# MEASUREMENT REPORT

## FCC PART 15.407 WLAN 802.11a/n/ac/ax

**FCC ID:** 2AXJ4AX72

**APPLICANT:** TP-Link Corporation Limited

**Application Type:** Certification

**Product:** AX5400 Wi-Fi 6 Router

**Model No.:** Archer AX72

**Brand Name:** tp-link

**FCC Classification:** Unlicensed National Information Infrastructure (NII)

**FCC Rule Part(s):** Part15 Subpart E (Section 15.407)

**Receive Date:** December 03, 2020

**Test Date:** December 03, 2020 ~ January 09, 2021

**Tested By** : ( Kevin Ker )

**Reviewed By** : ( Paddy Chen )

**Approved By** : ( Chenz Ker )

Testing Laboratory
3261

The test results relate only to the samples tested.

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 KDB 789033 D02v02r01. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

# Revision History

| Report No. | Version | Description | Issue Date | Note |
|---|---|---|---|---|
| 2012TW0008-U2 | Rev. 01 | Initial report | 2021-04-14 | Valid |
| | | | | |

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## General Information

| | |
|---|---|
| **Applicant** | TP-Link Corporation Limited |
| **Applicant Address** | Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hongkong |
| **Manufacturer** | TP-Link Corporation Limited |
| **Manufacturer Address** | Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hongkong |
| **Test Site** | MRT Technology (Taiwan) Co., Ltd |
| **Test Site Address** | No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C) |
| **MRT FCC Registration No.** | 291082 |
| **FCC Rule Part(s)** | Part 15.407 |
| **Test Device Serial No.** | N/A ☐ Production ☒ Pre-Production ☐ Engineering |

### Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.

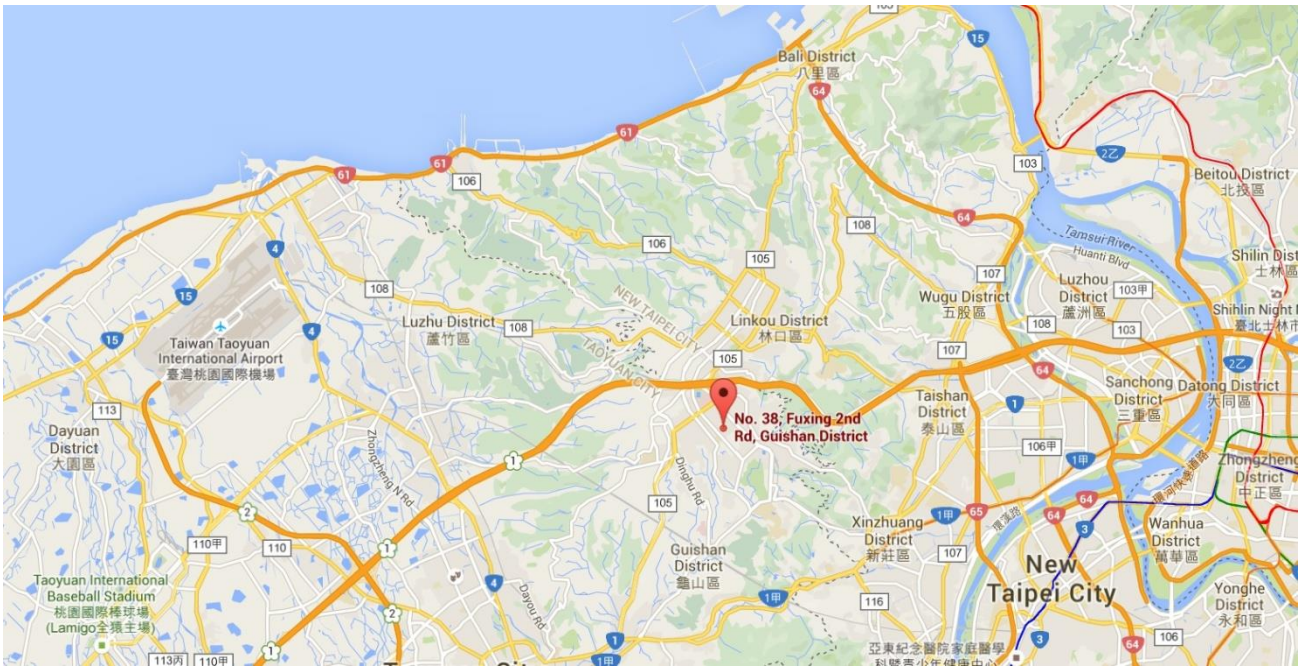
# 1. INTRODUCTION

## 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 and Certification and Engineering Bureau.

## 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



# 2. PRODUCT INFORMATION

## 2.1. Equipment Description

| | |
|---|---|
| Product Name: | AX5400 Wi-Fi 6 Router |
| Model No.: | Archer AX72 |
| Brand Name: | tp-link |
| Wi-Fi Specification: | 802.11a/b/g/n/ac/ax |
| EUTIdentificationNo.: | 20201206Sample#04 (Conducted)<br>20201206Sample#14 (Radiated) |
| Adapter | MODEL: NBS30D120250VU<br>INPUT: 100 - 240V ~ 50/60Hz 0.8A.<br>OUTPUT: DC 12.0V 2.5A |

## 2.2. Product Specification Subjective to this Report

| | |
|---|---|
| Frequency Range: | For 802.11a/n-HT20/ac-VHT20/ax-HE20:<br>5180~5240MHz, 5260~5320MHz, 5500~5720MHz, 5745~5825MHz<br>For 802.11n-HT40/ac-VHT40/ax-HE40:<br>5190~5230MHz, 5270~5310MHz, 5510~5710MHz, 5755~5795MHz<br>For 802.11ac-VHT80/ax-HE80:<br>5210MHz, 5290MHz, 5530MHz, 5610 MHz, 5690MHz, 5775MHz<br>For 802.11ac-VHT160/ax-HE160: 5250MHz, 5570MHz |
| Type of Modulation: | 802.11a/n/ac: OFDM<br>802.11ax: OFDMA |
| Data Rate: | 802.11a: 6/9/12/18/24/36/48/54Mbps<br>802.11n: up to 600Mbps<br>802.11ac: up to 3466.7Mbps<br>802.11ax: up to 4804Mbps |

Note: For other features of this EUT, test report will be issued separately.

## 2.3. Working Frequencies for this report

802.11a/n-HT20/ac-VHT20/ax-HE20

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 36 | 5180 MHz | 40 | 5200 MHz | 44 | 5220 MHz |
| 48 | 5240 MHz | 52 | 5260 MHz | 56 | 5280 MHz |
| 60 | 5300 MHz | 64 | 5320 MHz | 100 | 5500 MHz |
| 104 | 5520 MHz | 108 | 5540 MHz | 112 | 5560 MHz |
| 116 | 5580 MHz | 120 | 5600 MHz | 124 | 5620 MHz |
| 128 | 5640 MHz | 132 | 5660 MHz | 136 | 5680 MHz |
| 140 | 5700 MHz | 144 | 5720 MHz | 149 | 5745 MHz |
| 153 | 5765 MHz | 157 | 5785 MHz | 161 | 5805 MHz |
| 165 | 5825 MHz | -- | -- | -- | -- |

802.11n-HT40/ac-VHT40/ax-HE40

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 38 | 5190 MHz | 46 | 5230 MHz | 54 | 5270 MHz |
| 62 | 5310 MHz | 102 | 5510 MHz | 110 | 5550MHz |
| 118 | 5590 MHz | 126 | 5630 MHz | 134 | 5670 MHz |
| 142 | 5710 MHz | 151 | 5755 MHz | 159 | 5795 MHz |

802.11ac-VHT80/ax-HE80

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 42 | 5210 MHz | 58 | 5290 MHz | 106 | 5530 MHz |
| 122 | 5610 MHz | 138 | 5690 MHz | 155 | 5775 MHz |

802.11ac-VHT160/ax-HE160

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 50 | 5250MHz | 114 | 5570 MHz | -- | -- |

## 2.4. Description of Available Antennas

| Antenna Type | Frequency Band (MHz) | $T_X$ Paths | Max Antenna Gain (dBi) | Beamforming Directional Gain (dBi) | CDD Directional Gain (dBi) | |
|---|---|---|---|---|---|---|
| | | | | | For Power | For PSD |
| Dipole Antenna | 2412 ~ 2462 | 2 | 2.00 | 5.01 | 2.00 | 5.01 |
| | 5150 ~ 5350 | 4 | 2.50 | 8.52 | 2.50 | 8.52 |
| | 5470 ~ 5850 | 4 | 2.50 | 8.52 | 2.50 | 8.52 |

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

   If all antennas have the same gain, $G_{ANT}$, Directional gain = $G_{ANT}$ + Array Gain, where Array Gain is as follows.

