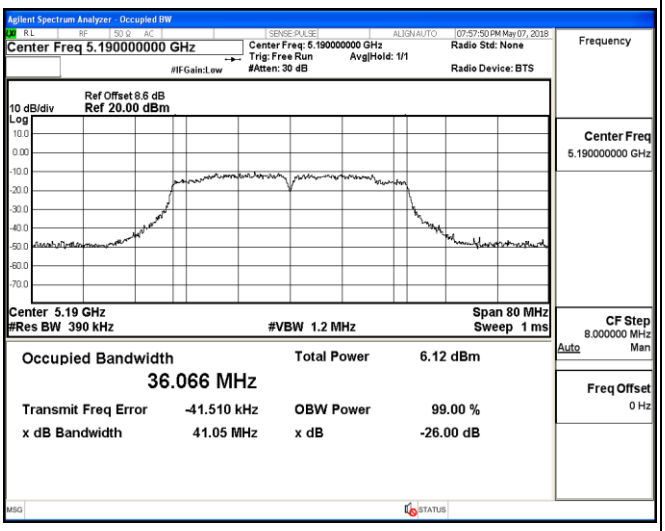
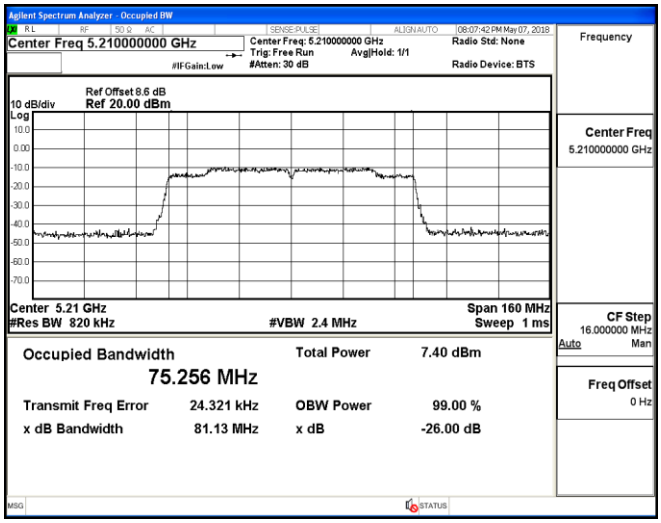
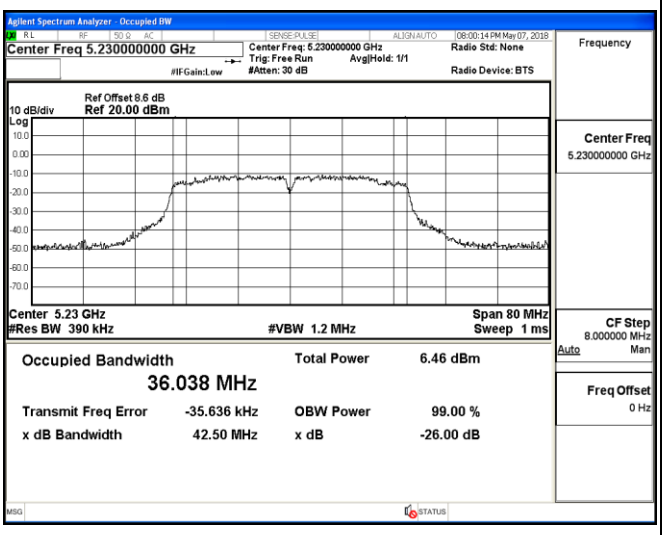
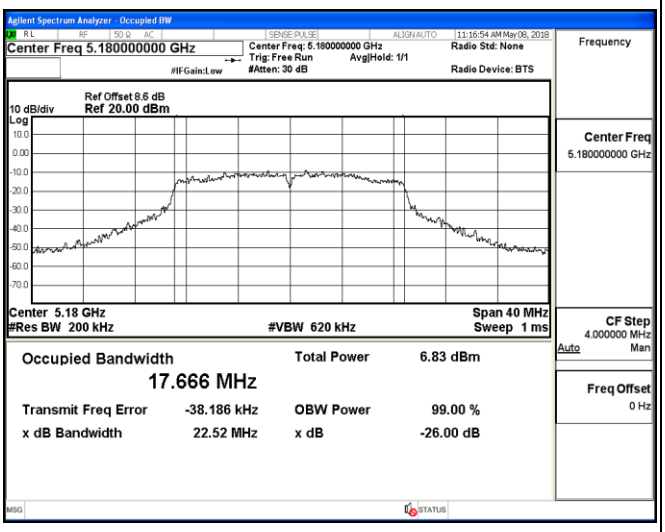
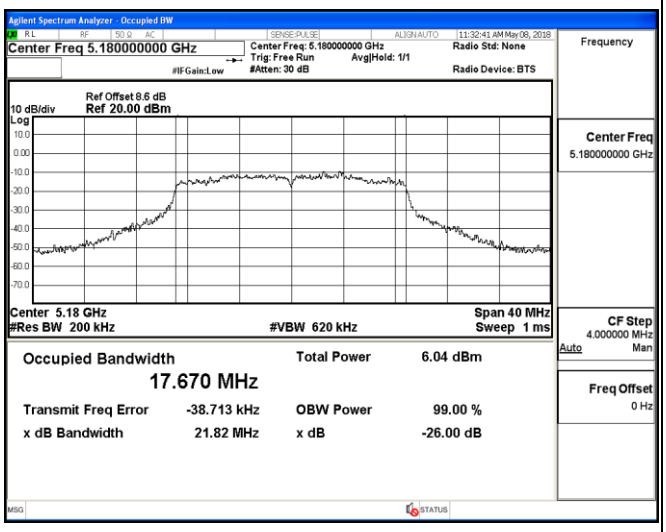
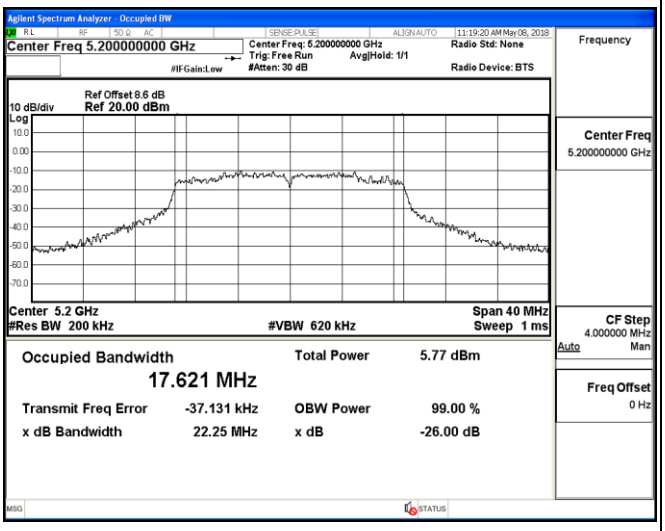
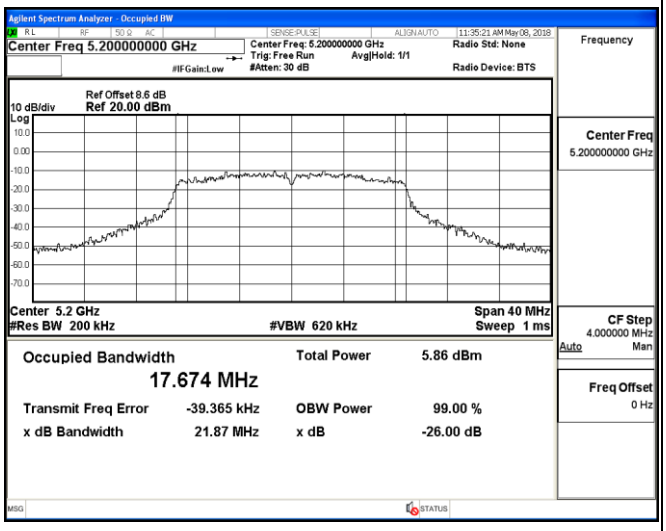
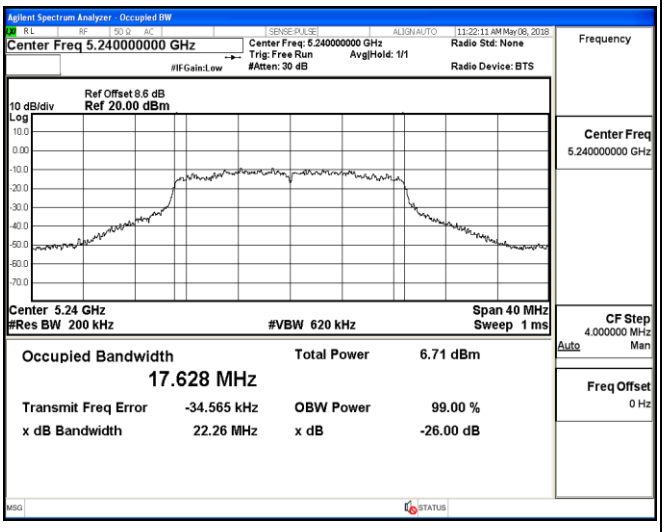
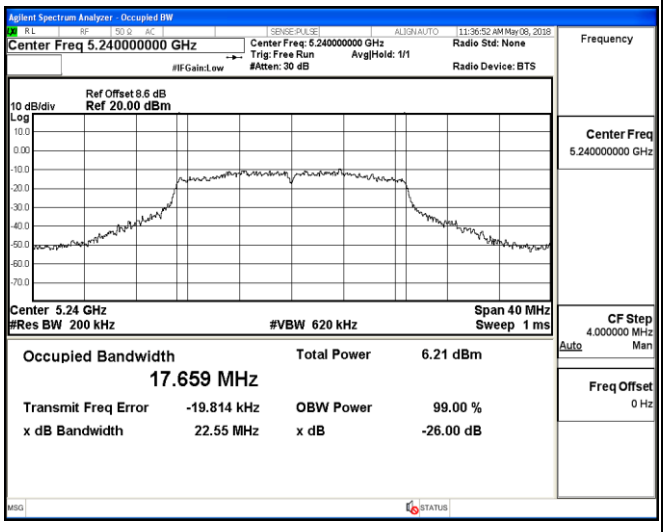
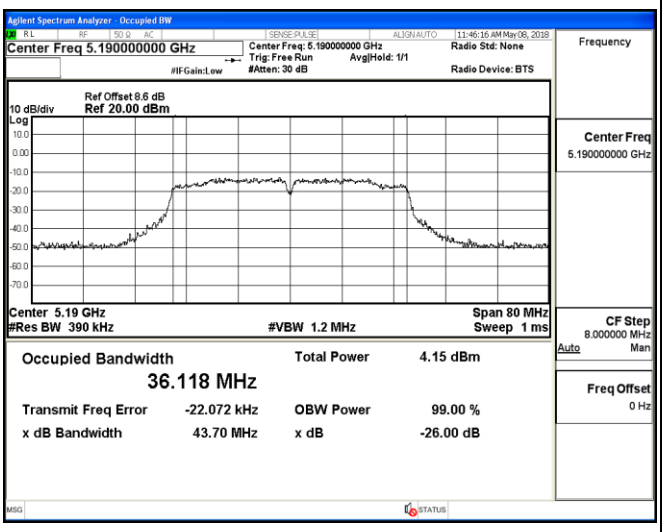
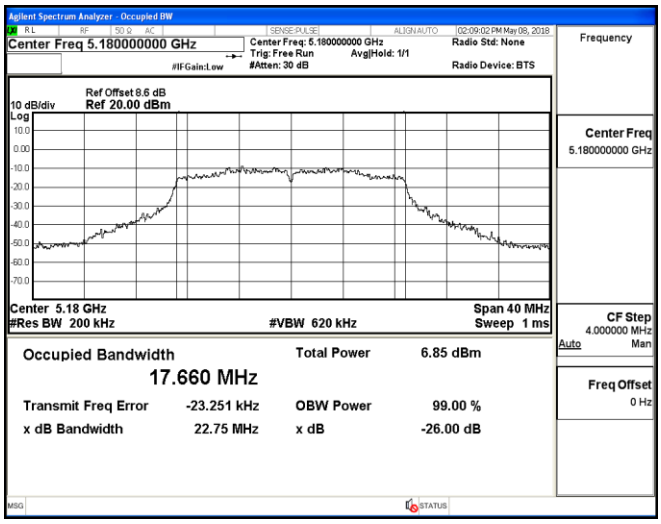
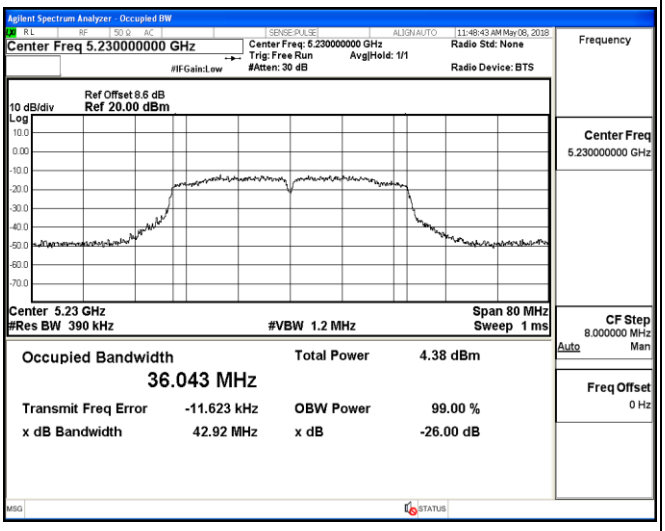
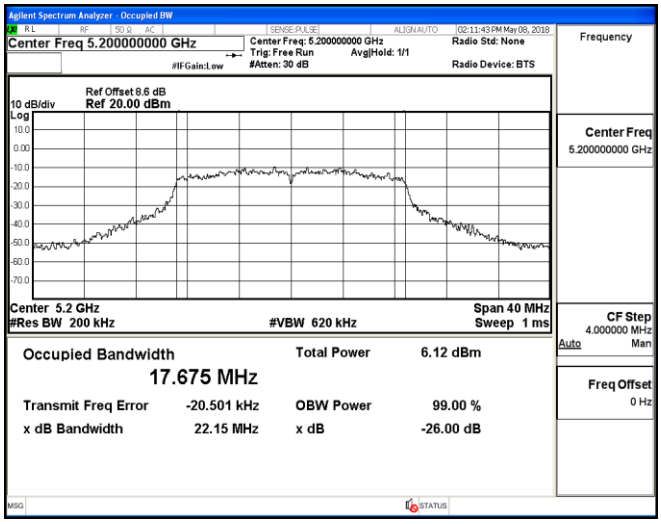
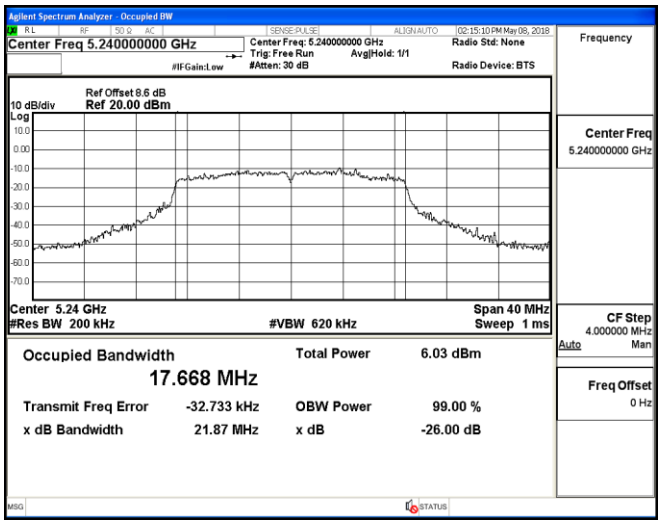
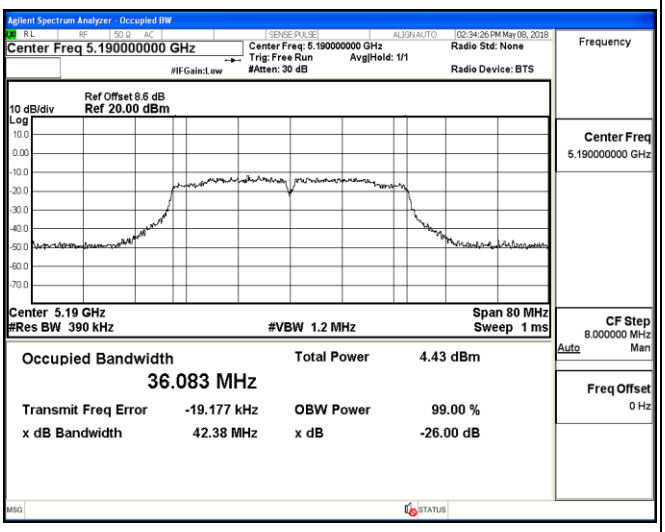
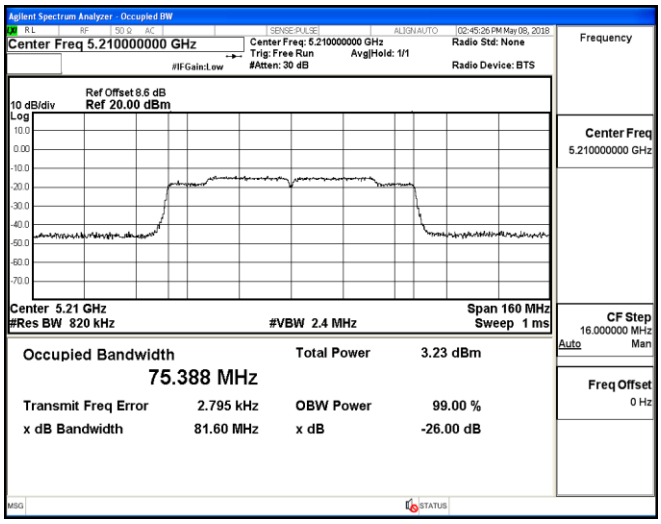
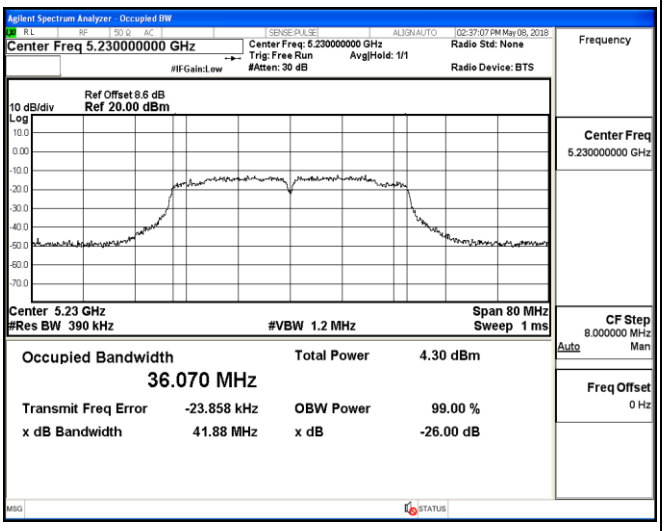
99% and 26dB Occupied Bandwidth-ant 0	
IEEE 802.11ac VHT40	IEEE 802.11ac VHT80
	
