

6dB Bandwidth

802.11a



802.11n HT20



CH149



CH149



CH157



CH157



CH165



CH165



6dB Bandwidth

802.11ac20



802.11n HT40



CH149



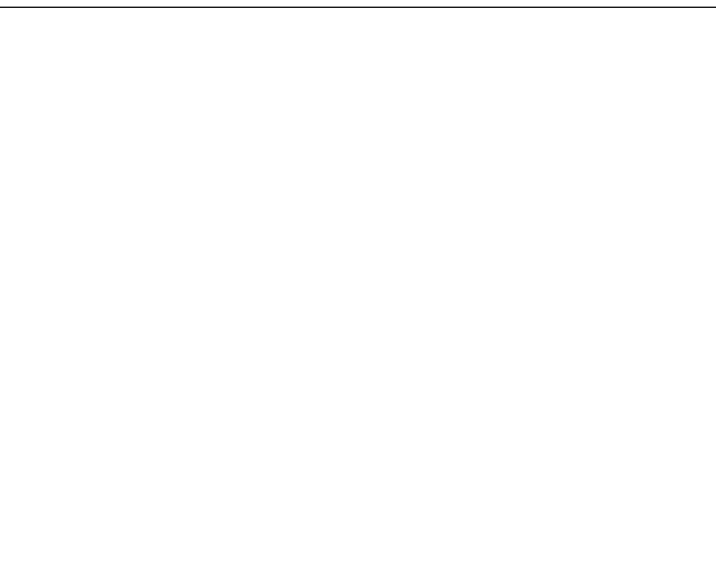
CH151



CH157



CH159



CH165

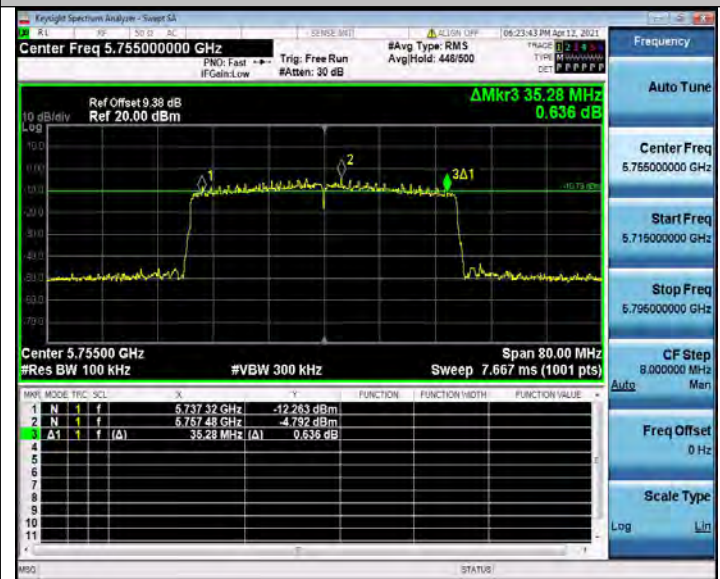


6dB Bandwidth

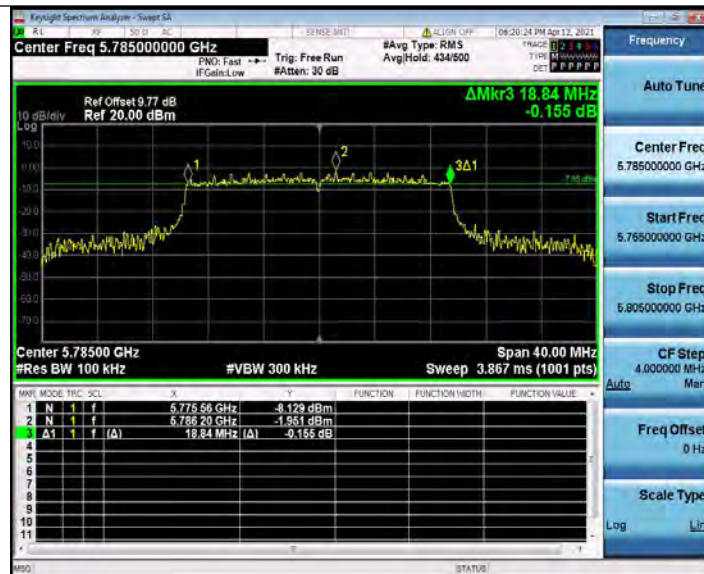
802.11ax20



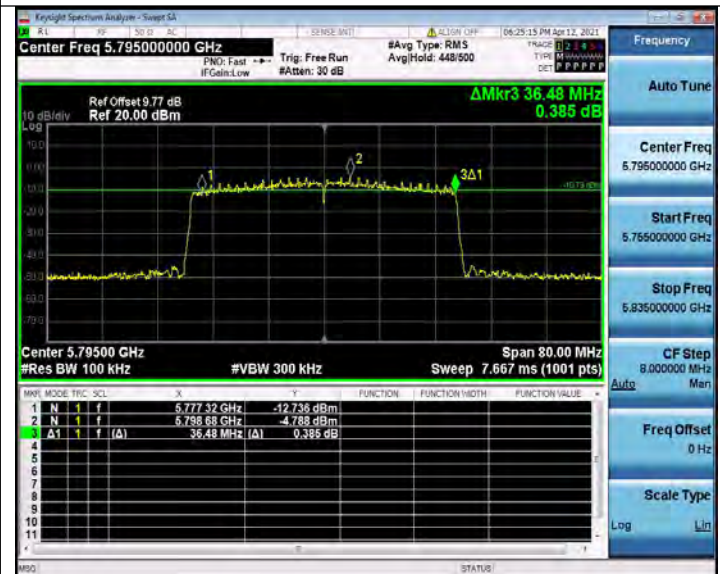
802.11ax HT40



CH149



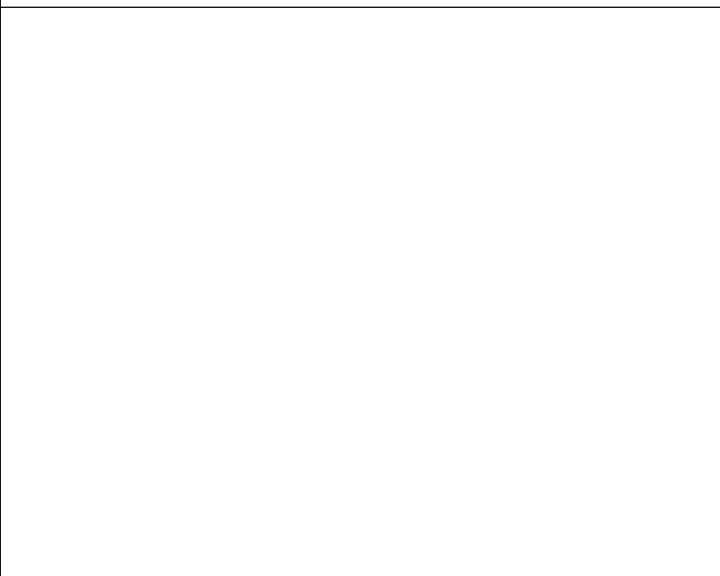
CH151



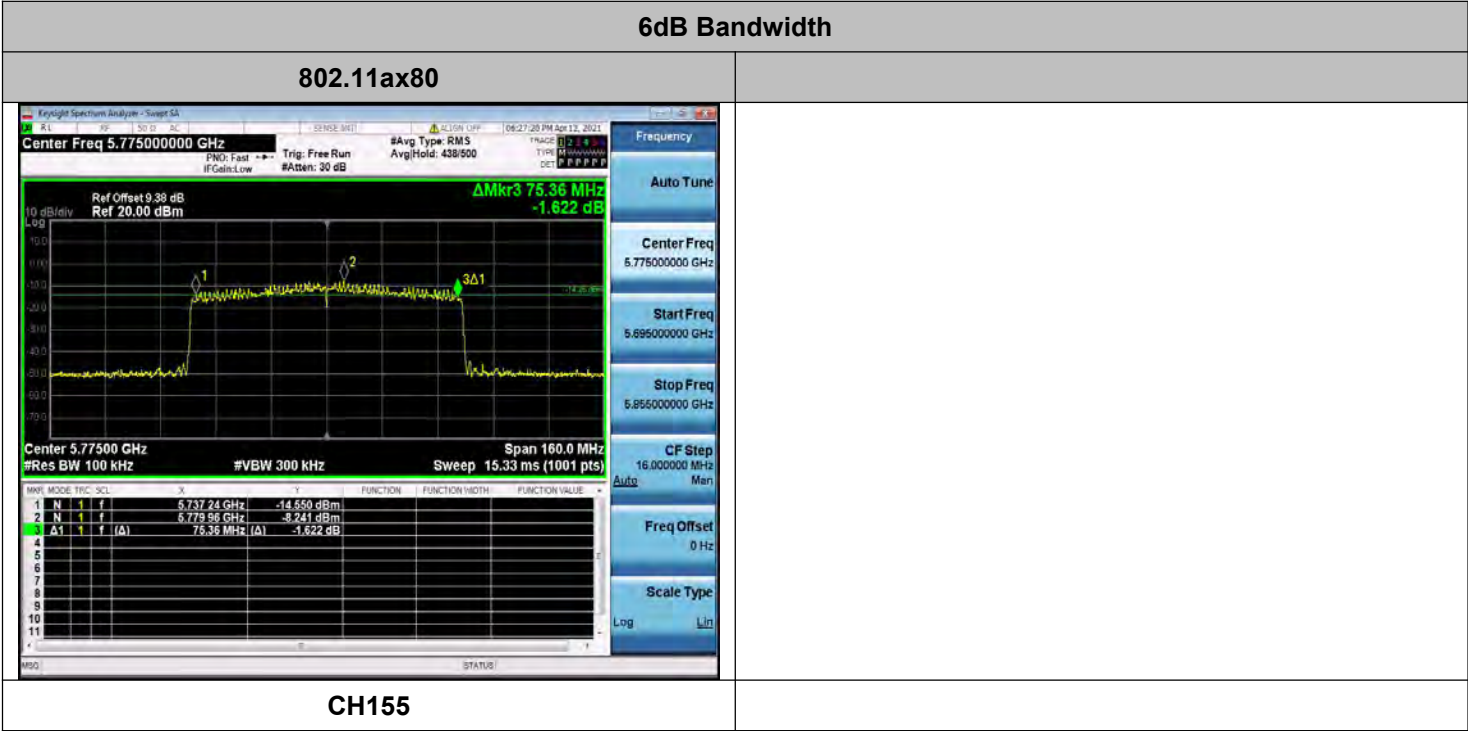
CH157



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CH165



4.7. 26dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

According to KDB789033 D02 General UNII Test Procedures New Rules v02r01 for one of the following procedures may be used for Emission Bandwidth (EBW) measurement:

- Set RBW = 300 kHz (approximately 1% of the emission bandwidth).
- Set the video bandwidth (VBW) = 1000 KHz (VBW > RBW)
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize
- Measure the maximum width of the emission that is 26 dB down from the maximum 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%.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

LIMIT

No Limits for 26dBc Bandwidth

TEST RESULTS

Temperature	23.6°C	Humidity	55.7%
Test Engineer	Moon Tan	Configurations	IEEE 802.11a/n/ac

Antenna 2:

Type	Channel	99%Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	36	16.986	20.120	-	Pass
	40	16.965	19.800		
	48	17.028	19.880		
802.11nHT20	36	17.875	20.280	-	Pass
	40	17.949	20.360		
	48	17.884	20.160		
802.11ac20	36	36.039	40.080	-	Pass
	40	36.029	40.240		
	48	17.944	20.360		
802.11n40	38	17.935	20.360	-	Pass
	46	17.926	20.400		
802.11ac40	38	36.121	40.320	-	Pass
	46	36.088	40.320		
802.11ac80	42	75.067	79.520	-	Pass
802.11ax20	36	19.270	25.880	-	Pass
	40	19.297	23.680		
	48	19.233	22.480		
802.11ax40	38	37.603	39.760	-	Pass
	46	37.535	39.600		
802.11ax80	42	76.788	80.000	-	Pass

Antenna 3:

Type	Channel	99%Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	36	17.024	19.960	-	Pass
	40	16.971	20.080		
	48	17.038	20.040		
802.11nHT20	36	17.921	20.320	-	Pass
	40	17.998	20.440		
	48	17.975	20.400		
802.11ac20	36	36.038	40.080	-	Pass
	40	36.093	40.320		
	48	17.904	20.400		
802.11n40	38	17.880	20.440	-	Pass
	46	17.889	20.480		
802.11ac40	38	36.095	39.840	-	Pass
	46	36.023	40.320		
802.11ac80	42	74.984	79.360	-	Pass
802.11ax20	36	19.272	22.800	-	Pass
	40	19.256	24.760		
	48	19.226	24.600		
802.11ax40	38	37.506	39.600	-	Pass
	46	37.570	39.520		
802.11ax80	42	76.647	80.320	-	Pass

Antenna 2:

99%Bandwidth

802.11a

802.11n HT20



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99%Bandwidth

802.11ac20



802.11n HT40



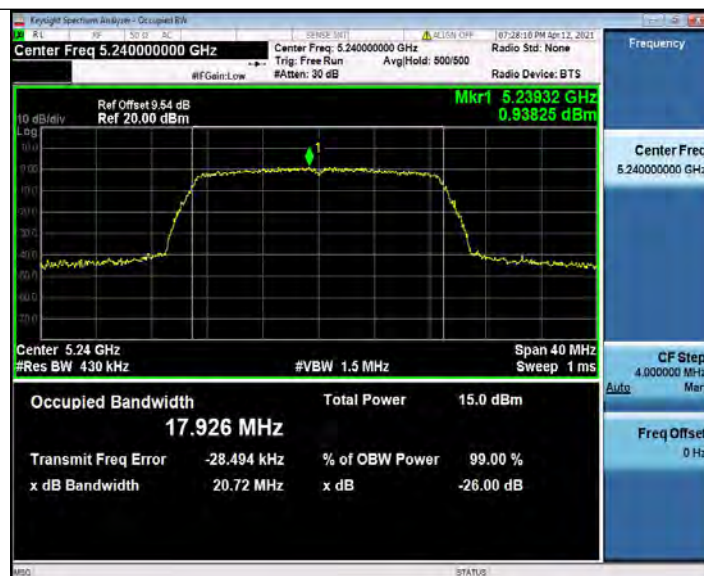
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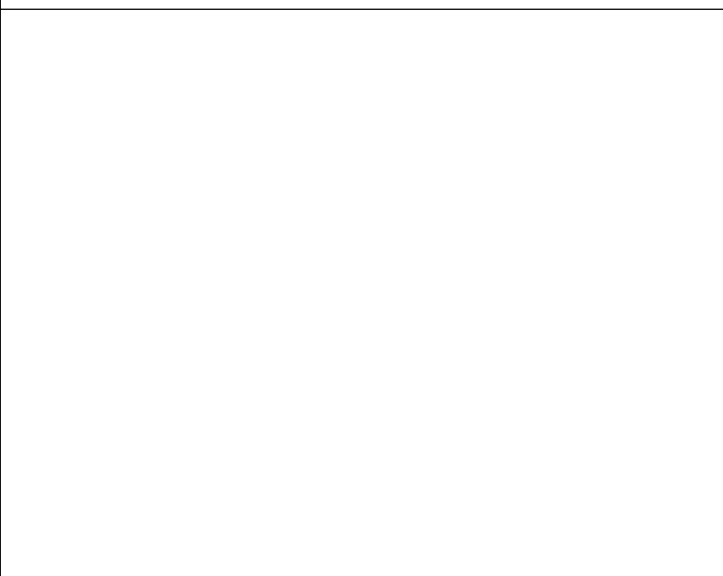
CH38



