



# MEASUREMENT REPORT

## FCC PART 15.407 / RSS-247 WLAN 802.11a/n/ac

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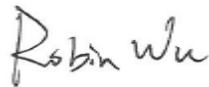
**FCC ID:** H8N-ASK8822  
**IC:** 1353A-ASK8822  
**Applicant:** Askey Computer Corp.  
**Application Type:** Certification  
**Product:** WIFI+BT Combo Module  
**Model No.:** ASK8822  
**Brand Name:** ASKEY  
**FCC Classification:** Unlicensed National Information Infrastructure (NII)  
**FCC Rule Part(s):** Part15 Subpart E (Section 15.407)  
**ISED Rule (s):** RSS-247 Issue 2, RSS-GEN Issue 5  
**Test Procedure(s):** ANSI C63.10-2013, KDB 789033 D02v02r01  
KDB 662911 D01v02r01  
**Test Date:** June 17 ~ August 24, 2020

Reviewed By:



( Kevin Guo )

Approved By:



( Robin Wu )



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 (Suzhou) Co., Ltd.

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### Revision History

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 2006RSU028-U4 | Rev. 01 | Initial Report | 08-31-2020 | Valid |
|               |         |                |            |       |

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## CONTENTS

| Description   | Page      |
|---|-----------|
| <b>1. INTRODUCTION .....</b>                              | <b>7</b>  |
| 1.1. Scope .....  | 7         |
| 1.2. MRT Test Location .....                              | 7         |
| <b>2. PRODUCT INFORMATION .....</b>                       | <b>8</b>  |
| 2.1. Equipment Description.....                           | 8         |
| 2.2. Product Specification Subjective to this Report..... | 8         |
| 2.3. Working Frequencies for this report.....             | 9         |
| 2.4. Description of Available Antennas.....               | 10        |
| 2.5. Description of Antenna .....                         | 10        |
| 2.6. Test Mode .....                                      | 11        |
| 2.7. Configuration of Test System.....                    | 11        |
| 2.8. Test System Details.....                             | 11        |
| 2.9. Description of Test Software.....                    | 12        |
| 2.10. Test Environment Condition .....                    | 12        |
| 2.11. Duty Cycle .....                                    | 12        |
| 2.12. EMI Suppression Device(s)/Modifications.....        | 13        |
| 2.13. Labeling Requirements.....                          | 13        |
| <b>3. ANTENNA REQUIREMENTS.....</b>                       | <b>14</b> |
| <b>4. TEST EQUIPMENT CALIBRATION DATE.....</b>            | <b>15</b> |
| <b>5. MEASUREMENT UNCERTAINTY.....</b>                    | <b>17</b> |
| <b>6. TEST RESULT .....</b>                               | <b>18</b> |
| 6.1. Summary.....   | 18        |
| 6.2. Occupied Bandwidth Measurement .....                 | 19        |
| 6.2.1. Test Limit .....                                   | 19        |
| 6.2.2. Test Procedure used.....                           | 19        |
| 6.2.3. Test Setting.....                                  | 19        |
| 6.2.4. Test Setup .....                                   | 20        |
| 6.2.5. Test Result.....                                   | 21        |
| 6.3. 6dB Bandwidth Measurement.....                       | 35        |
| 6.3.1. Test Limit .....                                   | 35        |
| 6.3.2. Test Procedure used.....                           | 35        |
| 6.3.3. Test Setting.....                                  | 35        |
| 6.3.4. Test Setup .....                                   | 35        |
| 6.3.5. Test Result.....                                   | 36        |

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|         |   |     |
|---------|---|-----|
| 6.4.    | Output Power Measurement .....                  | 40  |
| 6.4.1.  | Test Limit .....                                | 40  |
| 6.4.2.  | Test Procedure Used .....                       | 41  |
| 6.4.3.  | Test Setting.....                               | 41  |
| 6.4.4.  | Test Setup .....                                | 41  |
| 6.4.5.  | Test Result.....                                | 42  |
| 6.5.    | Transmit Power Control .....                    | 47  |
| 6.5.1.  | Test Limit .....                                | 47  |
| 6.5.2.  | Test Procedure Used .....                       | 47  |
| 6.5.3.  | Test Setting.....                               | 47  |
| 6.5.4.  | Test Setup .....                                | 47  |
| 6.5.5.  | Test Result.....                                | 47  |
| 6.6.    | Power Spectral Density Measurement.....         | 48  |
| 6.6.1.  | Test Limit .....                                | 48  |
| 6.6.2.  | Test Procedure Used .....                       | 48  |
| 6.6.3.  | Test Setting.....                               | 48  |
| 6.6.4.  | Test Setup .....                                | 49  |
| 6.6.5.  | Test Result.....                                | 50  |
| 6.7.    | Frequency Stability Measurement.....            | 83  |
| 6.7.1.  | Test Limit .....                                | 83  |
| 6.7.2.  | Test Procedure Used .....                       | 83  |
| 6.7.3.  | Test Setup .....                                | 83  |
| 6.7.4.  | Test Result.....                                | 84  |
| 6.8.    | Unwanted Emission Measurement .....             | 85  |
| 6.8.1.  | Test Limit .....                                | 85  |
| 6.8.2.  | Test Procedure Used .....                       | 85  |
| 6.8.3.  | Test Setting.....                               | 85  |
| 6.8.4.  | Test Setup .....                                | 87  |
| 6.8.5.  | Test Result.....                                | 89  |
| 6.9.    | Radiated Restricted Band Edge Measurement ..... | 158 |
| 6.9.1.  | Test Limit .....                                | 158 |
| 6.9.2.  | Test Procedure Used .....                       | 162 |
| 6.9.3.  | Test Setting.....                               | 162 |
| 6.9.4.  | Test Setup .....                                | 163 |
| 6.9.5.  | Test Result.....                                | 164 |
| 6.10.   | AC Conducted Emissions Measurement .....        | 268 |
| 6.10.1. | Test Limit .....                                | 268 |
| 6.10.2. | Test Setup .....                                | 268 |
| 6.10.3. | Test Result.....                                | 269 |

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**7. CONCLUSION .....271**

**Appendix A - Test Setup Photograph .....272**

**Appendix B-EUT Photograph.....273**

## General Information

|                              |  |
|------------------------------|--|
| <b>Applicant:</b>            | Askey Computer Corp.   |
| <b>Applicant Address:</b>    | 10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN                  |
| <b>Manufacturer:</b>         | Askey Computer Corp.   |
| <b>Manufacturer Address:</b> | 10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN                  |
| <b>Test Site:</b>            | MRT Technology (Suzhou) Co., Ltd   |
| <b>Test Site Address:</b>    | D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China |

### Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is an FCC accredited testing laboratory (MRT Designation No. CN1166) on the FCC website.
- MRT facility is an ISED recognized testing laboratory (MRT Reg. No. CN0001) on the ISED website.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the A2LA under the A2LA Program (Cert. No. 3628.01) and CNAS under the CNAS Program (Cert. No. L10551) in EMC, Safety, Radio, Telecommunications and SAR testing.

## 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 Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

|                          |                      |
|--------------------------|----------------------|
| Product Name:            | WIFI+BT Combo Module |
| Model No.:               | ASK8822              |
| PMN & HVIN:              | ASK8822              |
| Brand Name:              | ASKEY                |
| Wi-Fi Specification:     | 802.11a/b/g/n/ac     |
| Bluetooth Specification: | v4.2 dual mode       |
| Serial No.:              | G1A9A007625BD493 F00 |

### 2.2. Product Specification Subjective to this Report

|                     |   |
|---------------------|---|
| Frequency Range:    | For 802.11a/n-HT20/ac-VHT20:<br>5180~5240MHz, 5260~5320MHz, 5500~5720MHz, 5745~5825MHz<br>For 802.11n-HT40/ac-VHT40:<br>5190~5230MHz, 5270~5310MHz, 5510~5710MHz, 5755~5795MHz<br>For 802.11ac-VHT80:<br>5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz |
| Type of Modulation: | 802.11a/n/ac: OFDM  |
| Data Rate           | 802.11a: 6/9/12/18/24/36/48/54Mbps<br>802.11n: up to 300Mbps<br>802.11ac: up to 866.6Mbps   |

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

| 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

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

#### 802.11ac-VHT80

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

Note: The frequencies that fall in the 5600MHz to 5650MHz band will not be used in Canada.

## 2.4. Description of Available Antennas

| Antenna Type               | Frequency Band (GHz) | Tx Paths | Per Chain Max Antenna Gain (dBi) |       | Directional Gain (dBi) |         |
|----------------------------|----------------------|----------|----------------------------------|-------|------------------------|---------|
|                            |                      |          | Ant 0                            | Ant 1 | For Power              | For PSD |
|                            |                      |          | Wi-Fi Internal Antenna           |       |                        |         |
| PIFA                       | 2412 ~ 2462          | 2        | 2.40                             | 1.98  | 2.40                   | 5.41    |
|                            | 5150 ~ 5825          | 2        | 4.34                             | 3.14  | 4.34                   | 7.35    |
| Bluetooth Internal Antenna |                      |          |                                  |       |                        |         |
| PIFA                       | 2402 ~ 2480          | 1        | 1.98                             |       | --                     |         |

Note:

The EUT supports Cyclic Delay Diversity (CDD) technology and CDD signals are correlated.

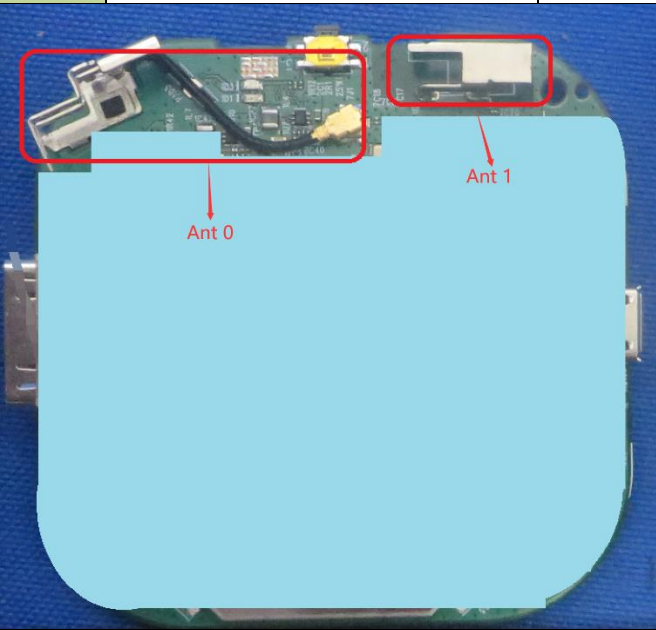
For CDD transmissions, directional gain is calculated as follows,  $N_{ANT} = 2$ ,  $N_{SS} = 1$ .

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

- For power spectral density (PSD) measurements on all devices,  
Array Gain =  $10 \log (N_{ANT} / N_{SS})$  dB = 3.01;
- For power measurements on IEEE 802.11 devices,  
Array Gain = 0 dB for  $N_{ANT} \leq 4$ ;

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with  $G_{ANT}$  set equal to the gain of the antenna having the highest gain.

## 2.5. Description of Antenna

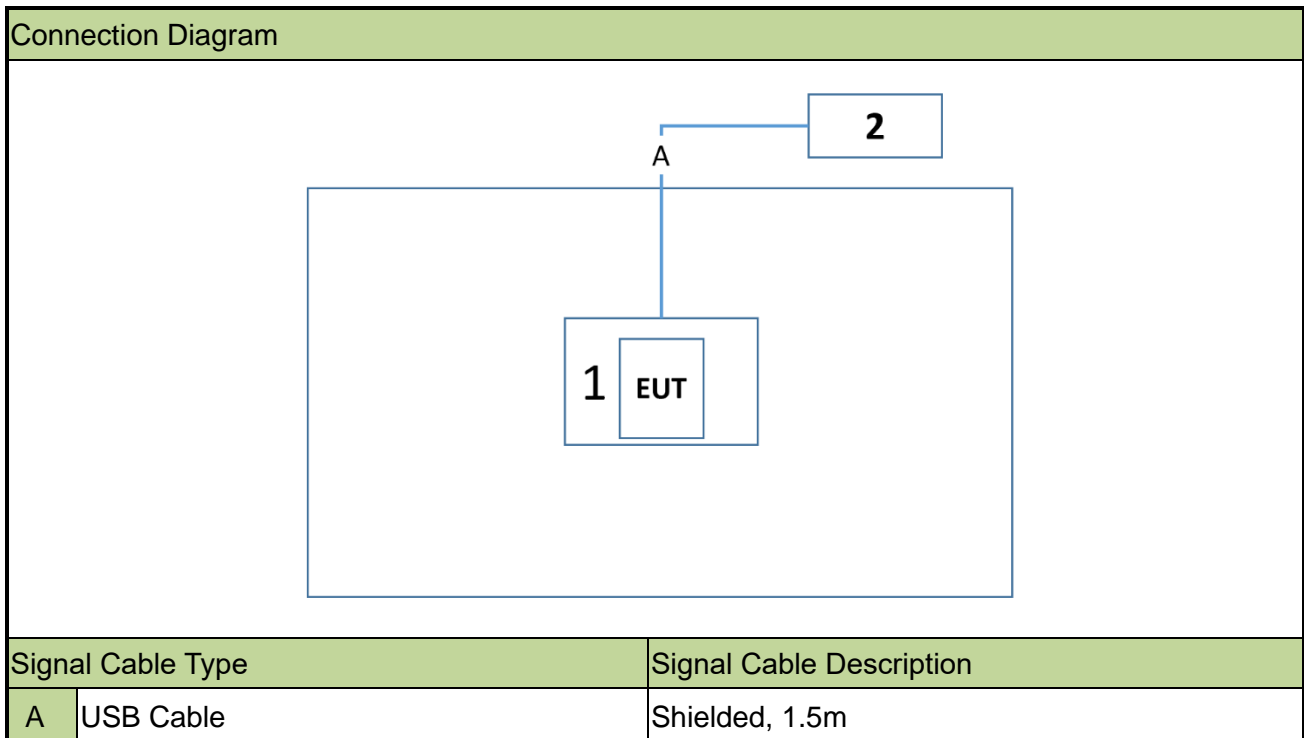
| Wi-Fi & Bluetooth Antenna   |               |                           |
|---|---------------|---------------------------|
| Software Control Port   | Ant 0 (Wi-Fi) | Ant 1 (Wi-Fi & Bluetooth) |
|       |               |                           |
| Note: A temporary RF connector to test conveniently in Ant 1 was provided by manufacturer |               |                           |

