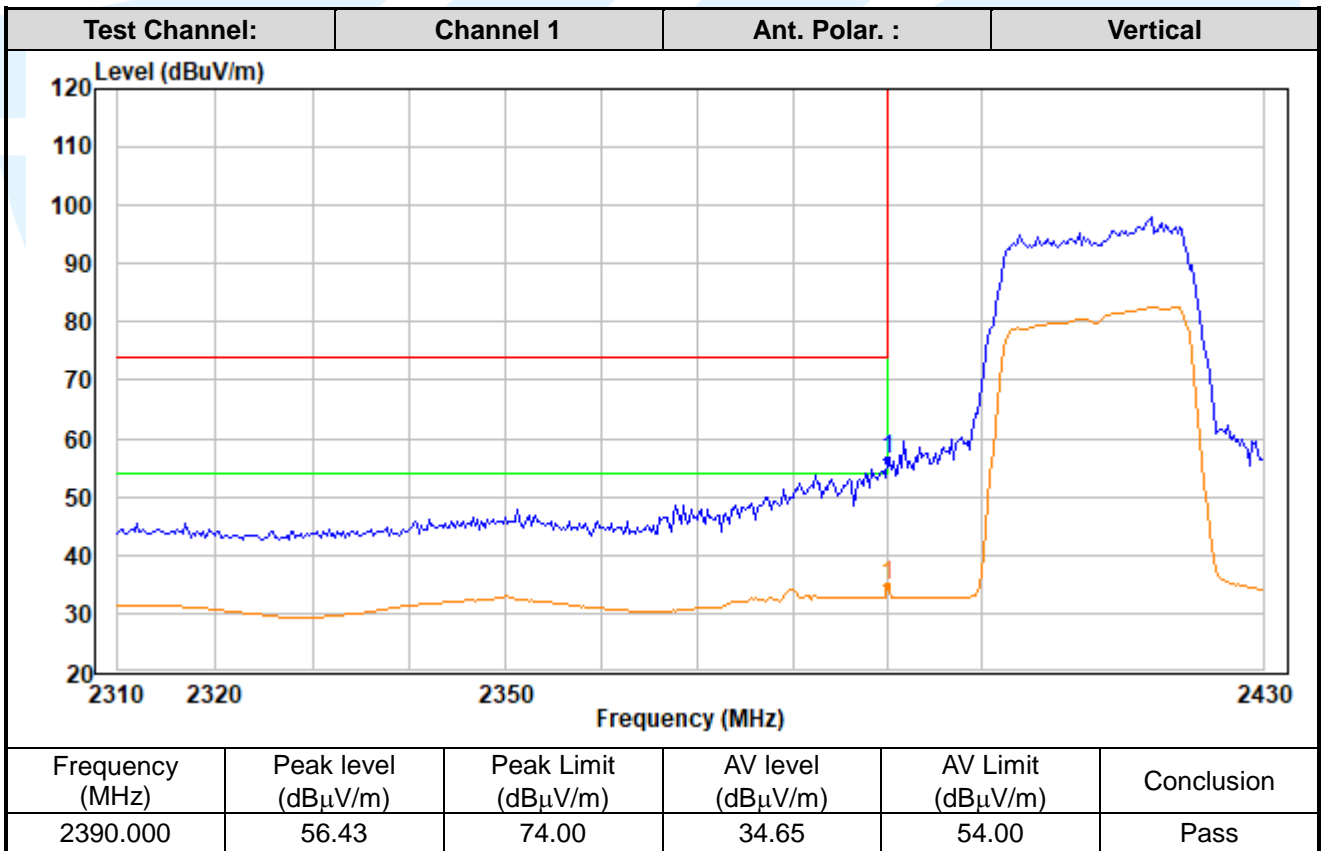
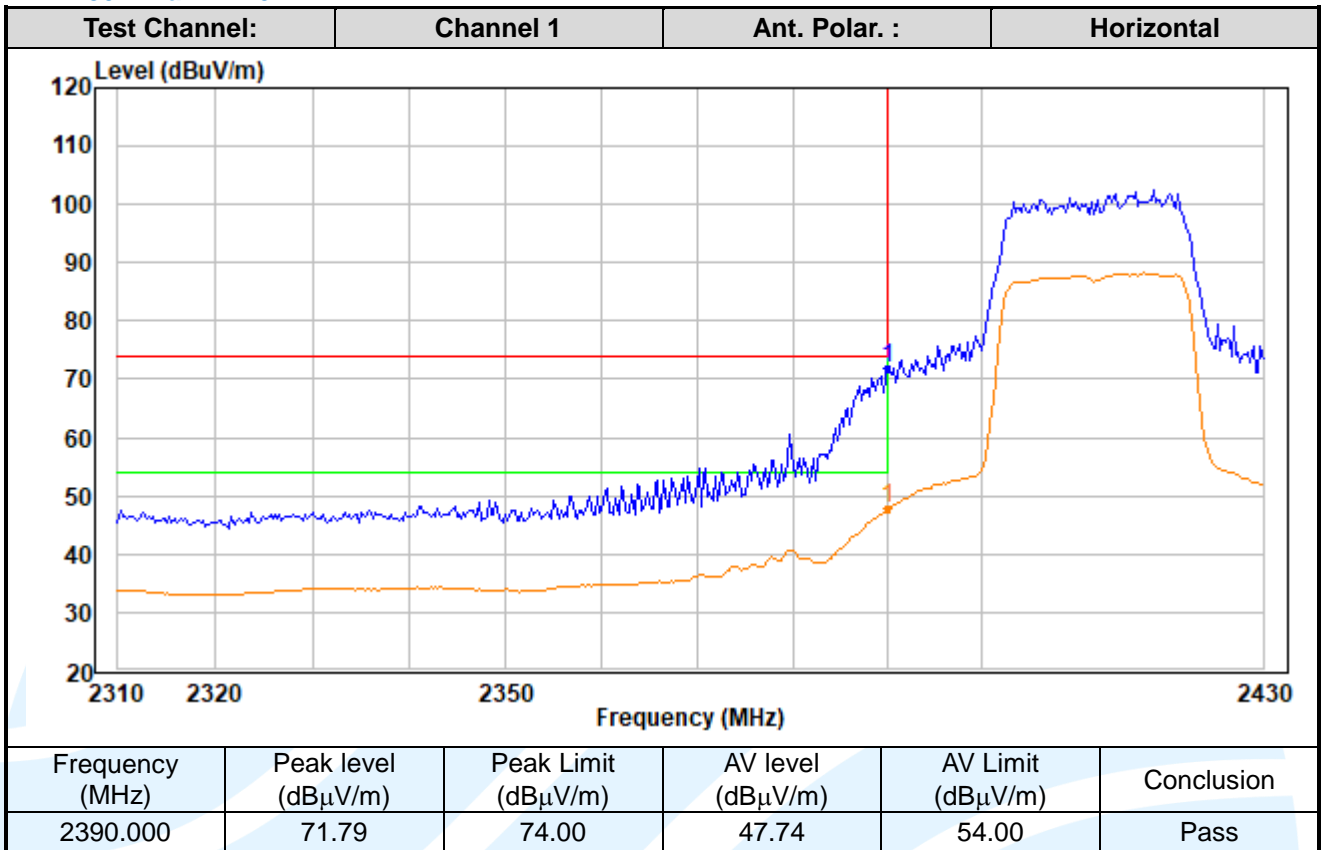