CH40



CH46

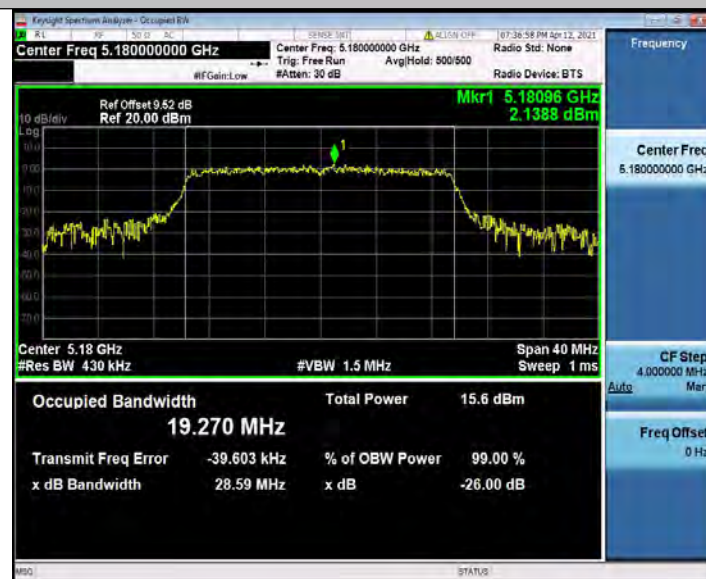


CH48



99%Bandwidth

802.11ax20



802.11ax HT40



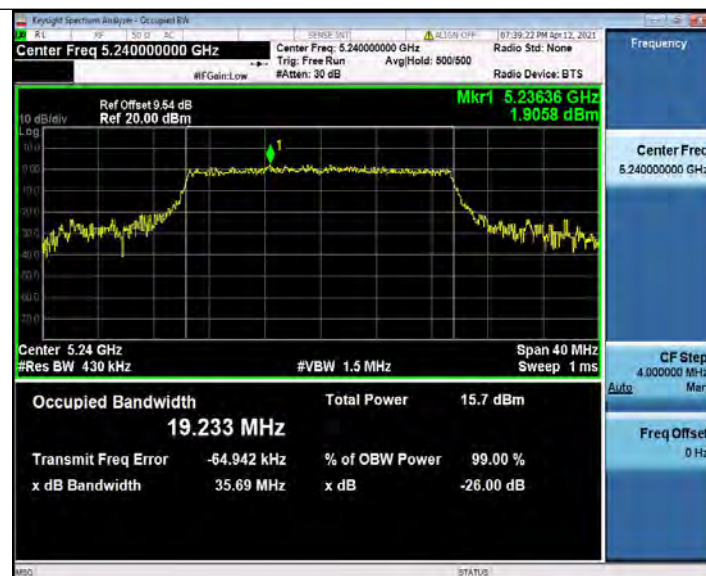
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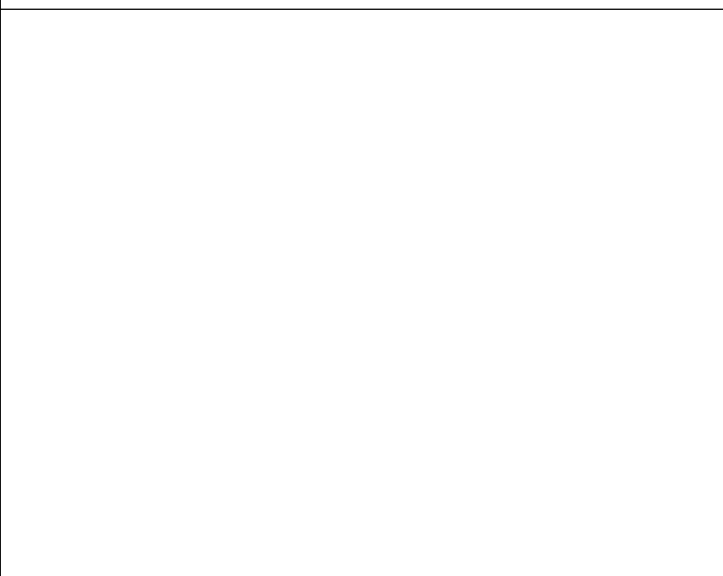
CH38



CH40



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CH48

99%Bandwidth

802.11ax80



CH42

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26dB Bandwidth

802.11a



802.11n HT20



CH36



CH36



CH40



CH40



CH48

CH48

26dB Bandwidth

802.11ac20



802.11n HT40



CH36



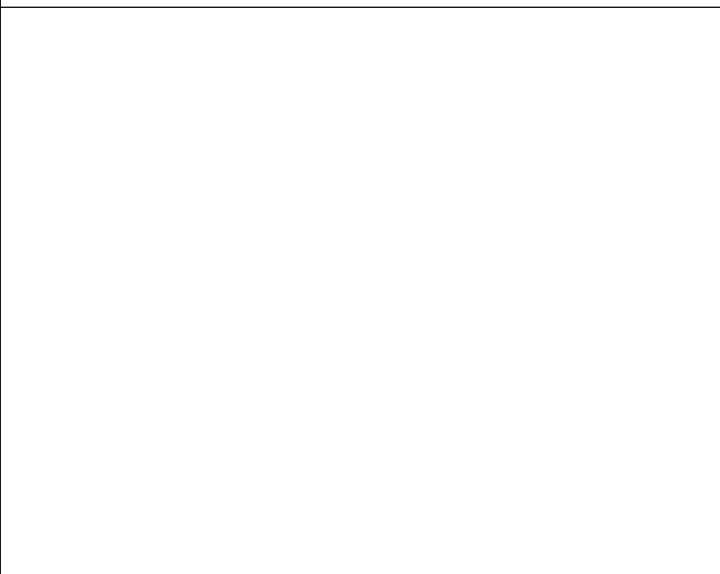
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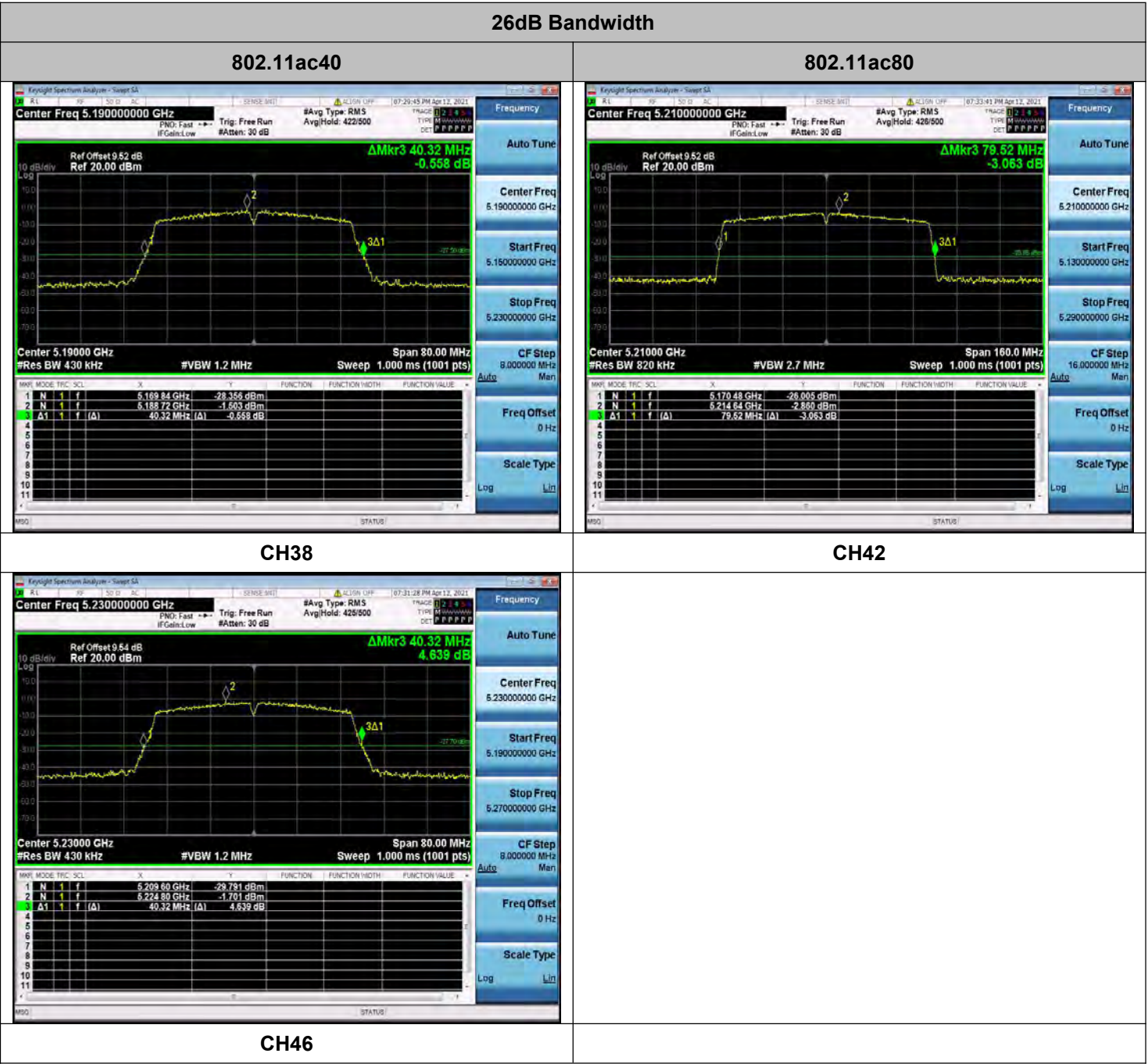
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26dB Bandwidth

802.11ax20



802.11ax HT40



CH36



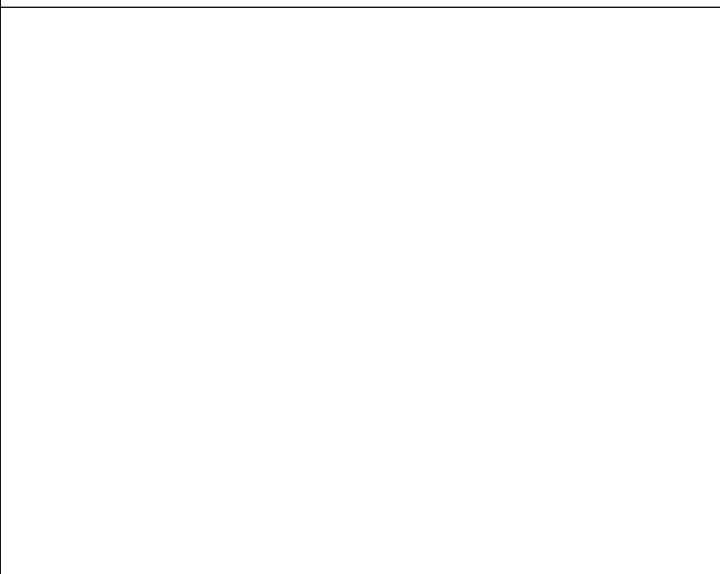
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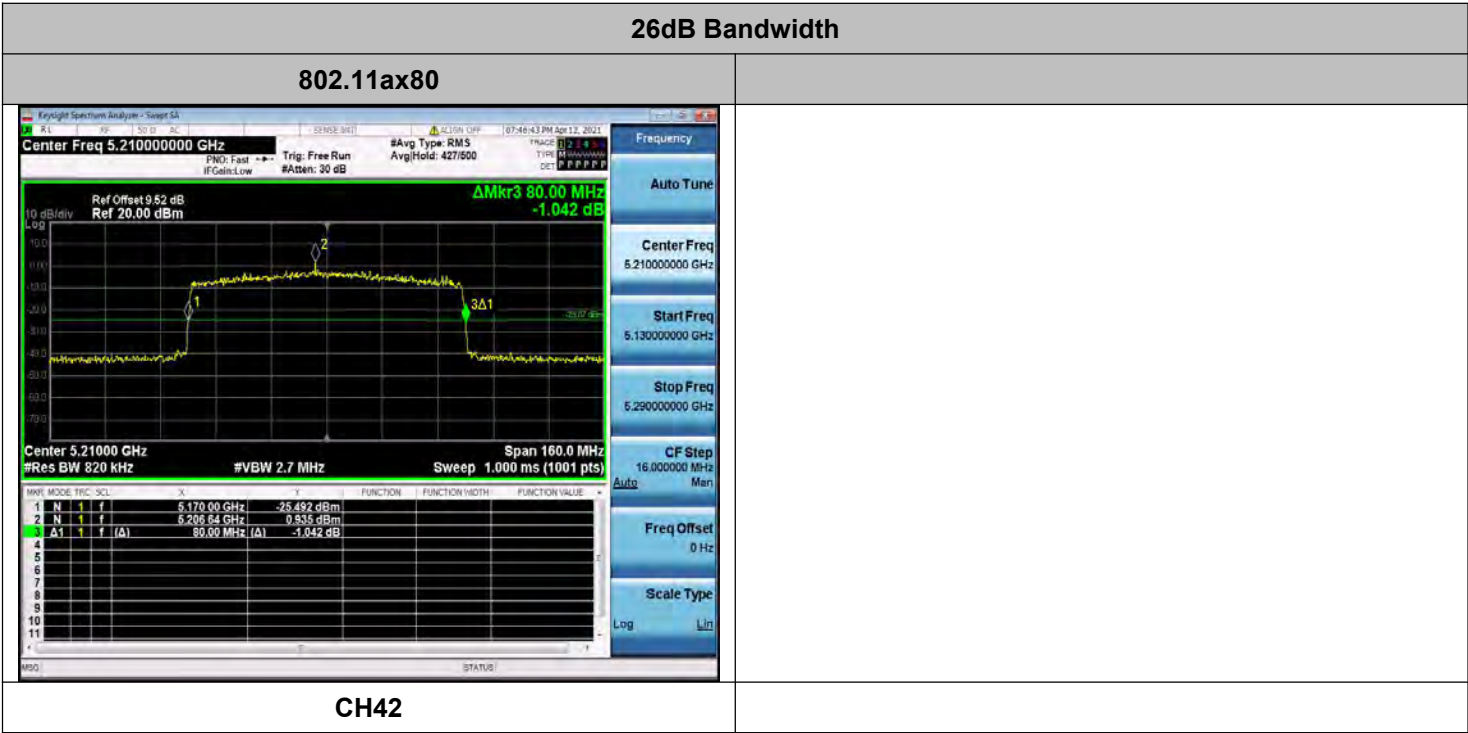
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Antenna 3:

99%Bandwidth

802.11a

802.11n HT20



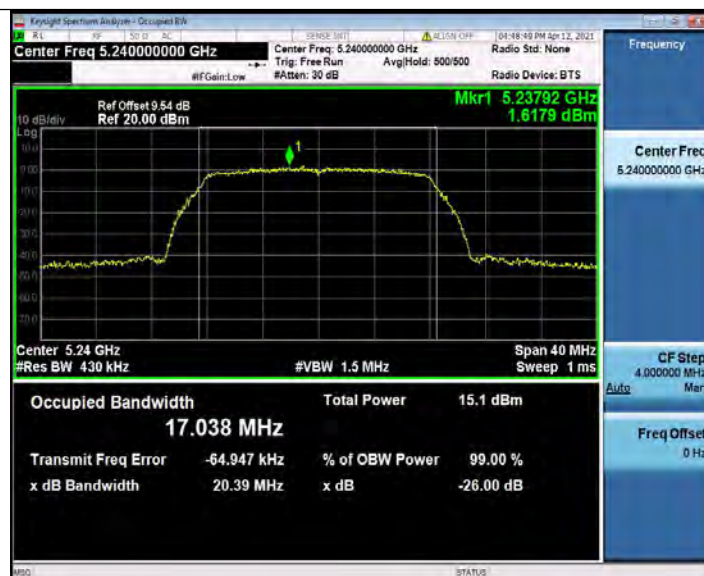
CH36

CH36



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CH48

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99%Bandwidth

802.11ac20



802.11n HT40



CH36



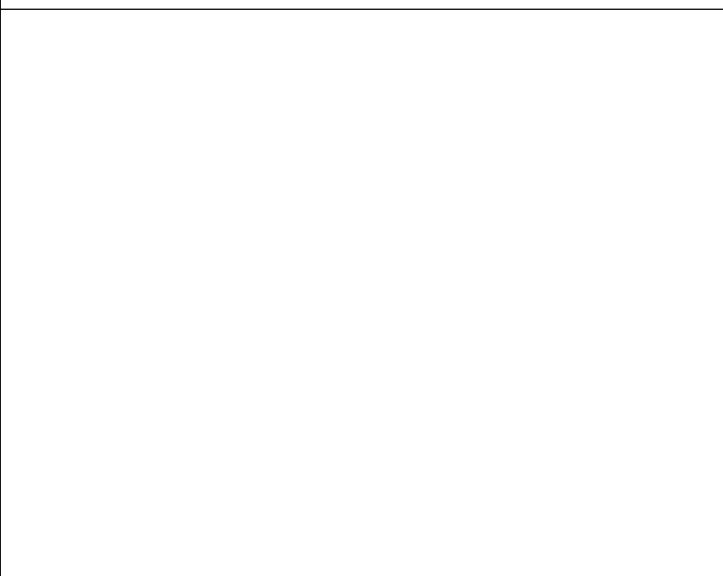
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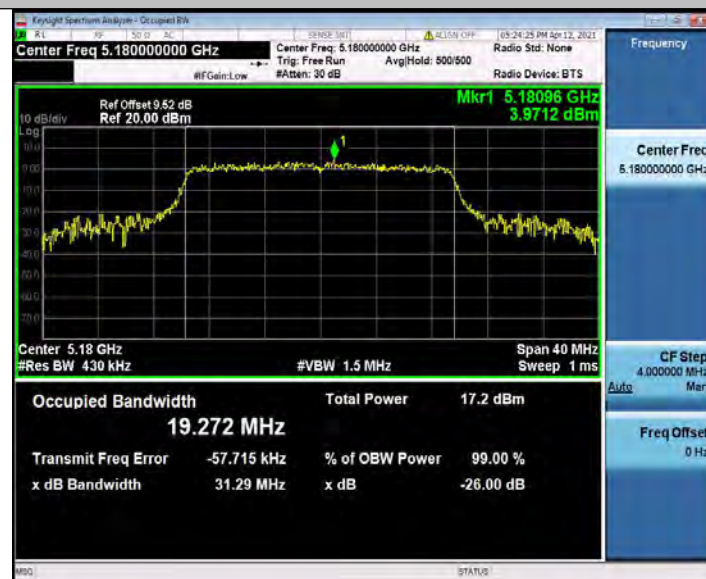


