

Channel 159 / 5795 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.385	57.67	33.23	35.04	3.91	59.77	68.20	-8.43	Peak	Horizontal
17.385	40.38	33.23	35.04	3.91	42.48	54.00	-11.52	Average	Horizontal
17.385	57.12	33.23	35.04	3.91	59.22	68.20	-8.98	Peak	Vertical
17.385	37.62	33.23	35.04	3.91	39.72	54.00	-14.28	Average	Vertical

IEEE 802.11ac VHT80 (Combine with Antenna Chain0 and Antenna Chain1)

Channel 155 / 5775 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol
17.325	60.21	33.27	35.15	3.93	62.26	68.20	-5.94	Peak	Horizontal
17.325	42.17	33.27	35.15	3.93	44.22	54.00	-9.78	Average	Horizontal
17.325	60.20	33.27	35.15	3.93	62.25	68.20	-5.95	Peak	Vertical
17.325	43.42	33.27	35.15	3.93	45.47	54.00	-8.53	Average	Vertical

Notes:

- 1). Measuring frequencies from 9 KHz ~ 40 GHz, No emission found between lowest internal used/generated frequency to 30MHz.
- 2). Radiated emissions measured in frequency range from 9 KHz ~ 40 GHz were made with an instrument using Peak detector mode.
- 3). 18~40GHz at least have 20dB margin. No recording in the test report.
- 4). Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;
- 5). Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 6). Pre-scan at Antenna0 and Antenna1 for IEEE 802.11a mode, pre-scan at Antenna0, Antenna1 and Combined Antenna 0 and Antenna 1 for IEEE 802.11n and IEEE 802.11ac, recorded worst case.

5.6. Power line conducted emissions

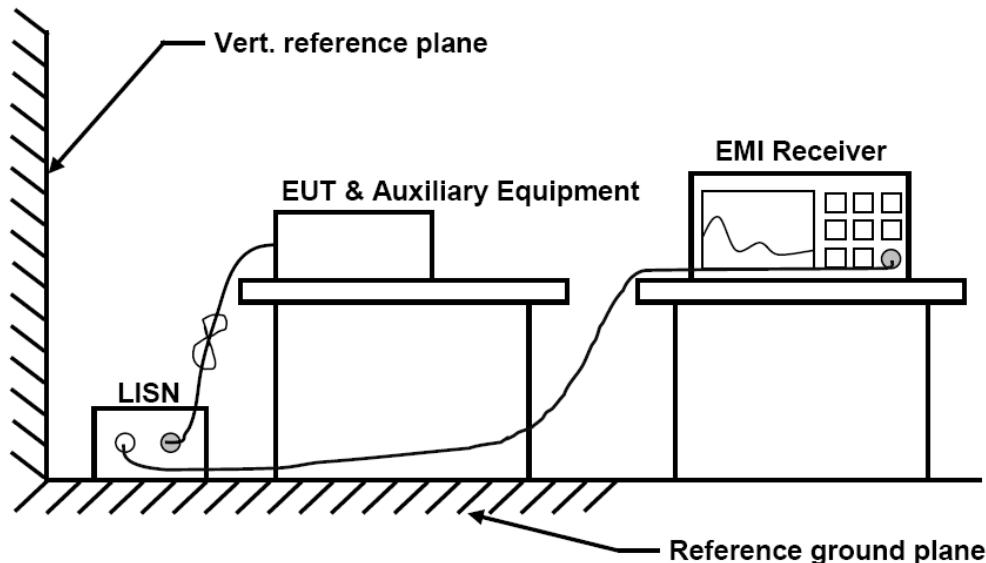
5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

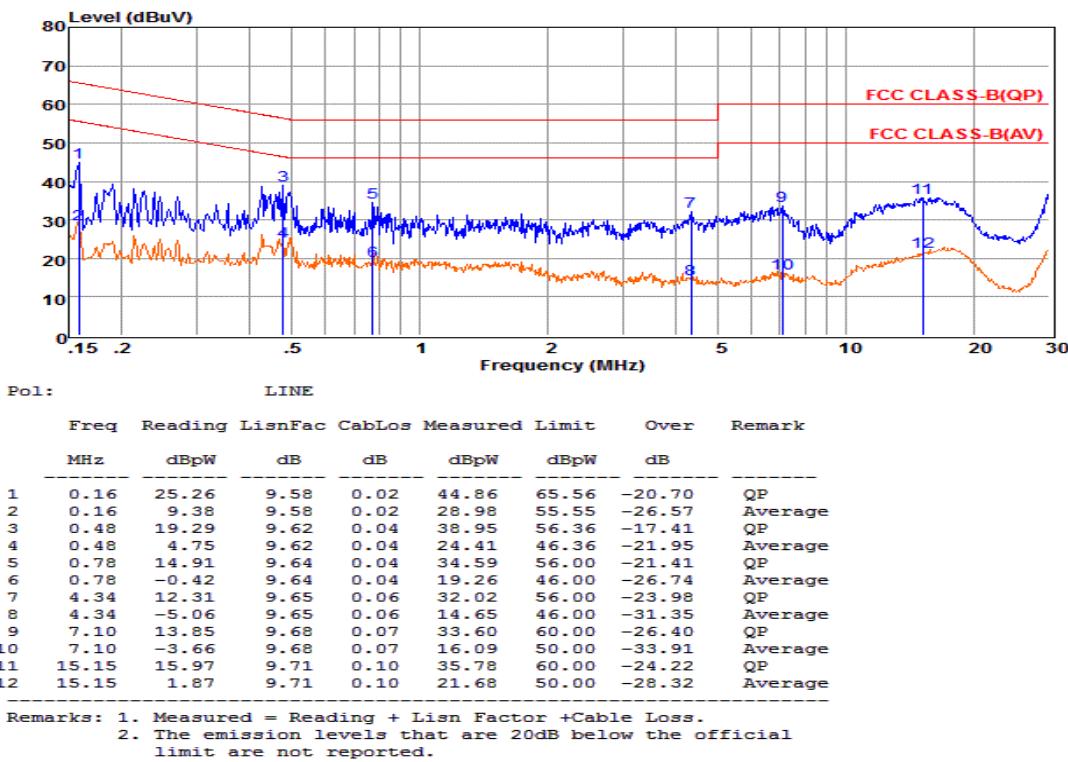
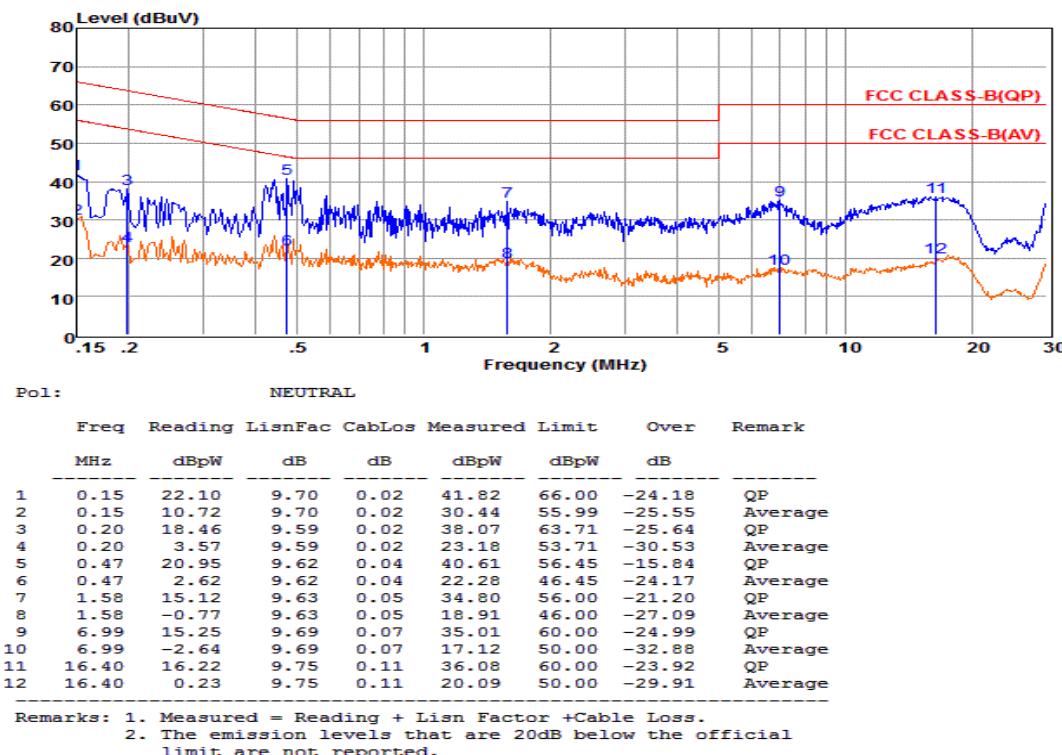
5.6.2 Block Diagram of Test Setup



5.6.3 Test Results

PASS.

The test data please refer to following page.

AC Conducted Emission of power by adapter @ AC 120V/60Hz @ IEEE 802.11ac VHT20 (worst case)**Line****Neutral**

***Note: Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11ac VHT20 mode (High Channel, Combined Antenna Chain0 and Antenna Chain1)).

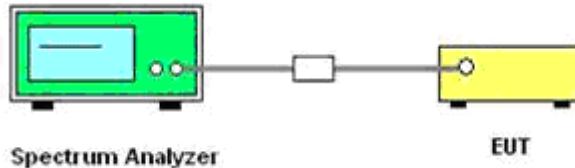
5.7 Undesirable Emissions Measurement

5.7.1 Limit

According to §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:

- (a) 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.
- (b) For transmitters operating in the 5.25-5.35 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.
- (c) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (d) For transmitters operating in the 5.725-5.85 GHz band:
 - (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.
 - (ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
- (e) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (f) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (g) The provisions of §15.205 apply to intentional radiators operating under this section.
- (h) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

5.7.2 Test Configuration



5.7.3 Test Procedure

1. The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
2. Set the RBW = 1MHz.
3. Set the VBW \geq 3MHz
4. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
5. Manually set sweep time $\geq 10 \times (\text{number of points in sweep}) \times (\text{total on/off period of the transmitted signal})$.
6. Set detector = power averaging (rms).
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.

