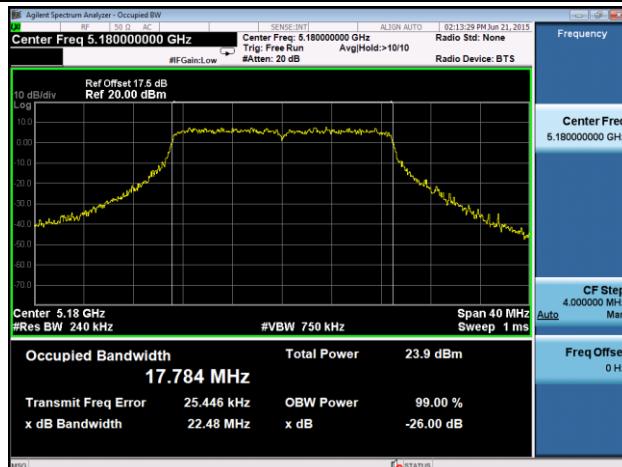
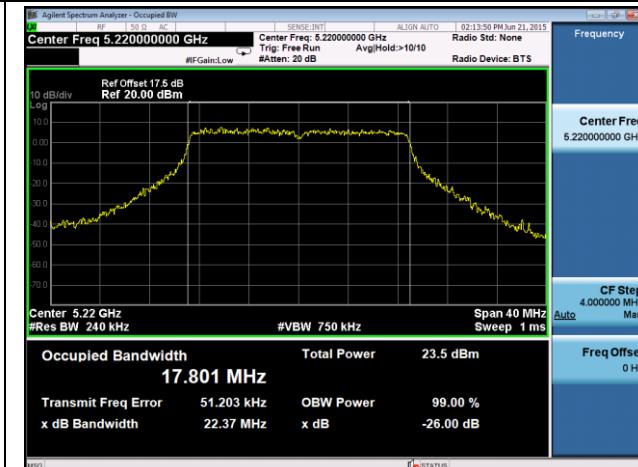


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 2

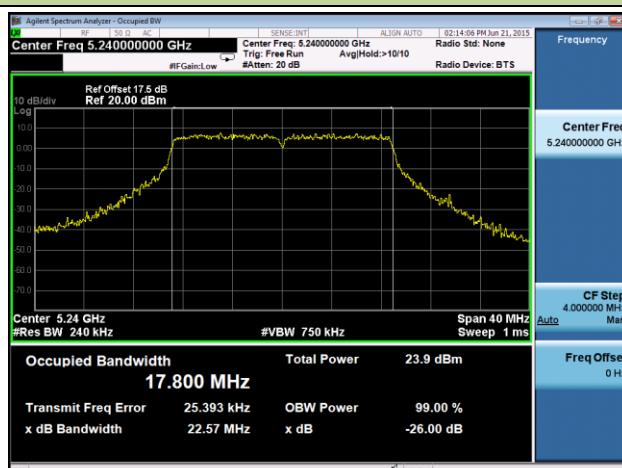
Channel 36 (5180MHz)



Channel 44 (5220MHz)



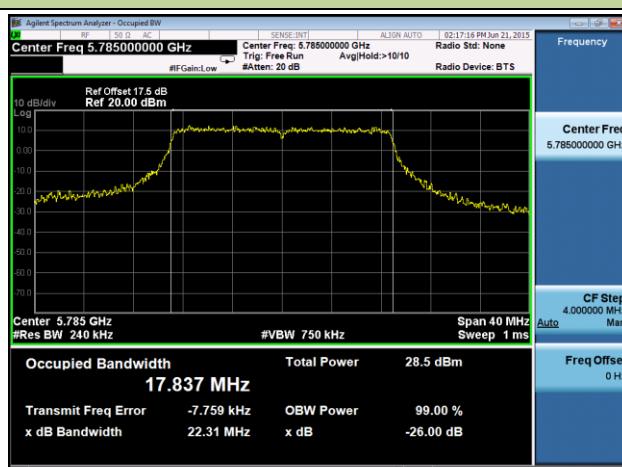
Channel 48 (5240MHz)



Channel 149 (5745MHz)



Channel 157 (5785MHz)



Channel 165 (5825MHz)

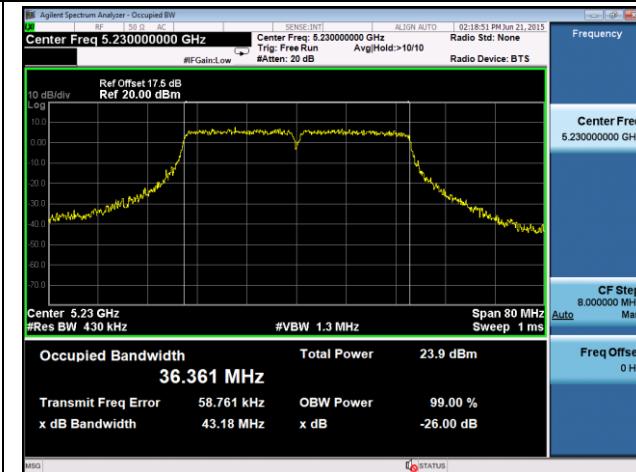


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 2

Channel 38 (5190MHz)



Channel 46 (5230MHz)

