



# FCC RADIO TEST REPORT

FCC ID : 2AFZZ123G  
Equipment : Mobile Phone  
Brand Name : XIAOMI  
Model Name : 2201123G  
Applicant : Xiaomi Communications Co., Ltd.  
#019, 9th Floor, Building 6, 33 Xi'erqi Middle  
Road, Haidian District, Beijing, China, 100085  
Manufacturer : Xiaomi Communications Co., Ltd.  
#019, 9th Floor, Building 6, 33 Xi'erqi Middle  
Road, Haidian District, Beijing, China, 100085  
Standard : FCC Part 15 Subpart E §15.407

The product was received on Nov. 15, 2021 and testing was performed from Nov. 22, 2021 to Dec. 18, 2021. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**Sporton International Inc. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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## History of this test report

| Report No. | Version | Description                                                                                               | Issue Date    |
|------------|---------|-----------------------------------------------------------------------------------------------------------|---------------|
| FR1N0901I  | 01      | Initial issue of report                                                                                   | Dec. 21, 2021 |
| FR1N0901I  | 02      | 1. Add table and remark in Product Feature of Equipment Under Test<br>2. Add PSD plot for each bandwidth. | Jan. 04, 2022 |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |
|            |         |                                                                                                           |               |

## Summary of Test Result

| Report Clause | Ref Std. Clause            | Test Items                         | Result (PASS/FAIL) | Remark                                        |
|---------------|----------------------------|------------------------------------|--------------------|-----------------------------------------------|
| 3.1           | 15.403(i)<br>15.407(a)(10) | 26dB Emission Bandwidth            | Pass               | -                                             |
| 3.1           | 2.1049                     | 99% Occupied Bandwidth             | Reporting only     | -                                             |
| 3.2           | 15.407(a)(8)               | Maximum Conducted Output Power     | Reporting only     | -                                             |
| 3.2           | 15.407(a)(8)               | Fundamental Maximum EIRP           | Pass               | -                                             |
| 3.3           | 15.407(a)(8)               | Fundamental Power Spectral Density | Pass               | -                                             |
| 3.4           | 15.407(b)(6)               | In-Band Emissions (Channel Mask)   | Pass               | -                                             |
| 3.5           | 15.407(d)(6)               | Contention Based Protocol          | Pass               |                                               |
| 3.6           | 15.407(b)                  | Unwanted Emissions                 | Pass               | 3.16 dB<br>under the limit at<br>7125.020 MHz |
| 3.7           | 15.207                     | AC Conducted Emission              | Pass               | 15.94 dB<br>under the limit at<br>2.427 MHz   |
| 3.8           | 15.203<br>15.407(a)        | Antenna Requirement                | Pass               | -                                             |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Lewis Ho**

**Report Producer: Celery Wei**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE/5G NR, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, Wi-Fi 6GHz 802.11ax, NFC, WPT/WPC, and GNSS.

EUT support CDD Mode

| Product Specification subjective to this standard |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sample 1</b>                                   | 8+256G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Sample 2</b>                                   | 12+256G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Sample 3</b>                                   | 8+128G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Antenna Type</b>                               | <b>WWAN</b><br><Main>: PIFA Antenna<br><Aux.>: PIFA Antenna<br><b>WLAN 2.4GHz</b><br><Ant. 16>: PIFA Antenna<br><Ant. 18>: PIFA Antenna<br><b>WLAN 5GHz</b><br><Ant. 17>: PIFA Antenna<br><Ant. 18>: PIFA Antenna<br><b>WLAN 6GHz</b><br><Ant. 17>: PIFA Antenna<br><Ant. 18>: PIFA Antenna<br><b>Bluetooth:</b><br><Ant. 16>: PIFA Antenna<br><Ant. 18>: PIFA Antenna<br><b>GPS/Glonass/BDS/Galileo/SBAS/QZSS/NavIC:</b> PIFA Antenna<br><b>NFC:</b> Planar Antenna<br><b>WPT/WPC:</b> Coil Antenna |

| Antenna information          |                  |                                |         |
|------------------------------|------------------|--------------------------------|---------|
| 5925 MHz ~ 6425 MHz          | Peak Gain (dBi)  | Ant. 17: -0.4<br>Ant. 18: -5.0 |         |
| 6425 MHz ~ 6525 MHz          | Peak Gain (dBi)  | Ant. 17: -1.6<br>Ant. 18: -5.7 |         |
| 6525 MHz ~ 6875 MHz          | Peak Gain (dBi)  | Ant. 17: -2.0<br>Ant. 18: -6.0 |         |
| 6875 MHz ~ 7125 MHz          | Peak Gain (dBi)  | Ant. 17: -2.9<br>Ant. 18: -6.8 |         |
| Antenna Function Description |                  | Ant. 17                        | Ant. 18 |
|                              | 802.11ax<br>MIMO | V                              | V       |

**Remark:**

1. MIMO Ant. 17+18 Directional Gain is a calculated result from MIMO Ant.17 and MIMO Ant.18. The formula used in calculation is documented in section 3.8.
2. Power of MIMO Ant.17 + Ant.18 is a calculated result from sum of the power MIMO Ant.17 and MIMO Ant.18.
3. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

## 1.2 Modification of EUT

No modifications made to the EUT during the testing.

### 1.3 Testing Location

|                           |                                                                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site</b>          | Sporton International Inc. EMC & Wireless Communications Laboratory                                                       |
| <b>Test Site Location</b> | No.52, Huaya 1st Rd., Guishan Dist.,<br>Taoyuan City 333, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b><br>CO05-HY, DF02-HY                                                                               |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

|                           |                                                                                                                                                  |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site</b>          | Sporton International Inc. Wensan Laboratory                                                                                                     |
| <b>Test Site Location</b> | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City 333010, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b><br>TH05-HY; 03CH20-HY                                                                                                    |
| <b>Remark</b>             | The Conducted and Radiation Spurious Emission test items subcontracted to Sporton International Inc. Wensan Laboratory.                          |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW3786

### 1.4 Applicable Standards

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

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 987594 D02 U-NII 6 GHz EMC Measurement v01
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

**Remark:**

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.

## 2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane and WPC Charging Mode as worst plane.
- b. AC power line Conducted Emission was tested under maximum output power.

### 2.1 Carrier Frequency and Channel

|         |             |      |      |      |      |      |      |      |      |
|---------|-------------|------|------|------|------|------|------|------|------|
| BW 20M  | Channel     | 1    | 5    | 9    | 13   | 17   | 21   | 25   | 29   |
|         | Freq. (MHz) | 5955 | 5975 | 5995 | 6015 | 6035 | 6055 | 6075 | 6095 |
| BW 40M  | Channel     | 3    |      | 11   |      | 19   |      | 27   |      |
|         | Freq. (MHz) | 5965 |      | 6005 |      | 6045 |      | 6085 |      |
| BW 80M  | Channel     | 7    |      |      |      | 23   |      |      |      |
|         | Freq. (MHz) | 5985 |      |      |      | 6065 |      |      |      |
| BW 160M | Channel     | 15   |      |      |      |      |      |      |      |
|         | Freq. (MHz) | 6025 |      |      |      |      |      |      |      |

|         |             |      |      |      |      |      |      |      |      |
|---------|-------------|------|------|------|------|------|------|------|------|
| BW 20M  | Channel     | 33   | 37   | 41   | 45   | 49   | 53   | 57   | 61   |
|         | Freq. (MHz) | 6115 | 6135 | 6155 | 6175 | 6195 | 6215 | 6235 | 6255 |
| BW 40M  | Channel     | 35   |      | 43   |      | 51   |      | 59   |      |
|         | Freq. (MHz) | 6125 |      | 6165 |      | 6205 |      | 6245 |      |
| BW 80M  | Channel     | 39   |      |      |      | 55   |      |      |      |
|         | Freq. (MHz) | 6145 |      |      |      | 6225 |      |      |      |
| BW 160M | Channel     | 47   |      |      |      |      |      |      |      |
|         | Freq. (MHz) | 6185 |      |      |      |      |      |      |      |



|         |             |      |      |      |      |      |      |      |      |
|---------|-------------|------|------|------|------|------|------|------|------|
| BW 20M  | Channel     | 65   | 69   | 73   | 77   | 81   | 85   | 89   | 93   |
|         | Freq. (MHz) | 6275 | 6295 | 6315 | 6335 | 6355 | 6375 | 6395 | 6415 |
| BW 40M  | Channel     | 67   |      | 75   |      | 83   |      | 91   |      |
|         | Freq. (MHz) | 6285 |      | 6325 |      | 6365 |      | 6405 |      |
| BW 80M  | Channel     | 71   |      |      |      | 87   |      |      |      |
|         | Freq. (MHz) | 6305 |      |      |      | 6385 |      |      |      |
| BW 160M | Channel     | 79   |      |      |      |      |      |      |      |
|         | Freq. (MHz) | 6345 |      |      |      |      |      |      |      |

|         |             |      |      |      |      |      |      |      |      |
|---------|-------------|------|------|------|------|------|------|------|------|
| BW 20M  | Channel     | 97   | 101  | 105  | 109  | 113  | 117  | 121  | 125  |
|         | Freq. (MHz) | 6435 | 6455 | 6475 | 6495 | 6515 | 6535 | 6555 | 6575 |
| BW 40M  | Channel     | 99   |      | 107  |      | 115  |      | 123  |      |
|         | Freq. (MHz) | 6445 |      | 6485 |      | 6525 |      | 6565 |      |
| BW 80M  | Channel     | 103  |      |      |      | 119  |      |      |      |
|         | Freq. (MHz) | 6465 |      |      |      | 6545 |      |      |      |
| BW 160M | Channel     | 111  |      |      |      |      |      |      |      |
|         | Freq. (MHz) | 6505 |      |      |      |      |      |      |      |

|         |             |      |      |      |      |      |      |      |      |
|---------|-------------|------|------|------|------|------|------|------|------|
| BW 20M  | Channel     | 129  | 133  | 137  | 141  | 145  | 149  | 153  | 157  |
|         | Freq. (MHz) | 6595 | 6615 | 6635 | 6655 | 6675 | 6695 | 6715 | 6735 |
| BW 40M  | Channel     | 131  |      | 139  |      | 147  |      | 155  |      |
|         | Freq. (MHz) | 6605 |      | 6645 |      | 6685 |      | 6725 |      |
| BW 80M  | Channel     | 135  |      |      |      | 151  |      |      |      |
|         | Freq. (MHz) | 6625 |      |      |      | 6705 |      |      |      |
| BW 160M | Channel     | 143  |      |      |      |      |      |      |      |
|         | Freq. (MHz) | 6665 |      |      |      |      |      |      |      |

|         |             |      |      |      |      |      |      |      |      |
|---------|-------------|------|------|------|------|------|------|------|------|
| BW 20M  | Channel     | 161  | 165  | 169  | 173  | 177  | 181  | 185  | 189  |
|         | Freq. (MHz) | 6755 | 6775 | 6795 | 6815 | 6835 | 6855 | 6875 | 6895 |
| BW 40M  | Channel     | 163  |      | 171  |      | 179  |      | 187  |      |
|         | Freq. (MHz) | 6765 |      | 6805 |      | 6845 |      | 6885 |      |
| BW 80M  | Channel     | 167  |      |      |      | 183  |      |      |      |
|         | Freq. (MHz) | 6785 |      |      |      | 6865 |      |      |      |
| BW 160M | Channel     | 175  |      |      |      |      |      |      |      |
|         | Freq. (MHz) | 6825 |      |      |      |      |      |      |      |

|         |             |      |      |      |      |      |      |      |      |
|---------|-------------|------|------|------|------|------|------|------|------|
| BW 20M  | Channel     | 193  | 197  | 201  | 205  | 209  | 213  | 217  | 221  |
|         | Freq. (MHz) | 6915 | 6935 | 6955 | 6975 | 6995 | 7015 | 7035 | 7055 |
| BW 40M  | Channel     | 195  |      | 203  |      | 211  |      | 219  |      |
|         | Freq. (MHz) | 6925 |      | 6965 |      | 7005 |      | 7045 |      |
| BW 80M  | Channel     | 199  |      |      |      | 215  |      |      |      |
|         | Freq. (MHz) | 6945 |      |      |      | 7025 |      |      |      |
| BW 160M | Channel     | 207  |      |      |      |      |      |      |      |
|         | Freq. (MHz) | 6985 |      |      |      |      |      |      |      |

|        |             |      |  |  |  |      |  |  |  |
|--------|-------------|------|--|--|--|------|--|--|--|
| BW 20M | Channel     | 225  |  |  |  | 229  |  |  |  |
|        | Freq. (MHz) | 7075 |  |  |  | 7095 |  |  |  |
| BW 40M | Channel     | 227  |  |  |  |      |  |  |  |
|        | Freq. (MHz) | 7085 |  |  |  |      |  |  |  |

|        |             |      |  |  |  |  |  |  |  |
|--------|-------------|------|--|--|--|--|--|--|--|
| BW 20M | Channel     | 233  |  |  |  |  |  |  |  |
|        | Freq. (MHz) | 7115 |  |  |  |  |  |  |  |

## 2.2 Test Mode

The final test modes consider the modulation and the worst data rates as shown in the table below.

### MIMO Mode

| Modulation     | Data Rate |
|----------------|-----------|
| 802.11ax HE20  | MCS0      |
| 802.11ax HE40  | MCS0      |
| 802.11ax HE80  | MCS0      |
| 802.11ax HE160 | MCS0      |

### Note:

1. Since the verify power, the smaller power can be covered by the higher power. The SISO Mode are covered by MIMO Mode.
2. For 802.11ax, since the verify power & PSD, the smaller power can be covered by the higher power. The Partial RU are covered by Full RU.

| Test Cases                                                                                      |                                                                                                                        |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>AC Conducted Emission</b>                                                                    | Mode 1 : WLAN (6GHz) Link + Bluetooth Link + MPEG 4 + USB Cable 1<br>(Charging from AC Adapter) + Battery for Sample 1 |
| <b>Remark:</b> For Radiated Test Cases, the tests were performed with USB Cable 1 and Sample 1. |                                                                                                                        |

| Ch. #    |        | UNII-5<br>(5925-6425 MHz) | UNII-6<br>(6425-6525 MHz) | UNII-7<br>(6525-6875 MHz) | UNII-8<br>(6875-7125 MHz) |
|----------|--------|---------------------------|---------------------------|---------------------------|---------------------------|
|          |        | 802.11ax HE20             | 802.11ax HE20             | 802.11ax HE20             | 802.11ax HE20             |
| L        | Low    | 001                       | -                         | -                         | -                         |
| M        | Middle | -                         | -                         | -                         | -                         |
| H        | High   | -                         | -                         | -                         | 233                       |
| Straddle |        | -                         | -                         | -                         | -                         |

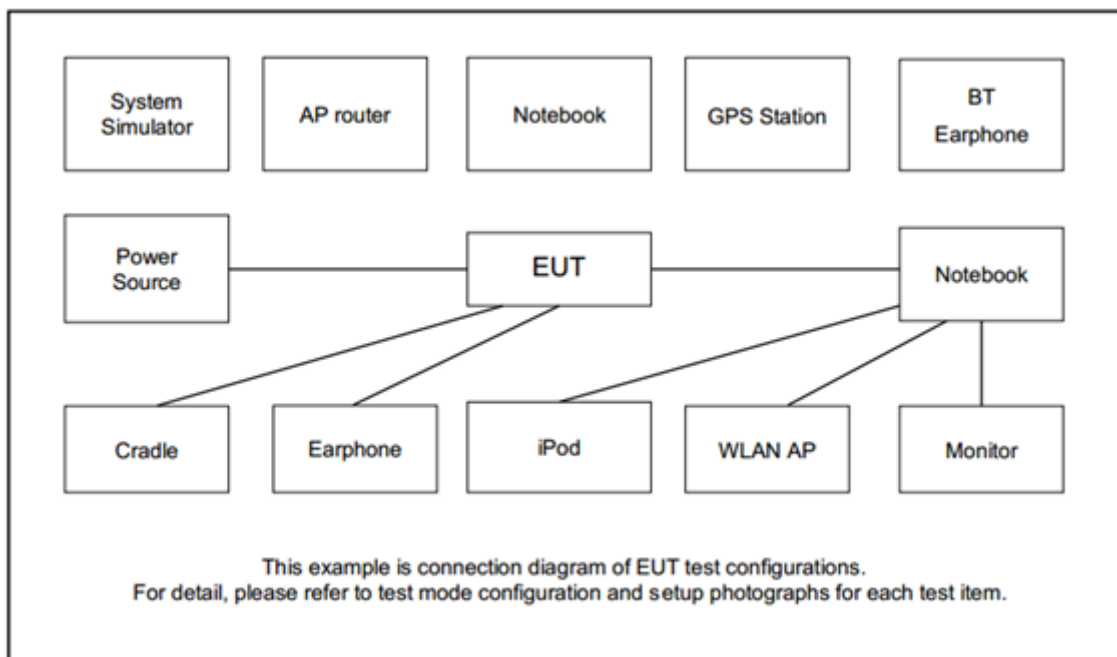
| Ch. #    |        | UNII-5<br>(5925-6425 MHz) | UNII-6<br>(6425-6525 MHz) | UNII-7<br>(6525-6875 MHz) | UNII-8<br>(6875-7125 MHz) |
|----------|--------|---------------------------|---------------------------|---------------------------|---------------------------|
|          |        | 802.11ax HE40             | 802.11ax HE40             | 802.11ax HE40             | 802.11ax HE40             |
| L        | Low    | 003                       | -                         | -                         | -                         |
| M        | Middle | -                         | -                         | -                         | -                         |
| H        | High   | -                         | -                         | -                         | 227                       |
| Straddle |        | -                         | -                         | -                         | -                         |

| Ch. #    |        | UNII-5<br>(5925-6425 MHz) | UNII-6<br>(6425-6525 MHz) | UNII-7<br>(6525-6875 MHz) | UNII-8<br>(6875-7125 MHz) |
|----------|--------|---------------------------|---------------------------|---------------------------|---------------------------|
|          |        | 802.11ax HE80             | 802.11ax HE80             | 802.11ax HE80             | 802.11ax HE80             |
| L        | Low    | 007                       | -                         | -                         | -                         |
| M        | Middle | -                         |                           | -                         | -                         |
| H        | High   | -                         |                           | -                         | 215                       |
| Straddle |        | -                         | -                         | -                         | -                         |

| Ch. #    |        | UNII-5<br>(5925-6425 MHz) | UNII-6<br>(6425-6525 MHz) | UNII-7<br>(6525-6875 MHz) | UNII-8<br>(6875-7125 MHz) |
|----------|--------|---------------------------|---------------------------|---------------------------|---------------------------|
|          |        | 802.11ax HE160            | 802.11ax HE160            | 802.11ax HE160            | 802.11ax HE160            |
| L        | Low    | 015                       | -                         | 143                       | 207                       |
| M        | Middle | 047                       |                           |                           |                           |
| H        | High   | 079                       |                           |                           |                           |
| Straddle |        | -                         | 111                       | 175                       | -                         |

