



FCC PART 15.407

TEST REPORT

For

Tactus Ltd

Building 1, Olympic Way, Olympic Park, Warrington, Cheshire WA2 0YL, United Kingdom

FCC ID: 2AY5Z-GEOBOOK

| | |
|--|--------------------------------|
| Report Type: Original Report | Product Type: Laptop |
| Report Number: RSZ210225801-00C | |
| Report Date: 2021-03-24 | |
| Reviewed By: RF Engineer | Candy Li <i>Candy . Li</i> |
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TABLE OF CONTENTS

| | |
|---|-----------|
| GENERAL INFORMATION | 4 |
| PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) | 4 |
| OBJECTIVE | 4 |
| TEST METHODOLOGY | 4 |
| MEASUREMENT UNCERTAINTY | 5 |
| TEST FACILITY | 5 |
| SYSTEM TEST CONFIGURATION | 6 |
| DESCRIPTION OF TEST CONFIGURATION | 6 |
| EUT EXERCISE SOFTWARE | 6 |
| EQUIPMENT MODIFICATIONS | 11 |
| SUPPORT EQUIPMENT LIST AND DETAILS | 11 |
| EXTERNAL I/O CABLE | 11 |
| BLOCK DIAGRAM OF TEST SETUP | 12 |
| SUMMARY OF TEST RESULTS | 13 |
| TEST EQUIPMENT LIST | 14 |
| FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION | 15 |
| APPLICABLE STANDARD | 15 |
| TEST RESULT | 15 |
| FCC §15.203 – ANTENNA REQUIREMENT | 16 |
| APPLICABLE STANDARD | 16 |
| ANTENNA CONNECTOR CONSTRUCTION | 16 |
| FCC §15.407 (B) (8) §15.207 (A) – CONDUCTED EMISSIONS | 17 |
| APPLICABLE STANDARD | 17 |
| EUT SETUP | 17 |
| EMI TEST RECEIVER SETUP | 17 |
| TEST PROCEDURE | 17 |
| TEST DATA | 18 |
| §15.205 & §15.209 & §15.407(B) (1), (4), (7), (8) , (9), (10) – UNDESIRABLE EMISSION | 21 |
| APPLICABLE STANDARD | 21 |
| EUT SETUP | 21 |
| EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP | 22 |
| TEST PROCEDURE | 22 |
| FACTOR & MARGIN CALCULATION | 23 |
| TEST DATA | 23 |
| FCC §15.407(a) (12), (e) – BANDWIDTH | 30 |
| APPLICABLE STANDARD | 30 |
| TEST PROCEDURE | 30 |
| TEST DATA | 31 |
| FCC §15.407(a) (1) (3) – CONDUCTED TRANSMITTER OUTPUT POWER | 61 |
| APPLICABLE STANDARD | 61 |
| TEST PROCEDURE | 61 |
| TEST DATA | 61 |
| FCC §15.407(a) (1) (3) - POWER SPECTRAL DENSITY | 64 |
| APPLICABLE STANDARD | 64 |

| | |
|----------------------|----|
| TEST PROCEDURE | 64 |
| TEST DATA | 65 |

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

| | |
|---|--|
| Product | Laptop |
| Trade Name | Bmorn |
| Tested Model | GeoBook |
| Multiple Model | GeoBook 120, GeoBook 110, GeoBook 140, GeoBook 240, GeoBook 340, GeoBook 540, GeoFlex 110, GeoFlex 340, GeoFlex 230, GeoFlex 240 |
| Model Differences | All the same except model name is different. |
| Frequency Range | 5G Wi-Fi: 5150-5250 MHz; 5725-5850 MHz |
| Maximum Average Conducted Output Power | 5G Wi-Fi: 5150-5250 MHz: 14.25dBm (802.11a), 13.05dBm(802.11n20), 12.99 dBm(802.11n40) 12.73dBm (802.11ac20), 12.11dBm (802.11ac40), 11.87dBm (802.11ac80) 5725-5850 MHz: 13.76dBm (802.11a), 13.49dBm(802.11n20), 13.58dBm(802.11n40) 12.74dBm (802.11ac20), 11.96dBm (802.11ac40), 11.58dBm (802.11ac80) |
| Modulation Technique | OFDM |
| Antenna Specification | FPC Antenna: 0.74dBi(provided by the applicant) |
| Voltage Range | DC7.6V from battery or DC 12V from adapter |
| Date of Test | 2021-03-10 to 2021-03-18 |
| Sample serial number | RSZ210225801-RF-S1(Assigned by ATC) |
| Received date | 2021-02-28 |
| Sample/EUT Status | Good condition |
| Adapter information | Model: CGSW30A INPUT: 100-240VAC, 50/60Hz, 0.8A OUTPUT: 12V, 2000mA |

Objective

This type approval report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd.. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

| Parameter | | Uncertainty |
|------------------------------------|----------------|-------------|
| AC Power Lines Conducted Emissions | | ±2.72dB |
| Emissions, Radiated | 30MHz - 1GHz | ±4.28dB |
| | 1GHz- 18GHz | ±4.98dB |
| | 18GHz- 26.5GHz | ±5.06dB |

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A-2.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

The device only supports 5GWi-Fi 802.11a/n20/n40/ac20/ac40/ac80 modes, which was declared by manufacturer.

For 5150-5250MHz Band, 7 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 36 | 5180 | 44 | 5220 |
| 38 | 5190 | 46 | 5230 |
| 40 | 5200 | 48 | 5240 |
| 42 | 5210 | / | / |

For 802.11a, 802.11n20, 802.11ac20 channel 36, 40, 48 were tested;

For 802.11n40/ac40 channel 38, 46 were tested.

For 802.11ac80 channel 48 was tested.

For 5725-5850MHz Band, 8 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 149 | 5745 | 157 | 5785 |
| 151 | 5755 | 159 | 5795 |
| 153 | 5765 | 161 | 5805 |
| 155 | 5775 | 165 | 5825 |

For 802.11a, 802.11n20, 802.11ac20 channel 149, 157, 165 were tested;

For 802.11n40/ac40, channel 151, 159 were tested;

For 802.11ac80, channel 155 was tested.

Note: This product has two antennas for Wi-Fi function, but only main antenna can support transmitting function, which declared by applicant.

EUT Exercise Software

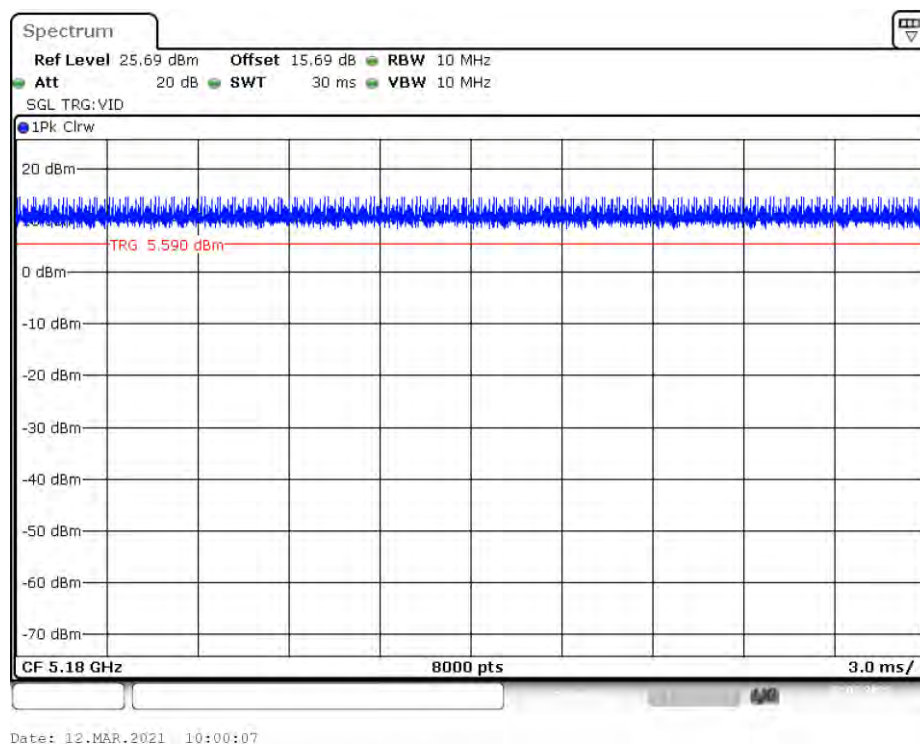
“REALTEK 11ac 8821CE” was used during testing and power level as below.

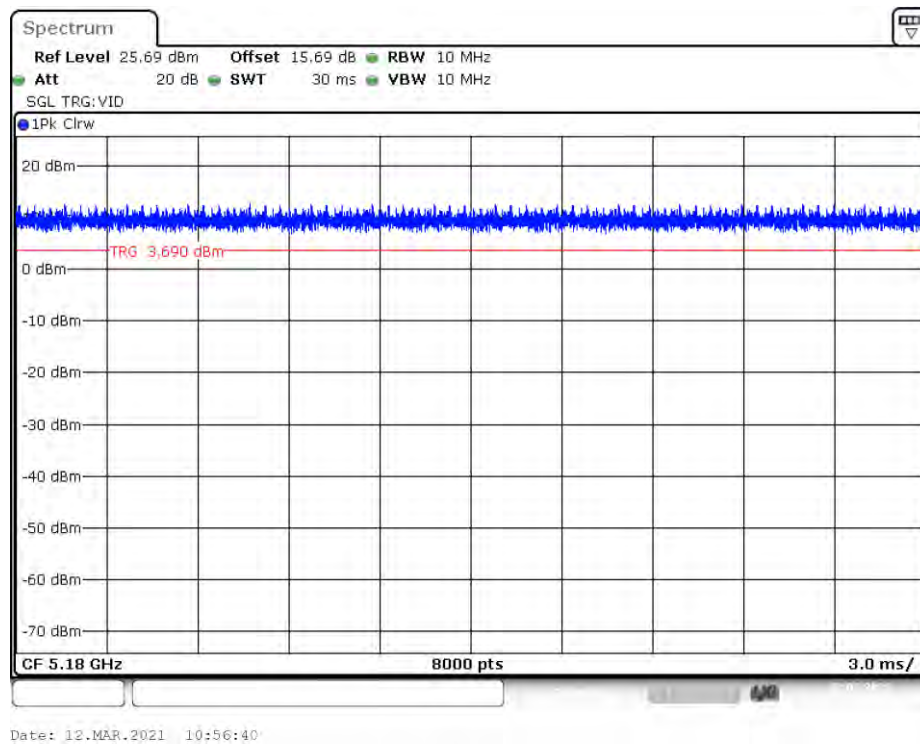
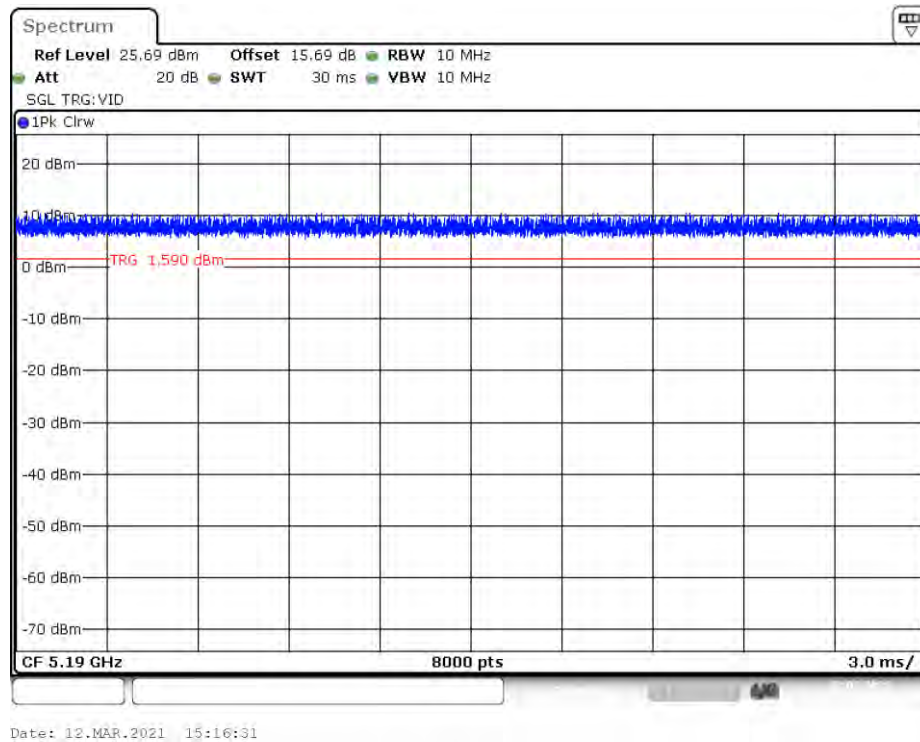
| Mode | Data Rate (Mbps) | Power Level |
|-----------------------|------------------|-------------|
| 802.11 a | 6 | 32 |
| 802.11 n20/n40 | MCS0 | 30 |
| 802.11 ac20/ac40/ac80 | MCS0 | 28 |

Duty cycle

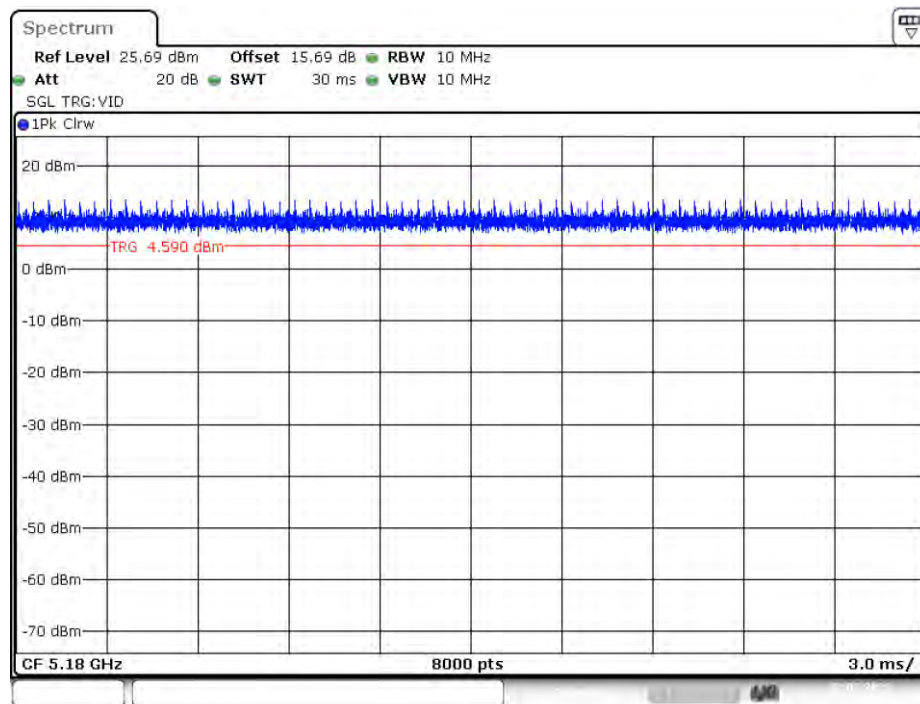
| Mode | Ton (ms) | Ton+off (ms) | Duty Cycle (%) | 10*log(1/duty cycle) (dB) |
|------------|----------|--------------|----------------|---------------------------|
| 802.11a | - | - | 100 | 0 |
| 802.11n20 | - | - | 100 | 0 |
| 802.11n40 | - | - | 100 | 0 |
| 802.11ac20 | - | - | 100 | 0 |
| 802.11ac40 | - | - | 100 | 0 |
| 802.11ac80 | - | - | 100 | 0 |

802.11a mode

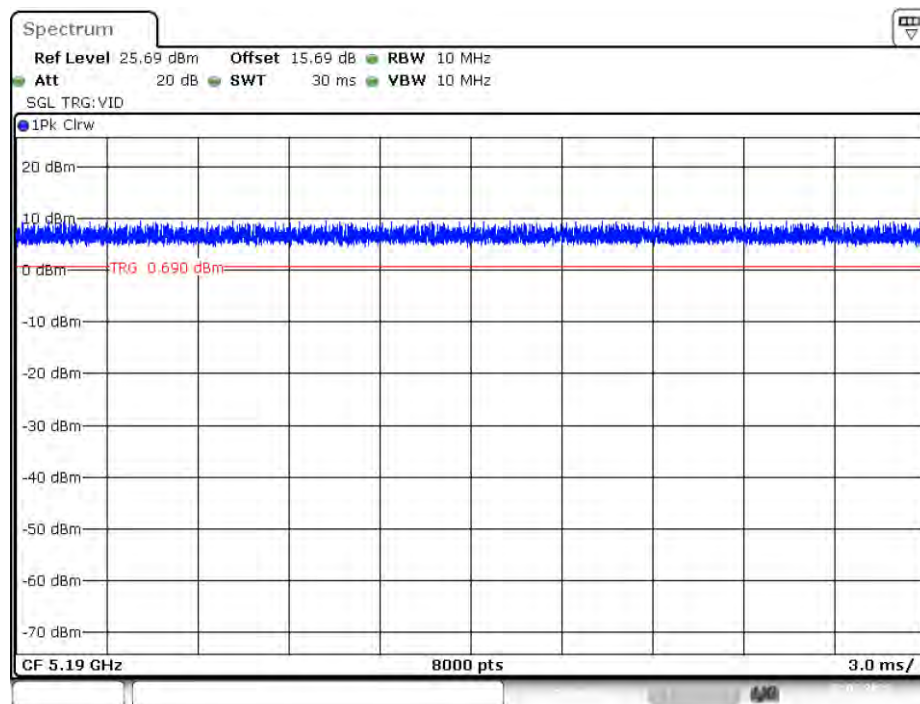


802.11n20 mode**802.11n40 mode**

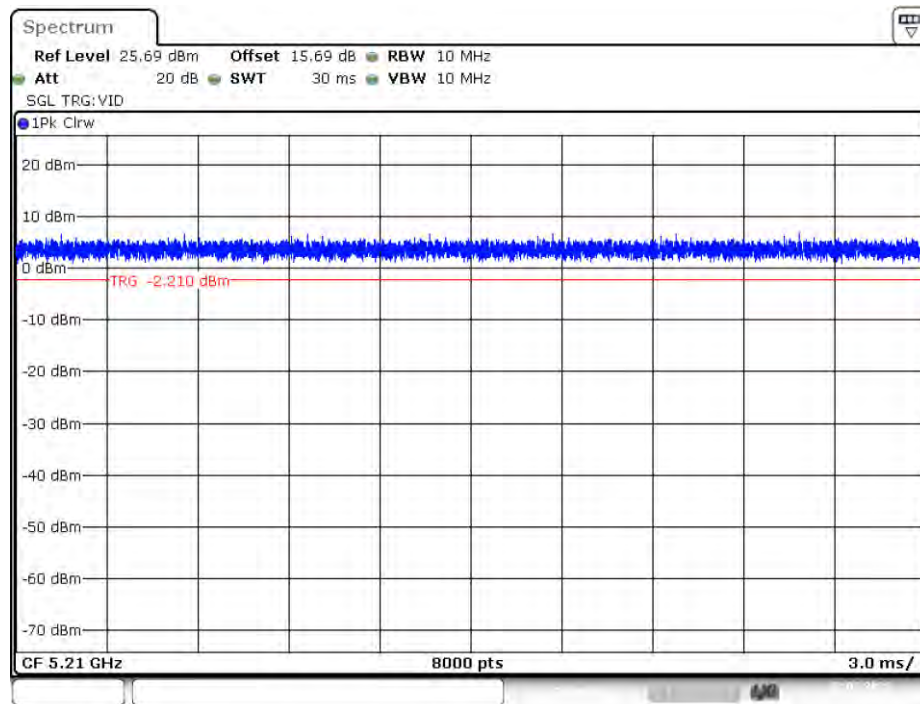
802.11ac20 Mode



802.11ac40 Mode



802.11ac80 Mode



Date: 12.MAR.2021 16:36:27

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

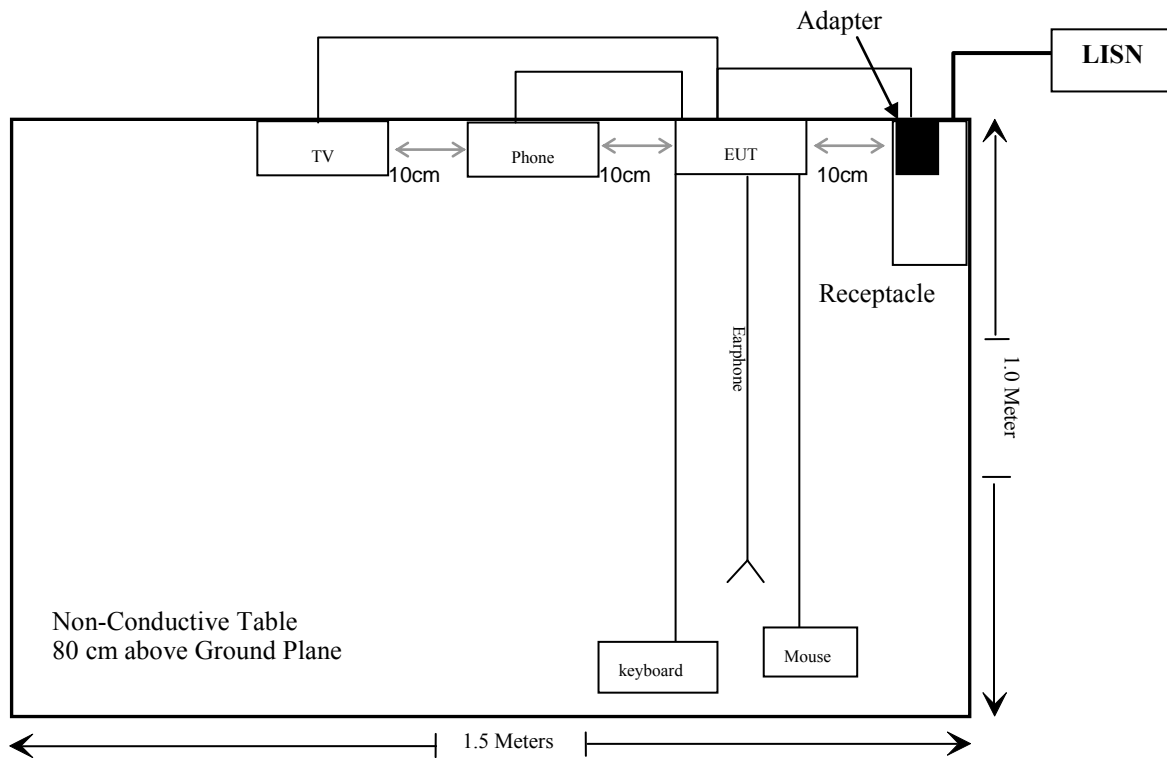
| Manufacturer | Description | Model | Serial Number |
|--------------|---------------|--------------|---------------|
| SHARP | LCD COLOUR TV | LCD-19A33-BK | 709913440 |
| SFY | Keyboard | WK-100USB | / |
| Logitech | Mouse | M-U0026 | / |
| / | Earphone | / | / |
| TOSHIBA | SD Card | 1849PZ41056 | / |
| SONY | Mobile Phone | Xperia Z2 | D6053 |

External I/O Cable

| Cable Description | Length (m) | From Port | To |
|-------------------|------------|-----------|-----|
| DC IN | 2.0 | Adapter | EUT |
| HDMI | 1.0 | EUT | TV |

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|--|------------|
| §1.1307 (b) (1)& §2.1093 | RF Exposure | Compliance |
| §15.203 | Antenna Requirement | Compliance |
| §15.407(b)(8) & §15.207(a) | Conducted Emissions | Compliance |
| §15.205 & §15.209 & §15.407(b) (1), (4), (7), (8), (9), (10) | Undesirable Emission& Restricted Bands | Compliance |
| §15.407(a) (12), (e) | Bandwidth | Compliance |
| §15.407(a) (1), (3) | Conducted Transmitter Output Power | Compliance |
| §15.407 (a) (1), (3) | Power Spectral Density | Compliance |

TEST EQUIPMENT LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-------------------------|------------------------------|----------------------|--------------------|------------------|----------------------|
| Conducted emission test | | | | | |
| Rohde & Schwarz | Test Receiver | ESPI | 100396/003 | 2020/12/24 | 2021/12/23 |
| R & S | L.I.S.N. | ENV216 | 101314 | 2021/12/25 | 2021/12/24 |
| Anritsu Corp | 50Ω Coaxial Switch | MP59B | 6200506474 | 2020/12/25 | 2021/12/24 |
| Unknown | RF Coaxial Cable | N-2m | No.2 | 2020/12/25 | 2021/12/24 |
| Radiated emission test | | | | | |
| Rohde& Schwarz | Test Receiver | ESR | 101817 | 2020/12/24 | 2021/12/23 |
| Rohde&Schwarz | Spectrum Analyzer | FSV40 | 101495 | 2020/12/24 | 2021/12/23 |
| SONOMA INSTRUMENT | Amplifier | 310 N | 186131 | 2020/12/25 | 2021/12/24 |
| A.H. Systems, inc. | Preamplifier | PAM-0118P | 531 | 2020/07/08 | 2021/07/07 |
| Quinstar | Amplifier | QLW-184055 36-J0 | 15964001002 | 2020/11/28 | 2021/11/27 |
| Anritsu Corp | 50 Coaxial Switch | MP59B | 6100237248 | 2020/12/25 | 2021/12/24 |
| Schwarzbeck | Bilog Antenna | VULB9163 | 9163-323 | 2020/01/05 | 2023/01/04 |
| Schwarzbeck | Horn Antenna | BBHA9120D | 9120D-1067 | 2020/01/05 | 2023/01/04 |
| Schwarzbeck | HORN ANTENNA | BBHA9170 | 9170-359 | 2020/01/05 | 2023/01/04 |
| Unknown | RF Coaxial Cable | N-5m | No.3 | 2020/12/25 | 2021/12/24 |
| Unknown | RF Coaxial Cable | N-5m | No.4 | 2020/12/25 | 2021/12/24 |
| Unknown | RF Coaxial Cable | N-1m | No.5 | 2020/12/25 | 2021/12/24 |
| Unknown | RF Coaxial Cable | N-1m | No.6 | 2020/12/25 | 2021/12/24 |
| RF conducted test | | | | | |
| Rohde&Schwarz | Spectrum Analyzer | FSV40 | 101495 | 2020/12/24 | 2021/12/23 |
| Rohde & Schwarz | Open Switch and Control Unit | OSP120 +OSP -B157 | 101244 + 100866 | 2020/12/24 | 2021/12/23 |
| Rohde & Schwarz | Open Switch and Control Unit | OSP120 +OSP -B157 | 101244 + 100866 | 2020/12/24 | 2021/12/23 |

* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ210225801-20.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two internal antennas for Wi-Fi function, but only main antenna can support transmitting function, and the antenna gain are 0.74dBi, which fulfill the requirement of this section. Please refer to the EUT photos.

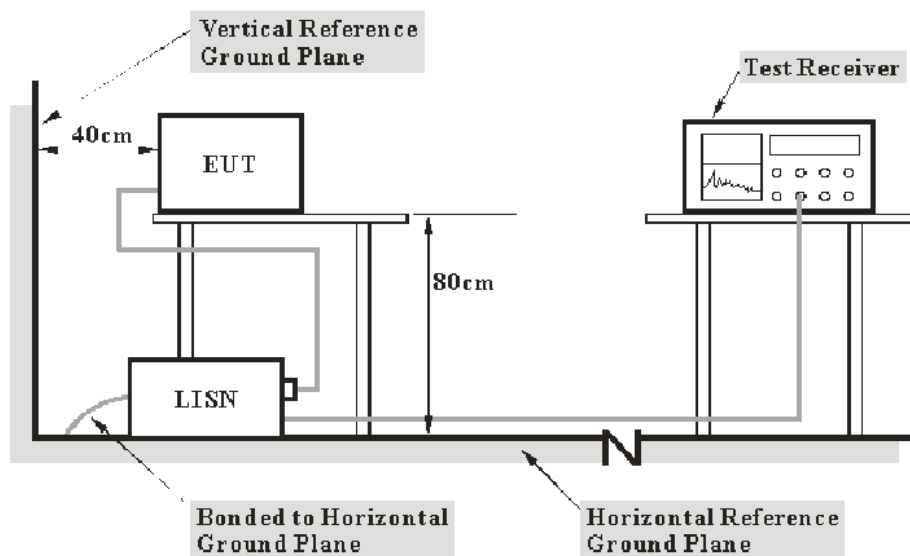
Result: Compliance.

FCC §15.407 (B) (8) §15.207 (A) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (8)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | IF B/W |
|------------------|--------|
| 150 kHz – 30 MHz | 9 kHz |

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

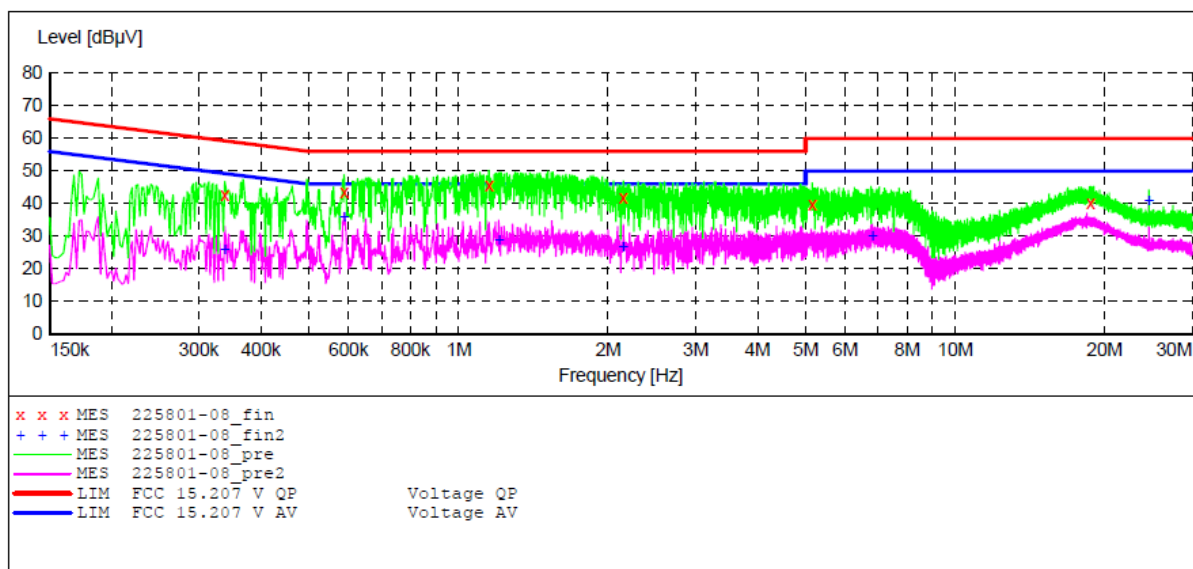
All data was recorded in the Quasi-peak and average detection mode.

