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# MEASUREMENT REPORT
## FCC PART 15.407 UNII / ISED RSS-247

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

**Date of Testing:**
05/04 - 07/06/2020
**Test Site/Location:**
PCTEST Lab. Columbia, MD, USA
**Test Report Serial No.:**
1M2005040080-08.A3L

| | |
|---|---|
| **FCC ID:** | **A3LSMF707U** |
| **IC:** | **649E-SMF707U** |
| **APPLICANT:** | **Samsung Electronics Co., Ltd.** |

| | |
|---|---|
| **Application Type:** | Certification |
| **Model:** | SM-F707U |
| **HVIN:** | SM-F707W |
| **Additional Model(s):** | SM-F707U1, SM-F707W |
| **EUT Type:** | Portable Handset |
| **Frequency Range:** | 5180 – 5825MHz |
| **Modulation Type:** | OFDM |
| **FCC Classification:** | Unlicensed National Information Infrastructure (UNII) |
| **FCC Rule Part(s):** | Part 15 Subpart E (15.407) |
| **Test Procedure(s):** | ANSI C63.10-2013, KDB 789033 D02 v02r01 |
| , | KDB 662911 D01 v02r01, KDB 648474 D03 v01r04 |

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

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.

Randy Ortanez
President

ACCREDITED
CERT #2041.01

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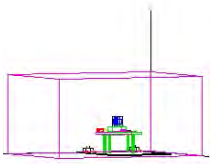
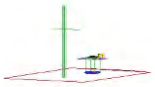


# MEASUREMENT REPORT



| UNII Band | Channel Bandwidth (MHz) | Tx Frequency (MHz) | ANT1 | | ANT2 | | MIMO | |
|---|---|---|---|---|---|---|---|---|
| | | | Max. Power (mW) | Max. Power (dBm) | Max. Power (mW) | Max. Power (dBm) | Max. Power (mW) | Max. Power (dBm) |
| 1 | 20 | 5180 - 5240 | 49.888 | 16.98 | 49.659 | 16.96 | 99.083 | 19.96 |
| 2A | | 5260 - 5320 | 49.888 | 16.98 | 49.545 | 16.95 | 99.083 | 19.96 |
| 2C | | 5500 - 5720 | 49.888 | 16.98 | 48.865 | 16.89 | 96.383 | 19.84 |
| 3 | | 5745 - 5825 | 49.545 | 16.95 | 49.888 | 16.98 | 99.083 | 19.96 |
| 1 | 40 | 5190 - 5230 | 39.628 | 15.98 | 39.628 | 15.98 | 79.250 | 18.99 |
| 2A | | 5270 - 5310 | 39.264 | 15.94 | 38.459 | 15.85 | 77.446 | 18.89 |
| 2C | | 5510 - 5710 | 39.537 | 15.97 | 39.537 | 15.97 | 79.068 | 18.98 |
| 3 | | 5755 - 5795 | 37.757 | 15.77 | 39.264 | 15.94 | 75.162 | 18.76 |
| 1 | 80 | 5210 | 30.832 | 14.89 | 31.550 | 14.99 | 61.660 | 17.90 |
| 2A | | 5290 | 24.210 | 13.84 | 24.660 | 13.92 | 48.865 | 16.89 |
| 2C | | 5530 - 5690 | 30.620 | 14.86 | 31.405 | 14.97 | 61.944 | 17.92 |
| 3 | | 5775 | 30.974 | 14.91 | 30.479 | 14.84 | 60.814 | 17.84 |

**EUT Overview**

# 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 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility 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 PCTEST located in Columbia, MD 21046, U.S.A.**

- PCTEST is an ISO 17025-2005 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.

- PCTEST 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).

- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMF707U**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

This device can operate in one of two physical configurations – "open" and "closed". All emissions are investigated in both modes for compliance.

**Test Device Serial No.:** 0025H, 0023H, 0009H, 0036H, 0038H, 1064M, 1049M

## 2.2 Device Capabilities

This device contains the following capabilities:

800/850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n71, n5, n66, n25, n2, n41), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

| Band 1 | | Band 2A | | Band 2C | | Band 3 | |
|---|---|---|---|---|---|---|---|
| Ch. | Frequency (MHz) | Ch. | Frequency (MHz) | Ch. | Frequency (MHz) | Ch. | Frequency (MHz) |
| 36 | 5180 | 52 | 5260 | 100 | 5500 | 149 | 5745 |
| : | : | : | : | : | : | : | : |
| 42 | 5210 | 56 | 5280 | 120 | 5600 | 157 | 5785 |
| : | : | : | : | : | : | : | : |
| 48 | 5240 | 64 | 5320 | 144 | 5720 | 165 | 5825 |

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

| Band 1 | | Band 2A | | Band 2C | | Band 3 | |
|---|---|---|---|---|---|---|---|
| Ch. | Frequency (MHz) | Ch. | Frequency (MHz) | Ch. | Frequency (MHz) | Ch. | Frequency (MHz) |
| 38 | 5190 | 54 | 5270 | 102 | 5510 | 151 | 5755 |
| : | : | : | : | : | : | : | : |
| 46 | 5230 | 62 | 5310 | 118 | 5590 | 159 | 5795 |
| | | | | : | : | | |
| | | | | 142 | 5710 | | |

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

| Band 1 | | Band 2A | | Band 2C | | Band 3 | |
|---|---|---|---|---|---|---|---|
| Ch. | Frequency (MHz) | Ch. | Frequency (MHz) | Ch. | Frequency (MHz) | Ch. | Frequency (MHz) |
| 42 | 5210 | 58 | 5290 | 106 | 5530 | 155 | 5775 |
| | | | | : | : | | |
| | | | | 138 | 5690 | | |

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

**Notes:**

1. 5GHz NII operation is possible in 20MHz, and 40MHz, and 80MHz 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 and KDB 789033 D02 v02r01. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

| 802.11 Mode/Band | | ANT1 Duty Cycle [%] | ANT2 Duty Cycle [%] | MIMO Duty Cycle [%] |
|---|---|---|---|---|
| 5GHz | a | 98.9 | 98.9 | 98.9 |
| | n (HT20) | 98.6 | 98.8 | 99.7 |
| | ac (HT20) | 98.8 | 98.9 | 99.7 |
| | ax (HT20) | 98.6 | 98.6 | 99.7 |
| | n (HT40) | 97.7 | 97.7 | 99.8 |
| | ac (HT40) | 97.7 | 97.7 | 99.8 |
| | ax (HT40) | 97.4 | 97.4 | 99.7 |
| | ac (HT80) | 95.4 | 95.5 | 99.7 |
| | ax (HT80) | 95.2 | 95.1 | 99.7 |

**Table 2-4. Measured Duty Cycles**

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

| WiFi Configurations | | SISO | | SDM | | CDD | |
|---|---|---|---|---|---|---|---|
| | | ANT1 | ANT2 | ANT1 | ANT2 | ANT1 | ANT2 |
| 5GHz | 11a | ✓ | ✓ | × | × | ✓ | ✓ |
| | 11n/ac/ax (20MHz) | ✓ | ✓ | ✓ | ✓ | × | × |
| | 11n/ac/ax (40MHz) | ✓ | ✓ | ✓ | ✓ | × | × |
| | 11ac/ax (80MHz) | ✓ | ✓ | ✓ | ✓ | × | × |

**Table 2-5. Frequency / Channel Operations**

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

3. This device supports simultaneous transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz (WLAN & BT) and 5GHz bands simultaneously on each antenna. The following tables show the worst case configurations determined during testing. The data for these configurations is contained in this test report. The BT + 5GHz case is not considered as worst case since the BT power is lower than the 2.4GHz WLAN power.

**Configuration 1:** ANT1 transmitting in 2.4GHz mode and ANT2 in 5GHz mode

| Description | 2.4 GHz Emission | 5 GHz Emission |
|---|---|---|
| Antenna | 1 | 2 |
| Channel | 1 | 153 |
| Operating Frequency (MHz) | 2412 | 5765 |
| Data Rate (Mbps) | 1M | 6M |
| Mode | 802.11b | 802.11a |

**Table 2-6. Config-1 (ANT1 2.4GHz & ANT2 5GHz)**

**Configuration 2:** ANT1 transmitting in 5GHz mode and ANT2 in 2.4GHz mode

| Description | 2.4 GHz Emission | 5 GHz Emission |
|---|---|---|
| Antenna | 2 | 1 |
| Channel | 1 | 124 |
| Operating Frequency (MHz) | 2412 | 5620 |
| Data Rate (Mbps) | 1M | 6M |
| Mode | 802.11b | 802.11a |

**Table 2-7. Config-2 (ANT1 5GHz & ANT2 2.4GHz)**

**Configuration 3:** ANT1 and ANT2 both transmitting in 2.4GHz and 5GHz modes simultaneously

| Description | 2.4 GHz Emission | 5 GHz Emission |
|---|---|---|
| Antenna | 1, 2 | 1, 2 |
| Channel | 2 | 64 |
| Operating Frequency (MHz) | 2417 | 5320 |
| Data Rate (Mbps) | MCS0 | MCS0 |
| Mode | 802.11n | 802.11n |

**Table 2-8. Config-3 (ANT1 MIMO & ANT2 MIMO)**

## 2.3 Antenna Description

Following antenna was used for the testing.

| Frequency [GHz] | Antenna Gain (dBi) |
|---|---|
| 5.20 | -6.5 |
| 5.30 | -6.2 |
| 5.50 | -6.1 |
| 5.80 | -5.9 |

**Table 2-9. Antenna Peak Gain**

## 2.4 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted emissions test setups.

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 version F707USQE0ATEJ 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) and the guidance provided in KDB 789033 D02 v02r01 were used in the measurement of the EUT**.**

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

## 3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.8. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

## 3.3 Radiated Emissions

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

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 474788 D01.

## 3.4 Environmental Conditions

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

# 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 |
|---|---|---|---|---|---|---|
| - | WL25-1 | Conducted Cable Set (25GHz) | 10/30/2019 | Annual | 10/30/2020 | WL25-1 |
| - | WL40-1 | Conducted Cable Set (40GHz) | 3/13/2020 | Annual | 3/13/2021 | WL40-1 |
| - | WL25-4 | Conducted Cable Set (25GHz) | 1/22/2020 | Annual | 1/22/2021 | WL25-4 |
| Agilent | N9038A | MXE EMI Receiver | 7/17/2019 | Annual | 7/17/2020 | MY51210133 |
| Anritsu | ML2495A | Power Meter | 12/17/2019 | Annual | 12/17/2020 | 941001 |
| Anritsu | MA2411B | Pulse Power Sensor | 8/27/2019 | Annual | 8/27/2020 | 1339027 |
| Anritsu | MA2411B | Pulse Power Sensor | 10/15/2019 | Annual | 10/15/2020 | 1339026 |
| Anritsu | MS46322A | Vector Network Analyzer | 8/19/2019 | Annual | 8/19/2020 | 1521001 |
| Anritsu | 36585K-2F | Precision Autocal 2-Port | 7/16/2019 | Annual | 7/16/2020 | 1628014 |
| Com-Power | AL-130 | 9kHz - 30MHz Loop Antenna | 10/10/2019 | Biennial | 10/10/2021 | 121034 |
| EMCO | 3160-09 | Small Horn (18 - 26.5GHz) | 8/9/2018 | Biennial | 8/9/2020 | 135427 |
| EMCO | 3160-10 | Small Horn (26.5 - 40GHz) | 8/9/2018 | Biennial | 8/9/2020 | 130993 |
| ETS Lindgren | 3117 | 1-18 GHz DRG Horn (Medium) | 2/14/2019 | Biennial | 2/14/2021 | 125518 |
| ETS-Lindgren | 3115 | Double Ridged Guide Horn 750MHz - 18GHz | 3/12/2020 | Biennial | 3/12/2022 | 150693 |
| Pasternack | NMLC-2 | Line Conducted Emissions Cable (NM) | 1/9/2020 | Annual | 1/9/2021 | NMLC-2 |
| Rohde & Schwarz | TS-PR26 | 18-26.5 GHz Pre-Amplifier | 11/1/2019 | Annual | 11/1/2020 | 100040 |
| Rohde & Schwarz | TS-PR40 | 26.5-40 GHz Pre-Amplifier | 11/1/2019 | Annual | 11/1/2020 | 100037 |
| Rohde & Schwarz | ESU40 | EMI Test Receiver (40GHz) | 9/23/2019 | Annual | 9/23/2020 | 100348 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 7/11/2019 | Annual | 7/11/2020 | 102134 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 7/8/2019 | Annual | 7/8/2020 | 102133 |
| Solar Electronics | 8012-50-R-24-BNC | Line Impedance Stabilization Network | 10/1/2019 | Biennial | 10/1/2021 | 310233 |
| Sunol | DRH-118 | Horn Antenna (1-18GHz) | 10/3/2019 | Biennial | 10/3/2021 | A050307 |

**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: A3LSMF707U
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 [6.6] | 26dB Bandwidth | N/A | CONDUCTED | PASS | Section 7.2 |
| 15.407(e) | RSS-Gen [6.6] | 6dB Bandwidth | >500kHz(5725-5850MHz) | | 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), (2), (3), (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), (4), (5), (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 |
| 15.407 | RSS-Gen [8.8] | AC Conducted Emissions 150kHz – 30MHz | < FCC 15.207 (RSS-Gen [8.8]) limits | LINE CONDUCTED | PASS | Section 7.8 |

**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 PCTEST "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 PCTEST "Chamber Automation," Version 1.3.1.

## 7.2 26dB Bandwidth Measurement – 802.11a/n/ac/ax

**RSS-Gen [6.2]**

### Test Overview and Limit

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

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

### Test Procedure Used

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

### Test Settings

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

### Test Setup

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


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

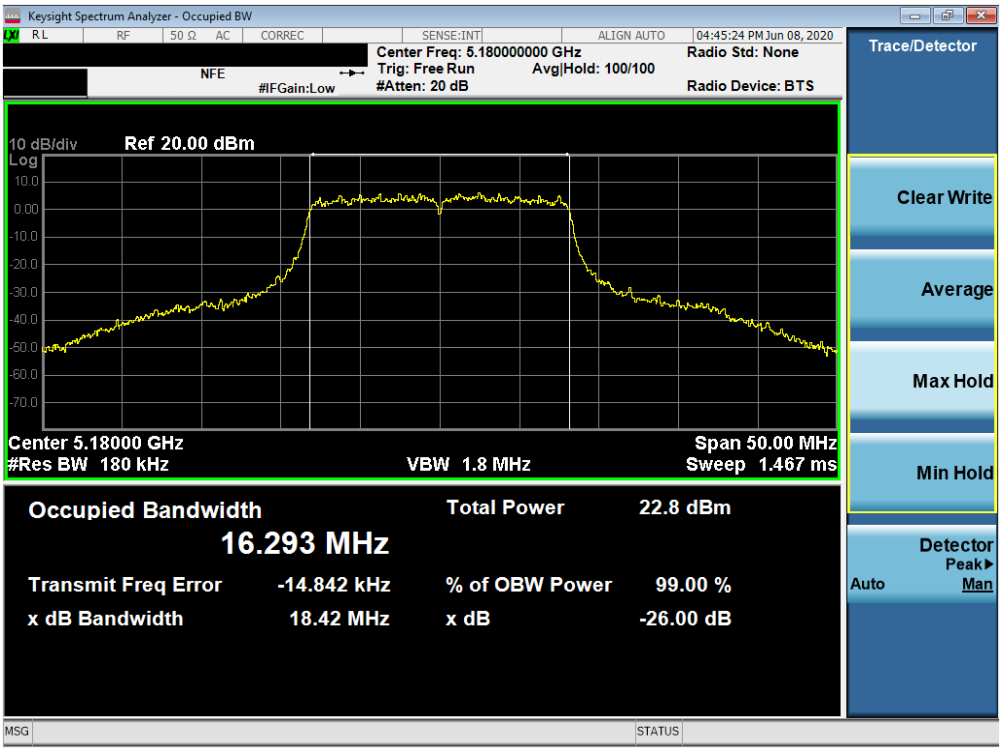
### Test Notes

None.

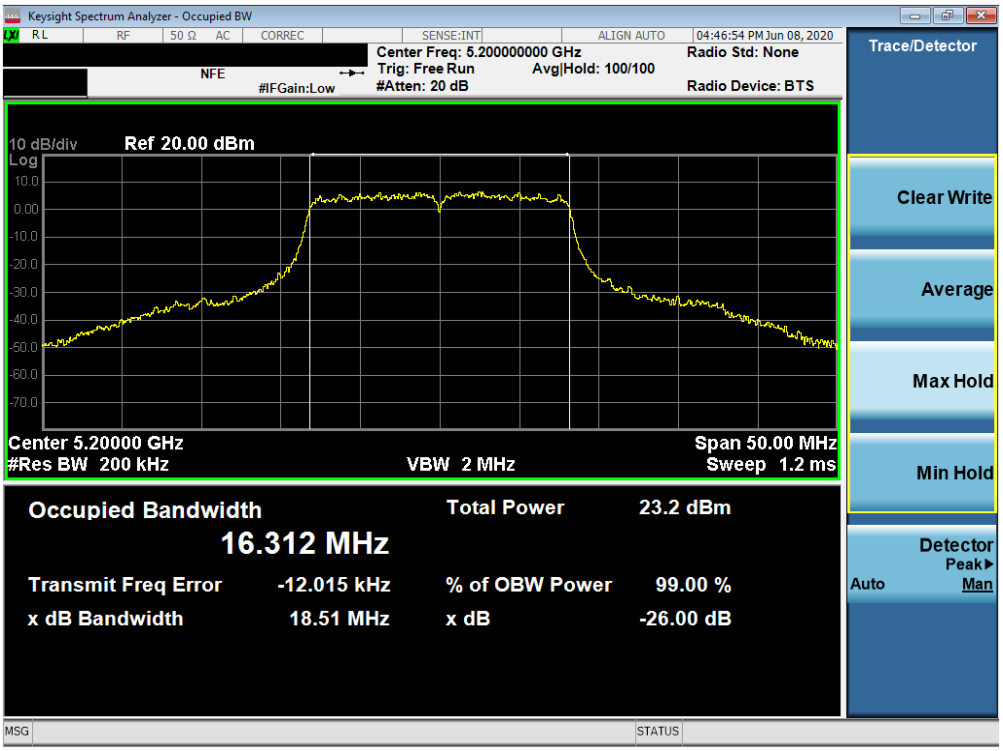
## SISO Antenna-1 26 dB Bandwidth Measurements

| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured 26dB Bandwidth [MHz] |
|---|---|---|---|---|---|
| Band 1 | 5180 | 36 | a | 6 | 18.42 |
| | 5200 | 40 | a | 6 | 18.51 |
| | 5240 | 48 | a | 6 | 18.46 |
| | 5180 | 36 | n (20MHz) | 6.5/7.2 (MCS0) | 20.52 |
| | 5200 | 40 | n (20MHz) | 6.5/7.2 (MCS0) | 19.87 |
| | 5240 | 48 | n (20MHz) | 6.5/7.2 (MCS0) | 19.79 |
| | 5180 | 36 | ax (20MHz) | 6.5/7.2 (MCS0) | 22.14 |
| | 5200 | 40 | ax (20MHz) | 6.5/7.2 (MCS0) | 23.98 |
| | 5240 | 48 | ax (20MHz) | 6.5/7.2 (MCS0) | 21.83 |
| | 5190 | 38 | n (40MHz) | 13.5/15 (MCS0) | 39.33 |
| | 5230 | 46 | n (40MHz) | 13.5/15 (MCS0) | 39.20 |
| | 5190 | 38 | ax (40MHz) | 13.5/15 (MCS0) | 40.25 |
| | 5230 | 46 | ax (40MHz) | 13.5/15 (MCS0) | 40.13 |
| | 5210 | 42 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.82 |
| | 5210 | 42 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.53 |
| Band 2A | 5260 | 52 | a | 6 | 18.50 |
| | 5280 | 56 | a | 6 | 18.36 |
| | 5320 | 64 | a | 6 | 18.49 |
| | 5260 | 52 | n (20MHz) | 6.5/7.2 (MCS0) | 20.02 |
| | 5280 | 56 | n (20MHz) | 6.5/7.2 (MCS0) | 19.74 |
| | 5320 | 64 | n (20MHz) | 6.5/7.2 (MCS0) | 19.67 |
| | 5260 | 52 | ax (20MHz) | 6.5/7.2 (MCS0) | 22.91 |
| | 5280 | 56 | ax (20MHz) | 6.5/7.2 (MCS0) | 22.19 |
| | 5320 | 64 | ax (20MHz) | 6.5/7.2 (MCS0) | 21.51 |
| | 5270 | 54 | n (40MHz) | 13.5/15 (MCS0) | 39.24 |
| | 5310 | 62 | n (40MHz) | 13.5/15 (MCS0) | 39.31 |
| | 5270 | 54 | ax (40MHz) | 13.5/15 (MCS0) | 40.22 |
| | 5310 | 62 | ax (40MHz) | 13.5/15 (MCS0) | 40.31 |
| | 5290 | 58 | ac (80MHz) | 29.3/32.5 (MCS0) | 82.03 |
| | 5290 | 58 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.88 |
| Band 2C | 5500 | 100 | a | 6 | 18.48 |
| | 5600 | 120 | a | 6 | 18.55 |
| | 5720 | 144 | a | 6 | 18.56 |
| | 5500 | 100 | n (20MHz) | 6.5/7.2 (MCS0) | 19.76 |
| | 5600 | 120 | n (20MHz) | 6.5/7.2 (MCS0) | 19.87 |
| | 5720 | 144 | n (20MHz) | 6.5/7.2 (MCS0) | 19.69 |
| | 5500 | 100 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.62 |
| | 5600 | 120 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.69 |
| | 5720 | 144 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.63 |
| | 5510 | 102 | n (40MHz) | 13.5/15 (MCS0) | 39.55 |
| | 5590 | 118 | n (40MHz) | 13.5/15 (MCS0) | 39.46 |
| | 5710 | 142 | n (40MHz) | 13.5/15 (MCS0) | 39.23 |
| | 5510 | 102 | ax (40MHz) | 13.5/15 (MCS0) | 40.30 |
| | 5590 | 118 | ax (40MHz) | 13.5/15 (MCS0) | 40.44 |
| | 5710 | 142 | ax (40MHz) | 13.5/15 (MCS0) | 40.26 |
| | 5530 | 106 | ac (80MHz) | 29.3/32.5 (MCS0) | 82.14 |
| | 5610 | 122 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.35 |
| | 5690 | 138 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.34 |
| | 5530 | 106 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.52 |
| | 5610 | 122 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.92 |
| | 5690 | 138 | ax (80MHz) | 29.3/32.5 (MCS0) | 82.19 |

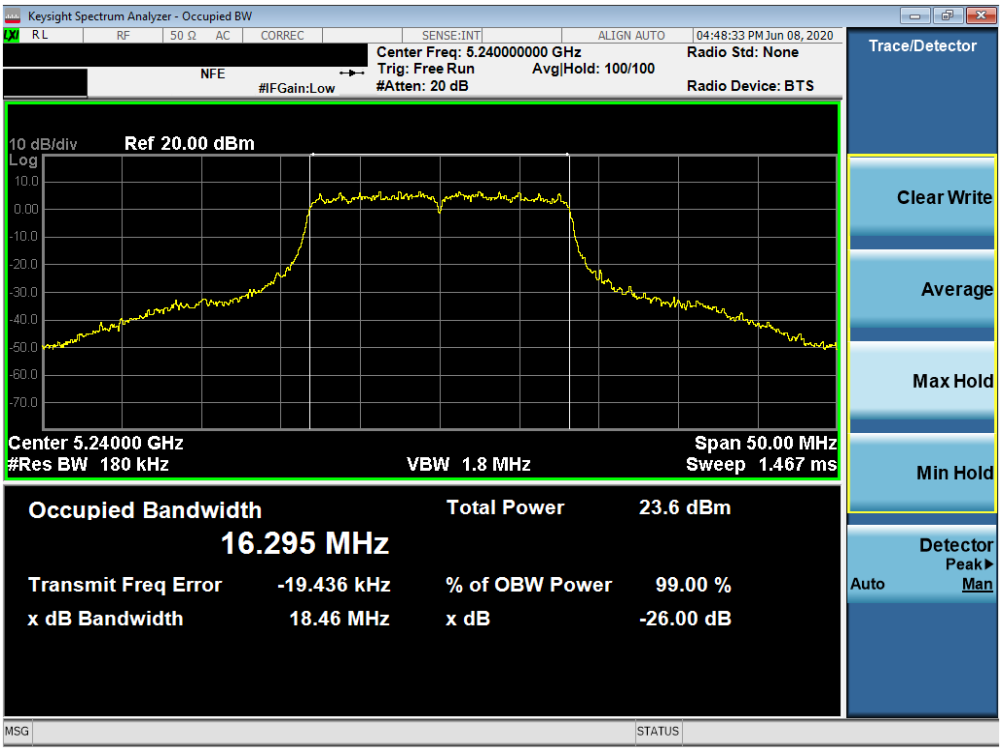
**Table 7-2. Conducted Bandwidth Measurements SISO ANT1**



