e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described in this section. For devices that use channel aggregation refer to III.A and III.C for determining emission bandwidth.

**D. 99% Occupied Bandwidth**

The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. Measurement of the 99% occupied bandwidth is *required* only as a condition for using the optional band-edge measurement techniques described in II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the 789033 D02 General UNII Test Procedures New Rules v02r01 Page 4 spectrum is integrated when measuring maximum conducted output power as described in II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with Section 15.407(a).
The following procedure shall be used for measuring (99%) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.

2. Set span = 1.5 times to 5.0 times the OBW.

3. Set RBW = 1% to 5% of the OBW

4. Set VBW ≥ 3 * RBW

5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

6. Use the 99% power bandwidth function of the instrument (if available).

7. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

10.4 Test Results

| Test mode ANT 1 | Test Channel (MHz) | 26dB Bandwidth (MHz) |
|---|---|---|
| 802.11a | 5180 | 26.96 |
| | 5200 | 28.067 |
| | 5240 | 26.008 |
| 802.11ac20 | 5180 | 28.448 |
| | 5200 | 27.394 |
| | 5240 | 29.807 |
| 802.11ac40 | 5190 | 56.403 |
| | 5230 | 58.587 |
| 802.11ac80 | 5210 | 99.692 |
| 802.11n(HT20) | 5180 | 29.926 |
| | 5200 | 28.322 |
| | 5240 | 29.925 |
| 802.11n(HT40) | 5190 | 55.885 |
| | 5230 | 58.027 |

| Test mode ANT 2 | Test Channel (MHz) | 26dB Bandwidth (MHz) |
|---|---|---|
| 802.11a | 5180 | 25.509 |
| | 5200 | 27.941 |
| | 5240 | 23.149 |
| 802.11ac20 | 5180 | 29.415 |
| | 5200 | 28.904 |
| | 5240 | 28.752 |
| 802.11ac40 | 5190 | 59.722 |
| | 5230 | 53.544 |
| 802.11ac80 | 5210 | 99.68 |
| 802.11n(HT20) | 5180 | 29.618 |
| | 5200 | 29.666 |
| | 5240 | 29.077 |
| 802.11n(HT40) | 5190 | 53.864 |
| | 5230 | 58.792 |

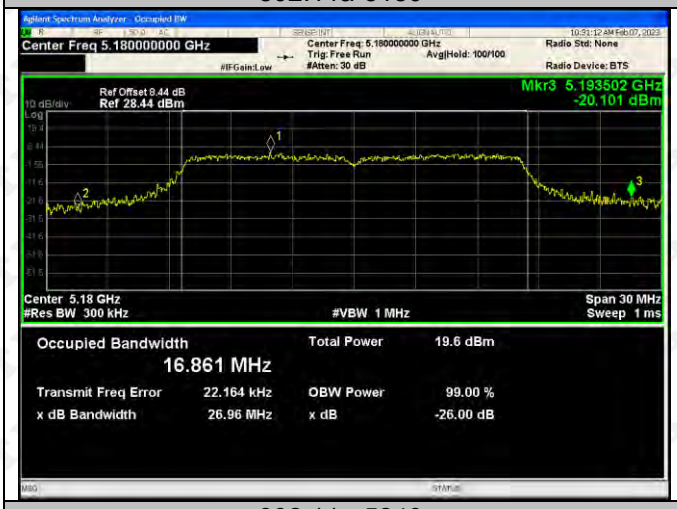
5725-5850 MHz

| Test mode Ant 1 | Test Channel (MHz) | 6dB Bandwidth (MHz) | Result |
|---|---|---|---|
| 802.11a | 5745 | 16.358 | Pass |
| | 5785 | 16.325 | Pass |
| | 5825 | 16.084 | Pass |
| 802.11ac(VH20) | 5745 | 16.954 | Pass |
| | 5785 | 16.469 | Pass |
| | 5825 | 16.401 | Pass |
| 802.11ac(VH40) | 5755 | 35.479 | Pass |
| | 5795 | 34.277 | Pass |
| 802.11ac(VH80) | 5775 | 75.291 | Pass |
| 802.11n(VH20) | 5745 | 16.919 | Pass |
| | 5785 | 17.563 | Pass |
| | 5825 | 17.16 | Pass |
| 802.11n(VH40) | 5755 | 35.144 | Pass |
| | 5795 | 35.113 | Pass |

| Test mode Ant 2 | Test Channel (MHz) | 6dB Bandwidth (MHz) | Result |
|---|---|---|---|
| 802.11a | 5745 | 16.338 | Pass |
| | 5785 | 16.359 | Pass |
| | 5825 | 16.418 | Pass |
| 802.11ac(VH20) | 5745 | 16.713 | Pass |
| | 5785 | 16.945 | Pass |
| | 5825 | 16.975 | Pass |
| 802.11ac(VH40) | 5755 | 36.46 | Pass |
| | 5795 | 36.484 | Pass |
| 802.11ac(VH80) | 5775 | 76.398 | Pass |
| 802.11n(VH20) | 5745 | 16.903 | Pass |
| | 5785 | 16.891 | Pass |
| | 5825 | 17.233 | Pass |
| 802.11n(VH40) | 5755 | 36.487 | Pass |
| | 5795 | 36.439 | Pass |

