3.5. Emission Bandwidth (26dBm Bandwidth)

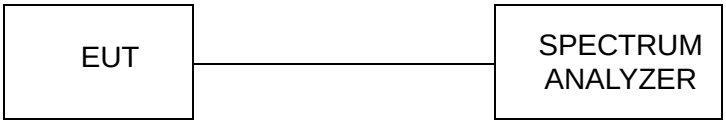
Limit

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

For ANT1:

Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	20.02	N/A	Pass
		40	19.89		
		48	19.79		
802.11n(HT20)	U-NII 1	36	20.04		
		40	20.13		
		48	20.19		
802.11n(HT40)	U-NII 1	38	40.65		
		46	40.38		
802.11ac(HT20)	U-NII 1	36	20.14	N/A	Pass
		40	20.04		
		48	20.33		
802.11ac(HT40)	U-NII 1	38	40.17		
		46	40.13		
802.11ac(HT80)	U-NII 1	42	80.82		

For ANT2:

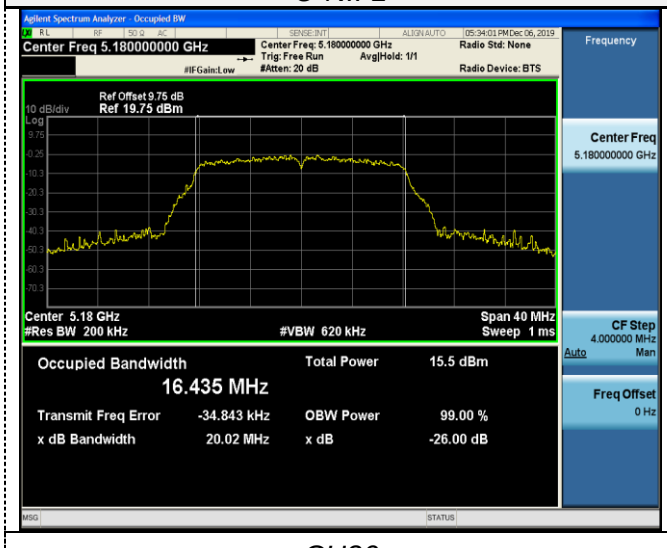
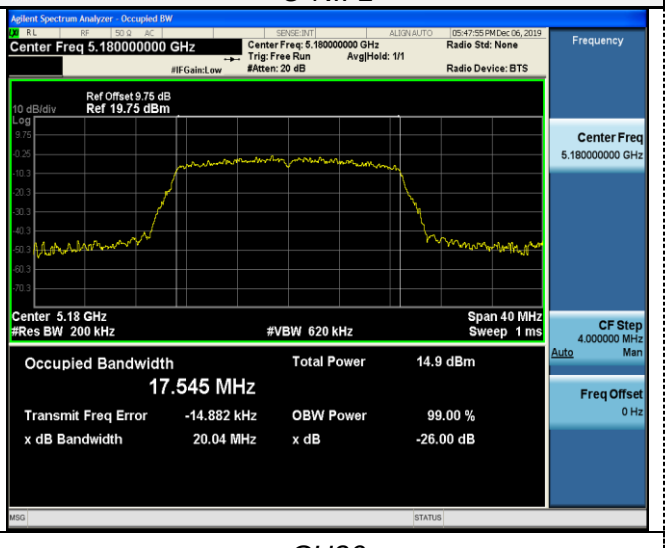
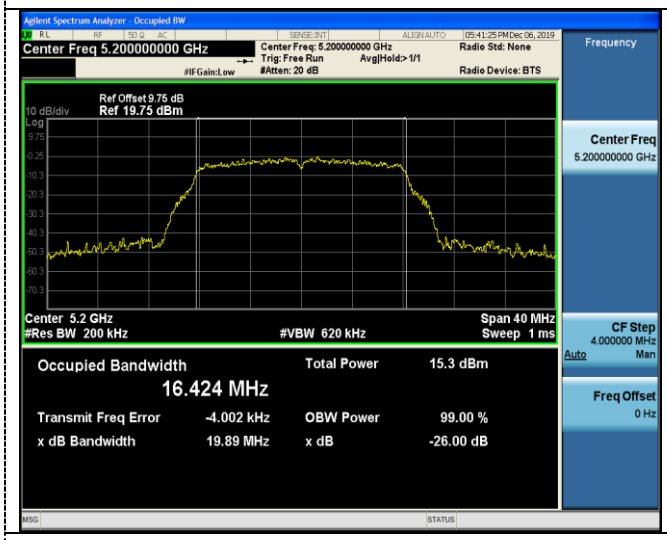
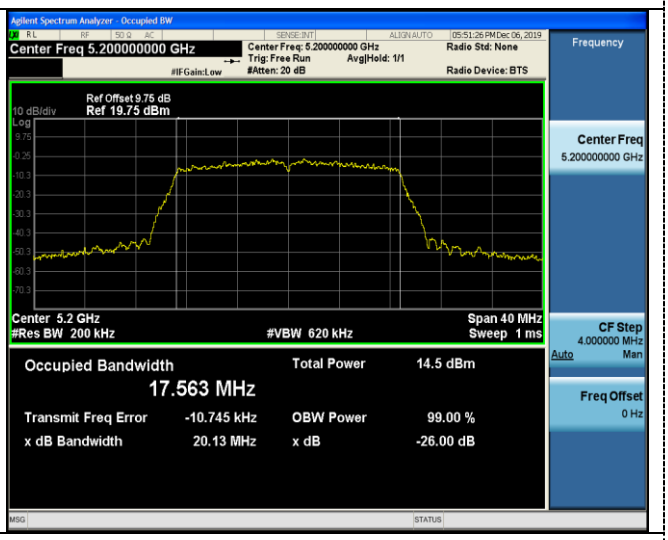
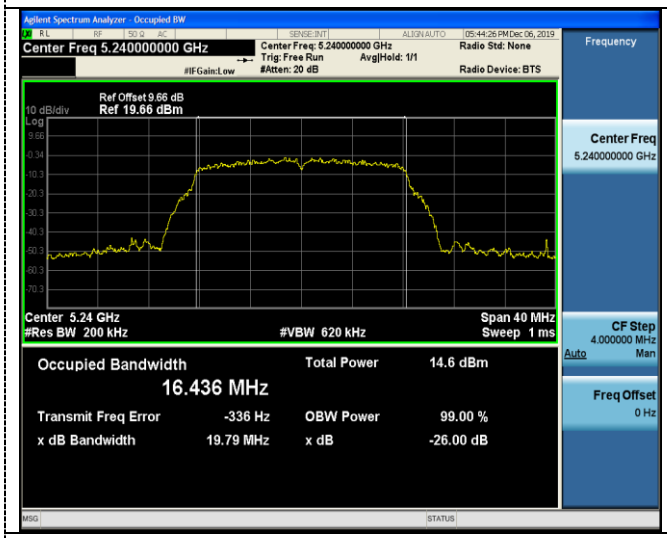
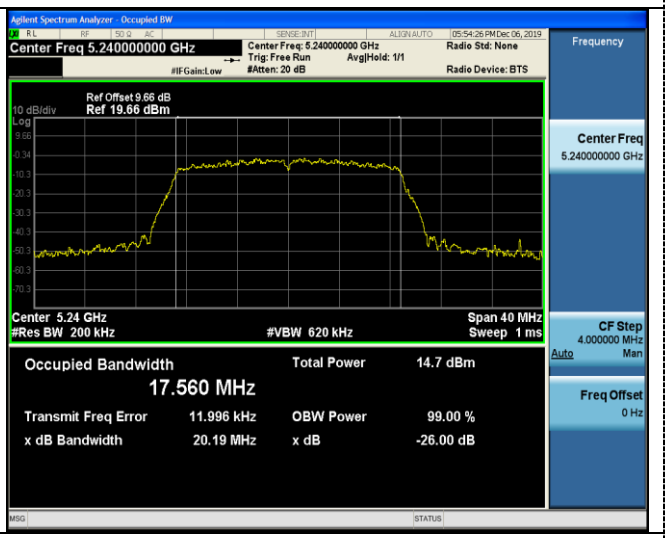
Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	19.73	N/A	Pass
		40	19.78		
		48	19.82		
802.11n(HT20)	U-NII 1	36	19.97		
		40	20.06		
		48	20.02		
802.11n(HT40)	U-NII 1	38	40.32		
		46	40.73		
802.11ac(HT20)	U-NII 1	36	20.07	N/A	Pass
		40	20.17		
		48	20.14		
802.11ac(HT40)	U-NII 1	38	40.29		
		46	40.23		
802.11ac(HT80)	U-NII 1	42	80.93		