IEEE 802.11ax-HE20



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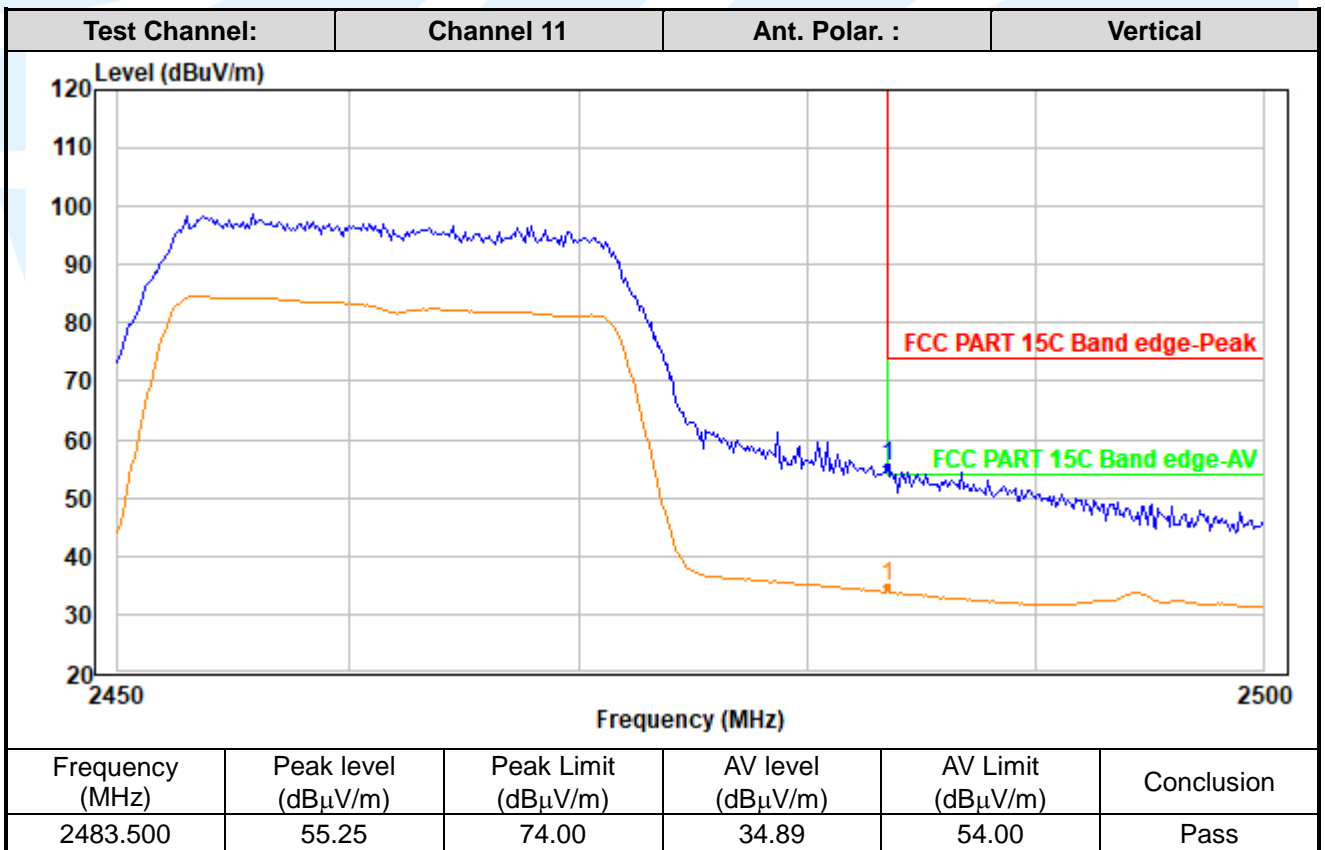
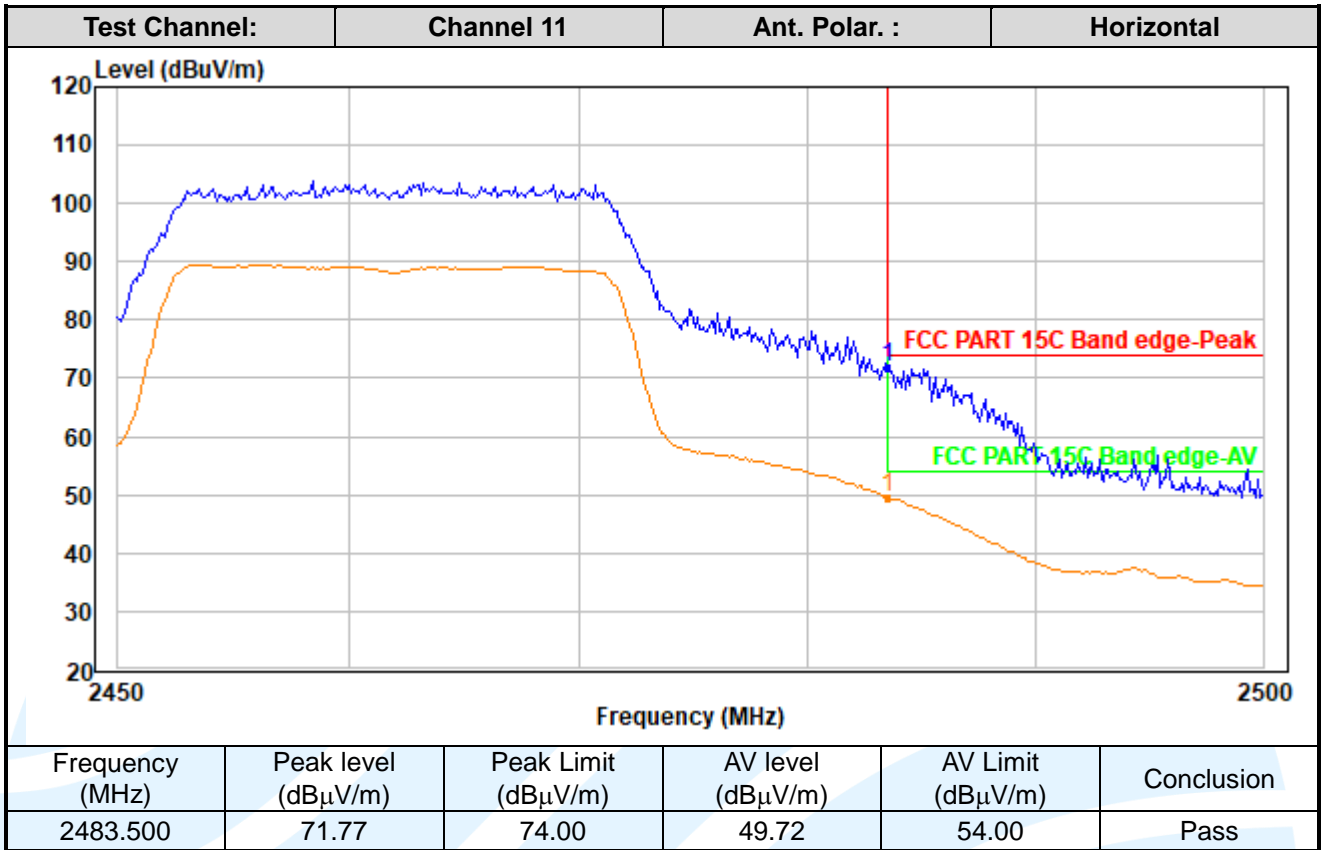
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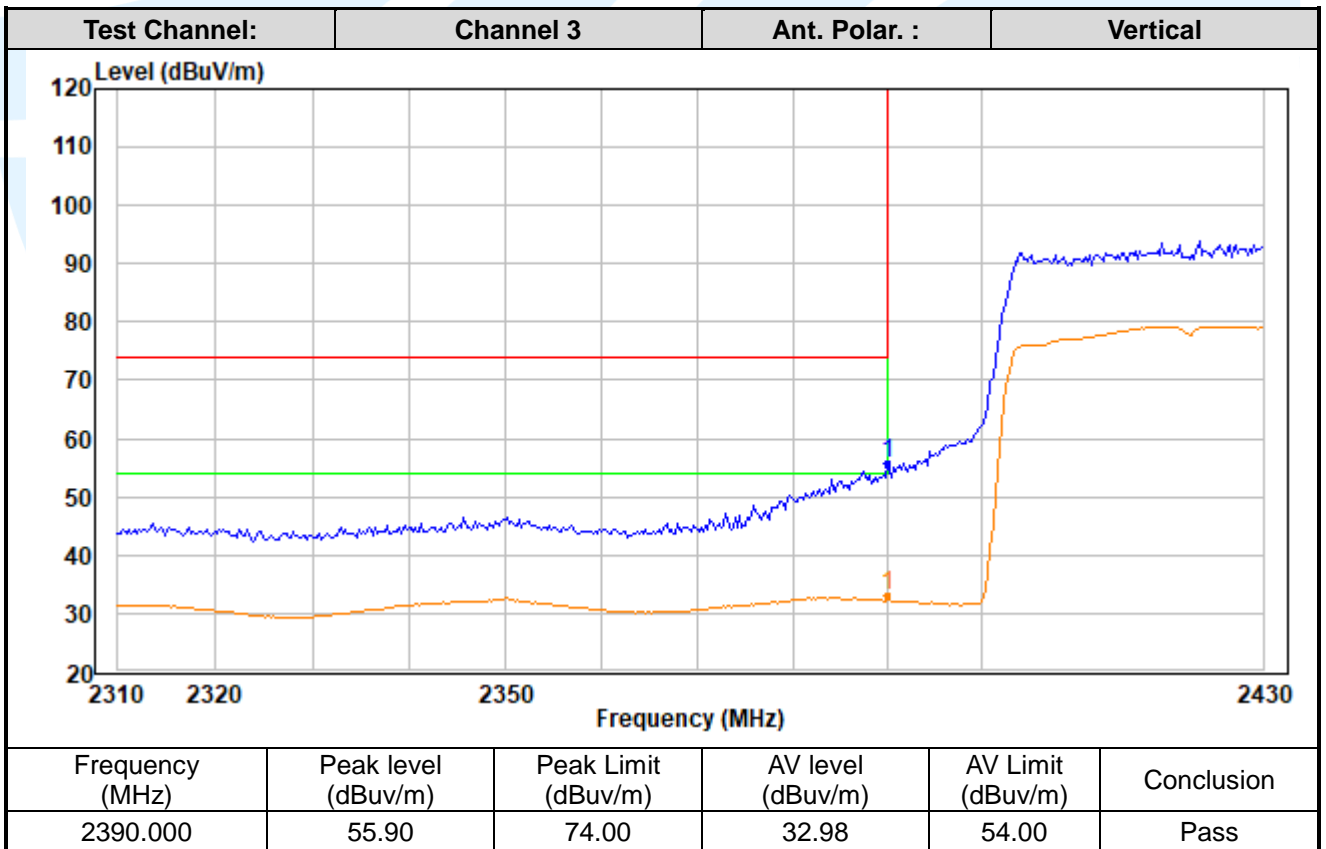
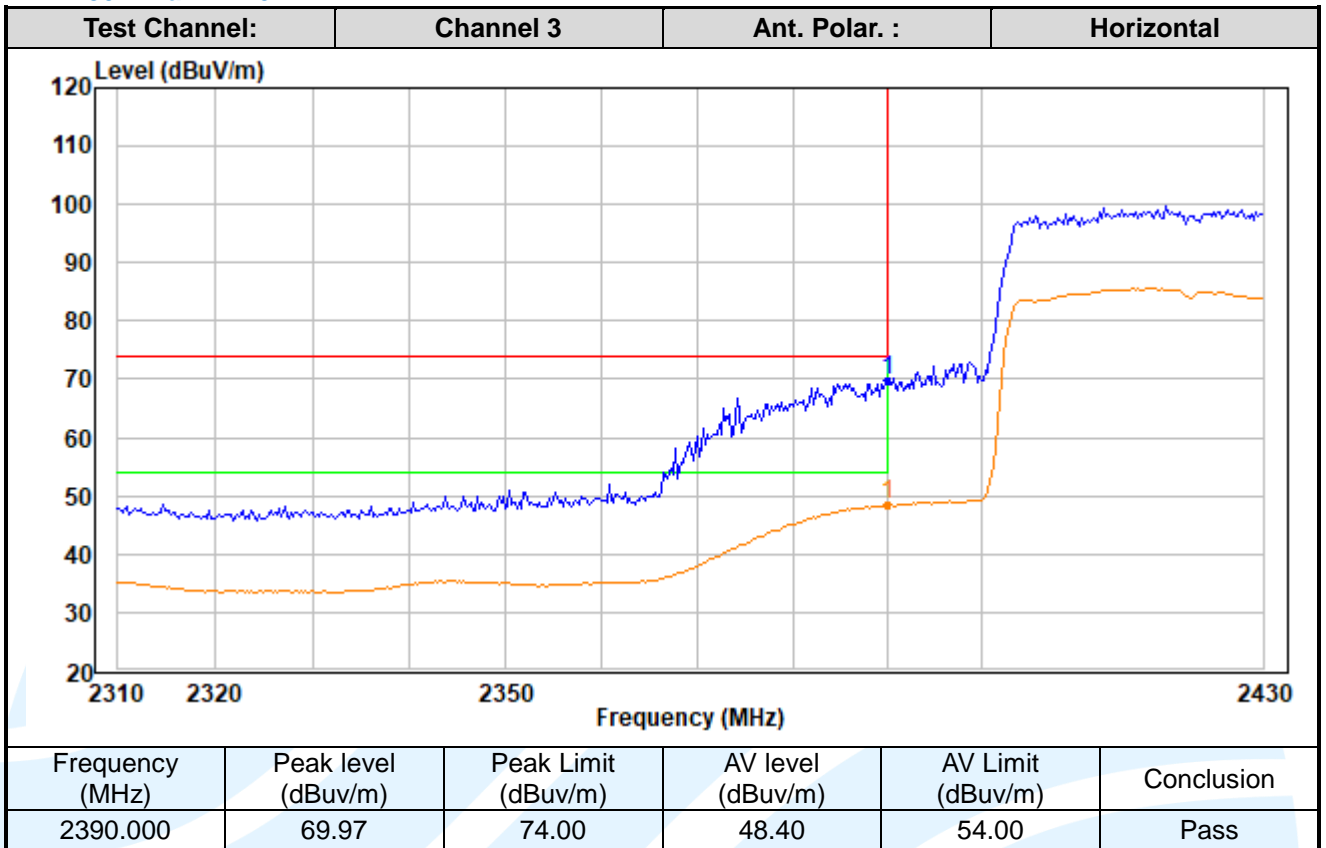
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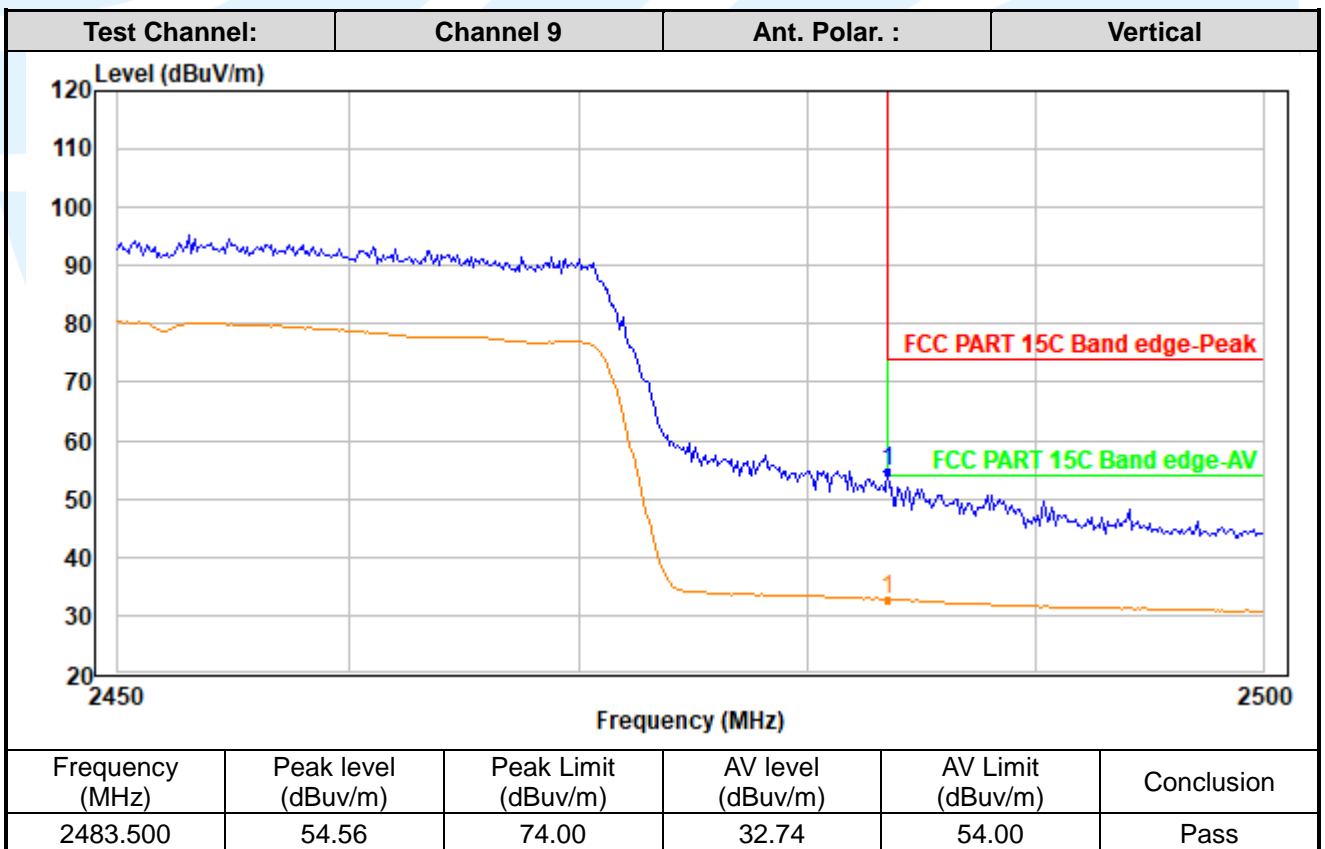
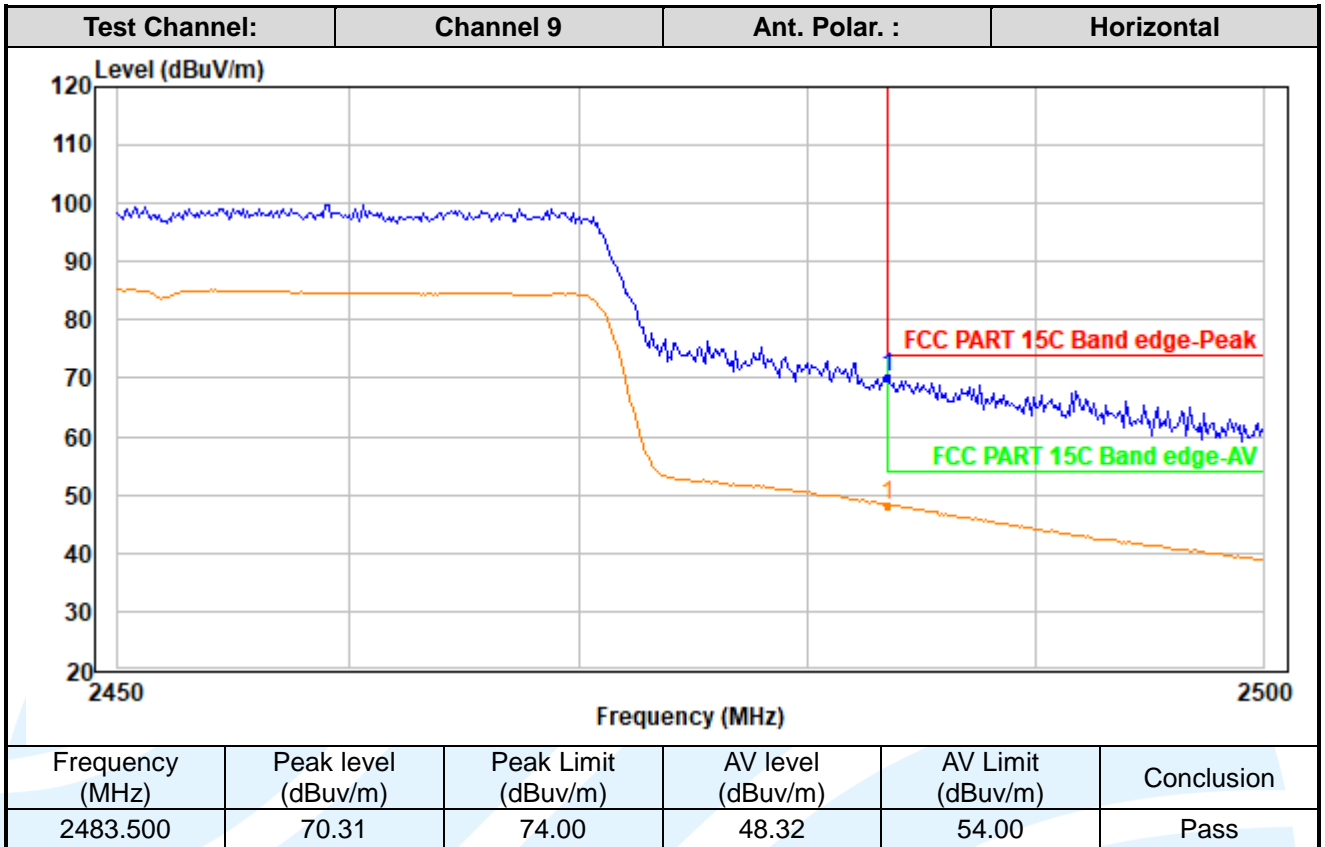
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5.9 CONDUCTED EMISSION

Test Requirement: 47 CFR Part 15C Section 15.207
 RSS-Gen Issue 5, Section 8.8
Test Method: ANSI C63.10-2013 Section 6.2

Limits:

| Frequency range (MHz) | Limits (dB(μV)) | |
|-----------------------|-----------------|----------|
| | Quasi-peak | Average |
| 0,15 to 0,50 | 66 to 56 | 56 to 46 |
| 0,50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.4.2 for details.