Channel 38 / 5190 MHz	Channel 42 / 5210 MHz
	
Channel 46 / 5230 MHz	

99% and 26dB Occupied Bandwidth-ant 1

IEEE 802.11a	IEEE 802.11n HT20
	
Channel 36 / 5180 MHz	Channel 36 / 5180 MHz
	
Channel 40 / 5200 MHz	Channel 40 / 5200 MHz
	
Channel 48 / 5240 MHz	Channel 48 / 5240 MHz

99% and 26dB Occupied Bandwidth-ant 1	
IEEE 802.11n HT40	IEEE 802.11ac VHT20
	
Channel 38 / 5190 MHz	Channel 36 / 5180 MHz
	
Channel 46 / 5230 MHz	Channel 40 / 5200 MHz
	
	Channel 48 / 5240 MHz

99% and 26dB Occupied Bandwidth-ant 1	
IEEE 802.11ac VHT40	IEEE 802.11ac VHT80
	
Channel 38 / 5190 MHz	Channel 42 / 5210 MHz
	
Channel 46 / 5230 MHz	

5.5. 6dB Occupied Bandwidth Measurement

5.5.1. Standard Applicable

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

5.5.2. Measuring Instruments and Setting

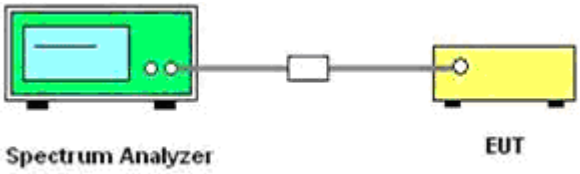
Please refer to equipment list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span	> 26dB Bandwidth
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.5.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 KHz and the video bandwidth of 300 KHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

5.5.4. Test Setup Layout



5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

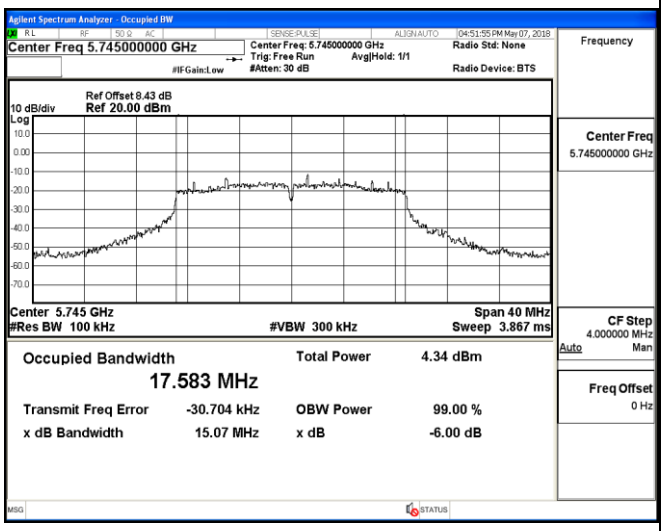
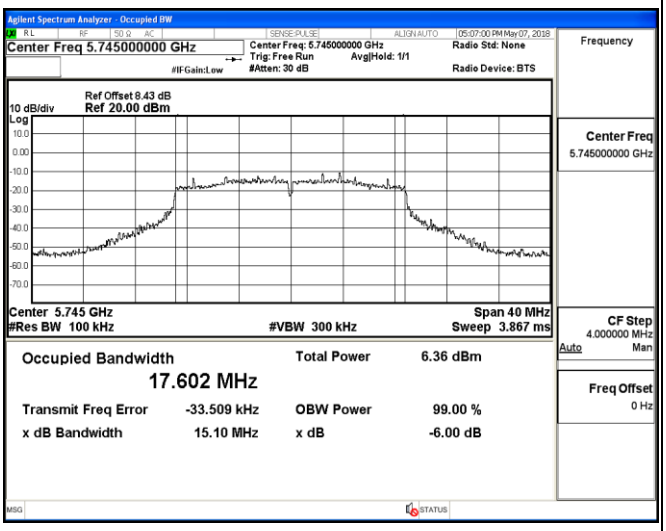
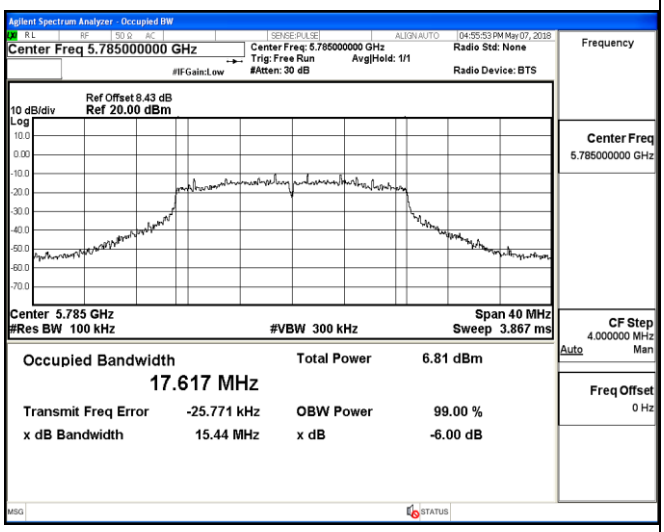
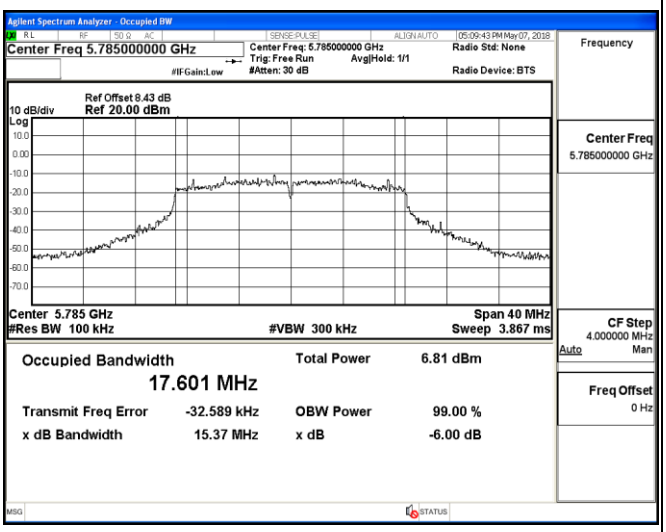
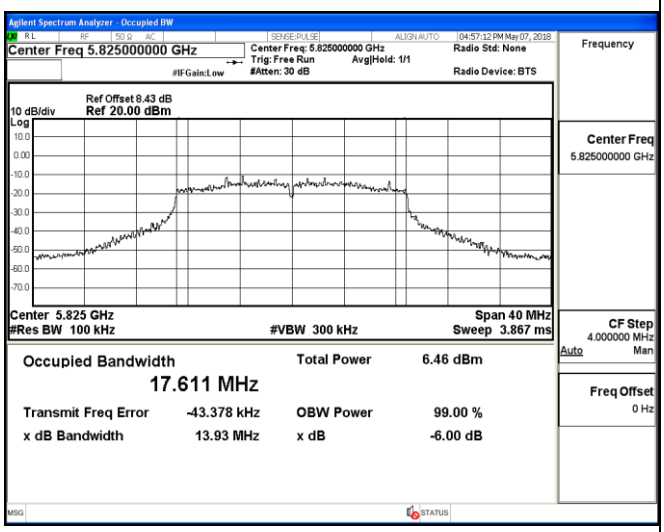
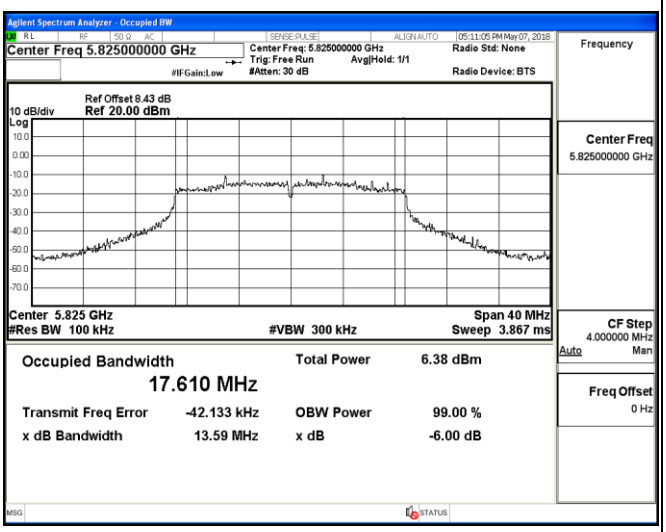
5.5.6. Test Result of 6dB Occupied Bandwidth

5.5.6.1 UNII Band 3

Test Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Limits (MHz)	Verdict
			Chain0	Chain1		
IEEE 802.11a	149	5745	15.07	15.13	≥0.500	Complies
	157	5785	15.44	16.32		
	163	5825	13.93	15.10		
IEEE 802.11n HT20	149	5745	15.10	13.41	≥0.500	Complies
	157	5785	15.37	15.15		
	163	5825	13.59	13.82		
IEEE 802.11n HT40	151	5755	35.18	33.86	≥0.500	Complies
	159	5795	32.69	35.18		
IEEE 802.11 ac VHT20	149	5745	13.02	14.75	≥0.500	Complies
	157	5785	16.67	17.18		
	165	5825	15.72	15.07		
IEEE 802.11 ac VHT40	151	5755	35.09	35.10	≥0.500	Complies
	159	5795	33.92	35.22		
IEEE 802.11 ac VHT80	155	5775	75.28	75.29	≥0.500	Complies

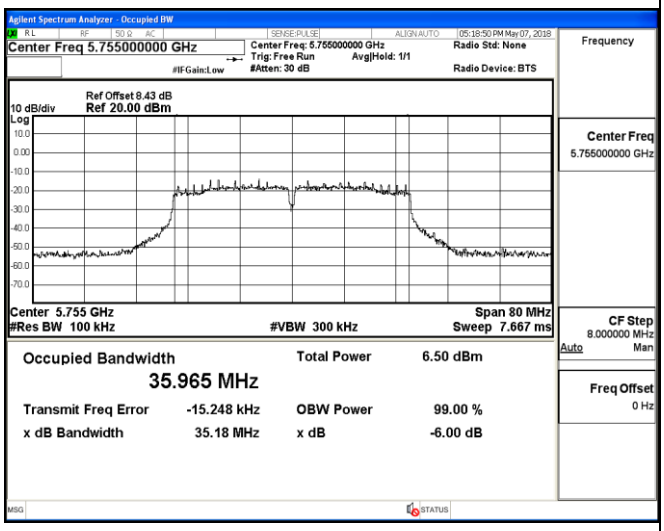
Remark:

1. *Measured 6dB 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, IEEE 802.11ac VHT80;*
4. *Please refer to following test plots;*

6dB Occupied Bandwidth-ant 0	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