   - For power spectral density (PSD) measurements on all devices,

   Array Gain = 10 log($N_{ANT}$/ $N_{SS}$) dB;

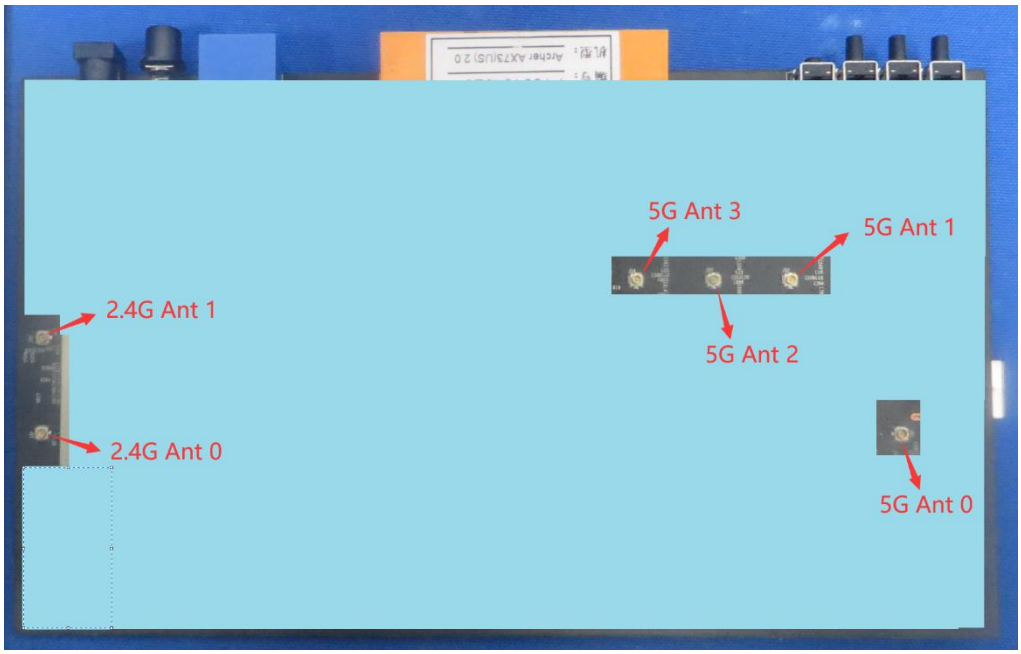
   - For power measurements on IEEE 802.11 devices,

   Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11ac/ax, not include 802.11a/b/g/n. BF Directional gain = $G_{ANT}$ + 10 log ($N_{ANT}$).
3. All messages of antenna were declared by manufacturer.

## 2.5. Description of Antenna RF Port

| Antenna RF Port | | | | | | |
|---|---|---|---|---|---|---|
| Software Control Port | 2.4G Port | | 5G Port | | | |
| | Ant 0 | Ant 1 | Ant 0 | Ant 1 | Ant 2 | Ant 3 |



## 2.6. Test Mode

| | |
|---|---|
| Test Mode | Mode 1: Transmit by 802.11a (6Mbps) (CDD mode) |
| | Mode 2: Transmit by 802.11ac-VHT20 (MCS0) (CDD mode) |
| | Mode 3: Transmit by 802.11ac-VHT40 (MCS0) (CDD mode) |
| | Mode 4: Transmit by 802.11ac-VHT80 (MCS0) (CDD mode) |
| | Mode 5: Transmit by 802.11ac-VHT160 (MCS0) (CDD mode) |
| | Mode 6: Transmit by 802.11ax-HE20 (MCS0) (CDD mode) |
| | Mode 7: Transmit by 802.11ax-HE40 (MCS0) (CDD mode) |
| | Mode 8: Transmit by 802.11ax-HE80 (MCS0) (CDD mode) |
| | Mode 9: Transmit by 802.11ax-HE160 (MCS0) (CDD mode) |
| | Mode 10: Transmit by 802.11ac-VHT20 (MCS0) (Beam-Forming mode) |
| | Mode 11: Transmit by 802.11ac-VHT40 (MCS0) (Beam-Forming mode) |
| | Mode 12: Transmit by 802.11ac-VHT80 (MCS0) (Beam-Forming mode) |
| | Mode 13: Transmit by 802.11ac-VHT160 (MCS0) (Beam-Forming mode) |
| | Mode 14: Transmit by 802.11ax-HE20 (MCS0) (Beam-Forming mode) |
| | Mode 15: Transmit by 802.11ax-HE40 (MCS0) (Beam-Forming mode) |
| | Mode 16: Transmit by 802.11ax-HE80 (MCS0) (Beam-Forming mode) |
| | Mode 17: Transmit by 802.11ax-HE160 (MCS0) (Beam-Forming mode) |

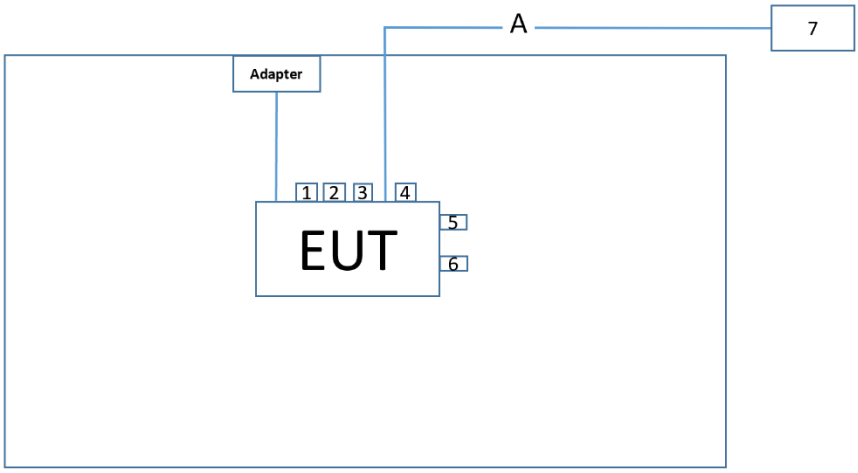
Note 1: Due to the same modulation between 802.11n and 802.11ac, so 802.11n-HT20 and HT40 are covered by 802.11ac-VHT20 and VHT40 in this report, meanwhile, power setting for 802.11n-HT20 and HT40 will not be greater than 802.11ac-VHT20 and VHT40.

Note 2: Due to CDD mode was the worst mode, so all test items were evaluated in this report. The beamforming mode only evaluated the RF output power.

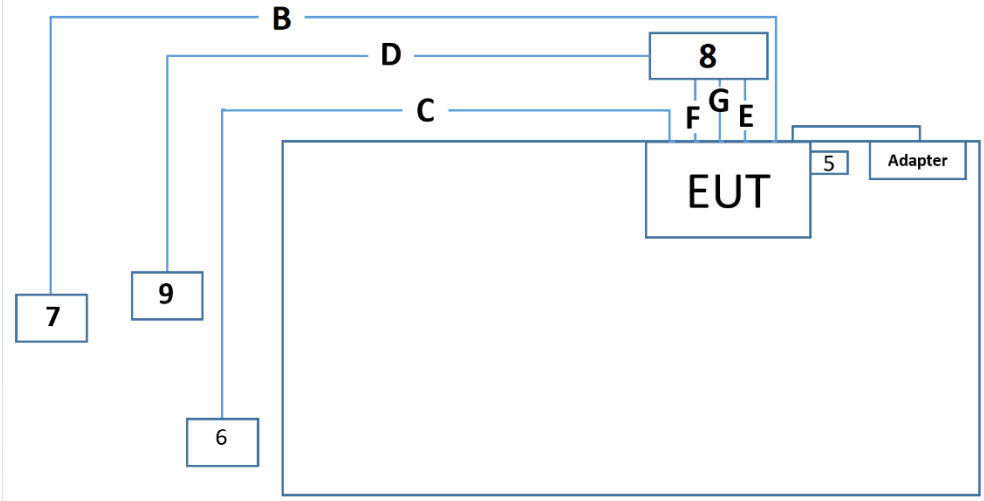
## 2.7. Configuration of Test System

The devicewas tested per the guidance ANSI C63.10: 2013was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Connection Diagram- Radiated Emission testing




Connection Diagram- AC Conducted Emissions




| Signal Cable Type | | Signal Cable Description |
|---|---|---|
| A | LAN Cable | Non shielded, > 10m |
| B | LAN Cable | Non shielded, > 10m |
| C | LAN Cable | Non shielded, > 10m |
| D | LAN Cable | Non shielded, > 10m |
| E | LAN Cable | Non shielded, 1.0m |
| F | LAN Cable | Non shielded, 1.0m |
| G | LAN Cable | Non shielded, 1.0m |

## 2.8. Test System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product | | Manufacturer | Model No. | Serial No. | Power Cord |
|---|---|---|---|---|---|
| 1~4 | Simulated load | N/A | 001 | N/A | N/A |
| 5 | USB flash disk | SanDisk | CZ48 | N/A | N/A |
| 6 | Notebook | Lenovo | E431 | PF-10ZRN 13/12 | Non-Shielded, 1.8m |
| 7 | Station Device | tp-link | Archer AX6000 | N/A | N/A |
| 8 | Switch | tp-link | TL-SG5428 | N/A | N/A |
| 9 | Notebook | Lenovo | E431 | PF-10ZRN 13/12 | Non-Shielded, 1.8m |

## 2.9. Description of Test Software

The test utility software used during testing was “QSPR”, the version is ver5.0-00196.

Note: Final power setting please refer to operational description.