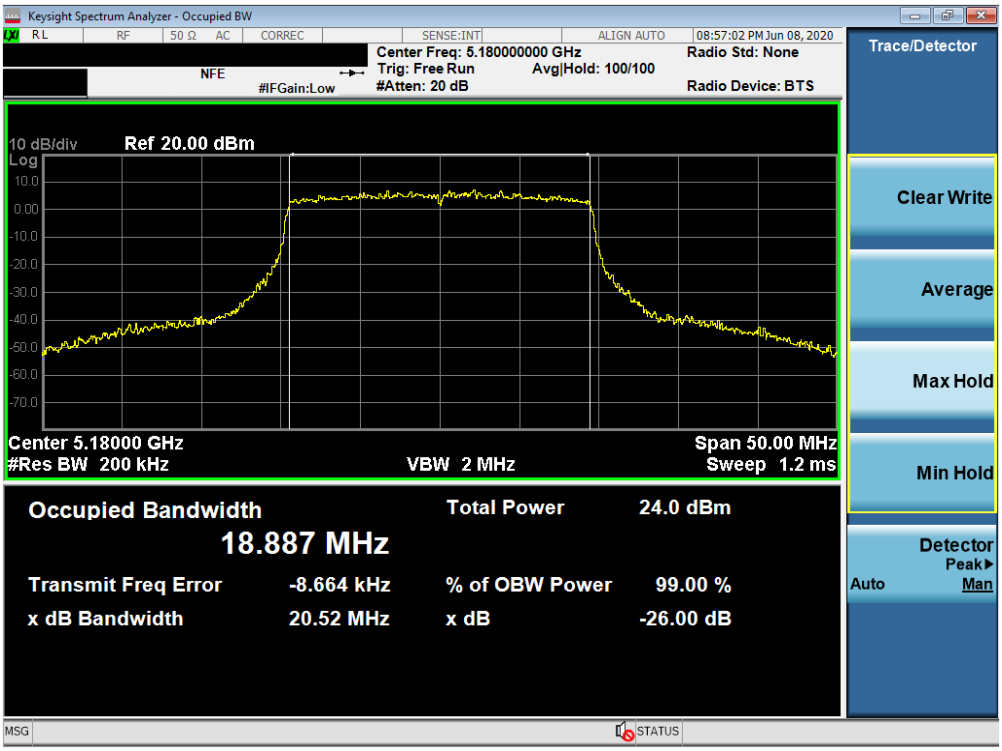

**Plot 7-1. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 1) – Ch. 36)**



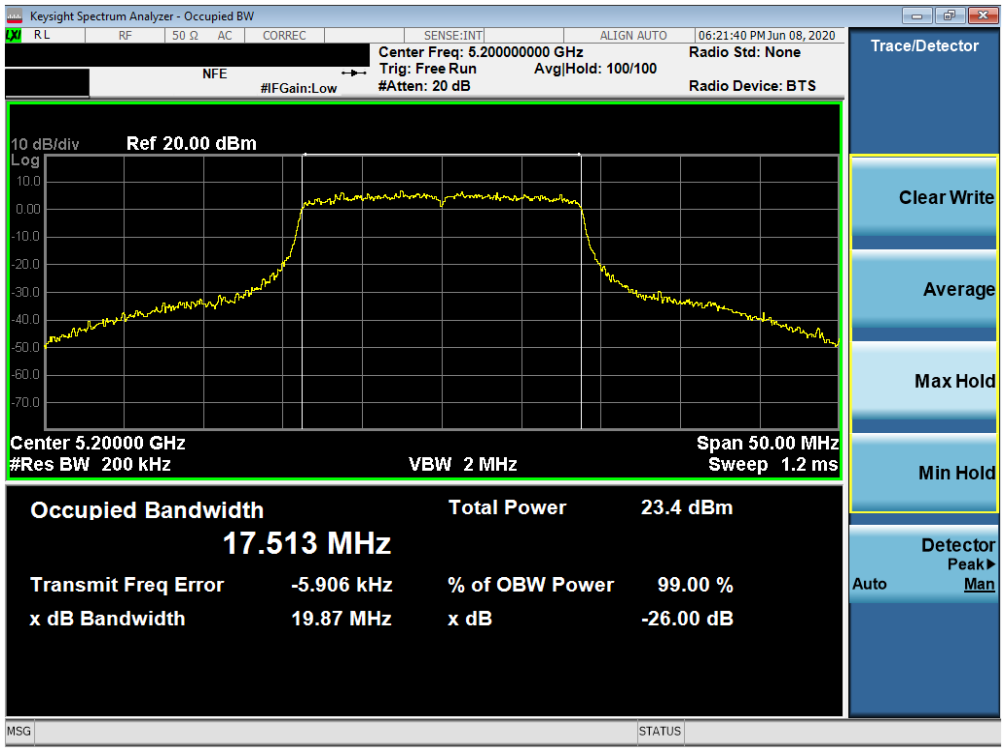

**Plot 7-2. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 1) – Ch. 40)**



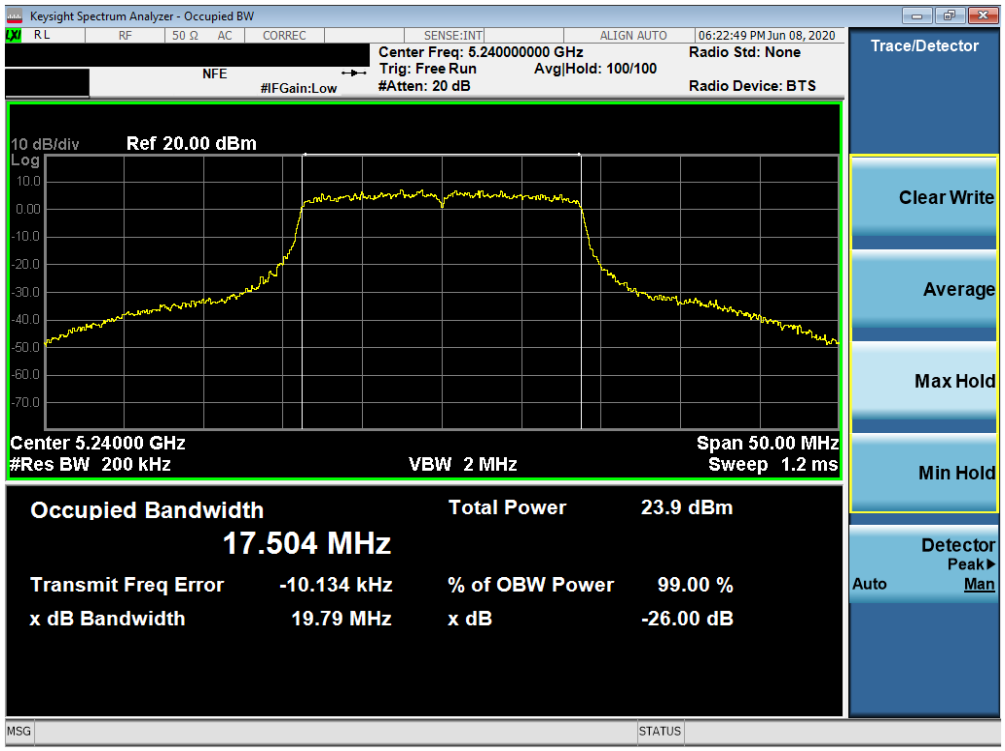

**Plot 7-3. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 1) – Ch. 48)**



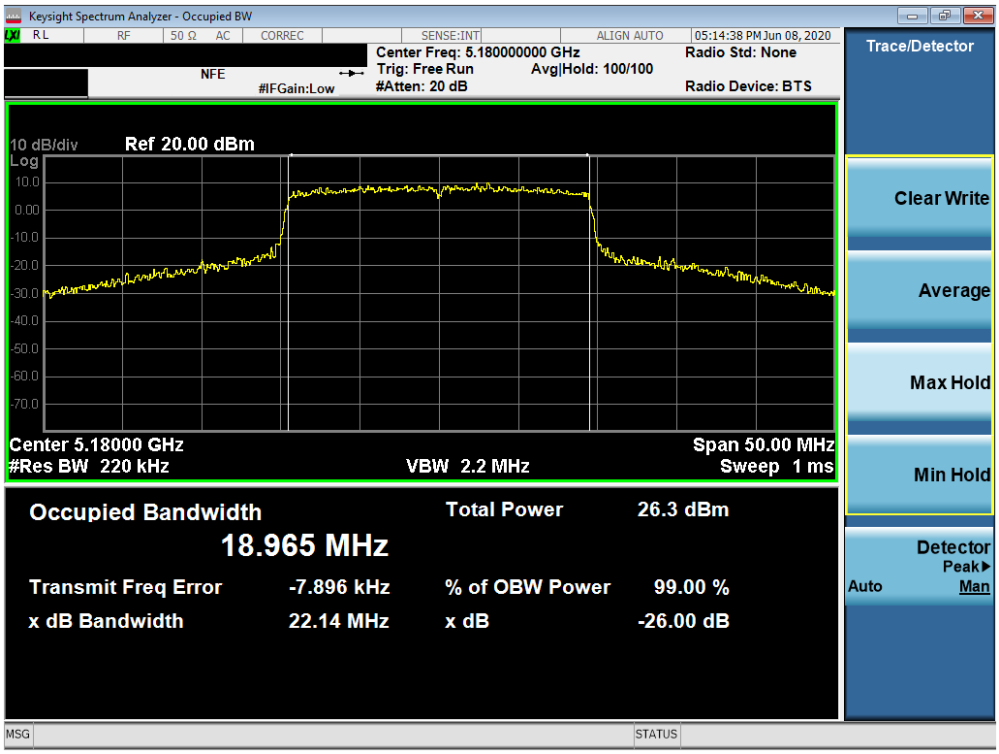

**Plot 7-4. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 1) – Ch. 36)**



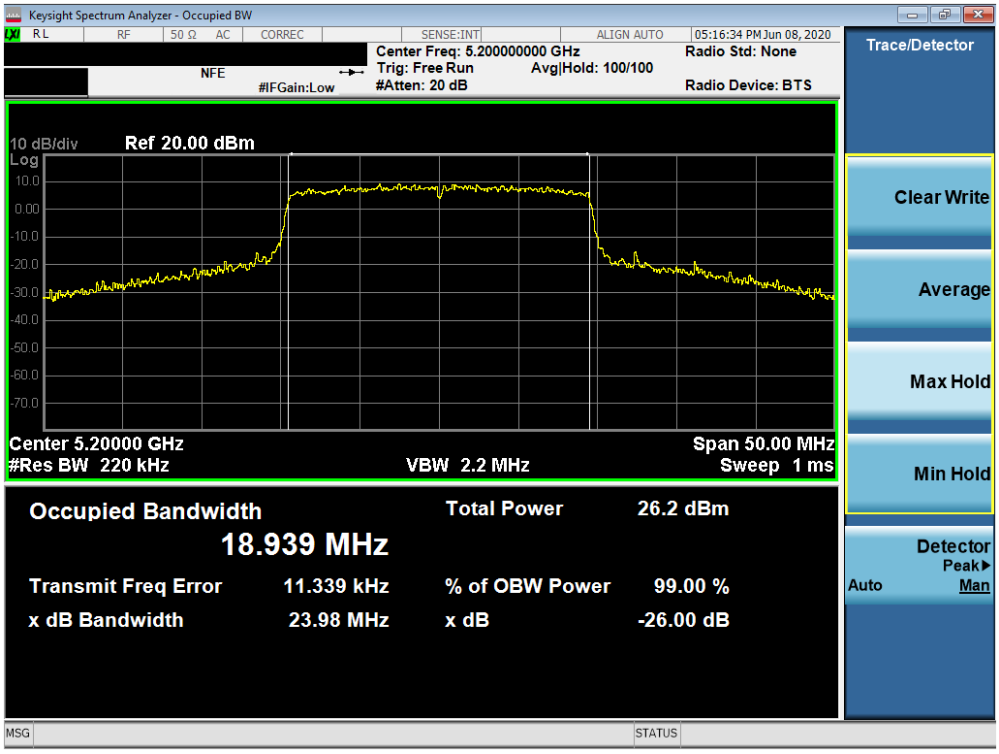

**Plot 7-5. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 1) – Ch. 40)**



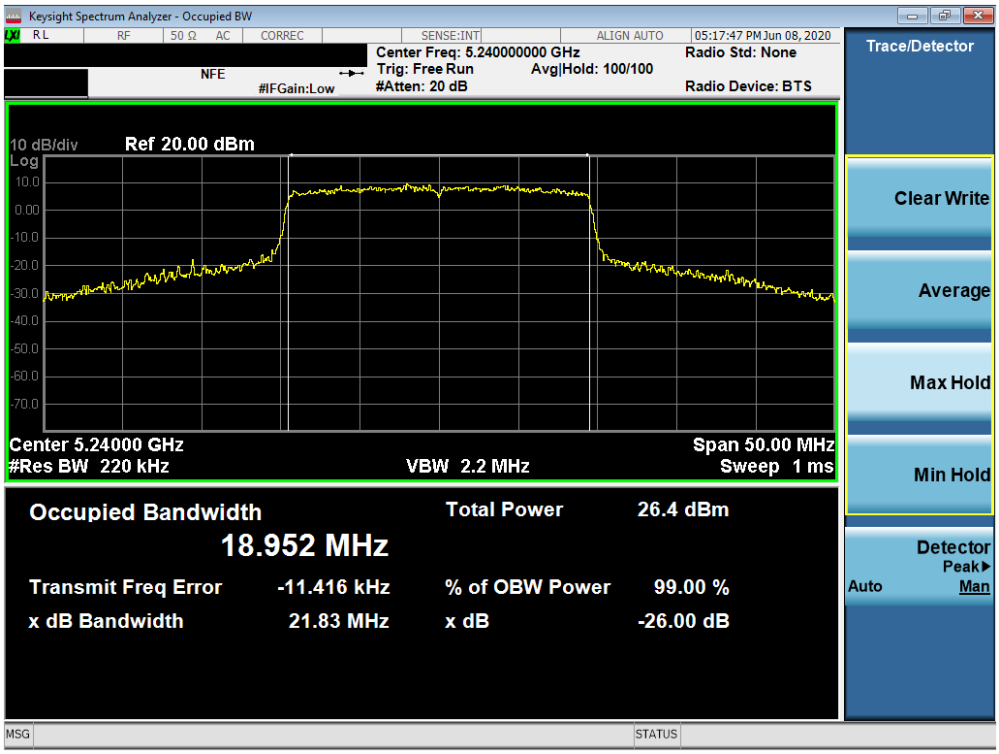

**Plot 7-6. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 1) – Ch. 48)**



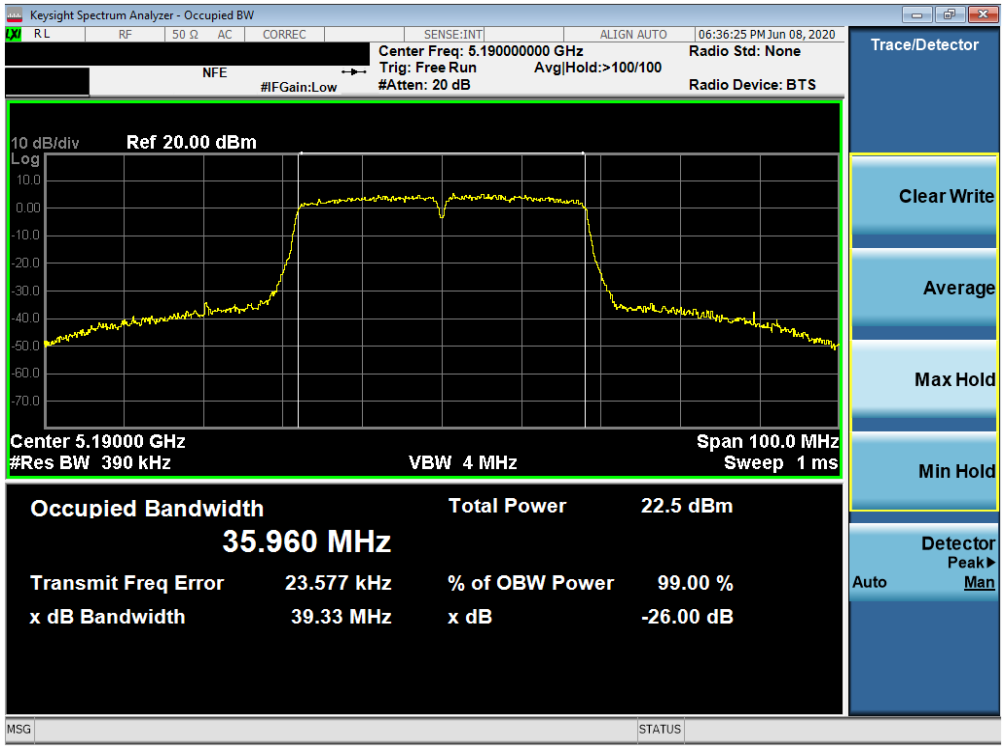

**Plot 7-7. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 1) – Ch. 36)**



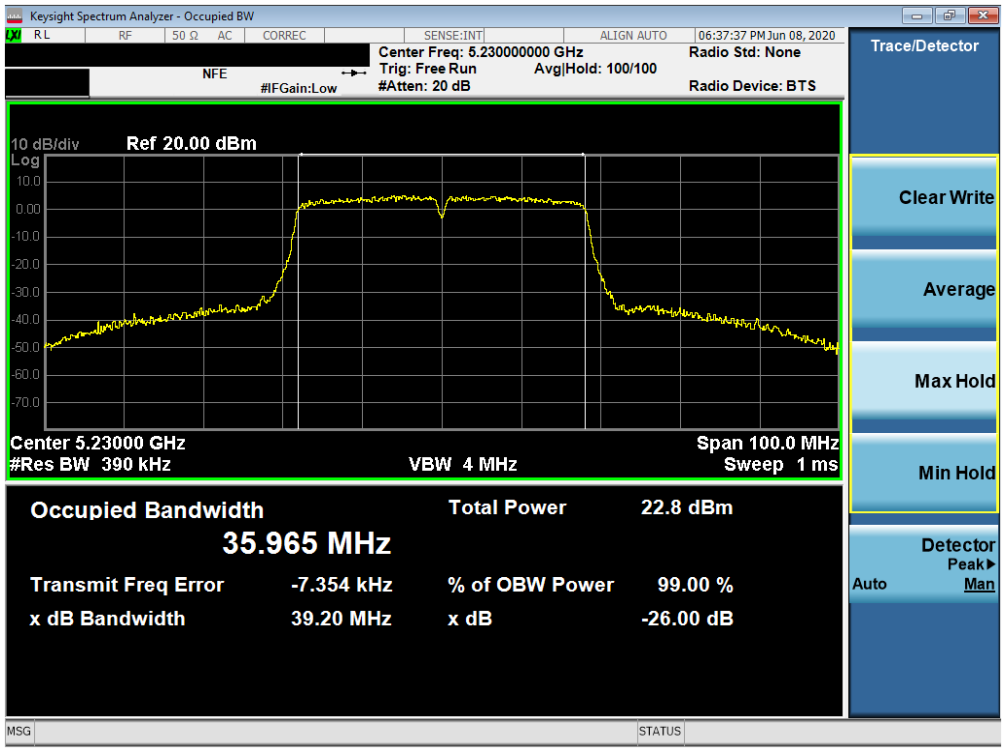

**Plot 7-8. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 1) – Ch. 40)**



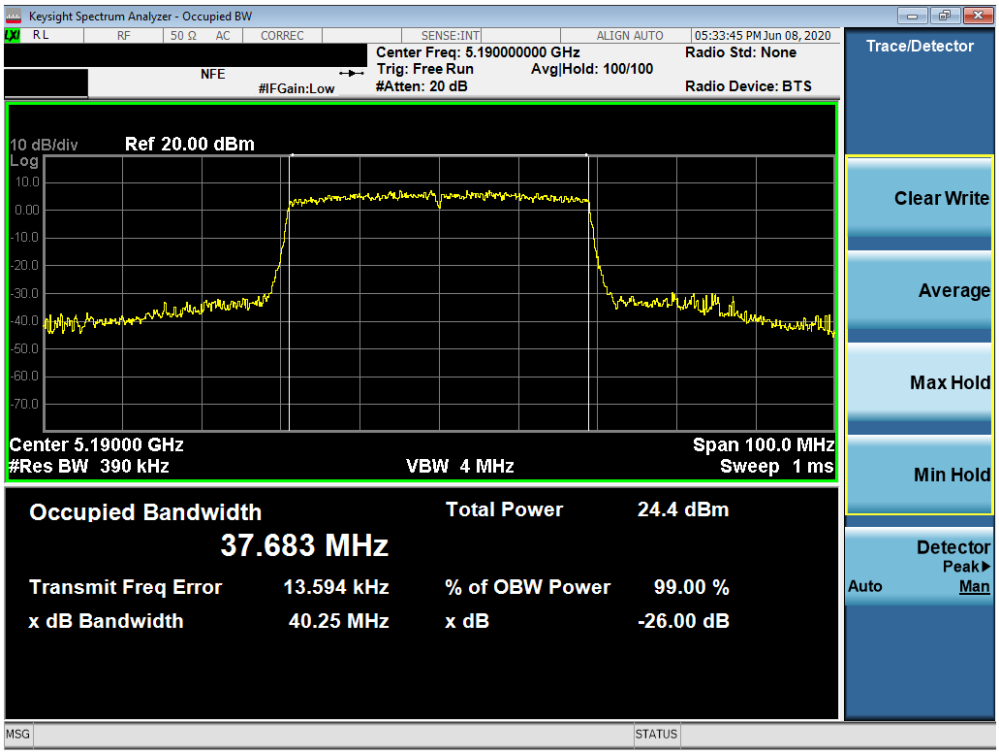

**Plot 7-9. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 1) – Ch. 48)**



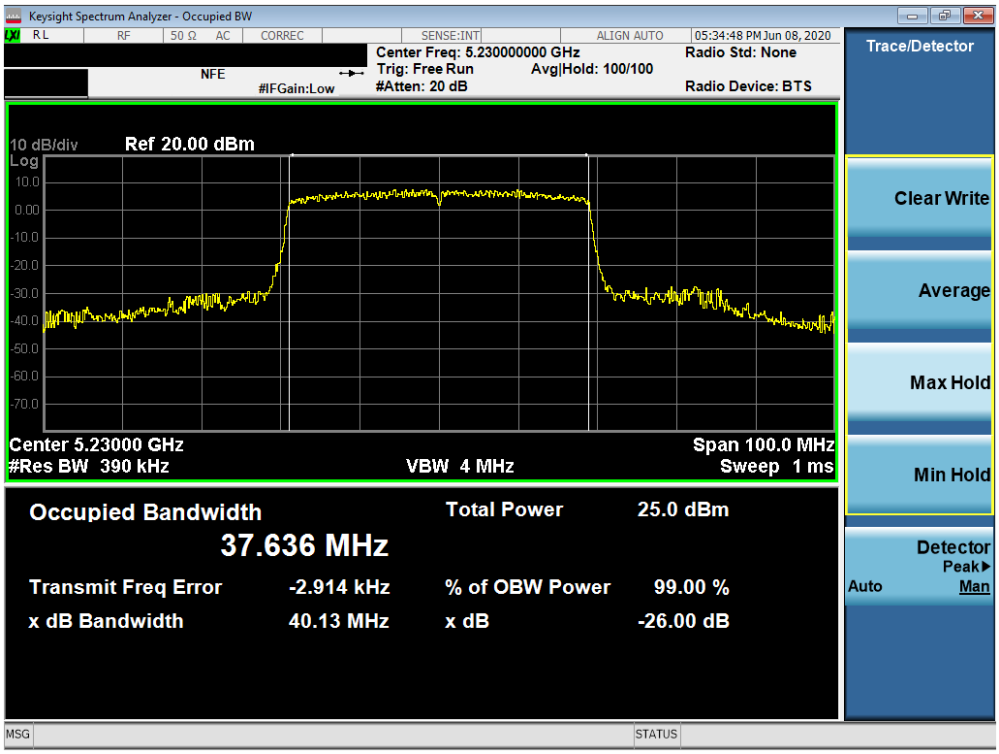

**Plot 7-10. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 1) – Ch. 38)**



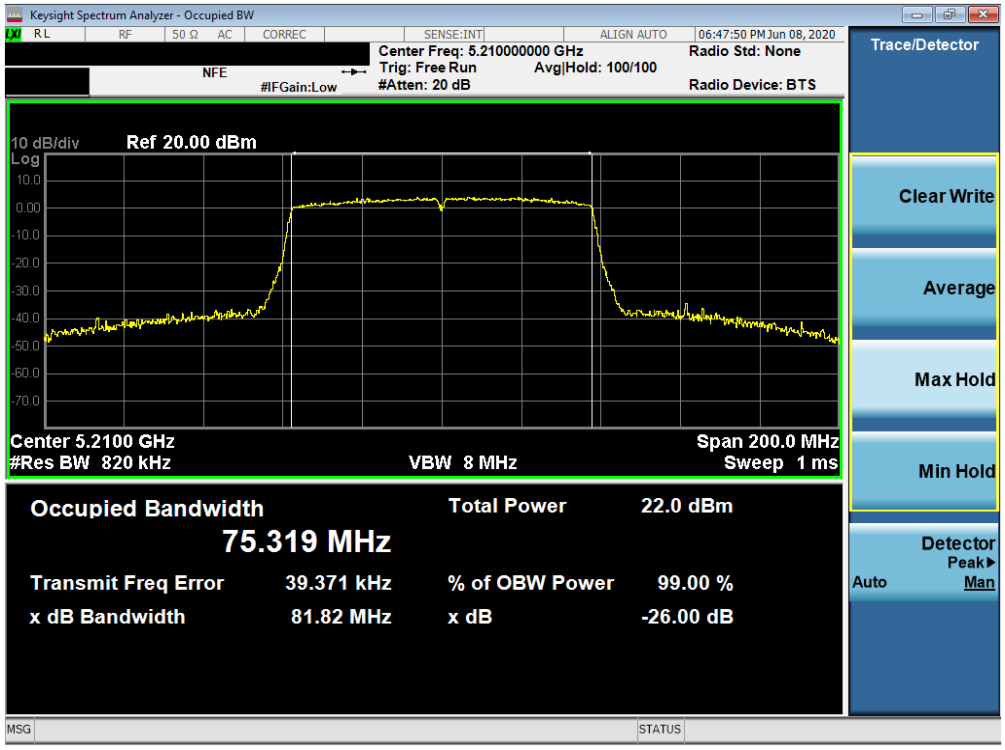

**Plot 7-11. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 1) – Ch. 46)**



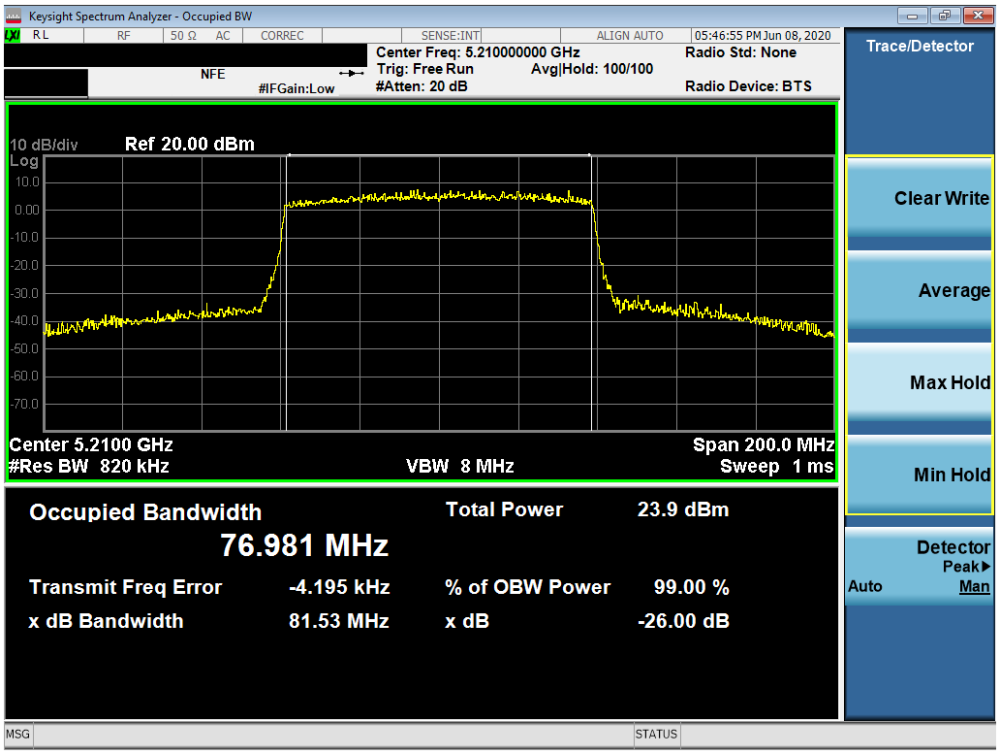

**Plot 7-12. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 1) – Ch. 38)**



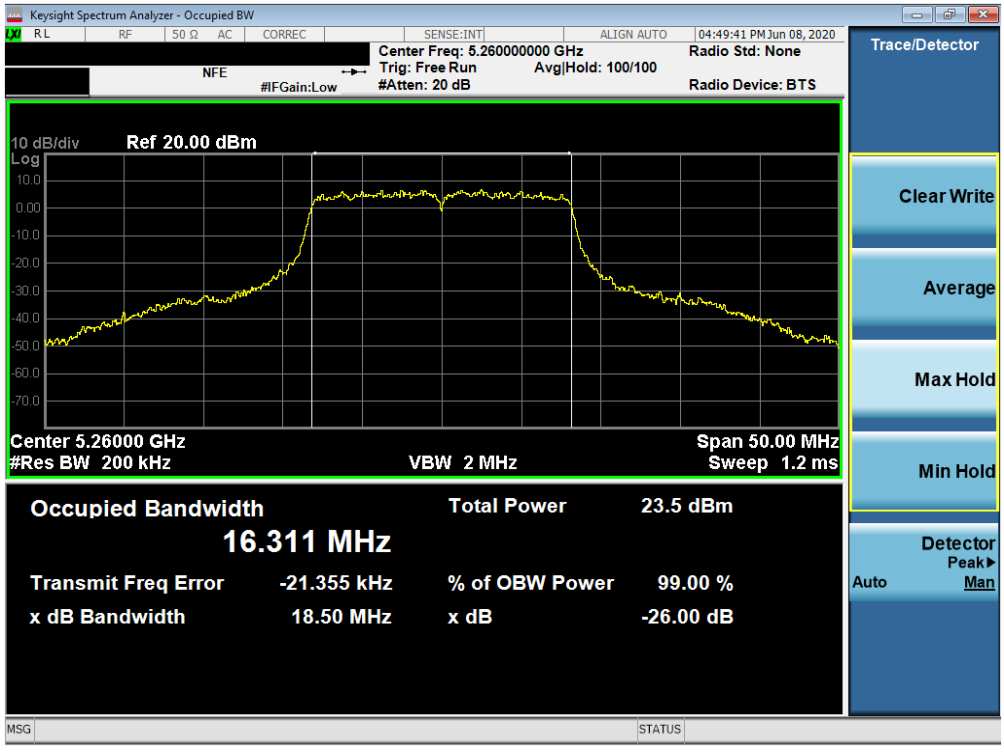

**Plot 7-13. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 1) – Ch. 38)**



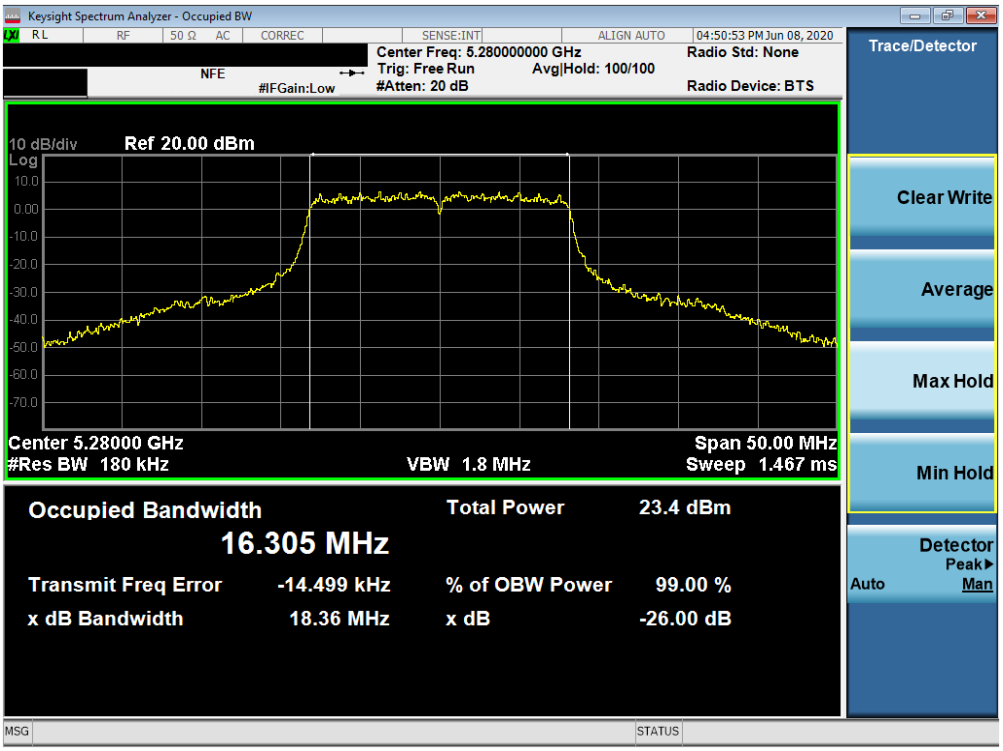

**Plot 7-14. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)**



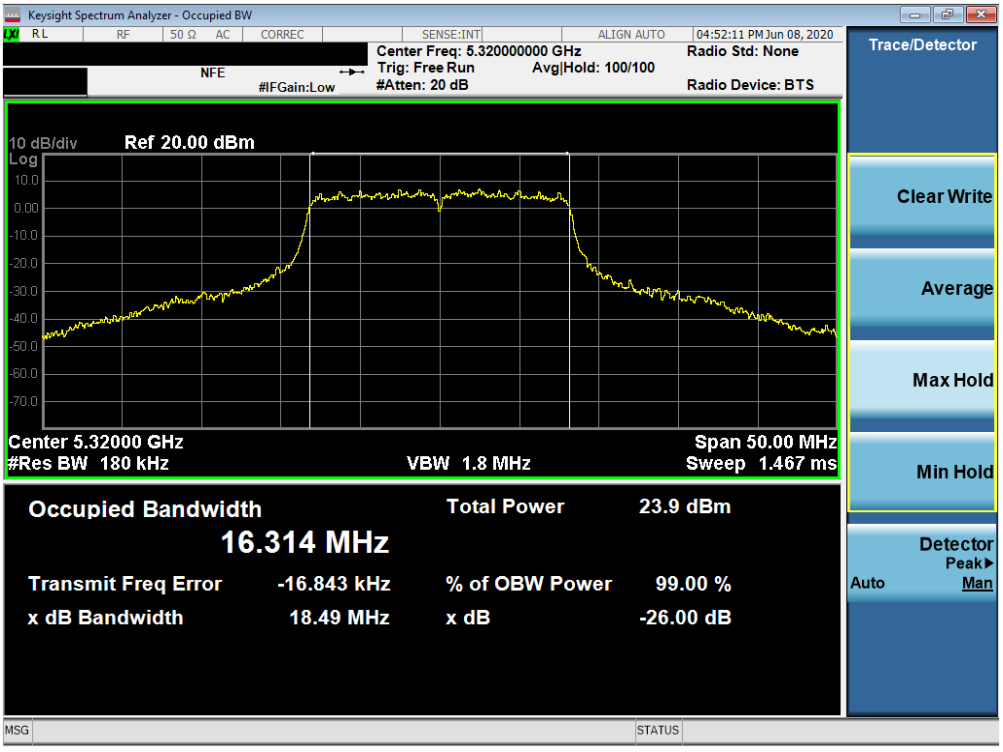

**Plot 7-15. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax SU (UNII Band 1) – Ch. 42)**



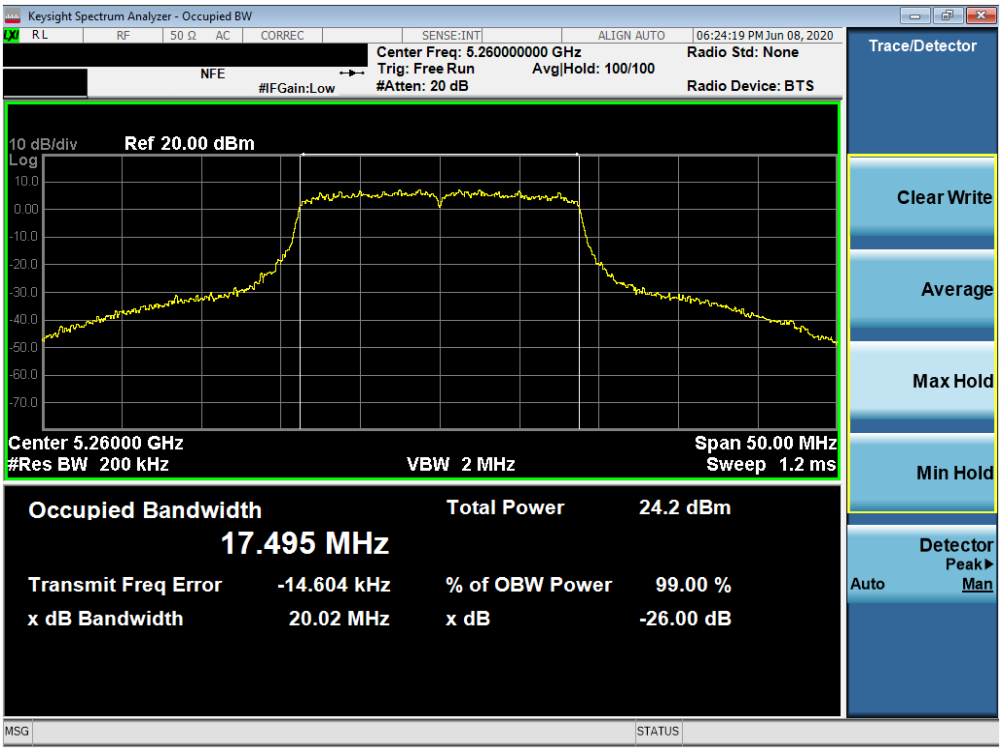

**Plot 7-16. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) – Ch. 52)**



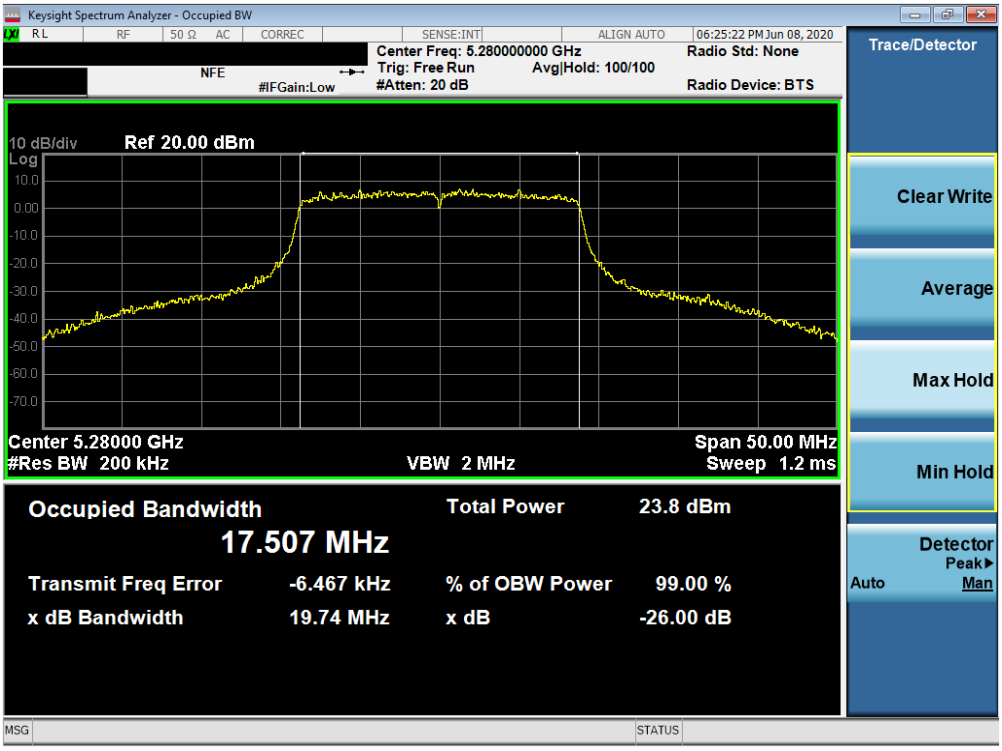

**Plot 7-17. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) – Ch. 56)**



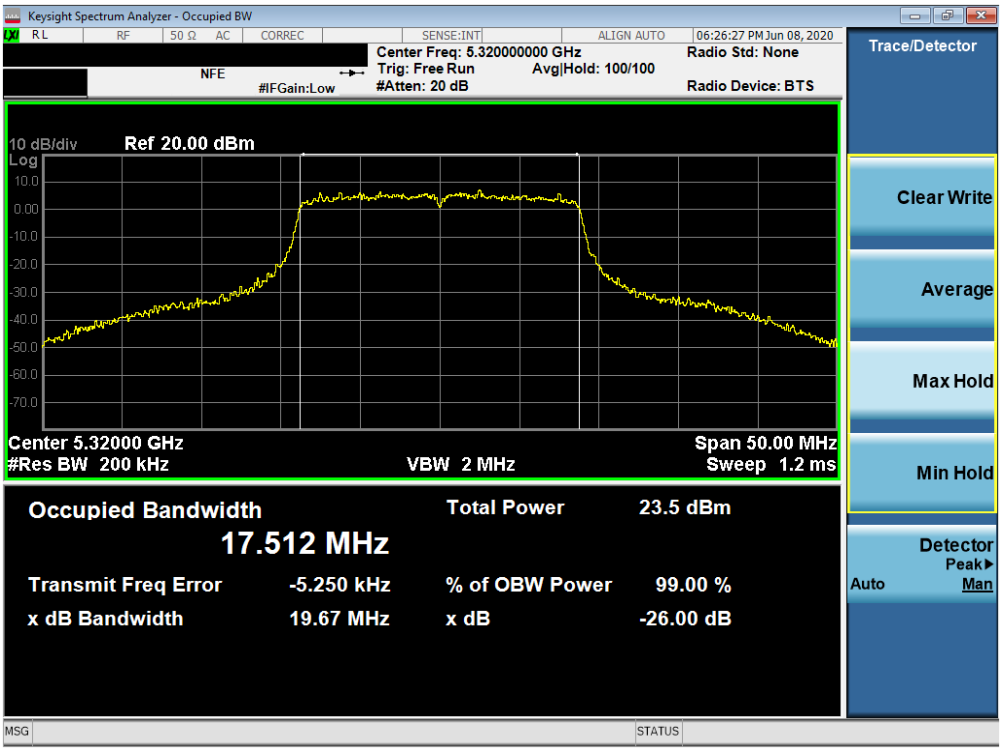

**Plot 7-18. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) – Ch. 64)**



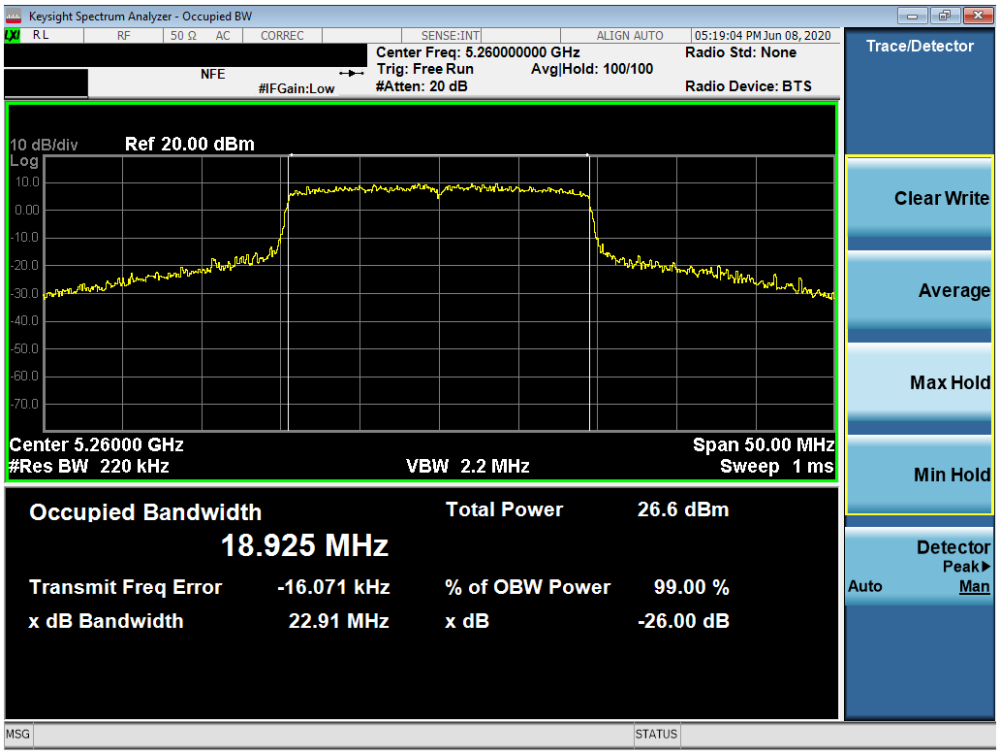

**Plot 7-19. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)**



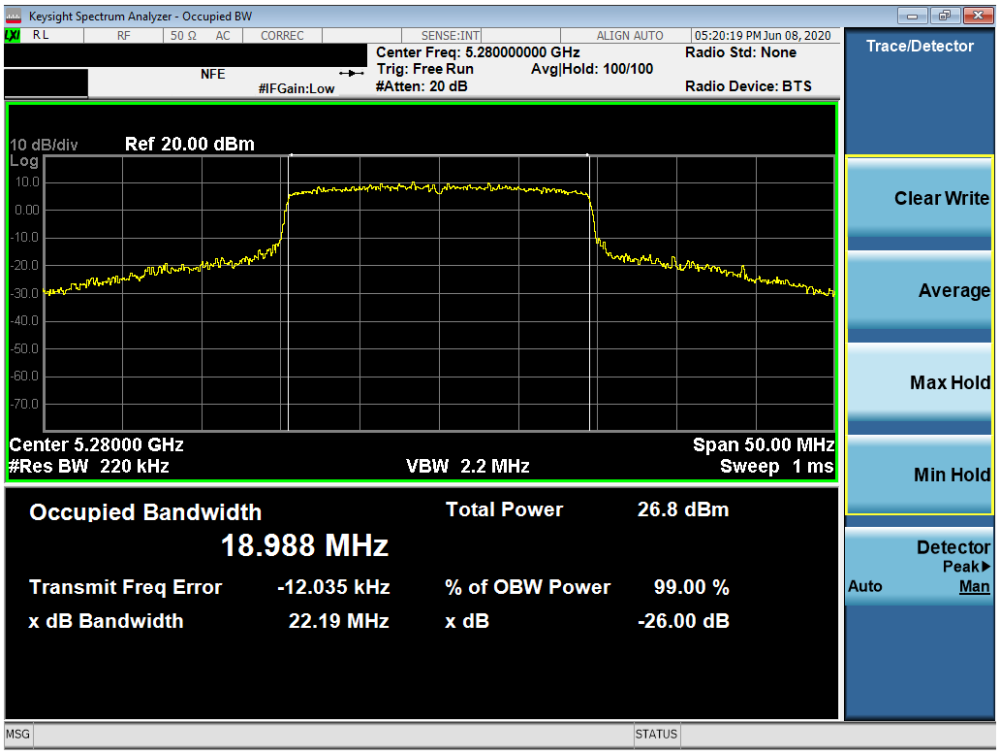

**Plot 7-20. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)**



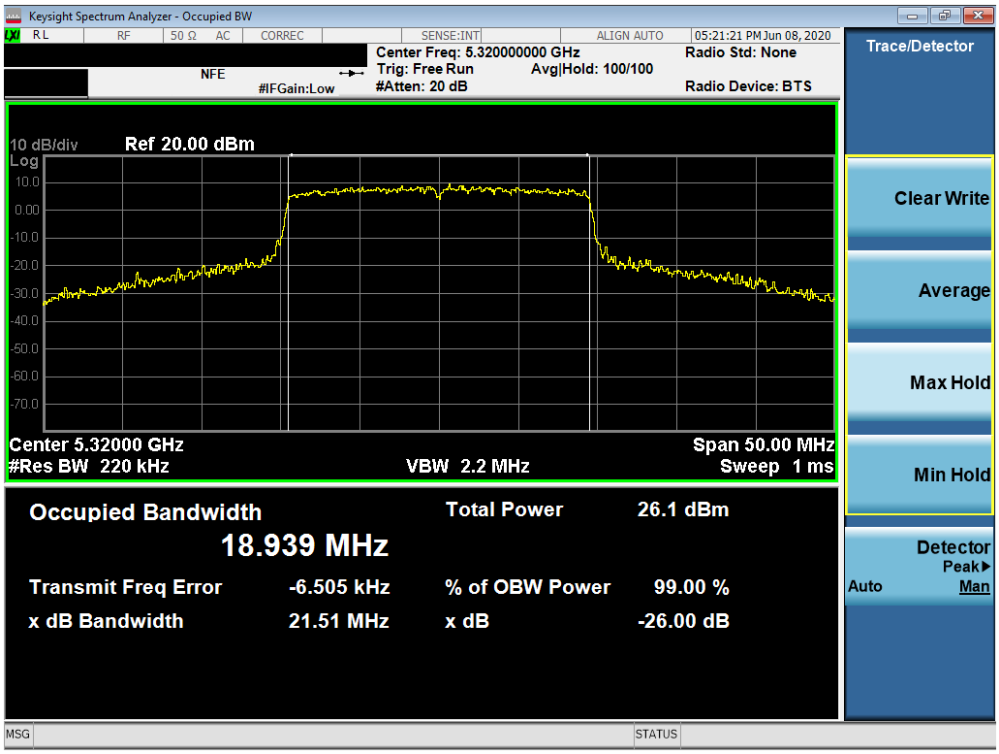

**Plot 7-21. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)**



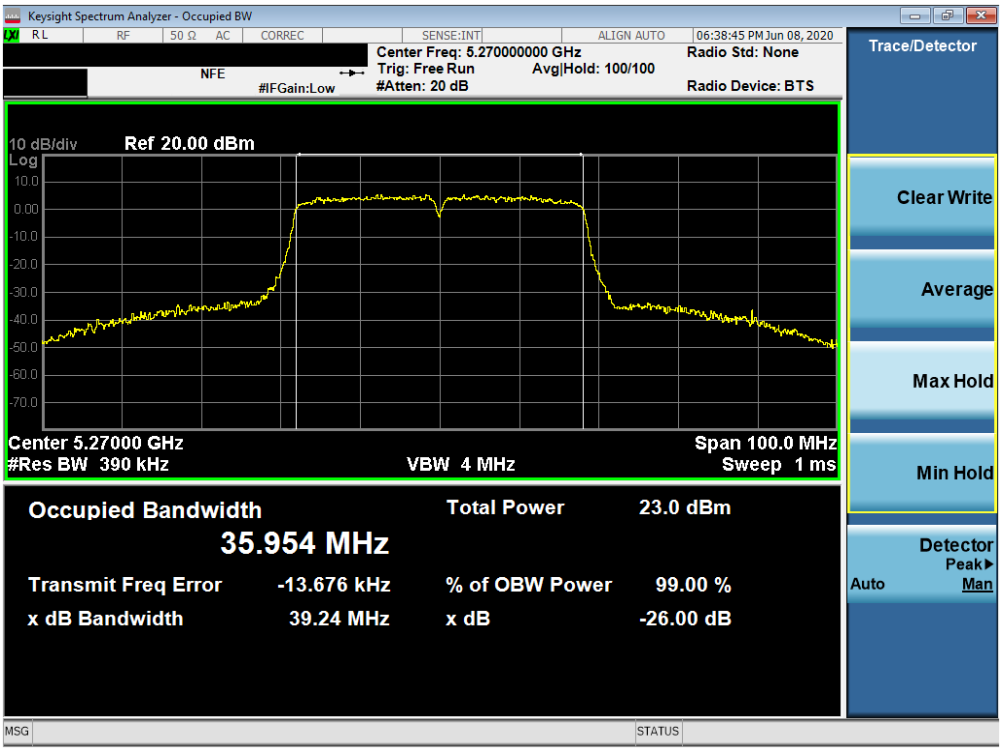

**Plot 7-22. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 2A) – Ch. 52)**



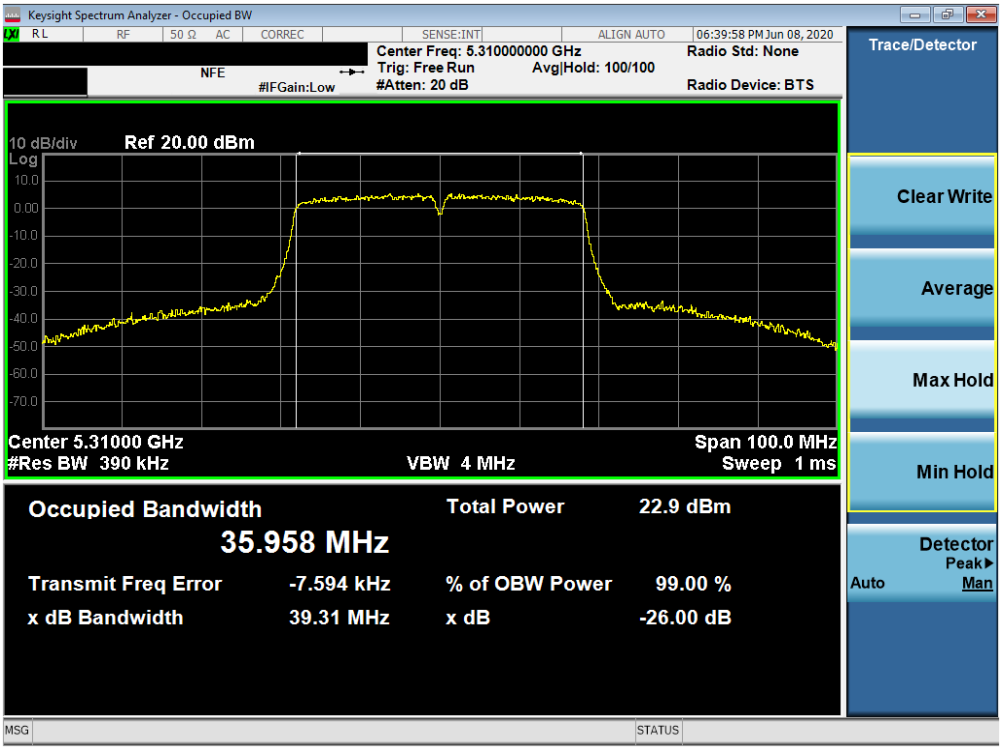

**Plot 7-23. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 2A) – Ch. 56)**



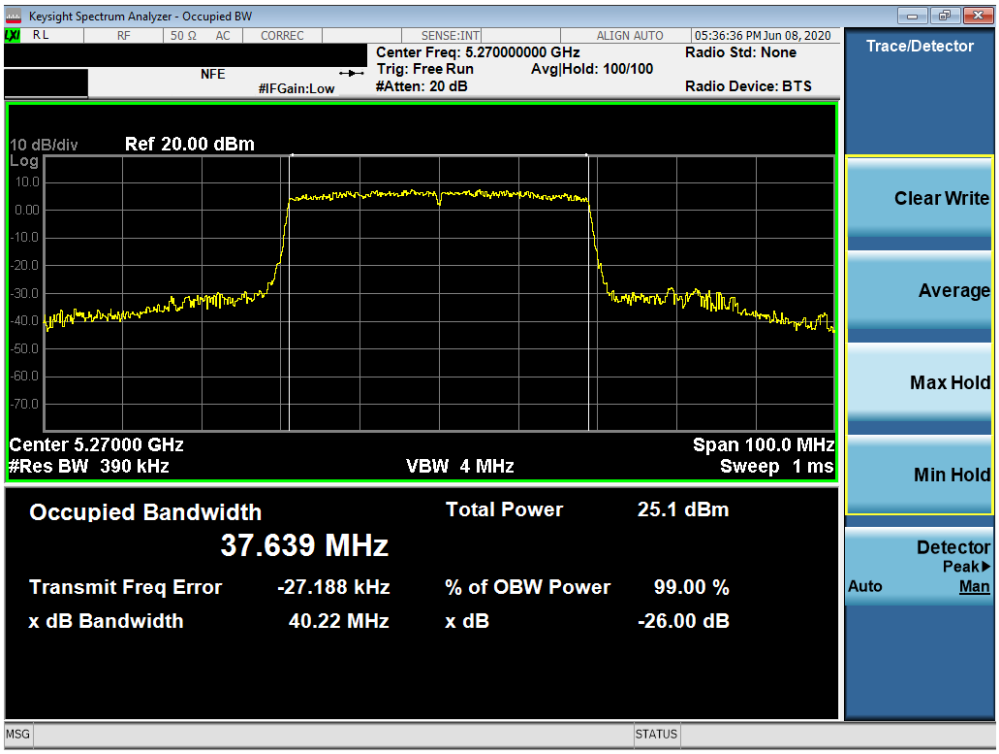

**Plot 7-24. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 2A) – Ch. 64)**



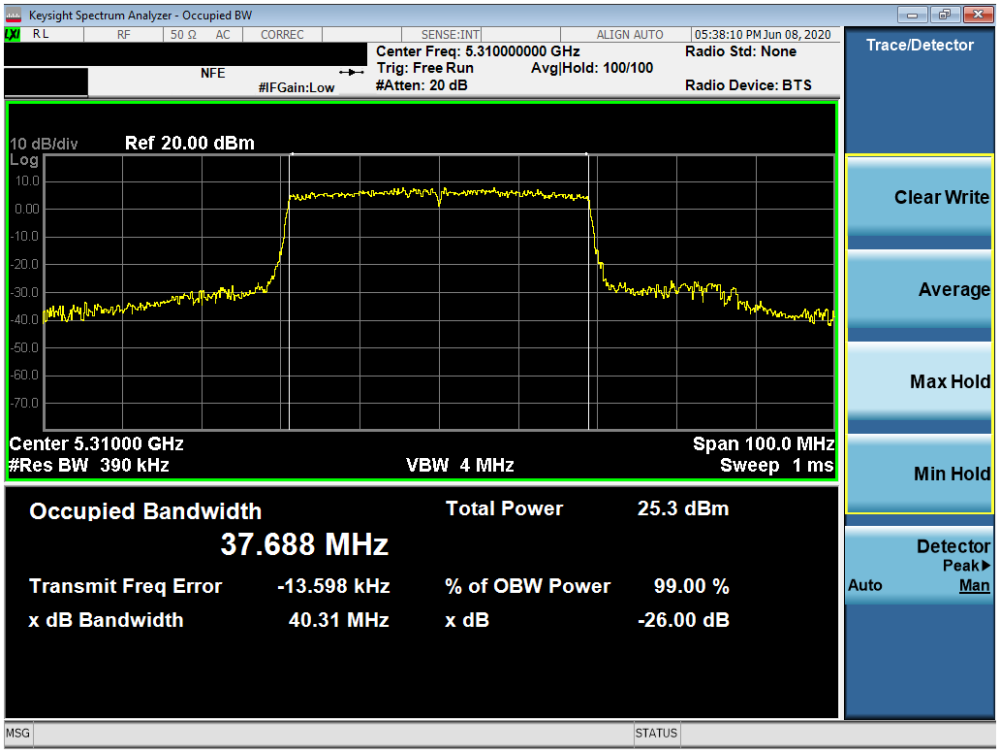

**Plot 7-25. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)**



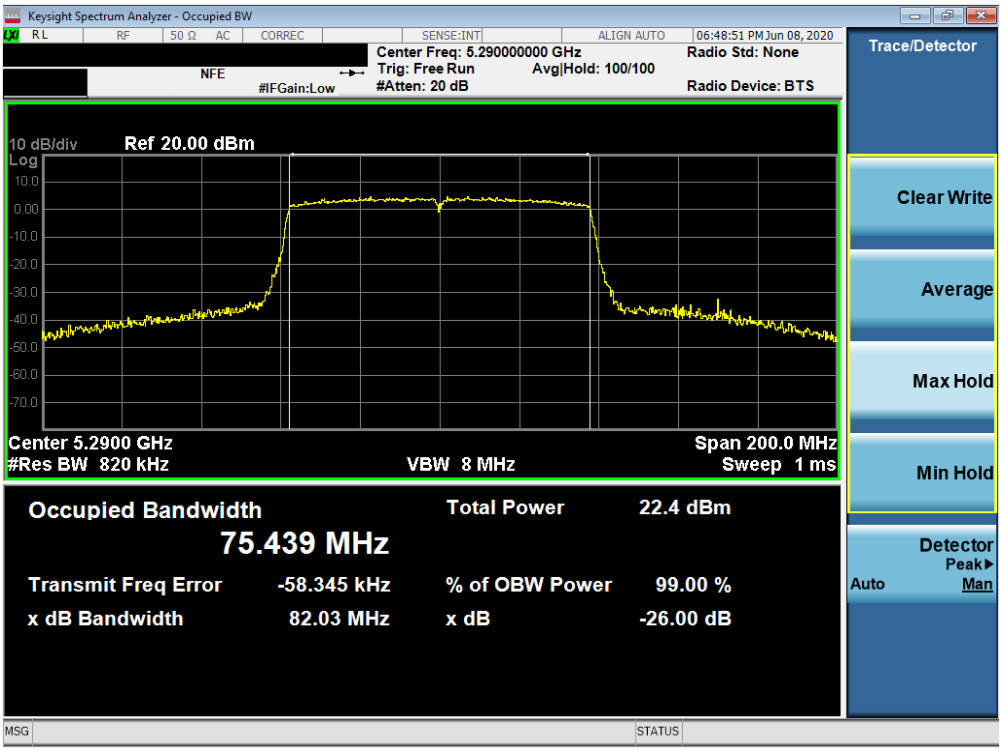

