



FCC RADIO TEST REPORT

FCC ID : S9GR760
Equipment : R760 Access Point
Brand Name : RUCKUS
Model Name : R760
Applicant : Ruckus Wireless LLC
350 W. Java Dr., Sunnyvale CA 94089 USA
Manufacturer : Ruckus Wireless LLC
350 W. Java Dr., Sunnyvale CA 94089 USA
Standard : FCC Part 15 Subpart E §15.407

The product was received on Jul. 28, 2021 and testing was performed from Aug. 15, 2021 to Aug. 07, 2024. We, Sporton International (USA) Inc., 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 (USA) Inc., the test report shall not be reproduced except in full.

Approved by: Neil Kao

Sporton International (USA) Inc.
1175 Montague Expressway, Milpitas, CA 95035



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History of this test report

| Report No. | Version | Description | Issue Date |
|-----------------|---------|--|---------------|
| FR210728001-08B | 01 | Initial issue of report | Oct. 15, 2024 |
| FR210728001-08B | 02 | Revise appendix A and Section 3.3 This report is an updated version, replacing the report issued on Oct. 15, 2024. | Oct. 21, 2024 |
| FR210728001-08B | 03 | Revise appendix A and Antenna Directional Gain This report is an updated version, replacing the report issued on Oct. 21, 2024. | Oct. 22, 2024 |
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Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|---------------------|------------------------------------|--------------------|--|
| 3.1 | 15.407(a)(10) | 26dB Emission Bandwidth | Pass | - |
| 3.1 | 2.1049 | 99% Occupied Bandwidth | Pass | - |
| 3.2 | 15.407(a)(4) | Fundamental Maximum EIRP | Pass | - |
| 3.3 | 15.407(a)(4) | Fundamental Power Spectral Density | Pass | - |
| 3.4 | 15.407(b)(6) | In-Band Emissions (Channel Mask) | Pass | - |
| - | 15.407(d)(6) | Contention Based Protocol | Not Required | Standard Access Points |
| 3.5 | 15.407(b) | Unwanted Emissions | Pass | 0.70 dB under the limit at 5912.68 MHz |
| 3.6 | 15.207 | AC Conducted Emission | Pass | 9.27 dB under the limit at 0.37 MHz |
| 3.7 | 15.203 15.407(a) | Antenna Requirement | Pass | - |

Note:

- Not required means after assessing, test items are not necessary to carry out.
- Except AC Conducted Emissions and Unwanted Emissions are carrying out, the FR210728001-08B report reuses test data from the FR210728001F report.

Conformity Assessment Condition:

- The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

Disclaimer:

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



1 General Description

1.1 Product Feature of Equipment Under Test

The EUT is an indoor AP with radios including Bluetooth - LE, Wi-Fi 2.4GHz 802.11b/g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, Wi-Fi 6GHz 802.11a/n/ac/ax, 802.15.4 (Zigbee), equipped with integrated antennas configured below:

| Antenna Configuration | |
|-----------------------|--|
| Antenna Type | <p>WLAN 2.4GHz <Ant. A>: Omni Antenna <Ant. B>: Omni Antenna <Ant. C>: Omni Antenna <Ant. D>: Omni Antenna</p> <p>WLAN 5GHz Radio 1 and Radio 2: <Ant. A>: Omni Antenna <Ant. B>: Omni Antenna <Ant. C>: Omni Antenna <Ant. D>: Omni Antenna Radio 3: <Ant. E>: Omni Antenna <Ant. F>: Omni Antenna <Ant. G>: Omni Antenna <Ant. H>: Omni Antenna</p> <p>WLAN 6GHz <Ant. E>: Omni Antenna <Ant. F>: Omni Antenna <Ant. G>: Omni Antenna <Ant. H>: Omni Antenna</p> <p>Bluetooth-LE: <Ant. 1>Omni Antenna Zigbee: <Ant. 1>Omni Antenna</p> |

| Antenna information | | | |
|---------------------|-----------------|------------|--------------------------------|
| 5925 MHz ~ 6425 MHz | Peak Gain (dBi) | Vertical | <Ant. E>: 3.7 <Ant. H>: 3.7 |
| | | Horizontal | <Ant. F>: 3.8 <Ant. G>: 3.8 |
| 6525 MHz ~ 6875 MHz | Peak Gain (dBi) | Vertical | <Ant. E>: 3.7 <Ant. H>: 3.7 |
| | | Horizontal | <Ant. F>: 3.8 <Ant. G>: 3.8 |

Remark:

- The above EUT's information is declared by manufacturer. Please refer to Comments and Explanations in report summary.
- The device is a special case of MIMO system with four outputs driving a cross-polarized pair of linearly polarized antennas (noted as "vertical" and "horizontal").
The antenna printed on the secondary board which is vertically/horizontally mounted on the main board. Horizontal and Vertical antennas are cross-polarization antenna and the transmitter outputs is a 90-degree phase-shifted replica of the other and the phase centers of the two antennas orientations are co-located.

1.1.1 Antenna Directional Gain

The device is the special case of a MIMO system with four outputs driving a cross-polarized pair of linearly polarized antennas (noted as "vertical" and "horizontal").

Refer to KDB 662911 D01 v02r01 F)2)c) for a system in which the antennas have fixed orientations relative to one another that ensure that the antennas are cross-polarized regardless of any user actions, the directional gain is computed as follows.

The total gain—including array gain—is computed separately for each of the two polarizations using the procedures presented in KDB 662911 D01 v02r01. The highest of the total gains shall apply.

Horizontal and Vertical antennas are cross-polarization antenna and the transmitter outputs is a 90-degree phase-shifted replica of the other and the phase centers of the two antennas orientations are co-located.

For power measurements on IEEE 802.11 devices,

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows:

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

G_{ANT} is set equal to the gain of the antenna having the highest gain.

For PSD measurements, the directional gain calculation follows F)2)f)i) of KDB 662911 D01

Directional gain = $G_{ANT\ MAX} + 10 \log(N_{ANT}/N_{SS})$ dBi, where N_{SS} = the number of independent spatial streams of data and $G_{ANT\ MAX}$ is the gain of the antenna having the highest gain (in dBi).

The directional gain of EUT is listed in the following table.

| 6GHz CDD mode | Ant E Vertical polarization (dBi) | Ant H Vertical polarization (dBi) | DG for Power (dBi) | DG for PSD (dBi) |
|------------------|--|--|-----------------------------|---------------------------|
| UNII-5 | 3.70 | 3.70 | 3.70 | 6.71 |
| UNII-7 | 3.70 | 3.70 | 3.70 | 6.71 |
| 6GHz CDD mode | Ant F Horizontal polarization (dBi) | Ant G Horizontal polarization (dBi) | DG for Power (dBi) | DG for PSD (dBi) |
| UNII-5 | 3.80 | 3.80 | 3.80 | 6.81 |
| UNII-7 | 3.80 | 3.80 | 3.80 | 6.81 |

Calculation:

Directional gain of power measurement(Horizontal polarization):

= max. antenna gain (3.8dBi, 3.8dBi) + 0 = 3.8 dBi

Directional gain of power measurement(Vertical polarization):

= max. antenna gain (3.7dBi, 3.7dBi) + 0 = 3.7 dBi

Directional gain of PSD measurement (Horizontal polarization):

= max. antenna gain (3.8dBi, 3.8dBi)+10*log(2/1) = 6.81dBi

Directional gain of PSD measurement (Vertical polarization):

= max. antenna gain (3.7dBi, 3.7dBi)+10*log(2/1) = 6.71dBi



1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 Testing Location

| | |
|---------------------------|---|
| Test Site | Sporton International (USA) Inc. |
| Test Site Location | 1175 Montague Expressway, Milpitas, CA 95035 TEL : 408 9043300 |
| Test Site No. | Sporton Site No. |
| | TH01-CA, 03CH02-CA, CO01-CA |

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

FCC Designation No.: US1250

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 v03
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

Remark: All the test items were validated and recorded in accordance with the standards without any modification during the testing.

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 antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.
- 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 | 117 | 121 | 125 |
| | Freq. (MHz) | 6535 | 6555 | 6575 |
| BW 40M | Channel | - | | 123 |
| | Freq. (MHz) | - | | 6565 |

| | | | | | | | | | |
|---------|-------------|------|------|------|------|------|------|------|------|
| 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 |
| | Freq. (MHz) | 6755 | 6775 | 6795 | 6815 | 6835 | 6855 |
| BW 40M | Channel | 163 | | 171 | | 179 | |
| | Freq. (MHz) | 6765 | | 6805 | | 6845 | |
| BW 80M | Channel | 167 | | | - | | |
| | Freq. (MHz) | 6785 | | | - | | |

2.2 Test Mode

All modulation schemes/data rate are verified by conducted power test case, and the modulation schemes with highest power is used for all test cases. The final test items are considering the modulation schemes and the worst data rates as the table below.

CDD Mode

| Modulation | Data Rate |
|------------------------------------|-----------|
| 802.11a | 6 Mbps |
| 802.11n HT20 (Covered by HE20) | MCS0 |
| 802.11n HT40 (Covered by HE40) | MCS0 |
| 802.11ac VHT20 (Covered by HE20) | MCS0 |
| 802.11ac VHT40 (Covered by HE40) | MCS0 |
| 802.11ac VHT80 (Covered by HE80) | MCS0 |
| 802.11ac VHT160 (Covered by HE160) | MCS0 |
| 802.11ax HE20 | MCS0 |
| 802.11ax HE40 | MCS0 |
| 802.11ax HE80 | MCS0 |
| 802.11ax HE160 | MCS0 |

Remark:

- 1 Since the verify power, the smaller power can be covered by the higher power. The SISO Mode is covered by MIMO Mode.
- 2 The 802.11ax covers the 802.11n and 11ac due to same modulation family scheme.
- 3 After preliminary scan, CDD mode is determined to be the worst case compared to Beamforming mode, hence, all the conducted test is performed in CDD mode.

AC Conducted Emission Test Cases are listed in the following table:

| Test Cases | |
|---|--|
| AC Conducted Emission | Mode 1 : WLAN (2.4GHz) Link + Bluetooth – LE Idle + Zigbee Link + WLAN (5GHz) Radio 2 Link + WLAN (6GHz) Link + AC Adapter + LAN 1 Link + LAN 2 Link + USB Flash Drive (Load) |
| | Mode 2 : WLAN (2.4GHz) Link + Bluetooth – LE Idle + Zigbee Link + WLAN (5GHz) Radio 3 Link + WLAN (5GHz) (Iron 5G -QPQ190) Link + AC Adapter + LAN1 Link + LAN 2 Link + USB Flash Drive (Load) |
| | Mode 3 : WLAN (2.4GHz) Link + Bluetooth – LE Link + Zigbee Idle + WLAN (5GHz) Radio 2 Link + WLAN (6GHz) Link + AC Adapter + LAN 1 Link + LAN 2 Link + USB Flash Drive (Load) |
| Remark: The worst case of Conducted Emission is mode 1; only the test data of it was reported. | |

| Ch. # | | UNII-5 (5925-6425 MHz) | UNII-7 (6525-6875 MHz) |
|-------|--------|---------------------------|---------------------------|
| | | 802.11a | 802.11a |
| L | Low | 001 | 117 |
| M | Middle | 045 | 149 |
| H | High | 093 | 181 |

| Ch. # | | UNII-5 (5925-6425 MHz) | | | |
|-------|--------|---------------------------|---------------|---------------|----------------|
| | | 802.11ax HE20 | 802.11ax HE40 | 802.11ax HE80 | 802.11ax HE160 |
| L | Low | 001 | 003 | 007 | 015 |
| M | Middle | 045 | 043 | 039 | 047 |
| H | High | 093 | 091 | 087 | 079 |

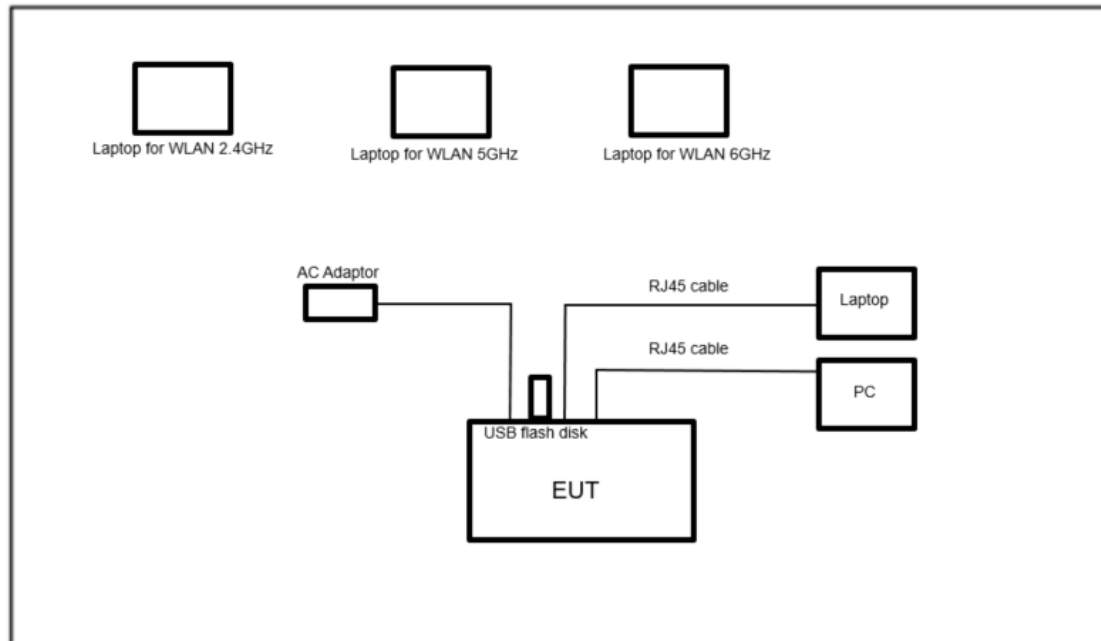
| Ch. # | | UNII-7 (6525-6875 MHz) | | | |
|-------|--------|---------------------------|---------------|---------------|----------------|
| | | 802.11ax HE20 | 802.11ax HE40 | 802.11ax HE80 | 802.11ax HE160 |
| L | Low | 117 | 123 | 135 | 143 |
| M | Middle | 149 | 147 | 151 | |
| H | High | 181 | 179 | 167 | |

Remark:

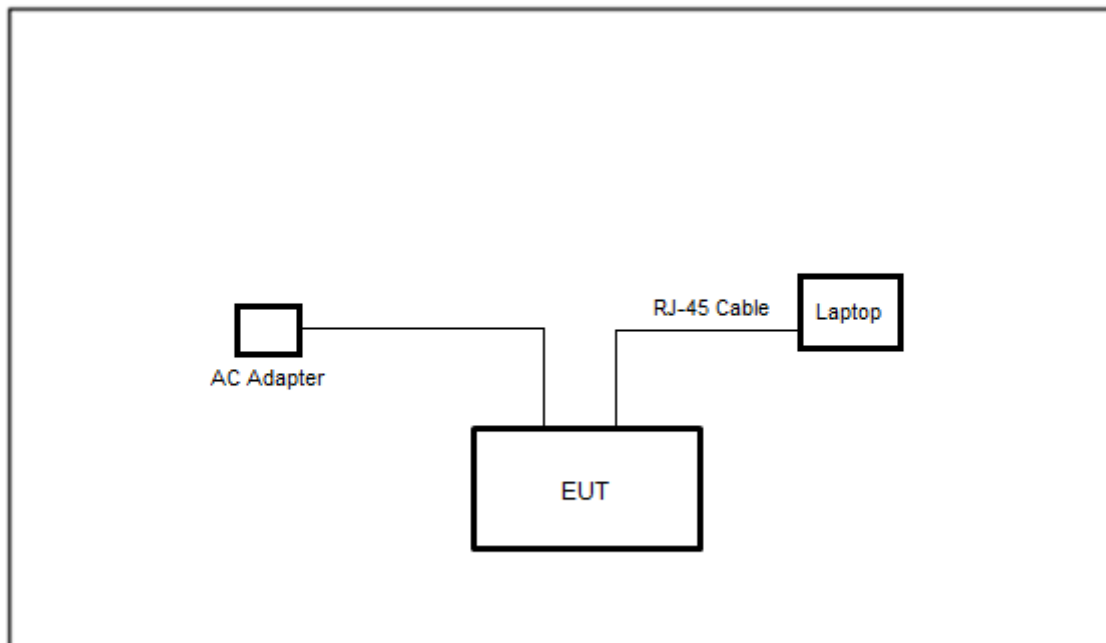
1. For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.
2. RF power on each chain in MIMO mode is greater than SISO mode. The SISO Mode is covered by MIMO Mode.
3. After preliminary scan designated by the manufacturer, CDD mode is determined to be the worst case compared to Beamforming mode, hence, all the radiated test is performed in CDD mode.
4. The setup method between CDD and Beamforming mode is identical except that one of the polarizations is disabled while Beamforming mode is activated so both modes share the same conducted power table. The only difference is how directional gain is calculated between two modes.
5. Partial RUs are not supported at the current product stage, the test report and test results do not cover any Partial RU test assessments.