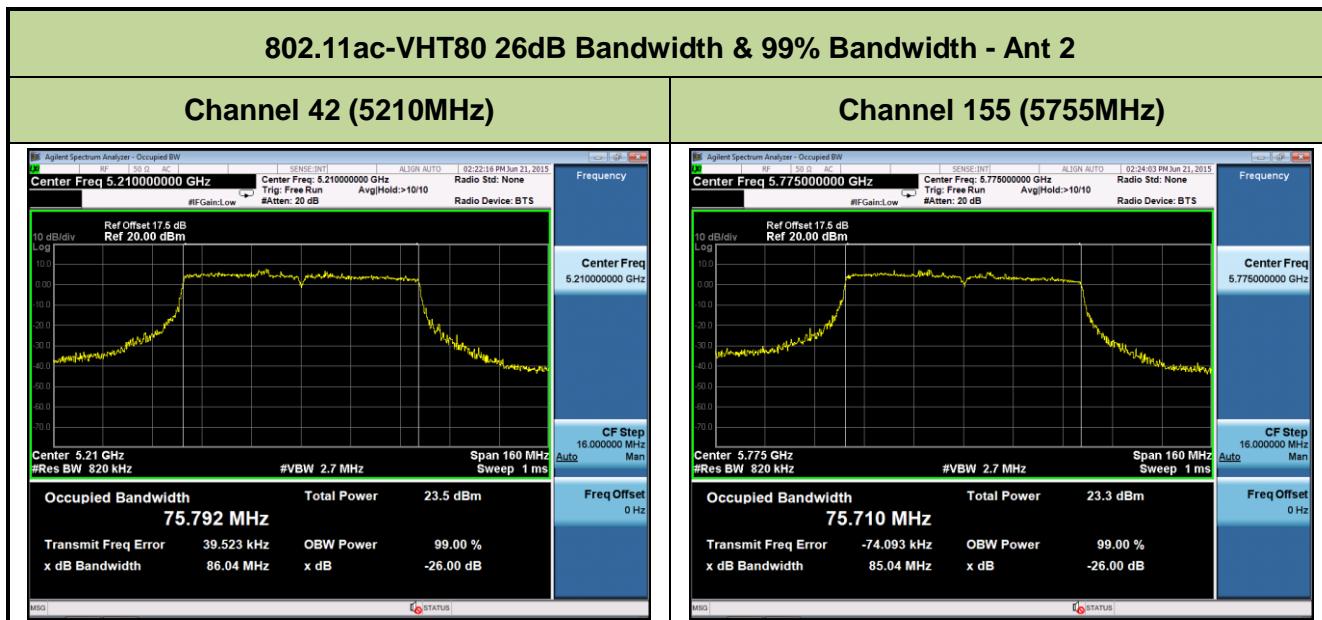


Channel 151 (5755MHz)



Channel 159 (5795MHz)





7.3. 6dB Bandwidth Measurement

7.3.1. Test Limit

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

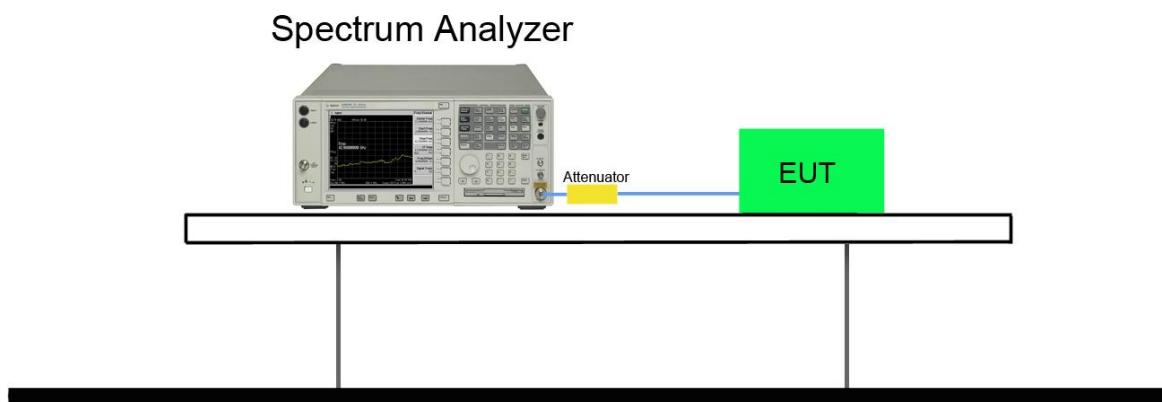
7.3.2. Test Procedure used

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 $\geq 3 \times$ 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



