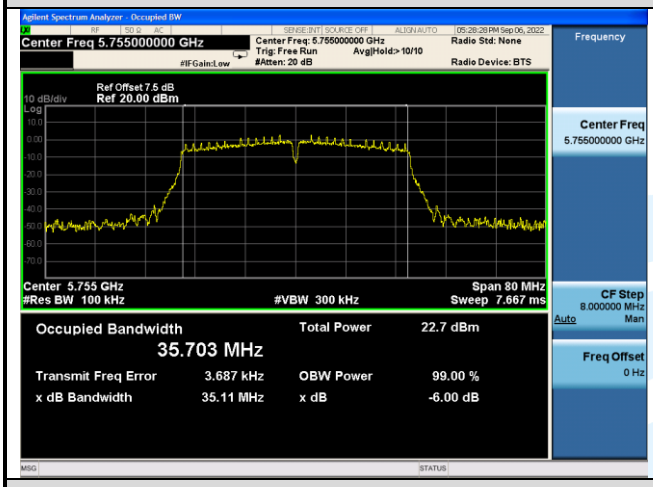
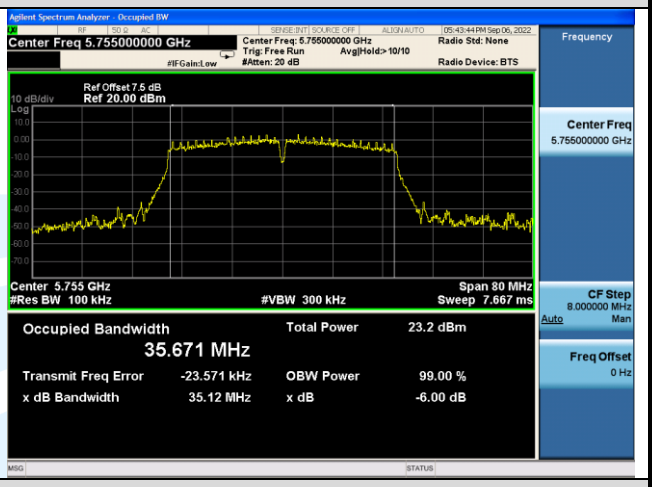
IEEE 802.11ac-VHT40_ant0	IEEE 802.11ac-VHT40_ant1
Channel 151	
	
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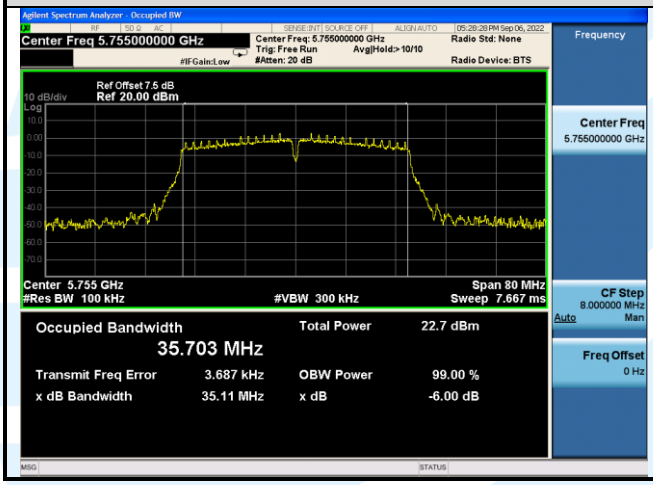
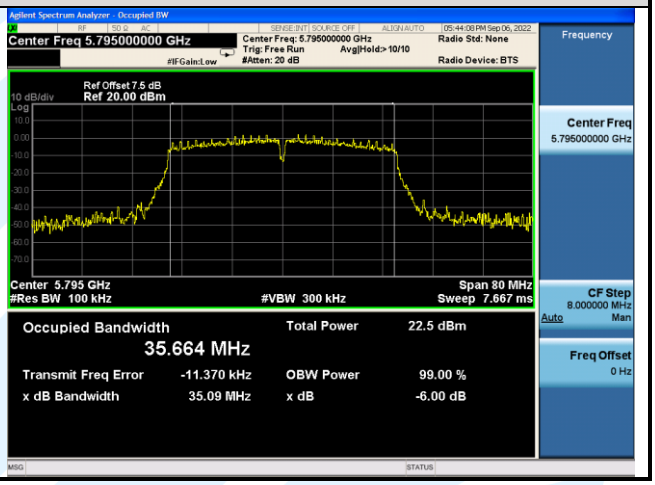
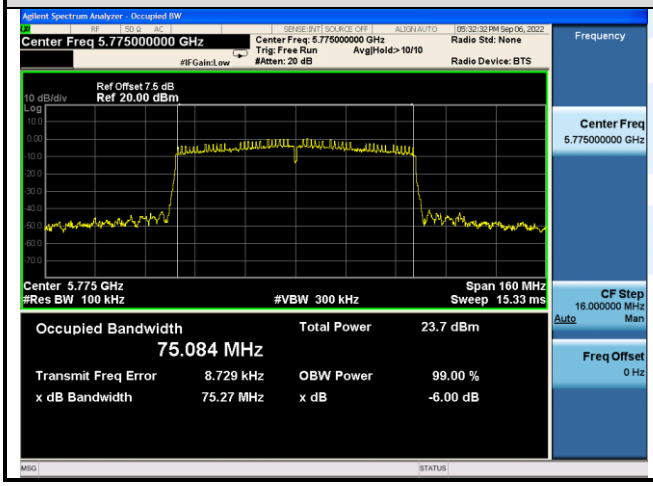
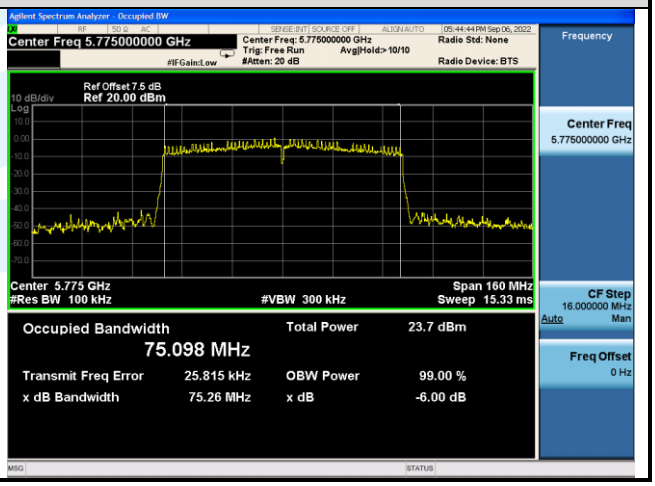
	

IEEE 802.11ac-VHT80_ant0	IEEE 802.11ac-VHT80_ant1
Channel 155	
	

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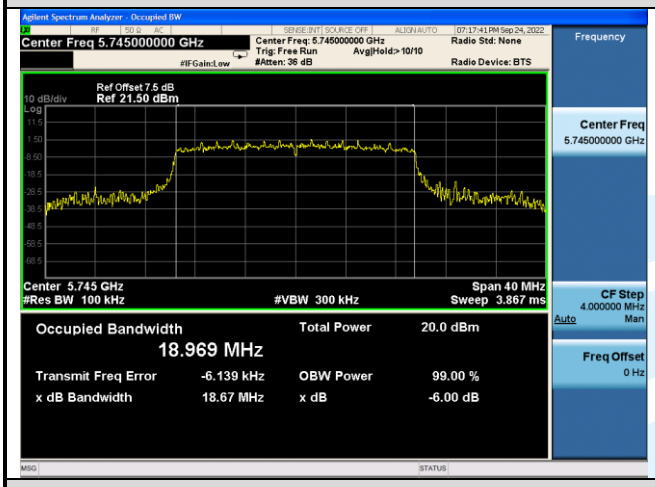
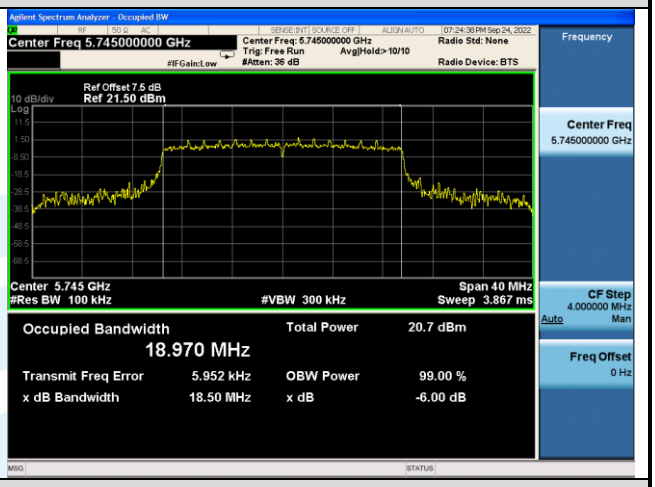
Channel 149	
	
