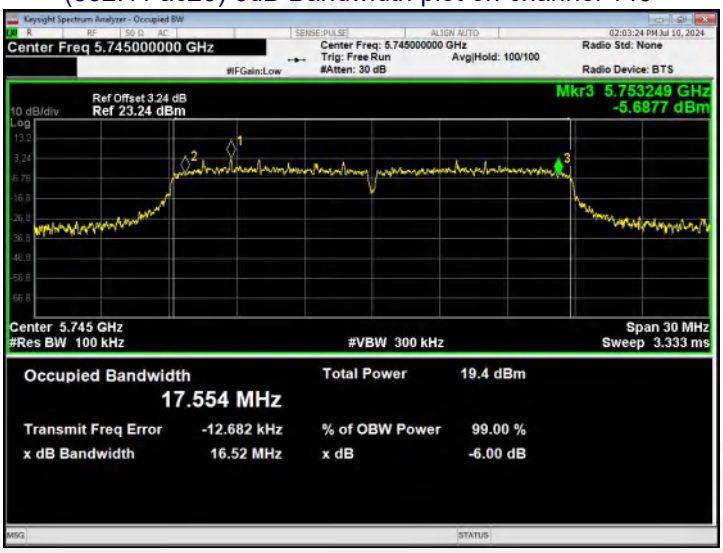
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz

Test Mode	Antenna	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
802.11ac20	SISO ANT A	5745	16.52	>500	Pass
		5785	16.51		
		5825	16.88		
	SISO ANT B	5745	16.52	>500	Pass
		5785	16.73		
		5825	16.28		
	MIMO ANT A	5745	16.89	>500	Pass
		5785	16.54		
		5825	16.88		
	MIMO ANT B	5745	16.29	>500	Pass
		5785	16.51		
		5825	16.89		

Test Mode	Antenna	Frequency (MHz)	26 Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
802.11ac20	SISO ANT A	5745	23.07	17.593	N/A	Pass
		5785	20.62	17.582		
		5825	26.04	17.706		
	SISO ANT B	5745	21.57	17.546	N/A	Pass
		5785	20.59	17.543		
		5825	20.46	17.547		
	MIMO ANT A	5745	30.00	17.852	N/A	Pass
		5785	29.50	17.731		
		5825	29.75	18.214		
	MIMO ANT B	5745	20.53	17.573	N/A	Pass
		5785	20.35	17.537		
		5825	20.34	17.561		

SISO ANT A - 802.11ac20

(802.11 ac20) 6dB Bandwidth plot on channel 149

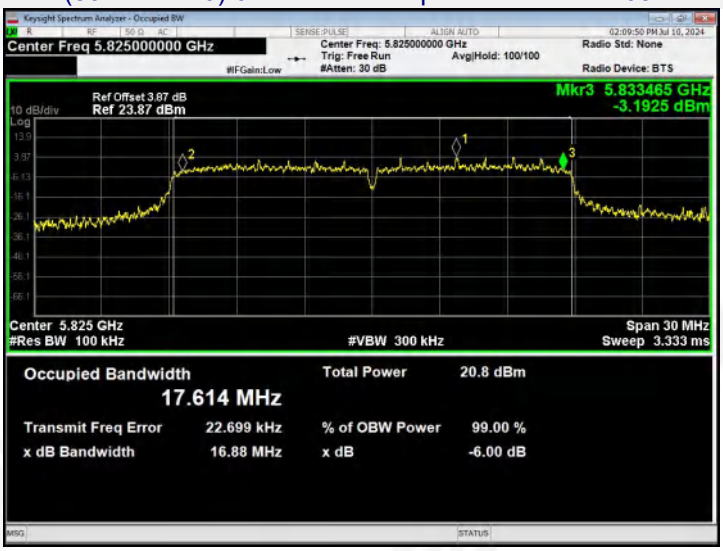


(802.11 ac20) 26dB & 99% Bandwidth plot on channel 149

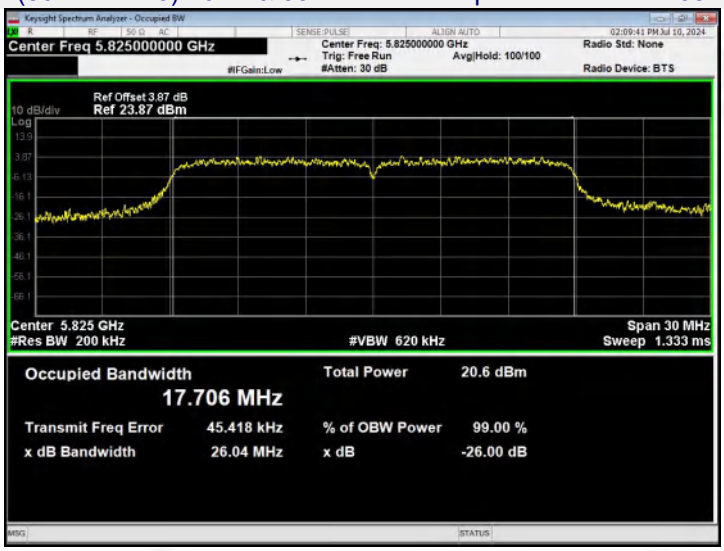
(802.11 ac20) 6dB Bandwidth plot on channel 157

(802.11 ac20) 26dB & 99% Bandwidth plot on channel 157

(802.11 ac20) 6dB Bandwidth plot on channel 165

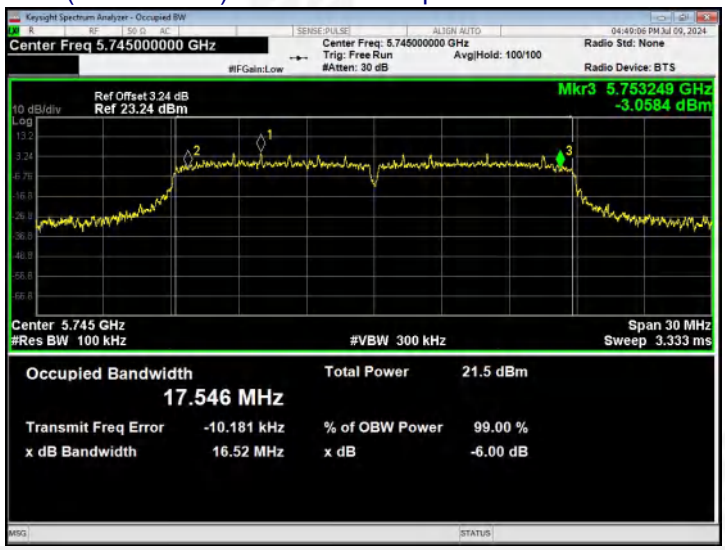


(802.11 ac20) 26dB & 99% Bandwidth plot on channel 165

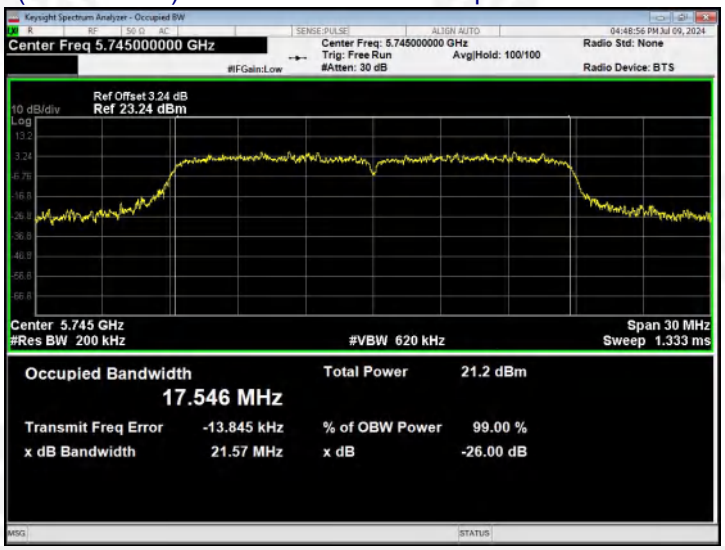


SISO ANT B - 802.11ac20

(802.11 ac20) 6dB Bandwidth plot on channel 149

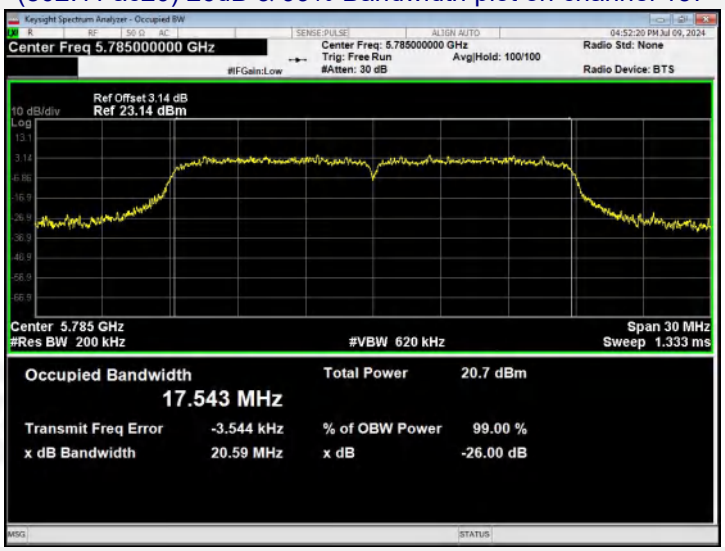


(802.11 ac20) 26dB & 99% Bandwidth plot on channel 149

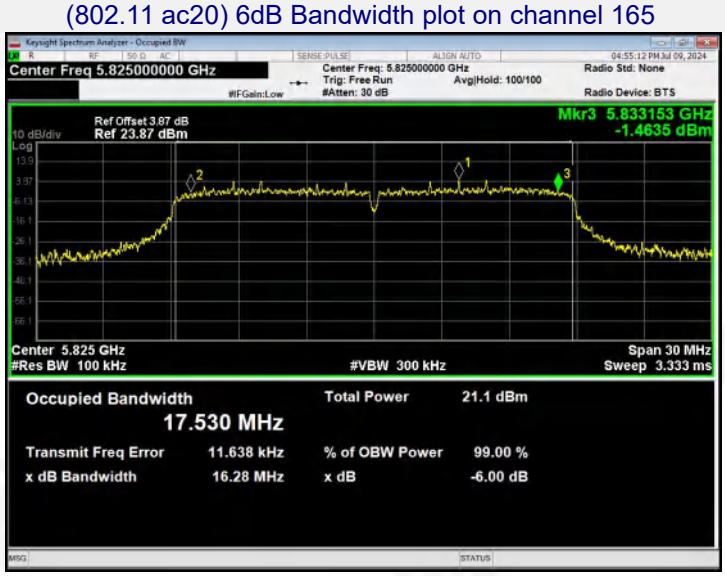


(802.11 ac20) 6dB Bandwidth plot on channel 157

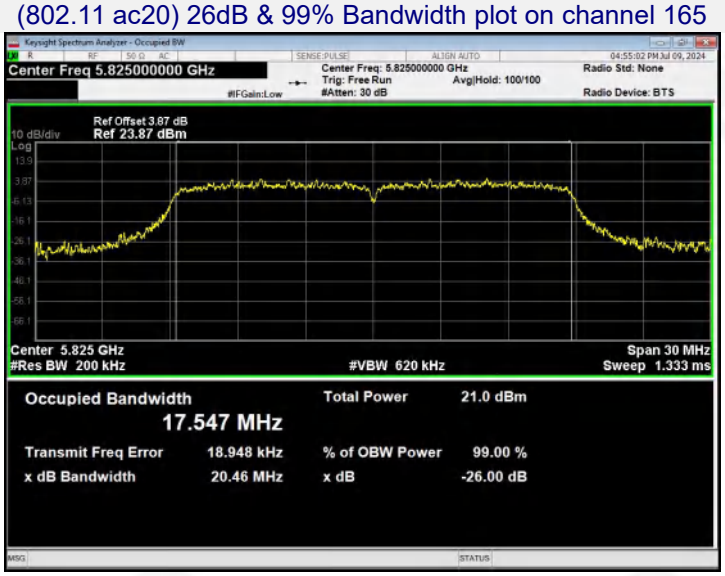
(802.11 ac20) 26dB & 99% Bandwidth plot on channel 157



(802.11 ac20) 6dB Bandwidth plot on channel 165

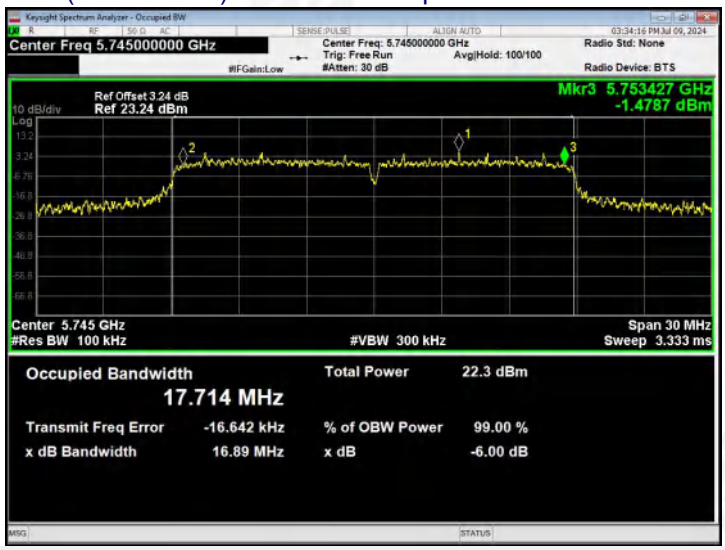


(802.11 ac20) 26dB & 99% Bandwidth plot on channel 165

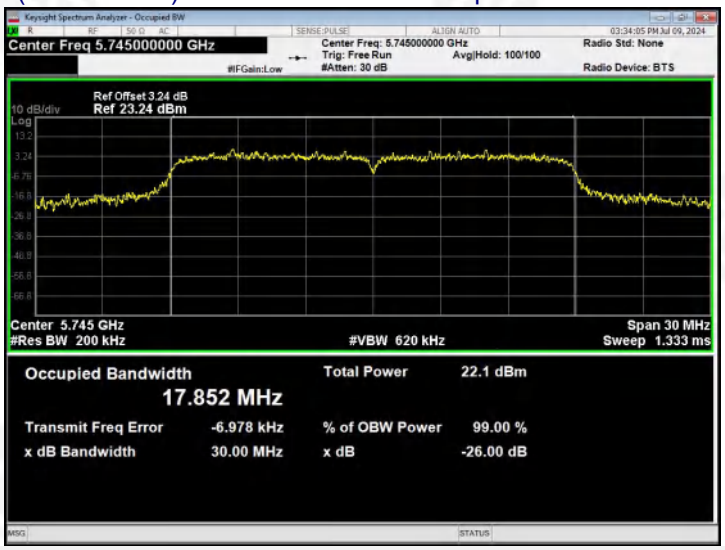


MIMO ANT A - 802.11ac20

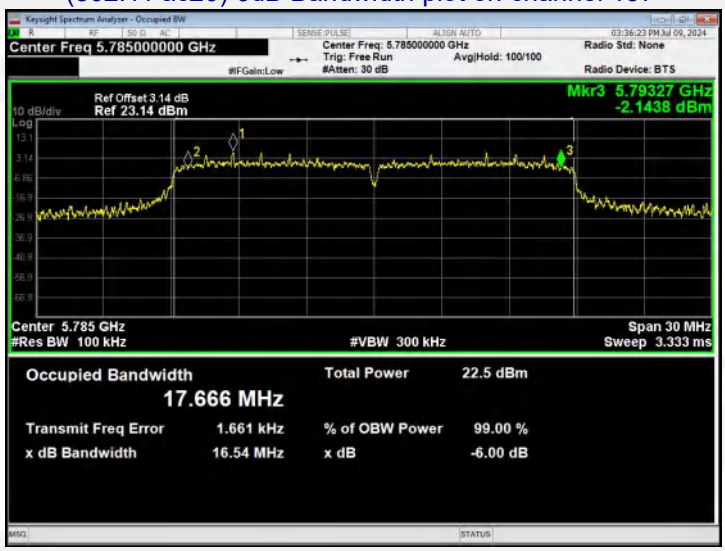
(802.11 ac20) 6dB Bandwidth plot on channel 149



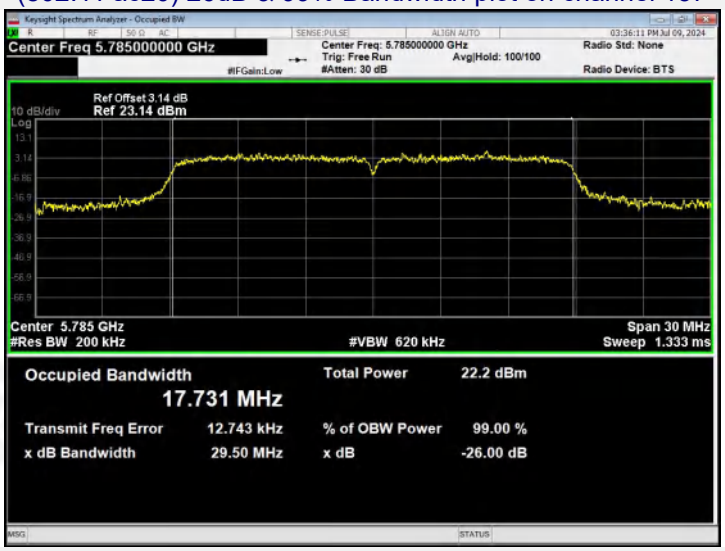
(802.11 ac20) 26dB & 99% Bandwidth plot on channel 149



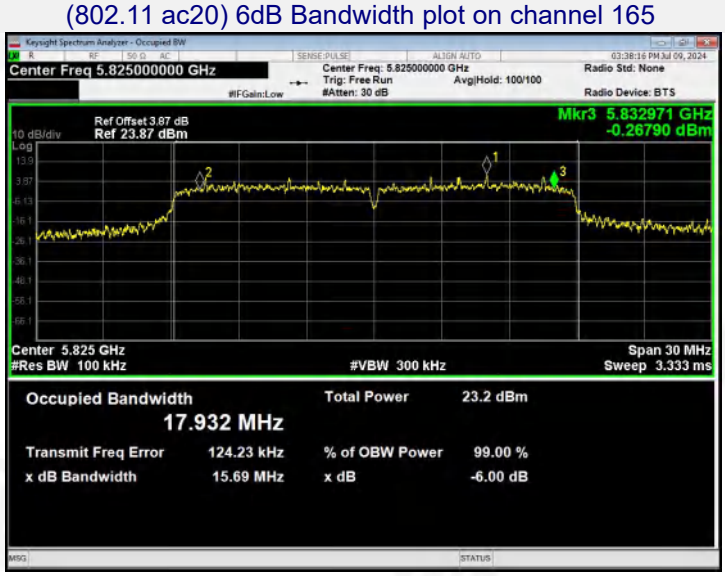
(802.11 ac20) 6dB Bandwidth plot on channel 157



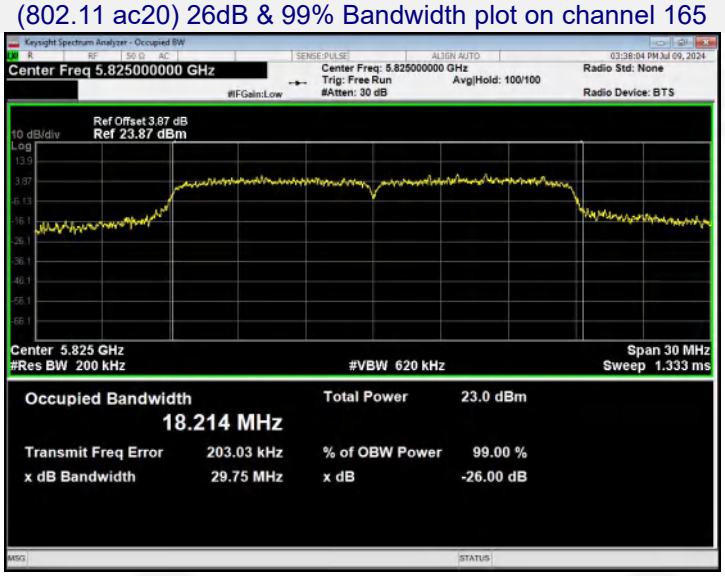
(802.11 ac20) 26dB & 99% Bandwidth plot on channel 157