**Plot 7-26. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)**



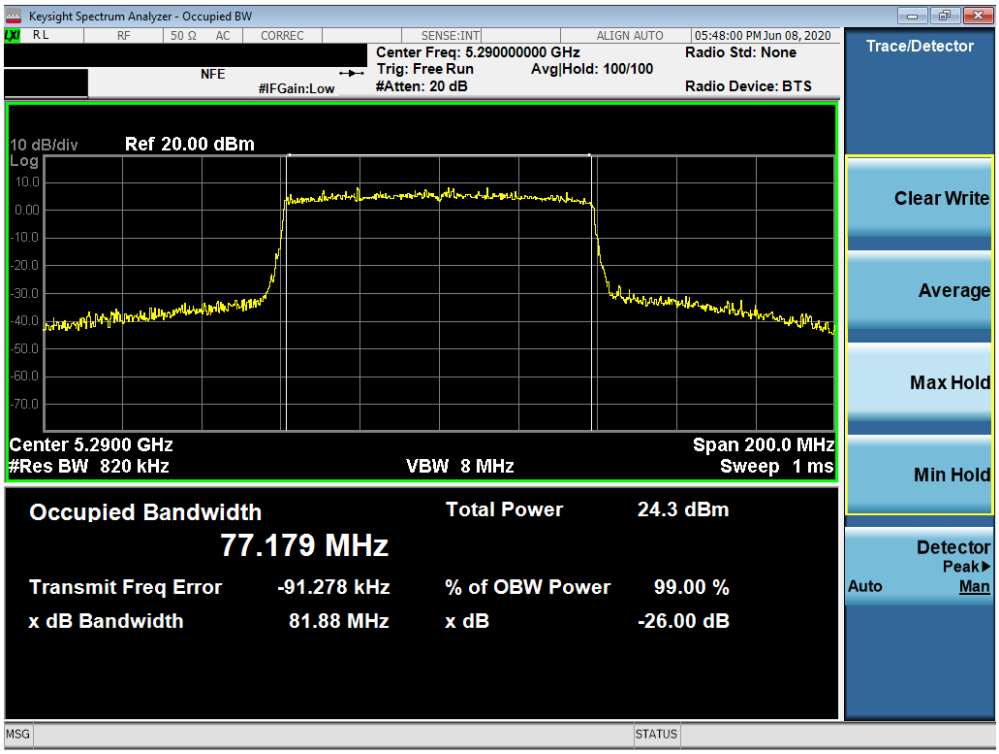

**Plot 7-27. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 2A) – Ch. 54)**



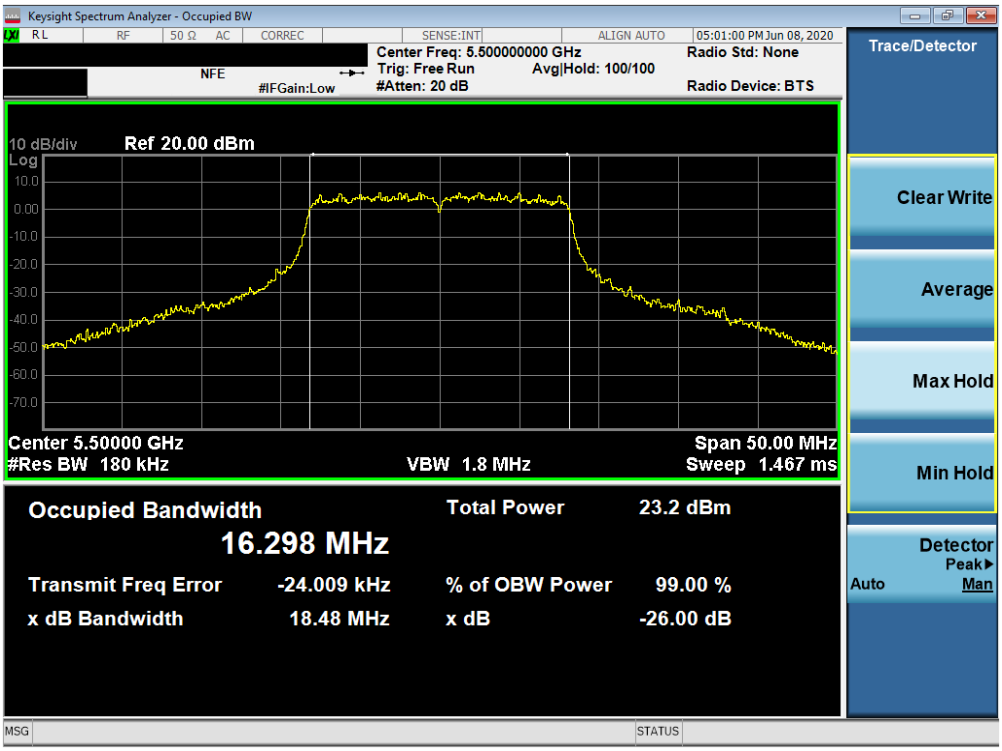

**Plot 7-28. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 2A) – Ch. 62)**



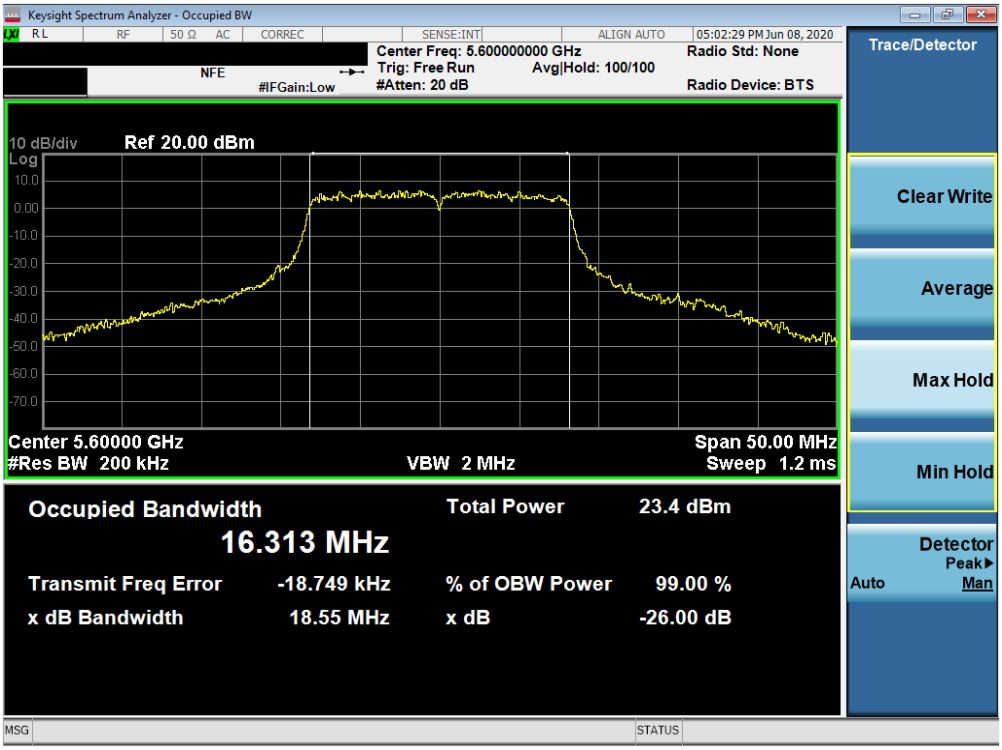

**Plot 7-29. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)**



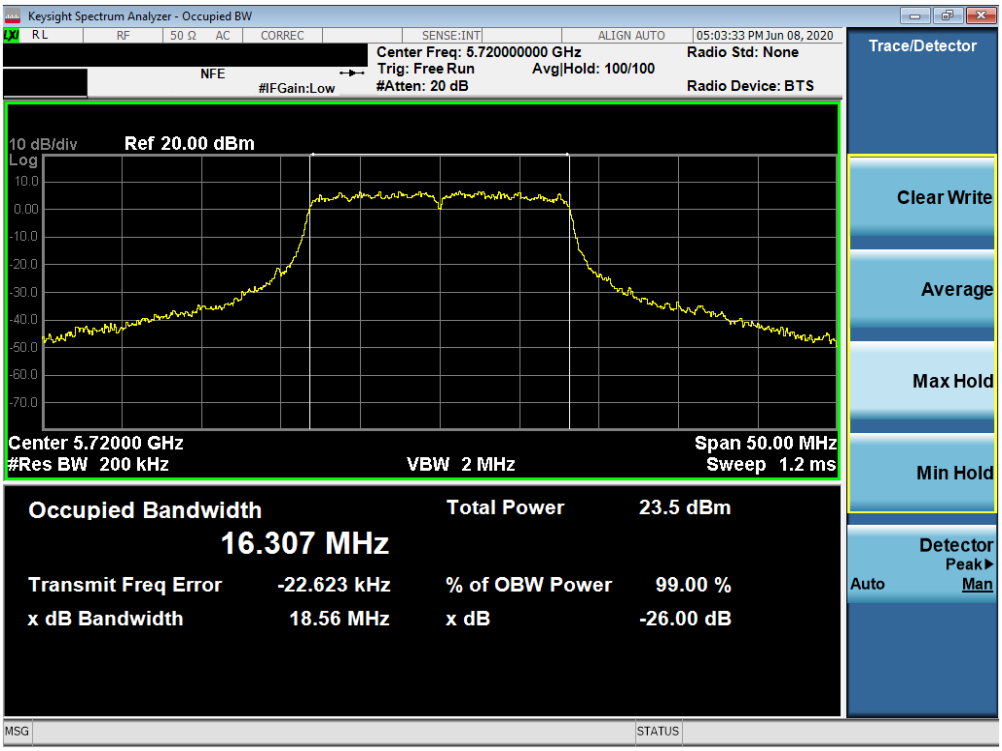

**Plot 7-30. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax SU (UNII Band 2A) – Ch. 58)**



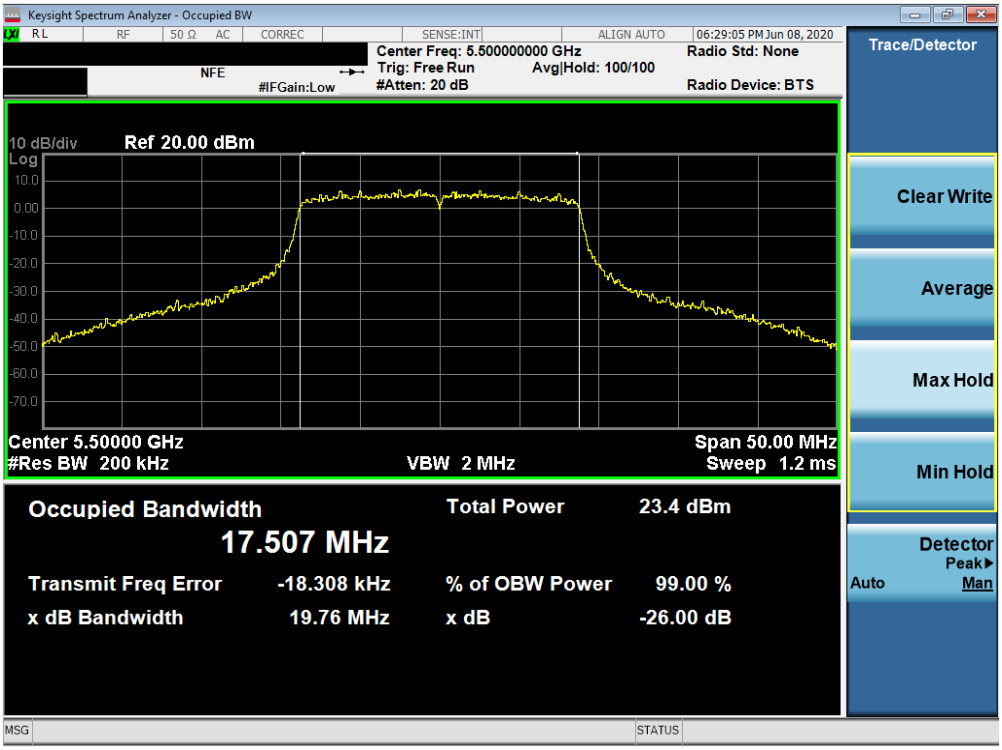

**Plot 7-31. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2C) – Ch. 100)**



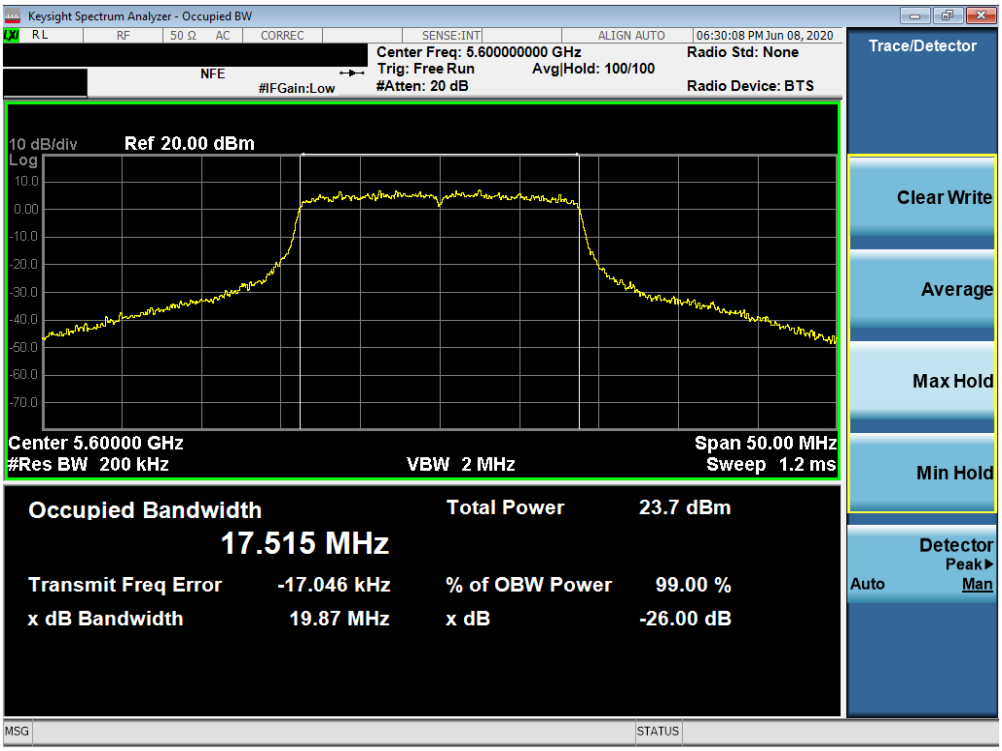

**Plot 7-32. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2C) – Ch. 120)**



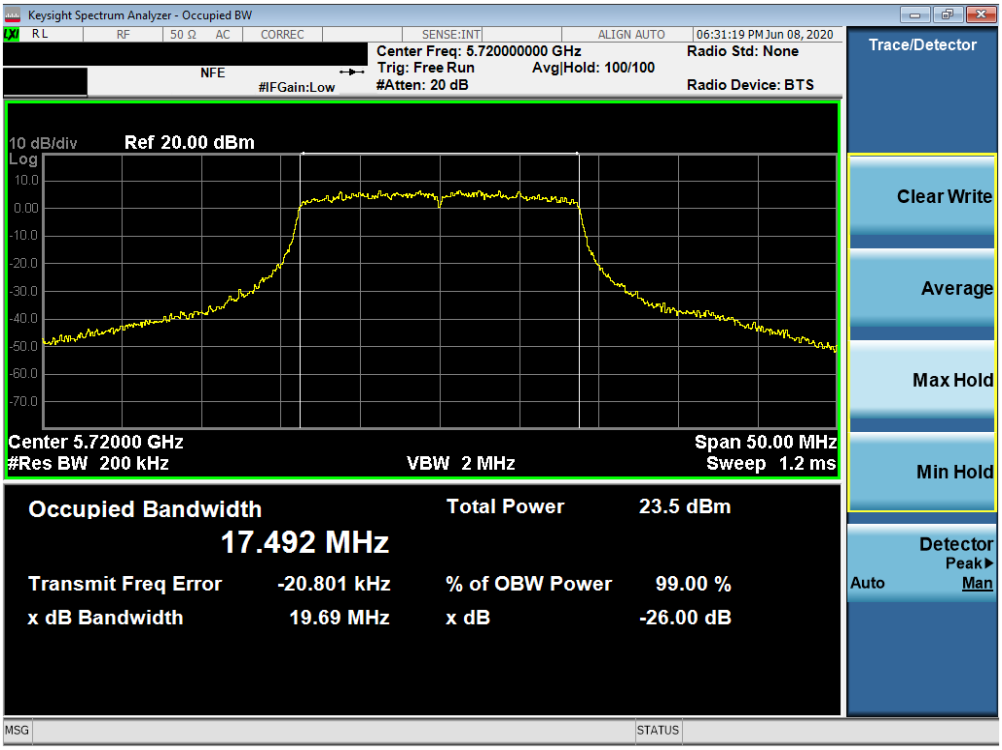

**Plot 7-33. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2C) – Ch. 144)**



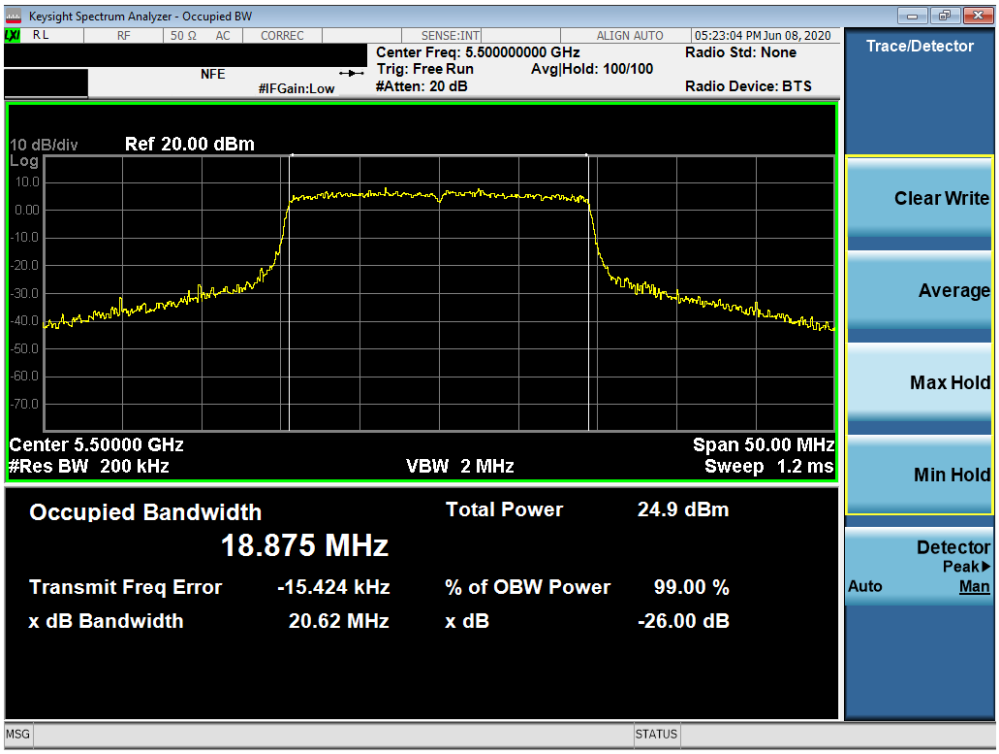

**Plot 7-34. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)**



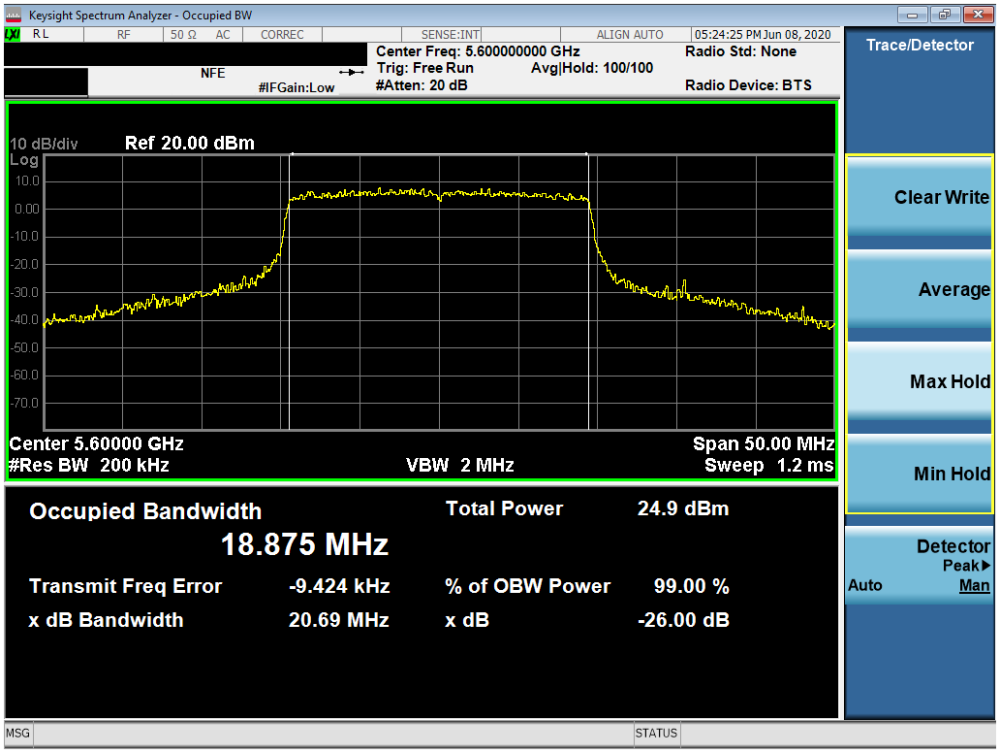

**Plot 7-35. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 120)**



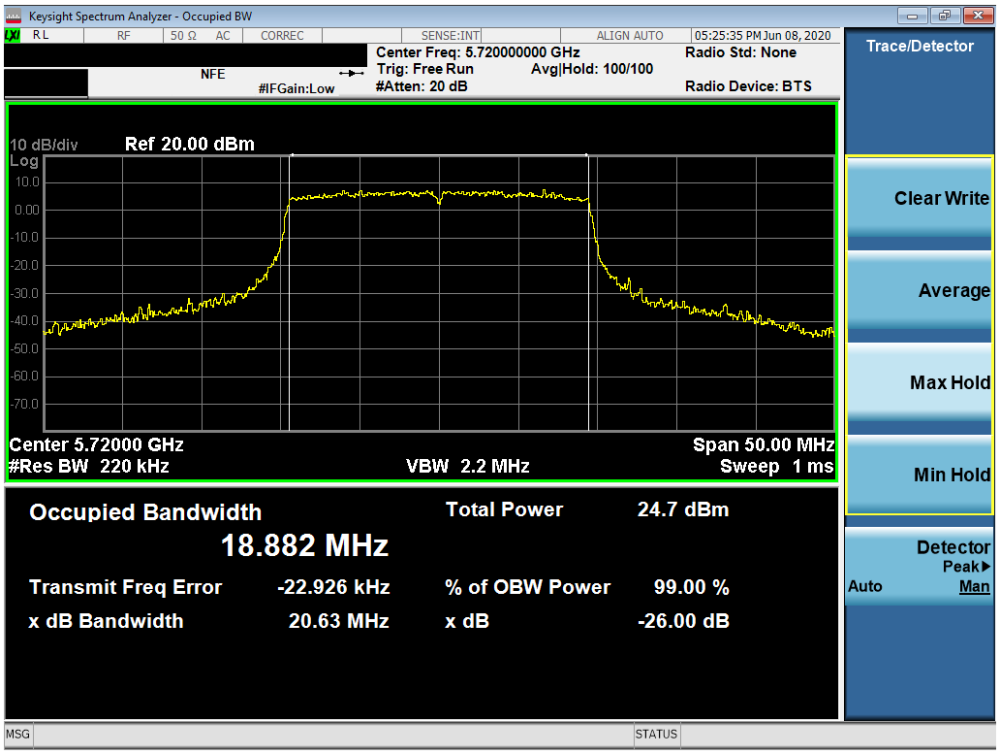

**Plot 7-36. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)**



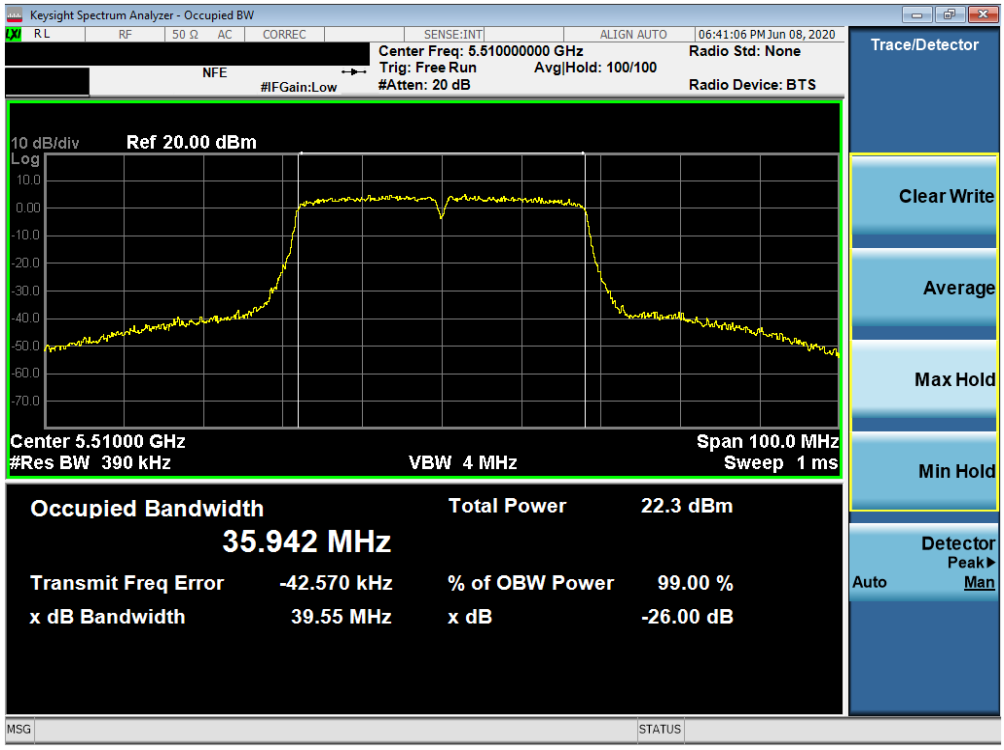

**Plot 7-37. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 2C) – Ch. 100)**



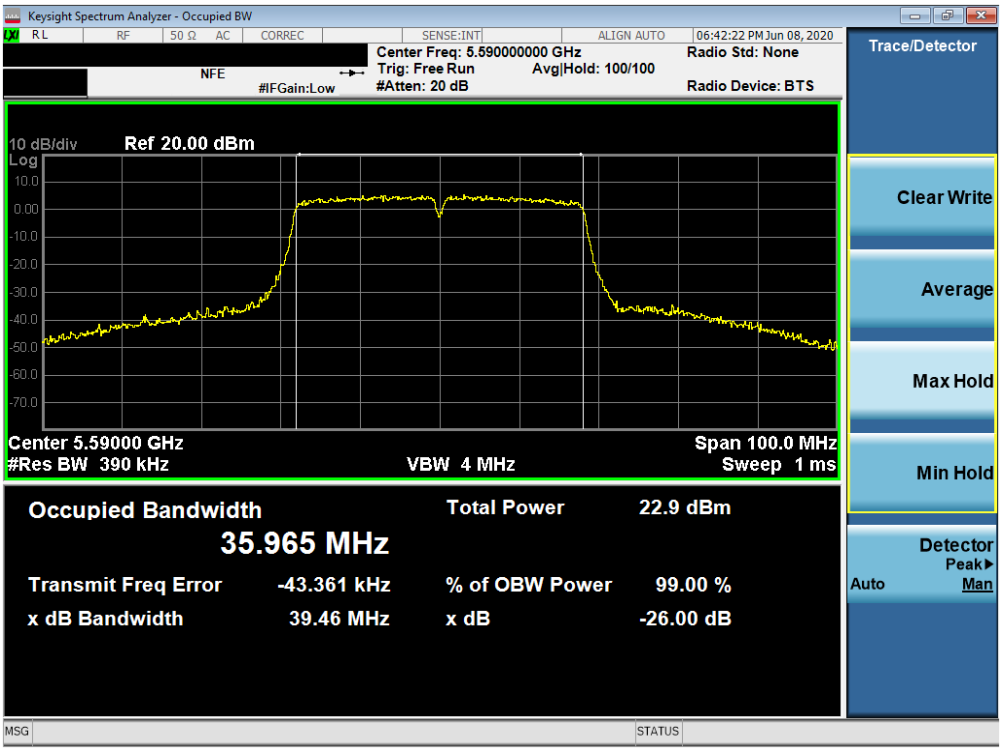

**Plot 7-38. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 2C) – Ch. 120)**



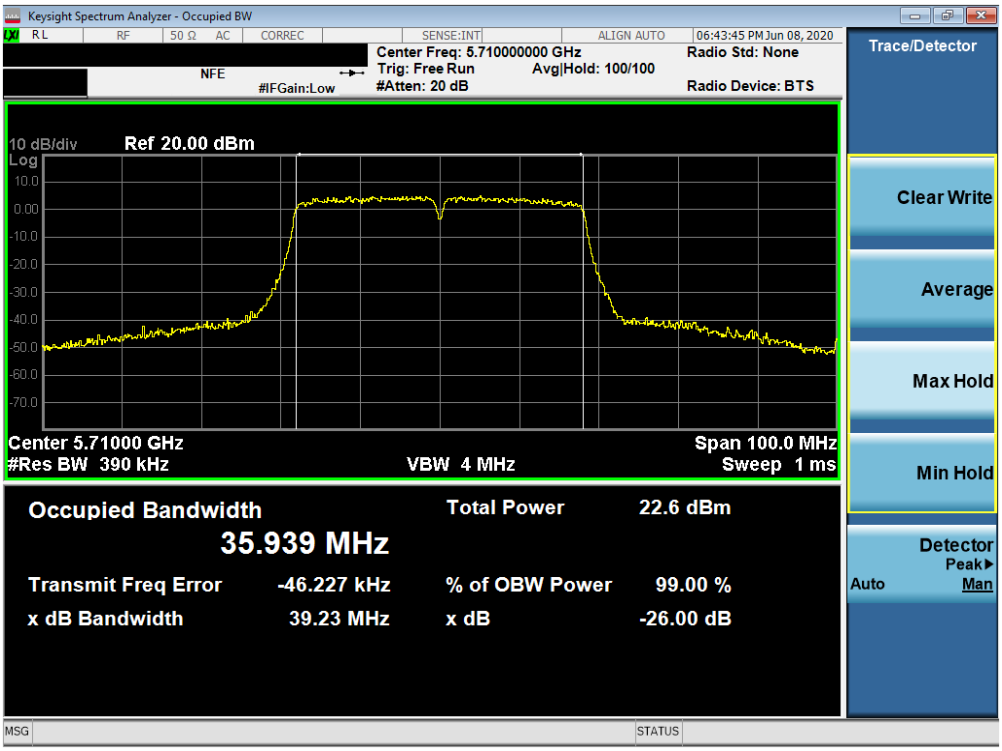

**Plot 7-39. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 2C) – Ch. 144)**



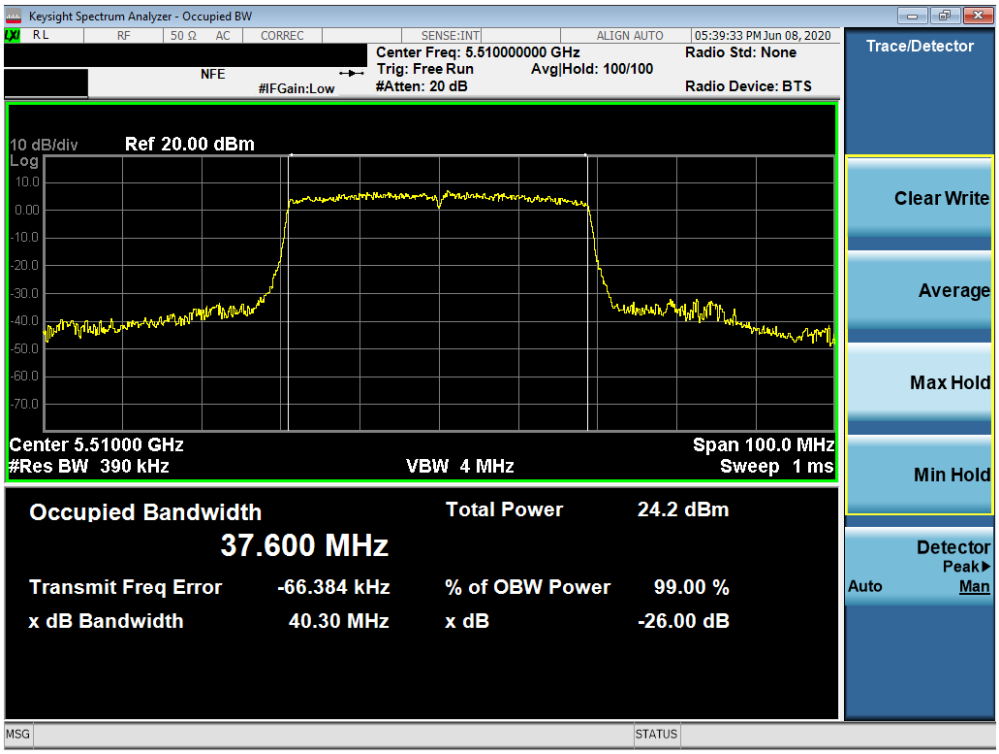

**Plot 7-40. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)**



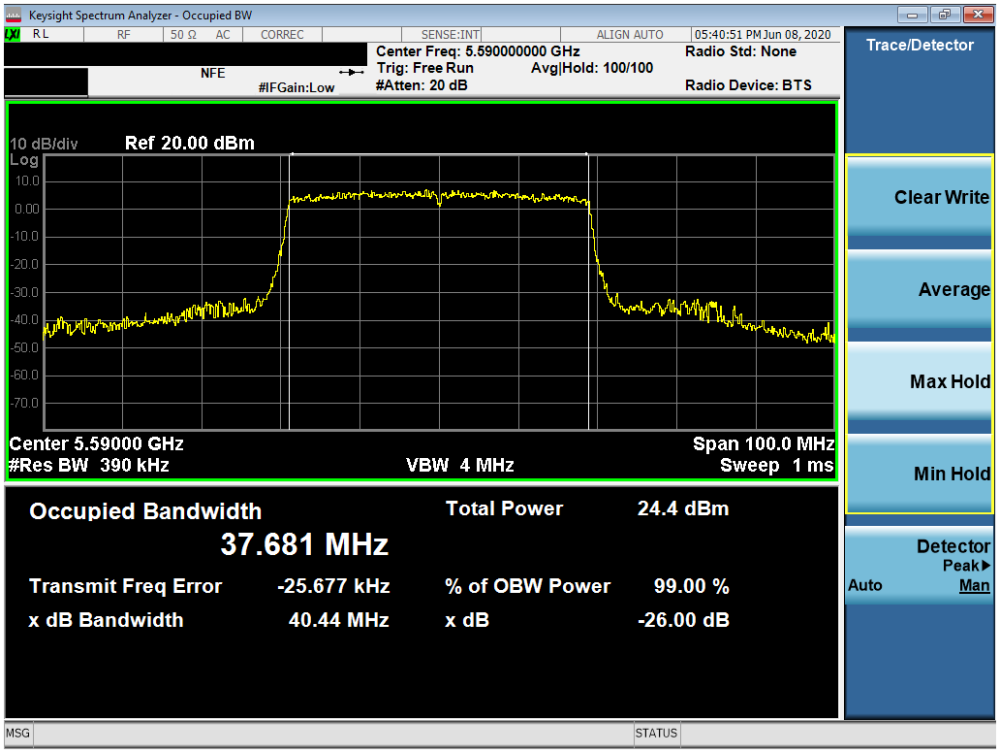

**Plot 7-41. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 118)**



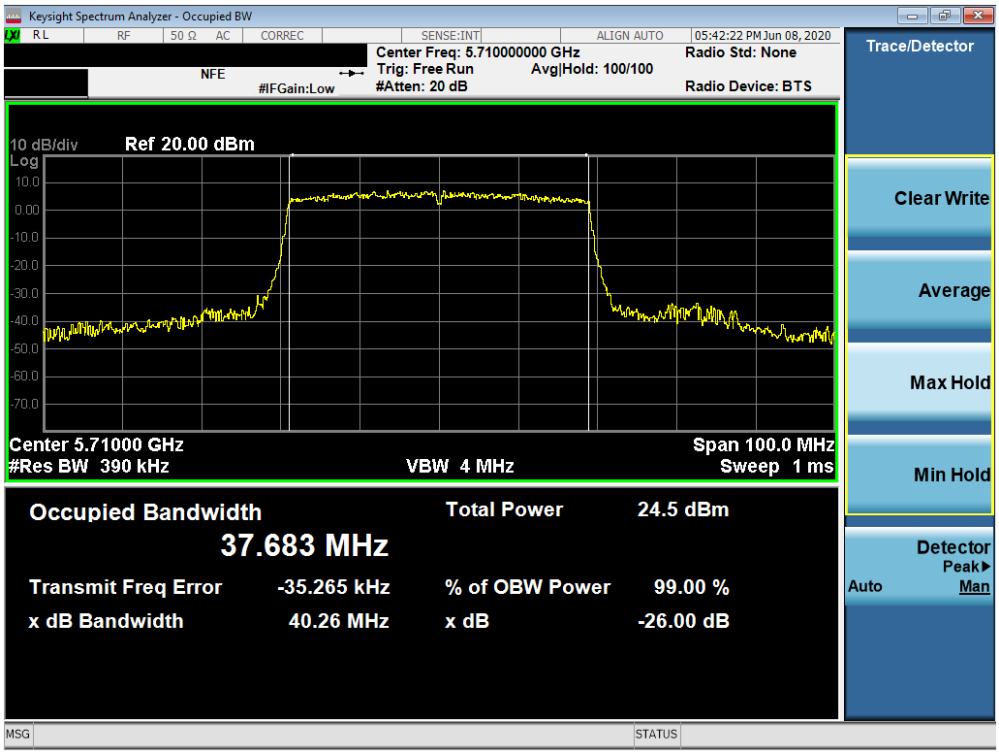

**Plot 7-42. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)**



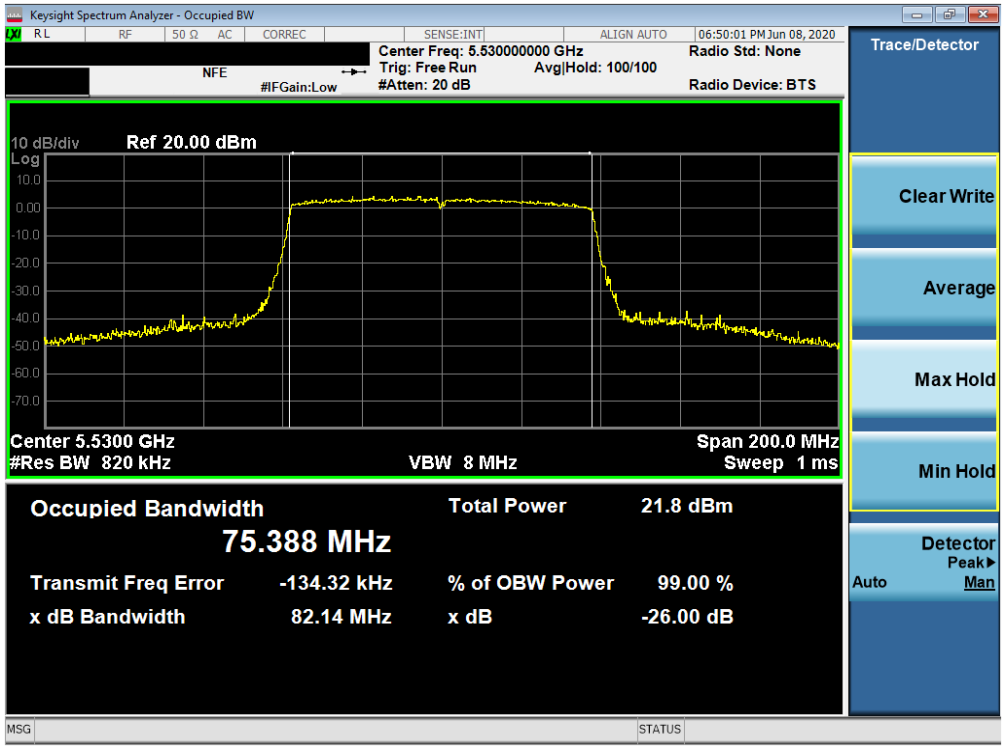

**Plot 7-43. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 2C) – Ch. 102)**



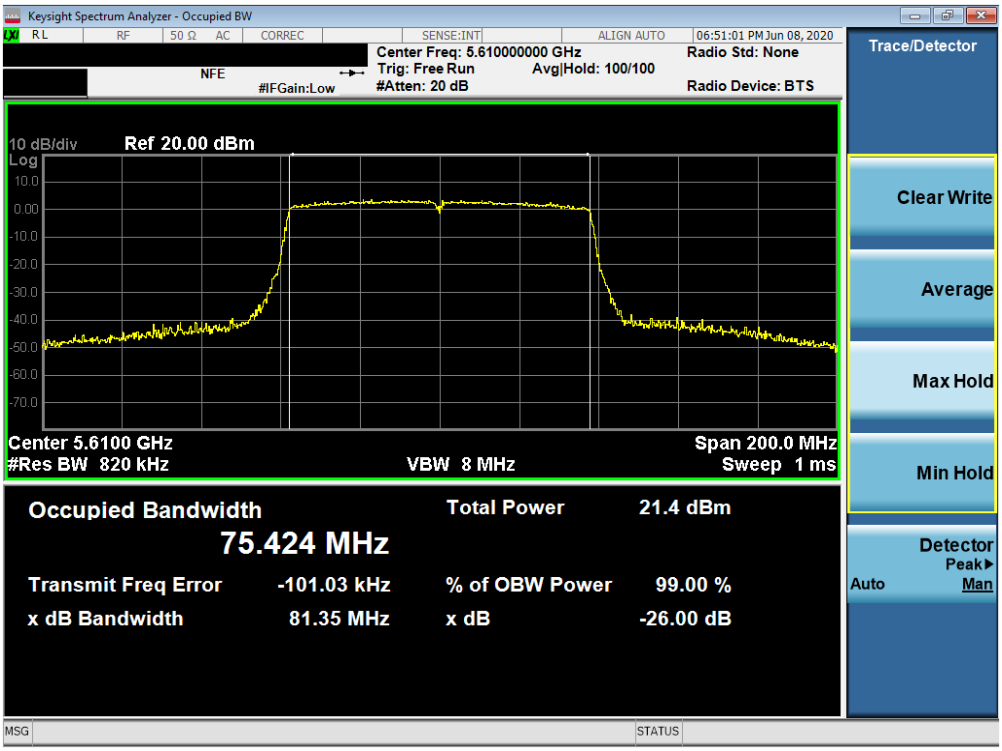

**Plot 7-44. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 2C) – Ch. 118)**



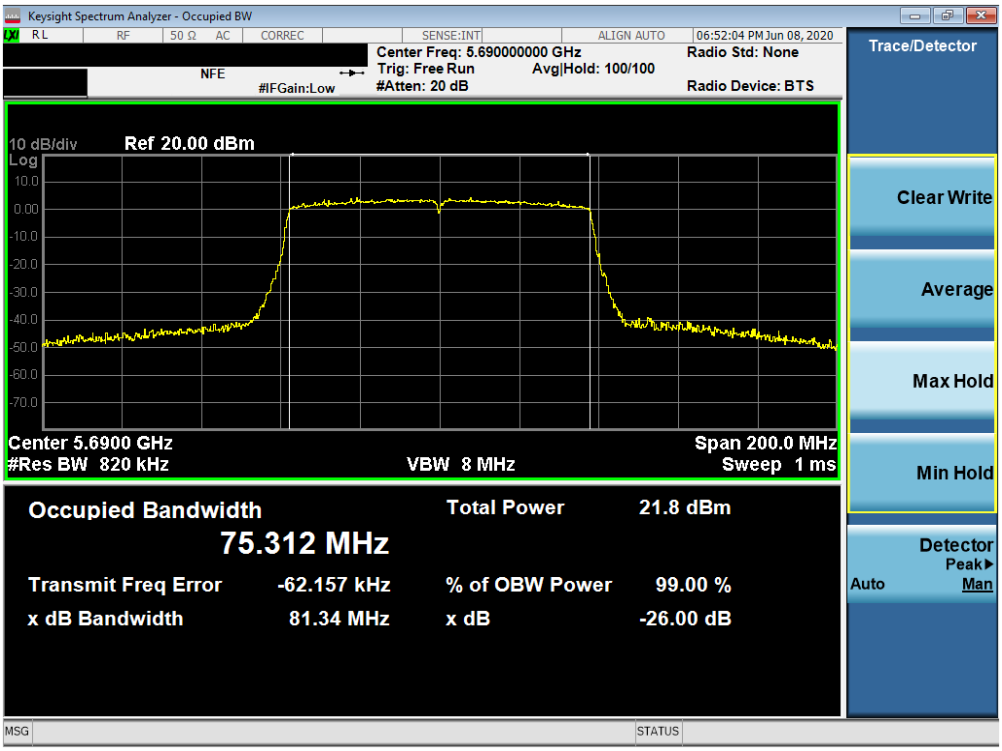

**Plot 7-45. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 2C) – Ch. 142)**



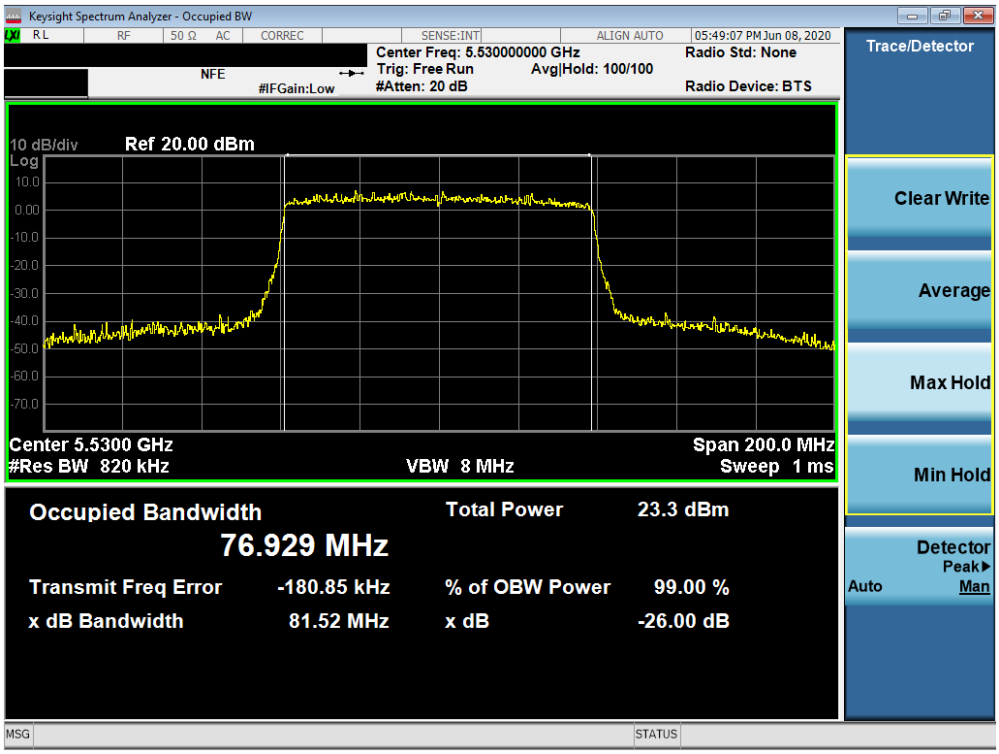

**Plot 7-46. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)**



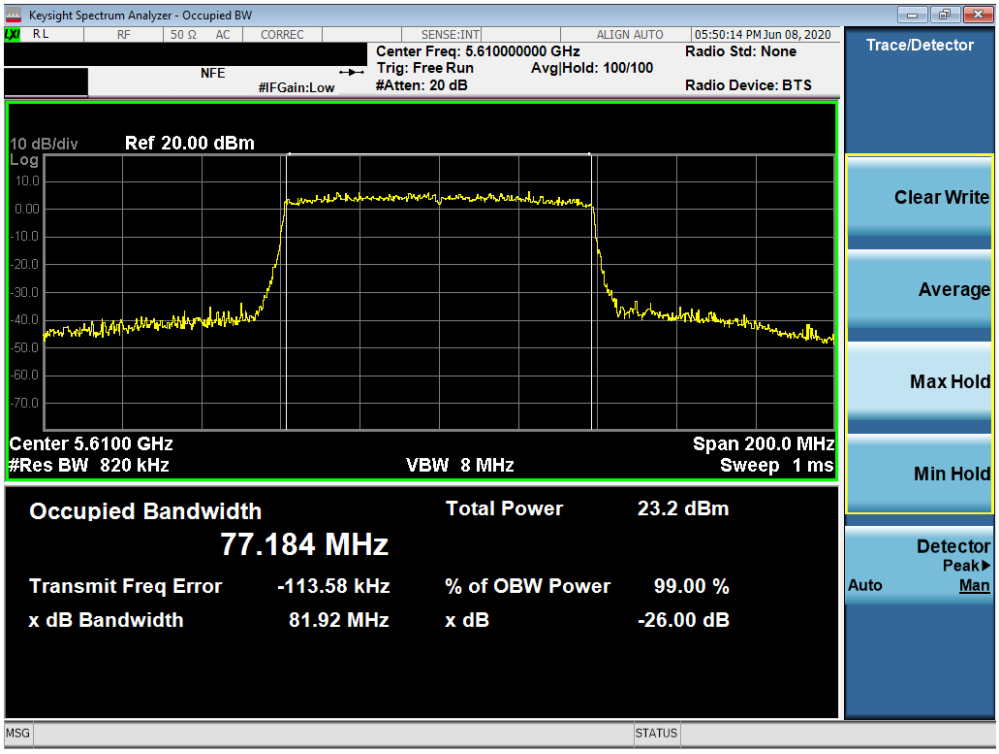

**Plot 7-47. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 122)**



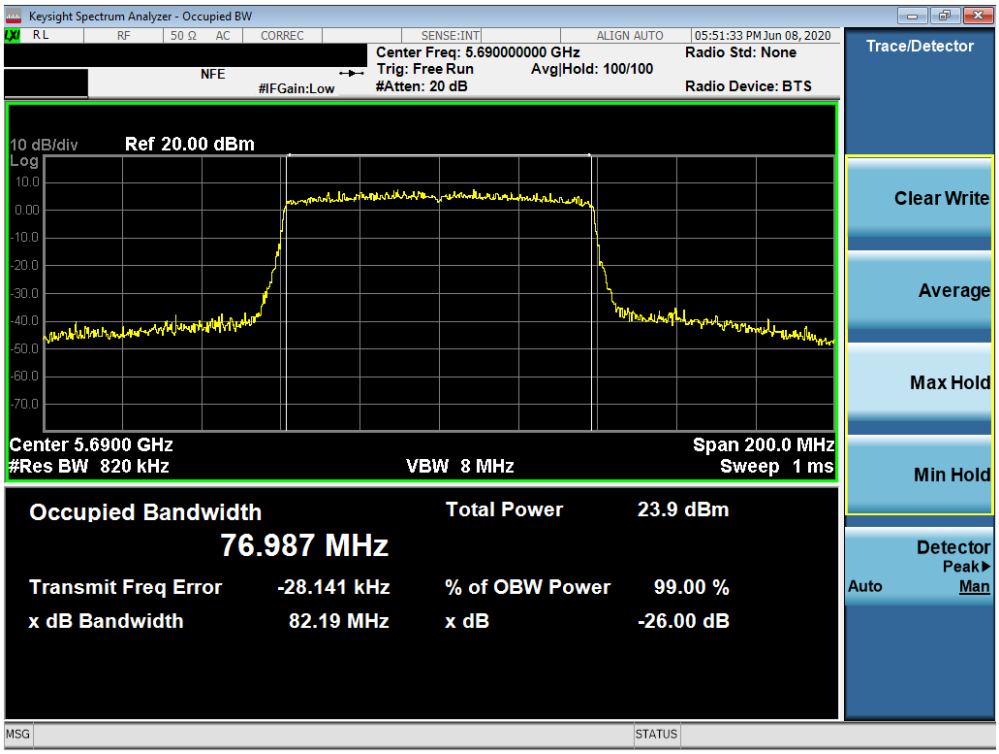

**Plot 7-48. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)**




**Plot 7-49. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax SU (UNII Band 2C) – Ch. 106)**




**Plot 7-50. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax SU (UNII Band 2C) – Ch. 122)**

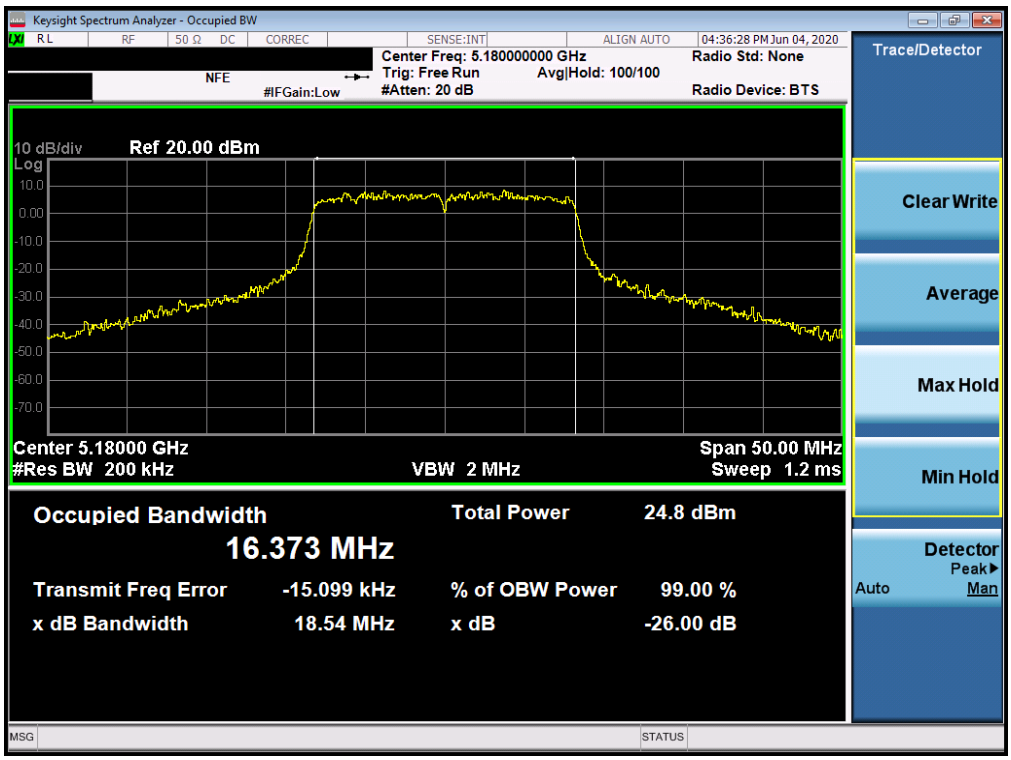



**Plot 7-51. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax SU (UNII Band 2C) – Ch. 138)**

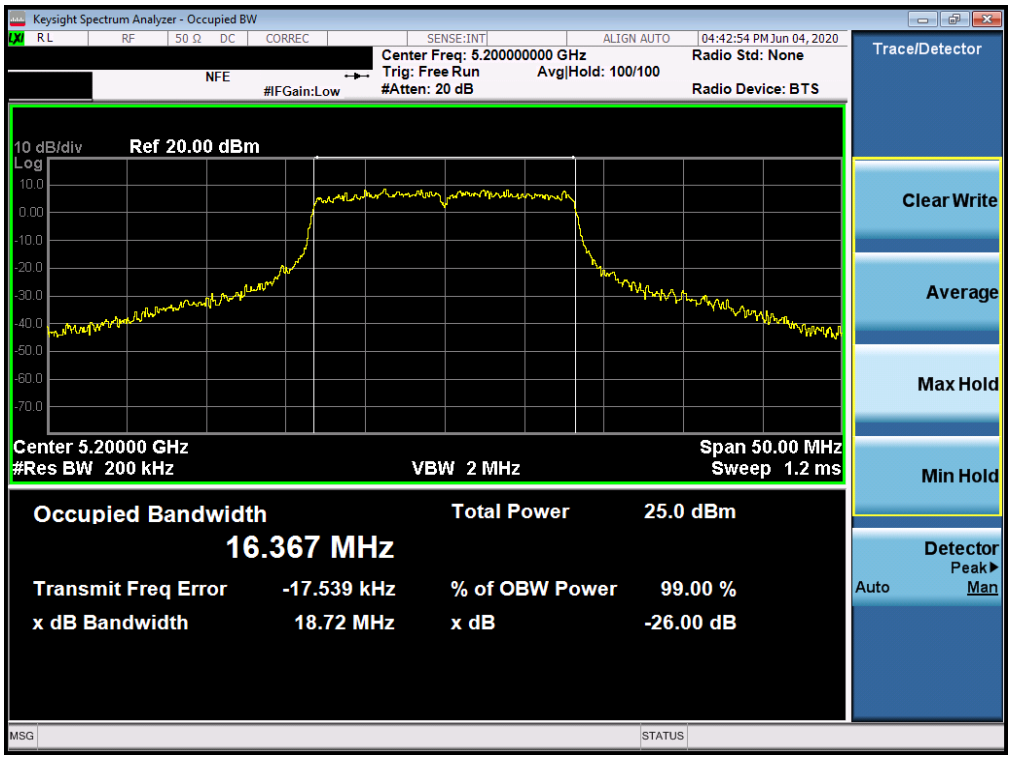