Test Procedures:

Test frequency range :150KHz-30MHz

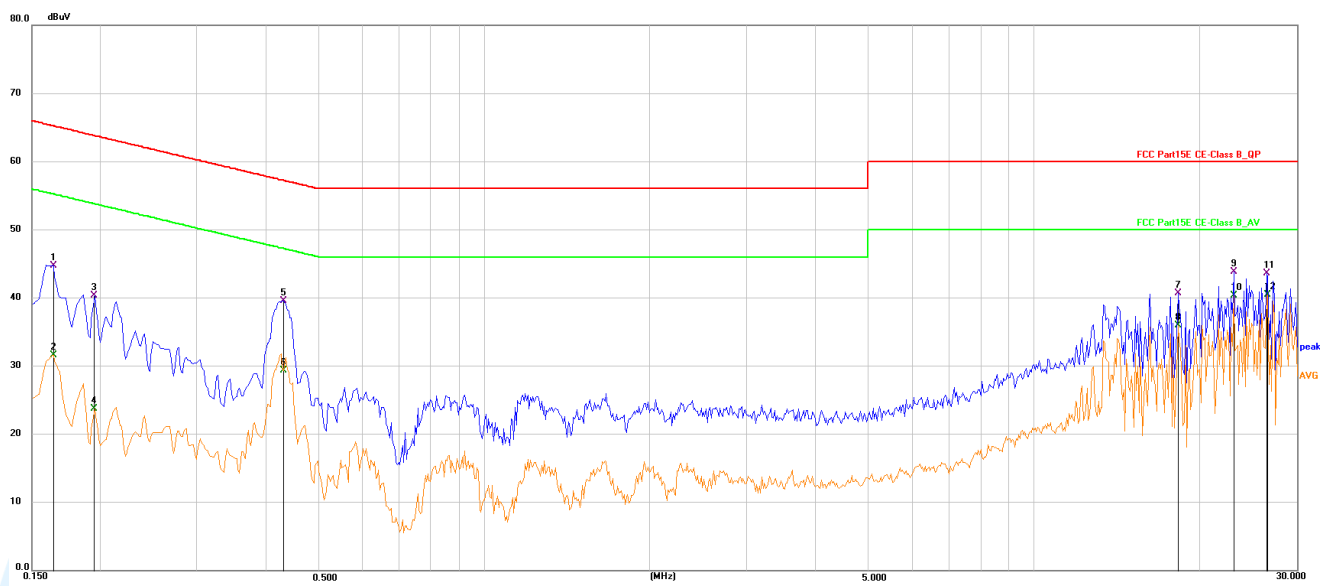
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The worst measurement data as follows:
 Quasi Peak and Average:
 Mode: WIFI Link

Live Line



| No. | Frequency (MHz) | Reading (dBμV) | Correction factor (dB) | Result (dBμV) | Limit (dBμV) | Margin (dB) | Detector |
|-----|-----------------|----------------|------------------------|---------------|--------------|-------------|----------|
| 1 | 0.1635 | 34.55 | 10.19 | 44.74 | 65.28 | -20.54 | QP |
| 2 | 0.1635 | 21.43 | 10.19 | 31.62 | 55.28 | -23.66 | AVG |
| 3 | 0.1949 | 30.14 | 10.16 | 40.30 | 63.83 | -23.53 | QP |
| 4 | 0.1949 | 13.60 | 10.16 | 23.76 | 53.83 | -30.07 | AVG |
| 5 | 0.4290 | 29.45 | 10.14 | 39.59 | 57.27 | -17.68 | QP |
| 6 | 0.4290 | 19.16 | 10.14 | 29.30 | 47.27 | -17.97 | AVG |
| 7 | 18.2445 | 29.96 | 10.70 | 40.66 | 60.00 | -19.34 | QP |
| 8 | 18.2445 | 25.22 | 10.70 | 35.92 | 50.00 | -14.08 | AVG |
| 9 | 23.1315 | 33.03 | 10.81 | 43.84 | 60.00 | -16.16 | QP |
| 10 | 23.1315 | 29.58 | 10.81 | 40.39 | 50.00 | -9.61 | AVG |
| 11 | 26.4885 | 32.69 | 10.85 | 43.54 | 60.00 | -16.46 | QP |
| 12 | 26.6100 | 29.56 | 10.85 | 40.41 | 50.00 | -9.59 | AVG |

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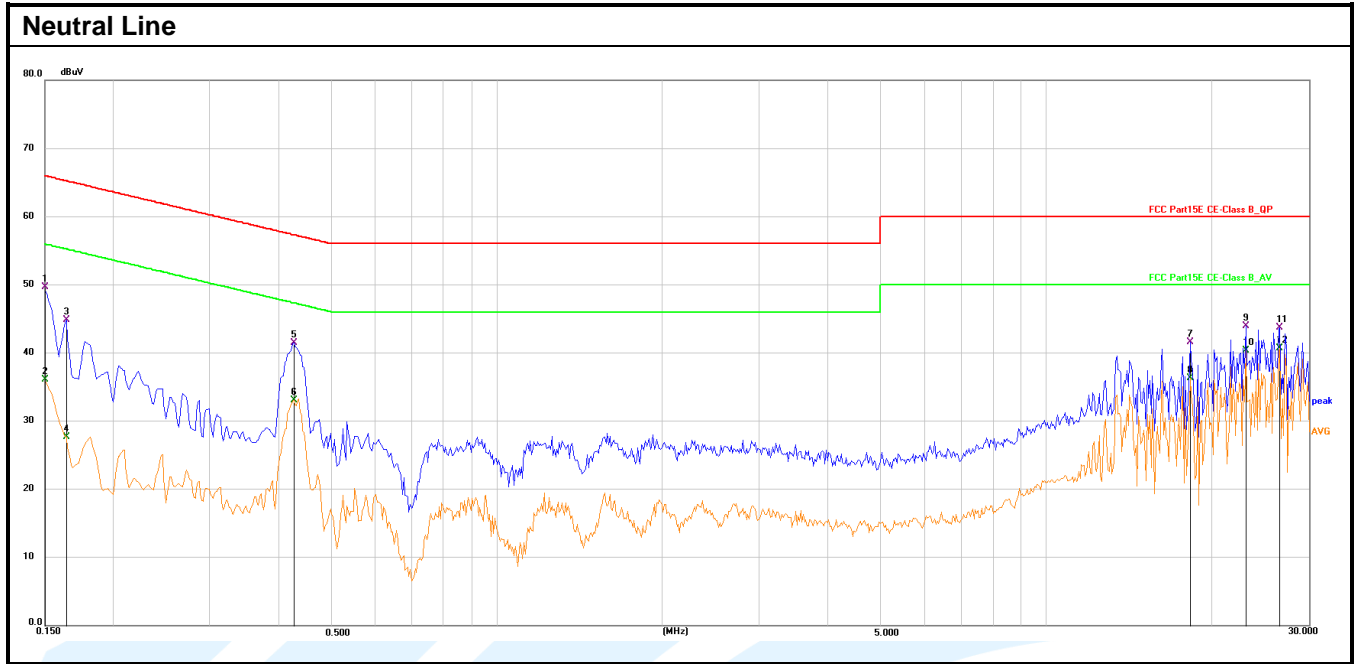
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| No. | Frequency (MHz) | Reading (dBμV) | Correction factor (dB) | Result (dBμV) | Limit (dBμV) | Margin (dB) | Detector |
|-----|-----------------|----------------|------------------------|---------------|--------------|-------------|----------|
| 1 | 0.1500 | 39.43 | 10.19 | 49.62 | 66.00 | -16.38 | QP |
| 2 | 0.1500 | 25.89 | 10.19 | 36.08 | 56.00 | -19.92 | AVG |
| 3 | 0.1635 | 34.66 | 10.16 | 44.82 | 65.28 | -20.46 | QP |
| 4 | 0.1635 | 17.45 | 10.16 | 27.61 | 55.28 | -27.67 | AVG |
| 5 | 0.4244 | 31.28 | 10.21 | 41.49 | 57.36 | -15.87 | QP |
| 6 | 0.4244 | 22.79 | 10.21 | 33.00 | 47.36 | -14.36 | AVG |
| 7 | 18.2443 | 30.85 | 10.71 | 41.56 | 60.00 | -18.44 | QP |
| 8 | 18.2443 | 25.56 | 10.71 | 36.27 | 50.00 | -13.73 | AVG |
| 9 | 23.1314 | 33.21 | 10.77 | 43.98 | 60.00 | -16.02 | QP |
| 10 | 23.1314 | 29.59 | 10.77 | 40.36 | 50.00 | -9.64 | AVG |
| 11 | 26.6100 | 32.86 | 10.82 | 43.68 | 60.00 | -16.32 | QP |
| 12 | 26.6100 | 29.81 | 10.82 | 40.63 | 50.00 | -9.37 | AVG |

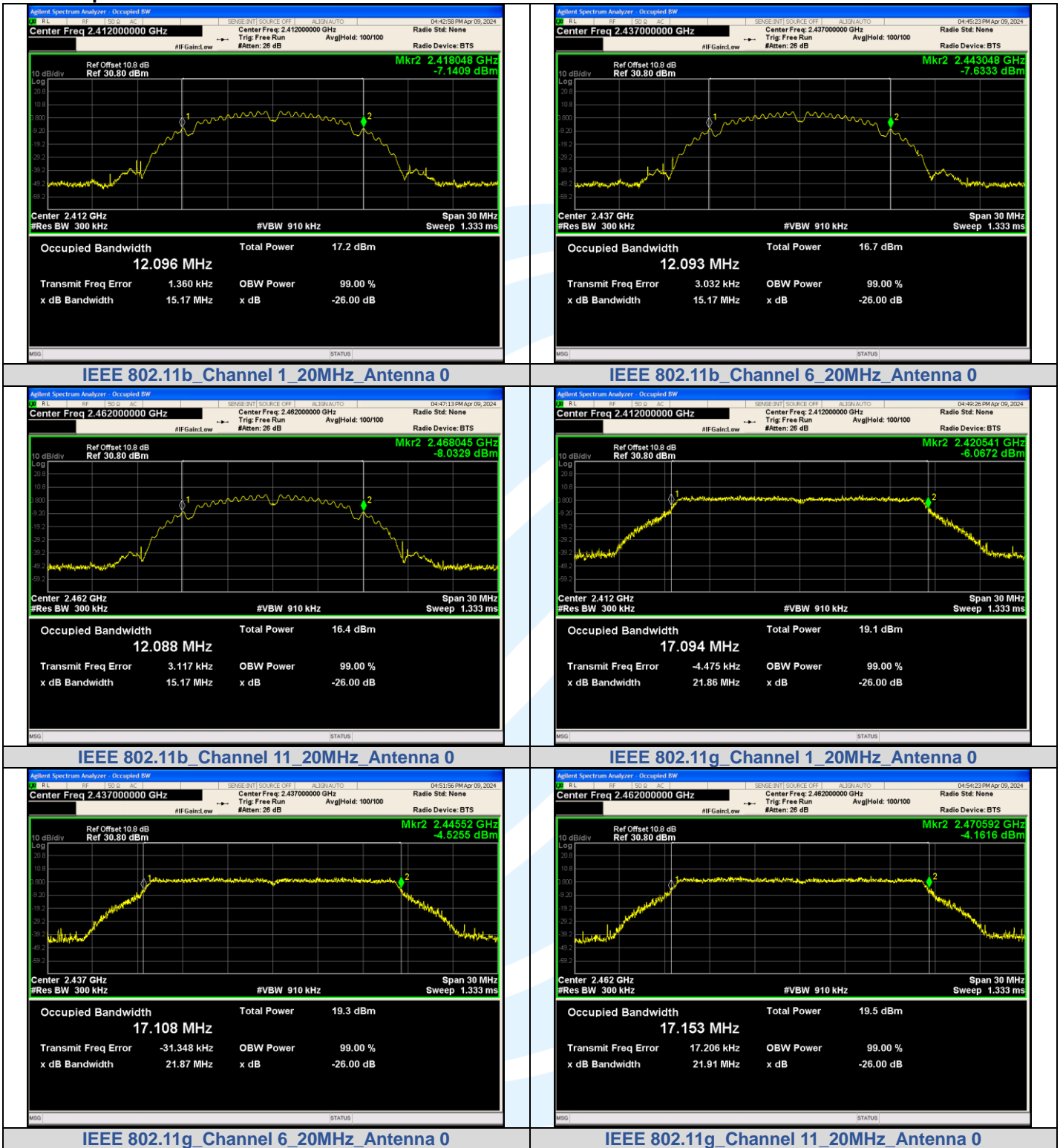
Remark:

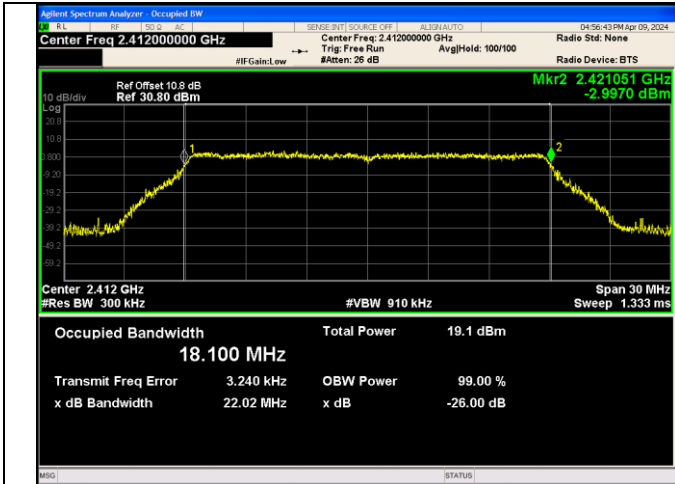
1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

APPENDIX A RF TEST DATA
A.1 99% BANDWIDTH

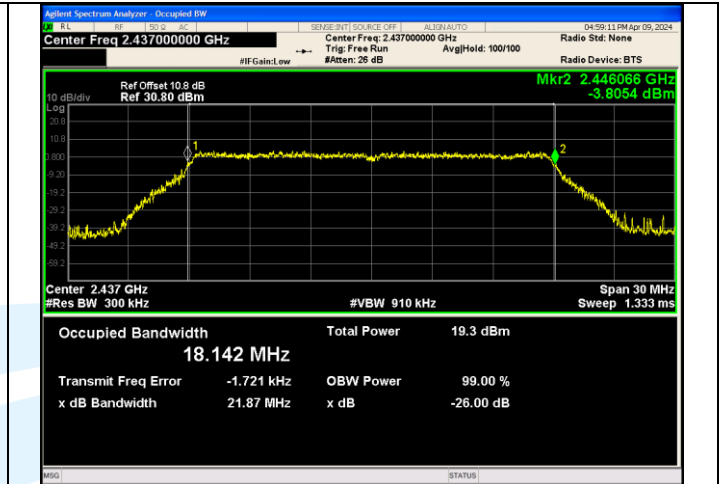
| Mode | Channel | RU & Index | Ant. | 99% BW (MHz) |
|------------------|---------|------------|------|--------------|
| IEEE 802.11b | 1 | N/A | 0 | 12.096 |
| | 6 | | | 12.093 |
| | 11 | | | 12.088 |
| IEEE 802.11g | 1 | | | 17.094 |
| | 6 | | | 17.108 |
| | 11 | | | 17.153 |
| IEEE 802.11n_20 | 1 | | | 18.100 |
| | 6 | | | 18.142 |
| | 11 | | | 18.124 |
| IEEE 802.11n_40 | 3 | | | 36.500 |
| | 6 | | | 36.479 |
| | 9 | | | 36.495 |
| IEEE 802.11ax_20 | 1 | SU | 0 | 19.122 |
| | 6 | | | 19.117 |
| | 11 | | | 19.168 |
| IEEE 802.11ax_40 | 3 | | | 37.902 |
| | 6 | | | 37.864 |
| | 9 | | | 37.902 |