Test Data**Environmental Conditions**

| | |
|---------------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 65 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Black Ding on 2021-03-09.

EUT operation mode: Transmitting (Worst case as below)

AC 120V/60 Hz, Line**MEASUREMENT RESULT: "225801-08_fin"**

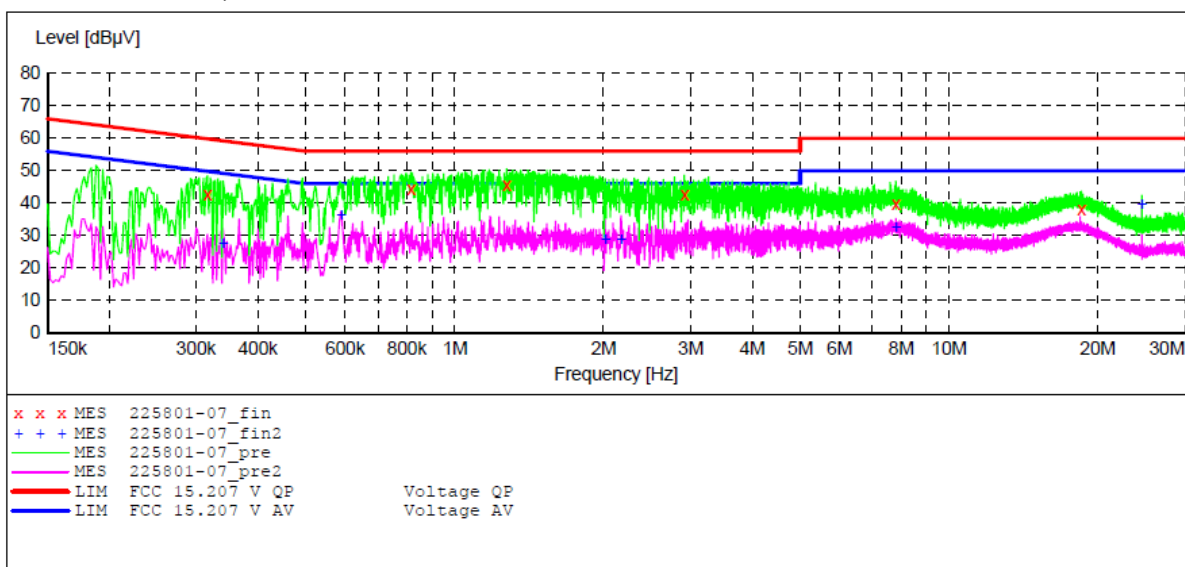
2021-3-9 19:49

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.338000 | 42.70 | 10.9 | 59 | 16.3 | QP | L1 | GND |
| 0.588000 | 43.30 | 11.0 | 56 | 12.7 | QP | L1 | GND |
| 1.150000 | 45.50 | 11.2 | 56 | 10.5 | QP | L1 | GND |
| 2.145000 | 41.90 | 11.3 | 56 | 14.1 | QP | L1 | GND |
| 5.155000 | 39.60 | 11.4 | 60 | 20.4 | QP | L1 | GND |
| 18.730000 | 40.00 | 11.7 | 60 | 20.0 | QP | L1 | GND |

MEASUREMENT RESULT: "225801-08_fin2"

2021-3-9 19:49

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.338000 | 26.10 | 10.9 | 49 | 22.9 | AV | L1 | GND |
| 0.588000 | 35.90 | 11.0 | 46 | 10.1 | AV | L1 | GND |
| 1.204000 | 28.80 | 11.2 | 46 | 17.2 | AV | L1 | GND |
| 2.145000 | 26.90 | 11.3 | 46 | 19.1 | AV | L1 | GND |
| 6.810000 | 30.20 | 11.5 | 50 | 19.8 | AV | L1 | GND |
| 24.575000 | 41.10 | 11.7 | 50 | 8.9 | AV | L1 | GND |

AC 120V/60 Hz, Neutral**MEASUREMENT RESULT: "225801-07_fin"**

2021-3-9 19:47

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.316000 | 42.50 | 10.9 | 60 | 17.5 | QP | N | GND |
| 0.816000 | 44.30 | 11.1 | 56 | 11.7 | QP | N | GND |
| 1.274000 | 45.60 | 11.2 | 56 | 10.4 | QP | N | GND |
| 2.915000 | 42.80 | 11.3 | 56 | 13.2 | QP | N | GND |
| 7.805000 | 39.90 | 11.5 | 60 | 20.1 | QP | N | GND |
| 18.540000 | 38.00 | 11.7 | 60 | 22.0 | QP | N | GND |

MEASUREMENT RESULT: "225801-07_fin2"

2021-3-9 19:47

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.340000 | 27.50 | 10.9 | 49 | 21.5 | AV | N | GND |
| 0.590000 | 36.50 | 11.0 | 46 | 9.5 | AV | N | GND |
| 2.015000 | 28.80 | 11.3 | 46 | 17.2 | AV | N | GND |
| 2.170000 | 28.80 | 11.3 | 46 | 17.2 | AV | N | GND |
| 7.805000 | 32.70 | 11.5 | 50 | 17.3 | AV | N | GND |
| 24.575000 | 39.90 | 11.7 | 50 | 10.1 | AV | N | GND |

§15.205 & §15.209 & §15.407(B) (1), (4), (7), (8), (9), (10) – UNDESIRABLE EMISSION

Applicable Standard

FCC §15.407 (b) (1), (4), (7), (8), (9), (10); §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

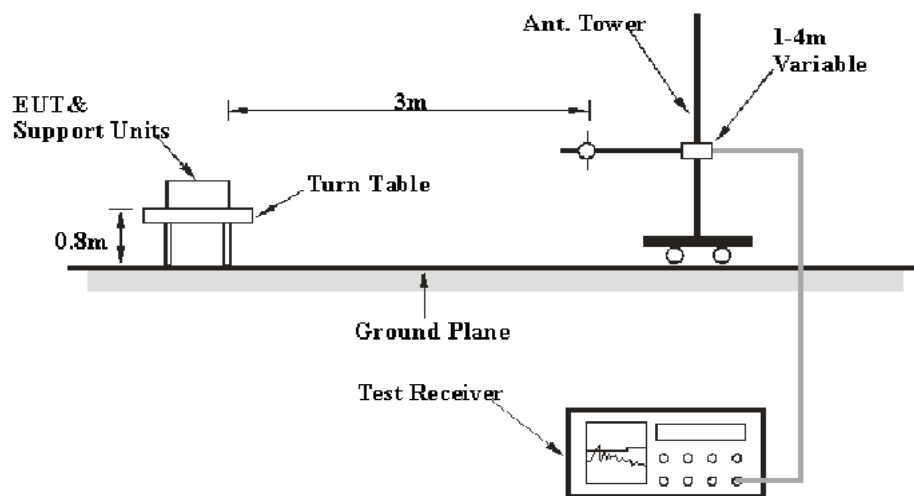
(4) For transmitters operating in the 5.725-5.85 GHz band:

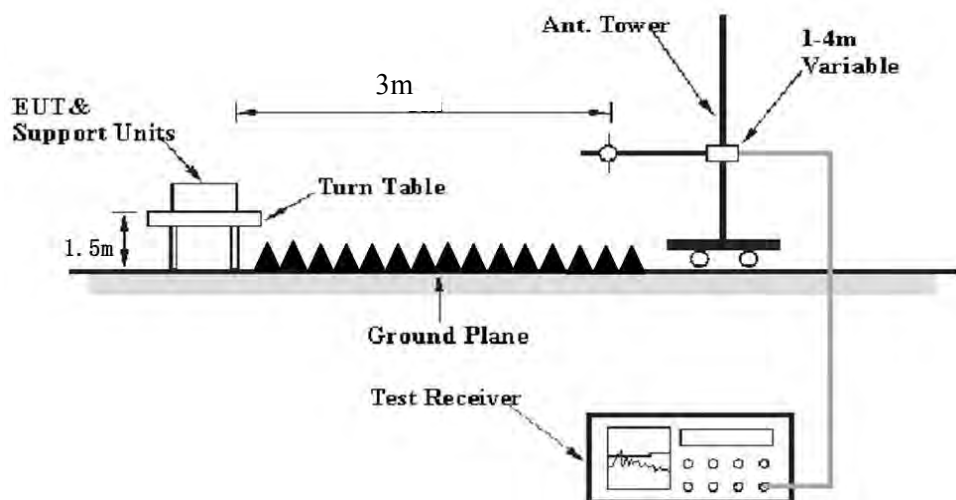
(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

Below 1 GHz:



Above 1 GHz:

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

| Frequency Range | RBW | Video B/W | IF B/W | Measurement |
|-------------------|---------|-------------------------|---------|-------------|
| 30 MHz – 1000 MHz | 100 kHz | 300 kHz | 120 kHz | QP |
| Above 1 GHz | 1 MHz | 3 MHz | / | PK |
| | 1MHz | 10 Hz ^{Note 1} | / | Average |
| | 1MHz | > 1/T ^{Note 2} | / | Average |

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

Test Procedure**Radiated Spurious Emission**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all the installation combinations.

According to ANSI C63.10-2013,9.4: For field strength measurements made at other than the distance at which the applicable limit is specified, extrapolate the measured field strength to the field strength at the distance specified by the limit using an inverse distance correction factor (20 dB/decade of distance). In some cases, a different distance correction factor may be required;

Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Factor} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\begin{aligned}\text{Margin} &= \text{Result} - \text{Limit} \\ \text{Result} &= \text{Reading} + \text{Factor}\end{aligned}$$

Test Data

Environmental Conditions

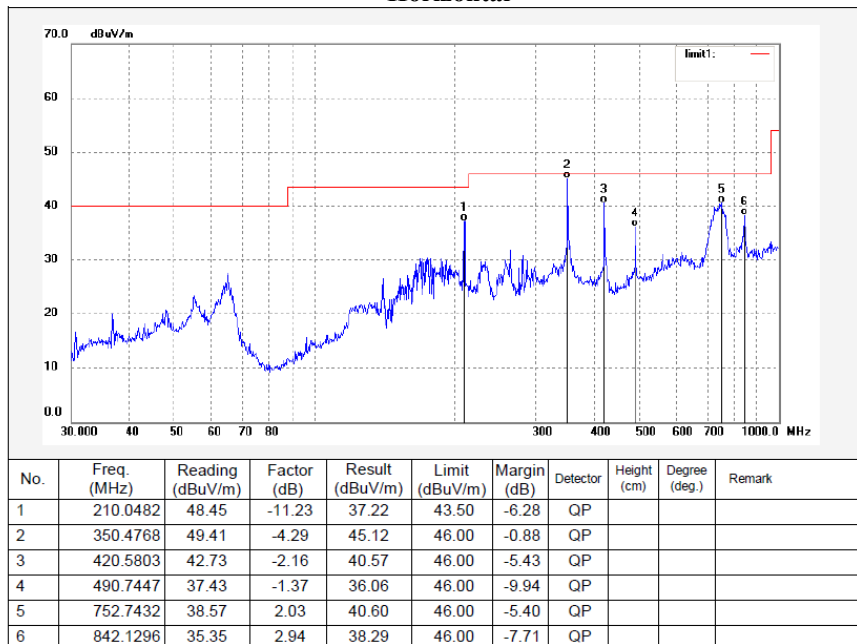
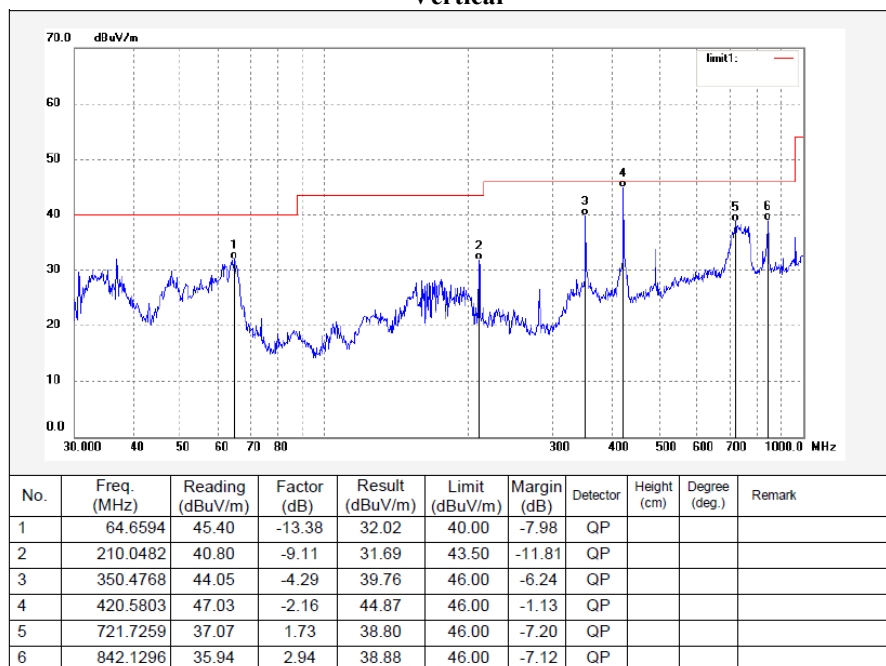
| | |
|---------------------------|-----------|
| Temperature: | 22~29 °C |
| Relative Humidity: | 50~56 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Black Ding on 2021-03-09.

EUT operation mode: Transmitting

30 MHz~1 GHz:

Note: Pretest with 802.11a, 802.11n20, 802.11n40, 802.11ac20, 802.11ac40, 802.11ac80 the worst case was 802.11a mode.

5180MHz:**Horizontal****Vertical**

1 ~ 40 GHz:

Note: Pretest with 802.11a, 802.11n20, 802.11n40, 802.11ac20, 802.11ac40, 802.11ac80
the worst case as below:

5150-5250 MHz:

| Frequency (MHz) | Receiver | | Turntable Angle Degree | Rx Antenna | | factor | Absolute Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------------------------------|---------------------|--------|------------------------------|---------------|----------------|--------|-------------------------------|-------------------|----------------|
| | Reading (dBuV/m) | PK/Ave | | Height (m) | Polar (H/V) | | | | |
| 5G 11A BAND1, Low Channel | | | | | | | | | |
| 4500.00 | 43.45 | PK | 125 | 1.50 | H | 1.89 | 45.34 | 74.00 | 28.66 |
| 4500.00 | 43.09 | PK | 151 | 1.60 | V | 1.89 | 44.98 | 74.00 | 29.02 |
| 5150.00 | 43.10 | PK | 197 | 1.70 | H | 3.37 | 46.47 | 74.00 | 27.53 |
| 5150.00 | 43.66 | PK | 214 | 1.90 | V | 3.37 | 47.03 | 74.00 | 26.97 |
| 10360.00 | 40.36 | PK | 266 | 1.10 | H | 11.41 | 51.77 | 68.20 | 16.43 |
| 10360.00 | 40.91 | PK | 142 | 1.00 | V | 11.41 | 52.32 | 68.20 | 15.88 |
| 5G 11A BAND1, Middle Channel | | | | | | | | | |
| 10400.00 | 41.67 | PK | 106 | 1.50 | H | 11.46 | 53.13 | 68.20 | 15.07 |
| 10400.00 | 42.14 | PK | 125 | 1.60 | V | 11.46 | 53.60 | 68.20 | 14.60 |
| 5G 11A BAND1, High Channel | | | | | | | | | |
| 10480.00 | 40.96 | PK | 254 | 1.40 | H | 11.53 | 52.49 | 68.20 | 15.71 |
| 10480.00 | 40.42 | PK | 206 | 1.80 | V | 11.53 | 51.95 | 68.20 | 16.25 |
| 5350.00 | 43.62 | PK | 153 | 1.90 | H | 3.43 | 47.05 | 74.00 | 26.95 |
| 5350.00 | 43.55 | PK | 160 | 1.60 | V | 3.43 | 46.98 | 74.00 | 27.02 |
| 5460.00 | 43.91 | PK | 124 | 2.00 | H | 3.58 | 47.49 | 74.00 | 26.51 |
| 5460.00 | 44.19 | PK | 191 | 1.50 | V | 3.58 | 47.77 | 74.00 | 26.23 |
| 5G 11N40 BAND1, Low Channel | | | | | | | | | |
| 4500.00 | 43.10 | PK | 106 | 2.20 | H | 1.89 | 44.99 | 74.00 | 29.01 |
| 4500.00 | 43.17 | PK | 129 | 1.60 | V | 1.89 | 45.06 | 74.00 | 28.94 |
| 5150.00 | 43.19 | PK | 204 | 1.80 | H | 3.37 | 46.56 | 74.00 | 27.44 |
| 5150.00 | 43.78 | PK | 198 | 1.30 | V | 3.37 | 47.15 | 74.00 | 26.85 |
| 10380.00 | 40.26 | PK | 234 | 1.60 | H | 11.43 | 51.69 | 68.20 | 16.51 |
| 10380.00 | 40.65 | PK | 109 | 1.80 | V | 11.43 | 52.08 | 68.20 | 16.12 |
| 5G 11N40 BAND1, High Channel | | | | | | | | | |
| 5350.00 | 44.33 | PK | 156 | 1.50 | H | 3.43 | 47.76 | 74.00 | 26.24 |
| 5350.00 | 44.44 | PK | 103 | 1.40 | V | 3.43 | 47.87 | 74.00 | 26.13 |
| 5460.00 | 44.03 | PK | 184 | 1.90 | H | 3.58 | 47.61 | 74.00 | 26.39 |
| 5460.00 | 44.14 | PK | 91 | 1.60 | V | 3.58 | 47.72 | 74.00 | 26.28 |
| 10460.00 | 41.77 | PK | 115 | 1.60 | H | 11.5 | 53.27 | 68.20 | 14.93 |
| 10460.00 | 41.66 | PK | 161 | 1.80 | V | 11.5 | 53.16 | 68.20 | 15.04 |
| 5G 11AC80 BAND1 | | | | | | | | | |
| 4500.00 | 43.15 | PK | 123 | 1.20 | H | 1.89 | 45.04 | 74.00 | 28.96 |
| 4500.00 | 43.59 | PK | 159 | 1.90 | V | 1.89 | 45.48 | 74.00 | 28.52 |
| 5150.00 | 43.70 | PK | 216 | 1.70 | H | 3.37 | 47.07 | 74.00 | 26.93 |

| | | | | | | | | | |
|----------|-------|----|-----|------|---|-------|-------|-------|-------|
| 5150.00 | 43.08 | PK | 203 | 1.60 | V | 3.37 | 46.45 | 74.00 | 27.55 |
| 5350.00 | 44.16 | PK | 263 | 1.90 | H | 3.43 | 47.59 | 74.00 | 26.41 |
| 5350.00 | 44.20 | PK | 161 | 1.70 | V | 3.43 | 47.63 | 74.00 | 26.37 |
| 5460.00 | 44.00 | PK | 281 | 1.90 | H | 3.58 | 47.58 | 74.00 | 26.42 |
| 5460.00 | 44.17 | PK | 304 | 1.60 | V | 3.58 | 47.75 | 74.00 | 26.25 |
| 10420.00 | 41.89 | PK | 159 | 1.50 | H | 11.49 | 53.38 | 68.20 | 14.82 |
| 10420.00 | 41.35 | PK | 115 | 2.00 | V | 11.49 | 52.84 | 68.20 | 15.36 |

5725-5850 MHz:

| Frequency (MHz) | Receiver | | Turntable Degree | Rx Antenna | | Corrected Factor (dB/m) | Corrected Amplitude (dBμV/m) | FCC Part 15.407/205/209 | |
|------------------------------|-------------------|------------|---------------------|---------------|----------------|-------------------------------|------------------------------------|----------------------------|----------------|
| | Reading (dBμV) | PK/QP/Ave. | | Height (m) | Polar (H/V) | | | Limit (dBμV/m) | Margin (dB) |
| 5G 11A BAND4, Low Channel | | | | | | | | | |
| 5646.50 | 44.05 | PK | 36 | 1.50 | V | 4.16 | 48.21 | 68.20 | 19.99 |
| 5696.17 | 43.51 | PK | 124 | 1.80 | H | 3.85 | 47.36 | 102.36 | 55.00 |
| 5717.50 | 43.59 | PK | 112 | 1.40 | V | 4.06 | 47.65 | 110.10 | 62.45 |
| 5724.50 | 43.75 | PK | 84 | 1.50 | H | 4.16 | 47.91 | 121.06 | 73.15 |
| 11490.00 | 38.31 | PK | 182 | 1.30 | H | 14.74 | 53.05 | 74.00 | 20.95 |
| 11490.00 | 38.14 | PK | 116 | 1.70 | V | 14.74 | 52.88 | 74.00 | 21.12 |
| 5G 11A BAND4, Middle Channel | | | | | | | | | |
| 11570.00 | 38.02 | PK | 109 | 1.60 | H | 14.74 | 52.76 | 74.00 | 21.24 |
| 11570.00 | 37.97 | PK | 135 | 1.70 | V | 14.74 | 52.71 | 74.00 | 21.29 |
| 5G 11A BAND4, High Channel | | | | | | | | | |
| 5854.78 | 44.33 | PK | 48 | 1.50 | H | 4.58 | 48.91 | 121.71 | 72.80 |
| 5871.61 | 44.44 | PK | 203 | 1.70 | V | 4.62 | 49.06 | 109.85 | 60.79 |
| 5886.67 | 44.03 | PK | 357 | 1.60 | H | 4.66 | 48.69 | 76.84 | 28.15 |
| 5929.72 | 44.14 | PK | 4 | 1.50 | V | 4.85 | 48.99 | 68.20 | 19.21 |
| 11650.00 | 37.56 | PK | 127 | 1.30 | H | 14.79 | 52.35 | 74.00 | 21.65 |
| 11650.00 | 38.18 | PK | 116 | 1.80 | V | 14.79 | 52.97 | 74.00 | 21.03 |
| 5G 11N40 BAND4, Low Channel | | | | | | | | | |
| 5646.50 | 44.05 | PK | 36 | 1.50 | V | 4.16 | 48.21 | 68.20 | 19.99 |
| 5696.17 | 43.51 | PK | 124 | 1.80 | H | 3.85 | 47.36 | 102.36 | 55.00 |
| 5717.50 | 43.59 | PK | 112 | 1.40 | V | 4.06 | 47.65 | 110.10 | 62.45 |
| 5724.50 | 43.75 | PK | 84 | 1.50 | H | 4.16 | 47.91 | 121.06 | 73.15 |
| 11490.00 | 38.31 | PK | 182 | 1.30 | H | 14.74 | 53.05 | 74.00 | 20.95 |
| 11490.00 | 38.14 | PK | 116 | 1.70 | V | 14.74 | 52.88 | 74.00 | 21.12 |
| 5G 11N40 BAND4, High Channel | | | | | | | | | |
| 11570.00 | 38.02 | PK | 109 | 1.60 | H | 14.74 | 52.76 | 74.00 | 21.24 |
| 11570.00 | 37.97 | PK | 135 | 1.70 | V | 14.74 | 52.71 | 74.00 | 21.29 |
| 5G 11 BAND4 AC80 BAND4 | | | | | | | | | |
| 5649.94 | 44.18 | PK | 316 | 1.60 | V | 4.16 | 48.34 | 68.20 | 19.86 |
| 5697.34 | 43.66 | PK | 214 | 1.90 | H | 3.85 | 47.51 | 103.23 | 55.72 |
| 5709.47 | 43.80 | PK | 135 | 1.70 | V | 4.06 | 47.86 | 107.85 | 59.99 |
| 5724.30 | 44.00 | PK | 226 | 1.90 | H | 4.13 | 48.13 | 120.60 | 72.47 |
| 5851.35 | 44.35 | PK | 25 | 1.60 | H | 4.58 | 48.93 | 113.87 | 64.94 |
| 5869.58 | 44.51 | PK | 118 | 1.90 | V | 4.62 | 49.13 | 109.28 | 60.15 |
| 5920.25 | 44.62 | PK | 139 | 1.40 | H | 4.83 | 49.45 | 101.69 | 52.24 |
| 5929.91 | 44.75 | PK | 251 | 1.50 | V | 4.85 | 49.60 | 68.20 | 18.60 |
| 11550 | 38.26 | PK | 159 | 1.30 | H | 14.74 | 53.00 | 74.00 | 21.00 |

| | | | | | | | | | |
|-------|-------|----|-----|------|---|-------|-------|-------|-------|
| 11550 | 38.08 | PK | 122 | 2.10 | V | 14.74 | 52.82 | 74.00 | 21.18 |
|-------|-------|----|-----|------|---|-------|-------|-------|-------|

Note 1:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

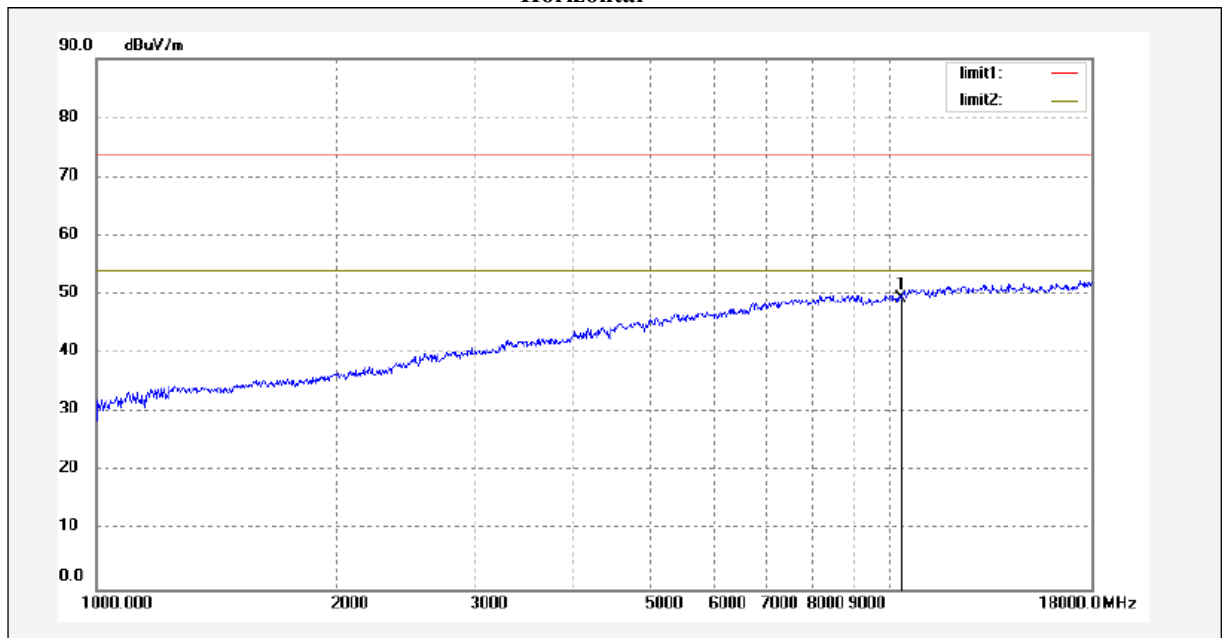
Margin = Limit- Corr. Amplitude

Note 2:

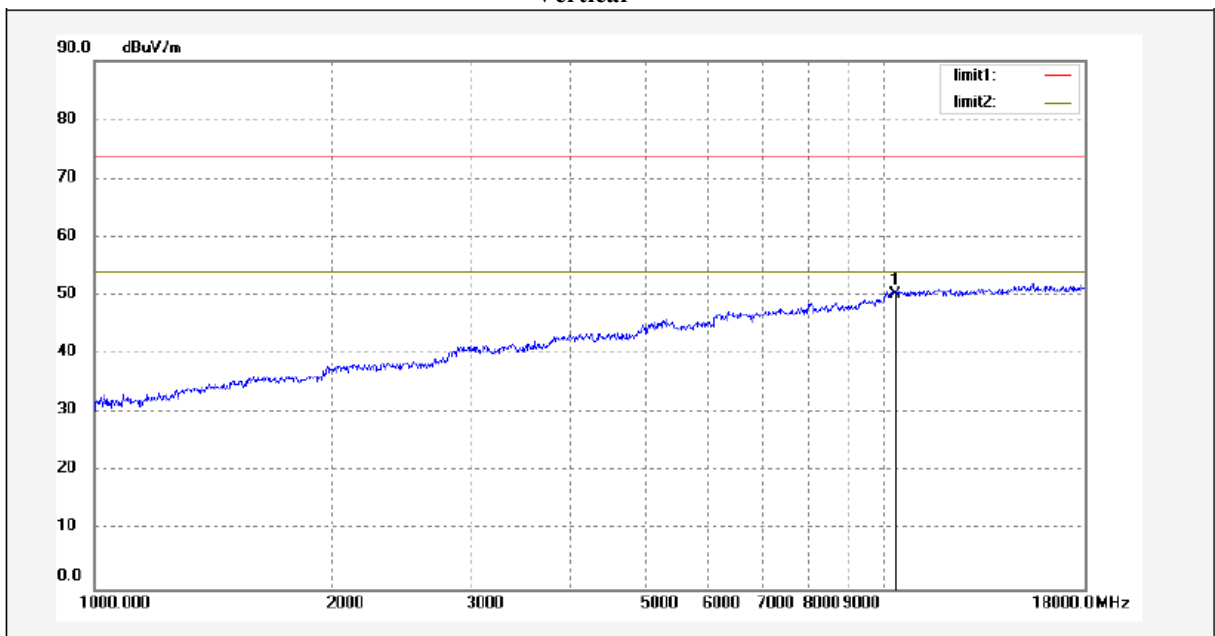
For 18-40GHz, all spurious emissions are 20 dB below the limit or are on the system noise floor level.

The test result of peak was less than the limit of average, so just peak values were recorded.

Pre-scan for Peak
802.11 a Middle Channel
Horizontal



Vertical



FCC §15.407(a) (12), (e) – BANDWIDTH

Applicable Standard

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

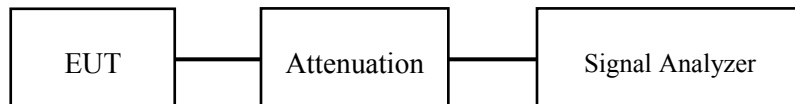
Test Procedure**1. Emission Bandwidth (EBW)**

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the 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 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%.

2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ 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.