## 2.10. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 789033 D02v02r01,
- KDB 662911 D01v02r01
- ANSI C63.10-2013

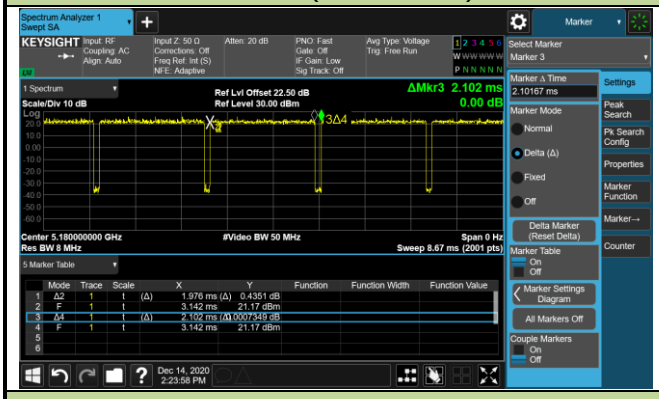
## 2.11. Duty Cycle

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. 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:

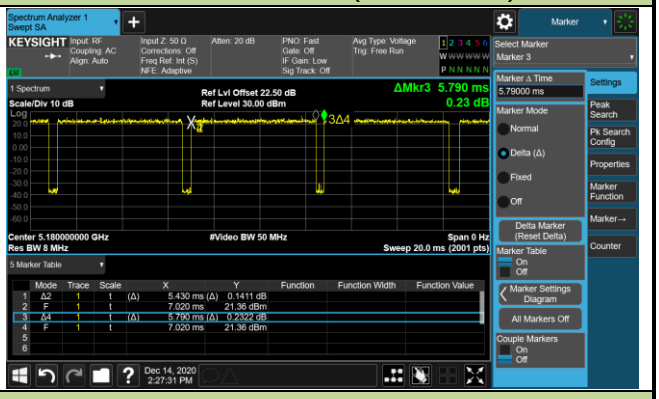
| Test Mode | Duty Cycle |
|---|---|
| 802.11a | 94.00% |
| 802.11ac-VHT20 | 93.78% |
| 802.11ac-VHT40 | 88.73% |
| 802.11ac-VHT80 | 95.91% |
| 802.11ac-VHT160 | 91.43% |
| 802.11ax-HE20 | 92.89% |
| 802.11ax-HE40 | 92.89% |
| 802.11ax-HE80 | 92.83% |
| 802.11ax-HE160 | 93.61% |

Duty Cycle (T = Transmission Duration)

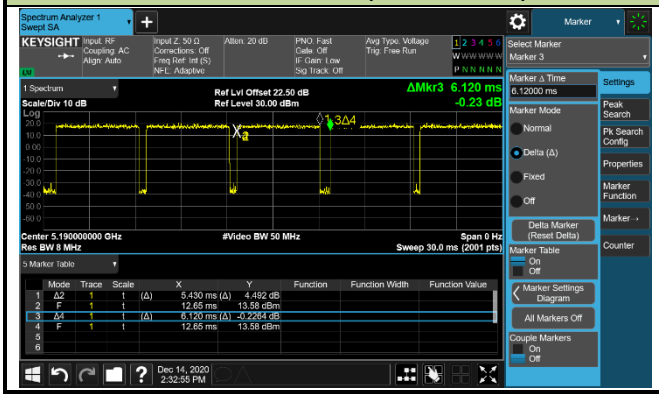
802.11a (T=1.976ms)



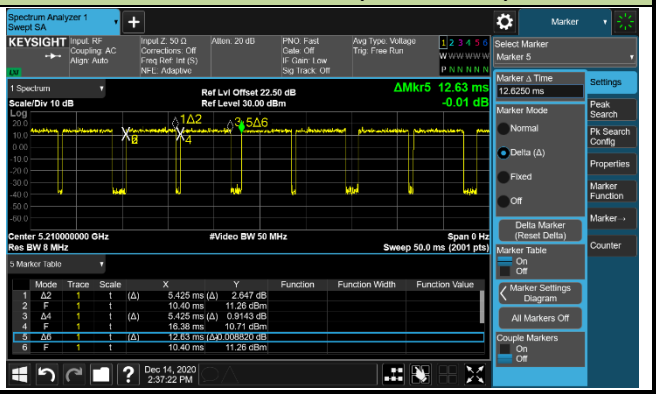

802.11ac-VHT20(T=5.430ms)

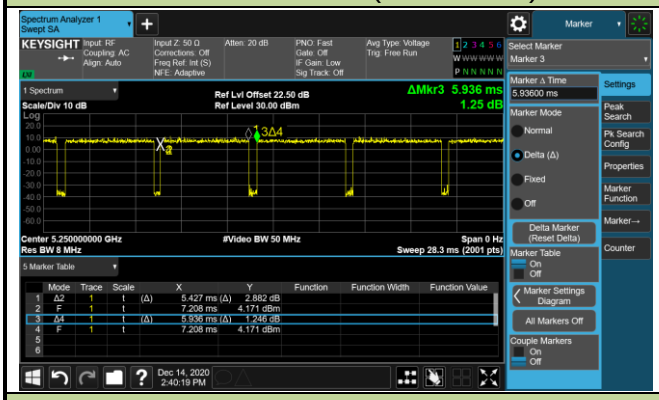
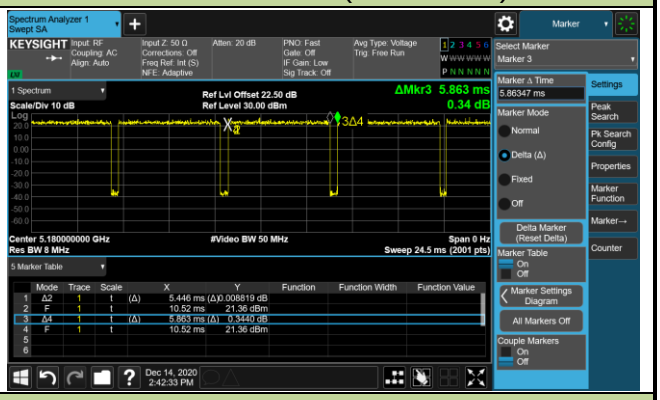
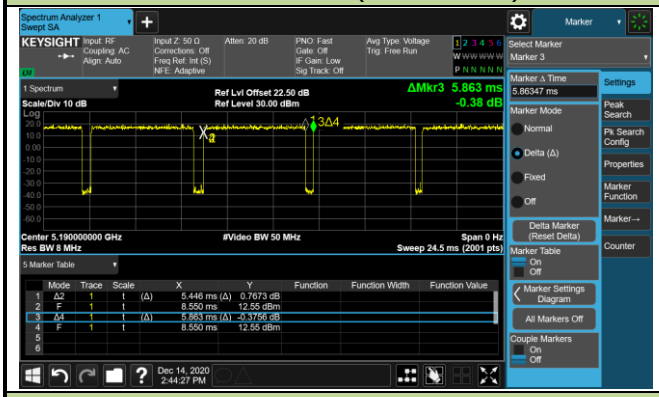
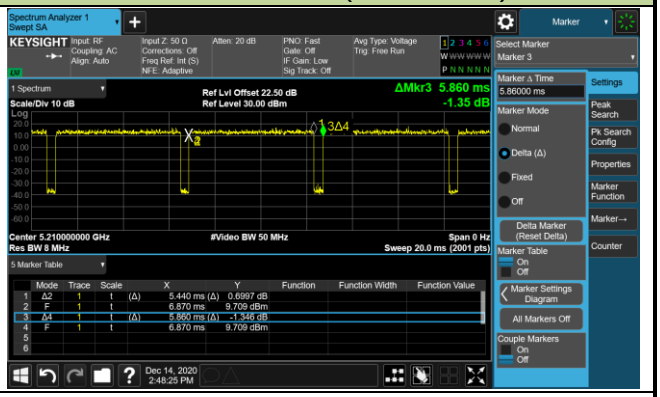
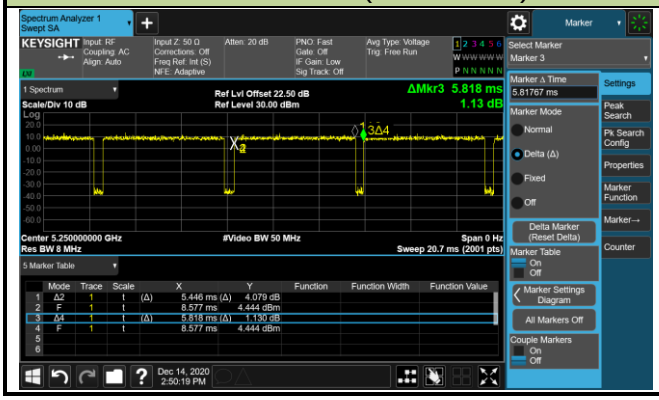



802.11ac-VHT40(T=5.430ms)




802.11ac-VHT80(T=10.849s)



| Duty Cycle (T = Transmission Duration) | |
|---|---|
| 802.11ac-VHT160(T=5.427ms) | 802.11ax-HE20(T=5.446ms) |
|  |  |
| 802.11ax-HE40(T=5.446ms) | 802.11ax-HE80(T=5.440ms) |
|  |  |
| 802.11ax-HE160(T=5.446ms) | |
|  | |

## 2.12. Test Configuration

The devicewas tested per the guidance of KDB 789033 D02v02r01.ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testingand AC line conducted testing.

## 2.13. EMI Suppression Device(s)/Modifications

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

## 2.14. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphletsupplied to the user and be readily visible to the purchaser at the time of purchase. However, when the deviceis so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label andlabel location.

# 3. DESCRIPTION OF TEST

## 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard ofProcedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 789033 D02v02r01 were used in themeasurement.

## 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an8'x4'x4' shielded enclosure. A 1m x 2m 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/50uH 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. 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. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are 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.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

## 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. For measurements above 1GHz 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 below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remotecontrolled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An80cm high PVC support structure is placed on top of the turntable.

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(b)(1) 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 for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated tomaximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, 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. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

# 4. 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 theresponsible party can be used with the device. The use of a permanently attached antenna or of an antennathat uses a unique coupling to the intentional radiator shall be considered sufficient to comply with theprovisions of this section."

- The antenna of thedeviceis**permanently attached.**
- There are no provisions for connection to an external antenna.

**Conclusion:**

The unit complies with the requirement of §15.203.

