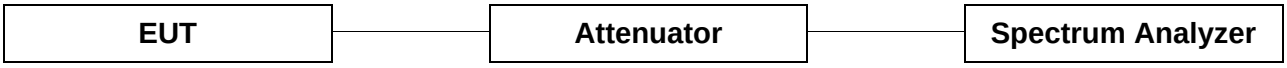
3. 6 dB Bandwidth Measurement

3.1. Test Setup



3.2. Limit

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 ~928 ㎒, 2 400 ~ 2 483.5 ㎒, and 5 725 ~ 5 825 ㎒ bands. The minimum of 6 dB Bandwidth shall be at least 500 ㎑

3.3. Test Procedure

3.3.1. 6 dB Bandwidth

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.

The test follows section 8.0 DTS bandwidth of FCC KDB Publication 558074_v03r01
Tests performed using section 8.2 Option 2.

- Option 2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i,e., RBW = 100 ㎑, VBW ≥ 3 x RBW, peak detector with maximum hold) is implemented by the instrumentation function.
When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

1. Set RBW = 100 ㎑
2. Set the video bandwidth (VBW) ≥ 3 x RBW
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple
6. Allow the trace to stabilize.

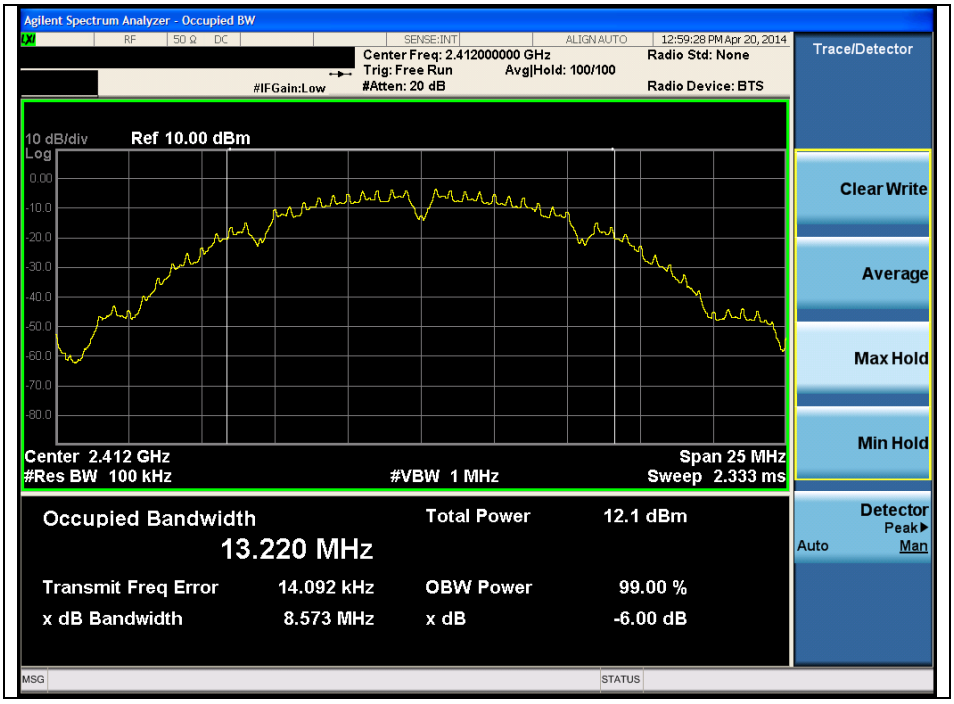
3.4. Test Results

Ambient temperature : (23 ± 2) ℃
Relative humidity : 47 % R.H.

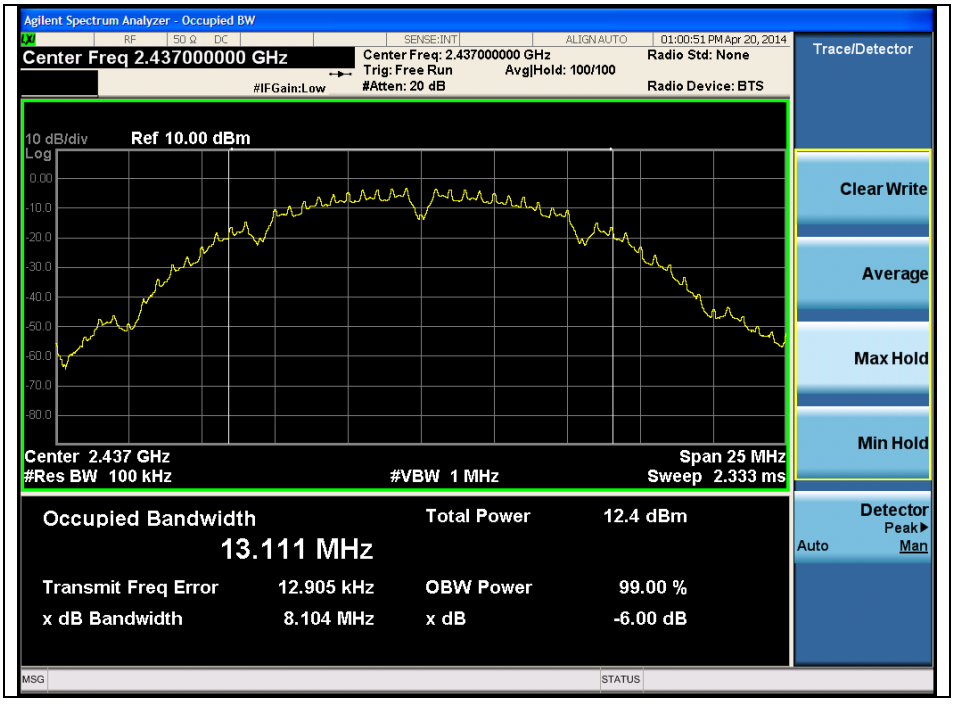
Mode	Frequency (㎒)	Ch.	Data Rate	6 ㏈ Bandwidth (㎒)
11b	2 412	1	1	8.57
	2 437	6	1	8.10
	2 462	11	1	8.57
11g	2 412	1	6	16.39
	2 437	6	6	16.39
	2 462	11	6	16.38
11n_HT20	2 412	1	MCS0	17.60
	2 437	6	MCS0	17.60
	2 462	11	MCS0	17.60
11a	5 745	149	6	16.41
	5 785	157	6	16.38
	5 825	165	6	16.41
11an_HT20	5 745	149	MCS0	17.60
	5 785	157	MCS0	17.62
	5 825	165	MCS0	17.60
11an_HT40	5 755	151	MCS0	35.21
	5 795	159	MCS0	35.17
11ac_VHT20	5 745	149	MCS0	17.60
	5 785	157	MCS0	17.60
	5 825	165	MCS0	17.62
11ac_VHT40	5 755	151	MCS0	35.13
	5 795	159	MCS0	35.20
11ac_VHT80	5 775	155	MCS0	75.13

