5.46 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.407 (e)

Test Method: KDB 789033 D02 v01r03Section C.2

Limit: Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer.

Spectrum analyzer according to the following Settings:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 * RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

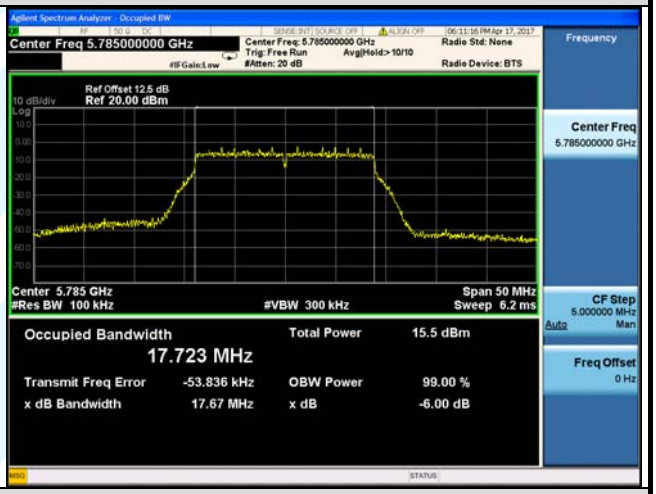
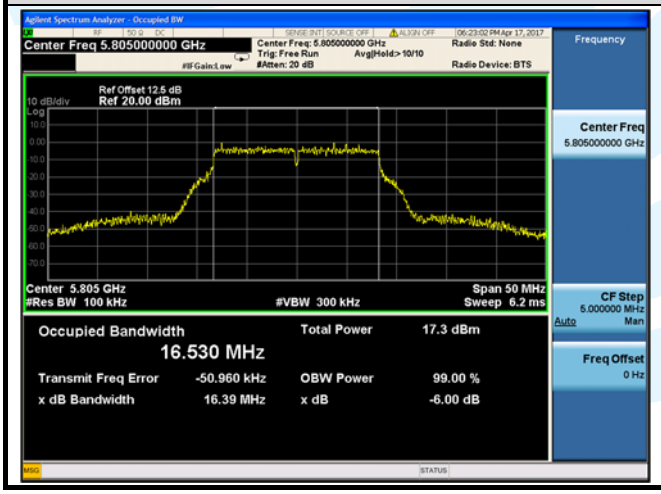
Test Mode: Transmitter mode

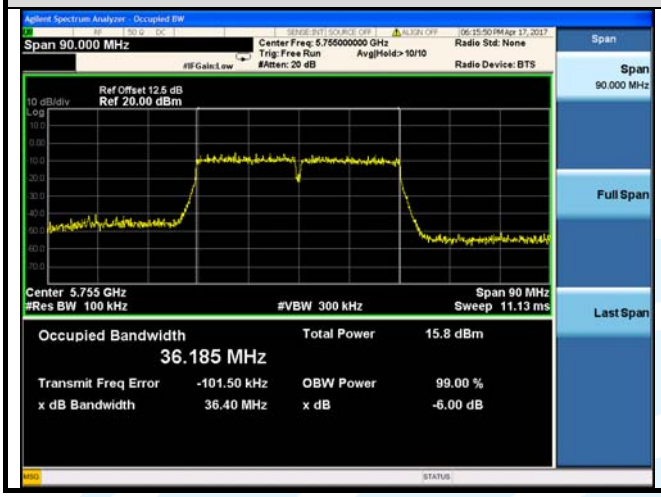
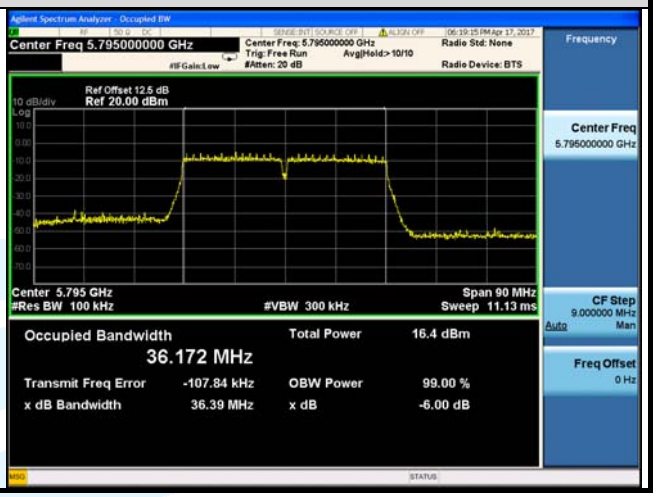
Test Results: Pass

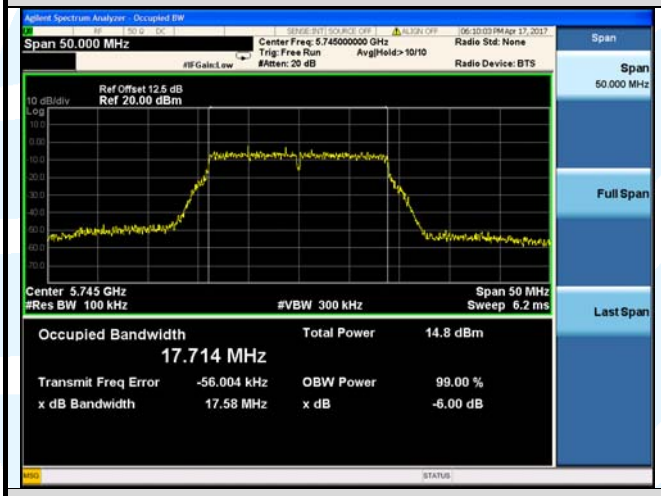
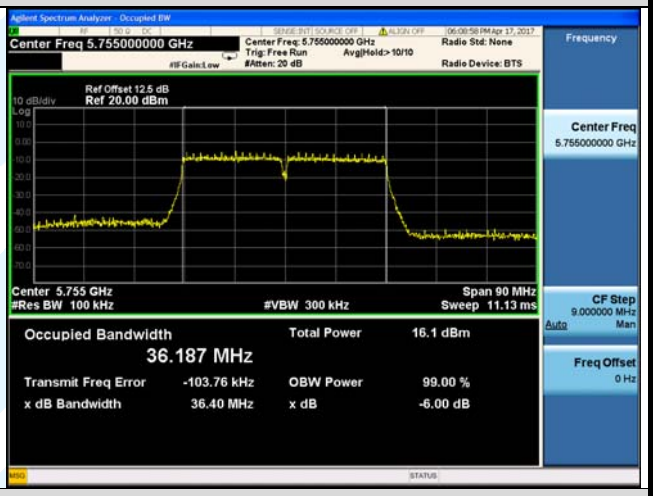
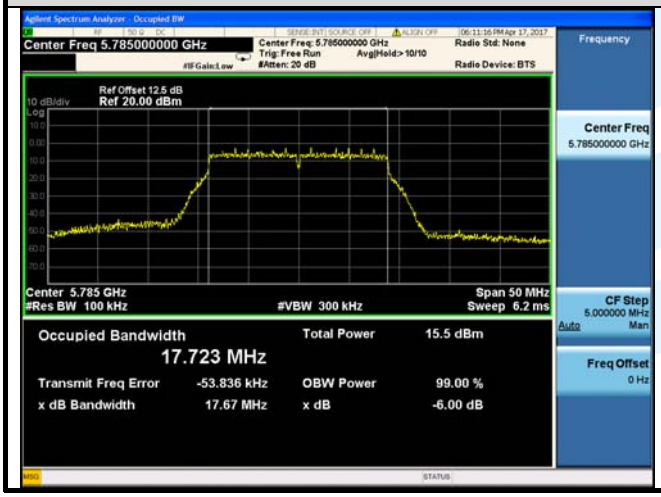
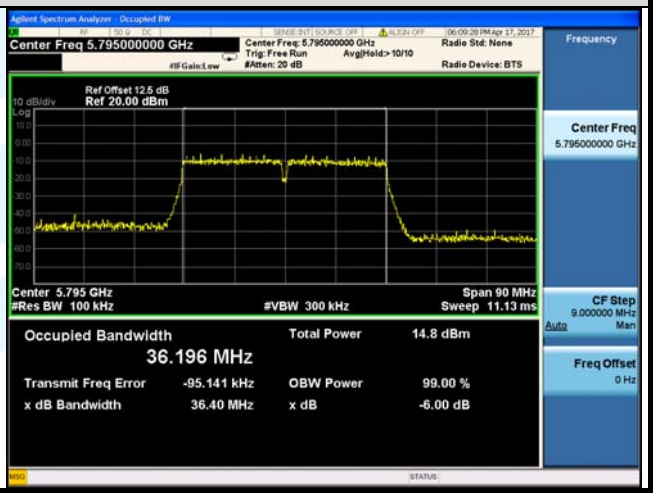
Test Data:

Mode	Channel/ Frequency (MHz)	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limit	Pass / Fail
The worst case test data					
IEEE 802.11a	149 (5745)	16.42	16.535	> 500 kHz	Pass
	157 (5785)	16.37	16.536	> 500 kHz	Pass
	161 (5805)	16.39	16.530	> 500 kHz	Pass
IEEE 802.11n-HT20	149 (5745)	17.58	17.714	> 500 kHz	Pass
	157 (5785)	17.67	17.723	> 500 kHz	Pass
	161 (5805)	17.64	17.726	> 500 kHz	Pass
IEEE 802.11n-HT40	151 (5755)	36.40	36.185	> 500 kHz	Pass
	159 (5795)	36.39	36.172	> 500 kHz	Pass
IEEE 802.11ac-VHT20	149 (5745)	17.58	17.714	> 500 kHz	Pass
	157 (5785)	17.67	17.723	> 500 kHz	Pass
	161 (5805)	17.64	17.726	> 500 kHz	Pass
IEEE 802.11ac-VHT40	151 (5755)	36.40	36.187	> 500 kHz	Pass
	159 (5795)	36.40	36.196	> 500 kHz	Pass
IEEE 802.11ac-VHT80	155 (5775)	75.86	75.489	> 500 kHz	Pass

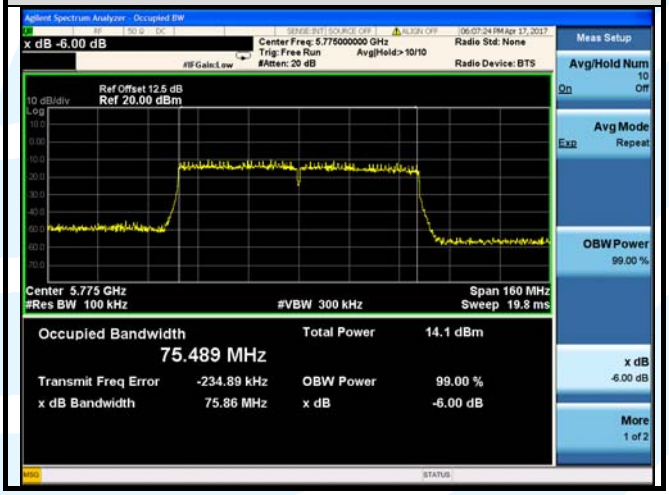
The test plot as follows:

IEEE 802.11a	IEEE 802.11n-HT20
Channel 149	
	
Channel 157	
	
Channel 161	
	

IEEE 802.11n-HT40	
Channel 151	Channel 159
	

IEEE 802.11ac-VHT20	IEEE 802.11ac-VHT40
Channel 149	Channel 151
	
Channel 157	Channel 159
	

Channel 161


IEEE 802.11ac-VHT80
Channel 155


5.5 MAXIMUM CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)

Test Method: KDB 789033 D02 v01r03 Section E.3.a(Method PM)

Limits:

1. For the band 5.15-5.25 GHz.
   (i) For an outdoor 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

   (ii) 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

   (iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

   (iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure:

1. Connected the EUT's antenna port to measure device by 10dB attenuator.
2. Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of Tx on burst.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		SISO				Total Power MIMO_ Chain 0+1	Limits (dBm)	Pass / Fail
		Chain 0		Chain 1				
		Meas Power	Corr'd Power	Meas Power	Corr'd Power			
IEEE 802.11a	36 (5180)	14.53	14.66	14.83	14.96	---	24	Pass
	44 (5220)	14.63	14.76	14.69	14.82	---	24	Pass
	48 (5240)	14.68	14.81	14.77	14.90	---	24	Pass
	52 (5260)	14.31	14.44	14.51	14.64	---	24	Pass
	60 (5300)	14.29	14.42	14.61	14.74	---	24	Pass
	64 (5320)	14.10	14.23	14.58	14.71	---	24	Pass
	100 (5500)	12.72	12.85	13.60	13.73	---	24	Pass
	116 (5580)	12.47	12.60	13.41	13.54	---	24	Pass
	140 (5700)	13.51	13.64	13.82	13.95	---	24	Pass
	149 (5745)	14.41	14.54	14.38	14.51	---	30	Pass
	157 (5785)	14.05	14.18	14.19	14.32	---	30	Pass
	161 (5805)	13.78	13.91	13.75	13.88	---	30	Pass

Note:

For U-NII-2A, U-NII-2C Band, the conducted power limit according KDB905462 D06 select the 24dBm or 11dBm+10logB, whichever is lower(B=26-dB emission BW)

1. Channel 52: 11 dBm + 10log (22.38) = 24.50 dBm > 24 dBm;
2. Channel 60: 11 dBm + 10log (22.27) = 24.48 dBm > 24 dBm;
3. Channel 64: 11 dBm + 10log (22.20) = 24.46 dBm > 24 dBm;
4. Channel 100: 11 dBm + 10log (22.48) = 24.52 dBm > 24 dBm;
5. Channel 116: 11 dBm + 10log (22.14) = 24.45 dBm > 24 dBm;
6. Channel 140: 11 dBm + 10log (22.25) = 24.47 dBm > 24 dBm.

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		SISO				Total Power MIMO_ Chain 0+1	Limits (dBm)	Pass / Fail
		Chain 0		Chain 1				
		Meas Power	Corr'd Power	Meas Power	Corr'd Power			
IEEE 802.11n-HT20	36 (5180)	13.47	13.61	13.49	13.63	16.63	24	Pass
	44 (5220)	13.21	13.35	13.27	13.41	16.39	24	Pass
	48 (5240)	13.18	13.32	13.24	13.38	16.36	24	Pass
	52 (5260)	13.00	13.14	13.32	13.46	16.32	24	Pass
	60 (5300)	13.02	13.16	13.45	13.59	16.39	24	Pass
	64 (5320)	12.99	13.13	13.42	13.56	16.36	24	Pass
	100 (5500)	11.64	11.78	12.14	12.28	15.05	24	Pass
	116 (5580)	11.29	11.43	11.93	12.07	14.77	24	Pass
	140 (5700)	11.91	12.05	12.61	12.75	15.43	24	Pass
	149 (5745)	13.04	13.18	13.11	13.25	16.23	30	Pass
	157 (5785)	12.83	12.97	12.93	13.07	16.03	30	Pass
	161 (5805)	12.49	12.63	12.37	12.51	15.58	30	Pass

Note:

For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band, the conducted power limit according KDB905462 D06 select the 24dBm or 11dBm+10logB, whichever is lower(B=26-Db emission BW)

1. Channel 52: 11 dBm + 10log (22.17) = 24.46 dBm > 24 dBm;
2. Channel 60: 11 dBm + 10log (22.47) = 24.52 dBm > 24 dBm;
3. Channel 64: 11 dBm + 10log (22.70) = 24.56 dBm > 24 dBm;
4. Channel 100: 11 dBm + 10log (22.65) = 24.55 dBm > 24 dBm;
5. Channel 116: 11 dBm + 10log (22.60) = 24.54 dBm > 24 dBm;
6. Channel 140: 11 dBm + 10log (22.29) = 24.48 dBm > 24 dBm.

