

### 7.3. 6dB Bandwidth Measurement

#### 7.3.1. Test Limit

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

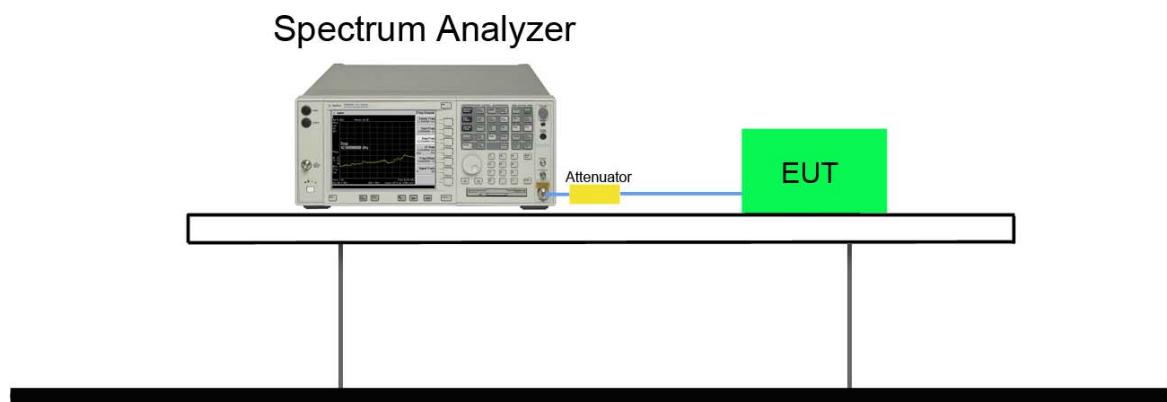
#### 7.3.2. Test Procedure used

KDB 789033 D02v01r03 – 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



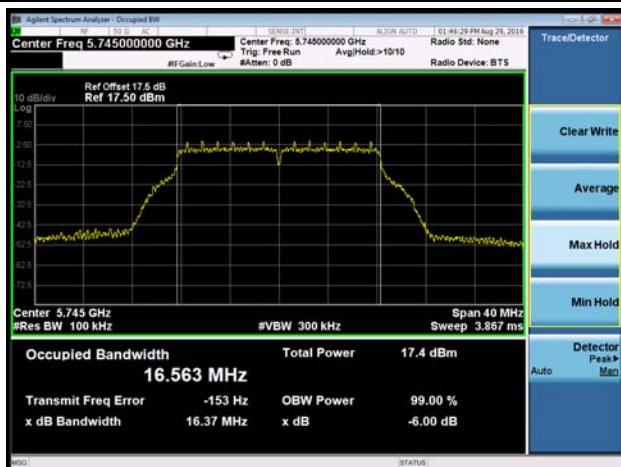
### 7.3.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
<b>Ant 0</b>						
802.11a	6	149	5745	16.4	$\geq 0.5$	Pass
802.11a	6	157	5785	16.4	$\geq 0.5$	Pass
802.11a	6	165	5825	16.4	$\geq 0.5$	Pass
802.11n-HT20	6.5	149	5745	17.6	$\geq 0.5$	Pass
802.11n-HT20	6.5	157	5785	17.6	$\geq 0.5$	Pass
802.11n-HT20	6.5	165	5825	17.6	$\geq 0.5$	Pass
802.11n-HT40	13.5	151	5755	36.3	$\geq 0.5$	Pass
802.11n-HT40	13.5	159	5795	36.1	$\geq 0.5$	Pass
802.11ac-VHT20	6.5	149	5745	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	6.5	157	5785	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	6.5	165	5825	17.6	$\geq 0.5$	Pass
802.11ac-VHT40	13.5	151	5755	36.4	$\geq 0.5$	Pass
802.11ac-VHT40	13.5	159	5795	36.4	$\geq 0.5$	Pass
802.11ac-VHT80	29.3	54	5775	76.0	$\geq 0.5$	Pass
<b>Ant 1</b>						
802.11a	6	149	5745	16.4	$\geq 0.5$	Pass
802.11a	6	157	5785	16.4	$\geq 0.5$	Pass
802.11a	6	165	5825	16.4	$\geq 0.5$	Pass
802.11n-HT20	6.5	149	5745	17.6	$\geq 0.5$	Pass
802.11n-HT20	6.5	157	5785	17.6	$\geq 0.5$	Pass
802.11n-HT20	6.5	165	5825	17.6	$\geq 0.5$	Pass
802.11n-HT40	13.5	151	5755	36.4	$\geq 0.5$	Pass
802.11n-HT40	13.5	159	5795	36.4	$\geq 0.5$	Pass
802.11ac-VHT20	6.5	149	5745	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	6.5	157	5785	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	6.5	165	5825	17.6	$\geq 0.5$	Pass
802.11ac-VHT40	13.5	151	5755	36.4	$\geq 0.5$	Pass
802.11ac-VHT40	13.5	159	5795	36.4	$\geq 0.5$	Pass
802.11ac-VHT80	29.3	54	5775	75.8	$\geq 0.5$	Pass

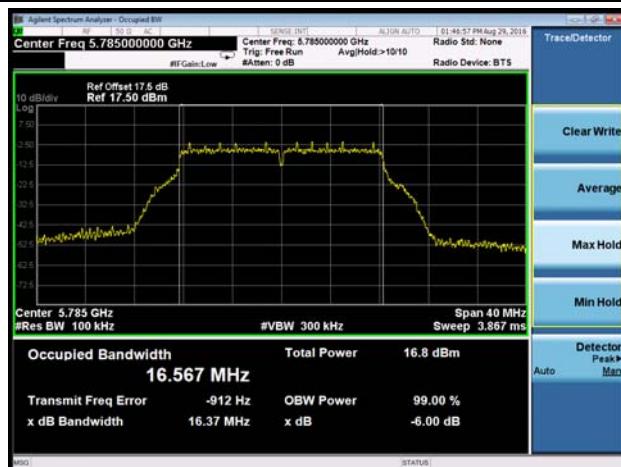
Ant 0 / Ant 0 + 1						
802.11n-HT20	13	149	5745	17.6	$\geq 0.5$	Pass
802.11n-HT20	13	157	5785	17.6	$\geq 0.5$	Pass
802.11n-HT20	13	165	5825	17.6	$\geq 0.5$	Pass
802.11n-HT40	27	151	5755	36.3	$\geq 0.5$	Pass
802.11n-HT40	27	159	5795	36.4	$\geq 0.5$	Pass
802.11ac-VHT20	13	149	5745	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	13	157	5785	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	13	165	5825	17.6	$\geq 0.5$	Pass
802.11ac-VHT40	27	151	5755	36.3	$\geq 0.5$	Pass
802.11ac-VHT40	27	159	5795	36.3	$\geq 0.5$	Pass
802.11ac-VHT80	58.6	155	5775	75.9	$\geq 0.5$	Pass
Ant 1 / Ant 0 + 1						
802.11n-HT20	13	149	5745	17.6	$\geq 0.5$	Pass
802.11n-HT20	13	157	5785	17.6	$\geq 0.5$	Pass
802.11n-HT20	13	165	5825	17.6	$\geq 0.5$	Pass
802.11n-HT40	27	151	5755	36.4	$\geq 0.5$	Pass
802.11n-HT40	27	159	5795	36.4	$\geq 0.5$	Pass
802.11ac-VHT20	13	149	5745	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	13	157	5785	17.6	$\geq 0.5$	Pass
802.11ac-VHT20	13	165	5825	17.6	$\geq 0.5$	Pass
802.11ac-VHT40	27	151	5755	36.4	$\geq 0.5$	Pass
802.11ac-VHT40	27	159	5795	36.4	$\geq 0.5$	Pass
802.11ac-VHT80	58.6	155	5775	76.2	$\geq 0.5$	Pass

### 802.11a 6dB Bandwidth - Ant 0

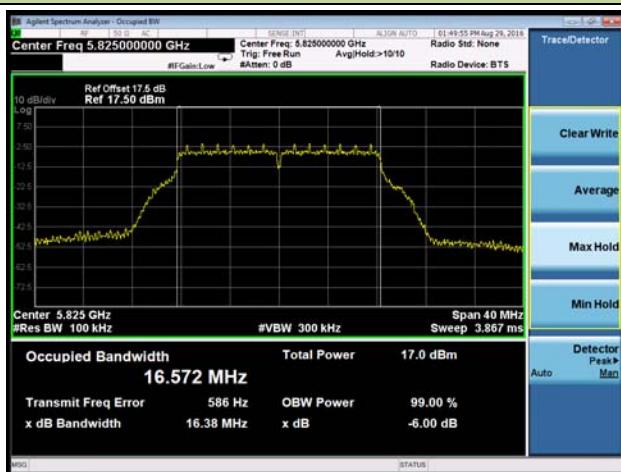
#### Channel 149 (5745MHz)



#### Channel 157 (5785MHz)

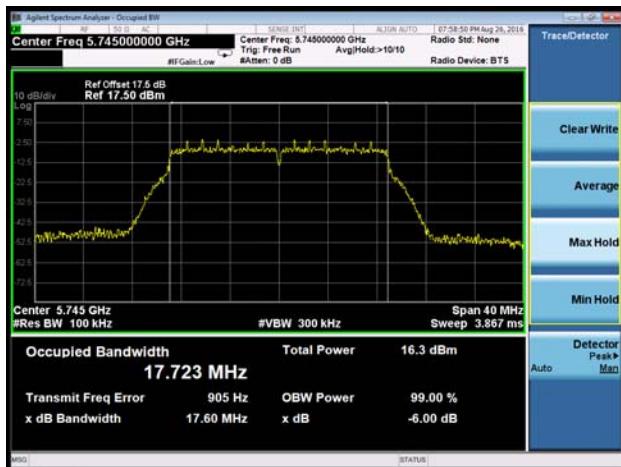


#### Channel 165 (5825MHz)

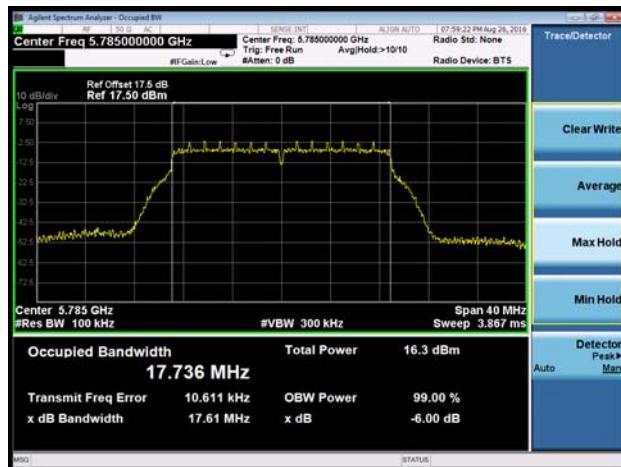


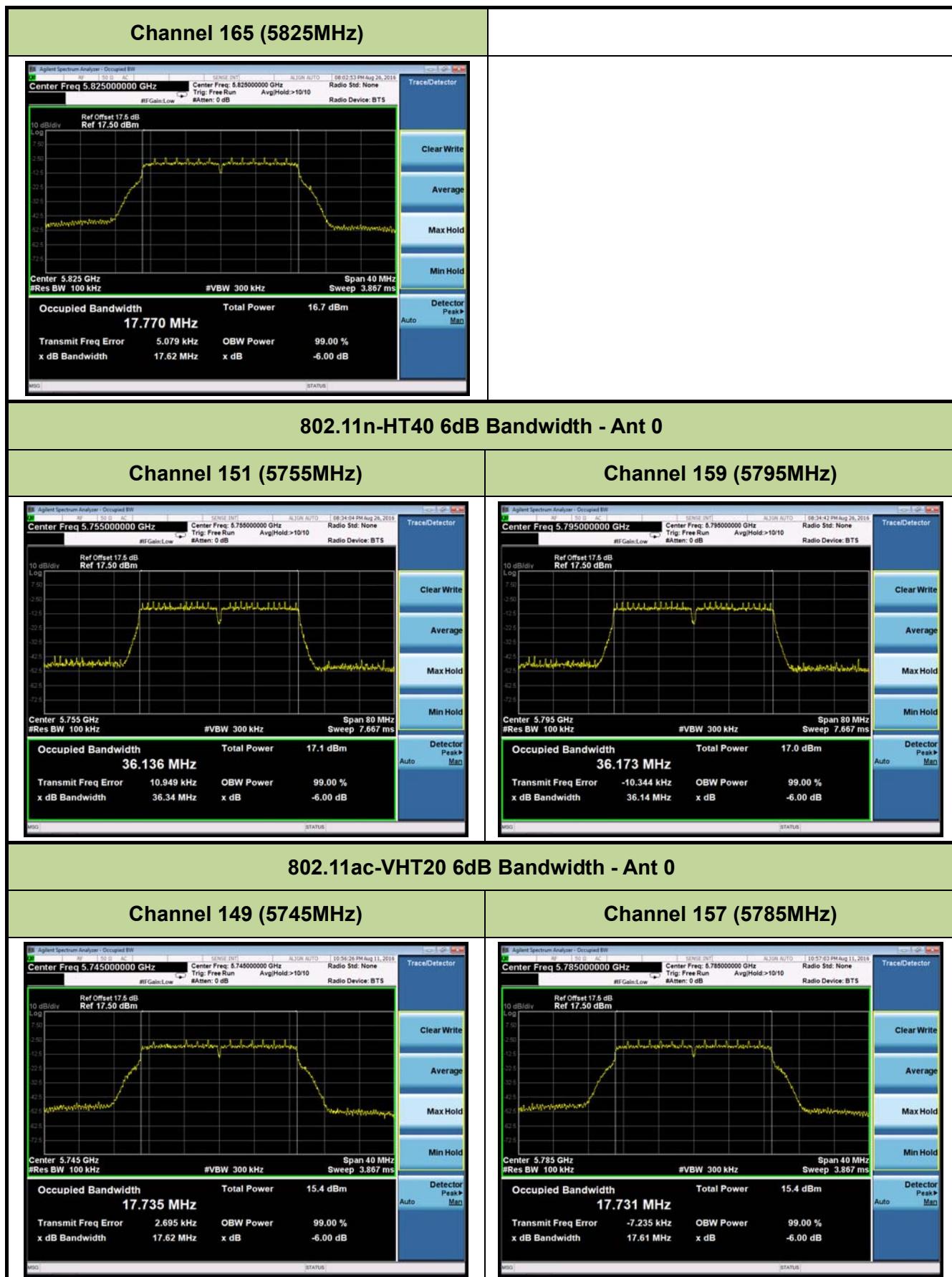
### 802.11n-HT20 6dB Bandwidth - Ant 0

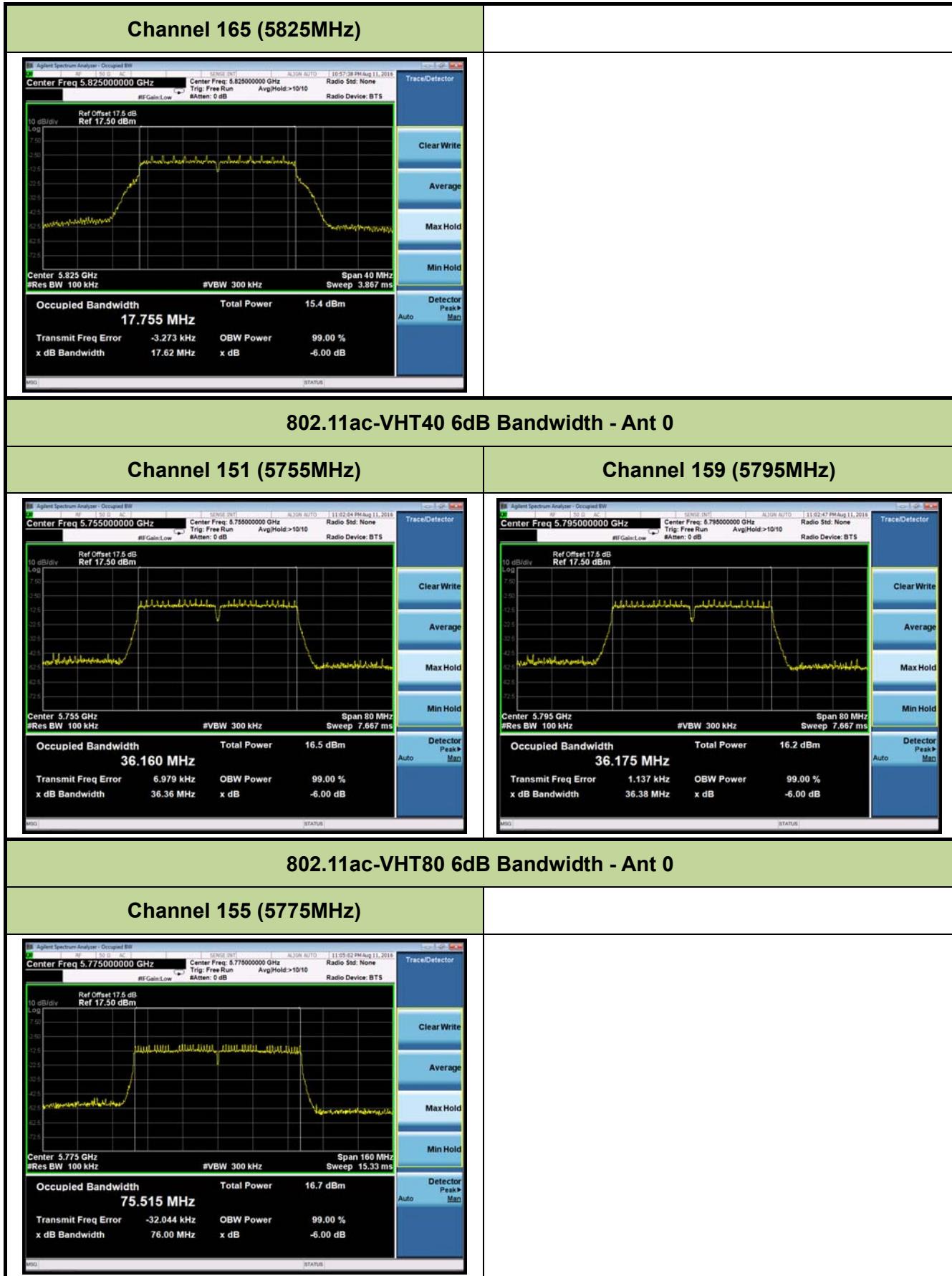
#### Channel 149 (5745MHz)