6 dB Bandwidth
DSSS : 802.11b

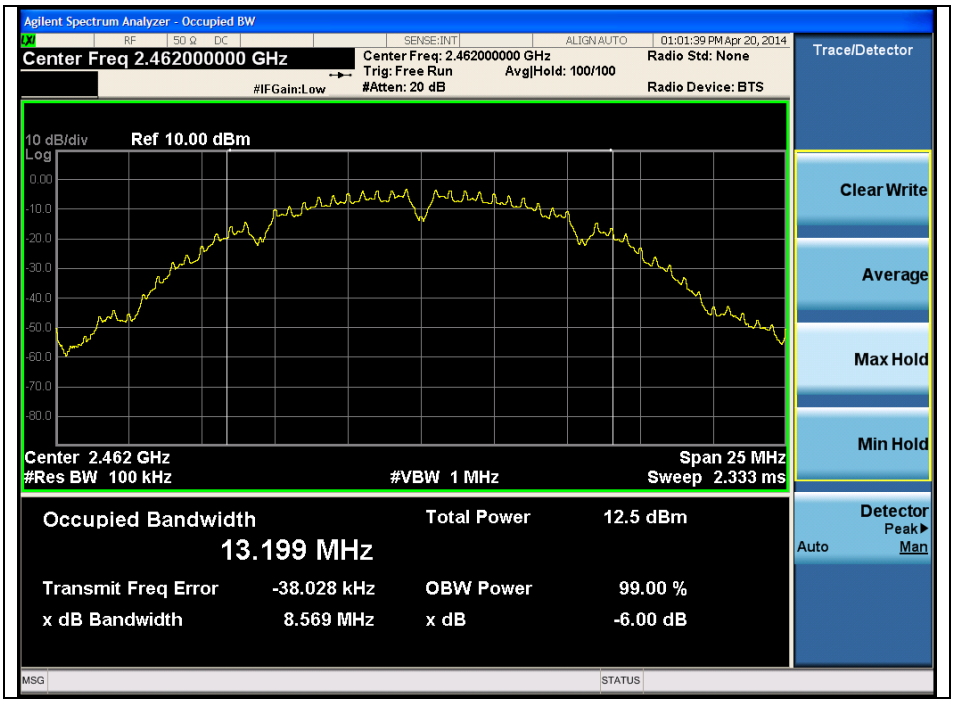
Low Channel



Middle Channel

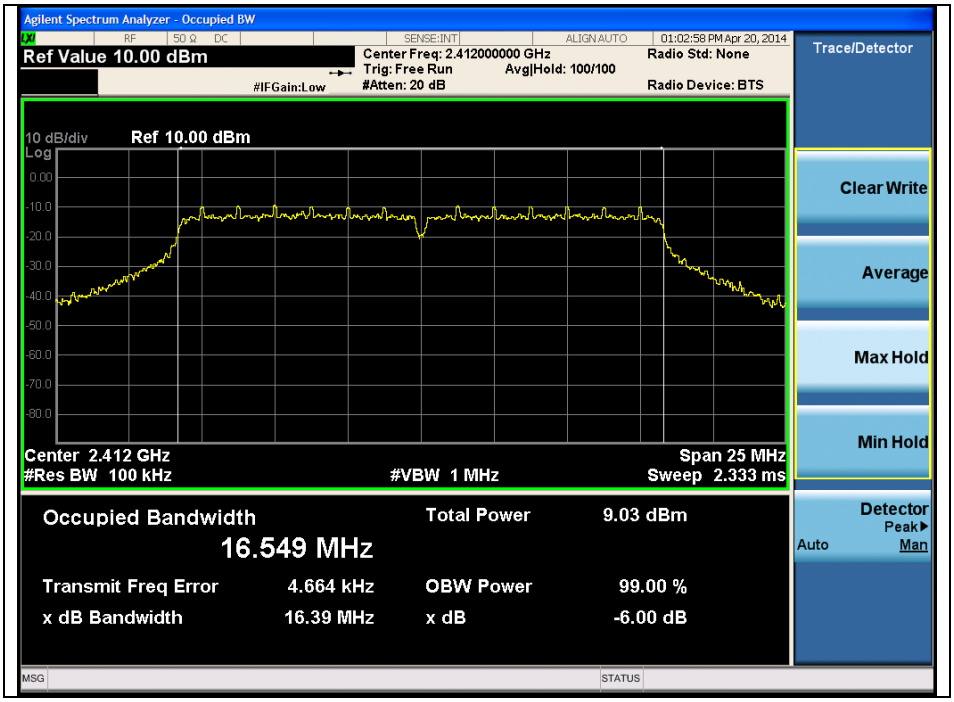


High Channel

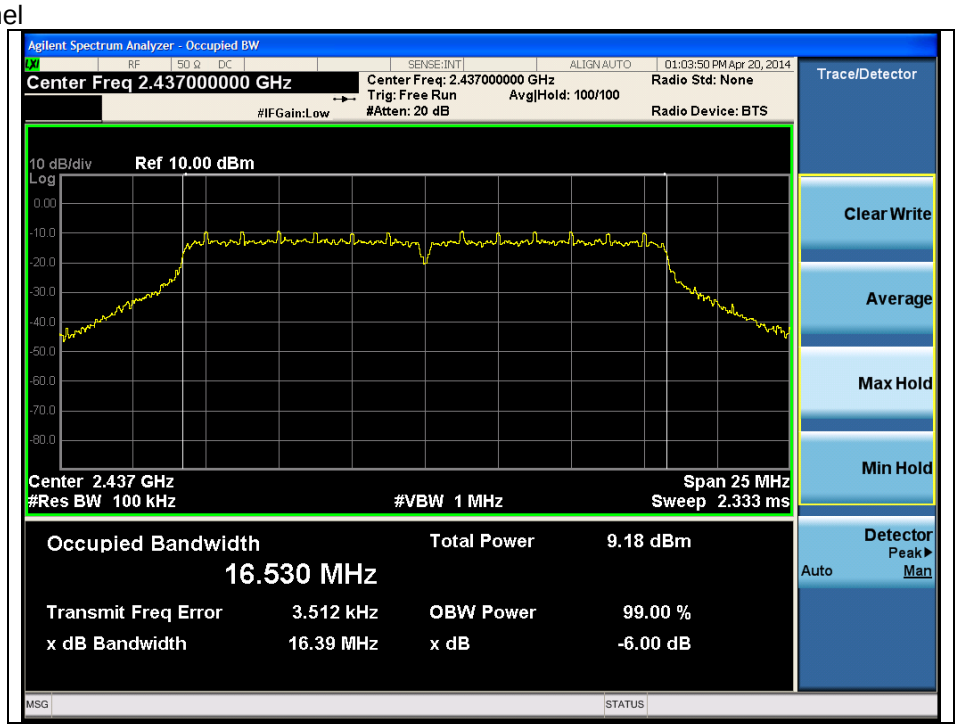


OFDM : 802.11g

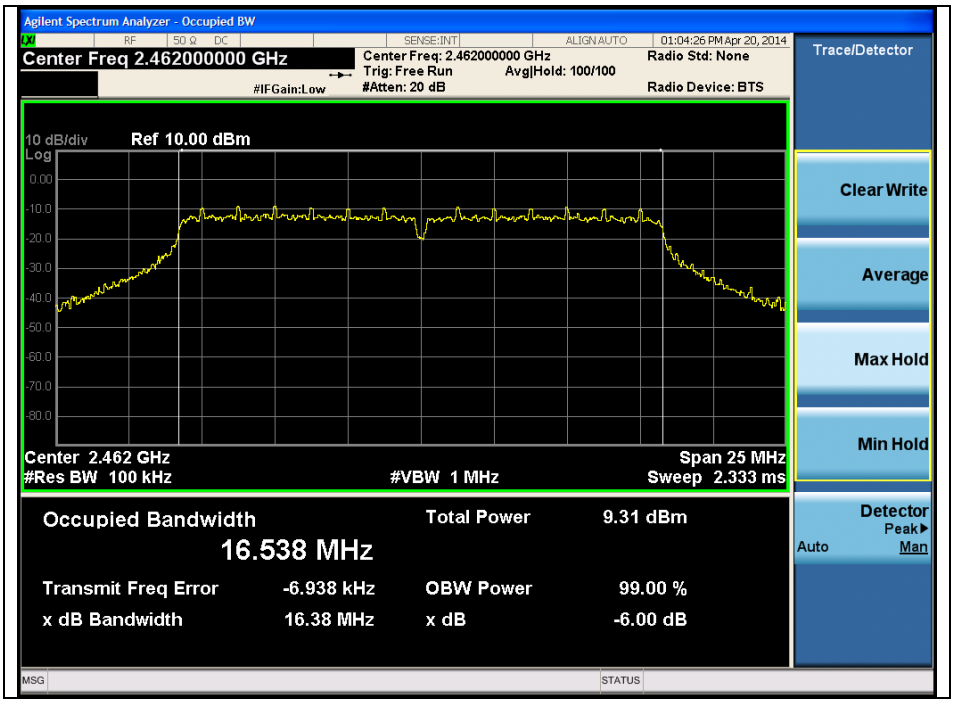
Low Channel



Middle Channel

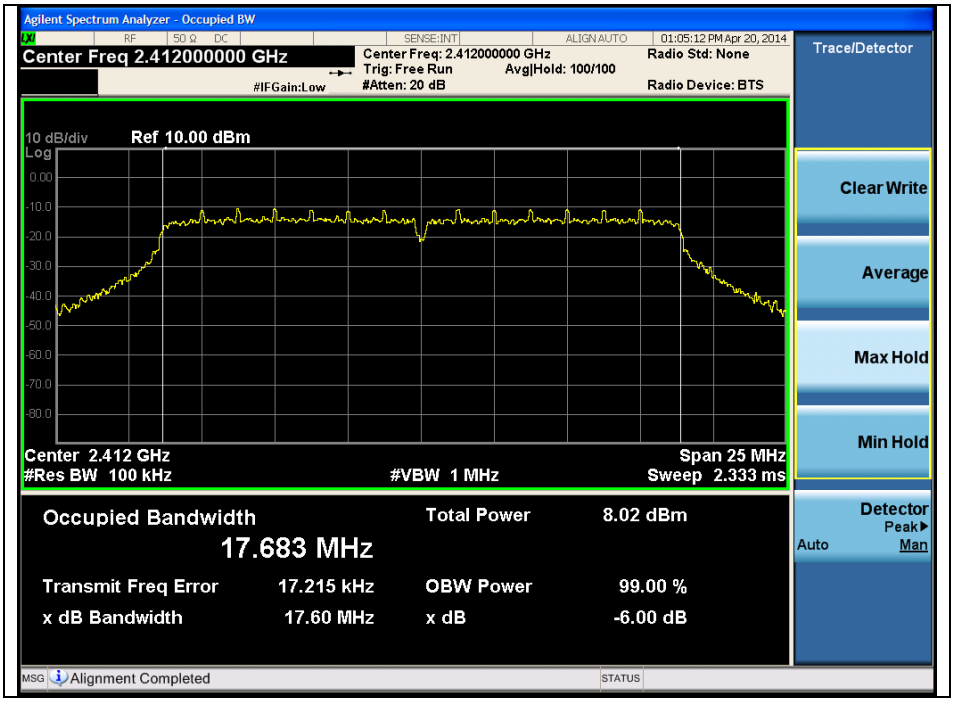


High Channel

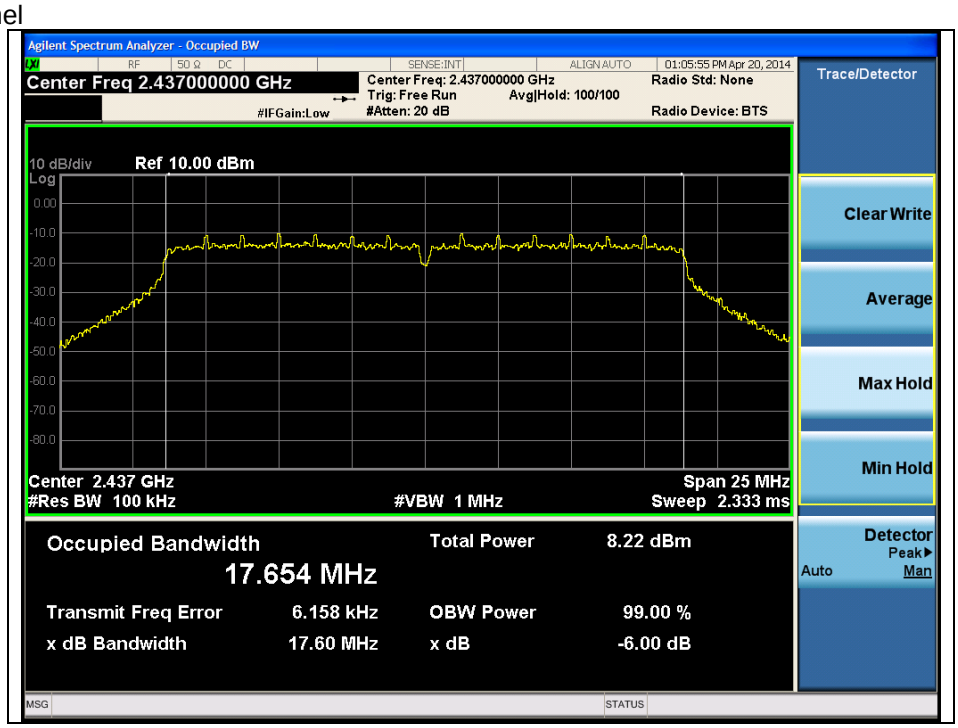


OFDM : 802.11n_HT20

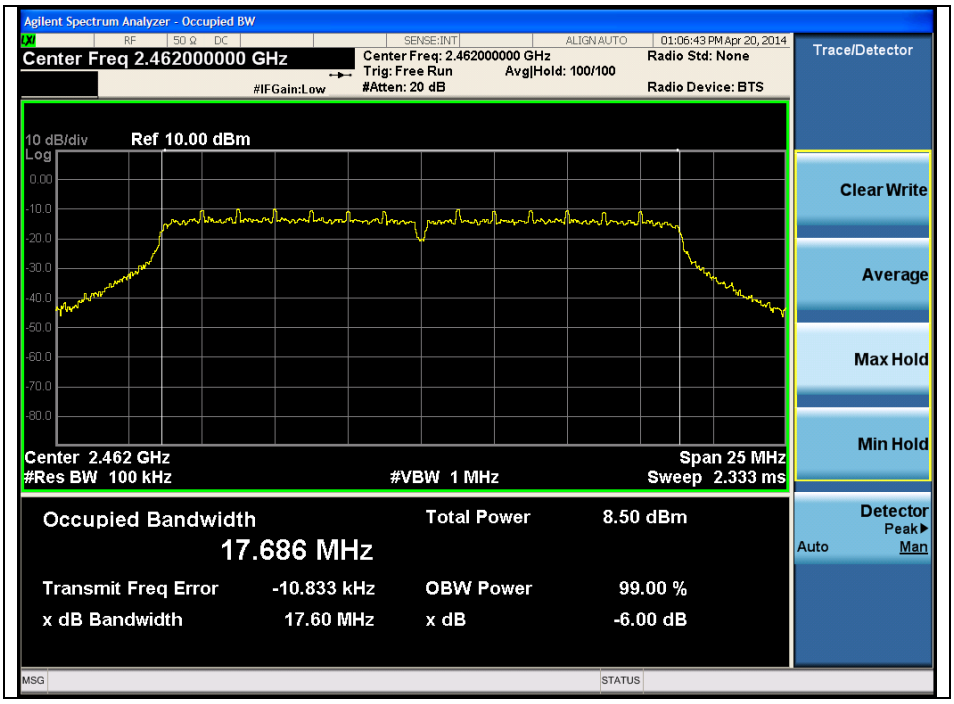
Low Channel



Middle Channel

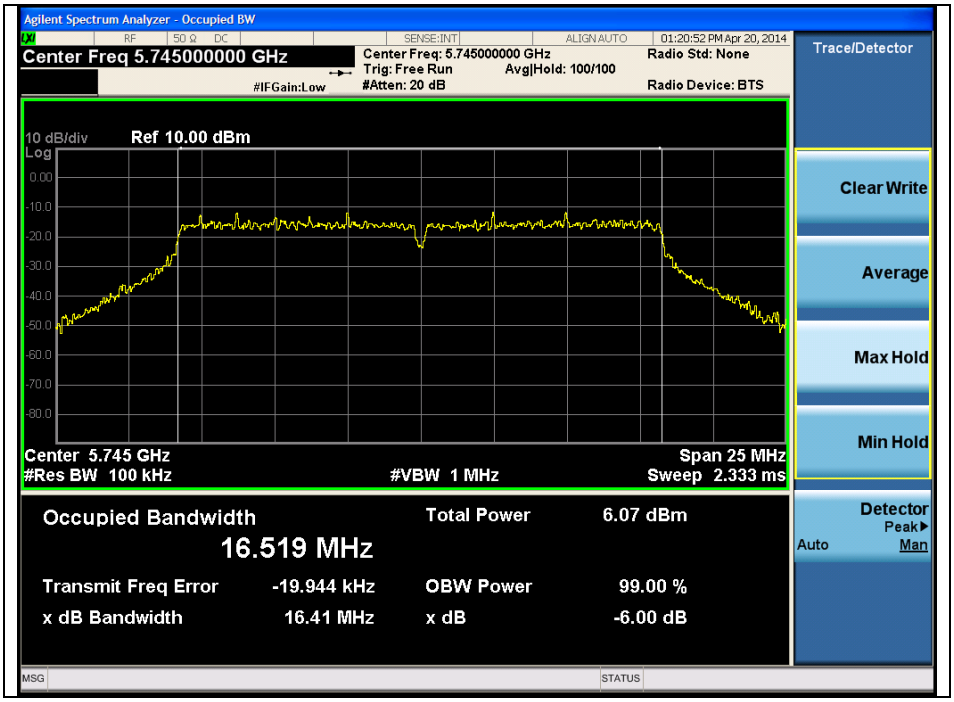


High Channel

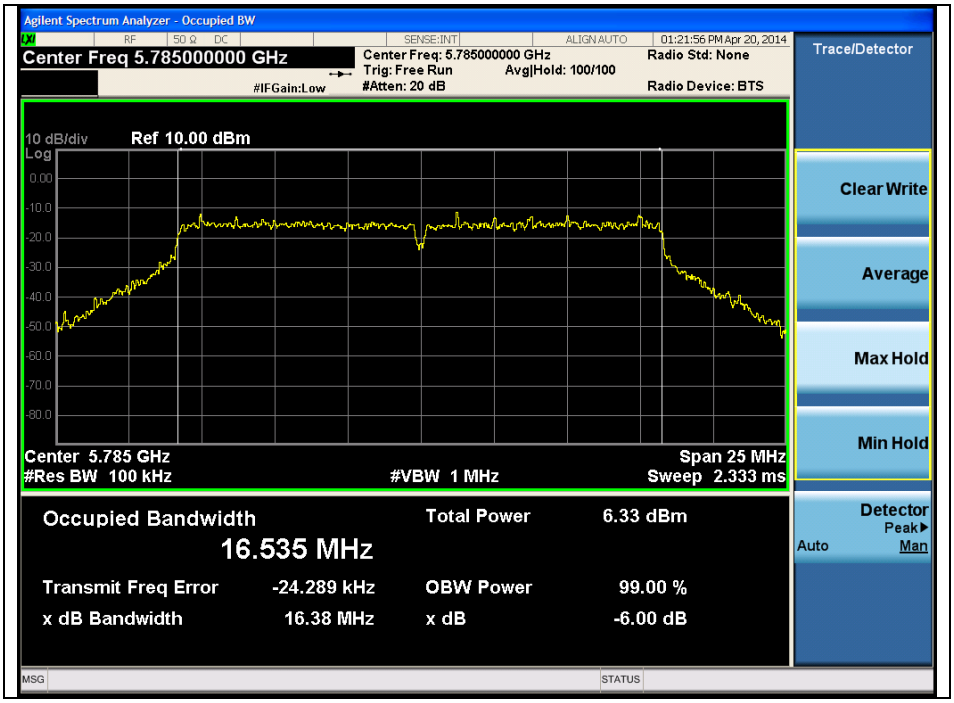


OFDM : 802.11a

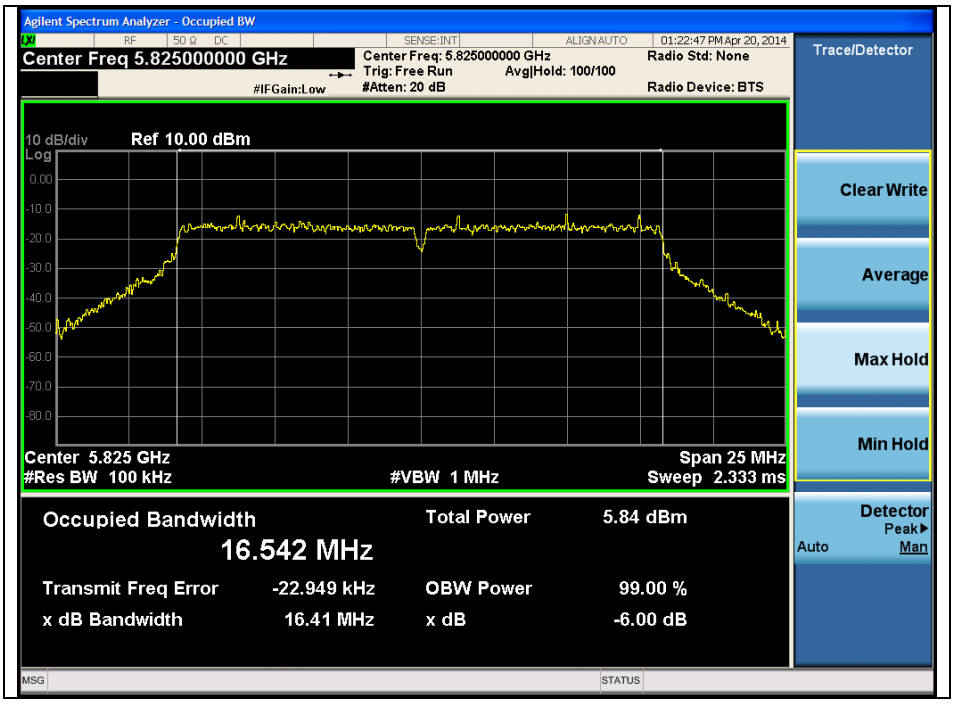
Low Channel



Middle Channel

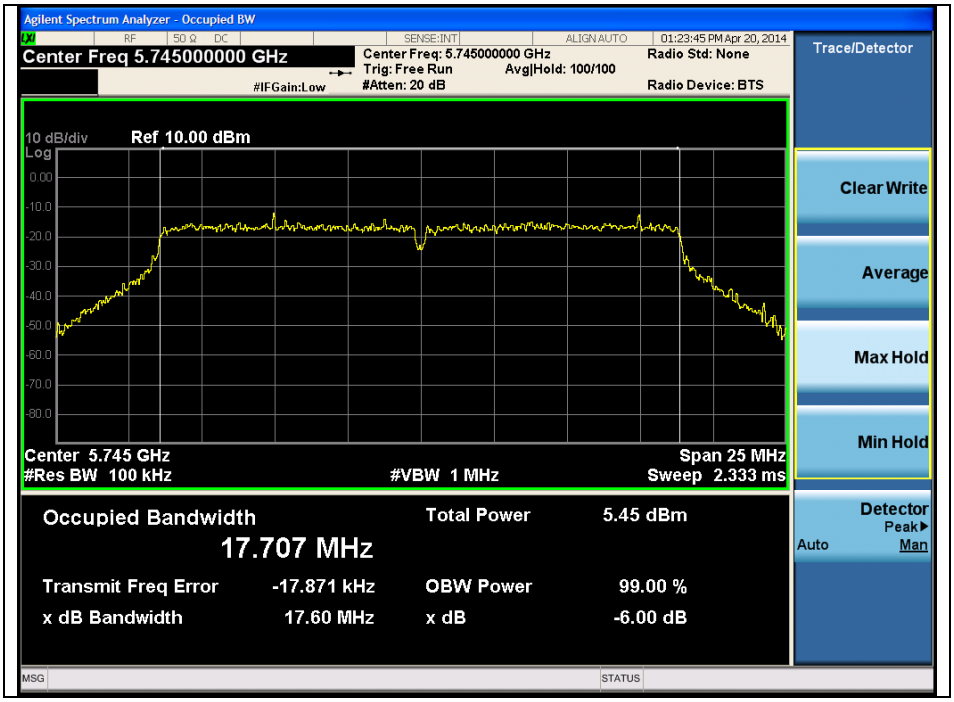


High Channel

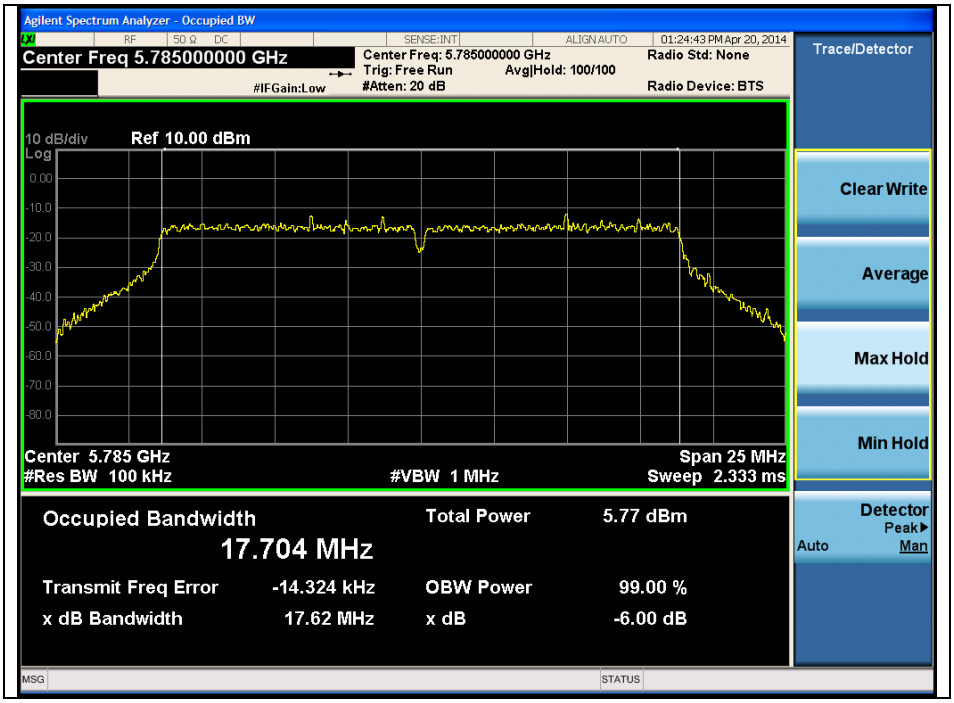


OFDM : 802.11an_HT20

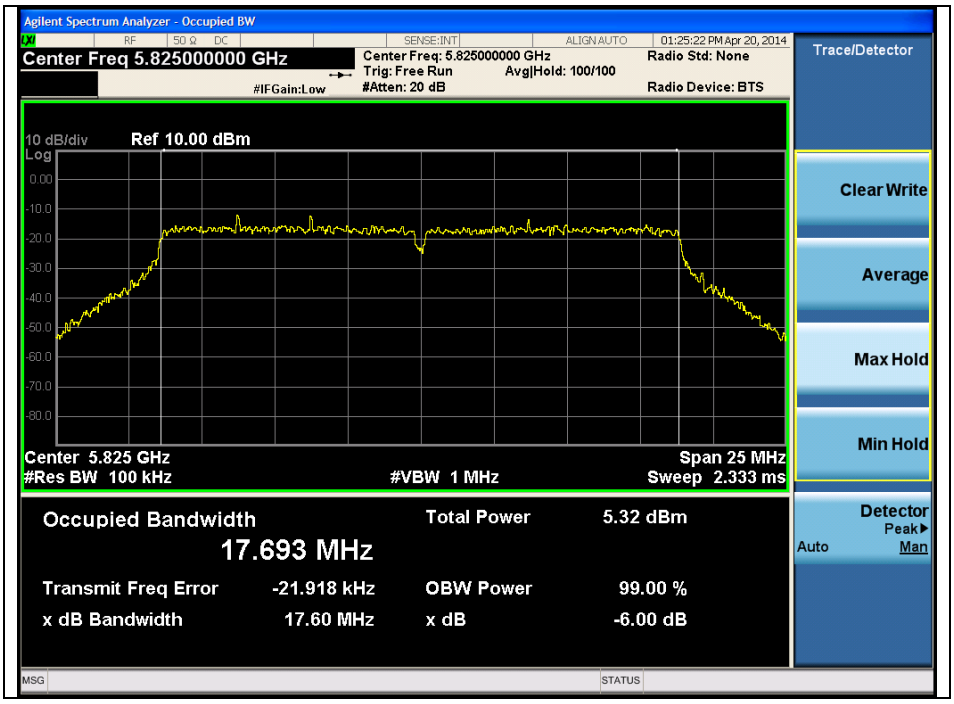
Low Channel



Middle Channel

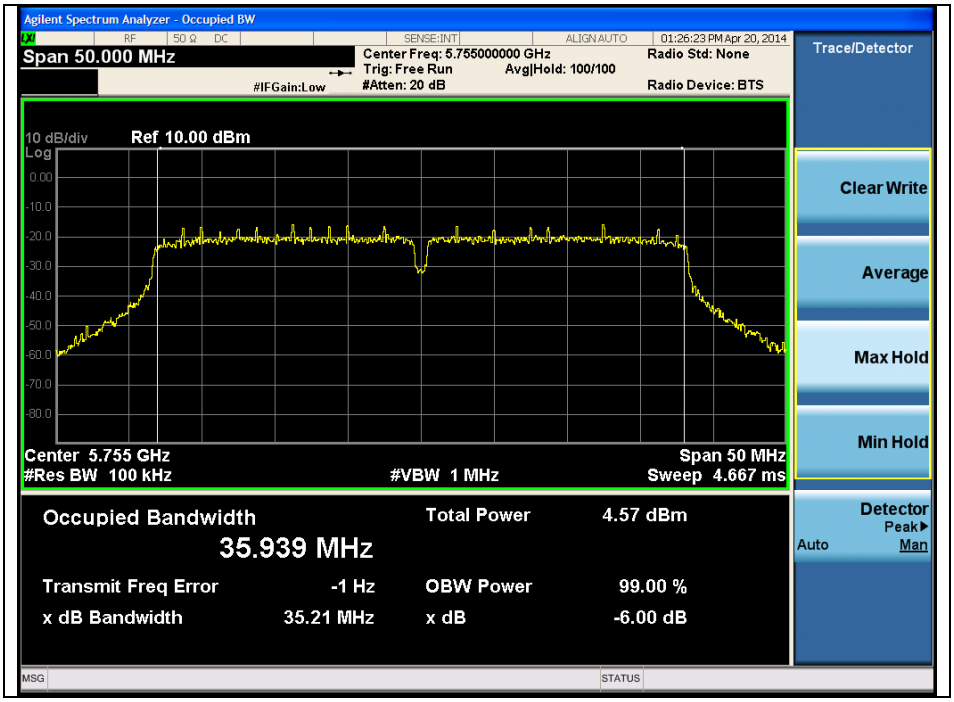


High Channel

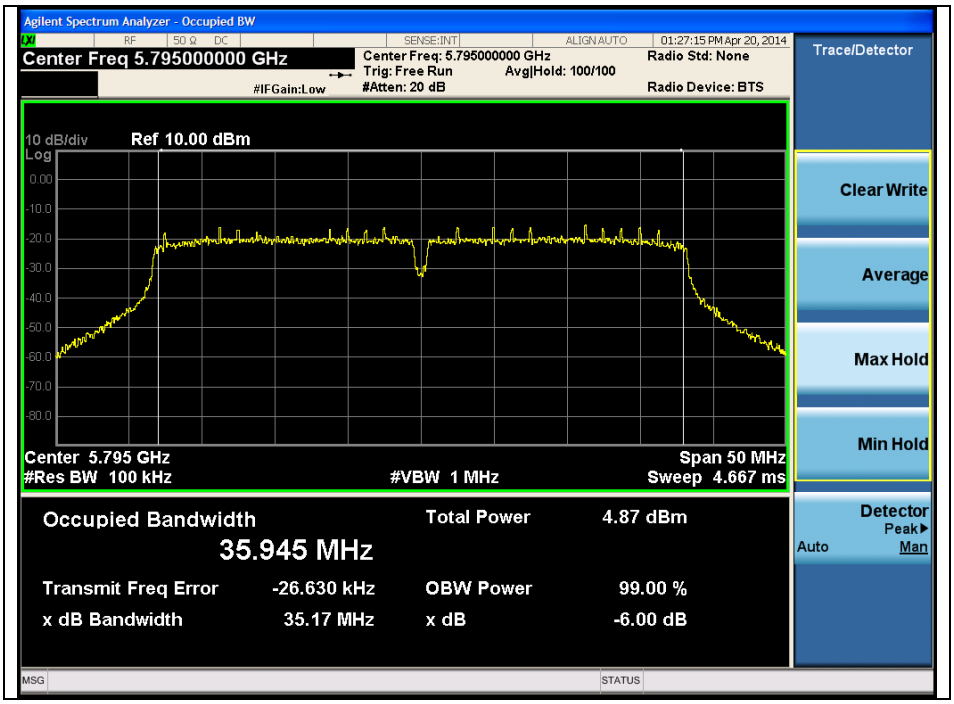


OFDM : 802.11an_HT40

Low Channel

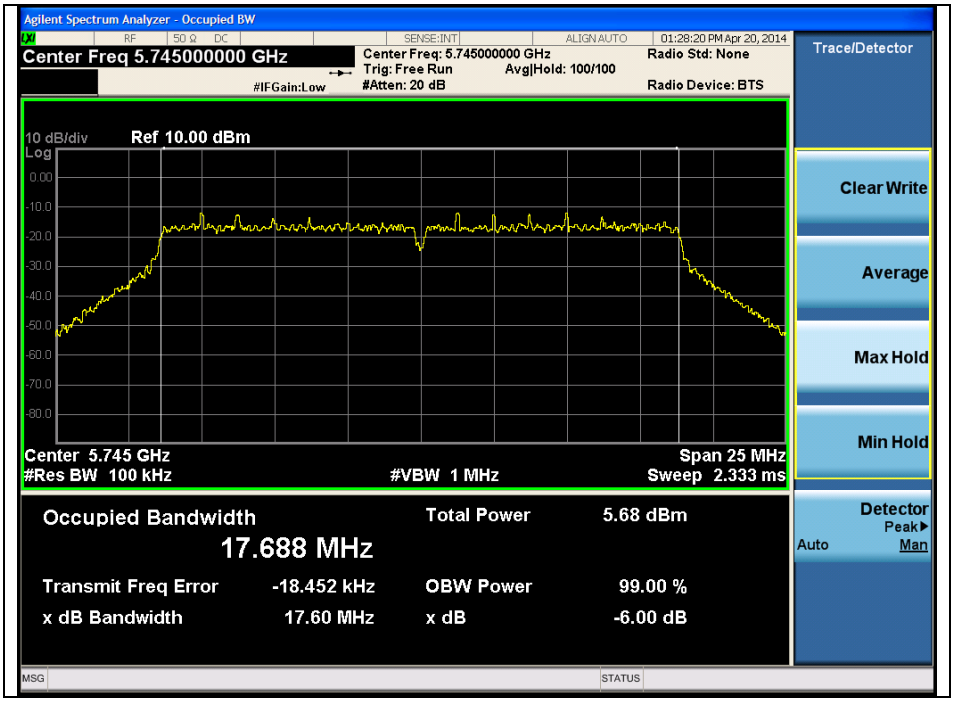


High Channel

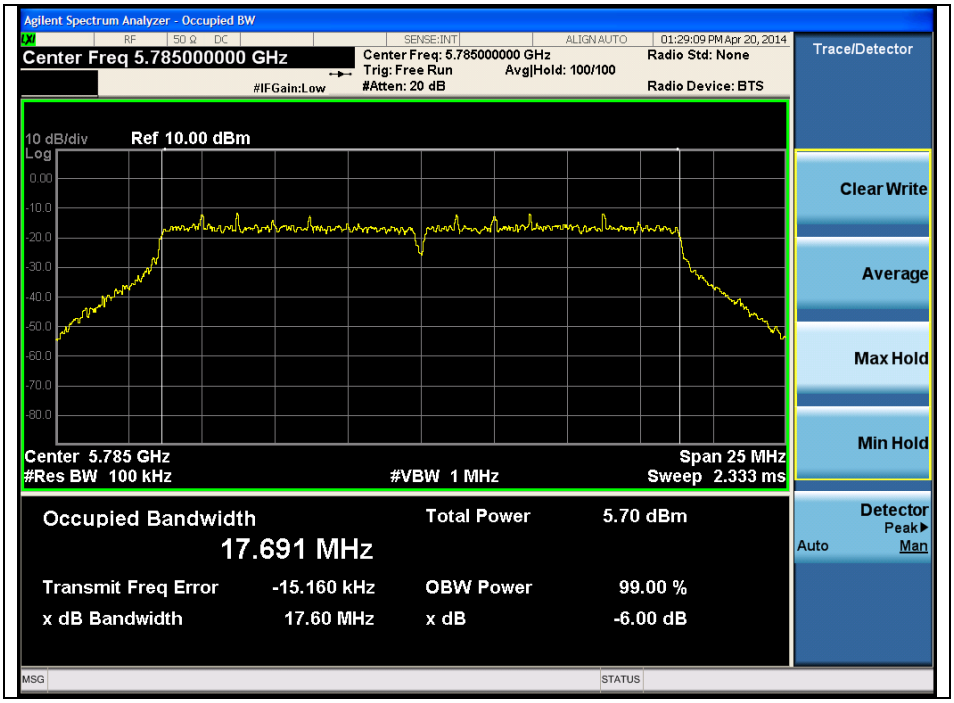


OFDM : 802.11ac_VHT20

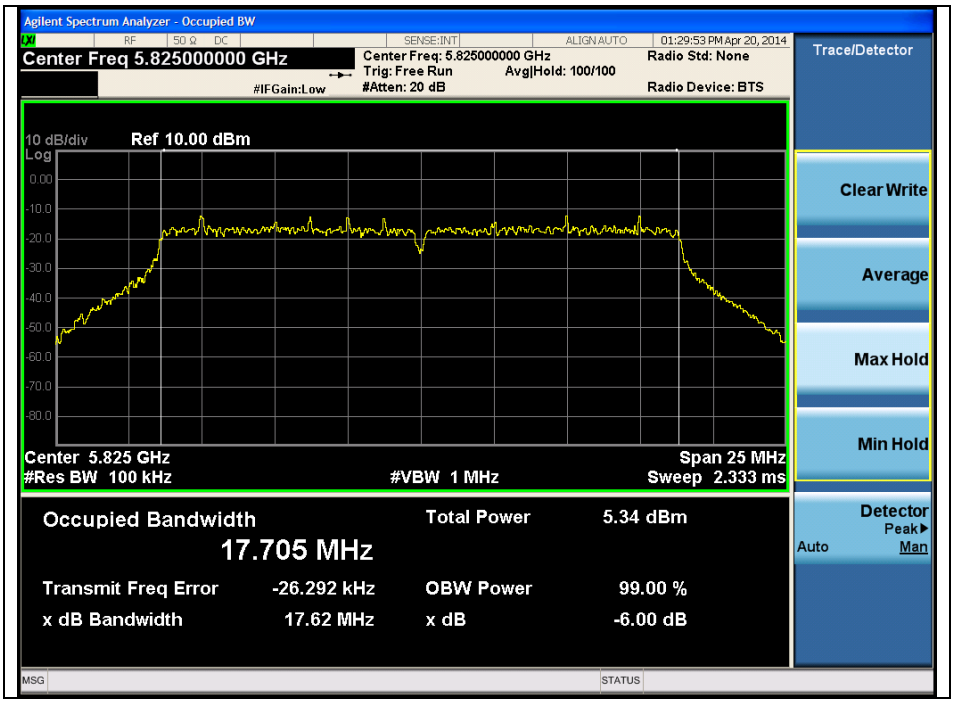
Low Channel



Middle Channel

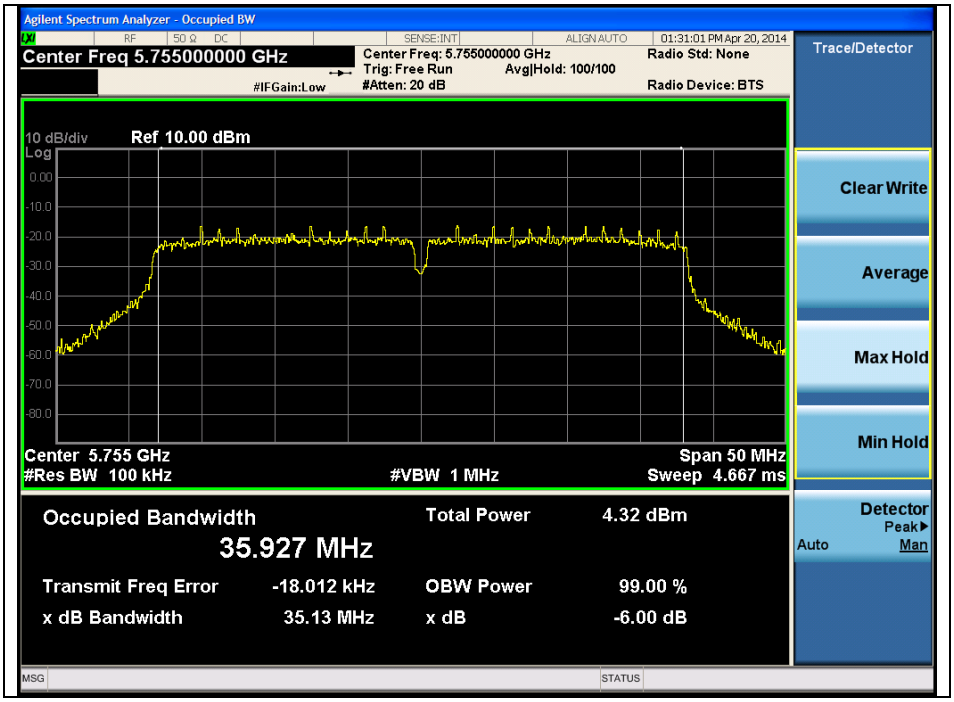


High Channel

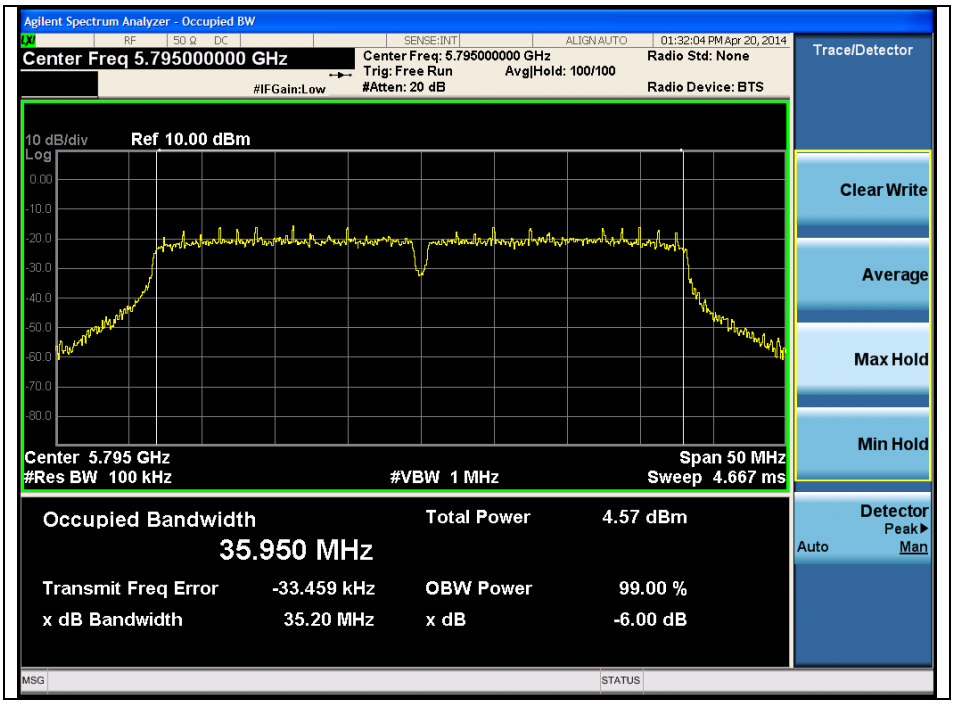


OFDM : 802.11ac_VHT40

Low Channel

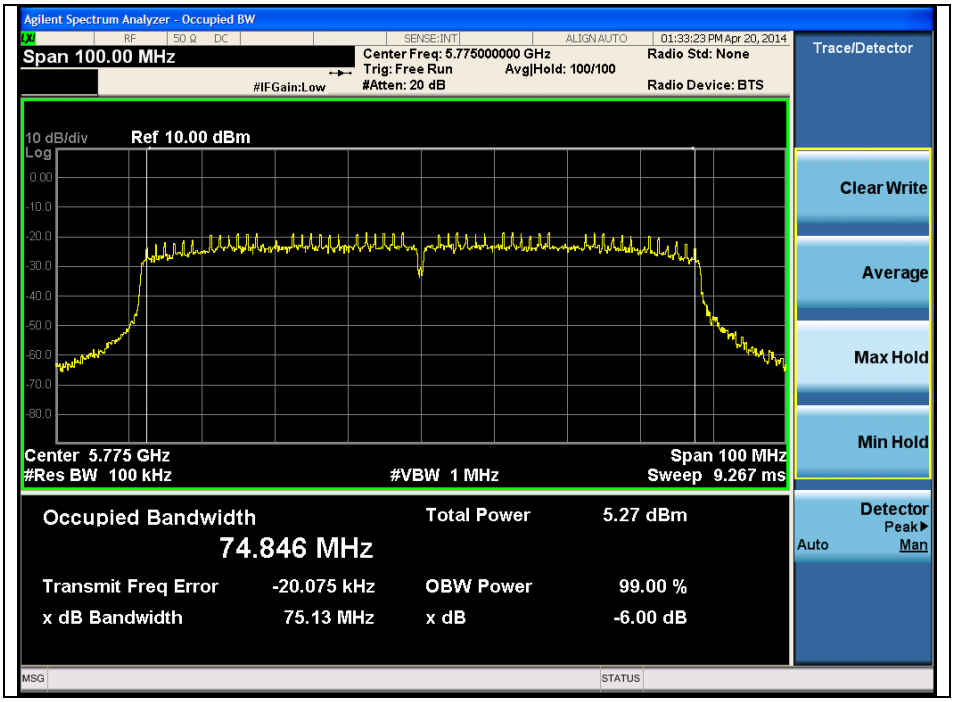


High Channel



OFDM : 802.11ac_VHT80 (MCS0)

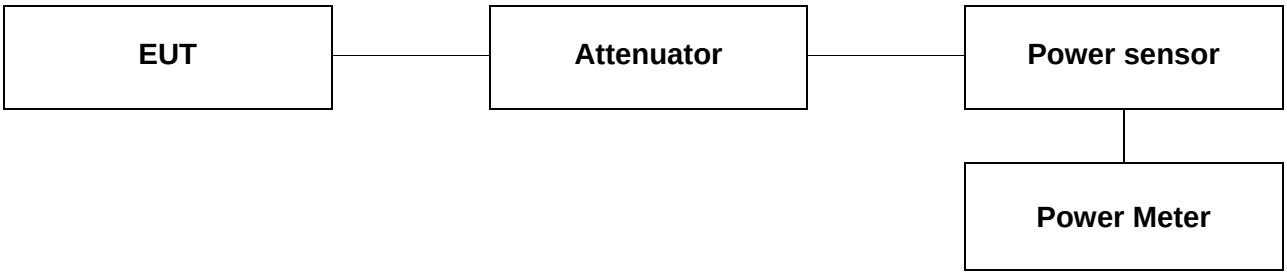
Middle Channel



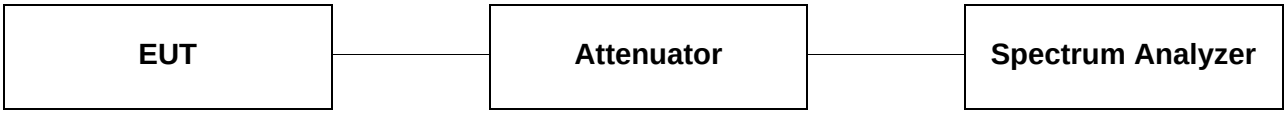
4. Maximum Conducted Output Power Measurement

4.1. Test Setup

4.1.1. 11b/g/n_HT20, 11a/n_HT20, 40, 11ac_VHT20, 40, 80



4.1.2. 11ac_VHT80 (Only peak power)



4.2. Limit

According to §15.247(b)(3), for systems using digital modulation in the 902 ~ 928 ㎒, 2 400 ~2 483.5 ㎒, and 5 725 ~ 5 850 ㎒ band: 1 Watt. As an alternative to a peak power measurement, compliance with the one watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antenna elements. The average must not include any intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
According to §15.247(b)(4), the conducted output power limit specified in paragraph(b) of this section is based on the use of antenna with directional gains that do not exceed 6 ㏈i. Except as shown in paragraph(c) of this section, if transmitting antenna of directional gain greater than 6 ㏈i are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in ㏈ that the directional gain of the antenna exceeds 6㏈i.

4.3. Test Procedure

- Peak and average power meter method.

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.

- Peak power meter method

The test follows section 9.1.3 of FCC KDB Publication 558074_v03r01

-The maximum peak conducted output power can be measured using a broad band peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast, average-responding diode type detector.
The power sensor employs a VBW = 65 ㎒ which is greater than the DTS bandwidth.

- Integrated band power method (only 11ac_VHT80 peak power measurement)

The test follows section 9.1.2 of FCC KDB Publication 558074_v03r01

1) Set the RBW = 1 ㎒
2) Set the VBW ≥ 3 x RBW
3) Set the span ≥ 1.5 x DTS bandwidth.
4) Detector = Peak.
5) Sweep time = auto couple.
6) Trace mode = max hold.
7) Allow trace to fully stabilize.
8) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

- Average power meter method

The test follows section 9.2.3.1 of FCC KDB Publication 558074_v03r01

- Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

1) The EUT is configured to transmit continuously, of to transmit with a constant duty factor.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0 of KDB 558074_v03r01.

Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