**Test Graph**
**ANT 1**

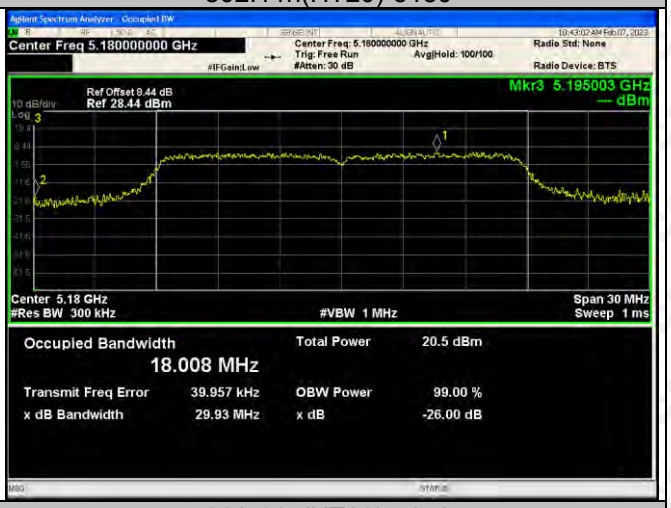
802.11a-5180




802.11a-5200

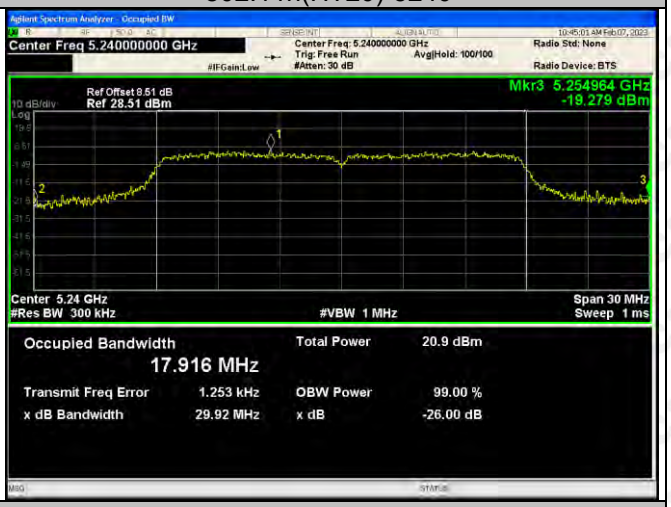
802.11a-5240

802.11n(HT20)-5180




802.11n(HT20)-5200

802.11n(HT20)-5240

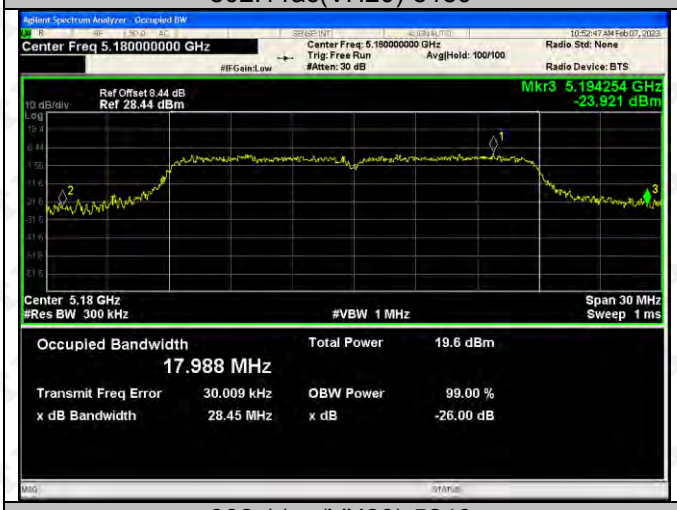



802.11n(HT40)-5190

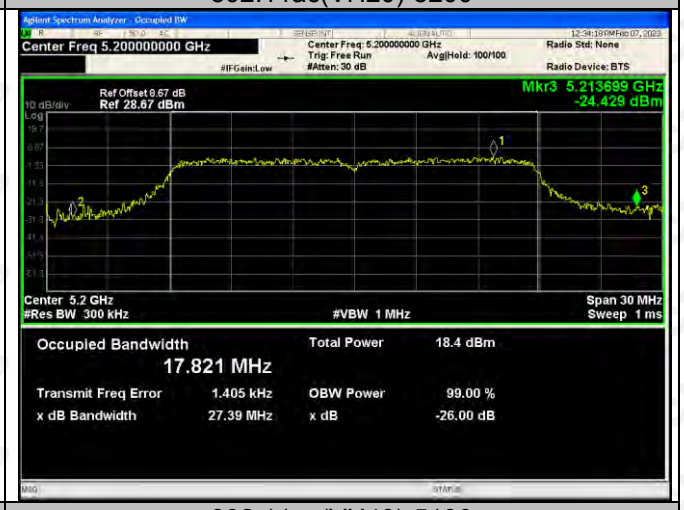
802.11n(HT40)-5230

802.11ac(VH20)-5180

802.11ac(VH20)-5200

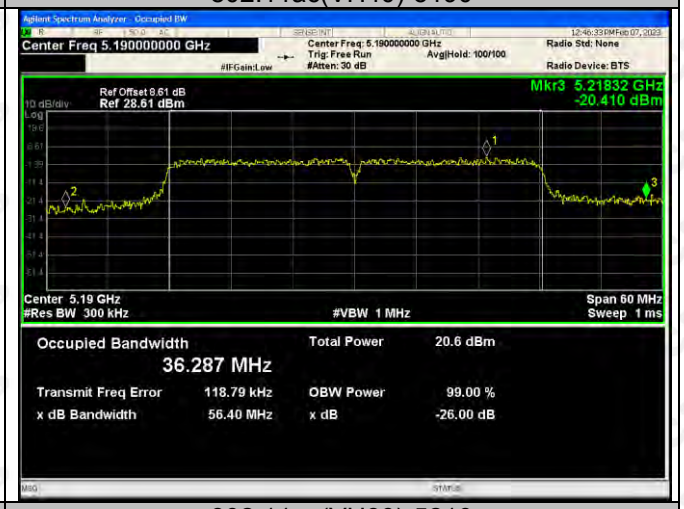



802.11ac(VH20)-5240

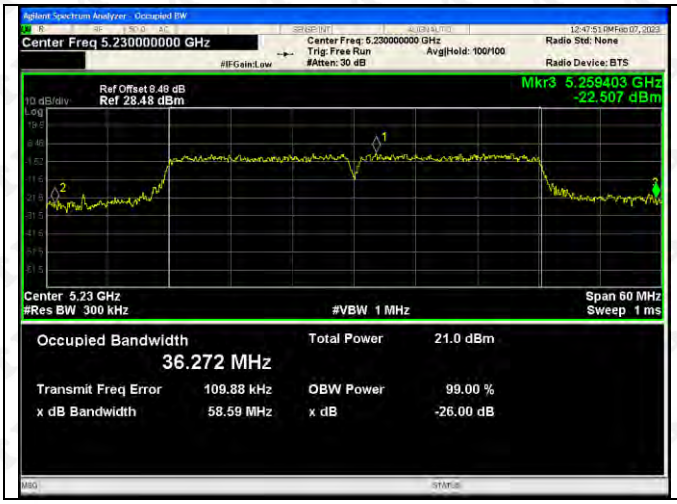


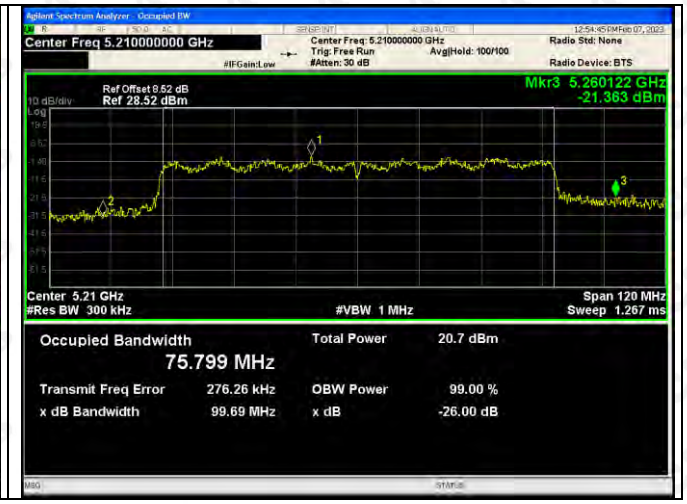

802.11ac(VH40)-5190

802.11ac(VH40)-5230



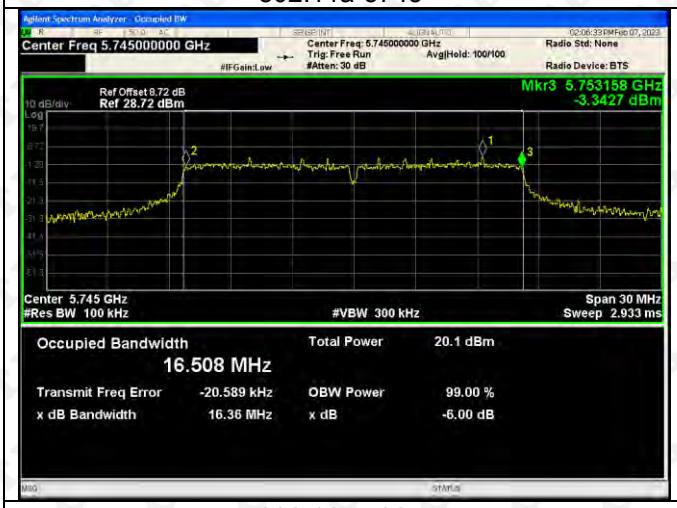

802.11ac(VH80)-5210



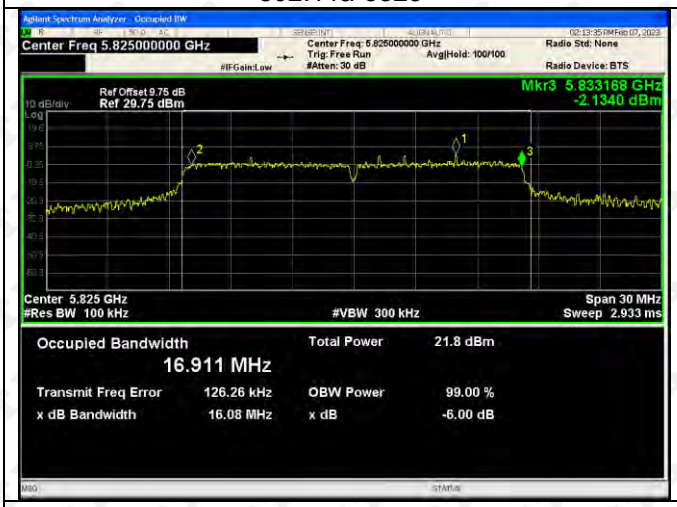

**ANT1:**
**5725-5850MHz**

802.11a-5745




802.11a-5785

802.11a-5825



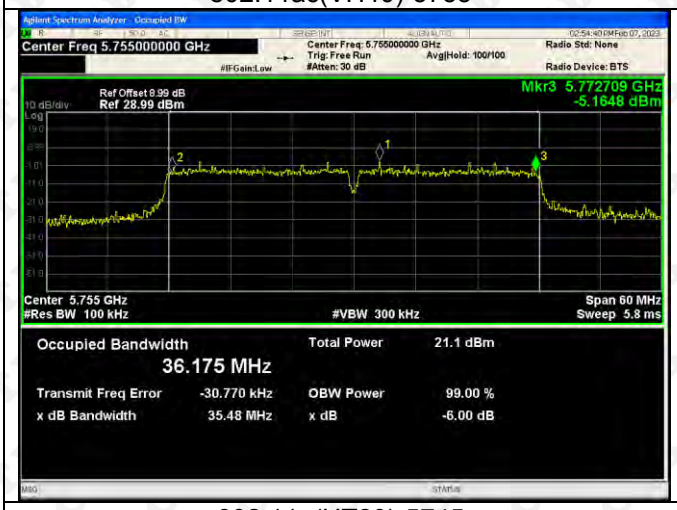

802.11ac(VH20)-5745

802.11ac(VH20)-5785

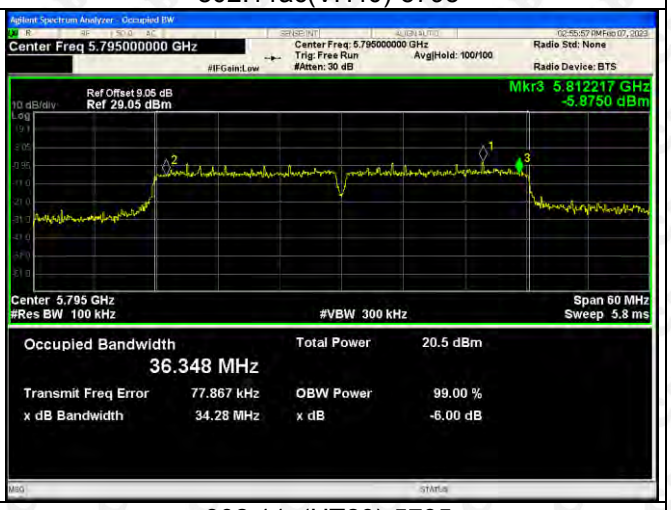
802.11ac(VH20)-5825

802.11ac(VH40)-5755

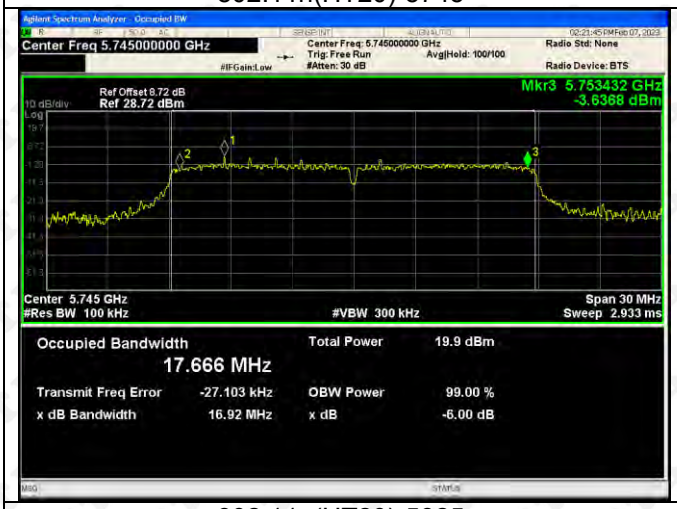
802.11ac(VH40)-5795




802.11n(HT20)-5745




802.11n(HT20)-5785

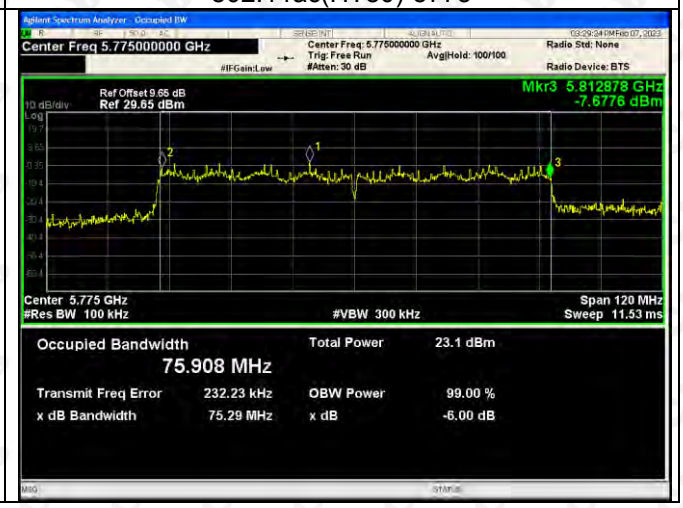