#### Channel 157 (5785MHz)





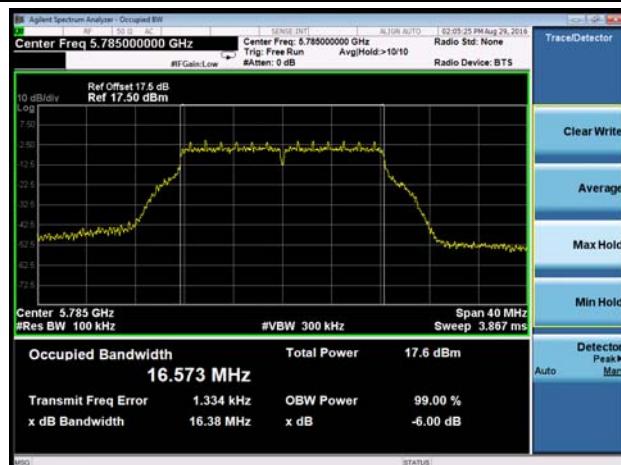


### 802.11a 6dB Bandwidth - Ant 1

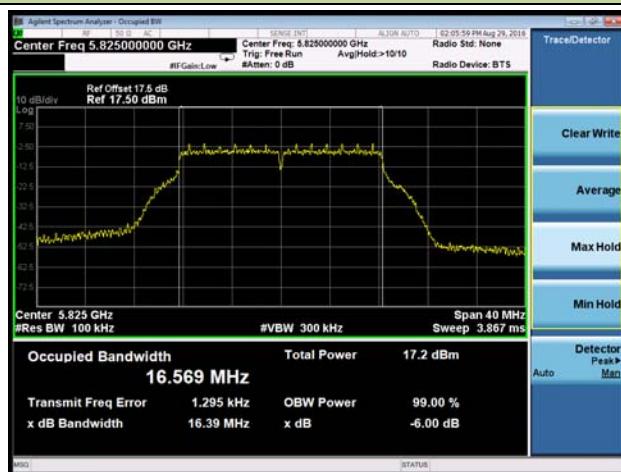
#### Channel 149 (5745MHz)



#### Channel 157 (5785MHz)

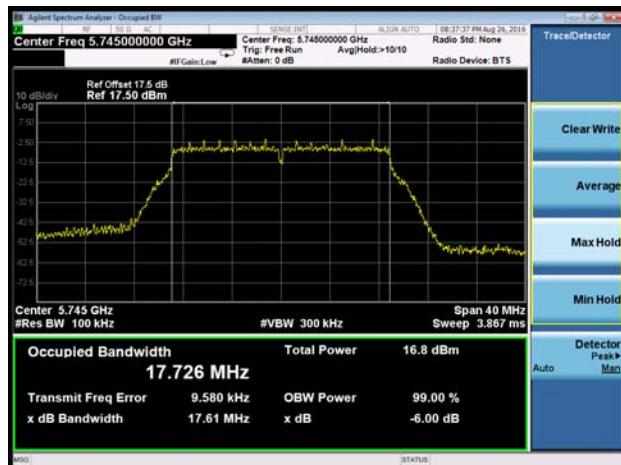


#### Channel 165 (5825MHz)

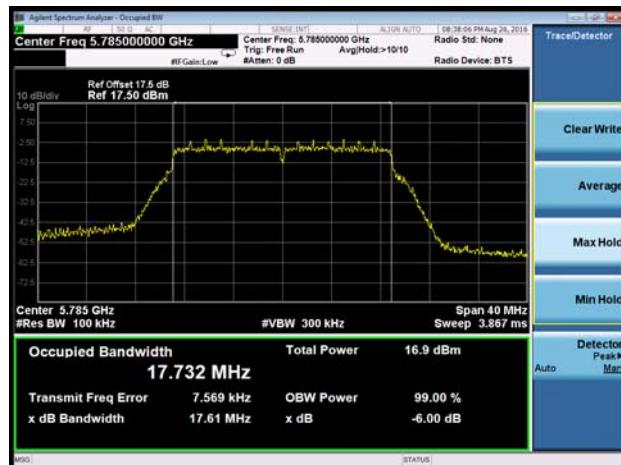


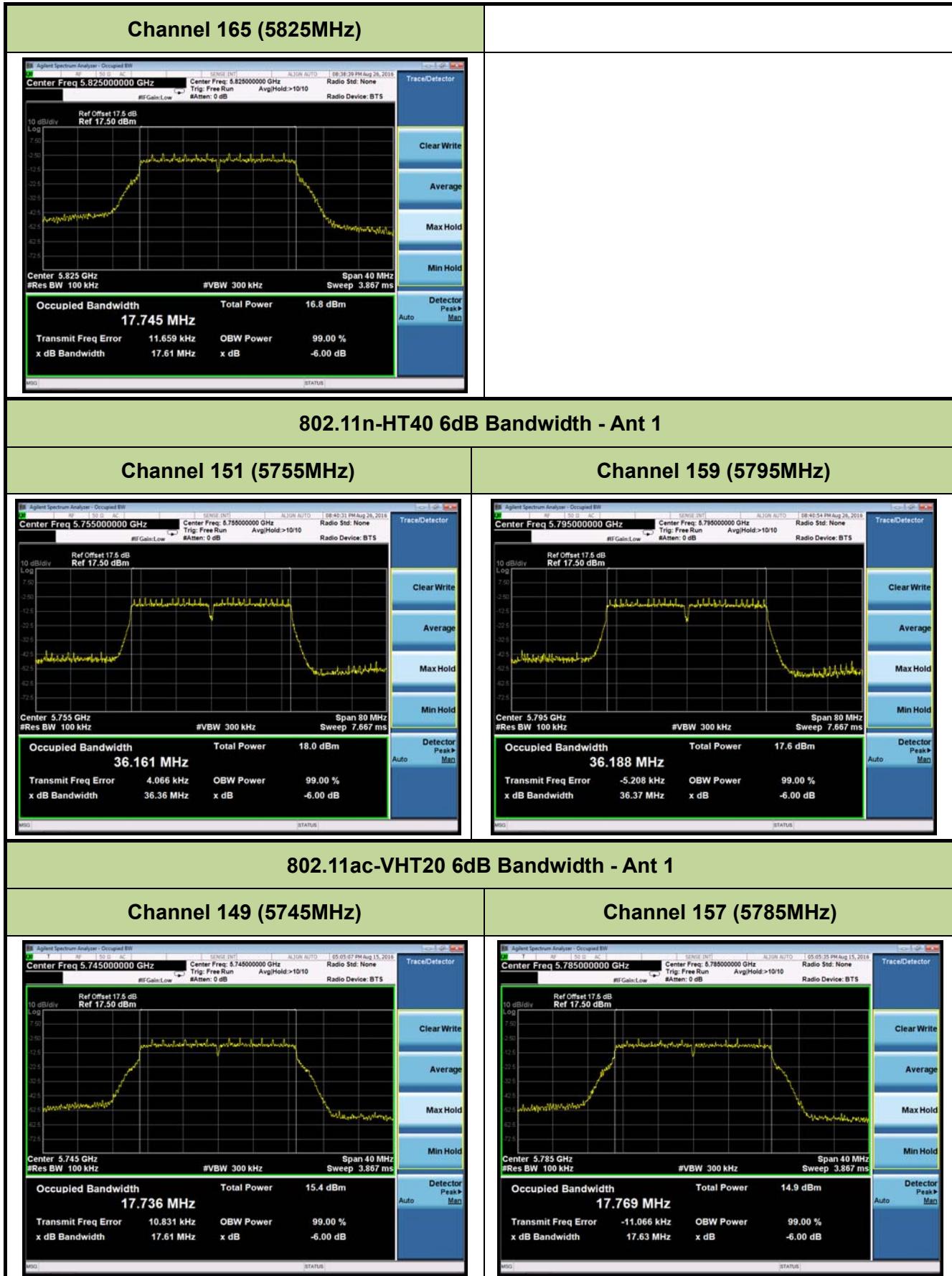
### 802.11n-HT20 6dB Bandwidth - Ant 1

#### Channel 149 (5745MHz)

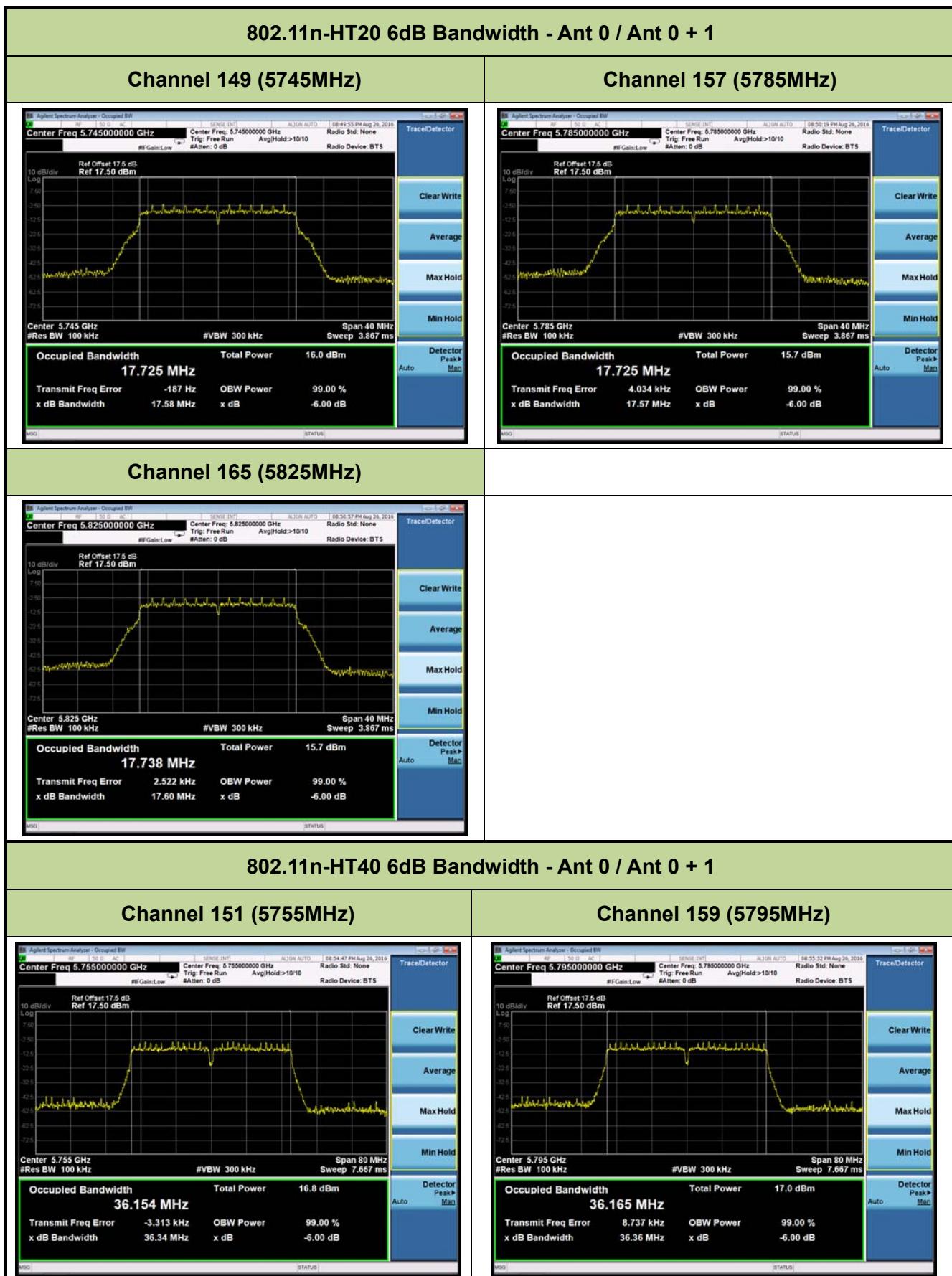


#### Channel 157 (5785MHz)



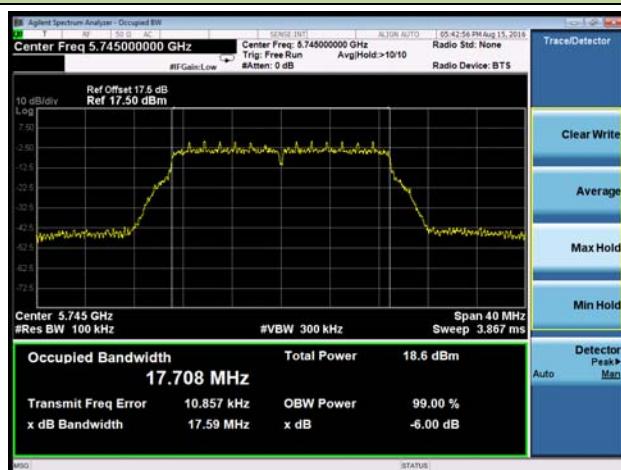




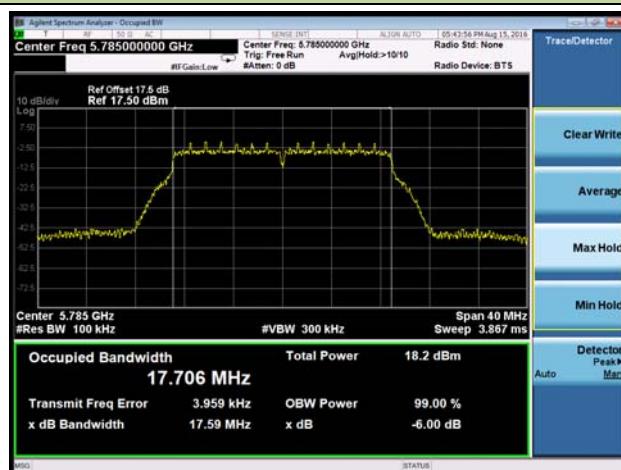


### 802.11ac-VHT20 6dB Bandwidth - Ant 0 / Ant 0 + 1

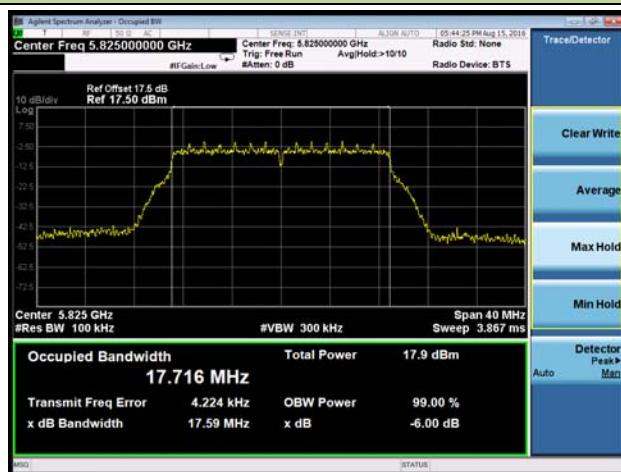
#### Channel 149 (5745MHz)



#### Channel 157 (5785MHz)

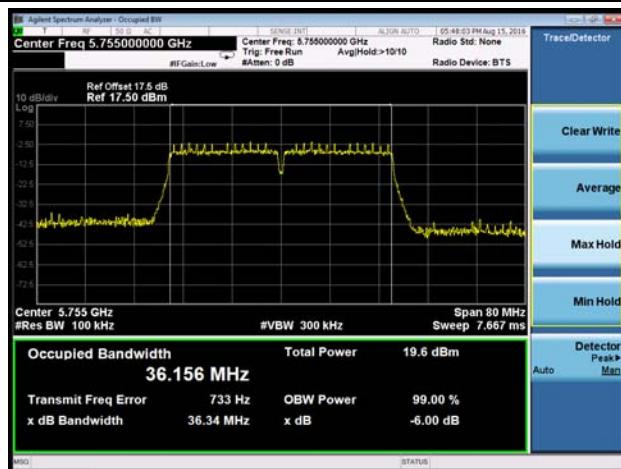


#### Channel 165 (5825MHz)

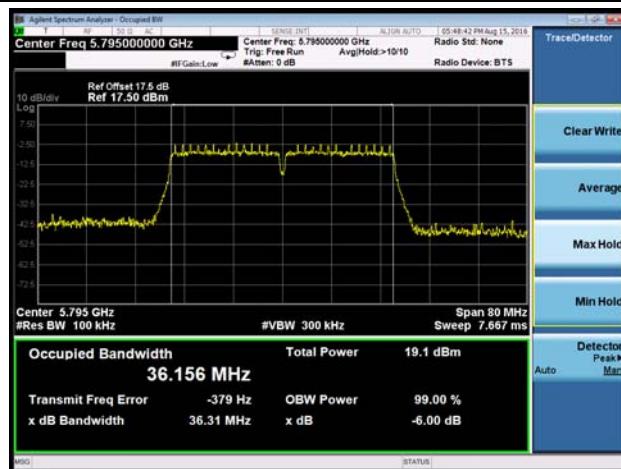


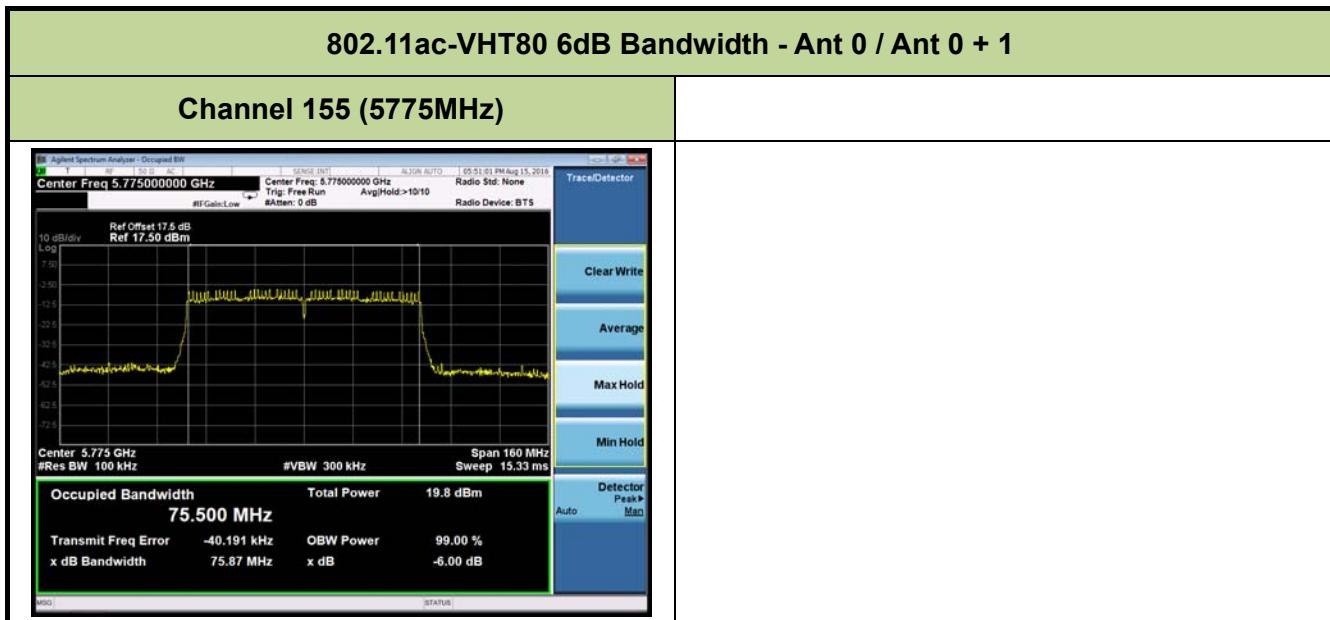
### 802.11ac-VHT40 6dB Bandwidth - Ant 0 / Ant 0 + 1