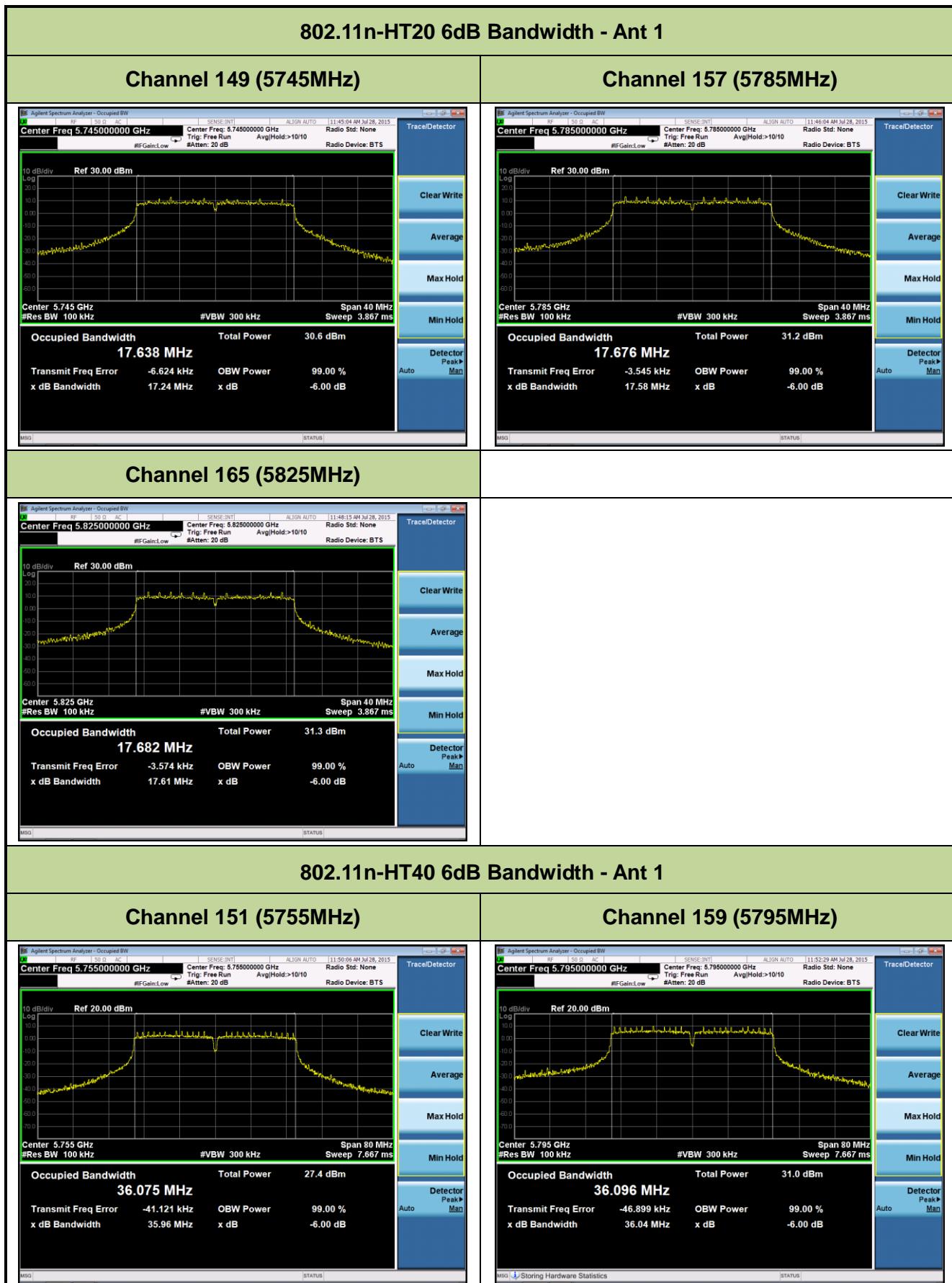
7.3.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Ant 1						
802.11a	6	149	5745	16.39	≥ 0.5	Pass
802.11a	6	157	5785	16.35	≥ 0.5	Pass
802.11a	6	165	5825	16.38	≥ 0.5	Pass
802.11n-HT20	6.5	149	5745	17.24	≥ 0.5	Pass
802.11n-HT20	6.5	157	5785	17.58	≥ 0.5	Pass
802.11n-HT20	6.5	165	5825	17.61	≥ 0.5	Pass
802.11n-HT40	13.5	151	5755	35.96	≥ 0.5	Pass
802.11n-HT40	13.5	159	5795	36.04	≥ 0.5	Pass
802.11ac-VHT20	6.5	149	5745	17.63	≥ 0.5	Pass
802.11ac-VHT20	6.5	157	5785	17.60	≥ 0.5	Pass
802.11ac-VHT20	6.5	165	5825	17.59	≥ 0.5	Pass
802.11ac-VHT40	13.5	151	5755	36.08	≥ 0.5	Pass
802.11ac-VHT40	13.5	159	5795	35.87	≥ 0.5	Pass
802.11ac-VHT80	29.3	155	5775	74.79	≥ 0.5	Pass
Ant 2						
802.11a	6	149	5745	16.39	≥ 0.5	Pass
802.11a	6	157	5785	16.36	≥ 0.5	Pass
802.11a	6	165	5825	16.40	≥ 0.5	Pass
802.11n-HT20	6.5	149	5745	17.54	≥ 0.5	Pass
802.11n-HT20	6.5	157	5785	17.61	≥ 0.5	Pass
802.11n-HT20	6.5	165	5825	17.60	≥ 0.5	Pass
802.11n-HT40	13.5	151	5755	35.59	≥ 0.5	Pass
802.11n-HT40	13.5	159	5795	35.83	≥ 0.5	Pass
802.11ac-VHT20	6.5	149	5745	17.53	≥ 0.5	Pass
802.11ac-VHT20	6.5	157	5785	17.59	≥ 0.5	Pass
802.11ac-VHT20	6.5	165	5825	17.34	≥ 0.5	Pass
802.11ac-VHT40	13.5	151	5755	36.11	≥ 0.5	Pass
802.11ac-VHT40	13.5	159	5795	35.93	≥ 0.5	Pass
802.11ac-VHT80	29.3	155	5775	75.68	≥ 0.5	Pass

802.11a 6dB Bandwidth - Ant 1
Channel 149 (5745MHz)

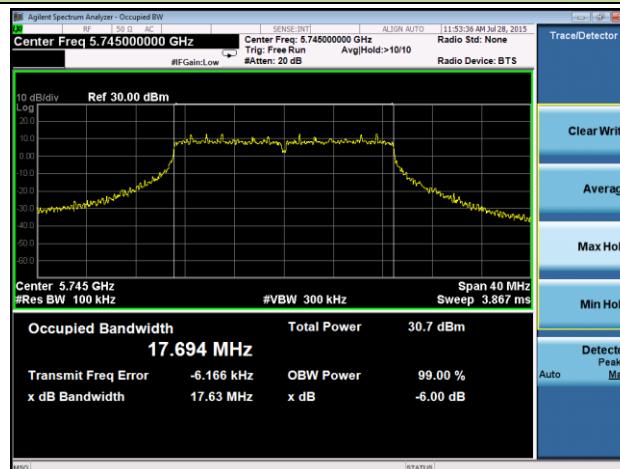
Channel 157 (5785MHz)

Channel 165 (5825MHz)

802.11ac-VHT20 6dB Bandwidth - Ant 1

Channel 149 (5745MHz)



Channel 157 (5785MHz)

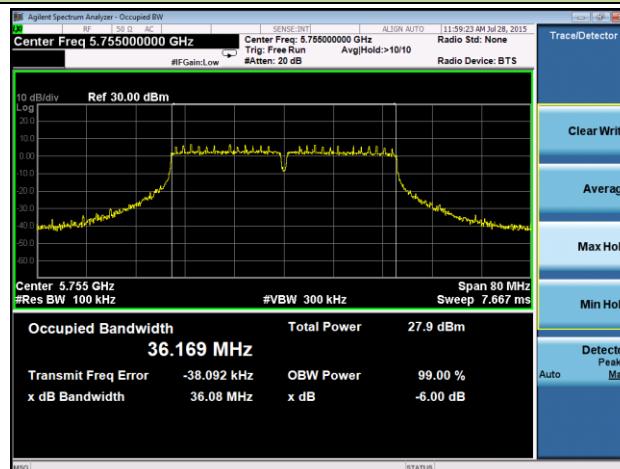


Channel 165 (5825MHz)