(802.11 ac20) 6dB Bandwidth plot on channel 165

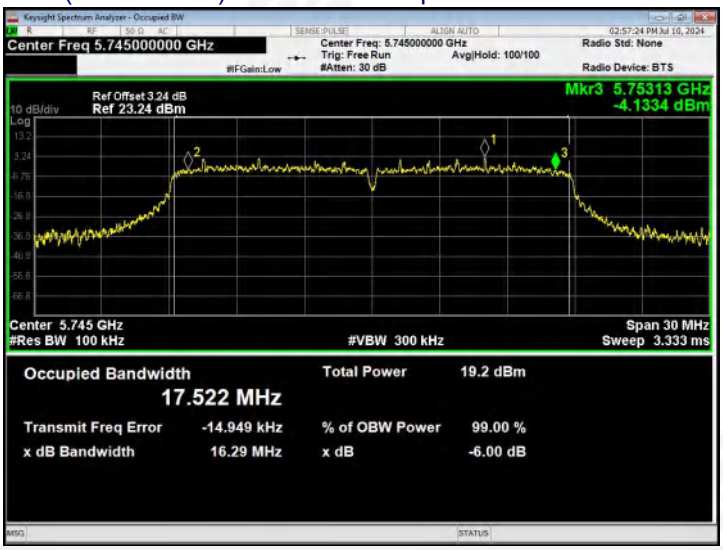


(802.11 ac20) 26dB & 99% Bandwidth plot on channel 165

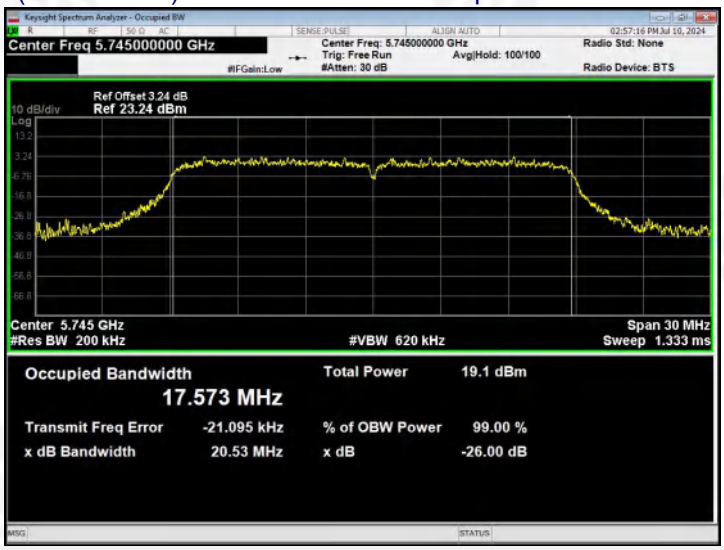


MIMO ANT B - 802.11ac20

(802.11 ac20) 6dB Bandwidth plot on channel 149

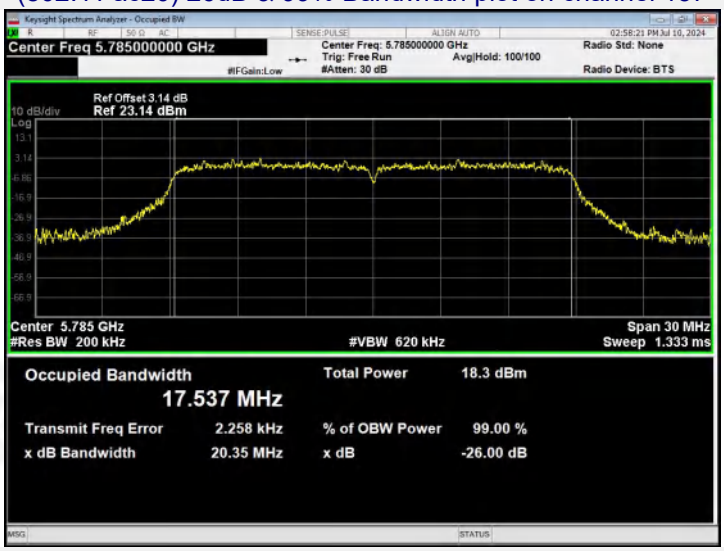


(802.11 ac20) 26dB & 99% Bandwidth plot on channel 149

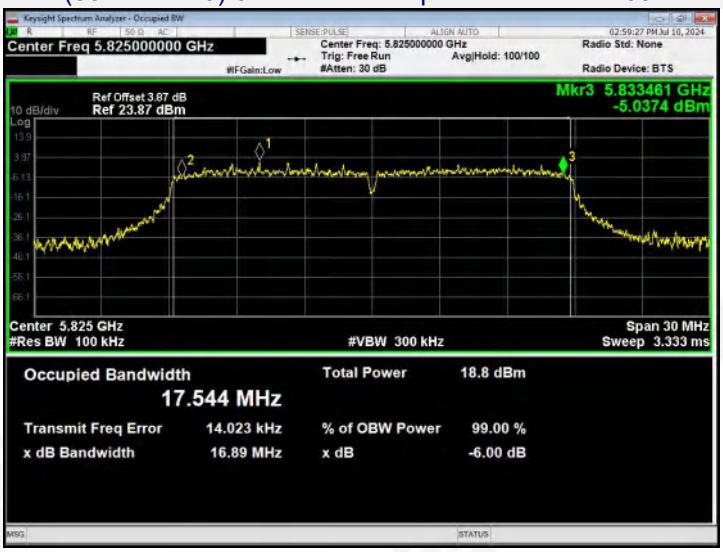


(802.11 ac20) 6dB Bandwidth plot on channel 157

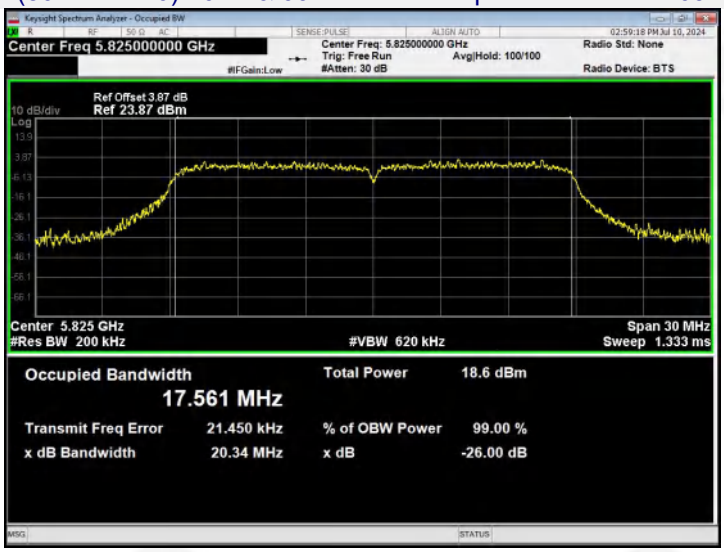
(802.11 ac20) 26dB & 99% Bandwidth plot on channel 157



(802.11 ac20) 6dB Bandwidth plot on channel 165



(802.11 ac20) 26dB & 99% Bandwidth plot on channel 165



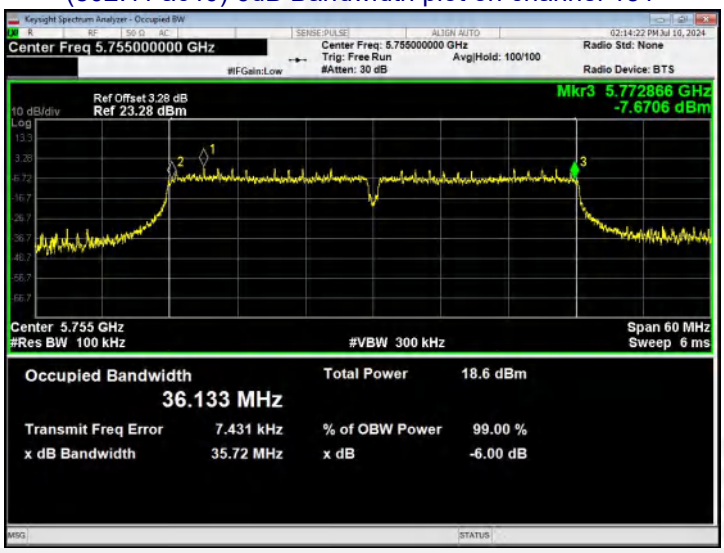
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz

Test Mode	Antenna	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
802.11ac40	SISO ANT A	5755	35.72	>500	Pass
		5795	35.64		
	SISO ANT B	5755	35.65	>500	Pass
		5795	35.80		
	MIMO ANT A	5755	35.87	>500	Pass
		5795	35.17		
	MIMO ANT B	5755	35.83	>500	Pass
		5795	35.66		

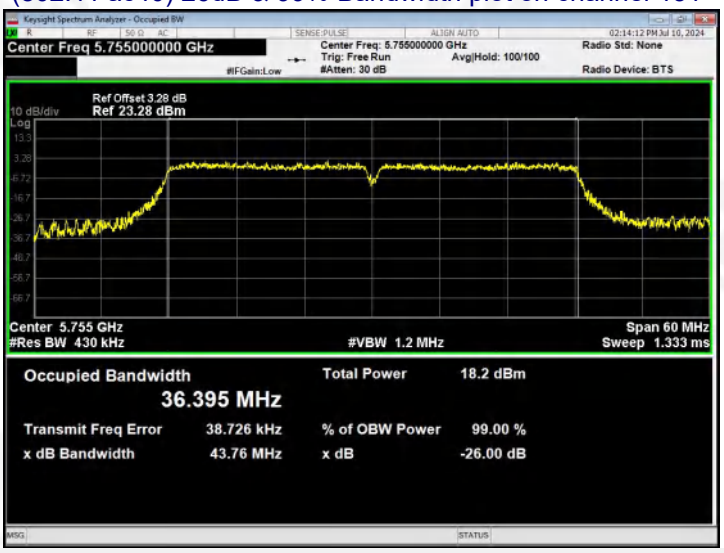
Test Mode	Antenna	Frequency (MHz)	26 Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
802.11ac40	SISO ANT A	5755	43.76	36.395	N/A	Pass
		5795	43.85	36.381		
	SISO ANT B	5755	43.36	36.311	N/A	Pass
		5795	42.80	36.307		
	MIMO ANT A	5755	53.83	36.488	N/A	Pass
		5795	54.13	36.517		
	MIMO ANT B	5755	42.37	36.313	N/A	Pass
		5795	42.74	36.298		

SISO ANT A - 802.11ac40

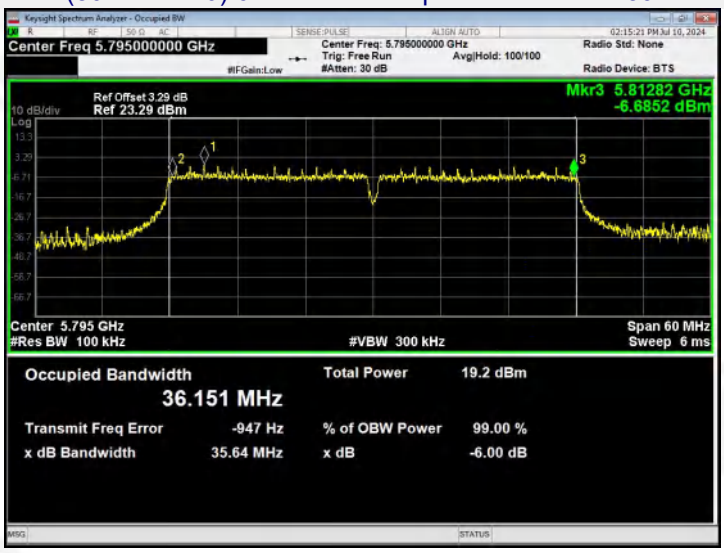
(802.11 ac40) 6dB Bandwidth plot on channel 151



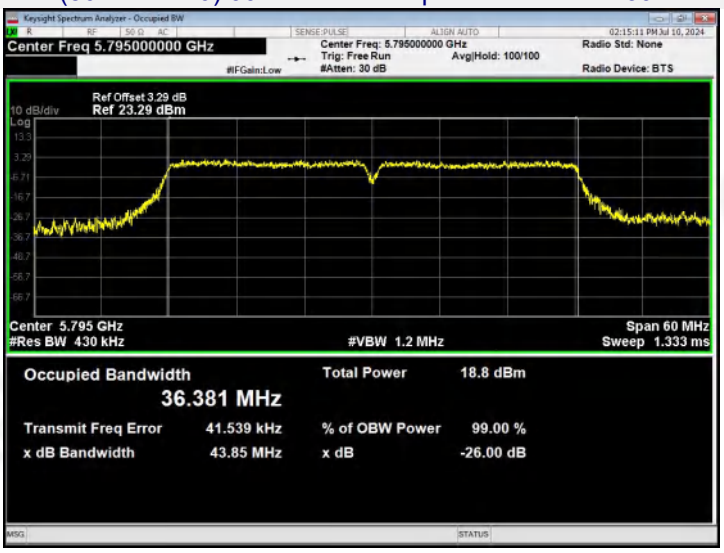
(802.11 ac40) 26dB & 99% Bandwidth plot on channel 151



(802.11 ac40) 6dB Bandwidth plot on channel 159



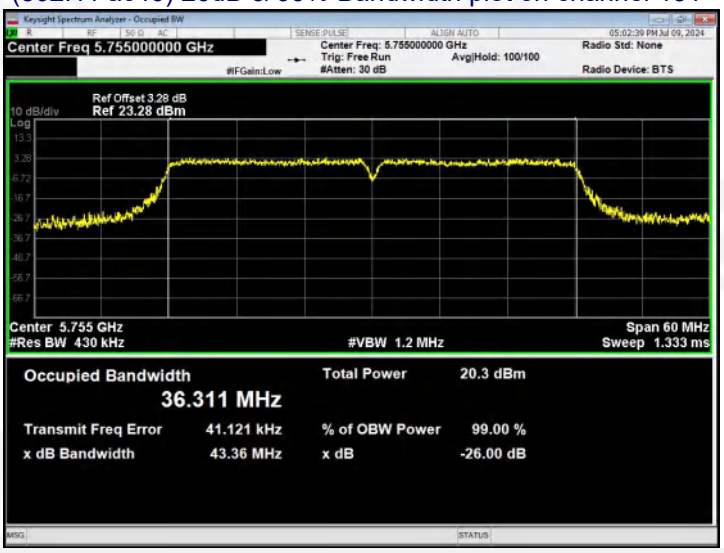
(802.11 ac40) 99% Bandwidth plot on channel 159



SISO ANT B - 802.11ac40

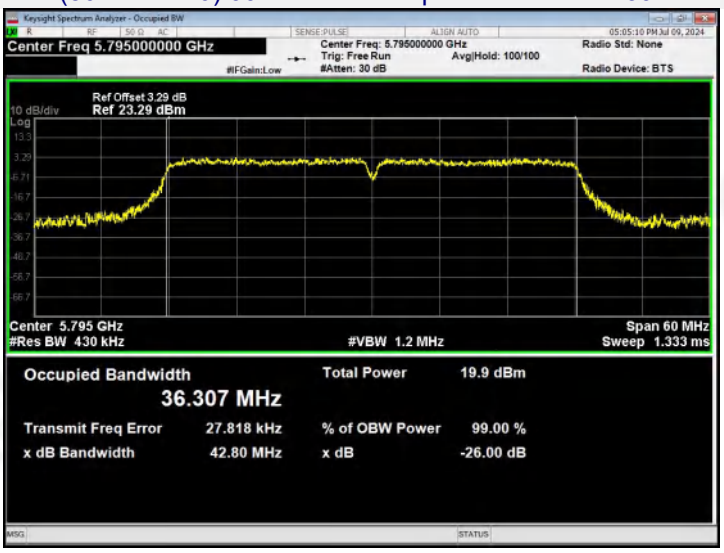
(802.11 ac40) 6dB Bandwidth plot on channel 151

(802.11 ac40) 26dB & 99% Bandwidth plot on channel 151



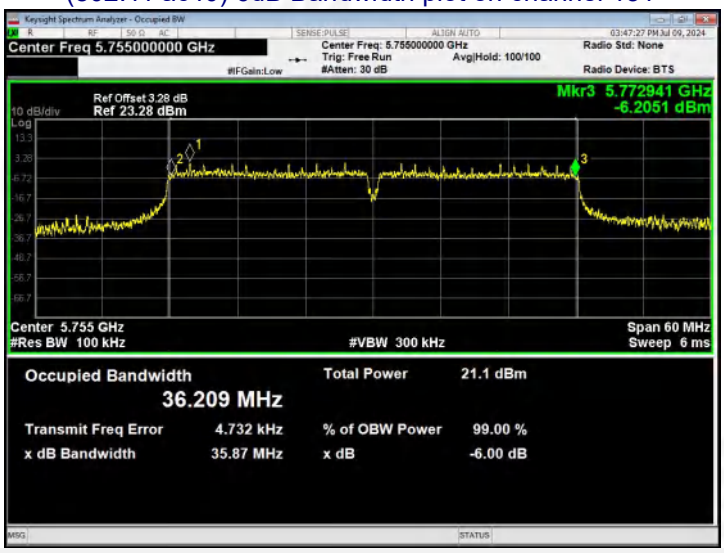
(802.11 ac40) 6dB Bandwidth plot on channel 159

(802.11 ac40) 99% Bandwidth plot on channel 159

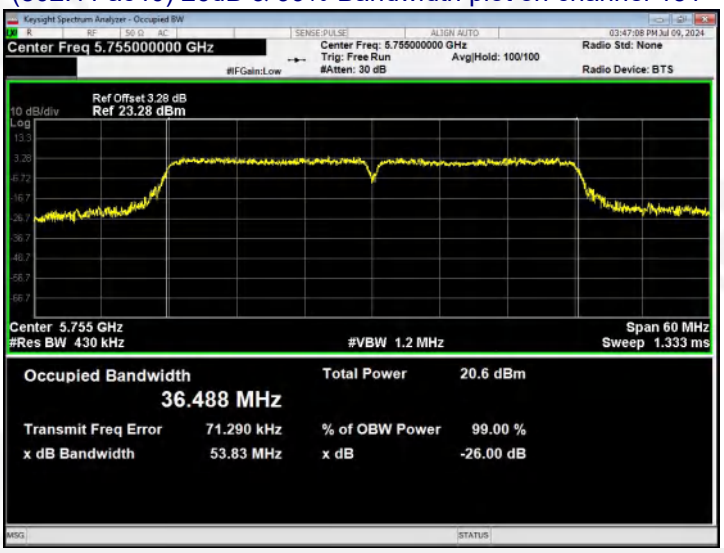


MIMO ANT A - 802.11ac40

(802.11 ac40) 6dB Bandwidth plot on channel 151

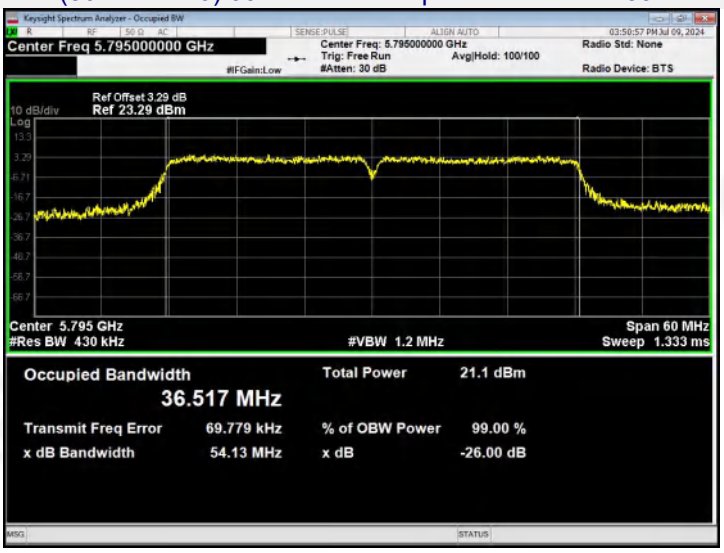


(802.11 ac40) 26dB & 99% Bandwidth plot on channel 151



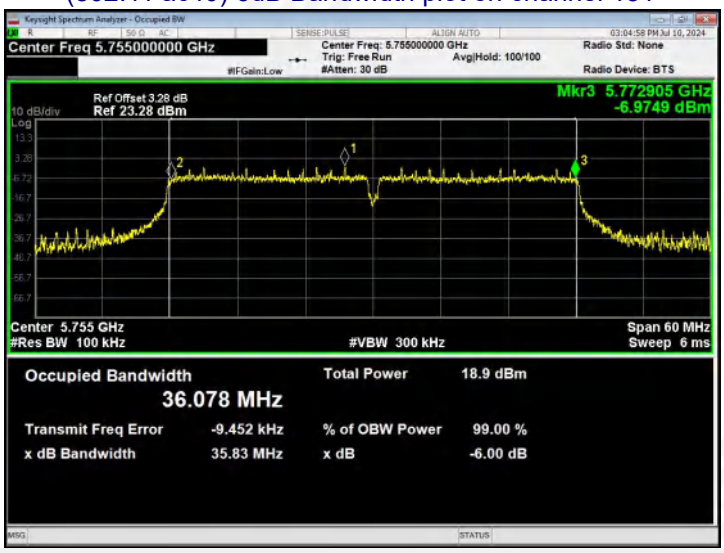
(802.11 ac40) 6dB Bandwidth plot on channel 159

(802.11 ac40) 99% Bandwidth plot on channel 159

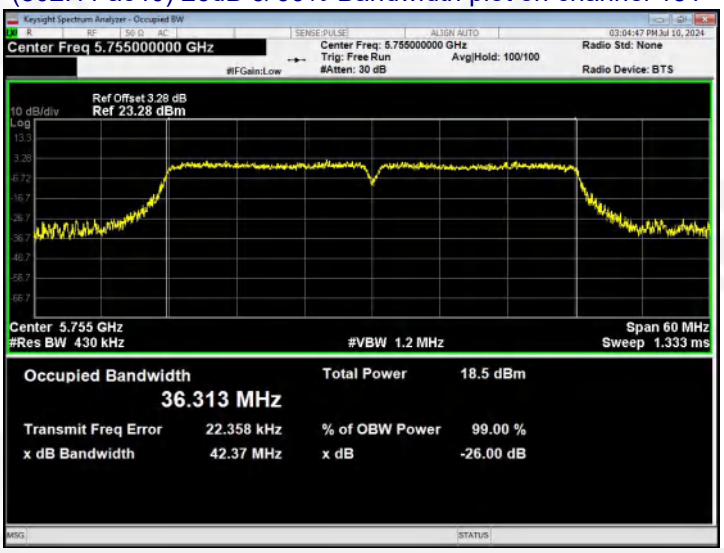


MIMO ANT B - 802.11ac40

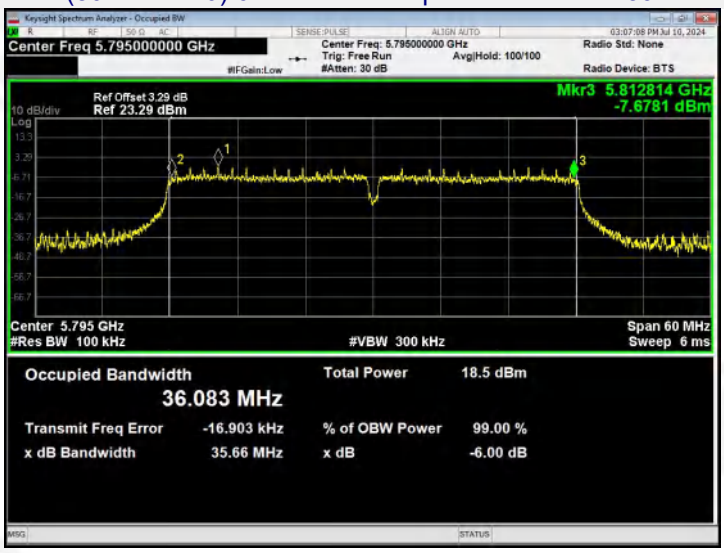
(802.11 ac40) 6dB Bandwidth plot on channel 151