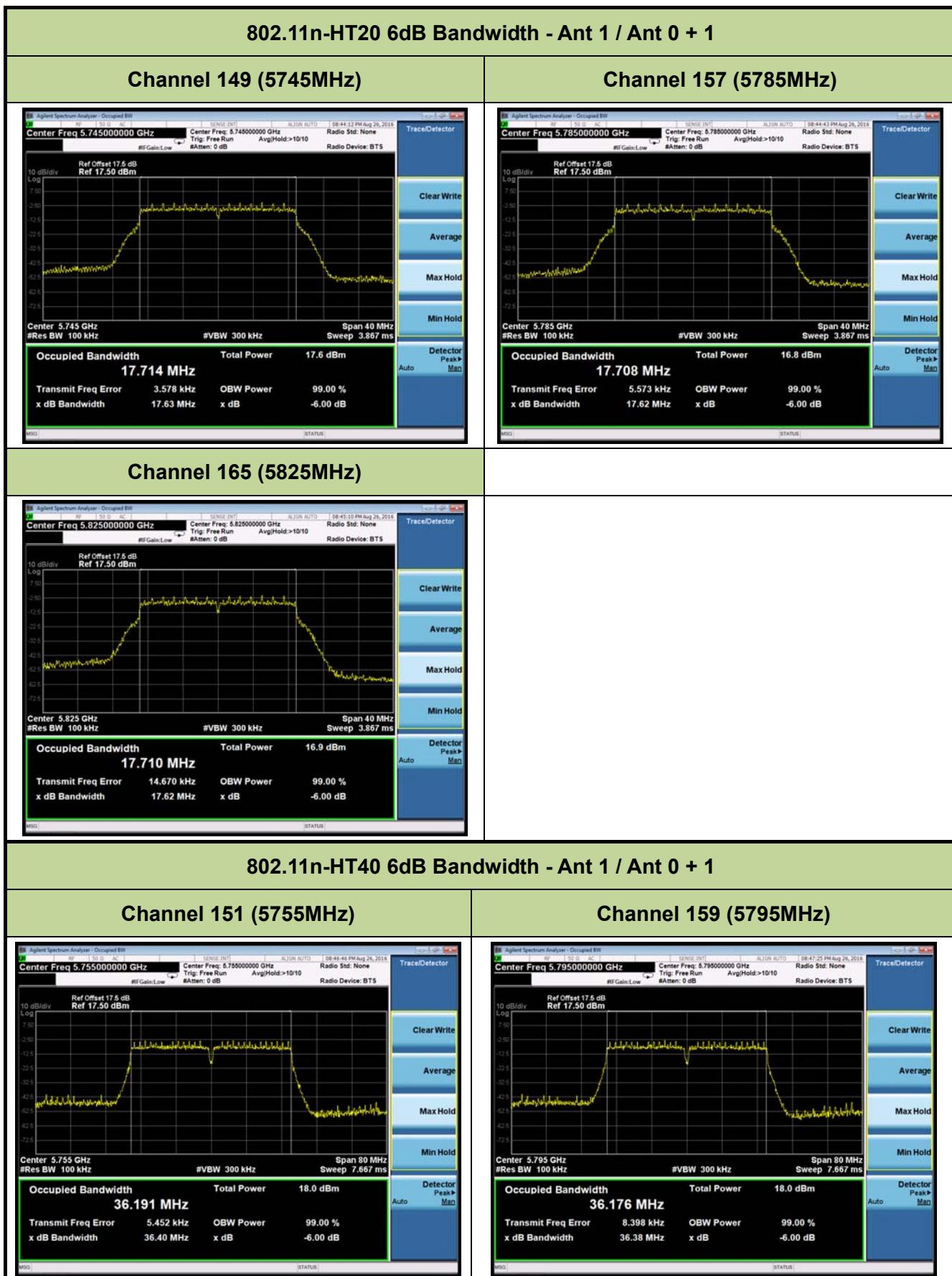
#### Channel 151 (5755MHz)



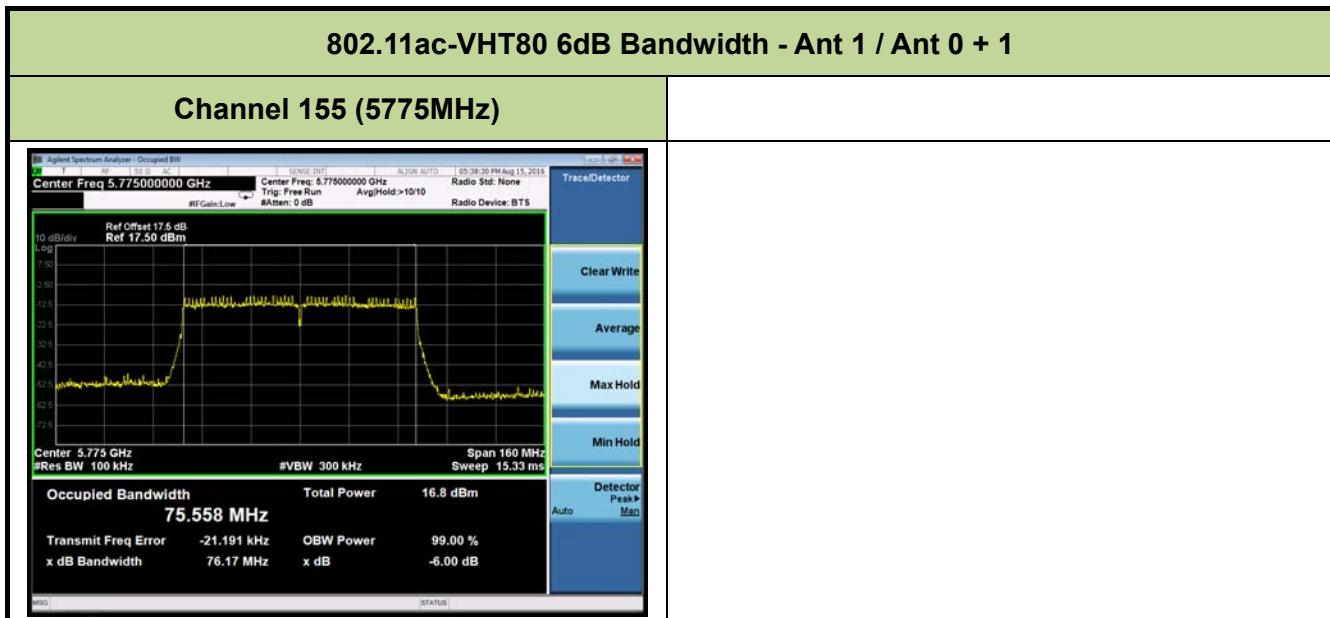
#### Channel 159 (5795MHz)











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

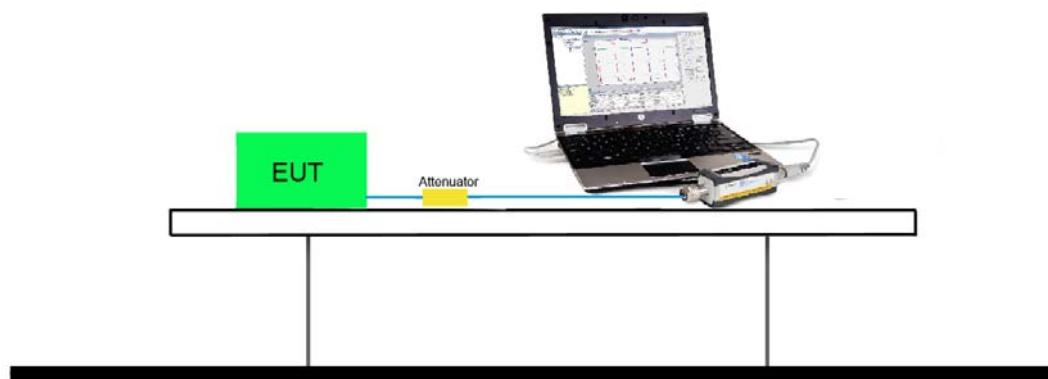
### 7.4.2. Test Procedure Used

KDB 789033 D02v01r03 - Section E) 3) b) Method PM-G

### 7.4.3. Test Setting

Average power measurements were performed 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 <sub>Tx</sub>	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	27.0	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
2	---	---	13.0	14.4	27.0	30.0
2	---	---	26.0	28.9	54.0	60.0
2	---	---	39.0	43.3	81.0	90.0
2	---	---	52.0	57.8	108.0	120.0
2	---	---	78.0	86.7	162.0	180.0
2	---	---	104.0	115.6	216.0	240.0
2	---	---	117.0	130.0	243.0	270.0
2	---	---	130.0	144.4	270.0	300.0

N <sub>Tx</sub>	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	65.0
1	1	13.0	14.4	27.0	30.0	58.5	130.0
1	2	19.5	21.7	40.5	45.0	87.8	195.0
1	3	26.0	28.9	54.0	60.0	117.0	260.0
1	4	39.0	43.3	81.0	90.0	175.5	390.0
1	5	52.0	57.8	108.0	120.0	234.0	520.0
1	6	58.5	65.0	121.5	135.0	263.3	585.0
1	7	65.0	72.2	135.0	150.0	292.5	650.0
1	8	78.0	86.7	162.0	180.0	351.0	780.0

1	9	--	--	180.0	200.0	390.0	866.7
2	0	13.0	14.4	27.0	30.0	58.6	65.0
2	1	26.0	28.9	54.0	60.0	117.0	130.0
2	2	39.0	43.3	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	86.7	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 0:**

Test Mode	Bandwidth	Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)
802.11a	20	44	5220	6	11.58
				24	11.02
				54	10.48
802.11n	20	44	5220	6.5	10.12
				7.2	9.51
				39	8.75
				43.3	8.45
				65	7.86
				72	7.41
802.11n	40	46	5230	13.5	10.04
				15	9.53
				81	8.94
				90	7.66
				135	7.12
				150	6.52
802.11ac	20	44	5220	6.5	9.85
				7.2	8.88
				39	8.26
				43.3	7.62
				78	7.16
				86.7	6.54
802.11ac	40	46	5230	13.5	10.12
				15	9.63
				81	9.24
				90	8.81
				180	8.33
				200	7.75

802.11ac	80	42	5210	29.3	8.94
				65.0	8.45
				234.0	8.15
				520.0	7.65
				390.0	7.28
				866.7	6.84

Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	Result
<b>1Tx - Ant 0</b>									
802.11a	1	6	36	5180	11.65	--	11.65	≤ 24.00	Pass
802.11a	1	6	44	5220	11.58	--	11.58	≤ 24.00	Pass
802.11a	1	6	48	5240	11.57	--	11.57	≤ 24.00	Pass
802.11a	1	6	149	5745	11.31	--	11.31	≤ 30.00	Pass
802.11a	1	6	157	5785	11.03	--	11.03	≤ 30.00	Pass
802.11a	1	6	165	5825	10.81	--	10.81	≤ 30.00	Pass
802.11n-HT20	1	6.5	36	5180	10.39	--	10.39	≤ 24.00	Pass
802.11n-HT20	1	6.5	44	5220	10.12	--	10.12	≤ 24.00	Pass
802.11n-HT20	1	6.5	48	5240	10.10	--	10.10	≤ 24.00	Pass
802.11n-HT20	1	6.5	149	5745	9.81	--	9.81	≤ 30.00	Pass
802.11n-HT20	1	6.5	157	5785	9.63	--	9.63	≤ 30.00	Pass
802.11n-HT20	1	6.5	165	5825	9.47	--	9.47	≤ 30.00	Pass
802.11n-HT40	1	13.5	38	5190	10.23	--	10.23	≤ 24.00	Pass
802.11n-HT40	1	13.5	46	5230	10.04	--	10.04	≤ 24.00	Pass
802.11n-HT40	1	13.5	151	5755	9.75	--	9.75	≤ 30.00	Pass
802.11n-HT40	1	13.5	159	5795	9.49	--	9.49	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	36	5180	9.99	--	9.99	≤ 24.00	Pass
802.11ac-VHT20	1	6.5	44	5220	9.85	--	9.85	≤ 24.00	Pass
802.11ac-VHT20	1	6.5	48	5240	9.75	--	9.75	≤ 24.00	Pass
802.11ac-VHT20	1	6.5	149	5745	9.54	--	9.54	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	157	5785	9.36	--	9.36	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	165	5825	9.08	--	9.08	≤ 30.00	Pass
802.11ac-VHT40	1	13.5	38	5190	10.16	--	10.16	≤ 24.00	Pass
802.11ac-VHT40	1	13.5	46	5230	10.12	--	10.12	≤ 24.00	Pass
802.11ac-VHT40	1	13.5	151	5755	9.59	--	9.59	≤ 30.00	Pass
802.11ac-VHT40	1	13.5	159	5795	9.39	--	9.39	≤ 30.00	Pass
802.11ac-VHT80	1	29.3	42	5210	8.94	--	8.94	≤ 24.00	Pass
802.11ac-VHT80	1	29.3	155	5775	8.45	--	8.45	≤ 30.00	Pass

1Tx - Ant 1									
802.11a	1	6	36	5180	--	11.02	11.02	$\leq 24.00$	Pass
802.11a	1	6	44	5220	--	11.12	11.12	$\leq 24.00$	Pass
802.11a	1	6	48	5240	--	11.31	11.31	$\leq 24.00$	Pass
802.11a	1	6	149	5745	--	11.53	11.53	$\leq 30.00$	Pass
802.11a	1	6	157	5785	--	11.32	11.32	$\leq 30.00$	Pass
802.11a	1	6	165	5825	--	11.21	11.21	$\leq 30.00$	Pass
802.11n-HT20	1	6.5	36	5180	--	9.68	9.68	$\leq 24.00$	Pass
802.11n-HT20	1	6.5	44	5220	--	9.75	9.75	$\leq 24.00$	Pass
802.11n-HT20	1	6.5	48	5240	--	9.91	9.91	$\leq 24.00$	Pass
802.11n-HT20	1	6.5	149	5745	--	10.38	10.38	$\leq 30.00$	Pass
802.11n-HT20	1	6.5	157	5785	--	10.21	10.21	$\leq 30.00$	Pass
802.11n-HT20	1	6.5	165	5825	--	10.07	10.07	$\leq 30.00$	Pass
802.11n-HT40	1	13.5	38	5190	--	9.61	9.61	$\leq 24.00$	Pass
802.11n-HT40	1	13.5	46	5230	--	9.71	9.71	$\leq 24.00$	Pass
802.11n-HT40	1	13.5	151	5755	--	10.25	10.25	$\leq 30.00$	Pass
802.11n-HT40	1	13.5	159	5795	--	10.11	10.11	$\leq 30.00$	Pass
802.11ac-VHT20	1	6.5	36	5180	--	9.27	9.27	$\leq 24.00$	Pass
802.11ac-VHT20	1	6.5	44	5220	--	9.31	9.31	$\leq 24.00$	Pass
802.11ac-VHT20	1	6.5	48	5240	--	9.35	9.35	$\leq 24.00$	Pass
802.11ac-VHT20	1	6.5	149	5745	--	10.01	10.01	$\leq 30.00$	Pass
802.11ac-VHT20	1	6.5	157	5785	--	9.77	9.77	$\leq 30.00$	Pass
802.11ac-VHT20	1	6.5	165	5825	--	9.75	9.75	$\leq 30.00$	Pass
802.11ac-VHT40	1	13.5	38	5190	--	9.31	9.31	$\leq 24.00$	Pass
802.11ac-VHT40	1	13.5	46	5230	--	9.55	9.55	$\leq 24.00$	Pass
802.11ac-VHT40	1	13.5	151	5755	--	10.13	10.13	$\leq 30.00$	Pass
802.11ac-VHT40	1	13.5	159	5795	--	10.00	10.00	$\leq 30.00$	Pass
802.11ac-VHT80	1	29.3	42	5210	--	8.34	8.34	$\leq 24.00$	Pass
802.11ac-VHT80	1	29.3	155	5775	--	8.95	8.95	$\leq 30.00$	Pass

2Tx - Ant 0 + 1									
802.11n-HT20	2	6	36	5180	9.75	9.37	12.57	$\leq 24.00$	Pass
802.11n-HT20	2	6	44	5220	9.66	9.31	12.50	$\leq 24.00$	Pass
802.11n-HT20	2	6	48	5240	9.61	9.42	12.53	$\leq 24.00$	Pass
802.11n-HT20	2	6	149	5745	9.23	9.85	12.56	$\leq 30.00$	Pass
802.11n-HT20	2	6	157	5785	9.06	9.71	12.41	$\leq 30.00$	Pass
802.11n-HT20	2	6	165	5825	9.09	9.56	12.34	$\leq 30.00$	Pass
802.11n-HT40	2	13	38	5190	9.51	9.01	12.28	$\leq 24.00$	Pass
802.11n-HT40	2	13	46	5230	9.26	9.02	12.15	$\leq 24.00$	Pass
802.11n-HT40	2	13	151	5755	8.98	9.61	12.32	$\leq 30.00$	Pass
802.11n-HT40	2	13	159	5795	8.74	9.45	12.12	$\leq 30.00$	Pass
802.11ac-VHT20	2	6	36	5180	9.45	8.82	12.16	$\leq 24.00$	Pass
802.11ac-VHT20	2	6	44	5220	9.31	9.01	12.17	$\leq 24.00$	Pass
802.11ac-VHT20	2	6	48	5240	9.28	8.99	12.15	$\leq 24.00$	Pass
802.11ac-VHT20	2	6	149	5745	8.91	10.01	12.51	$\leq 30.00$	Pass
802.11ac-VHT20	2	6	157	5785	8.66	10.06	12.43	$\leq 30.00$	Pass
802.11ac-VHT20	2	6	165	5825	8.59	10.21	12.49	$\leq 30.00$	Pass
802.11ac-VHT40	2	13	38	5190	9.36	8.66	12.03	$\leq 24.00$	Pass
802.11ac-VHT40	2	13	46	5230	9.16	8.87	12.03	$\leq 24.00$	Pass
802.11ac-VHT40	2	13	151	5755	8.82	10.01	12.47	$\leq 30.00$	Pass
802.11ac-VHT40	2	13	159	5795	8.69	10.01	12.41	$\leq 30.00$	Pass
802.11ac-VHT80	2	58.6	42	5210	8.06	7.53	10.81	$\leq 24.00$	Pass
802.11ac-VHT80	2	58.6	155	5775	7.35	8.63	11.05	$\leq 30.00$	Pass

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

## 7.5. Power Spectral Density Measurement

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

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.