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		SISO				Total Power MIMO_ Chain 0+1	Limits (dBm)	Pass / Fail
		Chain 0		Chain 1				
		Meas Power	Corr'd Power	Meas Power	Corr'd Power			
IEEE 802.11n-HT40	38 (5190)	11.51	11.76	12.03	12.28	15.04	24	Pass
	46 (5230)	11.45	11.70	11.98	12.23	14.98	24	Pass
	54 (5270)	11.53	11.78	10.61	10.86	14.35	24	Pass
	62 (5310)	10.50	10.75	11.41	11.66	14.24	24	Pass
	102 (5510)	8.61	8.86	10.55	10.80	12.95	24	Pass
	110 (5550)	8.69	8.94	10.66	10.91	13.05	24	Pass
	134 (5670)	9.34	9.59	10.78	11.03	13.38	24	Pass
	151 (5755)	10.73	10.98	11.53	11.78	14.41	30	Pass
	159 (5795)	10.39	10.64	11.08	11.33	14.01	30	Pass

Note:

For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band, the conducted power limit according KDB905462 D06 select the 24dBm or 11dBm+10logB, whichever is lower(B=26-dB emission BW)

1. Channel 54: 11 dBm + 10log (40.15) = 27.04 dBm > 24 dBm;
2. Channel 62: 11 dBm + 10log (40.50) = 27.07 dBm > 24 dBm;
3. Channel 102: 11 dBm + 10log (40.39) = 27.06 dBm > 24 dBm;
4. Channel 110: 11 dBm + 10log (40.75) = 27.10 dBm > 24 dBm;
5. Channel 134: 11 dBm + 10log (40.45) = 27.07 dBm > 24 dBm.

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		SISO				Total Power MIMO_ Chain 0+1	Limits (dBm)	Pass / Fail
		Chain 0		Chain 1				
		Meas Power	Corr'd Power	Meas Power	Corr'd Power			
IEEE 802.11ac-VHT20	36 (5180)	13.07	13.20	13.45	13.58	16.40	24	Pass
	44 (5220)	12.90	13.03	13.23	13.36	16.21	24	Pass
	48 (5240)	12.99	13.12	13.16	13.29	16.22	24	Pass
	52 (5260)	12.93	13.06	13.32	13.45	16.27	24	Pass
	60 (5300)	12.98	13.11	13.40	13.53	16.34	24	Pass
	64 (5320)	12.94	13.07	13.36	13.49	16.30	24	Pass
	100 (5500)	11.62	11.75	12.00	12.13	14.95	24	Pass
	116 (5580)	11.32	11.45	11.88	12.01	14.75	24	Pass
	140 (5700)	11.90	12.03	12.51	12.64	15.36	24	Pass
	149 (5745)	12.97	13.10	13.08	13.21	16.17	30	Pass
	157 (5785)	12.62	12.75	12.54	12.67	15.72	30	Pass
	161 (5805)	12.23	12.36	12.30	12.43	15.41	30	Pass

Note:
For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band, the conducted power limit according KDB905462 D06 select the 24dBm or 11dBm+10logB, whichever is lower(B=26-dB emission BW)

1. Channel 52: 11 dBm + 10log (22.79) = 24.58 dBm > 24 dBm;
2. Channel 60: 11 dBm + 10log (22.79) = 24.58 dBm > 24 dBm;
3. Channel 64: 11 dBm + 10log (22.63) = 24.55 dBm > 24 dBm;
4. Channel 100: 11 dBm + 10log (22.23) = 24.47 dBm > 24 dBm;
5. Channel 116: 11 dBm + 10log (22.79) = 24.58 dBm > 24 dBm;
6. Channel 140: 11 dBm + 10log (22.88) = 24.59 dBm > 24 dBm.

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		SISO				Total Power MIMO_ Chain 0+1	Limits (dBm)	Pass / Fail
		Chain 0		Chain 1				
		Meas Power	Corr'd Power	Meas Power	Corr'd Power			
IEEE 802.11ac-VHT40	38 (5190)	11.45	11.70	11.97	12.22	14.98	24	Pass
	46 (5230)	11.38	11.63	11.90	12.15	14.91	24	Pass
	54 (5270)	11.44	11.69	10.54	10.79	14.27	24	Pass
	62 (5310)	10.44	10.69	11.35	11.60	14.18	24	Pass
	102 (5510)	8.62	8.87	10.54	10.79	12.95	24	Pass
	110 (5550)	8.63	8.88	10.60	10.85	12.99	24	Pass
	134 (5670)	9.26	9.51	10.73	10.98	13.32	24	Pass
	151 (5755)	10.64	10.89	11.49	11.74	14.35	30	Pass
	159 (5795)	10.33	10.58	11.01	11.26	13.94	30	Pass

Note:
For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band, the conducted power limit according KDB905462 D06 select the 24dBm or 11dBm+10logB, whichever is lower(B=26-dB emission BW)

1. Channel 54: 11 dBm + 10log (40.24) = 27.05 dBm > 24 dBm;
2. Channel 62: 11 dBm + 10log (40.36) = 27.06 dBm > 24 dBm;
3. Channel 102: 11 dBm + 10log (40.45) = 27.07 dBm > 24 dBm;
4. Channel 110: 11 dBm + 10log (40.67) = 27.09 dBm > 24 dBm;
5. Channel 134: 11 dBm + 10log (40.17) = 27.04 dBm > 24 dBm.

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		SISO				Total Power MIMO_ Chain 0+1	Limits (dBm)	Pass / Fail
		Chain 0		Chain 1				
		Meas Power	Corr'd Power	Meas Power	Corr'd Power			
IEEE 802.11ac-VHT80	42 (5230)	10.53	11.02	10.74	11.23	14.14	24	Pass
	58 (5290)	9.7	10.19	10.72	11.21	13.74	24	Pass
	106 (5530)	7.83	8.32	9.77	10.26	12.41	24	Pass
	122 (5610)	8.07	8.56	9.83	10.32	12.54	24	Pass
	155 (5775)	9.76	10.25	10.48	10.97	13.64	30	Pass

Note:

For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band For U-NII-2A, U-NII-2C Band, the conducted power limit according KDB905462 D06 select the 24dBm or 11dBm+10logB, whichever is lower(B=26-dB emission BW)

1. Channel 52: 11 dBm + 10log (80.83) = 30.08 dBm > 24 dBm;
2. Channel 60: 11 dBm + 10log (81.32) = 30.10 dBm > 24 dBm;
3. Channel 64: 11 dBm + 10log (81.42) = 30.11 dBm > 24 dBm;

Remark:

1. Corr'd Power = Meas Power + Duty Cycle Factor
2. Total (Chain 0+1) = $10*\log[(10^{\text{Chain 0}/10})+(10^{\text{Chain 1}/10})]$
3. Directional gain and the maximum conducted output power limit see table below:

Frequency Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated chains directional gain (dBi)	Peak Power Limits (dBm)
U-NII-1	2.00	2.00	5.01	24.00
U-NII-2A	2.00	2.00	5.01	24.00
U-NII-2C	2.00	2.00	5.01	24.00
U-NII-3	2.00	2.00	5.01	30.00
Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power. Directional gain is to be computed as follows:				
If *any* transmit signals are *correlated* with each other,				
Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi				

5.6 PEAK POWER SPECTRAL DENSITY

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)

Test Method: KDB 789033 D02 v01r03 Section F

Limits:

1. For the band 5.15-5.25 GHz.
   (i) For an outdoor 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

   (ii) 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

   (iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

   (iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
3. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum

Analyzer.

Spectrum analyzer according to the following Settings:
1. For U-NII-1, U-NII-2A, U-NII-2C band:
Using method SA-2
a) Set span to encompass the entire emission bandwidth (EBW) of the signal.
b) Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS
c) Sweep time = auto, trigger set to “free run”.
d) Trace average at least 100 traces in power averaging mode.
e) Record the max value and add 10 log (1/duty cycle)
2. For U-NII-3 band:
a) Set span to encompass the entire emission bandwidth (EBW) of the signal.
b) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS
c) Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.
d) Sweep time = auto, trigger set to “free run”.
e) Trace average at least 100 traces in power averaging mode.
f) Record the max value and add 10 log (1/duty cycle)

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.
Instruments Used: Refer to section 3 for details
Test Mode: Transmitter mode
Test Results: Pass
Test Data:

For U-NII-1, U-NII-2A, U-NII-2C band

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11a	36 (5180)	---	---	6.690	6.820	---	11	Pass
	44 (5220)	---	---	6.550	6.680	---	11	Pass
	48 (5240)	---	---	6.396	6.526	---	11	Pass
	52 (5260)	---	---	6.603	6.733	---	11	Pass
	60 (5300)	---	---	6.152	6.282	---	11	Pass
	64 (5320)	---	---	5.852	5.982	---	11	Pass
	100 (5500)	---	---	2.050	2.180	---	11	Pass
	116 (5580)	---	---	1.618	1.748	---	11	Pass
	140 (5700)	---	---	2.503	2.633	---	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11n-HT20	36 (5180)	3.275	3.415	4.168	4.308	6.89	11	Pass
	44 (5220)	3.088	3.228	3.703	3.843	6.56	11	Pass
	48 (5240)	3.097	3.237	3.987	4.127	6.72	11	Pass
	52 (5260)	2.603	2.743	3.882	4.022	6.44	11	Pass
	60 (5300)	2.388	2.528	3.527	3.667	6.15	11	Pass
	64 (5320)	2.451	2.591	3.521	3.661	6.17	11	Pass
	100 (5500)	-3.124	-2.984	0.496	0.636	2.20	11	Pass
	116 (5580)	-4.162	-4.022	1.142	1.282	2.40	11	Pass
	140 (5700)	-3.531	-3.391	2.619	2.759	3.70	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11n-HT40	38 (5190)	-2.535	-2.285	-1.313	-1.063	1.379	11	Pass
	46 (5230)	-2.425	-2.175	-1.645	-1.395	1.243	11	Pass
	54 (5270)	-3.164	-2.914	-1.628	-1.378	0.932	11	Pass
	62 (5310)	-3.558	-3.308	-1.871	-1.621	0.627	11	Pass
	102 (5510)	-8.533	-8.283	-4.351	-4.101	-2.697	11	Pass
	110 (5550)	-8.762	-8.512	-3.771	-3.521	-2.326	11	Pass
	134 (5670)	-9.229	-8.979	-2.475	-2.225	-1.393	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac-VHT20	36 (5180)	3.150	3.280	4.222	4.352	6.859	11	Pass
	44 (5220)	3.410	3.540	3.989	4.119	6.849	11	Pass
	48 (5240)	3.068	3.198	3.523	3.653	6.442	11	Pass
	52 (5260)	2.812	2.942	3.918	4.048	6.540	11	Pass
	60 (5300)	2.392	2.522	3.585	3.715	6.170	11	Pass
	64 (5320)	2.307	2.437	3.281	3.411	5.962	11	Pass
	100 (5500)	-3.024	-2.894	0.462	0.592	2.200	11	Pass
	116 (5580)	-4.244	-4.114	1.086	1.216	2.332	11	Pass
	140 (5700)	-3.646	-3.516	2.696	2.826	3.733	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac-VHT40	38 (5190)	-2.177	-1.927	-1.340	-1.090	1.522	11	Pass
	46 (5230)	-2.617	-2.367	-1.719	-1.469	1.115	11	Pass
	54 (5270)	-3.107	-2.857	-1.609	-1.359	0.967	11	Pass
	62 (5310)	-3.397	-3.147	-1.549	-1.299	0.885	11	Pass
	102 (5510)	-8.559	-8.309	-4.222	-3.972	-2.610	11	Pass
	110 (5550)	-9.006	-8.756	-4.012	-3.762	-2.567	11	Pass
	134 (5670)	-9.219	-8.969	-2.480	-2.230	-1.395	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac-VHT80	42 (5230)	-5.975	-5.485	-5.306	-4.816	-2.127	11	Pass
	58 (5290)	-7.053	-6.563	-5.327	-4.837	-2.605	11	Pass
	106 (5530)	-12.193	-11.703	-7.391	-6.901	-5.659	11	Pass
	122 (5610)	-12.169	-11.679	-6.200	-5.710	-4.731	11	Pass

For U-NII-3 band

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11a	149 (5745)	---	---	1.885	2.015	---	30	Pass
	157 (5785)	---	---	1.662	1.792	---	30	Pass
	161 (5805)	---	---	1.187	1.317	---	30	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11n-HT20	149 (5745)	-1.170	-1.030	-1.292	-1.152	1.920	30	Pass
	157 (5785)	-1.473	-1.333	-1.588	-1.448	1.620	30	Pass
	161 (5805)	-1.833	-1.693	-1.277	-1.137	1.604	30	Pass
IEEE 802.11n-HT40	151 (5755)	-2.029	-1.779	-1.925	-1.675	1.284	30	Pass
	159 (5795)	-2.594	-2.344	-2.215	-1.965	0.860	30	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		SISO				Total PSD MIMO_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac-VHT20	149 (5745)	0.745	0.875	-1.302	-1.172	2.981	30	Pass
	157 (5785)	0.378	0.508	-1.192	-1.062	2.804	30	Pass
	161 (5805)	-0.094	0.036	-1.635	-1.505	2.344	30	Pass
IEEE 802.11ac-VHT40	151 (5755)	-1.974	-1.724	-4.925	-4.675	0.057	30	Pass
	159 (5795)	-2.470	-2.220	-4.458	-4.208	-0.091	30	Pass
IEEE 802.11ac-VHT80	155 (5775)	-6.405	-5.915	-7.922	-7.432	-3.597	30	Pass

Remark:
1. Corr'd PSD = Meas PSD + Duty Cycle Factor
2. Total (Chain 0+1) = $10*\log[(10^{\text{Chain 0}/10})+(10^{\text{Chain 1}/10})]$
3. Directional gain and the maximum conducted output power limit see table below:

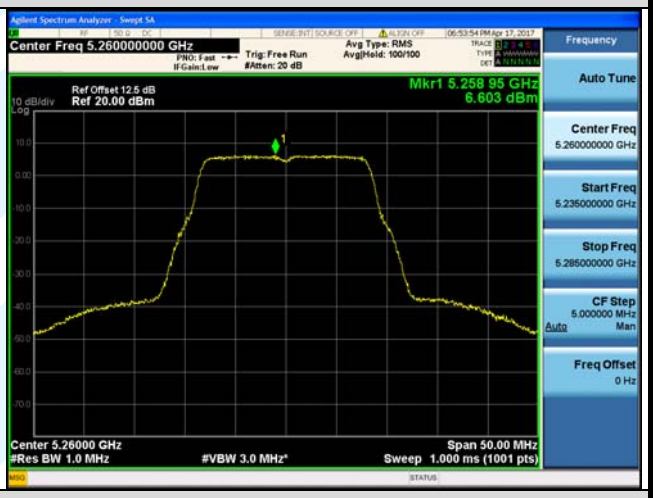
Frequency Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated chains directional gain (dBi)	PSD Limits (dBm/MHz or dBm/500kHz)
U-NII-1	2.00	2.00	5.01	11.00
U-NII-2A	2.00	2.00	5.01	11.00
U-NII-2C	2.00	2.00	5.01	11.00
U-NII-3	2.00	2.00	5.01	30.00

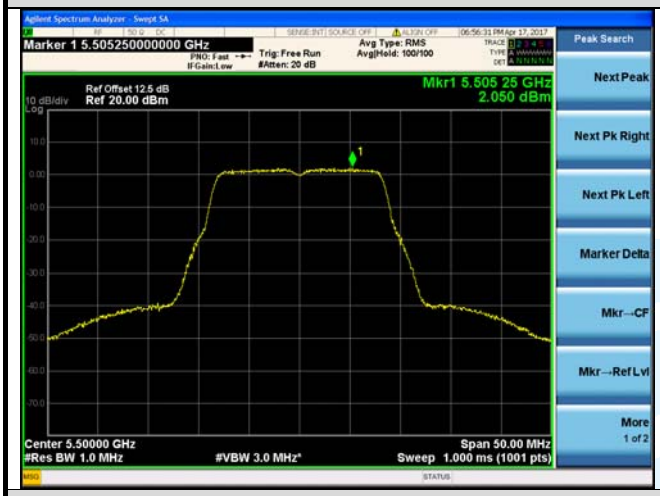
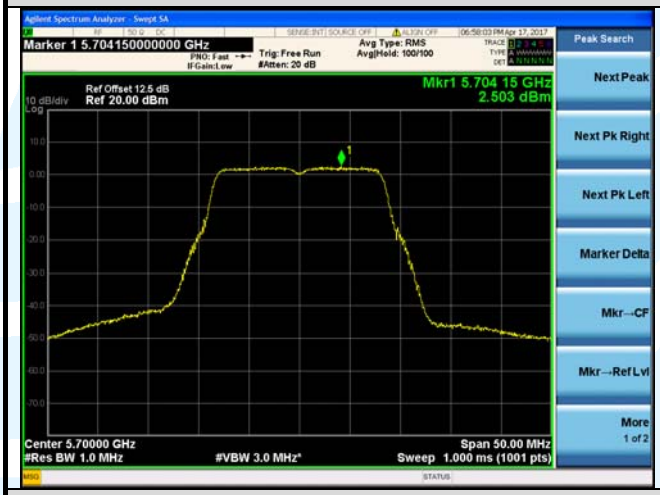
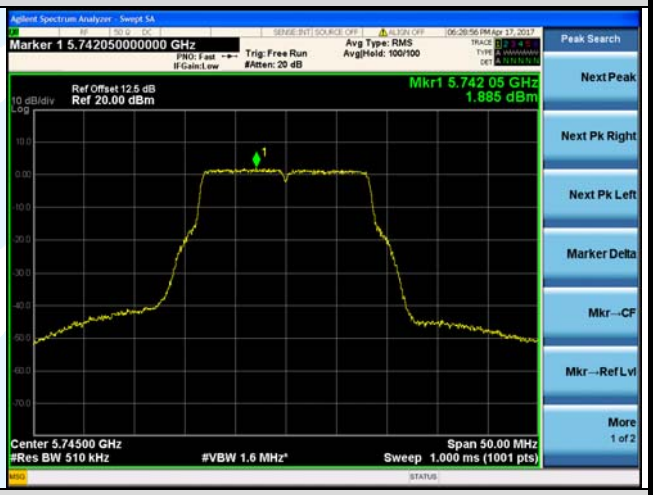
Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power. Directional gain is to be computed as follows:

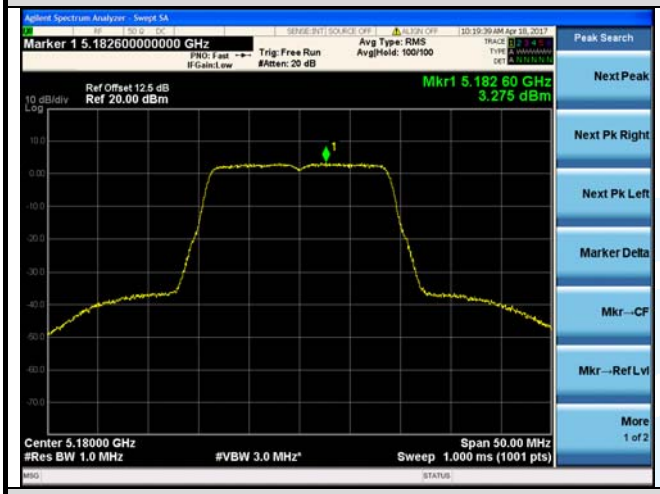
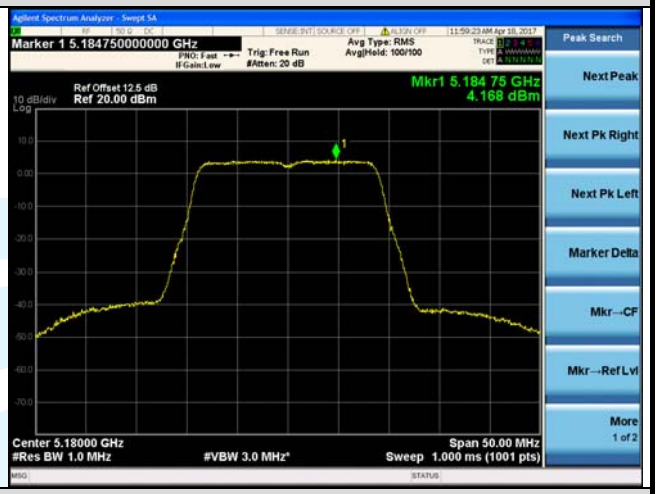
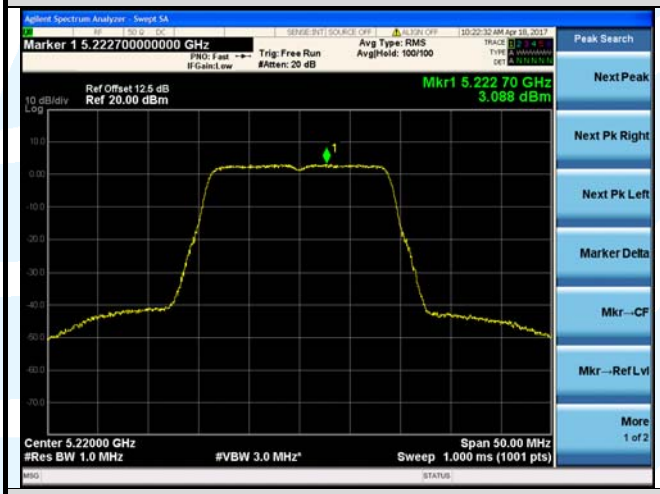
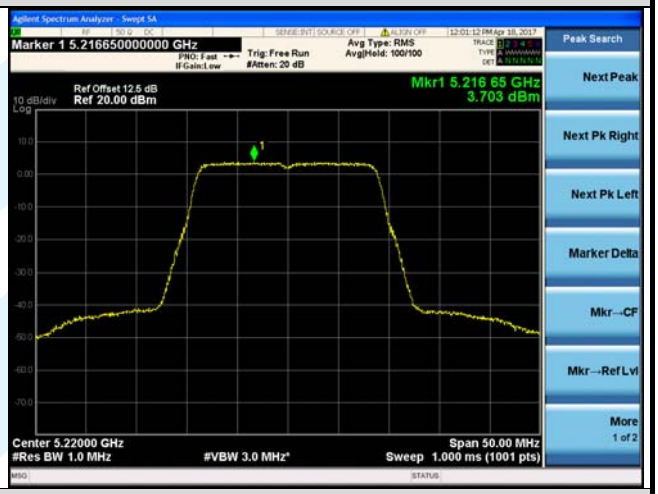
If *any* transmit signals are *correlated* with each other,

Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi

The test plot as follows:

IEEE 802.11a	
Channel 36	**Channel 44**
	
Channel 48	**Channel 52**
	
Channel 60	**Channel 64**
	

IEEE 802.11a	
Channel 100	Channel 116
	
Channel 140	Channel 149
	
Channel 157	Channel 161
	

IEEE 802.11n-HT20	
Chain 0	Chain 1
Channel 36	
	
Channel 44	
	
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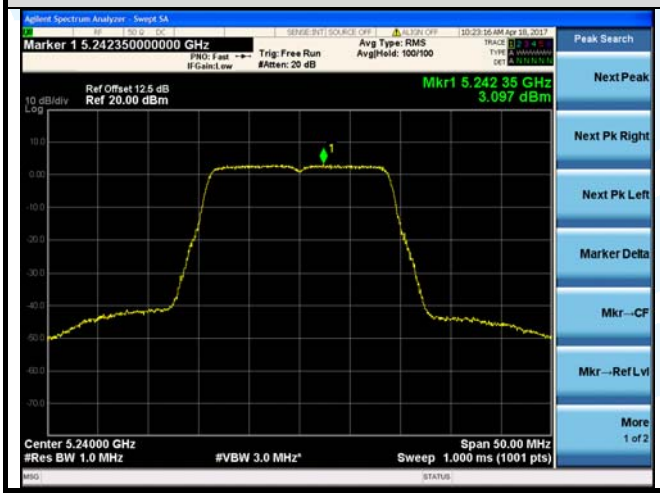
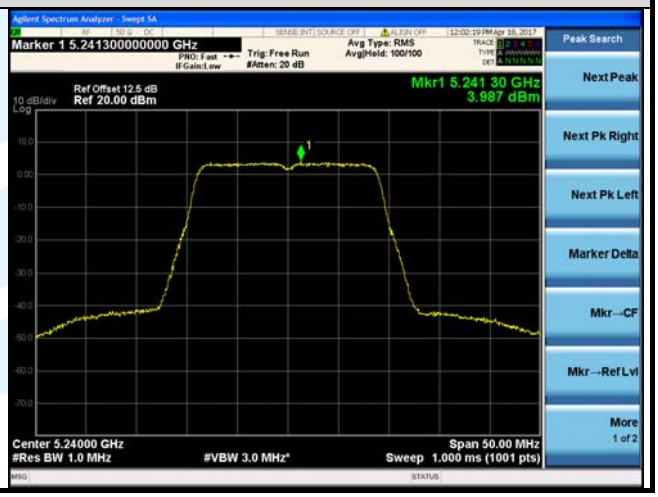
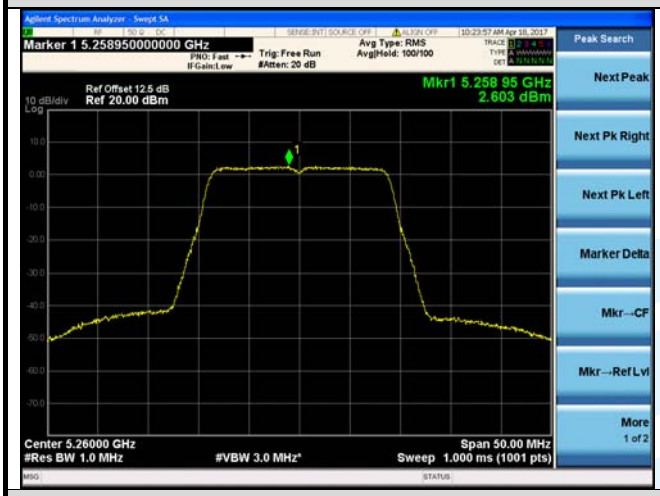
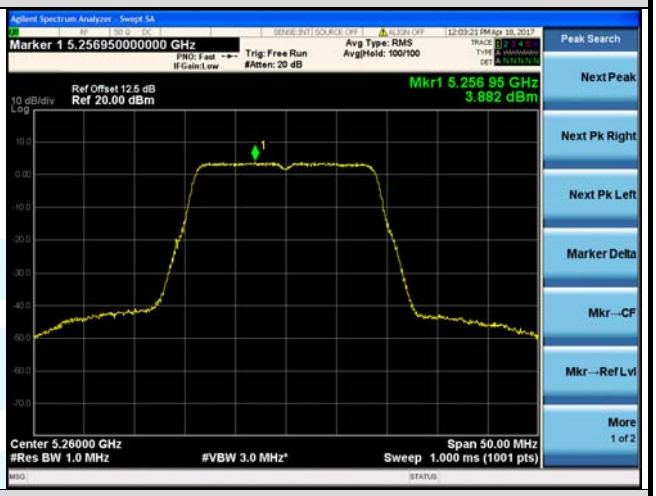
	

