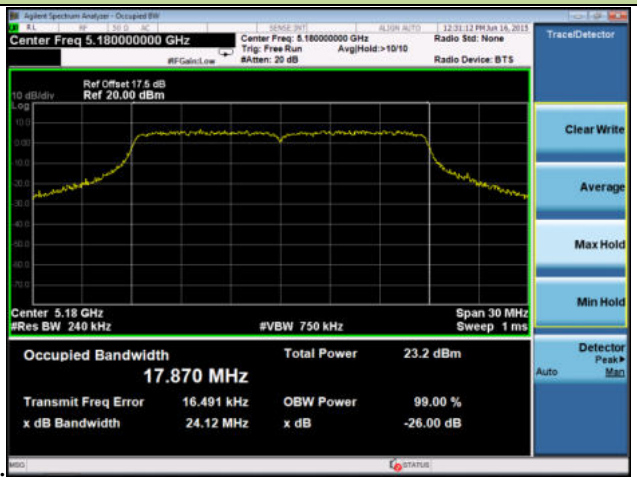
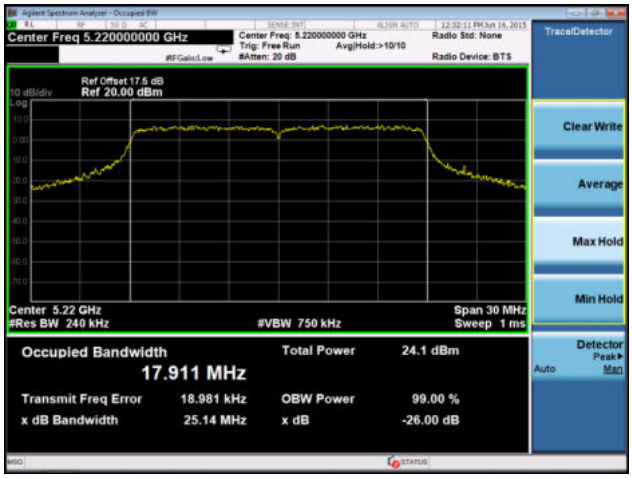
802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth

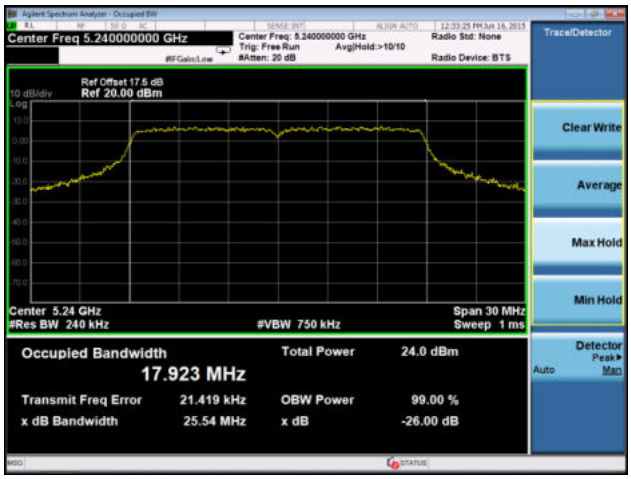
Channel 36 (5180MHz)



Channel 44 (5220MHz)

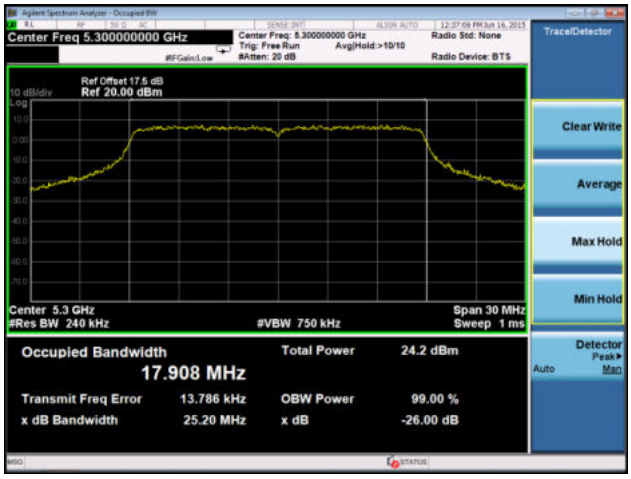


Channel 48 (5240MHz)

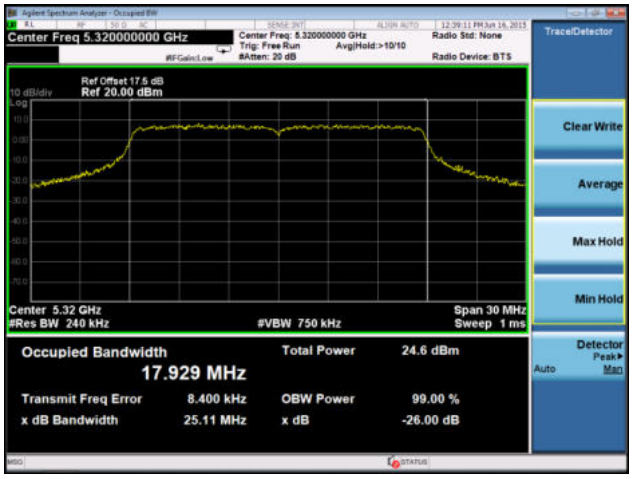


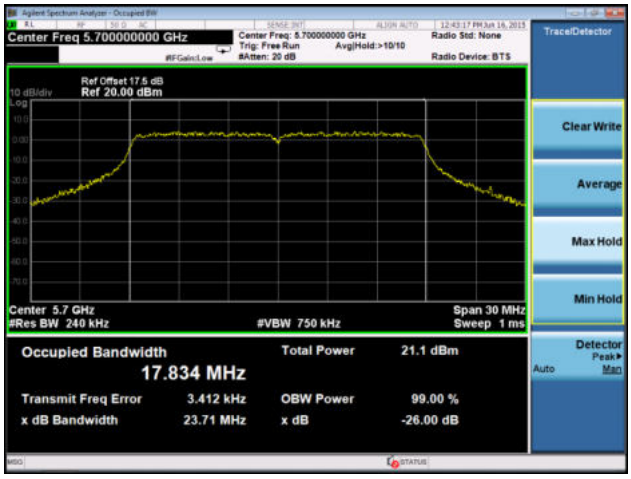
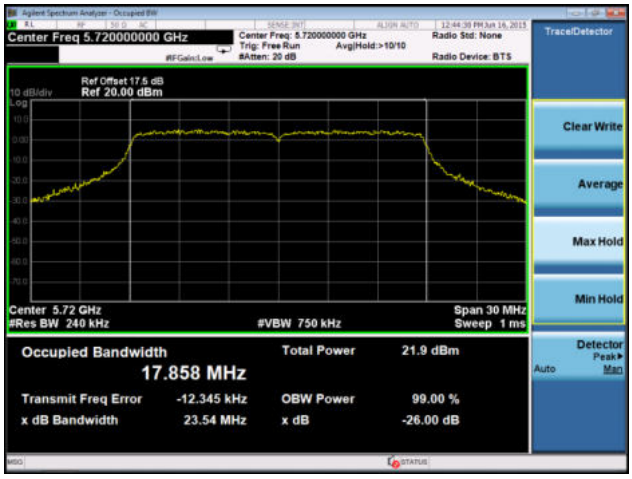
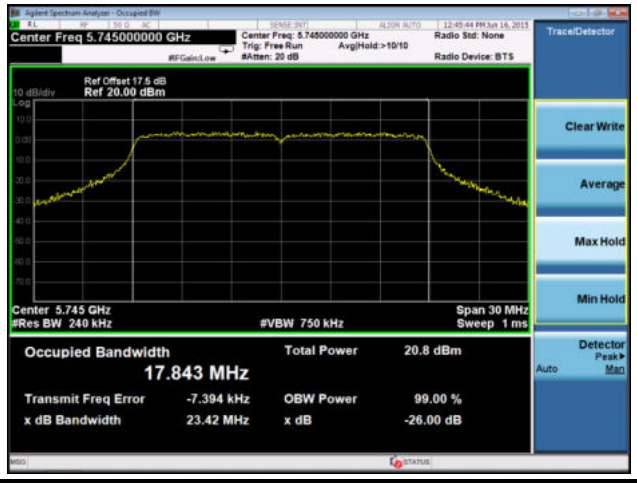
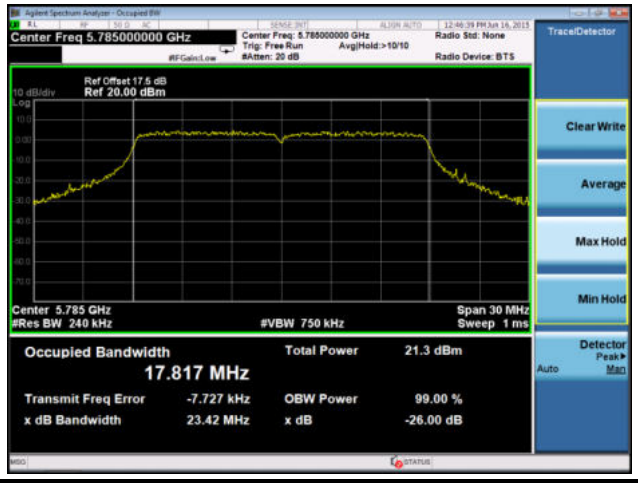
Channel 52 (5260MHz)

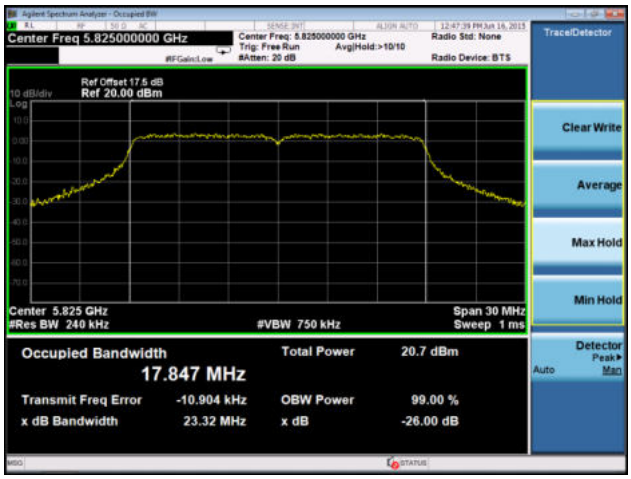
Channel 60 (5300MHz)