802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795

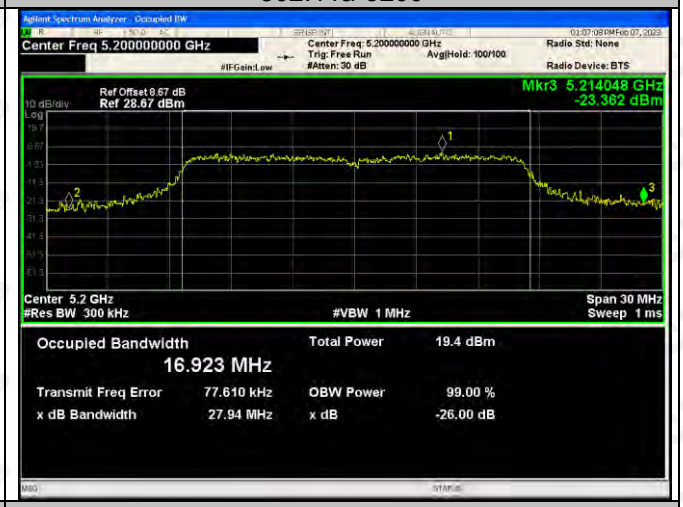
802.11ac(HT80)-5775




**Test Graph**
**ANT 2**

802.11a-5180

802.11a-5200

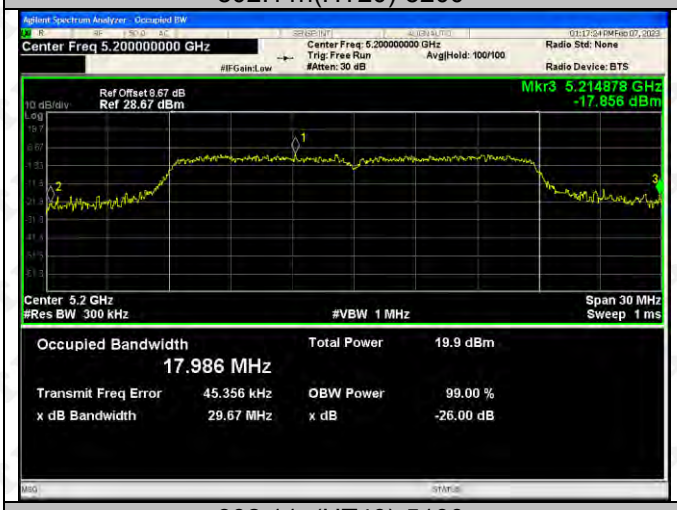



802.11a-5240

802.11n(HT20)-5180

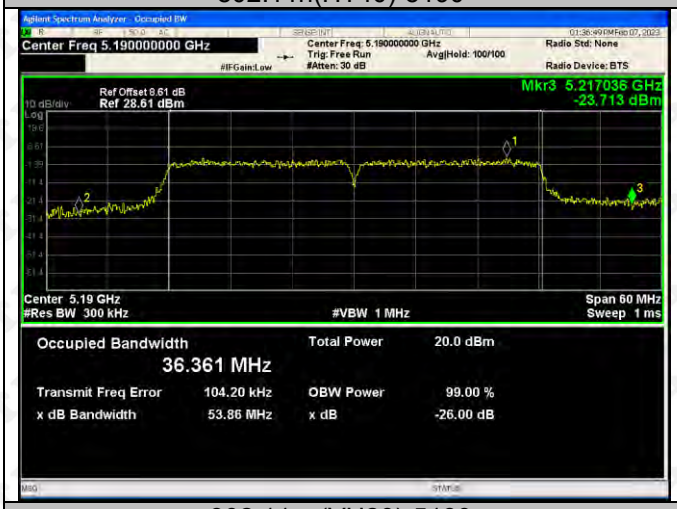
802.11n(HT20)-5200

802.11n(HT20)-5240




802.11n(HT40)-5190

802.11n(HT40)-5230

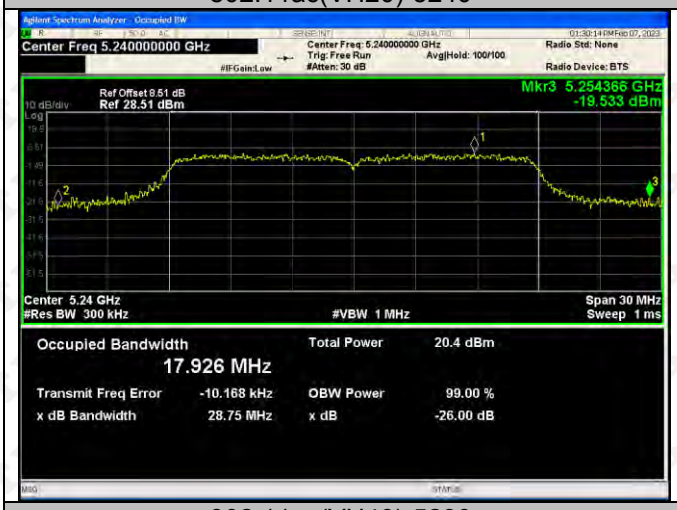



802.11ac(VH20)-5180

802.11ac(VH20)-5200

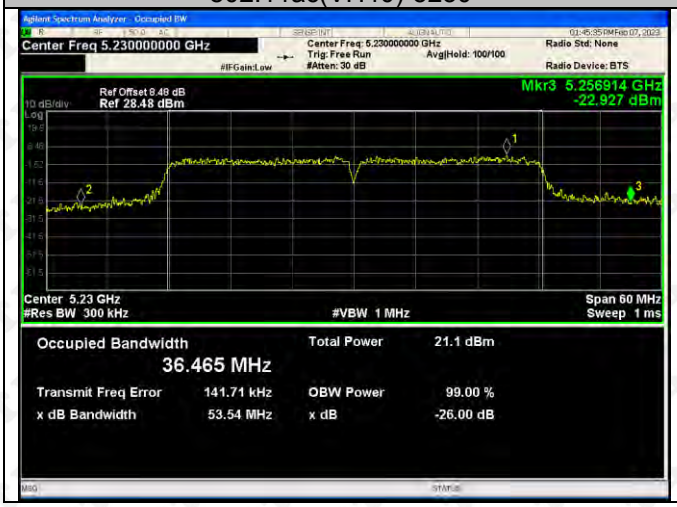
802.11ac(VH20)-5240

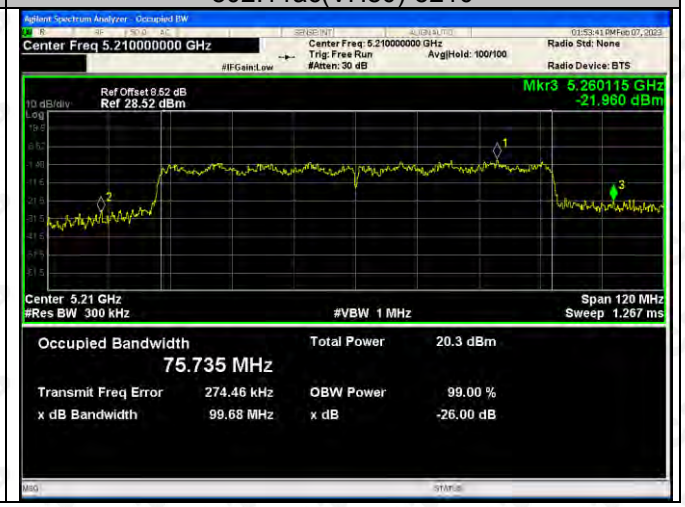
802.11ac(VH40)-5190




802.11ac(VH40)-5230

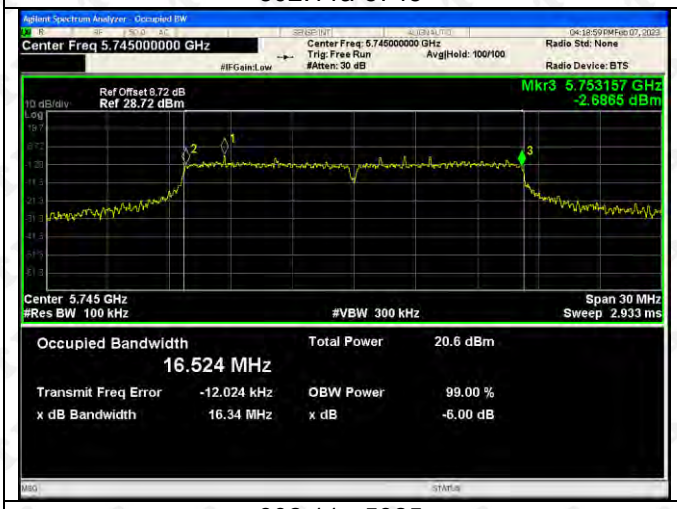
802.11ac(VH80)-5210



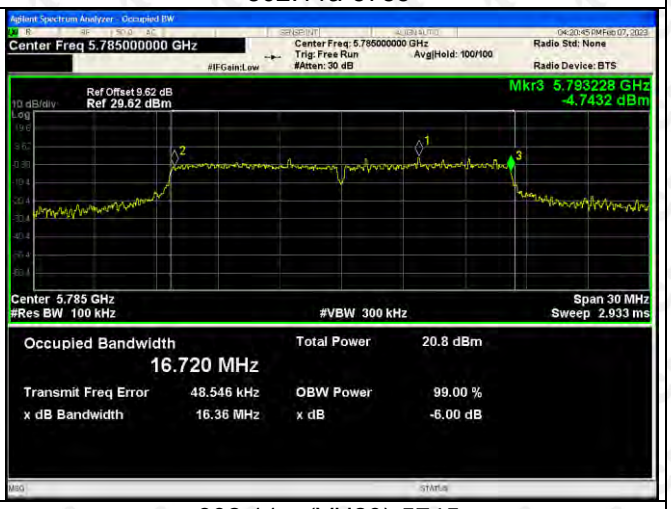



**ANT2:**
**5725-5850MHz**

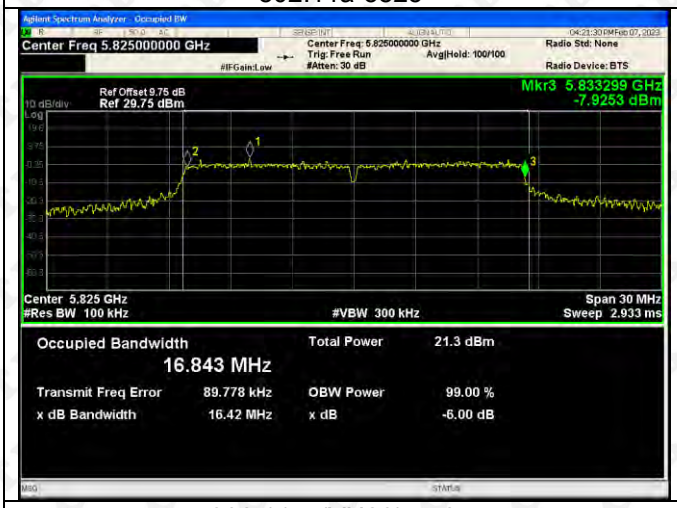
802.11a-5745




802.11a-5785

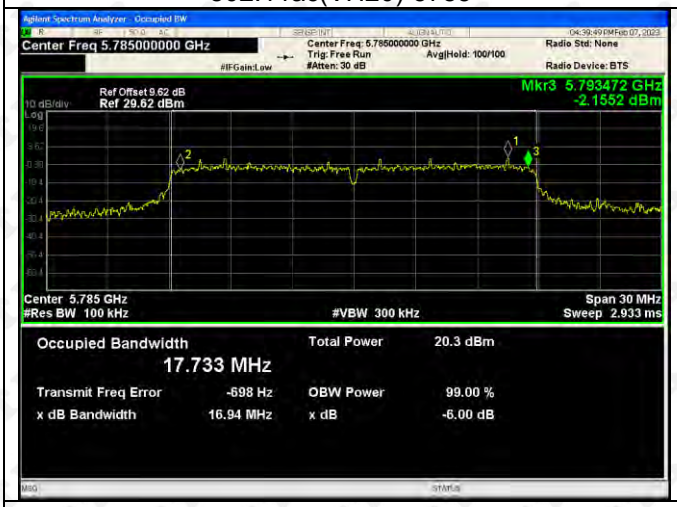



802.11a-5825

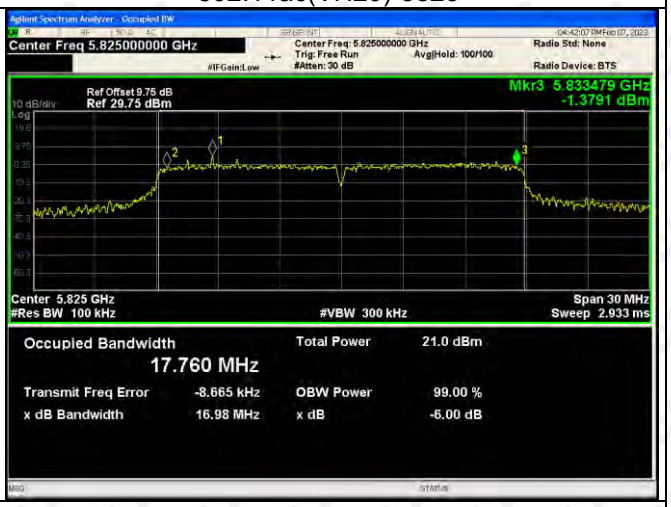



802.11ac(VH20)-5745

802.11ac(VH20)-5785




802.11ac(VH20)-5825

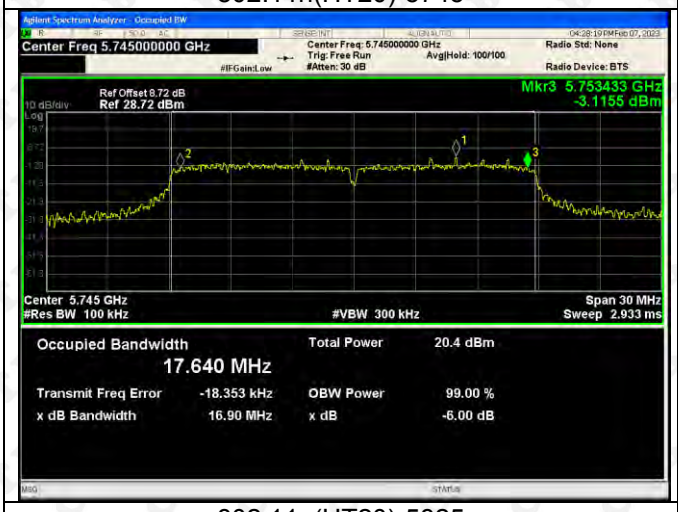



802.11ac(VH40)-5755

802.11ac(VH40)-5795

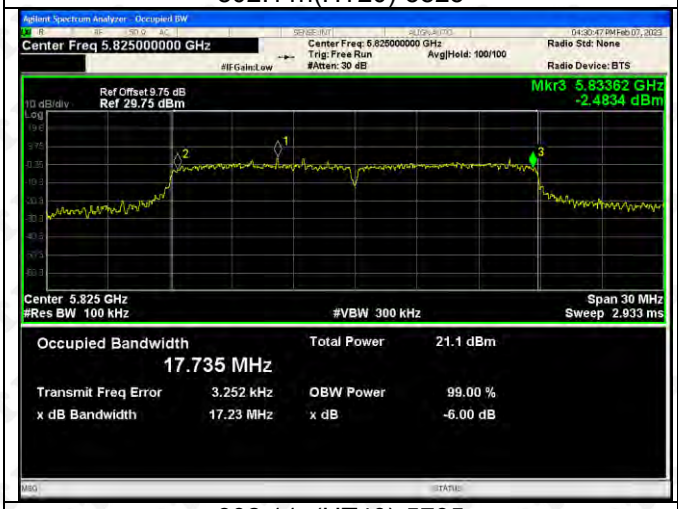