CH48



99%Bandwidth

802.11ax20



802.11ax HT40



CH36



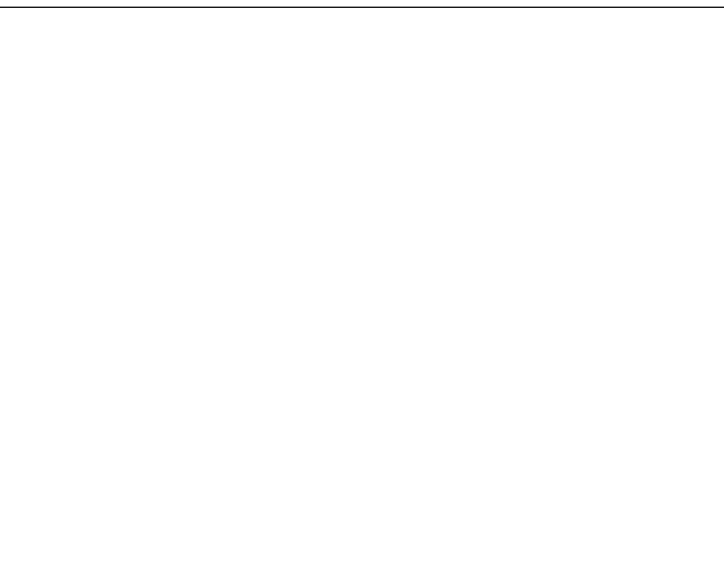
CH38



CH40



CH46



CH48

99%Bandwidth

802.11ax80



CH42

26dB Bandwidth

802.11a



802.11n HT20



CH36



CH36



CH40



CH40



CH48



CH48



26dB Bandwidth

802.11ac20



802.11n HT40



CH36



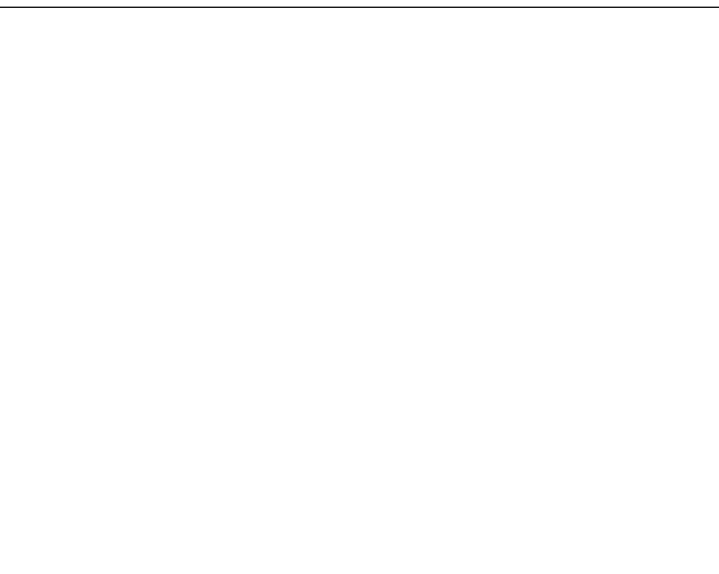
CH38



CH40



CH46

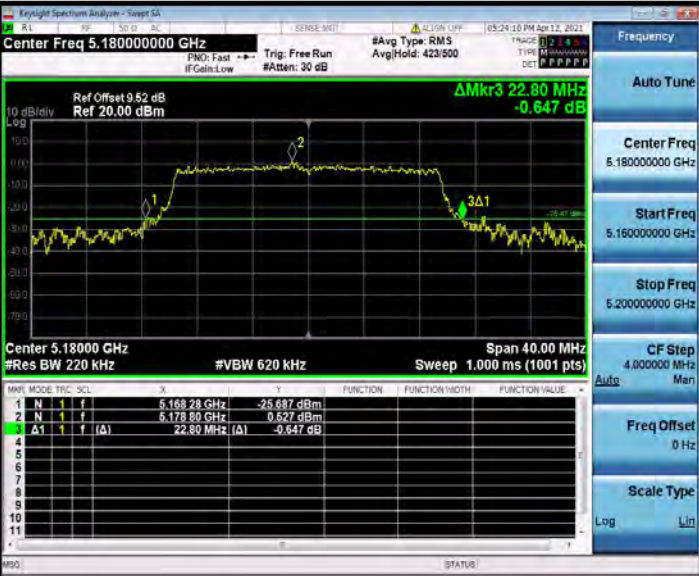


CH48



26dB Bandwidth

802.11ax20



802.11ax HT40



CH36



CH38



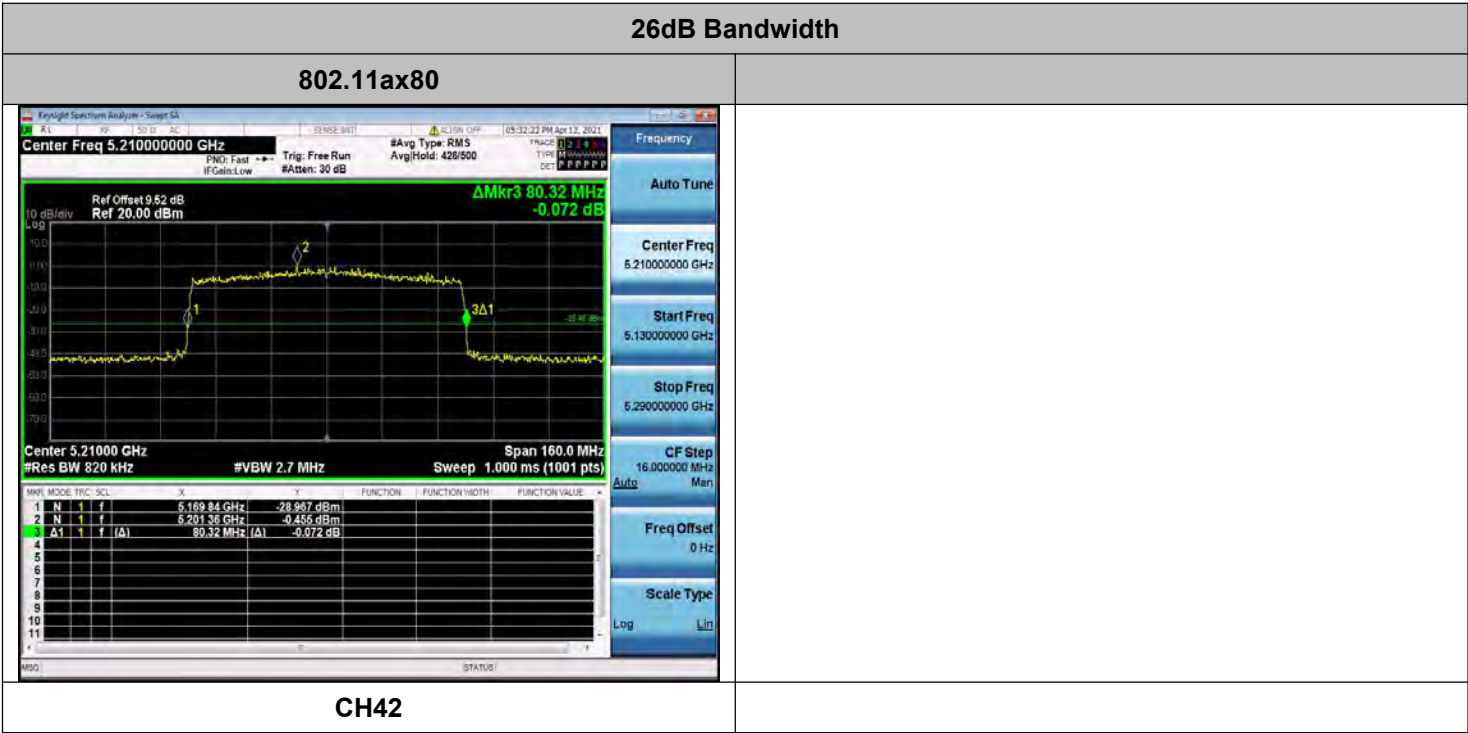
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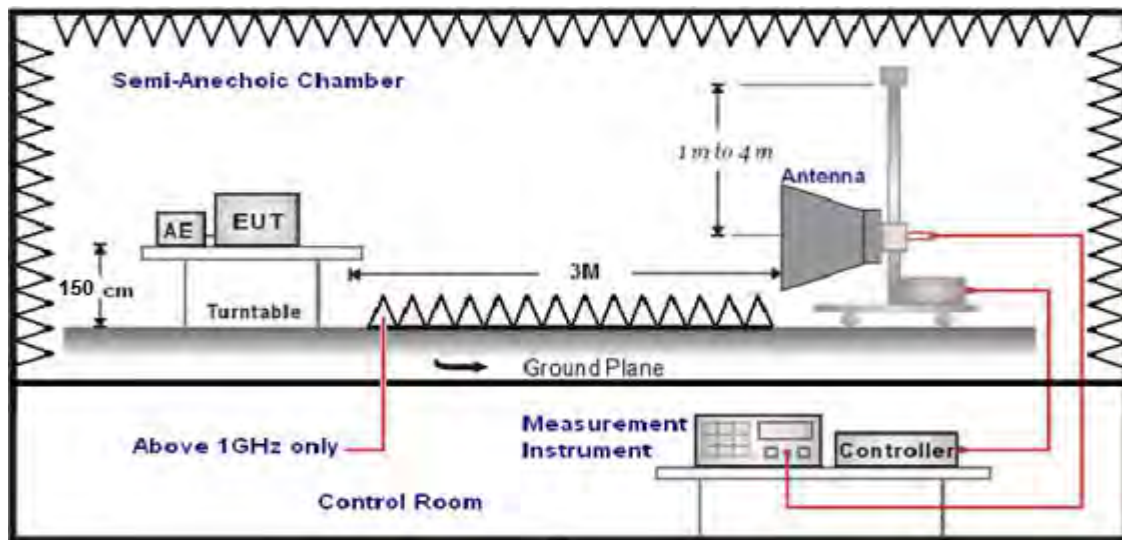


CH48



4.8. Band Edge Compliance

TEST CONFIGURATION



LIMIT

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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.

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz})) + 40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz})) + 40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30) + 40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

According to §15.407 (b): 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

Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dB μ V/m)
5150-5250	-27	68.2
5250-5350	-27	68.2
5470-5725	-27	68.2
5725-5850	-27 (beyond 10MHz of the bandedge)	68.2
	-17 (within 10 MHz of band edge)	78.2

TEST PROCEDURE

1. The EUT was placed on a turn table which is 1.5m above 1GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
1GHz-18GHz	Double Ridged Horn Antenna	3

6. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
1GHz-18GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

TEST RESULTS

Remark:For radiated bandedge We measured at both mode, recorded worst case in Antenna 2's 802.11 ac20 mode;

For Radiated Bandedge Measurement

Temperature	22.3°C	Humidity	54.5%
Test Engineer	Moon Tan	Configurations	IEEE 802.11a/n/ac

802.11 ac20/ Channel 36 :5180 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
4500.0	35.09	35.58	29.04	8.28	49.91	74.00	-24.09	Peak	Horizontal
4500.0	30.00	35.58	29.04	8.28	44.82	54.00	-9.18	AV	Horizontal
5150.0	39.20	35.58	29.04	8.28	54.02	74.00	-19.98	Peak	Horizontal
5150.0	30.61	35.58	29.04	8.28	45.43	54.00	-8.57	AV	Horizontal

802.11 ac20/ Channel 48 :5240 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
5350.0	35.25	35.42	29.06	8.39	50.00	74.00	-24.00	Peak	Horizontal
5350.0	30.23	35.42	29.06	8.39	44.98	54.00	-9.02	AV	Horizontal
5460.0	39.29	35.42	29.06	8.39	54.04	74.00	-19.96	Peak	Horizontal
5460.0	30.53	35.42	29.06	8.39	45.28	54.00	-8.72	AV	Horizontal

NOTE: We measured Radiated Emission at Antenna 2 & Antenna 3 mode from 1GHz to 25GHz and the worst case was recorded.

802.11 ac20/ Channel 149 :5745 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
5650.0	35.24	35.35	29.07	8.43	49.95	68.20	-18.25	Peak	Horizontal
5700.0	30.21	35.35	29.07	8.43	44.92	68.20	-23.28	Peak	Horizontal
5720.0	39.22	35.35	29.07	8.43	53.93	68.20	-14.27	Peak	Horizontal
5725.0	30.67	35.35	29.07	8.43	45.38	68.20	-22.82	Peak	Horizontal

802.11 ac20/ Channel 165 :5825 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
5850.0	35.07	35.3	29.11	8.51	49.77	68.20	-18.43	Peak	Horizontal
5855.0	30.28	35.3	29.11	8.51	44.98	68.20	-23.22	Peak	Horizontal
5875.0	39.12	35.3	29.11	8.51	53.82	68.20	-14.38	Peak	Horizontal
5925.0	30.71	35.3	29.11	8.51	45.41	68.20	-22.79	Peak	Horizontal

NOTE: We measured Radiated Emission at Antenna 2& Antenna 3 mode from 1GHz to 25GHz and the worst case was recorded.

