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

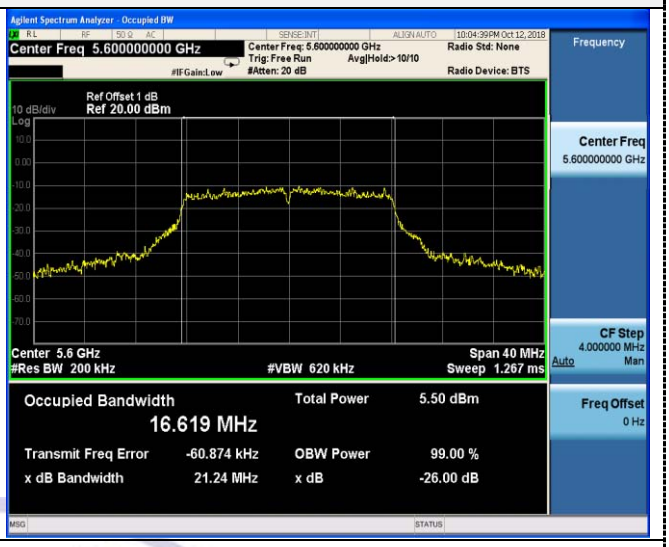
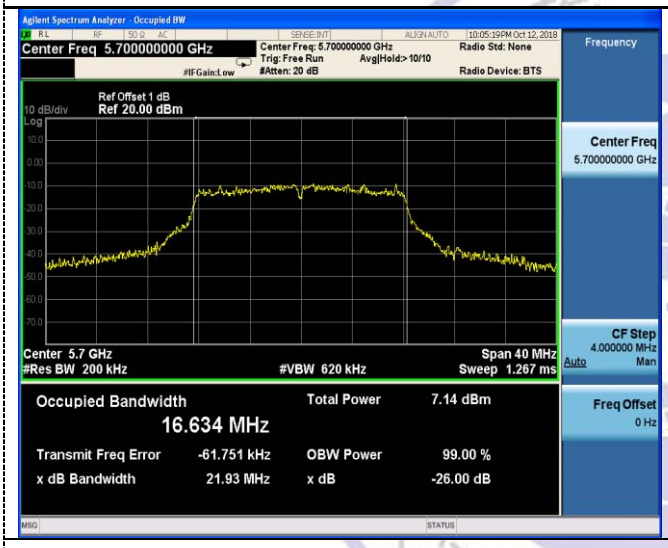
Type	Bands	Channel	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	24.870	16.848	N/A	Pass
		40	24.410	16.768		
		48	24.280	16.754		
	U-NII 2A	52	26.800	16.901		
		60	24.220	16.792		
		64	27.390	16.903		
	U-NII 2C	100	21.290	16.612		
		120	21.240	16.619		
		140	21.930	16.634		
802.11n(HT20)	U-NII 1	36	24.000	17.897		
		40	26.080	17.933		
		48	25.660	17.843		
	U-NII 2A	52	23.420	17.875		
		60	25.660	17.880		
		64	26.400	17.928		
	U-NII 2C	100	21.490	17.772		
		120	22.430	17.777		
		140	21.780	17.765		
802.11n(HT40)	U-NII 1	38	56.170	36.366		
		46	45.160	36.295		
	U-NII 2A	54	52.620	36.406		
		52	49.440	36.326		
	U-NII 2C	102	39.580	36.262		
		118	45.730	36.235		
		134	44.270	36.301		

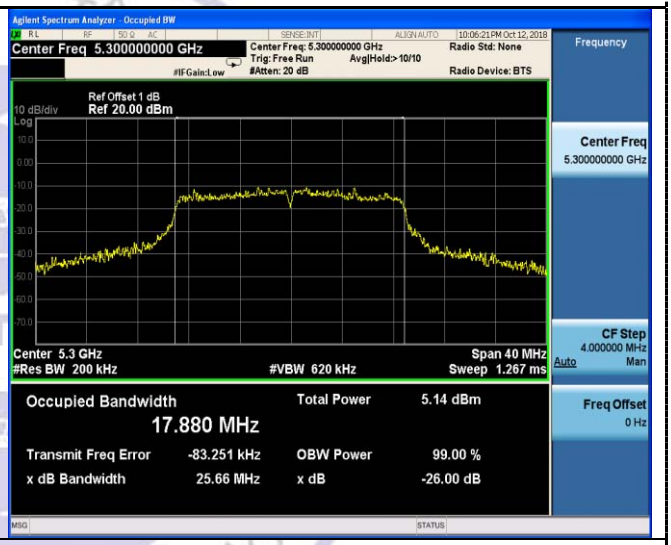
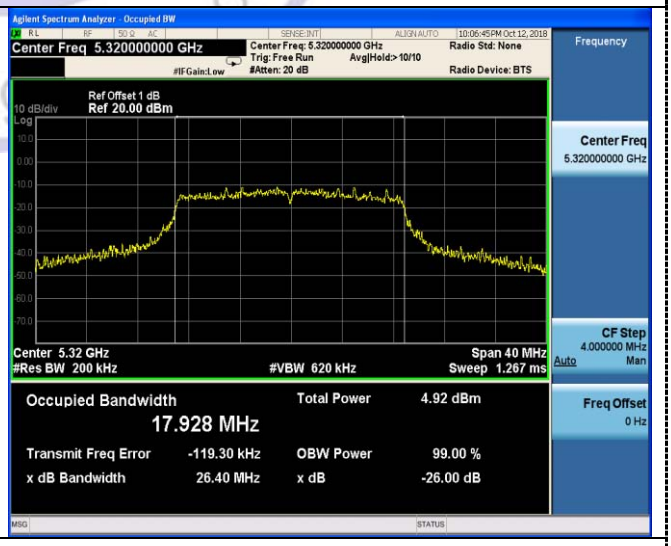
Type	Bands	Channel	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Result
802.11ac(HT20)	U-NII 1	36	26.770	17.904	N/A	Pass
		40	26.470	17.945		
		48	27.490	17.991		
	U-NII 2A	52	25.650	17.879		
		60	24.390	17.866		
		64	24.820	17.865		
	U-NII 2C	100	22.020	17.800		
		120	22.780	17.773		
		140	21.930	17.784		
802.11ac(HT40)	U-NII 1	38	47.500	36.390		
		46	42.280	36.245		
	U-NII 2A	54	52.220	36.355		
		52	47.050	36.308		
	U-NII 2C	102	39.830	36.232		
		118	44.660	36.350		
		134	40.300	36.259		
802.11ac(HT80)	U-NII 1	42	108.00	75.879		
	U-NII 2A	58	108.90	75.830		
	U-NII 2C	106	83.070	75.759		
		122	80.770	75.559		