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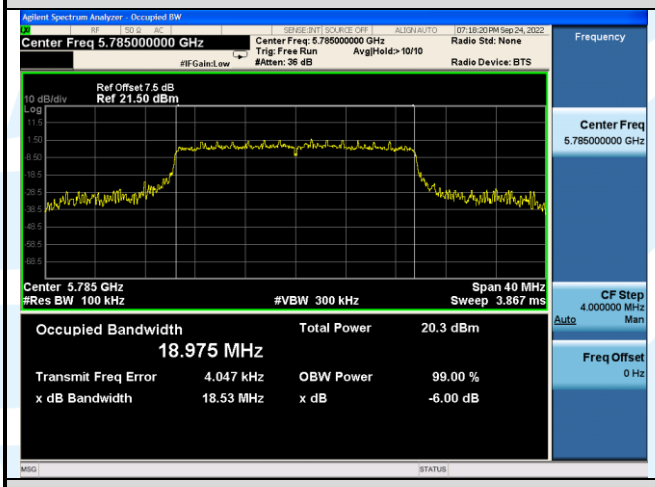	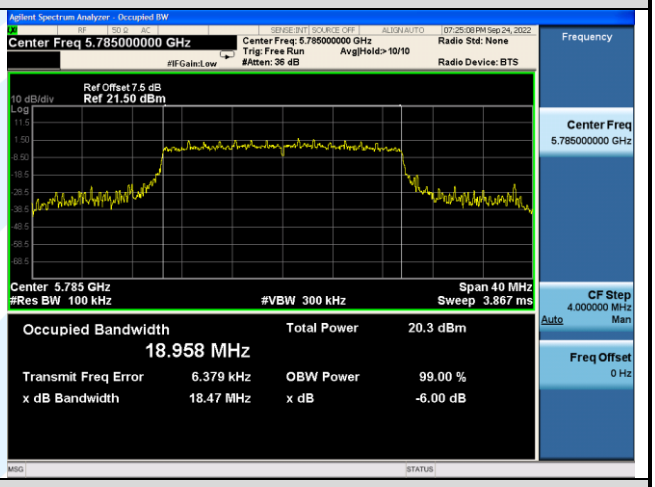
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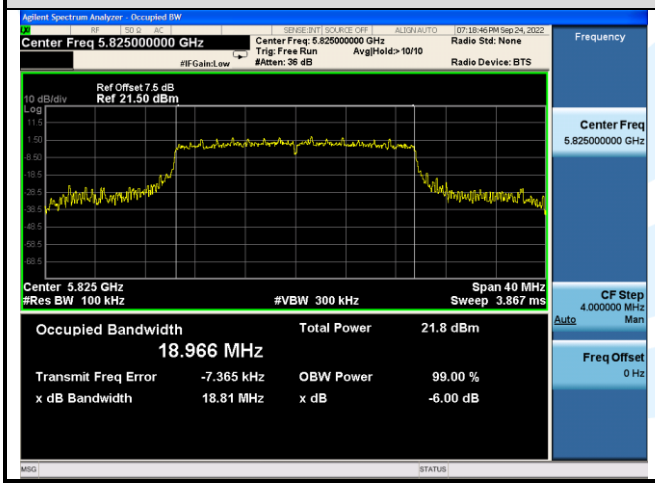	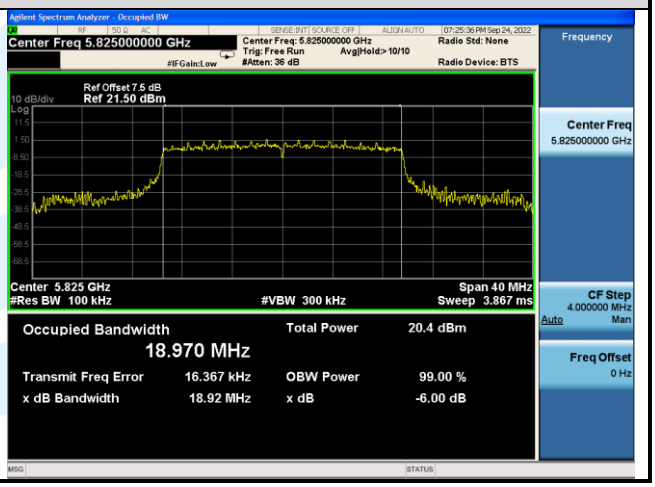

IEEE 802.11ax-HE20_26RU_ant0	IEEE 802.11ax-HE20_26RU_ant1
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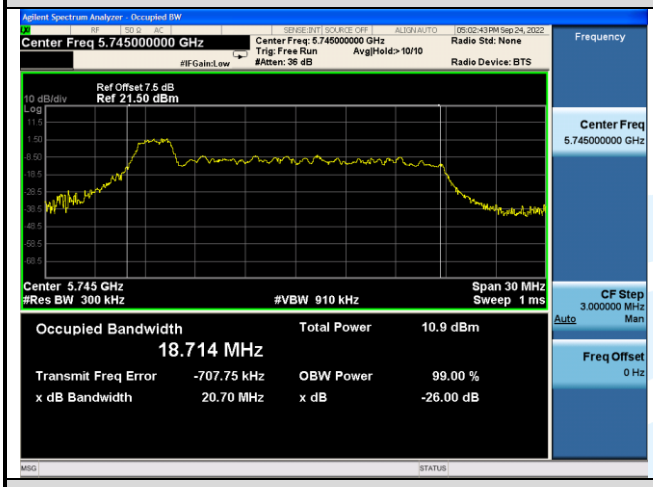	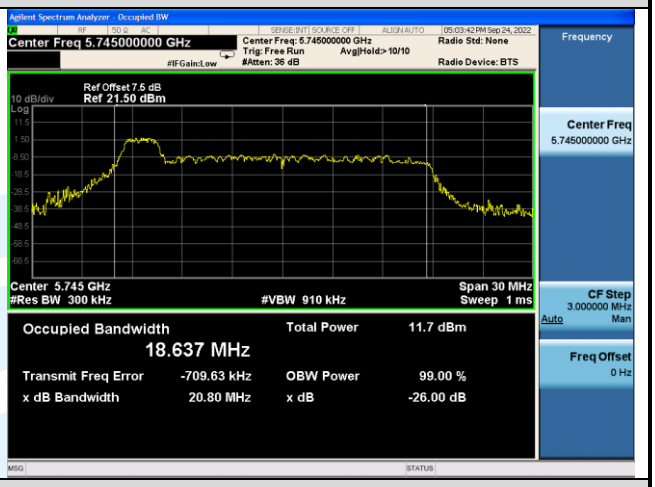
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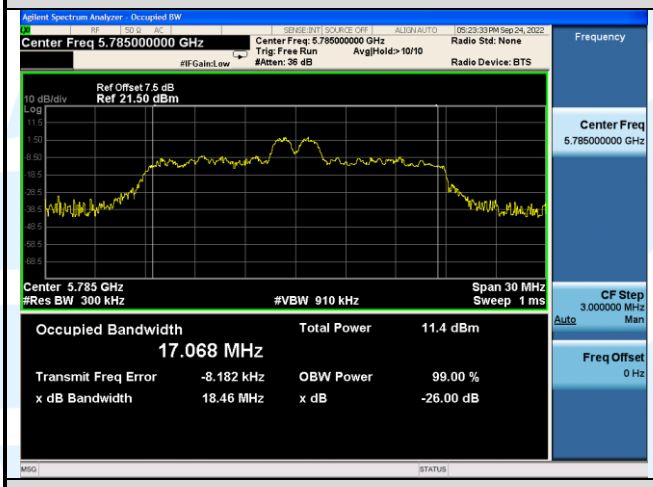	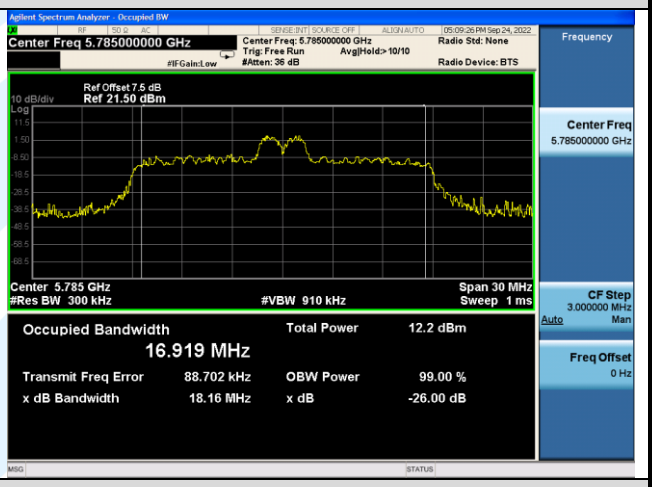
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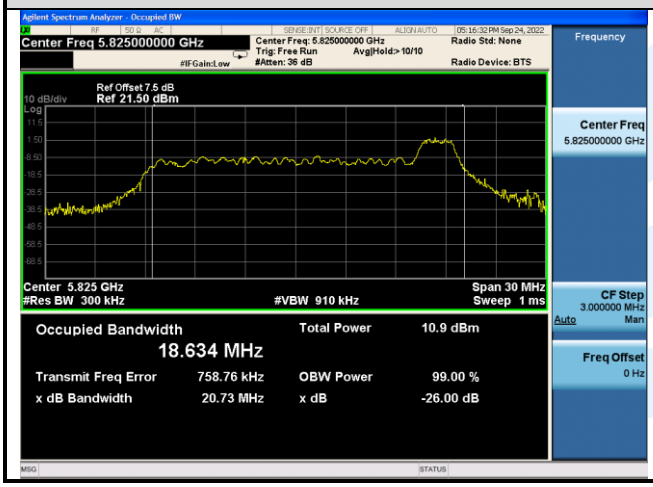	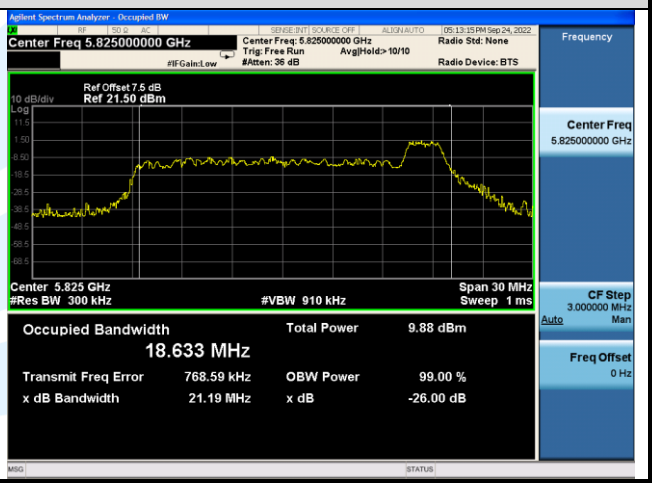