1) Place the EUT on the table and set it in the transmitting mode.
2) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the broadband power meter and power sensor.
3) Measure peak & average power each channel.

4.4. Test Results

Ambient temperature : (23 ± 2) ℃
Relative humidity : 47 % R.H.

- 11b

Power	Frequency (㎒)	Conducted Power (㏈m)			
		Data Rate [Mbps]			
		1	2	5.5	11
Peak	2 412	18.53	18.67	18.78	18.63
Mea. Average		15.66	15.66	15.72	15.50
Result		15.70	15.75	15.90	15.82
Peak	2 437	18.70	18.68	18.78	18.90
Mea. Average		15.91	15.92	15.92	15.74
Result		15.95	16.01	16.10	16.06
Peak	2 462	18.83	18.85	19.09	19.01
Mea. Average		16.12	16.07	16.09	15.91
Result		16.16	16.16	16.27	16.23

Mode	Duty cycle			
	Data Rate [Mbps]			
11b	1	2	5.5	11
Duty Cycle (%)	99	98	96	93
Correction factor (dB)	0.04	0.09	0.18	0.32

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11g

Power	Frequency (㎒)	Conducted Power (㏈m)							
		Data Rate [Mbps]							
		6	9	12	18	24	36	48	54
Peak	2 412	21.61	22.31	22.39	22.40	22.43	22.29	22.24	22.14
Mea. Average		12.55	12.42	12.29	12.14	12.01	11.53	11.25	11.10
Result		12.77	12.78	12.75	12.80	12.82	12.61	12.62	12.59
Peak	2 437	22.67	22.77	22.88	22.82	22.94	22.79	22.80	22.91
Mea. Average		12.66	12.58	12.50	12.33	12.12	11.78	11.60	11.38
Result		12.88	12.94	12.96	12.99	12.93	12.86	12.97	12.87
Peak	2 462	22.57	22.60	22.68	22.55	22.64	22.59	22.70	22.60
Mea. Average		12.84	12.73	12.69	12.45	12.27	11.98	11.76	11.58
Result		13.06	13.09	13.15	13.11	13.08	13.06	13.13	13.07

Mode	Duty cycle							
	Data Rate [Mbps]							
11g	6	9	12	18	24	36	48	54
Duty Cycle (%)	95	92	90	86	83	78	73	71
Correction factor (dB)	0.22	0.36	0.46	0.66	0.81	1.08	1.37	1.49

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11n_HT20

Power	Frequency (㎒)	Conducted Power (㏈m)							
		Data Rate [MCS]							
		0	1	2	3	4	5	6	7
Peak	2 412	21.66	21.97	21.72	21.73	21.82	21.70	21.58	21.83
Mea. Average		11.44	11.23	11.03	10.84	10.53	10.25	10.14	10.03
Result		11.71	11.69	11.74	11.76	11.67	11.86	11.88	11.90
Peak	2 437	21.85	22.35	22.42	22.32	22.03	22.49	20.30	22.04
Mea. Average		11.56	11.39	11.22	11.26	10.71	10.45	10.33	10.18
Result		11.83	11.85	11.93	12.18	11.85	12.06	12.07	12.05
Peak	2 462	22.20	22.23	22.15	22.14	22.38	22.22	22.50	22.30
Mea. Average		11.91	11.69	11.50	11.21	10.99	10.70	10.59	10.47
Result		12.18	12.15	12.21	12.13	12.13	12.31	12.33	12.34

Mode	Duty cycle							
	Data Rate [MCS]							
11n_HT20	0	1	2	3	4	5	6	7
Duty Cycle (%)	94	90	85	81	77	69	67	65
Correction factor (㏈)	0.27	0.46	0.71	0.92	1.14	1.61	1.74	1.87

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11a

Power	Frequency (㎒)	Conducted Power (㏈m)							
		Data Rate [Mbps]							
		6	9	12	18	24	36	48	54
Peak	5 745	19.85	19.78	19.81	19.87	19.89	19.92	20.13	19.94
Mea. Average		10.32	10.23	10.13	9.83	9.53	9.28	9.02	8.90
Result		10.54	10.59	10.59	10.49	10.34	10.36	10.39	10.39
Peak	5 785	19.66	19.58	19.65	19.70	19.72	19.63	19.69	19.61
Mea. Average		10.57	10.40	10.32	10.17	9.99	9.75	9.60	9.17
Result		10.79	10.76	10.78	10.83	10.80	10.83	10.97	10.66
Peak	5 825	19.51	19.48	19.61	19.60	19.66	19.74	19.61	19.77
Mea. Average		10.13	10.01	9.92	9.75	9.58	9.32	9.06	8.95
Result		10.35	10.37	10.38	10.41	10.39	10.40	10.43	10.44

Mode	Duty cycle							
	Data Rate [Mbps]							
11a	6	9	12	18	24	36	48	54
Duty Cycle (%)	95	92	90	86	83	78	73	71
Correction factor (dB)	0.22	0.36	0.46	0.66	0.81	1.08	1.37	1.49

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11an_HT20

Power	Frequency (㎒)	Conducted Power (㏈m)							
		Data Rate [MCS]							
		0	1	2	3	4	5	6	7
Peak	5 745	19.42	19.23	19.46	19.49	19.52	19.41	19.33	19.34
Mea. Average		9.00	8.79	8.61	8.42	8.16	7.91	7.69	7.64