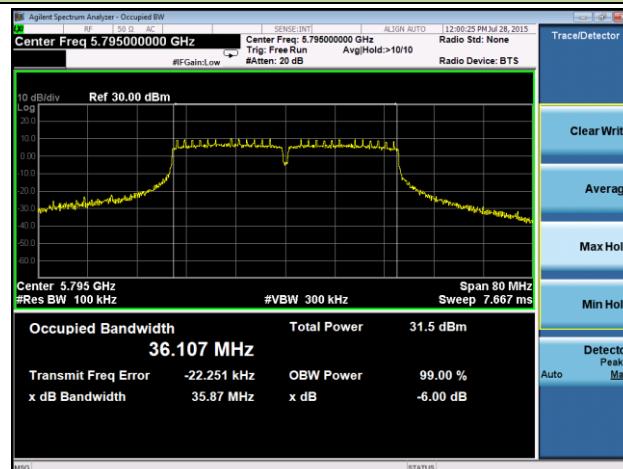


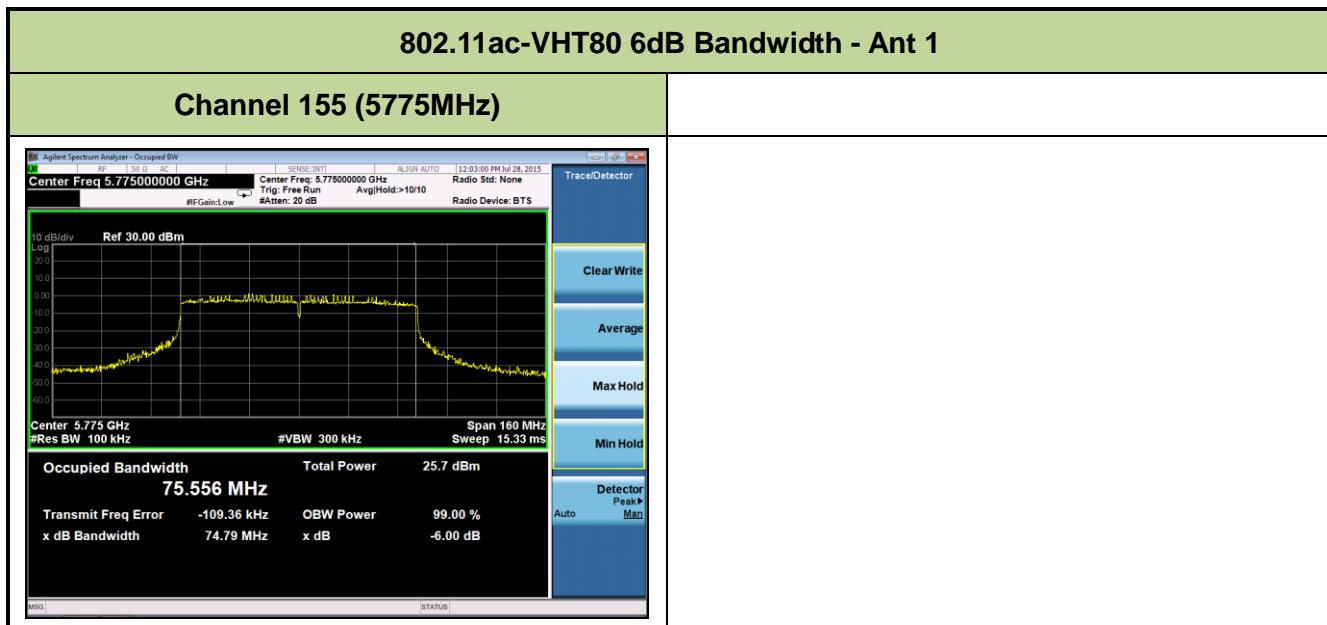
802.11ac-VHT40 6dB Bandwidth - Ant 1

Channel 151 (5755MHz)



Channel 159 (5795MHz)



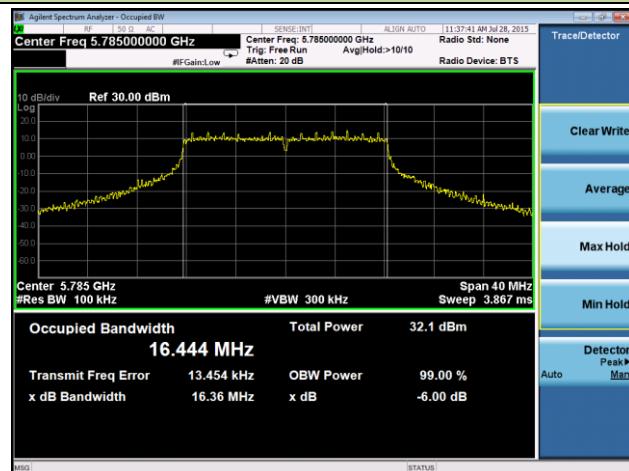


802.11a 6dB Bandwidth - Ant 2

Channel 149 (5745MHz)



Channel 157 (5785MHz)



Channel 165 (5825MHz)



802.11n-HT20 6dB Bandwidth - Ant 2

Channel 149 (5745MHz)



Channel 157 (5785MHz)



Channel 165 (5825MHz)

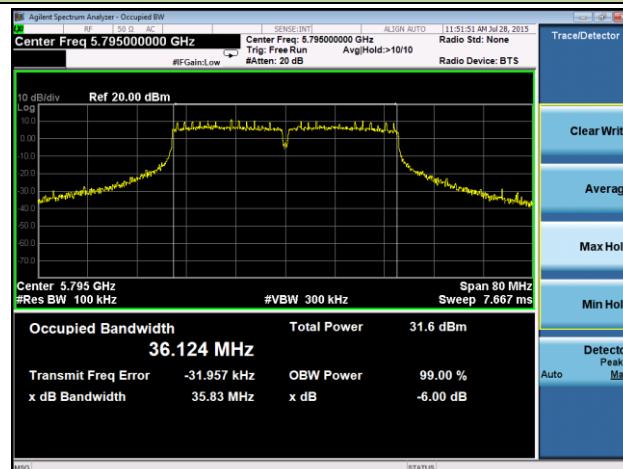


802.11n-HT40 6dB Bandwidth - Ant 2

Channel 151 (5755MHz)