## SISO Antenna-2 26dB Bandwidth Measurements

| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured 26dB Bandwidth [MHz] |
|---|---|---|---|---|---|
| Band 1 | 5180 | 36 | a | 6 | 18.54 |
| | 5200 | 40 | a | 6 | 18.72 |
| | 5240 | 48 | a | 6 | 18.41 |
| | 5180 | 36 | n (20MHz) | 6.5/7.2 (MCS0) | 19.99 |
| | 5200 | 40 | n (20MHz) | 6.5/7.2 (MCS0) | 19.95 |
| | 5240 | 48 | n (20MHz) | 6.5/7.2 (MCS0) | 19.77 |
| | 5180 | 36 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.43 |
| | 5200 | 40 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.77 |
| | 5240 | 48 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.60 |
| | 5190 | 38 | n (40MHz) | 13.5/15 (MCS0) | 38.95 |
| | 5230 | 46 | n (40MHz) | 13.5/15 (MCS0) | 38.73 |
| | 5190 | 38 | ax (40MHz) | 13.5/15 (MCS0) | 40.38 |
| | 5230 | 46 | ax (40MHz) | 13.5/15 (MCS0) | 40.37 |
| | 5210 | 42 | ac (80MHz) | 29.3/32.5 (MCS0) | 80.11 |
| | 5210 | 42 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.30 |
| Band 2A | 5260 | 52 | a | 6 | 20.20 |
| | 5280 | 56 | a | 6 | 19.23 |
| | 5320 | 64 | a | 6 | 18.46 |
| | 5260 | 52 | n (20MHz) | 6.5/7.2 (MCS0) | 20.25 |
| | 5280 | 56 | n (20MHz) | 6.5/7.2 (MCS0) | 19.87 |
| | 5320 | 64 | n (20MHz) | 6.5/7.2 (MCS0) | 19.45 |
| | 5260 | 52 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.59 |
| | 5280 | 56 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.65 |
| | 5320 | 64 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.67 |
| | 5270 | 54 | n (40MHz) | 13.5/15 (MCS0) | 39.06 |
| | 5310 | 62 | n (40MHz) | 13.5/15 (MCS0) | 38.97 |
| | 5270 | 54 | ax (40MHz) | 13.5/15 (MCS0) | 40.22 |
| | 5310 | 62 | ax (40MHz) | 13.5/15 (MCS0) | 40.34 |
| | 5290 | 58 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.04 |
| | 5290 | 58 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.91 |
| Band 2C | 5500 | 100 | a | 6 | 18.69 |
| | 5600 | 120 | a | 6 | 18.53 |
| | 5720 | 144 | a | 6 | 18.58 |
| | 5500 | 100 | n (20MHz) | 6.5/7.2 (MCS0) | 20.18 |
| | 5600 | 120 | n (20MHz) | 6.5/7.2 (MCS0) | 19.78 |
| | 5720 | 144 | n (20MHz) | 6.5/7.2 (MCS0) | 19.79 |
| | 5500 | 100 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.32 |
| | 5600 | 120 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.50 |
| | 5720 | 144 | ax (20MHz) | 6.5/7.2 (MCS0) | 20.48 |
| | 5510 | 102 | n (40MHz) | 13.5/15 (MCS0) | 38.69 |
| | 5590 | 118 | n (40MHz) | 13.5/15 (MCS0) | 39.05 |
| | 5710 | 142 | n (40MHz) | 13.5/15 (MCS0) | 39.03 |
| | 5510 | 102 | ax (40MHz) | 13.5/15 (MCS0) | 40.02 |
| | 5590 | 118 | ax (40MHz) | 13.5/15 (MCS0) | 40.23 |
| | 5710 | 142 | ax (40MHz) | 13.5/15 (MCS0) | 40.27 |
| | 5530 | 106 | ac (80MHz) | 29.3/32.5 (MCS0) | 79.24 |
| | 5610 | 122 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.05 |
| | 5690 | 138 | ac (80MHz) | 29.3/32.5 (MCS0) | 80.64 |
| | 5530 | 106 | ax (80MHz) | 29.3/32.5 (MCS0) | 82.16 |
| | 5610 | 122 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.60 |
| | 5690 | 138 | ax (80MHz) | 29.3/32.5 (MCS0) | 81.62 |

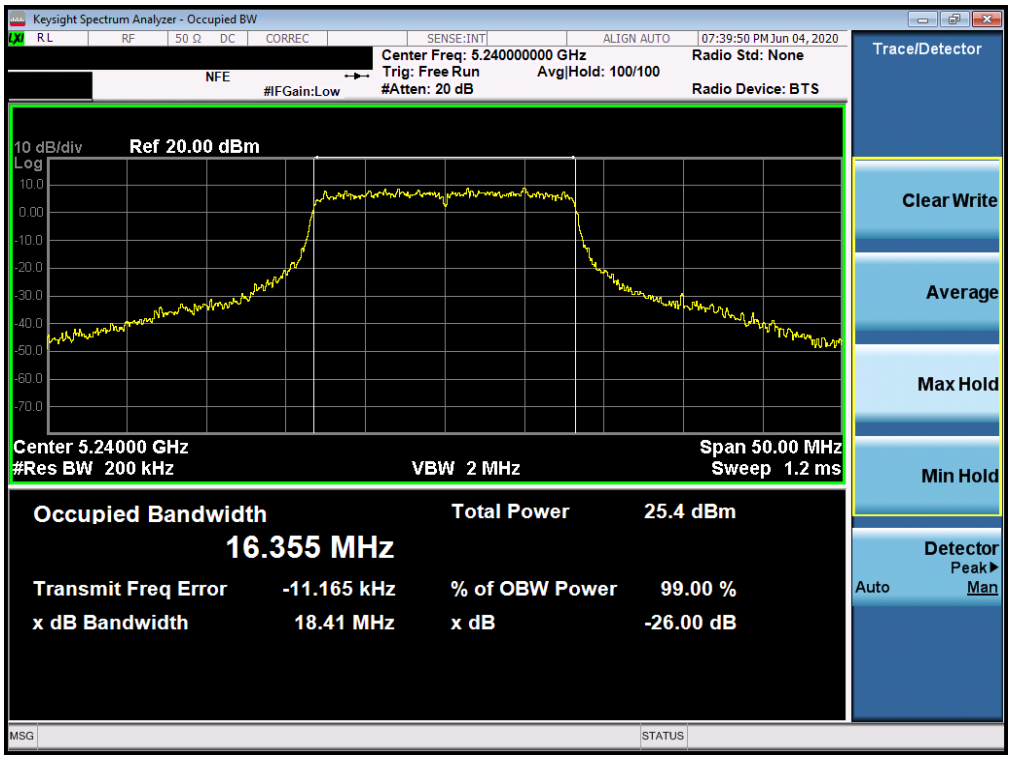
## Table 7-3. Conducted Bandwidth Measurements SISO ANT2



