REPORT No.: SZ20060303W07

# TEST REPORT

| | | |
|---|---|---|
| **APPLICANT** | : | Great Talent Technology Limited |
| **PRODUCT NAME** | : | Smart phone |
| **MODEL NAME** | : | freedom turbo XL |
| **BRAND NAME** | : | Schok |
| **FCC ID** | : | 2ALZM-TURBOXL |
| **STANDARD(S)** | : | 47 CFR Part 15 Subpart E |
| **RECEIPT DATE** | : | 2020-06-28 |
| **TEST DATE** | : | 2020-07-02 to 2020-10-15 |
| **ISSUE DATE** | : | 2020-10-16 |

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Peng Huarui(Supervisor)

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MORLAB

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# DIRECTORY



| Change History | | |
|---|---|---|
| Version | Date | Reason for change |
| 1.0 | 2020-10-16 | First edition |
| | | |

# 1. Technical Information

**Note:** Provide by applicant.

## 1.1. Applicant and Manufacturer Information

| | |
|---|---|
| **Applicant:** | Great Talent Technology Limited |
| **Applicant Address:** | RM602,T3 Software Park, Nanshan, Shenzhen, China |
| **Manufacturer:** | Unimaxcomm |
| **Manufacturer Address:** | Floor 35th, HBC Huilong Centre 2nd Phase office building, Minzhi Street, Longhua District, Shenzhen, P.R. China 518057 |

## 1.2. Equipment Under Test (EUT) Description

| | | |
|---|---|---|
| **Product Name:** | Smart phone | |
| **Serial No.:** | (N/A, marked #1 by test site) | |
| **Hardware Version:** | V10_0506 | |
| **Software Version:** | Q6501_SFT656128_V1.0.29-userdebug | |
| **Modulation Type:** | OFDM | |
| **Modulation Mode:** | 802.11a, 802.11n (HT20), 802.11n (HT40)<br>802.11ac (VHT20), 802.11ac (VHT40), 802.11ac (VHT80), | |
| **Operating Frequency Range:** | 5180MHz–5240MHz; 5260MHz–5320MHz;<br>5500MHz–5720MHz; 5745MHz-5825MHz | |
| **Channel Number:** | Refer to 1.3 | |
| **Antenna Type:** | PIFA Antenna | |
| **Antenna Gain:** | 1.06dBi | |
| **Accessory Information:** | Battery | |
| | Brand Name: | Milai |
| | Model No.: | 426684P4000 |
| | Serial No.: | (N/A, marked #1 by test site) |
| | Capacity: | 4000mAh |
| | Rated Voltage: | 3.85V |
| | Charge Limit: | 4.40V |

| | | |
|---|---|---|
| **Accessory Information:** | AC Adapter | |
| | Brand Name: | Schok |
| | Model No.: | BLJ-QC06HU |
| | Serial No.: | (N/A, marked #1 by test site) |
| | Rated Output: | 5V⎓3A, 9V⎓2A, 12V⎓1.5A |
| | Rated Input: | 100-240V～50/60Hz, 0.5A |

**Note 1:** WIFI hotspot does not support U-NII band.

**Note 2:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 1.3. Modulation Type and Data Rate of EUT

| Modulation technology | Modulation Type | Data Rate (Mbps)Note1 |
|---|---|---|
| OFDM (802.11a) | BPSK | **6**/9 |
| | QPSK | 12/18 |
| | 16QAM | 24/36 |
| | 64QAM | 48/54 |
| OFDM (802.11n) | BPSK | **6.5** |
| | QPSK | 13/19.5 |
| | 16QAM | 26/39 |
| | 64QAM | 52/58.5/65 |
| OFDM (802.11ac) | BPSK | **6.5** |
| | QPSK | 13/19.5 |
| | 16QAM | 26/39 |
| | 64QAM | 52/58.5/65 |
| | 256QAM | 78 |

**Note1:** The worst-case mode(black bold) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.

# 1.4. The Channel Number and Frequency

| **Frequency Range: 5150MHz-5250MHz** | | | | |
|---|---|---|---|---|
| Bandwidth | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 20MHz | **36** | **5180** | 40 | 5200 |
| | **44** | **5220** | **48** | **5240** |
| 40MHz | **38** | **5190** | **46** | **5230** |
| 80MHz | **42** | **5210** | | |
| **Frequency Range: 5250MHz-5350MHz** | | | | |
| Bandwidth | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 20MHz | **52** | **5260** | 56 | 5280 |
| | **60** | **5300** | **64** | **5320** |
| 40MHz | **54** | **5270** | **62** | **5310** |
| 80MHz | **58** | **5290** | | |
| **Frequency Range: 5470MHz-5725MHz** | | | | |
| Bandwidth | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 20MHz | **100** | **5500** | 105 | 5520 |
| | 108 | 5540 | 112 | 5560 |
| | 116 | 5580 | **120** | **5600** |
| | 124 | 5620 | 128 | 5640 |
| | 132 | 5660 | 136 | 5680 |
| | 140 | 5700 | **144** | **5720** |
| 40MHz | **102** | **5510** | 110 | 5550 |
| | 118 | 5590 | **126** | **5630** |
| | 134 | 5670 | **142** | **5710** |
| 80MHz | **106** | **5530** | **122** | **5610** |
| | **138** | **5690** | | |
| **Frequency Range: 5725MHz-5825MHz** | | | | |
| Bandwidth | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 20MHz | **149** | **5745** | 153 | 5765 |
| | **157** | **5785** | 161 | 5805 |
| | **165** | **5825** | | |
| 40MHz | **151** | **5775** | **159** | **5795** |
| 80MHz | **155** | **5775** | | |

**Note 1:** The black bold channels were selected for test.

## 1.5. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E (U-NII band) for the EUT FCC ID Certification:

| No. | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 15(5-1-14 Edition) | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Test Date | Test Engineer | Result | Method determination /Remark |
|---|---|---|---|---|---|---|
| 1 | 15.203 | Antenna Requirement | N/A | N/A | PASS | No deviation |
| 2 | ANSI C63.10 | Duty Cycle of the Test Signal | Jul 08, 2020 | Ouyang Feng | PASS | No deviation |
| 3 | 15.407(a) | Maximum Conducted Output Power | Jul 29, 2020 | Ouyang Feng | PASS | No deviation |
| 4 | 15.407(a) (e) | Emission Bandwidth | Jul 08, 2020 Oct 15, 2020 | Ouyang Feng | PASS | No deviation |
| 5 | 15.407(a) | Peak Power Spectral Density | Jul 29&30, 2020 | Ouyang Feng | PASS | No deviation |
| 6 | 15.407(g) | Frequency Stability | Jul 30, 2020 | Ouyang Feng | PASS | No deviation |
| 7 | 15.207 | Conducted Emission | Jul 02, 2020 | Huang Zhiye | PASS | No deviation |
| 8 | 15.407(b) | Restricted Frequency Bands | Jul 09&10&16, 2020 | Gao Jianrou | PASS | No deviation |
| 9 | 15.407(b) | Radiated Emission | Jul 16&17, 2020 | Gao Jianrou | PASS | No deviation |

**Note 1:** The DFS test report was documented in a separate report (Report No.: SZ20060303W08).

**Note 2:** The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.102013.

**Note 3:** These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 v01r03.

**Note 4:** The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 12dB contains two parts that cable loss 2dB and Attenuator 10dB.
**Note 5:** Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.
**Note 6:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% risk level.

## 1.6. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature (°C): | 15-35 |
| Relative Humidity (%): | 30-60 |
| Atmospheric Pressure (kPa): | 86-106 |

# 2. 47 CFR Part 15E Requirements

## 2.1. Antenna Requirement

### 2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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.

### 2.1.2. Test Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

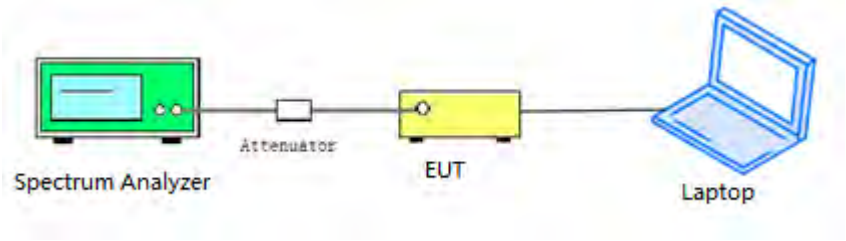
## 2.2. Duty Cycle of the Test Signal

### 2.2.1.Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).
When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be nonconstant.

### 2.2.2.Test Description

**Test Setup:**




The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

### 2.2.3.Test Procedure

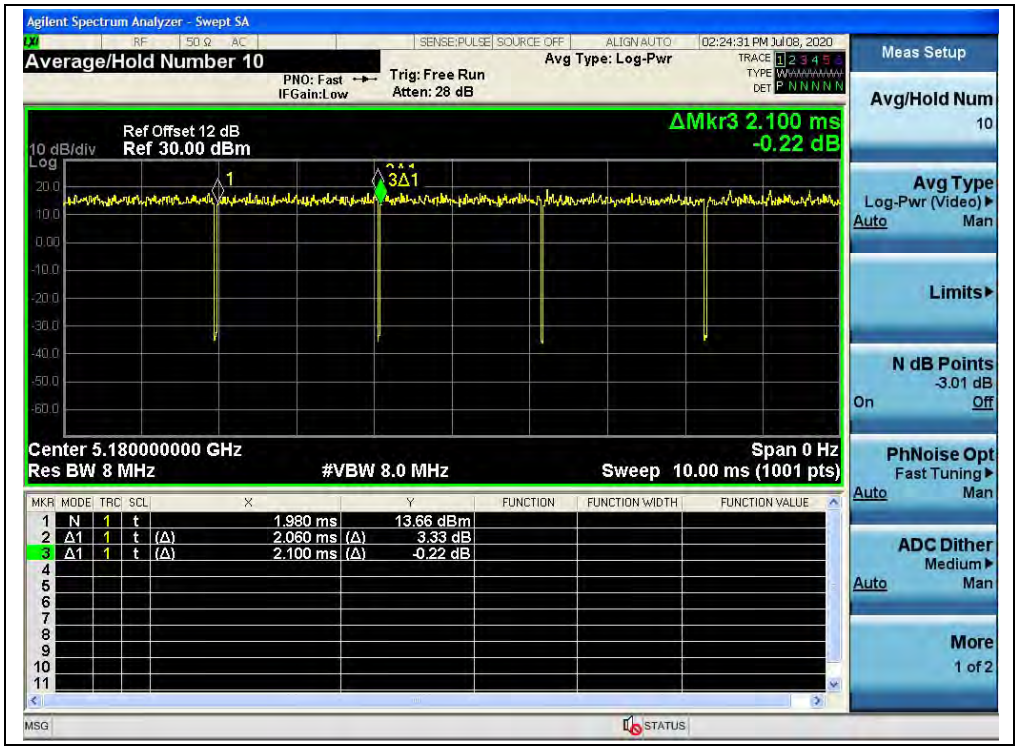
KDB 789033 Section B was used in order to prove compliance.

### 2.2.4.Test Result

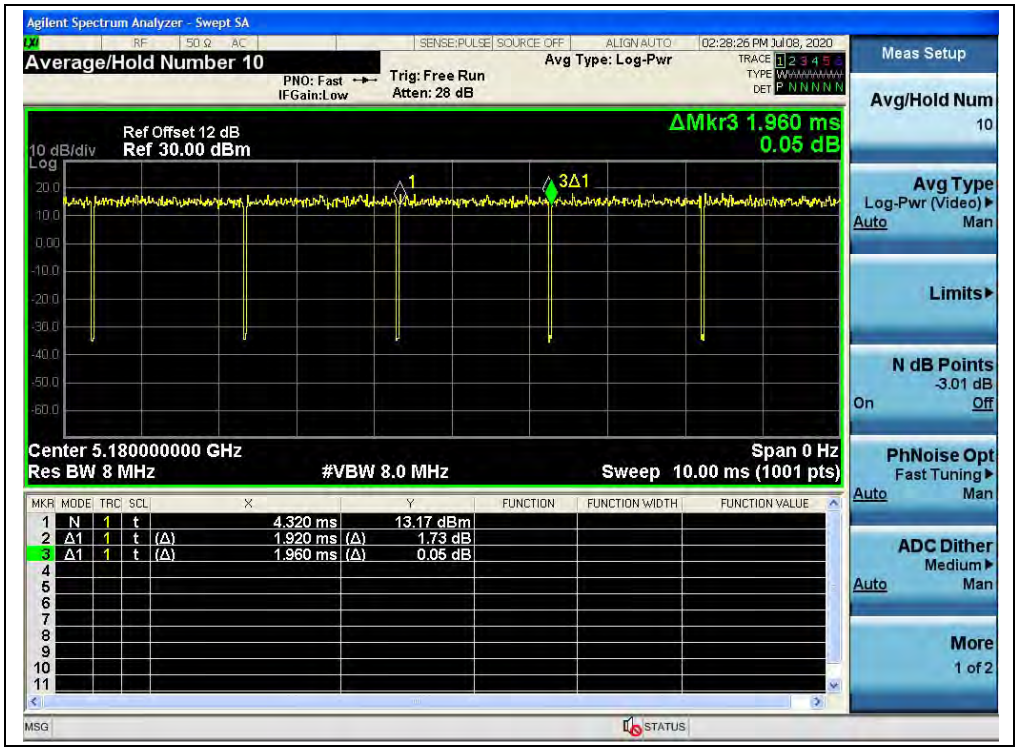
**A.Test Verdict:**

| Test Mode | Duty Cycle (%) (D) | Duty Factor (10*log[1/D]) |
|---|---|---|
| 802.11a | 98.10 | 0.08 |
| 802.11n (HT20) | 97.96 | 0.09 |
| 802.11n (HT40) | 96.94 | 0.13 |
| 802.11ac (VHT20) | 97.96 | 0.09 |
| 802.11ac (VHT40) | 96.97 | 0.13 |
| 802.11ac (VHT80) | 94.00 | 0.27 |

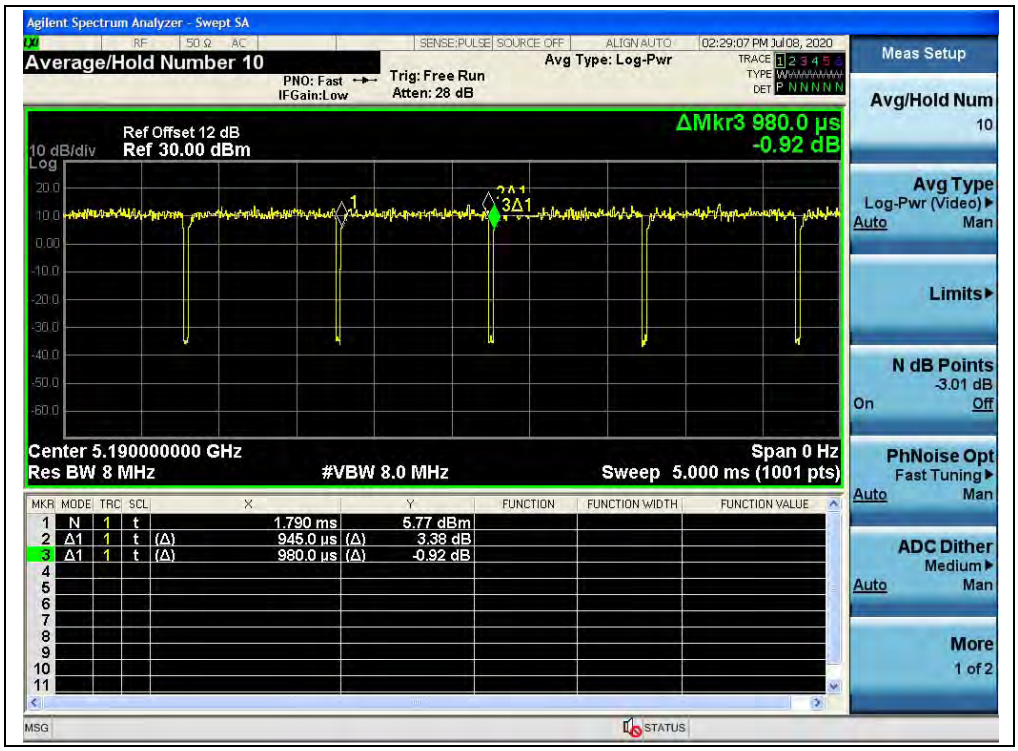
**B.Test Plot:**



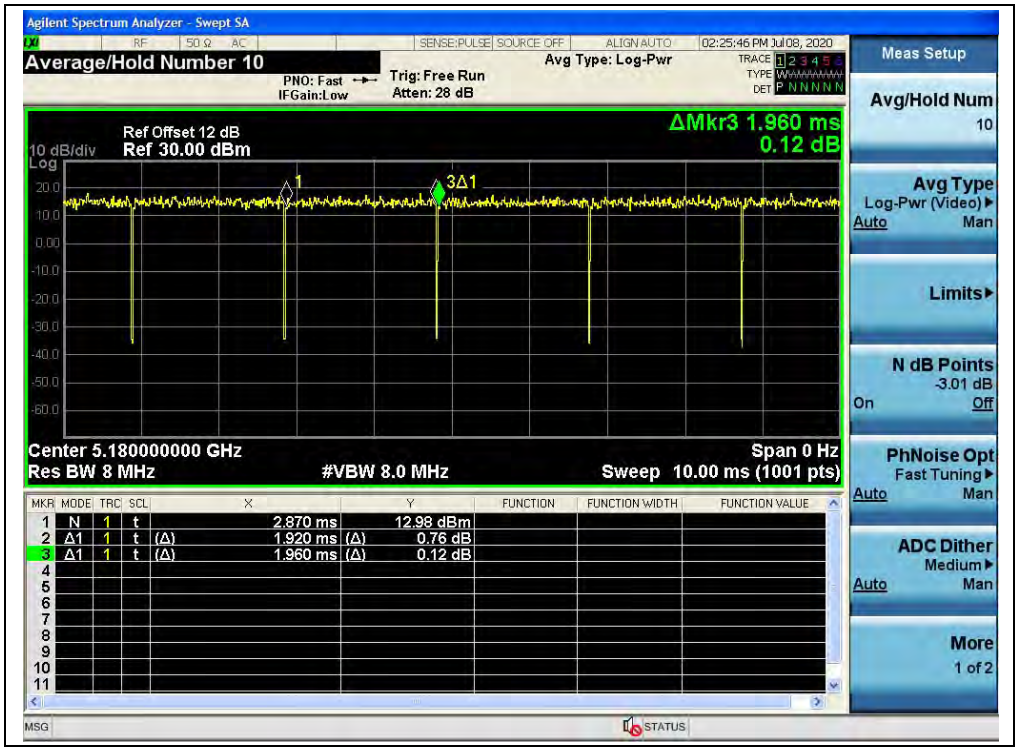

(Channel 36, 5180MHz, 802.11a)



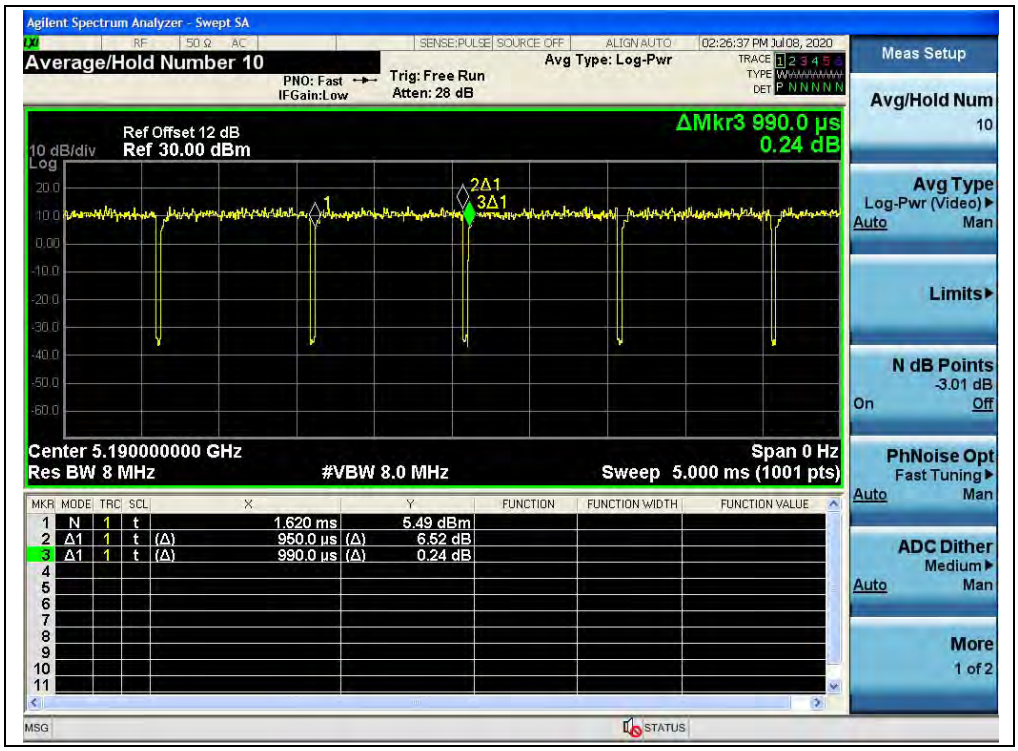

(Channel 36, 5180MHz, 802.11n (HT20))



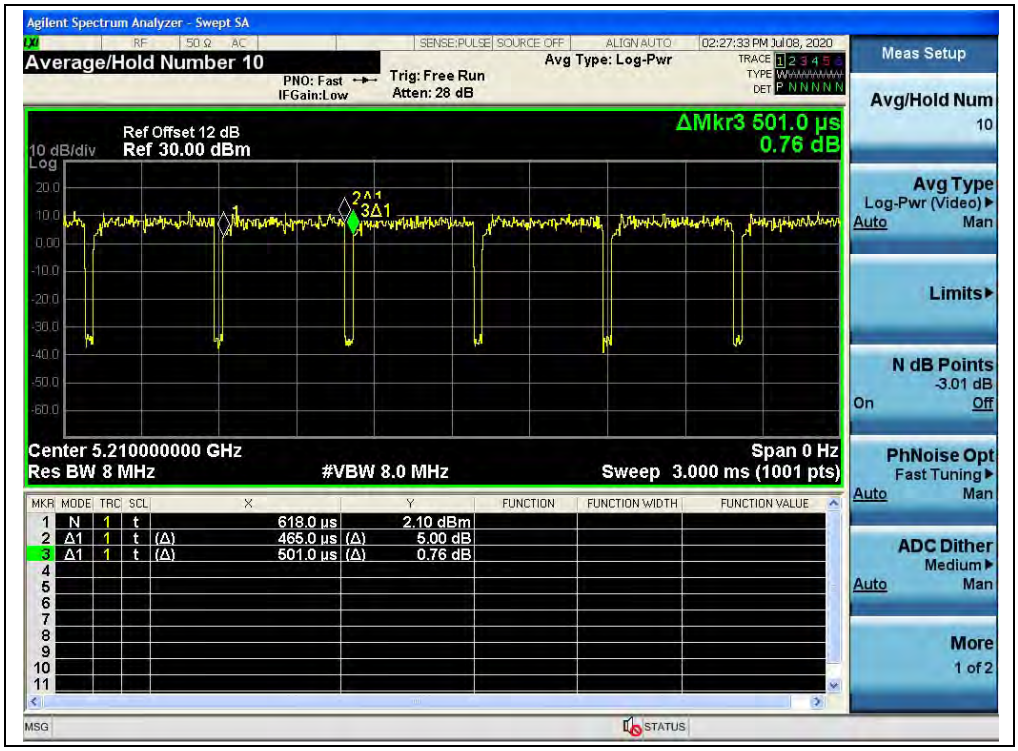

(Channel 38, 5190MHz, 802.11n (HT40))




(Channel 36, 5180MHz, 802.11ac (VHT20))




(Channel 38, 5190MHz, 802.11ac (VHT40))




(Channel 42, 5210MHz, 802.11ac (VHT80))

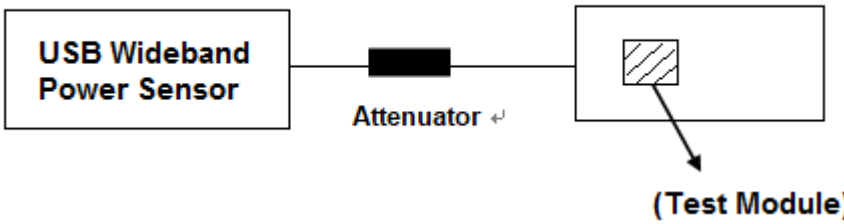
# 2.3. Maximum Conducted Output Power

### 2.3.1.Requirement

(1) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi.
(2)For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.
(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = $G_{ANT}$ +10log($N_{ANT}$)dBi, where $G_{ANT}$ is the antenna gain in dBi, $N_{ANT}$ is the number of outputs.