802.11n(HT20)-5745

802.11n(HT20)-5785



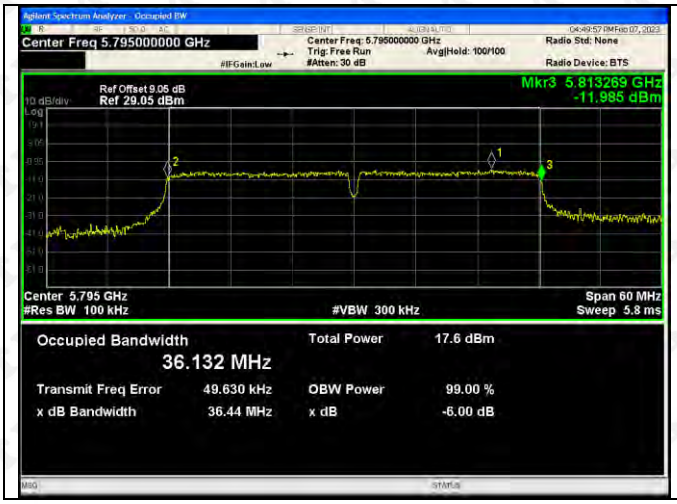

802.11n(HT20)-5825

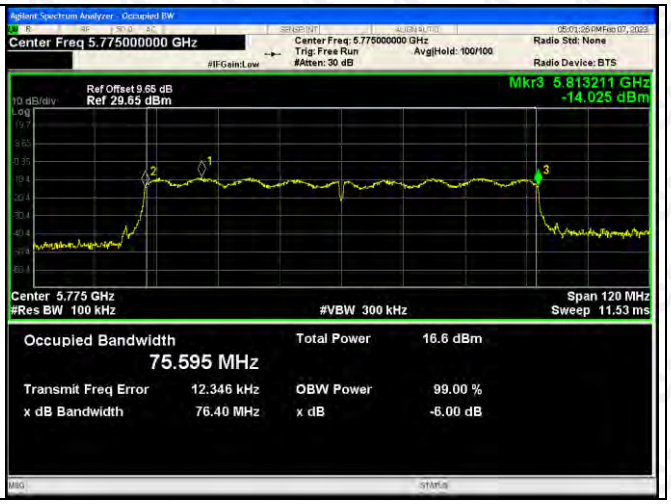
802.11n(HT40)-5755




802.11n(HT40)-5795

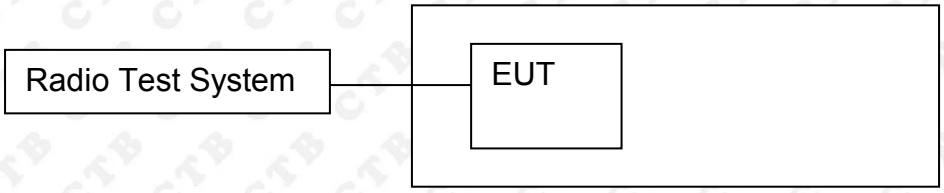
802.11ac(HT80)-5775


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.795000000 GHz
Center Freq: 5.795000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.05 dB
10 dB/div Ref 29.05 dBm
Mkr3 5.813269 GHz
-11.985 dBm
Center 5.795 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60 MHz
Sweep 5.8 ms
Occupied Bandwidth
36.132 MHz
Total Power 17.6 dBm
Transmit Freq Error 49.630 kHz
OBW Power 99.00 %
x dB Bandwidth 36.44 MHz
x dB -6.00 dB


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.775000000 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 9.65 dB
10 dB/div Ref 29.65 dBm
Mkr3 5.813211 GHz
-14.025 dBm
Center 5.775 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 120 MHz
Sweep 11.53 ms
Occupied Bandwidth
75.595 MHz
Total Power 16.6 dBm
Transmit Freq Error 12.346 kHz
OBW Power 99.00 %
x dB Bandwidth 76.40 MHz
x dB -6.00 dB