Test Graphs

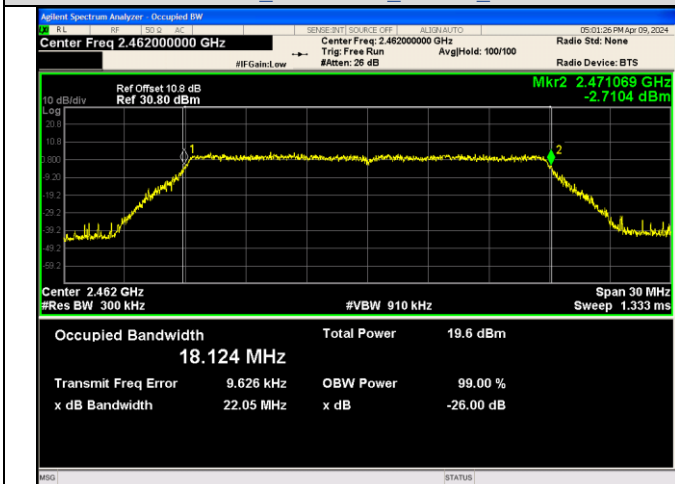




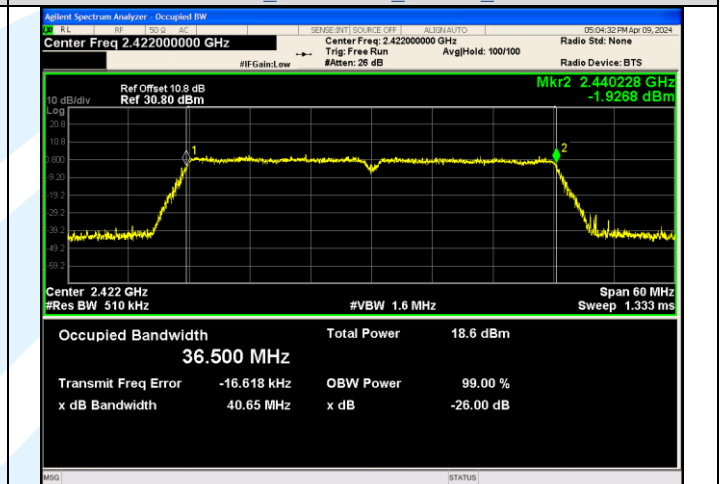
IEEE 802.11n_Channel 1_20MHz_Antenna 0



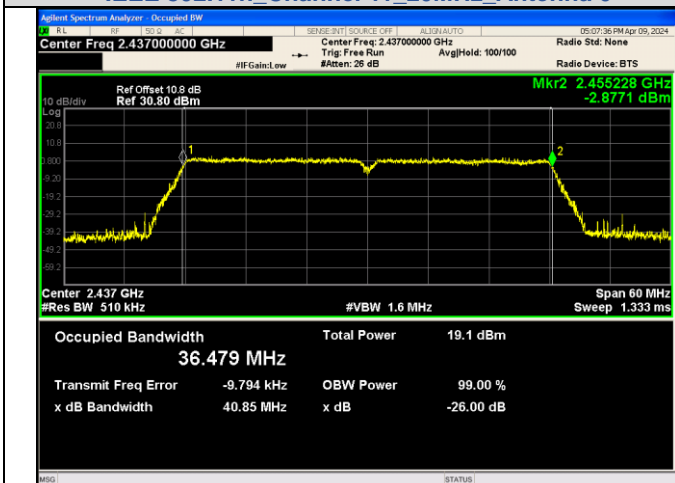
IEEE 802.11n_Channel 6_20MHz_Antenna 0



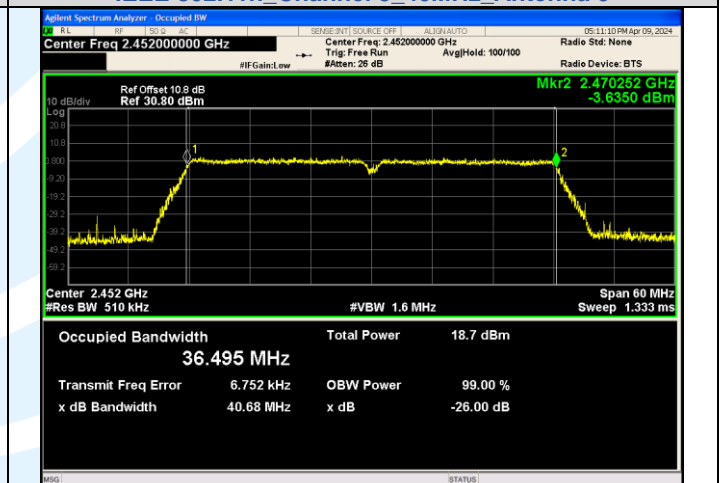
IEEE 802.11n_Channel 11_20MHz_Antenna 0



IEEE 802.11n_Channel 3_40MHz_Antenna 0



IEEE 802.11n_Channel 6_40MHz_Antenna 0



IEEE 802.11n_Channel 9_40MHz_Antenna 0

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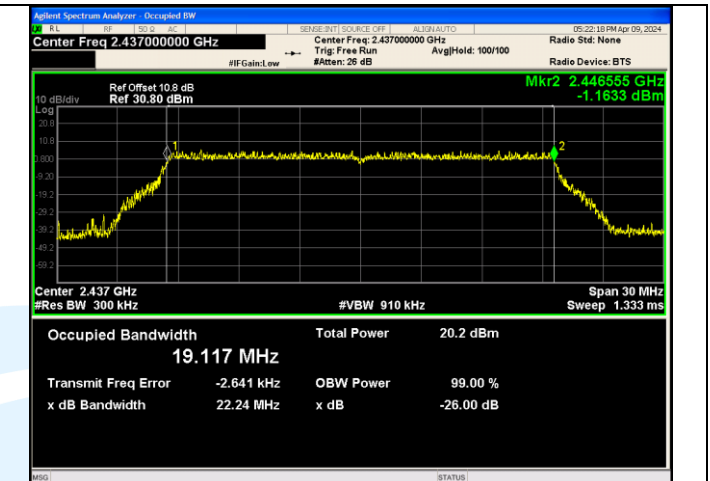
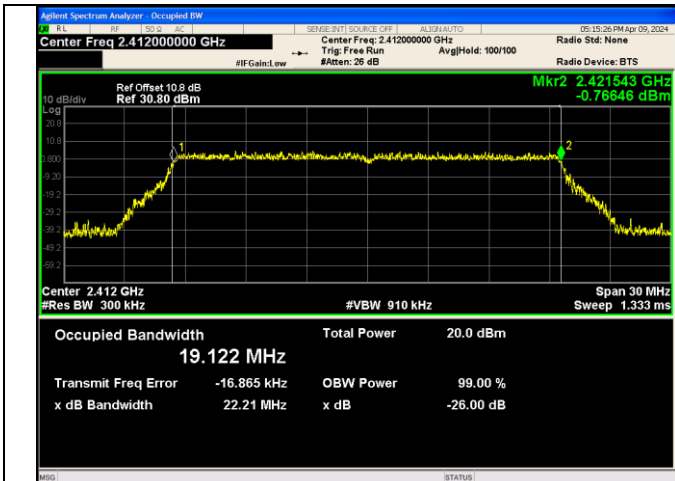
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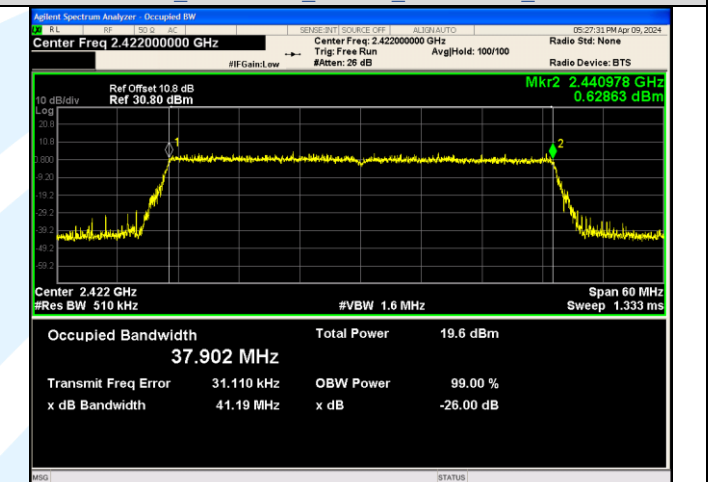
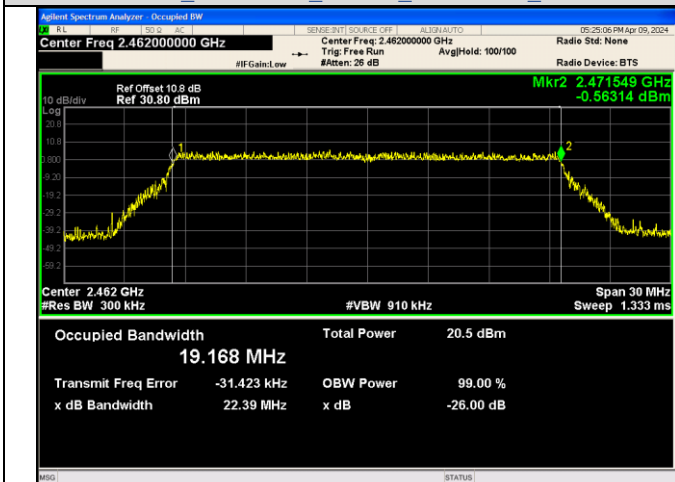
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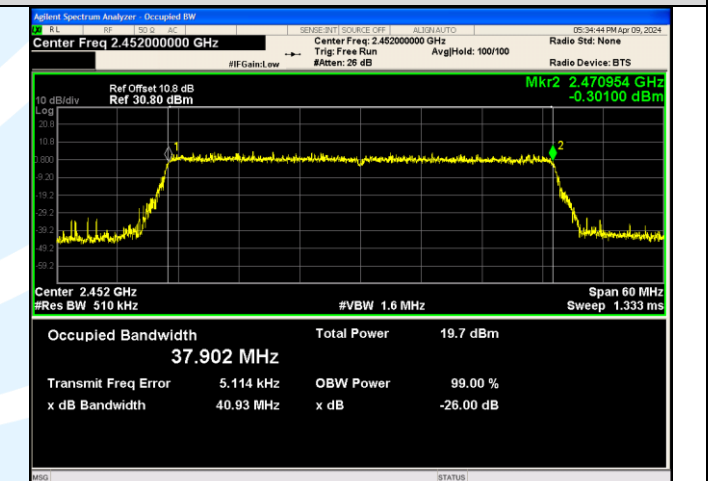
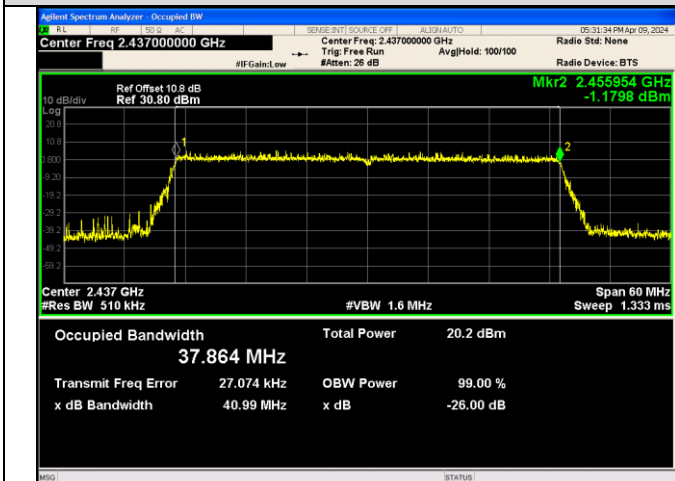
IEEE 802.11ax_Channel 1_20MHz_Antenna 0_RU&Index SU

IEEE 802.11ax_Channel 6_20MHz_Antenna 0_RU&Index SU



IEEE 802.11ax_Channel 11_20MHz_Antenna 0_RU&Index SU

IEEE 802.11ax_Channel 3_40MHz_Antenna 0_RU&Index SU



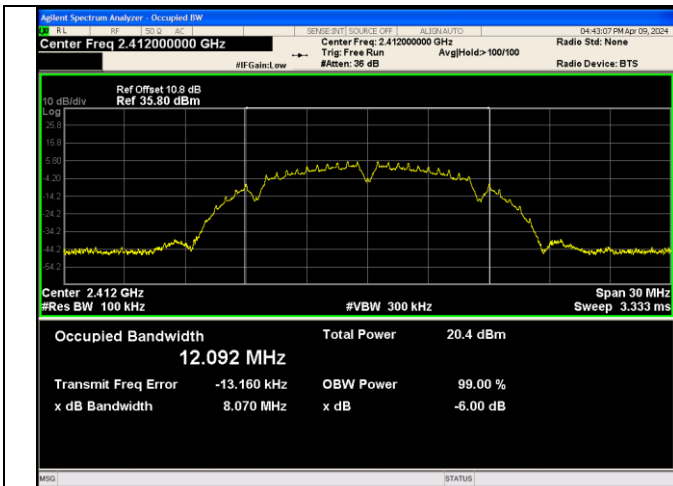
IEEE 802.11ax_Channel 6_40MHz_Antenna 0_RU&Index SU

IEEE 802.11ax_Channel 9_40MHz_Antenna 0_RU&Index SU

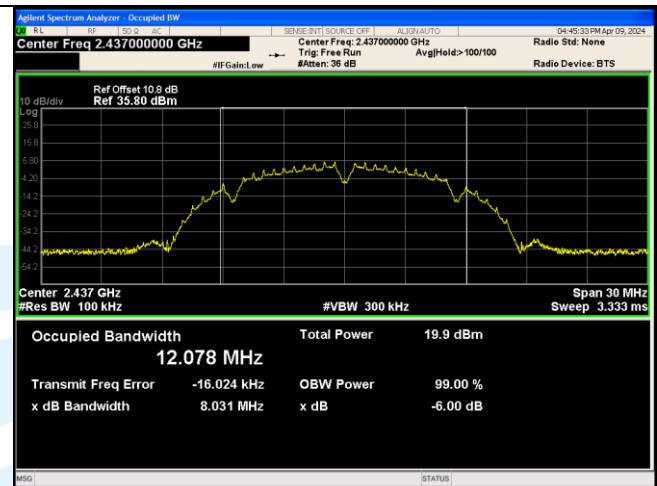
A.2 6DB BANDWIDTH

| Mode | Channel | RU & Index | Ant. | Center Frequency (MHz) | 6 dB Bandwidth (MHz) | Limit (MHz) | Result |
|------------------|---------|------------|------|------------------------|----------------------|-------------|--------|
| IEEE 802.11b | 1 | N/A | 0 | 2412 | 8.070 | 0.5 | PASS |
| | 6 | | | 2437 | 8.031 | | PASS |
| | 11 | | | 2462 | 7.548 | | PASS |
| IEEE 802.11g | 1 | | | 2412 | 16.44 | | PASS |
| | 6 | | | 2437 | 16.51 | | PASS |
| | 11 | | | 2462 | 16.42 | | PASS |
| IEEE 802.11n_20 | 1 | | | 2412 | 17.66 | | PASS |
| | 6 | | | 2437 | 17.74 | | PASS |
| | 11 | | | 2462 | 17.71 | | PASS |
| IEEE 802.11n_40 | 3 | | | 2422 | 36.30 | | PASS |
| | 6 | | | 2437 | 36.08 | | PASS |
| | 9 | | | 2452 | 36.36 | | PASS |
| IEEE 802.11ax_20 | 1 | SU | 2412 | 19.04 | PASS | | |
| | 6 | | 2437 | 19.08 | PASS | | |
| | 11 | | 2462 | 19.02 | PASS | | |
| IEEE 802.11ax_40 | 3 | | 2422 | 38.03 | PASS | | |
| | 6 | | 2437 | 38.04 | PASS | | |
| | 9 | | 2452 | 37.96 | PASS | | |