## 2.6. Test Mode

|           |   |
|-----------|---|
| Test Mode | Mode 1: Transmit by 802.11a (6Mbps) (CDD mode)        |
|           | Mode 2: Transmit by 802.11n-HT20 (MCS0) (CDD mode)    |
|           | Mode 3: Transmit by 802.11n-HT40 (MCS0) (CDD mode)    |
|           | Mode 4: Transmit by 802.11ac-VHT20 (MCS0) (CDD mode)  |
|           | Mode 5: Transmit by 802.11 ac-VHT40 (MCS0) (CDD mode) |
|           | Mode 6: Transmit by 802.11 ac-VHT80 (MCS0) (CDD mode) |

## 2.7. Configuration of Test System

The measurement procedures and appropriate EUT setup described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and KDB 789033 were used in the measurement.



## 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. | Description                         |
|----------------|--------------|-------------|------------|-------------------------------------|
| 1 Test Fixture | ASKEY        | N/A         | N/A        | As a power and signal control board |
| 2 Notebook     | DELL         | Vostro 3300 | DN62SP1    | Non-Shielded, 1.8m                  |

## 2.9. Description of Test Software

The test utility software used during testing was the command provided by the customer.

Note: Final power setting please refer to operational description.

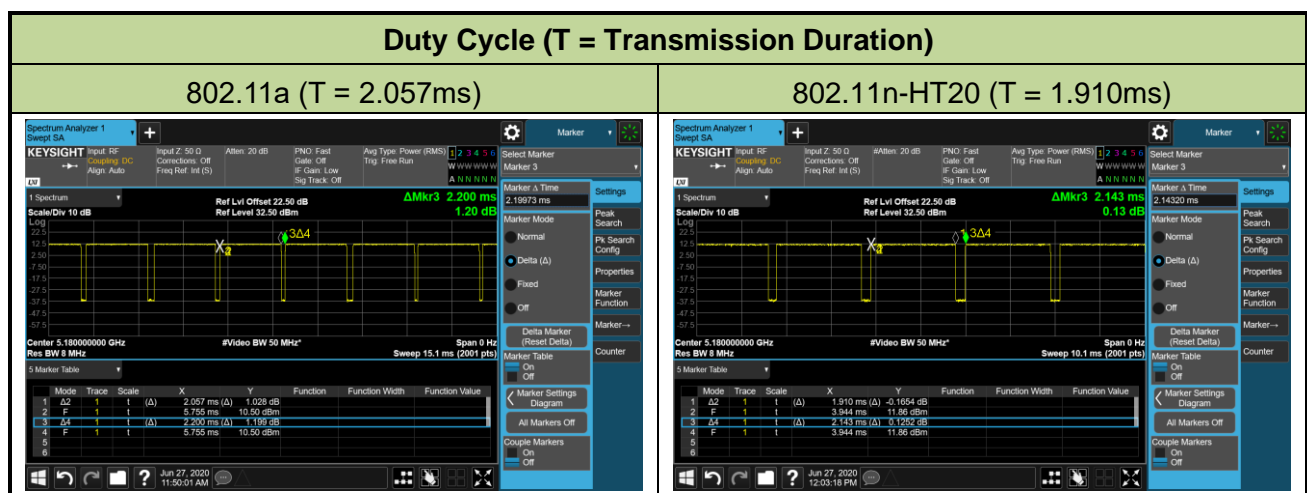
## 2.10. Test Environment Condition

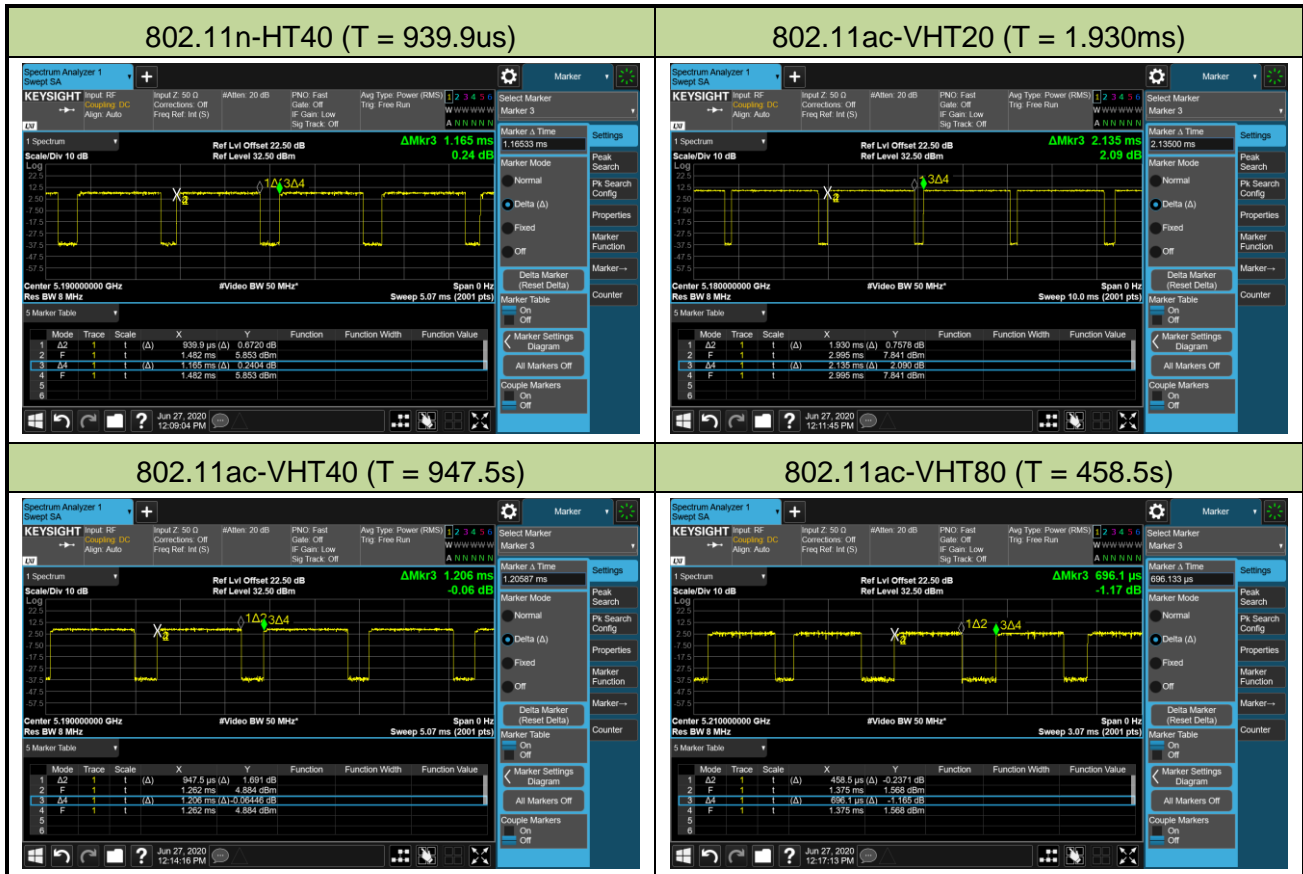
|                     |              |
|---------------------|--------------|
| Ambient Temperature | 15°C~35°C    |
| Relative Humidity   | 20%RH ~75%RH |

## 2.11. Duty Cycle

5GHz WLAN operation is possible in 20MHz, 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. 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        | 93.50%     |
| 802.11n-HT20   | 89.13%     |
| 802.11n-HT40   | 80.68%     |
| 802.11ac-VHT20 | 90.40%     |
| 802.11ac-VHT40 | 78.57%     |
| 802.11ac-VHT80 | 65.87%     |





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

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

## 2.13. 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 pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is 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 and label location.

### RSS-Gen Issue 5 Section 4

In addition to complying with the applicable RSSs and RSP-100, each unit of a product model (i.e. of a radio apparatus) shall meet the labelling requirements set out in this section prior to being marketed in Canada or imported into Canada.

For information regarding the labelling option, see Section 4.1, 4.2, 4.3 4.4. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

### **3. 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.”

**Conclusion:**

The unit complies with the requirement of §15.203.

#### 4. TEST EQUIPMENT CALIBRATION DATE

##### Conducted Emissions - SR2

| Instrument         | Manufacturer | Type No. | Asset No.   | Cali. Interval | Cali. Due Date |
|--------------------|--------------|----------|-------------|----------------|----------------|
| EMI Test Receiver  | R&S          | ESR3     | MRTSUE06185 | 1 year         | 2021/01/18     |
| Two-Line V-Network | R&S          | ENV 216  | MRTSUE06002 | 1 year         | 2021/06/11     |
| Two-Line V-Network | R&S          | ENV 216  | MRTSUE06003 | 1 year         | 2021/06/11     |
| Thermohygrometer   | Testo        | 608-H1   | MRTSUE06404 | 1 year         | 2021/07/26     |

##### Radiated Emissions – AC1

| Instrument                 | Manufacturer | Type No.    | Asset No.   | Cali. Interval | Cali. Due Date |
|----------------------------|--------------|-------------|-------------|----------------|----------------|
| EMI Test Receiver          | R&S          | ESR7        | MRTSUE06001 | 1 year         | 2021/01/18     |
| PXA Signal Analyzer        | Keysight     | 9030B       | MRTSUE06395 | 1 year         | 2020/09/03     |
| Loop Antenna               | Schwarzbeck  | FMZB 1519   | MRTSUE06025 | 1 year         | 2020/11/13     |
| Bilog Period Antenna       | Schwarzbeck  | VULB 9168   | MRTSUE06172 | 1 year         | 2021/04/03     |
| Broad Band Horn Antenna    | Schwarzbeck  | BBHA 9120D  | MRTSUE06023 | 1 year         | 2020/10/13     |
| Broad Band Horn Antenna    | Schwarzbeck  | BBHA 9170   | MRTSUE06597 | 1 year         | 2020/12/17     |
| Microwave System Amplifier | Agilent      | 83017A      | MRTSUE06076 | 1 year         | 2020/11/15     |
| Preamplifier               | Schwarzbeck  | BBV 9721    | MRTSUE06121 | 1 year         | 2021/06/11     |
| Thermohygrometer           | Testo        | 608-H1      | MRTSUE06403 | 1 year         | 2021/07/26     |
| Anechoic Chamber           | TDK          | Chamber-AC1 | MRTSUE06212 | 1 year         | 2021/04/30     |

##### Radiated Emission - AC2

| Instrument                     | Manufacturer | Type No.    | Asset No.   | Cali. Interval | Cali. Due Date |
|--------------------------------|--------------|-------------|-------------|----------------|----------------|
| Spectrum Analyzer              | Keysight     | N9038A      | MRTSUE06125 | 1 year         | 2021/07/02     |
| Loop Antenna                   | Schwarzbeck  | FMZB 1519   | MRTSUE06025 | 1 year         | 2020/11/13     |
| Bilog Period Antenna           | Schwarzbeck  | VULB 9162   | MRTSUE06022 | 1 year         | 2020/10/13     |
| Horn Antenna                   | Schwarzbeck  | BBHA9120D   | MRTSUE06171 | 1 year         | 2020/10/27     |
| Broad Band Horn Antenna        | Schwarzbeck  | BBHA 9170   | MRTSUE06597 | 1 year         | 2020/12/17     |
| Broadband Coaxial Preamplifier | Schwarzbeck  | BBV 9718    | MRTSUE06176 | 1 year         | 2020/11/15     |
| Preamplifier                   | Schwarzbeck  | BBV 9721    | MRTSUE06121 | 1 year         | 2021/06/11     |
| Temperature/Humidity Meter     | Minggao      | ETH529      | MRTSUE06170 | 1 year         | 2020/12/15     |
| Anechoic Chamber               | RIKEN        | Chamber-AC2 | MRTSUE06213 | 1 year         | 2021/04/30     |