Test Data**Environmental Conditions**

| | |
|---------------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 52 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Black Ding on 2021-03-12

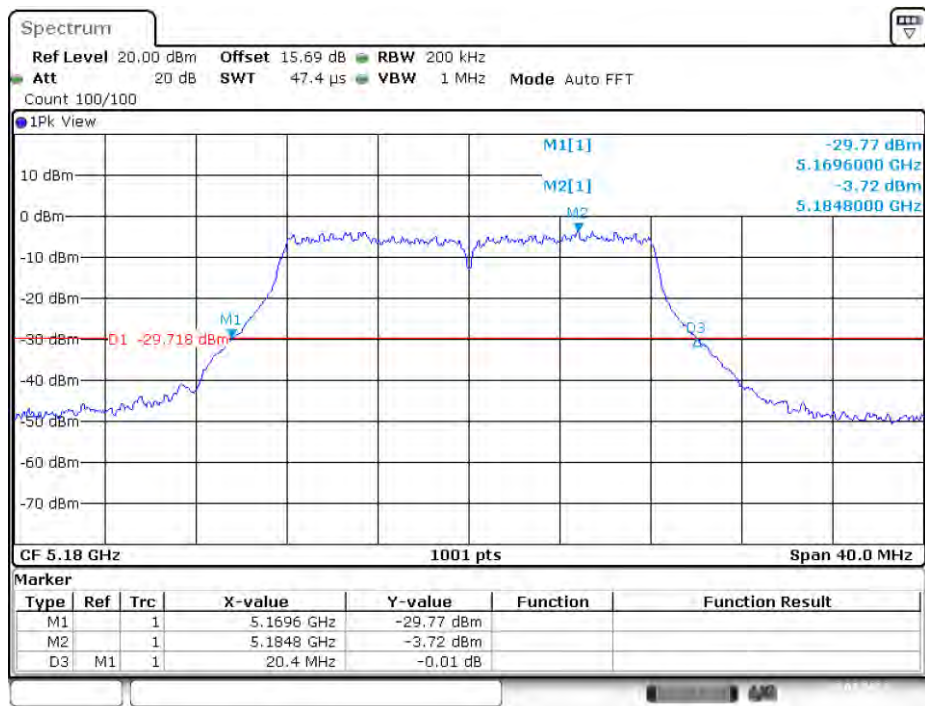
EUT operation mode: Transmitting

Test Result: Pass; please refer to the following tables and plots.

5150 MHz - 5250 MHz:

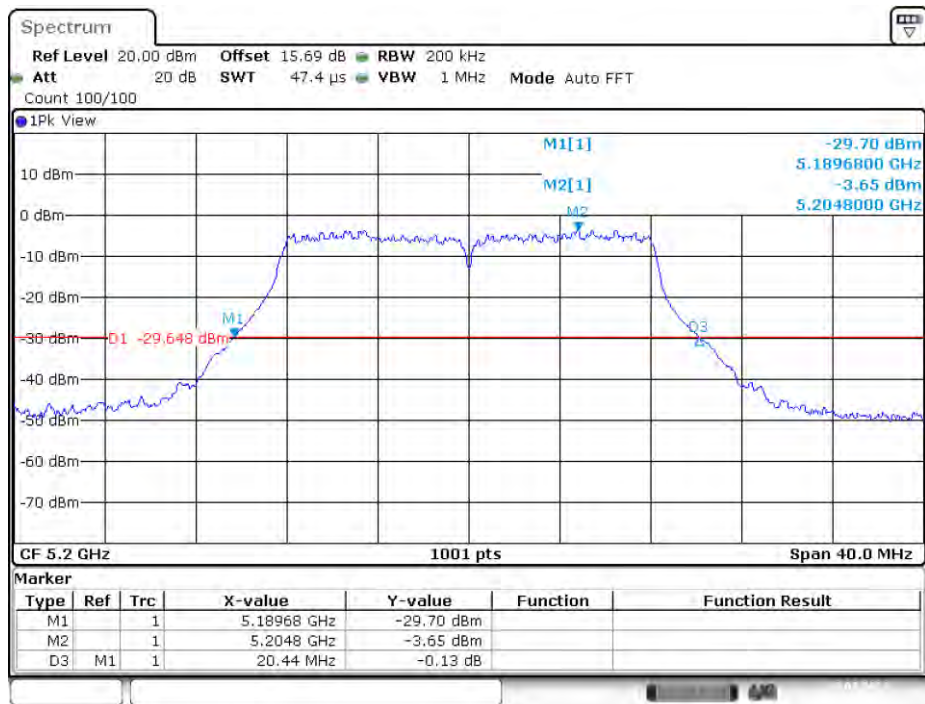
| Frequency (MHz) | 26 dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Remark |
|--------------------|--------------------------|------------------------|---|
| 802.11a | | | No transmitted signal in the 99% bandwidth extends into the U-NII-2A band |
| 5180 | 20.400 | 17.223 | |
| 5200 | 20.440 | 17.263 | |
| 5240 | 20.520 | 17.263 | |
| 802.11n20 | | | |
| 5180 | 20.640 | 18.182 | |
| 5200 | 21.280 | 18.182 | |
| 5240 | 21.320 | 18.182 | |
| 802.11n40 | | | |
| 5190 | 43.040 | 36.843 | |
| 5230 | 43.040 | 36.843 | |
| 802.11ac20 | | | |
| 5180 | 21.240 | 18.182 | |
| 5200 | 21.280 | 18.222 | |
| 5240 | 21.200 | 18.222 | |
| 802.11ac40 | | | |
| 5190 | 42.960 | 36.843 | |
| 5230 | 43.120 | 36.843 | |
| 802.11ac80 | | | |
| 5210 | 83.200 | 76.084 | |

802.11a mode, 26 dB Emissions, 5180 MHz



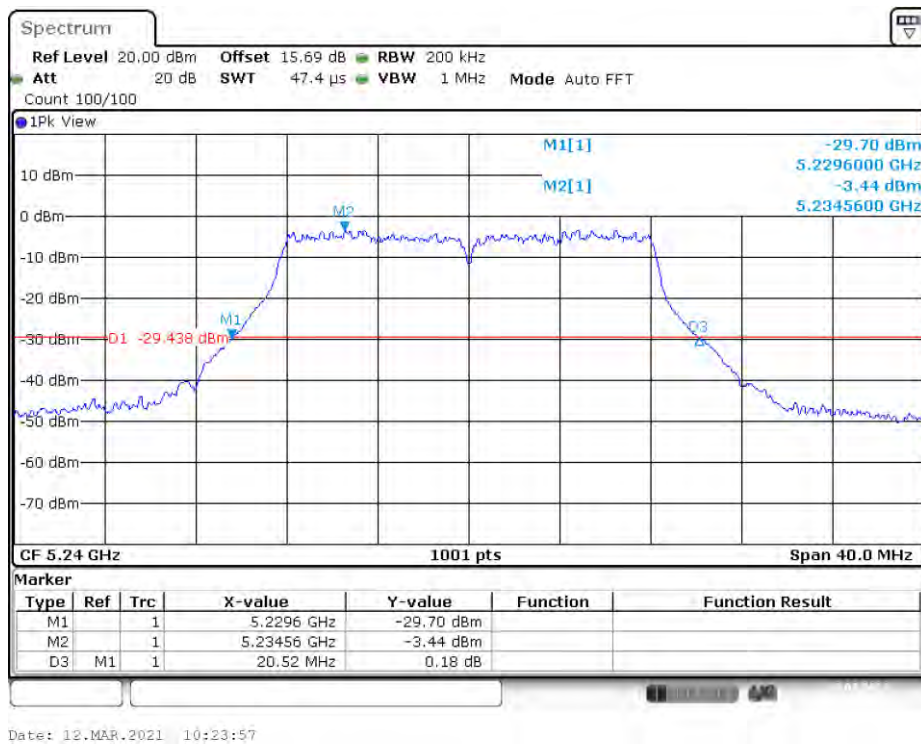
Date: 12.MAR.2021 09:59:17

802.11a mode, 26 dB Emissions, 5200 MHz

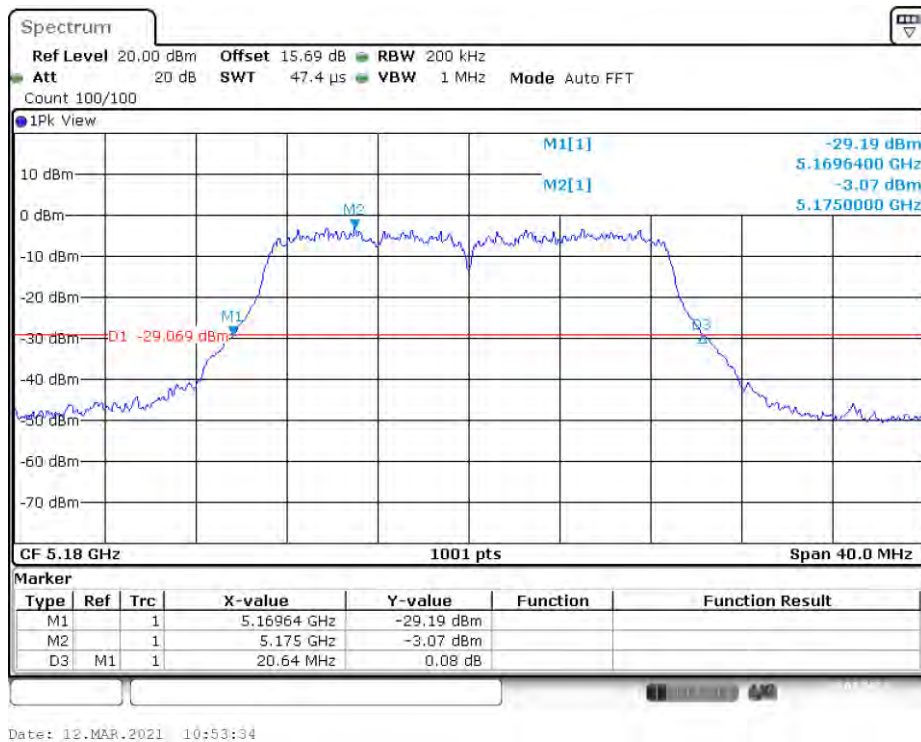


Date: 12.MAR.2021 10:17:34

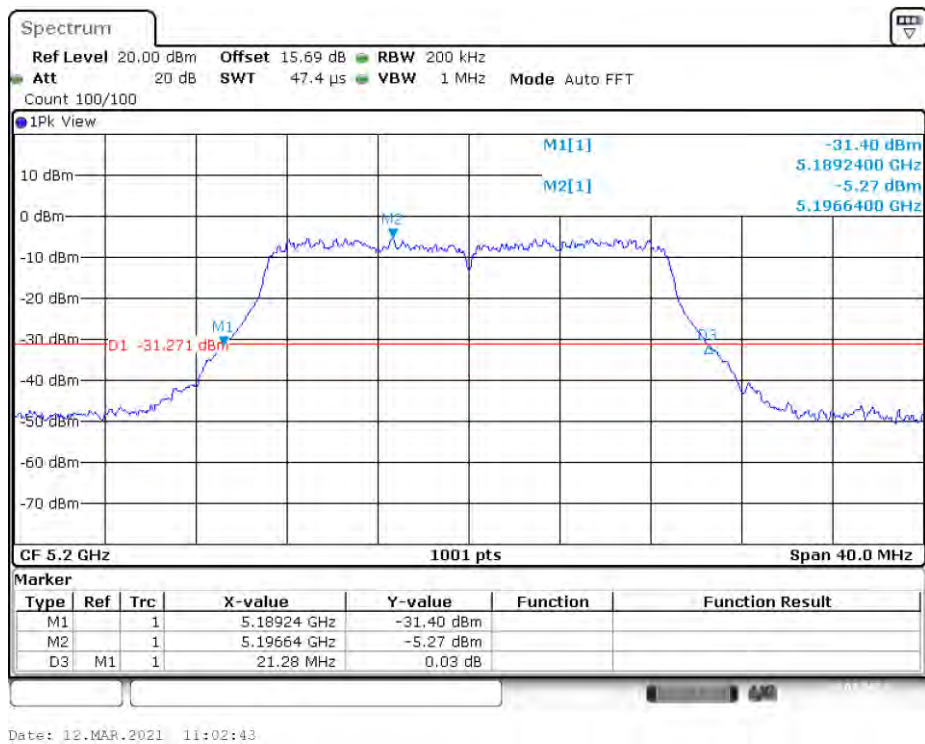
802.11a mode, 26 dB Emissions, 5240 MHz



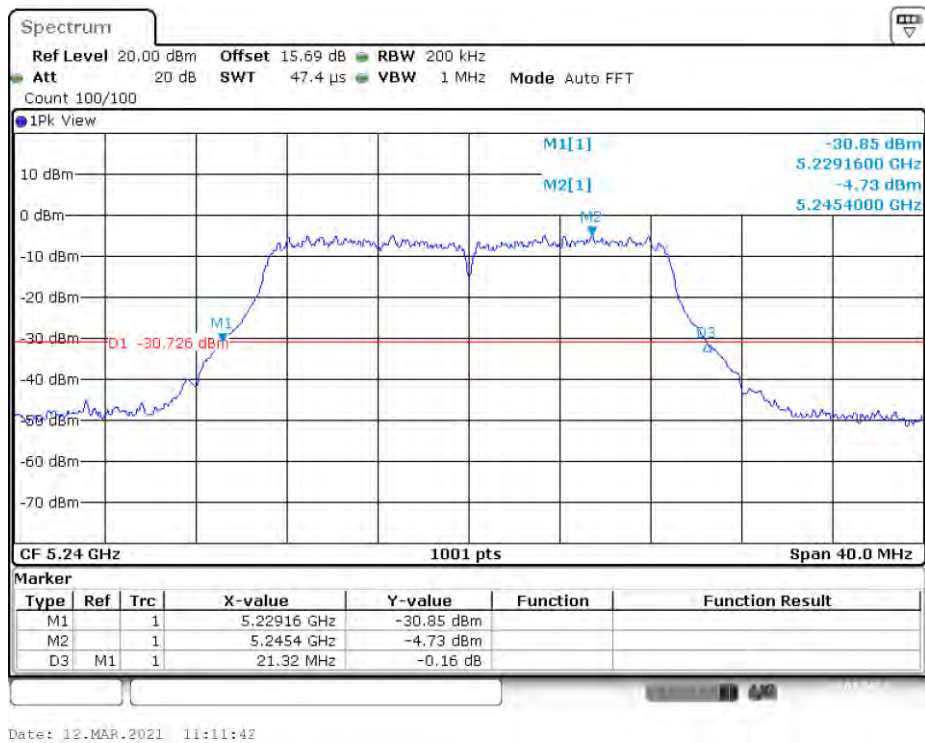
802.11n20 mode, 26 dB Emissions, 5180 MHz



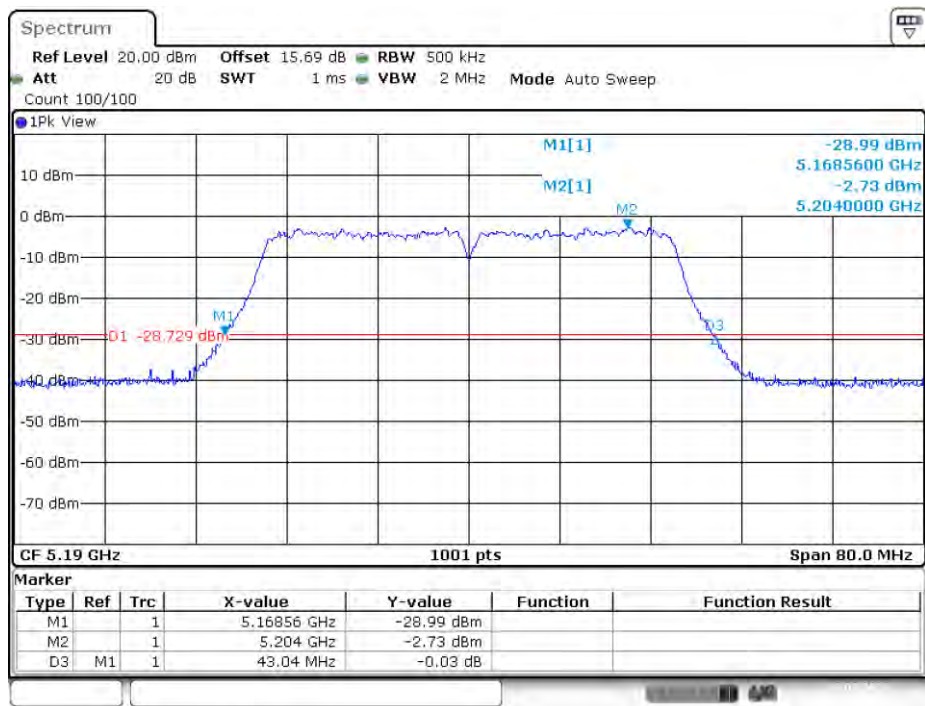
802.11n20 mode, 26 dB Emissions, 5200 MHz



802.11n20 mode, 26 dB Emissions, 5240 MHz

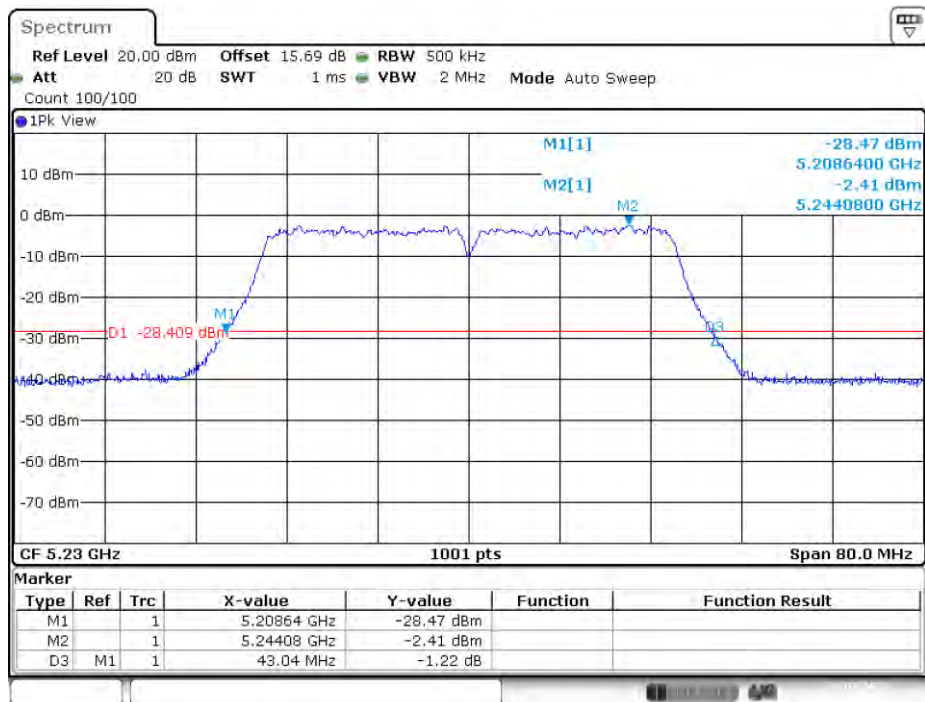


802.11n40 mode, 26 dB Emissions, 5190 MHz



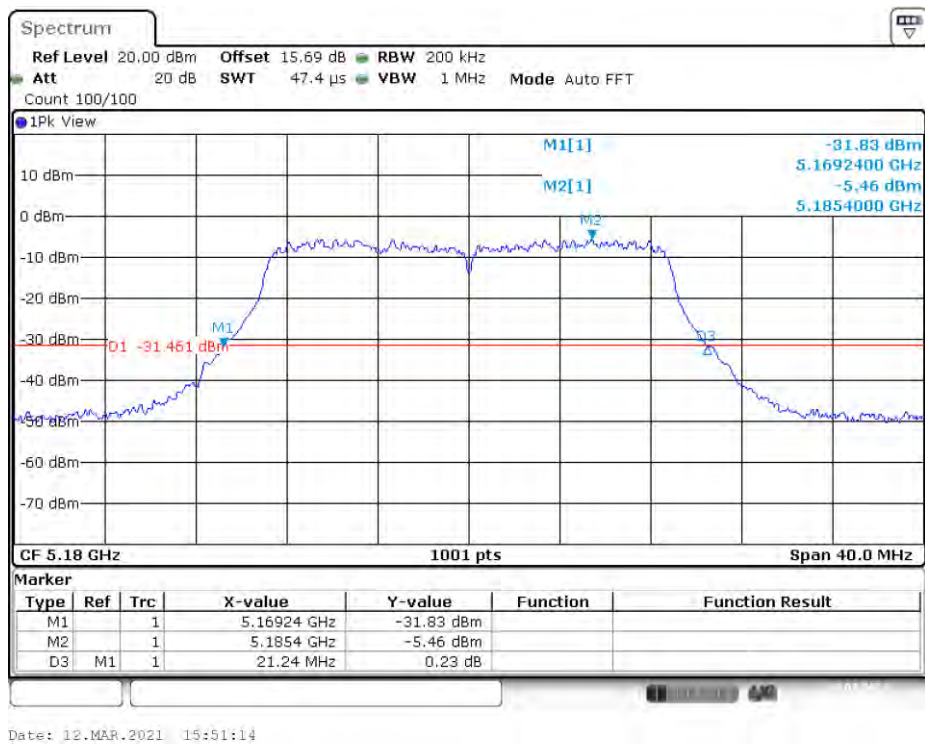
Date: 12.MAR.2021 15:15:41

802.11n40 mode, 26 dB Emissions, 5230 MHz

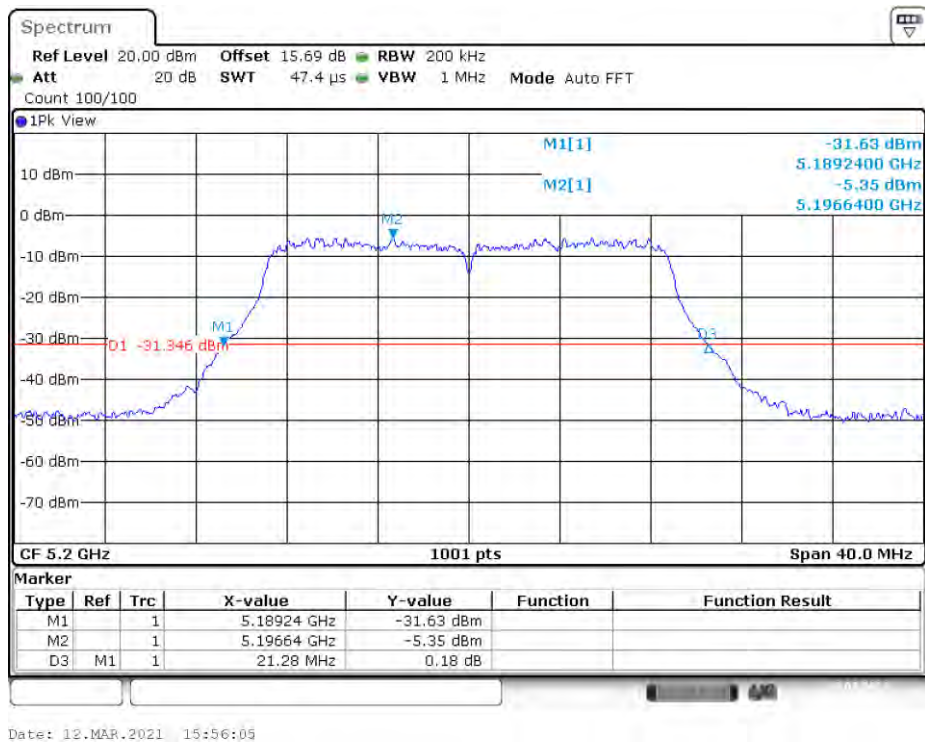


Date: 12.MAR.2021 15:25:57

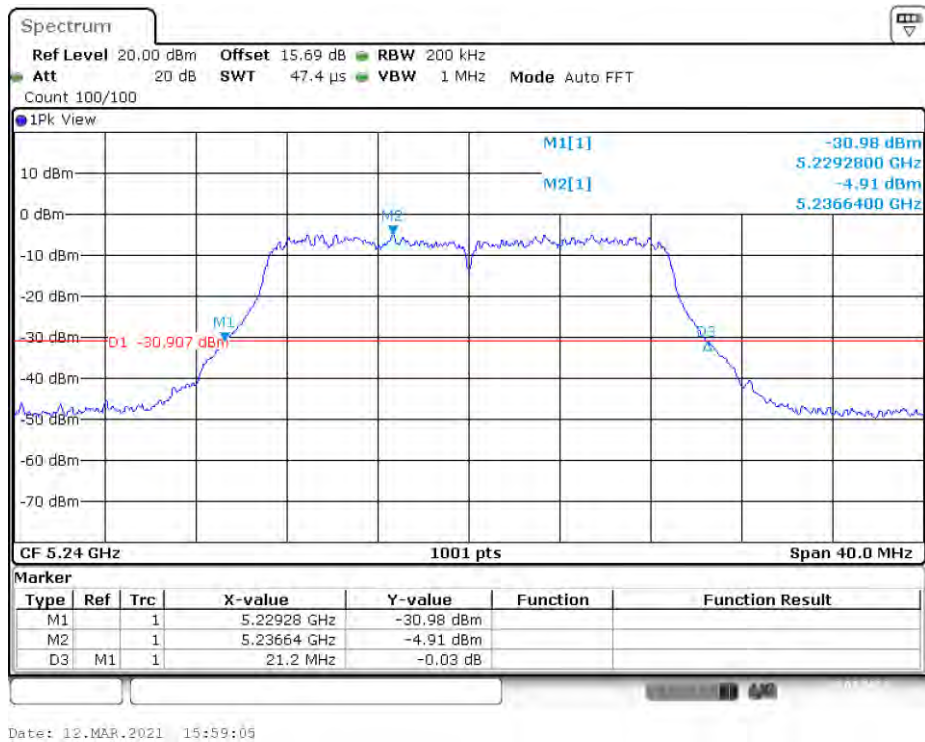
802.11ac20 mode, 26 dB Emissions, 5180 MHz



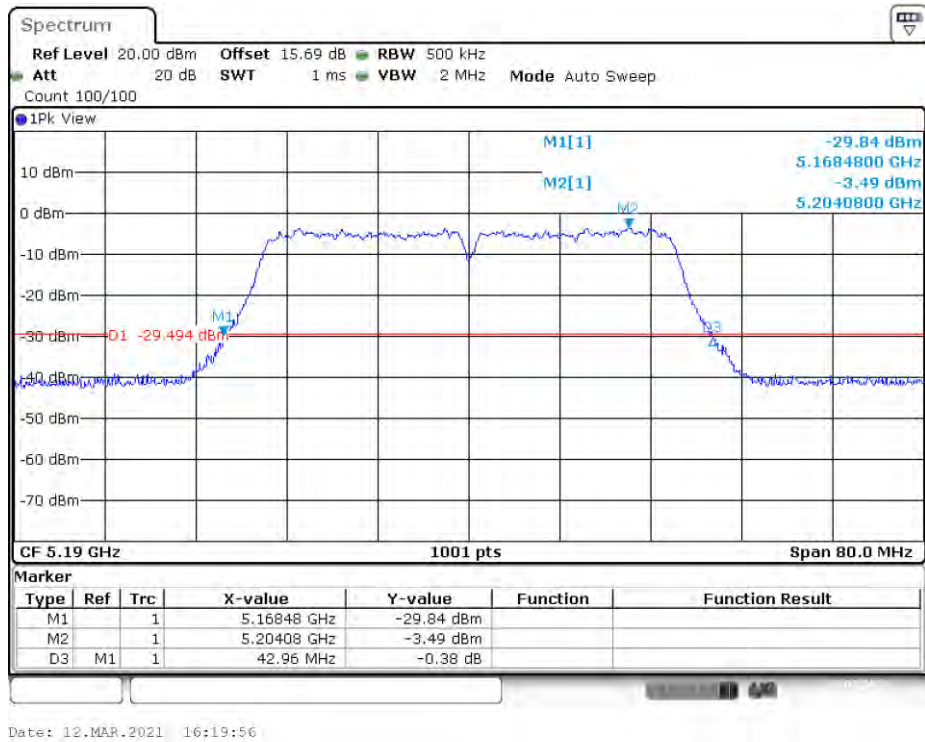
802.11ac20 mode, 26 dB Emissions, 5200 MHz

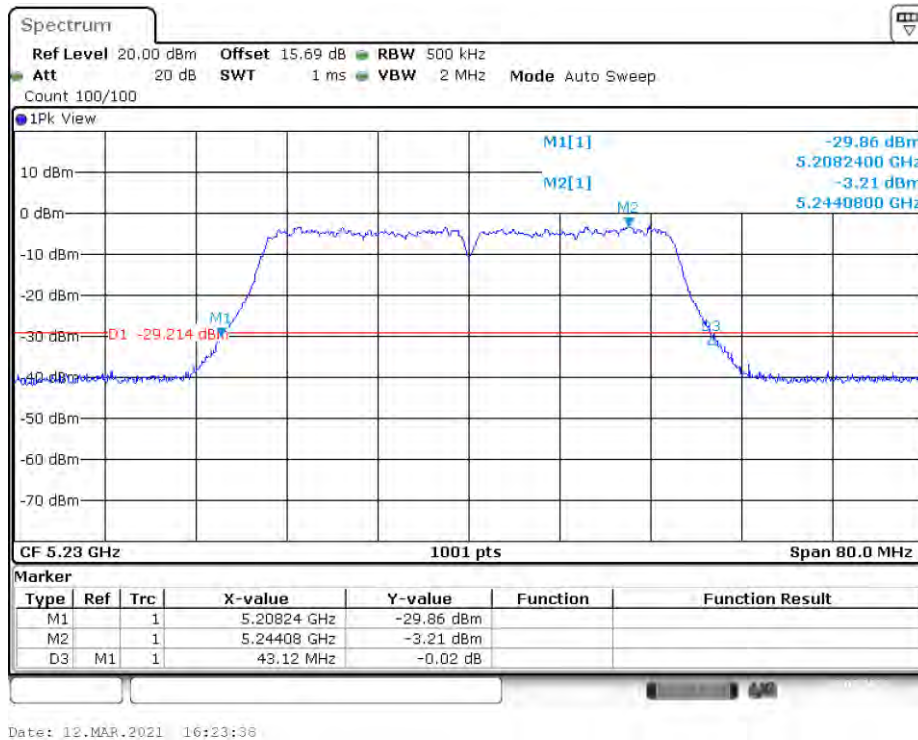
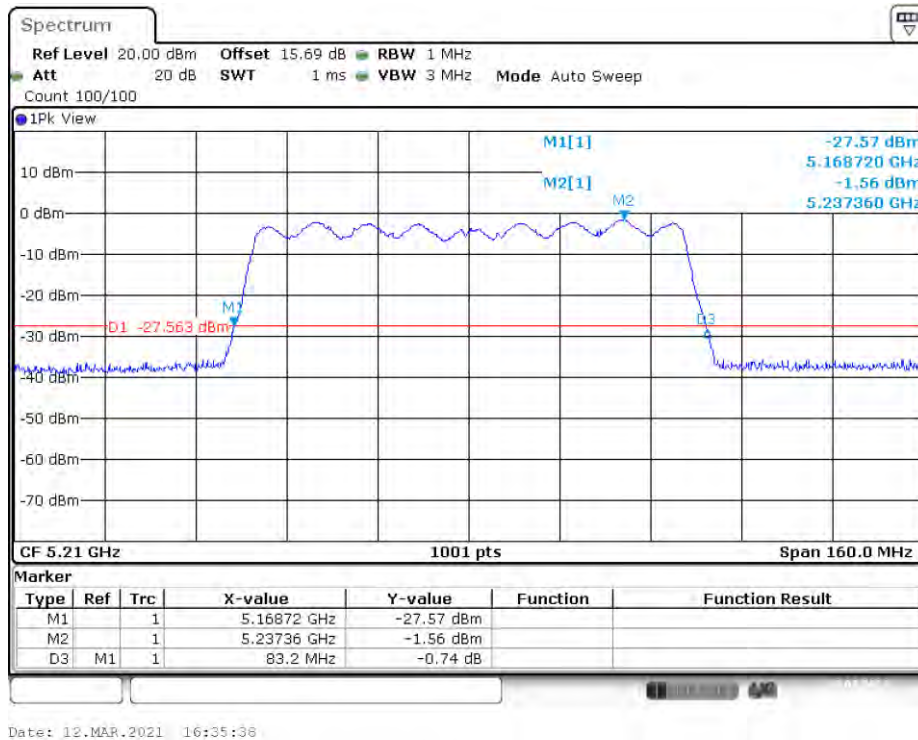