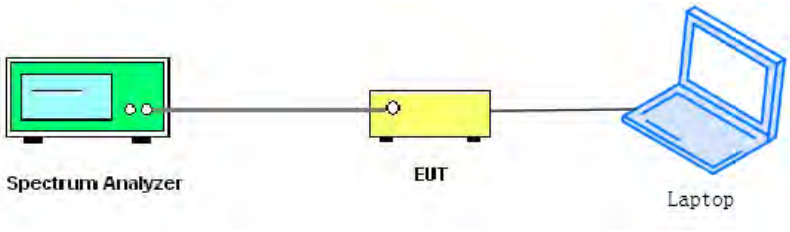
### 2.3.2.Test Description

Section E) 3) of KDB 789033 defines a methodology using a USB Wideband Power Sensor.
**Test Setup:**




The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in USB Wideband Power Sensor.

**For ac (VHT80) mode power**




The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

### 2.3.3.Limits

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

| Mode | Band | Channel (MHz) | 26dB BW (MHz) | 11+10log(26dB BW) | Limits (dBm) |
|---|---|---|---|---|---|
| a | UNII-2a | 5260 | 20.71 | 24.16 | 24.00 |
| | | 5300 | 21.23 | 24.27 | 24.00 |
| | | 5320 | 21.67 | 24.36 | 24.00 |
| | UNII-2c | 5500 | 21.63 | 24.35 | 24.00 |
| | | 5600 | 21.37 | 24.30 | 24.00 |
| | | 5720 | 22.22 | 24.47 | 24.00 |
| n20 | UNII-2a | 5260 | 22.54 | 24.53 | 24.00 |
| | | 5300 | 22.78 | 24.58 | 24.00 |
| | | 5320 | 22.39 | 24.50 | 24.00 |
| | UNII-2c | 5500 | 22.49 | 24.52 | 24.00 |
| | | 5600 | 22.85 | 24.59 | 24.00 |
| | | 5720 | 22.74 | 24.57 | 24.00 |
| ac20 | UNII-2a | 5260 | 22.35 | 24.49 | 24.00 |
| | | 5300 | 22.61 | 24.54 | 24.00 |
| | | 5320 | 22.81 | 24.58 | 24.00 |
| | UNII-2c | 5500 | 22.54 | 24.53 | 24.00 |
| | | 5600 | 22.73 | 24.57 | 24.00 |
| | | 5720 | 22.65 | 24.55 | 24.00 |

### 2.3.4.Test Result

**Maximum Average Conducted Output Power**

**802.11a Mode**

| Frequency (MHz) | Average Power | | | | Limit | | Verdict |
|---|---|---|---|---|---|---|---|
| | Measured | Duty Factor | Duty factor Calculated | | Limit | | Verdict |
| | dBm | | dBm | W | dBm | W | |
| 5180 | 15.81 | 0.08 | 15.89 | 0.039 | 24 | 0.25 | PASS |
| 5220 | 15.94 | | 16.02 | 0.040 | | | |
| 5240 | 16.24 | | 16.32 | 0.043 | | | |
| 5260 | 16.33 | | 16.41 | 0.044 | | | |
| 5300 | 16.38 | | 16.46 | 0.044 | | | |
| 5320 | 16.62 | | 16.70 | 0.047 | | | |
| 5500 | 16.54 | | 16.62 | 0.046 | | | |
| 5600 | 16.90 | | 16.98 | 0.050 | | | |
| 5720 | 16.83 | | 16.91 | 0.049 | | | |
| 5745 | 16.80 | | 16.88 | 0.049 | 30 | 1 | |
| 5785 | 16.85 | | 16.93 | 0.049 | | | |
| 5825 | 17.07 | | **17.15** | **0.052** | | | |

**802.11n (HT20) Mode**

| Frequency (MHz) | Average Power | | | | Limit | | Verdict |
|---|---|---|---|---|---|---|---|
| | Measured | Duty Factor | Duty factor Calculated | | Limit | | Verdict |
| | dBm | | dBm | W | dBm | W | |
| 5180 | 16.23 | 0.09 | 16.32 | 0.043 | 24 | 0.25 | PASS |
| 5220 | 16.16 | | 16.25 | 0.042 | | | |
| 5240 | 16.39 | | 16.48 | 0.044 | | | |
| 5260 | 16.46 | | 16.55 | 0.045 | | | |
| 5300 | 16.59 | | 16.68 | 0.047 | | | |
| 5320 | 16.51 | | 16.60 | 0.046 | | | |
| 5500 | 16.42 | | 16.51 | 0.045 | | | |
| 5600 | 16.78 | | 16.87 | 0.049 | | | |
| 5720 | 16.82 | | 16.91 | 0.049 | | | |
| 5745 | 16.79 | | 16.88 | 0.049 | 30 | 1 | |
| 5785 | 16.85 | | **16.94** | **0.049** | | | |
| 5825 | 16.80 | | 16.89 | 0.049 | | | |

**802.11n (HT40) Mode**

| Frequency (MHz) | Average Power | | | | Limit | | Verdict |
|---|---|---|---|---|---|---|---|
| | Measured | Duty Factor | Duty factor Calculated | | | | |
| | dBm | | dBm | W | dBm | W | |
| 5190 | 14.85 | 0.13 | 14.98 | 0.031 | 24 | 0.25 | PASS |
| 5230 | 14.56 | | 14.69 | 0.029 | | | |
| 5270 | 14.99 | | 15.12 | 0.033 | | | |
| 5310 | 14.99 | | 15.12 | 0.033 | | | |
| 5510 | 15.46 | | 15.59 | 0.036 | | | |
| 5630 | 15.57 | | 15.70 | 0.037 | | | |
| 5710 | 16.22 | | **16.35** | **0.043** | | | |
| 5755 | 15.79 | | 15.92 | 0.039 | 30 | 1 | |
| 5795 | 15.86 | | 15.99 | 0.040 | | | |

**802.11ac (VHT20) Mode**

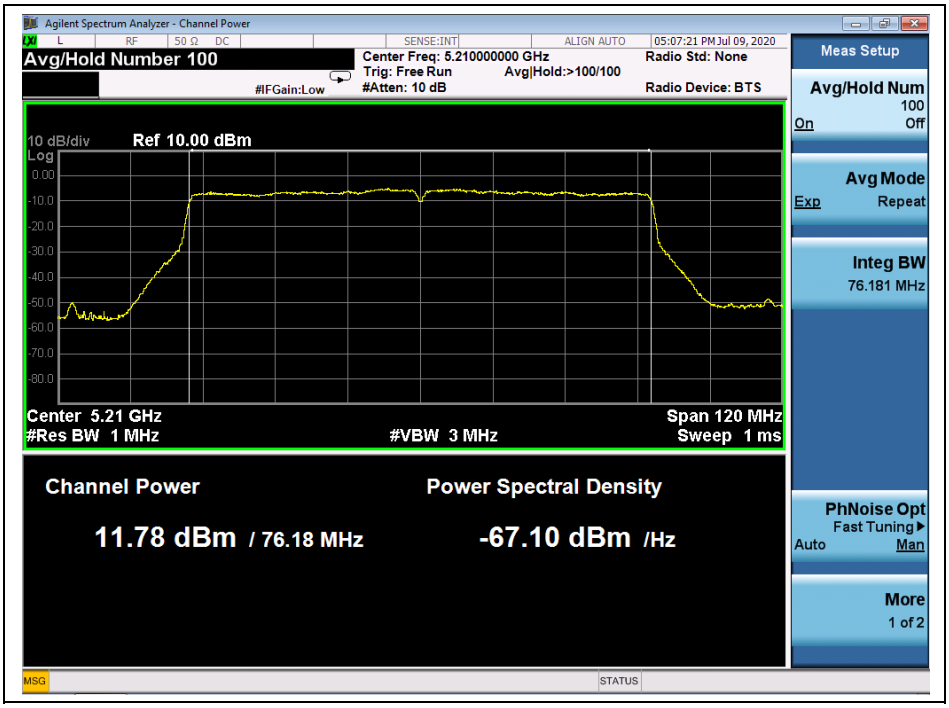
| Frequency (MHz) | Average Power | | | | Limit | | Verdict |
|---|---|---|---|---|---|---|---|
| | Measured | Duty Factor | Duty factor Calculated | | | | |
| | dBm | | dBm | W | dBm | W | |
| 5180 | 14.59 | 0.09 | 14.68 | 0.029 | 24 | 0.25 | PASS |
| 5220 | 14.72 | | 14.81 | 0.030 | | | |
| 5240 | 14.88 | | 14.97 | 0.031 | | | |
| 5260 | 14.85 | | 14.94 | 0.031 | | | |
| 5300 | 14.57 | | 14.66 | 0.029 | | | |
| 5320 | 15.21 | | 15.30 | 0.034 | | | |
| 5500 | 15.33 | | 15.42 | 0.035 | | | |
| 5600 | 15.58 | | 15.67 | 0.037 | | | |
| 5720 | 15.73 | | 15.82 | 0.038 | | | |
| 5745 | 15.60 | | 15.69 | 0.037 | 30 | 1 | |
| 5785 | 15.79 | | **15.88** | **0.039** | | | |
| 5825 | 15.75 | | 15.84 | 0.038 | | | |

**802.11ac (VHT40) Mode**

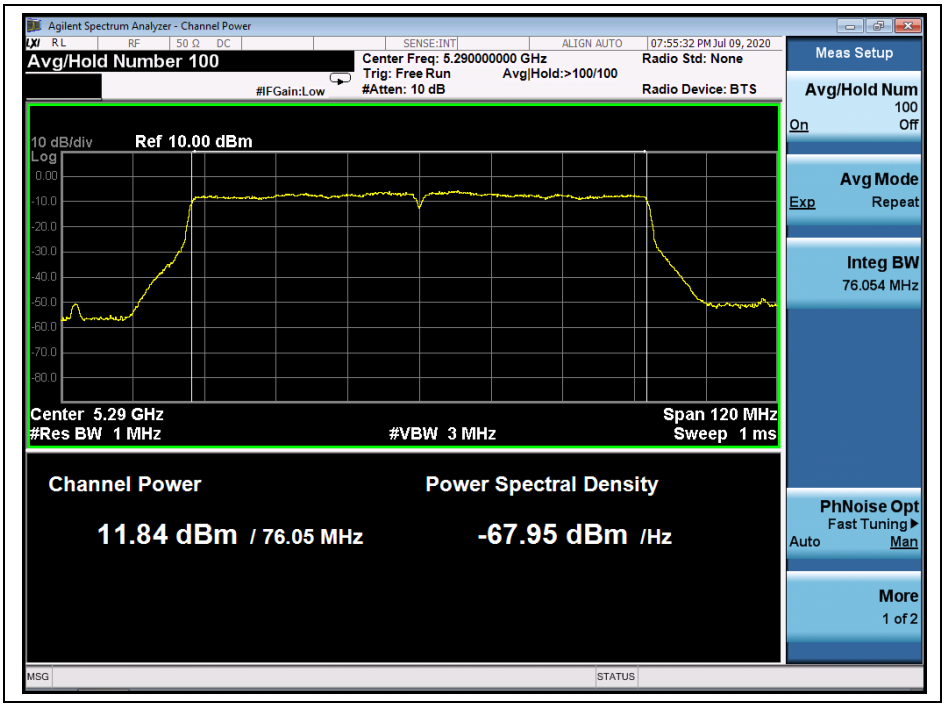
| Frequency (MHz) | Average Power | | | | Limit | | Verdict |
|---|---|---|---|---|---|---|---|
| | Measured | Duty Factor | Duty factor Calculated | | | | |
| | dBm | | dBm | W | dBm | W | |
| 5190 | 15.09 | 0.13 | 15.22 | 0.033 | 24 | 0.25 | PASS |
| 5230 | 14.40 | | 14.53 | 0.028 | | | |
| 5270 | 14.39 | | 14.52 | 0.028 | | | |
| 5310 | 14.66 | | 14.79 | 0.030 | | | |
| 5510 | 14.98 | | 15.11 | 0.032 | | | |
| 5630 | 15.13 | | 15.26 | 0.034 | | | |
| 5710 | 15.43 | | **15.56** | **0.036** | | | |
| 5755 | 15.38 | | 15.51 | 0.036 | 30 | 1 | |
| 5795 | 15.36 | | 15.49 | 0.035 | | | |

**802.11ac (VHT80) Mode**

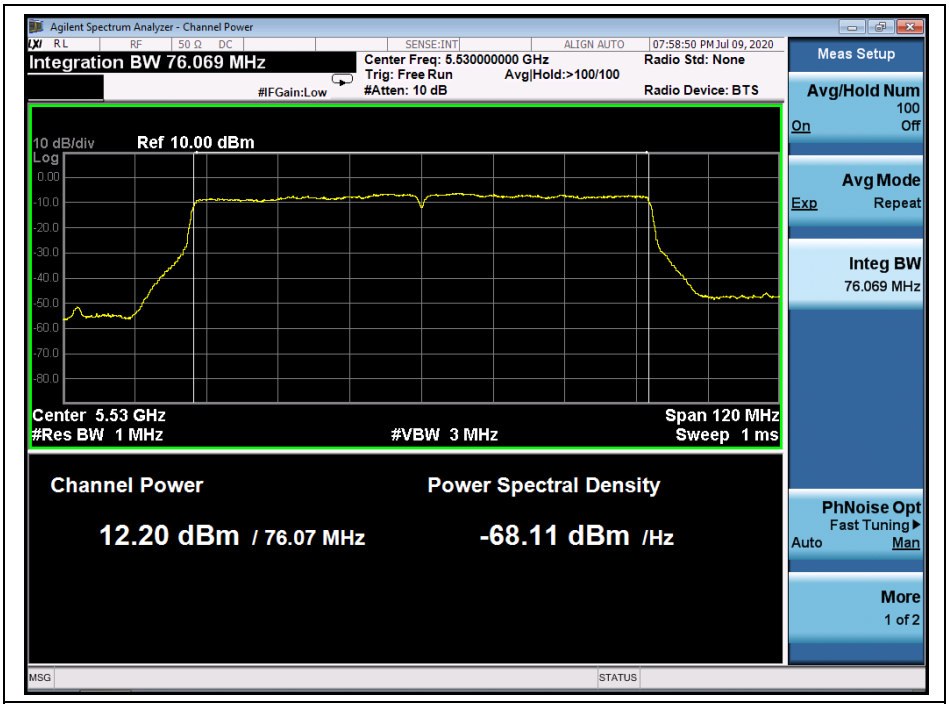
| Frequency (MHz) | Average Power | | | | Limit | | Verdict |
|---|---|---|---|---|---|---|---|
| | Measured | Duty Factor | Duty factor Calculated | | | | |
| | dBm | | dBm | W | dBm | W | |
| 5210 | 11.78 | 0.27 | 12.05 | 0.016 | 24 | 0.25 | PASS |
| 5290 | 11.84 | | 12.11 | 0.016 | | | |
| 5530 | 12.20 | | 12.47 | 0.018 | | | |
| 5610 | 12.45 | | **12.72** | **0.019** | | | |
| 5690 | 12.35 | | 12.62 | 0.018 | | | |
| 5775 | 12.34 | | 12.61 | 0.018 | 30 | 1 | |



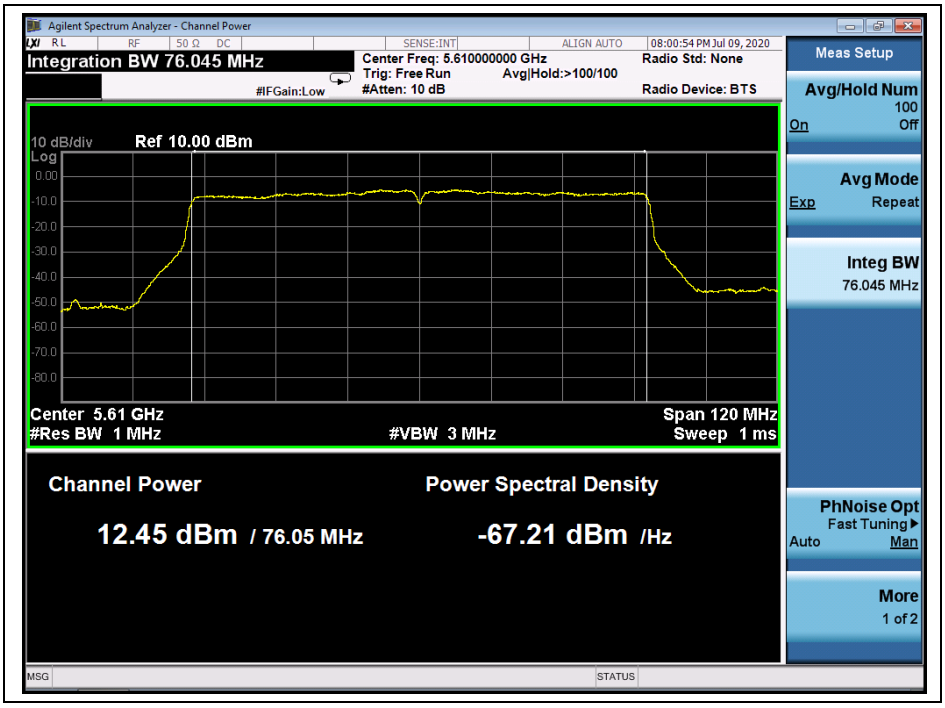

(Channel 42, 5210MHz, 802.11ac (VHT80))



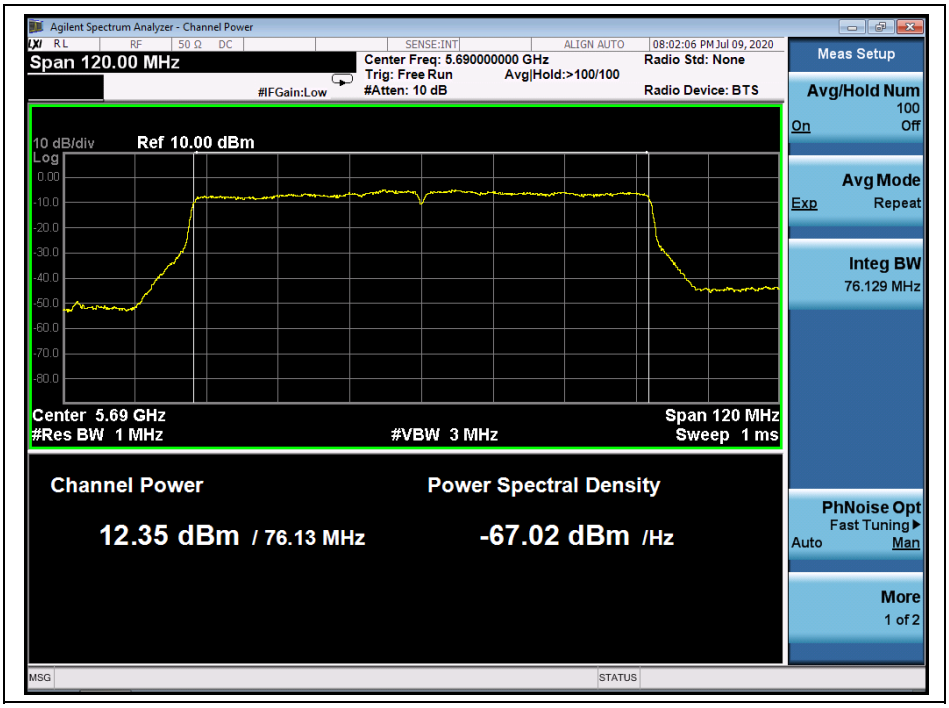

(Channel 58, 5290MHz, 802.11ac (VHT80))



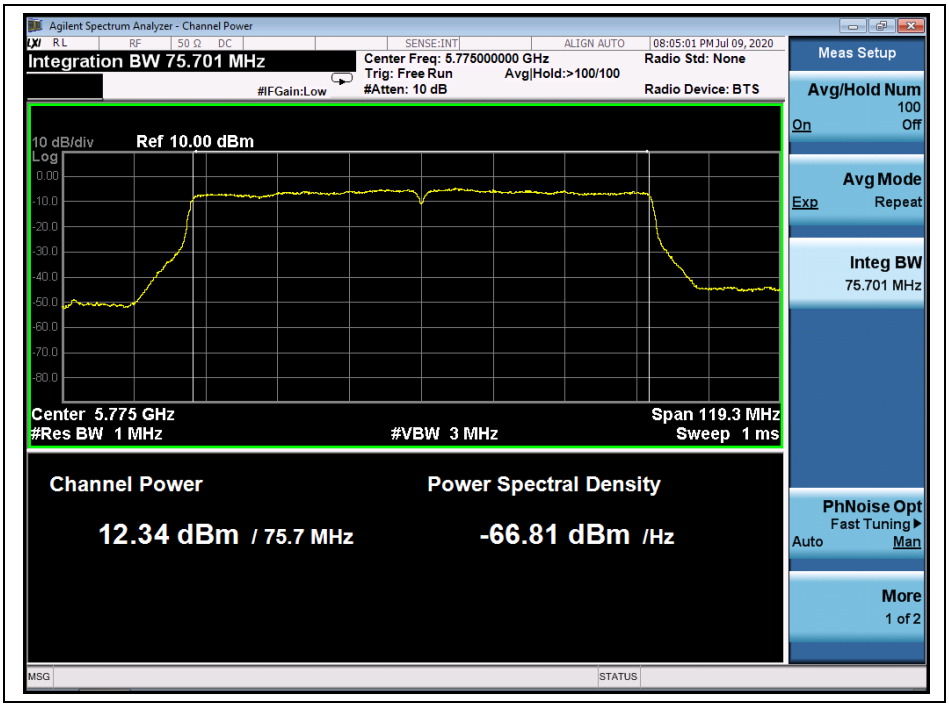

(Channel 106, 5530MHz, 802.11ac (VHT80))




(Channel 122, 5610MHz, 802.11ac (VHT80))




(Channel 138, 5690MHz, 802.11ac (VHT80))




(Channel 155, 5775MHz, 802.11ac (VHT80))

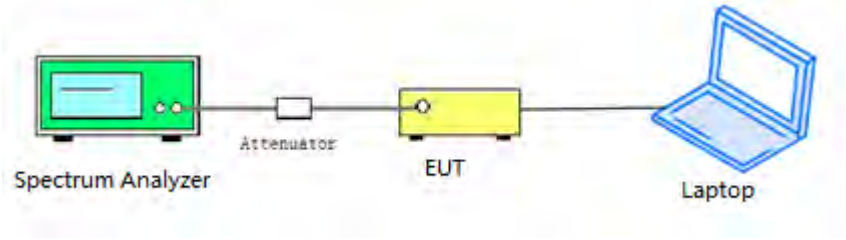
# 2.4. Emission Bandwidth

### 2.4.1.Requirement

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement. Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### 2.4.2.Test Description

**Test Setup:**




The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

### 2.4.3.Test Procedure

1. KDB 789033 Section C) 1) Emission Bandwidth was used in order to prove compliance
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
2. KDB 789033 Section C) 2) minimum emission bandwidth for the band 5.725-5.85GHz was used in order to prove compliance.
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for theband5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
b) Set video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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.