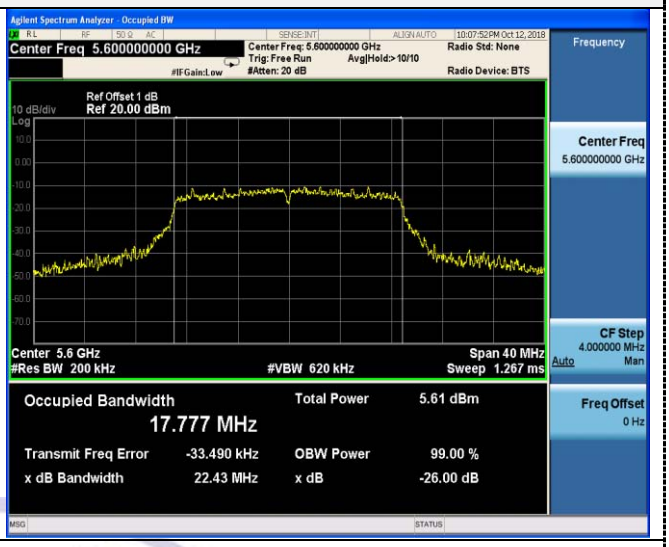
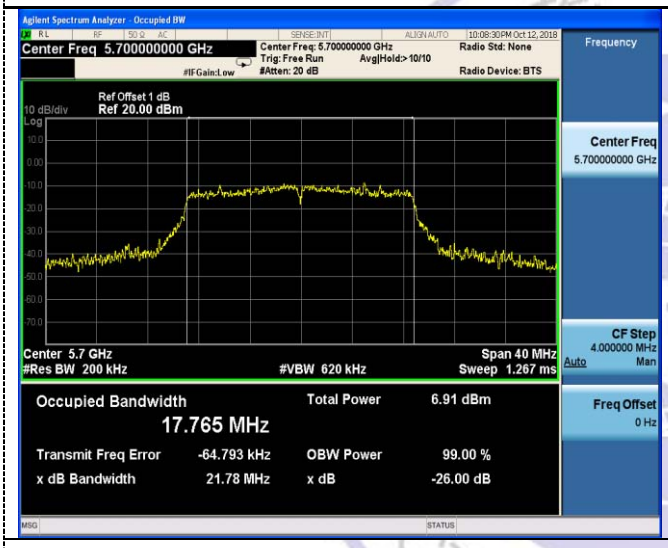
Note:

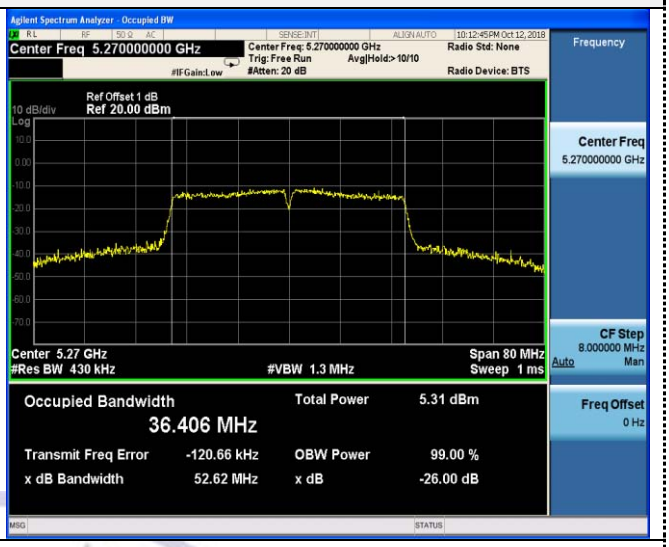
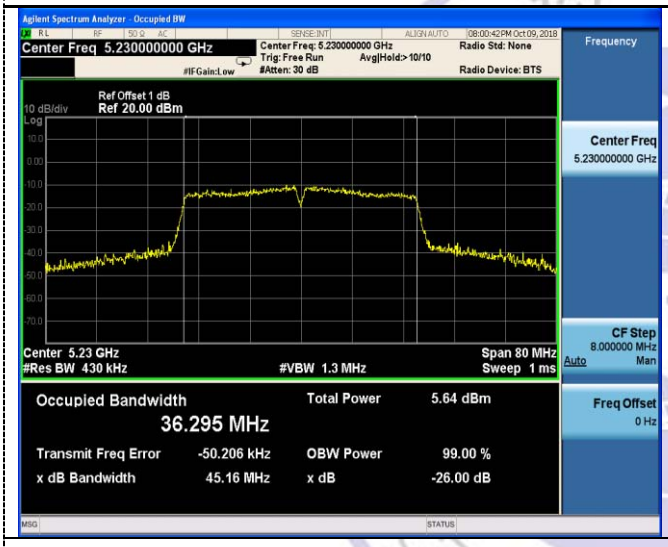
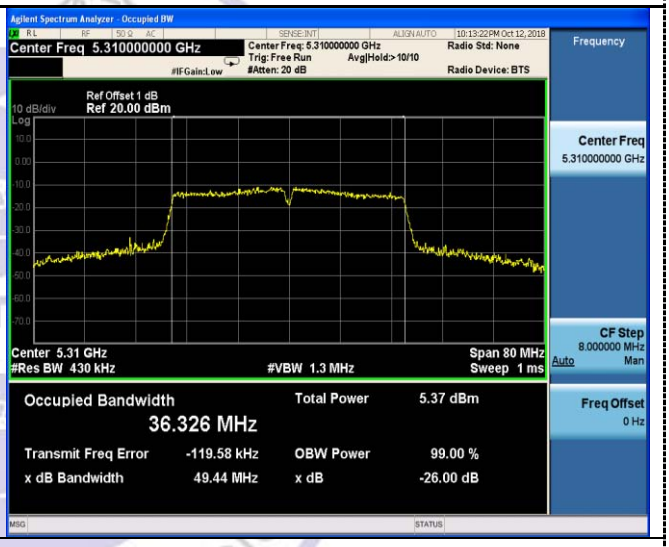
1. *Measured 26dB bandwidth at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20 ,IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*
4. *Please refer to following test plots;*

