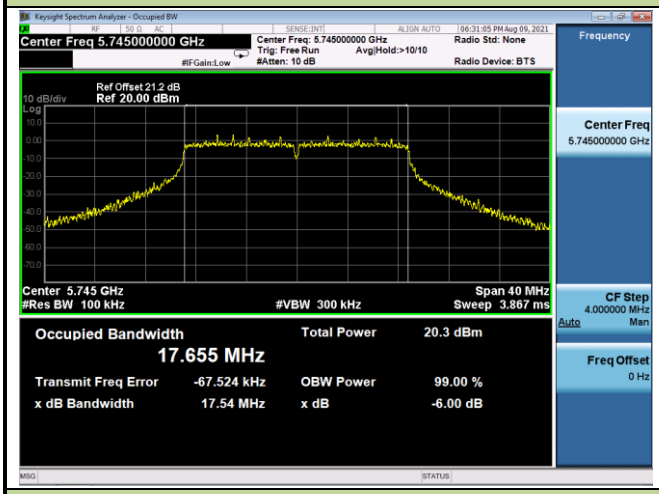
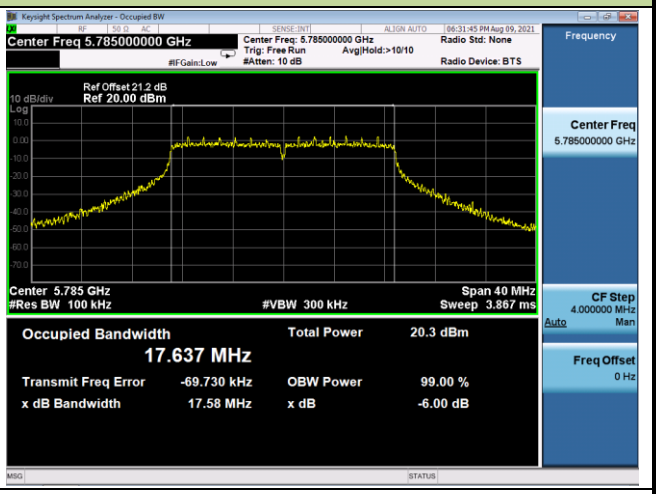
802.11ac-VHT20 6dB Bandwidth

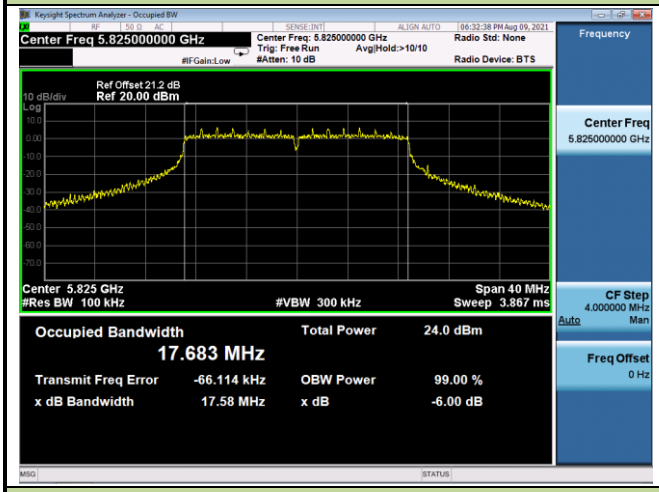
Channel 149 (5745MHz)



Channel 157 (5785MHz)

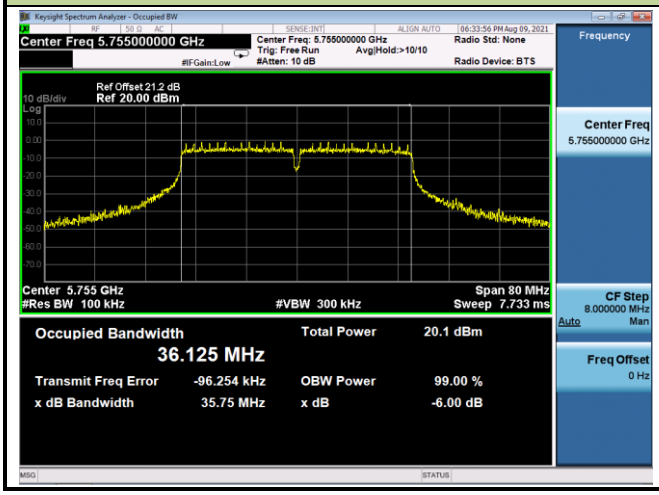


Channel 165 (5825MHz)

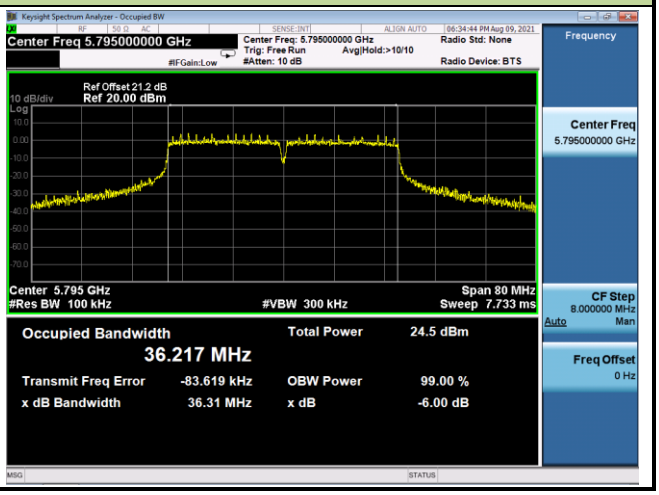


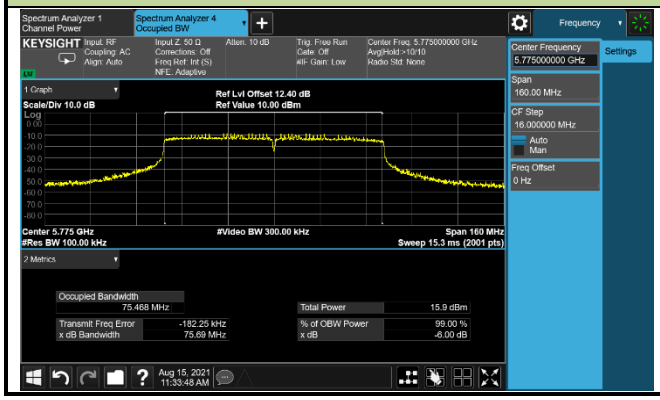
802.11ac-VHT40 6dB Bandwidth

Channel 151 (5755MHz)



Channel 159 (5795MHz)



802.11ac-VHT80 6dB Bandwidth	
Channel 155 (5775MHz)	
	

5.4. Output Power Measurement

5.4.1.Test Limit

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 (23.98dBm).

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 (23.98dBm) or 11dBm +10 log (26dB BW).

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm).

If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

NII-1 & NII-2A & NII-2C Bands	Limit = 23.98 – (7 - 6) = 22.98
NII-3 Band	Limit = 30.00 – (7 - 6) = 29.00

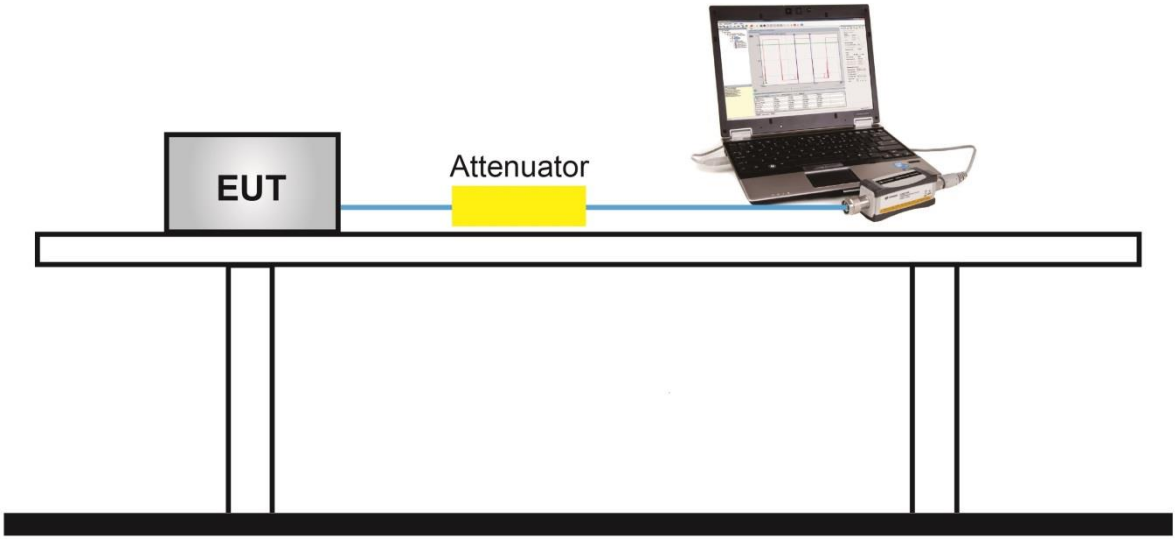
5.4.2.Test Procedure Used

ANSI C63.10-2013 - Section 12.3.3.2 Method PM-G

5.4.3.Test Setting

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a wideband gated RF power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