Channel 159 (5795MHz)



802.11ac-VHT20 6dB Bandwidth - Ant 2

Channel 149 (5745MHz)



Channel 157 (5785MHz)

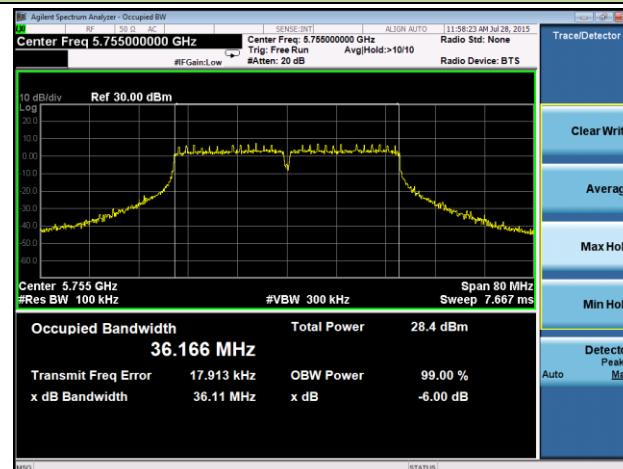


Channel 165 (5825MHz)

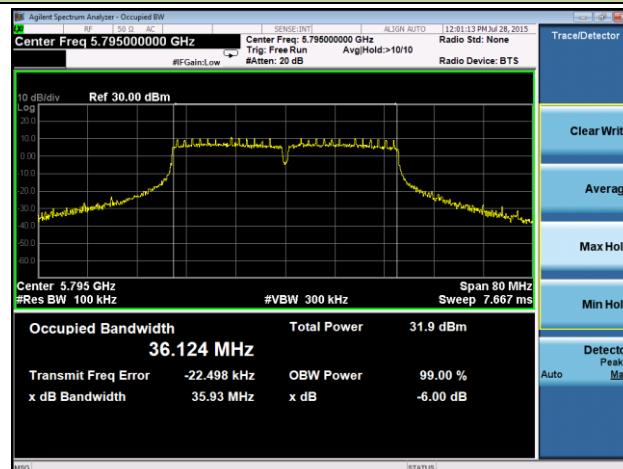


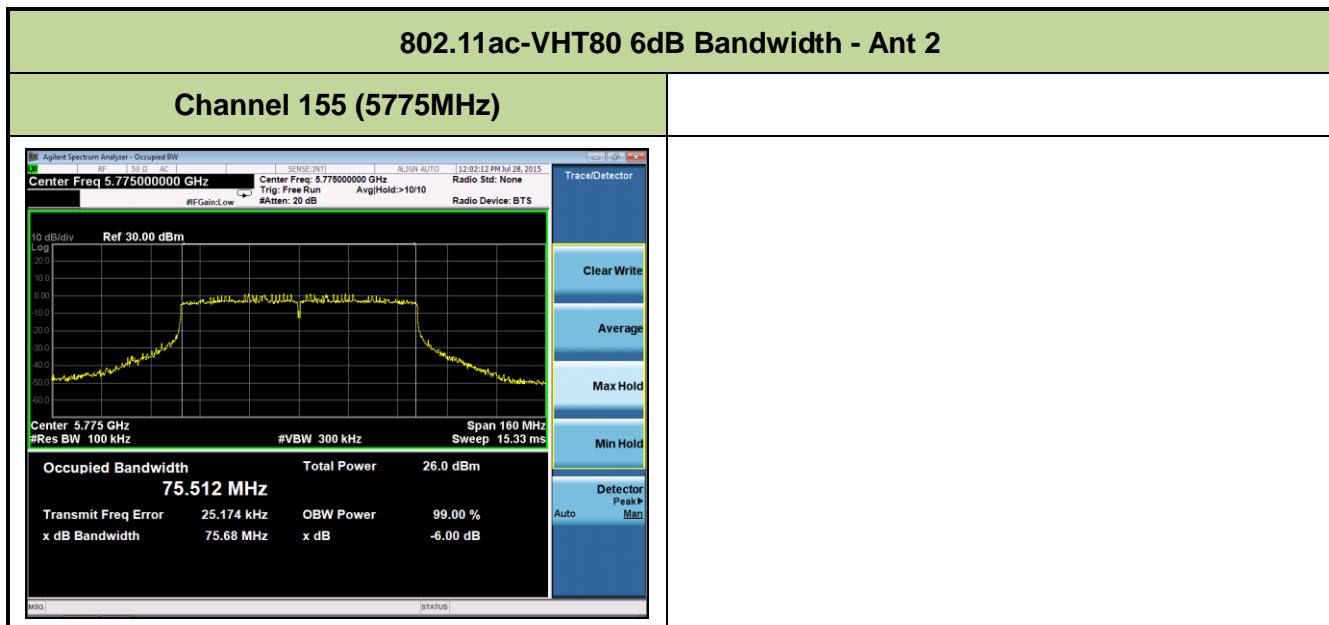
802.11ac-VHT40 6dB Bandwidth - Ant 2

Channel 151 (5755MHz)



Channel 159 (5795MHz)





7.4. Operation Frequency Range of 26dBc Bandwidth Measurement

7.4.1. Test Limit

For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. However, any unwanted emissions that fall into the band 5250-5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz.