Result		9.27	9.25	9.32	9.34	9.30	9.52	9.43	9.51
Peak	5 785	19.43	19.34	19.27	19.23	19.35	19.49	19.34	19.26
Mea. Average		9.13	8.93	8.59	8.39	8.11	7.84	7.74	7.63
Result		9.40	9.39	9.30	9.31	9.25	9.45	9.48	9.50
Peak	5 825	19.25	19.14	19.35	19.46	19.34	19.39	19.28	19.40
Mea. Average		9.00	8.80	8.67	8.44	8.16	7.89	7.78	7.66
Result		9.27	9.26	9.38	9.36	9.30	9.50	9.52	9.53

Mode	Duty cycle							
	Data Rate [MCS]							
11an_HT20	0	1	2	3	4	5	6	7
Duty Cycle (%)	94	90	85	81	77	69	67	65
Correction factor (dB)	0.27	0.46	0.71	0.92	1.14	1.61	1.74	1.87

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11an_HT40

Power	Frequency (㎒)	Conducted Power (㏈m)							
		Data Rate [MCS]							
		0	1	2	3	4	5	6	7
Peak	5 755	19.31	19.06	19.17	19.17	19.01	19.24	19.14	18.92
Mea. Average		8.42	8.08	7.77	7.46	7.00	6.59	6.46	6.09
Result		8.93	9.00	8.96	9.07	9.15	9.27	9.06	9.10
Peak	5 795	19.44	19.17	19.28	19.20	19.13	19.31	19.26	19.44
Mea. Average		8.65	8.34	7.81	7.50	7.06	6.65	6.49	6.39
Result		9.16	9.26	9.00	9.11	9.21	9.33	9.09	9.40

Mode	Duty cycle							
	Data Rate [MCS]							
11an_HT40	0	1	2	3	4	5	6	7
Duty Cycle (%)	89	81	76	69	61	54	55	50
Correction factor (㏈)	0.51	0.92	1.19	1.61	2.15	2.68	2.60	3.01

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11ac_VHT20

Power	Frequency (㎒)	Conducted Power (㏈m)								
		Data Rate [MCS]								
		0	1	2	3	4	5	6	7	8
Peak	5 745	18.79	18.75	18.37	18.69	18.81	18.24	18.18	18.22	18.33
Mea. Average		9.03	8.64	8.39	8.08	7.55	7.37	7.14	7.00	6.72
Result		9.49	9.50	9.47	9.57	9.35	9.74	9.51	9.44	9.73
Peak	5 785	18.83	18.75	18.32	18.27	18.71	18.12	18.15	18.57	18.47
Mea. Average		9.08	8.65	8.26	8.03	7.62	7.44	7.21	7.02	6.85
Result		9.54	9.51	9.34	9.52	9.42	9.81	9.58	9.46	9.86
Peak	5 825	18.77	18.71	18.34	18.31	18.78	18.15	18.02	18.08	18.34
Mea. Average		9.01	8.66	8.39	8.09	7.67	7.29	7.07	6.95	6.70
Result		9.47	9.52	9.47	9.58	9.47	9.66	9.44	9.39	9.71

Mode	Duty cycle								
	Data Rate [MCS]								
11ac_VHT20	0	1	2	3	4	5	6	7	8
Duty Cycle (%)	90	82	78	71	66	58	58	57	50
Correction factor (dB)	0.46	0.86	1.08	1.49	1.80	2.37	2.37	2.44	3.01

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11ac_VHT40

Power	Frequency (㎒)	Conducted Power (㏈m)									
		Data Rate [MCS]									
		0	1	2	3	4	5	6	7	8	9
Peak	5 755	18.23	18.22	17.88	19.03	17.75	19.15	18.12	17.72	17.73	18.40
Mea. Average		7.91	6.97	6.56	6.19	6.00	5.72	5.32	5.18	5.02	4.99
Result		8.77	8.34	8.36	8.27	8.60	8.73	8.60	8.46	8.59	8.56
Peak	5 795	18.32	18.38	18.23	18.24	17.59	19.19	18.04	17.62	18.14	18.31
Mea. Average		7.60	7.18	7.04	6.12	5.67	5.92	5.81	5.13	4.96	4.97
Result		8.46	8.55	8.84	8.20	8.27	8.93	9.09	8.41	8.53	8.54

Mode	Duty cycle									
	Data Rate [MCS]									
11ac_VHT40	0	1	2	3	4	5	6	7	8	9
Duty Cycle (%)	82	73	66	62	55	50	47	47	44	44
Correction factor (㏈)	0.86	1.37	1.80	2.08	2.60	3.01	3.28	3.28	3.57	3.57

Remark:
1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))

- 11ac_VHT80

Power	Frequency (㎒)	Conducted Power (㏈m)									
		Data Rate [MCS]									
		0	1	2	3	4	5	6	7	8	9
Peak	5 775	17.42	16.64	15.84	16.38	16.66	16.88	16.77	17.00	17.05	16.92
Mea. Average		7.82	7.07	6.18	5.80	5.32	5.45	4.98	5.00	4.83	4.66
Result		9.31	9.59	9.02	9.08	8.89	9.32	9.18	9.20	9.03	9.75

Mode	Duty cycle									
	Data Rate [MCS]									
11ac_VHT80	0	1	2	3	4	5	6	7	8	9
Duty Cycle (%)	71	56	52	47	44	41	38	38	38	31
Correction factor (㏈)	1.49	2.52	2.84	3.28	3.57	3.87	4.20	4.20	4.20	5.09

Remark:

1. Result (㏈m) = Average (㏈m) + Correction factor (㏈)
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (㏈) = 10 log (1/duty cycle (㎳))
4. Average power and peak power of all mode and data rates were investigated by using power sensor and power meter except for 11ac (80 ㎒ bandwidth) peak.