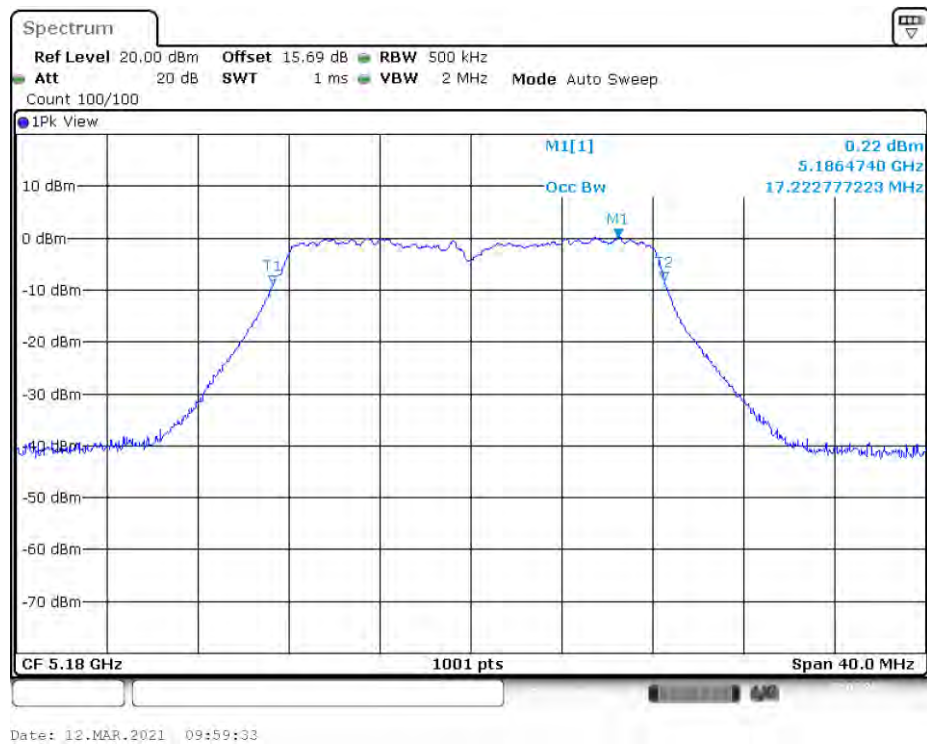
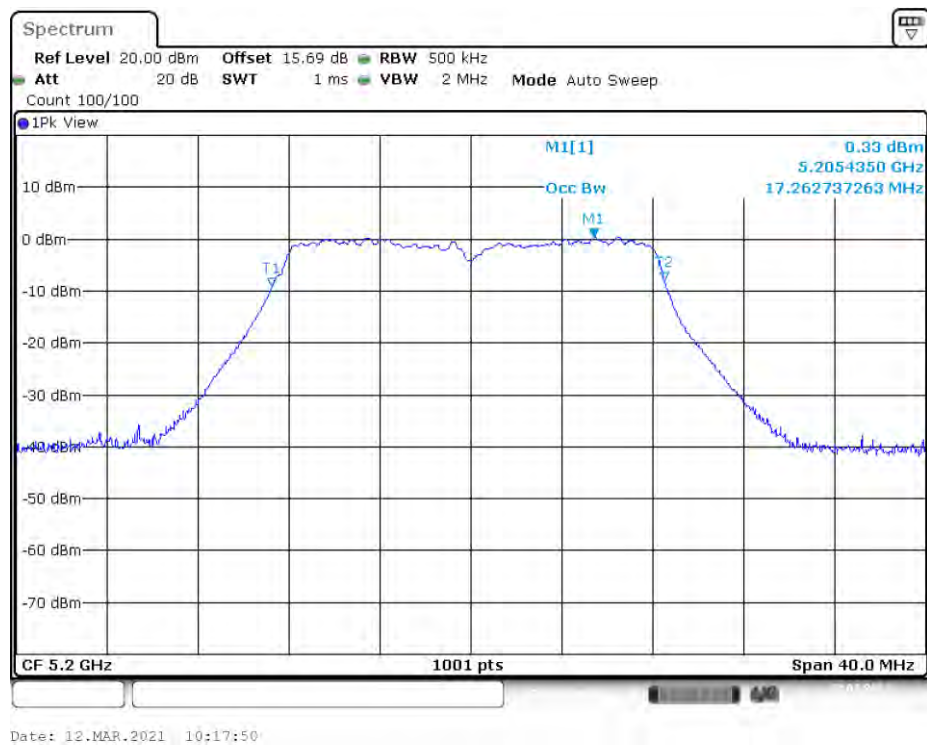
802.11ac20 mode, 26 dB Emissions, 5240 MHz

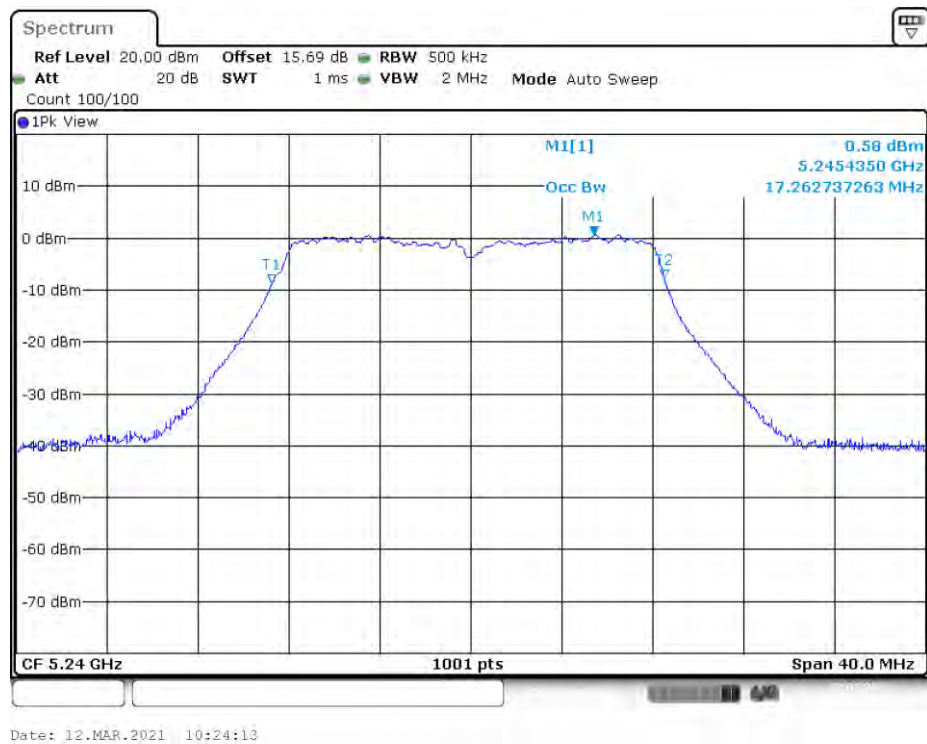
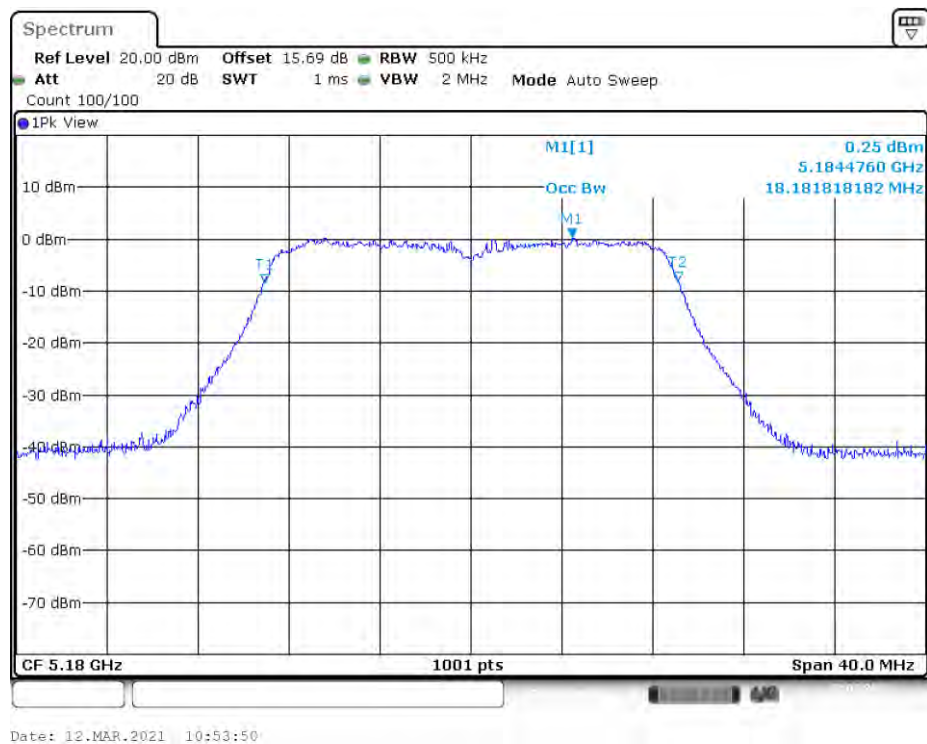


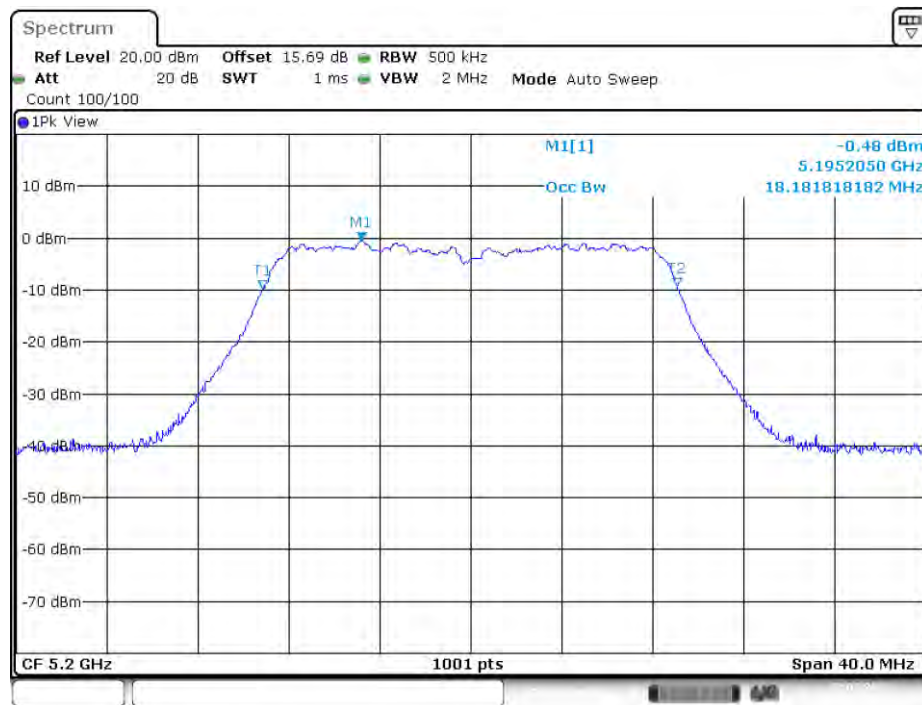
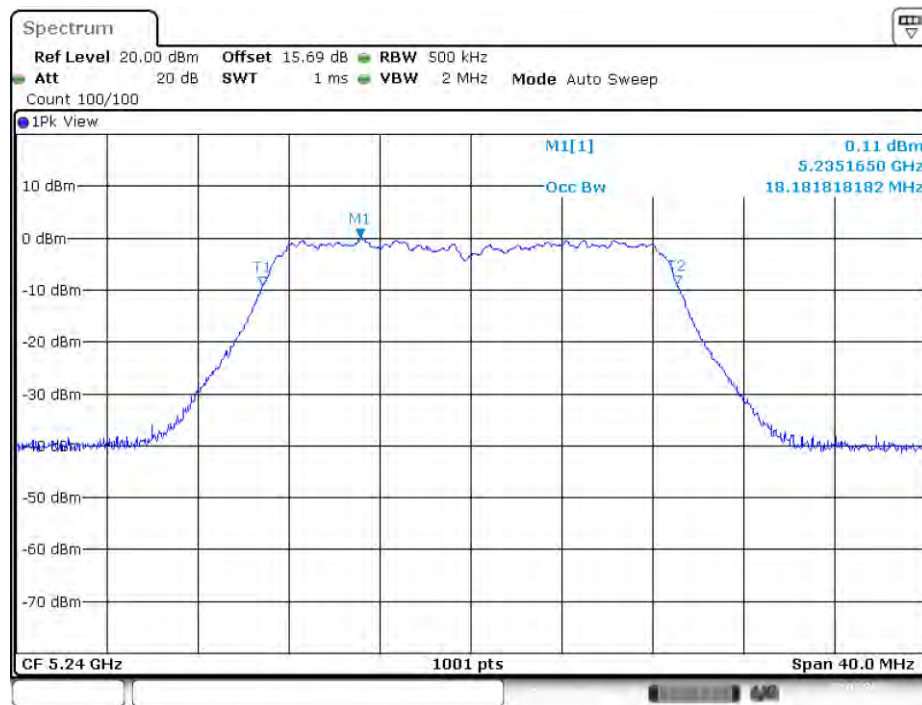
802.11ac40 mode, 26 dB Emissions, 5190 MHz

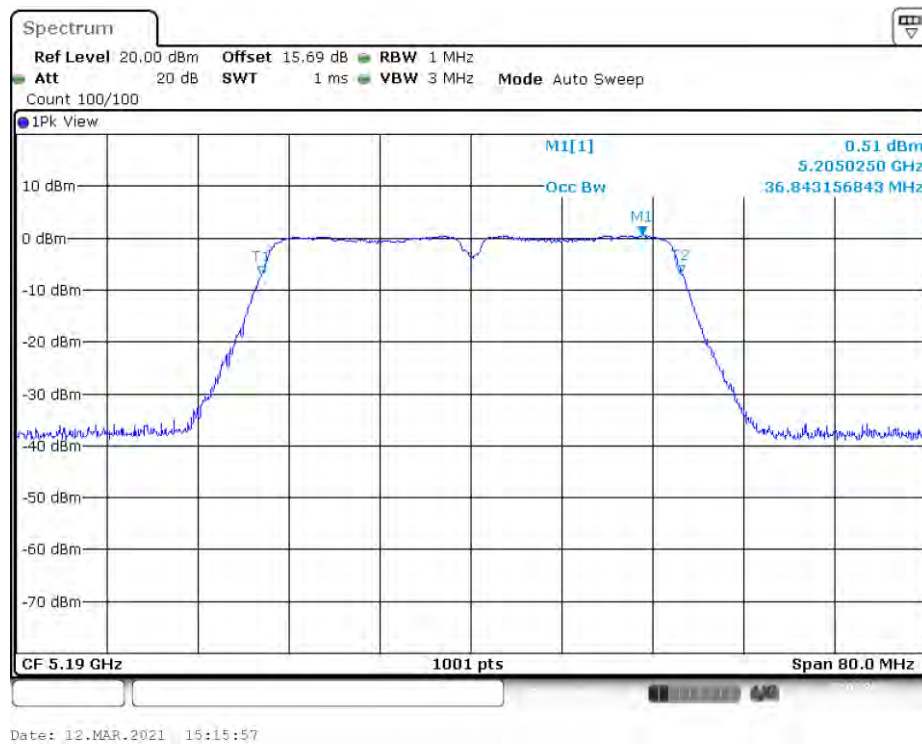


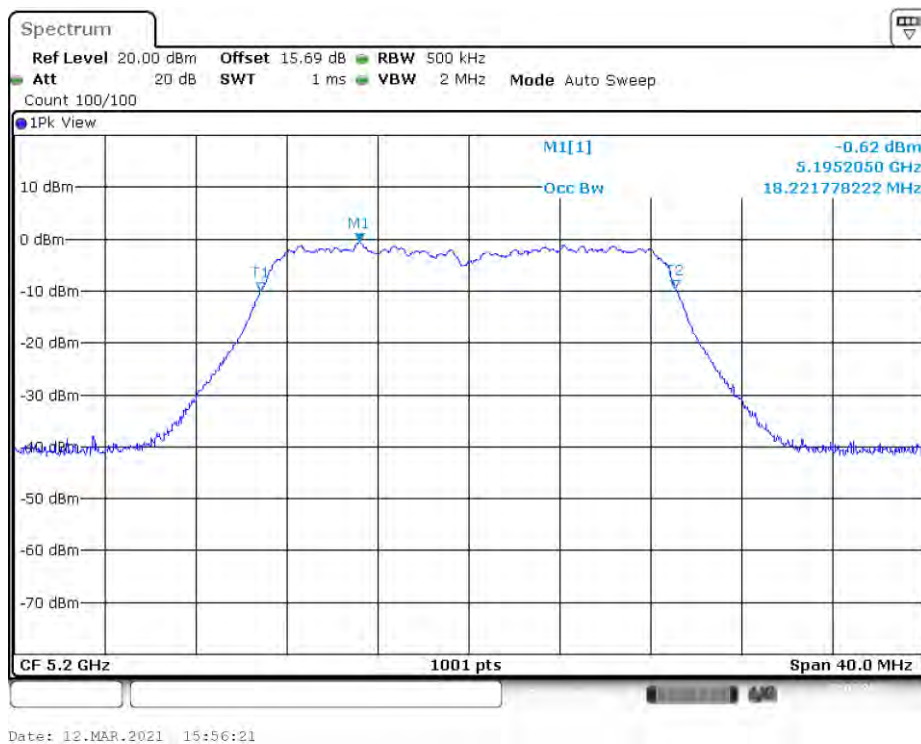
802.11ac40 mode, 26 dB Emissions, 5230 MHz**802.11ac80 mode, 26 dB Emissions, 5210 MHz**

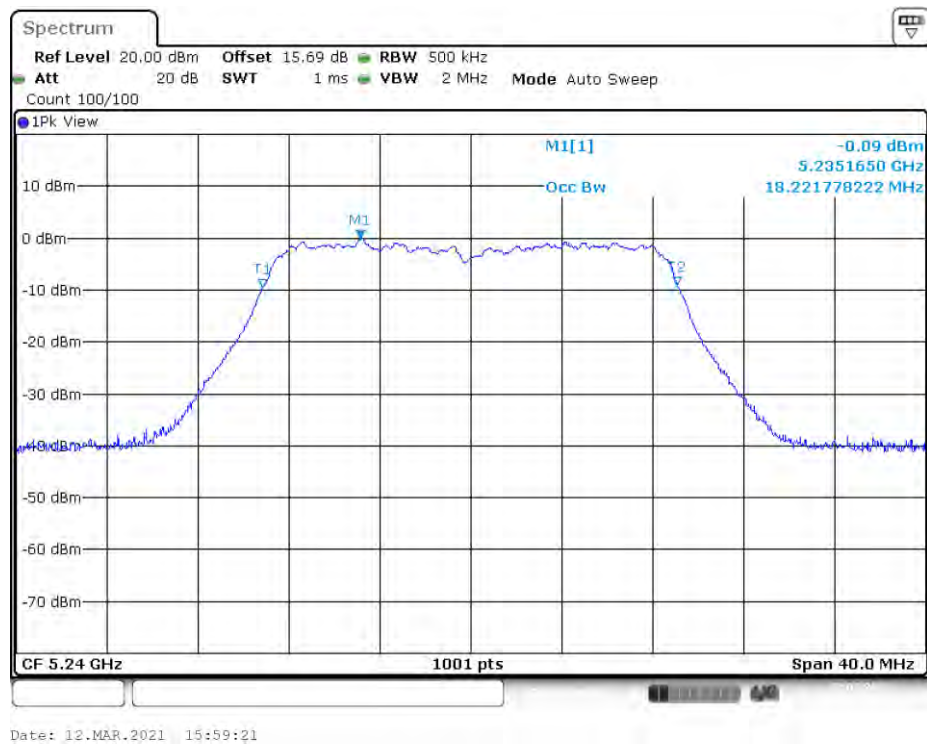
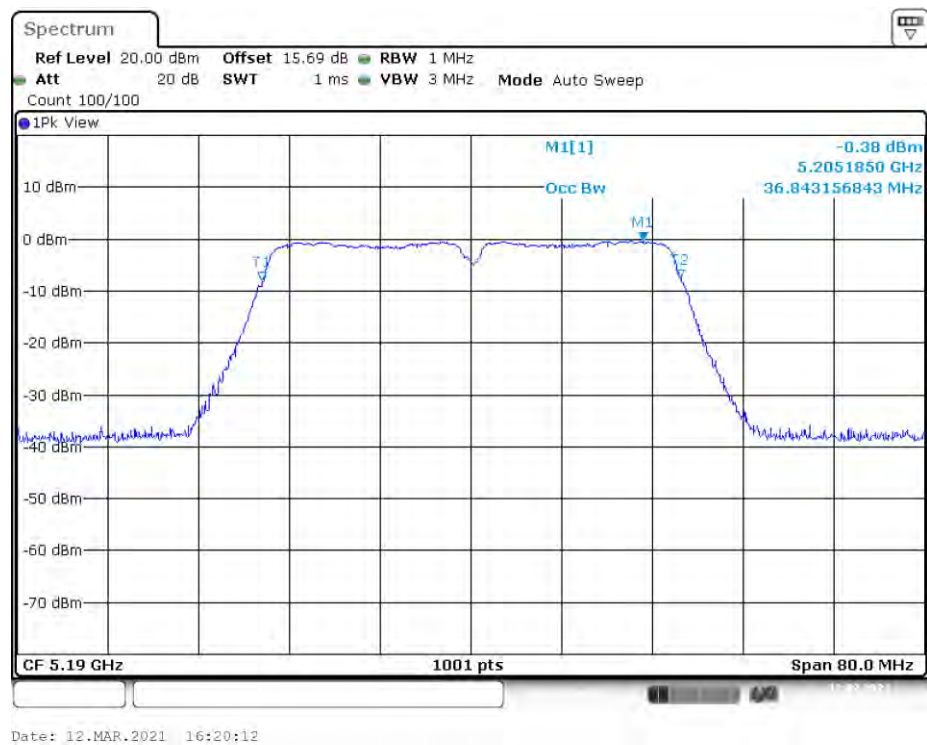
802.11a mode, 99% Occupied Bandwidth, 5180 MHz**802.11a mode, 99% Occupied Bandwidth, 5200 MHz**

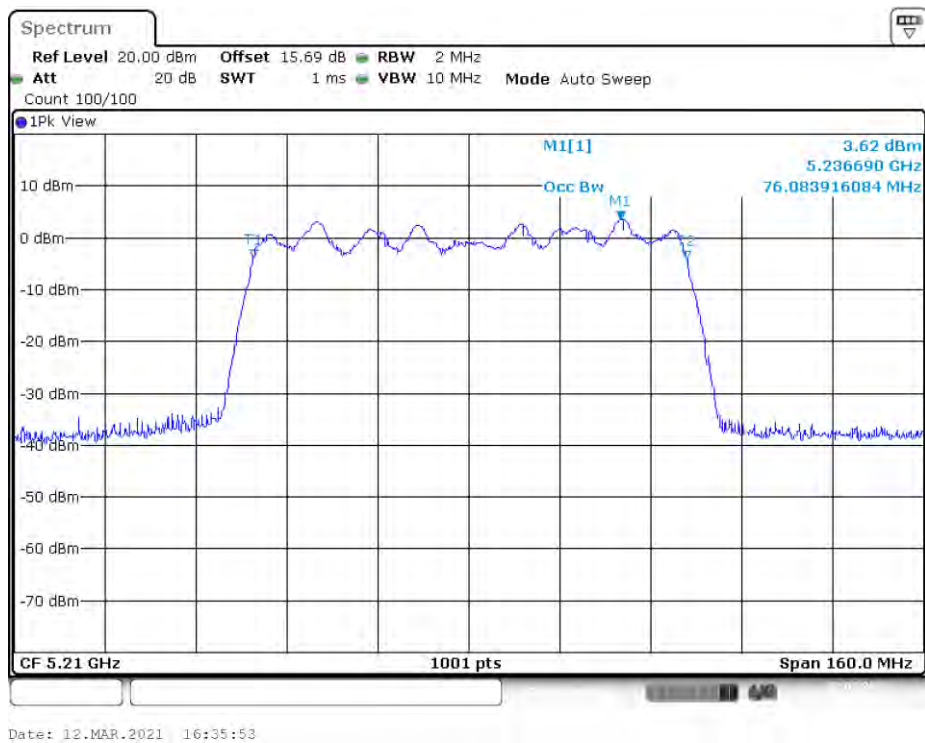
802.11a mode, 99% Occupied Bandwidth, 5240 MHz**802.11n20 mode, 99% Occupied Bandwidth, 5180 MHz**

802.11n20 mode, 99% Occupied Bandwidth, 5200 MHz**802.11n20 mode, 99% Occupied Bandwidth, 5240 MHz**

802.11n40 mode, 99% Occupied Bandwidth, 5190 MHz**802.11n40 mode, 99% Occupied Bandwidth, 5230 MHz**

802.11ac20 mode, 99% Occupied Bandwidth, 5180 MHz**802.11ac20 mode, 99% Occupied Bandwidth, 5200 MHz**

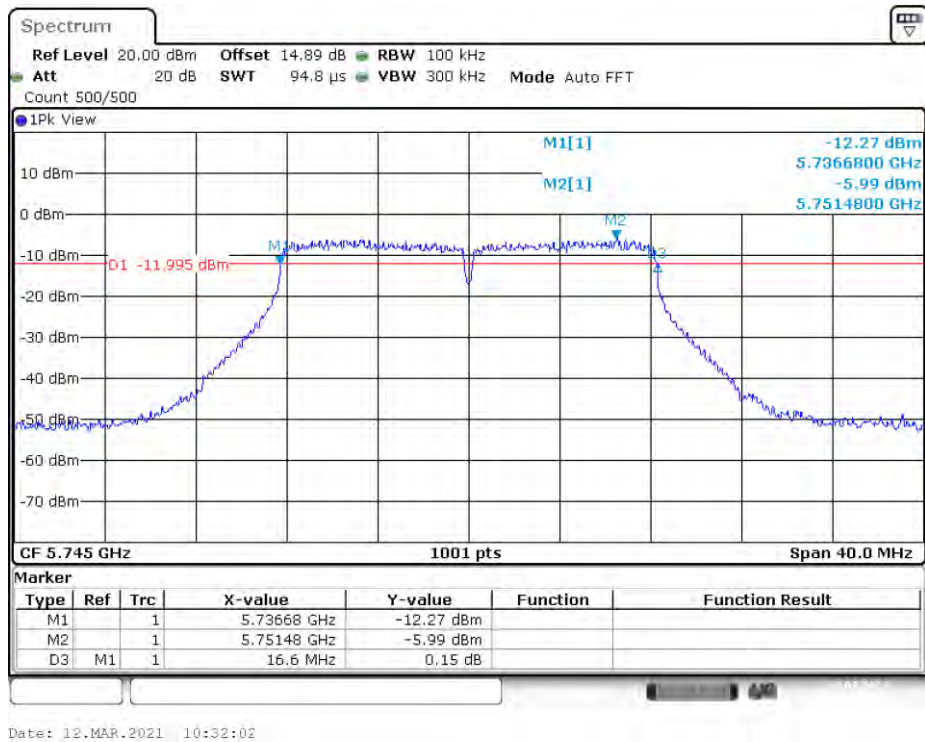
802.11ac20 mode, 99% Occupied Bandwidth, 5240 MHz**802.11ac40 mode, 99% Occupied Bandwidth, 5190 MHz**

802.11ac40 mode, 99% Occupied Bandwidth, 5230 MHz**802.11ac80 mode, 99% Occupied Bandwidth, 5210 MHz**