5.4.4.Test Setup



5.4.5.Test Result

Test Site	WZ-TR3	Test Engineer	Liz Yuan
Test Date	2021/08/08	Test Mode	SISO Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Average Power Limit (dBm)	Result
11a	6Mbps	36	5180	17.36	17.12	≤ 22.98	Pass
11a	6Mbps	44	5220	19.01	18.93	≤ 22.98	Pass
11a	6Mbps	48	5240	18.92	18.79	≤ 22.98	Pass
11a	6Mbps	52	5260	18.81	18.72	≤ 22.98	Pass
11a	6Mbps	60	5300	18.48	18.28	≤ 22.98	Pass
11a	6Mbps	64	5320	16.87	15.81	≤ 22.98	Pass
11a	6Mbps	100	5500	18.13	17.51	≤ 22.98	Pass
11a	6Mbps	116	5580	18.02	17.70	≤ 22.98	Pass
11a	6Mbps	140	5700	14.98	14.78	≤ 22.98	Pass
11a	6Mbps	149	5745	14.30	13.35	≤ 29.00	Pass
11a	6Mbps	157	5785	17.78	18.14	≤ 29.00	Pass
11a	6Mbps	165	5825	16.74	17.29	≤ 29.00	Pass
11ac-VHT20	MCS0	36	5180	16.38	16.21	≤ 22.98	Pass
11ac-VHT20	MCS0	44	5220	16.96	17.12	≤ 22.98	Pass
11ac-VHT20	MCS0	48	5240	17.15	17.49	≤ 22.98	Pass
11ac-VHT20	MCS0	52	5260	16.68	17.04	≤ 22.98	Pass
11ac-VHT20	MCS0	60	5300	17.01	17.20	≤ 22.98	Pass
11ac-VHT20	MCS0	64	5320	14.81	14.67	≤ 22.98	Pass
11ac-VHT20	MCS0	100	5500	14.78	14.39	≤ 22.98	Pass
11ac-VHT20	MCS0	116	5580	17.22	17.35	≤ 22.98	Pass
11ac-VHT20	MCS0	140	5700	13.11	12.95	≤ 22.98	Pass
11ac-VHT20	MCS0	144	5720	16.63	17.12	≤ 22.98	Pass
11ac-VHT20	MCS0	149	5745	13.21	13.31	≤ 29.00	Pass
11ac-VHT20	MCS0	157	5785	13.10	12.86	≤ 29.00	Pass
11ac-VHT20	MCS0	165	5825	16.49	16.33	≤ 29.00	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Average Power Limit (dBm)	Result
11ac-VHT40	MCS0	38	5190	10.78	10.67	≤ 22.98	Pass
11ac-VHT40	MCS0	46	5230	15.63	15.52	≤ 22.98	Pass
11ac-VHT40	MCS0	54	5270	18.05	18.03	≤ 22.98	Pass
11ac-VHT40	MCS0	62	5310	10.88	10.96	≤ 22.98	Pass
11ac-VHT40	MCS0	102	5510	10.25	9.57	≤ 22.98	Pass
11ac-VHT40	MCS0	110	5550	17.60	17.01	≤ 22.98	Pass
11ac-VHT40	MCS0	134	5670	16.57	16.22	≤ 22.98	Pass
11ac-VHT40	MCS0	142	5710	18.06	17.58	≤ 22.98	Pass
11ac-VHT40	MCS0	151	5755	12.63	12.05	≤ 29.00	Pass
11ac-VHT40	MCS0	159	5795	16.96	16.56	≤ 29.00	Pass
11ac-VHT80	MCS0	42	5210	8.31	8.56	≤ 22.98	Pass
11ac-VHT80	MCS0	58	5290	7.05	7.04	≤ 22.98	Pass
11ac-VHT80	MCS0	106	5530	9.26	8.68	≤ 22.98	Pass
11ac-VHT80	MCS0	122	5610	16.51	16.57	≤ 22.98	Pass
11ac-VHT80	MCS0	138	5690	16.77	16.42	≤ 22.98	Pass
11ac-VHT80	MCS0	155	5775	7.28	7.04	≤ 29.00	Pass

Test Site	WZ-TR3	Test Engineer	Liz Yuan
Test Date	2021/08/08	Test Mode	MIMO Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	Result
11ac-VHT20	MCS0	36	5180	16.02	16.12	19.08	≤ 22.98	Pass
11ac-VHT20	MCS0	44	5220	16.98	17.23	20.12	≤ 22.98	Pass
11ac-VHT20	MCS0	48	5240	17.33	17.68	20.52	≤ 22.98	Pass
11ac-VHT20	MCS0	52	5260	16.84	17.39	20.13	≤ 22.98	Pass
11ac-VHT20	MCS0	60	5300	17.12	17.52	20.33	≤ 22.98	Pass
11ac-VHT20	MCS0	64	5320	14.83	14.88	17.87	≤ 22.98	Pass
11ac-VHT20	MCS0	100	5500	14.84	14.70	17.78	≤ 22.98	Pass
11ac-VHT20	MCS0	116	5580	17.09	17.11	20.11	≤ 22.98	Pass
11ac-VHT20	MCS0	140	5700	13.13	13.05	16.10	≤ 22.98	Pass
11ac-VHT20	MCS0	144	5720	16.71	16.95	19.84	≤ 22.98	Pass
11ac-VHT20	MCS0	149	5745	13.08	13.30	16.20	≤ 29.00	Pass
11ac-VHT20	MCS0	157	5785	13.29	13.25	16.28	≤ 29.00	Pass
11ac-VHT20	MCS0	165	5825	16.53	16.28	19.42	≤ 29.00	Pass
11ac-VHT40	MCS0	38	5190	10.81	10.72	13.78	≤ 22.98	Pass
11ac-VHT40	MCS0	46	5230	15.78	15.65	18.73	≤ 22.98	Pass
11ac-VHT40	MCS0	54	5270	18.16	18.28	21.23	≤ 22.98	Pass
11ac-VHT40	MCS0	62	5310	11.12	11.35	14.25	≤ 22.98	Pass
11ac-VHT40	MCS0	102	5510	10.04	9.76	12.91	≤ 22.98	Pass
11ac-VHT40	MCS0	110	5550	17.33	17.21	20.28	≤ 22.98	Pass
11ac-VHT40	MCS0	134	5670	16.30	16.28	19.30	≤ 22.98	Pass
11ac-VHT40	MCS0	142	5710	17.62	17.52	20.58	≤ 22.98	Pass
11ac-VHT40	MCS0	151	5755	12.76	12.46	15.62	≤ 29.00	Pass
11ac-VHT40	MCS0	159	5795	16.96	16.87	19.93	≤ 29.00	Pass
11ac-VHT80	MCS0	42	5210	8.17	8.29	11.24	≤ 22.98	Pass
11ac-VHT80	MCS0	58	5290	7.30	7.47	10.40	≤ 22.98	Pass
11ac-VHT80	MCS0	106	5530	9.04	8.58	11.83	≤ 22.98	Pass
11ac-VHT80	MCS0	122	5610	15.77	15.82	18.81	≤ 22.98	Pass
11ac-VHT80	MCS0	138	5690	16.01	16.31	19.17	≤ 22.98	Pass
11ac-VHT80	MCS0	155	5775	7.58	7.29	10.45	≤ 29.00	Pass

Note: Total Average Power (dBm) = $10*\log\{10^{(\text{Ant 0 Average Power}/10)} + 10^{(\text{Ant 1 Average Power}/10)}\}$ (dBm).

5.5. Transmit Power Control

5.5.1.Test Limit

The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm.

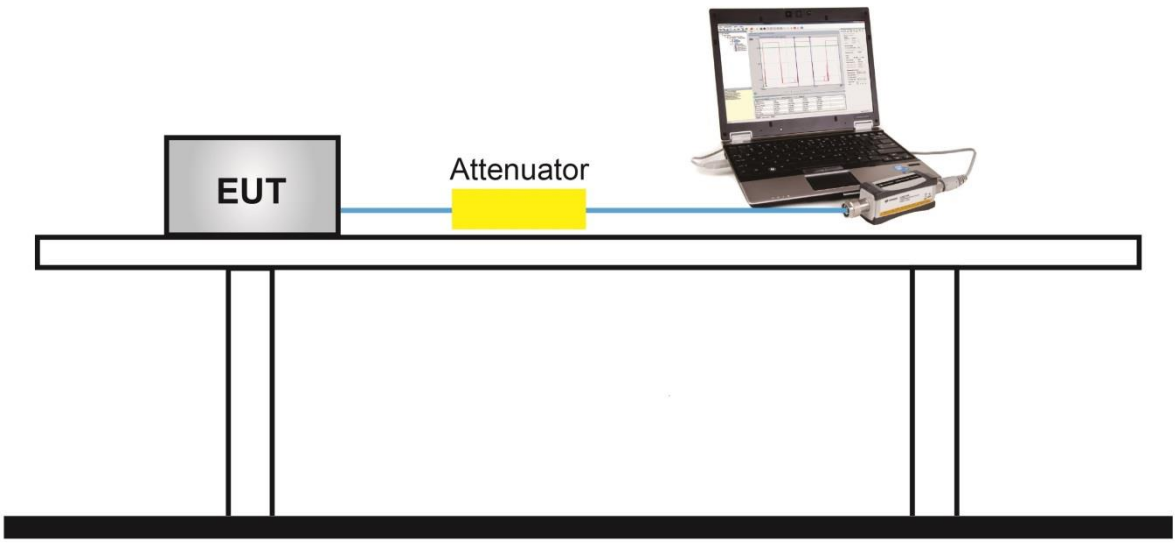
5.5.2.Test Procedure Used

ANSI C63.10-2013 - Section 12.3.3.2 Method PM-G

5.5.3.Test Setting

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a wideband gated RF power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

5.5.4.Test Setup



5.5.5.Test Result

It gets addressed in the operational description.

5.6. Power Spectral Density Measurement

5.6.1.Test Limit

For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

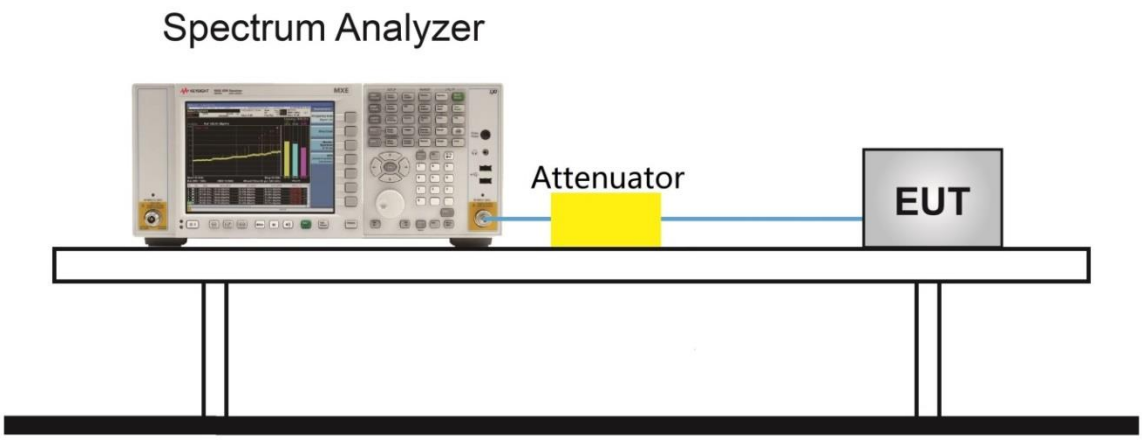
5.6.2.Test Procedure Used

ANSI C63.10 - Section 12.5

5.6.3.Test Setting

1. Analyzer was set to the center frequency of the U-NII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal
3. RBW = 1MHz for UNII-Band 1 & 2A & 2C, RBW = 510 kHz for UNII-Band 3; VBW ≥ 3*RBW
4. Number of sweep points ≥ 2 × (span / RBW)
5. Detector = power averaging (Average)
6. Sweep time = auto
7. Trigger = free run
8. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
9. Add 10*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log(1/0.25) = 6 dB if the duty cycle is 25 percent.