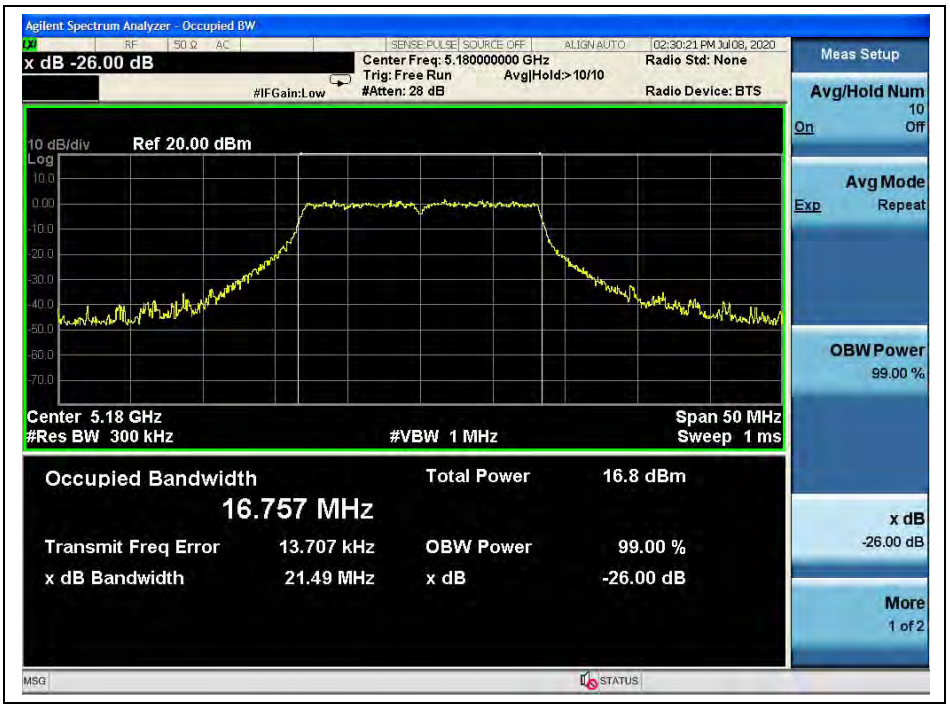
### 2.4.4.Test Result

**802.11a Mode**

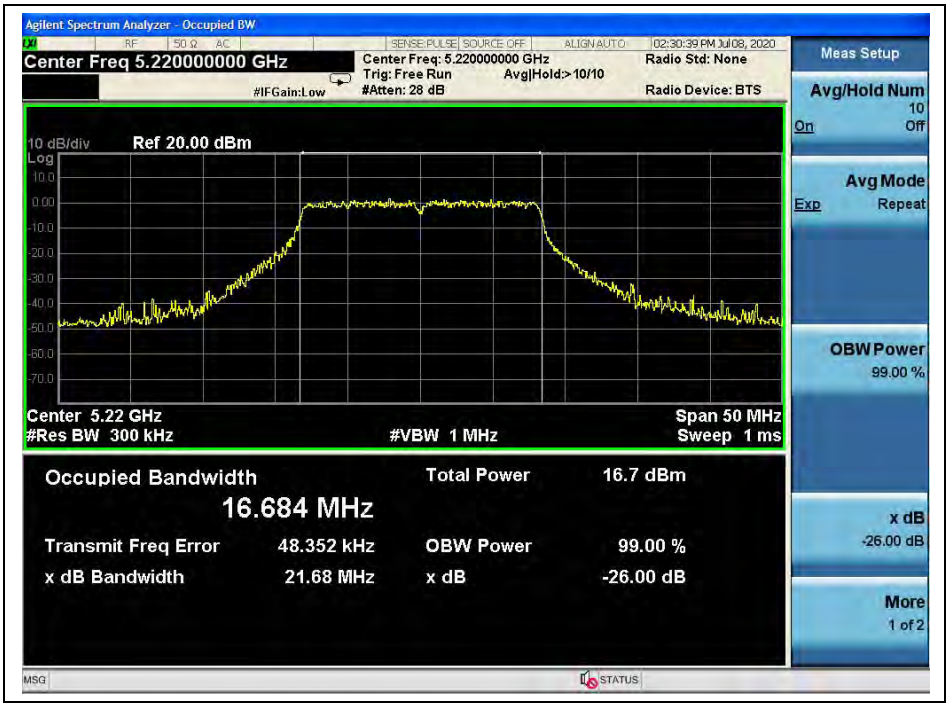
**A.Test Verdict:**

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| 36 | 5180 | 21.49 |
| 44 | 5220 | 21.68 |
| 48 | 5240 | 21.58 |
| 52 | 5260 | 20.71 |
| 60 | 5300 | 21.23 |
| 64 | 5320 | 21.67 |
| 100 | 5500 | 21.63 |
| 120 | 5600 | 21.37 |
| 144 | 5720 | 22.22 |
| **Channel** | **Frequency (MHz)** | **6 dB Bandwidth (MHz)** |
| 144 | 5720 | 15.67 |
| 149 | 5745 | 15.41 |
| 157 | 5785 | 16.42 |
| 165 | 5825 | 16.36 |

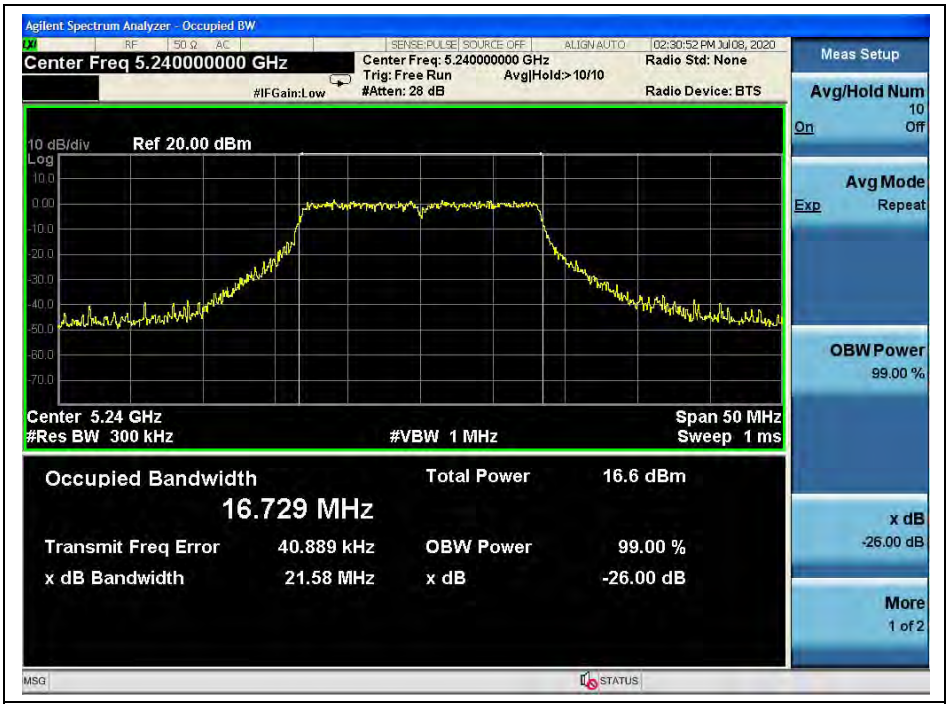
**B.Test Plot:**



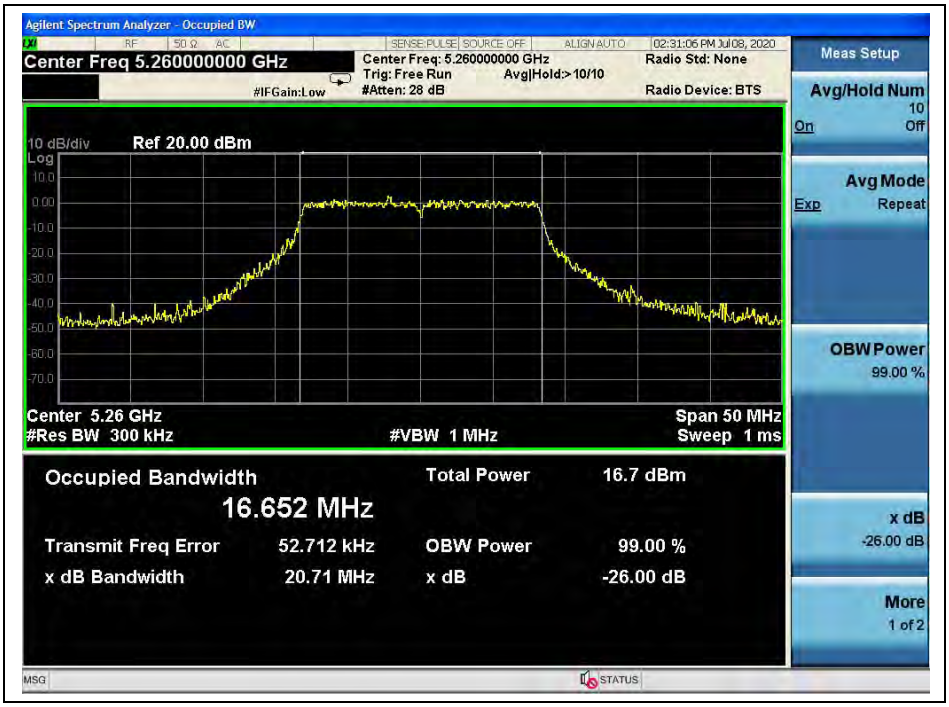

(Channel 36, 5180MHz, 802.11a)



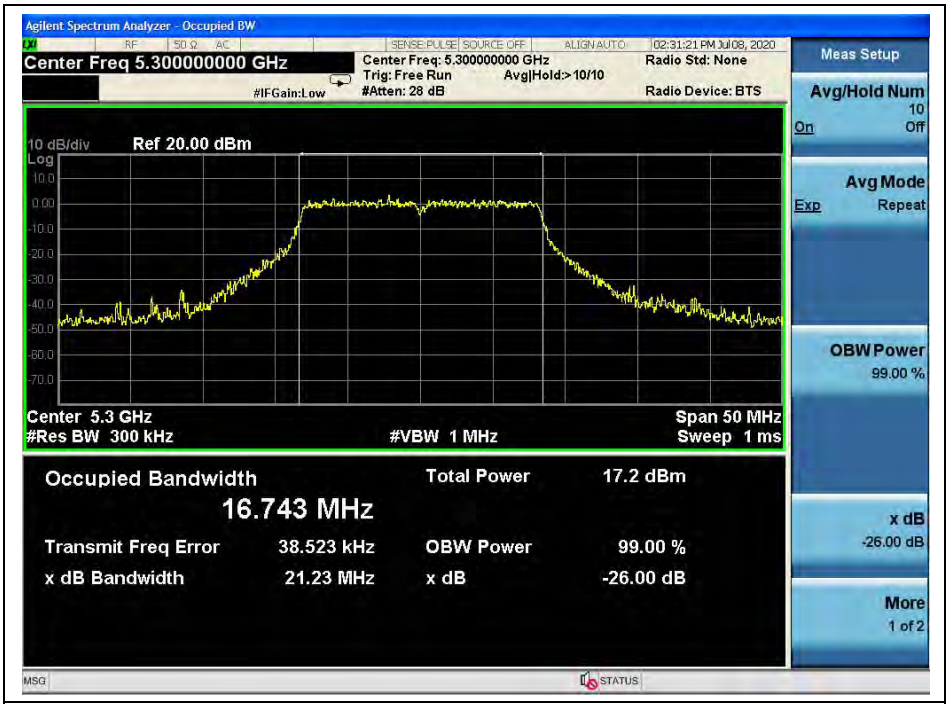

(Channel 44, 5220 MHz, 802.11a)




(Channel 48, 5240MHz, 802.11a)



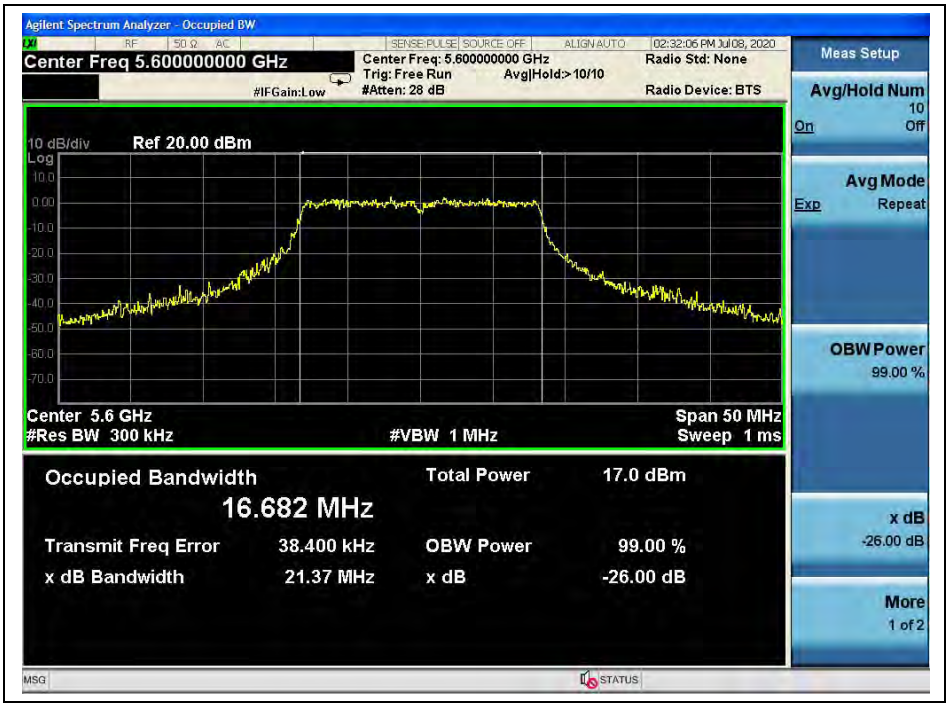

(Channel 52,5260MHz, 802.11a)



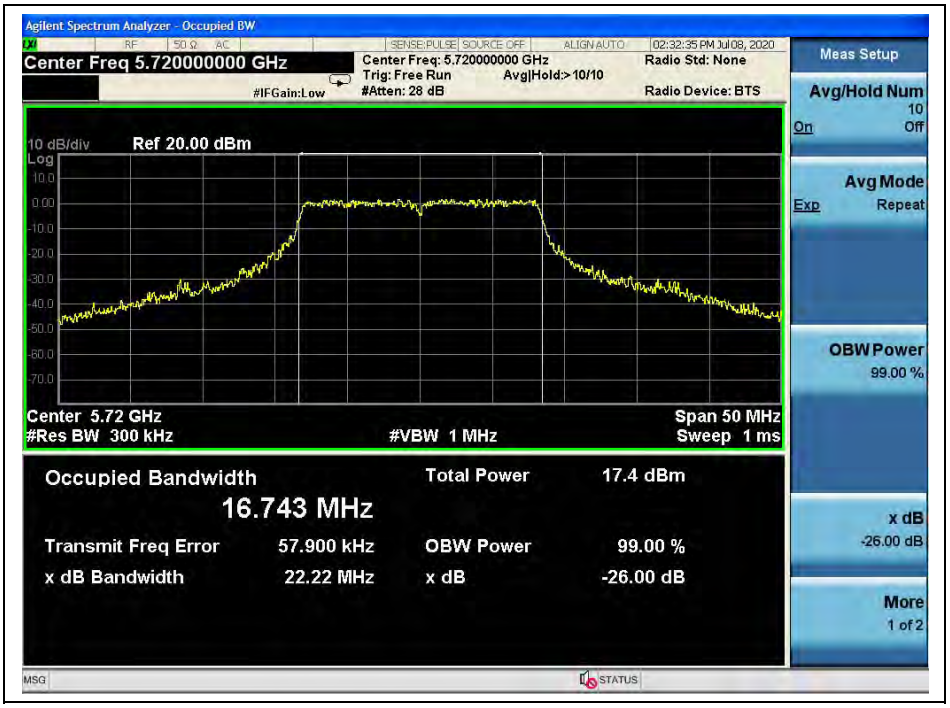

(Channel 60, 5300 MHz, 802.11a)


(Channel 64, 5320MHz, 802.11a)


(Channel 100,5500MHz, 802.11a)

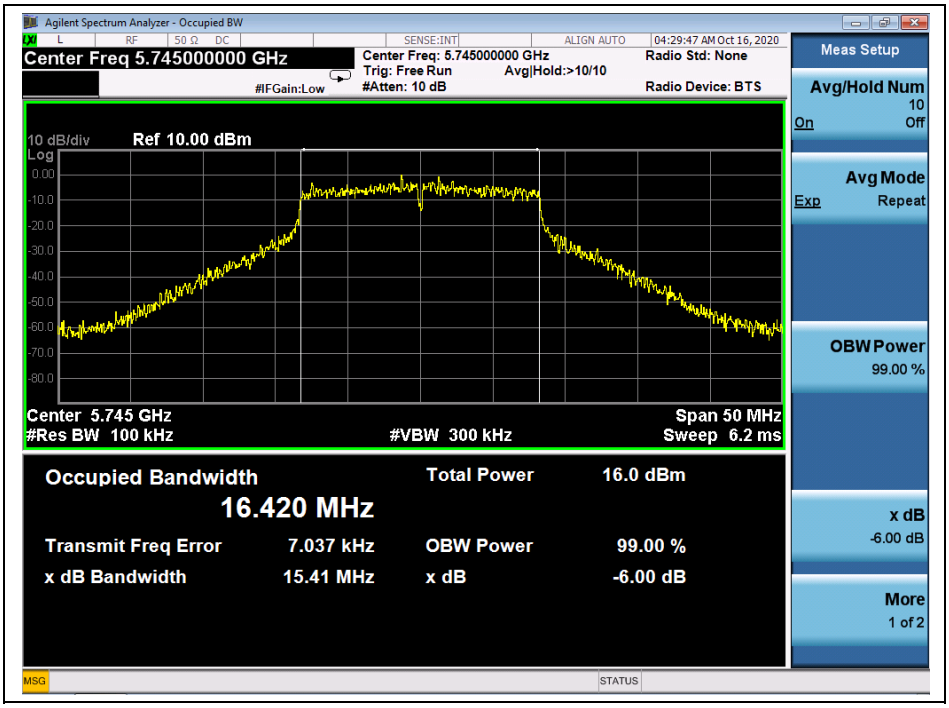



(Channel 120, 5600 MHz, 802.11a)