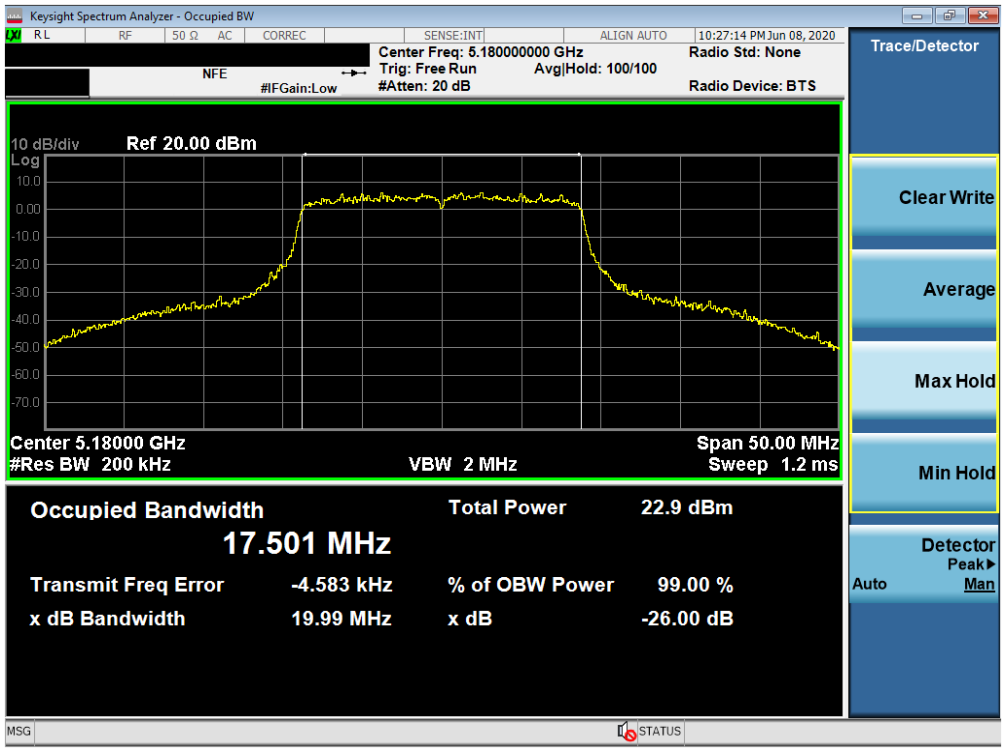

**Plot 7-52. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 1) – Ch. 36)**



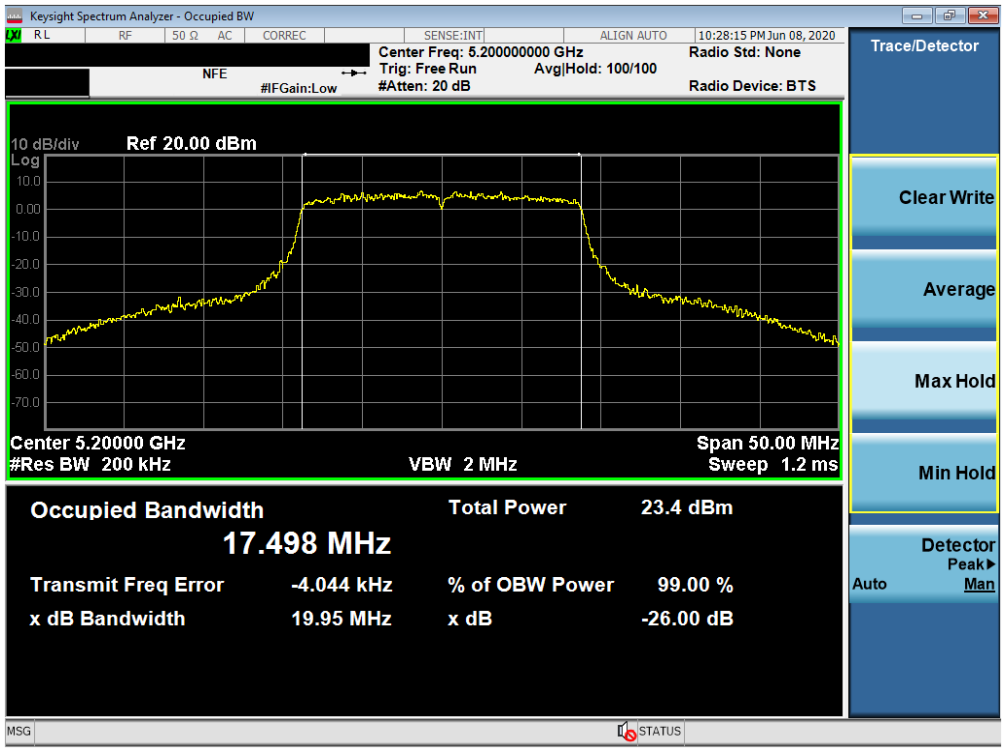

**Plot 7-53. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 1) – Ch. 40)**



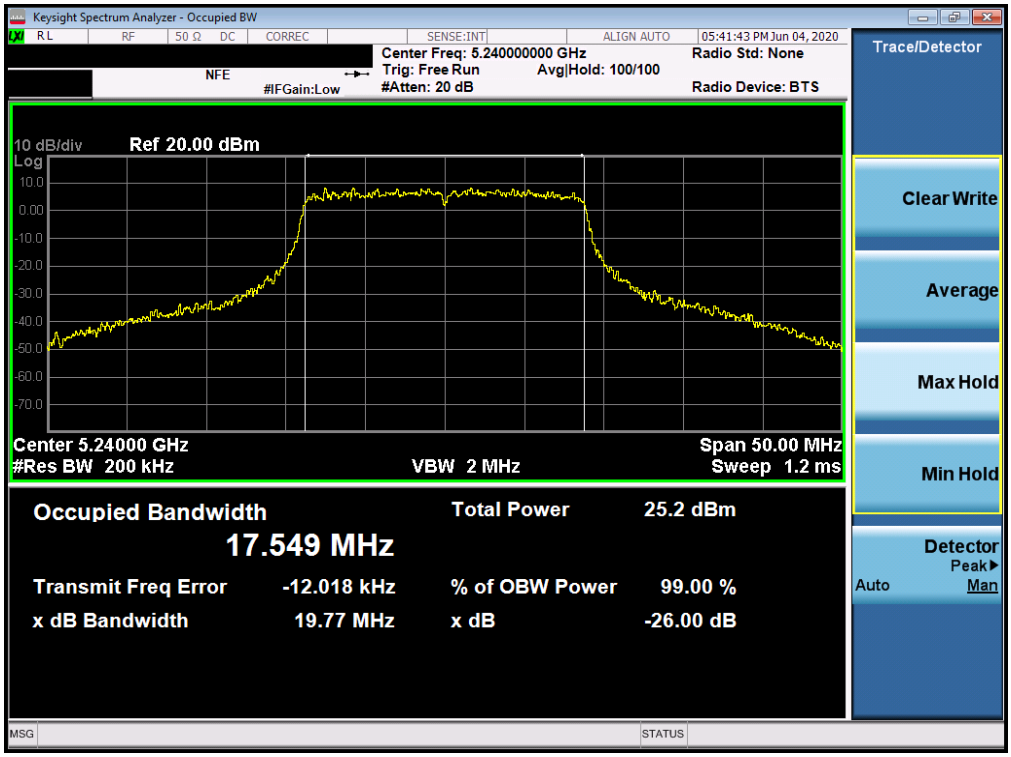

**Plot 7-54. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 1) – Ch. 48)**



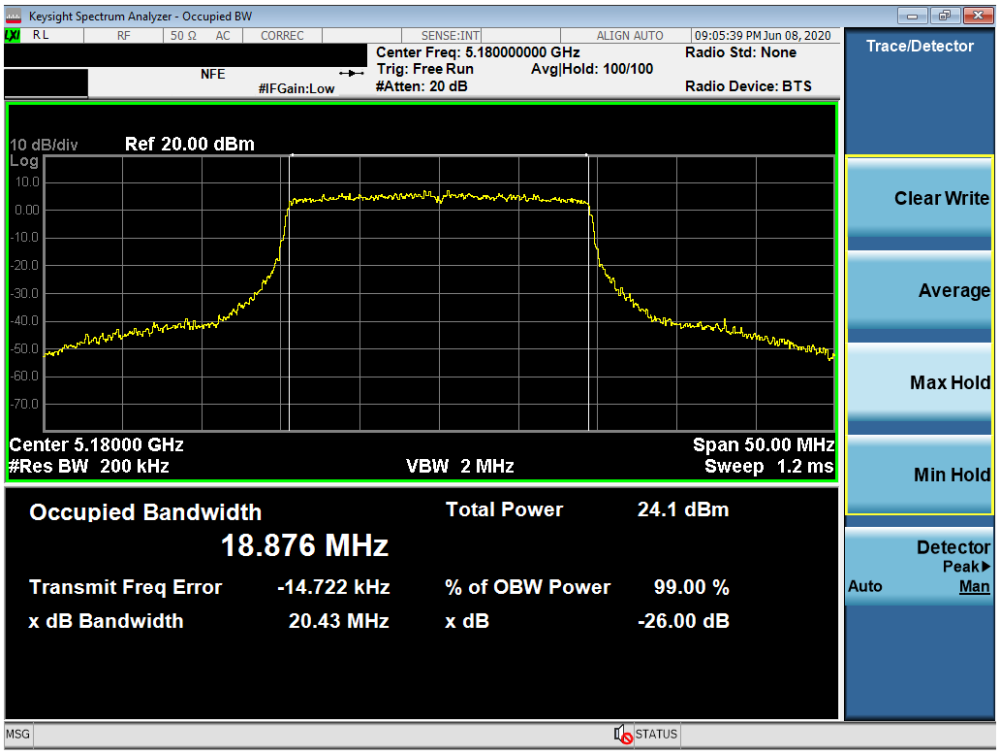

**Plot 7-55. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) – Ch. 36)**



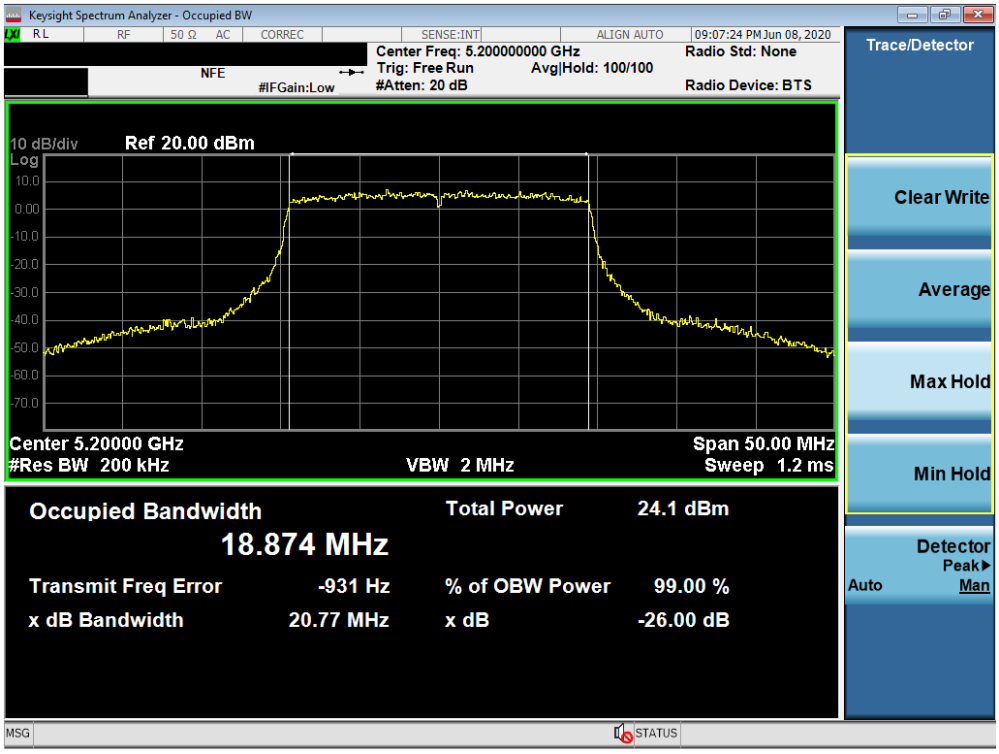

**Plot 7-56. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) – Ch. 40)**



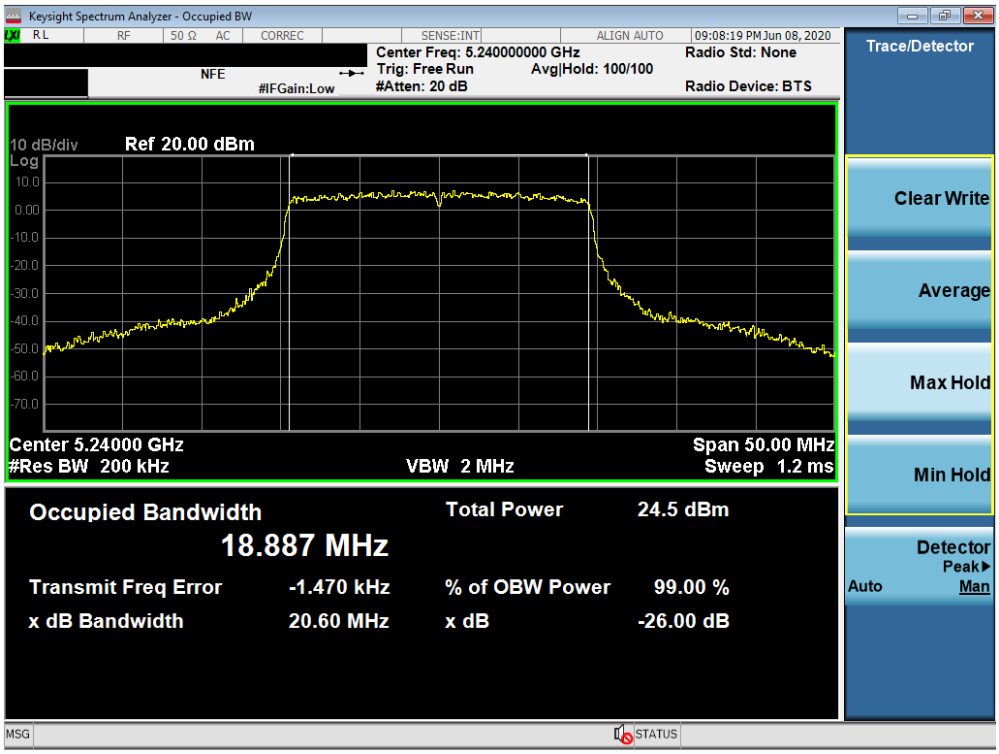

**Plot 7-57. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) – Ch. 48)**



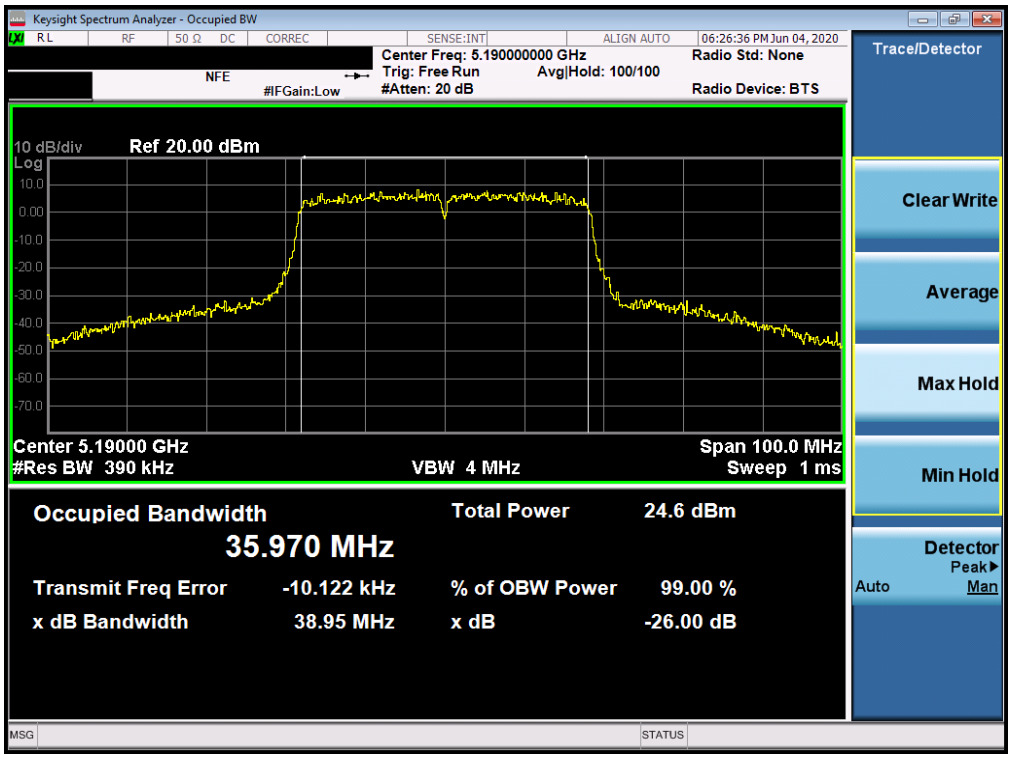

**Plot 7-58. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax SU (UNII Band 1) – Ch. 36)**



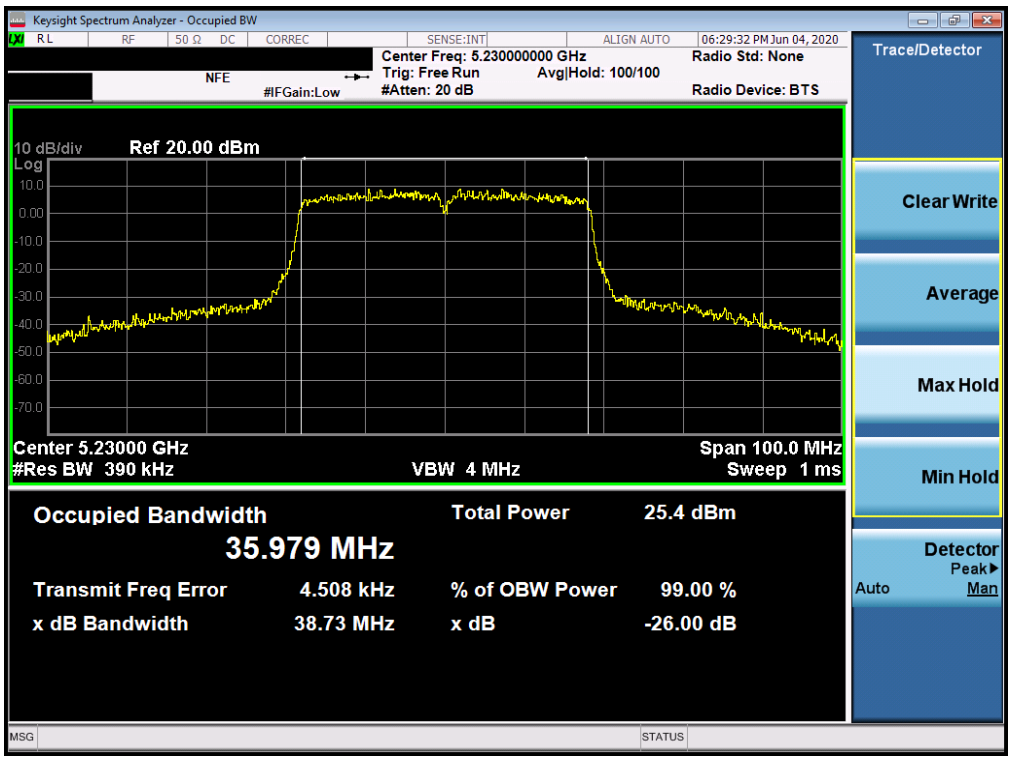

**Plot 7-59. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax SU (UNII Band 1) – Ch. 40)**



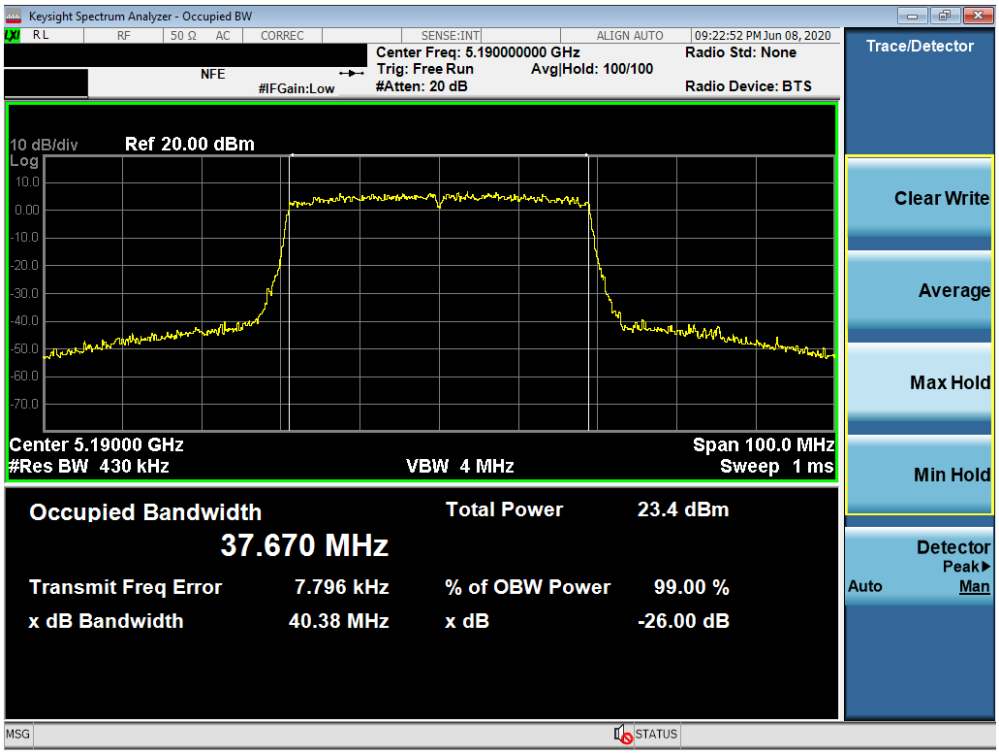

**Plot 7-60. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax SU (UNII Band 1) – Ch. 48)**



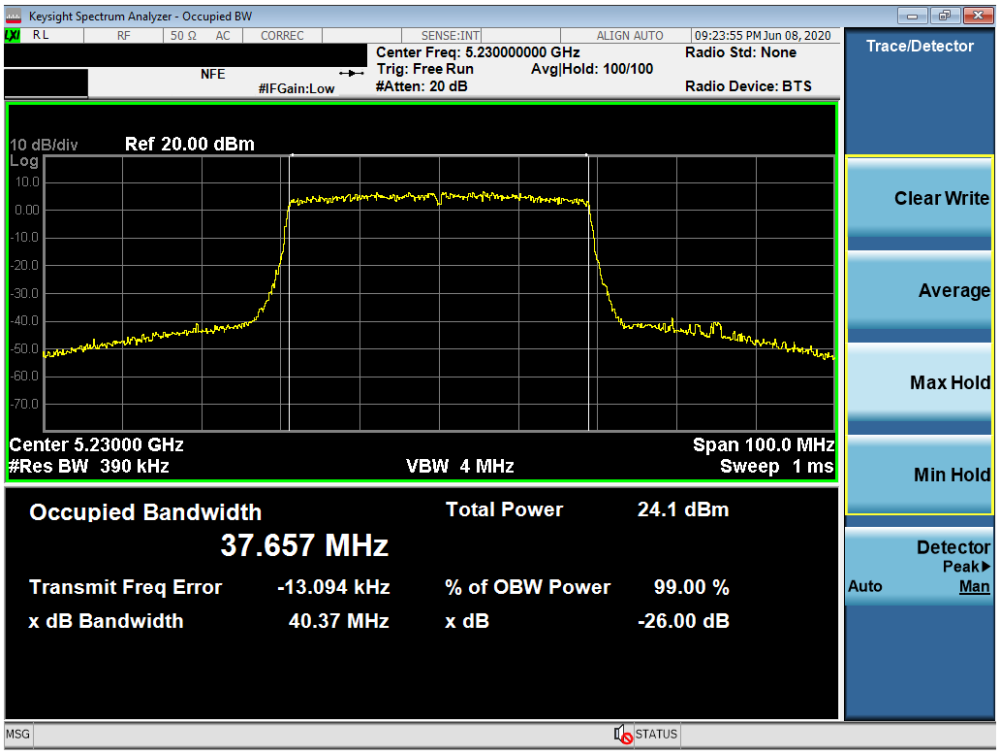

**Plot 7-61. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 1) – Ch. 38)**



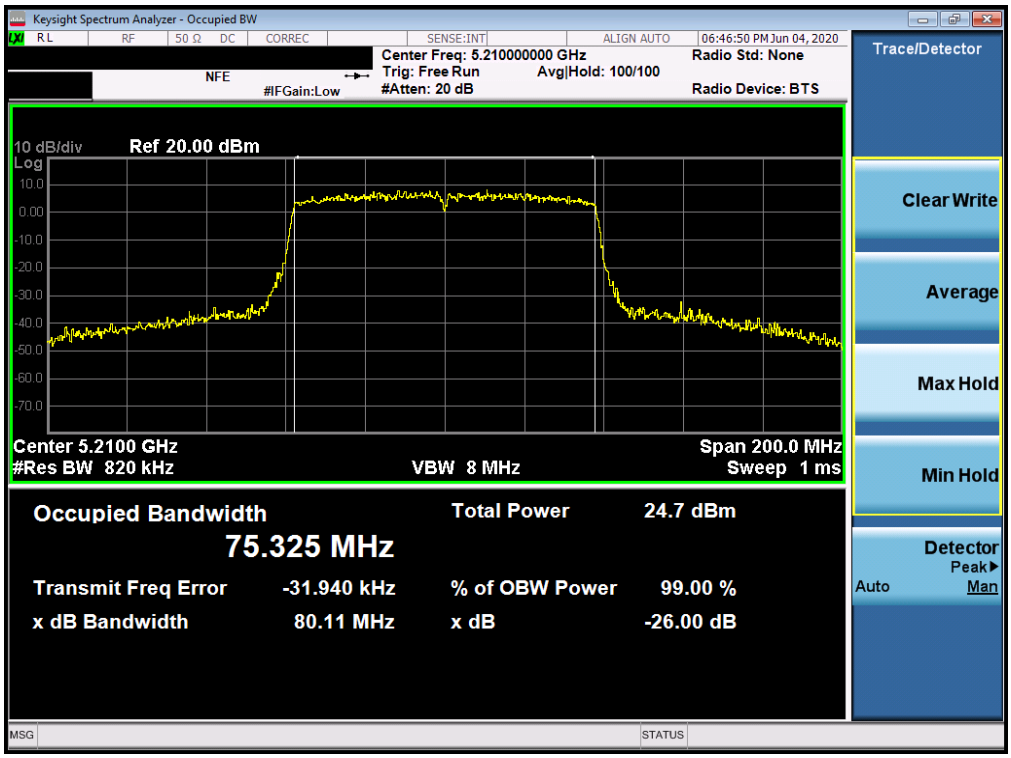

**Plot 7-62. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 1) – Ch. 46)**



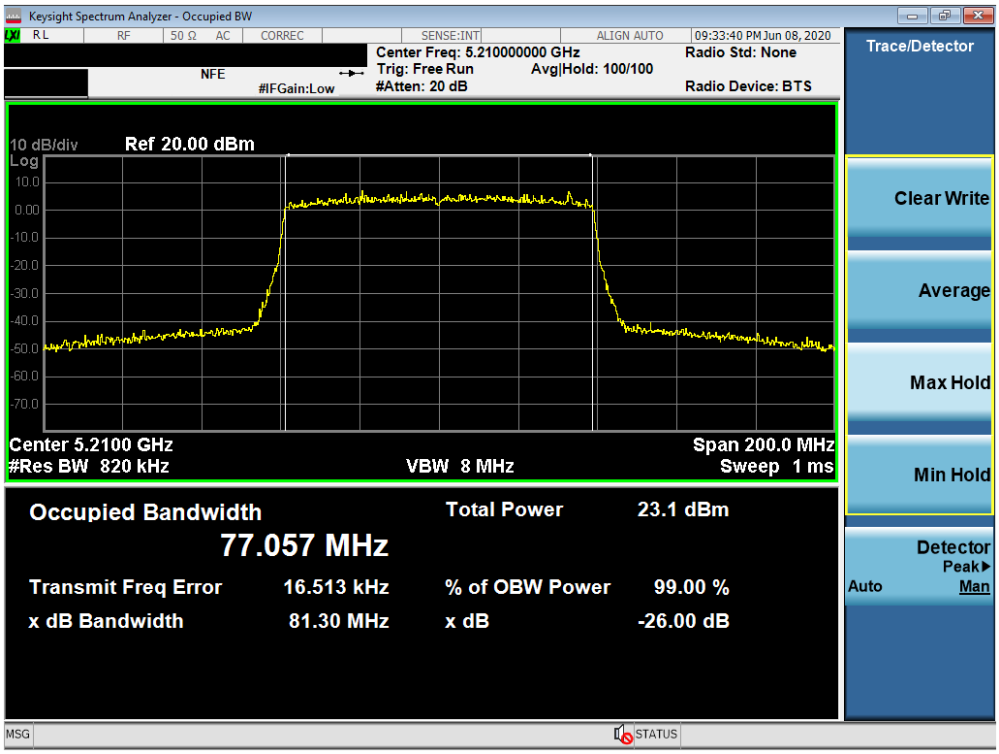

**Plot 7-63. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 1) – Ch. 38)**



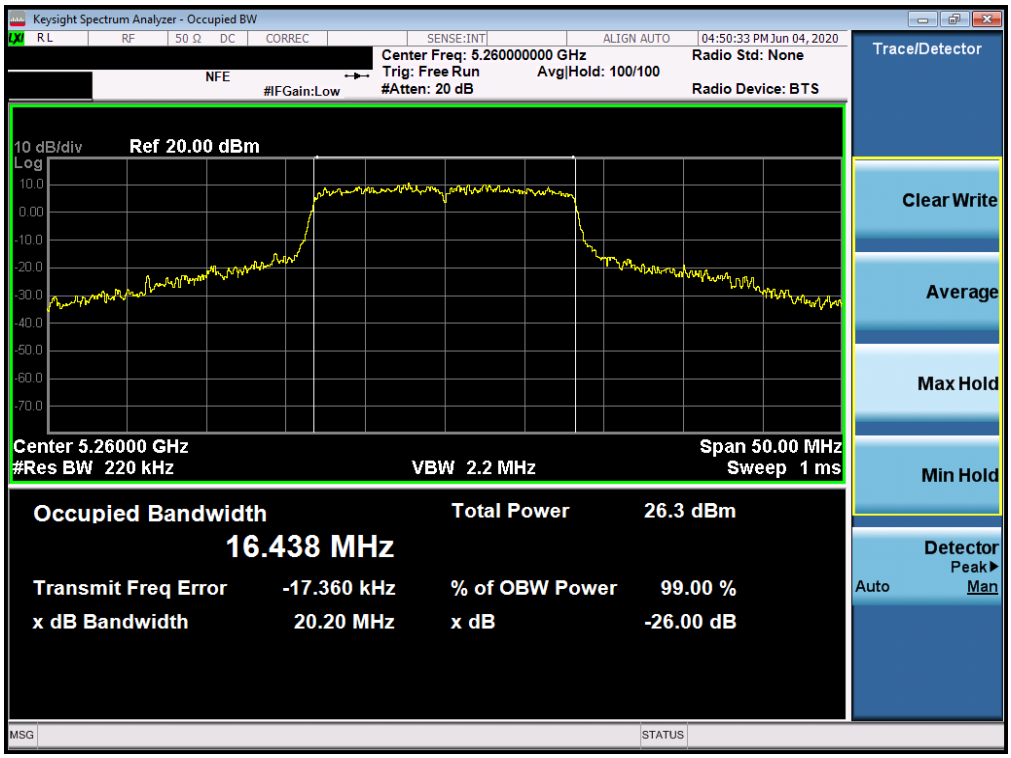

**Plot 7-64. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 1) – Ch. 46)**



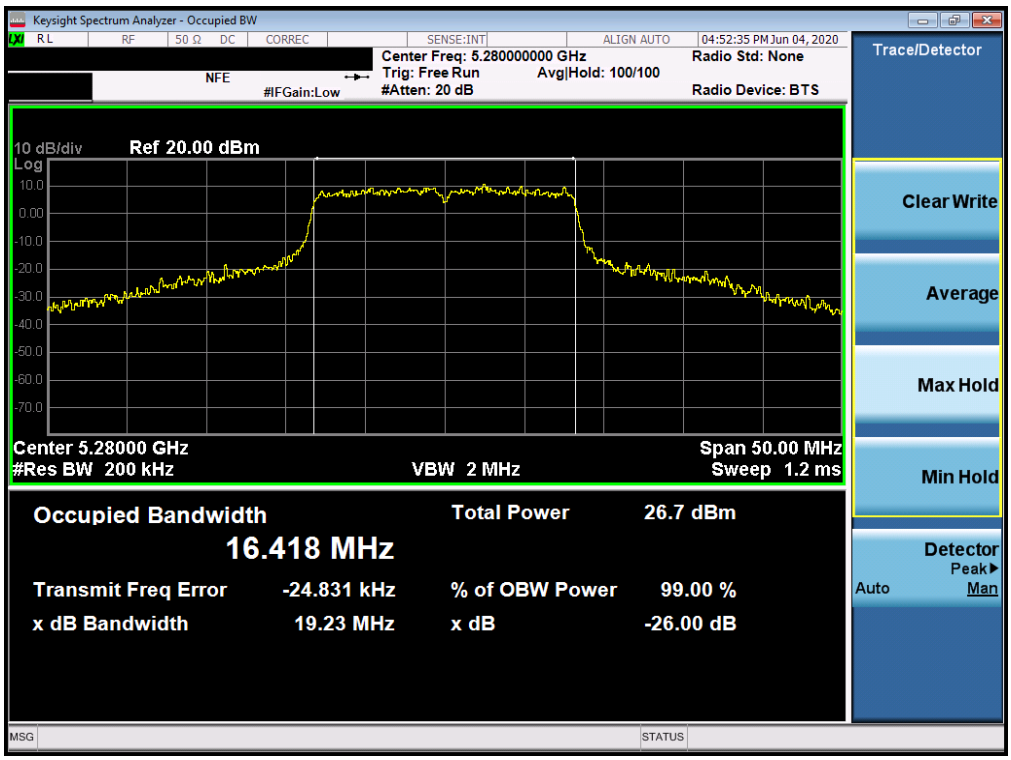

**Plot 7-65. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)**



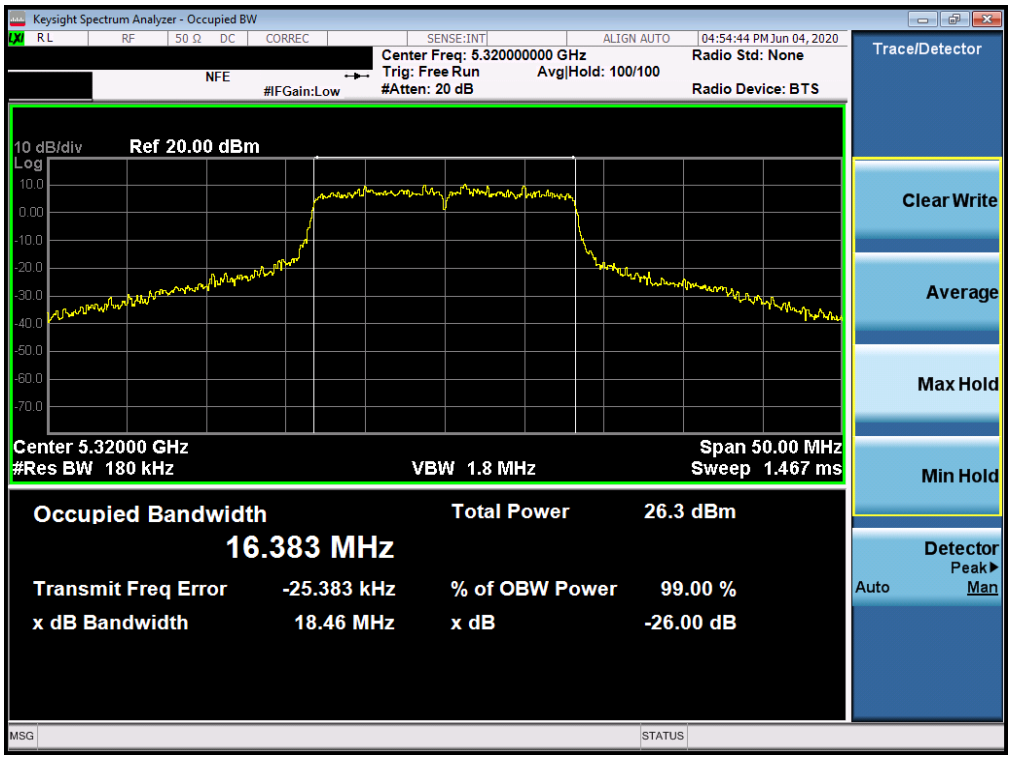

**Plot 7-66. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax SU (UNII Band 1) – Ch. 42)**



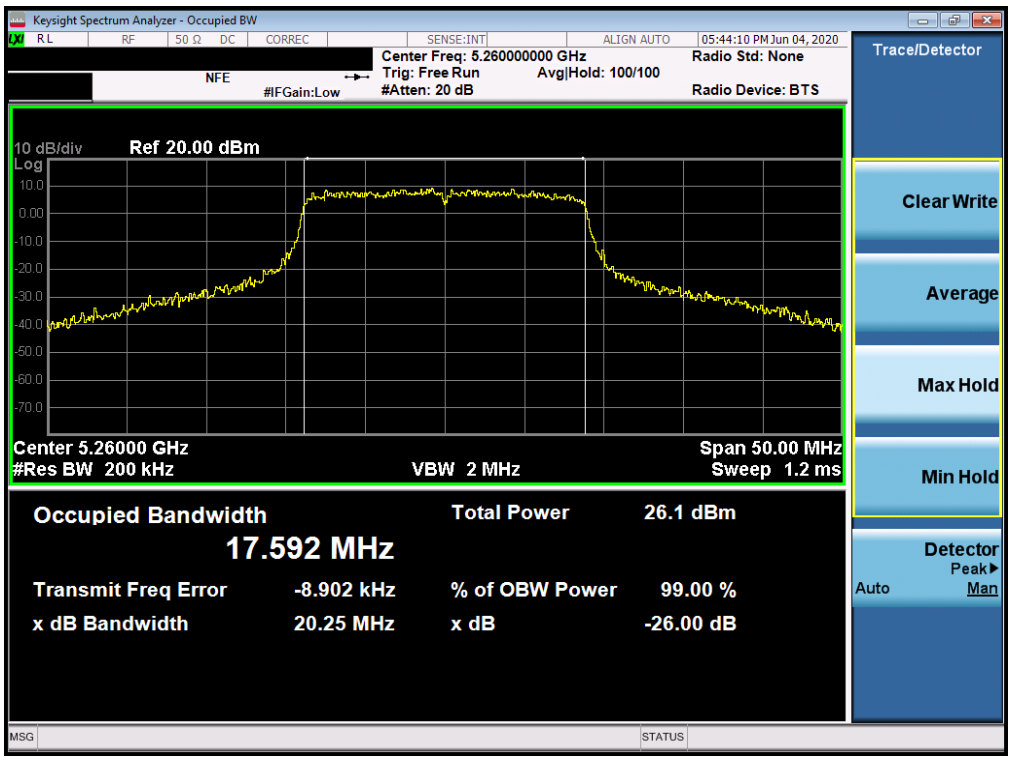

**Plot 7-67. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) – Ch. 52)**



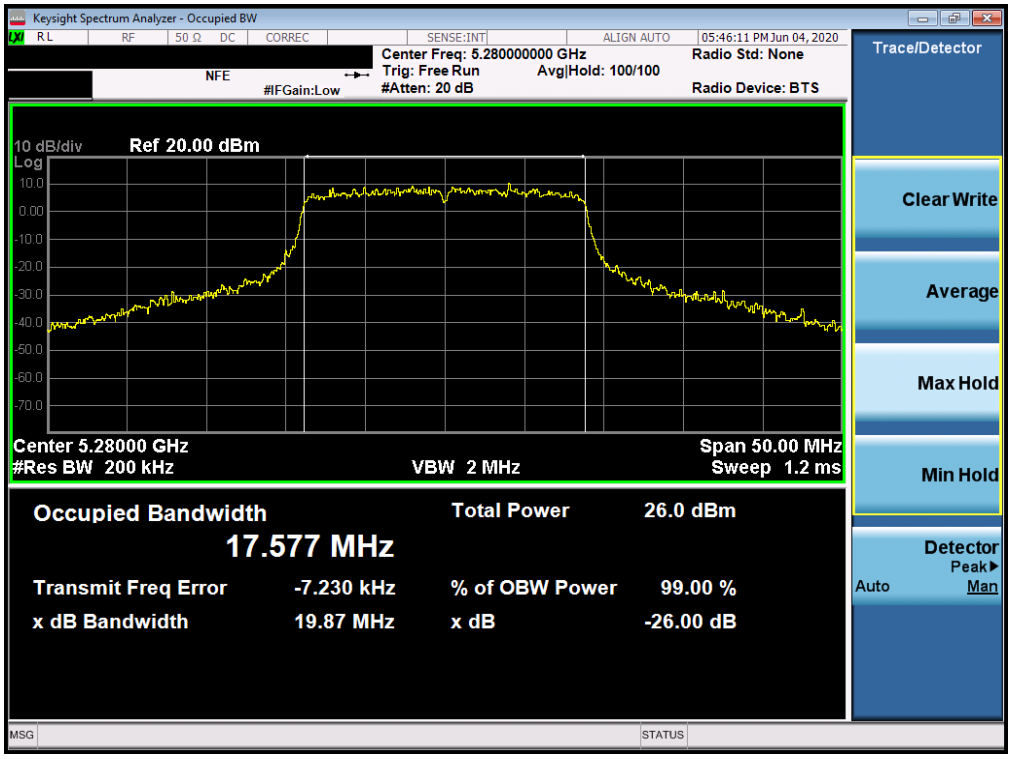

**Plot 7-68. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) – Ch. 56)**



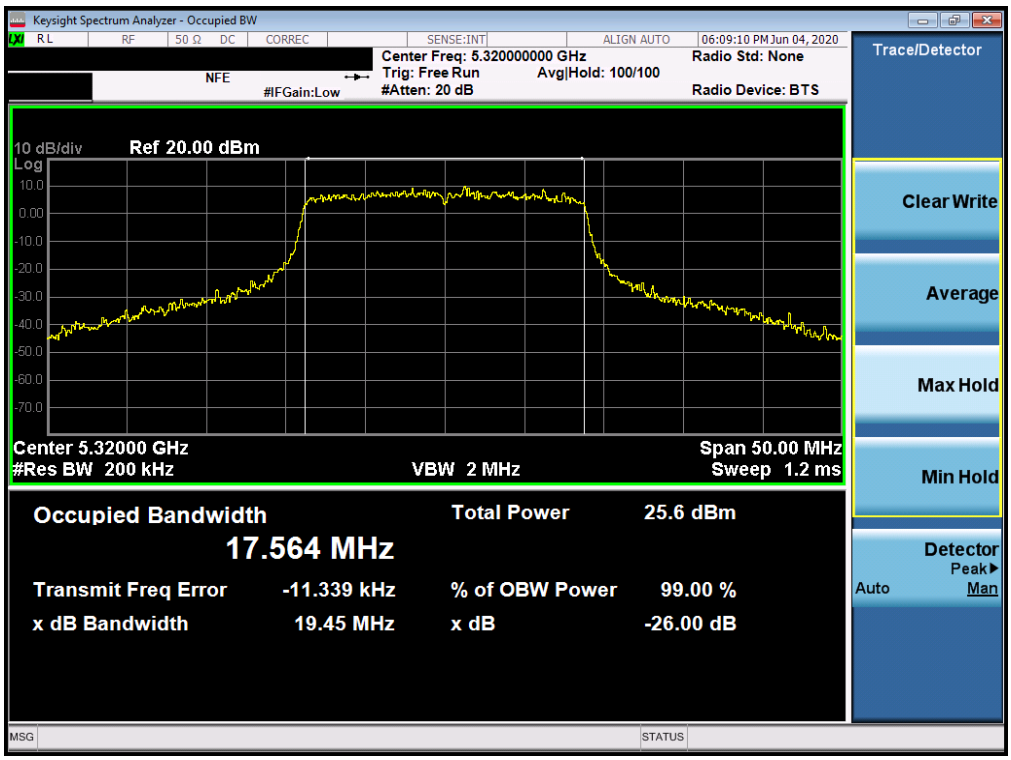

**Plot 7-69. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) – Ch. 64)**



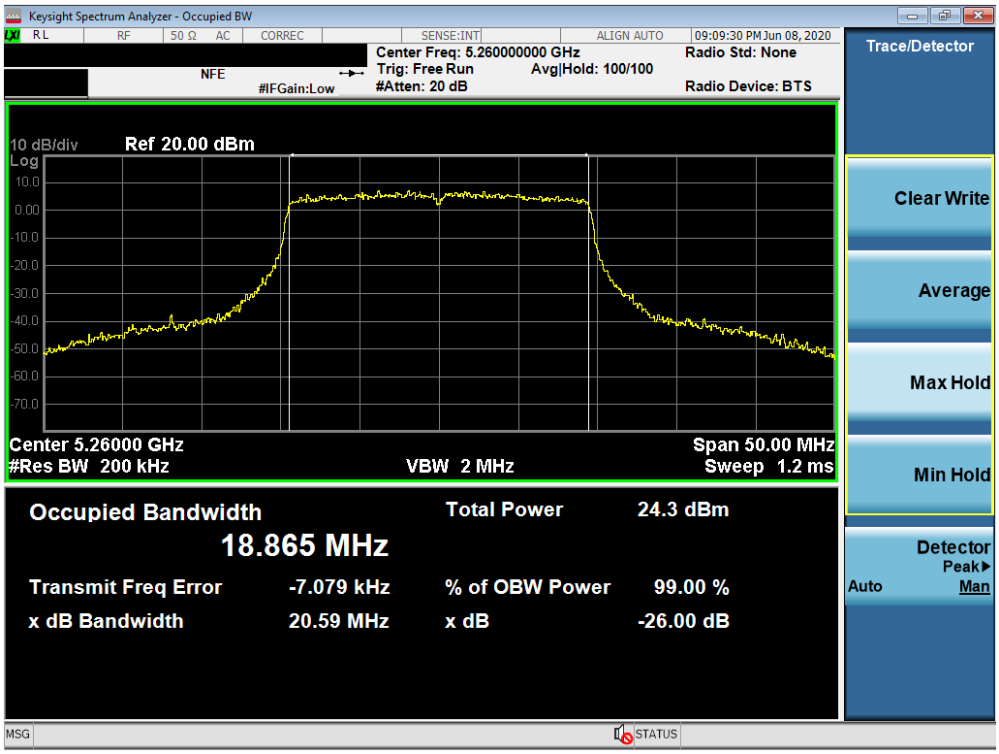

**Plot 7-70. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)**



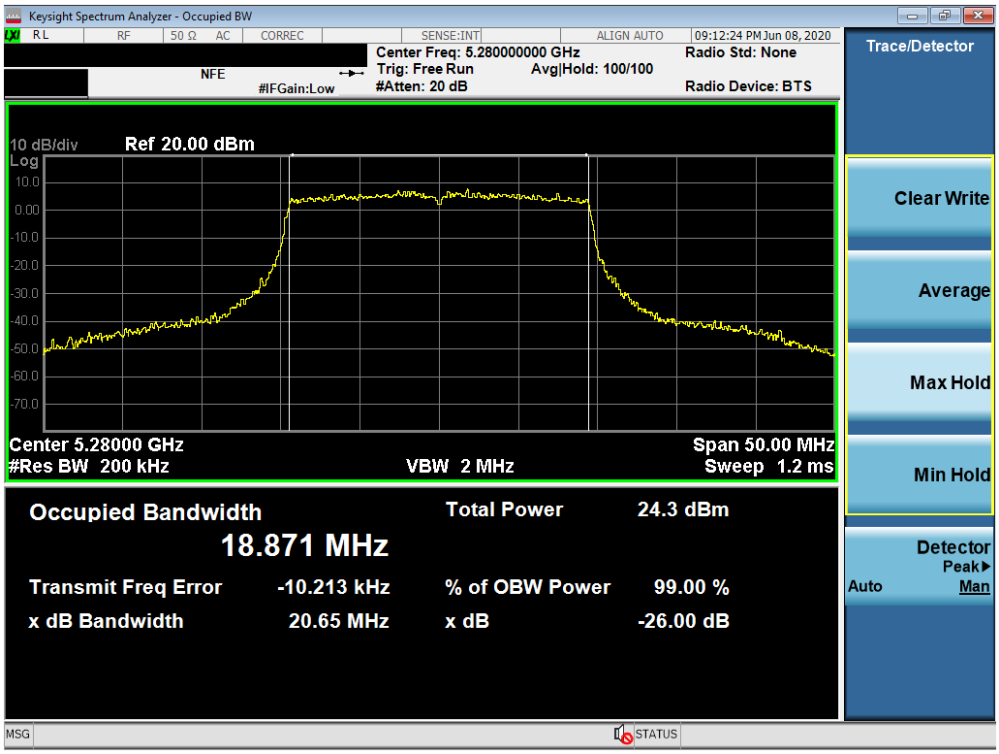

**Plot 7-71. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)**



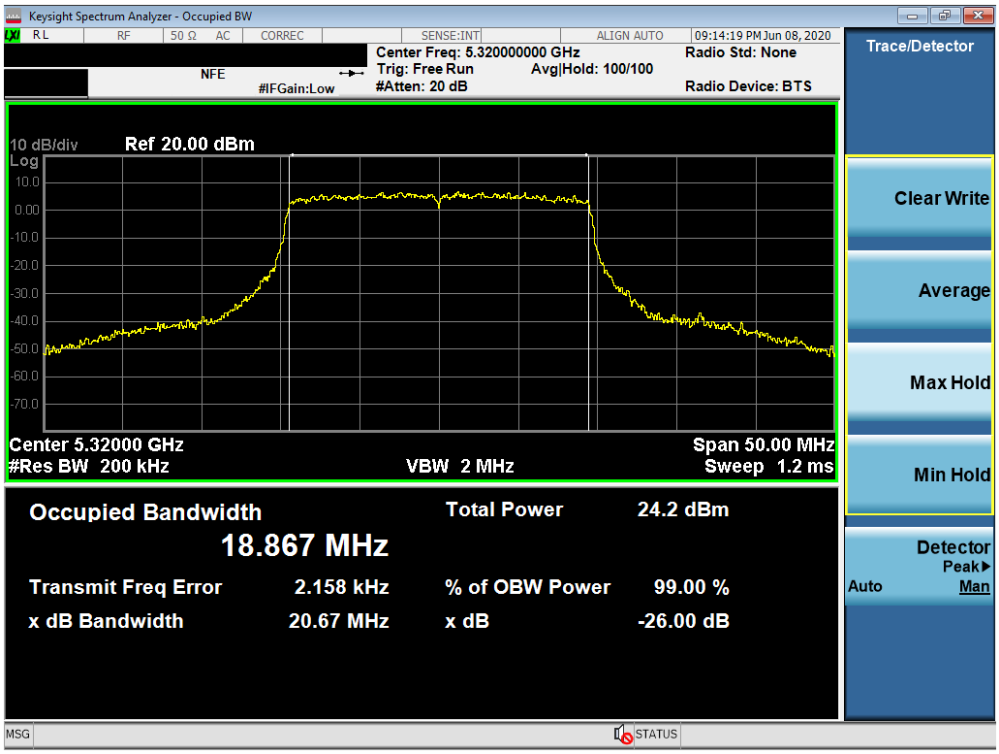

**Plot 7-72. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)**



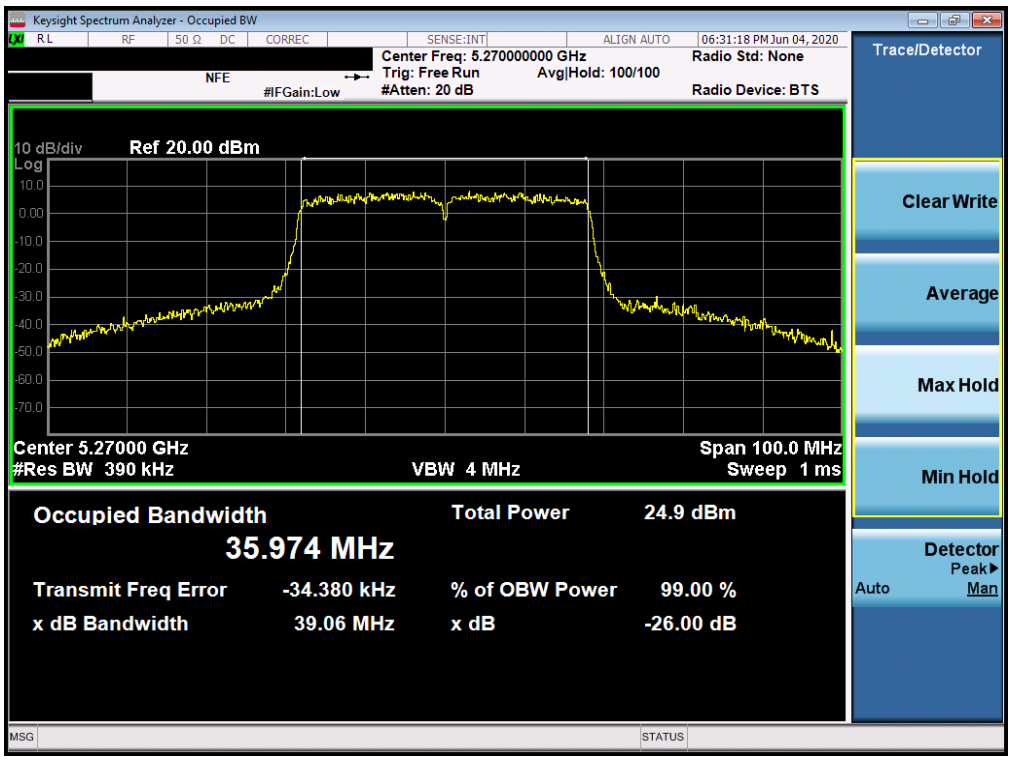