2.3 Connection Diagram of Test System

<AC Conducted Emission Mode>



<Radiated Emission Mode>



2.4 Support Unit used in test configuration and system

| Item | Equipment | Brand Name | Model Name | FCC ID | Data Cable | Power Cord |
|------|-----------------|------------|--|---------|------------|--|
| 1. | Notebook | ACER | Altos PS548-G1 | FCC DoC | N/A | AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m |
| 2. | Notebook | LENOVO | 80RU | FCC DoC | N/A | AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m |
| 3. | Notebook | MSI | MS-17F3 | FCC DoC | N/A | AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m |
| 4. | PC | Fractal | FD-C-DEF7A-01 (NETINTX550TR Intel X550T2BLK) | FCC DoC | N/A | AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m |
| 5. | USB Flash drive | SanDisk | N/A | N/A | N/A | N/A |
| 6. | AC Adaptor | Ruckus | 740-64277-001 | N/A | N/A | AC I/P: Unshielded, 1.2m |

2.5 EUT Operation Test Setup

The RF test items, utility "PuTTY Release 0.62" 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.

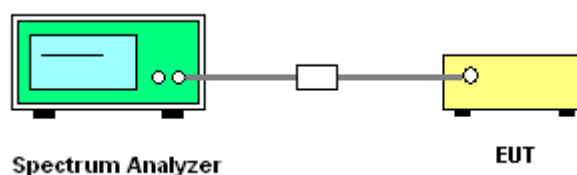
3.1.2 Measuring Instruments

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



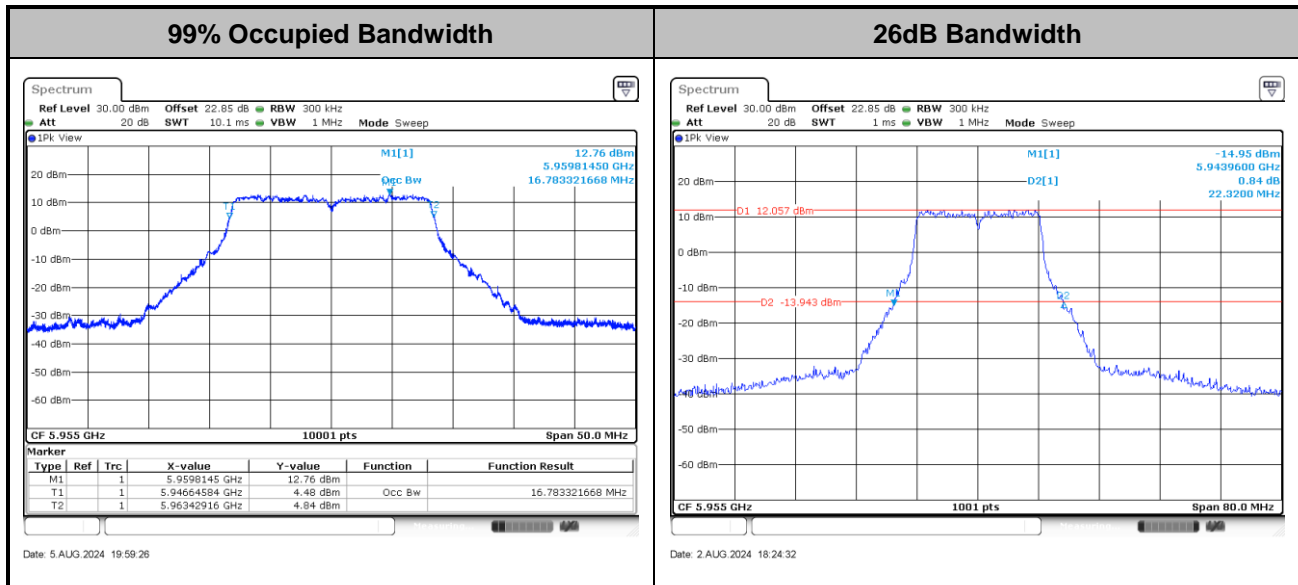
3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.

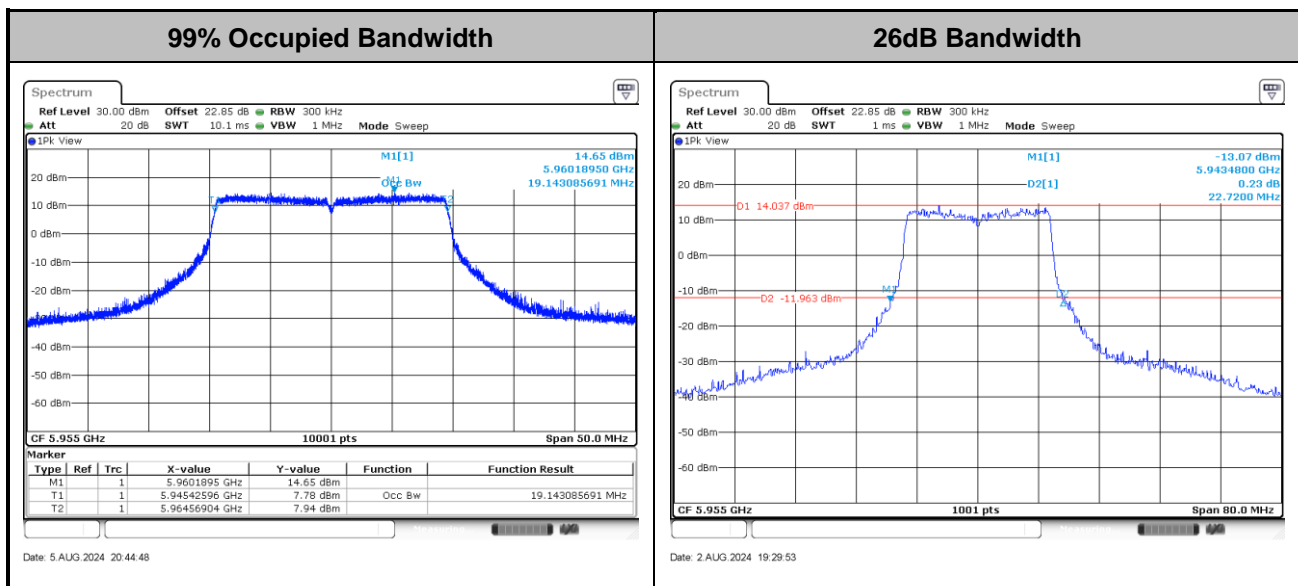


MIMO <Ant. E+F+G+H>

<802.11a>

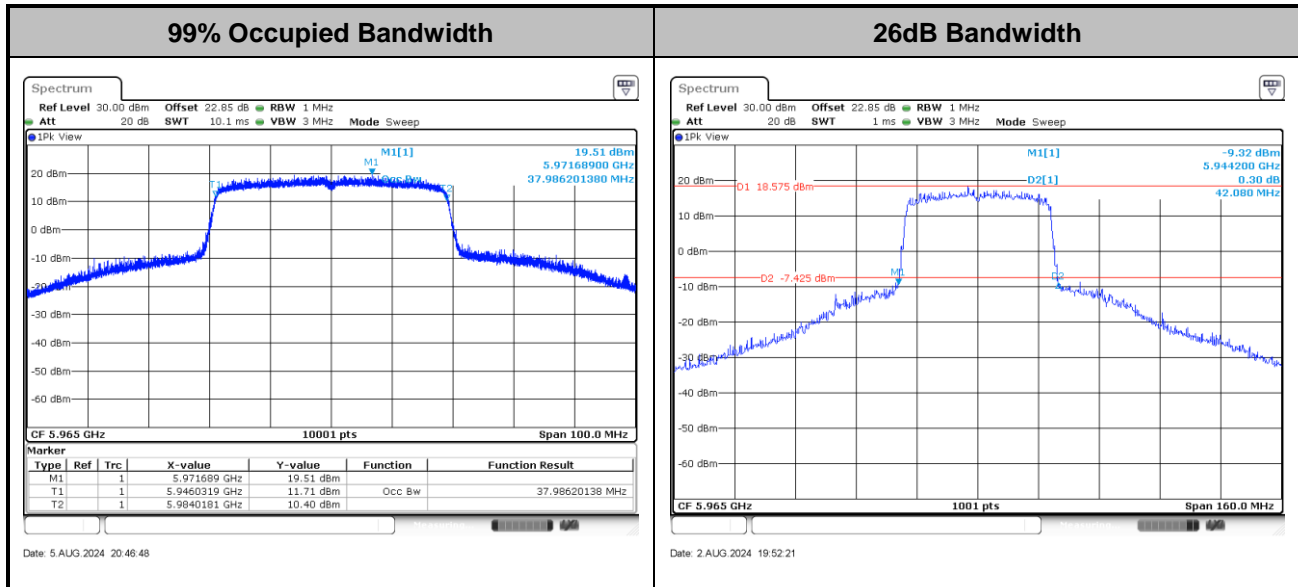


<802.11ax HE20>



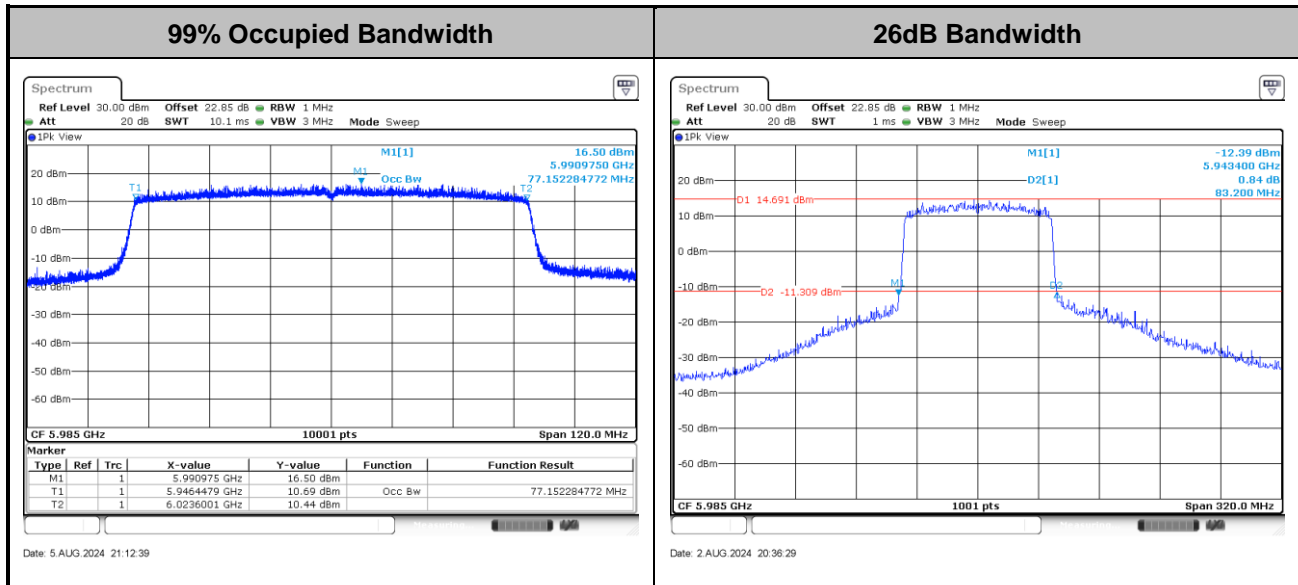


<802.11ax HE40>



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

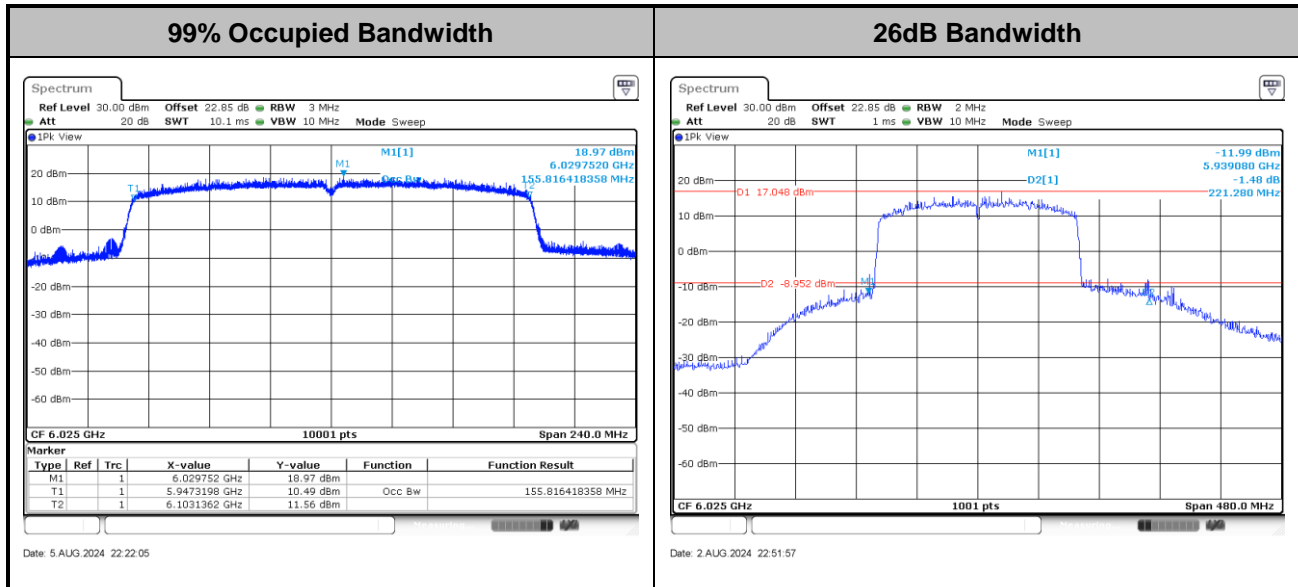
<802.11ax HE80>



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



<802.11ax HE160>



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

3.2 Fundamental Maximum EIRP Measurement

3.2.1 Limit of Fundamental Maximum EIRP

<FCC 14-30 CFR 15.407>

(a)(4) For a standard power access point and fixed client device operating in the 5.925–6.425 GHz and 6.525–6.875 GHz bands, the maximum power spectral density must not exceed 23 dBm e.i.r.p in any 1-megahertz band. In addition, the maximum e.i.r.p. over the frequency band of operation must not exceed 36 dBm. For outdoor devices, the maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