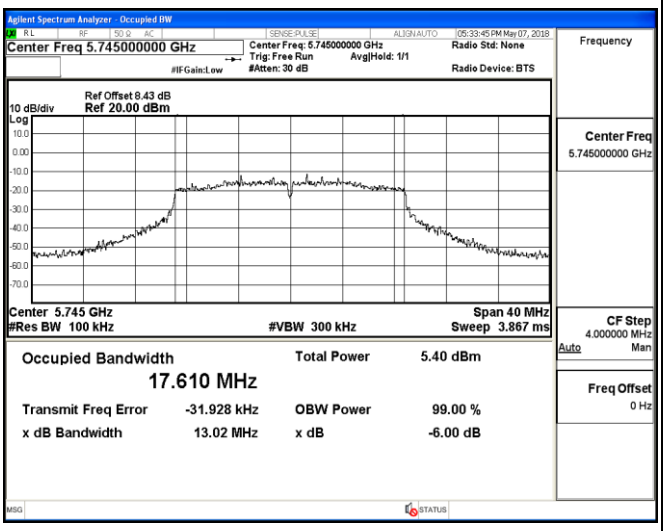
6dB Occupied Bandwidth-ant 0

IEEE 802.11n HT40

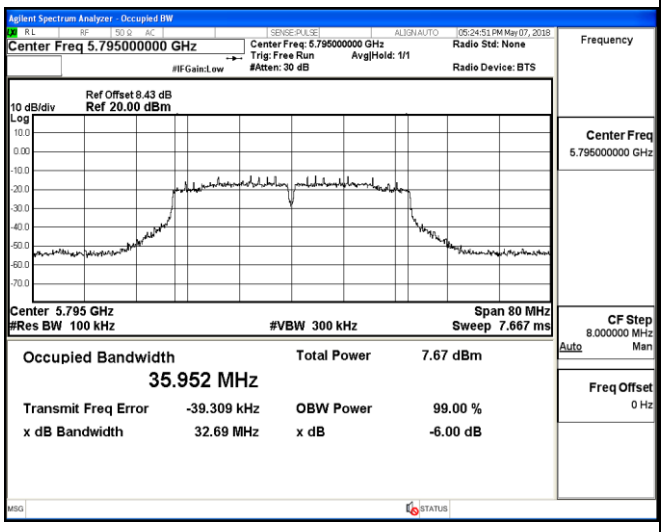


Channel 151 / 5755 MHz

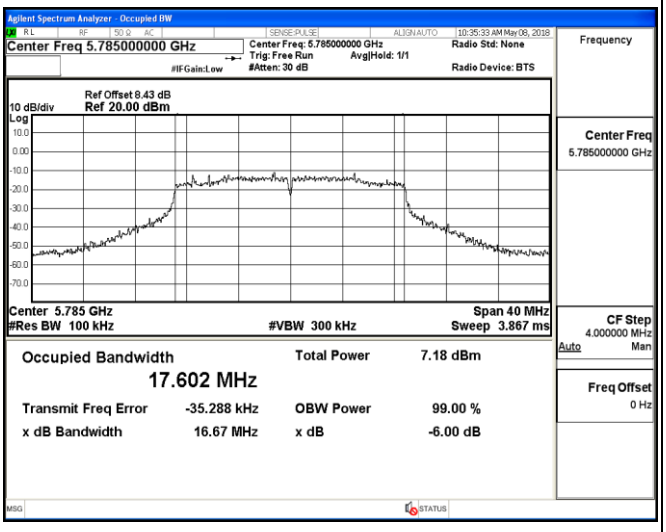
IEEE 802.11ac VHT20



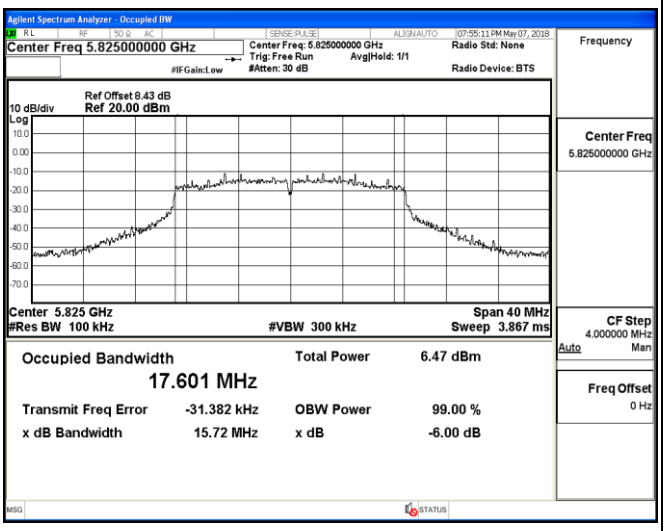
Channel 149 / 5745 MHz



Channel 159 / 5795 MHz



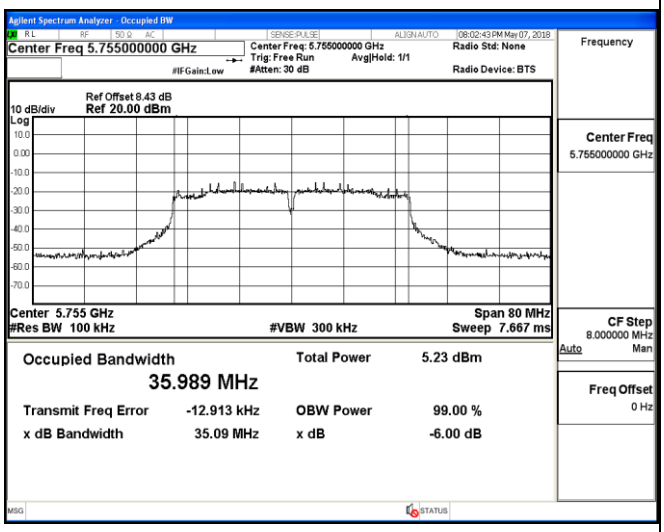
Channel 157 / 5785 MHz



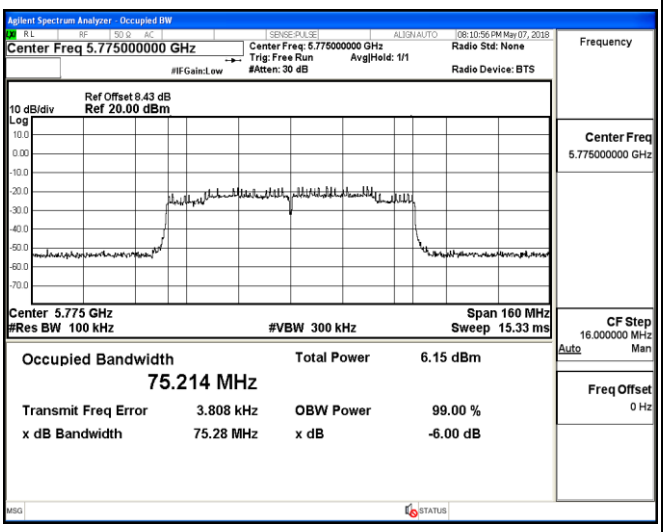
Channel 165 / 5825 MHz

6dB Occupied Bandwidth-ant 0

IEEE 802.11ac VHT40

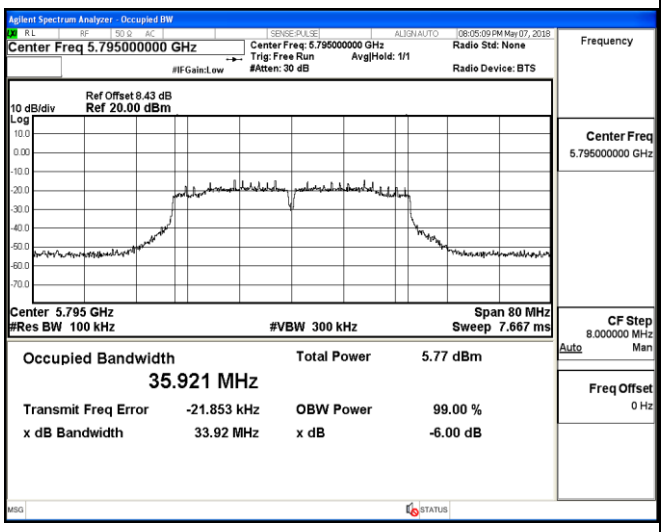


IEEE 802.11ac VHT80



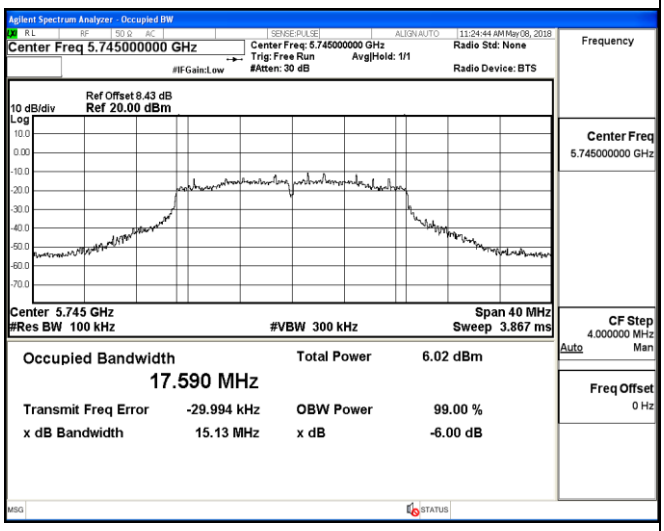
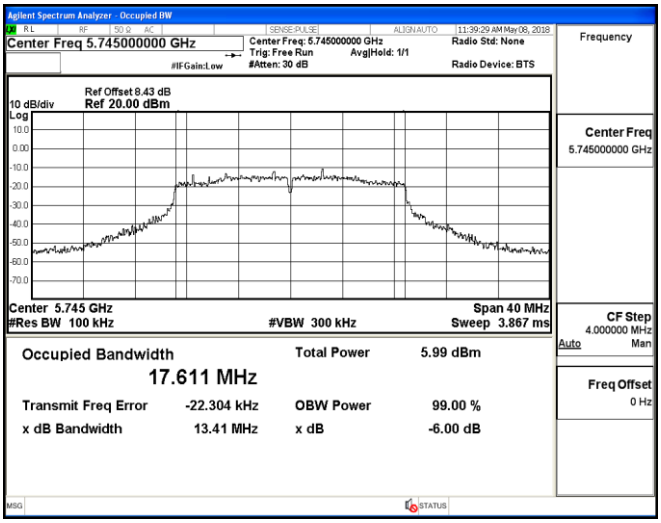
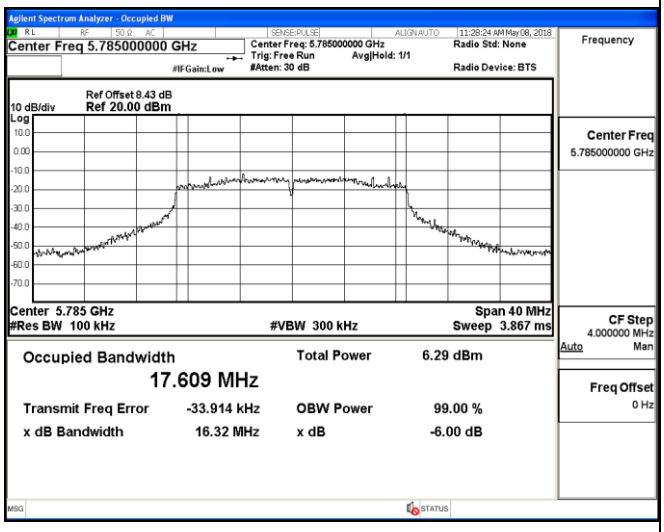
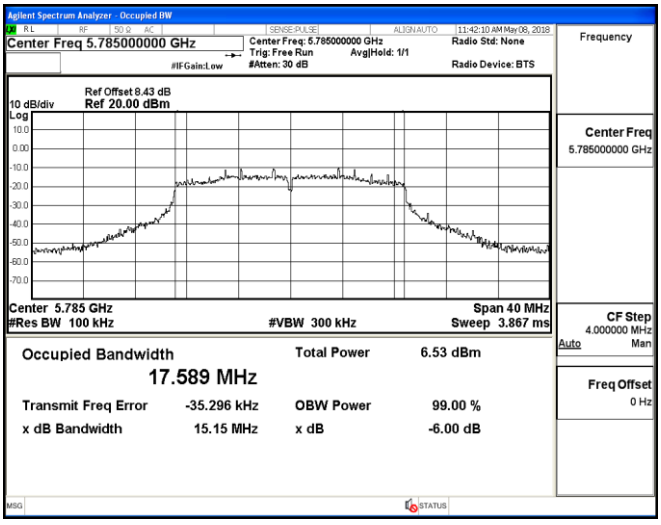
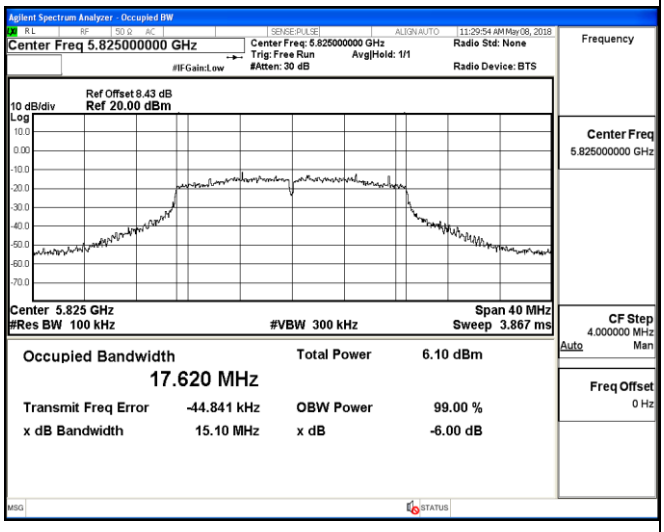
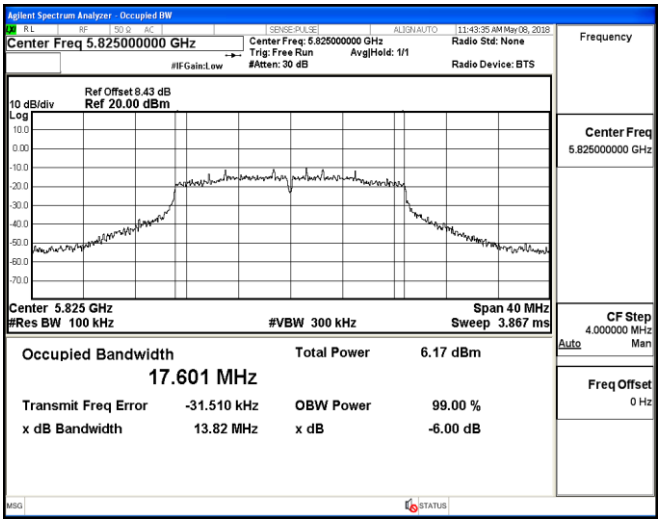
Channel 151 / 5755 MHz

Channel 155 / 5775 MHz



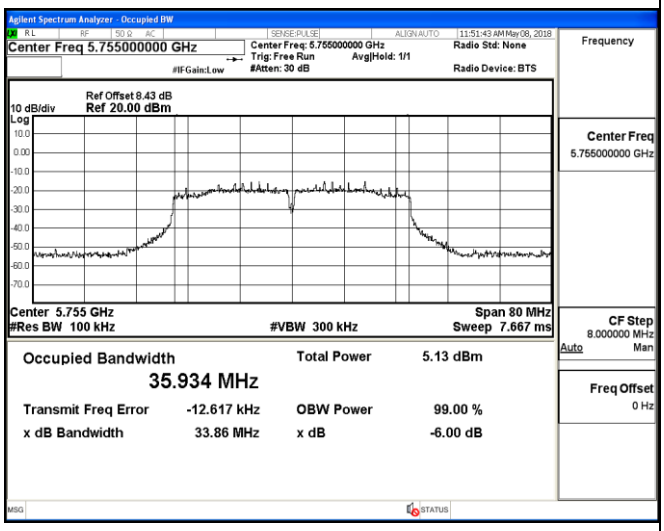
Channel 159 / 5795 MHz

6dB Occupied Bandwidth-ant 1

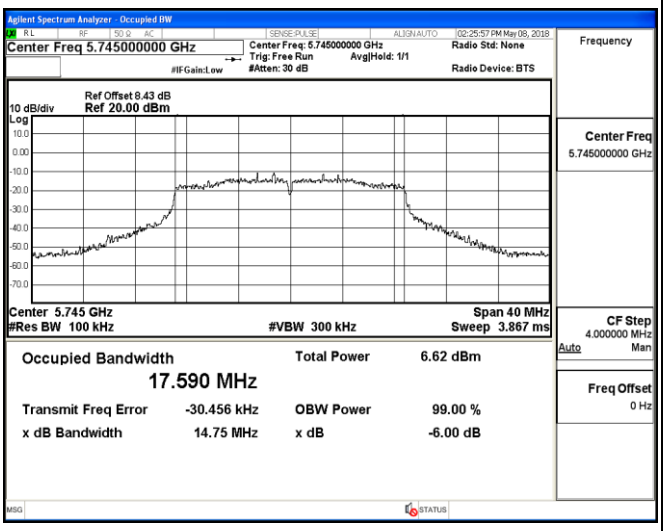
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

