3.3. Maximum Conducted Output Power

Limit

(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. 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. 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. 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. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1dB reduction in maximum conducted output power 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 mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

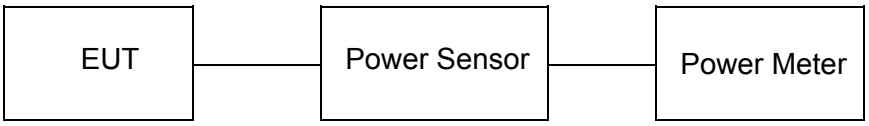
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power 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. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power 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

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

Type	Bands	Channel	Output power Ant1 (dBm)	Output power Ant2 (dBm)	Output power Total (dBm)	Limit (dBm)	Result
802.11a	U-NII 1	36	22.76	18.65	/	30.00	Pass
		40	22.63	19.05	/		
		48	22.01	18.95	/		
	U-NII 3	149	19.54	19.12	/		
		157	19.29	19.91	/		
		165	18.62	19.13	/		
802.11n(HT20) MIMO	U-NII 1	36	16.82	18.17	20.56	30.00	Pass
		40	17.24	18.27	20.80		
		48	17.40	17.97	20.70		
	U-NII 3	149	14.41	18.00	19.58		
		157	14.57	19.22	20.50		
		165	13.88	19.05	20.20		
802.11n(HT40) MIMO	U-NII 1	38	20.05	18.22	22.24	30.00	Pass
		46	21.39	18.11	23.06		
	U-NII 3	151	18.61	17.94	21.30		
		159	18.63	18.62	21.64		
802.11ac(HT20) MIMO	U-NII 1	36	18.83	18.38	21.62	30.00	Pass
		40	20.72	18.93	22.93		
		48	19.56	18.54	22.09		
	U-NII 3	149	18.34	18.47	21.42		
		157	18.02	18.83	21.45		
		165	18.12	17.67	20.91		
802.11ac(HT40) MIMO	U-NII 1	38	21.22	17.23	22.68	30.00	Pass
		46	21.41	17.20	22.81		
	U-NII 3	151	19.23	17.34	21.40		
		159	18.86	17.52	21.25		

Note: 1.The test results including the cable lose.

3.4. Power Spectral Density

Limit

(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 power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. [note1, note2]

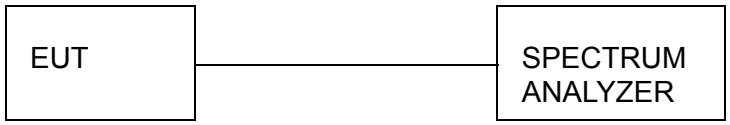
Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: 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.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 1MHz for U-NII 1, U-NII 2A, U-NII C band and 510KHz for U-NII 3 band.
3. Set the VBW ≥ 3× RBW.
4. Set the span to encompass the entire EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.

Test Configuration



Test Results

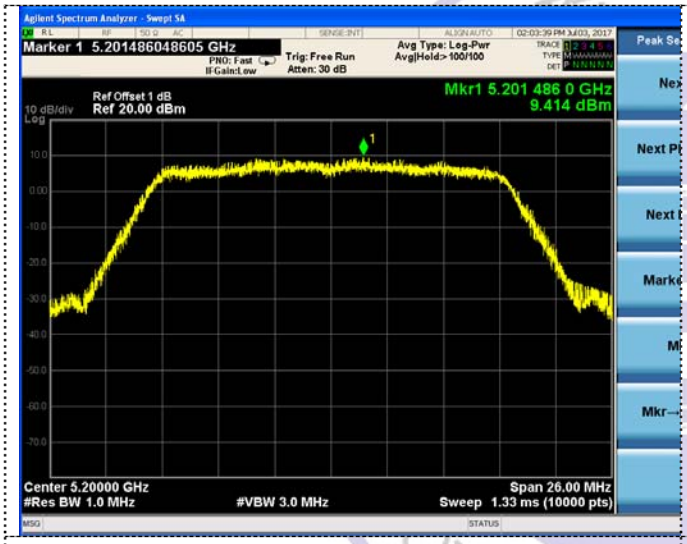
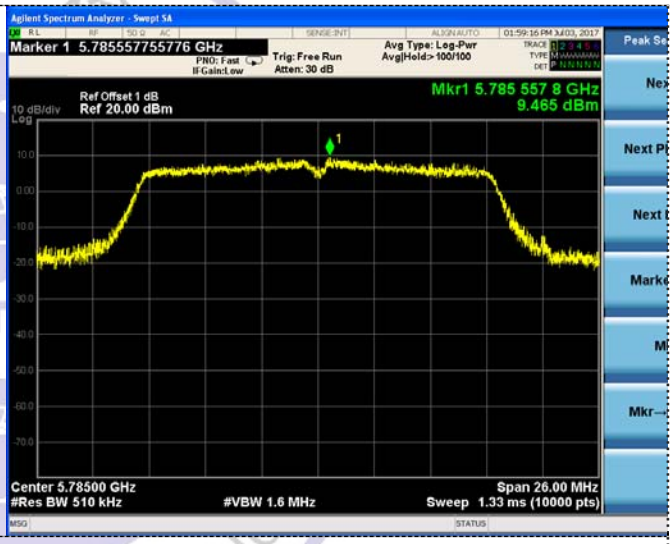
Type	Bands	Channel	Power Spectral Density Ant1 (dBm/MHz)	Power Spectral Density Ant2 (dBm/MHz)	Power Spectral Density Total (dBm/ MHz)	Limit (dBm/MHz)	Result
802.11a SISO	U-NII 1	36	9.675	9.033	/	17	Pass
		40	9.414	8.980	/		
		48	10.249	8.938	/		
802.11n (HT20) MIMO	U-NII 1	36	9.486	8.566	12.061		
		40	10.026	8.438	12.314		
		48	9.913	8.322	12.200		
802.11n (HT40) MIMO	U-NII 1	38	9.066	7.459	11.347		
		46	9.299	7.791	11.620		
802.11ac (HT20) MIMO	U-NII 1	36	9.343	8.511	11.957		
		40	9.622	8.425	12.075		
		48	9.615	8.832	12.251		
802.11ac (HT40) MIMO	U-NII 1	38	6.713	7.780	10.289		
		46	6.131	7.824	10.070		