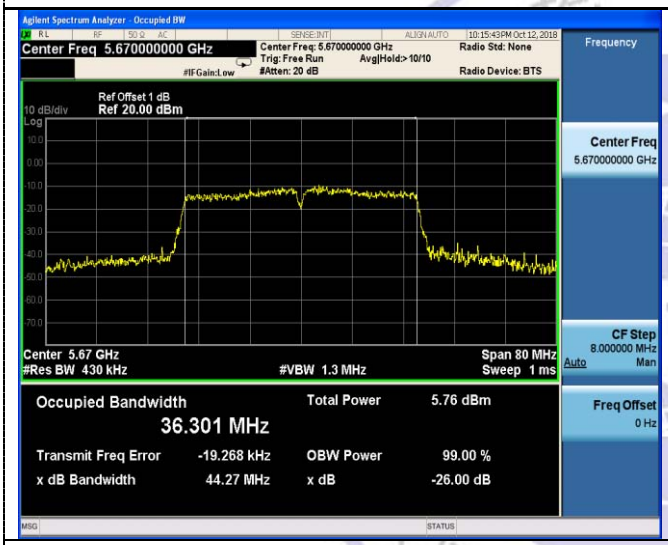
802.11a	
U-NII 1	U-NII 2A
	
CH36	CH52
	
CH40	CH60
	
CH48	CH64

802.11a	
U-NII 2C	
	
CH100	CH120
	
CH140	

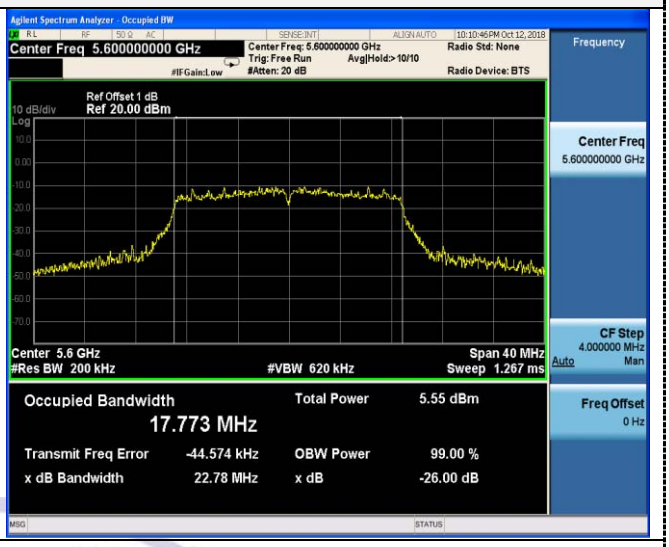
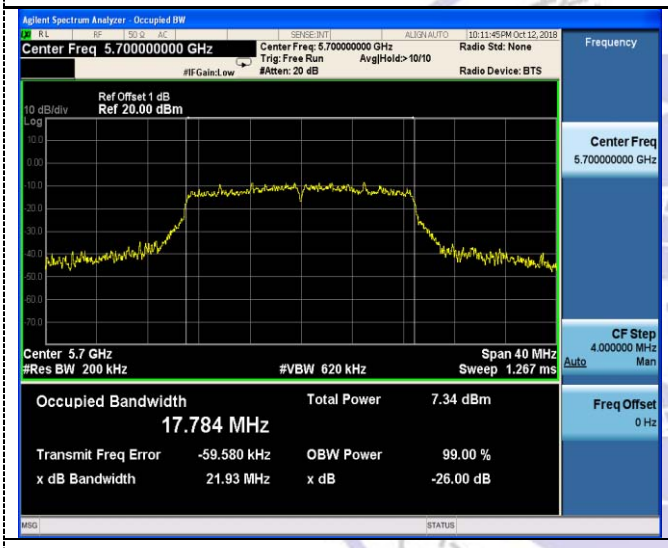
802.11n(HT20)	
U-NII 1	U-NII 2A
	