3.2.2 Measuring Instruments

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

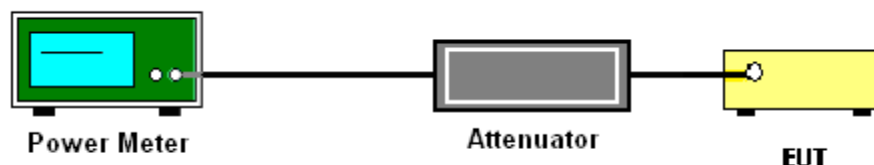
3.2.3 Test Procedures

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

Method PM-G (Measurement using a gated RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit at its maximum power control level.
3. Measure the average power of the transmitter.
4. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
5. 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)(4) For a standard power access point and fixed client device operating in the 5.925–6.425 GHz and 6.525–6.875 GHz bands, the maximum power spectral density must not exceed 23 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-2

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

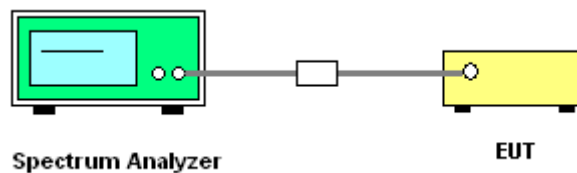
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW \geq 3 MHz.
- Number of points in sweep \geq 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

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

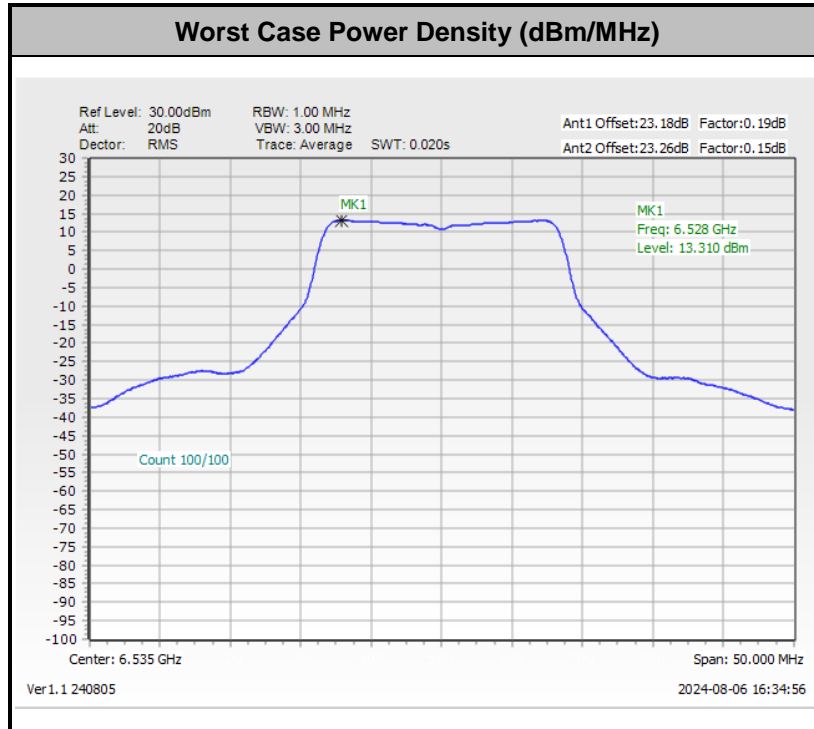




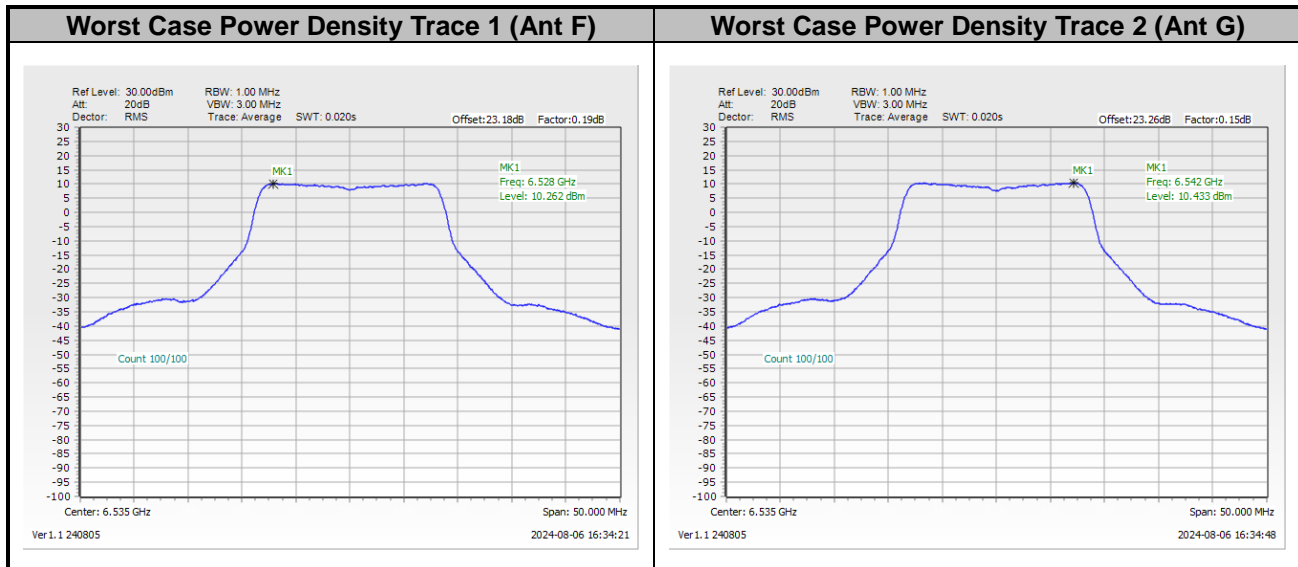
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

<802.11a 6535MHz>

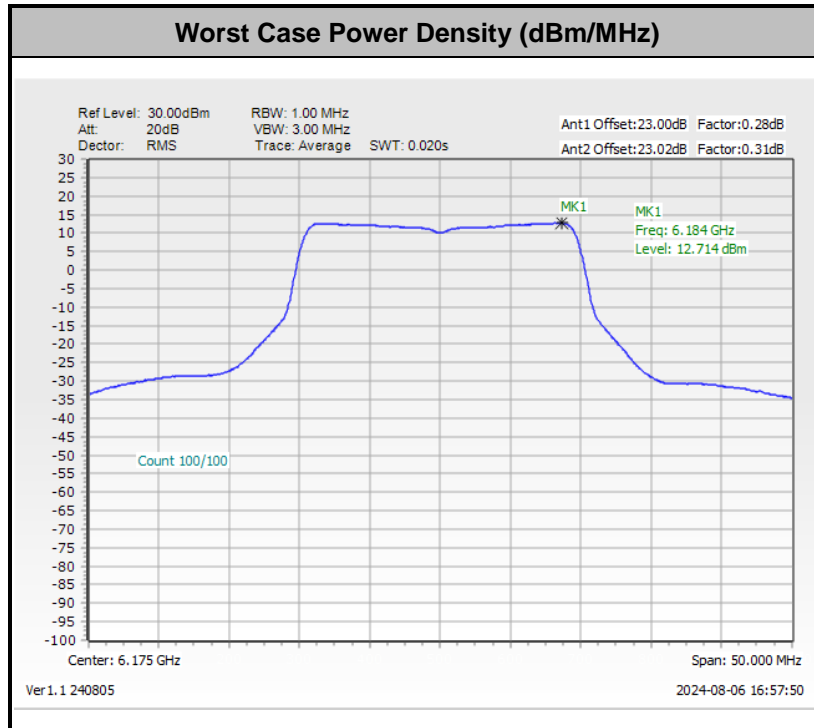


Remark: The test plot is showing a bin by bin combined result mathematically adds two traces.

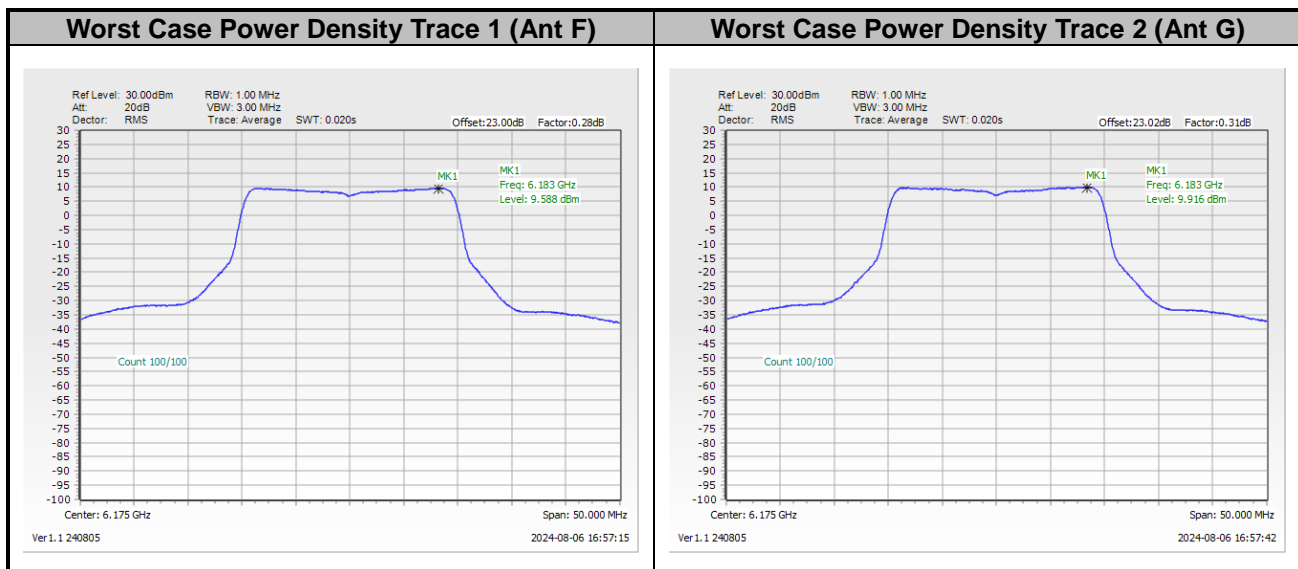




<802.11ax HE20 6175MHz>

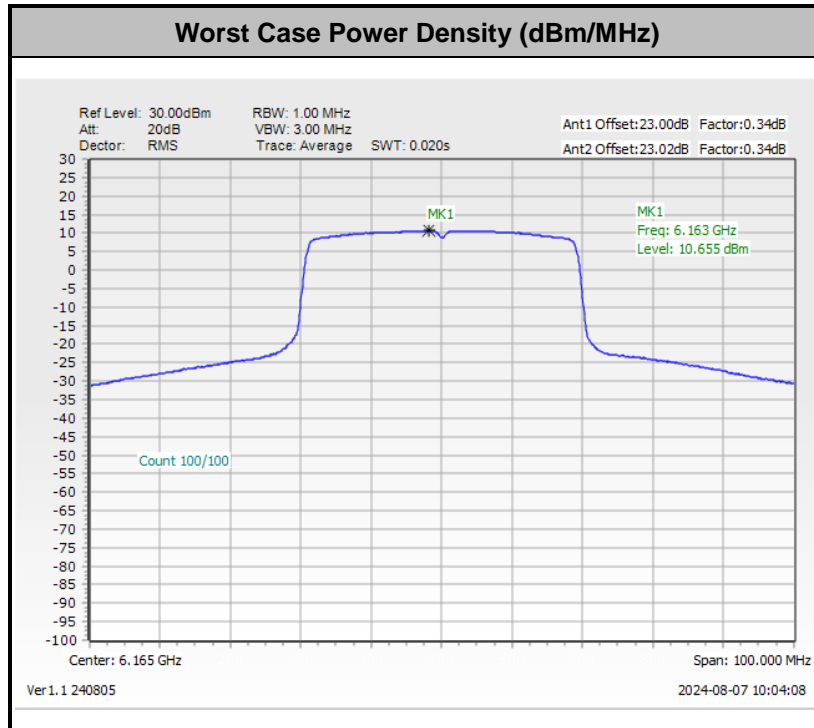


Remark: The test plot is showing a bin by bin combined result mathematically adds two traces.

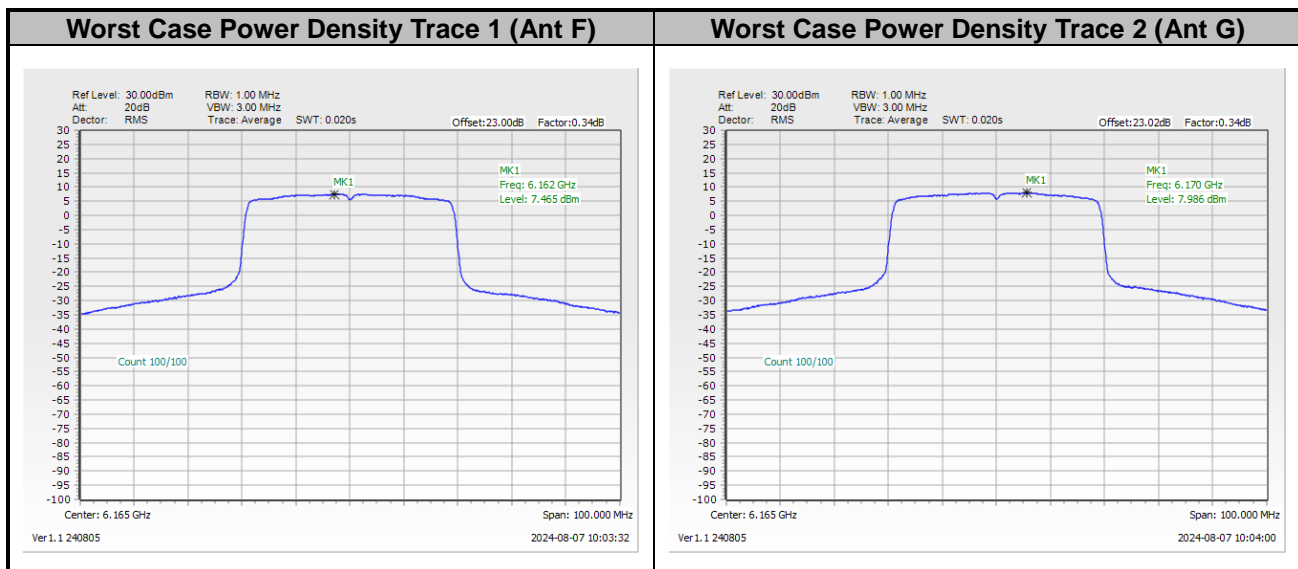




<802.11ax HE40 6165MHz>

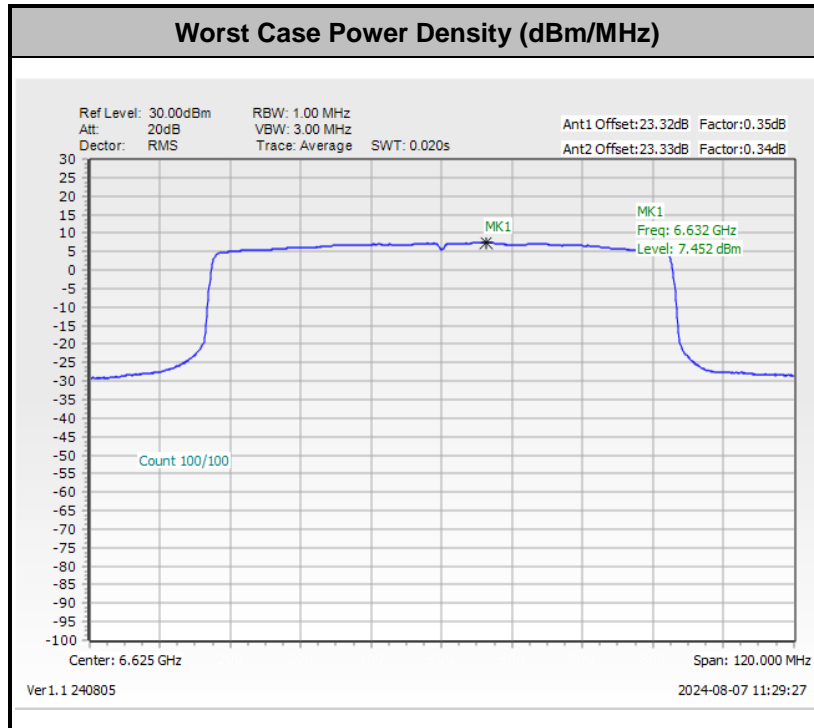


Remark: The test plot is showing a bin by bin combined result mathematically adds two traces.

