# FCC 47 CFR PART 15 SUBPART E

# CERTIFICATION TEST REPORT

*For*

cnPilot Home Wireless Access Point

MODEL No.: REG-PL-R195W

FCC ID: Z8H89FT0049

Trade Mark: Cambium Networks

REPORT NO.: ES181229009W02-3

ISSUE DATE: July 9, 2019

*Prepared for*

Cambium Networks Inc.

3800 Golf Road, Suite 360 Rolling Meadows, IL 60008 USA

*Prepared by*

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# 1 TEST RESULT CERTIFICATION

| | |
|---|---|
| Applicant: | Cambium Networks Inc.<br>3800 Golf Road, Suite 360 Rolling Meadows, IL 60008 USA |
| Manufacturer: | Cambium Networks Ltd.<br>Unit B2 Linhay Business Park Eastern Rd Ashburton, Devon TQ13 7UP United Kingdom |
| Factory: | Flyingvoice Network Technology Co., Ltd<br>Room 207~209, 2/F, Bldg B52#, Zhongchuang industrial park, Liuxian Avenue, Taoyuan street, Nanshan District, Shenzhen, China |
| Product Description: | cnPilot Home Wireless Access Point |
| Model Number: | REG-PL-R195W |
| Trade Mark: | Cambium Networks |

Measurement Procedure Used:

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULT** |
| FCC 47 CFR Part 2, Subpart J<br>FCC 47 CFR Part 15, Subpart E | **PASS** |

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD.. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.407

The test results of this report relate only to the tested sample identified in this report.

Date of Test : June 25, 2019 to July 9 , 2019

Prepared by : Doris Su.
Doris Su/Editor

Reviewer : Yaping Shen
Yaping Shen/Supervisor

Approve & Authorized Signer :
Lisa Wang/Manager

EMTEK (SHENZHEN) CO., LTD. TESTING

Modified History

| Rev. | Summary | Date of Rev. | Report No. |
|---|---|---|---|
| V1.0 | Original Report | March 01, 2019 | ES181229002W02 |
| V1.0 | Updated applicant, manufacturer; Product Name, Model Number | arch 07, 2019 | ES181229002W02-1 |
| V1.0 | Updated manufacturer, factory | April 08, 2019 | ES181229002W02-2 |
| V1.0 | Updated 5G WIFI Power level | July 9, 2019 | ES181229002W02-3 |
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# 2 EUT TECHNICAL DESCRIPTION

| Characteristics | Description | | | |
|---|---|---|---|---|
| **IEEE 802.11 WLAN Mode Supported Band** | ☒2.4G WIFI Band<br>☒5G WIFI Band | | | |
| **IEEE 802.11 WLAN Mode Supported** | ☒802.11b<br>☒802.11g<br>☒802.11a(20MHz channel bandwidth)<br>☒802.11n(20MHz channel bandwidth)<br>☒802.11n(40MHz channel bandwidth)<br>☒802.11ac(20MHz channel bandwidth)<br>☒802.11ac(40MHz channel bandwidth)<br>☒802.11ac(80MHz channel bandwidth) | | | |
| **Data Rate** | 802.11 b:1,2,5.5,11Mbps;<br>802.11 g/a:6,9,12,18,24,36,48,54Mbps;<br>802.11n(HT20)/ac(HT20): MCS0-MCS15;<br>802.11n(HT40): MCS0-MCS15;<br>802.11ac(HT40):MCS0-MCS15;<br>802.11ac(VHT80):MCS0-MCS15; | | | |
| **Operating Frequency Range** | Band | Mode | Frequency Range(MHz) | Number of channels |
| | 2.4G Band | 802.11b/g/n(HT20) | 2412-2462 | 11 |
| | | 802.11n(HT40) | 2422-2452 | 7 |
| | 5G Band/ UNII Band I | 802.11a/n(HT20)/ac(VHT20) | 5180-5240 | 4 |
| | | 802.11n(HT40)/ac(VHT40) | 5190-5230 | 2 |
| | | 802.11 ac(VHT80) | 5210 | 1 |
| | 5G Band/ UNII Band III | 802.11a/n(HT20)/ac(VHT20) | 5745-5825 | 5 |
| | | 802.11n(HT40)/ac(VHT40) | 5755-5795 | 2 |
| | | 802.11 ac(VHT80) | 5775 | 1 |
| **Modulation** | DSSS with DBPSK/DQPSK/CCK for 802.11b;<br>OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/ac/g/n | | | |
| **Antenna Type** | External PCB Antenna | | | |
| **Smart system** | ☒SISO | | ☒MIMO | |
| **Number of Antenna:** | Four | Two for 2.4G Band<br>Two for 5G Band | | |
| **Antenna Gain** | 2.4G Band<br>Antenna 0: 5dBi;<br>Antenna 1: 5dBi<br>5G Band<br>Antenna 0: 5dBi;<br>Antenna 1: 5dB | | | |

| | |
|---|---|
| **Direction Gain** | 2.4G Band<br>8.01 dBi<br>5G Band<br>8.01 dBi |
| **Power supply** | ☒DC 12V from Adapter |
| | ☒Adapter:<br>Model: S12B23-120A100-04<br>Input: 100-240V~, 50-60Hz, Max 0.5A<br>Output: DC 12V, 1A |
| **This test report is only applicable to 5G WIFI Band** | |

***Note:*** *for more details, please refer to the User's manual of the EUT.*

# 3 SUMMARY OF TEST RESULT

| FCC Part Clause | Test Parameter | Verdict | Remark |
|---|---|---|---|
| 15.407 (a)<br>15.407 (e) | 99% , 6dB and 26dB Bandwidth | PASS | |
| 15.407 (a) | Maximum Conducted Output Power | PASS | |
| 15.407 (a) | Peak Power Spectral Density | PASS | |
| 15.407 (b) | Radiated Spurious Emission | PASS | |
| 15.407(g) | Frequency Stability | PASS | |
| 15.407 (b)(6)<br>15.207 | Power Line Conducted Emission | PASS | |
| 15.407(a)<br>15.203 | Antenna Application | PASS | |
| NOTE1: N/A (Not Applicable)<br>NOTE2: According to FCC OET KDB 789033 D02 General UNII Test Procedures New Rules v02r01, In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits. | | | |

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: Z8H89FT0049 filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

# 4 TEST METHODOLOGY

## 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart E
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01

## 4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LASTCAL. | DUE CAL. |
|---|---|---|---|---|---|
| Test Receiver | Rohde & Schwarz | ESCI | 26115-010-0027 | May 18, 2019 | May 17, 2020 |
| L.I.S.N. | Rohde & Schwarz | ENV216 | 101161 | May 18, 2019 | May 17, 2020 |
| 50Ω Coaxial Switch | Anritsu | MP59B | 6100175589 | May 19, 2019 | May 18, 2020 |
| Voltage Probe | Rohde & Schwarz | ESH2-Z3 | 100122 | May 19, 2019 | May 18, 2020 |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100006 | May 18, 2019 | May 17, 2020 |
| I.S.N | Teseq GmbH | ISN T800 | 30327 | May 19, 2019 | May 18, 2020 |

4.2.2 Radiated Emission Test Equipment

| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | DUE CAL. |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESU | 1302.6005.26 | May 19, 2019 | May 18, 2020 |
| Pre-Amplifier | HP | 8447F | 2944A07999 | May 18, 2019 | May 17, 2020 |
| Bilog Antenna | Schwarzbeck | VULB9163 | 142 | May 18, 2019 | May 17, 2020 |
| Loop Antenna | ARA | PLA-1030/B | 1029 | May 18, 2019 | May 17, 2020 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | BBHA9170399 | May 19, 2019 | May 18, 2020 |
| Horn Antenna | Schwarzbeck | BBHA 9120 | D143 | May 18, 2019 | May 17, 2020 |
| Cable | Schwarzbeck | AK9513 | ACRX1 | May 19, 2019 | May 18, 2020 |
| Cable | Rosenberger | N/A | FP2RX2 | May 19, 2019 | May 18, 2020 |
| Cable | Schwarzbeck | AK9513 | CRPX1 | May 19, 2019 | May 18, 2020 |
| Cable | Schwarzbeck | AK9513 | CRRX2 | May 19, 2019 | May 18, 2020 |

4.2.3 Radio Frequency Test Equipment

| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LASTCAL. | DUE CAL. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4407B | 88156318 | May 19, 2019 | May 18, 2020 |
| Signal Analyzer | Agilent | N9010A | My53470879 | May 19, 2019 | May 18, 2020 |
| Power meter | Anritsu | ML2495A | 0824006 | May 19, 2019 | May 18, 2020 |
| Power sensor | Anritsu | MA2411B | 0738172 | May 19, 2019 | May 18, 2020 |
| Temperature & Humidity test chamber | ESPEC | EL-02KA | 12107166 | May 19, 2019 | May 18, 2020 |

***Remark:*** *Each piece of equipment is scheduled for calibration once a year.*

## 4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (☒802.11a: 6 Mbps; ☒802.11n (HT20): MCS0; ☒802.11n (HT20): MCS15; ☒802.11n (HT40): MCS0; ☒802.11n (HT40): MCS15; ☒802.11ac (HT20): MCS0; ☒802.11ac (HT20): MCS15; ☒802.11ac (HT40): MCS0; ☒802.11ac (HT40): MCS15; ☒802.11ac (HT80): MCS0; ☒802.11ac (HT80): MCS15;) were used for all test.

Test software: MT7612E_AP_QA_Tool_V1.0.3.4

Power Setting:

UNII Band I and Band III

802a.11a/n(HT20)/n(HT40)/ac(VHT20)/ac(VHT40)/ac(VHT80): 15

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

☒Wifi 5G with UNII Band I

Frequency and Channel list for 802.11a/n(HT20)/ac(VHT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 36 | 5180 | 44 | 5220 | | |
| 40 | 5200 | 48 | 5240 | | |

Frequency and Channel list for 802.11n(HT40)/ac(VHT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 38 | 5190 | | | | |
| 46 | 5230 | | | | |

Frequency and Channel list for 802.11ac(VHT80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 42 | 5210 | | | | |
| | | | | | |

Test Frequency and Channel for 802.11a/n(HT20)/ac(VHT20):

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 36 | 5180 | 40 | 5200 | 48 | 5240 |

Test Frequency and channel for 802.11n (VHT40)/ac(VHT40):

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 38 | 5190 | N/A | N/A | 46 | 5230 |

Test Frequency and channel for 802.11ac (HT80):

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 42 | 5210 | N/A | N/A | N/A | N/A |

☒ Wifi 5G with UNII Band III

Frequency and Channel list for 802.11a/n(HT20)/ac(VHT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 149 | 5745 | 157 | 5785 | 165 | 5825 |
| 153 | 5765 | 161 | 5805 | | |

Frequency and Channel list for 802.11n(HT40)/ac(VHT40):

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

Frequency and Channel list for 802.11ac(VHT80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 155 | 5775 | | | | |

Test Frequency and Channel for 802.11a/n(HT20)/ac(VHT20):

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 149 | 5745 | 157 | 5785 | 165 | 5825 |

Test Frequency and channel for 802.11n(HT40)/ac(VHT40):

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 151 | 5755 | N/A | N/A | 159 | 5795 |

Test Frequency and channel for 802.11ac(VHT80):

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 155 | 5775 | | | | |

# 5 FACILITIES AND ACCREDITATIONS

## 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

## 5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : Accredited by CNAS,2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2016.5.19
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, August 06, 2018
The certificate is valid until August 07, 2020
Designation Number: CN1204
Test Firm Registration Number: 882943

Accredited by Industry Canada, November 09, 2018
The Conformity Assessment Body Identifier is CN0008.

Name of Firm : EMTEK(SHENZHEN) CO., LTD.

Site Location : Bldg 69, Majialong Industry Zone,
Nanshan District, Shenzhen, Guangdong, China

# 6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

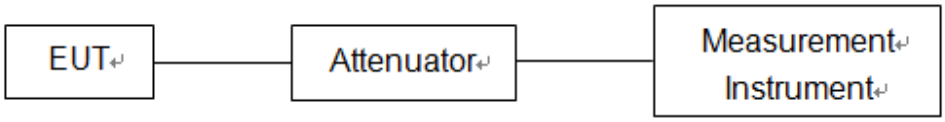
| Parameter | Uncertainty |
|---|---|
| Radio Frequency | ±1x10^-5 |
| Maximum Peak Output Power Test | ±1.0dB |
| Conducted Emissions Test | ±2.0dB |
| Radiated Emission Test | ±2.0dB |
| Power Density | ±2.0dB |
| Occupied Bandwidth Test | ±1.0dB |
| Band Edge Test | ±3dB |
| All emission, radiated | ±3dB |
| Antenna Port Emission | ±3dB |
| Temperature | ±0.5℃ |
| Humidity | ±3% |

Measurement Uncertainty for a level of Confidence of 95%

# 7 SETUP OF EQUIPMENT UNDER TEST

## 7.1 RADIO FREQUENCY TEST SETUP

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.




## 7.2 RADIO FREQUENCY TEST SETUP

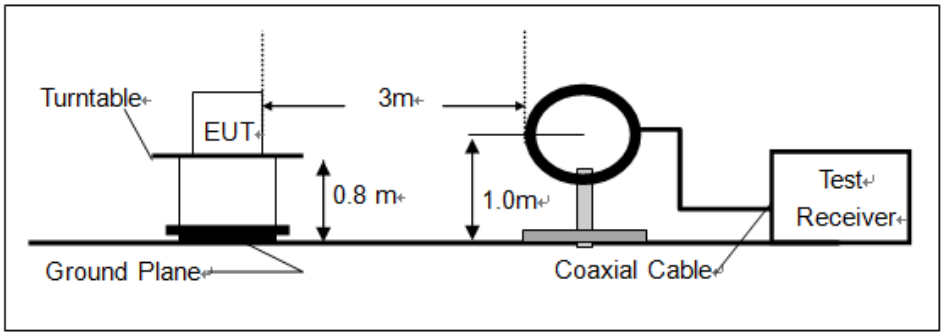
The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

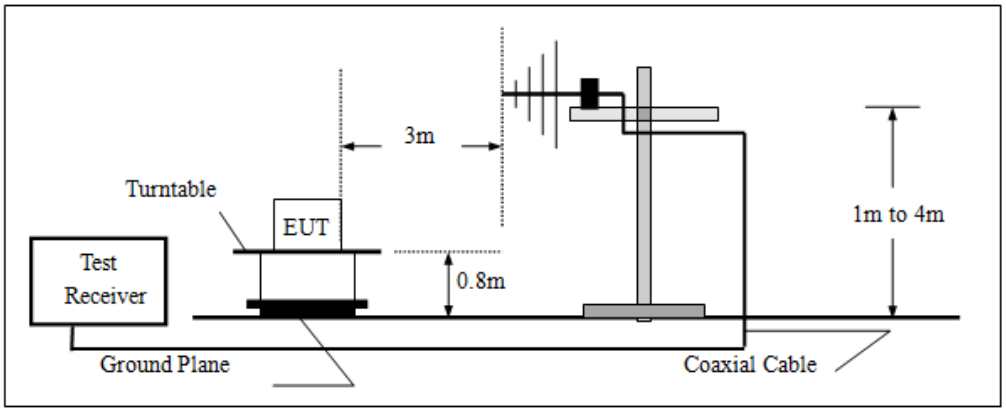
Above 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz：
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

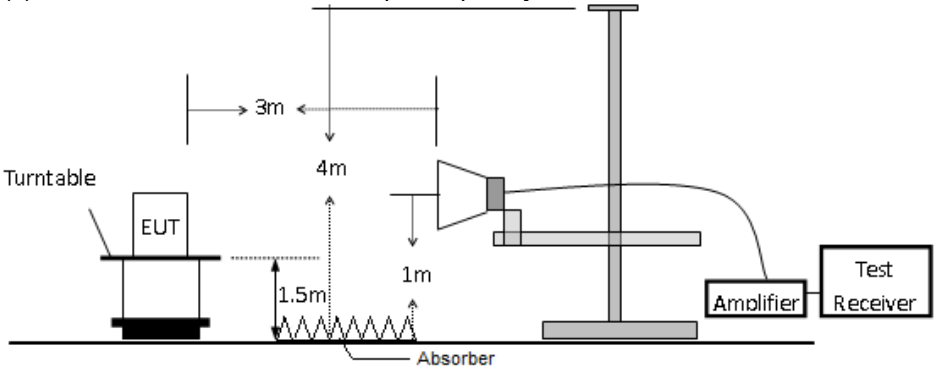
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz




(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

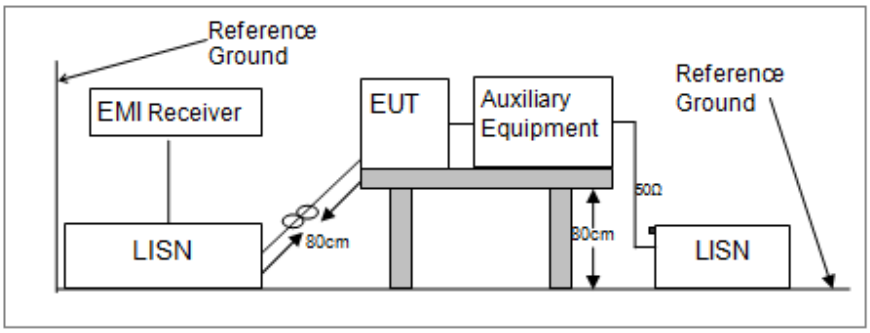


## 7.3 CONDUCTED EMISSION TEST SETUP

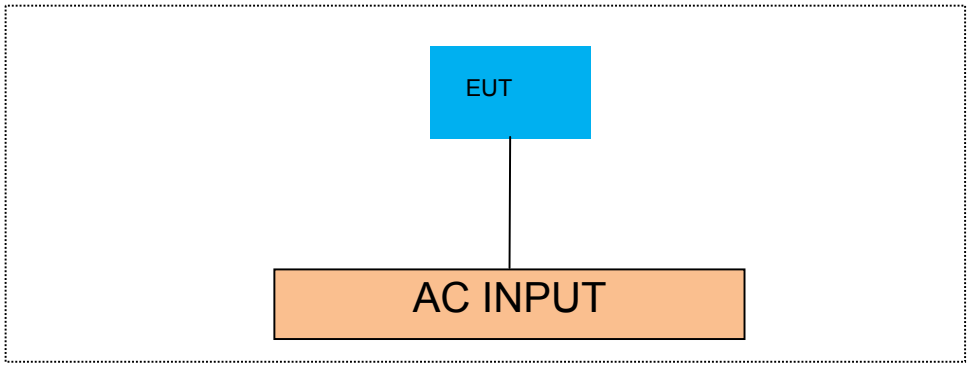
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



## 7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM




## 7.5 SUPPORT EQUIPMENT

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. | Note |
|---|---|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A | N/A | N/A |

***Notes:***

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

# 8 TEST REQUIREMENTS

## 8.1 BANDWIDTH MEASUREMENT

### 8.1.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I
According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C
According to FCC Part 15.407(a)(3) for UNII Band III
According to FCC Part 15.407(e) for UNII Band III
According to 789033 D02 Section II(C)
According to 789033 D02 Section II(D)

### 8.1.2 Conformance Limit

No limit requirement.
The minimum 6 dB emission bandwidth of at least 500 KHz for the UNII Band III.

### 8.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

### 8.1.4 Test Procedure

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below

- The following procedure shall be used for measuring (26 dB) power bandwidth:

Center Frequency: test Frequency
Set RBW = approximately 1% of the emission bandwidth.
Set the VBW > RBW.
Detector = Peak.
Trace mode = max hold.
X dB Bandwidth: 26 dB
Measure the maximum width of the emission that is 26 dB down from the maximum 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%.

