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MEASUREMENT REPORT
FCC PART 15.407 802.11ax (OFDMA)

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
3/4-5/30/2023
Test Report Issue Date:
7/11/2023
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2304260059-13-R2.A3L

FCC ID:	**A3LSMF731JPN**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SC-54D
Additional Model(s):	SCG23
EUT Type:	Portable Handset
Frequency Range:	5180 – 5925MHz
Modulation Type:	OFDMA
FCC Equipment Class:	Unlicensed National Information Infrastructure TX (NII)
FCC Rule Part(s):	Part 15 Subpart E (15.407)
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02 v02r01, KDB 291074 D02 v01, KDB 648474 D03 v01r04, KDB 662911 D01 v02r01

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

Note: This revised Test Report (S/N: 1M2304260059-13-R2.A3L) 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 of it 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

ACCREDITED
CERT #2041.01

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UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	MIMO	
			Max. Power (mW)	Max. Power (dBm)
1	20	5180 - 5240	74.673	18.73
2A		5260 - 5320	79.165	18.99
2C		5500 - 5720	75.354	18.77
3		5745 - 5825	75.354	18.77
4		5845 - 5885	36.728	15.65
1	40	5190 - 5230	77.444	18.89
2A		5270 - 5310	74.945	18.75
2C		5510 - 5710	77.051	18.87
3		5755 - 5795	74.357	18.71
4		5835 - 5875	35.645	15.52
1	80	5210	78.445	18.95
2A		5290	76.305	18.83
2C		5530 - 5690	77.327	18.88
3		5775	77.327	18.88
4		5855	35.975	15.56
1/2A	160	5250	77.983	18.92
2C		5570	78.343	18.94
3/4		5815	35.975	15.56

EUT Overview

Note: The UNII Band 4 max power values shown in the above table are e.i.r.p values.

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 Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 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 Washington DC LLC facility is a registered (2451B) 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 **Samsung Portable Handset FCC ID: A3LSMF731JPN**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: 0084M, 0097M, 0091M, 0032M, 0096M, 0432M, 0164M, 0227M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n/ac/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

Band 1		Band 2A		Band 2C		Band 3		Band 3/4	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5180	52	5260	100	5500	149	5745	169	5845
:	:	:	:	:	:	:	:	:	:
40	5200	56	5280	120	5600	157	5785	173	5865
:	:	:	:	:	:	:	:	:	:
48	5240	64	5320	144	5720	165	5825	177	5885

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

Band 1		Band 2A		Band 2C		Band 3		Band 3/4	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510	151	5755	167	5835
:	:	:	:	:	:	:	:	:	:
46	5230	62	5310	118	5590	159	5795	175	5875
				:	:				
				142	5710				

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

Band 1		Band 2A		Band 2C		Band 3		Band 3/4	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
42	5210	58	5290	106	5530	155	5775	167	5835
				:	:				
				122	5610				
				:	:				
				138	5690				

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

Band 1/2A		Band 2C		Band 3/4	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
50	5250	114	5570	163	5815

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

Notes:

1. 5GHz 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) of 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:

Mode	Antenna	Bandwidth [MHz]	Tone	Duty Cycle
802.11ax NII RU 6E	MIMO	20	26T	99.4
			52T	99.3
			106T	99.3
			242T	99.3
		40	26T	99.2
			52T	99.4
			106T	99.3
			242T	99.3
			484T	99.3
		80	26T	99.1
			52T	99.3
			106T	98.9
			242T	99.2
			484T	99.3
			996T	99.3
		160 1st	26T	98.3
			52T	99.1
			106T	99.3
			242T	98.8
			484T	99.3
			996T	99.3
		160 2nd	26T	99.1
			52T	99.3
			106T	98.5
			242T	99.3
			484T	99.2
			996T	99.4
		160	2x996T	99.7

Table 2-5. Measured Duty Cycles

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

WiFi Configurations		SDM		CDD	
		ANT1	ANT2	ANT1	ANT2
5GHz	11ax (20MHz)	✓	✓	✓	✓
	11ax (40MHz)	✓	✓	✓	✓
	11ax (80MHz)	✓	✓	✓	✓
	11ax (160MHz)	✓	✓	✓	✓

Table 2-6. Frequency / Channel Operations

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

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

MCS Index	Spatial Stream	OFDMA (802.11ax)																					
		26T			52T			106T			242T			484T			996T			2x996T		
HE		0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI
0	1	0.9	0.8	0.8	1.8	1.7	1.5	3.8	3.5	3.2	8.6	8.1	7.3	17.2	16.3	14.6	36	34	30.6	72.1	68.1	61.3
1	1	1.8	1.7	1.5	3.5	3.3	3	7.5	7.1	6.4	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5
2	1	2.6	2.5	2.3	5.3	5	4.5	11.3	10.6	9.6	25.8	24.4	21.9	51.6	48.8	43.9	108.1	102.1	91.9	216.2	204.2	183.8
3	1	3.5	3.3	3	7.1	6.7	6	15	14.2	12.8	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245
4	1	5.3	5	4.5	10.6	10	9	22.5	21.3	19.1	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5
5	1	7.1	6.7	6	14.1	13.3	12	30	28.3	25.5	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490
6	1	7.9	7.5	6.8	15.9	15	13.5	33.8	31.9	28.7	77.4	73.1	65.8	154.9	146.3	131.6	324.3	306.3	275.6	648.5	612.5	551.3
7	1	8.8	8.3	7.5	17.6	16.7	15	37.5	35.4	31.9	86	81.3	73.1	172.1	162.5	146.3	360.3	340.3	306.3	720.6	680.6	612.5
8	1	10.6	10	9	21.2	20	18	45	42.5	38.3	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735
9	1	11.8	11.1	10	23.5	22.2	20	50	47.2	42.5	114.7	108.3	97.5	229.4	216.7	195	480.4	453.7	408.3	960.8	907.4	816.7
10	1	13.2	12.5	11.3	26.5	25	22.5	56.3	53.1	47.8	129	121.9	109.7	258.1	243.8	219.4	540.4	510.4	459.4	1080.9	1020.8	918.8
11	1	14.7	13.9	12.5	29.4	27.8	25	62.5	59	53.1	143.4	135.4	121.9	286.8	270.8	243.8	600.5	567.1	510.4	1201	1134.3	1020.8
0	2	1.8	1.7	1.5	3.5	3.3	3	7.5	7.1	6.4	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5
1	2	3.5	3.3	3	7.1	6.7	6	15	14.2	12.8	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245
2	2	5.3	5	4.5	10.6	10	9	22.5	21.3	19.1	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5
3	2	7.1	6.7	6	14.1	13.3	12	30	28.3	25.5	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490
4	2	10.6	10	9	21.2	20	18	45	42.5	38.3	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735
5	2	14.1	13.3	12	28.2	26.7	24	60	56.7	51	137.6	130	117	275.3	260	234	576.5	544.4	490	1152.9	1088.9	980
6	2	15.9	15	13.5	31.8	30	27	67.5	63.8	57.4	154.9	146.3	131.6	309.7	292.5	263.3	648.5	612.5	551.3	1297.1	1225	1102.5
7	2	17.6	16.7	15	35.3	33.3	30	75	70.8	63.8	172.1	162.5	146.3	344.1	325	292.5	720.6	680.6	612.5	1441.2	1361.1	1225
8	2	21.2	20	18	42.4	40	36	90	85	76.5	206.5	195	175.5	412.9	390	351	864.7	816.7	735	1729.4	1633.3	1470
9	2	23.5	22.2	20	47.1	44.4	40	100	94.4	85	229.4	216.7	195	458.8	433.3	390	960.8	907.4	816.7	1921.6	1814.8	1633.3
10	2	26.5	25	22.5	52.9	50	45	112.5	106.3	95.6	258.1	243.8	219.4	516.2	487.5	438.8	1080.9	1020.8	918.8	2161.8	2041.7	1837.5
11	2	29.4	27.8	25	58.8	55.6	50	125	118.1	106.3	286.8	270.8	243.8	573.5	541.7	487.5	1201	1134.3	1020.8	2402	2268.5	2041.7

Table 2-7. Supported Data Rates

2.3 Antenna Description

The following antenna gains were used for the testing.

Frequency [GHz]	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)	Directional Gain (dBi)
5.20	-4.49	-6.34	-2.36
5.30	-4.51	-5.72	-2.08
5.50	-5.66	-6.74	-3.17
5.80	-5.92	-7.38	-3.61
5.85	-5.78	-6.96	-3.34

Table 2-8. Antenna Peak Gain per Frequency

2.4 Test Configuration

ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 7.7 for AC line conducted emissions test setups, 7.6 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted emissions test setups.

This device supports three configurations: one is with screen open; one is where the screen is half open (90 degrees), and one is with the screen closed. All configurations are tested, and the worst case radiated emissions data is shown in this report.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.5 Software and Firmware

The test was conducted with software/firmware version F731USQU0AWD7 installed on the EUT.

2.6 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) was used in the measurement of the EUT**.**

Deviation from measurement procedure……..…….....None

3.2 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.

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.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

3.3 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 C63.10-2013. 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	1.13
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	NMLC-2	Line Conducted Emissions Cable (NM)	1/11/2023	Annual	1/11/2024	NMLC-2
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9203-2178
EMCO	3116	Horn Antenna (18-40GHz)	7/20/2021	Biennial	7/20/2023	9704-5182
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	8/18/2022	Annual	8/18/2023	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer	9/6/2022	Annual	9/6/2023	MY55410501
Keysight Technologies	N9038A	MXE EMI Receiver	1/21/2022	Annual	6/21/2023	MY51210133
Sunol Sciences	DRH-118	Horn (Small)	2/14/2022	Biennial	2/14/2024	A102416-2
Sunol Sciences	JB5	Bi-Log Antenna (30M-5GHz)	8/30/2022	Biennial	8/30/2024	A102416-1
Sunol Sciences	DRH-118	Horn Antenna (1-18GHz)	7/14/2021	Biennial	7/14/2023	A051107
Rohde & Schwarz	ESW26	ESW26 EMI Test Receiver	5/19/2022	Annual	5/19/2023	161675
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	9/21/2021	Annual	9/21/2023	310233

Table 6-1. Annual Test Equipment Calibration Schedule

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: Samsung Electronics Co., Ltd.
FCC ID: A3LSMF731JPN
FCC Classification: Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
N/A	RSS-Gen [6.7]	26dB Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
15.407(e)	RSS-Gen [6.7]	6dB Bandwidth	>500kHz (5725-5850MHz and 5850 – 5895MHz)		PASS	Section 7.3
15.407 (a)(1)(iv), (a)(2), (a)(3)	RSS-247 [6.2]	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.4
15.407 (a)(1)(iv), (a)(2), (a)(3)	RSS-247 [6.2]	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.5
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.407(b)(1), (b)(2), (b)(3), (b)(4)	RSS-247 [6.2]	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b) (RSS-247 [6.2])	RADIATED	PASS	Section 7.6
15.205, 15.407(b)(1), (b)(4), (b)(5), (b)(6)	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])		PASS	Section 7.6, 7.7

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 "UNII Automation," Version 4.7.
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 1.5.0.
6) 802.11ax OFDMA testing was performed for all signal tone configurations as specified by the 802.11ax standard. Worst case results are determined and reported per the guidance provided at the October 2018 TCB Workshop.
7) Only one RU index could be selected at a time, so no contiguous or non-contiguous RUs were considered for testing.

7.2 26dB Bandwidth Measurement

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 at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

The 26dB bandwidth is used to determine the conducted power limits.

Test Procedure Used

ANSI C63.10-2013 – Section 12.4

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

The 26dB Bandwidth measurement for each channel was measured with the RU index showing the highest conducted power.

MIMO 26dB Bandwidth Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	ax (20MHz)	26T	MCS0	17.22
	5200	40	ax (20MHz)	26T	MCS0	20.14
	5240	48	ax (20MHz)	26T	MCS0	19.64
	5190	38	ax (40MHz)	26T	MCS0	39.88
	5230	46	ax (40MHz)	26T	MCS0	39.49
	5210	42	ax (80MHz)	26T	MCS0	81.99
1/2A	5250	50	ax (160MHz)	26T	MCS0	162.20
Band 2A	5260	52	ax (20MHz)	26T	MCS0	18.37
	5280	56	ax (20MHz)	26T	MCS0	19.72
	5320	64	ax (20MHz)	26T	MCS0	19.95
	5270	54	ax (40MHz)	26T	MCS0	39.07
	5310	62	ax (40MHz)	26T	MCS0	40.00
	5290	58	ax (80MHz)	26T	MCS0	80.96
Band 2C	5500	100	ax (20MHz)	26T	MCS0	20.49
	5600	120	ax (20MHz)	26T	MCS0	19.68
	5720	144	ax (20MHz)	26T	MCS0	20.01
	5510	102	ax (40MHz)	26T	MCS0	38.04
	5590	118	ax (40MHz)	26T	MCS0	39.72
	5710	142	ax (40MHz)	26T	MCS0	39.72
	5530	106	ax (80MHz)	26T	MCS0	80.71
	5610	122	ax (80MHz)	26T	MCS0	80.89
	5690	138	ax (80MHz)	26T	MCS0	80.36
	5570	114	ax (160MHz)	26T	MCS0	162.60

Table 7-2. Bands 1, 2A, 2C Conducted 26dB Bandwidth Measurements MIMO ANT1 (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	ax (20MHz)	26T	MCS0	20.30
	5200	40	ax (20MHz)	26T	MCS0	20.14
	5240	48	ax (20MHz)	26T	MCS0	18.23
	5190	38	ax (40MHz)	26T	MCS0	39.85
	5230	46	ax (40MHz)	26T	MCS0	39.72
	5210	42	ax (80MHz)	26T	MCS0	80.96
1/2A	5250	50	ax (160MHz)	26T	MCS0	162.90
Band 2A	5260	52	ax (20MHz)	26T	MCS0	19.94
	5280	56	ax (20MHz)	26T	MCS0	17.83
	5320	64	ax (20MHz)	26T	MCS0	20.01
	5270	54	ax (40MHz)	26T	MCS0	39.72
	5310	62	ax (40MHz)	26T	MCS0	38.07
	5290	58	ax (80MHz)	26T	MCS0	80.81
Band 2C	5500	100	ax (20MHz)	26T	MCS0	16.78
	5600	120	ax (20MHz)	26T	MCS0	20.25
	5720	144	ax (20MHz)	26T	MCS0	20.15
	5510	102	ax (40MHz)	26T	MCS0	38.05
	5590	118	ax (40MHz)	26T	MCS0	38.33
	5710	142	ax (40MHz)	26T	MCS0	34.92
	5530	106	ax (80MHz)	26T	MCS0	82.71
	5610	122	ax (80MHz)	26T	MCS0	81.16
	5690	138	ax (80MHz)	26T	MCS0	70.79
	5570	114	ax (160MHz)	26T	MCS0	162.20

Table 7-3. Bands 1, 2A, 2C Conducted 26dB Bandwidth Measurements MIMO ANT2 (26 Tones)

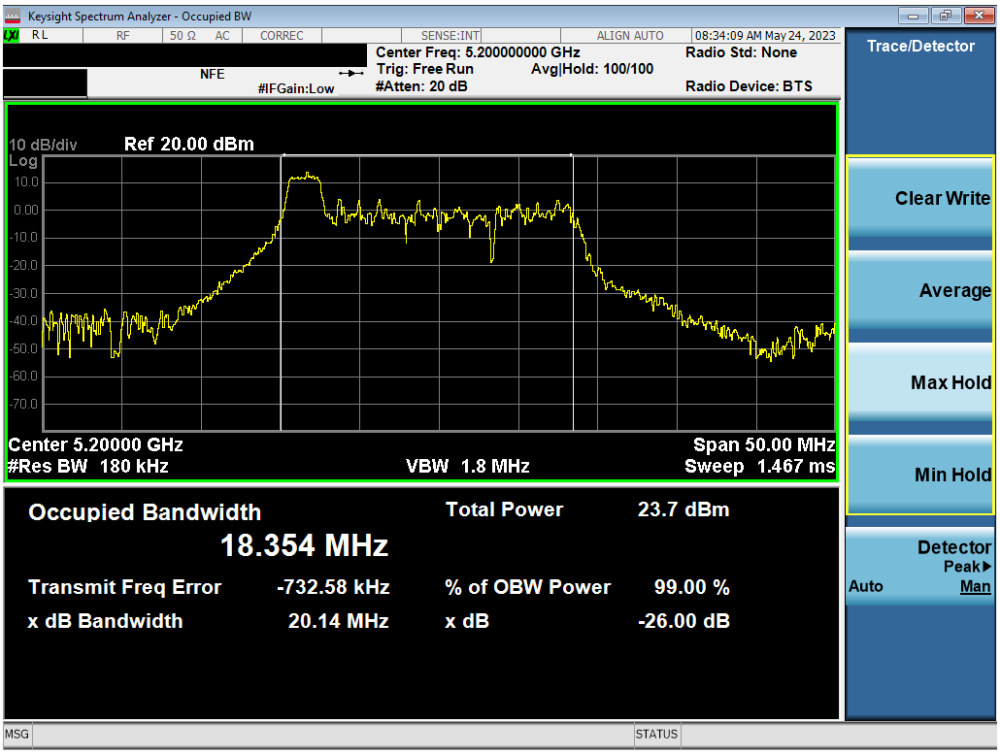
	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	ax (20MHz)	242T	MCS0	22.00
	5200	40	ax (20MHz)	242T	MCS0	22.39
	5240	48	ax (20MHz)	242T	MCS0	22.47
	5190	38	ax (40MHz)	484T	MCS0	44.70
	5230	46	ax (40MHz)	484T	MCS0	43.69
	5210	42	ax (80MHz)	996T	MCS0	87.52
Band 1/2A	5250	50	ax (160MHz)	2x996T	MCS0	162.40
Band 2A	5260	52	ax (20MHz)	242T	MCS0	22.07
	5280	56	ax (20MHz)	242T	MCS0	22.06
	5320	64	ax (20MHz)	242T	MCS0	22.00
	5270	54	ax (40MHz)	484T	MCS0	44.19
	5310	62	ax (40MHz)	484T	MCS0	44.53
	5290	58	ax (80MHz)	996T	MCS0	89.12
Band 2C	5500	100	ax (20MHz)	242T	MCS0	21.68
	5600	120	ax (20MHz)	242T	MCS0	22.72
	5720	144	ax (20MHz)	242T	MCS0	22.71
	5510	102	ax (40MHz)	484T	MCS0	44.58
	5590	118	ax (40MHz)	484T	MCS0	44.79
	5710	142	ax (40MHz)	484T	MCS0	44.64
	5530	106	ax (80MHz)	996T	MCS0	87.31
	5610	122	ax (80MHz)	996T	MCS0	90.84
	5690	138	ax (80MHz)	996T	MCS0	86.13
	5570	114	ax (160MHz)	2x996T	MCS0	163.20

Table 7-4. Bands 1, 2A, 2C Conducted 26dB Bandwidth Measurements MIMO ANT1 (Full Tones)

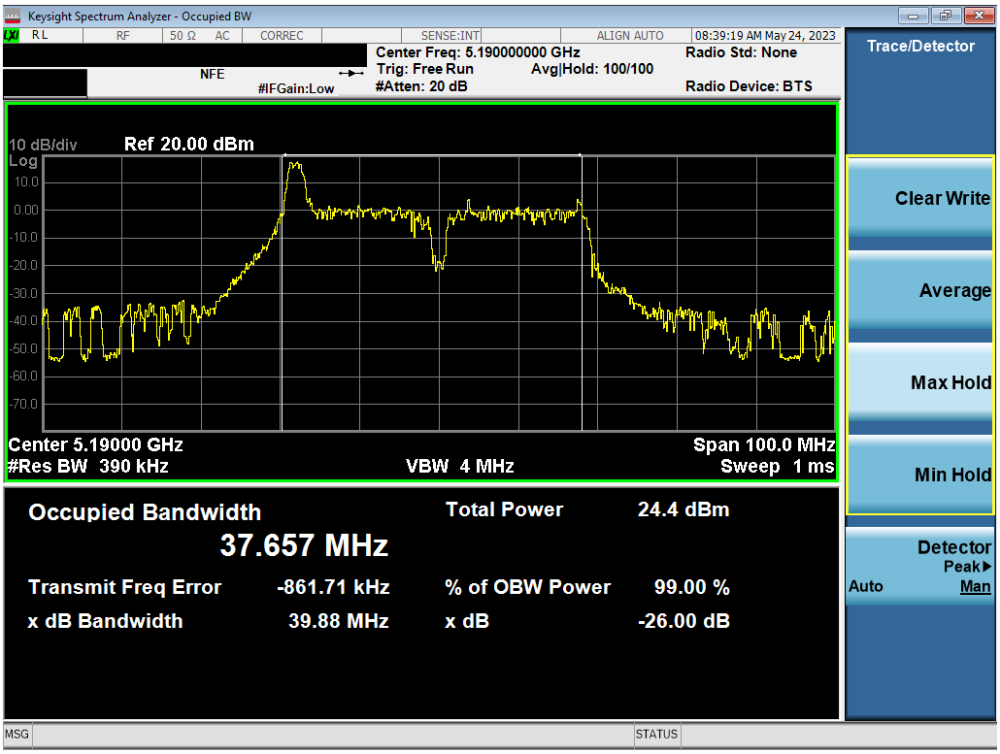
	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	ax (20MHz)	242T	MCS0	21.91
	5200	40	ax (20MHz)	242T	MCS0	21.75
	5240	48	ax (20MHz)	242T	MCS0	21.97
	5190	38	ax (40MHz)	484T	MCS0	44.44
	5230	46	ax (40MHz)	484T	MCS0	42.72
	5210	42	ax (80MHz)	996T	MCS0	87.38
	5250	50	ax (160MHz)	2x996T	MCS0	162.50
Band 2A	5260	52	ax (20MHz)	242T	MCS0	22.21
	5280	56	ax (20MHz)	242T	MCS0	21.77
	5320	64	ax (20MHz)	242T	MCS0	22.73
	5270	54	ax (40MHz)	484T	MCS0	43.22
	5310	62	ax (40MHz)	484T	MCS0	43.48
	5290	58	ax (80MHz)	996T	MCS0	88.35
Band 2C	5500	100	ax (20MHz)	242T	MCS0	29.56
	5600	120	ax (20MHz)	242T	MCS0	21.85
	5720	144	ax (20MHz)	242T	MCS0	26.42
	5510	102	ax (40MHz)	484T	MCS0	45.76
	5590	118	ax (40MHz)	484T	MCS0	45.11
	5710	142	ax (40MHz)	484T	MCS0	42.81
	5530	106	ax (80MHz)	996T	MCS0	86.26
	5610	122	ax (80MHz)	996T	MCS0	86.23
	5690	138	ax (80MHz)	996T	MCS0	86.14
	5570	114	ax (160MHz)	2x996T	MCS0	162.30

Table 7-5. Bands 1, 2A, 2C Conducted 26dB Bandwidth Measurements MIMO ANT2 (Full Tones)

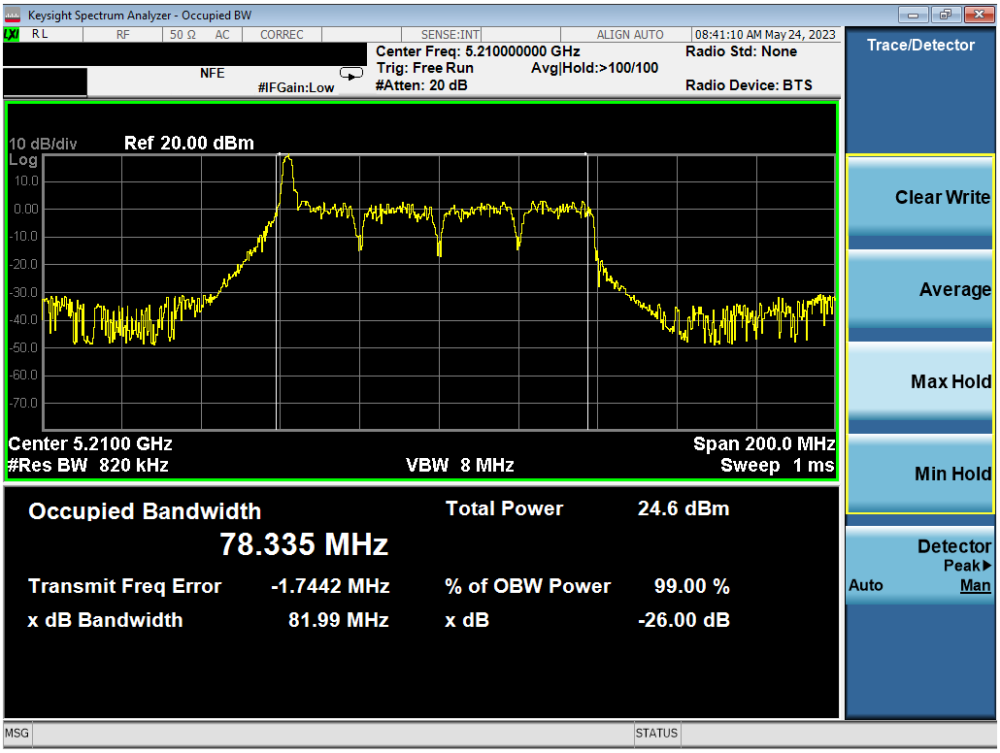
7.2.1 MIMO Antenna-1 26dB Bandwidth Measurements



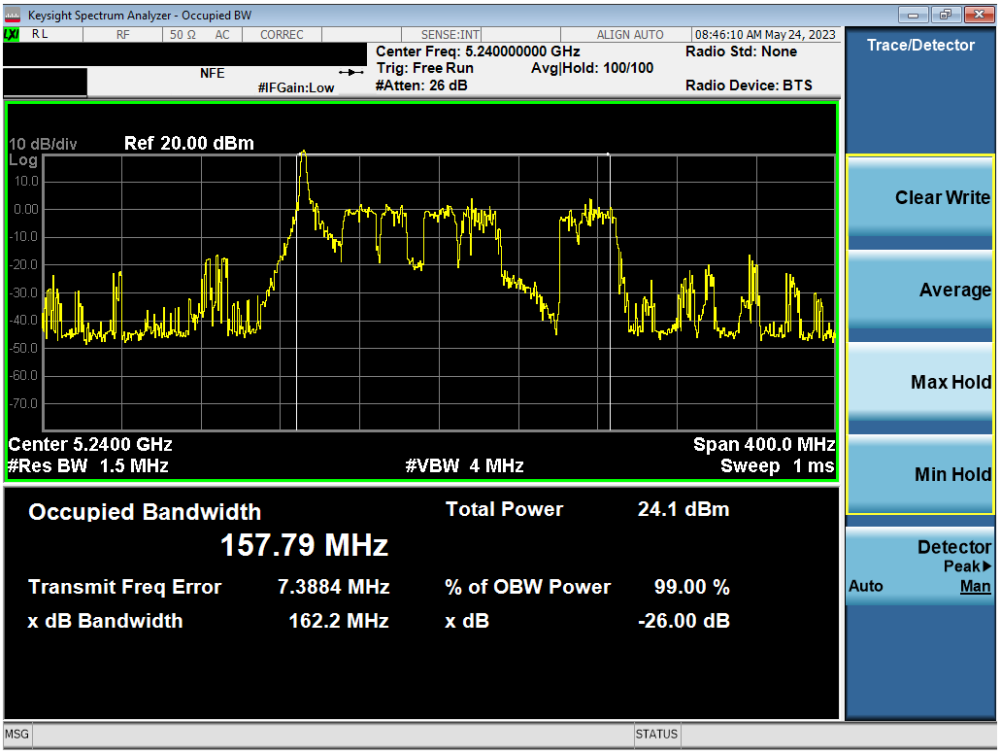
Plot 7-1. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 40)



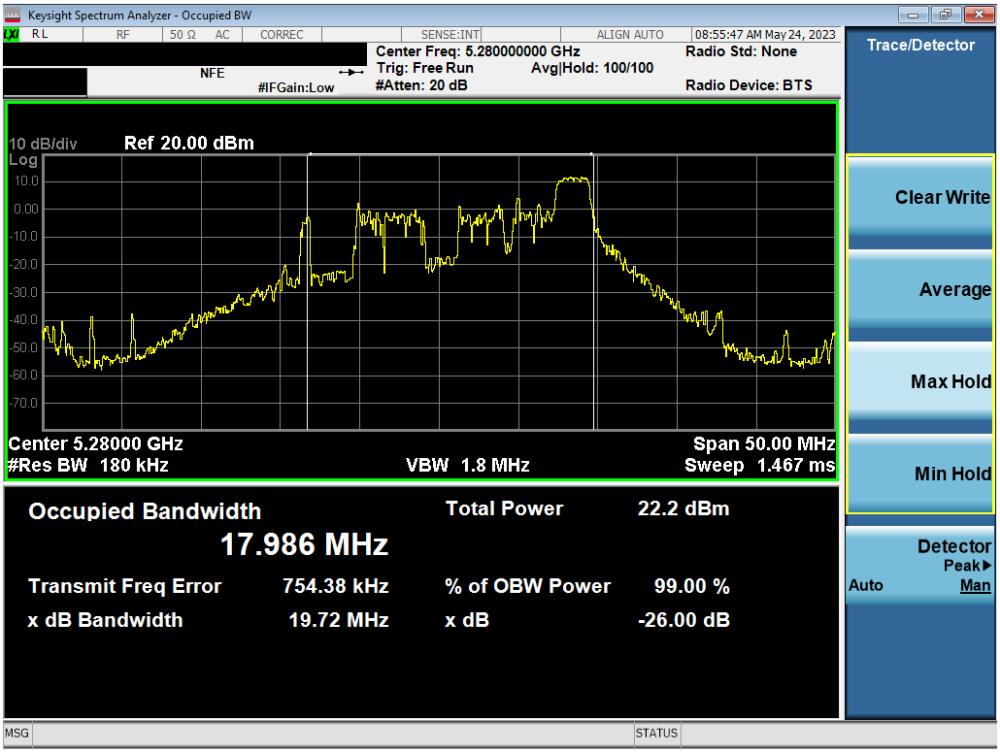
Plot 7-2. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 38)



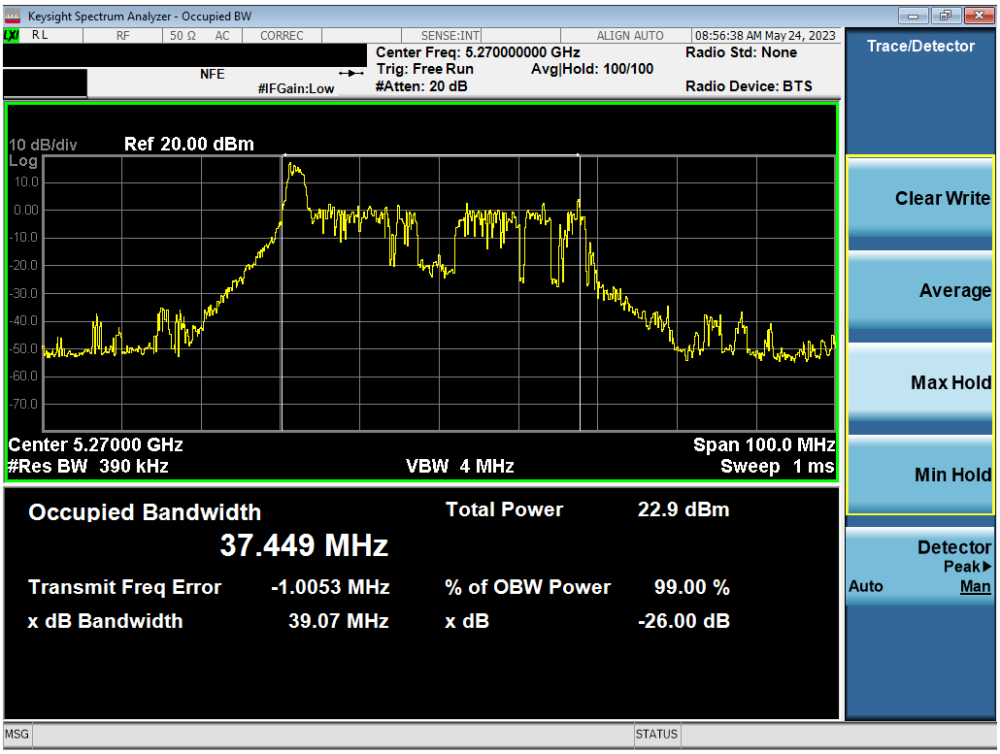
Plot 7-3. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 42)



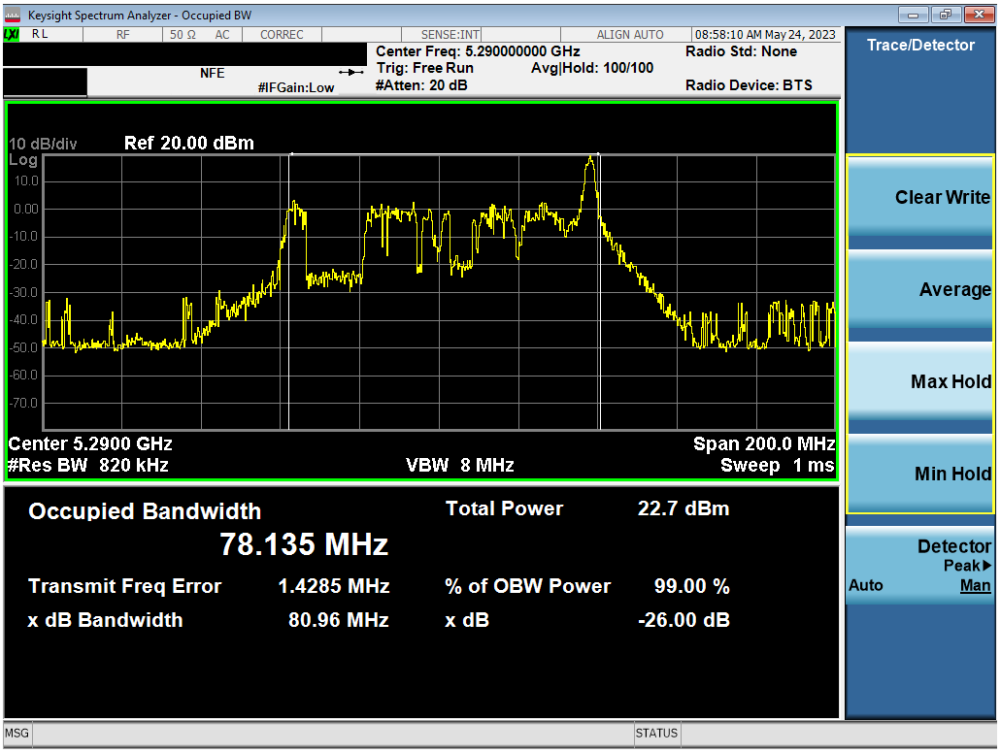
Plot 7-4. 26dB Bandwidth Plot MIMO ANT1 (160MHz(L) BW 802.11ax – 26 Tones (UNII Band 1/2A) – Ch. 50)



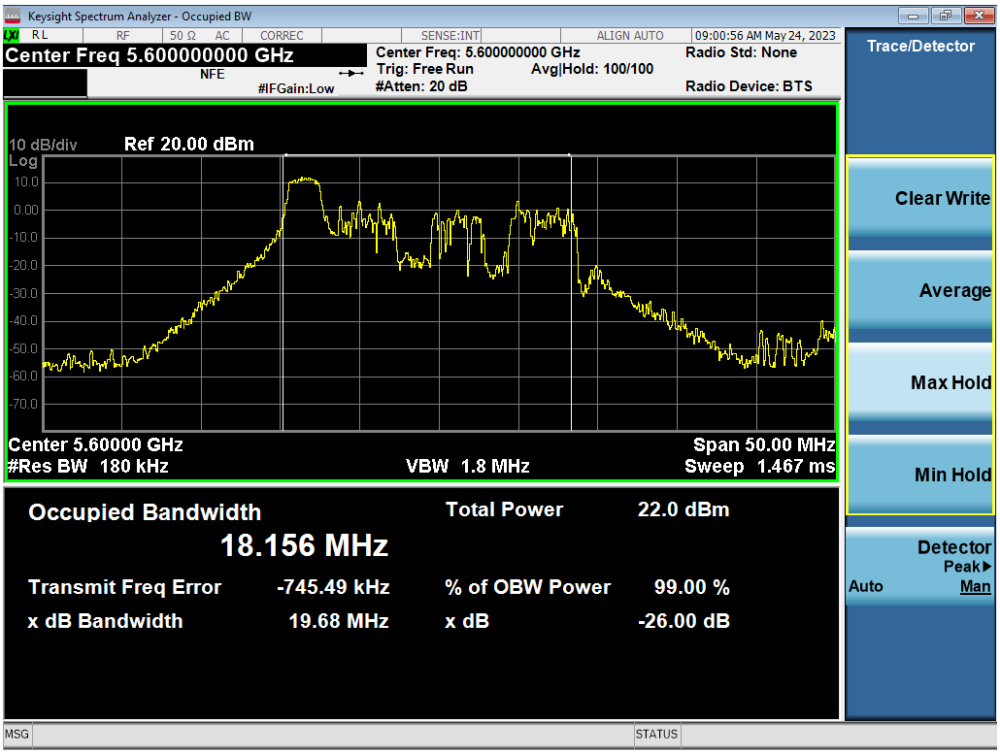
Plot 7-5. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 56)



Plot 7-6. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 54)

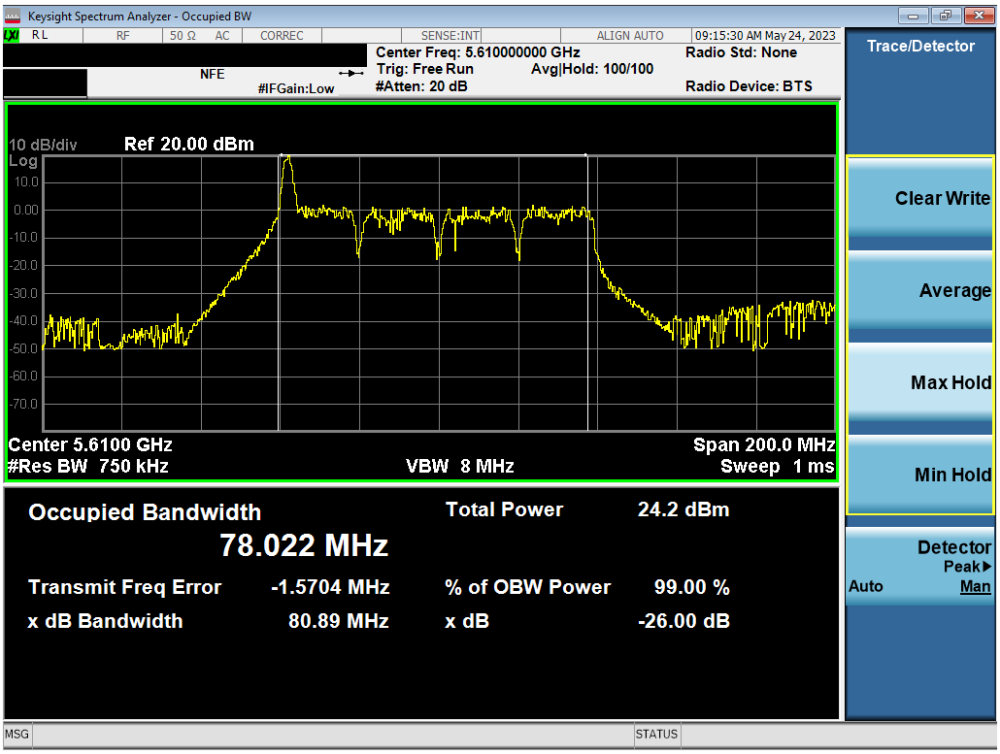


Plot 7-7. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 58)