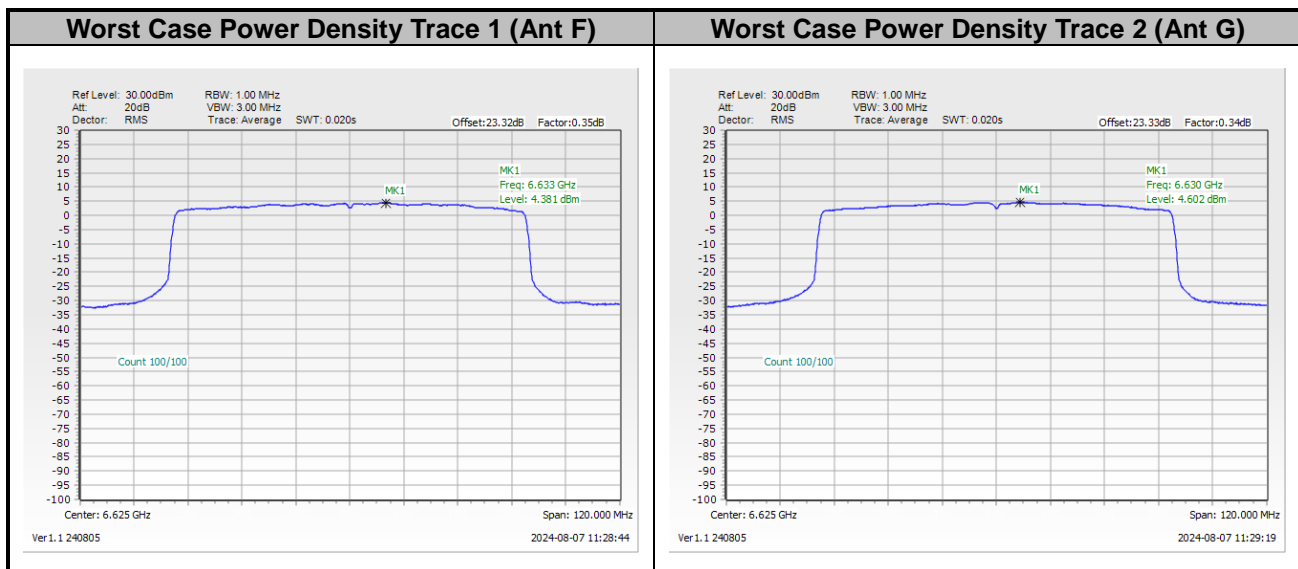




<802.11ax HE80 6625MHz>

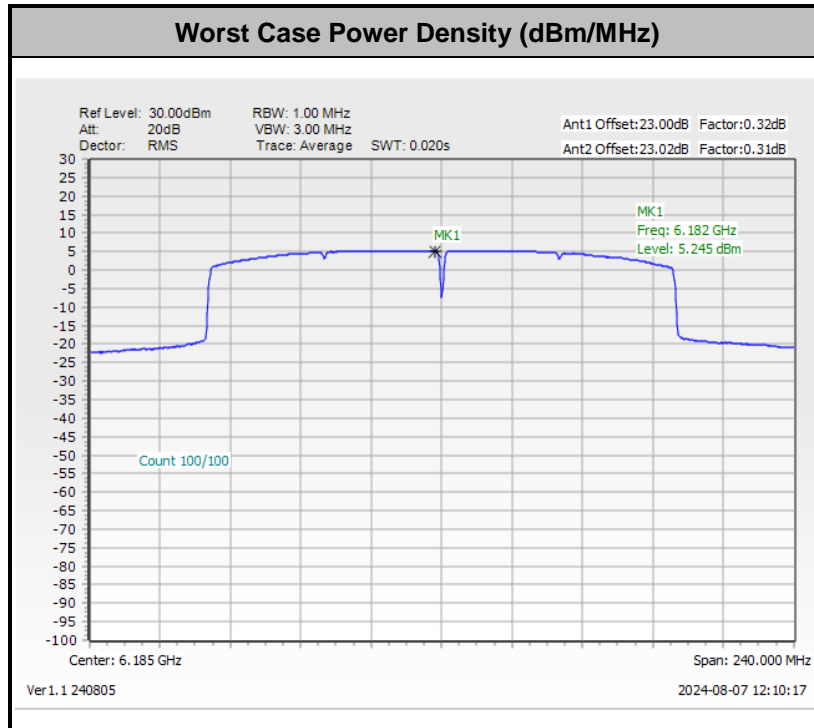


Remark: The test plot is showing a bin by bin combined result mathematically adds two traces.

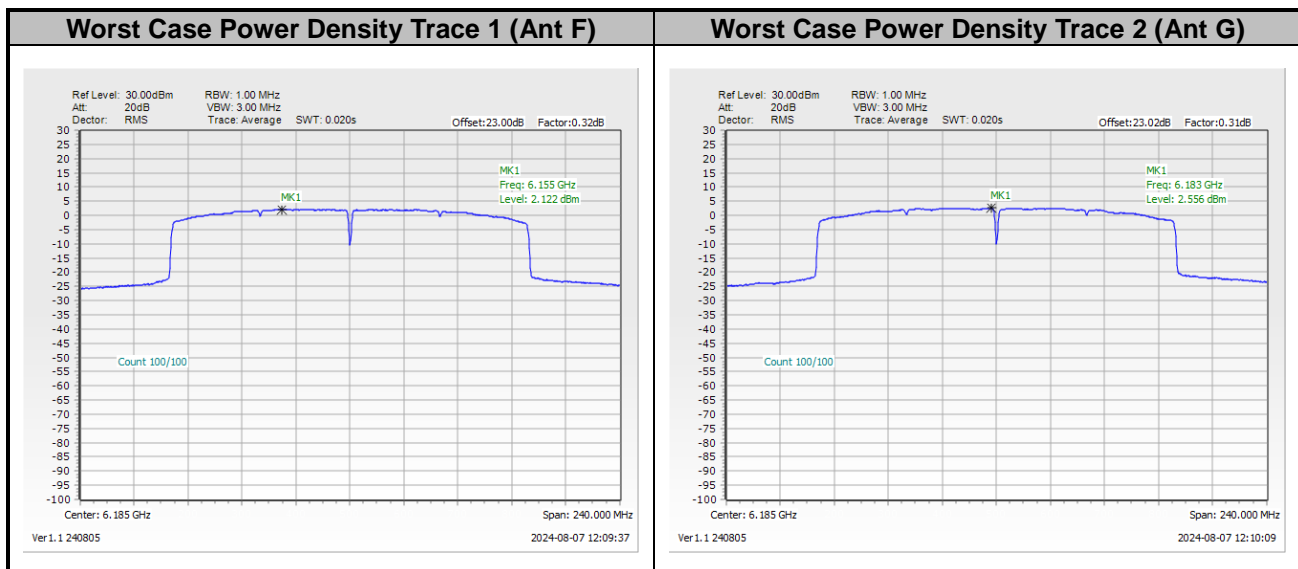




<802.11ax HE160 6185MHz>



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.

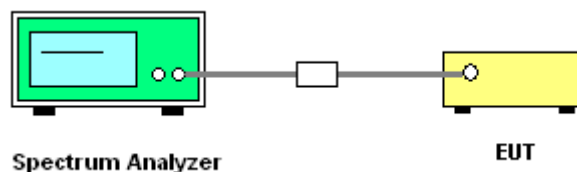
3.4.3 Test Procedures

The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v03.