### 7.5.2. Test Procedure Used

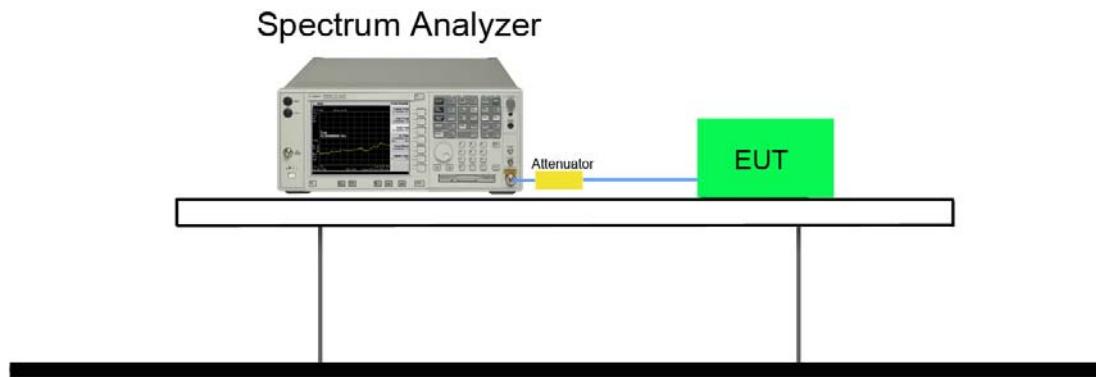
KDB 789033 D02v01r03 - Section F

### 7.5.3. 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  $\geq 2 \times (\text{span} / \text{RBW})$
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  $10 \cdot \log(500\text{kHz}/100\text{kHz}) = 7 \text{ dB}$  to the measured result

#### 7.5.4. Test Setup



### 7.5.5. Test Result

Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm)	Ant 1 PSD (dBm)	Duty Cycle (%)	Total PSD (dBm)	Limit (dBm /MHz)	Result
1Tx - Ant 0										
802.11a	1	6	36	5180	-0.29	--	93.5	0.00	≤ 11.00	Pass
802.11a	1	6	44	5220	-0.41	--	93.5	-0.12	≤ 11.00	Pass
802.11a	1	6	48	5240	-0.28	--	93.5	0.01	≤ 11.00	Pass
802.11n-HT20	1	6.5	36	5180	-1.45	--	87.5	-0.87	≤ 11.00	Pass
802.11n-HT20	1	6.5	44	5220	-1.46	--	87.5	-0.88	≤ 11.00	Pass
802.11n-HT20	1	6.5	48	5240	-1.29	--	87.5	-0.71	≤ 11.00	Pass
802.11n-HT40	1	13.5	38	5190	-4.38	--	78.0	-3.30	≤ 11.00	Pass
802.11n-HT40	1	13.5	46	5230	-4.21	--	78.0	-3.13	≤ 11.00	Pass
802.11ac-VHT20	1	6.5	36	5180	-2.80	--	92.7	-2.47	≤ 11.00	Pass
802.11ac-VHT20	1	6.5	44	5220	-2.68	--	92.7	-2.35	≤ 11.00	Pass
802.11ac-VHT20	1	6.5	48	5240	-2.63	--	92.7	-2.30	≤ 11.00	Pass
802.11ac-VHT40	1	13.5	38	5190	-5.42	--	87.1	-4.82	≤ 11.00	Pass
802.11ac-VHT40	1	13.5	46	5230	-5.36	--	87.1	-4.76	≤ 11.00	Pass
802.11ac-VHT80	1	29.3	42	5210	-9.16	--	76.9	-8.02	≤ 11.00	Pass
1Tx - Ant 1										
802.11a	1	6	36	5180	--	-1.31	93.5	-1.02	≤ 11.00	Pass
802.11a	1	6	44	5220	--	-1.26	93.5	-0.97	≤ 11.00	Pass
802.11a	1	6	48	5240	--	-0.87	93.5	-0.58	≤ 11.00	Pass
802.11n-HT20	1	6.5	36	5180	--	-2.31	87.5	-1.73	≤ 11.00	Pass
802.11n-HT20	1	6.5	44	5220	--	-2.22	87.5	-1.64	≤ 11.00	Pass
802.11n-HT20	1	6.5	48	5240	--	-1.96	87.5	-1.38	≤ 11.00	Pass
802.11n-HT40	1	13.5	38	5190	--	-5.10	78.0	-4.02	≤ 11.00	Pass
802.11n-HT40	1	13.5	46	5230	--	-4.90	78.0	-3.82	≤ 11.00	Pass
802.11ac-VHT20	1	6.5	36	5180	--	-3.44	92.7	-3.11	≤ 11.00	Pass
802.11ac-VHT20	1	6.5	44	5220	--	-3.29	92.7	-2.96	≤ 11.00	Pass
802.11ac-VHT20	1	6.5	48	5240	--	-2.92	92.7	-2.59	≤ 11.00	Pass
802.11ac-VHT40	1	13.5	38	5190	--	-6.28	87.1	-5.68	≤ 11.00	Pass
802.11ac-VHT40	1	13.5	46	5230	--	-5.78	87.1	-5.18	≤ 11.00	Pass
802.11ac-VHT80	1	29.3	42	5210	--	-9.87	76.9	-8.73	≤ 11.00	Pass

Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm)	Ant 1 PSD (dBm)	Duty Cycle (%)	Total PSD (dBm)	Limit (dBm /MHz)	Result
2Tx – Ant 0 + 1										
802.11a	2	6	36	5180	-0.44	-1.15	93.5	2.52	≤ 11.00	Pass
802.11a	2	6	44	5220	-0.14	-0.93	93.5	2.79	≤ 11.00	Pass
802.11a	2	6	48	5240	-0.24	-0.79	93.5	2.80	≤ 11.00	Pass
802.11n-HT20	2	13	36	5180	-1.62	-2.60	87.5	1.51	≤ 11.00	Pass
802.11n-HT20	2	13	44	5220	-1.38	-2.66	87.5	1.62	≤ 11.00	Pass
802.11n-HT20	2	13	48	5240	-1.26	-2.13	87.5	1.92	≤ 11.00	Pass
802.11n-HT40	2	27	38	5190	-4.65	-5.69	78.0	-1.05	≤ 11.00	Pass
802.11n-HT40	2	27	46	5230	-4.56	-5.76	78.0	-1.03	≤ 11.00	Pass
802.11ac-VHT20	2	13	36	5180	-3.94	-3.53	92.7	-0.39	≤ 11.00	Pass
802.11ac-VHT20	2	13	44	5220	-3.76	-3.25	92.7	-0.16	≤ 11.00	Pass
802.11ac-VHT20	2	13	48	5240	-3.31	-3.24	92.7	0.06	≤ 11.00	Pass
802.11ac-VHT40	2	27	38	5190	-6.60	-6.65	87.1	-3.01	≤ 11.00	Pass
802.11ac-VHT40	2	27	46	5230	-6.61	-6.35	87.1	-2.87	≤ 11.00	Pass
802.11ac-VHT80	2	58.6	42	5210	-10.40	-10.28	76.9	-6.19	≤ 11.00	Pass

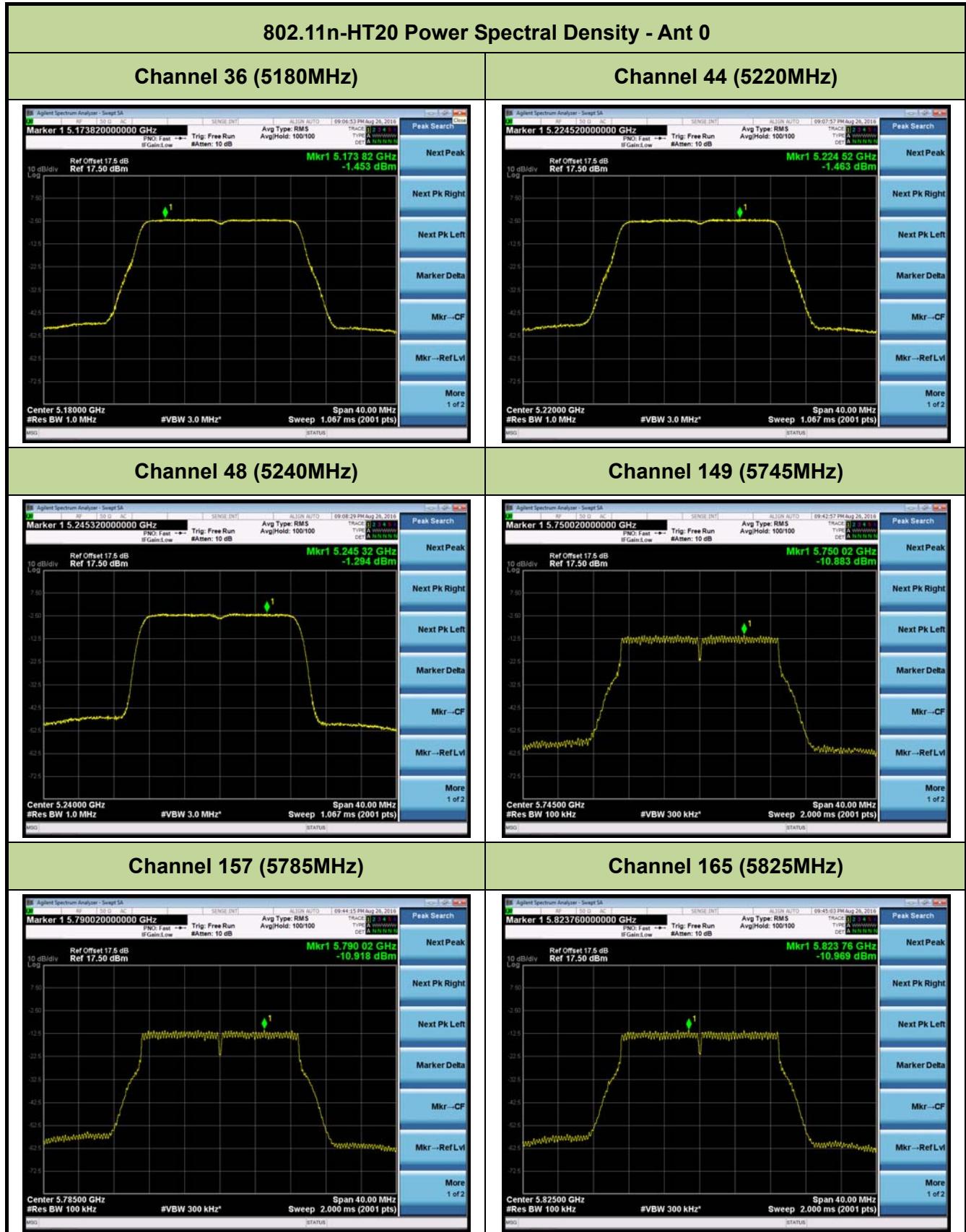
Note: When EUT duty cycle < 98%, the total PSD =  $10^{\log\{10^{(Ant\ 0\ PSD/10)}+10^{(Ant\ 1\ PSD/10)}\}} + 10^{\log(1/\text{duty\ cycle})}$ .

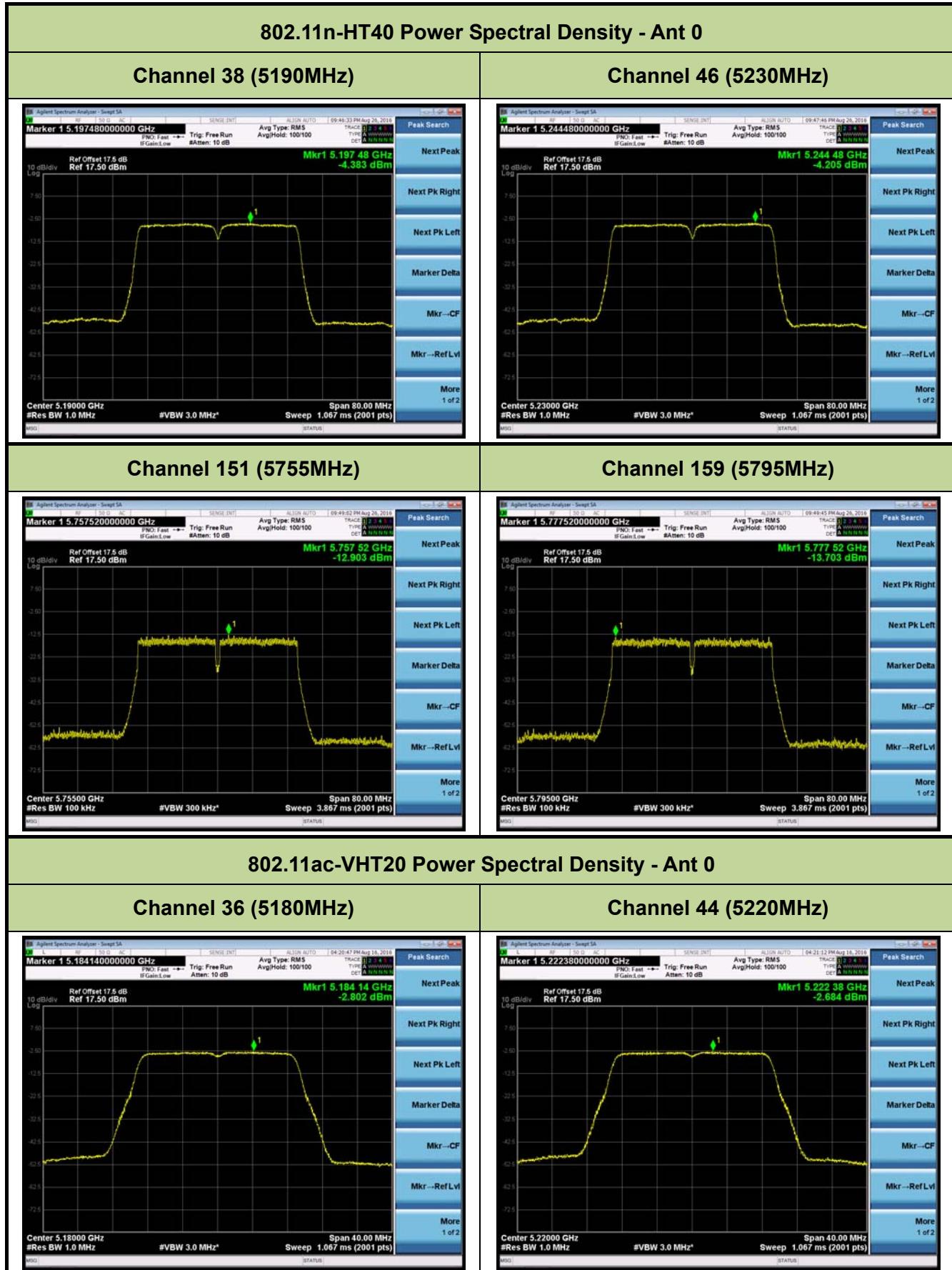
Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm)	Ant 1 PSD (dBm)	Duty Cycle (%)	Constant Factor	Total PSD (dBm)	Limit (dBm/ 500KHz)	Result
1Tx - Ant 0											
802.11a	1	6	149	5745	-9.28	--	93.5	7	-1.99	≤ 30.00	Pass
802.11a	1	6	157	5785	-9.63	--	93.5	7	-2.34	≤ 30.00	Pass
802.11a	1	6	165	5825	-9.97	--	93.5	7	-2.68	≤ 30.00	Pass
802.11n-HT20	1	6.5	149	5745	-10.88	--	87.5	7	-3.30	≤ 30.00	Pass
802.11n-HT20	1	6.5	157	5785	-10.92	--	87.5	7	-3.34	≤ 30.00	Pass
802.11n-HT20	1	6.5	165	5825	-10.97	--	87.5	7	-3.39	≤ 30.00	Pass
802.11n-HT40	1	13.5	151	5755	-12.90	--	78.0	7	-4.82	≤ 30.00	Pass
802.11n-HT40	1	13.5	159	5795	-13.70	--	78.0	7	-5.62	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	149	5745	-11.39	--	92.7	7	-4.06	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	157	5785	-12.23	--	92.7	7	-4.90	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	165	5825	-12.70	--	92.7	7	-5.37	≤ 30.00	Pass
802.11ac-VHT40	1	13.5	151	5755	-14.50	--	87.1	7	-6.90	≤ 30.00	Pass
802.11ac-VHT40	1	13.5	159	5795	-14.98	--	87.1	7	-7.38	≤ 30.00	Pass
802.11ac-VHT80	1	29.3	155	5775	-18.49	--	76.9	7	-10.35	≤ 30.00	Pass
1Tx - Ant 1											
802.11a	1	6	149	5745	--	-8.79	93.5	7	-1.50	≤ 30.00	Pass
802.11a	1	6	157	5785	--	-8.96	93.5	7	-1.67	≤ 30.00	Pass
802.11a	1	6	165	5825	--	-8.99	93.5	7	-1.70	≤ 30.00	Pass
802.11n-HT20	1	6.5	149	5745	--	-9.76	87.5	7	-2.18	≤ 30.00	Pass
802.11n-HT20	1	6.5	157	5785	--	-10.03	87.5	7	-2.45	≤ 30.00	Pass
802.11n-HT20	1	6.5	165	5825	--	-10.25	87.5	7	-2.67	≤ 30.00	Pass
802.11n-HT40	1	13.5	151	5755	--	-12.24	78.0	7	-4.16	≤ 30.00	Pass
802.11n-HT40	1	13.5	159	5795	--	-12.67	78.0	7	-4.59	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	149	5745	--	-10.97	92.7	7	-3.64	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	157	5785	--	-11.88	92.7	7	-4.55	≤ 30.00	Pass
802.11ac-VHT20	1	6.5	165	5825	--	-11.99	92.7	7	-4.66	≤ 30.00	Pass
802.11ac-VHT40	1	13.5	151	5755	--	-14.00	87.1	7	-6.40	≤ 30.00	Pass
802.11ac-VHT40	1	13.5	159	5795	--	-14.08	87.1	7	-6.48	≤ 30.00	Pass
802.11ac-VHT80	1	29.3	155	5775	--	-17.79	76.9	7	-9.65	≤ 30.00	Pass