Channel 64 (5320MHz)

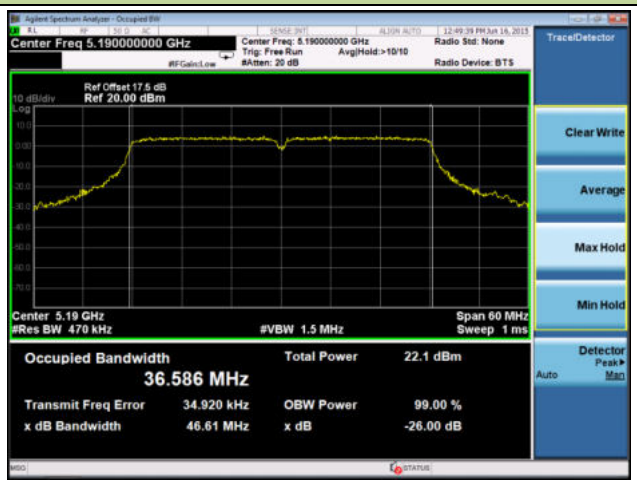


Channel 100 (5500MHz)	Channel 120 (5600MHz)
Channel 140 (5700MHz)	**Channel 144 (5720MHz)**
	
Channel 149 (5745MHz)	**Channel 157 (5785MHz)**
	

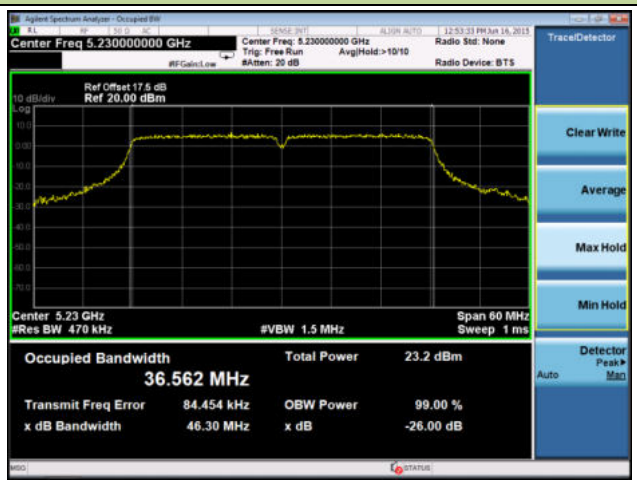
Channel 165 (5825MHz)	
	

802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth

Channel 38 (5190MHz)



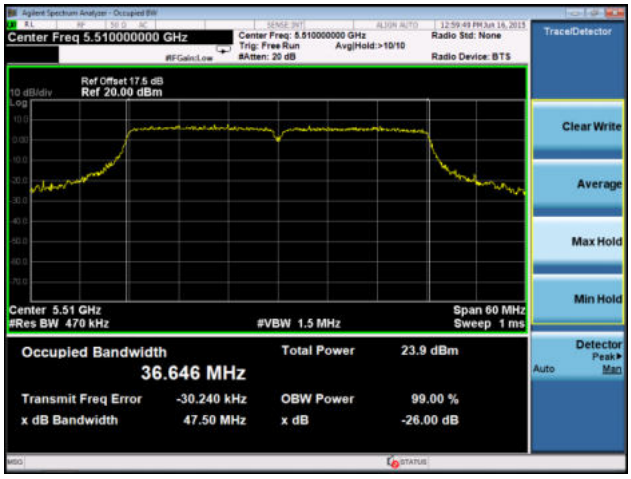
Channel 46 (5230MHz)



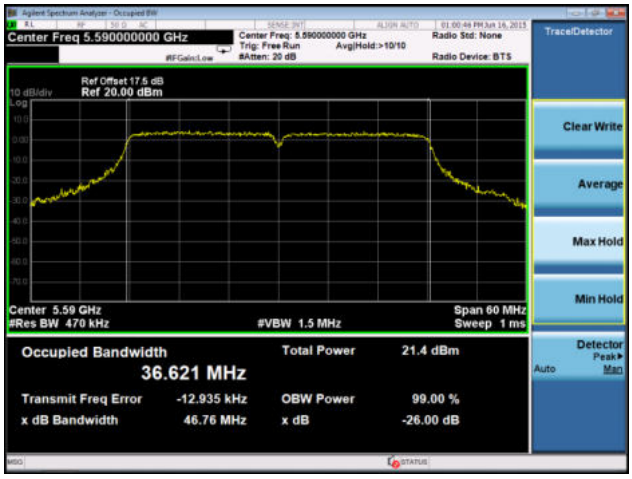
Channel 54 (5270MHz)

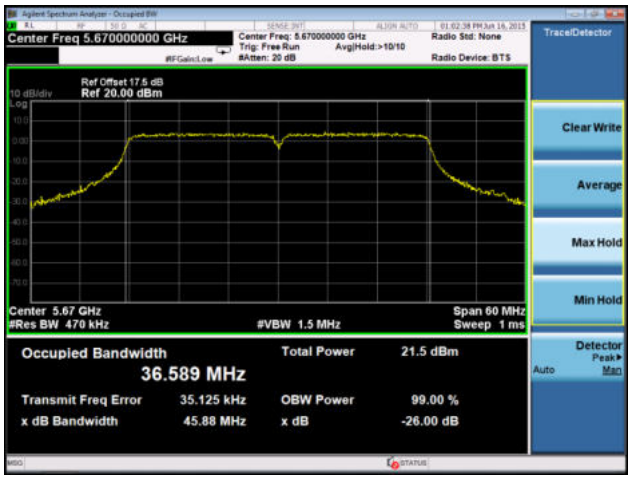
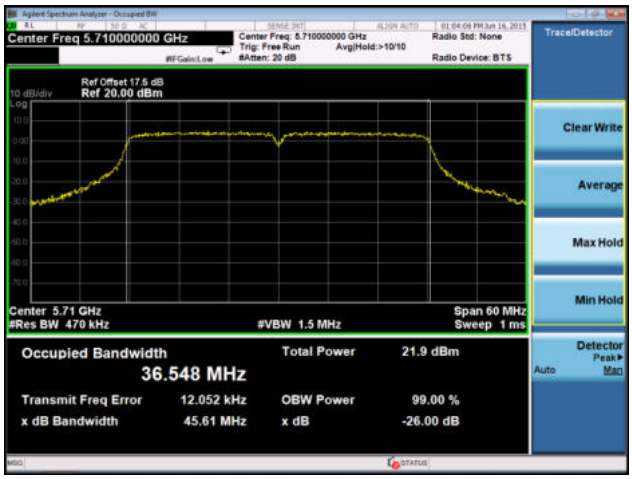
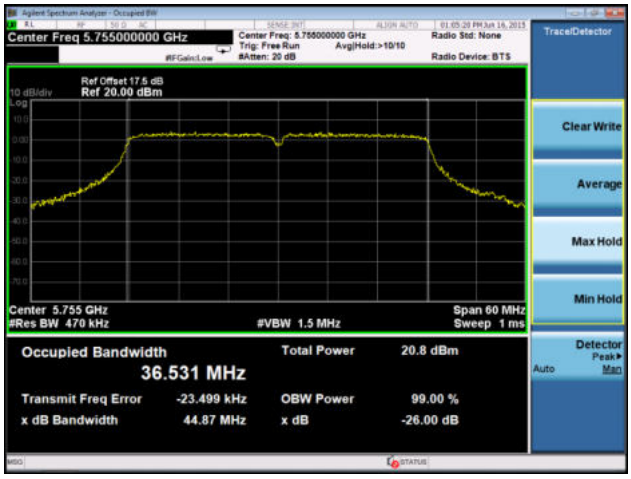
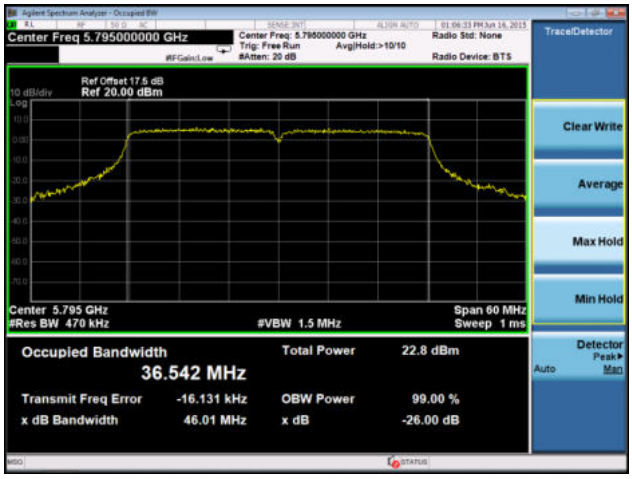
Channel 62 (5310MHz)

Channel 102 (5510MHz)



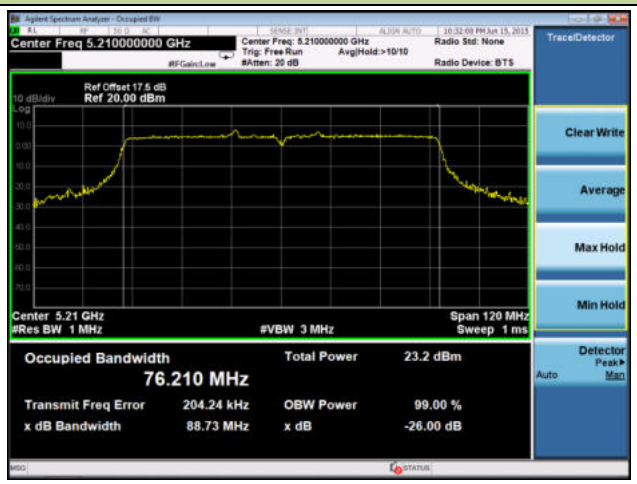
Channel 118 (5590MHz)