5.7.4 Test Results

IEEE 802.11a (Antenna Chain0)							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.12	5.000	-37.12	Peak	27.0	-64.12	PASS
5650.0	-54.57	5.000	-49.57	Average	27.0	-76.57	PASS
5700.0	-42.21	5.000	-37.21	Peak	15.6	-52.81	PASS
5700.0	-54.52	5.000	-49.52	Average	15.6	-65.12	PASS
5720.0	-42.69	5.000	-37.69	Peak	10.0	-47.69	PASS
5720.0	-54.36	5.000	-49.36	Average	10.0	-59.36	PASS
5725.0	-43.21	5.000	-38.21	Peak	-27.0	-11.21	PASS
5725.0	-54.35	5.000	-49.35	Average	-27.0	-22.35	PASS
5850.0	-41.99	5.000	-36.99	Peak	-27.0	-9.99	PASS
5850.0	-54.09	5.000	-49.09	Average	-27.0	-22.09	PASS
5855.0	-42.41	5.000	-37.41	Peak	10.0	-47.41	PASS
5855.0	-54.13	5.000	-49.13	Average	10.0	-59.13	PASS
5875.0	-42.59	5.000	-37.59	Peak	15.6	-53.19	PASS
5875.0	-54.12	5.000	-49.12	Average	15.6	-64.72	PASS
5925.0	-42.20	5.000	-37.20	Peak	27.0	-64.20	PASS
5925.0	-54.19	5.000	-49.19	Average	27.0	-76.19	PASS

IEEE 802.11n HT20 (Antenna Chain0)							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.97	5.000	-37.97	Peak	27.0	-64.97	PASS
5650.0	-54.58	5.000	-49.58	Average	27.0	-76.58	PASS
5700.0	-41.98	5.000	-36.98	Peak	15.6	-52.58	PASS
5700.0	-54.43	5.000	-49.43	Average	15.6	-65.03	PASS
5720.0	-41.22	5.000	-36.22	Peak	10.0	-46.22	PASS
5720.0	-54.52	5.000	-49.52	Average	10.0	-59.52	PASS
5725.0	-42.39	5.000	-37.39	Peak	-27.0	-10.39	PASS
5725.0	-54.37	5.000	-49.37	Average	-27.0	-22.37	PASS
5850.0	-41.86	5.000	-36.86	Peak	-27.0	-9.86	PASS
5850.0	-54.06	5.000	-49.06	Average	-27.0	-22.06	PASS
5855.0	-41.88	5.000	-36.88	Peak	10.0	-46.88	PASS
5855.0	-54.10	5.000	-49.10	Average	10.0	-59.10	PASS
5875.0	-42.68	5.000	-37.68	Peak	15.6	-53.28	PASS
5875.0	-54.15	5.000	-49.15	Average	15.6	-64.75	PASS
5925.0	-42.48	5.000	-37.48	Peak	27.0	-64.48	PASS
5925.0	-54.21	5.000	-49.21	Average	27.0	-76.21	PASS

IEEE 802.11ac VHT20 (Antenna Chain0)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.59	5.000	-37.59	Peak	27.0	-64.59	PASS
5650.0	-54.60	5.000	-49.60	Average	27.0	-76.60	PASS
5700.0	-42.07	5.000	-37.07	Peak	15.6	-52.67	PASS
5700.0	-54.46	5.000	-49.46	Average	15.6	-65.06	PASS
5720.0	-43.20	5.000	-38.20	Peak	10.0	-48.20	PASS
5720.0	-54.54	5.000	-49.54	Average	10.0	-59.54	PASS
5725.0	-40.91	5.000	-35.91	Peak	-27.0	-8.91	PASS
5725.0	-54.36	5.000	-49.36	Average	-27.0	-22.36	PASS
5850.0	-42.14	5.000	-37.14	Peak	-27.0	-10.14	PASS
5850.0	-54.10	5.000	-49.10	Average	-27.0	-22.10	PASS
5855.0	-41.43	5.000	-36.43	Peak	10.0	-46.43	PASS
5855.0	-54.18	5.000	-49.18	Average	10.0	-59.18	PASS
5875.0	-42.63	5.000	-37.63	Peak	15.6	-53.23	PASS
5875.0	-54.18	5.000	-49.18	Average	15.6	-64.78	PASS
5925.0	-41.89	5.000	-36.89	Peak	27.0	-63.89	PASS
5925.0	-54.27	5.000	-49.27	Average	27.0	-76.27	PASS

IEEE 802.11n HT40 (Antenna Chain0)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.47	5.000	-37.47	Peak	27.0	-64.47	PASS
5650.0	-54.45	5.000	-49.45	Average	27.0	-76.45	PASS
5700.0	-42.04	5.000	-37.04	Peak	15.6	-52.64	PASS
5700.0	-54.34	5.000	-49.34	Average	15.6	-64.94	PASS
5720.0	-42.76	5.000	-37.76	Peak	10.0	-47.76	PASS
5720.0	-54.22	5.000	-49.22	Average	10.0	-59.22	PASS
5725.0	-42.29	5.000	-37.29	Peak	-27.0	-10.29	PASS
5725.0	-54.22	5.000	-49.22	Average	-27.0	-22.22	PASS
5850.0	-42.51	5.000	-37.51	Peak	-27.0	-10.51	PASS
5850.0	-53.79	5.000	-48.79	Average	-27.0	-21.79	PASS
5855.0	-41.98	5.000	-36.98	Peak	10.0	-46.98	PASS
5855.0	-53.78	5.000	-48.78	Average	10.0	-58.78	PASS
5875.0	-42.51	5.000	-37.51	Peak	15.6	-53.11	PASS
5875.0	-53.81	5.000	-48.81	Average	15.6	-64.41	PASS
5925.0	-41.99	5.000	-36.99	Peak	27.0	-63.99	PASS
5925.0	-53.91	5.000	-48.91	Average	27.0	-75.91	PASS

IEEE 802.11ac VHT40 (Antenna Chain0)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.69	5.000	-37.69	Peak	27.0	-64.69	PASS
5650.0	-54.46	5.000	-49.46	Average	27.0	-76.46	PASS
5700.0	-43.49	5.000	-38.49	Peak	15.6	-54.09	PASS
5700.0	-54.38	5.000	-49.38	Average	15.6	-64.98	PASS
5720.0	-42.95	5.000	-37.95	Peak	10.0	-47.95	PASS
5720.0	-54.26	5.000	-49.26	Average	10.0	-59.26	PASS
5725.0	-42.81	5.000	-37.81	Peak	-27.0	-10.81	PASS
5725.0	-54.22	5.000	-49.22	Average	-27.0	-22.22	PASS
5850.0	-42.47	5.000	-37.47	Peak	-27.0	-10.47	PASS
5850.0	-53.82	5.000	-48.82	Average	-27.0	-21.82	PASS
5855.0	-40.69	5.000	-35.69	Peak	10.0	-45.69	PASS
5855.0	-53.79	5.000	-48.79	Average	10.0	-58.79	PASS
5875.0	-42.05	5.000	-37.05	Peak	15.6	-52.65	PASS
5875.0	-53.80	5.000	-48.80	Average	15.6	-64.40	PASS
5925.0	-43.09	5.000	-38.09	Peak	27.0	-65.09	PASS
5925.0	-53.85	5.000	-48.85	Average	27.0	-75.85	PASS

IEEE 802.11ac VHT80 (Antenna Chain0)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.08	5.000	-37.08	Peak	27.0	-64.08	PASS
5650.0	-53.55	5.000	-48.55	Average	27.0	-75.55	PASS
5700.0	-42.63	5.000	-37.63	Peak	15.6	-53.23	PASS
5700.0	-53.50	5.000	-48.50	Average	15.6	-64.10	PASS
5720.0	-42.06	5.000	-37.06	Peak	10.0	-47.06	PASS
5720.0	-53.48	5.000	-48.48	Average	10.0	-58.48	PASS
5725.0	-42.33	5.000	-37.33	Peak	-27.0	-10.33	PASS
5725.0	-53.47	5.000	-48.47	Average	-27.0	-21.47	PASS
5850.0	-42.33	5.000	-37.33	Peak	-27.0	-10.33	PASS
5850.0	-53.47	5.000	-48.47	Average	-27.0	-21.47	PASS
5855.0	-42.06	5.000	-37.06	Peak	10.0	-47.06	PASS
5855.0	-53.48	5.000	-48.48	Average	10.0	-58.48	PASS
5875.0	-42.63	5.000	-37.63	Peak	15.6	-53.23	PASS
5875.0	-53.50	5.000	-48.50	Average	15.6	-64.10	PASS
5925.0	-42.08	5.000	-37.08	Peak	27.0	-64.08	PASS
5925.0	-53.55	5.000	-48.55	Average	27.0	-75.55	PASS

IEEE 802.11a (Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.81	5.000	-37.81	Peak	27.0	-64.81	PASS
5650.0	-54.53	5.000	-49.53	Average	27.0	-76.53	PASS
5700.0	-42.84	5.000	-37.84	Peak	15.6	-53.44	PASS
5700.0	-54.49	5.000	-49.49	Average	15.6	-65.09	PASS
5720.0	-42.46	5.000	-37.46	Peak	10.0	-47.46	PASS
5720.0	-54.38	5.000	-49.38	Average	10.0	-59.38	PASS
5725.0	-42.47	5.000	-37.47	Peak	-27.0	-10.47	PASS
5725.0	-54.37	5.000	-49.37	Average	-27.0	-22.37	PASS
5850.0	-42.08	5.000	-37.08	Peak	-27.0	-10.08	PASS
5850.0	-54.03	5.000	-49.03	Average	-27.0	-22.03	PASS
5855.0	-42.42	5.000	-37.42	Peak	10.0	-47.42	PASS
5855.0	-54.12	5.000	-49.12	Average	10.0	-59.12	PASS
5875.0	-40.84	5.000	-35.84	Peak	15.6	-51.44	PASS
5875.0	-54.20	5.000	-49.20	Average	15.6	-64.80	PASS
5925.0	-42.18	5.000	-37.18	Peak	27.0	-64.18	PASS
5925.0	-54.21	5.000	-49.21	Average	27.0	-76.21	PASS