2*2MIMO:

802.11 ac20/ Channel 36 :5180 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
4500.0	35.07	35.58	29.04	8.28	49.89	74.00	-24.11	Peak	Horizontal
4500.0	30.28	35.58	29.04	8.28	45.10	54.00	-8.90	AV	Horizontal
5150.0	39.21	35.58	29.04	8.28	54.03	74.00	-19.97	Peak	Horizontal
5150.0	30.49	35.58	29.04	8.28	45.31	54.00	-8.69	AV	Horizontal

802.11 ac20/ Channel 48 :5240 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
5350.0	35.01	35.42	29.06	8.39	49.76	74.00	-24.24	Peak	Horizontal
5350.0	30.14	35.42	29.06	8.39	44.89	54.00	-9.11	AV	Horizontal
5460.0	39.28	35.42	29.06	8.39	54.03	74.00	-19.97	Peak	Horizontal
5460.0	30.72	35.42	29.06	8.39	45.47	54.00	-8.53	AV	Horizontal

NOTE: All modes are tested, only the worst mode is recorded

802.11 ac20/ Channel 149 :5745 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
5650.0	35.20	35.35	29.07	8.43	49.91	68.20	-18.29	Peak	Horizontal
5700.0	30.18	35.35	29.07	8.43	44.89	68.20	-23.31	Peak	Horizontal
5720.0	39.13	35.35	29.07	8.43	53.84	68.20	-14.36	Peak	Horizontal
5725.0	30.71	35.35	29.07	8.43	45.42	68.20	-22.78	Peak	Horizontal

802.11 ac20/ Channel 165 :5825 MHz									
Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector	Polarization
5850.0	35.06	35.3	29.11	8.51	49.76	68.20	-18.44	Peak	Horizontal
5855.0	30.21	35.3	29.11	8.51	44.91	68.20	-23.29	Peak	Horizontal
5875.0	39.17	35.3	29.11	8.51	53.87	68.20	-14.33	Peak	Horizontal
5925.0	30.58	35.3	29.11	8.51	45.28	68.20	-22.92	Peak	Horizontal

NOTE: All modes are tested, only the worst mode is recorded

REMARKS:

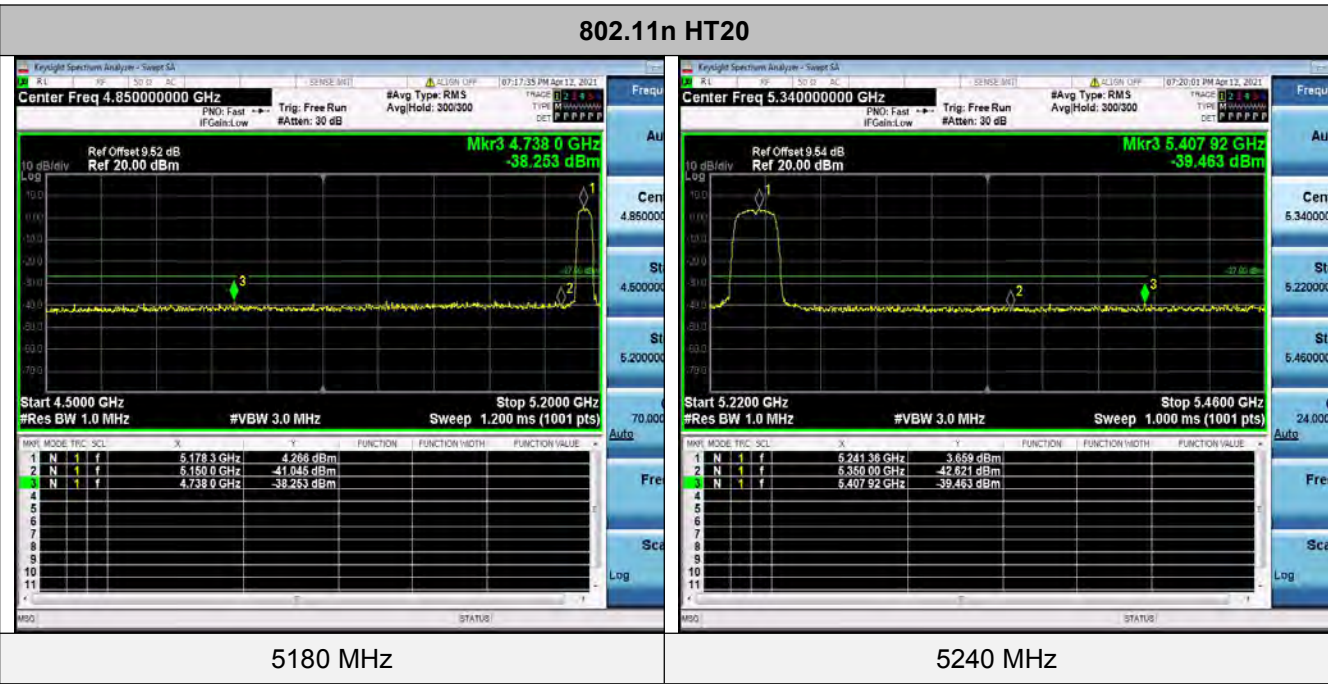
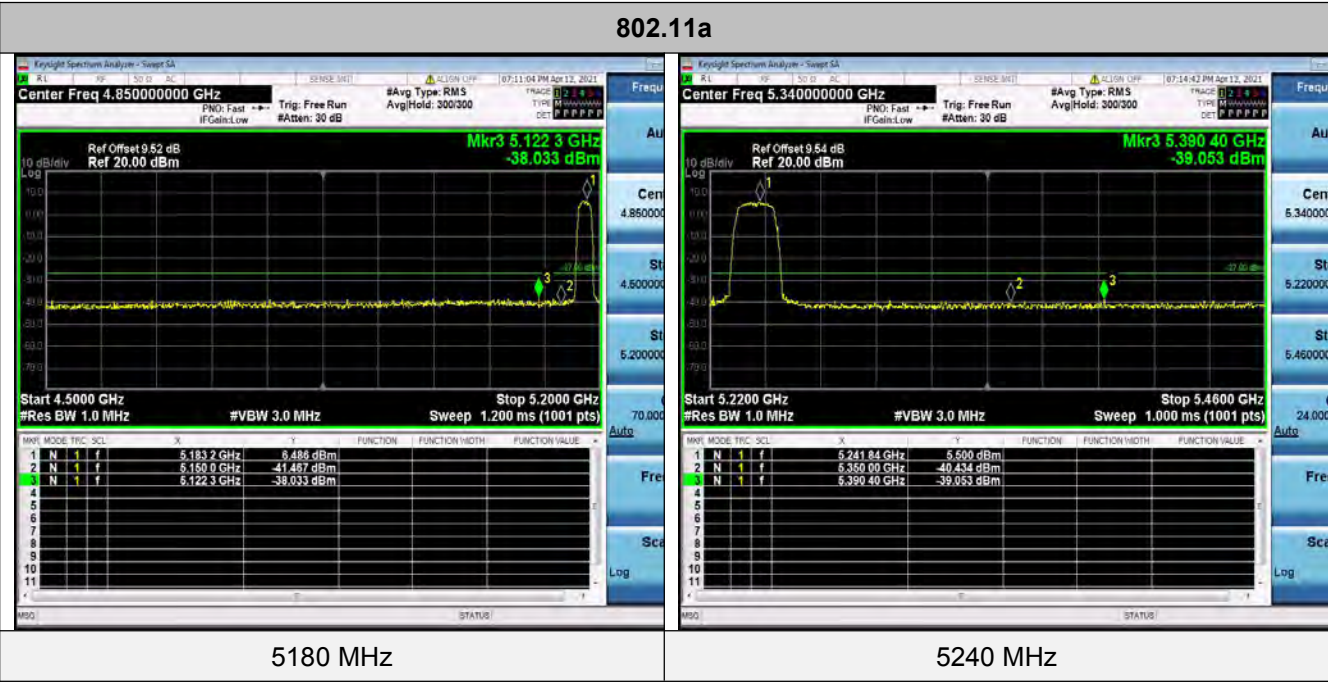
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. Margin value = Result Level-Limit value.
2. The other emission levels were very low against the limit.
3. The average measurement was not performed when the peak measured data under the limit of average detection.
4. Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=10Hz/Sweep time=Auto/Detector=Peak;

For Conducted Band edge Measurement

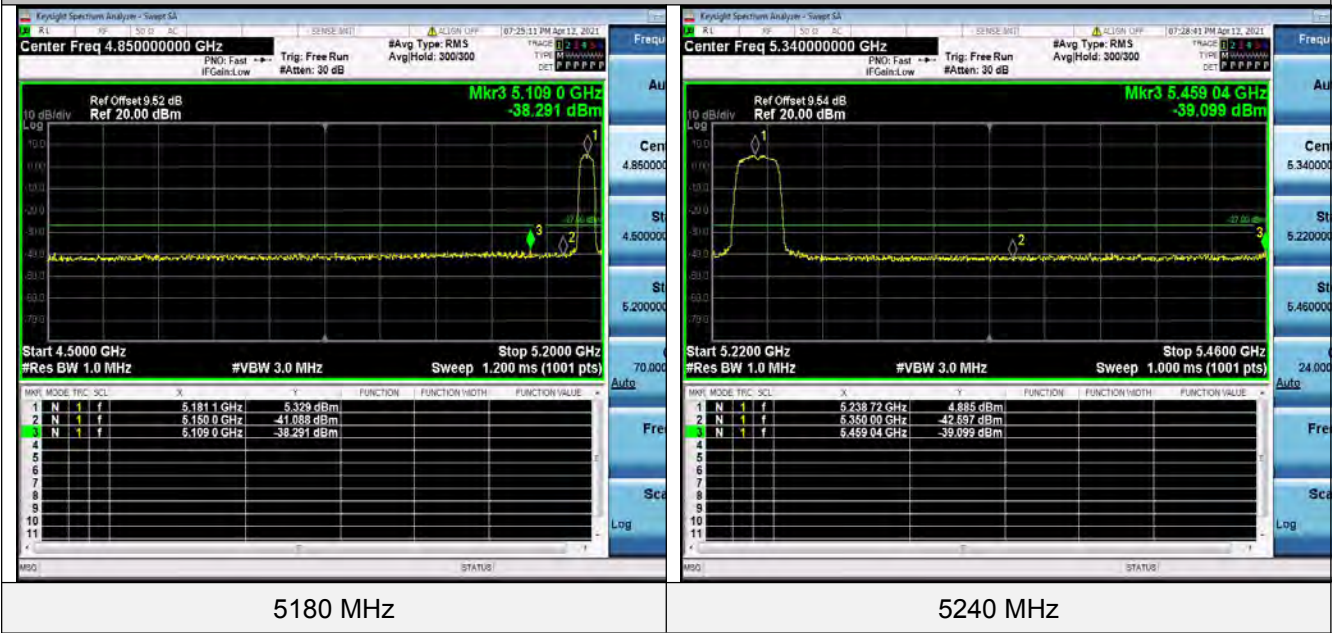
Temperature	23.6℃	Humidity	55.7%
Test Engineer	Moon Tan	Configurations	IEEE 802.11a/n/ac

The test results have included the antenna gain

Antenna 2:
5150-5250MHz:



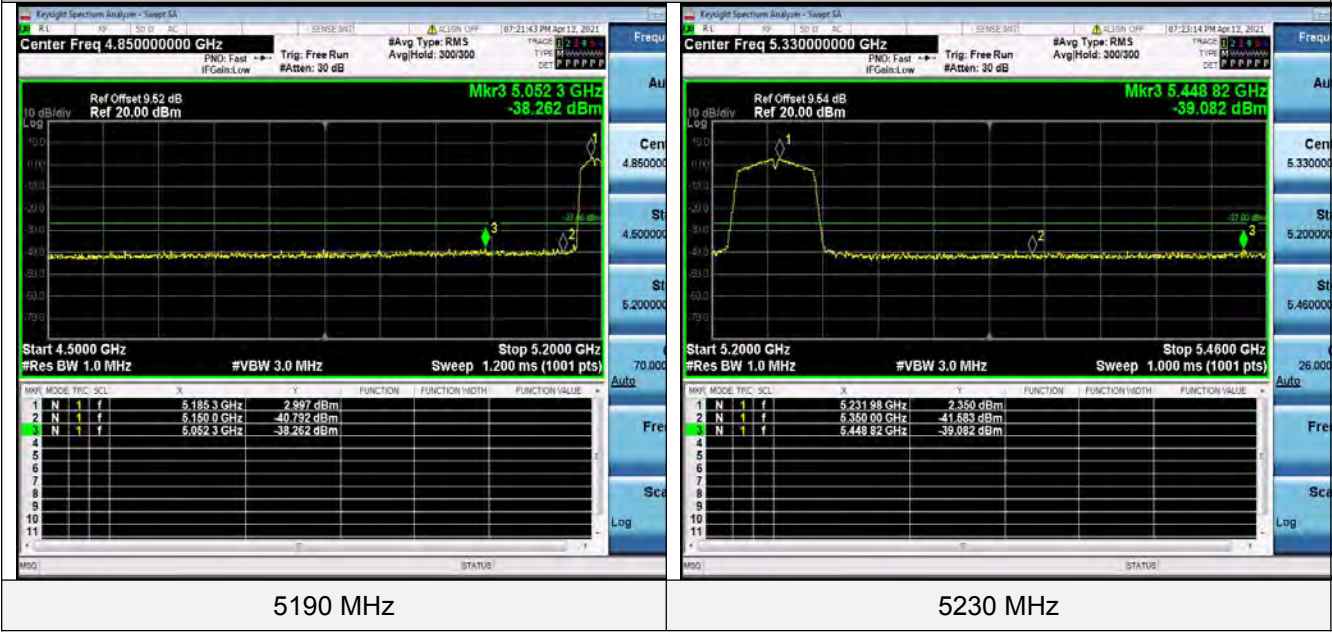
802.11ac20



5180 MHz

5240 MHz

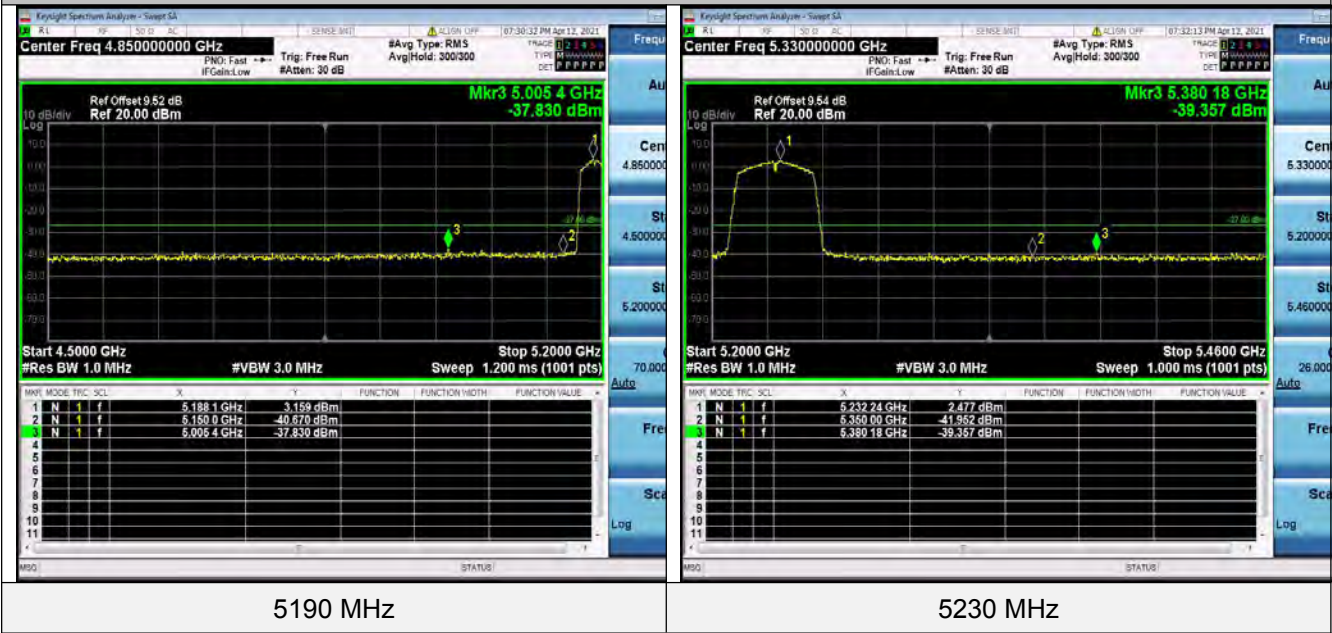
802.11n HT40



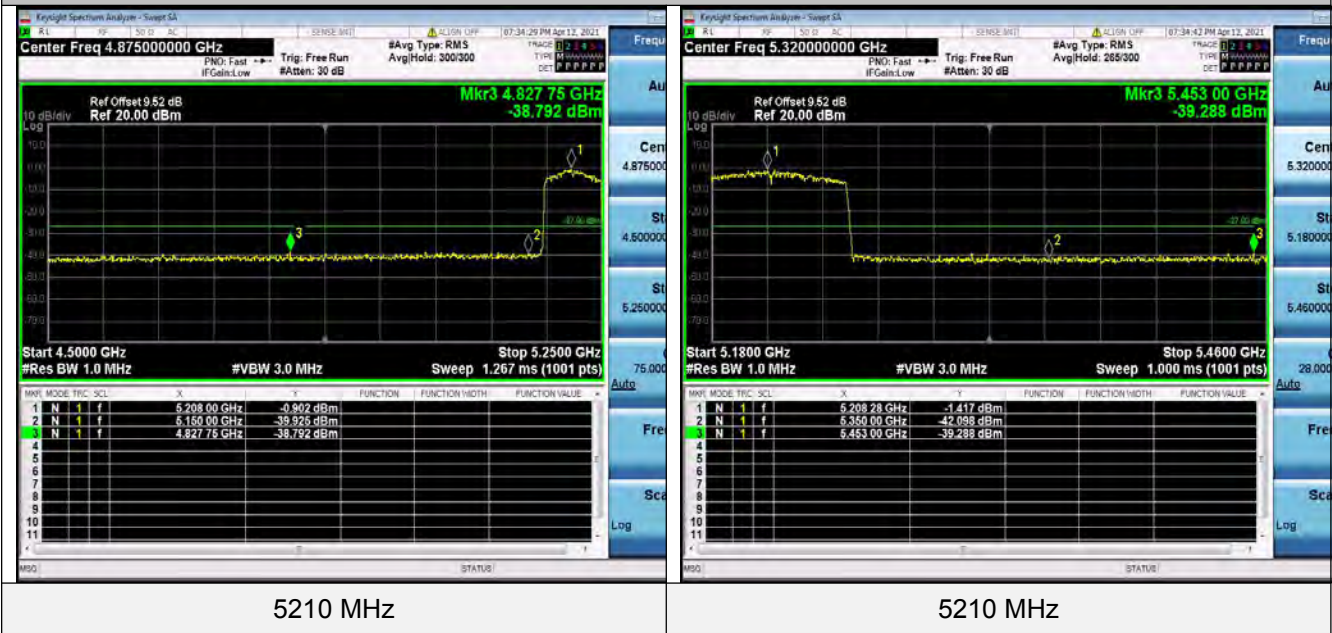
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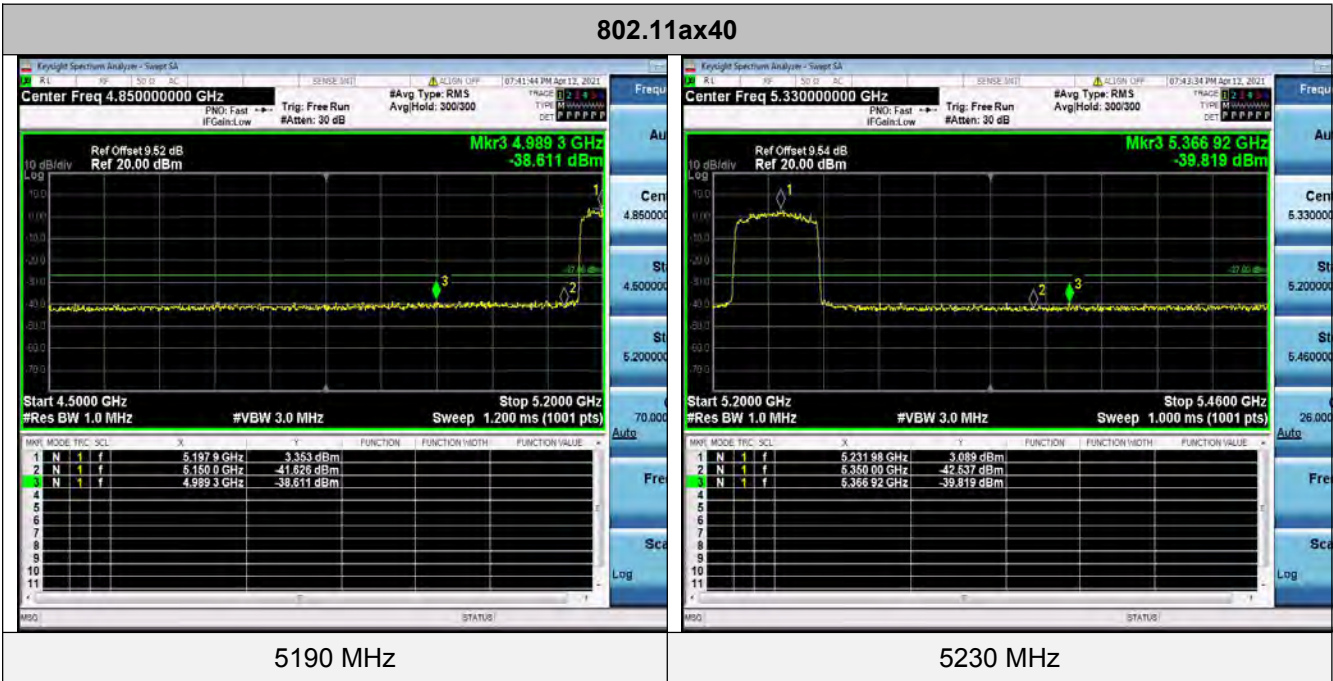
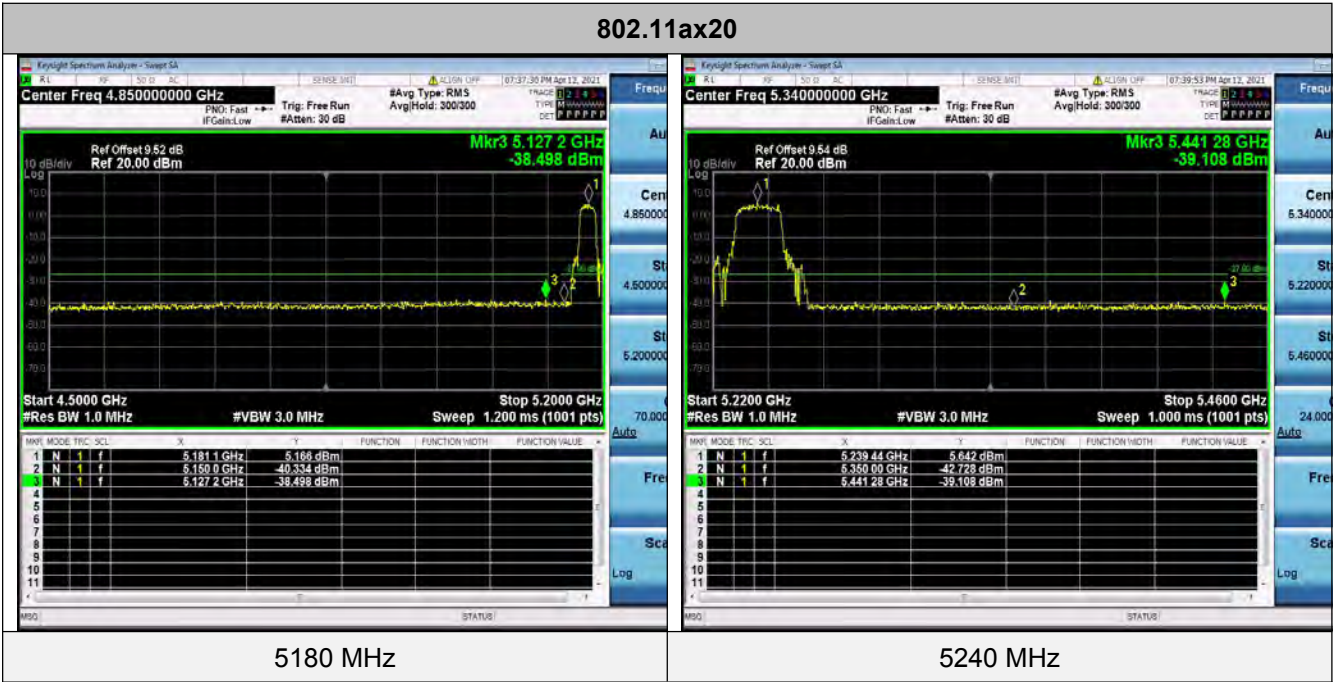
5230 MHz