## 11. POWER SPECTRAL DENSITY

### 11.1 Block Diagram Of Test Setup




### 11.2 Limit

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

### 11.3 Test procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

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

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

11.4 Test Result

ANT 1+ANT2

| Test mode | Test Channel (MHz) | PSD [dBm/MHz] ANT 1 | PSD [dBm/MHz] ANT 2 | PSD [dBm/MHz] Total | Limit (dBm/MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 5180 | 5.099 | 4.558 | / | 10.52 | Pass |
| | 5200 | 4.27 | 4.922 | / | 10.52 | Pass |
| | 5240 | 5.138 | 6.065 | / | 10.52 | Pass |
| 802.11ac(VH20) | 5180 | 5.092 | 5.884 | 8.516 | 10.52 | Pass |
| | 5200 | 6.148 | 4.999 | 8.622 | 10.52 | Pass |
| | 5240 | 6.663 | 5.89 | 9.304 | 10.52 | Pass |
| 802.11ac(VH40) | 5190 | 2.635 | 2.502 | 5.579 | 10.52 | Pass |
| | 5230 | 3.533 | 3.233 | 6.396 | 10.52 | Pass |
| 802.11n(VH20) | 5180 | 1.392 | 1.444 | 4.428 | 10.52 | Pass |
| | 5200 | 4.073 | 4.898 | 7.515 | 10.52 | Pass |
| | 5240 | 5.557 | 5.26 | 8.421 | 10.52 | Pass |