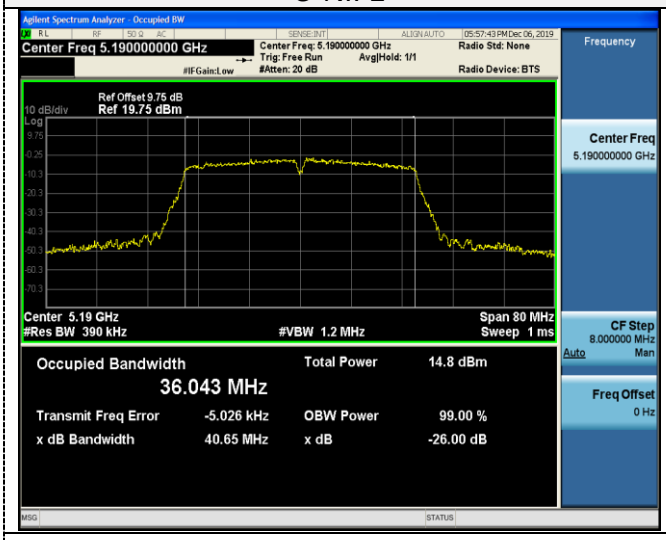
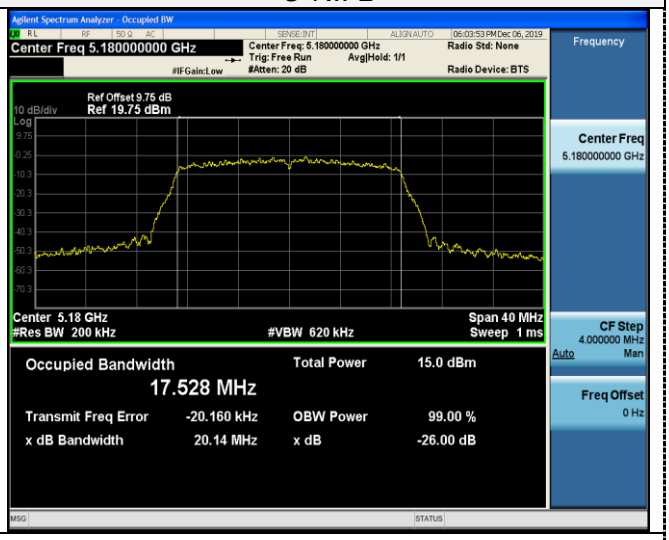
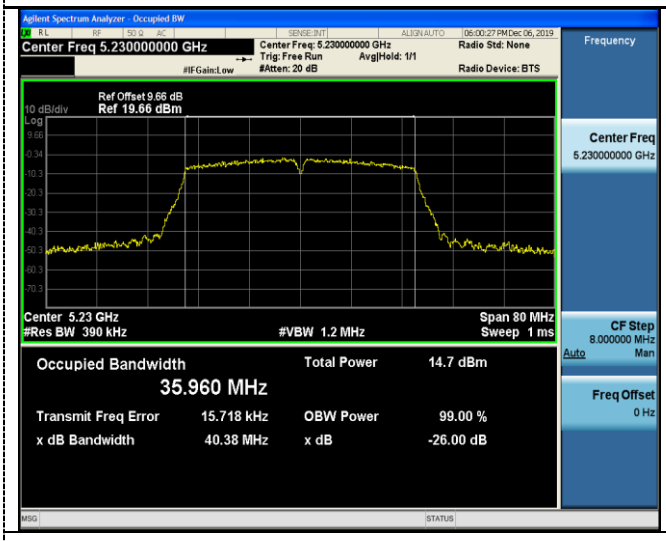
Note:

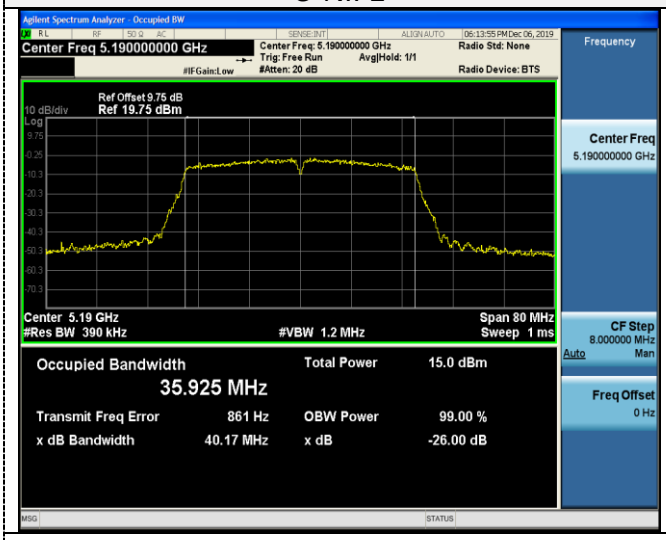
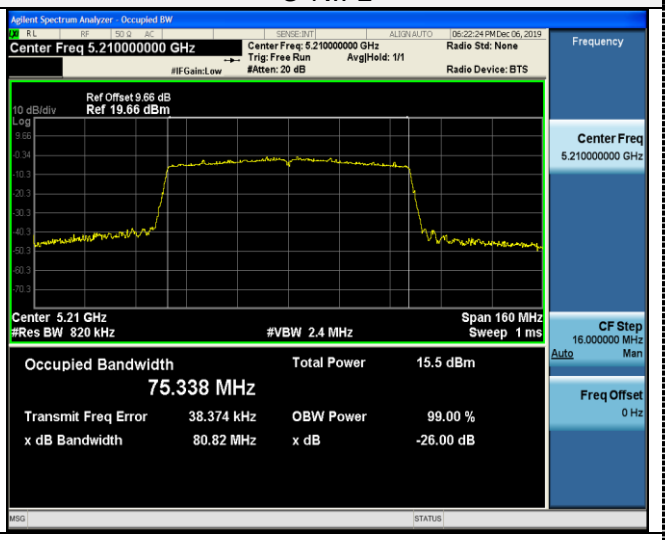
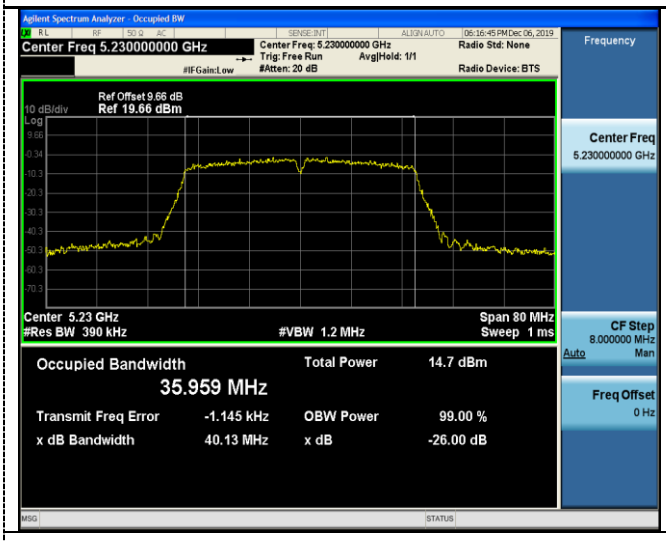
1. *Measured 26dB bandwidth at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20 ,IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*

Please refer to following test plots;