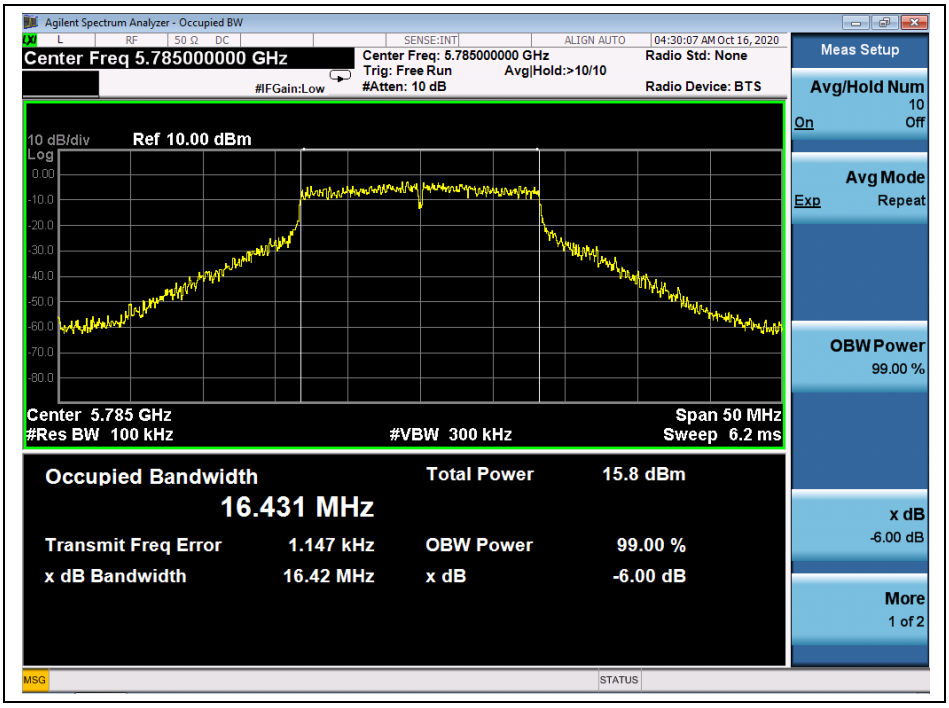



(Channel 144, 5720MHz, 802.11a)

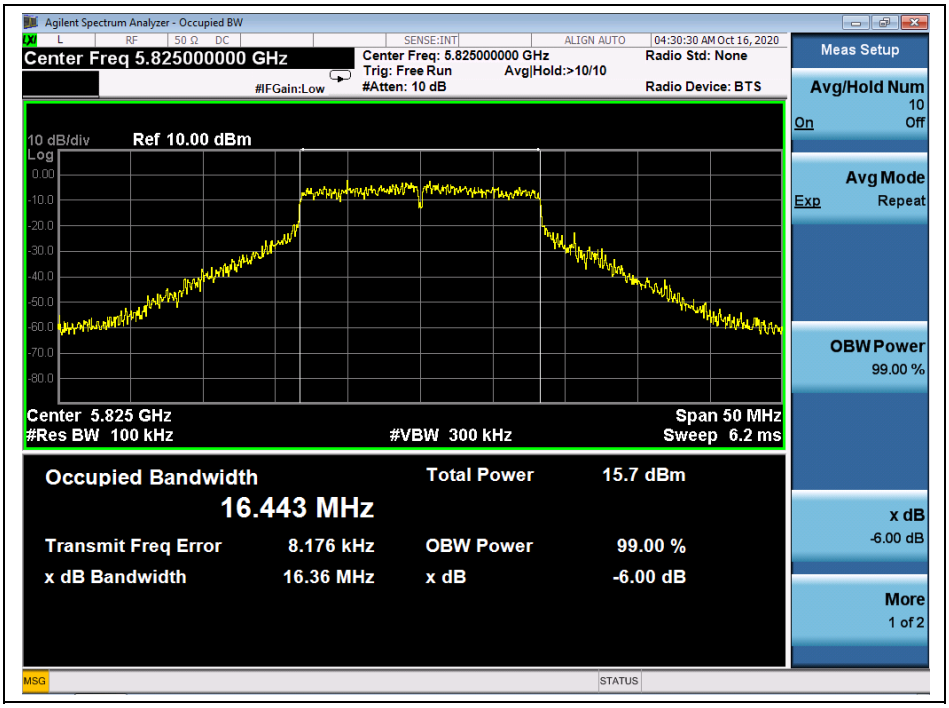

(Channel 144, 5720MHz, 802.11a)




(Channel 149,5745MHz, 802.11a)




(Channel 157,5785MHz, 802.11a)



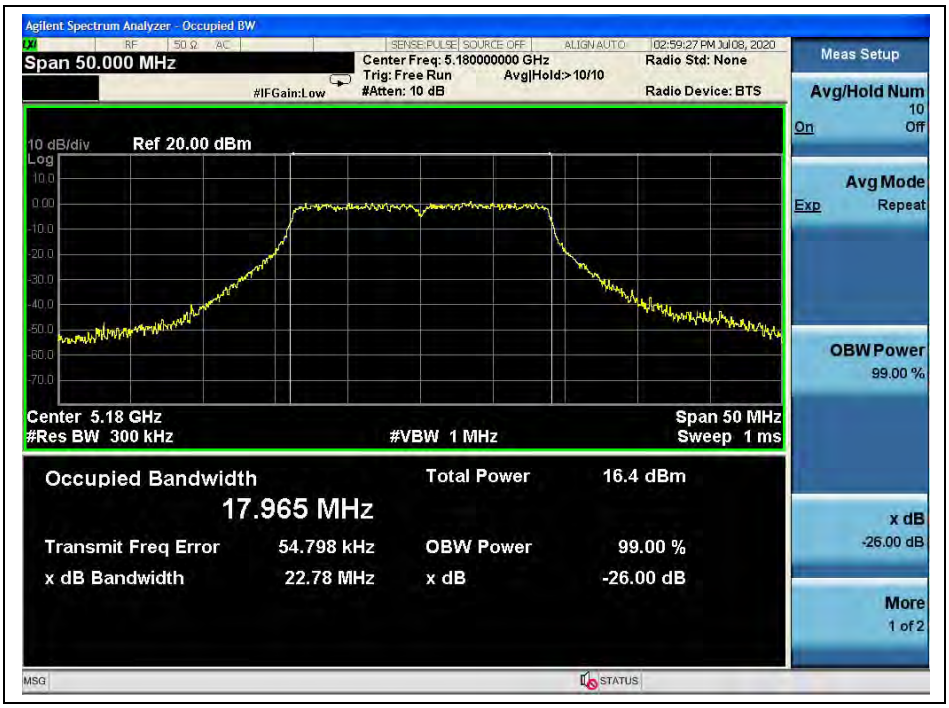

(Channel 165, 5825MHz, 802.11a)

## 802.11n (HT20) Mode

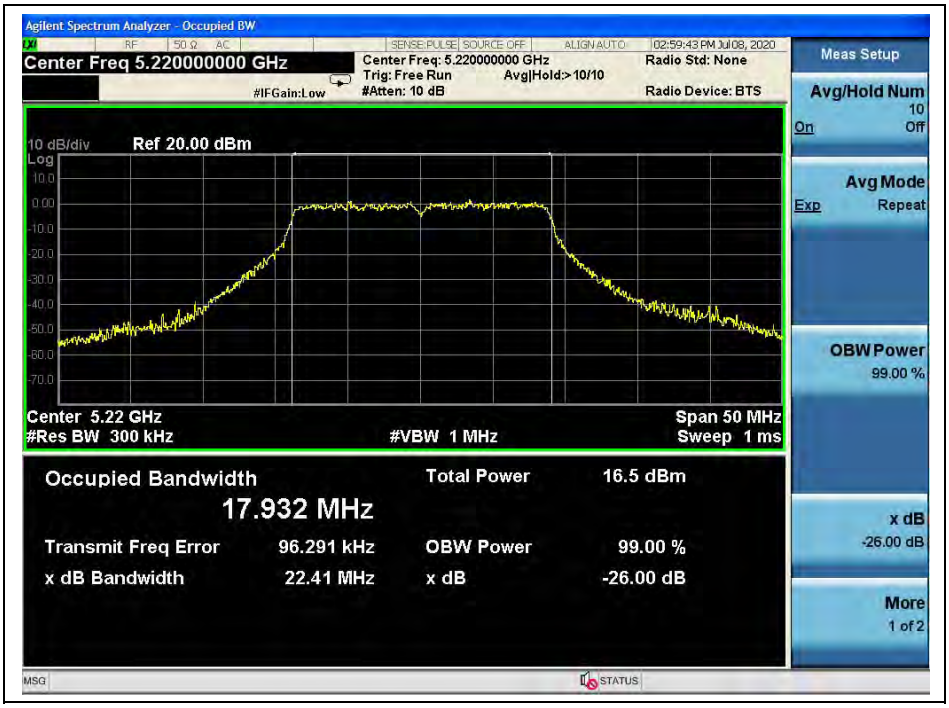
### A.Test Verdict:

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| 36 | 5180 | 22.78 |
| 44 | 5220 | 22.41 |
| 48 | 5240 | 22.59 |
| 52 | 5260 | 22.54 |
| 60 | 5300 | 22.78 |
| 64 | 5320 | 22.39 |
| 100 | 5500 | 22.49 |
| 120 | 5600 | 22.85 |
| 144 | 5720 | 22.74 |
| **Channel** | **Frequency (MHz)** | **6 dB Bandwidth (MHz)** |
| 144 | 5720 | 17.63 |
| 149 | 5745 | 15.63 |
| 157 | 5785 | 17.18 |
| 165 | 5825 | 17.60 |

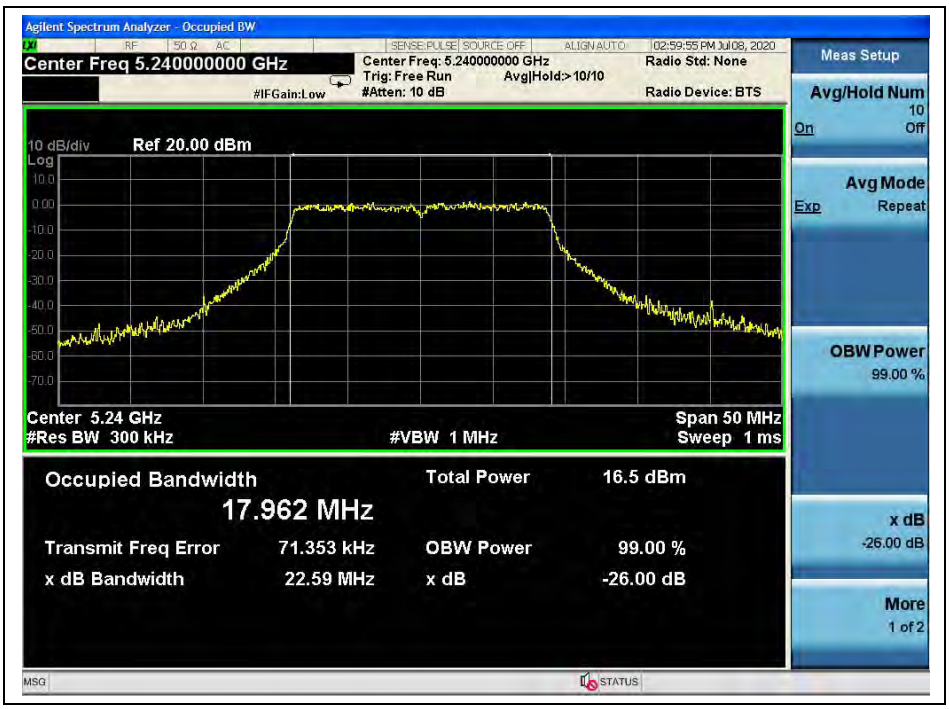
### B.Test Plot:



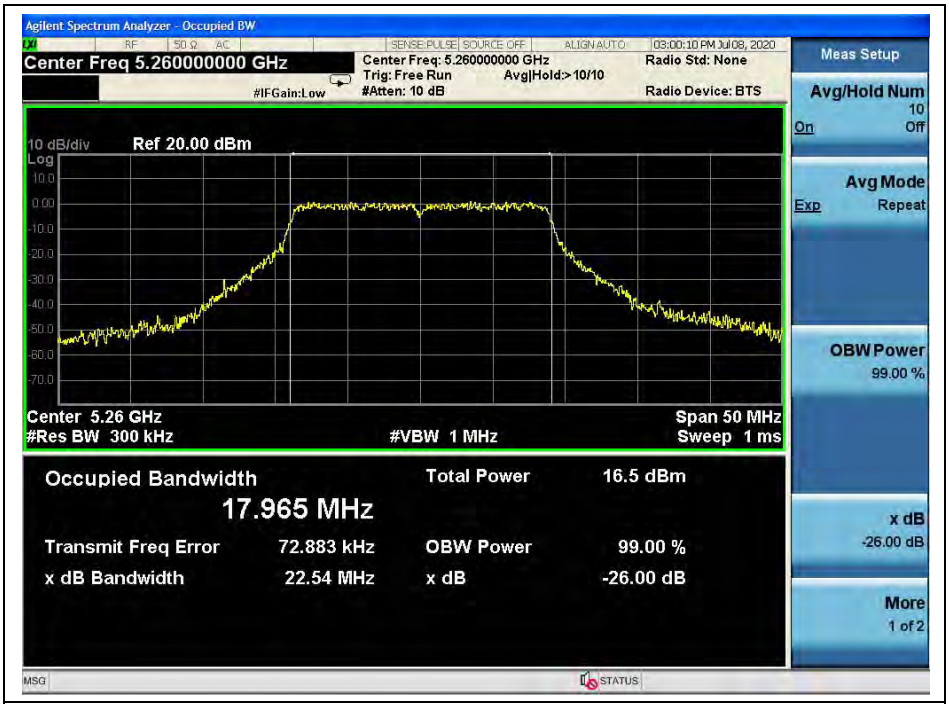

(Channel 36, 5180MHz, 802.11n (HT20))



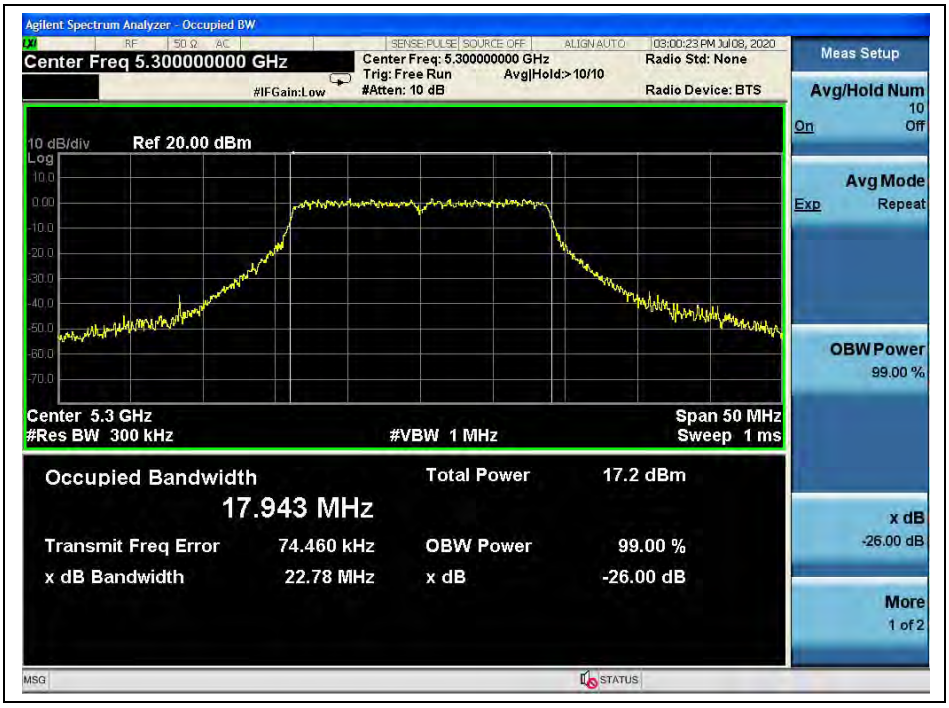

(Channel 44, 5220MHz, 802.11n (HT20))



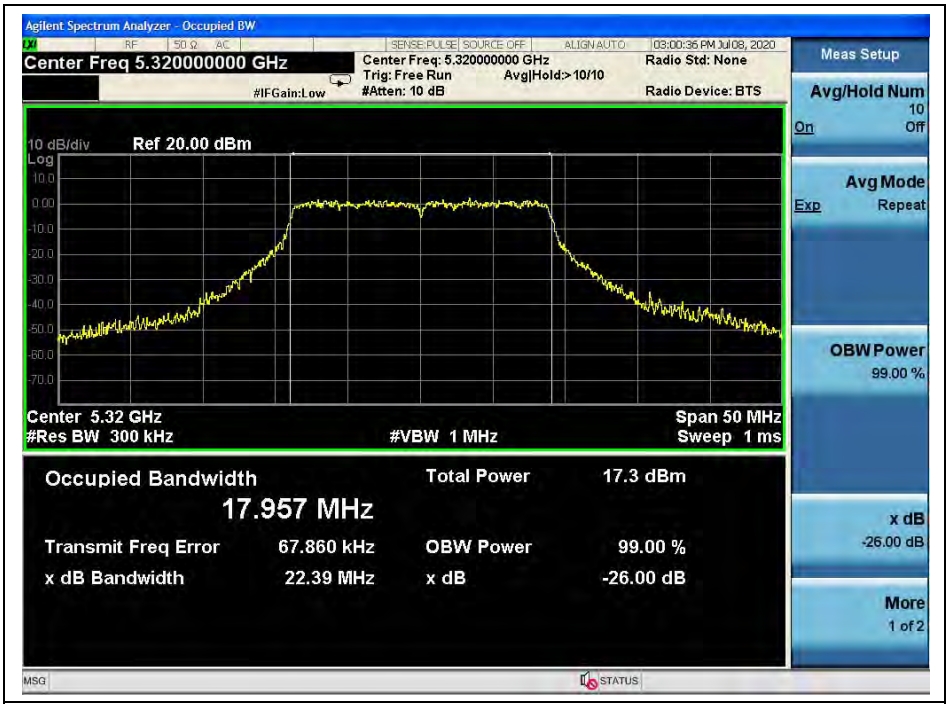

(Channel 48, 5240MHz, 802.11n (HT20))



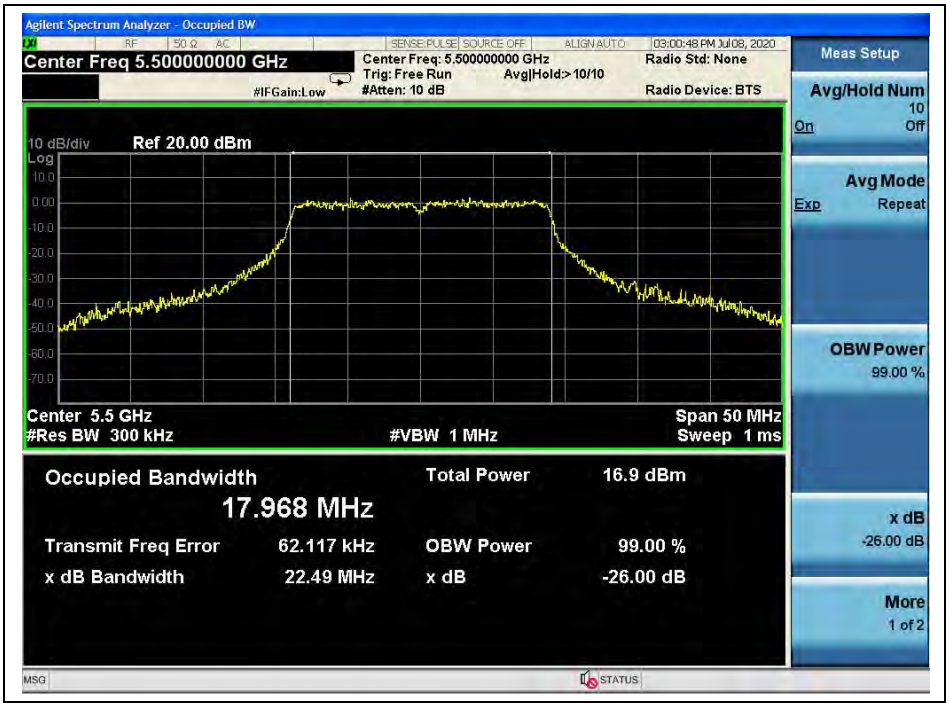

(Channel 52, 5260MHz, 802.11n (HT20))




(Channel 60, 5300MHz, 802.11n (HT20))

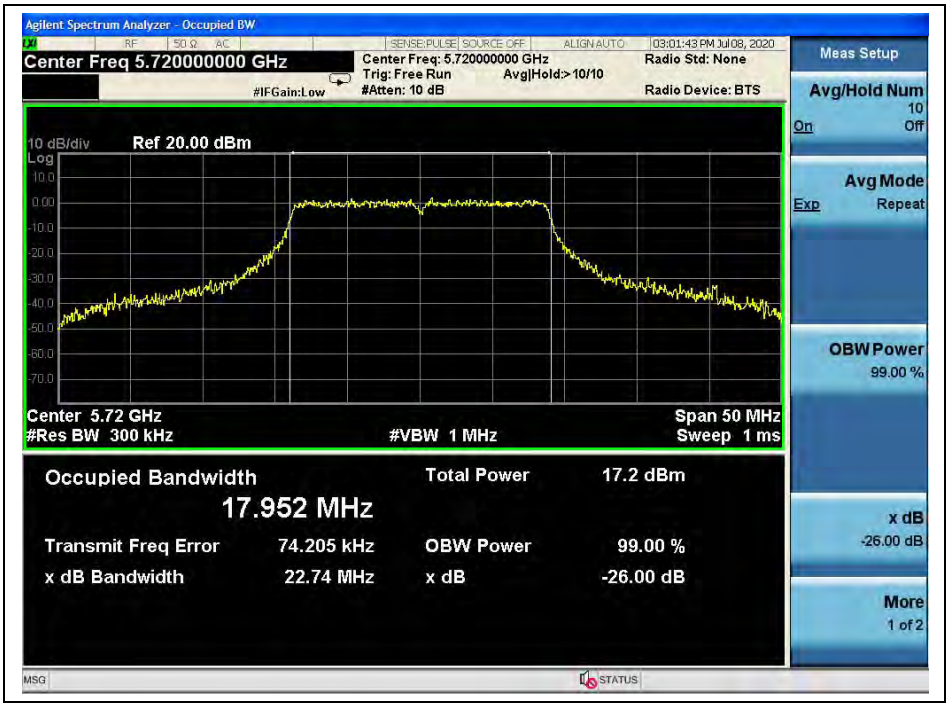



(Channel 64, 5320MHz, 802.11n (HT20))