| 802.11n(VH40) | 5190 | 5.759 | 6.598 | 9.209 | 10.52 | Pass |
| | 5230 | 2.92 | 3.056 | 5.999 | 10.52 | Pass |
| 802.11ac(VH80) | 5230 | 3.882 | 3.092 | 6.515 | 10.52 | Pass |

| Test mode | Test Channel (MHz) | PSD [dBm/MHz] ANT 1 | PSD [dBm/MHz] ANT 2 | PSD [dBm/MHz] Total | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 5745 | 2.632 | 2.638 | / | 28.20 | Pass |
| | 5785 | 3.061 | 3.15 | / | 28.20 | Pass |
| | 5825 | 4.226 | 4.72 | / | 28.20 | Pass |
| 802.11ac(VH20) | 5745 | 1.79 | 1.824 | 4.817 | 28.20 | Pass |
| | 5785 | 2.574 | 1.942 | 5.280 | 28.20 | Pass |
| | 5825 | 4.029 | 3.993 | 7.021 | 28.20 | Pass |
| 802.11ac(VH40) | 5755 | -0.11 | 0.628 | 3.285 | 28.20 | Pass |
| | 5795 | 1.765 | 0.299 | 4.104 | 28.20 | Pass |
| 802.11n(VH20) | 5775 | 0.182 | -3.319 | 1.785 | 28.20 | Pass |
| | 5745 | 2.832 | 3.181 | 6.020 | 28.20 | Pass |
| | 5785 | 2.85 | 2.75 | 5.811 | 28.20 | Pass |
| 802.11n(VH40) | 5825 | 6.233 | 4.703 | 8.545 | 28.20 | Pass |
| | 5755 | 0.07 | -1.35 | 2.428 | 28.20 | Pass |
| 802.11ac(VH80) | 5795 | -0.498 | -0.986 | 2.275 | 28.20 | Pass |

**ANT 1**

802.11a-5180

802.11a-5200

802.11a-5240

802.11n(HT20)-5180

802.11n(HT20)-5200

802.11n(HT20)-5240

802.11n(HT40)-5190

802.11n(HT40)-5230

802.11ac(VH20)-5180

802.11ac(VH20)-5200

802.11ac(VH20)-5240

802.11ac(VH40)-5190

802.11ac(VH40)-5230

802.11ac(VH80)-5210

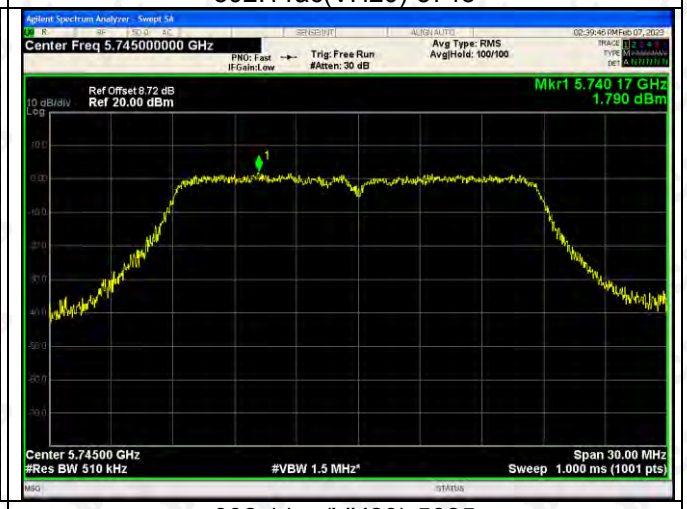
ANT1:

802.11a-5745

802.11a-5785

802.11a-5825

802.11ac(VH20)-5745




802.11ac(VH20)-5785

802.11ac(VH20)-5825

802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11n(HT20)-5745

802.11n(HT20)-5785

802.11n(HT20)-5825

802.11n(HT40)-5755

802.11n(HT40)-5795

802.11ac(HT80)-5775

**ANT 2**

802.11a-5180

802.11a-5200

802.11a-5240

802.11n(HT20)-5180

802.11n(HT20)-5200

802.11n(HT20)-5240

802.11n(HT40)-5190

802.11n(HT40)-5230

802.11ac(VH20)-5180

802.11ac(VH20)-5200

802.11ac(VH20)-5240

802.11ac(VH40)-5190

802.11ac(VH40)-5230

802.11ac(VH80)-5210

ANT2:

802.11a-5745

802.11a-5785

802.11a-5825

802.11ac(VH20)-5745

802.11ac(VH20)-5785

802.11ac(VH20)-5825

802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11n(HT20)-5745

802.11n(HT20)-5785

802.11n(HT20)-5825

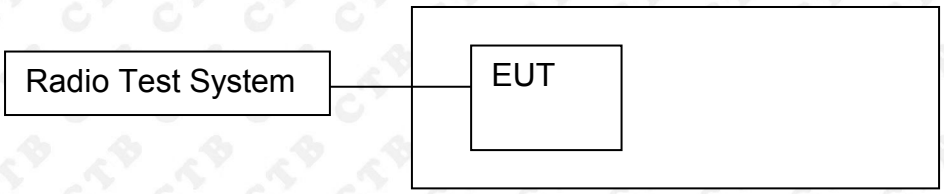
802.11n(HT40)-575

802.11n(HT40)-5795

802.11ac(HT80)-5775

## 12. FREQUENCY STABILITY

### 12.1 Block Diagram Of Test Setup




### 12.2 Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 12.3 Test procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.

2. Set EUT as normal operation.

3. Turn the EUT on and couple its output to spectrum.

4. Turn the EUT off and set the chamber to the highest temperature specified.

5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.

6. Repeat step with the temperature chamber set to the lowest temperature.

### 12.4 Test Result

TX Frequency (5150-5250MHz)

ANT1

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5180MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5180.0196 | 5180 | 0.0196 | 3.7847 |
| | | V max (V) | 132 | 5180.0672 | 5180 | 0.0672 | 12.9653 |
| | | V min (V) | 108 | 5180.0917 | 5180 | 0.0917 | 17.7013 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5180MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5180.0380 | 5180 | 0.0380 | 7.3358 |
| | | T (°C) | 10 | 5180.0180 | 5180 | 0.0180 | 3.4810 |
| | | T (°C) | 20 | 5180.0310 | 5180 | 0.0310 | 5.9770 |
| | | T (°C) | 30 | 5180.0479 | 5180 | 0.0479 | 9.2432 |
| | | T (°C) | 40 | 5180.0298 | 5180 | 0.0298 | 5.7552 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5200MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5200.0407 | 5200 | 0.0407 | 7.8278 |
| | | V max (V) | 132 | 5200.0249 | 5200 | 0.0249 | 4.7895 |
| | | V min (V) | 108 | 5200.0527 | 5200 | 0.0527 | 10.1257 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5200MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5200.0009 | 5200 | 0.0009 | 0.1673 |
| | | T (°C) | 10 | 5200.0422 | 5200 | 0.0422 | 8.1116 |
| | | T (°C) | 20 | 5200.0156 | 5200 | 0.0156 | 3.0025 |
| | | T (°C) | 30 | 5200.0121 | 5200 | 0.0121 | 2.3337 |
| | | T (°C) | 40 | 5200.0057 | 5200 | 0.0057 | 1.1047 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5240MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5240.0530 | 5240 | 0.0530 | 10.1052 |
| | | V max (V) | 132 | 5240.0241 | 5240 | 0.0241 | 4.5996 |
| | | V min (V) | 108 | 5240.0332 | 5240 | 0.0332 | 6.3333 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5240MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5240.0330 | 5240 | 0.0330 | 6.2994 |
| | | T (°C) | 10 | 5240.0320 | 5240 | 0.0320 | 6.1080 |
| | | T (°C) | 20 | 5240.0149 | 5240 | 0.0149 | 2.8461 |
| | | T (°C) | 30 | 5240.0462 | 5240 | 0.0462 | 8.8144 |
| | | T (°C) | 40 | 5240.0292 | 5240 | 0.0292 | 5.5641 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

TX Frequency (5725-5850MHz)