   Only peak power measurement of 11ac (80 ㎒ bandwidth) was tested as integrated band power method and reported plots at the end of this section

OFDM : 802.11ac_VHT80 (Integrated band power method)

MCS0

MCS1

MCS2

MCS3

MCS4

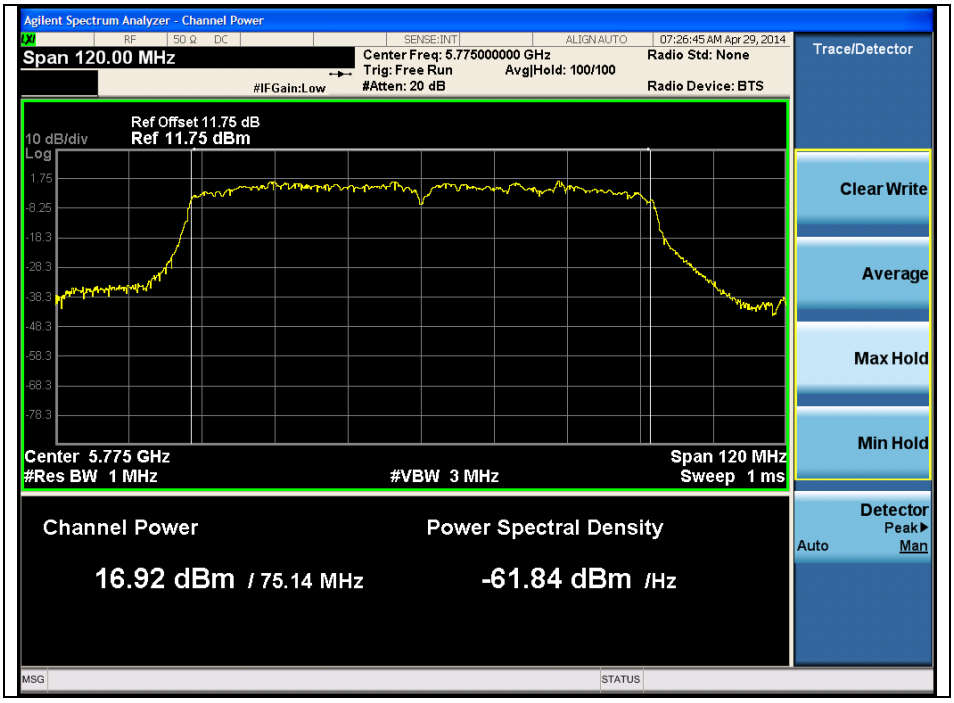
MCS5

MCS6

MCS7

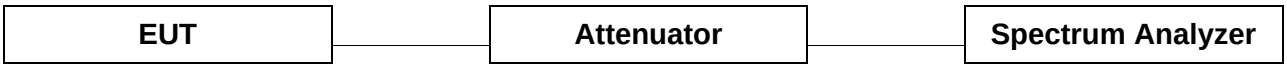
MCS8

MCS9



5. Power Spectral Density Measurement

5.1. Test Setup



5.2. Limit

§15.247(e) For digitally modulated system, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 ㏈ m in any 3 ㎑ band any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.3. Test Procedure

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.

The measurement is recorded using the PK PSD measurement procedure in 10.2 of KDB 558074_v03r01.

1. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.

2. Set analyzer center frequency to DTS channel center frequency.
3. Set the span to at least 1.5 times the DTS channel bandwidth.
4. Set the RBW to: 3 ㎑ ≤ RBW ≤ 100 ㎑
5. Set the VBW ≥ 3 x RBW
6. Detector = Peak
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level within the RBW.
11. If measured value exceeds limit, reduce RBW (no less than 3 ㎑) and repeat.

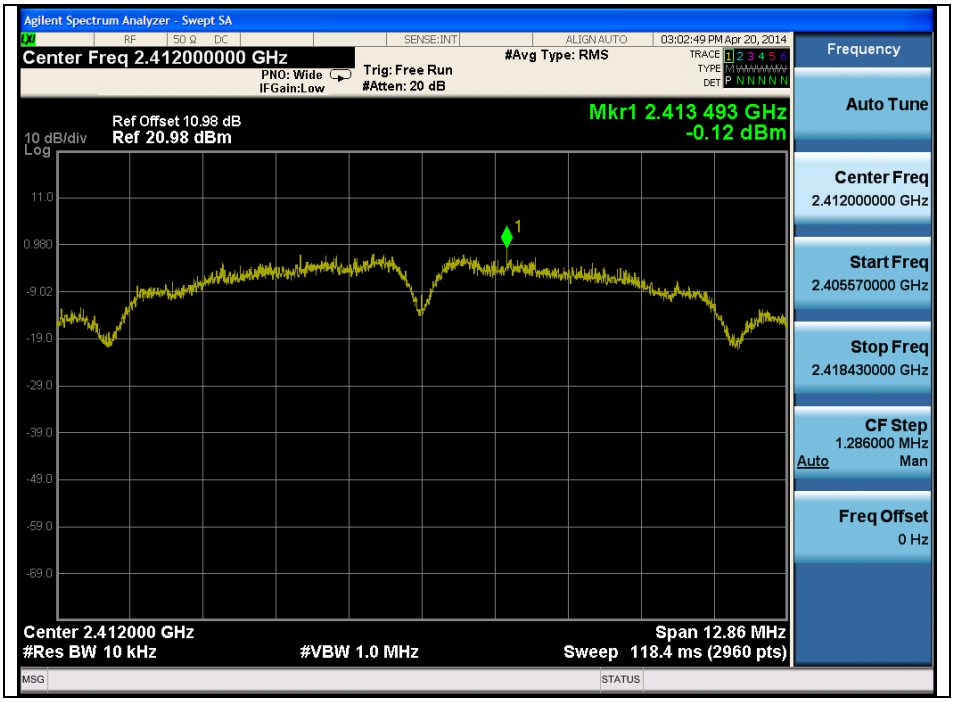
5.4. Test Results

Ambient temperature : (23 ± 2) ℃
Relative humidity : 47 % R.H.

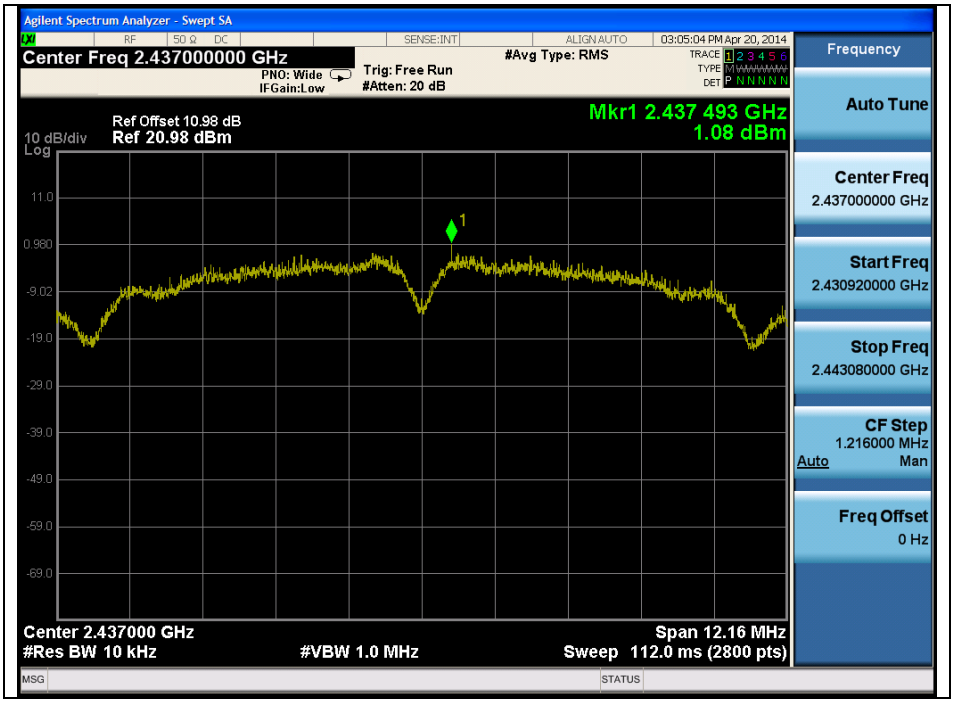
Mode	Frequency (㎒)	Ch.	Data Rate	Measured PSD (㏈m)	PSD Limit (㏈m / 3 ㎑)
11b	2 412	1	1	-0.12	8
	2 437	6	1	1.08	8
	2 462	11	1	0.23	8
11g	2 412	1	6	-6.29	8
	2 437	6	6	-6.53	8
	2 462	11	6	-6.55	8
11n_HT20	2 412	1	MCS0	-8.15	8
	2 437	6	MCS0	-8.10	8
	2 462	11	MCS0	-7.09	8
11a	5 745	149	6	-8.75	8
	5 785	157	6	-8.34	8
	5 825	165	6	-9.33	8
11an_HT20	5 745	149	MCS0	-10.22	8
	5 785	157	MCS0	-10.16	8
	5 825	165	MCS0	-9.03	8
11an_HT40	5 755	151	MCS0	-12.91	8
	5 795	159	MCS0	-13.79	8
11ac_VHT20	5 745	149	MCS0	-10.27	8
	5 785	157	MCS0	-10.64	8
	5 825	165	MCS0	-10.46	8
11ac_VHT40	5 755	151	MCS0	-13.87	8
	5 795	159	MCS0	-14.06	8
11ac_VHT80	5 775	155	MCS0	-15.34	8