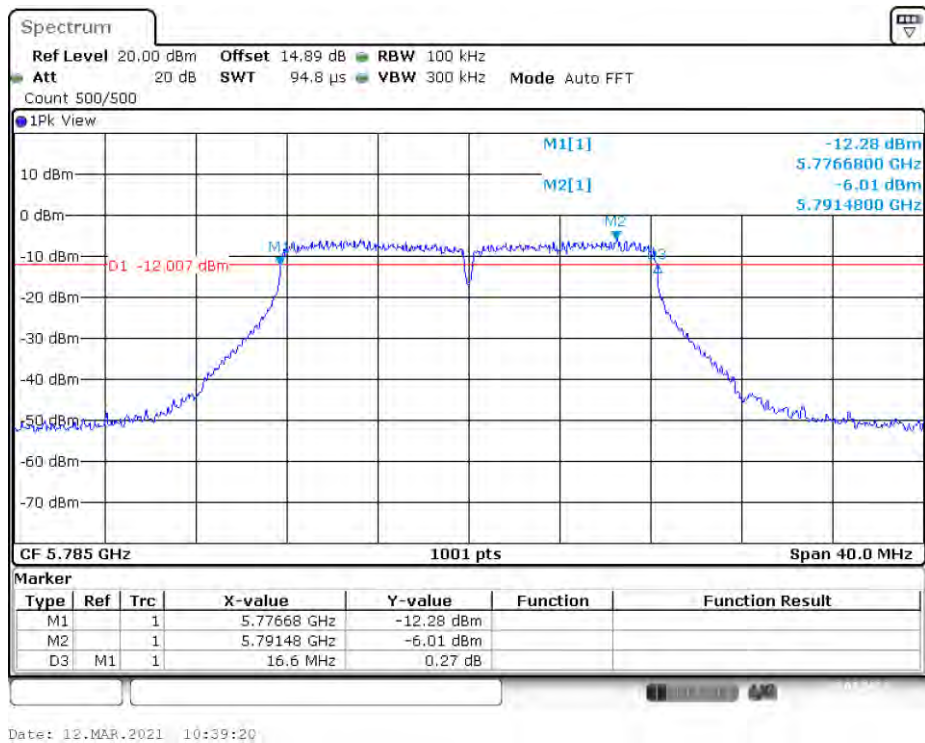
5725 MHz – 5850 MHz:

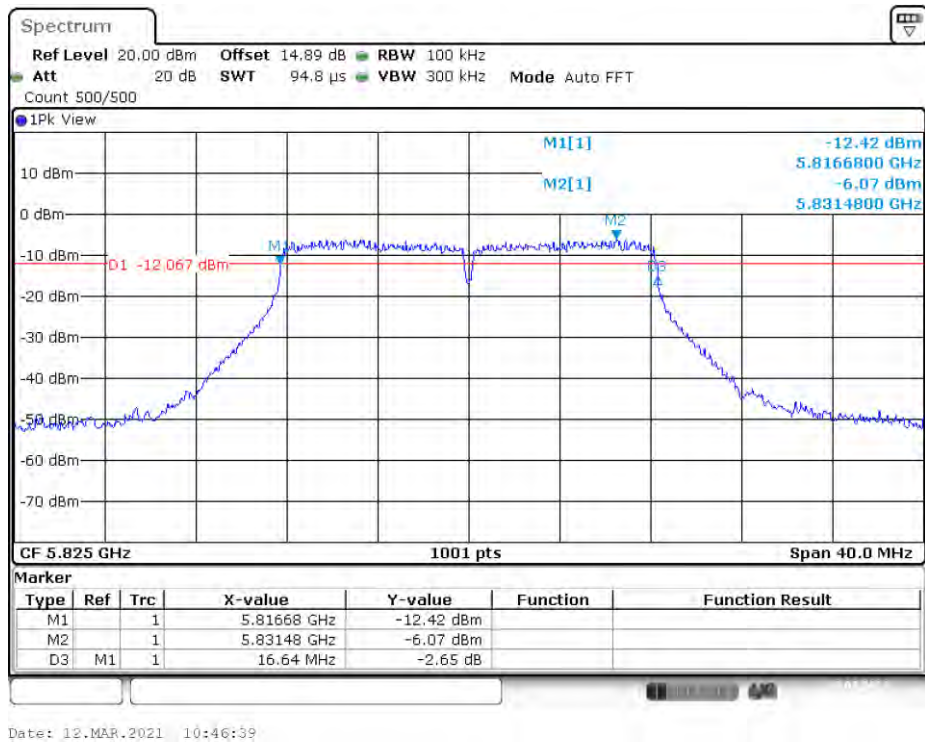
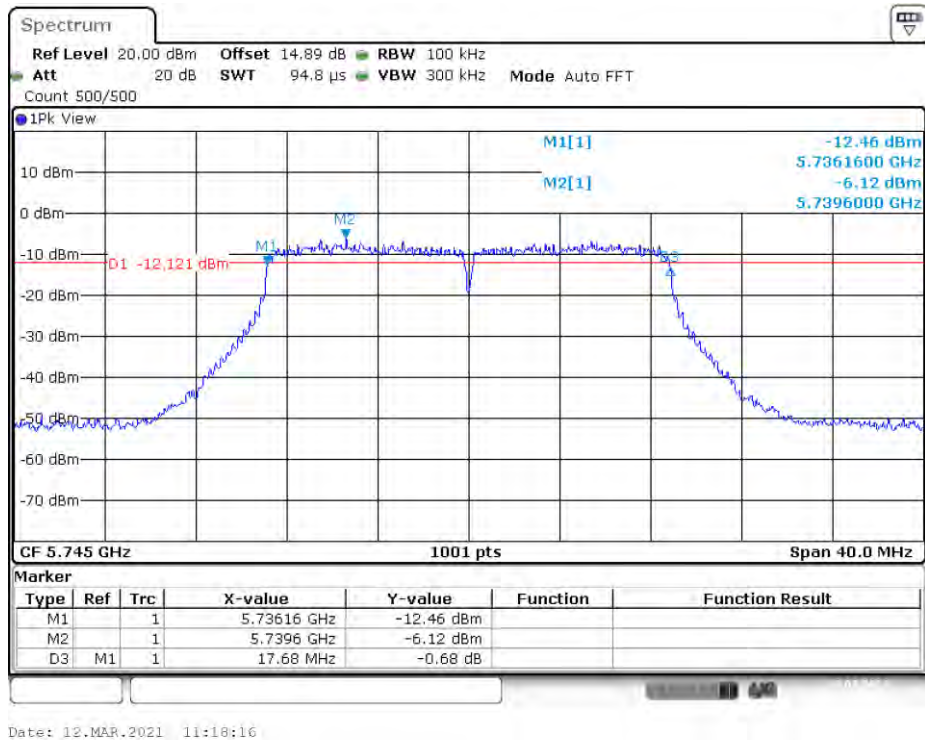
| Frequency (MHz) | 6 dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Limit (MHz) | Remark |
|--------------------|-------------------------|---------------------------|----------------|---|
| 802.11a | | | | No transmitted signal in the 99% bandwidth extends into the U-NII-2C band |
| 5745 | 16.600 | 17.223 | 0.5 | |
| 5785 | 16.600 | 17.263 | 0.5 | |
| 5825 | 16.640 | 17.263 | 0.5 | |
| 802.11n20 | | | | |
| 5745 | 17.680 | 18.182 | 0.5 | |
| 5785 | 17.680 | 18.142 | 0.5 | |
| 5825 | 17.680 | 18.182 | 0.5 | |
| 802.11n40 | | | | |
| 5755 | 36.640 | 36.923 | 0.5 | |
| 5795 | 36.640 | 36.923 | 0.5 | |
| 802.11ac20 | | | | |
| 5745 | 17.680 | 18.222 | 0.5 | |
| 5785 | 17.680 | 18.182 | 0.5 | |
| 5825 | 17.680 | 18.222 | 0.5 | |
| 802.11ac40 | | | | |
| 5755 | 36.640 | 36.923 | 0.5 | |
| 5795 | 36.640 | 36.923 | 0.5 | |
| 802.11ac80 | | | | |
| 5775 | 76.800 | 76.084 | 0.5 | |

802.11a mode, 6dB Emission Bandwidth, 5745 MHz

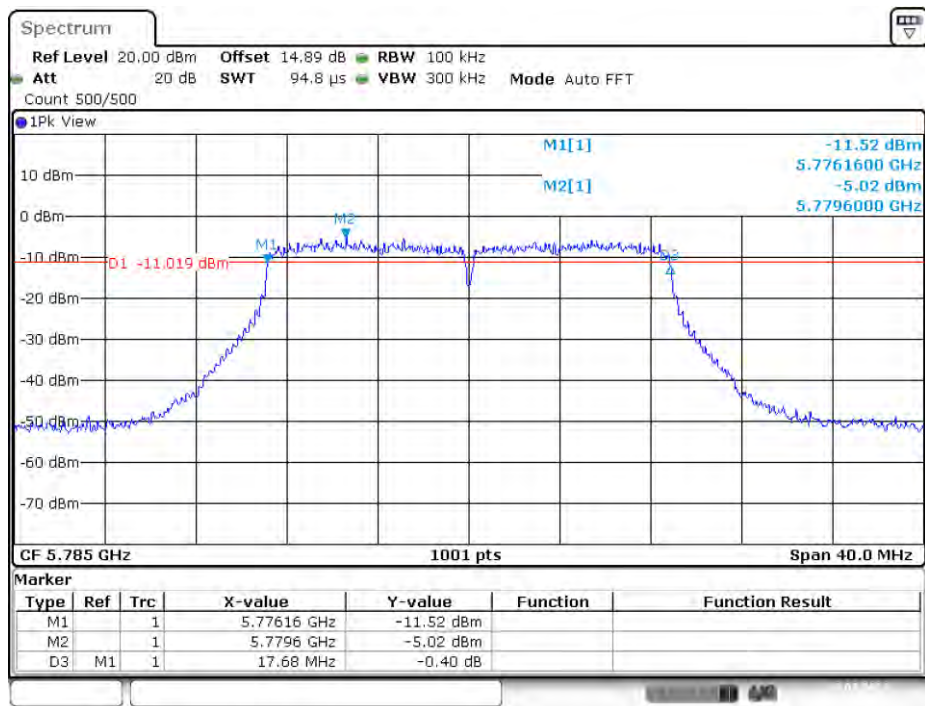


802.11a mode, 6dB Emission Bandwidth, 5785 MHz



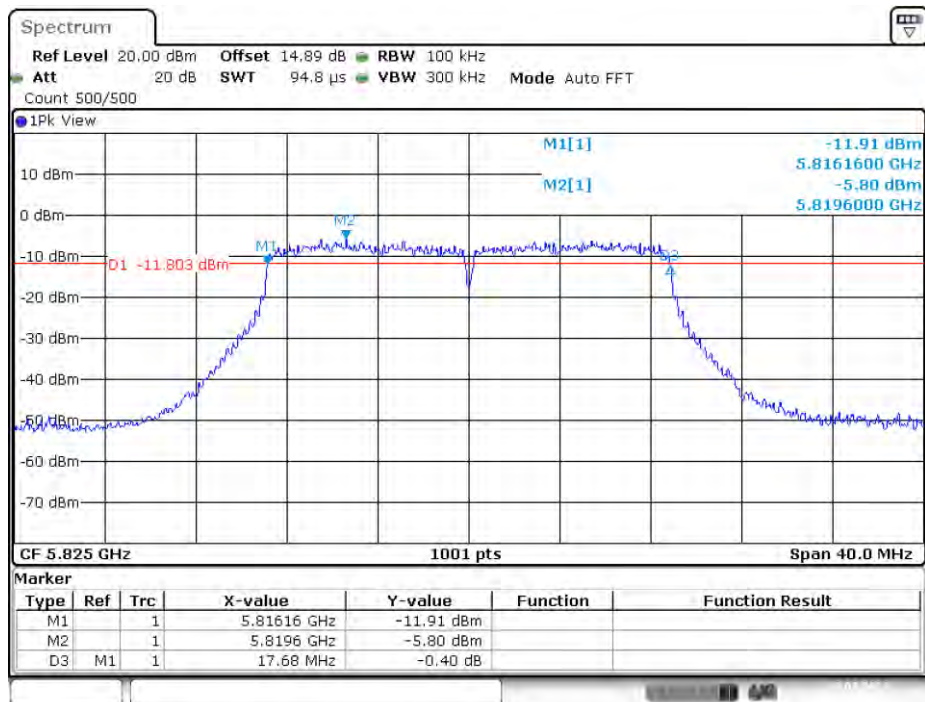
802.11a mode, 6dB Emission Bandwidth, 5825 MHz**802.11n20 mode, 6dB Emission Bandwidth, 5745 MHz**

802.11n20 mode, 6dB Emission Bandwidth, 5785 MHz



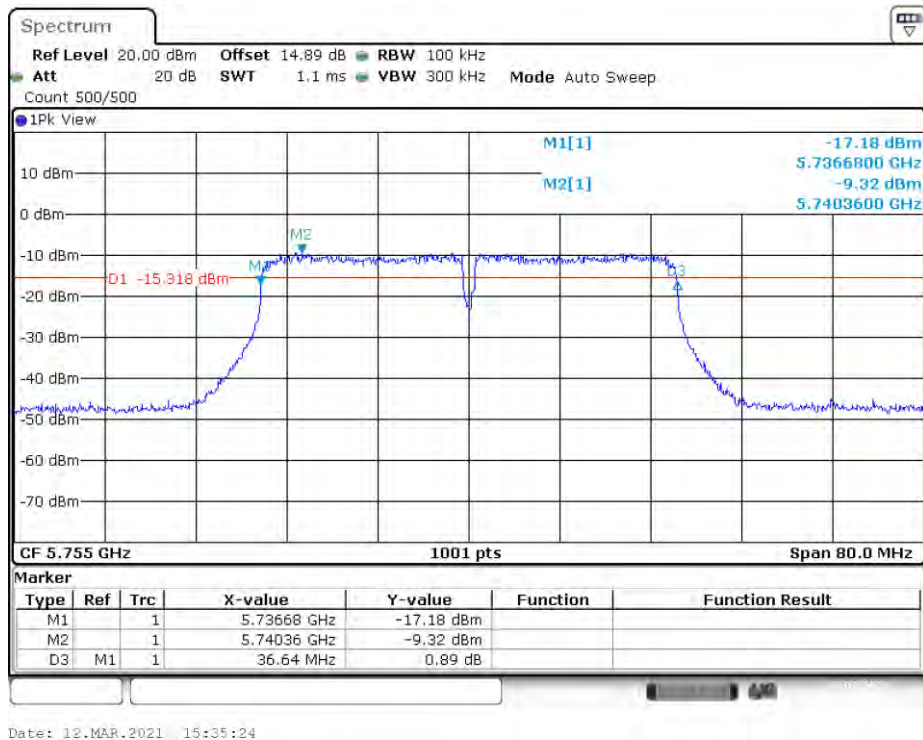
Date: 12.MAR.2021 14:59:53

802.11n20 mode, 6dB Emission Bandwidth, 5825 MHz

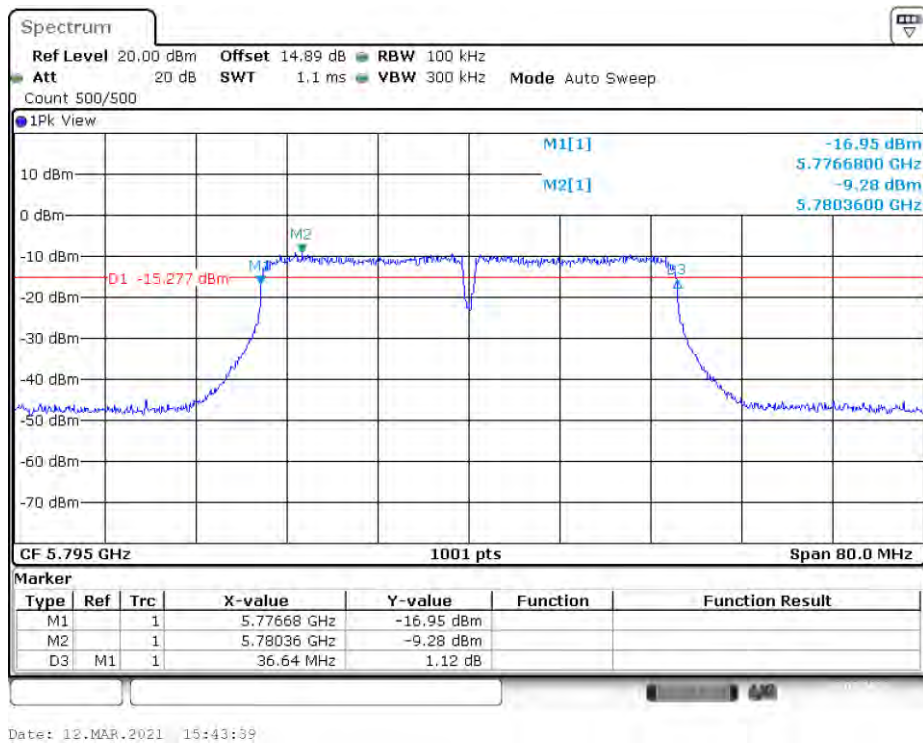


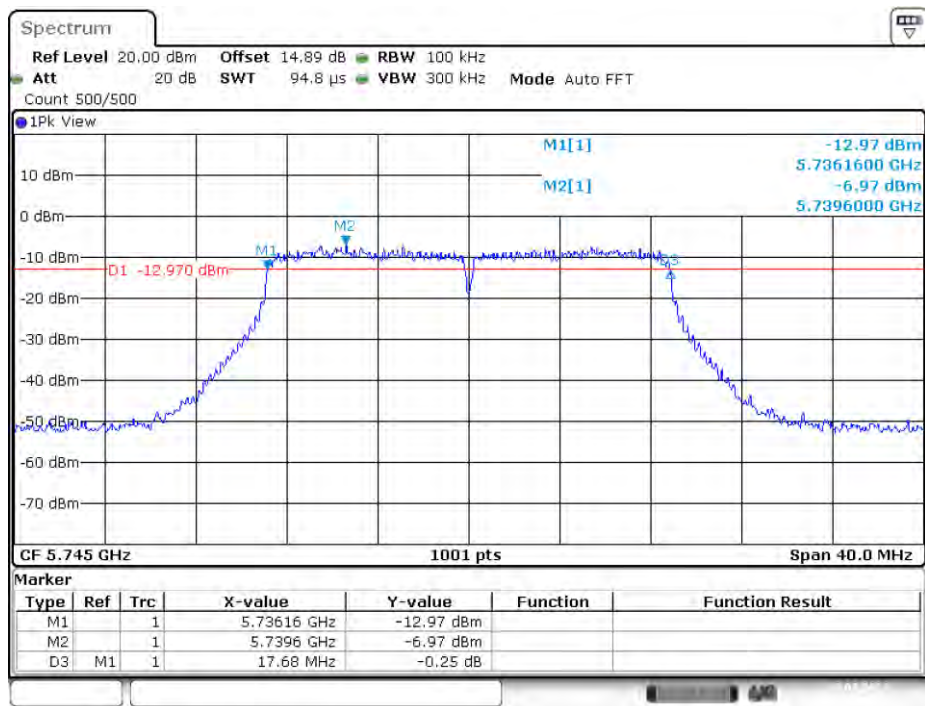
Date: 12.MAR.2021 15:03:20

802.11n40 mode, 6dB Emission Bandwidth, 5755 MHz

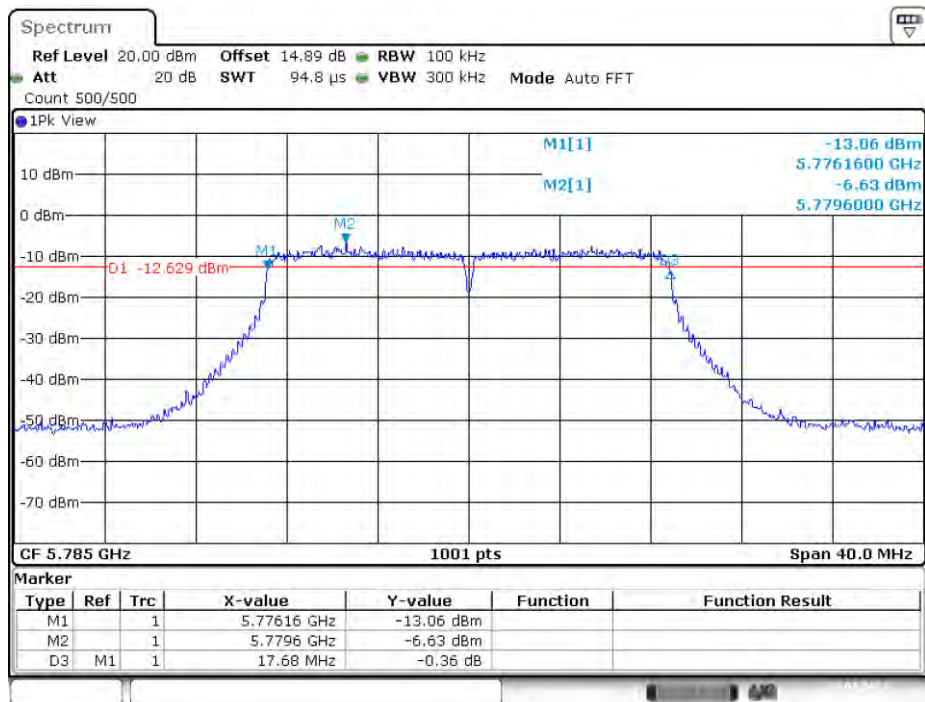


802.11n40 mode, 6dB Emission Bandwidth, 5795 MHz

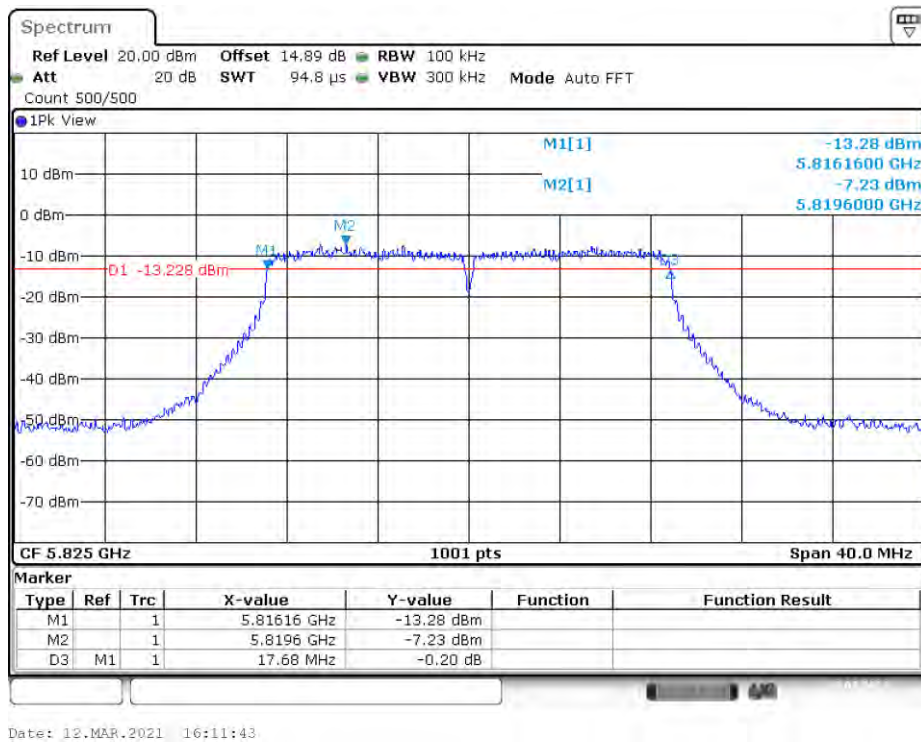
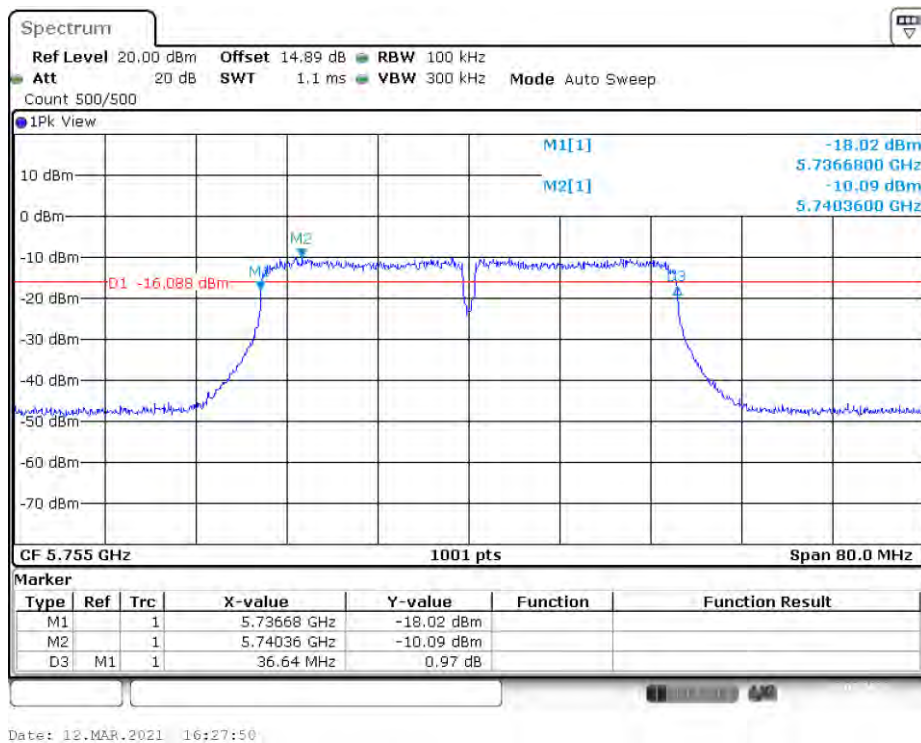


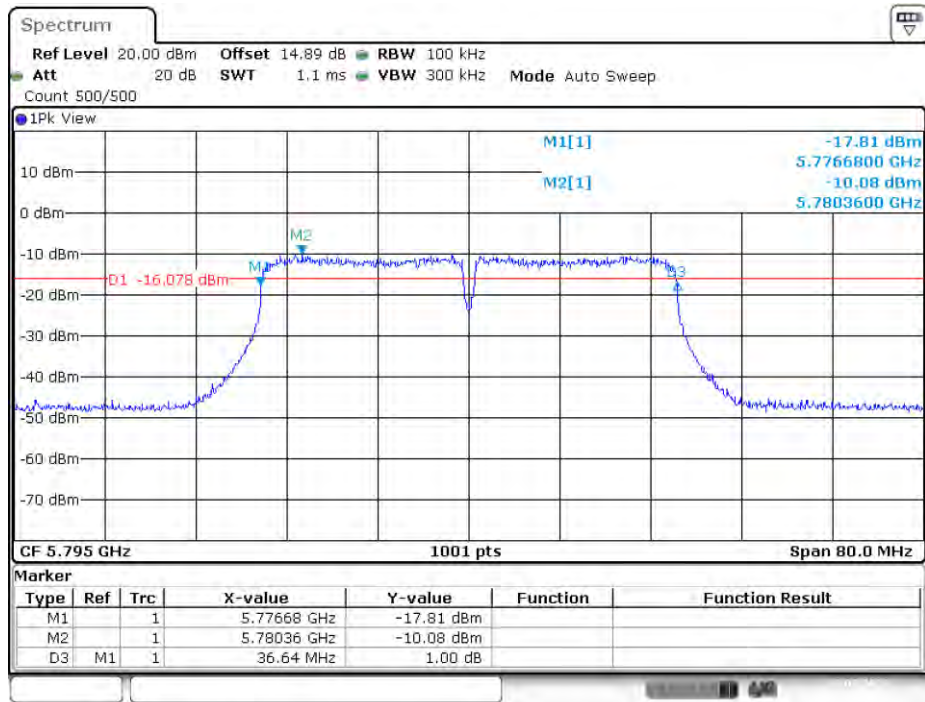
802.11ac20 mode, 6dB Emission Bandwidth, 5745 MHz

Date: 12.MAR.2021 16:04:55

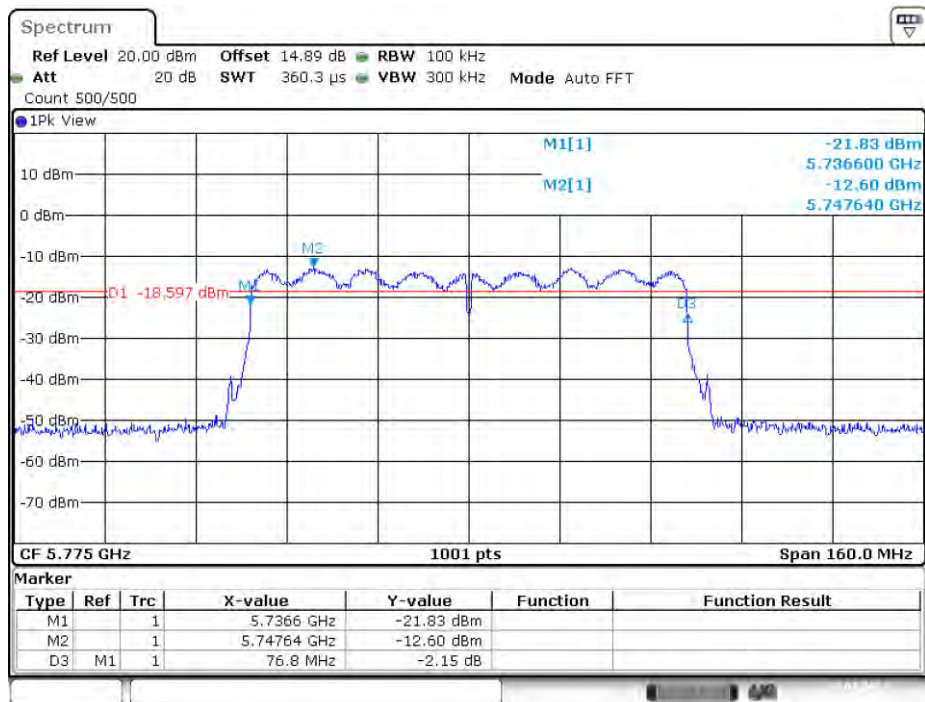
802.11ac20 mode, 6dB Emission Bandwidth, 5785 MHz