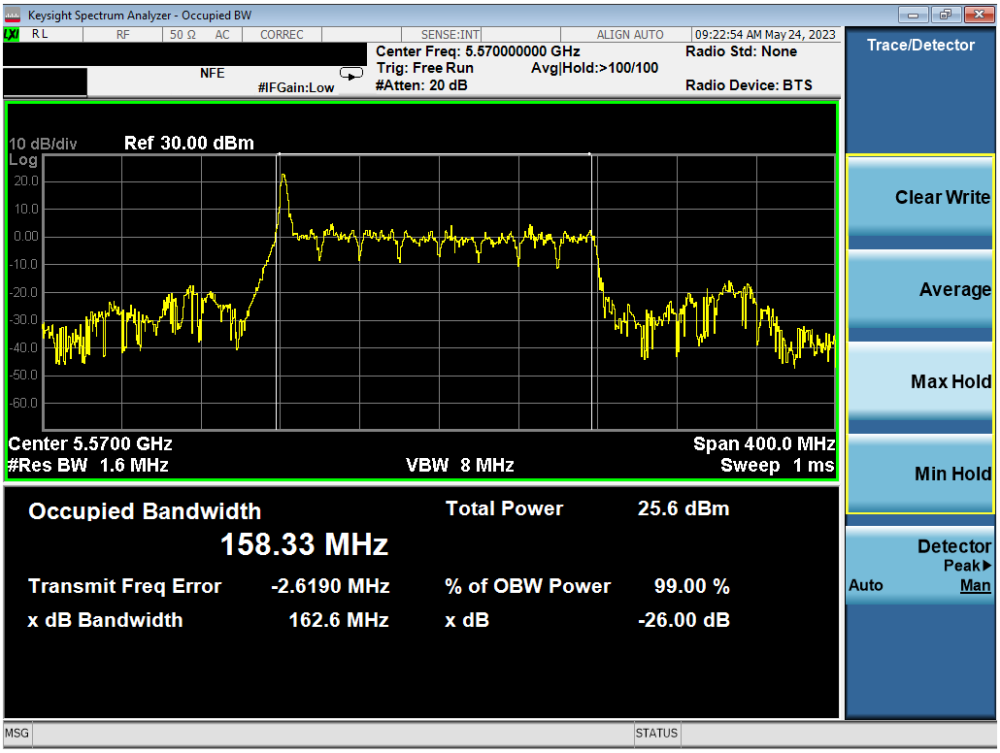


Plot 7-8. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 120)

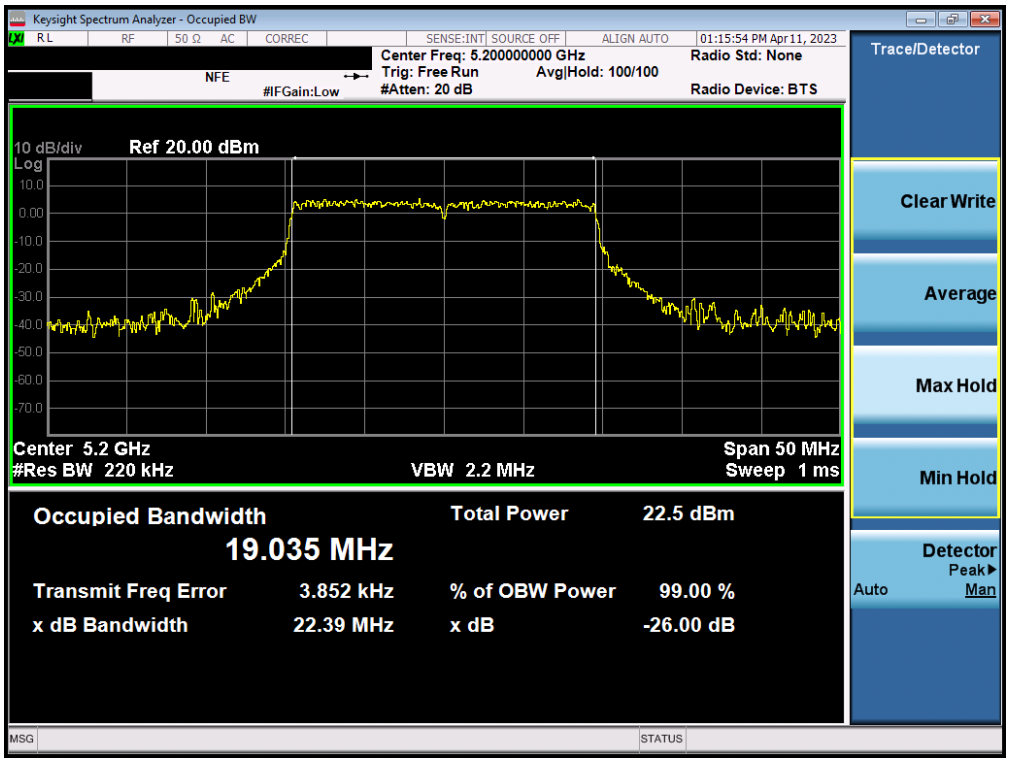
Plot 7-9. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 118)



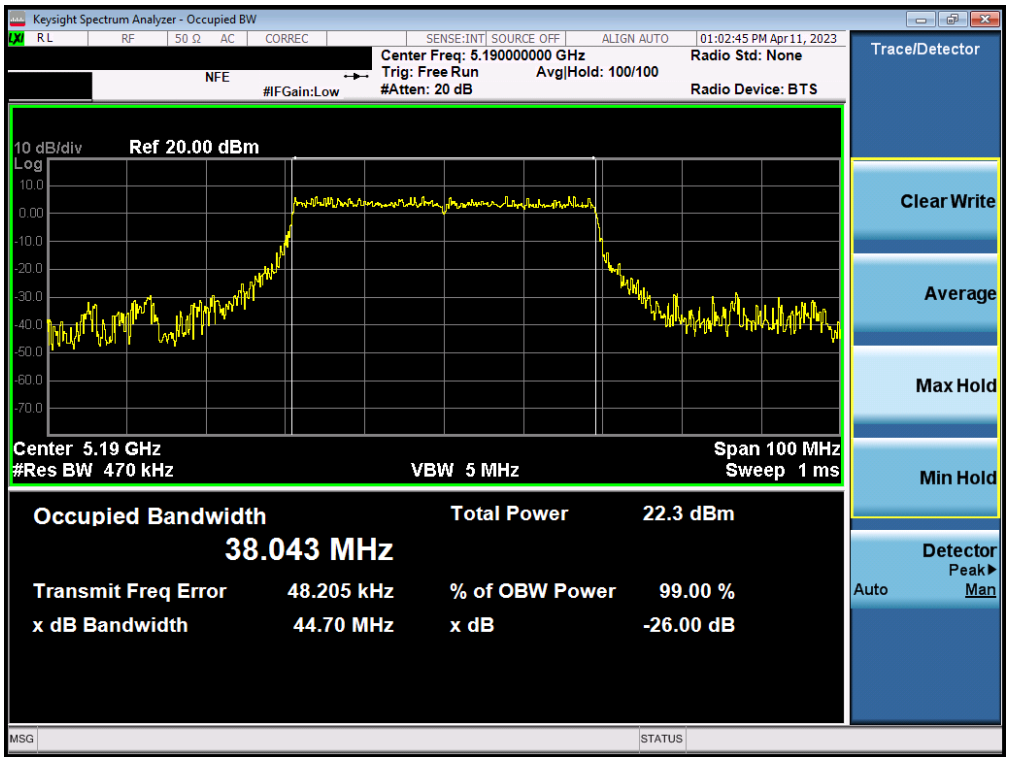
Plot 7-10. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 122)



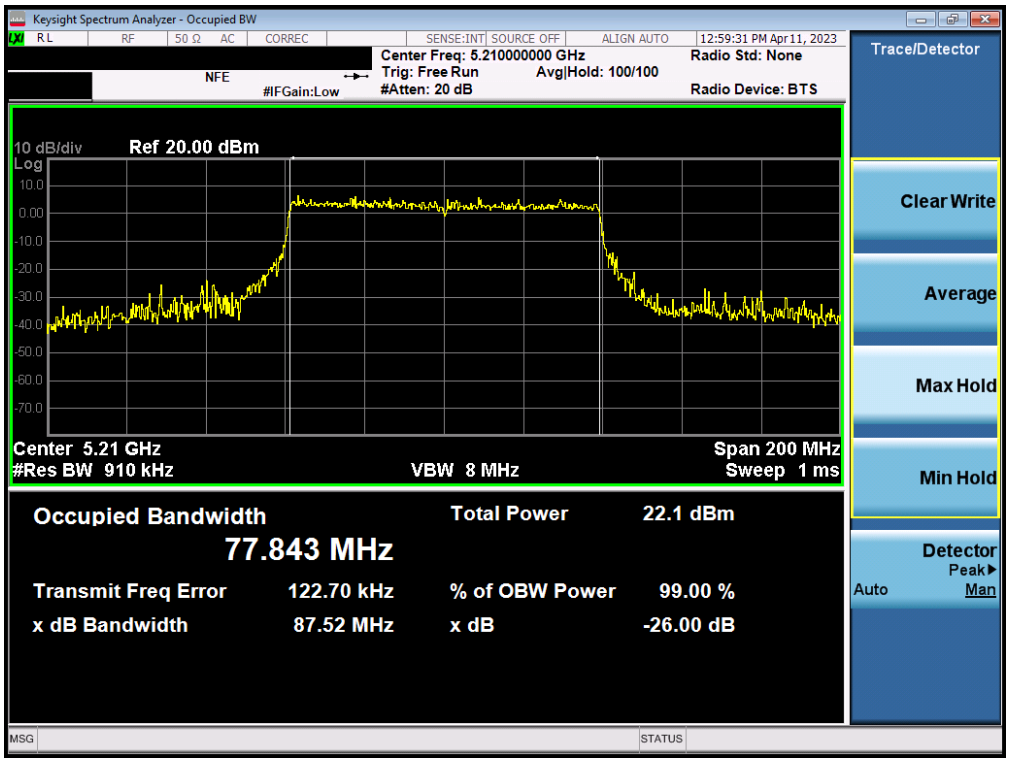
Plot 7-11. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 114)



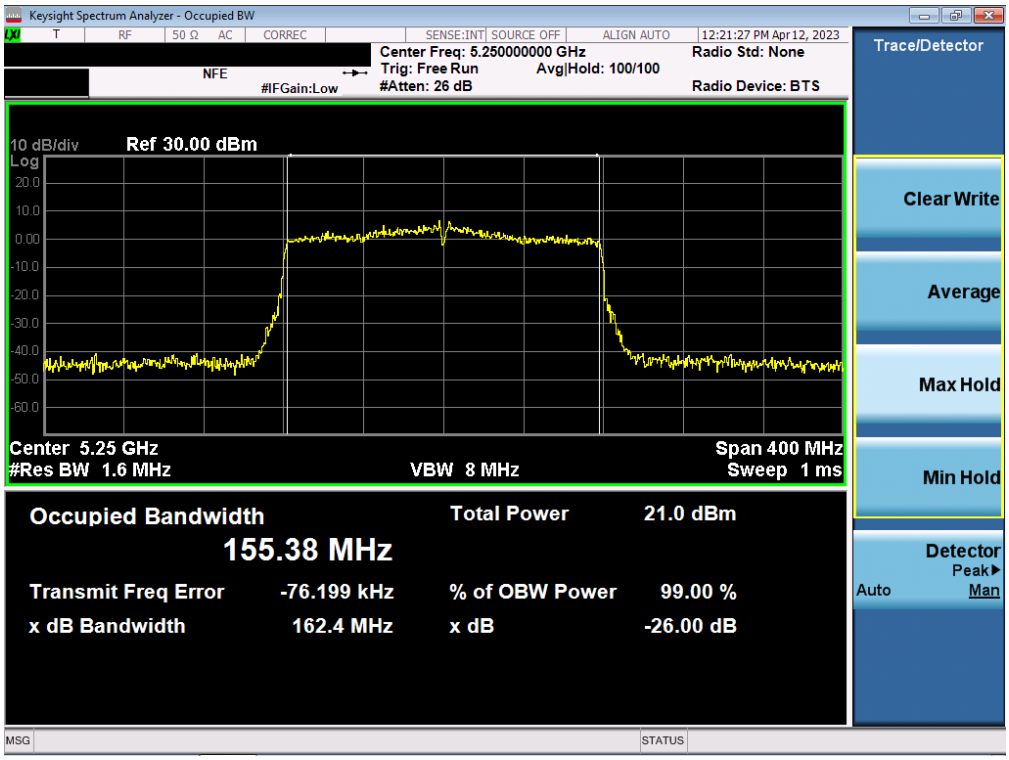
Plot 7-12. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 242 Tones (UNII Band 1) – Ch. 40)



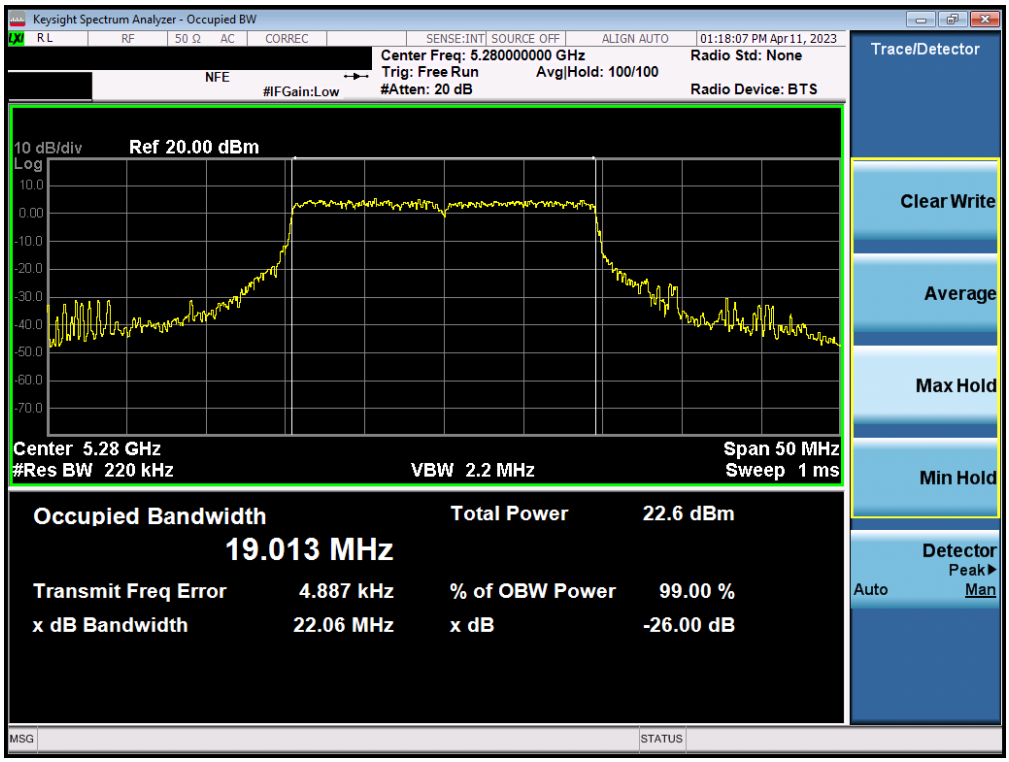
Plot 7-13. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 484 Tones (UNII Band 1) – Ch. 38)



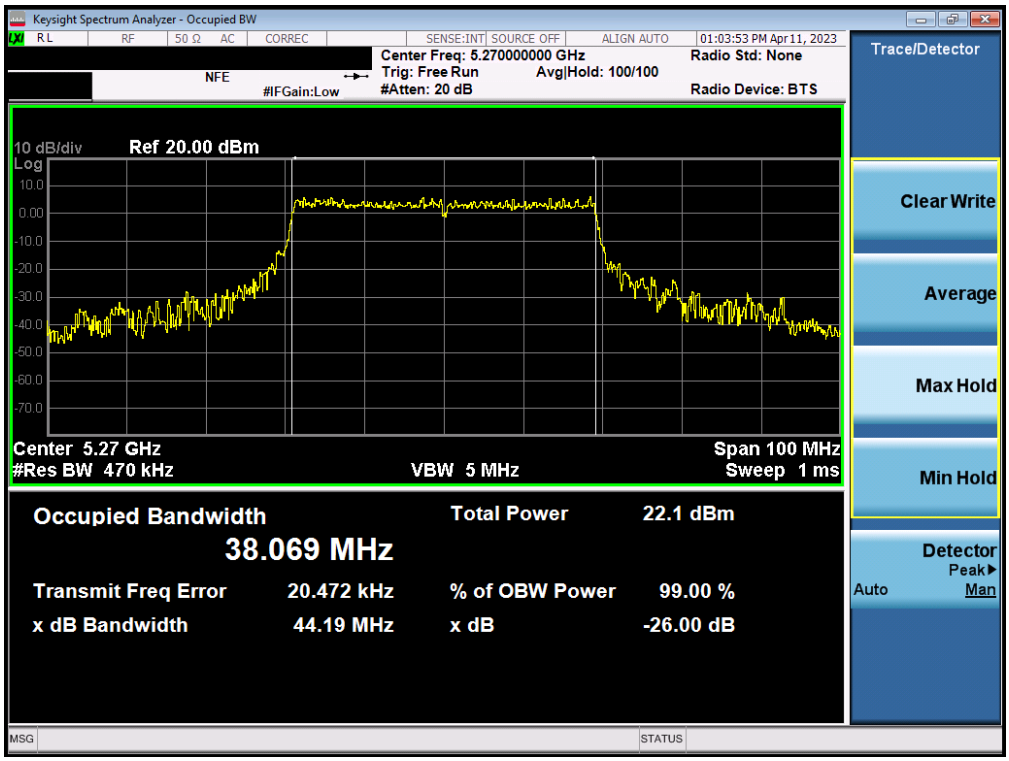
Plot 7-14. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 996 Tones (UNII Band 1) – Ch. 42)



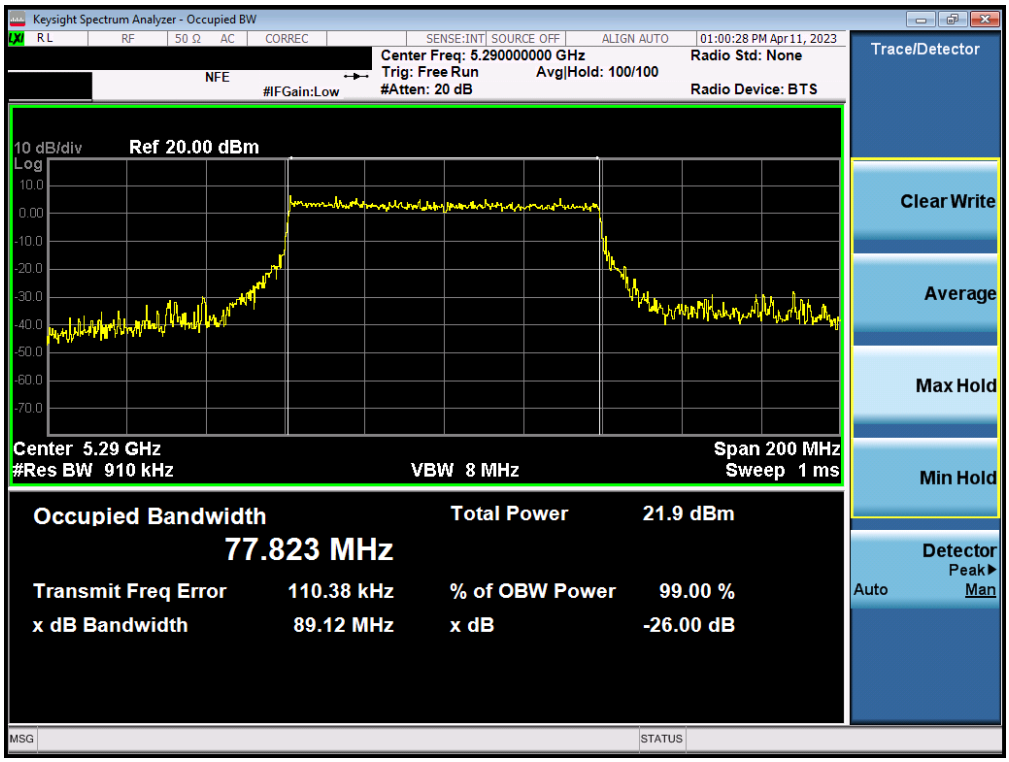
Plot 7-15. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax – 2x996 Tones (UNII Band 1/2A) – Ch. 50)



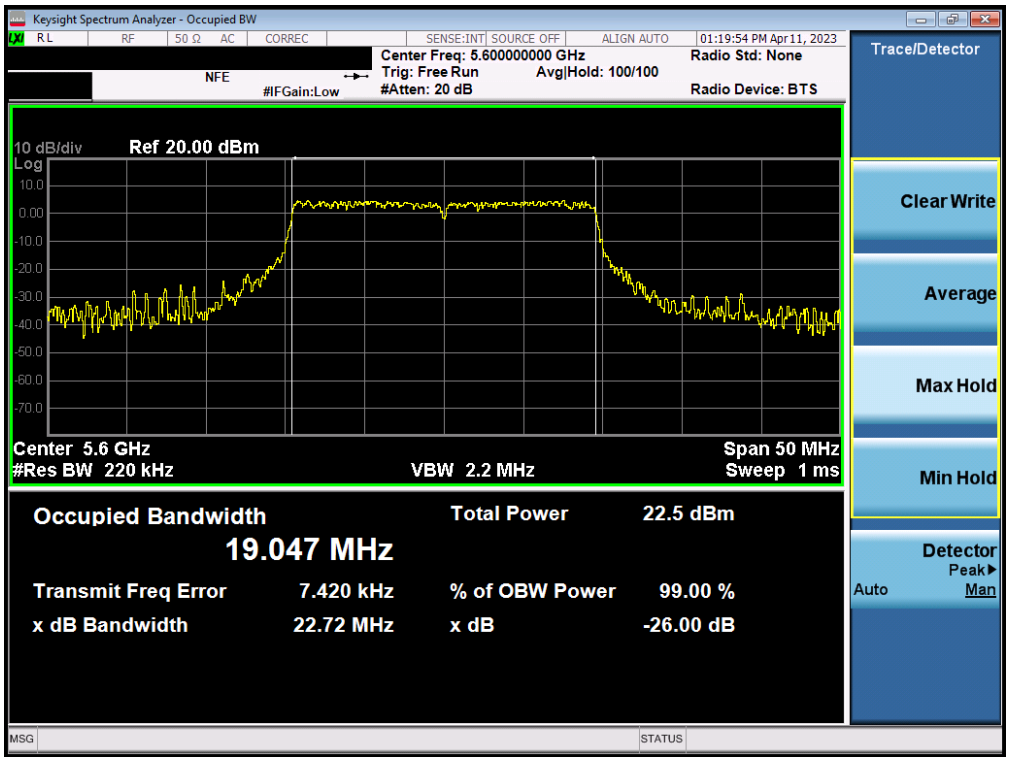
Plot 7-16. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 242 Tones (UNII Band 2A) – Ch. 56)



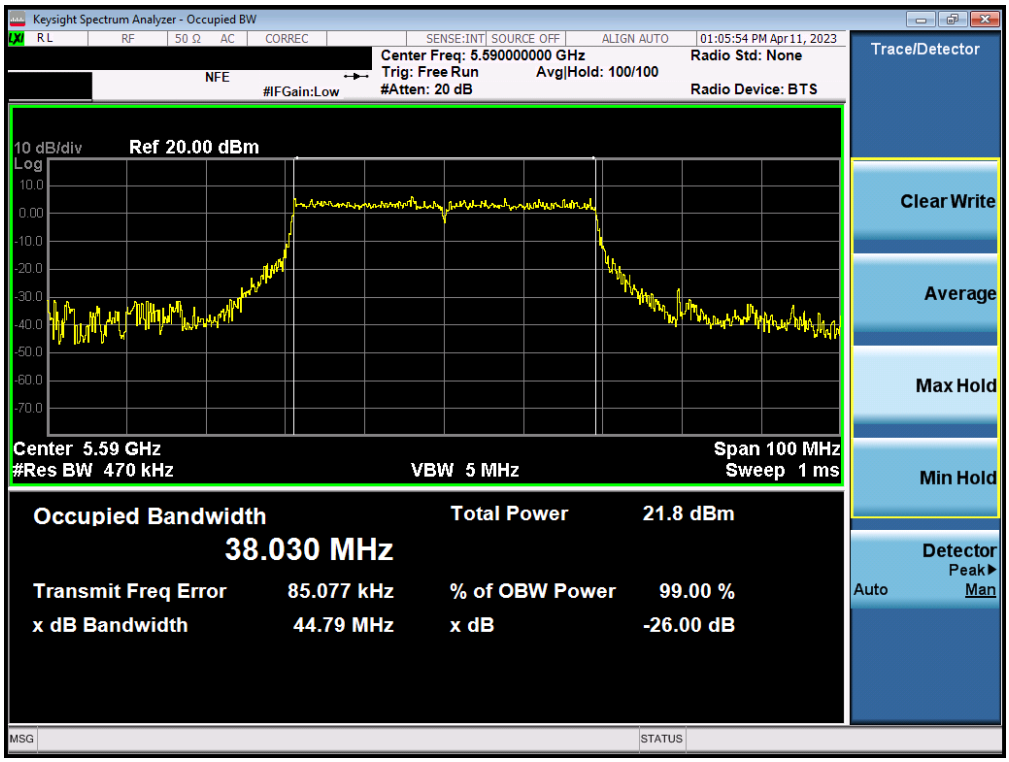
Plot 7-17. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 484 Tones (UNII Band 2A) – Ch. 54)



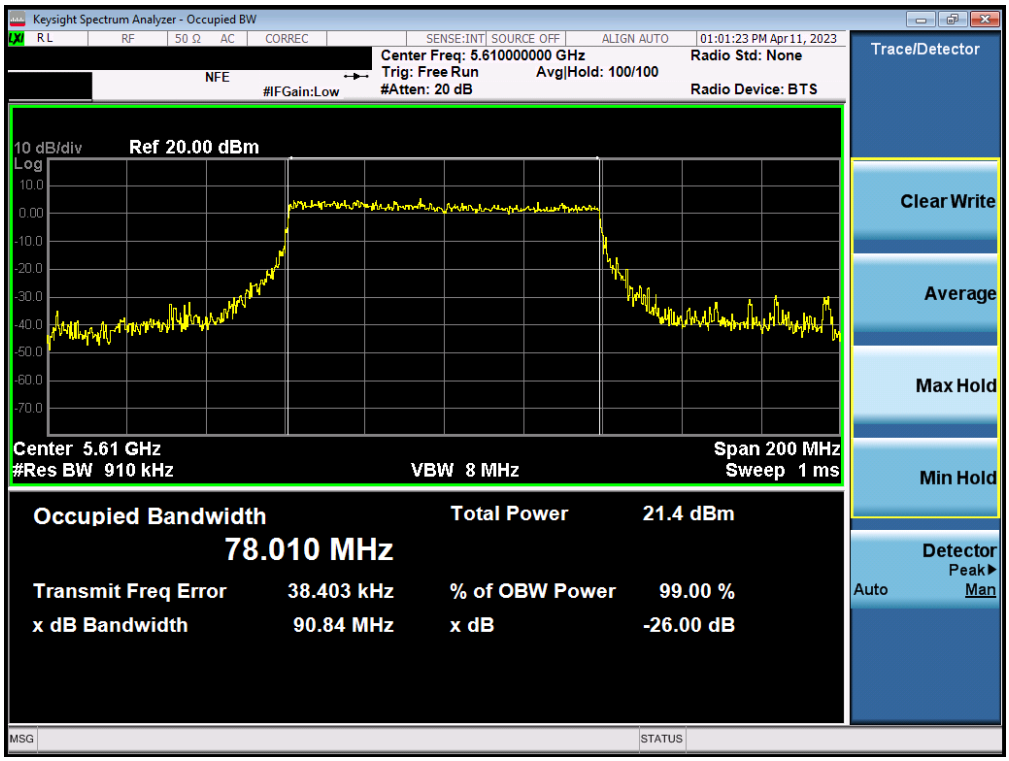
Plot 7-18. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 996 Tones (UNII Band 2A) – Ch. 58)



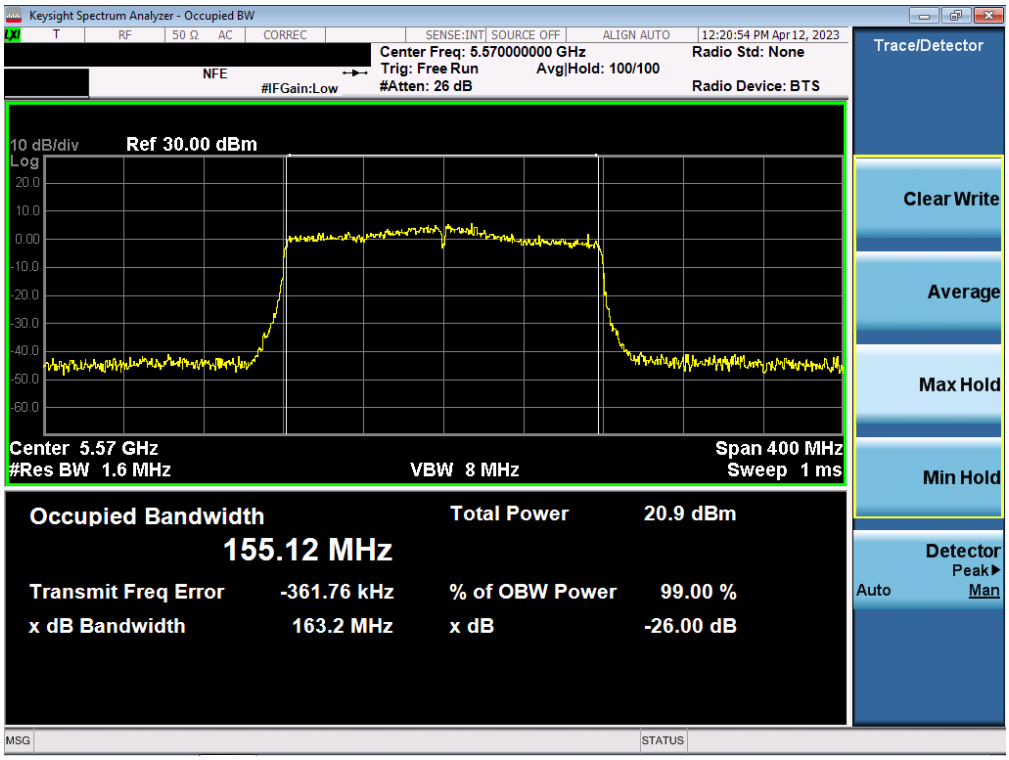
Plot 7-19. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 242 Tones (UNII Band 2C) – Ch. 120)



Plot 7-20. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 484 Tones (UNII Band 2C) – Ch. 118)

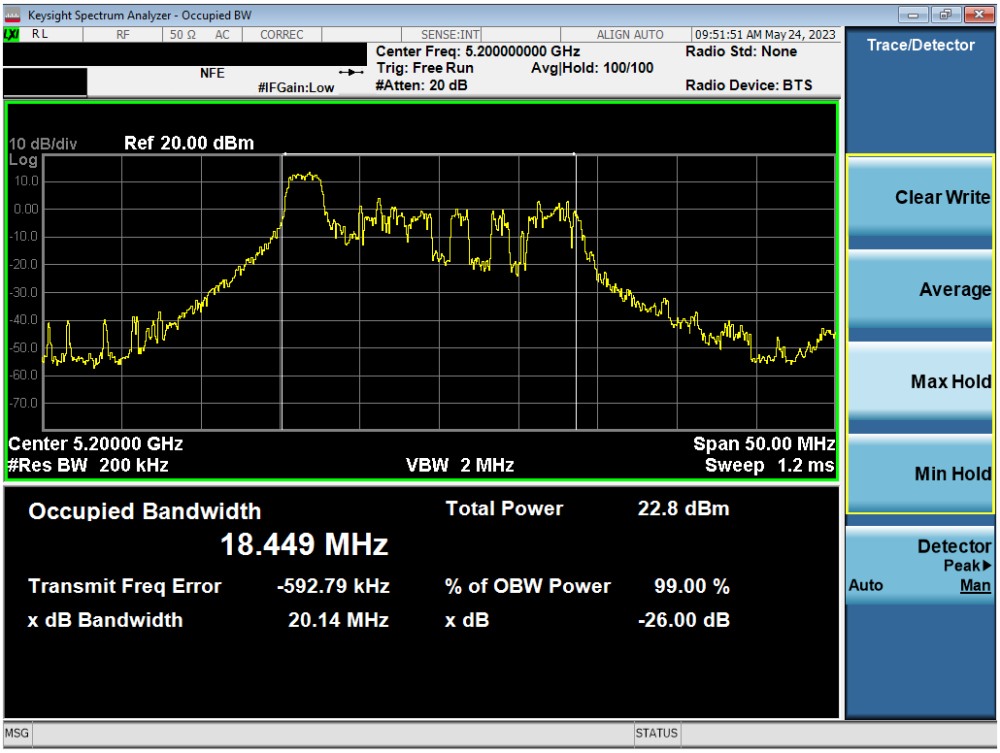


Plot 7-21. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 996 Tones (UNII Band 2C) – Ch. 122)

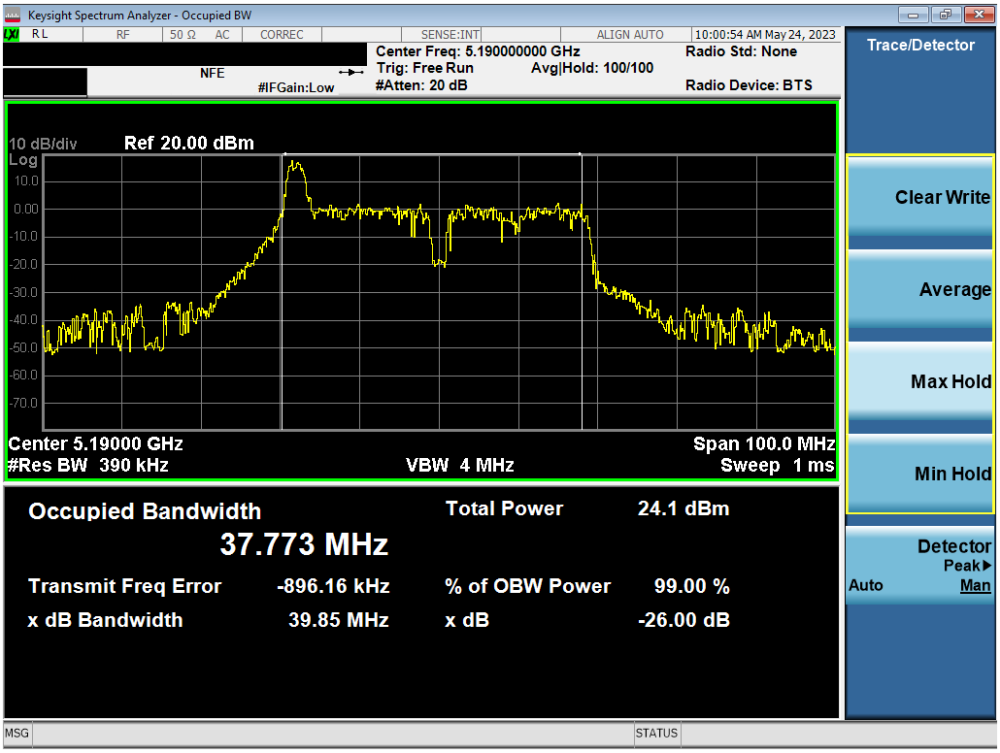


Plot 7-22. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax – 2x996 Tones (UNII Band 2C) – Ch. 114)

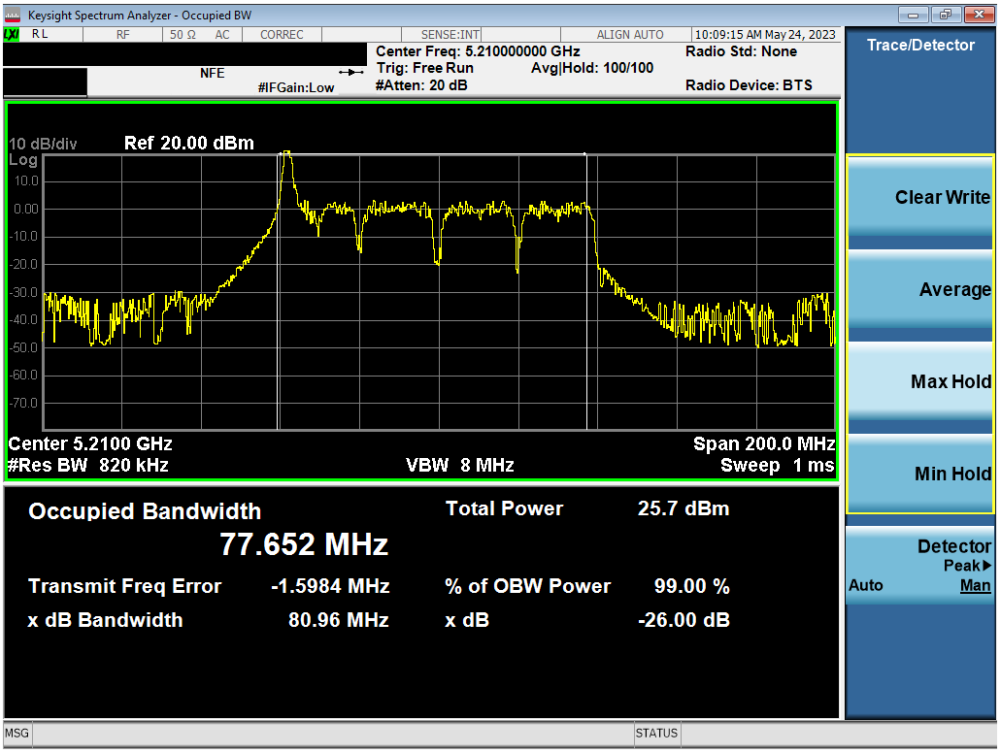
7.2.2 MIMO Antenna-2 26dB Bandwidth Measurements



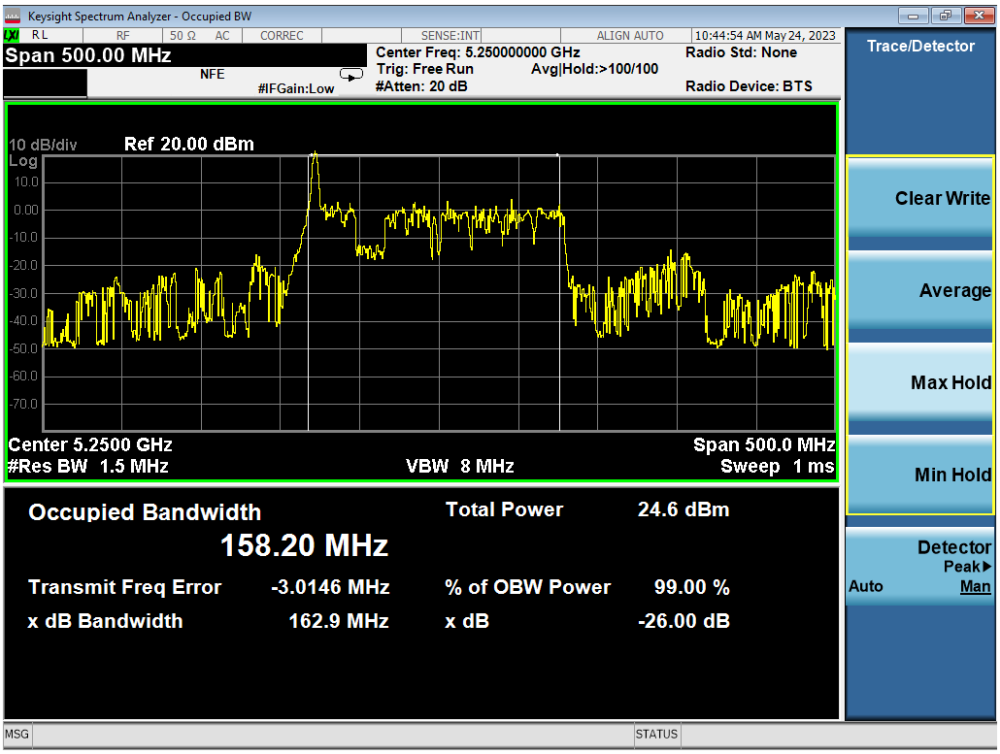
Plot 7-23. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 40)