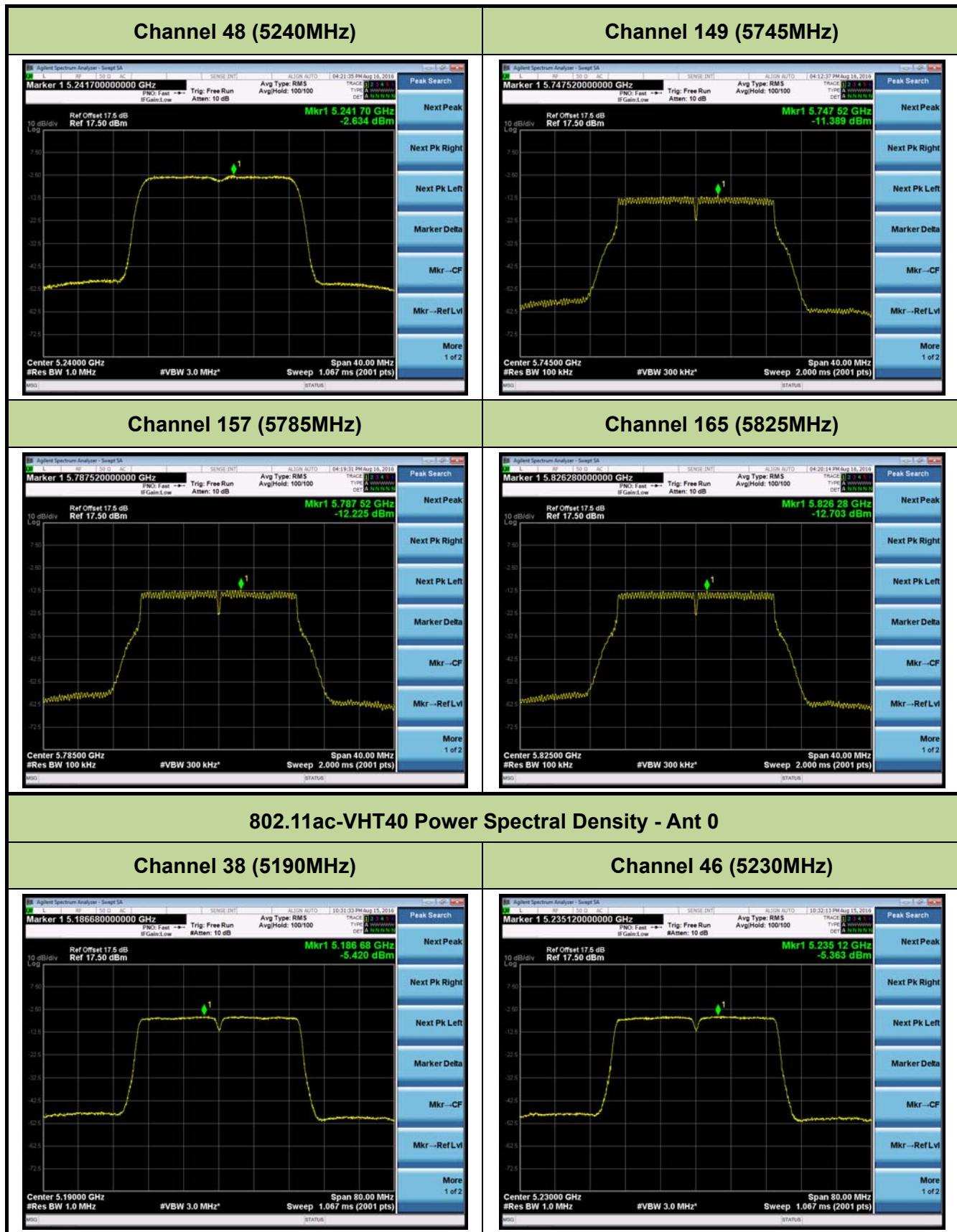
Test Mode	N <sub>Tx</sub>	Data Rate	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm)	Ant 1 PSD (dBm)	Duty Cycle (%)	Constant Factor	Total PSD (dBm)	Limit (dBm/ 500KHz)	Result
2Tx – Ant 0 + 1											
802.11a	2	6	149	5745	-9.00	-9.00	93.5	7	1.30	≤ 30.00	Pass
802.11a	2	6	157	5785	-9.86	-8.79	93.5	7	1.01	≤ 30.00	Pass
802.11a	2	6	165	5825	-10.09	-8.98	93.5	7	0.80	≤ 30.00	Pass
802.11n-HT20	2	13	149	5745	-10.87	-9.49	87.5	7	0.46	≤ 30.00	Pass
802.11n-HT20	2	13	157	5785	-10.60	-9.87	87.5	7	0.37	≤ 30.00	Pass
802.11n-HT20	2	13	165	5825	-10.63	-10.32	87.5	7	0.12	≤ 30.00	Pass
802.11n-HT40	2	27	151	5755	-12.46	-11.34	78.0	7	-0.77	≤ 30.00	Pass
802.11n-HT40	2	27	159	5795	-12.81	-12.45	78.0	7	-1.54	≤ 30.00	Pass
802.11ac-VHT20	2	13	149	5745	-12.74	-11.08	92.7	7	-1.49	≤ 30.00	Pass
802.11ac-VHT20	2	13	157	5785	-12.99	-11.62	92.7	7	-1.91	≤ 30.00	Pass
802.11ac-VHT20	2	13	165	5825	-12.87	-11.57	92.7	7	-1.83	≤ 30.00	Pass
802.11ac-VHT40	2	27	151	5755	-15.20	-14.44	87.1	7	-4.19	≤ 30.00	Pass
802.11ac-VHT40	2	27	159	5795	-15.92	-14.62	87.1	7	-4.61	≤ 30.00	Pass
802.11ac-VHT80	2	58.6	155	5775	-18.69	-17.88	76.9	7	-7.12	≤ 30.00	Pass

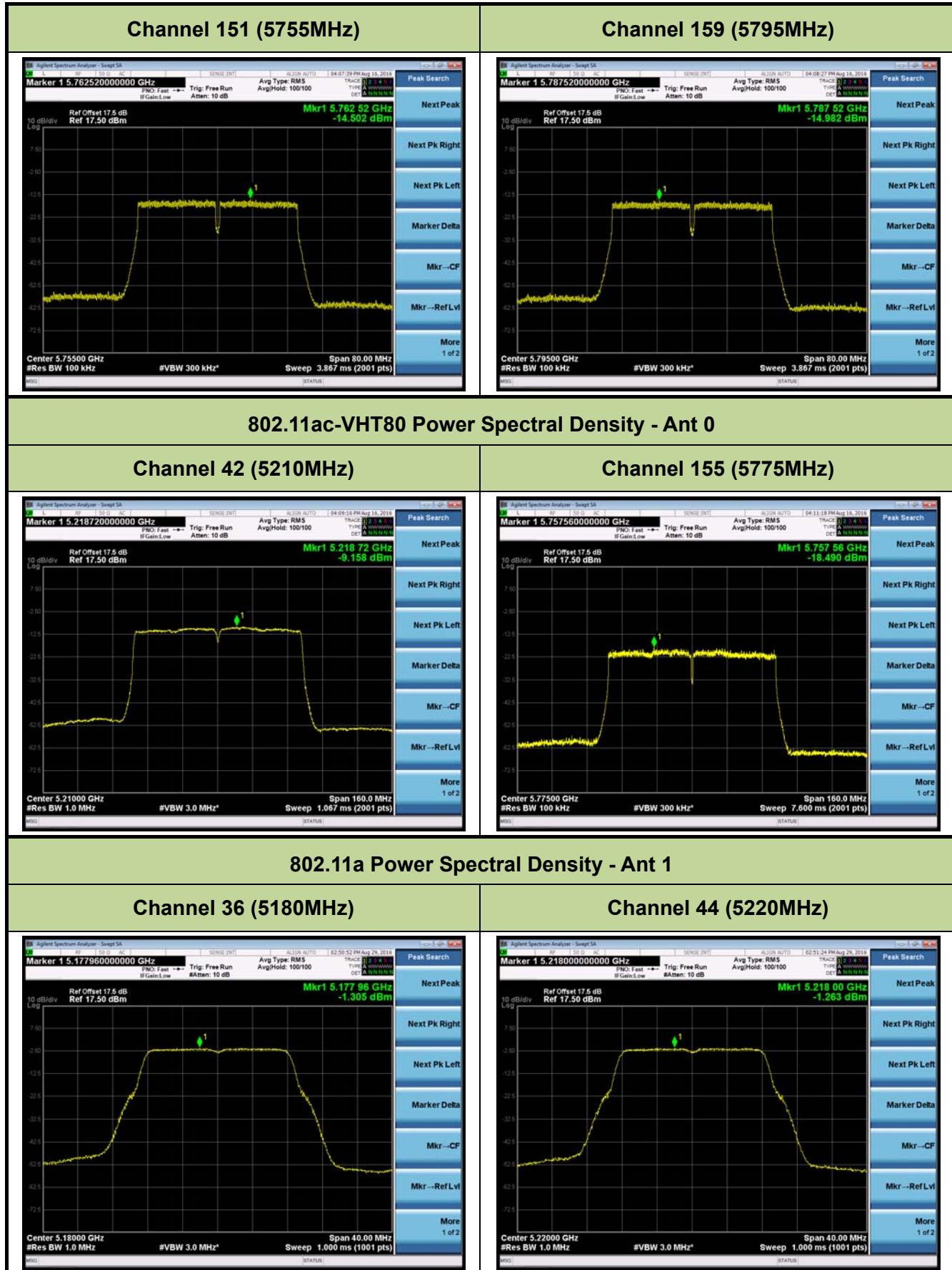
Note: When EUT duty cycle < 98%, the total PSD =  $10^{\log\{10^{(\text{Ant 0 PSD}/10)}+10^{(\text{Ant 1 PSD}/10)}\}} + 10^{\log(1/\text{duty cycle})} + \text{Constant Factor.}$