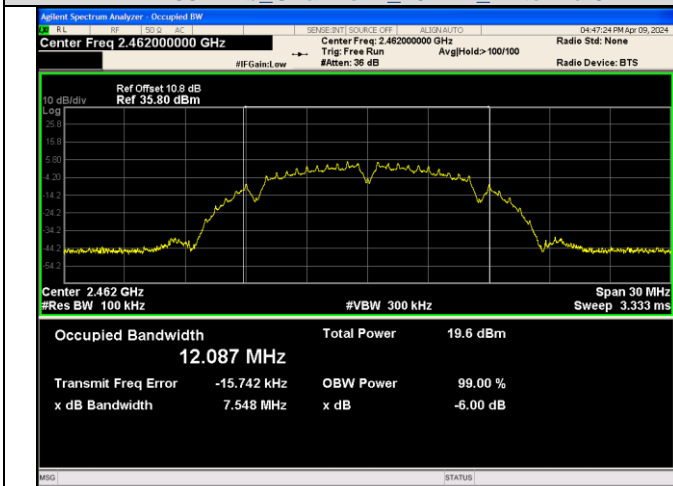
Test Graphs



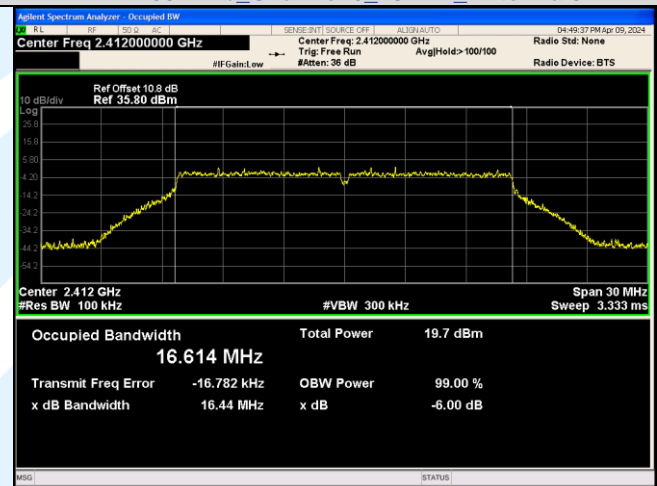
IEEE 802.11b_Channel 1_20MHz_Antenna 0



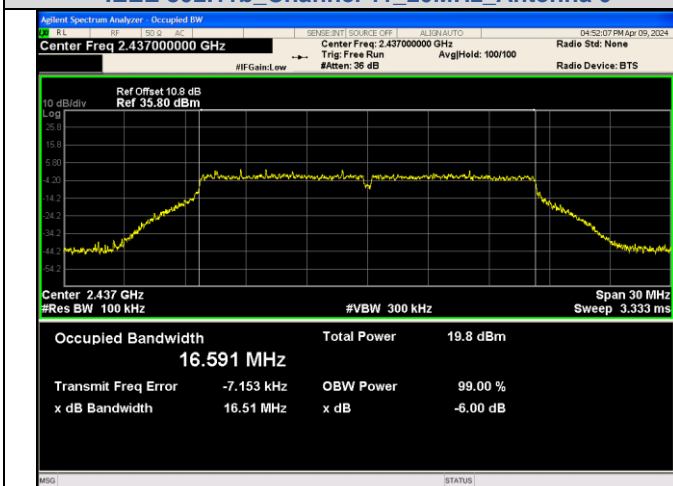
IEEE 802.11b_Channel 6_20MHz_Antenna 0



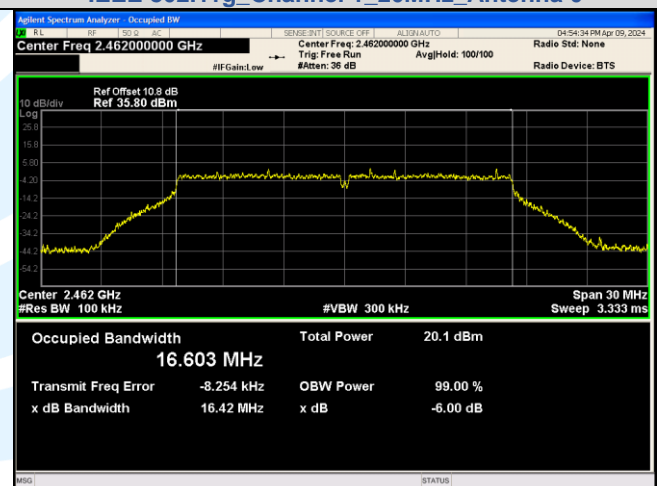
IEEE 802.11b_Channel 11_20MHz_Antenna 0



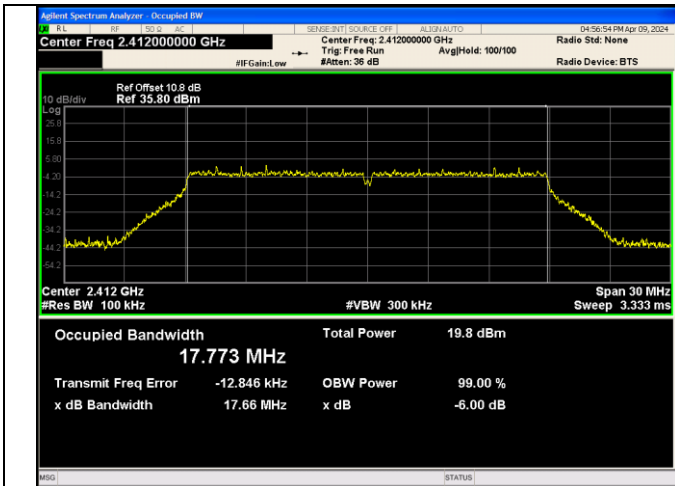
IEEE 802.11g_Channel 1_20MHz_Antenna 0



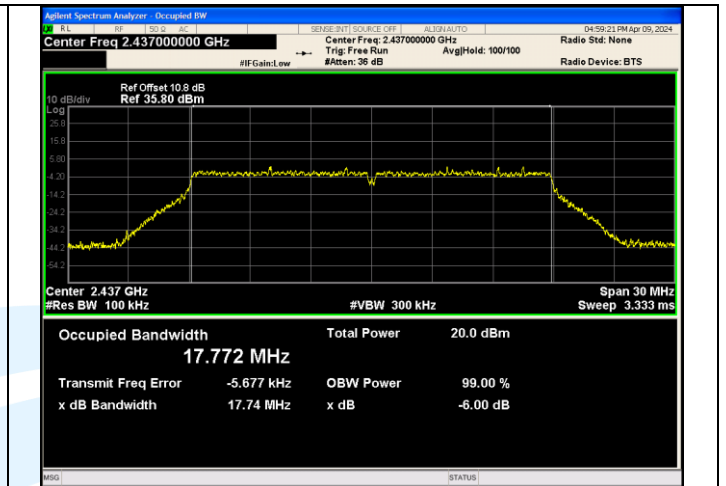
IEEE 802.11g_Channel 6_20MHz_Antenna 0



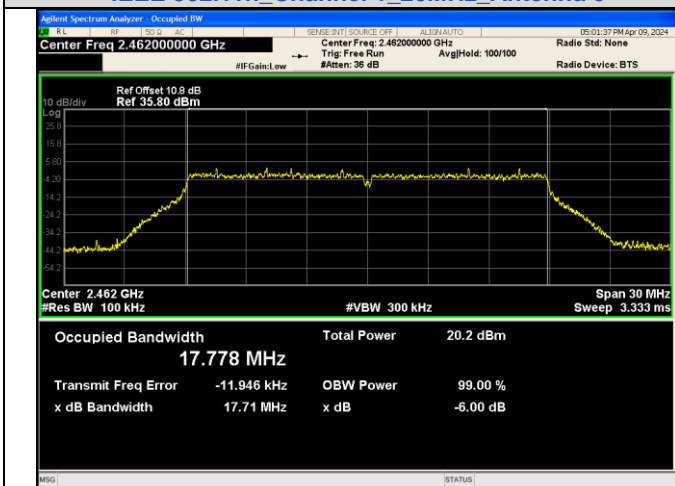
IEEE 802.11g_Channel 11_20MHz_Antenna 0



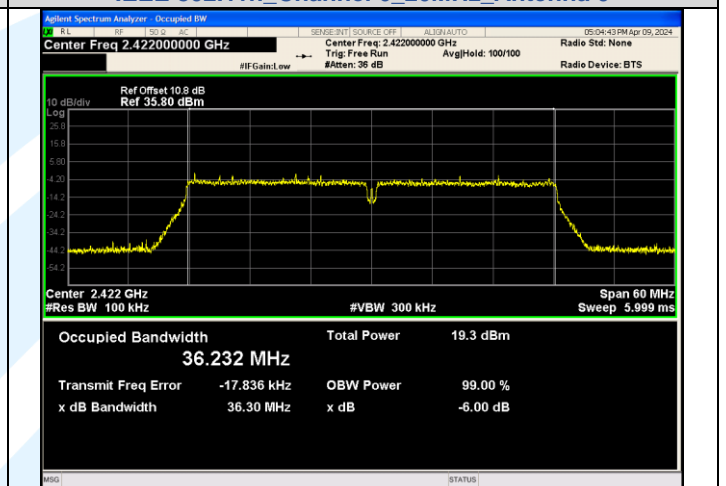
IEEE 802.11n_Channel 1_20MHz_Antenna 0



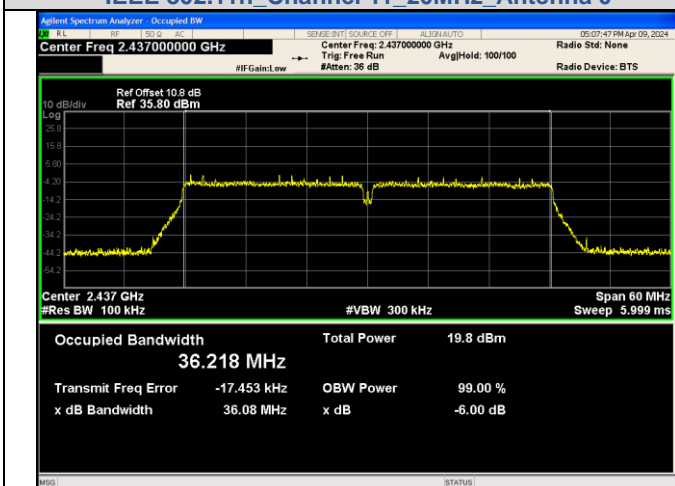
IEEE 802.11n_Channel 6_20MHz_Antenna 0



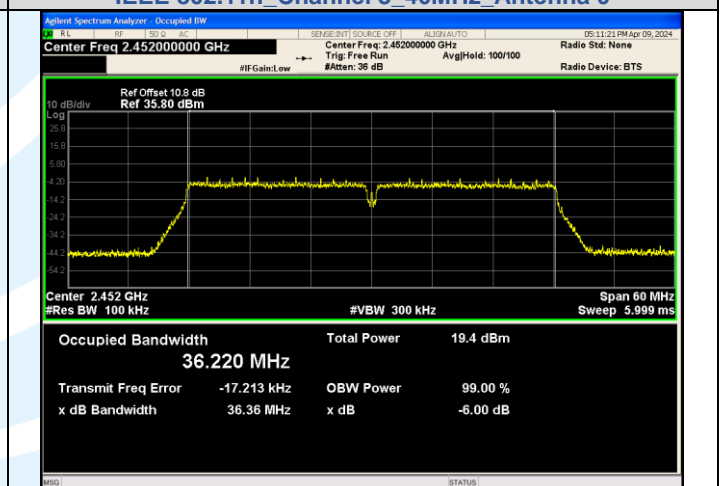
IEEE 802.11n_Channel 11_20MHz_Antenna 0



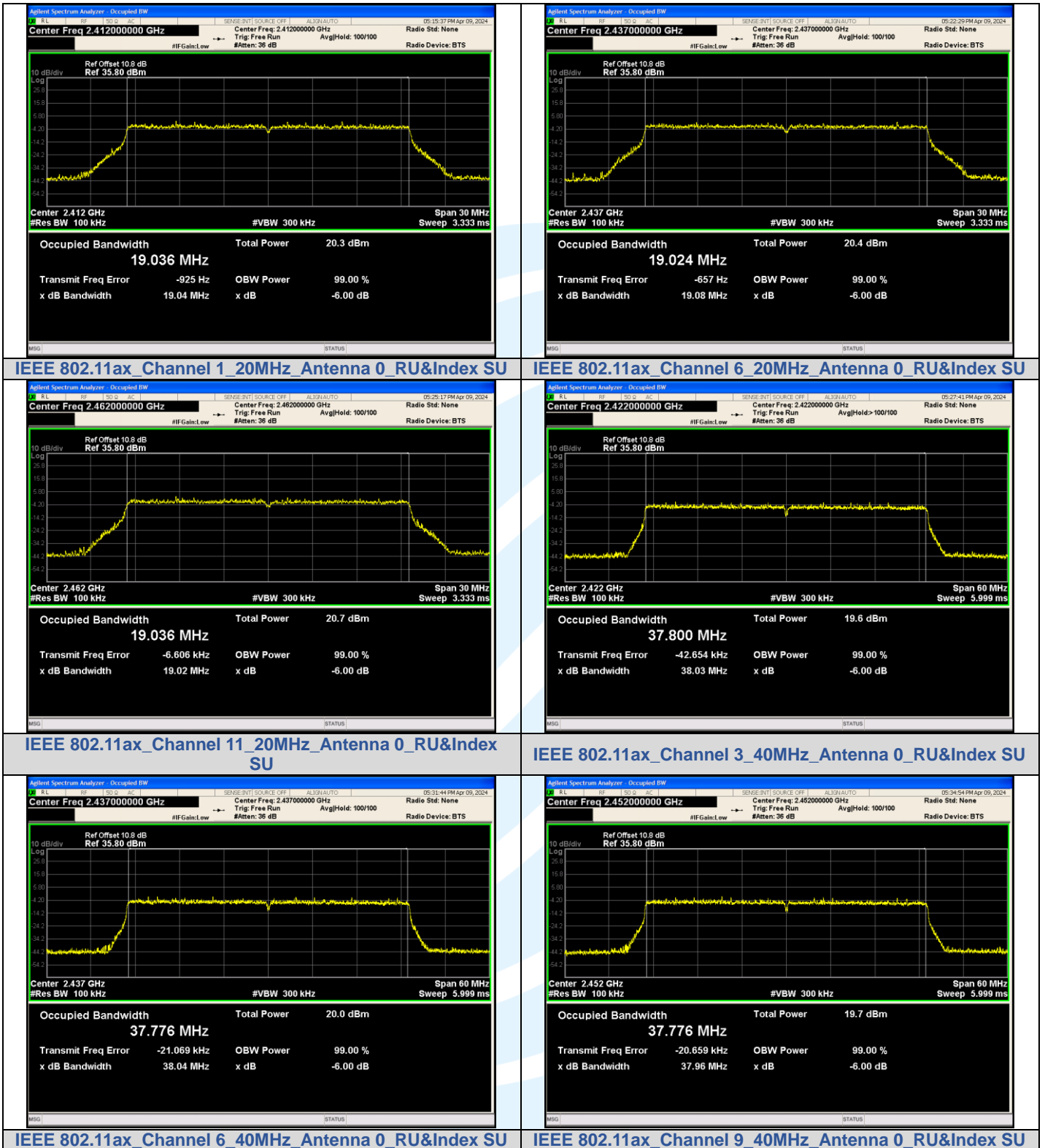
IEEE 802.11n_Channel 3_40MHz_Antenna 0



IEEE 802.11n_Channel 6_40MHz_Antenna 0



IEEE 802.11n_Channel 9_40MHz_Antenna 0



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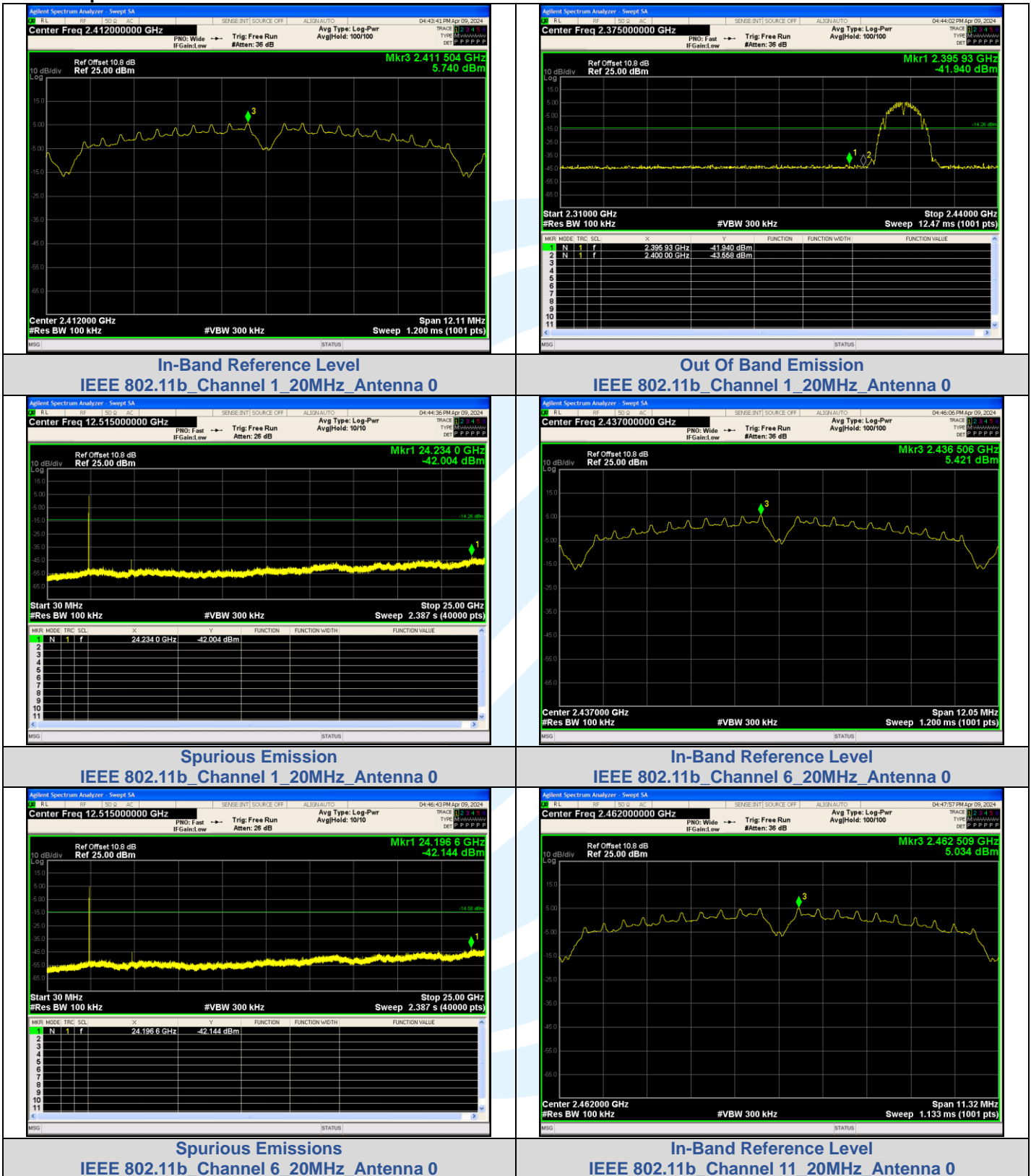
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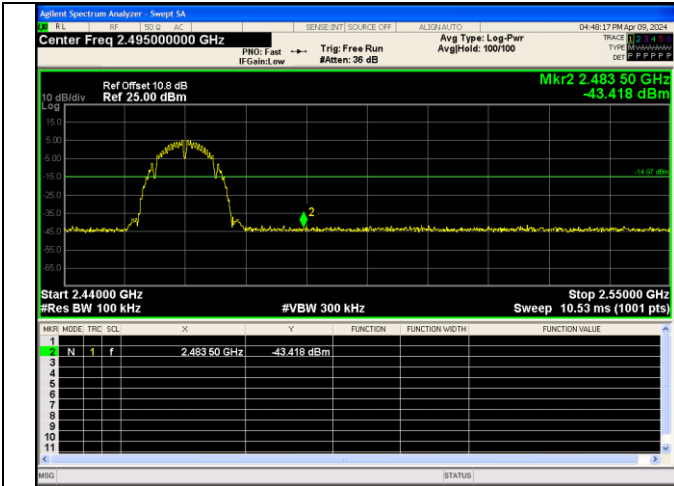
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A.3 CONDUCTED OUT OF BAND EMISSION

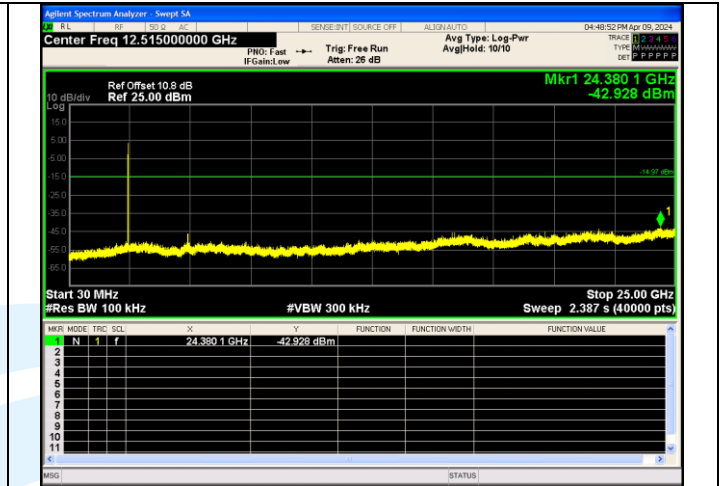
| Mode | Channel | RU & Index | Ant. | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result | |
|------------------|---------|------------|---------|------------------------------|--------------------------|-------------|-----------------|---------|------|
| IEEE 802.11b | 1 | N/A | 0 | 2400.00 | -43.558 | -14.26 | -29.298 | PASS | |
| | | | | 2395.93 | -41.940 | -14.26 | -27.680 | PASS | |
| | | | | 24234.0 | -42.004 | -14.26 | -27.744 | PASS | |
| | 6 | | | 24196.6 | -42.144 | -14.58 | -27.564 | PASS | |
| | | | | 11 | 2483.50 | -43.418 | -14.97 | -28.448 | PASS |
| | | | | | 24380.1 | -42.928 | -14.97 | -27.958 | PASS |
| IEEE 802.11g | 1 | | | 2400.00 | -38.608 | -17.65 | -20.958 | PASS | |
| | | | | 2398.79 | -36.731 | -17.65 | -19.081 | PASS | |