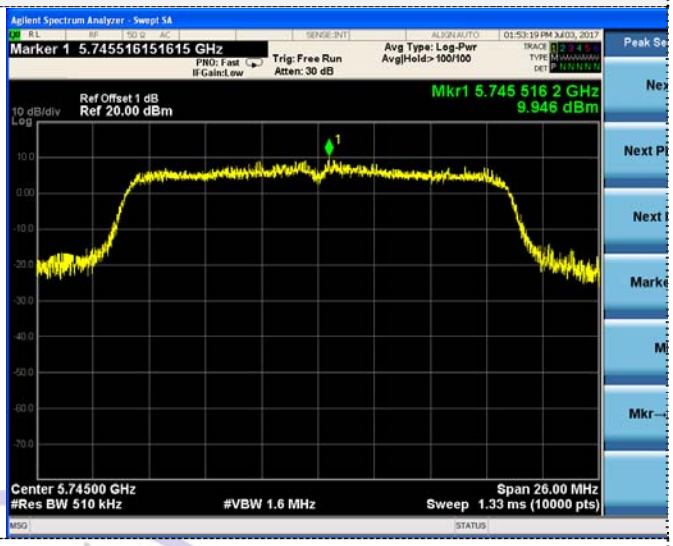
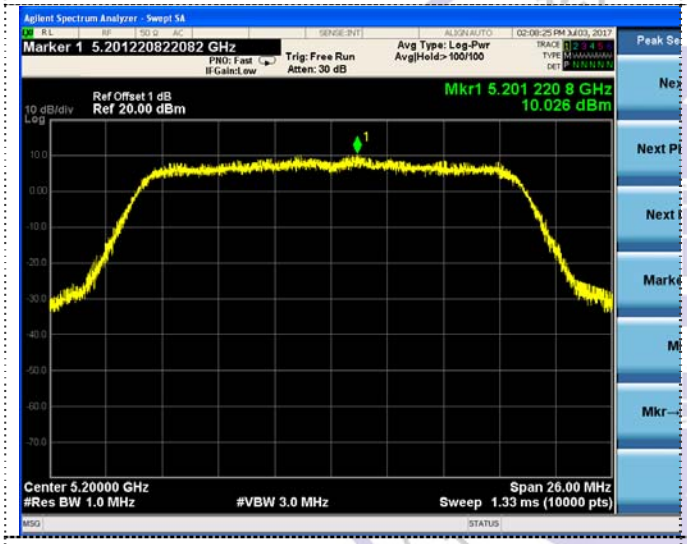
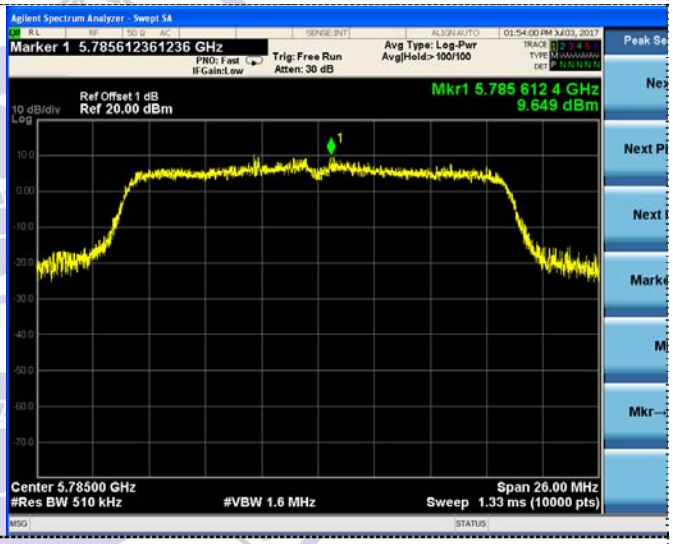
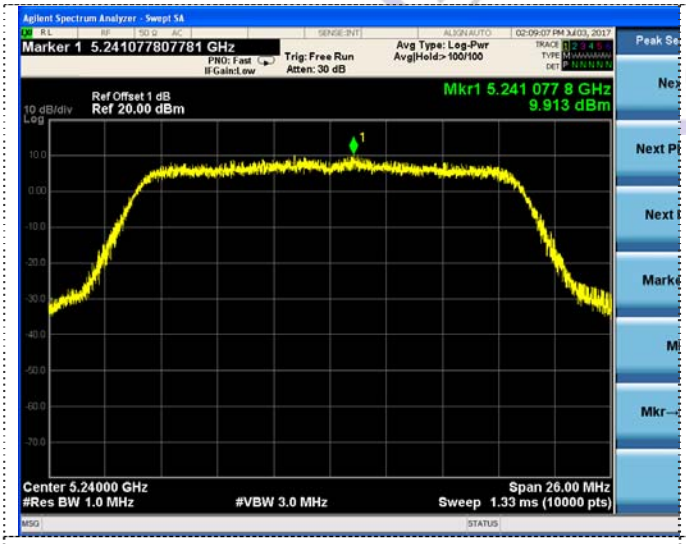
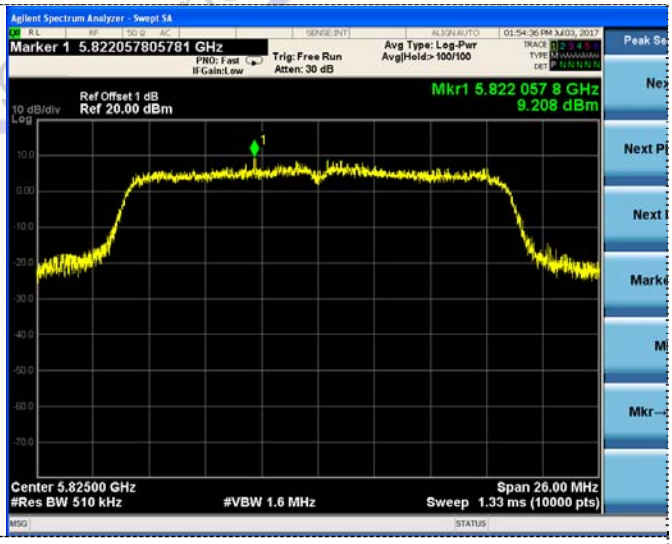
Type	Bands	Channel	Power Spectral Density Ant1 (dBm/500KHz)	Power Spectral Density Ant2 (dBm/500KHz)	Power Spectral Density Total (dBm/ 500KHz)	Limit (dBm/500KHz)	Result
802.11a SISO	U-NII 3	149	8.652	9.259	/	30	Pass
		157	9.465	9.515	/		
		165	8.947	9.543	/		
802.11n (HT20) MIMO	U-NII 3	149	9.946	8.779	12.412		
		157	9.649	10.172	12.929		
		165	9.208	9.427	12.329		
802.11n (HT40) MIMO	U-NII 3	151	7.457	5.363	9.545		
		159	6.599	6.195	9.412		
802.11ac (HT20) MIMO	U-NII 3	149	8.739	8.047	11.417		
		157	9.821	9.659	12.751		
		165	8.957	7.937	11.487		
802.11ac (HT40) MIMO	U-NII 3	151	5.15	6.43	8.847		
		159	6.287	5.961	9.137		

Test plot as follows:

ANT1

802.11a

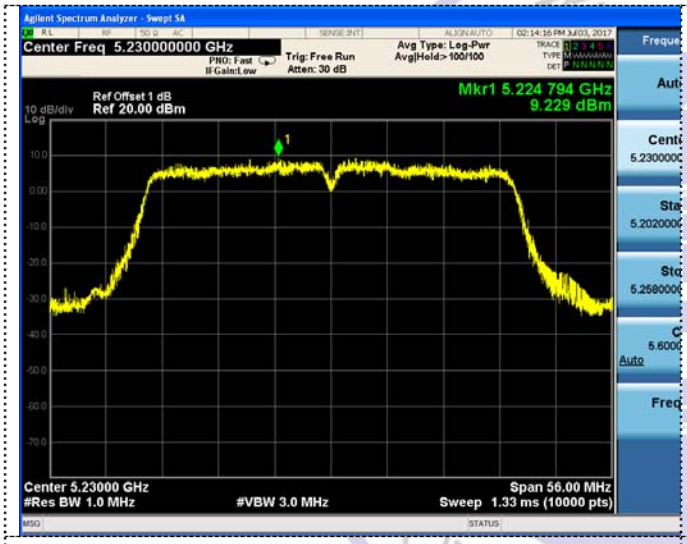
U-NII 1	*U-NII 3*
	
CH36	*CH149*
	
CH40	*CH157*
	
CH48	*CH165*

802.11n(HT20)	
U-NII 1	U-NII 3
	
CH36	CH149
	
CH40	CH157
	
CH48	CH165

802.11n(HT40)