DSSS : 802.11b

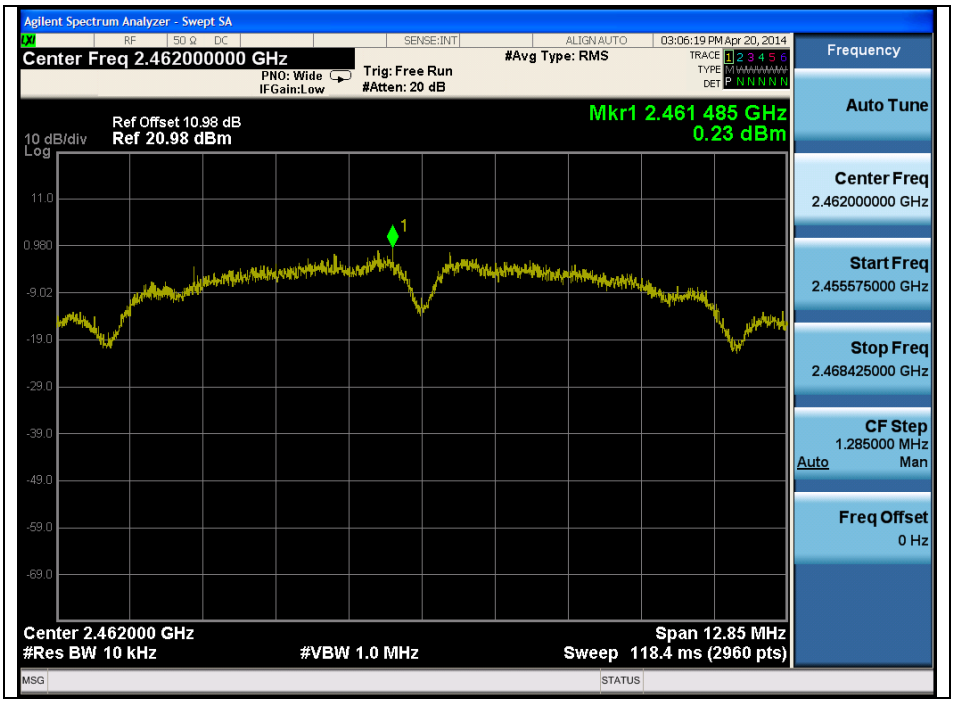
Low Channel



Middle Channel

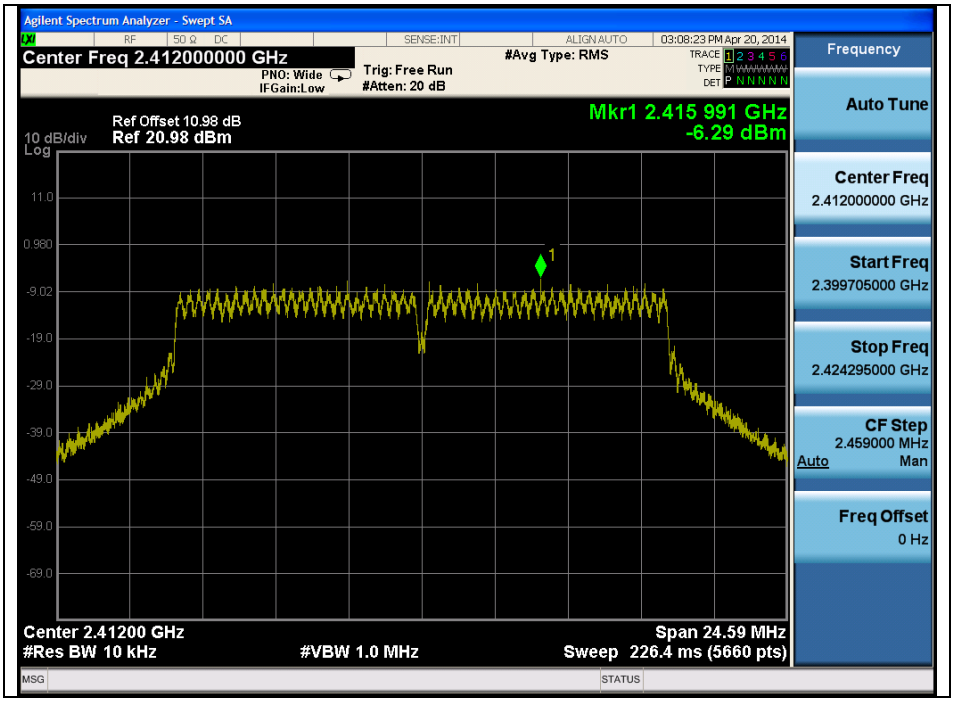


High Channel

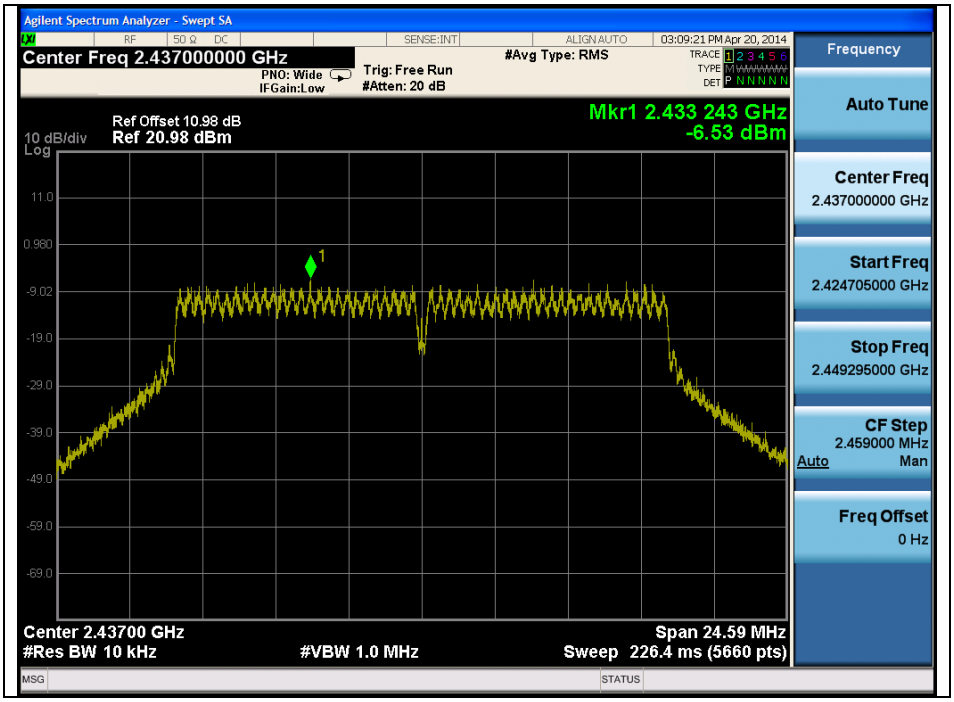


OFDM : 802.11g

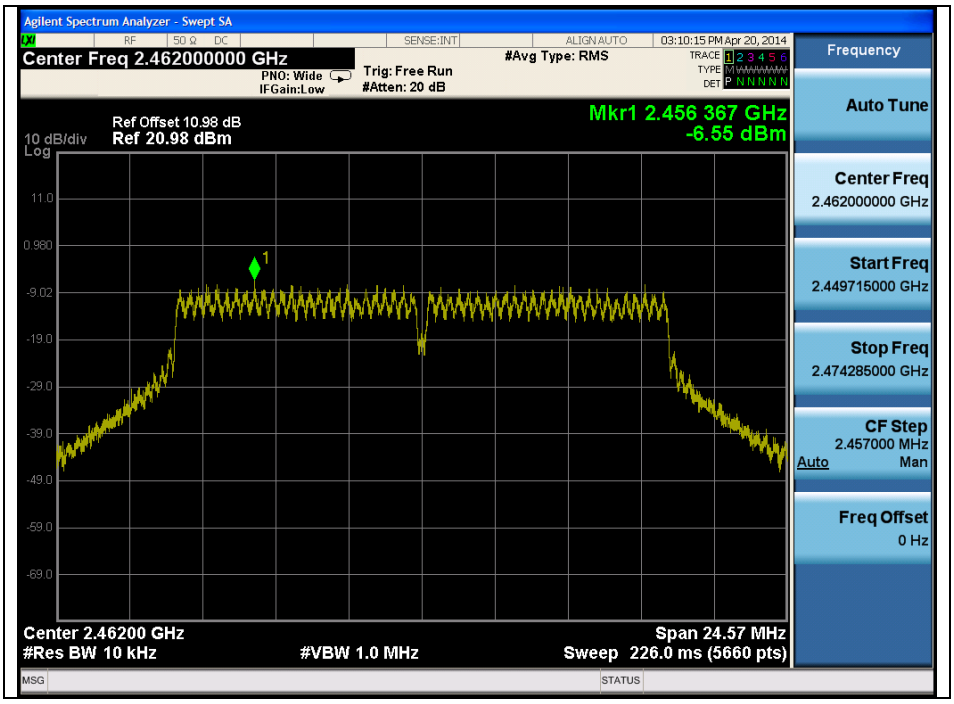
Low Channel



Middle Channel

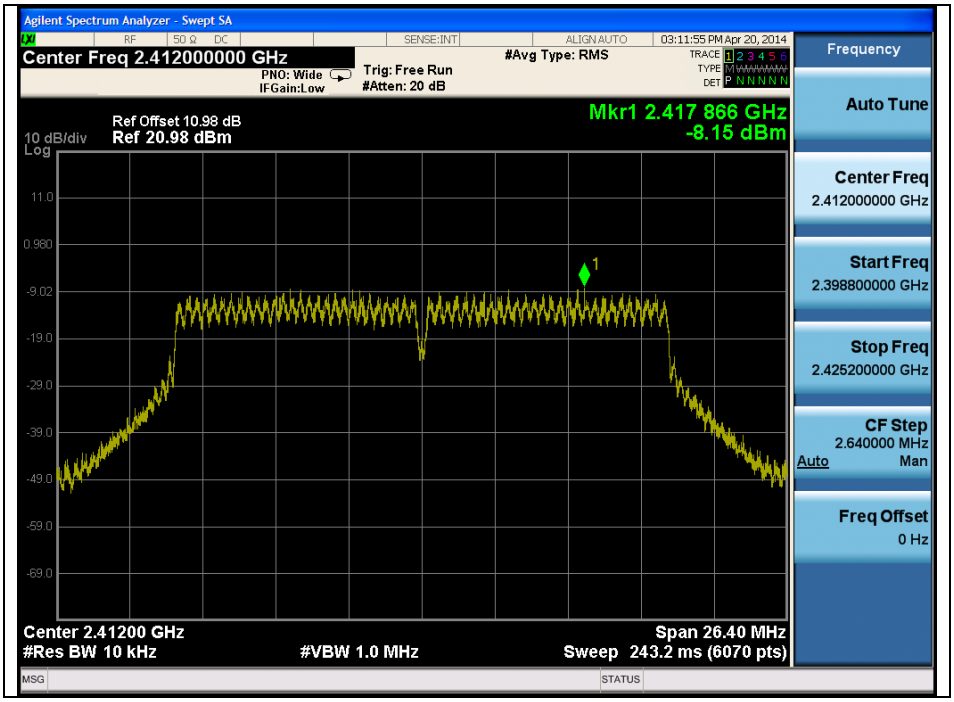


High Channel

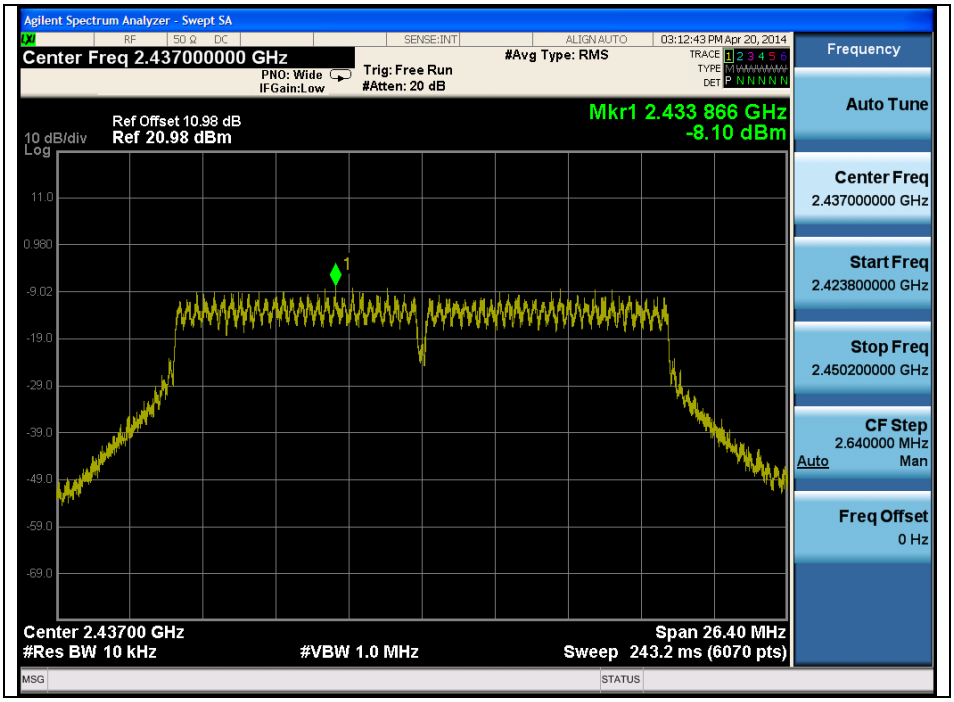


OFDM : 802.11n_HT20

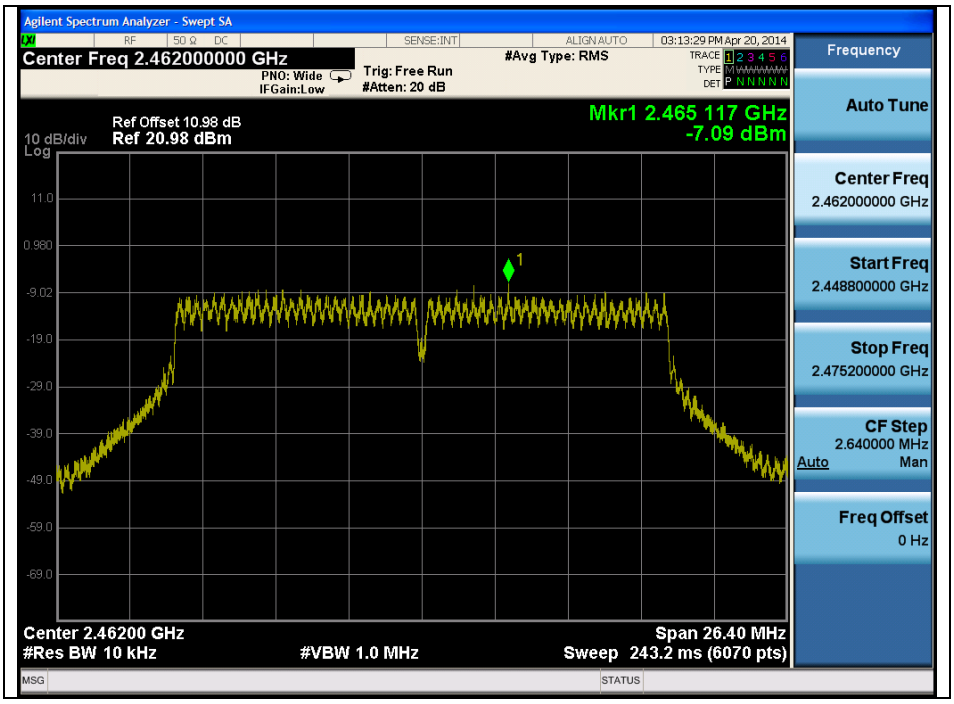
Low Channel



Middle Channel

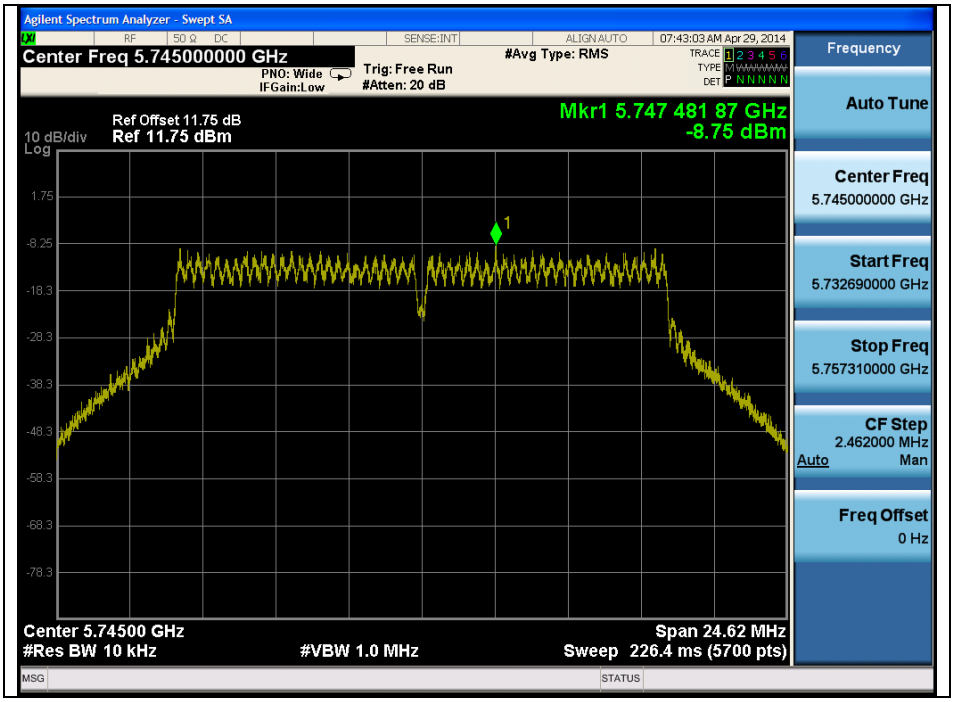


High Channel

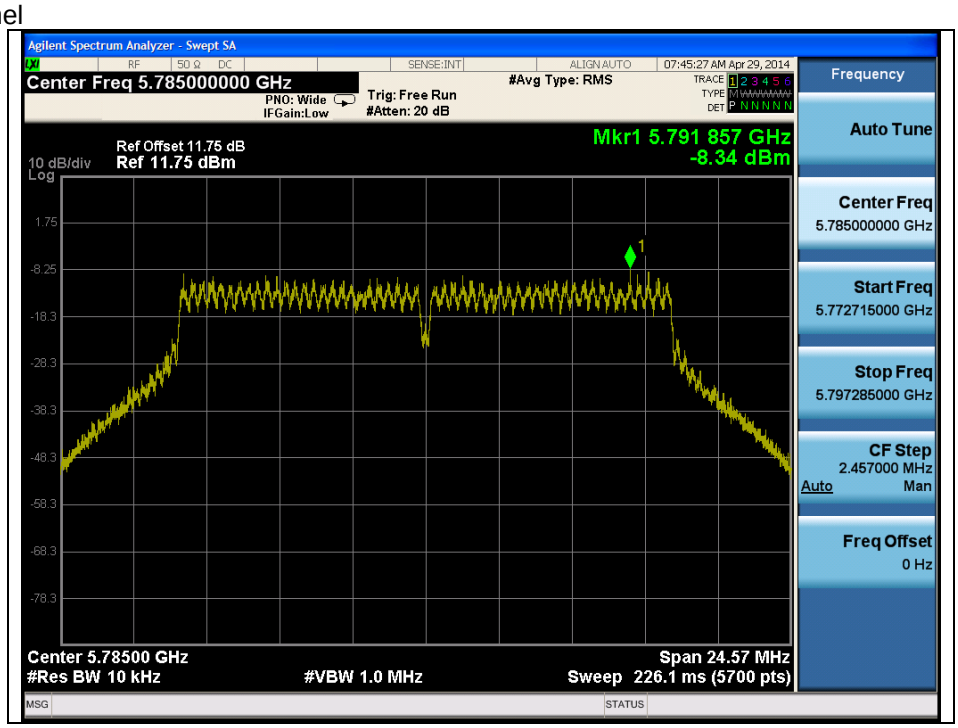


OFDM : 802.11a

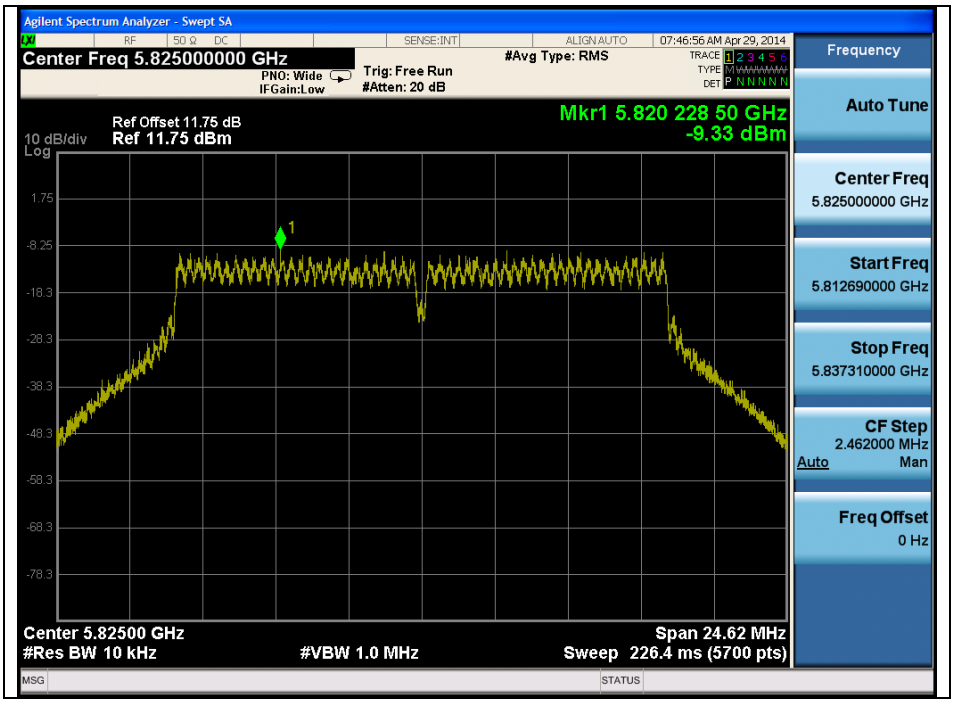
Low Channel



Middle Channel

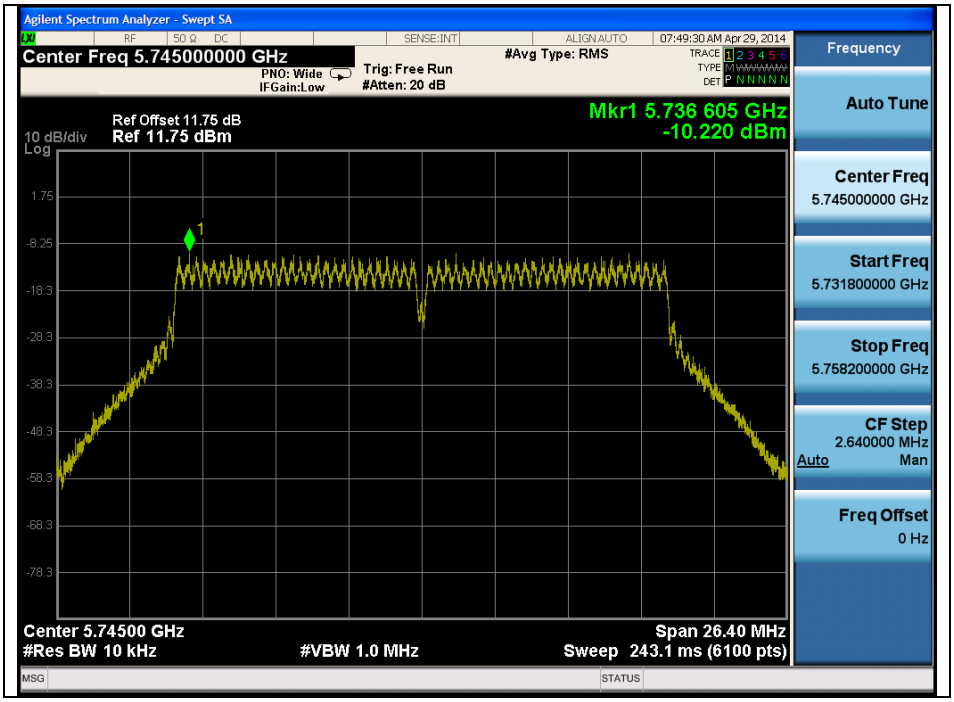


High Channel

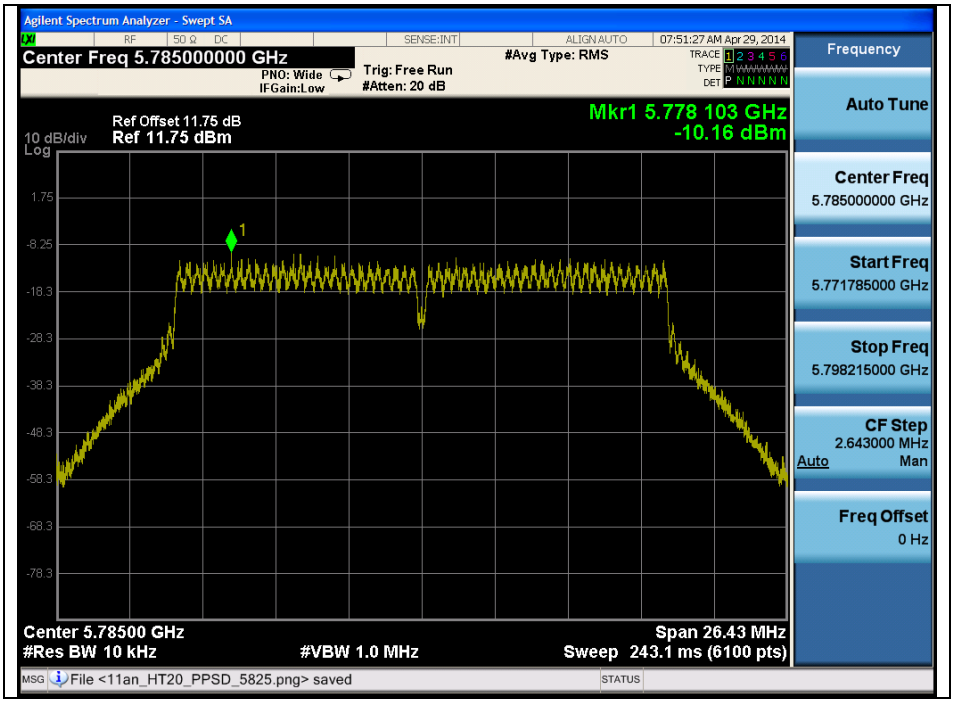


OFDM : 802.11an_HT20

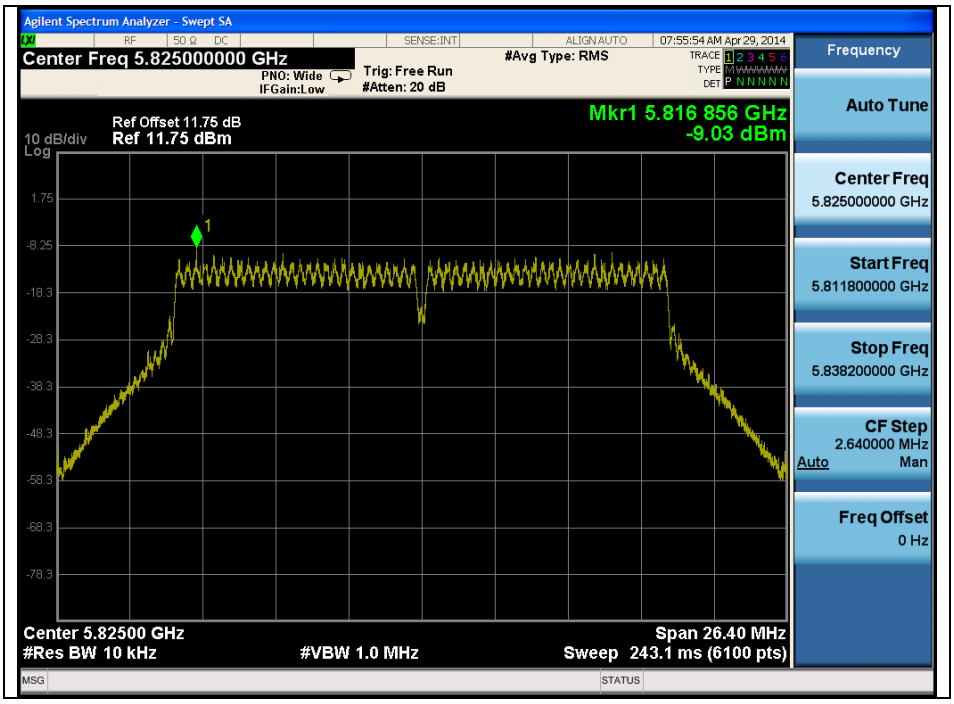
Low Channel



Middle Channel

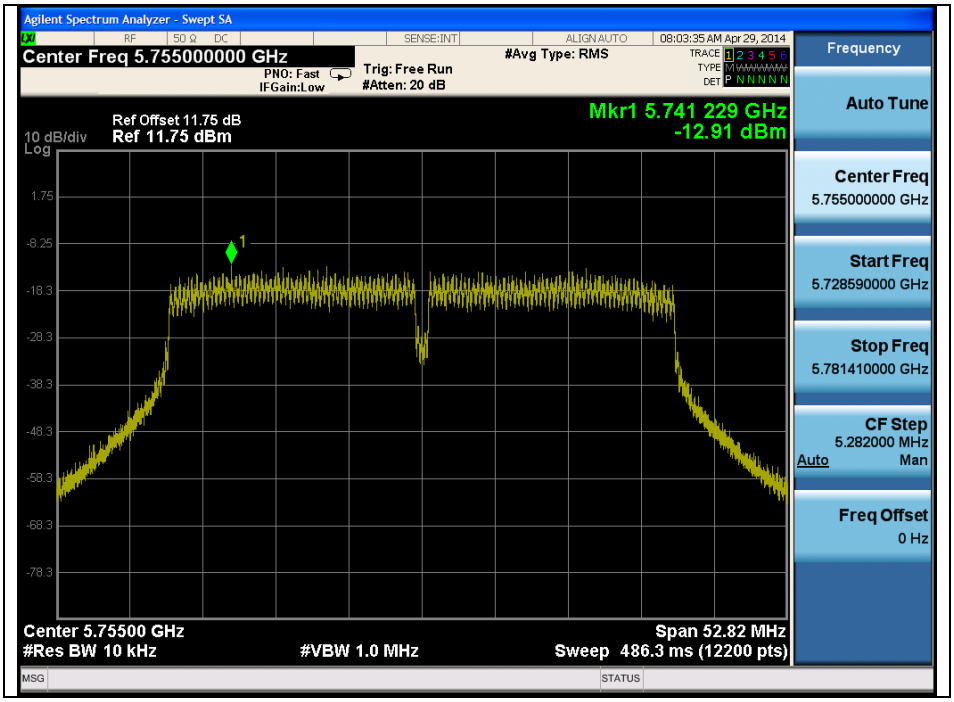


High Channel

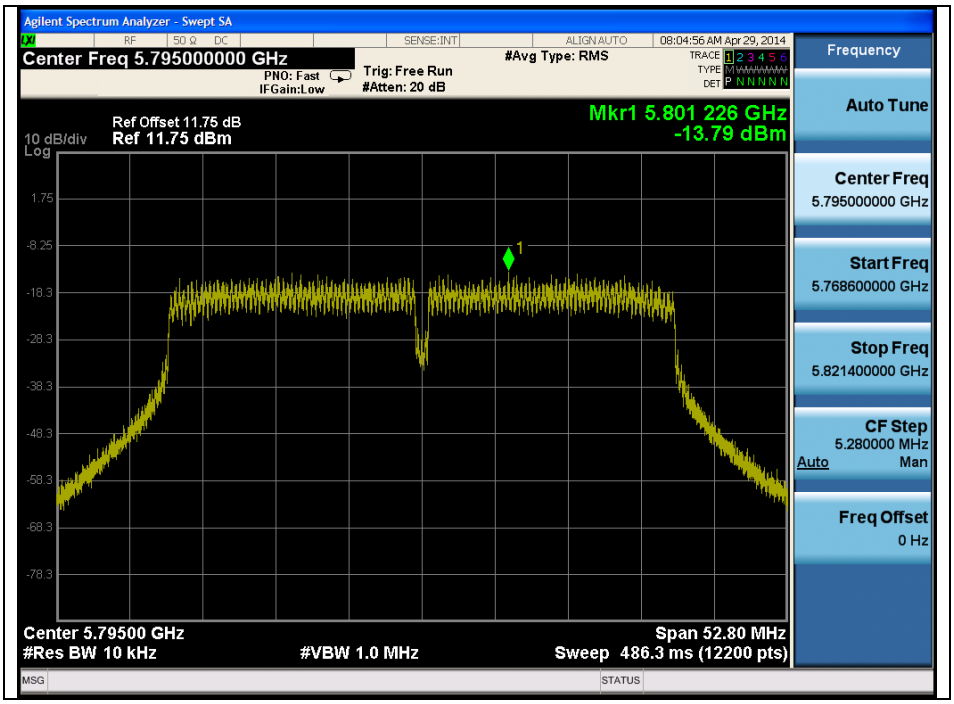


OFDM : 802.11an_HT40

Low Channel

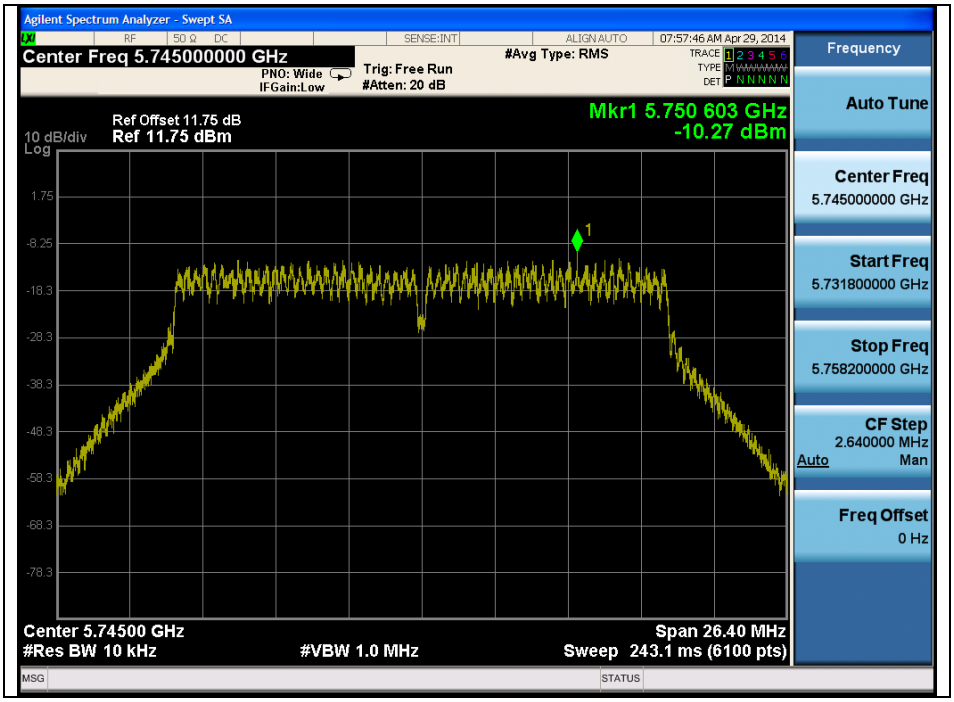


High Channel

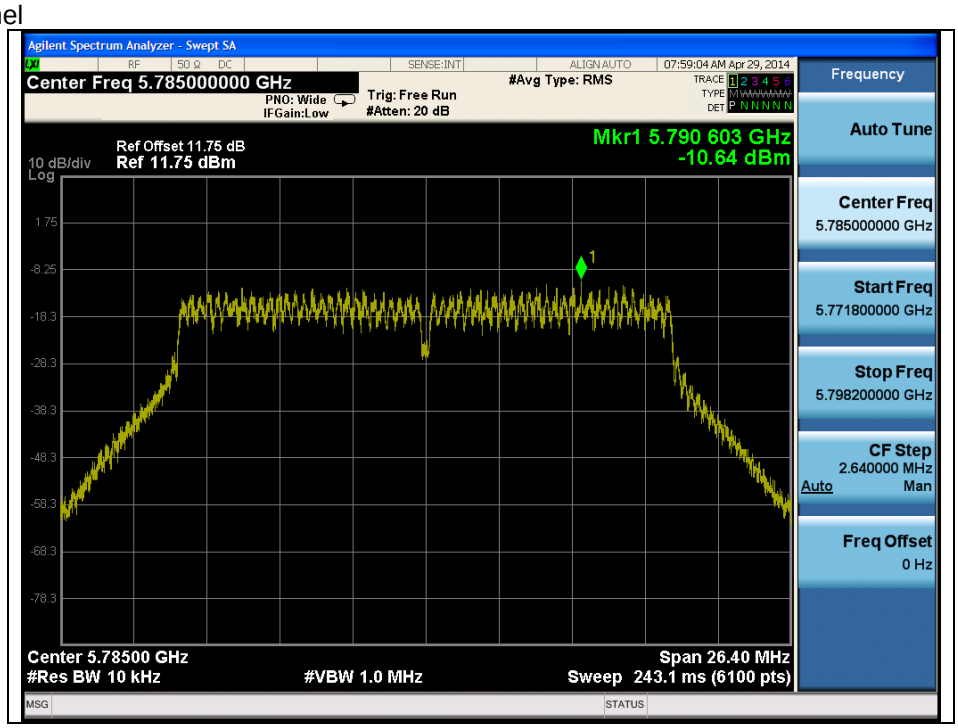


OFDM : 802.11ac_VHT20

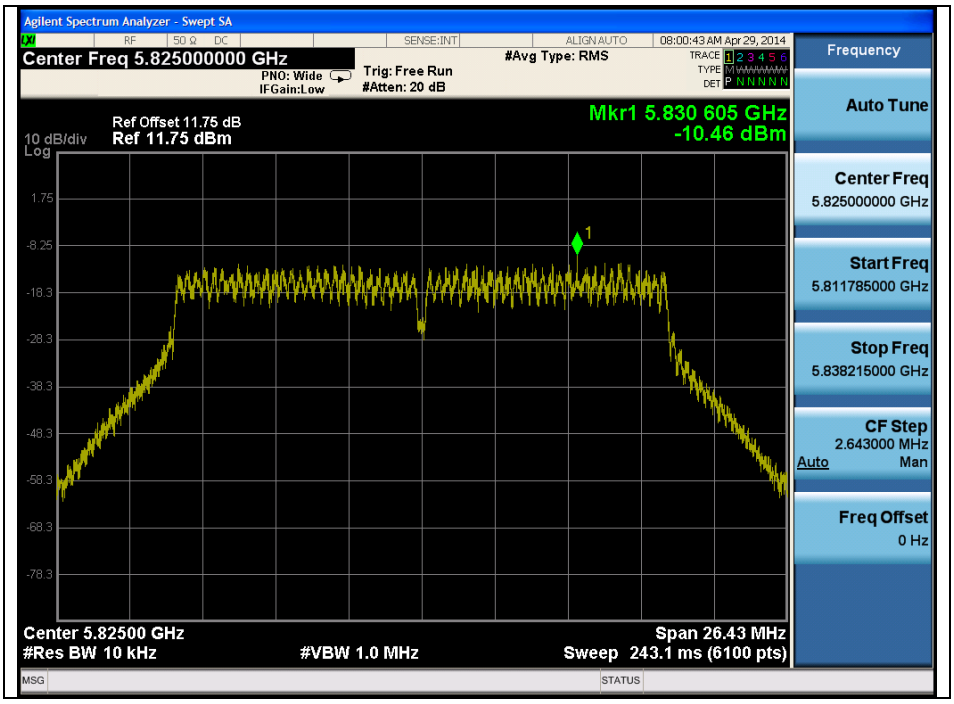
Low Channel



Middle Channel

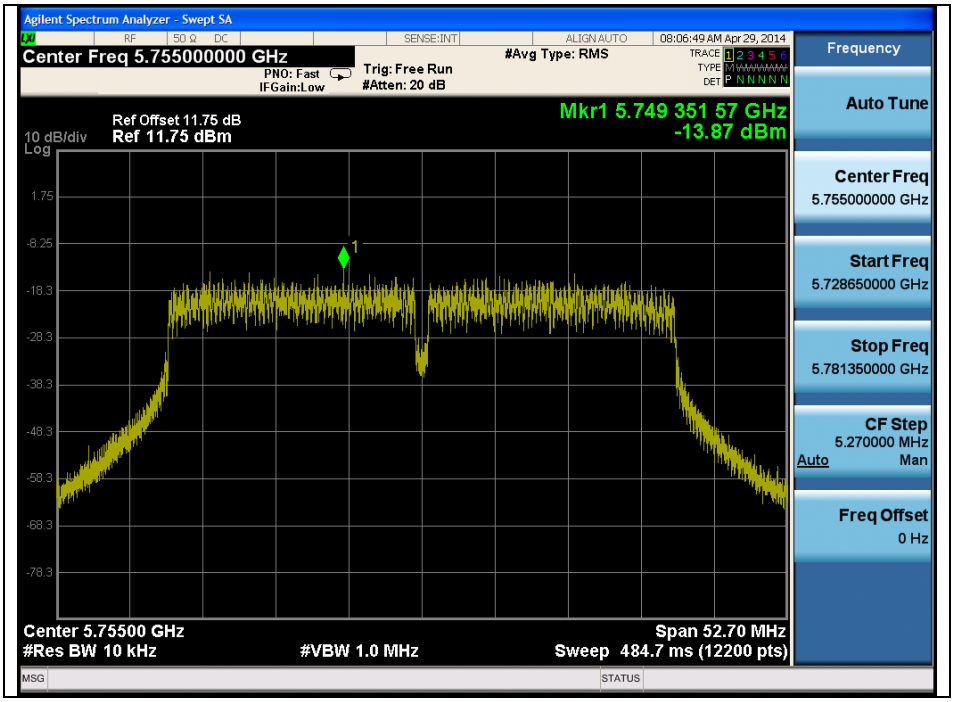


High Channel

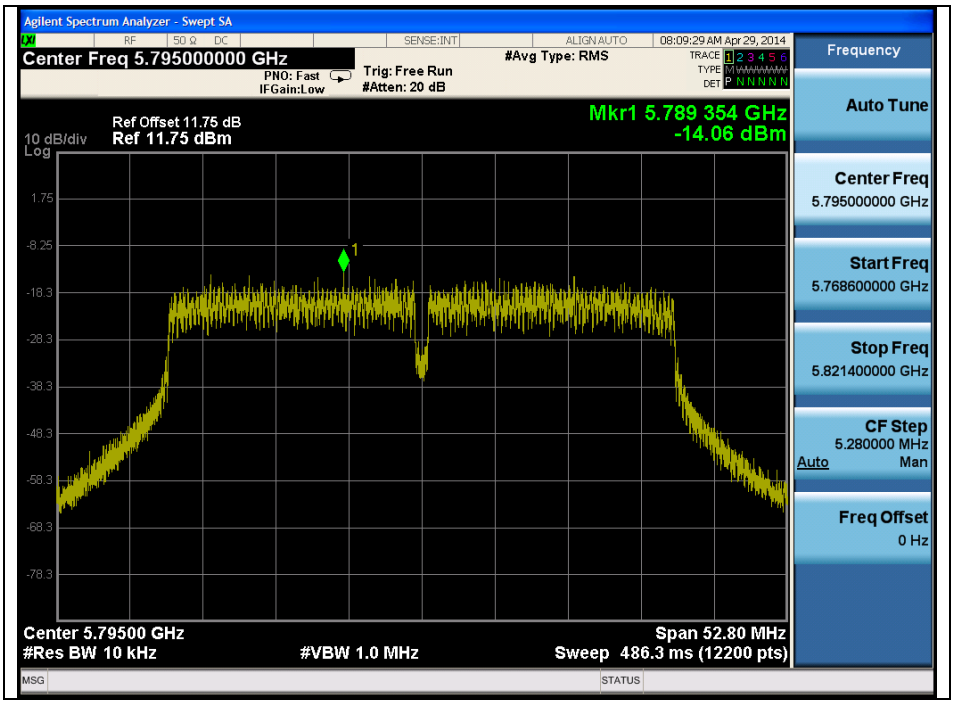


OFDM : 802.11ac_VHT40

Low Channel

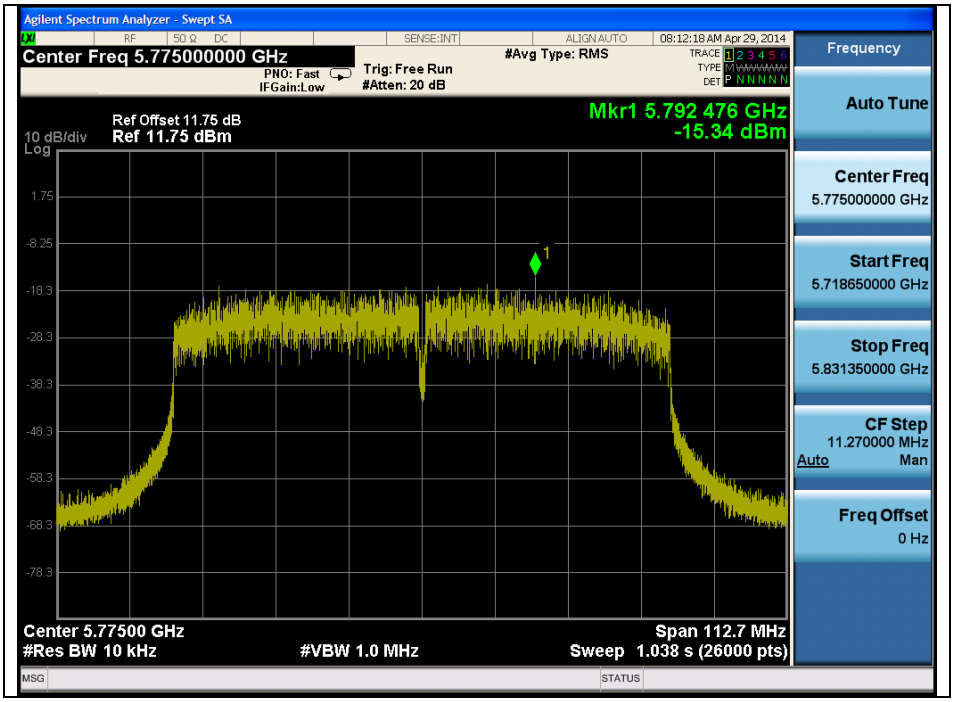


High Channel