## Conducted Test Equipment - TR3

| Instrument                          | Manufacturer | Type No.    | Asset No.   | Cali. Interval | Cali. Due Date |
|-------------------------------------|--------------|-------------|-------------|----------------|----------------|
| EXA Signal Analyzer                 | Agilent      | N9020A      | MRTSUE06106 | 1 year         | 2021/04/14     |
| EXA Signal Analyzer                 | Keysight     | N9010B      | MRTSUE06452 | 1 year         | 2021/01/08     |
| Signal Analyzer                     | R&S          | FSV40       | MRTSUE06218 | 1 year         | 2021/04/14     |
| Power Meter                         | Agilent      | U2021XA     | MRTSUE06030 | 1 year         | 2020/11/18     |
| USB wideband power sensor           | Keysight     | U2021XA     | MRTSUE06446 | 1 year         | 2021/06/11     |
| USB wideband power sensor           | Keysight     | U2021XA     | MRTSUE06447 | 1 year         | 2021/06/11     |
| Bluetooth Test Set                  | Anritsu      | MT8852B-042 | MRTSUE06389 | 1 year         | 2021/06/11     |
| Audio Analyzer                      | Agilent      | U8903B      | MRTSUE06143 | 1 year         | 2021/06/11     |
| Modulation Analyzer                 | HP           | 8901A       | MRTSUE06098 | 1 year         | 2020/10/10     |
| Wideband Radio Communication Tester | R&S          | CMW 500     | MRTSUE06243 | 1 year         | 2020/11/07     |
| DC Power Supply                     | GWINSTEK     | DPS-3303C   | MRTSUE06064 | N/A            | N/A            |
| Attenuator                          | MVE          | 6dB         | MRTSUE06534 | 1 year         | 2020/12/12     |
| Attenuator                          | MVE          | 10dB        | MRTSUE06543 | 1 year         | 2020/12/12     |
| Temperature & Humidity Chamber      | BAOYT        | BYH-150CL   | MRTSUE06051 | 1 year         | 2020/11/07     |
| Thermohygrometer                    | testo        | 608-H1      | MRTSUE06401 | 1 year         | 2021/07/26     |

| Software     | Version | Function          |
|--------------|---------|-------------------|
| EMI Software | V3      | EMI Test Software |



## 5. 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  $k = 2$ .

|  |
|--|
| <b>Conducted Emission Measurement</b>  |
| Measurement Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ):<br>9kHz~150kHz: 3.74dB<br>150kHz~30MHz: 3.44dB   |
| <b>Radiated Disturbance</b>  |
| Measurement Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ):<br>Horizontal: 9KHz~300MHz: 5.04dB<br>300MHz~1GHz: 4.95dB<br>1GHz~6GHz: 6.40dB<br>Vertical: 9KHz~300MHz: 5.24dB<br>300MHz~1GHz: 6.03dB<br>1GHz~40GHz: 6.40dB |
| <b>Spurious Emissions, Conducted</b>   |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 0.78dB   |
| <b>Output Power</b>  |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 1.13dB   |
| <b>Power Spectrum Density</b>  |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 1.15dB   |
| <b>Occupied Bandwidth</b>  |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 0.28%  |

## 6. TEST RESULT

### 6.1. Summary

| FCC Section(s)                           | ISED Section(s)                        | Test Description  | Test Limit   | Test Condition | Test Result | Reference         |             |
|--|--|---|--|----------------|-------------|-------------------|-------------|
| 15.407(a)                                | RSS-247 §6.2                           | 26dB Bandwidth  | N/A  | Conducted      | Pass        | Section 6.2       |             |
| N/A                                      | RSS-Gen [6.7]                          | 99% Bandwidth   | N/A  |                | Pass        |                   |             |
| 15.407(e)                                | RSS-247 §6.2.4                         | 6dB Bandwidth   | ≥ 500kHz   |                | Pass        | Section 6.3       |             |
| 15.407(a)(1)(iv), (2), (3)               | RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4 | Maximum Conducted Output Power  | Refer to Section 6.4   |                | Radiated    | Pass              | Section 6.4 |
|  |  | Maximum E.I.R.P   |  |                |             |                   |             |
| 15.407(h)(1)                             | RSS-247 §6.2.2, §6.2.3                 | Transmit Power Control  | ≤ 24 dBm   |                |             | N/A               | Section 6.5 |
| 15.407(a)(1)(iv), (2), (3)               | RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4 | Peak Power Spectral Density   | Refer to Section 6.6   |                |             | Pass              | Section 6.6 |
| 15.407(g)                                | RSS-Gen [8.11]                         | Frequency Stability   | N/A  | Pass           |             | Section 6.7       |             |
| 15.407(b)(1), (2), (3), (4)(i)           | RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4 | Undesirable Emissions   | Refer to Section 6.8 & 6.9   | Pass           |             | Section 6.8 & 6.9 |             |
| 15.205, 15.209<br>15.407(b)(7), (8), (9) | RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4 | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 | Pass           |             |                   |             |
| 15.207                                   | RSS-Gen [8.8]                          | AC Conducted Emissions<br>150kHz - 30MHz                                      | < FCC 15.207 limits  | Line Conducted | Pass        | Section 6.10      |             |

#### 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 of the system to connect the EUT to the analyzer at all frequencies of interest.
- 2) All modes of operation and data rates were investigated. 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.
- 3) Test Items “26dB Bandwidth” & “6dB Bandwidth” showed the worst test data in this report.
- 4) “N/A” means that this item is not applicable, and the detail information refer to relevant section.

## 6.2. Occupied Bandwidth Measurement

### 6.2.1. Test Limit

N/A

### 6.2.2. Test Procedure used

KDB 789033 D02v02r01- Section C.1 (26dB Bandwidth)

KDB 789033 D02v02r01 - Section D (99% Bandwidth)

### 6.2.3. Test Setting

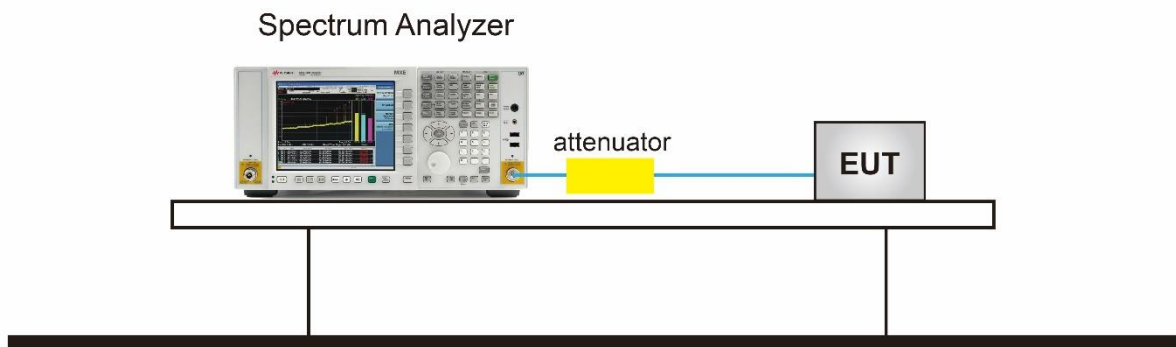
#### For 26dB Bandwidth

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  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold.

#### For 99% Bandwidth

1. Set center frequency to the nominal EUT channel center frequency.
2. Span = 1.5 times to 5.0 times the OBW.
3. RBW = 1 % to 5 % of the OBW.
4. VBW  $\geq 3 \times$  RBW.
5. Detector = Peak.
6. Trace mode = max hold.
7. Use the 99 % power bandwidth function of the instrument.

### 6.2.4. Test Setup



### 6.2.5. Test Result

|           |                        |               |         |
|-----------|------------------------|---------------|---------|
| Product   | WIFI+BT Combo Module   | Test Engineer | Yuri Li |
| Test Date | 2020/06/30 ~2020/08/18 | Test Site     | TR3     |

| Test Mode         | Data Rate/<br>MCS | Channel No. | Frequency<br>(MHz) | 26dB Bandwidth<br>(MHz) | 99% Bandwidth<br>(MHz) |
|-------------------|-------------------|-------------|--------------------|-------------------------|------------------------|
| Ant 0 / Ant 0 + 1 |                   |             |                    |                         |                        |
| 802.11a           | 6Mbps             | 36          | 5180               | 18.36                   | 16.36                  |
| 802.11a           | 6Mbps             | 44          | 5220               | 18.35                   | 16.35                  |
| 802.11a           | 6Mbps             | 48          | 5240               | 18.61                   | 16.33                  |
| 802.11a           | 6Mbps             | 52          | 5260               | 18.29                   | 16.35                  |
| 802.11a           | 6Mbps             | 60          | 5300               | 18.44                   | 16.35                  |
| 802.11a           | 6Mbps             | 64          | 5320               | 18.17                   | 16.35                  |
| 802.11a           | 6Mbps             | 100         | 5500               | 18.22                   | 16.35                  |
| 802.11a           | 6Mbps             | 116         | 5580               | 18.32                   | 16.36                  |
| 802.11a           | 6Mbps             | 140         | 5700               | 19.18                   | 16.36                  |
| 802.11a           | 6Mbps             | 144         | 5720               | 21.70                   | 16.41                  |
| 802.11a           | 6Mbps             | 149         | 5745               | 18.27                   | 16.35                  |
| 802.11a           | 6Mbps             | 157         | 5785               | 25.60                   | 16.47                  |
| 802.11a           | 6Mbps             | 165         | 5825               | 18.84                   | 16.36                  |
| 802.11n-HT20      | MCS0              | 36          | 5180               | 19.26                   | 17.53                  |
| 802.11n-HT20      | MCS0              | 44          | 5220               | 19.17                   | 17.57                  |
| 802.11n-HT20      | MCS0              | 48          | 5240               | 19.41                   | 17.51                  |
| 802.11n-HT20      | MCS0              | 52          | 5260               | 19.08                   | 17.56                  |
| 802.11n-HT20      | MCS0              | 60          | 5300               | 19.14                   | 17.54                  |
| 802.11n-HT20      | MCS0              | 64          | 5320               | 19.21                   | 17.57                  |
| 802.11n-HT20      | MCS0              | 100         | 5500               | 19.18                   | 17.57                  |
| 802.11n-HT20      | MCS0              | 116         | 5580               | 19.66                   | 17.57                  |
| 802.11n-HT20      | MCS0              | 140         | 5700               | 21.45                   | 17.58                  |
| 802.11n-HT20      | MCS0              | 144         | 5720               | 27.44                   | 17.64                  |
| 802.11n-HT20      | MCS0              | 149         | 5745               | 19.25                   | 17.56                  |
| 802.11n-HT20      | MCS0              | 157         | 5785               | 29.21                   | 17.70                  |
| 802.11n-HT20      | MCS0              | 165         | 5825               | 20.09                   | 17.58                  |

| Test Mode         | Data Rate/<br>MCS | Channel No. | Frequency<br>(MHz) | 26dB Bandwidth<br>(MHz) | 99% Bandwidth<br>(MHz) |
|-------------------|-------------------|-------------|--------------------|-------------------------|------------------------|
| Ant 0 / Ant 0 + 1 |                   |             |                    |                         |                        |
| 802.11n-HT40      | MCS0              | 38          | 5190               | 40.79                   | 36.01                  |
| 802.11n-HT40      | MCS0              | 46          | 5230               | 41.04                   | 36.11                  |
| 802.11n-HT40      | MCS0              | 54          | 5270               | 41.02                   | 36.11                  |
| 802.11n-HT40      | MCS0              | 62          | 5310               | 41.48                   | 36.05                  |
| 802.11n-HT40      | MCS0              | 102         | 5510               | 43.13                   | 36.14                  |
| 802.11n-HT40      | MCS0              | 110         | 5550               | 43.76                   | 36.06                  |
| 802.11n-HT40      | MCS0              | 134         | 5670               | 53.70                   | 36.20                  |
| 802.11n-HT40      | MCS0              | 142         | 5710               | 55.43                   | 36.12                  |
| 802.11n-HT40      | MCS0              | 151         | 5755               | 42.65                   | 36.11                  |
| 802.11n-HT40      | MCS0              | 159         | 5795               | 59.09                   | 36.27                  |
| 802.11ac-VHT20    | MCS0              | 36          | 5180               | 19.18                   | 17.54                  |
| 802.11ac-VHT20    | MCS0              | 44          | 5220               | 19.37                   | 17.57                  |
| 802.11ac-VHT20    | MCS0              | 48          | 5240               | 19.43                   | 17.51                  |
| 802.11ac-VHT20    | MCS0              | 52          | 5260               | 19.36                   | 17.53                  |
| 802.11ac-VHT20    | MCS0              | 60          | 5300               | 19.13                   | 17.55                  |
| 802.11ac-VHT20    | MCS0              | 64          | 5320               | 19.27                   | 17.54                  |
| 802.11ac-VHT20    | MCS0              | 100         | 5500               | 19.04                   | 17.54                  |
| 802.11ac-VHT20    | MCS0              | 116         | 5580               | 19.35                   | 17.56                  |
| 802.11ac-VHT20    | MCS0              | 140         | 5700               | 19.13                   | 17.56                  |
| 802.11ac-VHT20    | MCS0              | 144         | 5720               | 22.46                   | 17.56                  |
| 802.11ac-VHT20    | MCS0              | 149         | 5745               | 19.23                   | 17.56                  |
| 802.11ac-VHT20    | MCS0              | 157         | 5785               | 26.88                   | 17.60                  |
| 802.11ac-VHT20    | MCS0              | 165         | 5825               | 20.03                   | 17.56                  |
| 802.11ac-VHT40    | MCS0              | 38          | 5190               | 40.19                   | 36.07                  |
| 802.11ac-VHT40    | MCS0              | 46          | 5230               | 41.34                   | 36.14                  |
| 802.11ac-VHT40    | MCS0              | 54          | 5270               | 40.97                   | 36.02                  |
| 802.11ac-VHT40    | MCS0              | 62          | 5310               | 40.52                   | 36.00                  |
| 802.11ac-VHT40    | MCS0              | 102         | 5510               | 40.91                   | 36.07                  |
| 802.11ac-VHT40    | MCS0              | 110         | 5550               | 41.35                   | 36.05                  |
| 802.11ac-VHT40    | MCS0              | 134         | 5670               | 41.26                   | 36.07                  |
| 802.11ac-VHT40    | MCS0              | 142         | 5710               | 44.89                   | 36.01                  |
| 802.11ac-VHT40    | MCS0              | 151         | 5755               | 40.71                   | 36.04                  |
| 802.11ac-VHT40    | MCS0              | 159         | 5795               | 47.29                   | 36.09                  |