U-NII 1

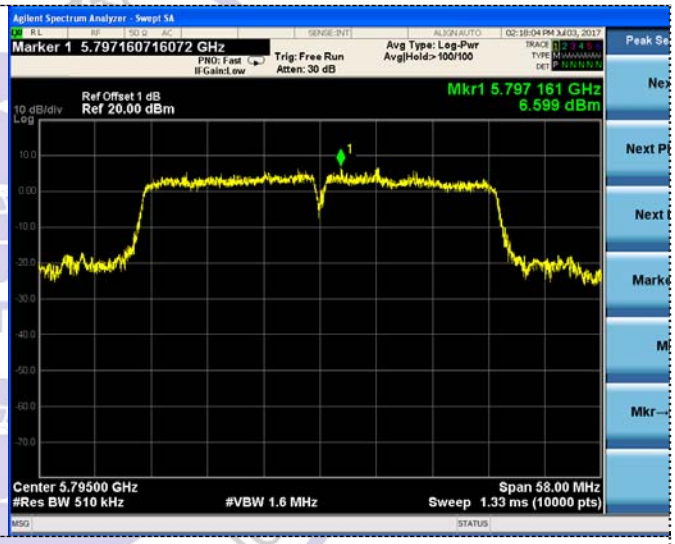
CH38



CH46

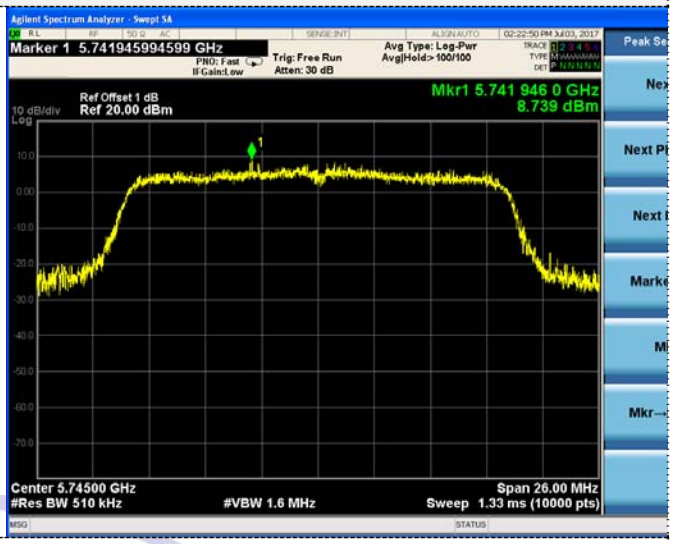
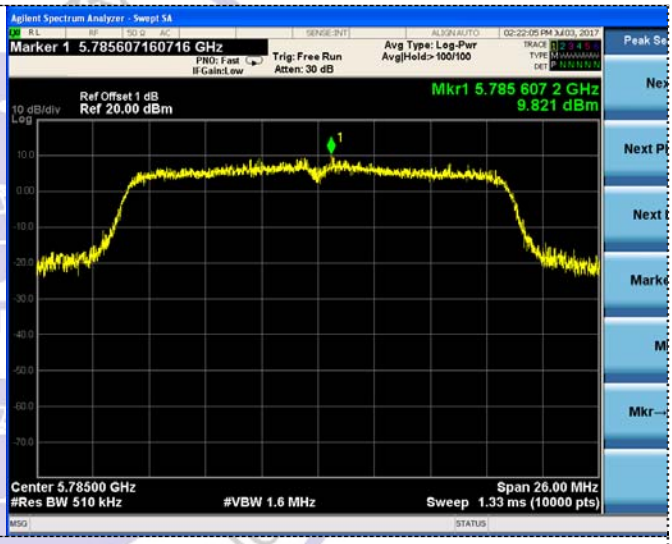
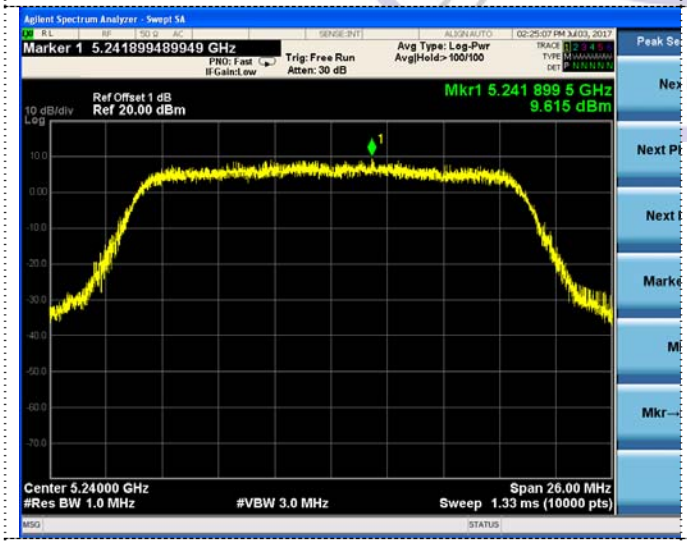
U-NII 3

CH151



CH159

802.11ac(HT20)

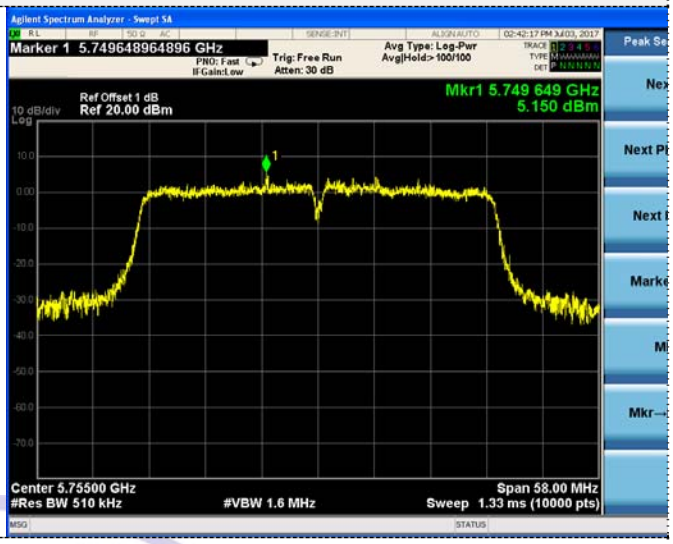
U-NII 1	*U-NII 3*
	
CH36	*CH149*
	
CH40	*CH157*
	
CH48	*CH165*

802.11ac(HT40)