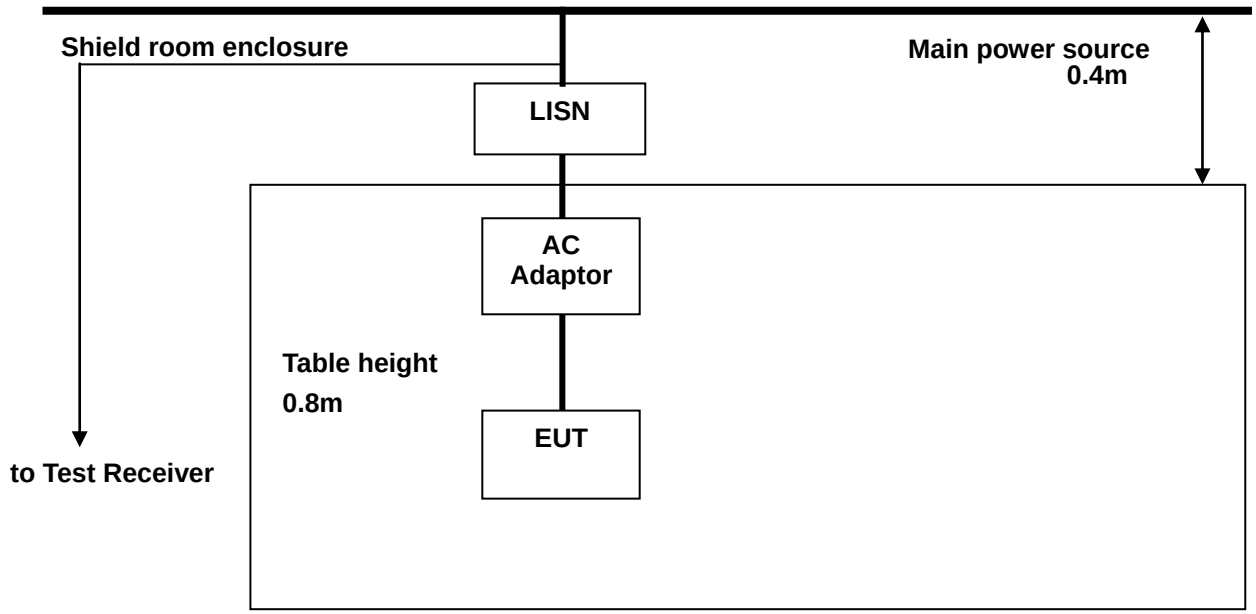
OFDM : 802.11ac_VHT80

Middle Channel



6. Transmitter AC Power Line Conducted Emission

6.1. Test Setup



6.2. Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network(LISN).
Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency of Emission (㎒)	Conducted limit (dB㎶)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

* Decreases with the logarithm of the frequency.

6.3. Test Procedures

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.
AC line conducted emissions from the EUT were measured according to the dictates of ANSI C63.4-2003

1. The test procedure is performed in a 6.5m × 3.6m× 3.6m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m(W)× 1.5 m(L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. The excess power cable between the EUT and the LISN was bundled. All connecting cables of EUT were moved to find the maximum emission.

6.4. Test Results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line

Ambient temperature : (23 ± 2) ℃
Relative humidity : 47 % R.H.

Frequency range : 0.15 ㎒ – 30 ㎒
Measured Bandwidth : 9 ㎑

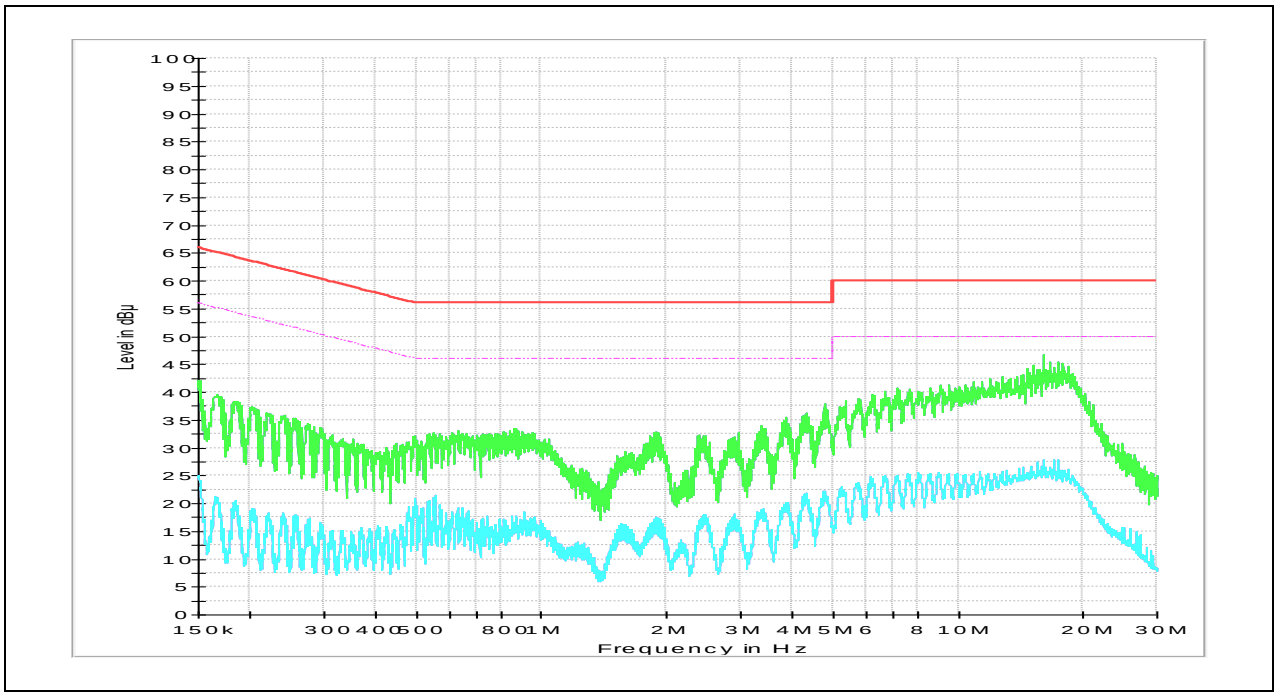
FREQ.	LEVEL(dBμV)		LINE	LIMIT(dBμV)		MARGIN(dB)	
(㎒)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	34.90	28.30	H	66.00	56.00	31.10	27.70
0.20	33.00	20.00	H	63.61	53.61	30.61	33.61
0.75	31.20	20.00	H	56.00	46.00	24.80	26.00