| Test Mode         | Data Rate/<br>MCS | Channel No. | Frequency<br>(MHz) | 26dB Bandwidth<br>(MHz) | 99% Bandwidth<br>(MHz) |
|-------------------|-------------------|-------------|--------------------|-------------------------|------------------------|
| Ant 0 / Ant 0 + 1 |                   |             |                    |                         |                        |
| 802.11ac-VHT80    | MCS0              | 42          | 5210               | 81.57                   | 74.68                  |
| 802.11ac-VHT80    | MCS0              | 58          | 5290               | 80.33                   | 74.75                  |
| 802.11ac-VHT80    | MCS0              | 106         | 5530               | 80.08                   | 74.68                  |
| 802.11ac-VHT80    | MCS0              | 138         | 5690               | 89.55                   | 74.73                  |
| 802.11ac-VHT80    | MCS0              | 155         | 5775               | 110.00                  | 74.87                  |

|           |                      |               |         |
|-----------|----------------------|---------------|---------|
| Product   | WIFI+BT Combo Module | Test Engineer | Yuri Li |
| Test Date | 2020/08/18           | Test Site     | TR3     |

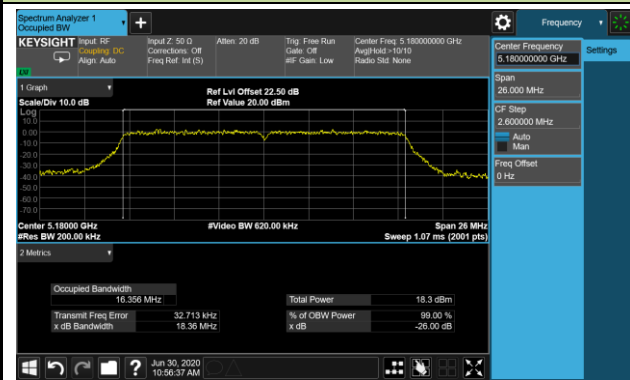
| Test Mode         | Channel No. | Frequency (MHz) | 99% Bandwidth (MHz) | F <sub>H</sub> (MHz) | Result |
|-------------------|-------------|-----------------|---------------------|----------------------|--------|
| Ant 0 / Ant 0 + 1 |             |                 |                     |                      |        |
| 802.11a           | 48          | 5240            | 16.33               | 5248.20              | < 5250 |
| 802.11n-HT20      | 48          | 5240            | 17.51               | 5248.88              | < 5250 |
| 802.11n-HT40      | 46          | 5230            | 36.11               | 5248.32              | < 5250 |
| 802.11ac-VHT20    | 48          | 5240            | 17.51               | 5248.92              | < 5250 |
| 802.11ac-VHT40    | 46          | 5230            | 36.11               | 5248.32              | < 5250 |
| 802.11ac-VHT80    | 42          | 5210            | 74.68               | 5247.92              | < 5250 |

Note: F<sub>H</sub> is the frequency of the upper marker resulting from the 99% Bandwidth.

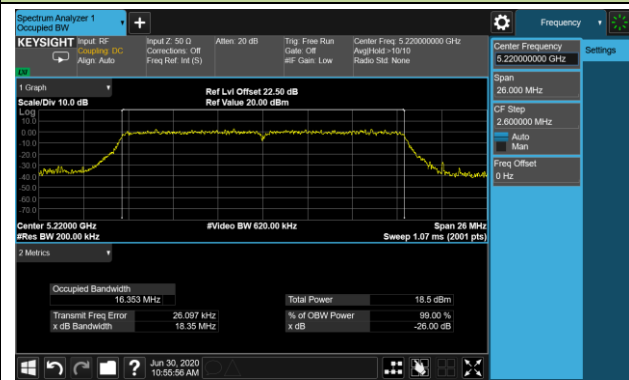


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

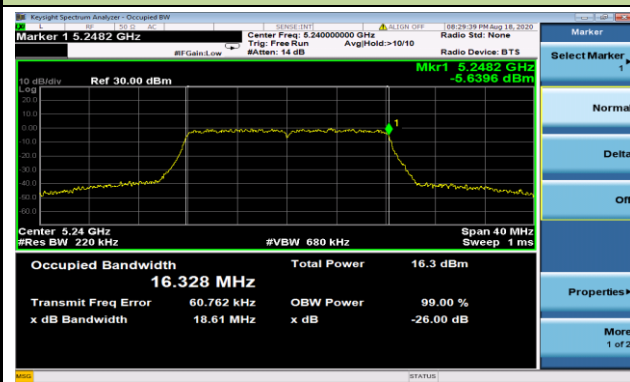
Channel 36 (5180MHz)



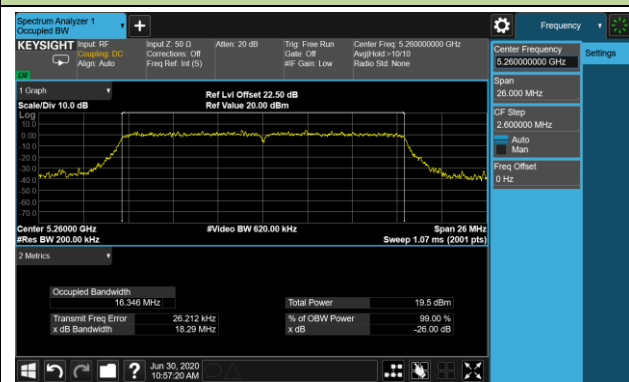
Channel 44 (5220MHz)



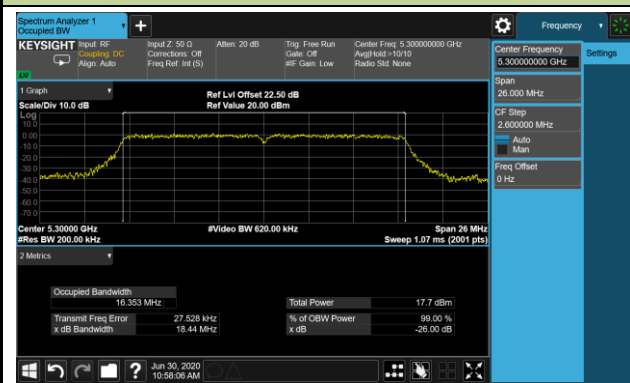
Channel 48 (5240MHz)



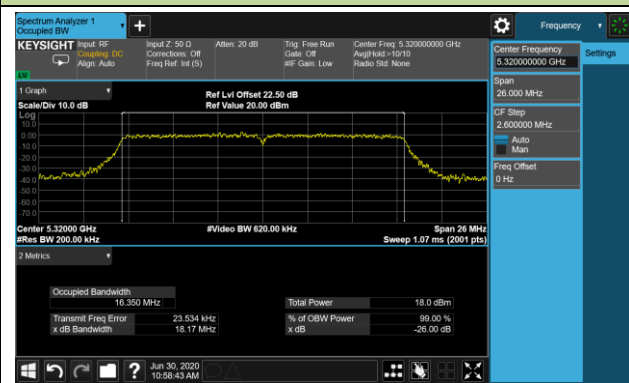
Channel 52 (5260MHz)



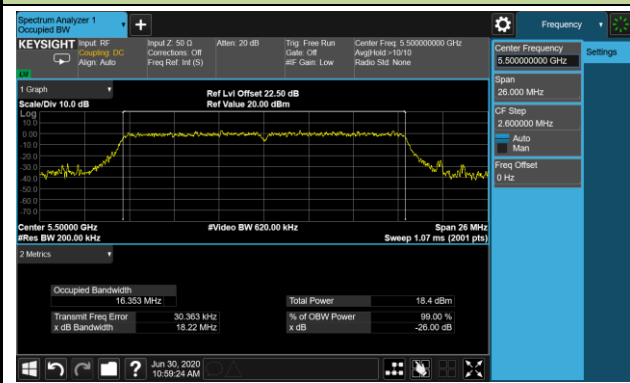
Channel 60 (5300MHz)



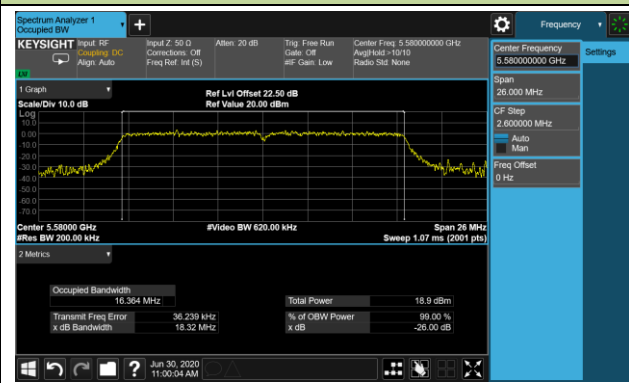
Channel 64 (5320MHz)



Channel 100 (5500MHz)

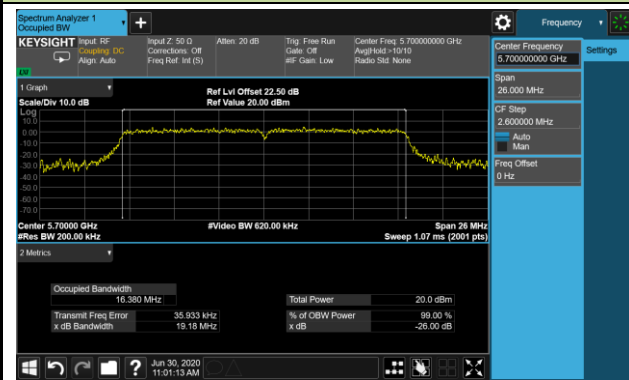


Channel 116 (5580MHz)

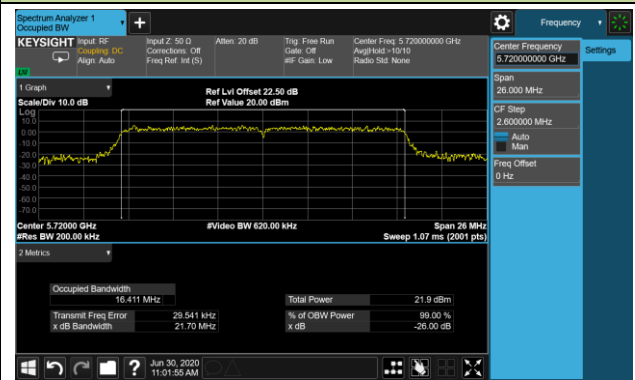


## 802.11a 26dB Bandwidth &amp; 99% Bandwidth - Ant 0 / Ant 0 + 1

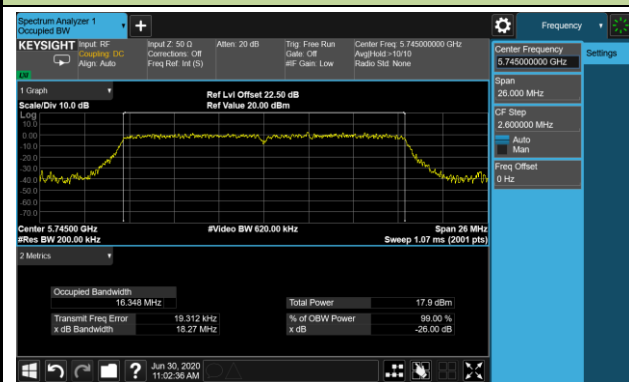
## Channel 140 (5700MHz)



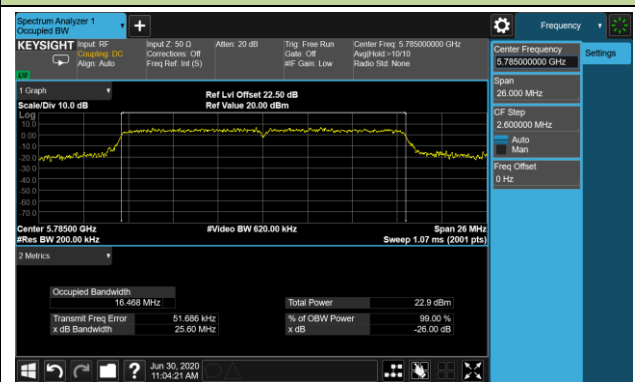
## Channel 144 (5720MHz)