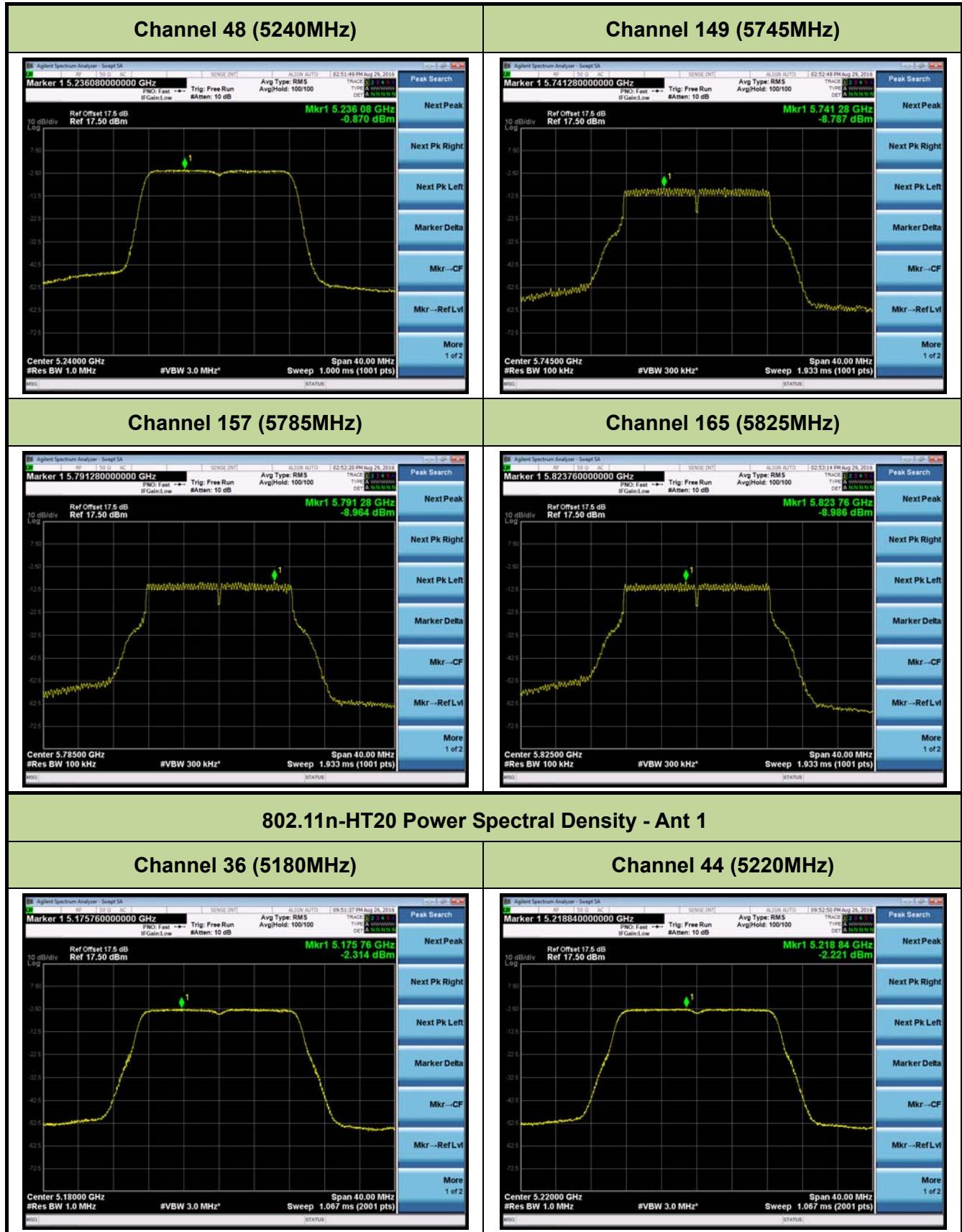


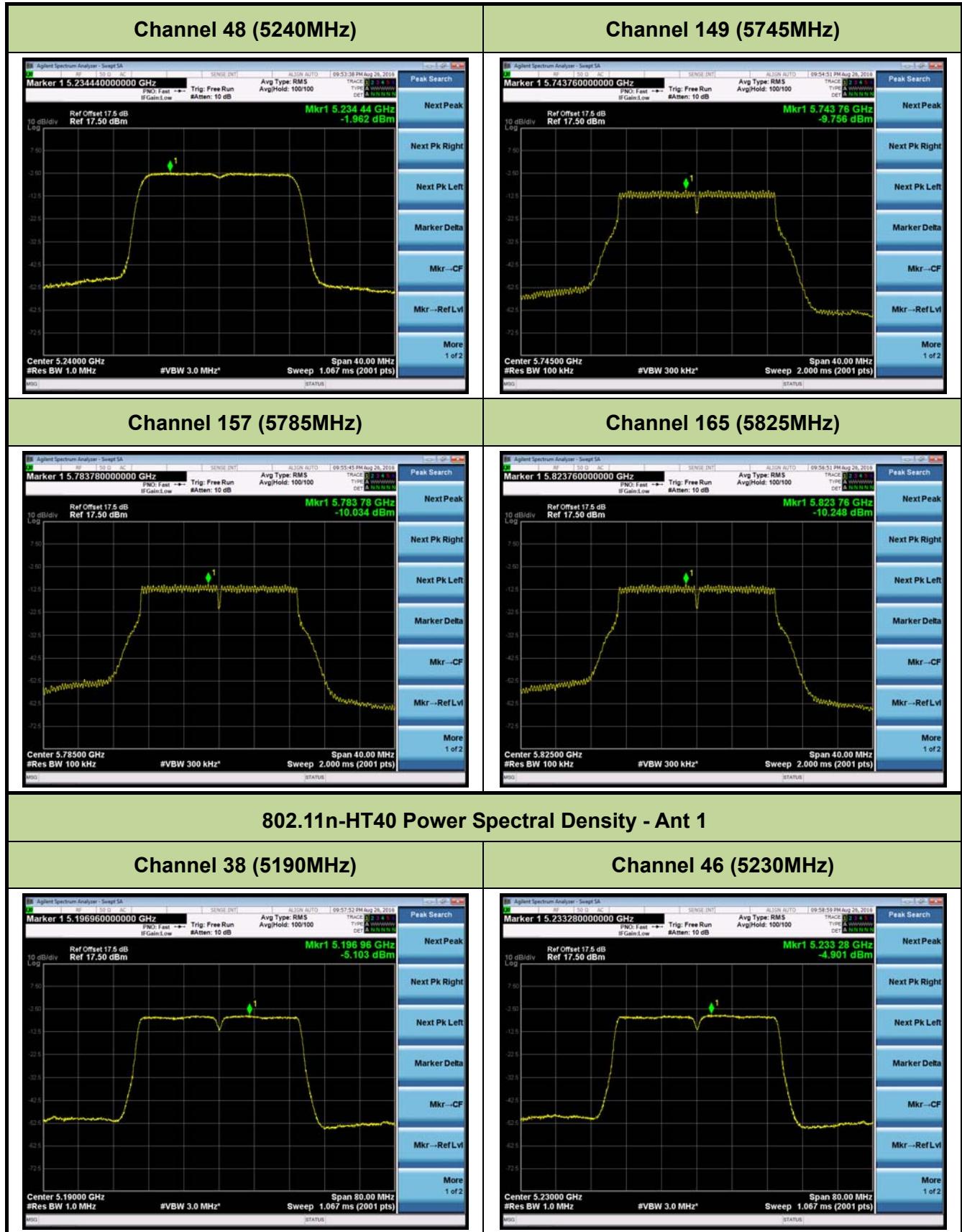


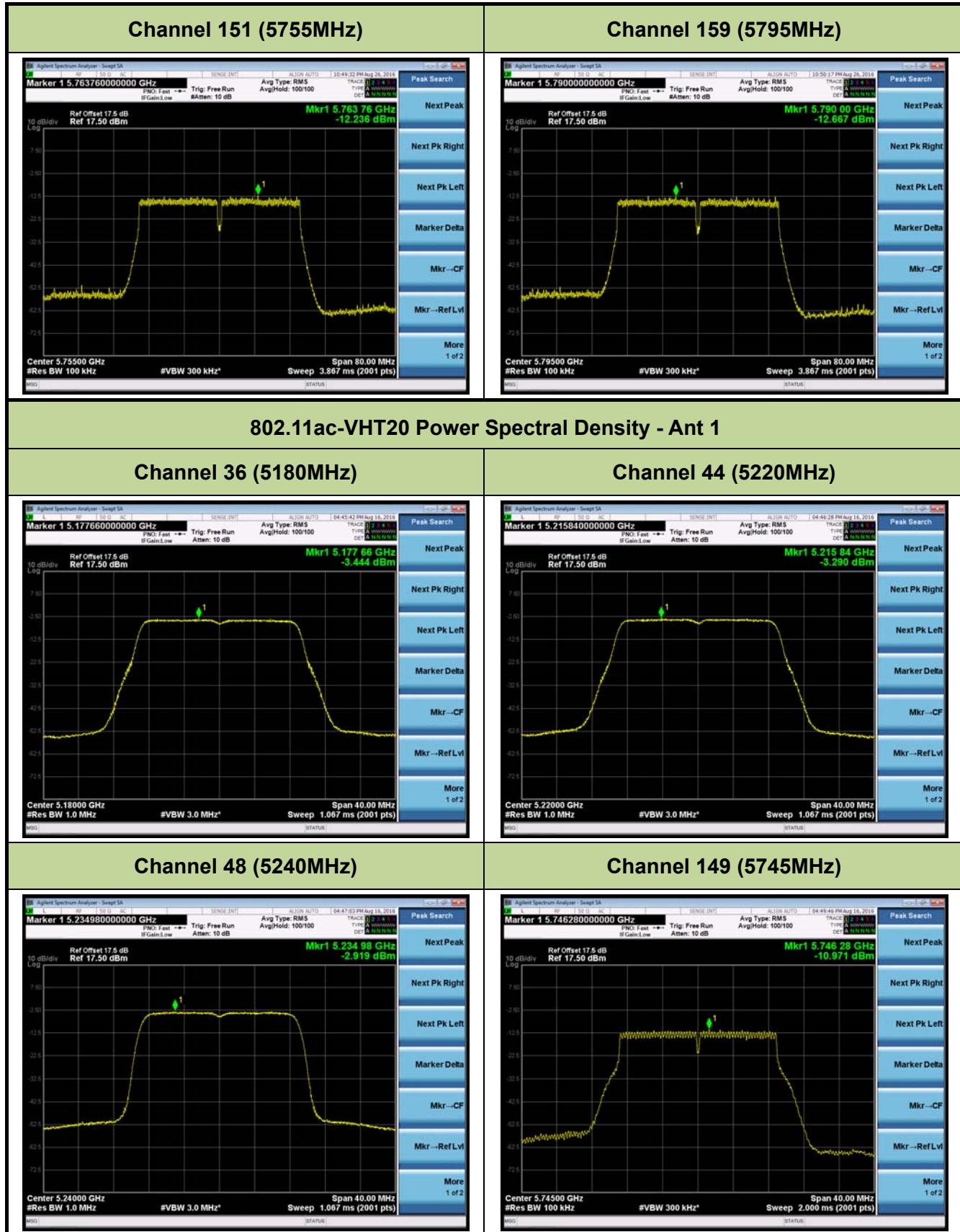


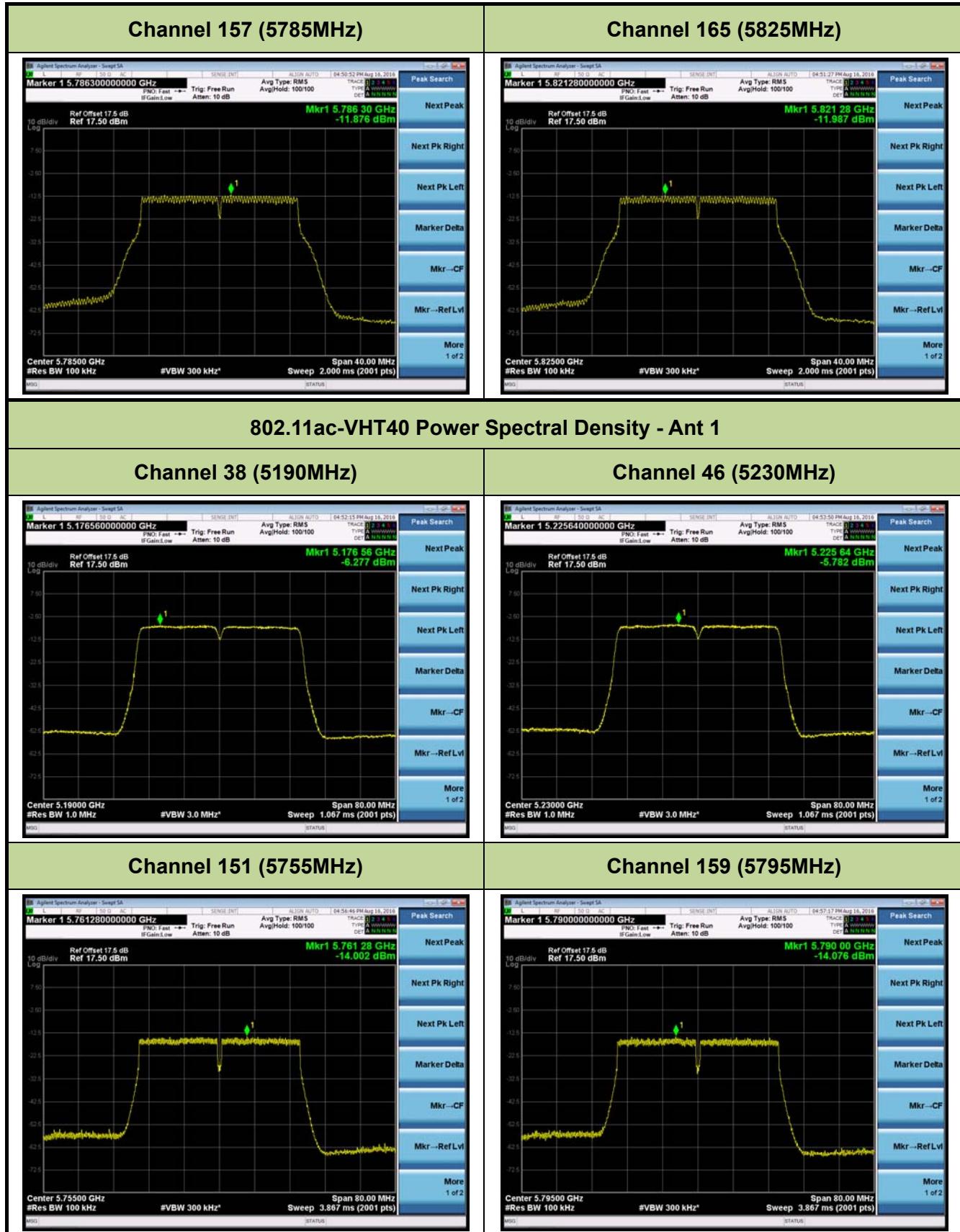


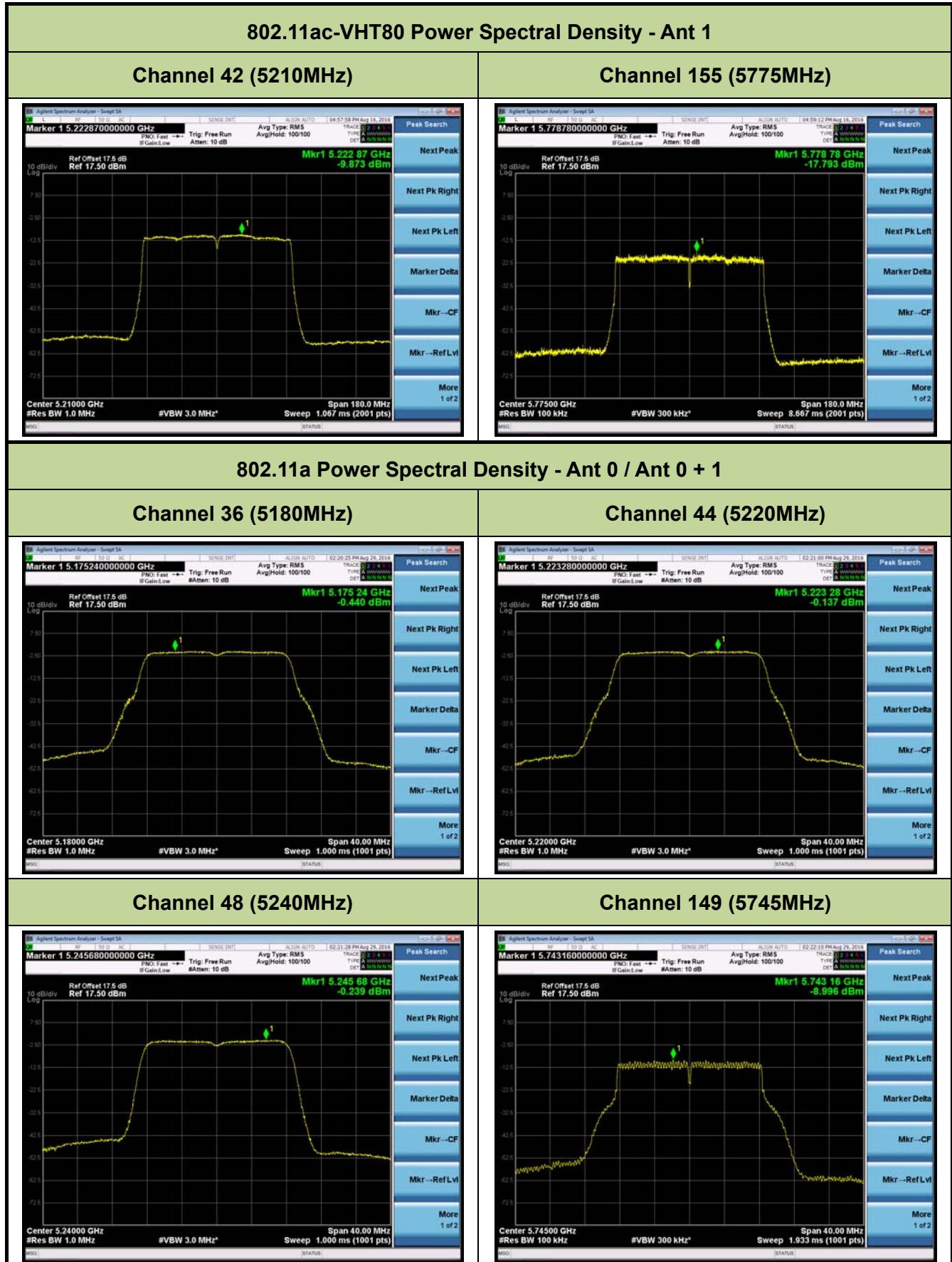


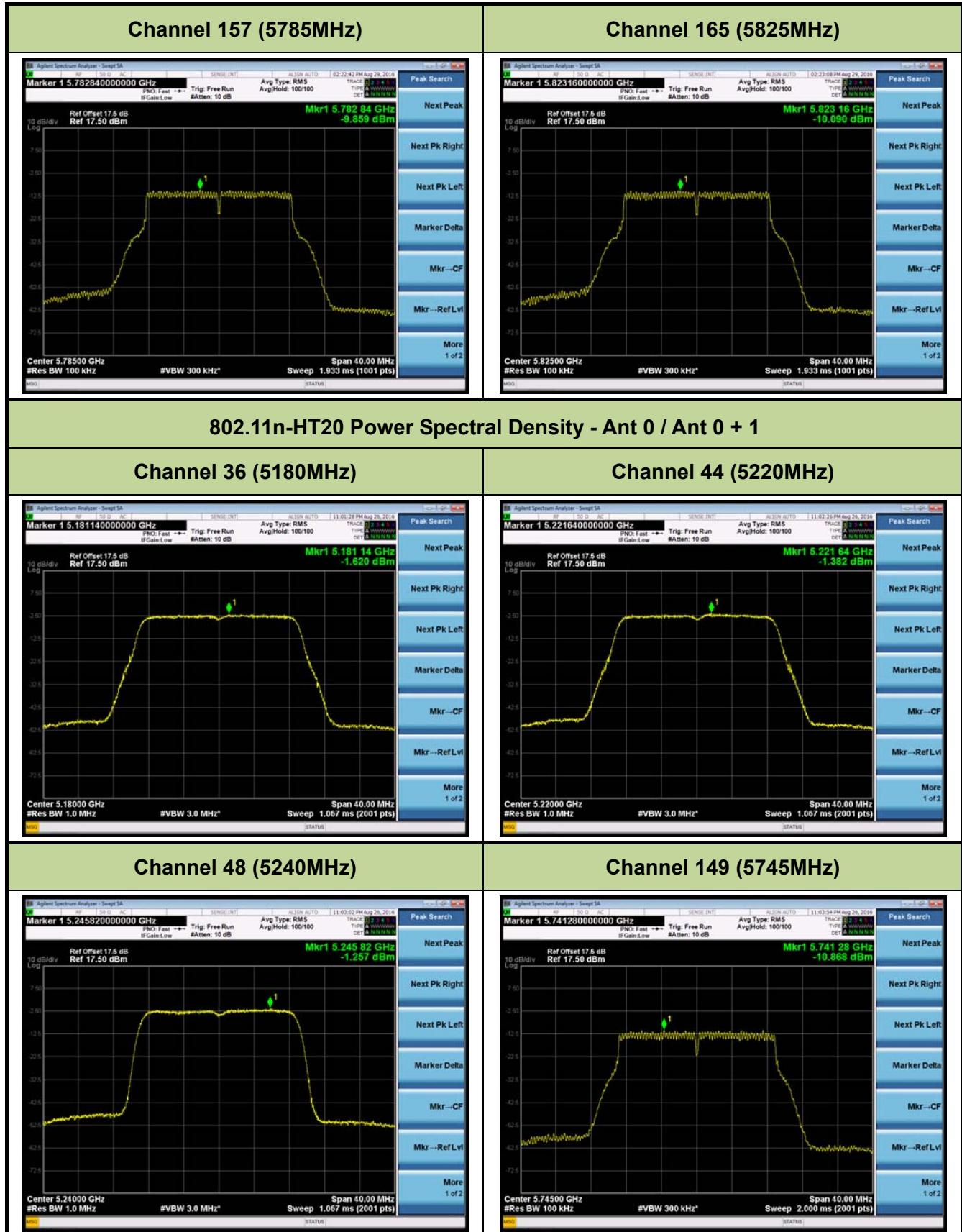




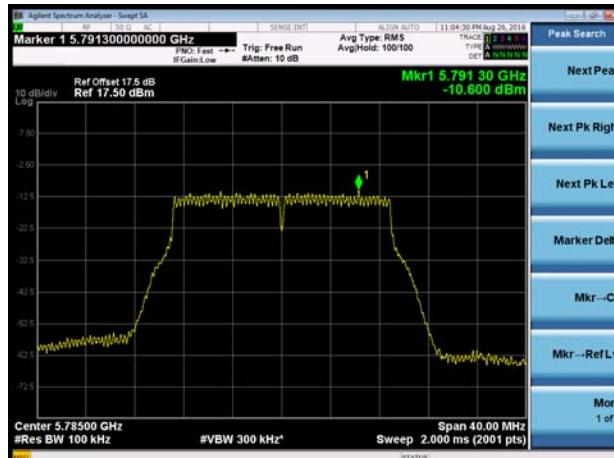




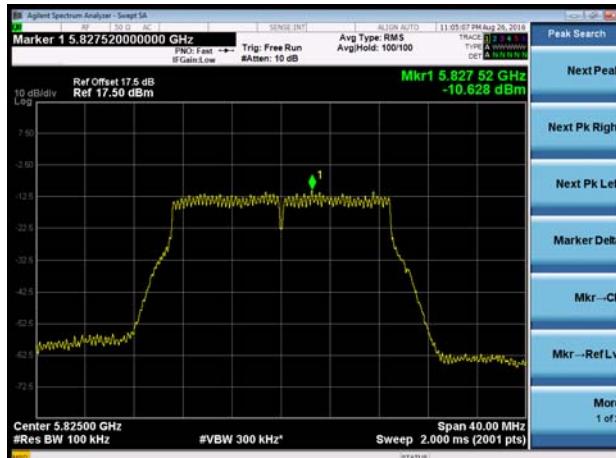




### Channel 157 (5785MHz)

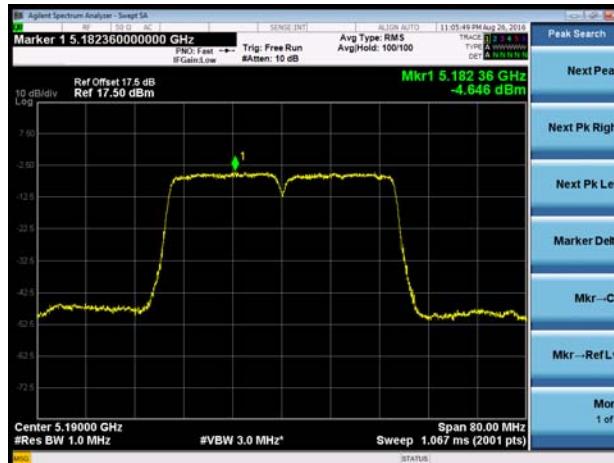


### Channel 165 (5825MHz)

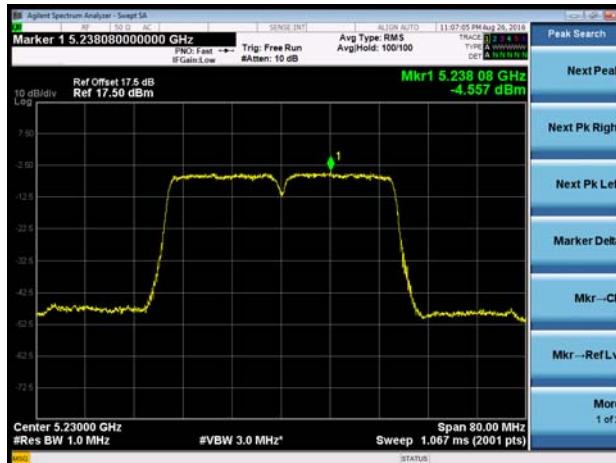


### 802.11n-HT40 Power Spectral Density - Ant 0 / Ant 0 + 1

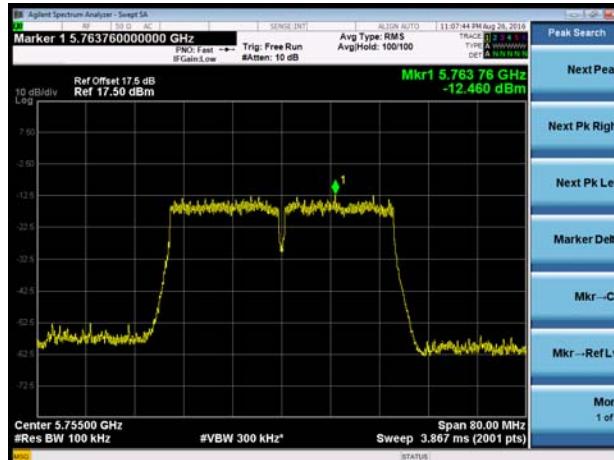
#### Channel 38 (5190MHz)



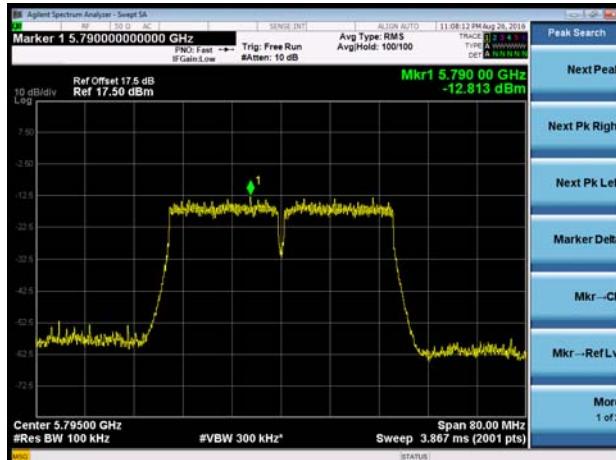
#### Channel 46 (5230MHz)



#### Channel 151 (5755MHz)



#### Channel 159 (5795MHz)

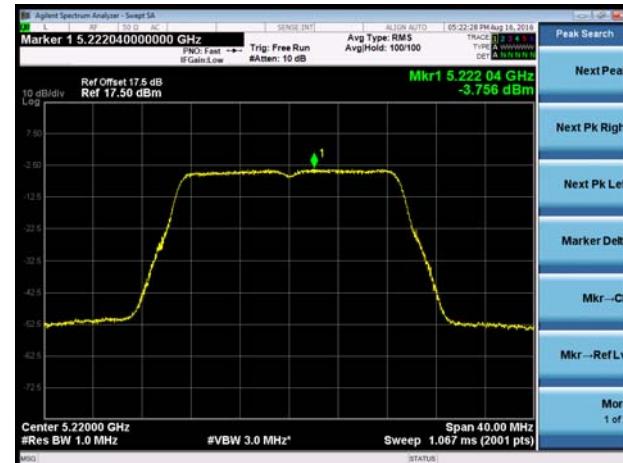


### 802.11ac-VHT20 Power Spectral Density - Ant 0 / Ant 0 + 1

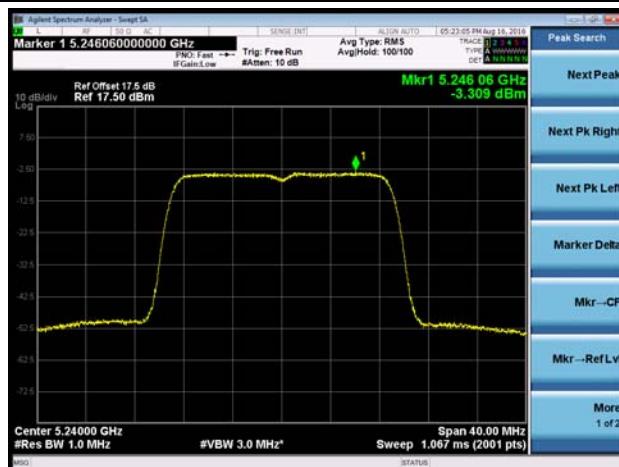
#### Channel 36 (5180MHz)