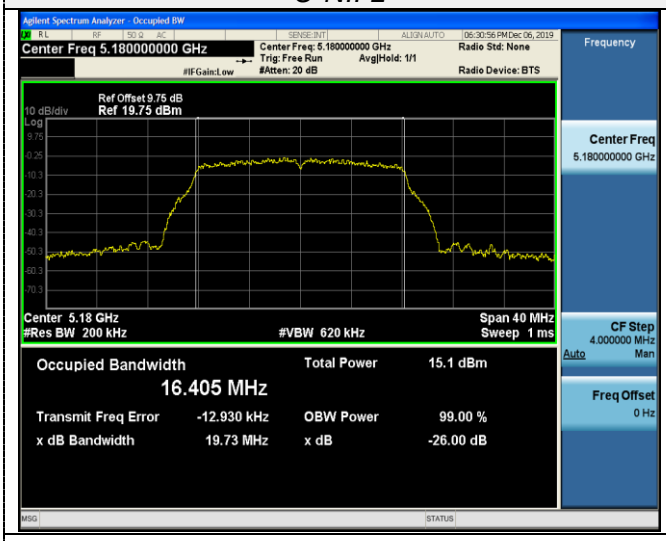
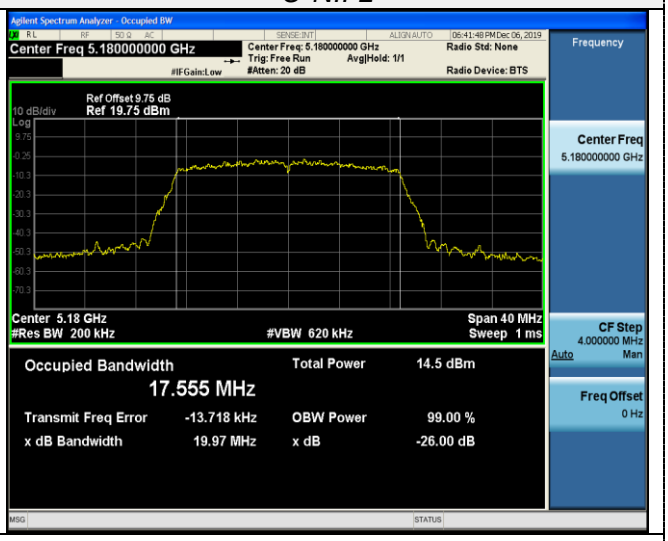
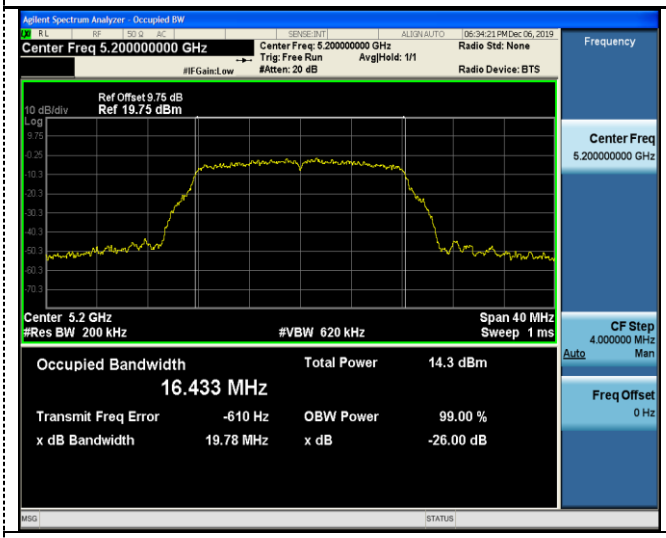
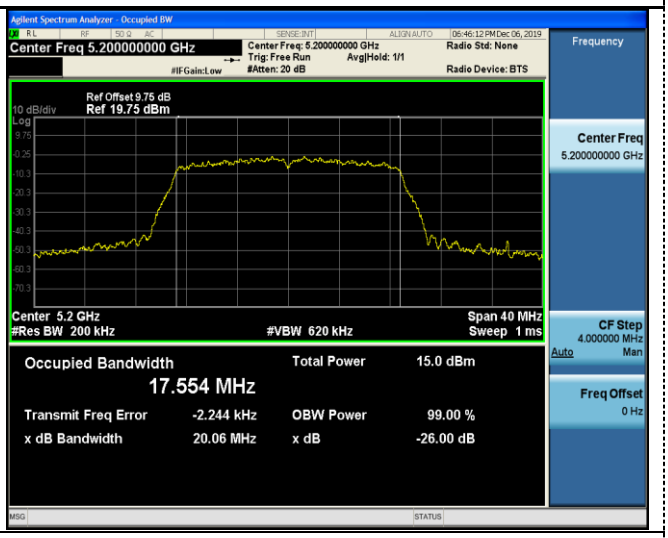
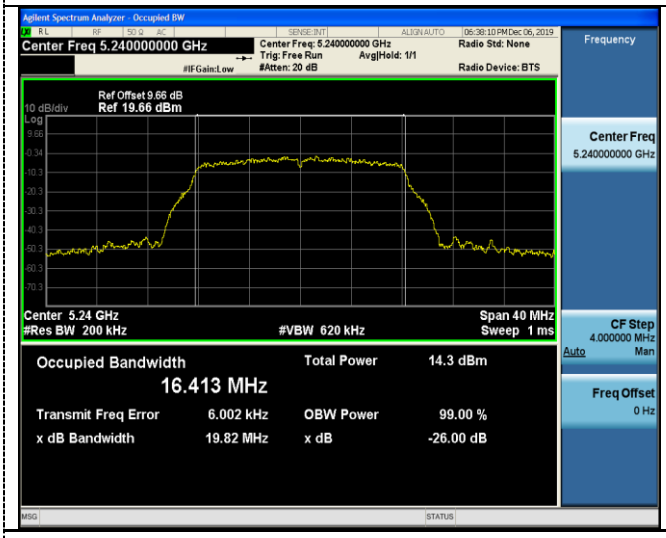
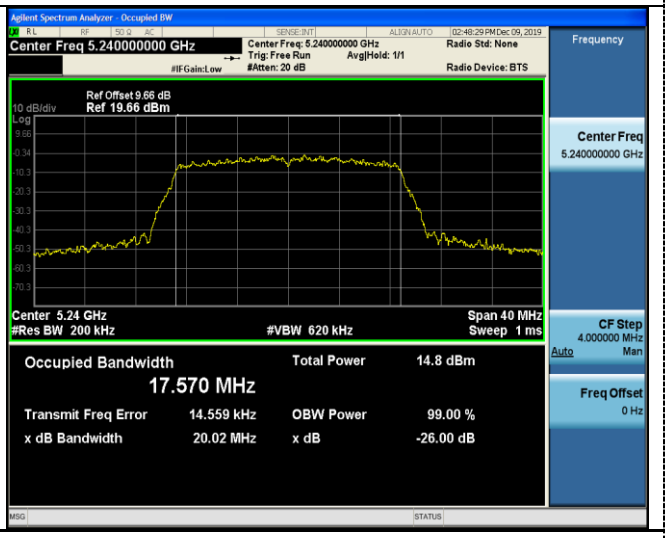
For ANT1:

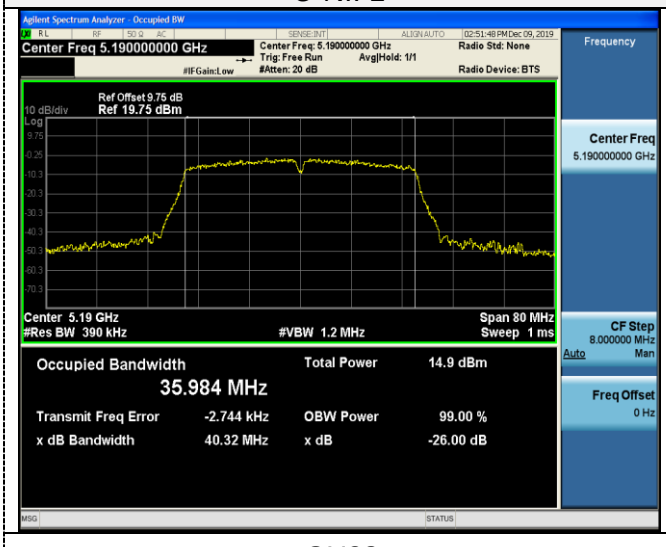
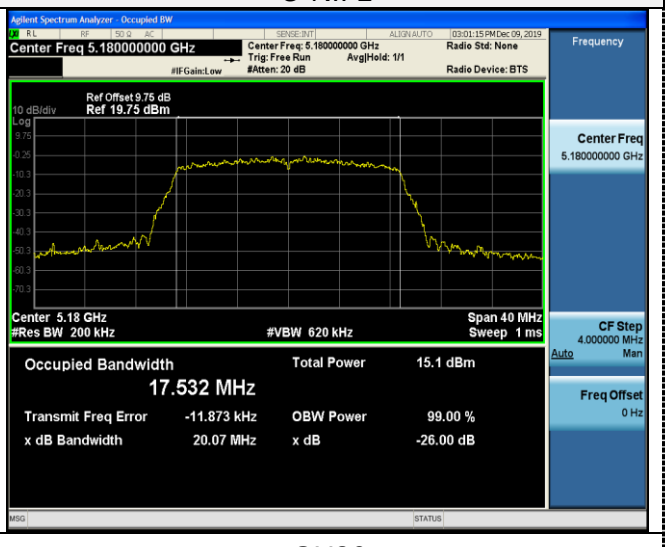
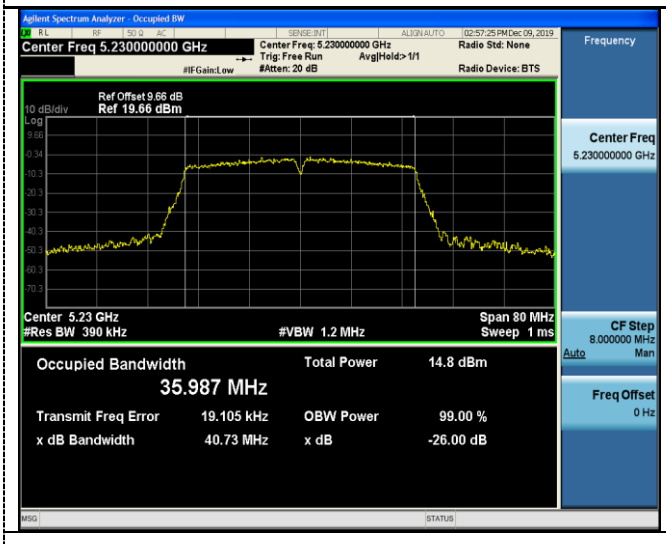
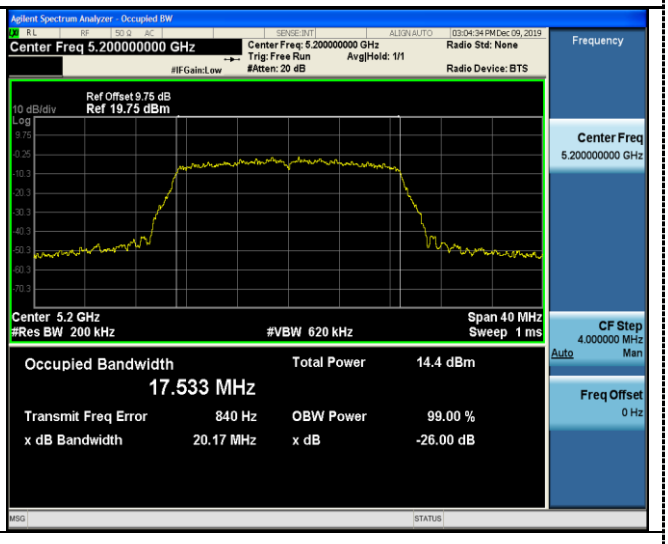
802.11a	*802.11n(HT20)*
U-NII 1	*U-NII 1*
	
CH36	*CH36*
	
CH40	*CH40*
	
CH48	*CH48*

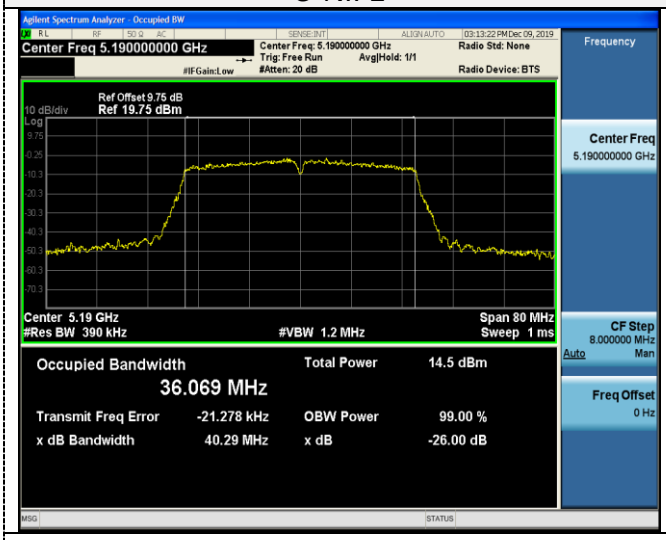
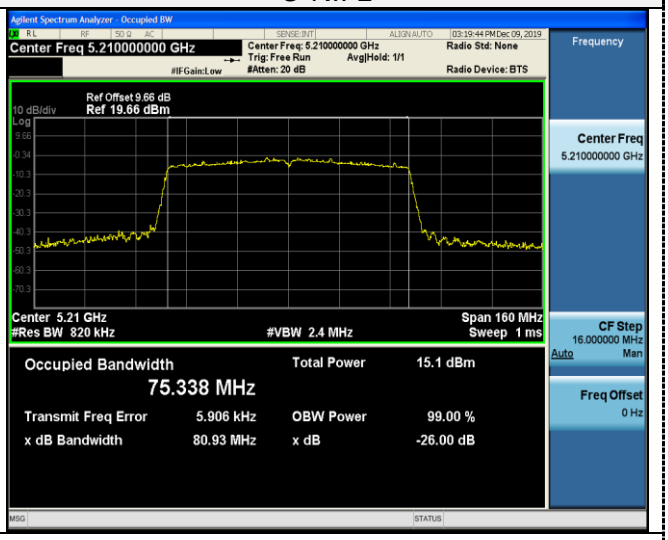
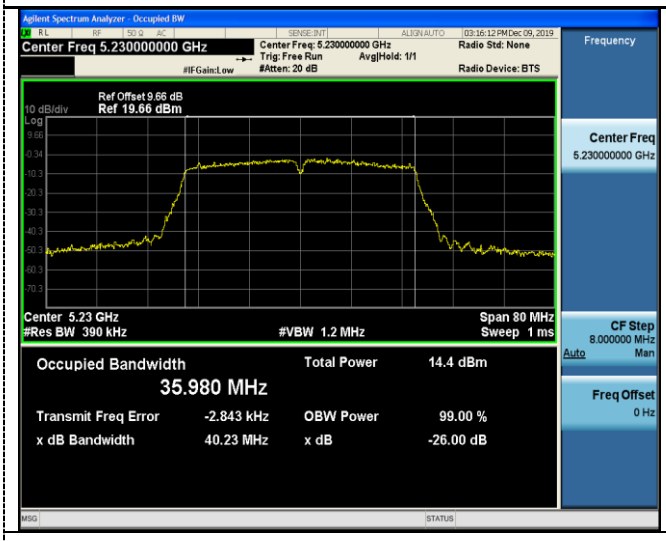
802.11n(HT40)	802.11ac(HT20)
U-NII 1	U-NII 1
	
CH38	CH36
	
CH46	CH40
	CH48

802.11ac(HT40)	802.11ac(HT80)
U-NII 1	U-NII 1
	
CH38	CH42
	
CH46	

For ANT2:

802.11a	802.11n(HT20)
U-NII 1	U-NII 1
	
CH36	CH36
	
CH40	CH40
	
CH48	CH48

802.11n(HT40)	802.11ac(HT20)
U-NII 1	U-NII 1
	
CH38	CH36
	
CH46	CH40
	CH48

802.11ac(HT40)	802.11ac(HT80)
U-NII 1	U-NII 1
	
CH38	CH42
	
CH46	

3.6. Minimum Emission Bandwidth (6dBm Bandwidth)

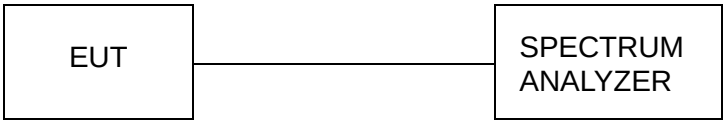
Limit

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

For ANT1:

Type	Bands	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	U-NII 3	149	15.17	≥500KHz	Pass
		157	15.07		
		165	15.18		
802.11n(HT20)	U-NII 3	149	15.02		
		157	15.46		
		165	15.16		
802.11n(HT40)	U-NII 3	151	35.14		
		159	35.19		
802.11ac(HT20)	U-NII 3	149	15.00		
		157	15.16		
		165	13.91		
802.11ac(HT40)	U-NII 3	151	35.14		
		159	35.16		
802.11ac(HT80)	U-NII 3	155	75.34		

For ANT2:

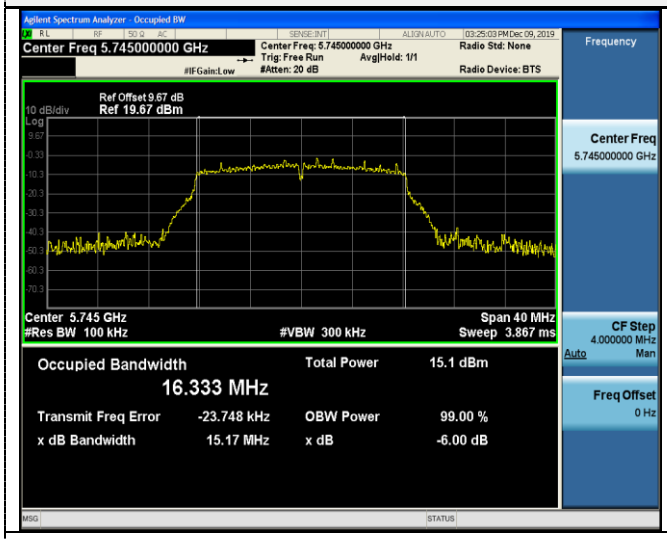
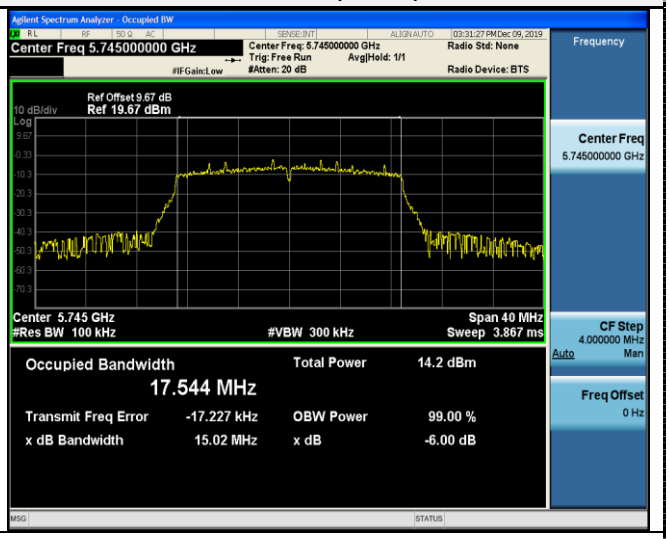
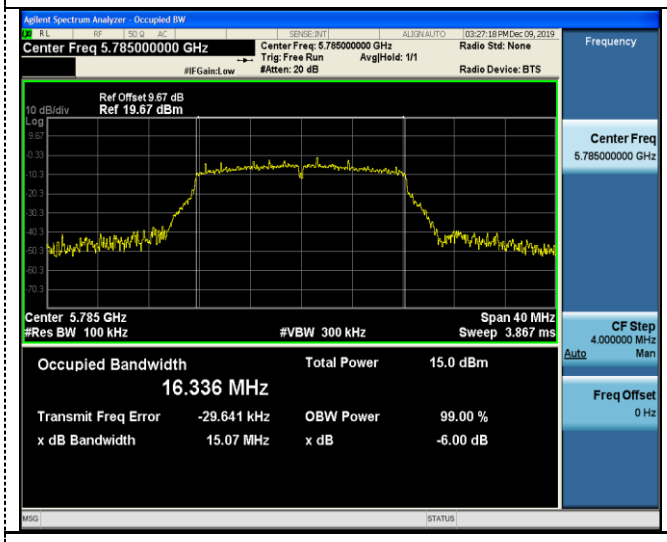
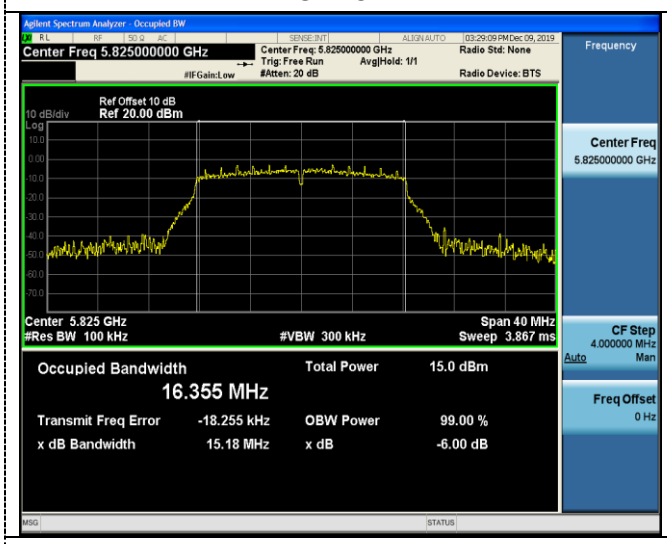
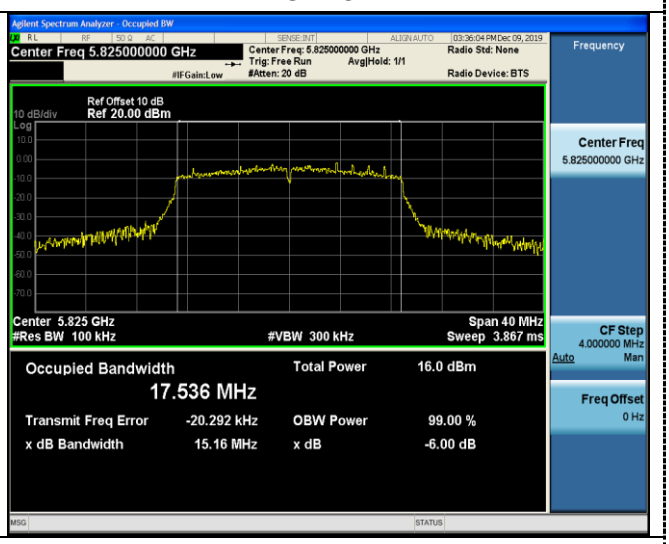
Type	Bands	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	U-NII 3	149	14.24	≥500KHz	Pass
		157	15.02		
		165	15.11		
802.11n(HT20)	U-NII 3	149	15.07		
		157	15.12		
		165	15.10		
802.11n(HT40)	U-NII 3	151	35.16		
		159	35.19		
802.11ac(HT20)	U-NII 3	149	15.09		
		157	15.13		
		165	13.89		
802.11ac(HT40)	U-NII 3	151	35.19		
		159	35.15		
802.11ac(HT80)	U-NII 3	155	75.29		

Note:

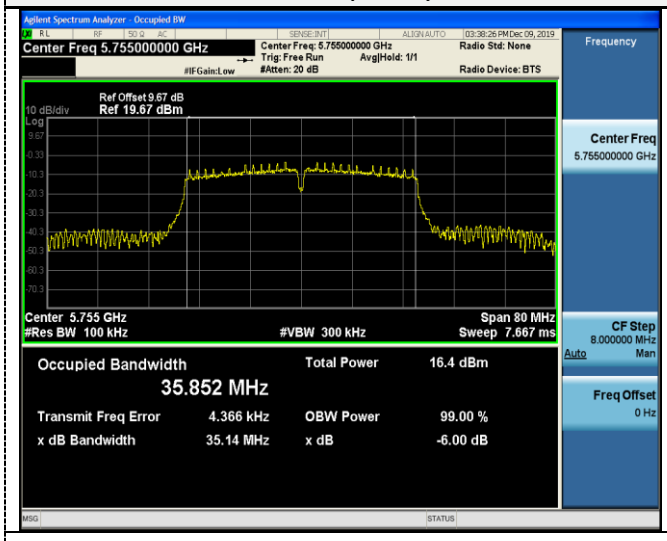
1. *Measured 26dB bandwidth at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20 ,IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*

Please refer to following test plots;

For ANT1:

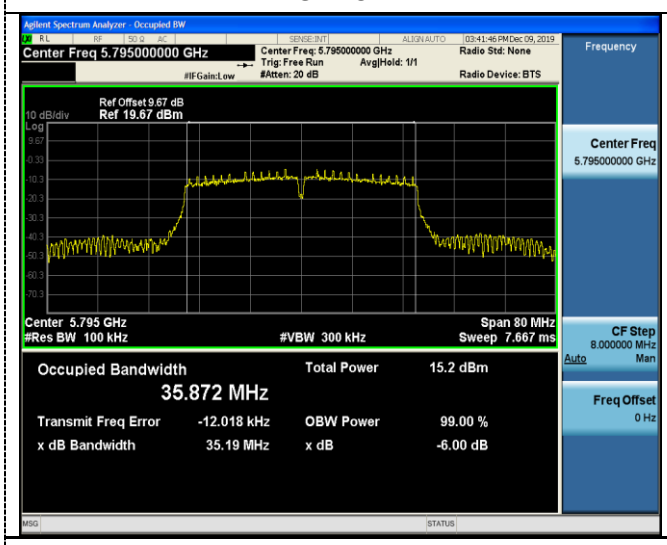
802.11a	*802.11n(HT20)*
	
CH149	*CH149*
	
CH157	*CH157*
	
CH165	*CH165*

802.11n(HT40)

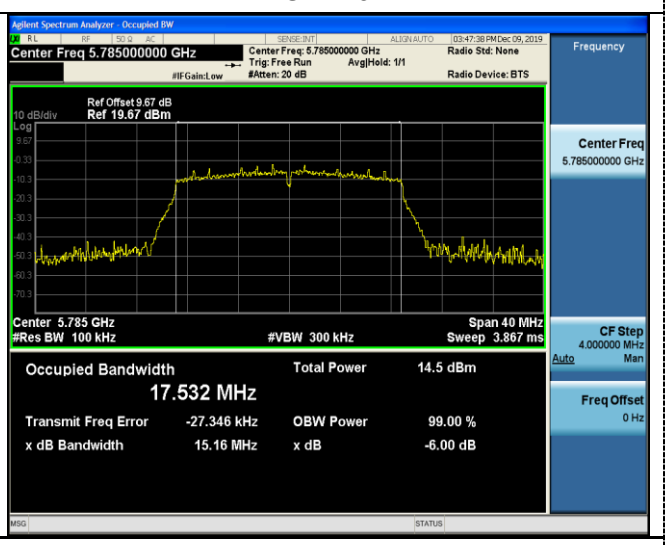


802.11ac(HT20)

CH151

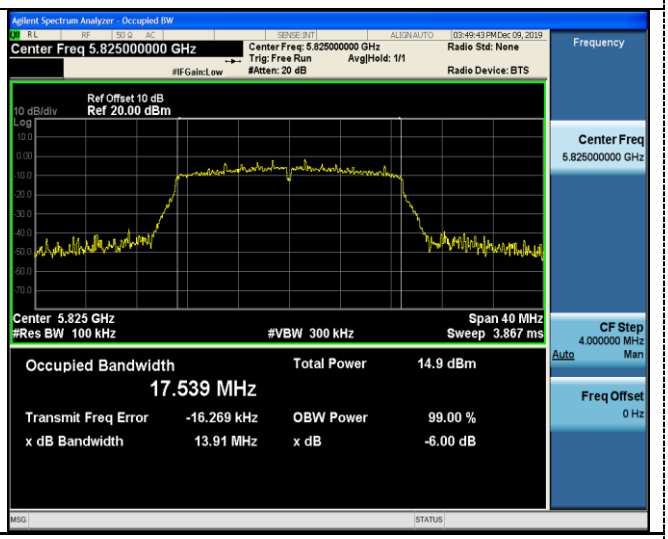


CH149



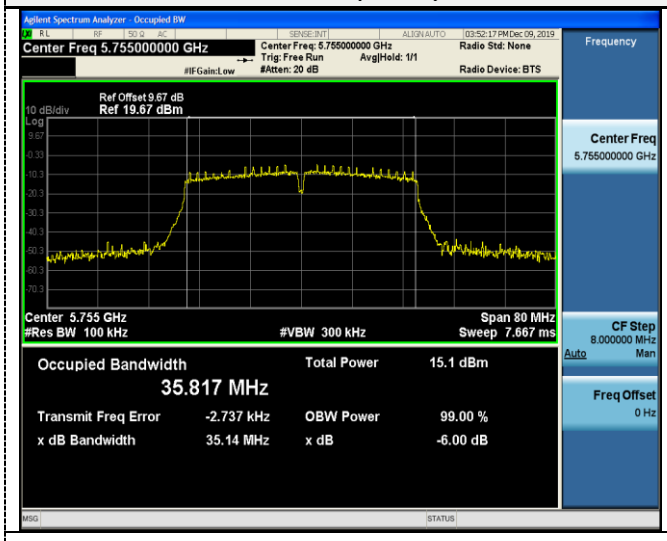
CH159

CH157



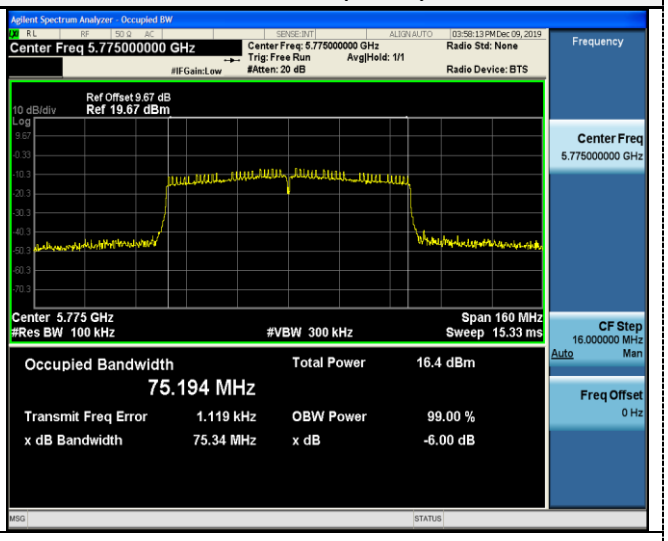
CH165

802.11ac(HT40)

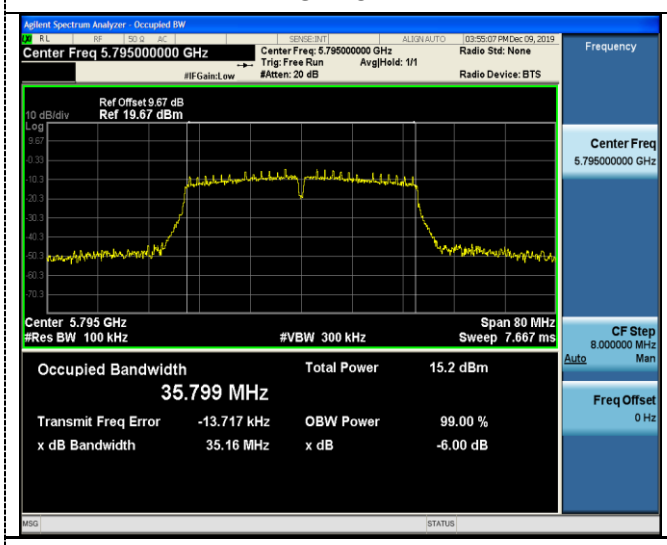


CH151

802.11ac(HT80)