IEEE 802.11n-HT20
Channel 52
 
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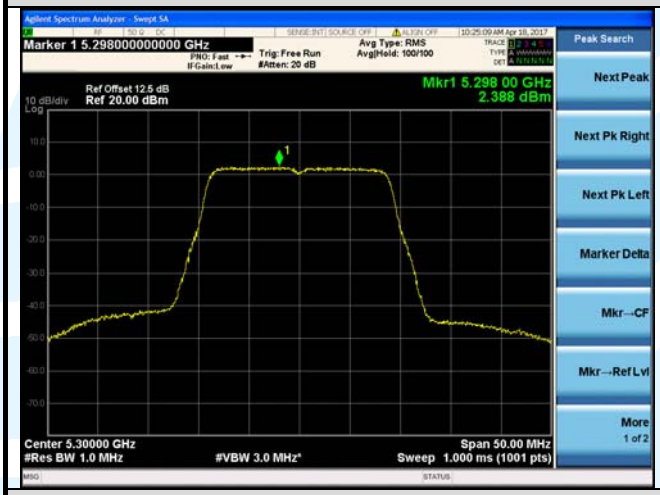 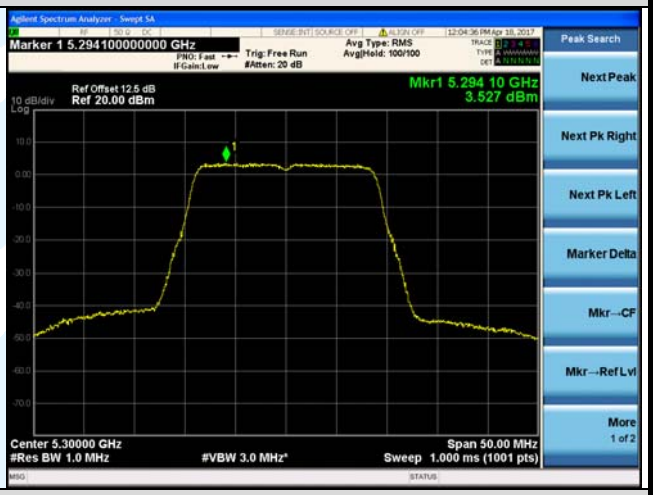
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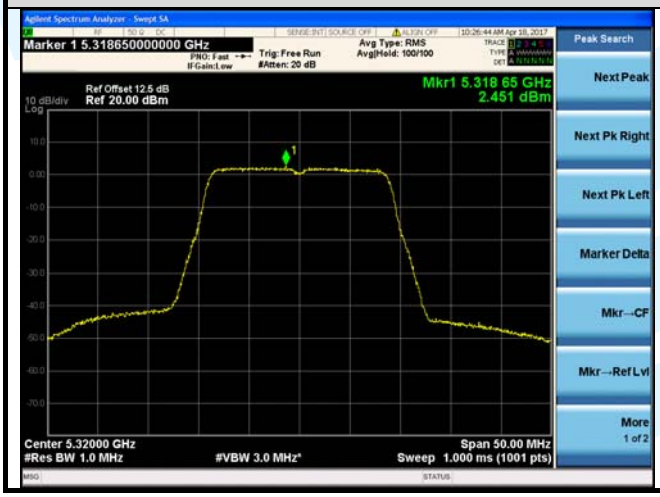
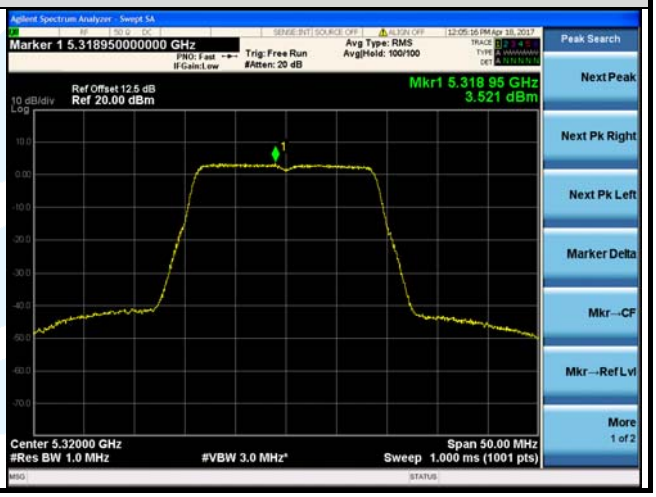
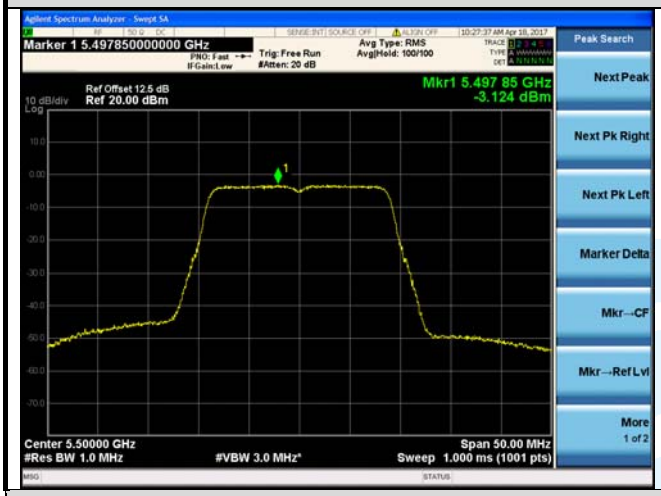
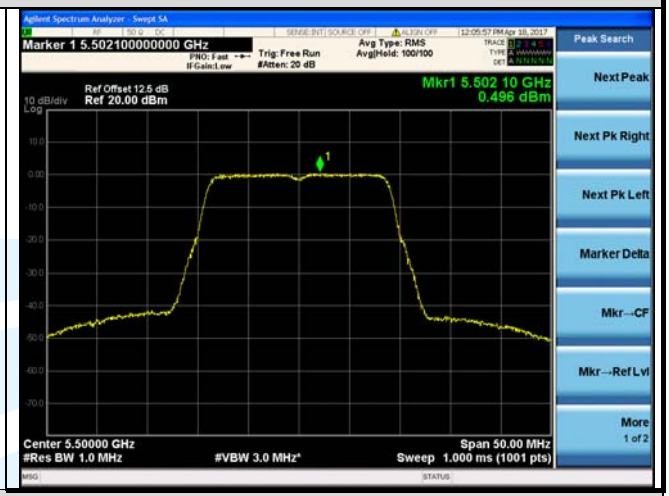
 

IEEE 802.11n-HT20	
Channel 100	
	
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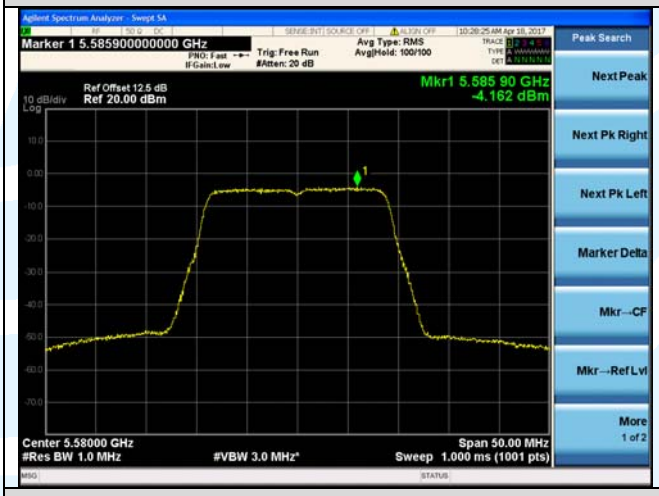	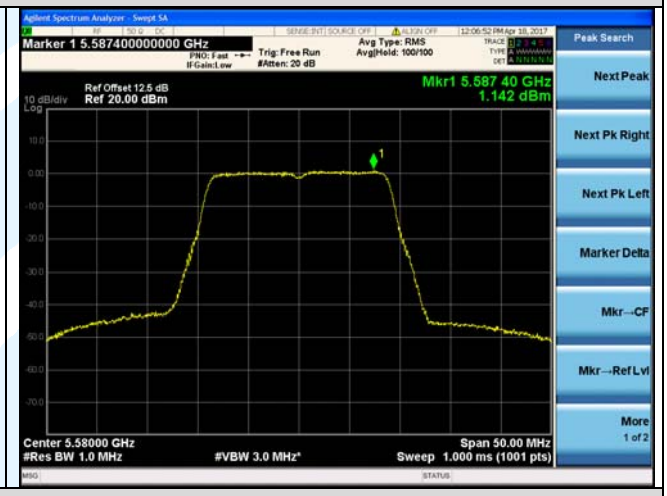
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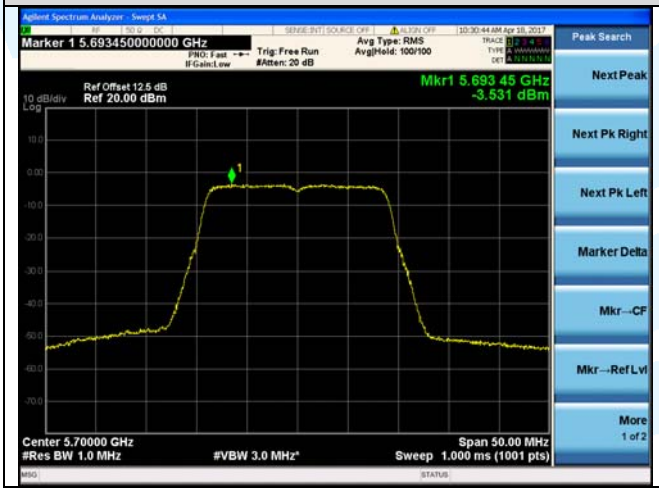	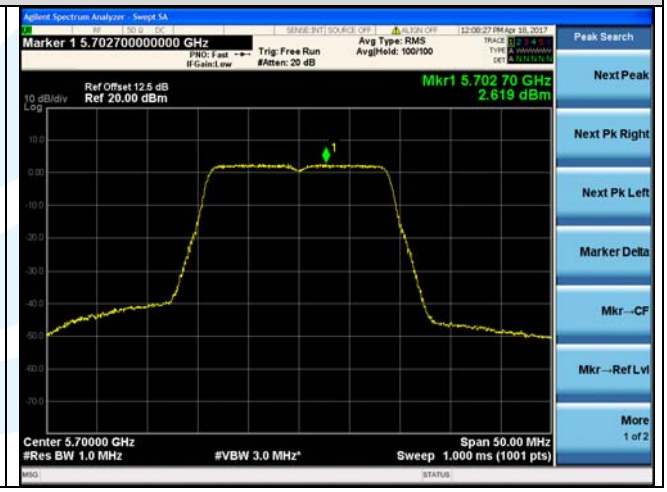

IEEE 802.11n-HT20	
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	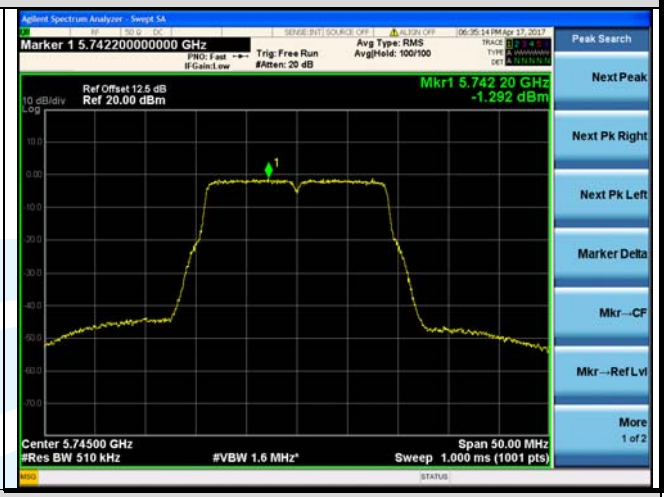
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	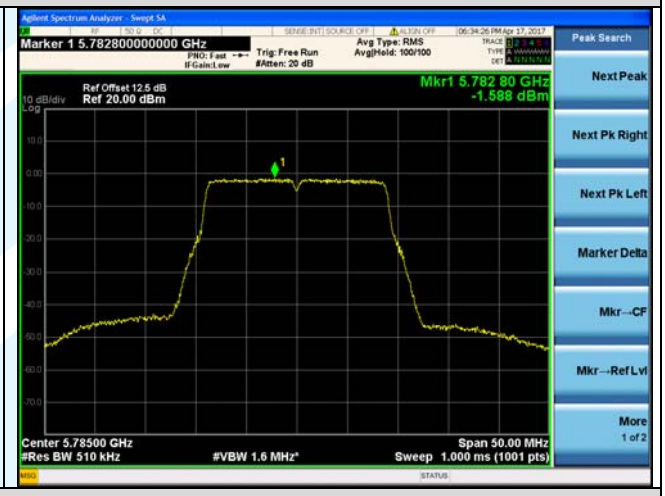
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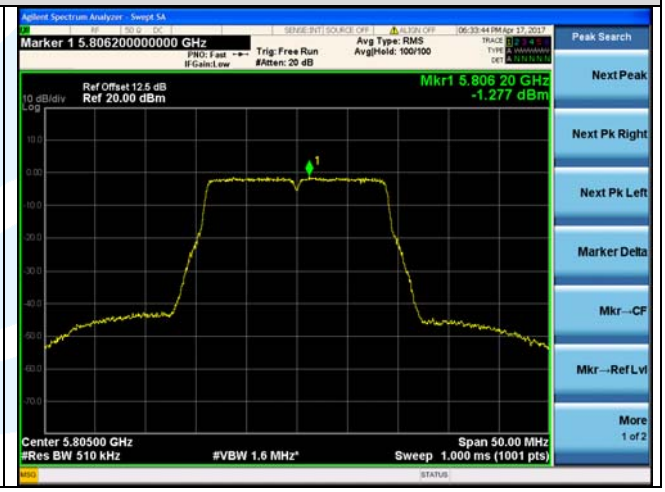
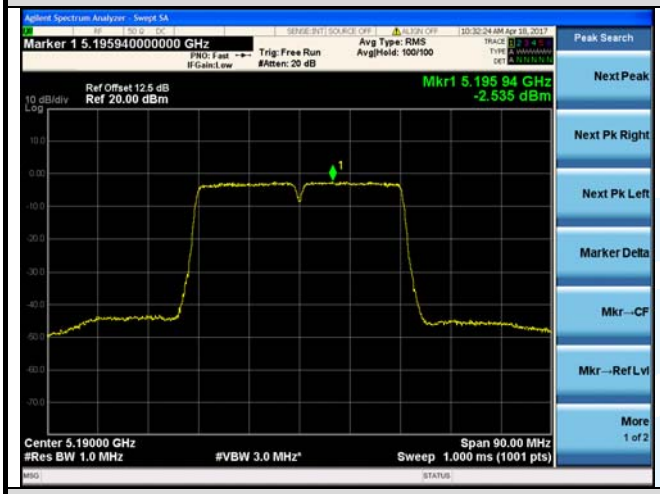
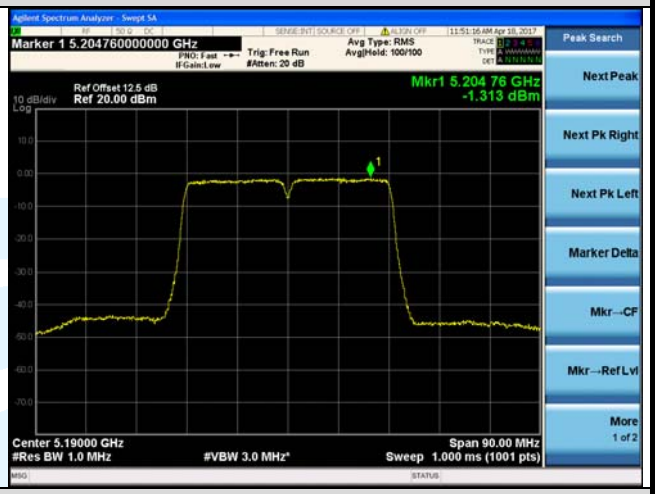
	