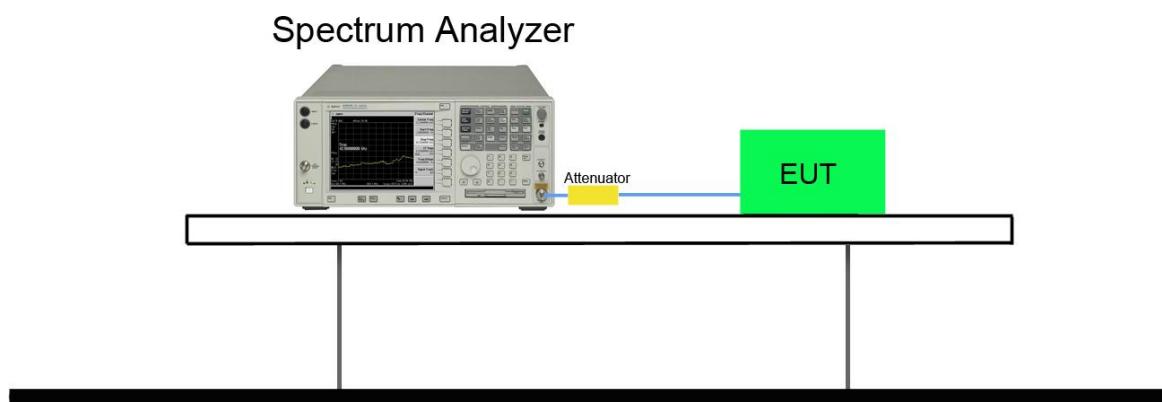
7.4.2. Test Procedure used

N/A

7.4.3. Test Setting

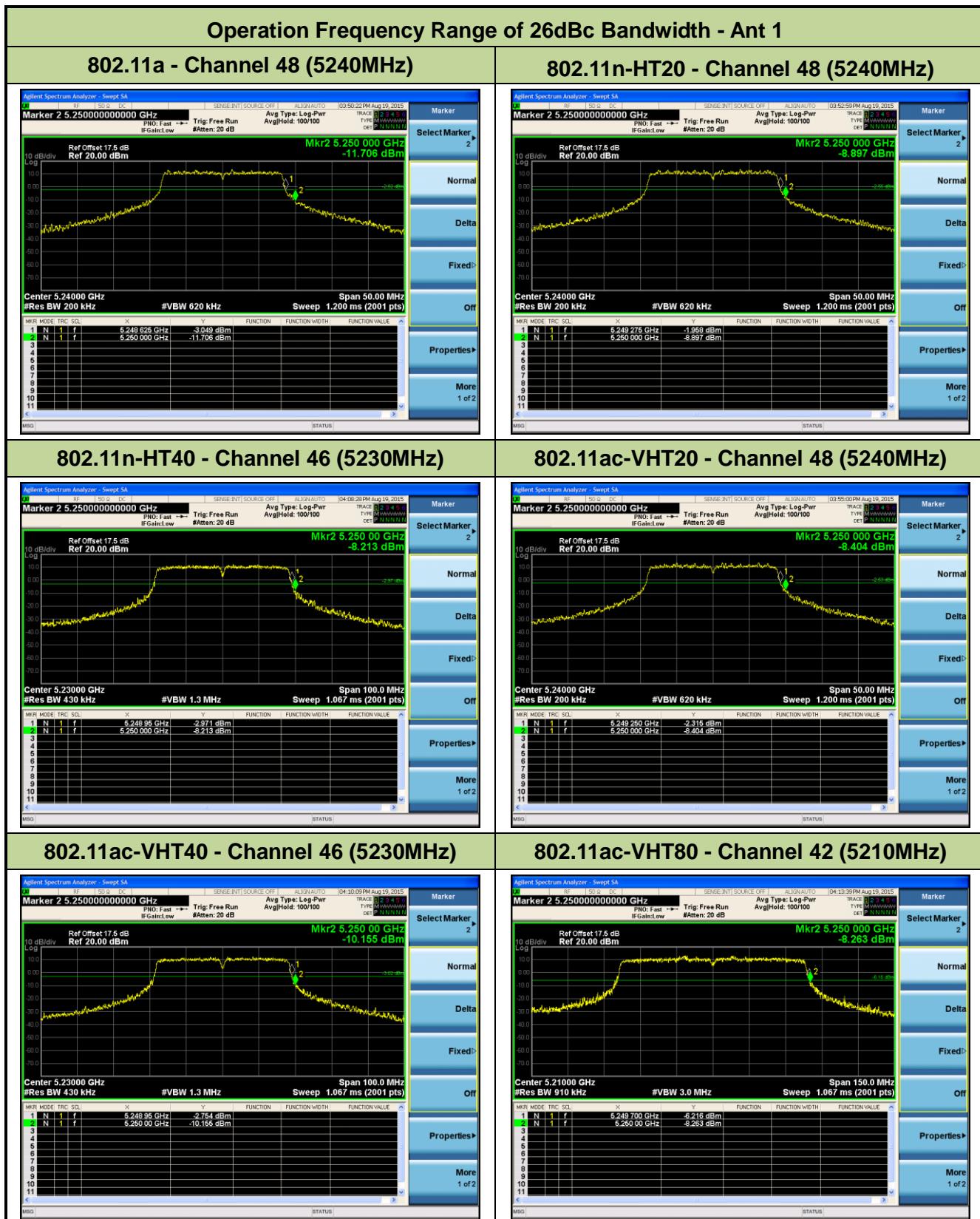
1. Set center frequency to the nominal EUT channel center frequency.
2. Span = 1.5 times to 5.0 times the OBW.
3. RBW = 1 % to 5 % of the OBW.
4. VBW $\geq 3 \times$ RBW.
5. Detector = Peak.
6. Trace mode = max hold.
7. Allow the trace to stabilize and set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
8. Determine the “-26 dB down amplitude” using [(reference value) – 26].
9. Using the marker function of the instrument to show 5250MHz frequency level.