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



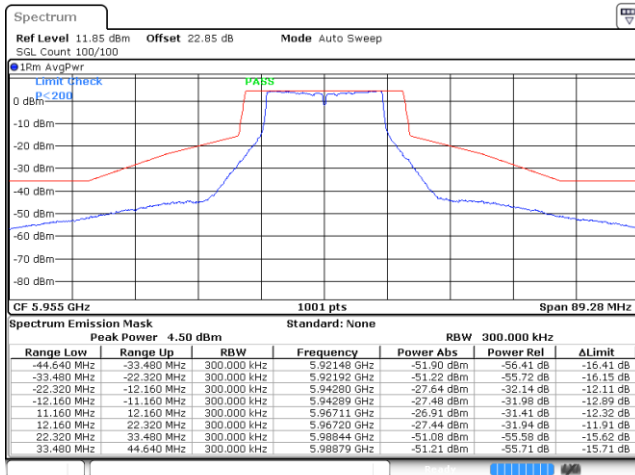


3.4.5 Test Result

MIMO <Ant. E+H(E)>

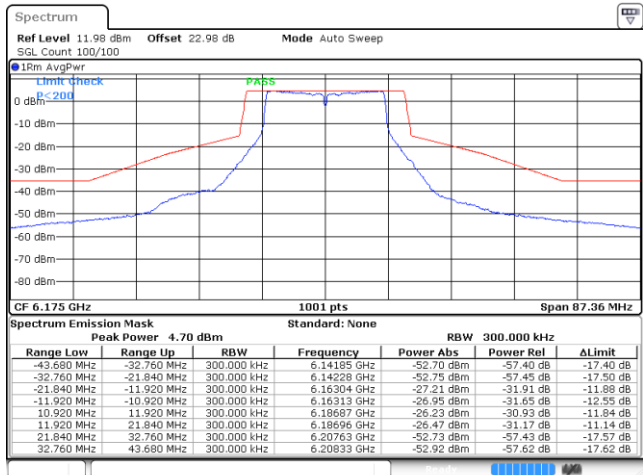
EUT Mode : 802.11a

Plot on Channel 5955MHz



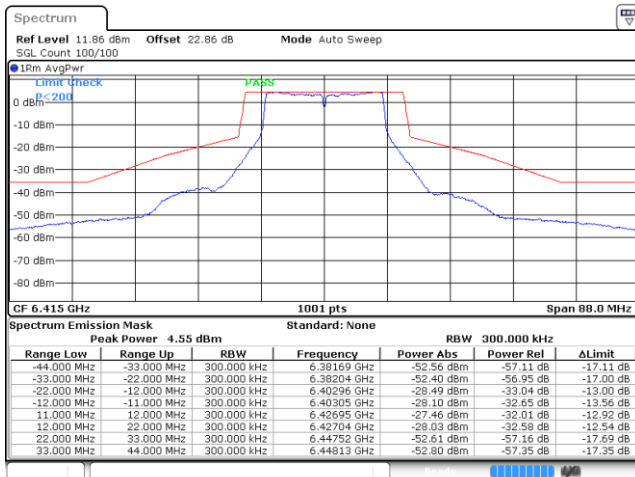
Date: 2.AUG.2024 18:25:01

Plot on Channel 6175MHz



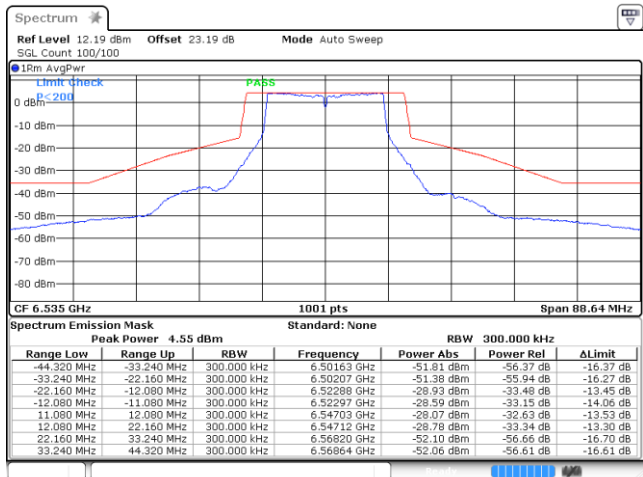
Date: 2.AUG.2024 19:13:07

Plot on Channel 6415MHz



Date: 2.AUG.2024 19:20:33

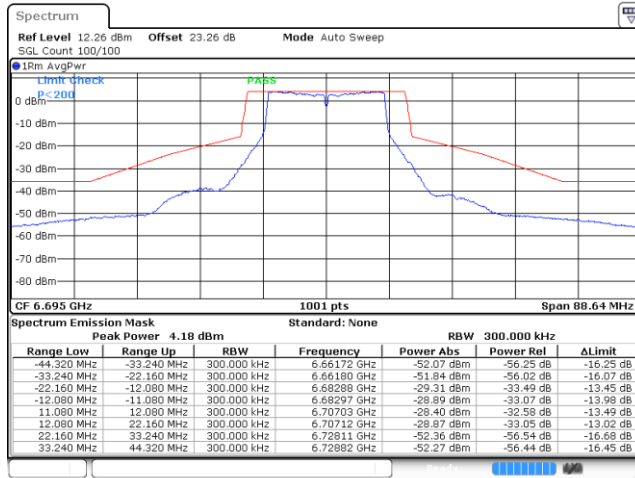
Plot on Channel 6535MHz



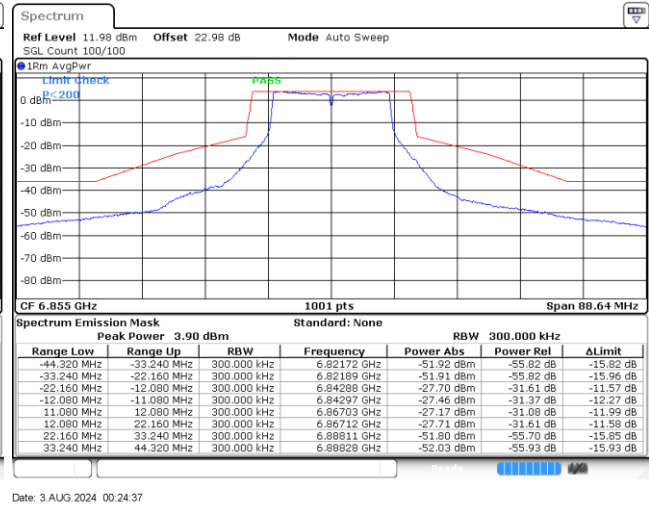
Date: 2.AUG.2024 23:42:30



Plot on Channel 6695MHz



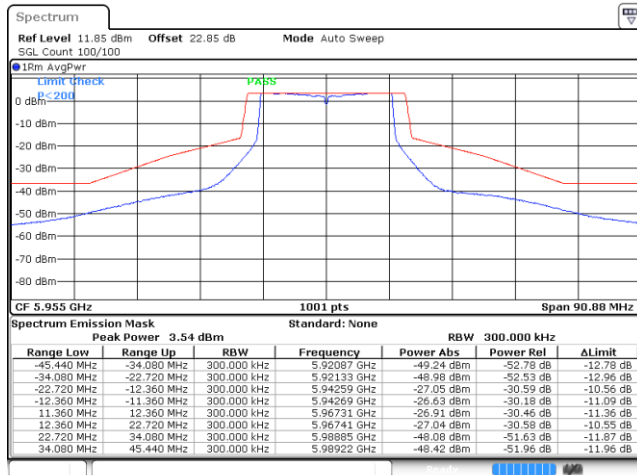
Plot on Channel 6855MHz





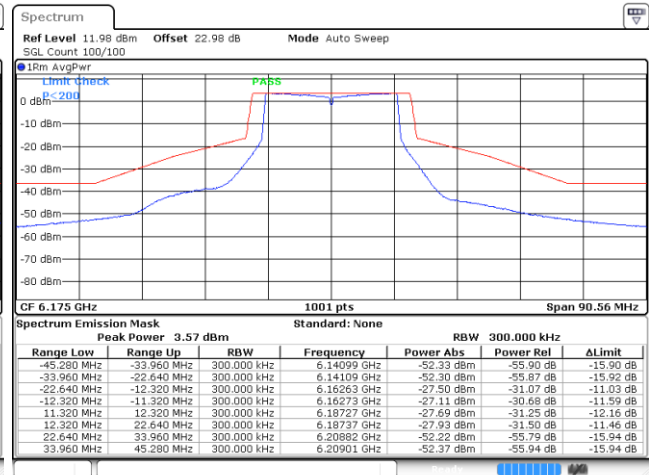
EUT Mode : 802.11ax HE20

Plot on Channel 5955MHz



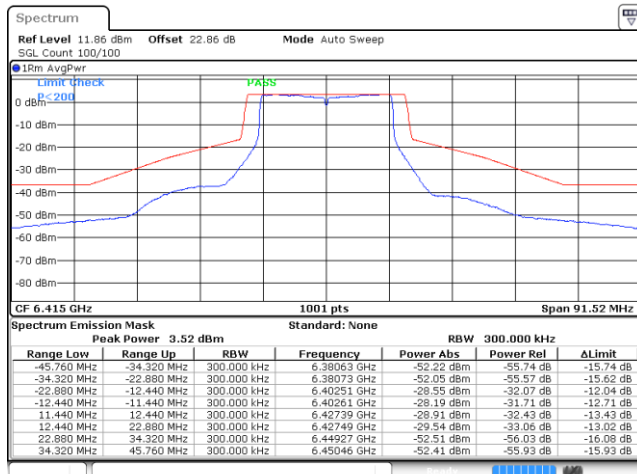
Date: 2 AUG 2024 19:30:13

Plot on Channel 6175MHz



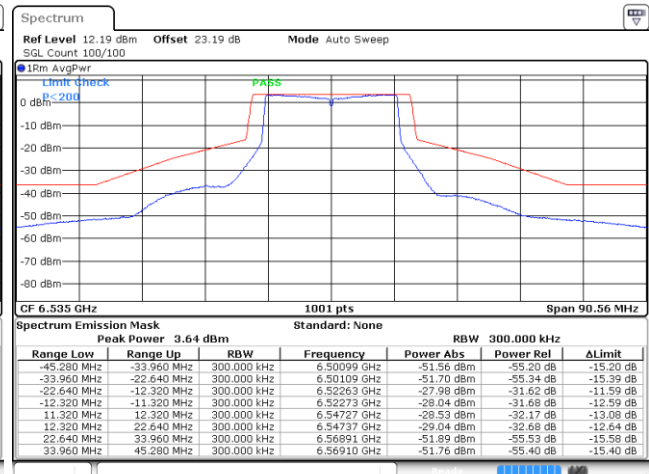
Date: 2 AUG 2024 19:38:42

Plot on Channel 6415MHz



Date: 2 AUG 2024 19:46:06

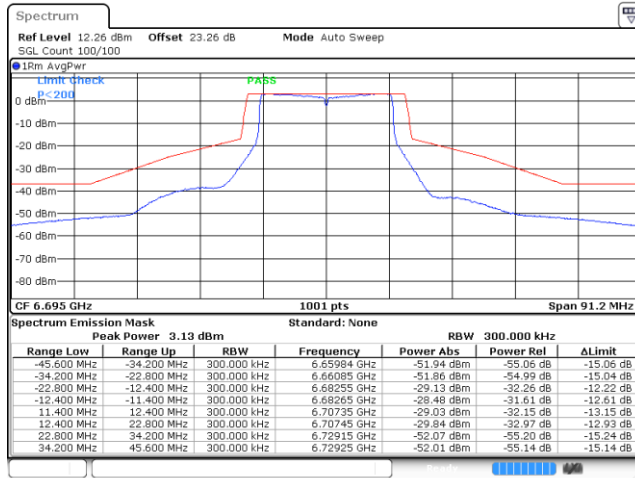
Plot on Channel 6535MHz



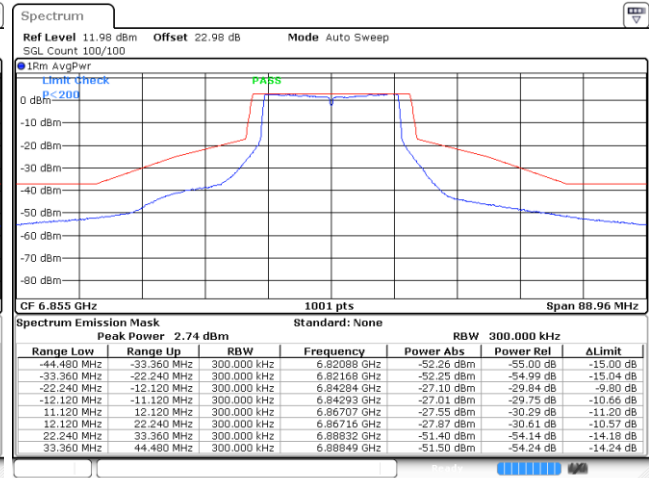
Date: 3 AUG 2024 00:59:32



Plot on Channel 6695MHz



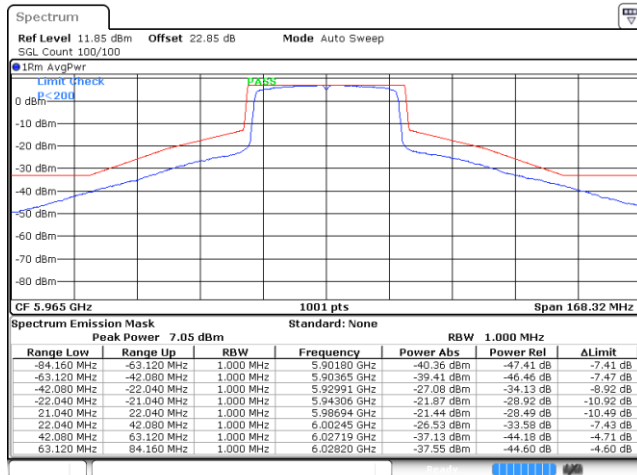
Plot on Channel 6855MHz





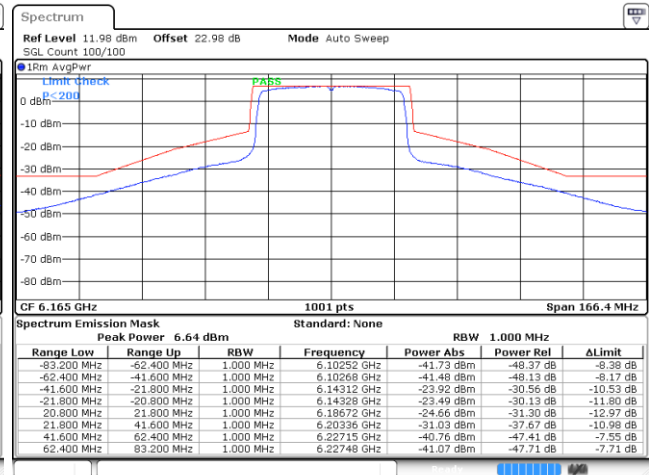
EUT Mode : 802.11ax HE40

Plot on Channel 5965MHz



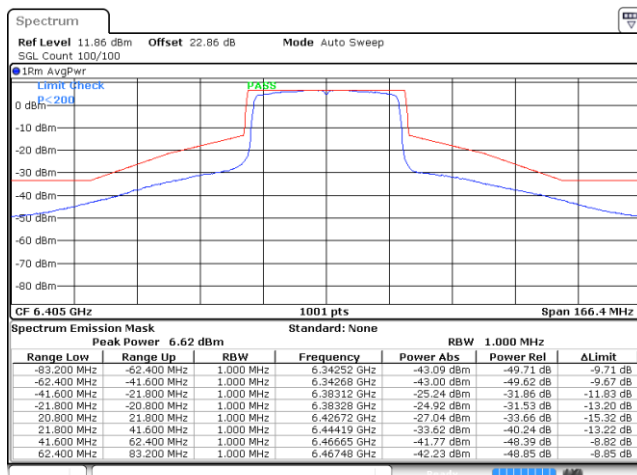
Date: 2 AUG 2024 19:52:40

Plot on Channel 6165MHz



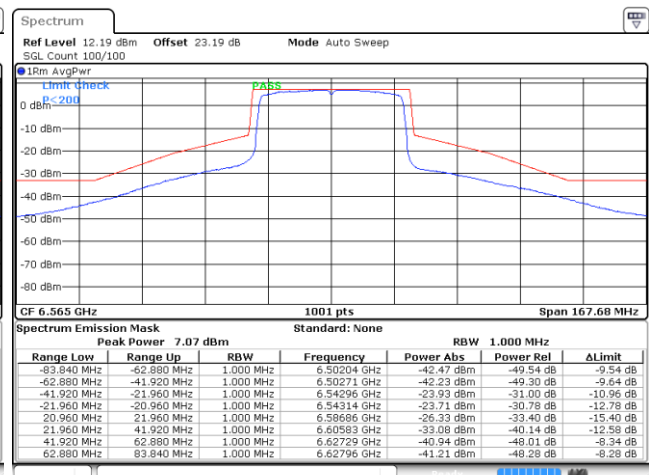
Date: 2 AUG 2024 20:00:01

Plot on Channel 6405MHz



Date: 2 AUG 2024 20:08:30