5.6.4.Test Setup



5.6.5.Test Result

Test Site	WZ-TR3	Test Engineer	Liz Yuan
Test Date	2021/08/09	Test Mode	SISO Mode
Test Item	Power Spectral Density (UNII-Band 1 & 2A & 2C)		

Test Mode	Data Rate/ MCS	Ch. No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Ant 0 Total PSD (dBm/MHz)	Ant 1 Total PSD (dBm/MHz)	PSD Limit (dBm/ MHz)	Result
11a	6Mbps	36	5180	6.45	6.34	96.38	6.61	6.50	≤ 10.00	Pass
11a	6Mbps	44	5220	8.16	8.13	96.38	8.32	8.29	≤ 10.00	Pass
11a	6Mbps	48	5240	7.79	7.75	96.38	7.95	7.91	≤ 10.00	Pass
11a	6Mbps	52	5260	7.71	7.79	96.38	7.87	7.95	≤ 10.00	Pass
11a	6Mbps	60	5300	7.96	7.58	96.38	8.12	7.74	≤ 10.00	Pass
11a	6Mbps	64	5320	6.28	5.24	96.38	6.44	5.40	≤ 10.00	Pass
11a	6Mbps	100	5500	7.50	6.77	96.38	7.66	6.93	≤ 10.00	Pass
11a	6Mbps	116	5580	7.34	6.90	96.38	7.50	7.06	≤ 10.00	Pass
11a	6Mbps	140	5700	4.59	4.35	96.38	4.75	4.51	≤ 10.00	Pass

Note 1: When EUT duty cycle < 98%, Total PSD (dBm/MHz) = PSD (dBm/MHz) + 10*log (1/Duty Cycle).

Note 2: PSD Limit = 11dBm/MHz - (7dBi - 6dBi) = 10 dBm/MHz.

Test Site	WZ-TR3	Test Engineer	Liz Yuan
Test Date	2021/08/09	Test Mode	SISO Mode
Test Item	Power Spectral Density (UNII-Band 3)		

Test Mode	Data Rate/ MCS	Ch. No.	Freq. (MHz)	Ant 0 PSD (dBm/ 510kHz)	Ant 1 PSD (dBm/ 510kHz)	Duty Cycle (%)	Ant 0 Total PSD (dBm/ 510kHz)	Ant 1 Total PSD (dBm/ 510kHz)	PSD Limit (dBm/ 500kHz)	Result
11a	6Mbps	149	5745	0.96	-0.12	96.38	1.12	0.04	≤ 29.00	Pass
11a	6Mbps	157	5785	4.21	4.81	96.38	4.37	4.97	≤ 29.00	Pass
11a	6Mbps	165	5825	3.31	3.84	96.38	3.47	4.00	≤ 29.00	Pass

Note 1: When EUT duty cycle < 98%, Total PSD (dBm/510kHz) = 10*log $\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ (dBm/MHz) + 10*log (1/Duty Cycle).

Note 2: PSD Limit = 30dBm/500kHHz - (7dBi - 6dBi) = 29 dBm/500kHz.

Test Site	WZ-TR3	Test Engineer	Liz Yuan
Test Date	2021/08/09	Test Mode	MIMO Mode
Test Item	Power Spectral Density (UNII-Band 1 & 2A & 2C)		

Test Mode	Data Rate/ MCS	Ch. No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	PSD Limit (dBm/ MHz)	Result
11ac-VHT20	MCS0	36	5180	5.30	5.24	96.35	8.44	≤ 10.00	Pass
11ac-VHT20	MCS0	44	5220	6.23	6.70	96.35	9.64	≤ 10.00	Pass
11ac-VHT20	MCS0	48	5240	6.57	6.72	96.35	9.82	≤ 10.00	Pass
11ac-VHT20	MCS0	52	5260	6.20	6.72	96.35	9.64	≤ 10.00	Pass
11ac-VHT20	MCS0	60	5300	6.32	6.83	96.35	9.76	≤ 10.00	Pass
11ac-VHT20	MCS0	64	5320	4.34	4.29	96.35	7.49	≤ 10.00	Pass
11ac-VHT20	MCS0	100	5500	4.23	3.56	96.35	7.08	≤ 10.00	Pass
11ac-VHT20	MCS0	116	5580	6.57	6.81	96.35	9.86	≤ 10.00	Pass
11ac-VHT20	MCS0	140	5700	1.87	1.85	96.35	5.03	≤ 10.00	Pass
11ac-VHT20	MCS0	144	5720	6.35	6.04	96.35	9.37	≤ 10.00	Pass
11ac-VHT40	MCS0	38	5190	-3.96	-3.53	92.78	-0.40	≤ 10.00	Pass
11ac-VHT40	MCS0	46	5230	1.78	2.08	92.78	5.27	≤ 10.00	Pass
11ac-VHT40	MCS0	54	5270	4.10	4.79	92.78	7.79	≤ 10.00	Pass
11ac-VHT40	MCS0	62	5310	-2.15	-2.12	92.78	1.20	≤ 10.00	Pass
11ac-VHT40	MCS0	102	5510	-3.71	-4.39	92.78	-0.70	≤ 10.00	Pass
11ac-VHT40	MCS0	110	5550	3.40	3.22	92.78	6.64	≤ 10.00	Pass
11ac-VHT40	MCS0	134	5670	2.39	2.47	92.78	5.76	≤ 10.00	Pass
11ac-VHT40	MCS0	142	5710	3.54	3.78	92.78	7.00	≤ 10.00	Pass
11ac-VHT80	MCS0	42	5210	-9.54	-9.42	78.74	-5.43	≤ 10.00	Pass
11ac-VHT80	MCS0	58	5290	-9.56	-9.75	78.74	-5.61	≤ 10.00	Pass
11ac-VHT80	MCS0	106	5530	-8.02	-8.66	78.74	-4.28	≤ 10.00	Pass
11ac-VHT80	MCS0	122	5610	-0.69	-0.13	78.74	3.65	≤ 10.00	Pass
11ac-VHT80	MCS0	138	5690	-0.32	0.24	78.74	4.01	≤ 10.00	Pass

Note 1: When EUT duty cycle < 98%, Total PSD (dBm/MHz) = PSD (dBm/MHz) + 10*log (1/Duty Cycle).

Note 2: PSD Limit = 11dBm/MHz - (7dBi - 6dBi) = 10 dBm/MHz.

Test Site	WZ-TR3	Test Engineer	Liz Yuan
Test Date	2021/08/09	Test Mode	MIMO Mode
Test Item	Power Spectral Density (UNII-Band 3)		

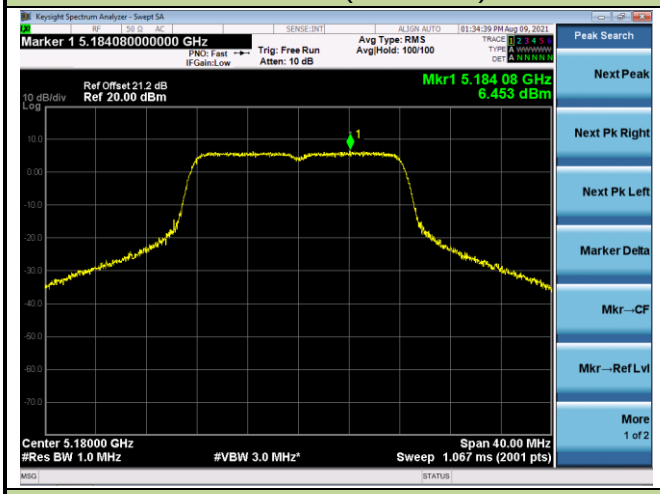
Test Mode	Data Rate/ MCS	Ch. No.	Freq. (MHz)	Ant 0 PSD (dBm/ 510kHz)	Ant 1 PSD (dBm/ 510kHz)	Duty Cycle (%)	Total PSD (dBm/ 510kHz)	PSD Limit (dBm/ 500kHz)	Result
11ac-VHT20	MCS0	149	5745	-0.11	0.61	96.35	3.44	≤ 29.00	Pass
11ac-VHT20	MCS0	157	5785	0.57	0.57	96.35	3.74	≤ 29.00	Pass
11ac-VHT20	MCS0	165	5825	3.41	3.38	96.35	6.57	≤ 29.00	Pass
11ac-VHT40	MCS0	151	5755	-4.11	-4.35	92.78	-0.89	≤ 29.00	Pass
11ac-VHT40	MCS0	159	5795	0.62	0.86	92.78	4.08	≤ 29.00	Pass
11ac-VHT80	MCS0	155	5775	-11.61	-11.84	78.74	-7.67	≤ 29.00	Pass

Note 1: When EUT duty cycle < 98%, Total PSD (dBm/510kHz) = 10*log {$10^{(\text{Ant 0 PSD}/10)}$ + $10^{(\text{Ant 1 PSD}/10)}$} (dBm/MHz) + 10*log (1/Duty Cycle).

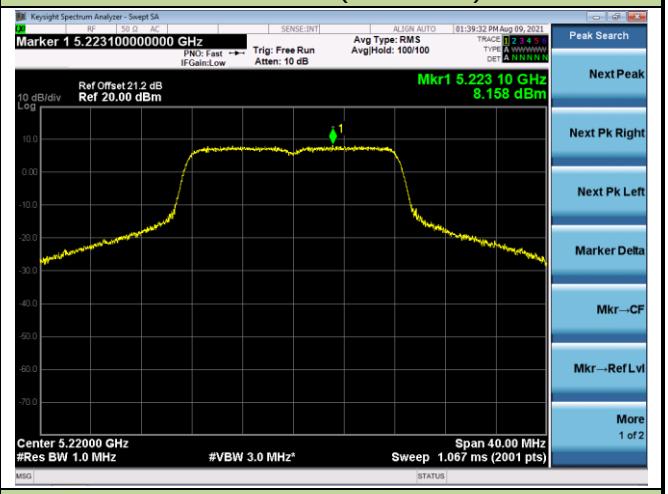
Note 2: PSD Limit = 30dBm/500kHHz - (7dBi - 6dBi) = 29 dBm/500kHz.