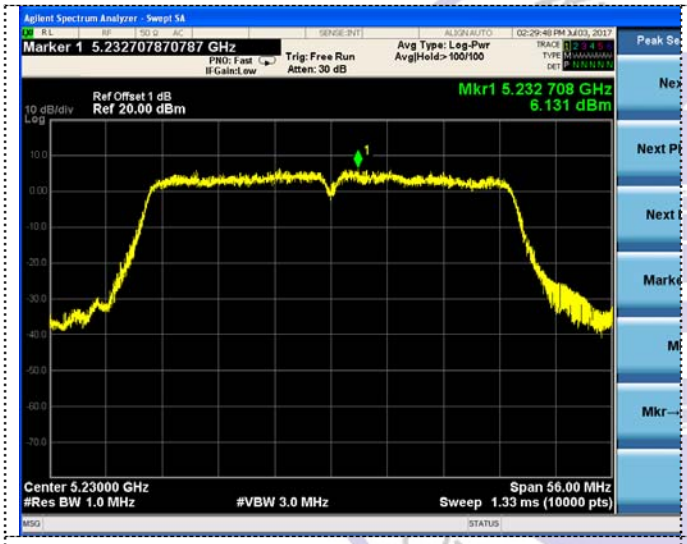
U-NII 1

CH38

U-NII 3



CH151



CH46

CH159

ANT2

802.11a

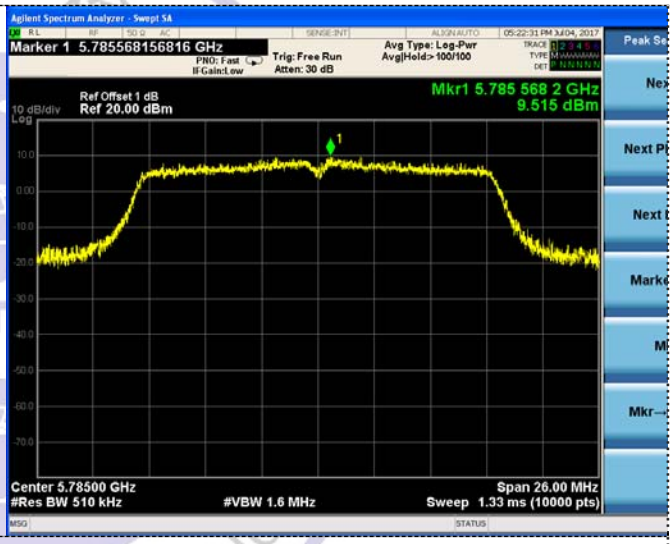
U-NII 1

CH36

U-NII 3

CH149

CH40



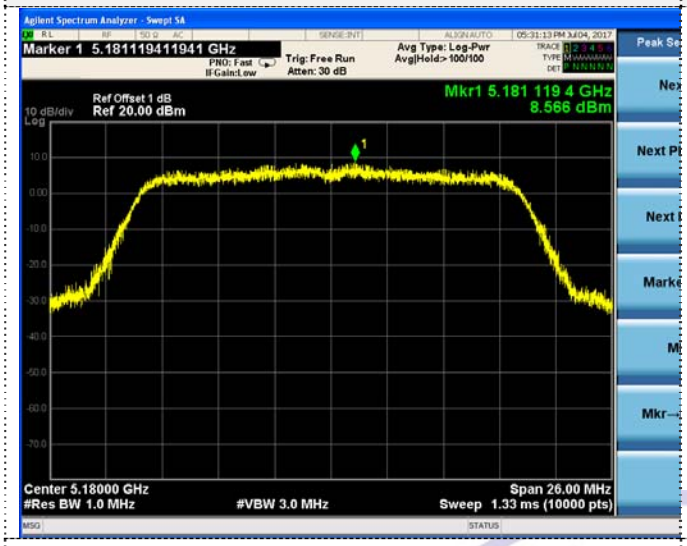
CH157

CH48

CH165

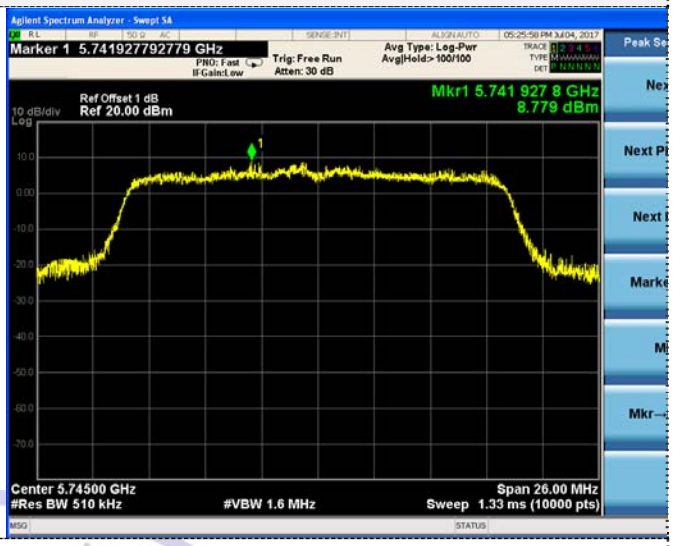
802.11n(HT20)