CH36	CH52
	
CH40	CH60
	
CH48	CH64

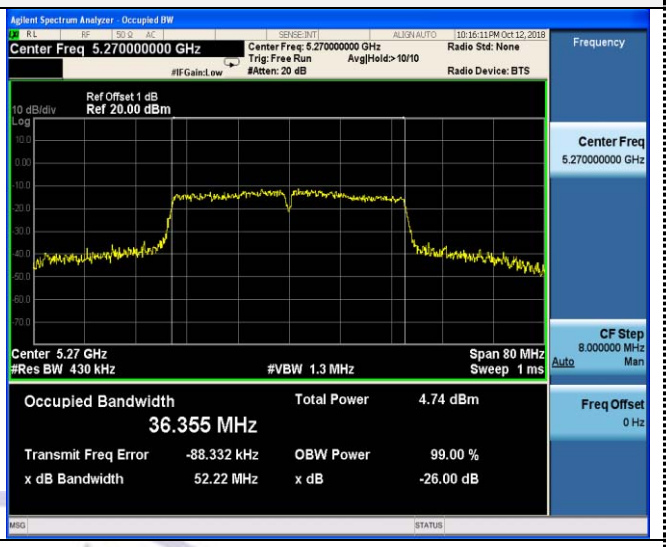
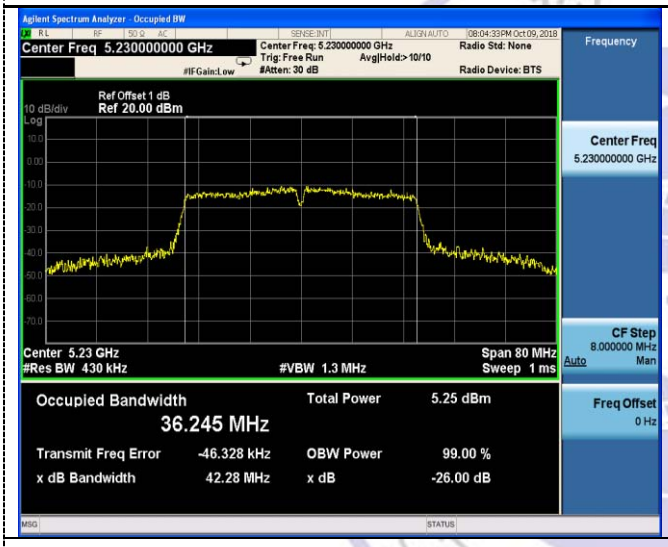
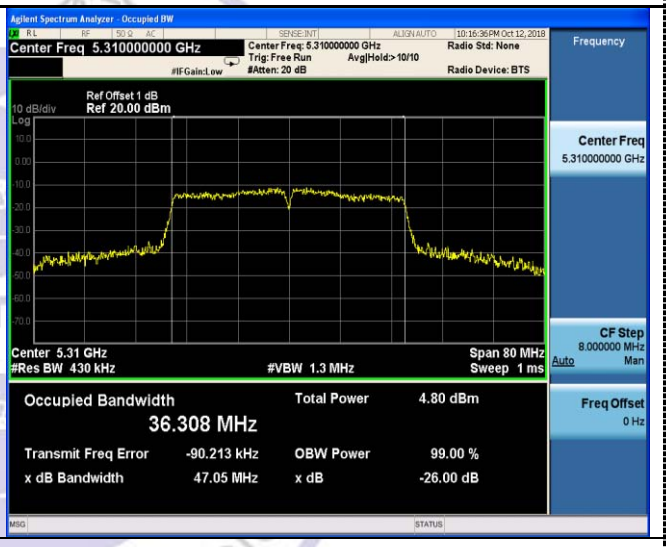
802.11n(HT20)	
U-NII 2C	
	