# 5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Two-Line V-Network | R&S | ENV216 | MRTTWA00019 | 1 year | 2021/03/26 |
| Two-Line V-Network | R&S | ENV216 | MRTTWA00020 | 1 year | 2021/04/24 |
| EMI Test Receiver | R&S | ESR3 | MRTTWA00045 | 1 year | 2021/05/26 |
| Temperature/Humidity Meter | TFA | 35.1078.10.IT | MRTTWA00033 | 1 year | 2021/05/28 |

Radiated Emissions

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Broadband TRILOG Antenna | SCHWARZBECK | VULB 9162 | MRTTWA00001 | 1 year | 2021/10/5 |
| Acitve Loop Antenna | SCHWARZBECK | FMZB 1519B | MRTTWA00002 | 1 year | 2021/04/27 |
| Broadband Hornantenna | SCHWARZBECK | BBHA 9120D | MRTTWA00003 | 1 year | 2021/04/24 |
| BreitbandHornantenna | SCHWARZBECK | BBHA 9170 | MRTTWA00004 | 1 year | 2021/04/24 |
| Broadband Preamplifier | SCHWARZBECK | BBV 9718 | MRTTWA00005 | 1 year | 2021/04/24 |
| Broadband Amplifier | SCHWARZBECK | BBV 9721 | MRTTWA00006 | 1 year | 2021/04/24 |
| Signal Analyzer | R&S | FSV40 | MRTTWA00007 | 1 year | 2021/03/24 |
| EMI Test Receiver | R&S | ESR3 | MRTTWA00009 | 1 year | 2021/03/25 |
| EXA Signal Analyzer | KEYSIGHT | N9010A | MRTTWA00012 | 1 year | 2020/11/02 |
| EXA Signal Analyzer | KEYSIGHT | N9010B | MRTTWA00074 | 1 year | 2021/07/14 |
| Antenna Cable | HUBERSUHNER | SF106 | MRTTWE00010 | 1 year | 2021/06/16 |
| Temperature/Humidity Meter | TFA | 35.1078.10.IT | MRTTWA00032 | 1 year | 2021/05/29 |

Conducted Test Equipment

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| X-Series USB Peak and Average Power Sensor | KEYSIGHT | U2021XA | MRTTWA00014 | 1 year | 2021/04/24 |
| EXA Signal Analyzer | KEYSIGHT | N9010A | MRTTWA00012 | 1 year | 2020/11/02 |
| EXA Signal Analyzer | KEYSIGHT | N9010B | MRTTWA00074 | 1 year | 2021/07/14 |
| Attenuator | WTI | 218FS-20 | MRTTWE00026 | 1 year | 2021/05/30 |
| Attenuator | WTI | 218FS-10 | MRTTWE00027 | 1 year | 2021/05/30 |
| Temperature & Humidity Chamber | TEN BILLION | TTH-B3UP | MRTTWA00036 | 1 year | 2021/06/09 |
| Temperature/Humidity Meter | TFA | 35.1078.10.IT | MRTTWA00033 | 1 year | 2021/05/28 |

| **Software** | **Version** | **Function** |
|---|---|---|
| e3 | 9.160520a | EMI Test Software |

# 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

| |
|---|
| AC Conducted Emission Measurement |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>150kHz~30MHz: 2.53dB |
| Radiated Emission Measurement |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>9kHz ~ 1GHz: 4.25dB<br>1GHz ~ 40GHz: 4.45dB |
| Conducted Power (Carrier Power / Power Density) |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.84dB |
| Conducted Spurious Emission |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):± 2.65 dB |
| Occupied Bandwidth |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 3.3% |
| Temp. / Humidity |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.82°C/ ±3% |
| Frequency Error |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±78.4Hz |

# 7. TEST RESULT

## 7.1. Summary

| FCC Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| 15.407(a) | 26dB Bandwidth | N/A | Conducted | Pass | Section7.2 |
| 15.407(e) | 6dB Bandwidth | ≥ 500kHz | | Pass | Section 7.3 |
| 15.407(a)(1)(ii), (2), (3) | Maximum Conducted Output Power | Refer to section 7.4 | | Pass | Section 7.4 |
| 15.407(h)(1) | Transmit Power Control | ≤ 24 dBm | | Pass | Section 7.5 |
| 15.407(a)(1)(ii), (2), (3), (12) | Peak Power Spectral Density | Refer to section 7.6 | | Pass | Section 7.6 |
| 15.407(g) | Frequency Stability | ± 20 ppm | | Pass | Section 7.7 |
| 15.407(b)(1), (2), (3), (4)(i) | Undesirable Emissions | Refer to Section 7.8 | Radiated | Pass | Section 7.8& 7.9 |
| 15.205, 15.209 15.407(b)(7), (8), (9) | General Field Strength Limits(Restricted Bands andRadiated Emission Limits) | Emissions in restrictedbands must meet theradiated limits detailed in15.209 | | Pass | |
| 15.207 | AC Conducted Emissions 150kHz - 30MHz | < FCC 15.207 limits | Line Conducted | Pass | Section 7.10 |

Notes:

1) 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 ofthe system to connect the EUT to the analyzer at all frequencies of interest.
2) Output power test was verified over all data rates of each mode (data refers to operational description), and then choose the maximum power output (low data rate) for final test of each channel.
3) For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
4) EUT supports one configuration only in 802.11ax full RU mode, i.e. 242 tone in 11ax-HE20, 484 tone in 11ax-HE40, 996 tone in 11ax-HE80 and 2 x 996 tone in 11ax-HE160.

## 7.2. 26dB Bandwidth Measurement

### 7.2.1.Test Limit

N/A

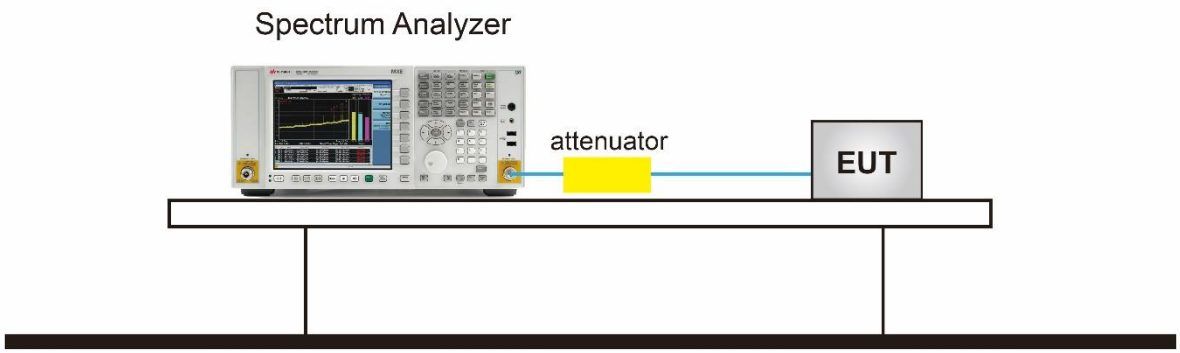
### 7.2.2.Test Procedure used

KDB 789033 D02v02r01- Section C.1

### 7.2.3.Test Setting

1. The 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 intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3×RBW.
4. Detector = Peak.
5. Trace mode = max hold.

### 7.2.4.Test Setup



### 7.2.5.Test Result

| Product | AX5400 Wi-Fi 6 Router | Test Engineer | Eric Lin |
|---|---|---|---|
| Test Site | SR1 | Test Date | 2020/12/17 |

| Test Mode | Data Rate/ MCS | Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | 99% Bandwidth (MHz) |
|---|---|---|---|---|---|
| Ant 3 | | | | | |
| 802.11a | 6Mbps | 36 | 5180 | 19.67 | 16.50 |
| 802.11a | 6Mbps | 44 | 5220 | 19.90 | 16.52 |
| 802.11a | 6Mbps | 48 | 5240 | 19.67 | 16.53 |
| 802.11a | 6Mbps | 52 | 5260 | 19.66 | 16.53 |
| 802.11a | 6Mbps | 60 | 5300 | 19.71 | 16.54 |
| 802.11a | 6Mbps | 64 | 5320 | 19.73 | 16.51 |
| 802.11a | 6Mbps | 100 | 5500 | 19.62 | 16.51 |
| 802.11a | 6Mbps | 116 | 5580 | 19.67 | 16.53 |
| 802.11a | 6Mbps | 140 | 5700 | 19.45 | 16.53 |
| 802.11a | 6Mbps | 144 | 5720 | 19.65 | 16.53 |
| 802.11a | 6Mbps | 149 | 5745 | 20.80 | 16.59 |
| 802.11a | 6Mbps | 157 | 5785 | 20.70 | 16.57 |
| 802.11a | 6Mbps | 165 | 5825 | 20.44 | 16.57 |
| 802.11ac-VHT20 | MCS0 | 36 | 5180 | 20.95 | 17.76 |
| 802.11ac-VHT20 | MCS0 | 44 | 5220 | 21.19 | 17.75 |
| 802.11ac-VHT20 | MCS0 | 48 | 5240 | 20.89 | 17.76 |
| 802.11ac-VHT20 | MCS0 | 52 | 5260 | 21.09 | 17.76 |
| 802.11ac-VHT20 | MCS0 | 60 | 5300 | 21.11 | 17.79 |
| 802.11ac-VHT20 | MCS0 | 64 | 5320 | 20.93 | 17.80 |
| 802.11ac-VHT20 | MCS0 | 100 | 5500 | 20.96 | 17.77 |
| 802.11ac-VHT20 | MCS0 | 116 | 5580 | 21.07 | 17.78 |
| 802.11ac-VHT20 | MCS0 | 140 | 5700 | 21.31 | 17.74 |
| 802.11ac-VHT20 | MCS0 | 144 | 5720 | 21.08 | 17.77 |
| 802.11ac-VHT20 | MCS0 | 149 | 5745 | 21.56 | 17.80 |
| 802.11ac-VHT20 | MCS0 | 157 | 5785 | 21.22 | 17.80 |
| 802.11ac-VHT20 | MCS0 | 165 | 5825 | 20.79 | 17.78 |