IEEE 802.11n HT20 (Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.58	5.000	-37.58	Peak	27.0	-64.58	PASS
5650.0	-54.53	5.000	-49.53	Average	27.0	-76.53	PASS
5700.0	-42.55	5.000	-37.55	Peak	15.6	-53.15	PASS
5700.0	-54.39	5.000	-49.39	Average	15.6	-64.99	PASS
5720.0	-43.32	5.000	-38.32	Peak	10.0	-48.32	PASS
5720.0	-54.46	5.000	-49.46	Average	10.0	-59.46	PASS
5725.0	-42.96	5.000	-37.96	Peak	-27.0	-10.96	PASS
5725.0	-54.30	5.000	-49.30	Average	-27.0	-22.30	PASS
5850.0	-43.10	5.000	-38.10	Peak	-27.0	-11.10	PASS
5850.0	-54.07	5.000	-49.07	Average	-27.0	-22.07	PASS
5855.0	-41.93	5.000	-36.93	Peak	10.0	-46.93	PASS
5855.0	-54.16	5.000	-49.16	Average	10.0	-59.16	PASS
5875.0	-42.56	5.000	-37.56	Peak	15.6	-53.16	PASS
5875.0	-54.18	5.000	-49.18	Average	15.6	-64.78	PASS
5925.0	-42.04	5.000	-37.04	Peak	27.0	-64.04	PASS
5925.0	-54.22	5.000	-49.22	Average	27.0	-76.22	PASS

IEEE 802.11ac VHT20 (Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.74	5.000	-37.74	Peak	27.0	-64.74	PASS
5650.0	-54.56	5.000	-49.56	Average	27.0	-76.56	PASS
5700.0	-43.17	5.000	-38.17	Peak	15.6	-53.77	PASS
5700.0	-54.40	5.000	-49.40	Average	15.6	-65.00	PASS
5720.0	-42.75	5.000	-37.75	Peak	10.0	-47.75	PASS
5720.0	-54.49	5.000	-49.49	Average	10.0	-59.49	PASS
5725.0	-41.59	5.000	-36.59	Peak	-27.0	-9.59	PASS
5725.0	-54.28	5.000	-49.28	Average	-27.0	-22.28	PASS
5850.0	-42.85	5.000	-37.85	Peak	-27.0	-10.85	PASS
5850.0	-54.09	5.000	-49.09	Average	-27.0	-22.09	PASS
5855.0	-41.51	5.000	-36.51	Peak	10.0	-46.51	PASS
5855.0	-54.14	5.000	-49.14	Average	10.0	-59.14	PASS
5875.0	-42.49	5.000	-37.49	Peak	15.6	-53.09	PASS
5875.0	-54.19	5.000	-49.19	Average	15.6	-64.79	PASS
5925.0	-42.67	5.000	-37.67	Peak	27.0	-64.67	PASS
5925.0	-54.25	5.000	-49.25	Average	27.0	-76.25	PASS

IEEE 802.11n HT40 (Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.48	5.000	-37.48	Peak	27.0	-64.48	PASS
5650.0	-54.41	5.000	-49.41	Average	27.0	-76.41	PASS
5700.0	-41.95	5.000	-36.95	Peak	15.6	-52.55	PASS
5700.0	-54.33	5.000	-49.33	Average	15.6	-64.93	PASS
5720.0	-42.95	5.000	-37.95	Peak	10.0	-47.95	PASS
5720.0	-54.21	5.000	-49.21	Average	10.0	-59.21	PASS
5725.0	-43.27	5.000	-38.27	Peak	-27.0	-11.27	PASS
5725.0	-54.16	5.000	-49.16	Average	-27.0	-22.16	PASS
5850.0	-42.16	5.000	-37.16	Peak	-27.0	-10.16	PASS
5850.0	-53.76	5.000	-48.76	Average	-27.0	-21.76	PASS
5855.0	-42.18	5.000	-37.18	Peak	10.0	-47.18	PASS
5855.0	-53.76	5.000	-48.76	Average	10.0	-58.76	PASS
5875.0	-42.12	5.000	-37.12	Peak	15.6	-52.72	PASS
5875.0	-53.83	5.000	-48.83	Average	15.6	-64.43	PASS
5925.0	-42.43	5.000	-37.43	Peak	27.0	-64.43	PASS
5925.0	-53.84	5.000	-48.84	Average	27.0	-75.84	PASS

IEEE 802.11ac VHT40 (Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.95	5.000	-37.95	Peak	27.0	-64.95	PASS
5650.0	-54.38	5.000	-49.38	Average	27.0	-76.38	PASS
5700.0	-42.81	5.000	-37.81	Peak	15.6	-53.41	PASS
5700.0	-54.28	5.000	-49.28	Average	15.6	-64.88	PASS
5720.0	-42.24	5.000	-37.24	Peak	10.0	-47.24	PASS
5720.0	-54.22	5.000	-49.22	Average	10.0	-59.22	PASS
5725.0	-42.72	5.000	-37.72	Peak	-27.0	-10.72	PASS
5725.0	-54.18	5.000	-49.18	Average	-27.0	-22.18	PASS
5850.0	-42.25	5.000	-37.25	Peak	-27.0	-10.25	PASS
5850.0	-53.79	5.000	-48.79	Average	-27.0	-21.79	PASS
5855.0	-42.58	5.000	-37.58	Peak	10.0	-47.58	PASS
5855.0	-53.80	5.000	-48.80	Average	10.0	-58.80	PASS
5875.0	-43.04	5.000	-38.04	Peak	15.6	-53.64	PASS
5875.0	-53.83	5.000	-48.83	Average	15.6	-64.43	PASS
5925.0	-42.66	5.000	-37.66	Peak	27.0	-64.66	PASS
5925.0	-53.86	5.000	-48.86	Average	27.0	-75.86	PASS

IEEE 802.11ac VHT80 (Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
5650.0	-42.13	5.000	-37.13	Peak	27.0	-64.13	PASS
5650.0	-53.58	5.000	-48.58	Average	27.0	-75.58	PASS
5700.0	-42.14	5.000	-37.14	Peak	15.6	-52.74	PASS
5700.0	-53.46	5.000	-48.46	Average	15.6	-64.06	PASS
5720.0	-42.72	5.000	-37.72	Peak	10.0	-47.72	PASS
5720.0	-53.48	5.000	-48.48	Average	10.0	-58.48	PASS
5725.0	-41.89	5.000	-36.89	Peak	-27.0	-9.89	PASS
5725.0	-53.44	5.000	-48.44	Average	-27.0	-21.44	PASS
5850.0	-41.89	5.000	-36.89	Peak	-27.0	-9.89	PASS
5850.0	-53.44	5.000	-48.44	Average	-27.0	-21.44	PASS
5855.0	-42.72	5.000	-37.72	Peak	10.0	-47.72	PASS
5855.0	-53.48	5.000	-48.48	Average	10.0	-58.48	PASS
5875.0	-42.14	5.000	-37.14	Peak	15.6	-52.74	PASS
5875.0	-53.46	5.000	-48.46	Average	15.6	-64.06	PASS
5925.0	-42.13	5.000	-37.13	Peak	27.0	-64.13	PASS
5925.0	-53.58	5.000	-48.58	Average	27.0	-75.58	PASS

IEEE 802.11n HT20 (Combined Antenna Chain0 and Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
	Chain0	Chain1	Sum						
5650.0	-42.97	-42.58	-39.76	8.010	-31.75	Peak	27.0	-58.75	PASS
5650.0	-54.58	-54.53	-51.54	8.010	-43.53	Average	27.0	-70.53	PASS
5700.0	-41.98	-42.55	-39.25	8.010	-31.24	Peak	15.6	-46.84	PASS
5700.0	-54.43	-54.39	-51.40	8.010	-43.39	Average	15.6	-58.99	PASS
5720.0	-41.22	-43.32	-39.13	8.010	-31.12	Peak	10.0	-41.12	PASS
5720.0	-54.52	-54.46	-51.48	8.010	-43.47	Average	10.0	-53.47	PASS
5725.0	-42.39	-42.96	-39.66	8.010	-31.65	Peak	-27.0	-4.65	PASS
5725.0	-54.37	-54.30	-51.32	8.010	-43.31	Average	-27.0	-16.31	PASS
5850.0	-41.86	-43.10	-39.43	8.010	-31.42	Peak	-27.0	-4.42	PASS
5850.0	-54.06	-54.07	-51.05	8.010	-43.04	Average	-27.0	-16.04	PASS
5855.0	-41.88	-41.93	-38.89	8.010	-30.88	Peak	10.0	-40.88	PASS
5855.0	-54.10	-54.16	-51.12	8.010	-43.11	Average	10.0	-53.11	PASS
5875.0	-42.68	-42.56	-39.61	8.010	-31.60	Peak	15.6	-47.20	PASS
5875.0	-54.15	-54.18	-51.15	8.010	-43.14	Average	15.6	-58.74	PASS
5925.0	-42.48	-42.04	-39.24	8.010	-31.23	Peak	27.0	-58.23	PASS
5925.0	-54.21	-54.22	-51.20	8.010	-43.19	Average	27.0	-70.19	PASS

IEEE 802.11ac VHT20 (Combined Antenna Chain0 and Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
	Chain0	Chain1	Sum						
5650.0	-42.59	-42.74	-39.65	8.010	-31.64	Peak	27.0	-58.64	PASS
5650.0	-54.60	-54.56	-51.57	8.010	-43.56	Average	27.0	-70.56	PASS
5700.0	-42.07	-43.17	-39.57	8.010	-31.56	Peak	15.6	-47.16	PASS
5700.0	-54.46	-54.40	-51.42	8.010	-43.41	Average	15.6	-59.01	PASS
5720.0	-43.20	-42.75	-39.96	8.010	-31.95	Peak	10.0	-41.95	PASS
5720.0	-54.54	-54.49	-51.50	8.010	-43.49	Average	10.0	-53.49	PASS
5725.0	-40.91	-41.59	-38.23	8.010	-30.22	Peak	-27.0	-3.22	PASS
5725.0	-54.36	-54.28	-51.31	8.010	-43.30	Average	-27.0	-16.30	PASS
5850.0	-42.14	-42.85	-39.47	8.010	-31.46	Peak	-27.0	-4.46	PASS
5850.0	-54.10	-54.09	-51.08	8.010	-43.07	Average	-27.0	-16.07	PASS
5855.0	-41.43	-41.51	-38.46	8.010	-30.45	Peak	10.0	-40.45	PASS
5855.0	-54.18	-54.14	-51.15	8.010	-43.14	Average	10.0	-53.14	PASS
5875.0	-42.63	-42.49	-39.55	8.010	-31.54	Peak	15.6	-47.14	PASS
5875.0	-54.18	-54.19	-51.17	8.010	-43.16	Average	15.6	-58.76	PASS
5925.0	-41.89	-42.67	-39.25	8.010	-31.24	Peak	27.0	-58.24	PASS
5925.0	-54.27	-54.25	-51.25	8.010	-43.24	Average	27.0	-70.24	PASS