IEEE 802.11ax-HE20_52RU_ant0	IEEE 802.11ax-HE20_52RU_ant1
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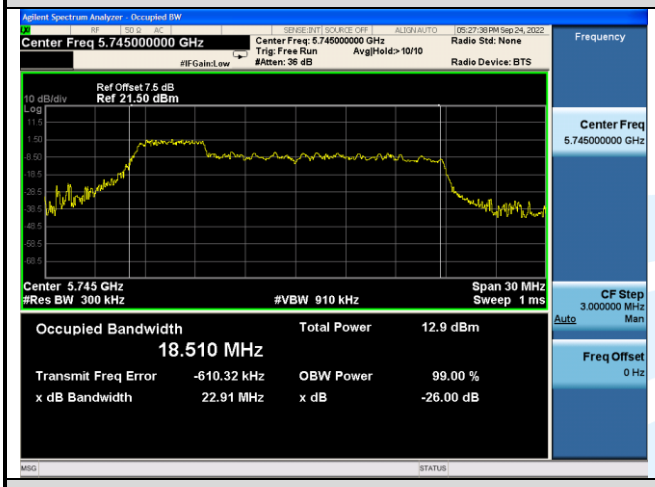	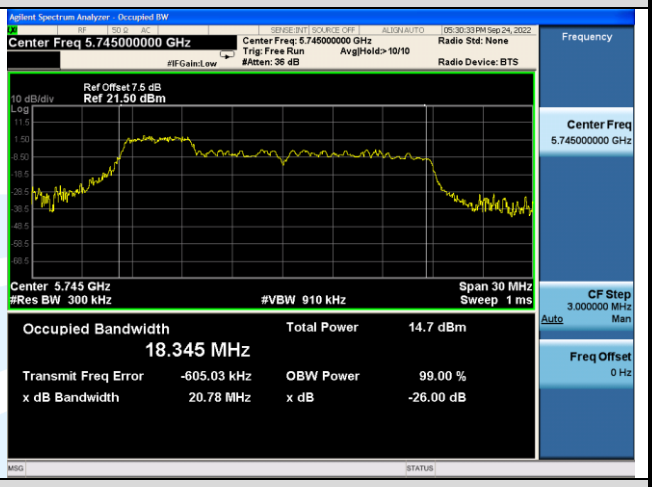
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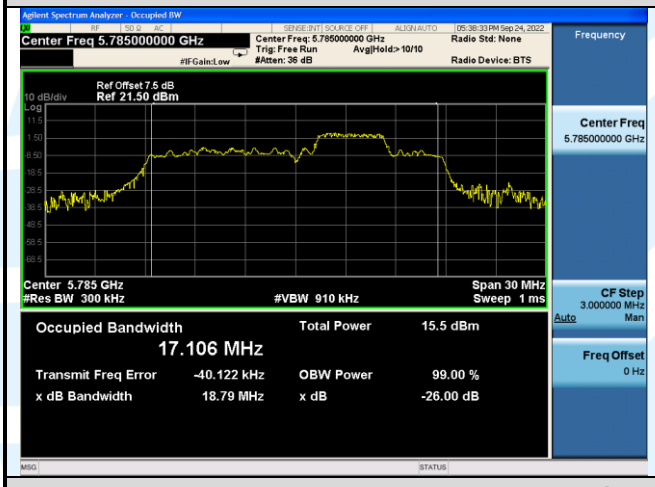
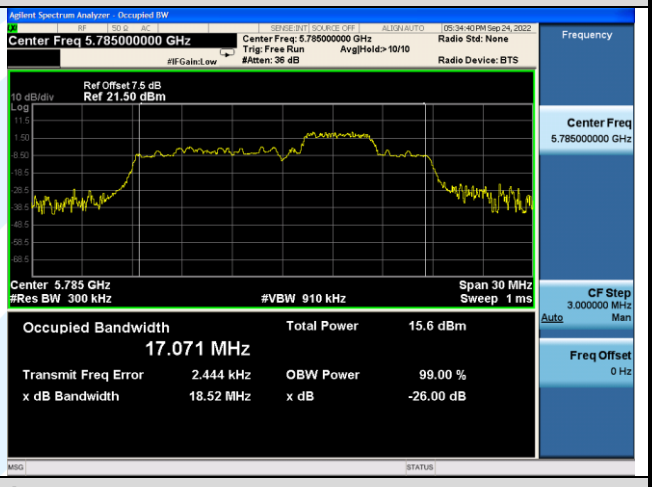
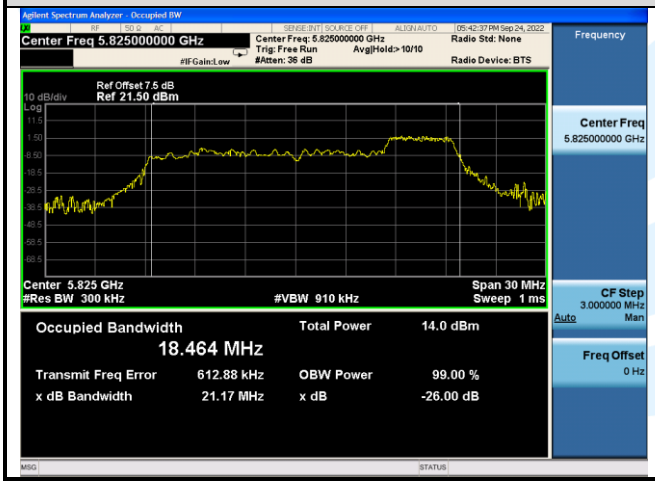
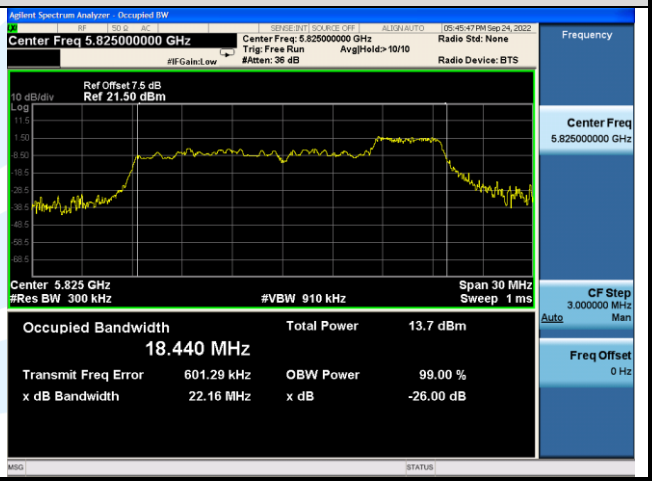
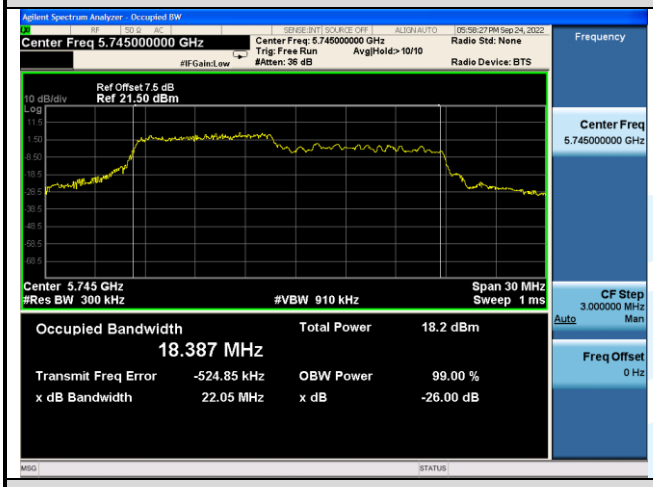
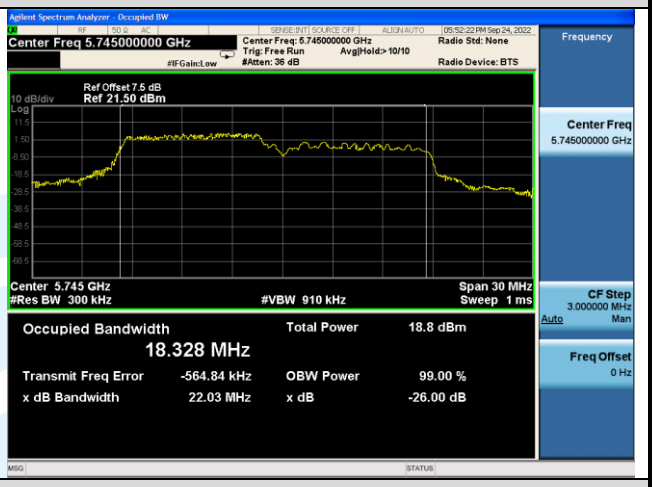
	