CH100	CH120
	
CH140	

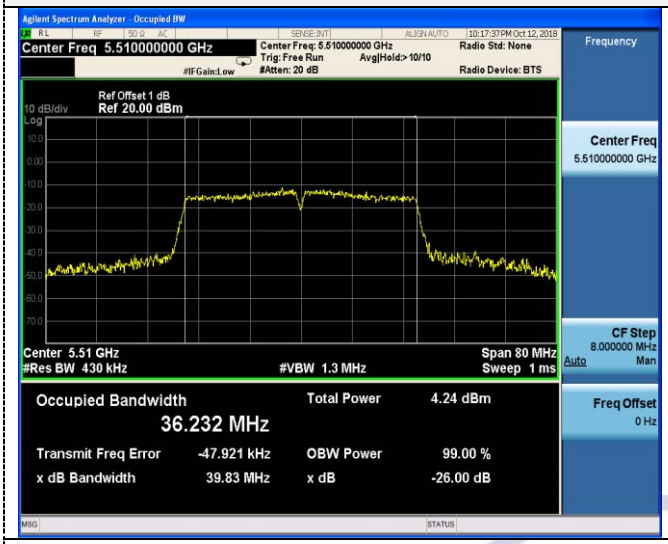
802.11n(HT40)	
U-NII 1	U-NII 2A
	
CH38	CH54
	
CH46	CH62

802.11n(HT40)	
U-NII 2C	
	
CH102	CH118
	
CH134	

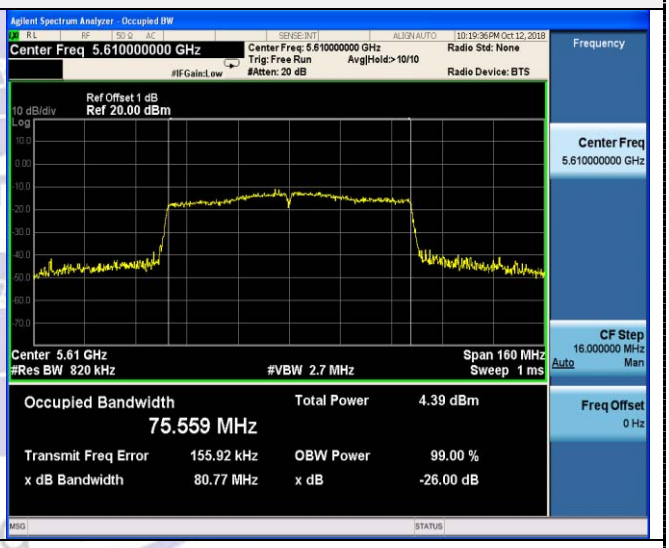
802.11ac(HT20)	
U-NII 1	U-NII 2A
	
CH36	CH52
	
CH40	CH60
	
CH48	CH64

802.11ac(HT20)	
U-NII 2C	
	
CH100	CH120
	
CH140	

802.11ac(HT40)	
U-NII 1	U-NII 2A
	
CH38	CH54
	
CH46	CH62

802.11ac(HT40)	
U-NII 2C	
	
CH102	CH118
	
CH134	

802.11ac(HT80)	
U-NII 1	U-NII 2A
	
CH42	CH58

802.11ac(HT80)	
U-NII 2C	
	
CH106	CH122

3.6. Minimum Emission Bandwidth (6dBm Bandwidth)

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

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. 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.

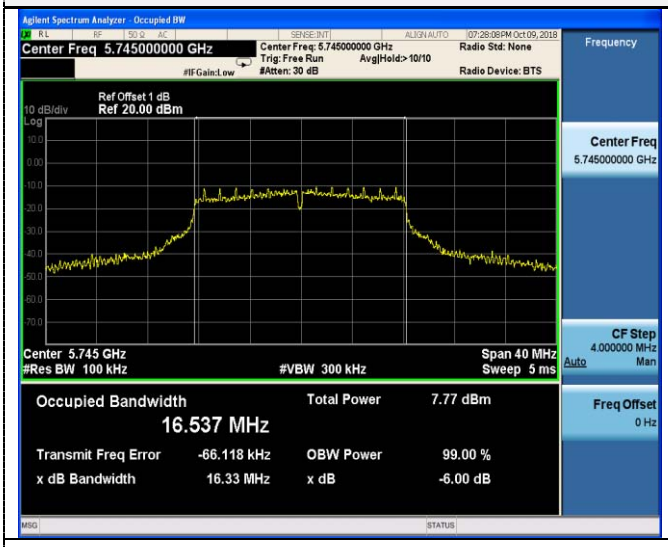
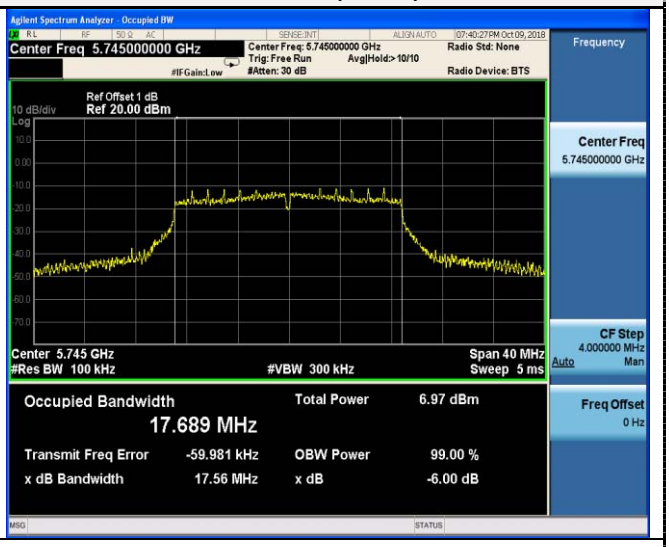
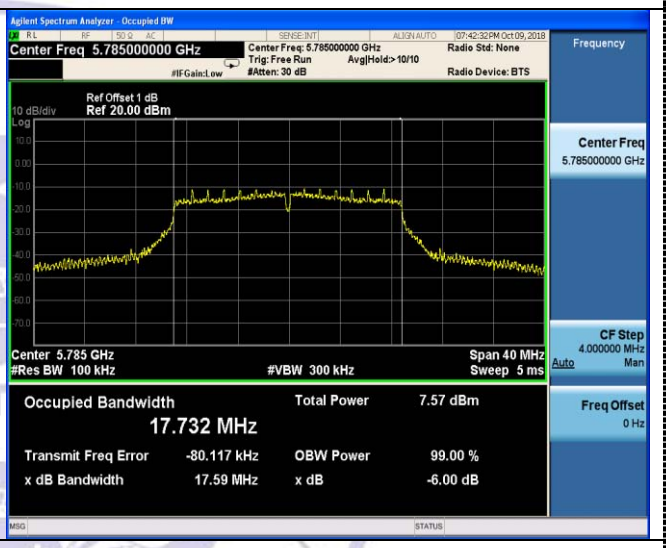
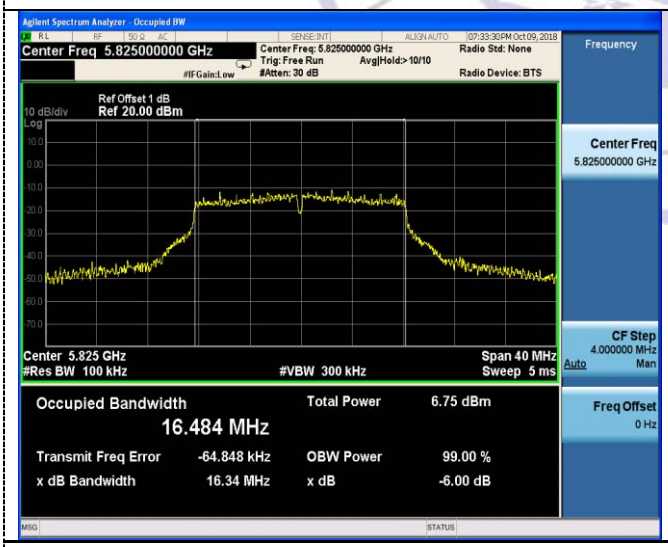
Test Configuration