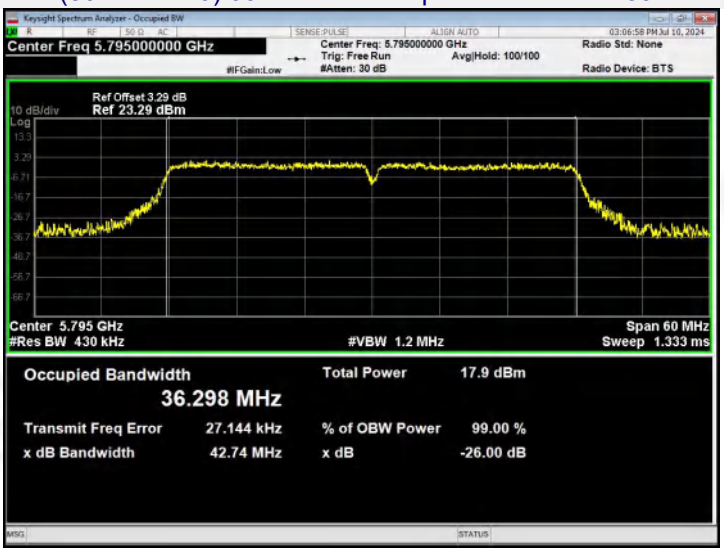
(802.11 ac40) 26dB & 99% Bandwidth plot on channel 151



(802.11 ac40) 6dB Bandwidth plot on channel 159



(802.11 ac40) 99% Bandwidth plot on channel 159



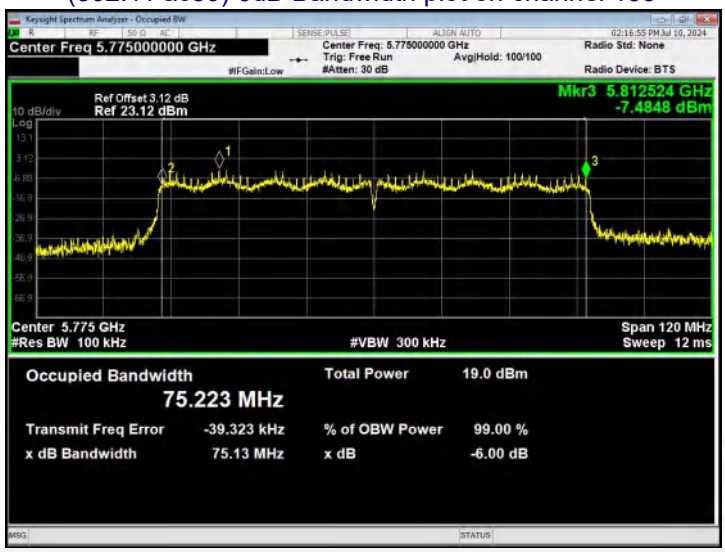
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V/60Hz

Test Mode	Antenna	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
802.11ac80	SISO ANT A	5775	75.13	>500	Pass
	SISO ANT B	5775	75.05	>500	Pass
	MIMO ANT A	5775	75.10	>500	Pass
	MIMO ANT B	5775	75.09	>500	Pass

Test Mode	Antenna	Frequency (MHz)	26 Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
802.11ac80	SISO ANT A	5775	82.92	75.464	N/A	Pass
	SISO ANT B	5775	80.88	75.241	N/A	Pass
	MIMO ANT A	5775	108.90	75.545	N/A	Pass
	MIMO ANT B	5775	80.34	75.204	N/A	Pass

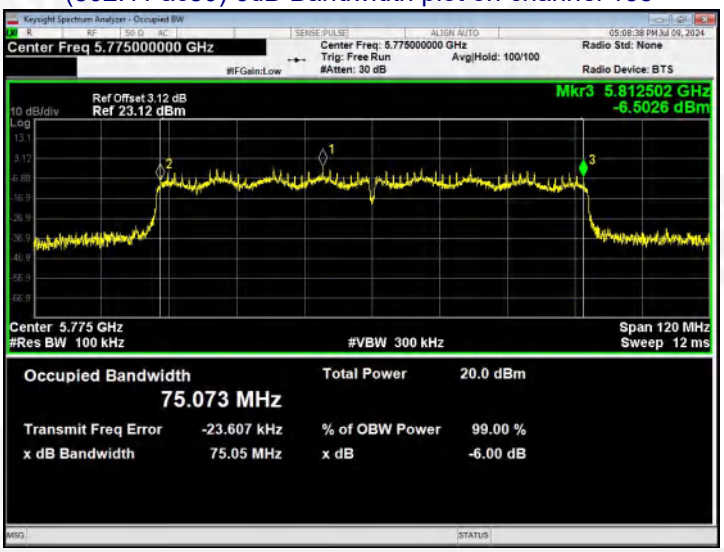
SISO ANT A - 802.11ac80

(802.11 ac80) 6dB Bandwidth plot on channel 155

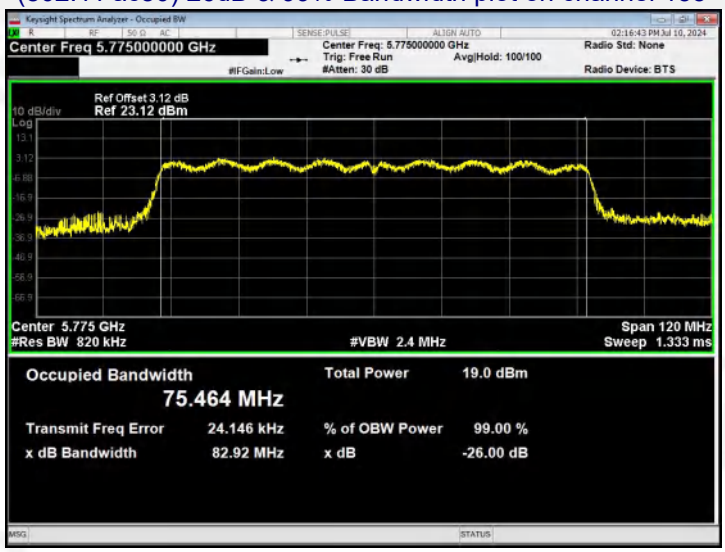


SISO ANT B - 802.11ac80

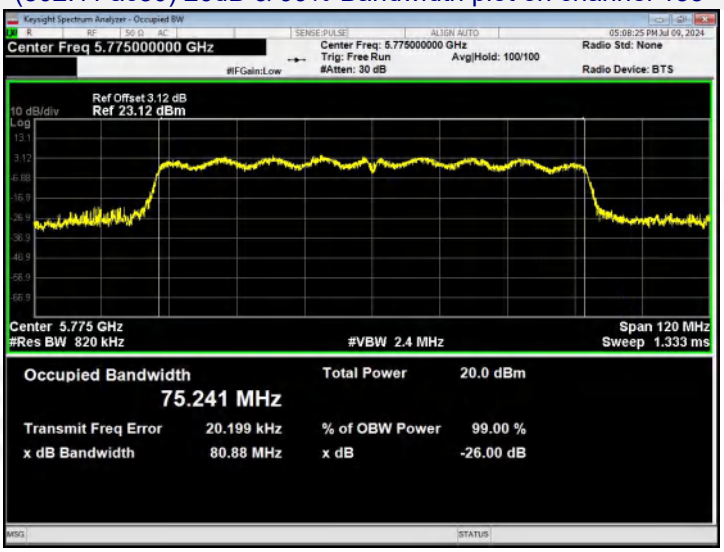
(802.11 ac80) 6dB Bandwidth plot on channel 155



(802.11 ac80) 26dB & 99% Bandwidth plot on channel 155

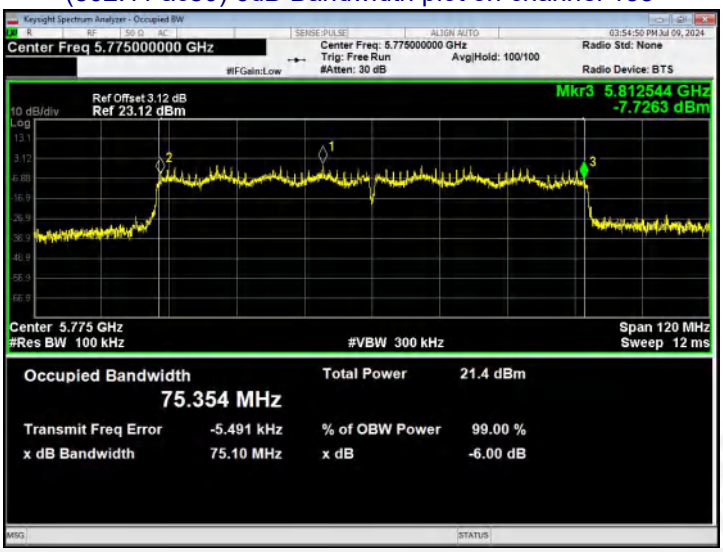


(802.11 ac80) 26dB & 99% Bandwidth plot on channel 155



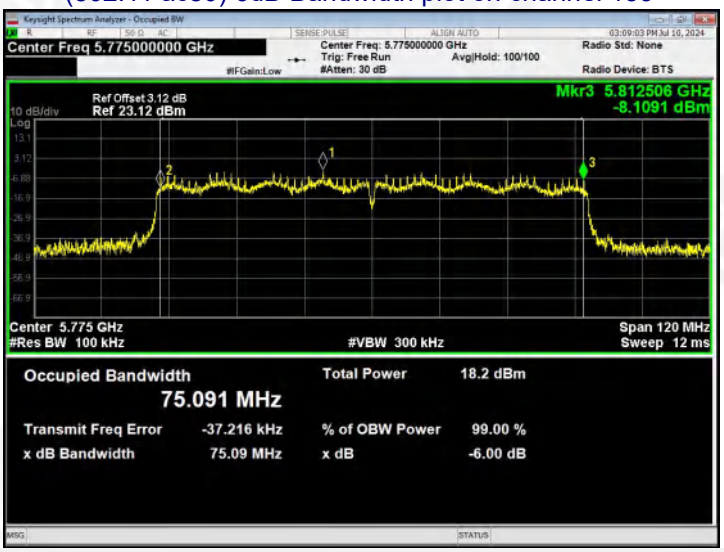
MIMO ANT A - 802.11ac80

(802.11 ac80) 6dB Bandwidth plot on channel 155

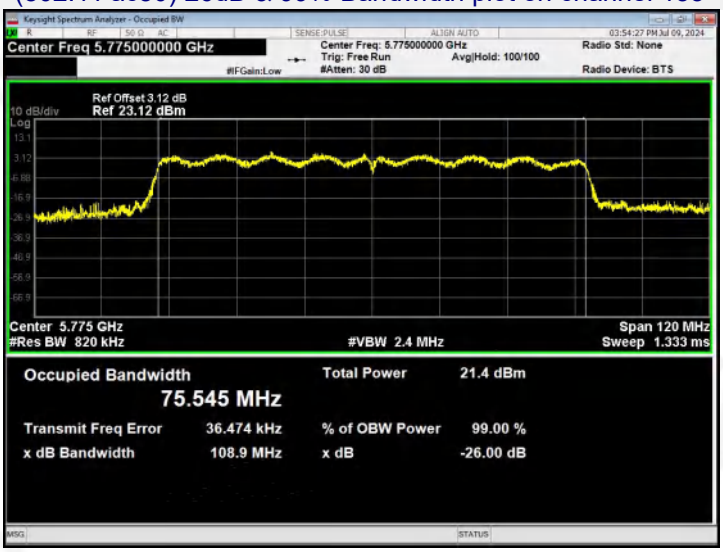


MIMO ANT B - 802.11ac80

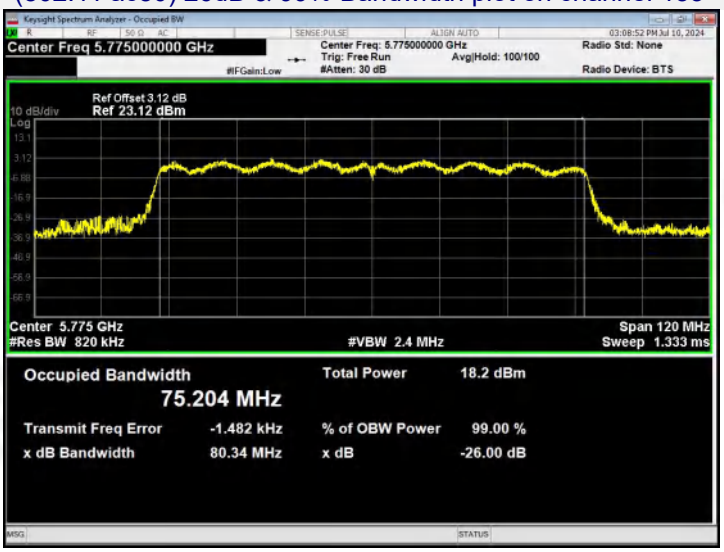
(802.11 ac80) 6dB Bandwidth plot on channel 155



(802.11 ac80) 26dB & 99% Bandwidth plot on channel 155



(802.11 ac80) 26dB & 99% Bandwidth plot on channel 155



7.MAXIMUM CONDUCTED OUTPUT POWER

7.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407
The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

7.2 TEST PROCEDURE

The EUT was directly connected to the Power meter

1. Device Configuration
If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).
a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

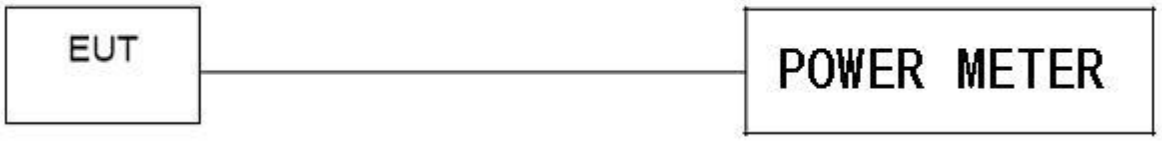
2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)
Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).
a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:
• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).
• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.
(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.
(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.
b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz

Test Mode	Antenna	Frequency (MHz)	Output power (dBm)	Duty cycle factor (dB)	Total power (dBm)	Limit (dBm)	Result
802.11a	SISO ANT A	5745	15.270	0.16	15.430	27.60	Pass
		5785	15.387	0.16	15.547		
		5825	16.159	0.16	16.319		
	SISO ANT B	5745	16.212	0.16	16.372	29.18	Pass
		5785	15.731	0.16	15.891		
		5825	15.882	0.16	16.042		
802.11n20	SISO ANT A	5745	16.343	0.17	16.513	27.60	Pass
		5785	16.509	0.17	16.679		
		5825	17.319	0.17	17.489		
	SISO ANT B	5745	15.741	0.17	15.911	29.18	Pass
		5785	15.202	0.17	15.372		
		5825	15.327	0.17	15.497		
	MIMO ANT A	5745	13.837	0.17	14.007	27.60	Pass
		5785	14.102	0.17	14.272		
		5825	15.327	0.17	15.497		
	MIMO ANT B	5745	13.771	0.17	13.941	29.18	Pass
		5785	12.762	0.17	12.932		
		5825	12.924	0.17	13.094		
	MIMO ANT A+B	5745	16.423	/	16.423	25.35	Pass
		5785	16.399	/	16.399		
		5825	17.341	/	17.341		
802.11n40	SISO ANT A	5755	14.970	0.34	15.310	27.60	Pass
		5795	15.472	0.34	15.812		
	SISO ANT B	5755	14.552	0.34	14.892	29.18	Pass
		5795	14.064	0.34	14.404		
	MIMO ANT A	5755	12.410	0.34	12.750	27.60	Pass
		5795	13.022	0.34	13.362		
	MIMO ANT B	5755	12.651	0.34	12.991	29.18	Pass
		5795	12.088	0.34	12.428		

	MIMO ANT A+B	5755	15.542	/	15.542	25.35	Pass
		5795	15.590	/	15.590		
Note: Total power = Output power + Duty cycle factor.							

If the antenna gain exceeds 6 dBi, the limit must be reduced by the excess value. For example, Antenna A has a gain of 8.40 dBi (exceeding by 2.40 dBi), and Antenna B has a gain of 6.82 dBi (exceeding by 0.82 dBi). Additionally, the combined gain of Antennas A + B is 10.65 dBi(exceeding by 4.65 dBi).

Test Mode	Antenna	Frequency (MHz)	Output power (dBm)	Duty cycle factor (dB)	Total power (dBm)	Limit (dBm)	Result
802.11ac20	SISO ANT A	5745	16.297	0.17	16.467	27.60	Pass
		5785	16.528	0.17	16.698		
		5825	17.216	0.17	17.386		
	SISO ANT B	5745	15.602	0.17	15.772	29.18	Pass
		5785	15.051	0.17	15.221		
		5825	15.227	0.17	15.397		
	MIMO ANT A	5745	13.315	0.17	13.485	27.60	Pass
		5785	13.795	0.17	13.965		
		5825	14.711	0.17	14.881		
	MIMO ANT B	5745	13.296	0.17	13.466	29.18	Pass
		5785	12.659	0.17	12.829		
		5825	13.013	0.17	13.183		
	MIMO ANT A+B	5745	16.508	/	16.508	25.35	Pass
		5785	16.409	/	16.409		
		5825	17.201	/	17.201		
802.11ac40	SISO ANT A	5755	14.79	0.34	15.130	27.60	Pass
		5795	15.575	0.34	15.915		
	SISO ANT B	5755	14.653	0.34	14.993	29.18	Pass
		5795	14.039	0.34	14.379		
	MIMO ANT A	5755	12.35	0.34	12.690	27.60	Pass
		5795	13.016	0.34	13.356		
	MIMO ANT B	5755	12.509	0.34	12.849	29.18	Pass
		5795	12.008	0.34	12.348		
	MIMO ANT A+B	5755	15.493	/	15.493	25.35	Pass
		5795	15.791	/	15.791		
802.11ac80	SISO ANT A	5775	14.927	0.66	15.587	27.60	Pass
	SISO ANT B	5775	13.954	0.65	14.604	29.18	Pass
	MIMO ANT A	5775	12.118	0.66	12.778	27.60	Pass
	MIMO ANT B	5775	11.575	0.66	12.235	29.18	Pass
	MIMO ANT A+B	5775	15.907	/	15.907	25.35	Pass
Note: Total power = Output power + Duty cycle factor.							

8.OUT OF BAND EMISSIONS

8.1 APPLICABLE STANDARD

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2)

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

8.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP

8.5 EUT OPERATION CONDITIONS

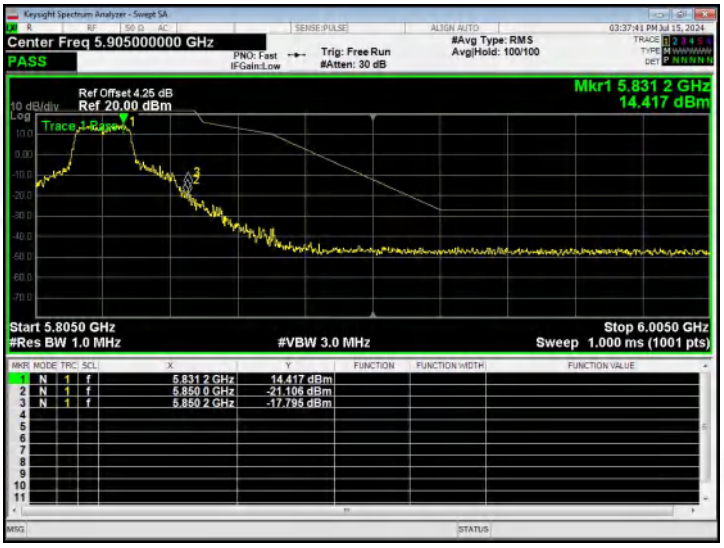
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage：	AC 120V/60Hz
Test band：	5.8G	Antenna gain：	ANT A :8.40dBi
			ANT B :6.82dBi