| | | | | 24400.7 | -42.235 | -17.65 | -24.585 | PASS | |
| | 6 | | | 24962.5 | -42.307 | -17.41 | -24.897 | PASS | |
| | | | | 11 | 2483.50 | -43.167 | -17.34 | -25.827 | PASS |
| | | | | | 24182.8 | -42.790 | -17.34 | -25.450 | PASS |
| IEEE 802.11n_20 | 1 | 2400.00 | -37.415 | -17.81 | -19.605 | PASS | | | |
| | | 2398.14 | -36.527 | -17.81 | -18.717 | PASS | | | |
| | | 24390.7 | -42.776 | -17.81 | -24.966 | PASS | | | |
| | 6 | 24403.8 | -42.342 | -17.57 | -24.772 | PASS | | | |
| | | 11 | 2483.50 | -42.148 | -17.36 | -24.788 | PASS | | |
| | | | 24624.8 | -42.687 | -17.36 | -25.327 | PASS | | |
| IEEE 802.11n_40 | 3 | 2400.00 | -39.065 | -20.68 | -18.385 | PASS | | | |
| | | 24290.8 | -42.663 | -20.68 | -21.983 | PASS | | | |
| | | 24187.8 | -42.586 | -20.08 | -22.506 | PASS | | | |
| | 6 | 2483.50 | -42.400 | -20.72 | -21.680 | PASS | | | |
| | | 9 | 24480.0 | -41.564 | -20.72 | -20.844 | PASS | | |
| | | | 2400.00 | -35.356 | -17.92 | -17.436 | PASS | | |
| IEEE 802.11ax_20 | 1 | 24342.0 | -42.882 | -17.92 | -24.962 | PASS | | | |
| | | 6 | 24748.4 | -41.799 | -17.75 | -24.049 | PASS | | |
| | | | 2483.50 | -43.157 | -17.52 | -25.637 | PASS | | |
| | 11 | 24656.0 | -43.004 | -17.52 | -25.484 | PASS | | | |
| | | 3 | 2400.00 | -41.384 | -21.56 | -19.824 | PASS | | |
| | | | 2354.98 | -40.707 | -21.56 | -19.147 | PASS | | |
| IEEE 802.11ax_40 | 3 | 24611.7 | -42.019 | -21.56 | -20.459 | PASS | | | |
| | | 6 | 24425.7 | -42.986 | -20.82 | -22.166 | PASS | | |
| | | | 2483.50 | -43.546 | -21.22 | -22.326 | PASS | | |
| | 9 | 24988.8 | -42.642 | -21.22 | -21.422 | PASS | | | |
| | | SU | 2400.00 | -35.356 | -17.92 | -17.436 | PASS | | |
| | | | 24342.0 | -42.882 | -17.92 | -24.962 | PASS | | |

Test Graphs





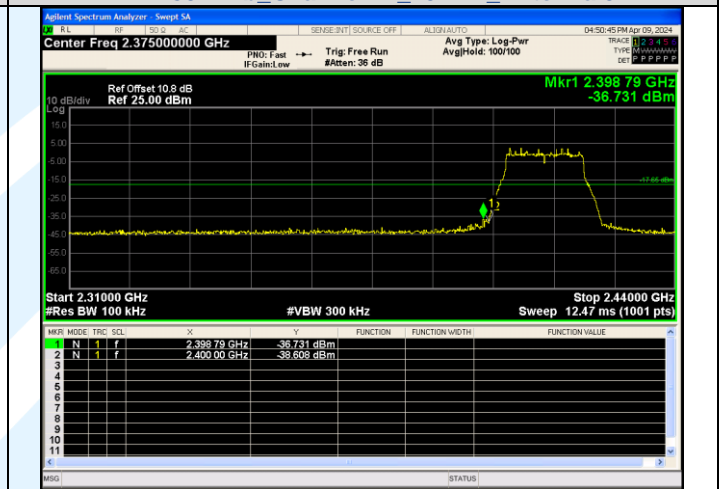
Out Of Band Emission
IEEE 802.11b Channel 11 20MHz Antenna 0



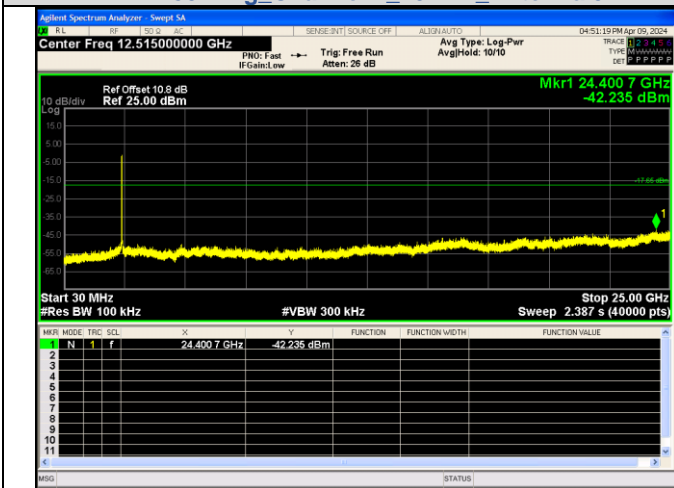
Spurious Emission
IEEE 802.11b Channel 11 20MHz Antenna 0



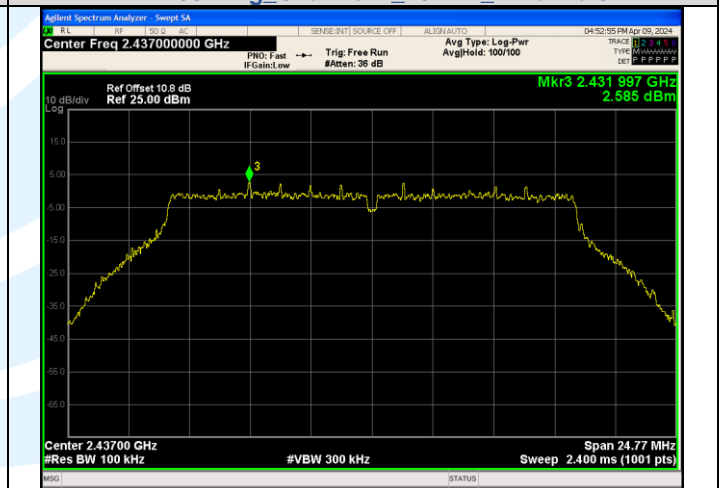
In-Band Reference Level
IEEE 802.11g Channel 1 20MHz Antenna 0