**Remark:** For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.

## 2.3 Connection Diagram of Test System



## 2.4 Support Unit used in test configuration and system

| Item | Equipment          | Brand Name    | Model Name    | FCC ID       | Data Cable | Power Cord                                           |
|------|--------------------|---------------|---------------|--------------|------------|------------------------------------------------------|
| 1.   | Bluetooth Earphone | Sony Ericsson | MW600         | PY7DDA-2029  | N/A        | N/A                                                  |
| 2.   | WLAN AP            | ASUS          | GT-AXE11000   | MSQ-RTAXJF00 | N/A        | Unshielded, 1.8 m                                    |
| 3.   | Notebook           | DELL          | Latitude 3400 | FCC DoC      | N/A        | AC I/P: Unshielded, 1.2 m<br>DC O/P: Shielded, 1.8 m |
| 4.   | Notebook           | DELL          | Latitude5310  | FCC DoC      | N/A        | AC I/P: Unshielded, 1.2 m<br>DC O/P: Shielded, 1.8 m |
| 5.   | Wireless Charger   | YU-live       | K8            | N/A          | N/A        | N/A                                                  |



## 2.5 EUT Operation Test Setup

For WLAN Tx test items, EUT (SW: MIUI13) get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

For Partial RU test items, utility "QSPR Version 5.0-00188" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

## 2.6 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

### 3 Test Result

#### 3.1 26dB & 99% Occupied Bandwidth Measurement

##### 3.1.1 Limit of 26dB & 99% Occupied Bandwidth

<FCC 14-30 CFR 15.407>

(a)(10) The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.

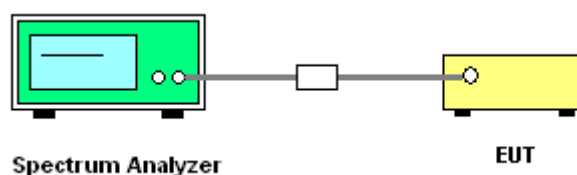
##### 3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

##### 3.1.3 Test Procedures

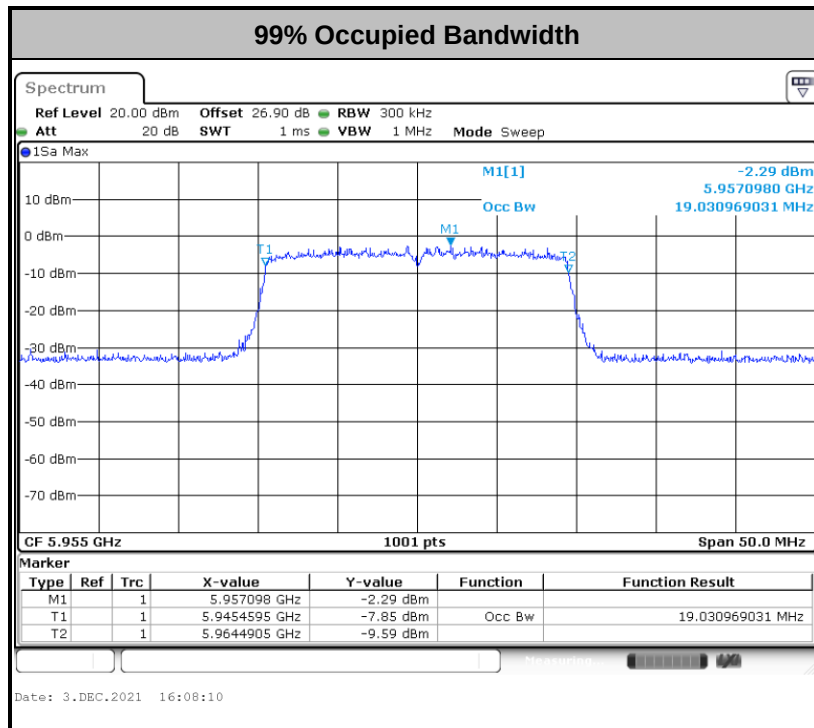
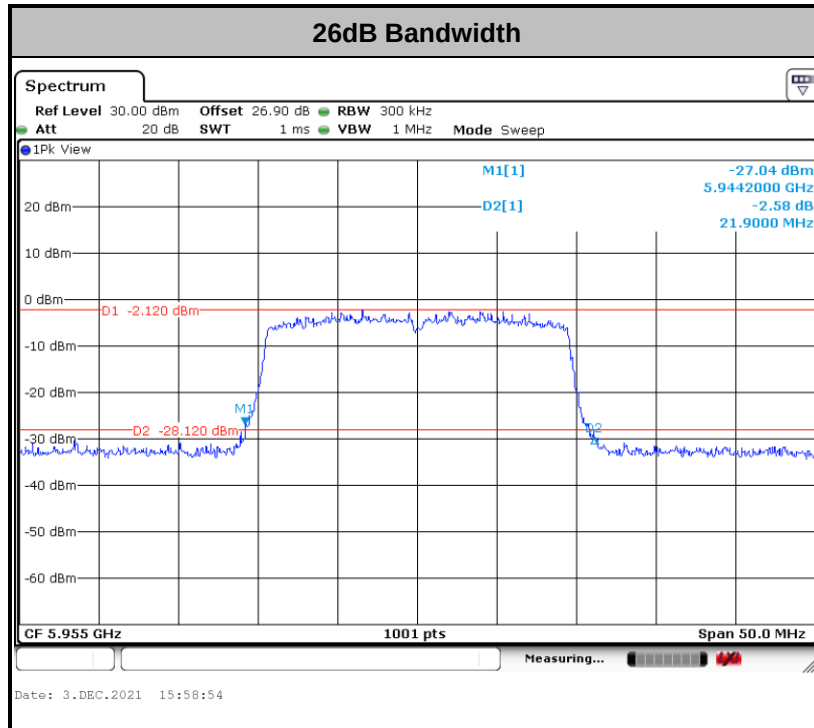
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW)  $\geq 3 * RBW$ .
8. Measure and record the results in the test report.

##### 3.1.4 Test Setup

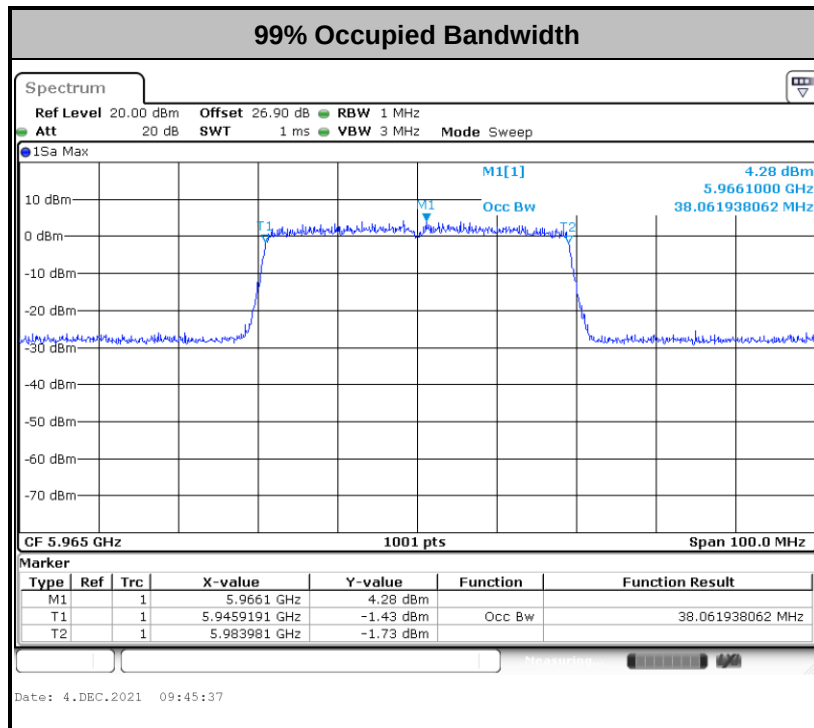
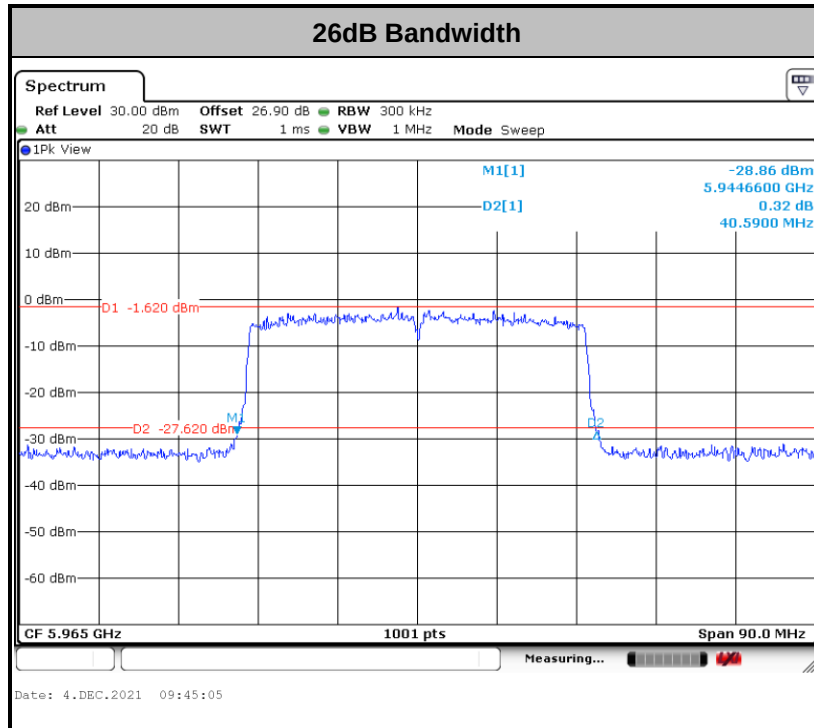


##### 3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.

**<802.11ax HE20 Mode>**


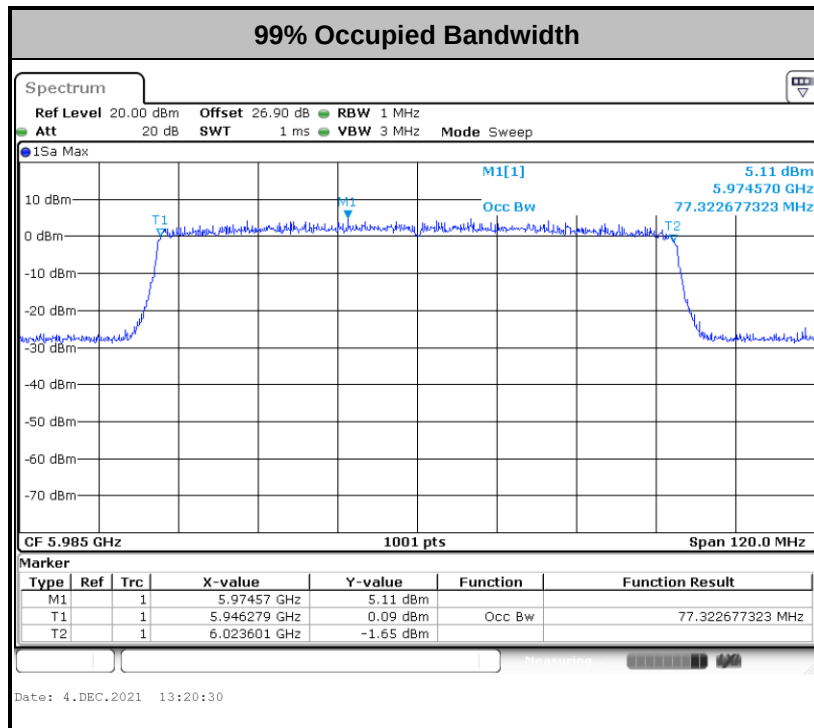
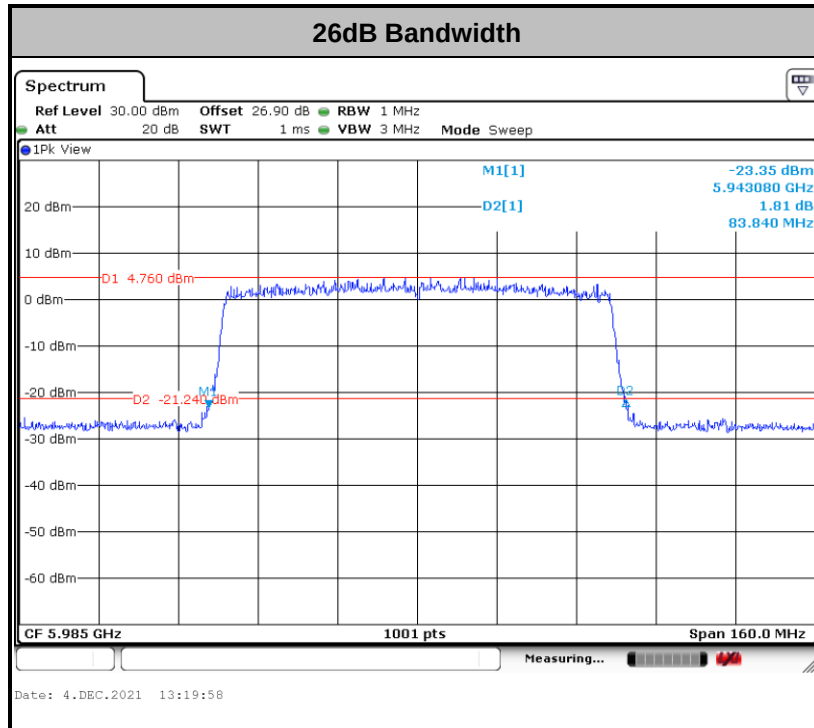
**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