SISO ANT A - 802.11a

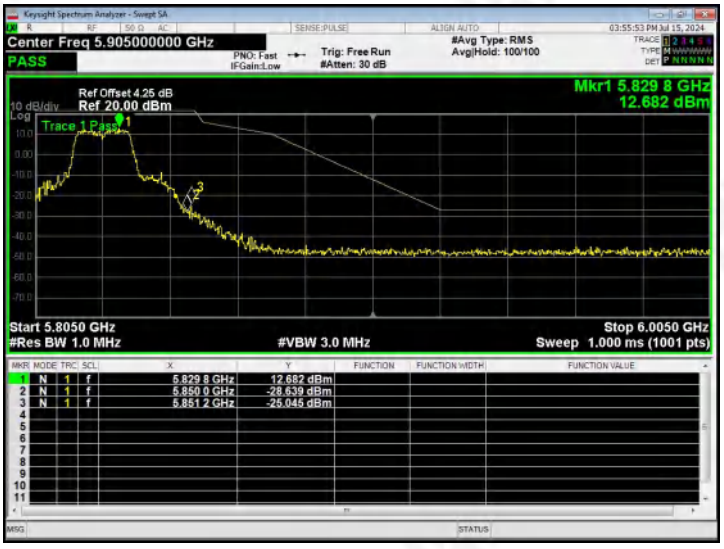
Lowest channel



Highest channel

SISO ANT B - 802.11a

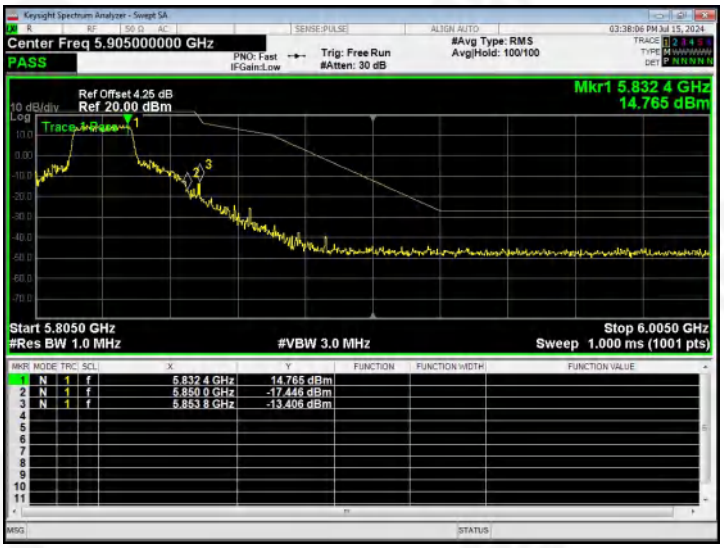
Lowest channel



Highest channel

SISO ANT A - 802.11n20

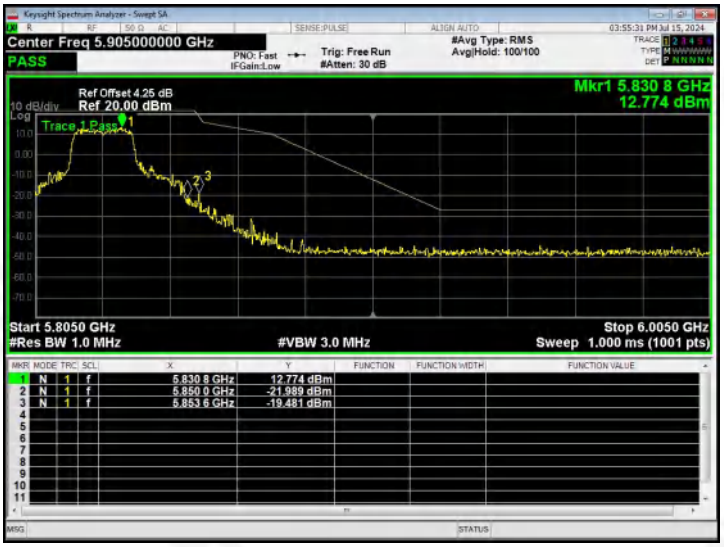
Lowest channel



Highest channel

MIMO ANT A + B - 802.11n20

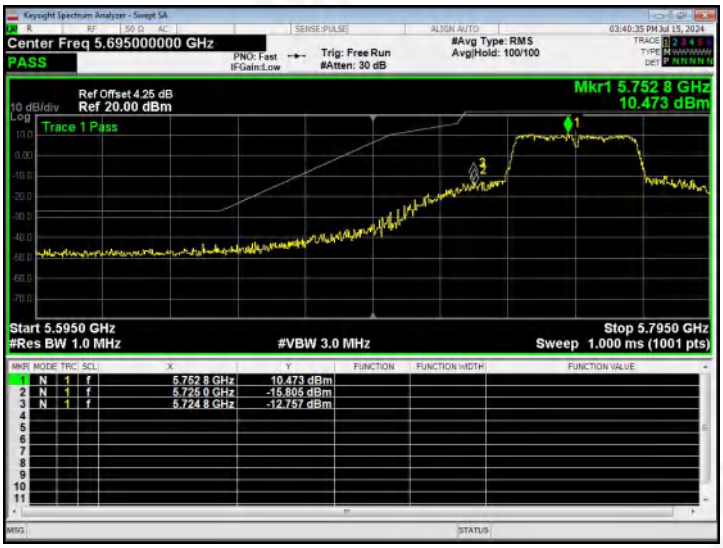
Lowest channel



Highest channel

Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

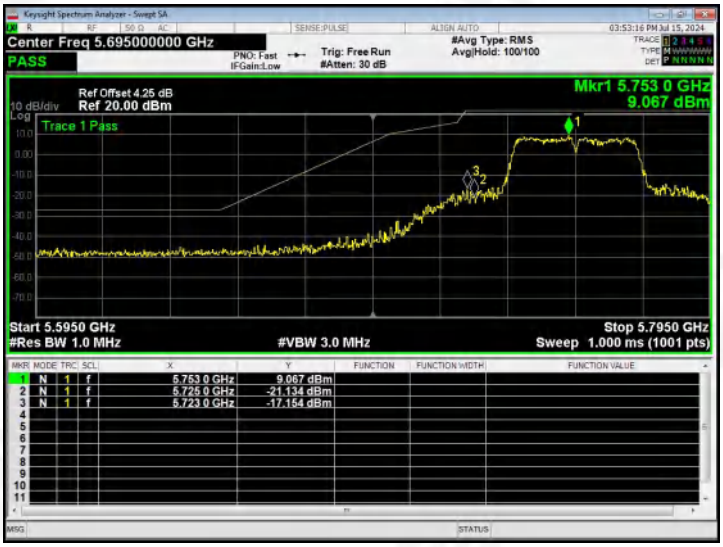
SISO ANT A - 802.11n40



Lowest channel

Highest channel

MIMO ANT A + B- 802.11n40



Lowest channel

Highest channel

Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

SISO ANT A - 802.11ac20

Lowest channel

Highest channel

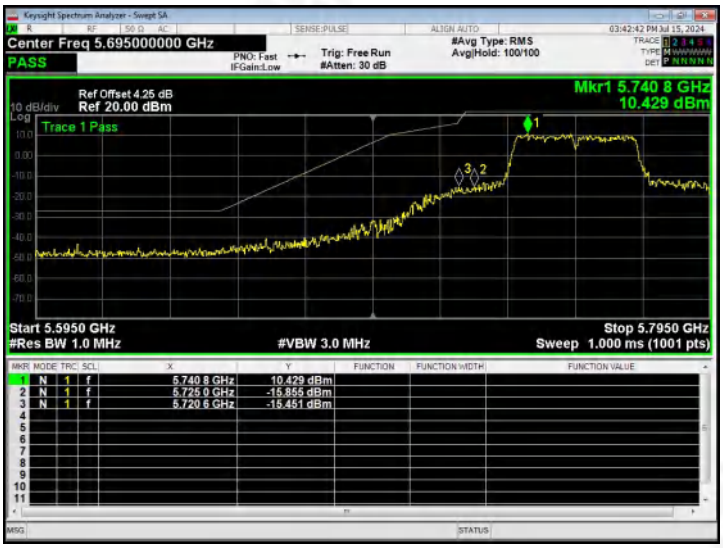
MIMO ANT A + B - 802.11ac20

Lowest channel

Highest channel

Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

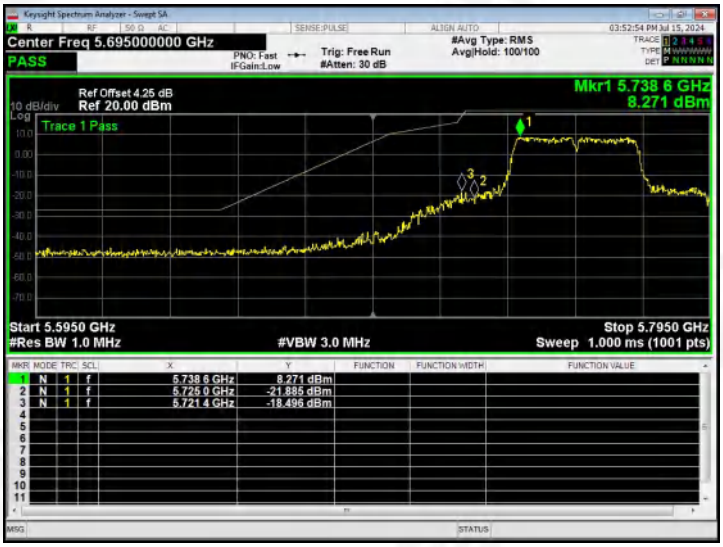
SISO ANT A - 802.11ac40



Lowest channel

Highest channel

MIMO ANT A + B- 802.11ac40

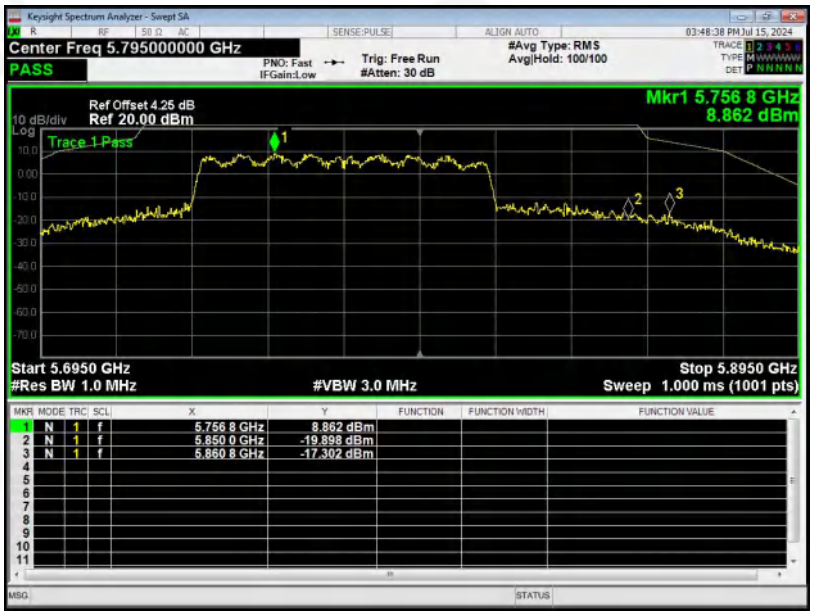


Lowest channel

Highest channel

Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

SISO ANT A - 802.11ac80



Channel 155

MIMO ANT A + B - 802.11ac80

Channel 155

Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

9.SPURIOUS RF CONDUCTED EMISSIONS

9.1 CONFORMANCE LIMIT

Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p. -27 dBm
5725 - 5850	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

9.2 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

9.3 TEST SETUP

9.4 TEST PROCEDURE

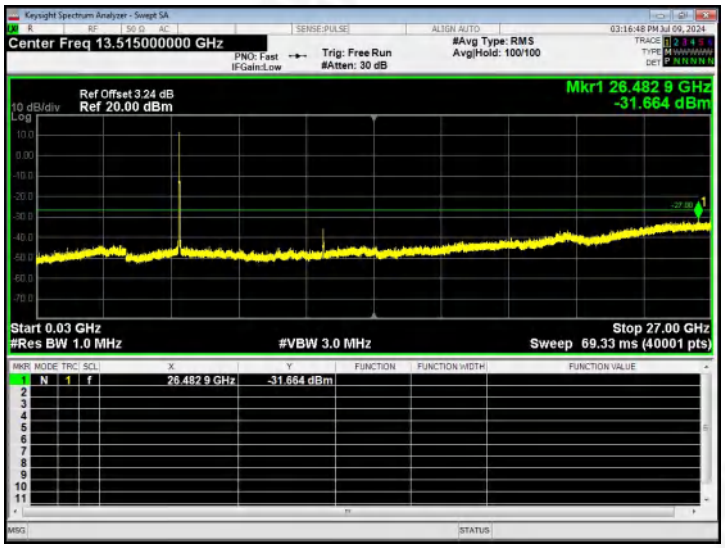
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=1MHz and VBW= 3MHz to measure the peak field strength, and measure frequency range from 30MHz to 26.5GHz.

9.5 TEST RESULTS

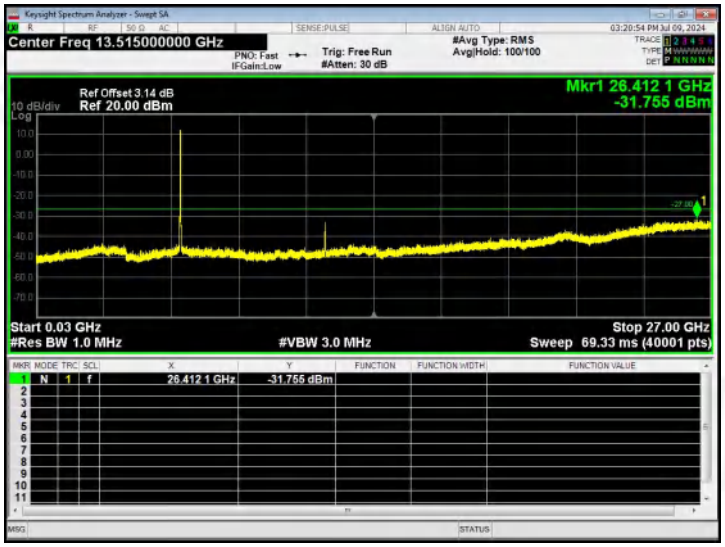
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage：	AC 120V/60Hz
Test band：	5.8G		
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. And above 26.5GHz of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.			