| Test Mode | Data Rate/ MCS | Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | 99% Bandwidth (MHz) |
|---|---|---|---|---|---|
| Ant 3 | | | | | |
| 802.11ac-VHT40 | MCS0 | 38 | 5190 | 39.15 | 35.91 |
| 802.11ac-VHT40 | MCS0 | 46 | 5230 | 39.18 | 35.94 |
| 802.11ac-VHT40 | MCS0 | 54 | 5270 | 39.26 | 35.90 |
| 802.11ac-VHT40 | MCS0 | 62 | 5310 | 39.06 | 35.92 |
| 802.11ac-VHT40 | MCS0 | 102 | 5510 | 39.01 | 35.99 |
| 802.11ac-VHT40 | MCS0 | 110 | 5550 | 39.07 | 36.02 |
| 802.11ac-VHT40 | MCS0 | 134 | 5670 | 39.35 | 35.95 |
| 802.11ac-VHT40 | MCS0 | 142 | 5710 | 39.05 | 35.94 |
| 802.11ac-VHT40 | MCS0 | 151 | 5755 | 39.59 | 35.98 |
| 802.11ac-VHT40 | MCS0 | 159 | 5795 | 39.42 | 35.96 |
| 802.11ac-VHT80 | MCS0 | 42 | 5210 | 80.37 | 75.33 |
| 802.11ac-VHT80 | MCS0 | 58 | 5290 | 81.05 | 75.24 |
| 802.11ac-VHT80 | MCS0 | 106 | 5530 | 81.32 | 75.39 |
| 802.11ac-VHT80 | MCS0 | 122 | 5610 | 81.05 | 75.37 |
| 802.11ac-VHT80 | MCS0 | 138 | 5690 | 81.00 | 75.33 |
| 802.11ac-VHT80 | MCS0 | 155 | 5775 | 81.16 | 75.33 |
| 802.11ac-VHT160 | MCS0 | 50 | 5250 | 163.0 | 153.30 |
| 802.11ac-VHT160 | MCS0 | 114 | 5570 | 164.5 | 153.18 |
| 802.11ax-HE20 | MCS0 | 36 | 5180 | 21.50 | 19.10 |
| 802.11ax-HE20 | MCS0 | 44 | 5220 | 21.11 | 19.10 |
| 802.11ax-HE20 | MCS0 | 48 | 5240 | 21.46 | 19.07 |
| 802.11ax-HE20 | MCS0 | 52 | 5260 | 21.66 | 19.09 |
| 802.11ax-HE20 | MCS0 | 60 | 5300 | 21.30 | 19.06 |
| 802.11ax-HE20 | MCS0 | 64 | 5320 | 21.32 | 19.07 |
| 802.11ax-HE20 | MCS0 | 100 | 5500 | 21.55 | 19.14 |
| 802.11ax-HE20 | MCS0 | 116 | 5580 | 21.52 | 19.09 |
| 802.11ax-HE20 | MCS0 | 140 | 5700 | 21.44 | 19.11 |
| 802.11ax-HE20 | MCS0 | 144 | 5720 | 21.26 | 19.08 |
| 802.11ax-HE20 | MCS0 | 149 | 5745 | 21.24 | 19.09 |
| 802.11ax-HE20 | MCS0 | 157 | 5785 | 21.38 | 19.07 |
| 802.11ax-HE20 | MCS0 | 165 | 5825 | 21.45 | 19.14 |

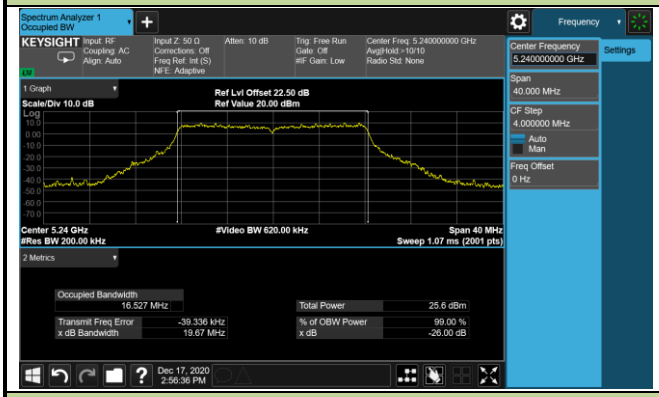
| Test Mode | Data Rate/ MCS | Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | 99% Bandwidth (MHz) |
|---|---|---|---|---|---|
| Ant 3 | | | | | |
| 802.11ax-HE40 | MCS0 | 38 | 5190 | 40.15 | 37.55 |
| 802.11ax-HE40 | MCS0 | 46 | 5230 | 40.01 | 37.64 |
| 802.11ax-HE40 | MCS0 | 54 | 5270 | 40.24 | 37.64 |
| 802.11ax-HE40 | MCS0 | 62 | 5310 | 40.12 | 37.65 |
| 802.11ax-HE40 | MCS0 | 102 | 5510 | 40.12 | 37.64 |
| 802.11ax-HE40 | MCS0 | 110 | 5550 | 40.14 | 37.71 |
| 802.11ax-HE40 | MCS0 | 134 | 5670 | 40.07 | 37.64 |
| 802.11ax-HE40 | MCS0 | 142 | 5710 | 40.19 | 37.59 |
| 802.11ax-HE40 | MCS0 | 151 | 5755 | 40.64 | 37.73 |
| 802.11ax-HE40 | MCS0 | 159 | 5795 | 40.33 | 37.66 |
| 802.11ax-HE80 | MCS0 | 42 | 5210 | 81.74 | 77.02 |
| 802.11ax-HE80 | MCS0 | 58 | 5290 | 81.21 | 77.08 |
| 802.11ax-HE80 | MCS0 | 106 | 5530 | 81.93 | 77.29 |
| 802.11ax-HE80 | MCS0 | 122 | 5610 | 81.69 | 77.12 |
| 802.11ax-HE80 | MCS0 | 138 | 5690 | 81.56 | 77.16 |
| 802.11ax-HE80 | MCS0 | 155 | 5775 | 81.37 | 77.04 |
| 802.11ax-HE160 | MCS0 | 50 | 5250 | 163.80 | 154.49 |
| 802.11ax-HE160 | MCS0 | 114 | 5570 | 163.20 | 154.47 |

## 802.11a 26dB Bandwidth & 99% Bandwidth

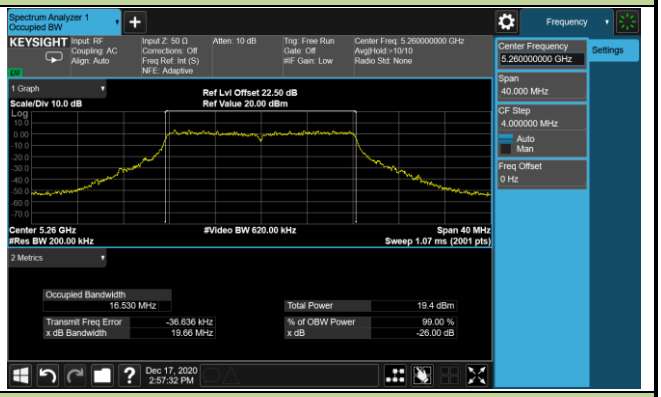
### Channel 36 (5180MHz)

### Channel 44 (5220MHz)

### Channel 48 (5240MHz)



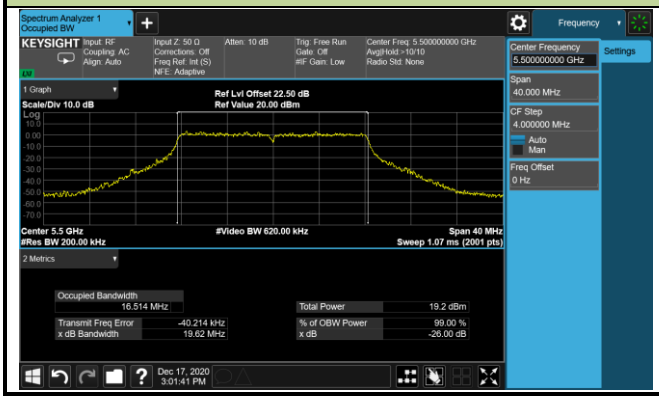

### Channel 52 (5260MHz)




### Channel 60 (5300MHz)

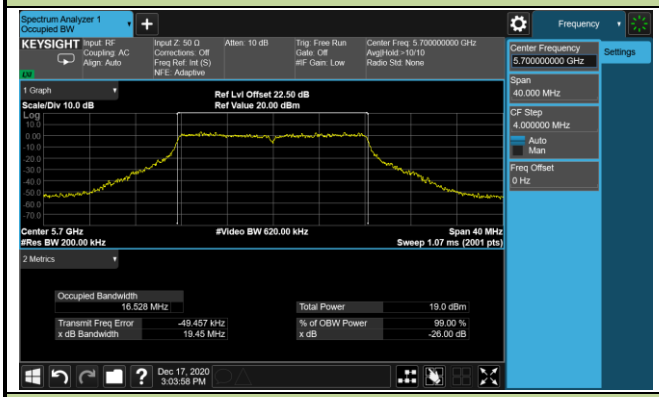
### Channel 64 (5320MHz)