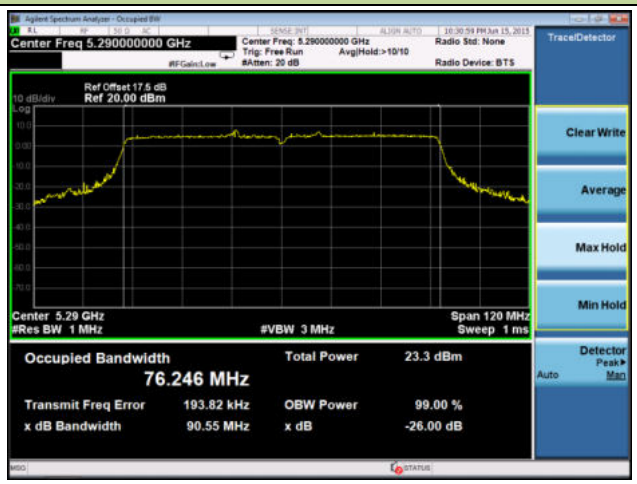
Channel 134 (5670MHz)	Channel 142 (5710MHz)
	
Channel 151 (5755MHz)	**Channel 159 (5795MHz)**
	

802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth

Channel 42 (5210MHz)

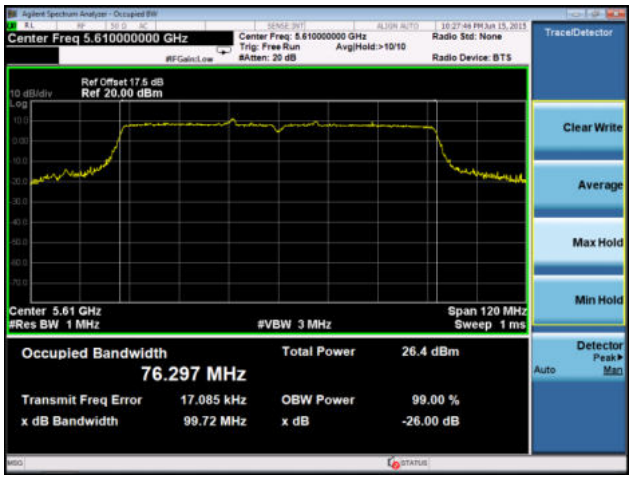


Channel 58 (5290MHz)



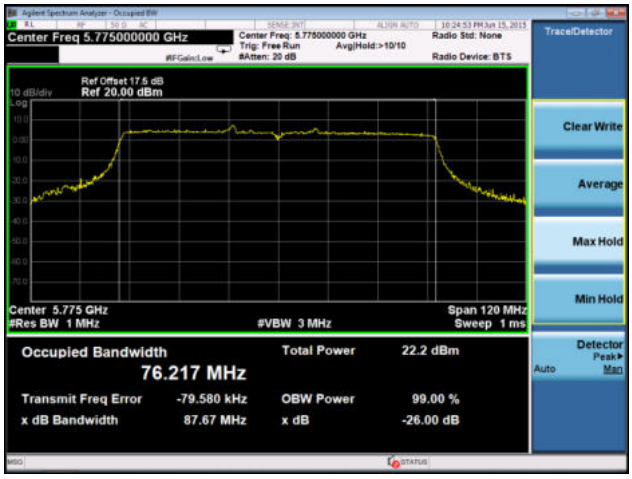
Channel 106 (5530MHz)

Channel 122 (5610MHz)



Channel 138 (5690MHz)

Channel 155 (5755MHz)



7.3. 6dB Bandwidth Measurement

7.3.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

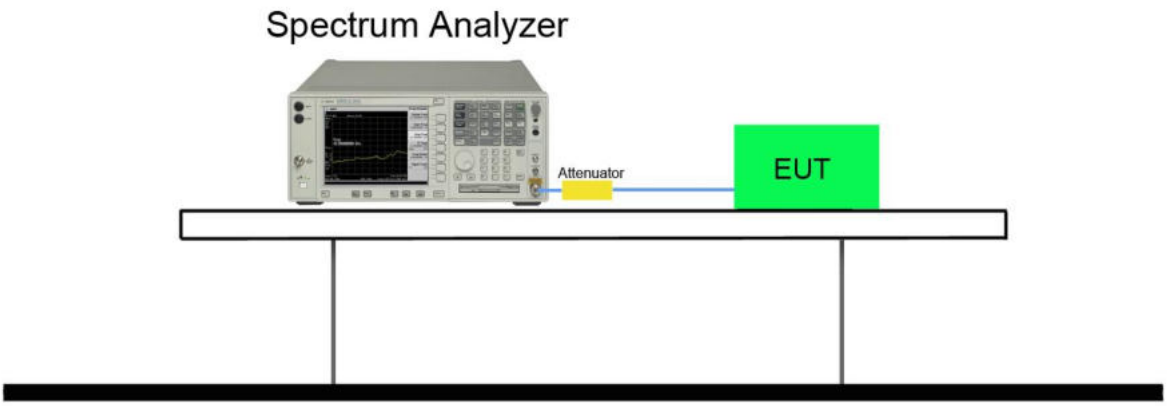
7.3.2. Test Procedure used

KDB 789033 D02v01 – Section C.2

7.3.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW ≧ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3.4. Test Setup

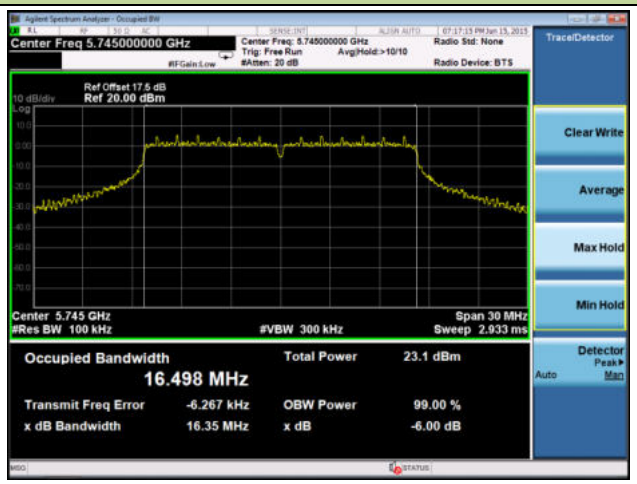


7.3.5. Test Result

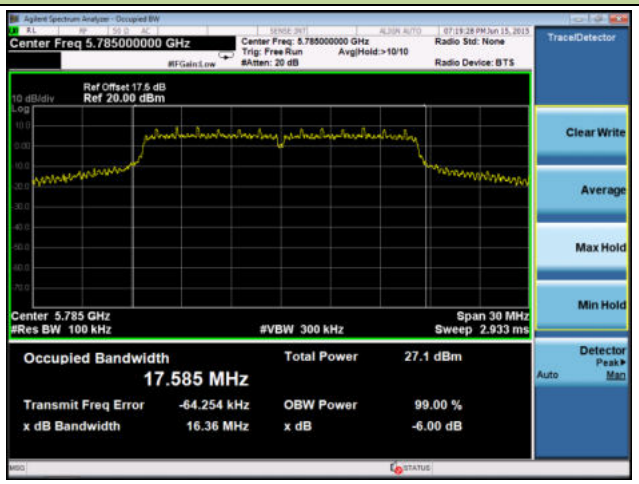
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	6	149	5745	16.35	≥0.5	Pass
802.11a	6	157	5785	16.36	≥0.5	Pass
802.11a	6	165	5825	16.35	≥0.5	Pass
802.11n-HT20	13	149	5745	17.57	≥0.5	Pass
802.11n-HT20	13	157	5785	17.57	≥0.5	Pass
802.11n-HT20	13	165	5825	17.58	≥0.5	Pass
802.11n-HT40	27	151	5755	36.10	≥0.5	Pass
802.11n-HT40	27	159	5795	36.00	≥0.5	Pass
802.11ac-VHT20	13	149	5745	17.58	≥0.5	Pass
802.11ac-VHT20	13	157	5785	17.57	≥0.5	Pass
802.11ac-VHT20	13	165	5825	17.58	≥0.5	Pass
802.11ac-VHT40	27	151	5755	36.41	≥0.5	Pass
802.11ac-VHT40	27	159	5795	36.33	≥0.5	Pass
802.11ac-VHT80	58.6	155	5775	75.80	≥0.5	Pass
Note: 6dB Bandwidth is measured at ant 1 port.						

802.11a 6dB Bandwidth

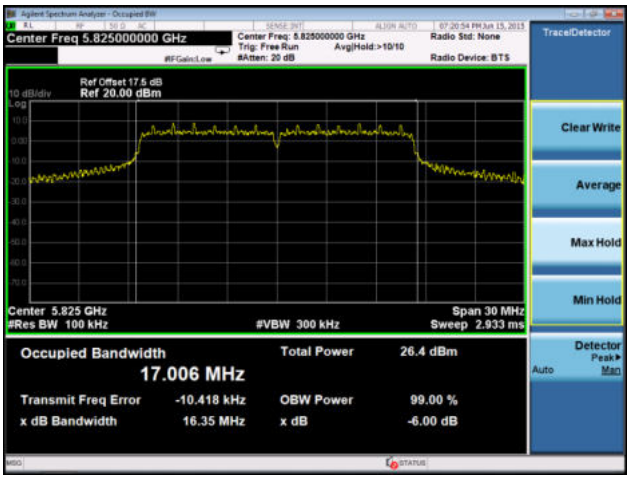
Channel 149 (5745MHz)