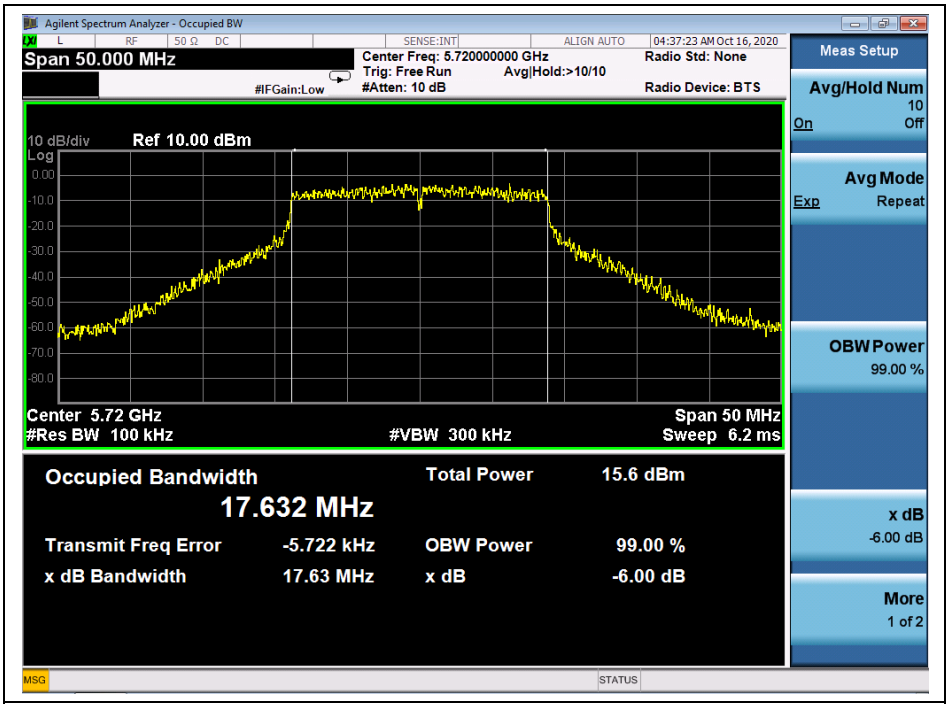



(Channel 100, 5500MHz, 802.11n (HT20))

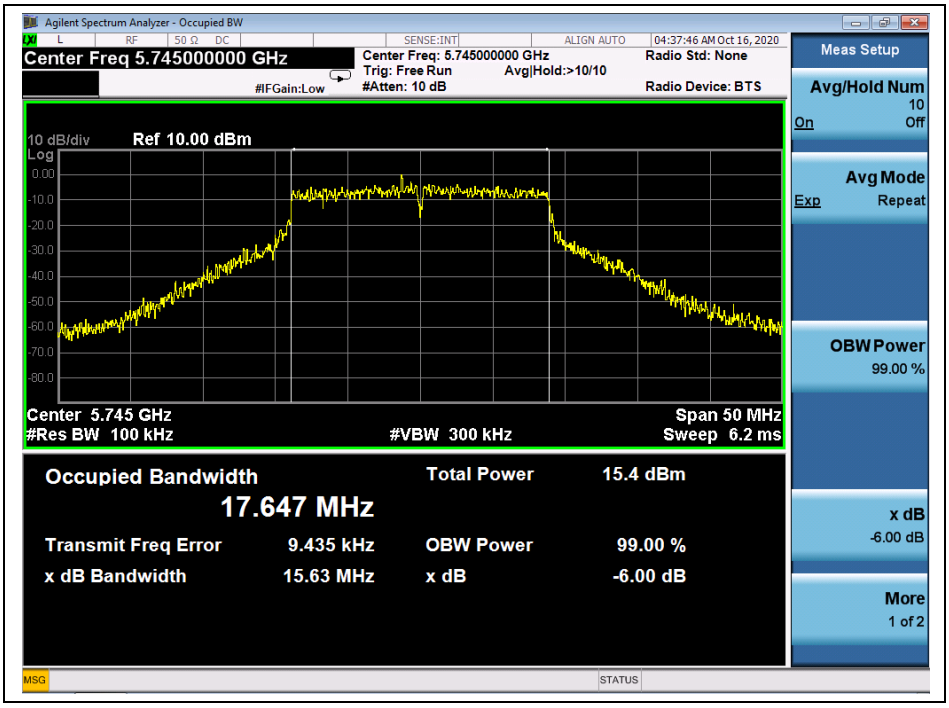

(Channel 120, 5600MHz, 802.11n (HT20))



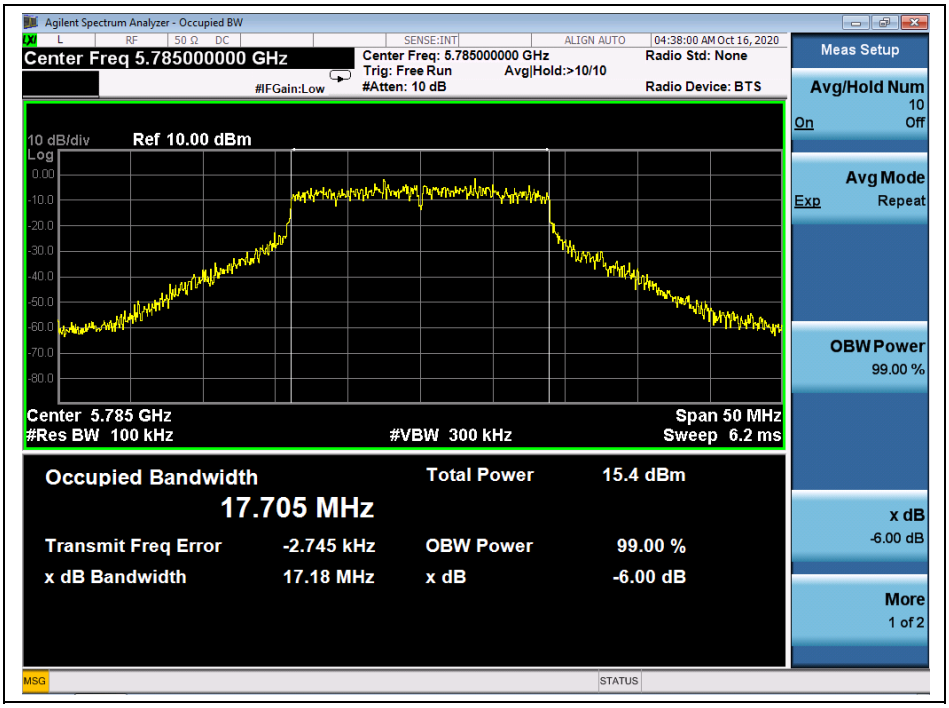

(Channel 144, 5720MHz, 802.11n (HT20))



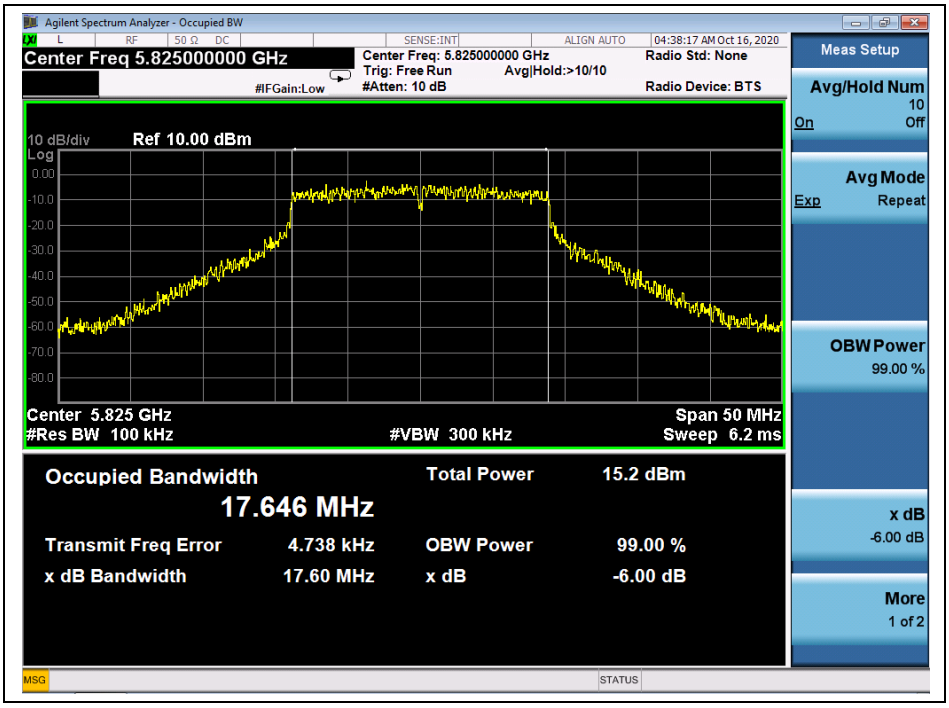

(Channel 144, 5720MHz, 802.11 n (HT20))




(Channel 149, 5745MHz, 802.11 n (HT20))




(Channel 157, 5785MHz, 802.11 n (HT20))



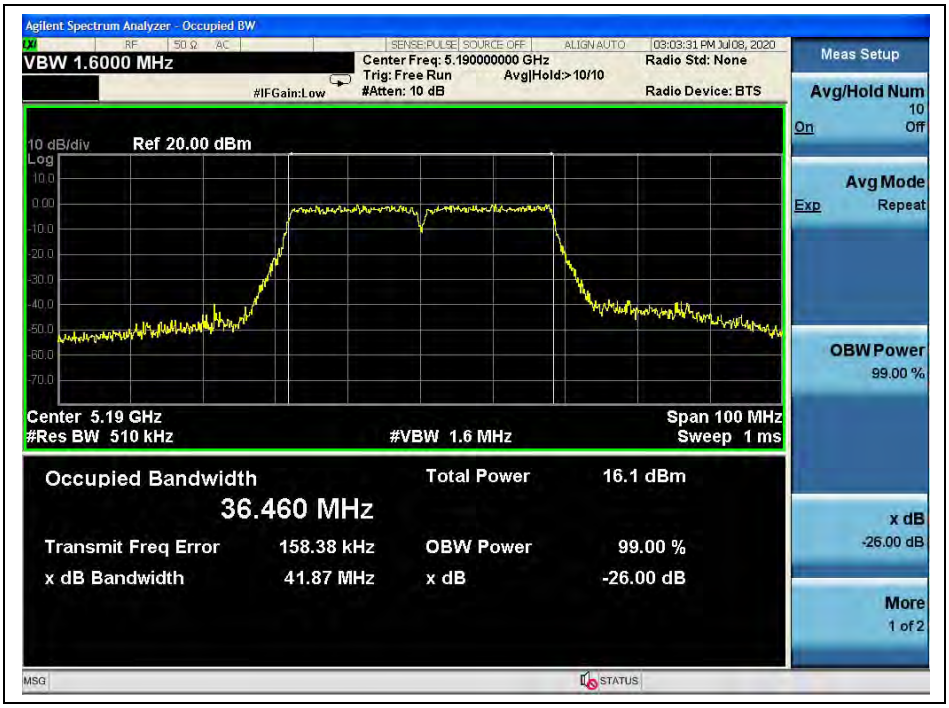

(Channel 165, 5825MHz, 802.11 n (HT20))

**802.11n (HT40) Test mode**

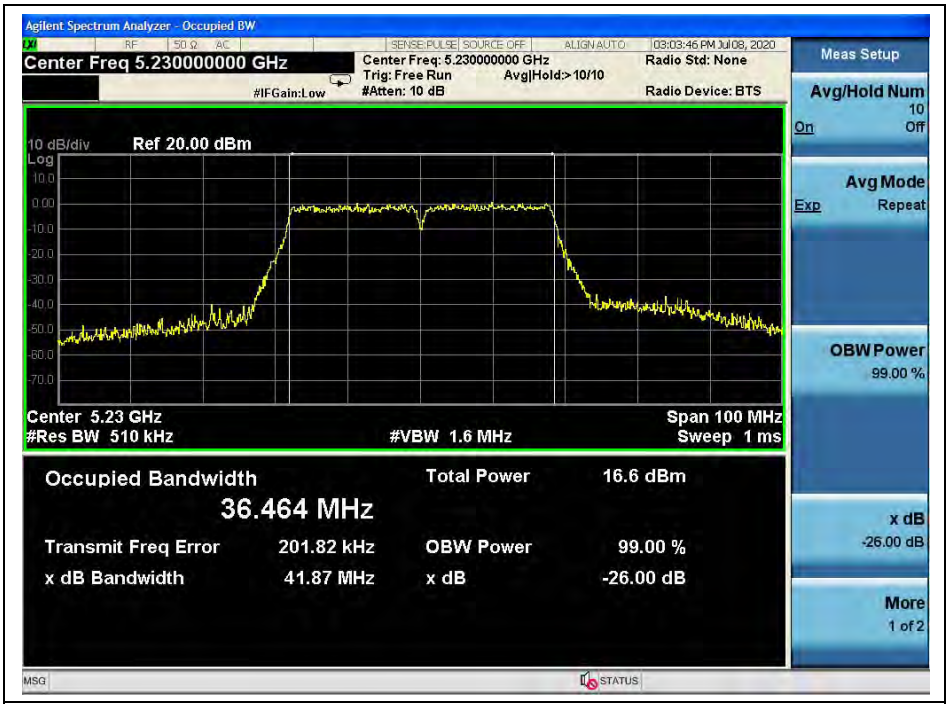
**A.Test Verdict:**

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| 38 | 5190 | 41.87 |
| 46 | 5230 | 41.87 |
| 54 | 5270 | 41.60 |
| 62 | 5310 | 41.83 |
| 102 | 5510 | 42.36 |
| 126 | 5630 | 42.19 |
| 142 | 5710 | 41.90 |
| **Channel** | **Frequency (MHz)** | **6 dB Bandwidth (MHz)** |
| 142 | 5710 | 36.35 |
| 151 | 5755 | 36.37 |
| 159 | 5795 | 36.23 |

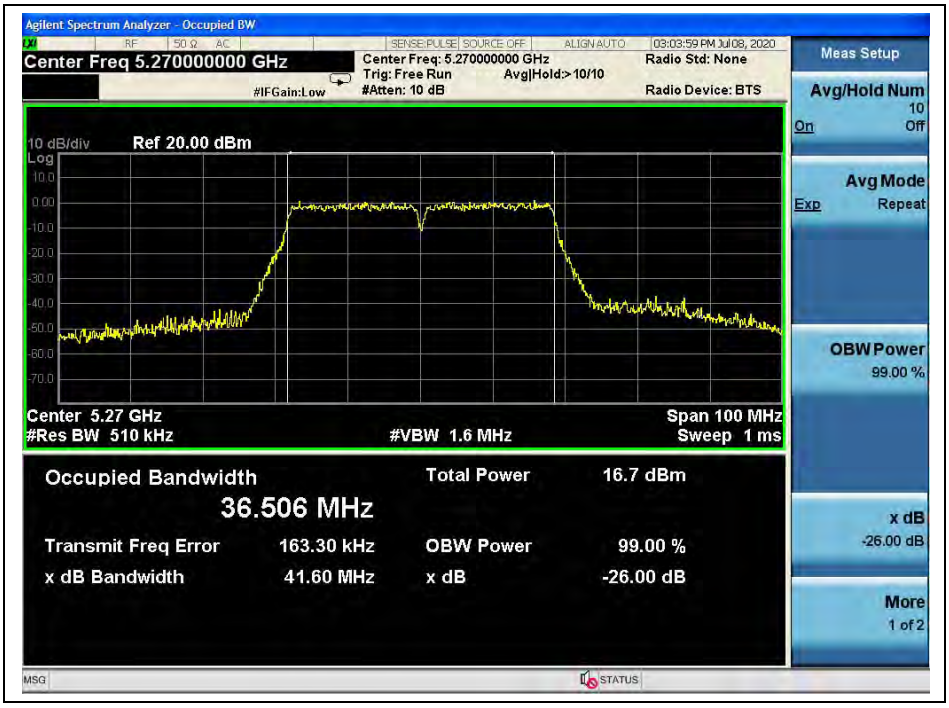
**B.Test Plot:**



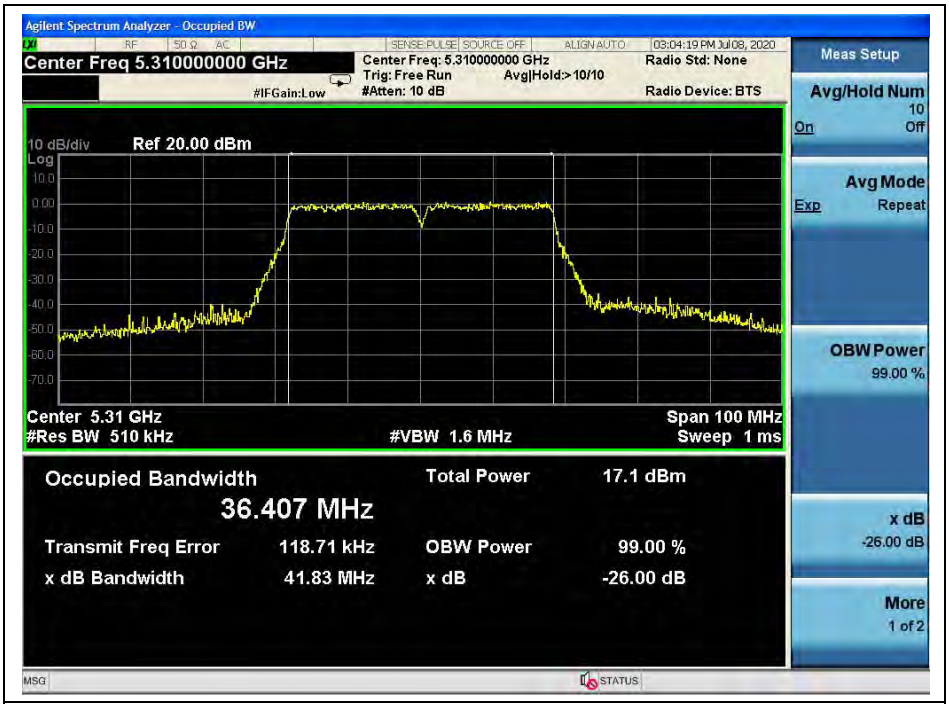

(Channel 38, 5190MHz, 802.11n (HT40))



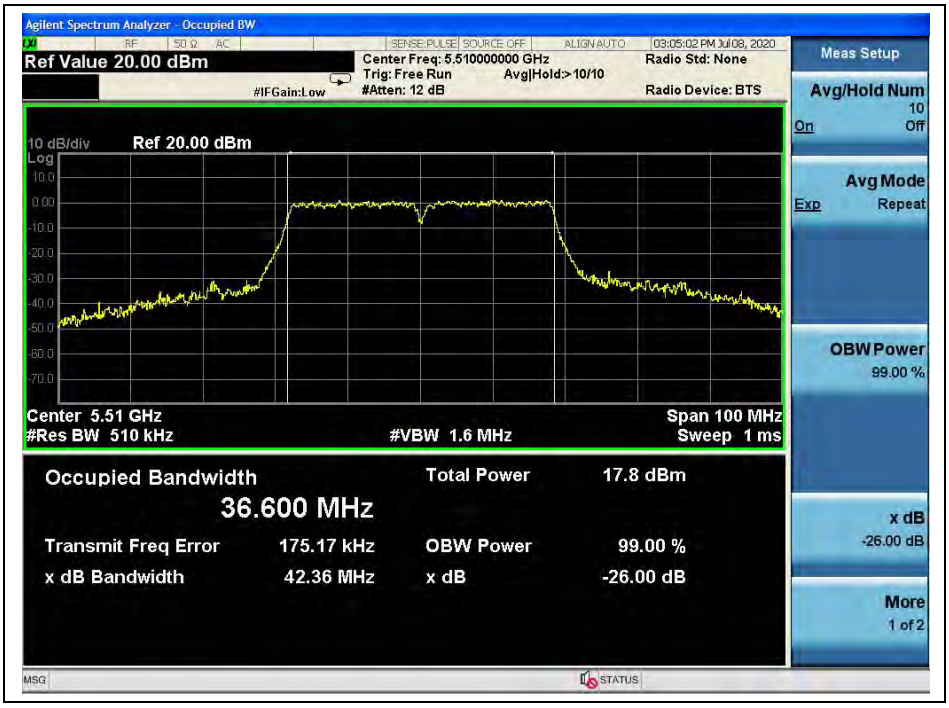

(Channel 46, 5230MHz, 802.11n (HT40))




(Channel 54, 5270MHz, 802.11n (HT40))

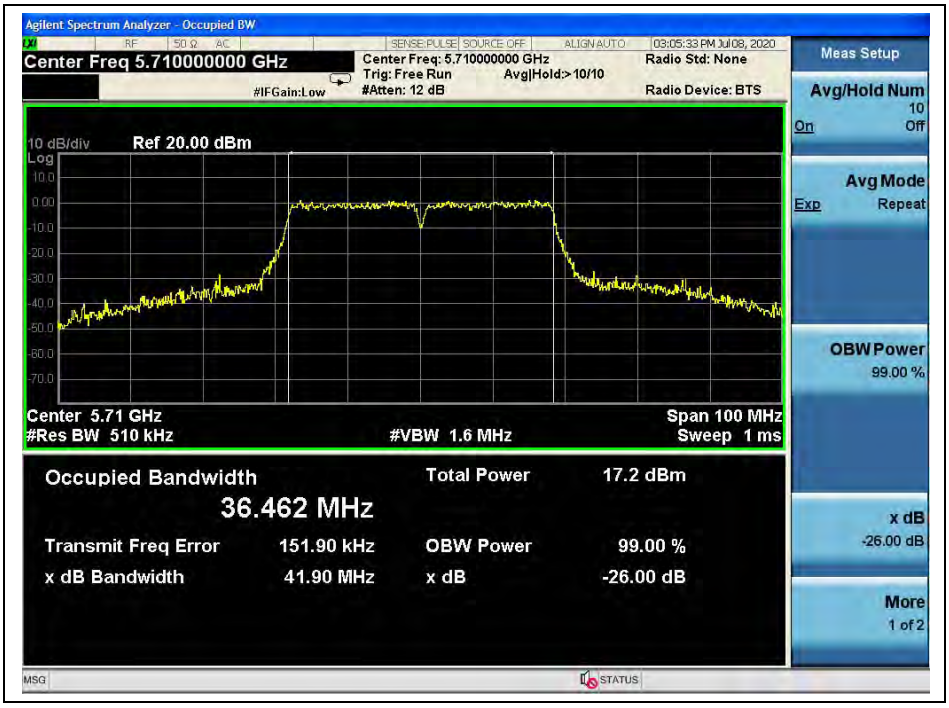



(Channel 62, 5310MHz, 802.11n (HT40))