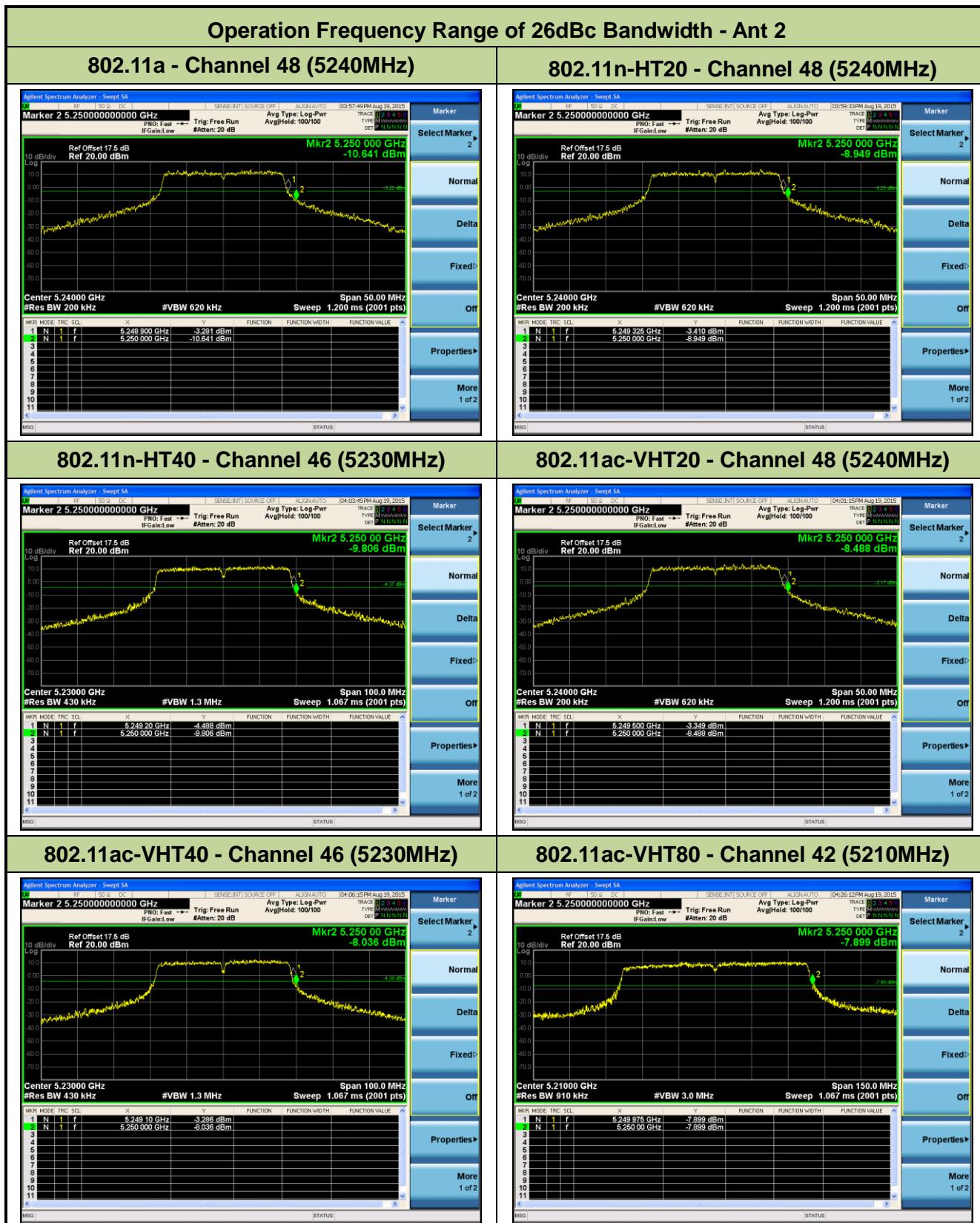
7.4.4. Test Setup



7.4.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Result
Ant 1				
802.11a	6	48	5240	Pass
802.11n-HT20	6.5	48	5240	Pass
802.11n-HT40	13.5	46	5230	Pass
802.11ac-VHT20	6.5	48	5240	Pass
802.11ac-VHT40	13.5	46	5230	Pass
802.11ac-VHT80	29.3	42	5210	Pass
Ant 2				
802.11a	6	48	5240	Pass
802.11n-HT20	6.5	48	5240	Pass
802.11n-HT40	13.5	46	5230	Pass
802.11ac-VHT20	6.5	48	5240	Pass
802.11ac-VHT40	13.5	46	5230	Pass
802.11ac-VHT80	29.3	42	5210	Pass





7.5. Output Power Measurement

7.5.1. Test Limit

For FCC

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

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.

For IC

For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW (23.01dBm) or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

For the 5.725-5.85 GHz band, the maximum conducted output power shall not exceed 1 W.

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.

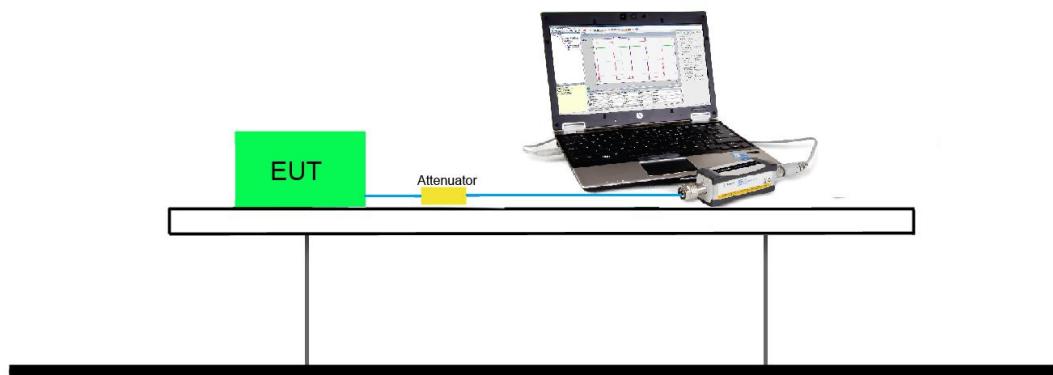
7.5.2. Test Procedure Used

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

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}	802.11a	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	27.0	30.0
1	12	2	19.5	21.7	40.5	45.0
1	18	3	26.0	28.9	54.0	60.0
1	24	4	39.0	43.3	81.0	90.0
1	36	5	52.0	57.8	108.0	120.0
1	48	6	58.5	65.0	121.5	135.0
1	54	7	65.0	72.2	135.0	150.0

N _{Tx}	802.11a	MCS Index for 802.11n	Data Rate (Mbps)			
			20MHz Bandwidth		40MHz Bandwidth	
			800ns GI	400ns GI	800ns GI	400ns GI
2	6	8	13.0	14.4	27.0	30.0
2	9	9	26.0	28.9	54.0	60.0
2	12	10	39.0	43.3	81.0	90.0
2	18	11	52.0	57.8	108.0	120.0
2	24	12	78.0	86.7	162.0	180.0
2	36	13	104.0	115.6	216.0	240.0
2	48	14	117.0	130.0	243.0	270.0
2	54	15	130.0	144.0	270.0	300.0