Date: 12.MAR.2021 16:08:56

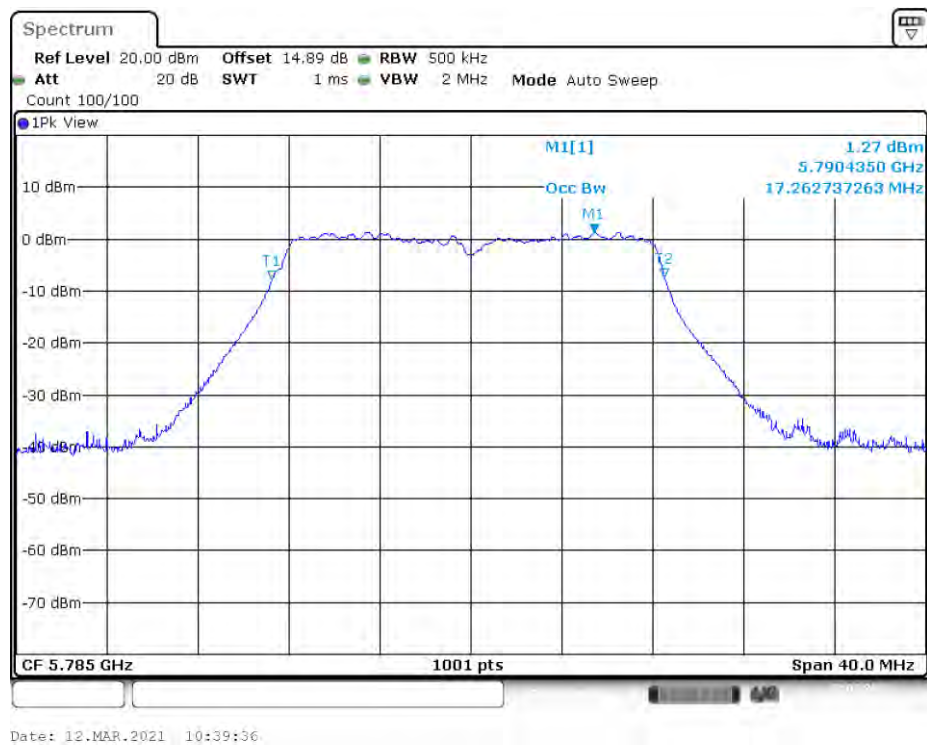
802.11ac20 mode, 6dB Emission Bandwidth, 5825 MHz**802.11ac40 mode, 6dB Emission Bandwidth, 5755 MHz**

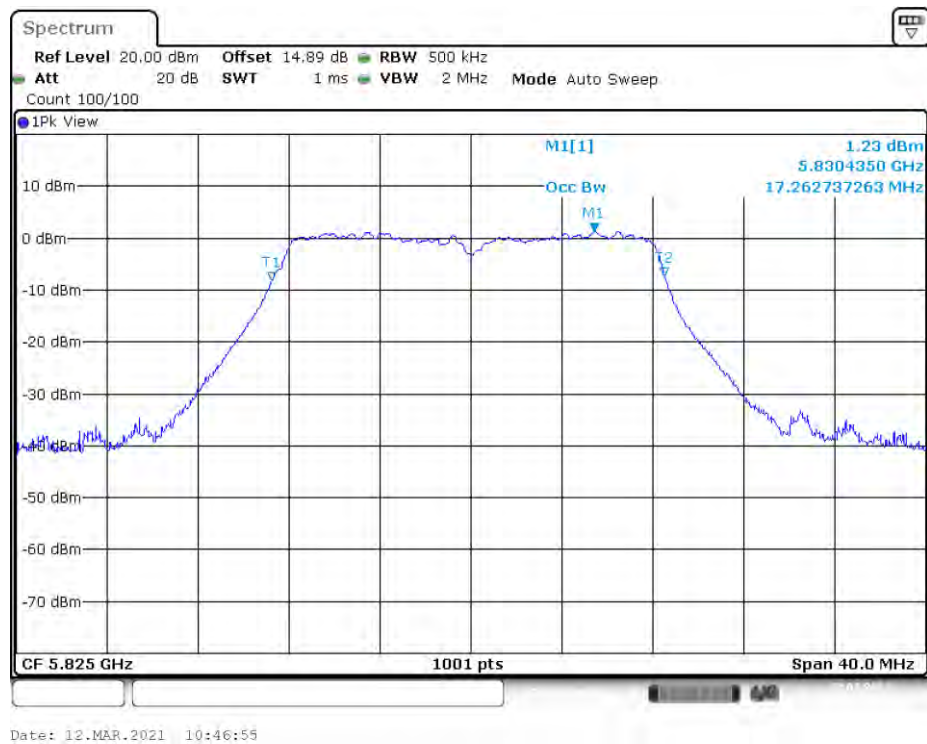
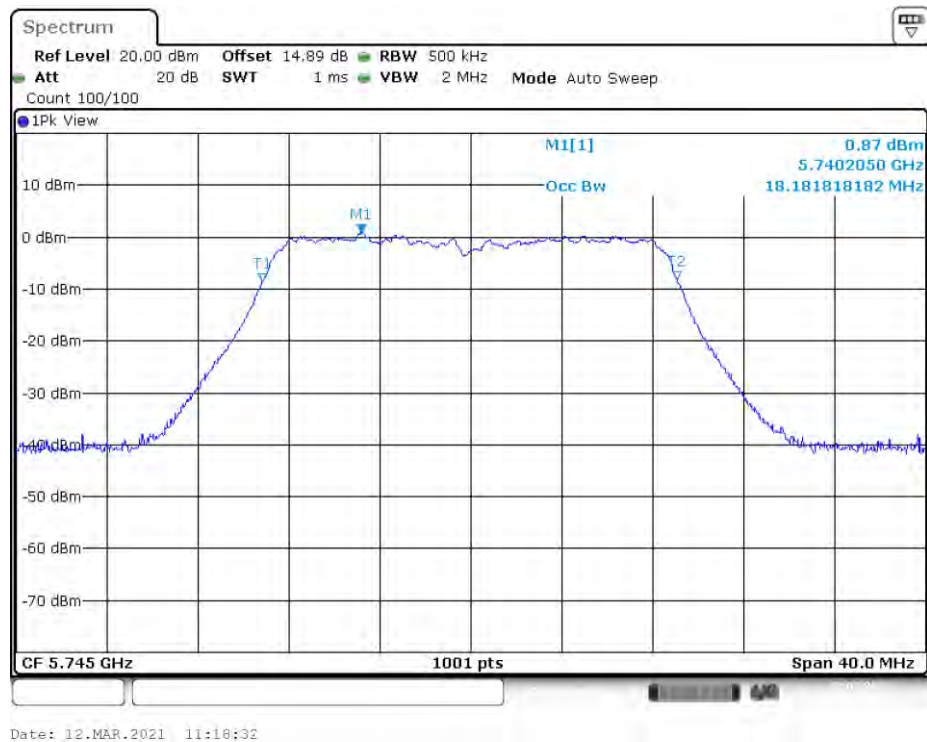
802.11ac40 mode, 6dB Emission Bandwidth, 5795 MHz

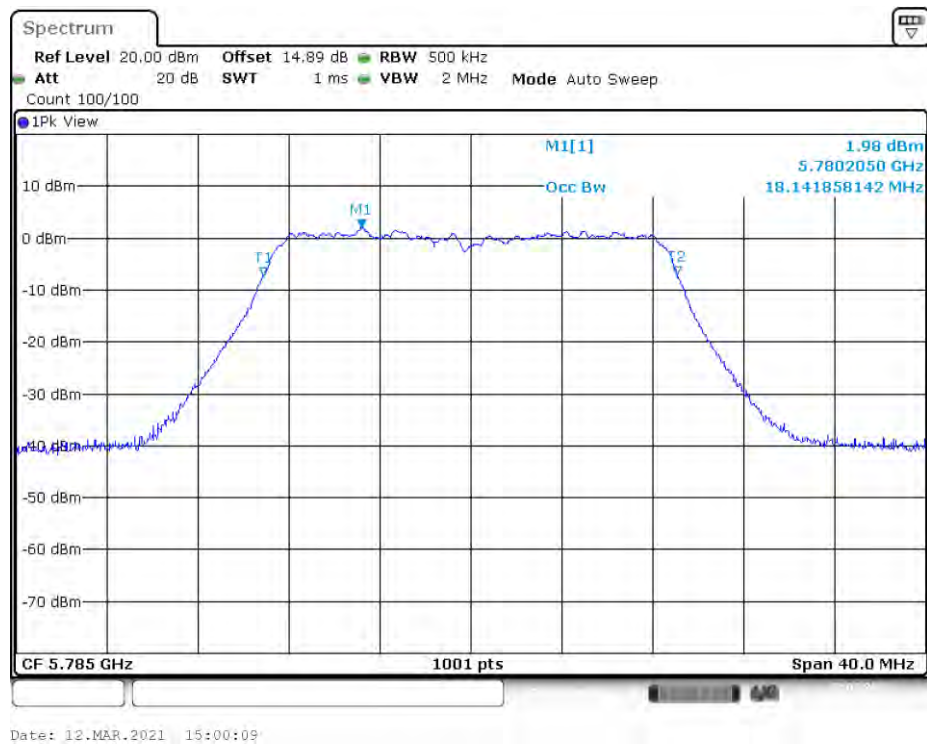
Date: 12.MAR.2021 16:31:52

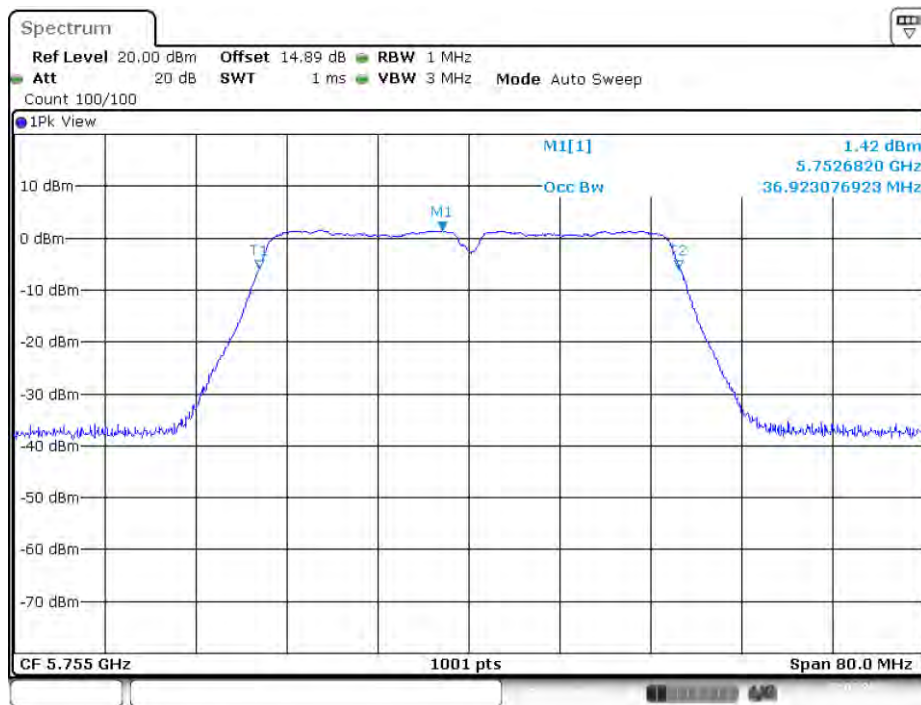
802.11ac80 mode, 6dB Emission Bandwidth, 5775 MHz

Date: 12.MAR.2021 16:45:07

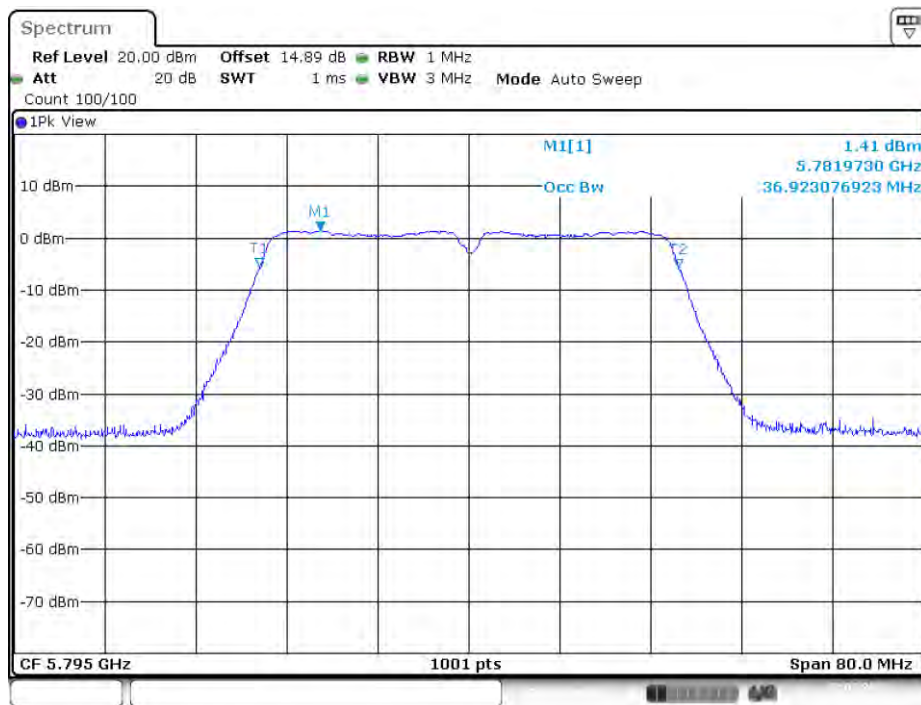
802.11a mode, 99% Occupied Bandwidth, 5745 MHz**802.11a mode, 99% Occupied Bandwidth, 5785 MHz**

802.11a mode, 99% Occupied Bandwidth, 5825 MHz**802.11n20 mode, 99% Occupied Bandwidth, 5745 MHz**

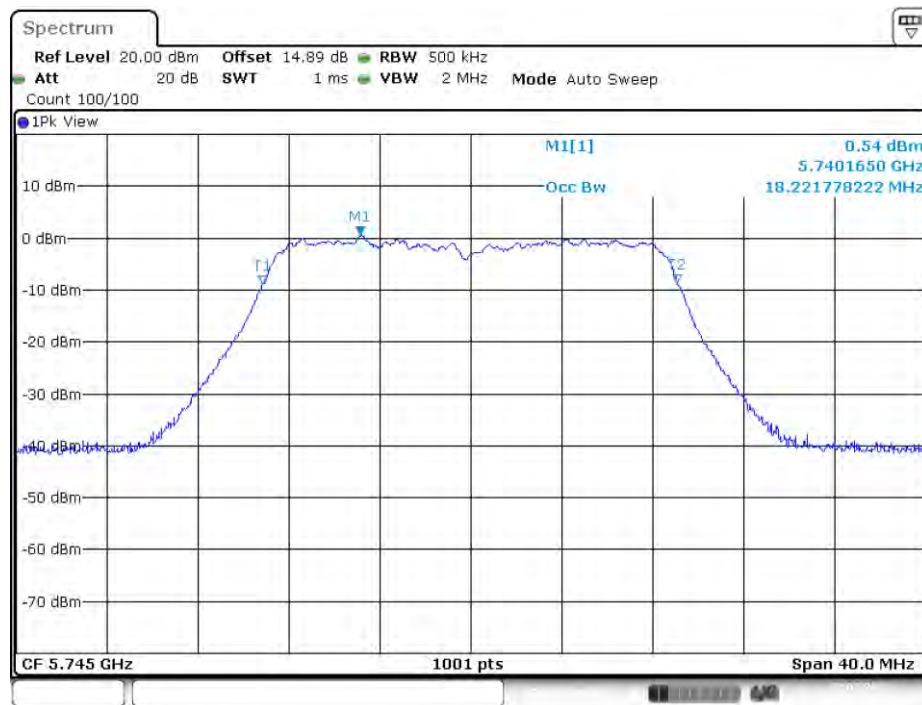
802.11n20 mode, 99% Occupied Bandwidth, 5785 MHz**802.11n20 mode, 99% Occupied Bandwidth, 5825 MHz**

802.11n40 mode, 99% Occupied Bandwidth, 5755 MHz

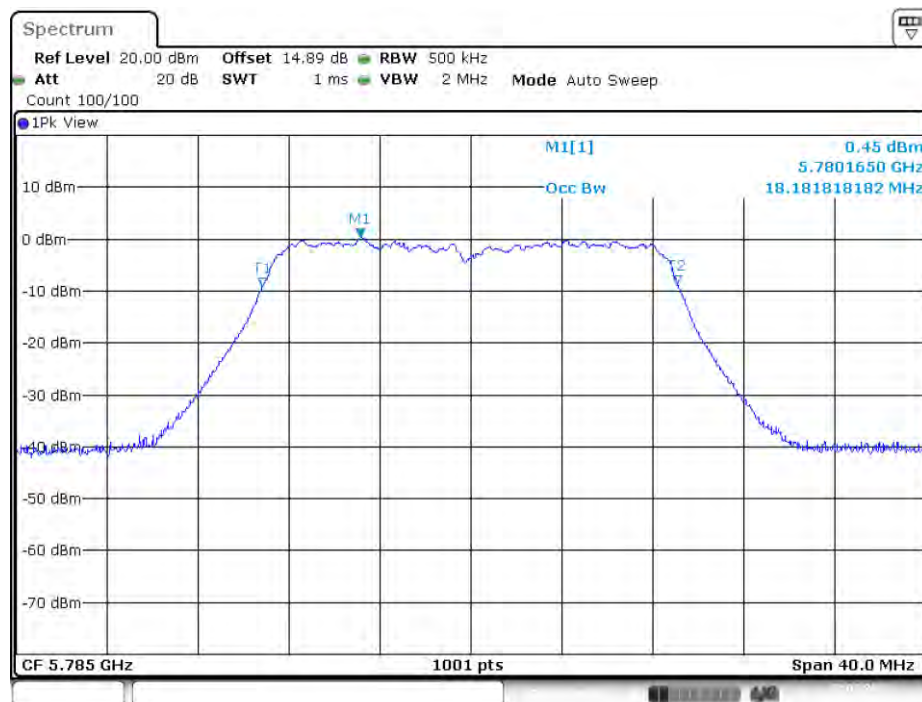
Date: 12.MAR.2021 15:35:40

802.11n40 mode, 99% Occupied Bandwidth, 5795 MHz

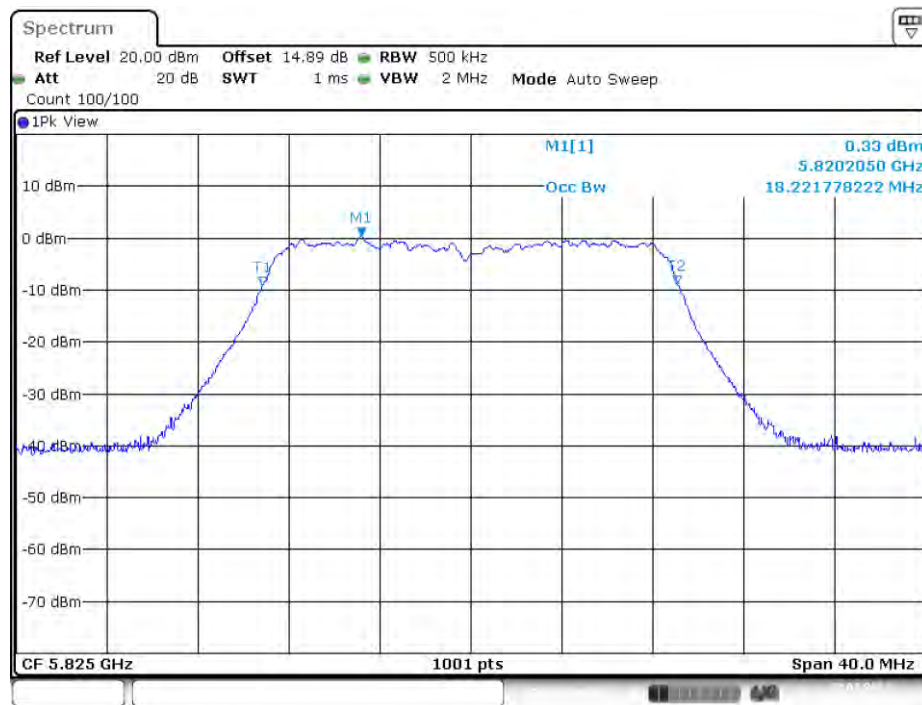
Date: 12.MAR.2021 15:43:55

802.11ac20 mode, 99% Occupied Bandwidth, 5745 MHz

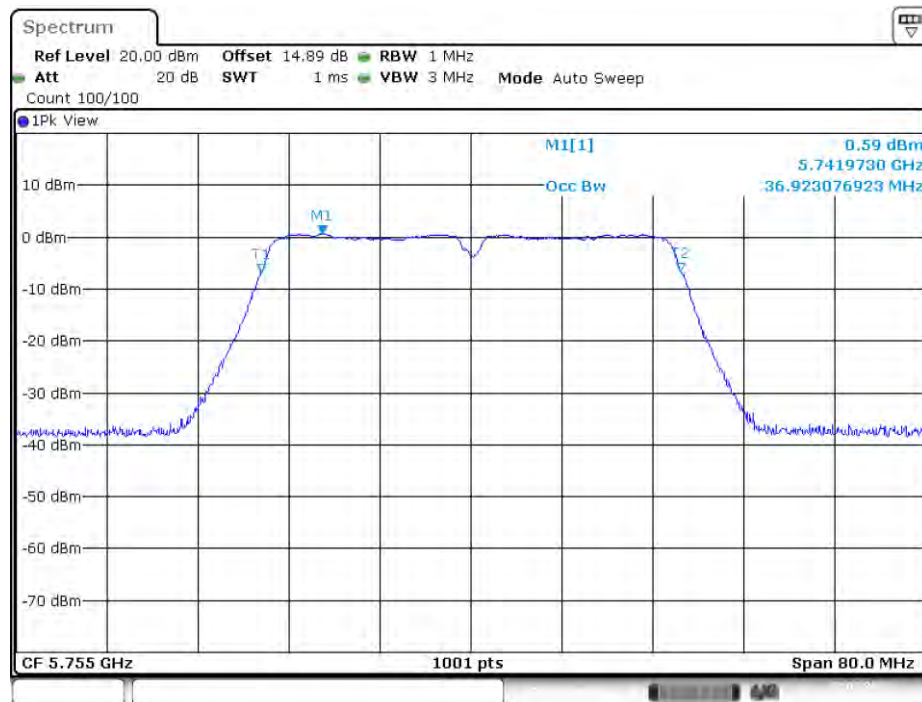
Date: 12.MAR.2021 16:05:10

802.11ac20 mode, 99% Occupied Bandwidth, 5785 MHz

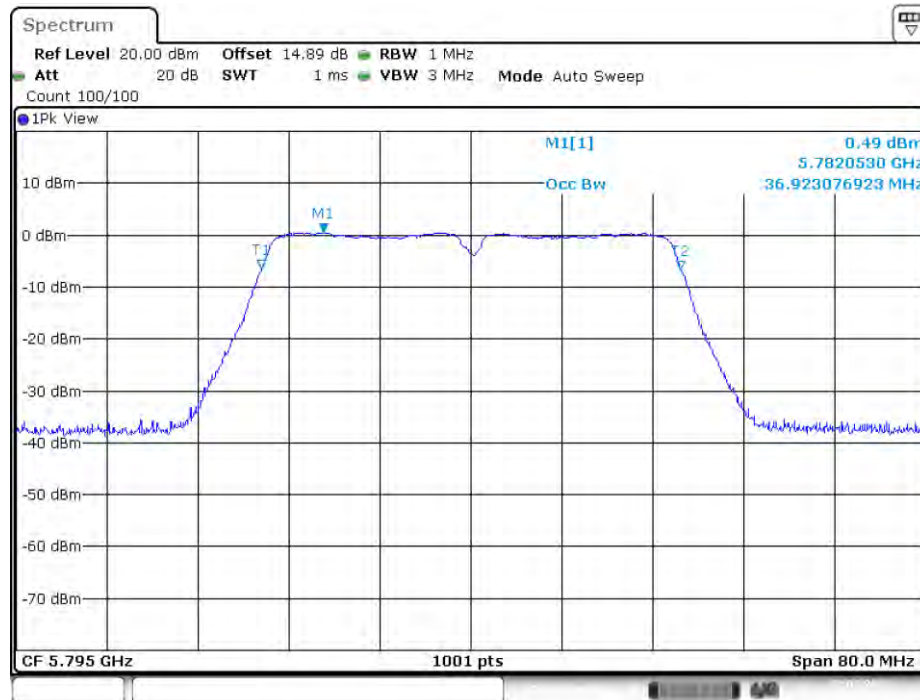
Date: 12.MAR.2021 16:09:13

802.11ac20 mode, 99% Occupied Bandwidth, 5825 MHz

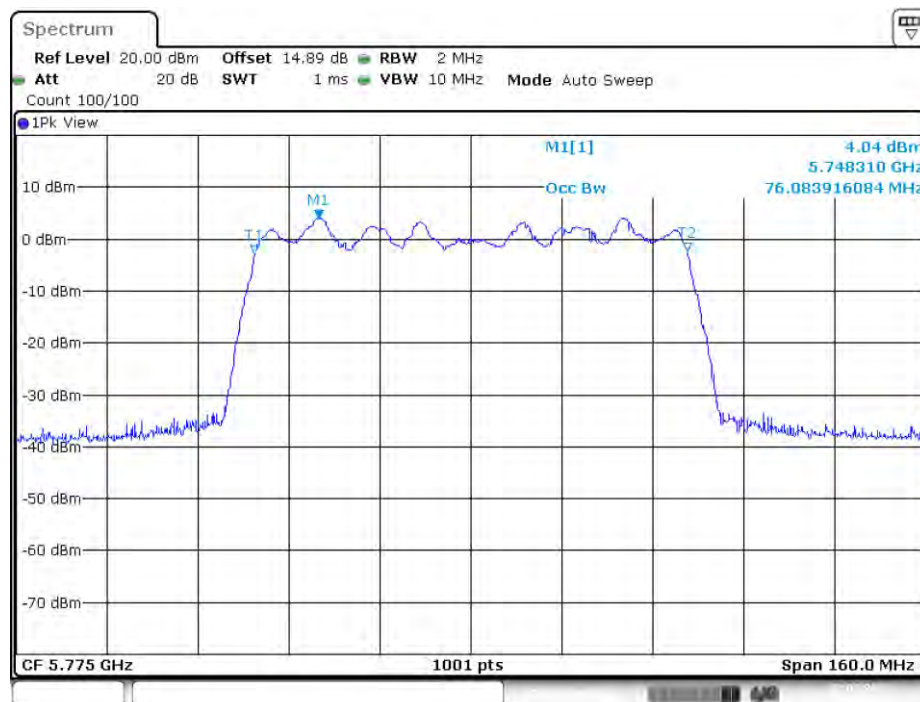
Date: 12.MAR.2021 16:11:59

802.11ac40 mode, 99% Occupied Bandwidth, 5755 MHz

Date: 12.MAR.2021 16:28:06

802.11ac40 mode, 99% Occupied Bandwidth, 5795 MHz

Date: 12.MAR.2021 16:32:07

802.11ac80 mode, 99% Occupied Bandwidth, 5775 MHz

Date: 12.MAR.2021 16:45:23

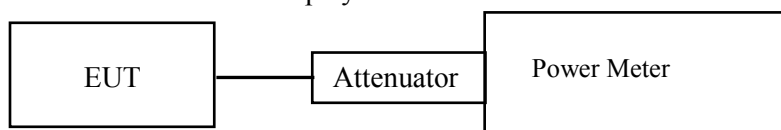
FCC §15.407(a) (1) (3) – CONDUCTED TRANSMITTER OUTPUT POWER**Applicable Standard**

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 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated 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.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.

**Test Data****Environmental Conditions**

| | |
|---------------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 52 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Black Ding on 2021-03-12.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following tables.

5150 MHz – 5250 MHz

| Frequency (MHz) | Conducted Output Average Power (dBm) | Duty Cycle Factor (dB) | Corrected Conducted Output Average Power (dBm) | Limit (dBm) |
|--------------------|--|------------------------------|---|----------------|
| 802.11a | | | | |
| 5180 | 13.81 | 0 | 13.81 | 24 |
| 5200 | 13.95 | 0 | 13.95 | |
| 5240 | 14.25 | 0 | 14.25 | |
| 802.11n20 | | | | |
| 5180 | 12.24 | 0 | 12.24 | 24 |
| 5200 | 12.52 | 0 | 12.52 | |
| 5240 | 13.05 | 0 | 13.05 | |
| 802.11n40 | | | | |
| 5190 | 12.69 | 0 | 12.69 | 24 |
| 5230 | 12.99 | 0 | 12.99 | |
| 802.11ac20 | | | | |
| 5180 | 12.17 | 0 | 12.17 | 24 |
| 5200 | 12.30 | 0 | 12.30 | |
| 5240 | 12.73 | 0 | 12.73 | |
| 802.11ac40 | | | | |
| 5190 | 11.72 | 0 | 11.72 | 24 |
| 5230 | 12.11 | 0 | 12.11 | |
| 802.11ac80 | | | | |
| 5210 | 11.87 | 0 | 11.87 | 24 |

5725 MHz – 5825 MHz:

| Frequency (MHz) | Conducted Output Average Power (dBm) | Duty Cycle Factor (dB) | Correct Conducted Average Power (dBm) | Limit (dBm) |
|--------------------|--|------------------------------|---|----------------|
| 802.11a | | | | |
| 5745 | 13.54 | 0 | 13.54 | 30 |
| 5785 | 13.72 | 0 | 13.72 | |
| 5825 | 13.76 | 0 | 13.76 | |
| 802.11n20 | | | | |
| 5745 | 12.77 | 0 | 12.77 | 30 |
| 5785 | 13.49 | 0 | 13.49 | |
| 5825 | 13.31 | 0 | 13.31 | |
| 802.11n40 | | | | |
| 5755 | 13.58 | 0 | 13.58 | 30 |
| 5795 | 13.50 | 0 | 13.50 | |
| 802.11ac20 | | | | |
| 5745 | 12.74 | 0 | 12.74 | 30 |
| 5785 | 12.63 | 0 | 12.63 | |
| 5825 | 12.58 | 0 | 12.58 | |
| 802.11ac40 | | | | |
| 5755 | 11.96 | 0 | 11.96 | 30 |
| 5795 | 11.93 | 0 | 11.93 | |
| 802.11ac80 | | | | |
| 5795 | 11.58 | 0 | 11.58 | 30 |

Note: This product is used for client device.

FCC §15.407(a) (1) (3) - POWER SPECTRAL DENSITY

Applicable Standard

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 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated 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.

Test Procedure

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

- a) Set $RBW \geq 1/T$, where T is defined in section II.B.1.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log(500 \text{ kHz}/RBW)$ to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log(1\text{MHz}/RBW)$ to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Test Data**Environmental Conditions**

| | |
|---------------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 52 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Black Ding on 2021-03-12.