**Plot 7-73. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)**



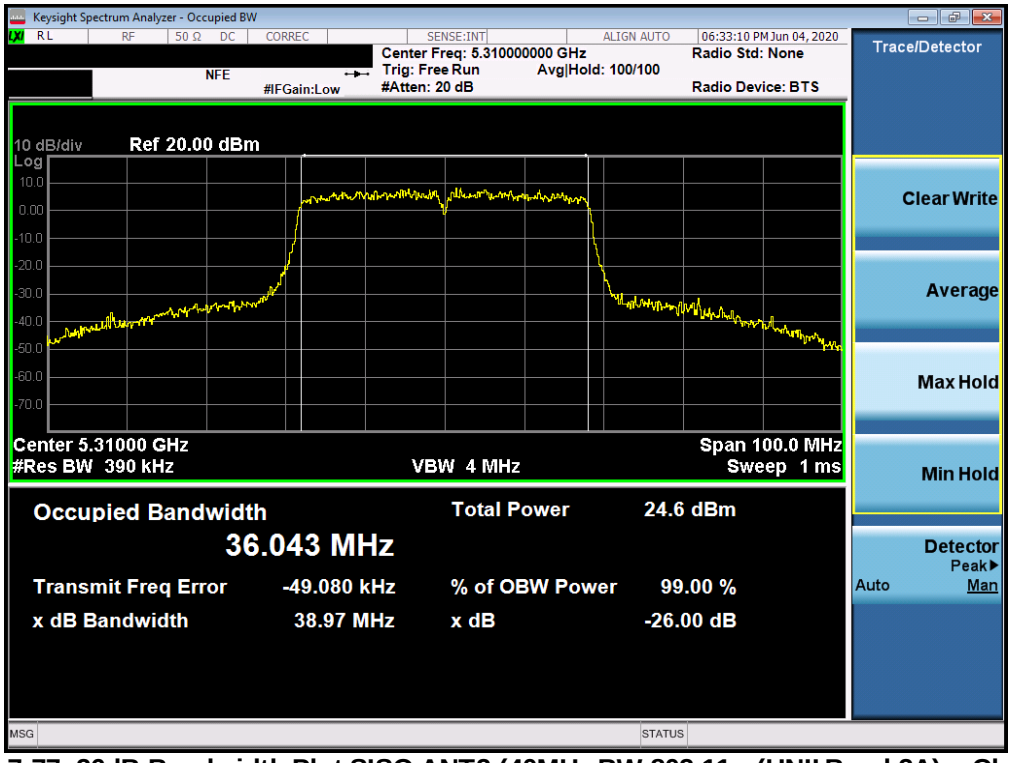

**Plot 7-74. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)**



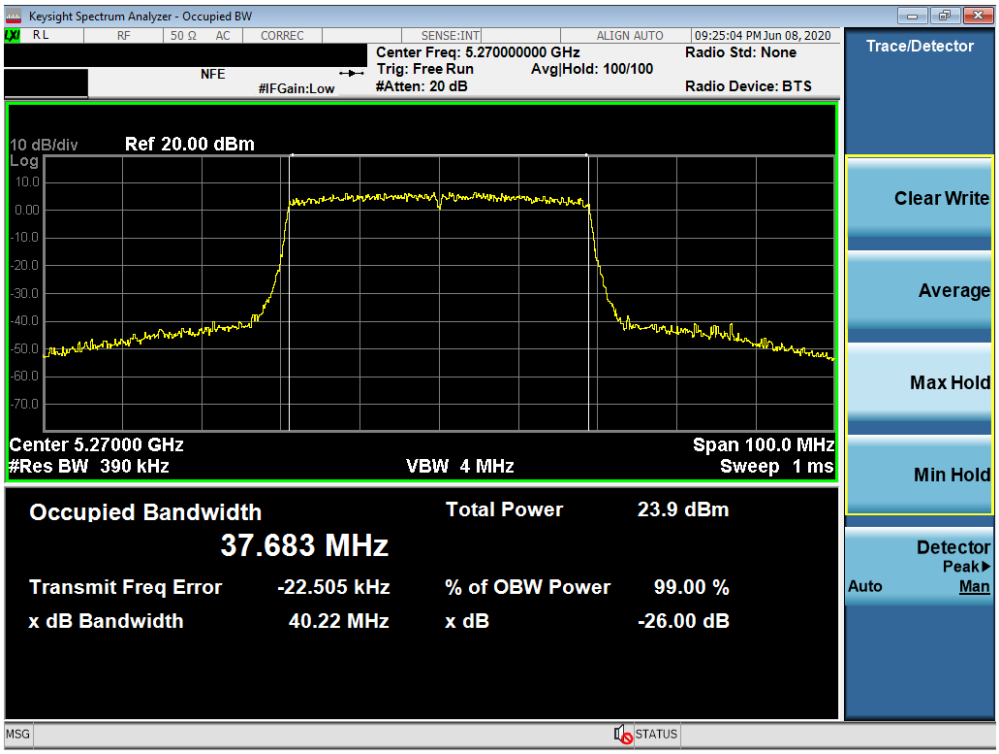

**Plot 7-75. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)**



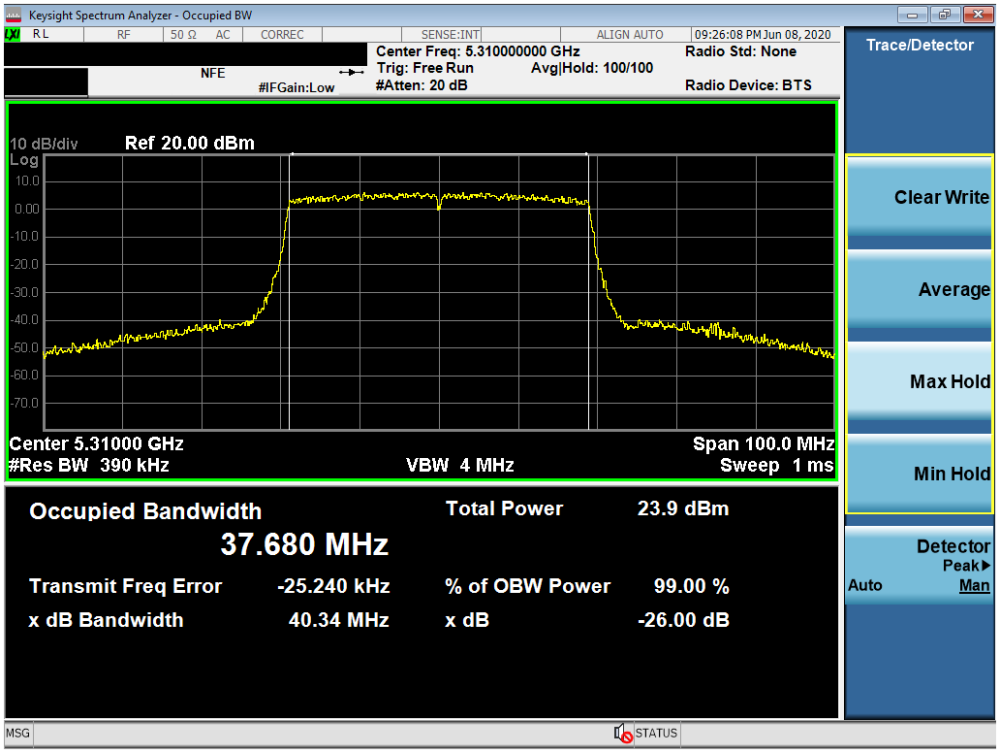

**Plot 7-76. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)**



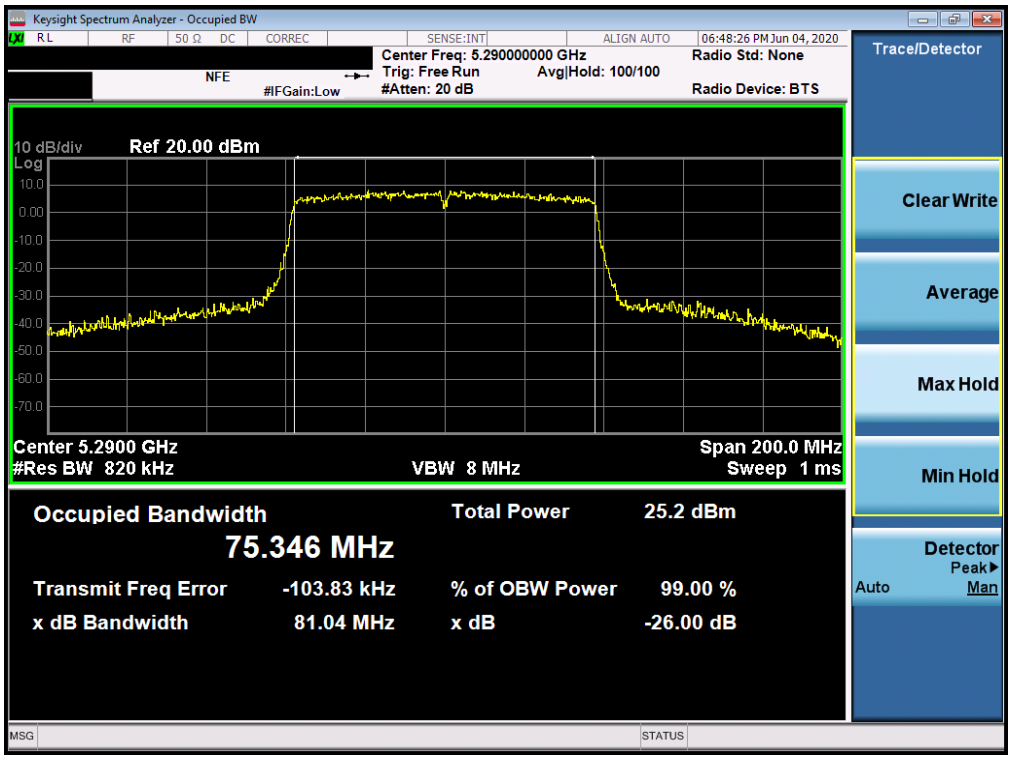

**Plot 7-77. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)**



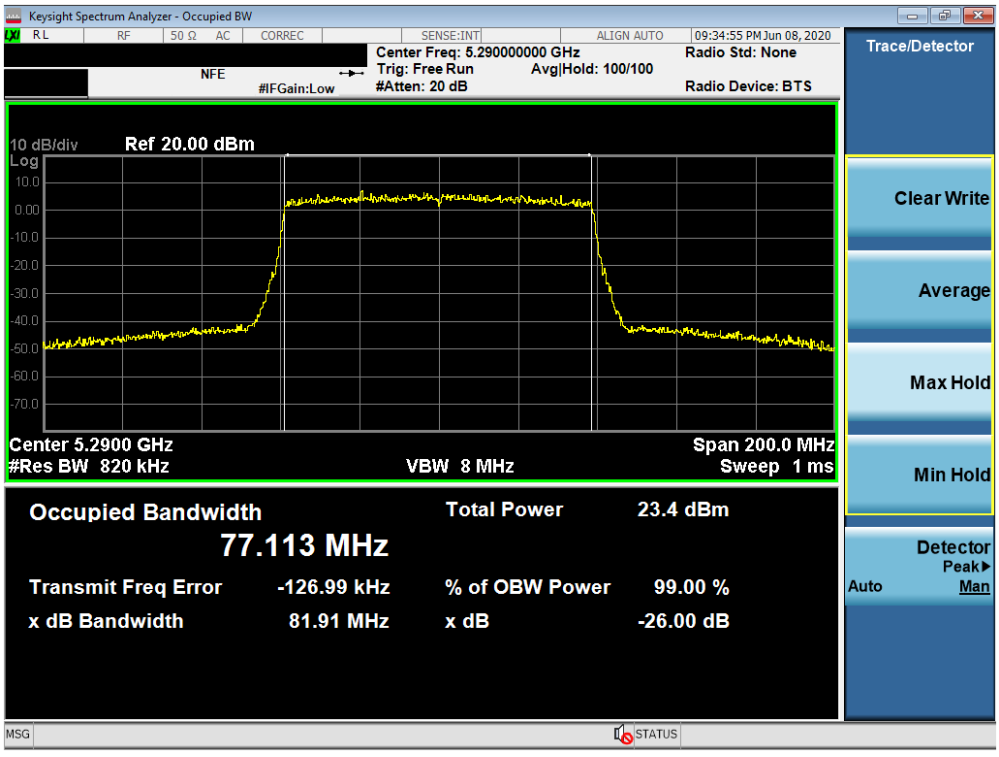

**Plot 7-78. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax SU (UNII Band 2A) – Ch. 54)**



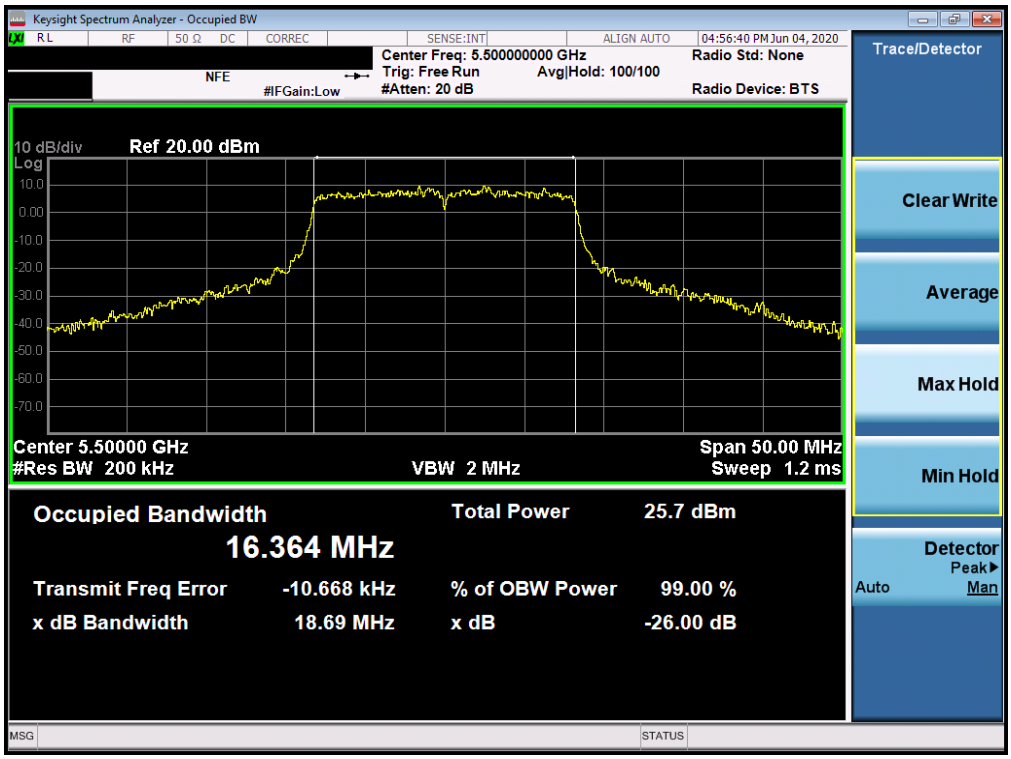

**Plot 7-79. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax SU (UNII Band 2A) – Ch. 62)**



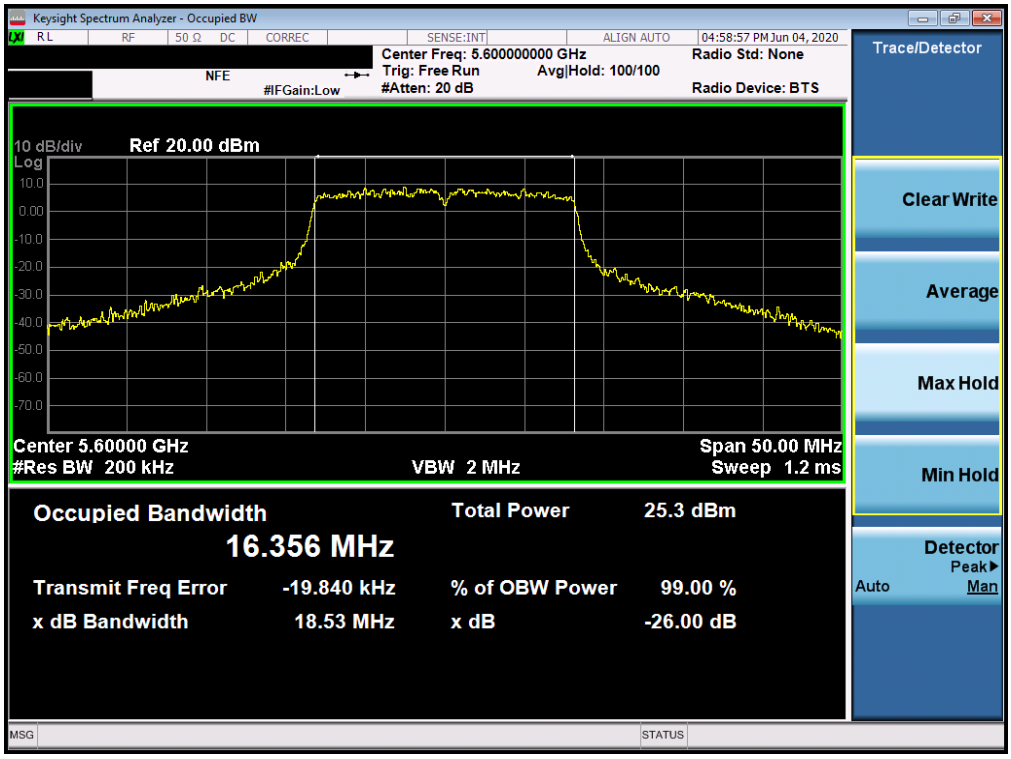

**Plot 7-80. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)**



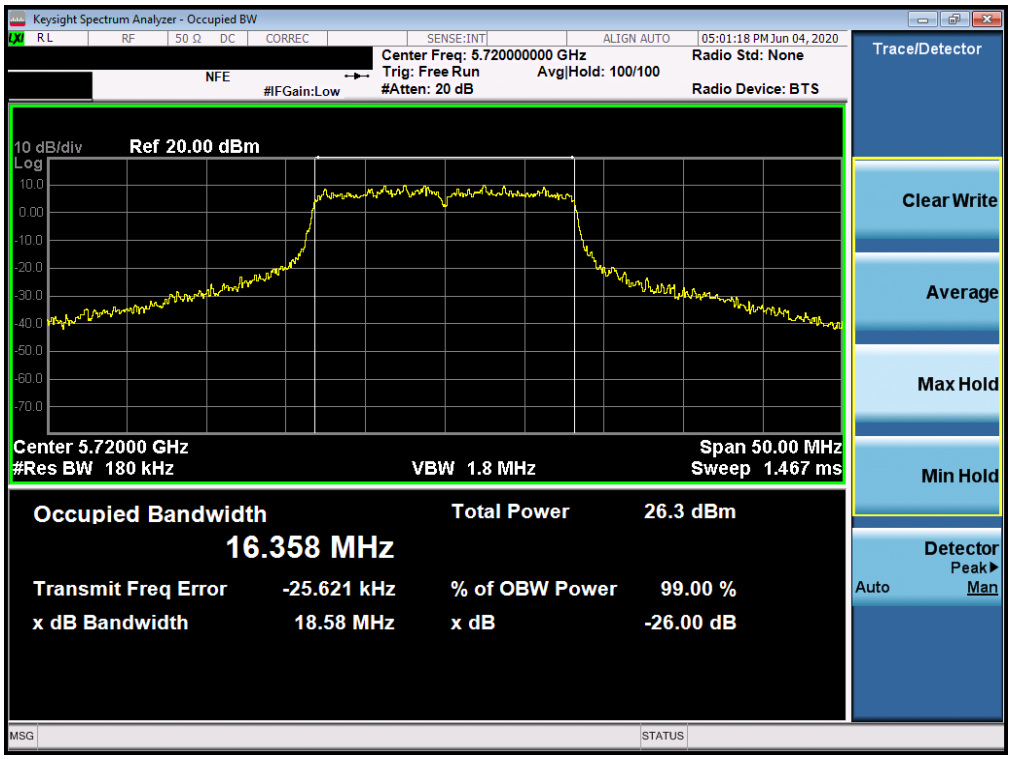

**Plot 7-81. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax SU (UNII Band 2A) – Ch. 58)**



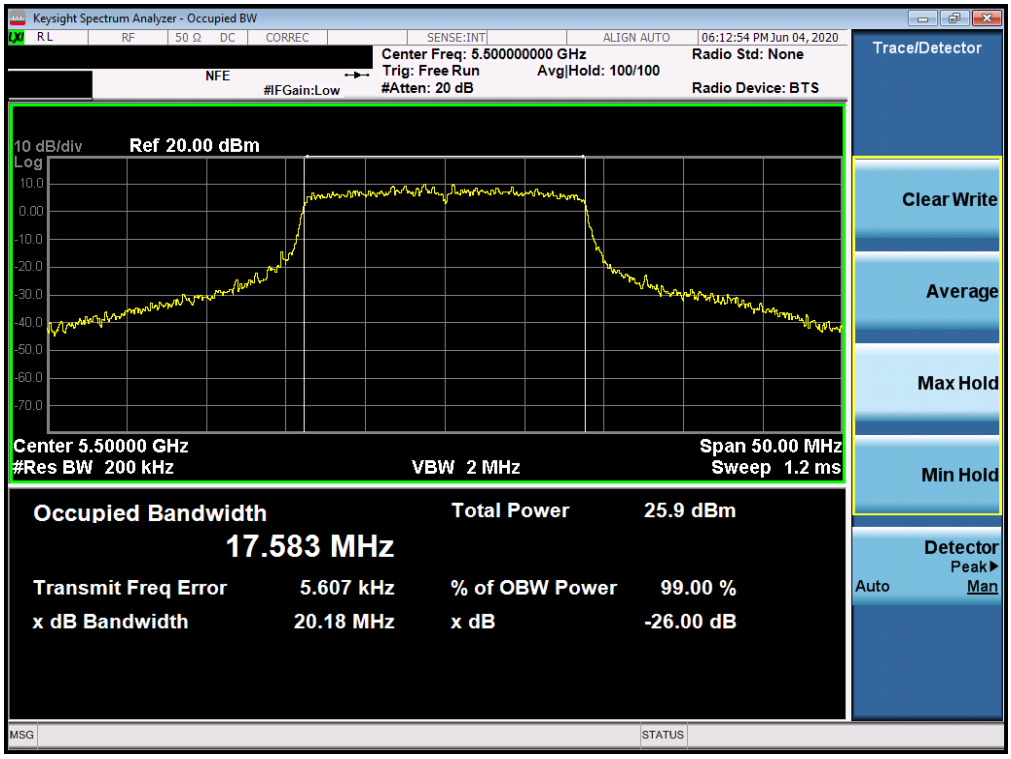

**Plot 7-82. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2C) – Ch. 100)**



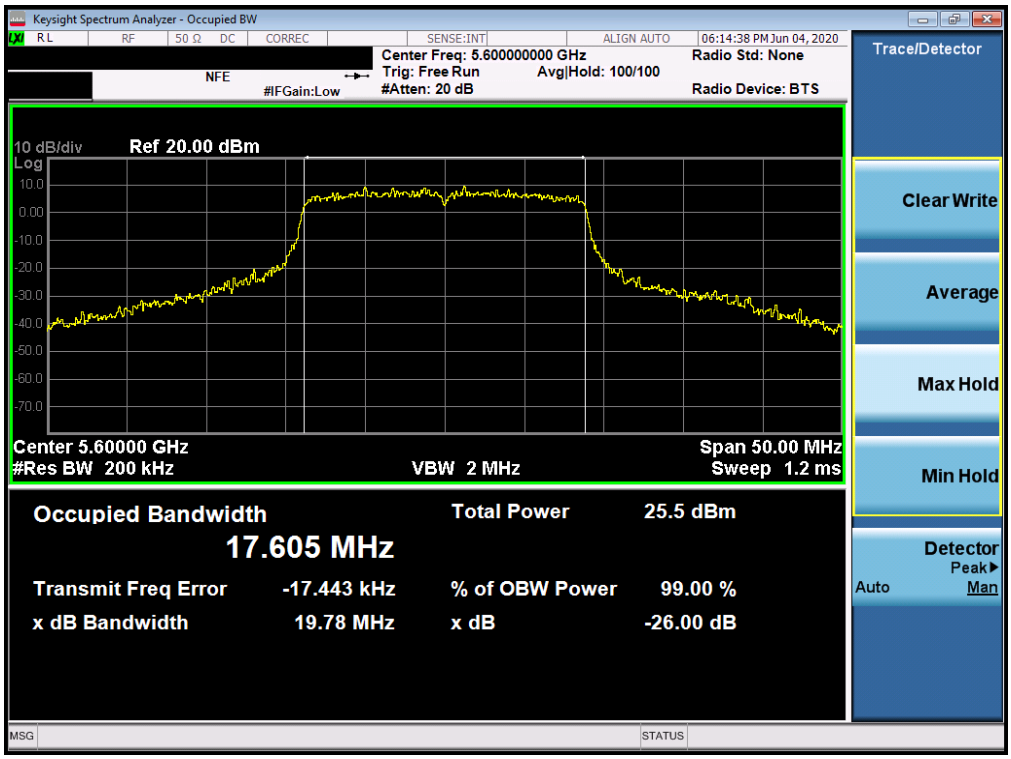

**Plot 7-83. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2C) – Ch. 120)**



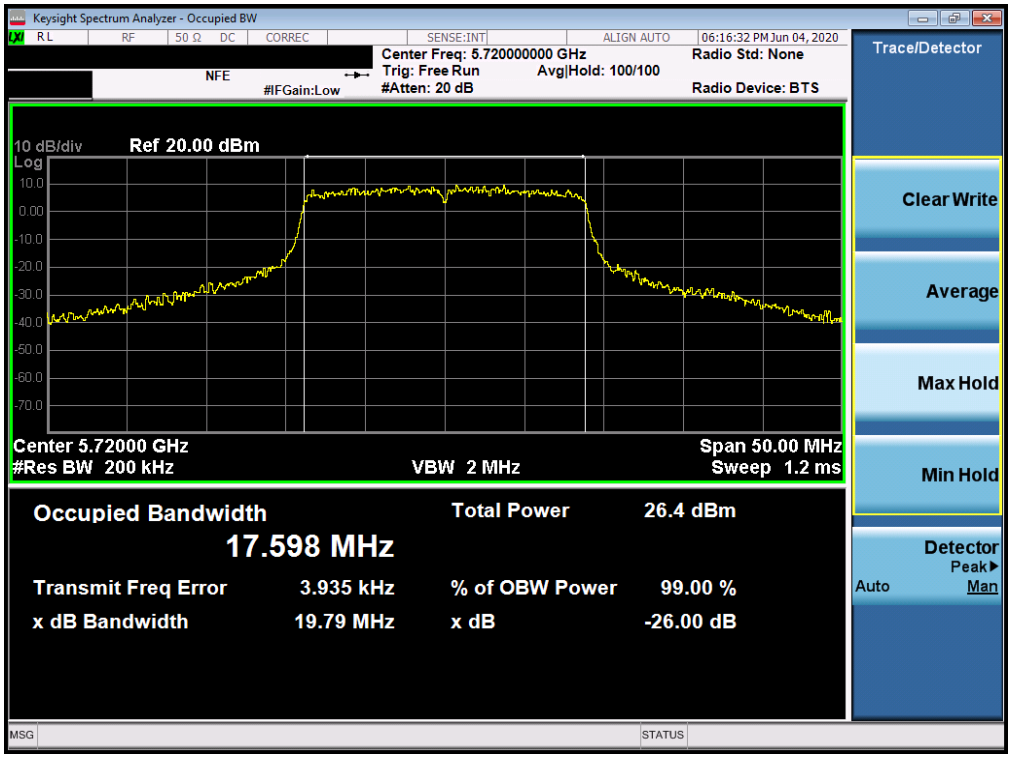

**Plot 7-84. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2C) – Ch. 144)**



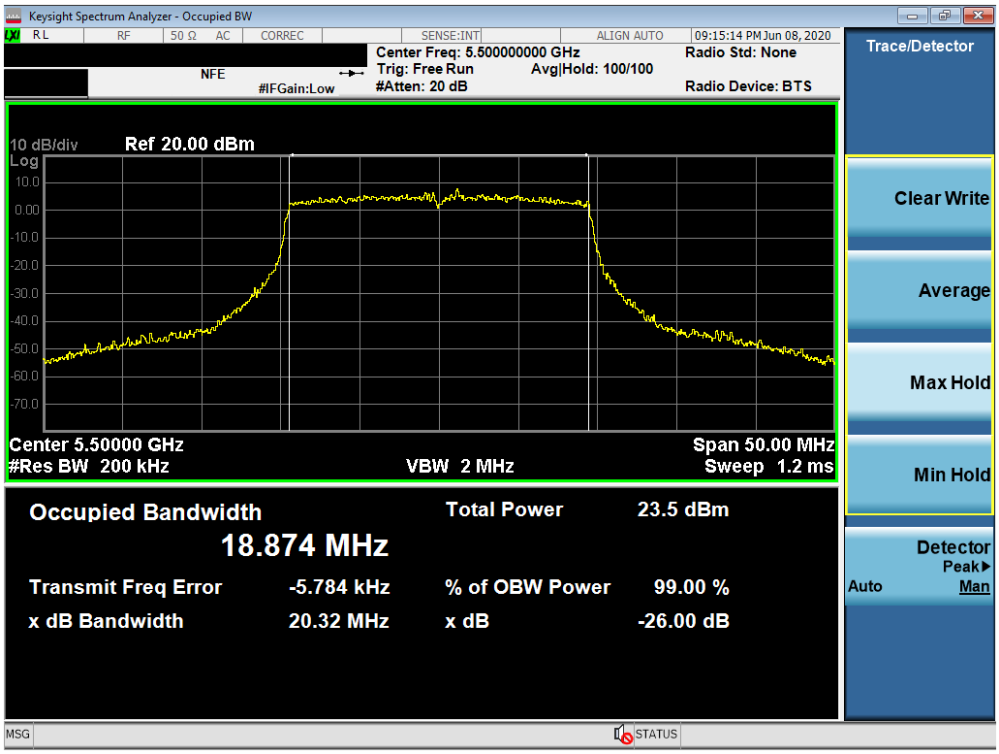

**Plot 7-85. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)**



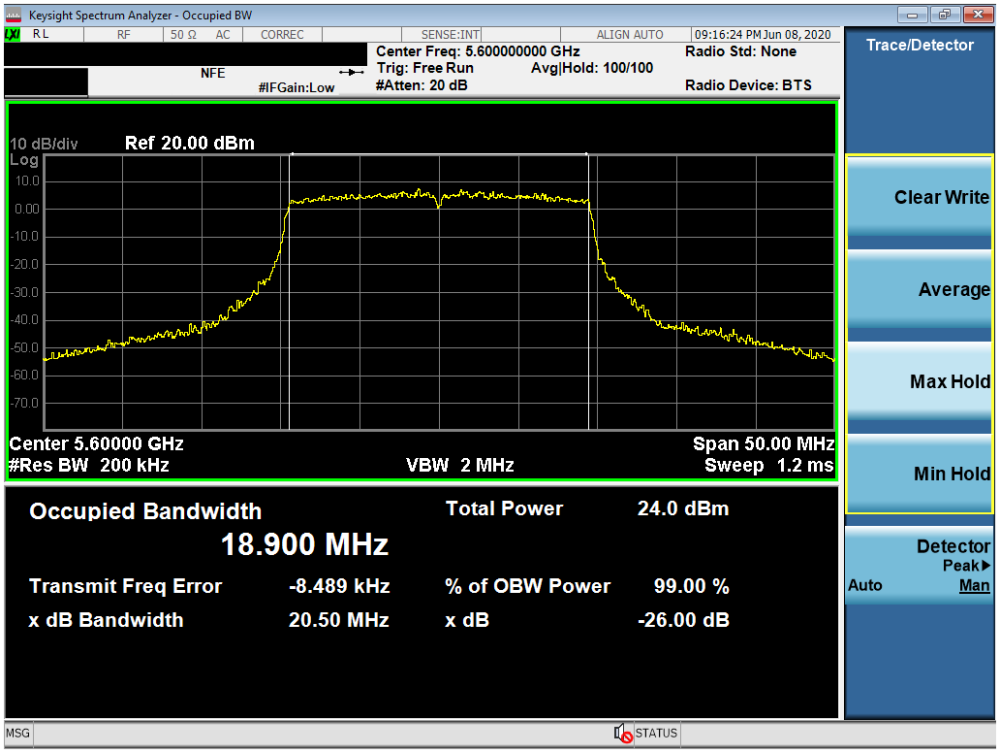

**Plot 7-86. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2C) – Ch. 120)**



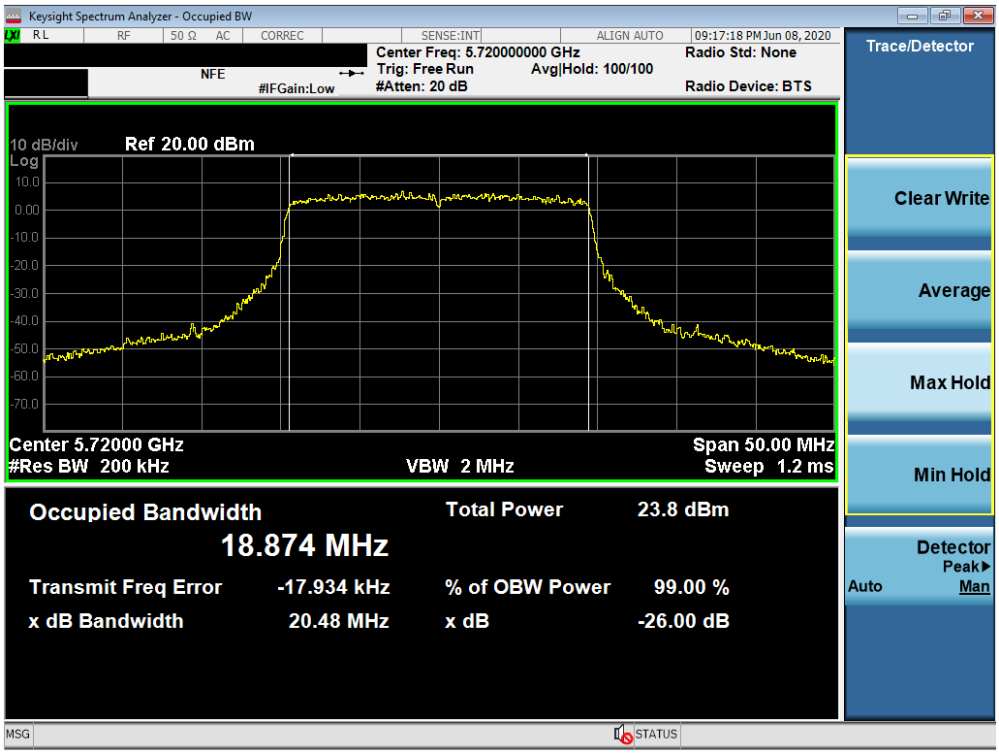

**Plot 7-87. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)**



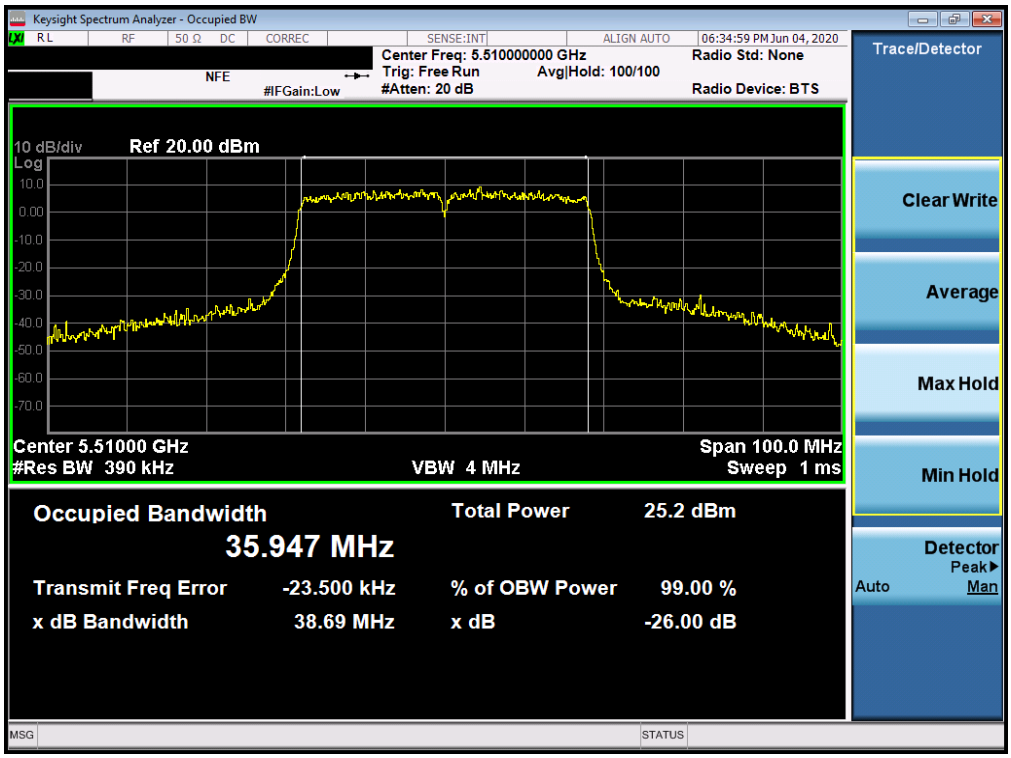

**Plot 7-88. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax SU (UNII Band 2C) – Ch. 100)**



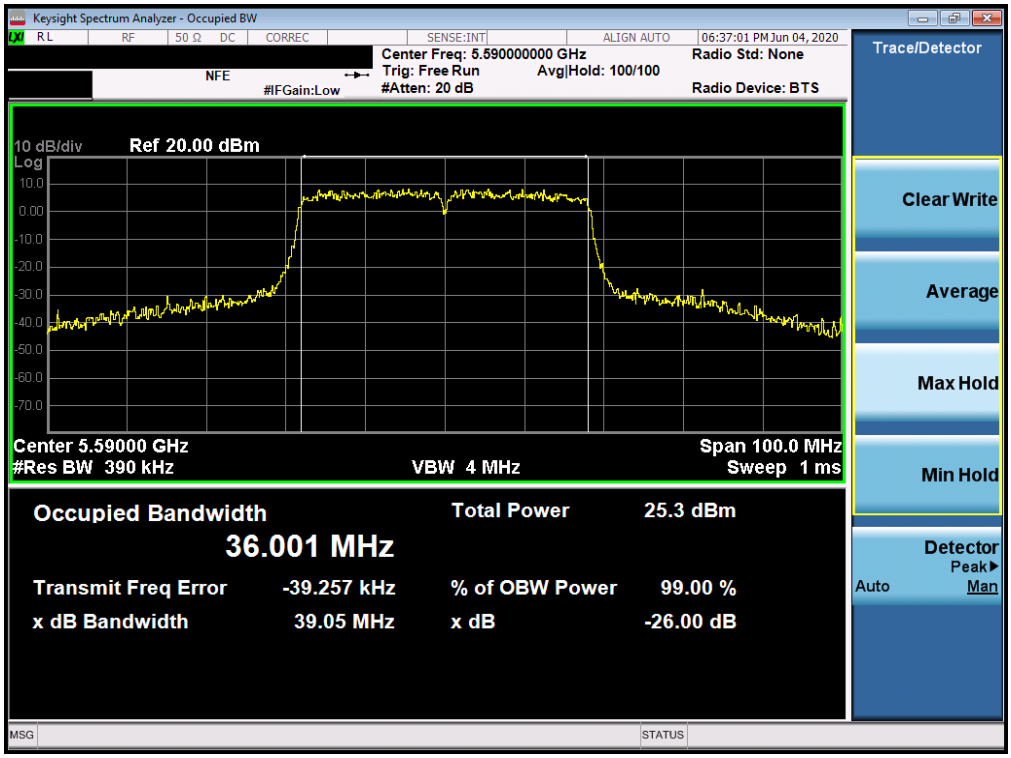

**Plot 7-89. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax SU (UNII Band 2C) – Ch. 120)**



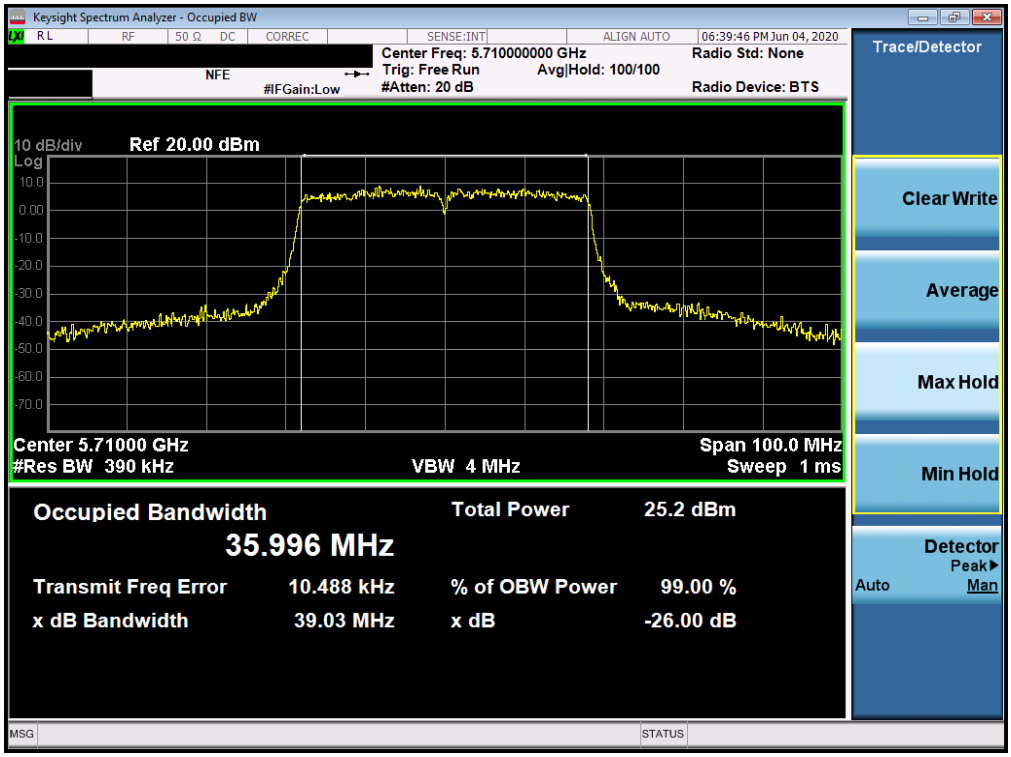

**Plot 7-90. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax SU (UNII Band 2C) – Ch. 144)**



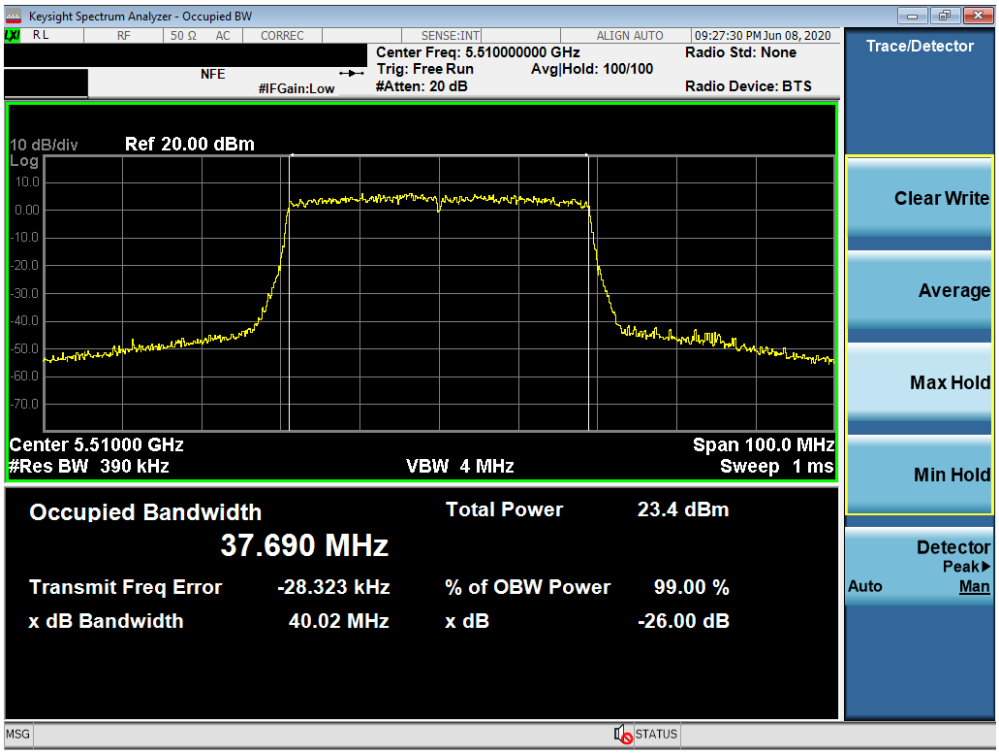

**Plot 7-91. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)**



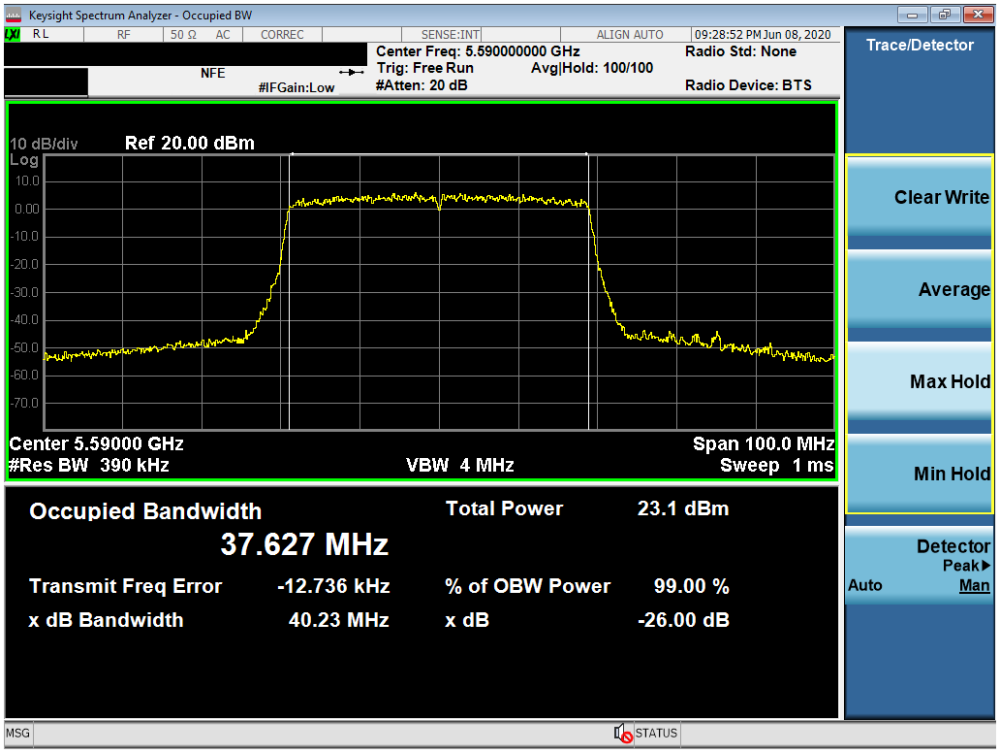

**Plot 7-92. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2C) – Ch. 118)**



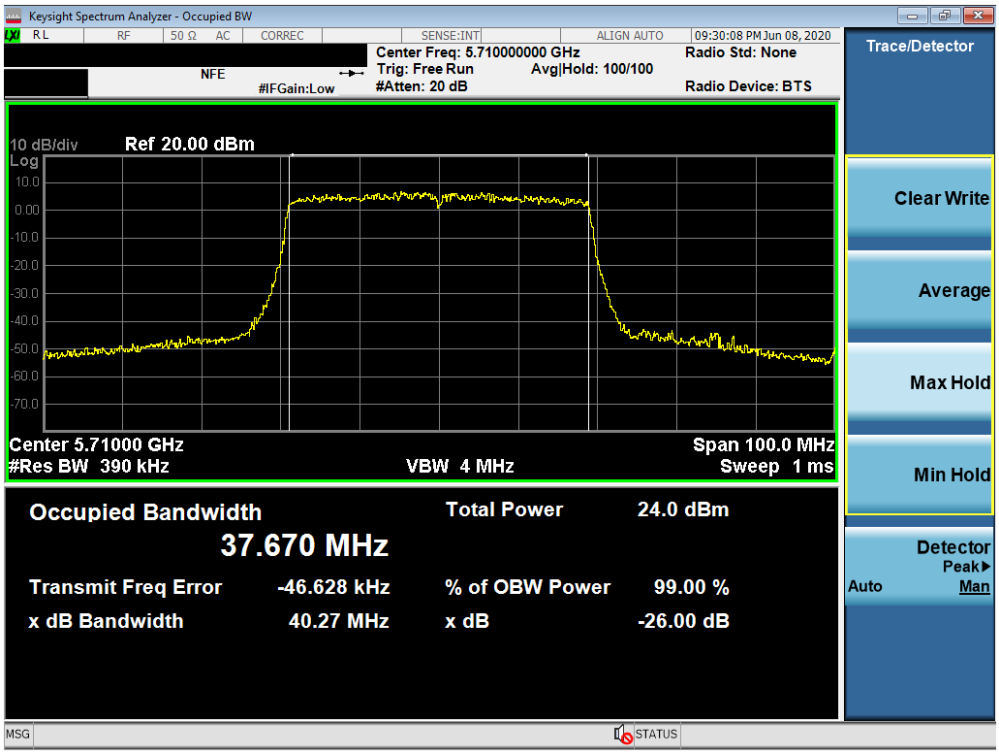

**Plot 7-93. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)**



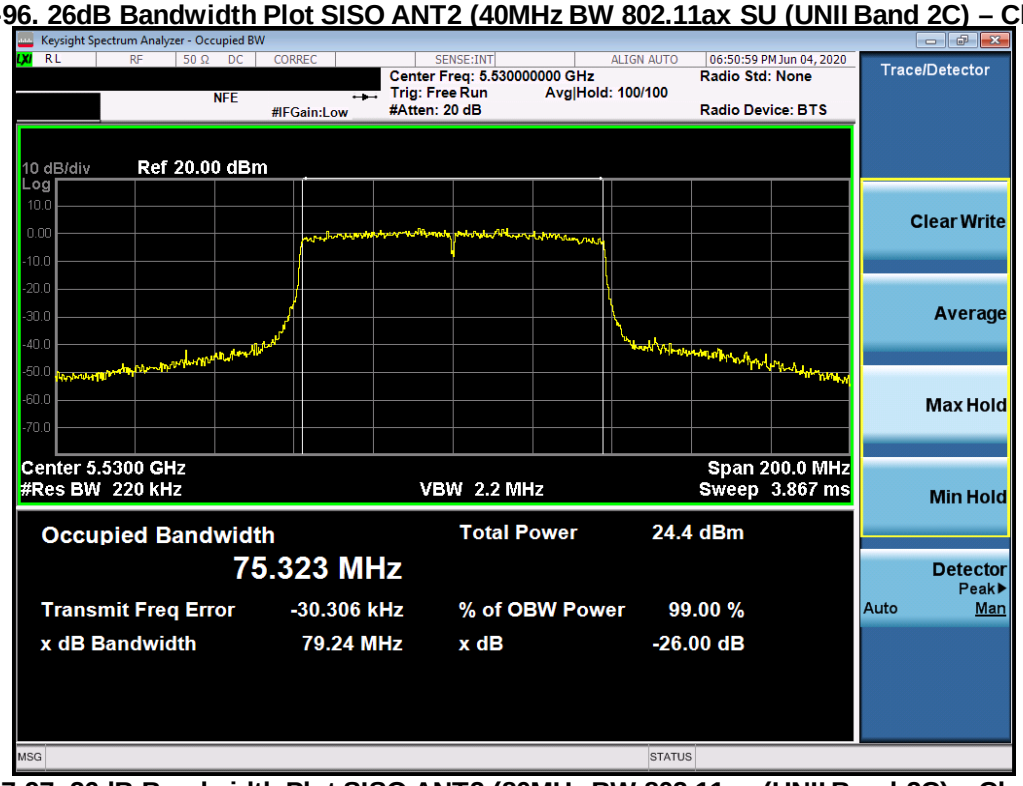