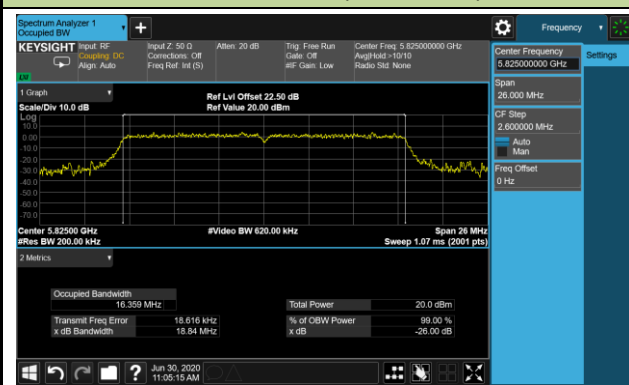
## Channel 149 (5745MHz)



## Channel 157 (5785MHz)

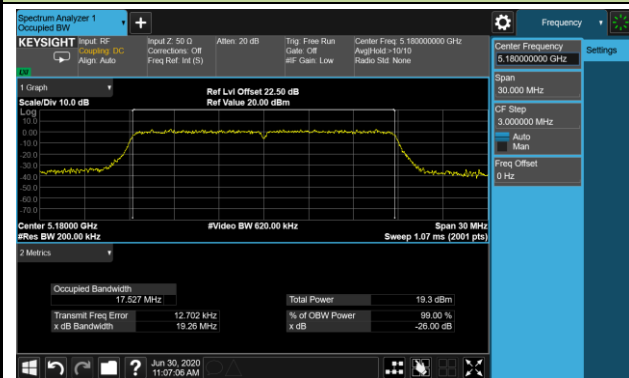


## Channel 165 (5825MHz)

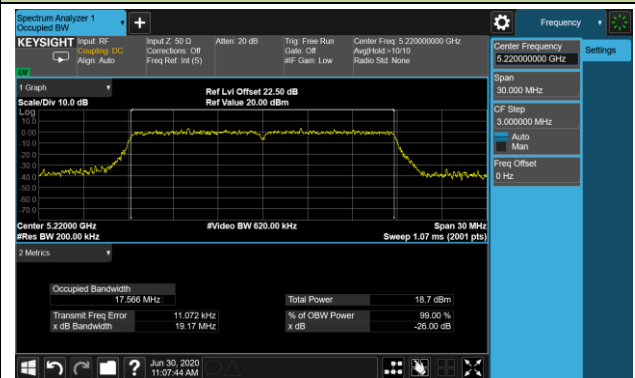


## 802.11n-HT20 26dB Bandwidth &amp; 99% Bandwidth - Ant 0 / Ant 0 + 1

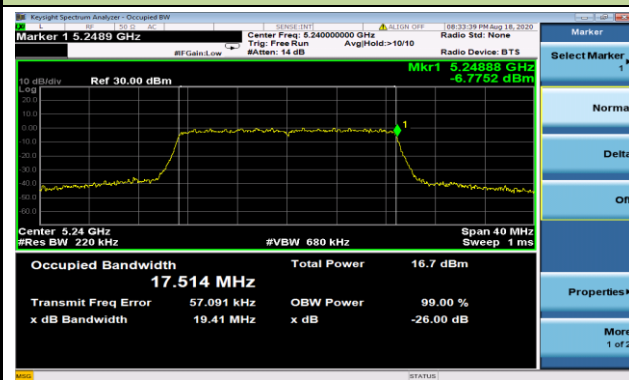
## Channel 36 (5180MHz)



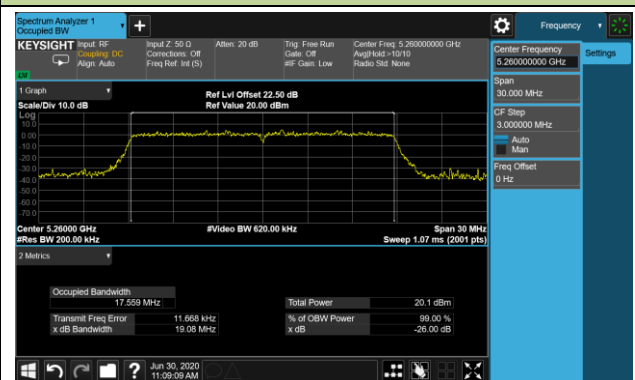
## Channel 44 (5220MHz)



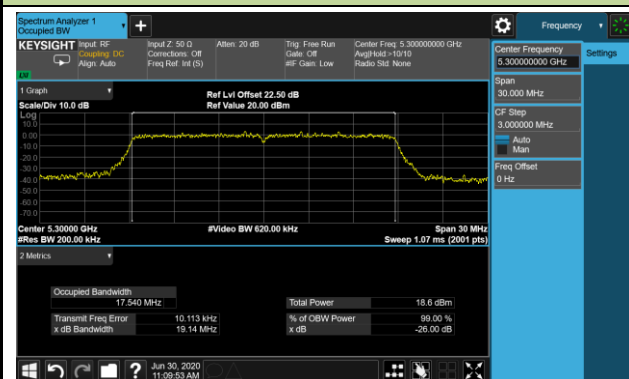
## Channel 48 (5240MHz)



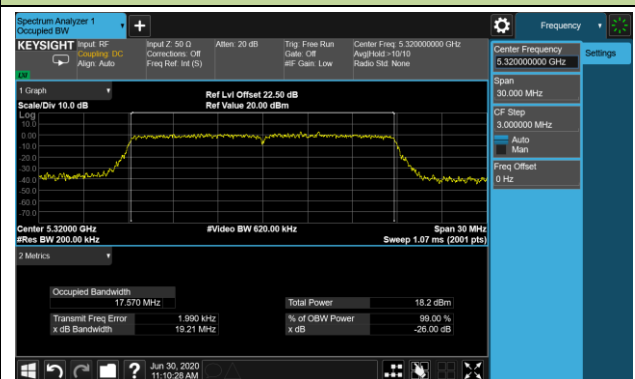
## Channel 52 (5260MHz)



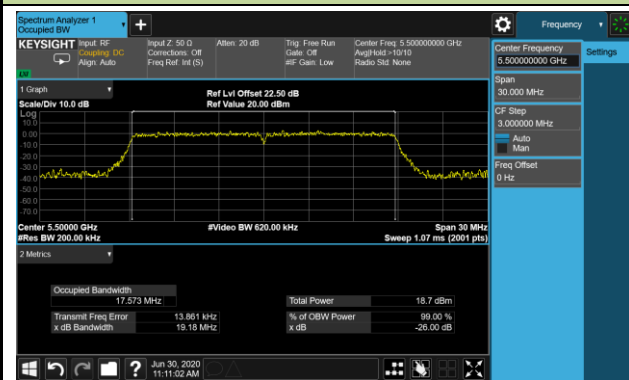
## Channel 60 (5300MHz)



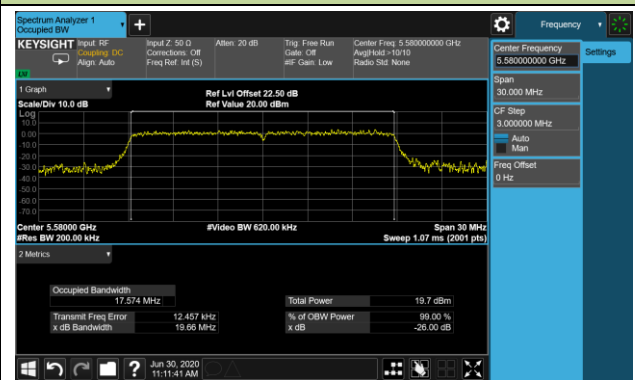
## Channel 64 (5320MHz)



## Channel 100 (5500MHz)

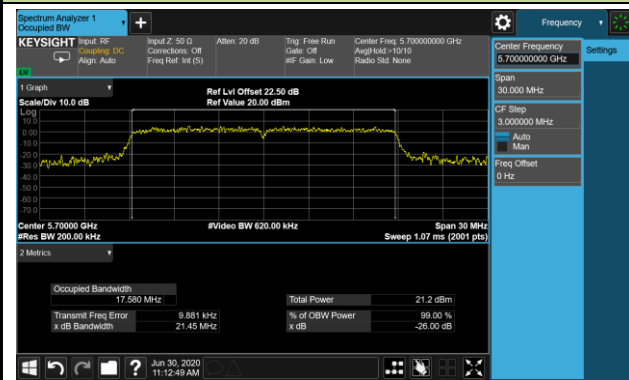


## Channel 116 (5580MHz)

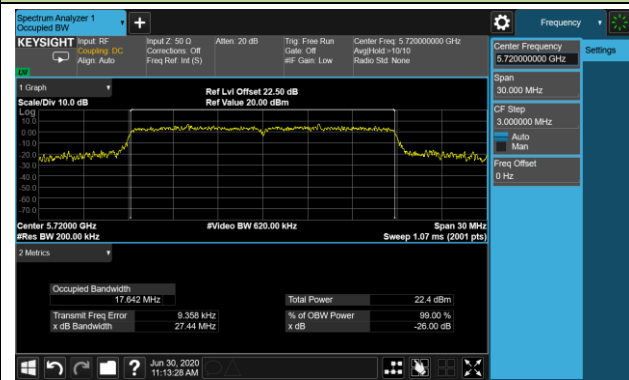


## 802.11n-HT20 26dB Bandwidth &amp; 99% Bandwidth - Ant 0 / Ant 0 + 1

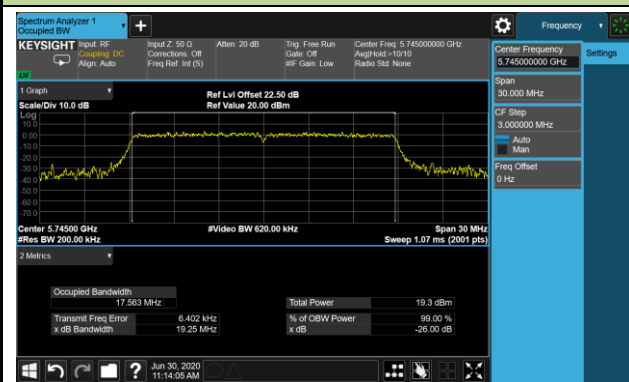
## Channel 140 (5700MHz)



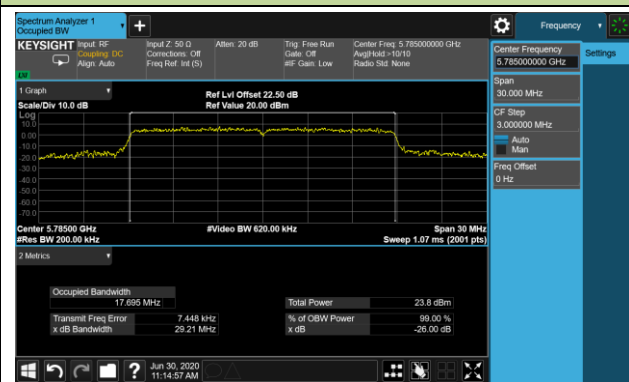
## Channel 144 (5720MHz)



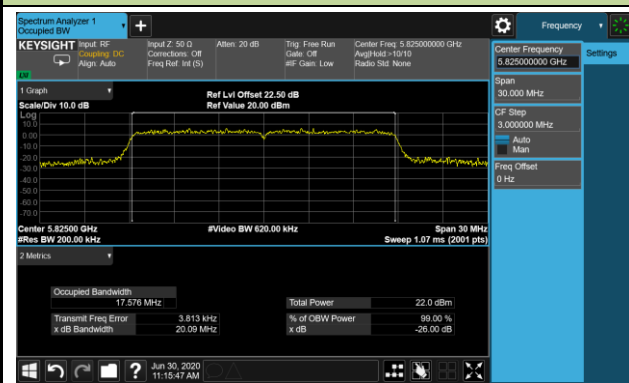
## Channel 149 (5745MHz)