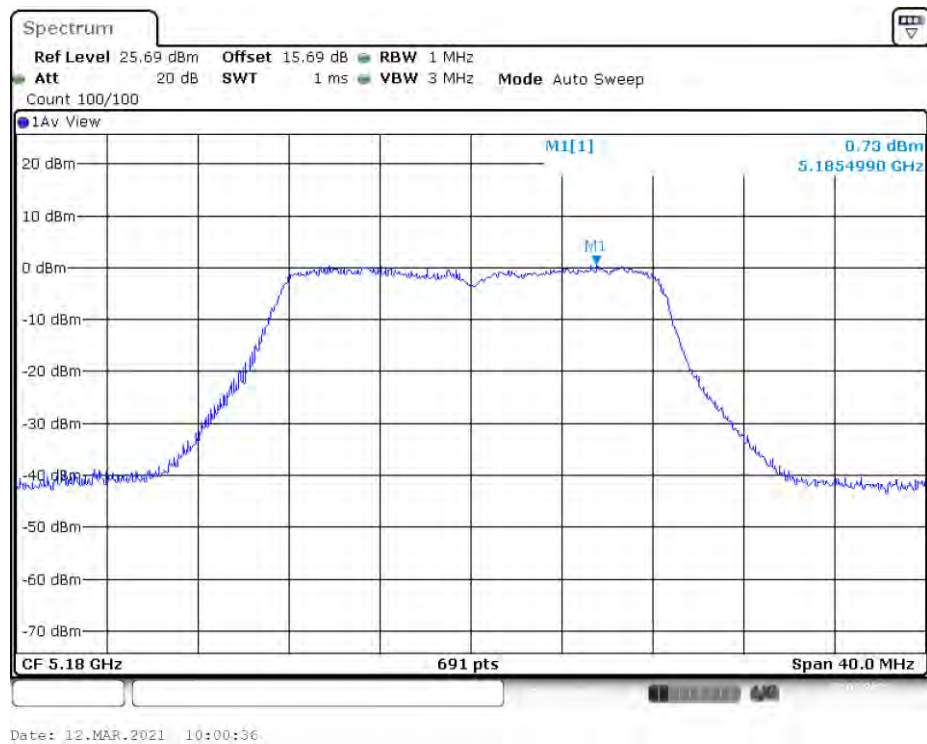
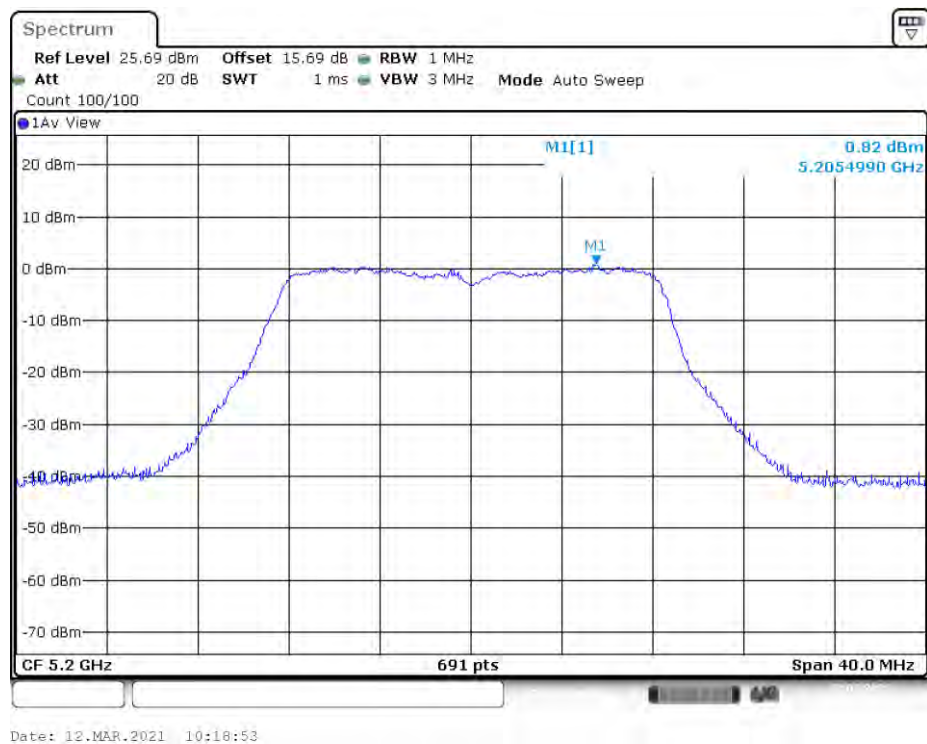
EUT operation mode: Transmitting

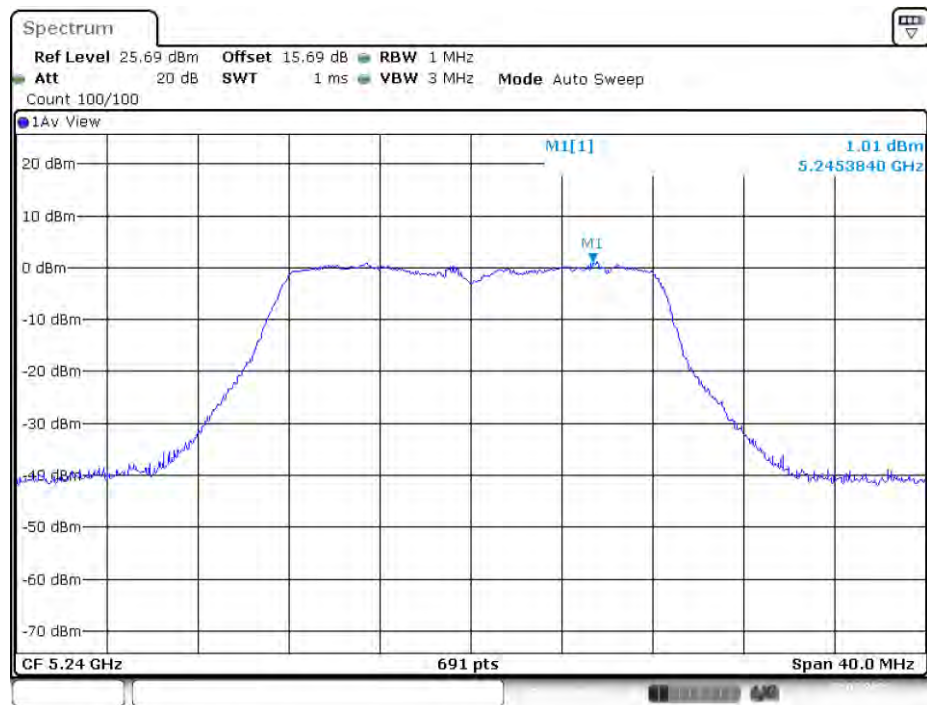
Test Result: Pass

Please refer to the following tables and plots.

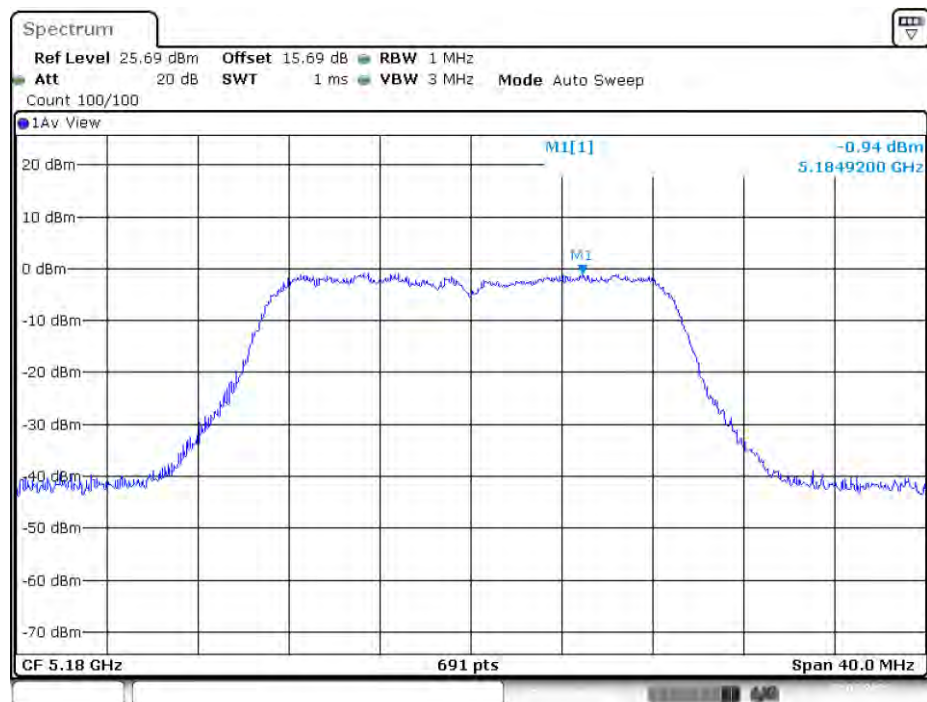
5150 – 5250 MHz

| Frequency (MHz) | Power Spectral Density (dBm/MHz) | Duty Cycle Factor (dB) | Corrected Power Spectral Density (dBm/MHz) | Limit (dBm/MHz) |
|--------------------|--|------------------------------|--|--------------------|
| 802.11a | | | | |
| 5180 | 0.73 | 0 | 0.73 | 11 |
| 5200 | 0.82 | 0 | 0.82 | |
| 5240 | 1.01 | 0 | 1.01 | |
| 802.11n20 | | | | |
| 5180 | -0.94 | 0 | -0.94 | 11 |
| 5200 | -0.76 | 0 | -0.76 | |
| 5240 | 0 | 0 | 0 | |
| 802.11n40 | | | | |
| 5190 | -2.9 | 0 | -2.9 | 11 |
| 5230 | -2.73 | 0 | -2.73 | |
| 802.11ac20 | | | | |
| 5180 | -0.86 | 0 | -0.86 | 11 |
| 5200 | -0.94 | 0 | -0.94 | |
| 5240 | -0.44 | 0 | -0.44 | |
| 802.11ac40 | | | | |
| 5190 | -4.02 | 0 | -4.02 | 11 |
| 5230 | -3.6 | 0 | -3.6 | |
| 802.11ac80 | | | | |
| 5210 | -5.78 | 0 | -5.78 | 11 |

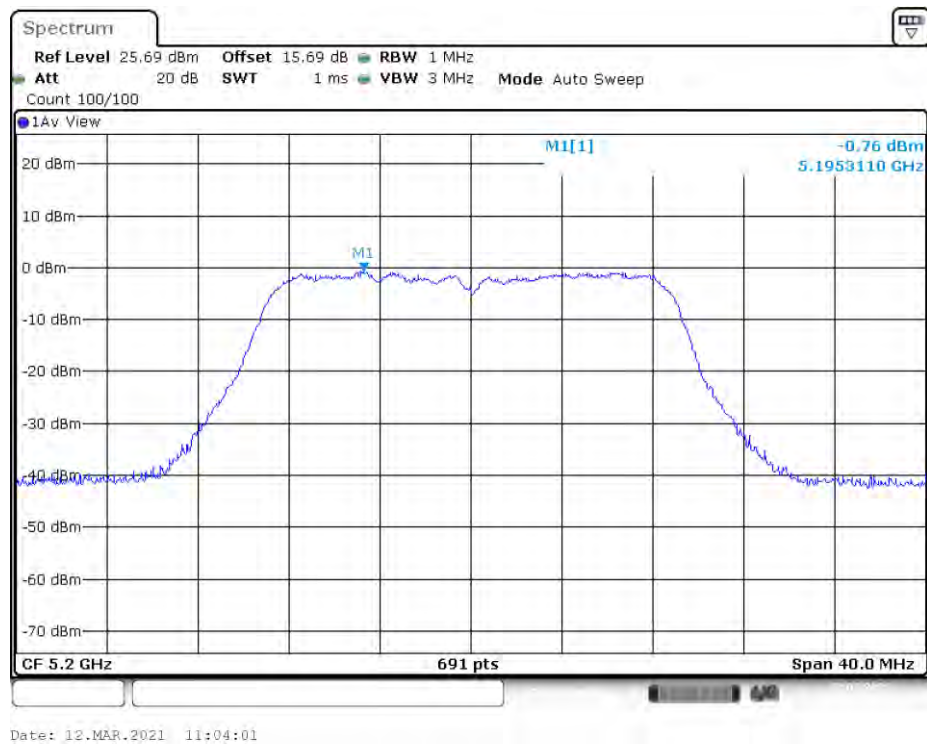
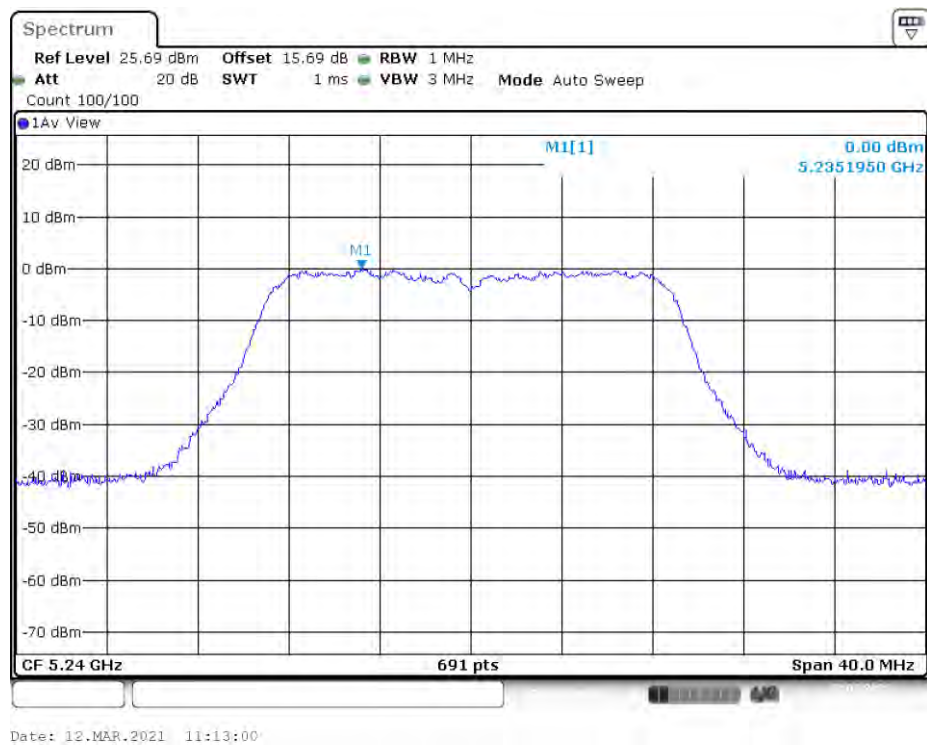
802.11a mode, Power Spectral Density, 5180 MHz**802.11a mode, Power Spectral Density, 5200 MHz**

802.11a mode, Power Spectral Density, 5240 MHz

Date: 12.MAR.2021 10:25:16

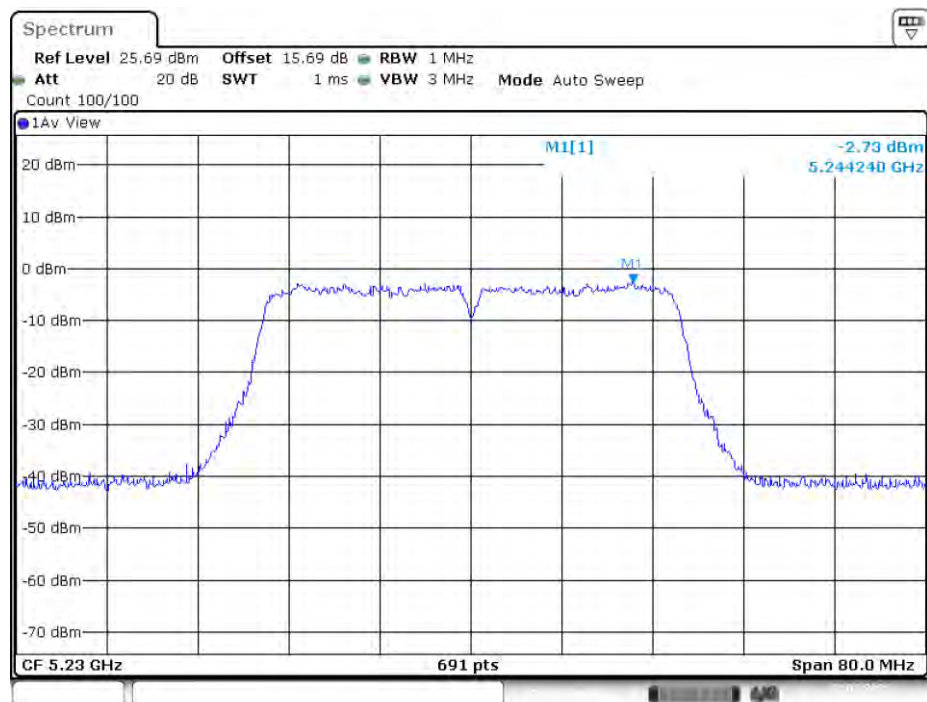
802.11n20 mode, Power Spectral Density, 5180 MHz

Date: 12.MAR.2021 10:57:09

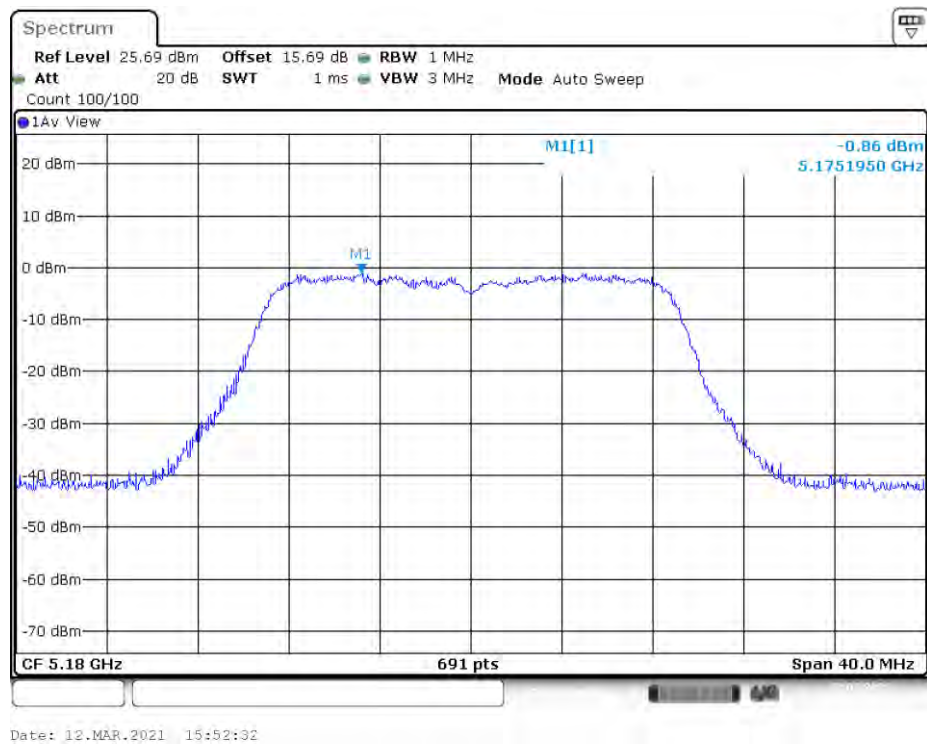
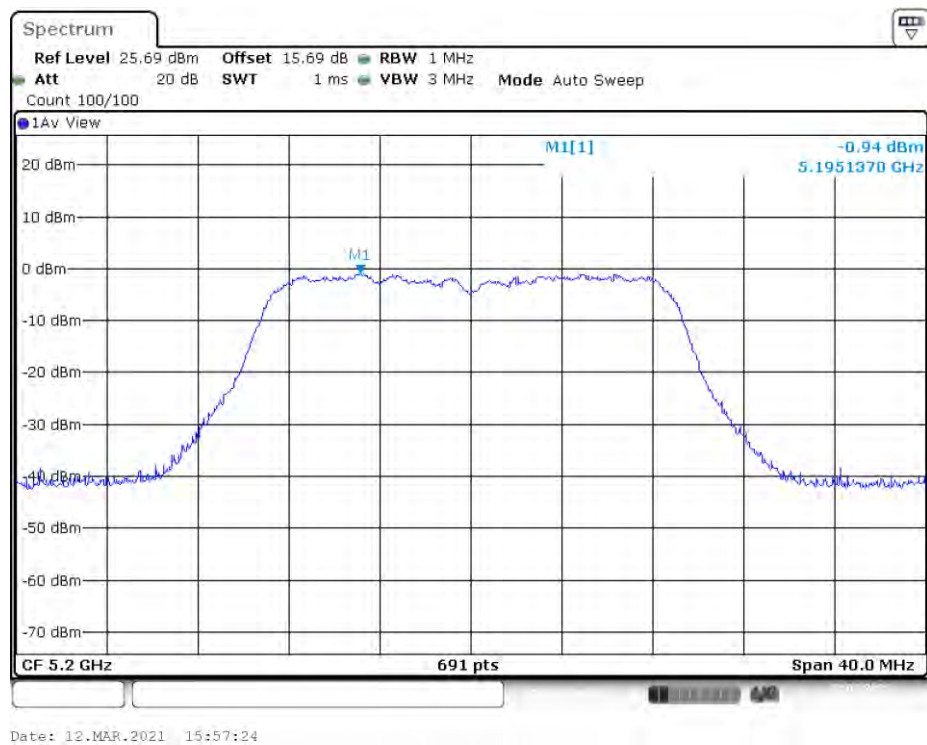
802.11n20 mode, Power Spectral Density, 5200 MHz**802.11n20 mode, Power Spectral Density, 5240 MHz**

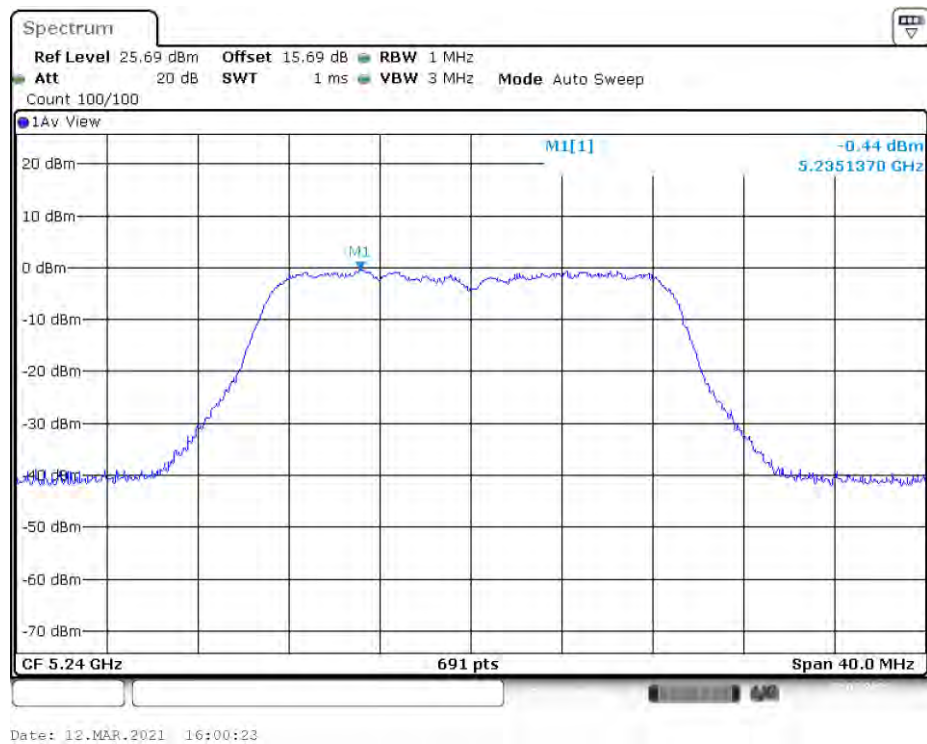
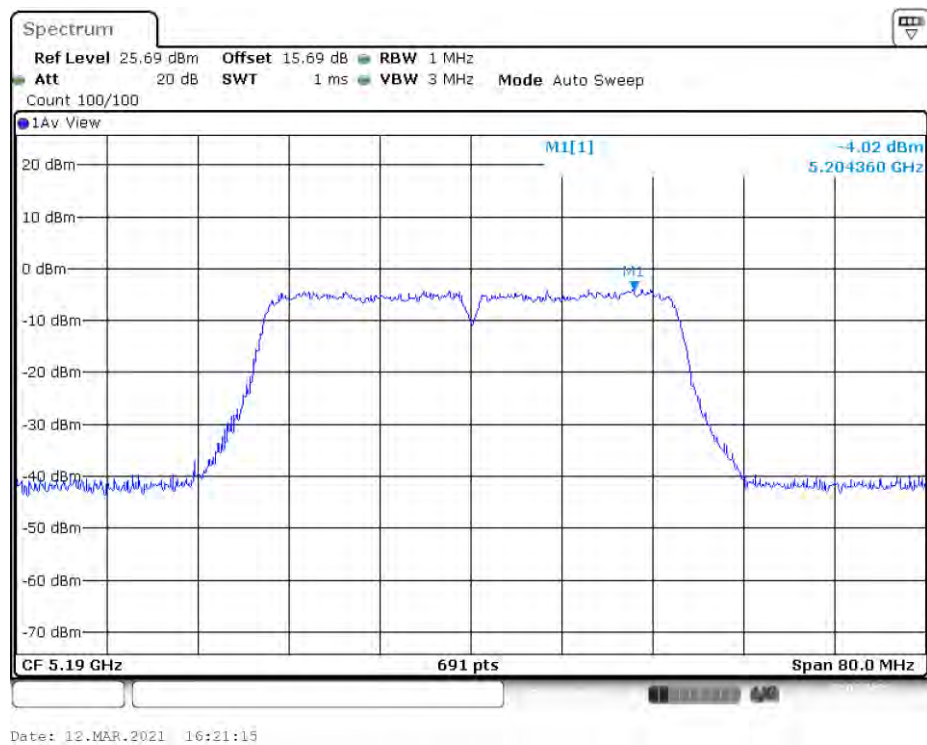
802.11n40 mode, Power Spectral Density, 5190 MHz

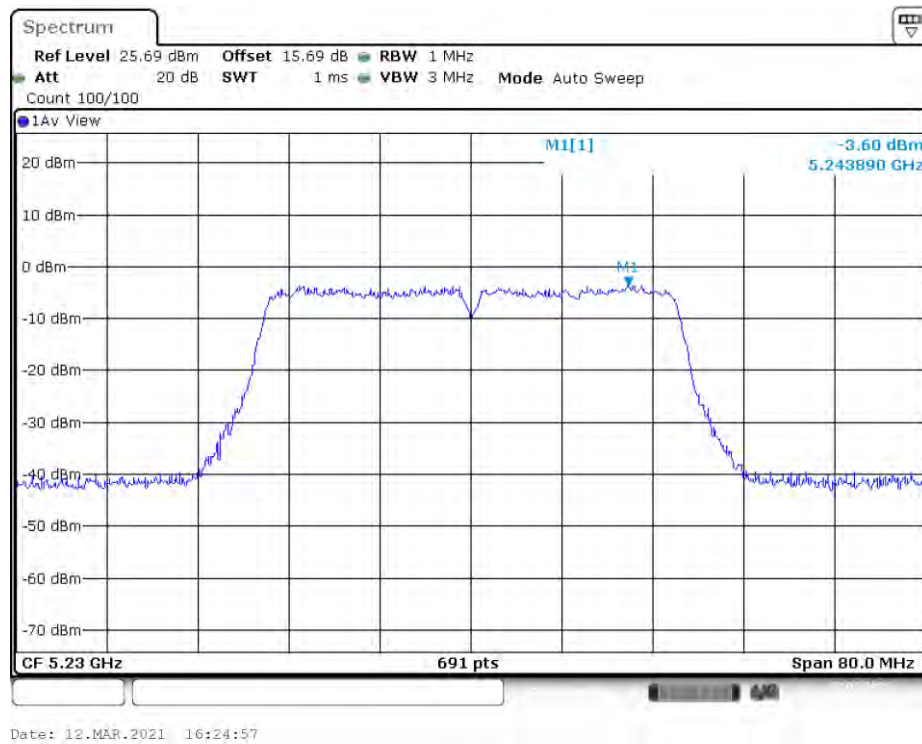
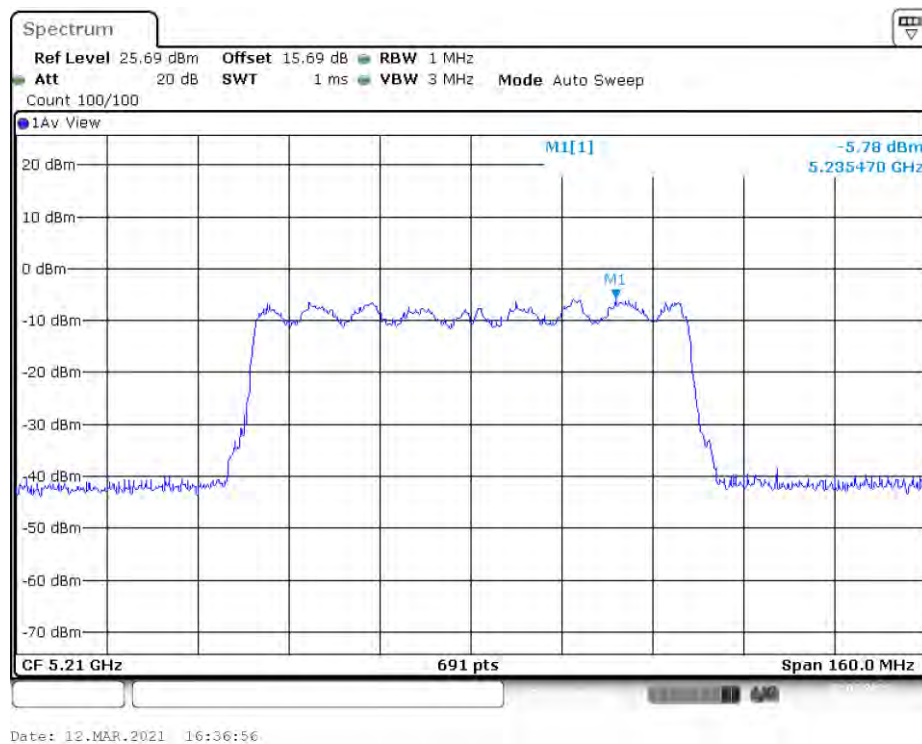
Date: 12.MAR.2021 15:17:00