### Channel 100 (5500MHz)

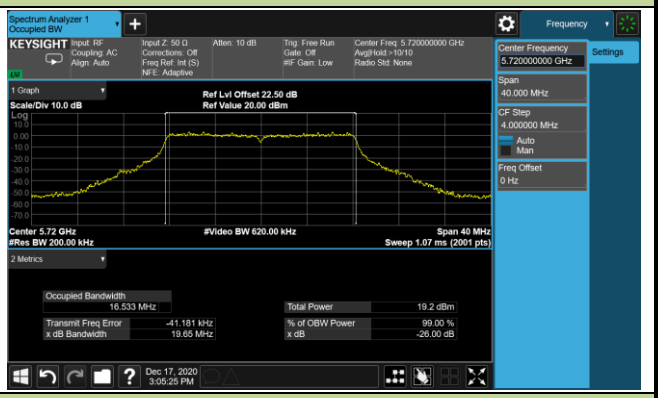



### Channel 116 (5580MHz)

Channel 140 (5700MHz)

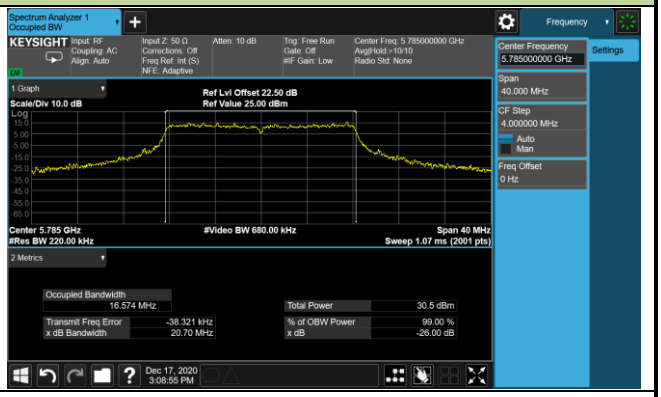



Channel 144 (5720MHz)




Channel 149 (5745MHz)

Channel 157 (5785MHz)




Channel 165 (5825MHz)

## 802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth

### Channel 36 (5180MHz)

### Channel 44 (5220MHz)

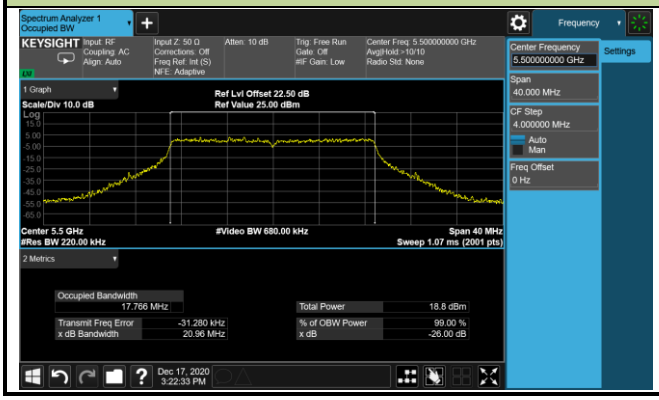
### Channel 48 (5240MHz)

### Channel 52 (5260MHz)

### Channel 60 (5300MHz)

### Channel 64 (5320MHz)

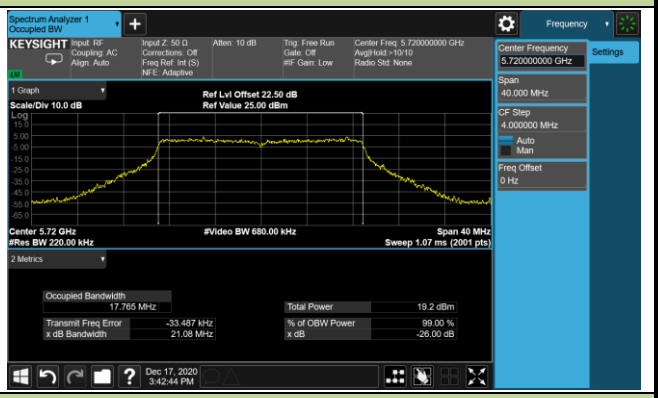
### Channel 100 (5500MHz)




### Channel 116 (5580MHz)

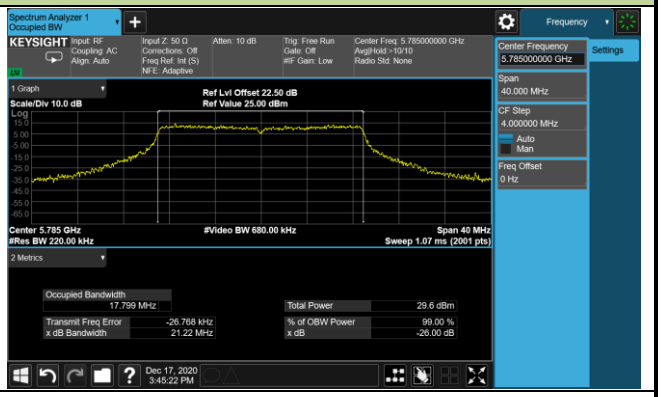
Channel 140 (5700MHz)

Channel 144 (5720MHz)




Channel 149 (5745MHz)

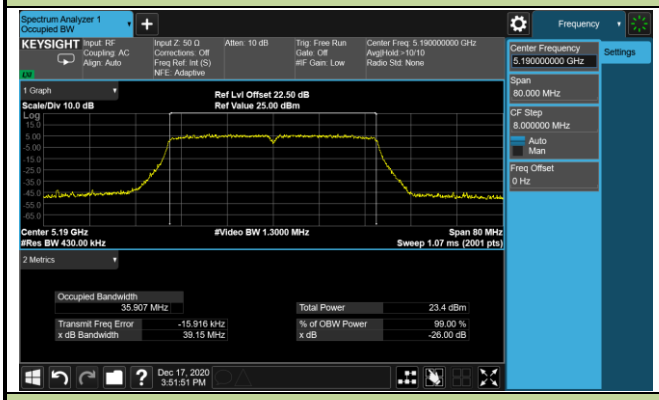
Channel 157 (5785MHz)




Channel 165 (5825MHz)

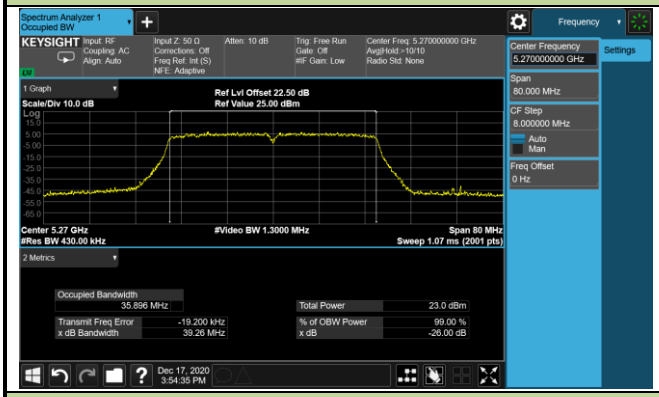
## 802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth

### Channel 38 (5190MHz)

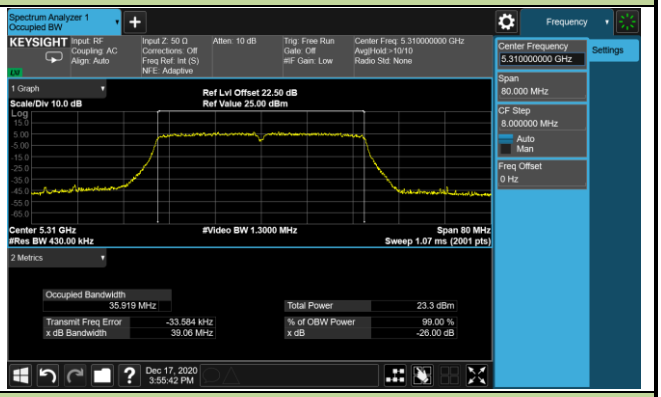



### Channel 46 (5230MHz)

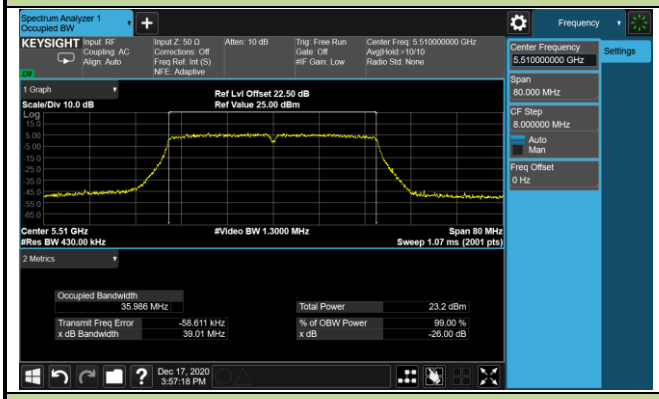
### Channel 54 (5270MHz)