IEEE 802.11n-HT40	
Chain 0	Chain 1
Channel 38	
	
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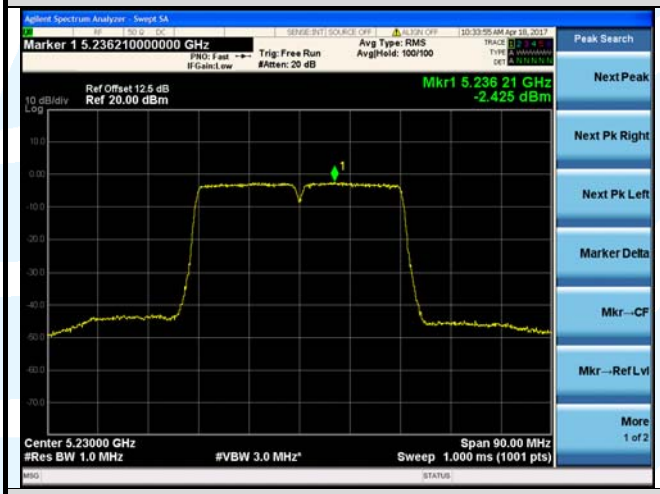	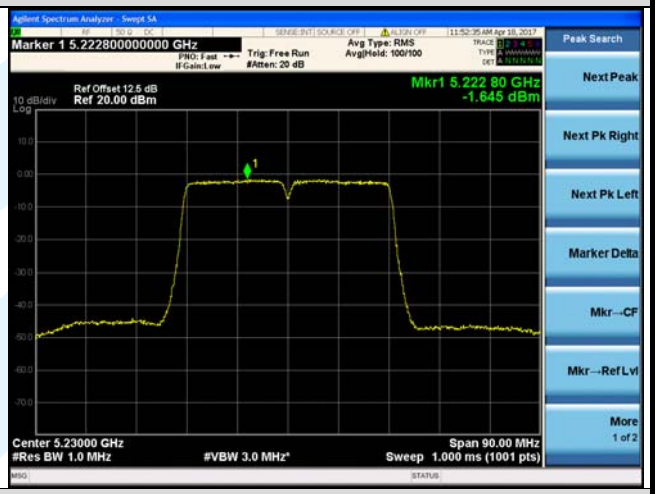
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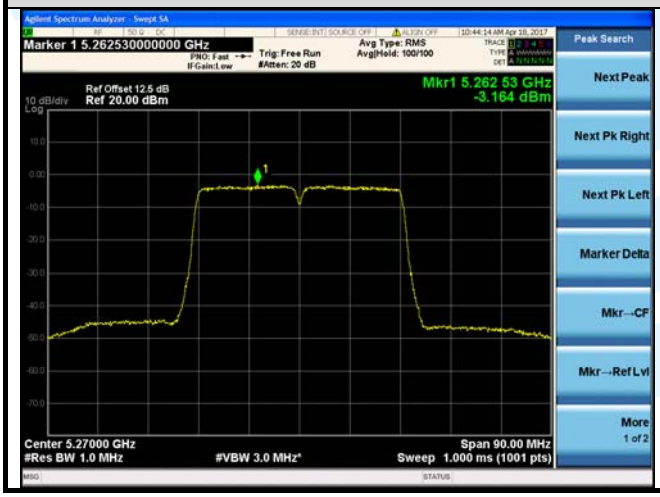	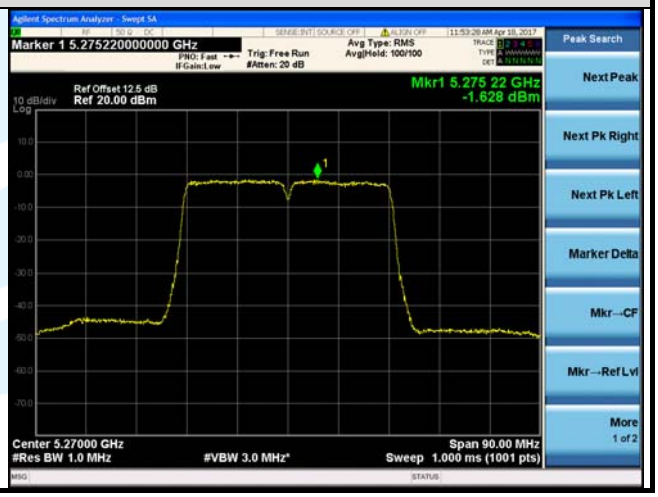

IEEE 802.11n-HT40	
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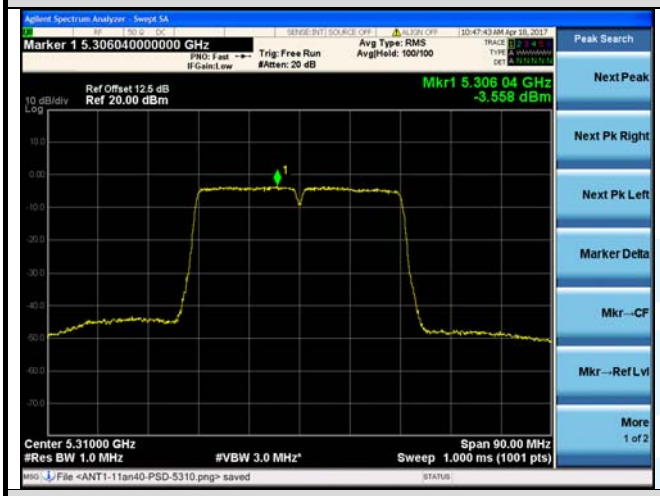	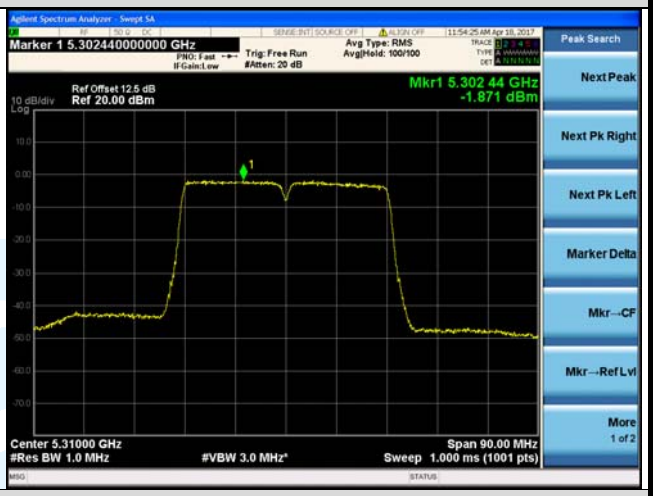
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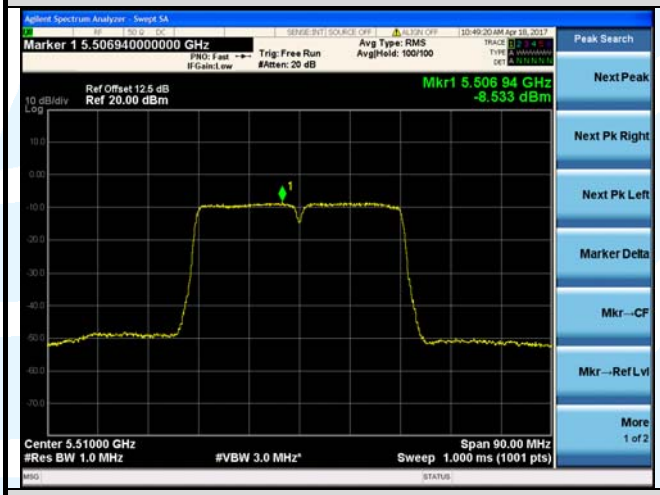	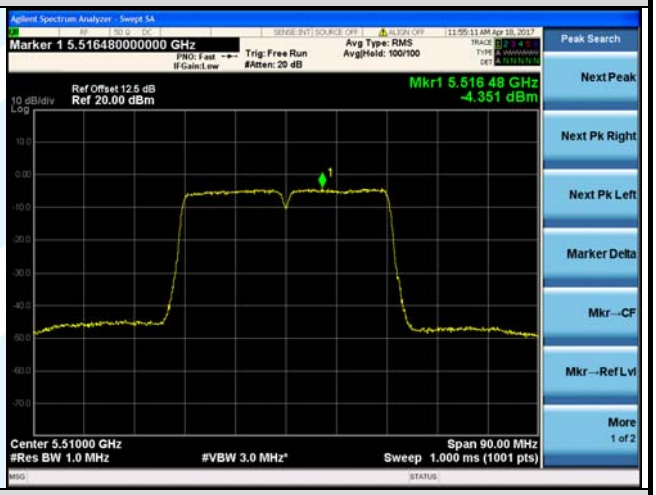
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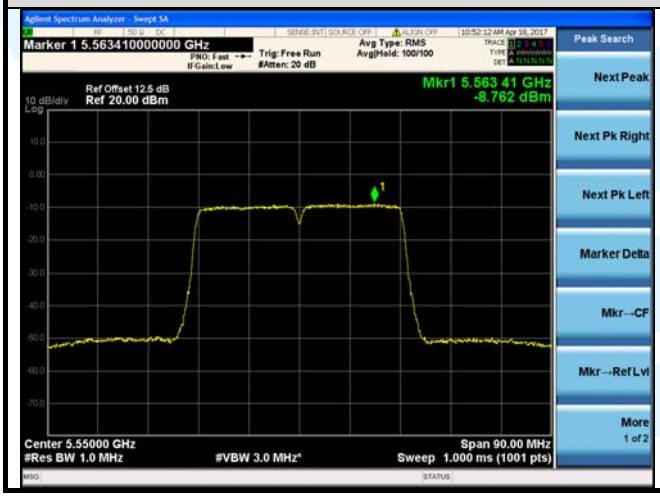	

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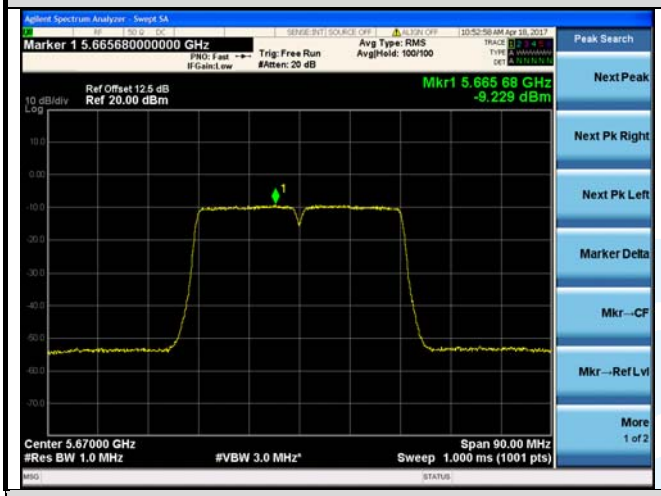	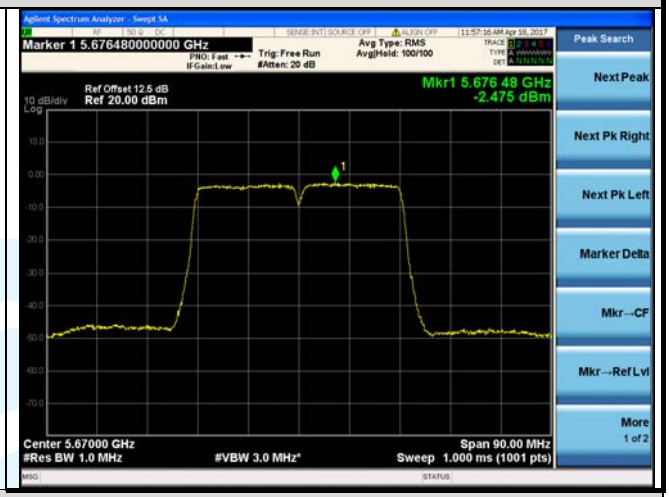
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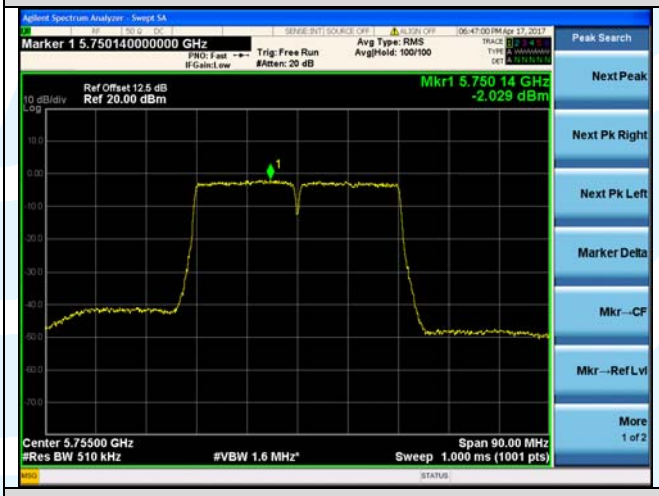	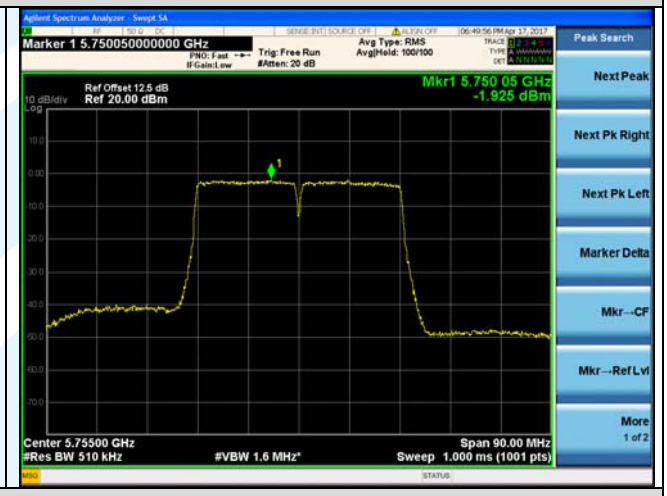
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	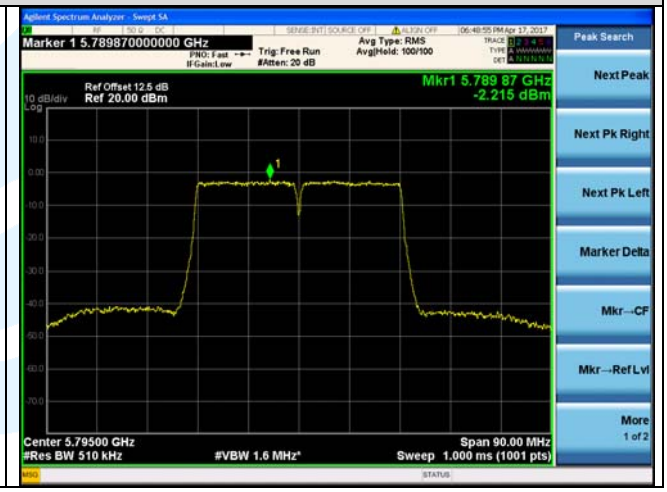

IEEE 802.11ac-VHT20	
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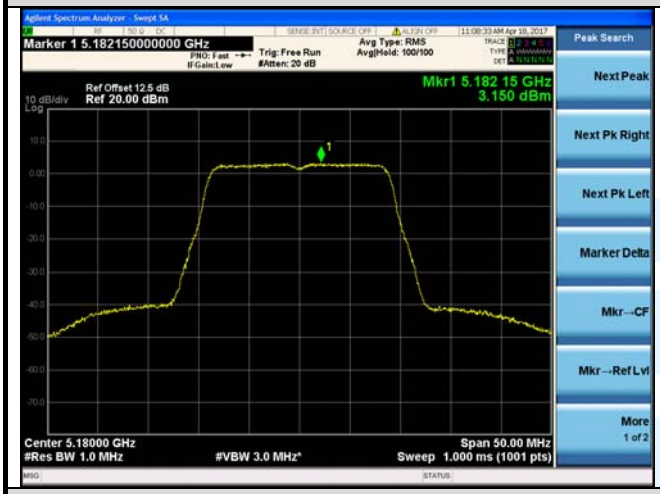	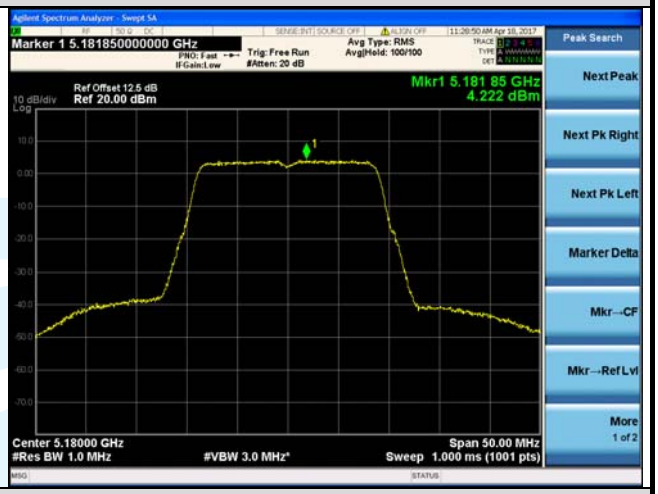
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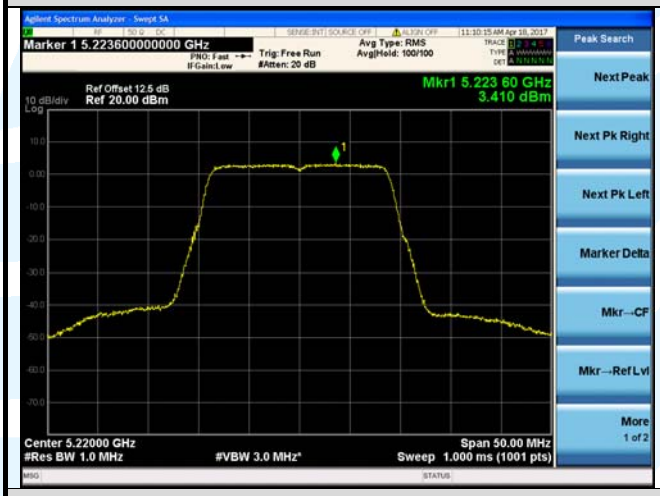	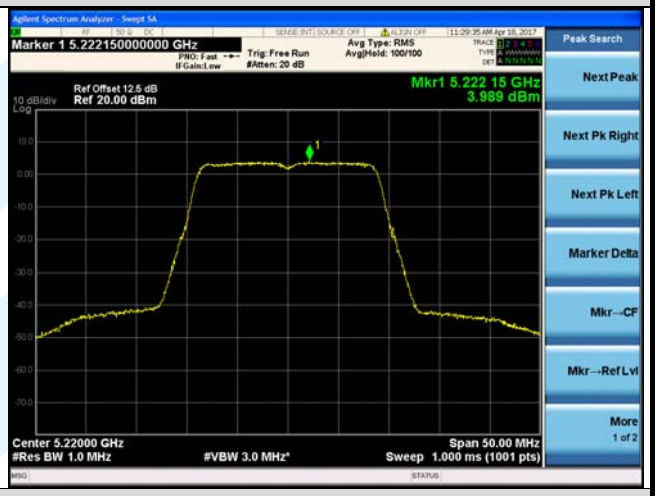
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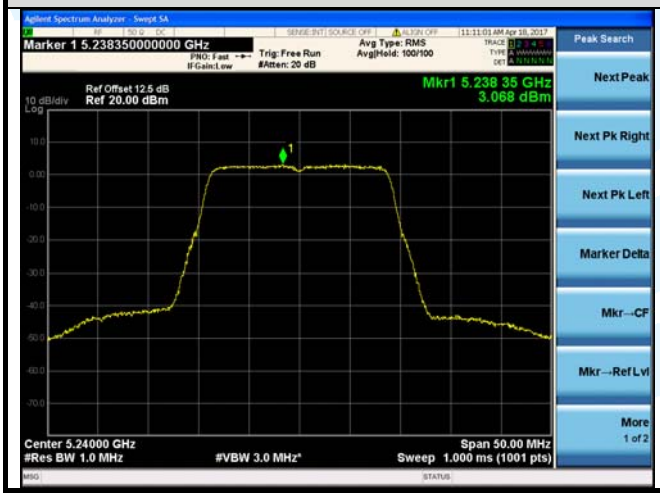	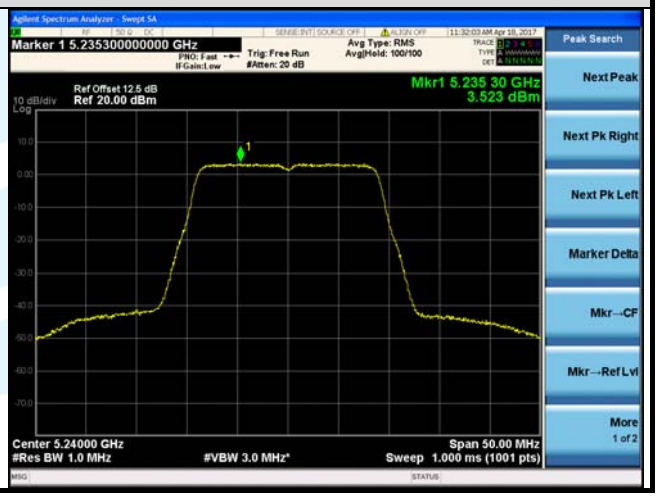

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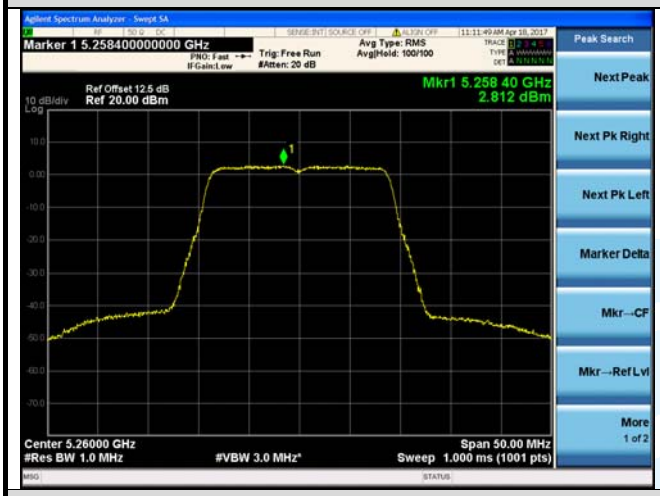	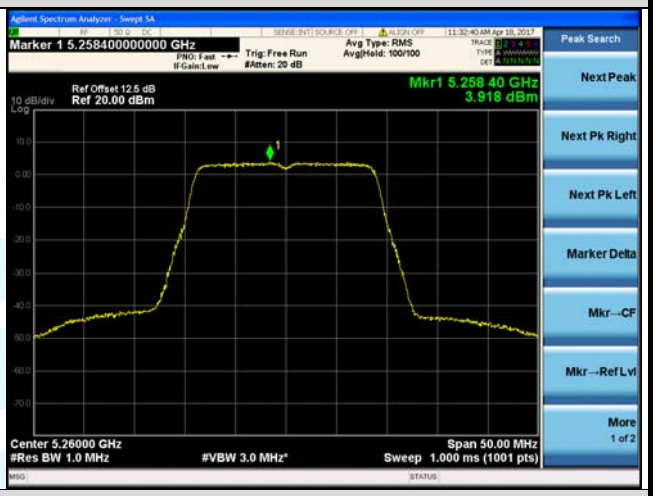
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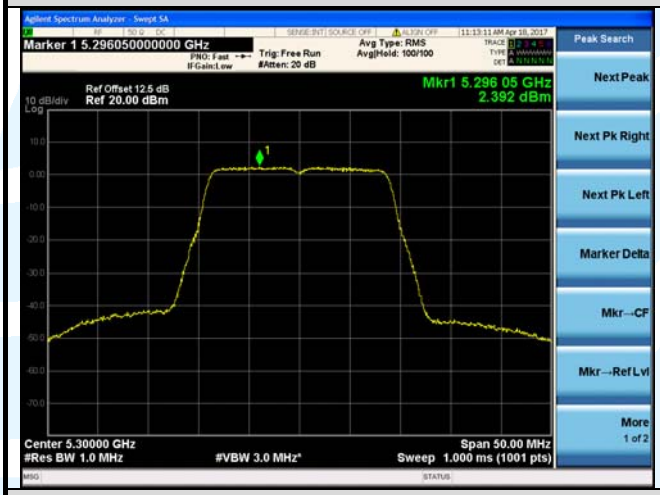	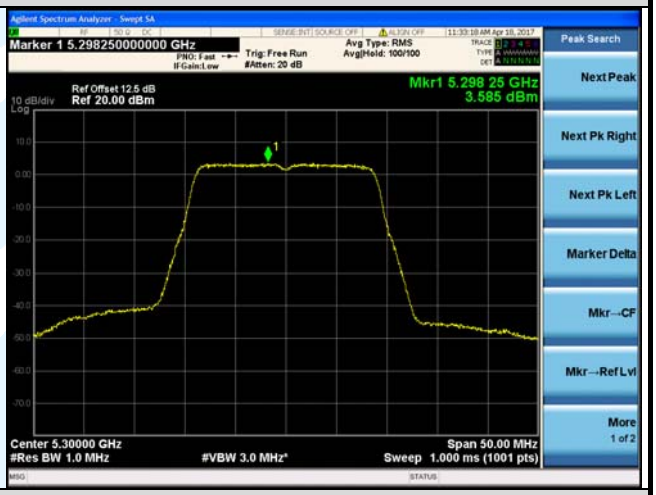
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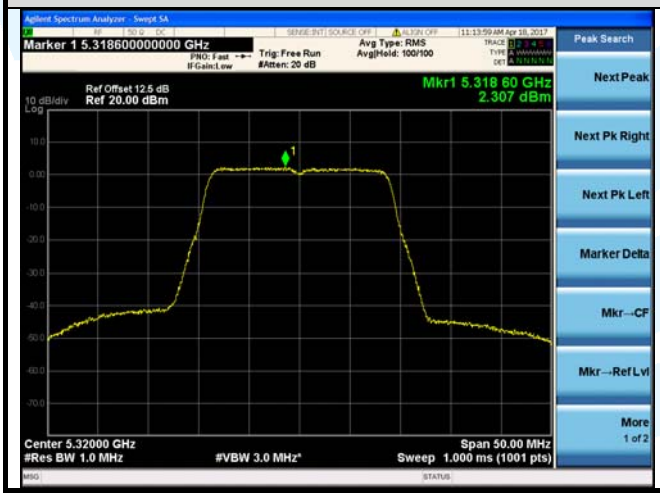	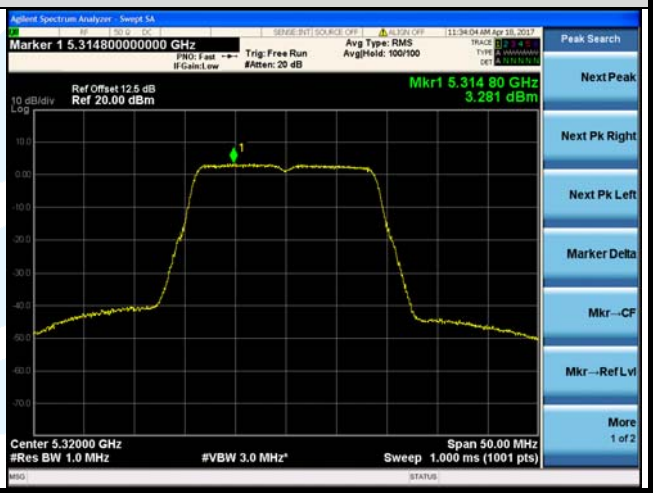

IEEE 802.11ac-VHT20	
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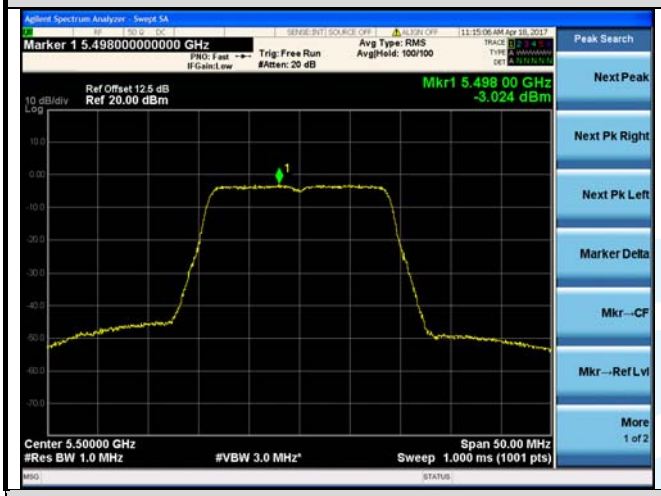	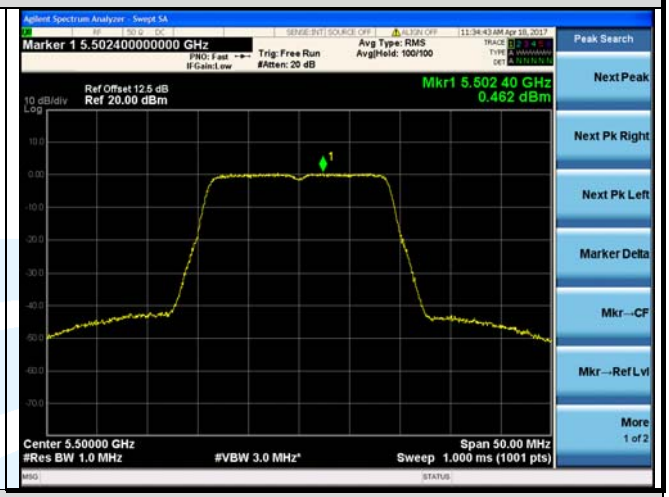
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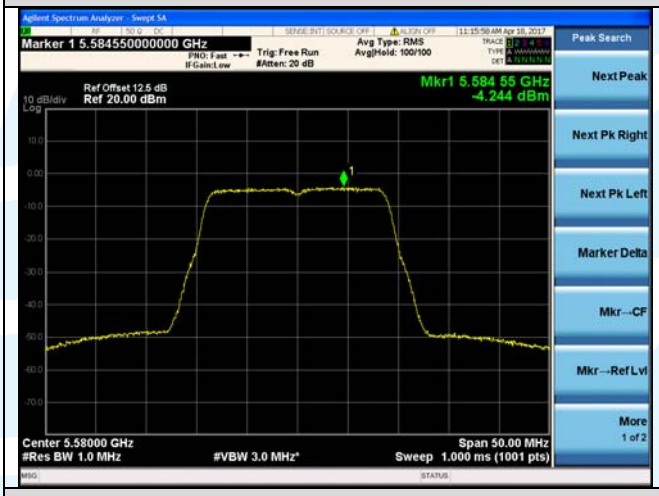	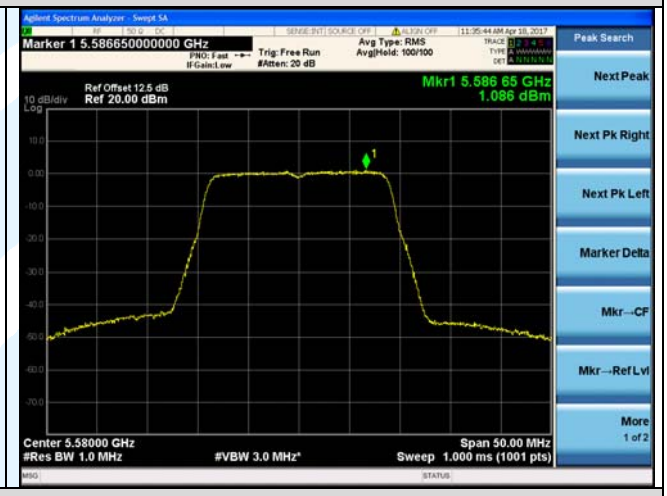
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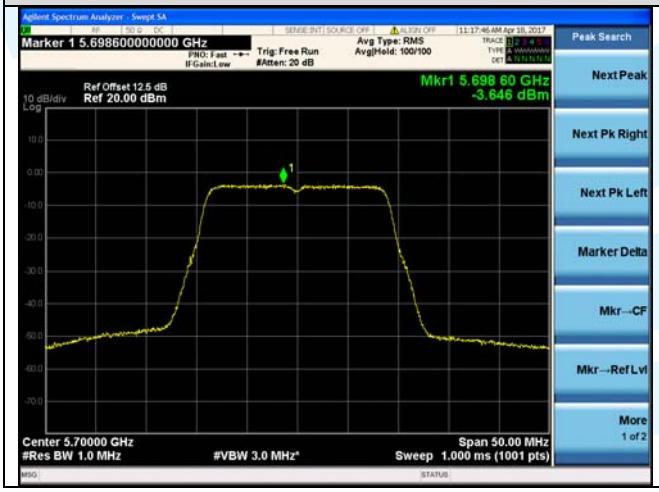	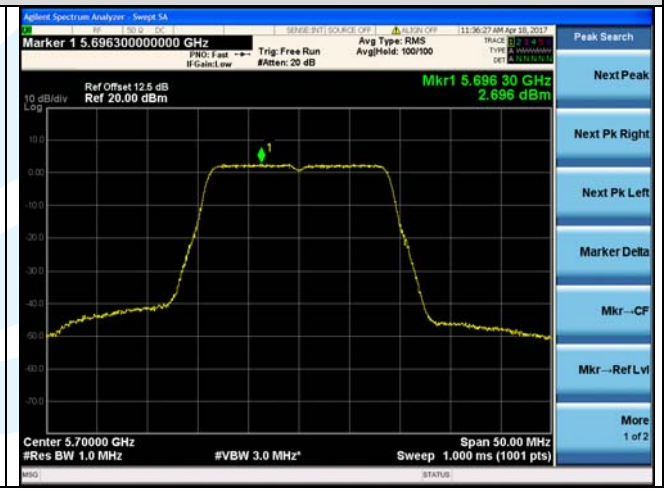

IEEE 802.11ac-VHT20	
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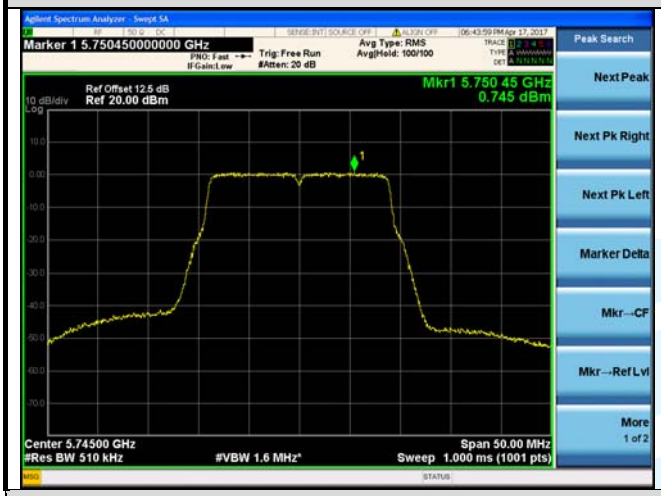	
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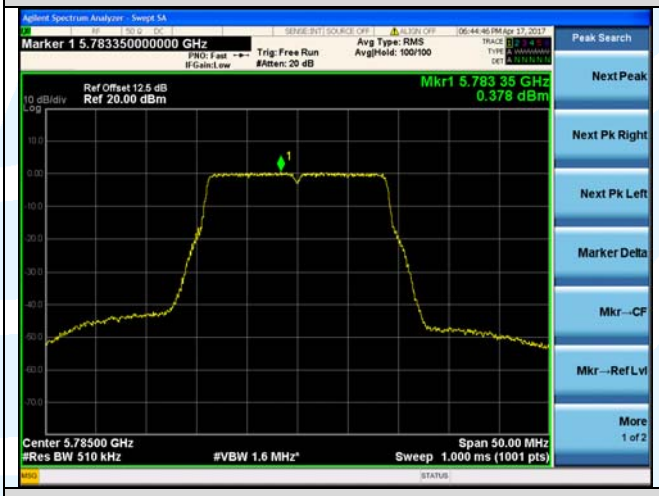	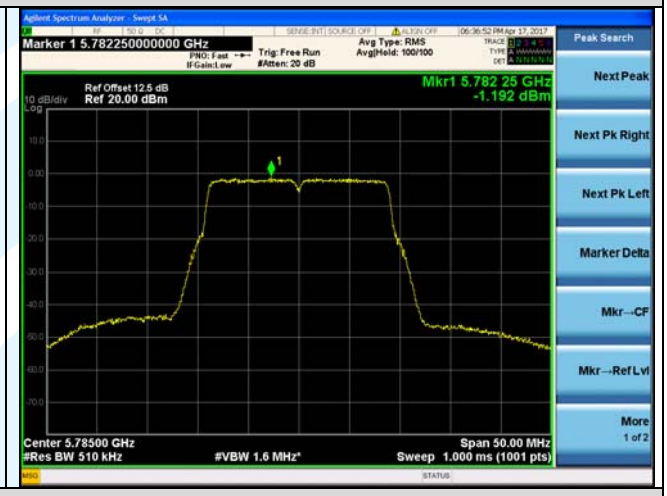
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	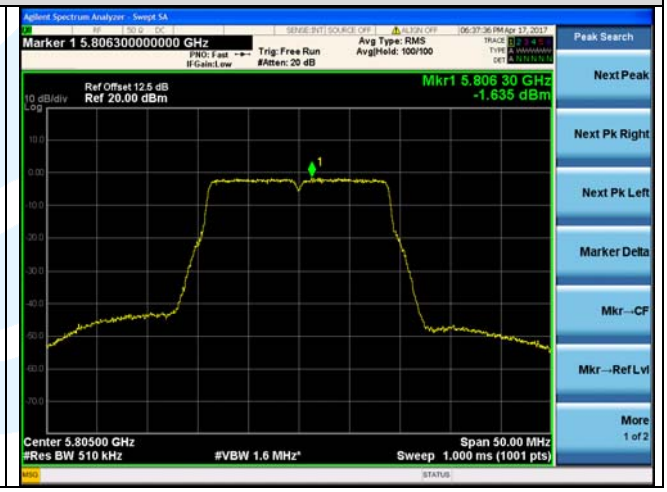

IEEE 802.11ac-VHT40	
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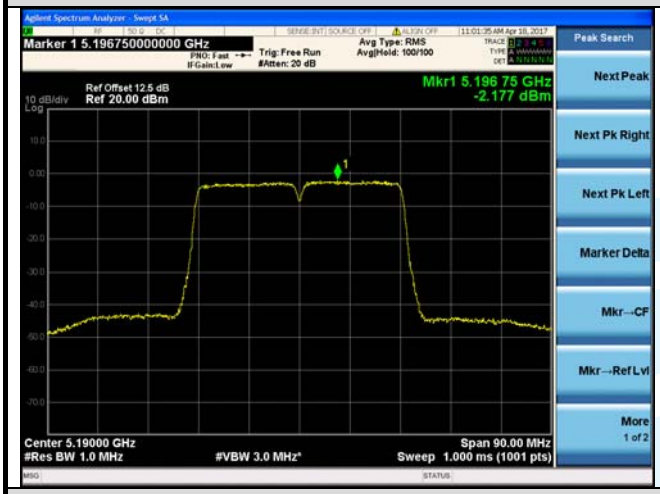	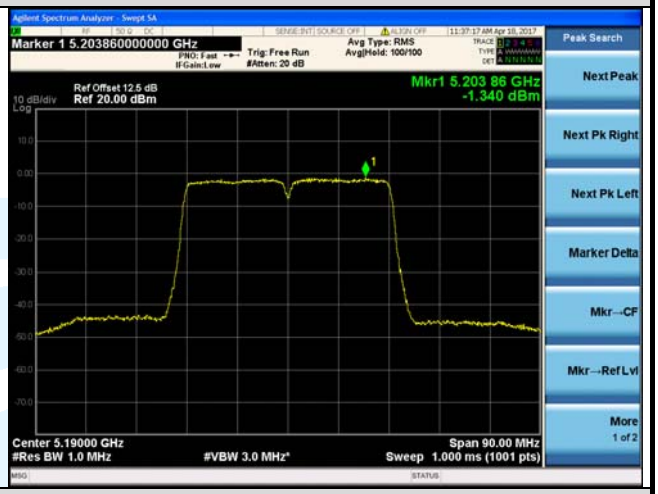
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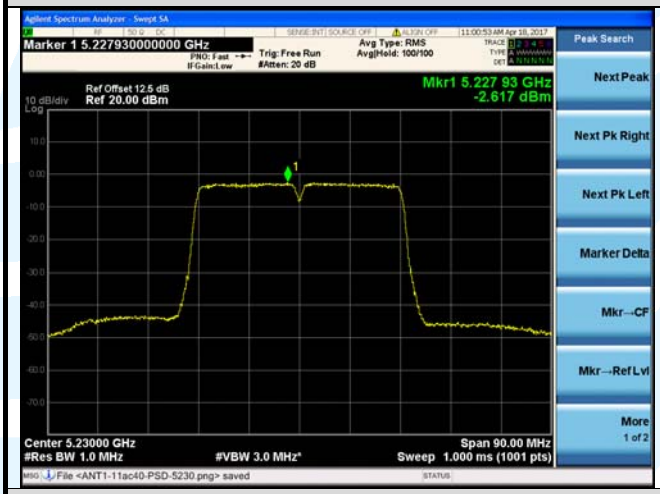	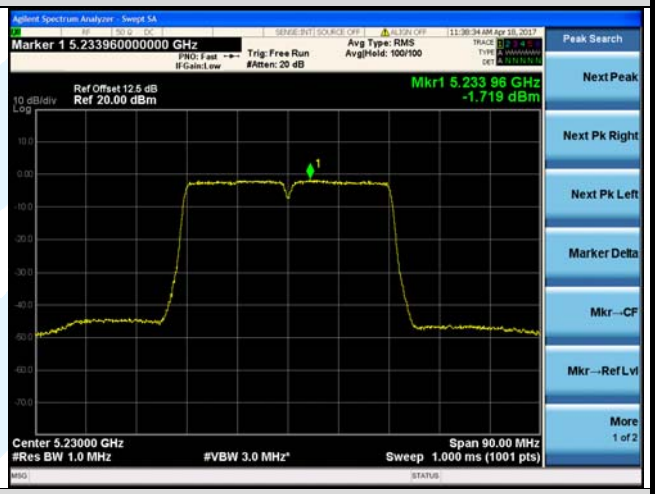
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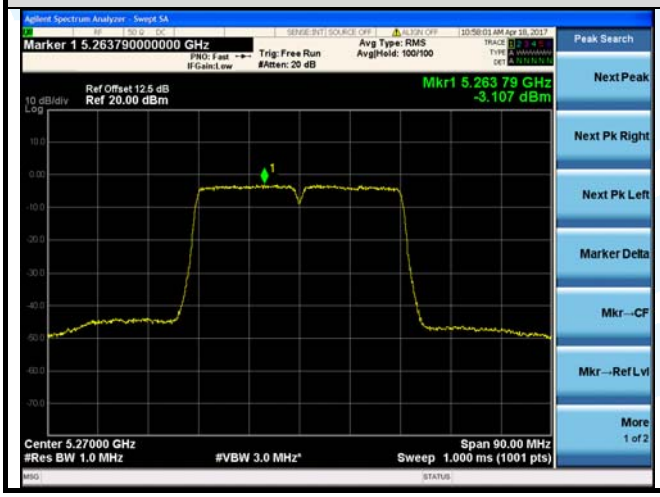	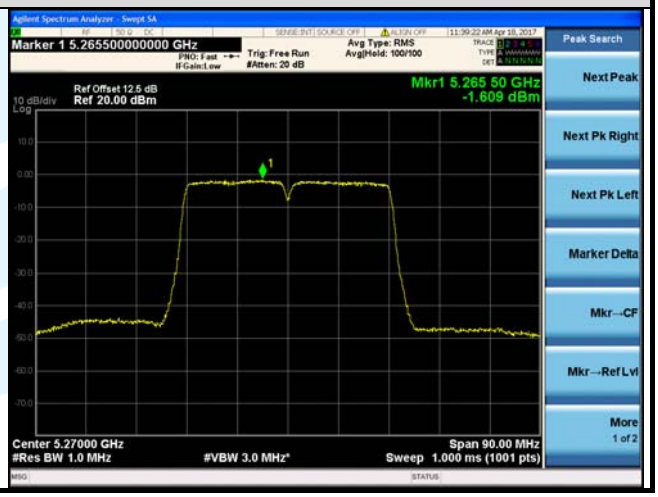

IEEE 802.11ac-VHT40	
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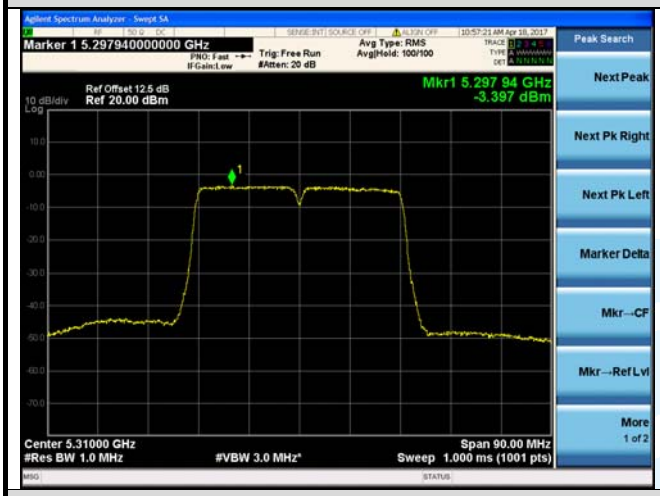	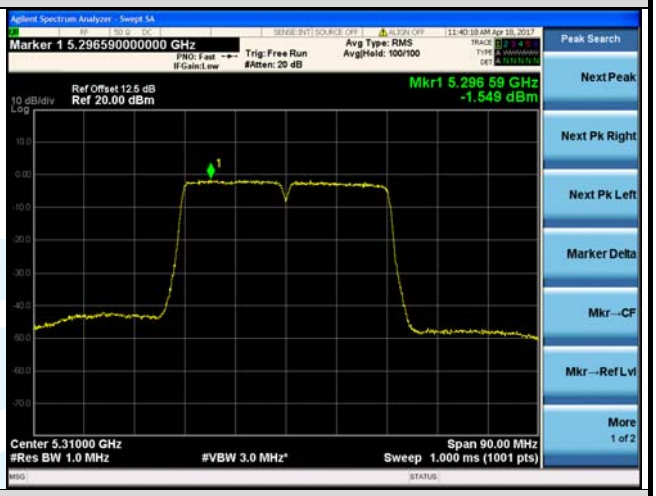
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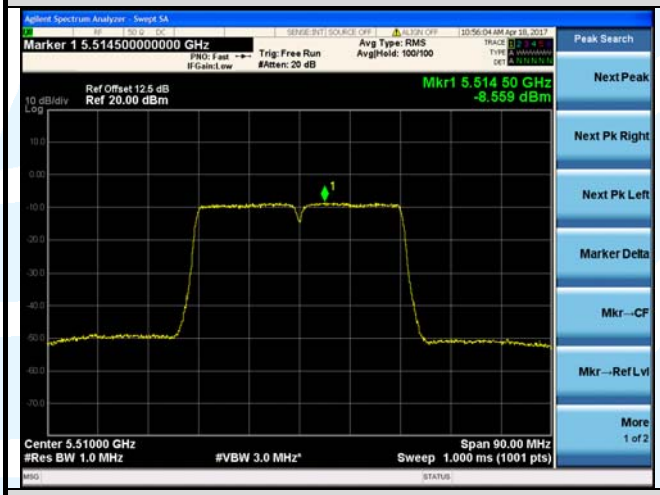	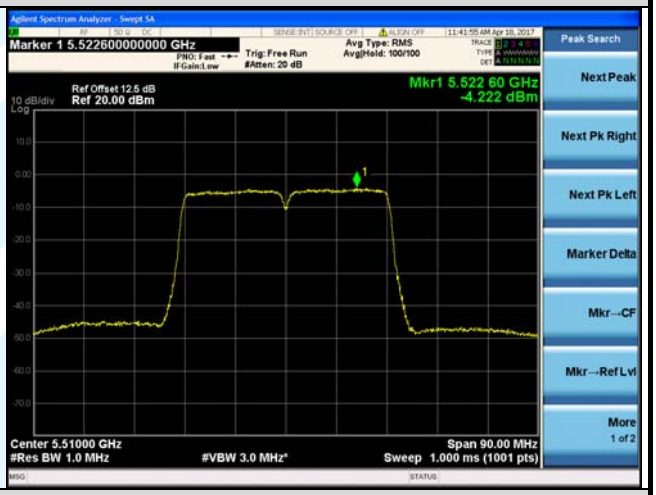
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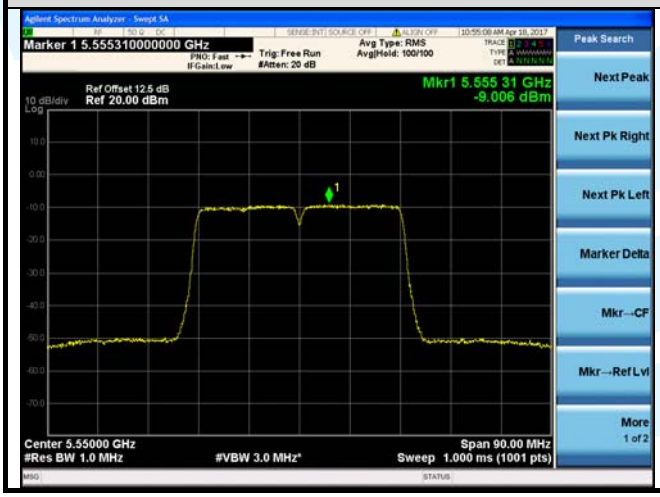	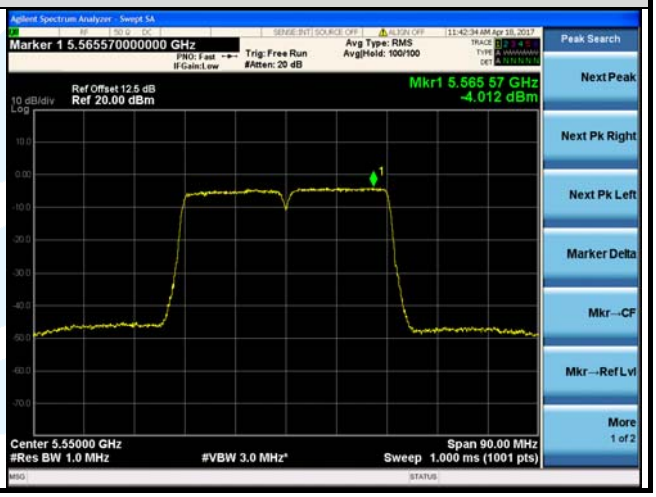

IEEE 802.11ac-VHT40	
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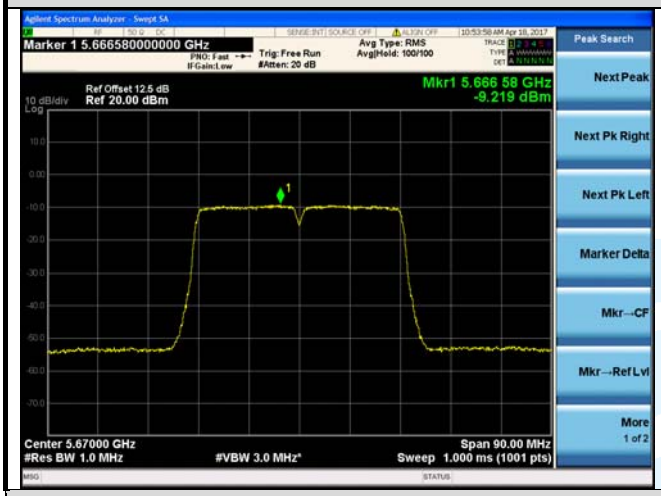	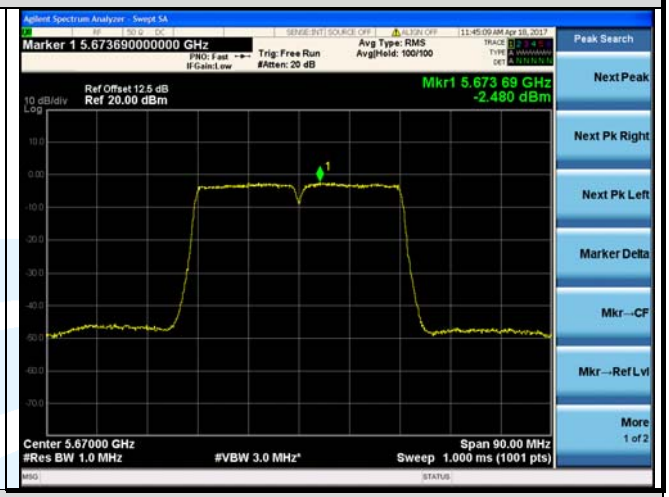
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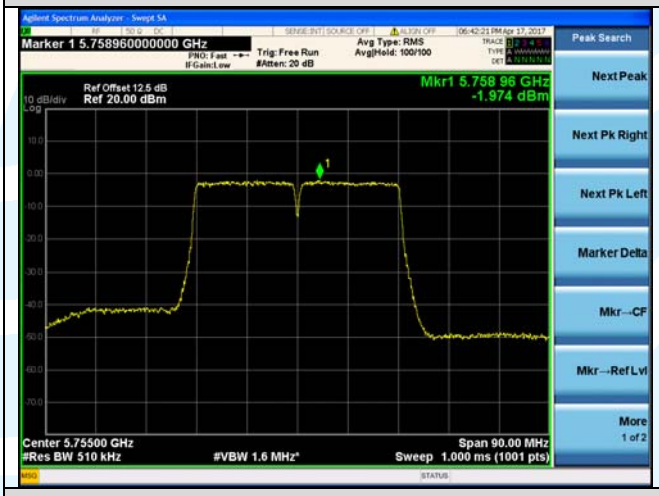	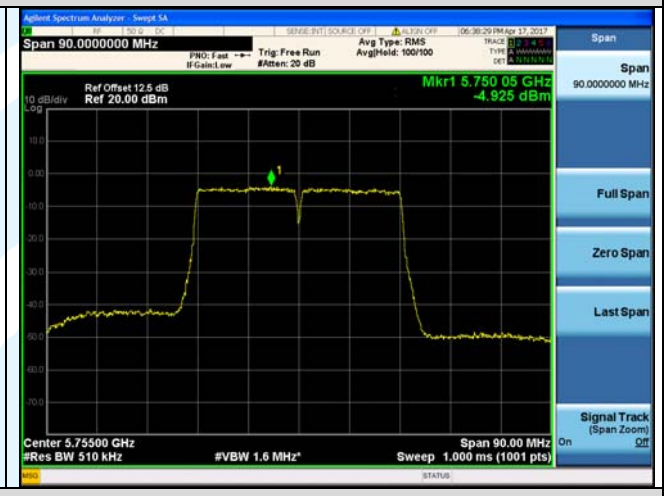
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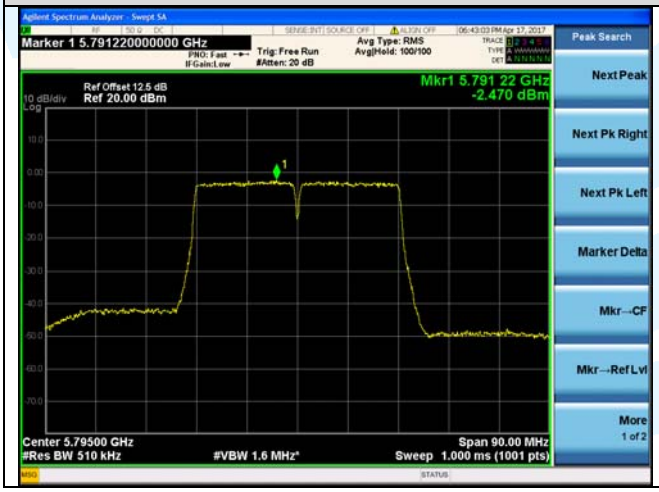
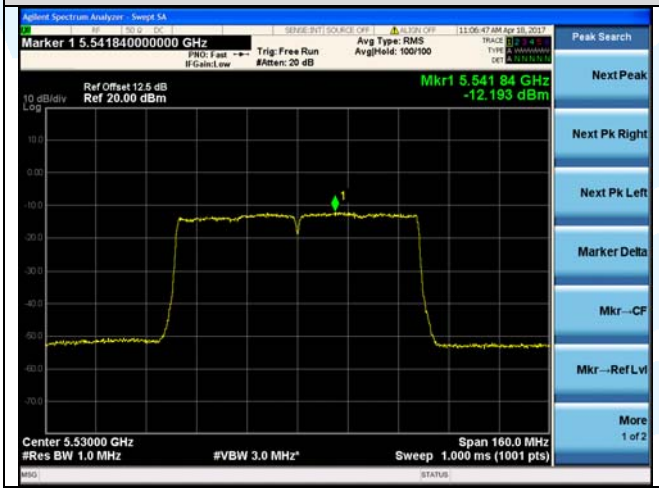
	

IEEE 802.11ac-VHT80	
Channel 42	
	
Channel 58	
	
Channel 106	
	

IEEE 802.11ac-VHT80	
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	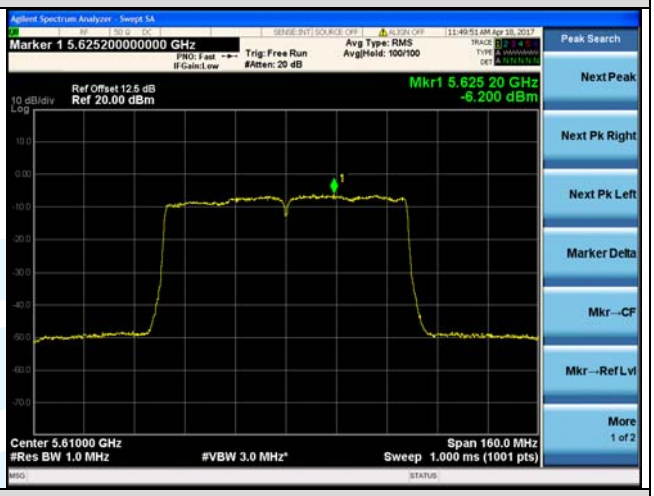
Channel 155