**<802.11ax HE40 Mode>**


**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



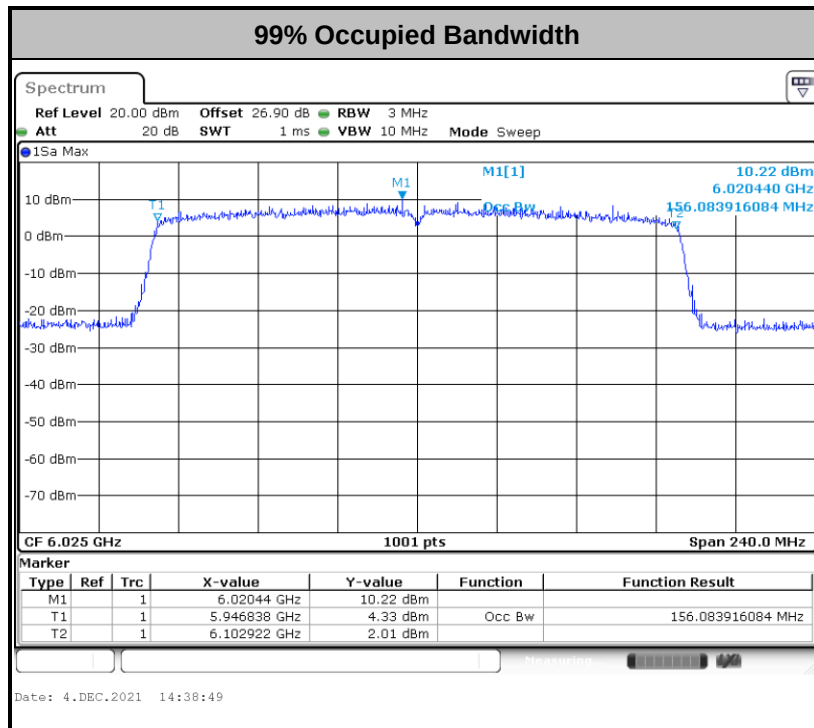
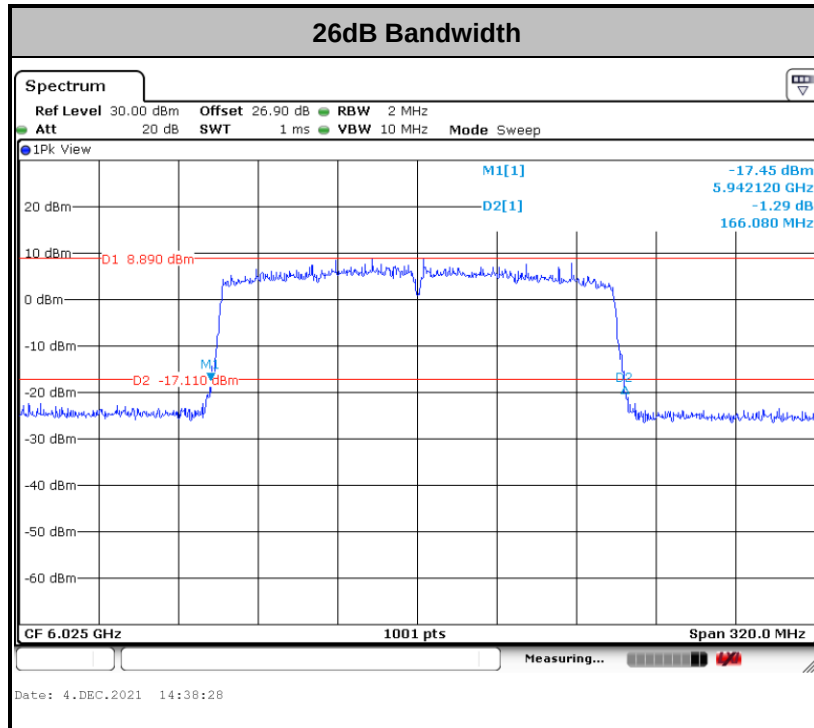
## &lt;802.11ax HE80 Mode&gt;



**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



## &lt;802.11ax HE160 Mode&gt;



**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

## 3.2 Maximum conducted Output Power and Fundamental Maximum EIRP Measurement

### 3.2.1 Limit of Fundamental Maximum EIRP

<FCC 14-30 CFR 15.407>

(a)(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

### 3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

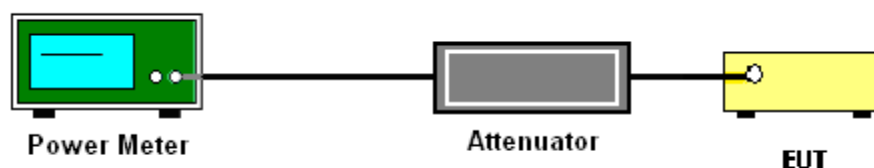
### 3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor,  $10 \log(1/x)$ , where  $x$  is the duty cycle.
4. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Fundamental Maximum EIRP

Please refer to Appendix A.

### 3.3 Fundamental Power Spectral Density Measurement

#### 3.3.1 Limit of Fundamental Power Spectral Density

##### <FCC 14-30 CFR 15.407>

(a)(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum power spectral density must not exceed  $-1$  dBm e.i.r.p. in any 1-megahertz band.

#### 3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

#### 3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Section F) Maximum power spectral density.

##### # Method SA-3 #

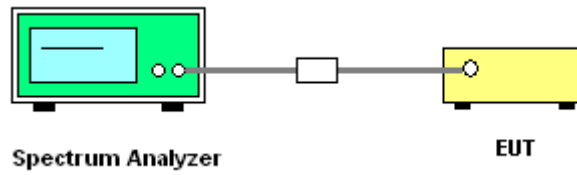
(power averaging (rms) detection with max hold):

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
  - Set RBW = 1 MHz.
  - Set VBW  $\geq$  3 MHz.
  - Number of points in sweep  $\geq$  2 Span / RBW.
  - Sweep time  $\leq$  (number of points in sweep)  $\times$  T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.  
Detector = power averaging (rms).
  - Trace mode = max hold.
  - Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
  2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
  3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (a): Measure and sum the spectra across the outputs.

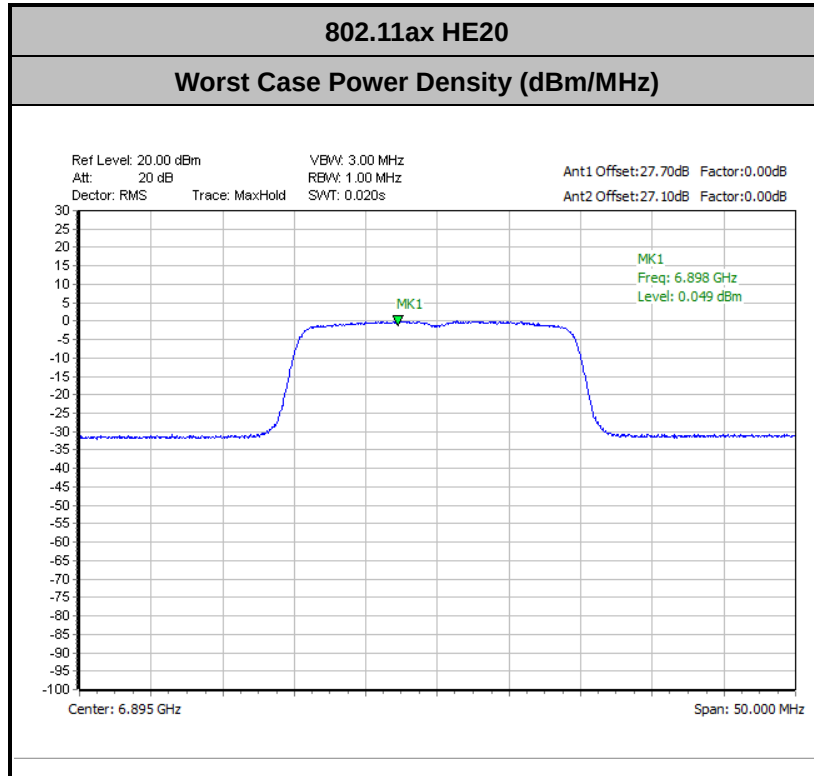
The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points; the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

### 3.3.4 Test Setup

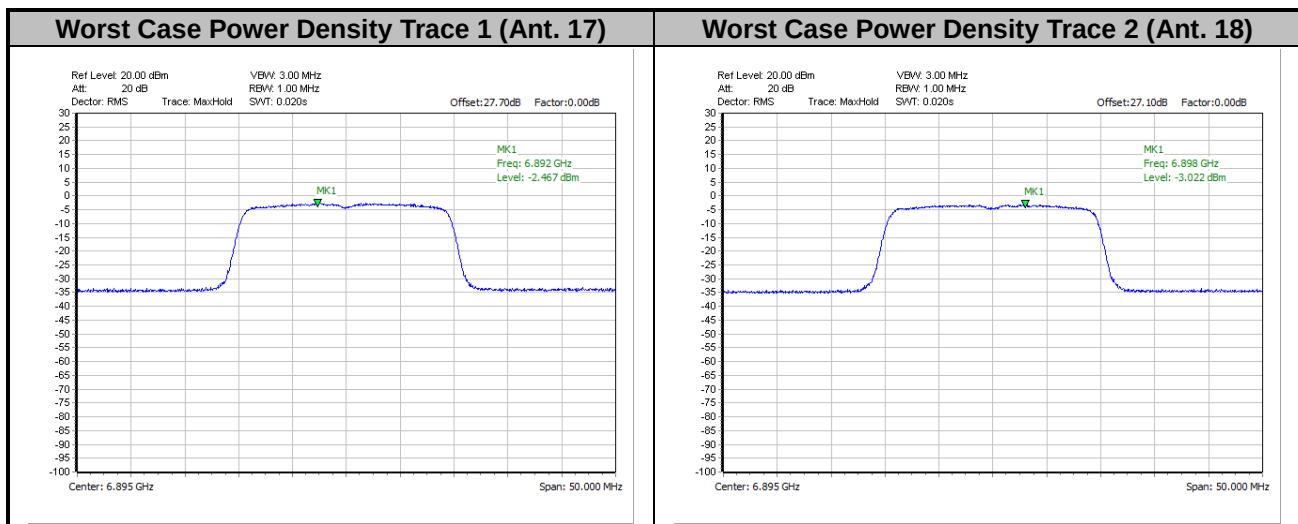


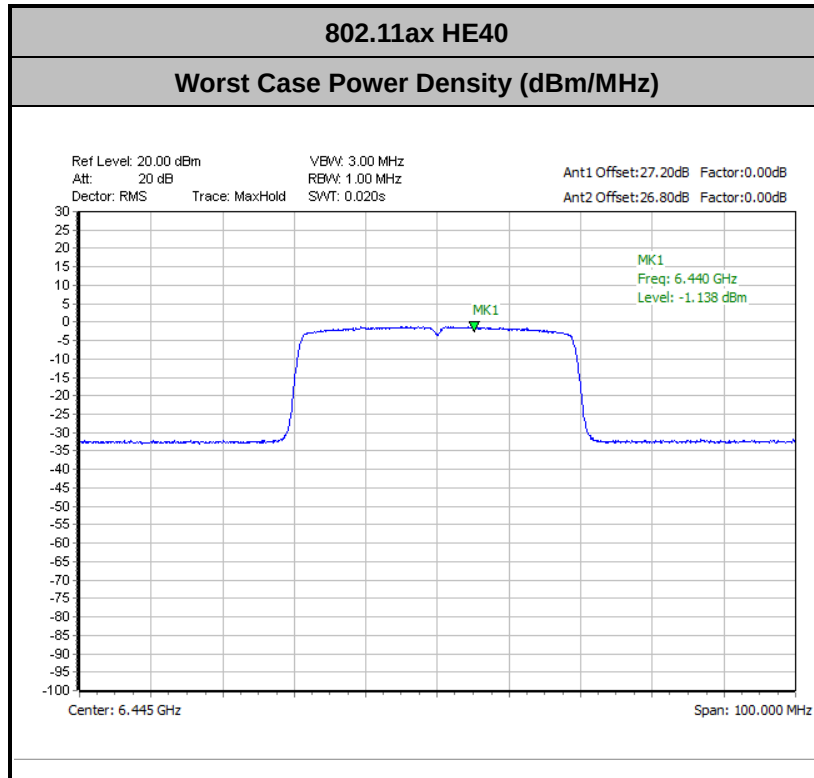
### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

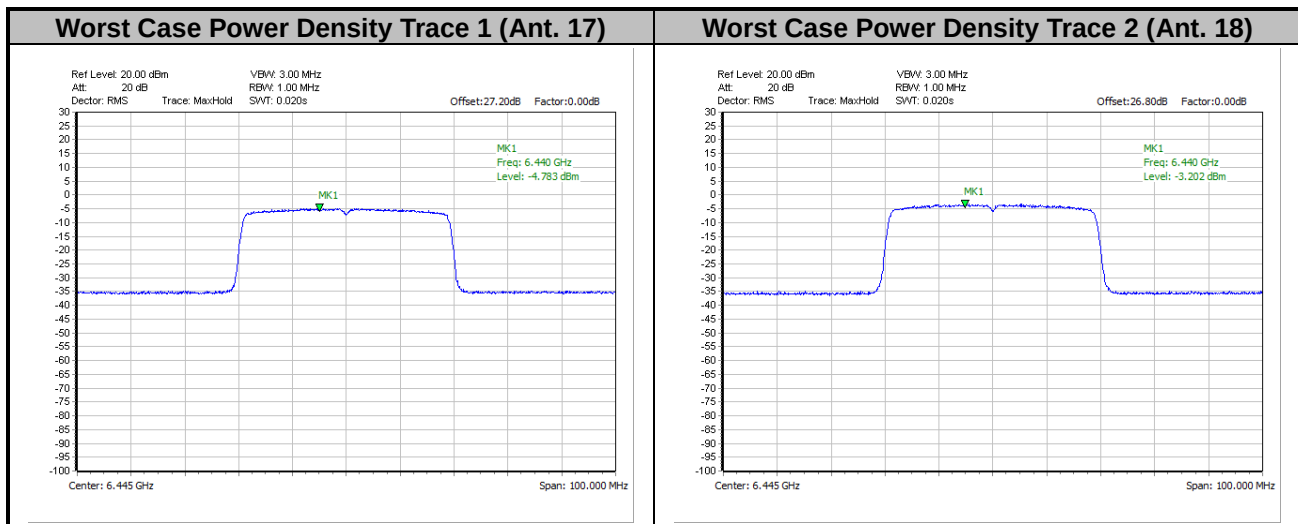


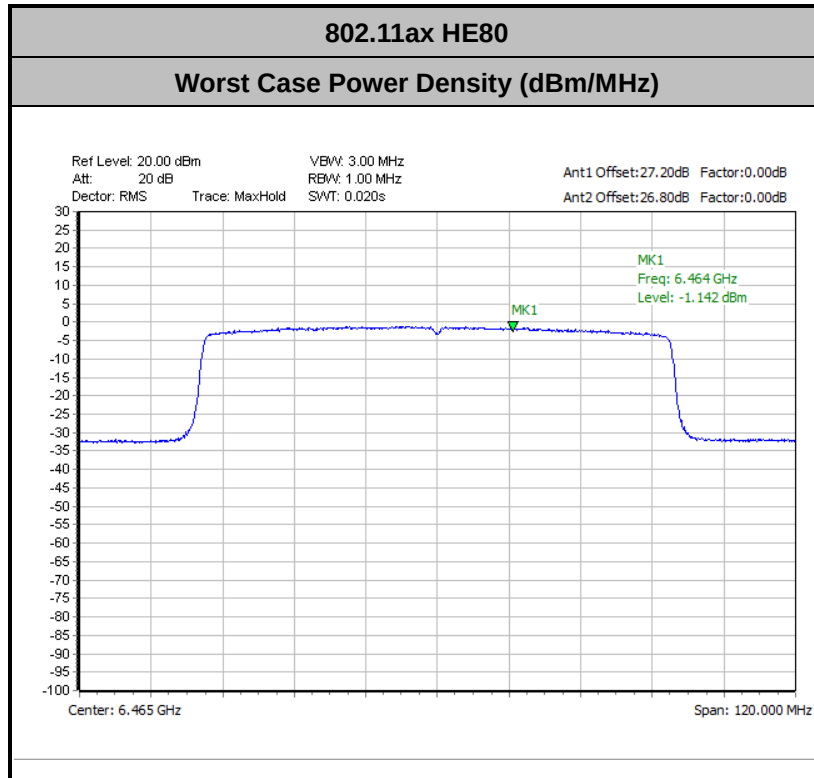
**Remark:** The test plot is showing a bin by bin combined result mathematically adds two traces.



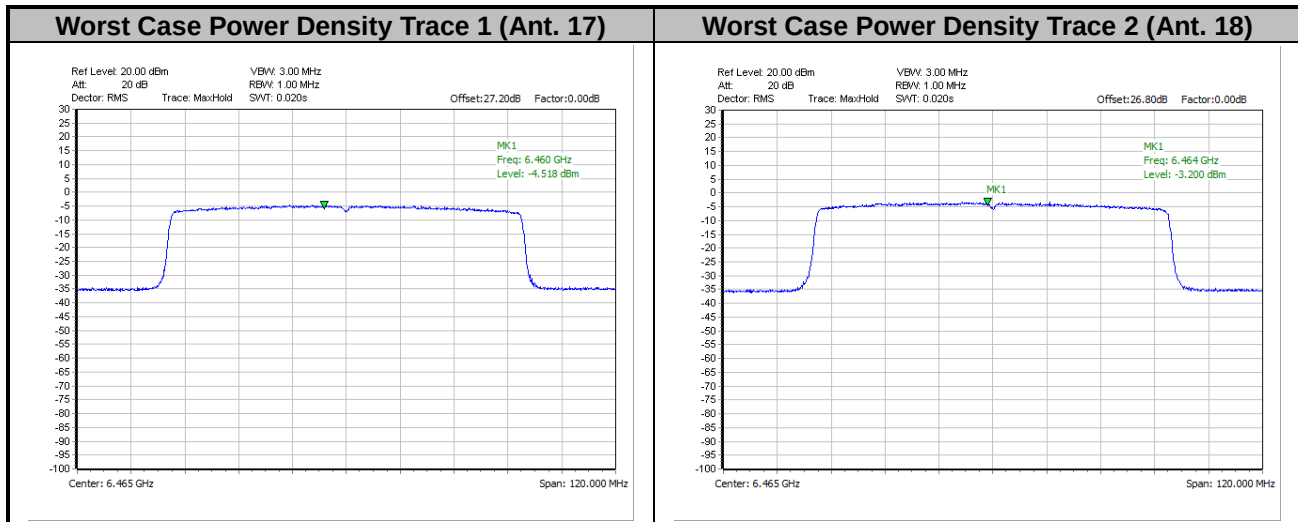


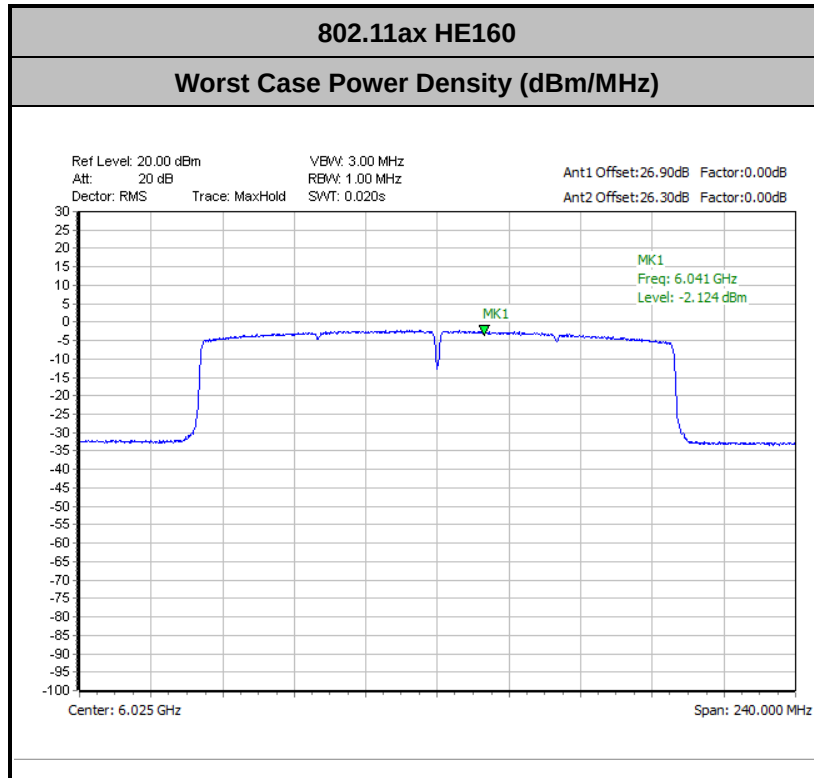
**Remark:** The test plot is showing a bin by bin combined result mathematically adds two traces.