Channel 165	
	

IEEE 802.11ax-HE20_106RU_ant0	IEEE 802.11ax-HE20_106RU_ant1
Channel 149	
	
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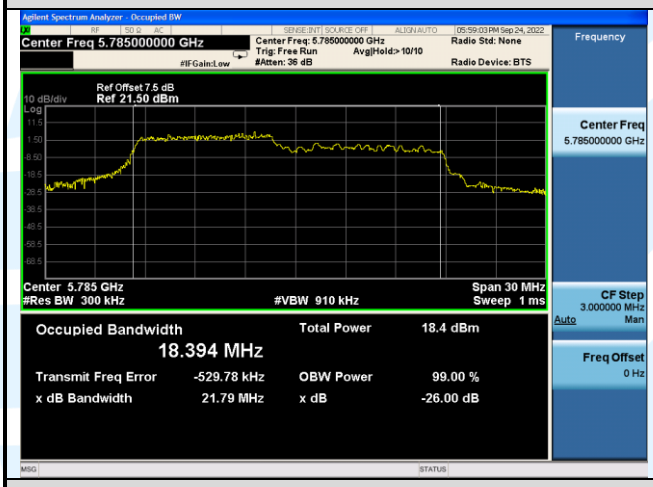
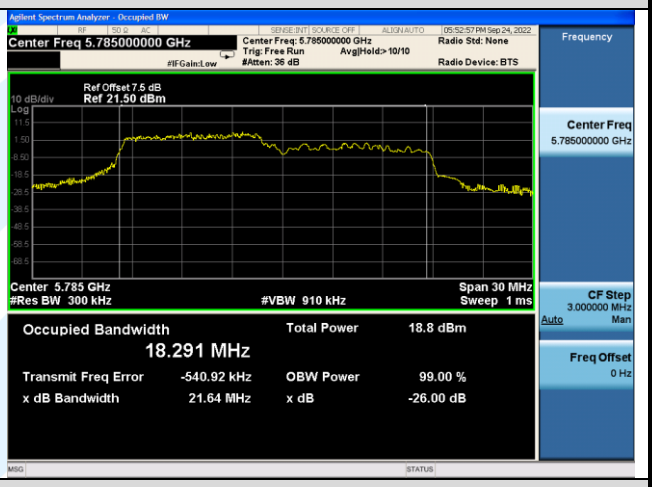
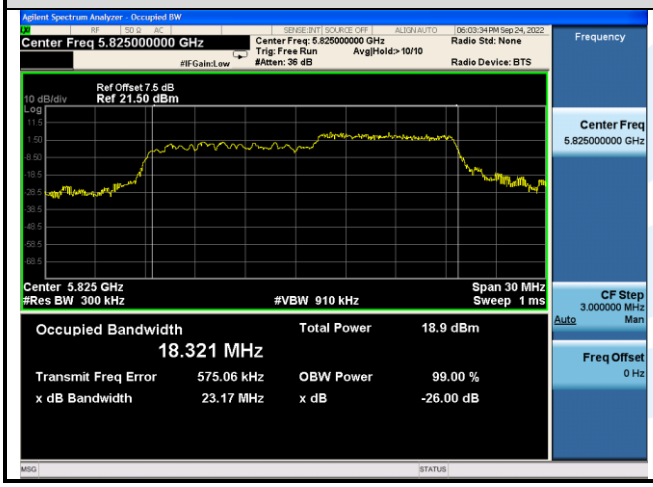
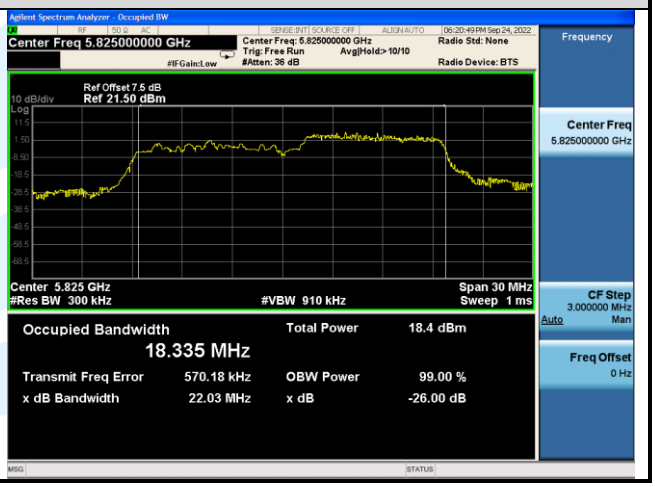
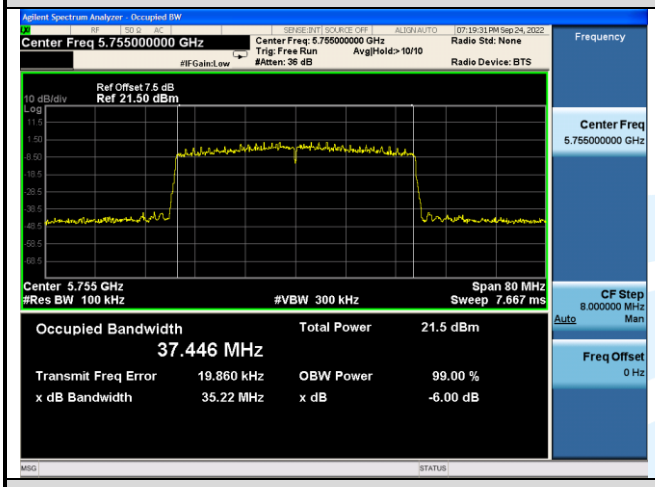
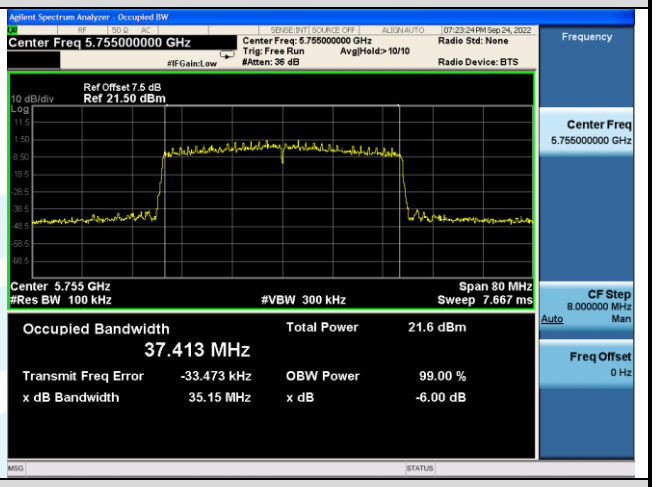
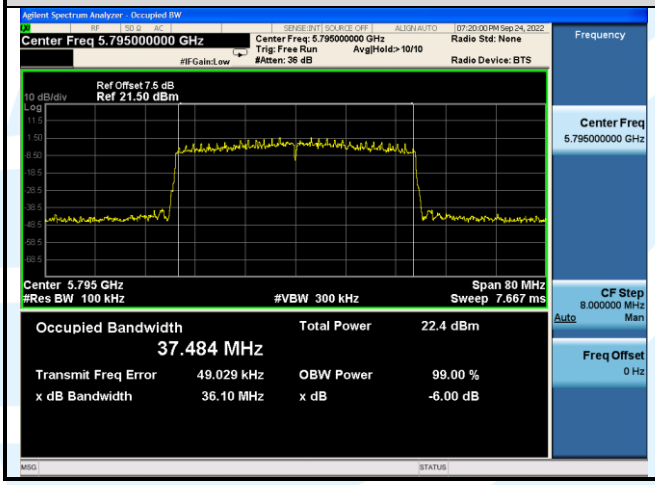
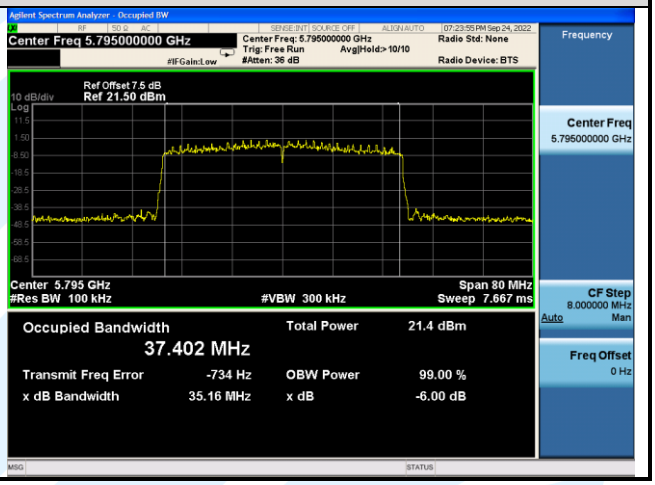
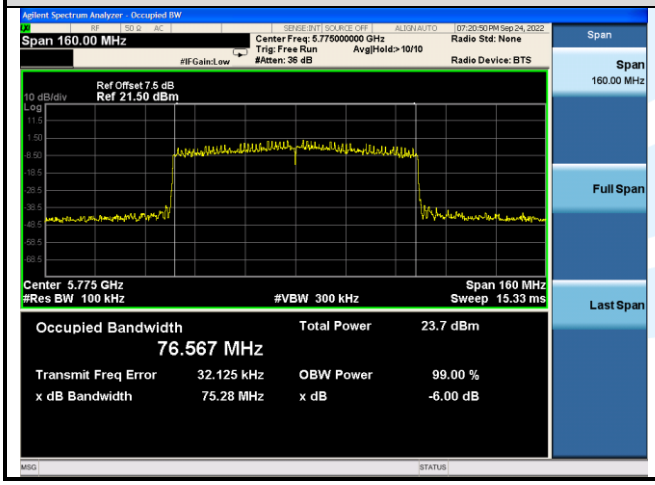
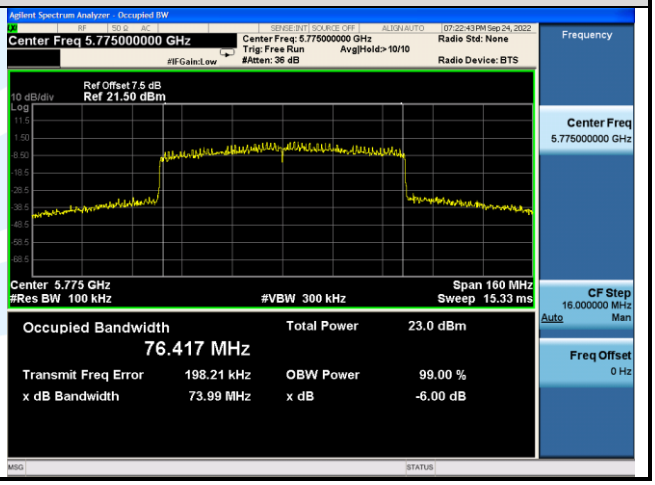
	
Channel 165	
	

IEEE 802.11ax-HE40_SU_ant0	IEEE 802.11ax-HE40_SU_ant1
Channel 151	
	
Channel 159	
	

IEEE 802.11ax-HE80_SU_ant0	IEEE 802.11ax-HE80_SU_ant1
Channel 155	
	

5.5 MAXIMUM CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)
Test Method: KDB 789033 D02 v02r01 Section E.3.a(Method PM)
Limits:

1. For the band 5.15-5.25 GHz.
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 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 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For 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.

Test Procedure:

1. Connected the EUT's antenna port to measure device by 10dB attenuator.
2. Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of Tx on burst.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Directional gain and the maximum output power limit.

Frequency (MHz)	Antenna Gain (dBi)		Correlated Directional gain (dBi)		Limit	
	Ant .0	Ant .1	Power	PSD	Power (dBm)	PSD (dBm/MHz or dBm/500kHz)
U-NII-1	5	5	8.01	8.01	30	14.99
U-NII-2A	5	5	8.01	8.01	24	8.99
U-NII-2C	5	5	8.01	8.01	24	8.99
U-NII-3	5	5	8.01	8.01	30	27.99

For CDD transmissions, directional gain is calculated as follows. In all formulas,

N_{ANT} = number of transmit antennas and
N_{SS} = number of spatial streams. (Assume N_{SS} = 1 unless you have specific information to the contrary.)

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

For power measurements on IEEE 802.11 devices, 1,2

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

Array Gain = 0 dB (i.e., no array gain) for channel widths $\geq$ 40 MHz for any N_{ANT};

Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

For U-NII-2A, U-NII-2C Band:

IEEE 802.11a: the minimum 26 dB emission bandwidth is 20.03 MHz
11 dBm + $10\log_{10}$ (20.03) = 24.02 dBm > 24 dBm (200mW)
So the 24 dB limit applicable

IEEE 802.11n-HT20/ac-VHT20: the minimum 26 dB emission bandwidth is 20.19 MHz
11 dBm + $10\log_{10}$ (20.19) = 24.05 dBm > 24 dBm (200mW)
So the 24 dB limit applicable

IEEE 802.11n-HT40/ac-VHT40/ac-VHT80: the minimum 26 dB emission bandwidth is 39.54 MHz
11 dBm + $10\log_{10}$ (39.54) = 26.97 dBm > 24 dBm (200mW)
So the 24 dB limit applicable