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5745MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5745.0256 | 5745 | 0.0256 | 4.4561 |
| | | V max (V) | 132 | 5745.0886 | 5745 | 0.0886 | 15.4243 |
| | | V min (V) | 108 | 5745.0256 | 5745 | 0.0256 | 4.4561 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5745MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5745.0756 | 5745 | 0.0756 | 13.1601 |
| | | T (°C) | 10 | 5745.0442 | 5745 | 0.0442 | 7.6877 |
| | | T (°C) | 20 | 5745.0697 | 5745 | 0.0697 | 12.1279 |
| | | T (°C) | 30 | 5745.0883 | 5745 | 0.0883 | 15.3636 |
| | | T (°C) | 40 | 5745.0791 | 5745 | 0.0791 | 13.7606 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5785MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5785.0495 | 5785 | 0.0495 | 8.5564 |
| | | V max (V) | 132 | 5785.0630 | 5785 | 0.0630 | 10.8916 |
| | | V min (V) | 108 | 5785.0154 | 5785 | 0.0154 | 2.6579 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5785MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5785.0492 | 5785 | 0.0492 | 8.5087 |
| | | T (°C) | 10 | 5785.0540 | 5785 | 0.0540 | 9.3382 |
| | | T (°C) | 20 | 5785.0128 | 5785 | 0.0128 | 2.2053 |
| | | T (°C) | 30 | 5785.0595 | 5785 | 0.0595 | 10.2825 |
| | | T (°C) | 40 | 5785.0612 | 5785 | 0.0612 | 10.5823 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5825MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5825.0168 | 5825 | 0.0168 | 2.8839 |
| | | V max (V) | 132 | 5825.0761 | 5825 | 0.0761 | 13.0595 |
| | | V min (V) | 108 | 5825.0930 | 5825 | 0.0930 | 15.9663 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5825MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5825.0328 | 5825 | 0.0328 | 5.6233 |
| | | T (°C) | 10 | 5825.0427 | 5825 | 0.0427 | 7.3294 |
| | | T (°C) | 20 | 5825.0759 | 5825 | 0.0759 | 13.0309 |
| | | T (°C) | 30 | 5825.0174 | 5825 | 0.0174 | 2.9926 |
| | | T (°C) | 40 | 5825.0639 | 5825 | 0.0639 | 10.9659 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

ANT2:

TX Frequency (5150-5250MHz)

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5180MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5180.0701 | 5180 | 0.0701 | 13.5410 |
| | | V max (V) | 132 | 5180.0053 | 5180 | 0.0053 | 1.0141 |
| | | V min (V) | 108 | 5180.0930 | 5180 | 0.0930 | 17.9539 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5180MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5180.0285 | 5180 | 0.0285 | 5.4963 |
| | | T (°C) | 10 | 5180.0182 | 5180 | 0.0182 | 3.5148 |
| | | T (°C) | 20 | 5180.0881 | 5180 | 0.0881 | 17.0063 |
| | | T (°C) | 30 | 5180.0578 | 5180 | 0.0578 | 11.1643 |
| | | T (°C) | 40 | 5180.0015 | 5180 | 0.0015 | 0.2885 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5200MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5200.0040 | 5200 | 0.0040 | 0.7762 |
| | | V max (V) | 132 | 5200.0838 | 5200 | 0.0838 | 16.1184 |
| | | V min (V) | 108 | 5200.0926 | 5200 | 0.0926 | 17.8111 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5200MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5200.0559 | 5200 | 0.0559 | 10.7442 |
| | | T (°C) | 10 | 5200.0702 | 5200 | 0.0702 | 13.5034 |
| | | T (°C) | 20 | 5200.0466 | 5200 | 0.0466 | 8.9599 |
| | | T (°C) | 30 | 5200.0250 | 5200 | 0.0250 | 4.8165 |
| | | T (°C) | 40 | 5200.0623 | 5200 | 0.0623 | 11.9746 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5240MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5240.0769 | 5240 | 0.0769 | 14.6684 |
| | | V max (V) | 132 | 5240.0436 | 5240 | 0.0436 | 8.3214 |
| | | V min (V) | 108 | 5240.0869 | 5240 | 0.0869 | 16.5802 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5240MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5240.0814 | 5240 | 0.0814 | 15.5396 |
| | | T (°C) | 10 | 5240.0084 | 5240 | 0.0084 | 1.6058 |
| | | T (°C) | 20 | 5240.0667 | 5240 | 0.0667 | 12.7228 |
| | | T (°C) | 30 | 5240.0846 | 5240 | 0.0846 | 16.1395 |
| | | T (°C) | 40 | 5240.0591 | 5240 | 0.0591 | 11.2706 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

TX Frequency (5725-5850MHz)

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5745MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5745.0255 | 5745 | 0.0255 | 4.4321 |
| | | V max (V) | 132 | 5745.0380 | 5745 | 0.0380 | 6.6073 |
| | | V min (V) | 108 | 5745.0729 | 5745 | 0.0729 | 12.6907 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5745MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5745.0933 | 5745 | 0.0933 | 16.2332 |
| | | T (°C) | 10 | 5745.0174 | 5745 | 0.0174 | 3.0239 |
| | | T (°C) | 20 | 5745.0758 | 5745 | 0.0758 | 13.1882 |
| | | T (°C) | 30 | 5745.0543 | 5745 | 0.0543 | 9.4582 |
| | | T (°C) | 40 | 5745.0711 | 5745 | 0.0711 | 12.3772 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5785MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5785.0813 | 5785 | 0.0813 | 14.0477 |
| | | V max (V) | 132 | 5785.0908 | 5785 | 0.0908 | 15.6979 |
| | | V min (V) | 108 | 5785.0040 | 5785 | 0.0040 | 0.6938 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5785MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5785.0871 | 5785 | 0.0871 | 15.0479 |
| | | T (°C) | 10 | 5785.0503 | 5785 | 0.0503 | 8.7007 |
| | | T (°C) | 20 | 5785.0918 | 5785 | 0.0918 | 15.8678 |
| | | T (°C) | 30 | 5785.0351 | 5785 | 0.0351 | 6.0667 |
| | | T (°C) | 40 | 5785.0405 | 5785 | 0.0405 | 6.9948 |
| | | T (°C) | 50 | 5785.0225 | 5785 | 0.0225 | 3.8932 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5825MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C) | 20 | V nom (V) | 120 | 5825.0433 | 5825 | 0.0433 | 7.4364 |
| | | V max (V) | 132 | 5825.0510 | 5825 | 0.0510 | 8.7477 |
| | | V min (V) | 108 | 5825.0394 | 5825 | 0.0394 | 6.7701 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | | Reference Frequency：5825MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V) | 120 | T (°C) | 0 | 5825.0388 | 5825 | 0.0388 | 6.6569 |
| | | T (°C) | 10 | 5825.0440 | 5825 | 0.0440 | 7.5540 |
| | | T (°C) | 20 | 5825.0265 | 5825 | 0.0265 | 4.5538 |
| | | T (°C) | 30 | 5825.0302 | 5825 | 0.0302 | 5.1824 |
| | | T (°C) | 40 | 5825.0564 | 5825 | 0.0564 | 9.6862 |
| Limits | | | | ±20ppm | | | |
| Result | | | | Complies | | | |

## 13. OPERATION IN THE ABSENCE OF INFORMATION TO THE TRANSMIT

### 13.1 Requirement

15.407(c) requirement:
The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signal ling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

### 13.2 Test Results

Operation in the absence of information to the transmit:

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling
signal of ASK message transmitting from remote device and verify whether it shall resend or
discontinue transmission. (manufacturer declare )

## 14. ANTENNA REQUIREMENT

15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
15.247(b) (4) requirement:
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**EUT Antenna:**

The antenna is FPC antenna and no consideration of replacement. The best case gain of the antenna is WiFi (5.2G):Ant1:4.63dBi, Ant2:1.91dBi, WiFi (5.8G):Ant1: 3.51dBi, Ant2: 4.96dBi.

## 15. EUT PHOTOGRAPHS

**EUT Photo 1**

**EUT Photo 2**

## 16. EUT TEST SETUP PHOTOGRAPHS

Spurious emissions

Below 1GHz

Above 1GHz

Conducted Emission

※※※※※ **END OF REPORT** ※※※※※