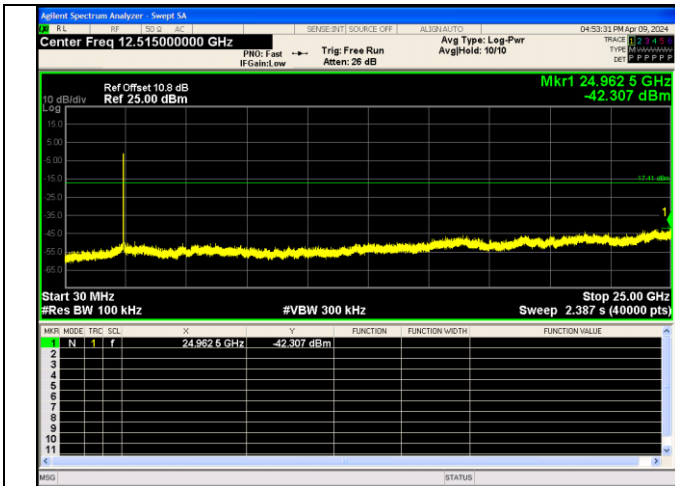
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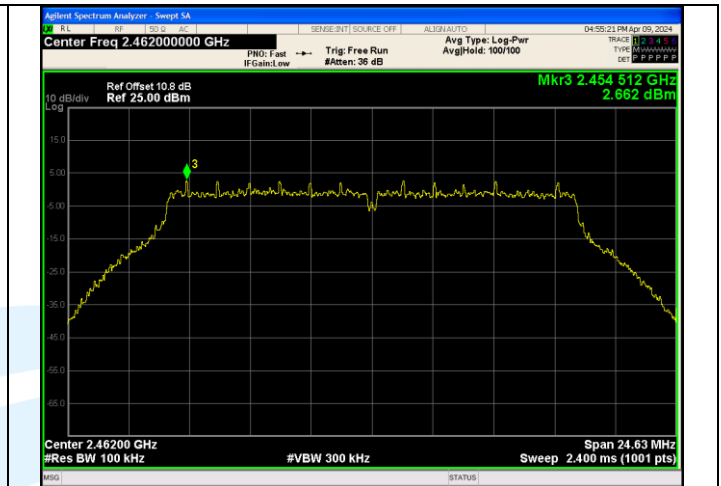
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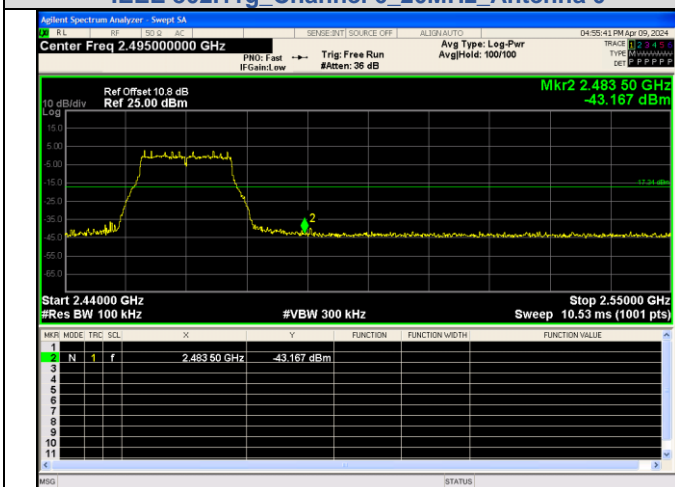
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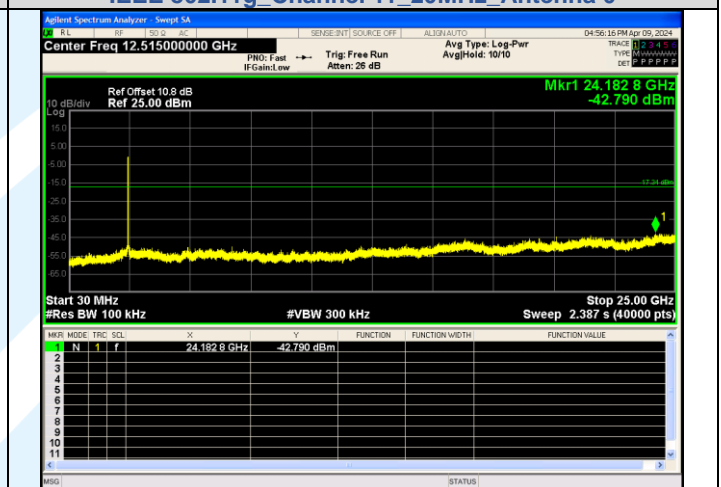
Spurious Emissions
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In-Band Reference Level
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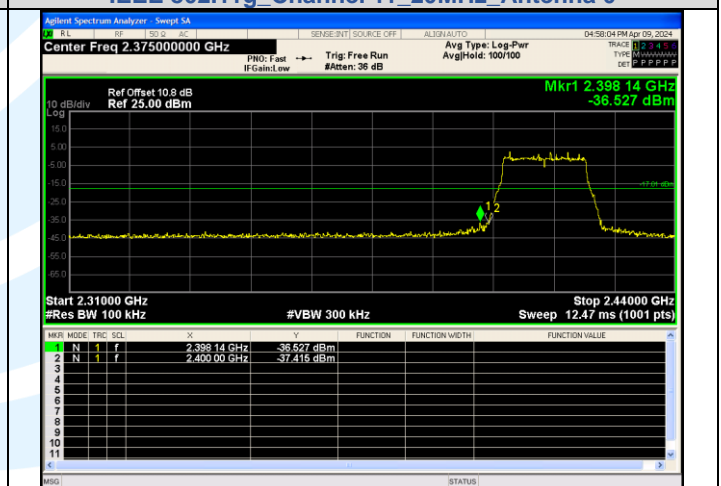
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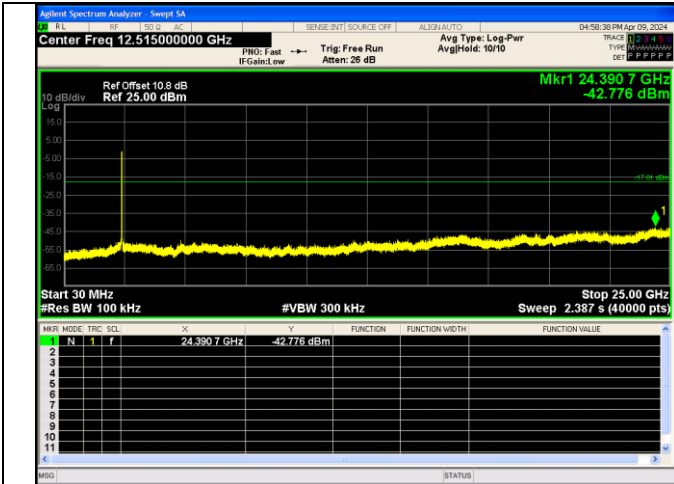
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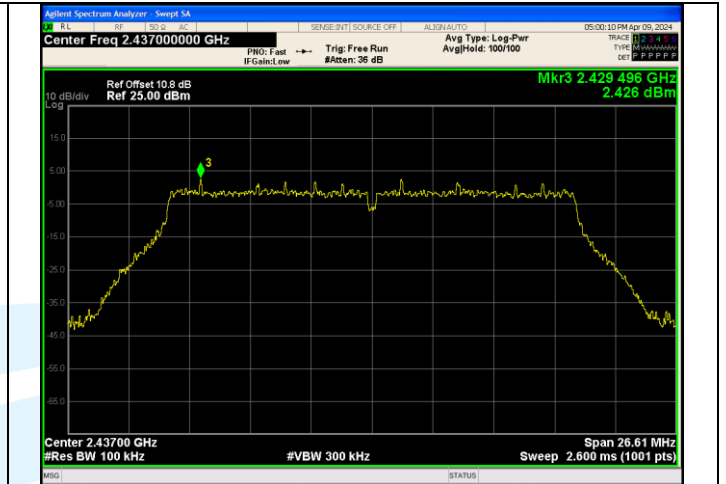
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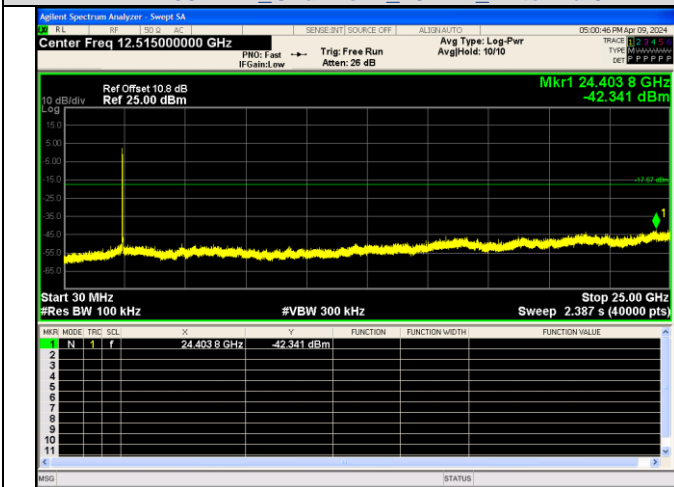
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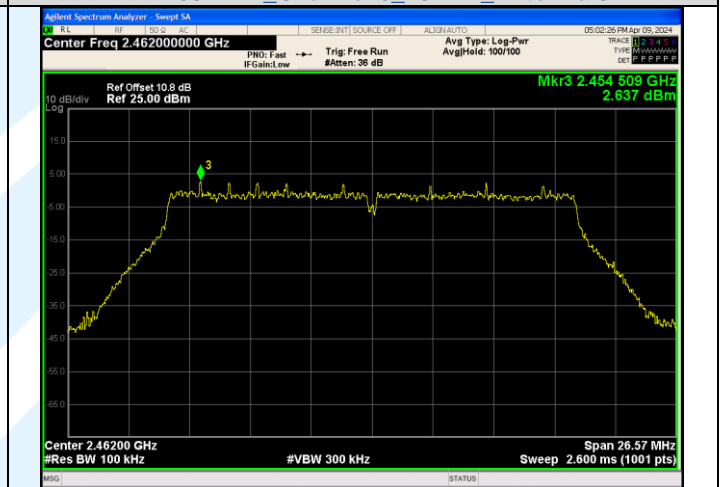
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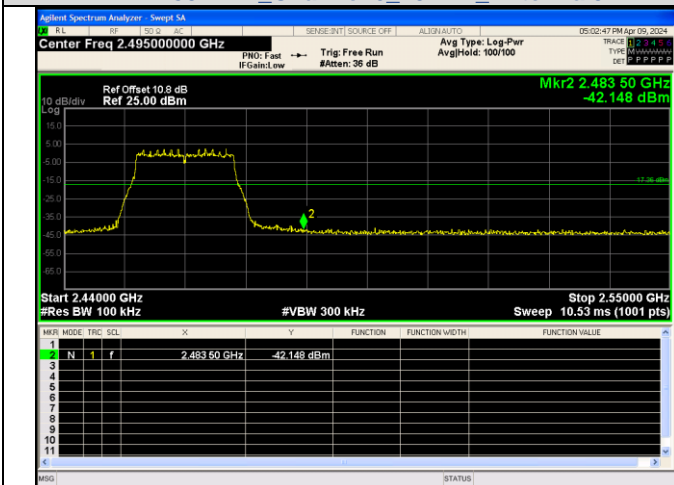
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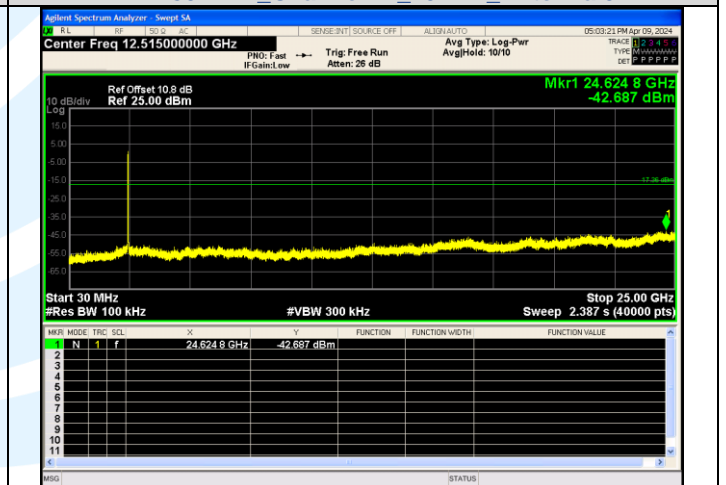
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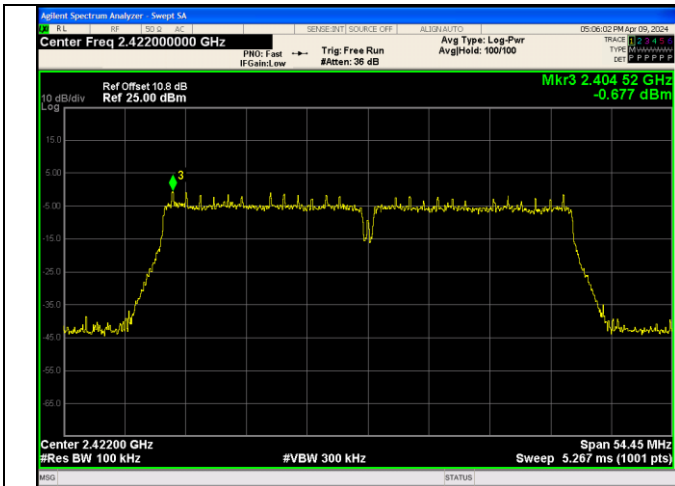
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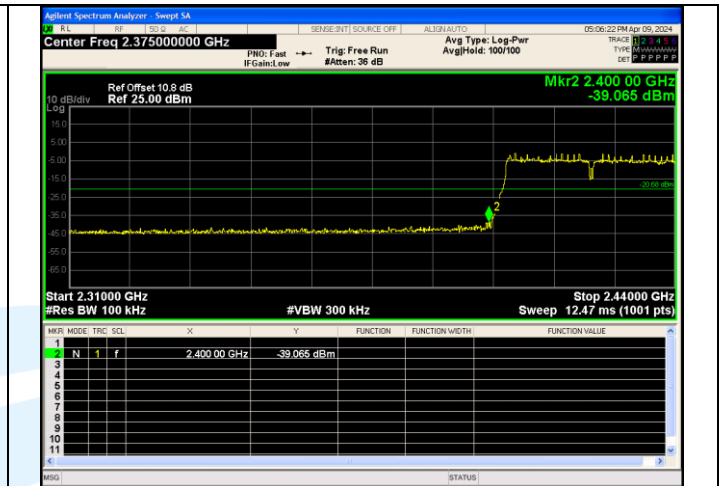
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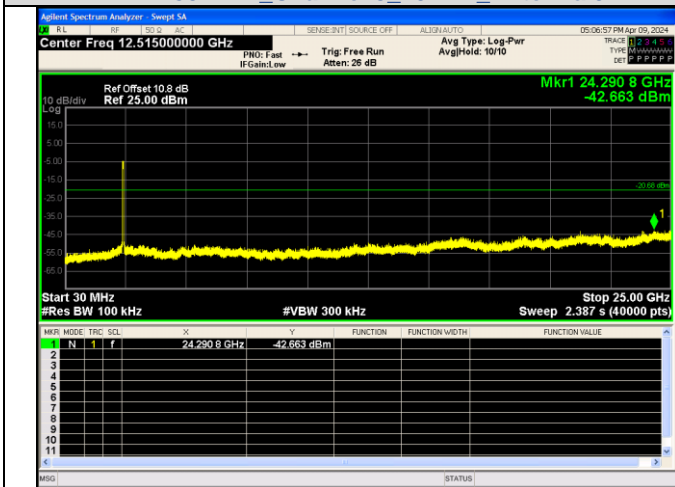
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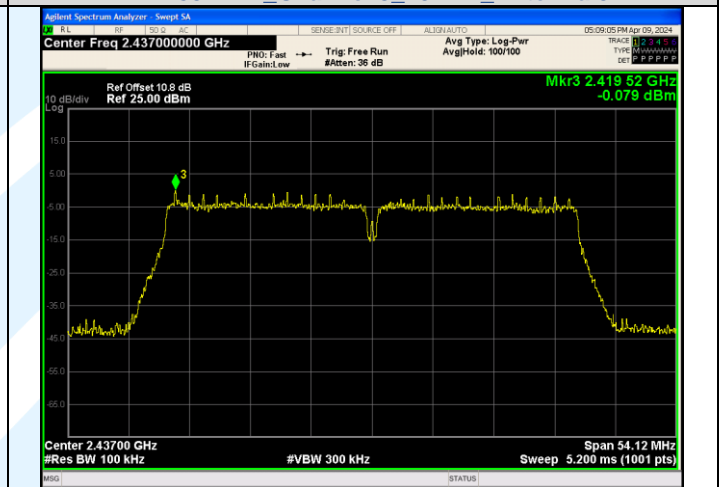
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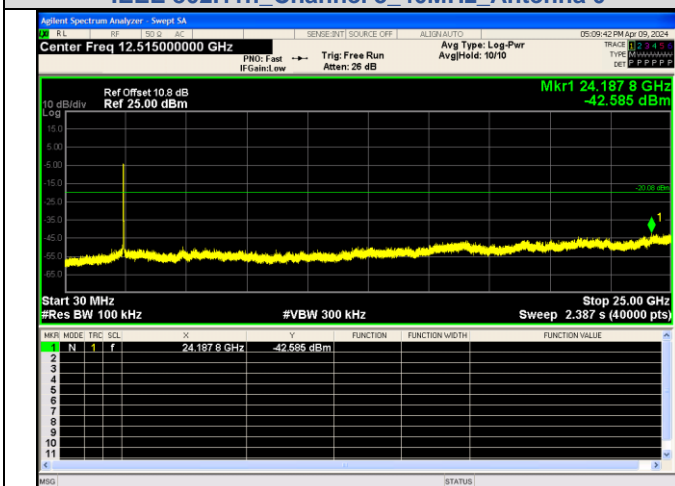
Out Of Band Emission
IEEE 802.11n Channel 3 40MHz Antenna 0