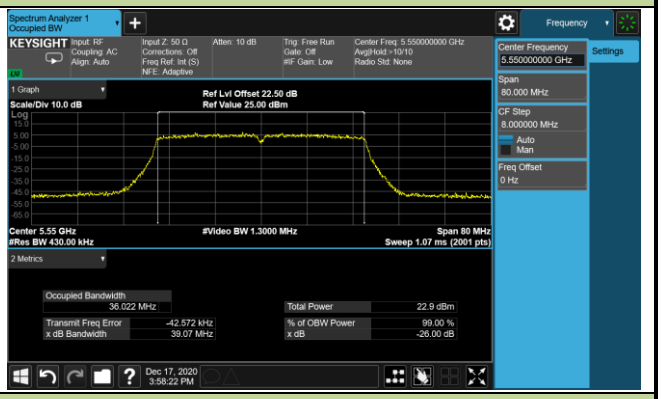

### Channel 62 (5310MHz)



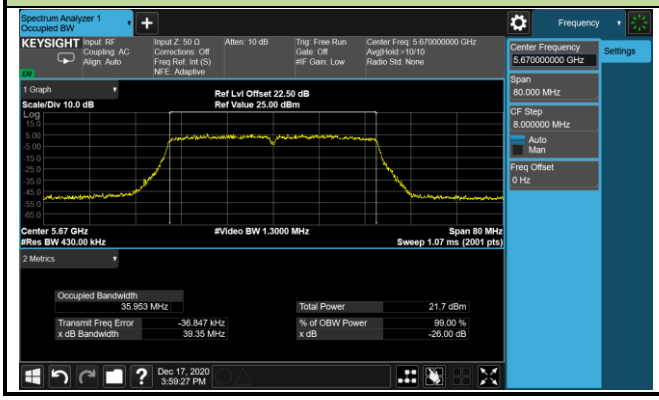

### Channel 102 (5510MHz)



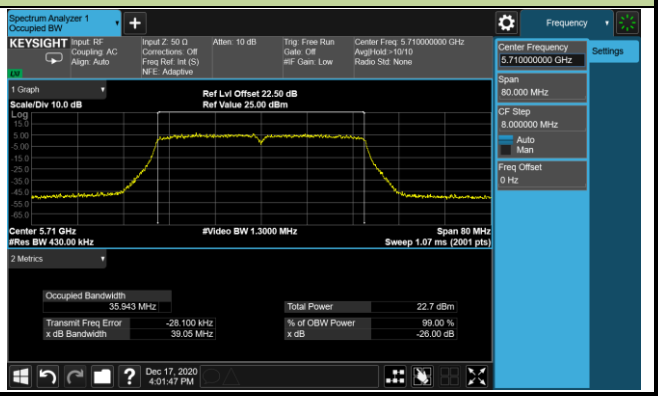

### Channel 110 (5550MHz)




### Channel 134 (5670MHz)



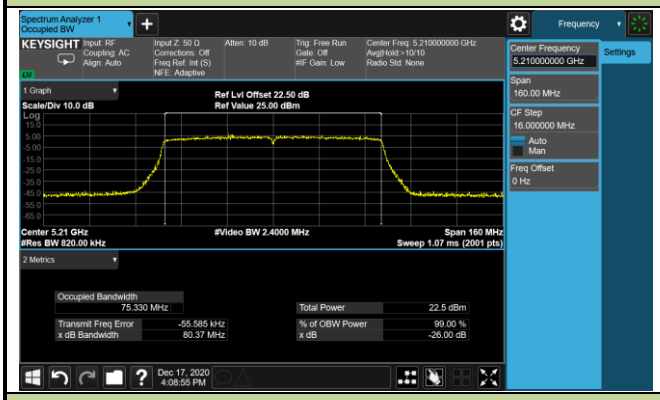

### Channel 142 (5710MHz)



| Channel 151 (5755MHz) | Channel 159 (5795MHz) |
|---|---|
| | |

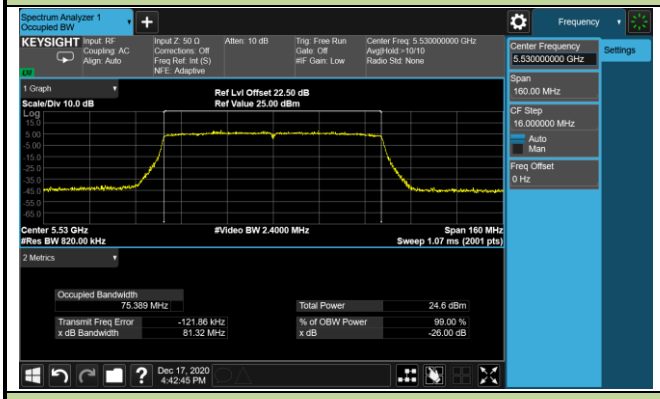
## 802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth

### Channel 42 (5210MHz)



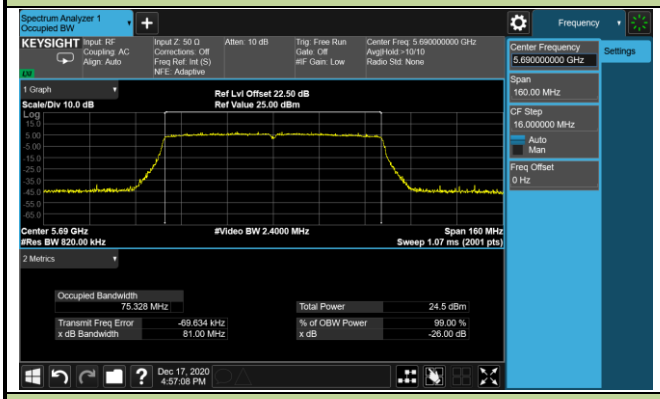

### Channel 58 (5290MHz)

### Channel 106 (5530MHz)




### Channel 122 (5610MHz)

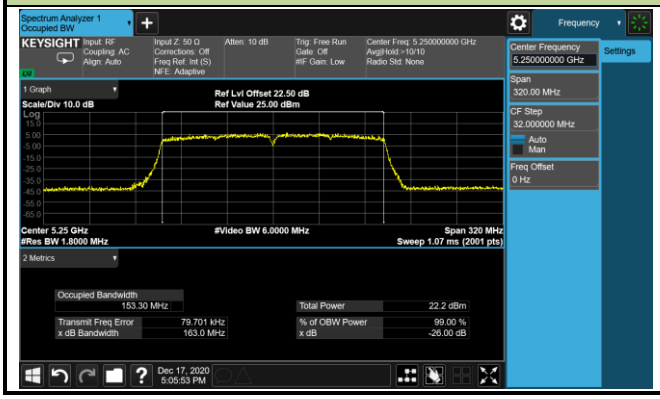
### Channel 138 (5690MHz)



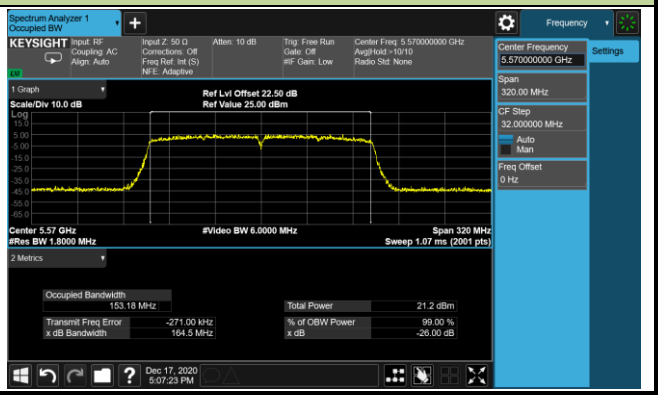

### Channel 155 (5775MHz)

## 802.11ac-VHT160 26dB Bandwidth & 99% Bandwidth

### Channel 50 (5250MHz)

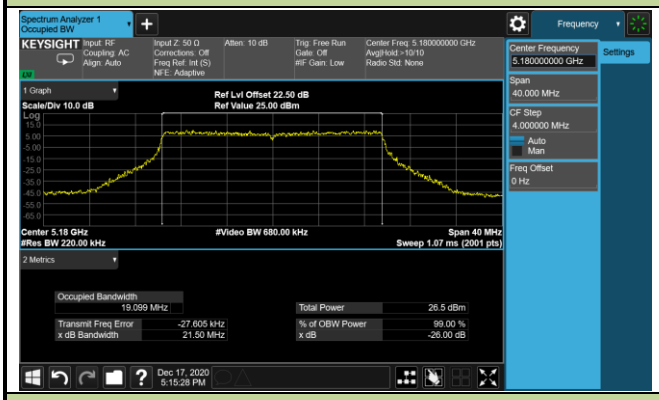



### Channel 114 (5570MHz)



## 802.11ax-HE20 26dB Bandwidth & 99% Bandwidth

### Channel 36 (5180MHz)




### Channel 44 (5220MHz)

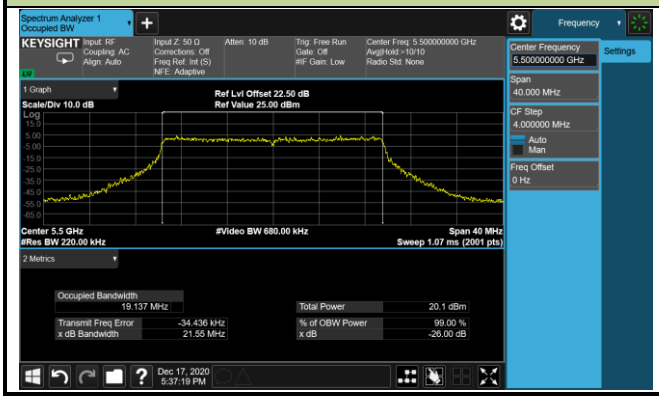
### Channel 48 (5240MHz)