IEEE 802.11n HT40 (Combined Antenna Chain0 and Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
	Chain0	Chain1	Sum						
5650.0	-42.47	-42.48	-39.46	8.010	-31.45	Peak	27.0	-58.45	PASS
5650.0	-54.45	-54.41	-51.42	8.010	-43.41	Average	27.0	-70.41	PASS
5700.0	-42.04	-41.95	-38.98	8.010	-30.97	Peak	15.6	-46.57	PASS
5700.0	-54.34	-54.33	-51.32	8.010	-43.31	Average	15.6	-58.91	PASS
5720.0	-42.76	-42.95	-39.84	8.010	-31.83	Peak	10.0	-41.83	PASS
5720.0	-54.22	-54.21	-51.20	8.010	-43.19	Average	10.0	-53.19	PASS
5725.0	-42.29	-43.27	-39.74	8.010	-31.73	Peak	-27.0	-4.73	PASS
5725.0	-54.22	-54.16	-51.18	8.010	-43.17	Average	-27.0	-16.17	PASS
5850.0	-42.51	-42.16	-39.32	8.010	-31.31	Peak	-27.0	-4.31	PASS
5850.0	-53.79	-53.76	-50.76	8.010	-42.75	Average	-27.0	-15.75	PASS
5855.0	-41.98	-42.18	-39.07	8.010	-31.06	Peak	10.0	-41.06	PASS
5855.0	-53.78	-53.76	-50.76	8.010	-42.75	Average	10.0	-52.75	PASS
5875.0	-42.51	-42.12	-39.30	8.010	-31.29	Peak	15.6	-46.89	PASS
5875.0	-53.81	-53.83	-50.81	8.010	-42.80	Average	15.6	-58.40	PASS
5925.0	-41.99	-42.43	-39.19	8.010	-31.18	Peak	27.0	-58.18	PASS
5925.0	-53.91	-53.84	-50.86	8.010	-42.85	Average	27.0	-69.85	PASS

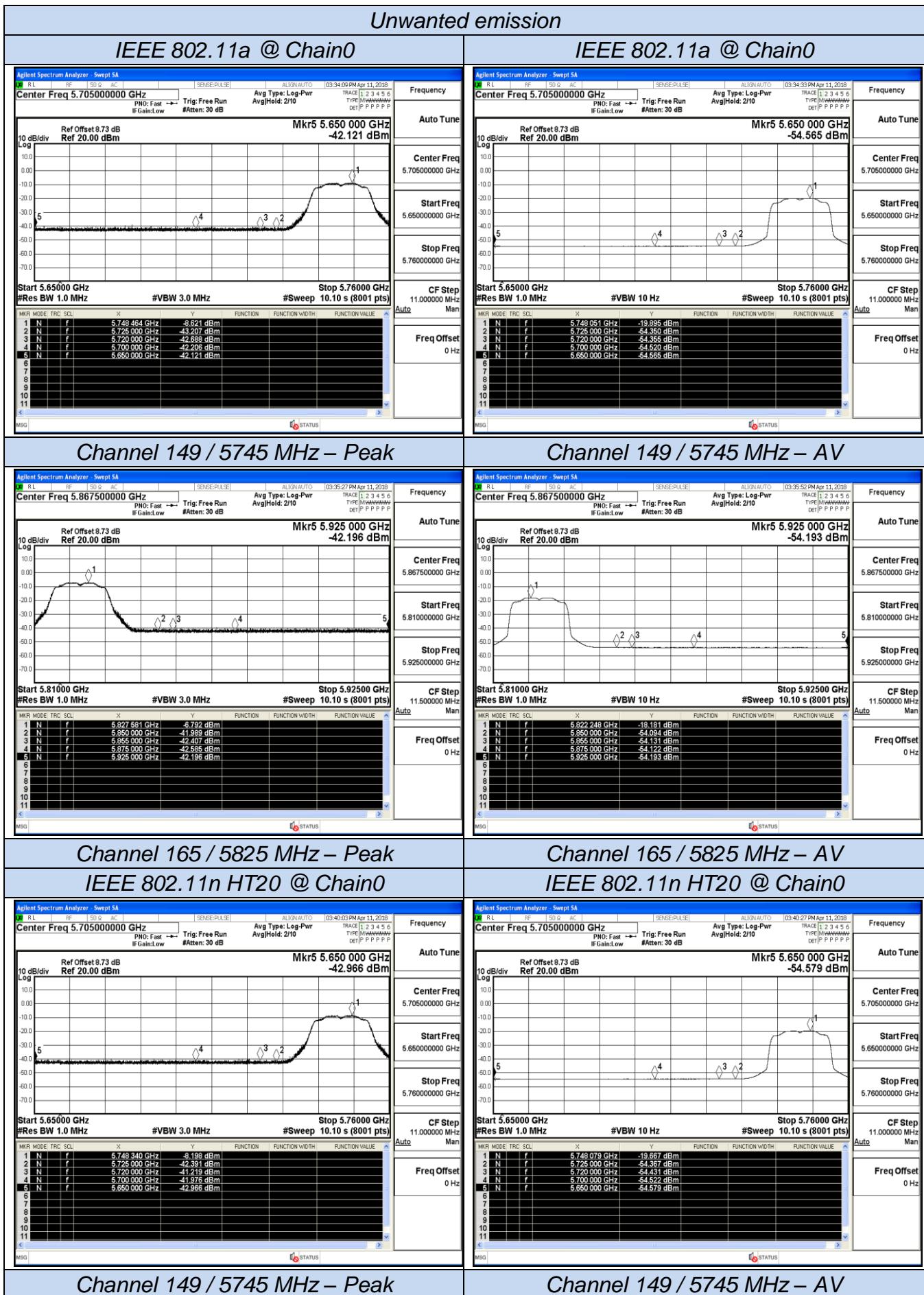
IEEE 802.11ac VHT40 (Combined Antenna Chain0 and Antenna Chain1)

Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
	Chain0	Chain1	Sum						
5650.0	-42.69	-42.95	-39.81	8.010	-31.80	Peak	27.0	-58.80	PASS
5650.0	-54.46	-54.38	-51.41	8.010	-43.40	Average	27.0	-70.40	PASS
5700.0	-43.49	-42.81	-40.13	8.010	-32.12	Peak	15.6	-47.72	PASS
5700.0	-54.38	-54.28	-51.32	8.010	-43.31	Average	15.6	-58.91	PASS
5720.0	-42.95	-42.24	-39.57	8.010	-31.56	Peak	10.0	-41.56	PASS
5720.0	-54.26	-54.22	-51.23	8.010	-43.22	Average	10.0	-53.22	PASS
5725.0	-42.81	-42.72	-39.75	8.010	-31.74	Peak	-27.0	-4.74	PASS
5725.0	-54.22	-54.18	-51.19	8.010	-43.18	Average	-27.0	-16.18	PASS
5850.0	-42.47	-42.25	-39.35	8.010	-31.34	Peak	-27.0	-4.34	PASS
5850.0	-53.82	-53.79	-50.79	8.010	-42.78	Average	-27.0	-15.78	PASS
5855.0	-40.69	-42.58	-38.52	8.010	-30.51	Peak	10.0	-40.51	PASS
5855.0	-53.79	-53.80	-50.78	8.010	-42.77	Average	10.0	-52.77	PASS
5875.0	-42.05	-43.04	-39.51	8.010	-31.50	Peak	15.6	-47.10	PASS
5875.0	-53.80	-53.83	-50.80	8.010	-42.79	Average	15.6	-58.39	PASS
5925.0	-43.09	-42.66	-39.86	8.010	-31.85	Peak	27.0	-58.85	PASS
5925.0	-53.85	-53.86	-50.84	8.010	-42.83	Average	27.0	-69.83	PASS

IEEE 802.11ac VHT80 (Combined Antenna Chain0 and Antenna Chain1)									
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Over limit (dB)	Verdict
	Chain0	Chain1	Sum						
5650.0	-42.08	-42.13	-39.09	8.010	-31.08	Peak	27.0	-58.08	PASS
5650.0	-53.55	-53.58	-50.55	8.010	-42.54	Average	27.0	-69.54	PASS
5700.0	-42.63	-42.14	-39.37	8.010	-31.36	Peak	15.6	-46.96	PASS
5700.0	-53.50	-53.46	-50.47	8.010	-42.46	Average	15.6	-58.06	PASS
5720.0	-42.06	-42.72	-39.37	8.010	-31.36	Peak	10.0	-41.36	PASS
5720.0	-53.48	-53.48	-50.47	8.010	-42.46	Average	10.0	-52.46	PASS
5725.0	-42.33	-41.89	-39.09	8.010	-31.08	Peak	-27.0	-4.08	PASS
5725.0	-53.47	-53.44	-50.44	8.010	-42.43	Average	-27.0	-15.43	PASS
5850.0	-42.33	-41.89	-39.09	8.010	-31.08	Peak	-27.0	-4.08	PASS
5850.0	-53.47	-53.44	-50.44	8.010	-42.43	Average	-27.0	-15.43	PASS
5855.0	-42.06	-42.72	-39.37	8.010	-31.36	Peak	10.0	-41.36	PASS
5855.0	-53.48	-53.48	-50.47	8.010	-42.46	Average	10.0	-52.46	PASS
5875.0	-42.63	-42.14	-39.37	8.010	-31.36	Peak	15.6	-46.96	PASS
5875.0	-53.50	-53.46	-50.47	8.010	-42.46	Average	15.6	-58.06	PASS
5925.0	-42.08	-42.13	-39.09	8.010	-31.08	Peak	27.0	-58.08	PASS
5925.0	-53.55	-53.58	-50.55	8.010	-42.54	Average	27.0	-69.54	PASS