6dB Occupied Bandwidth-ant 1

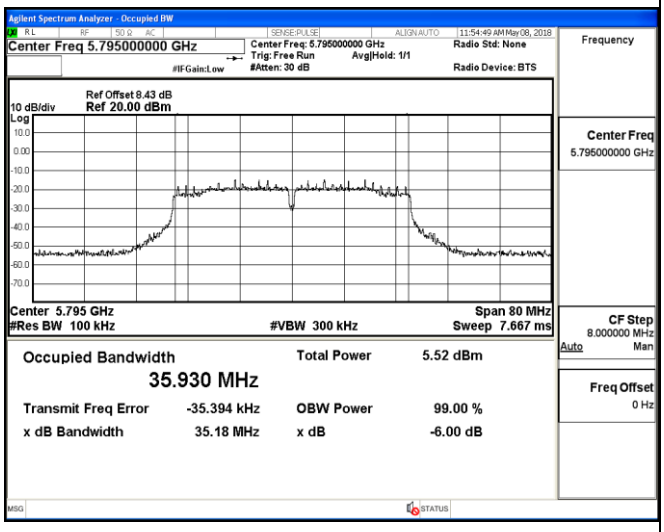
IEEE 802.11n HT40



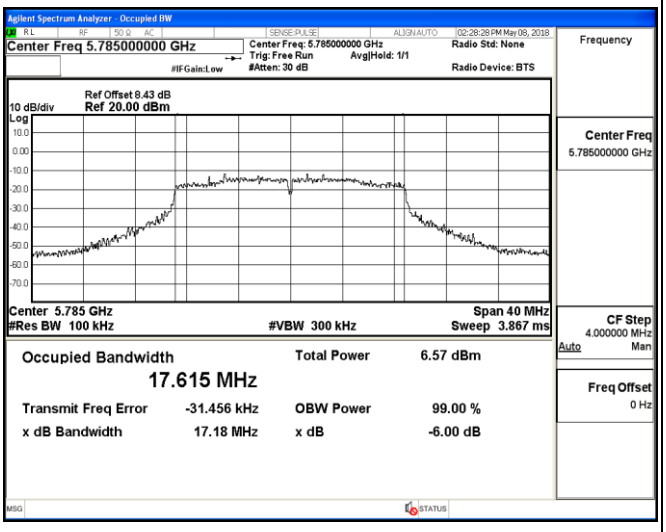
IEEE 802.11ac VHT20



Channel 151 / 5755 MHz

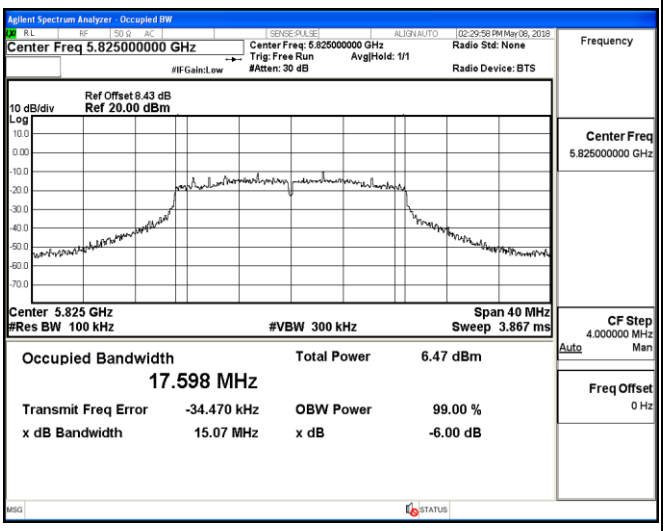


Channel 149 / 5745 MHz



Channel 159 / 5795 MHz

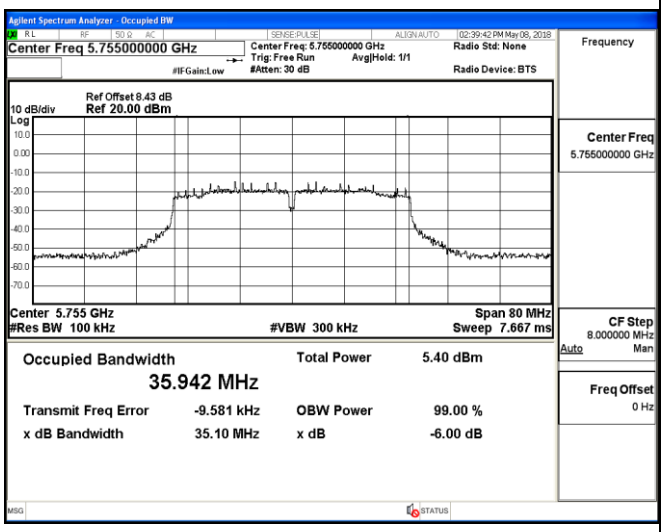
Channel 157 / 5785 MHz



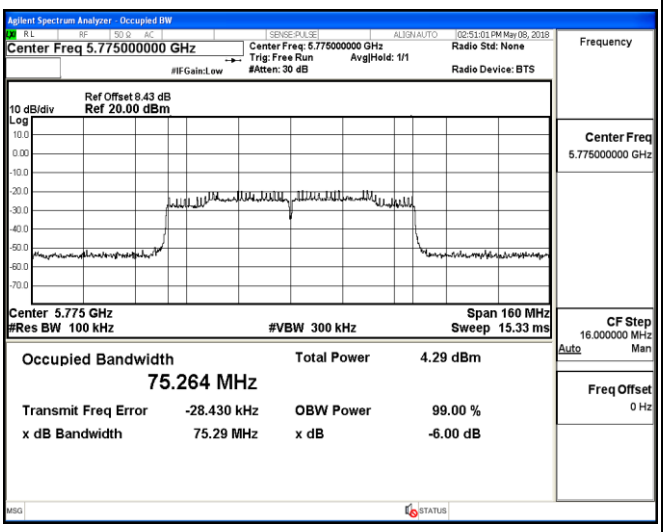
Channel 165 / 5825 MHz

6dB Occupied Bandwidth-ant 1

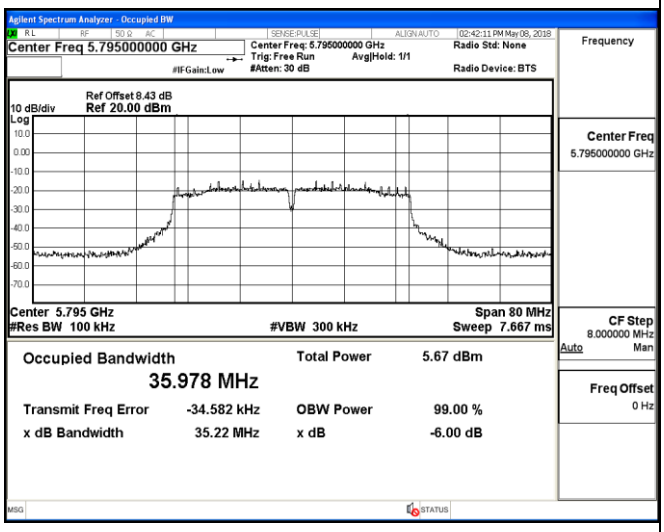
IEEE 802.11ac VHT40



IEEE 802.11ac VHT80



Channel 151 / 5755 MHz



Channel 155 / 5775 MHz

Channel 159 / 5795 MHz

5.6. Radiated Emissions Measurement

5.6.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2\)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
\2\ Above 38.6

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz (68.2dBuV/m at 3m).

For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of −27 dBm/MHz(68.2dBuV/m at 3m) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz(105.2dBuV/m at 3m) at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6(110.8dBuV/m at 3m) dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz(122.2dBuV/m at 3m) at the band edge

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.6.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

5.6.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Premeasurement:

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

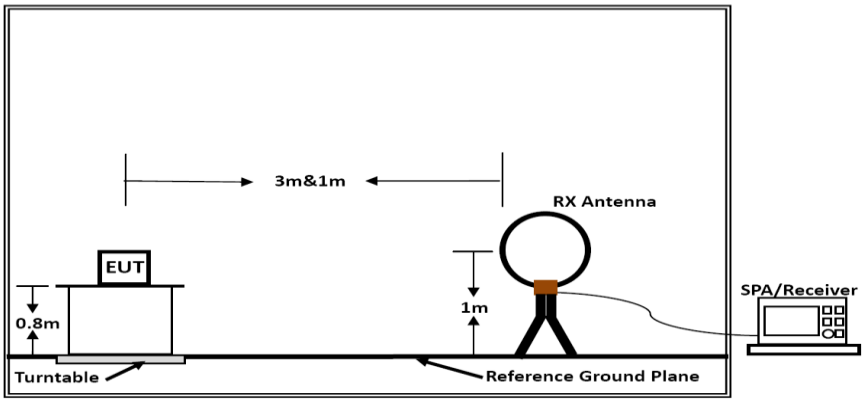
Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

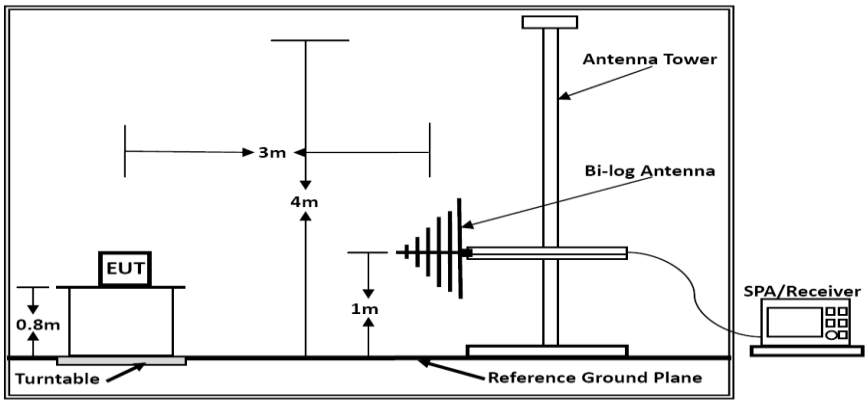
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.6.4. Test Setup Layout

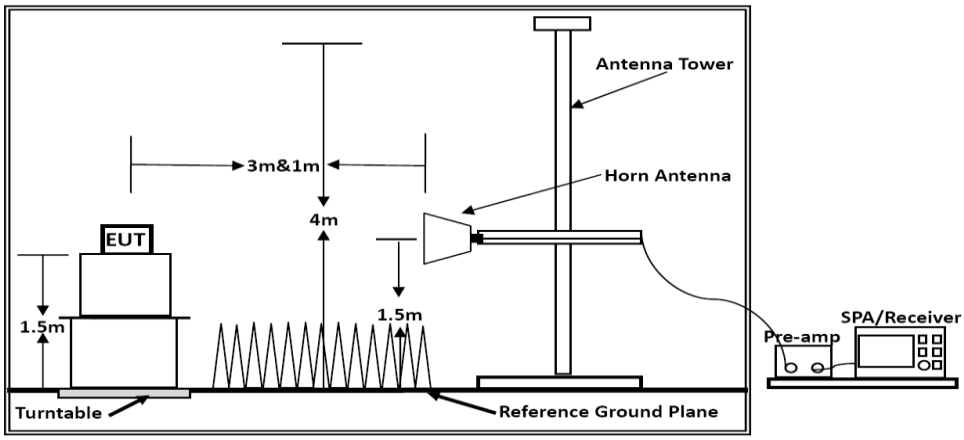
For radiated emissions below 30MHz



Below 30MHz



Below 1GHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.6.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.6.6. Results of Radiated Emissions (9 KHz~30MHz)

Temperature	22.6℃	Humidity	52.8%
Test Engineer	Tom Liu	Configurations	IEEE 802.11a/n/ac

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dB)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

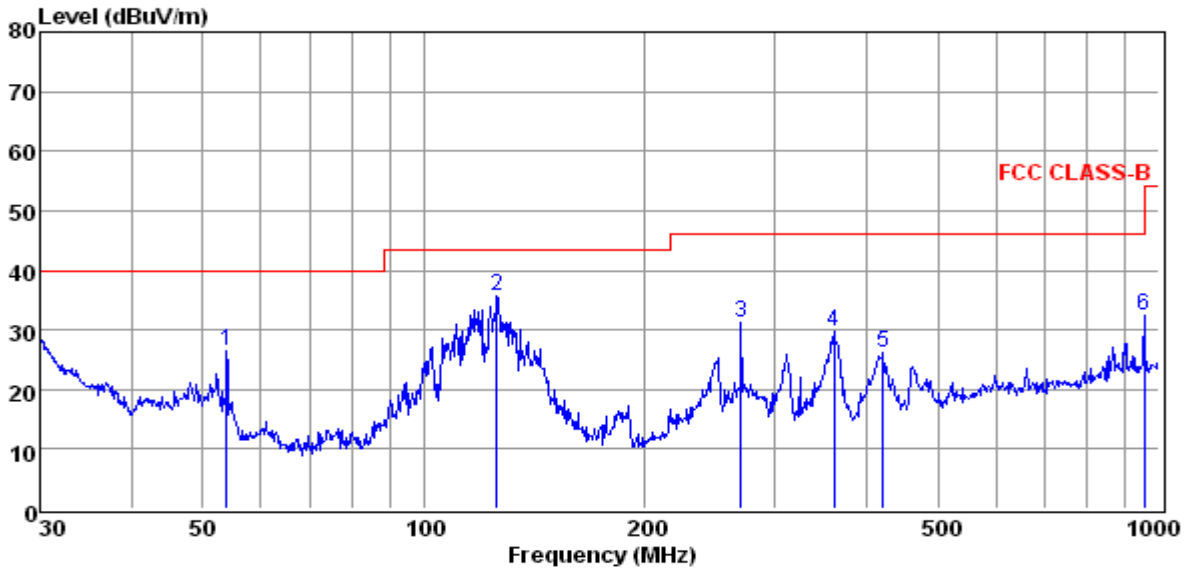
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.6.7. Results of Radiated Emissions (30MHz~1GHz)

Test result for IEEE 802.11ac VHT20(High channel:5240MHz)

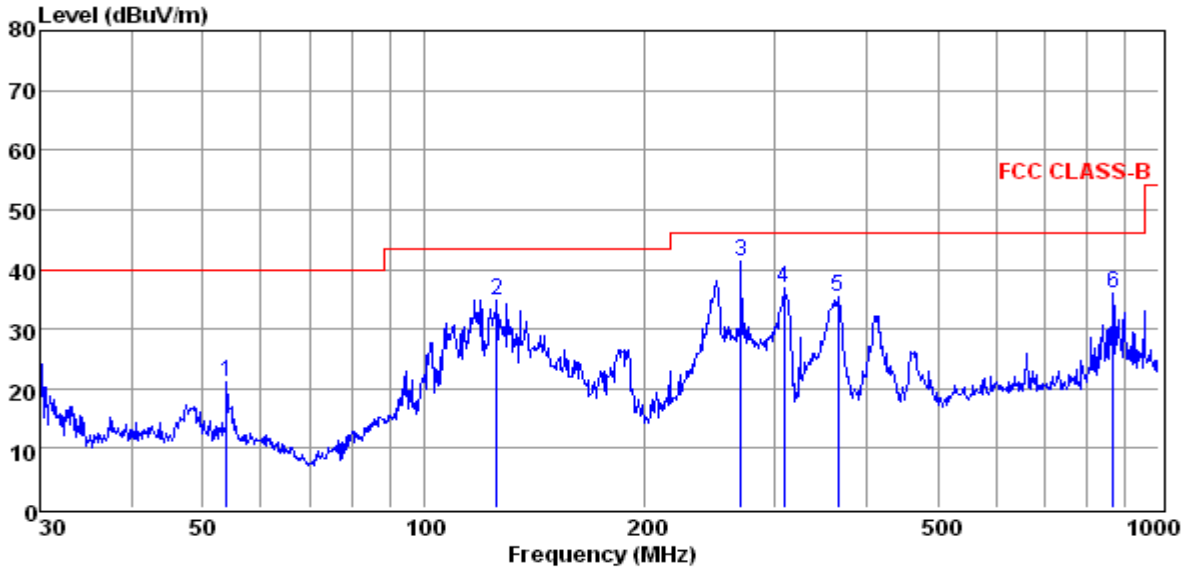
Vertical



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	53.88	12.90	0.46	13.07	26.43	40.00	-13.57	QP
2	125.45	25.23	0.71	9.64	35.58	43.50	-7.92	QP
3	270.37	17.94	0.99	12.37	31.30	46.00	-14.70	QP
4	361.71	14.19	1.17	14.44	29.80	46.00	-16.20	QP
5	422.06	9.22	1.33	15.48	26.03	46.00	-19.97	QP
6	955.44	9.02	1.89	21.45	32.36	46.00	-13.64	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Horizontal



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	53.88	7.50	0.46	13.07	21.03	40.00	-18.97	QP
2	125.45	24.51	0.71	9.64	34.86	43.50	-8.64	QP
3	270.37	28.07	0.99	12.37	41.43	46.00	-4.57	QP
4	308.91	22.50	1.08	13.18	36.76	46.00	-9.24	QP
5	365.54	19.79	1.14	14.47	35.40	46.00	-10.60	QP
6	866.09	13.45	1.87	20.74	36.06	46.00	-9.94	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

****Note:*

*Pre-scan all mode and recorded the worst case results in this report (IEEE 802.11*ac VHT20 mode (High Channel:5240MHz*)).*

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level = Level.

Only recorded the worst test case data in this report.

5.6.8. Results for Radiated Emissions (Above 1GHz)

Note: Only recorded the worst test result in this report.