Maximum output power

Mode	Band	Freq. (MHz)	RU	CONDUCTED AVG POWER					Limit (dBm)	Result
				Meas Value (dBm)		Corr'd Value (dBm)				
				Ant. 0	Ant. 1	Ant. 0	Ant. 1	Total		
IEEE 802.11a	U-NII-1	5180	N/A	14.48	16.51	14.68	16.71	N/A	30	Pass
		5220	N/A	14.35	17.12	14.55	17.32	N/A	30	Pass
		5240	N/A	14.34	17.42	14.54	17.62	N/A	30	Pass
	U-NII-2A	5260	N/A	13.85	17.30	14.05	17.50	N/A	24	Pass
		5300	N/A	14.04	17.19	14.24	17.39	N/A	24	Pass
		5320	N/A	14.26	17.00	14.46	17.20	N/A	24	Pass
	U-NII-2C	5500	N/A	14.30	15.55	14.50	15.75	N/A	24	Pass
		5600	N/A	14.72	15.05	14.92	15.25	N/A	24	Pass
		5700	N/A	14.66	14.06	14.86	14.26	N/A	24	Pass
	U-NII-3	5745	N/A	16.51	17.11	16.71	17.31	N/A	30	Pass
		5785	N/A	16.73	16.90	16.93	17.10	N/A	30	Pass
		5825	N/A	17.03	16.88	17.23	17.08	N/A	30	Pass
IEEE 802.11n -HT20	U-NII-1	5180	N/A	10.63	12.69	11.03	13.09	15.19	30	Pass
		5220	N/A	10.29	13.50	10.69	13.90	15.59	30	Pass
		5240	N/A	10.28	13.65	10.68	14.05	15.69	30	Pass
	U-NII-2A	5260	N/A	10.19	13.51	10.59	13.91	15.57	24	Pass
		5300	N/A	10.55	13.55	10.95	13.95	15.71	24	Pass
		5320	N/A	10.80	13.37	11.20	13.77	15.68	24	Pass
	U-NII-2C	5500	N/A	11.86	12.50	12.26	12.90	15.60	24	Pass
		5600	N/A	11.69	12.12	12.09	12.52	15.32	24	Pass
		5700	N/A	11.52	11.25	11.92	11.65	14.79	24	Pass
	U-NII-3	5745	N/A	13.06	12.80	13.46	13.20	16.34	30	Pass
		5785	N/A	13.34	12.70	13.74	13.10	16.44	30	Pass
		5825	N/A	13.73	12.49	14.13	12.89	16.56	30	Pass
IEEE 802.11n -HT40	U-NII-1	5190	N/A	8.04	10.34	8.73	11.03	13.05	30	Pass
		5230	N/A	7.88	10.94	8.57	11.63	13.38	30	Pass
	U-NII-2A	5270	N/A	7.68	10.38	8.37	11.07	12.94	24	Pass
		5310	N/A	8.00	10.35	8.69	11.04	13.04	24	Pass
	U-NII-2C	5510	N/A	10.25	11.01	10.94	11.70	14.35	24	Pass
		5550	N/A	10.04	10.61	10.73	11.30	14.04	24	Pass
		5670	N/A	9.91	9.88	10.60	10.57	13.60	24	Pass
	U-NII-3	5755	N/A	13.90	13.86	14.59	14.55	17.58	30	Pass

Mode	Band	Freq. (MHz)	RU	CONDUCTED AVG POWER					Limit (dBm)	Result
				Meas Value (dBm)		Corr'd Value (dBm)				
				Ant. 0	Ant. 1	Ant. 0	Ant. 1	Total		
		5795	N/A	13.95	13.02	14.64	13.71	17.21	30	Pass
IEEE 802.11ac -VHT20	U-NII-1	5180	N/A	10.23	12.61	10.44	12.82	14.81	30	Pass
		5220	N/A	9.73	13.48	9.94	13.69	15.22	30	Pass
		5240	N/A	9.73	13.70	9.94	13.91	15.38	30	Pass
	U-NII-2A	5260	N/A	9.66	13.59	9.87	13.80	15.28	24	Pass
		5300	N/A	9.98	13.57	10.19	13.78	15.36	24	Pass
		5320	N/A	10.23	13.54	10.44	13.75	15.42	24	Pass
	U-NII-2C	5500	N/A	11.86	12.52	12.07	12.73	15.43	24	Pass
		5600	N/A	11.57	12.10	11.78	12.31	15.07	24	Pass
		5700	N/A	11.51	11.11	11.72	11.32	14.54	24	Pass
	U-NII-3	5745	N/A	12.66	12.81	12.87	13.02	15.96	30	Pass
		5785	N/A	12.97	12.56	13.18	12.77	15.99	30	Pass
		5825	N/A	13.66	12.44	13.87	12.65	16.32	30	Pass
IEEE 802.11ac -VHT40	U-NII-1	5190	N/A	7.94	10.39	8.32	10.77	12.73	30	Pass
		5230	N/A	7.87	10.97	8.25	11.35	13.08	30	Pass
	U-NII-2A	5270	N/A	7.66	10.42	8.04	10.80	12.65	24	Pass
		5310	N/A	8.04	10.35	8.42	10.73	12.74	24	Pass
	U-NII-2C	5510	N/A	10.26	11.00	10.64	11.38	14.04	24	Pass
		5550	N/A	10.14	10.71	10.52	11.09	13.83	24	Pass
		5670	N/A	10.00	9.91	10.38	10.29	13.35	24	Pass
	U-NII-3	5755	N/A	13.77	13.85	14.15	14.23	17.20	30	Pass
		5795	N/A	13.94	12.99	14.32	13.37	16.88	30	Pass
IEEE 802.11ac -VHT80	U-NII-1	5210	N/A	4.08	6.96	4.82	7.70	9.51	30	Pass
	U-NII-2A	5290	N/A	4.16	6.73	4.90	7.47	9.38	24	Pass
	U-NII-2C	5530	N/A	5.49	6.33	6.23	7.07	9.68	24	Pass
		5610	N/A	5.45	5.82	6.19	6.56	9.39	24	Pass
	U-NII-3	5775	N/A	9.61	9.31	10.35	10.05	13.21	30	Pass

Mode	Band	Freq. (MHz)	RU	CONDUCTED AVG POWER					Limit (dBm)	Result
				Meas Value (dBm)		Corr'd Value (dBm)				
				Ant. 0	Ant. 1	Ant. 0	Ant. 1	Total		
IEEE 802.11ax -HE20	U-NII-1	5180	26RU0	-2.02	0.37	-1.68	0.71	2.68	30	Pass
			52RU37	1.96	3.56	2.46	4.06	6.34	30	Pass
			106RU53	5.20	6.79	5.55	7.14	9.43	30	Pass
			SU	8.82	10.89	9.09	11.16	13.26	30	Pass
		5220	26RU4	-0.70	1.68	-0.36	2.02	4.00	30	Pass
			52RU39	1.51	4.86	2.01	5.36	7.01	30	Pass
			106RU53	4.70	7.36	5.05	7.71	9.59	30	Pass
			SU	8.62	11.44	8.89	11.71	13.54	30	Pass
		5240	26RU8	-1.54	1.07	-1.20	1.41	3.30	30	Pass
			52RU40	1.45	4.47	1.95	4.97	6.73	30	Pass
			106RU54	4.79	7.52	5.14	7.87	9.72	30	Pass
			SU	8.53	11.64	8.80	11.91	13.64	30	Pass
	U-NII-2A	5260	26RU0	-1.52	0.47	-1.18	0.81	2.93	24	Pass
			52RU37	1.48	3.52	1.98	4.02	6.13	24	Pass
			106RU53	4.65	6.89	5.00	7.24	9.27	24	Pass
			SU	8.55	11.12	8.82	11.39	13.31	24	Pass
		5300	26RU4	-0.56	1.19	-0.22	1.53	3.75	24	Pass
			52RU39	1.75	3.38	2.25	3.88	6.15	24	Pass
			106RU53	4.97	6.95	5.32	7.30	9.43	24	Pass
			SU	8.75	11.14	9.02	11.41	13.39	24	Pass
		5320	26RU8	-1.01	0.45	-0.67	0.79	3.13	24	Pass
			52RU40	1.92	3.51	2.42	4.01	6.30	24	Pass
			106RU54	5.13	6.85	5.48	7.20	9.43	24	Pass
			SU	8.94	11.03	9.21	11.30	13.39	24	Pass
	U-NII-2C	5500	26RU0	0.24	0.54	0.58	0.88	3.74	24	Pass
			52RU37	2.83	3.60	3.33	4.10	6.74	24	Pass
			106RU53	5.26	6.76	5.61	7.11	9.43	24	Pass
			SU	10.43	10.75	10.70	11.02	13.88	24	Pass
		5600	26RU4	0.60	0.91	0.94	1.25	4.10	24	Pass
			52RU39	2.70	3.01	3.20	3.51	6.37	24	Pass
			106RU53	6.39	6.39	6.74	6.74	9.75	24	Pass
			SU	10.10	10.48	10.37	10.75	13.58	24	Pass
		5700	26RU8	-0.50	-0.95	-0.16	-0.61	2.63	24	Pass

			52RU40	2.53	2.12	3.03	2.62	5.84	24	Pass
			106RU54	6.40	5.38	6.75	5.73	9.28	24	Pass
			SU	10.16	9.46	10.43	9.73	13.11	24	Pass
	U-NII-3	5745	26RU0	-2.18	-1.17	-1.84	-0.83	1.70	30	Pass
			52RU37	1.92	2.88	2.42	3.38	5.93	30	Pass
			106RU53	6.69	7.17	7.04	7.52	10.29	30	Pass
			SU	10.30	11.19	10.57	11.46	14.05	30	Pass
		5785	26RU4	-1.15	-1.65	-0.81	-1.31	1.95	30	Pass
			52RU39	2.11	2.02	2.61	2.52	5.57	30	Pass
			106RU53	6.88	6.92	7.23	7.27	10.26	30	Pass
			SU	10.66	10.98	10.93	11.25	14.11	30	Pass
		5825	26RU8	-1.00	-1.46	-0.66	-1.12	2.12	30	Pass
			52RU40	2.17	2.00	2.67	2.50	5.59	30	Pass
			106RU54	7.45	6.74	7.80	7.09	10.47	30	Pass
			SU	12.21	10.86	12.48	11.13	14.87	30	Pass
IEEE 802.11ax -HE40	U-NII-1	5190	SU	6.96	9.50	7.42	9.96	11.89	30	Pass
		5230	SU	6.81	10.07	7.27	10.53	12.21	30	Pass
	U-NII-2A	5270	SU	6.97	9.58	7.43	10.04	11.94	24	Pass
		5310	SU	7.45	9.55	7.91	10.01	12.10	24	Pass
	U-NII-2C	5510	SU	8.77	9.12	9.23	9.58	12.42	24	Pass
		5550	SU	8.57	8.82	9.03	9.28	12.17	24	Pass
		5670	SU	8.53	8.09	8.99	8.55	11.79	24	Pass
	U-NII-3	5755	SU	10.87	11.27	11.33	11.73	14.55	30	Pass
		5795	SU	12.14	11.10	12.60	11.56	15.12	30	Pass
IEEE 802.11ax -HE80	U-NII-1	5210	SU	2.69	5.30	3.57	6.18	8.08	30	Pass
	U-NII-2A	5290	SU	2.68	5.16	3.56	6.04	7.98	24	Pass
	U-NII-2C	5530	SU	4.15	4.63	5.03	5.51	8.28	24	Pass
		5610	SU	3.97	4.11	4.85	4.99	7.93	24	Pass
	U-NII-3	5775	SU	9.45	8.65	10.33	9.53	12.96	30	Pass

Note: Pre-scan all RUs at 20MHz bandwidth to find the worst case mode selection report; the full RU is the worst case mode. For 40 bandwidths and 80 bandwidths, only the worst full RU mode is shown in the report.

5.6 PEAK POWER SPECTRAL DENSITY

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)

Test Method: KDB 789033 D02 v02r01 Section F

Limits:

1. For the band 5.15-5.25 GHz.
   (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

   (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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.