SISO ANT A - 802.11a

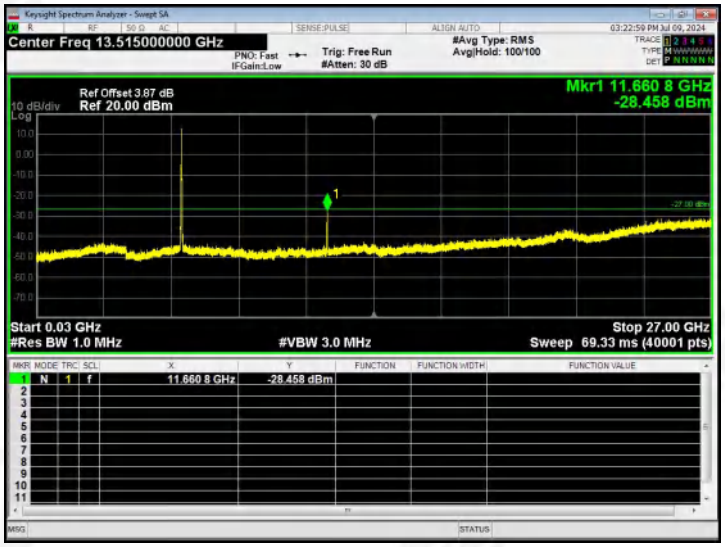
802.11a on channel 149



802.11a on channel 157

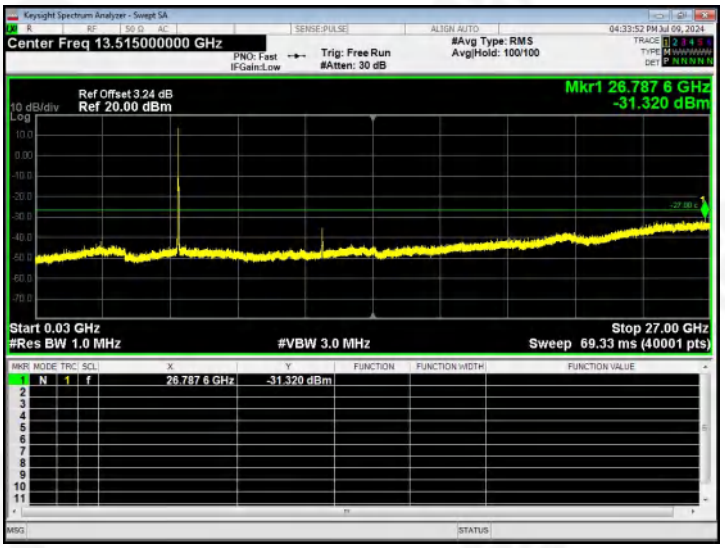


802.11a on channel 165

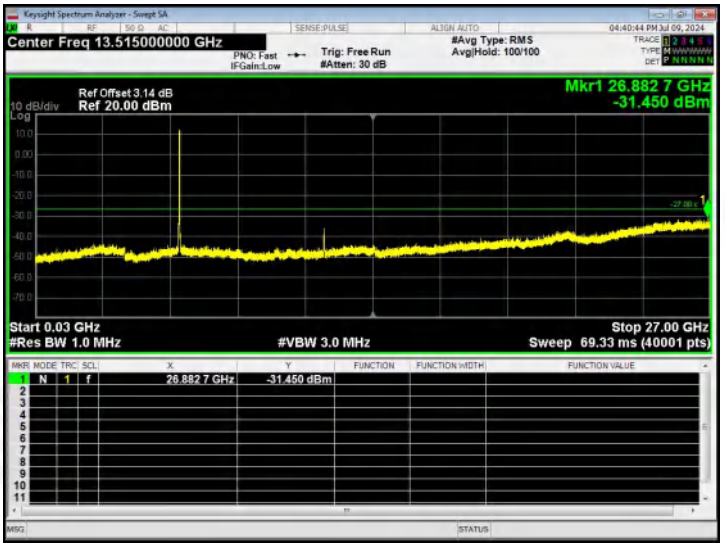


SISO ANT B - 802.11a

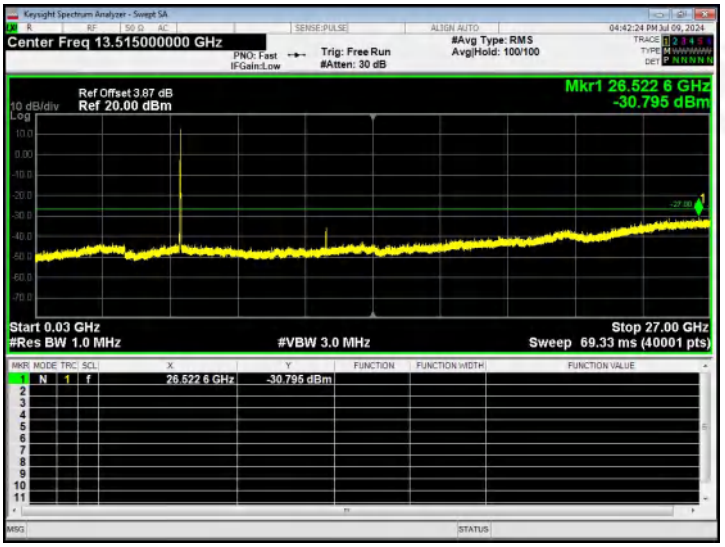
802.11a on channel 149



802.11a on channel 157

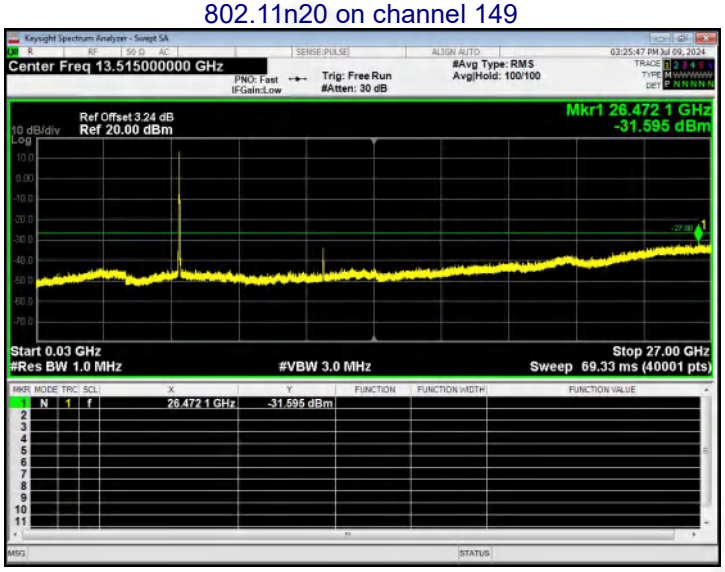


802.11a on channel 165

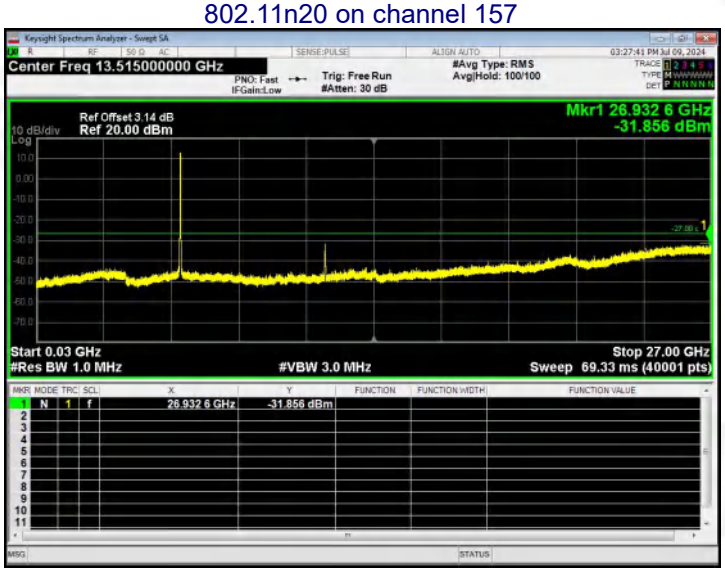


SISO ANT A - 802.11n20

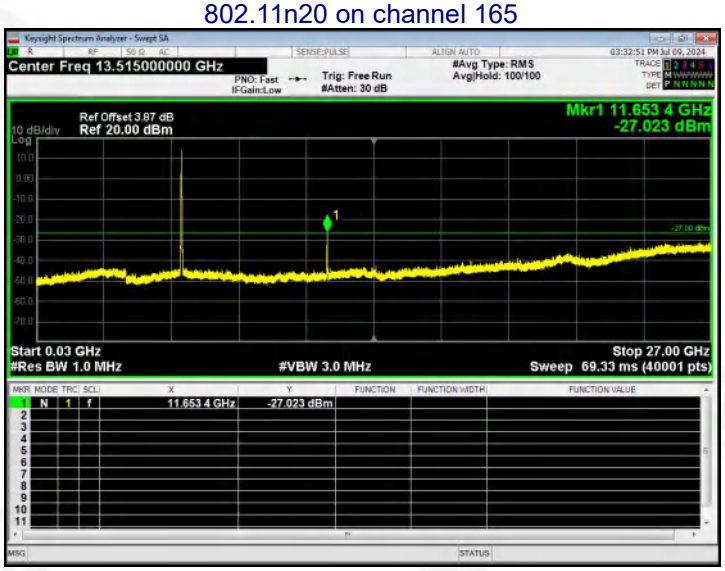
802.11n20 on channel 149



802.11n20 on channel 157

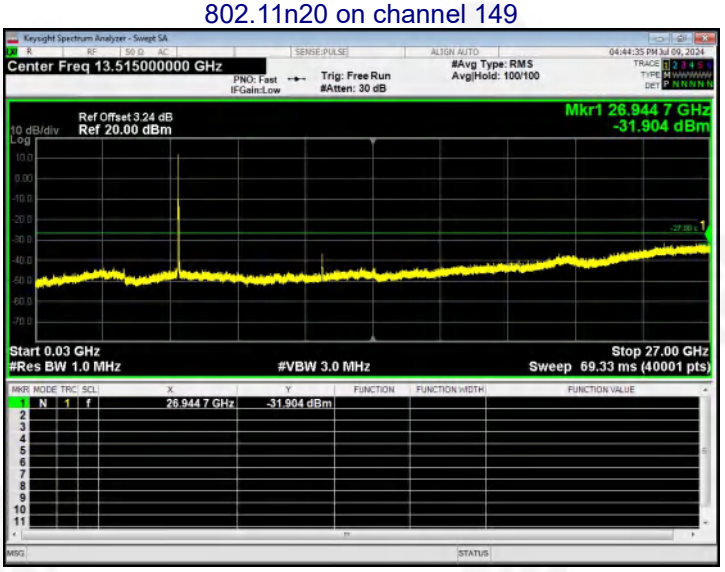


802.11n20 on channel 165

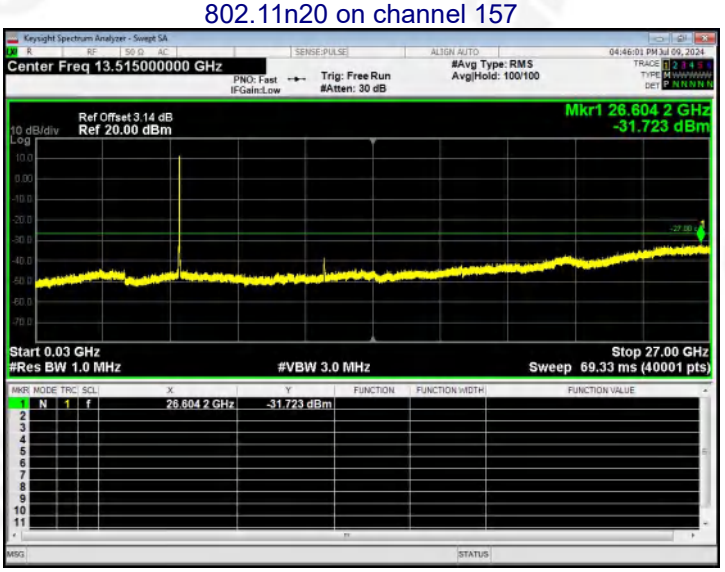


MIMO ANT A +B - 802.11n20

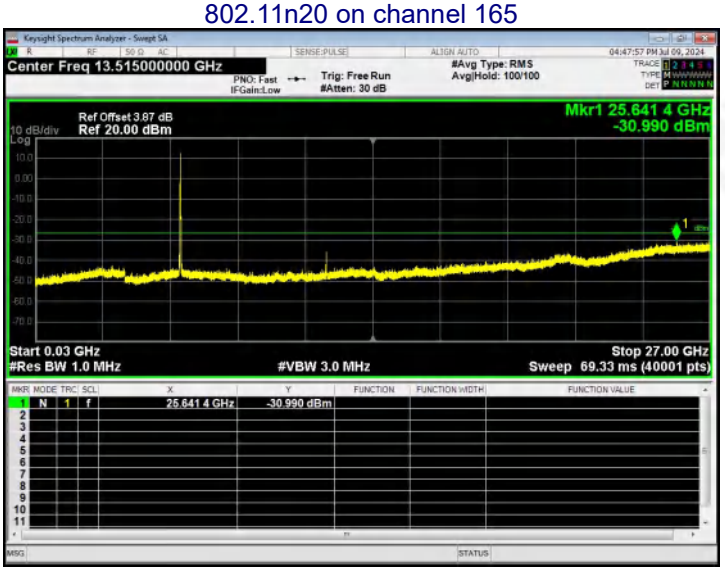
802.11n20 on channel 149



802.11n20 on channel 157



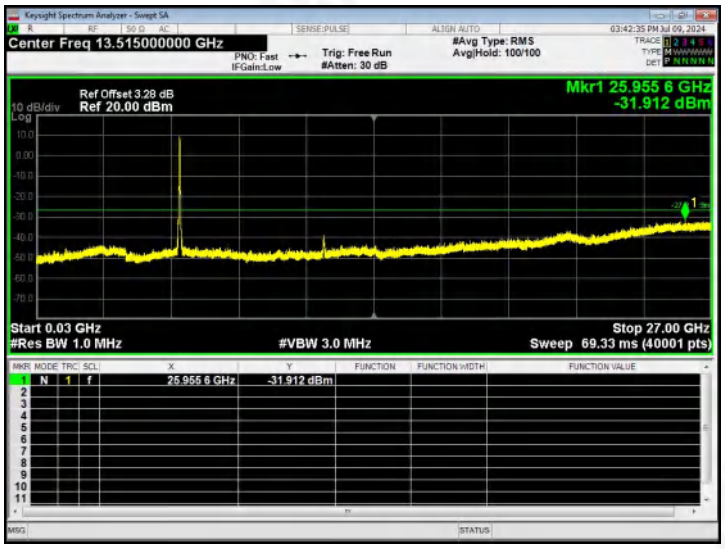
802.11n20 on channel 165



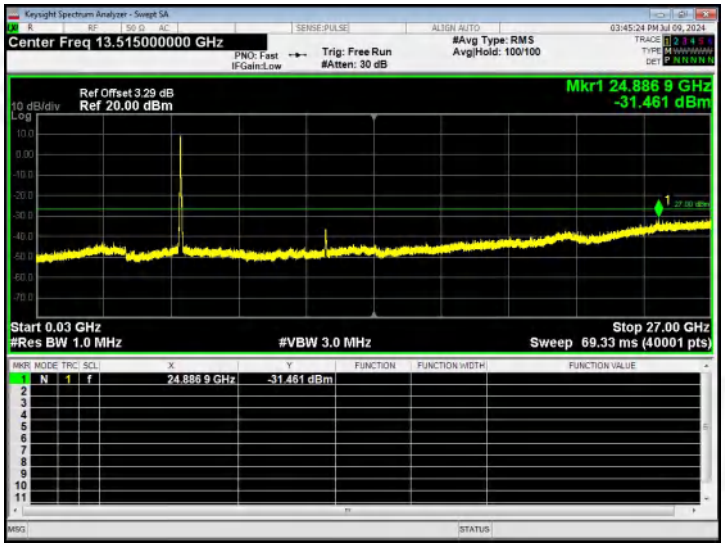
Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

SISO ANT A - 802.11n40

802.11n40 on channel 151

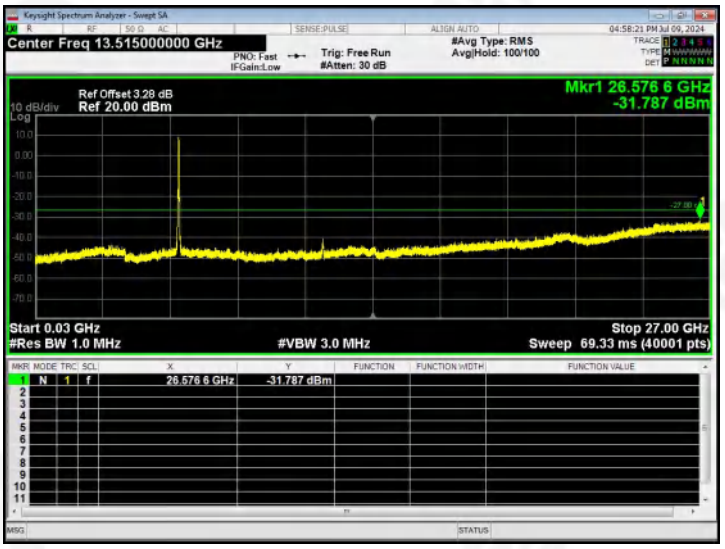


802.11n40 on channel 159

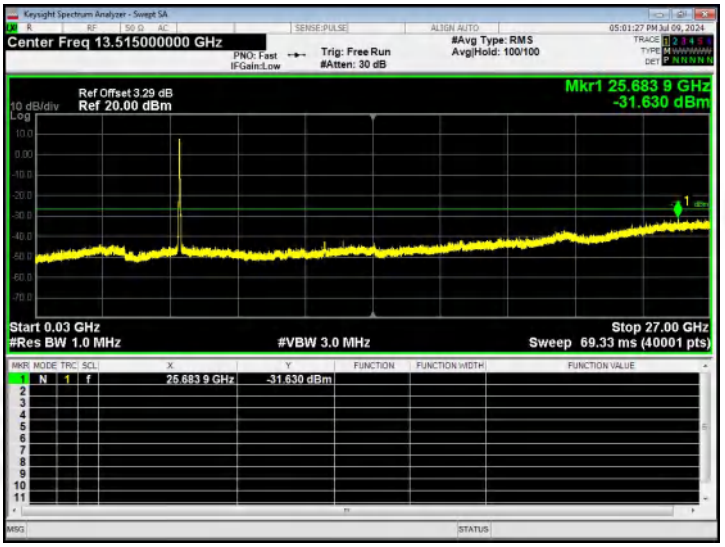


MIMO ANT A + B - 802.11n40

802.11n40 on channel 151



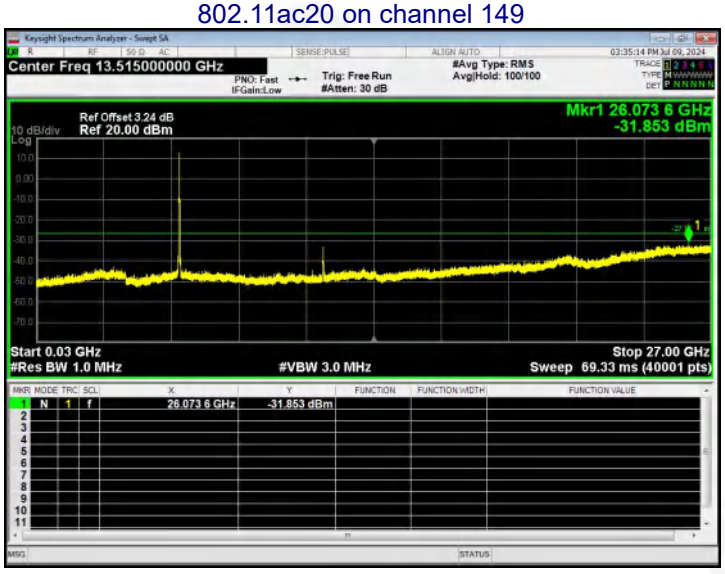
802.11n40 on channel 159



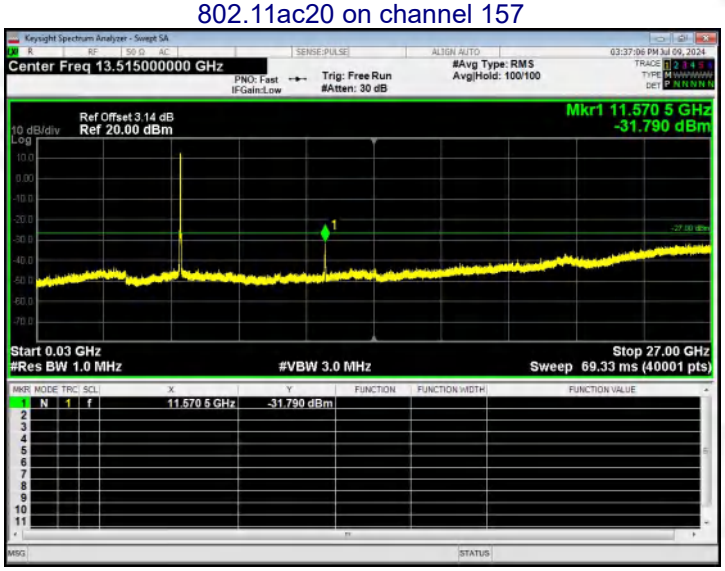
Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

SISO ANT A - 802.11ac20

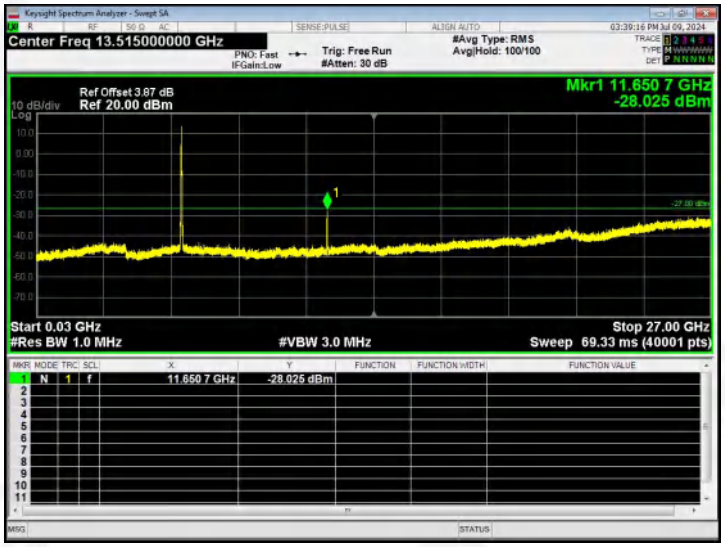
802.11ac20 on channel 149



802.11ac20 on channel 157

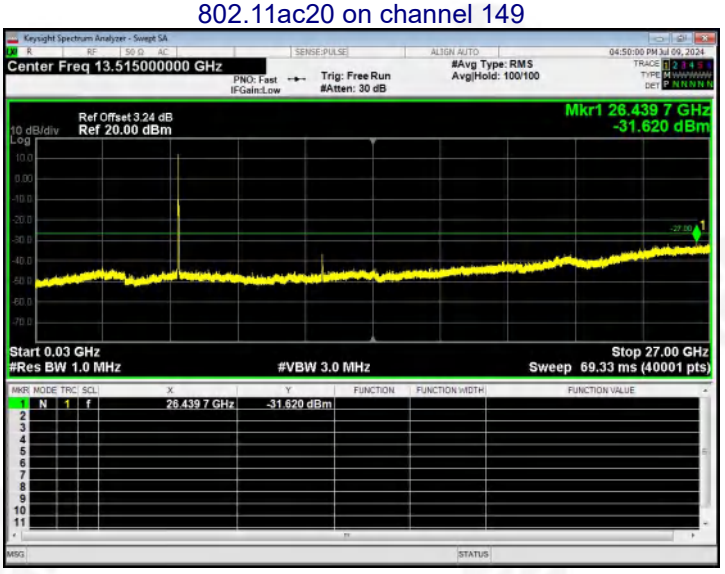


802.11ac20 on channel 165

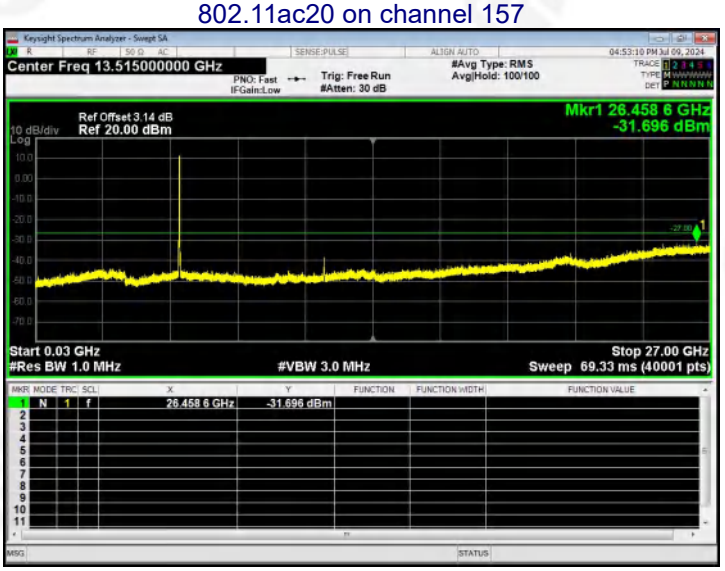


MIMO ANT A + B - 802.11ac20

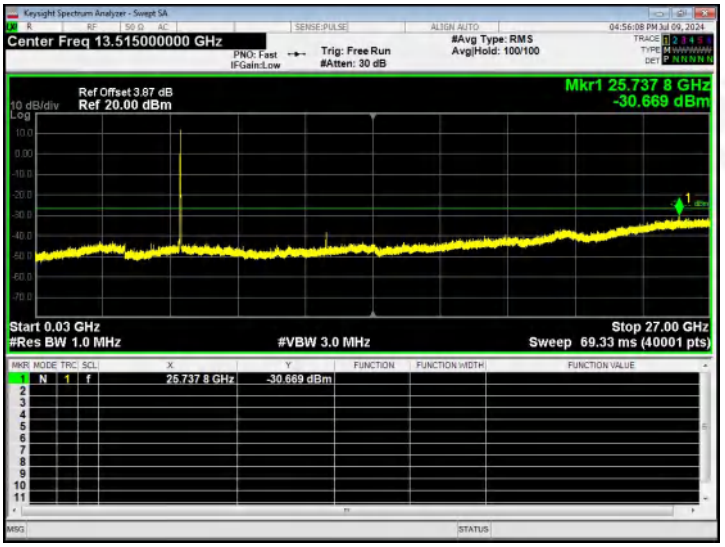
802.11ac20 on channel 149



802.11ac20 on channel 157



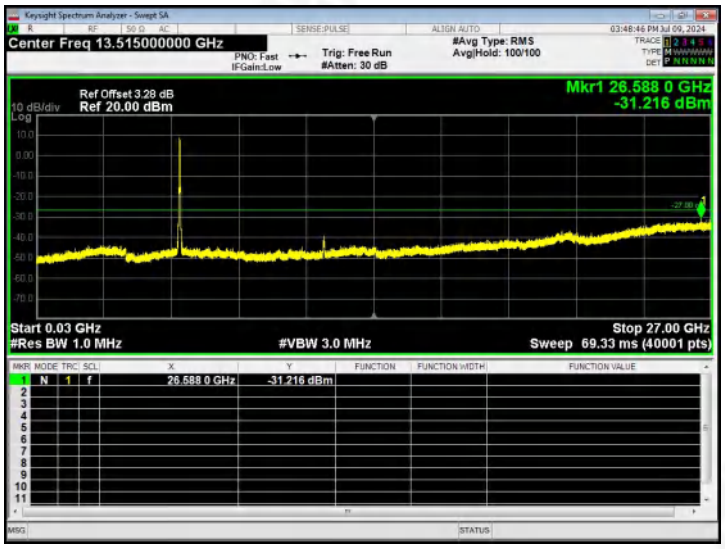
802.11ac20 on channel 165



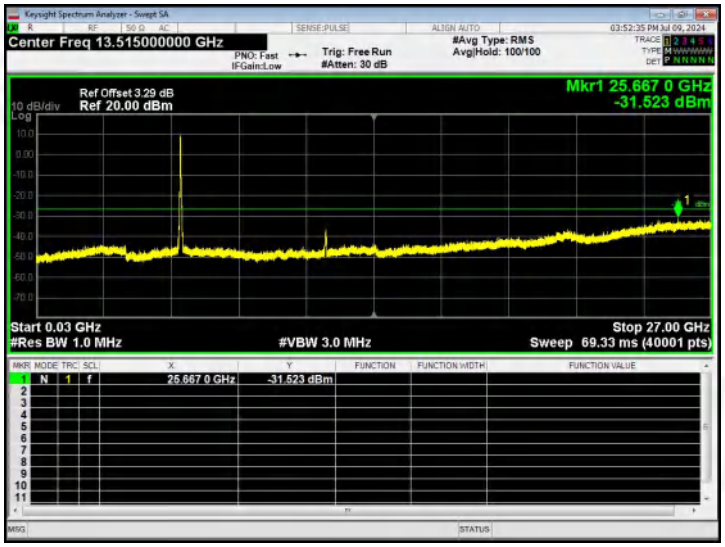
Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

SISO ANT A - 802.11ac40

802.11ac40 on channel 151

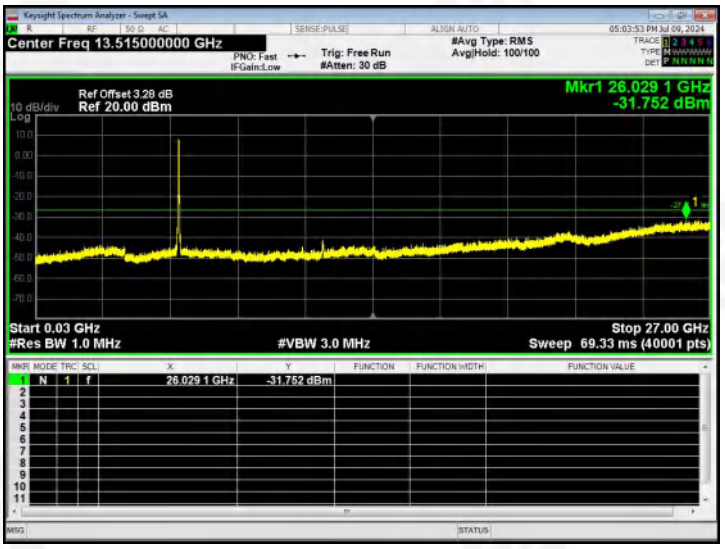


802.11ac40 on channel 159

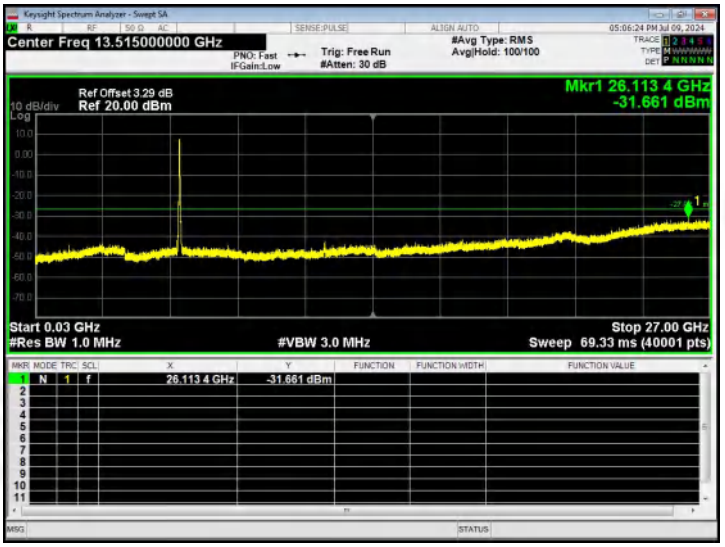


MIMO ANT A + B - 802.11ac40

802.11ac40 on channel 151



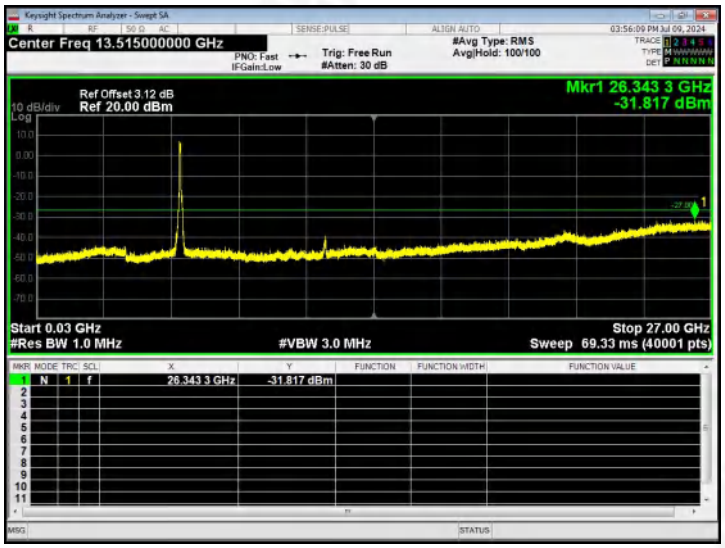
802.11ac40 on channel 159



Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

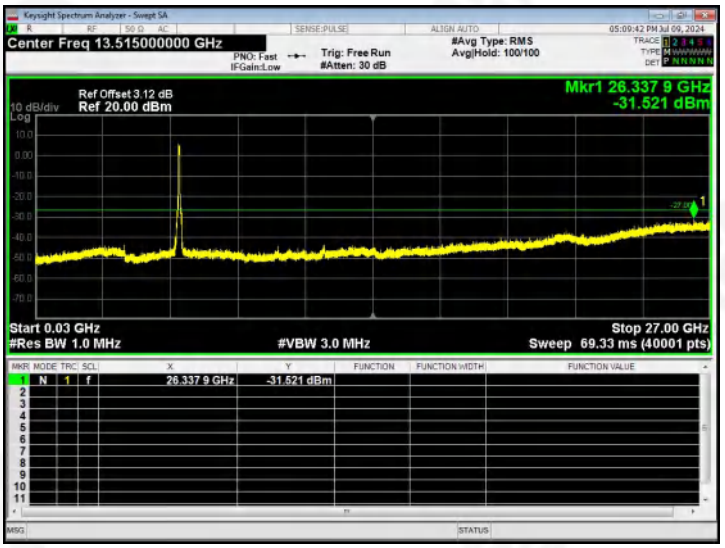
SISO ANT A - 802.11ac80

802.11ac80 on channel 155



MIMO ANT A + B - 802.11ac80

802.11ac80 on channel 155



Note: Both SISO ANT A&B and MIMO ANT A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO ANT A+B.