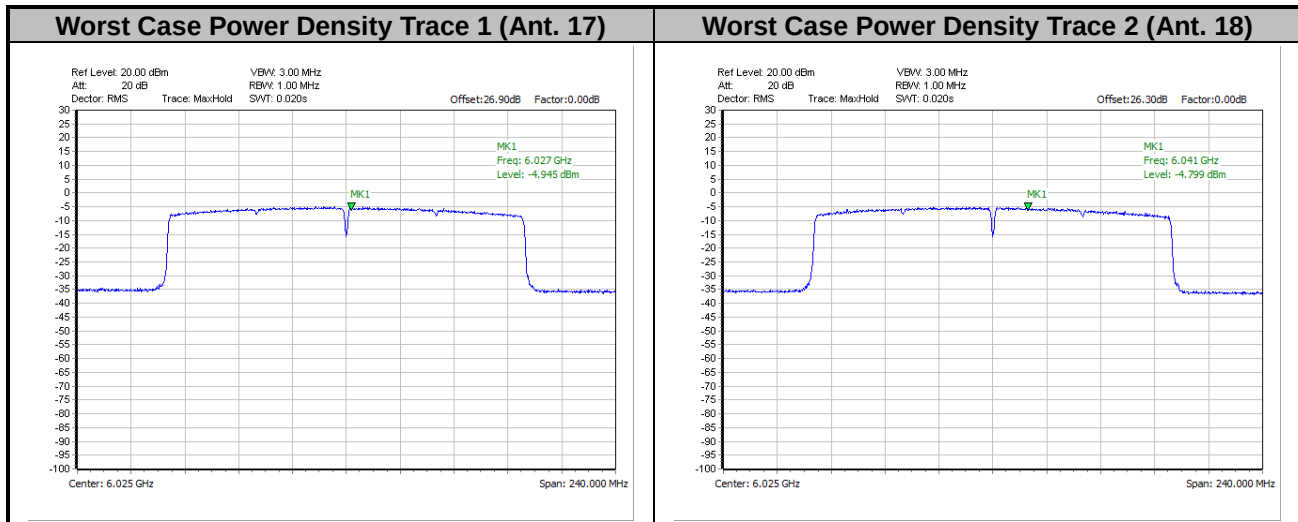


**Remark:** The test plot is showing a bin by bin combined result mathematically adds two traces.





**Remark:** The test plot is showing a bin by bin combined result mathematically adds two traces.



### 3.4 In-Band Emissions (Channel Mask)

#### 3.4.1 Limit of Unwanted Emissions

##### <FCC 14-30 CFR 15.407>

(a)(6) For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

#### 3.4.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

#### 3.4.3 Test Procedures

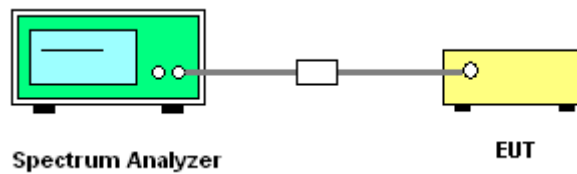
The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01.

Section J) In-Band Emissions.

1. Take nominal bandwidth as reference channel bandwidth provided that 26 dB emission bandwidth is always larger than nominal bandwidth
2. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:
  - a) Set the span to encompass the entire 26 dB EBW of the signal.
  - b) Set RBW = same RBW used for 26 dB EBW measurement.
  - c) Set VBW  $\geq 3 \times$  RBW
  - d) Number of points in sweep  $\geq [2 \times \text{span} / \text{RBW}]$ .
  - e) Sweep time = auto.
  - f) Detector = RMS (i.e., power averaging)
  - g) Trace average at least 100 traces in power averaging (rms) mode.
  - h) Use the peak search function on the instrument to find the peak of the spectrum.
3. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
  - a. Suppressed by 20 dB at 1 MHz outside of the channel edge.
  - b. Suppressed by 28 dB at one channel bandwidth from the channel center.
  - c. Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.

4. Adjust the span to encompass the entire mask as necessary.
5. Clear trace.
6. Trace average at least 100 traces in power averaging (rms) mode.
7. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.

### 3.4.4 Test Setup



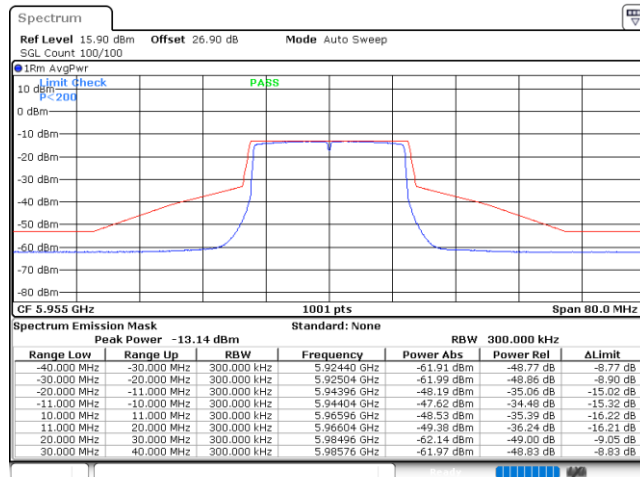


## 3.4.5 Test Result

MIMO &lt;Ant. 17+18(17)&gt;