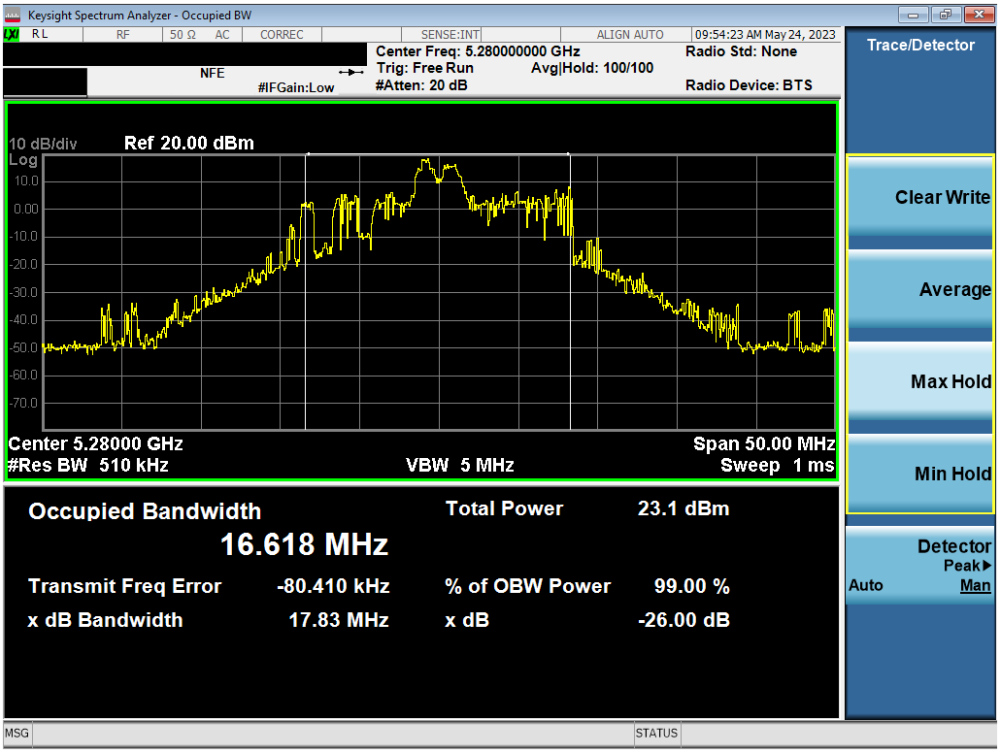
Plot 7-24. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 38)



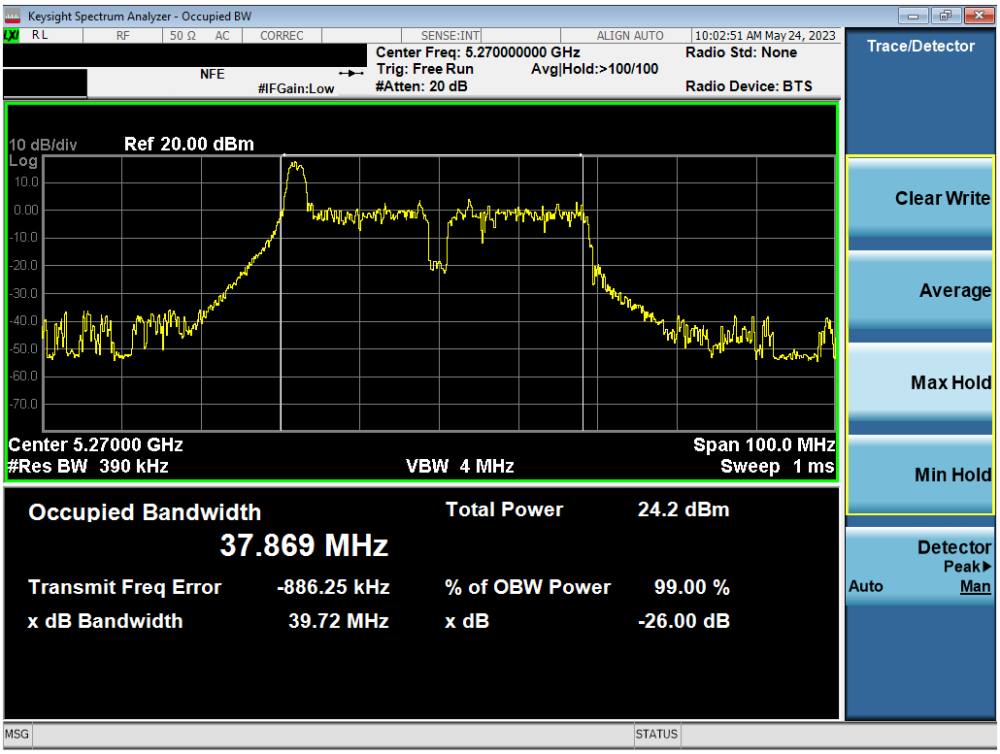
Plot 7-25. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 42)



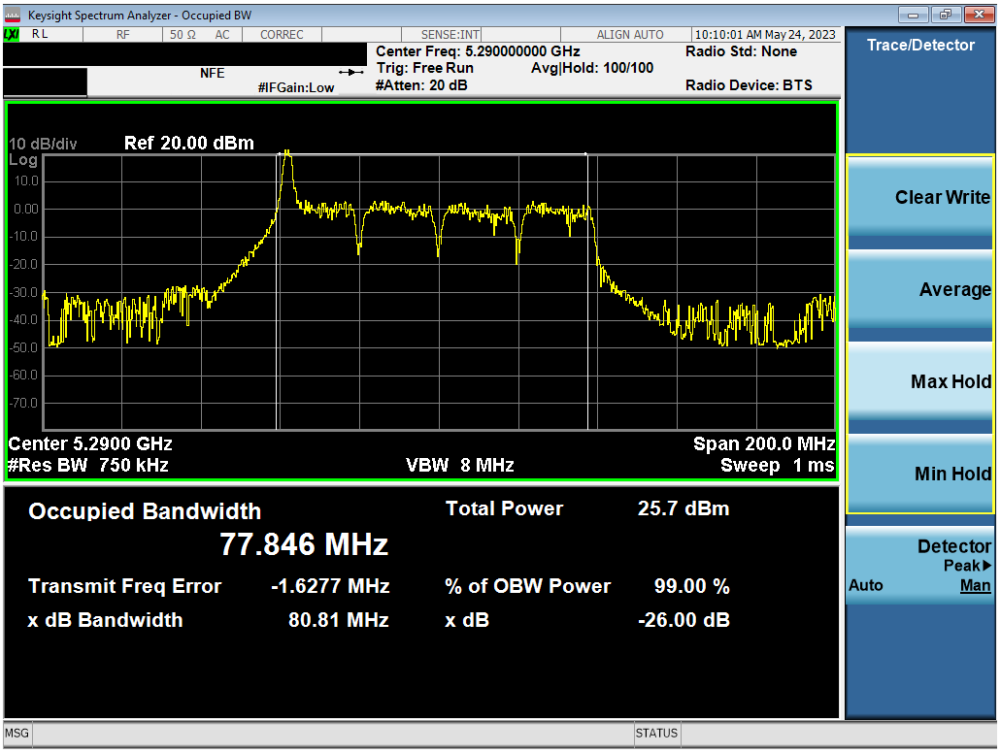
Plot 7-26. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax – 26 Tones (UNII Band 1/2A) – Ch. 50)



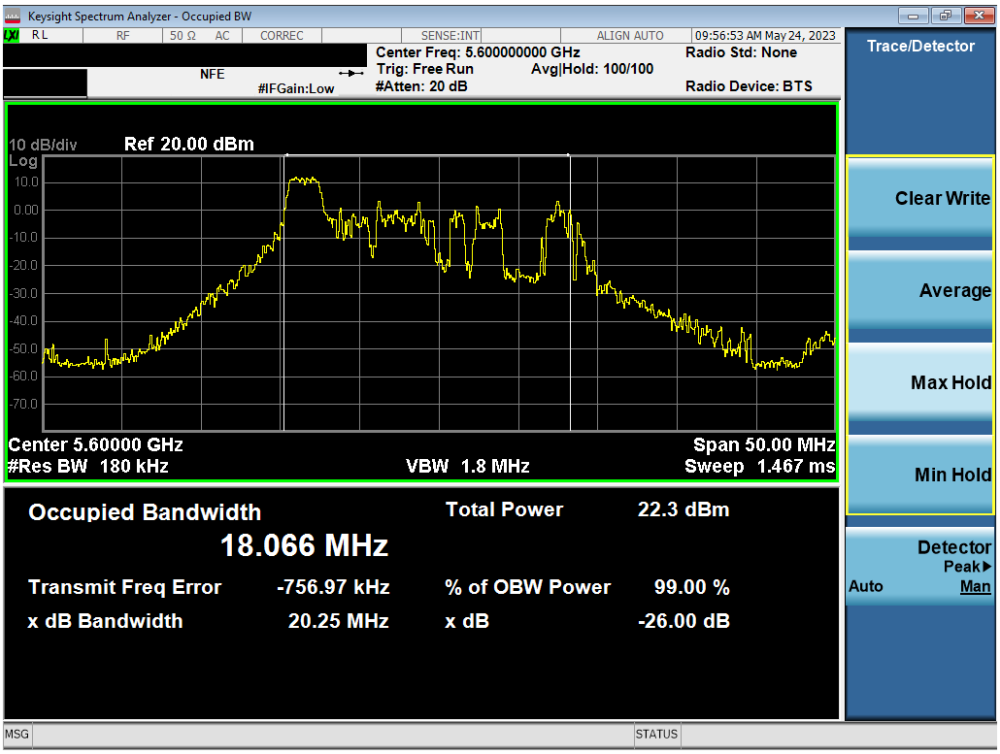
Plot 7-27. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 56)



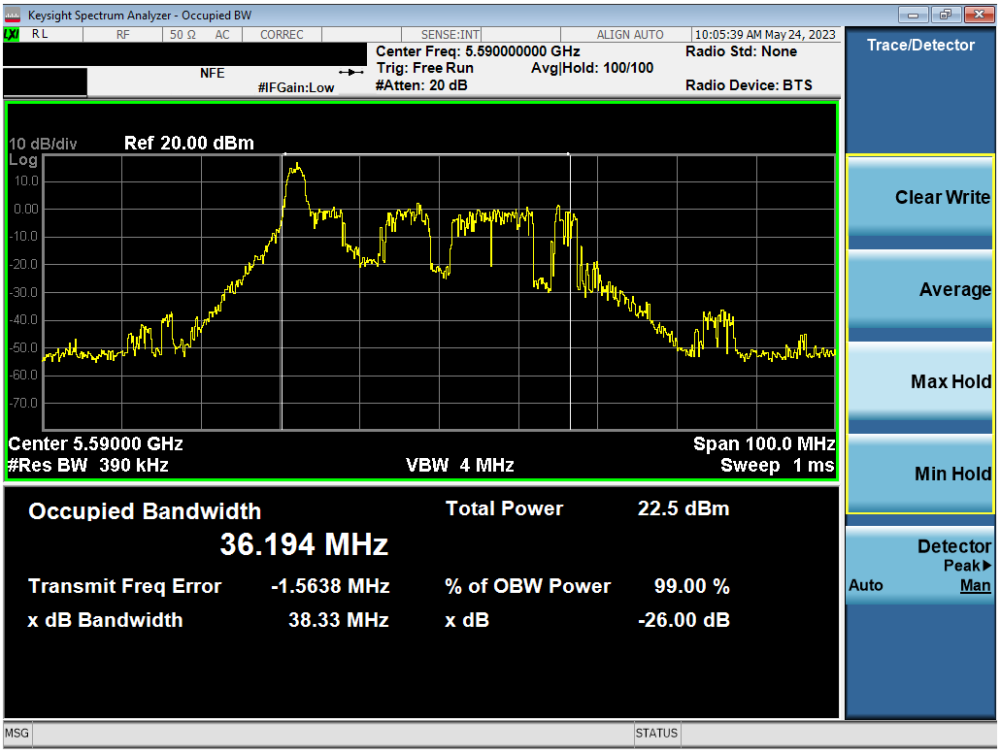
Plot 7-28. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 54)



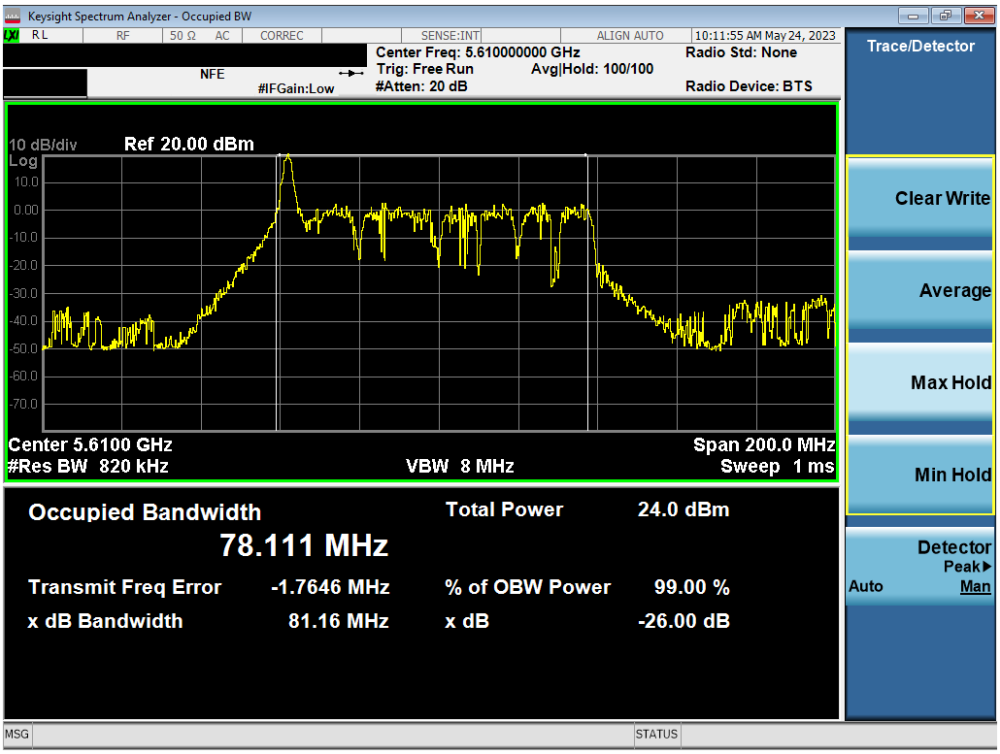
Plot 7-29. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 58)



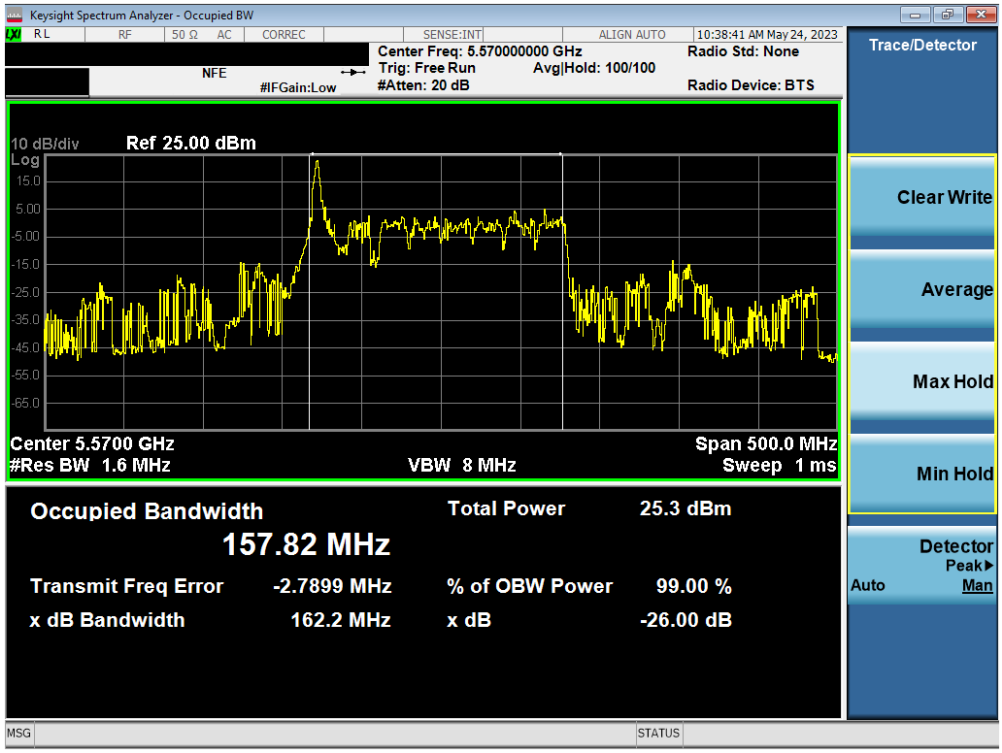
Plot 7-30. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 120)



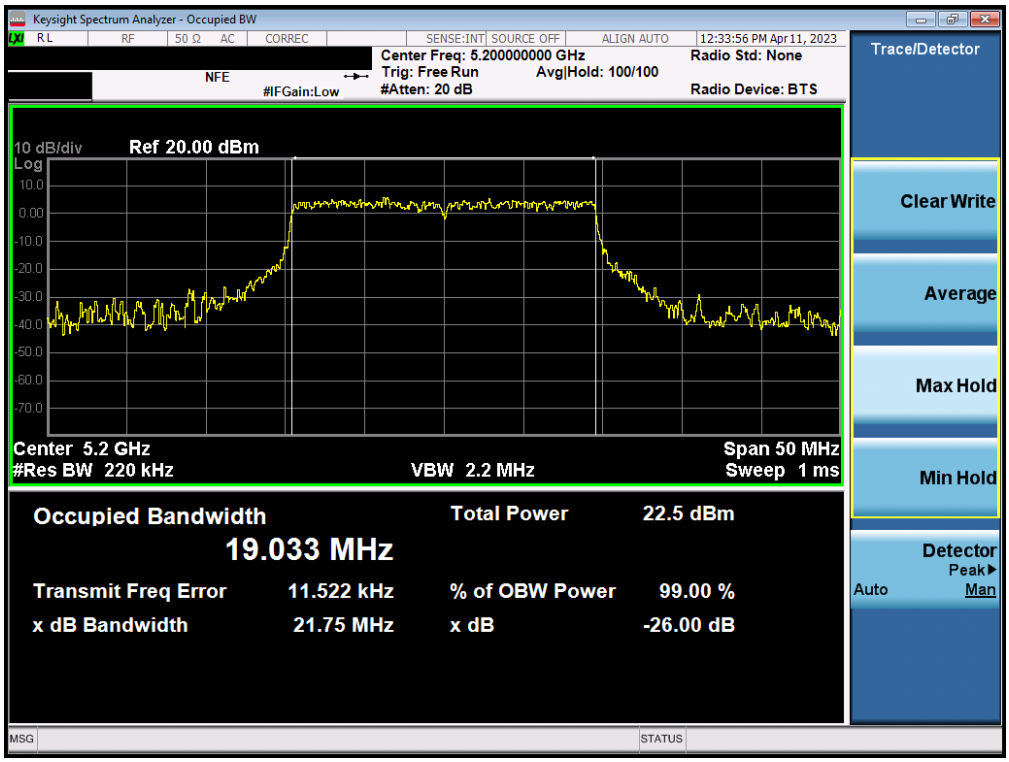
Plot 7-31. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 118)



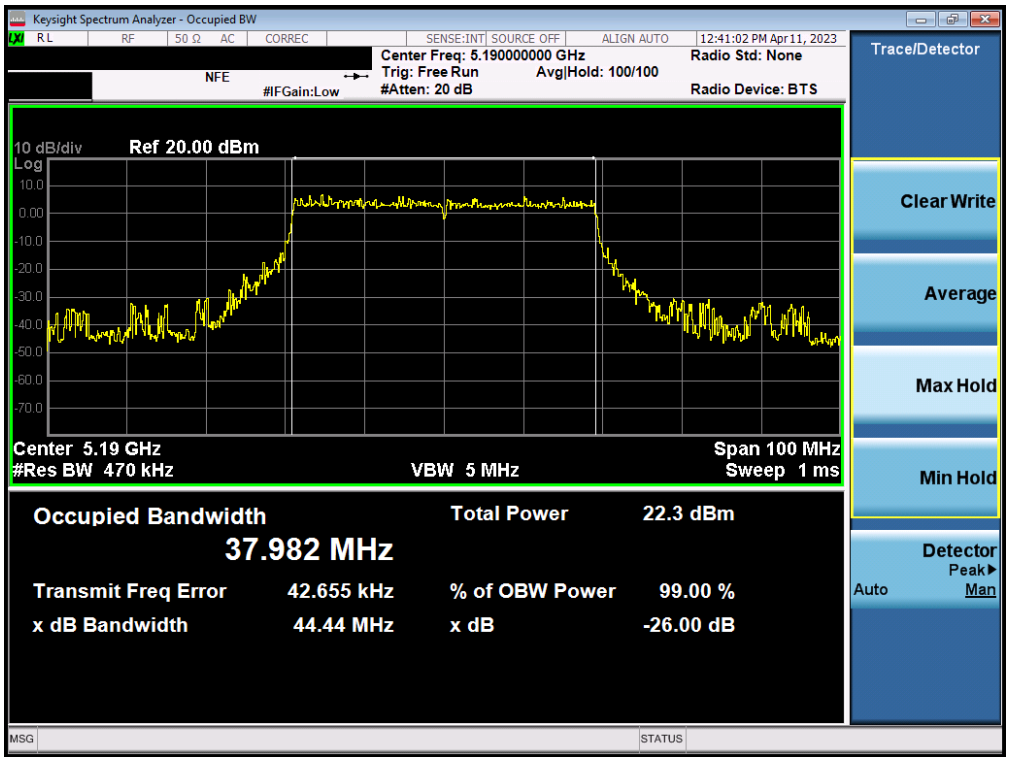
Plot 7-32. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 122)



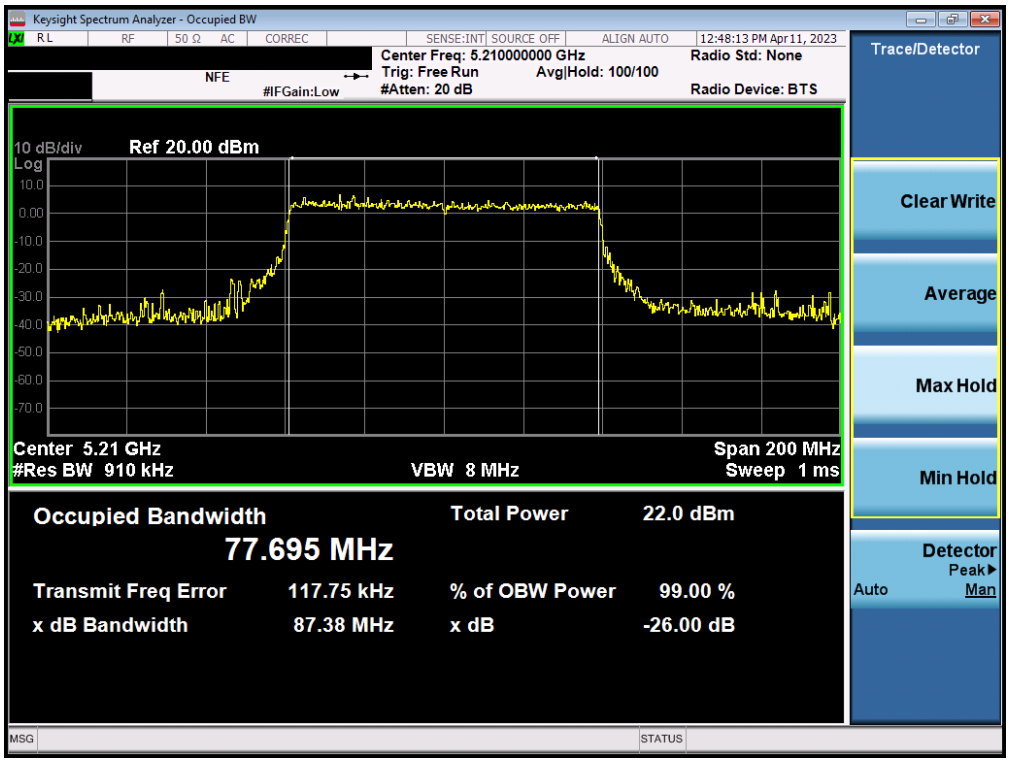
Plot 7-33. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 114)



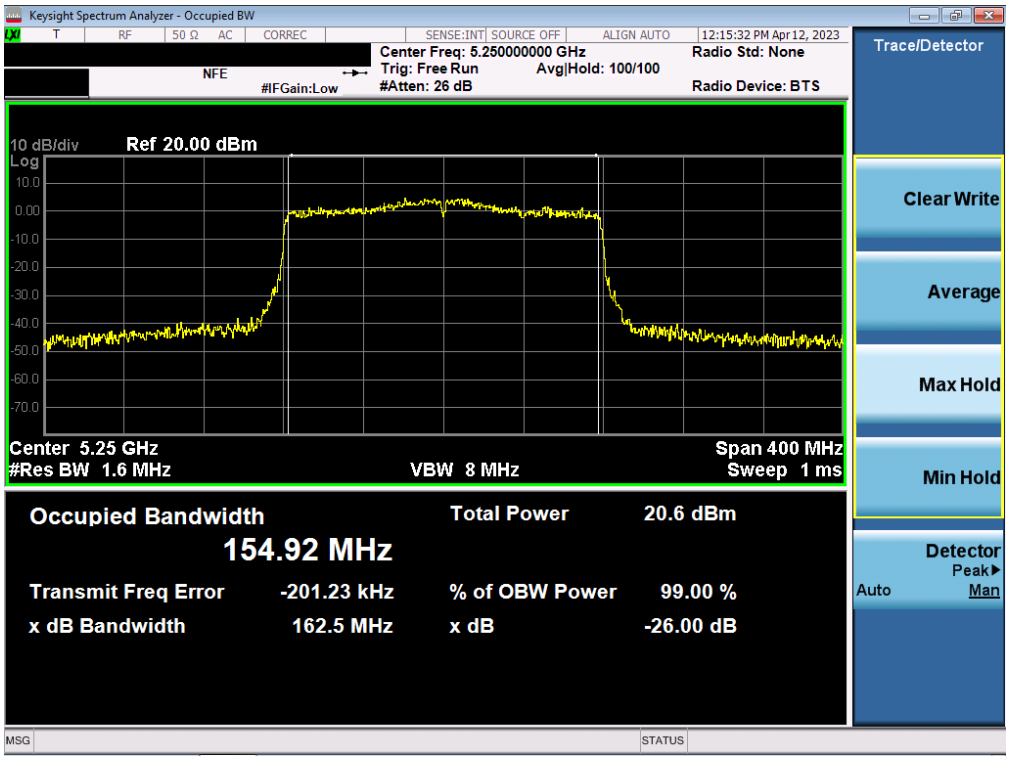
Plot 7-34. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 242 Tones (UNII Band 1) – Ch. 40)



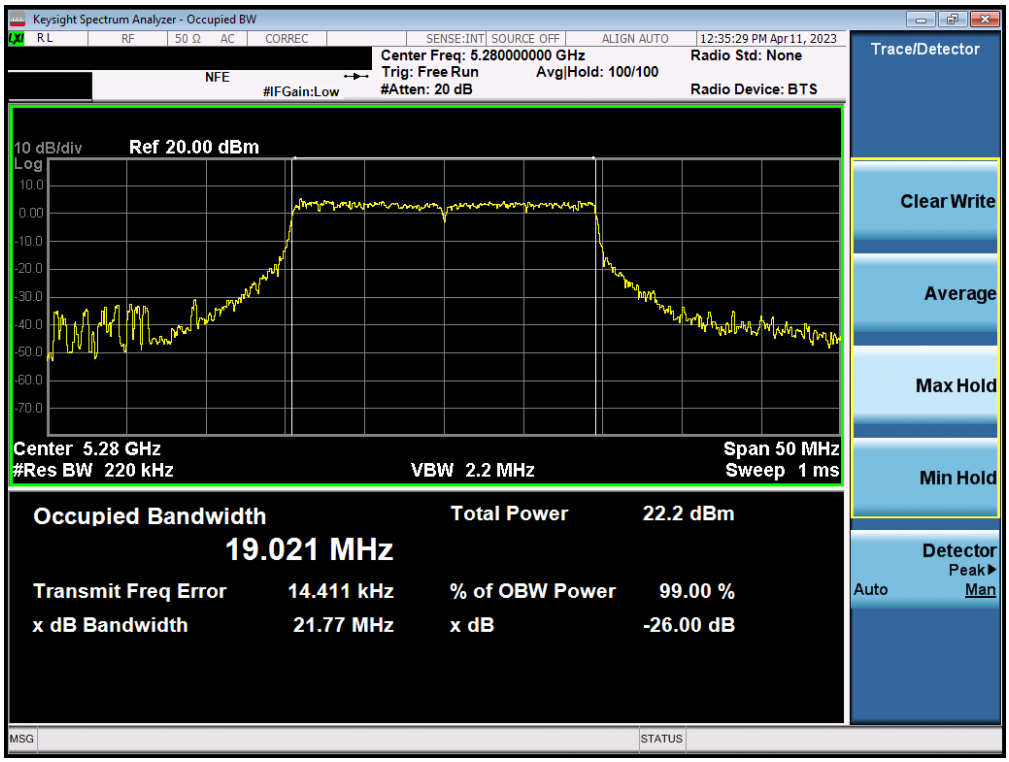
Plot 7-35. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 484 Tones (UNII Band 1) – Ch. 38)



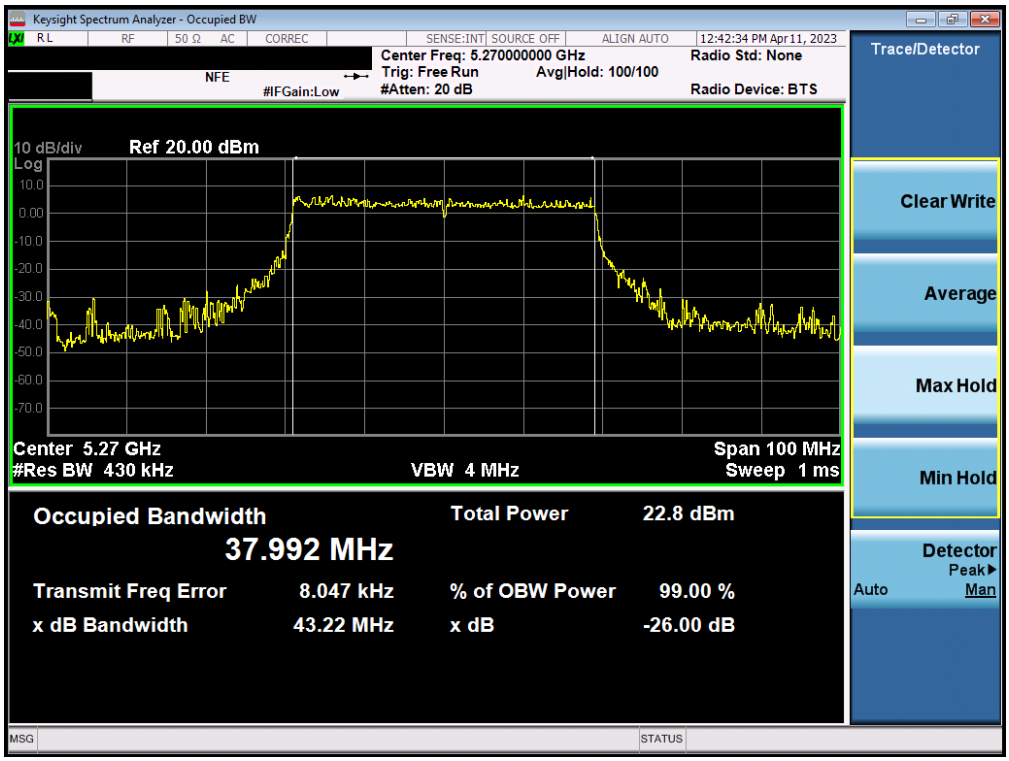
Plot 7-36. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 996 Tones (UNII Band 1) – Ch. 42)



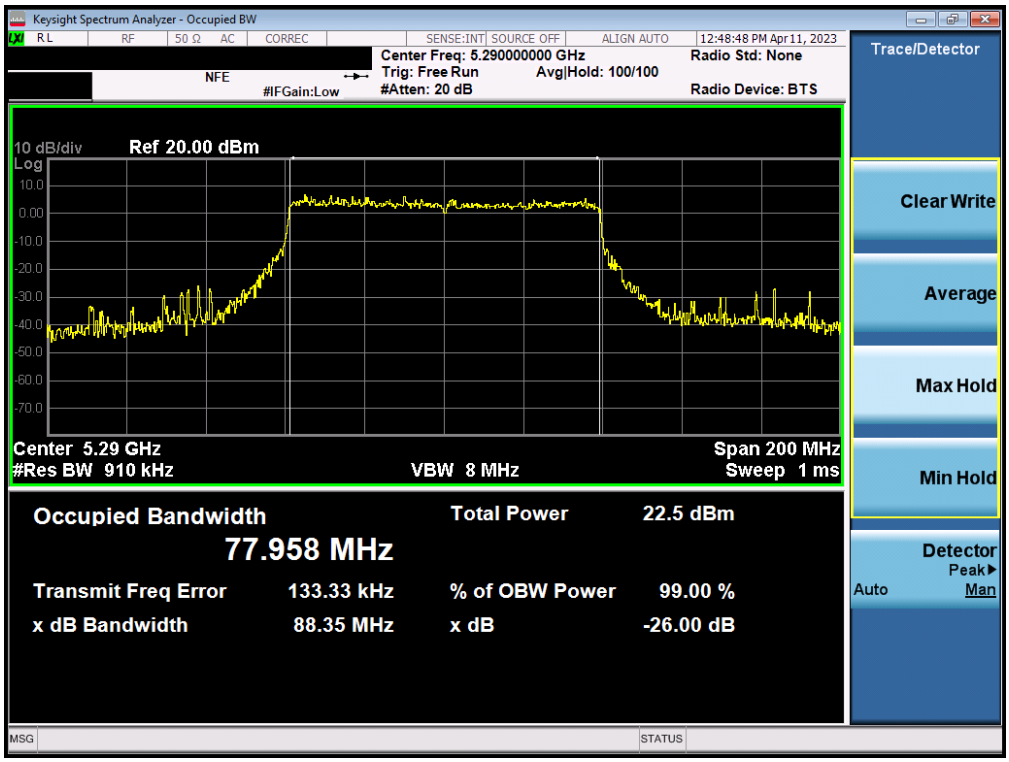
Plot 7-37. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax – 2x996 Tones (UNII Band 1/2A) – Ch. 50)



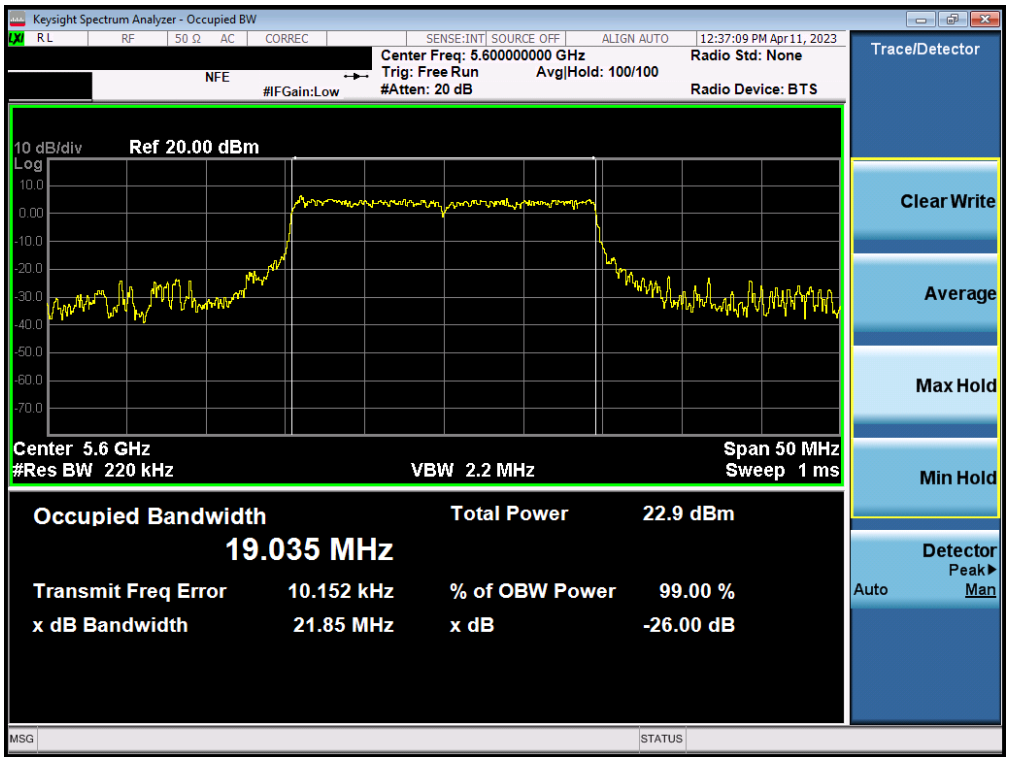
Plot 7-38. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 242 Tones (UNII Band 2A) – Ch. 56)



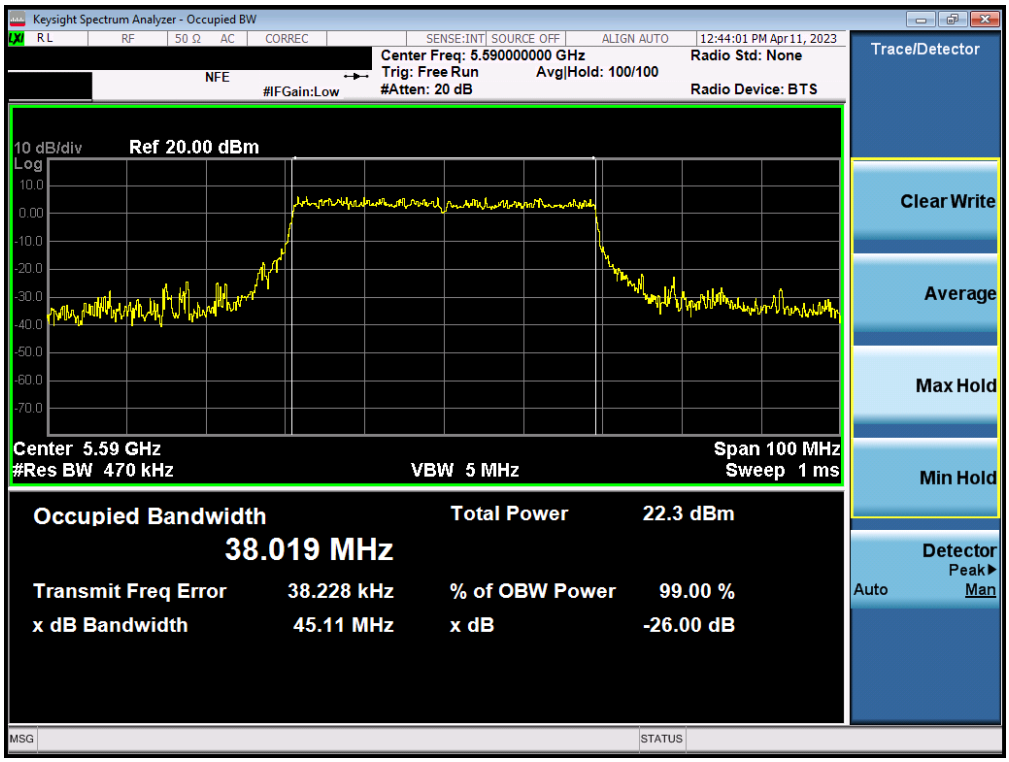
Plot 7-39. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 484 Tones (UNII Band 2A) – Ch. 54)



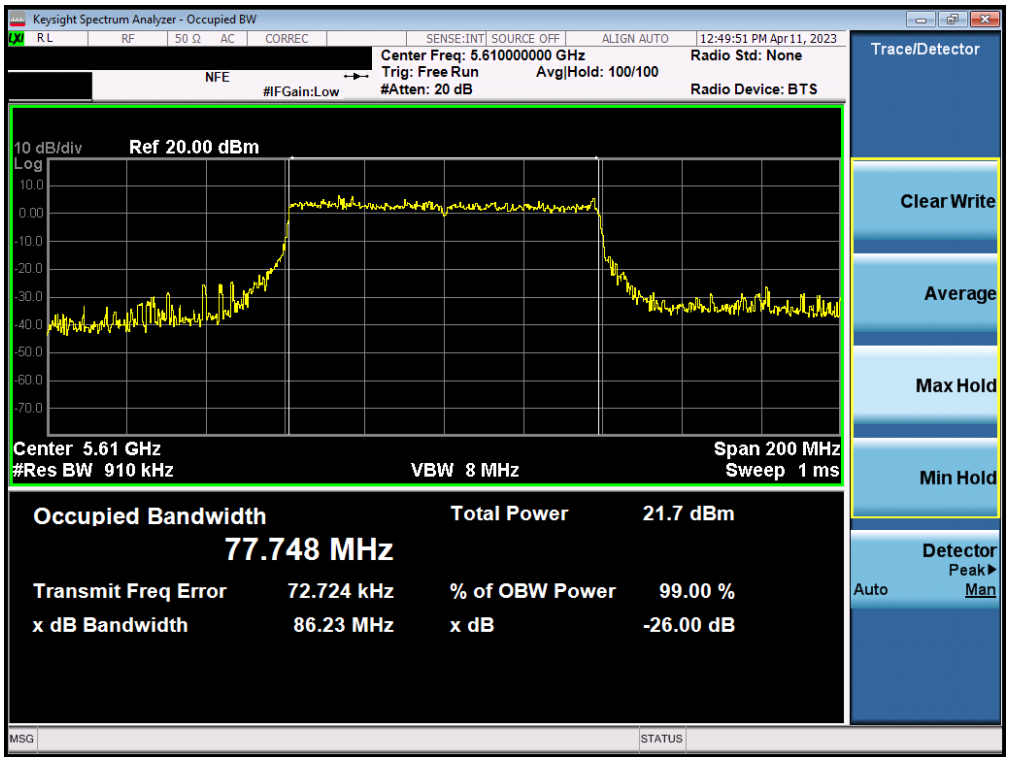
Plot 7-40. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 996 Tones (UNII Band 2A) – Ch. 58)



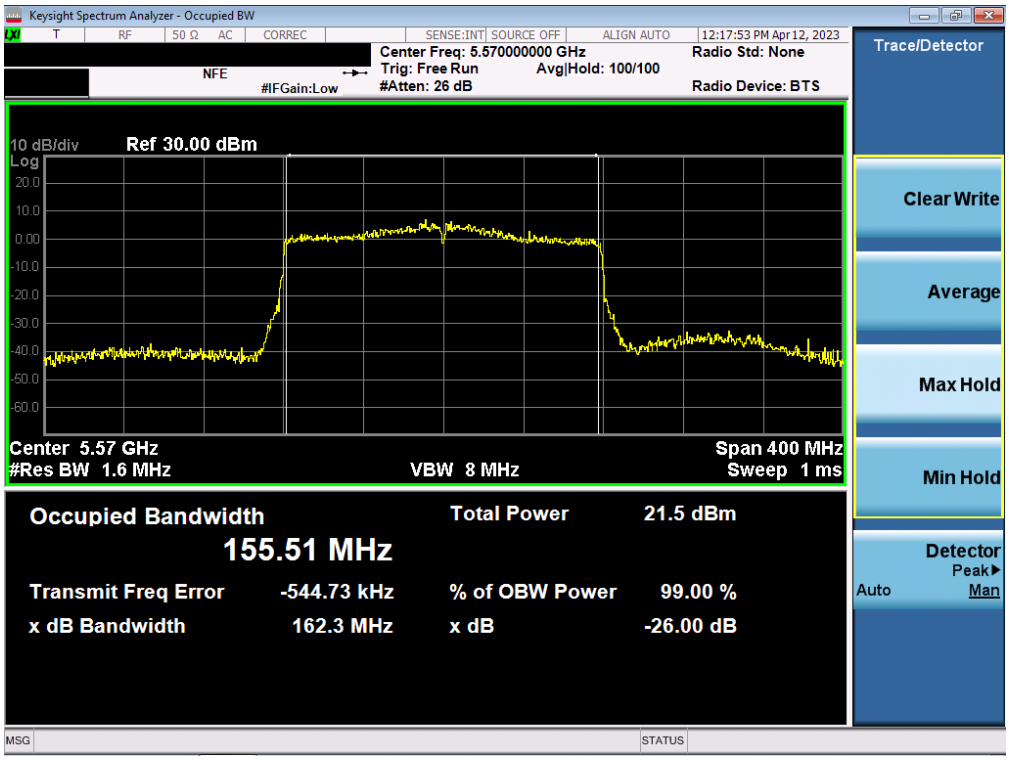
Plot 7-41. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 242 Tones (UNII Band 2C) – Ch. 120)



Plot 7-42. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 484 Tones (UNII Band 2C) – Ch. 118)



Plot 7-43. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 996 Tones (UNII Band 2C) – Ch. 122)



Plot 7-44. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax – 2x996 Tones (UNII Band 2C) – Ch. 114)

7.3 6dB Bandwidth Measurement

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 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 at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

In the 5.725 – 5.850GHz and 5.850-5.895GHz bands, the 6dB bandwidth must be ≥ 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 6.9.2

Test Settings

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. 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 = 100 kHz
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple

Test Setup

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

Figure 7-2. Test Instrument & Measurement Setup

Test Notes

The 6dB Bandwidth measurement for each channel was measured with the RU index showing the highest conducted power.