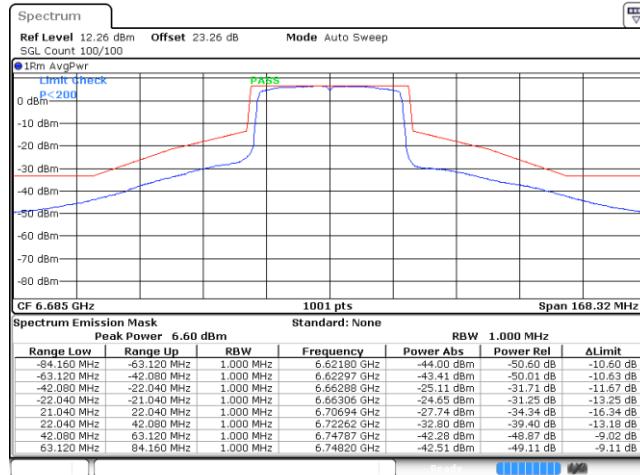
Plot on Channel 6565MHz



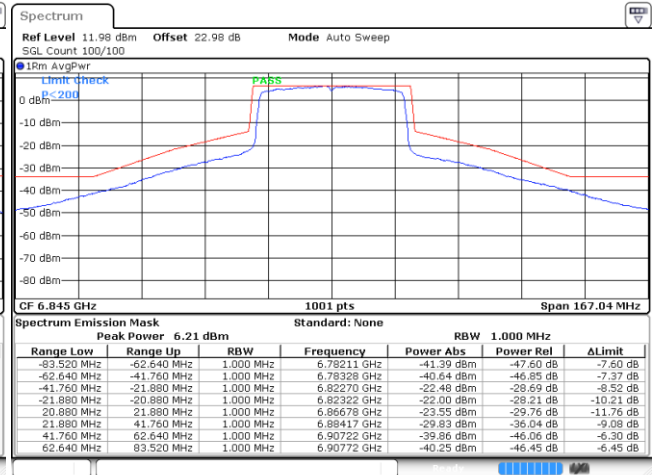
Date: 3 AUG 2024 01:09:57



Plot on Channel 6685MHz



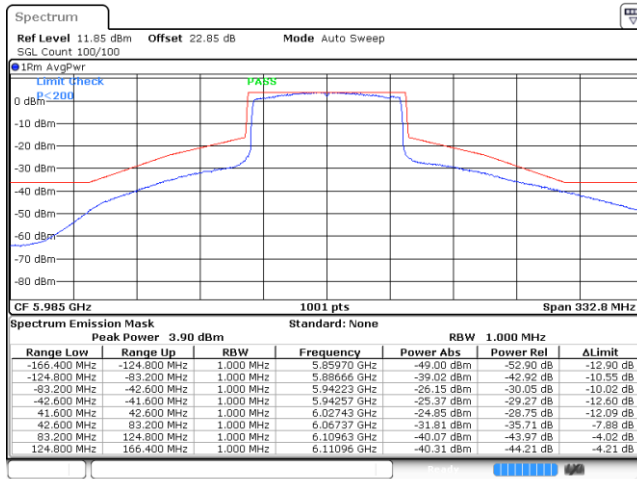
Plot on Channel 6845MHz





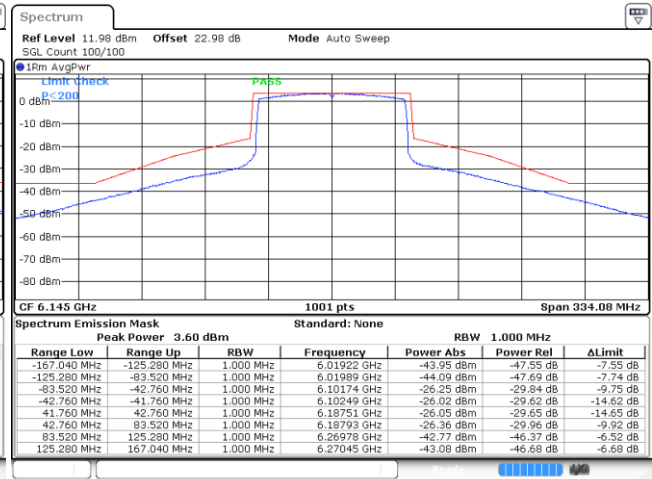
EUT Mode : 802.11ax HE80

Plot on Channel 5985MHz



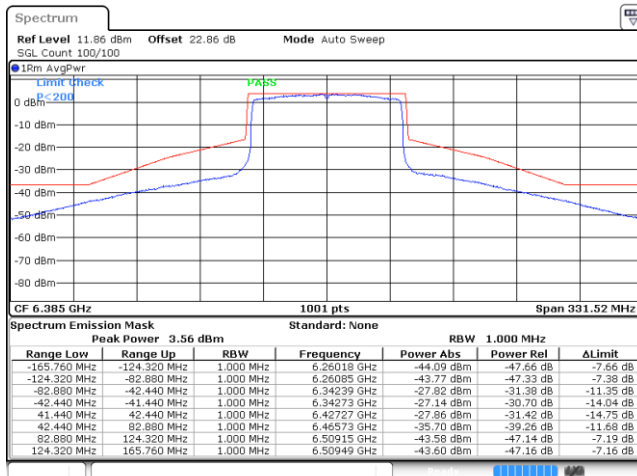
Date: 2 AUG 2024 20:36:42

Plot on Channel 6145MHz



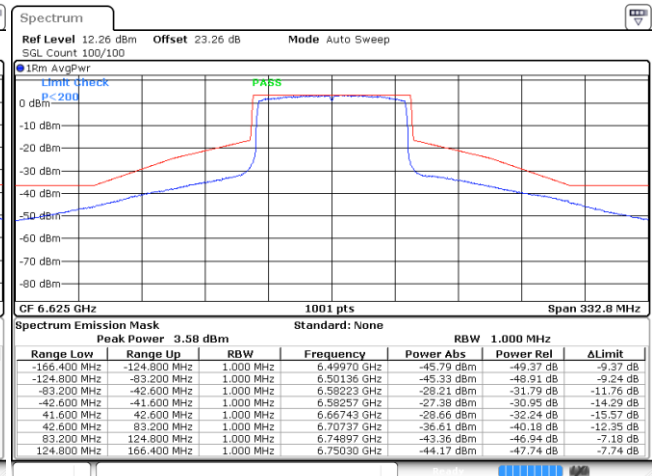
Date: 2 AUG 2024 20:46:49

Plot on Channel 6385MHz



Date: 2 AUG 2024 20:55:10

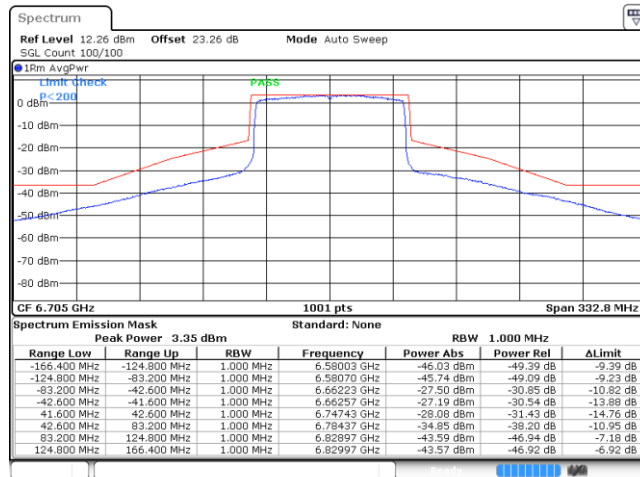
Plot on Channel 6625MHz



Date: 3 AUG 2024 01:47:16

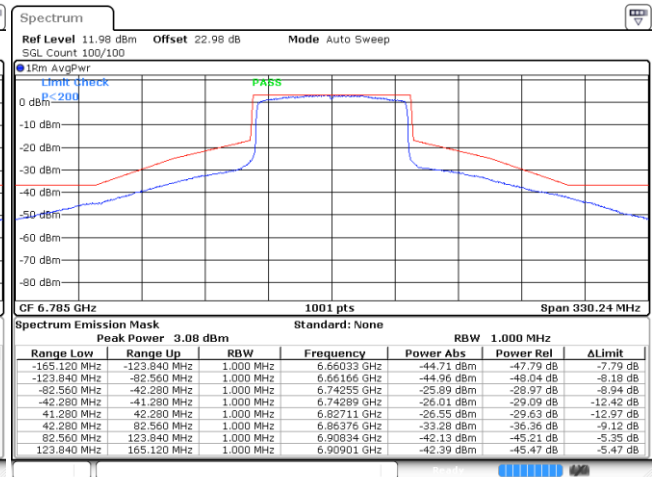


Plot on Channel 6705MHz



Date: 3 AUG 2024 01:42:49

Plot on Channel 6785MHz

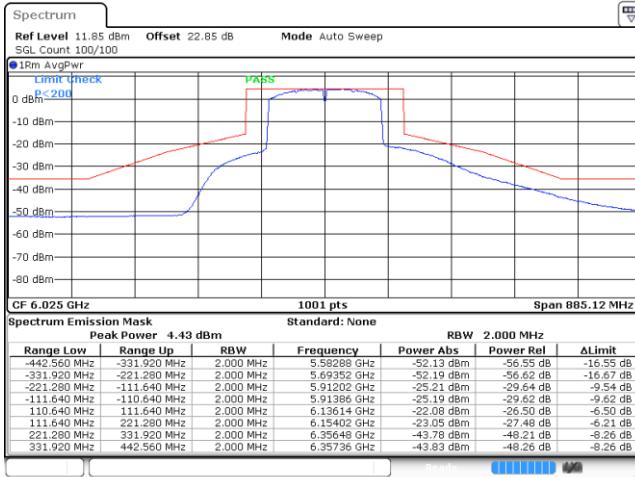


Date: 3 AUG 2024 01:37:52



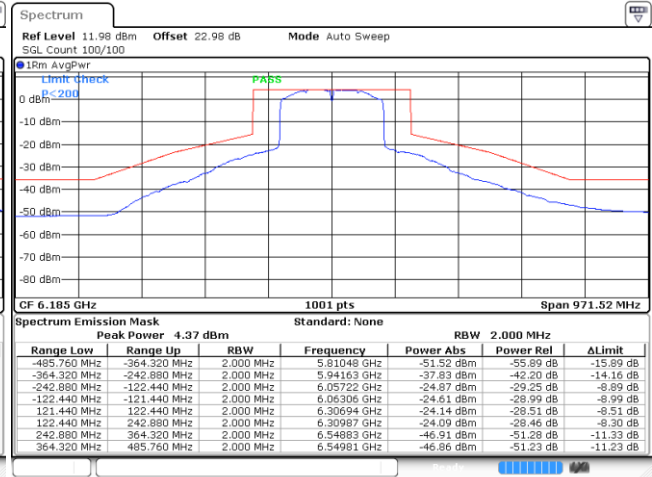
EUT Mode : 802.11ax HE160

Plot on Channel 6025MHz



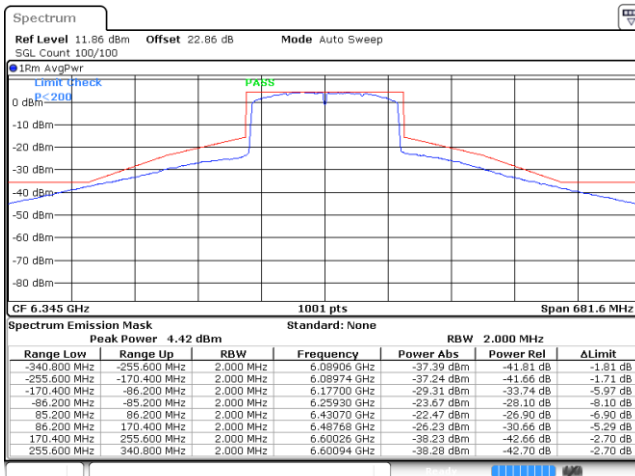
Date: 2 AUG 2024 22:52:20

Plot on Channel 6185MHz



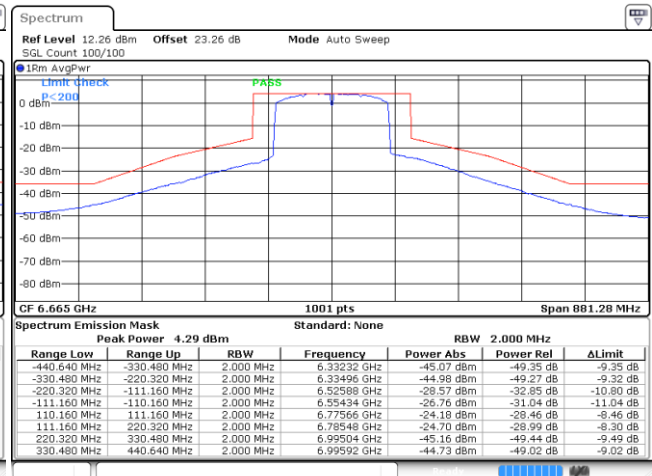
Date: 2 AUG 2024 23:06:51

Plot on Channel 6345MHz



Date: 2 AUG 2024 23:12:42

Plot on Channel 6665MHz



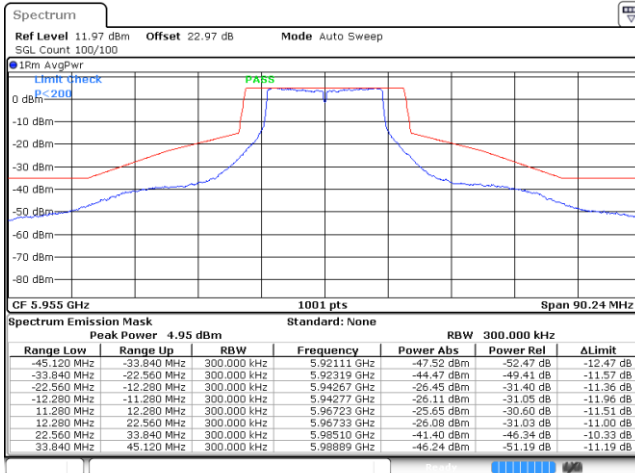
Date: 3 AUG 2024 02:01:01



MIMO <Ant. E+H(H)>

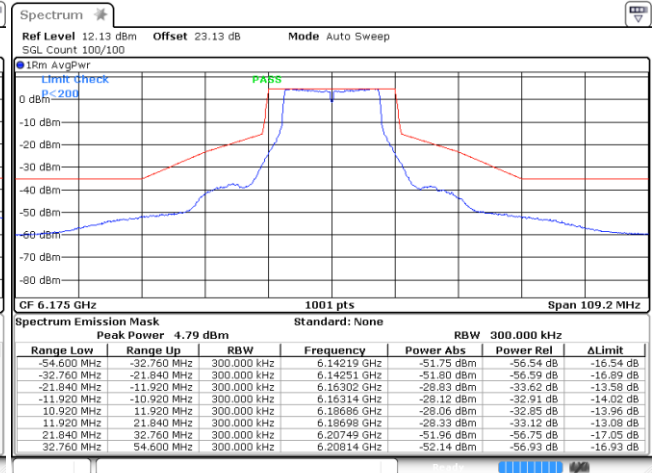
EUT Mode : 802.11a

Plot on Channel 5955MHz



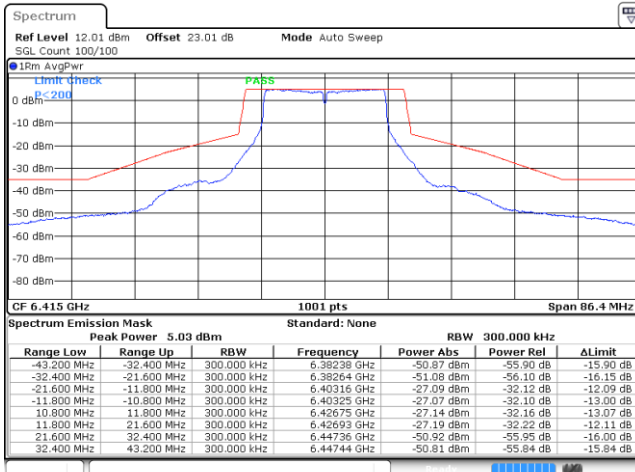
Date: 2 AUG 2024 19:05:06

Plot on Channel 6175MHz



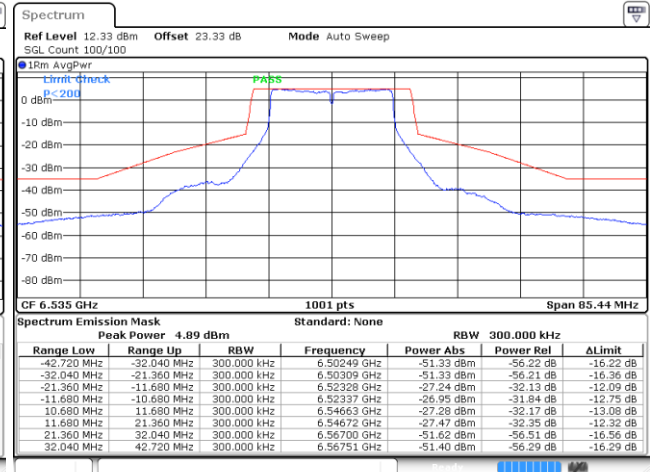
Date: 5 AUG 2024 23:37:33

Plot on Channel 6415MHz