**Plot 7-94. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax SU (UNII Band 2C) – Ch. 102)**



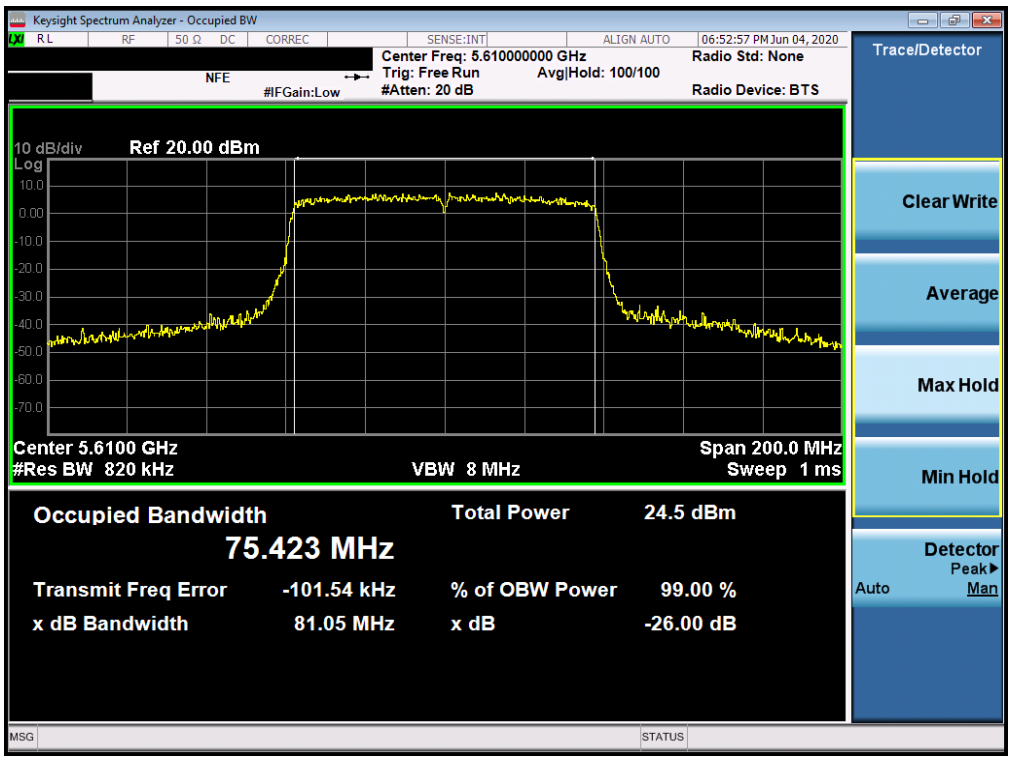

**Plot 7-95. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax SU (UNII Band 2C) – Ch. 118)**



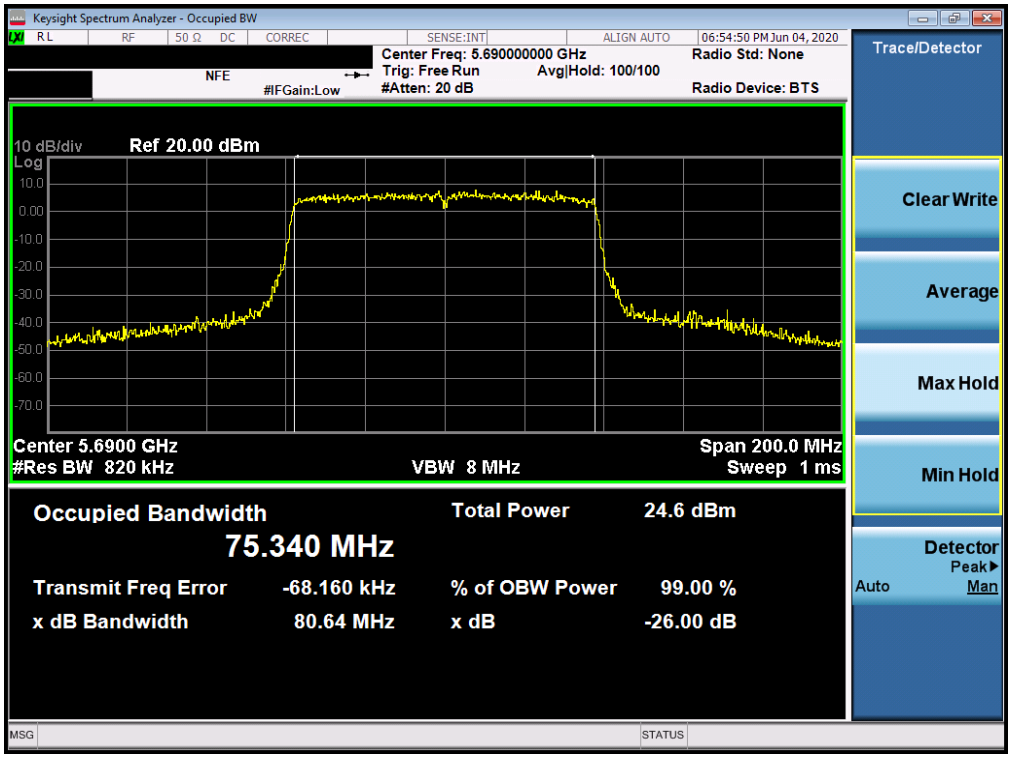

**Plot 7-96. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax SU (UNII Band 2C) – Ch. 142)**



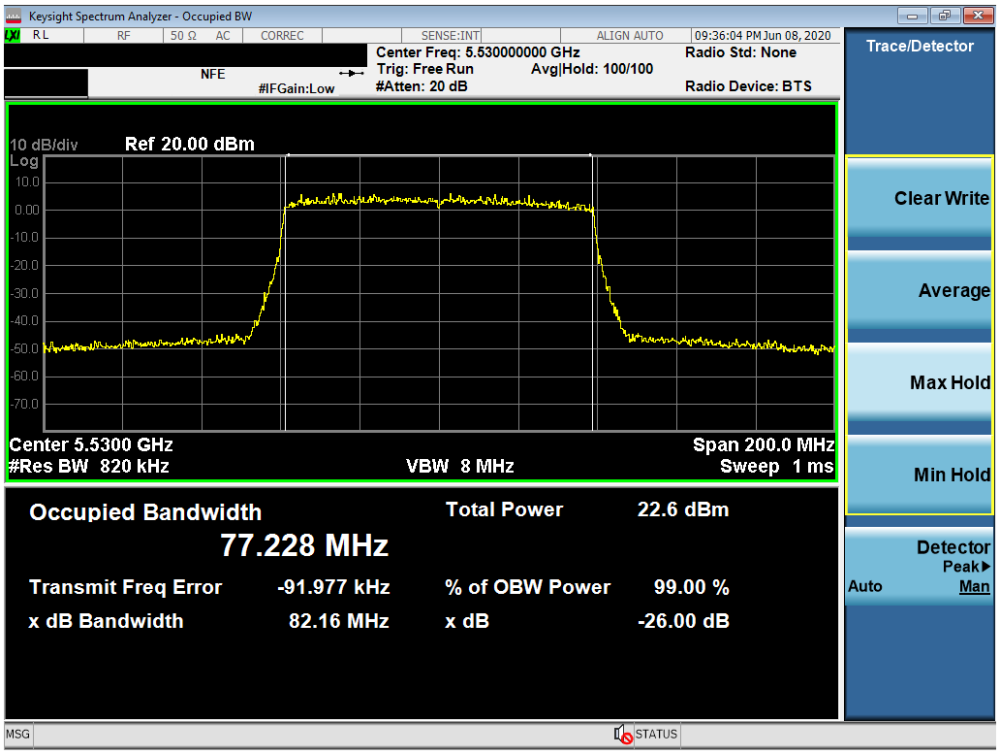

**Plot 7-97. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)**



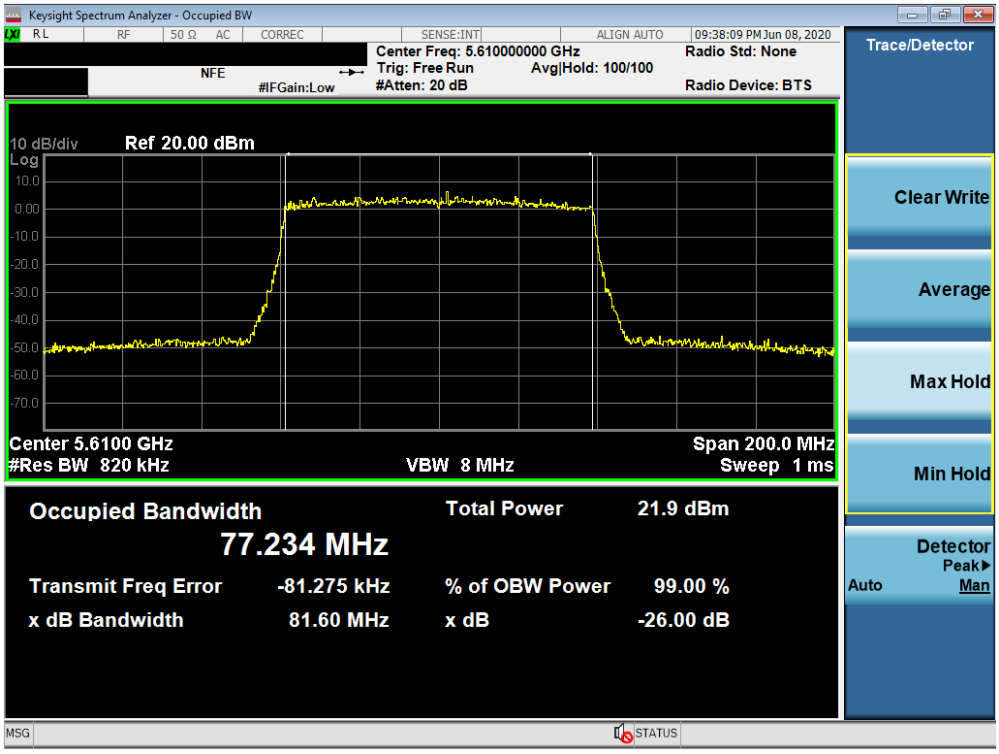

**Plot 7-98. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 122)**



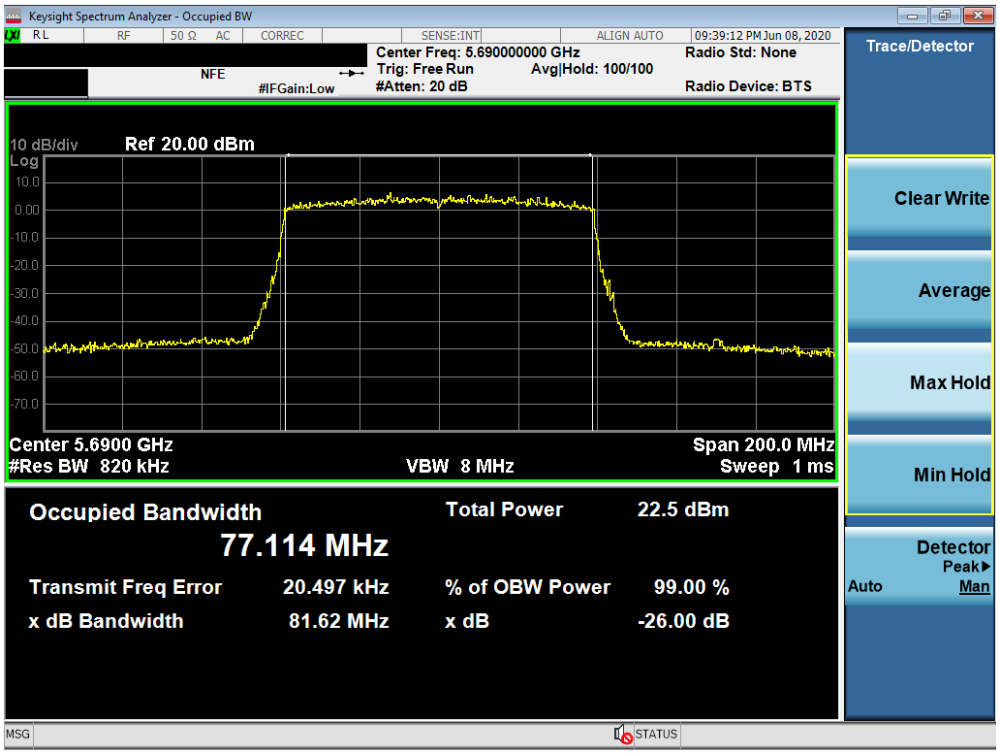

**Plot 7-99. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)**




**Plot 7-100. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax SU (UNII Band 2C) – Ch. 106)**




**Plot 7-101. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax SU (UNII Band 2C) – Ch. 122)**




**Plot 7-102. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax SU (UNII Band 2C) – Ch. 138)**

## 7.3 6dB Bandwidth Measurement – 802.11a/n/ac/ax

**§15.407 (e); RSS-Gen [6.2]**

### 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 KDB 789033 D02 v02r01, 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 band, the 6dB bandwidth must be ≥ 500 kHz.***

### Test Procedure Used

ANSI C63.10-2013 – Section 6.9.2
KDB 789033 D02 v02r01 – Section C

### 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**

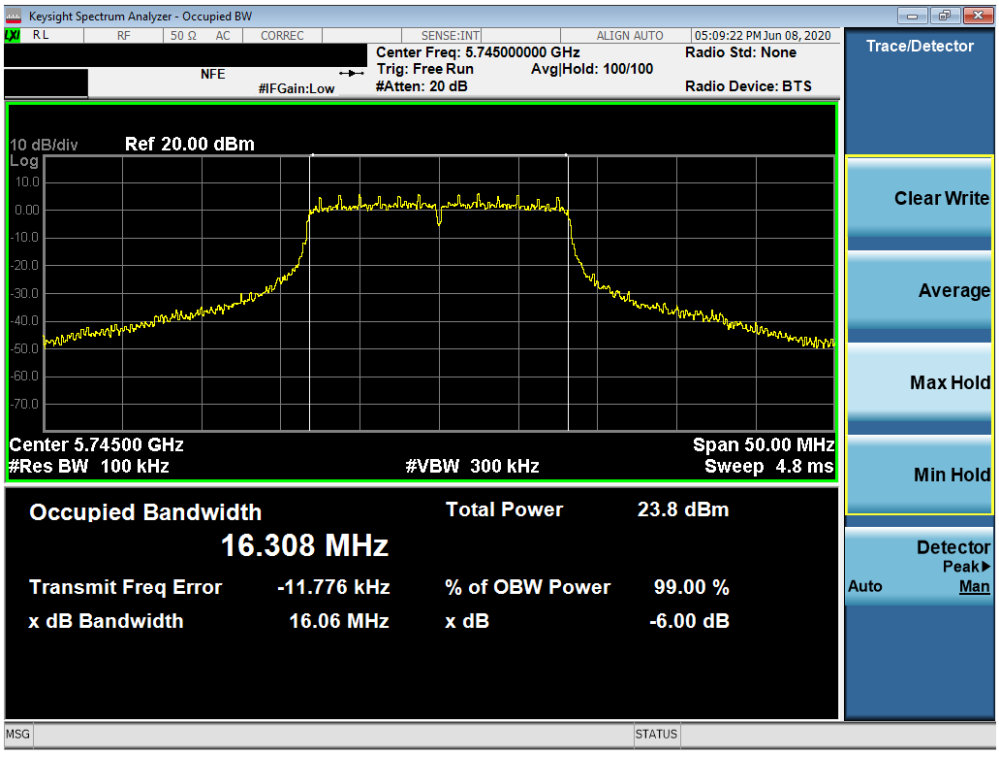
### Test Notes

None.

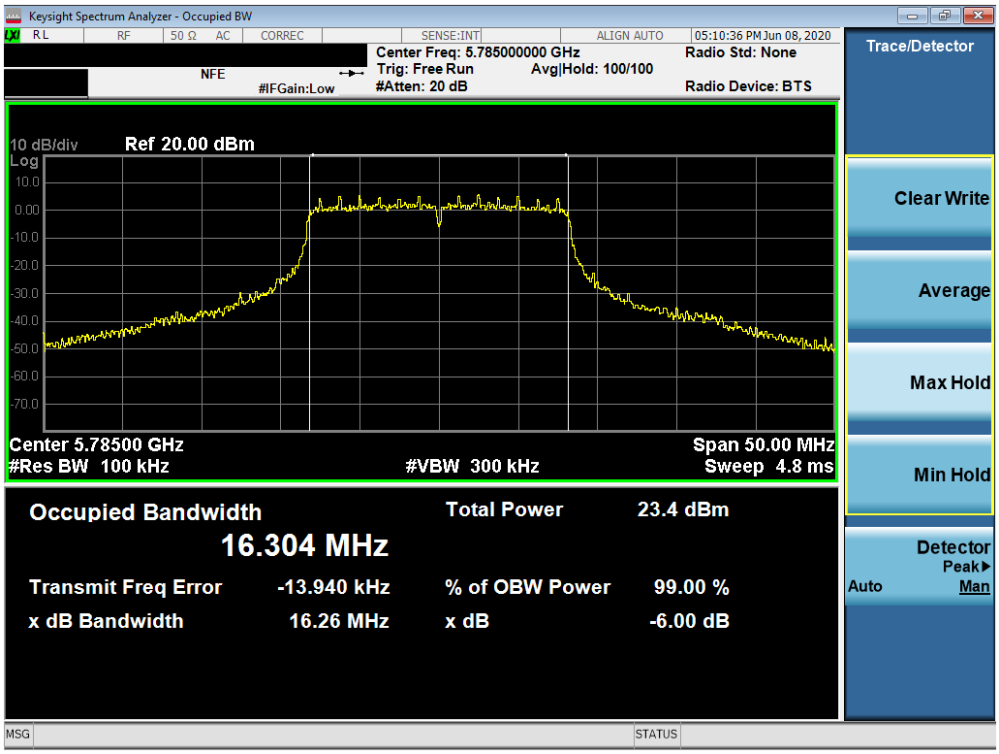
## SISO Antenna-1 6 dB Bandwidth Measurements

| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured 6dB Bandwidth [MHz] |
|---|---|---|---|---|---|
| Band 3 | 5745 | 149 | a | 6 | 16.06 |
| | 5785 | 157 | a | 6 | 16.26 |
| | 5825 | 165 | a | 6 | 16.32 |
| | 5745 | 149 | n (20MHz) | 6.5/7.2 (MCS0) | 16.85 |
| | 5785 | 157 | n (20MHz) | 6.5/7.2 (MCS0) | 17.19 |
| | 5825 | 165 | n (20MHz) | 6.5/7.2 (MCS0) | 16.90 |
| | 5745 | 149 | ax (20MHz) | 6.5/7.2 (MCS0) | 18.85 |
| | 5785 | 157 | ax (20MHz) | 6.5/7.2 (MCS0) | 18.85 |
| | 5825 | 165 | ax (20MHz) | 6.5/7.2 (MCS0) | 18.83 |
| | 5755 | 151 | n (40MHz) | 13.5/15 (MCS0) | 35.59 |
| | 5795 | 159 | n (40MHz) | 13.5/15 (MCS0) | 35.50 |
| | 5755 | 151 | ax (40MHz) | 13.5/15 (MCS0) | 37.92 |
| | 5795 | 159 | ax (40MHz) | 13.5/15 (MCS0) | 37.74 |
| | 5775 | 155 | ac (80MHz) | 29.3/32.5 (MCS0) | 75.05 |
| | 5775 | 155 | ax (80MHz) | 29.3/32.5 (MCS0) | 77.53 |

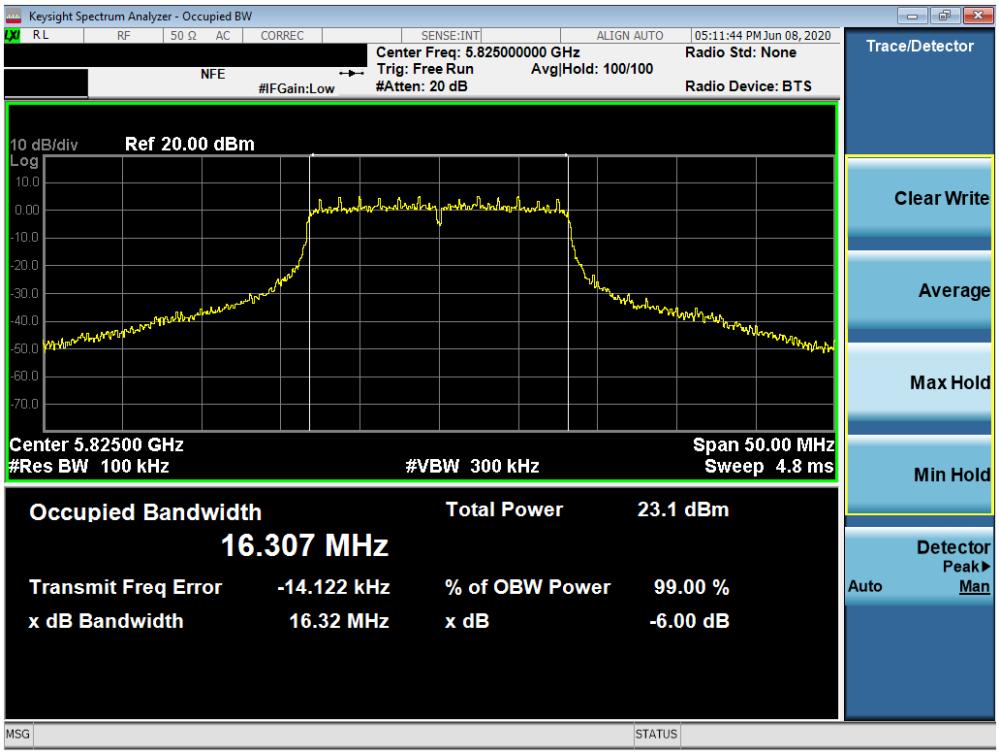
**Table 7-4. Conducted Bandwidth Measurements SISO ANT1**



