# Appendix D

# RF Test Data for 5.2G WLAN (Conducted Measurement)

**Product Name: Vivi Wireless Presentation**

**Trade Mark: Vivi**

**Test Model: VWP-205-16**

**Environmental Conditions**

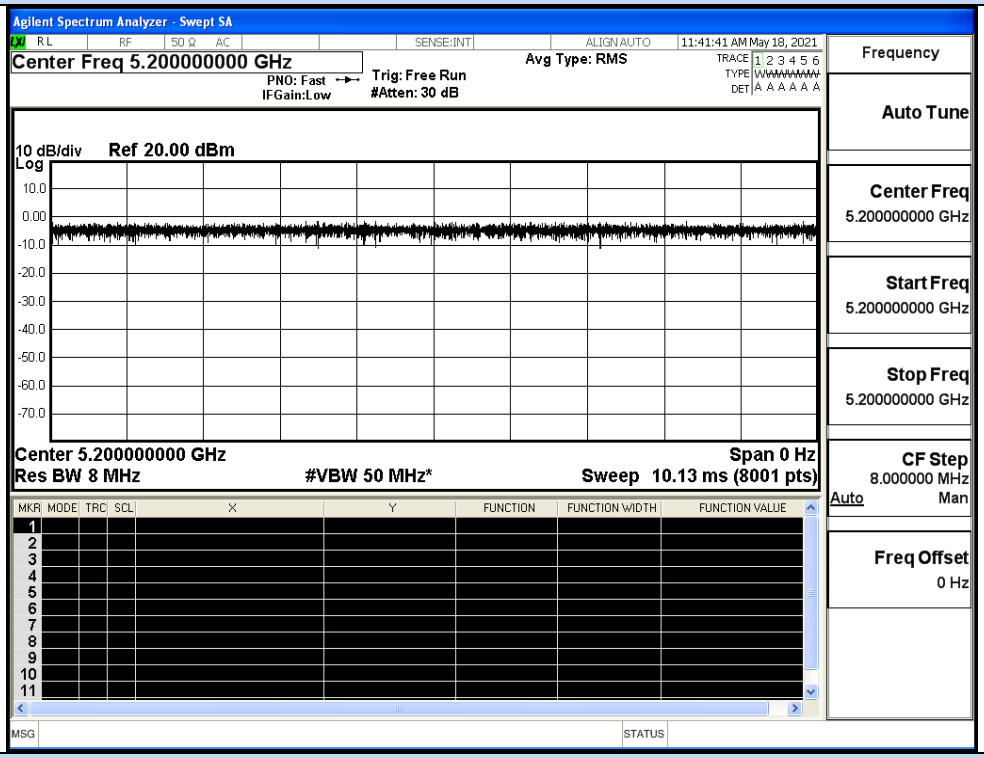
| | |
|---|---|
| Temperature: | 20.1℃ |
| Relative Humidity: | 51.6% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | Carl Fu |
| Supervised by: | Li Huan |

## D.1 Duty Cycle

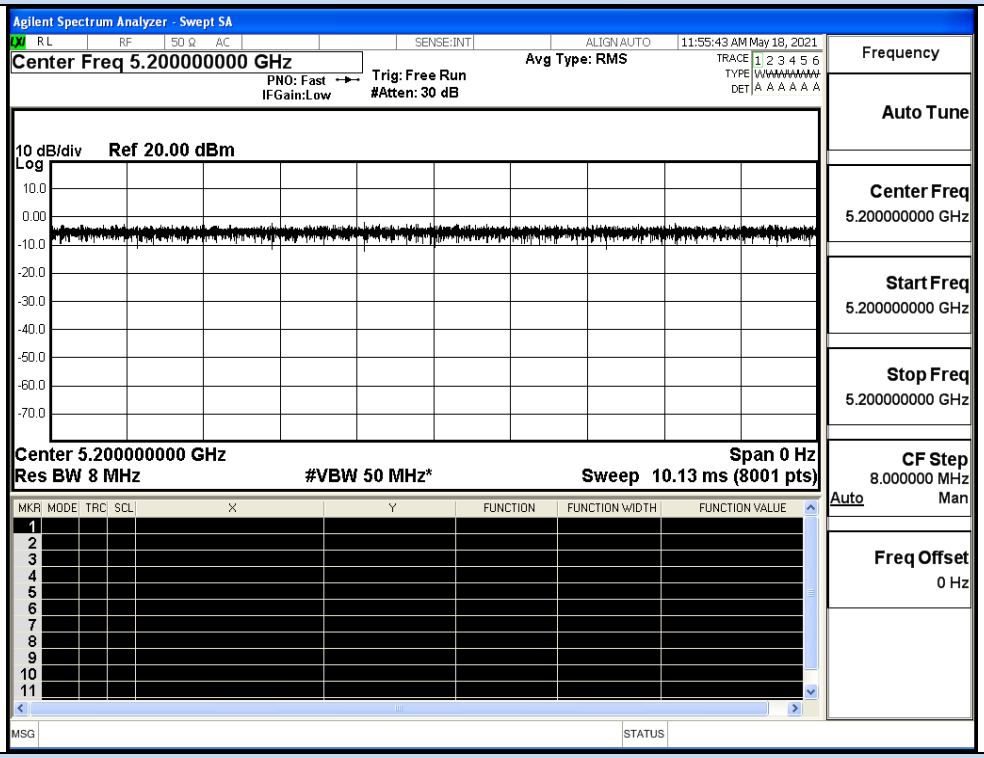
ANT0

| Test Mode | Test Frequency (MHz) | Duty Cycle (%) | 10log(1/x) Factor (dB) | 1/B Minimum VBW(KHz) |
|---|---|---|---|---|
| 11A | 5200 | 100 | 0.00 | 0.01 |
| 11N20 SISO | 5200 | 100 | 0.00 | 0.01 |
| 11N40 SISO | 5190 | 100 | 0.00 | 0.01 |
| 11AC20 SISO | 5200 | 100 | 0.00 | 0.01 |
| 11AC40 SISO | 5190 | 100 | 0.00 | 0.01 |
| 11AC80 SISO | 5210 | 100 | 0.00 | 0.01 |

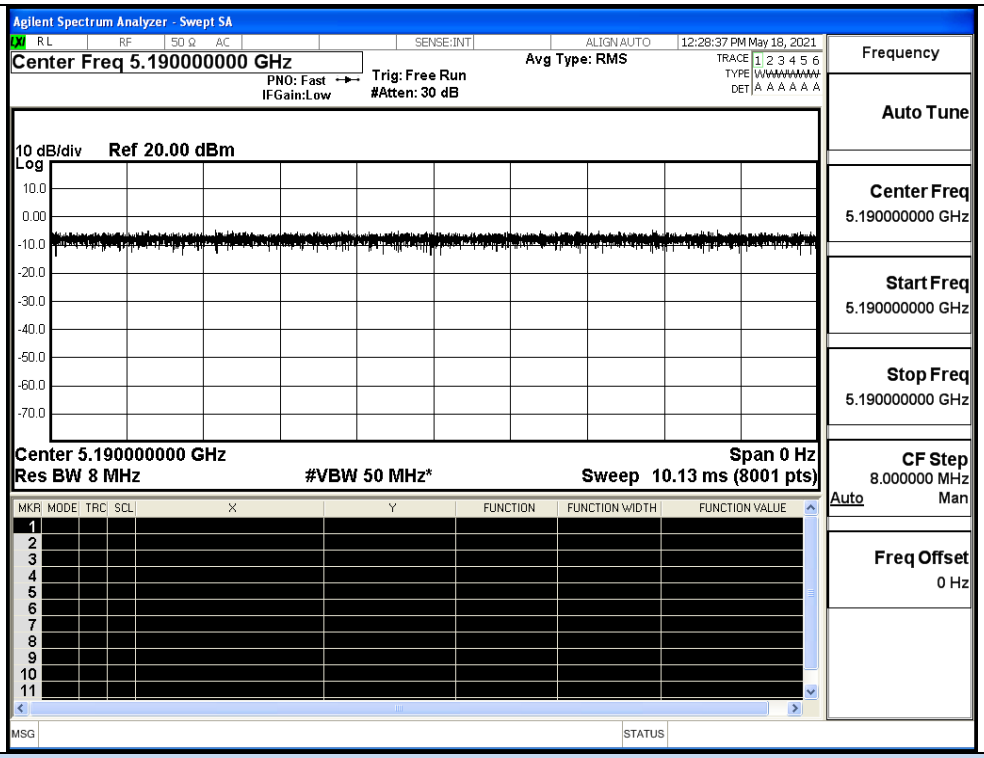
On Time and Duty Cycle



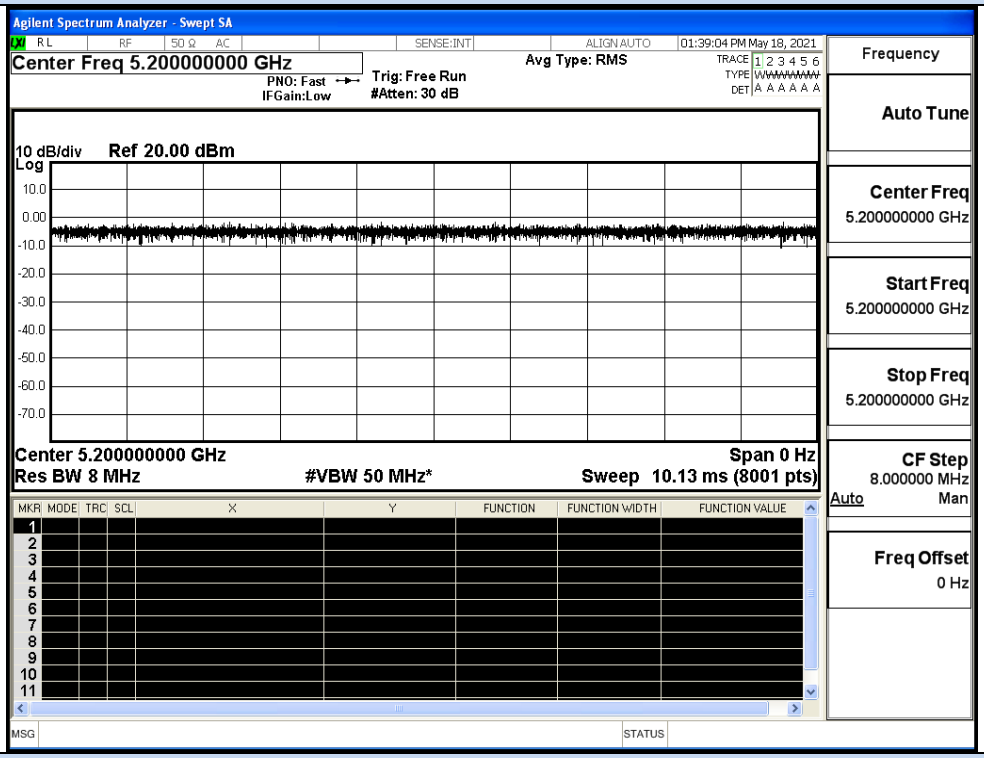

IEEE 802.11a



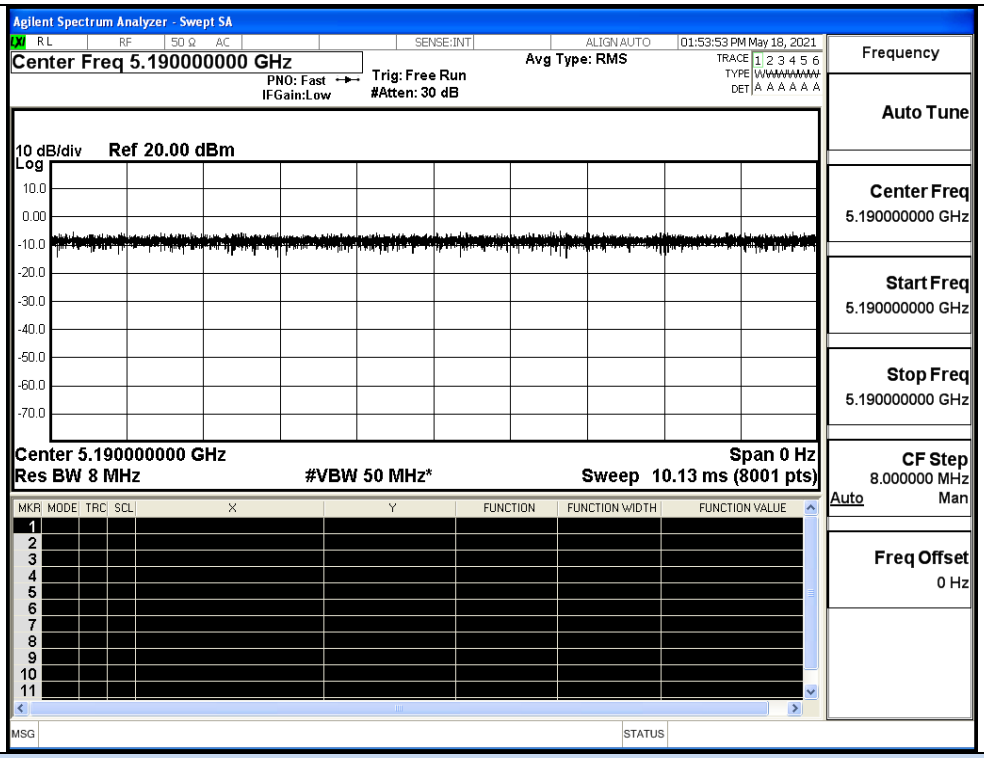

IEEE 802.11n HT20



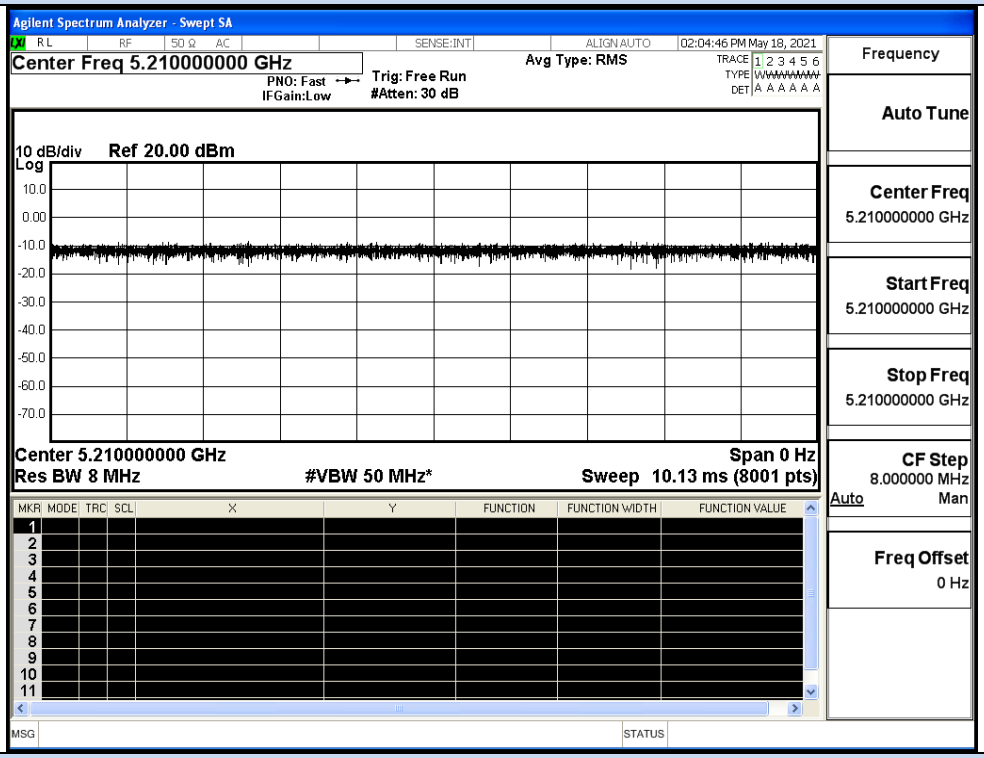

IEEE 802.11n HT40




IEEE 802.11AC20




IEEE 802.11 AC40

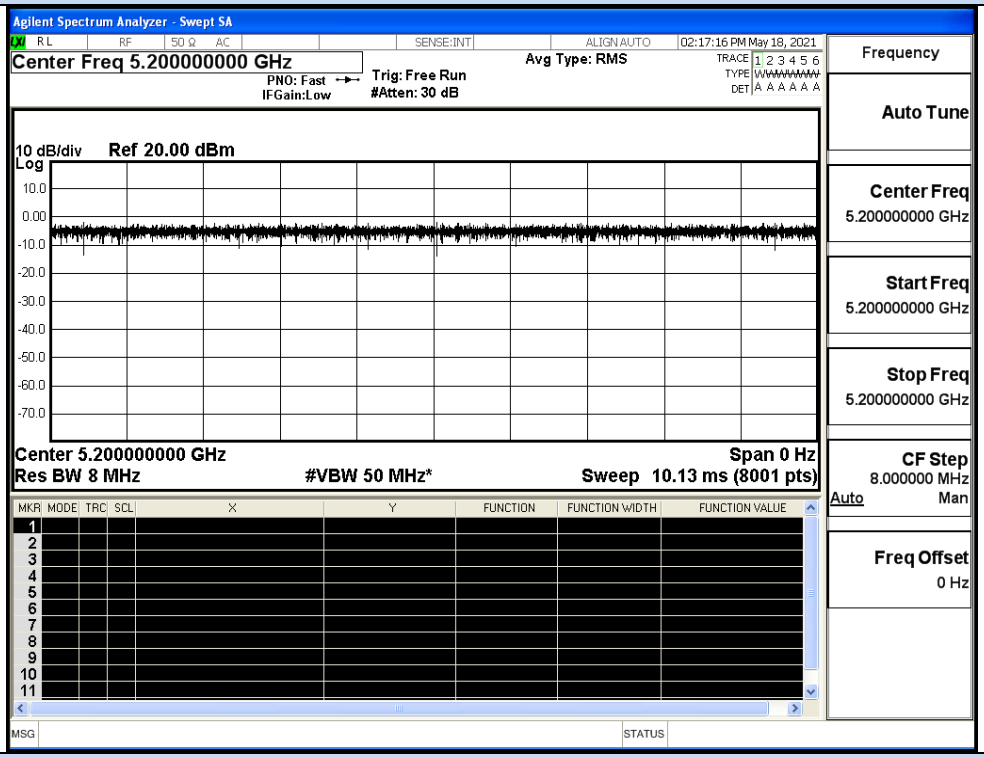



IEEE 802.11AC80

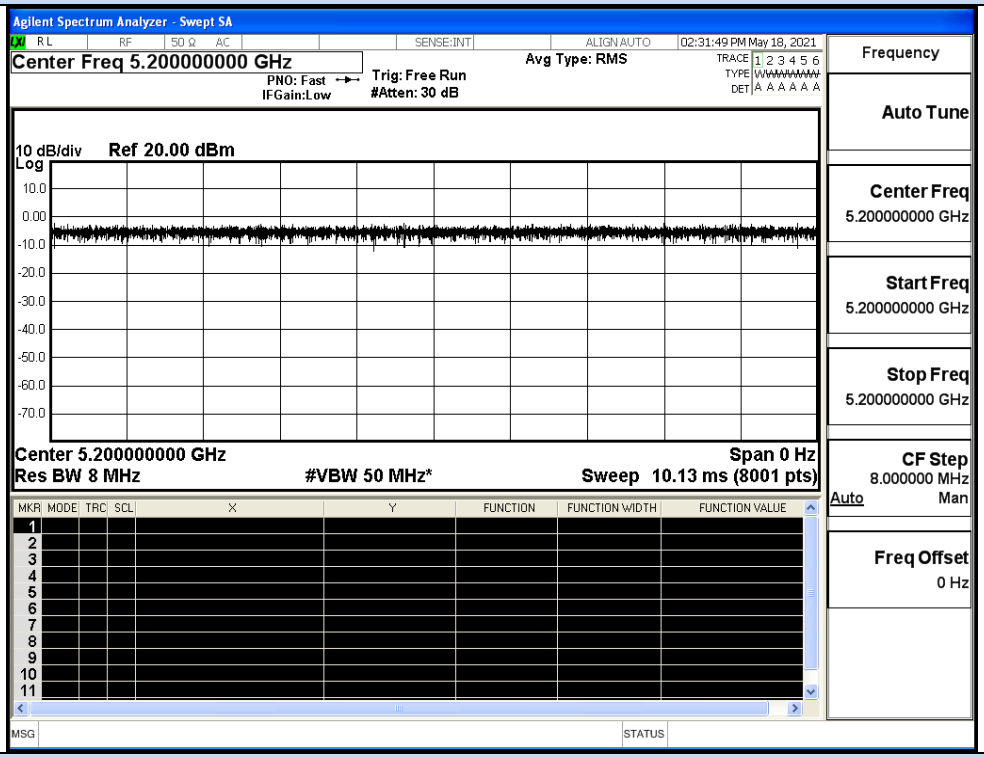
ANT1

| Test Mode | Test Frequency (MHz) | Duty Cycle (%) | 10log(1/x) Factor (dB) | 1/B Minimum VBW(KHz) |
|---|---|---|---|---|
| 11A | 5200 | 100 | 0.00 | 0.01 |
| 11N20 SISO | 5200 | 100 | 0.00 | 0.01 |
| 11N40 SISO | 5190 | 100 | 0.00 | 0.01 |
| 11AC20 SISO | 5200 | 100 | 0.00 | 0.01 |
| 11AC40 SISO | 5190 | 100 | 0.00 | 0.01 |
| 11AC80 SISO | 5210 | 100 | 0.00 | 0.01 |

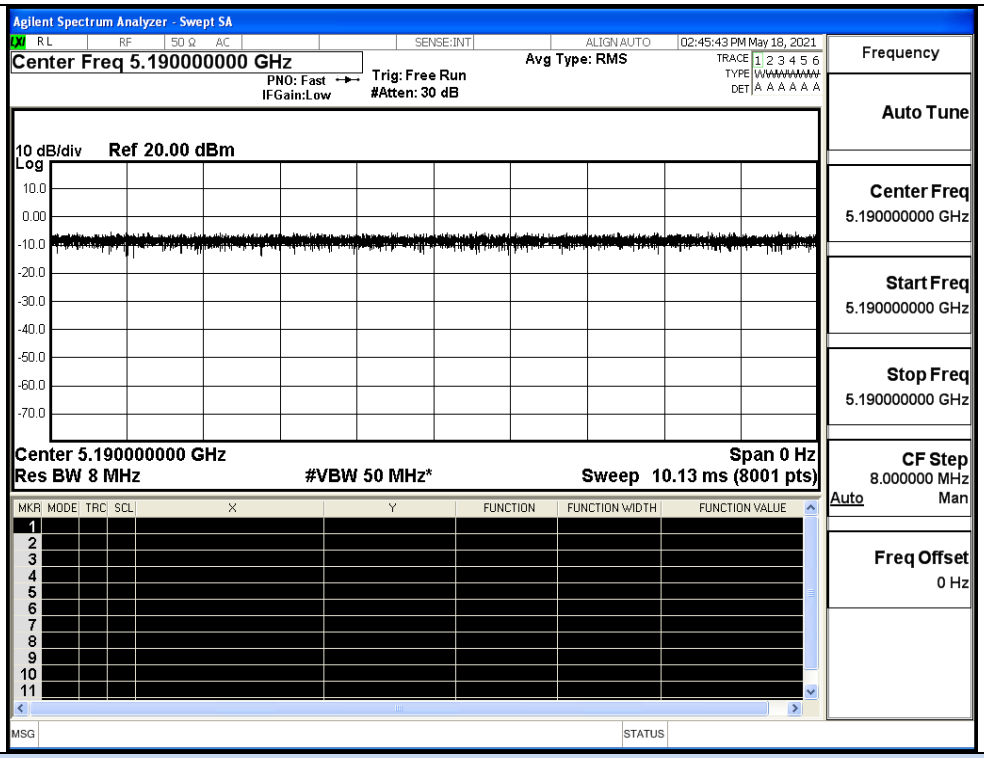
On Time and Duty Cycle



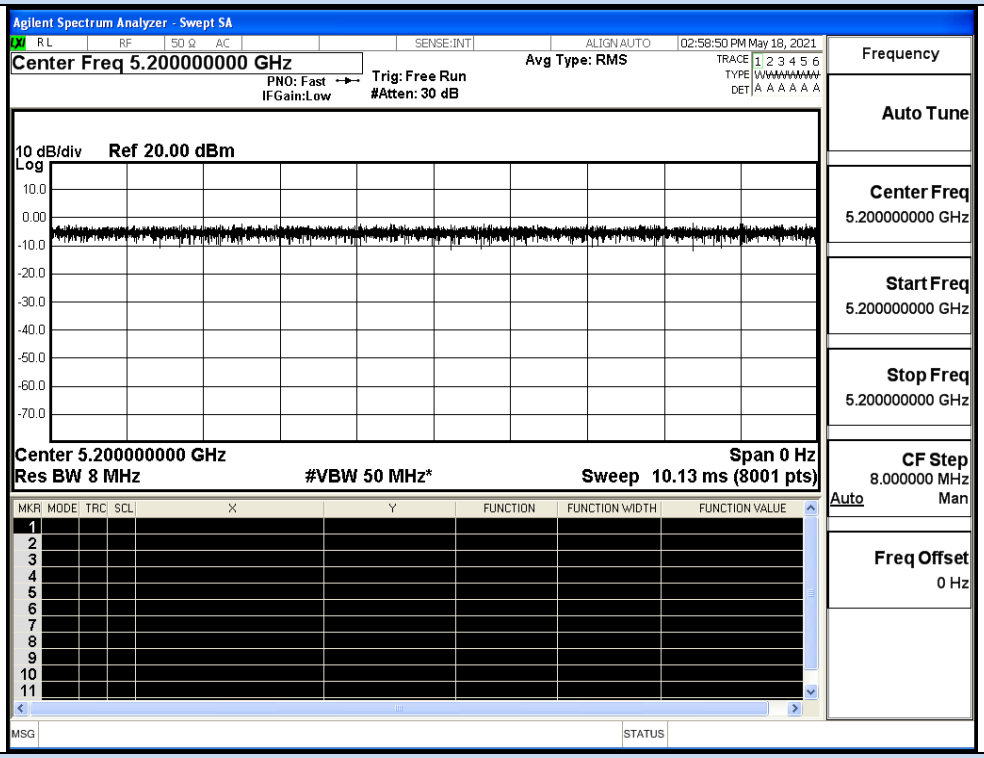

IEEE 802.11a



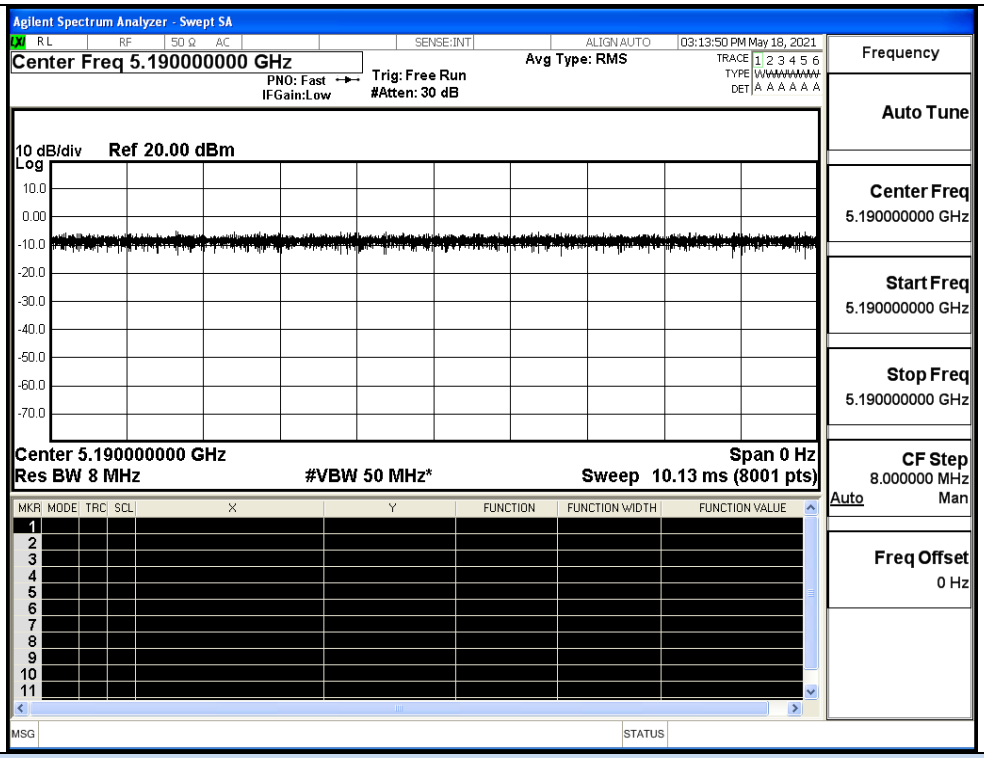

IEEE 802.11n HT20



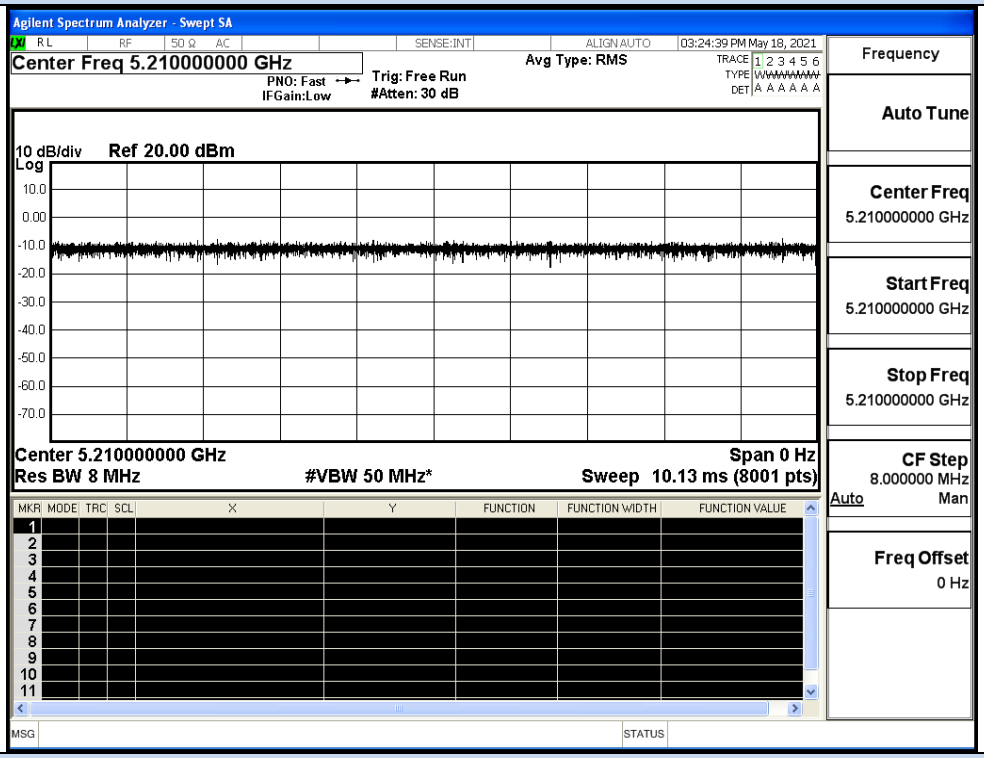

IEEE 802.11n HT40




IEEE 802.11AC20




IEEE 802.11 AC40




IEEE 802.11AC80

## D.2 Maximum Conduct Output Power

ANT0

| Test Mode | Channel | Frequency (MHz) | AVG Conducted Power (dBm) | Duty Cycle Factor( dB) | Report Conducted Power(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| 11A | 36 | 5180 | 12.53 | 0 | 12.53 | 30 | Pass |
| | 40 | 5200 | 11.26 | 0 | 11.26 | | Pass |
| | 48 | 5240 | 11.05 | 0 | 11.05 | | Pass |
| 11N20 SISO | 36 | 5180 | 10.68 | 0 | 10.68 | 30 | Pass |
| | 40 | 5200 | 10.64 | 0 | 10.64 | | Pass |
| | 48 | 5240 | 10.38 | 0 | 10.38 | | Pass |
| 11N40 SISO | 38 | 5190 | 11.39 | 0 | 11.39 | 30 | Pass |
| | 46 | 5230 | 11.14 | 0 | 11.14 | | Pass |
| 11AC20 SISO | 36 | 5180 | 11.23 | 0 | 11.23 | 30 | Pass |
| | 40 | 5200 | 11.24 | 0 | 11.24 | | Pass |
| | 48 | 5240 | 10.43 | 0 | 10.43 | | Pass |
| 11AC40 SISO | 38 | 5190 | 10.81 | 0 | 10.81 | 30 | Pass |
| | 46 | 5230 | 10.75 | 0 | 10.75 | | Pass |
| 11AC80 SISO | 42 | 5210 | 10.73 | 0 | 10.73 | 30 | Pass |

ANT1

| Test Mode | Channel | Frequency (MHz) | AVG Conducted Power (dBm) | Duty Cycle Factor( dB) | Report Conducted Power(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| 11A | 36 | 5180 | 10.89 | 0 | 10.89 | 30 | Pass |
| | 40 | 5200 | 10.89 | 0 | 10.89 | | Pass |
| | 48 | 5240 | 10.61 | 0 | 10.61 | | Pass |
| 11N20 SISO | 36 | 5180 | 10.78 | 0 | 10.78 | 30 | Pass |
| | 40 | 5200 | 10.75 | 0 | 10.75 | | Pass |
| | 48 | 5240 | 10.56 | 0 | 10.56 | | Pass |
| 11N40 SISO | 38 | 5190 | 10.96 | 0 | 10.96 | 30 | Pass |
| | 46 | 5230 | 10.86 | 0 | 10.86 | | Pass |
| 11AC20 SISO | 36 | 5180 | 10.88 | 0 | 10.88 | 30 | Pass |
| | 40 | 5200 | 10.91 | 0 | 10.91 | | Pass |
| | 48 | 5240 | 10.61 | 0 | 10.61 | | Pass |
| 11AC40 SISO | 38 | 5190 | 11.02 | 0 | 11.02 | 30 | Pass |
| | 46 | 5230 | 10.81 | 0 | 10.81 | | Pass |
| 11AC80 SISO | 42 | 5210 | 11.35 | 0 | 11.35 | 30 | Pass |

MIMO

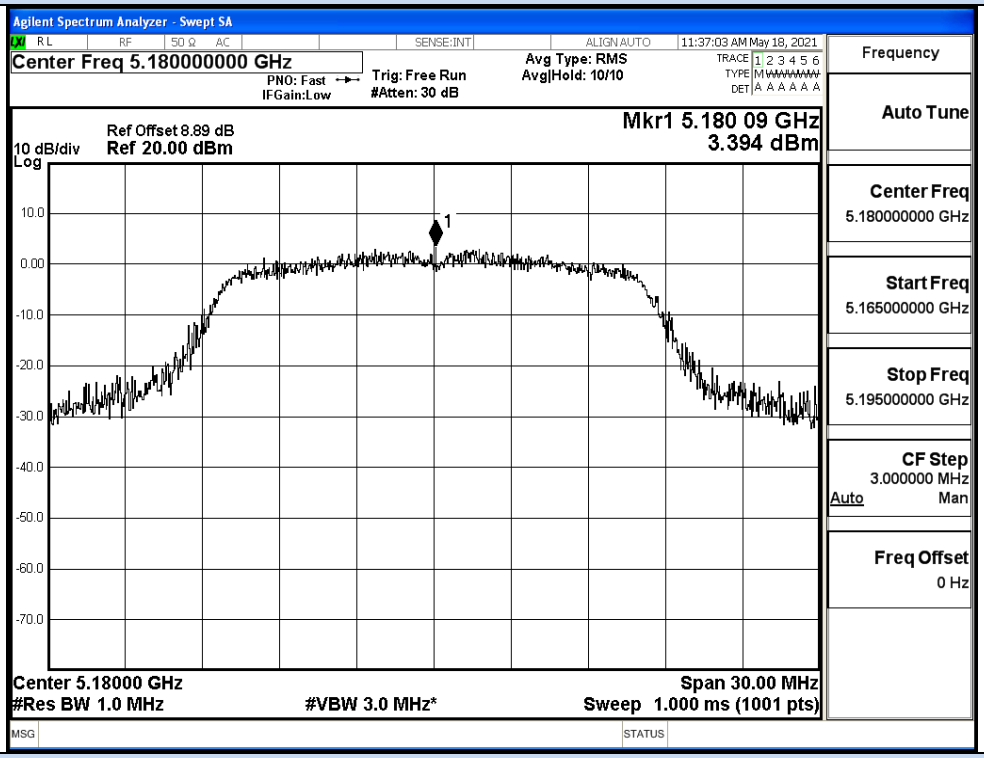
| Test Mode | Channel | Frequency (MHz) | ANT 0 AVG Conducted Power (dBm) | ANT 1 AVG Conducted Power (dBm) | MIMO AVG Conducted Power (dBm) | Duty Cycle Factor(dB) | Report Conducted Power(dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 11N20 | 36 | 5180 | 10.68 | 10.78 | 13.74 | 0 | 13.74 | 29.99 | Pass |
| | 40 | 5200 | 10.64 | 10.75 | 13.71 | 0 | 13.71 | | Pass |
| | 48 | 5240 | 10.38 | 10.56 | 13.48 | 0 | 13.48 | | Pass |
| 11N40 | 38 | 5190 | 11.39 | 10.96 | 14.19 | 0 | 14.19 | 29.99 | Pass |
| | 46 | 5230 | 11.14 | 10.86 | 14.01 | 0 | 14.01 | | Pass |
| 11AC20 | 36 | 5180 | 11.23 | 10.88 | 14.07 | 0 | 14.07 | 29.99 | Pass |
| | 40 | 5200 | 11.24 | 10.91 | 14.09 | 0 | 14.09 | | Pass |
| | 48 | 5240 | 10.43 | 10.61 | 13.53 | 0 | 13.53 | | Pass |
| 11AC40 | 38 | 5190 | 10.81 | 11.02 | 13.93 | 0 | 13.93 | 29.99 | Pass |
| | 46 | 5230 | 10.75 | 10.81 | 13.79 | 0 | 13.79 | | Pass |
| 11AC80 | 42 | 5210 | 10.73 | 11.35 | 14.06 | 0 | 14.06 | 29.99 | Pass |