802.11a Power Spectral Density / SISO / Ant 0

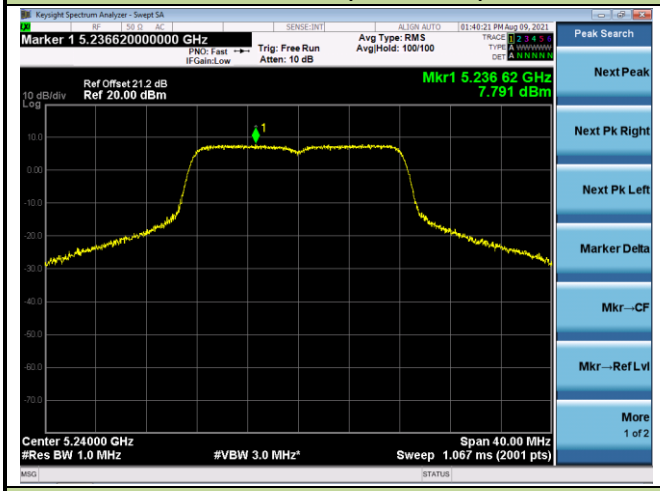
Channel 36 (5180MHz)



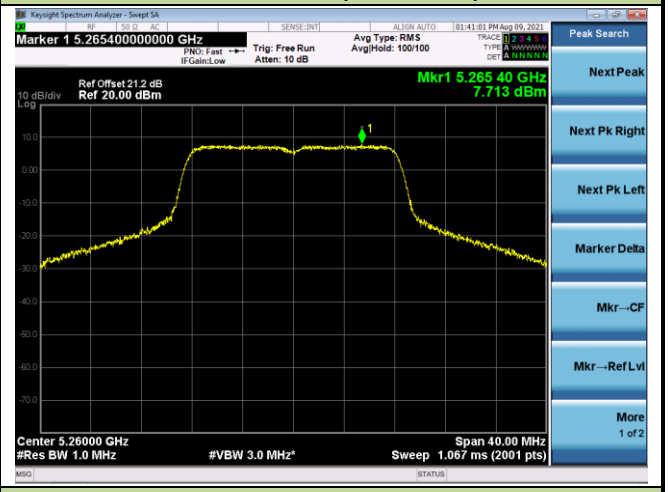
Channel 44 (5220MHz)



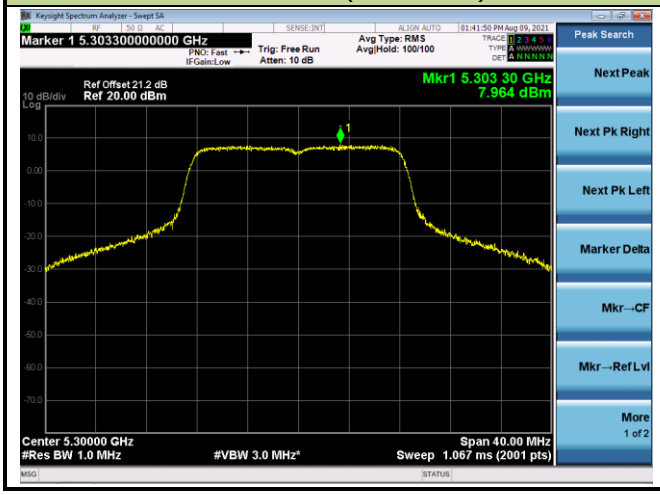
Channel 48 (5240MHz)



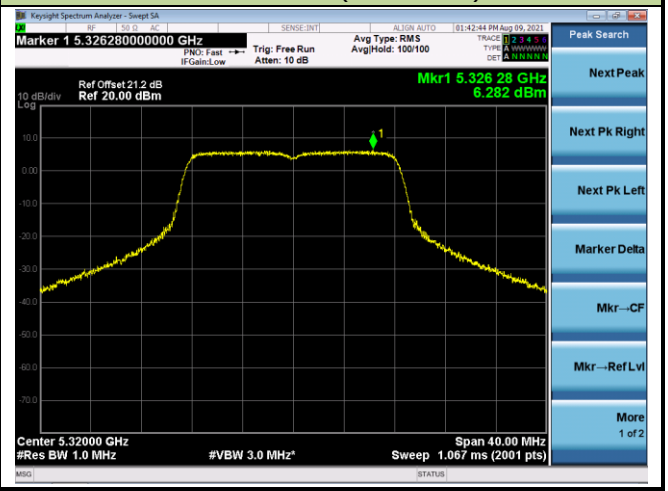
Channel 52 (5260MHz)



Channel 60 (5300MHz)

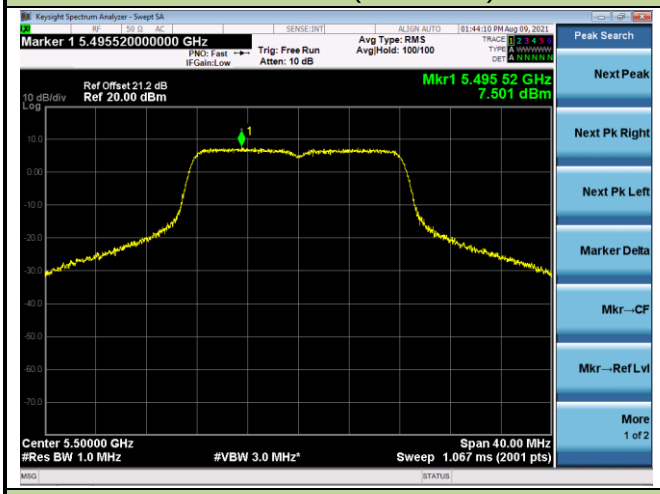


Channel 64 (5320MHz)

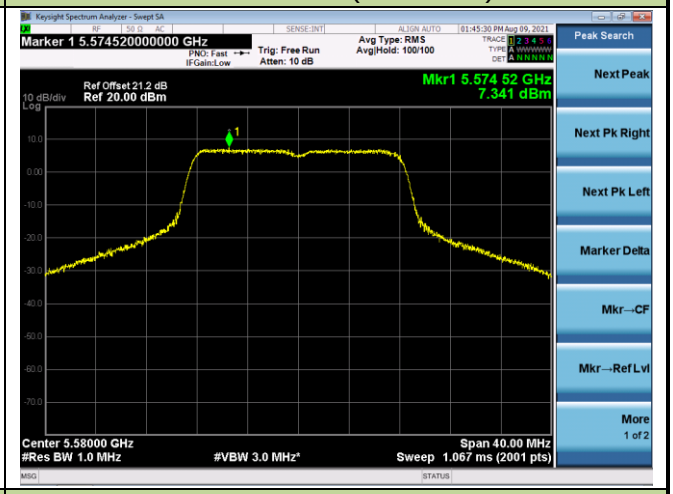


802.11a Power Spectral Density / SISO / Ant 0

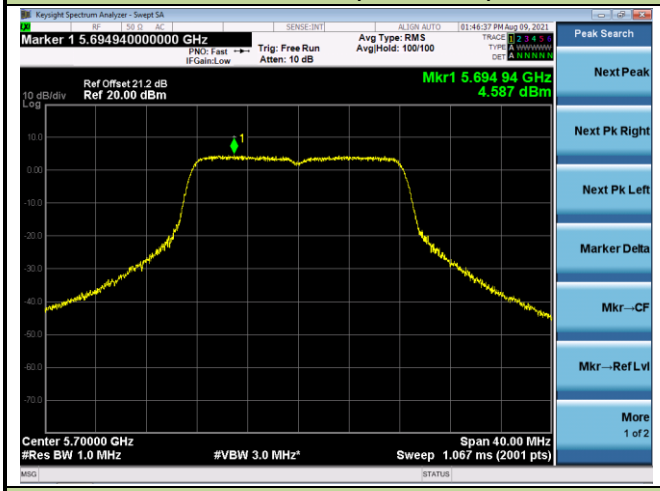
Channel 100 (5500MHz)



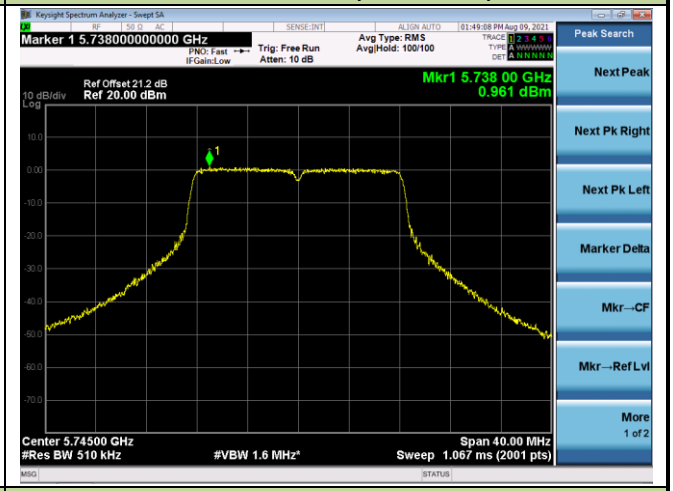
Channel 116 (5580MHz)



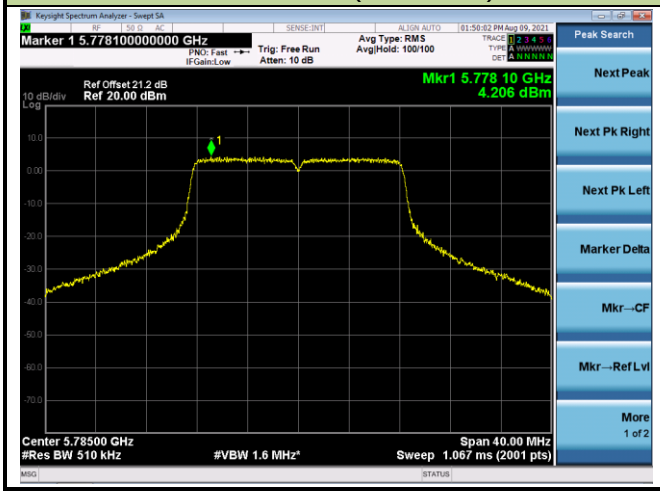
Channel 140 (5700MHz)



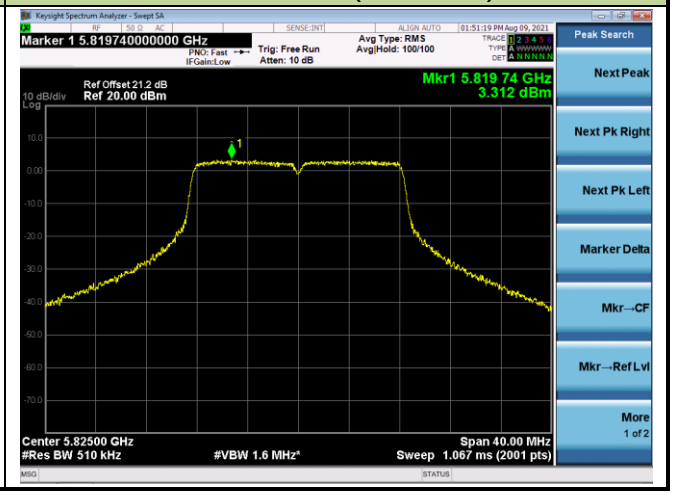
Channel 149 (5745MHz)



Channel 157 (5785MHz)

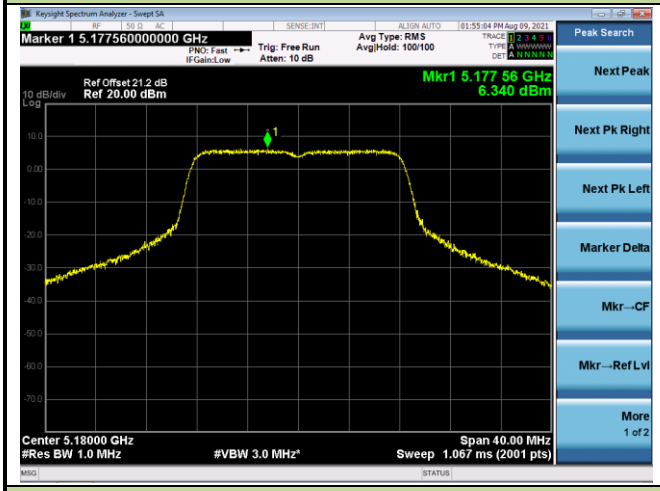


Channel 165 (5825MHz)