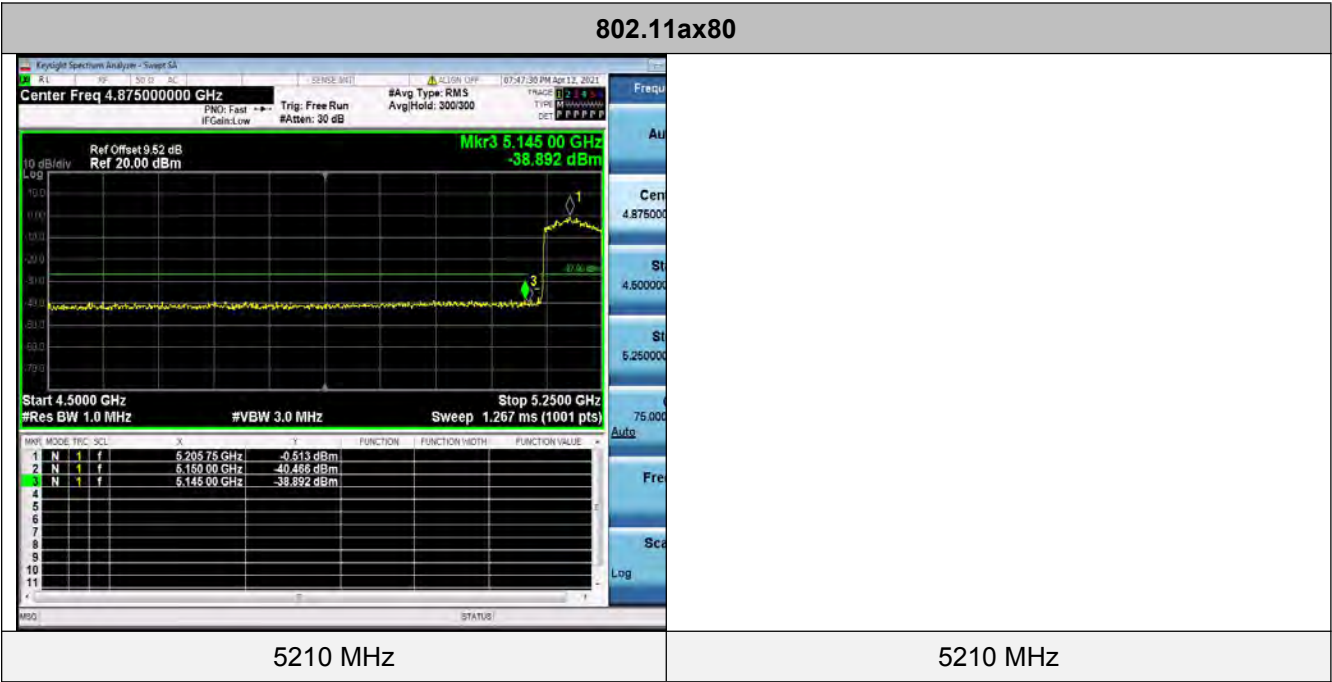
802.11ac40



802.11ac80

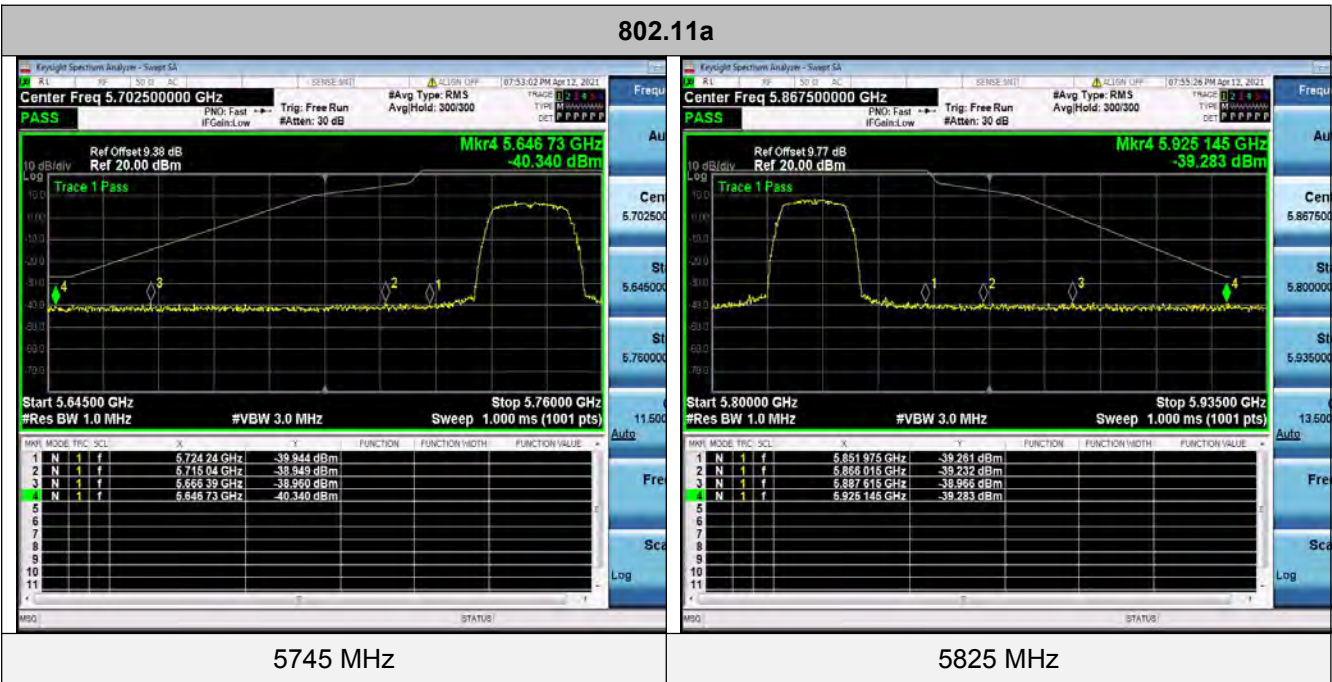


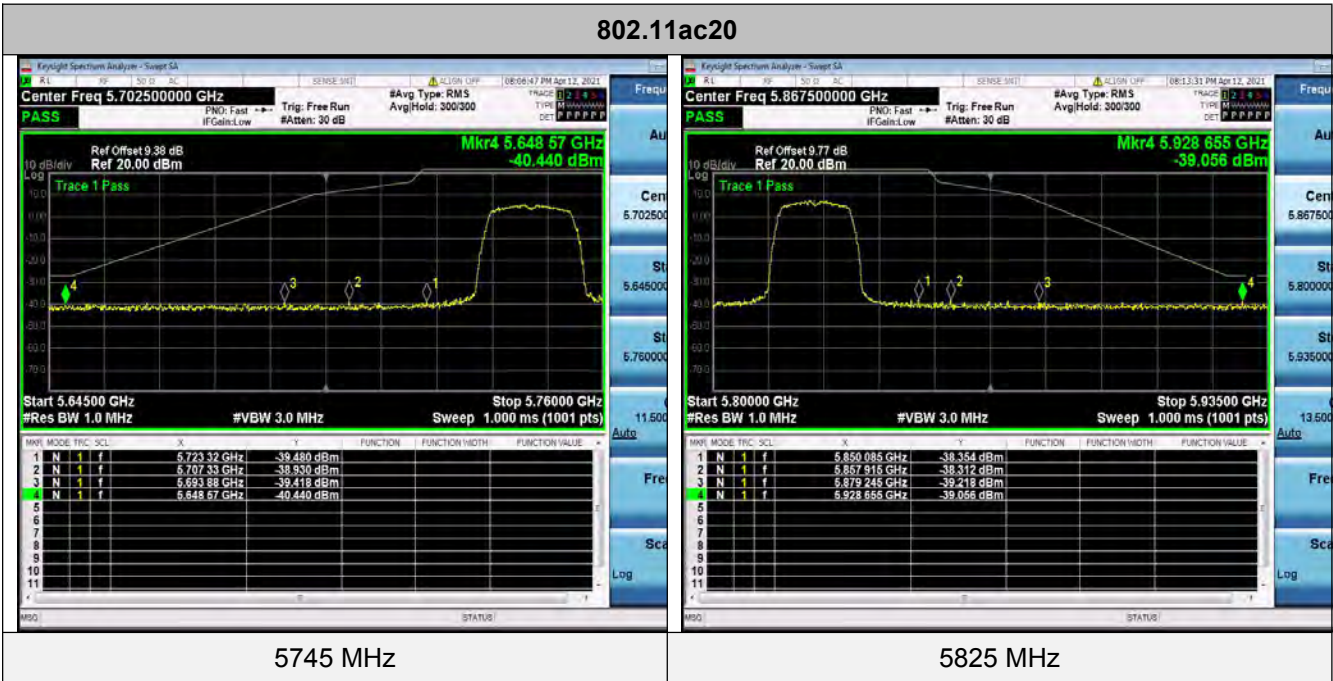
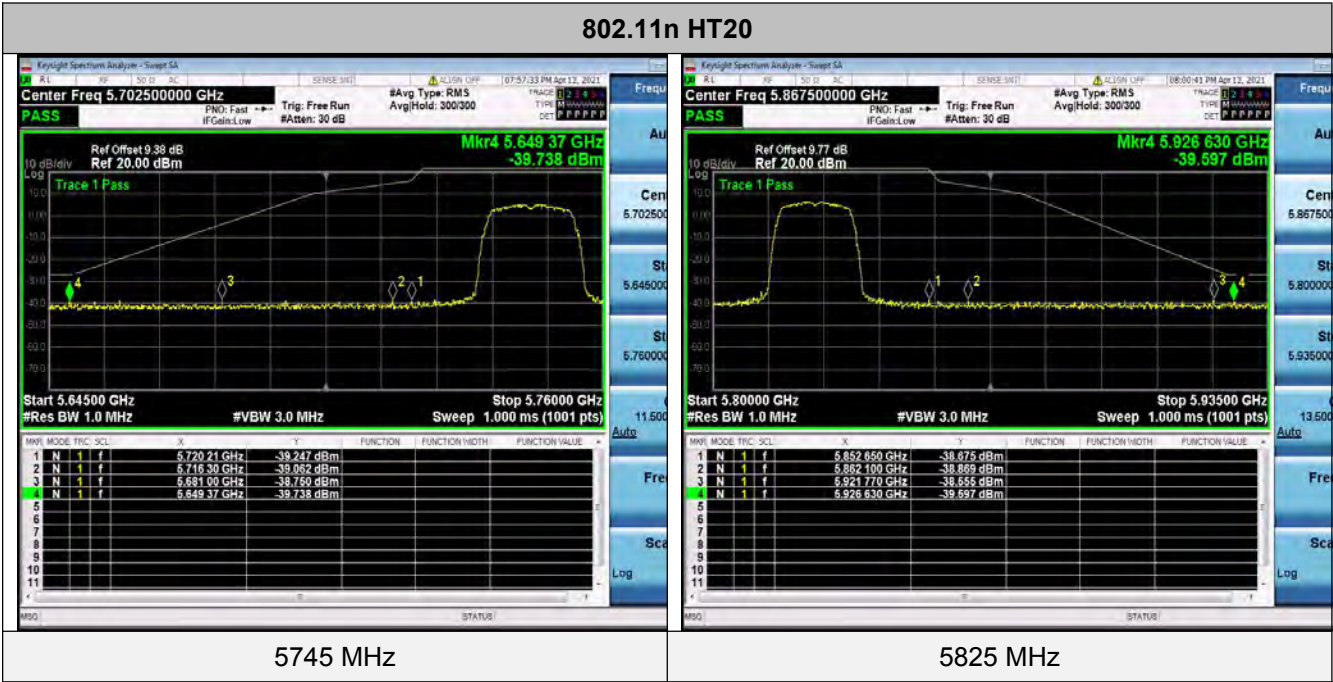


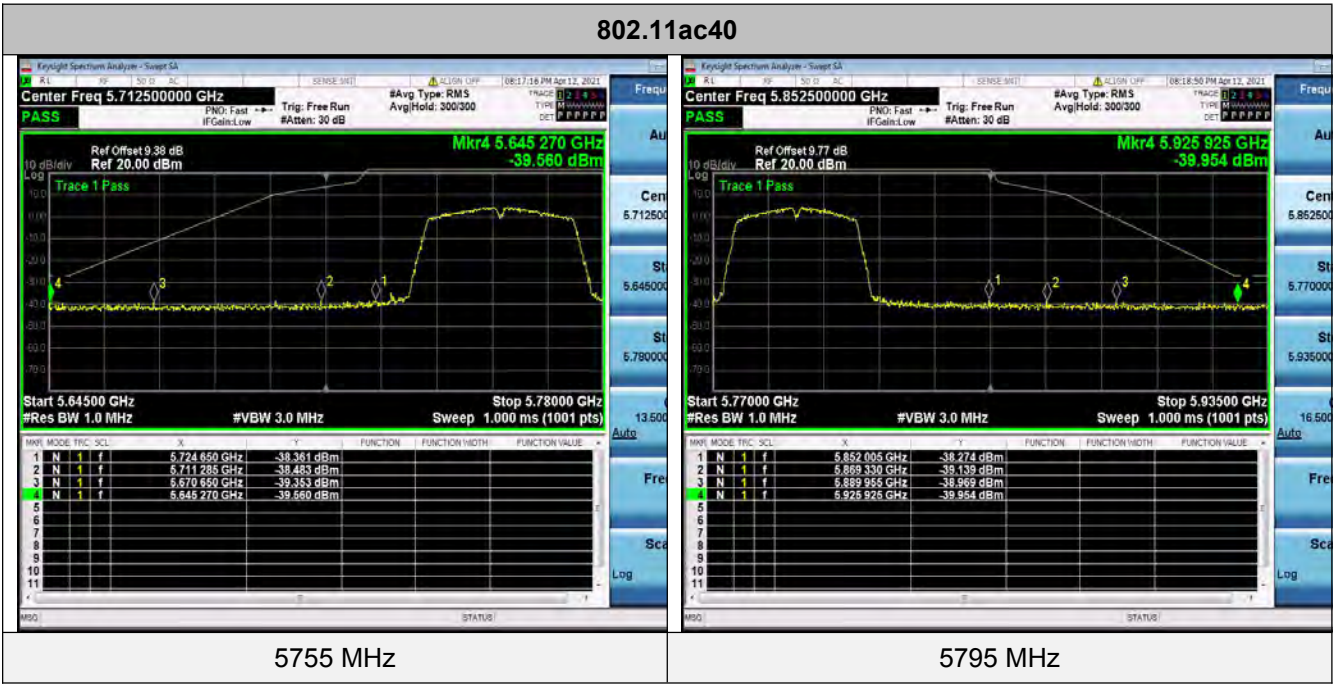
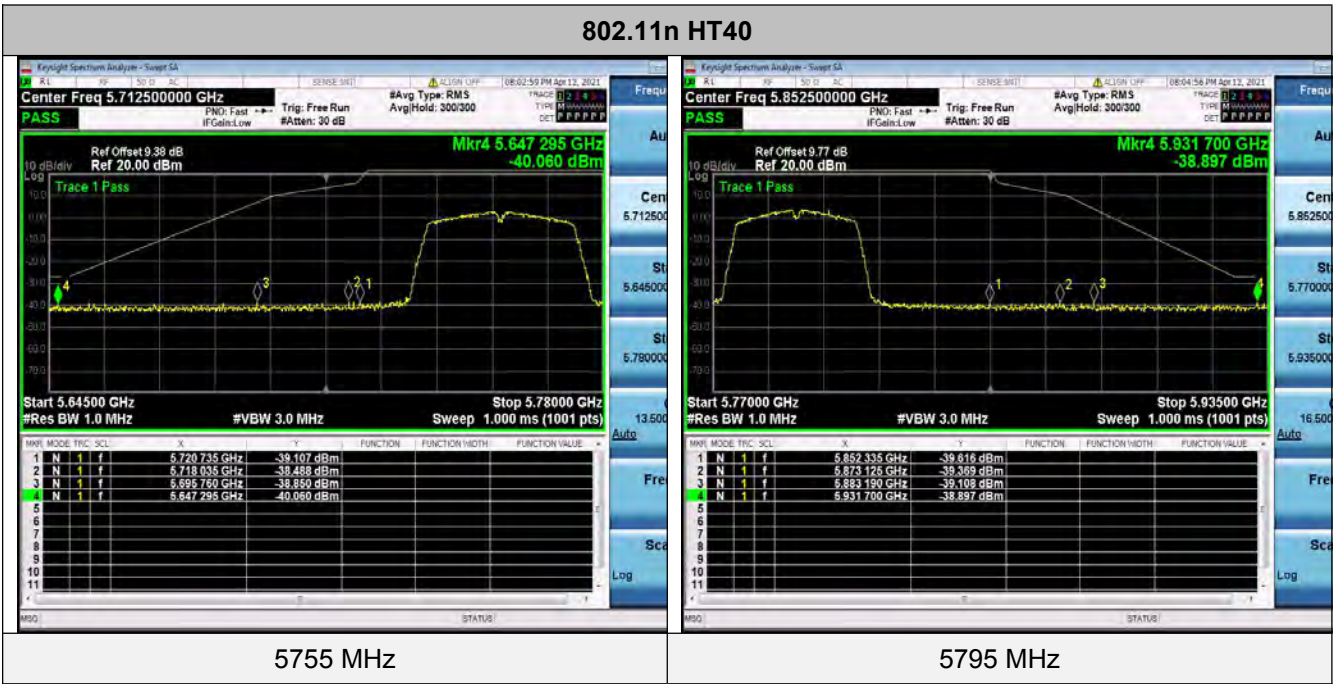


Antenna 2:

5725-5850MHz:









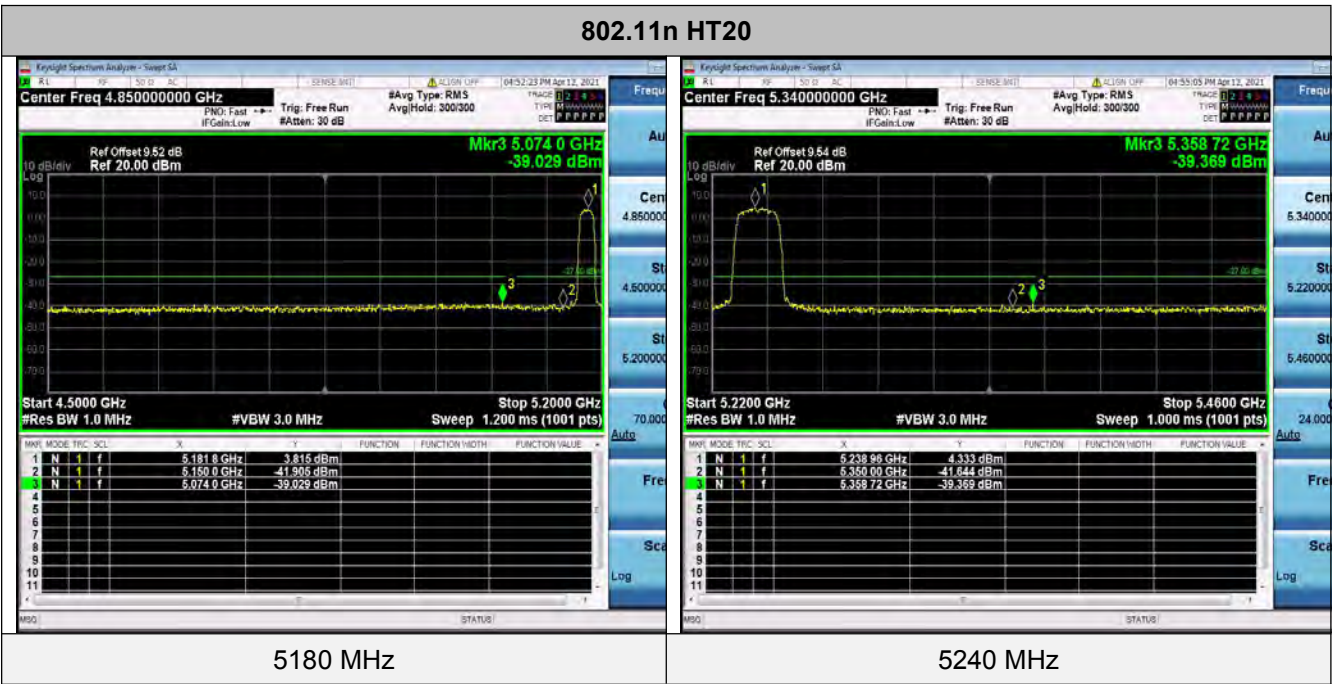
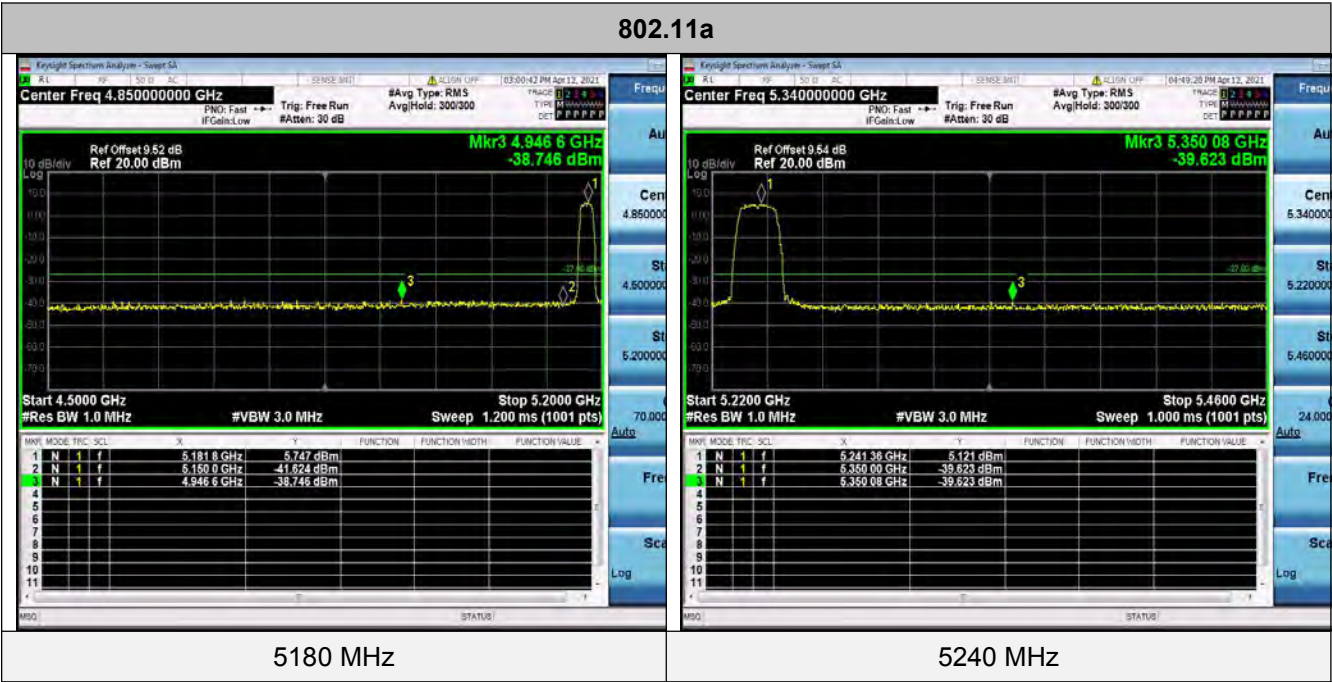
802.11ax40