10.FREQUENCY STABILITY MEASUREMENT

10.1 LIMIT

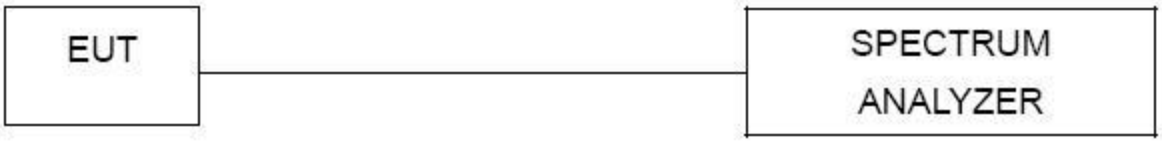
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

10.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C~70°C.

10.3 TEST SETUP LAYOUT



10.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

10.5 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1012 hPa	Test Voltage ：	AC 120V/60Hz
Test Band ：	5.8G		
Note: All channels have been tested, and only the worst test data is recorded in this report. Both SISO ANT A&B and MIMO A&B passed the test, the test data shows only the worst case SISO ANT A and MIMO A.			

Reference Frequency: SISO ANT A 802.11a - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5744.967	-5.689
40	120V/60Hz	5744.974	-4.452
30	120V/60Hz	5744.966	-5.851
25	120V/60Hz	5744.978	-3.915
10	120V/60Hz	5744.971	-4.982
0	120V/60Hz	5744.979	-3.610
-10	120V/60Hz	5744.972	-4.797
-20	120V/60Hz	5744.978	-3.759

Reference Frequency: SISO ANT B 802.11a - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5744.979	-3.610
40	120V/60Hz	5744.977	-3.996
30	120V/60Hz	5744.961	-6.856
25	120V/60Hz	5744.972	-4.797
10	120V/60Hz	5744.968	-5.645
0	120V/60Hz	5744.979	-3.655
-10	120V/60Hz	5744.967	-5.745
-20	120V/60Hz	5744.963	-6.389

Reference Frequency: SISO ANT A 802.11n20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5744.974	-4.593
40	120V/60Hz	5744.977	-3.962
30	120V/60Hz	5744.975	-4.362
25	120V/60Hz	5744.975	-4.420
10	120V/60Hz	5744.975	-4.272
0	120V/60Hz	5744.976	-4.187
-10	120V/60Hz	5744.980	-3.558
-20	120V/60Hz	5744.971	-5.009

Reference Frequency: MIMO ANT A 802.11n20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5744.980	-3.548
40	120V/60Hz	5744.970	-5.168
30	120V/60Hz	5744.972	-4.896
25	120V/60Hz	5744.979	-3.569
10	120V/60Hz	5744.978	-3.811
0	120V/60Hz	5744.980	-3.537
-10	120V/60Hz	5744.974	-4.471
-20	120V/60Hz	5744.979	-3.658

Reference Frequency: SISO ANT A 802.11n40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5754.997	-0.475
40	120V/60Hz	5754.991	-1.507
30	120V/60Hz	5755.000	-0.064
25	120V/60Hz	5754.986	-2.397
10	120V/60Hz	5754.980	-3.449
0	120V/60Hz	5754.990	-1.714
-10	120V/60Hz	5754.977	-3.977
-20	120V/60Hz	5754.986	-2.433

Reference Frequency: MIMO ANT A 802.11n40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5754.984	-2.842
40	120V/60Hz	5754.984	-2.863
30	120V/60Hz	5754.999	-0.122
25	120V/60Hz	5754.997	-0.464
10	120V/60Hz	5754.996	-0.689
0	120V/60Hz	5754.986	-2.370
-10	120V/60Hz	5754.979	-3.587
-20	120V/60Hz	5754.991	-1.503

Reference Frequency: SISO ANT A 802.11ac20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5744.976	-4.233
40	120V/60Hz	5744.976	-4.109
30	120V/60Hz	5744.971	-5.107
25	120V/60Hz	5744.973	-4.747
10	120V/60Hz	5744.970	-5.211
0	120V/60Hz	5744.972	-4.932
-10	120V/60Hz	5744.972	-4.865
-20	120V/60Hz	5744.972	-4.794

Reference Frequency: MIMO ANT A 802.11ac20 - 5745MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5744.980	-3.515
40	120V/60Hz	5744.970	-5.187
30	120V/60Hz	5744.972	-4.883
25	120V/60Hz	5744.978	-3.881
10	120V/60Hz	5744.971	-5.036
0	120V/60Hz	5744.974	-4.456
-10	120V/60Hz	5744.972	-4.801
-20	120V/60Hz	5744.974	-4.574

Reference Frequency: SISO ANT A 802.11ac40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5754.998	-0.407
40	120V/60Hz	5754.990	-1.809
30	120V/60Hz	5754.992	-1.412
25	120V/60Hz	5754.976	-4.224
10	120V/60Hz	5754.982	-3.083
0	120V/60Hz	5754.986	-2.463
-10	120V/60Hz	5754.985	-2.599
-20	120V/60Hz	5754.993	-1.245

Reference Frequency: MIMO ANT A 802.11ac40 - 5755MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5754.989	-1.927
40	120V/60Hz	5754.992	-1.366
30	120V/60Hz	5754.996	-0.638
25	120V/60Hz	5754.988	-2.149
10	120V/60Hz	5754.992	-1.460
0	120V/60Hz	5754.977	-3.967
-10	120V/60Hz	5754.987	-2.325
-20	120V/60Hz	5754.986	-2.512

Reference Frequency: SISO ANT A 802.11ac80 - 5775MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5775.019	3.367
40	120V/60Hz	5775.009	1.507
30	120V/60Hz	5775.021	3.595
25	120V/60Hz	5775.004	0.773
10	120V/60Hz	5775.020	3.491
0	120V/60Hz	5775.011	1.945
-10	120V/60Hz	5775.003	0.595
-20	120V/60Hz	5775.006	1.030

Reference Frequency: MIMO ANT A 802.11ac80 - 5775MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Deviation (ppm)
50	120V/60Hz	5775.016	2.740
40	120V/60Hz	5775.016	2.729
30	120V/60Hz	5775.011	1.977
25	120V/60Hz	5775.006	1.024
10	120V/60Hz	5775.018	3.158
0	120V/60Hz	5775.008	1.401
-10	120V/60Hz	5775.007	1.184
-20	120V/60Hz	5775.011	1.937

11. DUTY CYCLE

11.1 APPLIED PROCEDURES / LIMIT

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.

b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

3) Set VBW ≥ RBW. Set detector = peak or average.

4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T* and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7$ μs.)

11.2 DEVIATION FROM STANDARD

No deviation.

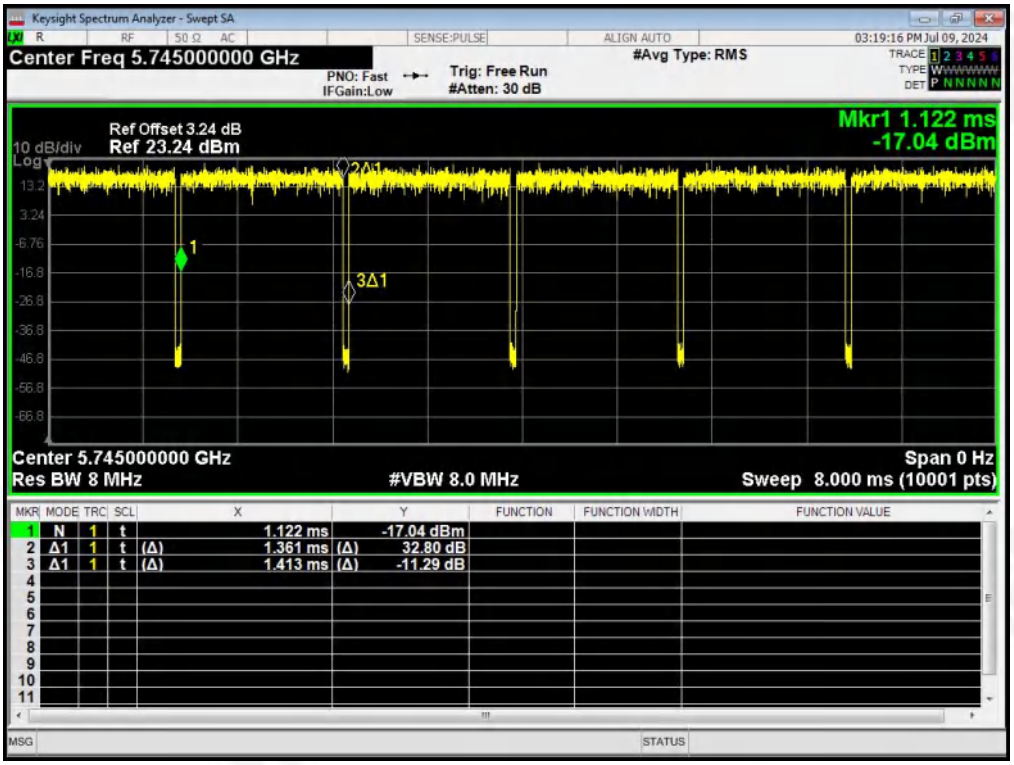
11.3 TEST SETUP

11.4 TEST RESULTS

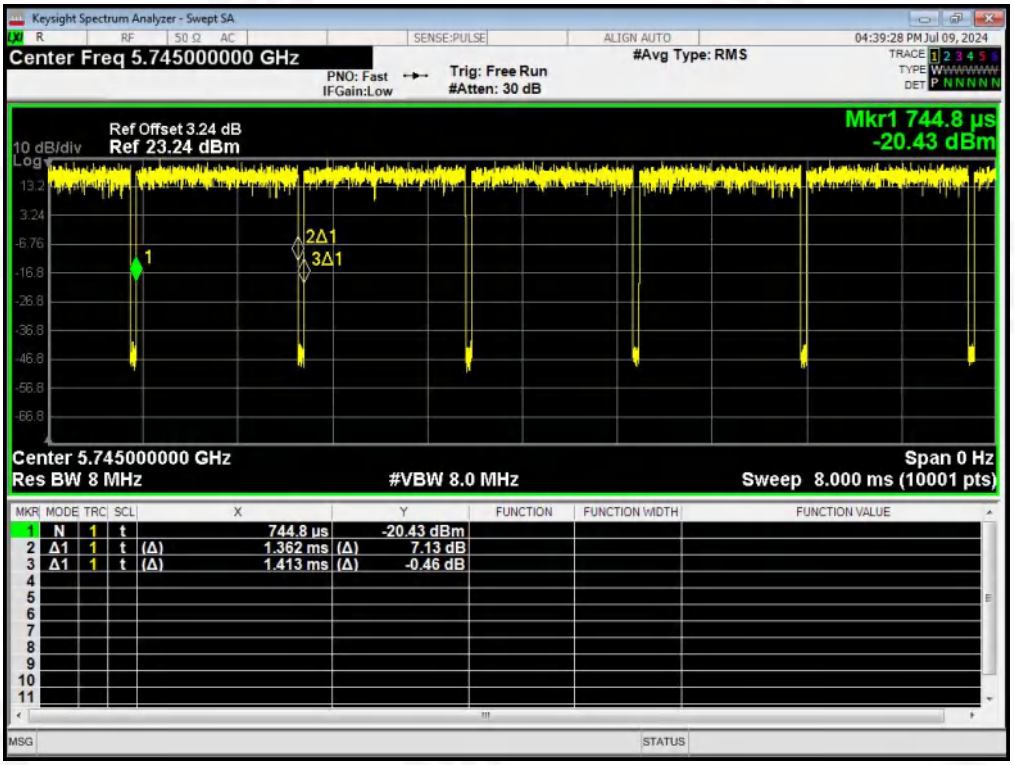
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Note: All channels have been tested, and only the worst test data is recorded in this report.			

Test Mode	Antenna	Frequency (MHz)	Duty Cycle (%)	Factor (dB)	Result
802.11a	SISO ANT A	5745	96.32	0.16	Pass
	SISO ANT B	5745	96.39	0.16	Pass
802.11n20	SISO ANT A	5745	96.15	0.17	Pass
	SISO ANT B	5745	96.15	0.17	Pass
	MIMO ANT A	5745	96.15	0.17	Pass
	MIMO ANT B	5745	96.15	0.17	Pass
802.11n40	SISO ANT A	5755	92.55	0.34	Pass
	SISO ANT B	5755	92.48	0.34	Pass
	MIMO ANT A	5755	92.48	0.34	Pass
	MIMO ANT B	5755	92.48	0.34	Pass
802.11ac20	SISO ANT A	5745	96.09	0.17	Pass
	SISO ANT B	5745	96.09	0.17	Pass
	MIMO ANT A	5745	96.16	0.17	Pass
	MIMO ANT B	5745	96.09	0.17	Pass
802.11ac40	SISO ANT A	5755	92.57	0.34	Pass
	SISO ANT B	5755	92.53	0.34	Pass
	MIMO ANT A	5755	92.53	0.34	Pass
	MIMO ANT B	5755	92.53	0.34	Pass
802.11ac80	SISO ANT A	5775	85.99	0.66	Pass
	SISO ANT B	5775	86.02	0.65	Pass
	MIMO ANT A	5775	85.95	0.66	Pass
	MIMO ANT B	5775	85.96	0.66	Pass
Note: Duty Cycle= Ton /Total*100% Duty Cycle Correction Factor = 10log (1/Duty Cycle)					