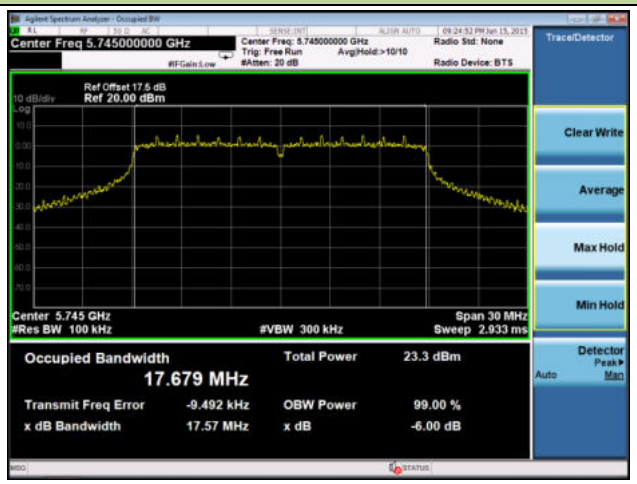
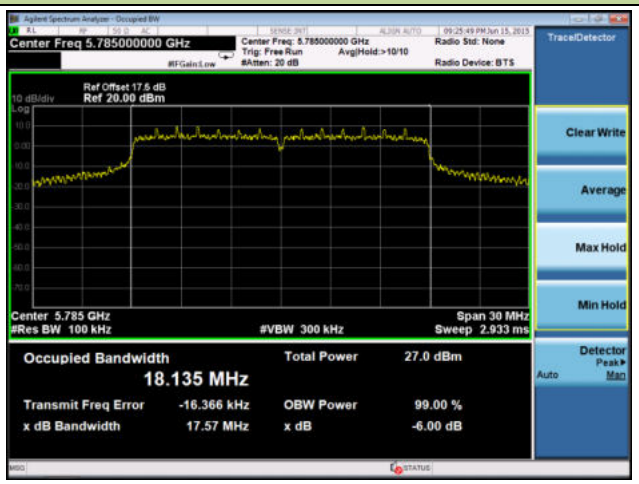


Channel 157 (5785MHz)



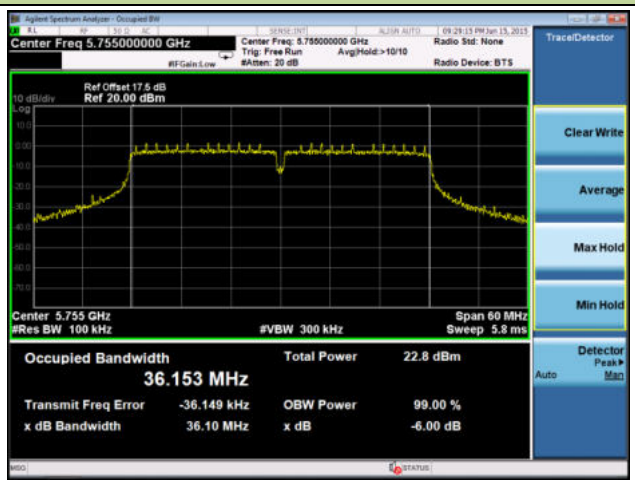
Channel 165 (5825MHz)



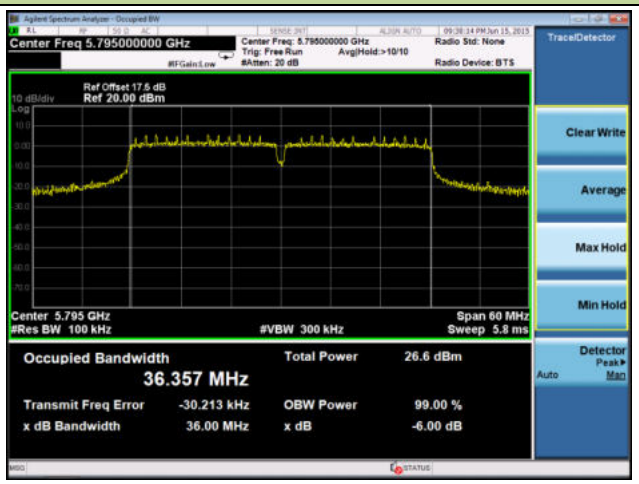
802.11n-HT20 6dB Bandwidth	
Channel 149 (5745MHz)	**Channel 157 (5785MHz)**
	
Channel 165 (5825MHz)	

802.11n-HT40 6dB Bandwidth

Channel 151 (5755MHz)

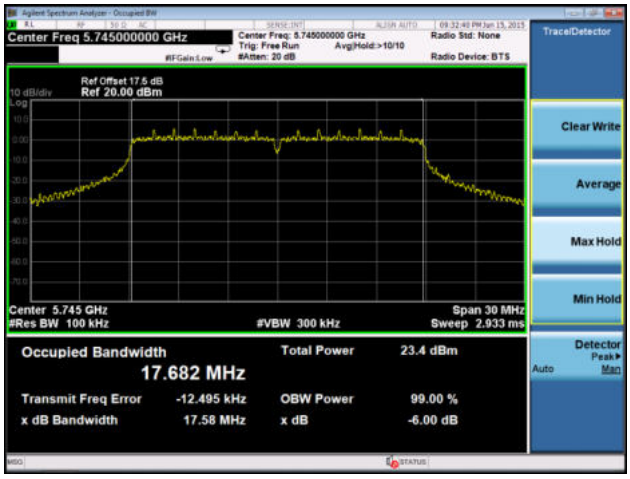


Channel 159 (5795MHz)

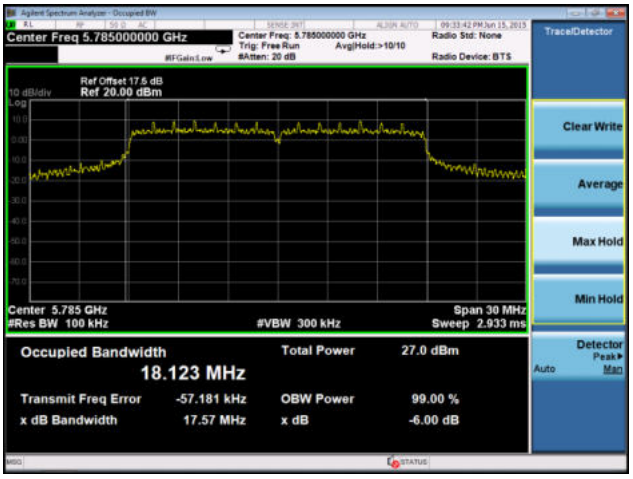


802.11ac-VHT20 6dB Bandwidth

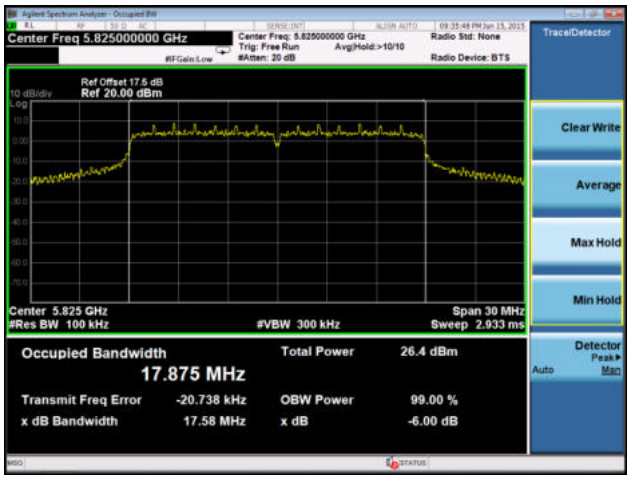
Channel 149 (5745MHz)

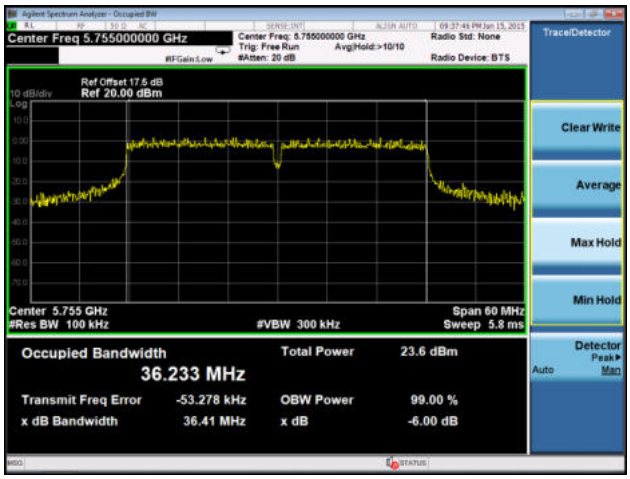
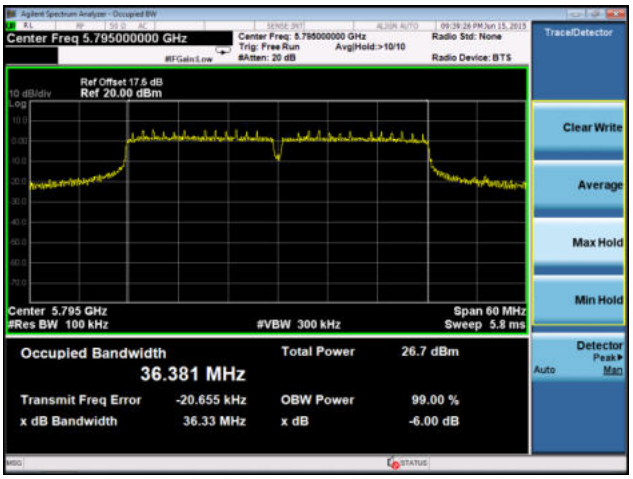


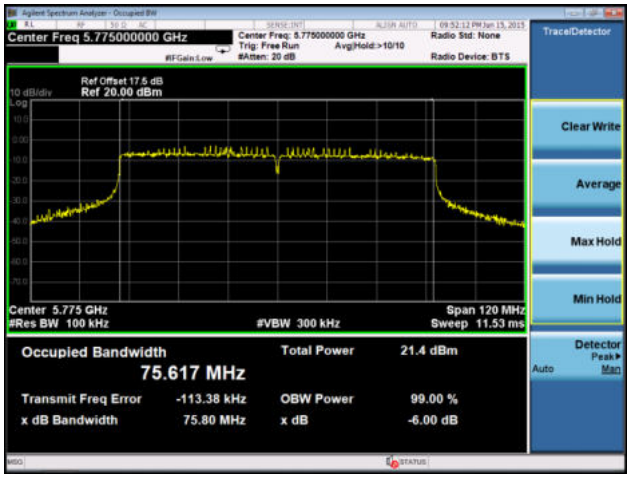
Channel 157 (5785MHz)



Channel 165 (5825MHz)



802.11ac-VHT40 6dB Bandwidth	
Channel 151 (5755MHz)	**Channel 159 (5795MHz)**
	

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

7.4. Output Power Measurement

7.4.1. Test Limit

For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

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 (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.