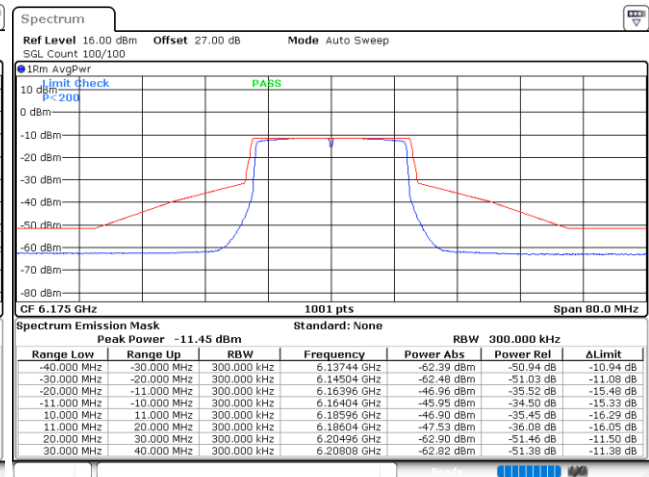
EUT Mode : 802.11ax HE20

Plot on Channel 5955MHz



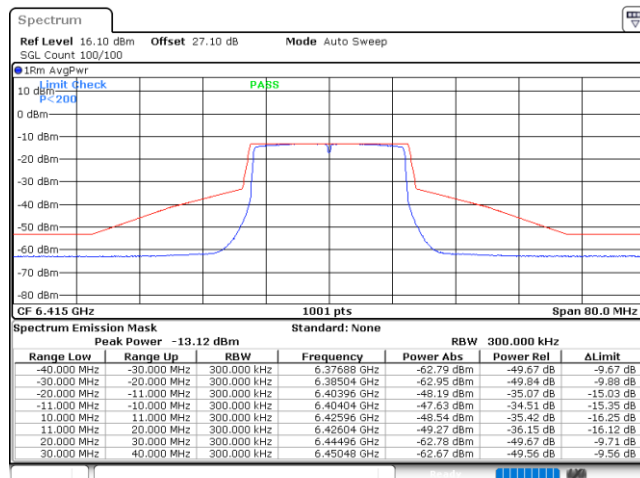
Date: 3.DEC.2021 16:10:27

Plot on Channel 6175MHz



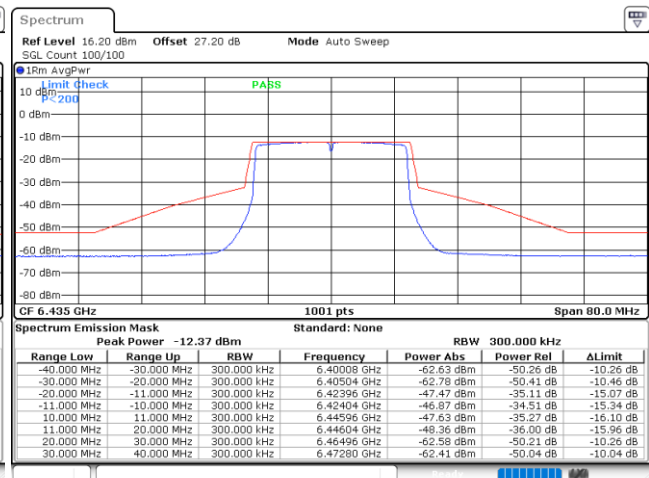
Date: 3.DEC.2021 16:33:08

Plot on Channel 6415MHz



Date: 3.DEC.2021 17:19:46

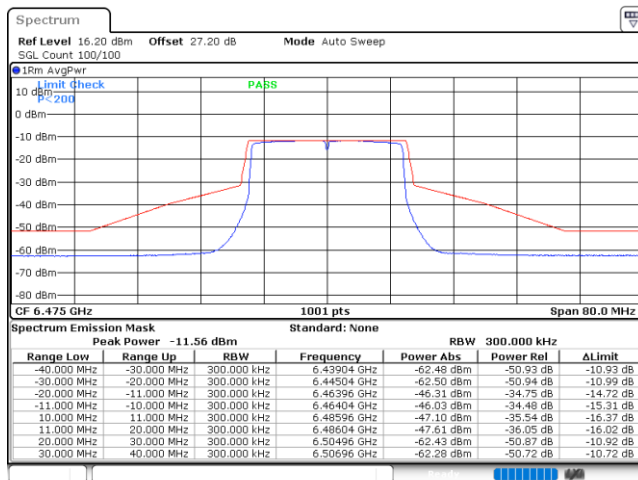
Plot on Channel 6435MHz



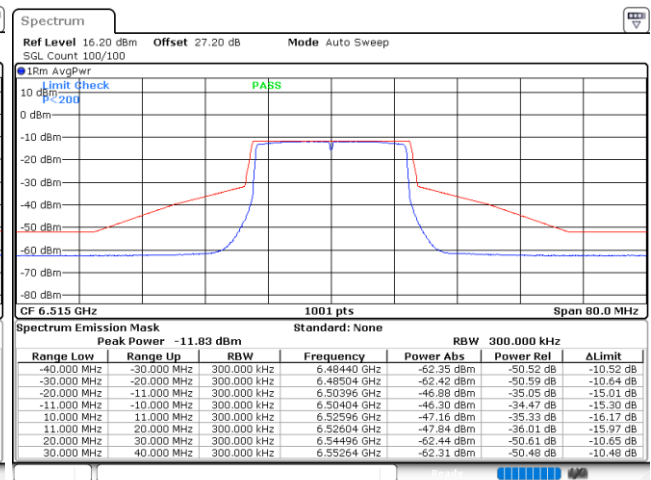
Date: 3.DEC.2021 18:52:50



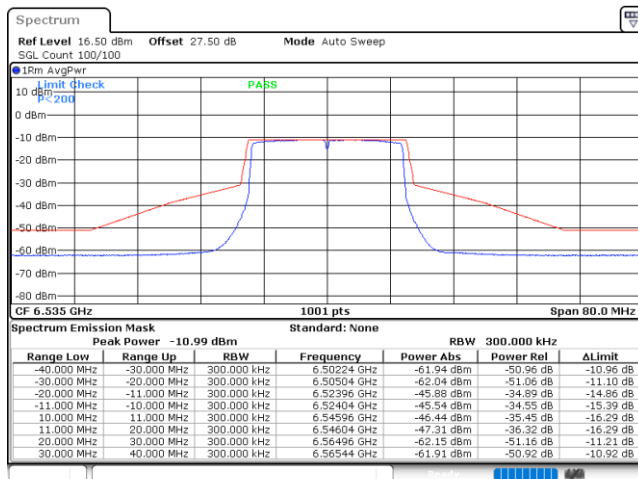
### Plot on Channel 6475MHz



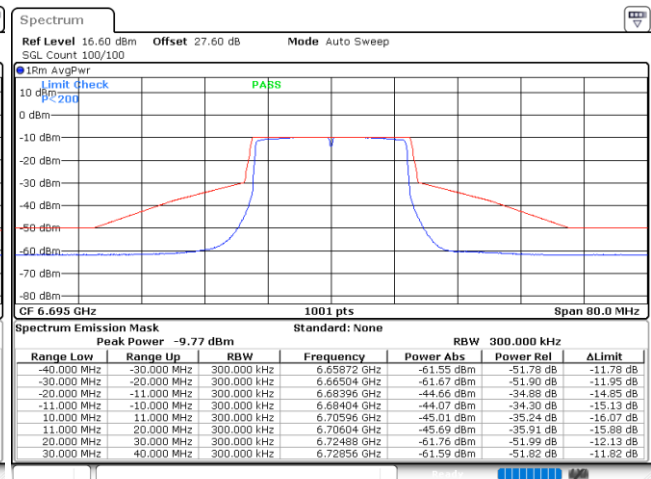
### Plot on Channel 6515MHz



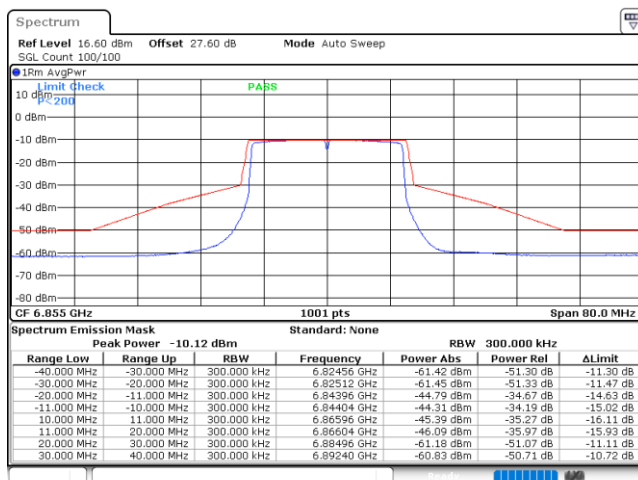
### Plot on Channel 6535MHz



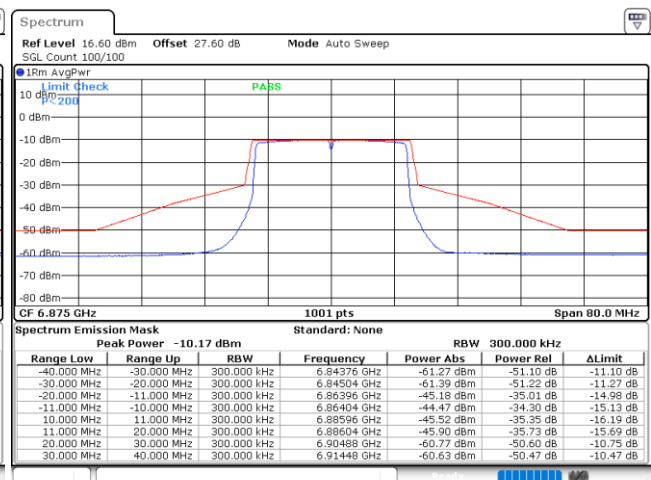
### Plot on Channel 6695MHz



### Plot on Channel 6855MHz

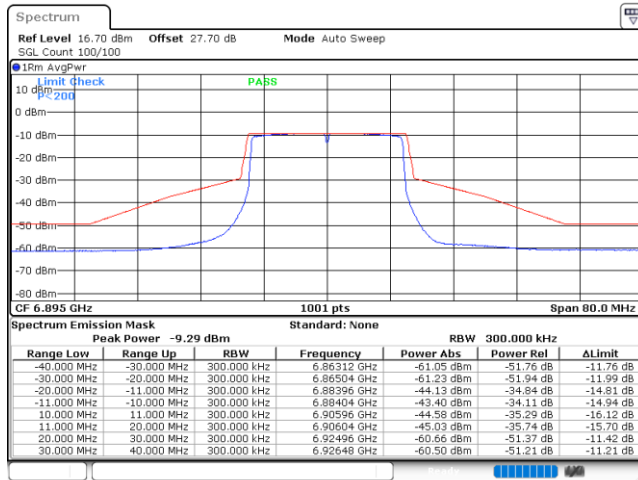


### Plot on Channel 6875MHz



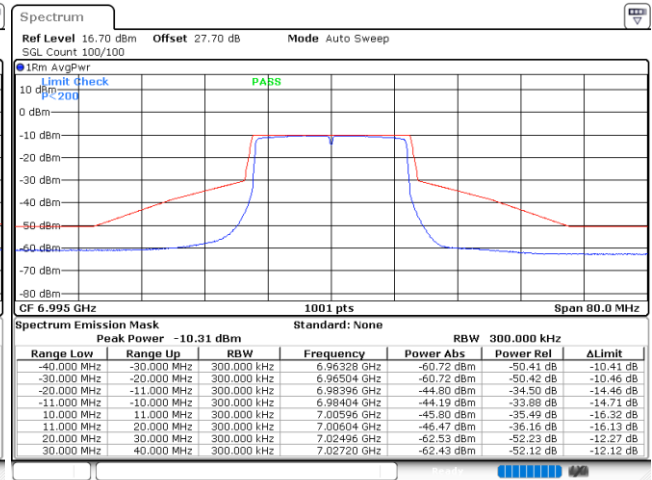


## Plot on Channel 6895MHz



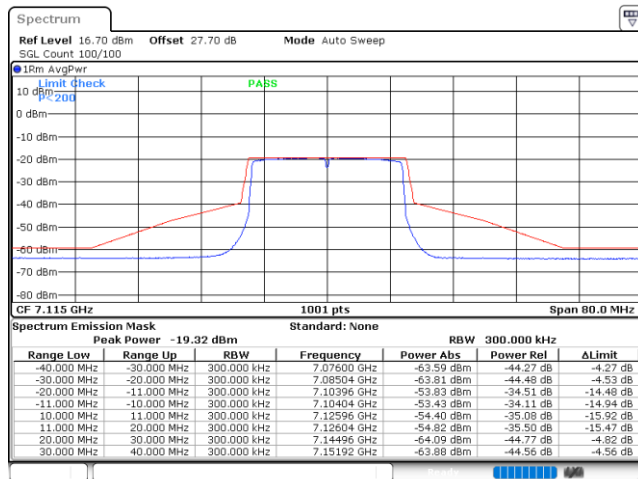
Date: 4.DEC.2021 09:21:28

## Plot on Channel 6995MHz

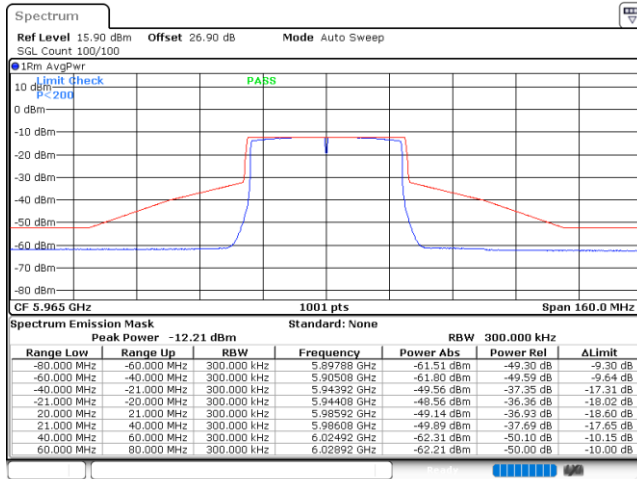


Date: 4.DEC.2021 09:24:54

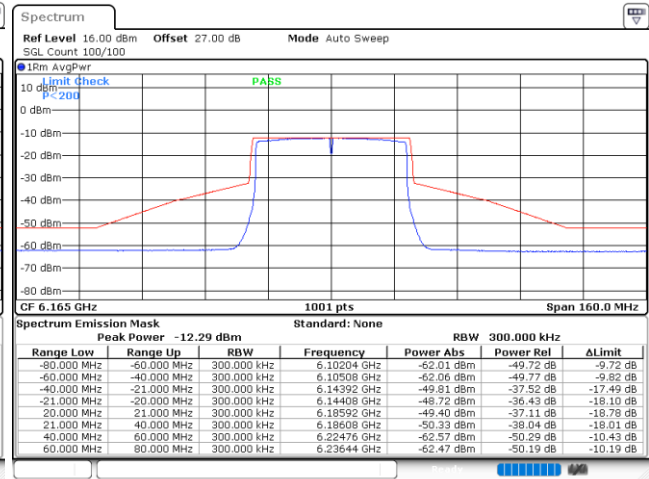
## Plot on Channel 7115MHz



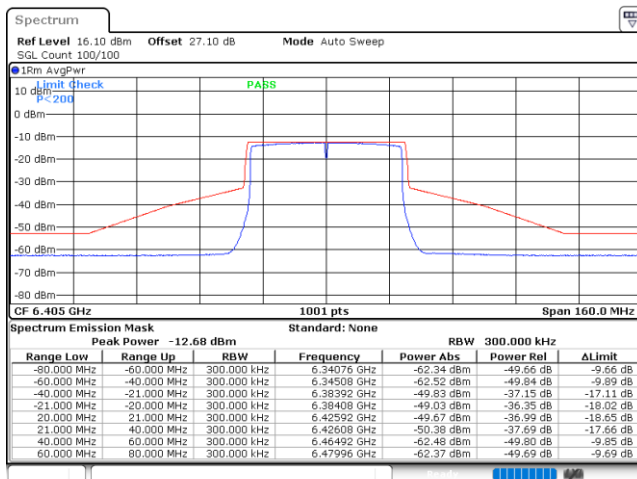
Date: 4.DEC.2021 09:36:59

**EUT Mode :** 802.11ax HE40**Plot on Channel 5965MHz**

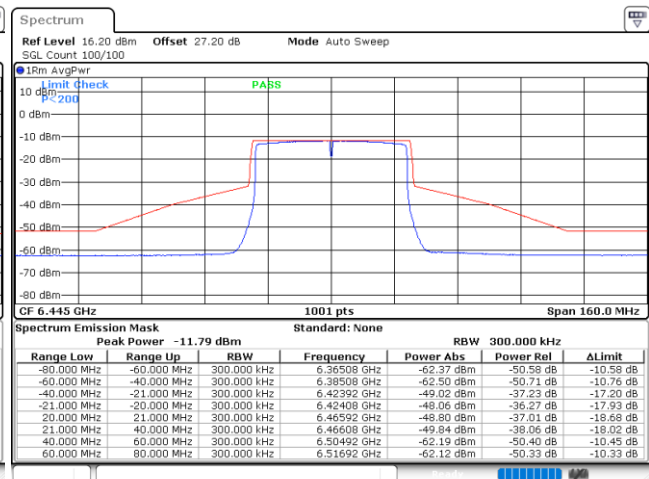
Date: 4.DEC.2021 09:46:08

**Plot on Channel 6165MHz**

Date: 4.DEC.2021 09:49:40