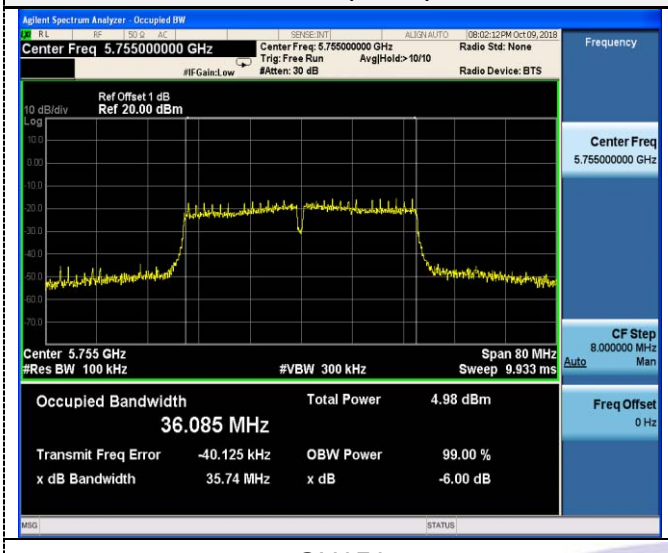
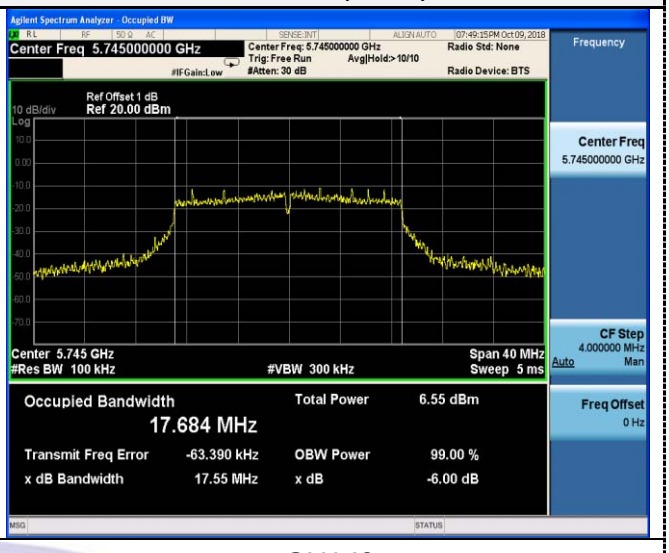
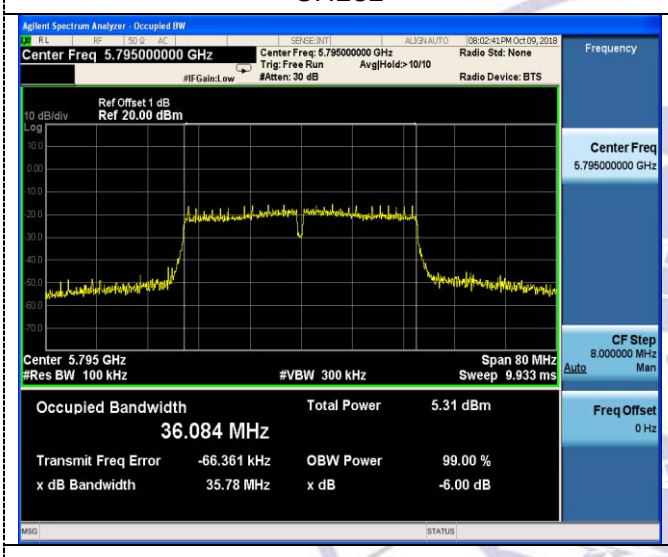
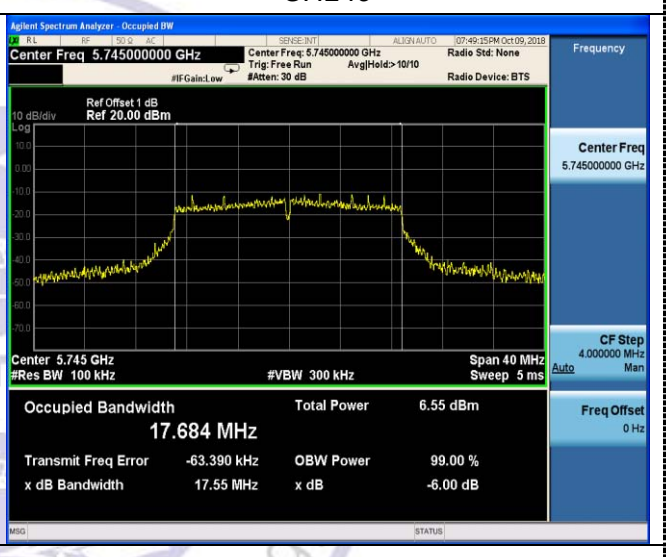
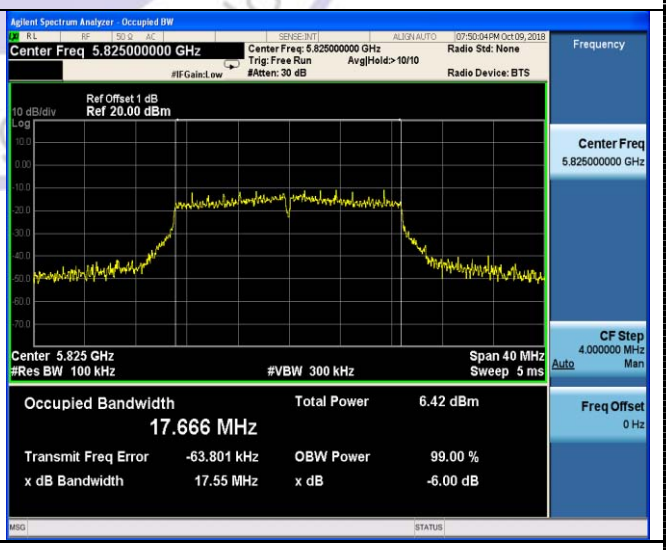
Test Results