## Channel 157 (5785MHz)

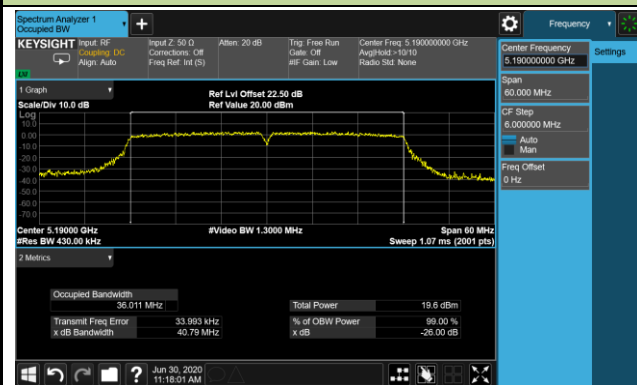


## Channel 165 (5825MHz)

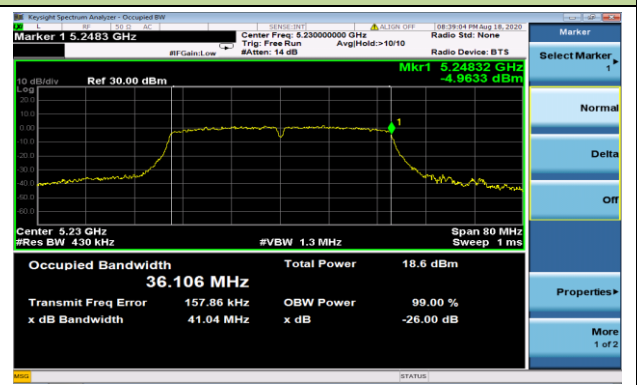


## 802.11n-HT40 26dB Bandwidth &amp; 99% Bandwidth - Ant 0 / Ant 0 + 1

## Channel 38 (5190MHz)



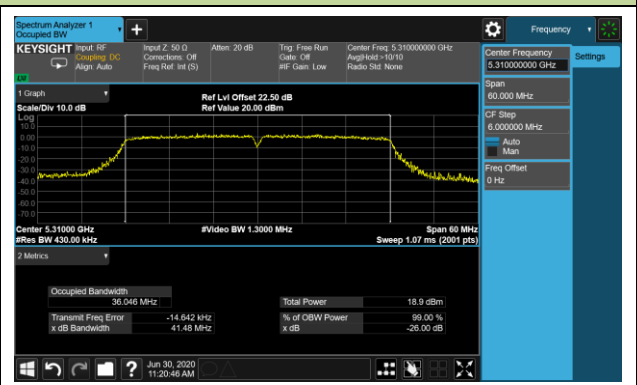
## Channel 46 (5230MHz)



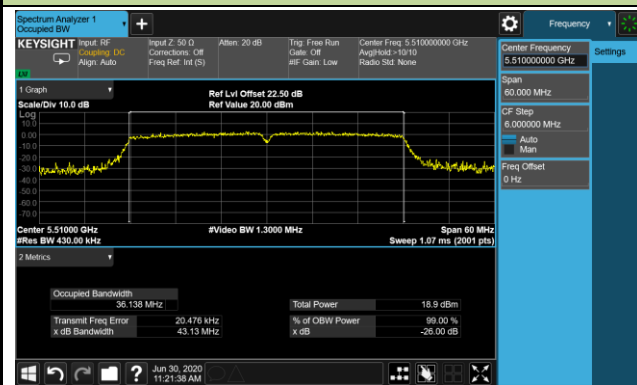
## Channel 54 (5270MHz)



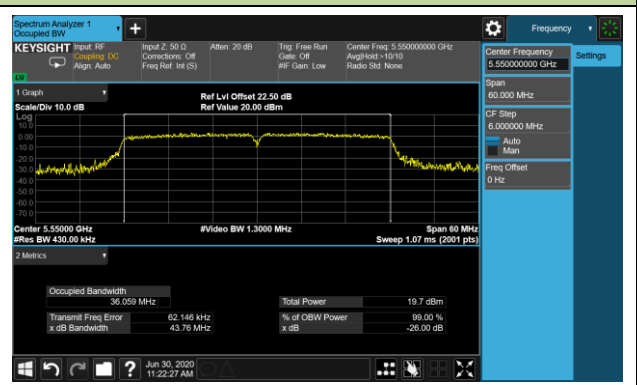
## Channel 62 (5310MHz)



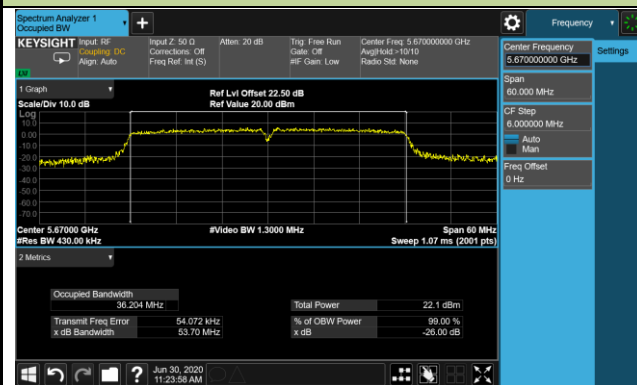
## Channel 102 (5510MHz)



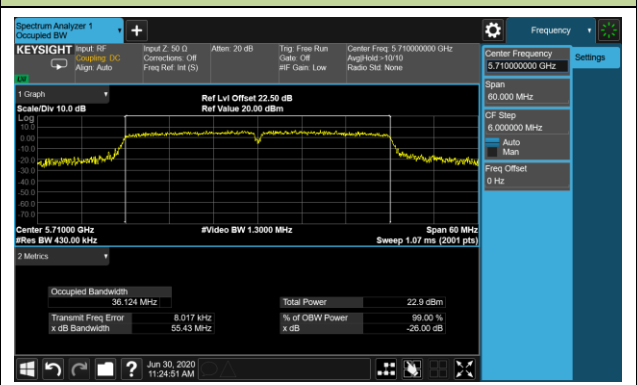
## Channel 110 (5550MHz)



## Channel 134 (5670MHz)



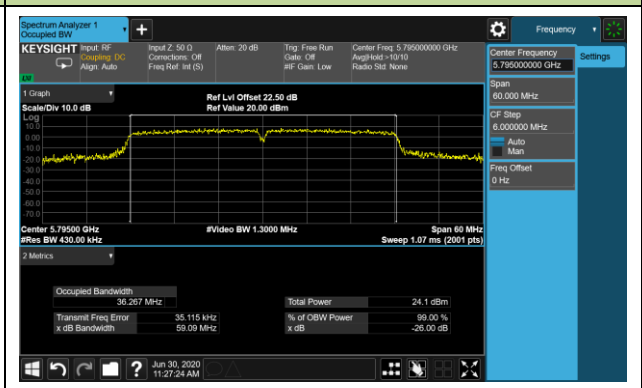
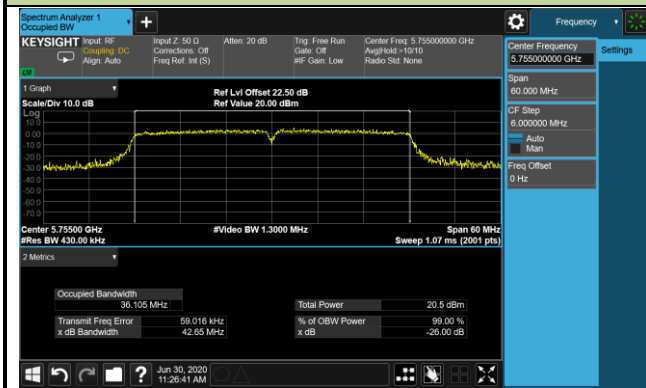
## Channel 142 (5710MHz)



802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

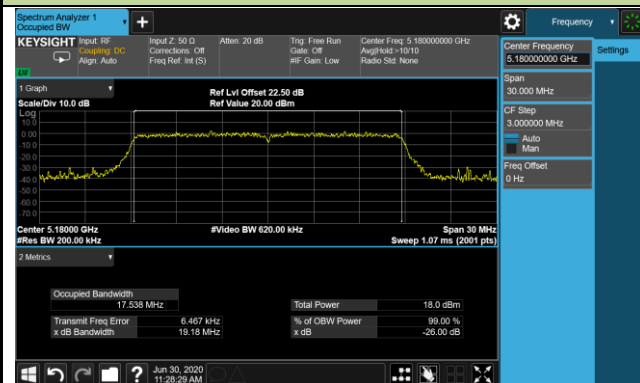
Channel 151 (5755MHz)

Channel 159 (5795MHz)

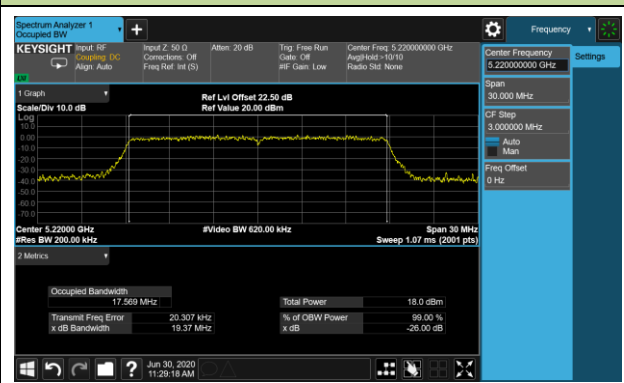


## 802.11ac-VHT20 26dB Bandwidth &amp; 99% Bandwidth - Ant 0 / Ant 0 + 1

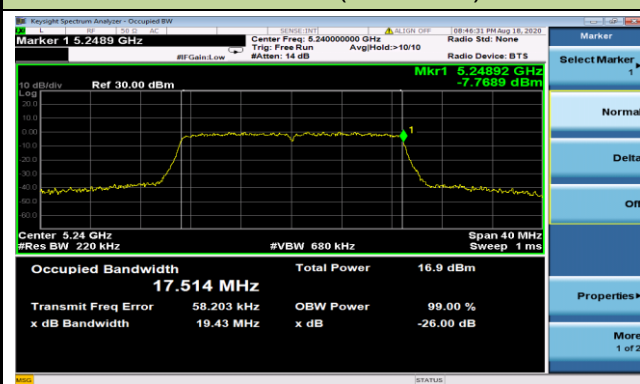
## Channel 36 (5180MHz)



## Channel 44 (5220MHz)



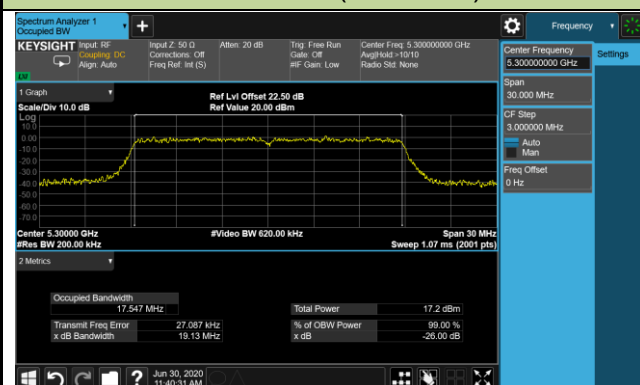
## Channel 48 (5240MHz)



## Channel 52 (5260MHz)



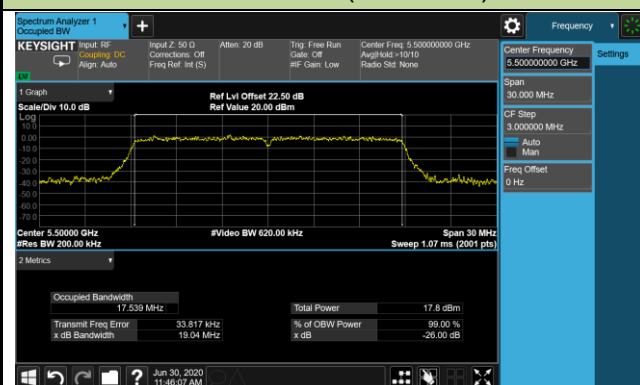
## Channel 60 (5300MHz)



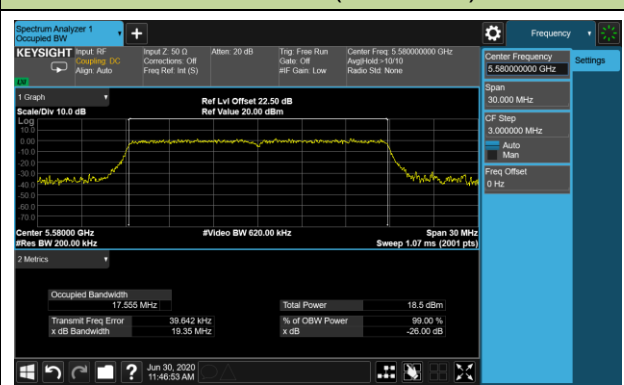
## Channel 64 (5320MHz)



## Channel 100 (5500MHz)

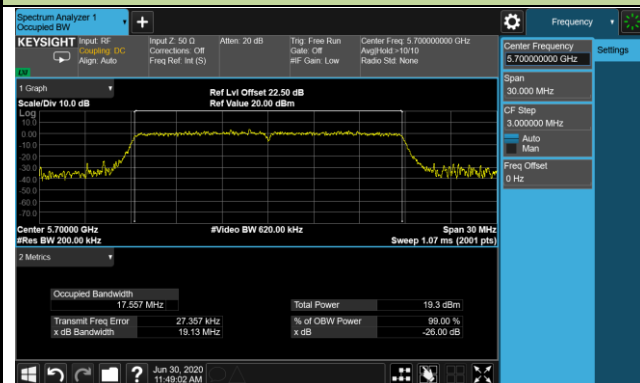


## Channel 116 (5580MHz)



## 802.11ac-VHT20 26dB Bandwidth &amp; 99% Bandwidth - Ant 0 / Ant 0 + 1

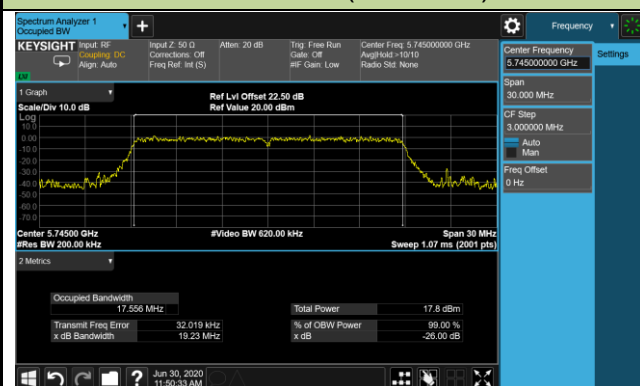
## Channel 140 (5700MHz)