U-NII 1

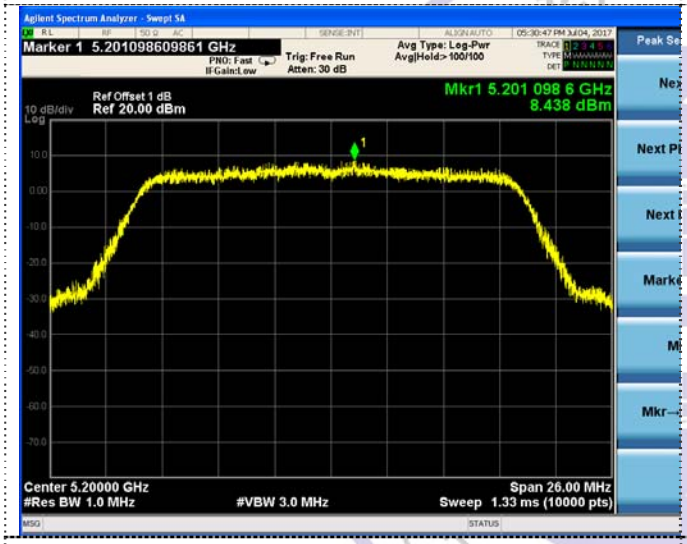


CH36

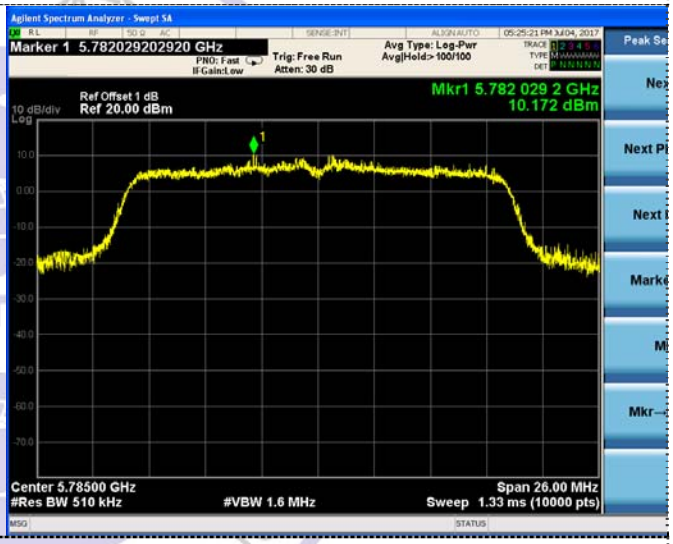
U-NII 3



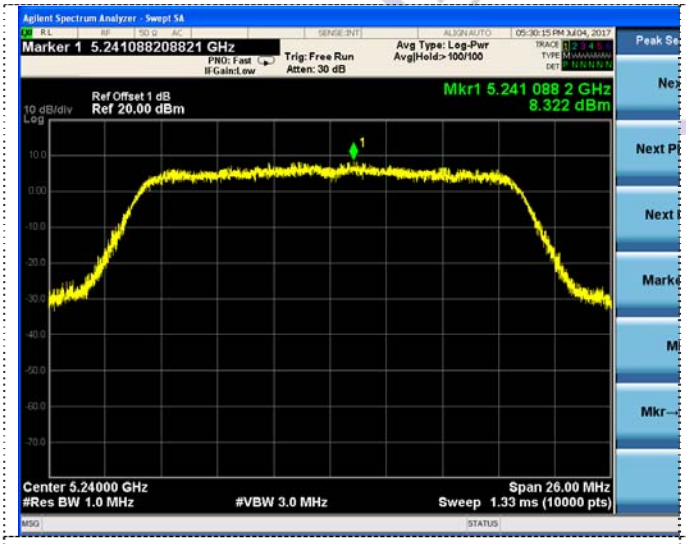
CH149



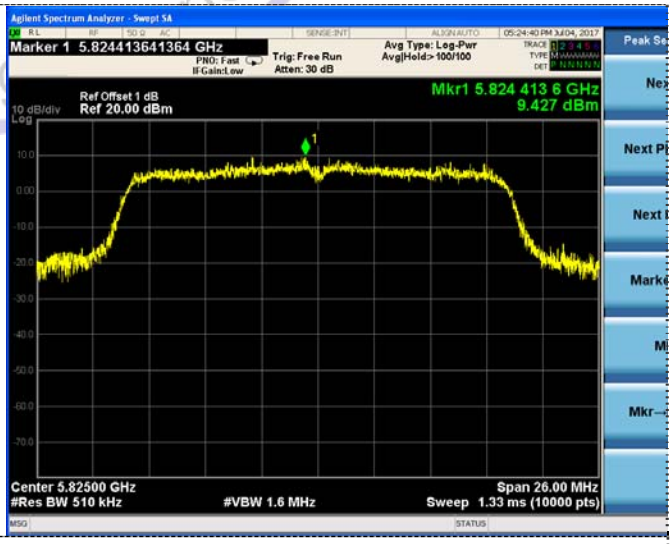
CH40



CH157



CH48



CH165

802.11n(HT40)

U-NII 1

CH38

CH46

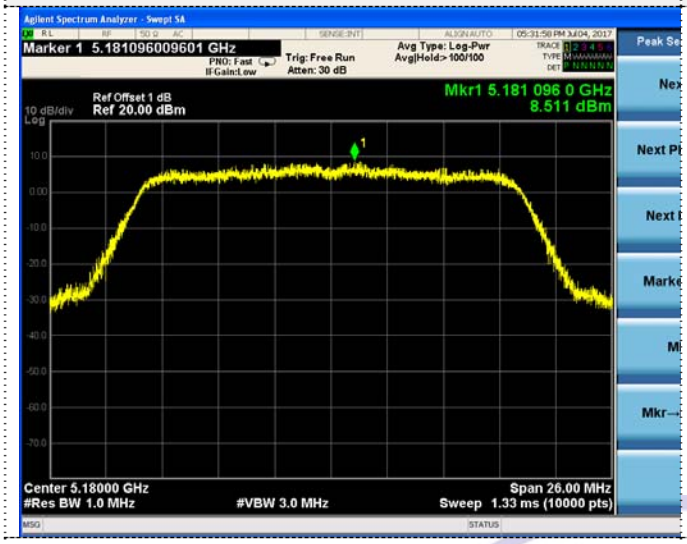
U-NII 3

CH151

CH159

802.11ac(HT20)

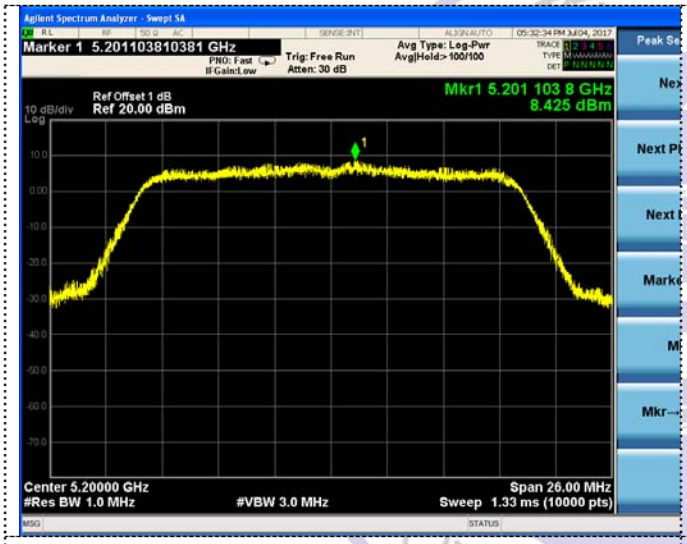
U-NII 1



CH36

U-NII 3

CH149



CH40

CH157

CH48

CH165

802.11ac(HT40)

U-NII 1

CH38

U-NII 3

CH151

CH46

CH159

3.5. Emission Bandwidth (26dBm Bandwidth)

Limit

N/A

Test Procedure

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW / EBW ratio is approximately 1 %.