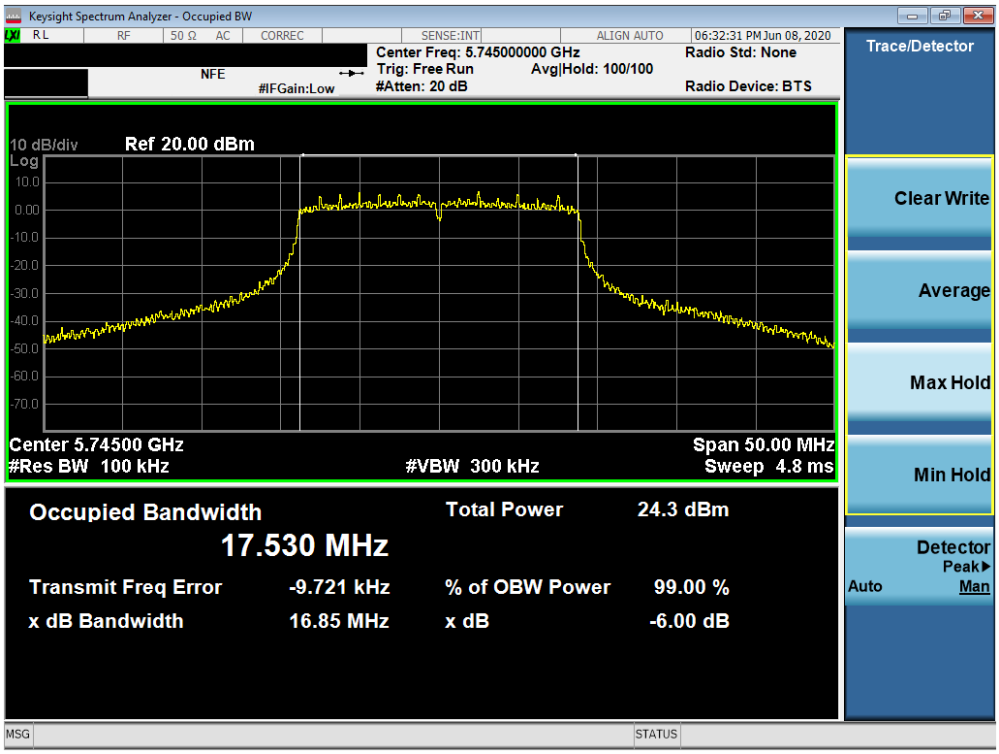

**Plot 7-103. 6dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 3) – Ch. 149)**



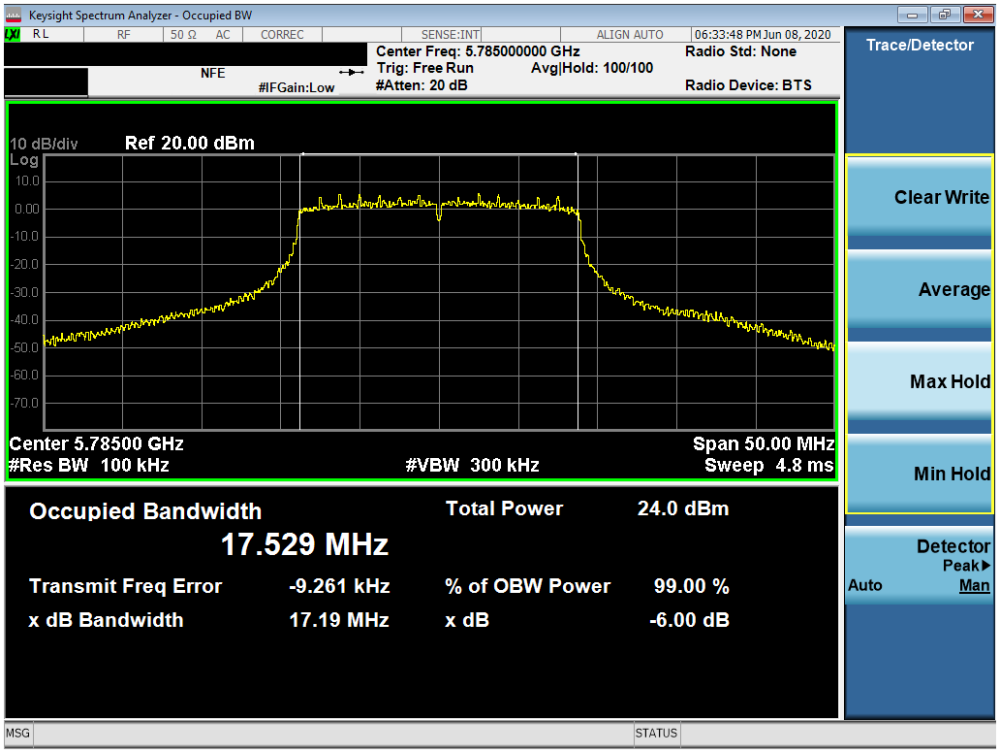

**Plot 7-104. 6dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 3) – Ch. 157)**



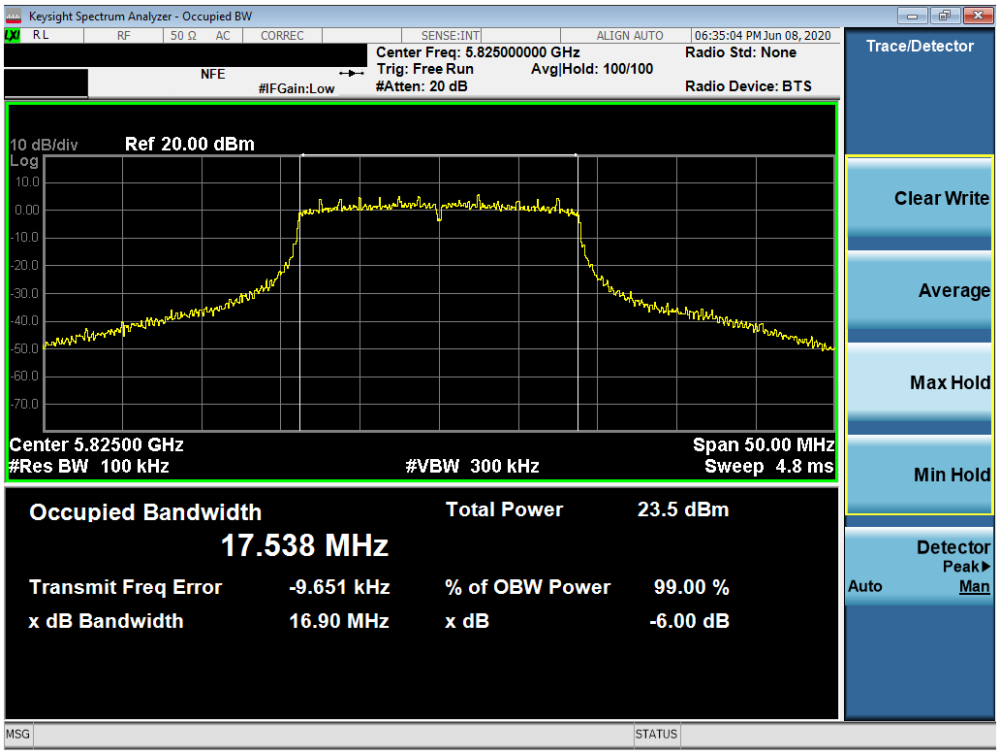

**Plot 7-105. 6dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 3) – Ch. 165)**



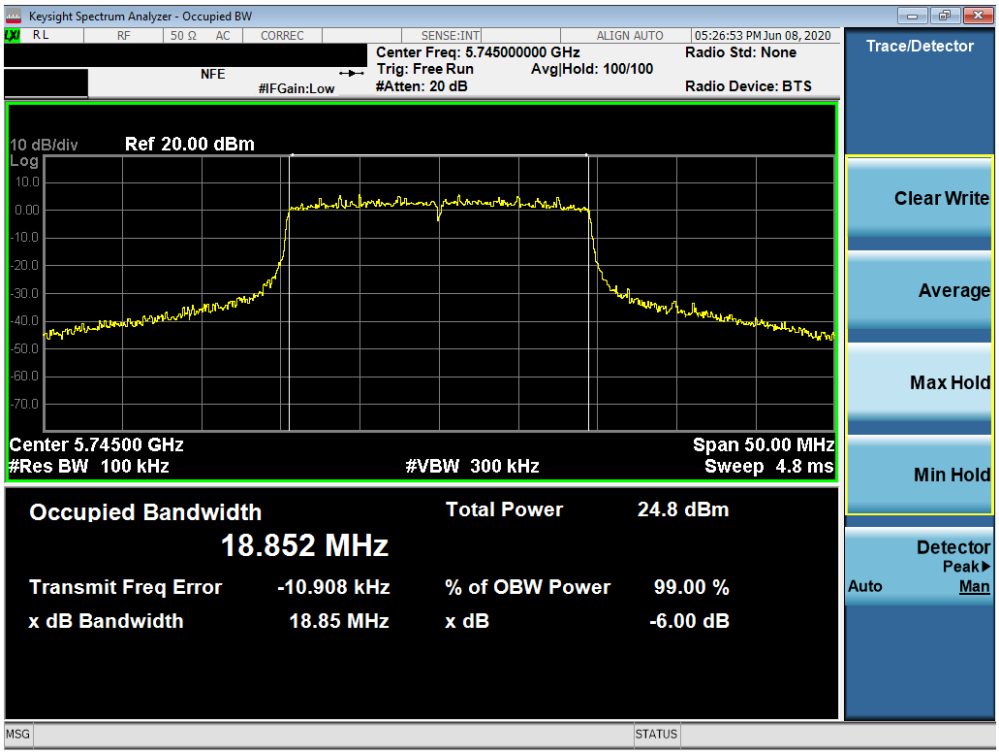

**Plot 7-106. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 3) – Ch. 149)**



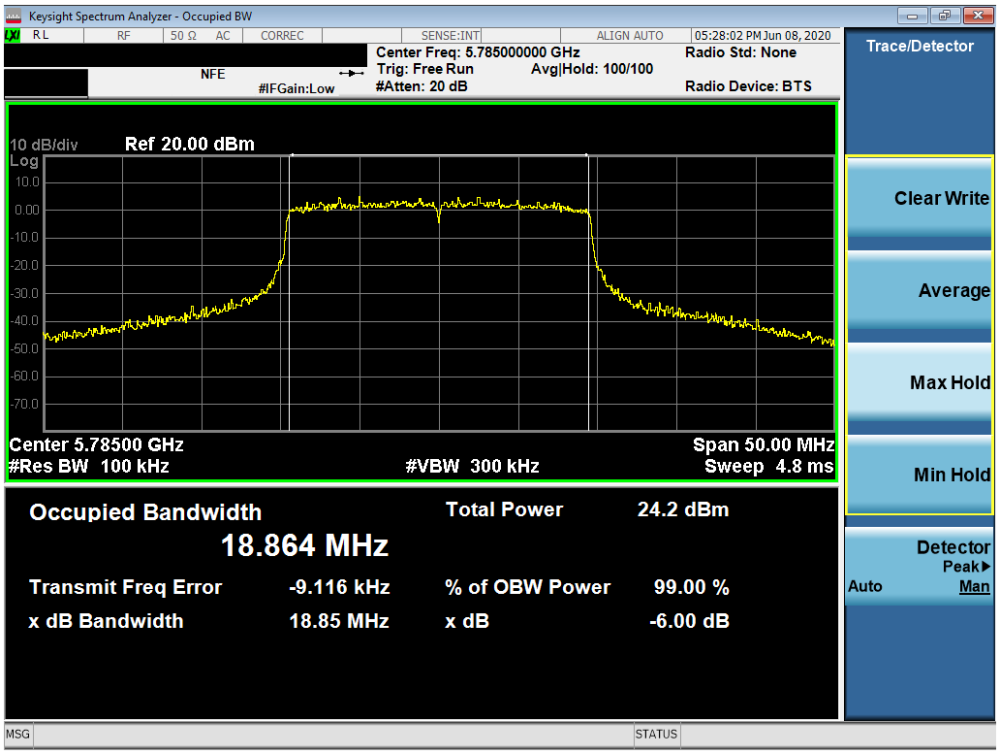

**Plot 7-107. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 3) – Ch. 157)**



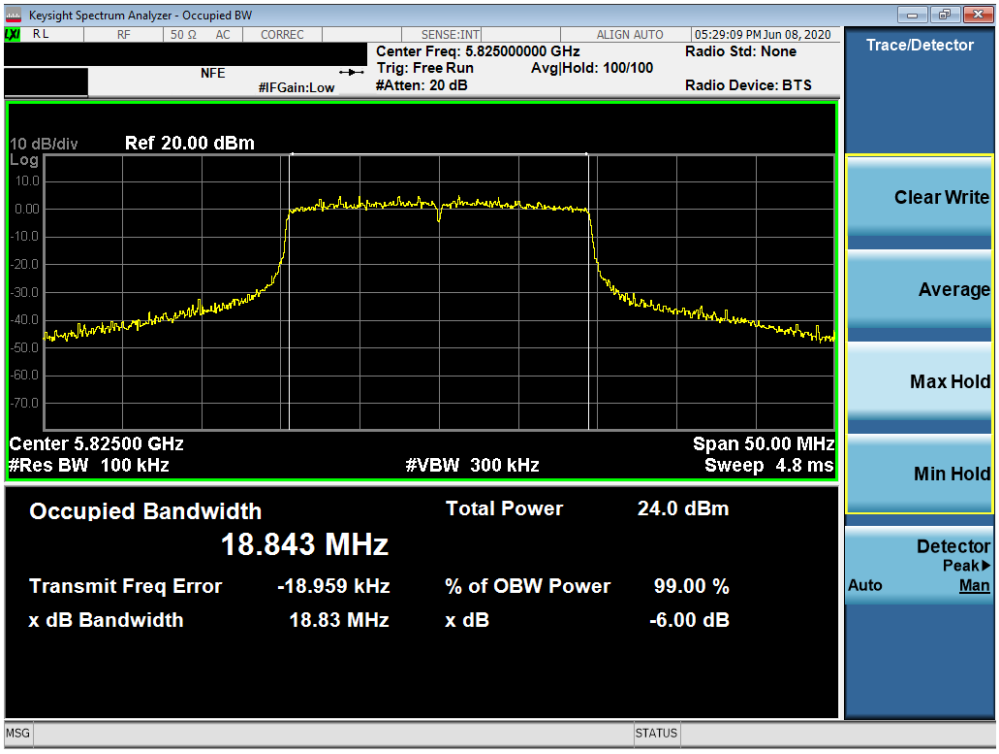

**Plot 7-108. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 3) – Ch. 165)**



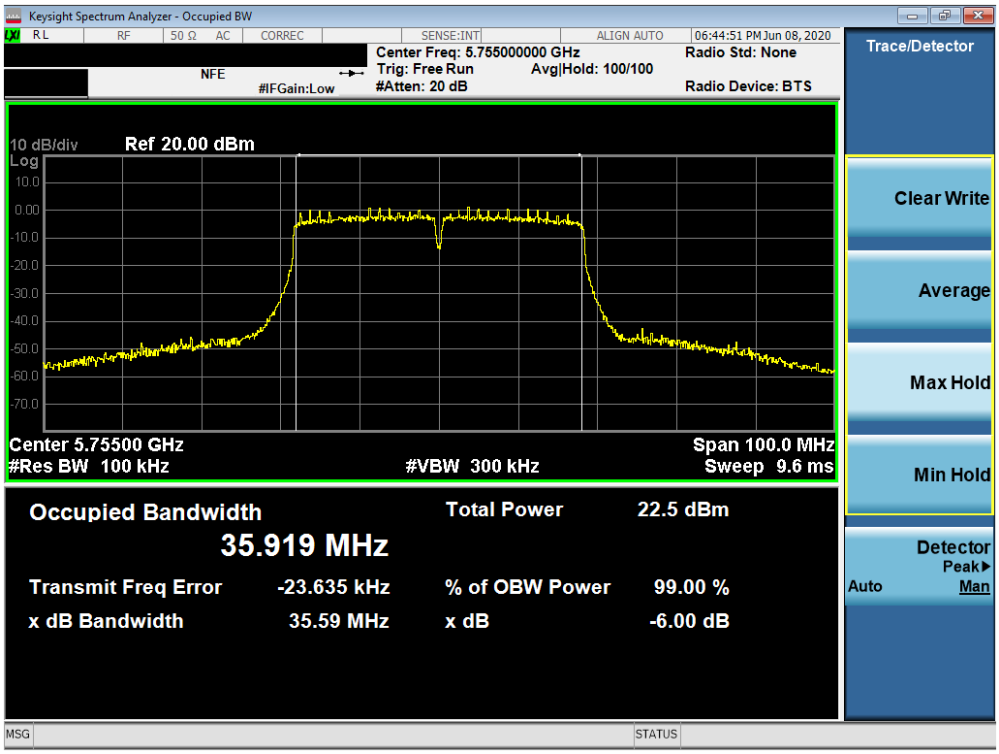

**Plot 7-109. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 3) – Ch. 149)**



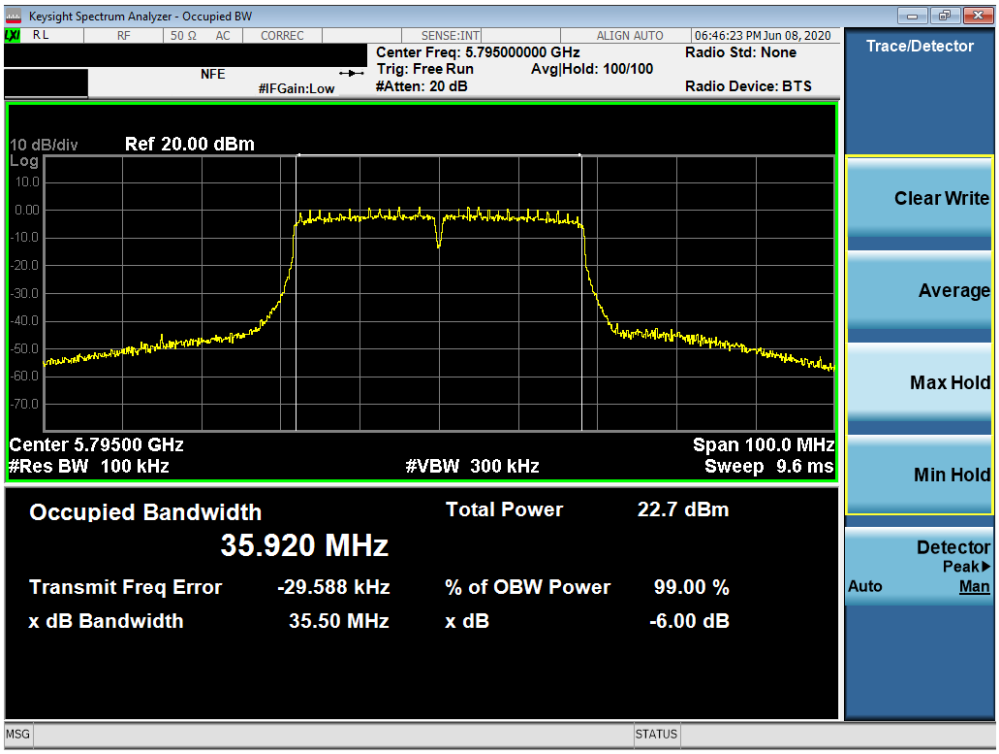

**Plot 7-110. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 3) – Ch. 157)**



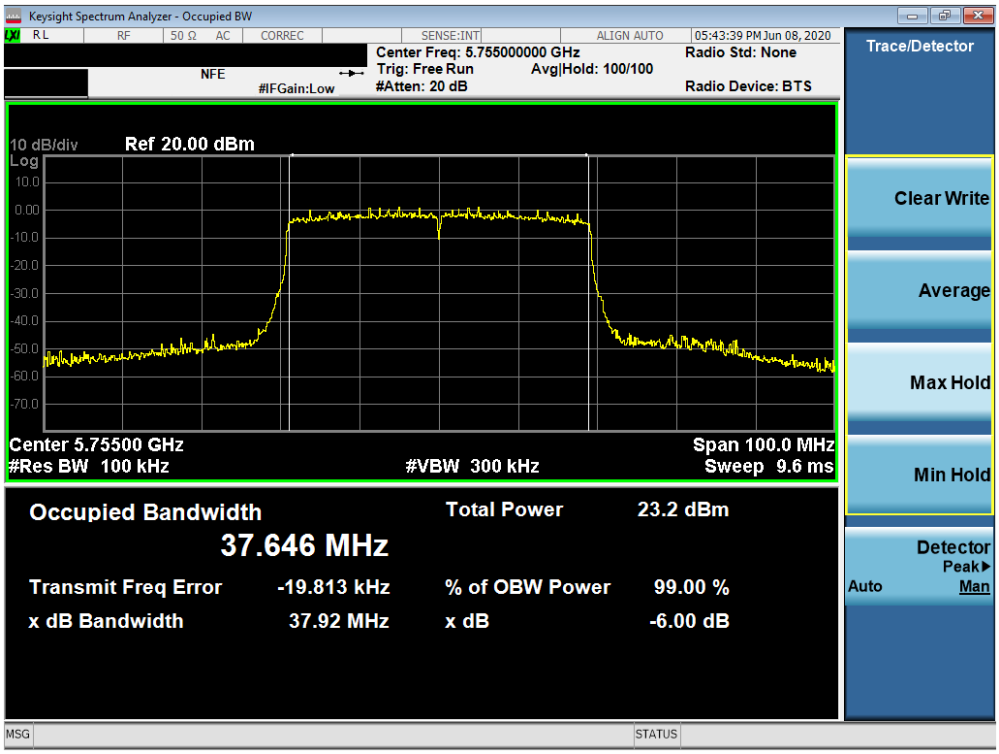

**Plot 7-111. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax SU (UNII Band 3) – Ch. 165)**



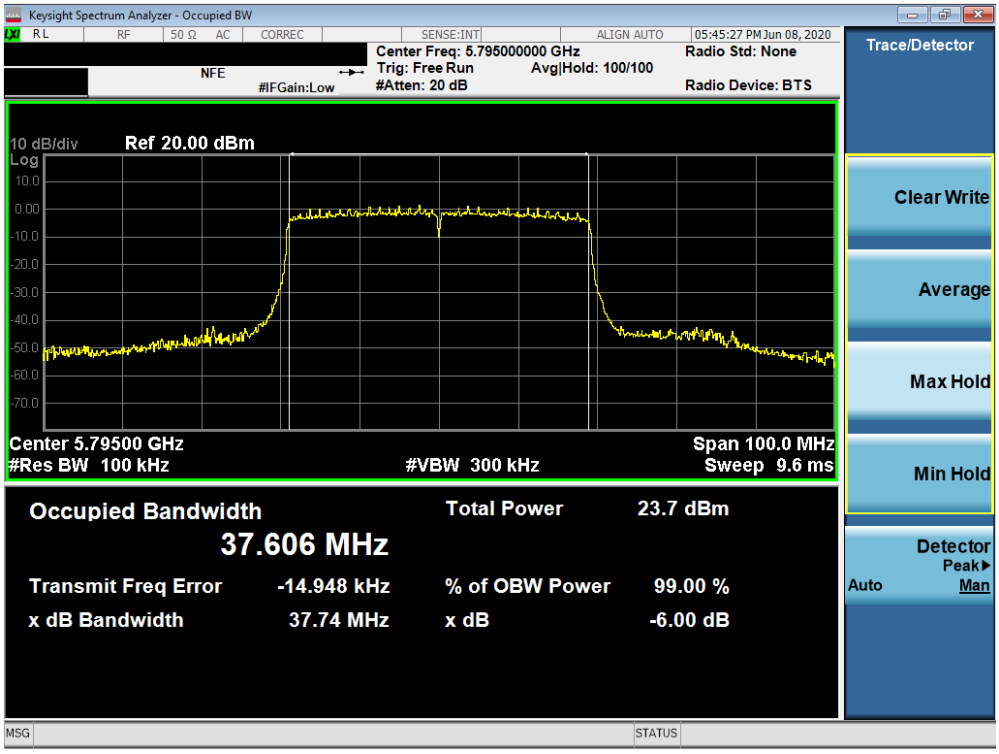

**Plot 7-112. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 3) – Ch. 151)**



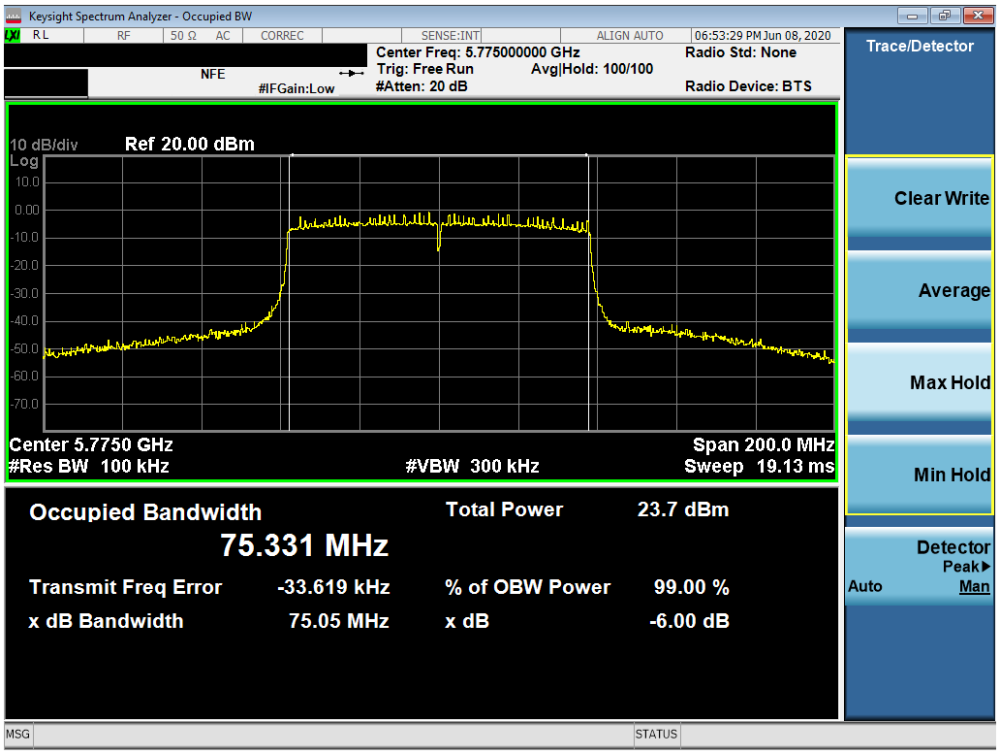

**Plot 7-113. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 3) – Ch. 159)**



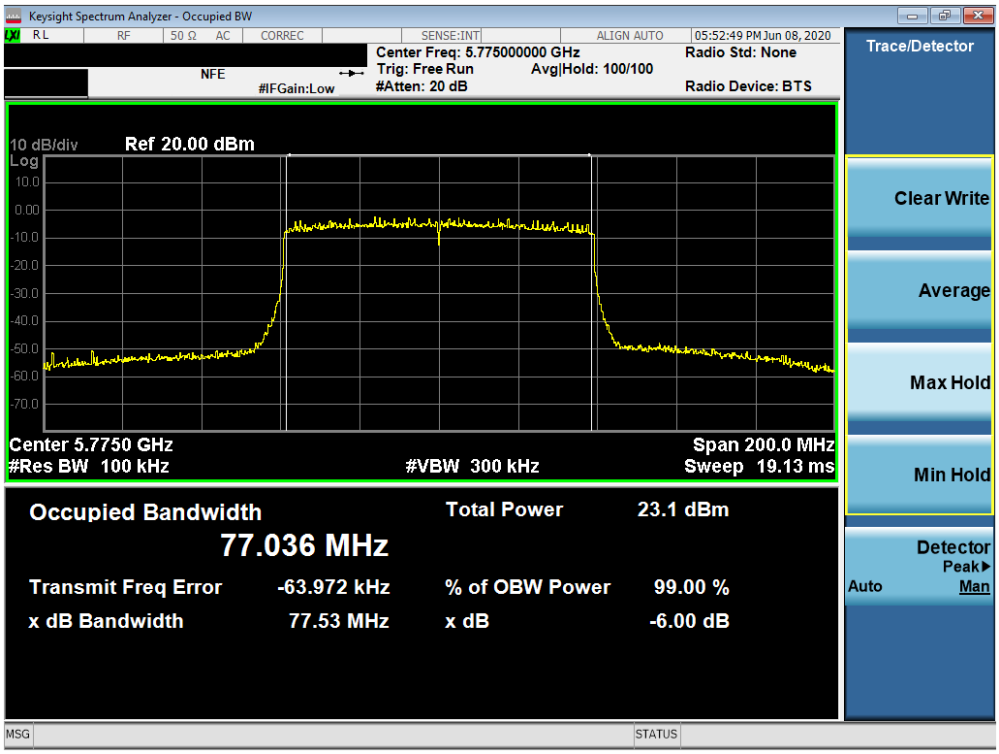

**Plot 7-114. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 3) – Ch. 151)**




**Plot 7-115. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax SU (UNII Band 3) – Ch. 159)**




**Plot 7-116. 6dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)**

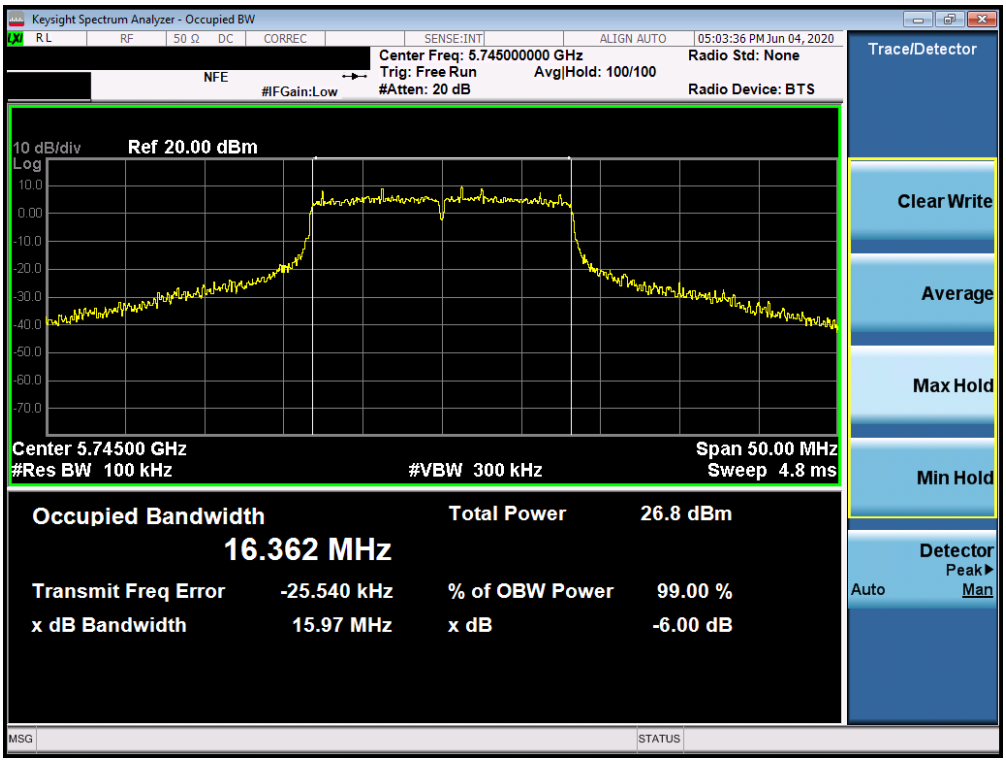



**Plot 7-117. 6dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax SU (UNII Band 3) – Ch. 155)**

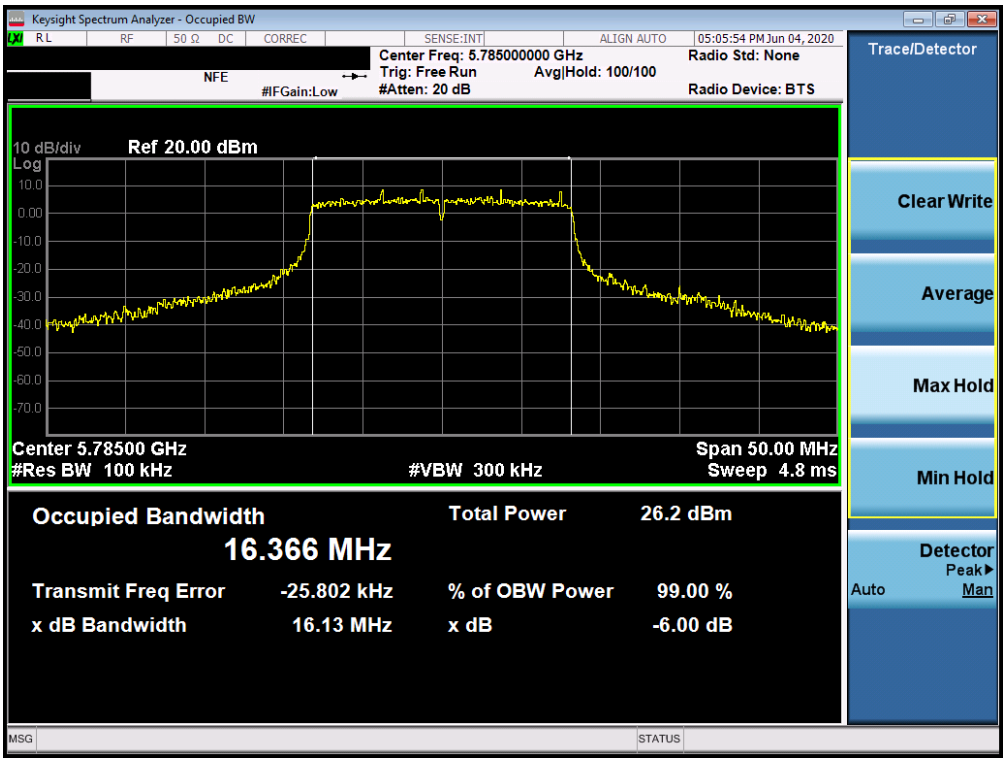
## SISO Antenna-2 6dB Bandwidth Measurements

| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured 6dB Bandwidth [MHz] |
|---|---|---|---|---|---|
| Band 3 | 5745 | 149 | a | 6 | 15.97 |
| | 5785 | 157 | a | 6 | 16.13 |
| | 5825 | 165 | a | 6 | 15.77 |
| | 5745 | 149 | n (20MHz) | 6.5/7.2 (MCS0) | 17.31 |
| | 5785 | 157 | n (20MHz) | 6.5/7.2 (MCS0) | 17.24 |
| | 5825 | 165 | n (20MHz) | 6.5/7.2 (MCS0) | 17.60 |
| | 5745 | 149 | ax (20MHz) | 6.5/7.2 (MCS0) | 18.82 |
| | 5785 | 157 | ax (20MHz) | 6.5/7.2 (MCS0) | 18.96 |
| | 5825 | 165 | ax (20MHz) | 6.5/7.2 (MCS0) | 18.88 |
| | 5755 | 151 | n (40MHz) | 13.5/15 (MCS0) | 36.05 |
| | 5795 | 159 | n (40MHz) | 13.5/15 (MCS0) | 35.82 |
| | 5755 | 151 | ax (40MHz) | 13.5/15 (MCS0) | 37.78 |
| | 5795 | 159 | ax (40MHz) | 13.5/15 (MCS0) | 37.88 |
| | 5775 | 155 | ac (80MHz) | 29.3/32.5 (MCS0) | 75.56 |
| | 5775 | 155 | ax (80MHz) | 29.3/32.5 (MCS0) | 77.80 |

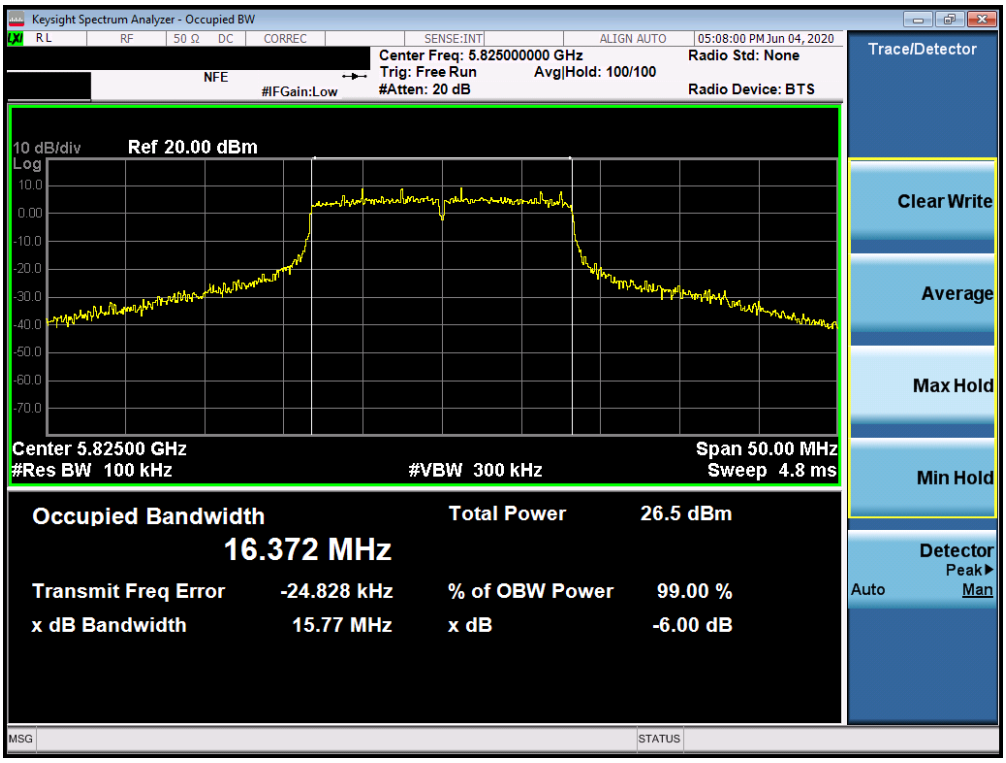
**Table 7-5. Conducted Bandwidth Measurements SISO ANT2**



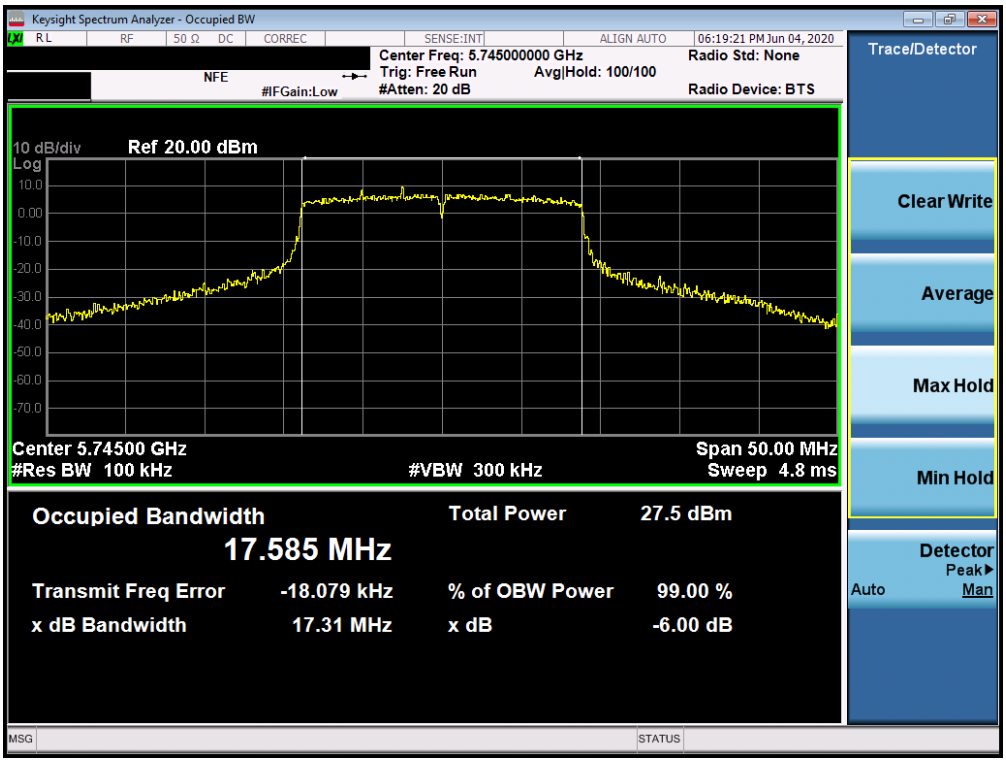

**Plot 7-118. 6dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 3) – Ch. 149)**



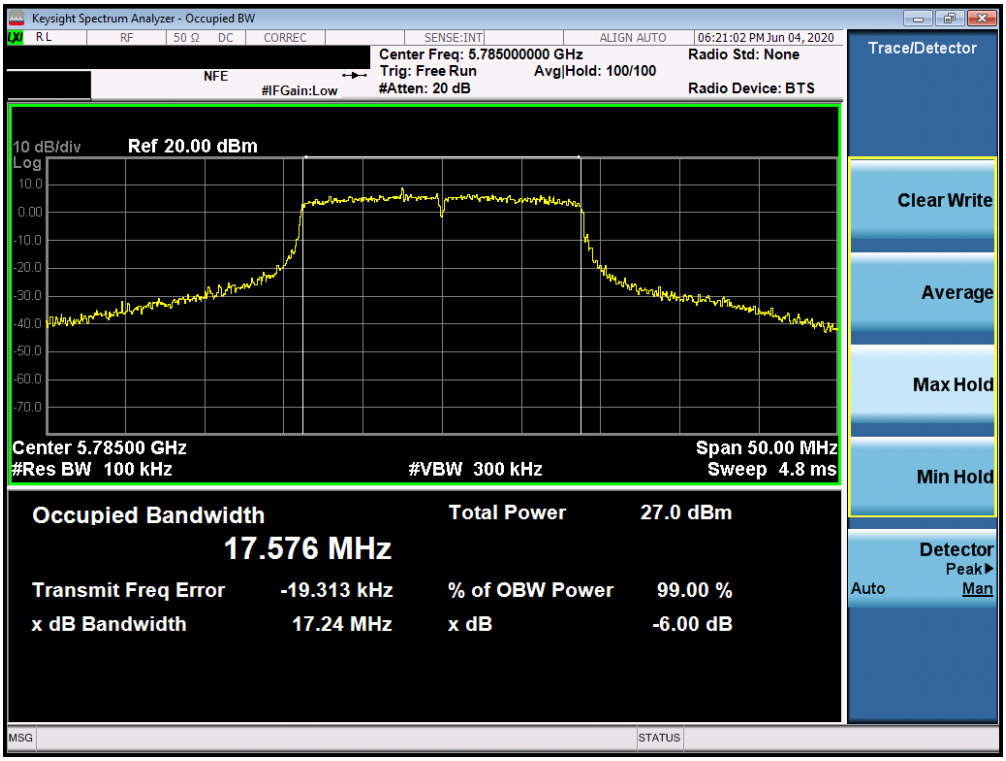

**Plot 7-119. 6dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 3) – Ch. 157)**



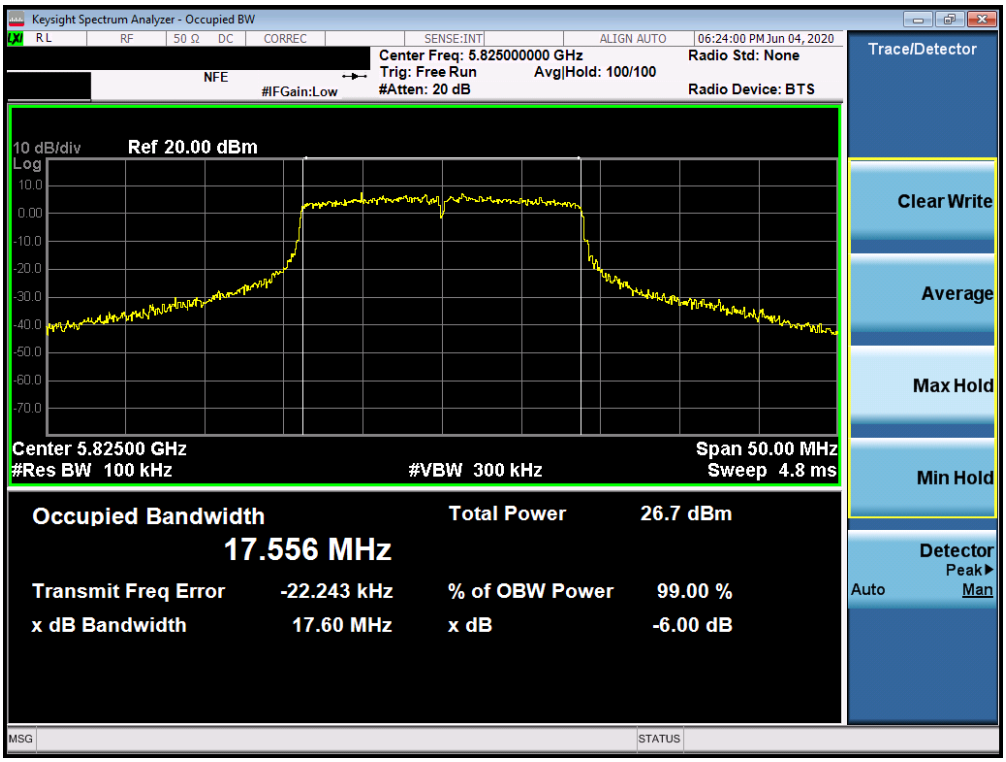

**Plot 7-120. 6dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 3) – Ch. 165)**



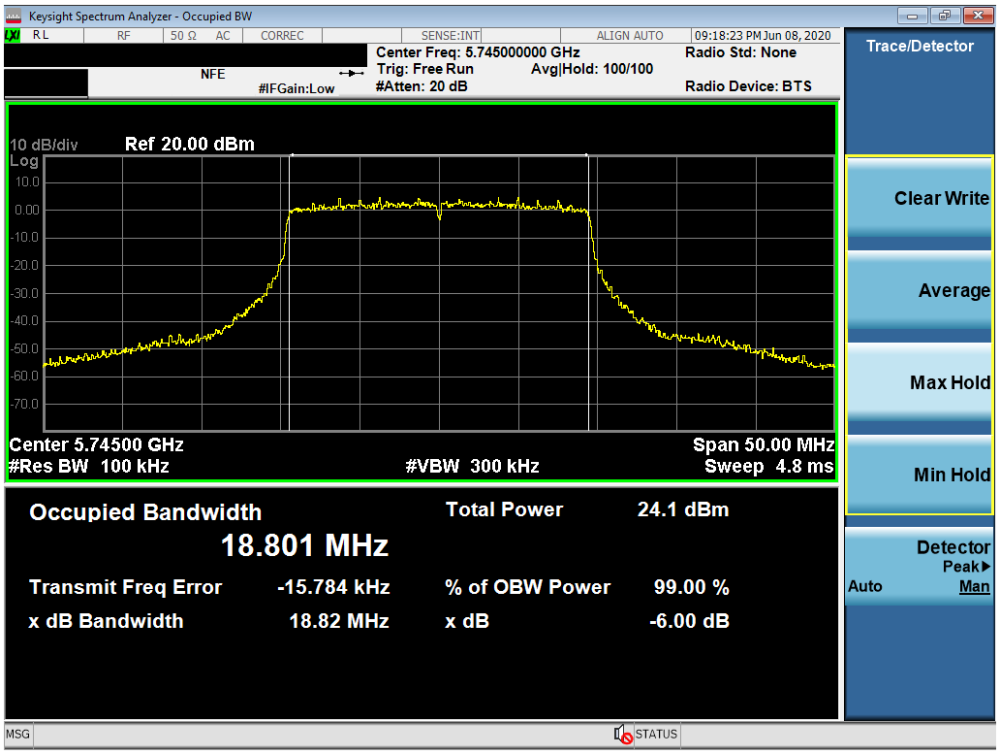

**Plot 7-121. 6dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 3) – Ch. 149)**




**Plot 7-122. 6dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 3) – Ch. 157)**




**Plot 7-123. 6dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 3) – Ch. 165)**




**Plot 7-124. 6dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax SU (UNII Band 3) – Ch. 149)**