## D.3 Power Spectral Density

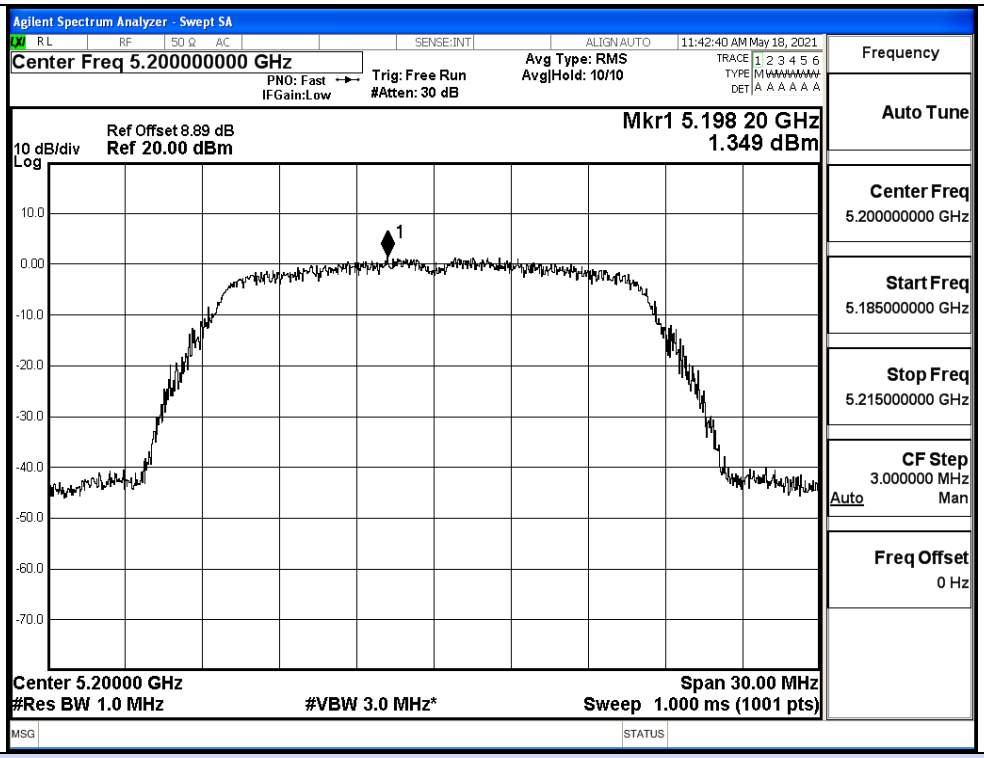
ANT0

| Test Mode | Channel | Frequency (MHz) | Power Density (dBm/MHz) | Duty Cycle Factor(dB) | Report Power Density (dBm/MHz) | Limit (dBm/MHz) | Verdict |
|---|---|---|---|---|---|---|---|
| 11A | 36 | 5180 | 3.39 | 0 | 3.39 | 17 | Pass |
| | 40 | 5200 | 1.35 | 0 | 1.35 | | Pass |
| | 48 | 5240 | 1.25 | 0 | 1.25 | | Pass |
| 11N20 SISO | 36 | 5180 | 0.75 | 0 | 0.75 | 17 | Pass |
| | 40 | 5200 | 0.60 | 0 | 0.60 | | Pass |
| | 48 | 5240 | 0.52 | 0 | 0.52 | | Pass |
| 11N40 SISO | 38 | 5190 | -1.81 | 0 | -1.81 | 17 | Pass |
| | 46 | 5230 | -1.19 | 0 | -1.19 | | Pass |
| 11AC20 SISO | 36 | 5180 | 1.79 | 0 | 1.79 | 17 | Pass |
| | 40 | 5200 | 1.13 | 0 | 1.13 | | Pass |
| | 48 | 5240 | 0.33 | 0 | 0.33 | | Pass |
| 11AC40 SISO | 38 | 5190 | -1.99 | 0 | -1.99 | 17 | Pass |
| | 46 | 5230 | -1.84 | 0 | -1.84 | | Pass |
| 11AC80 SISO | 42 | 5210 | -4.80 | 0 | -4.80 | 17 | Pass |

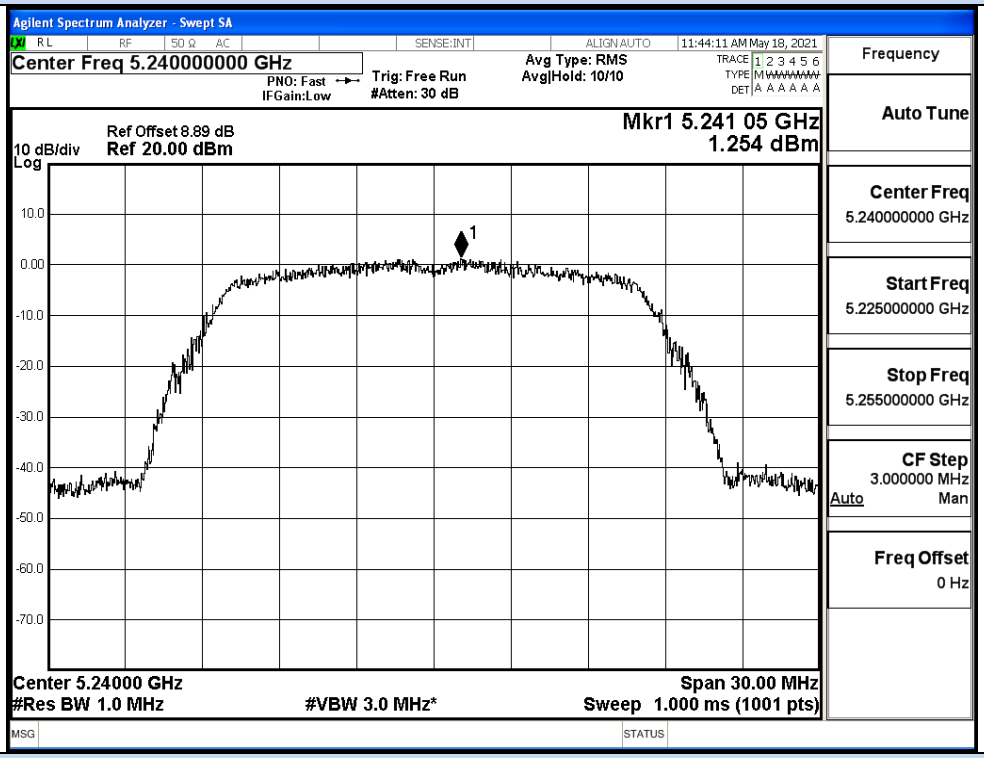
Power Spectral Density




IEEE 802.11a / Channel 36 / 5180MHz

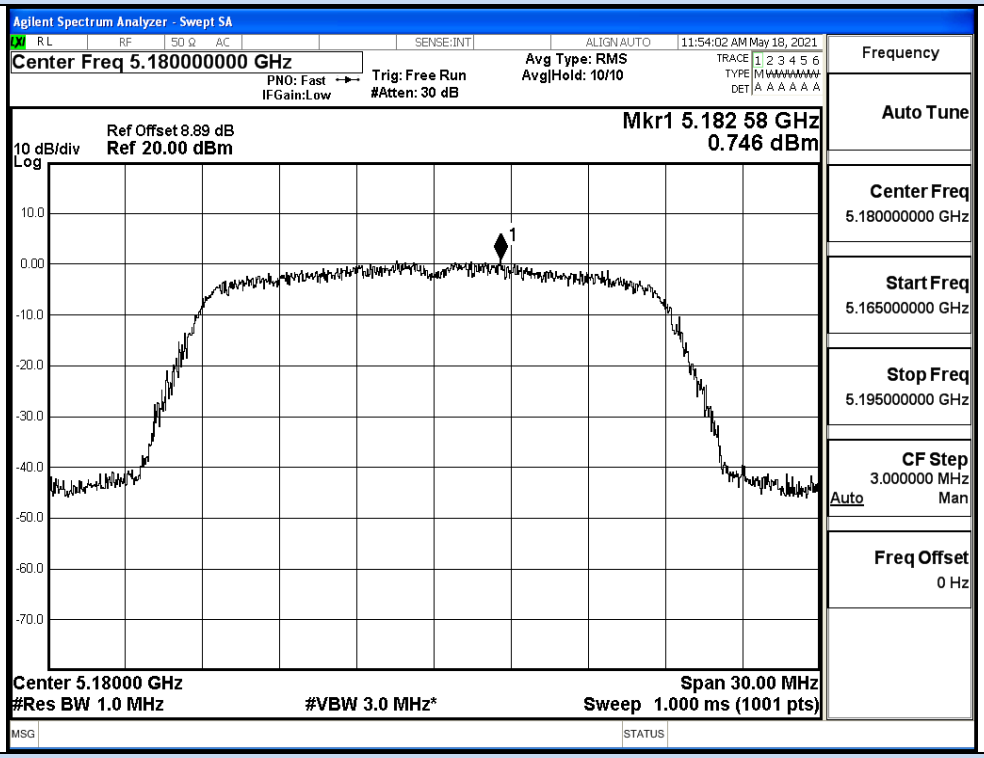



IEEE 802.11na / Channel 40 / 5200MHz

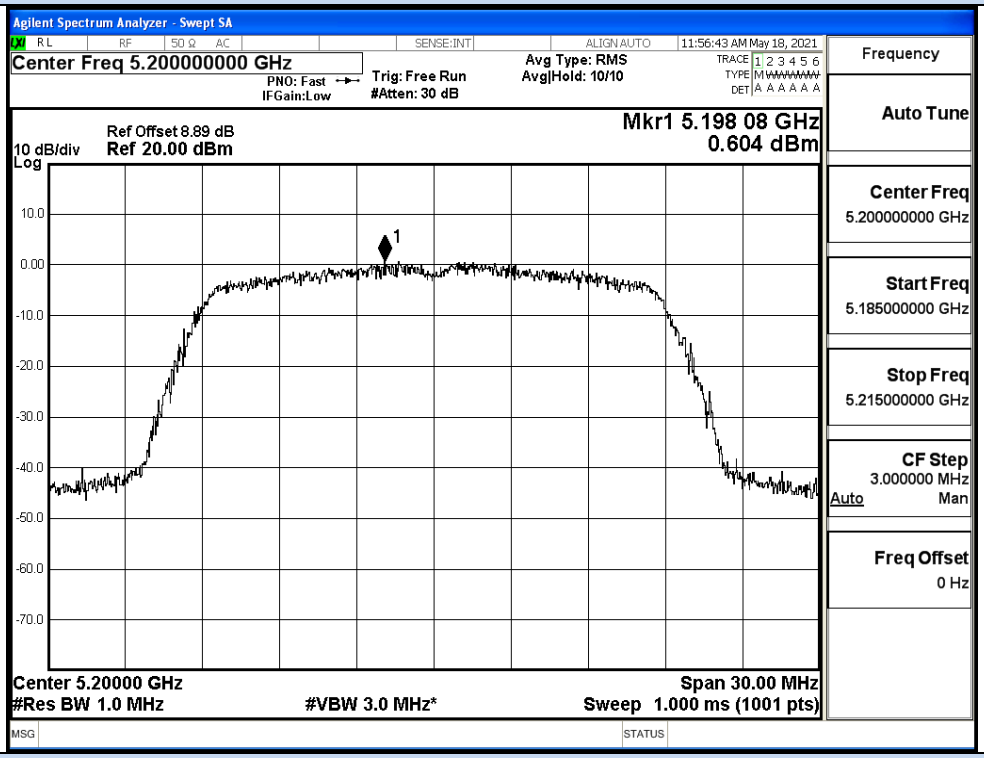



IEEE 802.11na / Channel 48 / 5240MHz

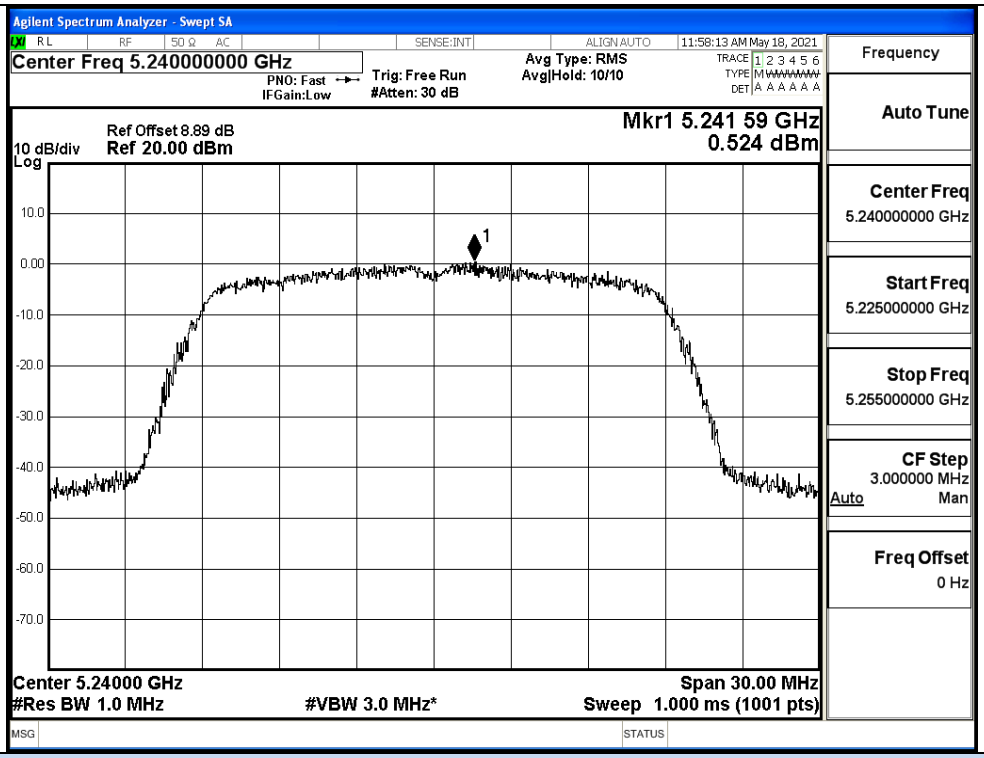
Power Spectral Density




IEEE 802.11n20 / Channel 36 / 5180MHz

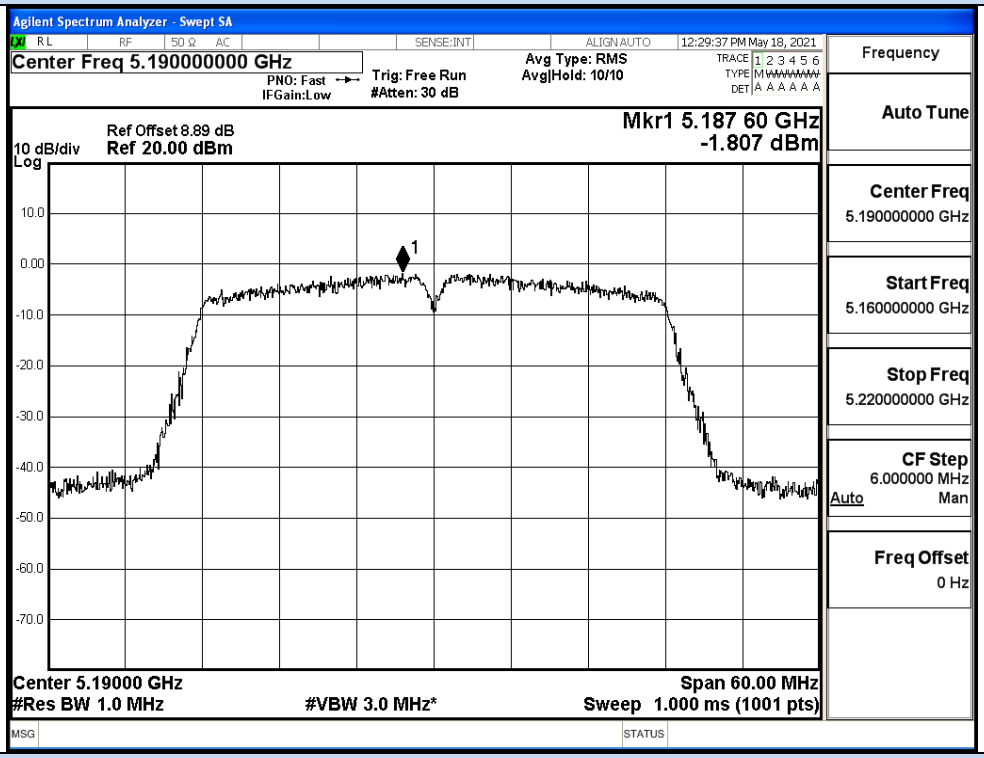



IEEE 802.11n20 / Channel 40 / 5200MHz

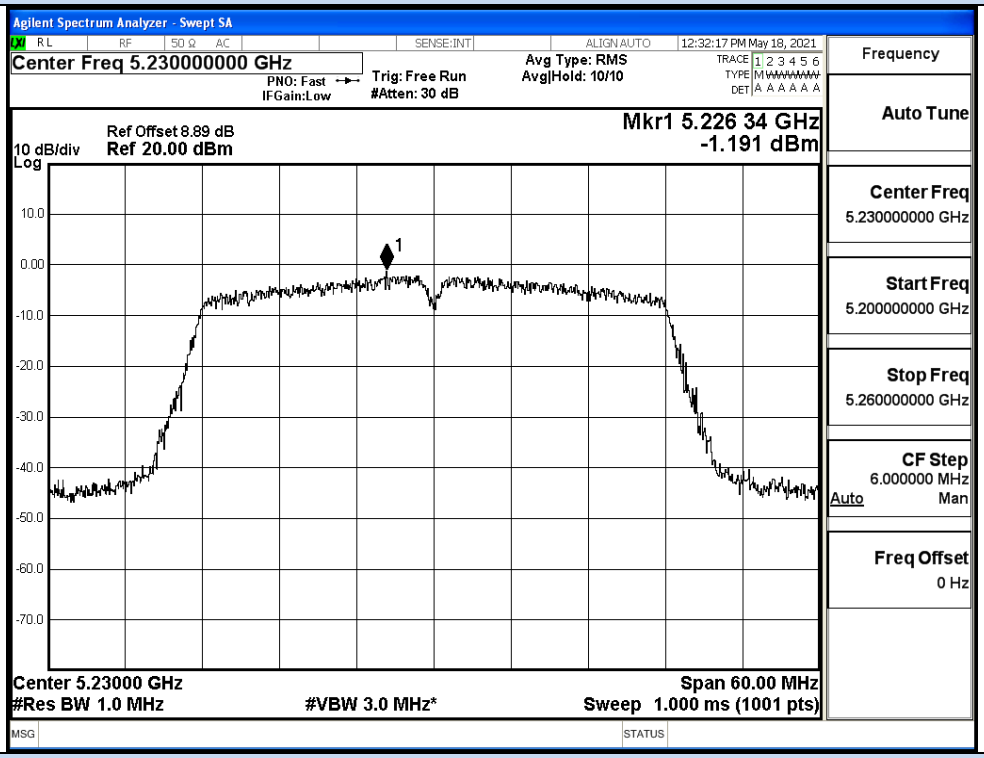



IEEE 802.11n20 / Channel 48 / 5240MHz

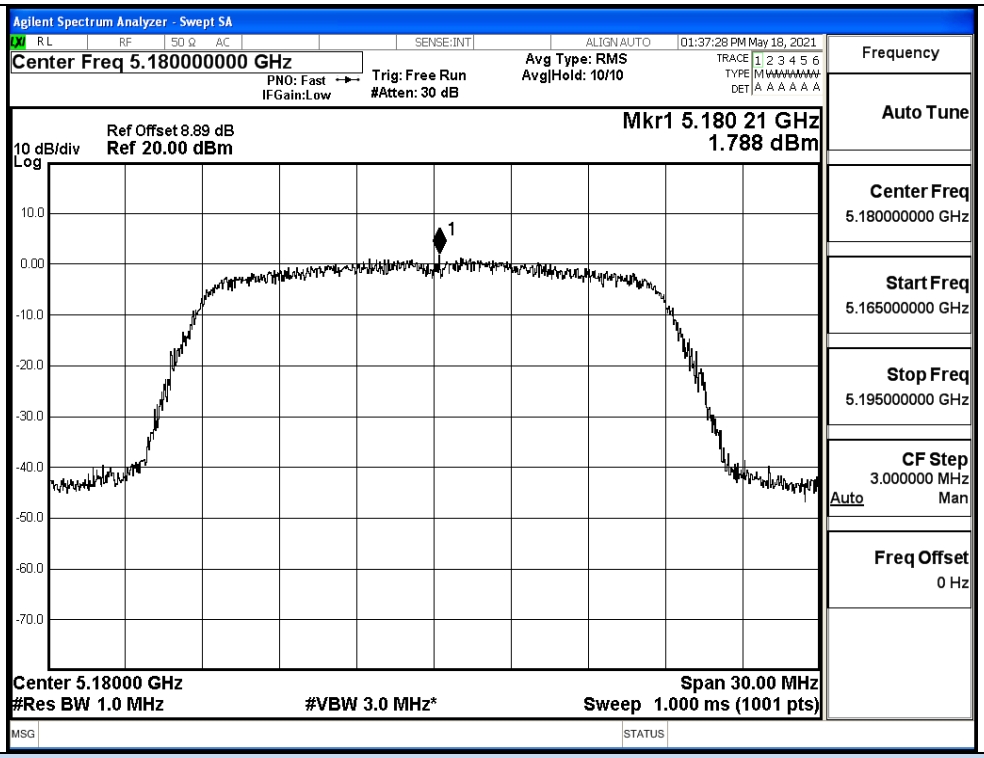
Power Spectral Density



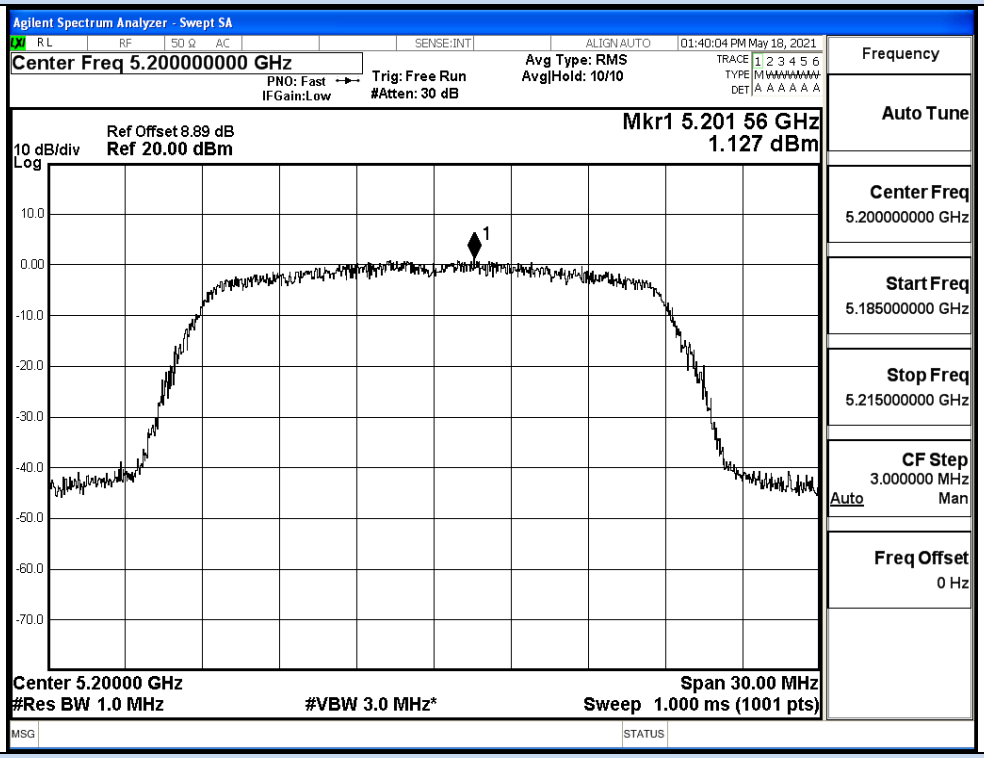

IEEE 802.11n40 / Channel 38 / 5190MHz



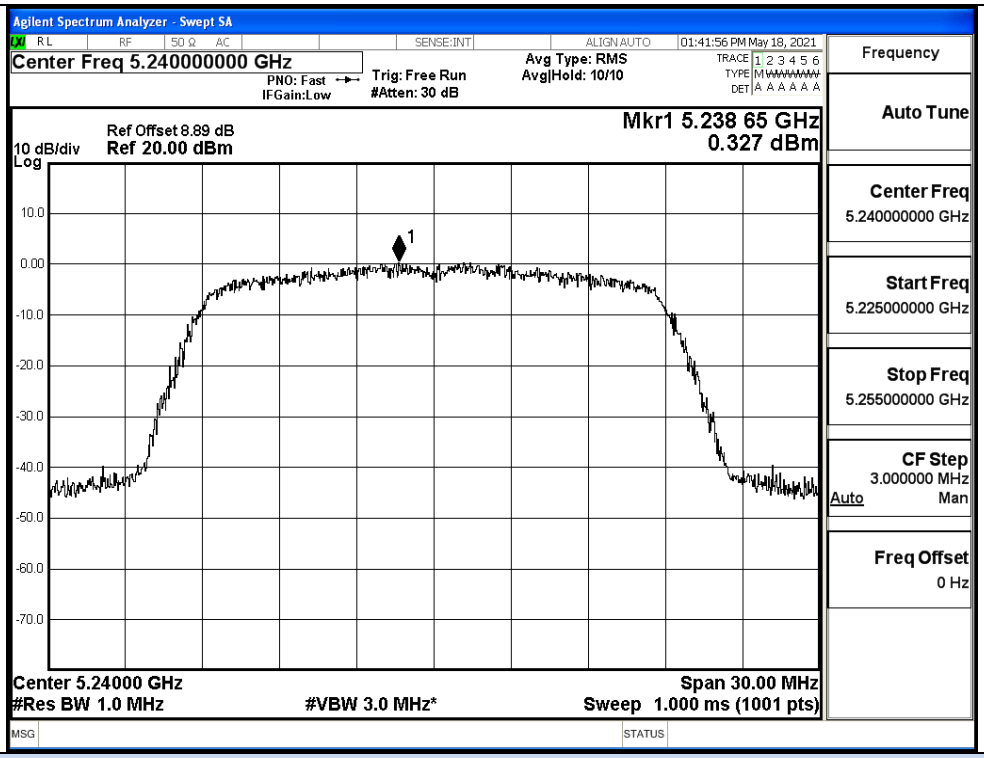

IEEE 802.11n40 / Channel 46 / 5230MHz



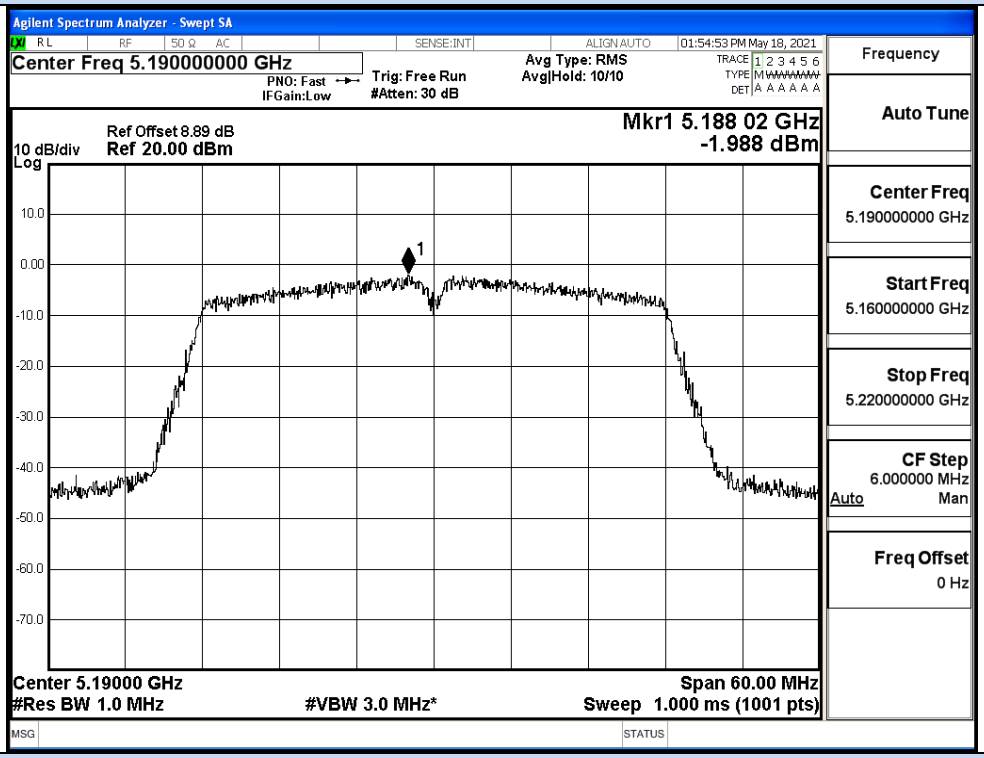

IEEE 802.11ac20 / Channel 36 / 5180MHz



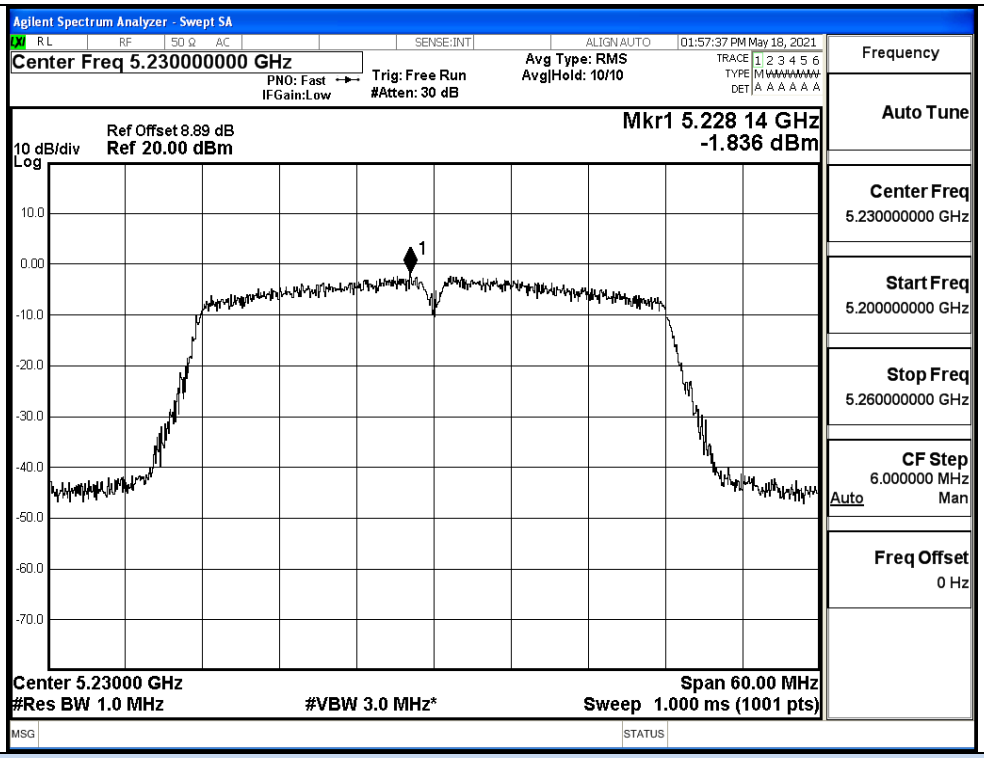

IEEE 802.11ac20 / Channel 40 / 5200MHz



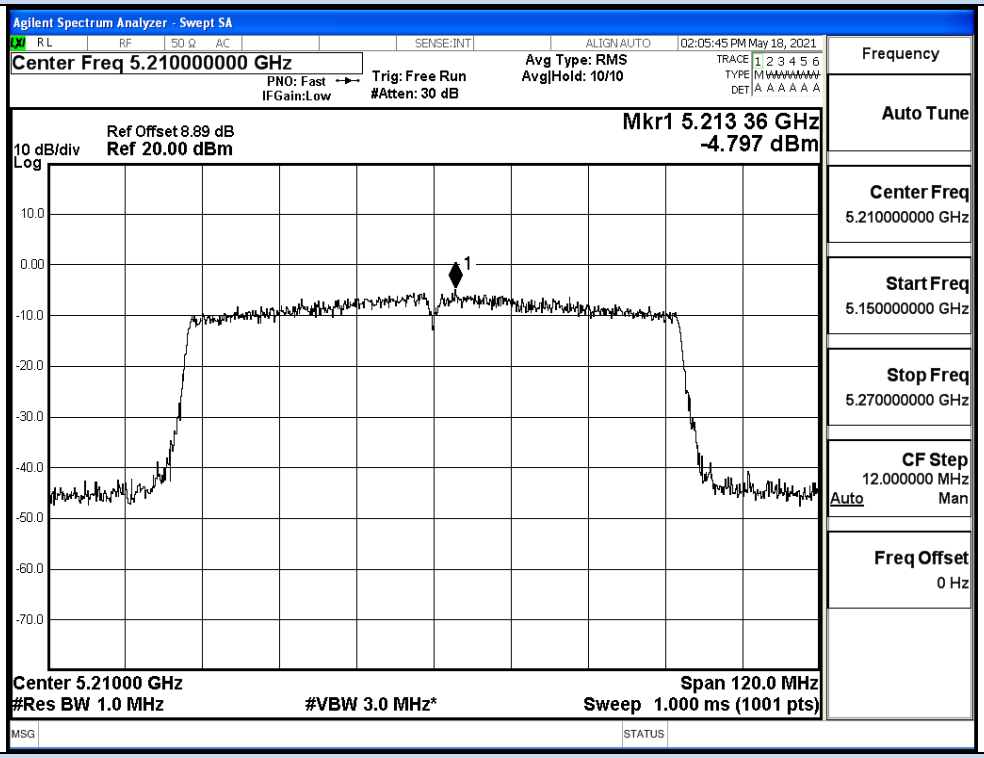

IEEE 802.11ac20 / Channel 48 / 5240MHz




IEEE 802.11ac40 / Channel 38 / 5190MHz




IEEE 802.11ac40 / Channel 46 / 5230MHz

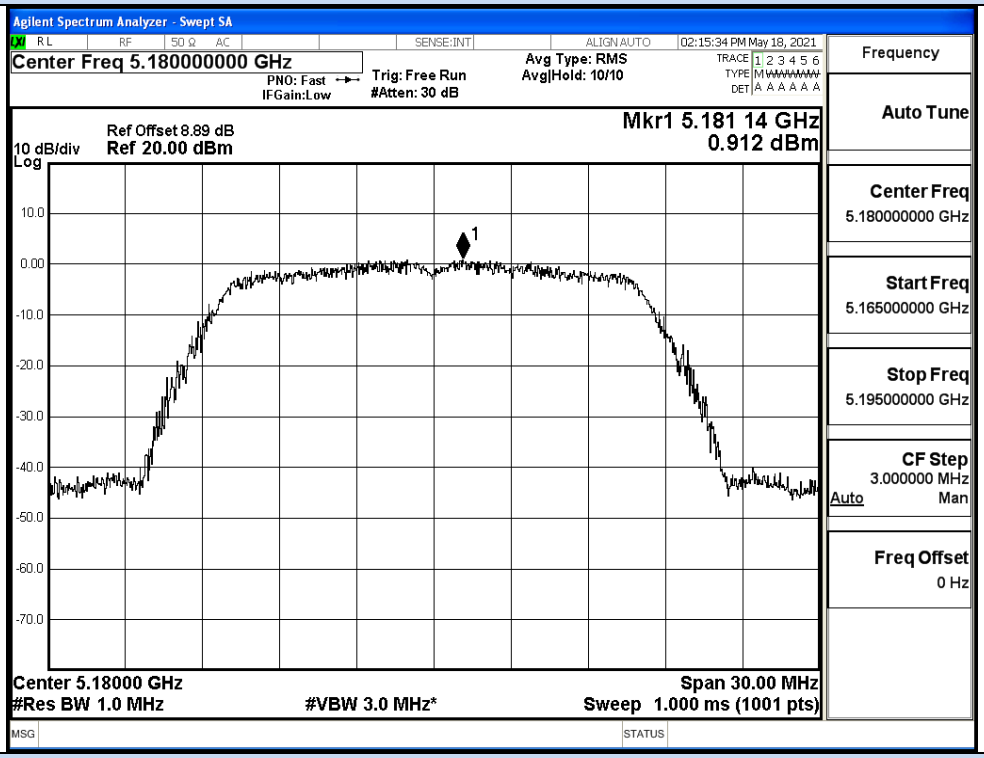



IEEE 802.11ac80 / Channel 42 / 5210MHz

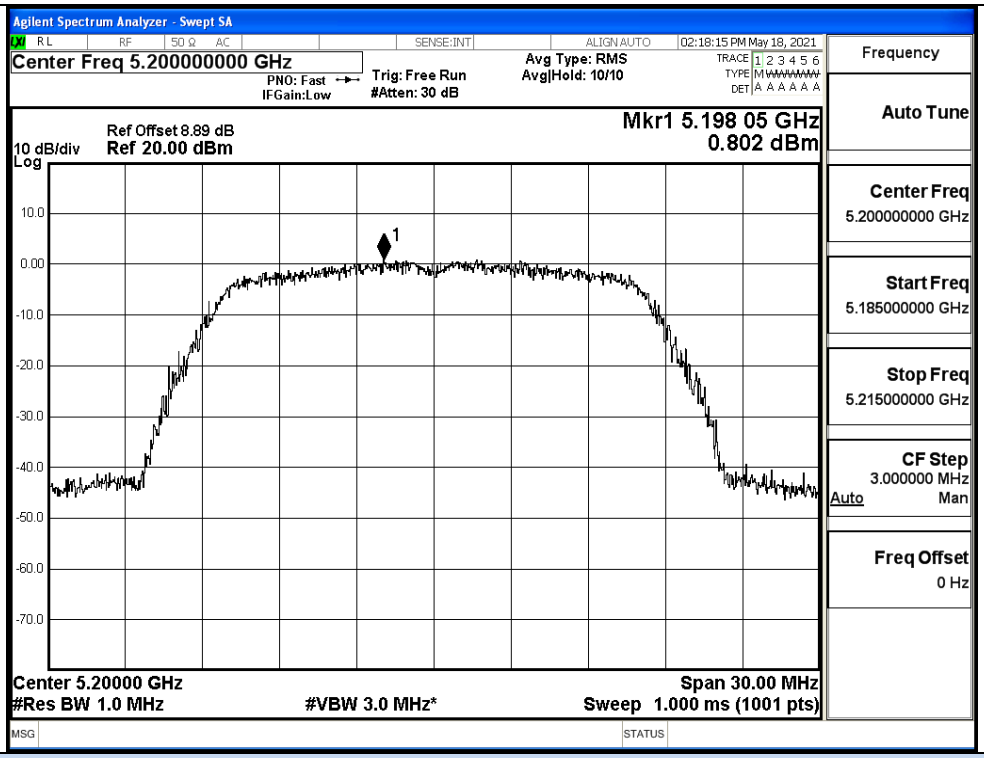
ANT1

| Test Mode | Channel | Frequency (MHz) | Power Density (dBm/MHz) | Duty Cycle Factor(dB) | Report Power Density (dBm/MHz) | Limit (dBm/MHz) | Verdict |
|---|---|---|---|---|---|---|---|
| 11A | 36 | 5180 | 0.91 | 0 | 0.91 | 17 | Pass |
| | 40 | 5200 | 0.80 | 0 | 0.80 | | Pass |
| | 48 | 5240 | 0.66 | 0 | 0.66 | | Pass |
| 11N20 SISO | 36 | 5180 | 0.51 | 0 | 0.51 | 17 | Pass |
| | 40 | 5200 | 0.80 | 0 | 0.80 | | Pass |
| | 48 | 5240 | 0.66 | 0 | 0.66 | | Pass |
| 11N40 SISO | 38 | 5190 | -1.67 | 0 | -1.67 | 17 | Pass |
| | 46 | 5230 | -1.48 | 0 | -1.48 | | Pass |
| 11AC20 SISO | 36 | 5180 | 0.53 | 0 | 0.53 | 17 | Pass |
| | 40 | 5200 | 0.57 | 0 | 0.57 | | Pass |
| | 48 | 5240 | 0.78 | 0 | 0.78 | | Pass |
| 11AC40 SISO | 38 | 5190 | -2.27 | 0 | -2.27 | 17 | Pass |
| | 46 | 5230 | -1.34 | 0 | -1.34 | | Pass |
| 11AC80 SISO | 42 | 5210 | -4.80 | 0 | -4.80 | 17 | Pass |