### Channel 52 (5260MHz)

### Channel 60 (5300MHz)

### Channel 64 (5320MHz)

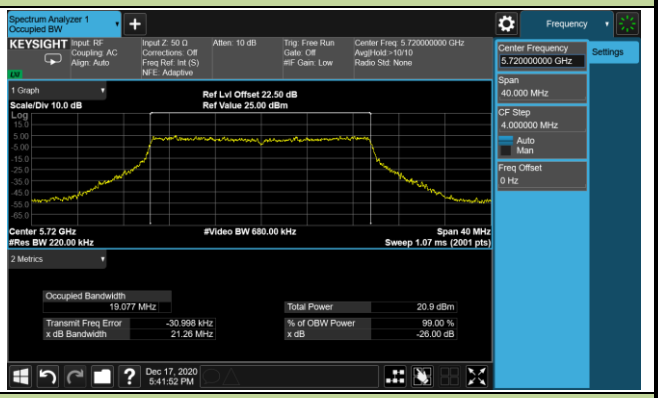
### Channel 100 (5500MHz)




### Channel 116 (5580MHz)

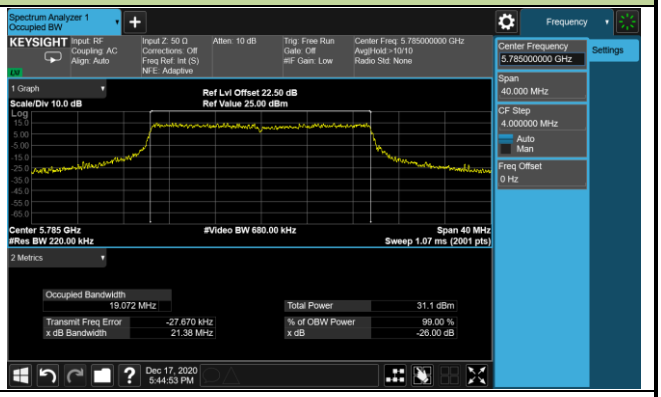
Channel 140 (5700MHz)

Channel 144 (5720MHz)




Channel 149 (5745MHz)

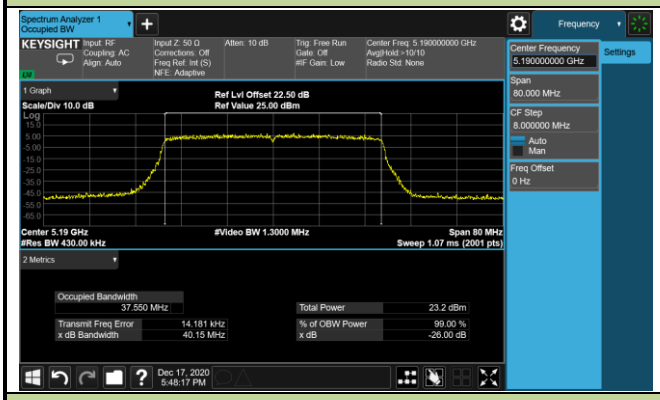
Channel 144 (5785MHz)




Channel 144 (5825MHz)

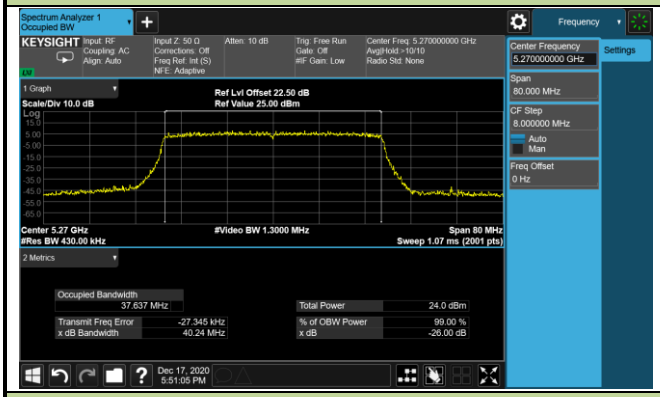
## 802.11ax-HE40 26dB Bandwidth & 99% Bandwidth

### Channel 38 (5190MHz)

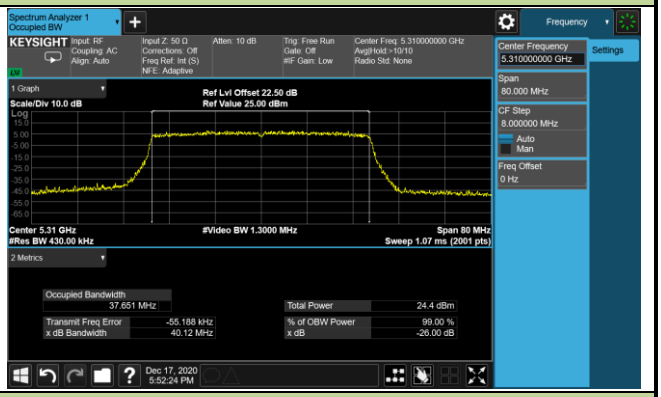



### Channel 46 (5230MHz)

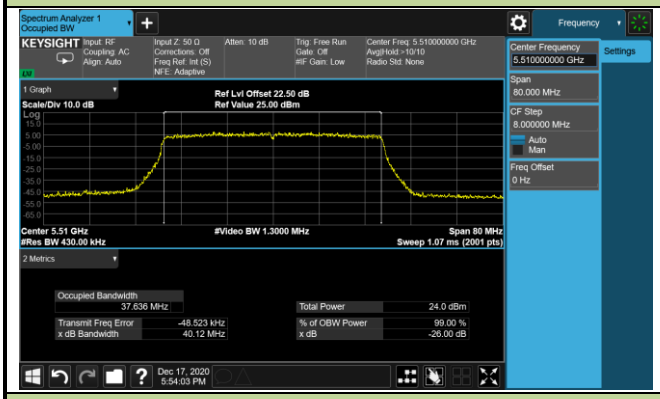
### Channel 54 (5270MHz)




### Channel 62 (5310MHz)

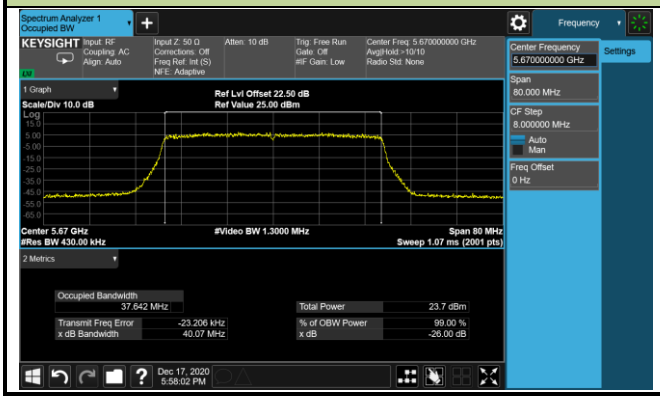



### Channel 102 (5510MHz)

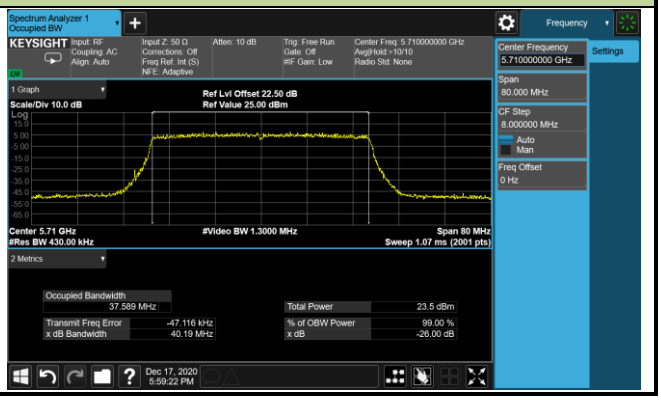


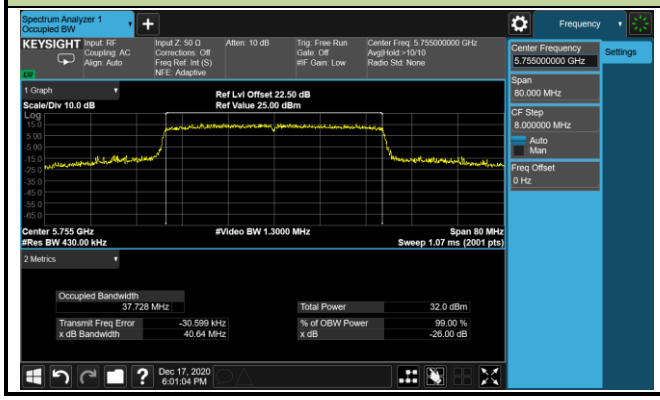
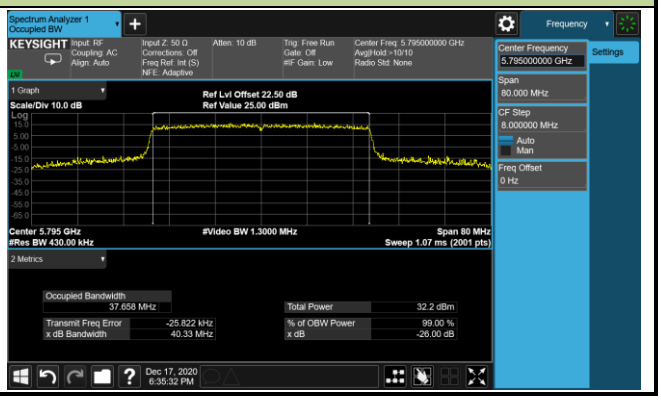

### Channel 110 (5550MHz)

### Channel 134 (5670MHz)




### Channel 142 (5710MHz)



| Channel 151 (5755MHz) | Channel 159 (5795MHz) |
|---|---|
|  |  |