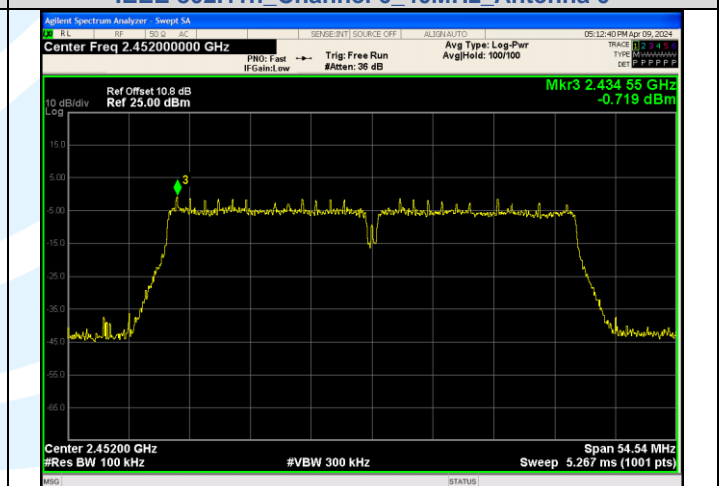
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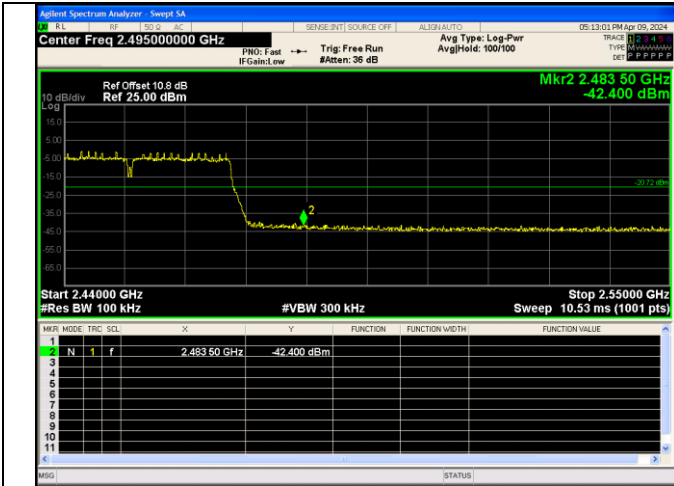
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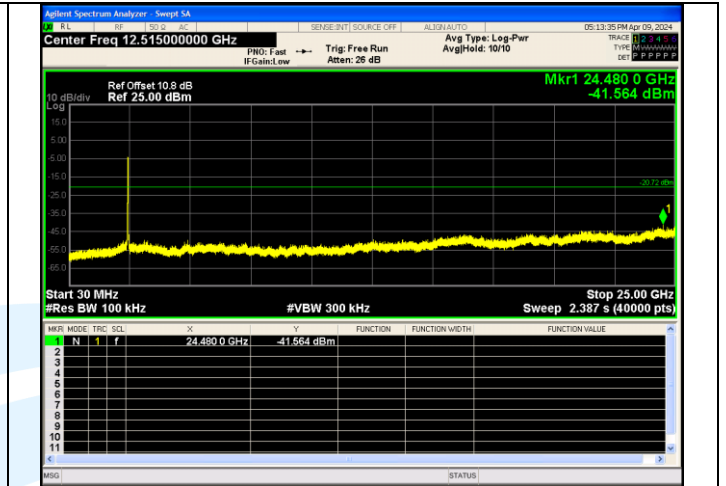
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IEEE 802.11n Channel 6 40MHz Antenna 0



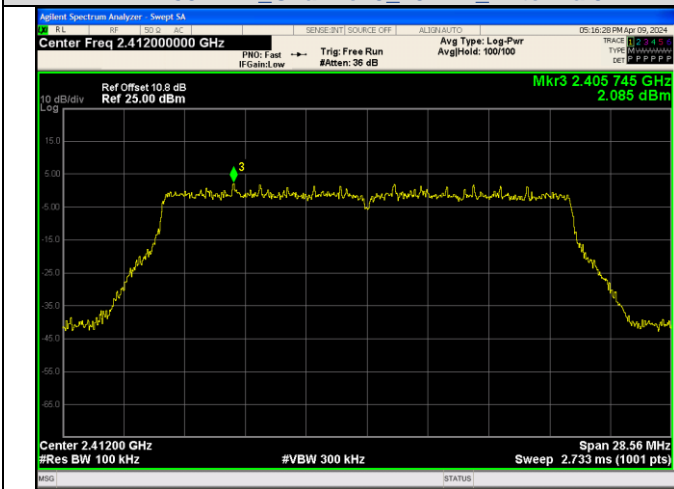
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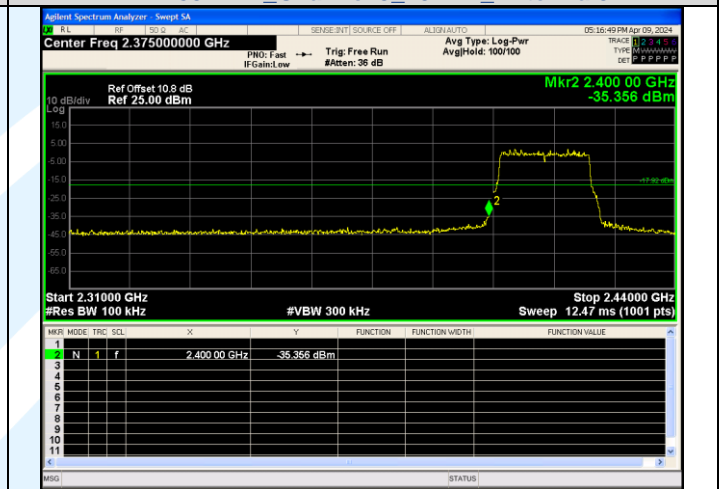
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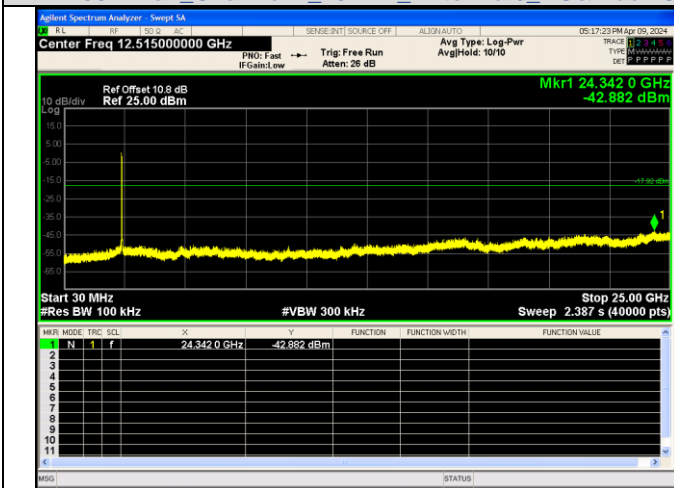
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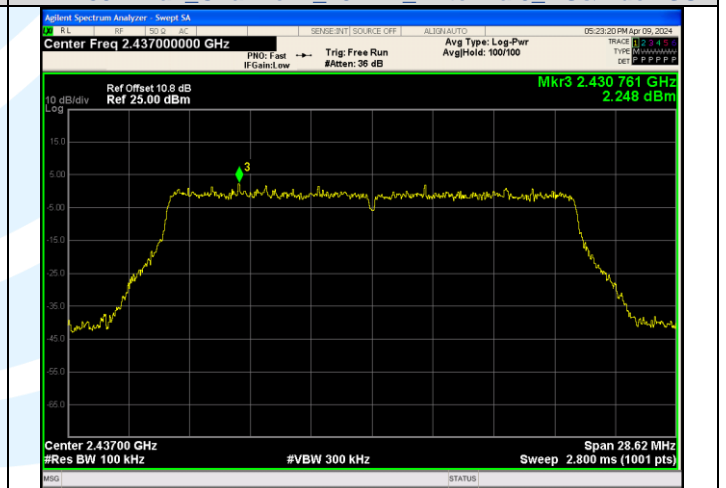
In-Band Reference Level
IEEE 802.11ax Channel 1 20MHz Antenna 0 RU&Index SU



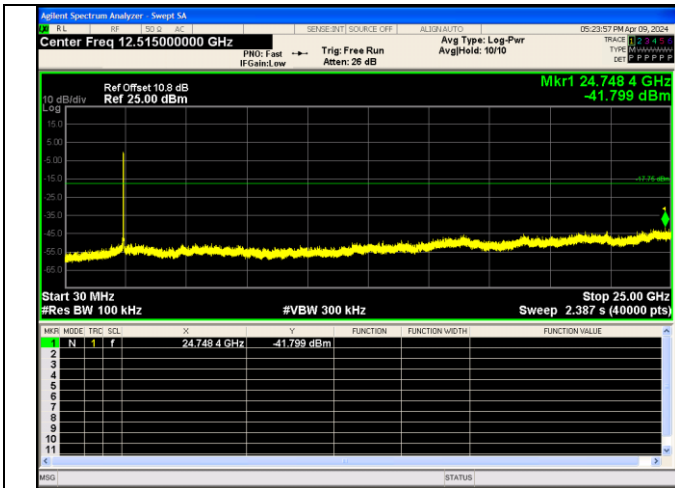
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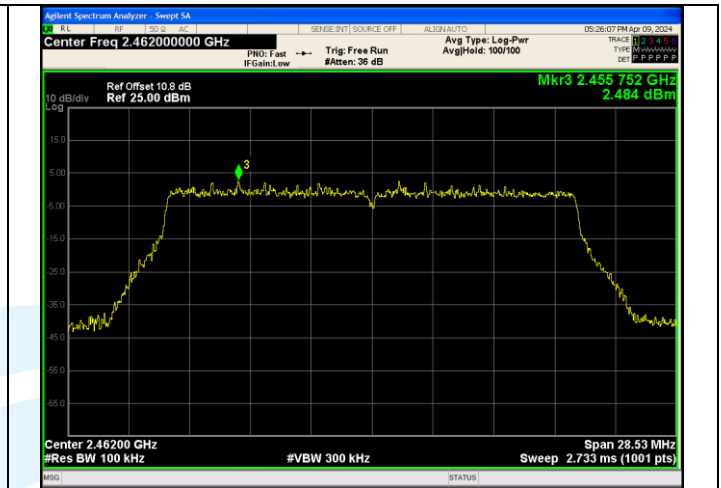
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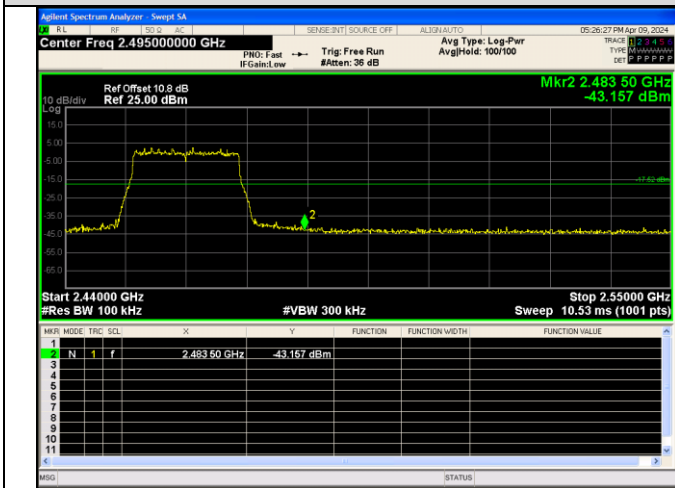
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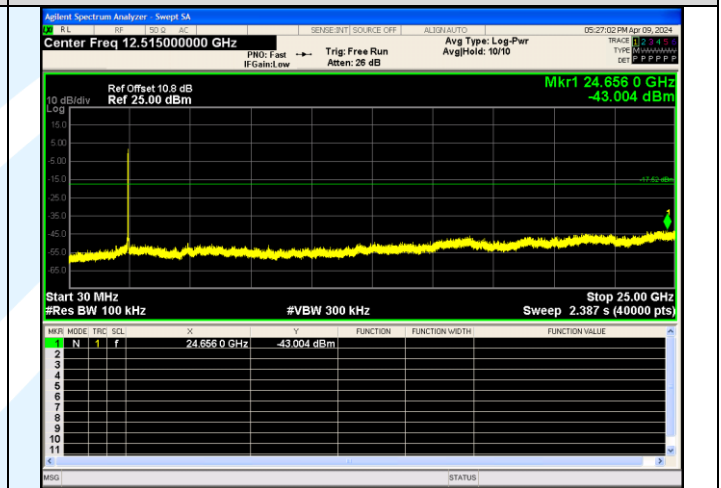
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IEEE 802.11ax_Channel 6_20MHz_Antenna 0_RU&Index SU



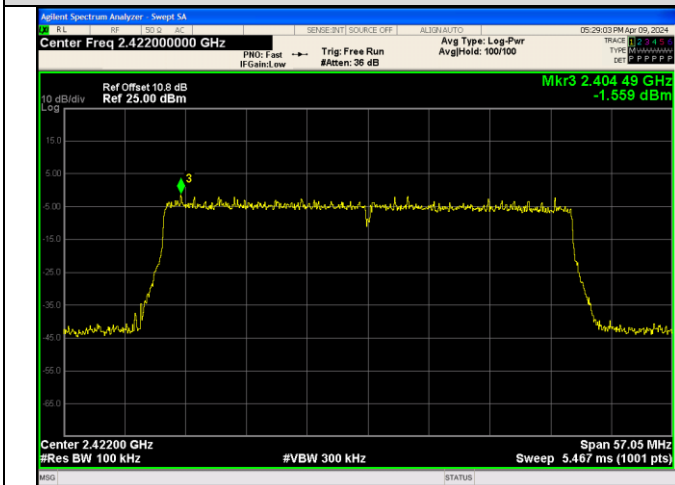
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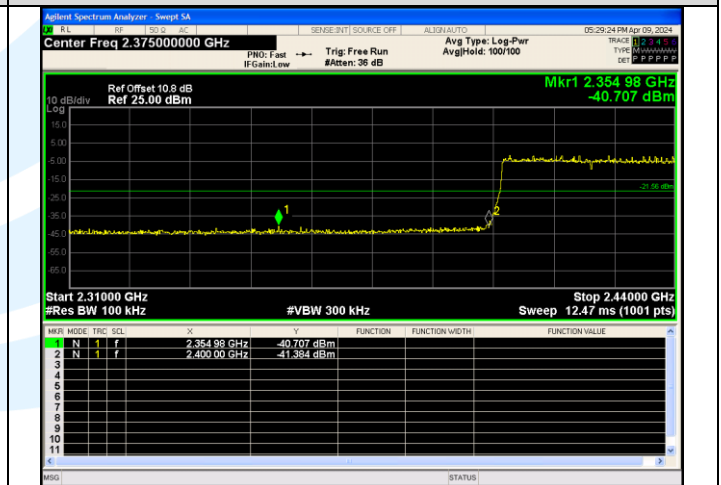
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IEEE 802.11ax_Channel 11_20MHz_Antenna 0_RU&Index SU



Spurious Emission
IEEE 802.11ax_Channel 11_20MHz_Antenna 0_RU&Index SU



In-Band Reference Level
IEEE 802.11ax_Channel 3_40MHz_Antenna 0_RU&Index SU



Out Of Band Emission
IEEE 802.11ax_Channel 3_40MHz_Antenna 0_RU&Index SU