**Plot on Channel 6405MHz**

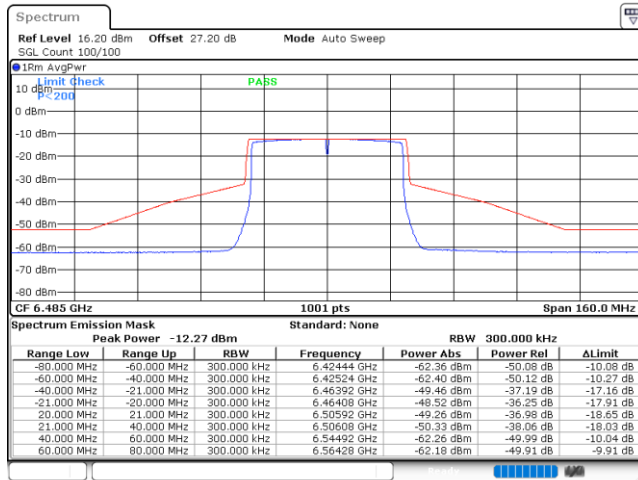
Date: 4.DEC.2021 09:53:45

**Plot on Channel 6445MHz**

Date: 4.DEC.2021 09:58:32

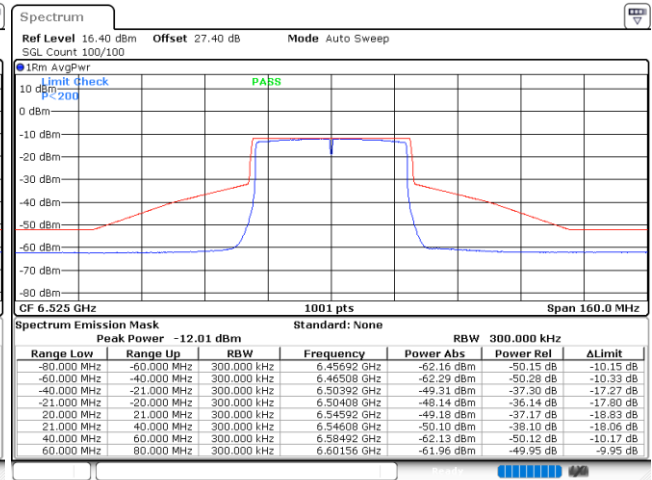


Plot on Channel 6485MHz



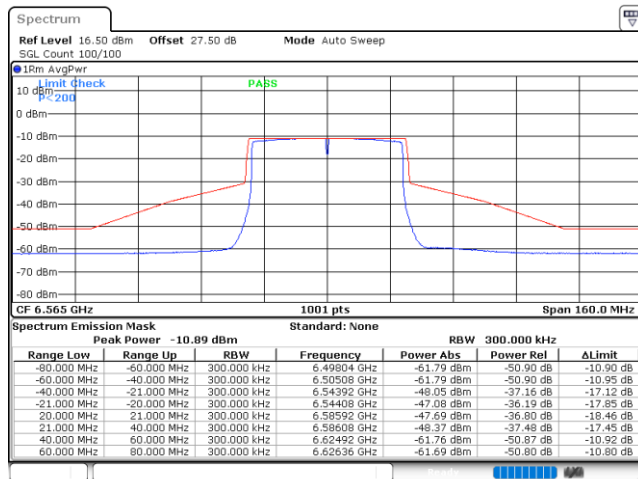
Date: 4.DEC.2021 10:03:11

Plot on Channel 6525MHz



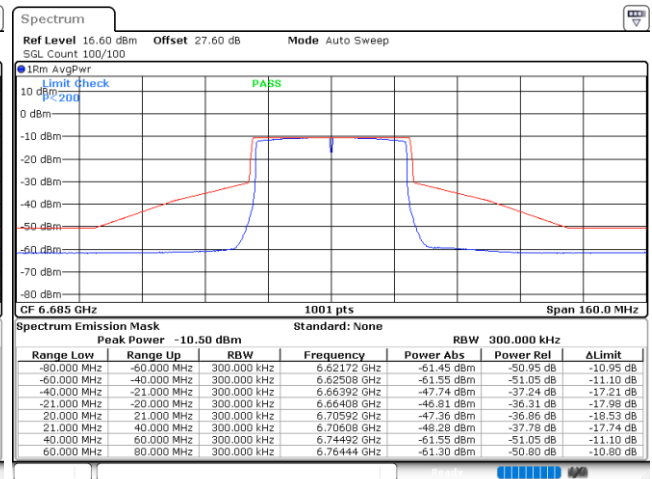
Date: 4.DEC.2021 10:18:28

Plot on Channel 6565MHz



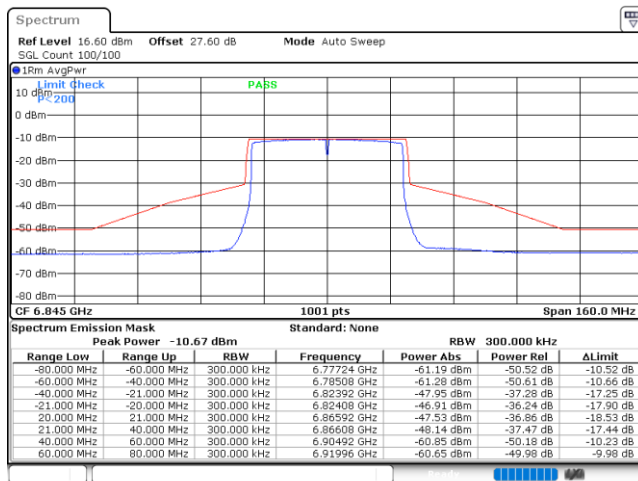
Date: 4.DEC.2021 10:29:30

Plot on Channel 6685MHz



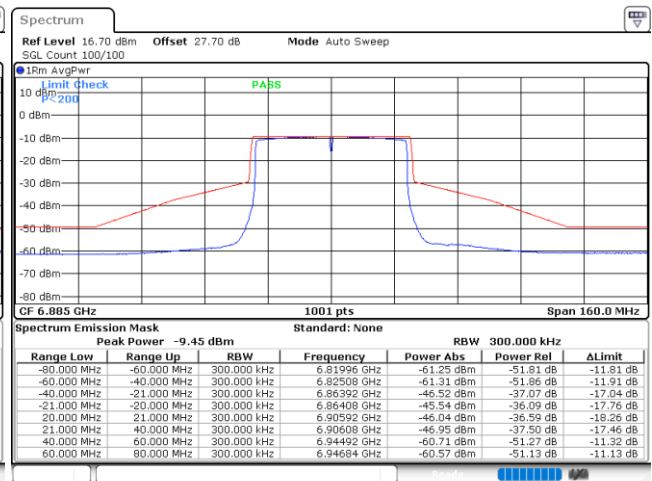
Date: 4.DEC.2021 10:38:24

Plot on Channel 6845MHz



Date: 4.DEC.2021 10:42:28

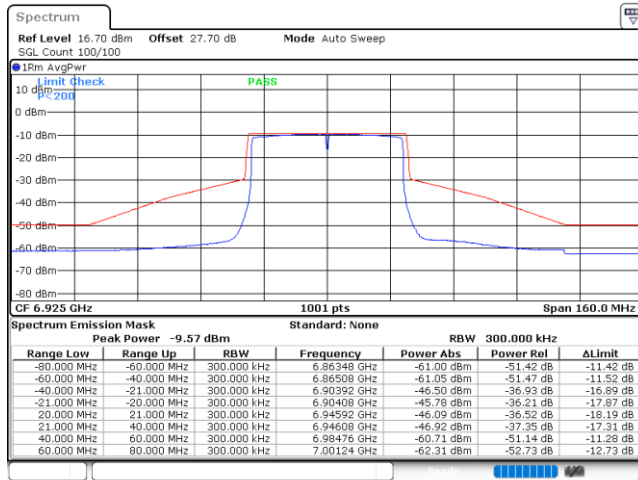
Plot on Channel 6885MHz



Date: 4.DEC.2021 11:01:33

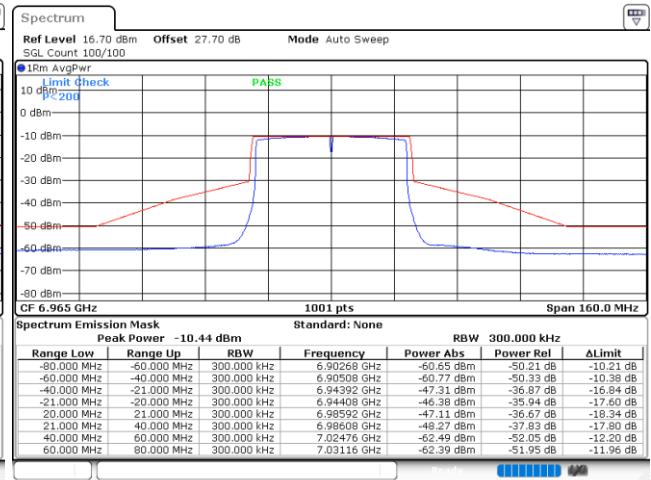


## Plot on Channel 6925MHz



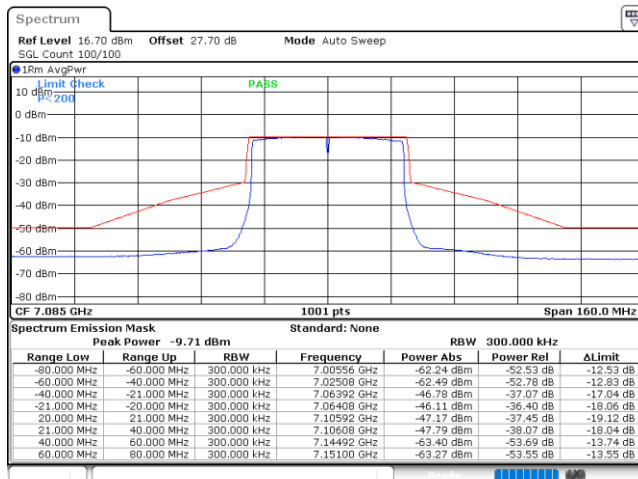
Date: 4.DEC.2021 11:09:07

## Plot on Channel 6965MHz



Date: 4.DEC.2021 12:49:08

## Plot on Channel 7085MHz

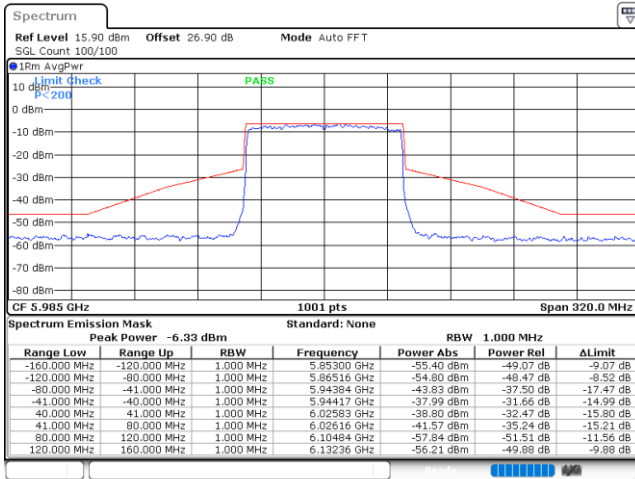


Date: 4.DEC.2021 12:54:30



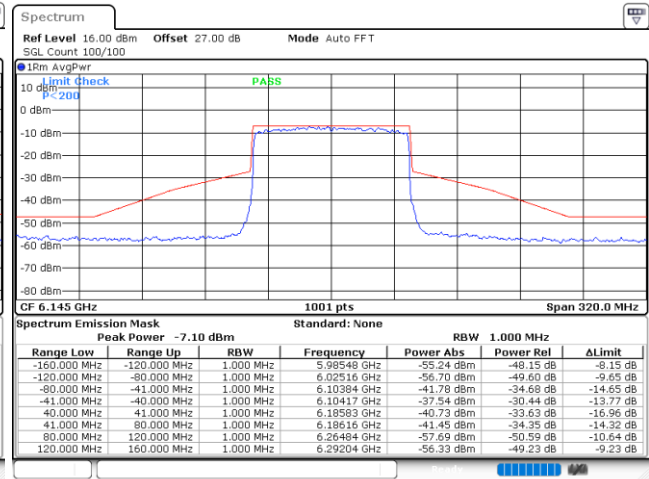
EUT Mode : 802.11ax HE80

Plot on Channel 5985MHz



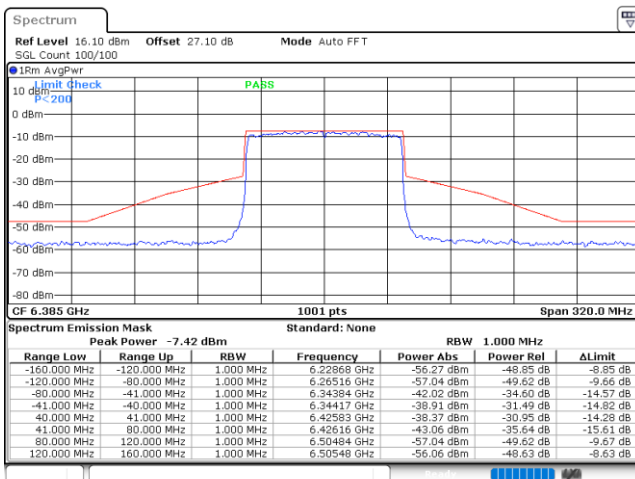
Date: 4.DEC.2021 13:21:06

Plot on Channel 6145MHz



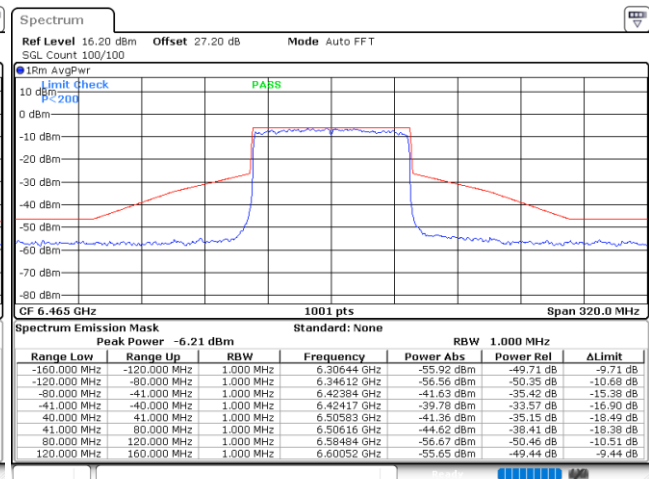
Date: 4.DEC.2021 13:26:31

Plot on Channel 6385MHz



Date: 4.DEC.2021 13:32:42