Frequency Band (GHz)	Output Power Limit (dBm)
5.15-5.25	23.98 – (7dBi – 6dBi) = 22.98
5.25-5.35	23.98 – (7dBi – 6dBi) = 22.98
5.47-5.725	23.98 – (7dBi – 6dBi) = 22.98
5.725-5.85	30 – (10dBi – 6dBi) = 26

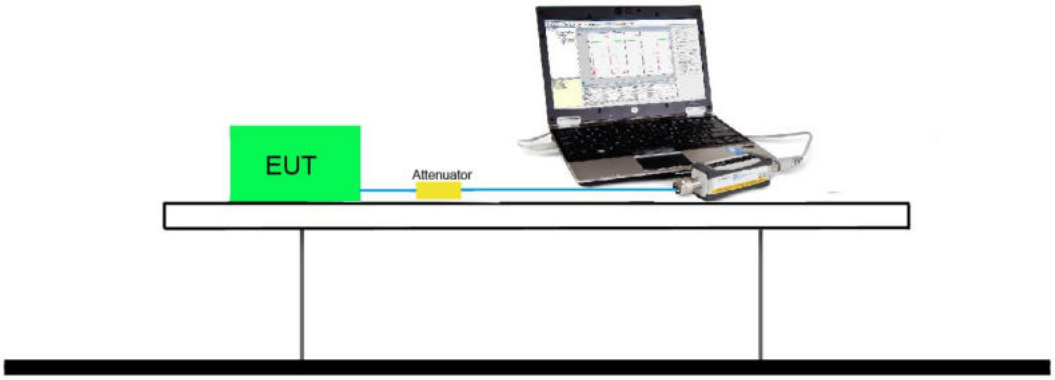
7.4.2. Test Procedure Used

KDB 789033 D02v01 - Section E) 3) b) Method PM-G

7.4.3. Test Setting

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband 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.

7.4.4. Test Setup



7.4.5. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (yellow marker) for final test of each channel.

N_{Tx}	a	MCS Index for 802.11n	Data Rate (Mbps)			
			20MHz Bandwidth		40MHz Bandwidth	
			800ns GI	400ns GI	800ns GI	400ns GI
1	6	0	6.5	7.2	13.5	15.0
1	9	1	13.0	14.4	27	30.0
1	12	2	19.5	21.7	40.5	45.0
1	18	3	26.0	28.9	54	60.0
1	24	4	39.0	43.3	81	90.0
1	36	5	52.0	57.8	108	120.0
1	48	6	58.5	65.0	121.5	135.0
1	54	7	65.0	72.2	135	150.0
2	---	8	13.0	14.4	27	30.0
2	---	9	26.0	28.9	54	60.0
2	---	10	39.0	43.3	81	90.0
2	---	11	52.0	57.8	108	120.0
2	---	12	78.0	86.7	162	180.0
2	---	13	104.0	115.6	216	240.0
2	---	14	117.0	130.0	243	270.0
2	---	15	130.0	270.0	144.4	300.0

MCS Index for 802.11ac	N_{Tx}	Data Rate (Mbps)					
		20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
		800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI
0	1	6.5	7.2	13.5	15.0	29.3	32.5
1	1	13.0	14.4	27.0	30.0	58.5	65.0
2	1	19.5	21.7	40.5	45.0	87.8	97.5
3	1	26.0	28.9	54.0	60.0	117.0	130.0
4	1	39.0	43.3	81.0	90.0	175.5	195
5	1	52.0	57.8	108.0	120.0	234.0	260.0
6	1	58.5	65.0	121.5	135.0	263.3	292.5
7	1	65.0	72.2	135.0	150.0	292.5	325
8	1	78.0	86.7	162.0	180.0	351.0	390.0
9	1	--	--	180.0	200.0	390.0	433.3
10	2	13.0	14.4	27.0	30.0	58.6	65.0
11	2	26.0	28.8	54.0	60.0	117.0	130.0
12	2	39.0	43.4	81.0	90.0	175.6	195.0
13	2	52.0	57.8	108.0	120.0	234.0	260.0
14	2	78.0	86.6	162.0	180.0	351.0	390.0
15	2	104.0	115.6	216.0	240.0	468.0	520.0
16	2	117.0	130.0	243.0	270.0	526.6	585.0
17	2	130.0	144.4	270.0	300.0	585.0	650.0
18	2	156.0	173.4	324.0	360.0	702.0	780.0
19	2	--	--	360.0	400.0	780.0	866.6

Note: Power output test was verified over all data rates of each mode shown as above, and then choose the maximum power output (yellow marker) for final test of each channel.

Output power at various data rates for Ant 0 / Ant 0 + 1:

Test Mode	Bandwidth	Channel	Frequency (MHz)	Data Rate (Mbps)	RMS Power (dBm)
802.11a	20	60	5300	6	21.51
				24	21.02
				54	20.83
802.11n	20	60	5300	13	21.40
				14.4	21.13
				78	20.84
				86.7	20.67
				130	20.49
				144	20.22
802.11n	40	62	5310	27	17.00
				30	16.83
				162	16.54
				180	16.39
				270	16.13
				300	16.02
802.11ac	20	60	5300	13	21.40
				14.4	21.25
				78	21.13
				86.6	21.07
				156	20.76
				173.4	20.43
802.11ac	40	62	5310	27	16.90
				30	16.76
				162	16.51
				180	16.37
				360	16.19
				400	16.03

802.11ac	80	58	5290	58.6	19.28
				65	19.08
				351	18.83
				390	18.55
				780	18.36
				866.6	18.15

1Tx

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Limit (dBm)	Result
11a	1	6	36	5180	18.39	19.72	≤ 22.98	Pass
11a	1	6	44	5220	20.38	19.80	≤ 22.98	Pass
11a	1	6	48	5240	20.35	20.06	≤ 22.98	Pass
11a	1	6	52	5260	21.42	21.71	≤ 22.98	Pass
11a	1	6	60	5300	21.51	21.55	≤ 22.98	Pass
11a	1	6	64	5320	19.72	20.09	≤ 22.98	Pass
11a	1	6	100	5500	20.84	20.96	≤ 22.98	Pass
11a	1	6	120	5600	19.73	19.44	≤ 22.98	Pass
11a	1	6	140	5700	18.76	19.81	≤ 22.98	Pass
11a	1	6	149	5745	20.04	20.42	≤ 26.00	Pass
11a	1	6	157	5785	20.37	20.93	≤ 26.00	Pass
11a	1	6	165	5825	19.82	20.66	≤ 26.00	Pass
11n-HT20	1	6.5	36	5180	18.37	18.92	≤ 22.98	Pass
11n-HT20	1	6.5	44	5220	20.29	19.98	≤ 22.98	Pass
11n-HT20	1	6.5	48	5240	20.26	20.03	≤ 22.98	Pass
11n-HT20	1	6.5	52	5260	21.33	21.89	≤ 22.98	Pass
11n-HT20	1	6.5	60	5300	21.40	21.72	≤ 22.98	Pass
11n-HT20	1	6.5	64	5320	19.61	19.96	≤ 22.98	Pass
11n-HT20	1	6.5	100	5500	21.05	20.78	≤ 22.98	Pass
11n-HT20	1	6.5	120	5600	19.64	19.47	≤ 22.98	Pass
11n-HT20	1	6.5	140	5700	17.79	19.63	≤ 22.98	Pass
11n-HT20	1	6.5	149	5745	19.91	20.42	≤ 26.00	Pass
11n-HT20	1	6.5	157	5785	20.25	20.77	≤ 26.00	Pass
11n-HT20	1	6.5	165	5825	19.67	20.62	≤ 26.00	Pass
11n-HT40	1	13.5	38	5190	15.94	17.26	≤ 22.98	Pass
11n-HT40	1	13.5	46	5230	19.66	20.21	≤ 22.98	Pass
11n-HT40	1	13.5	54	5270	19.67	20.42	≤ 22.98	Pass
11n-HT40	1	13.5	62	5310	17.03	17.44	≤ 22.98	Pass
11n-HT40	1	13.5	102	5510	19.66	19.42	≤ 22.98	Pass
11n-HT40	1	13.5	118	5590	18.26	18.38	≤ 22.98	Pass
11n-HT40	1	13.5	134	5670	17.83	18.14	≤ 22.98	Pass

11n-HT40	1	13.5	151	5755	18.15	18.85	≤ 26.00	Pass
11n-HT40	1	13.5	159	5795	19.02	19.67	≤ 26.00	Pass
11ac-VHT20	1	6.5	36	5180	18.39	19.79	≤ 22.98	Pass
11ac-VHT20	1	6.5	44	5220	20.28	21.10	≤ 22.98	Pass
11ac-VHT20	1	6.5	48	5240	20.51	20.77	≤ 22.98	Pass
11ac-VHT20	1	6.5	52	5260	21.35	21.65	≤ 22.98	Pass
11ac-VHT20	1	6.5	60	5300	21.40	21.54	≤ 22.98	Pass
11ac-VHT20	1	6.5	64	5320	19.60	19.96	≤ 22.98	Pass
11ac-VHT20	1	6.5	100	5500	21.11	20.83	≤ 22.98	Pass
11ac-VHT20	1	6.5	120	5600	19.61	19.44	≤ 22.98	Pass
11ac-VHT20	1	6.5	140	5700	17.66	19.63	≤ 22.98	Pass
11ac-VHT20	1	6.5	144	5720	19.78	19.95	≤ 22.98	Pass
11ac-VHT20	1	6.5	149	5745	19.91	20.34	≤ 26.00	Pass
11ac-VHT20	1	6.5	157	5785	20.26	20.71	≤ 26.00	Pass
11ac-VHT20	1	6.5	165	5825	19.67	20.64	≤ 26.00	Pass
11ac-VHT40	1	13.5	38	5190	15.82	17.18	≤ 22.98	Pass
11ac-VHT40	1	13.5	46	5230	20.02	20.53	≤ 22.98	Pass
11ac-VHT40	1	13.5	54	5270	20.03	20.71	≤ 22.98	Pass
11ac-VHT40	1	13.5	62	5310	16.90	17.45	≤ 22.98	Pass
11ac-VHT40	1	13.5	102	5510	20.38	19.34	≤ 22.98	Pass
11ac-VHT40	1	13.5	118	5590	18.62	18.73	≤ 22.98	Pass
11ac-VHT40	1	13.5	134	5670	18.22	18.52	≤ 22.98	Pass
11ac-VHT40	1	13.5	142	5710	18.46	18.87	≤ 22.98	Pass
11ac-VHT40	1	13.5	151	5755	18.58	19.23	≤ 26.00	Pass
11ac-VHT40	1	13.5	159	5795	19.50	20.11	≤ 26.00	Pass
11ac-VHT80	1	29.3	42	5210	19.42	19.68	≤ 22.98	Pass
11ac-VHT80	1	29.3	58	5290	19.30	19.86	≤ 22.98	Pass
11ac-VHT80	1	29.3	106	5530	19.28	18.73	≤ 22.98	Pass
11ac-VHT80	1	29.3	122	5610	17.44	17.42	≤ 22.98	Pass
11ac-VHT80	1	29.3	138	5690	17.68	18.13	≤ 22.98	Pass
11ac-VHT80	1	29.3	155	5775	18.62	19.15	≤ 26.00	Pass