   (iii) For fixed point-to-point access points operating in the band 5.15-5.25 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 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

   (iv) For 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.

Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer.

Spectrum analyzer according to the following Settings:

1. For U-NII-1, U-NII-2A, U-NII-2C band:

Using method SA-2

a) Set span to encompass the entire emission bandwidth (EBW) of the signal.
b) Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS
c) Sweep time = auto, trigger set to “free run”.
d) Trace average at least 100 traces in power averaging mode.
e) Record the max value and add 10 log (1/duty cycle)

2. For U-NII-3 band:

a) Set span to encompass the entire emission bandwidth (EBW) of the signal.
b) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS
c) Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.
d) Sweep time = auto, trigger set to “free run”.
e) Trace average at least 100 traces in power averaging mode.
f) Record the max value and add 10 log (1/duty cycle)

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Directional gain and the maximum power spectral density limit.

Frequency Band	Chain 1 Antenna Gain (dBi)	Chain 2 Antenna Gain (dBi)	Correlated chains directional gain (dBi)	PSD Limits (dBm/MHz or dBm/500kHz)
U-NII-1	5.00	5.00	8.01	14.99
U-NII-2A	5.00	5.00	8.01	8.99
U-NII-2C	5.00	5.00	8.01	8.99
U-NII-3	5.00	5.00	8.01	27.99
Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power. Directional gain is to be computed as follows:				
If *any* transmit signals are *correlated* with each other,				
Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi				

For CDD transmissions, directional gain is calculated as follows. In all formulas,

N_{ANT} = number of transmit antennas and
N_{SS} = number of spatial streams. (Assume N_{SS} = 1 unless you have specific information to the contrary.)

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

For power measurements on IEEE 802.11 devices, 1,2

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

Maximum power spectral density

Mode	Band	Freq. (MHz)	RU	Maximum power spectral density					Limit (dBm)	Result
				Meas Value (dBm)		Corr'd Value (dBm)				
				Ant. 0	Ant. 1	Ant. 0	Ant. 1	Total		
IEEE 802.11a	U-NII-1	5180	N/A	6.671	8.566	6.87	8.77	N/A	17	Pass
		5220	N/A	6.334	8.936	6.54	9.14	N/A	17	Pass
		5240	N/A	6.332	9.097	6.53	9.30	N/A	17	Pass
	U-NII-2A	5260	N/A	5.682	8.815	5.88	9.02	N/A	11	Pass
		5300	N/A	6.007	8.715	6.21	8.92	N/A	11	Pass
		5320	N/A	6.400	8.661	6.60	8.86	N/A	11	Pass
	U-NII-2C	5500	N/A	6.653	7.487	6.86	7.69	N/A	11	Pass
		5600	N/A	7.336	7.609	7.54	7.81	N/A	11	Pass
		5700	N/A	7.407	6.380	7.61	6.58	N/A	11	Pass
	U-NII-3	5745	N/A	4.864	5.325	5.07	5.53	N/A	30	Pass
		5785	N/A	6.019	5.459	6.22	5.66	N/A	30	Pass
		5825	N/A	6.034	5.799	6.24	6.00	N/A	30	Pass
IEEE 802.11n -HT20	U-NII-1	5180	N/A	2.727	4.499	3.12	4.89	7.11	14.99	Pass
		5220	N/A	2.011	5.199	2.41	5.59	7.30	14.99	Pass
		5240	N/A	2.294	5.189	2.69	5.58	7.38	14.99	Pass
	U-NII-2A	5260	N/A	2.397	5.160	2.79	5.56	7.40	8.99	Pass
		5300	N/A	2.146	4.928	2.54	5.32	7.16	8.99	Pass
		5320	N/A	2.611	4.894	3.01	5.29	7.31	8.99	Pass
	U-NII-2C	5500	N/A	3.840	4.023	4.24	4.42	7.34	8.99	Pass
		5600	N/A	4.135	4.484	4.53	4.88	7.72	8.99	Pass
		5700	N/A	4.101	3.484	4.50	3.88	7.21	8.99	Pass
	U-NII-3	5745	N/A	2.489	2.781	2.88	3.18	6.04	27.99	Pass
		5785	N/A	2.372	1.813	2.77	2.21	5.51	27.99	Pass
		5825	N/A	2.347	1.388	2.74	1.78	5.30	27.99	Pass
IEEE 802.11n -HT40	U-NII-1	5190	N/A	-2.164	-0.118	-1.47	0.58	2.68	14.99	Pass
		5230	N/A	-2.607	0.298	-1.91	0.99	2.79	14.99	Pass
	U-NII-2A	5270	N/A	-2.789	-0.399	-2.09	0.30	2.27	8.99	Pass
		5310	N/A	-2.339	0.292	-1.64	0.99	2.88	8.99	Pass
	U-NII-2C	5510	N/A	0.017	0.493	0.71	1.19	3.97	8.99	Pass
		5550	N/A	-0.076	0.547	0.62	1.24	3.95	8.99	Pass
		5670	N/A	0.028	-0.155	0.72	0.54	3.64	8.99	Pass
	U-NII-3	5755	N/A	1.404	1.039	2.10	1.73	4.93	27.99	Pass

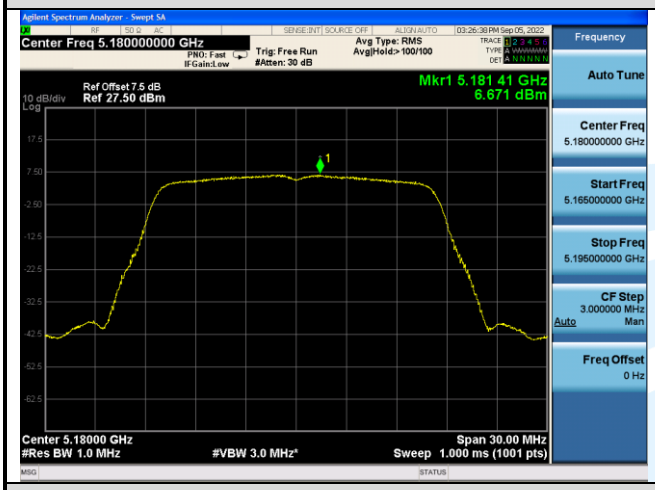
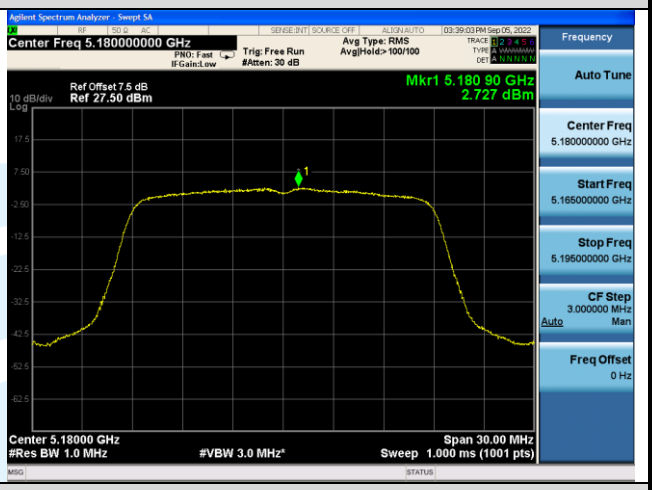
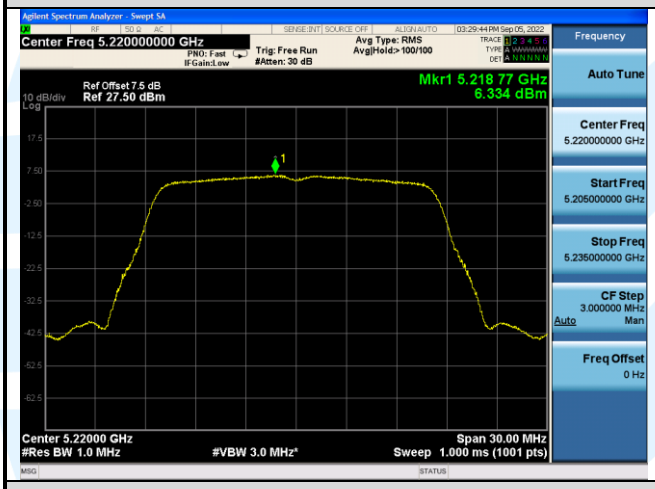
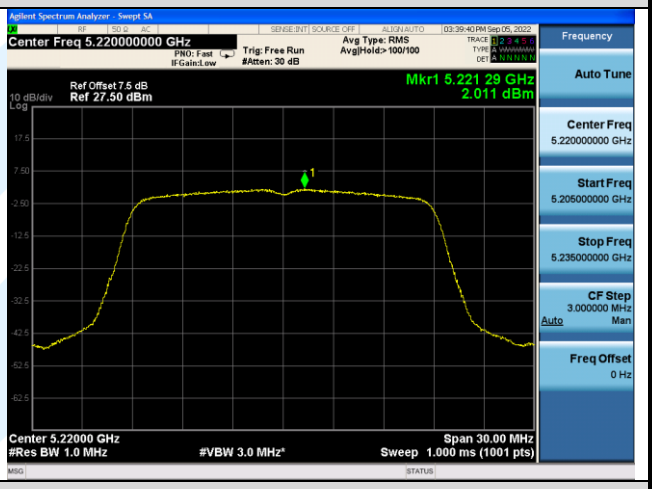
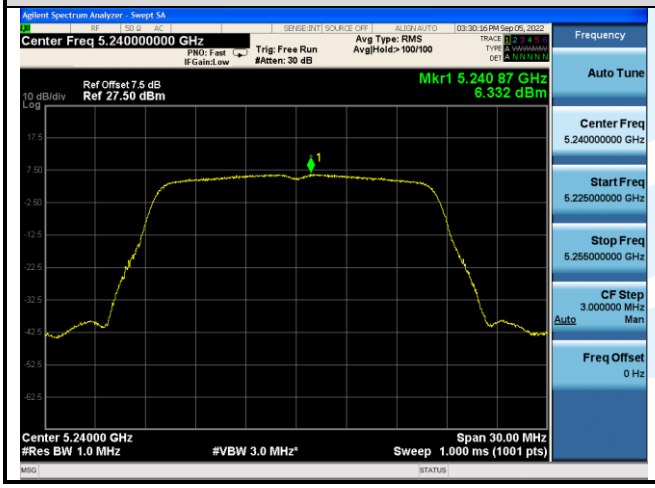
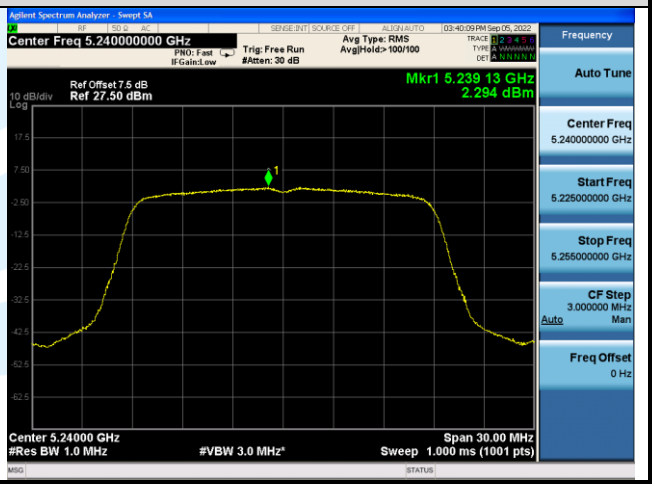
Mode	Band	Freq. (MHz)	RU	Maximum power spectral density					Limit (dBm)	Result
				Meas Value (dBm)		Corr'd Value (dBm)				
				Ant. 0	Ant. 1	Ant. 0	Ant. 1	Total		
		5795	N/A	0.892	1.449	1.59	2.14	4.88	27.99	Pass
IEEE 802.11ac -VHT20	U-NII-1	5180	N/A	2.879	4.469	3.09	4.68	6.97	14.99	Pass
		5220	N/A	2.152	5.172	2.37	5.39	7.14	14.99	Pass
		5240	N/A	2.360	5.132	2.57	5.35	7.19	14.99	Pass
	U-NII-2A	5260	N/A	1.974	4.931	2.19	5.14	6.92	8.99	Pass
		5300	N/A	2.318	4.853	2.53	5.07	6.99	8.99	Pass
		5320	N/A	2.522	5.090	2.74	5.30	7.22	8.99	Pass
	U-NII-2C	5500	N/A	3.959	4.261	4.17	4.47	7.34	8.99	Pass
		5600	N/A	4.192	4.511	4.41	4.72	7.58	8.99	Pass
		5700	N/A	3.981	3.489	4.19	3.70	6.97	8.99	Pass
	U-NII-3	5745	N/A	2.406	2.227	2.62	2.44	5.54	27.99	Pass
		5785	N/A	2.225	2.000	2.44	2.21	5.34	27.99	Pass
		5825	N/A	2.326	1.353	2.54	1.57	5.09	27.99	Pass
IEEE 802.11ac -VHT40	U-NII-1	5190	N/A	-2.272	0.027	-1.89	0.41	2.42	14.99	Pass
		5230	N/A	-2.572	0.272	-2.19	0.65	2.47	14.99	Pass
	U-NII-2A	5270	N/A	-2.858	-0.213	-2.48	0.17	2.05	8.99	Pass
		5310	N/A	-2.285	-0.434	-1.90	-0.05	2.13	8.99	Pass
	U-NII-2C	5510	N/A	0.152	0.518	0.53	0.90	3.73	8.99	Pass
		5550	N/A	-0.063	0.720	0.32	1.10	3.74	8.99	Pass
		5670	N/A	0.074	0.082	0.46	0.46	3.47	8.99	Pass
	U-NII-3	5755	N/A	0.742	-0.462	1.12	-0.08	3.57	27.99	Pass
		5795	N/A	0.709	-1.126	1.09	-0.74	3.28	27.99	Pass
IEEE 802.11ac -VHT80	U-NII-1	5210	N/A	-8.776	-5.944	-8.03	-5.20	-3.38	14.99	Pass
	U-NII-2A	5290	N/A	-9.359	-6.366	-8.62	-5.62	-3.86	8.99	Pass
	U-NII-2C	5530	N/A	-7.399	-7.096	-6.66	-6.35	-3.49	8.99	Pass
		5610	N/A	-6.650	-6.858	-5.91	-6.12	-3.00	8.99	Pass
	U-NII-3	5775	N/A	-7.466	-4.841	-6.72	-4.10	-2.21	30	Pass