802.11n40 mode, Power Spectral Density, 5230 MHz

Date: 12.MAR.2021 15:27:15

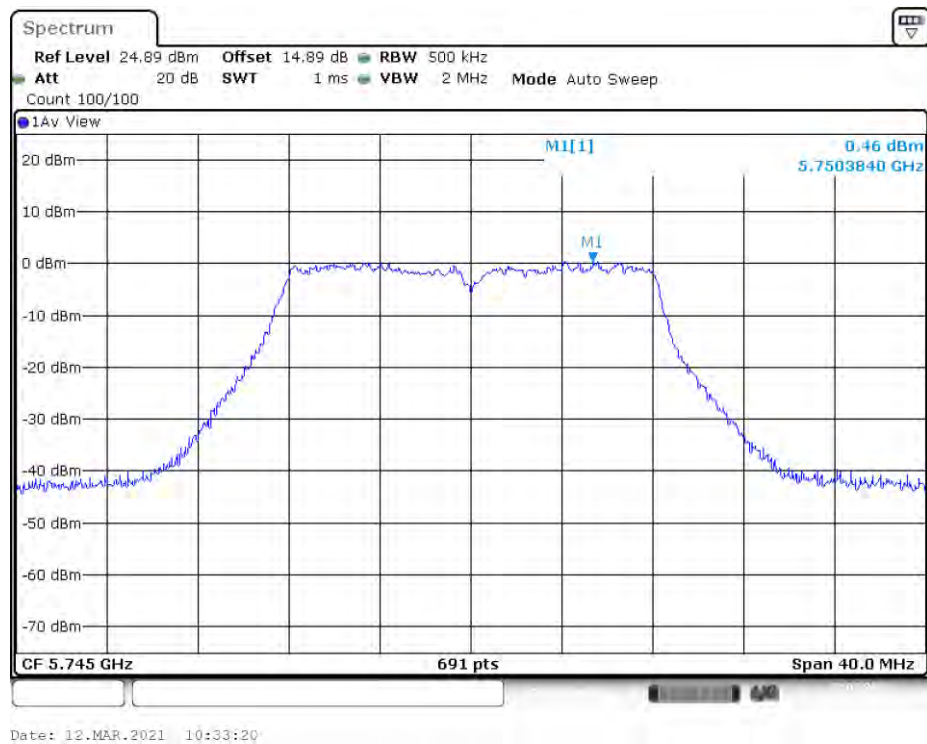
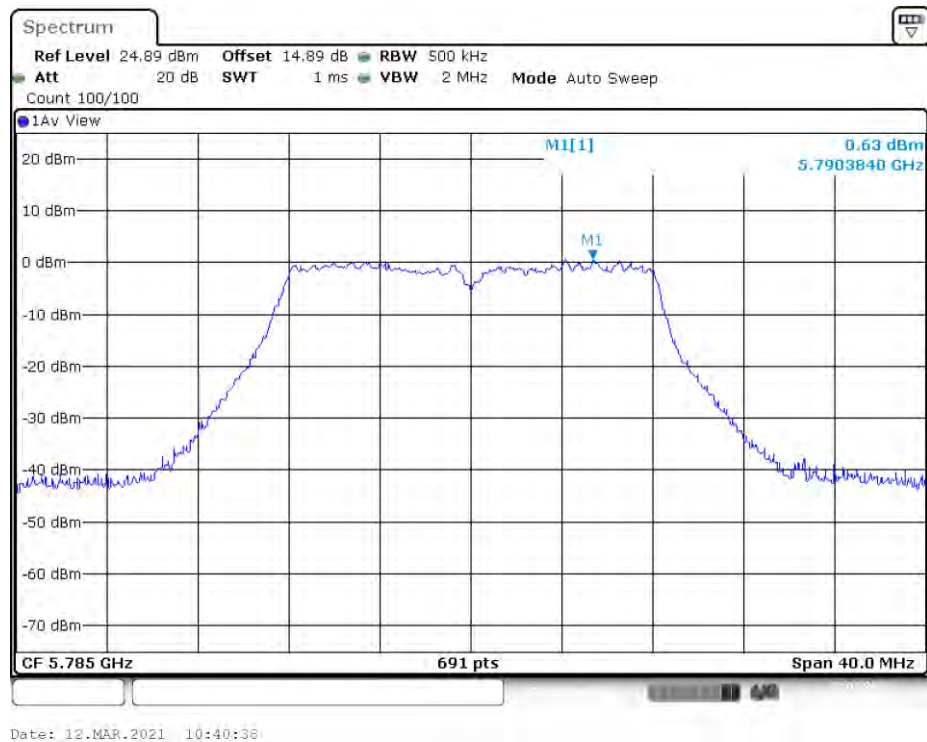
802.11ac20 mode, Power Spectral Density, 5180 MHz**802.11ac20 mode, Power Spectral Density, 5200 MHz**

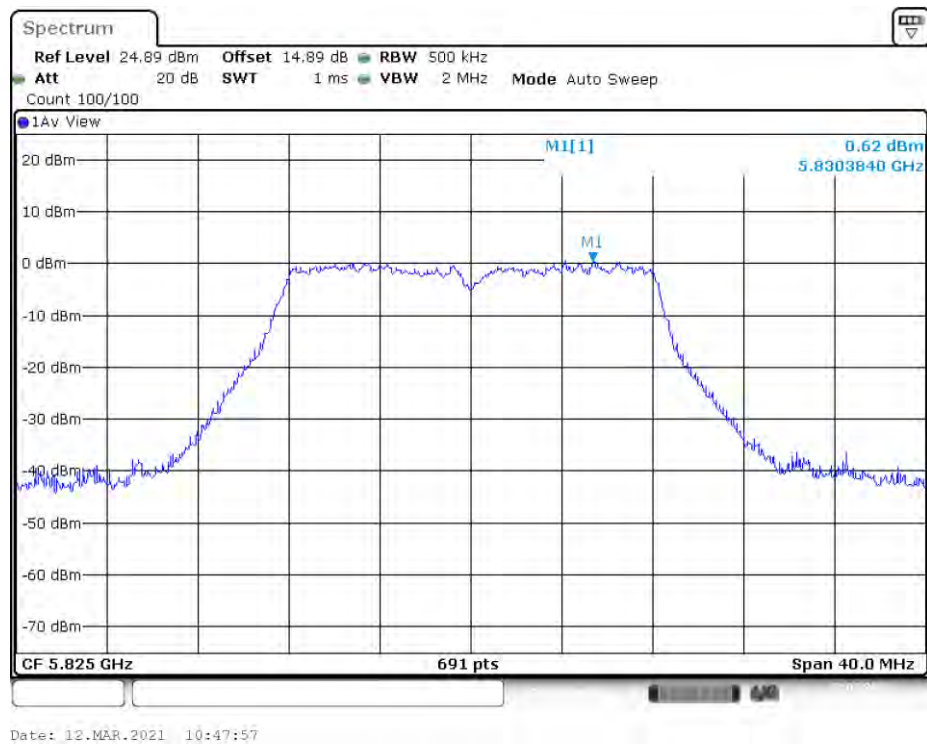
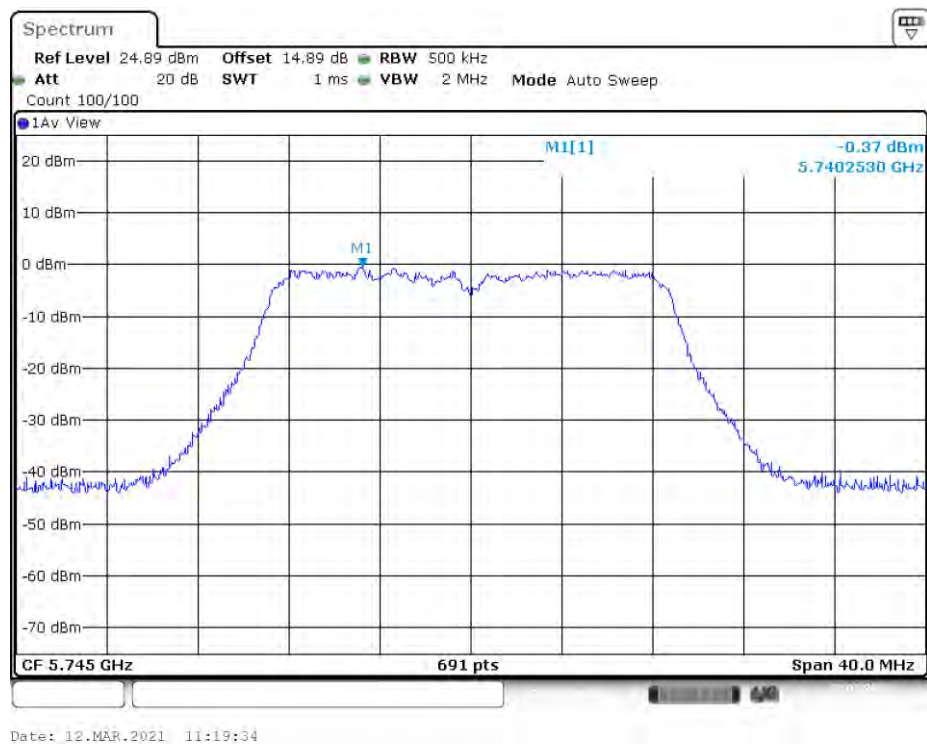
802.11ac20 mode, Power Spectral Density, 5240 MHz**802.11ac40 mode, Power Spectral Density, 5190 MHz**

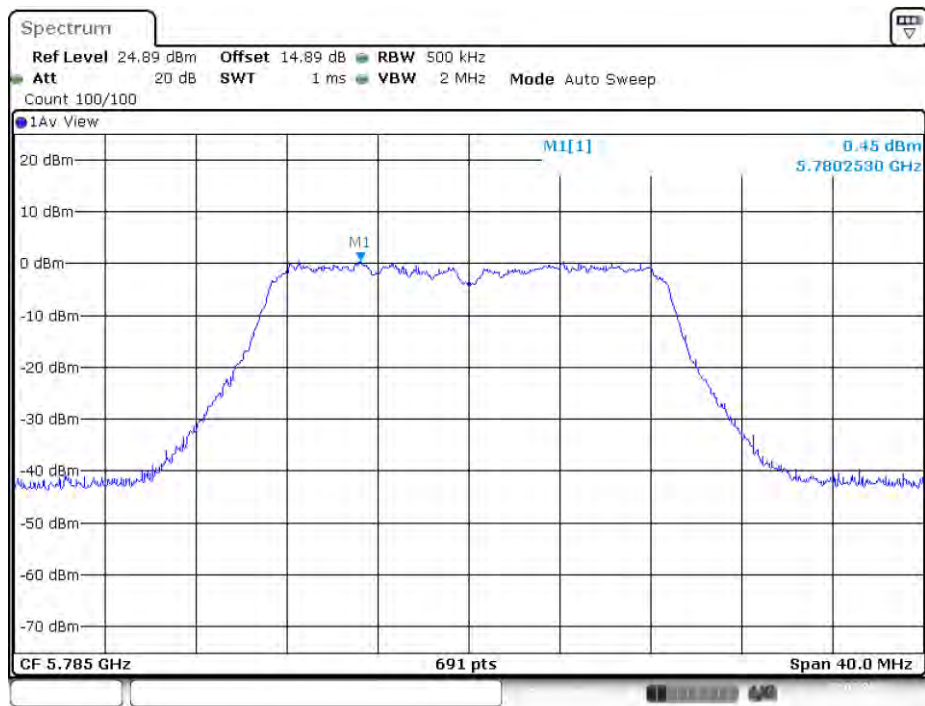
802.11ac40 mode, Power Spectral Density, 5230 MHz**802.11ac80 mode, Power Spectral Density, 5210 MHz**

5745– 5825 MHz:

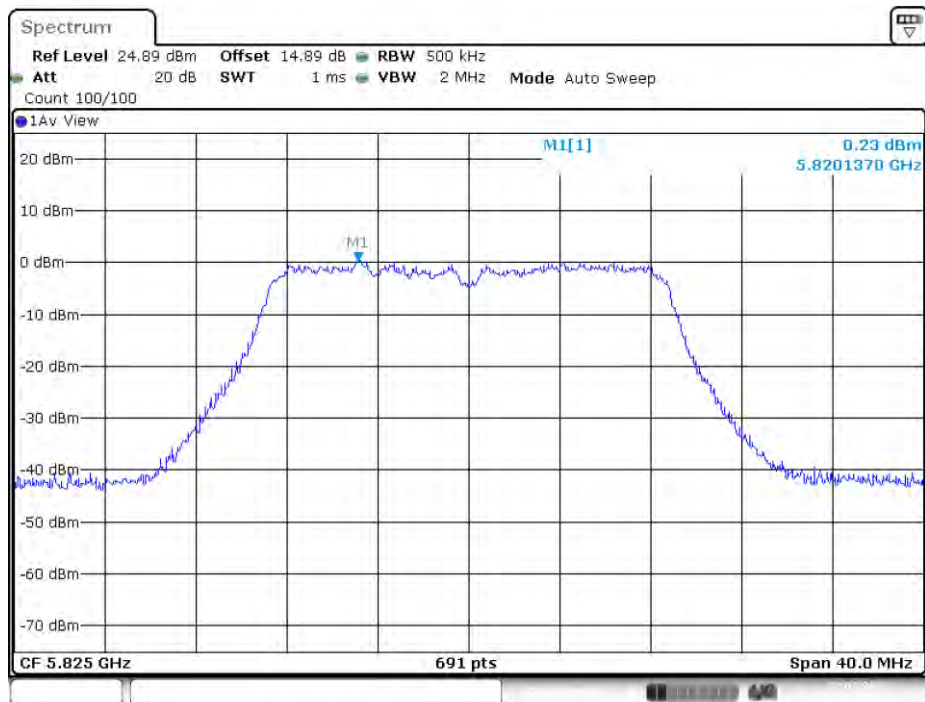
| Frequency (MHz) | Power Spectral Density (dBm/500kHz) | Duty Cycle Factor (dB) | Corrected Power Spectral Density (dBm/500kHz) | Limit (dBm/500kHz) |
|--------------------|---|------------------------------|---|-----------------------|
| 802.11a | | | | |
| 5745 | 0.46 | 0 | 0.46 | 30 |
| 5785 | 0.63 | 0 | 0.63 | |
| 5825 | 0.62 | 0 | 0.62 | |
| 802.11n20 | | | | |
| 5745 | -0.37 | 0 | -0.37 | 30 |
| 5785 | 0.45 | 0 | 0.45 | |
| 5825 | 0.23 | 0 | 0.23 | |
| 802.11n40 | | | | |
| 5755 | -3.08 | 0 | -3.08 | 30 |
| 5795 | -2.81 | 0 | -2.81 | |
| 802.11ac20 | | | | |
| 5745 | -0.4 | 0 | -0.4 | 30 |
| 5785 | -0.58 | 0 | -0.58 | |
| 5825 | -0.51 | 0 | -0.51 | |
| 802.11ac40 | | | | |
| 5755 | -3.79 | 0 | -3.79 | 30 |
| 5795 | -3.81 | 0 | -3.81 | |
| 802.11ac80 | | | | |
| 5775 | -6.47 | 0 | -6.47 | 30 |

802.11a mode, Power Spectral Density, 5745 MHz**802.11a mode, Power Spectral Density, 5785 MHz**

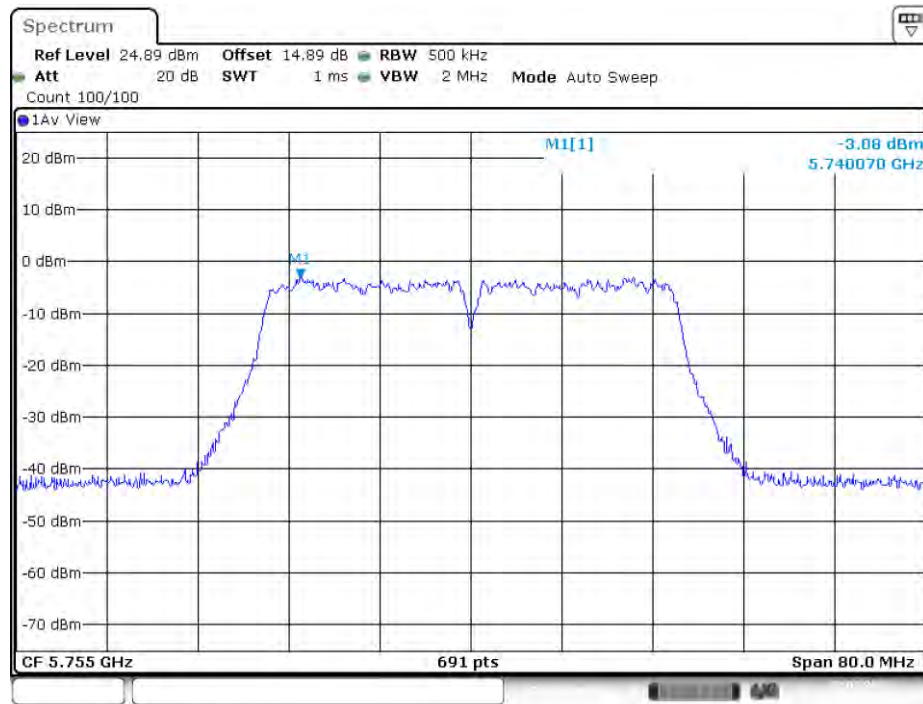
802.11a mode, Power Spectral Density, 5825 MHz**802.11n20 mode, Power Spectral Density, 5745 MHz**

802.11n20 mode, Power Spectral Density, 5785 MHz

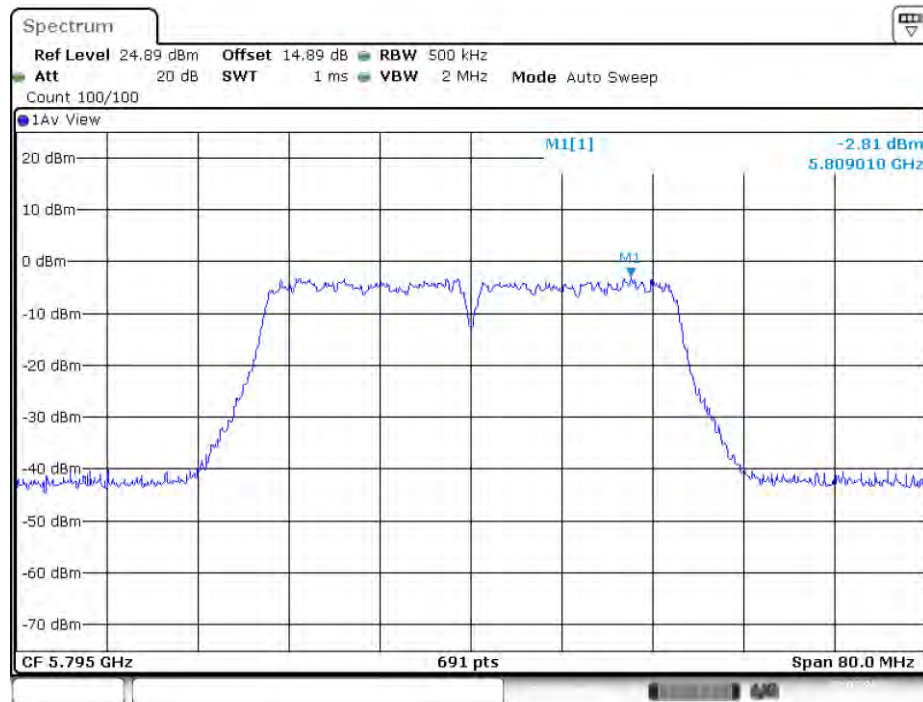
Date: 12.MAR.2021 15:01:11

802.11n20 mode, Power Spectral Density, 5825 MHz

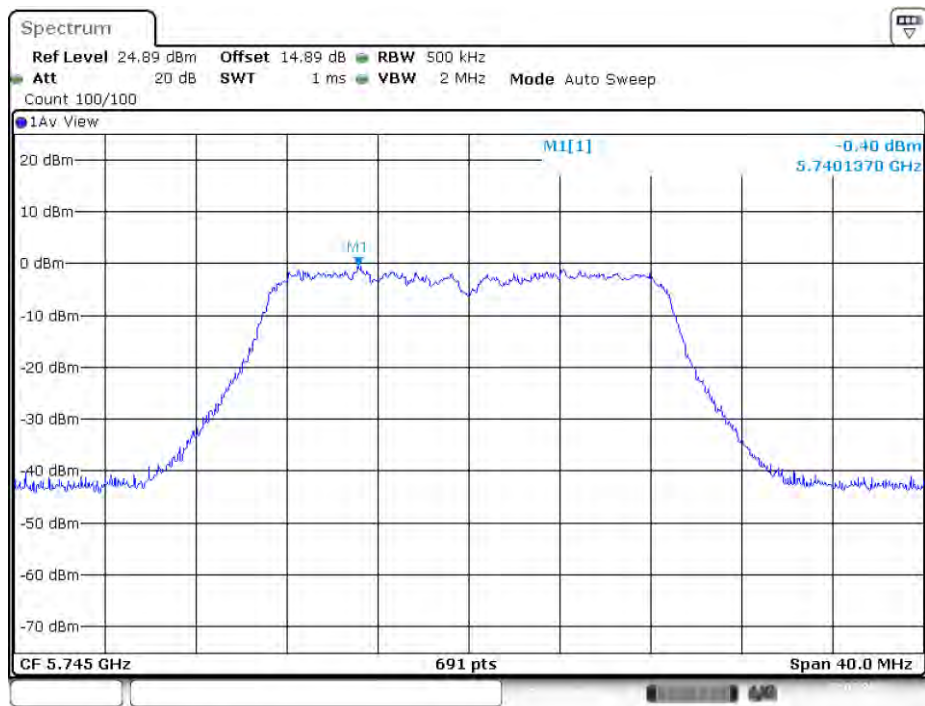
Date: 12.MAR.2021 15:04:38

802.11n40 mode, Power Spectral Density, 5755 MHz

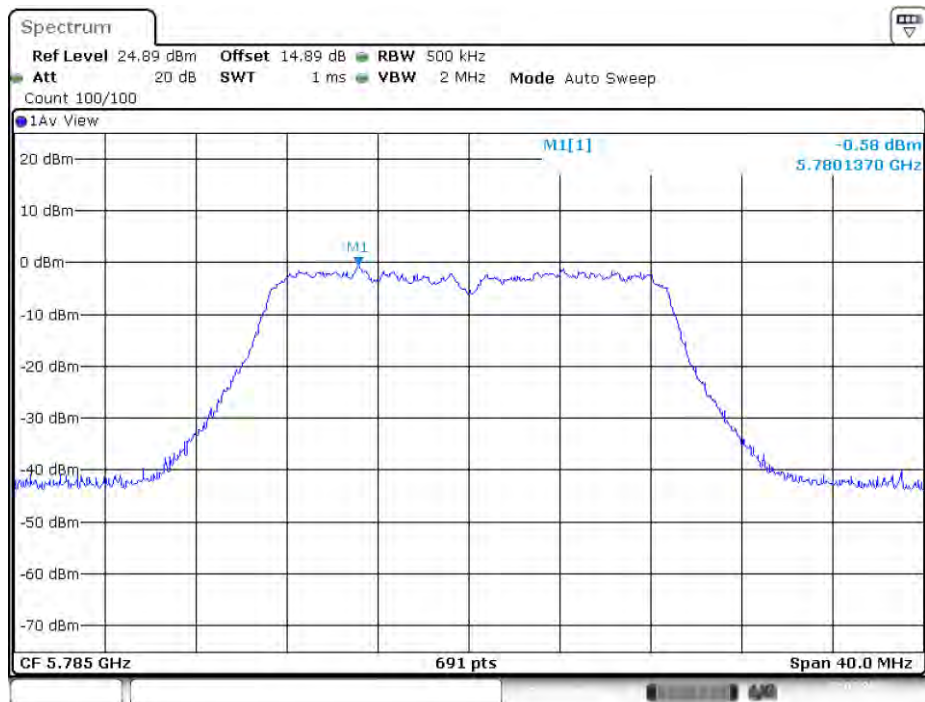
Date: 12.MAR.2021 15:36:42

802.11n40 mode, Power Spectral Density, 5795 MHz

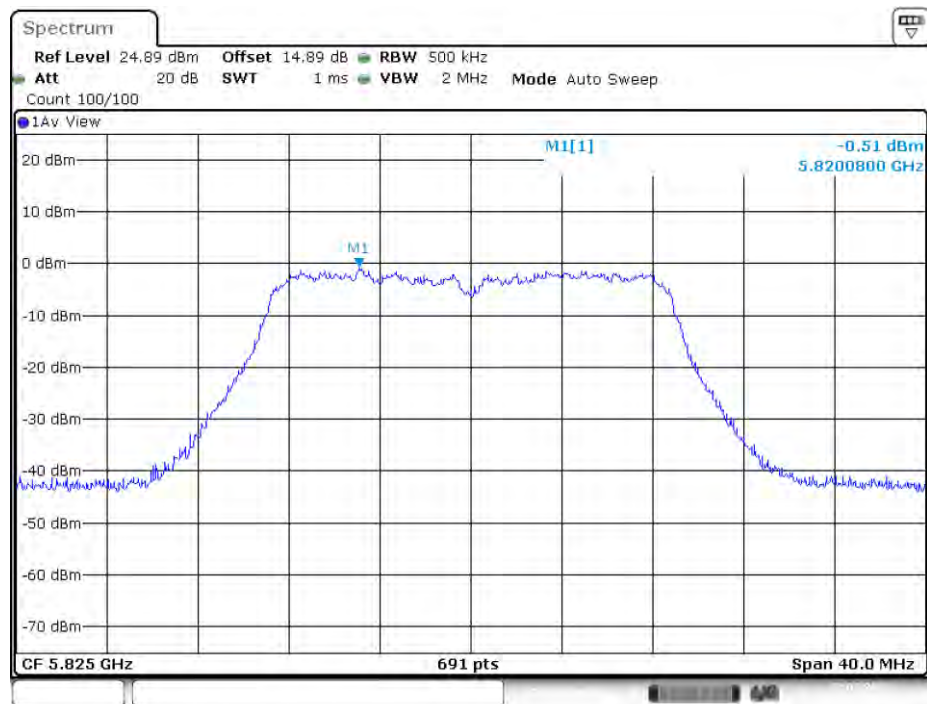
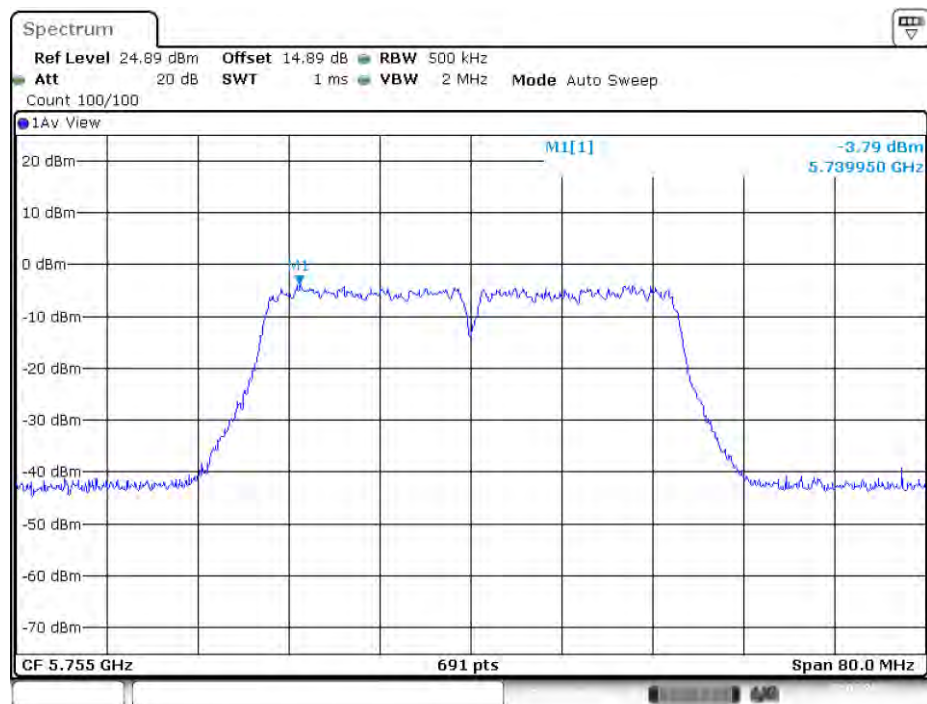
Date: 12.MAR.2021 15:44:57

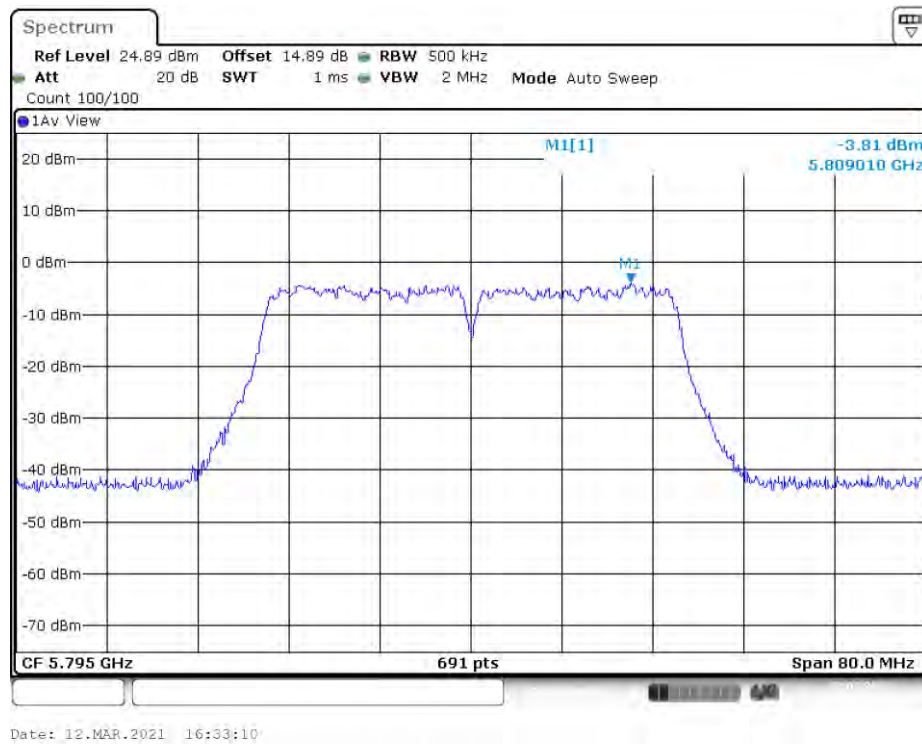
802.11ac20 mode, Power Spectral Density, 5745 MHz

Date: 12.MAR.2021 16:06:13

802.11ac20 mode, Power Spectral Density, 5785 MHz

Date: 12.MAR.2021 16:10:16

802.11ac20 mode, Power Spectral Density, 5825 MHz**802.11ac40 mode, Power Spectral Density, 5755 MHz**

802.11ac40 mode, Power Spectral Density, 5795 MHz

***** END OF REPORT *****