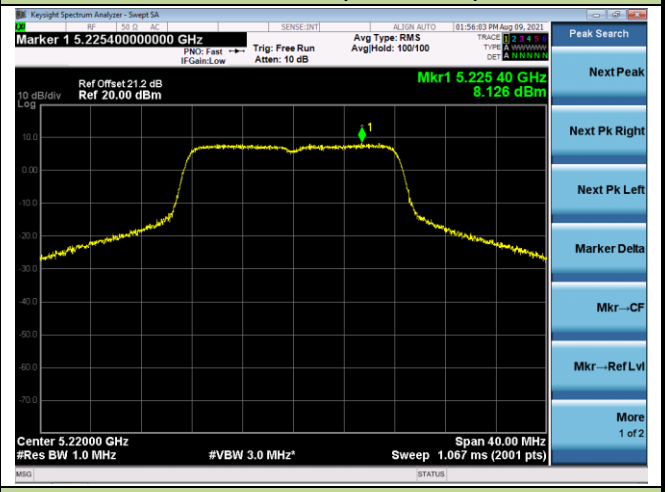


802.11a Power Spectral Density / SISO / Ant 1

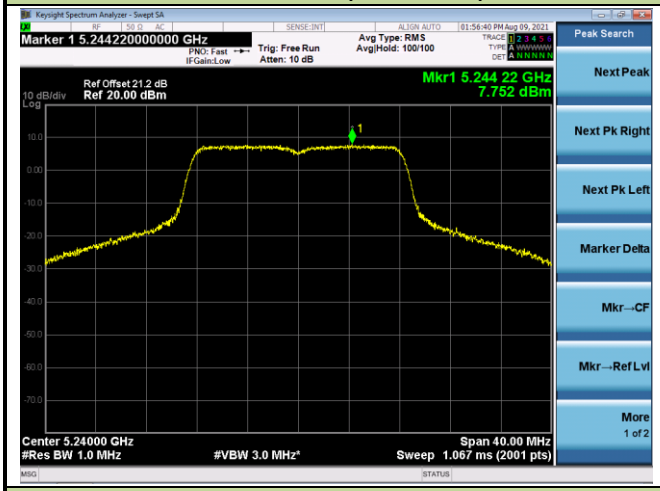
Channel 36 (5180MHz)



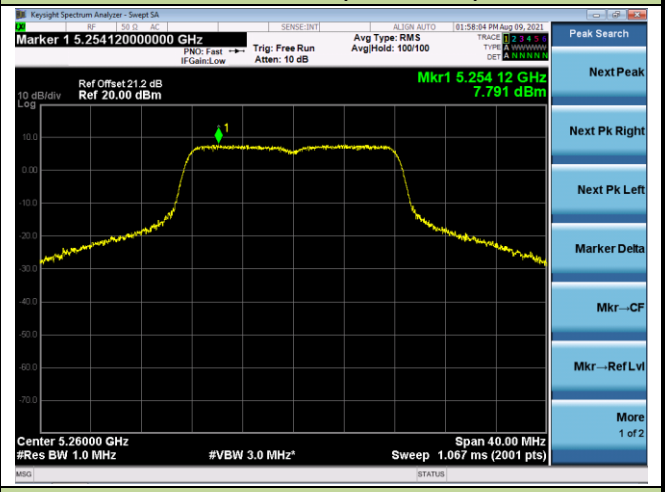
Channel 44 (5220MHz)



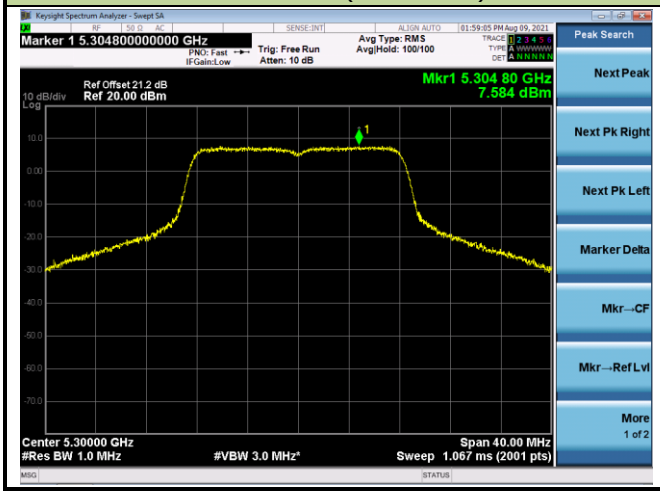
Channel 48 (5240MHz)



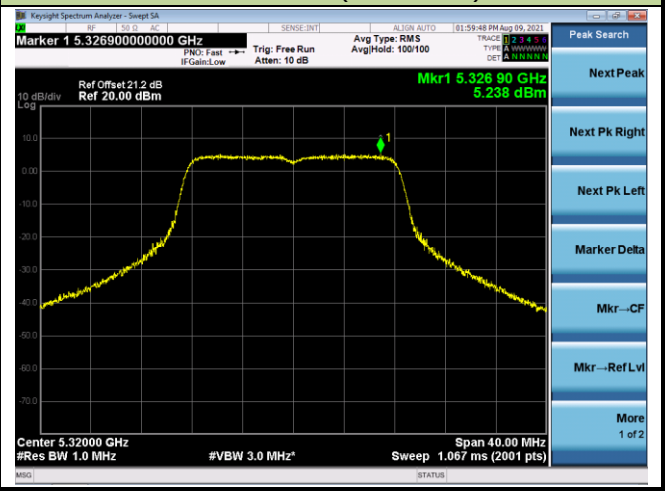
Channel 52 (5260MHz)



Channel 60 (5300MHz)

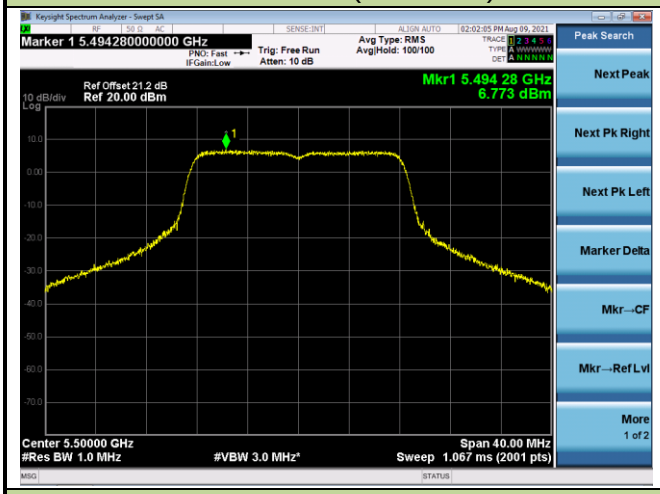


Channel 64 (5320MHz)

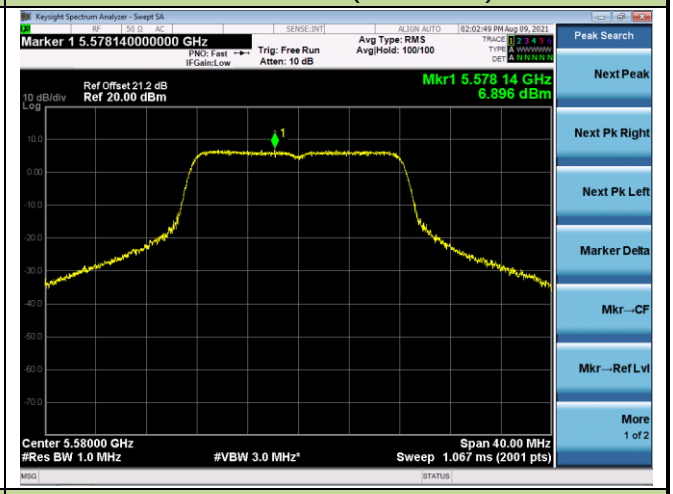


802.11a Power Spectral Density / SISO / Ant 1

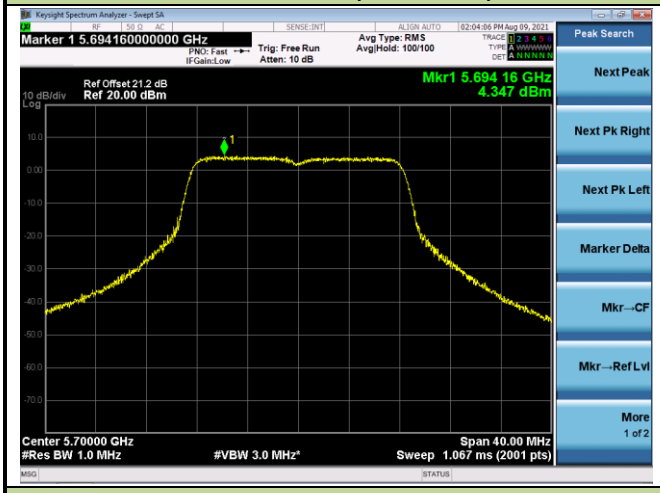
Channel 100 (5500MHz)



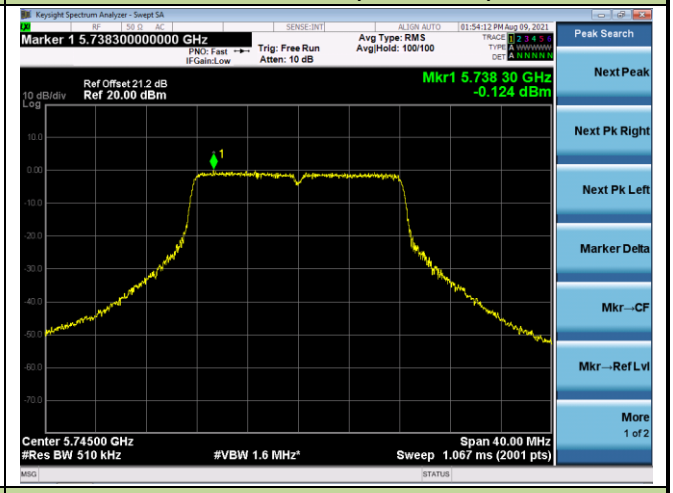
Channel 116 (5580MHz)



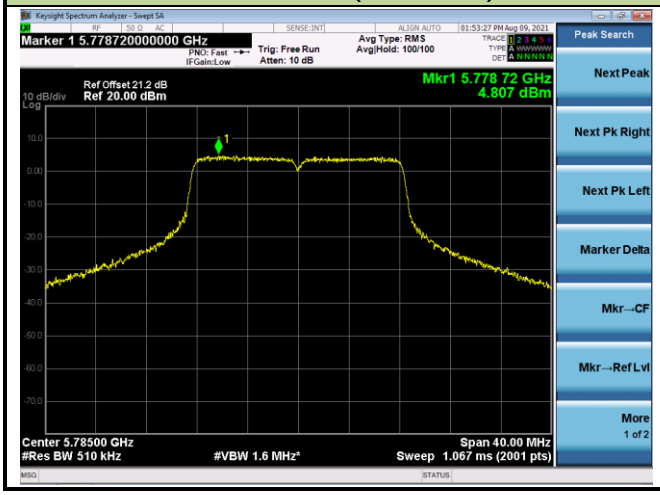
Channel 140 (5700MHz)