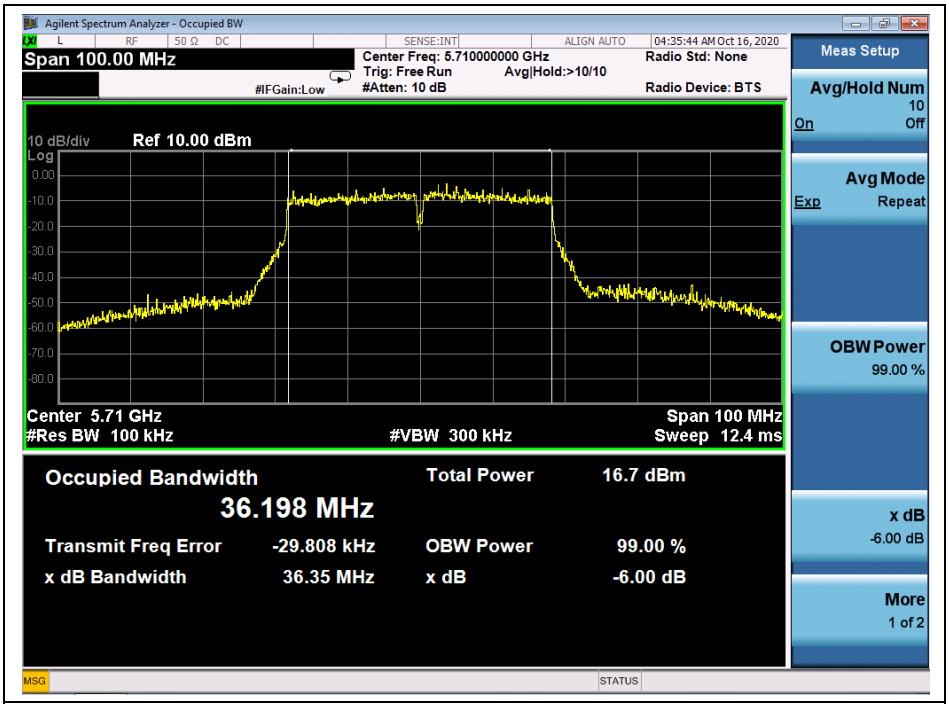



(Channel 102, 5510MHz, 802.11n (HT40))

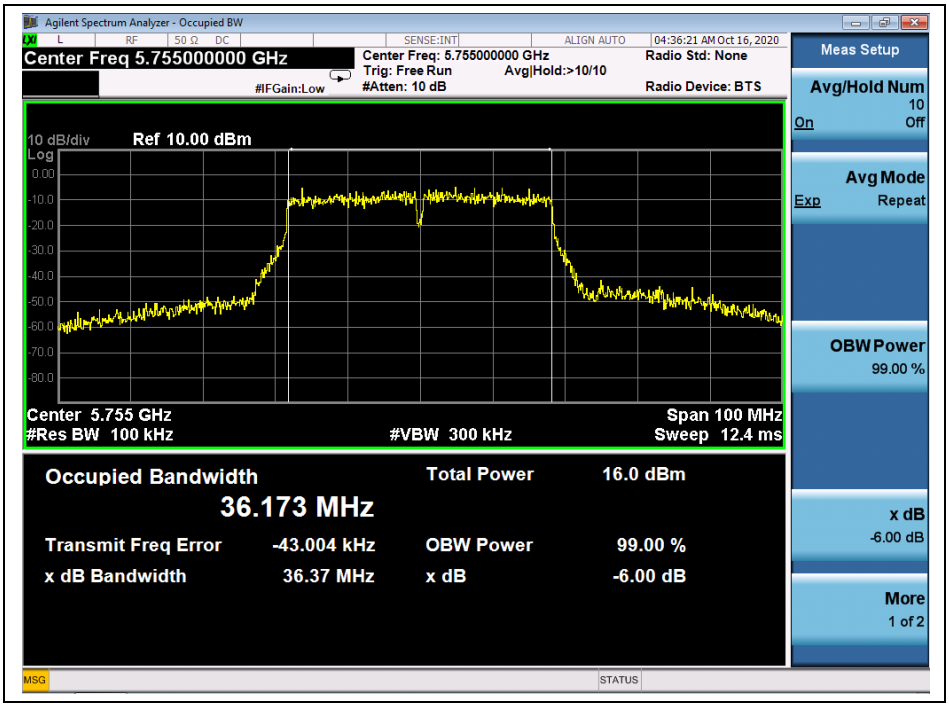

(Channel 126, 5630MHz, 802.11n (HT40))



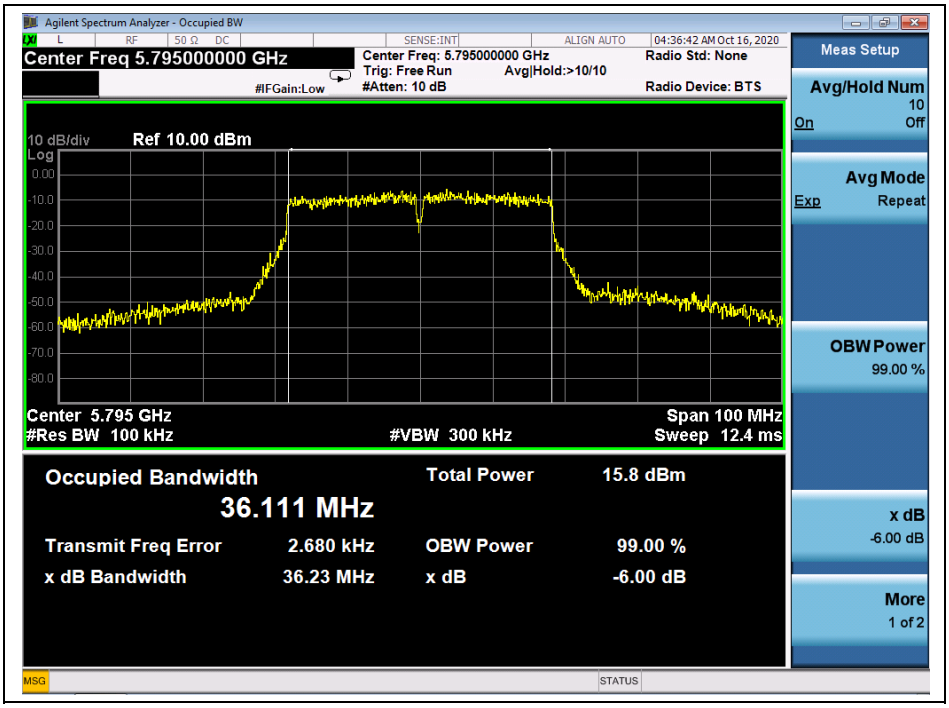

(Channel 142, 5710MHz, 802.11n (HT40))




(Channel 142, 5710MHz, 802.11n (HT40))




(Channel 151, 5755MHz, 802.11n (HT40))




(Channel 159, 5795MHz, 802.11n (HT40))

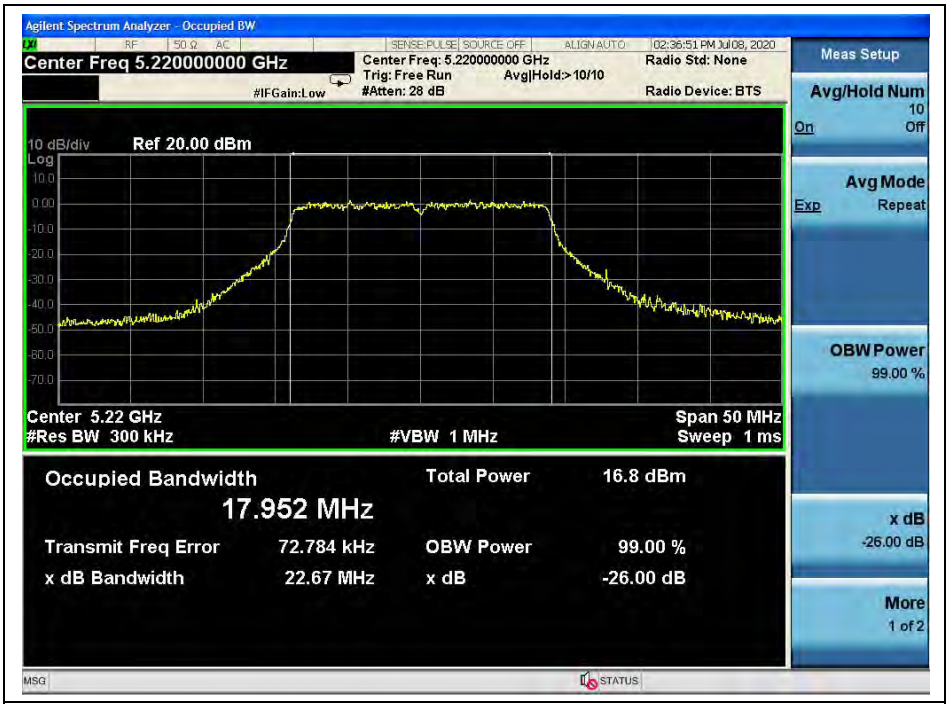
## 802.11ac (VHT20) Mode

### A.Test Verdict:

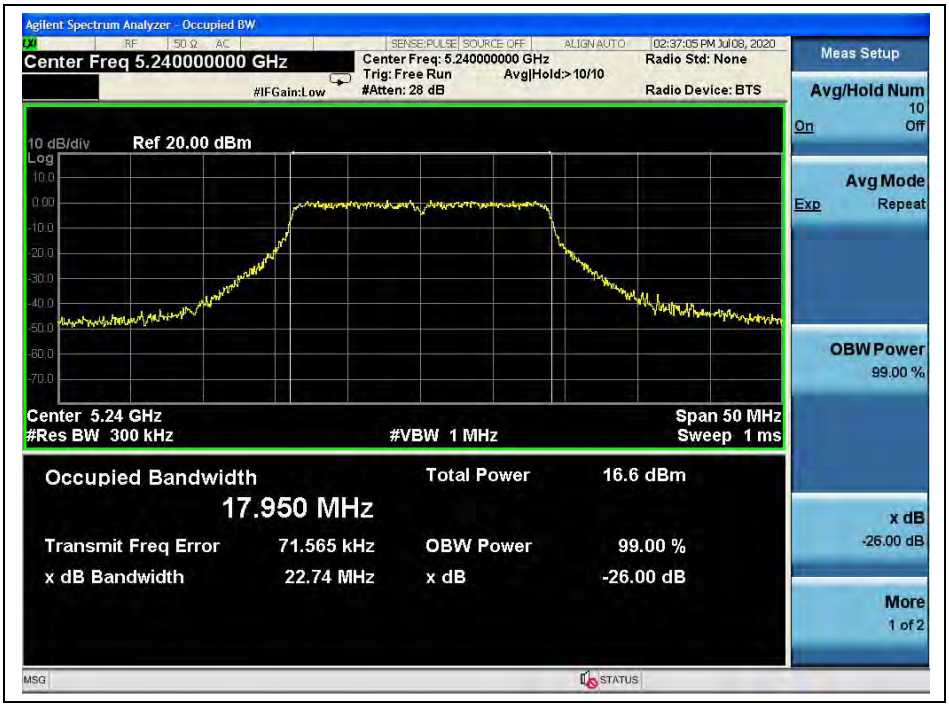
| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| 36 | 5180 | 22.83 |
| 44 | 5220 | 22.67 |
| 48 | 5240 | 22.74 |
| 52 | 5260 | 22.35 |
| 60 | 5300 | 22.61 |
| 64 | 5320 | 22.81 |
| 100 | 5500 | 22.54 |
| 120 | 5600 | 22.73 |
| 144 | 5720 | 22.65 |
| **Channel** | **Frequency (MHz)** | **6 dB Bandwidth (MHz)** |
| 144 | 5720 | 17.65 |
| 149 | 5745 | 17.53 |
| 157 | 5785 | 17.60 |
| 165 | 5825 | 17.27 |

### B.Test Plot:

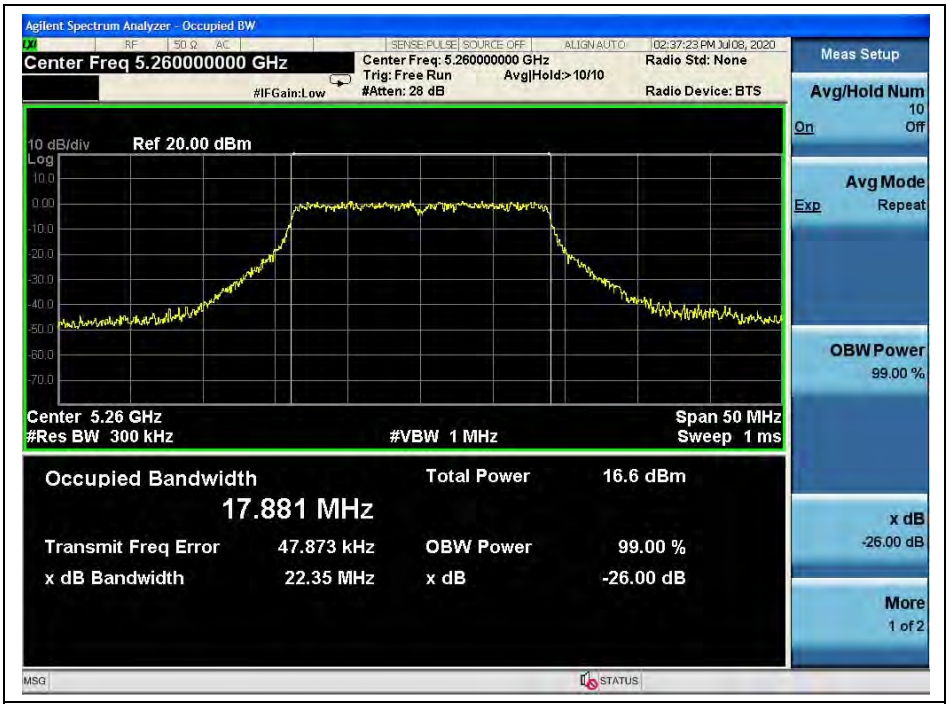

(Channel 36, 5180MHz, 802.11ac (VHT20))



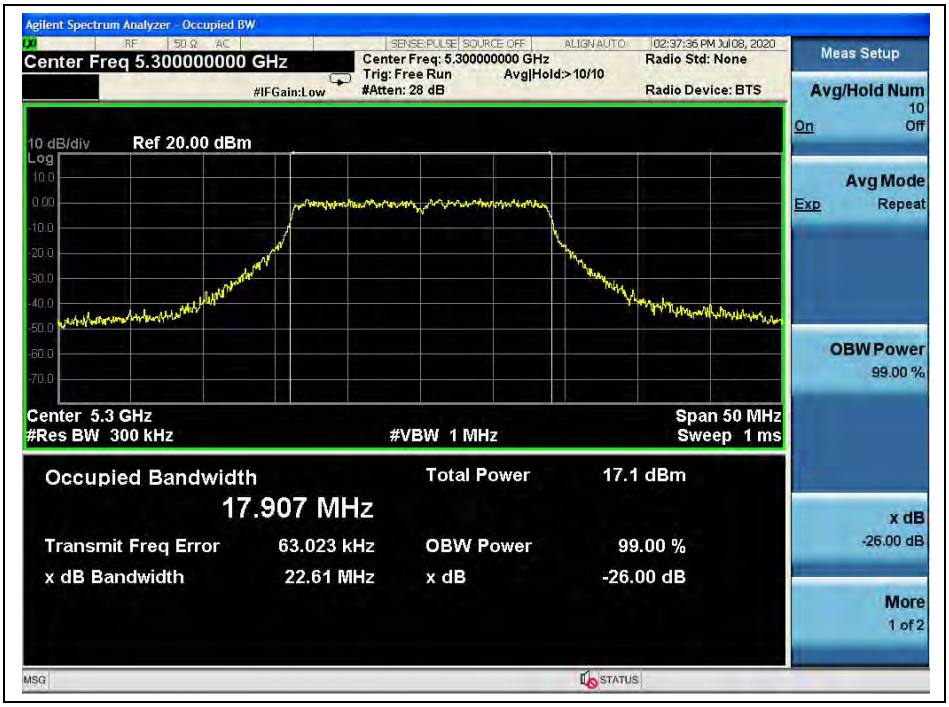

(Channel 44, 5220MHz, 802.11ac (VHT20))



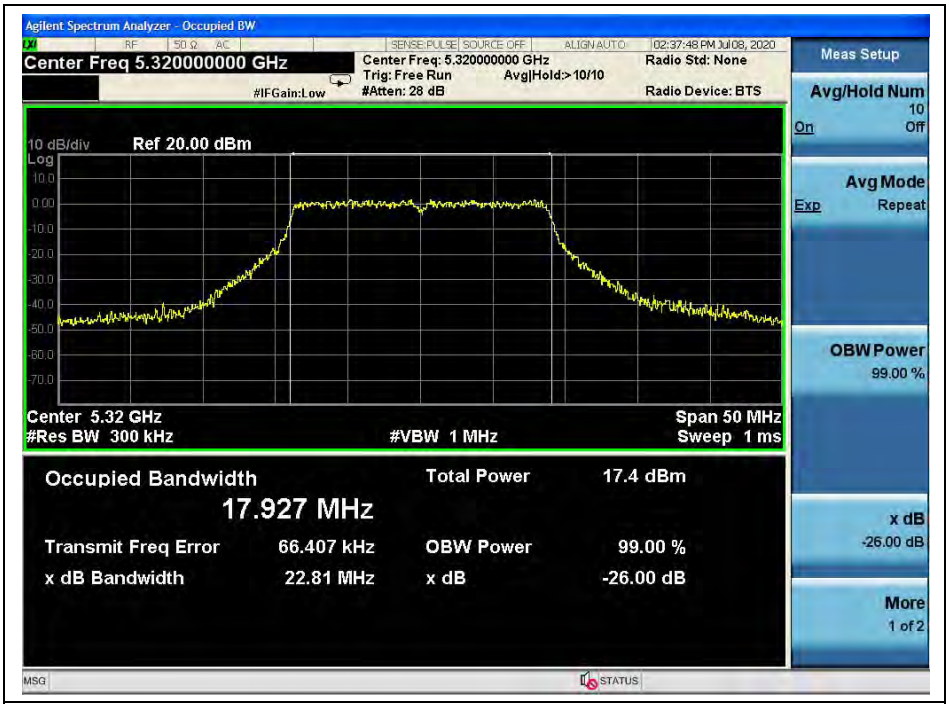

(Channel 48, 5240MHz, 802.11ac (VHT20))




(Channel 52, 5260MHz, 802.11ac (VHT20))



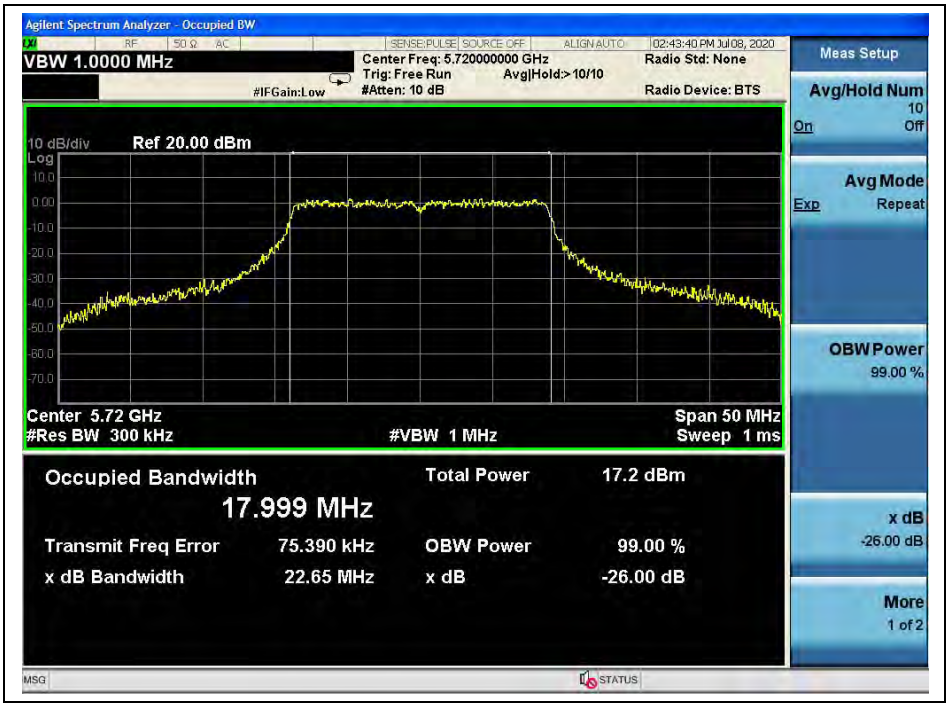

(Channel 60, 5300MHz, 802.11ac (VHT20))



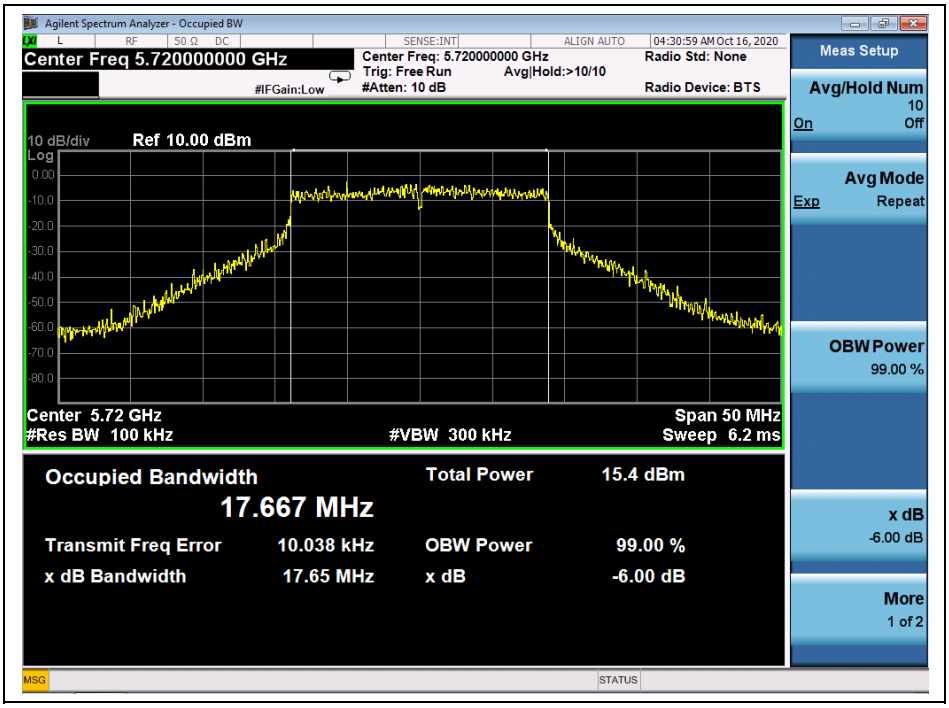

(Channel 64, 5320MHz, 802.11ac (VHT20))