2Tx

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	Result
11n-HT20	2	13	36	5180	16.70	17.88	20.34	≤ 22.98	Pass
11n-HT20	2	13	44	5220	16.94	18.08	20.56	≤ 22.98	Pass
11n-HT20	2	13	48	5240	16.70	17.52	20.14	≤ 22.98	Pass
11n-HT20	2	13	52	5260	19.59	18.82	22.23	≤ 22.98	Pass
11n-HT20	2	13	60	5300	19.67	18.58	22.17	≤ 22.98	Pass
11n-HT20	2	13	64	5320	19.12	18.21	21.70	≤ 22.98	Pass
11n-HT20	2	13	100	5500	19.55	19.14	22.36	≤ 22.98	Pass
11n-HT20	2	13	120	5600	19.99	19.78	22.90	≤ 22.98	Pass
11n-HT20	2	13	140	5700	18.99	18.79	21.90	≤ 22.98	Pass
11n-HT20	2	13	149	5745	18.79	18.67	21.74	≤ 26.00	Pass
11n-HT20	2	13	157	5785	20.56	21.55	24.09	≤ 26.00	Pass
11n-HT20	2	13	165	5825	19.35	20.37	22.90	≤ 26.00	Pass
11n-HT40	2	27	38	5190	17.69	17.47	20.59	≤ 22.98	Pass
11n-HT40	2	27	46	5230	17.70	17.72	20.72	≤ 22.98	Pass
11n-HT40	2	27	54	5270	19.72	20.04	22.89	≤ 22.98	Pass
11n-HT40	2	27	62	5310	15.86	16.10	18.99	≤ 22.98	Pass
11n-HT40	2	27	102	5510	18.42	18.53	21.49	≤ 22.98	Pass
11n-HT40	2	27	118	5590	19.96	19.84	22.91	≤ 22.98	Pass
11n-HT40	2	27	134	5670	19.83	19.65	22.75	≤ 22.98	Pass
11n-HT40	2	27	151	5755	18.84	17.17	21.10	≤ 26	Pass
11n-HT40	2	27	159	5795	19.27	20.49	22.93	≤ 26	Pass
11ac-VHT20	2	13	36	5180	18.06	17.49	20.79	≤ 22.98	Pass
11ac-VHT20	2	13	44	5220	16.98	17.59	20.31	≤ 22.98	Pass
11ac-VHT20	2	13	48	5240	18.26	17.60	20.95	≤ 22.98	Pass
11ac-VHT20	2	13	52	5260	19.12	19.25	22.20	≤ 22.98	Pass
11ac-VHT20	2	13	60	5300	19.21	19.22	22.23	≤ 22.98	Pass
11ac-VHT20	2	13	64	5320	17.61	17.87	20.75	≤ 22.98	Pass
11ac-VHT20	2	13	100	5500	18.78	16.58	20.83	≤ 22.98	Pass
11ac-VHT20	2	13	120	5600	19.52	18.76	22.17	≤ 22.98	Pass
11ac-VHT20	2	13	140	5700	17.82	18.44	21.15	≤ 22.98	Pass
11ac-VHT20	2	13	144	5720	18.81	19.50	22.18	≤ 22.98	Pass

11ac-VHT20	2	13	149	5745	19.75	20.68	23.25	≤ 26.00	Pass
11ac-VHT20	2	13	157	5785	21.03	22.13	24.63	≤ 26.00	Pass
11ac-VHT20	2	13	165	5825	19.39	20.39	22.93	≤ 26.00	Pass
11ac-VHT40	2	27	38	5190	15.76	15.47	18.63	≤ 22.98	Pass
11ac-VHT40	2	27	46	5230	18.84	18.84	21.85	≤ 22.98	Pass
11ac-VHT40	2	27	54	5270	19.56	19.78	22.68	≤ 22.98	Pass
11ac-VHT40	2	27	62	5310	14.89	14.14	17.54	≤ 22.98	Pass
11ac-VHT40	2	27	102	5510	16.44	17.49	20.01	≤ 22.98	Pass
11ac-VHT40	2	27	118	5590	18.93	18.57	21.76	≤ 22.98	Pass
11ac-VHT40	2	27	134	5670	19.02	19.77	22.42	≤ 22.98	Pass
11ac-VHT40	2	27	142	5710	19.00	19.57	22.30	≤ 22.98	Pass
11ac-VHT40	2	27	151	5755	17.28	18.19	20.77	≤ 26.00	Pass
11ac-VHT40	2	27	159	5795	19.20	20.43	22.87	≤ 26.00	Pass
11ac-VHT80	2	58.6	42	5210	14.34	14.67	17.52	≤ 22.98	Pass
11ac-VHT80	2	58.6	58	5290	14.36	14.76	17.57	≤ 22.98	Pass
11ac-VHT80	2	58.6	106	5530	17.58	18.90	21.30	≤ 22.98	Pass
11ac-VHT80	2	58.6	122	5610	19.39	19.40	22.41	≤ 22.98	Pass
11ac-VHT80	2	58.6	138	5690	18.76	19.32	22.06	≤ 22.98	Pass
11ac-VHT80	2	58.6	155	5775	12.76	13.89	16.37	≤ 26.00	Pass

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

7.5. Transmit Power Control

7.5.1. 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.

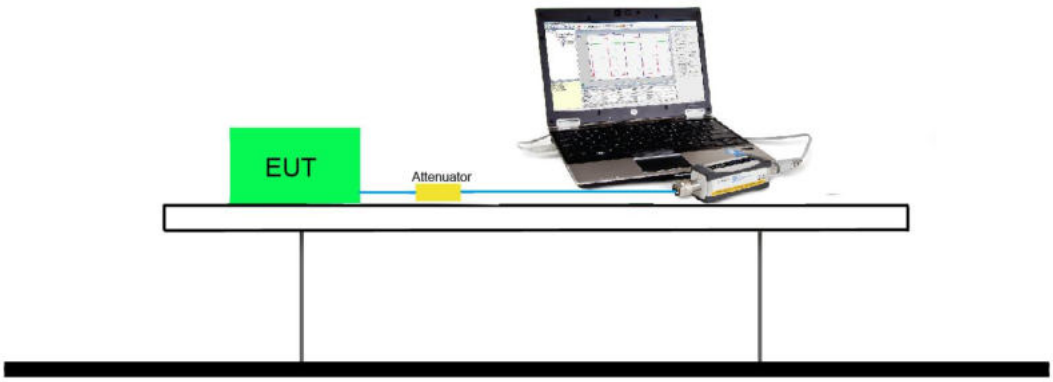
7.5.2. Test Procedure Used

KDB 789033 D02v01 - Section E) 3) b) Method PM-G

7.5.3. Test Setting

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband 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.

7.5.4. Test Setup



7.5.5. Test Result

1Tx

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 TPC Power (dBm)	Ant 1 TPC Power (dBm)	Limit (dBm)	Result
11a	1	6	52	5260	18.37	18.70	≤ 23.98	Pass
11a	1	6	60	5300	18.47	18.52	≤ 23.98	Pass
11a	1	6	64	5320	16.64	17.08	≤ 23.98	Pass
11a	1	6	100	5500	17.80	17.90	≤ 23.98	Pass
11a	1	6	120	5600	16.70	16.42	≤ 23.98	Pass
11a	1	6	140	5700	15.68	16.77	≤ 23.98	Pass
11n-HT20	1	6.5	52	5260	18.25	18.86	≤ 23.98	Pass
11n-HT20	1	6.5	60	5300	18.34	18.70	≤ 23.98	Pass
11n-HT20	1	6.5	64	5320	16.54	16.93	≤ 23.98	Pass
11n-HT20	1	6.5	100	5500	17.99	17.76	≤ 23.98	Pass
11n-HT20	1	6.5	120	5600	16.59	16.44	≤ 23.98	Pass
11n-HT20	1	6.5	140	5700	14.71	16.61	≤ 23.98	Pass
11n-HT40	1	13.5	54	5270	16.66	17.38	≤ 23.98	Pass
11n-HT40	1	13.5	62	5310	12.96	14.37	≤ 23.98	Pass
11n-HT40	1	13.5	102	5510	16.64	16.40	≤ 23.98	Pass
11n-HT40	1	13.5	118	5590	15.20	15.36	≤ 23.98	Pass
11n-HT40	1	13.5	134	5670	14.77	15.12	≤ 23.98	Pass
11ac-VHT20	1	6.5	52	5260	18.29	18.63	≤ 23.98	Pass
11ac-VHT20	1	6.5	60	5300	18.36	18.51	≤ 23.98	Pass
11ac-VHT20	1	6.5	64	5320	16.54	16.93	≤ 23.98	Pass
11ac-VHT20	1	6.5	100	5500	18.06	17.81	≤ 23.98	Pass
11ac-VHT20	1	6.5	120	5600	16.56	16.43	≤ 23.98	Pass
11ac-VHT20	1	6.5	140	5700	14.64	16.61	≤ 23.98	Pass
11ac-VHT20	1	6.5	144	5720	16.74	16.96	≤ 23.98	Pass
11ac-VHT40	1	13.5	54	5270	17.00	17.70	≤ 23.98	Pass
11ac-VHT40	1	13.5	62	5310	12.86	14.43	≤ 23.98	Pass
11ac-VHT40	1	13.5	102	5510	17.32	16.30	≤ 23.98	Pass
11ac-VHT40	1	13.5	118	5590	15.59	15.70	≤ 23.98	Pass
11ac-VHT40	1	13.5	134	5670	15.16	15.51	≤ 23.98	Pass
11ac-VHT40	1	13.5	142	5710	15.43	15.86	≤ 23.98	Pass
11ac-VHT80	1	29.3	58	5290	16.24	16.85	≤ 23.98	Pass

11ac-VHT80	1	29.3	106	5530	16.22	15.69	≤ 23.98	Pass
11ac-VHT80	1	29.3	122	5610	14.41	14.39	≤ 23.98	Pass
11ac-VHT80	1	29.3	138	5690	14.65	15.14	≤ 23.98	Pass

Note: The TPC Power (dBm) = Max TPC Power (dBm) + Antenna Gain.