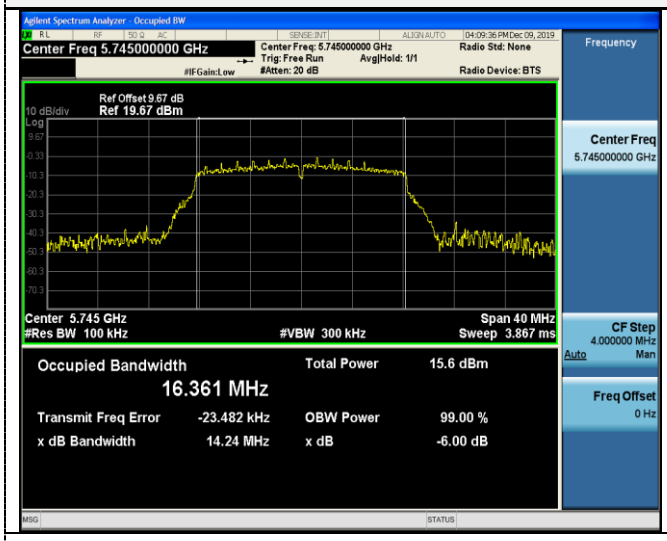
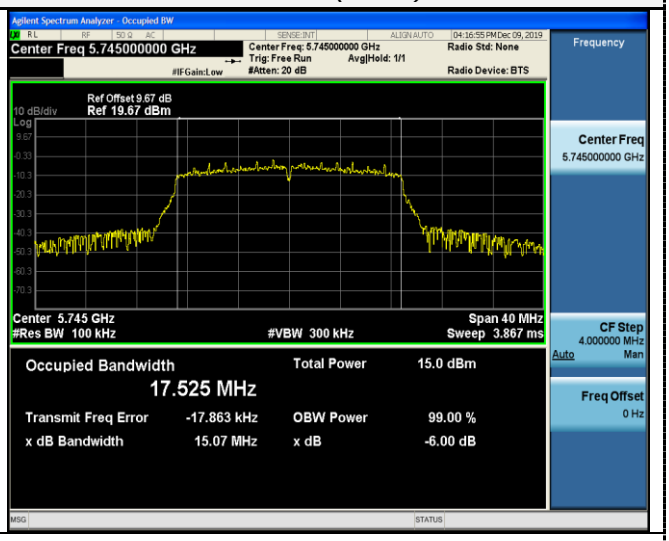
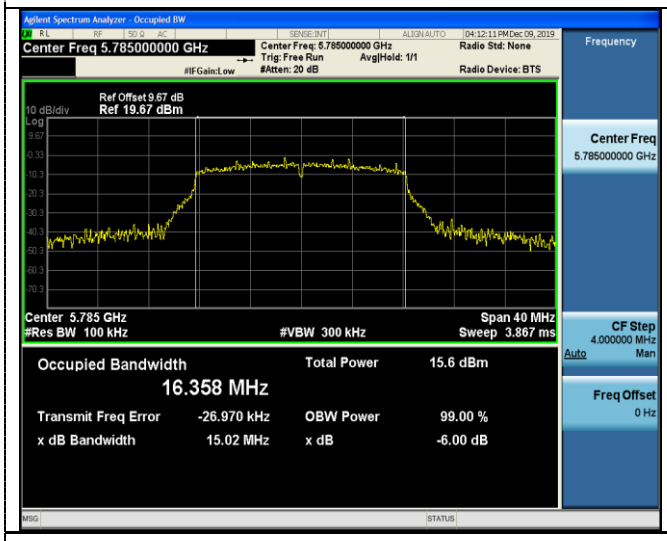


CH155

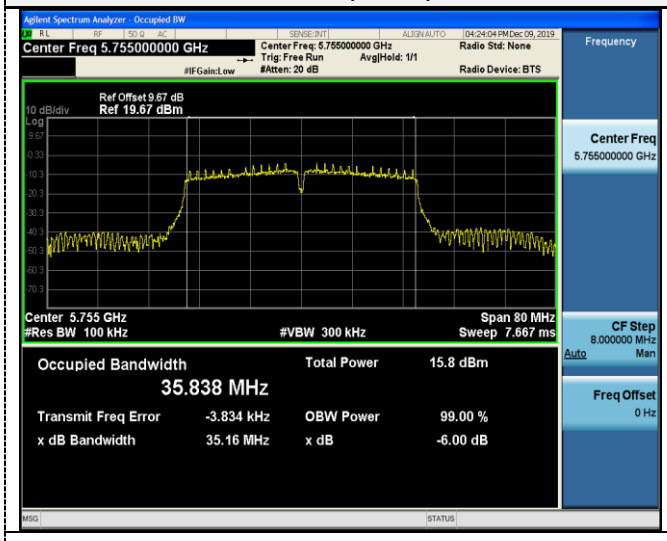


CH159

For ANT2:

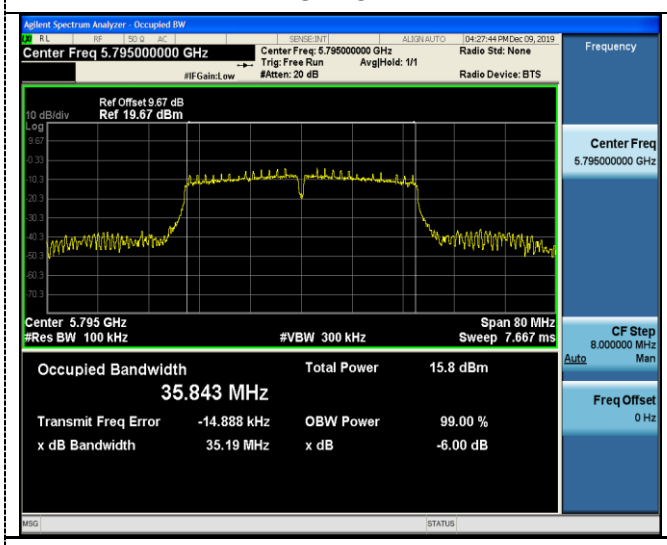
802.11a	*802.11n(HT20)*
	
CH149	*CH149*
	
CH157	*CH157*
CH165	*CH165*

802.11n(HT40)

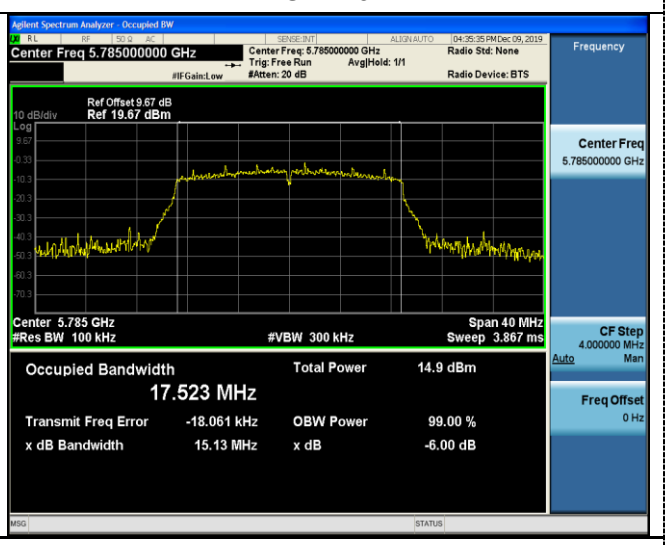


802.11ac(HT20)