Date: 2 AUG 2024 19:24:59

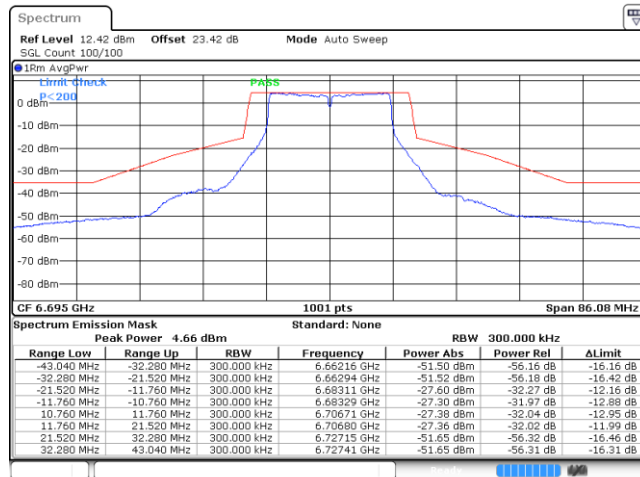
Plot on Channel 6535MHz



Date: 2 AUG 2024 23:45:52

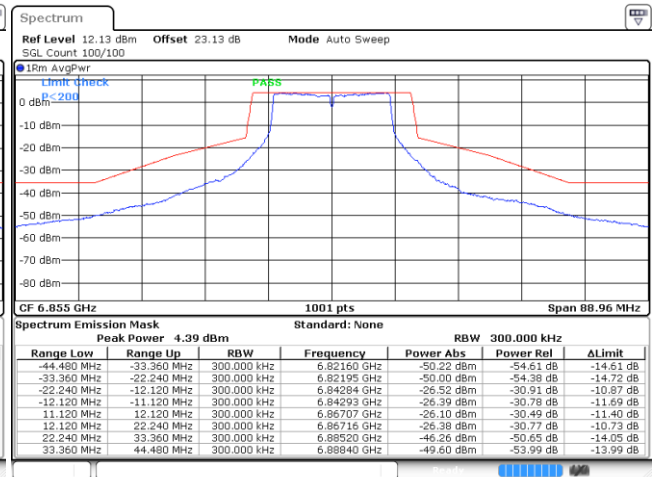


Plot on Channel 6695MHz



Date: 3 AUG 2024 00:22:54

Plot on Channel 6855MHz

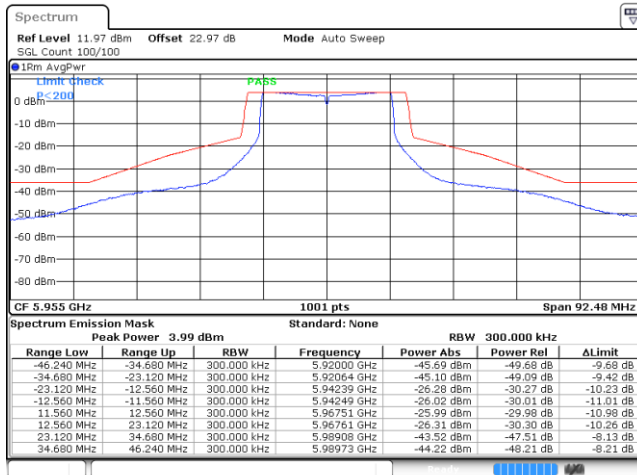


Date: 3 AUG 2024 00:28:49



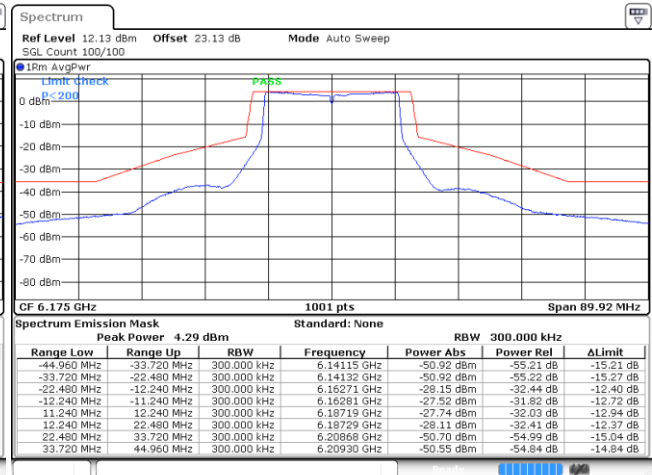
EUT Mode : 802.11ax HE20

Plot on Channel 5955MHz



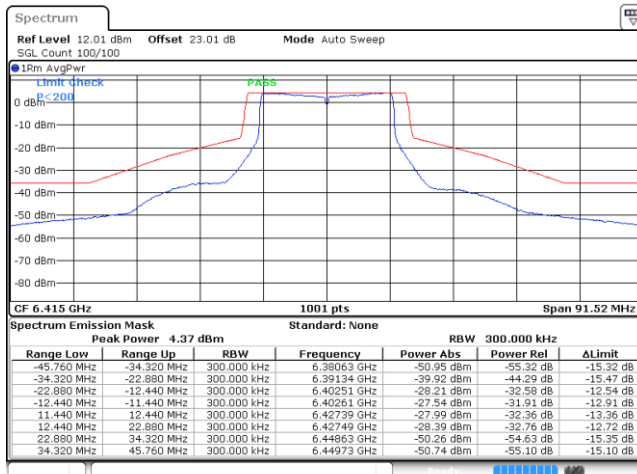
Date: 2 AUG 2024 19:36:09

Plot on Channel 6175MHz



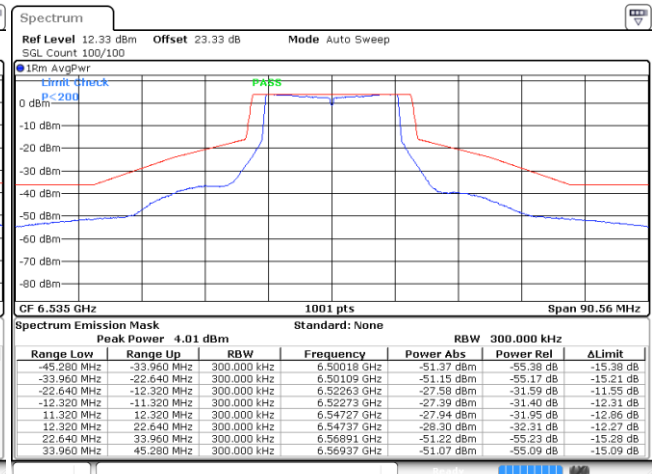
Date: 2 AUG 2024 19:42:56

Plot on Channel 6415MHz



Date: 2 AUG 2024 19:50:15

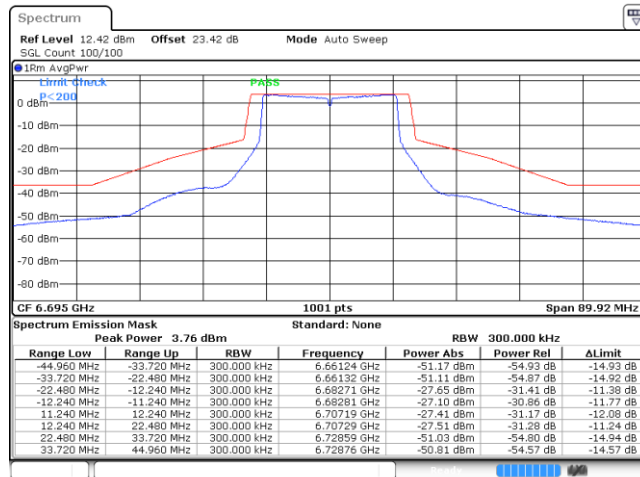
Plot on Channel 6535MHz



Date: 3 AUG 2024 01:06:37

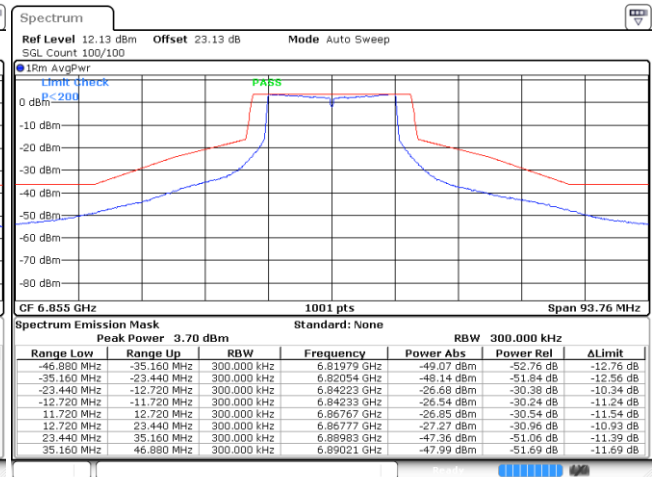


Plot on Channel 6695MHz



Date: 3 AUG. 2024 00:51:48

Plot on Channel 6855MHz

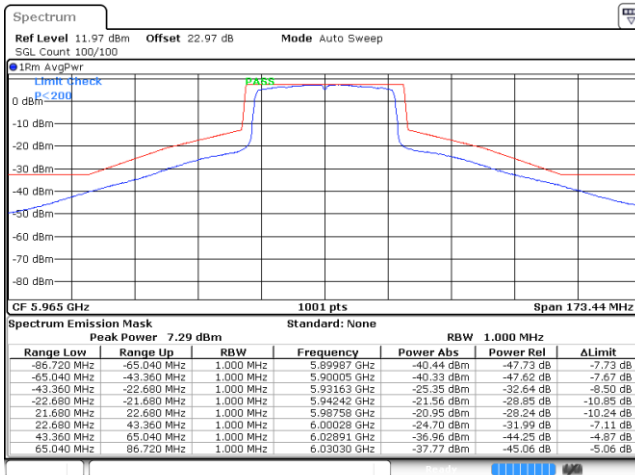


Date: 3 AUG. 2024 00:41:30



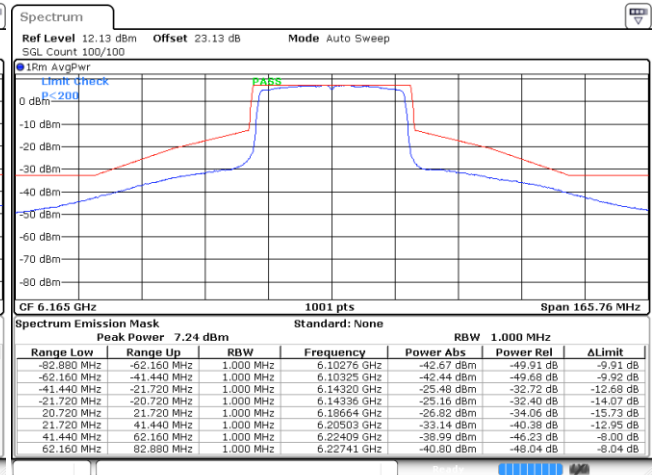
EUT Mode : 802.11ax HE40

Plot on Channel 5965MHz



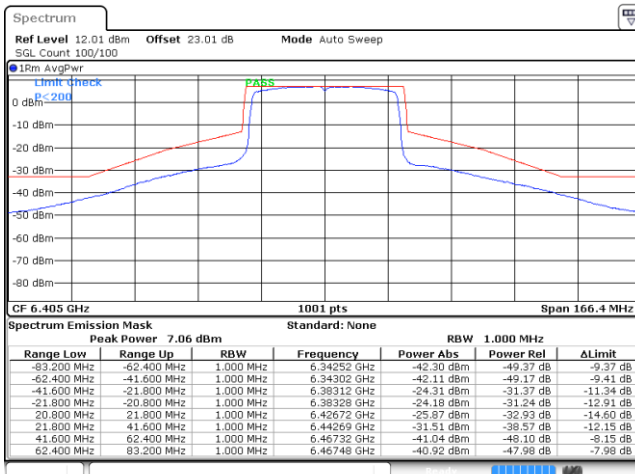
Date: 2 AUG 2024 19:57:51

Plot on Channel 6165MHz



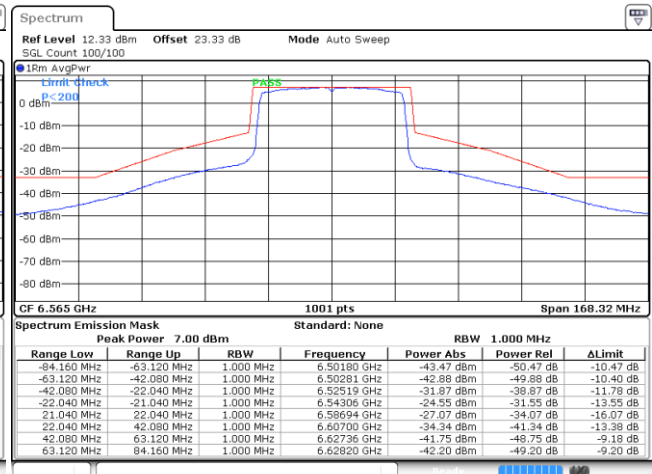
Date: 2 AUG 2024 20:04:06

Plot on Channel 6405MHz



Date: 2 AUG 2024 20:34:55

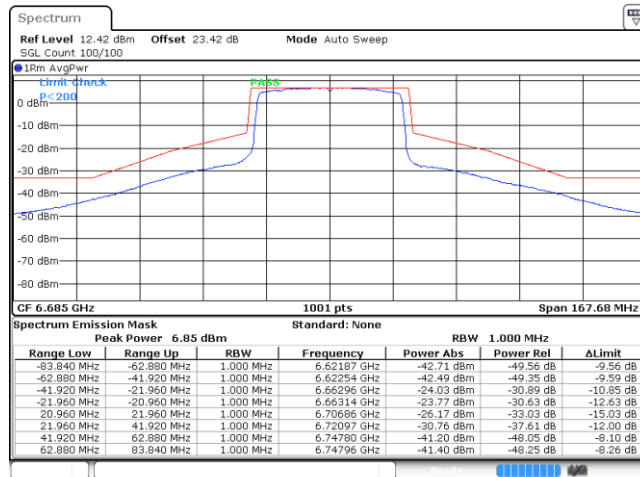
Plot on Channel 6565MHz



Date: 3 AUG 2024 01:14:40

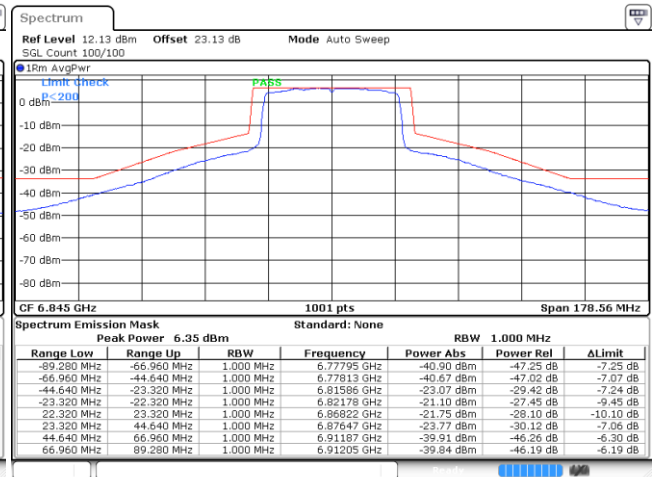


Plot on Channel 6685MHz



Date: 3 AUG 2024 01:30:43

Plot on Channel 6845MHz

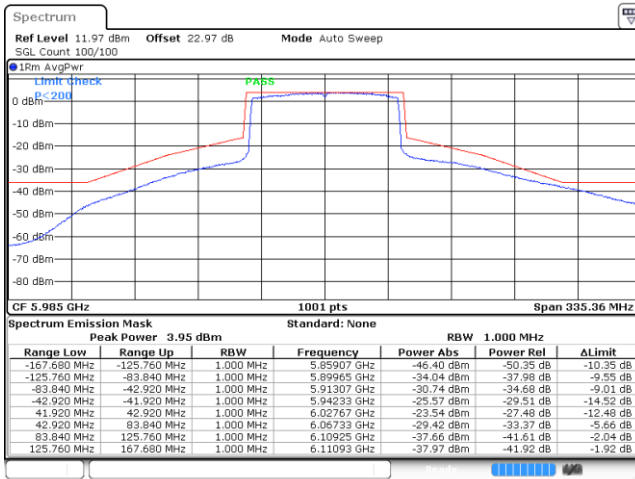


Date: 3 AUG 2024 01:36:16



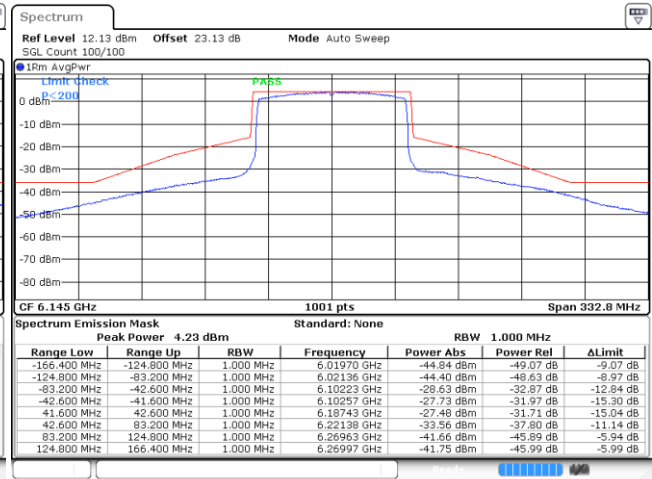