Test Configuration

Test Results

ANT1

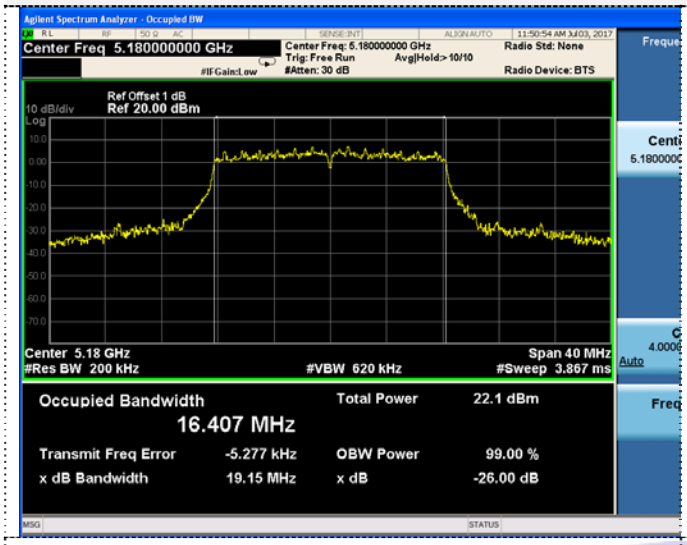
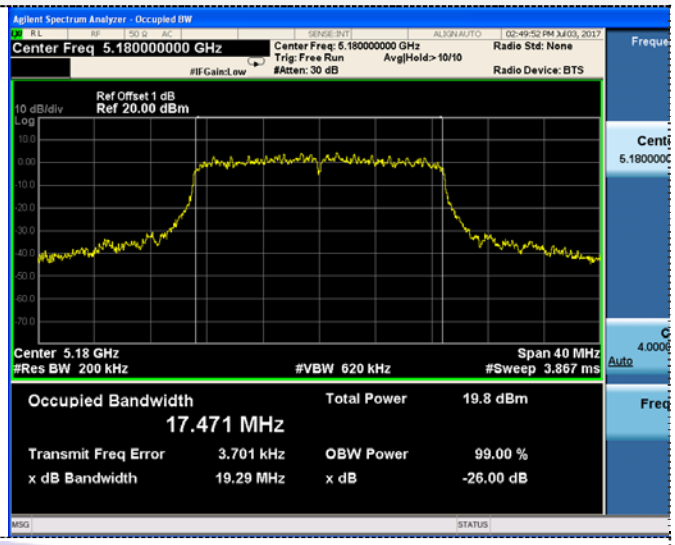
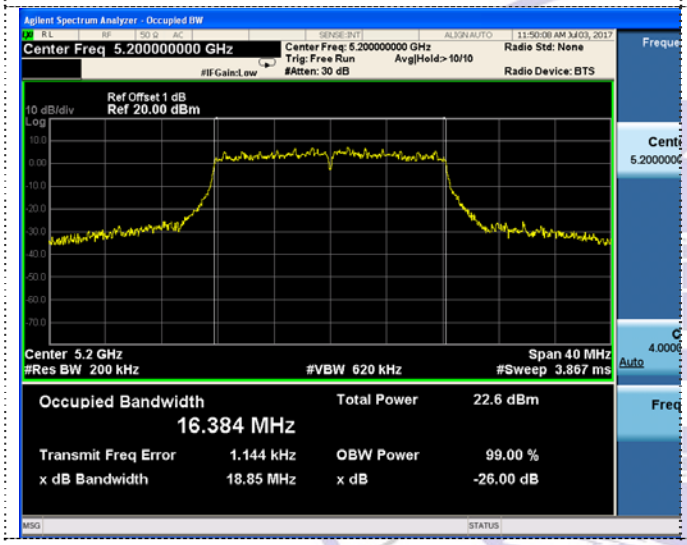
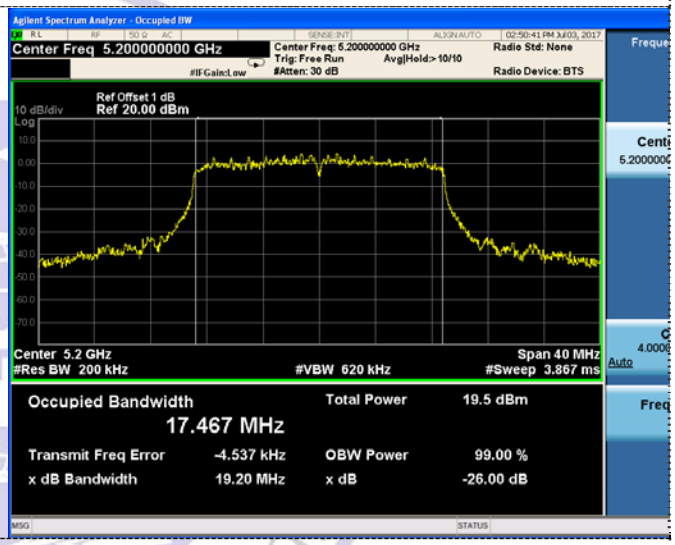
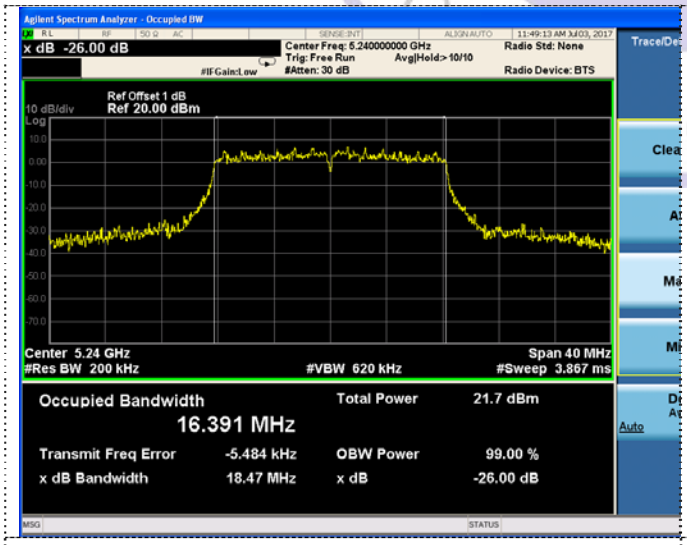
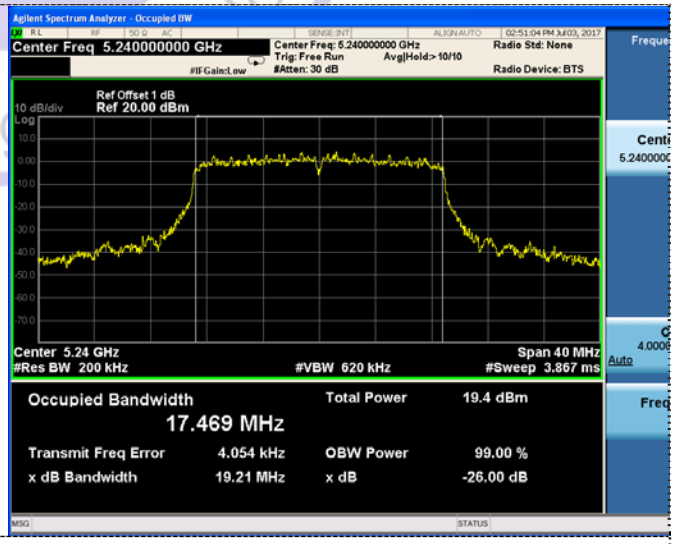
Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	19.15	N/A	Pass
		40	18.85		
		48	18.47		
802.11n(HT20)	U-NII 1	36	19.29		
		40	19.20		
		48	19.21		
802.11n(HT40)	U-NII 1	38	39.20		
		46	39.35		
802.11ac(HT20)	U-NII 1	36	19.16		
		40	19.04		
		48	19.04		
802.11ac(HT40)	U-NII 1	38	39.17		
		46	39.06		