CH151

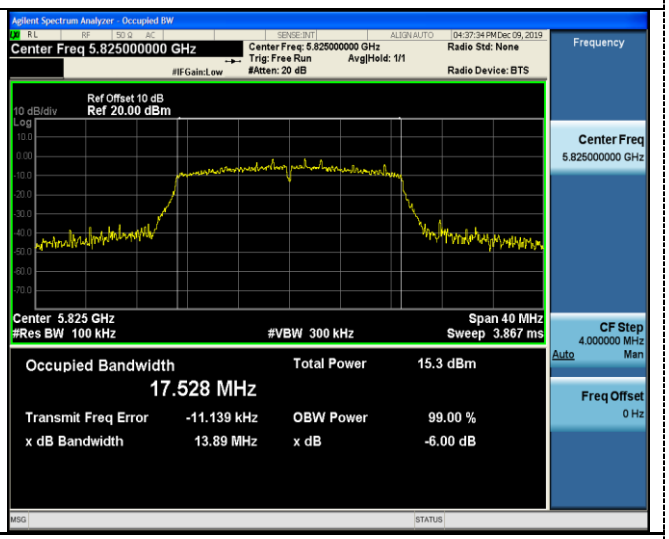


CH149



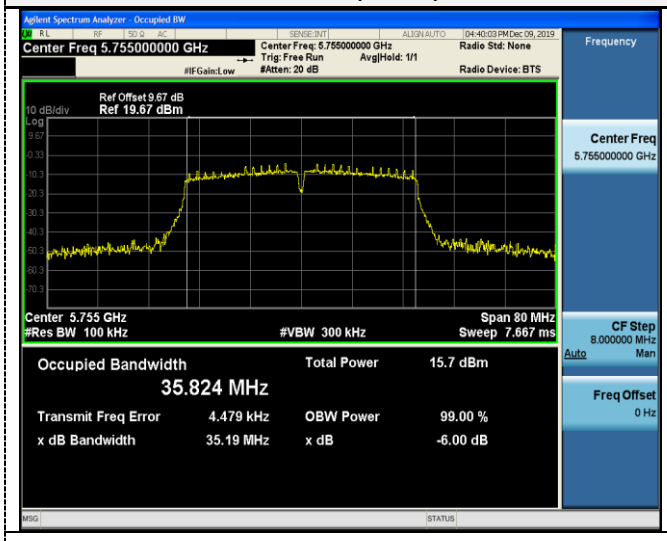
CH159

CH157



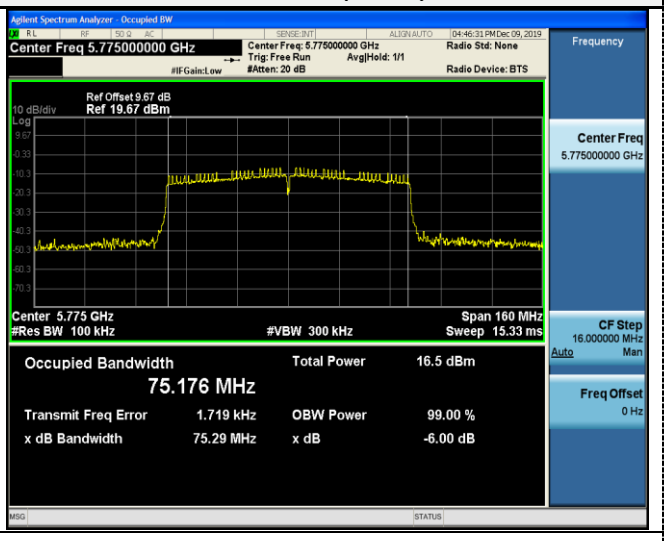
CH165

802.11ac(HT40)

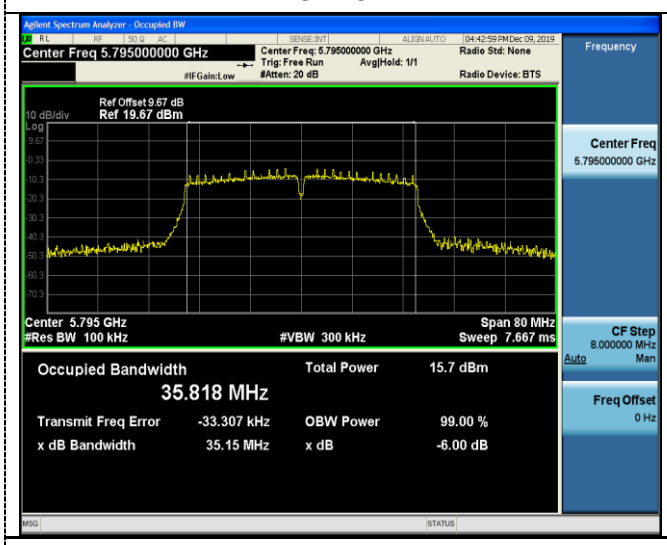


CH151

802.11ac(HT80)



CH155



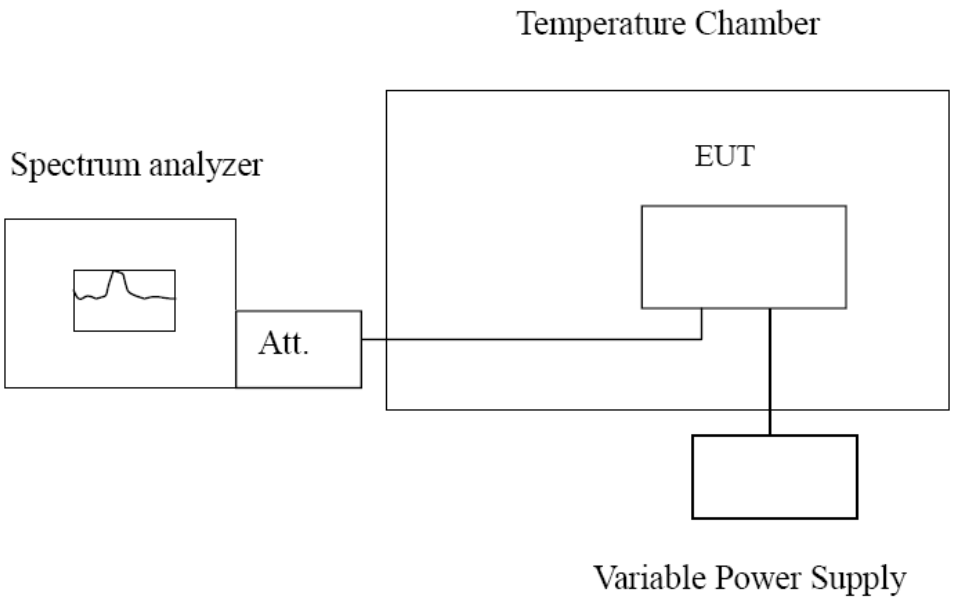
CH159

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:

For ANT1:

Reference Frequency: 802.11ac channel=36 frequency=5180MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
230	-30	690	0.133	Within the band of operation	Pass
	-20	502	0.097		
	-10	346	0.067		
	0	204	0.039		
	10	312	0.060		
	20	104	0.020		
	30	130	0.025		
	40	420	0.081		
	50	713	0.138		
240	25	898	0.173		
207	25	734	0.142		

Reference Frequency: 802.11ac channel=149 frequency=5745MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
230	-30	645	0.112	Within the band of operation	Pass
	-20	714	0.124		
	-10	508	0.088		
	0	320	0.056		
	10	223	0.039		
	20	127	0.022		
	30	149	0.026		
	40	325	0.057		
	50	740	0.129		
240	25	711	0.124		
207	25	726	0.126		

For ANT2:

Reference Frequency: 802.11ac channel=36 frequency=5180MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
230	-30	562	0.108	Within the band of operation	Pass
	-20	547	0.106		
	-10	429	0.083		
	0	372	0.072		
	10	408	0.079		
	20	583	0.113		
	30	429	0.083		
	40	518	0.100		
	50	633	0.122		
240	25	802	0.155		
207	25	699	0.133		

Reference Frequency: 802.11ac channel=149 frequency=5745MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
230	-30	642	0.112	Within the band of operation	Pass
	-20	752	0.131		
	-10	511	0.089		
	0	492	0.086		
	10	274	0.048		
	20	151	0.026		
	30	133	0.023		
	40	392	0.068		
	50	692	0.120		
240	25	699	0.122		
207	25	727	0.127		

3.8. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

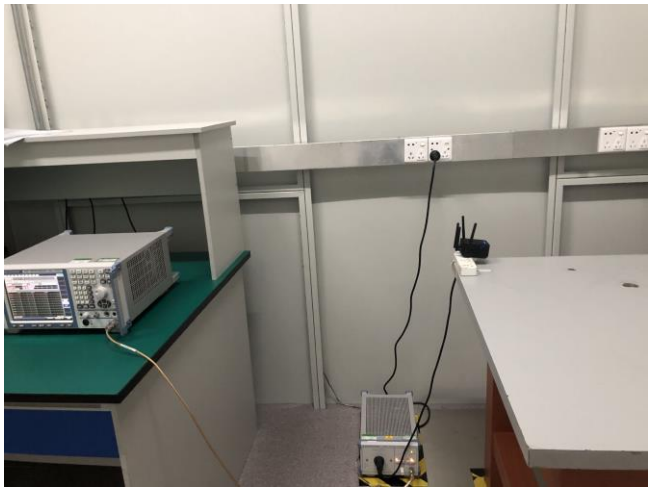
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may d

esign the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

Test Result:

Use External antennas connect to PCB Boards, The maximum gain of each antenna was 2.00dBi for 5G WIFI, Maximum directional gain is 5.01dBi.

4. Test Setup Photos of the EUT



5. The Photos of the EUT

External photos

Please refer to separated files for External Photos of the EUT.

Internal photos

Please refer to separated files for Internal Photos of the EUT.

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