(Channel 100, 5500MHz, 802.11ac (VHT20))

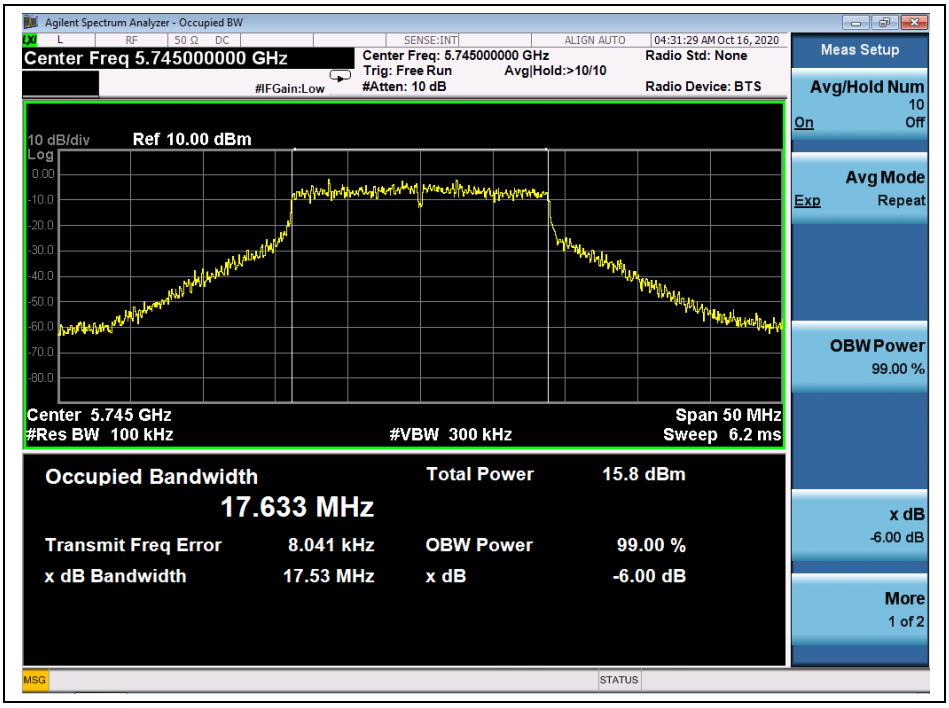

(Channel 120, 5600MHz, 802.11ac (VHT20))




(Channel 144, 5720MHz, 802.11ac (VHT20))

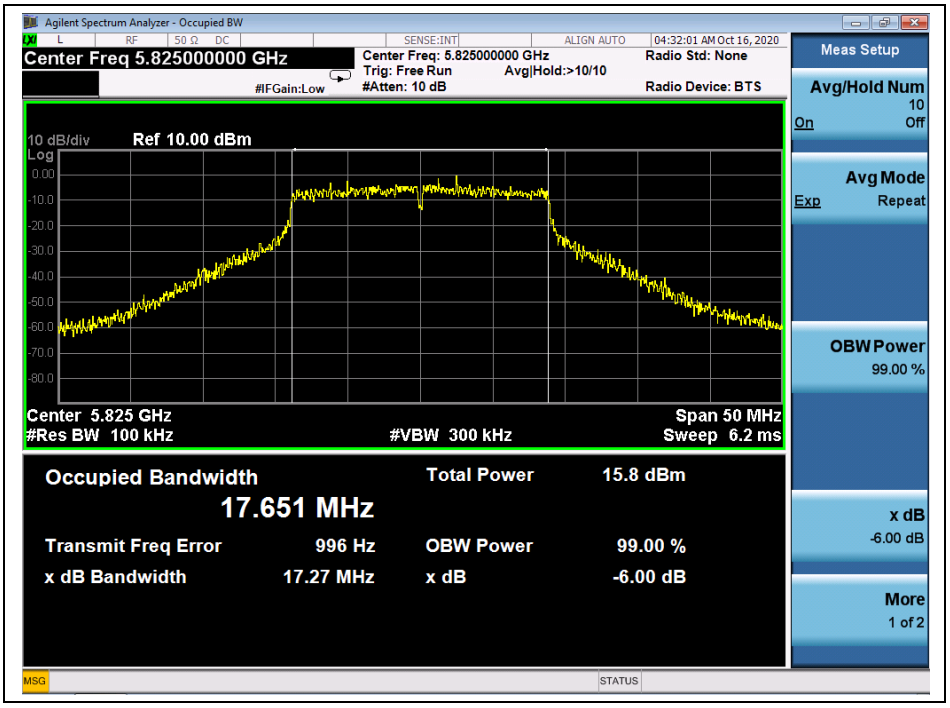



(Channel 144, 5720MHz, 802.11ac (VHT20))




(Channel 149, 5745MHz, 802.11 ac (VHT20))


(Channel 157, 5785MHz, 802.11 ac (VHT20))



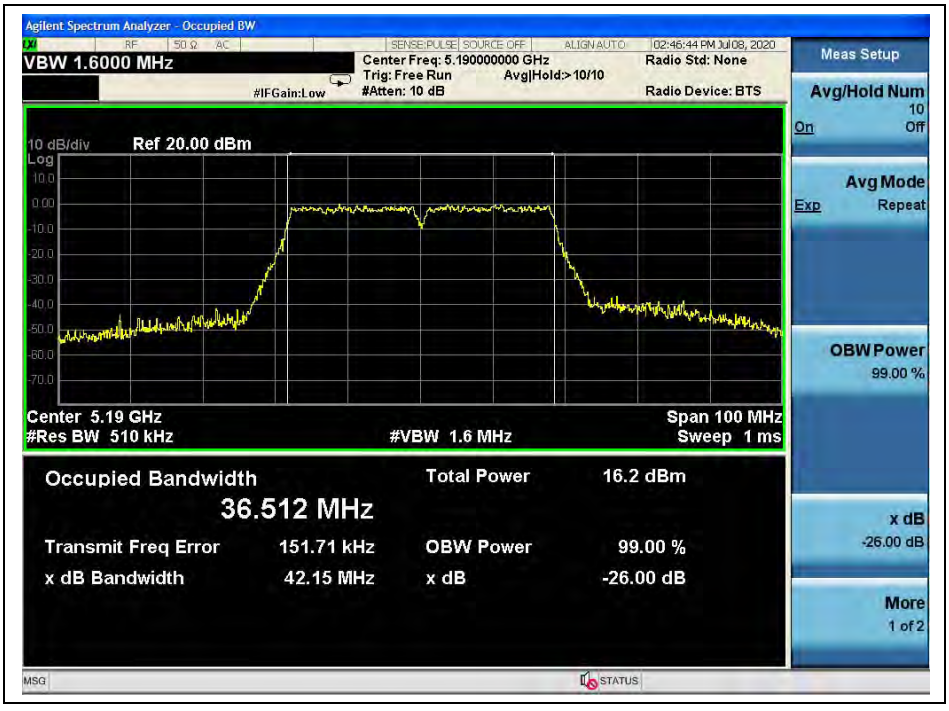

(Channel 165, 5825MHz, 802.11 ac (VHT20))

## 802.11ac (VHT40) Mode

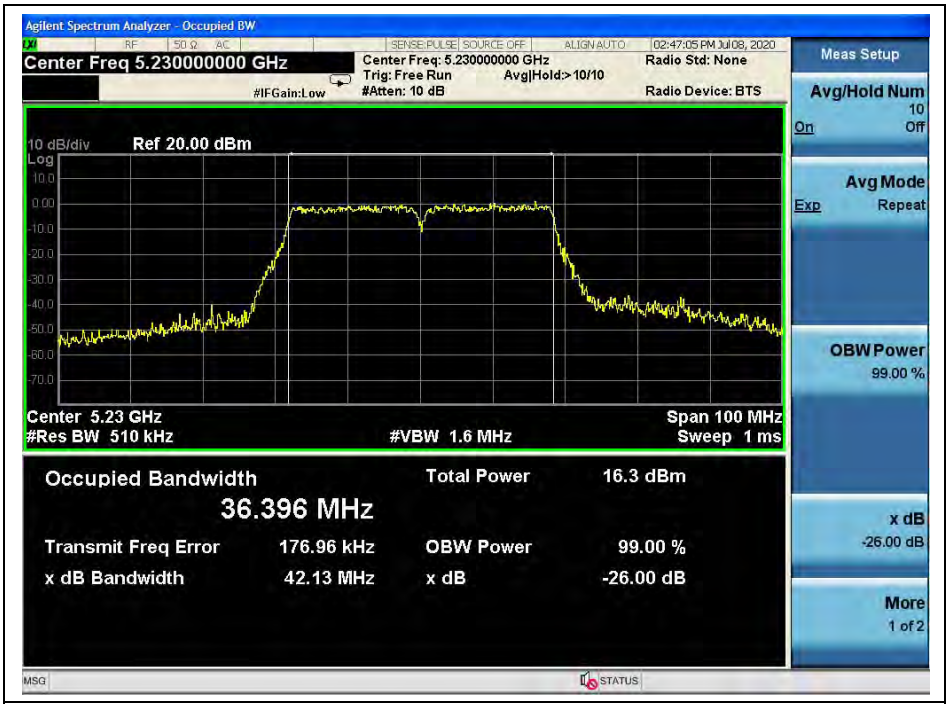
### A.Test Verdict:

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| 38 | 5190 | 42.15 |
| 46 | 5230 | 42.13 |
| 354 | 5270 | 42.04 |
| 62 | 5310 | 41.99 |
| 102 | 5510 | 41.72 |
| 126 | 5630 | 41.90 |
| 142 | 5710 | 41.52 |
| **Channel** | **Frequency (MHz)** | **6 dB Bandwidth (MHz)** |
| 142 | 5710 | 36.37 |
| 151 | 5755 | 36.33 |
| 159 | 5795 | 36.04 |

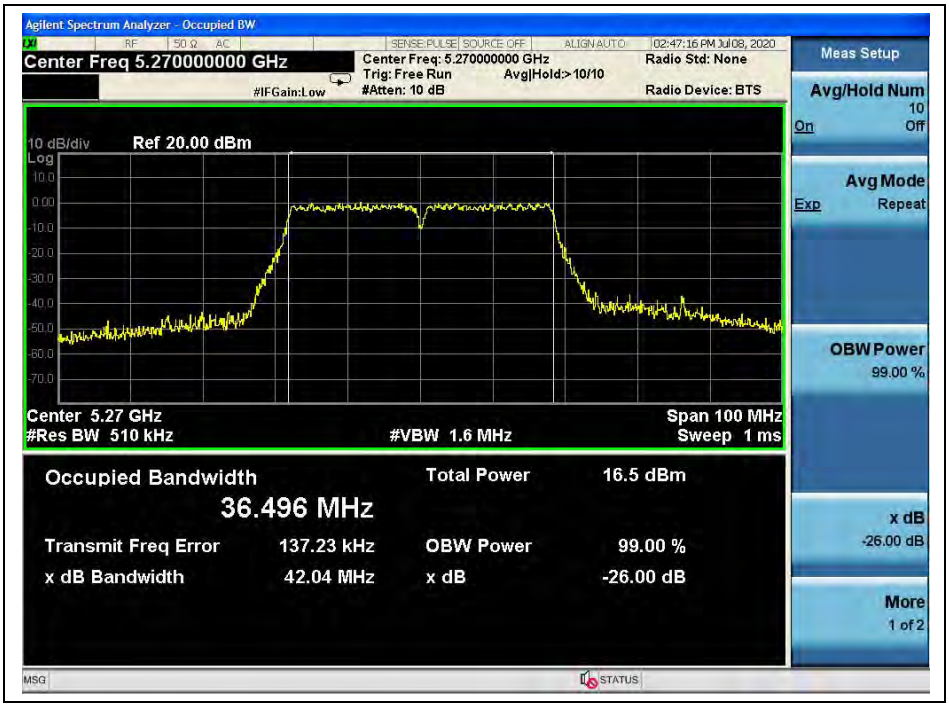
### B.Test Plot:




(Channel 38, 5190MHz, 802.11ac (VHT40))




(Channel 46, 5230MHz, 802.11ac (VHT40))

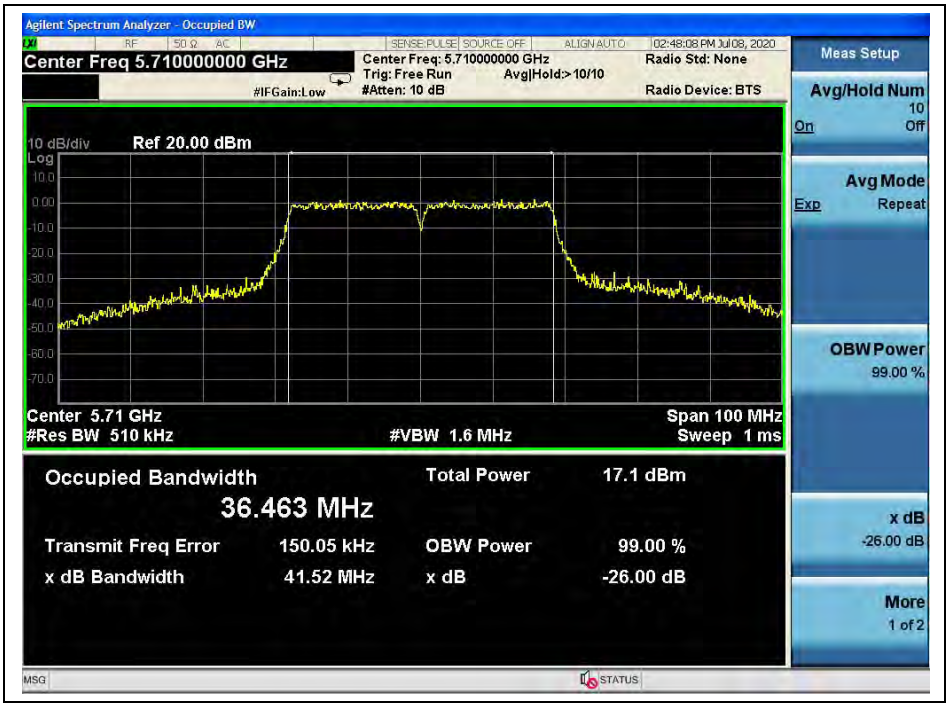



(Channel 54, 5270MHz, 802.11ac (VHT40))


(Channel 62, 5310MHz, 802.11ac (VHT40))

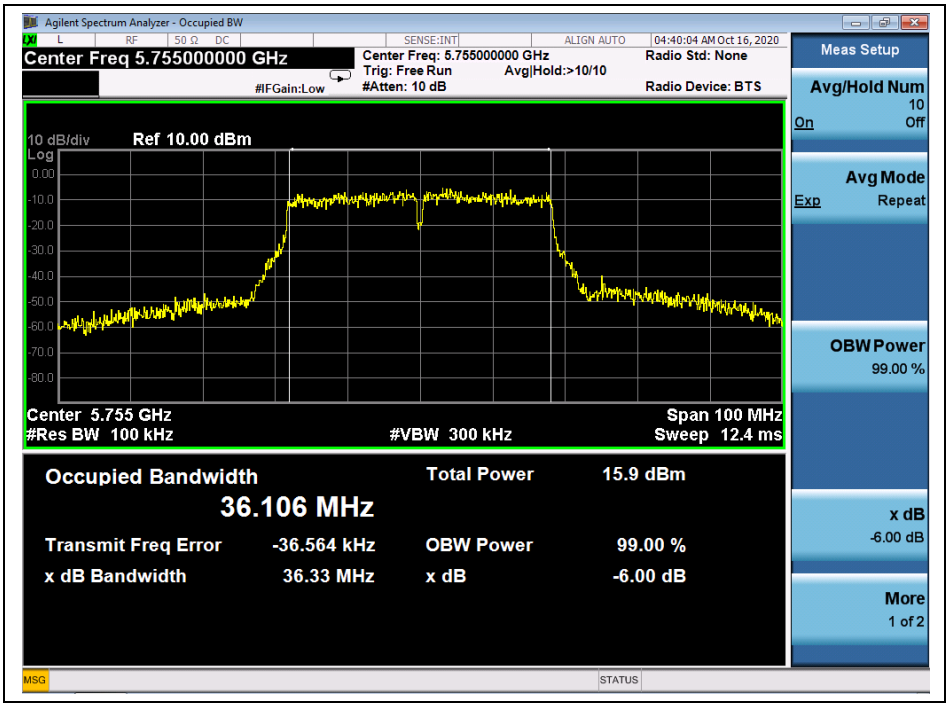

(Channel 102, 5510MHz, 802.11ac (VHT40))


(Channel 126, 5630MHz, 802.11ac (VHT40))

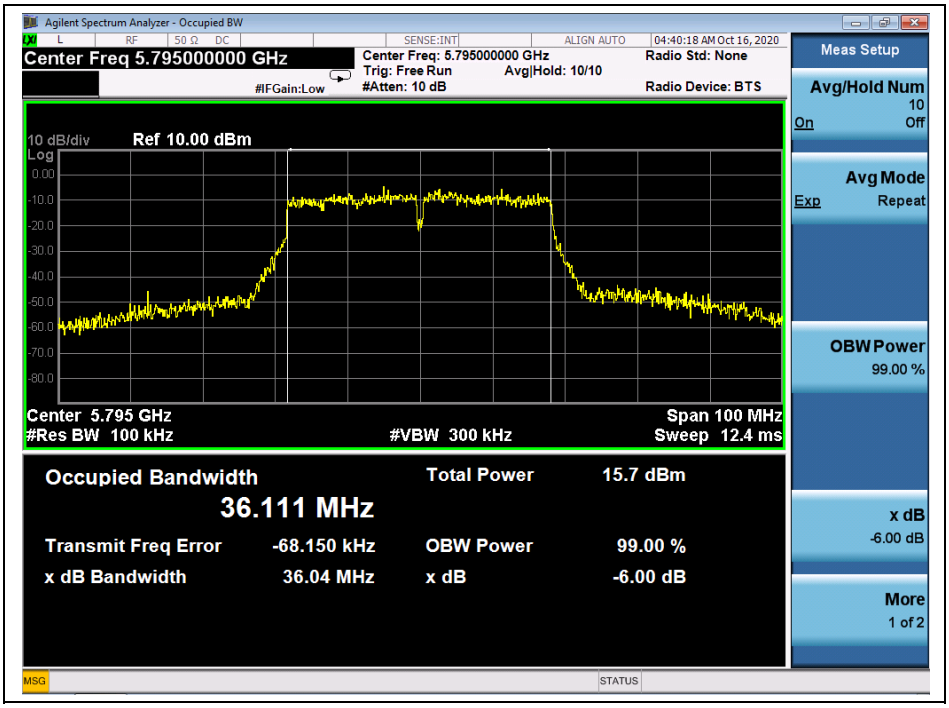



(Channel 142, 5710MHz, 802.11ac (VHT40))


(Channel 142, 5710MHz, 802.11ac (VHT40))




(Channel 151, 5755MHz, 802.11ac (VHT40))



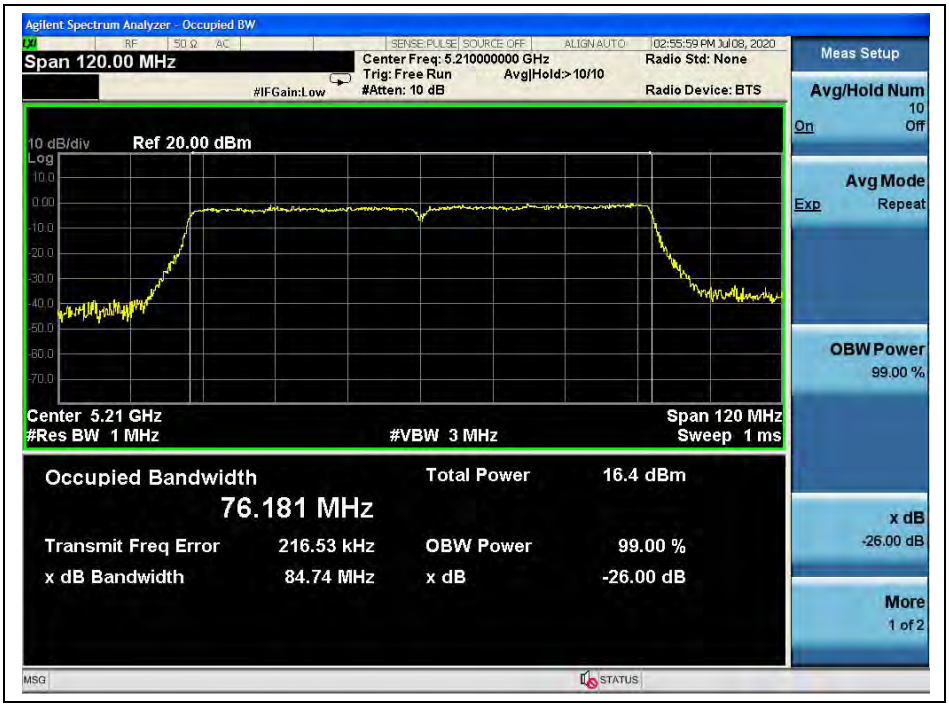

(Channel 159, 5795MHz, 802.11ac (VHT40))