5.6.8.1 UNII Band 1

IEEE 802.11a-ant 0

Channel 36 / 5180 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.36	45.62	33.21	35.82	9.52	52.53	74.00	-21.47	Peak	Horizontal
10.36	34.90	33.21	35.82	9.52	41.81	54.00	-12.19	Average	Horizontal
10.36	46.53	32.82	35.82	9.52	53.05	74.00	-20.95	Peak	Vertical
10.36	35.29	32.82	35.82	9.52	41.81	54.00	-12.19	Average	Vertical

Channel 40 / 5200 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.44	46.02	33.21	35.82	9.52	52.93	74.00	-21.07	Peak	Horizontal
10.44	35.23	33.21	35.82	9.52	42.14	54.00	-11.86	Average	Horizontal
10.44	47.10	32.82	35.82	9.52	53.62	74.00	-20.38	Peak	Vertical
10.44	35.70	32.82	35.82	9.52	42.22	54.00	-11.78	Average	Vertical

Channel 48 / 5240 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.48	46.43	33.21	35.82	9.52	53.34	74.00	-20.66	Peak	Horizontal
10.48	35.72	33.21	35.82	9.52	42.63	54.00	-11.37	Average	Horizontal
10.48	47.74	32.82	35.82	9.52	54.26	74.00	-19.74	Peak	Vertical
10.48	36.15	32.82	35.82	9.52	42.67	54.00	-11.33	Average	Vertical

IEEE 802.11n HT20-combined ant 0 & ant 1

Channel 36 / 5180 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.36	45.33	33.21	35.82	9.52	52.24	74.00	-21.76	Peak	Horizontal
10.36	34.45	33.21	35.82	9.52	41.36	54.00	-12.64	Average	Horizontal
10.36	46.39	32.82	35.82	9.52	52.91	74.00	-21.09	Peak	Vertical
10.36	34.93	32.82	35.82	9.52	41.45	54.00	-12.55	Average	Vertical

Channel 40 / 5200 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.44	45.79	33.21	35.82	9.52	52.70	74.00	-21.30	Peak	Horizontal
10.44	34.84	33.21	35.82	9.52	41.75	54.00	-12.25	Average	Horizontal
10.44	47.11	32.82	35.82	9.52	53.63	74.00	-20.37	Peak	Vertical
10.44	35.44	32.82	35.82	9.52	41.96	54.00	-12.04	Average	Vertical

Channel 48 / 5240 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.48	46.50	33.21	35.82	9.52	53.41	74.00	-20.59	Peak	Horizontal
10.48	35.48	33.21	35.82	9.52	42.39	54.00	-11.61	Average	Horizontal
10.48	47.38	32.82	35.82	9.52	53.90	74.00	-20.10	Peak	Vertical
10.48	35.82	32.82	35.82	9.52	42.34	54.00	-11.66	Average	Vertical

IEEE 802.11n HT40-combined ant 0 & ant 1

Channel 38 / 5190 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.38	45.86	33.21	35.82	9.52	52.77	74.00	-21.23	Peak	Horizontal
10.38	35.07	33.21	35.82	9.52	41.98	54.00	-12.02	Average	Horizontal
10.38	47.08	32.82	35.82	9.52	53.60	74.00	-20.40	Peak	Vertical
10.38	35.77	32.82	35.82	9.52	42.29	54.00	-11.71	Average	Vertical

Channel 46 / 5230 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.46	46.18	33.21	35.82	9.52	53.09	74.00	-20.91	Peak	Horizontal
10.46	35.54	33.21	35.82	9.52	42.45	54.00	-11.55	Average	Horizontal
10.46	47.16	32.82	35.82	9.52	53.68	74.00	-20.32	Peak	Vertical
10.46	35.78	32.82	35.82	9.52	42.30	54.00	-11.70	Average	Vertical

IEEE 802.11ac VHT20-combined ant 0 & ant 1

Channel 36 / 5180 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.36	45.43	33.21	35.82	9.52	52.34	74.00	-21.66	Peak	Horizontal
10.36	34.63	33.21	35.82	9.52	41.54	54.00	-12.46	Average	Horizontal
10.36	46.42	32.82	35.82	9.52	52.94	74.00	-21.06	Peak	Vertical
10.36	34.89	32.82	35.82	9.52	41.41	54.00	-12.59	Average	Vertical

Channel 40 / 5200 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.44	45.73	33.21	35.82	9.52	52.64	74.00	-21.36	Peak	Horizontal
10.44	35.18	33.21	35.82	9.52	42.09	54.00	-11.91	Average	Horizontal
10.44	47.19	32.82	35.82	9.52	53.71	74.00	-20.29	Peak	Vertical
10.44	35.48	32.82	35.82	9.52	42.00	54.00	-12.00	Average	Vertical

Channel 48 / 5240 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.48	46.54	33.21	35.82	9.52	53.45	74.00	-20.55	Peak	Horizontal
10.48	35.43	33.21	35.82	9.52	42.34	54.00	-11.66	Average	Horizontal
10.48	47.42	32.82	35.82	9.52	53.94	74.00	-20.06	Peak	Vertical
10.48	35.96	32.82	35.82	9.52	42.48	54.00	-11.52	Average	Vertical

IEEE 802.11ac VHT40-combined ant 0 & ant 1

Channel 38 / 5190 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.38	45.54	33.21	35.82	9.52	52.45	68.20	-15.75	Peak	Horizontal
10.38	34.82	33.21	35.82	9.52	41.73	54.00	-12.27	Average	Horizontal
10.38	46.65	32.82	35.82	9.52	53.17	68.20	-15.03	Peak	Vertical
10.38	35.08	32.82	35.82	9.52	41.60	54.00	-12.40	Average	Vertical

Channel 46 / 5230 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.46	45.71	33.21	35.82	9.52	52.62	68.20	-15.58	Peak	Horizontal
10.46	35.19	33.21	35.82	9.52	42.10	54.00	-11.90	Average	Horizontal
10.46	47.33	32.82	35.82	9.52	53.85	68.20	-14.35	Peak	Vertical
10.46	35.57	32.82	35.82	9.52	42.09	54.00	-11.91	Average	Vertical

IEEE 802.11ac VHT80-combined ant 0 & ant 1

Channel 42 / 5210 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
10.42	45.00	33.21	35.82	9.52	51.91	68.20	-16.29	Peak	Horizontal
10.42	34.44	33.21	35.82	9.52	41.35	54.00	-12.65	Average	Horizontal
10.42	46.42	32.82	35.82	9.52	52.94	68.20	-15.26	Peak	Vertical
10.42	34.73	32.82	35.82	9.52	41.25	54.00	-12.75	Average	Vertical

Notes:

1). Measuring frequencies from 9 KHz ~ 40 GHz, No emission found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9 KHz ~ 40 GHz were made with an instrument using Peak detector mode.
3). 18~40GHz at least have 20dB margin. No recording in the test report.
4). 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, IEEE 802.11ac VHT80;
5). Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.6.8.2 UNII Band 3

IEEE 802.11a-ant 0

Channel 149 / 5745 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.49	47.06	33.92	36.09	10.26	55.15	74.00	-18.85	Peak	Horizontal
11.49	36.46	33.92	36.09	10.26	44.55	54.00	-9.45	Average	Horizontal
11.49	48.28	33.99	35.99	10.26	56.54	74.00	-17.46	Peak	Vertical
11.49	36.73	33.99	35.99	10.26	44.99	54.00	-9.01	Average	Vertical

Channel 157 / 5785 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.57	46.74	33.92	36.09	10.26	54.83	74.00	-19.17	Peak	Horizontal
11.57	35.82	33.92	36.09	10.26	43.91	54.00	-10.09	Average	Horizontal
11.57	47.79	33.99	35.99	10.26	56.05	74.00	-17.95	Peak	Vertical
11.57	36.39	33.99	35.99	10.26	44.65	54.00	-9.35	Average	Vertical

Channel 163 / 5825 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.65	46.37	33.92	36.09	10.26	54.46	74.00	-19.54	Peak	Horizontal
11.65	35.69	33.92	36.09	10.26	43.78	54.00	-10.22	Average	Horizontal
11.65	47.46	33.99	35.99	10.26	55.72	74.00	-18.28	Peak	Vertical
11.65	36.07	33.99	35.99	10.26	44.33	54.00	-9.67	Average	Vertical

IEEE 802.11n HT20-combined ant 0 & ant 1

Channel 149 / 5745 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.49	46.81	33.92	36.09	10.26	54.90	74.00	-19.10	Peak	Horizontal
11.49	36.11	33.92	36.09	10.26	44.20	54.00	-9.80	Average	Horizontal
11.49	47.86	33.99	35.99	10.26	56.12	74.00	-17.88	Peak	Vertical
11.49	36.73	33.99	35.99	10.26	44.99	54.00	-9.01	Average	Vertical

Channel 157 / 5785 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.57	46.89	33.92	36.09	10.26	54.98	74.00	-19.02	Peak	Horizontal
11.57	36.51	33.92	36.09	10.26	44.60	54.00	-9.40	Average	Horizontal
11.57	47.91	33.99	35.99	10.26	56.17	74.00	-17.83	Peak	Vertical
11.57	36.74	33.99	35.99	10.26	45.00	54.00	-9.00	Average	Vertical

Channel 163 / 5825 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.65	46.50	33.92	36.09	10.26	54.59	74.00	-19.41	Peak	Horizontal
11.65	35.99	33.92	36.09	10.26	44.08	54.00	-9.92	Average	Horizontal
11.65	47.71	33.99	35.99	10.26	55.97	74.00	-18.03	Peak	Vertical
11.65	36.34	33.99	35.99	10.26	44.60	54.00	-9.40	Average	Vertical

IEEE 802.11n HT40-combined ant 0 & ant 1

Channel 151 / 5755 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.51	50.03	33.92	36.09	10.26	58.12	74.00	-15.88	Peak	Horizontal
11.51	39.22	33.92	36.09	10.26	47.31	54.00	-6.69	Average	Horizontal
11.51	50.93	33.99	35.99	10.26	59.19	74.00	-14.81	Peak	Vertical
11.51	39.62	33.99	35.99	10.26	47.88	54.00	-6.12	Average	Vertical

Channel 159 / 5795 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.59	49.57	33.92	36.09	10.26	57.66	74.00	-16.34	Peak	Horizontal
11.59	38.93	33.92	36.09	10.26	47.02	54.00	-6.98	Average	Horizontal
11.59	50.61	33.99	35.99	10.26	58.87	74.00	-15.13	Peak	Vertical
11.59	39.26	33.99	35.99	10.26	47.52	54.00	-6.48	Average	Vertical

IEEE 802.11ac VHT20-combined ant 0 & ant 1

Channel 149 / 5745 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.49	49.72	33.92	36.09	10.26	57.81	74.00	-16.19	Peak	Horizontal
11.49	38.71	33.92	36.09	10.26	46.80	54.00	-7.20	Average	Horizontal
11.49	50.64	33.99	35.99	10.26	58.90	74.00	-15.10	Peak	Vertical
11.49	39.35	33.99	35.99	10.26	47.61	54.00	-6.39	Average	Vertical

Channel 157 / 5785 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.57	49.36	33.92	36.09	10.26	57.45	74.00	-16.55	Peak	Horizontal
11.57	38.84	33.92	36.09	10.26	46.93	54.00	-7.07	Average	Horizontal
11.57	50.33	33.99	35.99	10.26	58.59	74.00	-15.41	Peak	Vertical
11.57	39.35	33.99	35.99	10.26	47.61	54.00	-6.39	Average	Vertical

Channel 163 / 5825 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.65	48.97	33.92	36.09	10.26	57.06	74.00	-16.94	Peak	Horizontal
11.65	38.38	33.92	36.09	10.26	46.47	54.00	-7.53	Average	Horizontal
11.65	50.21	33.99	35.99	10.26	58.47	74.00	-15.53	Peak	Vertical
11.65	39.18	33.99	35.99	10.26	47.44	54.00	-6.56	Average	Vertical

IEEE 802.11ac VHT40-combined ant 0 & ant 1

Channel 151 / 5755 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.51	49.32	33.92	36.09	10.26	57.41	74.00	-16.59	Peak	Horizontal
11.51	38.82	33.92	36.09	10.26	46.91	54.00	-7.09	Average	Horizontal
11.51	50.49	33.99	35.99	10.26	58.75	74.00	-15.25	Peak	Vertical
11.51	38.98	33.99	35.99	10.26	47.24	54.00	-6.76	Average	Vertical

Channel 159 / 5795 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.59	49.09	33.92	36.09	10.26	57.18	74.00	-16.82	Peak	Horizontal
11.59	38.39	33.92	36.09	10.26	46.48	54.00	-7.52	Average	Horizontal
11.59	49.88	33.99	35.99	10.26	58.14	74.00	-15.86	Peak	Vertical
11.59	38.78	33.99	35.99	10.26	47.04	54.00	-6.96	Average	Vertical

IEEE 802.11ac VHT80-combined ant 0 & ant 1

Channel 155 / 5775 MHz

Freq. GHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.51	49.27	33.92	36.09	10.26	57.36	74.00	-16.64	Peak	Horizontal
11.51	38.73	33.92	36.09	10.26	46.82	54.00	-7.18	Average	Horizontal
11.51	50.35	33.99	35.99	10.26	58.61	74.00	-15.39	Peak	Vertical
11.51	38.97	33.99	35.99	10.26	47.23	54.00	-6.77	Average	Vertical

Notes:

1). Measuring frequencies from 9 KHz ~ 40 GHz, No emission found between lowest internal used/generated frequency to 30MHz.

2). Radiated emissions measured in frequency range from 9 KHz ~ 40 GHz were made with an instrument using Peak detector mode.

3). 18~40GHz at least have 20dB margin. No recording in the test report.

4). 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, IEEE 802.11ac VHT80;

5). Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.7. Power line conducted emissions

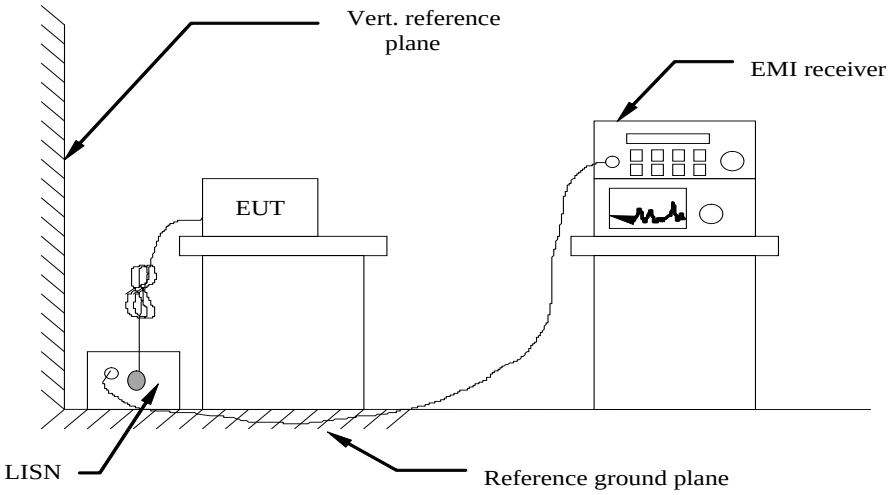
5.7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

5.7.2 Block Diagram of Test Setup



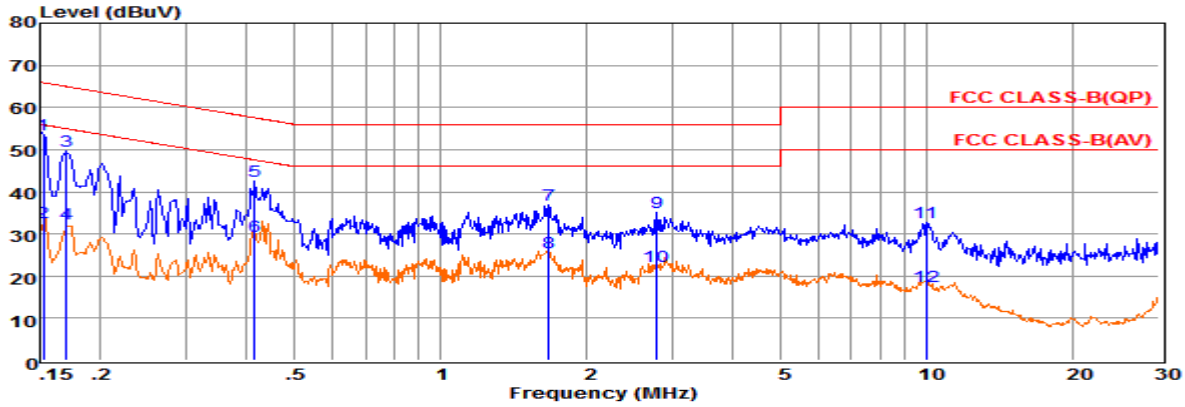
5.7.3 Test Results

PASS.

The test data please refer to following page.