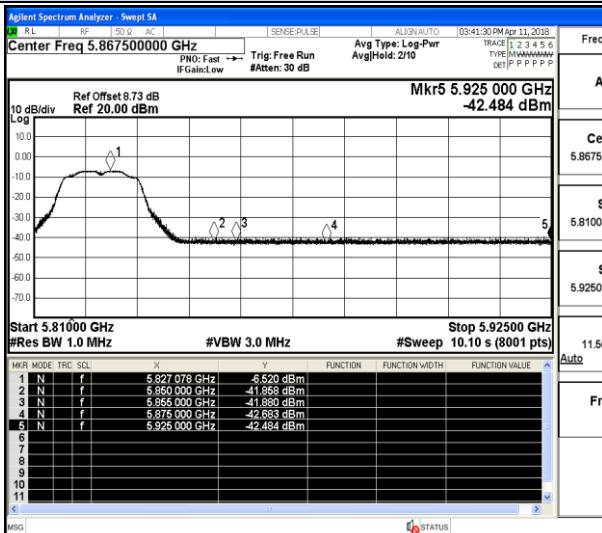
Remark:

1. Measured unwanted emission at difference data rate for each mode and recorded worst case for each mode.
2. Test results including cable loss;
3. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;
4. E.I.R.P = Conducted power + Directional Gain
5. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater.³ However, for devices that operate in multiple bands using the same transmit antenna, the highest gain of the antenna within the operating band nearest to the out-of-band frequency being measured may be used in lieu of the overall highest gain when measuring emissions at frequencies within 20% of the absolute frequency at the nearest edge of that band, but in no case shall a value less than 2 dBi be selected.
6. Over limit = EIRP - Limit
7. Please refer to following test plots;