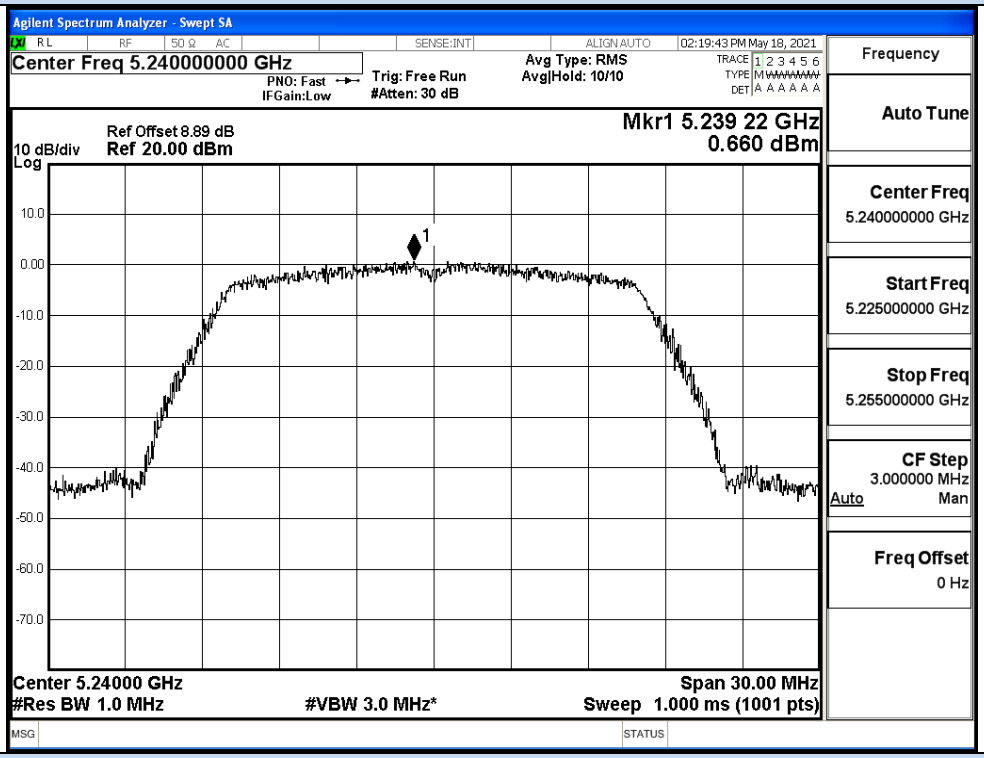
Power Spectral Density




IEEE 802.11a / Channel 36 / 5180MHz

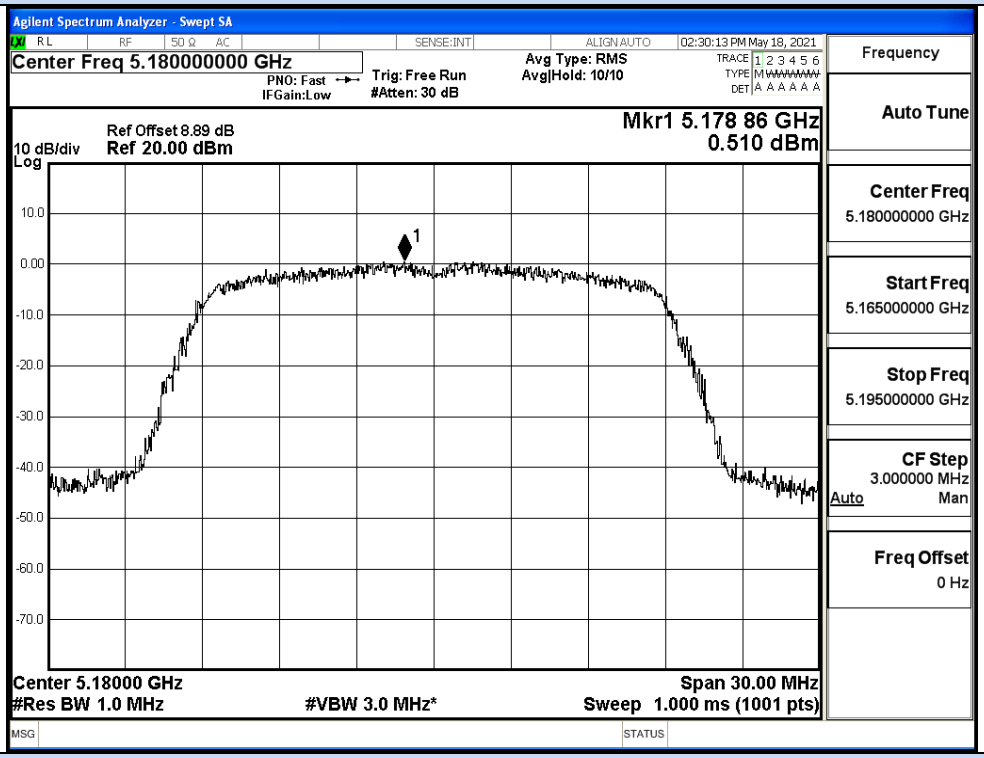



IEEE 802.11na / Channel 40 / 5200MHz

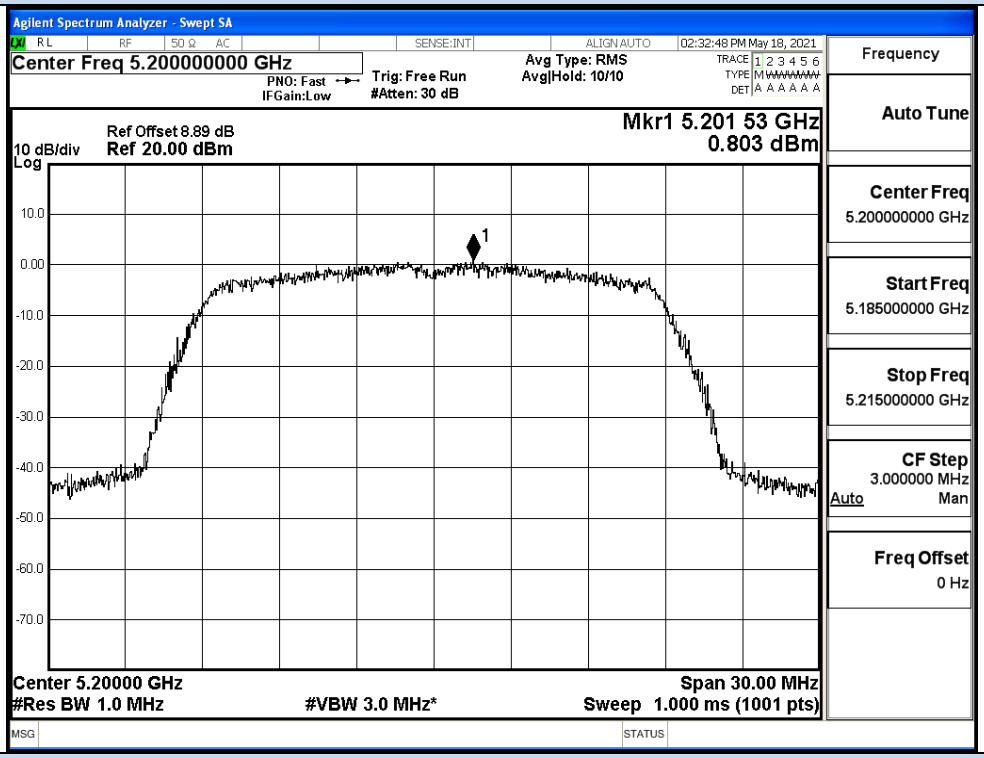



IEEE 802.11na / Channel 48 / 5240MHz

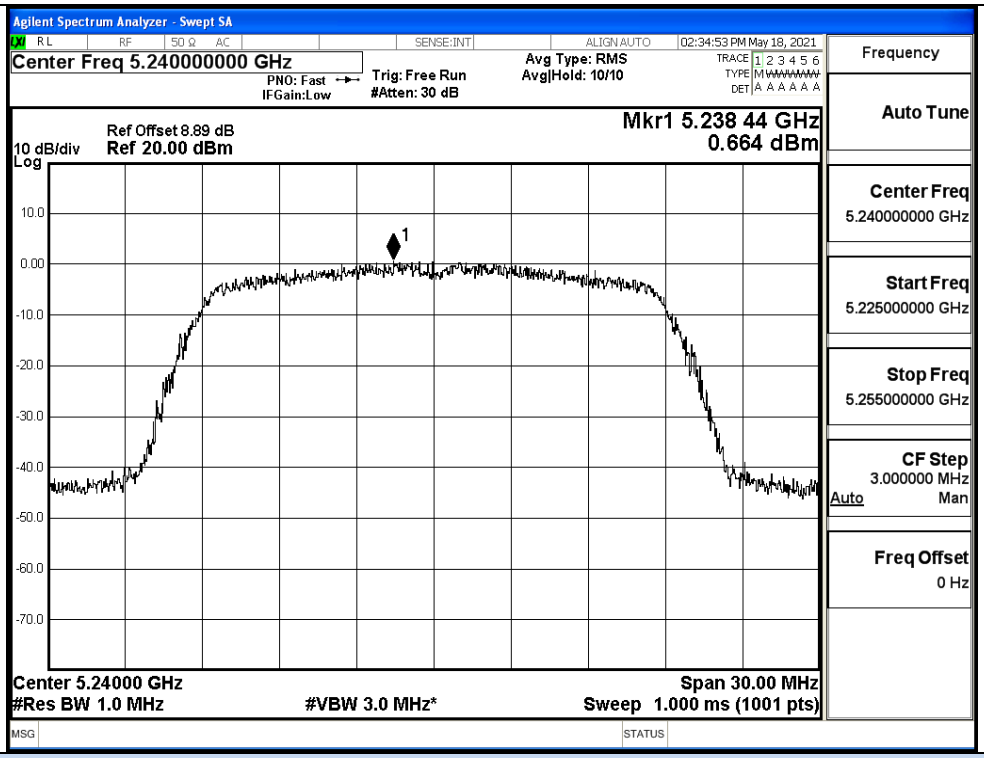
Power Spectral Density




IEEE 802.11n20 / Channel 36 / 5180MHz

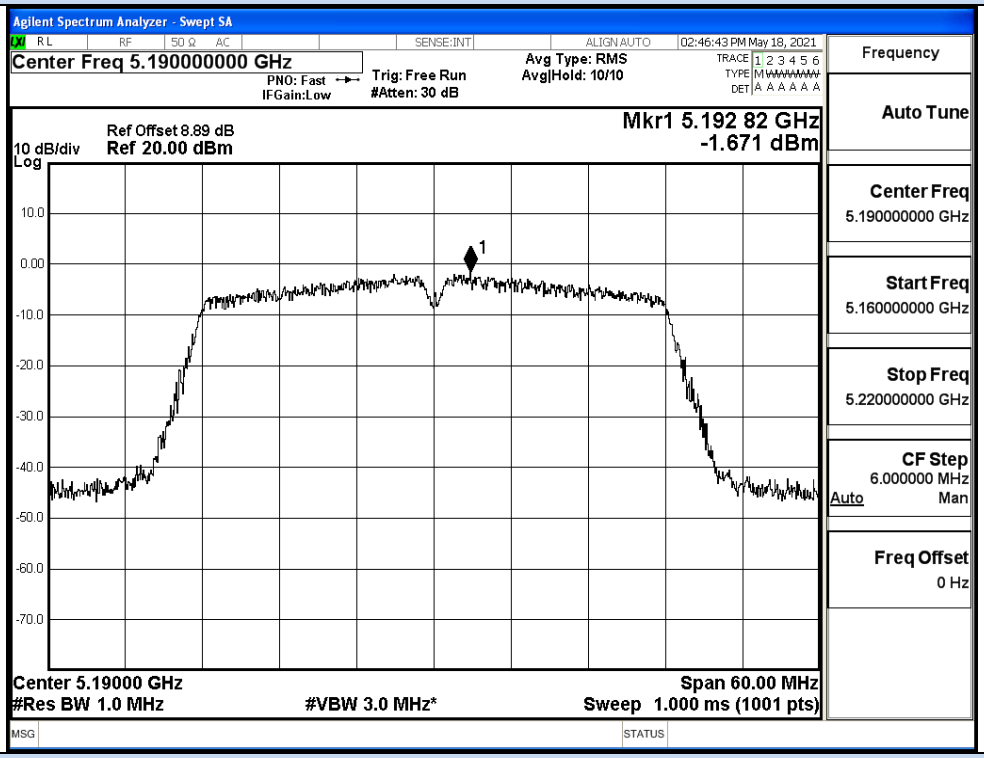



IEEE 802.11n20 / Channel 40 / 5200MHz

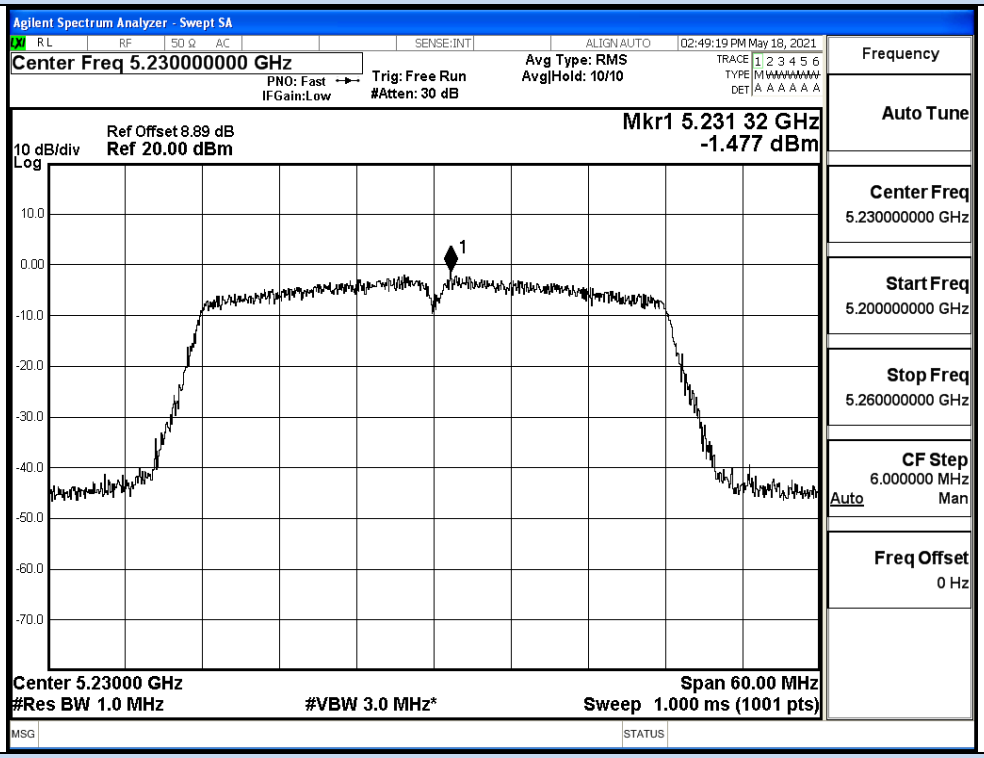



IEEE 802.11n20 / Channel 48 / 5240MHz

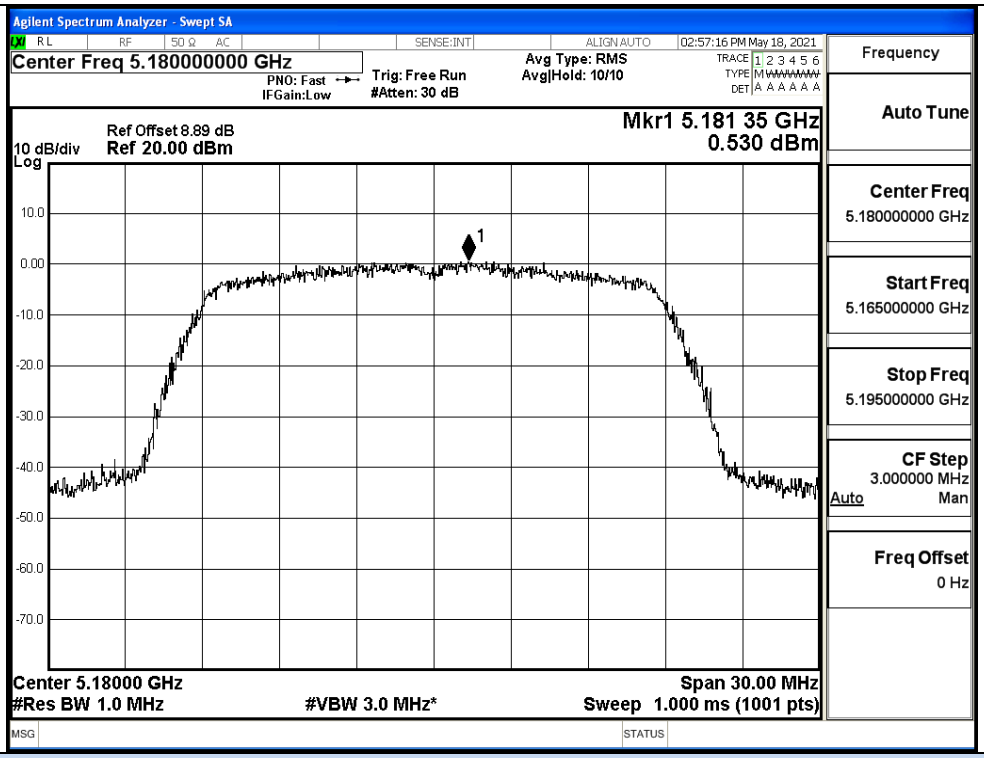
Power Spectral Density



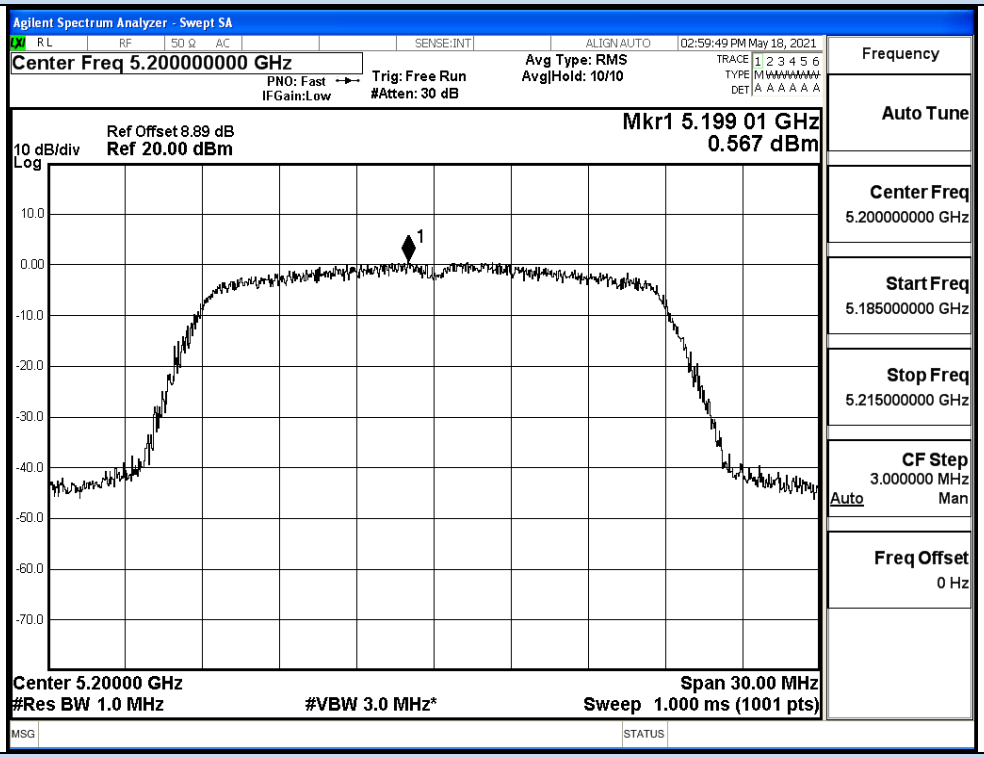

IEEE 802.11n40 / Channel 38 / 5190MHz



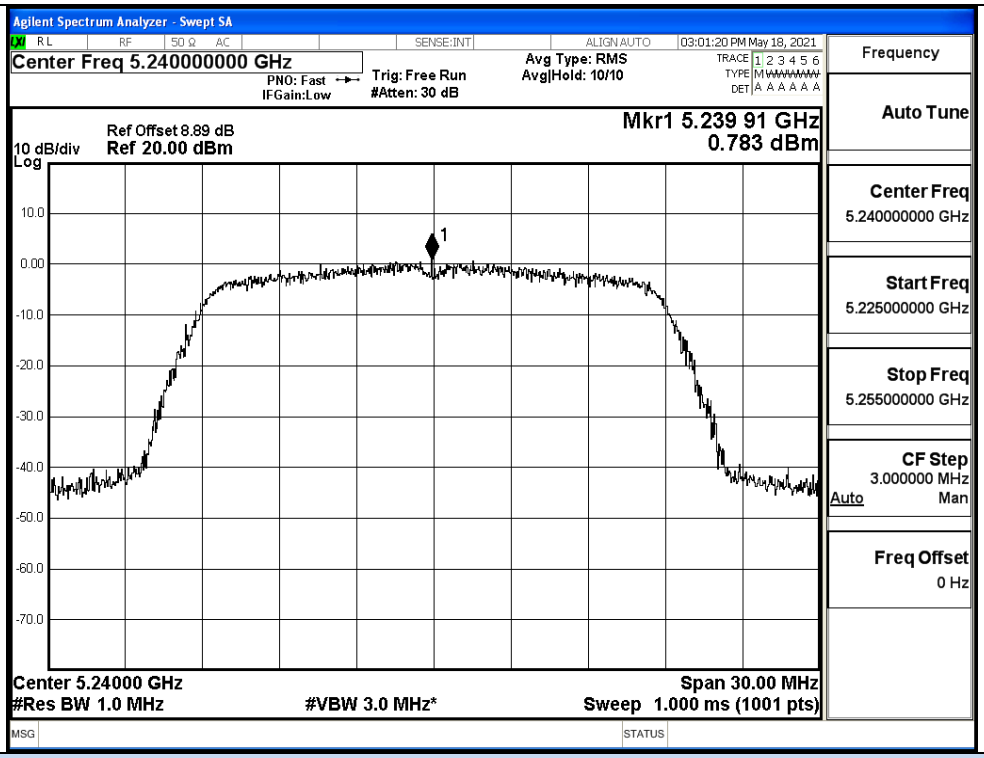

IEEE 802.11n40 / Channel 46 / 5230MHz



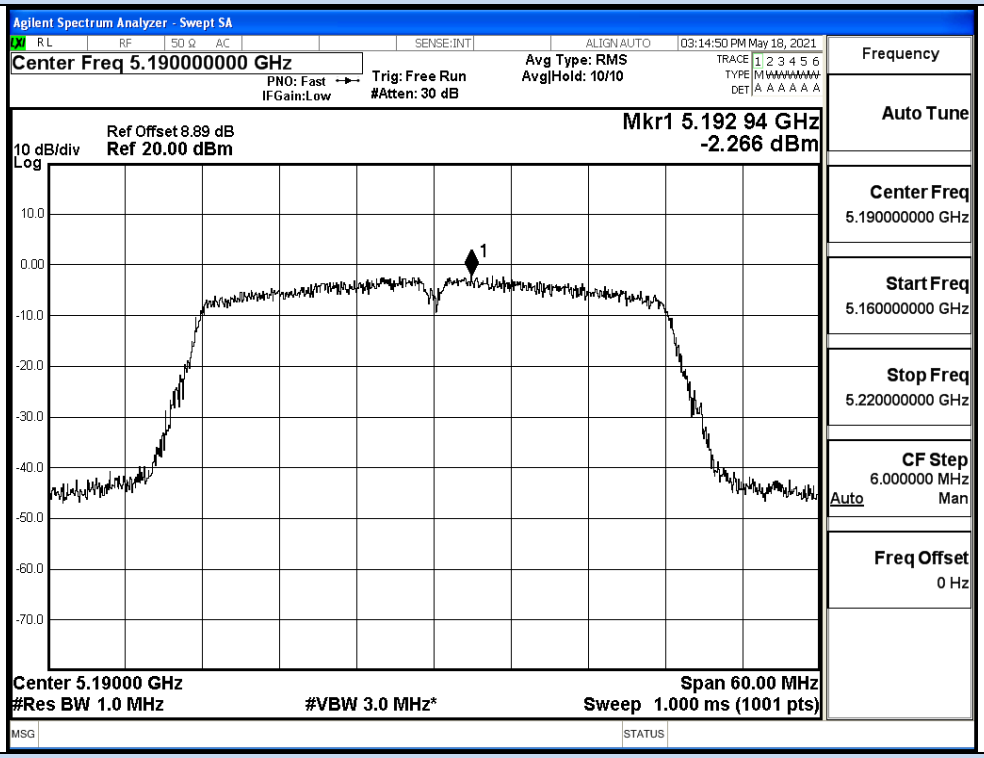

IEEE 802.11ac20 / Channel 36 / 5180MHz



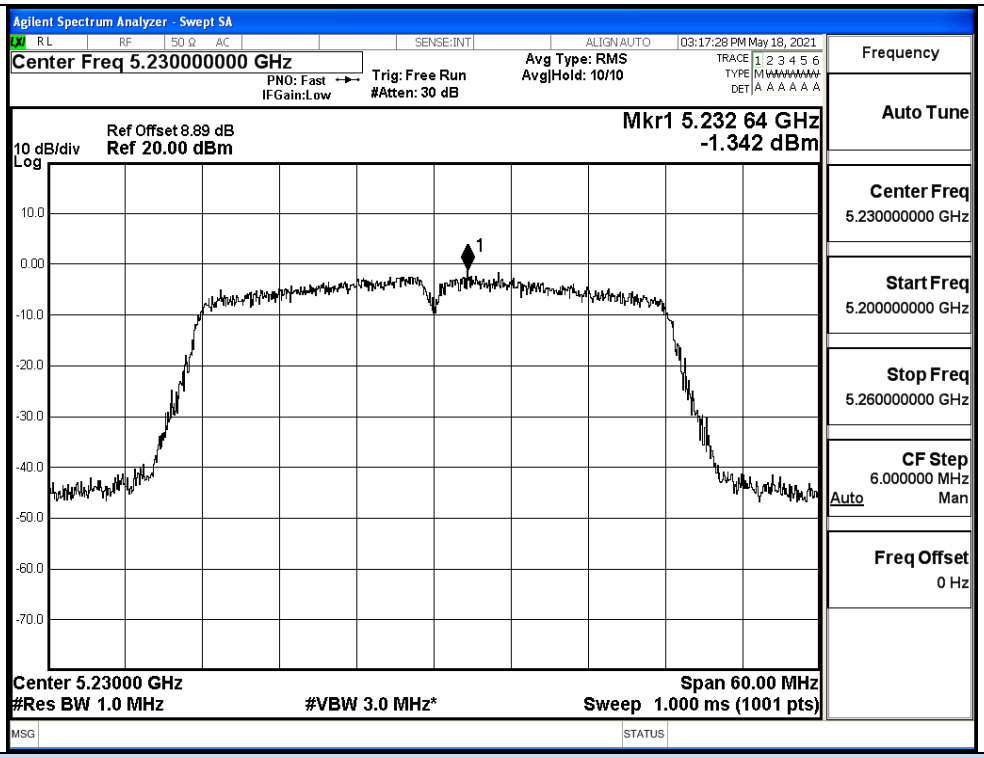

IEEE 802.11ac20 / Channel 40 / 5200MHz



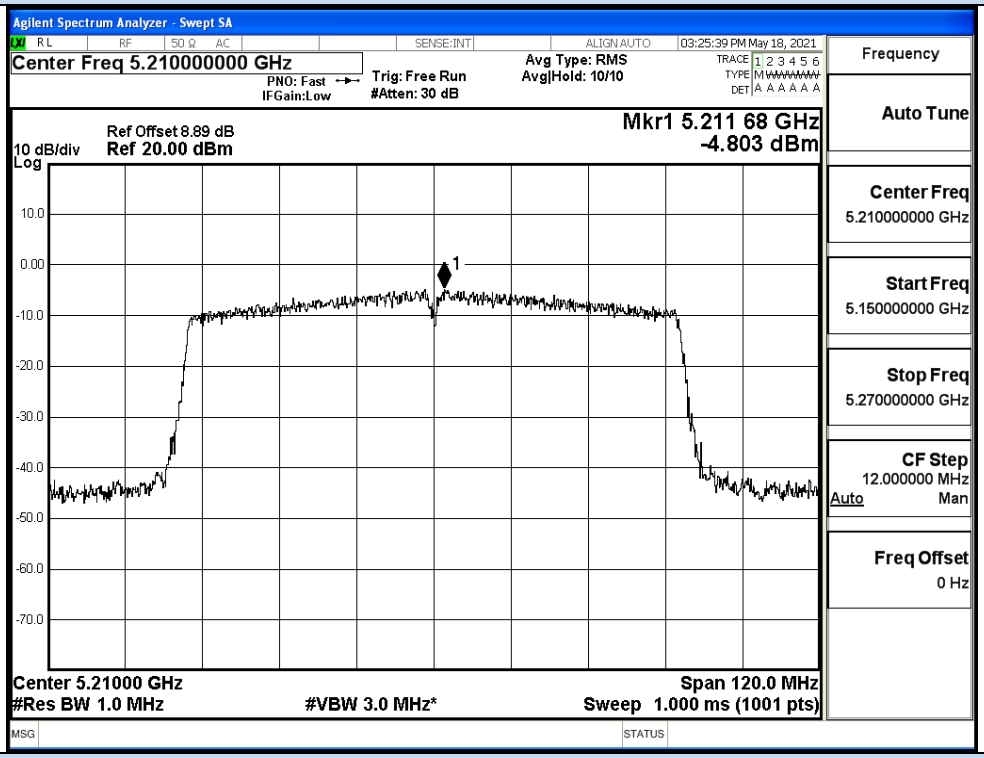

IEEE 802.11ac20 / Channel 48 / 5240MHz




IEEE 802.11ac40 / Channel 38 / 5190MHz




IEEE 802.11ac40 / Channel 46 / 5230MHz




IEEE 802.11ac80 / Channel 42 / 5210MHz

MIMO

| Test Mode | Channel | Frequency (MHz) | ANT 0 Power Density (dBm/MHz) | ANT 1 Power Density (dBm/MHz) | MIMO Power Density (dBm/MHz) | Duty Cycle Factor (dB) | Report Power Density (dBm/MHz) | Limit (dBm/MHz) | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 11N20 | 36 | 5180 | 0.75 | 0.51 | 3.64 | 0 | 3.64 | 16.99 | Pass |
| | 40 | 5200 | 0.60 | 0.80 | 3.71 | 0 | 3.71 | | Pass |
| | 48 | 5240 | 0.52 | 0.66 | 3.60 | 0 | 3.60 | | Pass |
| 11N40 | 38 | 5190 | -1.81 | -1.67 | 1.27 | 0 | 1.27 | 16.99 | Pass |
| | 46 | 5230 | -1.19 | -1.48 | 1.68 | 0 | 1.68 | | Pass |
| 11AC20 | 36 | 5180 | 1.79 | 0.53 | 4.22 | 0 | 4.22 | 16.99 | Pass |
| | 40 | 5200 | 1.13 | 0.57 | 3.87 | 0 | 3.87 | | Pass |
| | 48 | 5240 | 0.33 | 0.78 | 3.57 | 0 | 3.57 | | Pass |
| 11AC40 | 38 | 5190 | -1.99 | -2.27 | 0.88 | 0 | 0.88 | 16.99 | Pass |
| | 46 | 5230 | -1.84 | -1.34 | 1.43 | 0 | 1.43 | | Pass |
| 11AC80 | 42 | 5210 | -4.80 | -4.80 | -1.79 | 0 | -1.79 | 16.99 | Pass |

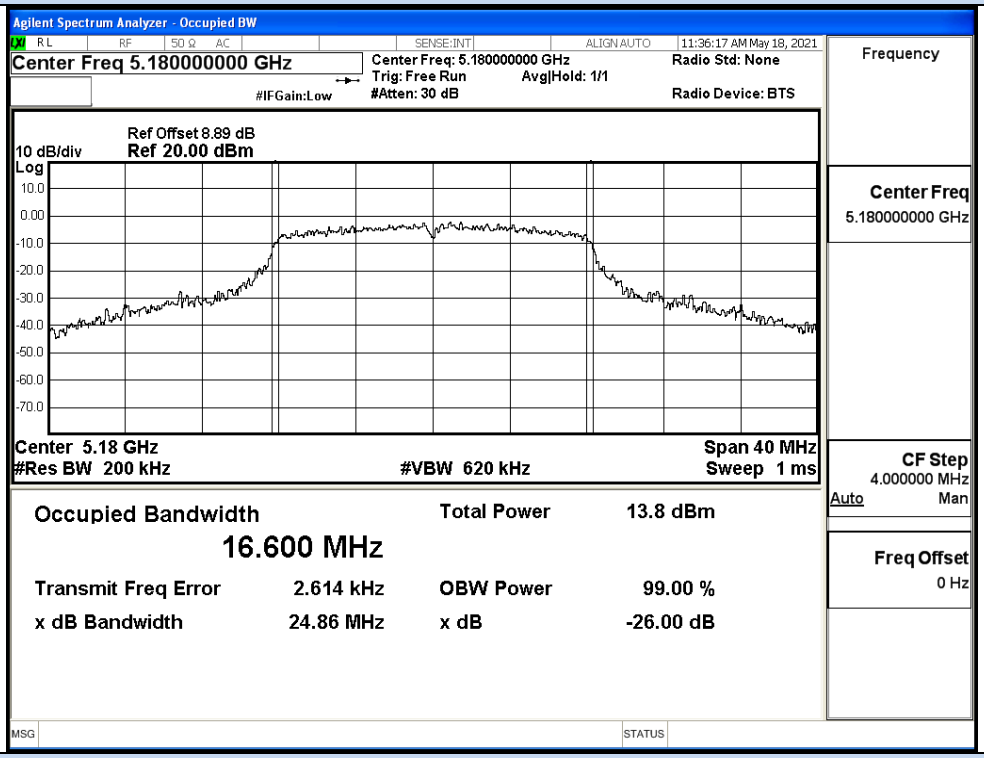
Directional gain=3dBi+10 log (2) = 6.01dBi > 6dBi, So the power density limit shall be reduced to 17-(6.01-6) = 16.99

## D.4 Emission Bandwidth

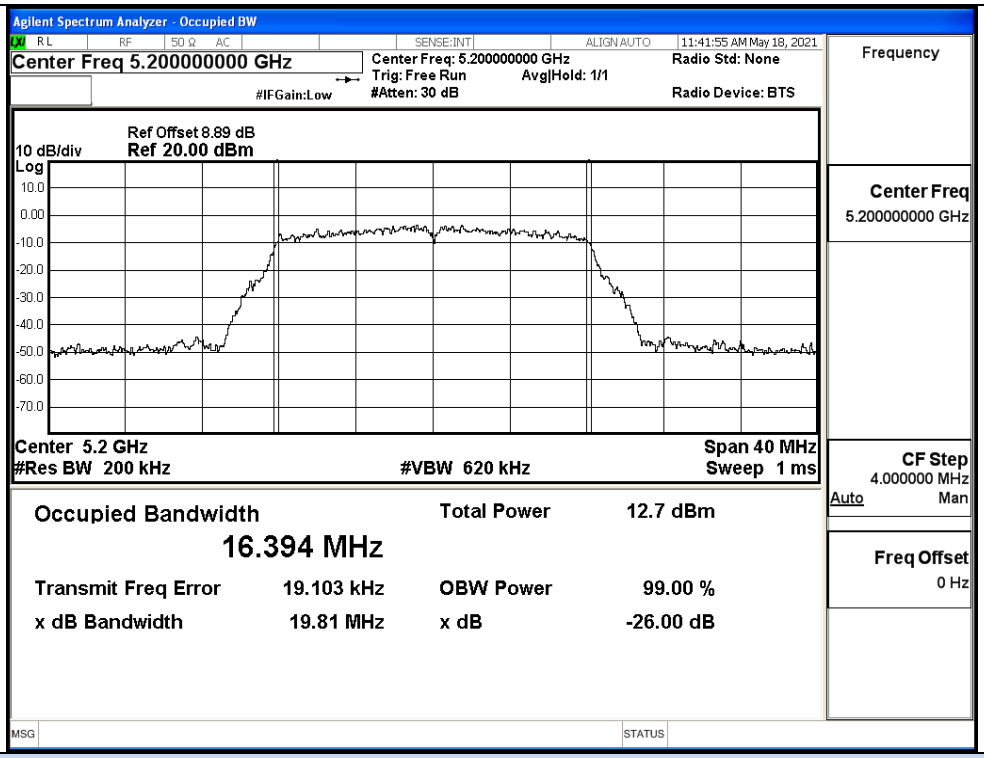
ANT0

| Test Mode | Channel | Frequency (MHz) | 26dB Bandwidth (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|---|---|
| 11A | 36 | 5180 | 24.86 | No Limit | Pass |
| | 40 | 5200 | 19.81 | | Pass |
| | 48 | 5240 | 19.88 | | Pass |
| 11N20 SISO | 36 | 5180 | 20.07 | No Limit | Pass |
| | 40 | 5200 | 20.22 | | Pass |
| | 48 | 5240 | 20.02 | | Pass |
| 11N40 SISO | 38 | 5190 | 40.10 | No Limit | Pass |
| | 46 | 5230 | 40.27 | | Pass |
| 11AC20 SISO | 36 | 5180 | 20.04 | No Limi | Pass |
| | 40 | 5200 | 20.16 | | Pass |
| | 48 | 5240 | 20.00 | | Pass |
| 11AC40 SISO | 38 | 5190 | 39.69 | No Limi | Pass |
| | 46 | 5230 | 40.10 | | Pass |
| 11AC80 SISO | 42 | 5210 | 80.55 | No Limi | Pass |

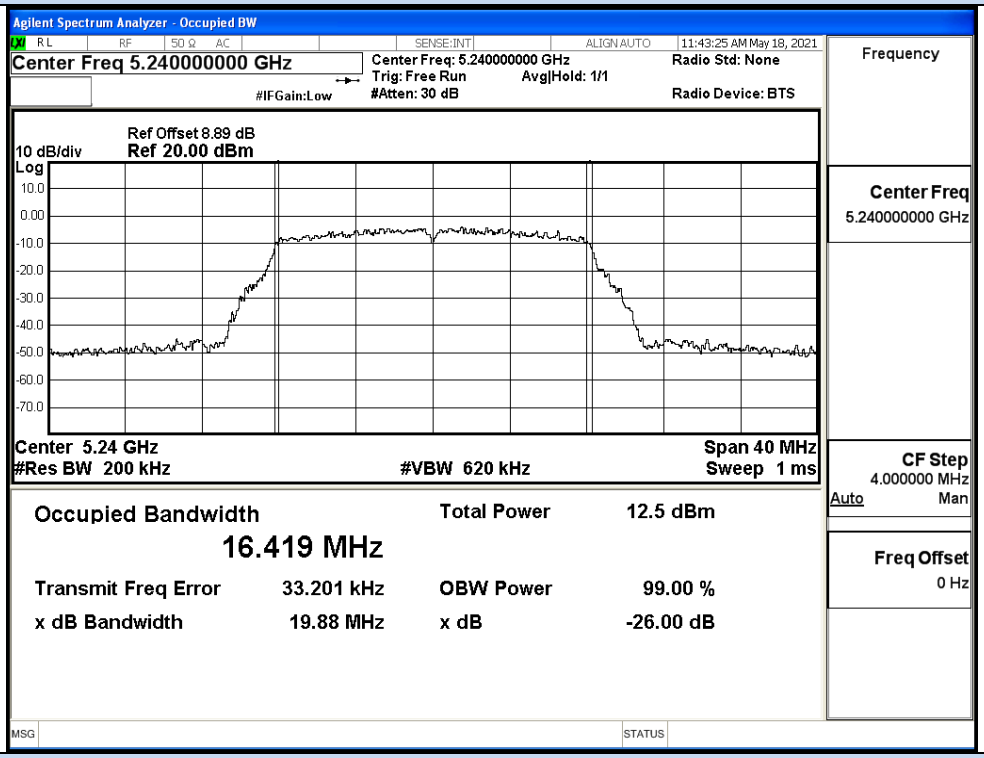
26dB Bandwidth




IEEE 802.11a / Channel 36 / 5180MHz

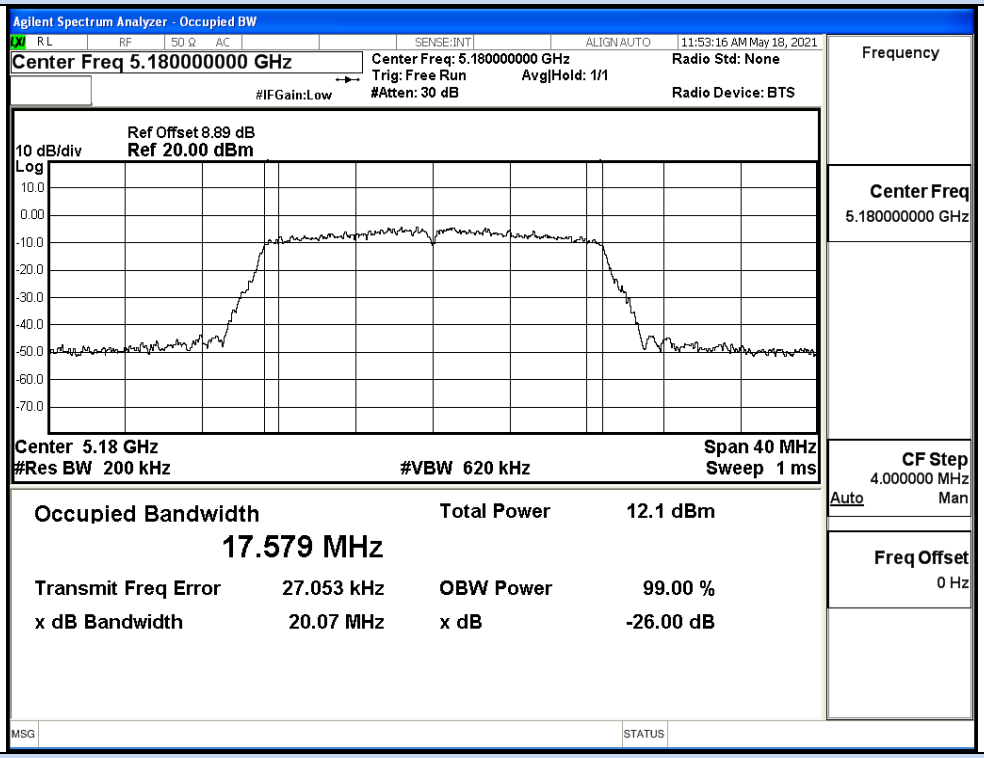



IEEE 802.11a / Channel 40 / 5200MHz

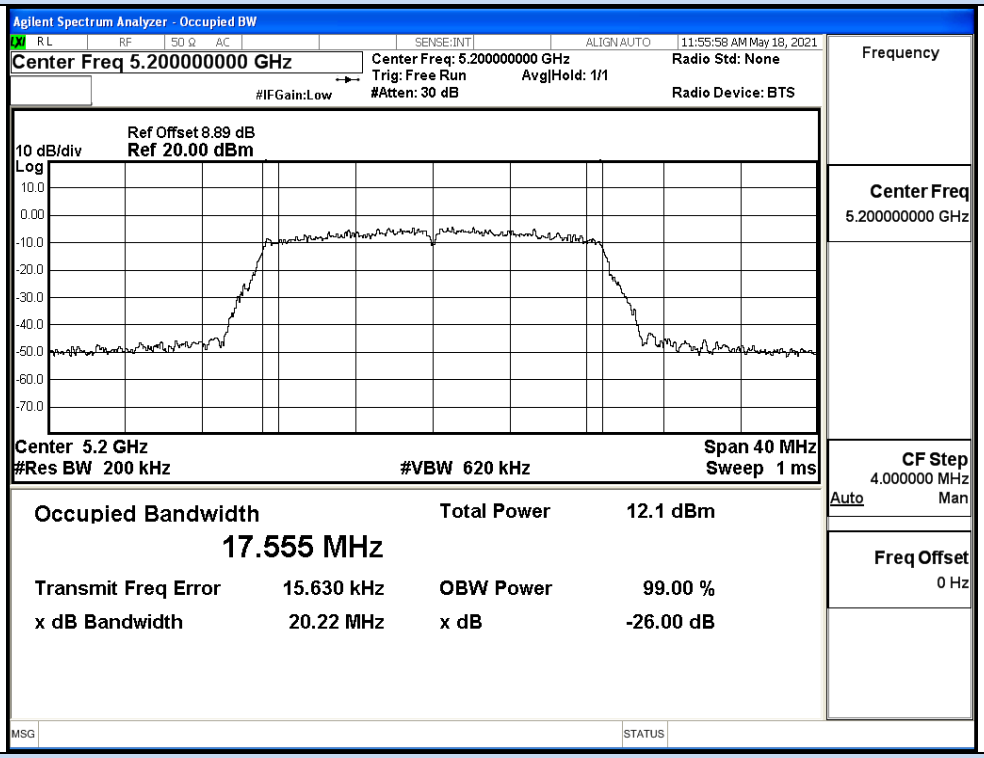



IEEE 802.11a / Channel 48 / 5240MHz

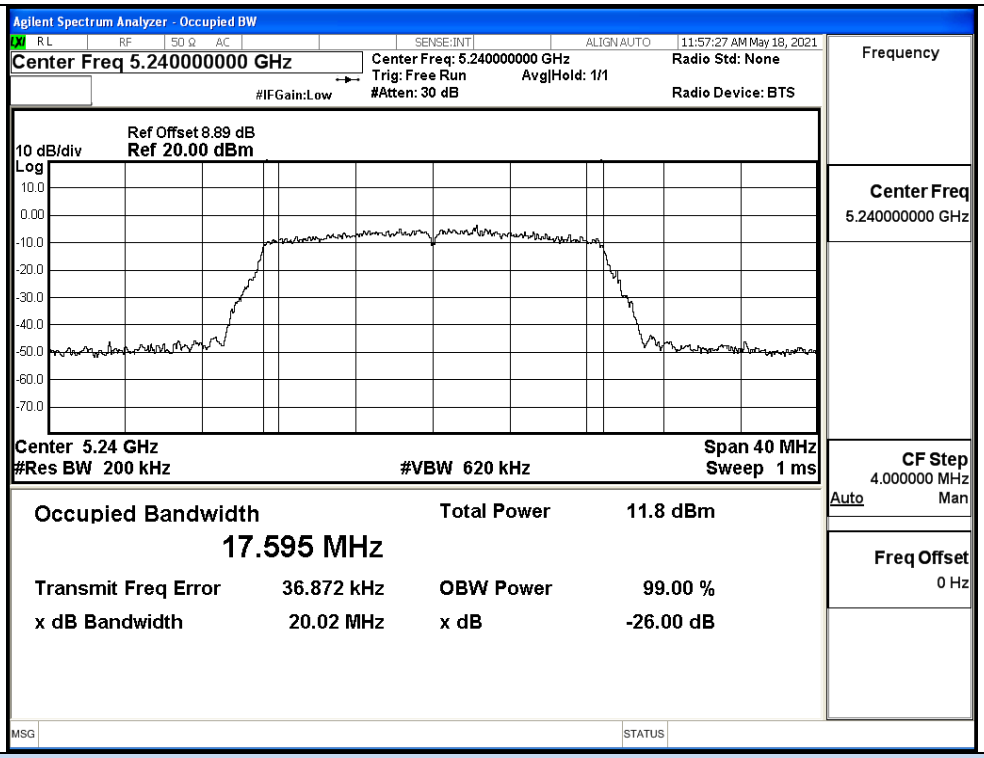
26dB Bandwidth




IEEE 802.11n20 / Channel 36 / 5180MHz

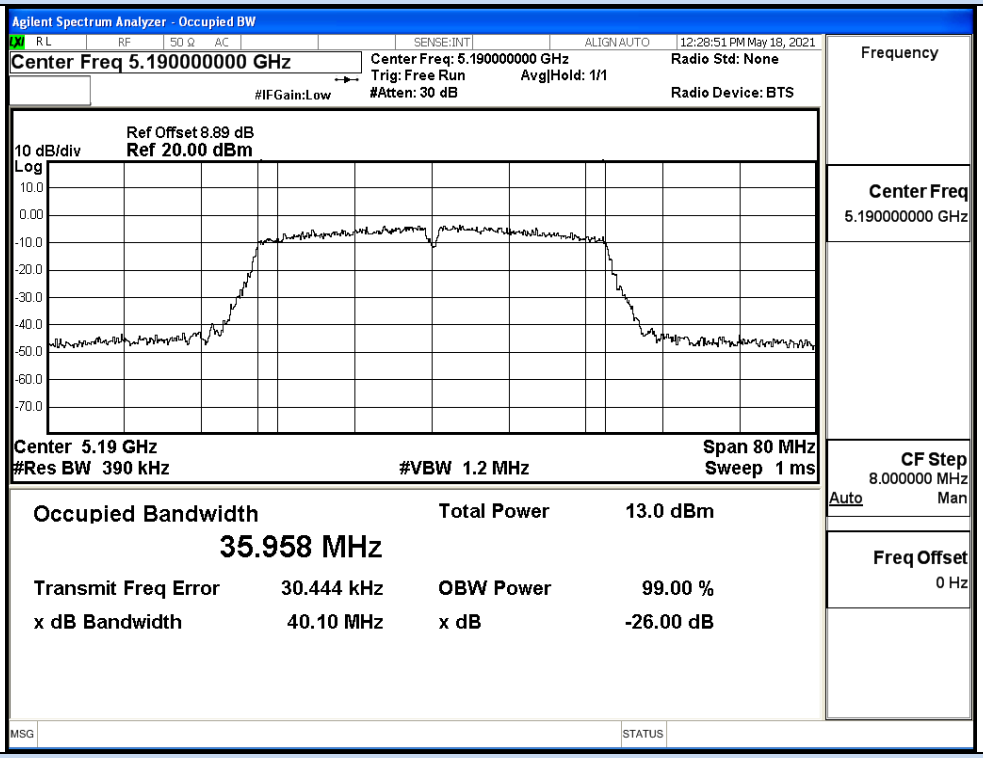



IEEE 802.11n20 / Channel 40 / 5200MHz

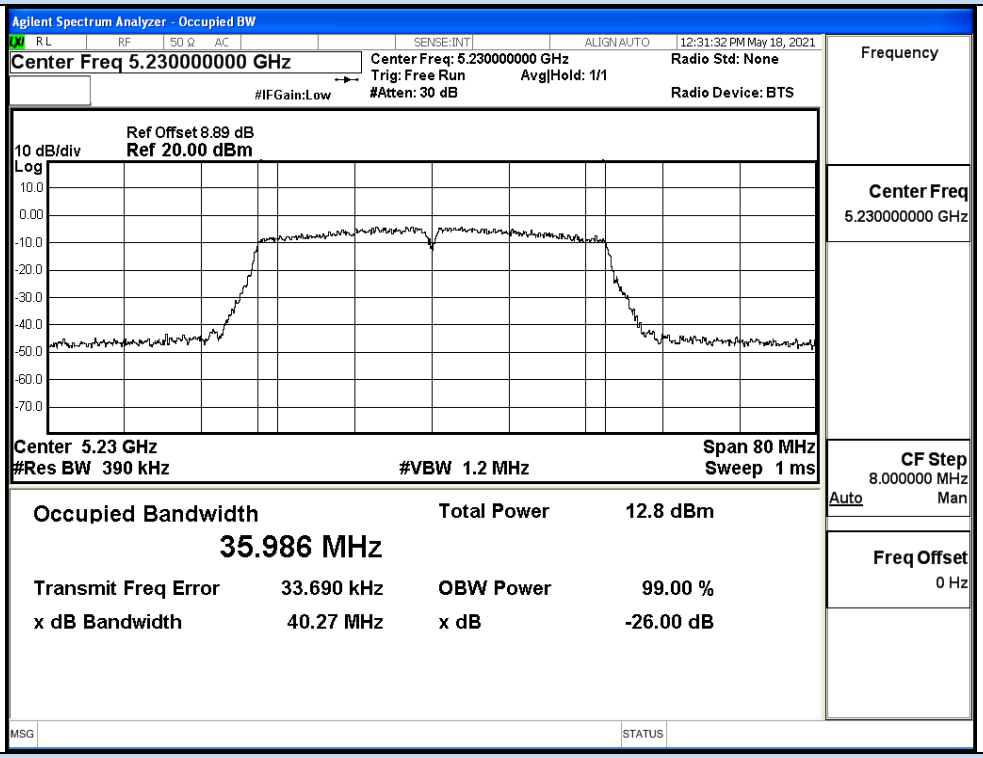



IEEE 802.11n20 / Channel 48 / 5240MHz

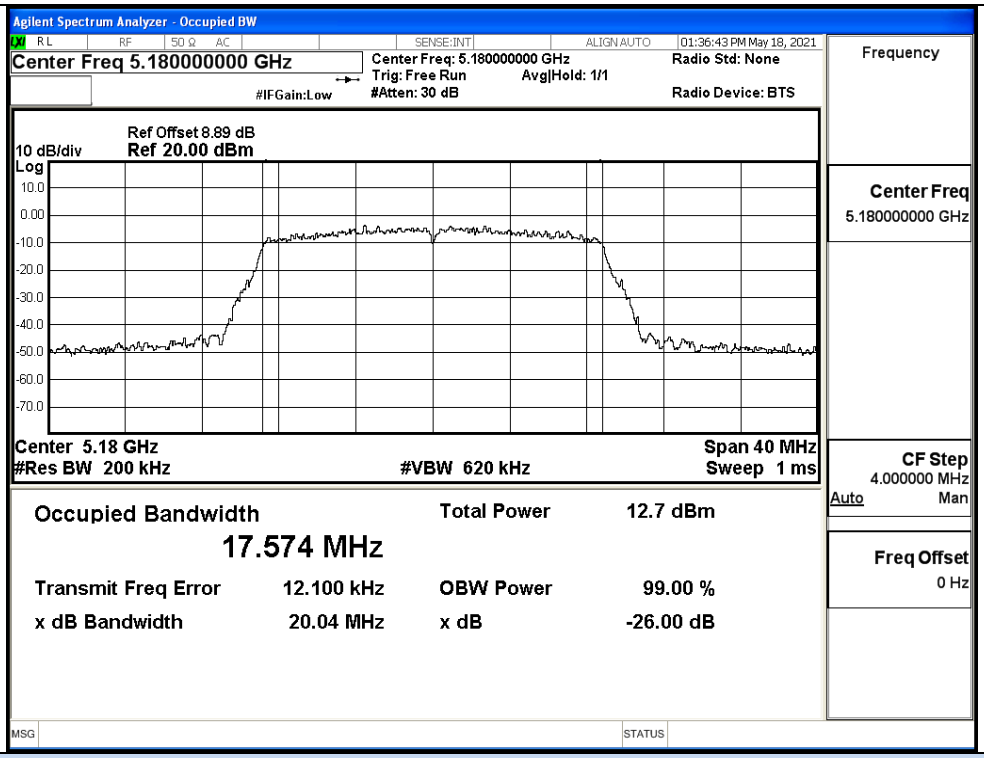
26dB Bandwidth



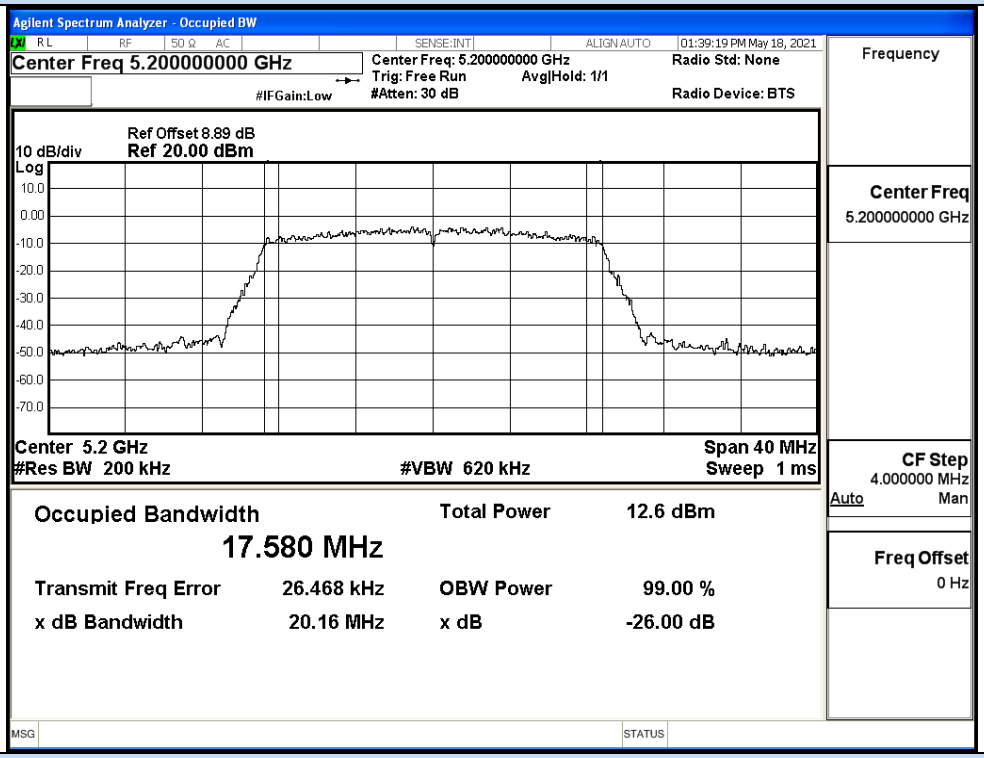

IEEE 802.11n40 / Channel 38 / 5190MHz



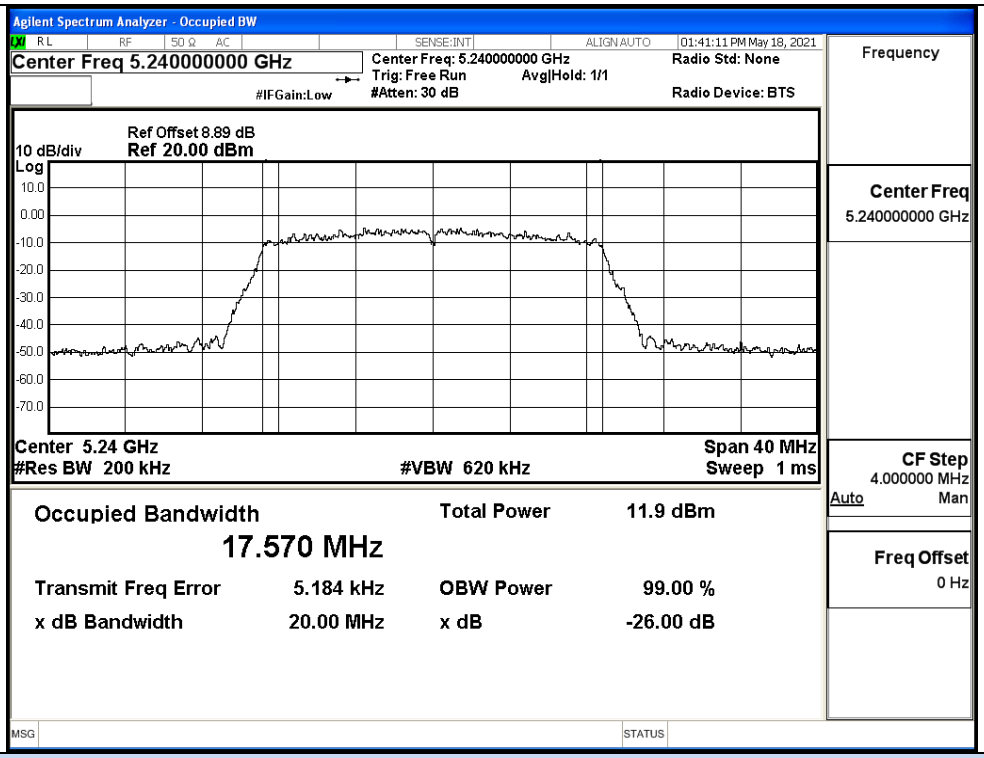

IEEE 802.11n40 / Channel 46 / 5230MHz



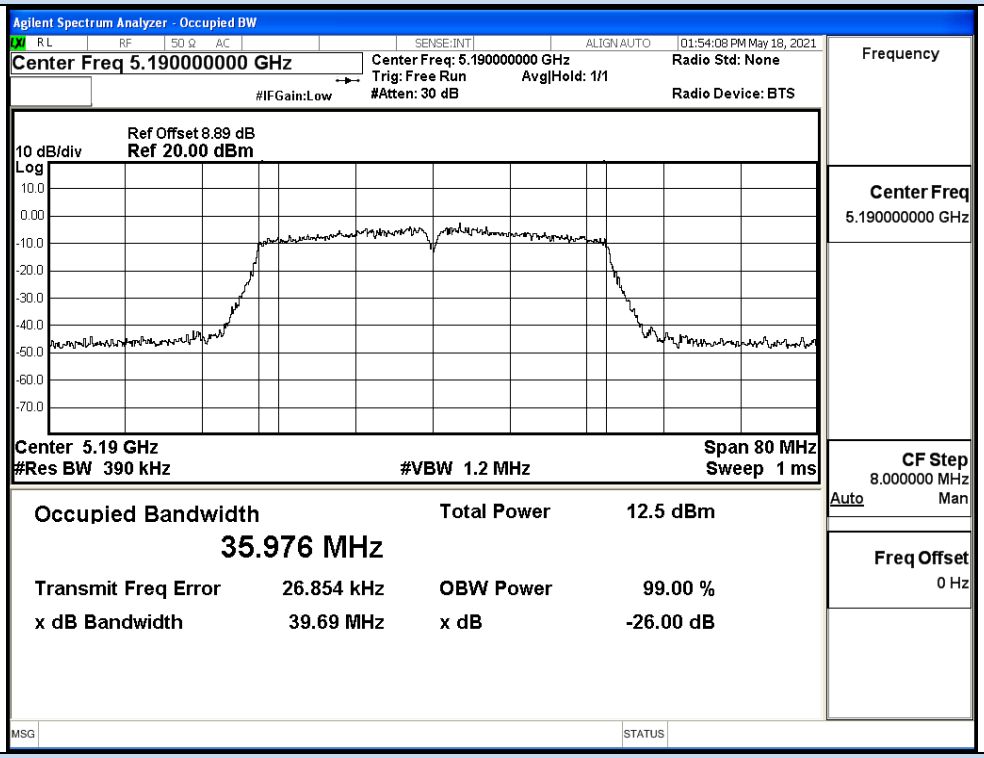

IEEE 802.11ac20 / Channel 36 / 5180MHz



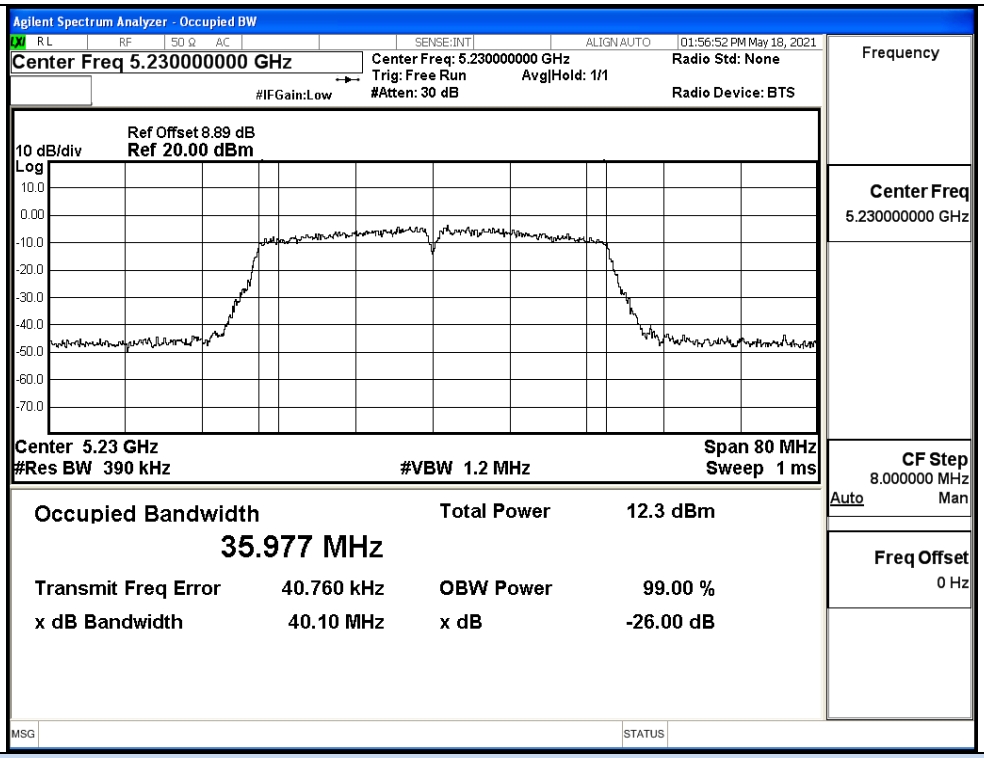

IEEE 802.11ac20 / Channel 40 / 5200MHz



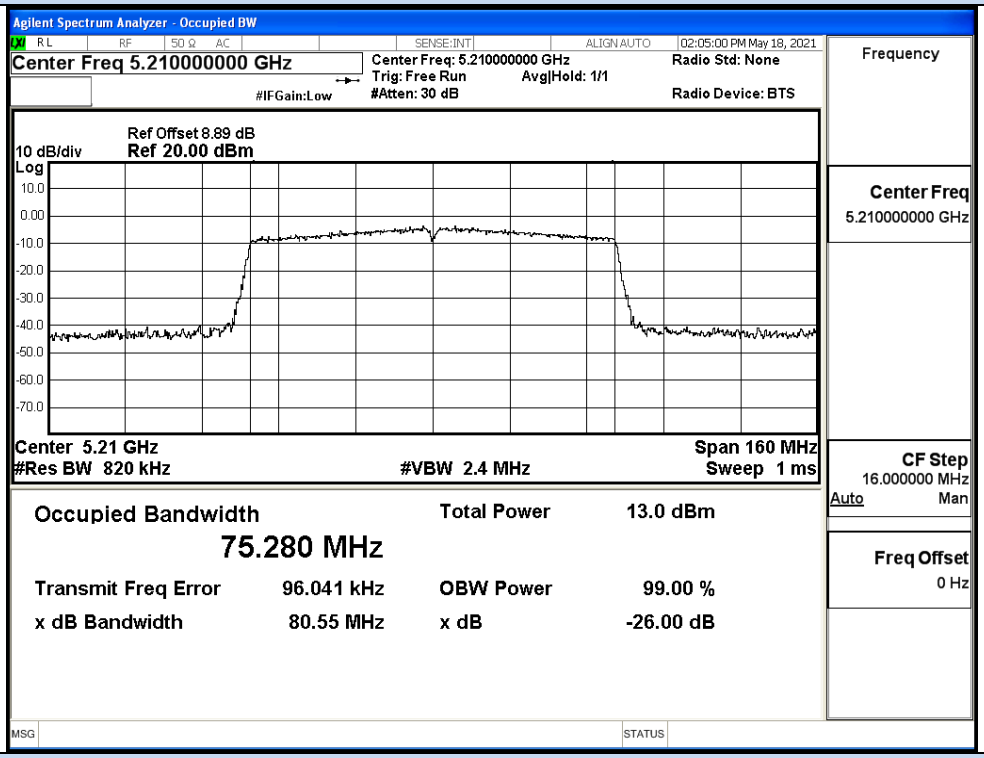

IEEE 802.11ac20 / Channel 48 / 5240MHz




IEEE 802.11ac40 / Channel 38 / 5190MHz




IEEE 802.11ac40 / Channel 46 / 5230MHz

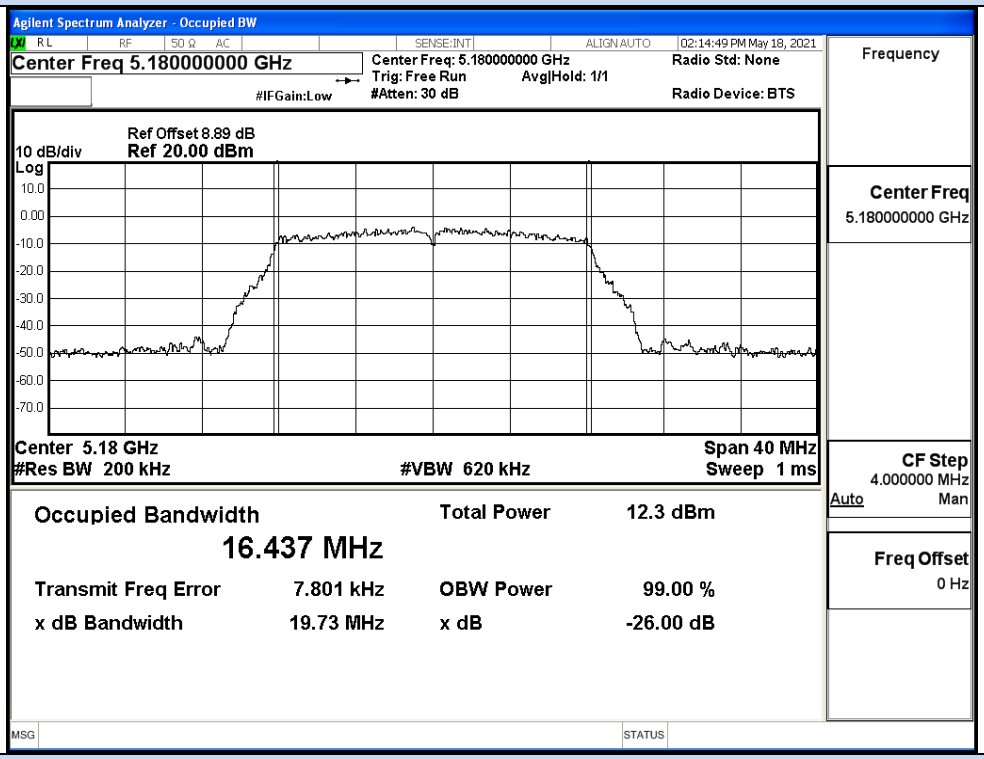



IEEE 802.11ac80 / Channel 42 / 5210MHz

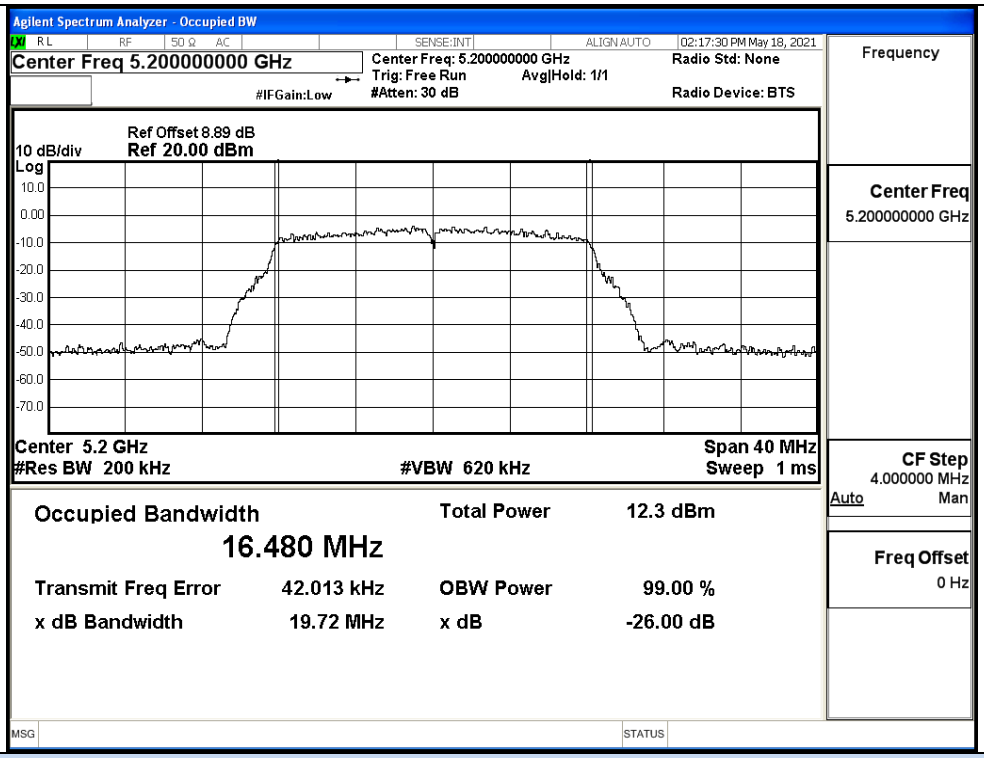
ANT1

| Test Mode | Channel | Frequency (MHz) | 26dB Bandwidth (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|---|---|
| 11A | 36 | 5180 | 19.73 | No Limit | Pass |
| | 40 | 5200 | 19.72 | | Pass |
| | 48 | 5240 | 19.82 | | Pass |
| 11N20 SISO | 36 | 5180 | 20.08 | No Limit | Pass |
| | 40 | 5200 | 20.45 | | Pass |
| | 48 | 5240 | 19.94 | | Pass |
| 11N40 SISO | 38 | 5190 | 40.58 | No Limit | Pass |
| | 46 | 5230 | 40.18 | | Pass |
| 11AC20 SISO | 36 | 5180 | 20.13 | No Limi | Pass |
| | 40 | 5200 | 20.07 | | Pass |
| | 48 | 5240 | 20.02 | | Pass |
| 11AC40 SISO | 38 | 5190 | 39.82 | No Limi | Pass |
| | 46 | 5230 | 40.12 | | Pass |
| 11AC80 SISO | 42 | 5210 | 80.80 | No Limi | Pass |

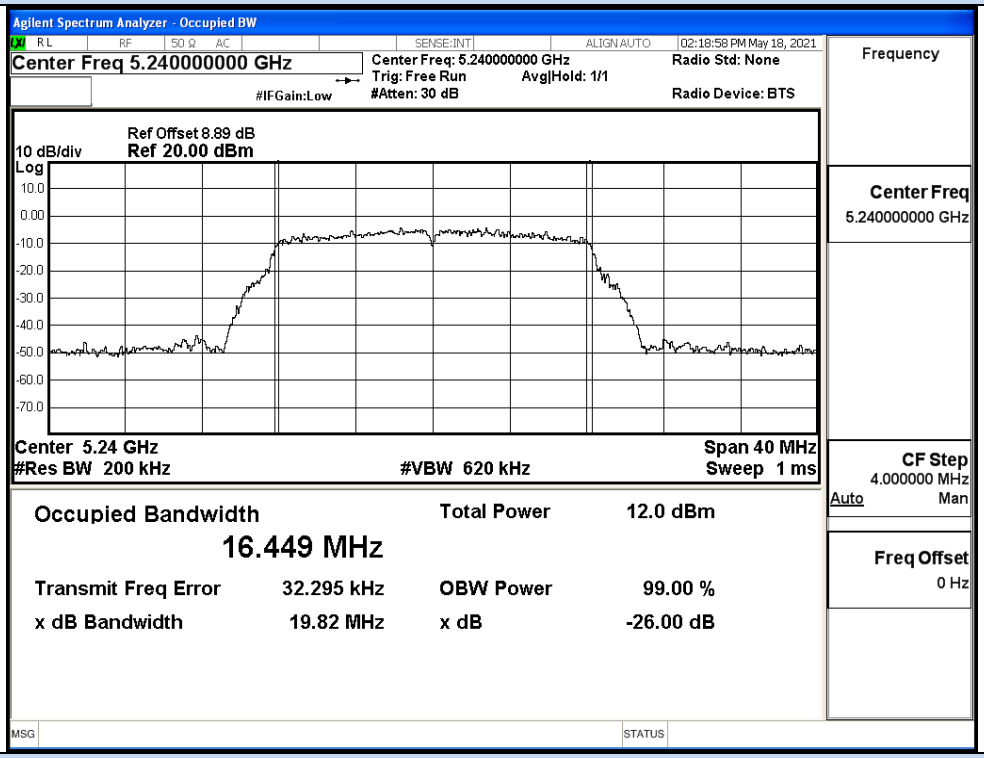
26dB Bandwidth




IEEE 802.11a / Channel 36 / 5180MHz

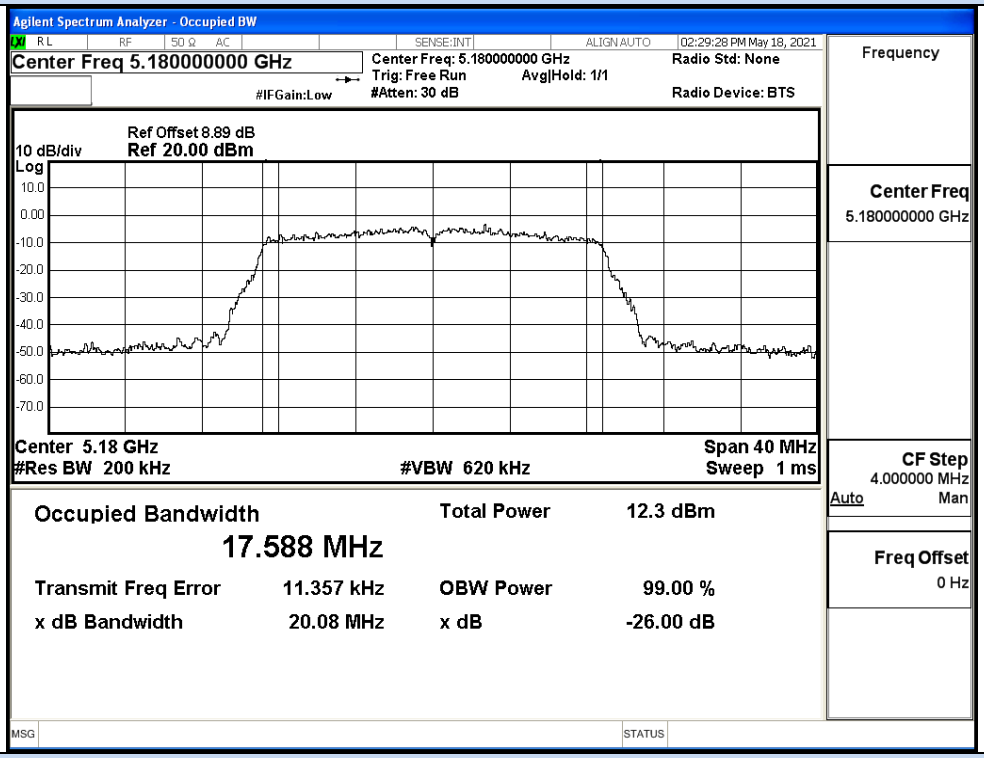



IEEE 802.11a / Channel 40 / 5200MHz

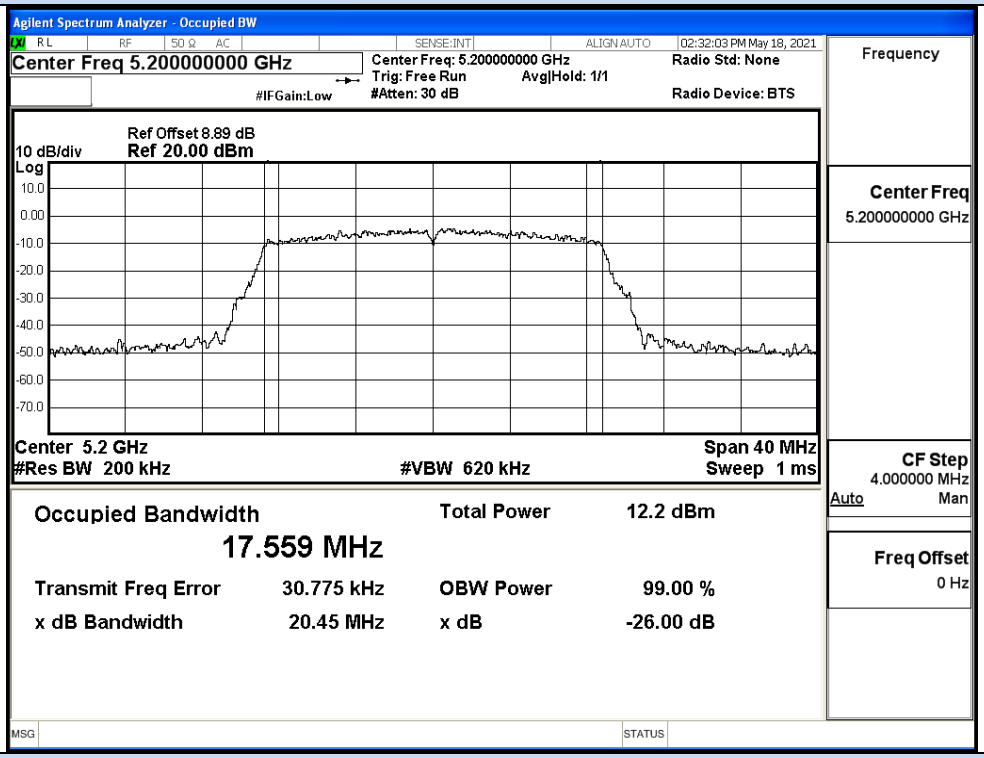



IEEE 802.11a / Channel 48 / 5240MHz

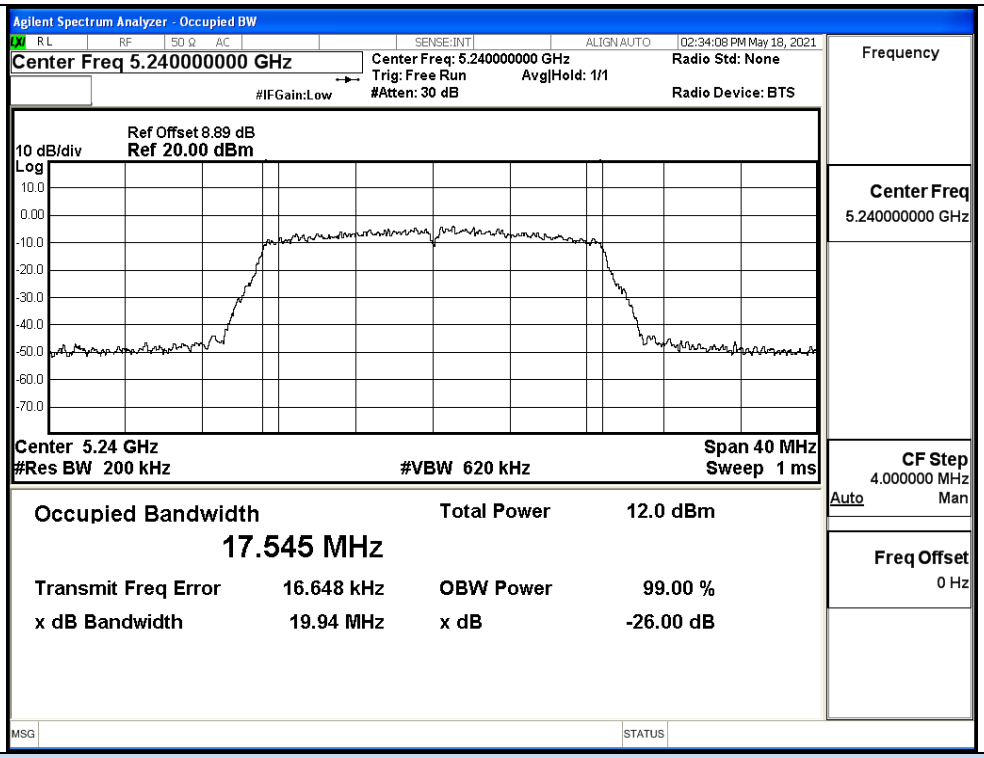
26dB Bandwidth




IEEE 802.11n20 / Channel 36 / 5180MHz

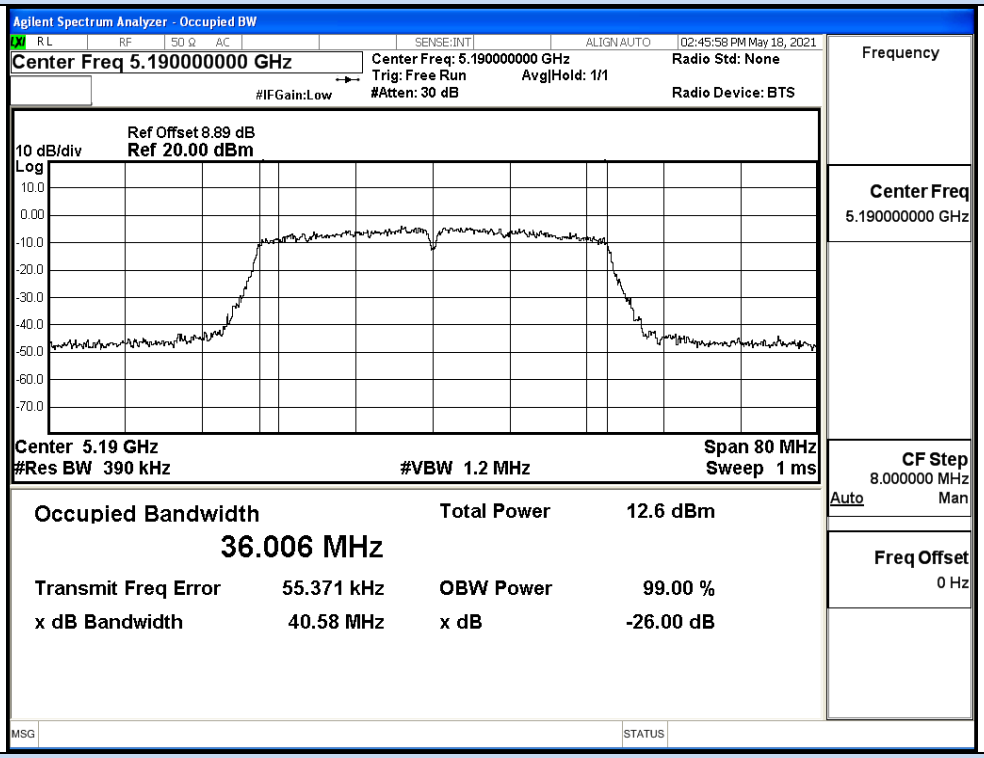



IEEE 802.11n20 / Channel 40 / 5200MHz

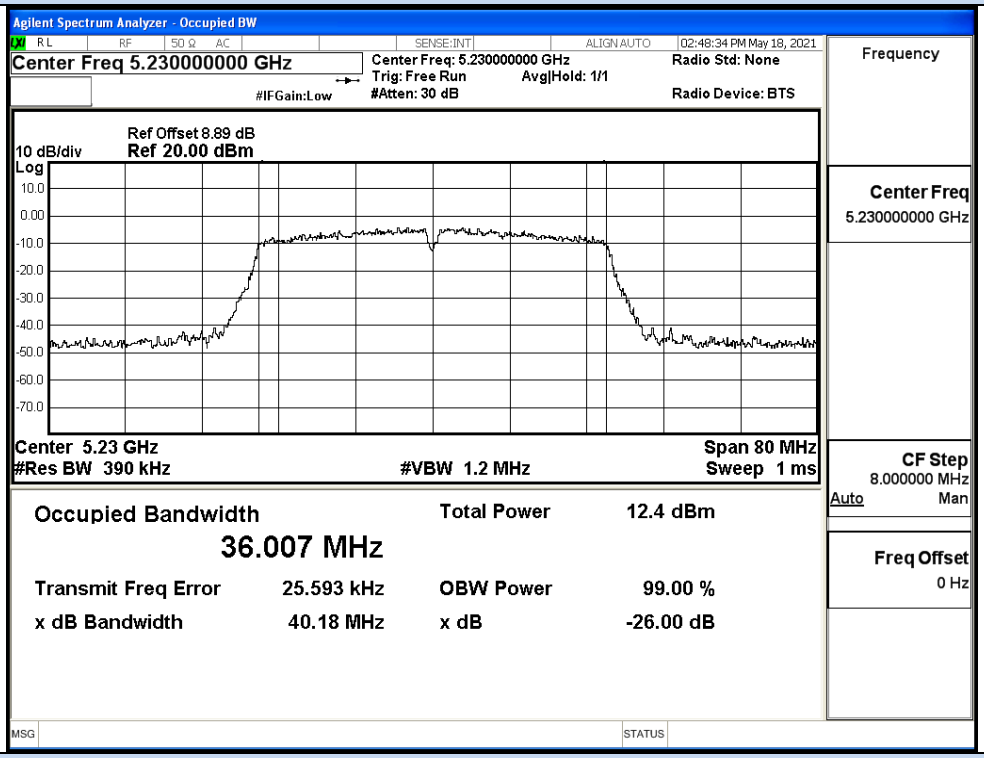



IEEE 802.11n20 / Channel 48 / 5240MHz

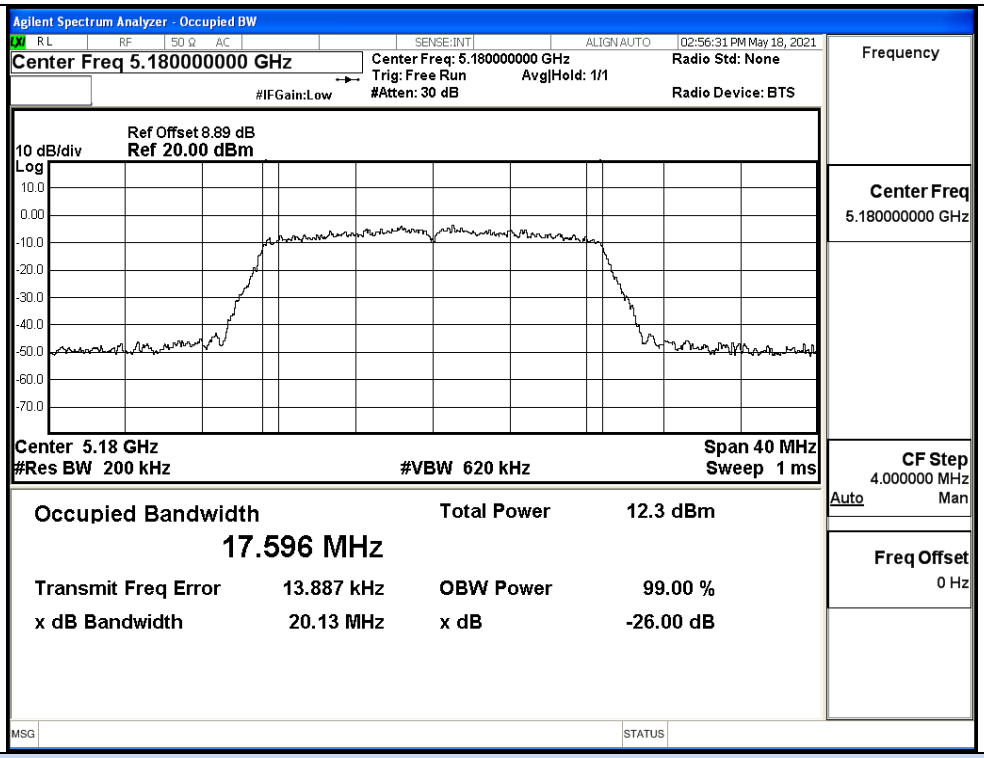
26dB Bandwidth



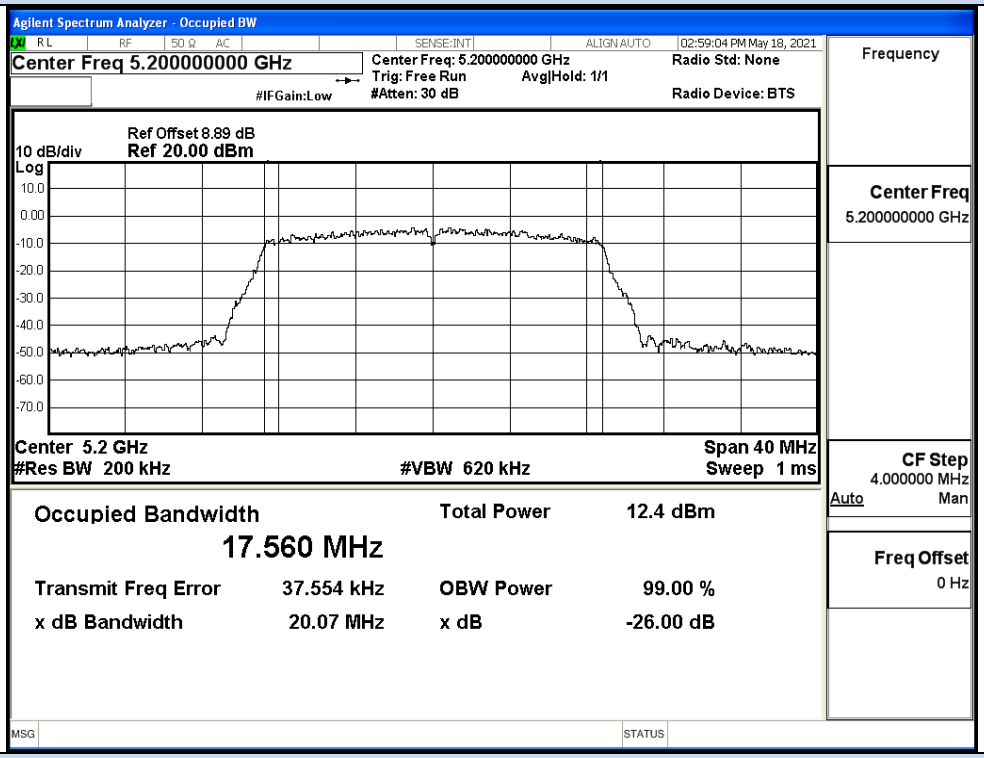

IEEE 802.11n40 / Channel 38 / 5190MHz



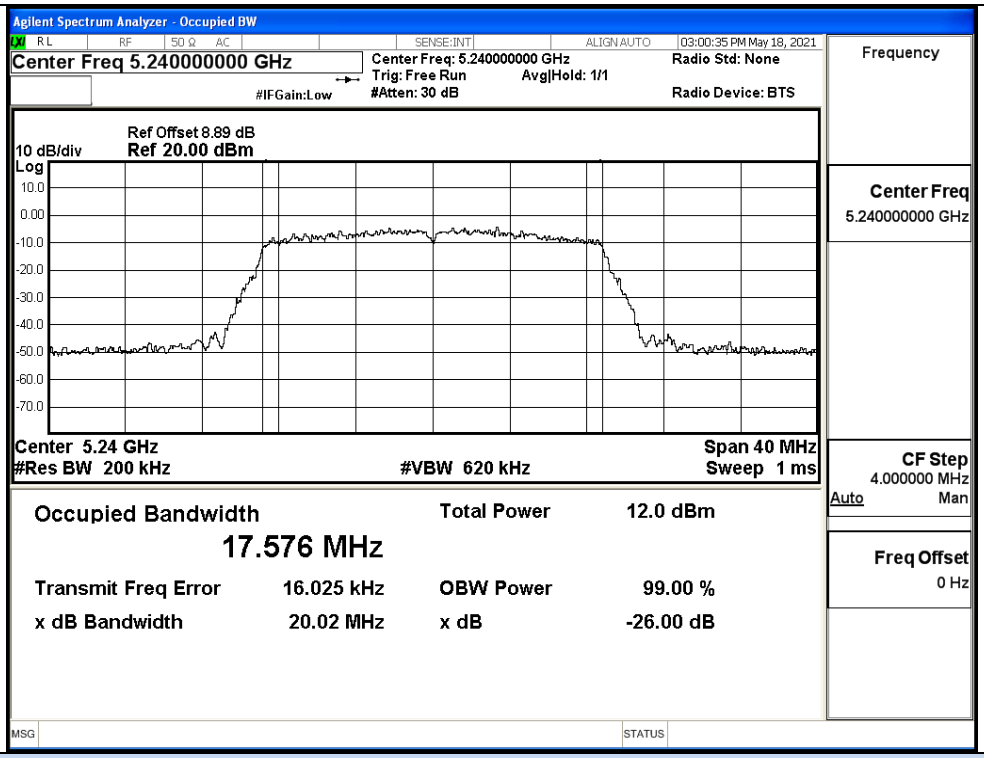

IEEE 802.11n40 / Channel 46 / 5230MHz



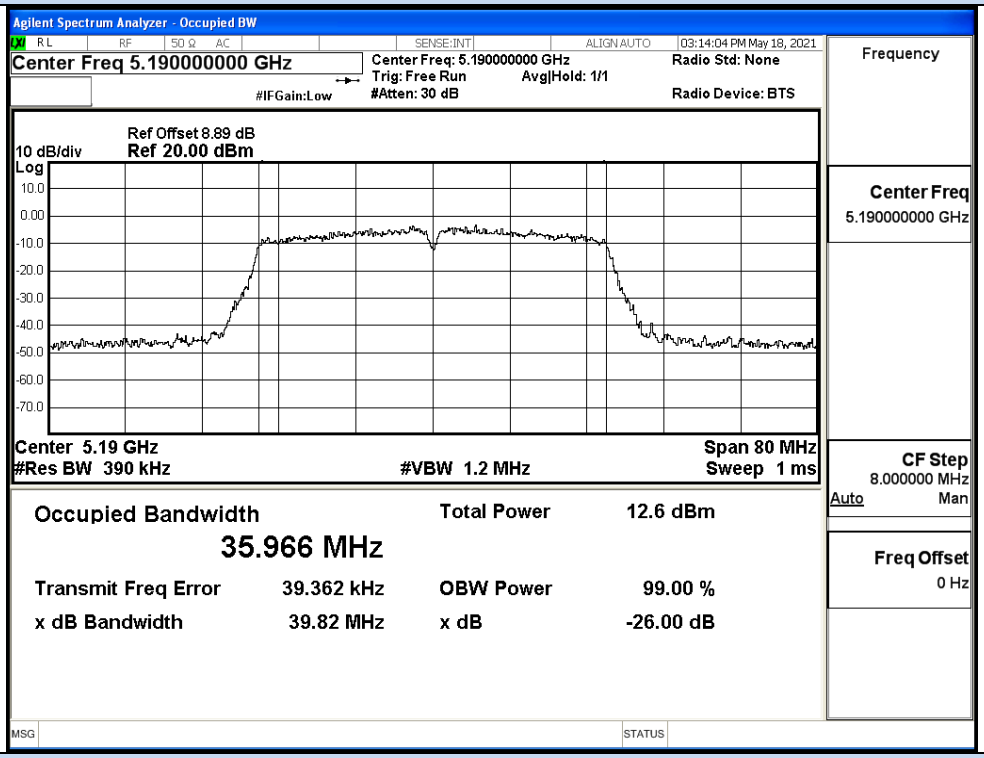

IEEE 802.11ac20 / Channel 36 / 5180MHz



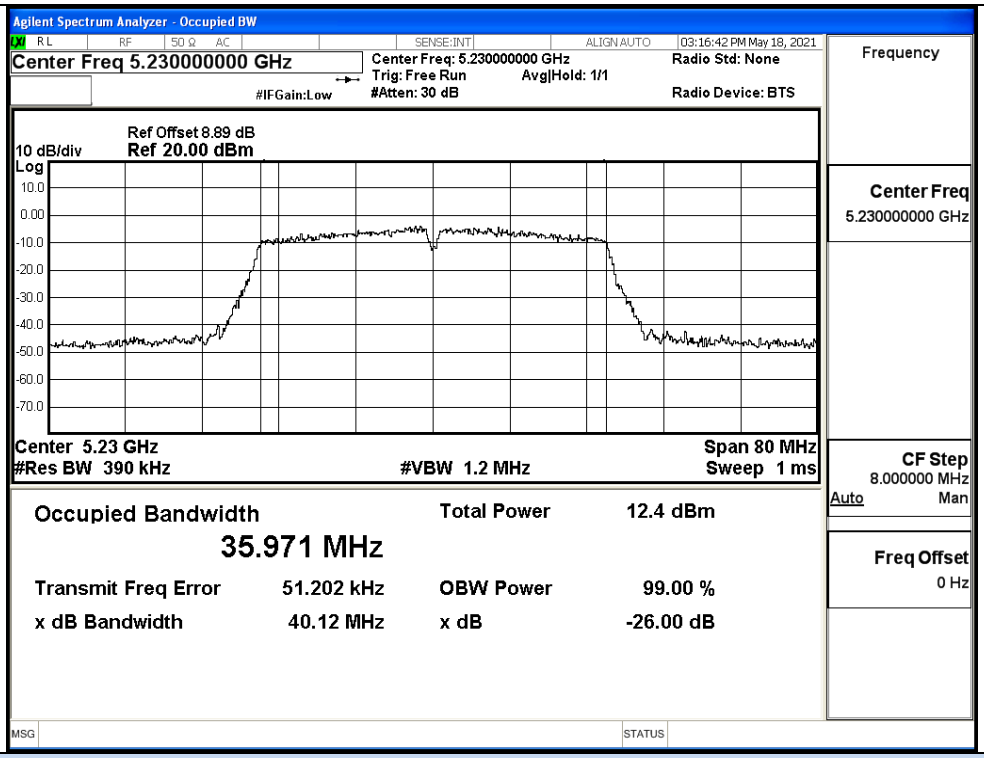

IEEE 802.11ac20 / Channel 40 / 5200MHz



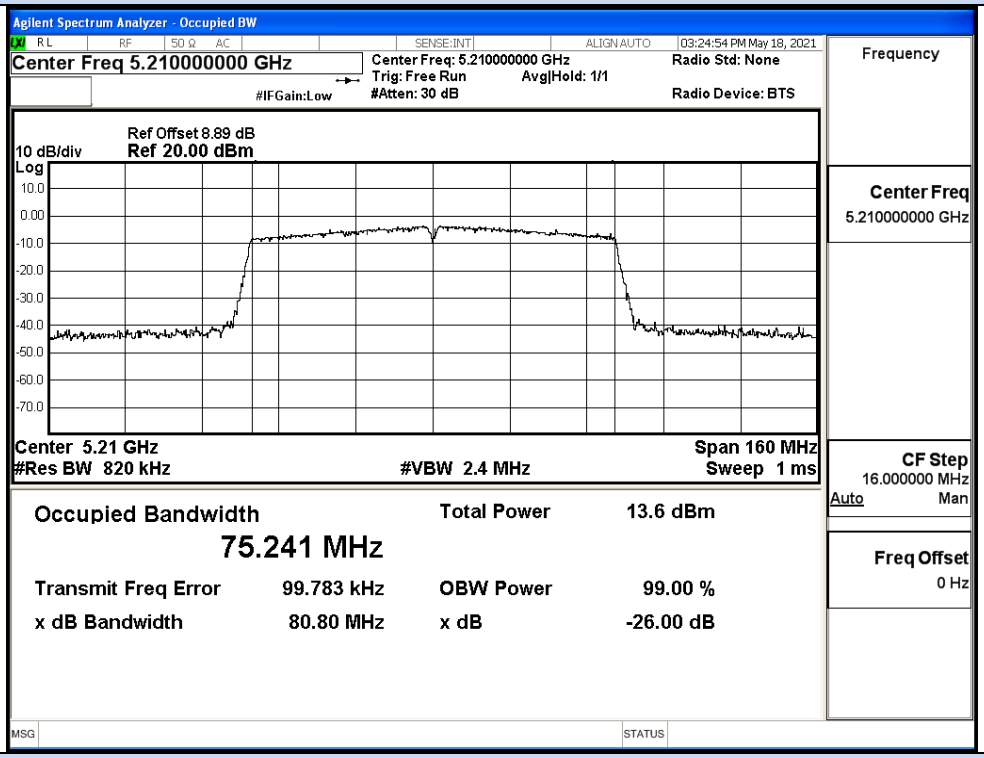

IEEE 802.11ac20 / Channel 48 / 5240MHz




IEEE 802.11ac40 / Channel 38 / 5190MHz




IEEE 802.11ac40 / Channel 46 / 5230MHz



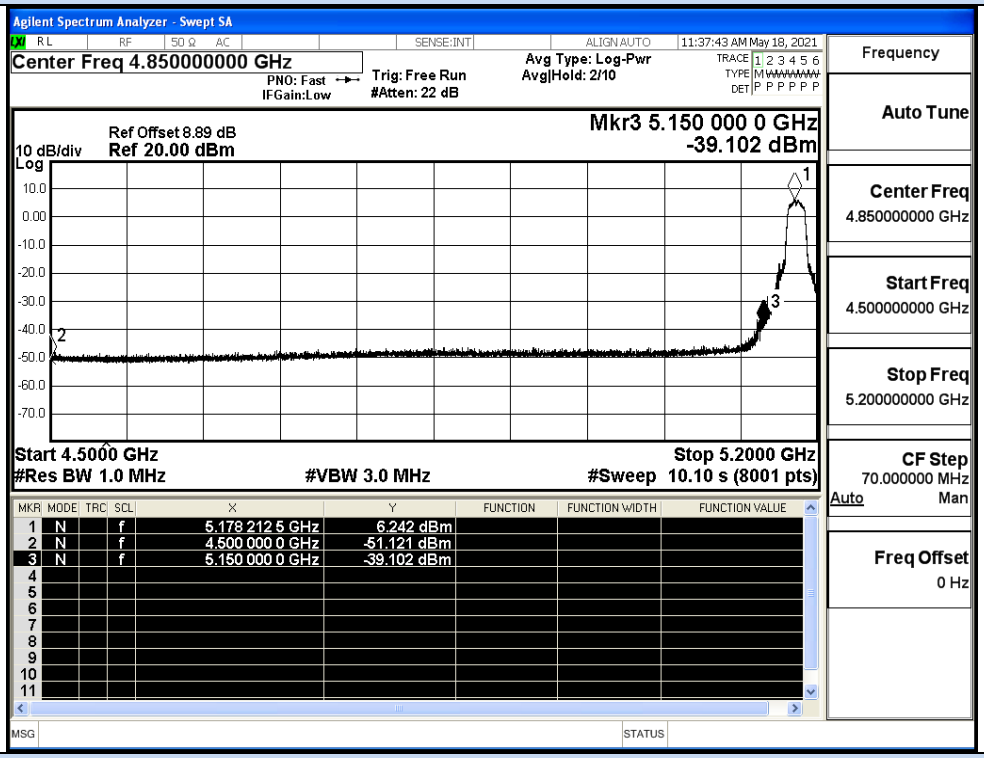

IEEE 802.11ac80 / Channel 42 / 5210MHz

## D.5 Undesirable Emissions Measurement

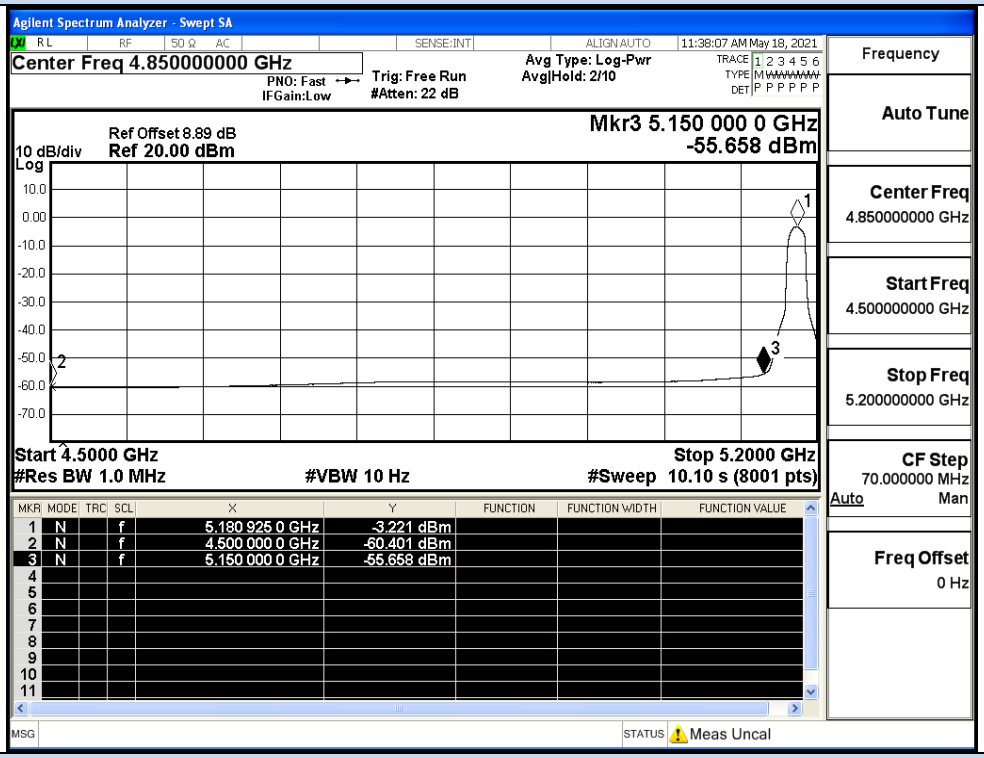
ANT0

| Test Mode | Channel | Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | Ground Reflection Factor (dB) | Covert Radiated E Level At 3m (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 11A | 36 | 4500.0 | -51.12 | 3.0 | 0 | 47.11 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.40 | 3.0 | 0 | 37.83 | Average | 54.00 | Pass |
| | | 5150.0 | -39.10 | 3.0 | 0 | 59.13 | Peak | 68.20 | Pass |
| | | 5150.0 | -55.66 | 3.0 | 0 | 42.57 | Average | 54.00 | Pass |
| | 48 | 5350.0 | -47.50 | 3.0 | 0 | 50.73 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.90 | 3.0 | 0 | 39.33 | Average | 54.00 | Pass |
| | | 5460.0 | -48.97 | 3.0 | 0 | 49.26 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.44 | 3.0 | 0 | 38.79 | Average | 54.00 | Pass |
| 11N20 SISO | 36 | 4500.0 | -49.40 | 3.0 | 0 | 48.83 | Peak | 68.20 | Pass |
| | | 4500.0 | -59.62 | 3.0 | 0 | 38.61 | Average | 54.00 | Pass |
| | | 5150.0 | -46.41 | 3.0 | 0 | 51.82 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.61 | 3.0 | 0 | 41.62 | Average | 54.00 | Pass |
| | 48 | 5350.0 | -47.10 | 3.0 | 0 | 51.13 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.89 | 3.0 | 0 | 39.34 | Average | 54.00 | Pass |
| | | 5460.0 | -48.56 | 3.0 | 0 | 49.67 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.48 | 3.0 | 0 | 38.75 | Average | 54.00 | Pass |
| 11N40 SISO | 38 | 4500.0 | -49.73 | 3.0 | 0 | 48.50 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.39 | 3.0 | 0 | 37.84 | Average | 54.00 | Pass |
| | | 5150.0 | -43.73 | 3.0 | 0 | 54.50 | Peak | 68.20 | Pass |
| | | 5150.0 | -55.40 | 3.0 | 0 | 42.83 | Average | 54.00 | Pass |
| | 46 | 5350.0 | -48.33 | 3.0 | 0 | 49.90 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.63 | 3.0 | 0 | 39.60 | Average | 54.00 | Pass |
| | | 5460.0 | -48.72 | 3.0 | 0 | 49.51 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.16 | 3.0 | 0 | 39.07 | Average | 54.00 | Pass |
| 11AC20 SISO | 36 | 4500.0 | -50.69 | 3.0 | 0 | 47.54 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.32 | 3.0 | 0 | 37.91 | Average | 54.00 | Pass |
| | | 5150.0 | -47.34 | 3.0 | 0 | 50.89 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.55 | 3.0 | 0 | 41.68 | Average | 54.00 | Pass |
| | 48 | 4500.0 | -50.69 | 3.0 | 0 | 47.54 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.32 | 3.0 | 0 | 37.91 | Average | 54.00 | Pass |
| | | 5150.0 | -47.34 | 3.0 | 0 | 50.89 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.55 | 3.0 | 0 | 41.68 | Average | 54.00 | Pass |
| 11AC40 SISO | 38 | 4500.0 | -49.73 | 3.0 | 0 | 48.50 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.30 | 3.0 | 0 | 37.93 | Average | 54.00 | Pass |
| | | 5150.0 | -47.09 | 3.0 | 0 | 51.14 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.13 | 3.0 | 0 | 42.10 | Average | 54.00 | Pass |
| | 46 | 5350.0 | -49.18 | 3.0 | 0 | 49.05 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.61 | 3.0 | 0 | 39.62 | Average | 54.00 | Pass |
| | | 5460.0 | -48.28 | 3.0 | 0 | 49.95 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.08 | 3.0 | 0 | 39.15 | Average | 54.00 | Pass |
| 11AC80 SISO | 42 | 4500.0 | -48.11 | 3.0 | 0 | 50.12 | Peak | 68.20 | Pass |
| | | 4500.0 | -58.16 | 3.0 | 0 | 40.07 | Average | 54.00 | Pass |
| | | 5150.0 | -49.28 | 3.0 | 0 | 48.95 | Peak | 68.20 | Pass |
| | | 5150.0 | -58.64 | 3.0 | 0 | 39.59 | Average | 54.00 | Pass |
| | | 5350.0 | -48.11 | 3.0 | 0 | 50.12 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.16 | 3.0 | 0 | 40.07 | Average | 54.00 | Pass |
| | | 5460.0 | -49.28 | 3.0 | 0 | 48.95 | Peak | 68.20 | Pass |
| | | 5460.0 | -58.64 | 3.0 | 0 | 39.59 | Average | 54.00 | Pass |

Undesirable Emissions Measurement

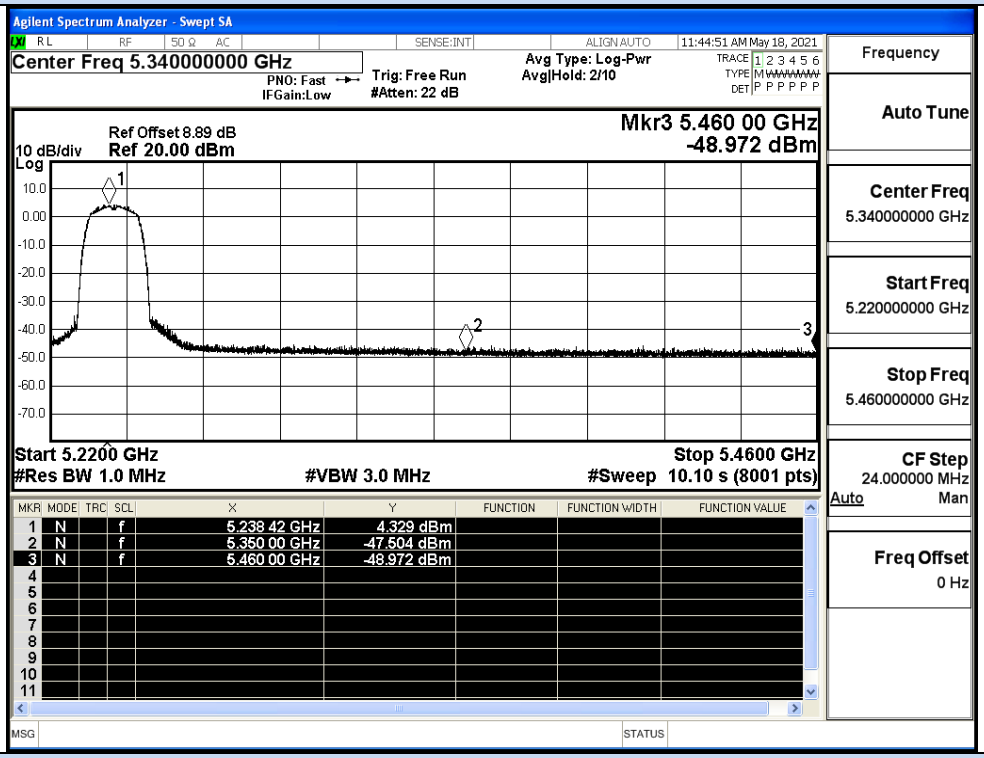



IEEE 802.11a / Channel 36 / 5180MHz / Peak

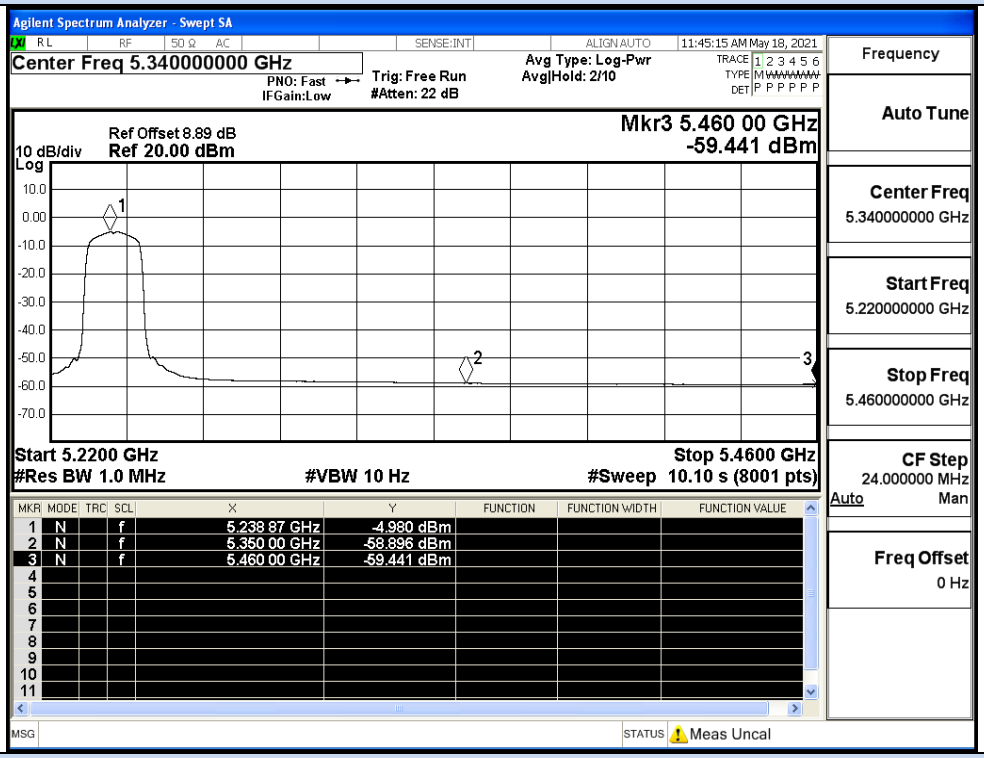



IEEE 802.11a / Channel 36 / 5180MHz / Average

Undesirable Emissions Measurement

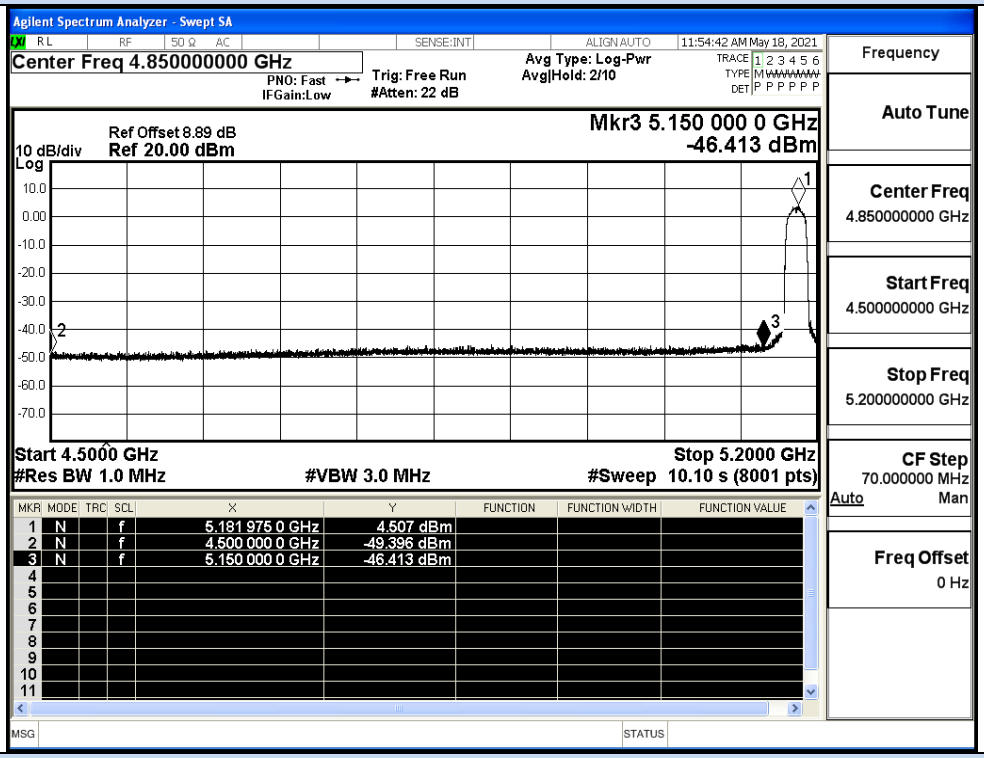



IEEE 802.11a / Channel 48 / 5240MHz / Peak

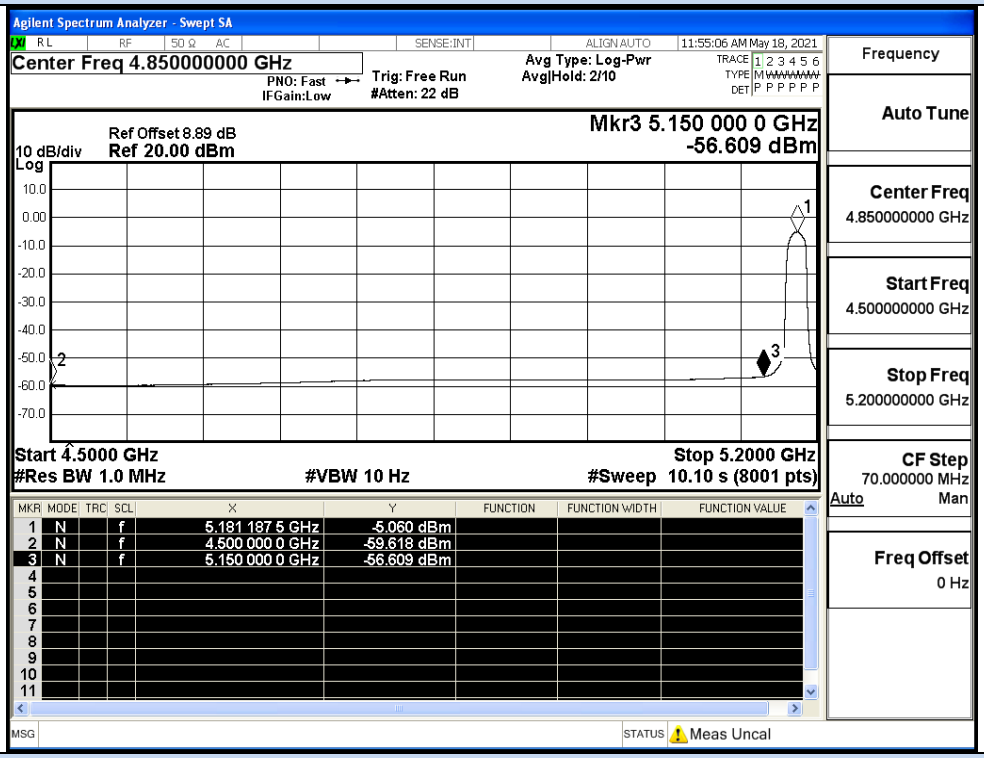



IEEE 802.11a / Channel 48 / 5240MHz / Average

## Undesirable Emissions Measurement

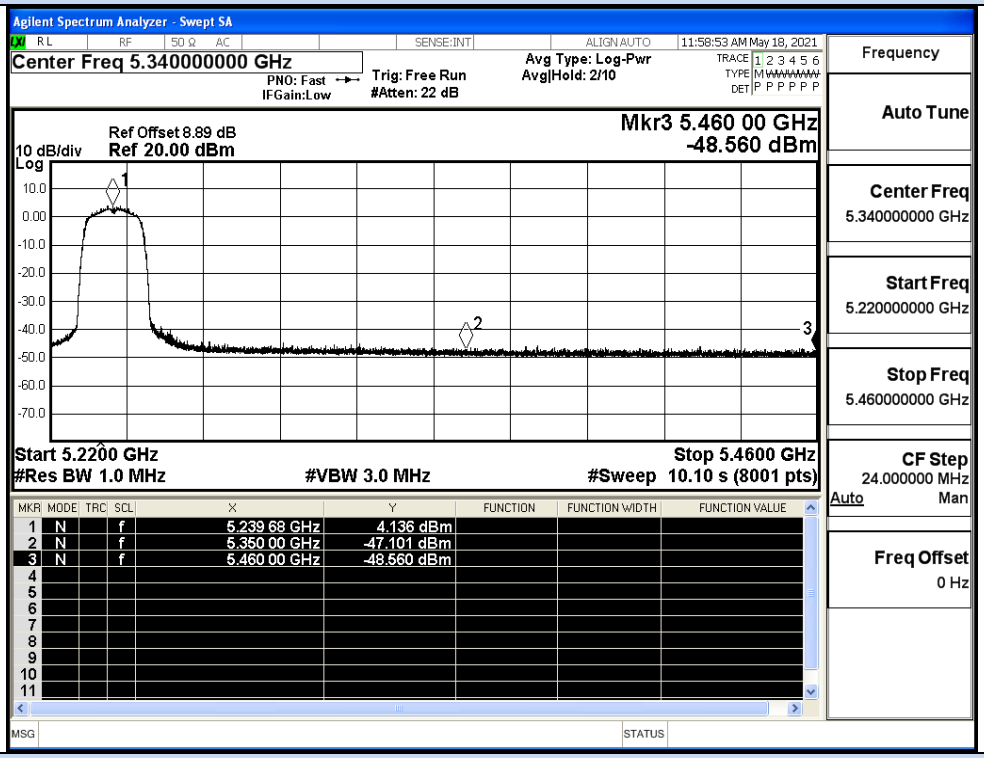



IEEE 802.11n20 / Channel 36 / 5180MHz / Peak

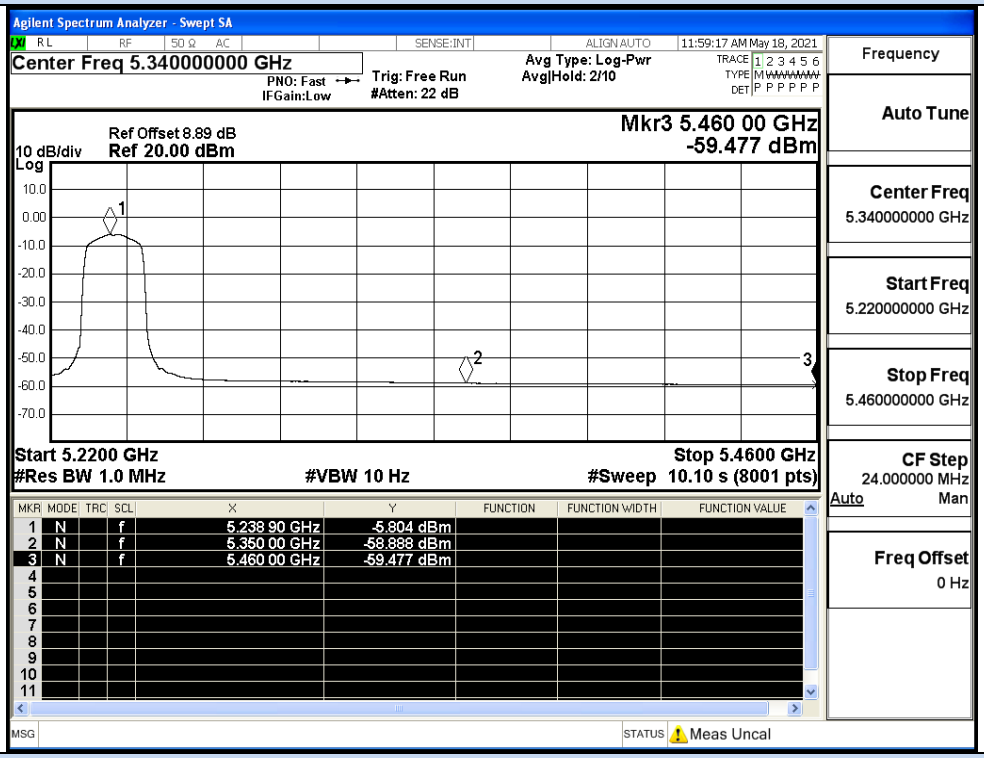



IEEE 802.11n20 / Channel 36 / 5180MHz / Average

Undesirable Emissions Measurement

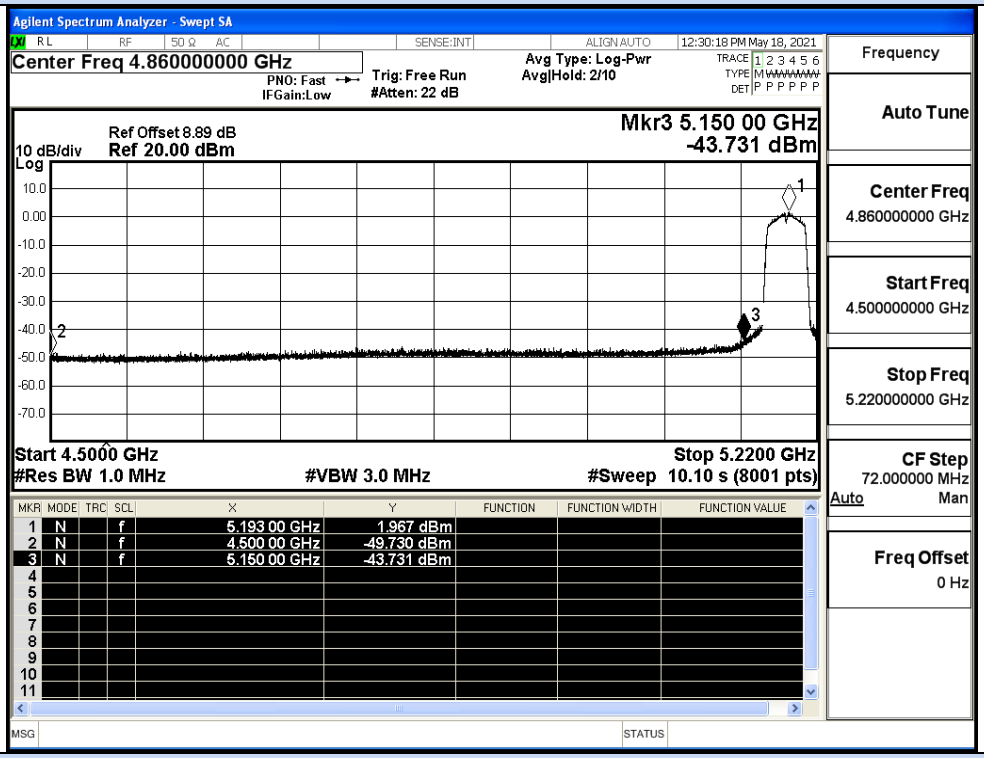



IEEE 802.11n20 / Channel 48 / 5240MHz / Peak

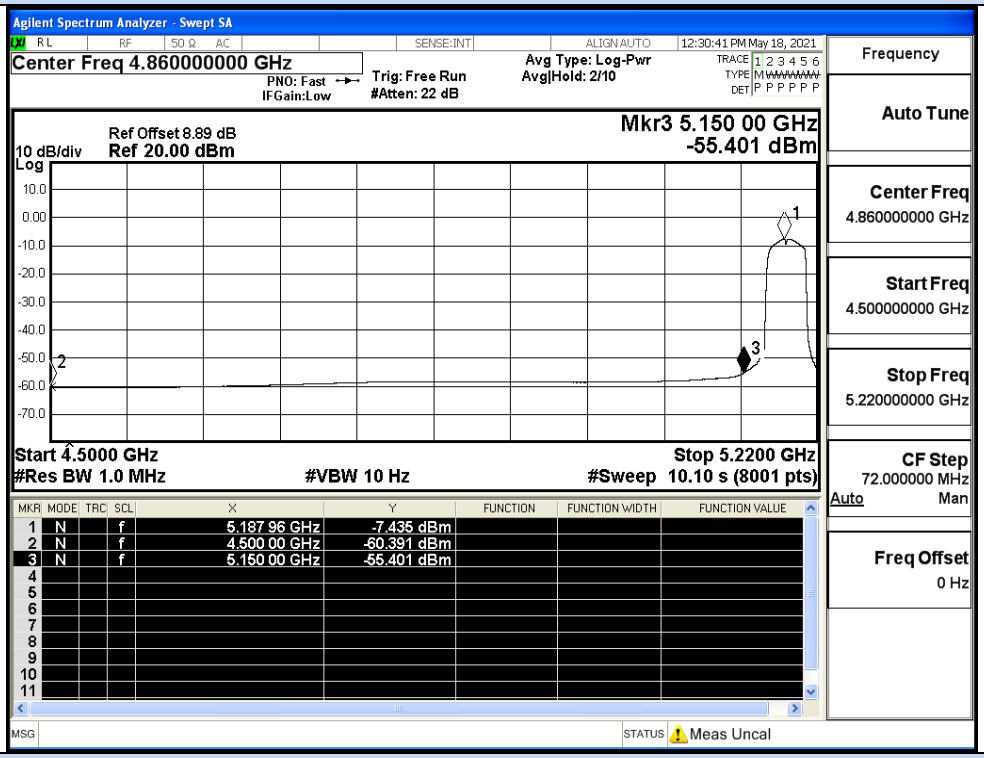



IEEE 802.11n20 / Channel 48 / 5240MHz / Average

Undesirable Emissions Measurement

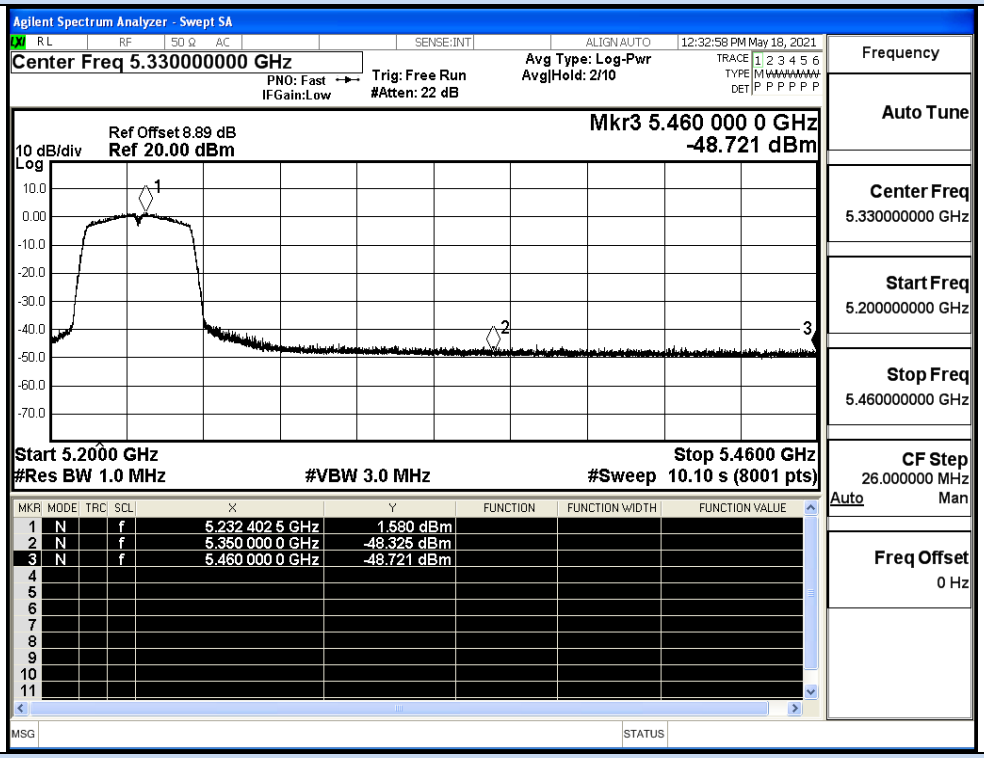



IEEE 802.11n40 / Channel 38 / 5190MHz / Peak

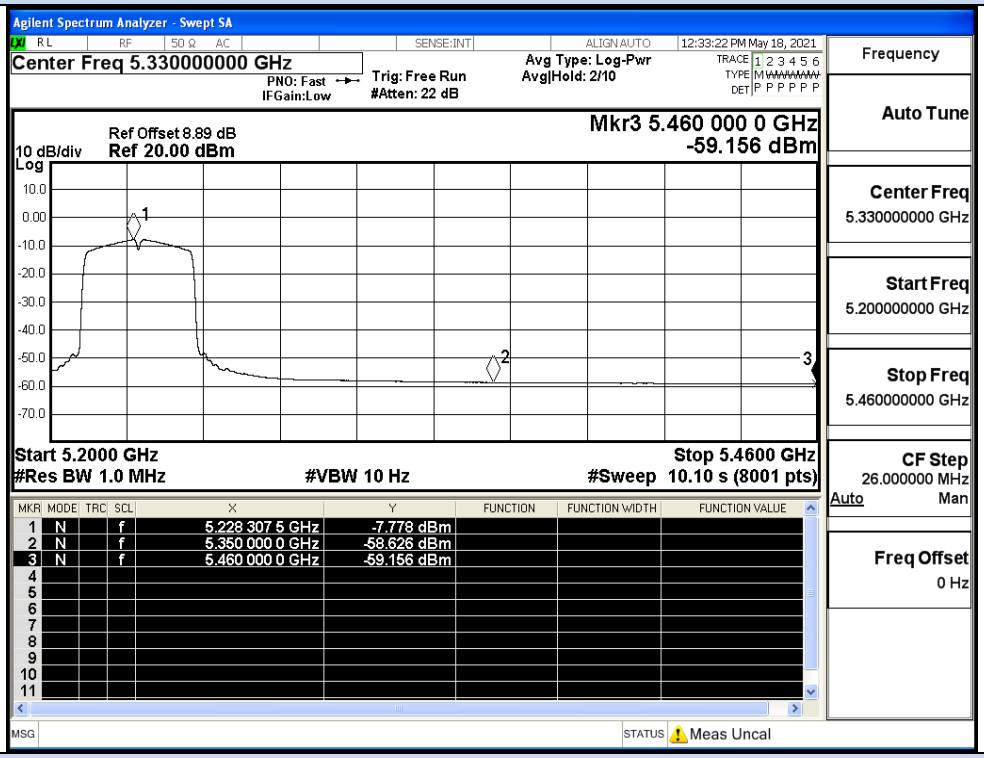



IEEE 802.11n40 / Channel 38 / 5190MHz / Average

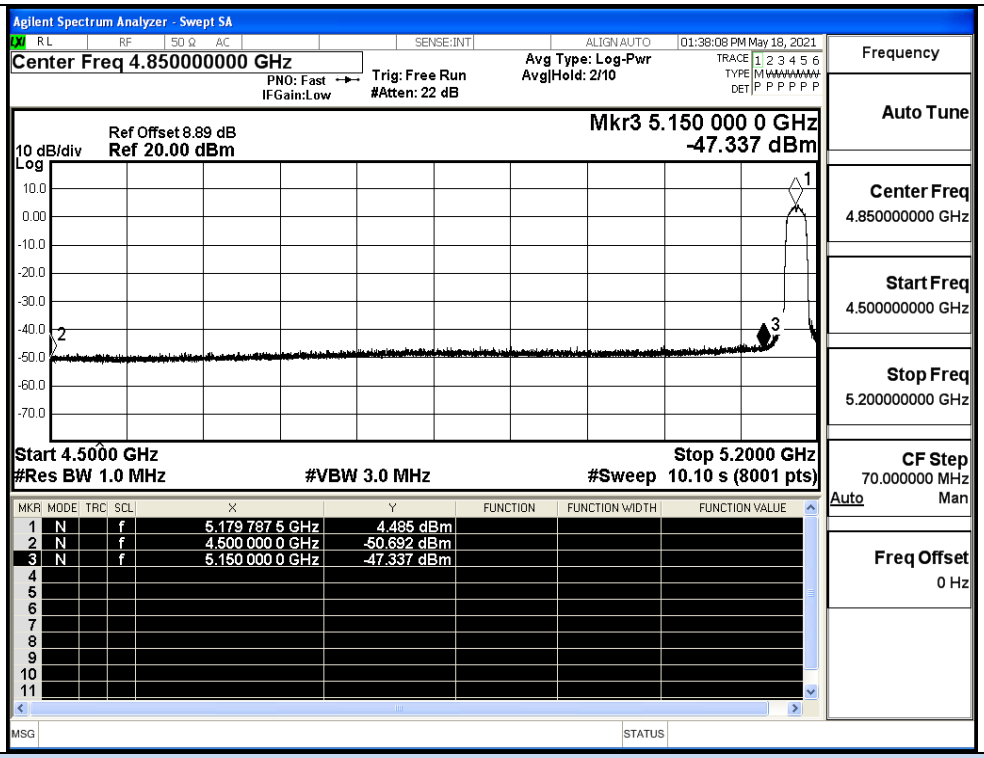
Undesirable Emissions Measurement



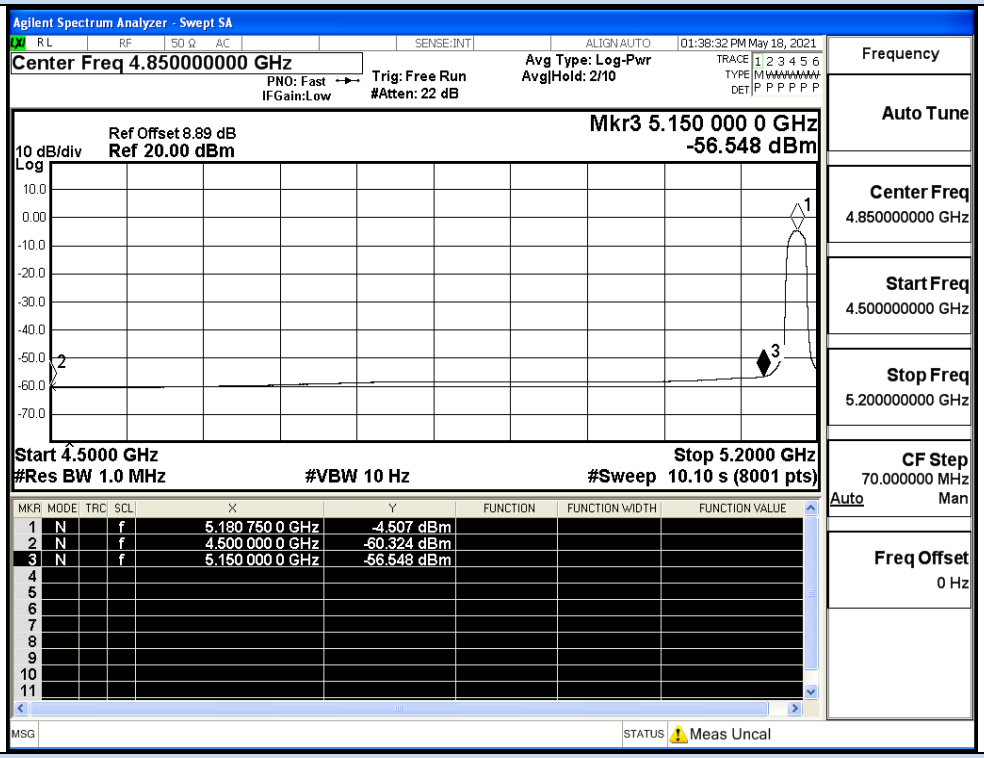

IEEE 802.11n40 / Channel 48 / 5230MHz / Peak



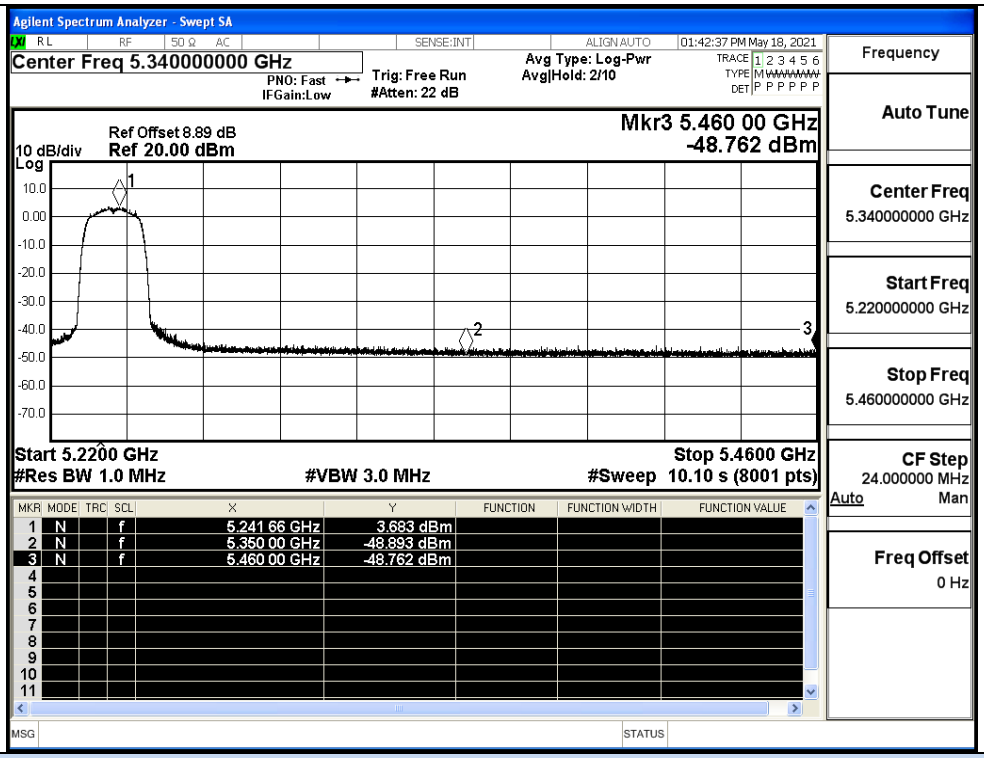

IEEE 802.11n40 / Channel 48 / 5230MHz / Average



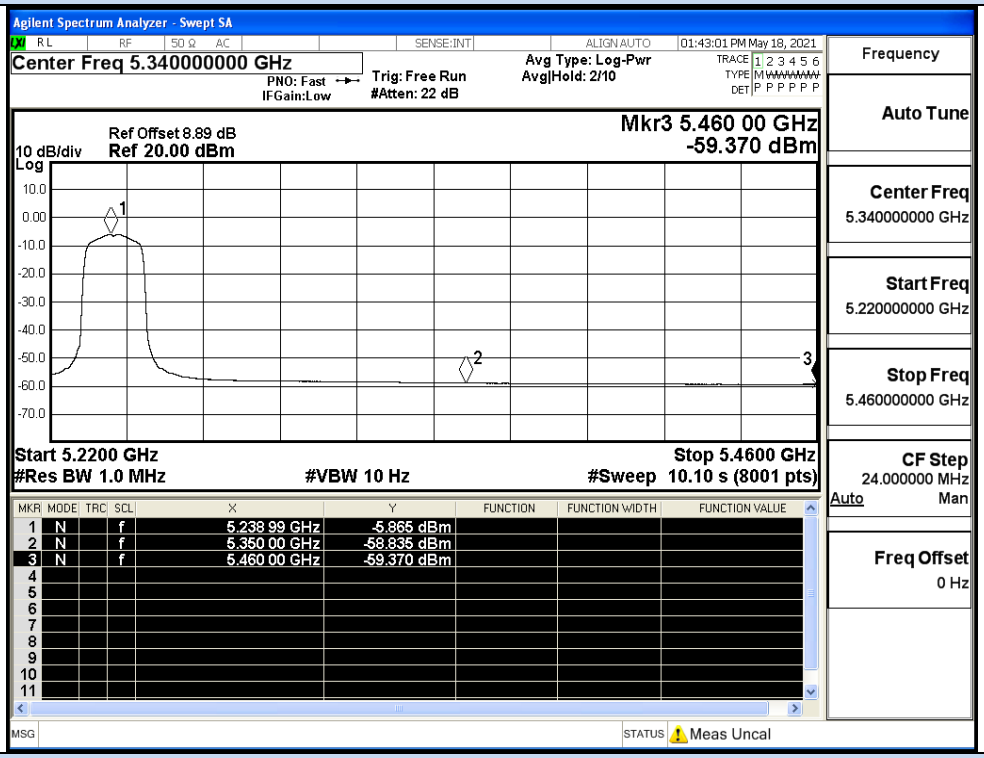

IEEE 802.11ac20 / Channel 36 / 5180MHz / Peak



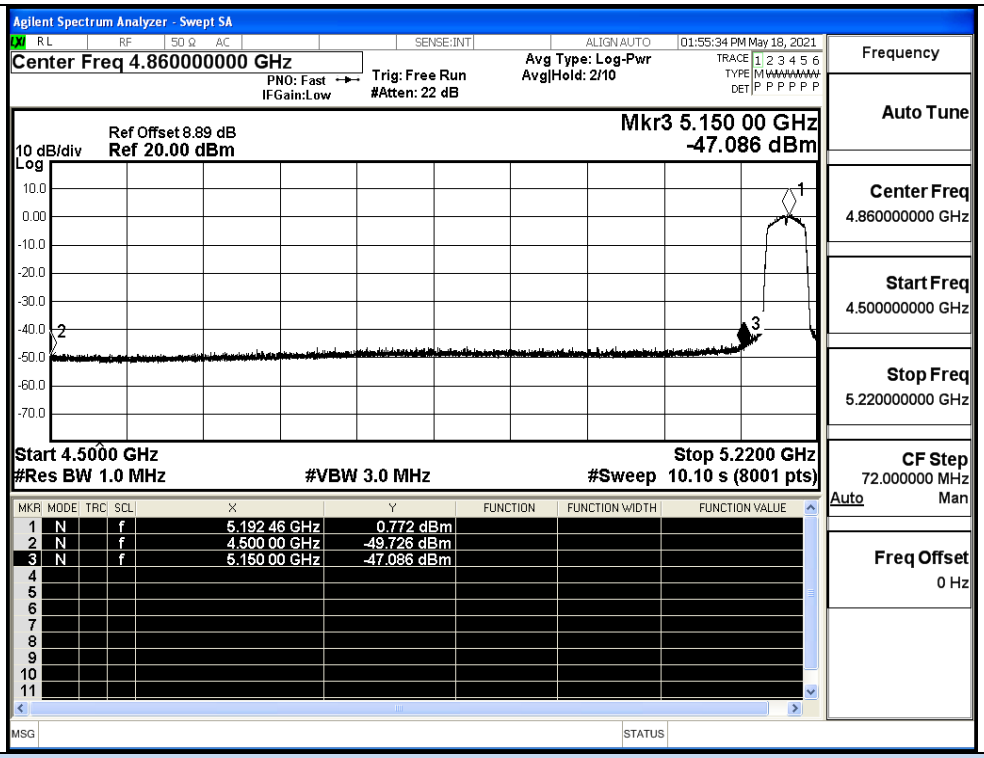

IEEE 802.11ac20 / Channel 36 / 5180MHz / Average



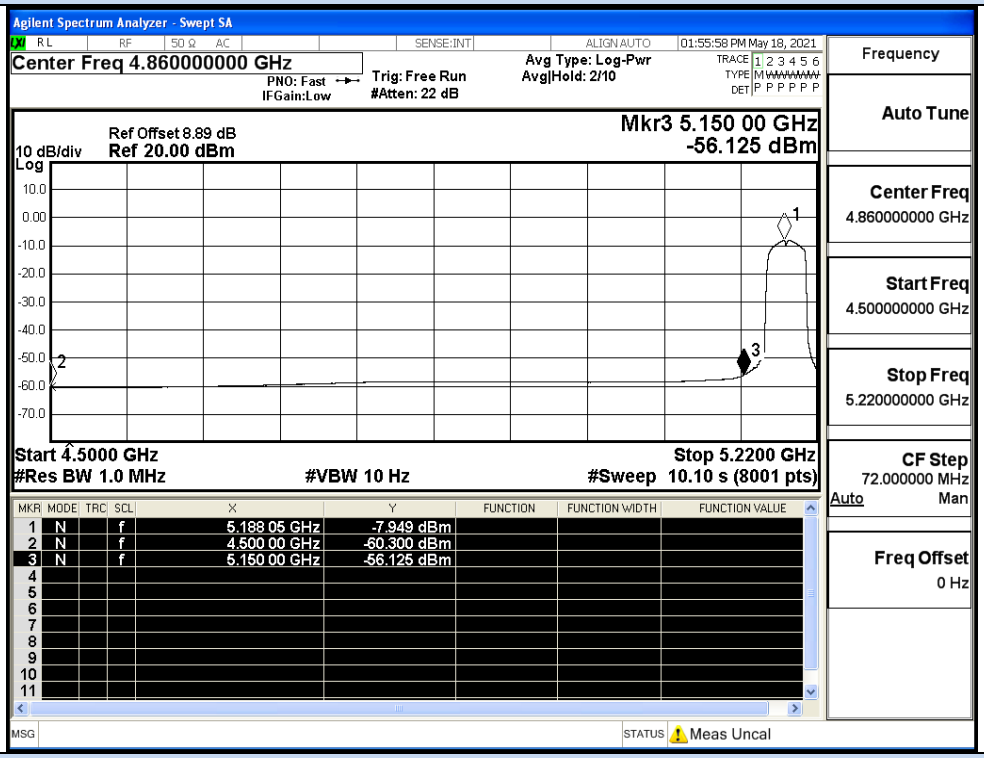

IEEE 802.11ac20 / Channel 48 / 5240MHz / Peak



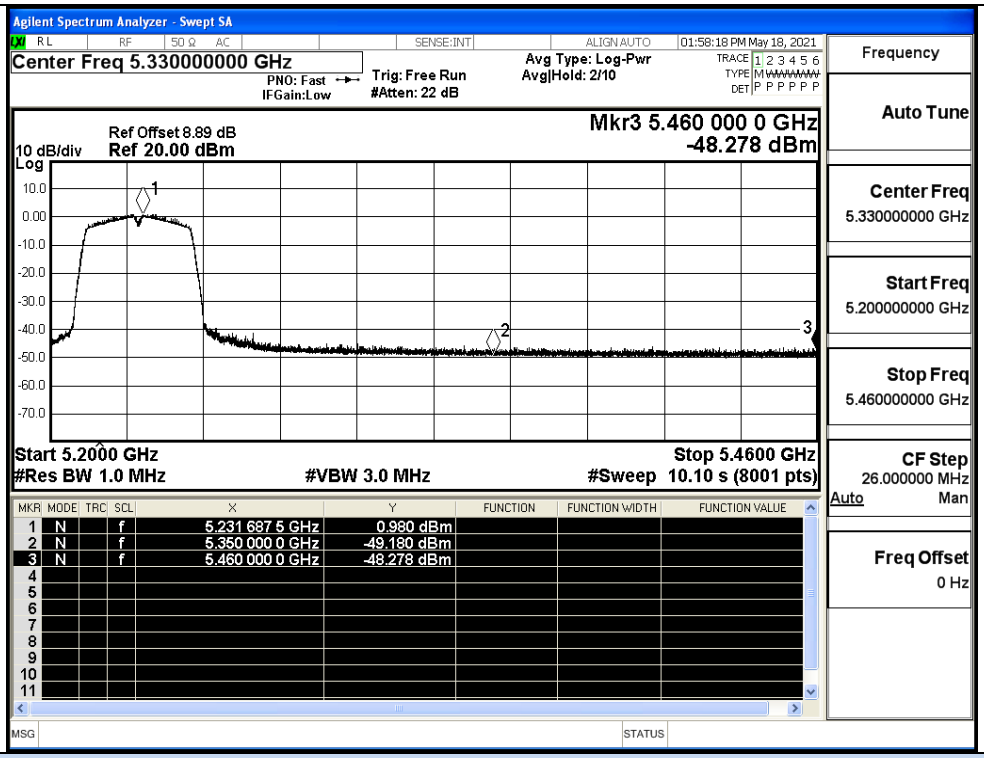

IEEE 802.11ac20 / Channel 48 / 5240MHz / Average



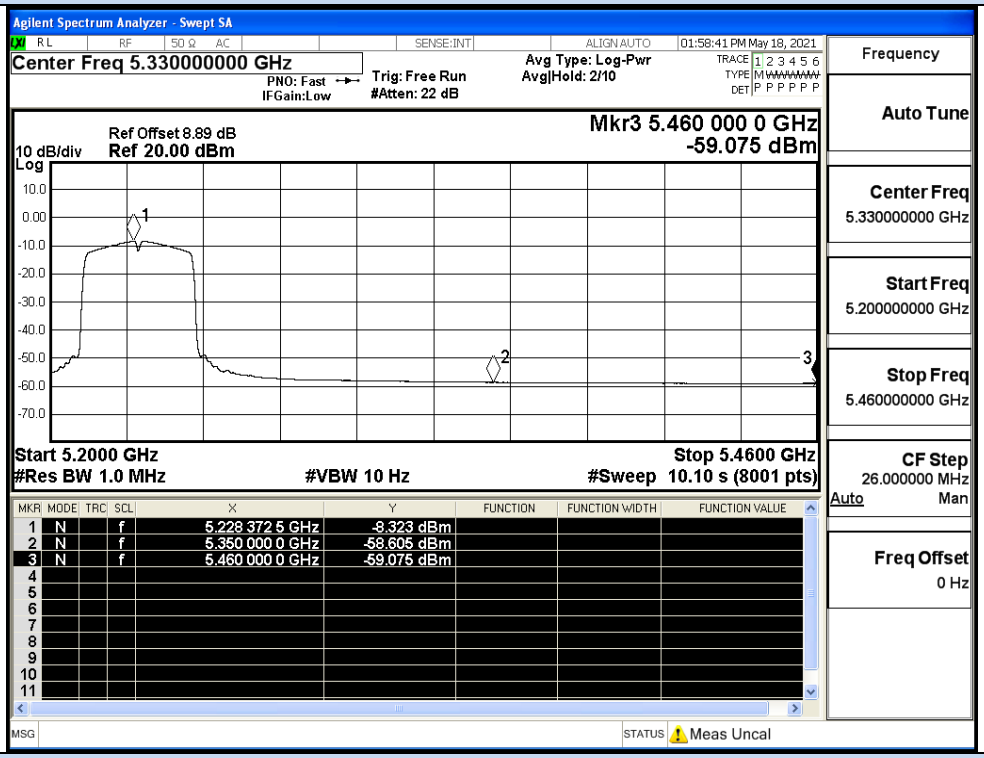

IEEE 802.11ac40 / Channel 38 / 5190MHz / Peak



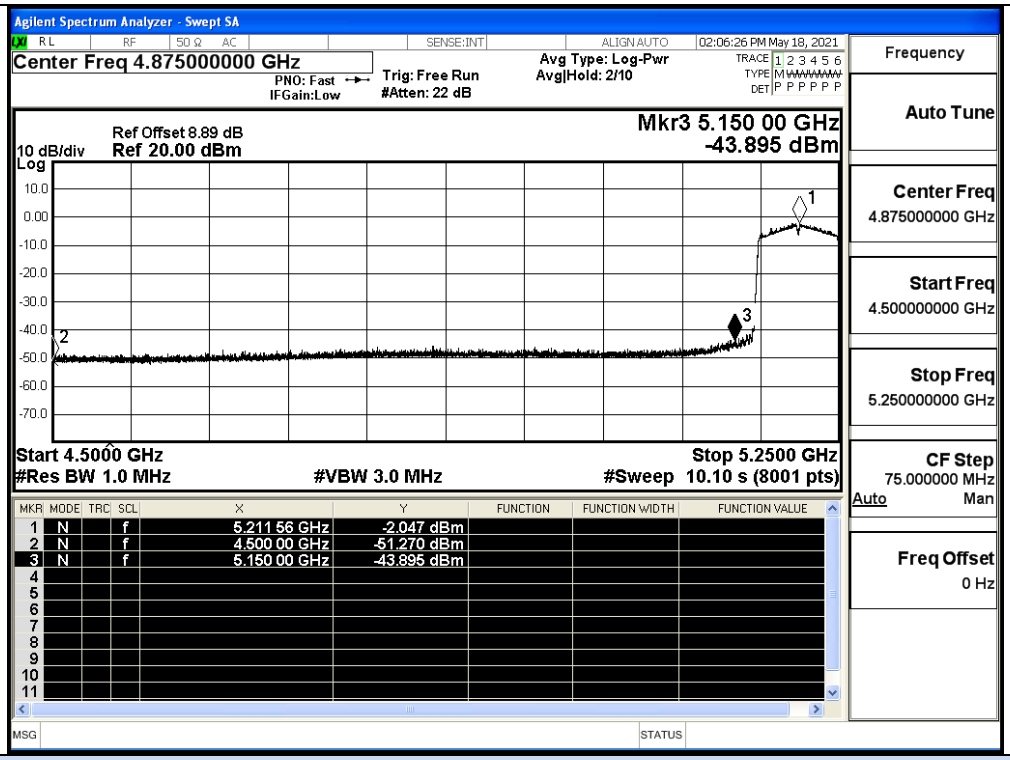

IEEE 802.11ac40 / Channel 38 / 5190MHz / Average



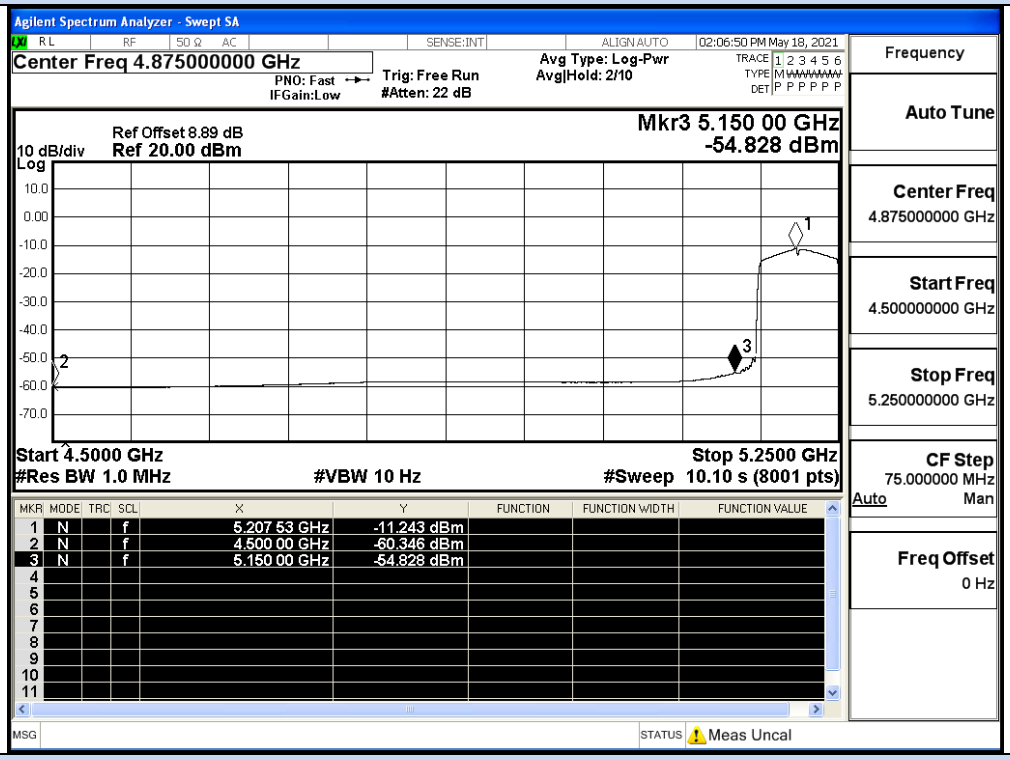

IEEE 802.11ac40 / Channel 48 / 5230MHz / Peak



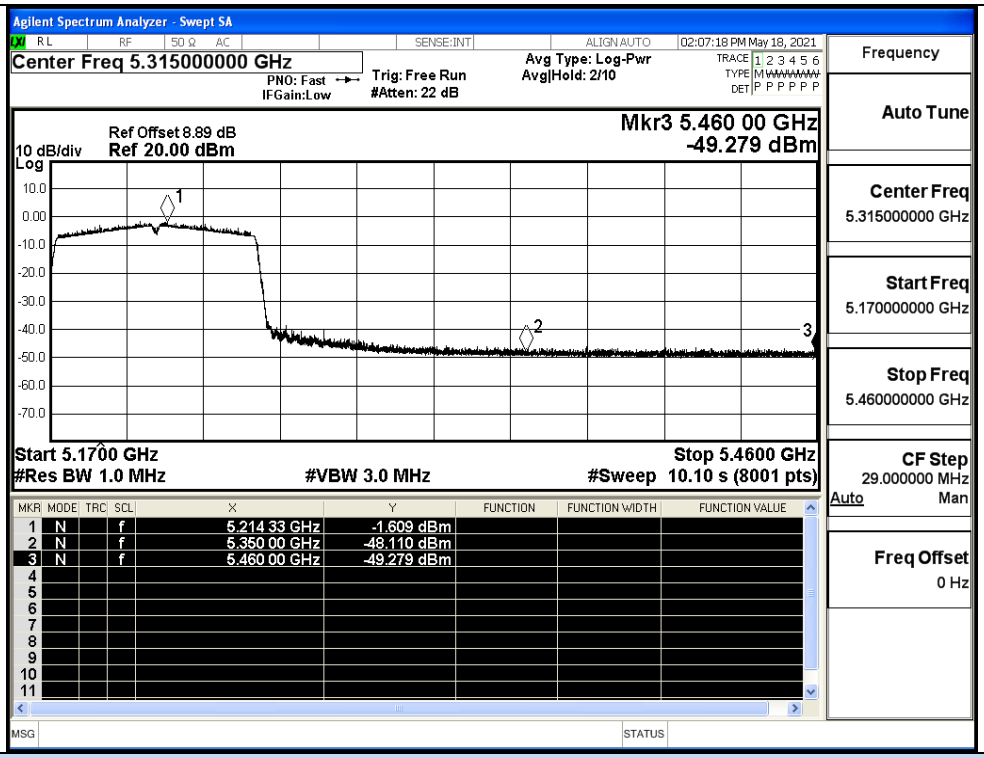

IEEE 802.11ac40 / Channel 48 / 5230MHz / Average



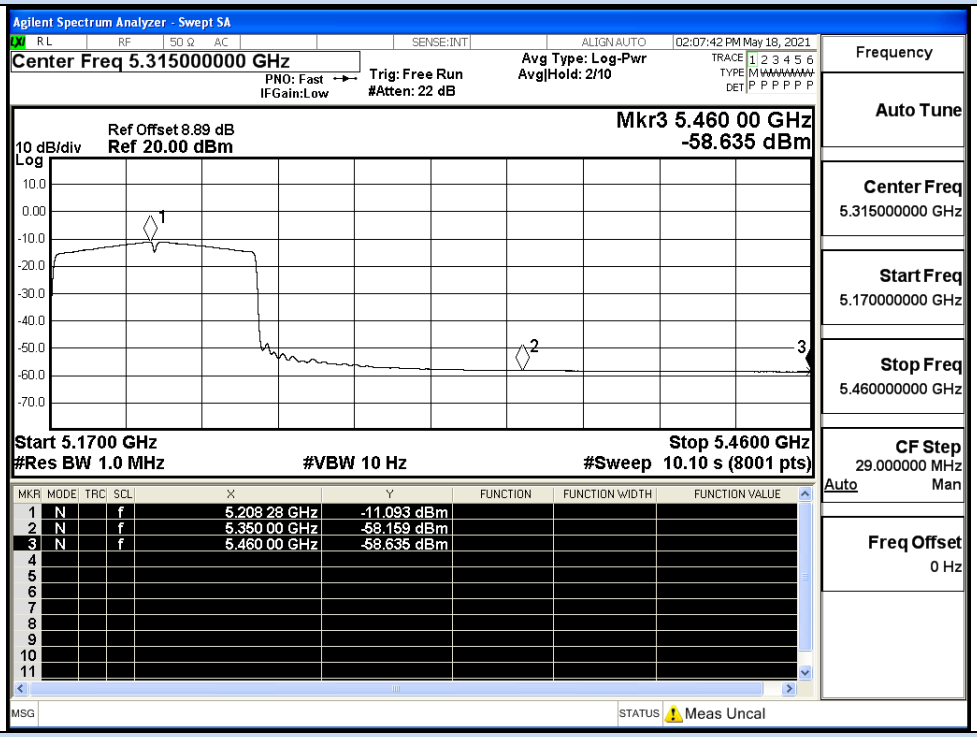

IEEE 802.11ac80 / Channel 42 / 5210MHz / Peak




IEEE 802.11ac80 / Channel 42 / 5210MHz / Average




IEEE 802.11ac80 / Channel 42/ 5210MHz / Peak

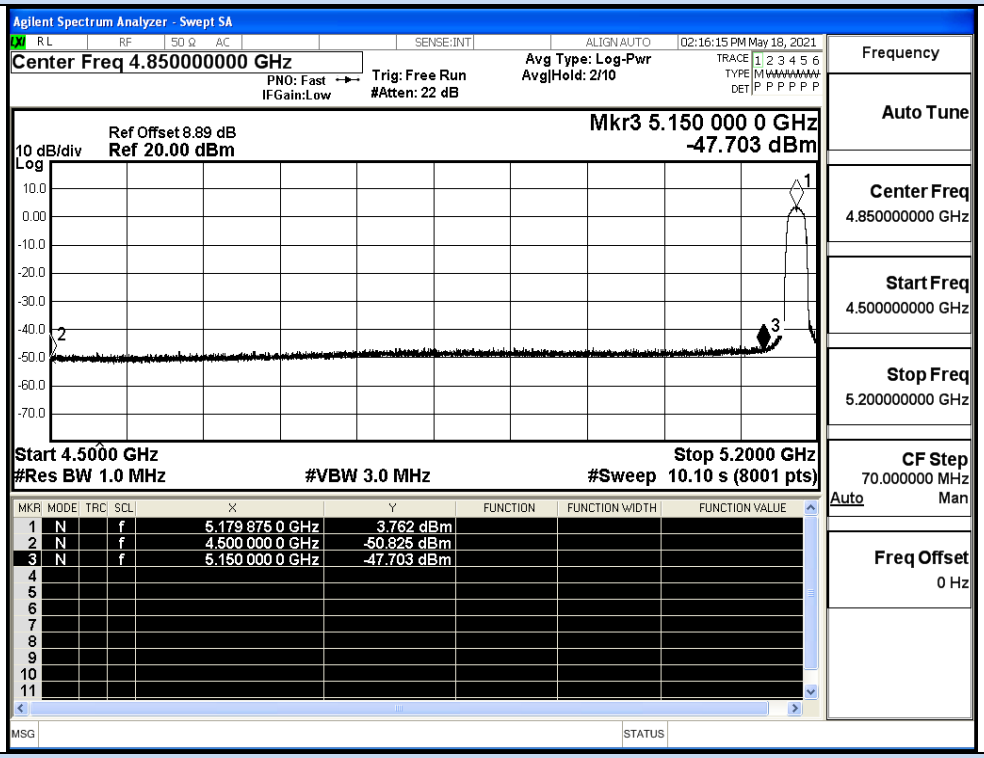



IEEE 802.11ac80 / Channel 42 / 5210MHz / Average

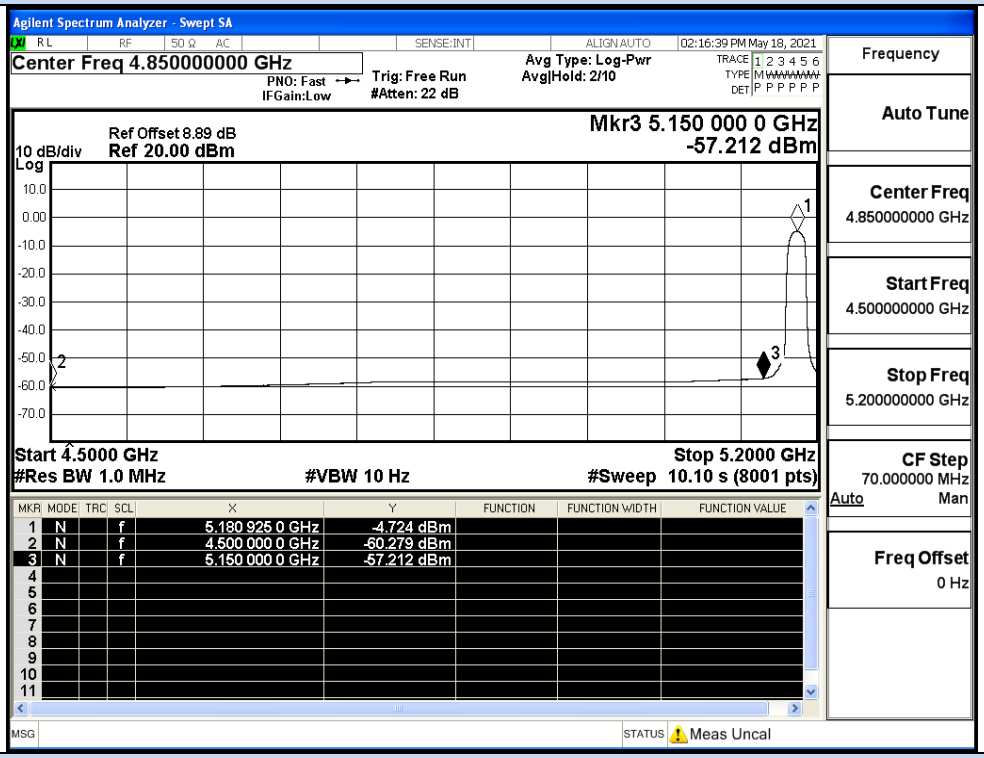
ANT1

| Test Mode | Channel | Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | Ground Reflection Factor (dB) | Covert Radiated E Level At 3m (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| 11A | 36 | 4500.0 | -50.83 | 3.0 | 0 | 47.40 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.28 | 3.0 | 0 | 37.95 | Average | 54.00 | Pass |
| | | 5150.0 | -47.70 | 3.0 | 0 | 50.53 | Peak | 68.20 | Pass |
| | | 5150.0 | -57.21 | 3.0 | 0 | 41.02 | Average | 54.00 | Pass |
| | 48 | 5350.0 | -47.92 | 3.0 | 0 | 50.31 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.82 | 3.0 | 0 | 39.41 | Average | 54.00 | Pass |
| | | 5460.0 | -48.74 | 3.0 | 0 | 49.49 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.39 | 3.0 | 0 | 38.84 | Average | 54.00 | Pass |
| 11N20 SISO | 36 | 4500.0 | -50.97 | 3.0 | 0 | 47.26 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.30 | 3.0 | 0 | 37.93 | Average | 54.00 | Pass |
| | | 5150.0 | -48.13 | 3.0 | 0 | 50.10 | Peak | 68.20 | Pass |
| | | 5150.0 | -57.17 | 3.0 | 0 | 41.06 | Average | 54.00 | Pass |
| | 48 | 5350.0 | -47.48 | 3.0 | 0 | 50.75 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.80 | 3.0 | 0 | 39.43 | Average | 54.00 | Pass |
| | | 5460.0 | -48.64 | 3.0 | 0 | 49.59 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.36 | 3.0 | 0 | 38.87 | Average | 54.00 | Pass |
| 11N40 SISO | 38 | 4500.0 | -50.33 | 3.0 | 0 | 47.90 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.32 | 3.0 | 0 | 37.91 | Average | 54.00 | Pass |
| | | 5150.0 | -45.30 | 3.0 | 0 | 52.93 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.18 | 3.0 | 0 | 42.05 | Average | 54.00 | Pass |
| | 46 | 5350.0 | -47.58 | 3.0 | 0 | 50.65 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.55 | 3.0 | 0 | 39.68 | Average | 54.00 | Pass |
| | | 5460.0 | -47.72 | 3.0 | 0 | 50.51 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.05 | 3.0 | 0 | 39.18 | Average | 54.00 | Pass |
| 11AC20 SISO | 36 | 4500.0 | -50.37 | 3.0 | 0 | 47.86 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.31 | 3.0 | 0 | 37.92 | Average | 54.00 | Pass |
| | | 5150.0 | -47.81 | 3.0 | 0 | 50.42 | Peak | 68.20 | Pass |
| | | 5150.0 | -57.05 | 3.0 | 0 | 41.18 | Average | 54.00 | Pass |
| | 48 | 4500.0 | -50.37 | 3.0 | 0 | 47.86 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.31 | 3.0 | 0 | 37.92 | Average | 54.00 | Pass |
| | | 5150.0 | -47.81 | 3.0 | 0 | 50.42 | Peak | 68.20 | Pass |
| | | 5150.0 | -57.05 | 3.0 | 0 | 41.18 | Average | 54.00 | Pass |
| 11AC40 SISO | 38 | 4500.0 | -48.86 | 3.0 | 0 | 49.37 | Peak | 68.20 | Pass |
| | | 4500.0 | -59.59 | 3.0 | 0 | 38.64 | Average | 54.00 | Pass |
| | | 5150.0 | -44.91 | 3.0 | 0 | 53.32 | Peak | 68.20 | Pass |
| | | 5150.0 | -55.73 | 3.0 | 0 | 42.50 | Average | 54.00 | Pass |
| | 46 | 5350.0 | -49.25 | 3.0 | 0 | 48.98 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.60 | 3.0 | 0 | 39.63 | Average | 54.00 | Pass |
| | | 5460.0 | -47.31 | 3.0 | 0 | 50.92 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.12 | 3.0 | 0 | 39.11 | Average | 54.00 | Pass |
| 11AC80 SISO | 42 | 4500.0 | -49.16 | 3.0 | 0 | 49.07 | Peak | 68.20 | Pass |
| | | 4500.0 | -58.14 | 3.0 | 0 | 40.09 | Average | 54.00 | Pass |
| | | 5150.0 | -48.72 | 3.0 | 0 | 49.51 | Peak | 68.20 | Pass |
| | | 5150.0 | -58.65 | 3.0 | 0 | 39.58 | Average | 54.00 | Pass |
| | | 5350.0 | -49.16 | 3.0 | 0 | 49.07 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.14 | 3.0 | 0 | 40.09 | Average | 54.00 | Pass |
| | | 5460.0 | -48.72 | 3.0 | 0 | 49.51 | Peak | 68.20 | Pass |
| | | 5460.0 | -58.65 | 3.0 | 0 | 39.58 | Average | 54.00 | Pass |

Undesirable Emissions Measurement

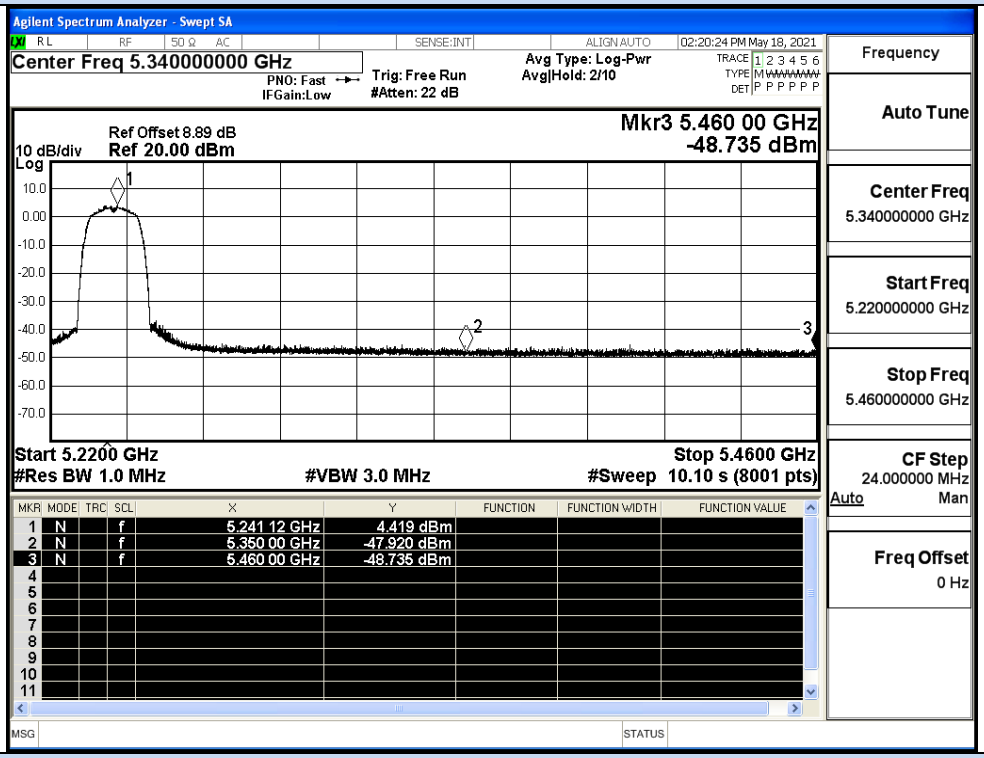



IEEE 802.11a / Channel 36 / 5180MHz / Peak

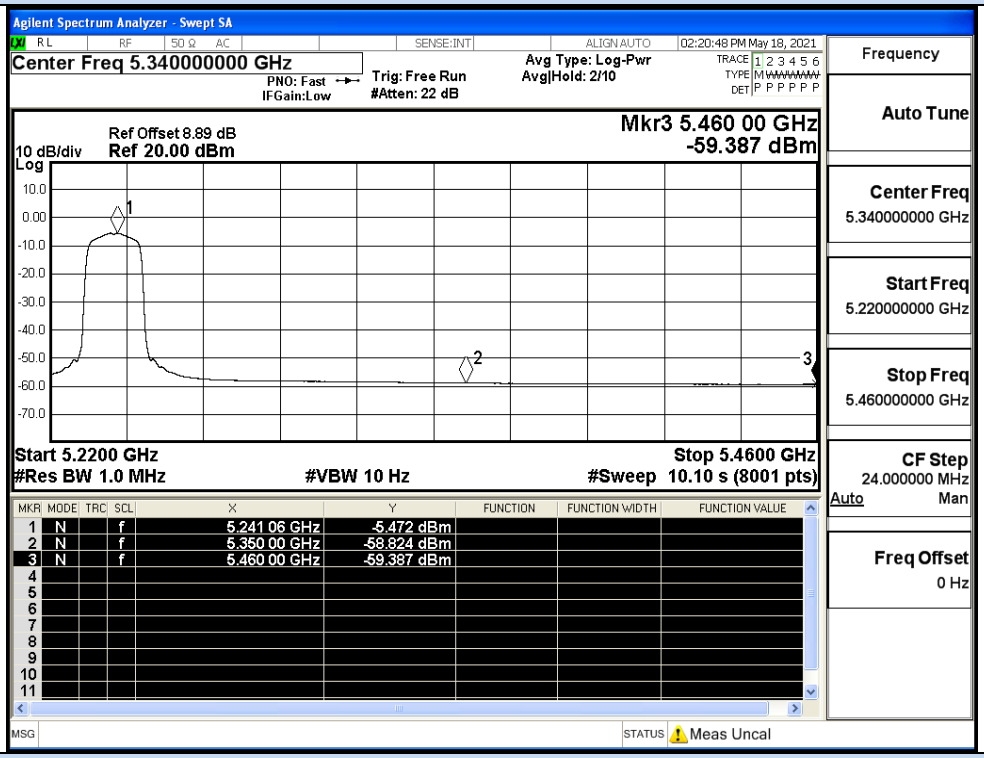



IEEE 802.11a / Channel 36 / 5180MHz / Average

Undesirable Emissions Measurement

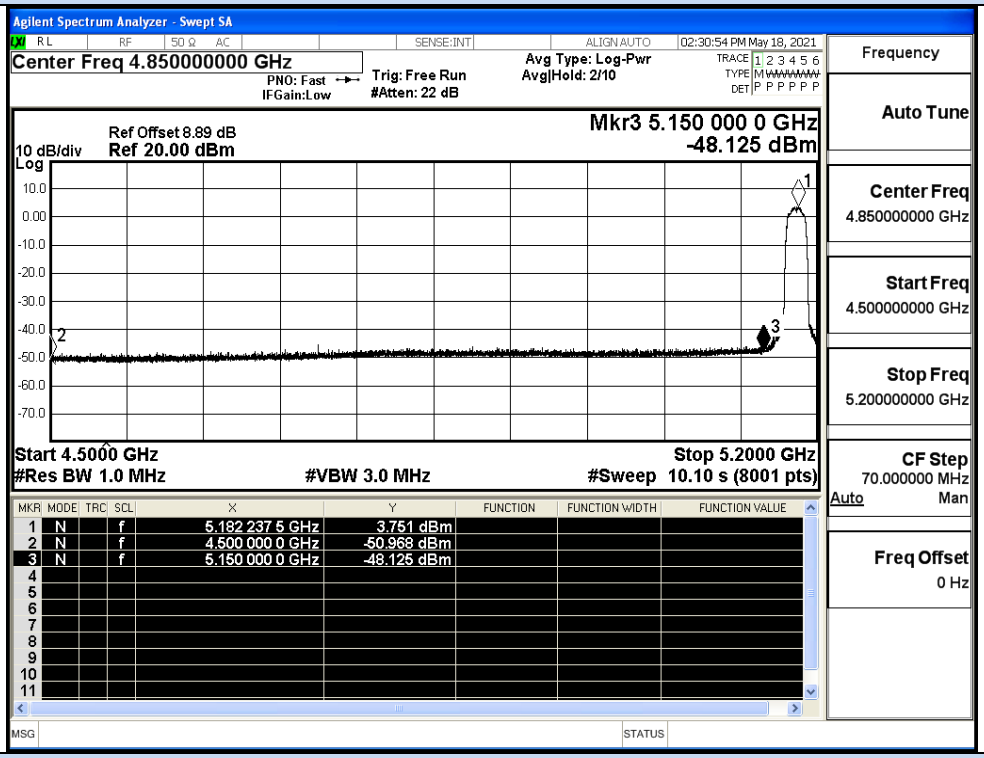



IEEE 802.11a / Channel 48 / 5240MHz / Peak

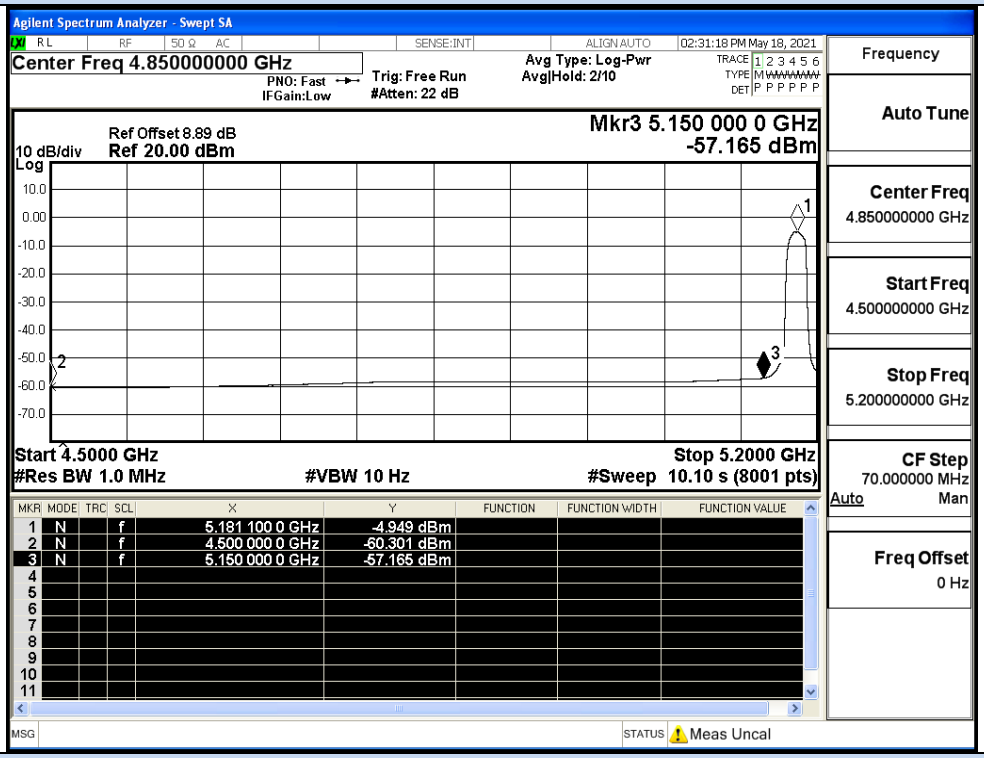



IEEE 802.11a / Channel 48 / 5240MHz / Average

Undesirable Emissions Measurement

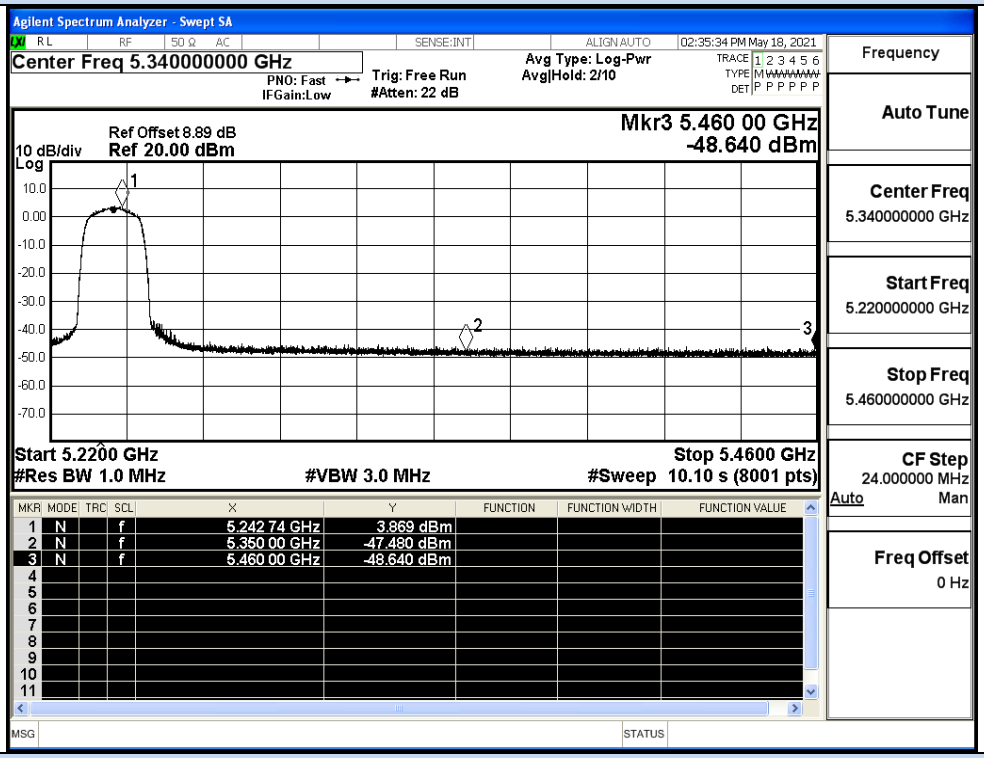



IEEE 802.11n20 / Channel 36 / 5180MHz / Peak

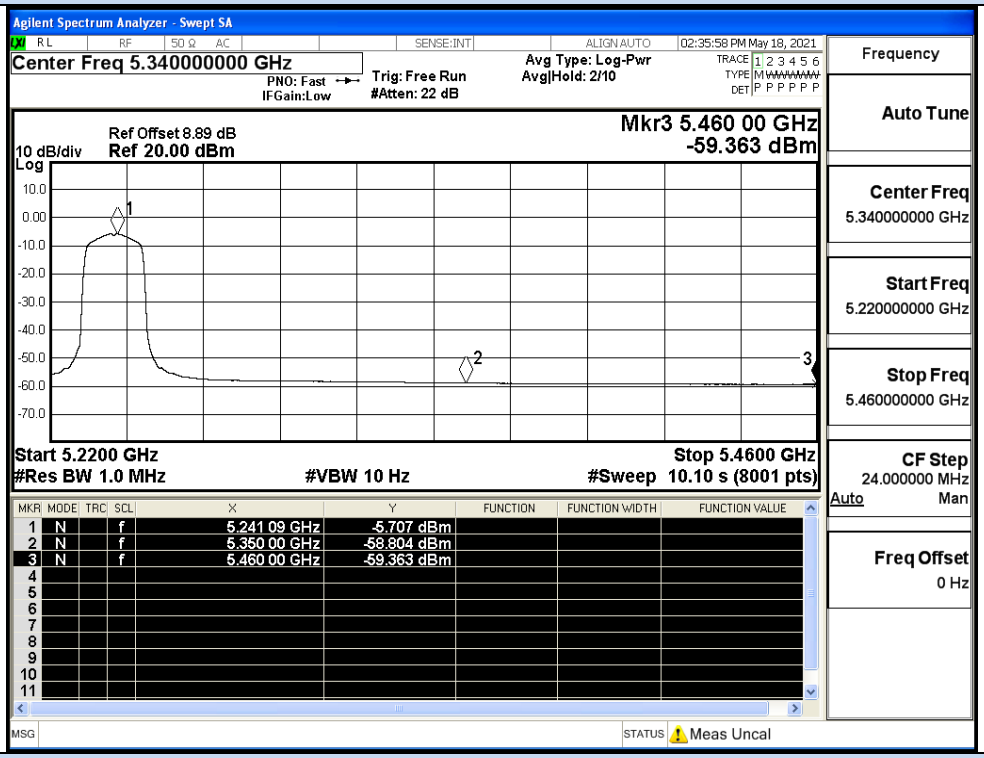



IEEE 802.11n20 / Channel 36 / 5180MHz / Average

Undesirable Emissions Measurement

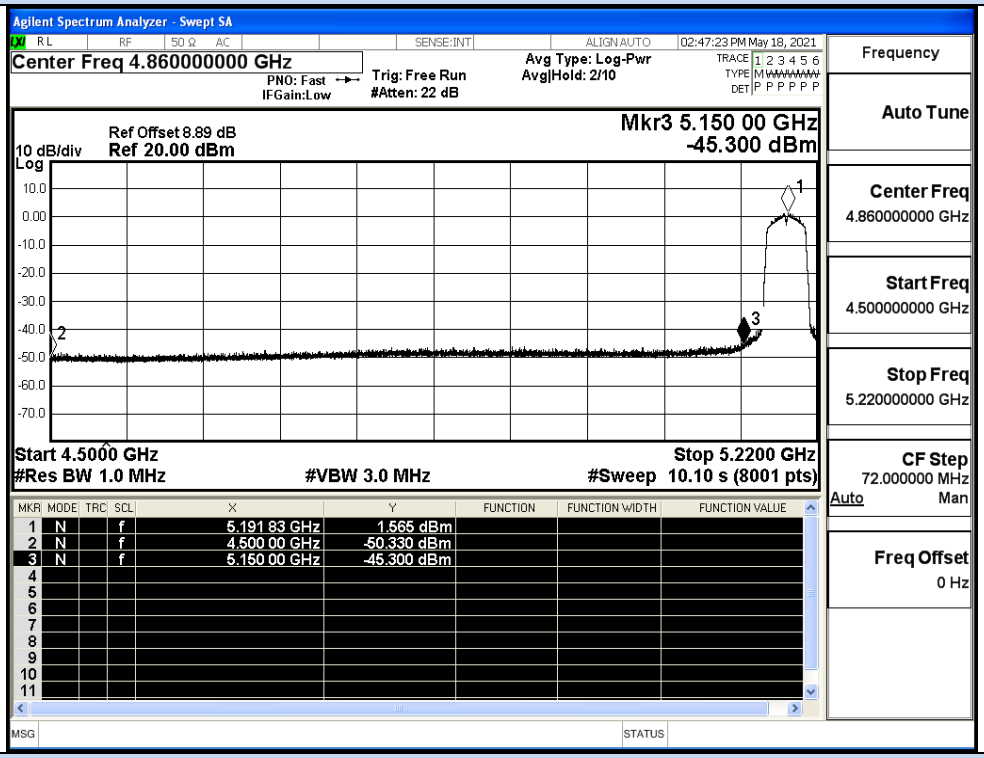



IEEE 802.11n20 / Channel 48 / 5240MHz / Peak

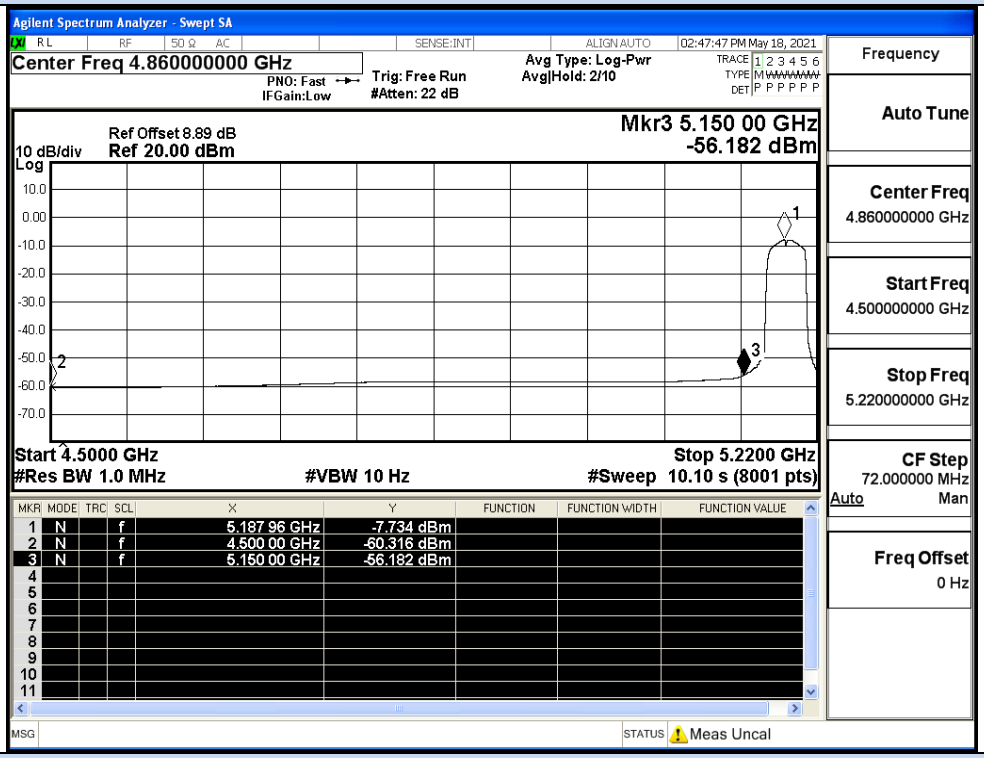



IEEE 802.11n20 / Channel 48 / 5240MHz / Average

Undesirable Emissions Measurement

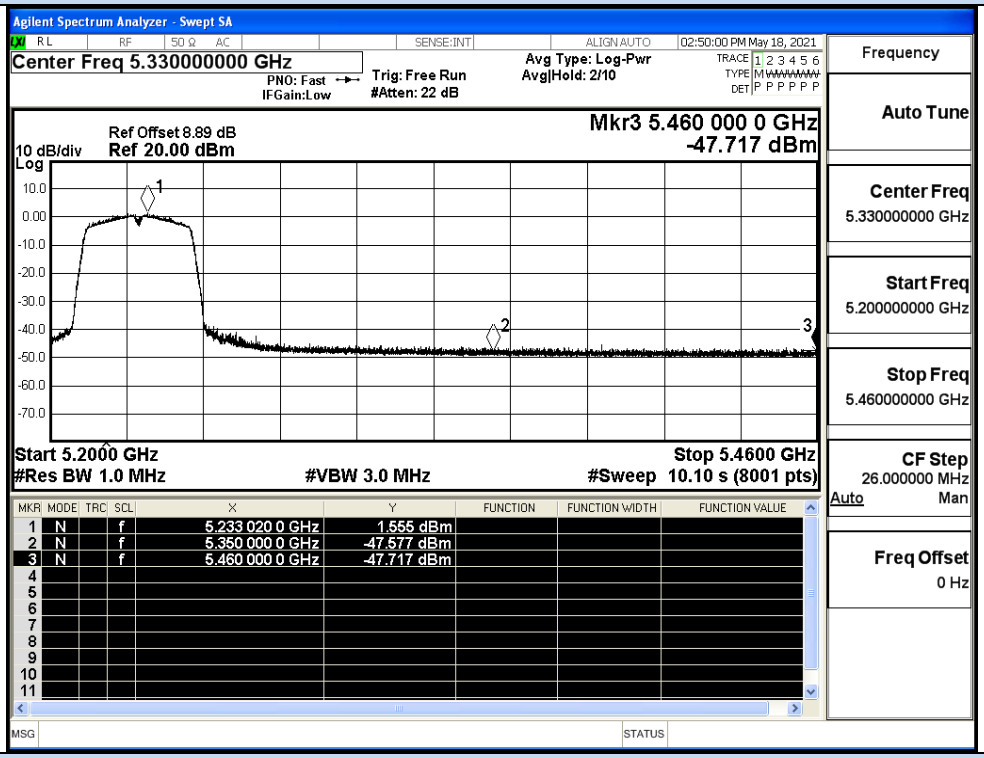



IEEE 802.11n40 / Channel 38 / 5190MHz / Peak

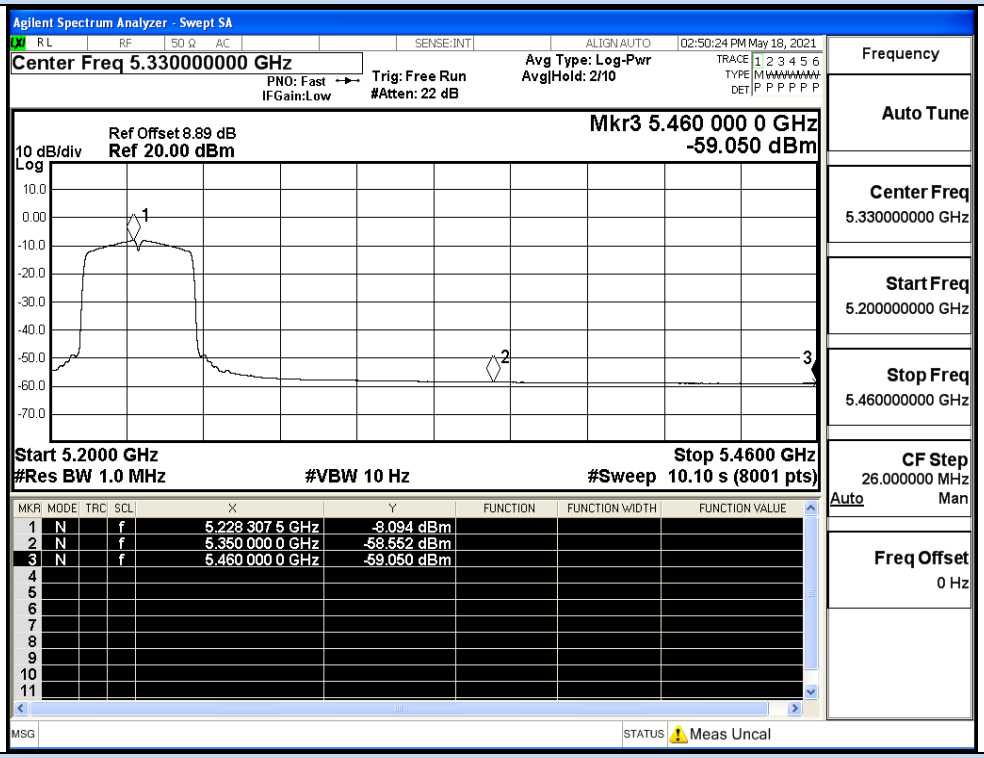



IEEE 802.11n40 / Channel 38 / 5190MHz / Average

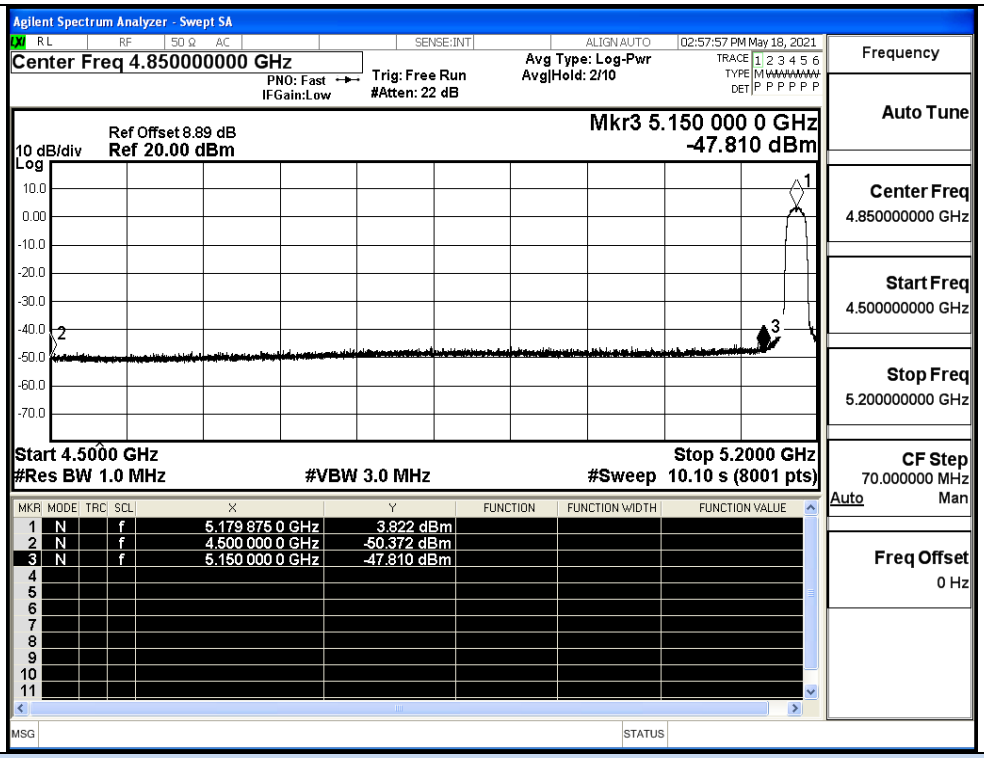
Undesirable Emissions Measurement



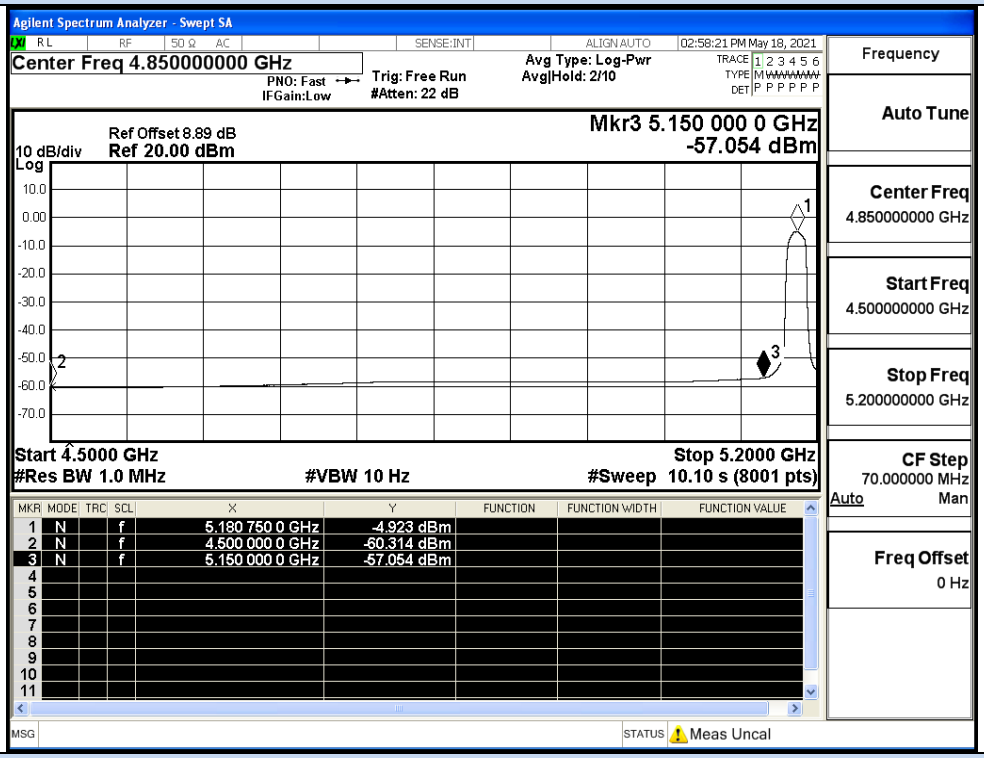

IEEE 802.11n40 / Channel 48 / 5230MHz / Peak



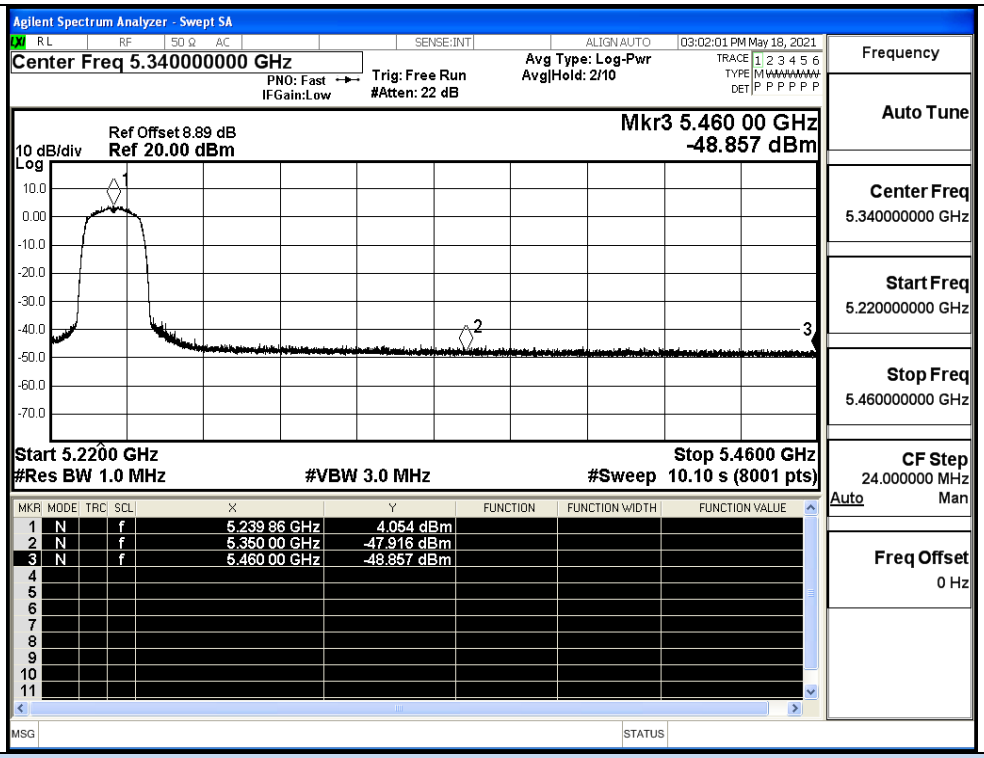

IEEE 802.11n40 / Channel 48 / 5230MHz / Average



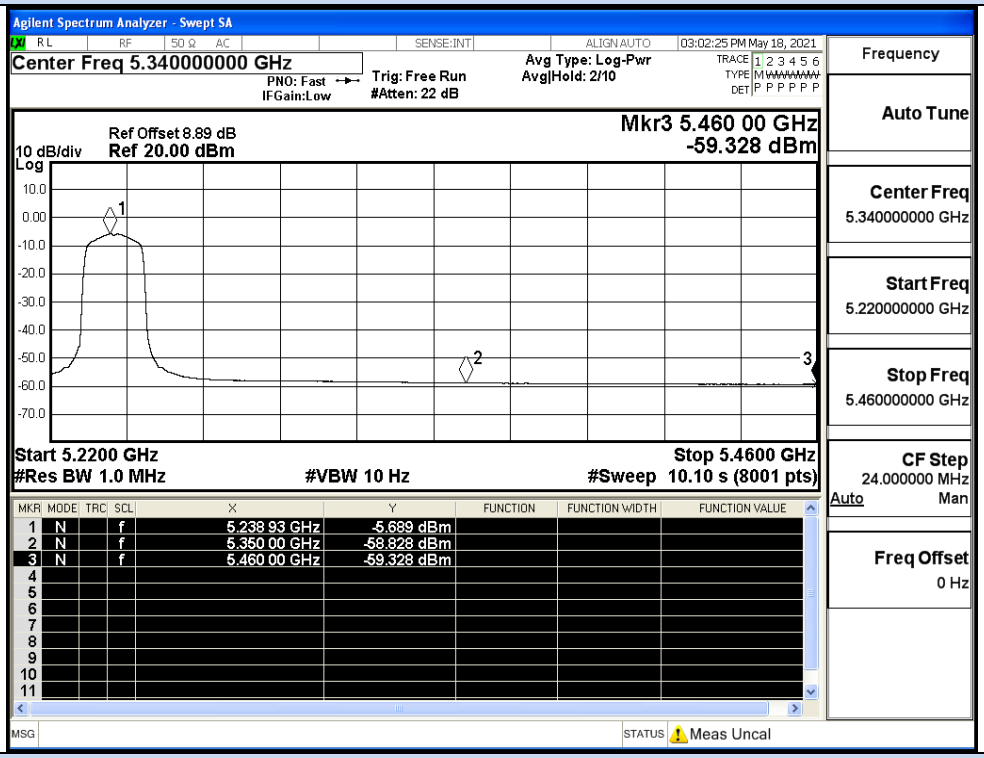

IEEE 802.11ac20 / Channel 36 / 5180MHz / Peak



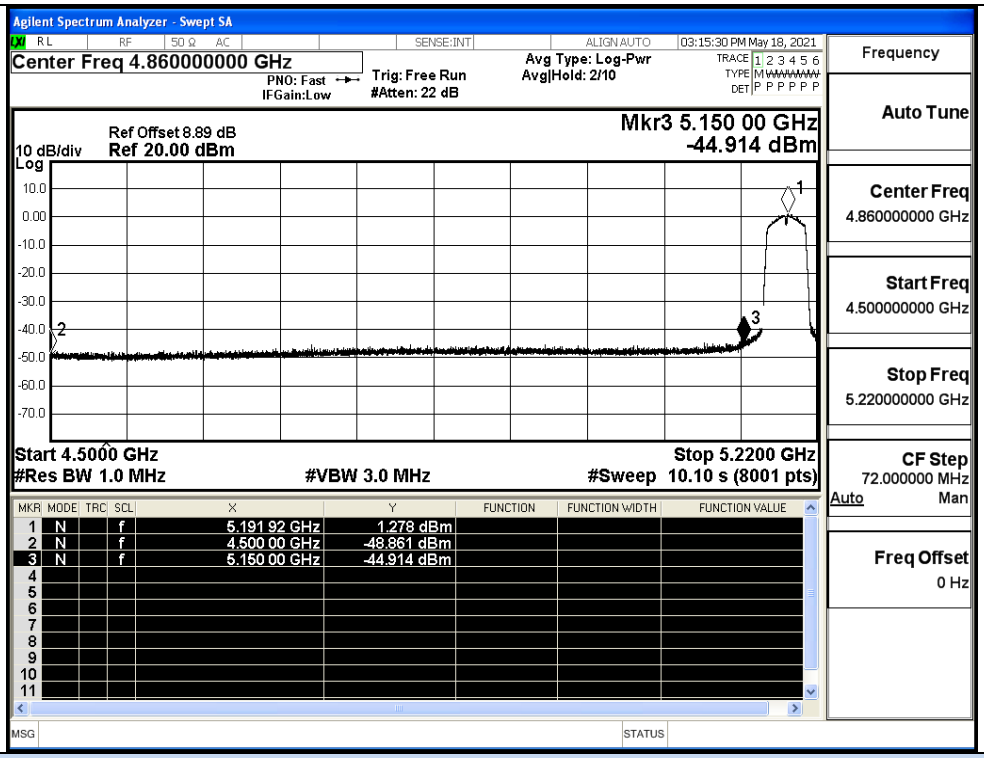

IEEE 802.11ac20 / Channel 36 / 5180MHz / Average



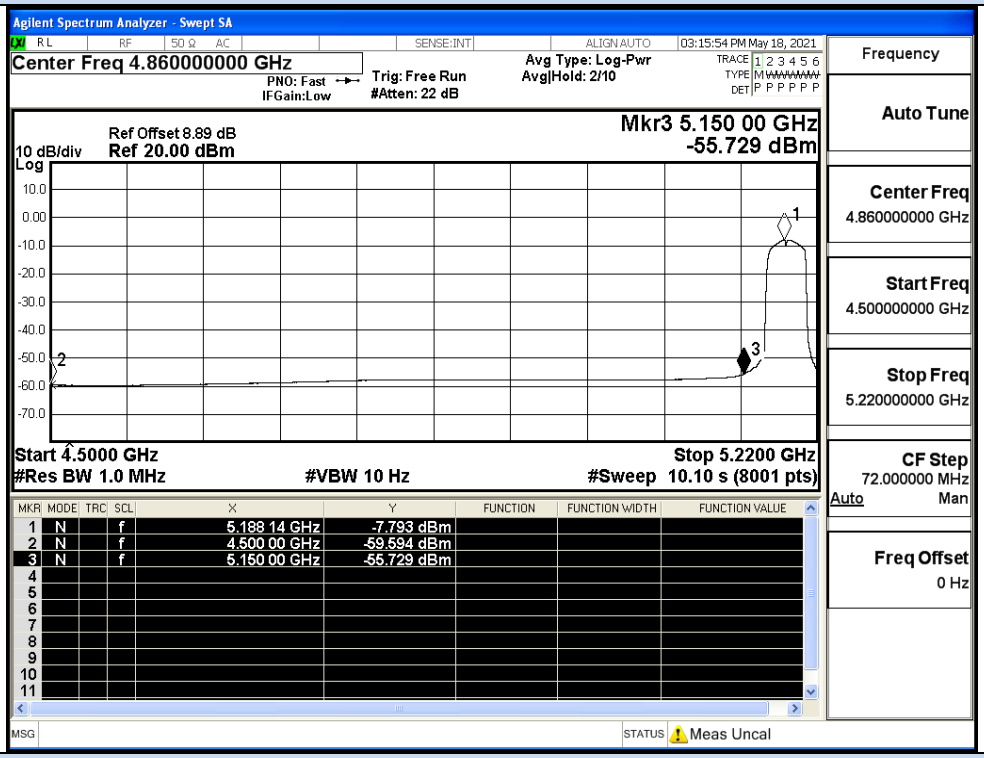

IEEE 802.11ac20 / Channel 48 / 5240MHz / Peak



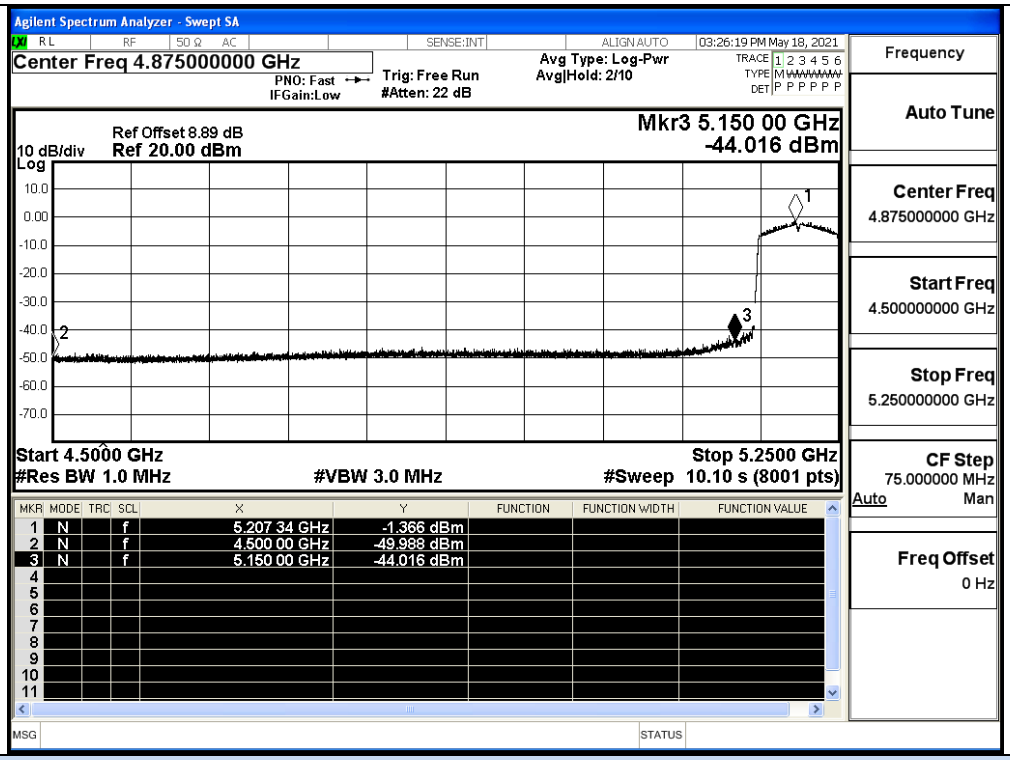

IEEE 802.11ac20 / Channel 48 / 5240MHz / Average



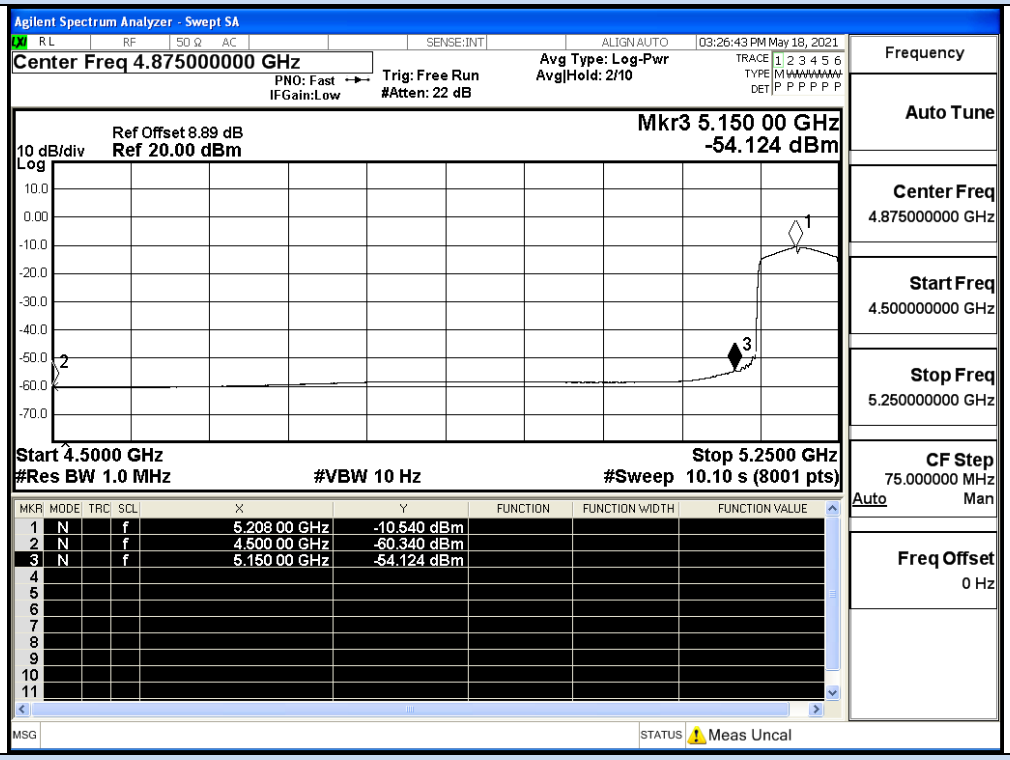

IEEE 802.11ac40 / Channel 38 / 5190MHz / Peak



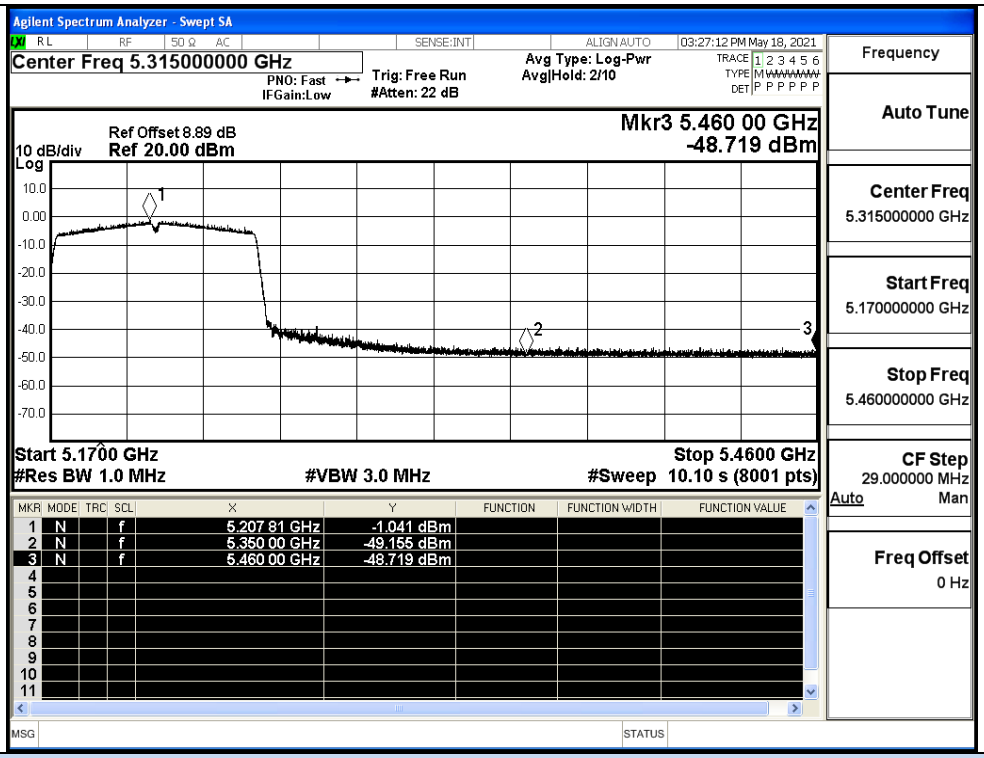

IEEE 802.11ac40 / Channel 38 / 5190MHz / Average



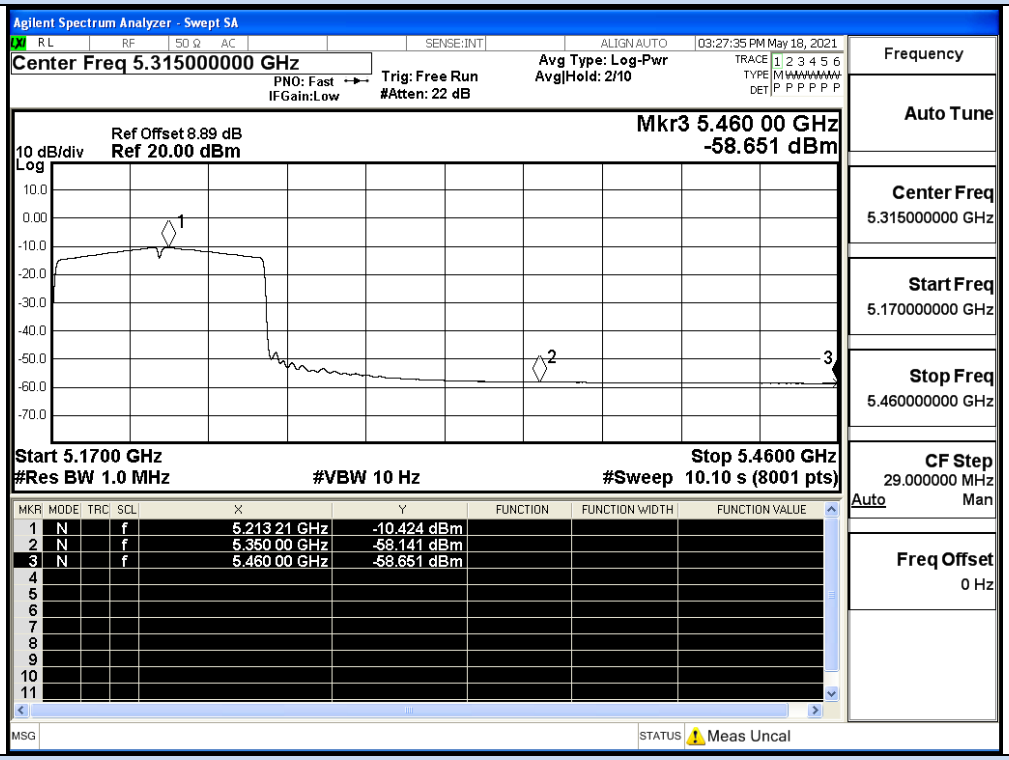

IEEE 802.11ac40 / Channel 48 / 5230MHz / Peak



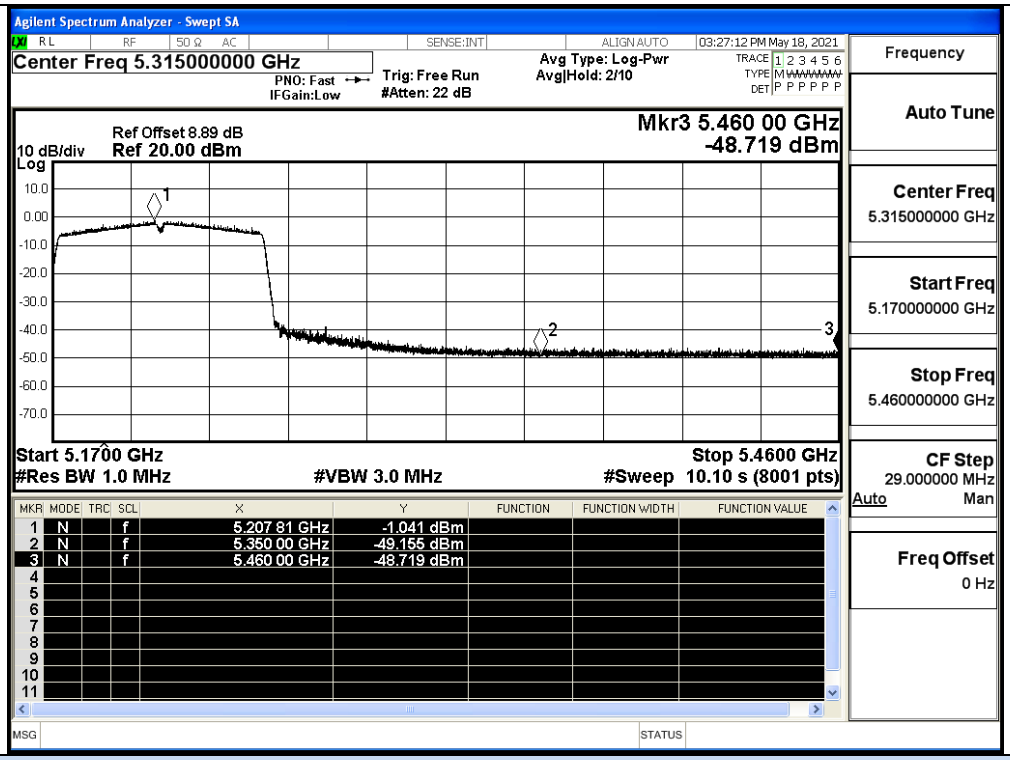

IEEE 802.11ac40 / Channel 48 / 5230MHz / Average



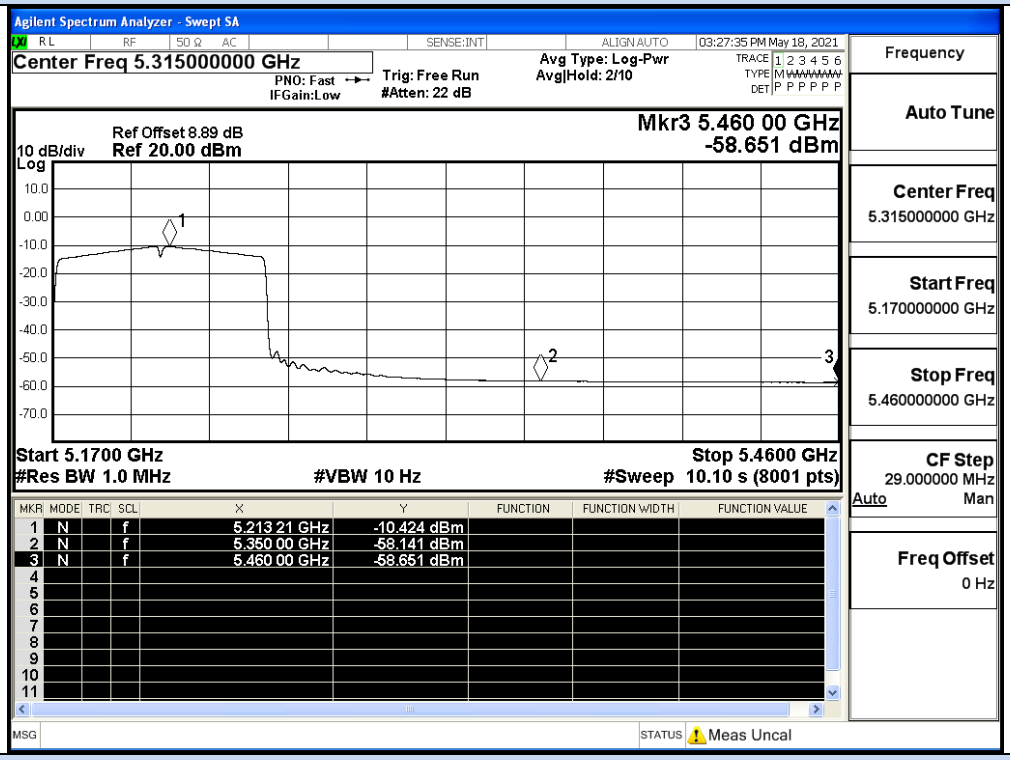

IEEE 802.11ac80 / Channel 42 / 5210MHz / Peak




IEEE 802.11ac80 / Channel 42 / 5210MHz / Average




IEEE 802.11ac80 / Channel 42/ 5210MHz / Peak




IEEE 802.11ac80 / Channel 42 / 5210MHz / Average

## MIMO

| Test Mode | Channel | Frequency (MHz) | ANT 0 Conducted Power (dBm) | ANT 1 Conducted Power (dBm) | MIMO Conducted Power (dBm) | Antenna Gain (dBi) | Ground Reflection Factor (dB) | Covert Radiated E Level At 3m (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11N20 | 36 | 4500.0 | -49.40 | -50.97 | -47.10 | 6.01 | 0 | 54.14 | Peak | 68.20 | Pass |
| | | 4500.0 | -59.62 | -60.30 | -56.94 | 6.01 | 0 | 44.30 | Average | 54.00 | Pass |
| | | 5150.0 | -46.41 | -48.13 | -44.18 | 6.01 | 0 | 57.06 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.61 | -57.17 | -53.87 | 6.01 | 0 | 47.37 | Average | 54.00 | Pass |
| | 48 | 5350.0 | -47.10 | -47.48 | -44.28 | 6.01 | 0 | 56.96 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.89 | -58.80 | -55.83 | 6.01 | 0 | 45.41 | Average | 54.00 | Pass |
| | | 5460.0 | -48.56 | -48.64 | -45.59 | 6.01 | 0 | 55.65 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.48 | -59.36 | -56.41 | 6.01 | 0 | 44.83 | Average | 54.00 | Pass |
| 11N40 | 38 | 4500.0 | -49.73 | -50.33 | -47.01 | 6.01 | 0 | 54.23 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.39 | -60.32 | -57.34 | 6.01 | 0 | 43.90 | Average | 54.00 | Pass |
| | | 5150.0 | -43.73 | -45.30 | -41.43 | 6.01 | 0 | 59.81 | Peak | 68.20 | Pass |
| | | 5150.0 | -55.40 | -56.18 | -52.76 | 6.01 | 0 | 48.48 | Average | 54.00 | Pass |
| | 46 | 5350.0 | -48.33 | -47.58 | -44.93 | 6.01 | 0 | 56.31 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.63 | -58.55 | -55.58 | 6.01 | 0 | 45.66 | Average | 54.00 | Pass |
| | | 5460.0 | -48.72 | -47.72 | -45.18 | 6.01 | 0 | 56.06 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.16 | -59.05 | -56.09 | 6.01 | 0 | 45.15 | Average | 54.00 | Pass |
| 11AC20 | 36 | 4500.0 | -50.69 | -50.37 | -47.52 | 6.01 | 0 | 53.72 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.32 | -60.31 | -57.30 | 6.01 | 0 | 43.94 | Average | 54.00 | Pass |
| | | 5150.0 | -47.34 | -47.81 | -44.56 | 6.01 | 0 | 56.68 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.55 | -57.05 | -53.78 | 6.01 | 0 | 47.46 | Average | 54.00 | Pass |
| | 48 | 4500.0 | -50.69 | -50.37 | -47.52 | 6.01 | 0 | 53.72 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.32 | -60.31 | -57.30 | 6.01 | 0 | 43.94 | Average | 54.00 | Pass |
| | | 5150.0 | -47.34 | -47.81 | -44.56 | 6.01 | 0 | 56.68 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.55 | -57.05 | -53.78 | 6.01 | 0 | 47.46 | Average | 54.00 | Pass |
| 11AC40 | 38 | 4500.0 | -49.73 | -48.86 | -46.26 | 6.01 | 0 | 54.98 | Peak | 68.20 | Pass |
| | | 4500.0 | -60.30 | -59.59 | -56.92 | 6.01 | 0 | 44.32 | Average | 54.00 | Pass |
| | | 5150.0 | -47.09 | -44.91 | -42.85 | 6.01 | 0 | 58.39 | Peak | 68.20 | Pass |
| | | 5150.0 | -56.13 | -55.73 | -52.92 | 6.01 | 0 | 48.32 | Average | 54.00 | Pass |
| | 46 | 5350.0 | -49.18 | -49.25 | -46.20 | 6.01 | 0 | 55.04 | Peak | 68.20 | Pass |
| | | 5350.0 | -58.61 | -58.60 | -55.59 | 6.01 | 0 | 45.65 | Average | 54.00 | Pass |
| | | 5460.0 | -48.28 | -47.31 | -44.76 | 6.01 | 0 | 56.48 | Peak | 68.20 | Pass |
| | | 5460.0 | -59.08 | -59.12 | -56.09 | 6.01 | 0 | 45.15 | Average | 54.00 | Pass |
| 11AC80 | 42 | 4500.0 | -48.11 | -49.16 | -45.59 | 6.01 | 0 | 55.65 | Peak | 68.20 | Pass |
| | | 5150.0 | -58.16 | -58.14 | -55.14 | 6.01 | 0 | 46.10 | Average | 54.00 | Pass |
| | | 4500.0 | -49.28 | -48.72 | -45.98 | 6.01 | 0 | 55.26 | Peak | 68.20 | Pass |
| | | 5150.0 | -58.64 | -58.65 | -55.63 | 6.01 | 0 | 45.61 | Average | 54.00 | Pass |
| | | 5350.0 | -48.11 | -49.16 | -45.59 | 6.01 | 0 | 55.65 | Peak | 68.20 | Pass |
| | | 5460.0 | -58.16 | -58.14 | -55.14 | 6.01 | 0 | 46.10 | Average | 54.00 | Pass |
| | | 5350.0 | -49.28 | -48.72 | -45.98 | 6.01 | 0 | 55.26 | Peak | 68.20 | Pass |
| | | 5460.0 | -58.64 | -58.65 | -55.63 | 6.01 | 0 | 45.61 | Average | 54.00 | Pass |

E [dBuV/m]= Power [dBm] + Gain + Ground Factor + 95.23

The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

Directional gain=3dBi+10 log (2) = 6.01dBi