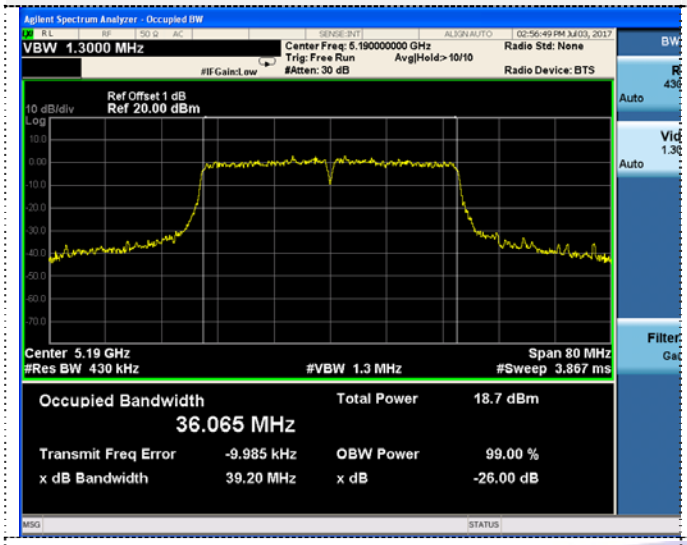
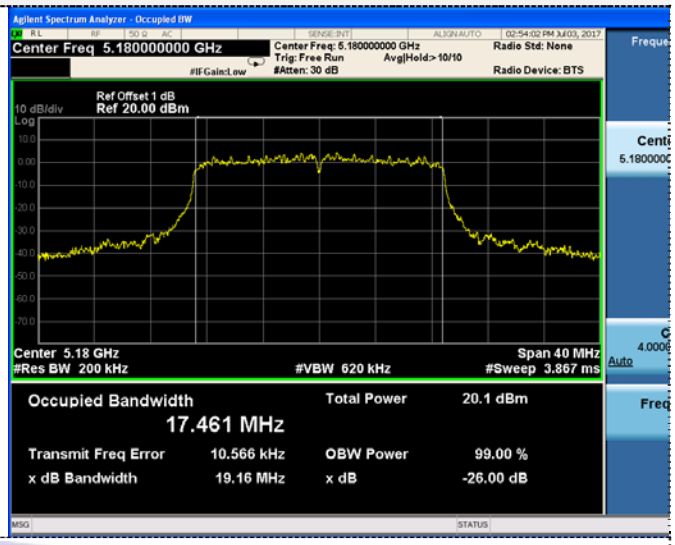
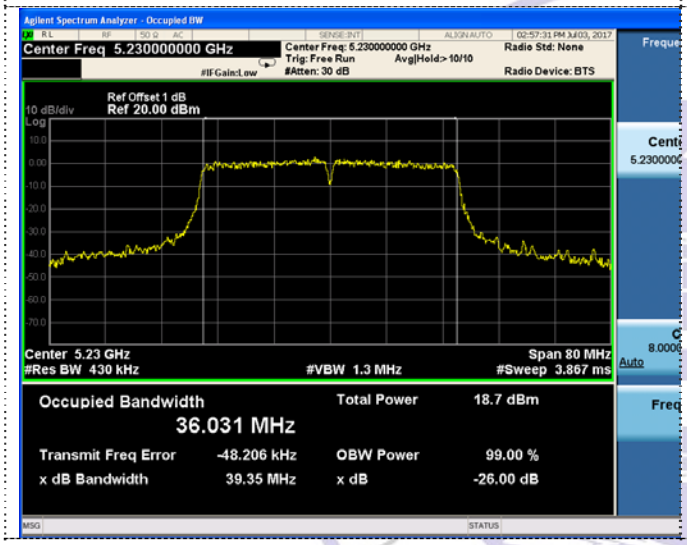
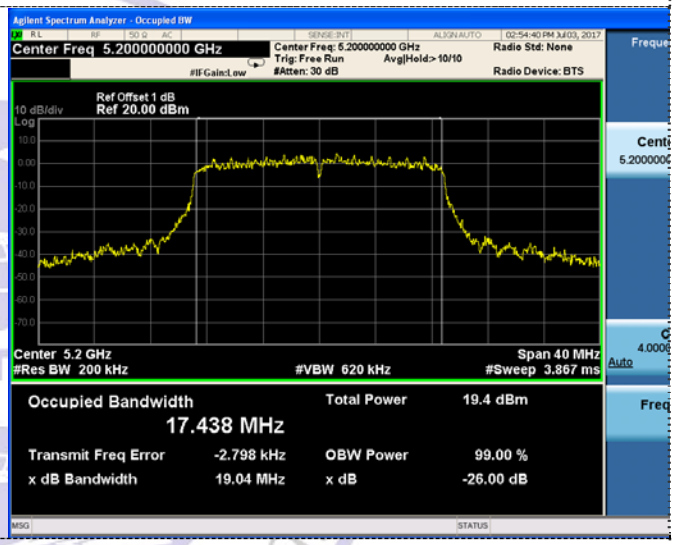
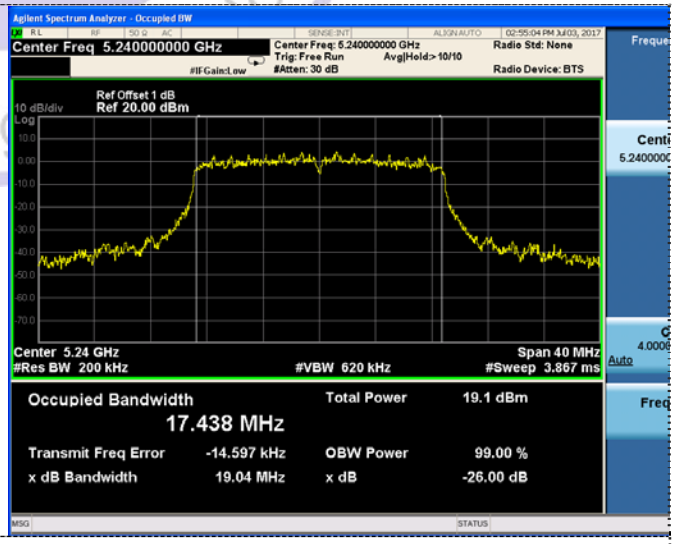
ANT2

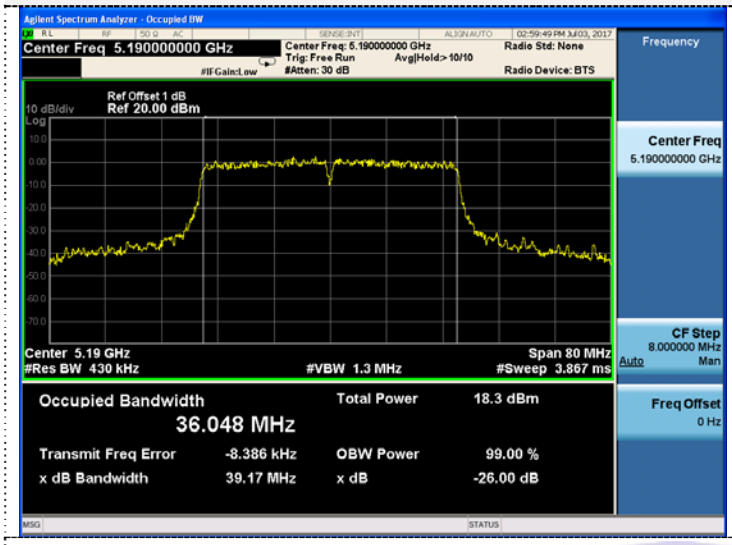
Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	19.12	N/A	Pass
		40	19.03		
		48	19.38		
802.11n(HT20)	U-NII 1	36	19.38		
		40	19.23		
		48	19.37		
802.11n(HT40)	U-NII 1	38	39.37		
		46	39.00		
802.11ac(HT20)	U-NII 1	36	19.41		
		40	19.20		
		48	19.25		
802.11ac(HT40)	U-NII 1	38	39.48		
		46	39.05		

Test plot as follows:

ANT1

802.11a	*802.11n(HT20)*
	
CH36	*CH36*
	
CH40	*CH40*
	
CH48	*CH48*

802.11n(HT40)	802.11ac(HT20)
	
CH38	CH36
	
CH46	CH40
	
	CH48

802.11ac(HT40)	
	