2Tx

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 TPC Power (dBm)	Ant 1 TPC Power (dBm)	Total TPC Power (dBm)	Limit (dBm)	Result
11n-HT20	2	13	52	5260	9.64	8.80	19.25	≤ 23.98	Pass
11n-HT20	2	13	60	5300	9.71	8.57	19.19	≤ 23.98	Pass
11n-HT20	2	13	64	5320	9.11	8.20	18.69	≤ 23.98	Pass
11n-HT20	2	13	100	5500	9.53	9.12	19.34	≤ 23.98	Pass
11n-HT20	2	13	120	5600	9.98	9.76	19.88	≤ 23.98	Pass
11n-HT20	2	13	140	5700	8.97	8.82	18.91	≤ 23.98	Pass
11n-HT40	2	27	54	5270	9.74	10.04	19.90	≤ 23.98	Pass
11n-HT40	2	27	62	5310	5.88	6.13	16.02	≤ 23.98	Pass
11n-HT40	2	27	102	5510	8.39	8.49	18.45	≤ 23.98	Pass
11n-HT40	2	27	118	5590	10.00	9.79	19.91	≤ 23.98	Pass
11n-HT40	2	27	134	5670	9.82	9.65	19.75	≤ 23.98	Pass
11ac-VHT20	2	13	52	5260	9.09	9.25	19.18	≤ 23.98	Pass
11ac-VHT20	2	13	60	5300	9.18	9.24	19.22	≤ 23.98	Pass
11ac-VHT20	2	13	64	5320	7.58	7.86	17.73	≤ 23.98	Pass
11ac-VHT20	2	13	100	5500	8.75	6.60	17.82	≤ 23.98	Pass
11ac-VHT20	2	13	120	5600	9.49	8.77	19.16	≤ 23.98	Pass
11ac-VHT20	2	13	140	5700	7.90	8.44	18.19	≤ 23.98	Pass
11ac-VHT20	2	13	144	5720	8.82	9.53	19.20	≤ 23.98	Pass
11ac-VHT40	2	27	54	5270	9.56	9.75	19.67	≤ 23.98	Pass
11ac-VHT40	2	27	62	5310	4.95	4.12	14.57	≤ 23.98	Pass
11ac-VHT40	2	27	102	5510	6.44	7.52	17.02	≤ 23.98	Pass
11ac-VHT40	2	27	118	5590	8.88	8.57	18.74	≤ 23.98	Pass
11ac-VHT40	2	27	134	5670	9.02	9.78	19.43	≤ 23.98	Pass
11ac-VHT40	2	27	142	5710	9.01	9.58	19.31	≤ 23.98	Pass
11ac-VHT80	2	58.6	58	5290	4.35	4.73	14.55	≤ 23.98	Pass
11ac-VHT80	2	58.6	106	5530	7.57	8.90	18.30	≤ 23.98	Pass
11ac-VHT80	2	58.6	122	5610	9.38	9.42	19.41	≤ 23.98	Pass
11ac-VHT80	2	58.6	138	5690	8.81	9.31	19.08	≤ 23.98	Pass

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

7.6. Power Spectral Density Measurement

7.6.1. Test Limit

For mobile and portable 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 provided the maximum antenna gain does not exceed 6 dBi.

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.

Frequency Band (GHz)	Power Spectral Density Limit
5.15-5.25	11 dBm/MHz – (7dBi – 6dBi) = 10 dBm/MHz
5.25-5.35	11 dBm/MHz – (7dBi – 6dBi) = 10 dBm/MHz
5.47-5.725	11 dBm/MHz – (7dBi – 6dBi) = 10 dBm/MHz
5.725-5.85	30 dBm/500kHz - (10dBi – 6dBi) = 26 dBm/500kHz

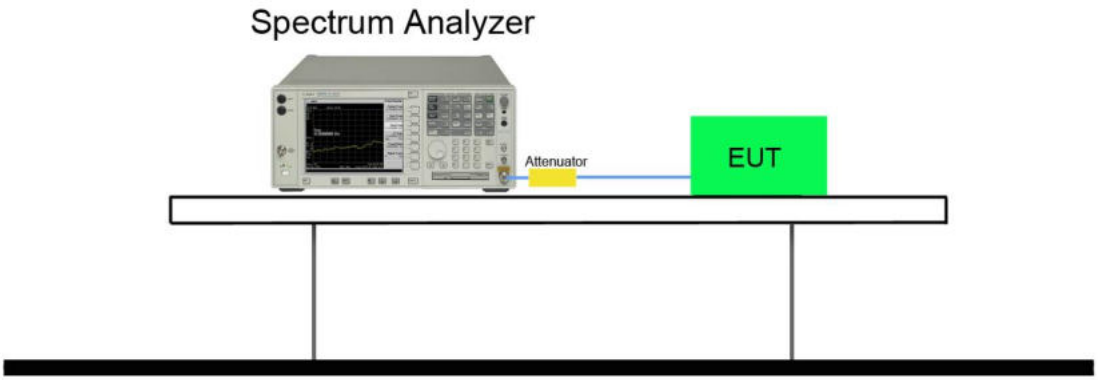
7.6.2. Test Procedure Used

KDB 789033 D02v01 - Section F

7.6.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100 kHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (RMS)
7. Sweep time = auto
8. Trigger = free run
9. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
10. 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.
11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor 10*log(500kHz/100kHz) = 7 dB to the measured result

7.6.4. Test Setup



7.6.5. Test Result

1Tx (U-NII-1 & U-NII-2A & U-NII-2C)

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Max PSD (dBm/ MHz)	Limit (dBm /MHz)	Result
11a	1	6	36	5180	7.10	7.95	96.9	8.09	≤ 10	Pass
11a	1	6	44	5220	9.22	8.25	96.9	9.36	≤ 10	Pass
11a	1	6	48	5240	9.23	9.02	96.9	9.37	≤ 10	Pass
11a	1	6	52	5260	9.29	9.51	96.9	9.65	≤ 10	Pass
11a	1	6	60	5300	9.46	9.12	96.9	9.60	≤ 10	Pass
11a	1	6	64	5320	9.49	9.08	96.9	9.63	≤ 10	Pass
11a	1	6	100	5500	9.44	9.11	96.9	9.58	≤ 10	Pass
11a	1	6	120	5600	9.07	8.38	96.9	9.21	≤ 10	Pass
11a	1	6	140	5700	8.94	8.53	96.9	9.08	≤ 10	Pass
11n-HT20	1	6.5	36	5180	8.11	7.36	94.4	8.36	≤ 10	Pass
11n-HT20	1	6.5	44	5220	9.08	8.46	94.4	9.33	≤ 10	Pass
11n-HT20	1	6.5	48	5240	8.96	8.71	94.4	9.21	≤ 10	Pass
11n-HT20	1	6.5	52	5260	9.19	9.03	94.4	9.44	≤ 10	Pass
11n-HT20	1	6.5	60	5300	9.36	9.02	94.4	9.61	≤ 10	Pass
11n-HT20	1	6.5	64	5320	9.39	8.64	94.4	9.64	≤ 10	Pass
11n-HT20	1	6.5	100	5500	9.25	9.47	94.4	9.72	≤ 10	Pass
11n-HT20	1	6.5	120	5600	9.05	8.21	94.4	9.30	≤ 10	Pass
11n-HT20	1	6.5	140	5700	9.00	8.01	94.4	9.25	≤ 10	Pass
11n-HT40	1	13.5	38	5190	1.65	-0.31	85.8	2.32	≤ 10	Pass
11n-HT40	1	13.5	46	5230	5.20	5.73	85.8	6.40	≤ 10	Pass
11n-HT40	1	13.5	54	5270	5.06	6.25	85.8	6.92	≤ 10	Pass
11n-HT40	1	13.5	62	5310	1.89	3.79	85.8	4.46	≤ 10	Pass
11n-HT40	1	13.5	102	5510	5.44	5.43	85.8	6.11	≤ 10	Pass
11n-HT40	1	13.5	118	5590	4.55	3.76	85.8	5.22	≤ 10	Pass
11n-HT40	1	13.5	134	5670	3.28	4.09	85.8	4.76	≤ 10	Pass
11ac-VHT20	1	6.5	36	5180	6.24	7.69	95.0	7.91	≤ 10	Pass
11ac-VHT20	1	6.5	44	5220	8.79	9.45	95.0	9.67	≤ 10	Pass
11ac-VHT20	1	6.5	48	5240	8.92	9.14	95.0	9.36	≤ 10	Pass
11ac-VHT20	1	6.5	52	5260	9.03	9.37	95.0	9.59	≤ 10	Pass
11ac-VHT20	1	6.5	60	5300	9.27	9.30	95.0	9.52	≤ 10	Pass