2.38	30.80	20.50	H	56.00	46.00	25.20	25.50
11.64	38.10	28.10	H	60.00	50.00	21.90	21.90
15.75	38.60	28.20	H	60.00	50.00	21.40	21.80
0.15	34.80	22.00	N	66.00	56.00	31.20	34.00
1.88	26.50	17.80	N	56.00	46.00	29.50	28.20
4.80	30.20	21.10	N	56.00	46.00	25.80	24.90
9.11	34.80	23.00	N	60.00	50.00	25.20	27.00
13.30	37.20	24.00	N	60.00	50.00	22.80	26.00
18.35	38.00	25.10	N	60.00	50.00	22.00	24.90

Remark;

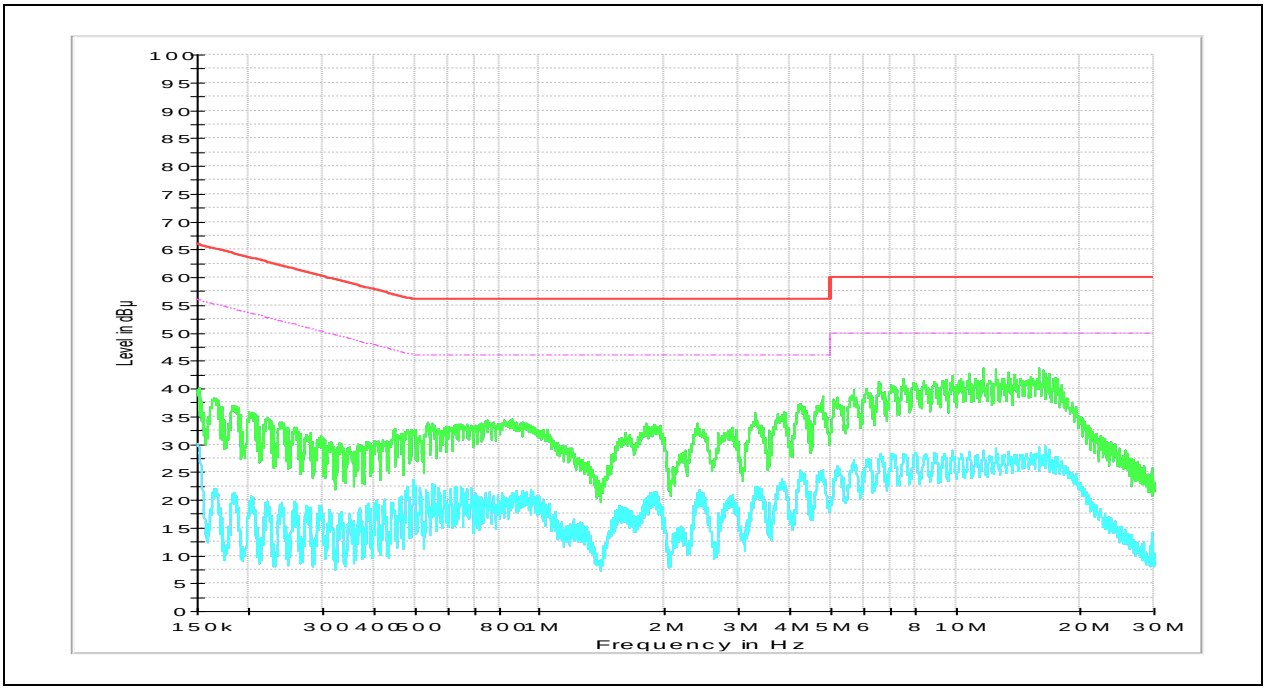
1. Line (H): Hot, Line (N): Neutral
2. All modes of operation were investigated and the worst-case emissions were reported using 11b Mode 1 Mbps, high channel.
3. Traces shown in plot mad using a peak detector and average detector
4. The limit for Class B device(s) from 150 ㎑ to 30 ㎒ are specified in Section of the Title 47 CFR.
5. Deviations to the Specifications: None.

Plots of Conducted Power line

Test mode : (Neutral)



Test mode : (Hot)



7. Antenna Requirement

7.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section §15.247 (b) if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the gain of the antenna exceeds 6 dBi.

7.2. Antenna Connected Construction

Antenna used in this product is Integral antenna and peak max gain of antenna as below.

Band	2 412 ㎒ – 2 462 ㎒	5 180 ㎒ – 5 320 ㎒	5 500 ㎒ – 5 700 ㎒	5 745 ㎒ – 5 825 ㎒
Mode	11b/g/n_HT20	11a/n_HT20, HT40, 11ac_VHT20, VHT40, VHT80		
Gain	-3.09 dBi	-1.58 dBi	-0.13 dBi	-0.13 dBi