MIMO 6dB Bandwidth Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	ax (20MHz)	26T	MCS0	2.12
	5785	157	ax (20MHz)	26T	MCS0	2.13
	5825	165	ax (20MHz)	26T	MCS0	2.09
	5755	151	ax (40MHz)	26T	MCS0	2.16
	5795	159	ax (40MHz)	26T	MCS0	2.18
	5775	155	ax (80MHz)	26T	MCS0	2.29

Table 7-6. Band 3 Conducted 6dB Bandwidth Measurements MIMO ANT1 (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3/4	5845	169	ax (20MHz)	26T	MCS0	2.10
Band 4	5865	173	ax (20MHz)	26T	MCS0	2.11
	5885	177	ax (20MHz)	26T	MCS0	2.12
Band 3/4	5835	167	ax (40MHz)	26T	MCS0	2.17
Band 4	5875	175	ax (40MHz)	26T	MCS0	2.16
Band 3/4	5855	171	ax (80MHz)	26T	MCS0	2.28
	5815	163	ax (160MHz)	26T	MCS0	2.58

Table 7-7. Bands 3/4 Conducted 6dB Bandwidth Measurements MIMO ANT1 (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	ax (20MHz)	26T	MCS0	2.69
	5785	157	ax (20MHz)	26T	MCS0	2.13
	5825	165	ax (20MHz)	26T	MCS0	2.07
	5755	151	ax (40MHz)	26T	MCS0	2.16
	5795	159	ax (40MHz)	26T	MCS0	2.17
	5775	155	ax (80MHz)	26T	MCS0	2.32

Table 7-8. Band 3 Conducted 6dB Bandwidth Measurements MIMO ANT2 (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3/4	5845	169	ax (20MHz)	26T	MCS0	2.10
Band 4	5865	173	ax (20MHz)	26T	MCS0	2.14
	5885	177	ax (20MHz)	26T	MCS0	2.10
Band 3/4	5835	167	ax (40MHz)	26T	MCS0	2.16
Band 4	5875	175	ax (40MHz)	26T	MCS0	2.14
Band 3/4	5855	171	ax (80MHz)	26T	MCS0	2.23
	5815	163	ax (160MHz)	26T	MCS0	2.51

Table 7-9. Bands 3/4 Conducted 6dB Bandwidth Measurements MIMO ANT2 (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	ax (20MHz)	242T	MCS0	19.02
	5785	157	ax (20MHz)	242T	MCS0	19.04
	5825	165	ax (20MHz)	242T	MCS0	19.02
	5755	151	ax (40MHz)	484T	MCS0	38.13
	5795	159	ax (40MHz)	484T	MCS0	38.13
	5775	155	ax (80MHz)	996T	MCS0	78.23

Table 7-10. Band 3 Conducted 6dB Bandwidth Measurements MIMO ANT1 (Full Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3/4	5845	169	ax (20MHz)	242T	MCS0	19.07
Band 4	5865	173	ax (20MHz)	242T	MCS0	19.05
	5885	177	ax (20MHz)	242T	MCS0	19.08
Band 3/4	5835	167	ax (40MHz)	484T	MCS0	38.16
Band 4	5875	175	ax (40MHz)	484T	MCS0	38.08
Band 3/4	5855	171	ax (80MHz)	996T	MCS0	78.20
	5815	163	ax (160MHz)	2x996T	MCS0	155.10

Table 7-11. Bands 3/4 Conducted 6dB Bandwidth Measurements MIMO ANT1 (Full Tones)

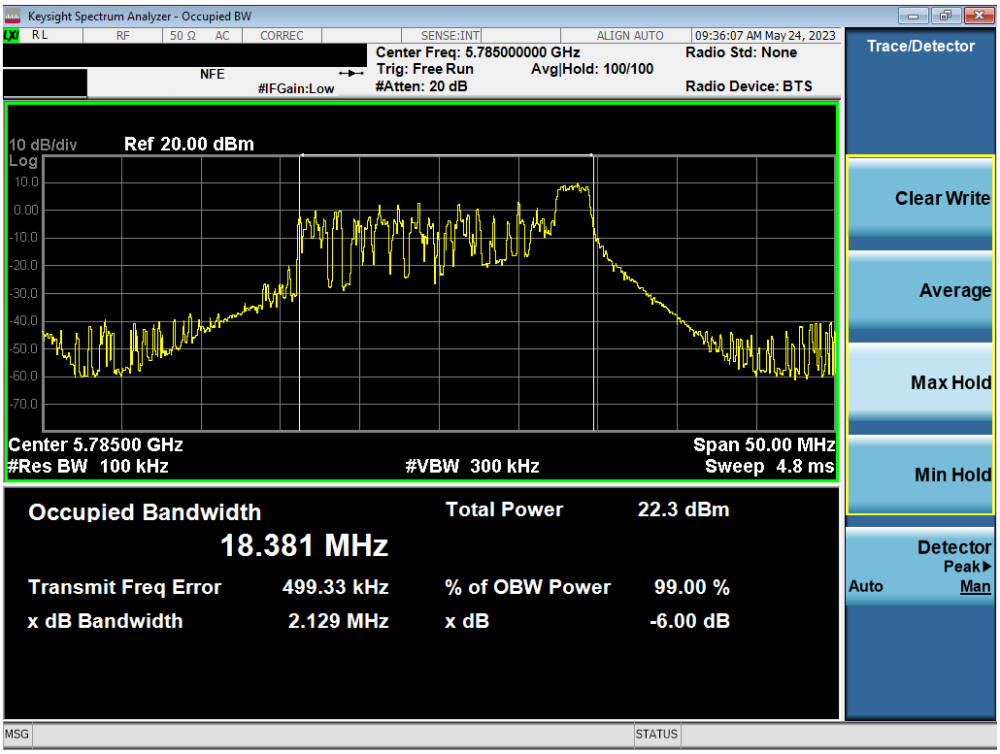
	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	ax (20MHz)	242T	MCS0	19.07
	5785	157	ax (20MHz)	242T	MCS0	19.07
	5825	165	ax (20MHz)	242T	MCS0	19.07
	5755	151	ax (40MHz)	484T	MCS0	38.15
	5795	159	ax (40MHz)	484T	MCS0	38.15
	5775	155	ax (80MHz)	996T	MCS0	78.17

Table 7-12. Band 3 Conducted 6dB Bandwidth Measurements MIMO ANT2 (Full Tones)

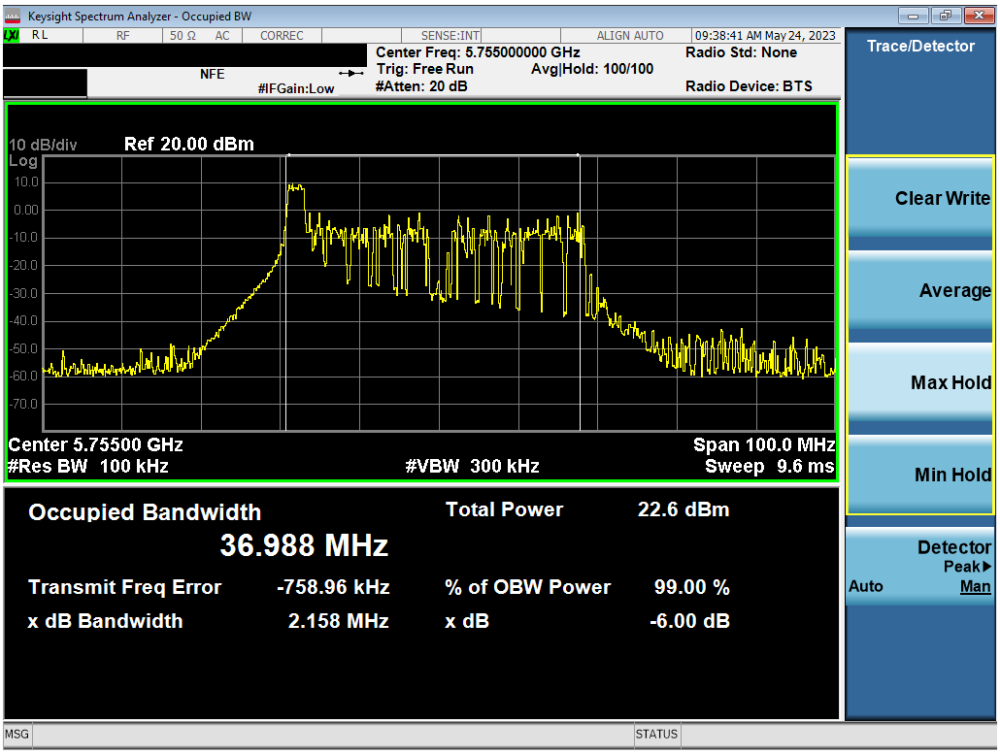
	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3/4	5845	169	ax (20MHz)	242T	MCS0	19.17
Band 4	5865	173	ax (20MHz)	242T	MCS0	19.05
	5885	177	ax (20MHz)	242T	MCS0	19.10
Band 3/4	5835	167	ax (40MHz)	484T	MCS0	38.13
Band 4	5875	175	ax (40MHz)	484T	MCS0	38.18
Band 3/4	5855	171	ax (80MHz)	996T	MCS0	78.20
	5815	163	ax (160MHz)	2x996T	MCS0	149.90

Table 7-13. Bands 3/4 Conducted 6dB Bandwidth Measurements MIMO ANT2 (Full Tones)

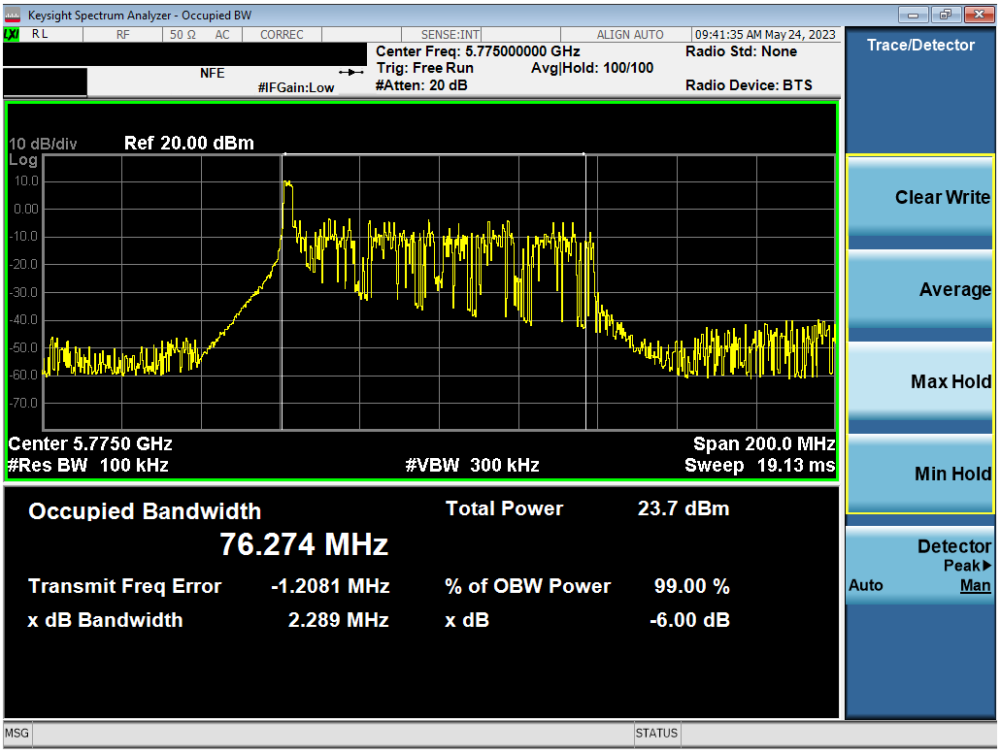
7.3.1 MIMO Antenna-1 6dB Bandwidth Measurements



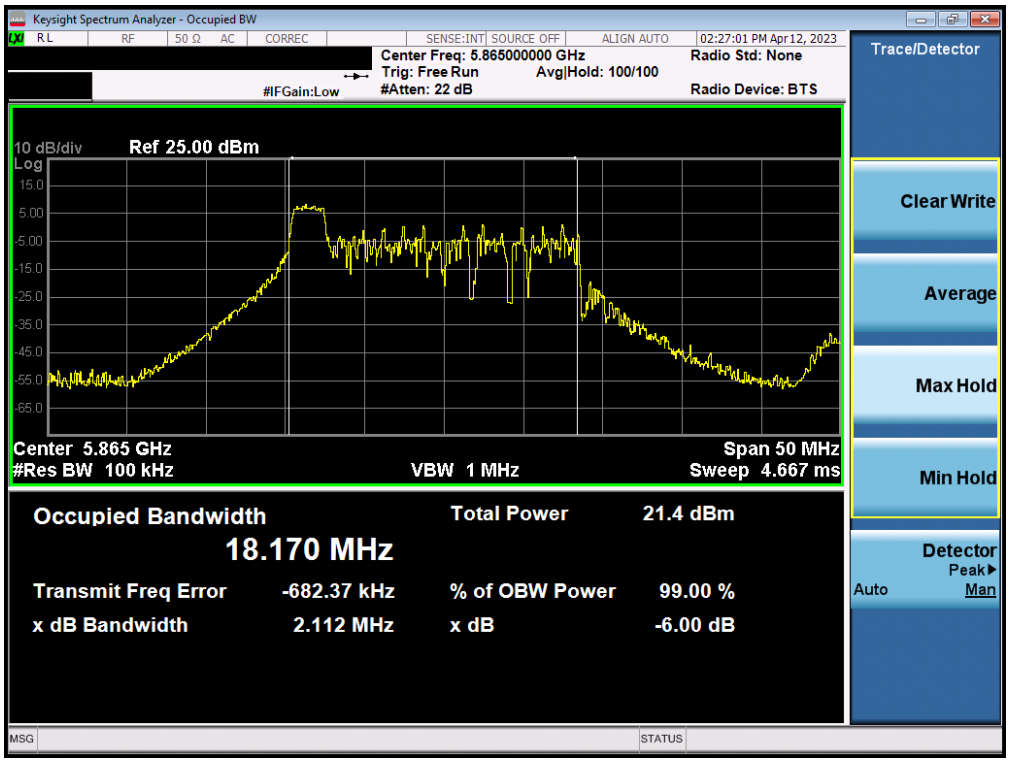
Plot 7-45. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 3) – Ch. 157)



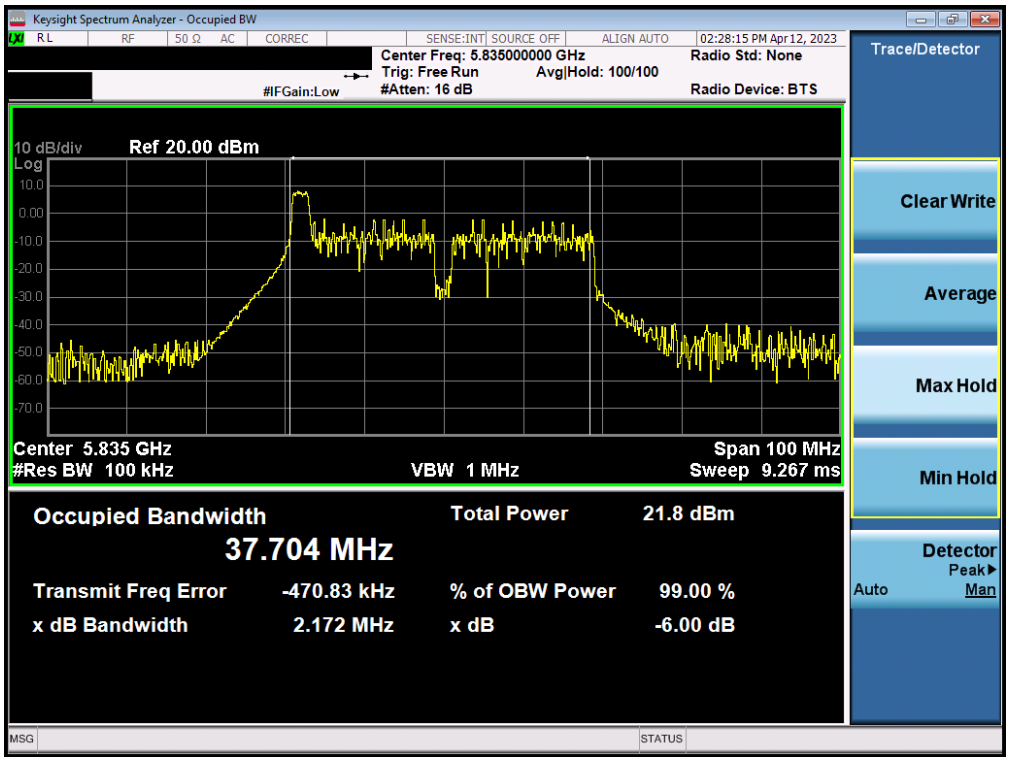
Plot 7-46. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 3) – Ch. 151)



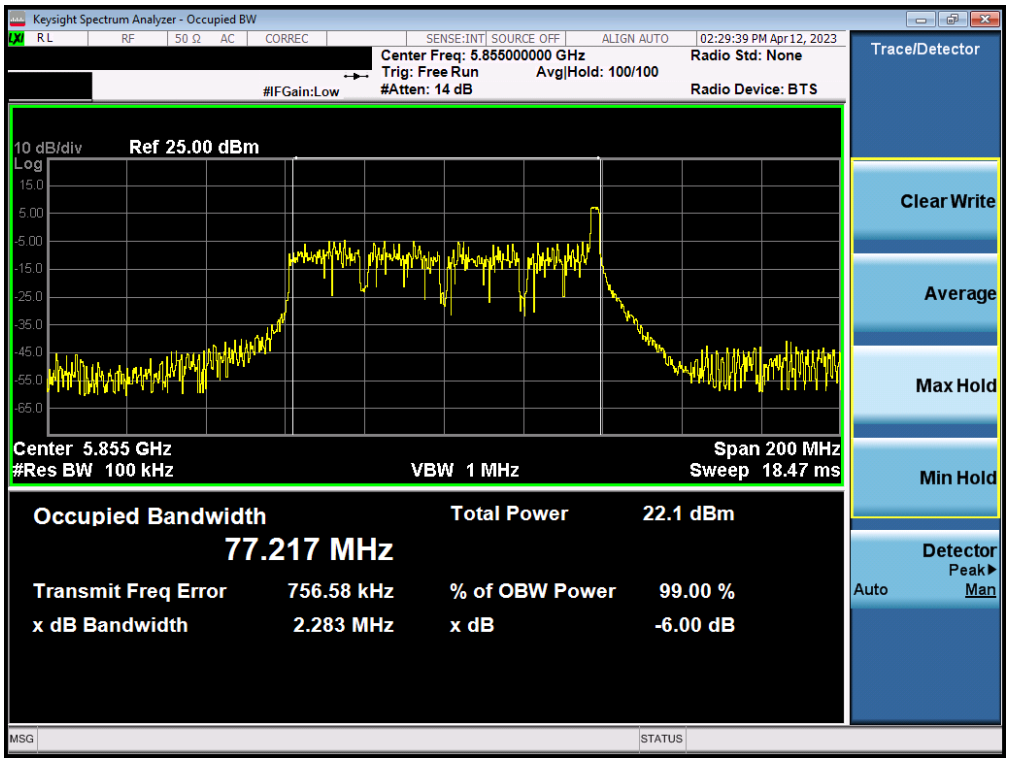
Plot 7-47. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UII Band 3) – Ch. 155)



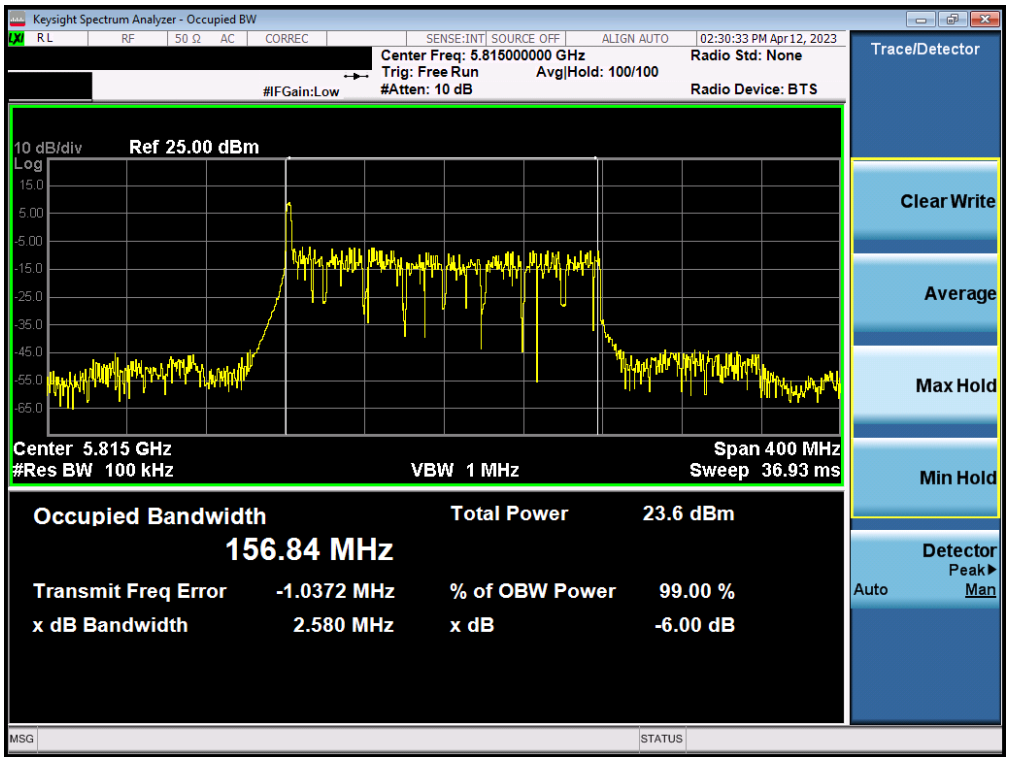
Plot 7-48. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 4) – Ch. 173)



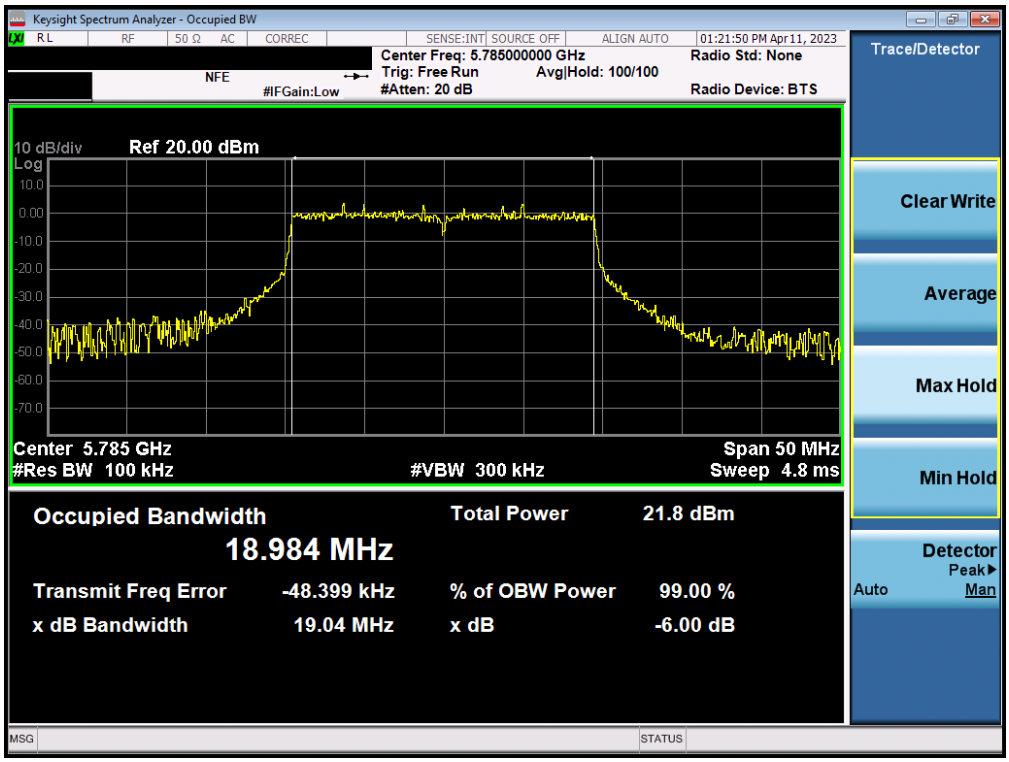
Plot 7-49. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 167)



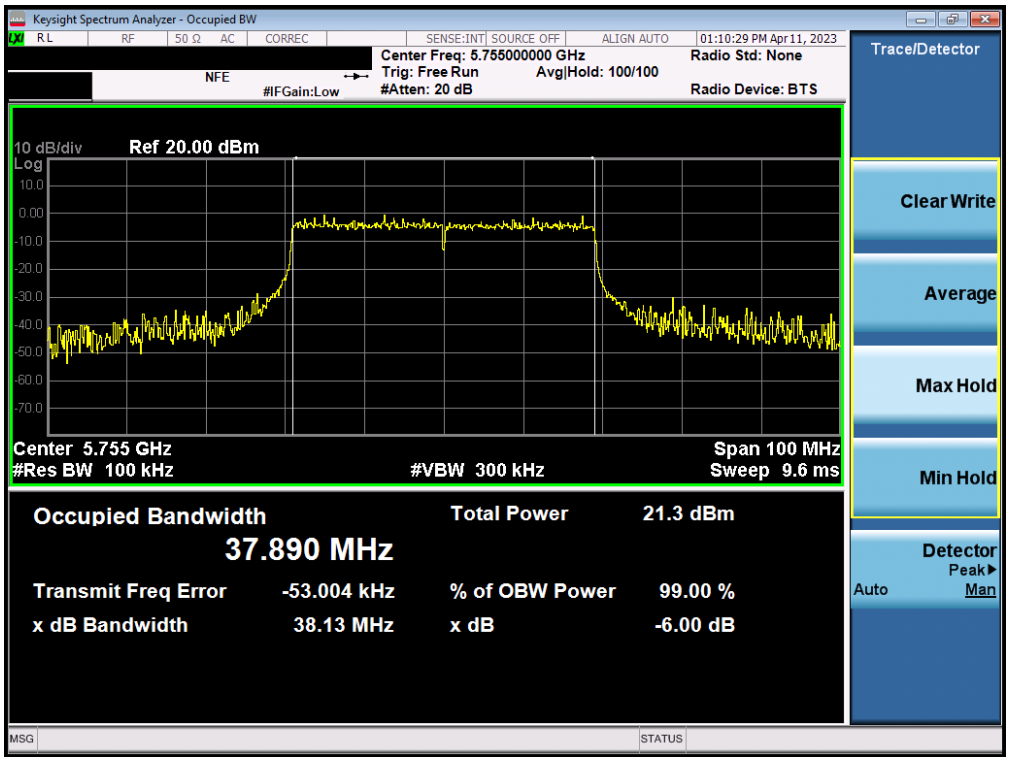
Plot 7-50. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 171)



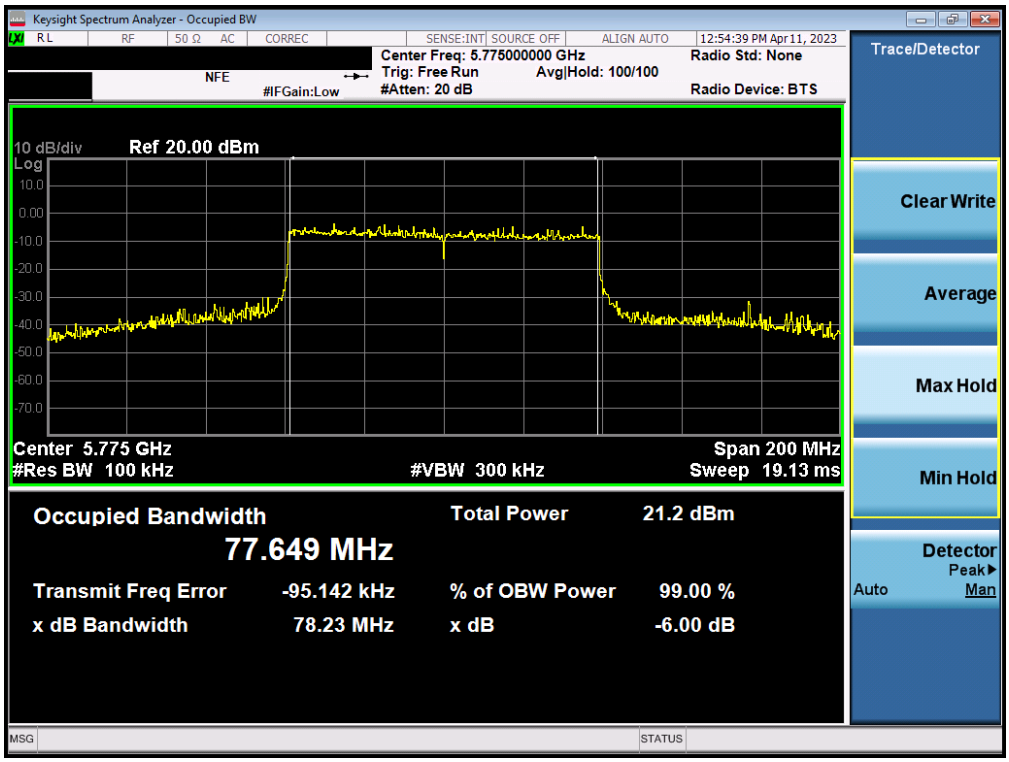
Plot 7-51. 6dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 163)



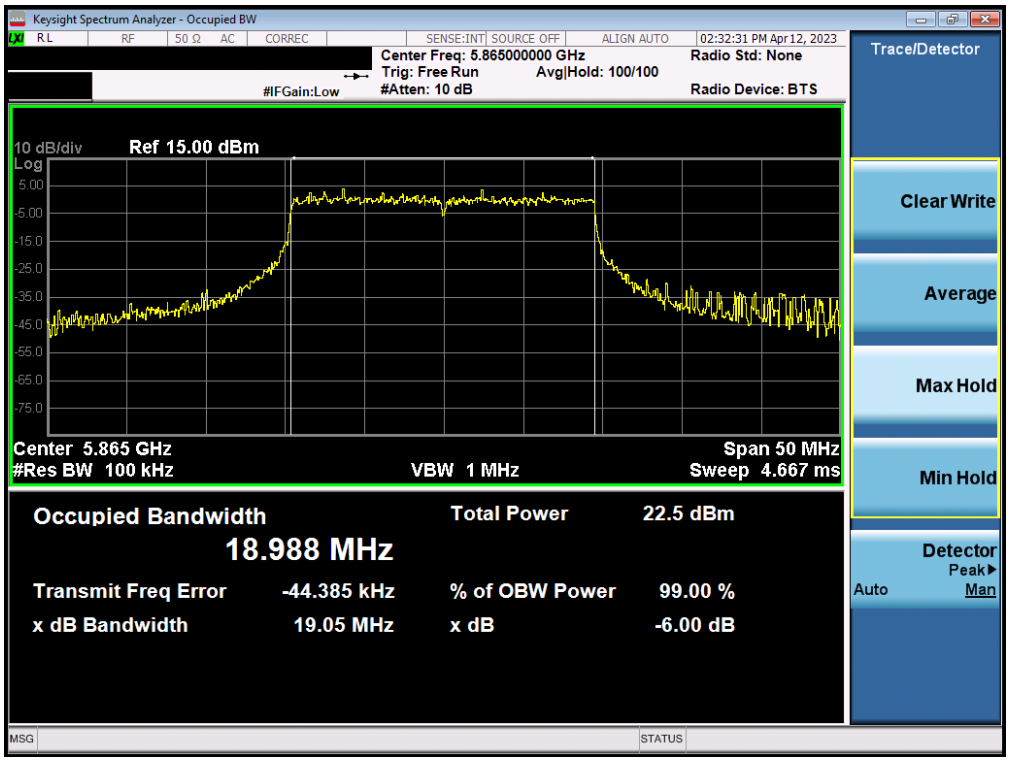
Plot 7-52. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 242 Tones (UNII Band 3) – Ch. 157)



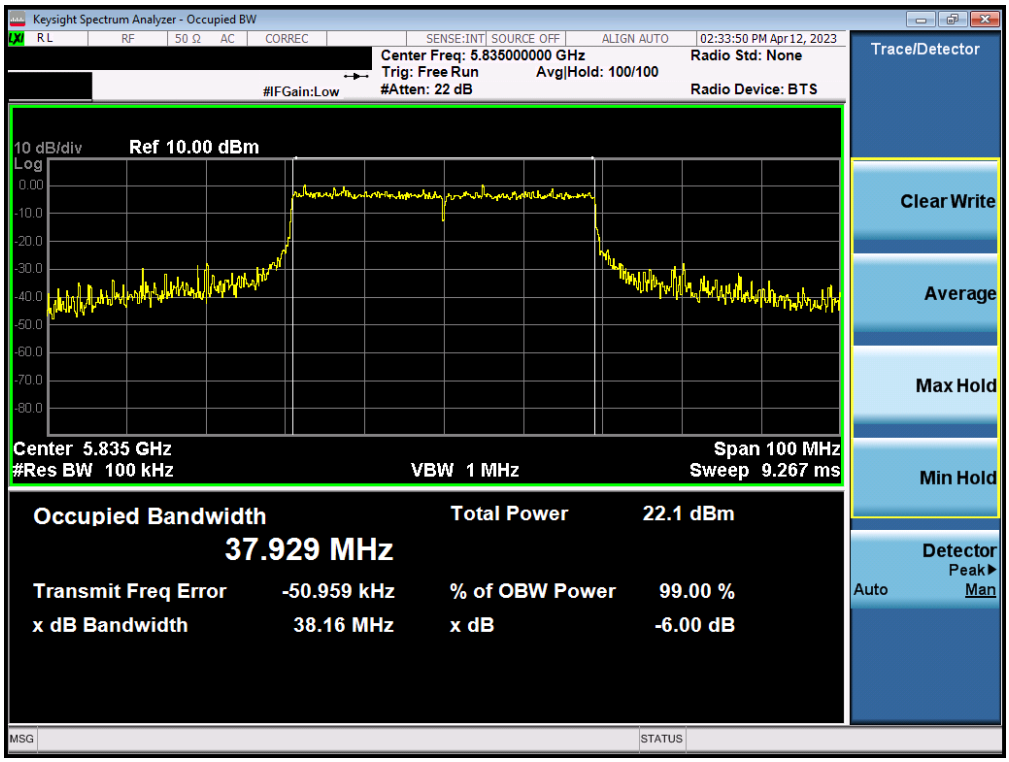
Plot 7-53. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 484 Tones (UNII Band 3) – Ch. 151)



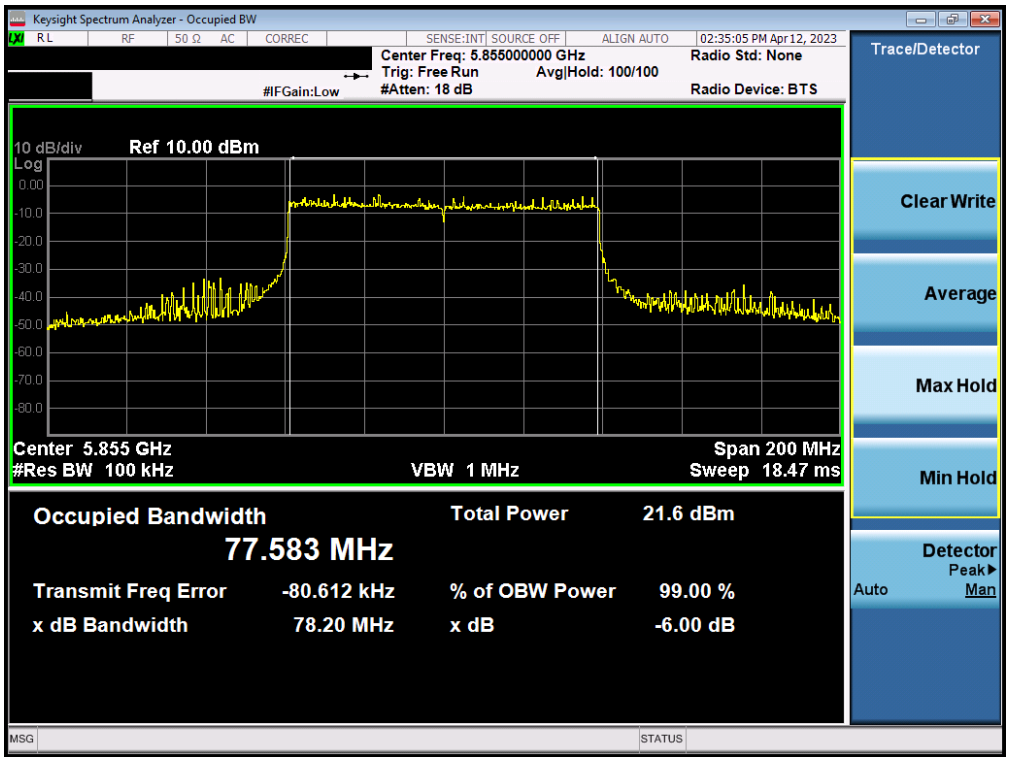
Plot 7-54. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 996 Tones (UNII Band 3) – Ch. 155)



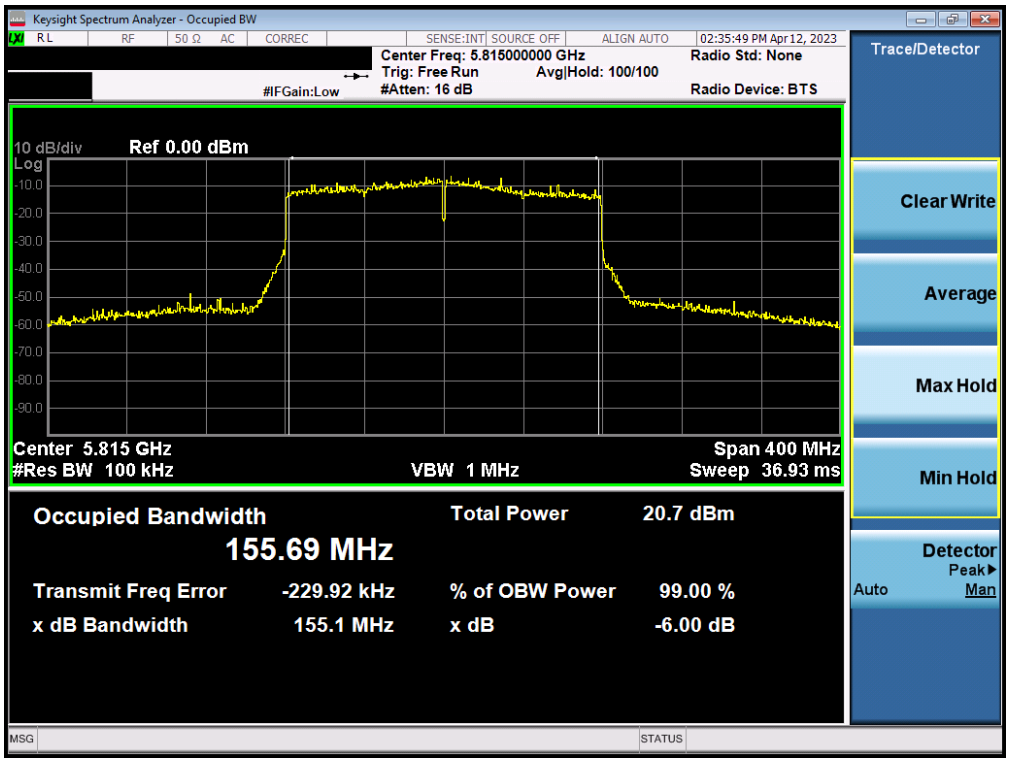
Plot 7-55. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax – 242 Tones (UNII Band 4) – Ch. 173)



Plot 7-56. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax – 484 Tones (UNII Band 3/4) – Ch. 167)

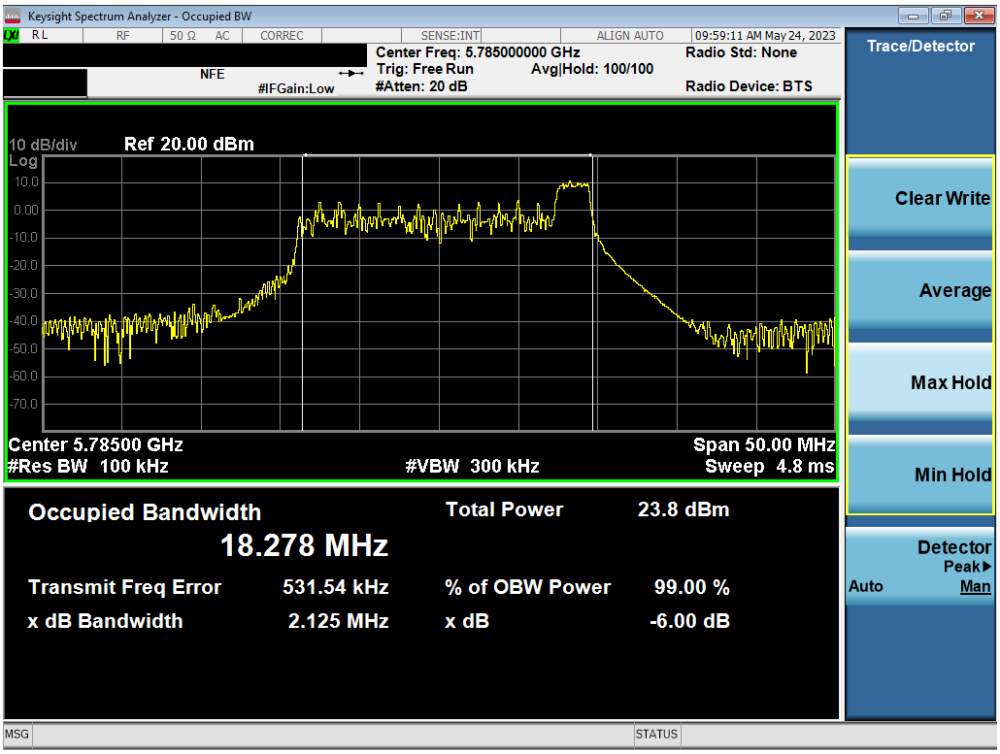


Plot 7-57. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax – 996 Tones (UNII Band 3/4) – Ch. 171)

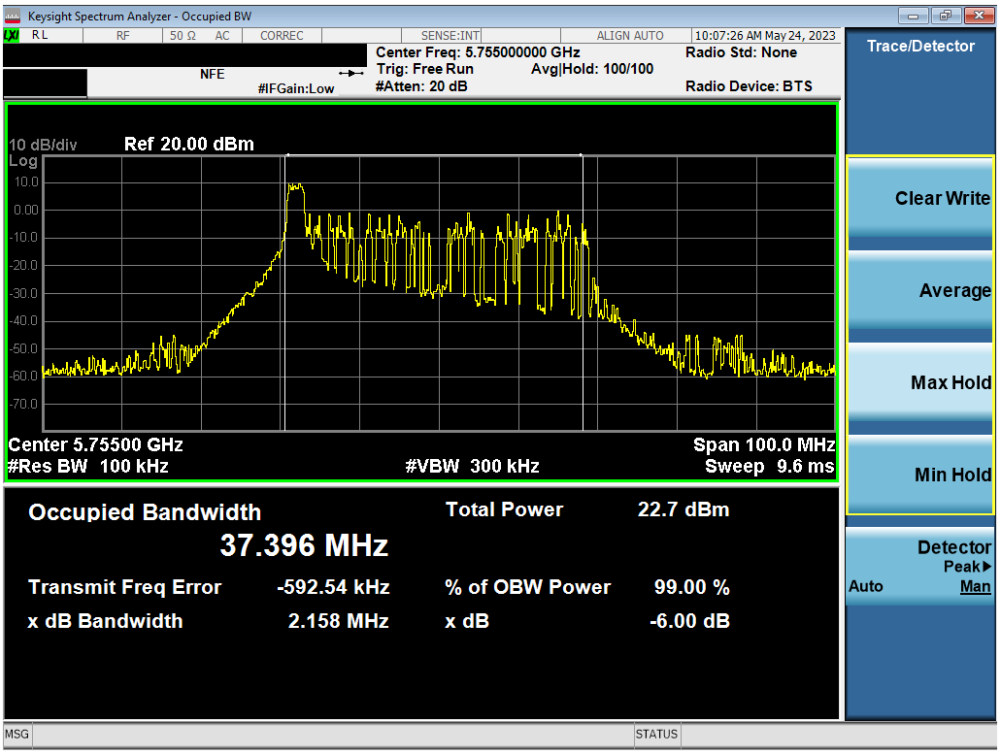


Plot 7-58. 6dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax – 2x996 Tones (UNII Band 3/4) – Ch. 163)

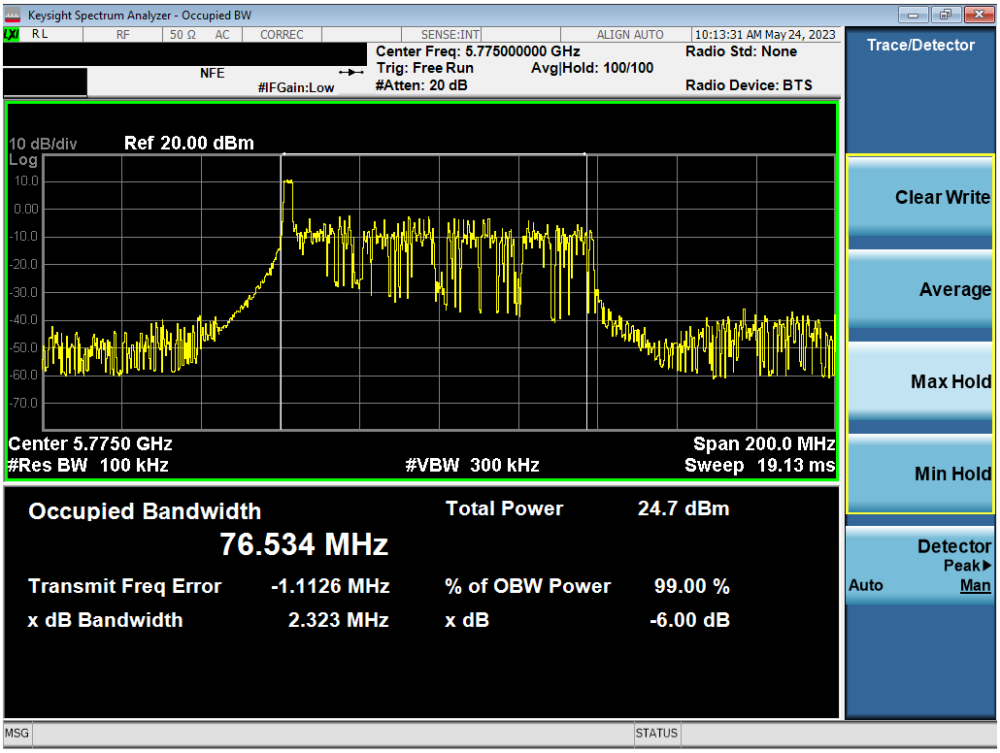
7.3.2 MIMO Antenna-2 6dB Bandwidth Measurements



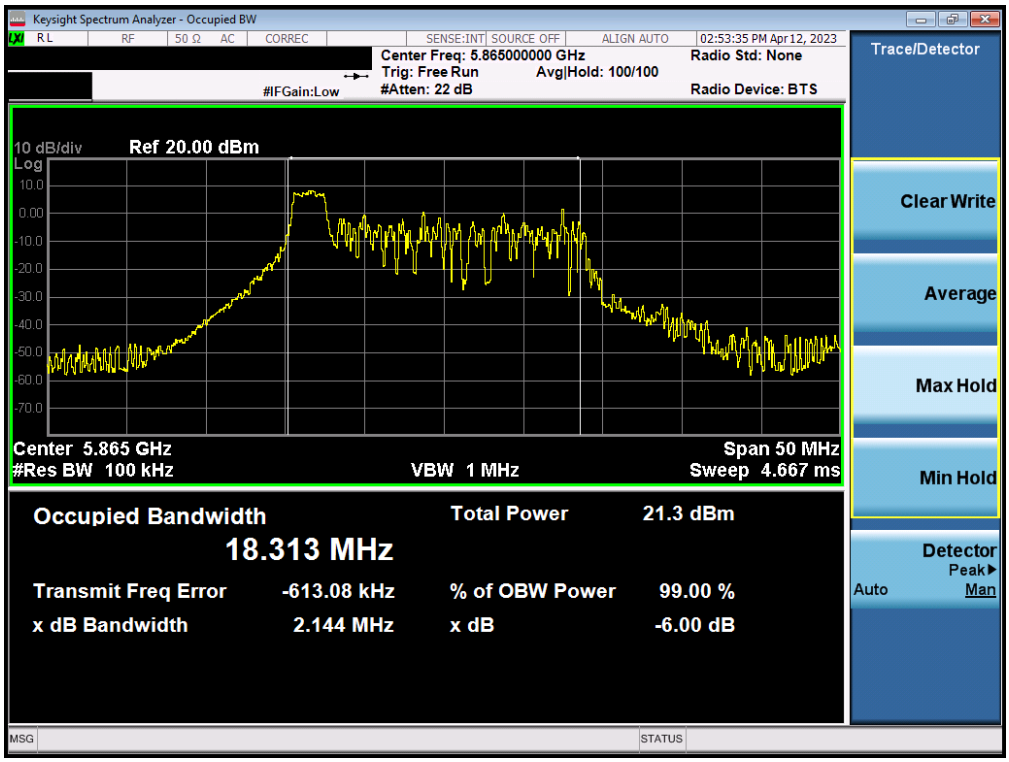
Plot 7-59. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 26 Tones (UNII Band 3) – Ch. 157)



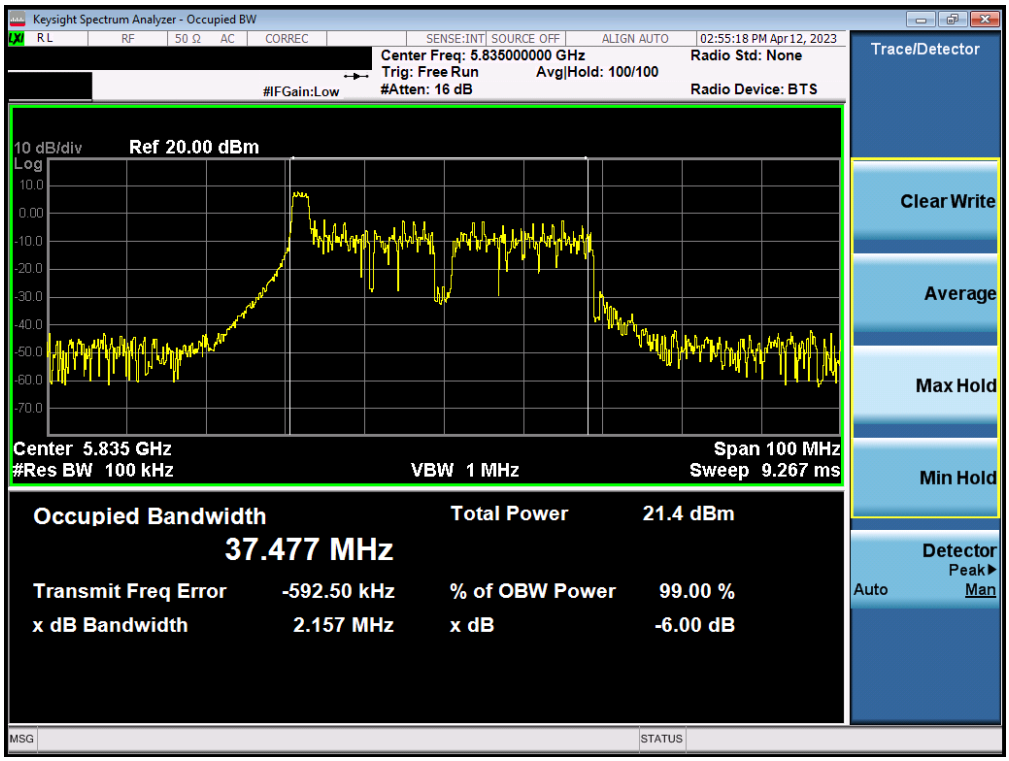
Plot 7-60. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 26 Tones (UNII Band 3) – Ch. 151)



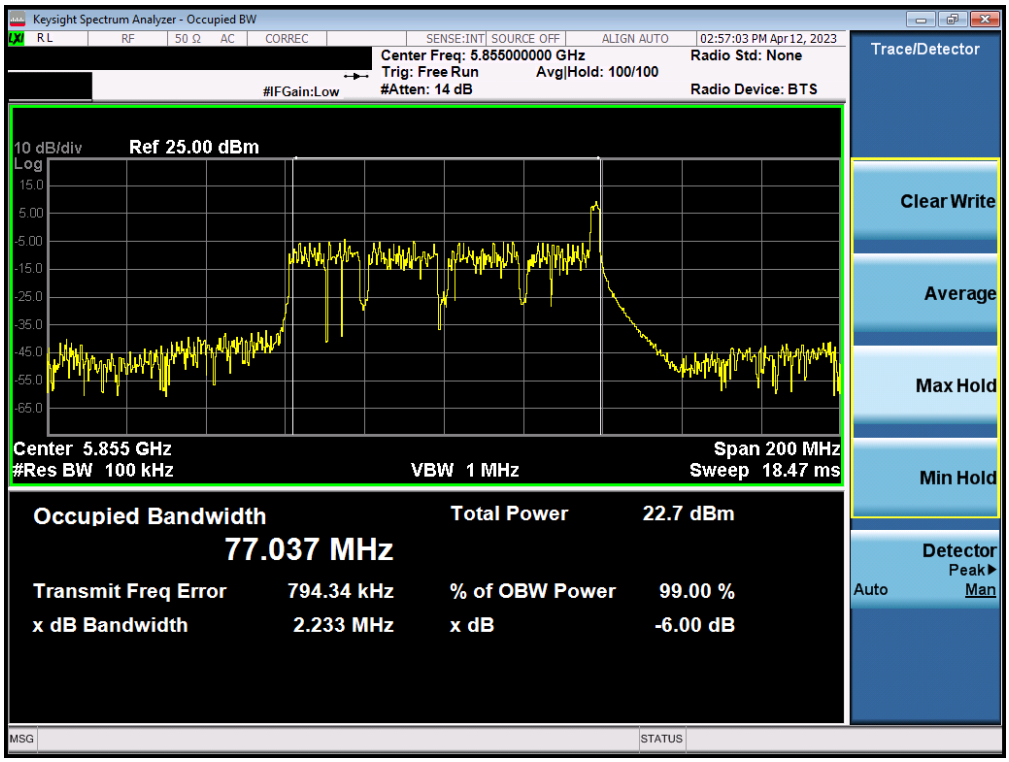
Plot 7-61. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 26 Tones (UII Band 3) – Ch. 155)



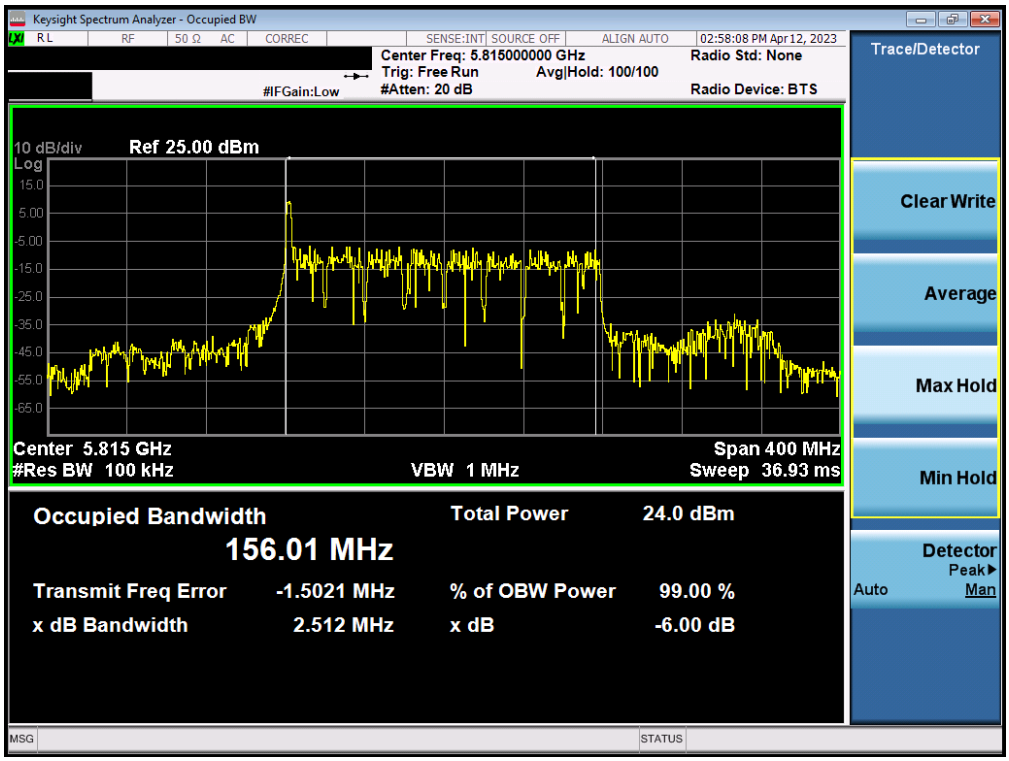
Plot 7-62. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 26 Tones (UNII Band 4) – Ch. 173)



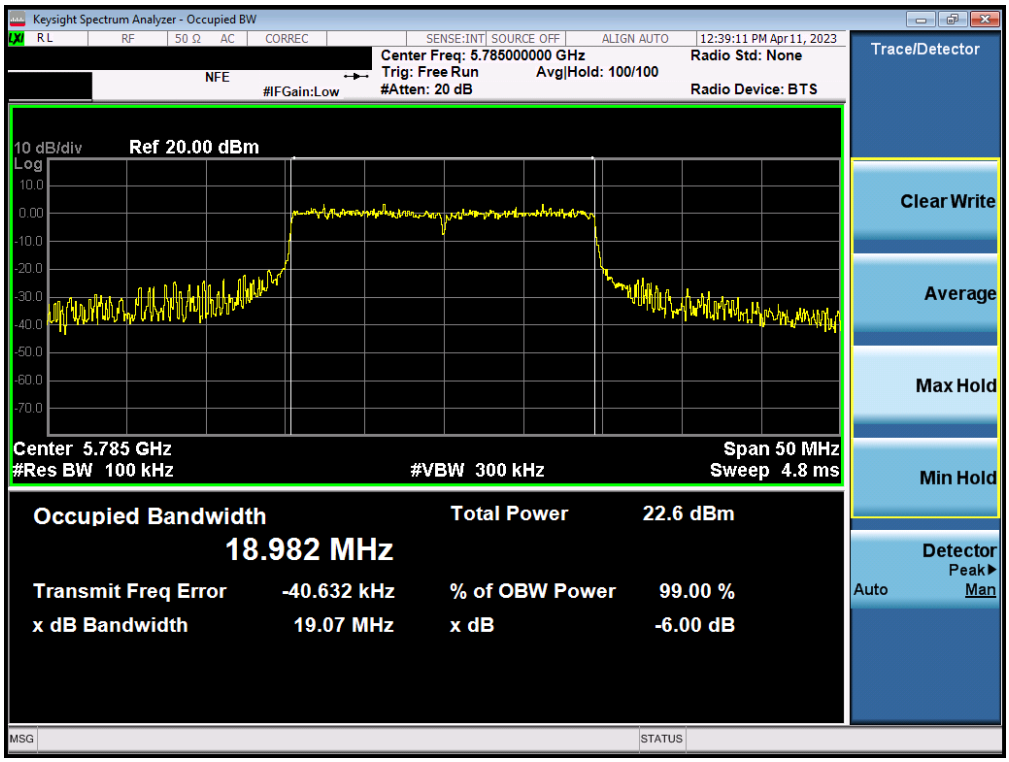
Plot 7-63. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 167)



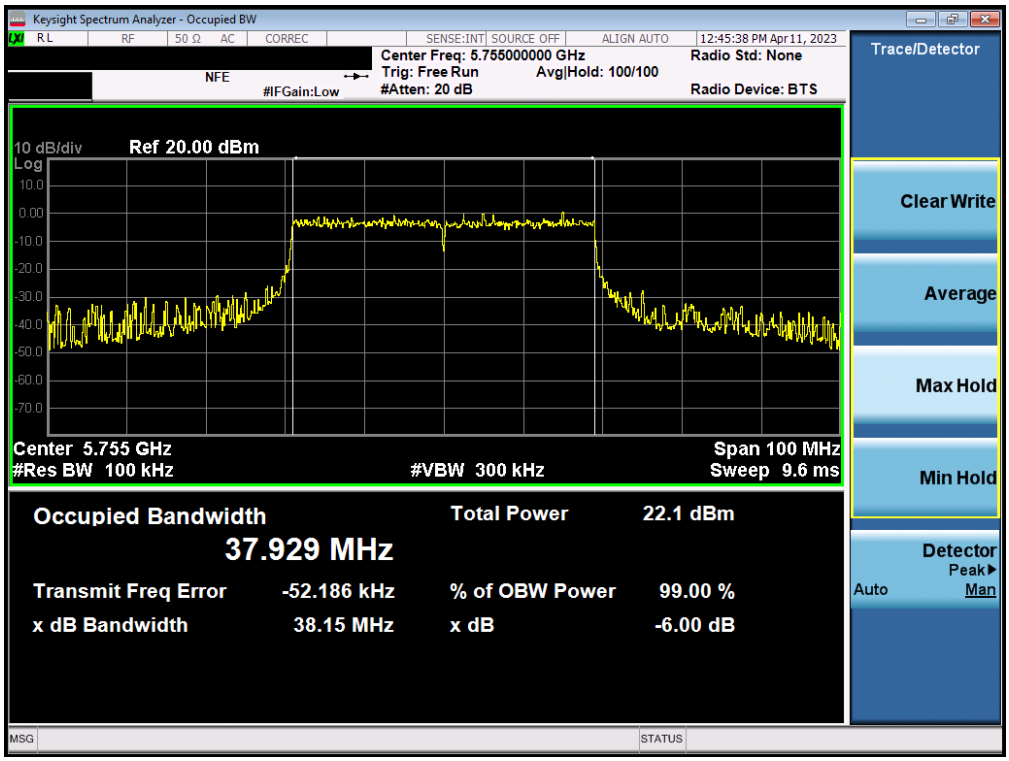
Plot 7-64. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 171)



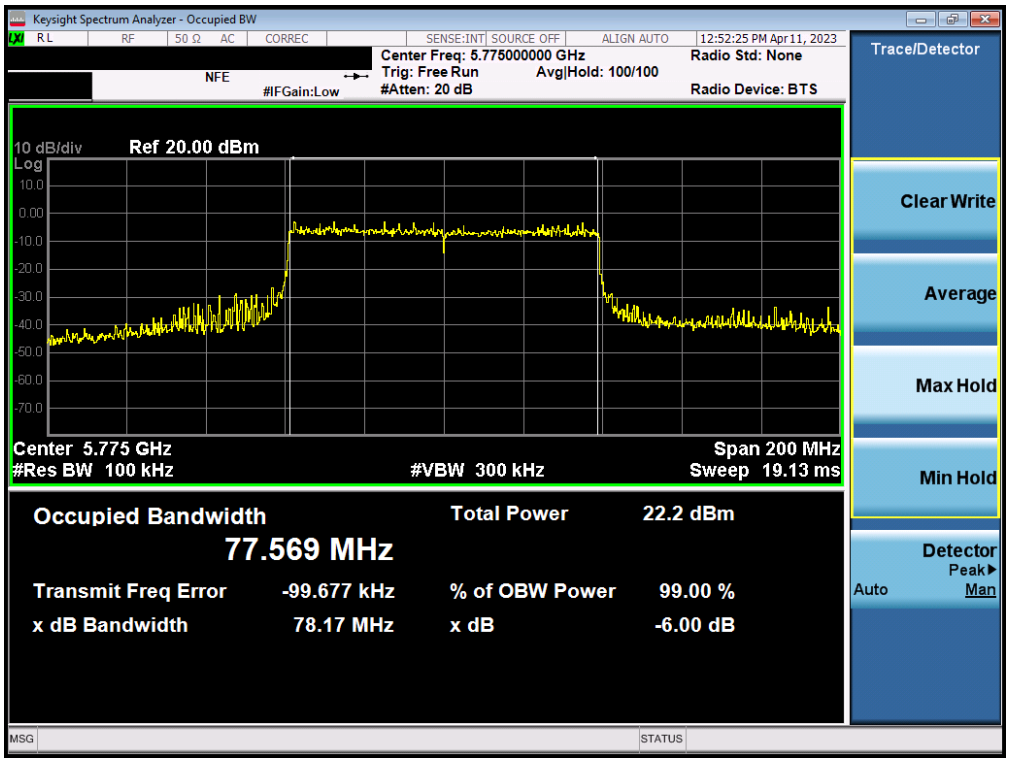
Plot 7-65. 6dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 163)



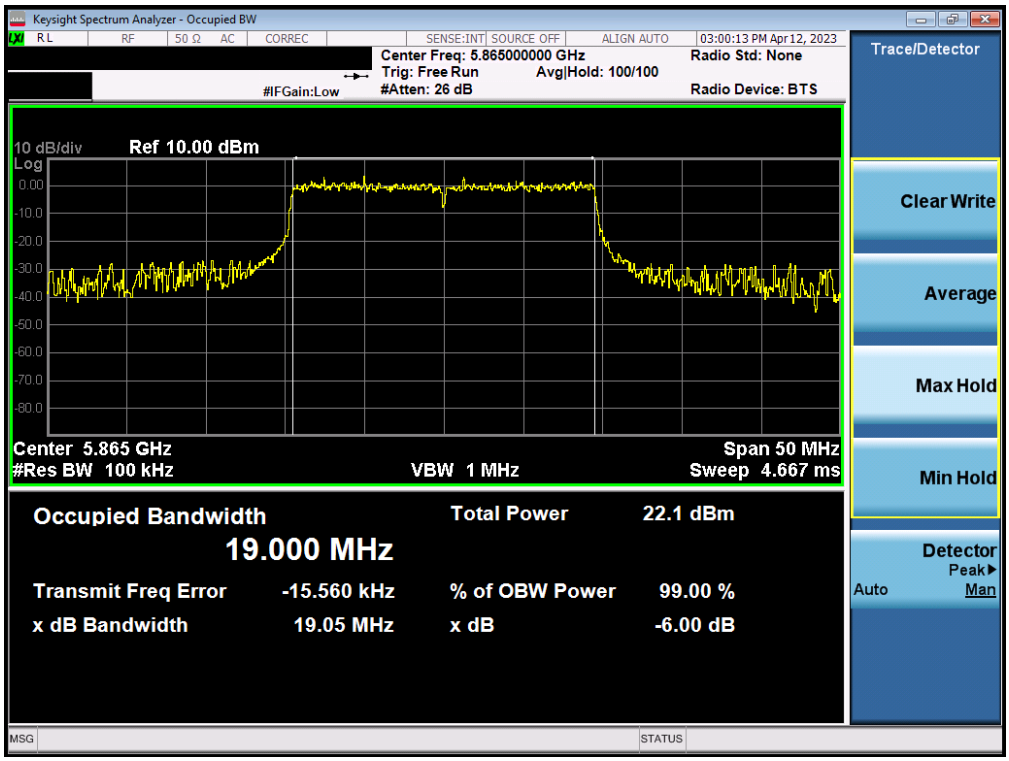
Plot 7-66. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 242 Tones (UNII Band 3) – Ch. 157)



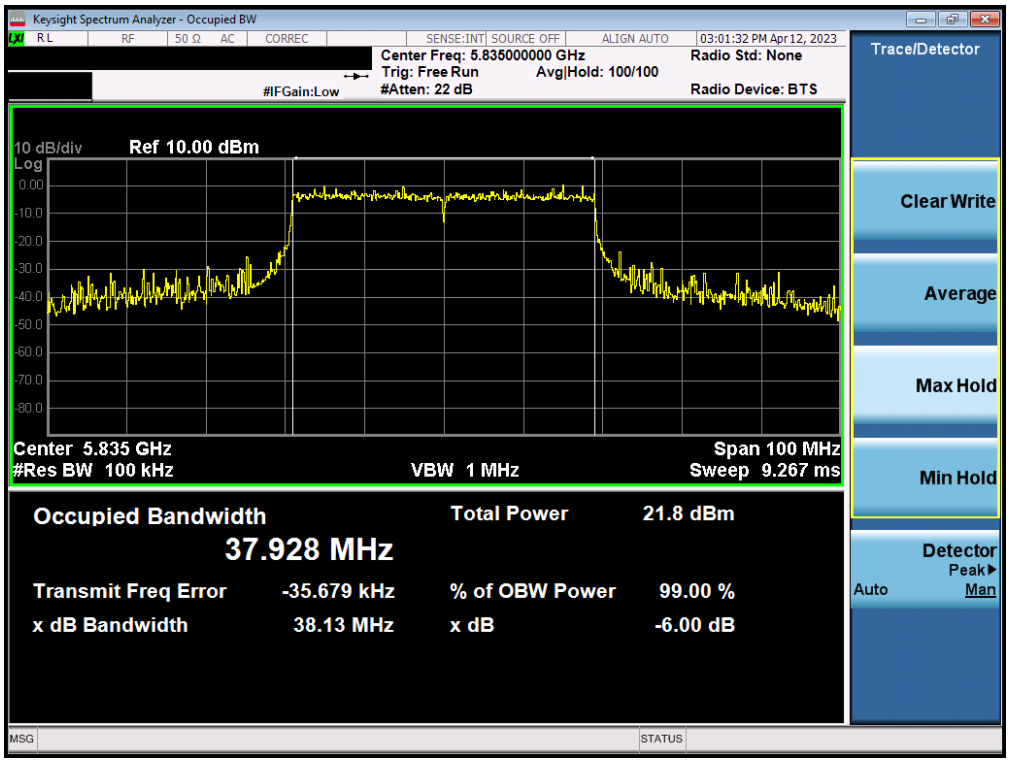
Plot 7-67. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 484 Tones (UNII Band 3) – Ch. 151)



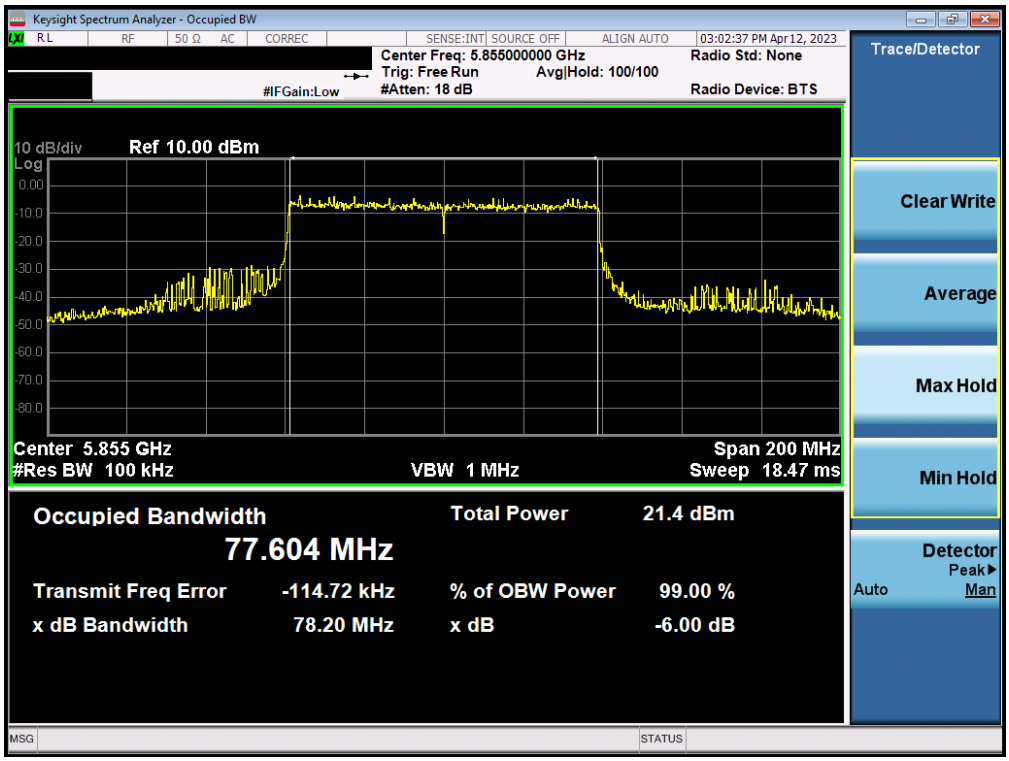
Plot 7-68. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 996 Tones (UNII Band 3) – Ch. 155)



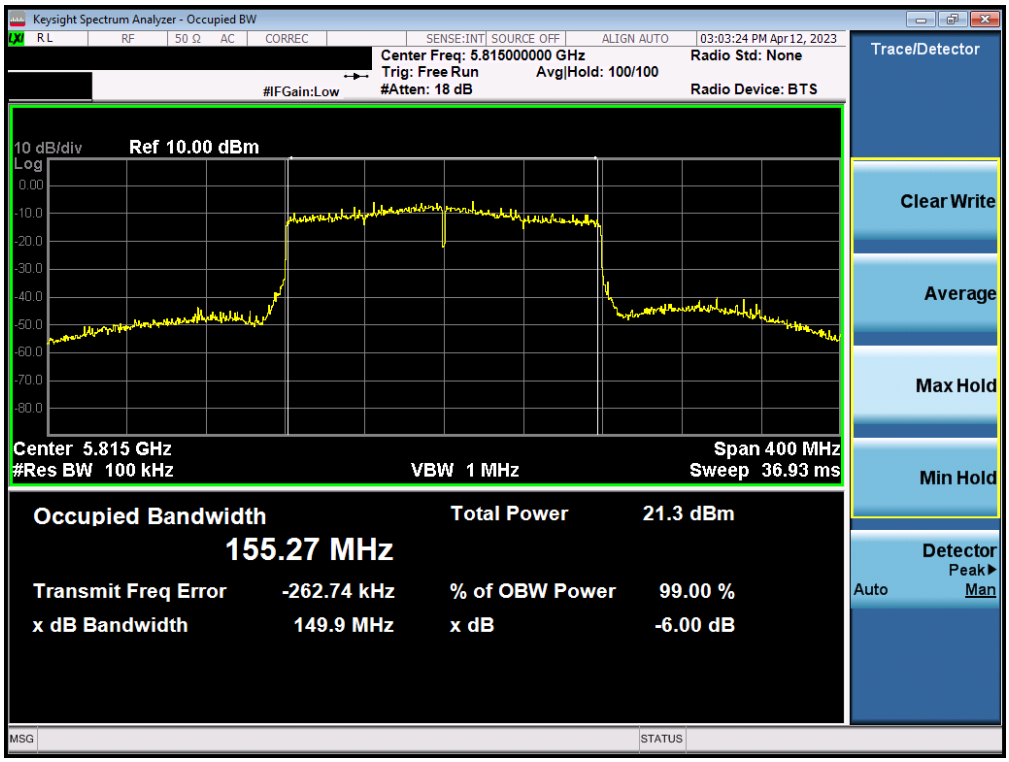
Plot 7-69. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax – 242 Tones (UNII Band 4) – Ch. 173)



Plot 7-70. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax – 484 Tones (UNII Band 3/4) – Ch. 167)



Plot 7-71. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax – 996 Tones (UNII Band 3/4) – Ch. 171)



Plot 7-72. 6dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax – 2x996 Tones (UNII Band 3/4) – Ch. 163)

7.4 UNII Output Power Measurement

Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies.

The output power limits are specified in the tables below.

UNII Band	Frequency Range	Maximum Conducted Power Limit	Maximum e.i.r.p
		FCC	FCC
UNII 1	5.15 – 5.25GHz	23.98dBm (250mW)	N/A
UNII 2A	5.25 – 5.35GHz	The lesser of 23.98dBm (250mW) **or** 11dBm + 10log$_{10}$B	N/A
UNII 2C	5.47 – 5.725GHz		
UNII 3	5.725 – 5.850GHz	30dBm (1W)	N/A
UNII 4	5.850 – 5.895GHz	N/A	30dBm (1W)

Test Procedure Used

ANSI C63.10-2013 – Section 12.3.3.2 Method PM-G
ANSI C63.10-2013 – Section 14.2 Measure-and-Sum Technique

Test Settings

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 diagram below.

Figure 7-3. Test Instrument & Measurement Setup

Test Notes

None.

MIMO Conducted Output Power Measurements (26 Tones)

20MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 0			RU Index: 4			RU Index: 8								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5180	36	26T	10.49	9.62	13.09	10.48	9.51	13.03	10.49	9.51	13.04	23.98	-10.89	-2.36	10.73	22.78	-12.05
		5200	40	26T	10.48	9.67	13.10	10.25	9.71	13.00	10.48	9.61	13.08	23.98	-10.88	-2.36	10.74	22.78	-12.04
		5240	48	26T	10.49	10.32	13.42	10.09	9.78	12.95	10.36	10.16	13.27	23.98	-10.56	-2.36	11.06	22.78	-11.72
	2A	5260	52	26T	10.33	9.51	12.95	10.18	10.39	13.30	10.07	9.52	12.81	23.78	-10.48	-2.08	11.22	23.98	-12.76
		5280	56	26T	10.27	9.52	12.92	10.14	10.31	13.24	9.95	9.61	12.79	23.78	-10.54	-2.08	11.16	23.98	-12.82
		5320	64	26T	10.17	10.46	13.33	9.64	9.89	12.78	9.91	10.20	13.07	23.78	-10.45	-2.08	11.25	23.98	-12.73
	2C	5500	100	26T	10.37	10.20	13.30	10.37	10.19	13.29	10.04	9.87	12.97	23.77	-10.47	-3.17	10.13	23.98	-13.85
		5600	120	26T	10.48	10.31	13.41	9.99	9.78	12.90	10.24	10.07	13.17	23.77	-10.36	-3.17	10.24	23.98	-13.74
		5720	144	26T	10.48	10.15	13.33	9.85	9.62	12.75	10.14	9.91	13.04	23.77	-10.44	-3.17	10.16	23.98	-13.82
	3	5745	149	26T	9.99	10.26	13.14	10.37	10.37	13.38	9.69	9.96	12.84	30.00	-16.62	-3.61	9.77	36.00	-26.23
		5785	157	26T	10.09	9.94	13.03	9.83	10.34	13.10	10.19	10.49	13.35	30.00	-16.65	-3.61	9.74	36.00	-26.26
		5825	165	26T	10.28	10.43	13.37	9.66	9.87	12.78	9.98	10.06	13.03	30.00	-16.63	-3.61	9.76	36.00	-26.24
	4	5845	169	26T	10.11	10.34	13.24	9.59	9.68	12.65	9.82	9.95	12.90	-	-	-3.34	9.90	30.00	-20.10
		5865	173	26T	10.02	10.16	13.10	10.27	10.04	13.17	10.49	10.31	13.41	-	-	-3.34	10.07	30.00	-19.93
		5885	177	26T	10.36	9.52	12.97	10.01	9.51	12.78	10.31	9.79	13.07	-	-	-3.34	9.73	30.00	-20.27

Table 7-14. MIMO 20MHz BW (UNII) Maximum Conducted Output Power (26 Tones)

40MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 0			RU Index: 8			RU Index: 17								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5190	38	26T	10.39	10.04	13.23	9.87	9.62	12.76	9.92	9.77	12.86	23.98	-10.75	-2.36	10.87	22.78	-11.91
		5230	46	26T	10.04	10.48	13.28	9.64	10.10	12.89	9.62	10.13	12.89	23.98	-10.70	-2.36	10.92	22.78	-11.86
	2A	5270	54	26T	10.25	9.91	13.09	9.73	9.40	12.58	9.75	9.40	12.59	23.78	-10.69	-2.08	11.01	23.98	-12.97
		5310	62	26T	10.19	9.95	13.08	10.03	10.67	13.37	10.03	10.49	13.28	23.78	-10.41	-2.08	11.29	23.98	-12.69
	2C	5510	102	26T	9.91	9.92	12.93	9.69	10.49	13.12	9.58	10.39	13.01	23.77	-10.65	-3.17	9.95	23.98	-14.03
		5590	118	26T	10.14	10.43	13.30	10.02	10.49	13.27	9.88	10.42	13.17	23.77	-10.47	-3.17	10.13	23.98	-13.85
		5710	142	26T	10.29	10.49	13.40	9.75	9.99	12.88	9.70	9.91	12.82	23.77	-10.37	-3.17	10.23	23.98	-13.75
	3	5755	151	26T	9.64	10.48	13.09	9.16	10.21	12.73	9.12	10.30	12.76	30.00	-16.91	-3.61	9.48	36.00	-26.52
		5795	159	26T	9.59	10.39	13.02	9.30	10.38	12.88	9.58	10.37	13.00	30.00	-16.98	-3.61	9.41	36.00	-26.59
	4	5835	167	26T	10.19	10.40	13.31	9.62	9.84	12.74	9.55	9.88	12.73	-	-	-3.34	9.97	30.00	-20.03
		5875	175	26T	9.92	10.25	13.10	9.52	10.47	13.03	9.44	10.49	13.01	-	-	-3.34	9.76	30.00	-20.24

Table 7-15. MIMO 40MHz BW (UNII) Maximum Conducted Output Power (26 Tones)

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 0			RU Index: 18			RU Index: 36								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5210	42	26T	10.40	10.31	13.37	9.98	10.13	13.07	9.99	10.25	13.13	23.98	-10.61	-2.36	11.01	22.78	-11.77
	2A	5290	58	26T	10.09	9.82	12.97	9.58	10.35	12.99	9.73	10.33	13.05	23.78	-10.73	-2.08	10.97	23.98	-13.01
	2C	5530	106	26T	10.49	10.31	13.41	9.79	10.18	13.00	9.60	10.04	12.83	23.77	-10.36	-3.17	10.24	23.98	-13.74
		5610	122	26T	10.18	10.02	13.11	9.86	10.01	12.95	9.71	10.16	12.95	23.77	-10.66	-3.17	9.94	23.98	-14.04
		5690	138	26T	10.29	9.99	13.15	9.94	10.41	13.19	9.98	10.37	13.19	23.77	-10.58	-3.17	10.02	23.98	-13.96
	3	5775	155	26T	9.51	10.26	12.91	9.83	10.39	13.13	9.96	10.48	13.24	30.00	-16.76	-3.61	9.63	36.00	-26.37
	4	5855	171	26T	9.62	10.09	12.87	9.86	10.42	13.16	10.02	10.39	13.22	-	-	-3.34	9.88	30.00	-20.12

Table 7-16. MIMO 80MHz BW (UNII) Maximum Conducted Output Power (26 Tones)

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 0 (L)			RU Index: 36 (L)			RU Index: 36 (U)								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5250	50	26T	10.49	10.44	13.48	9.79	10.28	13.05	10.38	10.35	13.37	23.98	-10.50	-2.36	11.12	22.78	-11.66
	2C	5570	114	26T	10.32	10.38	13.36	9.92	10.34	13.15	10.37	10.41	13.40	23.77	-10.37	-3.17	10.23	23.98	-13.75
	4	5815	163	26T	10.27	10.39	13.34	10.06	9.92	13.00	10.04	10.38	13.22	-	-	-3.34	10.00	30.00	-20.00

Table 7-17. MIMO 160MHz BW (UNII) Maximum Conducted Output Power (26 Tones)

MIMO Conducted Output Power Measurements (52 Tones)

20MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 37			RU Index: 39			RU Index: 40								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5180	36	52T	12.65	12.99	15.83	12.37	12.87	15.64	12.38	12.98	15.70	23.98	-8.15	-2.36	13.47	22.78	-9.31
		5200	40	52T	12.02	12.56	15.31	12.23	12.91	15.59	12.39	12.99	15.71	23.98	-8.27	-2.36	13.35	22.78	-9.43
		5240	48	52T	12.29	12.95	15.64	12.01	12.58	15.31	12.12	12.77	15.47	23.98	-8.34	-2.36	13.28	22.78	-9.50
	2A	5260	52	52T	12.47	12.98	15.74	12.10	12.88	15.52	12.26	12.98	15.65	23.78	-8.04	-2.08	13.66	23.98	-10.32
		5280	56	52T	12.41	12.99	15.72	12.08	12.81	15.47	12.23	12.95	15.62	23.78	-8.06	-2.08	13.64	23.98	-10.34
		5320	64	52T	12.43	12.78	15.62	12.29	12.84	15.58	12.46	12.99	15.74	23.78	-8.04	-2.08	13.66	23.98	-10.32
	2C	5500	100	52T	12.22	12.91	15.59	12.43	12.88	15.67	12.55	12.99	15.79	23.77	-7.98	-3.17	12.62	23.98	-11.36
		5600	120	52T	12.37	12.98	15.70	12.19	12.99	15.62	12.31	12.98	15.67	23.77	-8.07	-3.17	12.53	23.98	-11.45
		5720	144	52T	12.39	12.87	15.65	12.64	12.95	15.81	12.76	12.99	15.89	23.77	-7.88	-3.17	12.72	23.98	-11.26
	3	5745	149	52T	12.34	12.91	15.64	12.33	12.99	15.68	12.46	12.98	15.74	30.00	-14.26	-3.61	12.13	36.00	-23.87
		5785	157	52T	12.01	12.99	15.54	12.13	12.98	15.59	12.25	12.99	15.65	30.00	-14.35	-3.61	12.04	36.00	-23.96
		5825	165	52T	12.55	12.77	15.67	12.68	12.83	15.77	12.84	12.99	15.93	30.00	-14.07	-3.61	12.32	36.00	-23.68
	4	5845	169	52T	12.44	12.60	15.53	12.59	12.76	15.69	12.71	12.97	15.85	-	-	-3.34	12.51	30.00	-17.49
		5865	173	52T	12.30	12.61	15.47	12.41	12.76	15.60	12.56	12.99	15.79	-	-	-3.34	12.45	30.00	-17.55
		5885	177	52T	12.51	12.98	15.76	12.07	12.89	15.51	12.20	12.89	15.57	-	-	-3.34	12.42	30.00	-17.58

Table 7-18. MIMO 20MHz BW (UNII) Maximum Conducted Output Power (52 Tones)

40MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 37			RU Index: 40			RU Index: 44								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5190	38	52T	12.49	12.72	15.62	12.64	12.99	15.83	12.57	12.99	15.80	23.98	-8.15	-2.36	13.47	22.78	-9.31
		5230	46	52T	12.75	12.98	15.88	12.84	12.98	15.92	12.79	12.98	15.90	23.98	-8.06	-2.36	13.56	22.78	-9.22
	2A	5270	54	52T	12.35	12.99	15.69	12.45	12.99	15.74	12.71	12.54	15.64	23.78	-8.04	-2.08	13.66	23.98	-10.32
		5310	62	52T	12.75	12.91	15.84	12.57	12.88	15.74	12.50	12.91	15.72	23.78	-7.94	-2.08	13.76	23.98	-10.22
	2C	5510	102	52T	12.99	12.63	15.82	12.74	12.25	15.51	12.99	12.76	15.89	23.77	-7.88	-3.17	12.72	23.98	-11.26
		5590	118	52T	12.37	12.72	15.56	12.37	12.81	15.61	12.41	12.99	15.72	23.77	-8.05	-3.17	12.55	23.98	-11.43
		5710	142	52T	12.31	12.79	15.57	12.37	12.92	15.66	12.26	12.90	15.60	23.77	-8.11	-3.17	12.49	23.98	-11.49
	3	5755	151	52T	12.35	12.58	15.48	12.04	12.64	15.36	12.15	12.62	15.40	30.00	-14.52	-3.61	11.87	36.00	-24.13
		5795	159	52T	12.22	12.98	15.63	12.11	12.79	15.47	12.06	12.84	15.48	30.00	-14.37	-3.61	12.02	36.00	-23.98
	4	5835	167	52T	12.69	12.64	15.68	12.80	12.86	15.84	12.71	12.83	15.78	-	-	-3.34	12.50	30.00	-17.50
		5875	175	52T	12.59	12.69	15.65	12.68	12.71	15.71	12.61	12.60	15.61	-	-	-3.34	12.37	30.00	-17.63

Table 7-19. MIMO 40MHz BW (UNII) Maximum Conducted Output Power (52 Tones)

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 37			RU Index: 44			RU Index: 52								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5210	42	52T	12.92	12.88	15.91	12.36	12.33	15.36	12.19	12.75	15.49	23.98	-8.07	-2.36	13.55	22.78	-9.23
	2A	5290	58	52T	12.75	12.90	15.84	12.44	12.52	15.49	12.22	12.69	15.47	23.78	-7.94	-2.08	13.76	23.98	-10.22
	2C	5530	106	52T	12.89	12.96	15.94	12.21	12.44	15.34	12.21	12.84	15.55	23.77	-7.83	-3.17	12.77	23.98	-11.21
		5610	122	52T	12.96	12.93	15.95	12.14	12.11	15.14	12.17	12.88	15.55	23.77	-7.82	-3.17	12.78	23.98	-11.20
		5690	138	52T	12.99	12.63	15.82	12.33	12.32	15.34	12.20	12.14	15.18	23.77	-7.95	-3.17	12.65	23.98	-11.33
	3	5775	155	52T	12.97	12.72	15.86	12.56	12.86	15.72	12.77	12.69	15.74	30.00	-14.14	-3.61	12.25	36.00	-23.75
	4	5855	171	52T	12.98	12.81	15.91	12.60	12.67	15.64	12.61	12.50	15.57	-	-	-3.34	12.57	30.00	-17.43

Table 7-20. MIMO 80MHz BW (UNII) Maximum Conducted Output Power (52 Tones)

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 37 (L)			RU Index: 52 (L)			RU Index: 52 (U)								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5250	50	52T	12.83	12.99	15.92	12.11	12.86	15.51	12.62	12.99	15.82	23.98	-8.06	-2.36	13.56	22.78	-9.22
	2C	5570	114	52T	12.54	12.89	15.73	12.23	12.92	15.60	12.72	12.89	15.82	23.77	-7.95	-3.17	12.65	23.98	-11.33
	4	5815	163	52T	12.62	12.99	15.82	12.32	12.88	15.62	12.69	12.87	15.79	-	-	-3.34	12.48	30.00	-17.52

Table 7-21. MIMO 160MHz BW (UNII) Maximum Conducted Output Power (52 Tones)

MIMO Conducted Output Power Measurements (106 Tones)

	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 53			RU Index: 54								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
20MHz BW	1	5180	36	106T	15.48	15.95	18.73	15.31	15.84	18.59	23.98	-5.25	-2.36	16.37	22.78	-6.41
		5200	40	106T	15.40	15.98	18.71	15.23	15.89	18.58	23.98	-5.27	-2.36	16.35	22.78	-6.43
		5240	48	106T	15.18	15.79	18.51	15.02	15.66	18.36	23.98	-5.47	-2.36	16.15	22.78	-6.63
	2A	5260	52	106T	15.33	15.84	18.60	15.12	15.64	18.40	23.78	-5.18	-2.08	16.52	23.98	-7.46
		5280	56	106T	15.27	15.73	18.52	15.13	15.59	18.38	23.78	-5.26	-2.08	16.44	23.98	-7.54
		5320	64	106T	15.96	15.99	18.99	15.78	15.94	18.87	23.78	-4.79	-2.08	16.91	23.98	-7.07
	2C	5500	100	106T	15.25	15.77	18.53	15.03	15.63	18.35	23.77	-5.24	-3.17	15.36	23.98	-8.62
		5600	120	106T	15.39	15.98	18.71	15.15	15.69	18.44	23.77	-5.06	-3.17	15.54	23.98	-8.44
		5720	144	106T	15.68	15.84	18.77	15.45	15.66	18.57	23.77	-5.00	-3.17	15.60	23.98	-8.38
	3	5745	149	106T	15.24	15.90	18.59	15.07	15.77	18.44	30.00	-11.41	-3.61	14.98	36.00	-21.02
		5785	157	106T	15.04	15.82	18.46	15.26	15.98	18.65	30.00	-11.35	-3.61	15.04	36.00	-20.96
		5825	165	106T	15.82	15.84	18.84	15.56	15.63	18.61	30.00	-11.16	-3.61	15.23	36.00	-20.77
	4	5845	169	106T	15.69	15.71	18.71	15.97	15.98	18.99	-	-	-3.34	15.65	30.00	-14.35
		5865	173	106T	15.57	15.69	18.64	15.27	15.56	18.43	-	-	-3.34	15.30	30.00	-14.70
		5885	177	106T	15.26	15.76	18.53	14.99	15.66	18.35	-	-	-3.34	15.19	30.00	-14.81

Table 7-22. MIMO 20MHz BW (UNII) Maximum Conducted Output Power (106 Tones)

	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 53			RU Index: 54			RU Index: 56								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
40MHz BW	1	5190	38	106T	15.95	15.81	18.89	15.93	15.81	18.88	15.77	15.84	18.82	23.98	-5.09	-2.36	16.53	22.78	-6.25
		5230	46	106T	15.70	15.93	18.83	15.40	15.64	18.53	15.41	15.59	18.51	23.98	-5.15	-2.36	16.47	22.78	-6.31
	2A	5270	54	106T	15.62	15.85	18.75	15.31	15.54	18.44	15.29	15.50	18.41	23.78	-5.03	-2.08	16.67	23.98	-7.31
		5310	62	106T	15.49	15.42	18.47	15.52	15.73	18.64	15.39	15.70	18.55	23.78	-5.14	-2.08	16.56	23.98	-7.42
	2C	5510	102	106T	15.71	15.99	18.86	15.32	15.76	18.56	15.10	15.66	18.40	23.77	-4.91	-3.17	15.69	23.98	-8.29
		5590	118	106T	15.79	15.92	18.87	15.39	15.58	18.50	15.12	15.26	18.20	23.77	-4.90	-3.17	15.70	23.98	-8.28
		5710	142	106T	15.11	15.63	18.39	15.19	15.86	18.55	15.11	15.67	18.41	23.77	-5.22	-3.17	15.38	23.98	-8.60
	3	5755	151	106T	15.41	15.98	18.71	15.11	15.77	18.46	15.01	15.63	18.34	30.00	-11.29	-3.61	15.10	36.00	-20.90
		5795	159	106T	15.50	15.59	18.56	15.17	15.61	18.41	15.34	15.55	18.46	30.00	-11.44	-3.61	14.95	36.00	-21.05
	4	5835	167	106T	15.99	15.70	18.86	15.67	15.43	18.56	15.54	15.36	18.46	-	-	-3.34	15.52	30.00	-14.48
		5875	175	106T	15.88	15.70	18.80	15.58	15.38	18.49	15.42	15.18	18.31	-	-	-3.34	15.46	30.00	-14.54

Table 7-23. MIMO 40MHz BW (UNII) Maximum Conducted Output Power (106 Tones)

	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 53			RU Index: 56			RU Index: 60								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
80MHz BW	1	5210	42	106T	15.88	15.99	18.95	15.71	15.74	18.74	15.38	15.92	18.67	23.98	-5.03	-2.36	16.59	22.78	-6.19
	2A	5290	58	106T	15.86	15.77	18.83	15.76	15.82	18.80	15.42	15.74	18.59	23.78	-4.95	-2.08	16.75	23.98	-7.23
	2C	5530	106	106T	15.82	15.91	18.88	15.72	15.71	18.73	15.36	15.89	18.64	23.77	-4.89	-3.17	15.71	23.98	-8.27
		5610	122	106T	15.78	15.93	18.87	15.67	15.80	18.75	15.27	15.94	18.63	23.77	-4.90	-3.17	15.70	23.98	-8.28
		5690	138	106T	15.86	15.88	18.88	15.16	15.49	18.34	15.78	15.84	18.82	23.77	-4.89	-3.17	15.71	23.98	-8.27
	3	5775	155	106T	15.89	15.67	18.79	15.88	15.71	18.81	15.77	15.42	18.61	30.00	-11.19	-3.61	15.20	36.00	-20.80
	4	5855	171	106T	15.99	15.78	18.90	15.84	15.62	18.74	15.65	15.32	18.50	-	-	-3.34	15.56	30.00	-14.44

Table 7-24. MIMO 80MHz BW (UNII) Maximum Conducted Output Power (106 Tones)

	Band	Freq [MHz]	Channel	Tones	Average 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]
					RU Index: 53 (L)			RU Index: 60 (L)			RU Index: 60 (U)								
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
160MHz BW	1	5250	50	106T	15.86	15.97	18.92	15.09	15.79	18.46	15.64	15.99	18.83	23.98	-5.06	-2.36	16.56	22.78	-6.22
	2C	5570	114	106T	15.90	15.96	18.94	15.24	15.66	18.47	15.70	15.98	18.85	23.77	-4.83	-3.17	15.77	23.98	-8.21
	4	5815	163	106T	15.88	15.90	18.90	15.33	15.71	18.53	15.72	15.99	18.87	-	-	-3.34	15.56	30.00	-14.44

Table 7-25. MIMO 160MHz BW (UNII) Maximum Conducted Output Power (106 Tones)

MIMO Conducted Output Power Measurements (242 Tones)

	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 61 ANT1	ANT2	MIMO	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]
20MHz BW	1	5180	36	242T	15.13	15.68	18.42	23.98	-5.56	-2.36	16.06	22.78	-6.72
		5200	40	242T	15.05	15.74	18.42	23.98	-5.56	-2.36	16.06	22.78	-6.72
		5240	48	242T	14.97	15.61	18.31	23.98	-5.67	-2.36	15.95	22.78	-6.83
	2A	5260	52	242T	15.14	15.51	18.34	23.78	-5.44	-2.08	16.26	23.98	-7.72
		5280	56	242T	15.09	15.44	18.28	23.78	-5.50	-2.08	16.20	23.98	-7.78
		5320	64	242T	15.57	15.89	18.74	23.78	-5.04	-2.08	16.66	23.98	-7.32
	2C	5500	100	242T	15.44	15.88	18.68	23.77	-5.09	-3.17	15.51	23.98	-8.47
		5600	120	242T	15.43	15.79	18.62	23.77	-5.15	-3.17	15.45	23.98	-8.53
		5720	144	242T	15.44	15.63	18.55	23.77	-5.22	-3.17	15.38	23.98	-8.60
	3	5745	149	242T	14.91	15.81	18.39	30.00	-11.61	-3.61	14.78	36.00	-21.22
		5785	157	242T	14.92	15.64	18.31	30.00	-11.69	-3.61	14.70	36.00	-21.30
		5825	165	242T	15.65	15.55	18.61	30.00	-11.39	-3.61	15.00	36.00	-21.00
	4	5845	169	242T	15.50	15.48	18.50	-	-	-3.34	15.16	30.00	-14.84
		5865	173	242T	15.35	15.48	18.43	-	-	-3.34	15.09	30.00	-14.91
		5885	177	242T	15.41	15.62	18.53	-	-	-3.34	15.19	30.00	-14.81

Table 7-26. MIMO 20MHz BW (UNII) Maximum Conducted Output Power (242 Tones)

	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 61 ANT1	ANT2	MIMO	RU Index: 62 ANT1	ANT2	MIMO	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]
40MHz BW	1	5190	38	242T	14.78	14.66	17.73	14.48	14.51	17.51	23.98	-6.25	-2.36	15.37	22.78	-7.41
		5230	46	242T	14.67	15.00	17.85	14.44	14.80	17.63	23.98	-6.13	-2.36	15.49	22.78	-7.29
	2A	5270	54	242T	14.87	14.99	17.94	14.58	14.68	17.64	23.78	-5.84	-2.08	15.86	23.98	-8.12
		5310	62	242T	14.59	14.81	17.71	14.34	14.62	17.49	23.78	-6.07	-2.08	15.63	23.98	-8.35
	2C	5510	102	242T	14.49	14.87	17.69	14.02	14.67	17.36	23.77	-6.08	-3.17	14.52	23.98	-9.46
		5590	118	242T	14.54	14.73	17.64	14.17	14.38	17.28	23.77	-6.13	-3.17	14.47	23.98	-9.51
		5710	142	242T	14.34	14.95	17.67	14.13	14.64	17.40	23.77	-6.10	-3.17	14.50	23.98	-9.48
	3	5755	151	242T	14.22	14.90	17.59	14.53	14.99	17.78	30.00	-12.22	-3.61	14.17	36.00	-21.83
		5795	159	242T	14.30	14.73	17.53	14.10	14.53	17.33	30.00	-12.47	-3.61	13.92	36.00	-22.08
	4	5835	167	242T	14.81	14.53	17.68	14.51	14.32	17.43	-	-	-3.34	14.34	30.00	-15.66
		5875	175	242T	14.71	14.56	17.65	14.49	14.25	17.38	-	-	-3.34	14.31	30.00	-15.69

Table 7-27. MIMO 40MHz BW (UNII) Maximum Conducted Output Power (242 Tones)

	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 61 ANT1	ANT2	MIMO	RU Index: 62 ANT1	ANT2	MIMO	RU Index: 64 ANT1	ANT2	MIMO	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]
80MHz BW	1	5210	42	242T	13.41	13.74	16.59	13.63	13.40	16.53	13.71	13.32	16.53	23.98	-7.39	-2.36	14.23	22.78	-8.55
	2A	5290	58	242T	13.55	13.61	16.59	13.73	13.34	16.55	13.62	13.44	16.54	23.78	-7.19	-2.08	14.51	23.98	-9.47
	2C	5530	106	242T	13.58	13.71	16.66	13.20	13.24	16.23	13.10	13.81	16.48	23.77	-7.11	-3.17	13.49	23.98	-10.49
		5610	122	242T	13.62	13.63	16.63	13.16	13.26	16.22	13.08	13.77	16.45	23.77	-7.14	-3.17	13.46	23.98	-10.52
		5690	138	242T	13.89	13.59	16.75	13.42	13.34	16.39	13.28	13.27	16.29	23.77	-7.02	-3.17	13.58	23.98	-10.40
	3	5775	155	242T	13.70	13.62	16.67	13.19	13.76	16.49	13.21	13.95	16.61	30.00	-13.33	-3.61	13.06	36.00	-22.94
	4	5855	171	242T	13.65	13.58	16.63	13.71	13.73	16.73	13.31	13.28	16.30	-	-	-3.34	13.39	30.00	-16.61

Table 7-28. MIMO 80MHz BW (UNII) Maximum Conducted Output Power (242 Tones)

	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 61 (L) ANT1	ANT2	MIMO	RU Index: 64 (L) ANT1	ANT2	MIMO	RU Index: 64 (U) ANT1	ANT2	MIMO	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]
160MHz BW	1	5250	50	242T	13.01	12.93	15.98	12.39	12.89	15.66	12.76	12.81	15.80	23.98	-8.00	-2.36	13.62	22.78	-9.16
	2C	5570	114	242T	12.86	12.98	15.93	12.44	12.80	15.63	12.79	12.84	15.83	23.77	-7.84	-3.17	12.76	23.98	-11.22
	4	5815	163	242T	12.77	12.96	15.88	12.54	12.79	15.68	12.84	12.69	15.78	-	-	-3.34	12.54	30.00	-17.46

Table 7-29. MIMO 160MHz BW (UNII) Maximum Conducted Output Power (242 Tones)

MIMO Conducted Output Power Measurements (484 Tones)

	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 65 ANT1	ANT2	MIMO	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]
40MHz BW	1	5190	38	484T	14.34	14.90	17.64	23.98	-6.34	-2.36	15.28	22.78	-7.50
		5230	46	484T	14.07	14.69	17.40	23.98	-6.58	-2.36	15.04	22.78	-7.74
	2A	5270	54	484T	14.20	14.69	17.46	23.78	-6.32	-2.08	15.38	23.98	-8.60
		5310	62	484T	14.88	14.89	17.90	23.78	-5.88	-2.08	15.82	23.98	-8.16
	2C	5510	102	484T	14.46	15.00	17.75	23.77	-6.02	-3.17	14.58	23.98	-9.40
		5590	118	484T	14.27	14.89	17.60	23.77	-6.17	-3.17	14.43	23.98	-9.55
		5710	142	484T	14.55	14.78	17.68	23.77	-6.09	-3.17	14.51	23.98	-9.47
	3	5755	151	484T	14.02	14.76	17.42	30.00	-12.58	-3.61	13.81	36.00	-22.19
		5795	159	484T	14.28	15.00	17.67	30.00	-12.33	-3.61	14.06	36.00	-21.94
	4	5835	167	484T	14.60	14.64	17.63	-	-	-3.34	14.29	30.00	-15.71
		5875	175	484T	14.37	14.59	17.49	-	-	-3.34	14.15	30.00	-15.85

Table 7-30. MIMO 40MHz BW (UNII) Maximum Conducted Output Power (484 Tones)

	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 65 ANT1	ANT2	MIMO	RU Index: 66 ANT1	ANT2	MIMO	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]
80MHz BW	1	5210	42	484T	13.58	13.87	16.74	13.22	13.57	16.41	23.98	-7.24	-2.36	14.38	22.78	-8.40
	2A	5290	58	484T	13.61	13.96	16.80	13.14	13.68	16.43	23.78	-6.98	-2.08	14.72	23.98	-9.26
	2C	5530	106	484T	13.57	13.97	16.78	13.09	13.70	16.41	23.77	-6.99	-3.17	13.61	23.98	-10.37
		5610	122	484T	13.75	13.94	16.86	13.14	13.60	16.38	23.77	-6.91	-3.17	13.69	23.98	-10.29
		5690	138	484T	13.88	13.96	16.93	13.35	13.60	16.49	23.77	-6.84	-3.17	13.76	23.98	-10.22
	3	5775	155	484T	13.32	13.93	16.64	13.14	13.89	16.54	30.00	-13.36	-3.61	13.03	36.00	-22.97
	4	5855	171	484T	13.37	13.35	16.37	13.29	13.34	16.32	-	-	-3.34	13.03	30.00	-16.97

Table 7-31. MIMO 80MHz BW (UNII) Maximum Conducted Output Power (484 Tones)

	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 65 (L) ANT1	ANT2	MIMO	RU Index: 66 (U) ANT1	ANT2	MIMO	RU Index: 66 (L) ANT1	ANT2	MIMO	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]
160MHz BW	1	5250	50	484T	12.91	12.77	15.85	12.56	12.91	15.75	12.47	12.67	15.58	23.98	-8.13	-2.36	13.49	22.78	-9.29
	2C	5570	114	484T	12.84	12.66	15.76	12.64	12.92	15.79	12.54	12.72	15.64	23.77	-7.98	-3.17	12.62	23.98	-11.36
	4	5815	163	484T	12.77	12.91	15.85	12.71	12.89	15.81	12.65	12.71	15.69	-	-	-3.34	12.51	30.00	-17.49

Table 7-32. MIMO 160MHz BW (UNII) Maximum Conducted Output Power (484 Tones)

MIMO Conducted Output Power Measurements (996 Tones)

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 67			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]
					ANT1	ANT2	MIMO						
	1	5210	42	996T	13.71	13.95	16.84	23.98	-7.14	-2.36	14.48	22.78	-8.30
	2A	5290	58	996T	13.15	13.90	16.55	23.78	-7.23	-2.08	14.47	23.98	-9.51
	2C	5530	106	996T	12.80	13.74	16.31	23.77	-7.46	-3.17	13.14	23.98	-10.84
		5610	122	996T	13.00	13.76	16.41	23.77	-7.36	-3.17	13.24	23.98	-10.74
		5690	138	996T	12.82	13.76	16.33	23.77	-7.44	-3.17	13.16	23.98	-10.82
	3	5775	155	996T	13.33	13.98	16.68	30.00	-13.32	-3.61	13.07	36.00	-22.93
	4	5855	171	996T	13.66	13.86	16.77	-	-	-3.34	13.43	30.00	-16.57

Table 7-33. MIMO 80MHz BW (UNII) Maximum Conducted Output Power (996 Tones)

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 67 (L)			RU Index: 67 (U)			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]
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO						
	1	5250	50	996T	12.89	12.90	15.91	12.09	12.48	15.30	23.98	-8.07	-2.36	13.55	22.78	-9.23
	2C	5570	114	996T	12.94	12.71	15.84	12.71	12.68	15.71	23.77	-7.93	-3.17	12.67	23.98	-11.31
	4	5815	163	996T	12.76	12.49	15.64	12.49	12.60	15.56	-	-	-3.34	12.30	30.00	-17.70

Table 7-34. MIMO 160MHz BW (UNII) Maximum Conducted Output Power (996 Tones)

MIMO Conducted Output Power Measurements (2x996 Tones)

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm) RU Index: 68			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]
					ANT1	ANT2	MIMO						
	1	5250	50	2x996T	12.34	12.83	15.60	23.98	-8.38	-2.36	13.24	22.78	-9.54
	2C	5570	114	2x996T	11.81	13.15	15.54	23.77	-8.23	-3.17	12.37	23.98	-11.61
	4	5815	163	2x996T	12.23	13.49	15.92	-	-	-3.34	12.58	30.00	-17.42

Table 7-35. MIMO 160MHz BW (UNII) Maximum Conducted Output Power (2x996 Tones)

Note:

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

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

$$\text{Directional gain} = 10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}] \text{ dBi}$$

Sample MIMO Calculation:

At 5180MHz in 802.11ax (20MHz BW – 26T) mode, the average conducted output power was measured to be 10.49 dBm for Antenna 1 and 9.62 dBm for Antenna 2.

Antenna 1 + Antenna 2 = MIMO

(10.49 dBm + 9.62 dBm) = (11.19 mW + 9.16 mW) = 20.35 mW = 13.09 dBm

Sample e.i.r.p. Calculation:

At 5180MHz in 802.11ax (20MHz BW – 26T) mode, the average MIMO conducted power was calculated to be 13.09 dBm with directional gain of -2.36 dBi.

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

13.09 dBm + -2.36 dBi = 10.73 dBm

7.5 Maximum Power Spectral Density

Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies. Method SA-1, as defined in ANSI C63.10-2013, was used to measure the power spectral density.

The output power density limits are as specified in the tables below.

UNII Band	Frequency Range	Maximum Power Spectral Density	
		FCC	ISED
UNII 1	5.15 – 5.25GHz	11dBm/MHz	10dBm/MHz e.i.r.p
UNII 2A	5.25 – 5.35GHz	11dBm/MHz	
UNII 2C	5.47 – 5.725GHz		
UNII 3	5.725 – 5.850GHz	30dBm/500kHz	
UNII 4	5.850 – 5.895GHz	14dBm/MHz e.i.r.p	Not Supported

Test Procedure Used

ANSI C63.10-2013 – Section 12.3.2.2 (Method SA-1)
ANSI C63.10-2013 – Section 14.3.2.2 Measure-and-Sum Technique

Test Settings

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz
4. VBW = 3MHz
5. Number of sweep points $\geq$ 2 x (span/RBW)
6. Sweep time = auto
7. Detector = power averaging (RMS)
8. Trigger was set to free run for all modes
9. Trace was averaged over 100 sweeps
10. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

Test Setup

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

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

The power spectral density for each channel was measured with the RU index showing the highest conducted power.

Summed MIMO Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Summed MIMO Power Density [dBm]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	ax (20MHz)	26T	MCS0	6.74	6.70	9.73	11.00	-1.27
	5200	40	ax (20MHz)	26T	MCS0	6.82	6.92	9.88	11.00	-1.12
	5240	48	ax (20MHz)	26T	MCS0	7.14	6.88	10.02	11.00	-0.98
	5190	38	ax (40MHz)	26T	MCS0	6.78	6.97	9.89	11.00	-1.11
	5230	46	ax (40MHz)	26T	MCS0	6.62	7.08	9.87	11.00	-1.13
	5210	42	ax (80MHz)	26T	MCS0	6.36	6.94	9.67	11.00	-1.33
1/2A	5250	50	ax (160MHz)	26T	MCS0	6.68	6.66	9.68	11.00	-1.32
Band 2A	5260	52	ax (20MHz)	26T	MCS0	7.31	7.04	10.19	11.00	-0.81
	5280	56	ax (20MHz)	26T	MCS0	7.41	7.05	10.24	11.00	-0.76
	5320	64	ax (20MHz)	26T	MCS0	6.88	7.12	10.02	11.00	-0.98
	5270	54	ax (40MHz)	26T	MCS0	7.26	7.25	10.26	11.00	-0.74
	5310	62	ax (40MHz)	26T	MCS0	6.90	6.80	9.86	11.00	-1.14
	5290	58	ax (80MHz)	26T	MCS0	7.15	6.65	9.92	11.00	-1.08
Band 2C	5500	100	ax (20MHz)	26T	MCS0	7.07	7.04	10.07	11.00	-0.93
	5600	120	ax (20MHz)	26T	MCS0	6.70	6.72	9.72	11.00	-1.28
	5720	144	ax (20MHz)	26T	MCS0	6.97	6.83	9.91	11.00	-1.09
	5510	102	ax (40MHz)	26T	MCS0	7.02	6.84	9.94	11.00	-1.06
	5590	118	ax (40MHz)	26T	MCS0	7.16	6.98	10.08	11.00	-0.92
	5710	142	ax (40MHz)	26T	MCS0	7.31	7.22	10.28	11.00	-0.72
	5530	106	ax (80MHz)	26T	MCS0	7.27	6.87	10.08	11.00	-0.92
	5610	122	ax (80MHz)	26T	MCS0	7.88	7.08	10.51	11.00	-0.49
	5690	138	ax (80MHz)	26T	MCS0	7.89	6.88	10.42	11.00	-0.58
	5570	114	ax (160MHz)	26T	MCS0	6.90	7.00	9.96	11.00	-1.04

Table 7-36. Bands 1, 2A, 2C MIMO Conducted Power Spectral Density Measurements MIMO (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Summed MIMO Power Density [dBm]	Max Permissible Power Density	Margin [dB]
Band 3	5745	149	ax (20MHz)	26T	MCS0	7.86	9.09	11.52	30.00	-18.48
	5785	157	ax (20MHz)	26T	MCS0	7.85	10.07	12.11	30.00	-17.89
	5825	165	ax (20MHz)	26T	MCS0	7.74	9.38	11.65	30.00	-18.35
	5755	151	ax (40MHz)	26T	MCS0	6.87	8.46	10.75	30.00	-19.25
	5795	159	ax (40MHz)	26T	MCS0	7.17	8.58	10.94	30.00	-19.06
	5775	155	ax (80MHz)	26T	MCS0	7.15	9.10	11.24	30.00	-18.76

Table 7-37. Band 3 MIMO Conducted Power Spectral Density Measurements MIMO (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Antenna-1 Power Density [dBm/MHz]	Antenna-2 Power Density [dBm/MHz]	MIMO Summed Power Density [dBm/MHz]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]	Directional Antenna Gain [dBi]	EIRP Power Density [dBm/MHz]	Max EIRP Power Density [dBm/MHz]	Margin [dB]
Band 3/4	5845	169	ax (20MHz)	26T	MCS0	10.58	11.20	13.91	30.00	-16.09	-3.43	10.48	14.00	-3.52
Band 4	5865	173	ax (20MHz)	26T	MCS0	10.57	10.85	13.72			-3.34	10.38	14.00	-3.62
	5885	177	ax (20MHz)	26T	MCS0	10.74	10.62	13.69			-3.34	10.35	14.00	-3.65
Band 3/4	5835	167	ax (40MHz)	26T	MCS0	10.54	10.00	13.29	30.00	-16.71	-3.43	9.86	14.00	-4.14
Band 4	5875	175	ax (40MHz)	26T	MCS0	10.54	10.04	13.31			-3.34	9.97	14.00	-4.03
Band 3/4	5855	171	ax (80MHz)	26T	MCS0	10.28	10.16	13.23	30.00	-16.77	-3.43	9.80	14.00	-4.20
	5815	163	ax (160MHz)	26T	MCS0	11.33	11.23	14.29	30.00	-15.71	-3.88	10.41	14.00	-3.59

Table 7-38. Bands 3/4 MIMO Conducted Power Spectral Density Measurements MIMO (26 Tones)

	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Summed MIMO Power Density [dBm]	Max Power Density [dBm/MHz]	Margin [dB]
Band 1	5180	36	ax (20MHz)	242T	MCS0	4.03	3.93	6.99	11.00	-4.01
	5200	40	ax (20MHz)	242T	MCS0	3.96	3.80	6.89	11.00	-4.11
	5240	48	ax (20MHz)	242T	MCS0	3.36	3.70	6.54	11.00	-4.46
	5190	38	ax (40MHz)	484T	MCS0	0.34	0.07	3.22	11.00	-7.78
	5230	46	ax (40MHz)	484T	MCS0	-0.52	0.04	2.78	11.00	-8.22
	5210	42	ax (80MHz)	996T	MCS0	-3.42	-3.70	-0.55	11.00	-11.55
1/2A	5250	50	ax (160MHz)	2x996T	MCS0	-5.91	-6.04	-2.96	11.00	-13.96
Band 2A	5260	52	ax (20MHz)	242T	MCS0	4.01	4.13	7.08	11.00	-3.92
	5280	56	ax (20MHz)	242T	MCS0	4.01	3.61	6.82	11.00	-4.18
	5320	64	ax (20MHz)	242T	MCS0	4.20	4.50	7.36	11.00	-3.64
	5270	54	ax (40MHz)	484T	MCS0	0.18	0.93	3.58	11.00	-7.42
	5310	62	ax (40MHz)	484T	MCS0	0.69	0.74	3.73	11.00	-7.27
	5290	58	ax (80MHz)	996T	MCS0	-3.27	-2.96	-0.10	11.00	-11.10
Band 2C	5500	100	ax (20MHz)	242T	MCS0	4.38	4.61	7.51	11.00	-3.49
	5600	120	ax (20MHz)	242T	MCS0	3.86	4.41	7.15	11.00	-3.85
	5720	144	ax (20MHz)	242T	MCS0	3.97	4.11	7.05	11.00	-3.95
	5510	102	ax (40MHz)	484T	MCS0	0.49	0.83	3.67	11.00	-7.33
	5590	118	ax (40MHz)	484T	MCS0	-0.03	0.22	3.11	11.00	-7.89
	5710	142	ax (40MHz)	484T	MCS0	0.06	0.20	3.14	11.00	-7.86
	5530	106	ax (80MHz)	996T	MCS0	-3.95	-3.95	-0.94	11.00	-11.94
	5610	122	ax (80MHz)	996T	MCS0	-3.67	-3.66	-0.65	11.00	-11.65
	5690	138	ax (80MHz)	996T	MCS0	-3.60	-3.77	-0.67	11.00	-11.67
	5570	114	ax (160MHz)	2x996T	MCS0	-5.91	-4.72	-2.26	11.00	-13.26

Table 7-39. Bands 1, 2A, 2C MIMO Conducted Power Spectral Density Measurements MIMO (Full Tones)

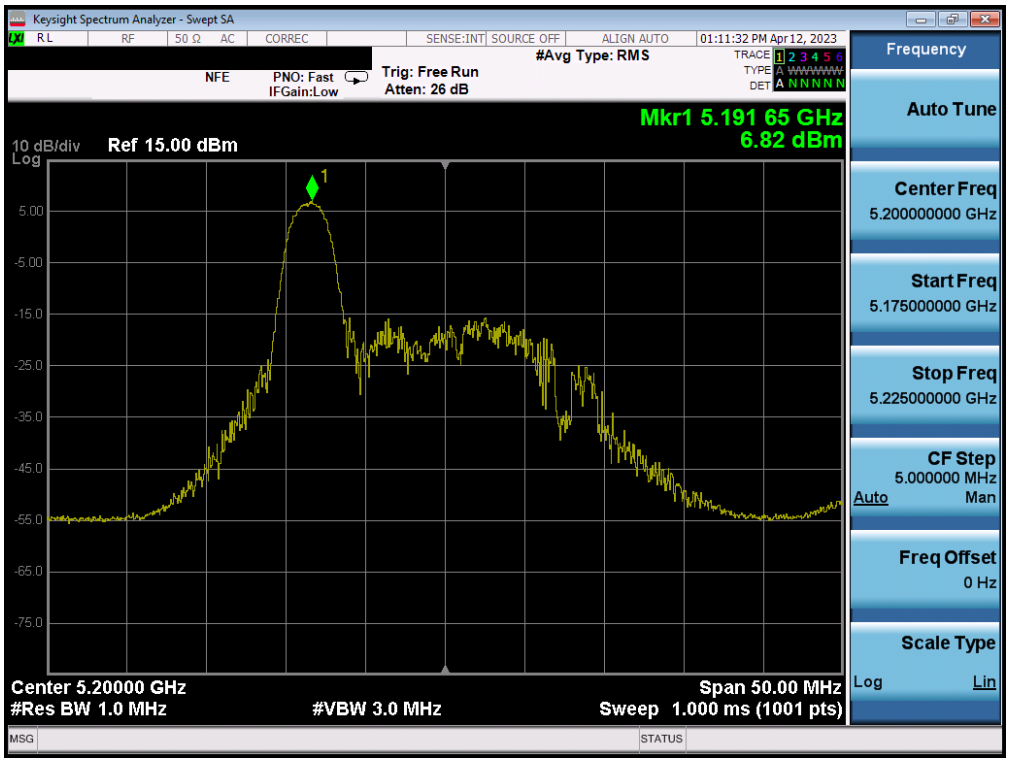
	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Summed MIMO Power Density [dBm]	Max Permissible Power Density	Margin [dB]
Band 3	5745	149	ax (20MHz)	242T	MCS0	0.60	1.43	4.05	30.00	-25.95
	5785	157	ax (20MHz)	242T	MCS0	0.67	1.41	4.07	30.00	-25.93
	5825	165	ax (20MHz)	242T	MCS0	1.38	1.15	4.28	30.00	-25.72
	5755	151	ax (40MHz)	484T	MCS0	-3.04	-2.36	0.32	30.00	-29.68
	5795	159	ax (40MHz)	484T	MCS0	-2.90	-1.70	0.75	30.00	-29.25
	5775	155	ax (80MHz)	996T	MCS0	-5.99	-5.65	-2.81	30.00	-32.81

Table 7-40. Band 3 MIMO Conducted Power Spectral Density Measurements MIMO (Full Tones)

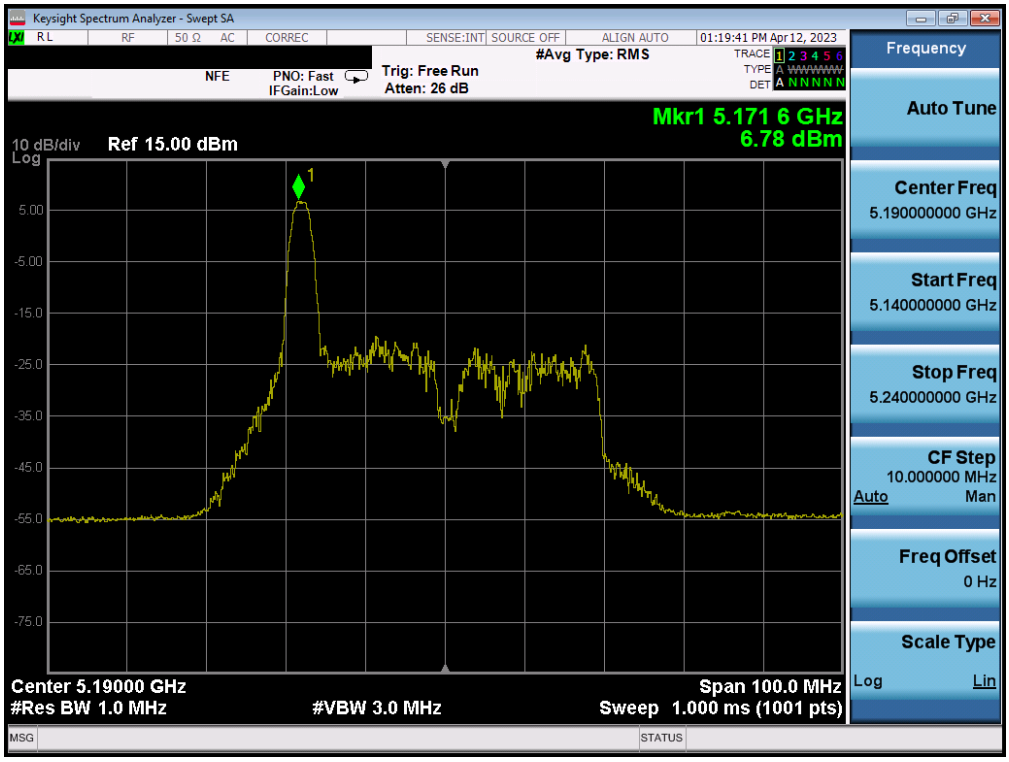
	Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Antenna-1 Power Density [dBm/MHz]	Antenna-2 Power Density [dBm/MHz]	MIMO Summed Power Density [dBm/MHz]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]	Directional Antenna Gain [dBi]	EIRP Power Density [dBm/MHz]	Max EIRP Power Density [dBm/MHz]	Margin [dB]
Band 3/4	5845	169	ax (20MHz)	242T	MCS0	4.55	3.91	7.25	30.00	-22.75	-3.43	3.83	14.00	-10.17
Band 4	5865	173	ax (20MHz)	242T	MCS0	4.52	3.82	7.19			-3.34	3.85	14.00	-10.15
	5885	177	ax (20MHz)	242T	MCS0	3.22	3.14	6.19			-3.34	2.85	14.00	-11.15
Band 3/4	5835	167	ax (40MHz)	484T	MCS0	0.87	0.06	3.49	30.00	-26.51	-3.43	0.07	14.00	-13.93
Band 4	5875	175	ax (40MHz)	484T	MCS0	0.49	0.04	3.28			-3.34	-0.06	14.00	-14.06
Band 3/4	5855	171	ax (80MHz)	996T	MCS0	-2.89	-3.11	0.01	30.00	-29.99	-3.43	-3.42	14.00	-17.42
	5815	163	ax (160MHz)	996T	MCS0	-5.52	-4.74	-2.10	30.00	-32.10	-3.88	-5.98	14.00	-19.98

Table 7-41. Bands 3/4 MIMO Conducted Power Spectral Density Measurements MIMO (Full Tones)

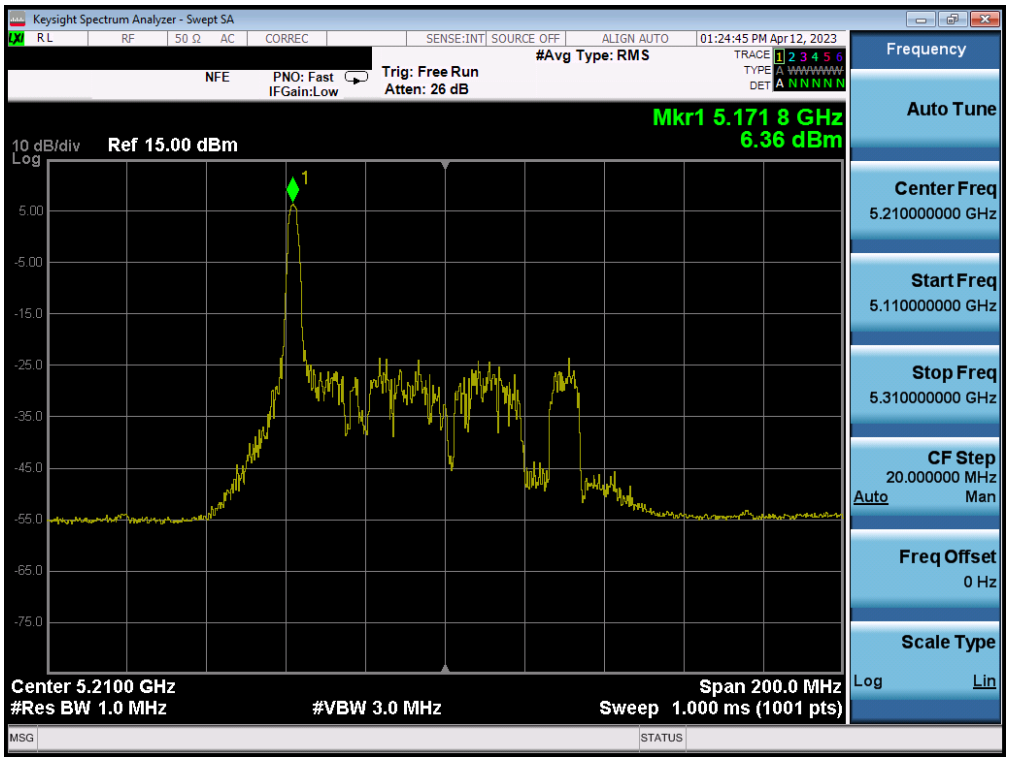
7.5.1 MIMO Antenna-1 Power Spectral Density Measurements



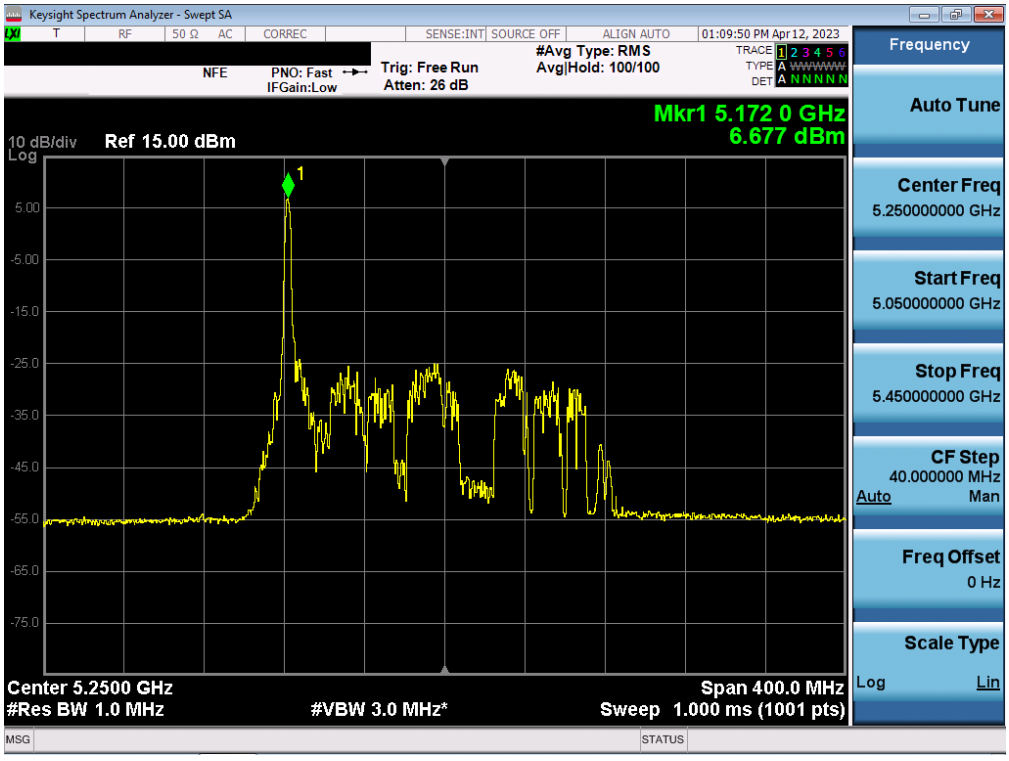
Plot 7-73. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 40)



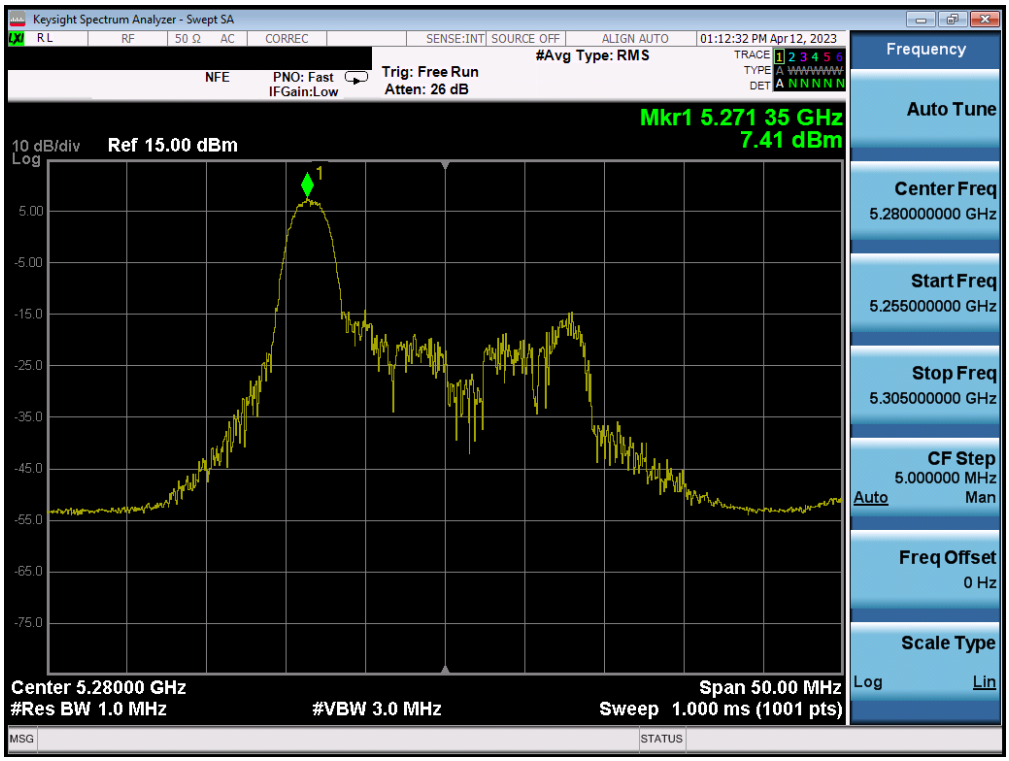
Plot 7-74. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 38)



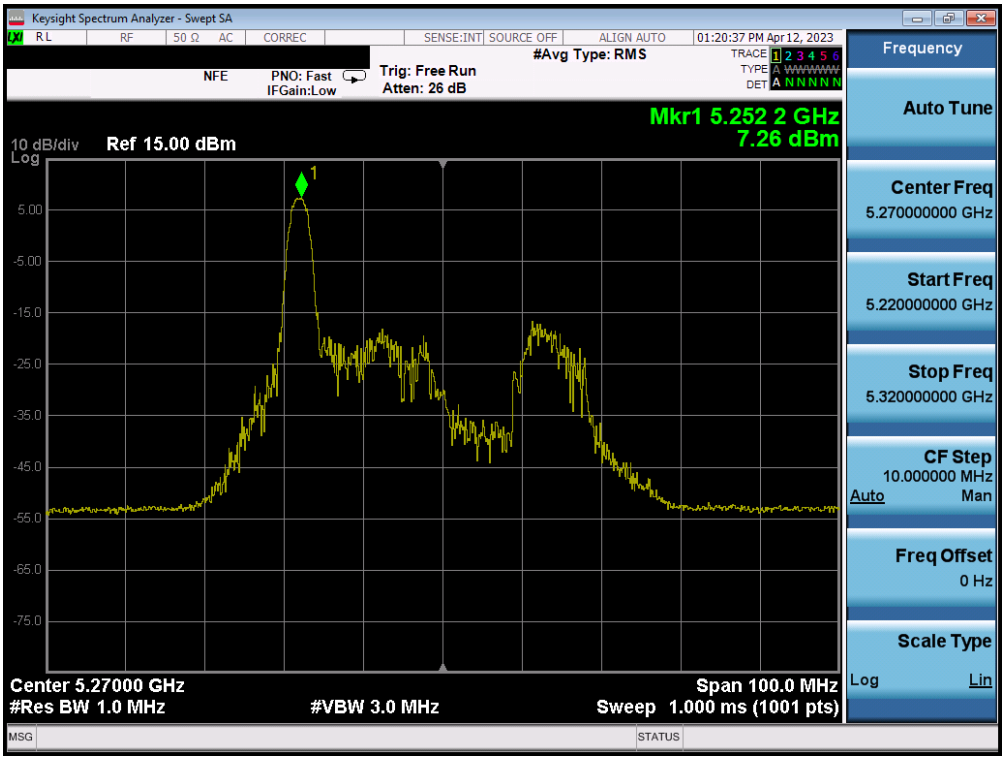
Plot 7-75. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 1) – Ch. 42)



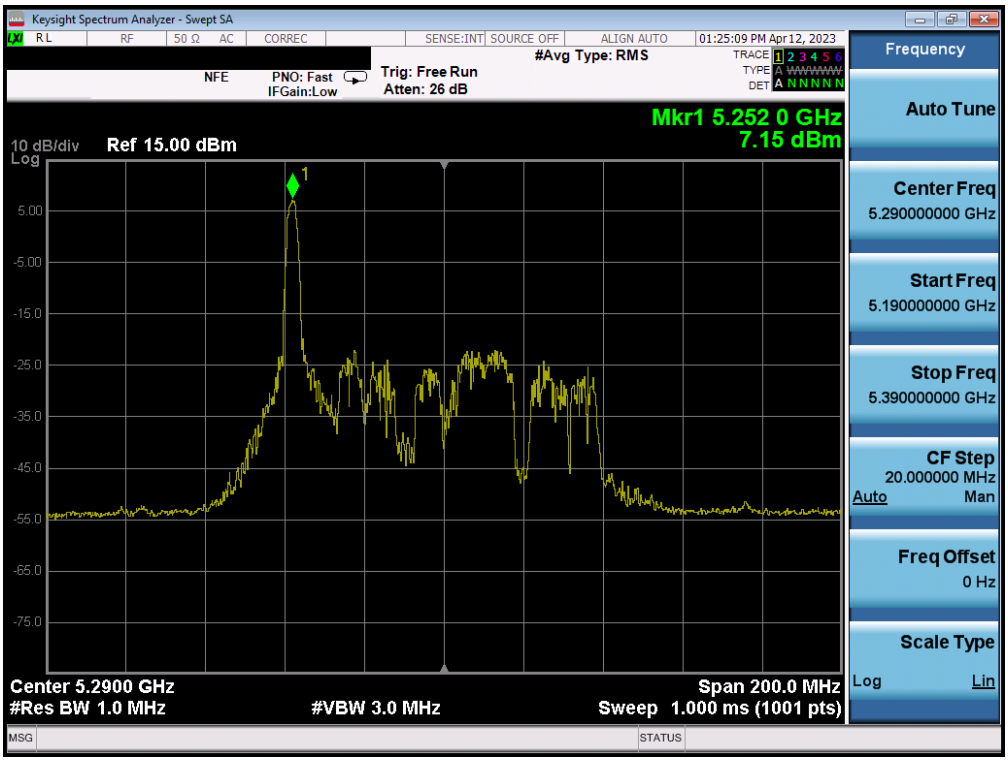
Plot 7-76. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax – 26 Tones (UNII Band 1/2A) – Ch. 50)



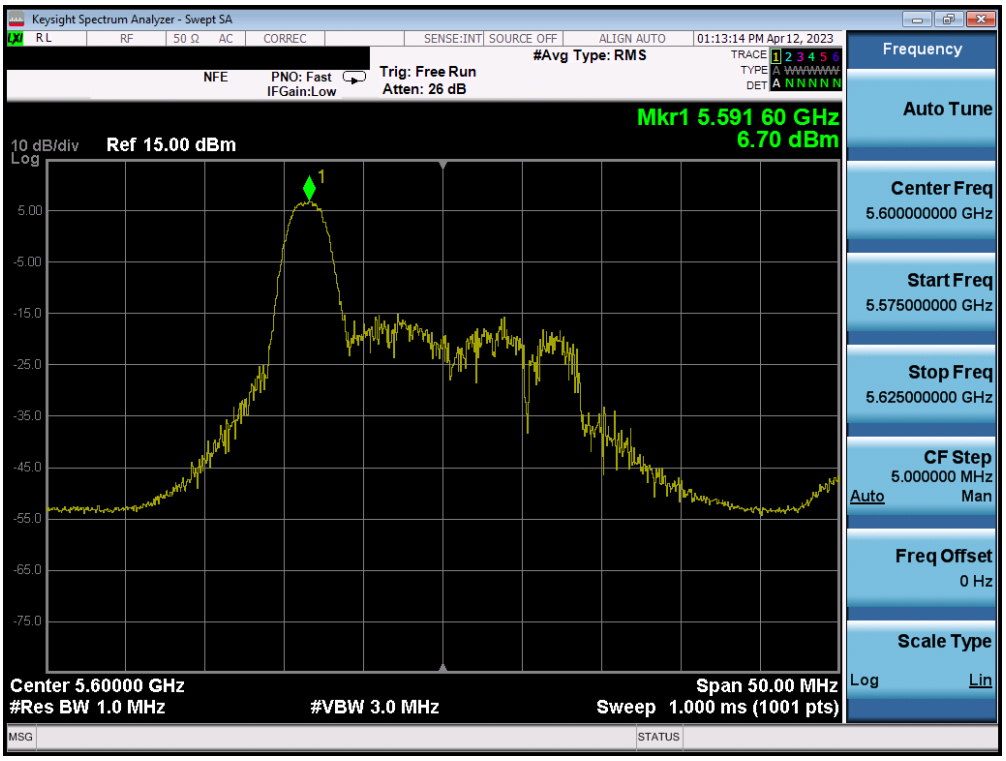
Plot 7-77. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 56)



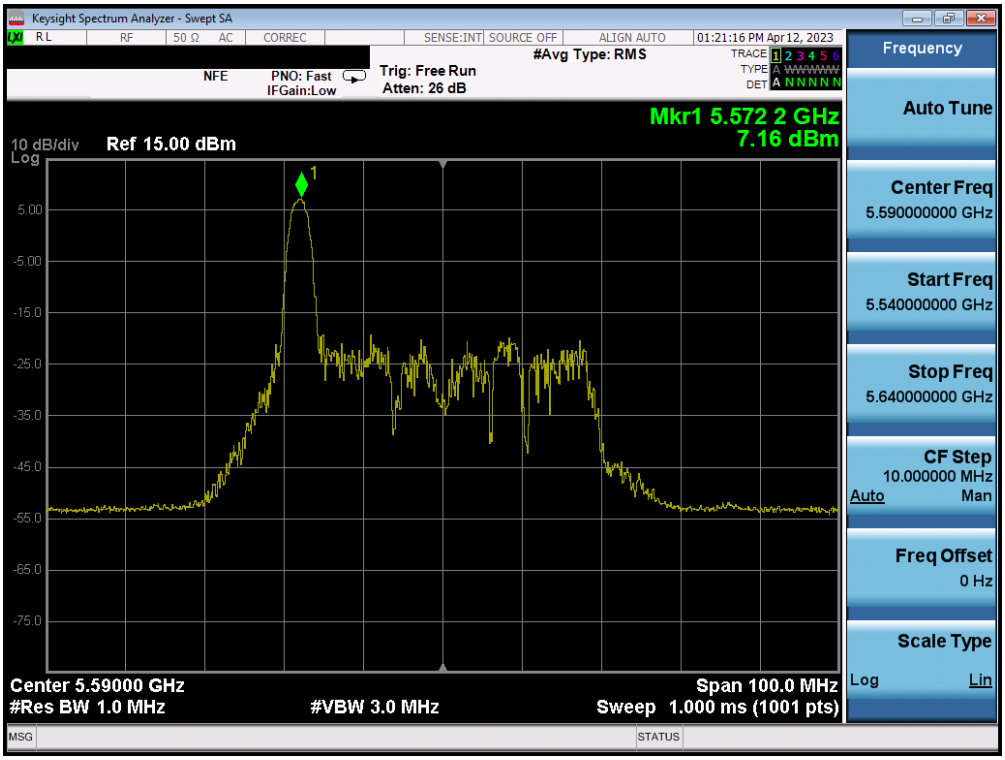
Plot 7-78. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 54)



Plot 7-79. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 2A) – Ch. 58)



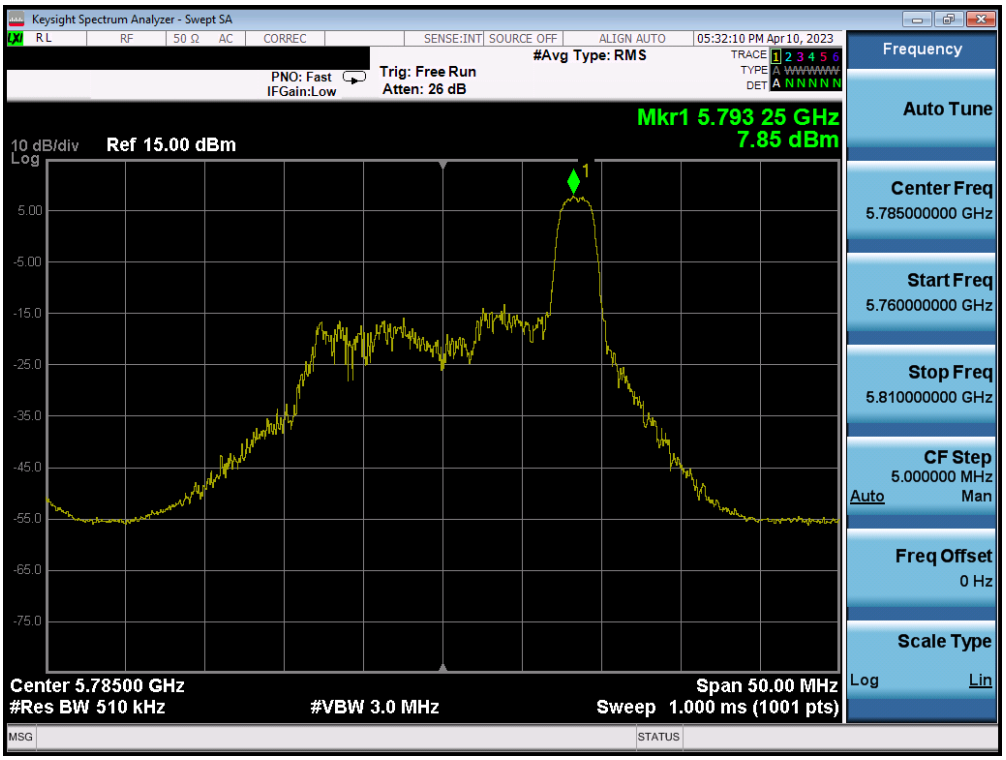
Plot 7-80. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 120)



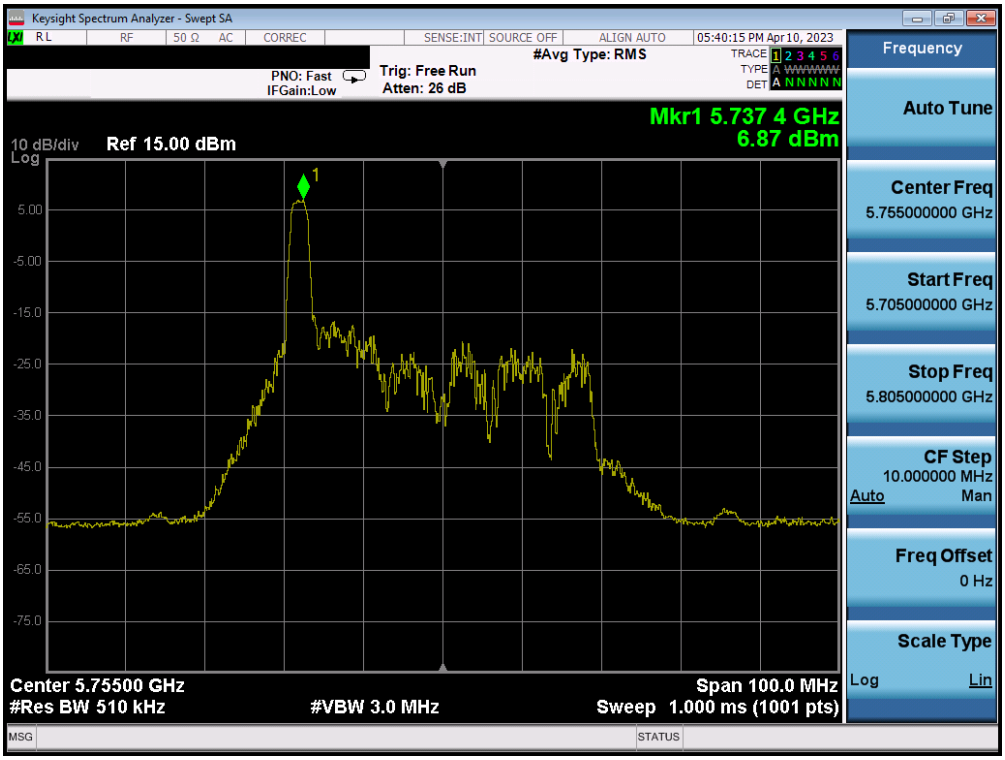
Plot 7-81. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 118)

Plot 7-82. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 2C) – Ch. 122)

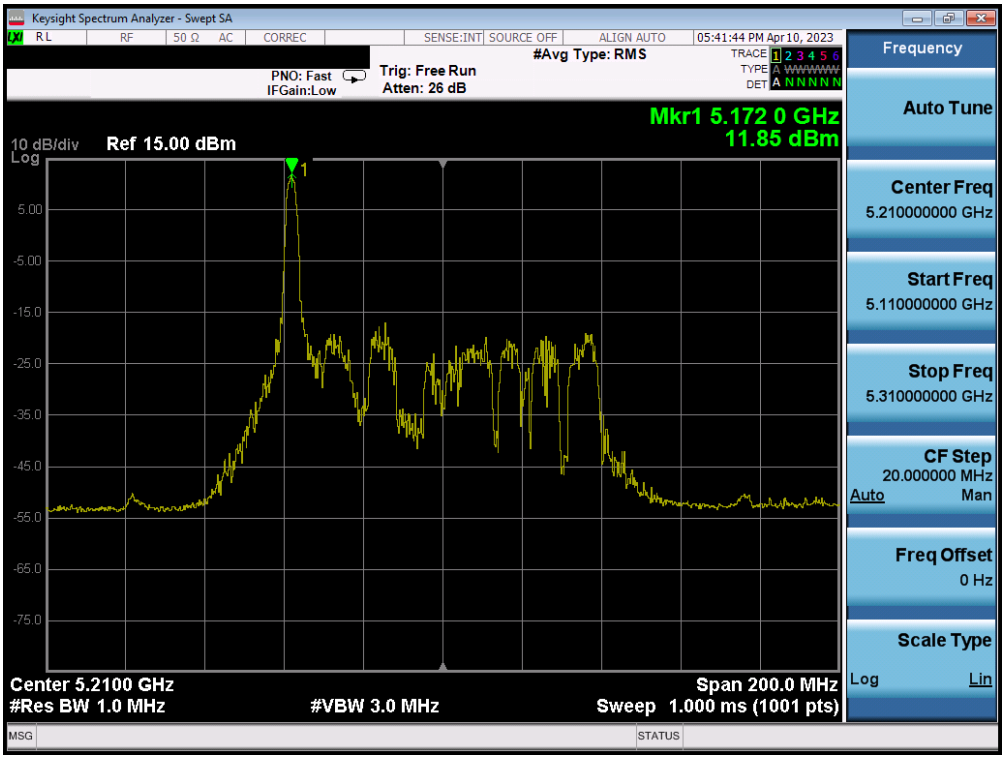
Plot 7-83. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax – 2 Tones (UNII Band 2C) – Ch. 114)



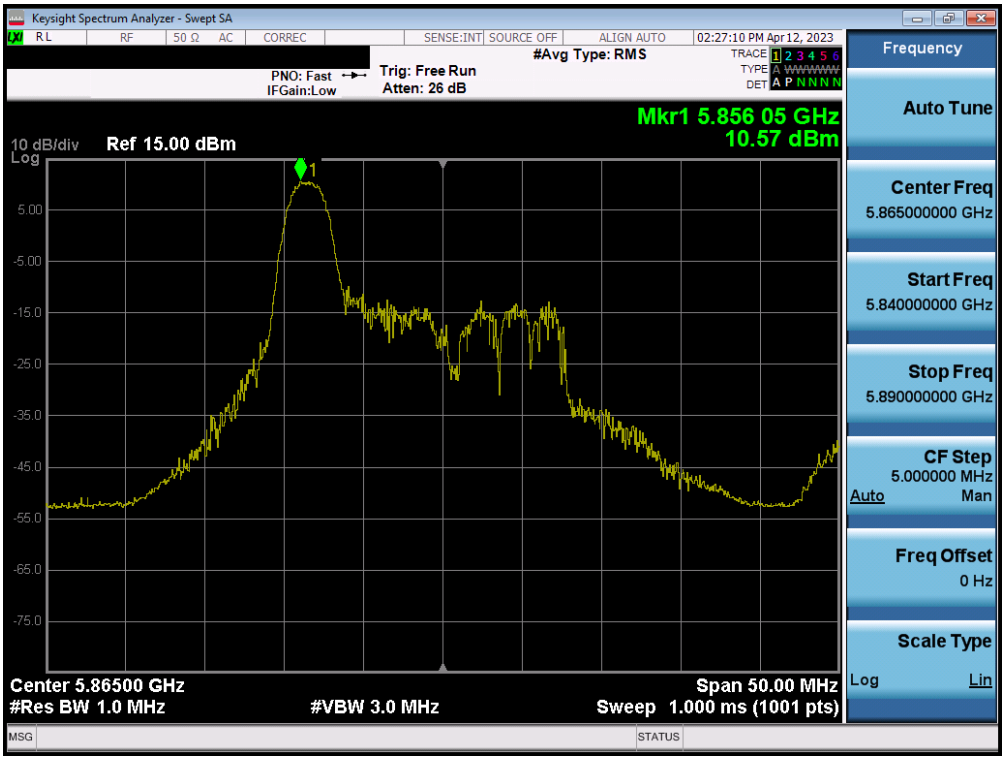
Plot 7-84. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 3) – Ch. 157)



Plot 7-85. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 3) – Ch. 151)

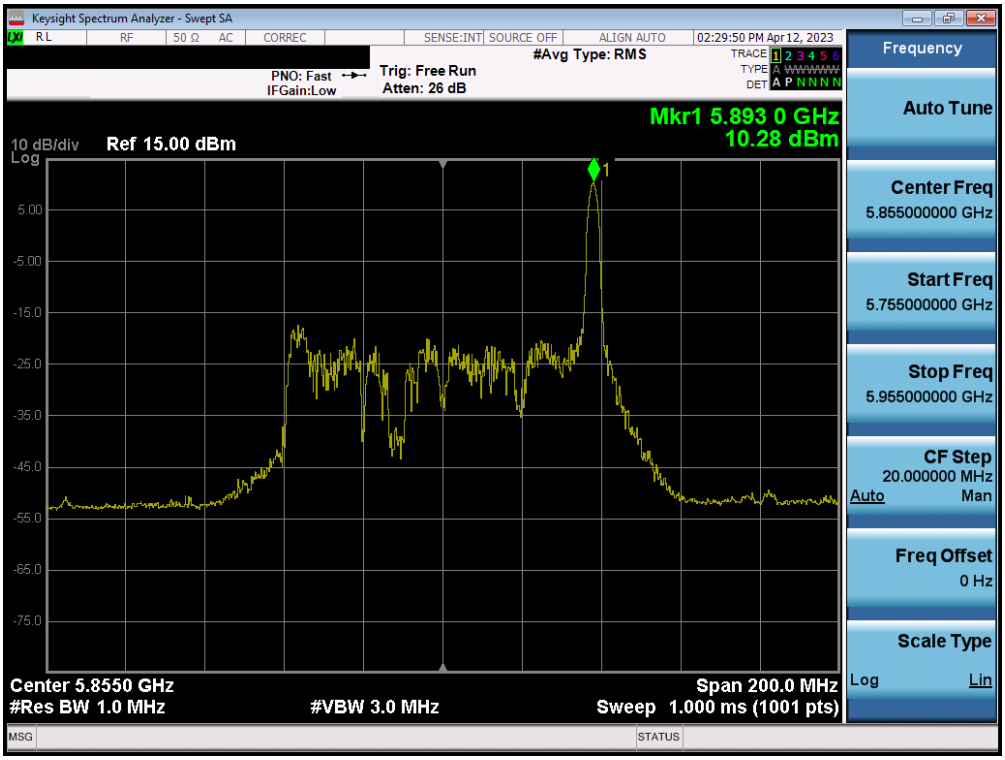


Plot 7-86. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 3) – Ch. 155)

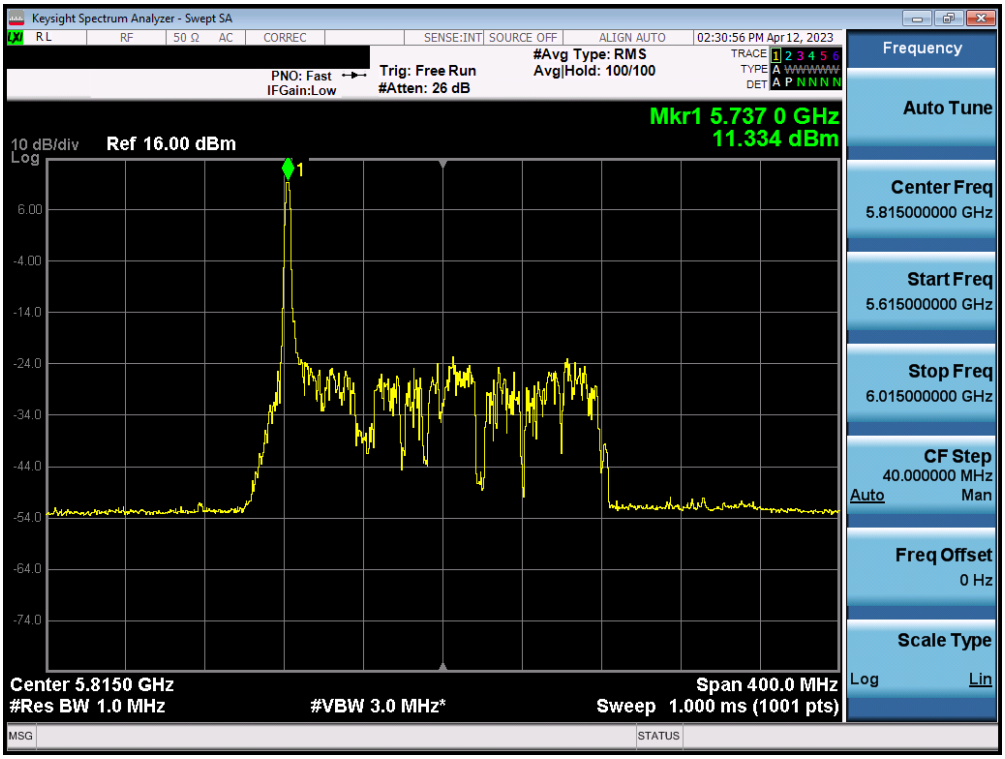


Plot 7-87. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – 26 Tones (UNII Band 4) – Ch. 173)

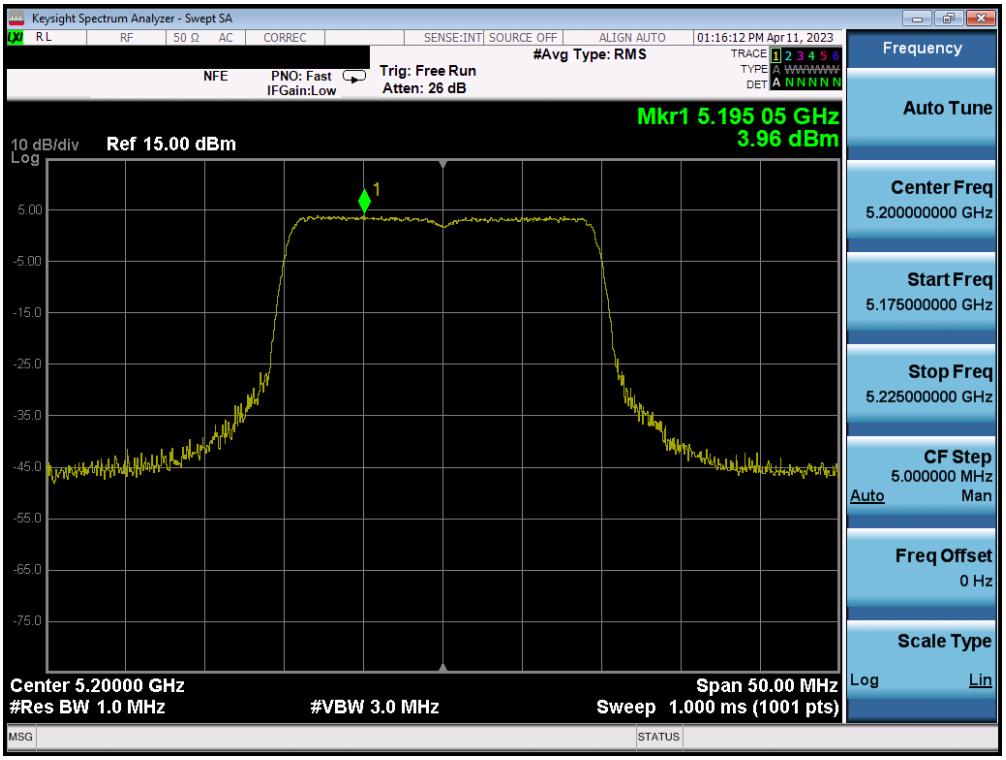
Plot 7-88. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 167)



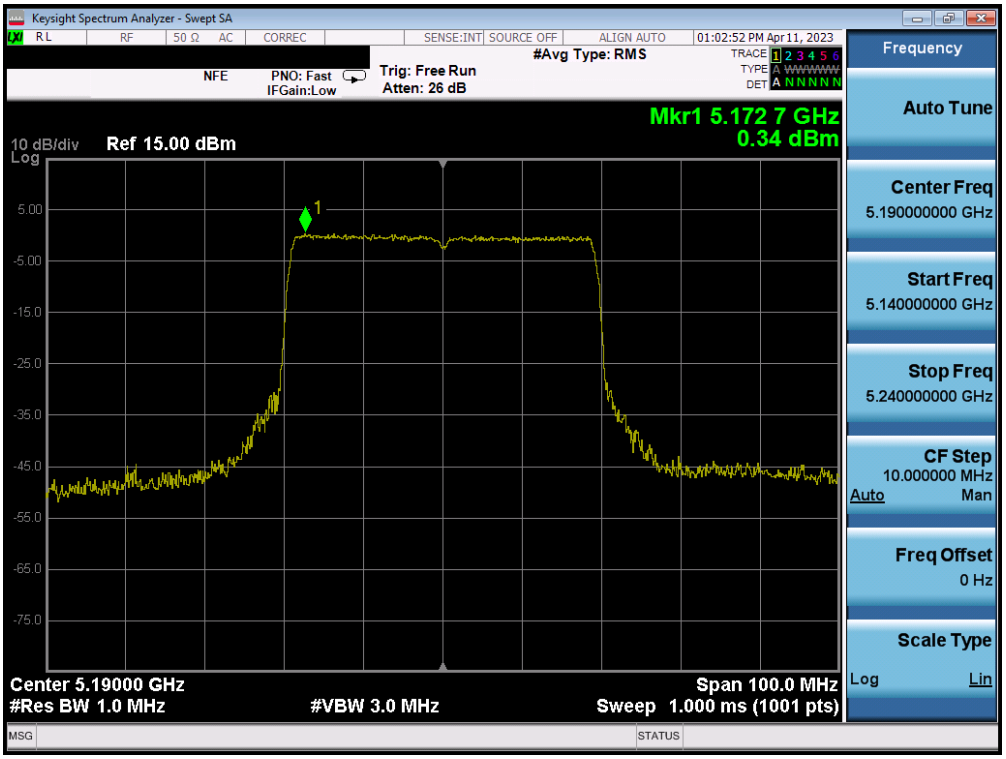
Plot 7-89. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 171)



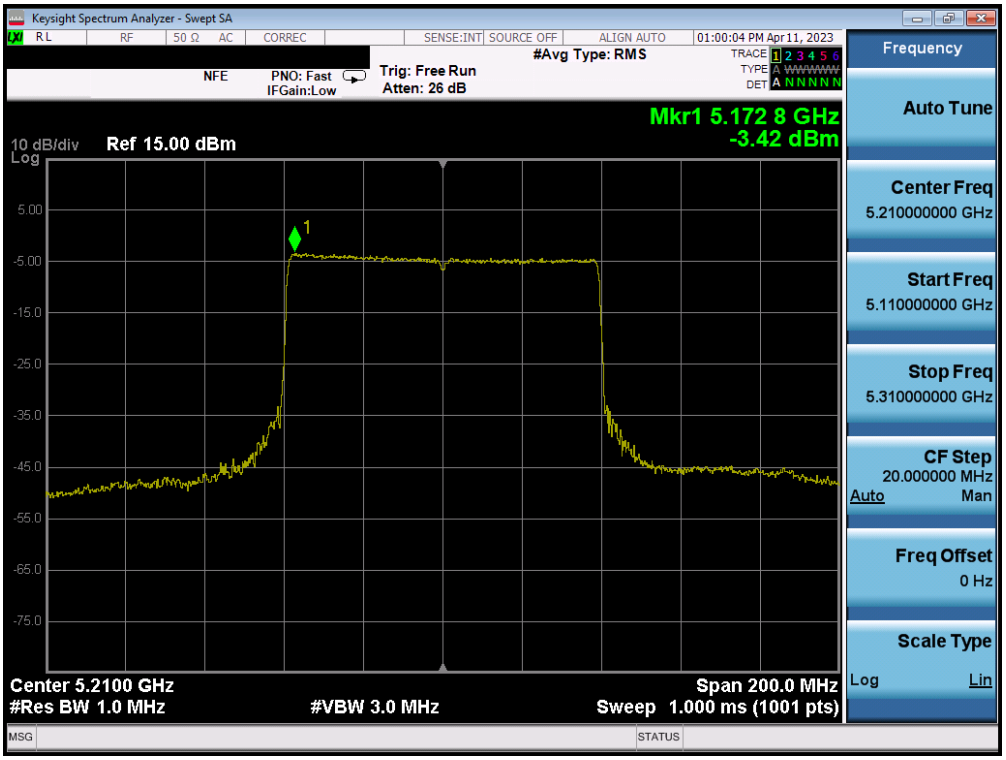
Plot 7-90. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax – 26 Tones (UNII Band 3/4) – Ch. 163)



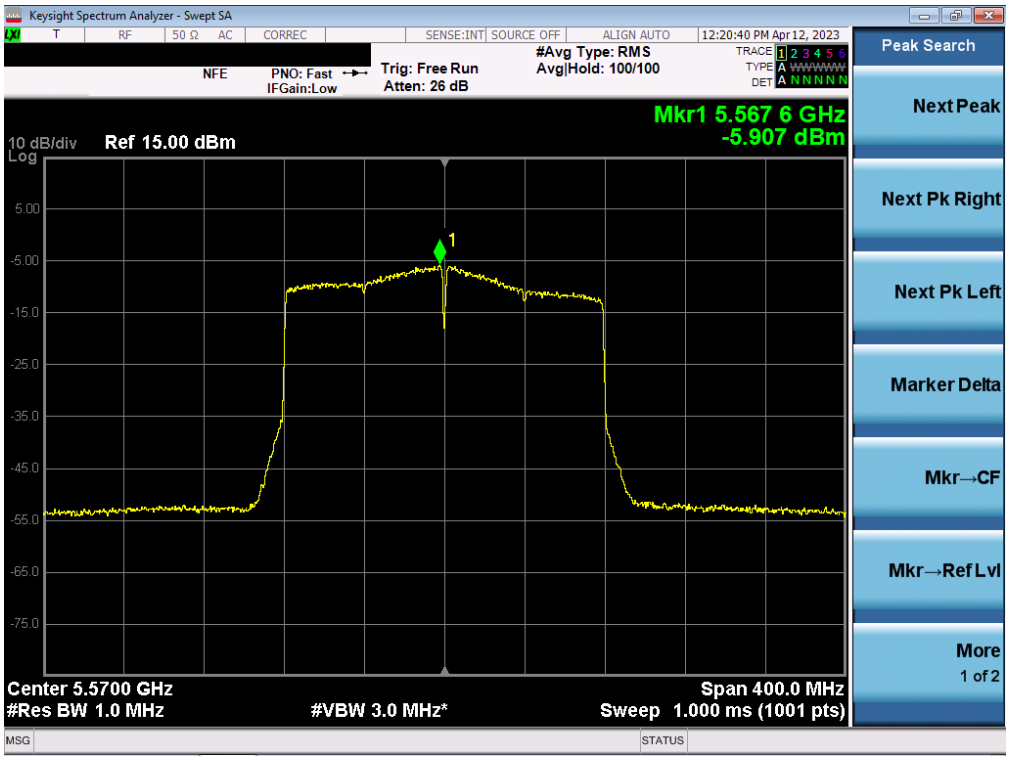
Plot 7-91. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – Full Tones (UNII Band 1) – Ch. 40)



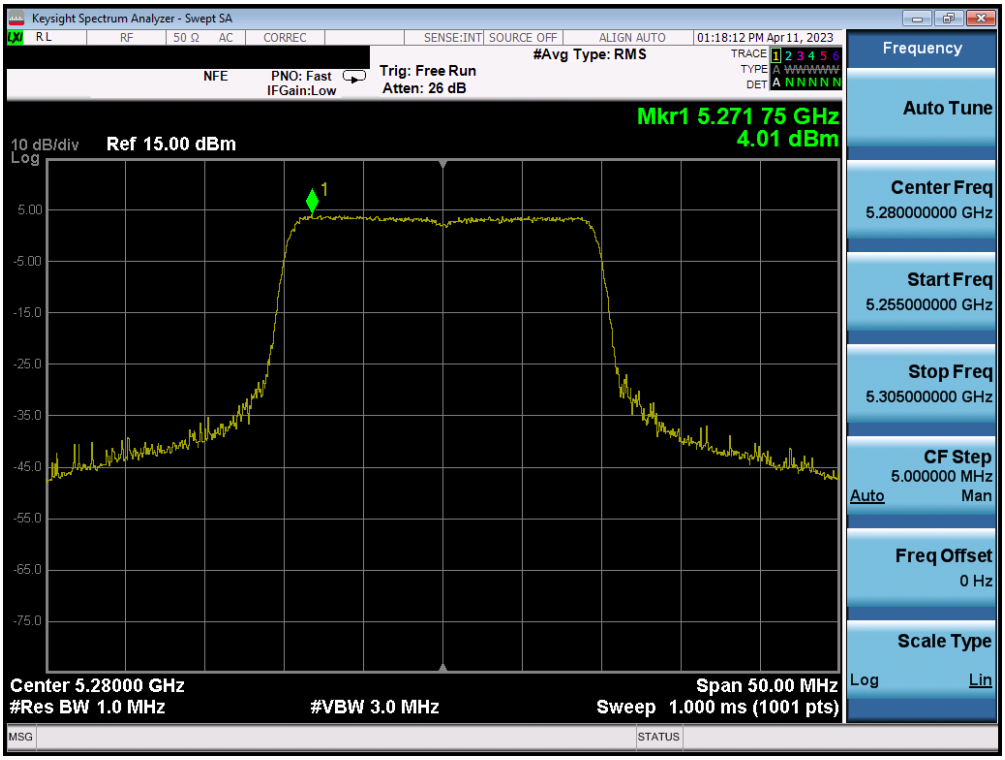
Plot 7-92. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – Full Tones (UNII Band 1) – Ch. 38)



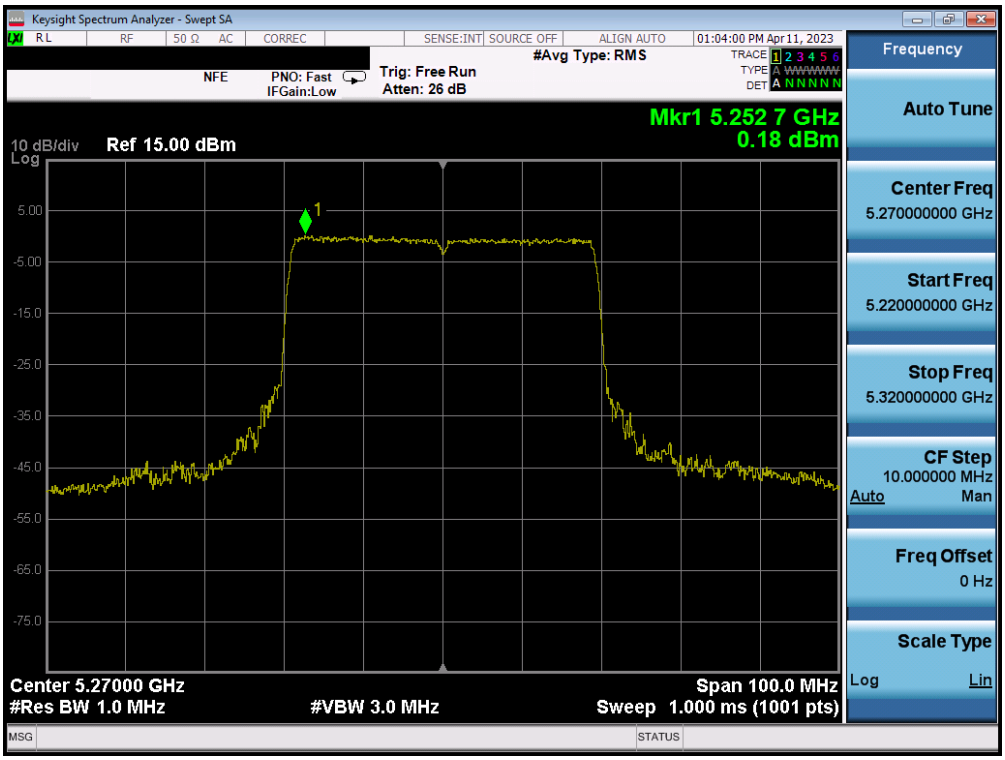
Plot 7-93. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – Full Tones (UNII Band 1) – Ch. 42)



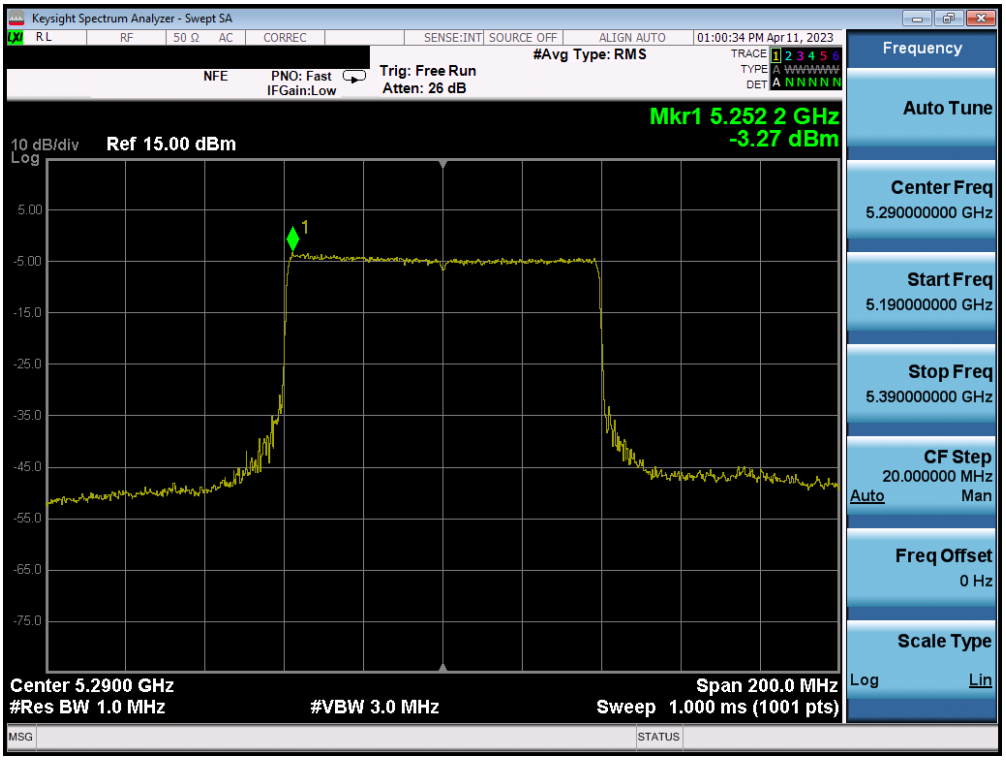
Plot 7-94. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax – Full Tones (UNII Band 1/2A) – Ch. 50)



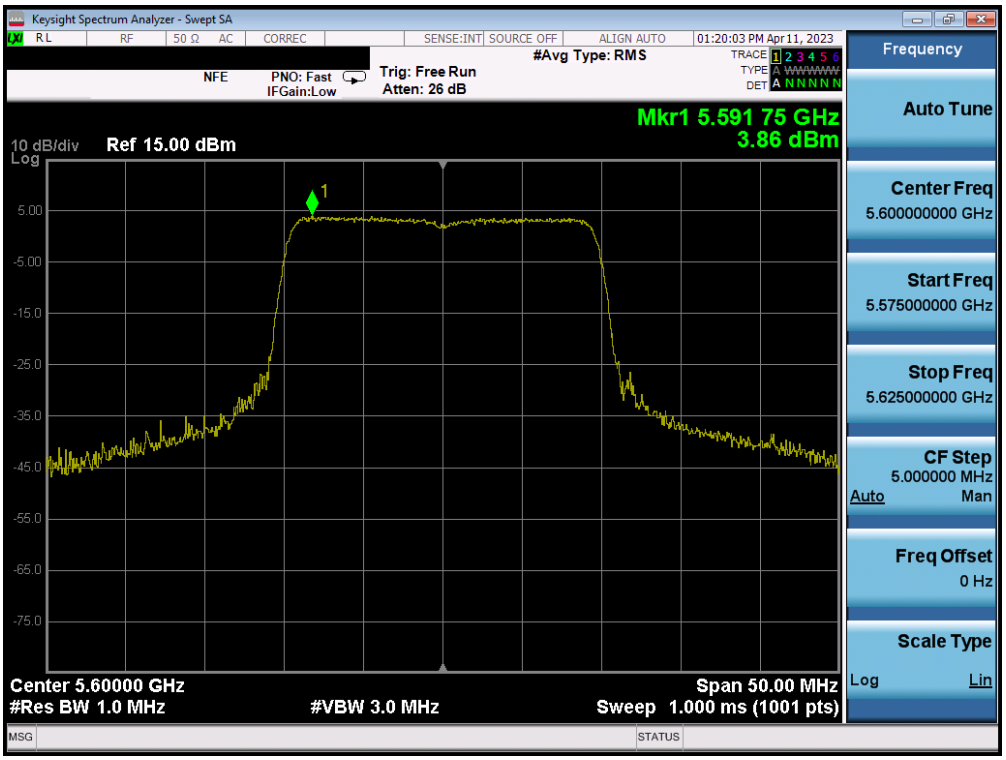
Plot 7-95. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – Full Tones (UNII Band 2A) – Ch. 56)



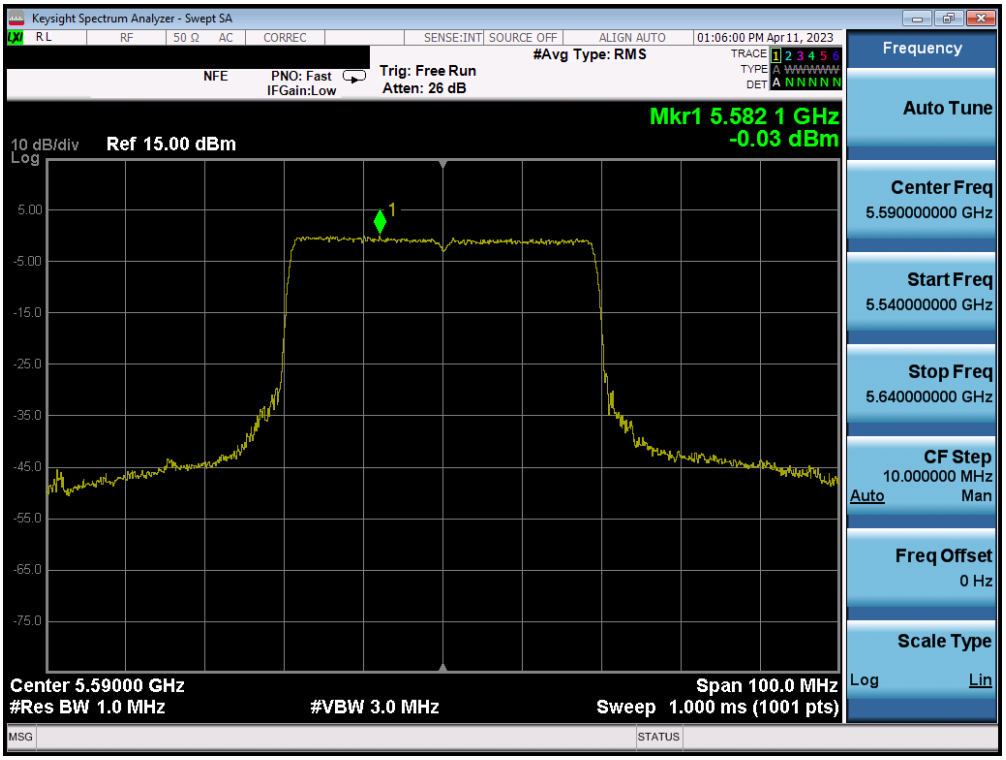
Plot 7-96. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – Full Tones (UNII Band 2A) – Ch. 54)



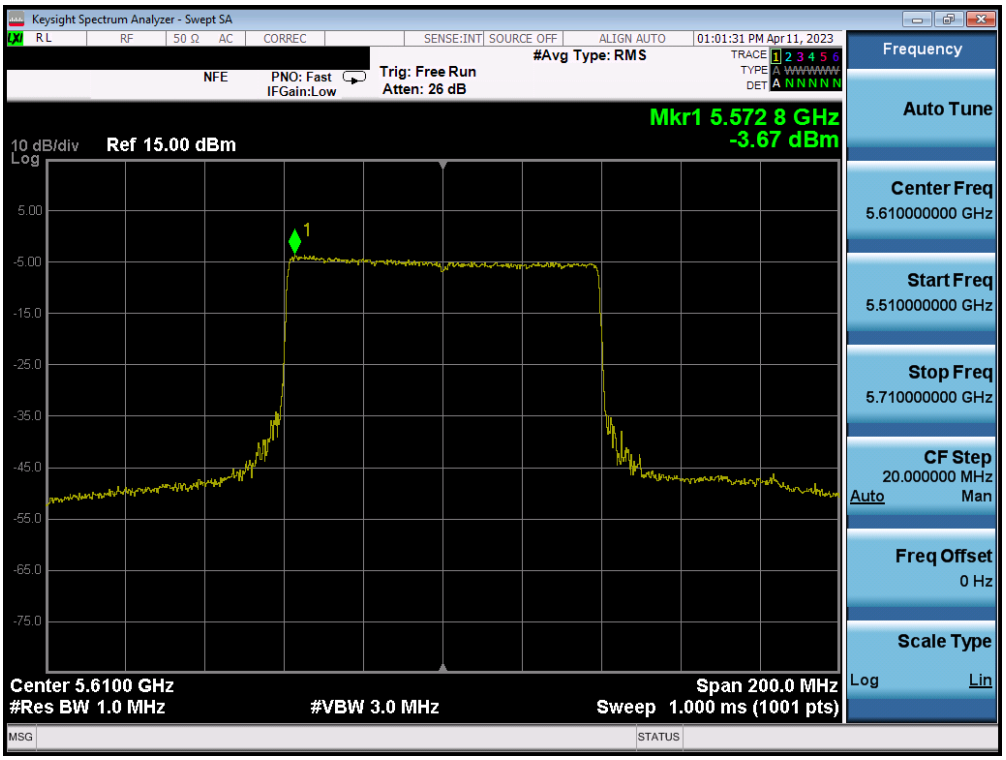
Plot 7-97. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – Full Tones (UNII Band 2A) – Ch. 58)



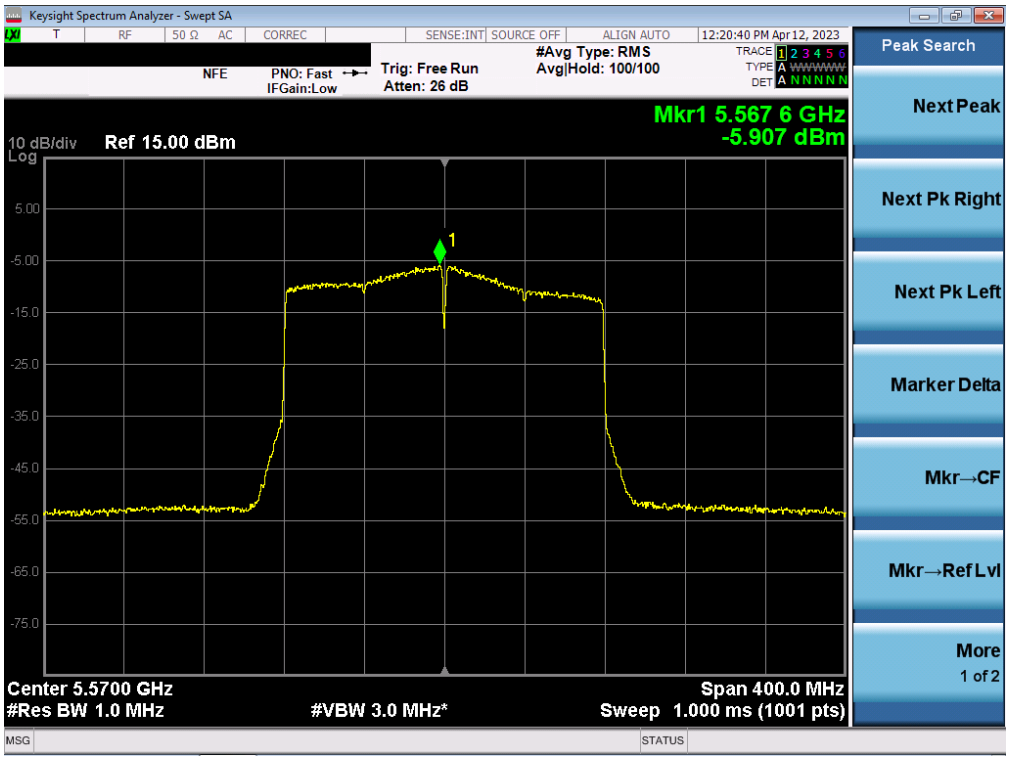
Plot 7-98. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – Full Tones (UNII Band 2C) – Ch. 120)



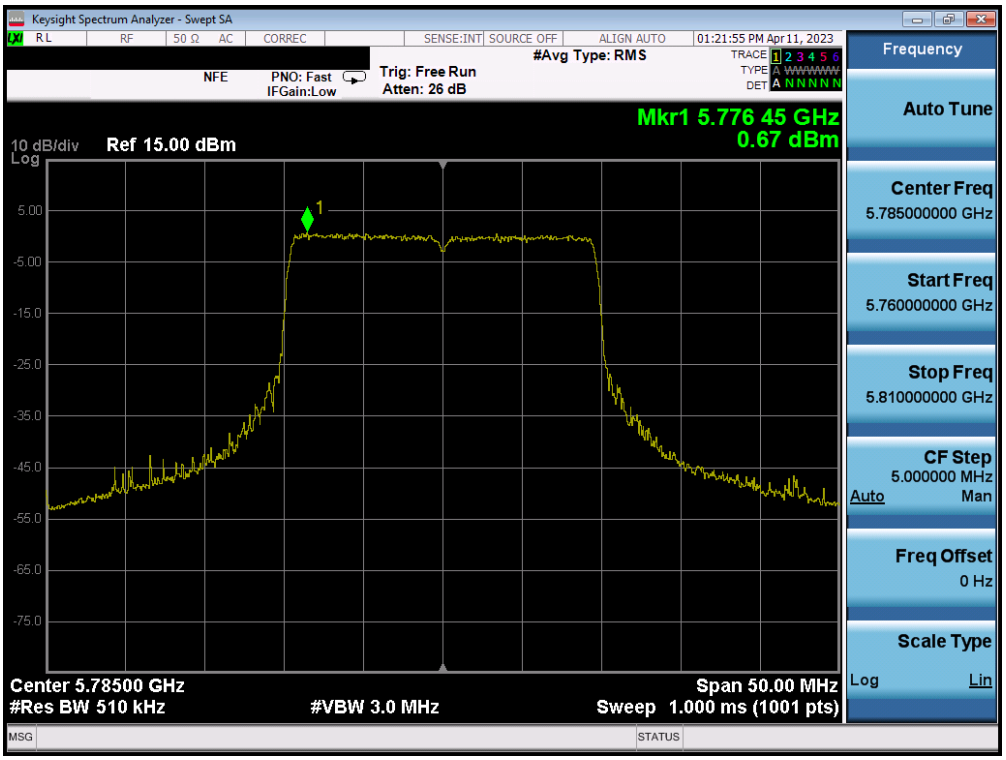
Plot 7-99. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – Full Tones (UNII Band 2C) – Ch. 118)



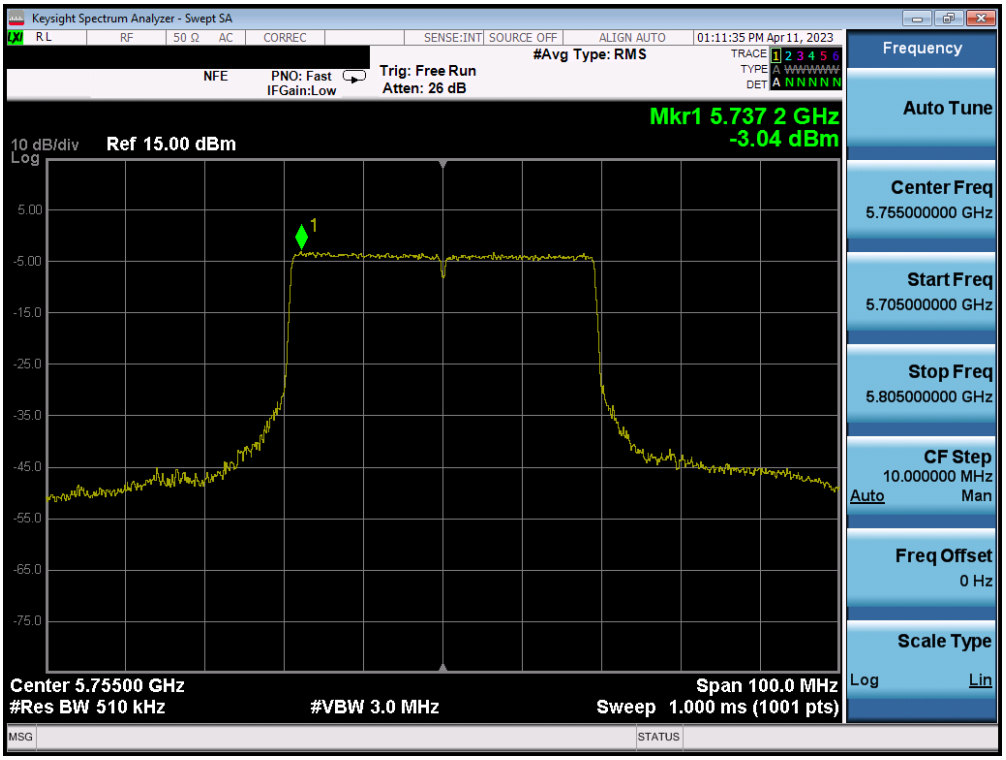
Plot 7-100. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – Full Tones (UNII Band 2C) – Ch. 122)



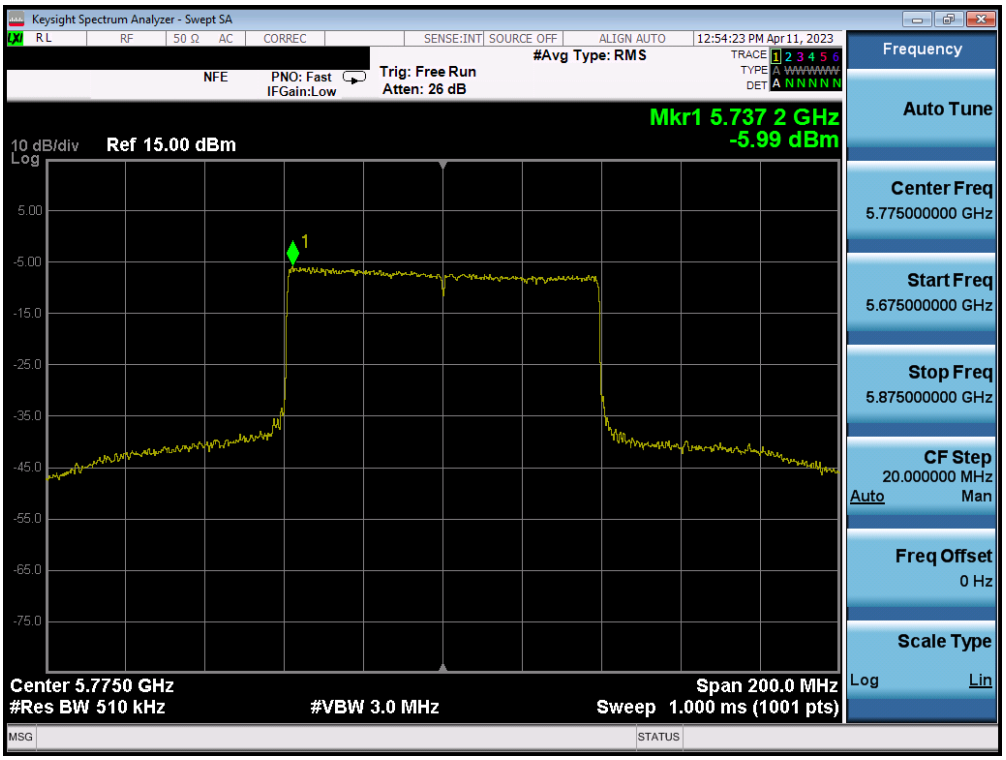
Plot 7-101. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax – Full Tones (UNII Band 2C) – Ch. 114)



Plot 7-102. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax – Full Tones (UNII Band 3) – Ch. 157)



Plot 7-103. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax – Full Tones (UNII Band 3) – Ch. 151)



Plot 7-104. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax – Full Tones (UNII Band 3) – Ch. 155)