11ac-VHT20	1	6.5	64	5320	9.36	8.37	95.0	9.58	≤ 10	Pass
11ac-VHT20	1	6.5	100	5500	9.09	8.97	95.0	9.31	≤ 10	Pass
11ac-VHT20	1	6.5	120	5600	8.21	7.42	95.0	8.43	≤ 10	Pass
11ac-VHT20	1	6.5	140	5700	6.60	8.51	95.0	8.73	≤ 10	Pass
11ac-VHT20	1	6.5	144	5720	8.33	8.79	95.0	9.01	≤ 10	Pass
11ac-VHT40	1	13.5	38	5190	1.46	2.80	93.5	3.09	≤ 10	Pass
11ac-VHT40	1	13.5	46	5230	5.17	6.05	93.5	6.34	≤ 10	Pass
11ac-VHT40	1	13.5	54	5270	5.15	6.04	93.5	6.33	≤ 10	Pass
11ac-VHT40	1	13.5	62	5310	1.77	2.93	93.5	3.22	≤ 10	Pass
11ac-VHT40	1	13.5	102	5510	6.49	4.78	93.5	6.78	≤ 10	Pass
11ac-VHT40	1	13.5	118	5590	4.96	3.10	93.5	5.25	≤ 10	Pass
11ac-VHT40	1	13.5	134	5670	4.20	4.17	93.5	4.49	≤ 10	Pass
11ac-VHT40	1	13.5	142	5710	3.86	4.50	93.5	4.79	≤ 10	Pass
11ac-VHT80	1	29.3	42	5210	1.88	1.82	80.0	2.85	≤ 10	Pass
11ac-VHT80	1	29.3	58	5290	1.55	1.63	80.0	2.60	≤ 10	Pass
11ac-VHT80	1	29.3	106	5530	2.11	0.68	80.0	3.08	≤ 10	Pass
11ac-VHT80	1	29.3	122	5610	0.17	1.02	80.0	1.99	≤ 10	Pass
11ac-VHT80	1	29.3	138	5690	0.19	0.82	80.0	1.79	≤ 10	Pass

Note: When EUT duty cycle < 98%, the Max PSD = $10*\log\{10^{(\text{Max PSD}/10)}\} + 10*\log(1/\text{duty cycle})$.

2Tx (U-NII-1 & U-NII-2A & U-NII-2C)

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	Limit (dBm /MHz)	Result
11n-HT20	2	13	36	5180	6.48	6.92	94.4	9.96	≤ 10	Pass
11n-HT20	2	13	44	5220	6.28	6.07	94.4	9.44	≤ 10	Pass
11n-HT20	2	13	48	5240	6.29	6.09	94.4	9.45	≤ 10	Pass
11n-HT20	2	13	52	5260	5.36	7.18	94.4	9.63	≤ 10	Pass
11n-HT20	2	13	60	5300	5.94	7.09	94.4	9.81	≤ 10	Pass
11n-HT20	2	13	64	5320	6.69	6.69	94.4	9.95	≤ 10	Pass
11n-HT20	2	13	100	5500	5.53	6.41	94.4	9.25	≤ 10	Pass
11n-HT20	2	13	120	5600	6.67	6.45	94.4	9.82	≤ 10	Pass
11n-HT20	2	13	140	5700	5.79	6.45	94.4	9.39	≤ 10	Pass
11n-HT40	2	27	38	5190	5.02	4.81	85.8	8.59	≤ 10	Pass
11n-HT40	2	27	46	5230	5.11	5.34	85.8	8.90	≤ 10	Pass
11n-HT40	2	27	54	5270	5.41	5.48	85.8	9.12	≤ 10	Pass
11n-HT40	2	27	62	5310	5.28	5.49	85.8	9.06	≤ 10	Pass
11n-HT40	2	27	102	5510	5.62	5.50	85.8	9.24	≤ 10	Pass
11n-HT40	2	27	118	5590	4.38	4.74	85.8	8.24	≤ 10	Pass
11n-HT40	2	27	134	5670	3.95	5.28	85.8	8.34	≤ 10	Pass
11ac-VHT20	2	13	36	5180	6.90	6.48	95.0	9.93	≤ 10	Pass
11ac-VHT20	2	13	44	5220	6.74	6.25	95.0	9.73	≤ 10	Pass
11ac-VHT20	2	13	48	5240	5.38	6.25	95.0	9.07	≤ 10	Pass
11ac-VHT20	2	13	52	5260	5.82	6.77	95.0	9.55	≤ 10	Pass
11ac-VHT20	2	13	60	5300	6.12	6.81	95.0	9.71	≤ 10	Pass
11ac-VHT20	2	13	64	5320	5.86	6.75	95.0	9.56	≤ 10	Pass
11ac-VHT20	2	13	100	5500	7.40	5.73	95.0	9.88	≤ 10	Pass
11ac-VHT20	2	13	120	5600	5.74	6.52	95.0	9.38	≤ 10	Pass
11ac-VHT20	2	13	140	5700	5.37	7.10	95.0	9.55	≤ 10	Pass
11ac-VHT20	2	13	144	5720	5.49	7.08	95.0	9.59	≤ 10	Pass
11ac-VHT40	2	27	38	5190	5.08	4.71	93.5	8.20	≤ 10	Pass
11ac-VHT40	2	27	46	5230	5.29	5.06	93.5	8.48	≤ 10	Pass
11ac-VHT40	2	27	54	5270	5.54	5.34	93.5	8.74	≤ 10	Pass
11ac-VHT40	2	27	62	5310	5.45	5.53	93.5	8.79	≤ 10	Pass
11ac-VHT40	2	27	102	5510	5.97	5.52	93.5	9.05	≤ 10	Pass
11ac-VHT40	2	27	118	5590	4.64	4.24	93.5	7.75	≤ 10	Pass

11ac-VHT40	2	27	134	5670	4.56	5.20	93.5	8.19	≤ 10	Pass
11ac-VHT40	2	27	142	5710	4.34	5.02	93.5	8.00	≤ 10	Pass
11ac-VHT80	2	58.6	42	5210	1.89	2.00	80.0	5.92	≤ 10	Pass
11ac-VHT80	2	58.6	58	5290	1.49	2.29	80.0	5.89	≤ 10	Pass
11ac-VHT80	2	58.6	106	5530	2.89	2.09	80.0	6.49	≤ 10	Pass
11ac-VHT80	2	58.6	122	5610	0.98	1.06	80.0	5.00	≤ 10	Pass
11ac-VHT80	2	58.6	138	5690	0.98	1.72	80.0	5.35	≤ 10	Pass

Note: When EUT duty cycle < 98%, the total PSD = $10*\log\{10^{(\text{Ant 0 PSD}/10)}+10^{(\text{Ant 1 PSD}/10)}\} + 10*\log(1/\text{duty cycle})$.

1Tx (U-NII-3)

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ 100kHz)	Ant 1 PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor	Max PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
11a	1	6	149	5745	-0.01	0.05	96.9	7	7.19	≤ 26	Pass
11a	1	6	157	5785	0.31	-0.14	96.9	7	7.45	≤ 26	Pass
11a	1	6	165	5825	-0.39	-0.47	96.9	7	6.75	≤ 26	Pass
11n-HT20	1	6.5	149	5745	-0.61	-0.41	94.4	7	6.84	≤ 26	Pass
11n-HT20	1	6.5	157	5785	-0.29	-0.48	94.4	7	6.96	≤ 26	Pass
11n-HT20	1	6.5	165	5825	-1.05	-0.17	94.4	7	7.08	≤ 26	Pass
11n-HT40	1	13.5	151	5755	-4.66	-4.59	85.8	7	3.08	≤ 26	Pass
11n-HT40	1	13.5	159	5795	-3.97	-3.90	85.8	7	3.77	≤ 26	Pass
11ac-VHT20	1	6.5	149	5745	-0.44	-0.38	95.0	7	6.84	≤ 26	Pass
11ac-VHT20	1	6.5	157	5785	-0.26	-0.19	95.0	7	7.03	≤ 26	Pass
11ac-VHT20	1	6.5	165	5825	-1.09	-0.90	95.0	7	6.32	≤ 26	Pass
11ac-VHT40	1	13.5	151	5755	-4.78	-4.56	93.5	7	2.73	≤ 26	Pass
11ac-VHT40	1	13.5	159	5795	-3.39	-3.49	93.5	7	3.90	≤ 26	Pass
11ac-VHT80	1	29.3	155	5775	-7.17	-7.39	80.0	7	0.80	≤ 26	Pass

Note: When EUT duty cycle < 98%, the Max PSD = Max PSD + 10*log(1/duty cycle) + Constant Factor.

2Tx (U-NII-3)

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ 100kHz)	Ant 1 PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
11n-HT20	2	13	149	5745	-0.52	-0.21	94.4	7	9.90	≤ 26	Pass
11n-HT20	2	13	157	5785	-0.43	-0.59	94.4	7	9.75	≤ 26	Pass
11n-HT20	2	13	165	5825	-0.70	-0.78	94.4	7	9.52	≤ 26	Pass
11n-HT40	2	27	151	5755	-4.45	-4.74	85.8	7	6.08	≤ 26	Pass
11n-HT40	2	27	159	5795	-3.65	-3.55	85.8	7	7.08	≤ 26	Pass
11ac-VHT20	2	13	149	5745	-0.35	0.06	95.0	7	10.09	≤ 26	Pass
11ac-VHT20	2	13	157	5785	-0.53	-0.30	95.0	7	9.82	≤ 26	Pass
11ac-VHT20	2	13	165	5825	-0.70	-0.72	95.0	7	9.52	≤ 26	Pass
11ac-VHT40	2	27	151	5755	-4.45	-4.07	93.5	7	6.05	≤ 26	Pass
11ac-VHT40	2	27	159	5795	-4.81	-4.17	93.5	7	5.82	≤ 26	Pass
11ac-VHT80	2	58.6	155	5775	-7.42	-7.05	80.0	7	3.75	≤ 26	Pass

Note: When EUT duty cycle < 98%, the Max PSD = $10*\log\{10^{(\text{Ant0 PSD}/10)} + 10^{(\text{Ant1 PSD}/10)}\} + 10*\log(1/\text{duty cycle}) +$ Constant Factor.