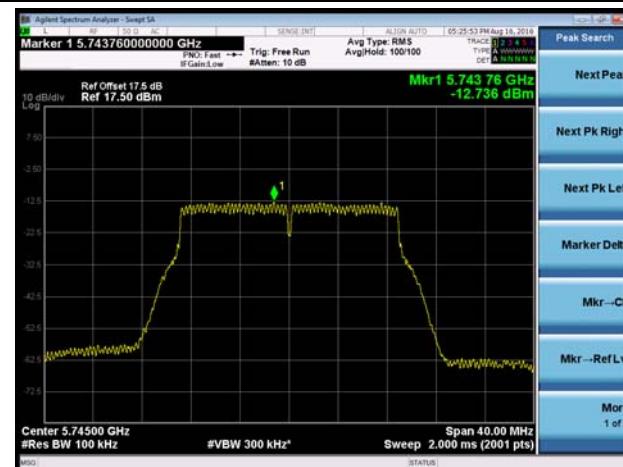
#### Channel 44 (5220MHz)



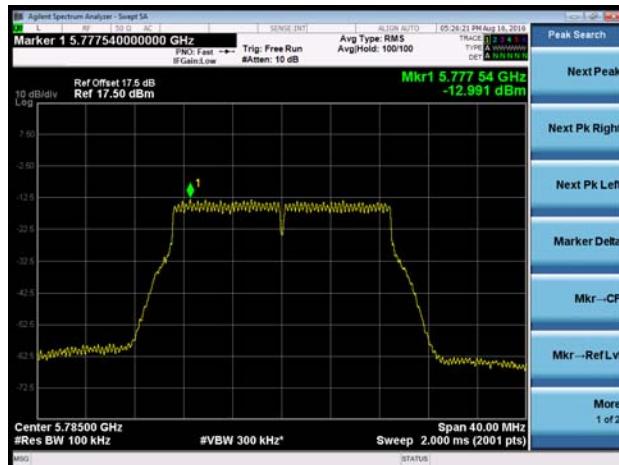
#### Channel 48 (5240MHz)



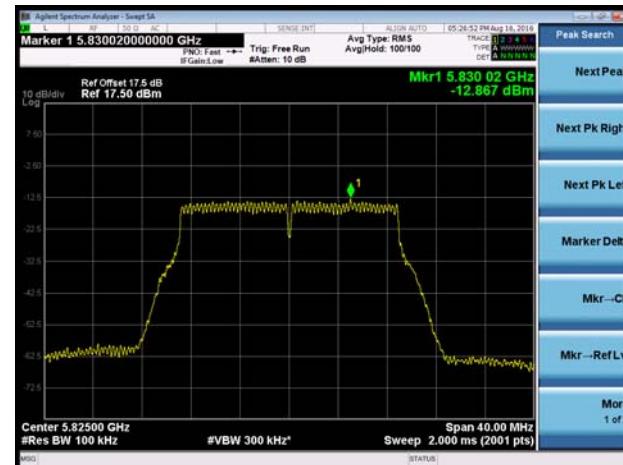
#### Channel 149 (5745MHz)



#### Channel 157 (5785MHz)

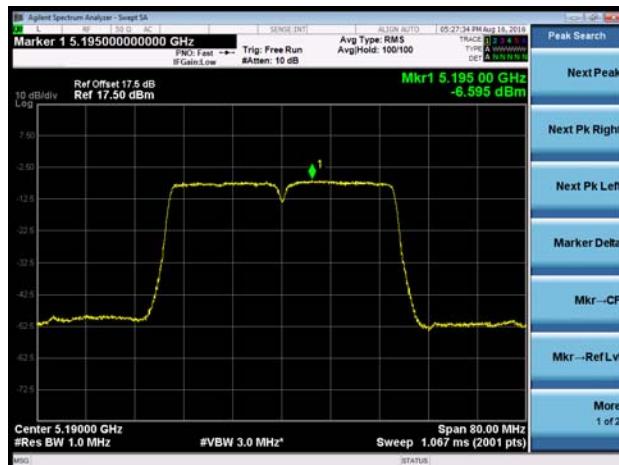


#### Channel 165 (5825MHz)

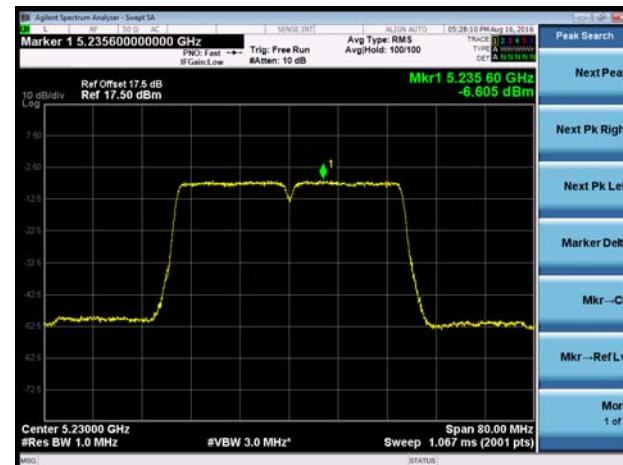


### 802.11ac-VHT40 Power Spectral Density - Ant 0 / Ant 0 + 1

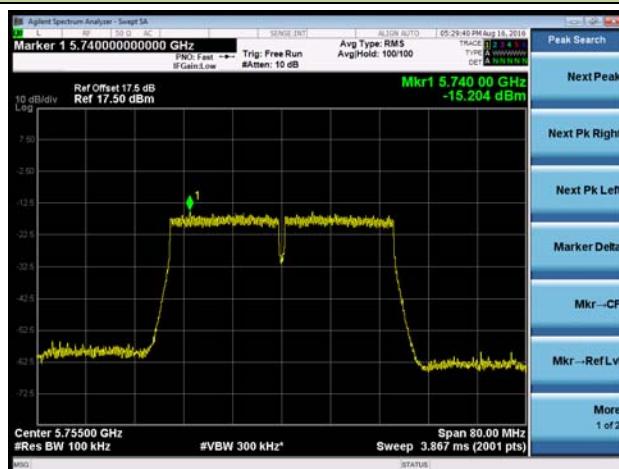
Channel 38 (5190MHz)



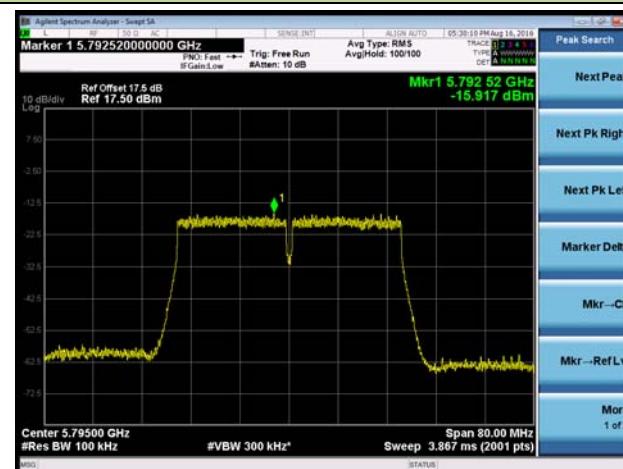
Channel 46 (5230MHz)



Channel 151 (5755MHz)



Channel 159 (5795MHz)

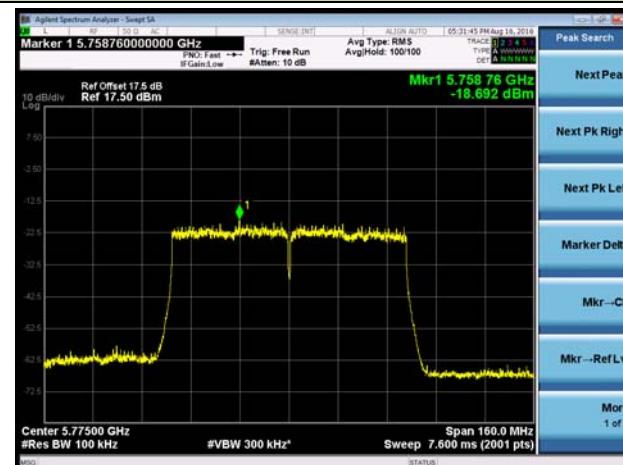


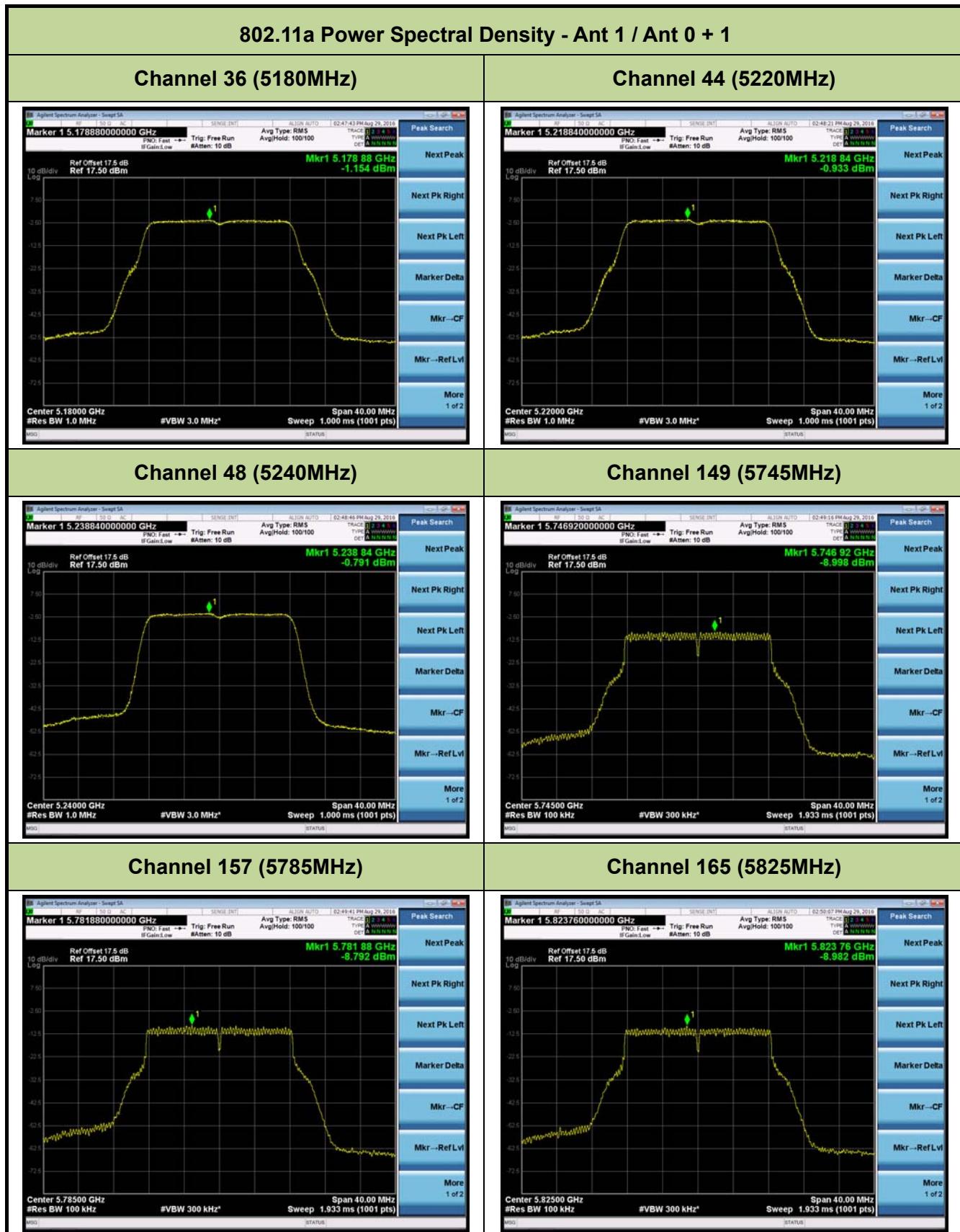
### 802.11ac-VHT80 Power Spectral Density - Ant 0 / Ant 0 + 1

Channel 42 (5210MHz)



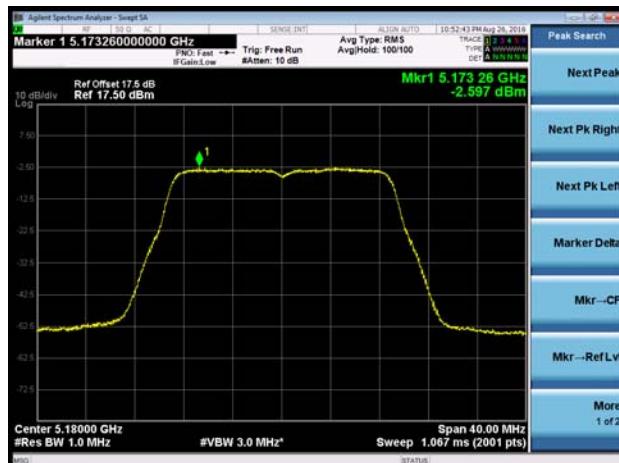
Channel 155 (5775MHz)



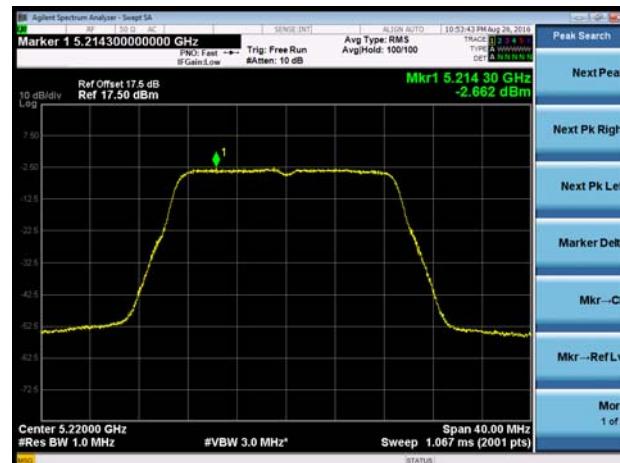


### 802.11n-HT20 Power Spectral Density - Ant 1 / Ant 0 + 1

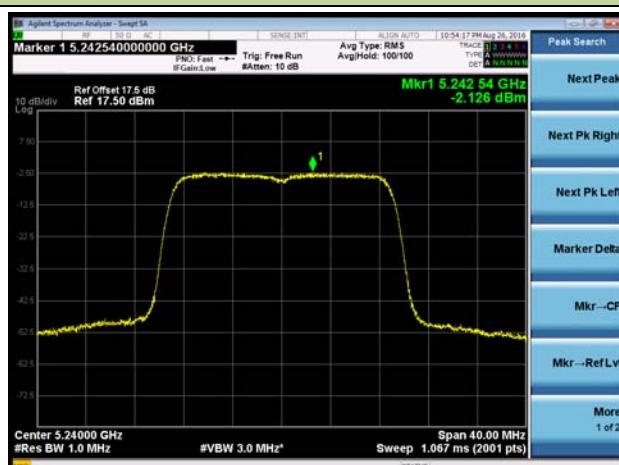
#### Channel 36 (5180MHz)



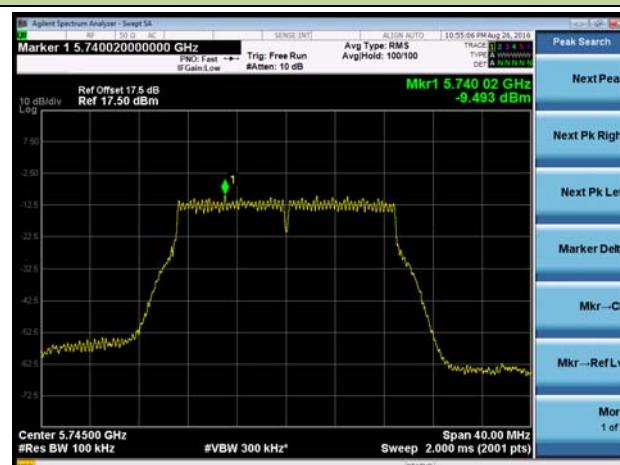
#### Channel 44 (5220MHz)



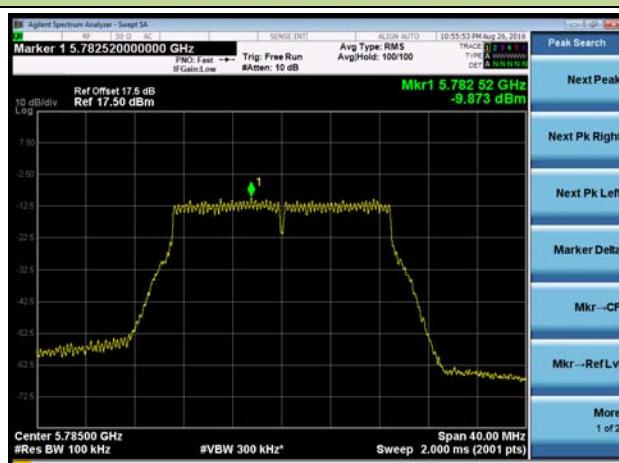
#### Channel 48 (5240MHz)



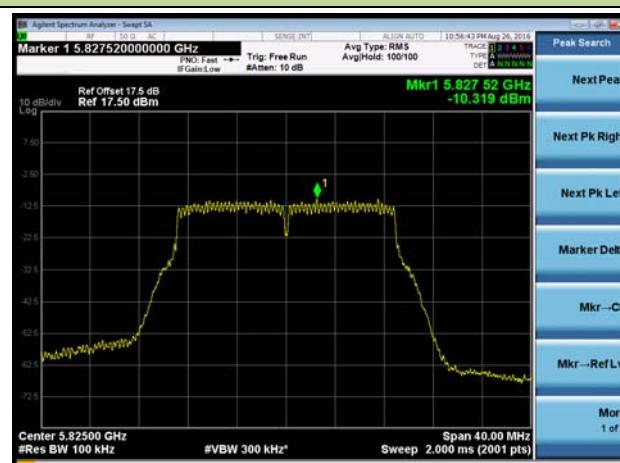
#### Channel 149 (5745MHz)