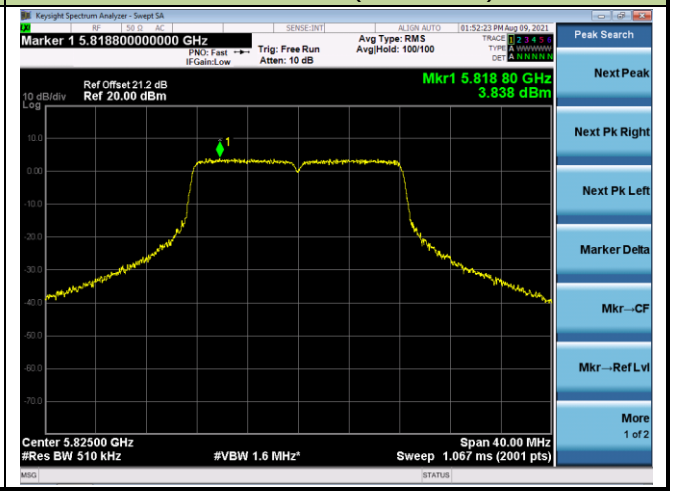
Channel 149 (5745MHz)



Channel 157 (5785MHz)

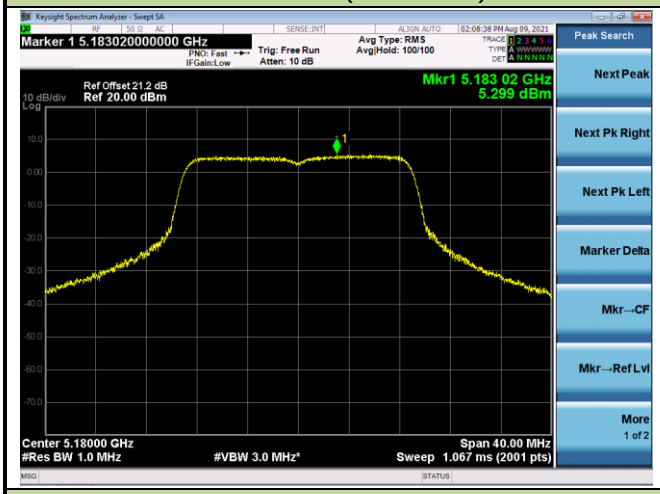


Channel 165 (5825MHz)



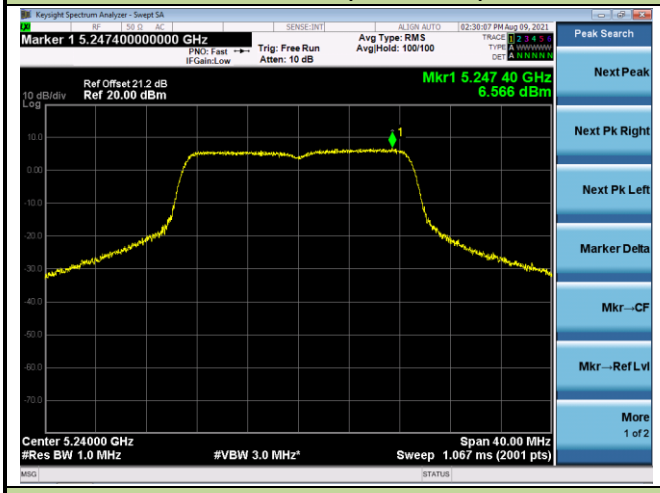
802.11ac-VHT20 Power Spectral Density / MIMO / Ant 0

Channel 36 (5180MHz)

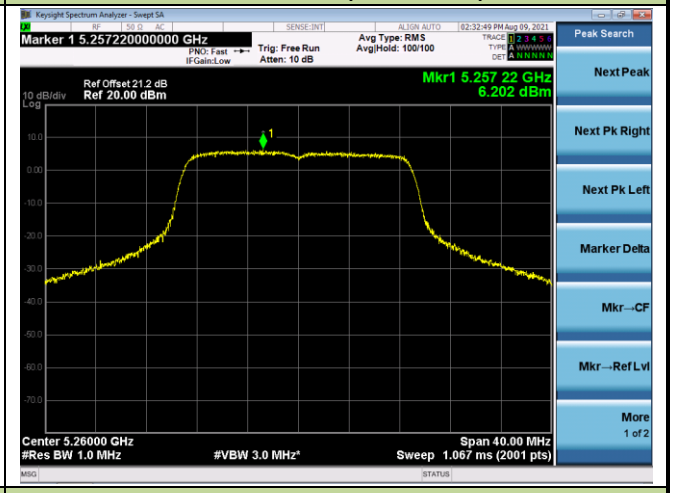


Channel 44 (5220MHz)

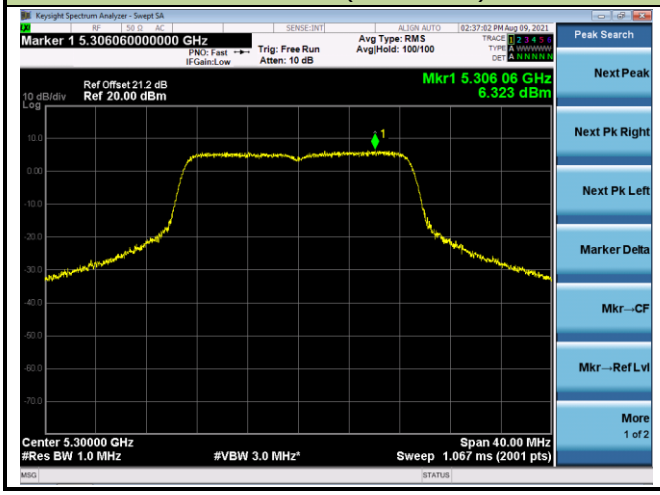
Channel 48 (5240MHz)



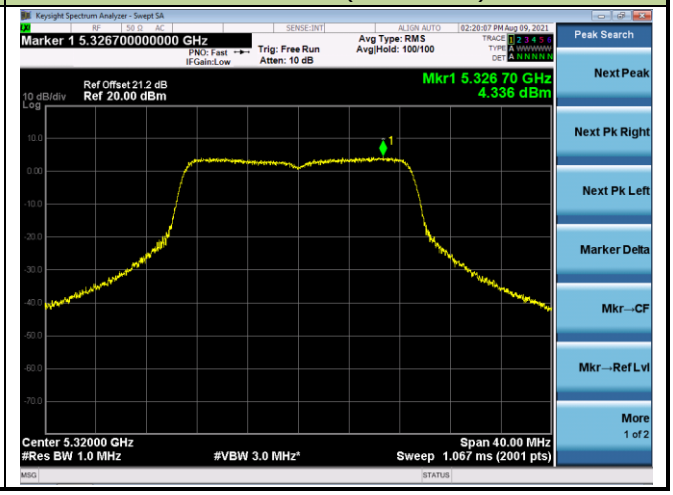
Channel 52 (5260MHz)



Channel 60 (5300MHz)

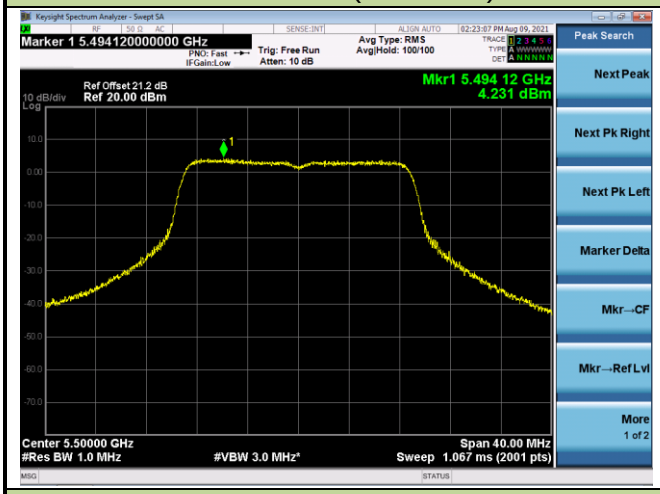


Channel 64 (5320MHz)

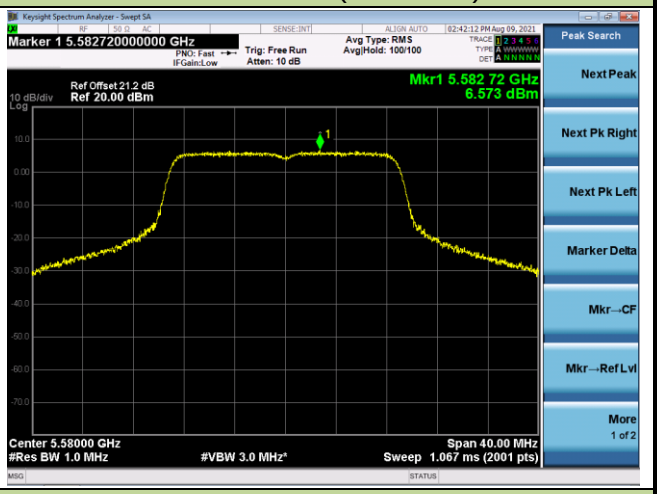


802.11ac-VHT20 Power Spectral Density / MIMO / Ant 0

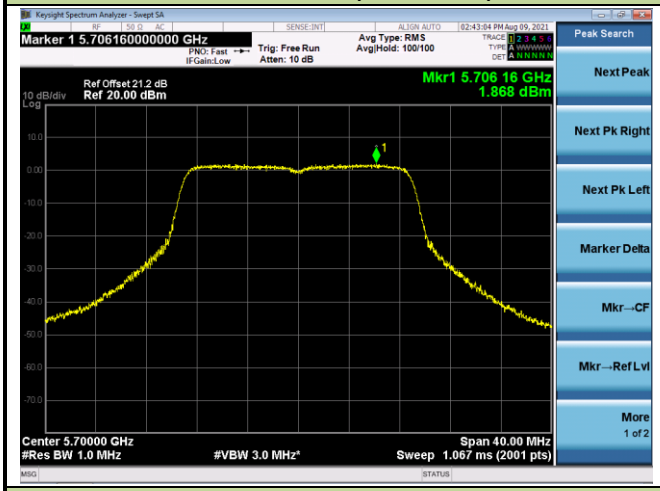
Channel 100 (5500MHz)



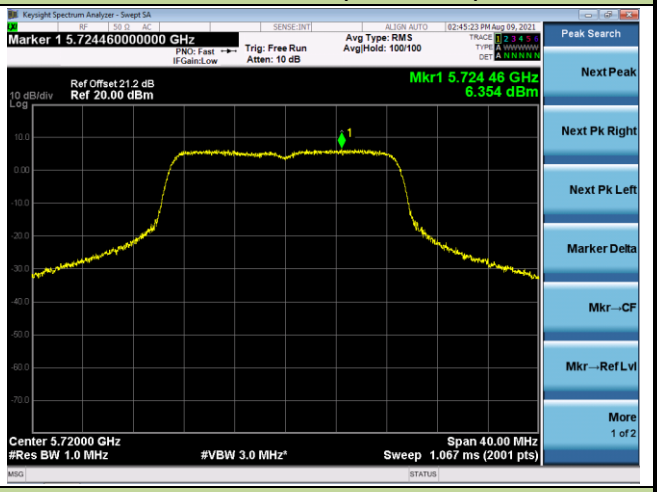
Channel 116 (5580MHz)



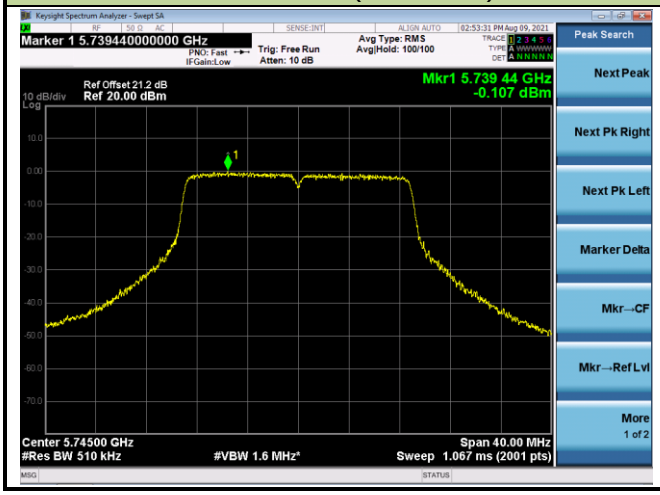
Channel 140 (5700MHz)



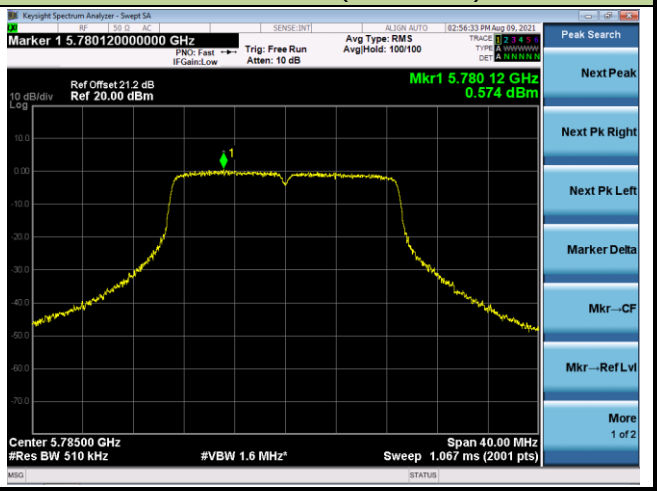
Channel 144 (5720MHz)

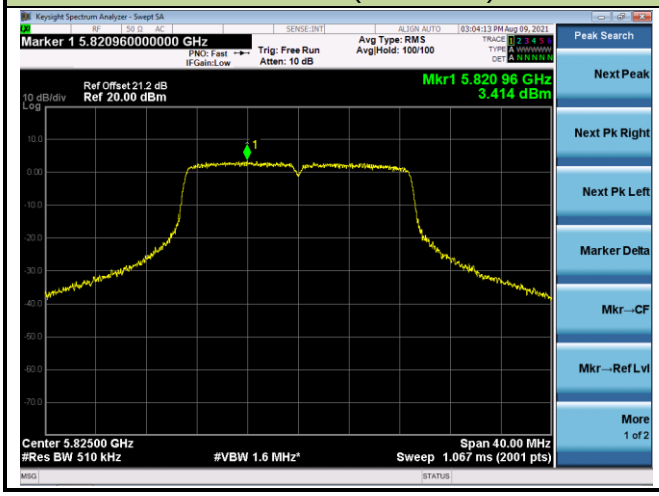


Channel 149 (5745MHz)



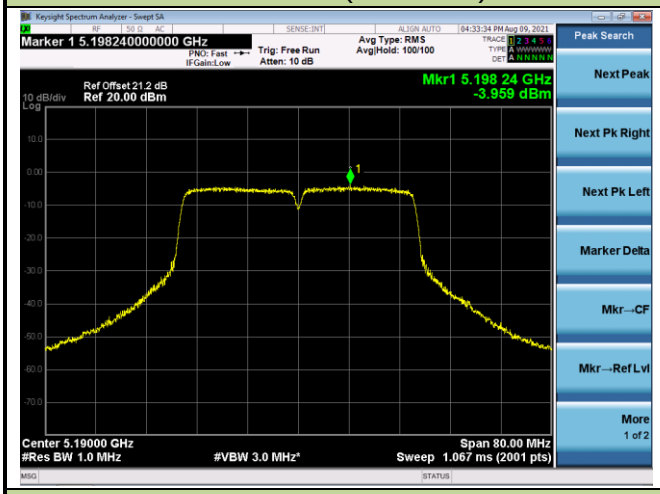
Channel 157 (5785MHz)



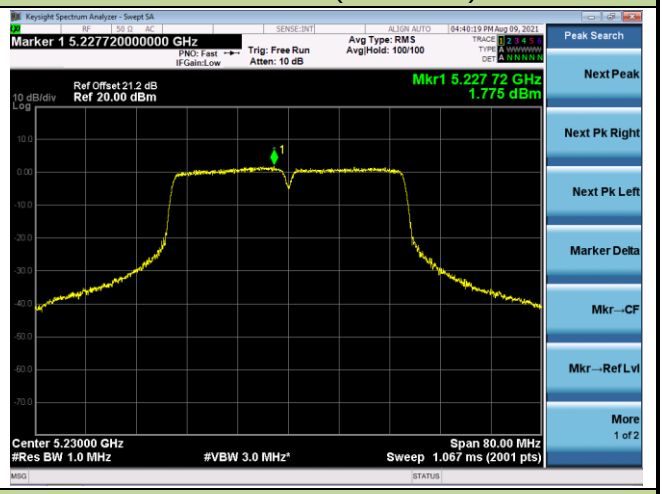
802.11ac-VHT20 Power Spectral Density / MIMO / Ant 0	
Channel 165 (5825MHz)	
	

802.11ac-VHT40 Power Spectral Density / MIMO / Ant 0

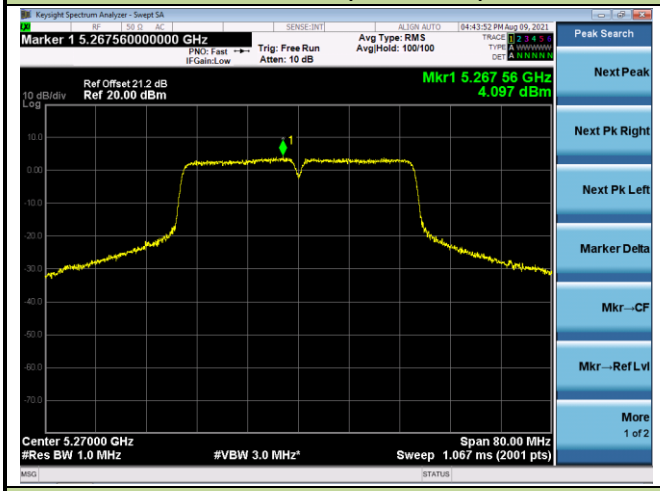
Channel 38 (5190MHz)



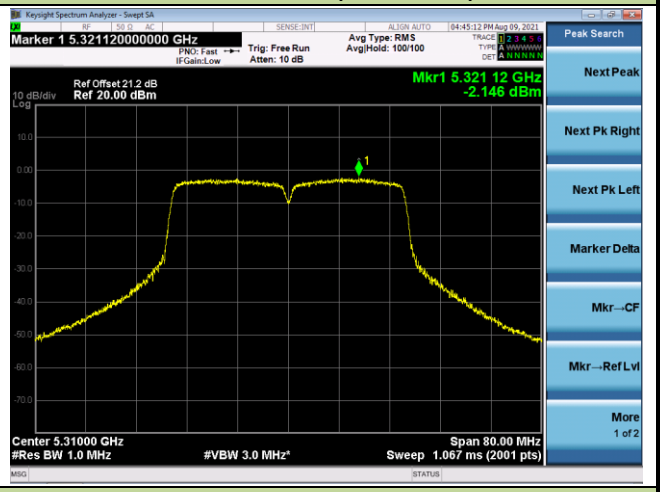
Channel 46 (5230MHz)



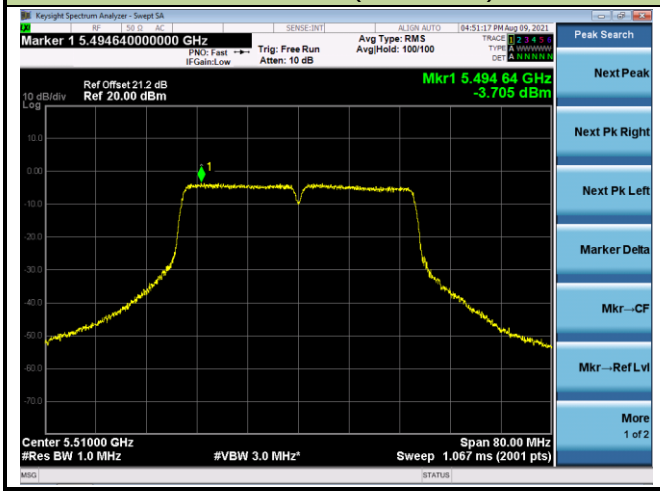
Channel 54 (5270MHz)



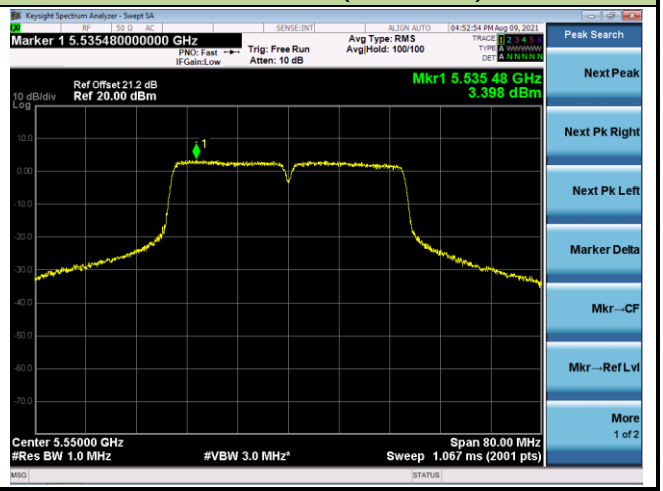
Channel 62 (5310MHz)

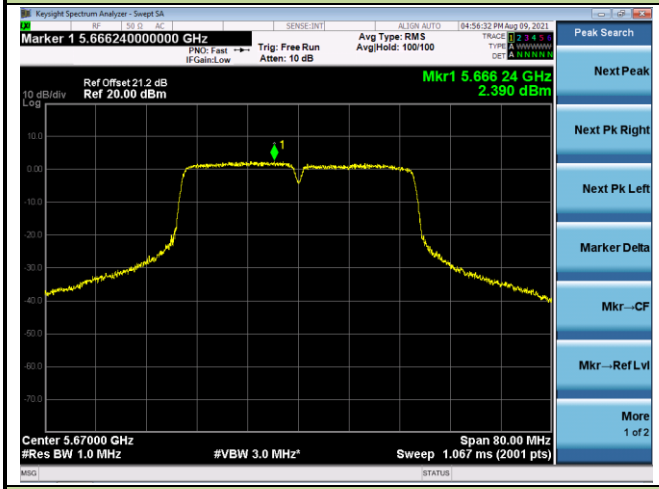
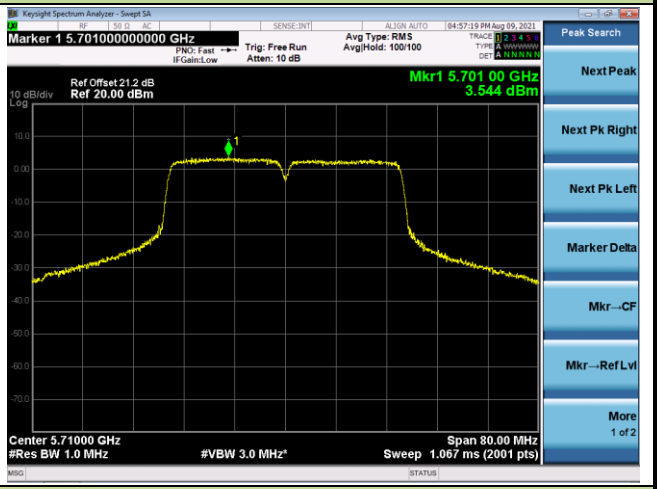
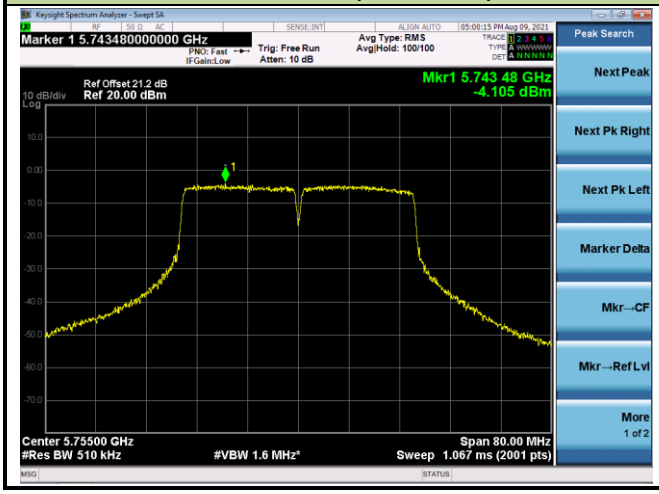
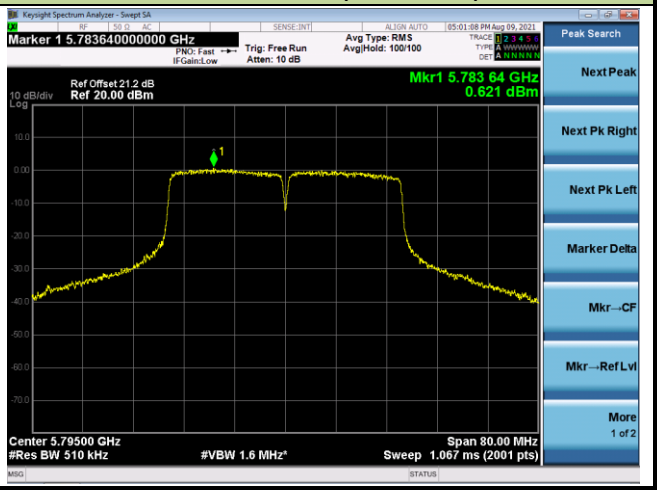


Channel 102 (5510MHz)



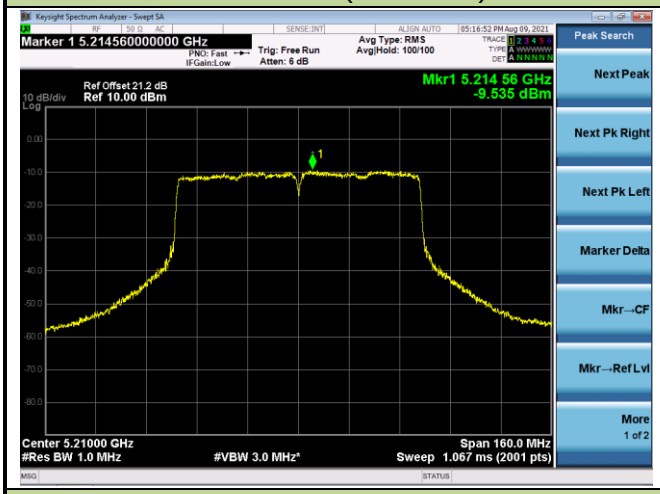
Channel 110 (5550MHz)



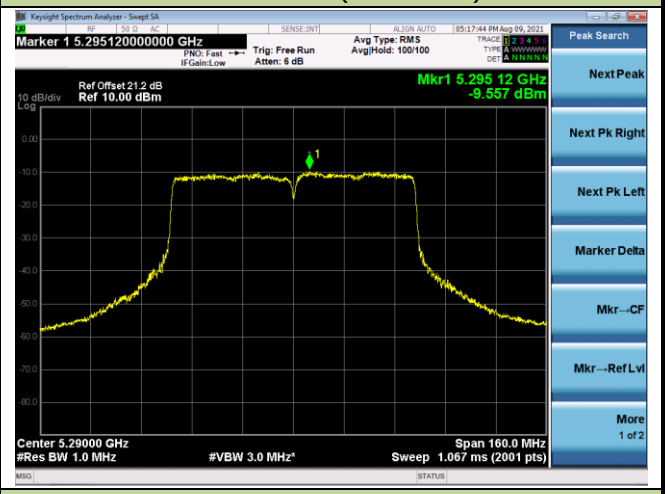
802.11ac-VHT40 Power Spectral Density / MIMO / Ant 0	
Channel 134 (5670MHz)	Channel 142 (5710MHz)
	
Channel 151 (5755MHz)	Channel 159 (5795MHz)
	

802.11ac-VHT80 Power Spectral Density / MIMO / Ant 0

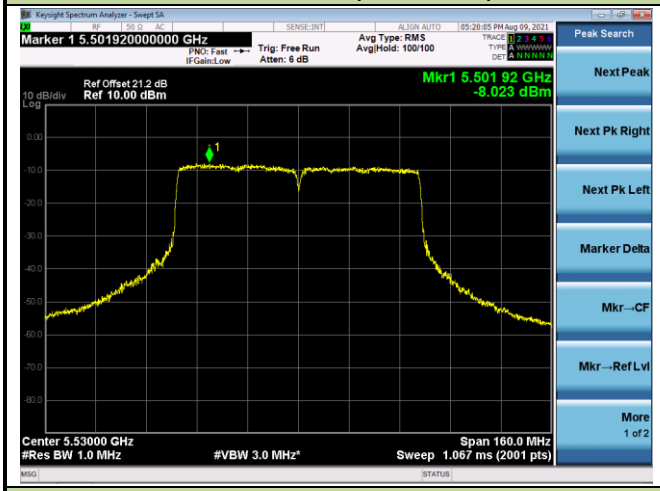
Channel 42 (5210MHz)



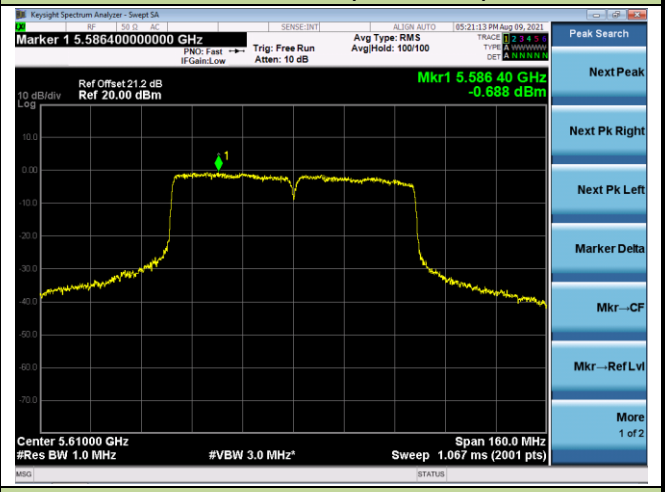
Channel 58 (5290MHz)



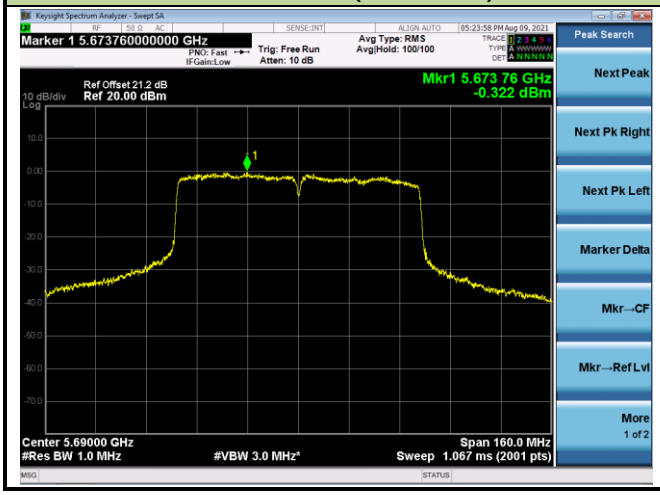
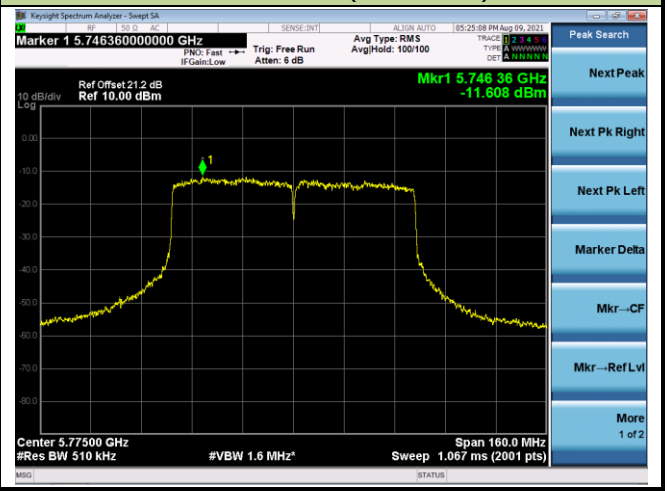
Channel 106 (5530MHz)



Channel 122 (5610MHz)



Channel 138 (5690MHz)



Channel 155 (5775MHz)