- Minimum Emission Bandwidth for the UNII Band III

Center Frequency: test Frequency
Set RBW = 100 kHz
Set VBW ≥ 3 · RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
X dB Bandwidth: 6 dB
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

- The following procedure shall be used for measuring (99 %) power bandwidth:

Set center frequency to the nominal EUT channel center frequency.
Set span = 1.5 times to 5.0 times the OBW.
Set RBW = 1 % to 5 % of the OBW
Set VBW ≥ 3 · RBW
Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
Use the 99 % power bandwidth function of the instrument (if available).
If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

8.1.5 Test Results

| ☒ 802.11a mode | | | |
|---|---|---|---|
| Temperature : | 28℃ | Test By: | King Kong |
| Humidity : | 65 % | | |

| Band | Channel Number | Channel Freq. (MHz) | 26dB EBW | 99% OBW | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|
| UNII Band I | CH36 | 5180 | 21.52 | 17.06 | N/A | N/A |
| | CH40 | 5200 | 25.78 | 17.147 | N/A | N/A |
| | CH48 | 5240 | 23.99 | 17.073 | N/A | N/A |
| UNII Band III | CH149 | 5745 | 29.34 | 17.174 | N/A | N/A |
| | CH157 | 5785 | 31.42 | 17.280 | N/A | N/A |
| | CH165 | 5825 | 25.88 | 17.157 | N/A | N/A |
| Note:<br>N/A (Not Applicable) | | | | | | |

| ☒ 802.11n(VHT20) mode | | | |
|---|---|---|---|
| Temperature : | 28℃ | Test By: | King Kong |
| Humidity : | 65 % | | |

| Band | Channel Number | Channel Freq. (MHz) | 26dB EBW | 99% OBW | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|
| UNII Band I | CH36 | 5180 | 20.63 | 17.704 | N/A | N/A |
| | CH40 | 5200 | 20.71 | 17.716 | N/A | N/A |
| | CH48 | 5240 | 20.58 | 17.699 | N/A | N/A |
| UNII Band III | CH149 | 5745 | 31.66 | 18.080 | N/A | N/A |
| | CH157 | 5785 | 31.65 | 18.038 | N/A | N/A |
| | CH165 | 5825 | 31.01 | 17.891 | N/A | N/A |
| Note:<br>N/A (Not Applicable) | | | | | | |

| ☒ 802.11ac(VHT20) mode | | | |
|---|---|---|---|
| Temperature : | 28℃ | Test By: | King Kong |
| Humidity : | 65 % | | |

| Band | Channel Number | Channel Freq. (MHz) | 26dB EBW | 99% OBW | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|
| UNII Band I | CH36 | 5180 | 20.47 | 17.711 | N/A | N/A |
| | CH40 | 5200 | 20.63 | 17.728 | N/A | N/A |
| | CH48 | 5240 | 20.63 | 17.717 | N/A | N/A |
| UNII Band III | CH149 | 5745 | 22.76 | 17.783 | N/A | N/A |
| | CH157 | 5785 | 22.60 | 17.739 | N/A | N/A |
| | CH165 | 5825 | 22.67 | 17.756 | N/A | N/A |
| Note:<br>N/A (Not Applicable) | | | | | | |

☒ 802.11n(VHT40) mode

Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | 26dB EBW | 99% OBW | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|
| UNII Band I | CH38 | 5190 | 40.97 | 36.062 | N/A | N/A |
| | CH46 | 5230 | 39.97 | 36.003 | N/A | N/A |
| UNII Band III | CH151 | 5755 | 50.76 | 36.060 | N/A | N/A |
| | CH159 | 5795 | 67.89 | 36.385 | N/A | N/A |
| Note:<br>N/A (Not Applicable) | | | | | | |

☒ 802.11ac(VHT40) mode

Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | 26dB EBW | 99% OBW | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|
| UNII Band I | CH38 | 5190 | 40.31 | 36.041 | N/A | N/A |
| | CH46 | 5230 | 40.17 | 36.018 | N/A | N/A |
| UNII Band III | CH151 | 5755 | 54.32 | 37.937 | N/A | N/A |
| | CH159 | 5795 | 64.82 | 36.352 | N/A | N/A |
| Note:<br>N/A (Not Applicable) | | | | | | |

☒ 802.11ac(VHT80) mode

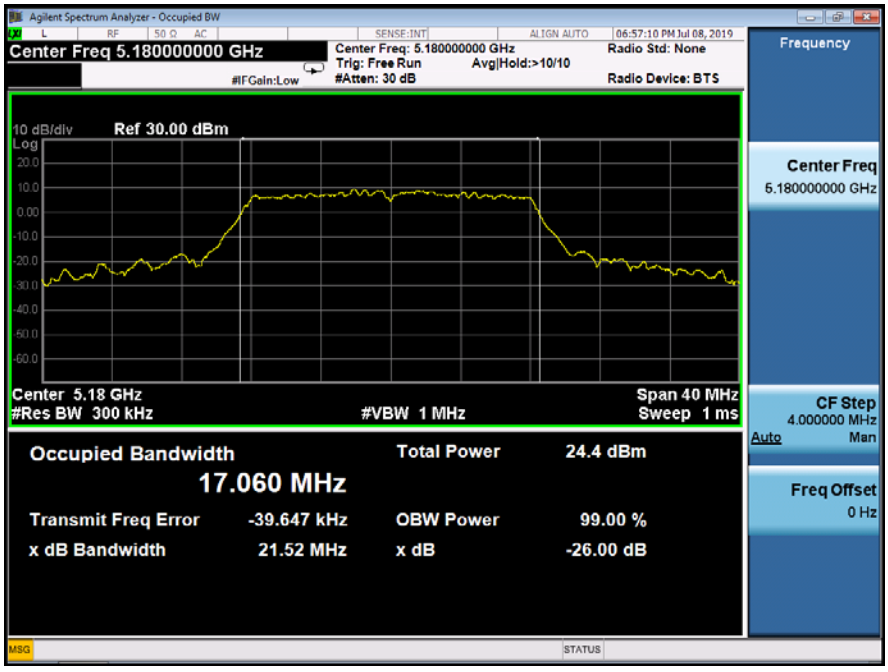
Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | 26dB EBW | 99% OBW | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|
| UNII Band I | CH42 | 5210 | 91.76 | 75.219 | N/A | N/A |
| UNII Band III | CH155 | 5775 | 116.5 | 75.448 | N/A | N/A |
| Note:<br>N/A (Not Applicable) | | | | | | |

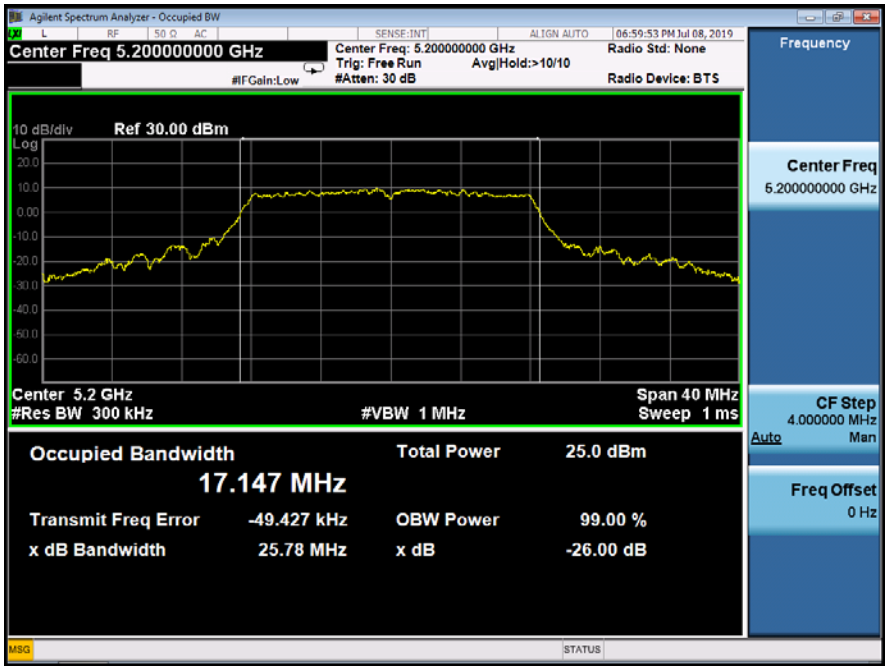
| | | | |
|---|---|---|---|
| | | ☒ UNII Band III | |
| Temperature : | 28℃ | Test By: | King Kong |
| Humidity : | 65 % | | |

| Operation Mode | Channel Number | Channel Freq. (MHz) | 6dB EBW | Limit (MHz) | Verdict |
|---|---|---|---|---|---|
| 802.11a | CH149 | 5745 | 16.56 | 500 | PASS |
| | CH157 | 5785 | 16.50 | 500 | PASS |
| | CH165 | 5825 | 17.00 | 500 | PASS |
| 802.11n (VHT20) | CH149 | 5745 | 17.68 | 500 | PASS |
| | CH157 | 5785 | 16.69 | 500 | PASS |
| | CH165 | 5825 | 17.67 | 500 | PASS |
| 802.11ac (VHT20) | CH149 | 5745 | 17.66 | 500 | PASS |
| | CH157 | 5785 | 17.69 | 500 | PASS |
| | CH165 | 5825 | 17.67 | 500 | PASS |
| 802.11n (VHT40) | CH151 | 5755 | 36.43 | 500 | PASS |
| | CH159 | 5795 | 36.44 | 500 | PASS |
| 802.11ac (VHT40) | CH151 | 5755 | 36.45 | 500 | PASS |
| | CH159 | 5795 | 36.42 | 500 | PASS |
| 802.11ac (VHT80) | CH155 | 5775 | 75.48 | 500 | PASS |
| Note:<br>N/A (Not Applicable) | | | | | |

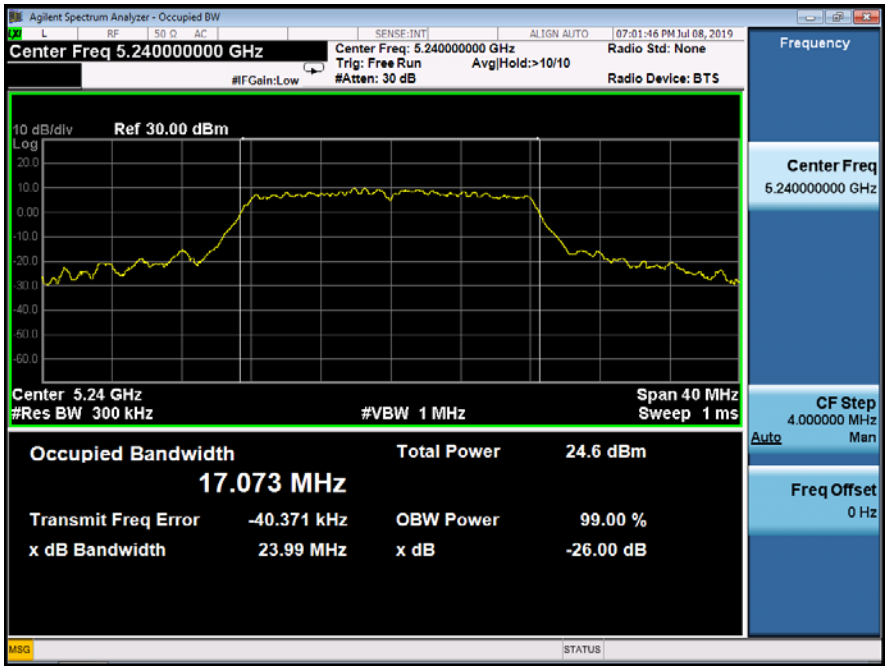
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5180 |



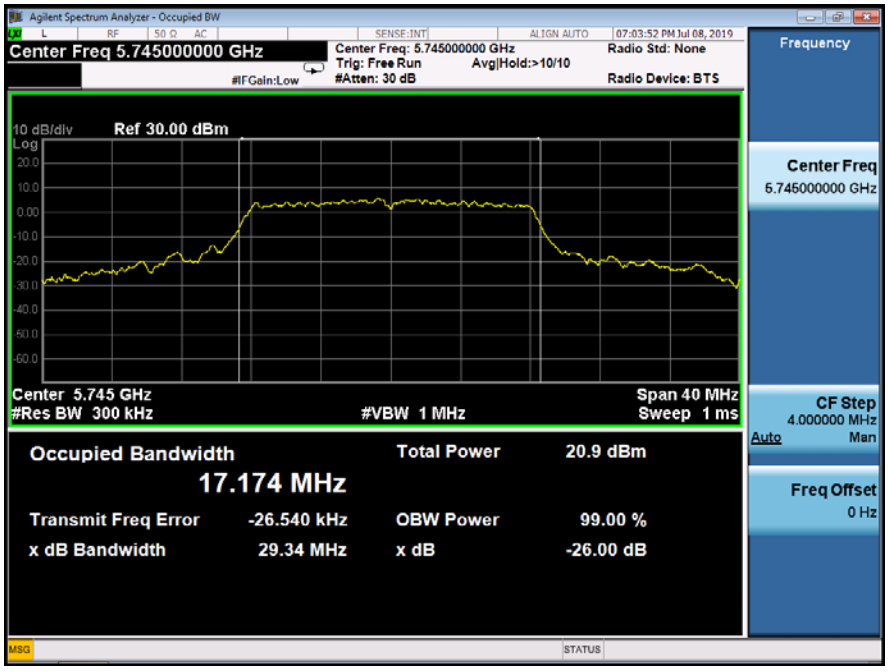

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5200 |



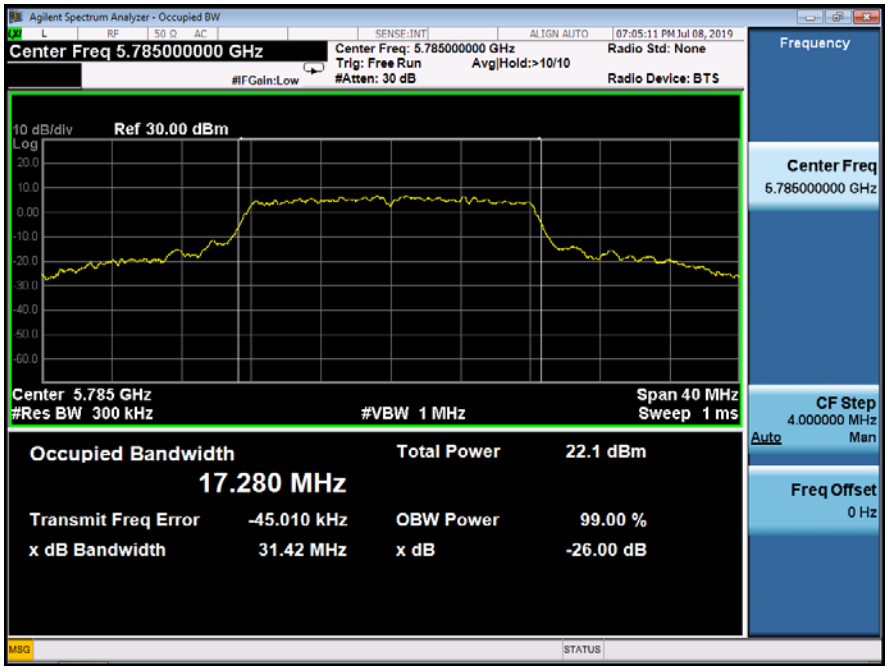
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5240 |



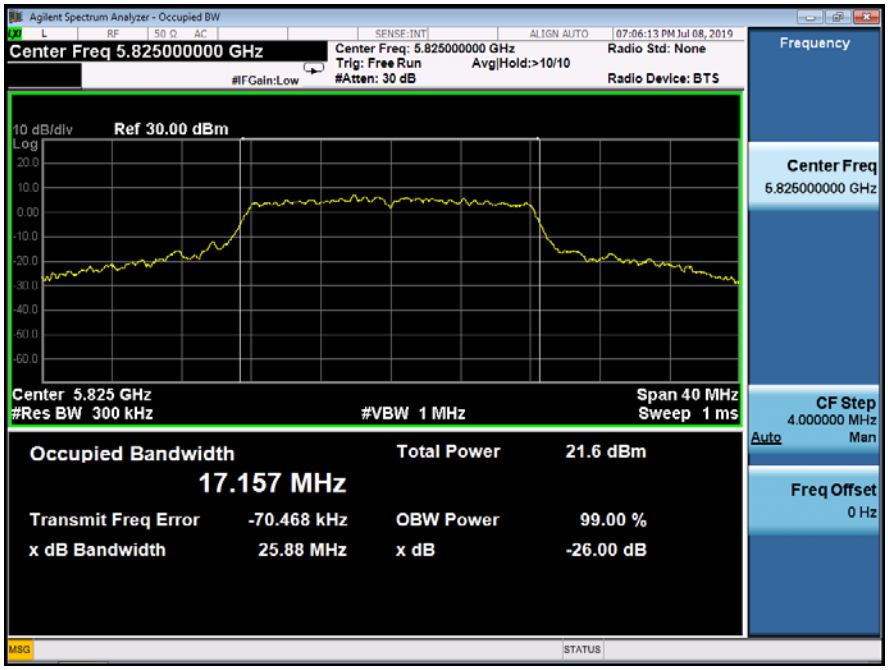
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5745 |



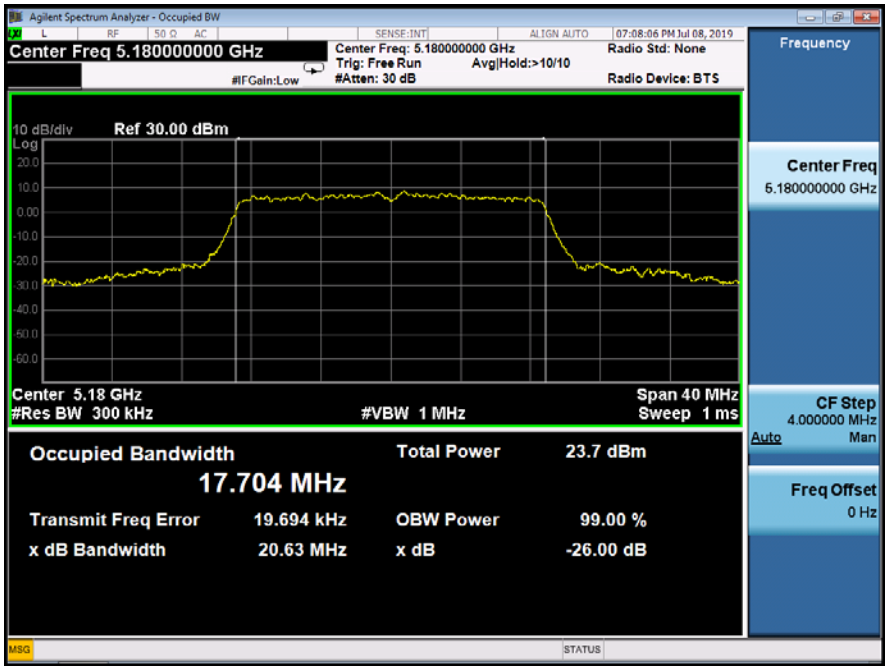

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5785 |



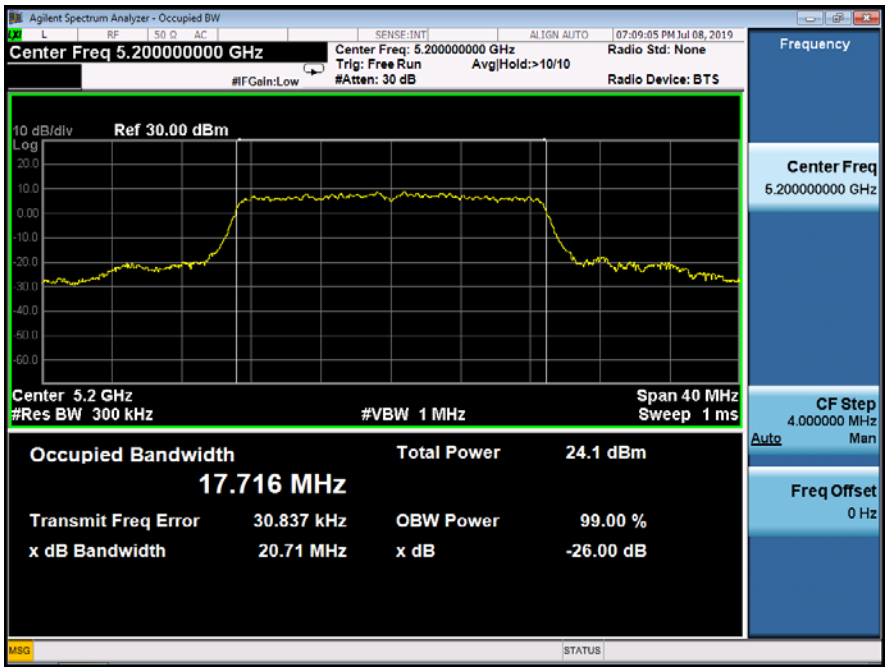
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5825 |



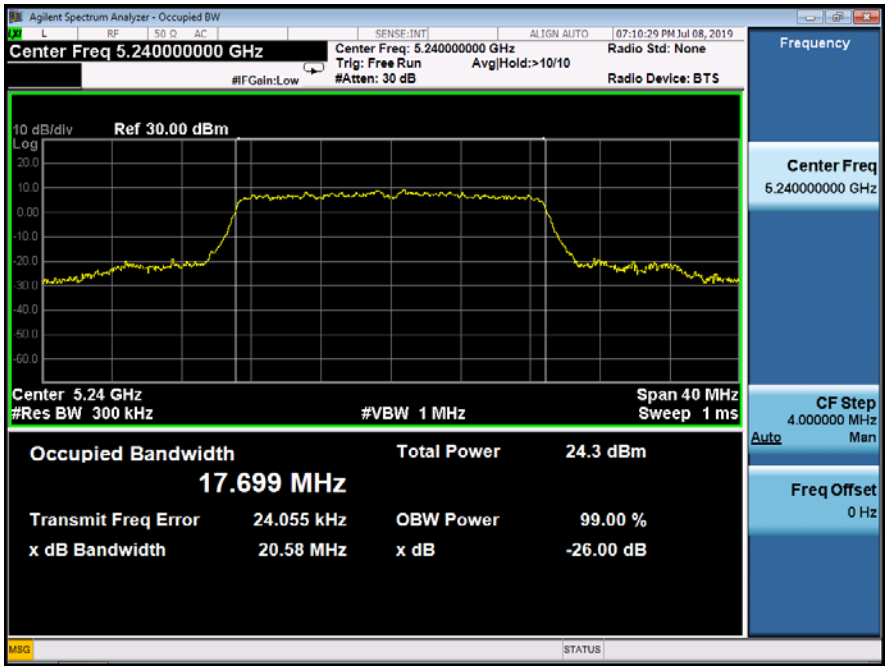
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5180 |



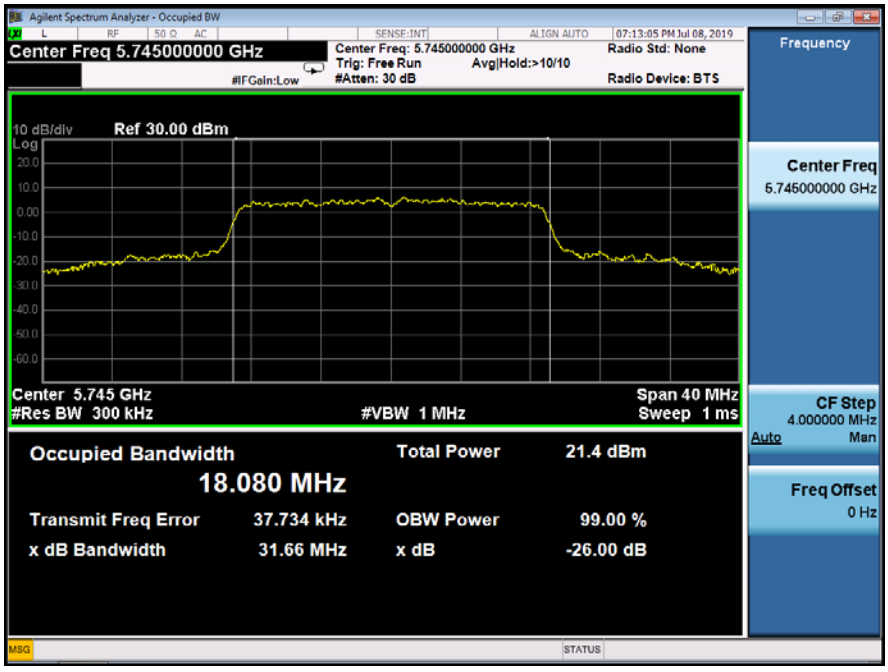

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5200 |



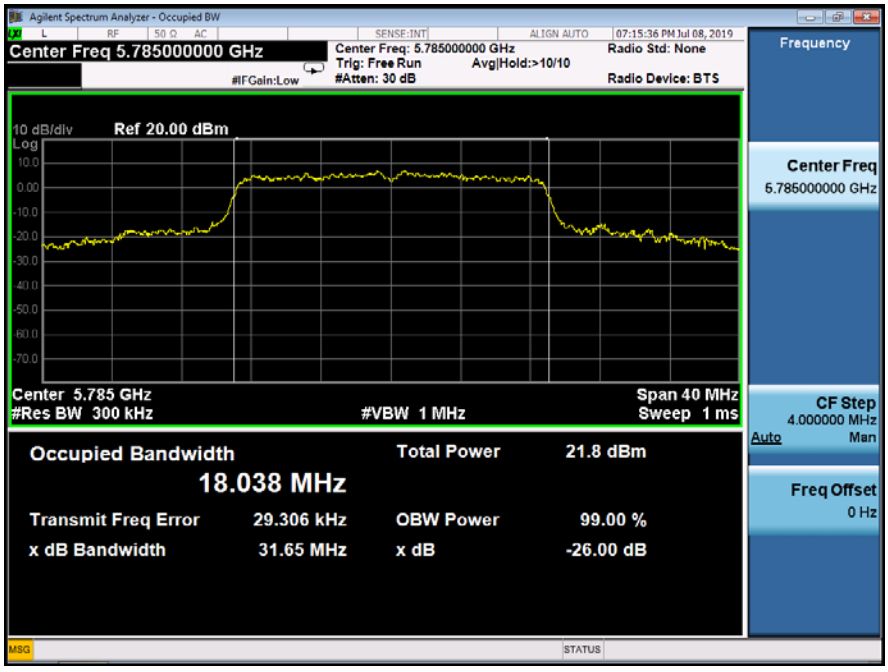
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5240 |



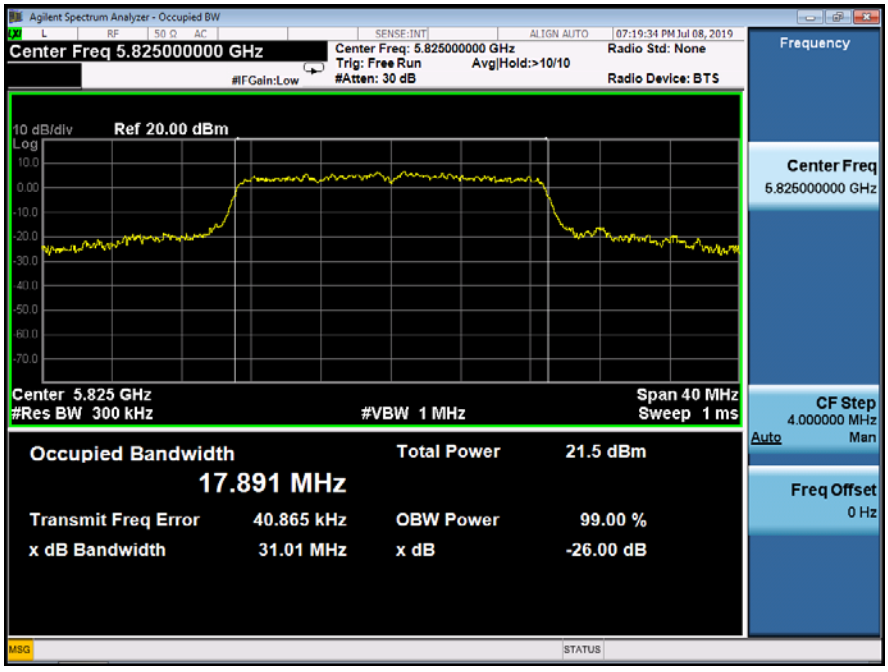
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5745 |



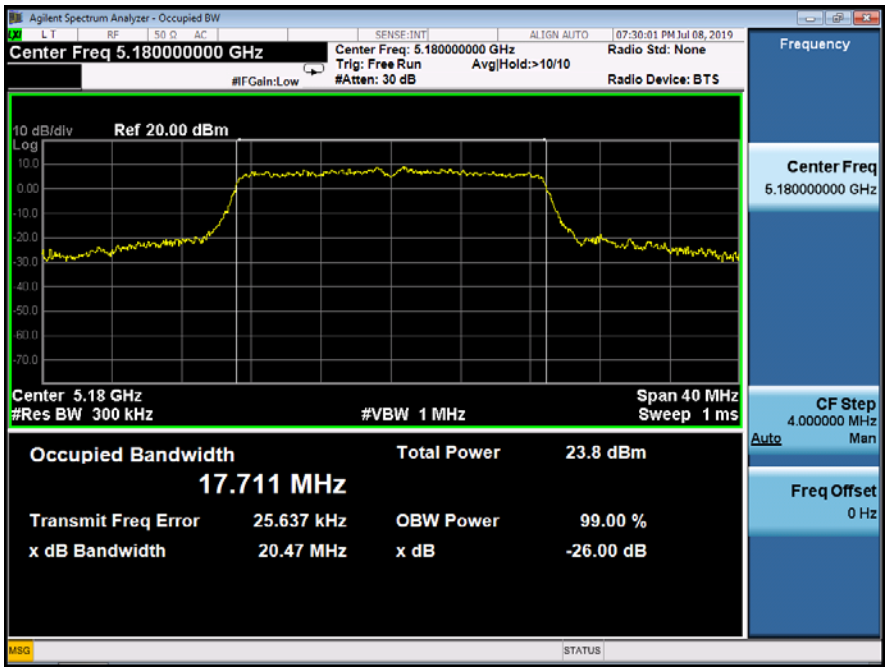

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5785 |



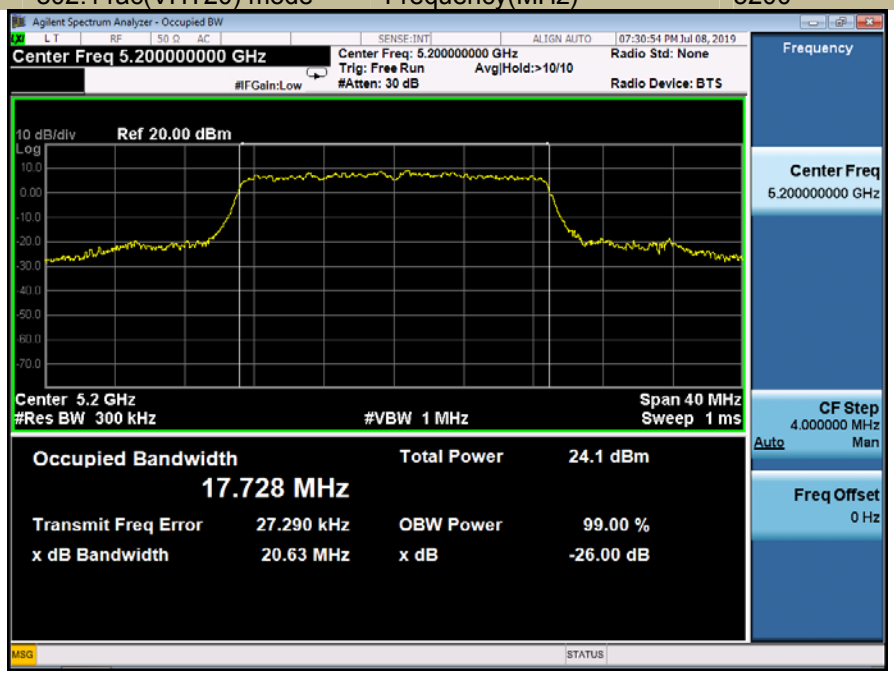
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5825 |



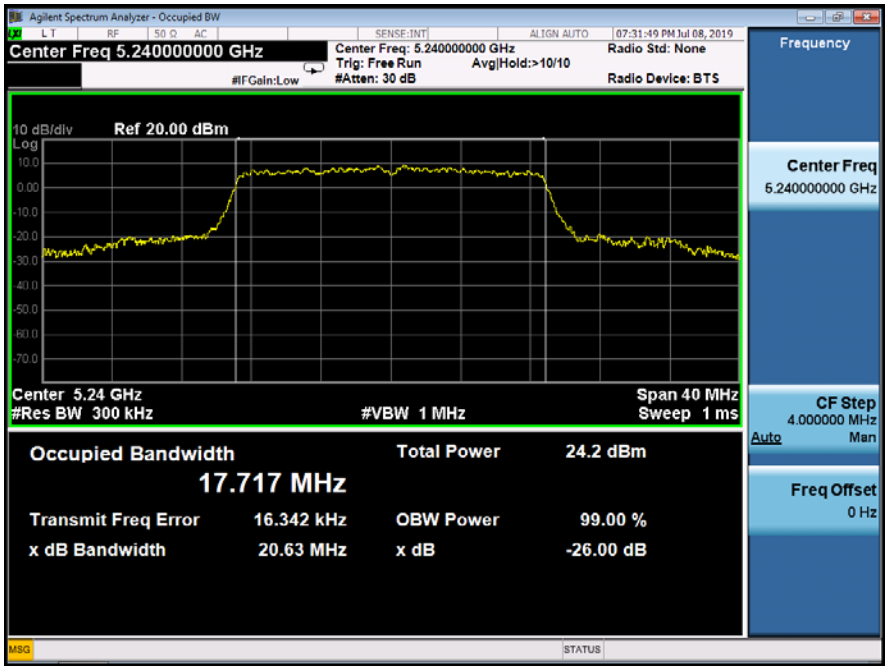
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5180 |



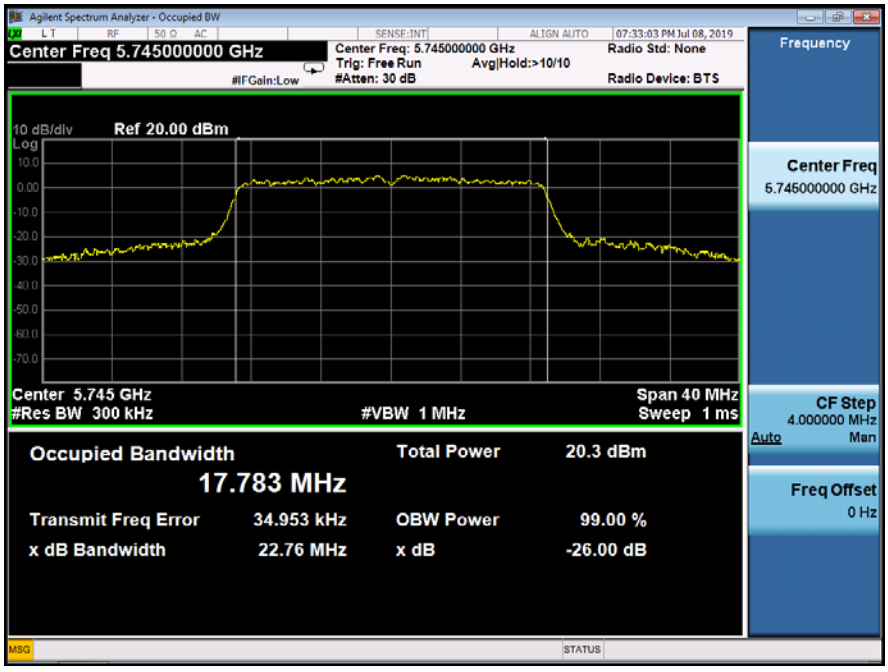

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5200 |



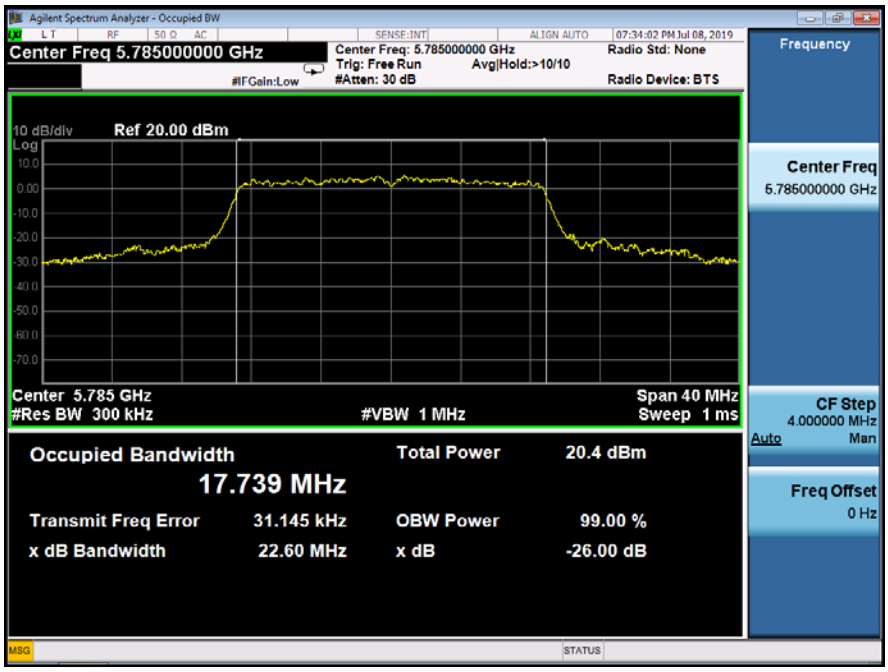
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5240 |



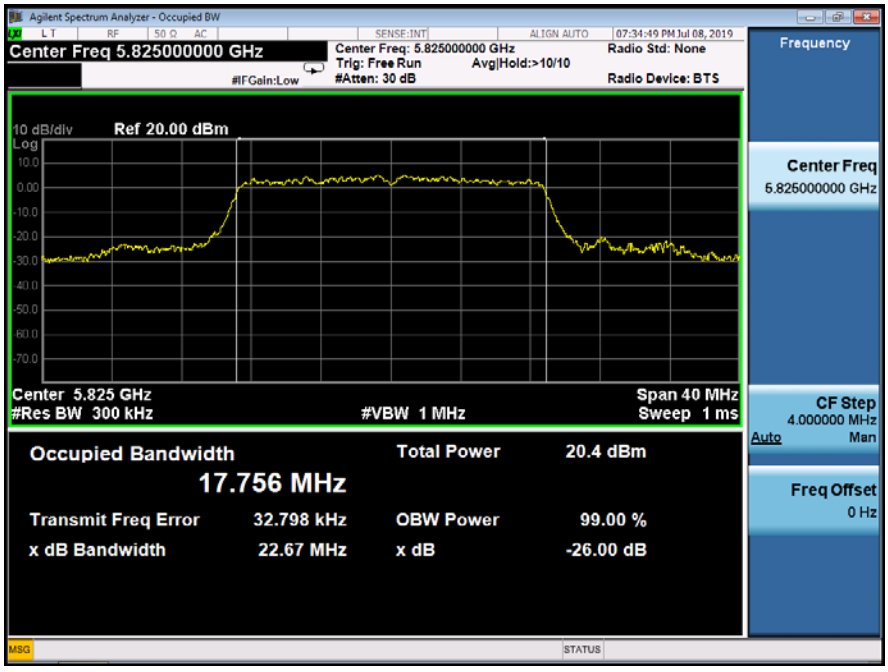
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5745 |



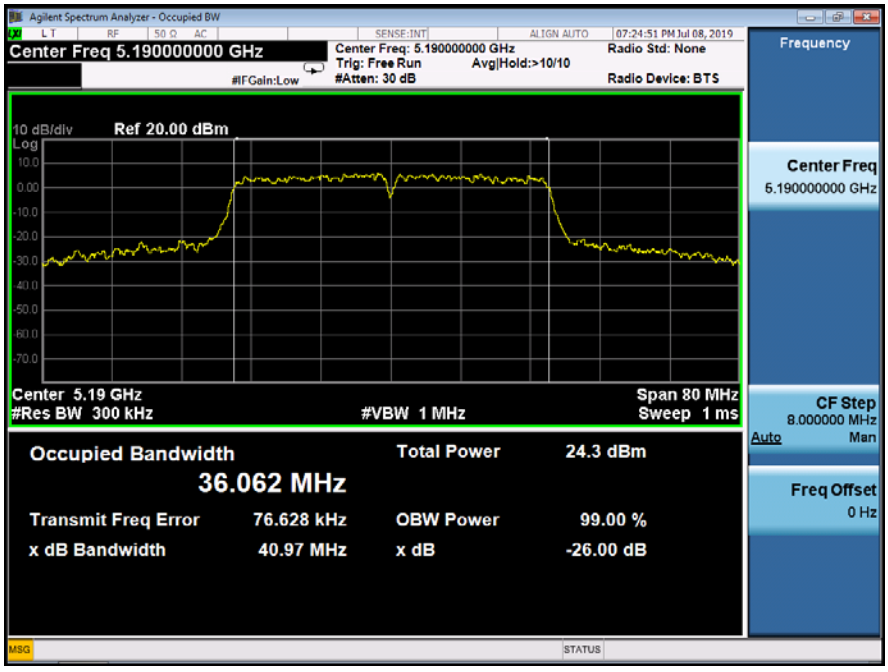

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5785 |



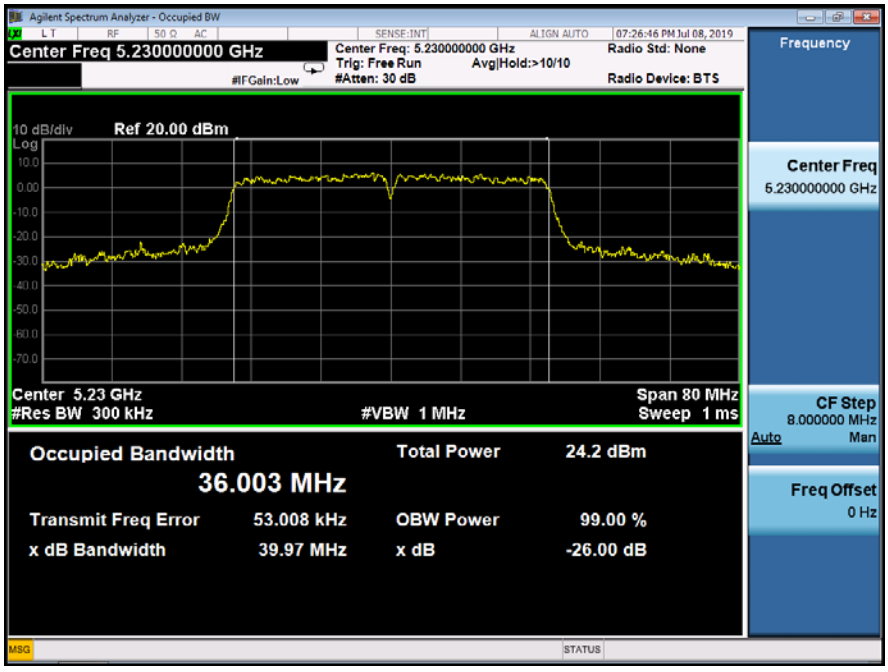
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5825 |



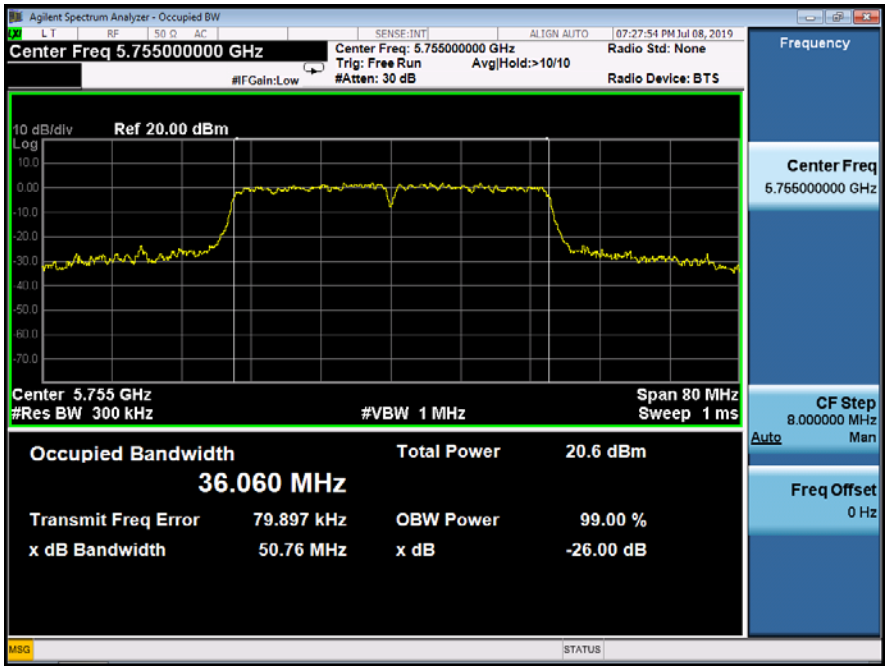
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5190 |



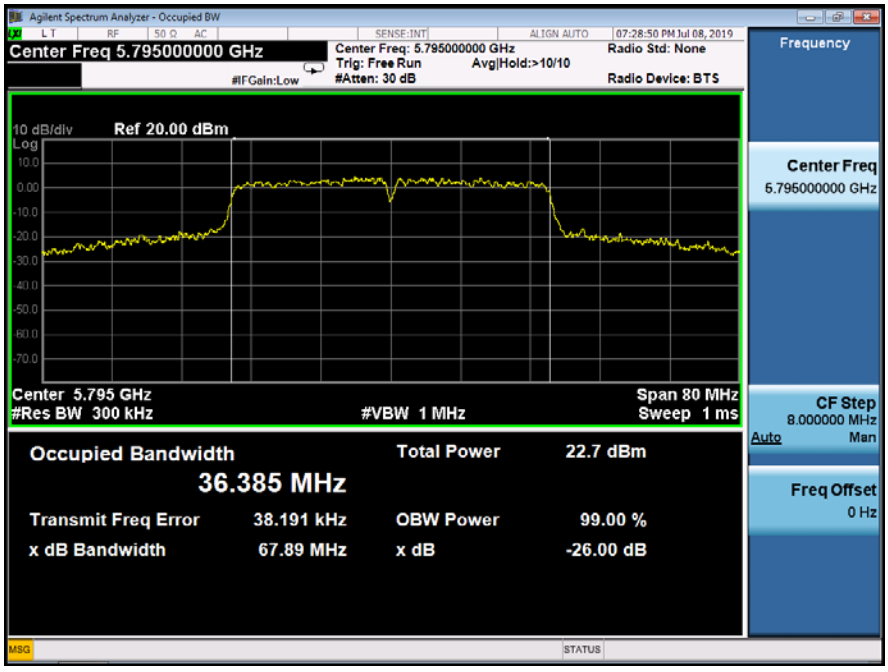

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5230 |



| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5755 |

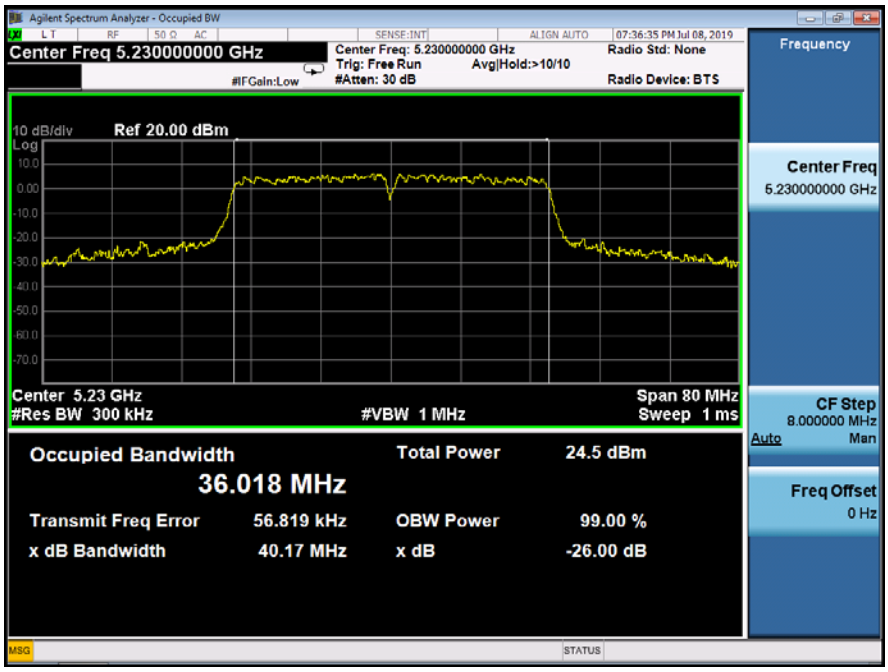



| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5795 |

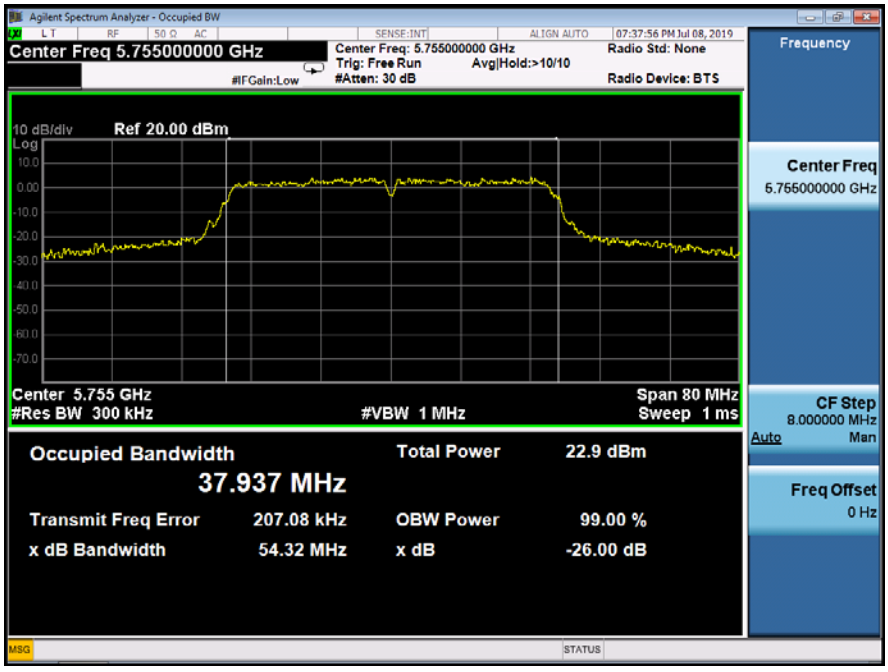


| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5190 |

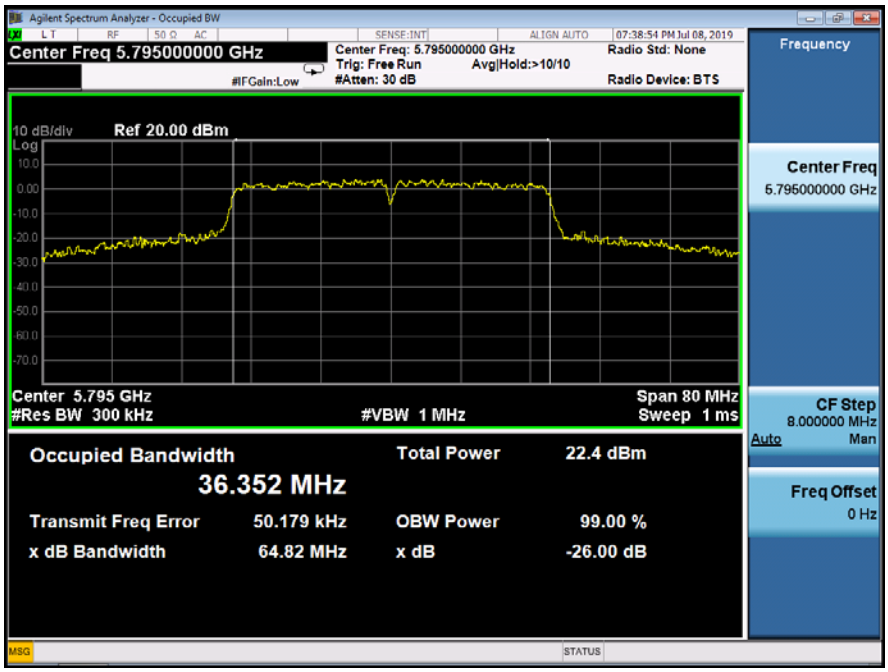

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5230 |



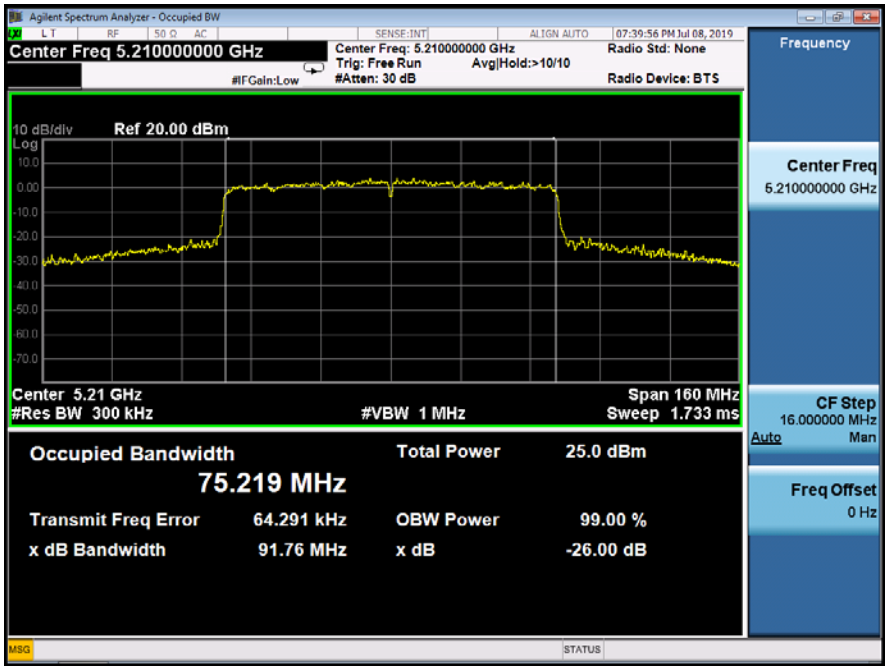
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5755 |



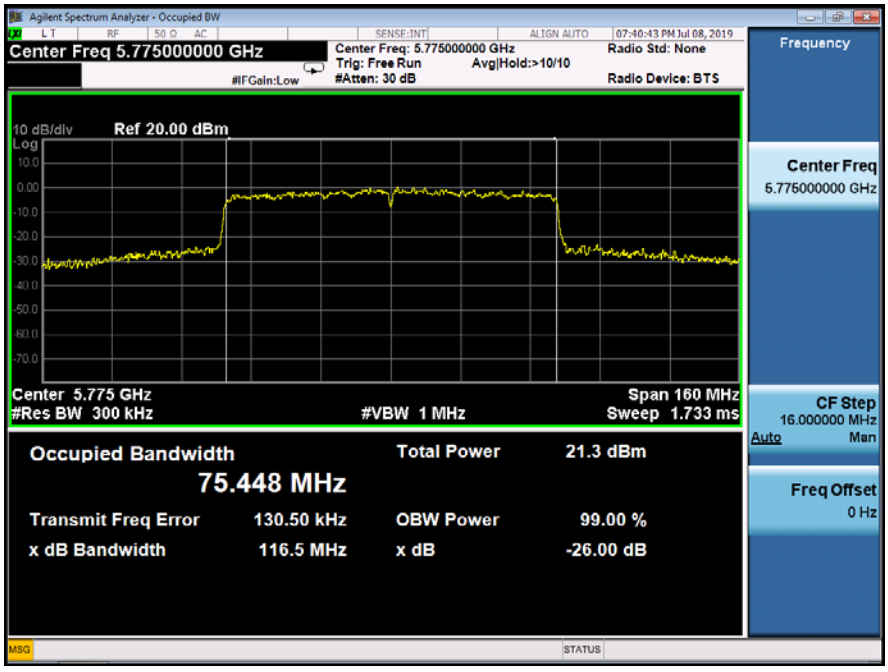

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5795 |



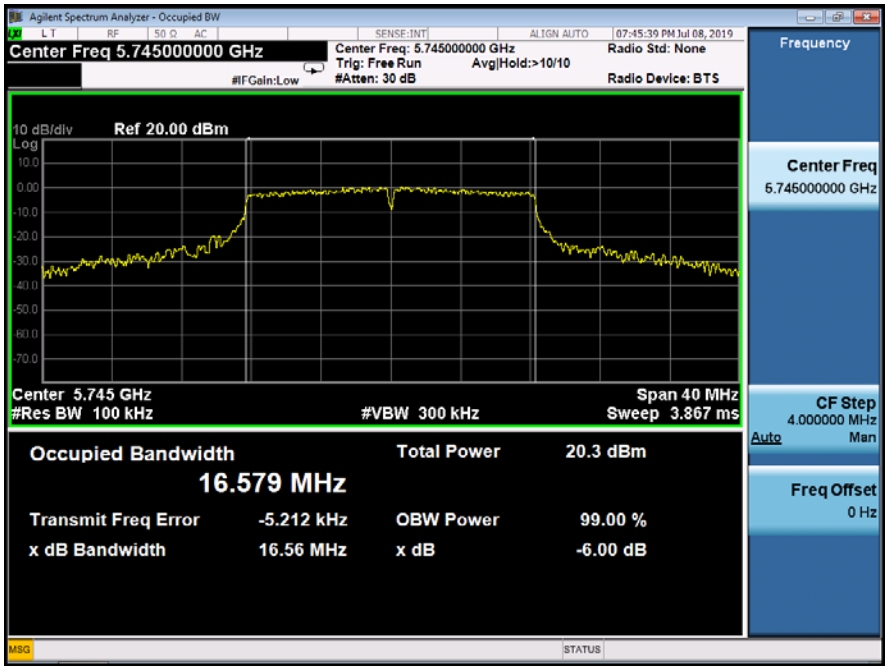
| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT80) mode | Frequency(MHz) | 5210 |



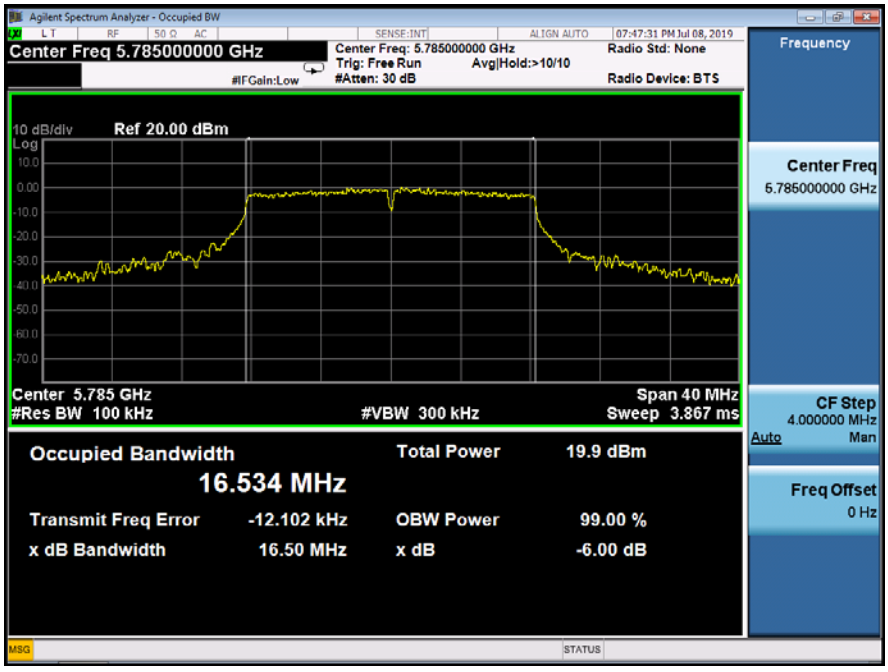

| Emission Bandwidth&99% Occupied Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT80) mode | Frequency(MHz) | 5775 |



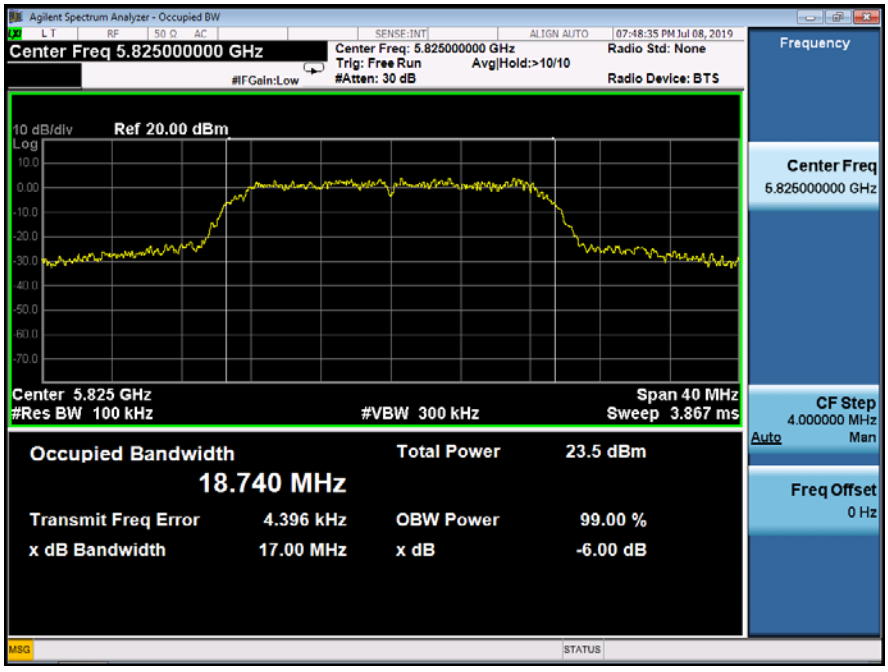
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a mode | Frequency(MHz) | 5745 |



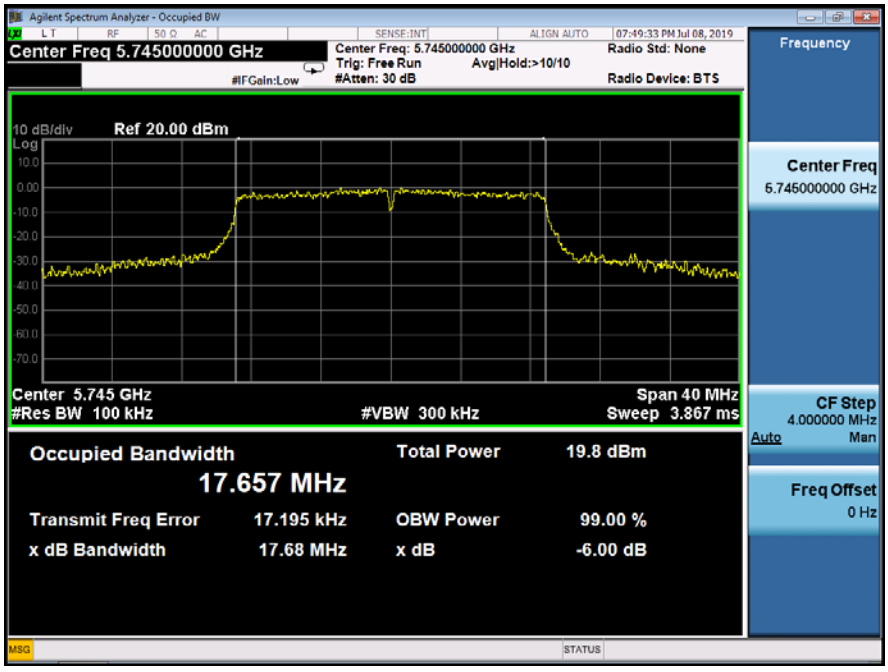

| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a mode | Frequency(MHz) | 5785 |



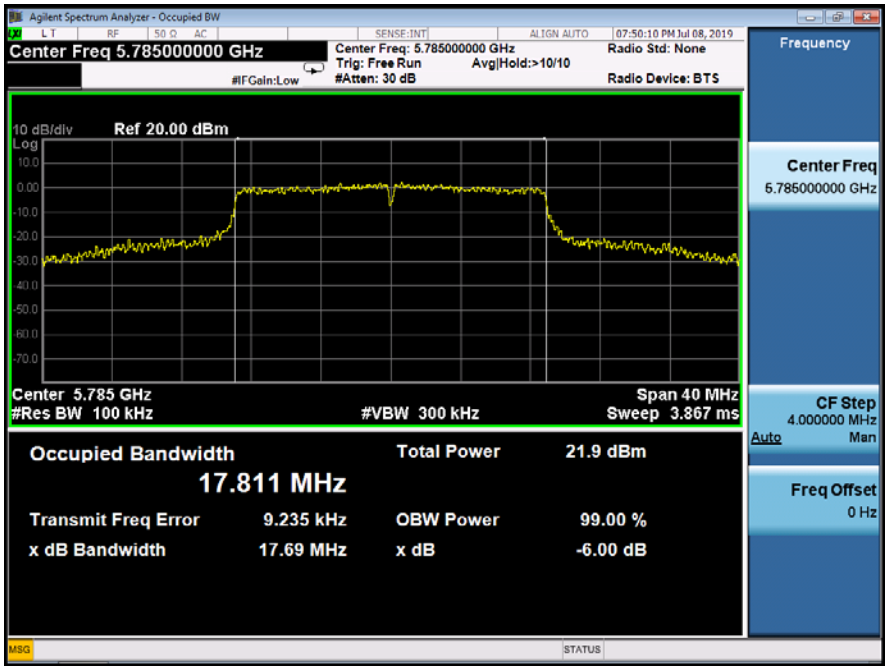
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a mode | Frequency(MHz) | 5825 |



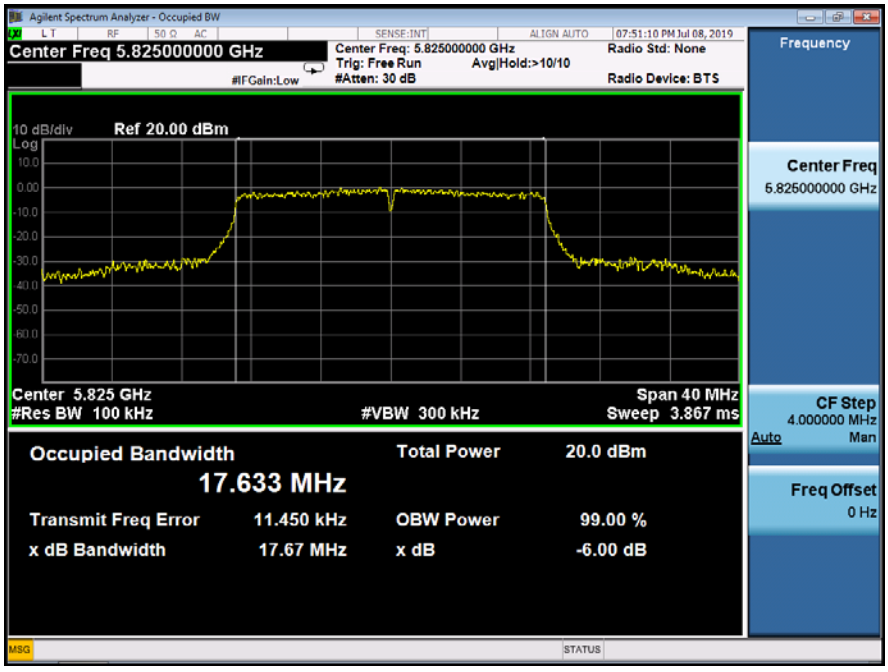
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5745 |



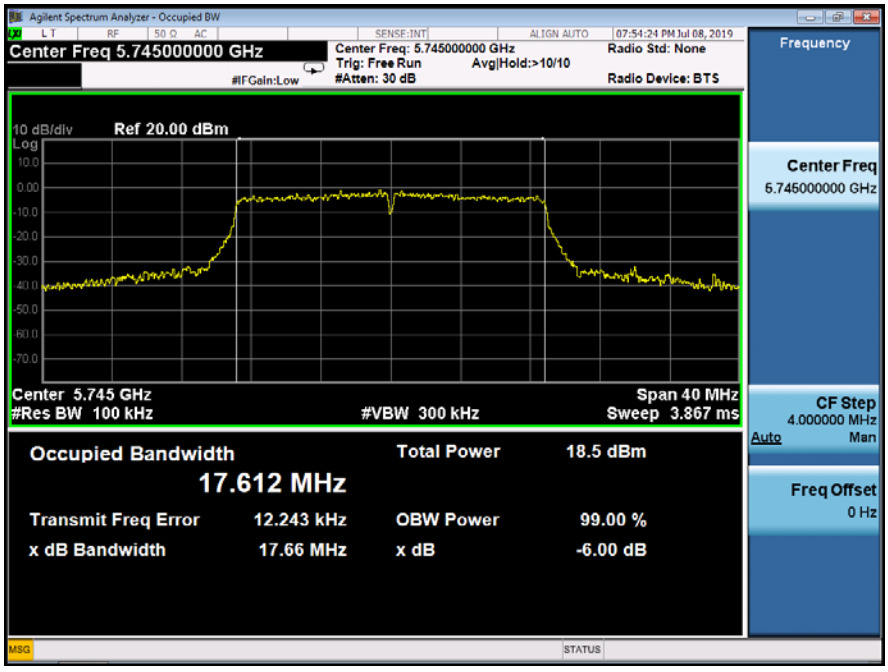

| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5785 |



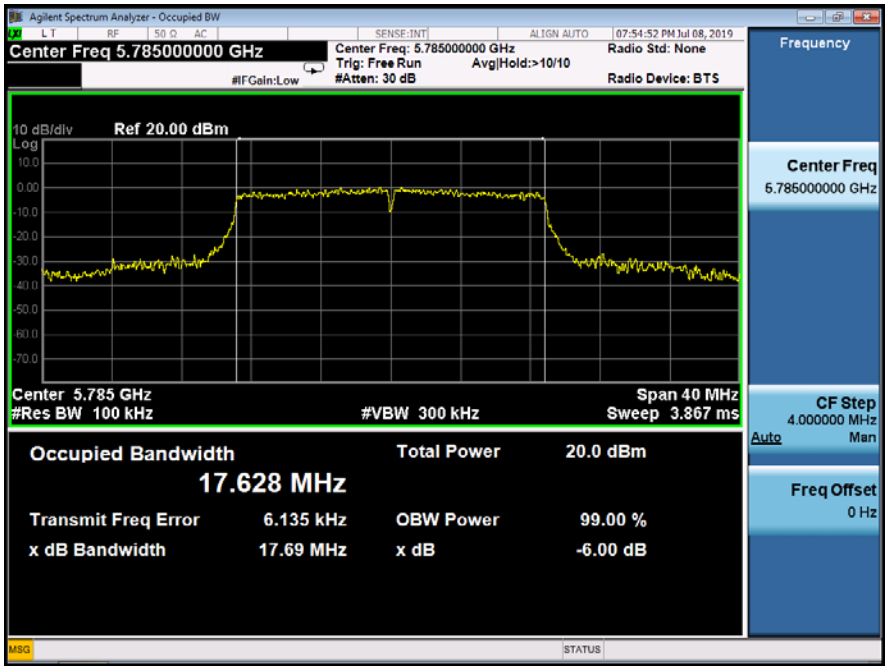
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(VHT20) mode | Frequency(MHz) | 5825 |



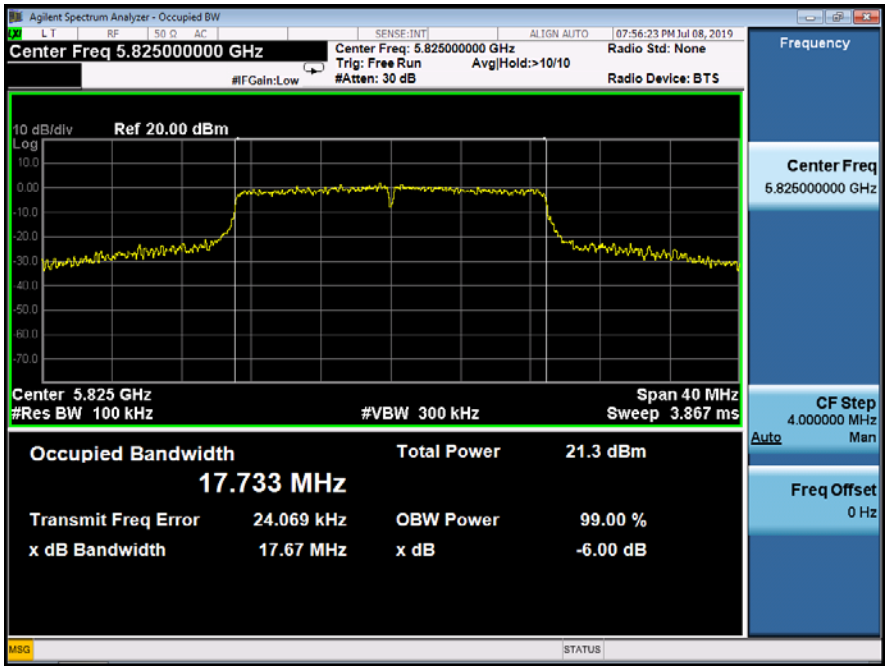
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5745 |



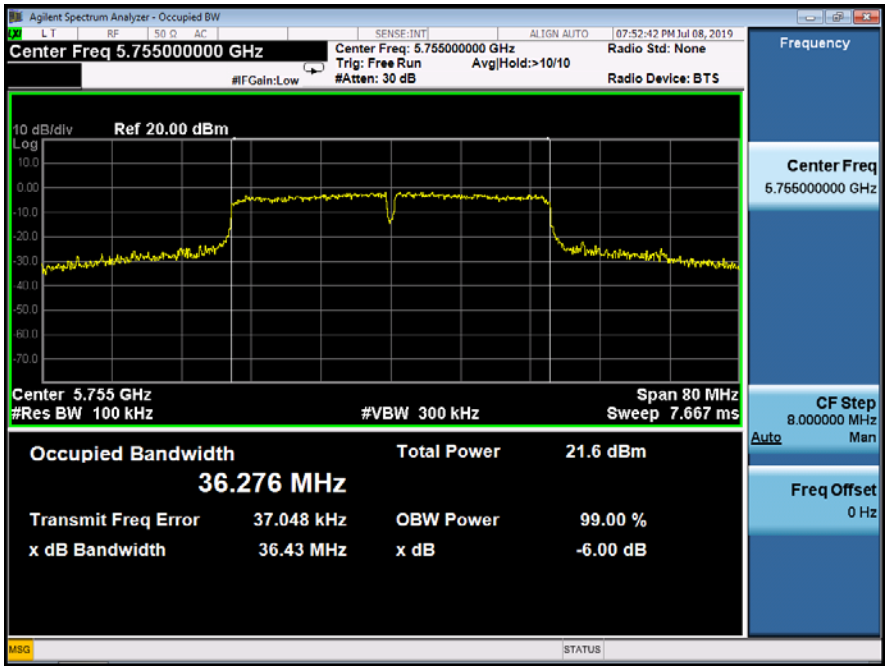

| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5785 |



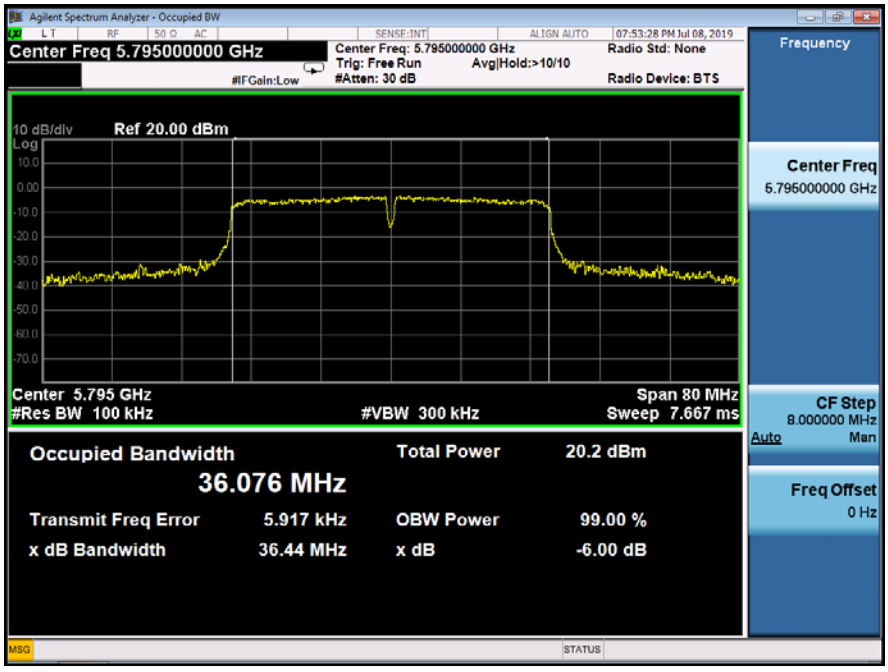
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5825 |



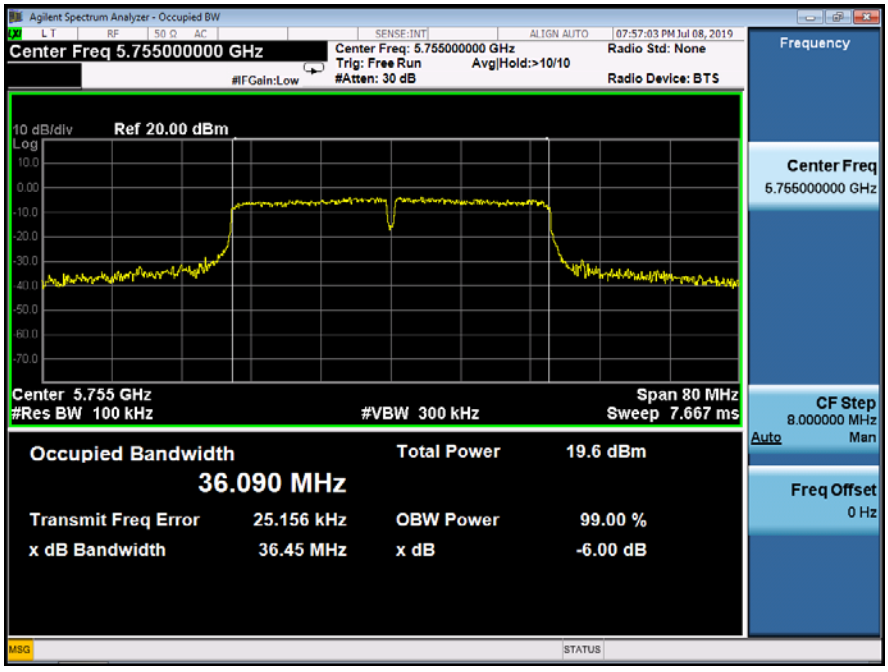
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5755 |



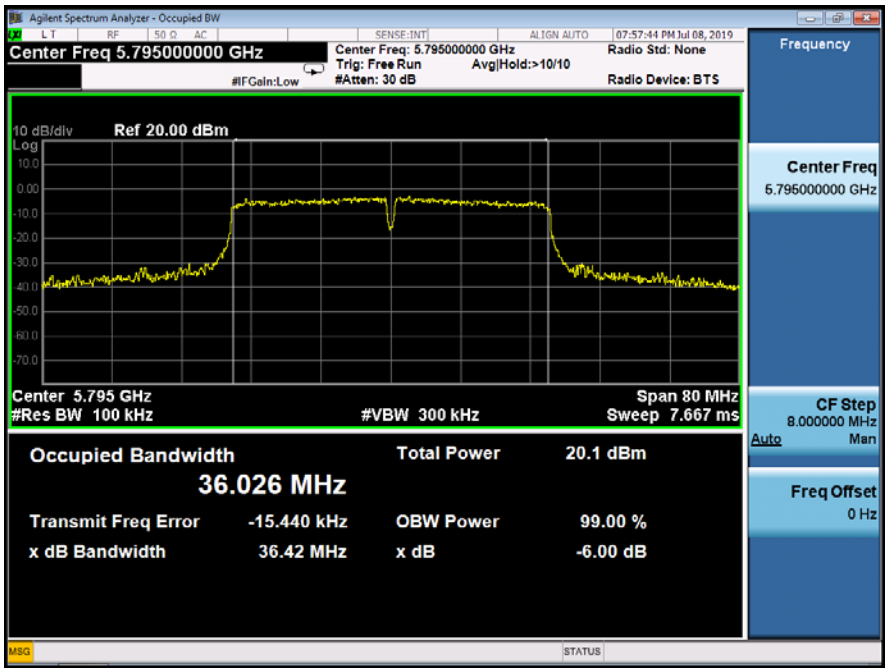
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5795 |



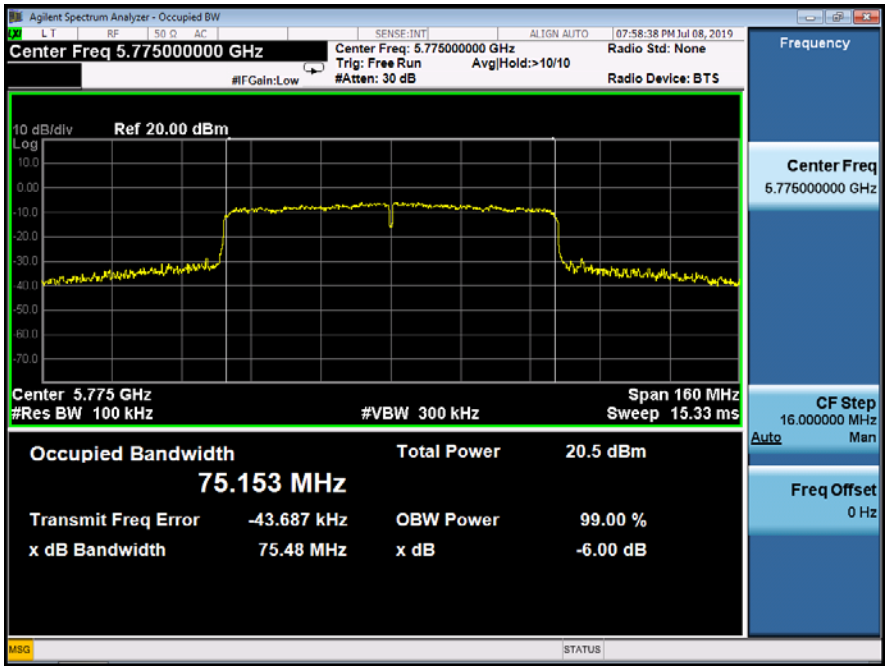
| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5755 |




| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5795 |



| Minimum Emission Bandwidth | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT80) mode | Frequency(MHz) | 5775 |



## 8.2 MAXIMUM CONDUCTED OUTPUT POWER

8.2.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I
According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C
According to FCC Part 15.407(a)(3) for UNII Band III
According to 789033 D02 Section II(E)

8.2.2 Conformance Limit

- For the band 5.15-5.25 GHz,

(a) (1) (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
(a) (1) (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(a) (1) (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
(a) (1) (iv) 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 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

(a) (2) 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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- For the band 5.725-5.85 GHz

(a) (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. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.2.4 Test Procedure

Method 1 For Normal Bandwidth 20MHz, 40MHz
The maximum average conducted output power can be measured using Method PM-G ( Measurement using an RF average power meter):

a. The Transmitter output (antenna port) was connected to the power meter.
b. Turn on the EUT and power meter and then record the power value.
c. Repeat above procedures on all channels needed to be tested.

Method 2 For Normal Bandwidth 80MHz
Measurement of maximum conducted output power using a spectrum analyzer (Method SA-1 from KDB 789033)

a. Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
b. Set RBW = 1 MHz.
c. Set VBW $\geqslant$ 3 MHz.
d. Number of points in sweep $\geqslant$ 2 $\times$ span / RBW. (This ensures that bin-to-bin spacing is $\leqslant$ RBW/2, so that narrowband signals are not lost between frequency bins.)
e. Sweep time = auto.
f. Detector = power averaging (rms)
g. Trace average at least 100 traces in power averaging (rms) mode.
h. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

8.2.5 Test Results

| ☒ 802.11a mode | | | |
|---|---|---|---|
| Temperature : | 28℃ | Test By: | King Kong |
| Humidity : | 65 % | | |

| Band | Channel Number | Channel Freq. (MHz) | Conducted Output Power(dBm) | | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | | |
| UNII Band I | CH36 | 5180 | 19.70 | 19.73 | 30.00 | Pass |
| | CH40 | 5200 | 19.50 | 19.67 | 30.00 | Pass |
| | CH48 | 5240 | 19.61 | 18.80 | 30.00 | Pass |
| UNII Band III | CH149 | 5745 | 18.27 | 18.78 | 30.00 | Pass |
| | CH157 | 5785 | 18.92 | 19.47 | 30.00 | Pass |
| | CH165 | 5825 | 19.75 | 18.79 | 30.00 | Pass |
| Note:<br>N/A (Not Applicable) | | | | | | |

| ☒ 802.11n(HT20) mode | | | |
|---|---|---|---|
| Temperature : | 28℃ | Test By: | King Kong |
| Humidity : | 65 % | | |

| Band | Channel Number | Channel Freq. (MHz) | Conducted Output Power(dBm) | | | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH36 | 5180 | 19.39 | 19.87 | 22.647 | 27.99 | Pass |
| | CH40 | 5200 | 19.64 | 19.53 | 22.596 | 27.99 | Pass |
| | CH48 | 5240 | 19.13 | 19.13 | 22.140 | 27.99 | Pass |
| UNII Band III | CH149 | 5745 | 18.13 | 18.73 | 21.451 | 27.99 | Pass |
| | CH157 | 5785 | 19.05 | 19.09 | 22.080 | 27.99 | Pass |
| | CH165 | 5825 | 19.74 | 18.84 | 22.324 | 27.99 | Pass |

| ☒ 802.11ac(VHT20) mode | | | |
|---|---|---|---|
| Temperature : | 28℃ | Test By: | King Kong |
| Humidity : | 65 % | | |

| Band | Channel Number | Channel Freq. (MHz) | Conducted Output Power(dBm) | | | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH36 | 5180 | 19.530 | 19.22 | 22.388 | 27.99 | Pass |
| | CH40 | 5200 | 19.500 | 19.87 | 22.699 | 27.99 | Pass |
| | CH48 | 5240 | 18.600 | 18.54 | 21.580 | 27.99 | Pass |
| UNII Band III | CH149 | 5745 | 19.220 | 18.80 | 22.025 | 27.99 | Pass |
| | CH157 | 5785 | 18.600 | 19.04 | 21.836 | 27.99 | Pass |
| | CH165 | 5825 | 19.420 | 18.61 | 22.044 | 27.99 | Pass |

☒ 802.11n(HT40) mode

Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Conducted Output Power(dBm) | | | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH38 | 5190 | 19.18 | 19.68 | 22.447 | 27.99 | Pass |
| | CH46 | 5230 | 19.41 | 18.75 | 22.103 | 27.99 | Pass |
| UNII Band III | CH151 | 5755 | 18.29 | 19.22 | 21.790 | 27.99 | Pass |
| | CH159 | 5795 | 19.99 | 19.62 | 22.819 | 27.99 | Pass |

☒ 802.11ac(VHT40) mode

Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Conducted Output Power(dBm) | | | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH38 | 5190 | 19.59 | 19.66 | 22.635 | 27.99 | Pass |
| | CH46 | 5230 | 19.21 | 18.86 | 22.049 | 27.99 | Pass |
| UNII Band III | CH151 | 5755 | 19.32 | 18.87 | 22.111 | 27.99 | Pass |
| | CH159 | 5795 | 19.47 | 19.52 | 22.505 | 27.99 | Pass |

☒ 802.11ac(VHT80) mode

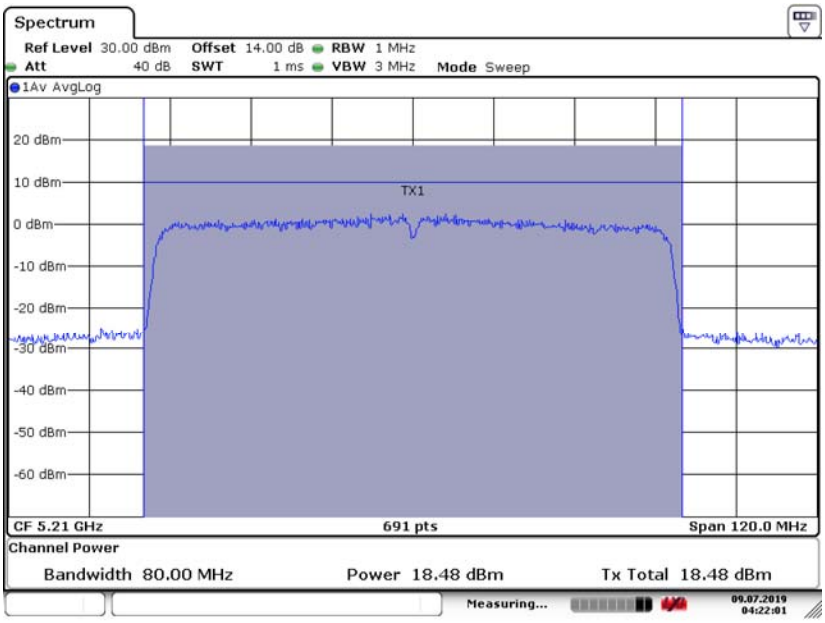
Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Conducted Output Power(dBm) | | | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH42 | 5210 | 18.49 | 19.45 | 22.007 | 27.99 | Pass |
| UNII Band III | CH155 | 5775 | 19.06 | 19.59 | 22.343 | 27.99 | Pass |

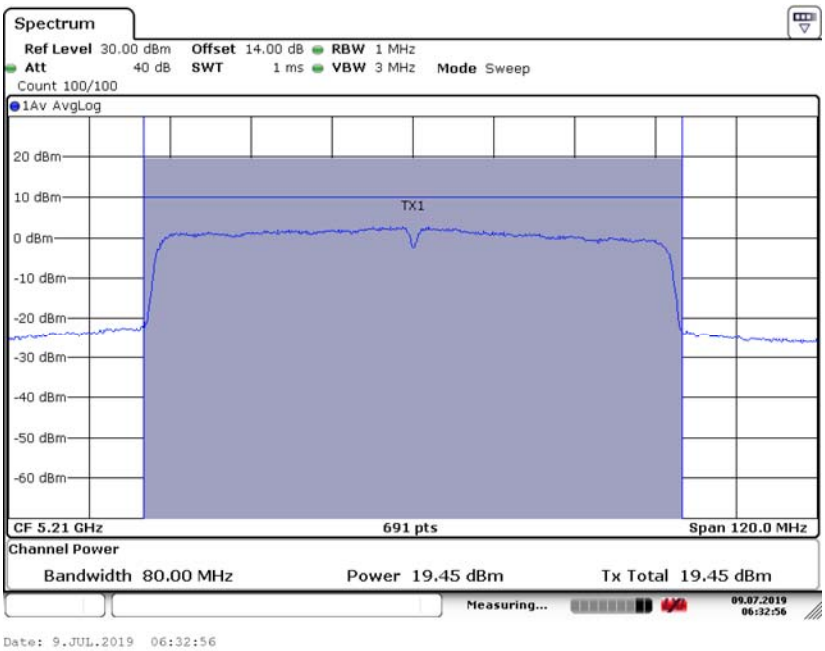
For 802.11ac (VHT80) Test Plots see the follow pages;

| MAXIMUM CONDUCTED OUTPUT POWER | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT80) mode | Frequency(MHz) | 5210 |

Ant0

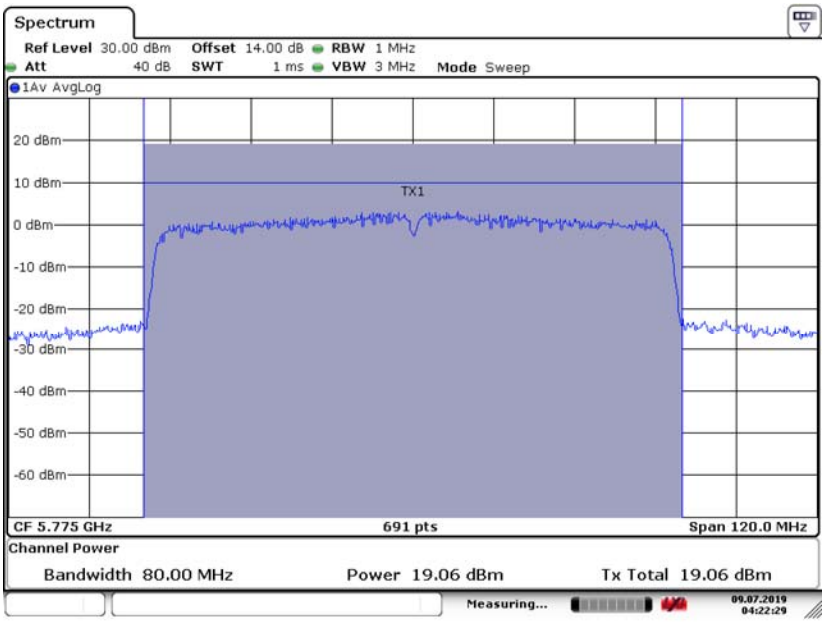



Ant1

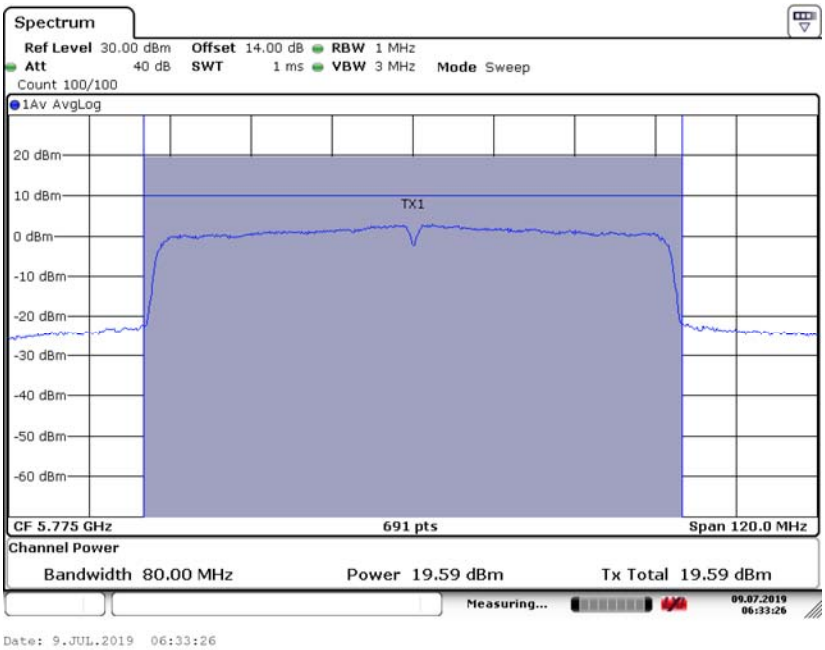


| MAXIMUM CONDUCTED OUTPUT POWER | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT80) mode | Frequency(MHz) | 5775 |

Ant0




Ant1



## 8.3 MAXIMUM PEAK POWER DENSITY

8.3.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I
According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C
According to FCC Part 15.407(a)(3) for UNII Band III
According to 789033 D02 Section II(F)

8.3.2 Conformance Limit

- For the band 5.15-5.25 GHz,

(a) (1) (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
(a) (1) (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(a) (1) (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
(a) (1) (iv) 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 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

(b) (2) 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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- For the band 5.725-5.85 GHz

(a) (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. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.3.4 Test Procedure

Methods refer to FCC KDB 789033

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”.

2) Use the peak search function on the instrument to find the peak of the spectrum.

3) The result is the PPSD.
4) The above procedures make use of 500kHz resolution bandwidth to satisfy the 500kHz measurement bandwidth specified in the 15.407(a)(5). That rule section also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 500kHz bandwidth
Note: As a practical matter, it is recommended to use reduced RBW of 500 kHz for the sections 5.c) and 5.d) above, since RBW=500 kHz is available on nearly all spectrum analyzers.

8.3.5 Test Results

☒ 802.11a mode

Temperature : 28℃ Test By: King Kong

Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Power Spectral Density | | Limit | Verdict |
|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | | |
| UNII Band I | CH36 | 5180 | 8.43 | 8.61 | ≤17dBm/1MHz | Pass |
| | CH40 | 5200 | 8.70 | 8.59 | ≤17dBm/1MHz | Pass |
| | CH48 | 5240 | 8.19 | 7.14 | ≤17dBm/1MHz | Pass |
| UNII Band III | CH149 | 5745 | 4.88 | 4.20 | ≤30dBm/500KHz | Pass |
| | CH157 | 5785 | 5.14 | 5.07 | ≤30dBm/500KHz | Pass |
| | CH165 | 5825 | 6.57 | 5.50 | ≤30dBm/500KHz | Pass |

☒ 802.11n(HT20) mode

Temperature : 28℃ Test By: King Kong

Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Power Spectral Density | | | Limit | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH36 | 5180 | 7.47 | 8.29 | 10.910 | ≤14.99dBm/1MHz | Pass |
| | CH40 | 5200 | 7.99 | 7.88 | 10.946 | ≤14.99dBm/1MHz | Pass |
| | CH48 | 5240 | 7.36 | 7.41 | 10.395 | ≤14.99dBm/1MHz | Pass |
| UNII Band III | CH149 | 5745 | 5.49 | 3.77 | 7.725 | ≤27.99dBm/500KHz | Pass |
| | CH157 | 5785 | 6.46 | 4.33 | 8.535 | ≤27.99dBm/500KHz | Pass |
| | CH165 | 5825 | 5.04 | 5.01 | 8.035 | ≤27.99dBm/500KHz | Pass |

☒ 802.11ac(VHT20) mode

Temperature : 28℃ Test By: King Kong

Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Power Spectral Density | | | Limit | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH36 | 5180 | 7.00 | 8.05 | 10.567 | ≤14.99dBm/1MHz | Pass |
| | CH40 | 5200 | 6.58 | 8.80 | 10.841 | ≤14.99dBm/1MHz | Pass |
| | CH48 | 5240 | 7.56 | 6.98 | 10.290 | ≤14.99dBm/1MHz | Pass |
| UNII Band III | CH149 | 5745 | 4.47 | 4.49 | 7.490 | ≤27.99dBm/500KHz | Pass |
| | CH157 | 5785 | 5.04 | 5.07 | 8.065 | ≤27.99dBm/500KHz | Pass |
| | CH165 | 5825 | 6.18 | 4.74 | 8.530 | ≤27.99dBm/500KHz | Pass |

☒ 802.11n(VHT40) mode

Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Power Spectral Density | | | Limit | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH38 | 5190 | 4.32 | 5.31 | 7.853 | ≤14.99dBm/1MHz | Pass |
| | CH46 | 5230 | 4.46 | 4.69 | 7.587 | ≤14.99dBm/1MHz | Pass |
| UNII Band III | CH151 | 5755 | 2.50 | 1.18 | 4.900 | ≤27.99dBm/500KHz | Pass |
| | CH159 | 5795 | 1.93 | 2.51 | 5.240 | ≤27.99dBm/500KHz | Pass |

☒ 802.11ac(VHT40) mode

Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Power Spectral Density | | | Limit | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH38 | 5190 | 3.95 | 5.29 | 7.682 | ≤14.99dBm/1MHz | Pass |
| | CH46 | 5230 | 3.92 | 4.75 | 7.365 | ≤14.99dBm/1MHz | Pass |
| UNII Band III | CH151 | 5755 | 2.44 | 1.56 | 5.033 | ≤27.99dBm/500KHz | Pass |
| | CH159 | 5795 | 1.85 | 2.22 | 5.049 | ≤27.99dBm/500KHz | Pass |

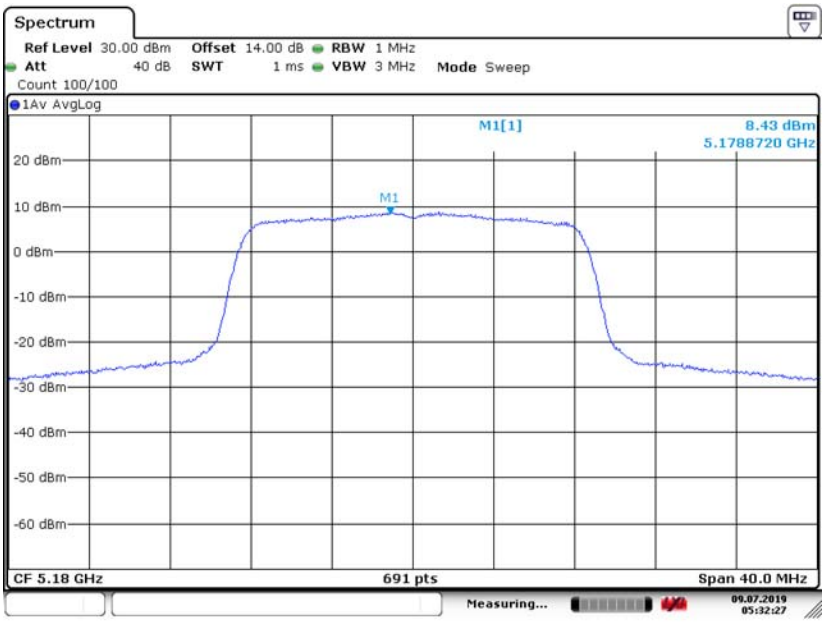
☒ 802.11ac(VHT80) mode

Temperature : 28℃ Test By: King Kong
Humidity : 65 %

| Band | Channel Number | Channel Freq. (MHz) | Power Spectral Density | | | Limit | Verdict |
|---|---|---|---|---|---|---|---|
| | | | Ant0 | Ant1 | Ant0+Ant1 | | |
| UNII Band I | CH42 | 5210 | 1.76 | 2.23 | 5.012 | ≤14.99dBm/1MHz | Pass |
| UNII Band III | CH155 | 5775 | -0.45 | -1.39 | 2.116 | ≤27.99dBm/500KHz | Pass |

**A. Antenna 0**

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5180 |

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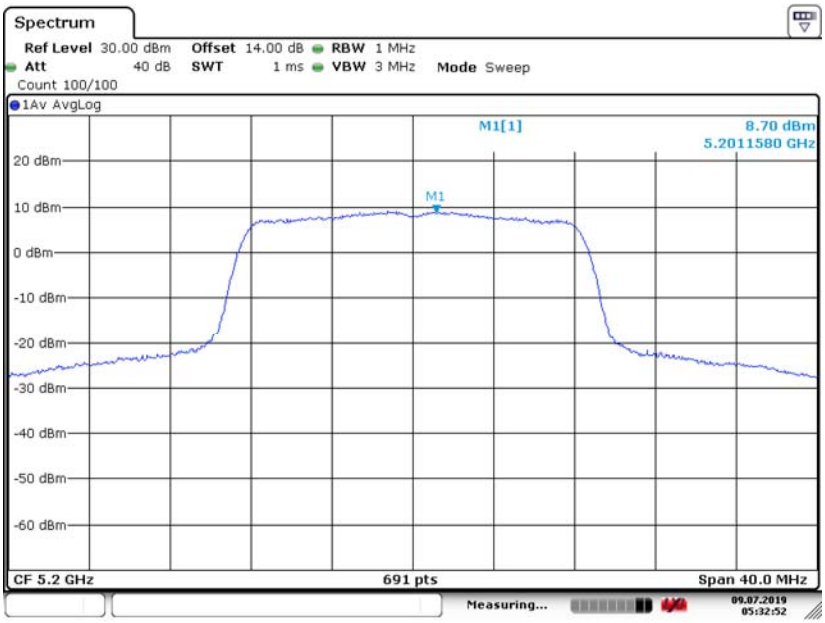
| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5200 |

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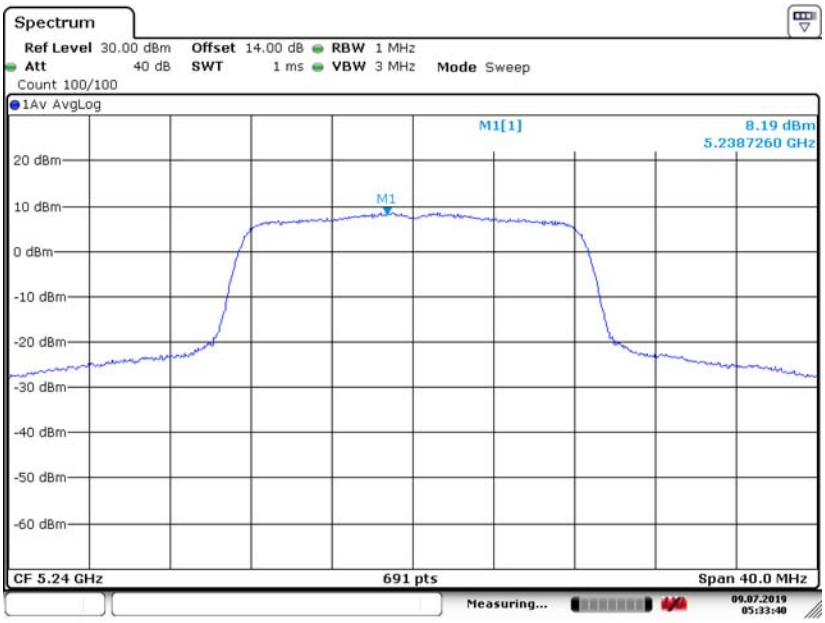
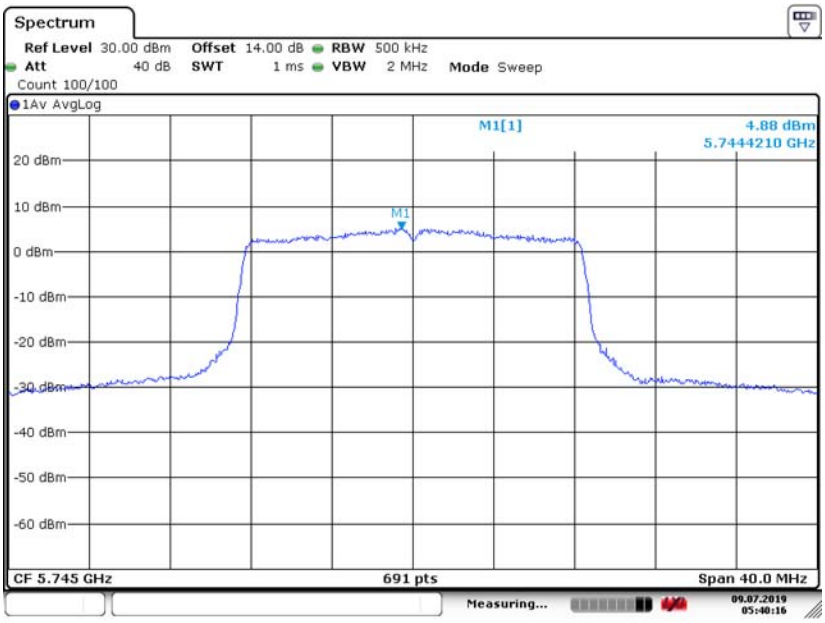
| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5240 |

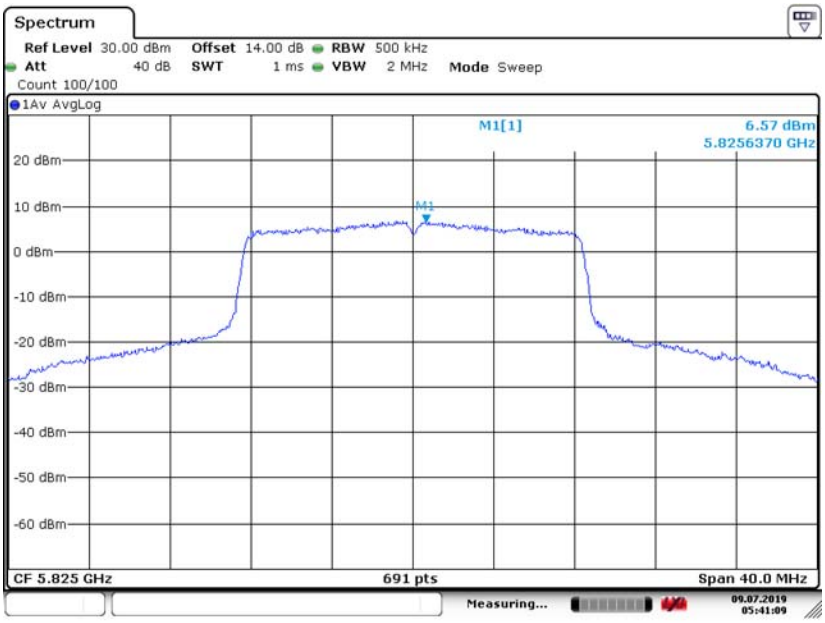


| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5745 |

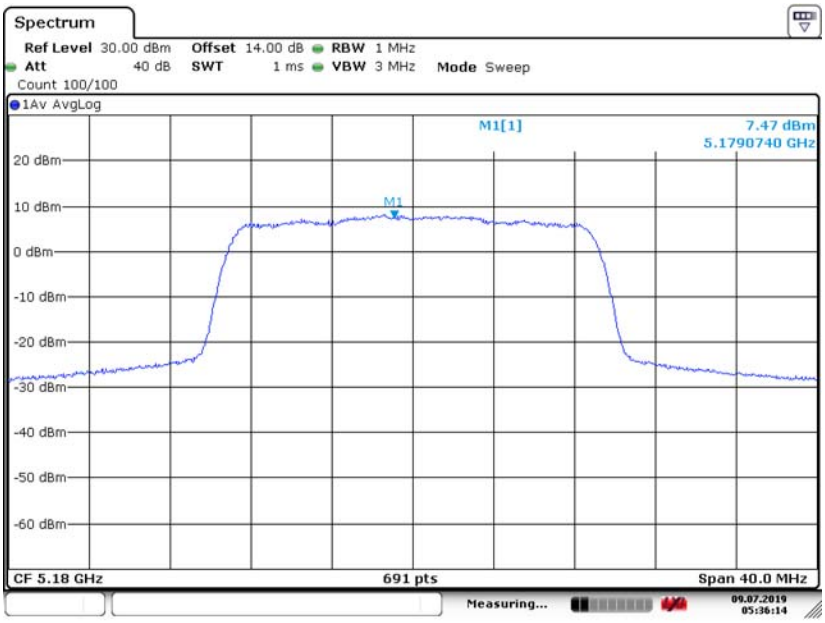



| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5785 |

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5825 |

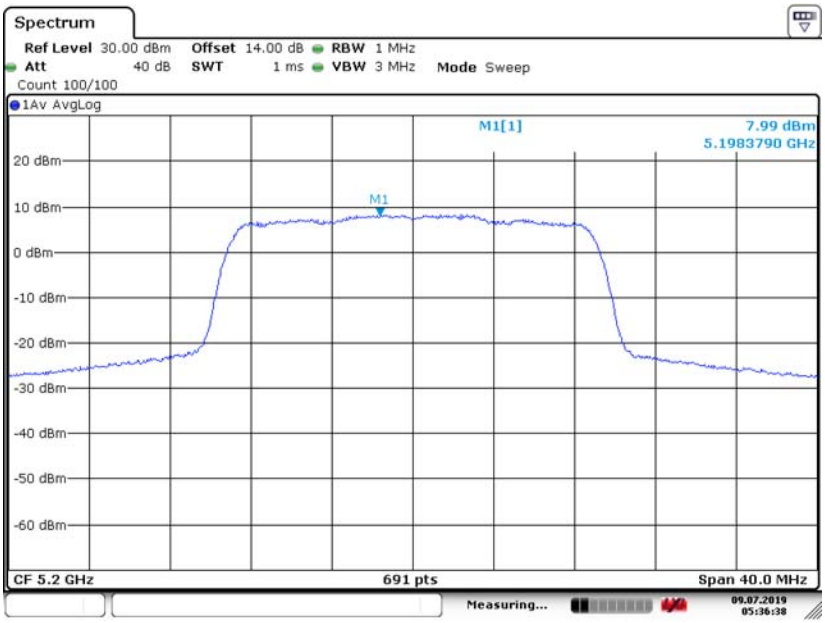


| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5180 |



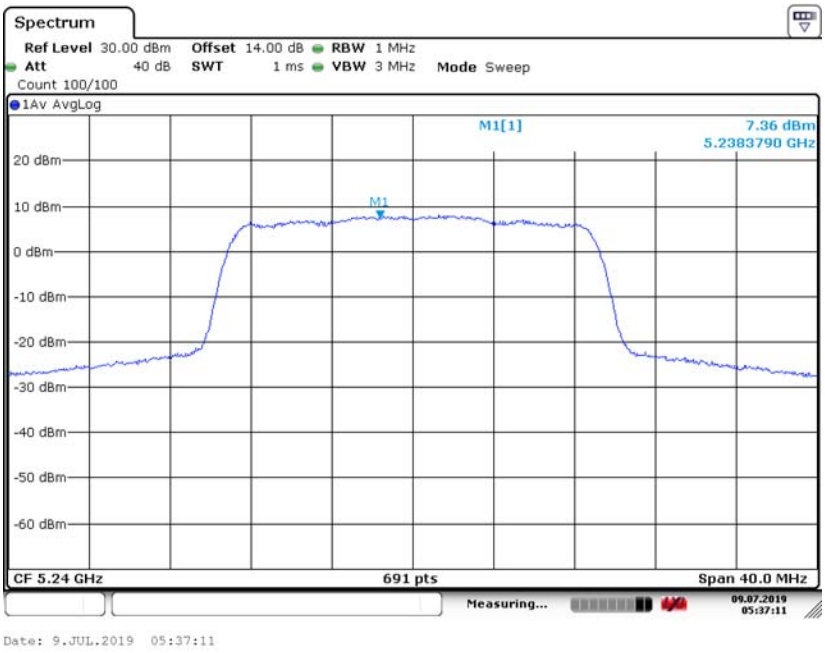

Date: 9.JUL.2019 05:36:14

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5200 |

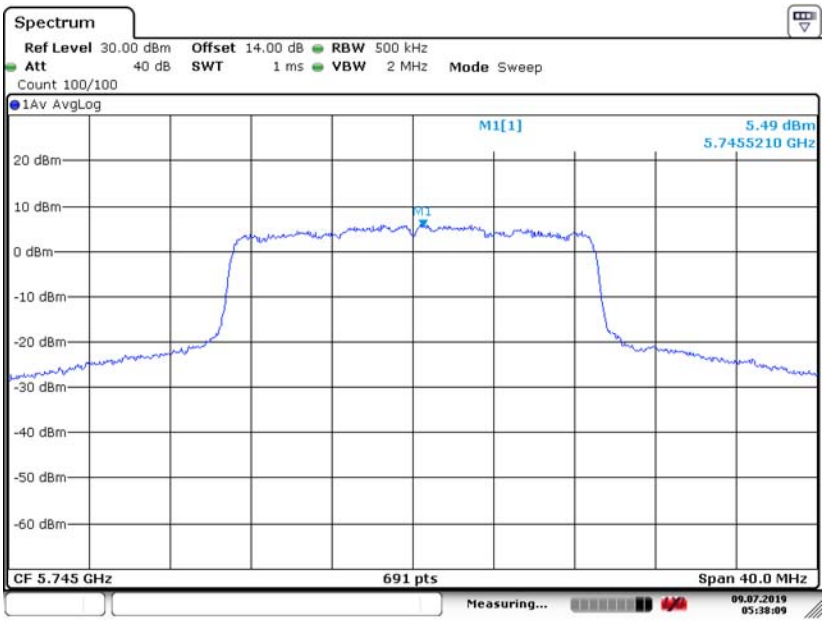



Date: 9.JUL.2019 05:36:38

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5240 |

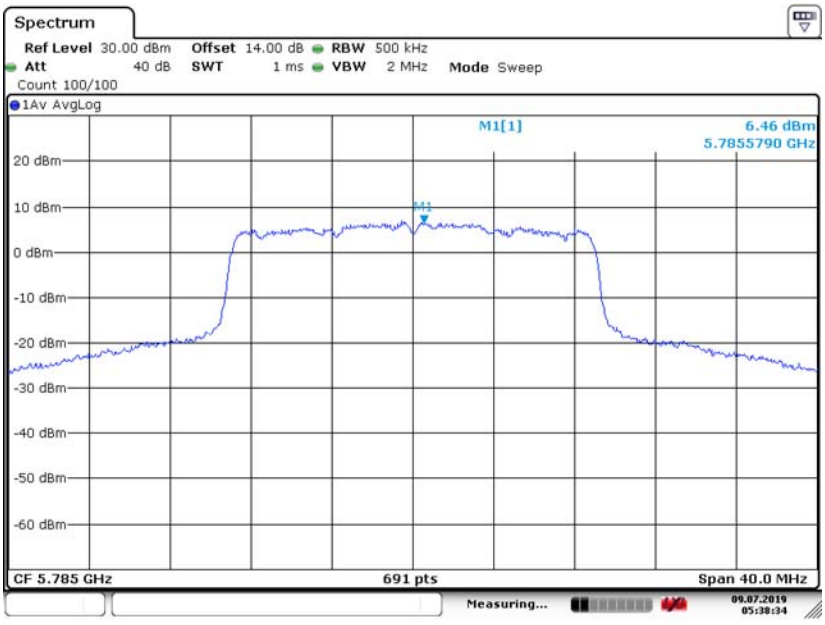


| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5745 |



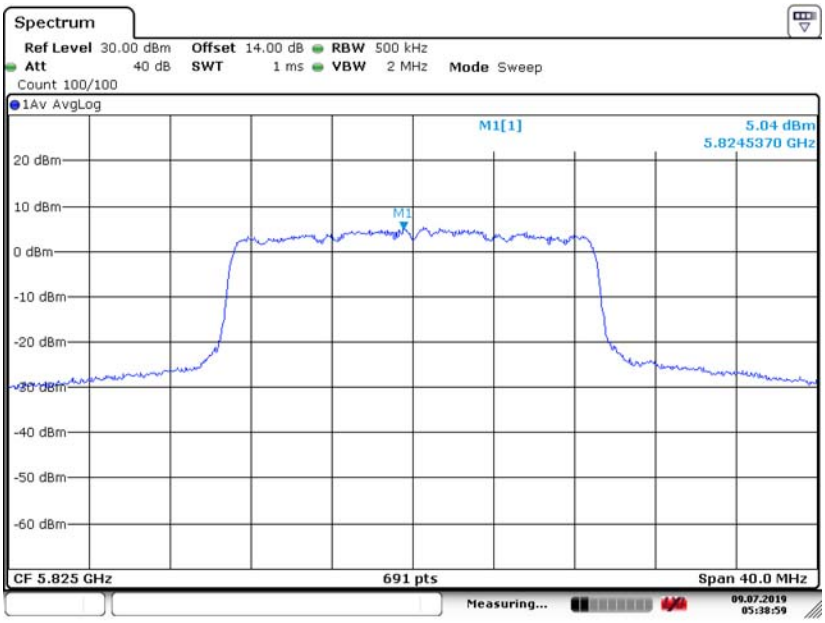

Date: 9.JUL.2019 05:38:09

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5785 |

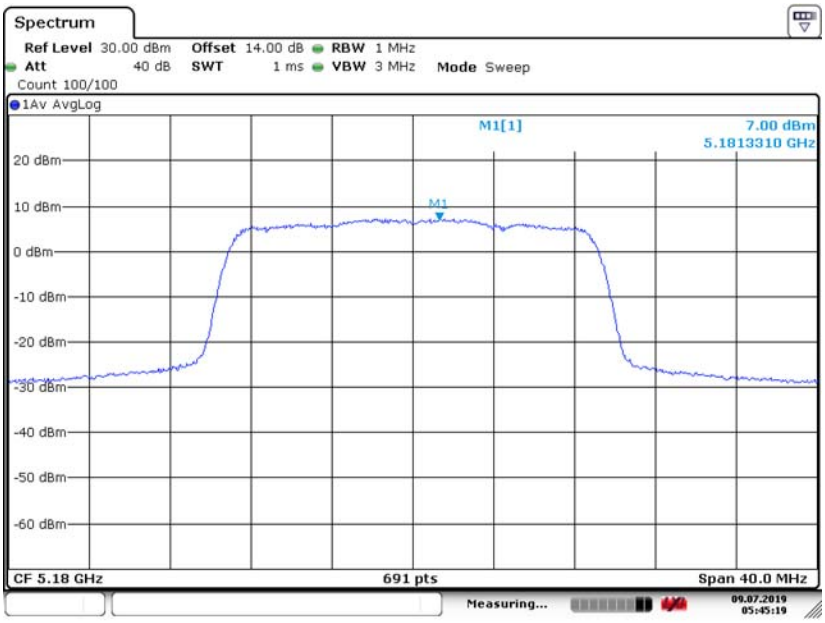



Date: 9.JUL.2019 05:38:34

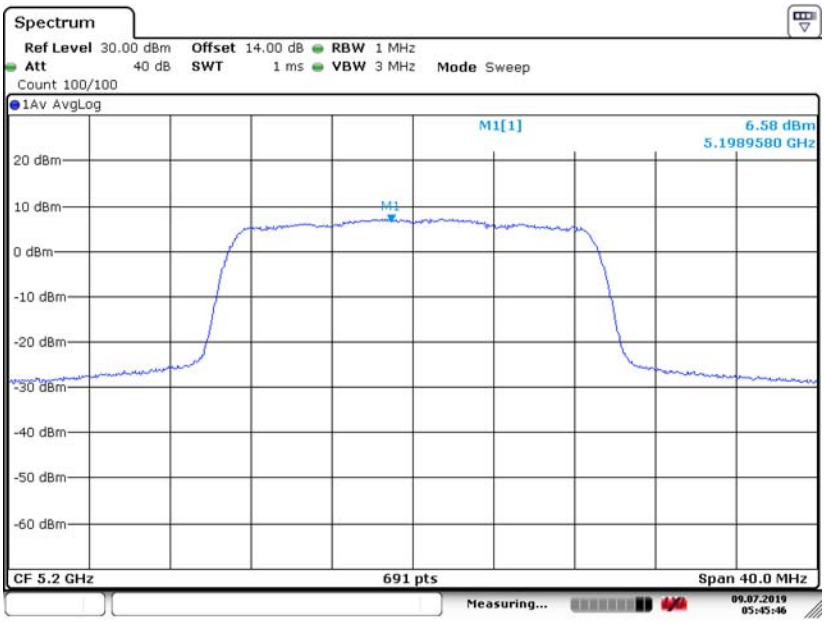
| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT20) mode | Frequency(MHz) | 5825 |



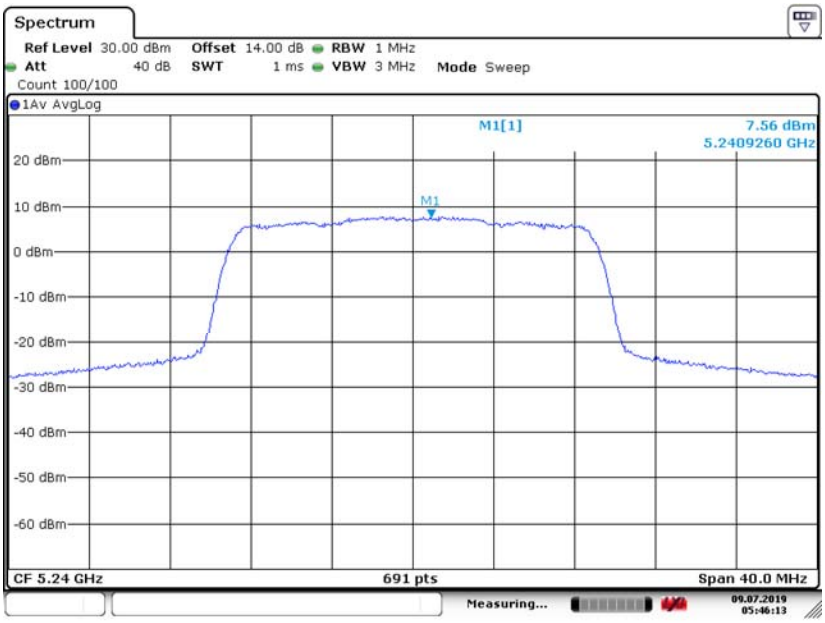
| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5180 |



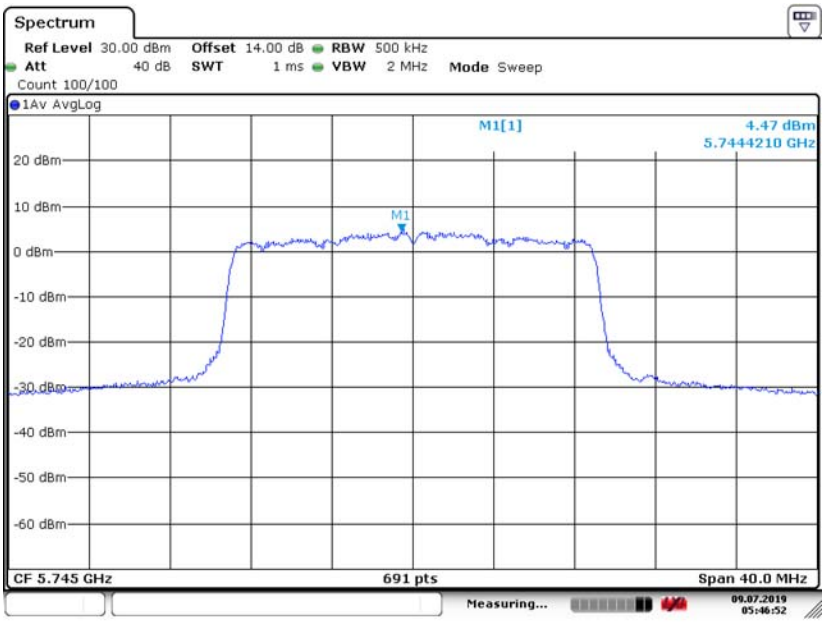

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5200 |



| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5240 |

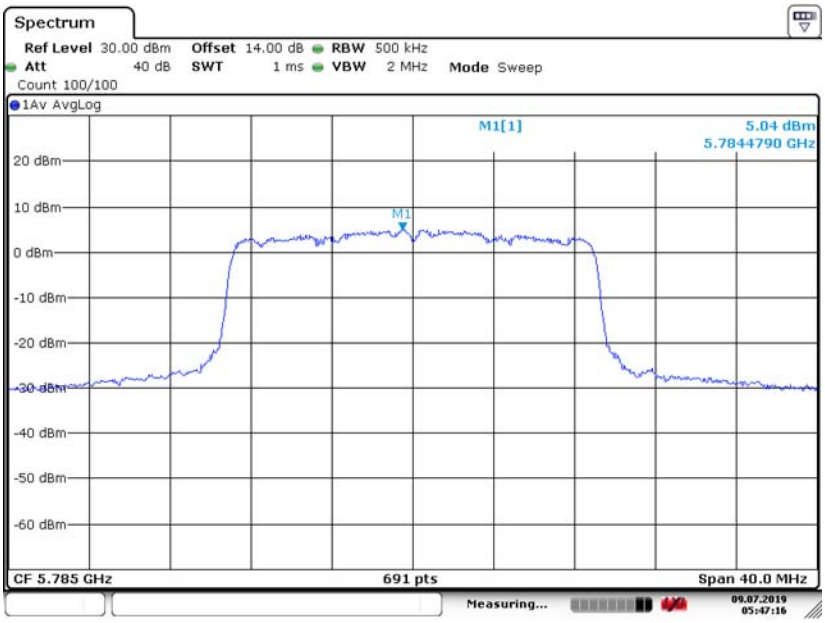


| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5745 |



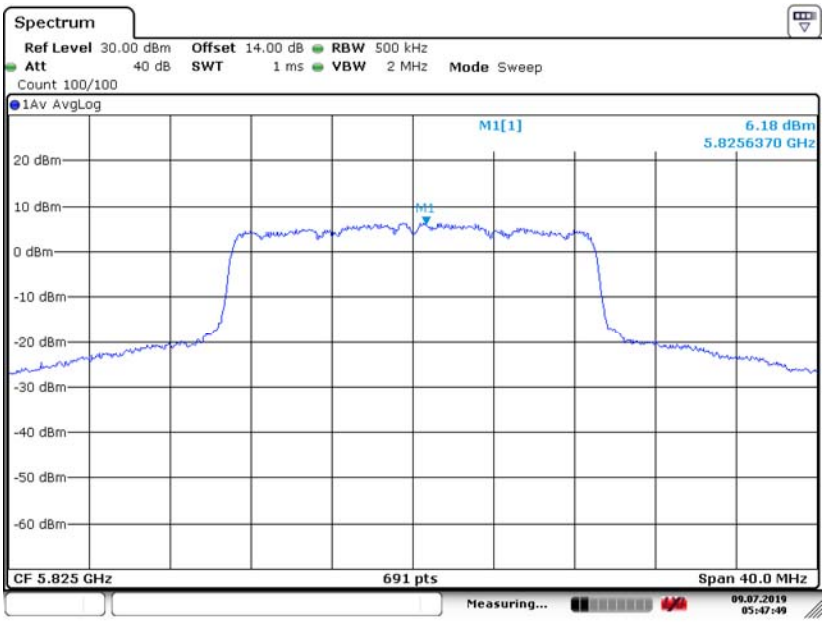

Date: 9.JUL.2019 05:46:52

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5785 |

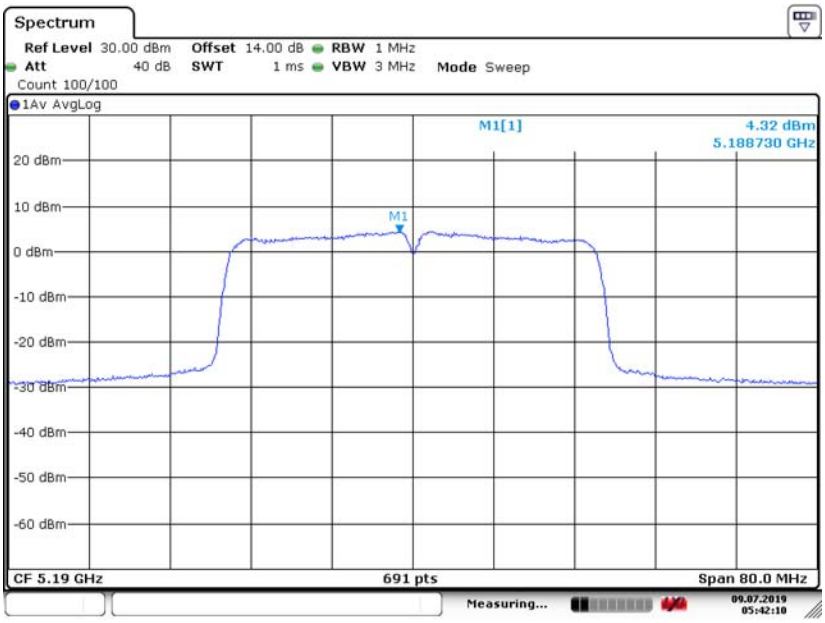



Date: 9.JUL.2019 05:47:17

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT20) mode | Frequency(MHz) | 5825 |

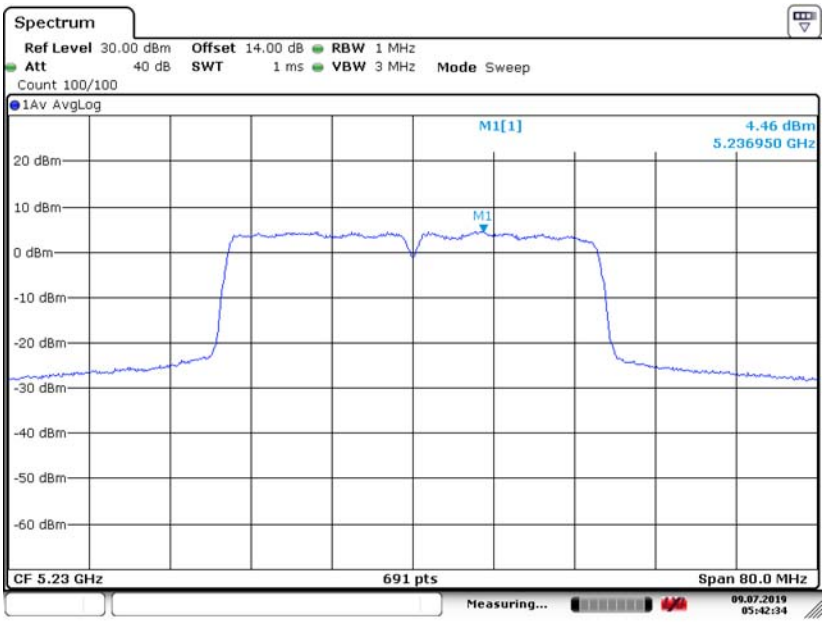


| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5190 |



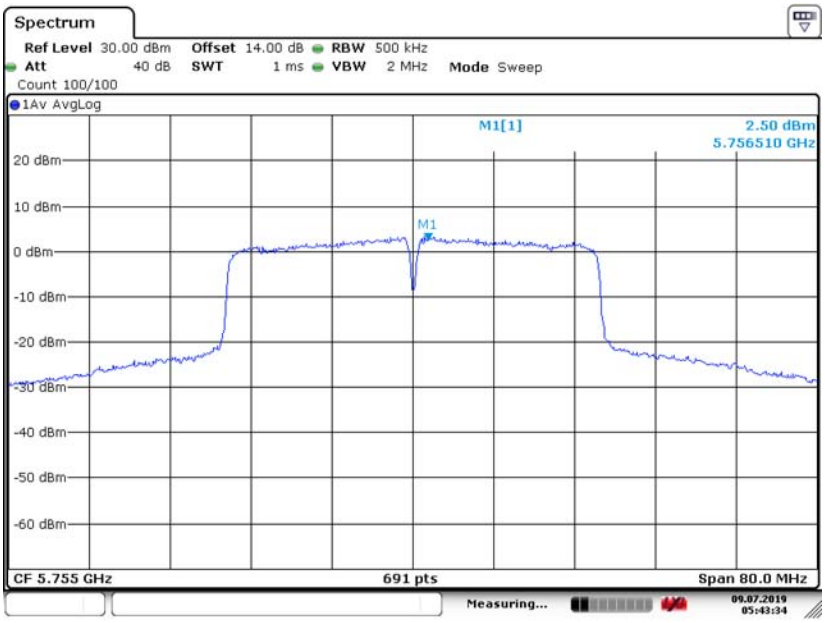

Date: 9.JUL.2019 05:42:10

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5230 |



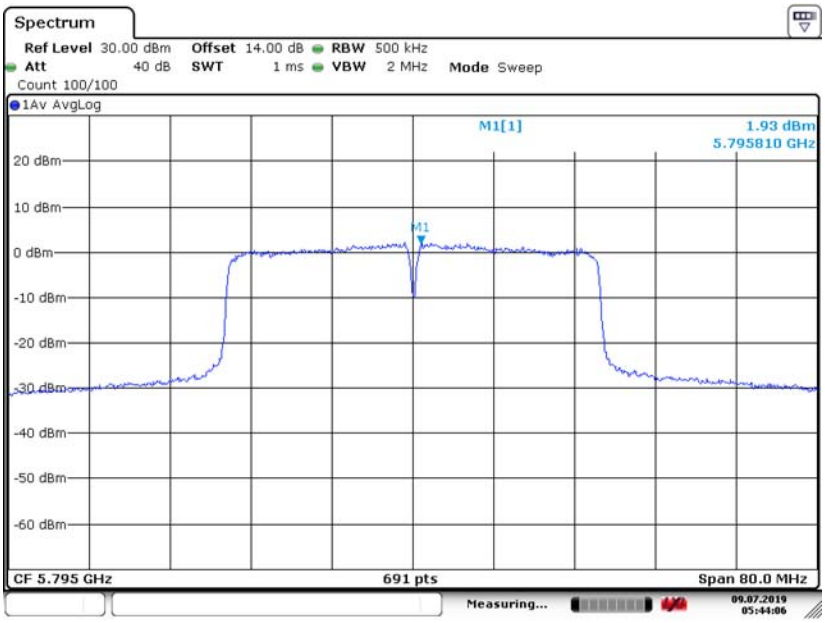

Date: 9.JUL.2019 05:42:34

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5755 |



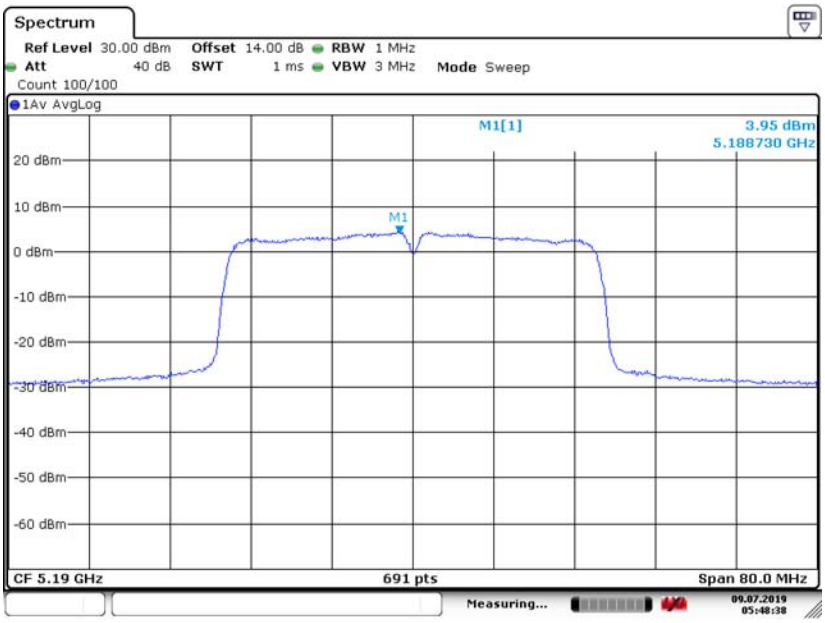

Date: 9.JUL.2019 05:43:34

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11n(HT40) mode | Frequency(MHz) | 5795 |



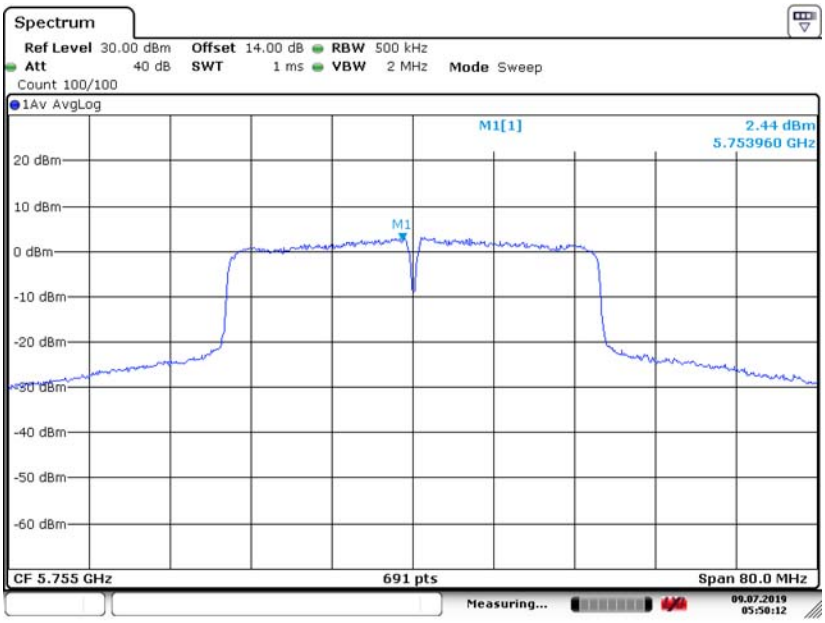

Date: 9.JUL.2019 05:44:06

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5190 |



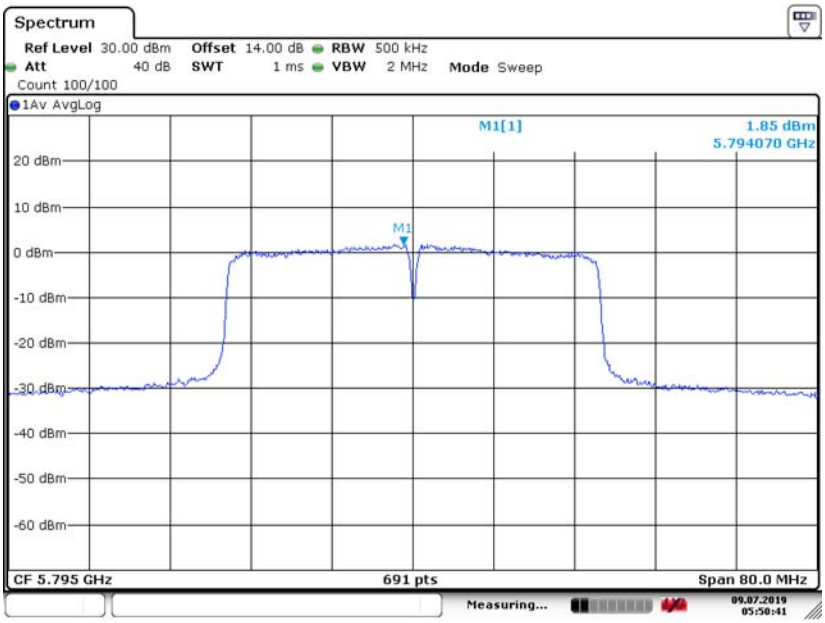

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5230 |

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5755 |



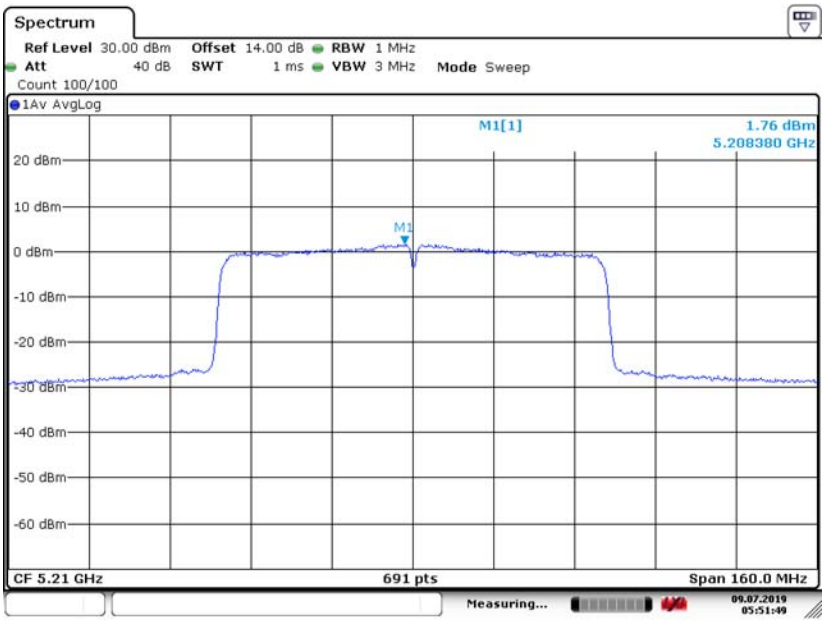

Date: 9.JUL.2019 05:50:12

| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT40) mode | Frequency(MHz) | 5795 |

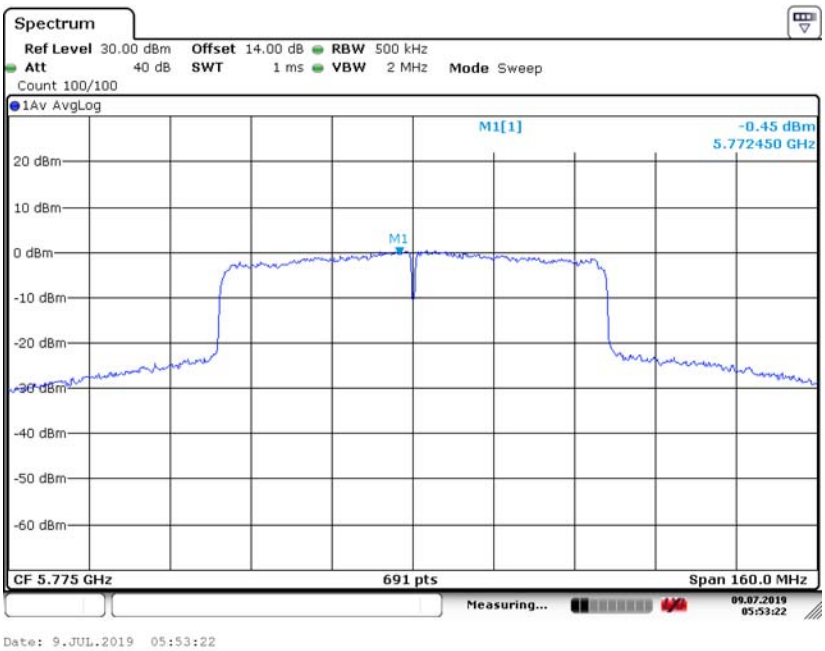



Date: 9.JUL.2019 05:50:41

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11ac(VHT80) mode | Frequency(MHz) | 5210 |

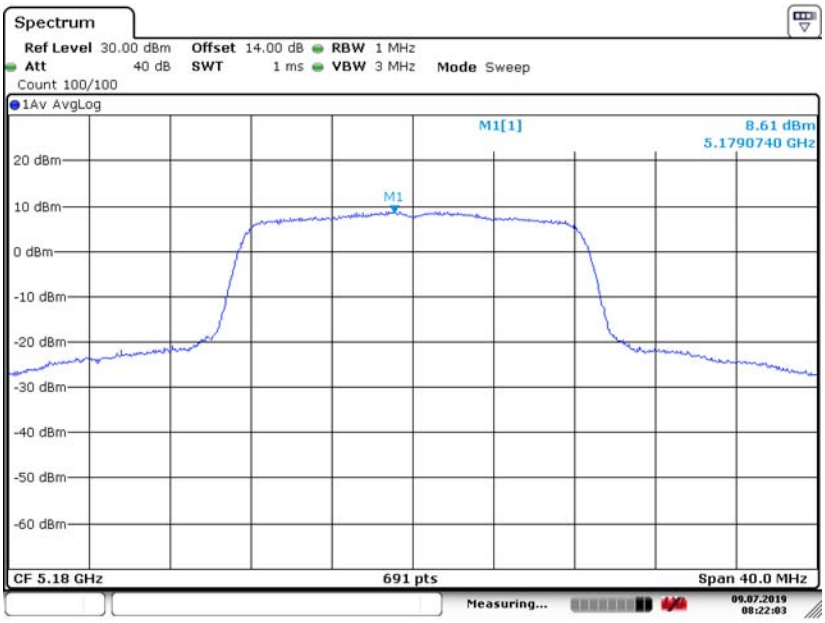



| Power Spectral Density | | UNII Band III | |
|---|---|---|---|
| Test Model | 802.11ac(VHT80) mode | Frequency(MHz) | 5775 |



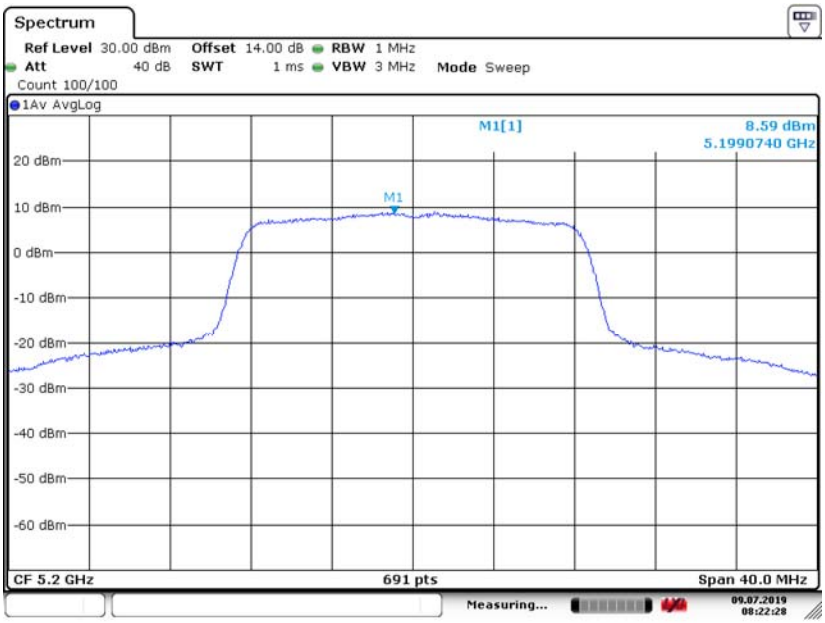
**B. Antenna 1**

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5180 |




Date: 9.JUL.2019 08:22:04

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5200 |




Date: 9.JUL.2019 08:22:29

| Power Spectral Density | | UNII Band I | |
|---|---|---|---|
| Test Model | 802.11a | Frequency(MHz) | 5240 |