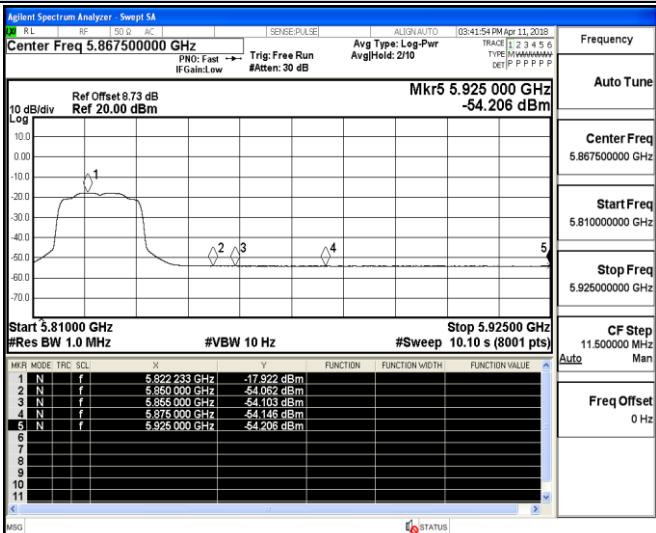


Unwanted emission

IEEE 802.11n HT20 @ Chain0

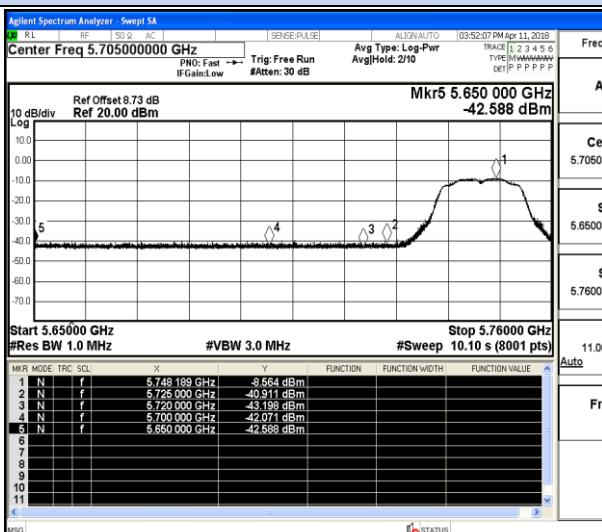


IEEE 802.11n HT20 @ Chain0



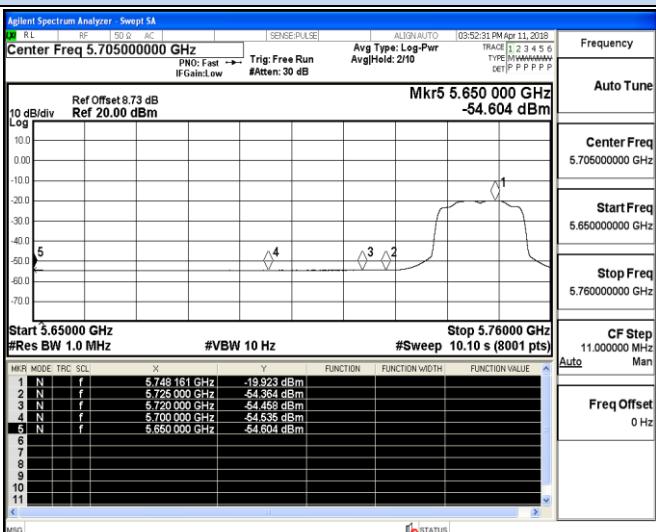
Channel 165 / 5825 MHz – Peak

IEEE 802.11ac VHT20 @ Chain0

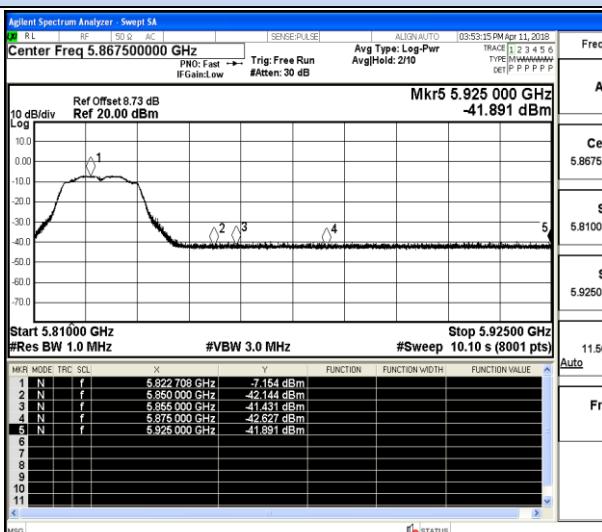


Channel 165 / 5825 MHz – AV

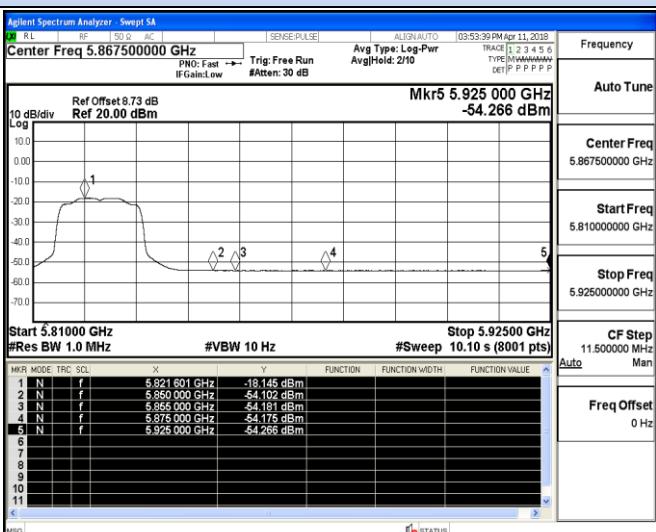
IEEE 802.11ac VHT20 @ Chain0



Channel 149 / 5745 MHz – Peak

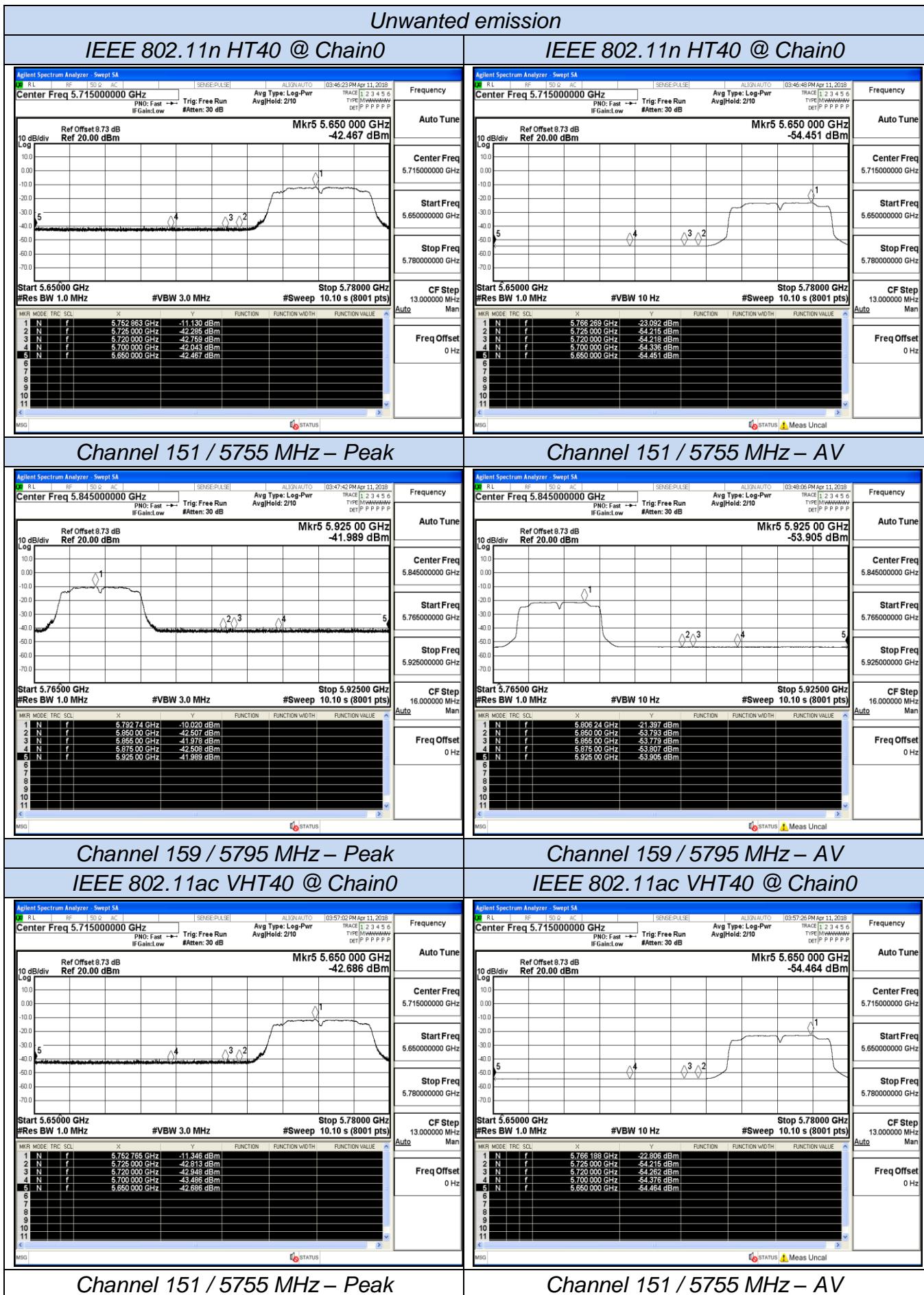


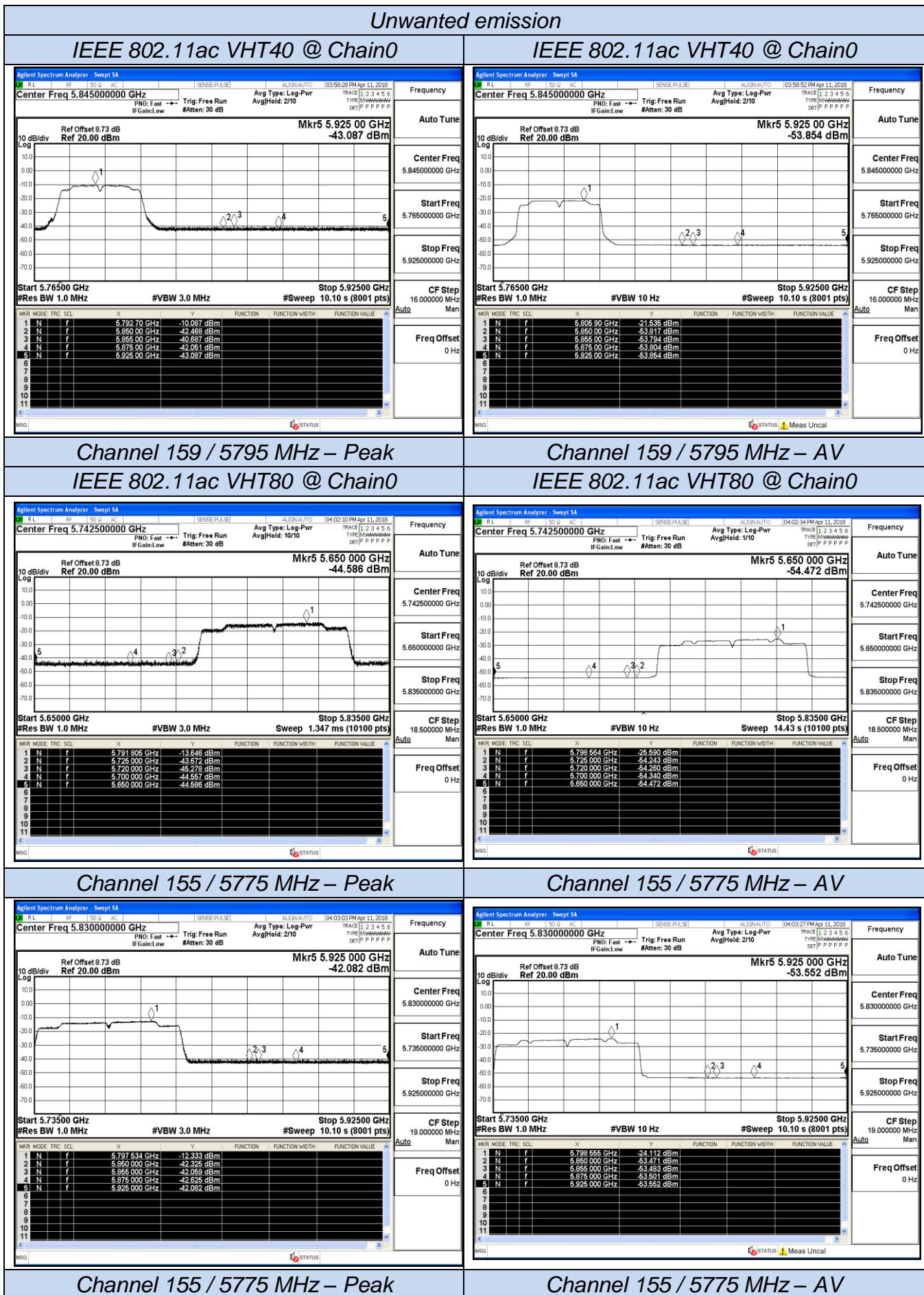
Channel 149 / 5745 MHz – AV



Channel 165 / 5825 MHz – Peak

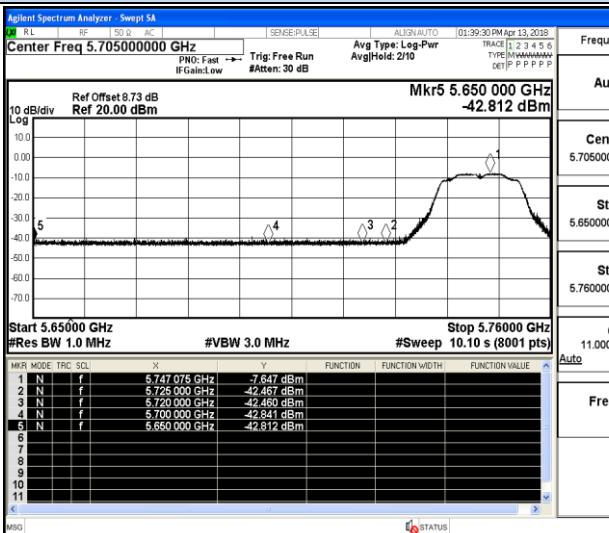
Channel 165 / 5825 MHz – AV



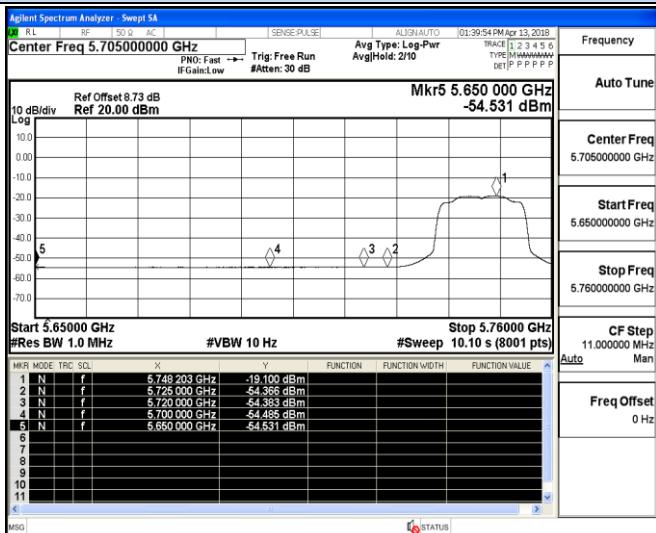


Unwanted emission

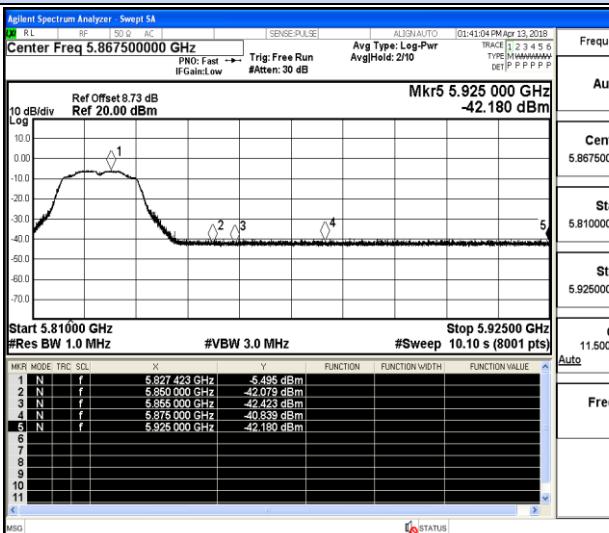
IEEE 802.11a @ Chain1



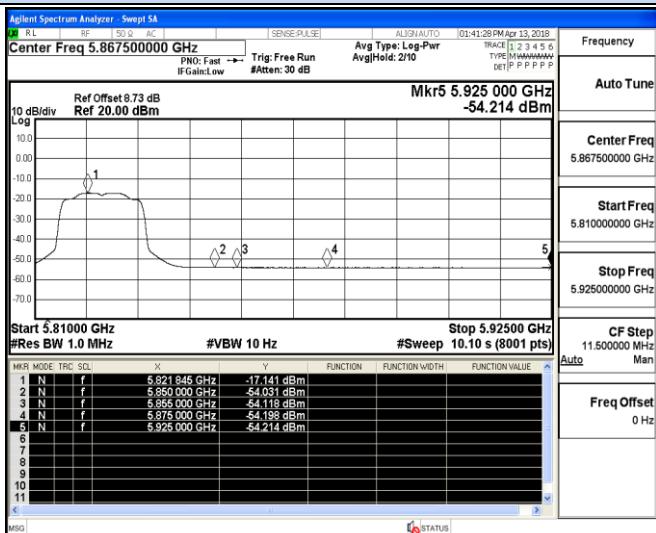
IEEE 802.11a @ Chain1



Channel 149 / 5745 MHz – Peak

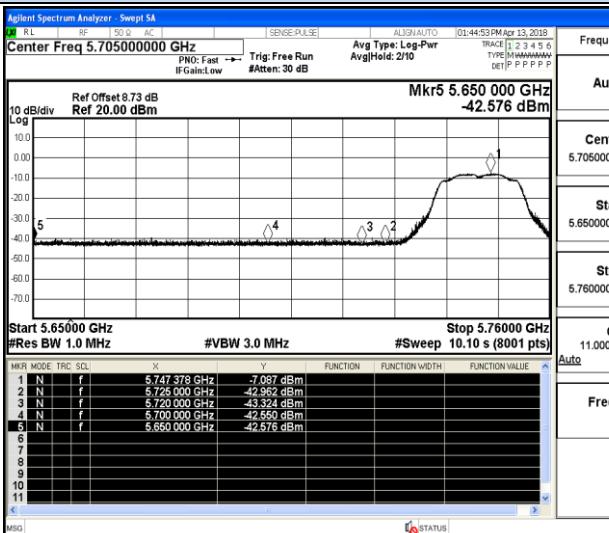


Channel 149 / 5745 MHz – AV

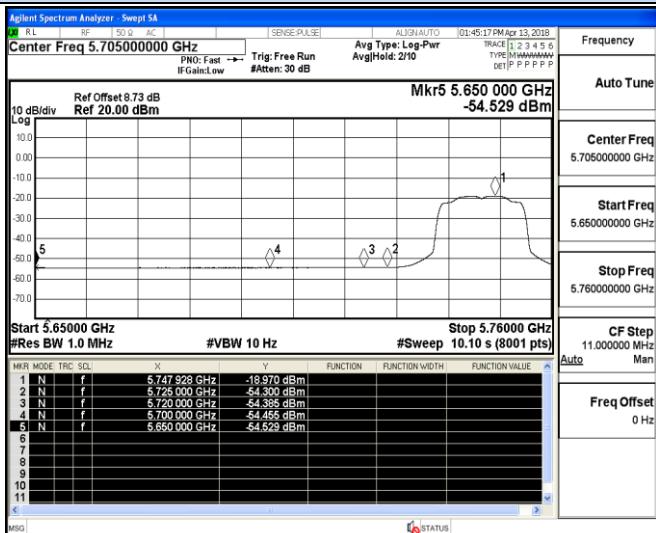


Channel 165 / 5825 MHz – Peak

IEEE 802.11n HT20 @ Chain1



Channel 165 / 5825 MHz – AV

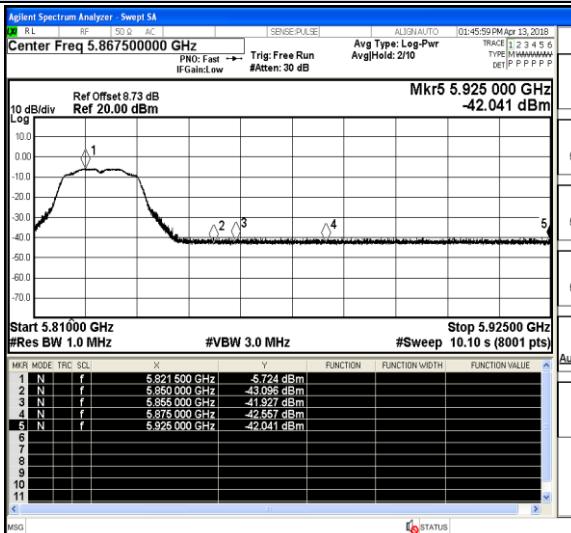


Channel 149 / 5745 MHz – Peak

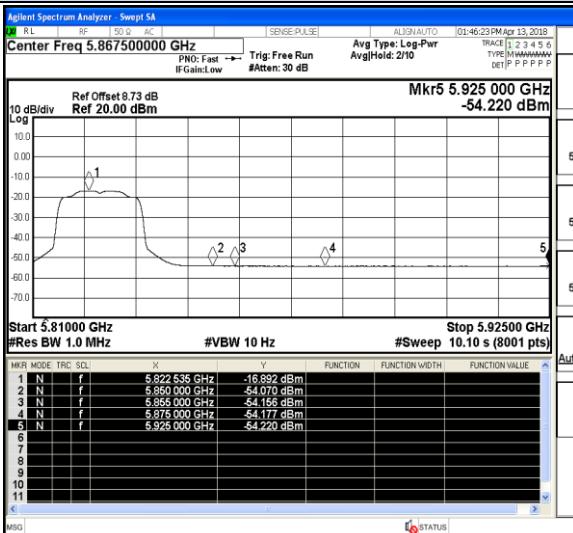
Channel 149 / 5745 MHz – AV

Unwanted emission

IEEE 802.11n HT20 @ Chain1

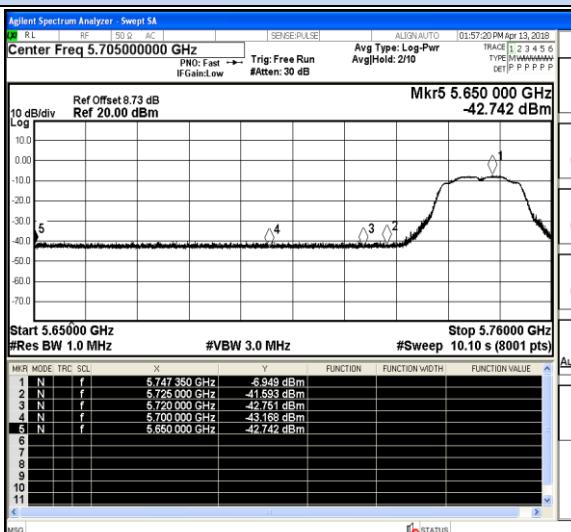


IEEE 802.11n HT20 @ Chain1



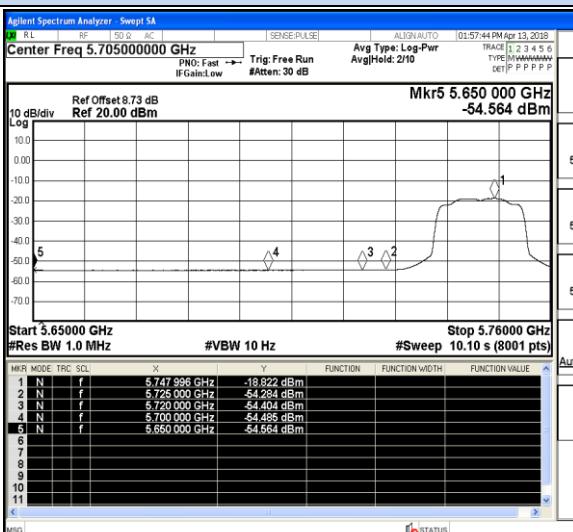
Channel 165 / 5825 MHz – Peak

IEEE 802.11ac VHT20 @ Chain1

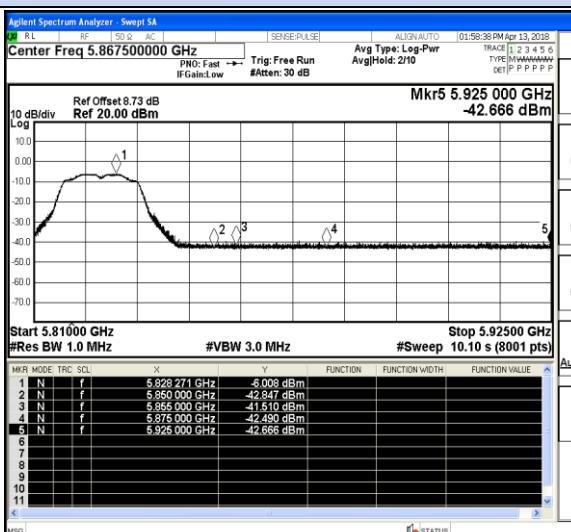


Channel 165 / 5825 MHz – AV

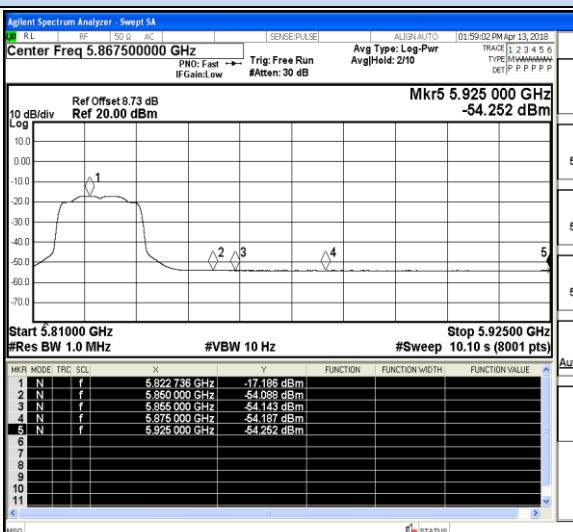
IEEE 802.11ac VHT20 @ Chain1



Channel 149 / 5745 MHz – Peak

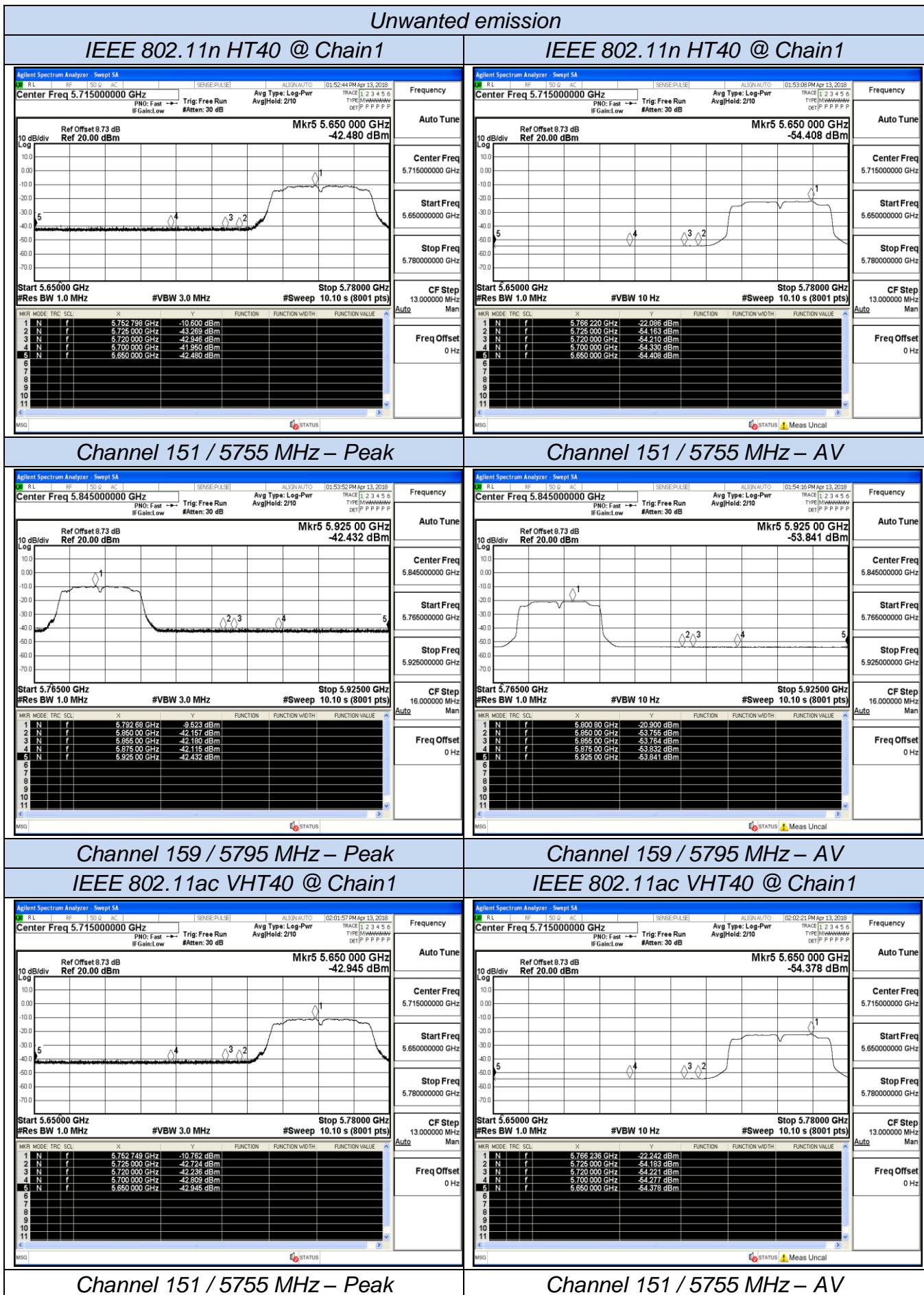


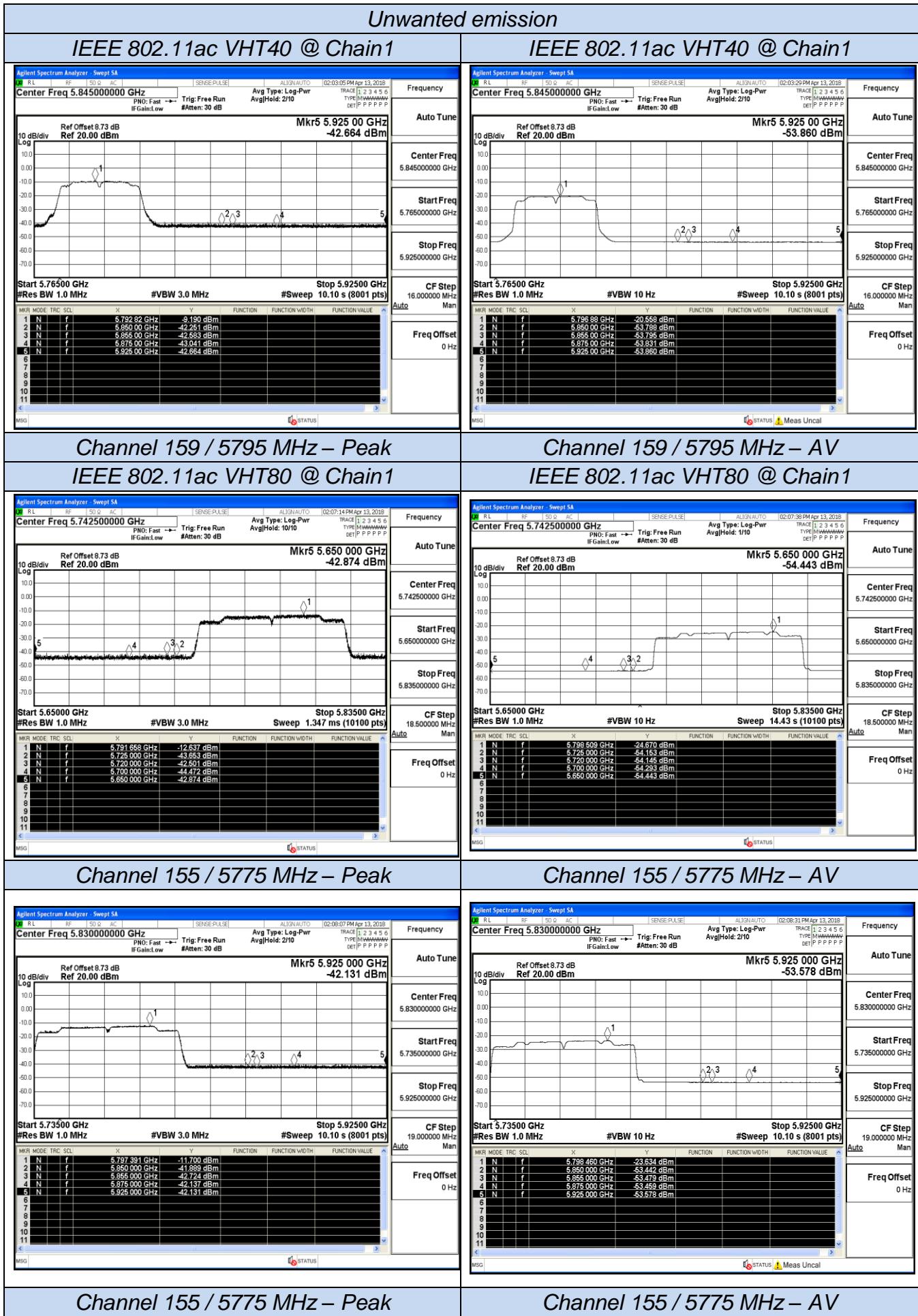
Channel 149 / 5745 MHz – AV



Channel 165 / 5825 MHz – Peak