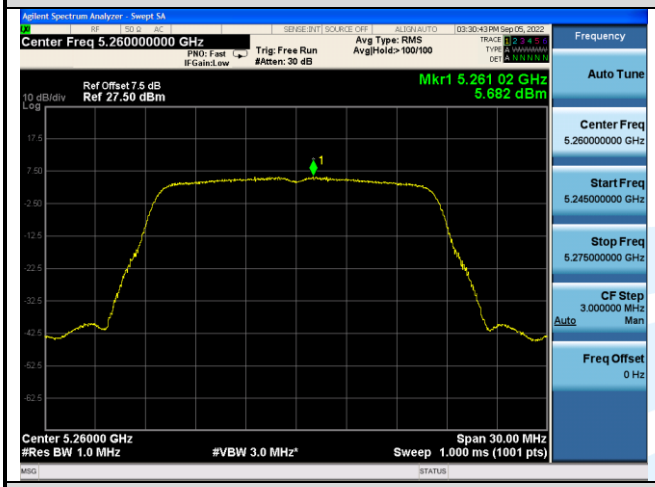
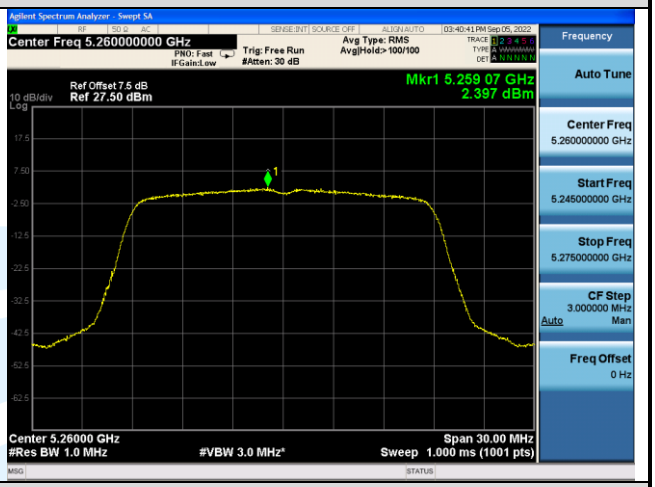
Mode	Band	Freq. (MHz)	RU	Maximum power spectral density					Limit (dB m)	Result
				Meas Value (dBm)		Corr'd Value (dBm)				
				Ant. 0	Ant. 1	Ant. 0	Ant. 1	Total		
IEEE 802.11ax -HE20	U-NII-1	5180	26RU0	-1.886	-0.165	-1.551	0.170	2.405	14.99	Pass
			52RU37	-1.440	0.379	-0.942	0.877	3.072	14.99	Pass
			106RU53	-0.694	1.000	-0.346	1.348	3.593	14.99	Pass
			SU	-0.306	2.031	-0.033	2.304	4.302	14.99	Pass
		5220	26RU4	-2.555	-0.294	-2.220	0.041	2.067	14.99	Pass
			52RU39	-1.789	0.459	-1.291	0.957	2.987	14.99	Pass
			106RU53	-1.006	1.104	-0.658	1.452	3.534	14.99	Pass
			SU	-0.244	2.233	0.029	2.506	4.453	14.99	Pass
		5240	26RU8	-2.642	0.034	-2.307	0.369	2.244	14.99	Pass
			52RU40	-1.885	0.706	-1.387	1.204	3.109	14.99	Pass
			106RU54	-1.398	1.369	-1.050	1.717	3.560	14.99	Pass
			SU	-0.622	2.729	-0.349	3.002	4.653	14.99	Pass
	U-NII-2A	5260	26RU0	-2.454	-0.359	-2.119	-0.024	2.064	8.99	Pass
			52RU37	-1.811	0.179	-1.313	0.677	2.805	8.99	Pass
			106RU53	-1.307	0.886	-0.959	1.234	3.284	8.99	Pass
			SU	-0.314	1.863	-0.041	2.136	4.193	8.99	Pass
		5300	26RU4	-2.577	-0.651	-2.242	-0.316	1.837	8.99	Pass
			52RU39	-1.777	0.038	-1.279	0.536	2.733	8.99	Pass
			106RU53	-0.842	0.884	-0.494	1.232	3.464	8.99	Pass
			SU	-0.114	1.943	0.159	2.216	4.319	8.99	Pass
		5320	26RU8	-2.059	-0.681	-1.724	-0.346	2.030	8.99	Pass
			52RU40	-1.575	-0.133	-1.077	0.365	2.714	8.99	Pass
			106RU54	-0.862	1.005	-0.514	1.353	3.529	8.99	Pass
			SU	-0.129	2.009	0.144	2.282	4.354	8.99	Pass
	U-NII-2C	5500	26RU0	-0.630	-0.404	-0.295	-0.069	2.830	8.99	Pass
			52RU37	-0.019	0.372	0.479	0.870	3.689	8.99	Pass
			106RU53	0.896	0.852	1.244	1.200	4.232	8.99	Pass
			SU	1.459	1.812	1.732	2.085	4.923	8.99	Pass
		5600	26RU4	-0.669	-0.006	-0.334	0.329	3.021	8.99	Pass
			52RU39	-0.075	0.522	0.423	1.020	3.742	8.99	Pass
			106RU53	0.976	1.045	1.324	1.393	4.369	8.99	Pass
			SU	1.865	2.229	2.138	2.502	5.335	8.99	Pass
		5700	26RU8	-1.518	-1.570	-1.183	-1.235	1.802	8.99	Pass