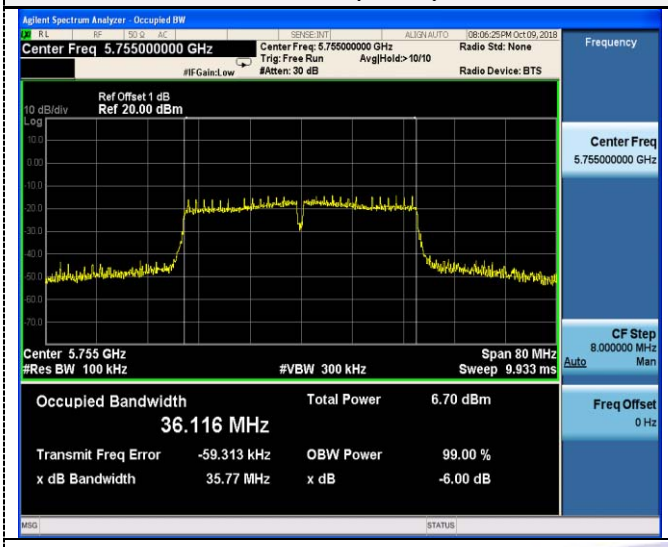
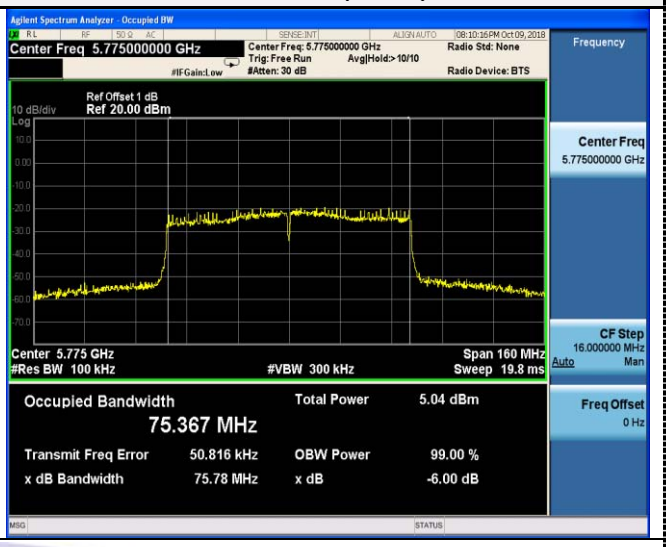
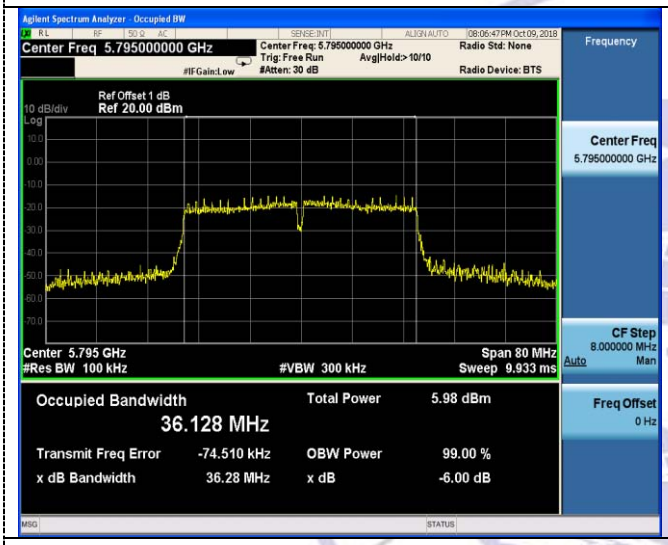
Type	Bands	Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (KHz)	Result
802.11a	U-NII 3	149	16.33	16.537	≥500KHz	Pass
		157	16.31	16.508		
		165	16.34	16.484		
802.11n(HT20)	U-NII 3	149	17.56	17.689		
		157	17.59	17.732		
		165	17.54	17.690		
802.11n(HT40)	U-NII 3	151	35.74	36.085		
		159	35.78	36.084		
802.11ac(HT20)	U-NII 3	149	17.55	17.684		
		157	17.55	17.684		
		165	17.55	17.666		
802.11ac(HT40)	U-NII 3	151	35.77	36.116		
		159	36.28	36.128		
802.11ac(HT80)	U-NII 3	155	75.78	75.367		

Note:

1. *Measured 26dB bandwidth at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20 ,IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*
4. *Please refer to following test plots;*

802.11a	802.11n(HT20)
	