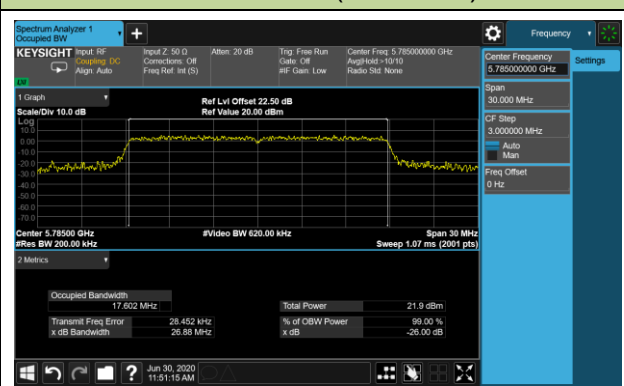
## Channel 144 (5720MHz)



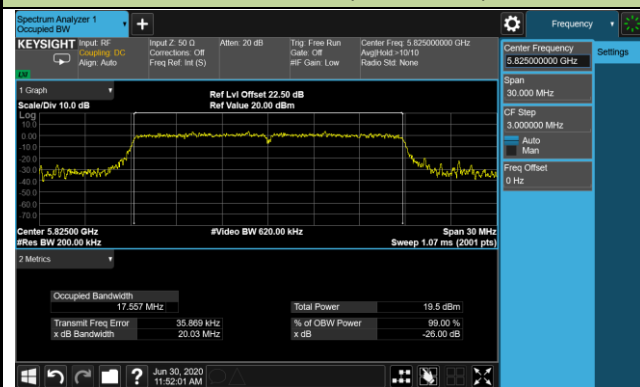
## Channel 149 (5745MHz)



## Channel 157 (5785MHz)



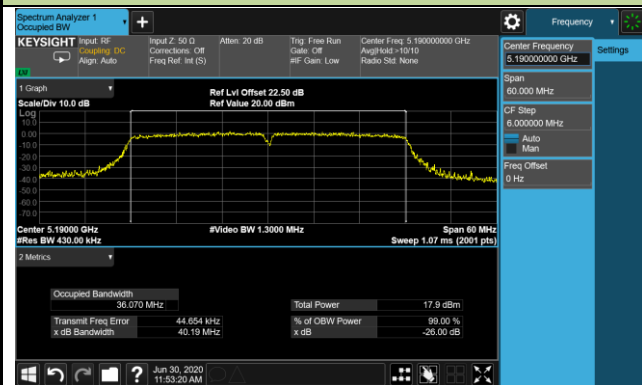
## Channel 165 (5825MHz)



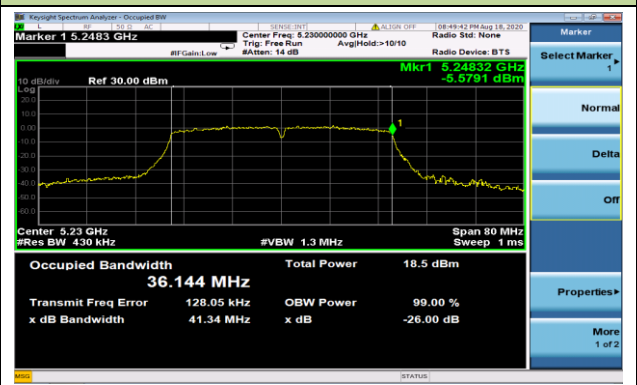


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

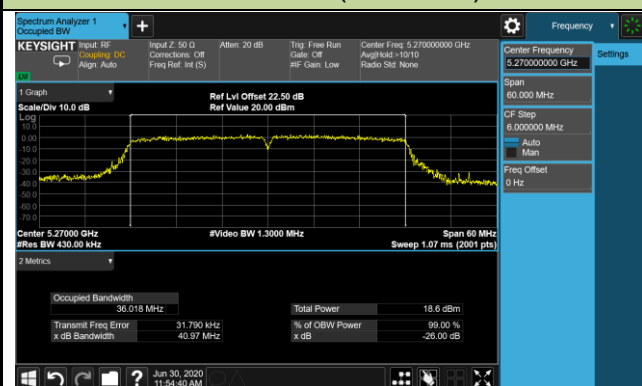
Channel 38 (5190MHz)



Channel 46 (5230MHz)



Channel 54 (5270MHz)



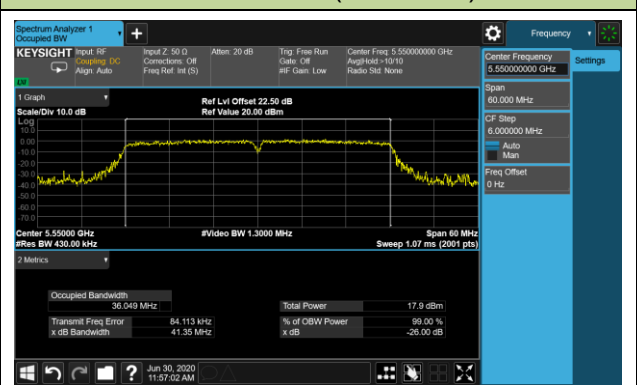
Channel 62 (5310MHz)



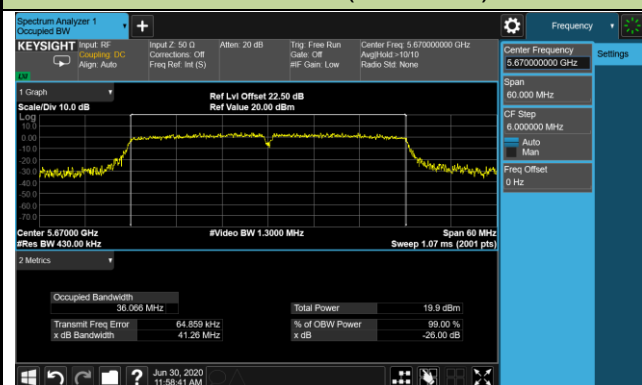
Channel 102 (5510MHz)



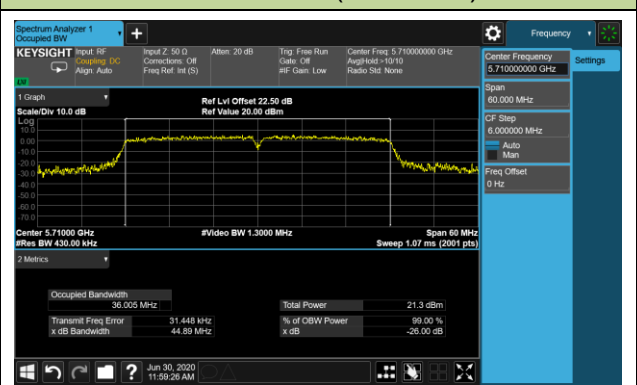
Channel 110 (5550MHz)



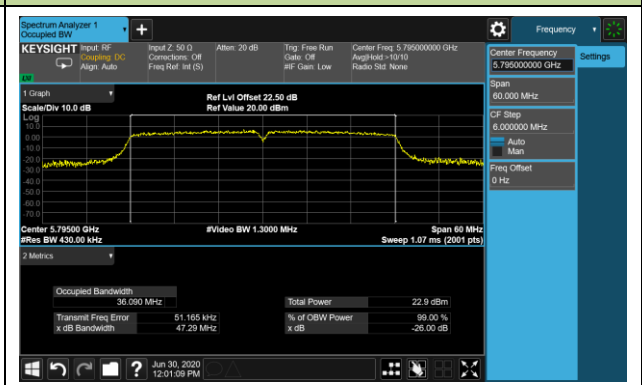
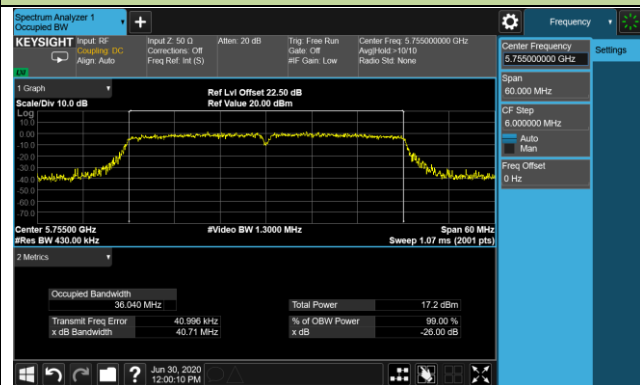
Channel 134 (5670MHz)



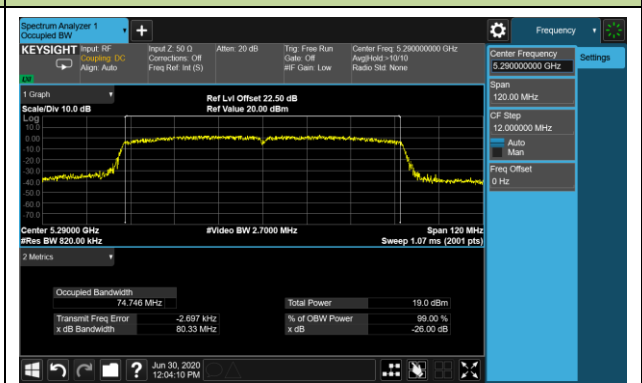
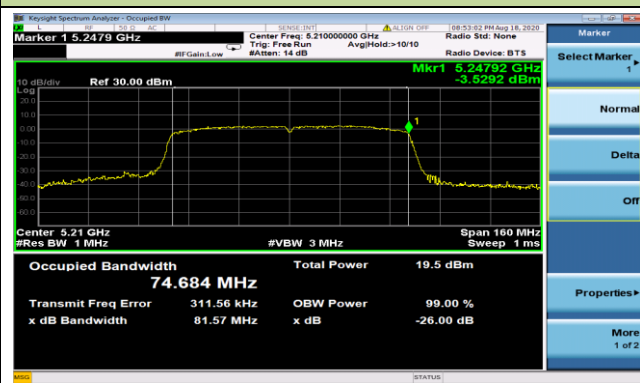
Channel 142 (5710MHz)



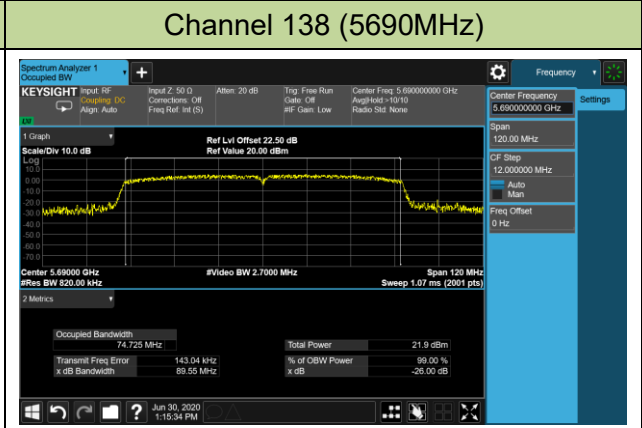
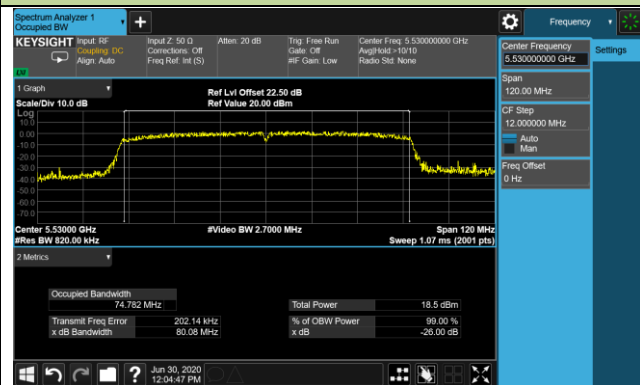
802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1  
 Channel 151 (5755MHz)



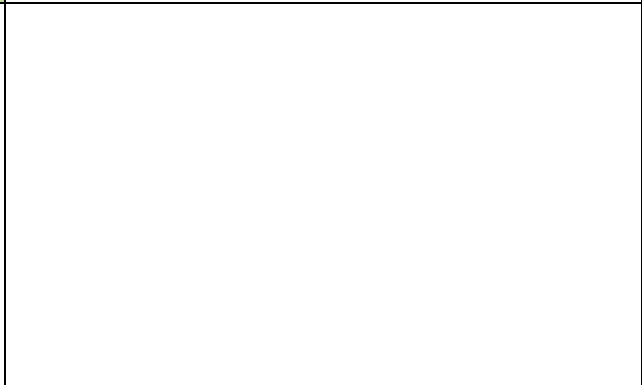
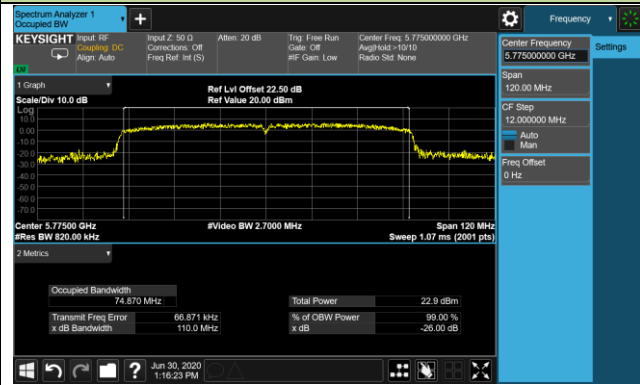
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1  
 Channel 42 (5210MHz)