AC Conducted Emission of power by adapter @ AC 120V/60Hz @ IEEE 802.11ac VHT20 (worst case)

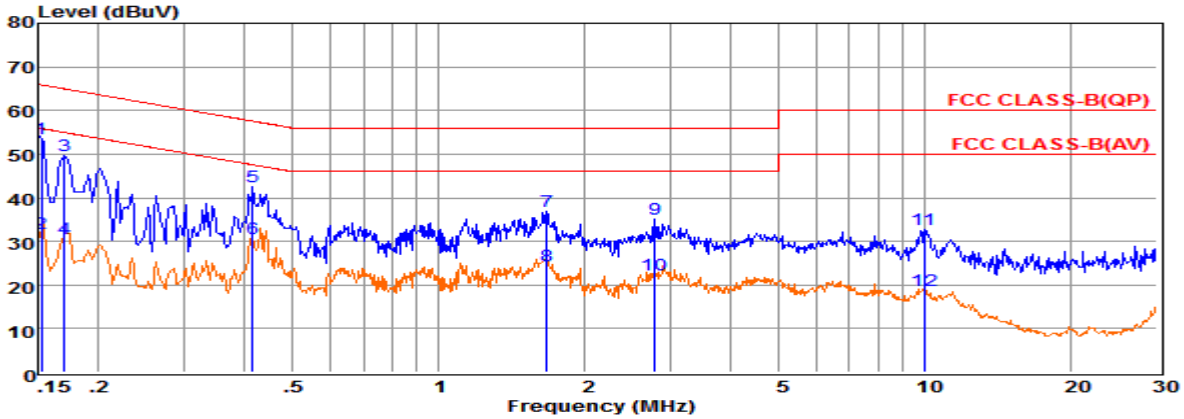
Line



	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.15	33.88	9.57	0.02	10.00	53.47	65.87	-12.40	QP
2	0.15	13.13	9.57	0.02	10.00	32.72	55.86	-23.14	Average
3	0.17	30.10	9.60	0.02	10.00	49.72	64.94	-15.22	QP
4	0.17	12.81	9.60	0.02	10.00	32.43	54.94	-22.51	Average
5	0.41	22.76	9.62	0.04	10.00	42.42	57.55	-15.13	QP
6	0.41	9.87	9.62	0.04	10.00	29.53	47.55	-18.02	Average
7	1.67	17.11	9.64	0.05	10.00	36.80	56.00	-19.20	QP
8	1.67	5.84	9.64	0.05	10.00	25.53	46.00	-20.47	Average
9	2.78	15.33	9.64	0.05	10.00	35.02	56.00	-20.98	QP
10	2.78	2.63	9.64	0.05	10.00	22.32	46.00	-23.68	Average
11	9.97	12.84	9.69	0.08	10.00	32.61	60.00	-27.39	QP
12	9.97	-2.18	9.69	0.08	10.00	17.59	50.00	-32.41	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

Neutral



	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.15	33.89	9.69	0.02	10.00	53.60	65.87	-12.27	QP
2	0.15	12.13	9.69	0.02	10.00	31.84	55.86	-24.02	Average
3	0.17	30.10	9.65	0.02	10.00	49.77	64.94	-15.17	QP
4	0.17	10.81	9.65	0.02	10.00	30.48	54.94	-24.46	Average
5	0.41	22.76	9.61	0.04	10.00	42.41	57.55	-15.14	QP
6	0.41	10.87	9.61	0.04	10.00	30.52	47.55	-17.03	Average
7	1.67	17.11	9.63	0.05	10.00	36.79	56.00	-19.21	QP
8	1.67	4.84	9.63	0.05	10.00	24.52	46.00	-21.48	Average
9	2.78	15.33	9.64	0.05	10.00	35.02	56.00	-20.98	QP
10	2.78	2.63	9.64	0.05	10.00	22.32	46.00	-23.68	Average
11	9.97	12.84	9.72	0.08	10.00	32.64	60.00	-27.36	QP
12	9.97	-1.18	9.72	0.08	10.00	18.62	50.00	-31.38	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

****Note: Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11acVHT20).*

5.8 Undesirable Emissions Measurement

5.8.1 Limit

According to ξ15.407 (b) Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(a) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(b) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(c) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(d) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

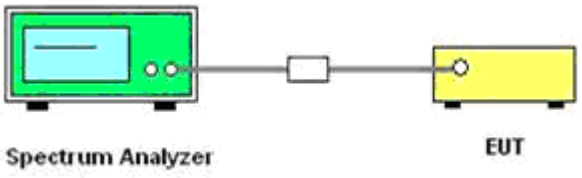
(e) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(f) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(g) The provisions of §15.205 apply to intentional radiators operating under this section.

(h) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

5.8.2 Test Configuration



5.8.3 Test Procedure

According to KDB789033 D02 General UNII Test Procedures New Rules Section G: Unwanted Emission Measurement

1. Unwanted Emissions in the Restricted Bands

a) For all measurements, follow the requirements in section II.G.3. “General Requirements for Unwanted Emissions Measurements.”

b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. “Procedure for Unwanted Emissions Measurements below 1000 MHz.”

c) At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in sections II.G.5. and II.G.6, respectively, must satisfy the respective peak and average limits. If all peak measurements satisfy the average limit, then average measurements are not required.

d) For conducted measurements above 1000 MHz, EIRP shall be computed as specified in section II.G.3.b) and then field strength shall be computed as follows (see KDB Publication 412172):

i) E[dBμV/m] = EIRP[dBm] - 20 log (d[meters]) + 104.77, where E = field strength and d = distance at which field strength limit is specified in the rules;

ii) E[dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters

e) For conducted measurements below 1000 MHz, the field strength shall be computed as specified in d), above, and then an additional 4.7 dB shall be added as an upper bound on the field strength that would be observed on a test range with a ground plane for frequencies between 30 MHz and 1000 MHz, or an additional 6 dB shall be added for frequencies below 30 MHz.

2. Unwanted Emissions that fall Outside of the Restricted Bands

a) For all measurements, follow the requirements in section II.G.3. “General Requirements for Unwanted Emissions Measurements.”

b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. “Procedure for Unwanted Emissions Measurements below 1000 MHz.”

c) At frequencies above 1000 MHz, use the procedure for maximum emissions described in section II.G.5., “Procedure for Unwanted Maximum Unwanted Emissions Measurements Above 1000 MHz.”

d) Section 15.407(b) (1-3) specifies the unwanted emissions limit for the U-NII-1 and 2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz dBm/MHz peak emission limit.

i) Section 15.407(b) (4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b) (4) (i). An alternative to the band emissions mask is specified in Section 15.407(b) (4) (ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the alternative limit.

e) If radiated measurements are performed, field strength is then converted to EIRP as follows:

i) EIRP = ((E×d) ^2) / 30

Where:

- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotopically radiated power in watts;

ii) Working in dB units, the above equation is equivalent to:

EIRP [dBm] = E [dBμV/m] + 20 log (d [meters]) - 104.77

iii) Or, if d is 3 meters:

EIRP [dBm] = E [dBμV/m] - 95.23

3) Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on radiated measurements; however, as an alternative, antenna-port conducted measurements in conjunction with cabinet emissions tests will be permitted to demonstrate compliance provided that the following steps are performed:

(i) Cabinet emissions measurements. A radiated test shall be performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna may be replaced by a termination matching the nominal impedance of the antenna.

(ii) Impedance matching. Conducted tests shall be performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT.

(iii) EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater.3 However, for devices that operate in multiple bands using the same transmit antenna, the highest gain of the antenna within the operating band nearest to the out-of-band frequency being measured may be used in lieu of the overall highest gain when measuring emissions at frequencies within 20% of the absolute frequency at the nearest edge of that band, but in no case shall a value less than 2 dBi be selected.

(iv) EIRP adjustments for multiple outputs. For devices with multiple outputs occupying the same or overlapping frequency ranges in the same band (e.g., MIMO or beamforming devices), compute the total EIRP as follows:

- Compute EIRP for each output, as described in (iii), above.
- Follow the procedures specified in KDB Publication 662911 for summing emissions across the outputs or adjusting emission levels measured on individual outputs by 10 log (N_{ANT}), where N_{ANT} is the number of outputs.
- Add the array gain term specified in KDB Publication 662911 for out-of-band and spurious signals.

(v) Direction of maximum emission.

For all radiated emissions tests, measurements shall correspond to the direction of maximum emission level for each measured emission (see ANSI C63.10 for guidance).

5.8.4 Test Results

5.8.4.1 UNII Band 1

IEEE 802.11a									
Frequency (MHz)	Conducted Power (dBm)		Antenna Gain (dBi)	Ground Reflection Factor (dB)	Convert Radiated E Level At 3m (dBuV/m)		Detector	Limit (dBuV/m)	Verdict
	chain 0	chain 1			chain 0	chain 1			
4500.000	-50.25	-50.43	5.00	0.00	49.98	49.80	Peak	74.00	PASS
4500.000	-60.05	-60.26	5.00	0.00	40.18	39.97	Average	54.00	PASS
5150.000	-48.46	-47.42	5.00	0.00	51.77	52.81	Peak	74.00	PASS
5150.000	-58.09	-58.05	5.00	0.00	42.14	42.18	Average	54.00	PASS
5350.000	-49.41	-49.73	5.00	0.00	50.82	50.50	Peak	74.00	PASS
5350.000	-59.66	-59.68	5.00	0.00	40.57	40.55	Average	54.00	PASS
5460.000	-50.50	-50.36	5.00	0.00	49.72	49.87	Peak	74.00	PASS
5460.000	-60.49	-60.53	5.00	0.00	39.74	39.69	Average	54.00	PASS

IEEE 802.11n HT20												
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor (dB)	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict
	chain 0	chain 1	Sum				chain 0	chain 1	Sum			
4500.000	-50.09	-50.98	-47.08	5.00	8.01	0.00	50.14	49.25	56.16	Peak	74.00	PASS
4500.000	-60.08	-60.20	-57.07	5.00	8.01	0.00	40.15	40.03	46.17	Average	54.00	PASS
5150.000	-48.43	-49.29	-45.42	5.00	8.01	0.00	51.80	50.94	57.82	Peak	74.00	PASS
5150.000	-58.06	-57.98	-55.05	5.00	8.01	0.00	42.16	42.25	48.19	Average	54.00	PASS
5350.000	-48.50	-49.52	-45.49	5.00	8.01	0.00	51.73	50.71	57.75	Peak	74.00	PASS
5350.000	-59.61	-59.66	-56.60	5.00	8.01	0.00	40.61	40.57	46.64	Average	54.00	PASS
5460.000	-49.75	-49.78	-46.74	5.00	8.01	0.00	50.48	50.44	56.50	Peak	74.00	PASS
5460.000	-60.45	-60.53	-57.44	5.00	8.01	0.00	39.78	39.70	45.80	Average	54.00	PASS

IEEE 802.11n HT40												
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor (dB)	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict
	chain 0	chain 1	Sum				chain 0	chain 1	Sum			
4500.000	-49.50	-50.74	-46.49	5.00	8.01	0.00	50.73	49.49	56.75	Peak	74.00	PASS
4500.000	-60.05	-60.18	-57.04	5.00	8.01	0.00	40.17	40.05	46.20	Average	54.00	PASS
5150.000	-47.47	-48.67	-44.46	5.00	8.01	0.00	52.76	51.56	58.78	Peak	74.00	PASS
5150.000	-57.96	-58.32	-54.95	5.00	8.01	0.00	42.27	41.91	48.29	Average	54.00	PASS
5350.000	-48.35	-49.73	-45.34	5.00	8.01	0.00	51.88	50.49	57.90	Peak	74.00	PASS
5350.000	-59.39	-59.67	-56.38	5.00	8.01	0.00	40.84	40.56	46.86	Average	54.00	PASS
5460.000	-49.94	-50.01	-46.93	5.00	8.01	0.00	50.29	50.22	56.31	Peak	74.00	PASS
5460.000	-60.17	-60.32	-57.16	5.00	8.01	0.00	40.05	39.91	46.08	Average	54.00	PASS

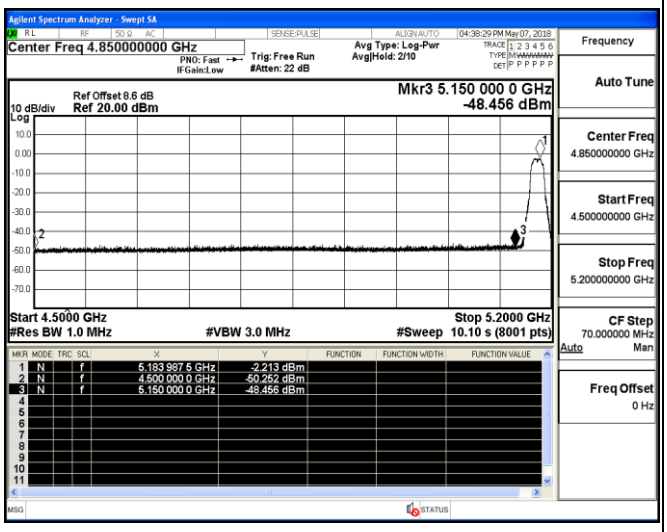
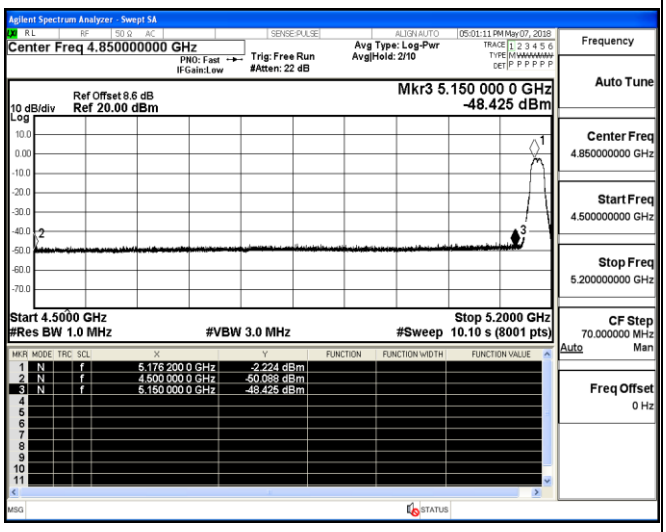
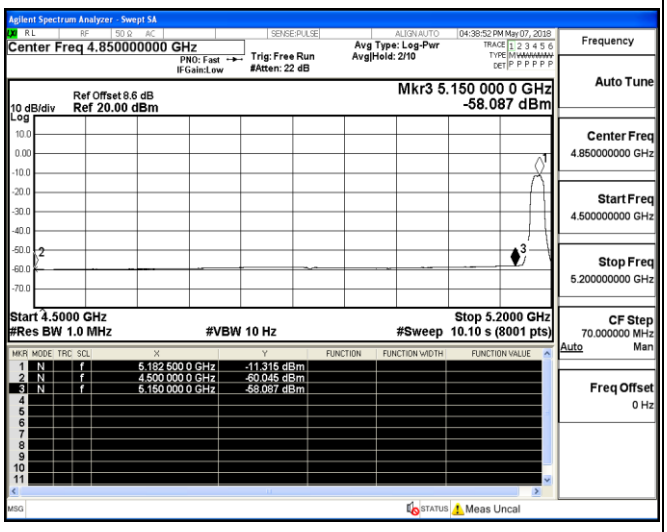
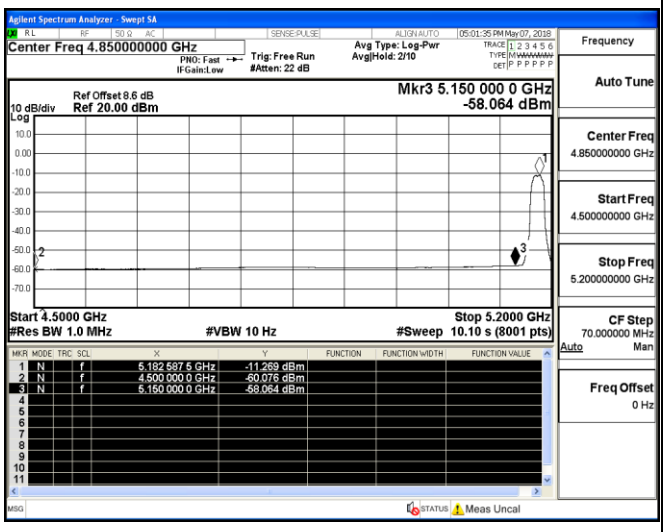
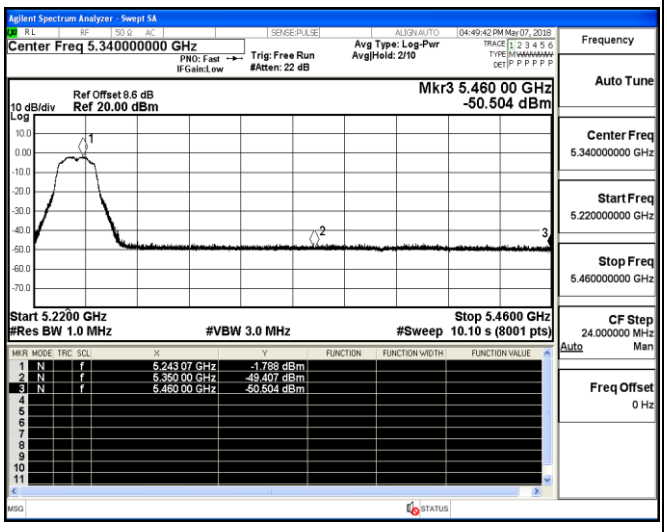
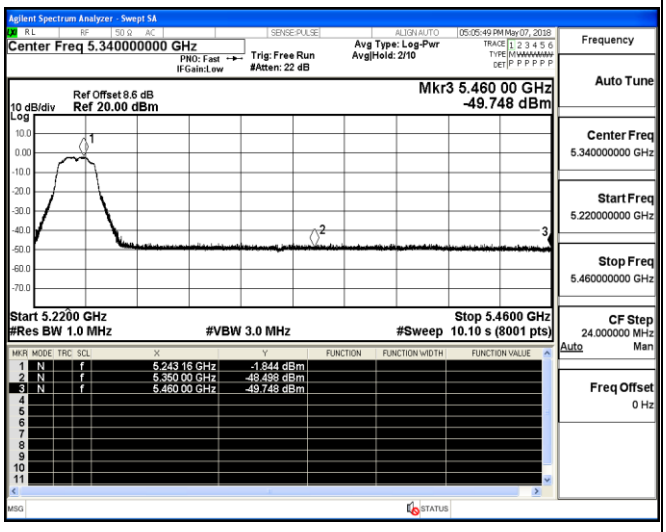
IEEE 802.11ac VHT20												
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor (dB)	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict
	chain 0	chain 1	Sum				chain 0	chain 1	Sum			
4500.000	-50.69	-49.94	-47.68	5.00	8.01	0.00	49.54	50.28	55.56	Peak	74.00	PASS
4500.000	-60.08	-60.14	-57.07	5.00	8.01	0.00	40.15	40.09	46.17	Average	54.00	PASS
5150.000	-48.61	-49.00	-45.60	5.00	8.01	0.00	51.62	51.23	57.64	Peak	74.00	PASS
5150.000	-57.91	-57.96	-54.90	5.00	8.01	0.00	42.32	42.27	48.34	Average	54.00	PASS
5350.000	-48.76	-49.68	-45.75	5.00	8.01	0.00	51.47	50.55	57.49	Peak	74.00	PASS
5350.000	-59.52	-59.59	-56.51	5.00	8.01	0.00	40.71	40.64	46.73	Average	54.00	PASS
5460.000	-49.21	-49.99	-46.20	5.00	8.01	0.00	51.02	50.24	57.04	Peak	74.00	PASS
5460.000	-60.45	-60.47	-57.44	5.00	8.01	0.00	39.78	39.76	45.80	Average	54.00	PASS