CH149	CH149
	
CH157	CH157
	
CH165	CH165

802.11n(HT40)	802.11ac(HT20)
	
CH151	CH149
	
CH159	CH157
	
	CH165

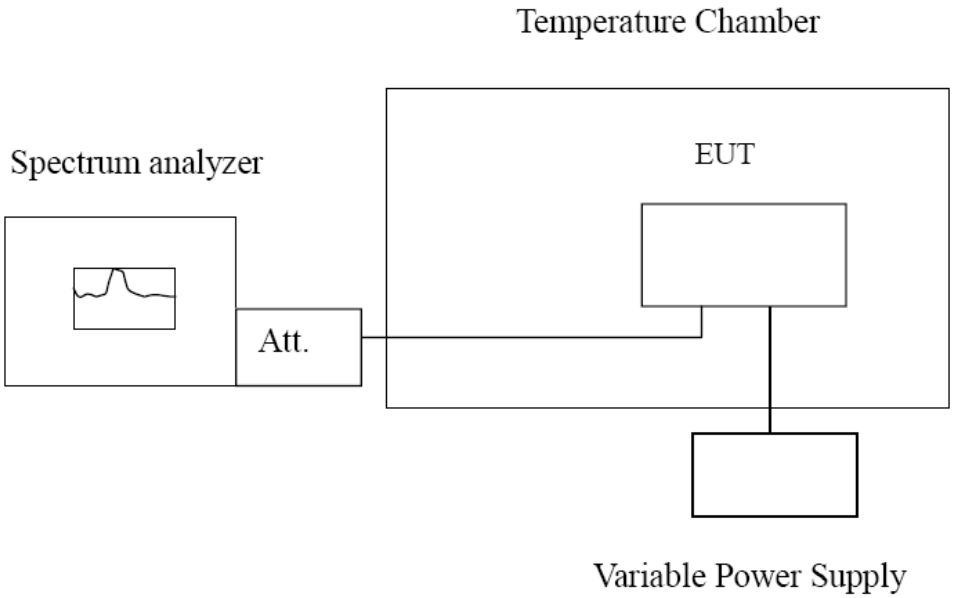
802.11ac(HT40)	802.11ac(HT80)
	
CH151	CH155
	
CH159	

3.7. Frequency Stability

LIMIT

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

TEST CONFIGURATION



TEST PROCEDURE

Frequency Stability under Temperature Variations:
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability under Voltage Variations:
Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

TEST RESULTS

Record worst case as below:

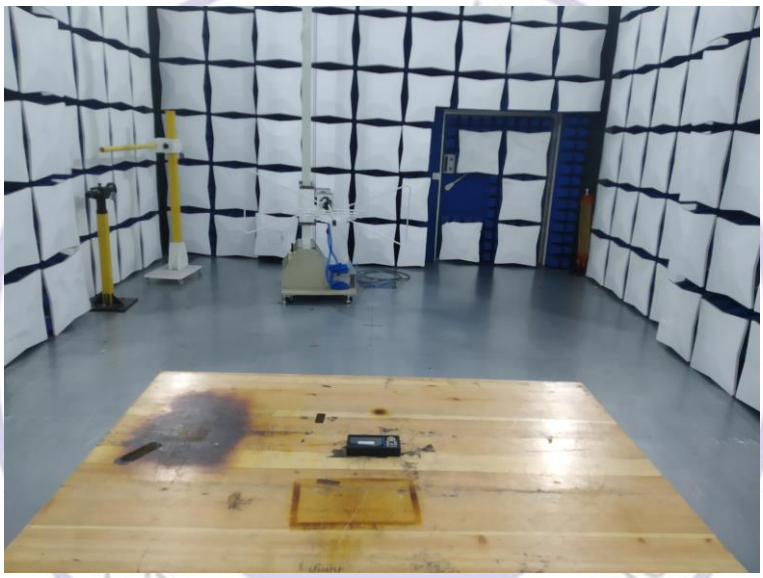
Reference Frequency: 802.11ac channel=36 frequency=5180MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	456	0.088	Within the band of operation	Pass
	-20	667	0.129		
	-10	794	0.153		
	0	832	0.161		
	10	837	0.162		
	20	657	0.127		
	30	528	0.102		
	40	568	0.110		
	50	501	0.097		
4.26	25	906	0.175		
3.15	25	456	0.088		

Reference Frequency: 802.11ac channel=52 frequency=5260MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	560	0.106	Within the band of operation	Pass
	-20	670	0.127		
	-10	550	0.105		
	0	542	0.103		
	10	533	0.101		
	20	919	0.175		
	30	593	0.113		
	40	452	0.086		
	50	513	0.098		
4.26	25	943	0.179		
3.15	25	426	0.081		

Reference Frequency: 802.11ac channel=100 frequency=5500MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	695	0.126	Within the band of operation	Pass
	-20	980	0.178		
	-10	861	0.157		
	0	537	0.098		
	10	612	0.111		
	20	458	0.083		
	30	748	0.136		
	40	440	0.080		
	50	792	0.144		
4.26	25	728	0.132		
3.15	25	766	0.139		

Reference Frequency: 802.11ac channel=149 frequency=5745MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	698	0.013	Within the band of operation	Pass
	-20	610	0.011		
	-10	766	0.014		
	0	832	0.015		
	10	723	0.013		
	20	711	0.013		
	30	816	0.015		
	40	995	0.018		
	50	656	0.012		
4.26	25	680	0.012		
3.15	25	937	0.017		

4. Test Setup Photos of the EUT



5. Photos of the EUT

Reference to the test report No. CTL1806193011-WF01

********** End of Report **********