Mode	Band	Freq. (MHz)	RU	Maximum power spectral density					Limit (dBm)	Result
				Meas Value (dBm)		Corr'd Value (dBm)				
				Ant. 0	Ant. 1	Ant. 0	Ant. 1	Total		
			52RU40	-0.702	-0.833	-0.204	-0.335	2.741	8.99	Pass
			106RU54	0.888	-0.094	1.236	0.254	3.783	8.99	Pass
			SU	1.583	1.019	1.856	1.292	4.594	8.99	Pass
	U-NII-3	5745	26RU0	-5.020	-3.781	-4.685	-3.446	-1.011	27.99	Pass
			52RU37	-4.057	-3.119	-3.559	-2.621	-0.054	27.99	Pass
			106RU53	-3.367	-2.557	-3.019	-2.209	0.415	27.99	Pass
			SU	-1.520	-0.409	-1.247	-0.136	2.355	27.99	Pass
		5785	26RU4	-4.303	-4.632	-3.968	-4.297	-1.119	27.99	Pass
			52RU39	-3.520	-3.706	-3.022	-3.208	-0.104	27.99	Pass
			106RU53	-3.048	-2.858	-2.700	-2.510	0.406	27.99	Pass
			SU	-1.349	-0.779	-1.076	-0.506	2.229	27.99	Pass
		5825	26RU8	-4.485	-4.679	-4.150	-4.344	-1.235	27.99	Pass
			52RU40	-3.764	-3.909	-3.266	-3.411	-0.328	27.99	Pass
			106RU54	-2.388	-2.644	-2.040	-2.296	0.844	27.99	Pass
			SU	0.064	-0.974	0.337	-0.701	2.860	27.99	Pass
IEEE 802.11ax -HE40	U-NII-1	5190	SU	-3.453	-1.080	-2.991	-0.618	1.366	14.99	Pass
		5230	SU	-4.113	-1.100	-3.651	-0.638	1.122	14.99	Pass
	U-NII-2A	5270	SU	-4.331	-1.938	-3.869	-1.476	0.501	8.99	Pass
		5310	SU	-3.986	-1.512	-3.524	-1.050	0.898	8.99	Pass
	U-NII-2C	5510	SU	-2.277	-1.719	-1.815	-1.257	1.484	8.99	Pass
		5550	SU	-2.431	-1.630	-1.969	-1.168	1.481	8.99	Pass
		5670	SU	-2.305	-2.344	-1.843	-1.882	1.148	8.99	Pass
	U-NII-3	5755	SU	-3.337	-2.864	-2.875	-2.402	0.379	27.99	Pass
		5795	SU	-1.648	-2.716	-1.186	-2.254	1.323	27.99	Pass
IEEE 802.11ax -HE80	U-NII-1	5210	SU	-10.431	-7.541	-9.554	-6.664	-4.862	14.99	Pass
	U-NII-2A	5290	SU	-11.072	-8.314	-10.195	-7.437	-5.590	8.99	Pass
	U-NII-2C	5530	SU	-9.473	-8.655	-8.596	-7.778	-5.157	8.99	Pass
		5610	SU	-8.324	-8.668	-7.447	-7.791	-4.605	8.99	Pass
	U-NII-3	5775	SU	-6.559	-7.403	-5.682	-6.526	-3.073	27.99	Pass

The test plots as follows:

Antenna 0:

IEEE 802.11a	IEEE 802.11n-HT20
Channel 36	
	
Channel 44	
	
Channel 48	
	

IEEE 802.11a	IEEE 802.11n-HT20
Channel 52	
	
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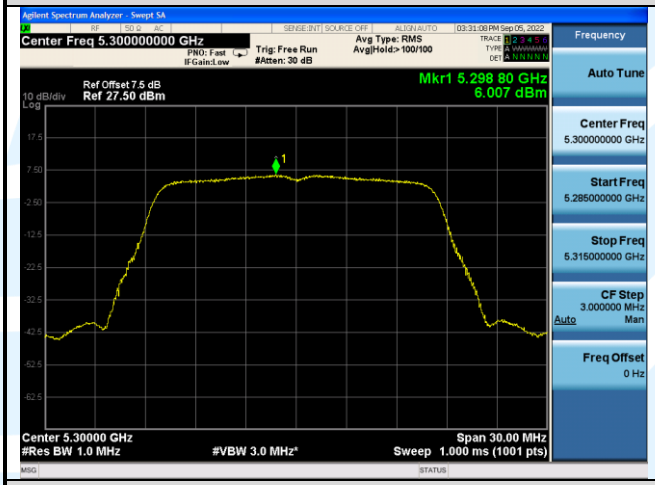
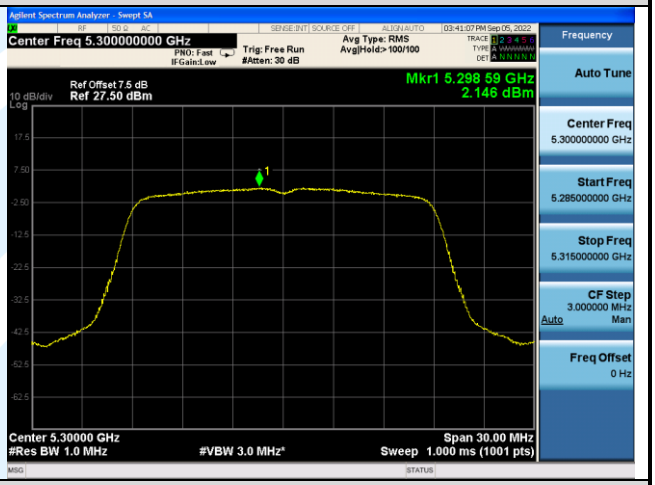
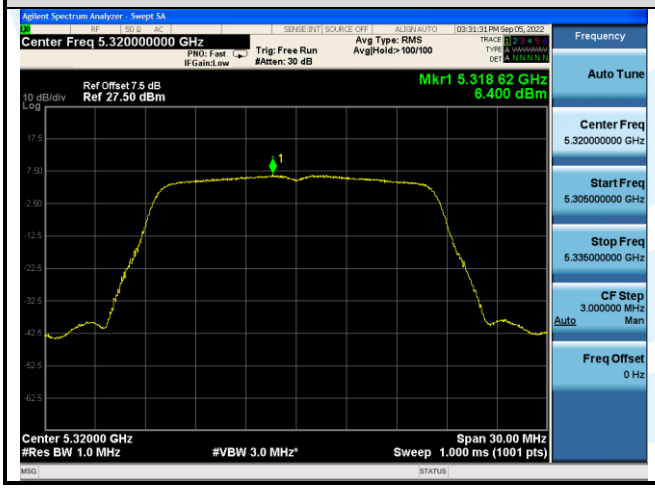
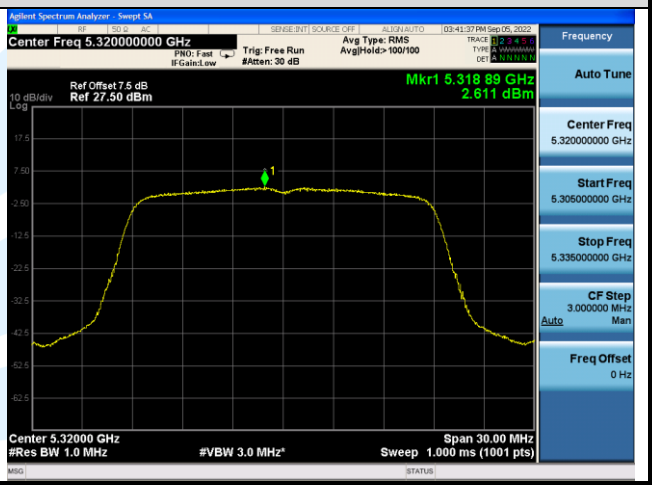
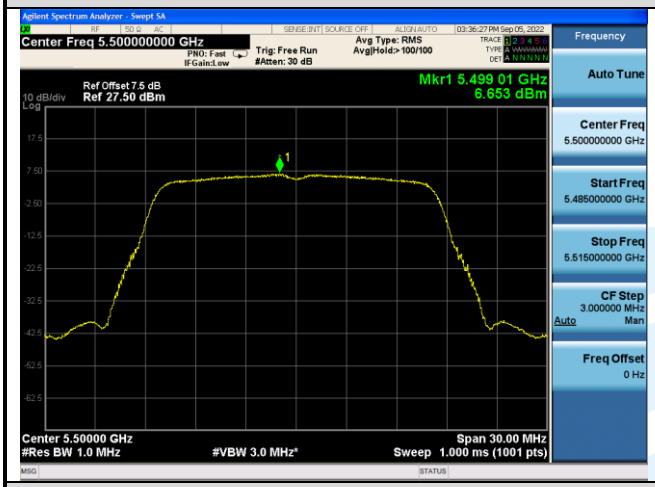
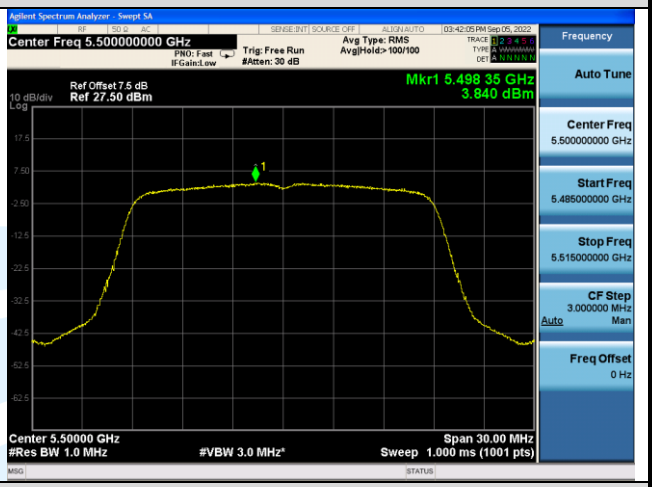
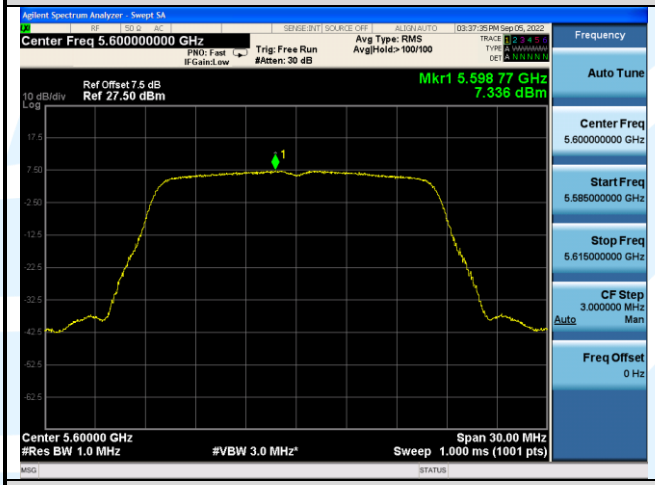
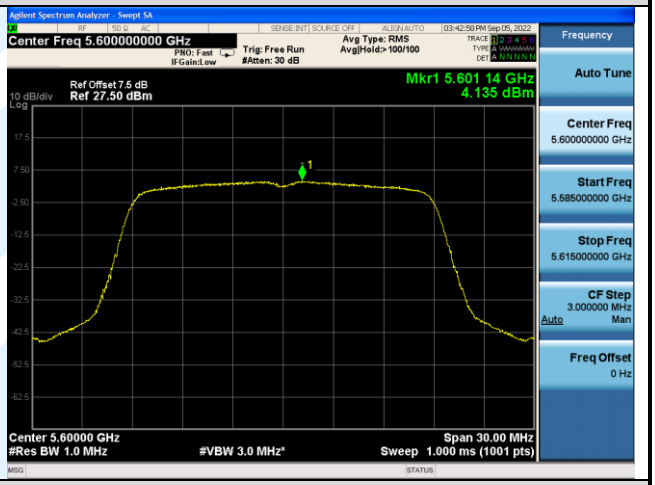
	
Channel 64	
	

IEEE 802.11a	IEEE 802.11n-HT20
Channel 100	
	
Channel 120	
	
Channel 140