Channel 106 (5530MHz)



Channel 155 (5775MHz)



### 6.3. 6dB Bandwidth Measurement

#### 6.3.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

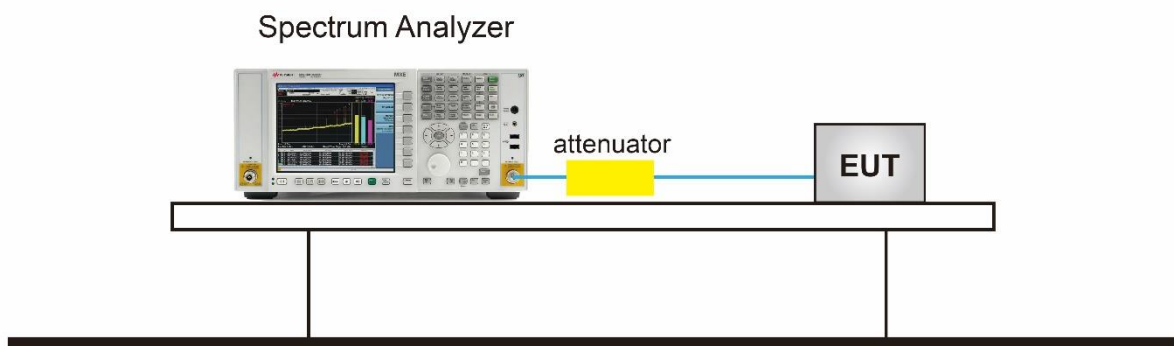
#### 6.3.2. Test Procedure used

KDB 789033 D02v02r01 - Section C.2

#### 6.3.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 6.3.4. Test Setup



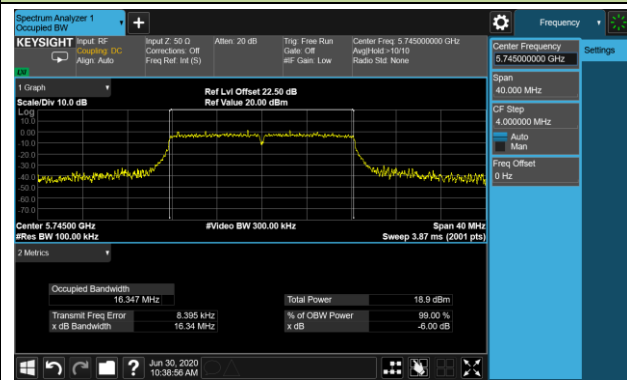
### 6.3.5. Test Result

|           |                      |               |         |
|-----------|----------------------|---------------|---------|
| Product   | WIFI+BT Combo Module | Test Engineer | Yuri Li |
| Test Date | 2020/06/30           | Test Site     | TR3     |

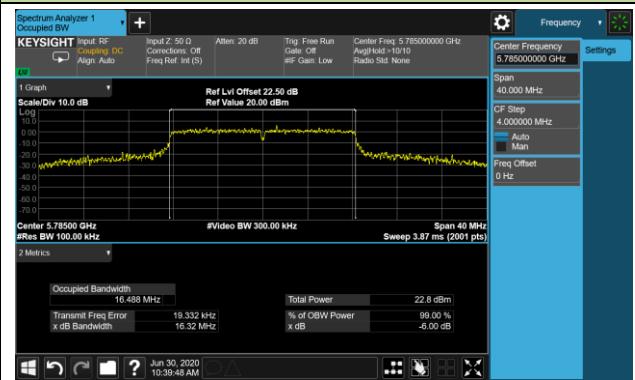
| Test Mode         | Data Rate/<br>MCS | Channel No. | Frequency<br>(MHz) | 6dB Bandwidth<br>(MHz) | Limit<br>(MHz) | Result |
|-------------------|-------------------|-------------|--------------------|------------------------|----------------|--------|
| Ant 0 / Ant 0 + 1 |                   |             |                    |                        |                |        |
| 802.11a           | 6Mbps             | 149         | 5745               | 16.34                  | ≥ 0.5          | Pass   |
| 802.11a           | 6Mbps             | 157         | 5785               | 16.32                  | ≥ 0.5          | Pass   |
| 802.11a           | 6Mbps             | 165         | 5825               | 16.33                  | ≥ 0.5          | Pass   |
| 802.11n-HT20      | MCS0              | 149         | 5745               | 17.57                  | ≥ 0.5          | Pass   |
| 802.11n-HT20      | MCS0              | 157         | 5785               | 17.14                  | ≥ 0.5          | Pass   |
| 802.11n-HT20      | MCS0              | 165         | 5825               | 17.57                  | ≥ 0.5          | Pass   |
| 802.11n-HT40      | MCS0              | 151         | 5755               | 35.08                  | ≥ 0.5          | Pass   |
| 802.11n-HT40      | MCS0              | 159         | 5795               | 35.31                  | ≥ 0.5          | Pass   |
| 802.11ac-VHT20    | MCS0              | 149         | 5745               | 16.80                  | ≥ 0.5          | Pass   |
| 802.11ac-VHT20    | MCS0              | 157         | 5785               | 17.39                  | ≥ 0.5          | Pass   |
| 802.11ac-VHT20    | MCS0              | 165         | 5825               | 17.68                  | ≥ 0.5          | Pass   |
| 802.11ac-VHT40    | MCS0              | 151         | 5755               | 35.06                  | ≥ 0.5          | Pass   |
| 802.11ac-VHT40    | MCS0              | 159         | 5795               | 35.10                  | ≥ 0.5          | Pass   |
| 802.11ac-VHT80    | MCS0              | 155         | 5775               | 72.66                  | ≥ 0.5          | Pass   |

## 802.11a 6dB Bandwidth - Ant 0 / Ant 0 + 1

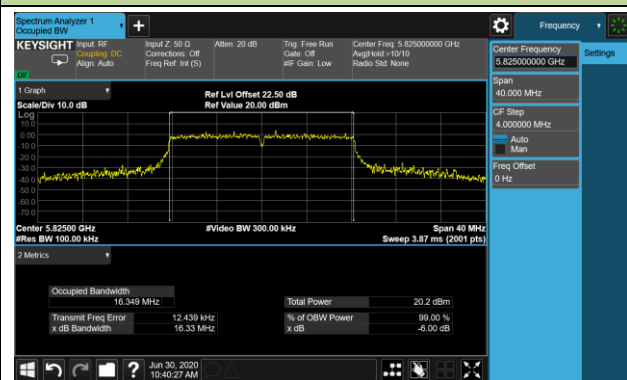
## Channel 149 (5745MHz)



## Channel 157 (5785MHz)

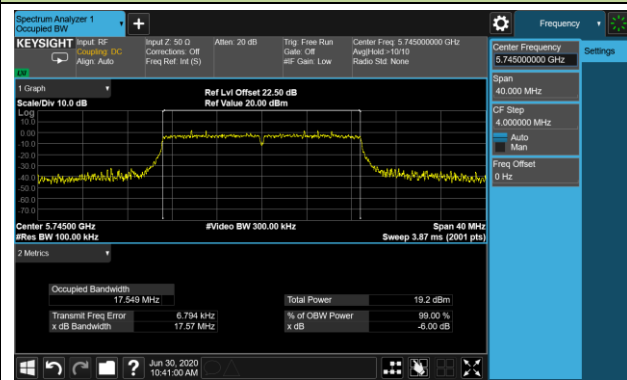


## Channel 165 (5825MHz)

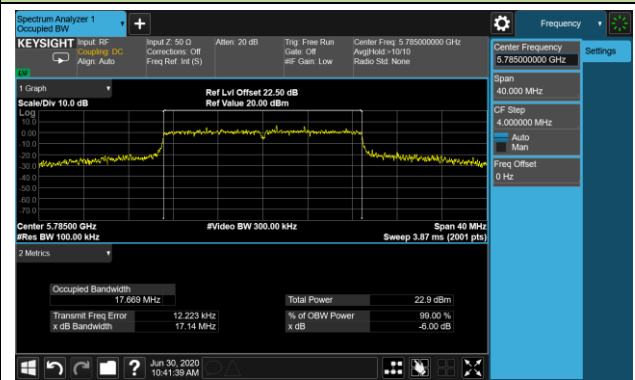


## 802.11n-HT20 6dB Bandwidth - Ant 0 / Ant 0 + 1

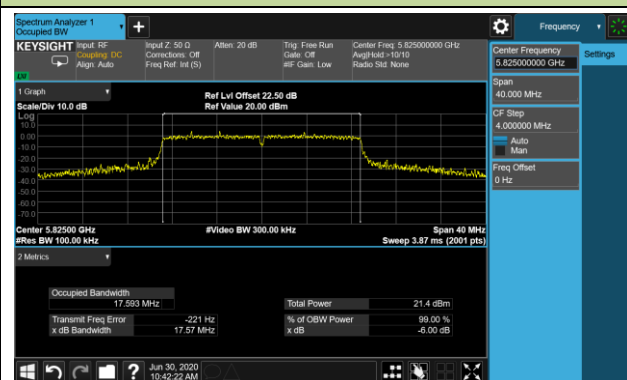
## Channel 149 (5745MHz)



## Channel 157 (5785MHz)

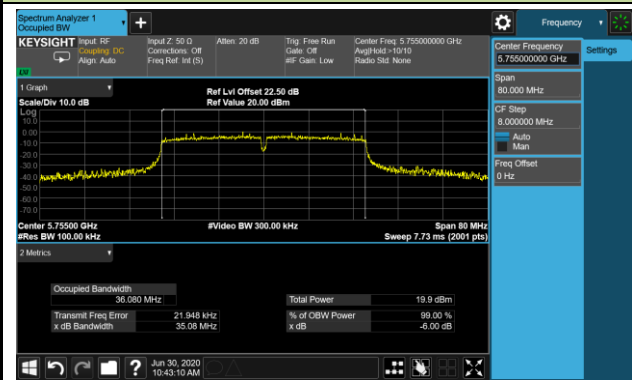


## Channel 165 (5825MHz)

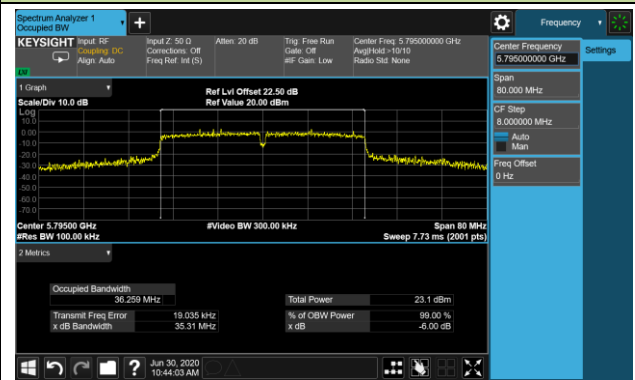


## 802.11n-HT40 6dB Bandwidth - Ant 0 / Ant 0 + 1

## Channel 151 (5755MHz)

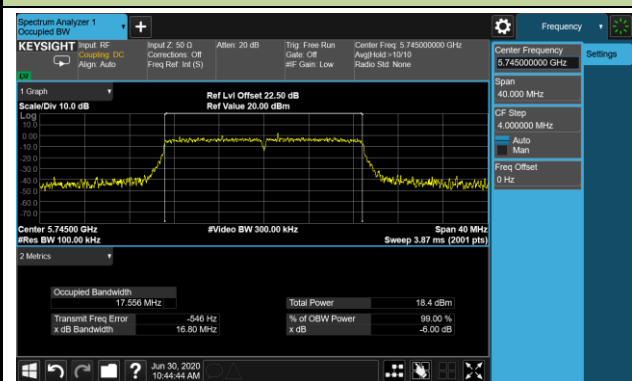


## Channel 159 (5795MHz)

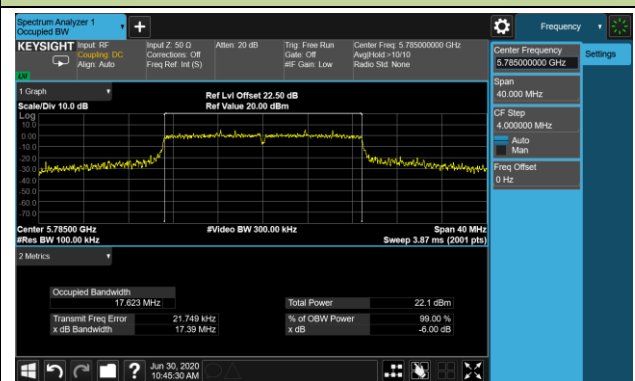


## 802.11ac-VHT20 6dB Bandwidth - Ant 0 / Ant 0 + 1

## Channel 149 (5745MHz)



## Channel 157 (5785MHz)



## Channel 165 (5825MHz)