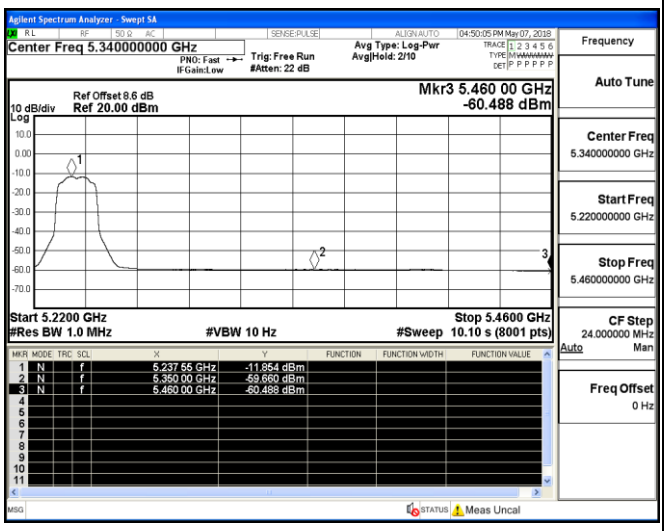
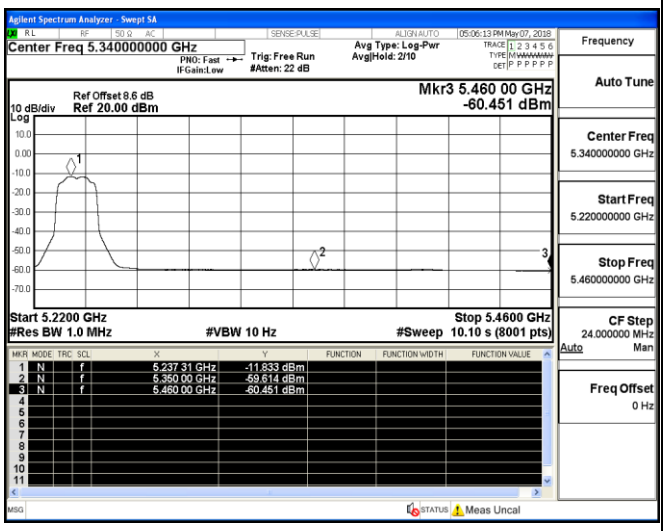
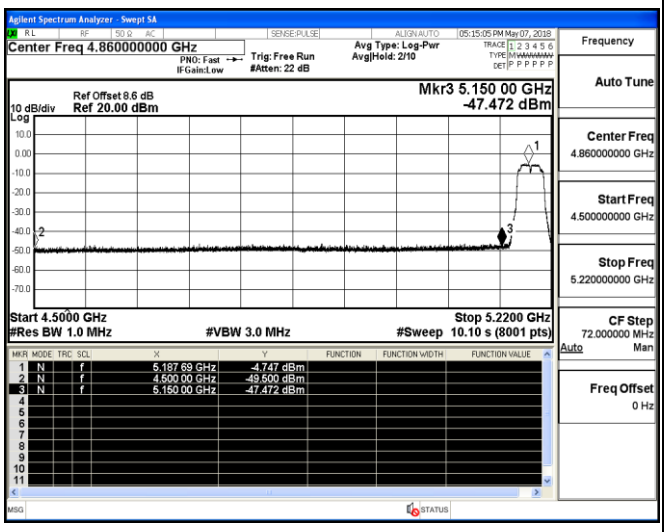
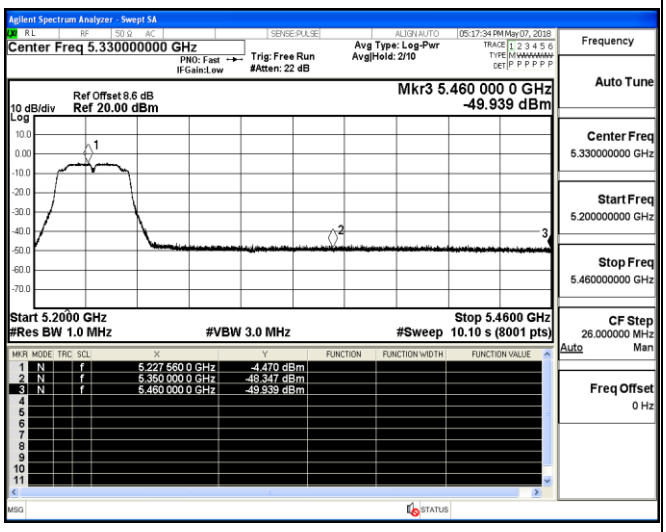
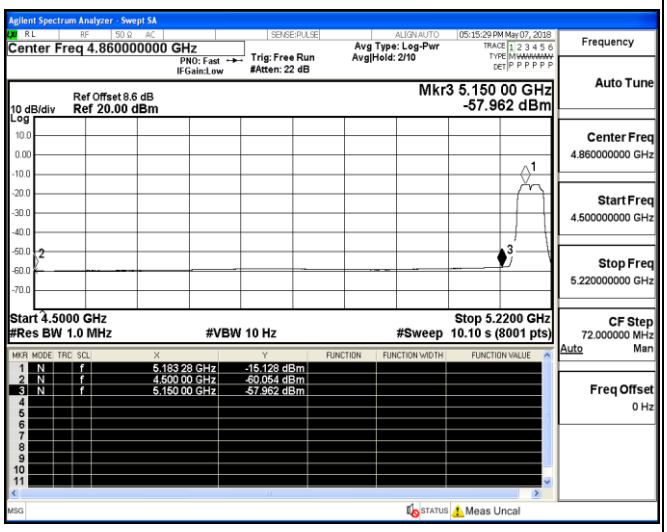
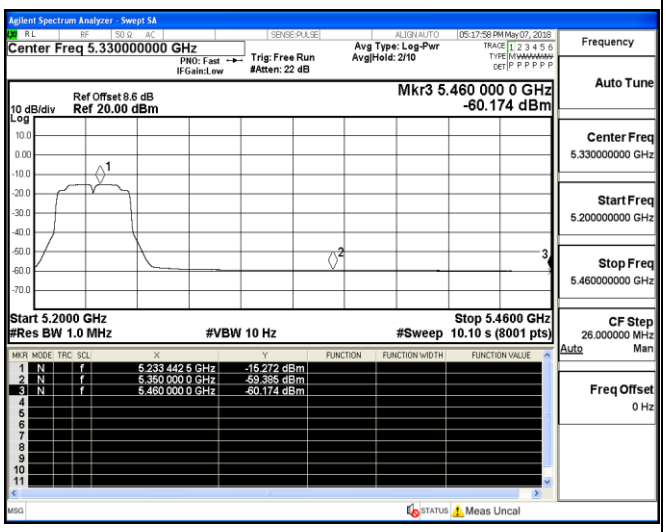
IEEE 802.11ac VHT40												
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor (dB)	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict
	chain 0	chain 1	Sum				chain 0	chain 1	Sum			
4500.000	-50.05	-50.58	-47.04	5.00	8.01	0.00	50.18	49.65	56.20	Peak	74.00	PASS
4500.000	-60.03	-60.10	-57.02	5.00	8.01	0.00	40.20	40.12	46.22	Average	54.00	PASS
5150.000	-48.38	-48.83	-45.37	5.00	8.01	0.00	51.85	51.40	57.87	Peak	74.00	PASS
5150.000	-57.68	-58.28	-54.67	5.00	8.01	0.00	42.55	41.95	48.57	Average	54.00	PASS
5350.000	-48.67	-49.68	-45.66	5.00	8.01	0.00	51.56	50.55	57.58	Peak	74.00	PASS
5350.000	-59.35	-59.62	-56.34	5.00	8.01	0.00	40.88	40.61	46.90	Average	54.00	PASS
5460.000	-50.44	-50.05	-47.43	5.00	8.01	0.00	49.79	50.18	55.81	Peak	74.00	PASS
5460.000	-60.13	-60.24	-57.12	5.00	8.01	0.00	40.10	39.99	46.12	Average	54.00	PASS

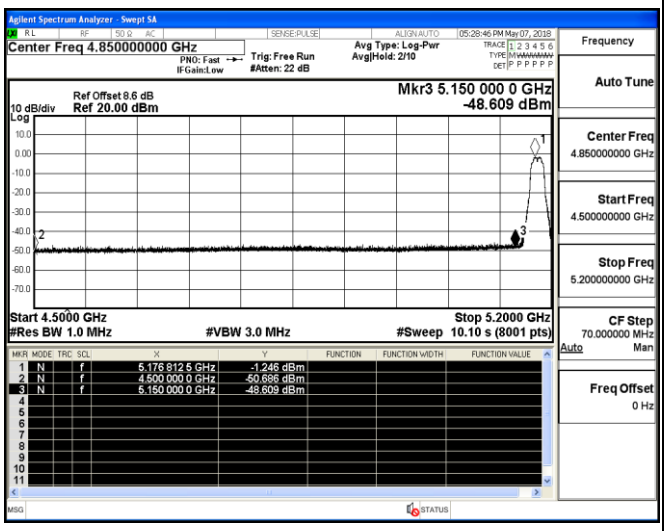
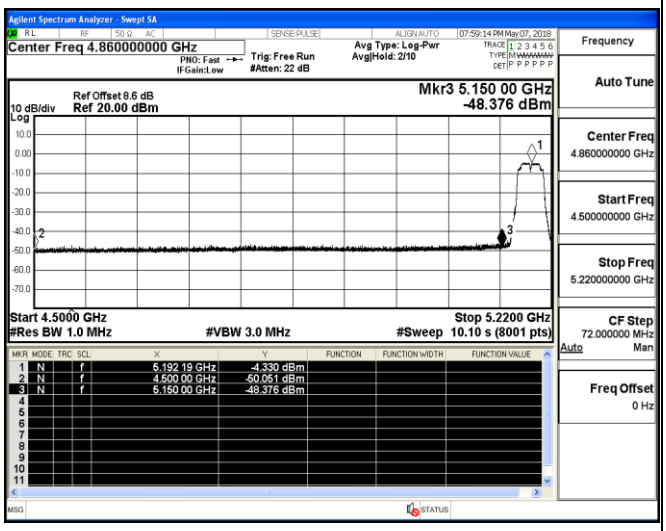
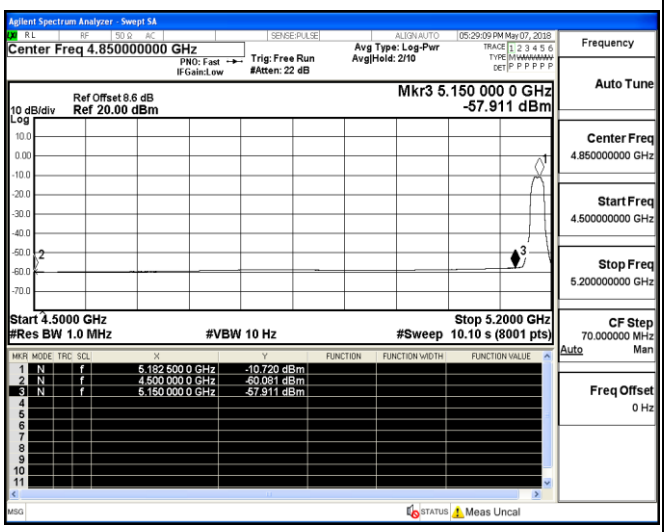
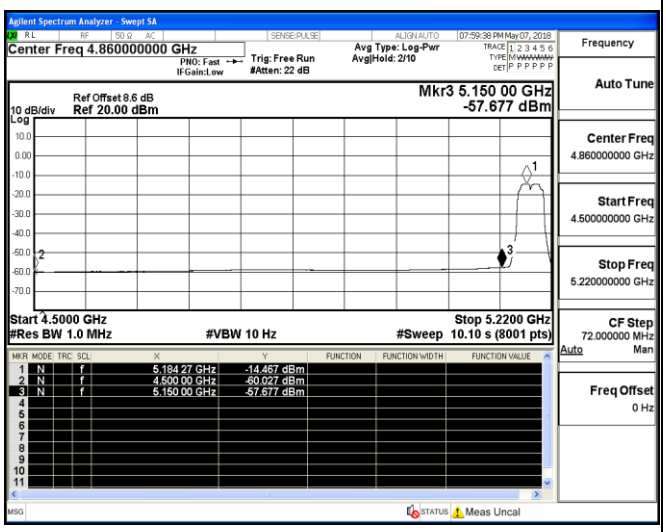
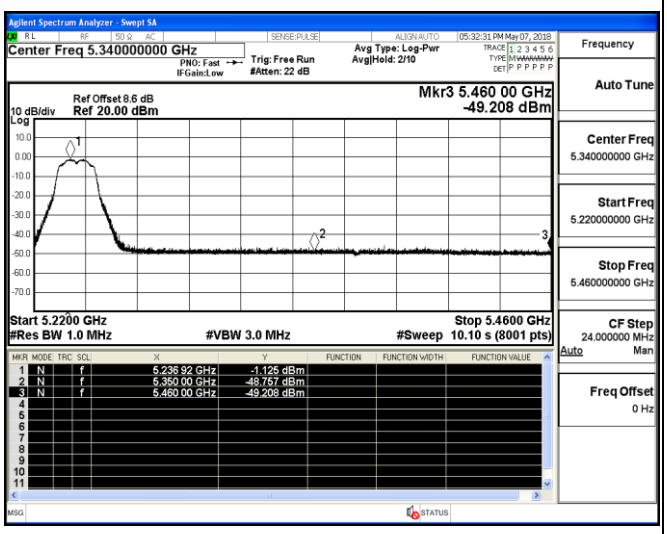
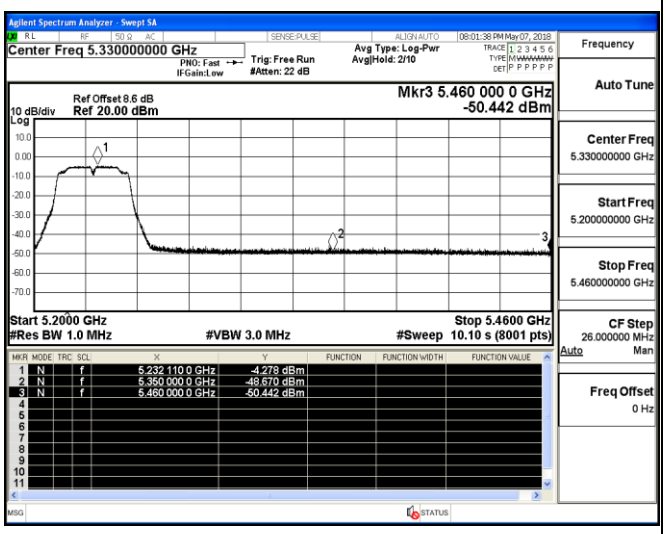
IEEE 802.11ac VHT80												
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	Directional Gain(dBi)	Ground Reflection Factor (dB)	Convert Radiated E Level At 3m (dBuV/m)			Detector	Limit (dBuV/m)	Verdict
	chain 0	chain 1	Sum				chain 0	chain 1	Sum			
4500.000	-50.76	-50.64	-47.75	5.00	8.01	0.00	49.47	49.59	55.49	Peak	74.00	PASS
4500.000	-60.08	-60.15	-57.07	5.00	8.01	0.00	40.15	40.08	46.17	Average	54.00	PASS
5150.000	-47.96	-48.64	-44.95	5.00	8.01	0.00	52.27	51.59	58.29	Peak	74.00	PASS
5150.000	-57.67	-58.44	-54.66	5.00	8.01	0.00	42.56	41.79	48.58	Average	54.00	PASS
5350.000	-49.69	-49.58	-46.68	5.00	8.01	0.00	50.53	50.65	56.56	Peak	74.00	PASS
5350.000	-58.91	-59.33	-55.90	5.00	8.01	0.00	41.32	40.90	47.34	Average	54.00	PASS
5460.000	-49.67	-49.89	-46.66	5.00	8.01	0.00	50.56	50.34	56.58	Peak	74.00	PASS
5460.000	-59.68	-59.83	-56.67	5.00	8.01	0.00	40.55	40.40	46.57	Average	54.00	PASS