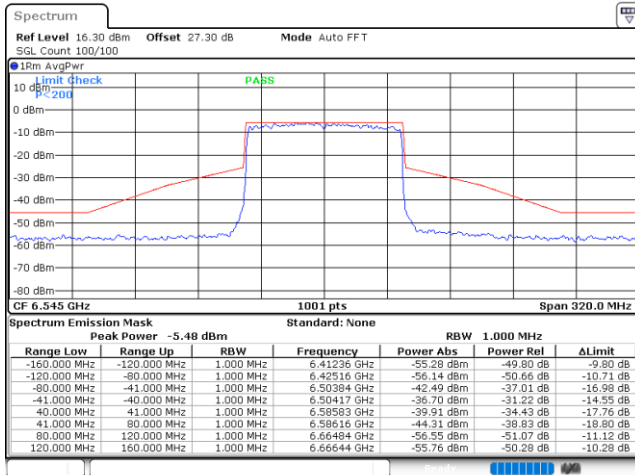
Plot on Channel 6465MHz



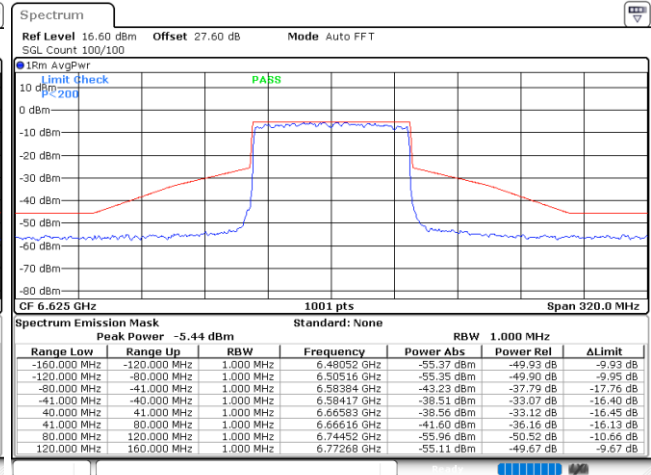
Date: 4.DEC.2021 13:44:29



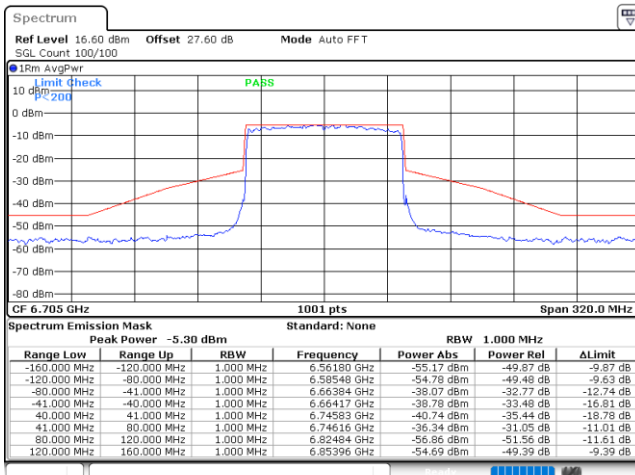
Plot on Channel 6545MHz



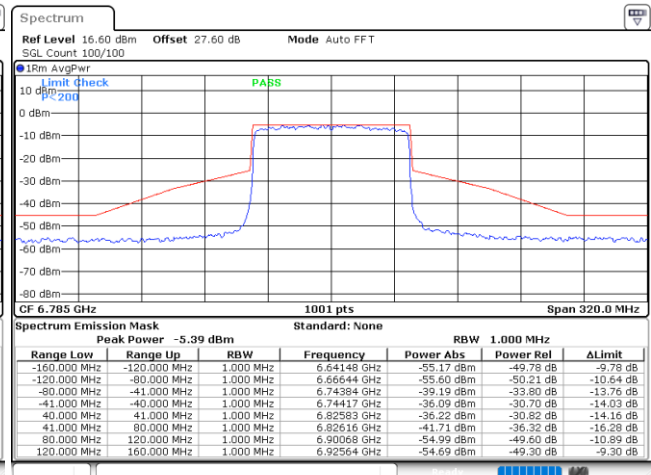
Plot on Channel 6625MHz



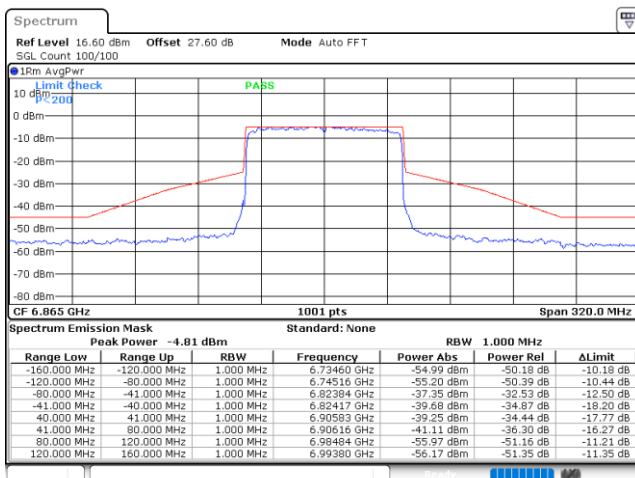
Plot on Channel 6705MHz



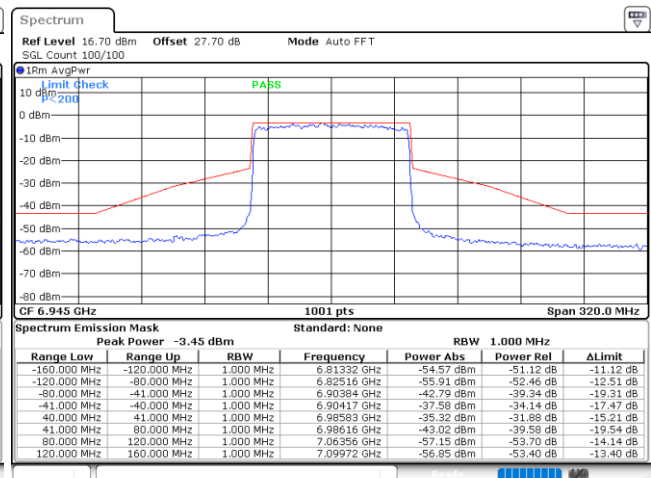
Plot on Channel 6785MHz



Plot on Channel 6865MHz

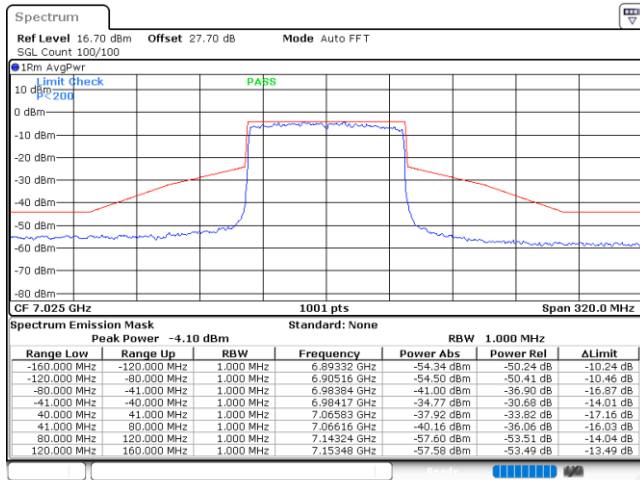


Plot on Channel 6945MHz





## Plot on Channel 7025MHz

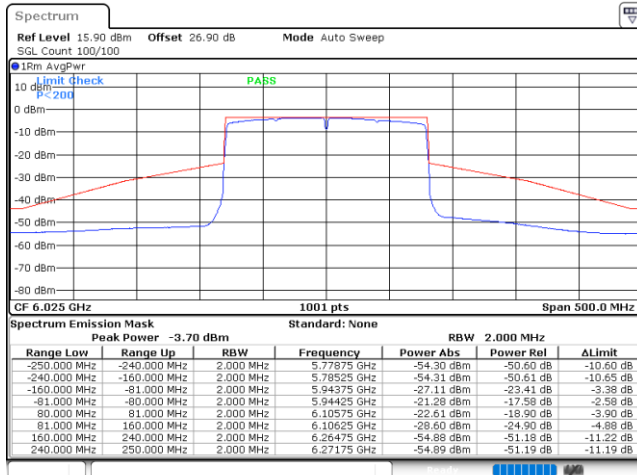


Date: 4.DEC.2021 14:24:29



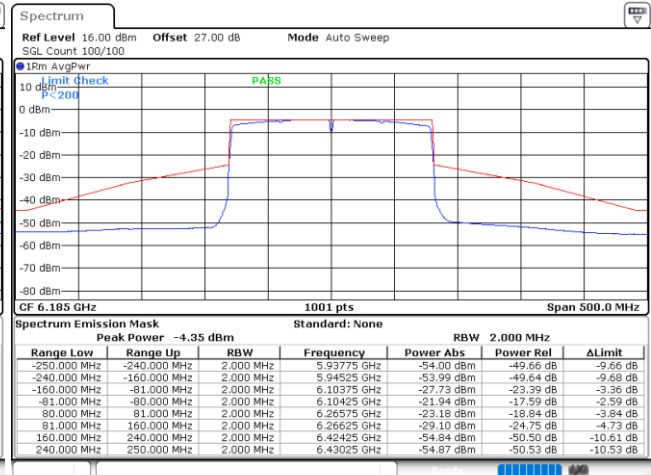
EUT Mode : 802.11ax HE160

## Plot on Channel 6025MHz



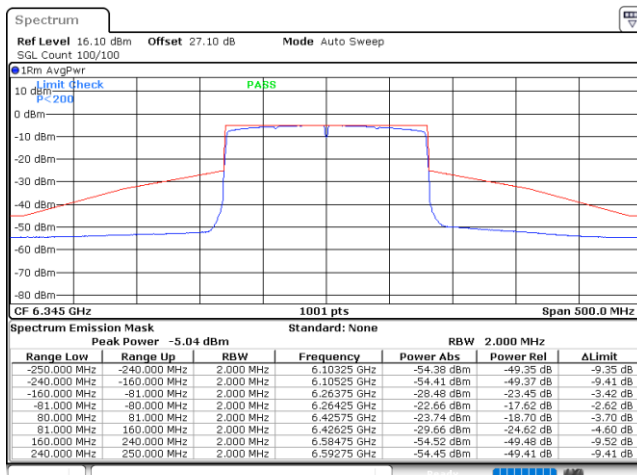
Date: 4.DEC.2021 14:39:29

## Plot on Channel 6185MHz



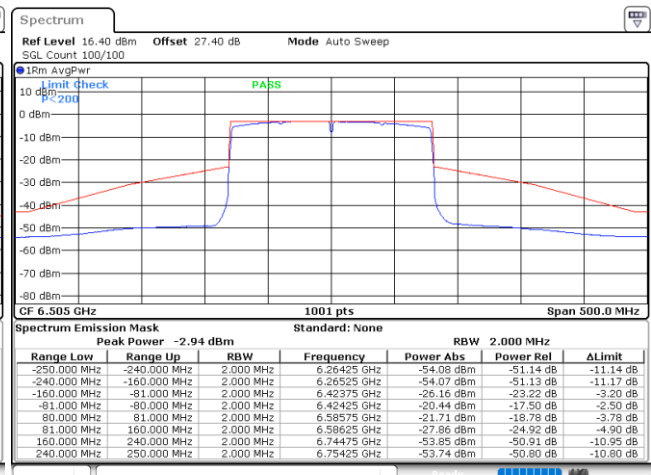
Date: 4.DEC.2021 14:43:42

## Plot on Channel 6345MHz



Date: 4.DEC.2021 14:47:04

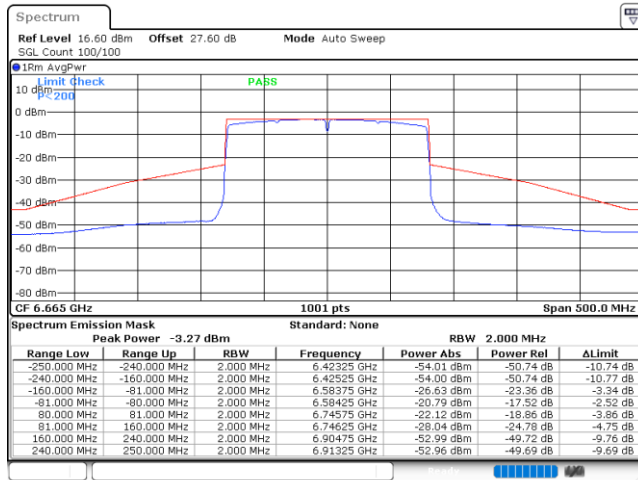
## Plot on Channel 6505MHz



Date: 4.DEC.2021 14:52:59

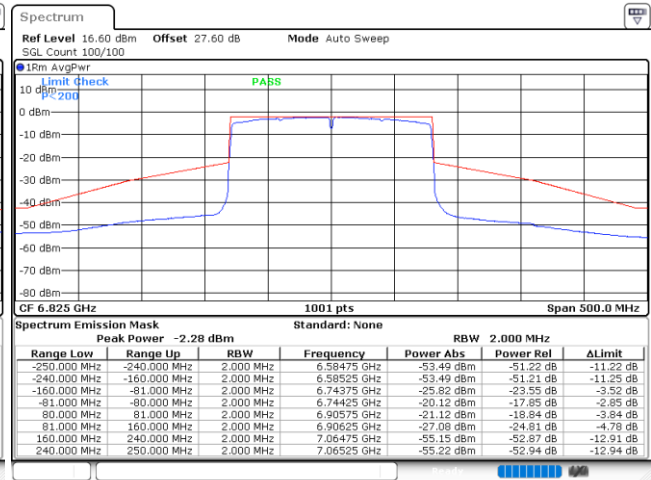


## Plot on Channel 6665MHz



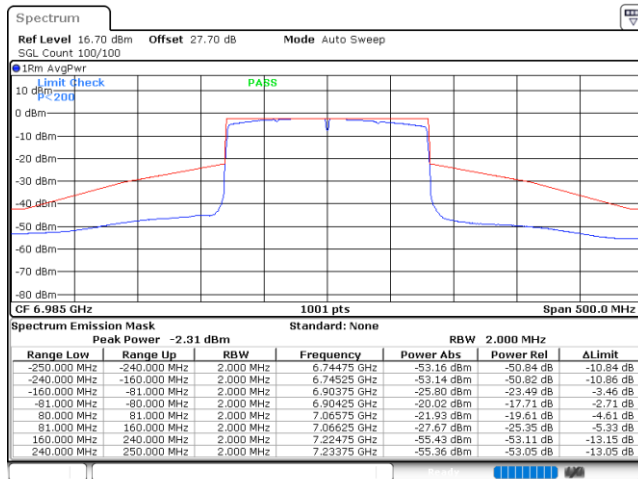
Date: 4.DEC.2021 14:58:49

## Plot on Channel 6825MHz



Date: 4.DEC.2021 15:07:20

## Plot on Channel 6985MHz



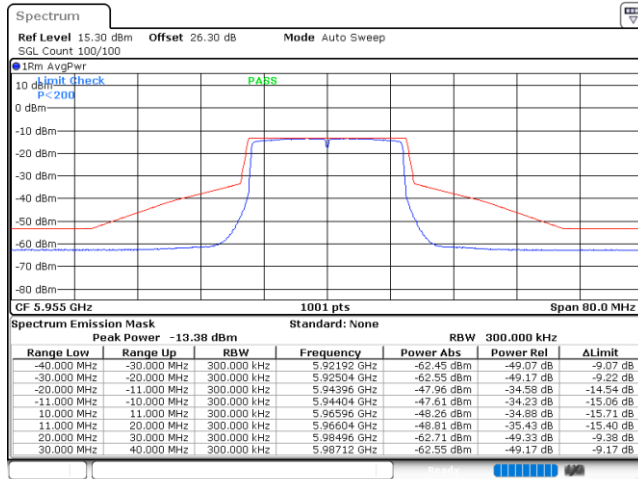
Date: 4.DEC.2021 15:47:41



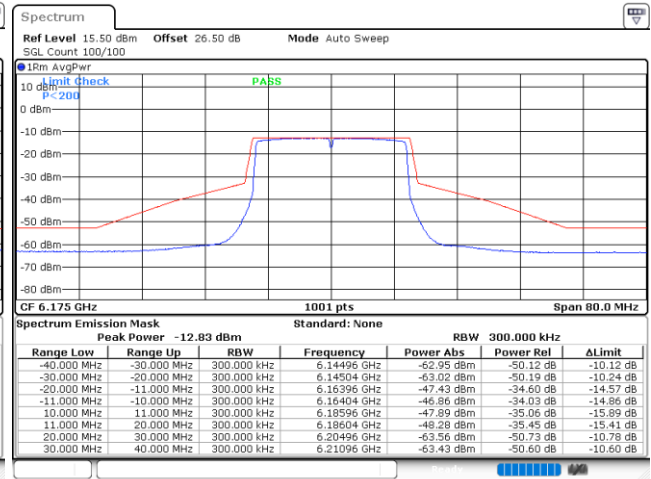
MIMO &lt;Ant. 17+18(18)&gt;