Channel 165 / 5825 MHz – AV





5.8. Antenna Requirements

5.8.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

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

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.8.2 Antenna Connected Construction

5.8.2.1. Standard Applicable

According to § 15.203 & RSS-Gen, 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.

5.8.2.2. Antenna Connector Construction

The gains of antenna used for transmitting is 5.0dBi, and the antenna is a Monopole Antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

5.8.2.3. Results: Compliance.

Measurement

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Conducted power refers ANSI C63.10:2013 Output power test procedure for NII devices.

Radiated power refers to ANSI C63.10:2013 Radiated emissions tests.

Measurement parameters

Measurement parameter	
Detector:	Peak
Sweep Time:	Auto
Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Trace-Mode:	Max hold

Limits

FCC	ISED
Antenna Gain	
6 dBi	

Note: The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For WLAN devices, the OFDM (IEEE 802.11a) mode is used;

Antenna Chain0

T _{nom}	V _{nom}	Lowest Channel 5745 MHz	Middle Channel 5785 MHz	Highest Channel 5825 MHz
Conducted power [dBm] Measured with DSSS modulation		10.08	11.05	10.30
Radiated power [dBm] Measured with DSSS modulation		14.97	16.02	15.23
Gain [dBi] Calculated		4.89	4.97	4.93
Measurement uncertainty		± 1.6 dB (cond.) / ± 3.8 dB (rad.)		

Antenna Chain1

T _{nom}	V _{nom}	Lowest Channel 5745 MHz	Middle Channel 5785 MHz	Highest Channel 5825 MHz
Conducted power [dBm] Measured with DSSS modulation		10.45	11.60	11.56
Radiated power [dBm] Measured with DSSS modulation		15.36	16.59	16.43
Gain [dBi] Calculated		4.91	4.99	4.87