**802.11ac (VHT80) Test mode**

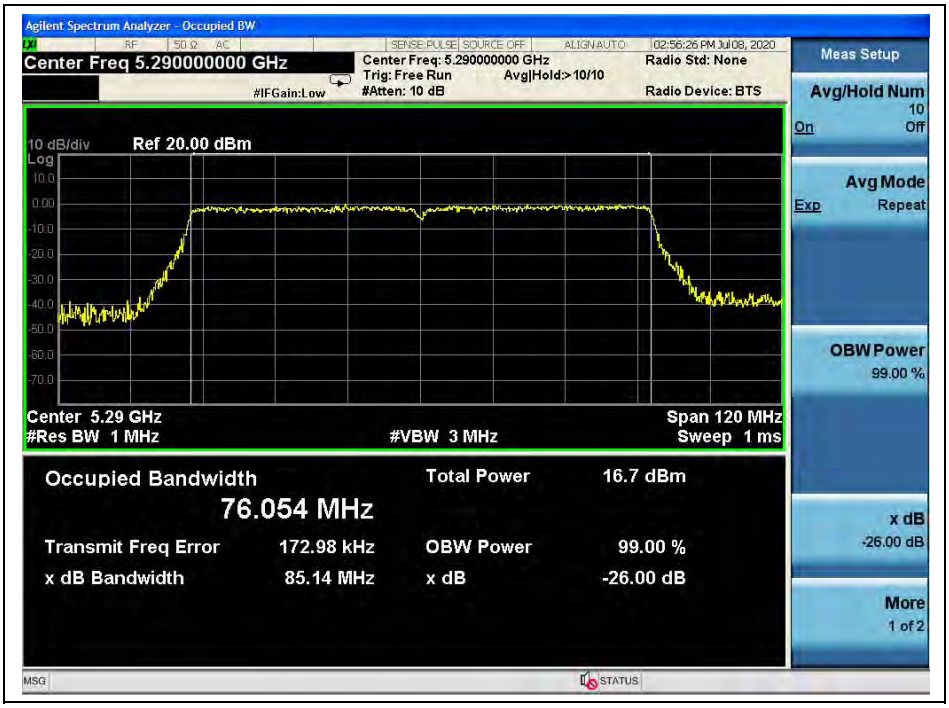
**A.Test Verdict:**

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| 42 | 5210 | 84.74 |
| 58 | 5290 | 85.14 |
| 106 | 5530 | 84.95 |
| 122 | 5610 | 84.58 |
| 138 | 5690 | 84.71 |
| **Channel** | **Frequency (MHz)** | **6 dB Bandwidth (MHz)** |
| 138 | 5690 | 75.37 |
| 155 | 5775 | 75.97 |

**B.Test Plot:**



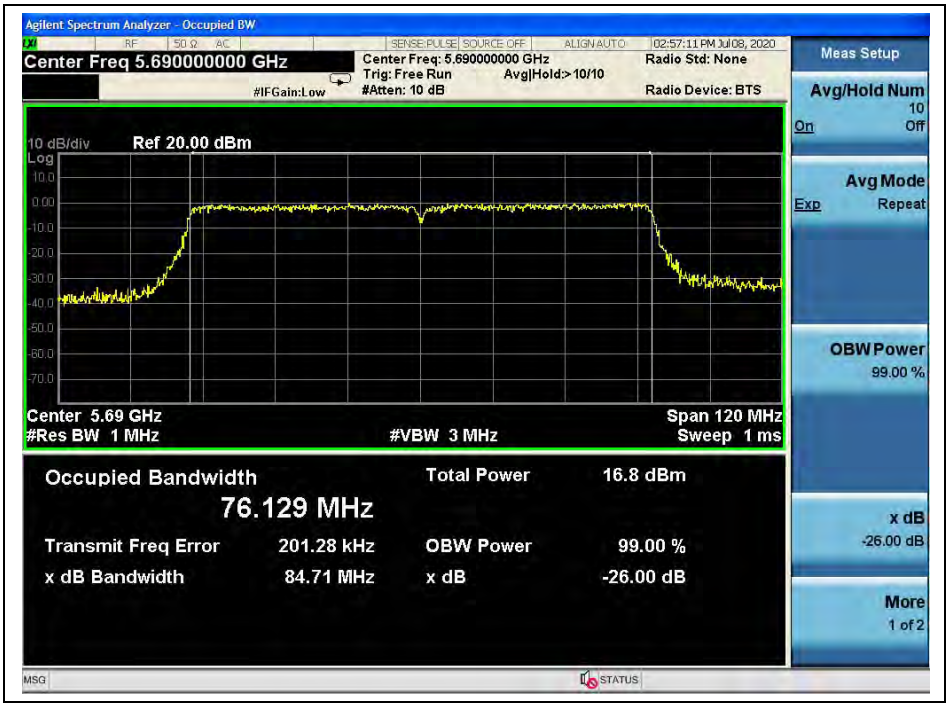

(Channel 42, 5210MHz, 802.11ac (VHT80))



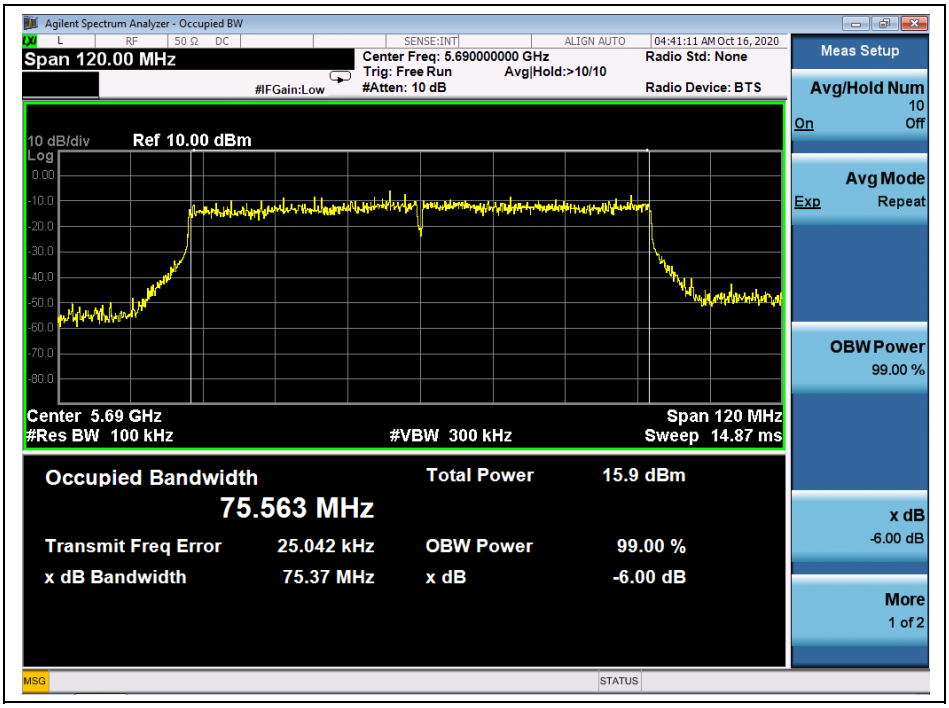

(Channel 58, 5290MHz, 802.11ac (VHT80))


(Channel 106, 5530MHz, 802.11ac (VHT80))

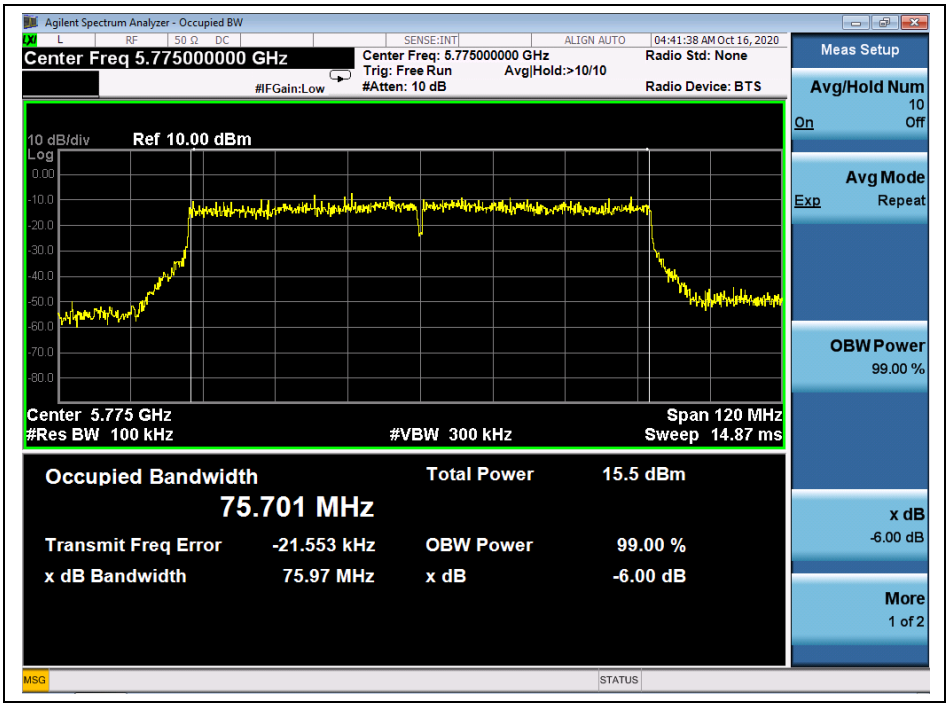

(Channel 122, 5610MHz, 802.11ac (VHT80))




(Channel 138, 5690MHz, 802.11ac (VHT80))




(Channel 138, 5690MHz, 802.11ac (VHT80))




(Channel 155, 5775MHz, 802.11ac (VHT80))

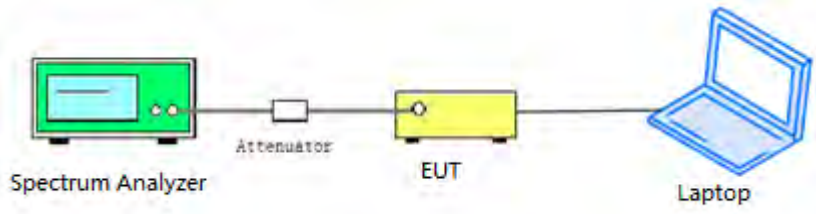
# 2.5. Peak Power Spectral Density

### 2.5.1.Requirement

(1)For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.
(2)For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.
(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30dBm in any 500kHz band.
If transmitting antennas of directional gain greater than 6dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = $G_{ANT}$ +10log($N_{ANT}$) dBi, where $G_{ANT}$ is the antenna gain in dBi, $N_{ANT}$ is the number of outputs.

### 2.5.2.Test Description

**Test Setup:**




The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

### 2.5.3.Test Procedure

KDB 789033 Section F) Maximum Power Spectral Density (PSD) Method SA-1 was used in order to prove compliance

1) Set span to encompass the entire 26-dB emission bandwidth
2) Set RBW = 1MHz. Set VBW ≥ 3MHz
3) Number of points in sweep ≥ 2 Span / RBW. Sweep time = auto
4) Detector = Peak
5) Trace mode=Max hold
6) Record the max value

### 2.5.4.Test Result

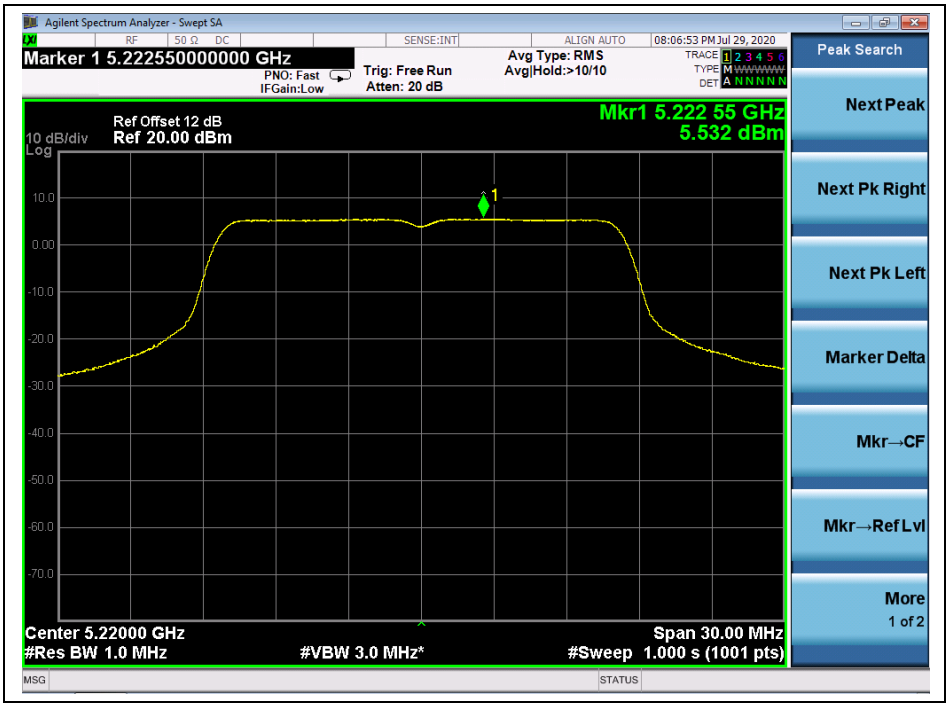
**802.11a Mode**

**A.Test Verdict:**

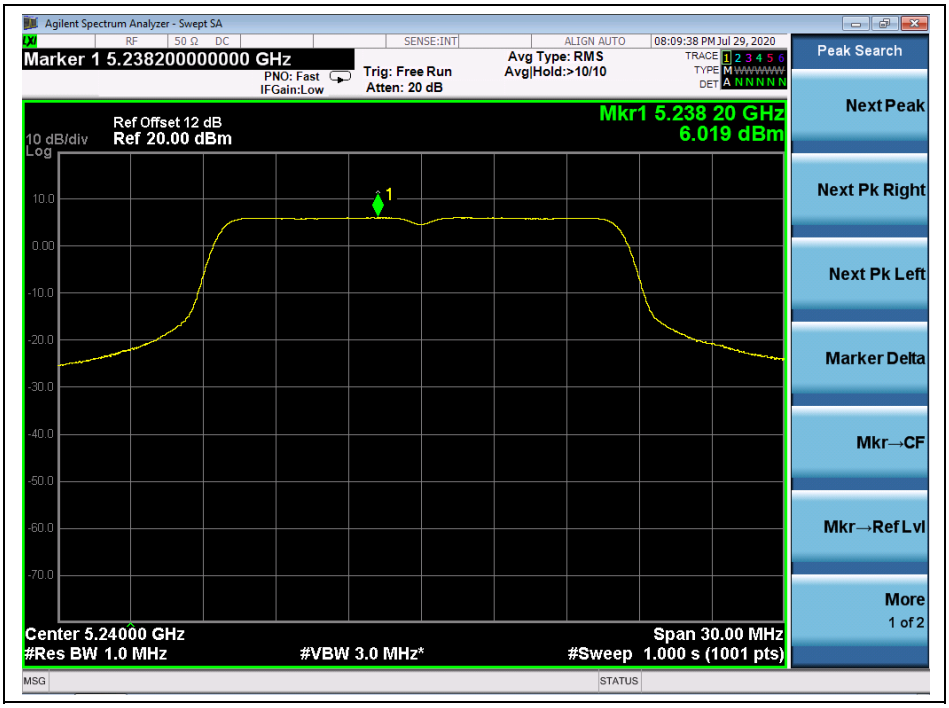
| Channel | Frequency (MHz) | Measured PPSD (dBm/MHz) | Duty Factor | Corrected PPSD (dBm/MHz) | Limit (dBm/MHz) | Verdict |
|---|---|---|---|---|---|---|
| 36 | 5180 | 6.42 | 0.08 | 6.50 | 11 | PASS |
| 44 | 5220 | 5.53 | | 5.61 | | |
| 48 | 5240 | 6.02 | | 6.10 | | |
| 52 | 5260 | 5.73 | | 5.81 | | |
| 60 | 5300 | 5.97 | | 6.05 | | |
| 64 | 5320 | 6.20 | | 6.28 | | |
| 100 | 5500 | 6.10 | | 6.18 | | |
| 120 | 5600 | 6.87 | | 6.95 | | |
| 144 | 5720 | 7.16 | | **7.24** | | |
| Channel | Frequency (MHz) | Measured PPSD (dBm/500KHz) | Duty Factor | Total PPSD (dBm/500KHz) | Limit (dBm/500KHz) | Verdict |
| 144 | 5720 | 3.76 | 0.08 | 3.84 | 30 | PASS |
| 149 | 5745 | 3.74 | | 3.82 | | |
| 157 | 5785 | 3.18 | | 3.26 | | |
| 165 | 5825 | 3.64 | | 3.72 | | |

**B.Test Plot:**


(Channel 36, 5180MHz, 802.11a)



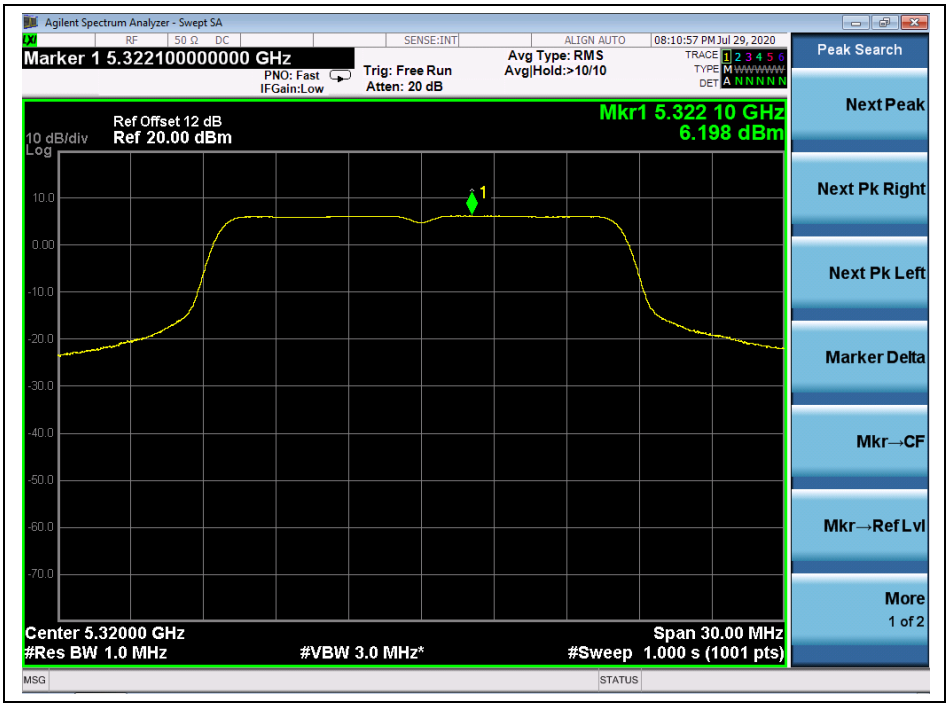

(Channel 44, 5220MHz, 802.11a)




(Channel 48, 5240MHz, 802.11a)


(Channel 52, 5260MHz, 802.11a)

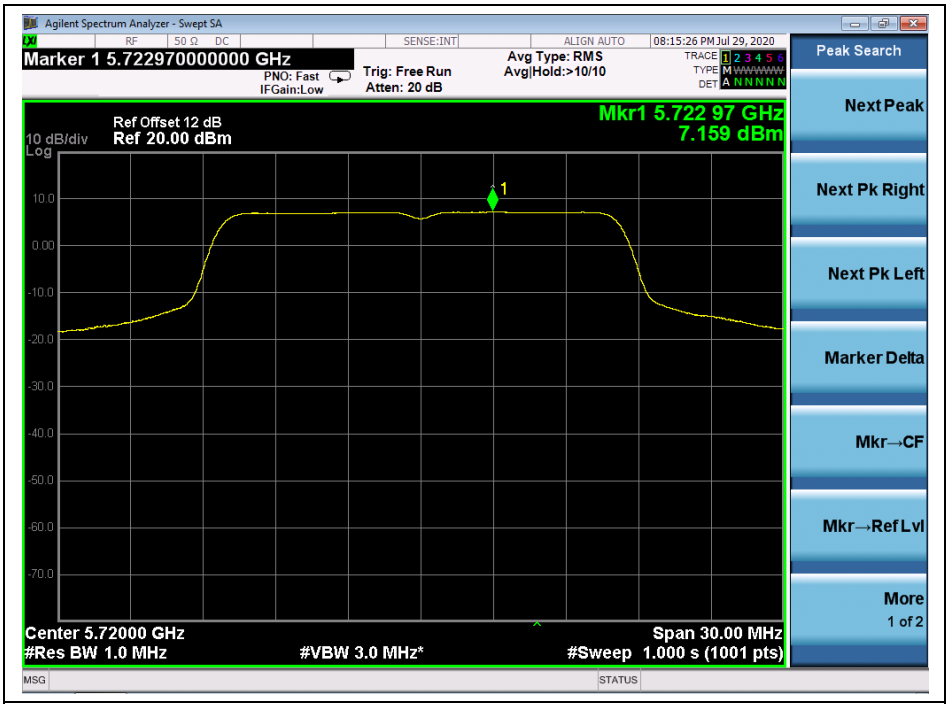

(Channel 60, 5300MHz, 802.11a)




(Channel 64, 5320MHz, 802.11a)


(Channel 100, 5500MHz, 802.11a)


(Channel 120, 5600MHz, 802.11a)




(Channel 144, 5720MHz, 802.11a)


(Channel 144, 5720MHz, 802.11a)


(Channel 149, 5745MHz, 802.11a)


(Channel 157, 5785MHz, 802.11a)


(Channel 165, 5825MHz, 802.11a)

**802.11n (HT20) Mode**

**A.Test Verdict:**

| Channel | Frequency (MHz) | Measured PPSD (dBm/MHz) | Duty Factor | Corrected PPSD (dBm/MHz) | Limit (dBm/MHz) | Verdict |
|---|---|---|---|---|---|---|
| 36 | 5180 | 5.38 | 0.09 | 5.47 | 11 | PASS |
| 44 | 5220 | 5.70 | | 5.79 | | |
| 48 | 5240 | 6.14 | | 6.23 | | |
| 52 | 5260 | 6.19 | | 6.28 | | |
| 60 | 5300 | 6.44 | | 6.53 | | |
| 64 | 5320 | 6.55 | | **6.64** | | |
| 100 | 5500 | 6.27 | | 6.36 | | |
| 120 | 5600 | 6.18 | | 6.27 | | |
| 144 | 5720 | 6.50 | | 6.59 | | |
| Channel | Frequency (MHz) | Measured PPSD (dBm/500KHz) | Duty Factor | Total PPSD (dBm/500KHz) | Limit (dBm/500KHz) | Verdict |
| 144 | 5720 | 3.57 | 0.09 | 3.66 | 30 | PASS |
| 149 | 5745 | 3.39 | | 3.48 | | |
| 157 | 5785 | 3.50 | | 3.59 | | |
| 165 | 5825 | 3.61 | | 3.70 | | |

**B.Test Plot:**


(Channel 36, 5180MHz, 802.11n (HT20))


(Channel 44, 5220MHz, 802.11n (HT20))


(Channel 48, 5240MHz, 802.11n (HT20))


(Channel 52, 5260MHz, 802.11n (HT20))