Remark:

1. *Measured Undesirable emission 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, IEEE 802.11ac VHT80;*
4. *Covert Radiated E Level At 3m = Conducted average power + Directional Gain + 104.77-20*log(3);*
5. *Please refer to following test plots;*

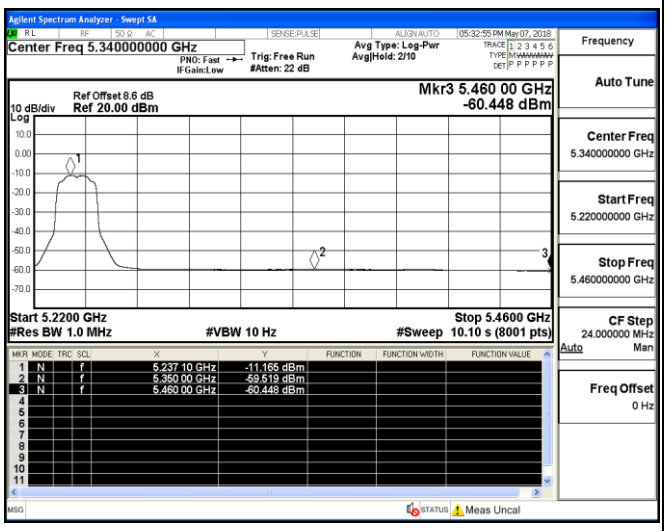
Undesirable emission-ant 0	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 36 / 5180 MHz – Peak	Channel 36 / 5180 MHz – Peak
	
Channel 36 / 5180 MHz – Average	Channel 36 / 5180 MHz – Average
	
Channel 48 / 5240 MHz – Peak	Channel 48 / 5240 MHz – Peak

Undesirable emission-ant 0	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 48 / 5240 MHz – Average	Channel 48 / 5240 MHz – Average
IEEE 802.11n HT40	IEEE 802.11n HT40
	
Channel 38 / 5190 MHz – Peak	Channel 46 / 5230 MHz – Peak
	
Channel 38 / 5190 MHz – Average	Channel 46 / 5230 MHz – Average

Undesirable emission-ant 0	
IEEE 802.11ac VHT20	IEEE 802.11ac VHT40
	
Channel 36 / 5180 MHz – Peak	Channel 38 / 5190 MHz – Peak
	
Channel 36 / 5180 MHz – Average	Channel 38 / 5190 MHz – Average
	
Channel 48 / 5240 MHz – Peak	Channel 46 / 5230 MHz – Peak

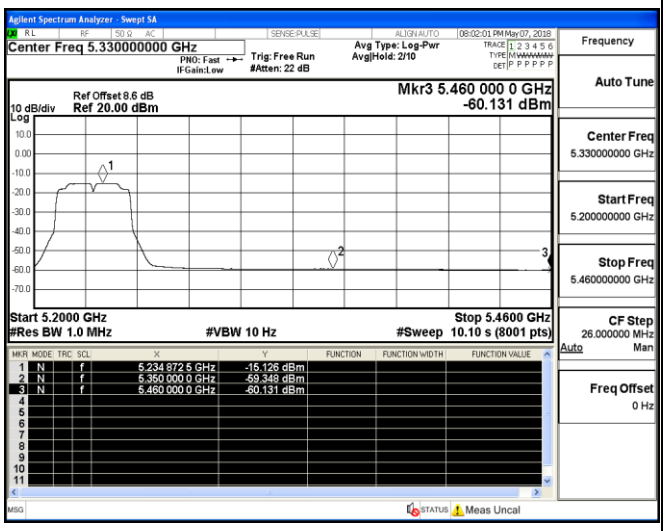
Undesirable emission-ant 0

IEEE 802.11ac VHT20



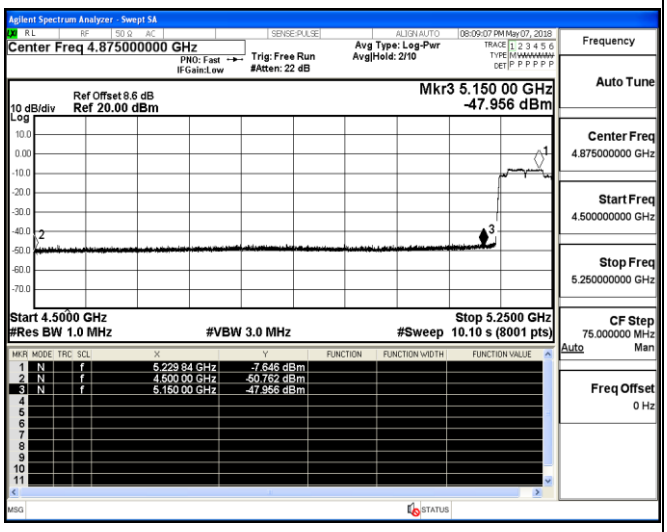
Channel 48 / 5240 MHz – Average

IEEE 802.11ac VHT40



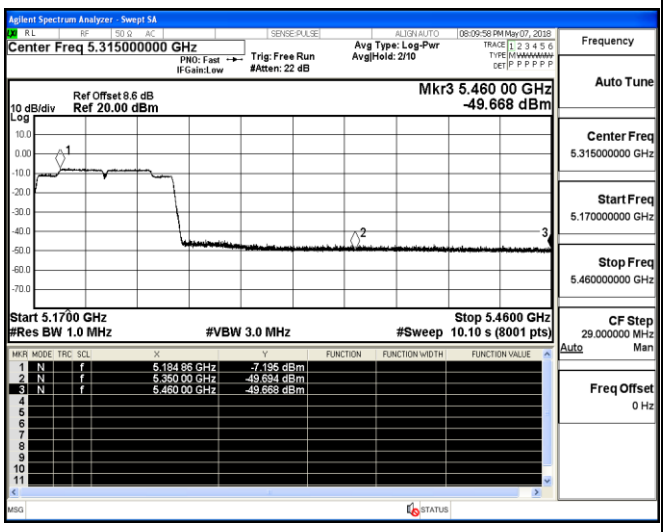
Channel 46 / 5230 MHz – Average

IEEE 802.11ac VHT80

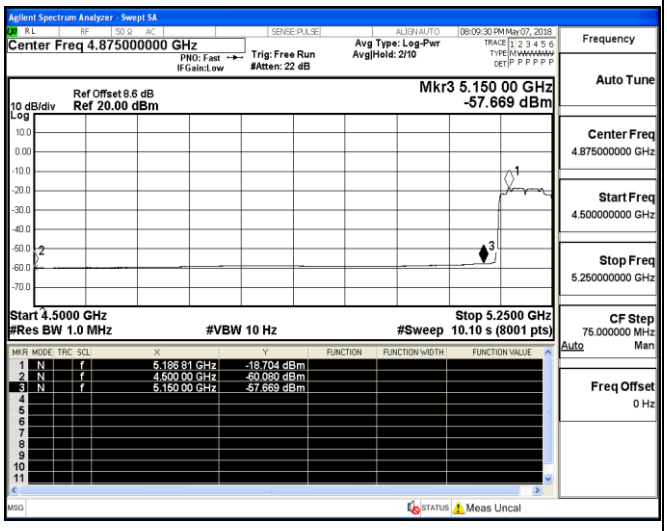


Channel 42 / 5210 MHz – Peak(left)

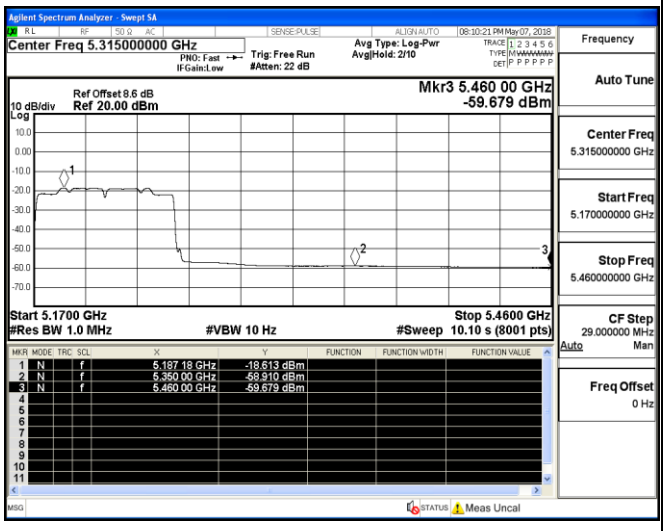
IEEE 802.11ac VHT80



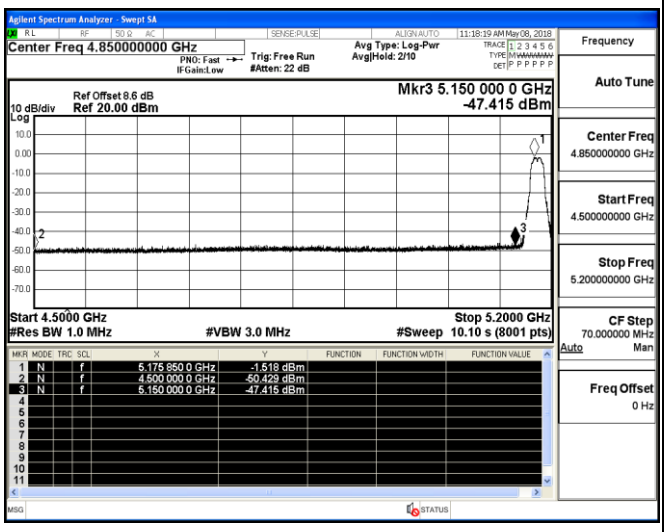
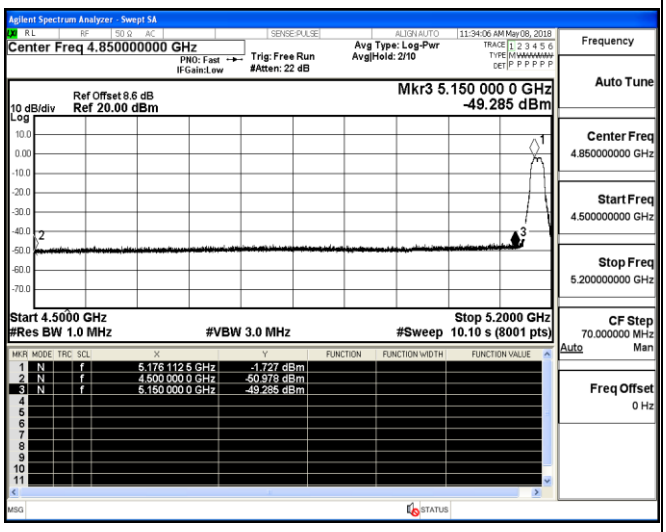
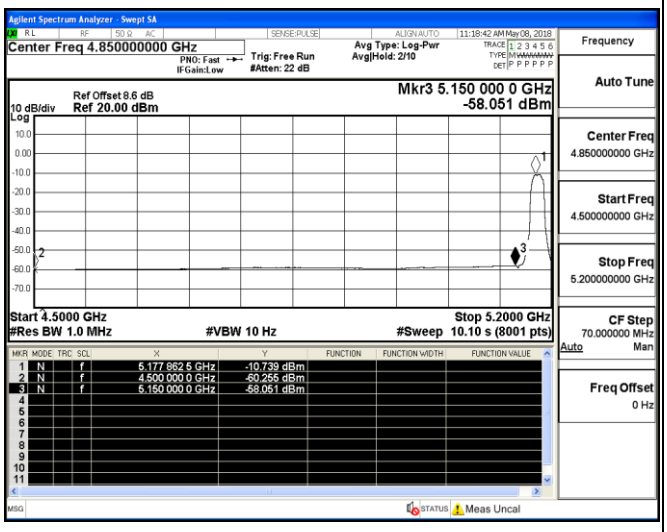
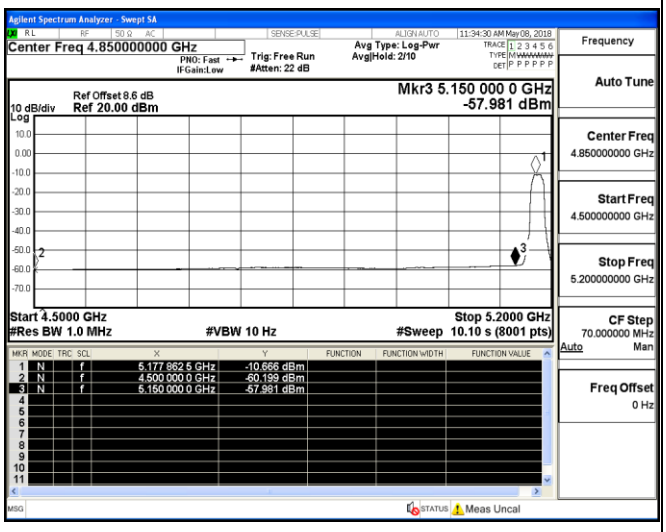
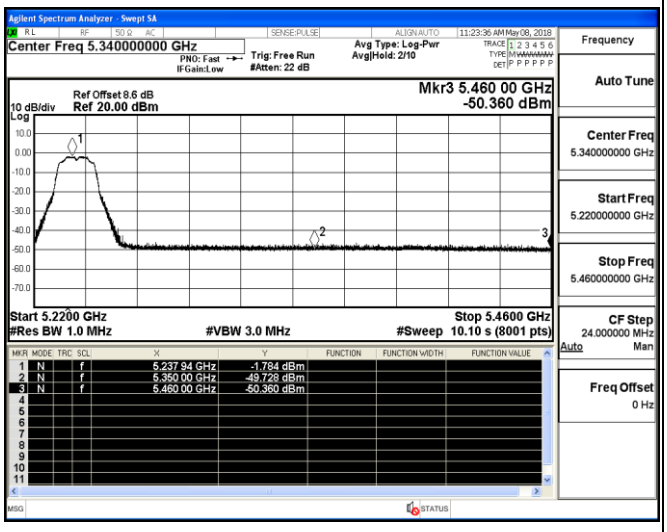
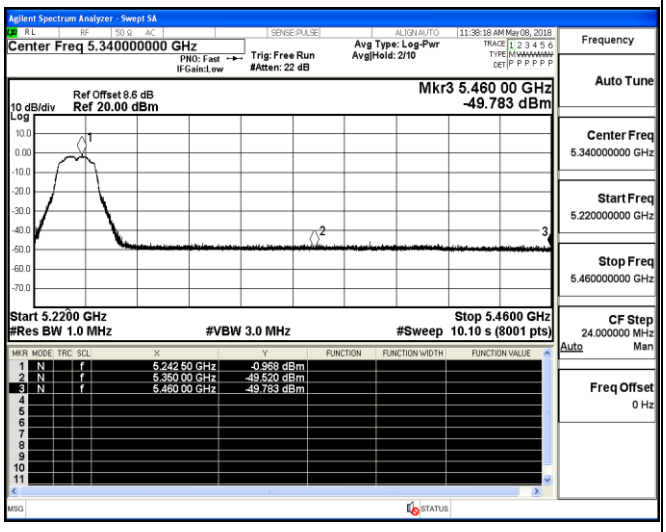
Channel 46 / 5230 MHz – Peak(right)



Channel 42 / 5210 MHz – Average(left)



Channel 46 / 5230 MHz – Average(right)

Undesirable emission-ant 1	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 36 / 5180 MHz – Peak	Channel 36 / 5180 MHz – Peak
	
Channel 36 / 5180 MHz – Average	Channel 36 / 5180 MHz – Average
	
Channel 48 / 5240 MHz – Peak	Channel 48 / 5240 MHz – Peak