EUT Mode : 802.11ax HE80

Plot on Channel 5985MHz



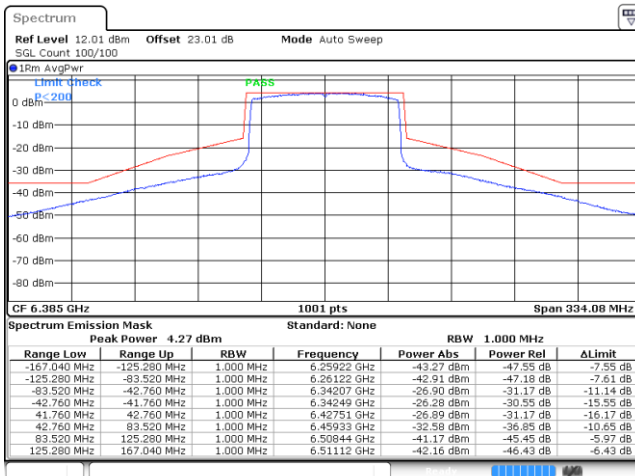
Date: 2 AUG 2024 20:43:25

Plot on Channel 6145MHz



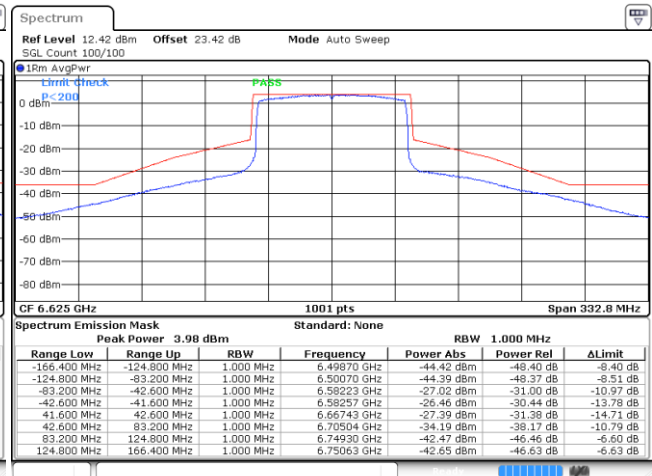
Date: 2 AUG 2024 20:52:08

Plot on Channel 6385MHz



Date: 2 AUG 2024 21:12:21

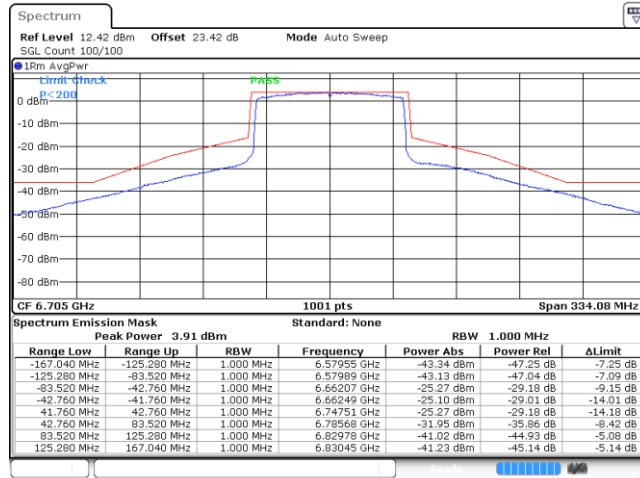
Plot on Channel 6625MHz



Date: 3 AUG 2024 01:58:57

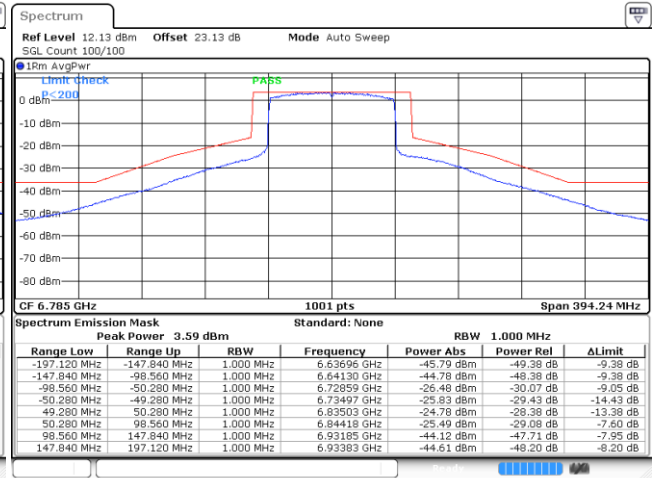


Plot on Channel 6705MHz



Date: 3 AUG 2024 01:45:48

Plot on Channel 6785MHz

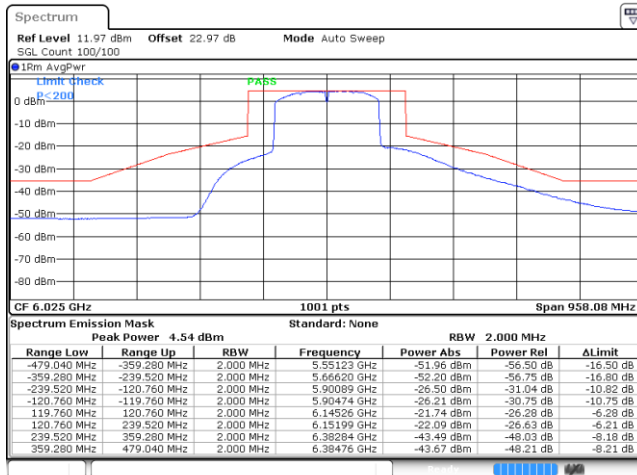


Date: 3 AUG 2024 01:41:08



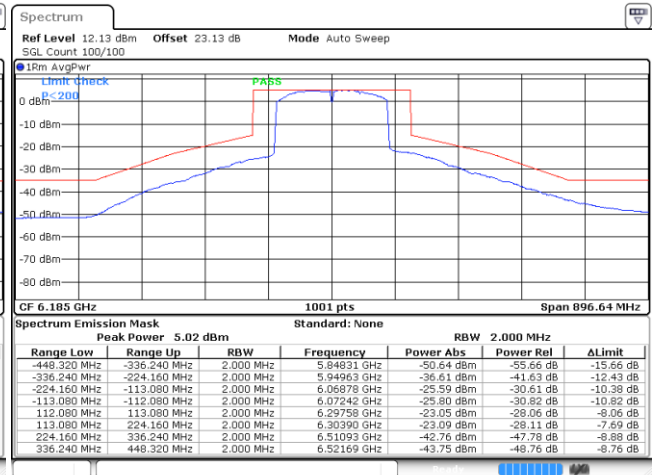
EUT Mode : 802.11ax HE160

Plot on Channel 6025MHz



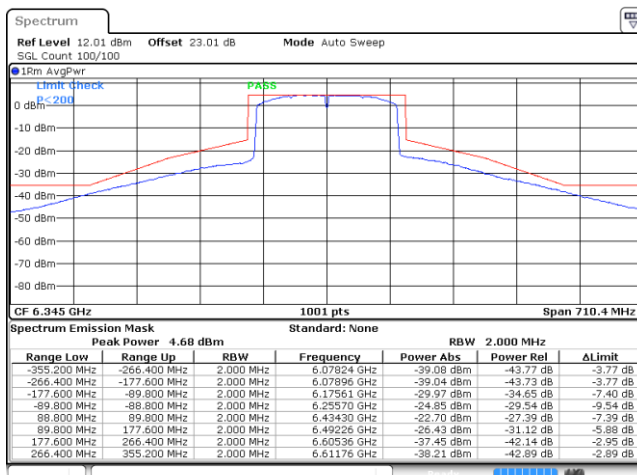
Date: 2 AUG 2024 22:57:55

Plot on Channel 6185MHz



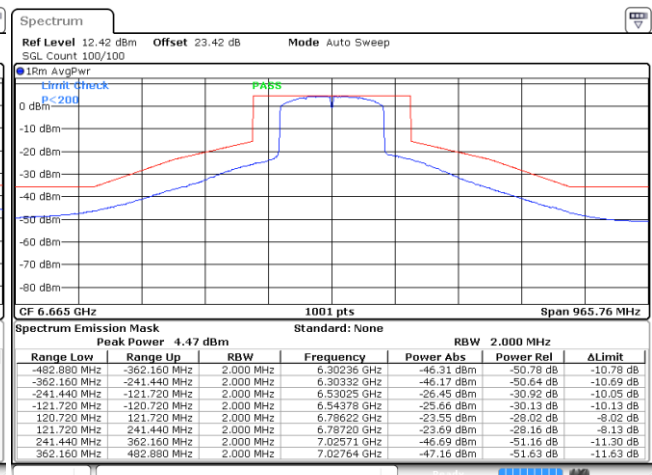
Date: 2 AUG 2024 23:10:41

Plot on Channel 6345MHz



Date: 2 AUG 2024 23:36:43

Plot on Channel 6665MHz



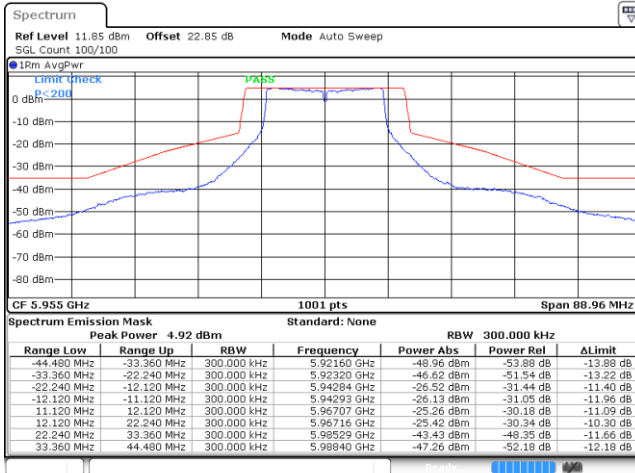
Date: 3 AUG 2024 02:05:11



MIMO <Ant. F+G(F)>

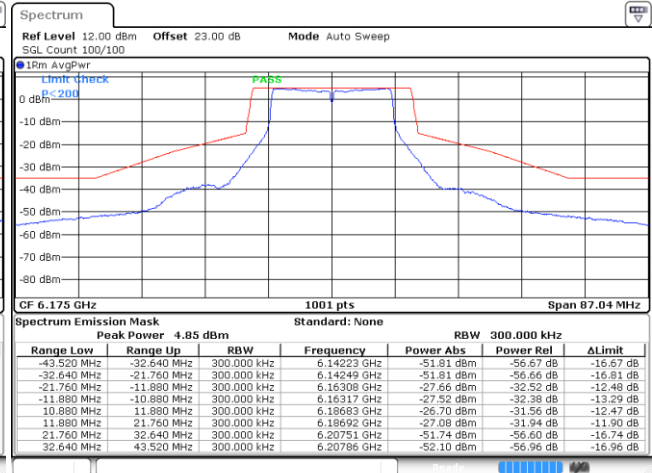
EUT Mode : 802.11a

Plot on Channel 5955MHz



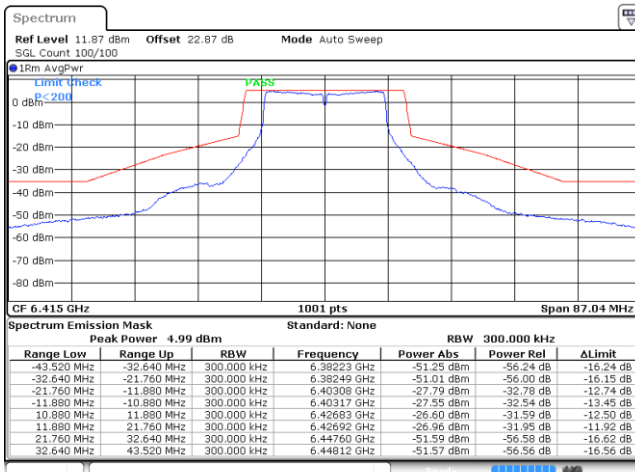
Date: 2 AUG 2024 18:27:14

Plot on Channel 6175MHz



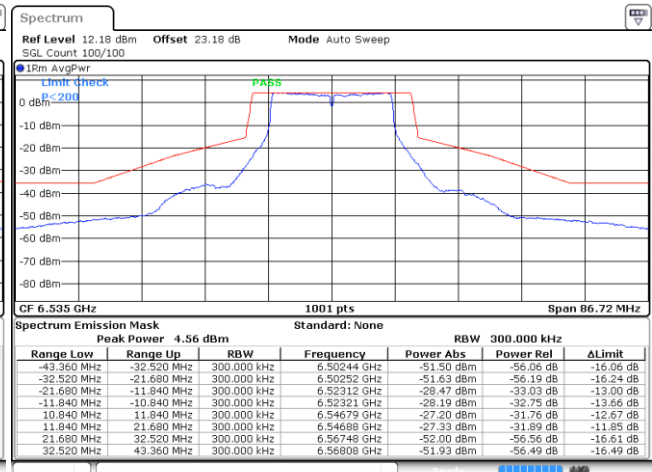
Date: 2 AUG 2024 19:14:31

Plot on Channel 6415MHz



Date: 2 AUG 2024 19:21:53

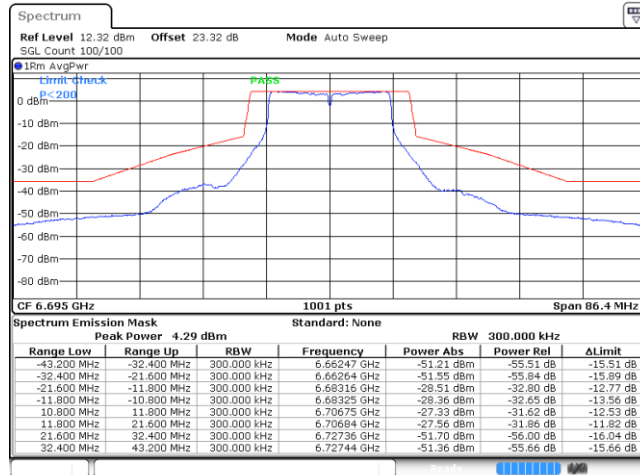
Plot on Channel 6535MHz



Date: 2 AUG 2024 23:43:33

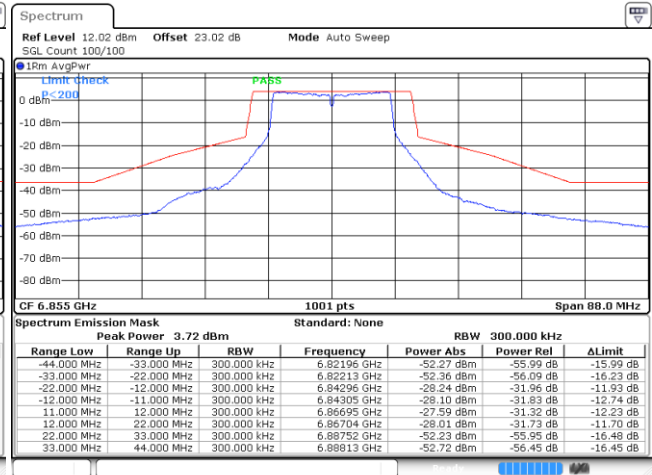


Plot on Channel 6695MHz



Date: 3 AUG. 2024 00:05:32

Plot on Channel 6855MHz



Date: 3 AUG. 2024 00:26:02