#### Channel 157 (5785MHz)

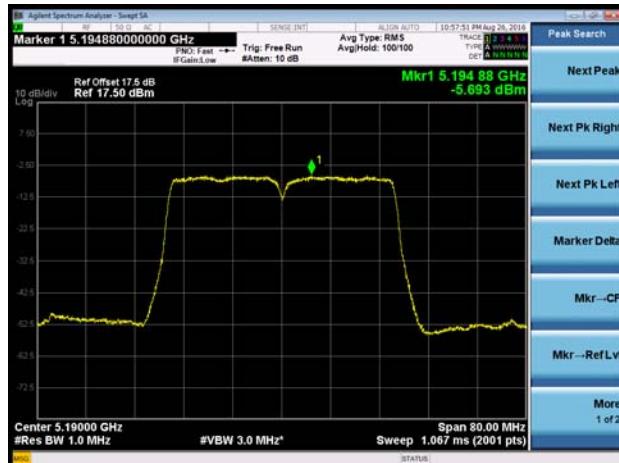


#### Channel 165 (5825MHz)

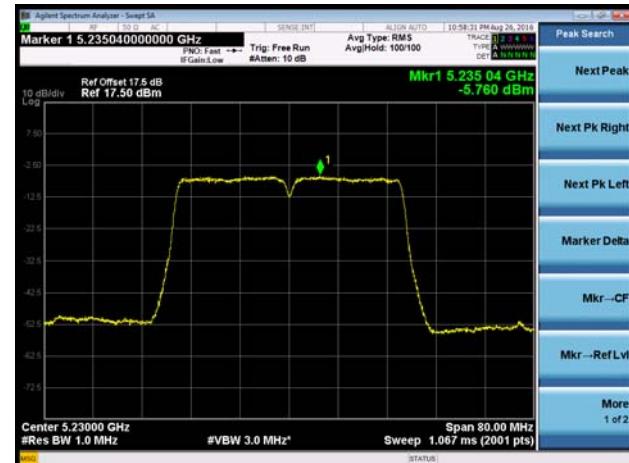


### 802.11n-HT40 Power Spectral Density - Ant 1 / Ant 0 + 1

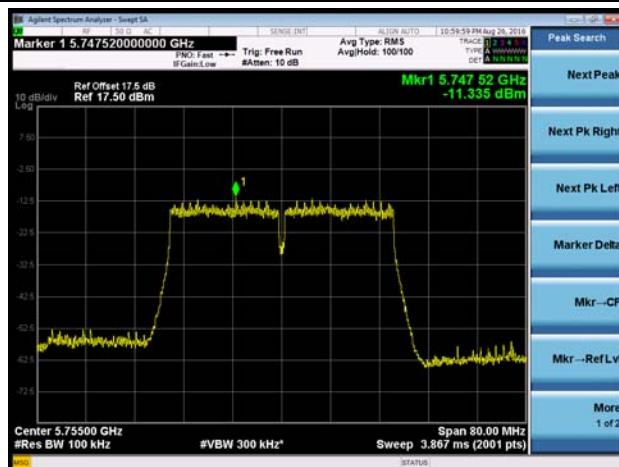
Channel 38 (5190MHz)



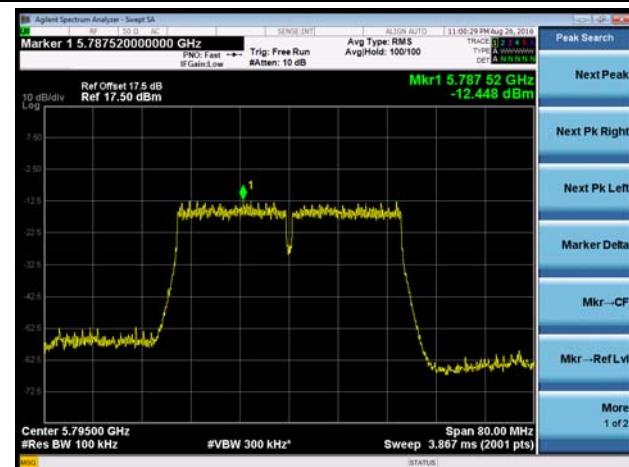
Channel 46 (5230MHz)



Channel 151 (5755MHz)



Channel 159 (5795MHz)

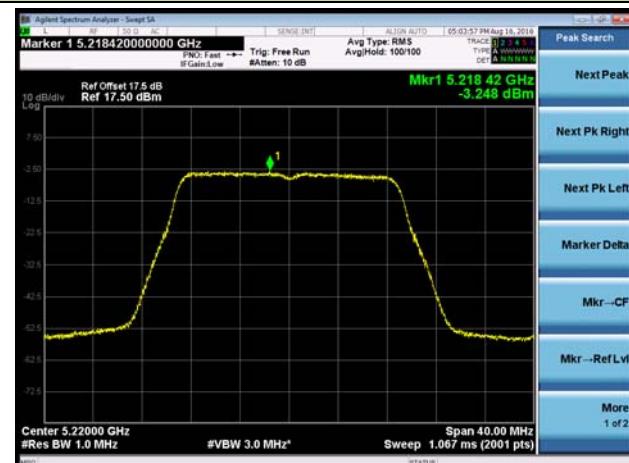


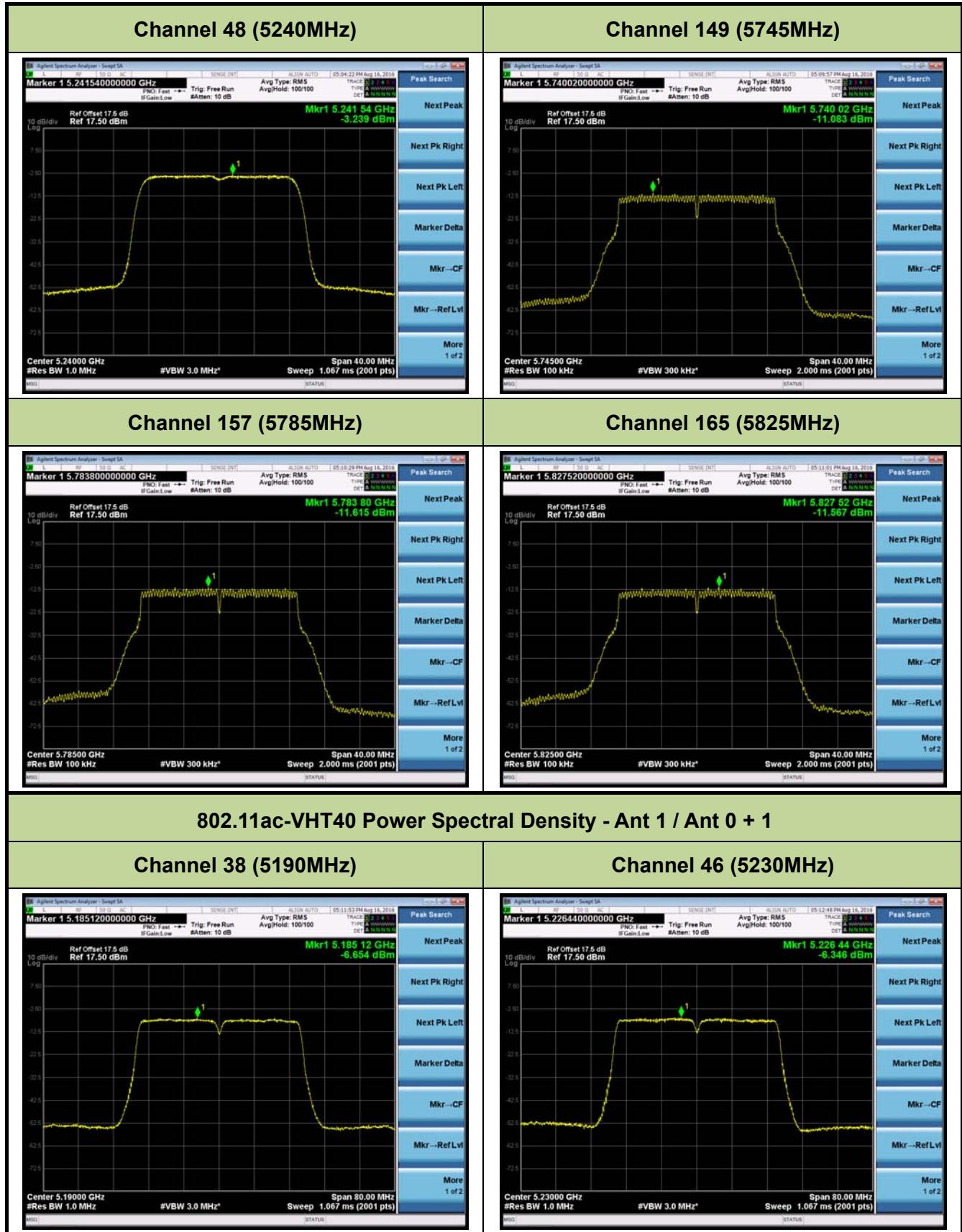
### 802.11ac-VHT20 Power Spectral Density - Ant 1 / Ant 0 + 1

Channel 36 (5180MHz)



Channel 44 (5220MHz)

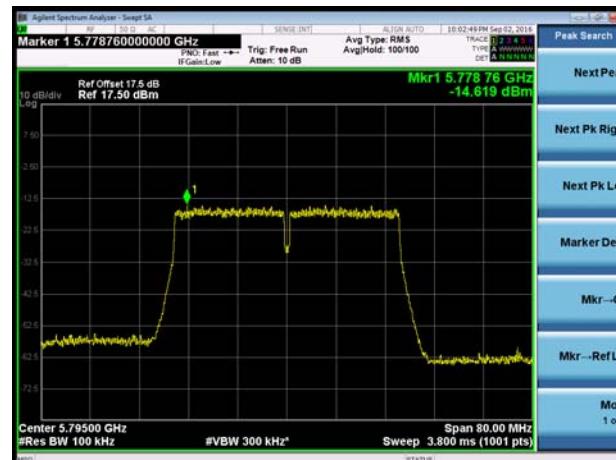




### Channel 151 (5755MHz)



### Channel 159 (5795MHz)

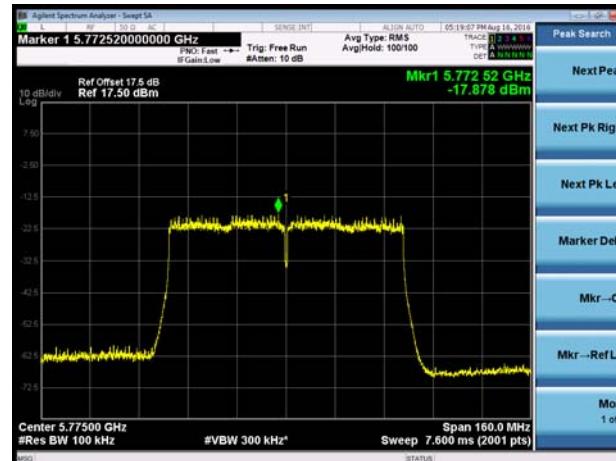


### 802.11ac-VHT80 Power Spectral Density - Ant 1 / Ant 0 + 1

#### Channel 42 (5210MHz)



#### Channel 155 (5775MHz)



## 7.6. Frequency Stability Measurement

### 7.6.1. Test Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 7.6.2. Test Procedure Used

#### Frequency Stability Under Temperature Variations:

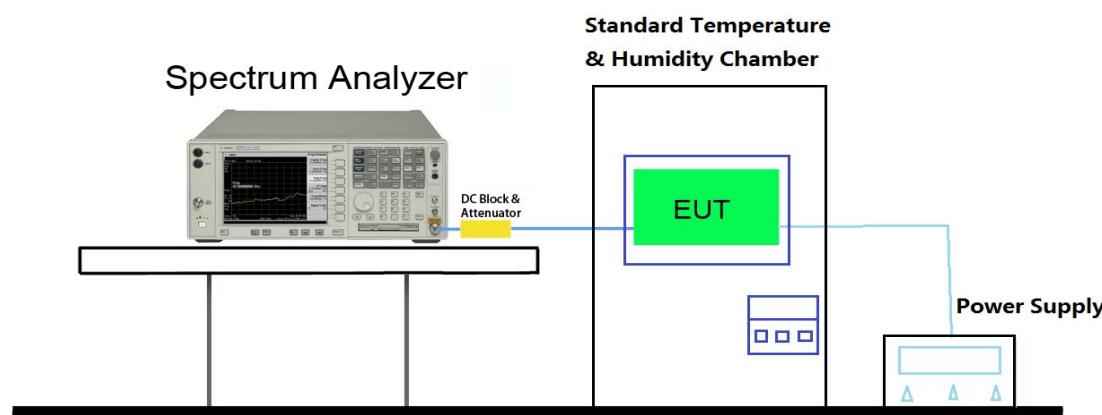
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

#### Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

### 7.6.3. Test Setup



#### 7.6.4. Test Result

Test Engineer	Vince Yu	Temperature	-30 ~ 50°C
Test Time	08-20-2016	Relative Humidity	52%RH

Voltage (%)	Power (VAC)	Temp (°C)	Frequency Tolerance (ppm)			
			0 minutes	2 minutes	5 minutes	10 minutes
100%	120	- 30	-3.23	-3.04	-2.23	-1.68
		- 20	-3.41	-3.18	-2.66	-1.94
		- 10	-3.16	-2.91	-2.03	-1.62
		0	-2.87	-2.33	-1.67	-1.02
		+ 10	-1.13	-1.82	-1.28	-0.31
		+ 20 (Ref)	-0.25	-1.63	-0.51	0.17
		+ 30	-1.39	-1.17	-1.18	-1.02
		+ 40	-1.99	-0.83	-1.52	-1.79
		+ 50	-2.03	-1.52	-2.34	-2.33
115%	138	+ 20	-2.45	-2.34	-2.90	-2.89
85%	102	+ 20	-3.02	-2.76	-3.32	-3.32

Note: Frequency Tolerance (ppm) = {[Measured Frequency (Hz) – Declared Frequency (Hz)] / Declared Frequency (Hz)} \*10<sup>6</sup>.

## 7.7. Radiated Spurious Emission Measurement

### 7.7.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

### 7.7.2. Test Procedure Used

KDB 789033 D02v01r03 – Section G

### 7.7.3. Test Setting

#### Peak Measurements above 1GHz

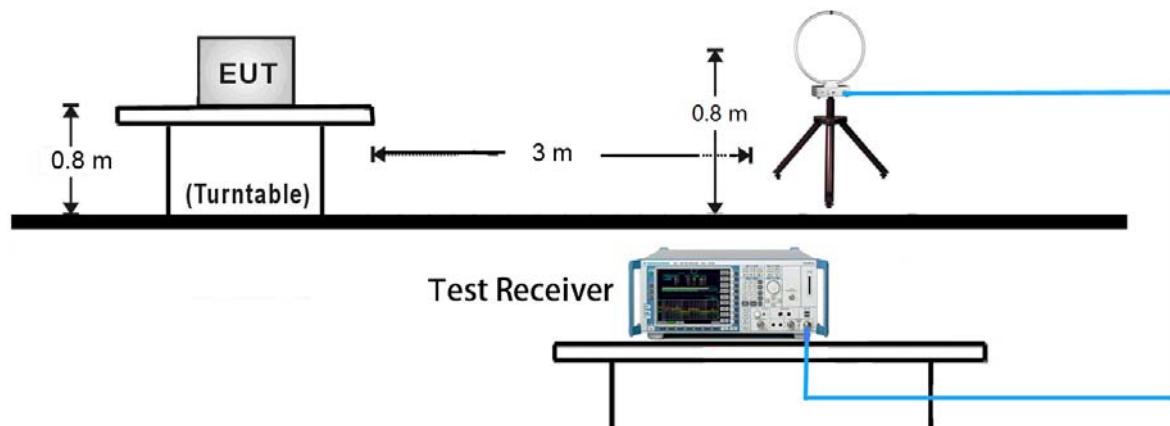
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

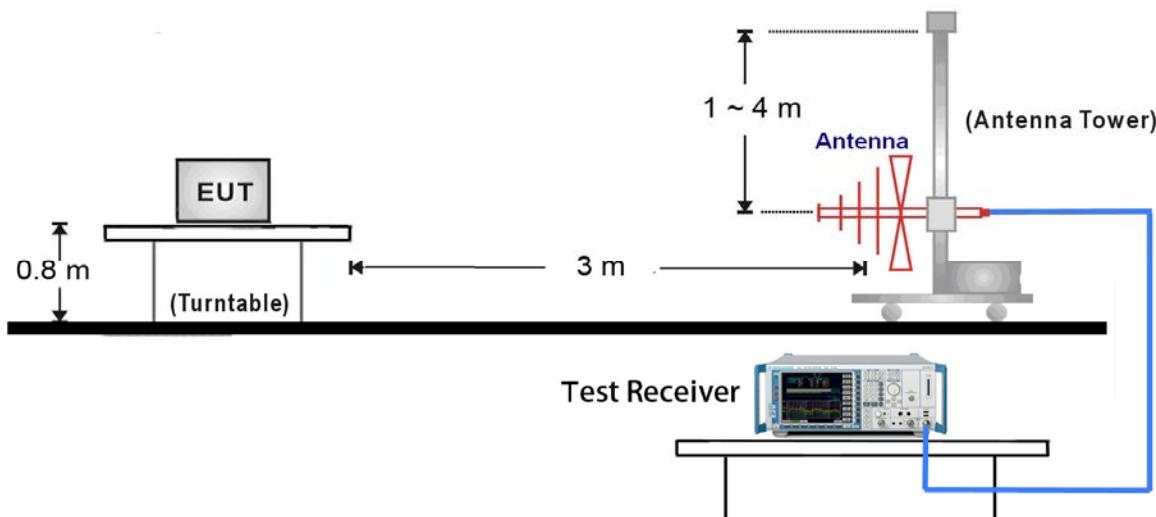
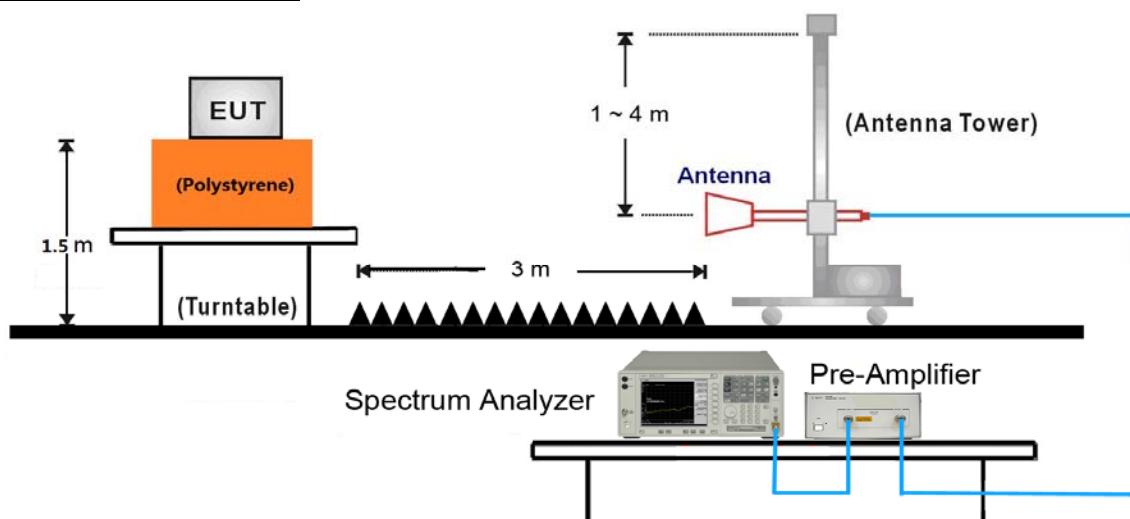
**Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

**Average Measurements above 1GHz (Method AD)**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be  $> 2 \times \text{span}/\text{RBW}$ )
6. Sweep time = auto
7. Trace was averaged over at 100 sweeps

**7.7.4. Test Setup****9kHz ~ 30MHz Test Setup:**

30MHz ~ 1GHz Test Setup:

1GHz ~18GHz Test Setup:

18GHz ~40GHz Test Setup:
