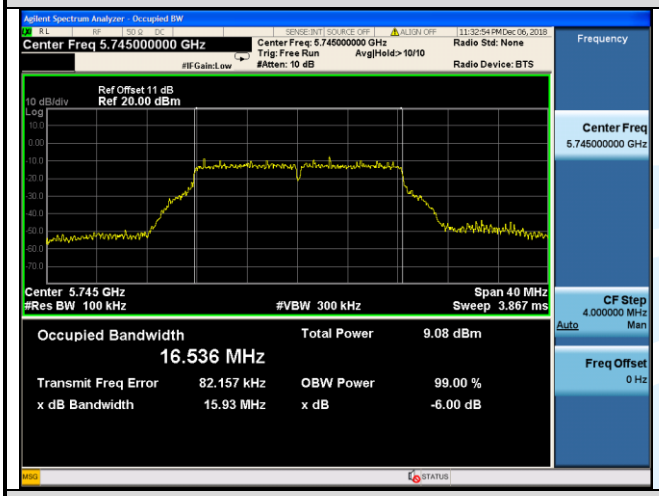
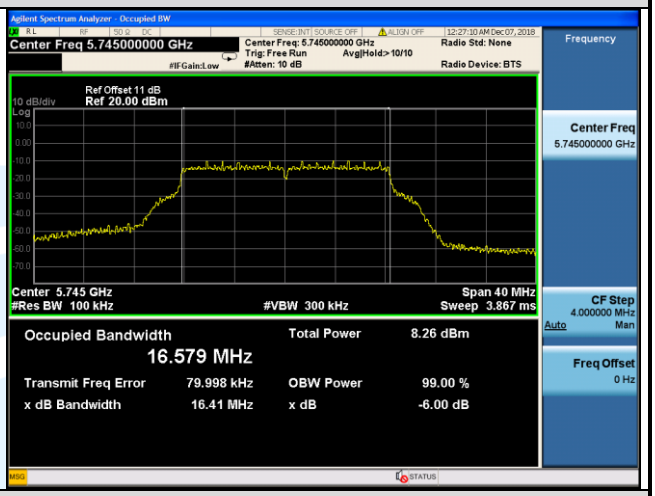
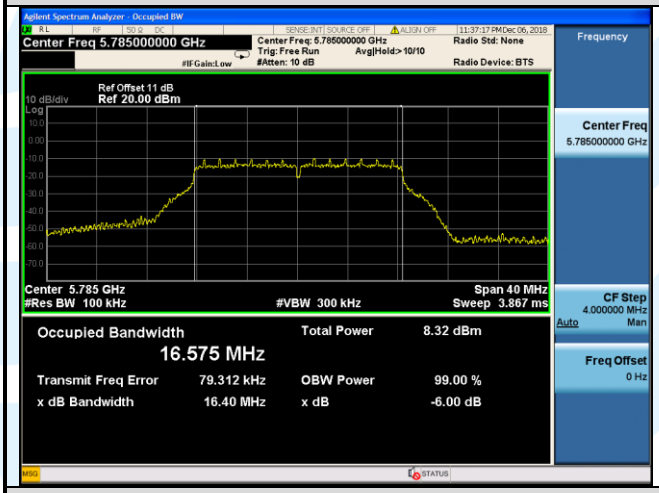
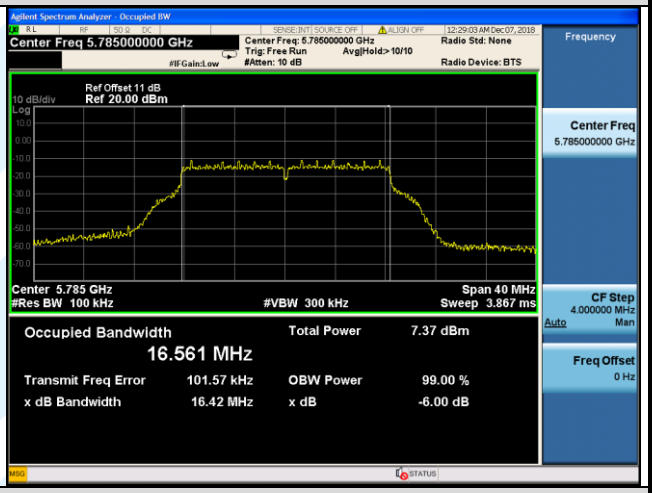
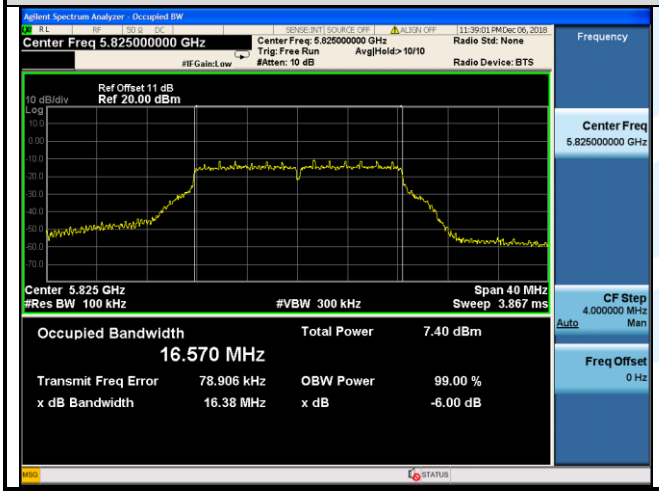
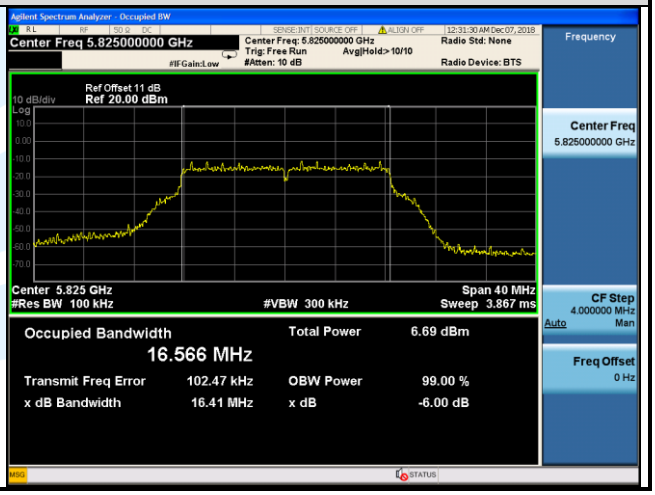
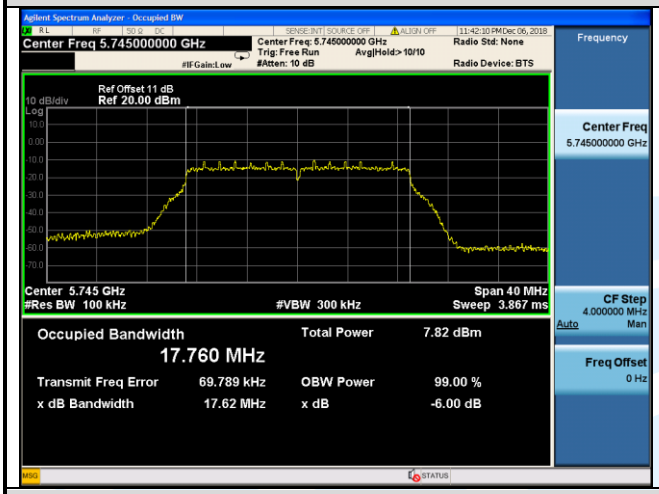
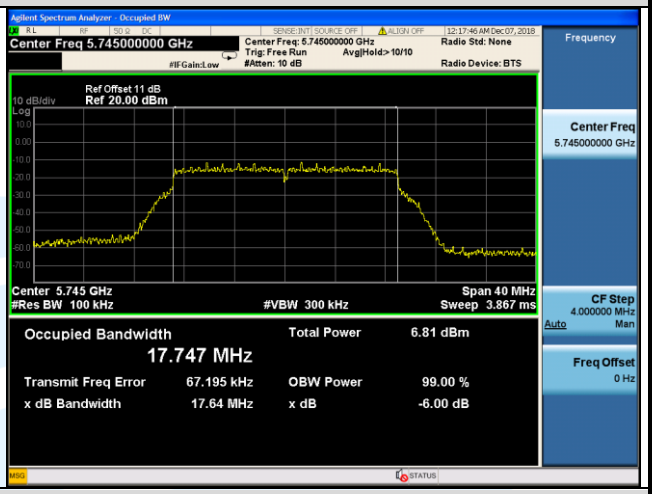
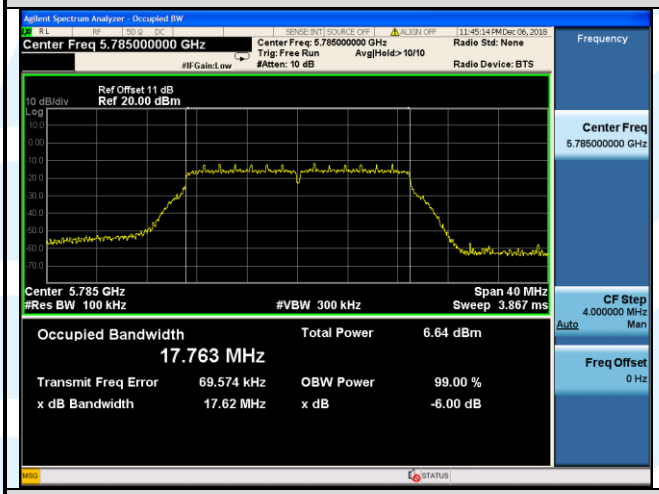
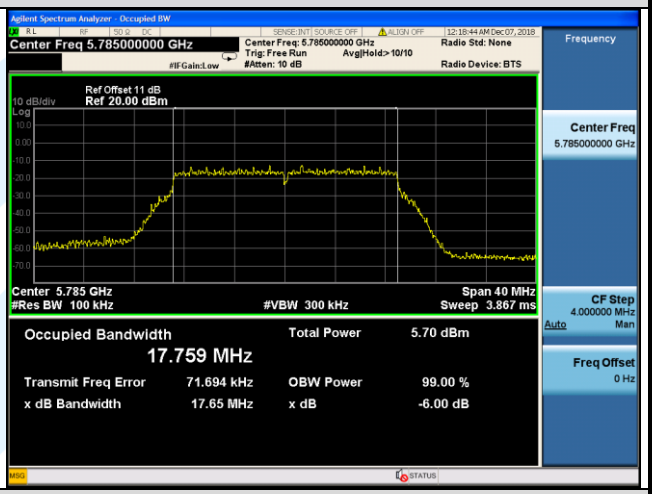
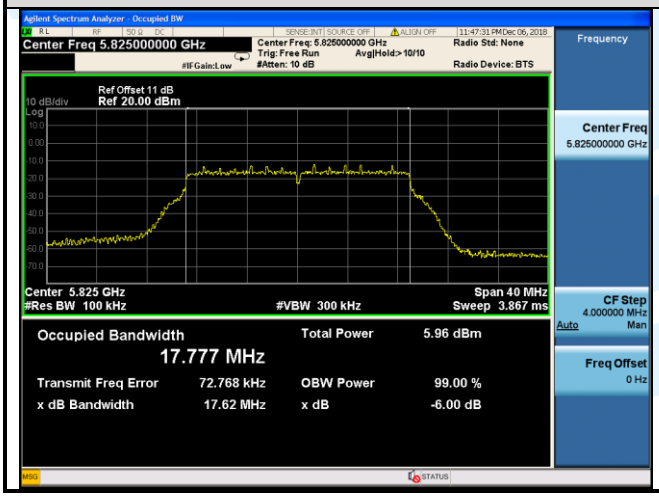
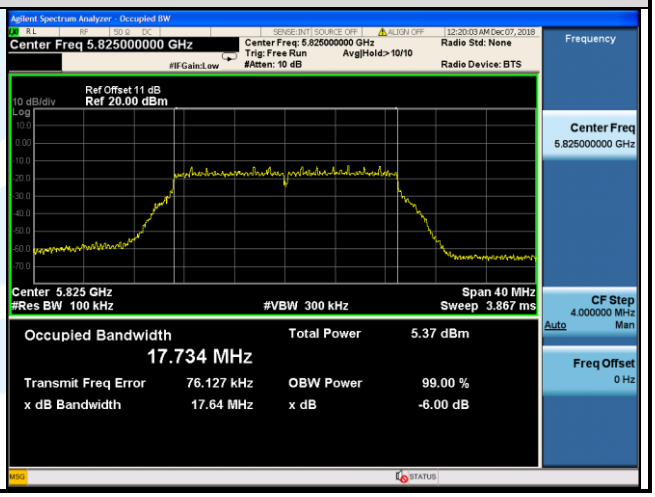
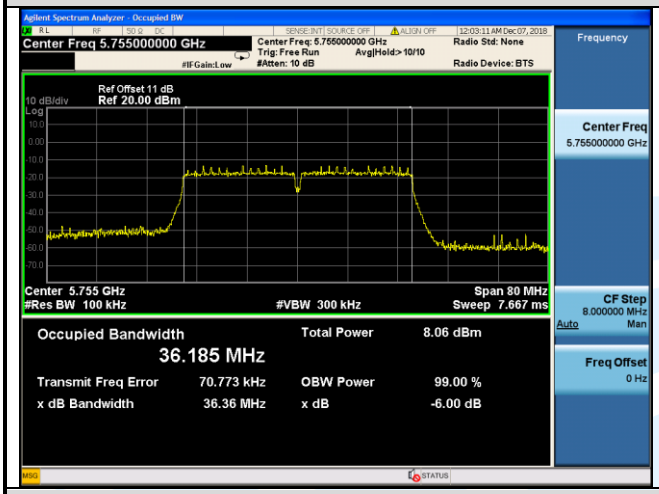
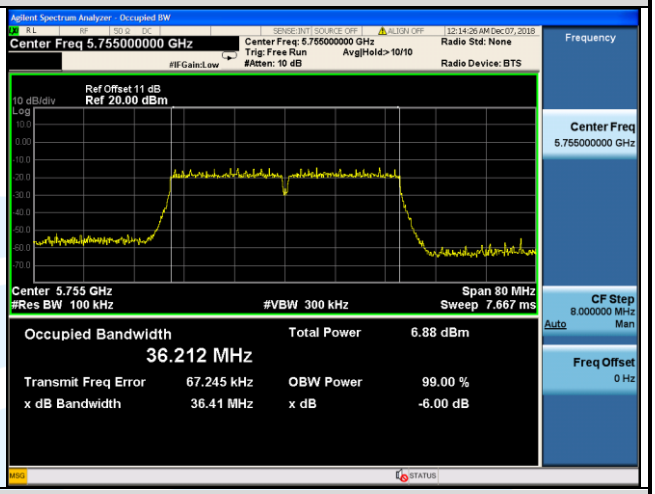
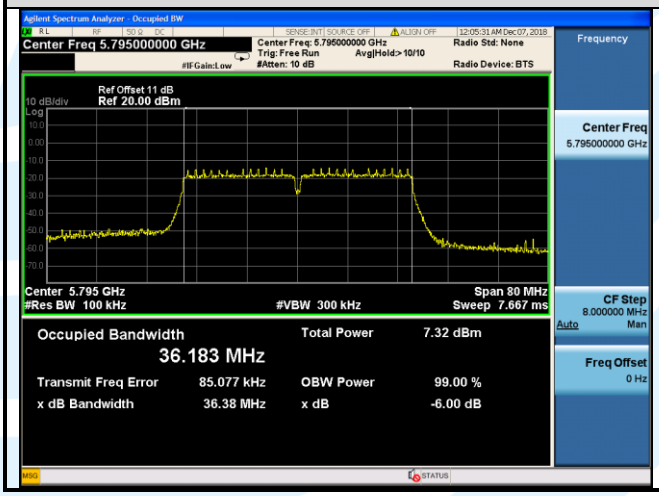
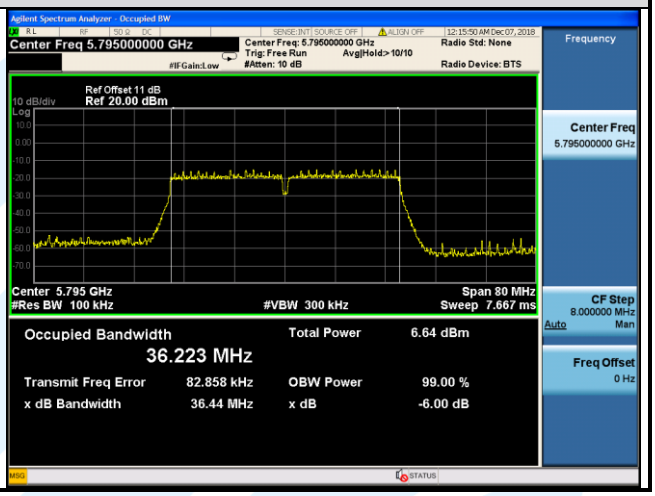
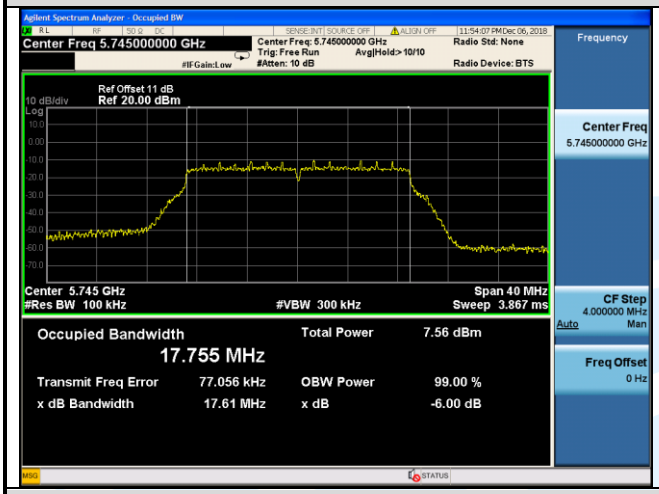
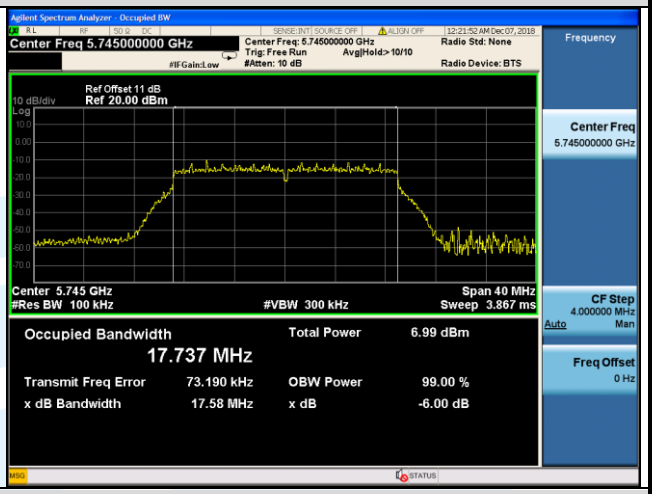
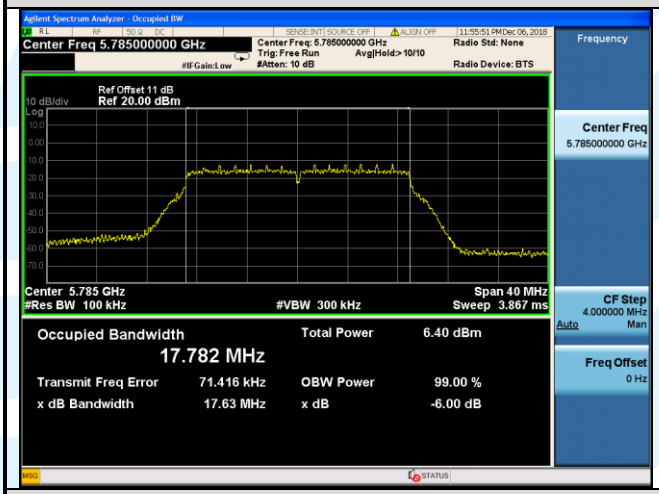
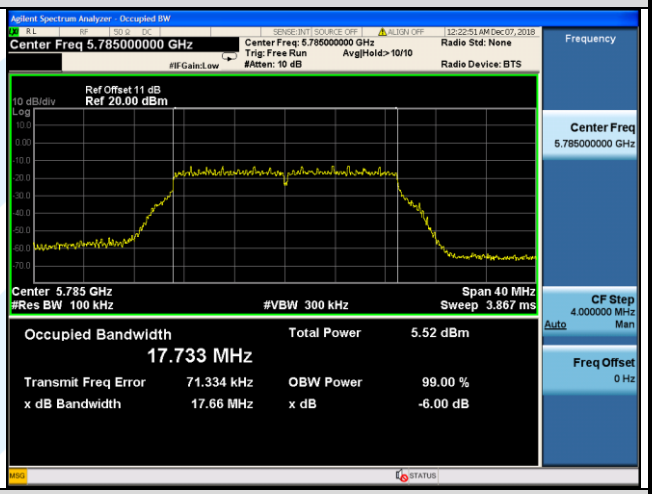
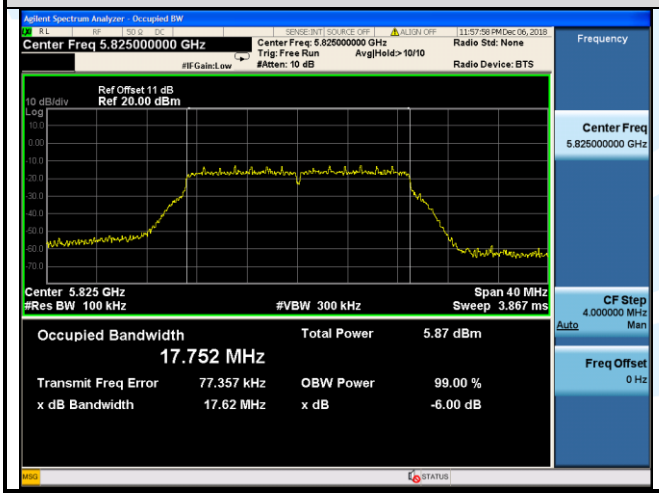
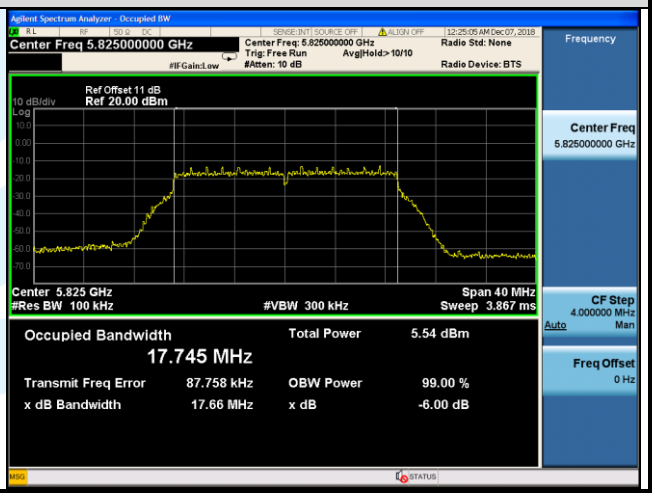
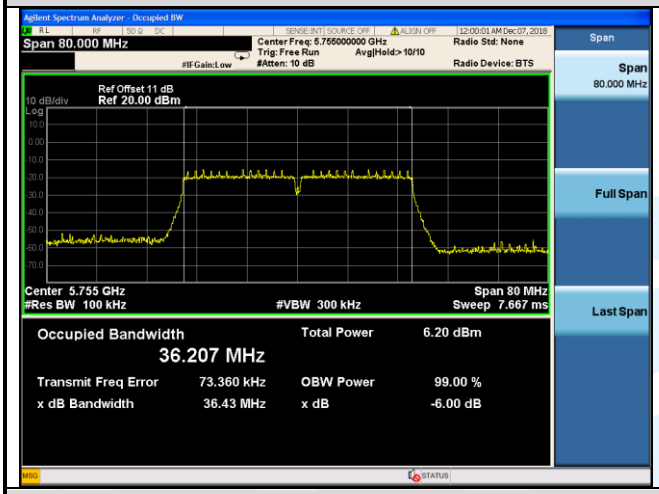
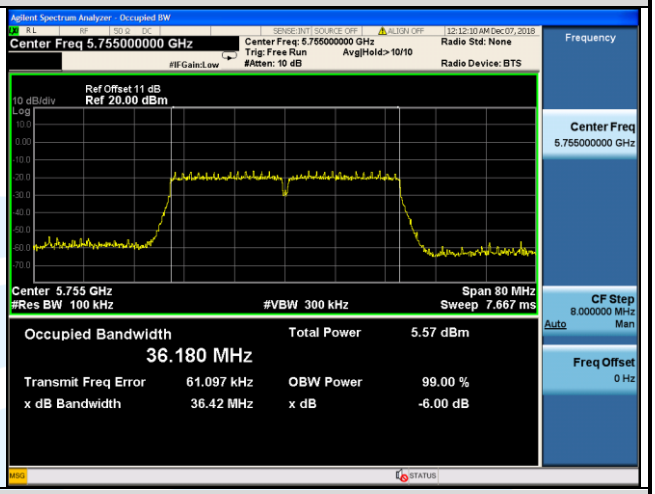
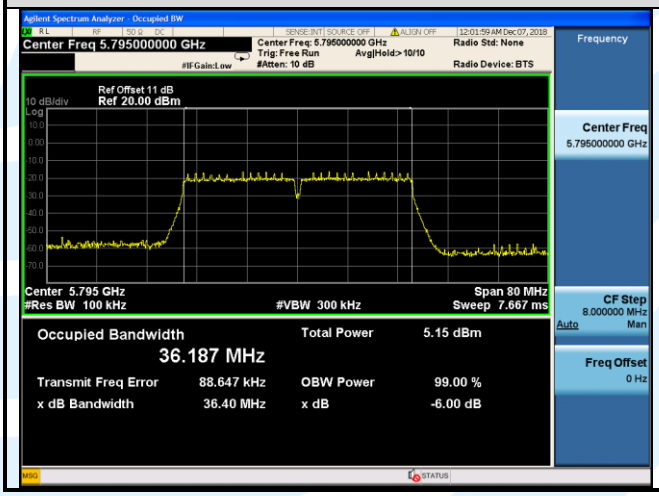
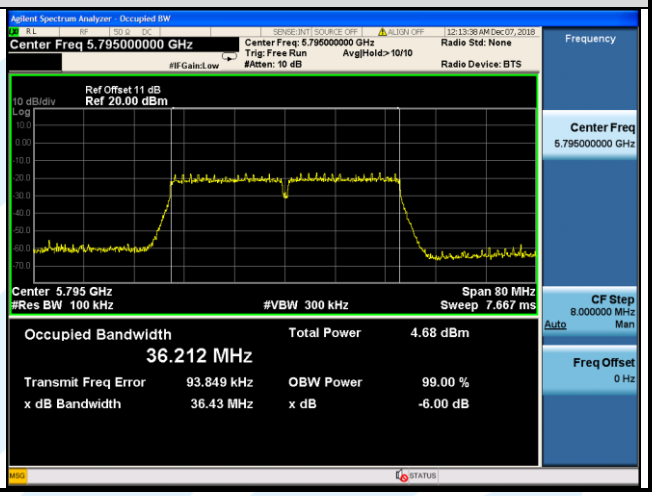
The test plots as follows:

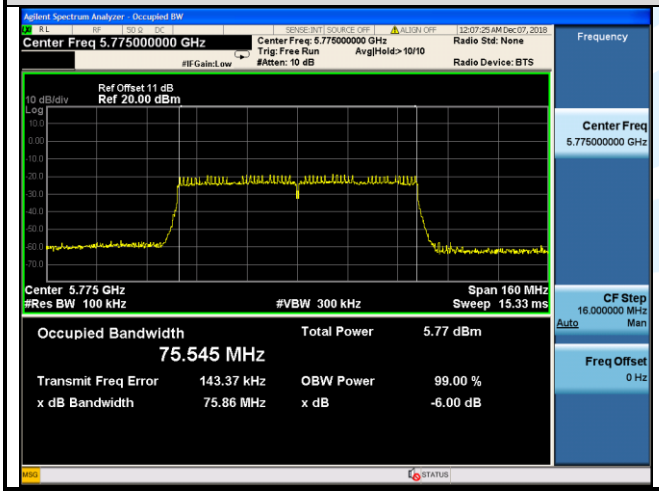
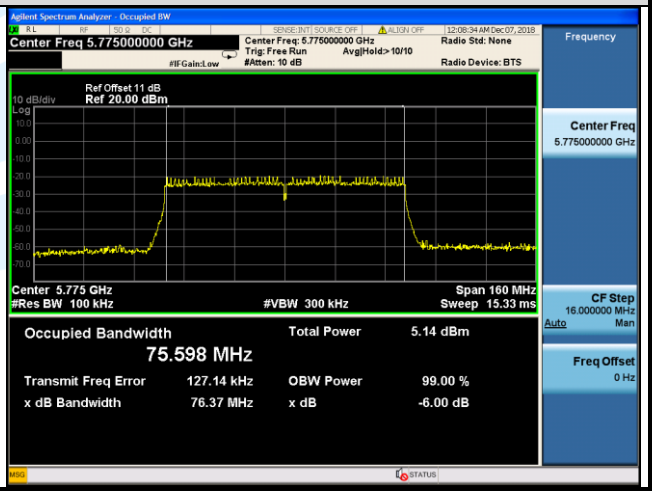
IEEE 802.11a	
Chain 0	**Chain 1**
Channel 149	
	
Channel 157	
	
Channel 165	
	

IEEE 802.11n-HT20	
Chain 0	Chain 1
Channel 149	
	
Channel 157	
	
Channel 165	
	

IEEE 802.11n-HT40	
Chain 0	Chain 1
Channel 151	
	
Channel 159	
	

IEEE 802.11ac-VHT20	
Chain 0	Chain 1
Channel 149	
	
Channel 157	
	
Channel 165	
	

IEEE 802.11ac-VHT40	
Chain 0	Chain 1
Channel 151	
	
Channel 159	
	

IEEE 802.11ac-VHT80	
Chain 0	Chain 1
Channel 151	
	

5.5 MAXIMUM CONDUCTED OUTPUT POWER

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

Test Method: KDB 789033 D02 v02r01 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 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:

Directional gain and the maximum output power limit.

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-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				

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		CDD				Total Power CDD_ 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)	11.43	11.65	12.30	12.52	15.12	24	Pass
	44 (5220)	10.52	10.74	11.41	11.63	14.22	24	Pass
	48 (5240)	10.75	10.97	11.35	11.57	14.29	24	Pass
	149 (5745)	11.05	11.27	9.45	9.67	13.55	30	Pass
	157 (5785)	10.85	11.07	9.73	9.95	13.56	30	Pass
	165 (5825)	10.88	11.10	9.50	9.72	13.47	30	Pass

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		CDD				Total Power CDD_ 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)	9.59	9.81	10.57	10.79	13.34	24	Pass
	44 (5220)	9.53	9.75	10.78	11.00	13.43	24	Pass
	48 (5240)	9.71	9.93	10.54	10.76	13.38	24	Pass
	149 (5745)	9.23	9.45	7.82	8.04	11.81	30	Pass
	157 (5785)	8.78	9.00	7.74	7.96	11.52	30	Pass
	165 (5825)	8.43	8.65	7.65	7.87	11.29	30	Pass

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		CDD				Total Power CDD_ 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)	9.21	9.65	10.26	10.70	13.22	24	Pass
	46 (5230)	9.34	9.78	10.22	10.66	13.25	24	Pass
	151 (5755)	9.31	9.75	8.15	8.59	12.22	30	Pass
	159 (5795)	9.55	9.99	8.00	8.44	12.29	30	Pass

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		CDD				Total Power CDD_ 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)	10.52	10.52	10.26	10.26	13.40	24	Pass
	44 (5220)	9.32	9.32	10.17	10.17	12.78	24	Pass
	48 (5240)	9.43	9.43	10.2	10.2	12.84	24	Pass
	149 (5745)	9.06	9.06	7.70	7.70	11.44	30	Pass
	157 (5785)	8.78	8.78	7.56	7.56	11.22	30	Pass
	165 (5825)	8.63	8.63	7.32	7.32	11.03	30	Pass

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		CDD				Total Power CDD_ Chain 0+1	Limits (dBm)	Pass / Fail
		Chain 0		Chain 1				
		Meas Power	Corr'd Power	Meas Power	Corr'd Power			
IEEE 802.11ac-HT40	38 (5190)	7.35	7.48	7.95	8.08	10.80	24	Pass
	46 (5230)	7.26	7.39	8.13	8.26	10.86	24	Pass
	151 (5755)	7.52	7.65	6.2	6.33	10.05	30	Pass
	159 (5795)	7.08	7.21	5.3	5.43	9.42	30	Pass

Mode	Channel/ Frequency (MHz)	Maximum Conducted Output Power (dBm)						
		CDD				Total Power CDD_ 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 (5210)	7.14	7.41	8.26	8.53	11.02	24	Pass
	155 (5775)	6.60	6.87	5.75	6.02	9.48	30	Pass

Remark:
1. Corr'd Power = Meas Power + Duty Cycle Factor
2. Total (Chain 0+1) = $10*\log[(10^{\text{Chain 0/10}})+(10^{\text{Chain 1/10}})]$

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 v02r01 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 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:

Directional gain and the maximum output power limit.

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-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				

For U-NII-1 band

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		CDD				Total PSD CDD_ 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)	-9.45	-9.23	-8.17	-7.95	-5.53	11	Pass
	44 (5220)	-9.84	-9.62	-8.21	-7.99	-5.72	11	Pass
	48 (5240)	-9.50	-9.28	-8.23	-8.01	-5.59	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		CDD				Total PSD CDD_ 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)	-10.88	-10.66	-10.09	-9.87	-7.24	11	Pass
	44 (5220)	-11.01	-10.79	-10.14	-9.92	-7.32	11	Pass
	48 (5240)	-10.43	-10.21	-10.01	-9.79	-6.99	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		CDD				Total PSD CDD_ 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)	-13.95	-13.51	-13.19	-12.75	-10.10	11	Pass
	46 (5230)	-13.15	-12.71	-13.19	-12.75	-9.72	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		CDD				Total PSD CDD_ 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)	-11.69	-11.69	-10.69	-10.69	-8.15	11	Pass
	44 (5220)	-11.08	-11.08	-10.47	-10.47	-7.75	11	Pass
	48 (5240)	-10.59	-10.59	-10.28	-10.28	-7.42	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		CDD				Total PSD CDD_ 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)	-15.93	-15.80	-15.34	-15.21	-12.48	11	Pass
	46 (5230)	-15.27	-15.14	-15.41	-15.28	-12.20	11	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		CDD				Total PSD CDD_ 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 (5210)	-18.546	-18.276	-18.076	-17.806	-15.02	11	Pass

For U-NII-3 band

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		CDD				Total PSD CDD_ 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)	-11.92	-11.70	-13.12	-12.90	-9.24	30	Pass
	157 (5785)	-13.27	-13.05	-14.46	-14.24	-10.59	30	Pass
	165 (5825)	-13.62	-13.40	-14.60	-14.38	-10.85	30	Pass

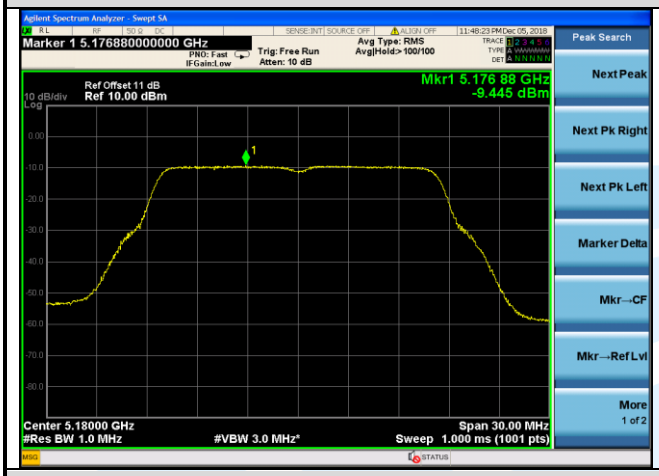
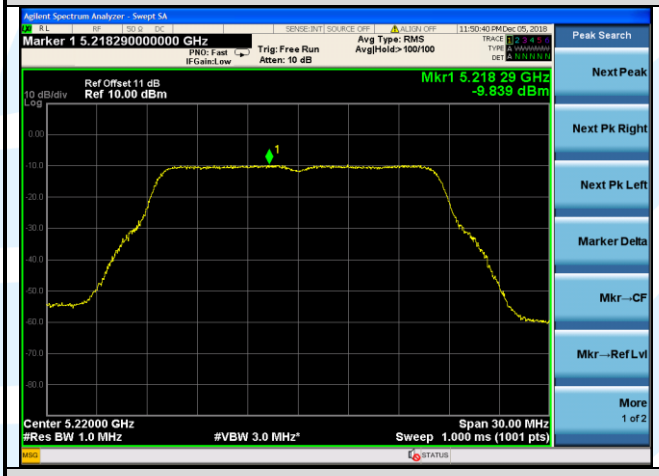
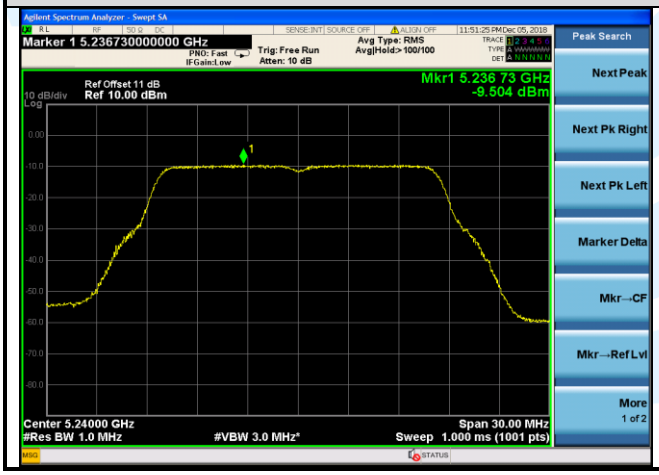
Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		CDD				Total PSD CDD_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11n-HT20	149 (5745)	-14.21	-13.99	-15.60	-15.38	-11.62	30	Pass
	157 (5785)	-15.46	-15.24	-16.56	-16.34	-12.74	30	Pass
	165 (5825)	-15.88	-15.66	-16.40	-16.18	-12.90	30	Pass
IEEE 802.11n-HT40	151 (5755)	-16.57	-16.13	-17.81	-17.37	-13.70	30	Pass
	159 (5795)	-17.75	-17.31	-18.68	-18.24	-14.74	30	Pass

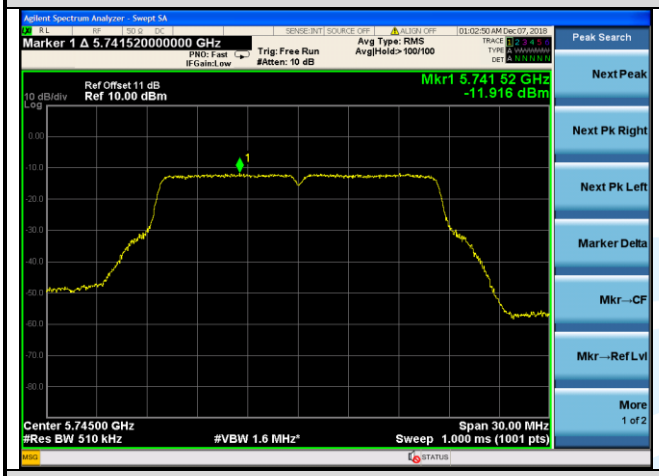
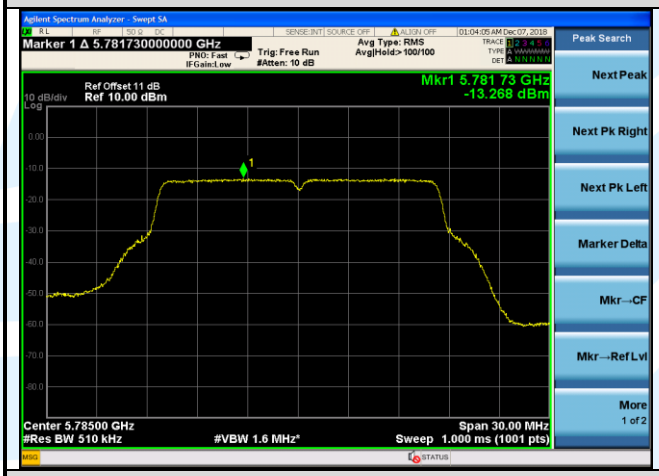
Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		CDD				Total PSD CDD_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac-VHT20	149 (5745)	-14.12	-14.12	-15.44	-15.44	-11.72	30	Pass
	157 (5785)	-15.27	-15.27	-16.75	-16.75	-12.94	30	Pass
	165 (5825)	-15.66	-15.66	-16.61	-16.61	-13.10	30	Pass
EEE 802.11ac-VHT4	151 (5755)	-18.35	-18.22	-19.48	-19.35	-15.74	30	Pass
	159 (5795)	-19.35	-19.22	-20.47	-20.34	-16.73	30	Pass

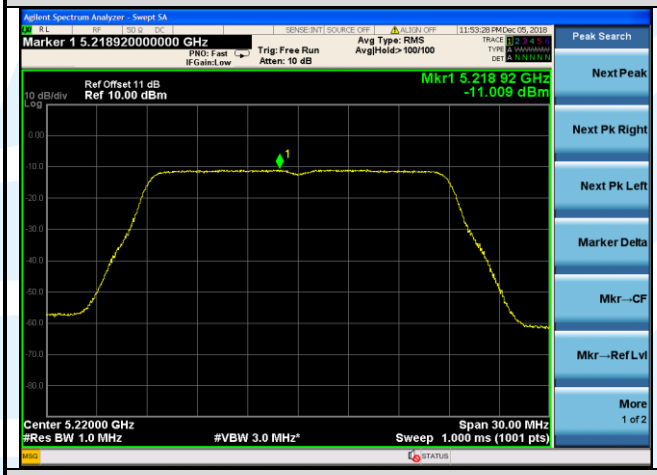
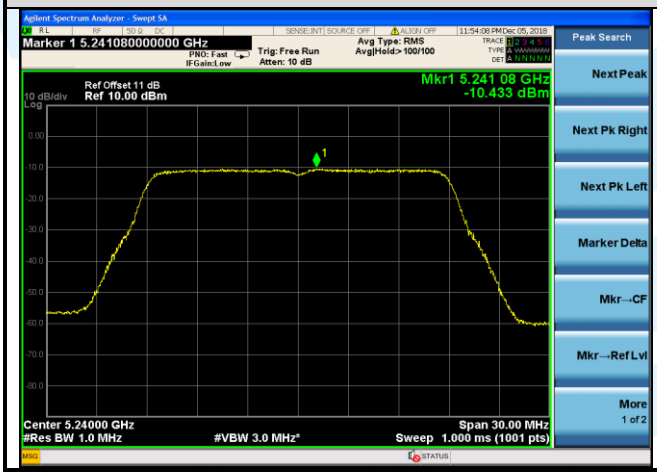
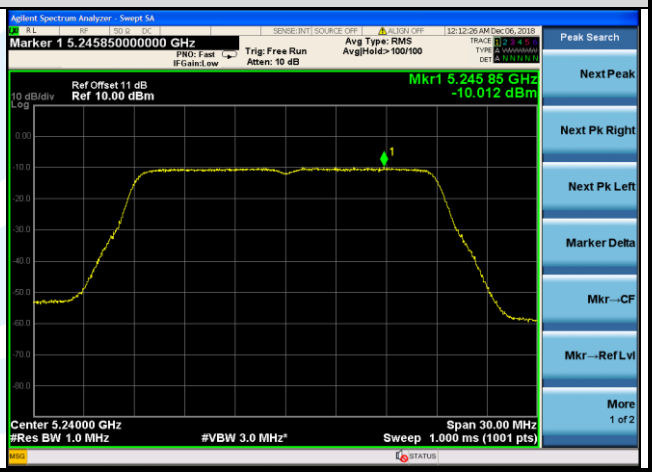
Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		CDD				Total PSD CDD_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac-VHT80	155 (5775)	-22.60	-22.33	-23.82	-23.55	-19.89	30	Pass

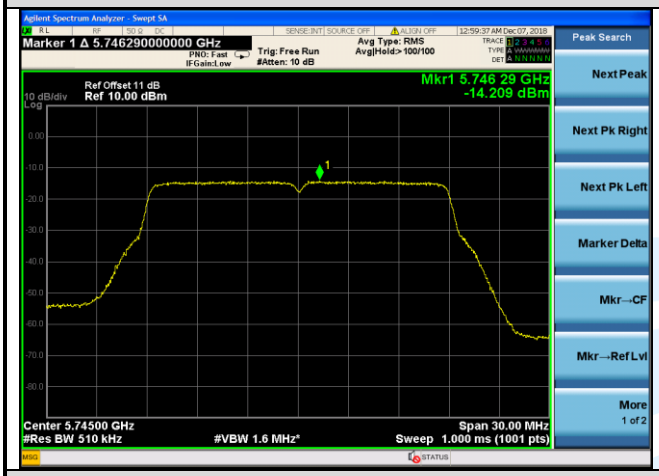
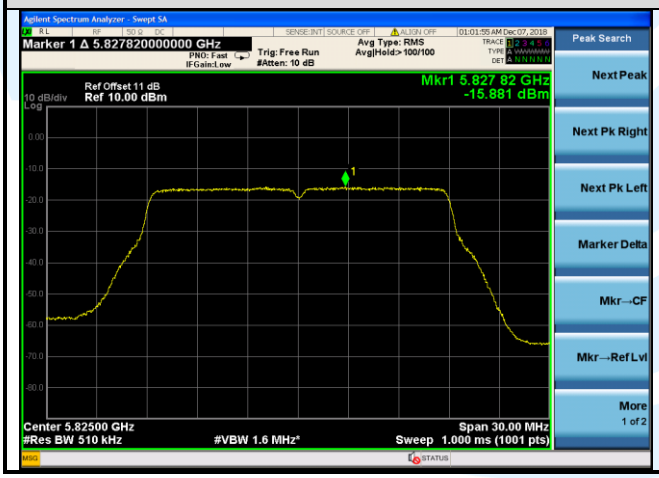
Remark:
1. Corr'd PSD = Meas PSD + Duty Cycle Factor
2. Total (Chain 0+1) = $10*\log[(10^{\text{Chain 0}/10})+(10^{\text{Chain 1}/10})]$

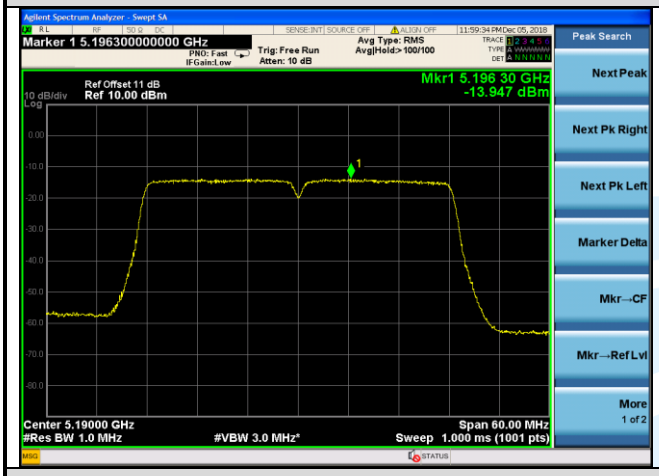
The test plots as follows:

IEEE 802.11a	
Chain 0	**Chain 1**
Channel 36	
	
Channel 44	
	
Channel 48	
	

IEEE 802.11a
Channel 149
 
Channel 157
 
Channel 165
 

IEEE 802.11n-HT20	
Chain 0	Chain 1
Channel 36	
	
Channel 44	
	
Channel 48	
	

IEEE 802.11n-HT20
Channel 149
 
Channel 157
 
Channel 165
 

IEEE 802.11n-HT40	
Chain 0	Chain 1
Channel 38	
	
Channel 46