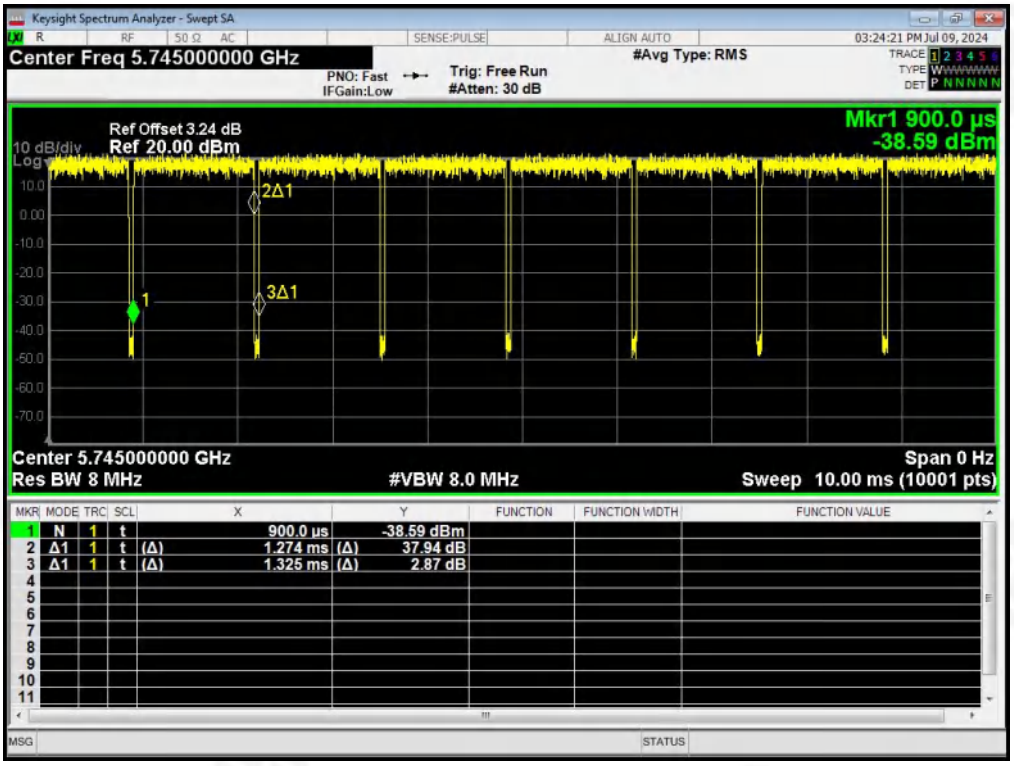
SISO ANT A 802.11a - 5745MHz



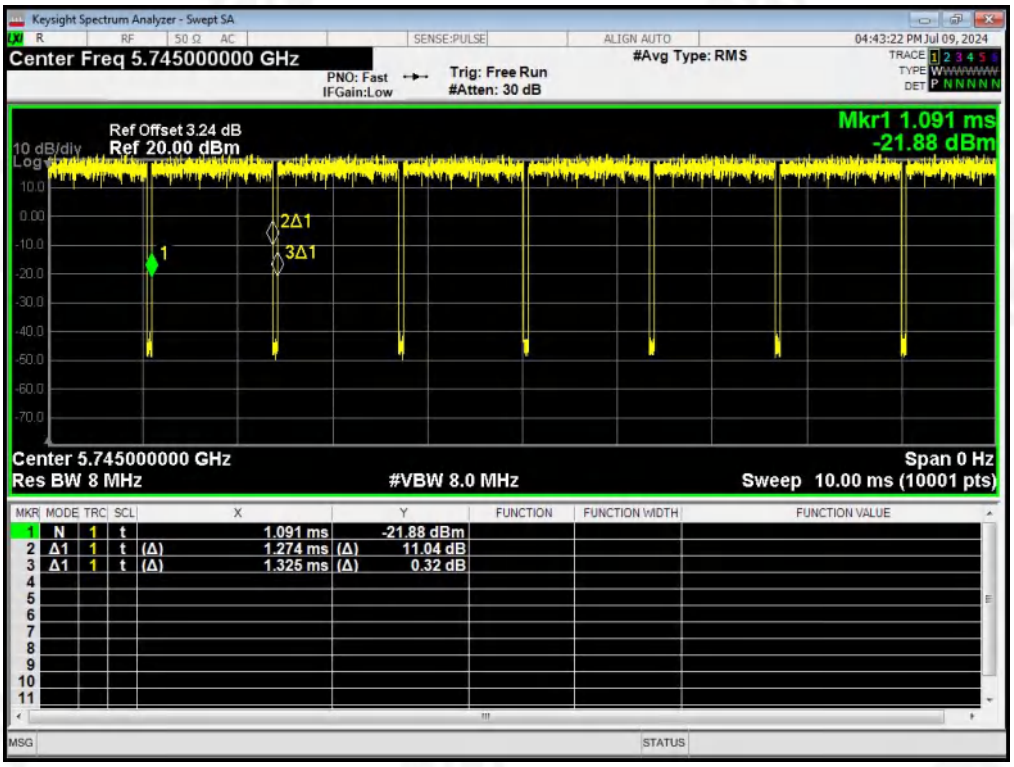
SISO ANT B 802.11a - 5745MHz



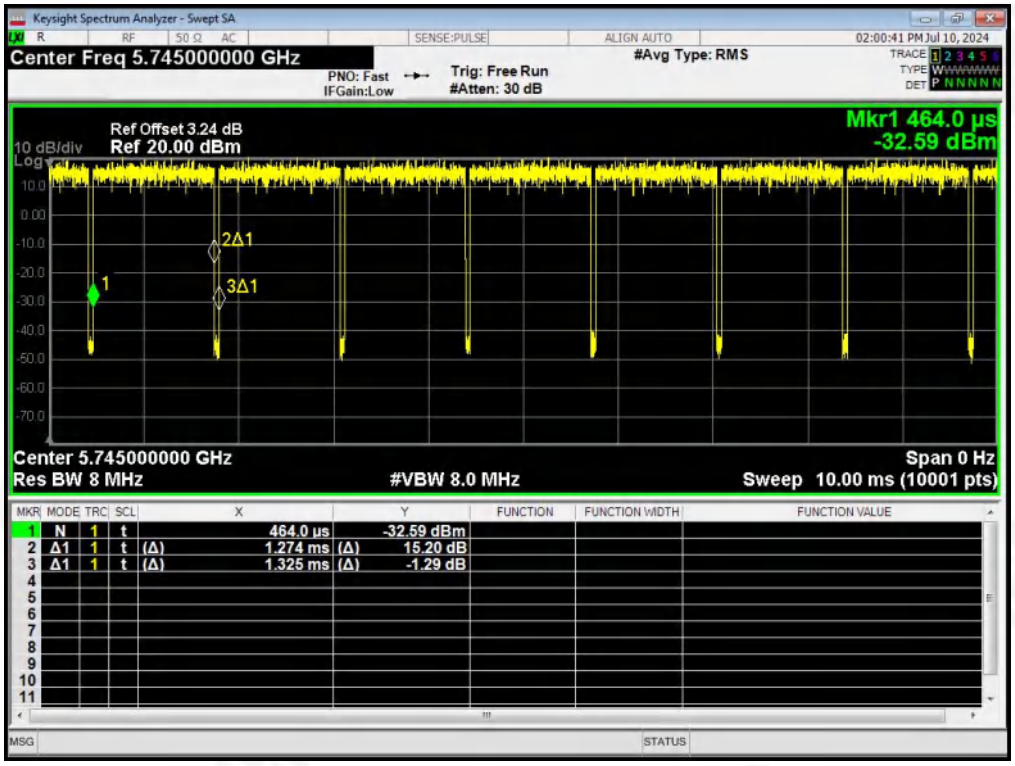
SISO ANT A 802.11n20 - 5745MHz



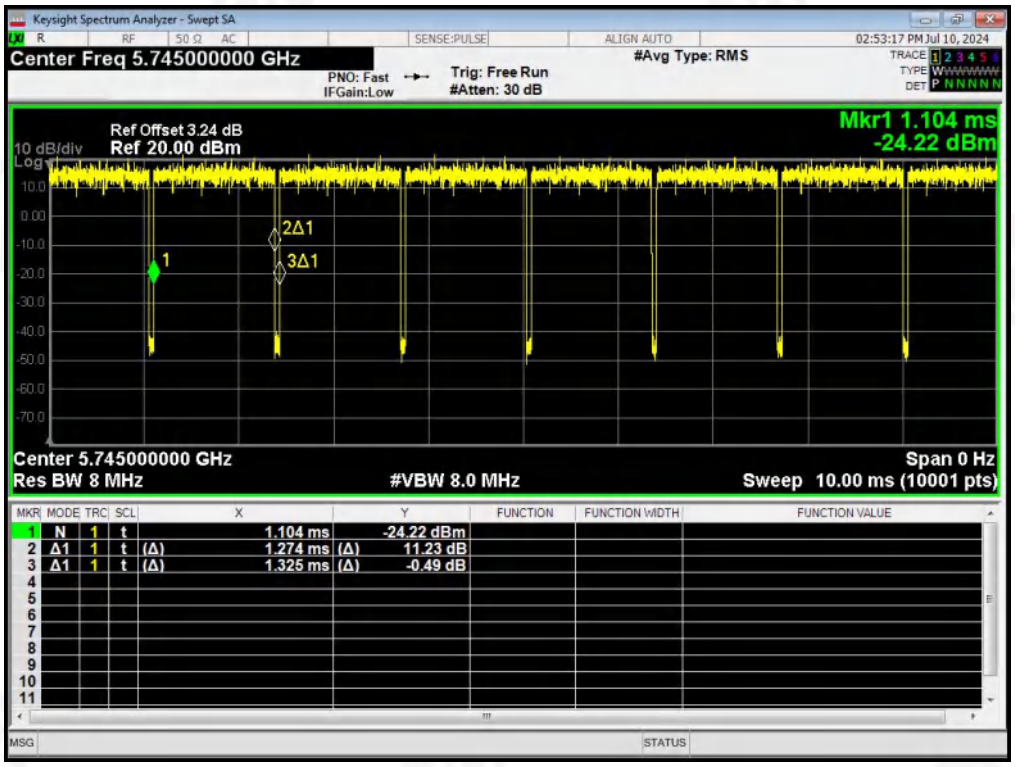
SISO ANT B 802.11n20 - 5745MHz



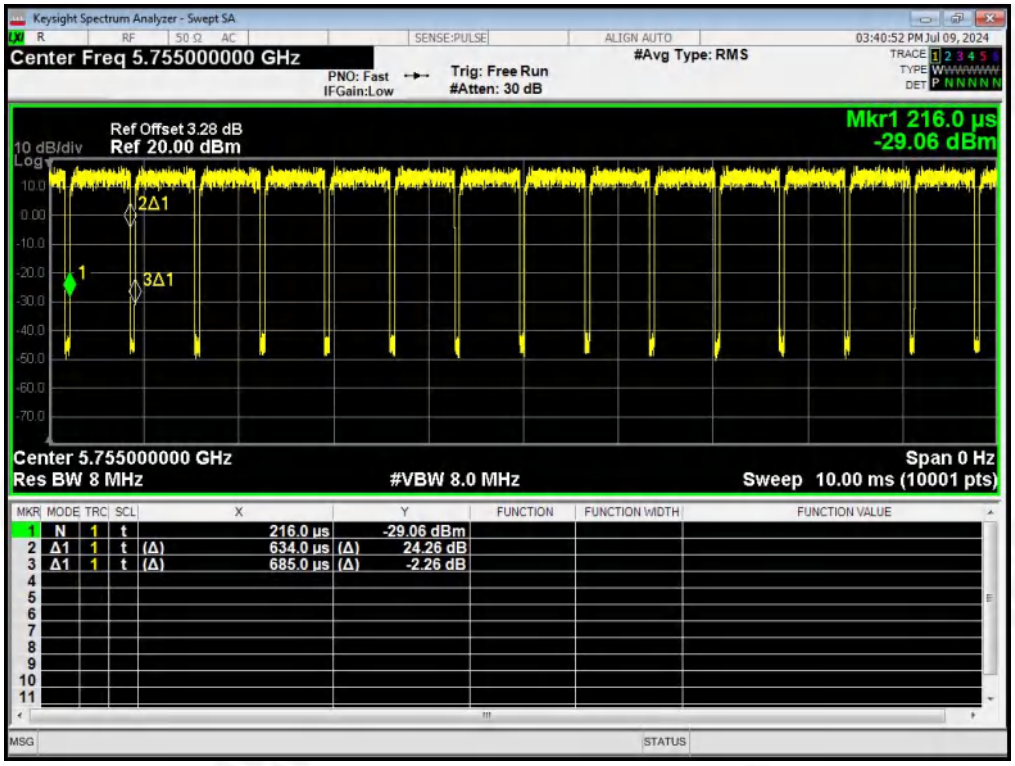
MIMO ANT A 802.11n20 - 5745MHz



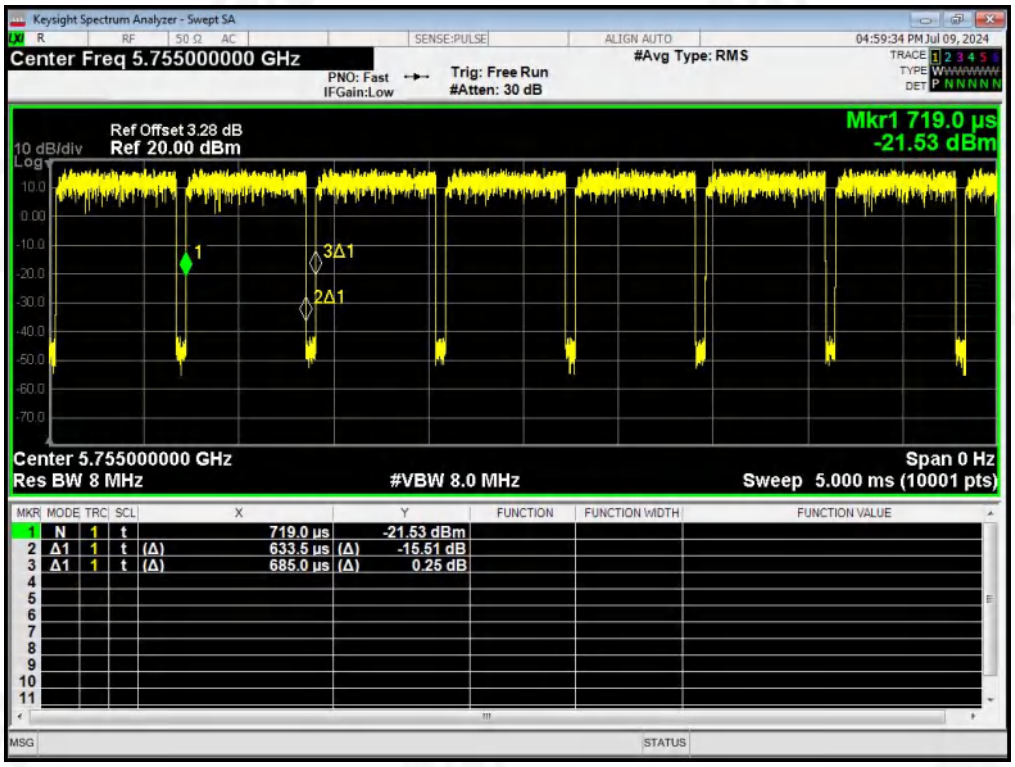
MIMO ANT B 802.11n20 - 5745MHz



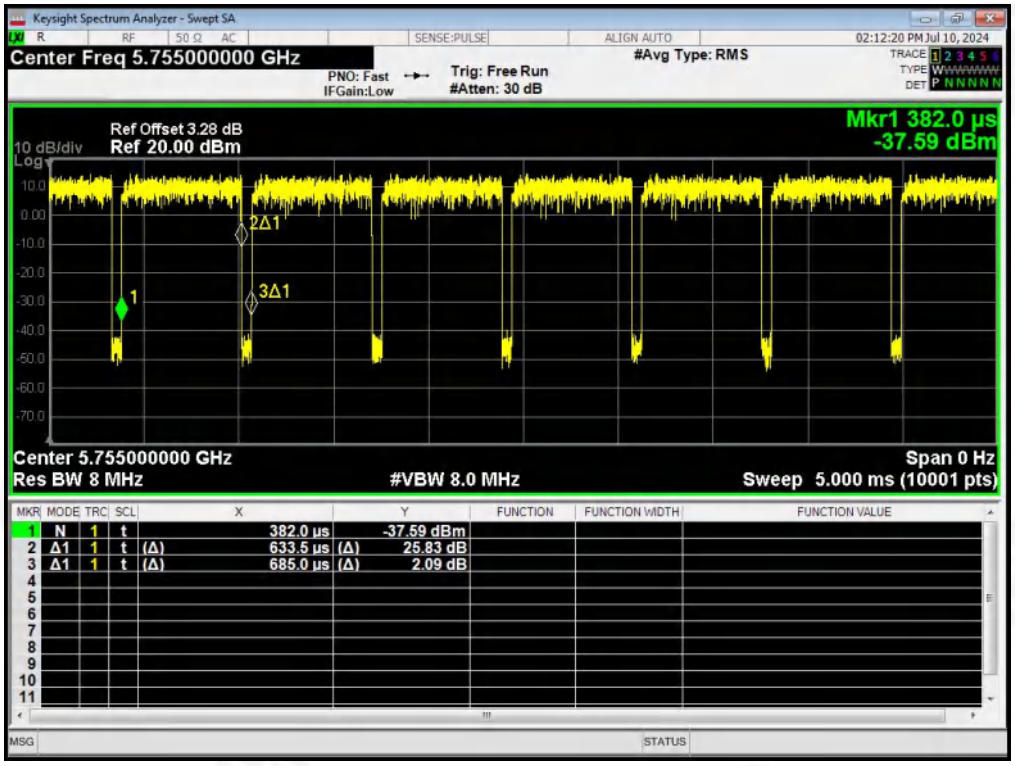
SISO ANT A 802.11n40 - 5755MHz



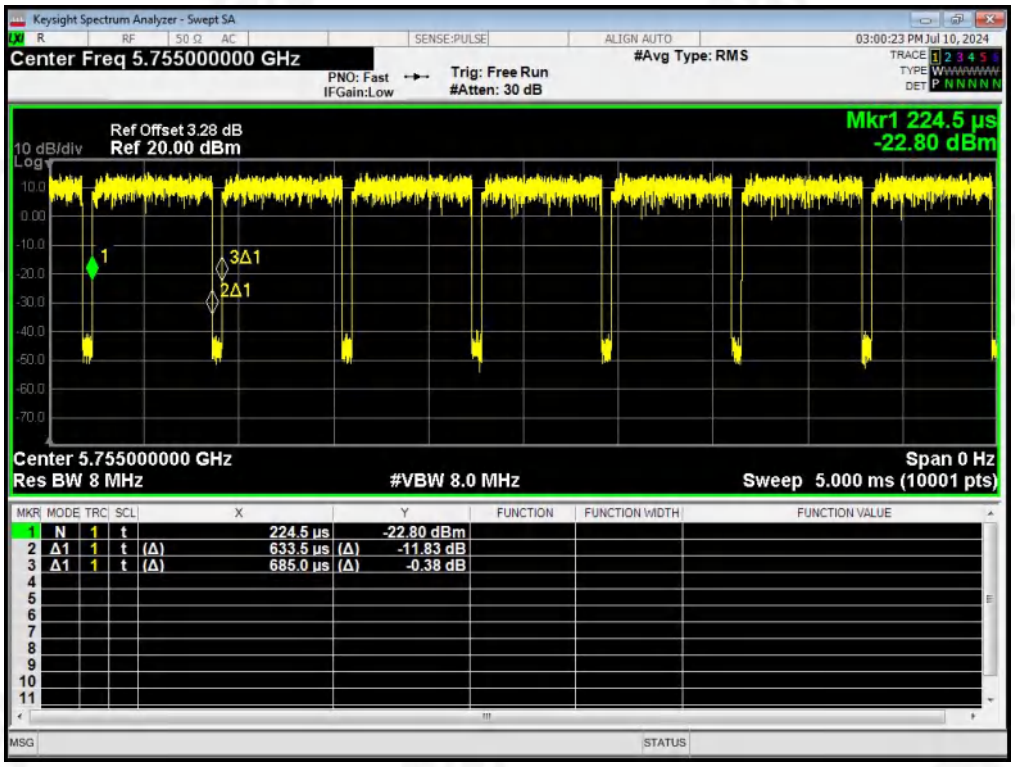
SISO ANT B 802.11n40 - 5755MHz



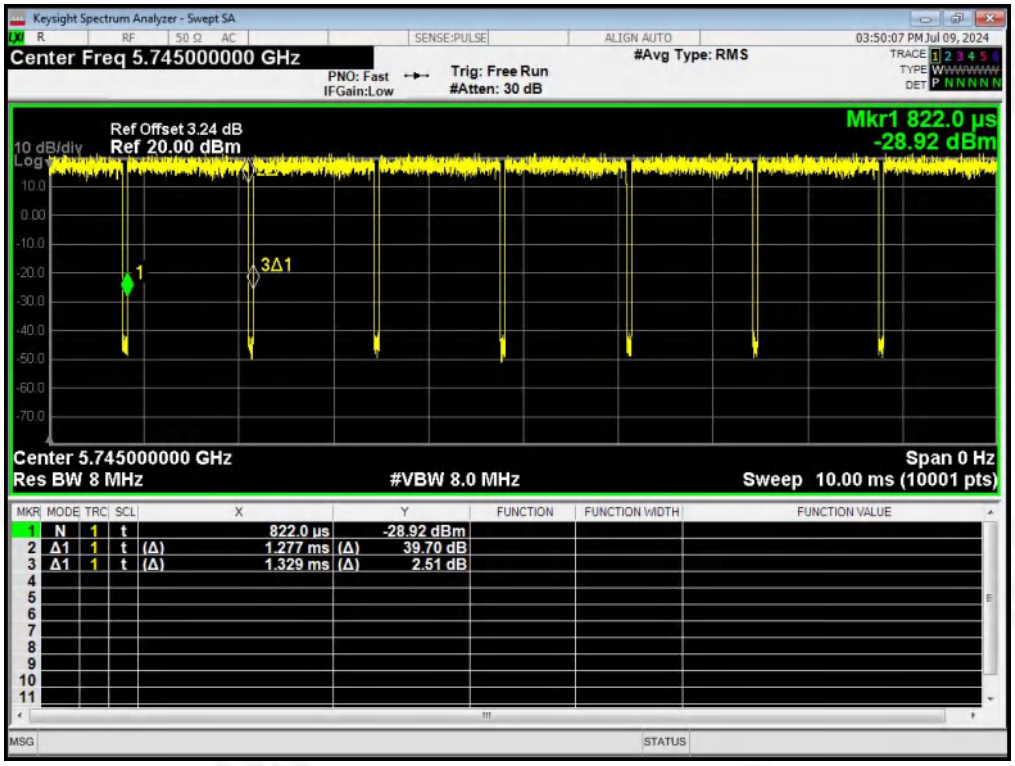
MIMO ANT A 802.11n40 - 5755MHz



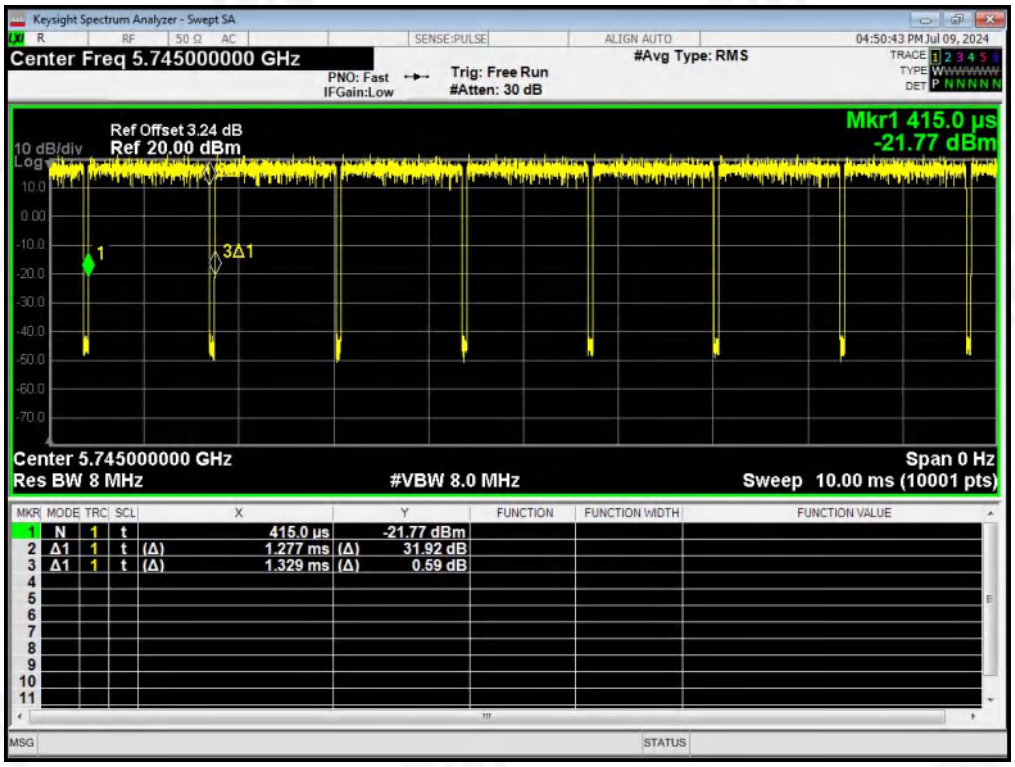
MIMO ANT B 802.11n40 - 5755MHz



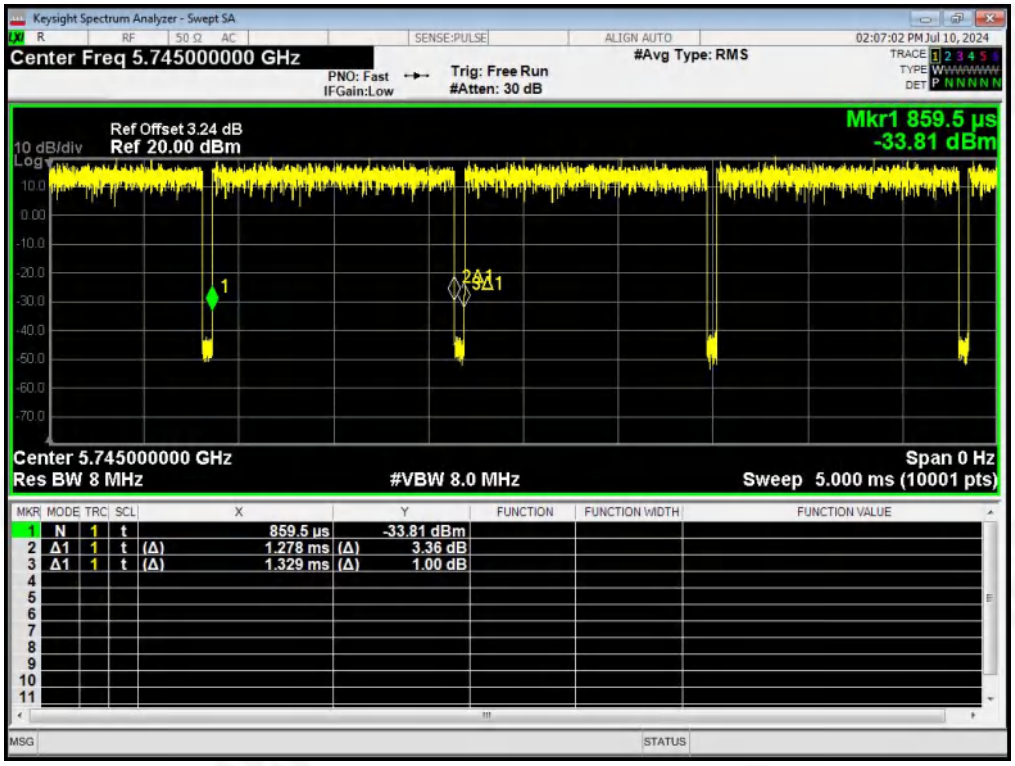
SISO ANT A 802.11ac20 - 5745MHz



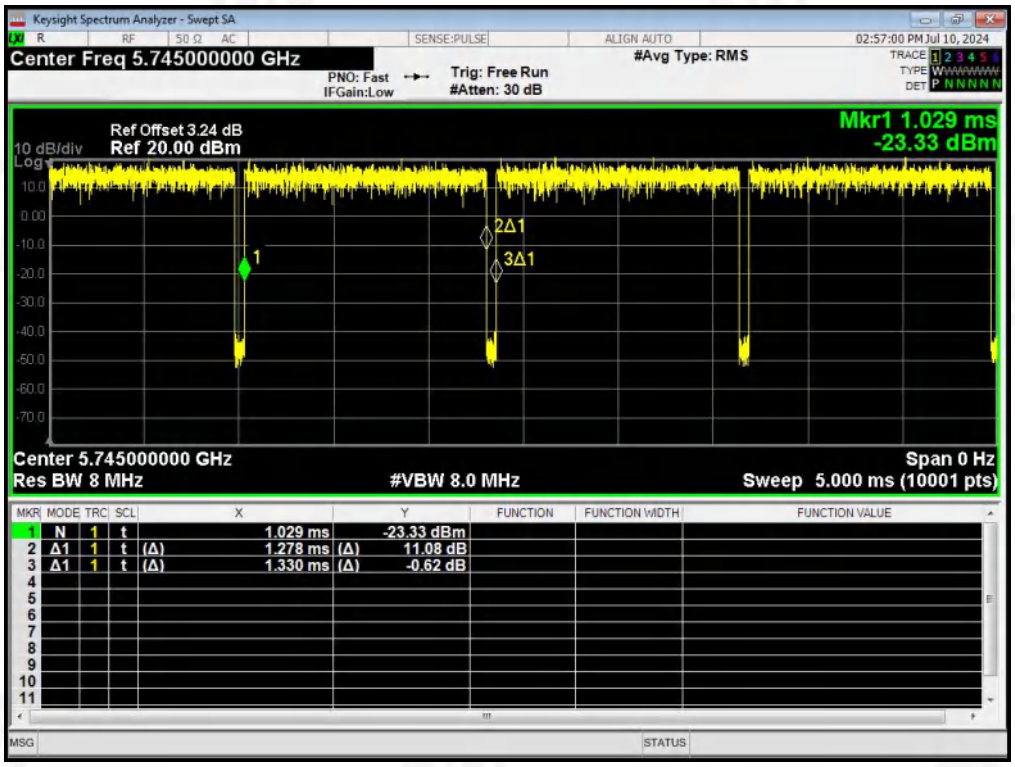
SISO ANT B 802.11ac20 - 5745MHz



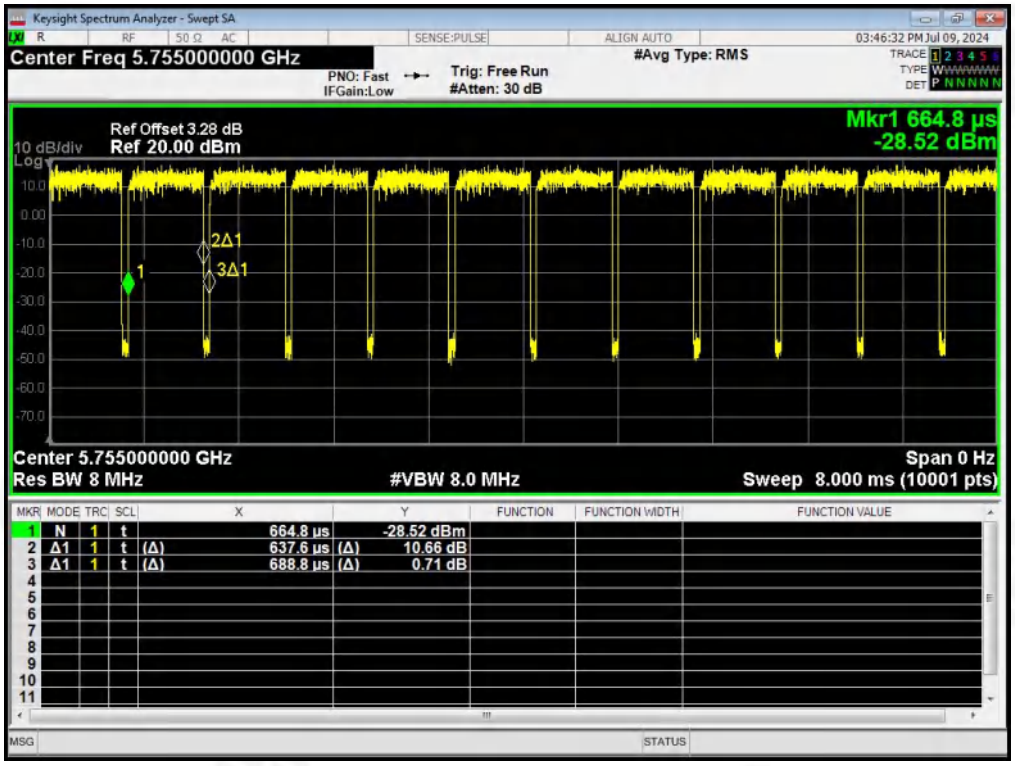
MIMO ANT A 802.11ac20 - 5745MHz



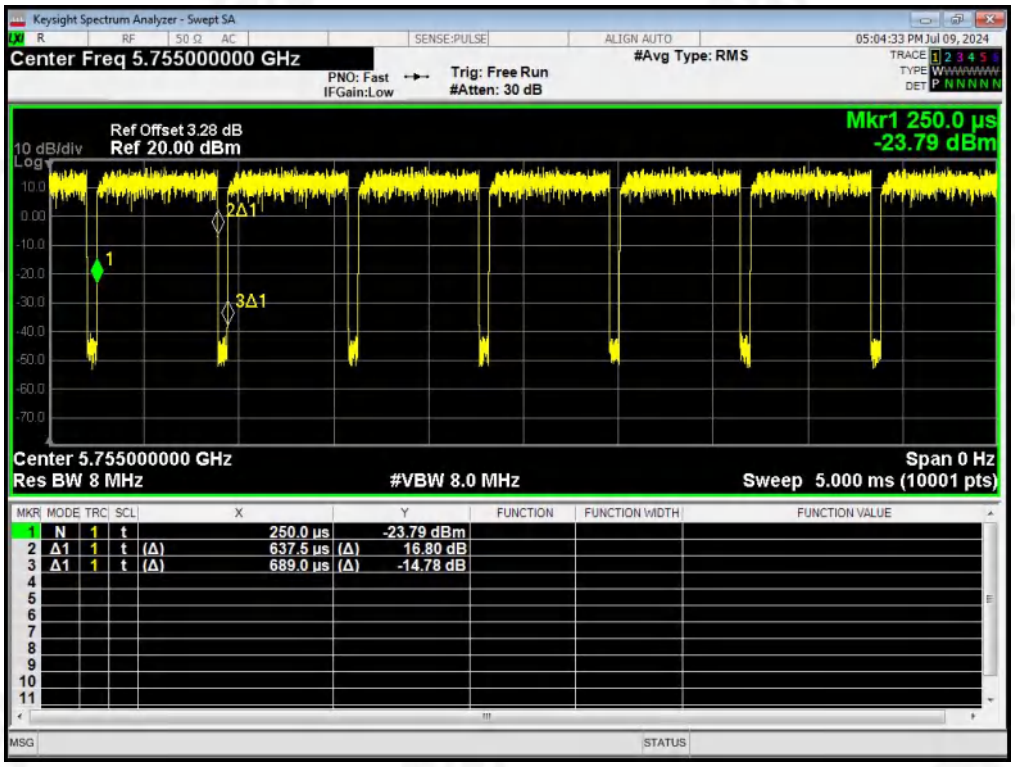