EUT Mode : 802.11ax HE20

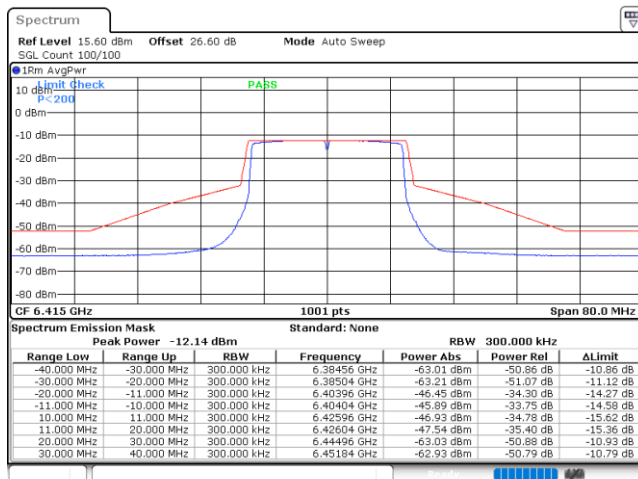
Plot on Channel 5955MHz



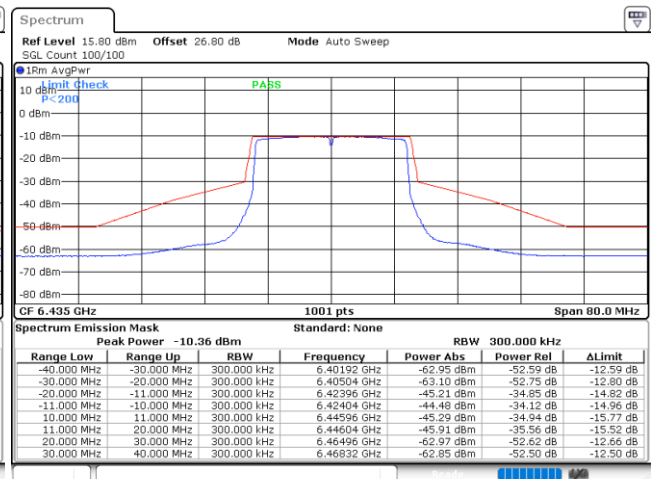
Plot on Channel 6175MHz



Plot on Channel 6415MHz

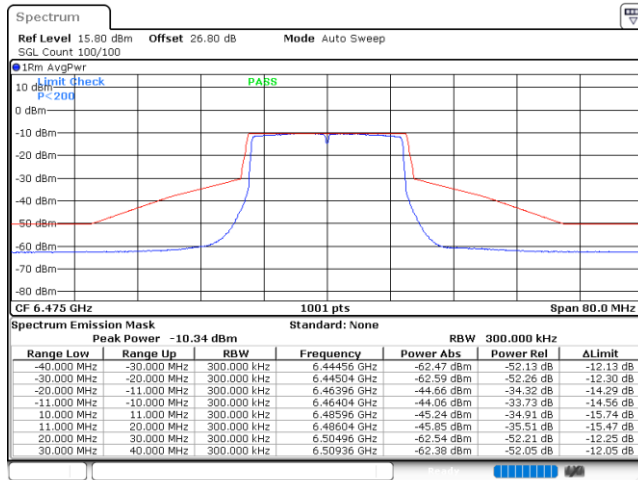


Plot on Channel 6435MHz



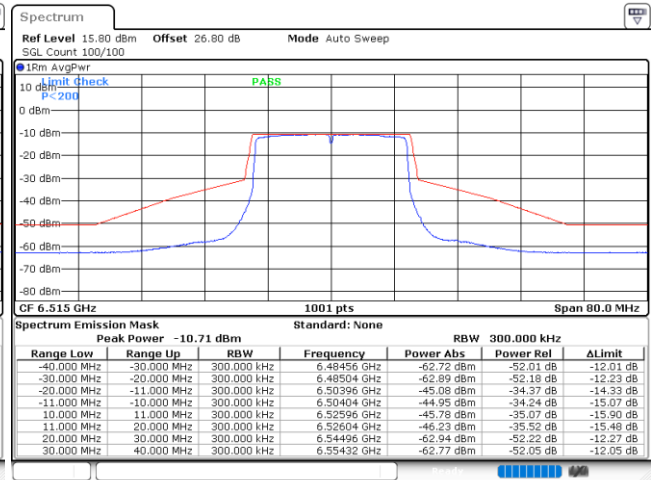


### Plot on Channel 6475MHz



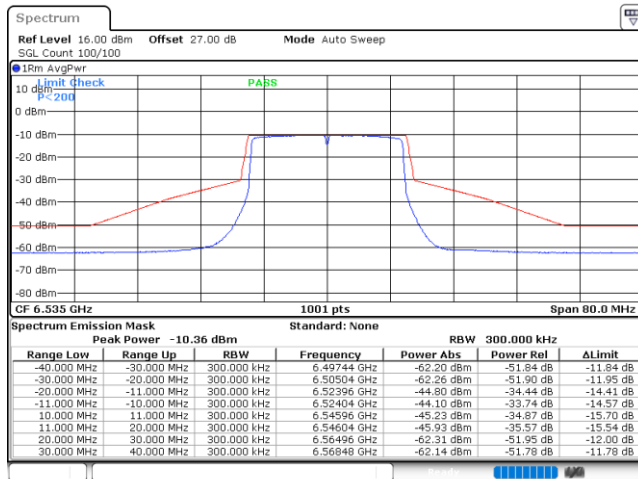
Date: 3.DEC.2021 19:00:41

### Plot on Channel 6515MHz



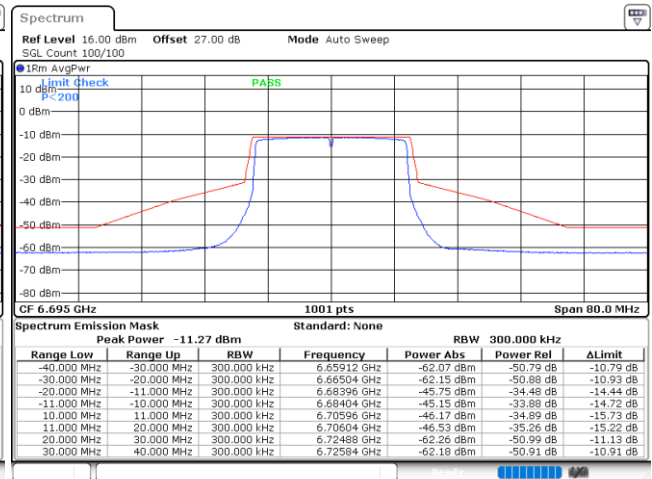
Date: 4.DEC.2021 08:37:11

### Plot on Channel 6535MHz



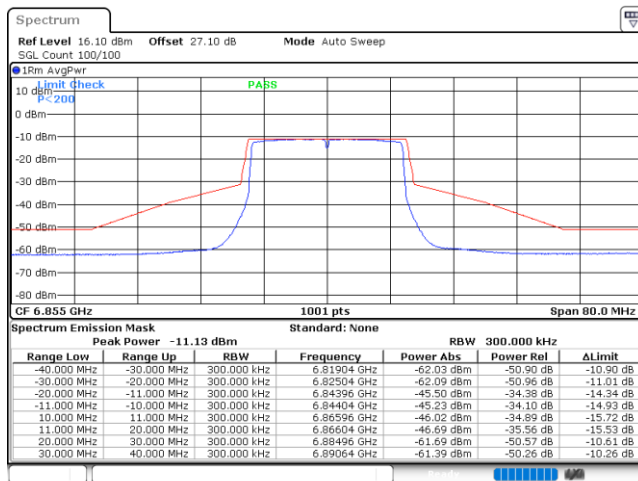
Date: 4.DEC.2021 08:45:06

### Plot on Channel 6695MHz



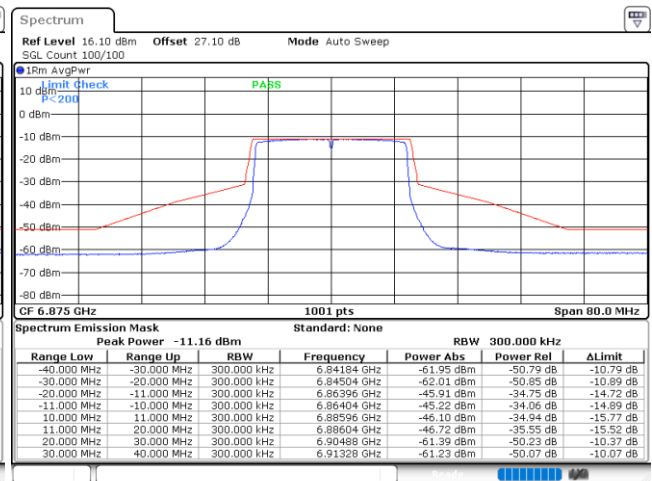
Date: 4.DEC.2021 08:52:51

### Plot on Channel 6855MHz



Date: 4.DEC.2021 09:00:55

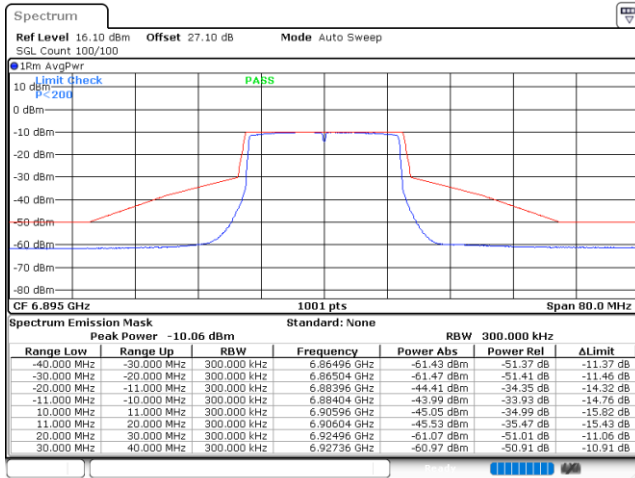
### Plot on Channel 6875MHz



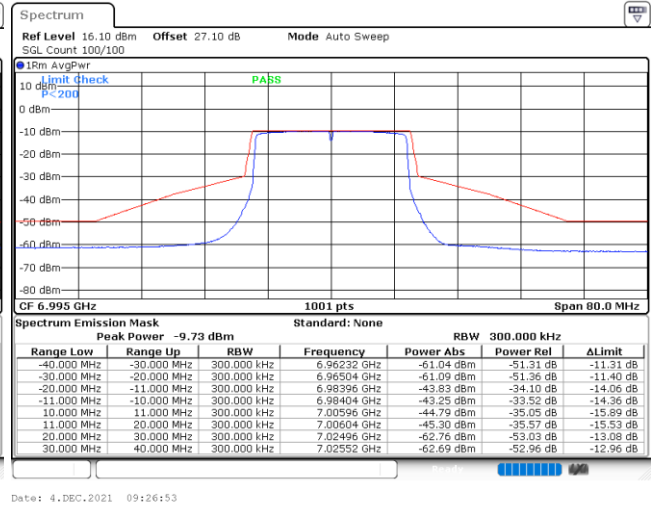
Date: 4.DEC.2021 09:17:56



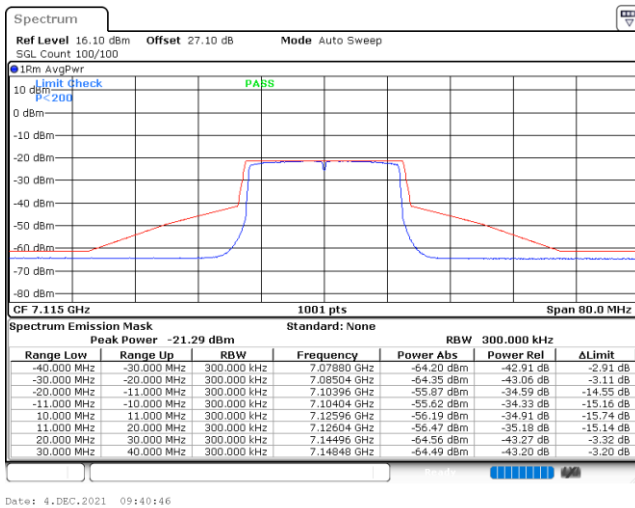
## Plot on Channel 6895MHz



## Plot on Channel 6995MHz



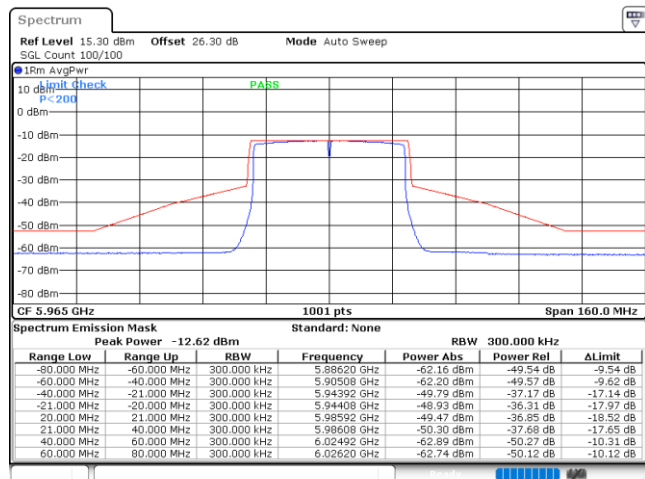
## Plot on Channel 7115MHz



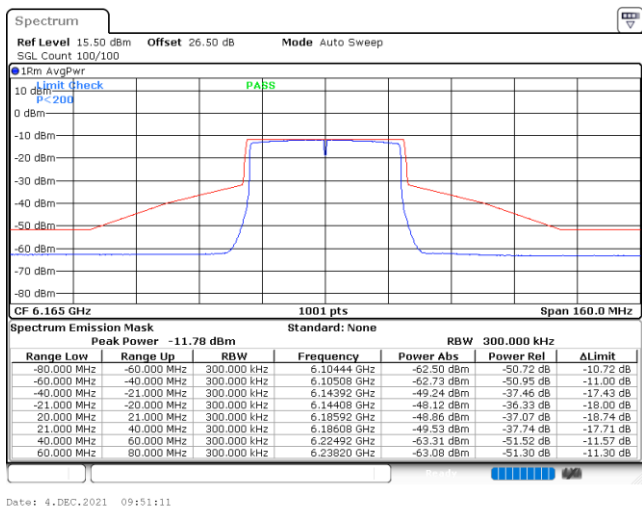


EUT Mode : 802.11ax HE40

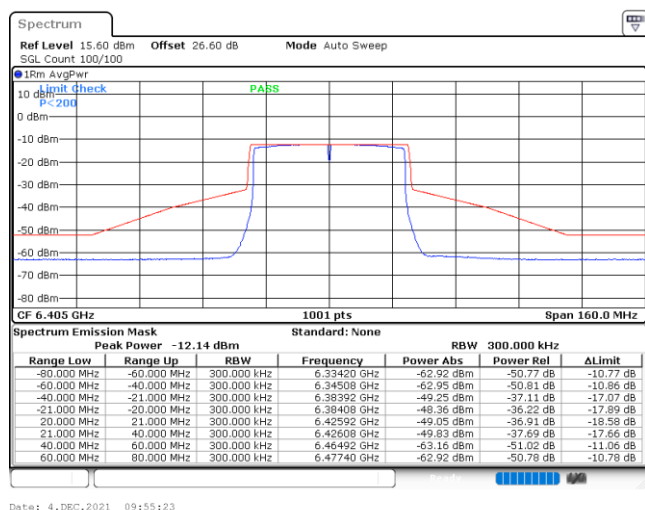
Plot on Channel 5965MHz



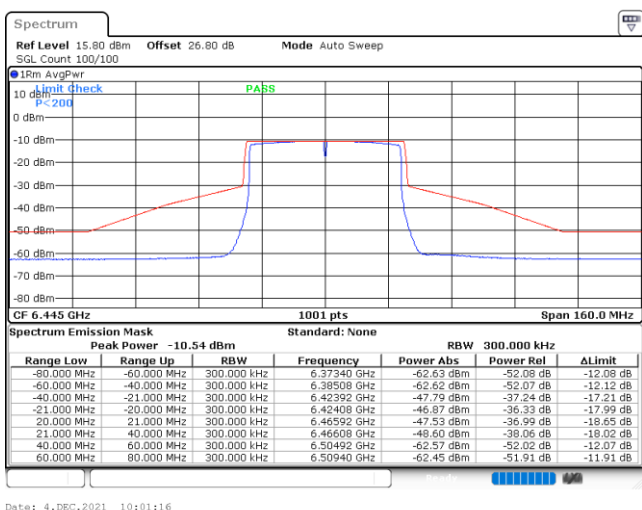
Plot on Channel 6165MHz



Plot on Channel 6405MHz

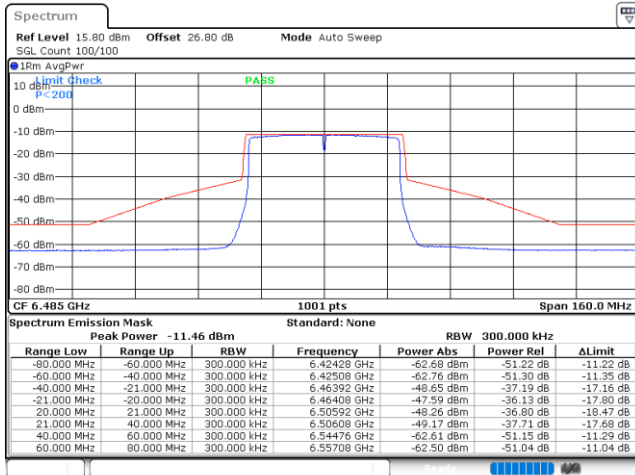


Plot on Channel 6445MHz



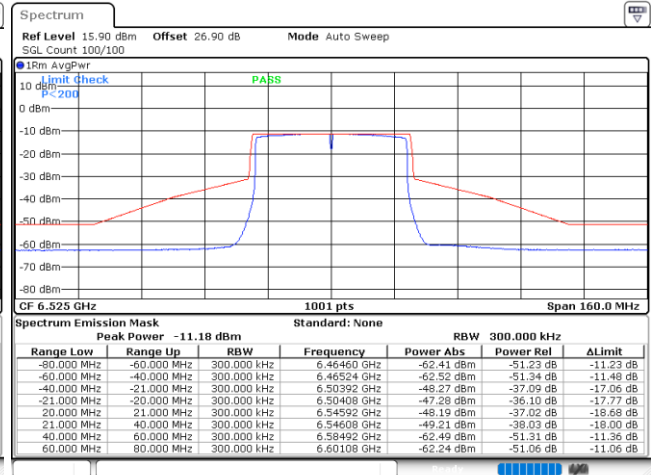


## Plot on Channel 6485MHz



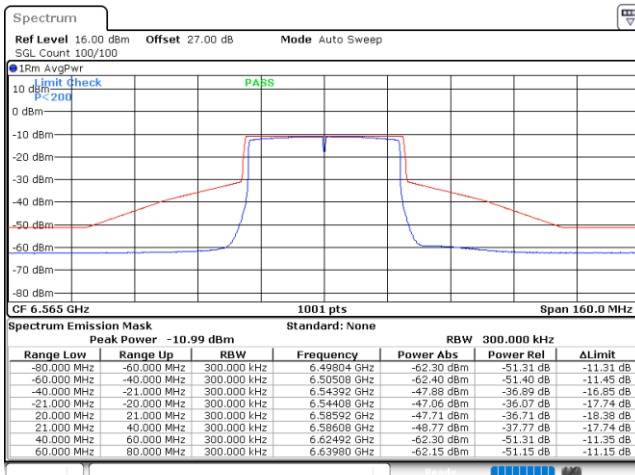
Date: 4.DEC.2021 10:04:56

## Plot on Channel 6525MHz



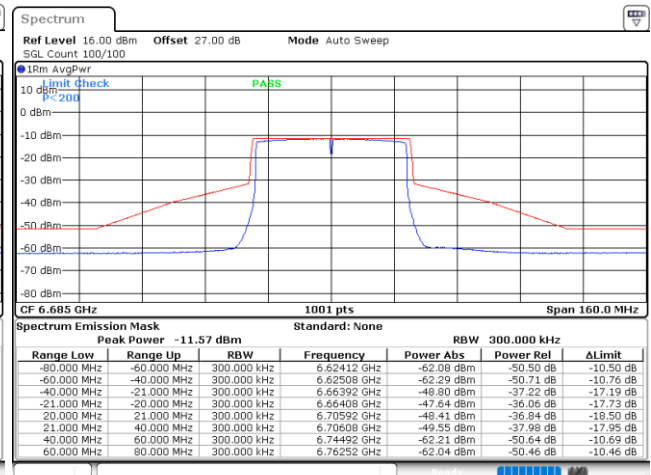
Date: 4.DEC.2021 10:20:03

## Plot on Channel 6565MHz



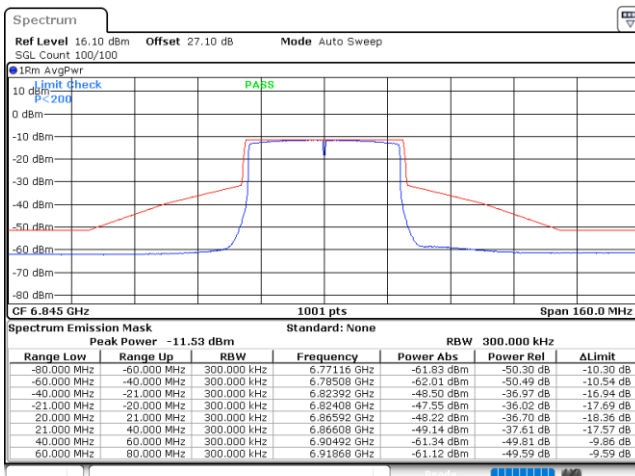
Date: 4.DEC.2021 10:34:27

## Plot on Channel 6685MHz



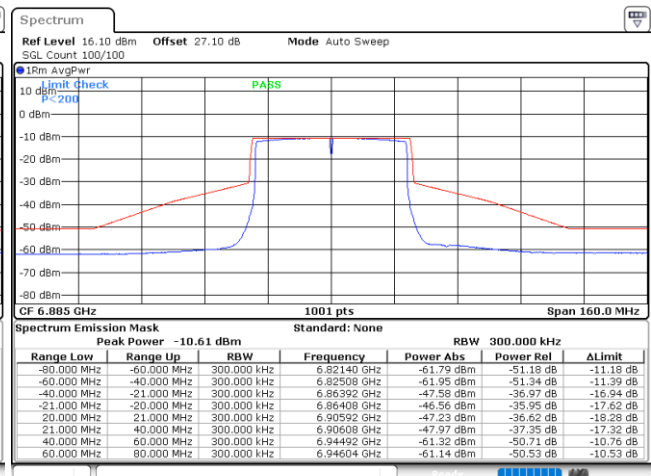
Date: 4.DEC.2021 10:39:49

## Plot on Channel 6845MHz



Date: 4.DEC.2021 10:44:24

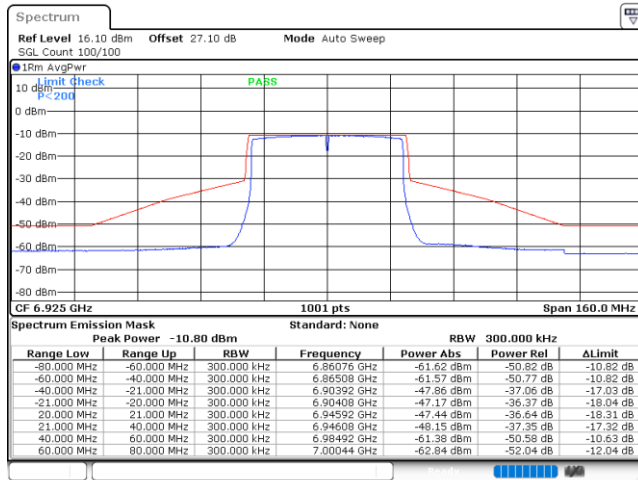
## Plot on Channel 6885MHz



Date: 4.DEC.2021 11:04:33

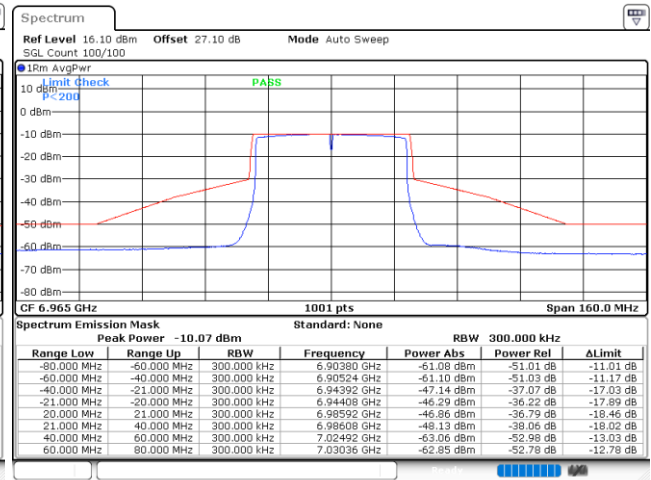


## Plot on Channel 6925MHz



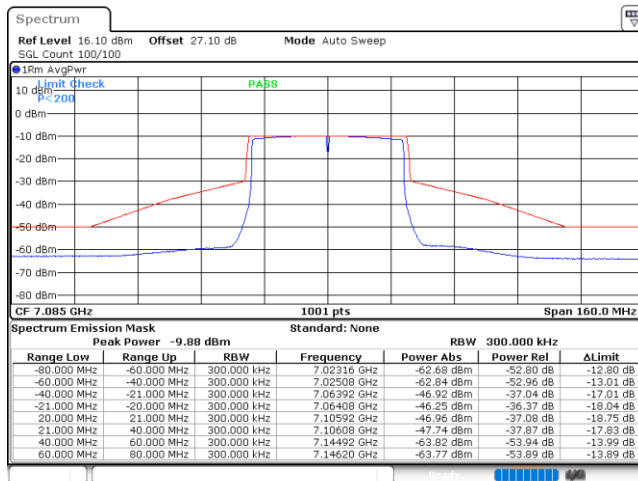
Date: 4.DEC.2021 11:13:42

## Plot on Channel 6965MHz



Date: 4.DEC.2021 12:50:37

## Plot on Channel 7085MHz

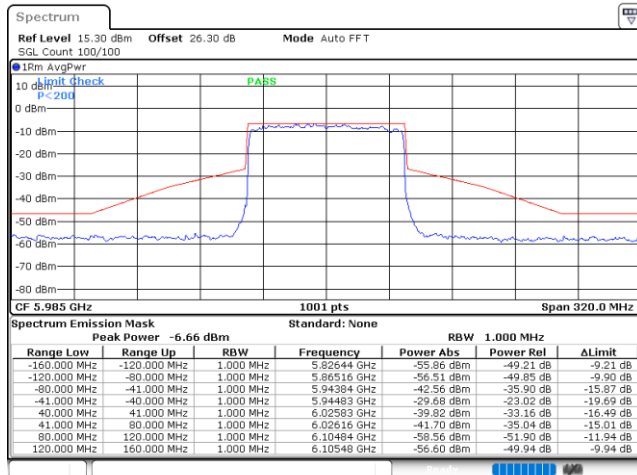


Date: 4.DEC.2021 12:55:54

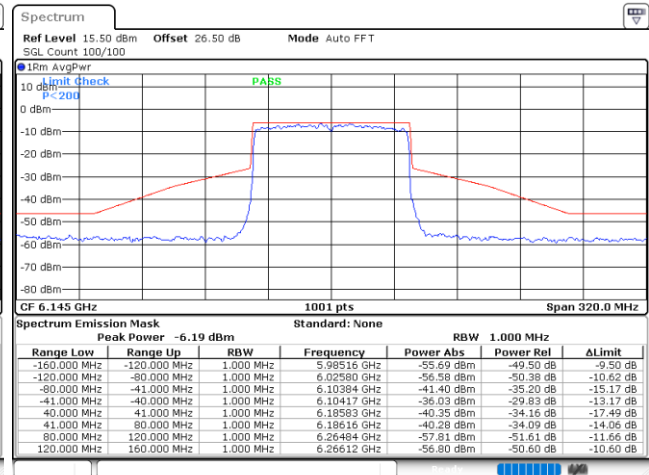


EUT Mode : 802.11ax HE80

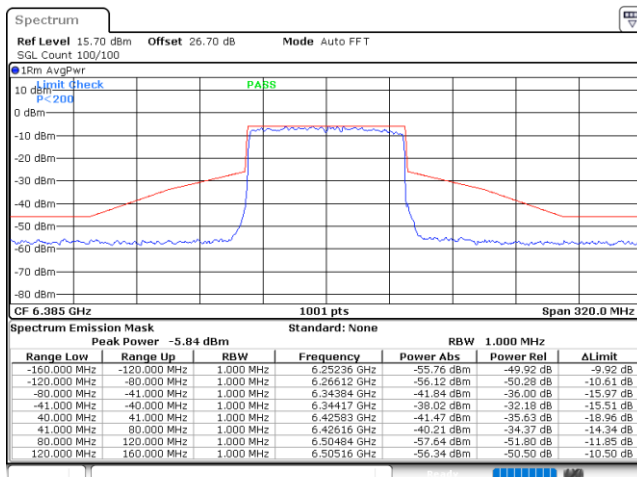
Plot on Channel 5985MHz



Plot on Channel 6145MHz



Plot on Channel 6385MHz



Plot on Channel 6465MHz