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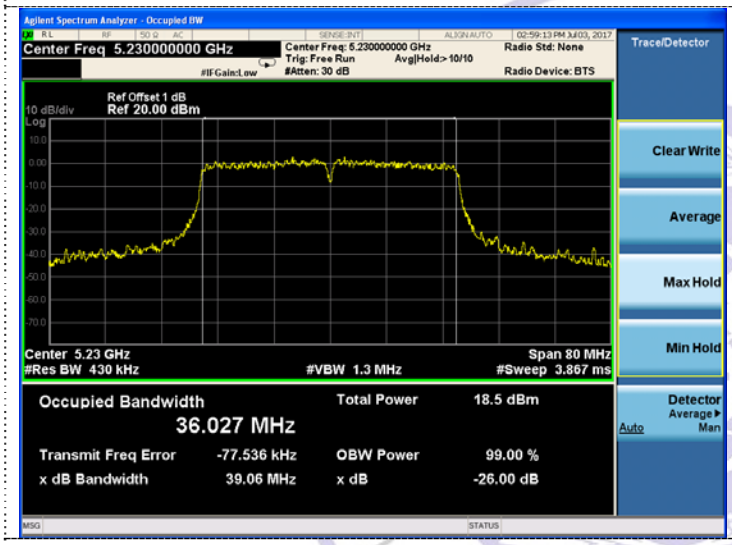
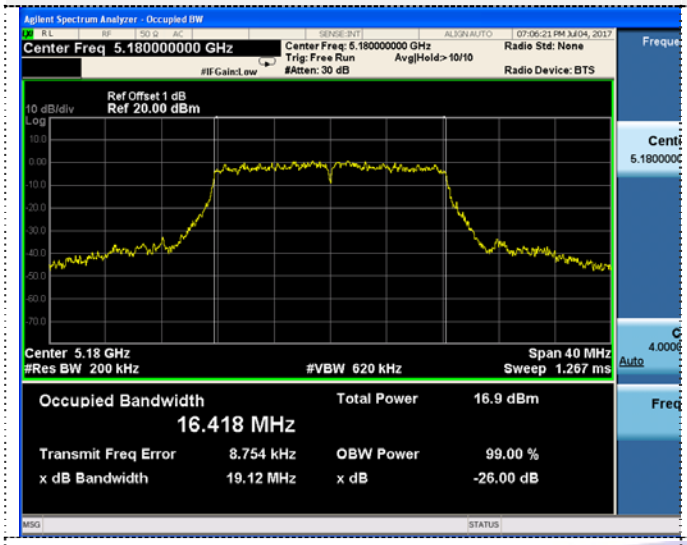
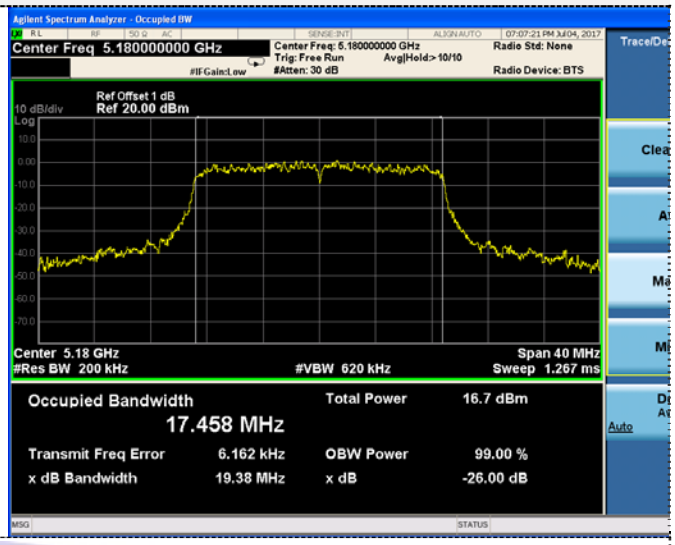
	
CH46	

ANT2

802.11a	*802.11n(HT20)*
	
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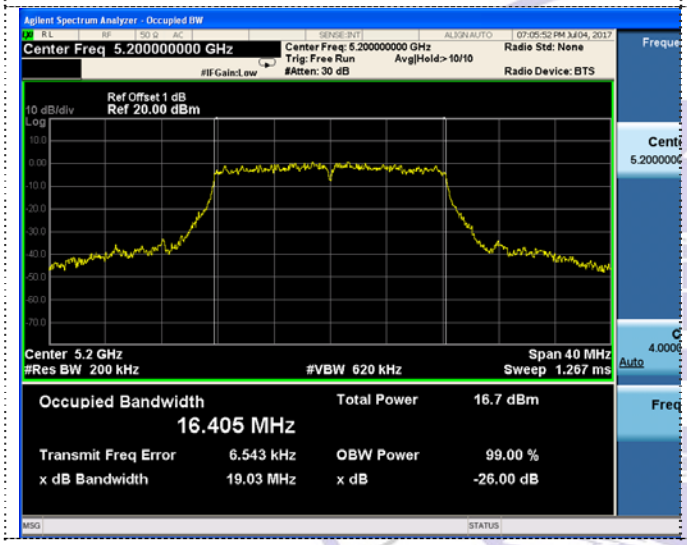
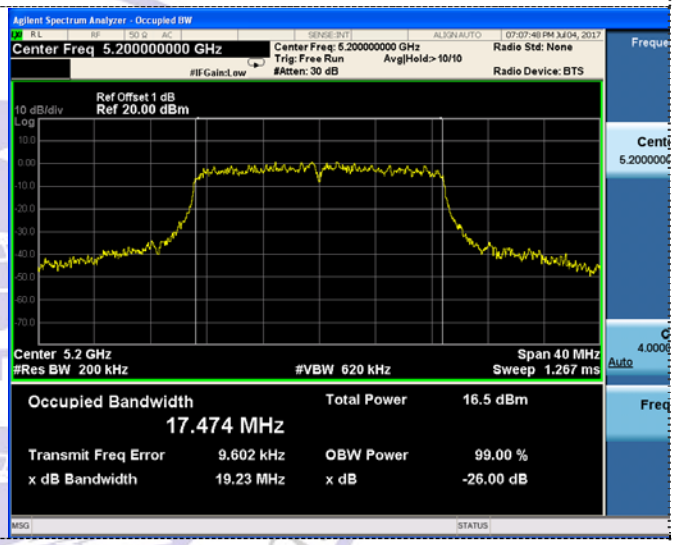
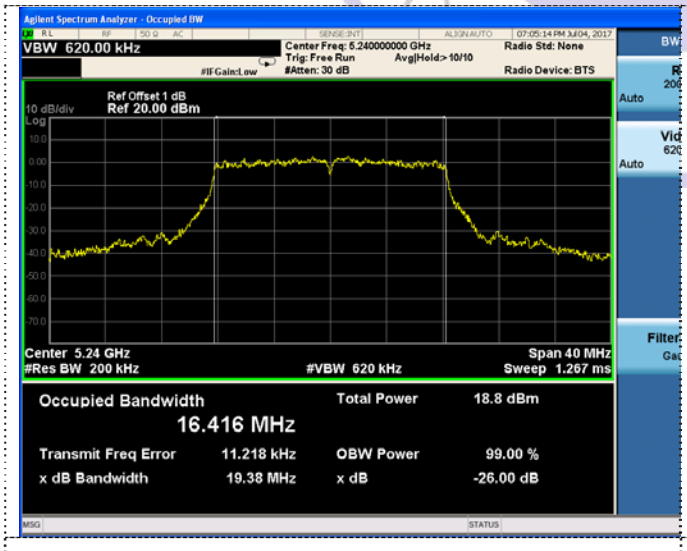
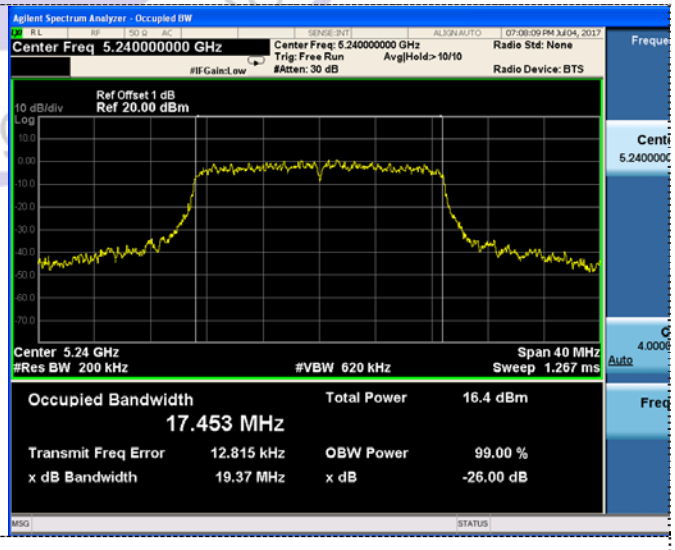
	
CH40	*CH40*
	
CH48	*CH48*