MIMO ANT B 802.11ac20 - 5745MHz



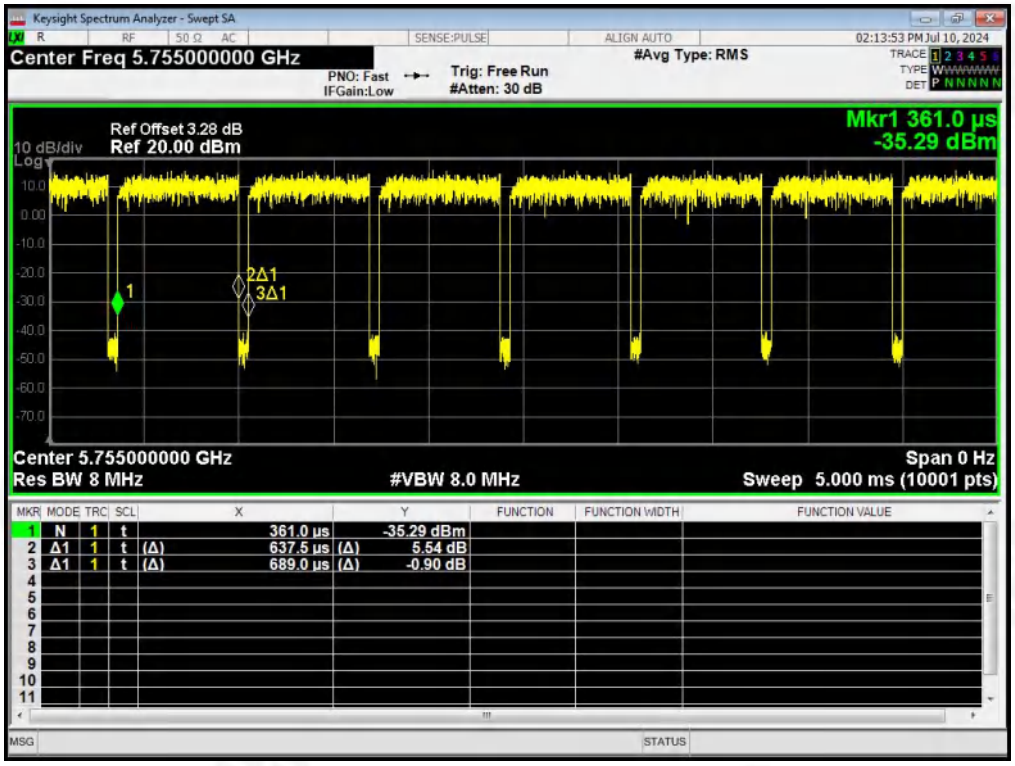
SISO ANT A 802.11ac40 - 5755MHz



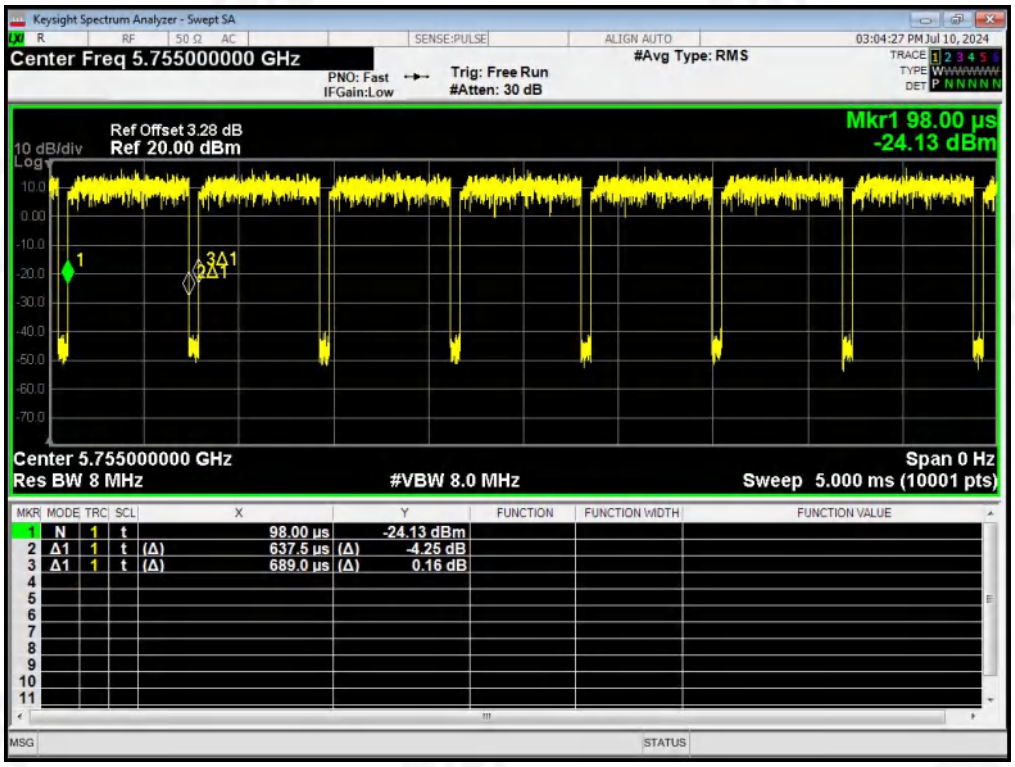
SISO ANT B 802.11ac40 - 5755MHz



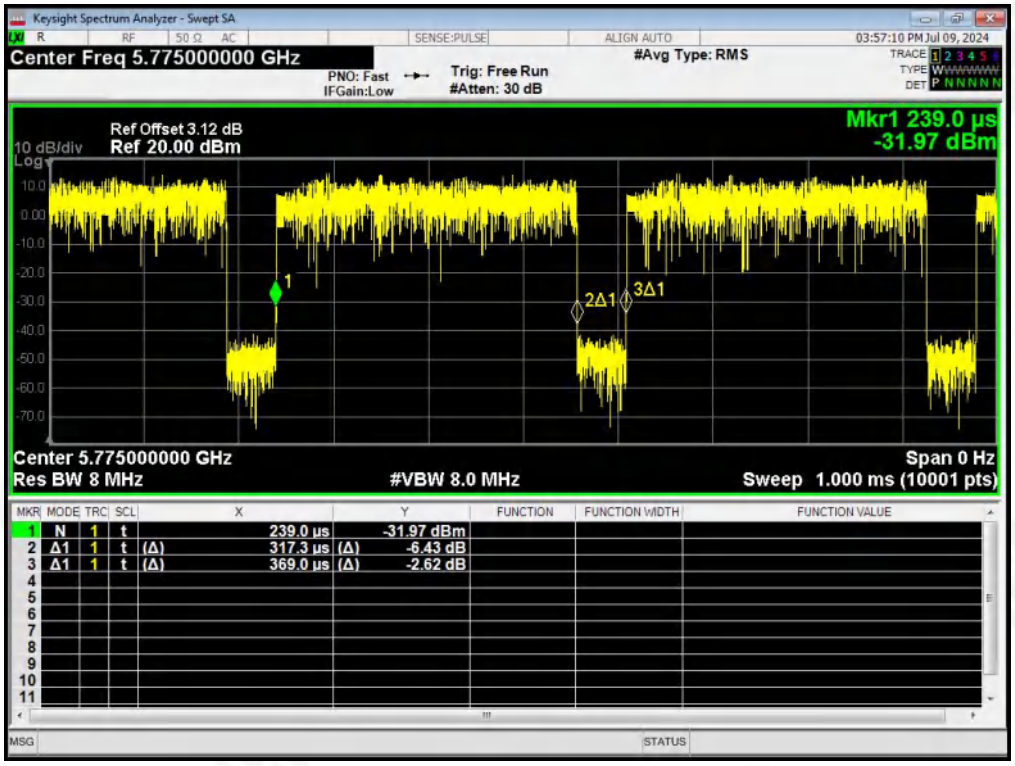
MIMO ANT A 802.11ac40 - 5755MHz



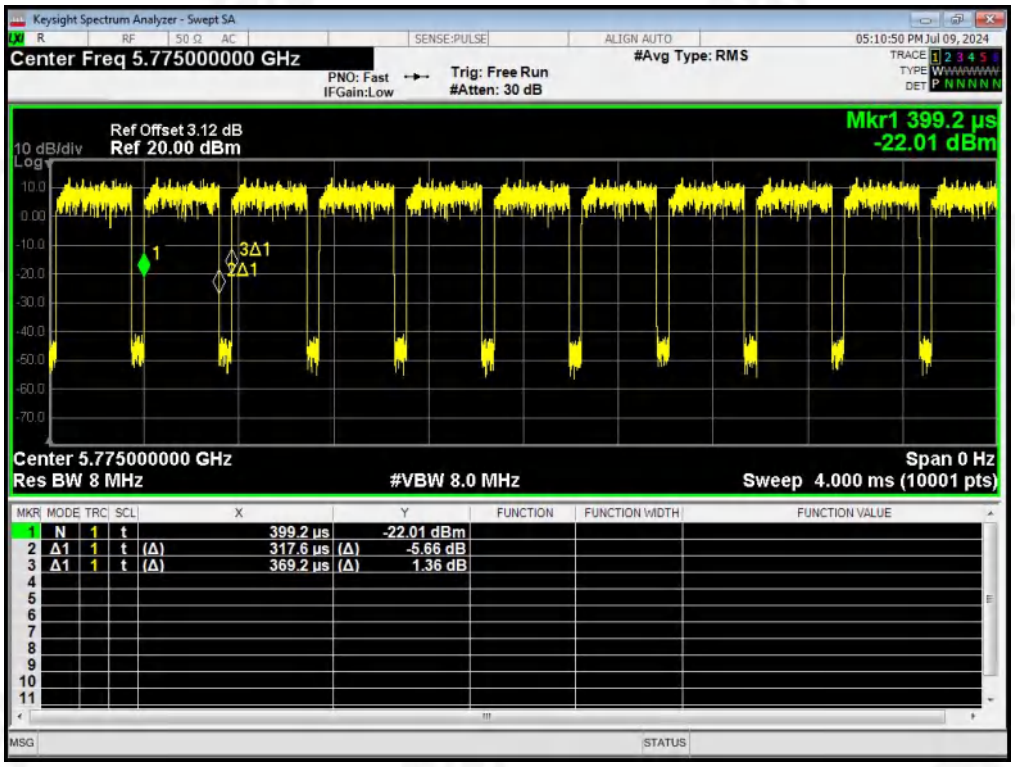
MIMO ANT B 802.11ac40 - 5755MHz



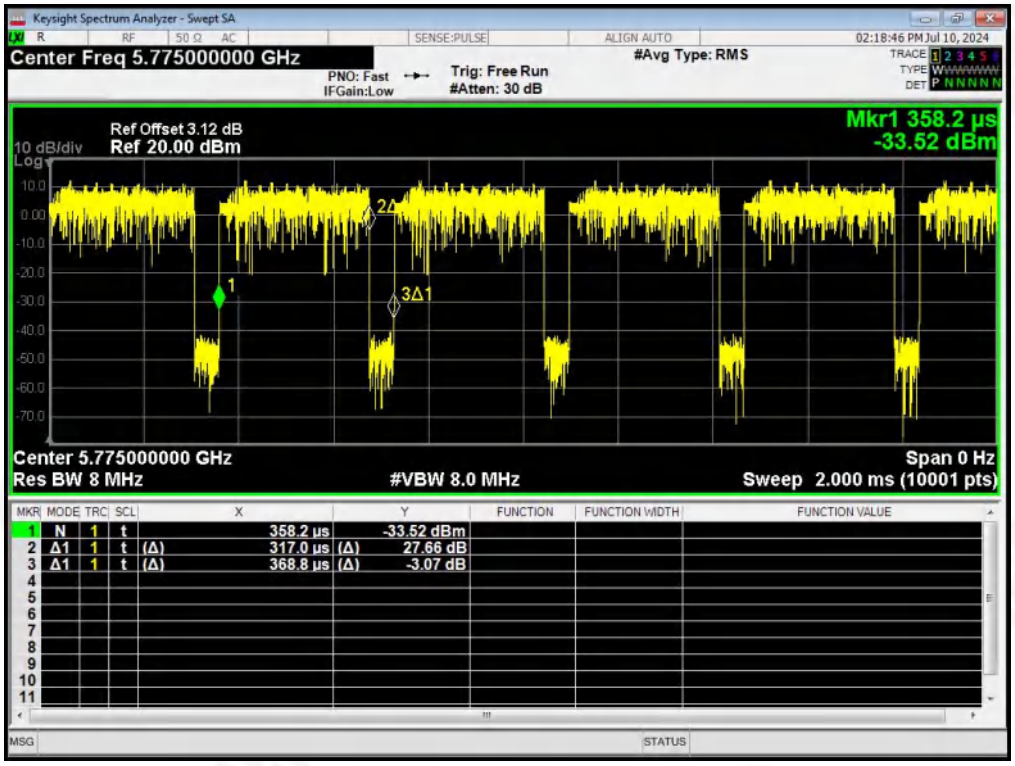
SISO ANT A 802.11ac80 - 5775MHz



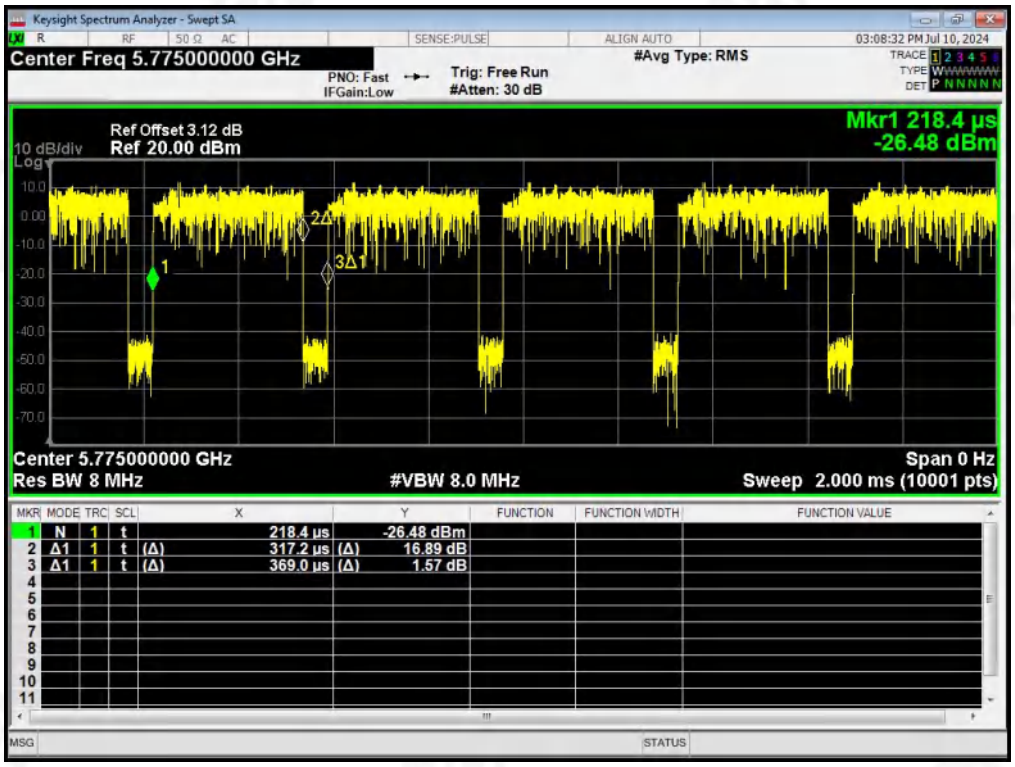
SISO ANT B 802.11ac80 - 5775MHz



MIMO ANT A 802.11ac80 - 5775MHz



MIMO ANT B 802.11ac80 - 5775MHz



12. ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203
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.	
EUT Antenna:	
The antenna is External antennaA&B, the best case gain of the antenna is SISO ANT A is 8.40dBi, B is 6.82dBi and MIMO ANT A+B is 10.65dBi, reference to the appendix II for details	

13. TEST SETUP PHOTO

Reference to the appendix I for details.

14. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

※※※※※ END OF REPORT ※※※※※