Measurement uncertainty		± 1.6 dB (cond.) / ± 3.8 dB (rad.)		

6. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Power Meter	R&S	NRVS	100444	2017-06-17	2018-06-16
2	Power Sensor	R&S	NRV-Z81	100458	2017-06-17	2018-06-16
3	Power Sensor	R&S	NRV-Z32	10057	2017-06-17	2018-06-16
4	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
5	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2017-06-17	2018-06-16
6	SPECTRUM ANALYZER	R&S	FSP	100503	2017-06-17	2018-06-16
7	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-17	2018-06-16
8	Positioning Controller	MF	MF-7082	/	2017-06-17	2018-06-16
9	EMI Test Software	AUDIX	E3	N/A	2017-06-17	2018-06-16
10	EMI Test Receiver	R&S	ESR 7	101181	2017-06-17	2018-06-16
11	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
12	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2017-06-23	2018-06-22
13	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2017-05-02	2018-05-01
14	Horn Antenna	EMCO	3115	6741	2017-06-23	2018-06-22
15	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2017-09-21	2018-09-20
16	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2017-09-21	2018-09-20
17	RF Cable-R03m	Jye Bao	RG142	CB021	2017-06-17	2018-06-16
18	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2017-06-17	2018-06-16
19	TEST RECEIVER	R&S	ESCI	101142	2017-06-17	2018-06-16
20	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2017-06-17	2018-06-16
21	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-00 32	2017-06-17	2018-06-16
22	Artificial Mains	R&S	ENV216	101288	2017-06-17	2018-06-16
23	RF Control Unit	Tonscend	JS0806-2	178060073	2017-10-28	2018-10-27
24	BT/WIFI Test Software	Tonscend	JS1120-3	/	N/A	N/A

Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

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