N _{Tx}	MCS Index for 802.11ac	Data Rate (Mbps)					
		20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
		800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI
1	0	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
1	2	19.5	21.7	40.5	45.0	87.8	97.5
1	3	26.0	28.9	54.0	60.0	117.0	130.0
1	4	39.0	43.3	81.0	90.0	175.5	195.0
1	5	52.0	57.8	108.0	120.0	234.0	260.0
1	6	58.5	65.0	121.5	135.0	263.3	292.5
1	7	65.0	72.2	135.0	150.0	292.5	325.0
1	8	78.0	86.7	162.0	180.0	351.0	390.0
1	9	--	--	180.0	200.0	390.0	433.3

N _{Tx}	MCS Index for 802.11ac	Data Rate (Mbps)					
		20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
		800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI
2	0	13.0	14.4	27.0	30.0	58.6	65.0
2	1	26.0	28.8	54.0	60.0	117.0	130.0
2	2	39.0	43.4	81.0	90.0	175.6	195.0
2	3	52.0	57.8	108.0	120.0	234.0	260.0
2	4	78.0	86.6	162.0	180.0	351.0	390.0
2	5	104.0	115.6	216.0	240.0	468.0	520.0
2	6	117.0	130.0	243.0	270.0	526.6	585.0
2	7	130.0	144.4	270.0	300.0	585.0	650.0
2	8	156.0	173.4	324.0	360.0	702.0	780.0
2	9	--	--	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 1:

Test Mode	Bandwidth	Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)
802.11a	20	60	5180	6	22.54
				24	22.32
				54	22.28
802.11n	20	60	5180	6.5	21.87
				7.2	21.67
				26	21.13
				28.9	21.04
				65	20.84
				72.2	20.56
802.11n	40	62	5190	13.5	19.08
				15	19.01
				54	18.65
				60	18.34
				135	18.02
				150	18.56
802.11ac	20	60	5180	6.5	21.48
				7.2	21.24
				39	21.01
				78	20.67
				81	20.43
				86.7	20.12
802.11ac	40	62	5190	13.5	19.03
				15	19.01
				108	18.89
				120	18.76
				180	18.34
				200	18.01
802.11ac	80	58	5210	29.3	18.98
				32.5	18.96
				260	18.76

				234	18.34
				390	18.04
				433.3	17.78

For FCC Bands (UNII-3) & IC Bands (UNII-1 & UNII-3)
1Tx

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	Max EIRP (dBm)	EIRP Limit (dBm)	Result
11a	6	36	5180	14.60	14.60	--	20.00	≤ 22.21	Pass
11a	6	44	5220	14.34	14.34	--	19.74	≤ 22.21	Pass
11a	6	48	5240	14.02	14.02	--	19.42	≤ 22.21	Pass
11a	6	149	5745	23.07	23.07	≤ 30.00	--	--	Pass
11a	6	157	5785	22.57	22.57	≤ 30.00	--	--	Pass
11a	6	165	5825	22.19	22.19	≤ 30.00	--	--	Pass
11n-HT20	6.5	36	5180	15.10	15.10	--	20.50	≤ 22.50	Pass
11n-HT20	6.5	44	5220	14.19	14.19	--	19.59	≤ 22.50	Pass
11n-HT20	6.5	48	5240	14.03	14.03	--	19.43	≤ 22.50	Pass
11n-HT20	6.5	149	5745	23.03	23.03	≤ 30.00	--	--	Pass
11n-HT20	6.5	157	5785	22.45	22.45	≤ 30.00	--	--	Pass
11n-HT20	6.5	165	5825	22.16	22.16	≤ 30.00	--	--	Pass
11n-HT40	13.5	38	5190	14.80	14.80	--	20.20	≤ 23.01	Pass
11n-HT40	13.5	46	5230	14.22	14.22	--	19.62	≤ 23.01	Pass
11n-HT40	13.5	151	5755	21.76	21.76	≤ 30.00	--	--	Pass
11n-HT40	13.5	159	5795	22.02	22.02	≤ 30.00	--	--	Pass
11ac-VHT20	6.5	36	5180	14.86	14.86	--	20.26	≤ 22.50	Pass
11ac-VHT20	6.5	44	5220	14.31	14.31	--	19.71	≤ 22.50	Pass
11ac-VHT20	6.5	48	5240	14.55	14.55	--	19.95	≤ 22.50	Pass
11ac-VHT20	6.5	149	5745	23.03	23.03	≤ 30.00	--	--	Pass
11ac-VHT20	6.5	157	5785	22.56	22.56	≤ 30.00	--	--	Pass
11ac-VHT20	6.5	165	5825	22.22	22.22	≤ 30.00	--	--	Pass
11ac-VHT40	13.5	38	5190	14.83	14.83	--	20.23	≤ 23.01	Pass
11ac-VHT40	13.5	46	5230	14.20	14.20	--	19.60	≤ 23.01	Pass
11ac-VHT40	13.5	151	5755	21.81	21.81	≤ 30.00	--	--	Pass
11ac-VHT40	13.5	159	5795	22.10	22.10	≤ 30.00	--	--	Pass
11ac-VHT80	29.3	42	5210	14.36	14.36	--	19.76	≤ 23.01	Pass
11ac-VHT80	29.3	155	5775	18.55	18.55	≤ 30.00	--	--	Pass

Note: Max EIRP Power (dBm) = Total Average Power (dBm) + Antenna Gain.

EIRP Limit Calculation as below:

For 5150-5250MHz

802.11a: $10 + 10 \log_{10} (16.65\text{MHz}) = 22.21\text{dBm}$ < 23.01dBm;

802.11n-HT20: $10 + 10 \log_{10} (17.78\text{MHz}) = 22.50\text{dBm}$ < 23.01dBm;

802.11ac-VHT20: $10 + 10 \log_{10} (17.79\text{MHz}) = 22.50\text{dBm}$ < 23.01dBm;

802.11n-HT40/ac-VHT40/ac-VHT80: $10 + 10 \log_{10} B > 23.01\text{dBm}$;