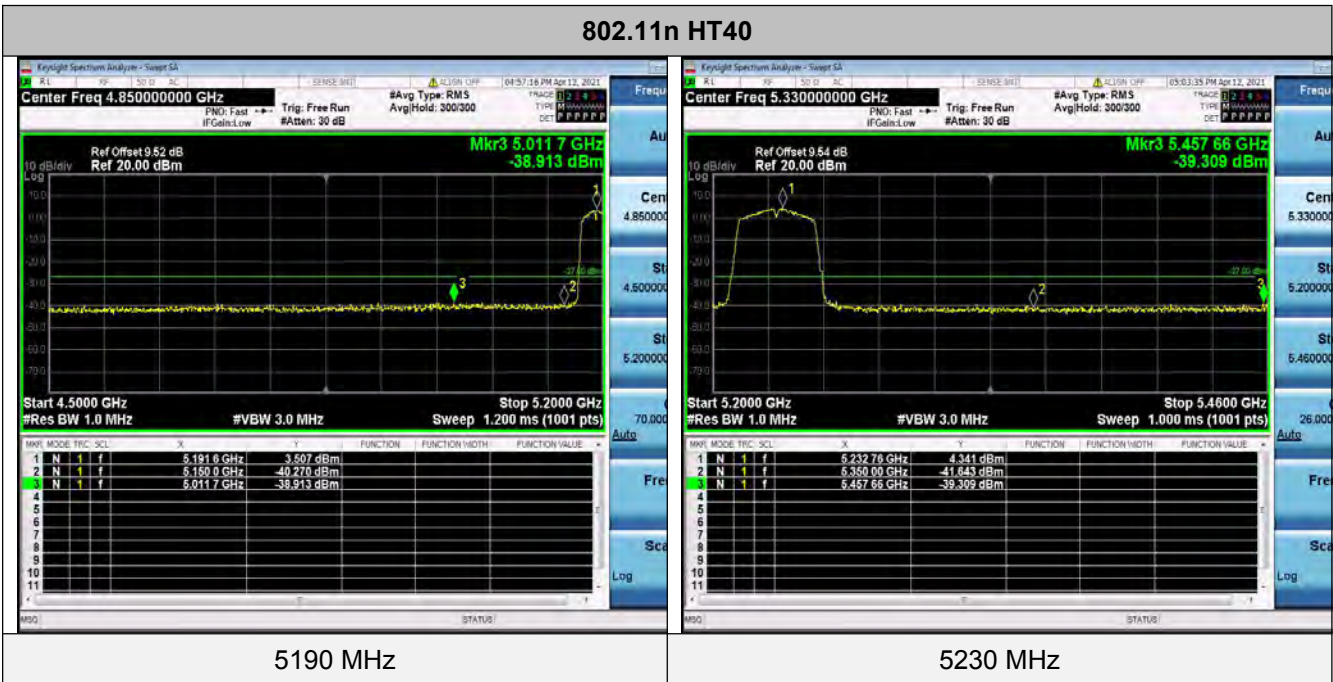
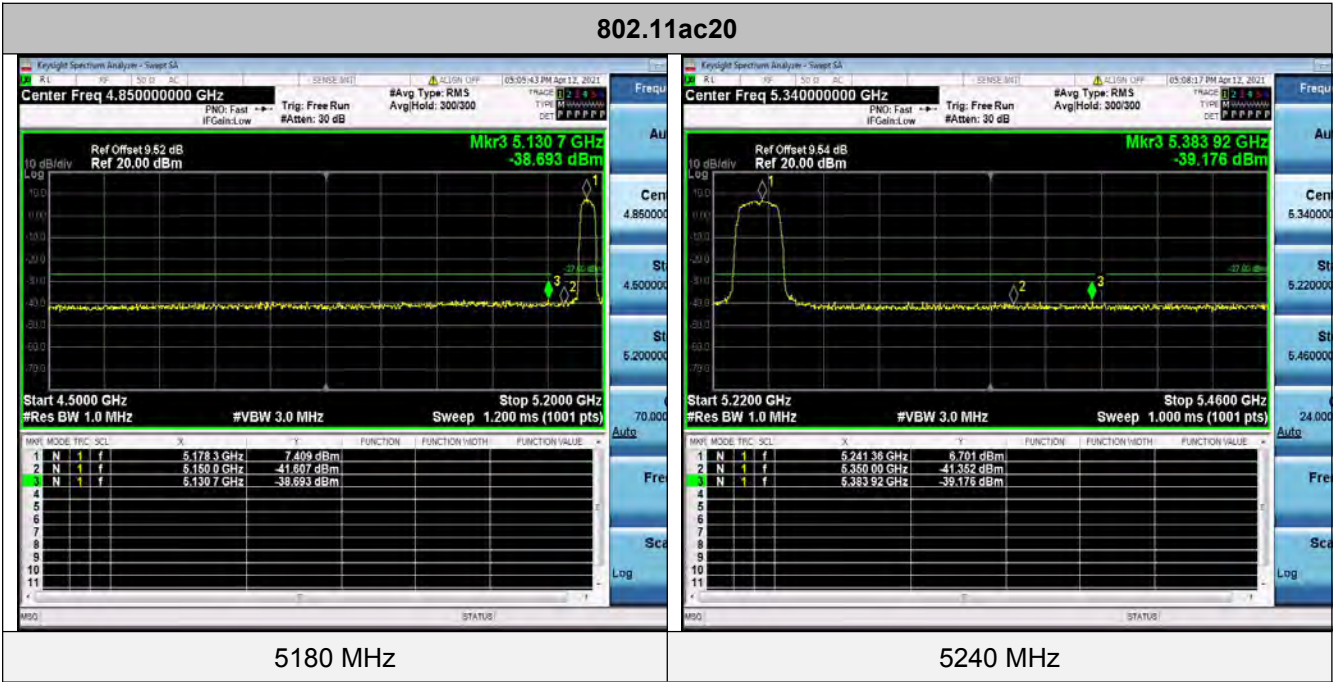


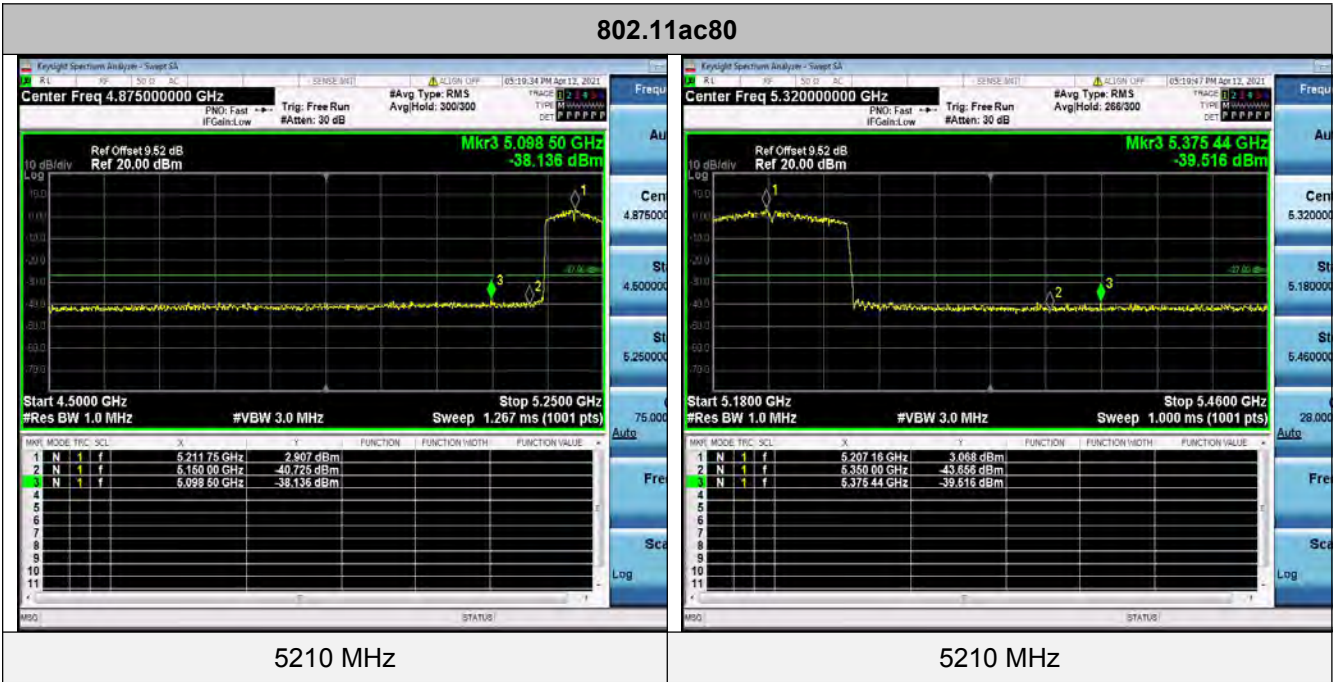
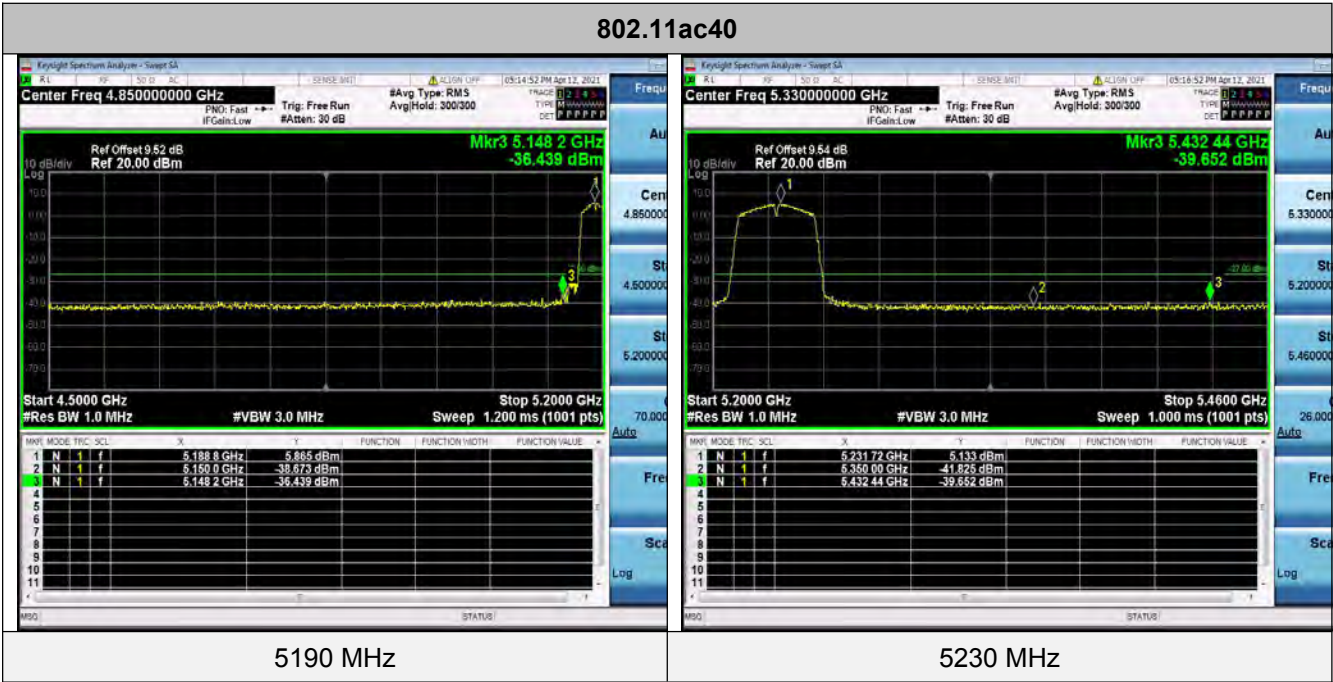
802.11ax80

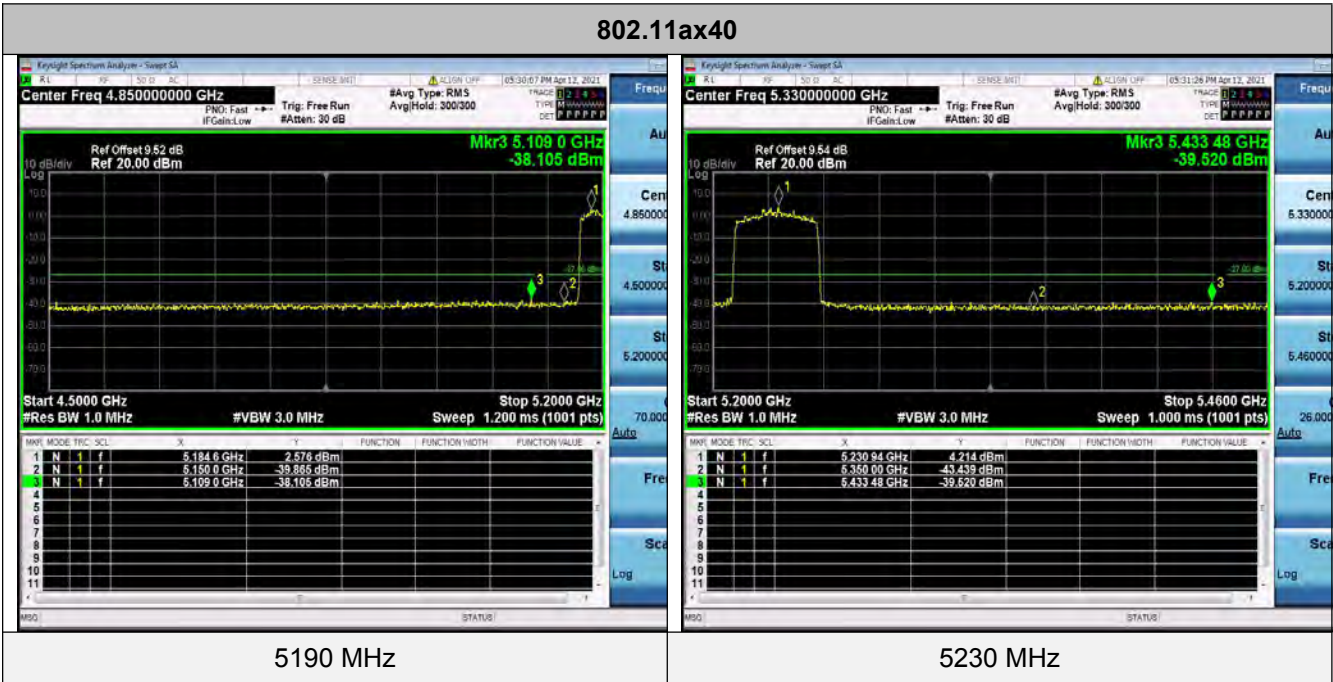


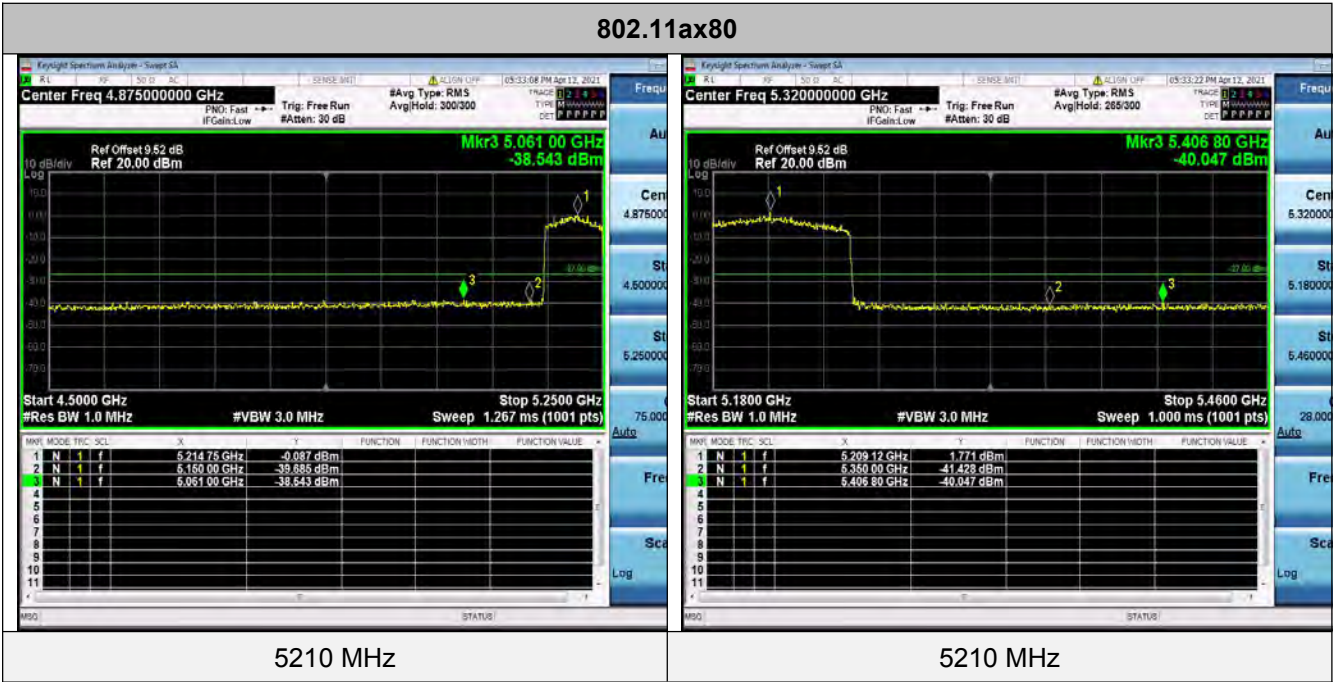
Antenna 3:
5150-5250MHz:





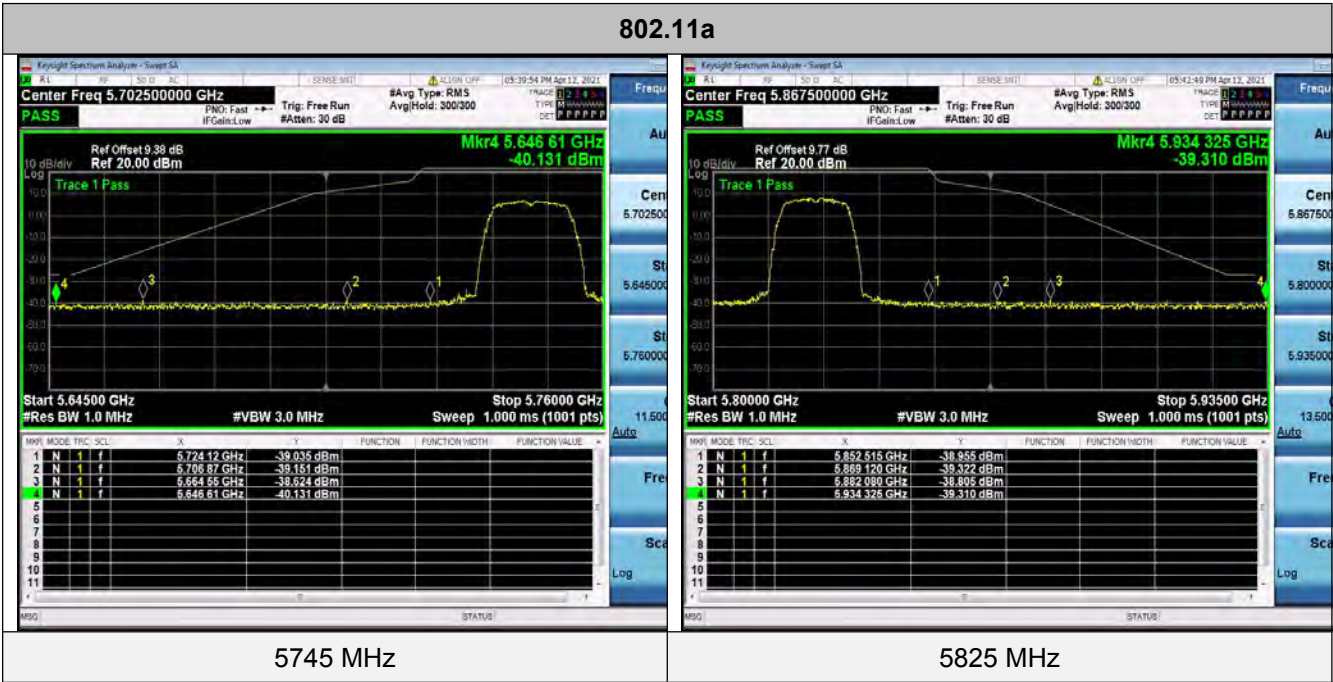


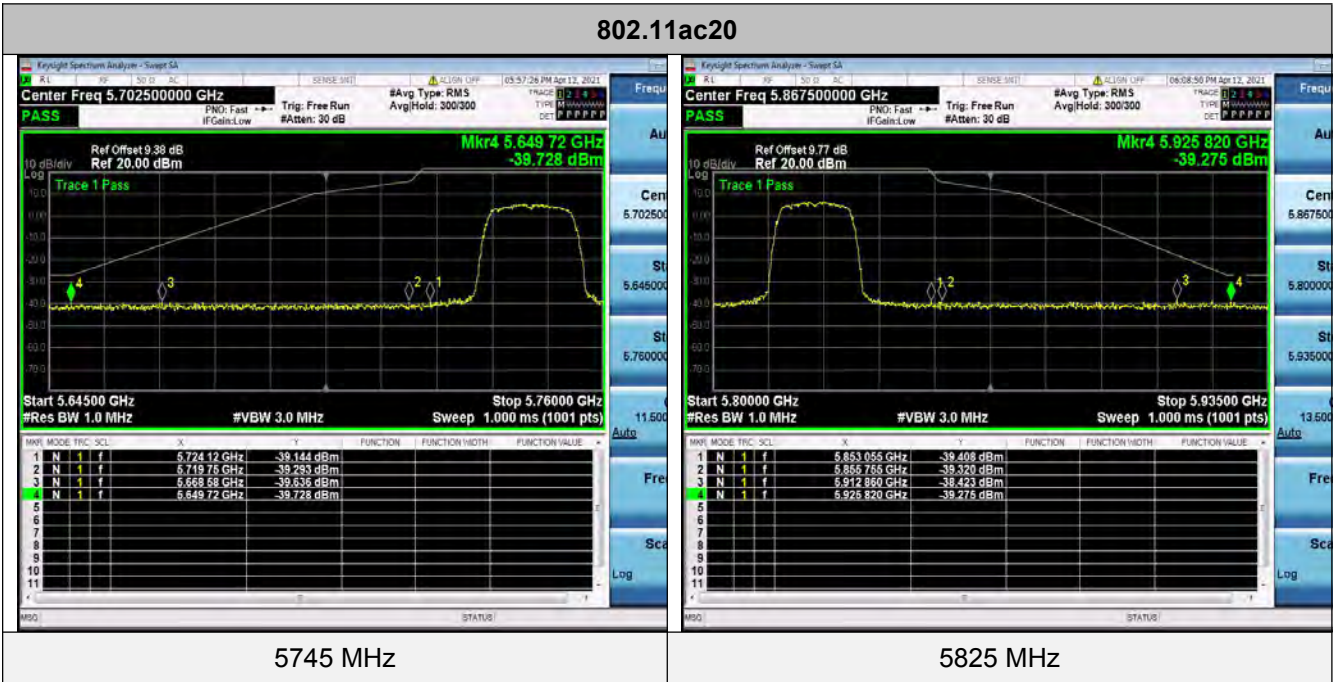
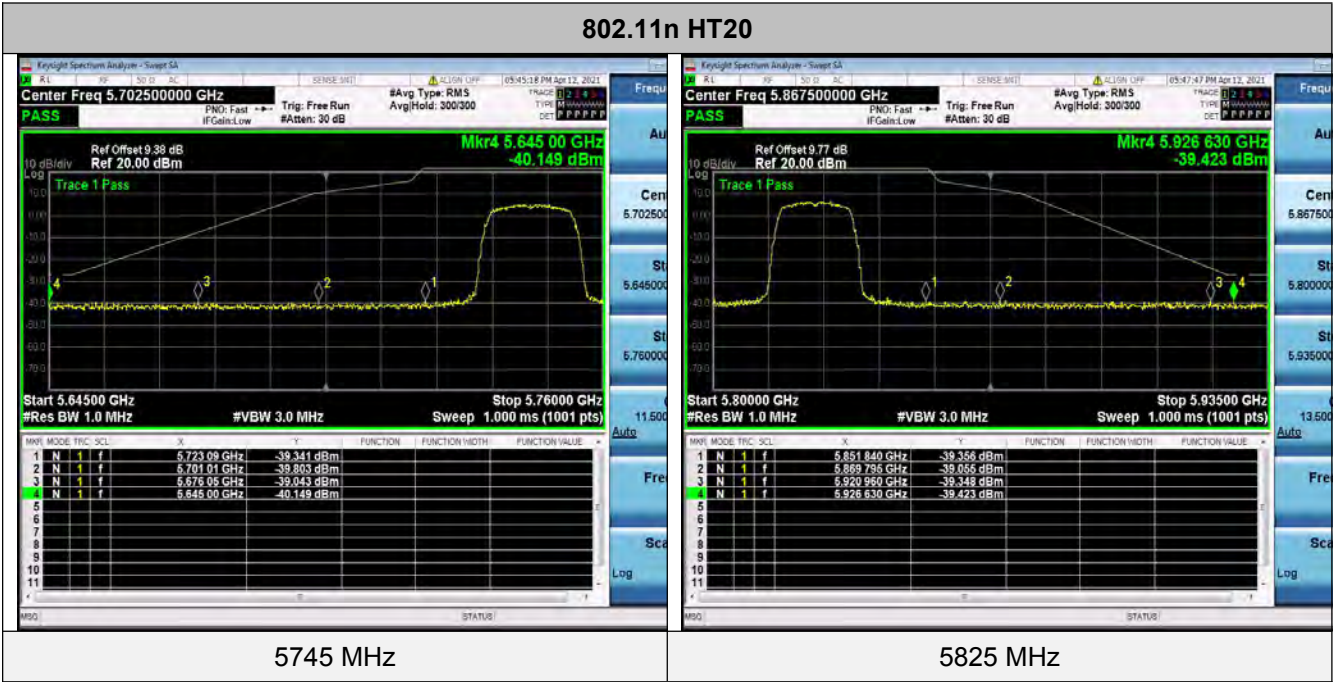




Antenna 3:

5725-5850MHz:





802.11n HT40



802.11ac40



802.11ac80



802.11ax20



802.11ax40



5755 MHz



5795 MHz

802.11ax80



5775 MHz



5775 MHz

4.9. Frequency Stability

Standard Applicable

According to FCC §15.407(g) "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 user manual."

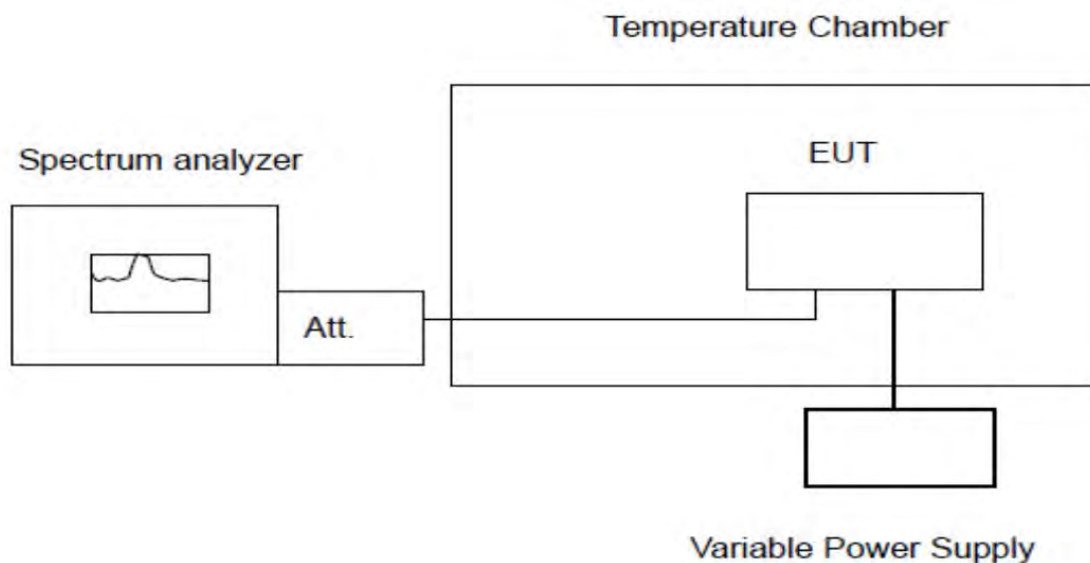
According to FCC §2.1055(a) "The frequency stability shall be measured with variation of ambient temperature as follows:"

(1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(2) From -20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

(3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

Test Configuration



Test Procedure

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 degree operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30 degree. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10 degree increased per stage until the highest temperature of +50 degree reached.

Test Results

PASS

Remark:

1. Measured all conditions and recorded worst case.

IEEE 802.11a Mode / 5180 – 5240 MHz / 5180 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5180.446344	5150 – 5250	PASS
20	DC 10.8V	5179.708853	5150 – 5250	PASS
50	DC 12V	5179.917558	5150 – 5250	PASS
40	DC 12V	5179.760933	5150 – 5250	PASS
30	DC 12V	5180.022168	5150 – 5250	PASS
20	DC 12V	5179.931166	5150 – 5250	PASS
10	DC 12V	5179.959101	5150 – 5250	PASS
0	DC 12V	5180.026354	5150 – 5250	PASS
-10	DC 12V	5179.679384	5150 – 5250	PASS
-20	DC 12V	5180.019260	5150 – 5250	PASS
-30	DC 12V	5179.981287	5150 – 5250	PASS

IEEE 802.11a Mode / 5180 – 5240 MHz / 5240 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5239.605905	5150 – 5250	PASS
20	DC 10.8V	5240.291823	5150 – 5250	PASS
50	DC 12V	5240.520793	5150 – 5250	PASS
40	DC 12V	5239.806402	5150 – 5250	PASS
30	DC 12V	5240.070019	5150 – 5250	PASS
20	DC 12V	5240.223421	5150 – 5250	PASS
10	DC 12V	5239.687436	5150 – 5250	PASS
0	DC 12V	5240.068219	5150 – 5250	PASS
-10	DC 12V	5240.188793	5150 – 5250	PASS
-20	DC 12V	5239.705871	5150 – 5250	PASS
-30	DC 12V	5239.885204	5150 – 5250	PASS

IEEE 802.11n20 Mode / 5180 – 5240 MHz / 5180 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5179.893740	5150 – 5250	PASS
20	DC 10.8V	5180.398860	5150 – 5250	PASS
50	DC 12V	5179.842082	5150 – 5250	PASS
40	DC 12V	5179.865803	5150 – 5250	PASS
30	DC 12V	5179.770074	5150 – 5250	PASS
20	DC 12V	5180.256484	5150 – 5250	PASS
10	DC 12V	5180.234129	5150 – 5250	PASS
0	DC 12V	5179.932521	5150 – 5250	PASS
-10	DC 12V	5180.078974	5150 – 5250	PASS
-20	DC 12V	5180.322834	5150 – 5250	PASS
-30	DC 12V	5180.179180	5150 – 5250	PASS

IEEE 802.11n20 Mode / 5180 – 5240 MHz / 5240 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5240.326344	5150 – 5250	PASS
20	DC 10.8V	5240.027176	5150 – 5250	PASS
50	DC 12V	5239.628351	5150 – 5250	PASS
40	DC 12V	5240.163742	5150 – 5250	PASS
30	DC 12V	5240.356574	5150 – 5250	PASS
20	DC 12V	5240.388698	5150 – 5250	PASS
10	DC 12V	5240.024264	5150 – 5250	PASS
0	DC 12V	5239.640071	5150 – 5250	PASS
-10	DC 12V	5239.919931	5150 – 5250	PASS
-20	DC 12V	5239.665637	5150 – 5250	PASS
-30	DC 12V	5240.088549	5150 – 5250	PASS

IEEE 802.11n40 Mode / 5190 – 5230 MHz / 5190 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5189.765314	5150 – 5250	PASS
20	DC 10.8V	5190.172603	5150 – 5250	PASS
50	DC 12V	5190.241250	5150 – 5250	PASS
40	DC 12V	5190.134265	5150 – 5250	PASS
30	DC 12V	5190.180151	5150 – 5250	PASS
20	DC 12V	5189.656558	5150 – 5250	PASS
10	DC 12V	5189.852170	5150 – 5250	PASS
0	DC 12V	5189.853740	5150 – 5250	PASS
-10	DC 12V	5190.250475	5150 – 5250	PASS
-20	DC 12V	5189.965406	5150 – 5250	PASS
-30	DC 12V	5190.080003	5150 – 5250	PASS

IEEE 802.11n40 Mode / 5190 – 5230 MHz / 5230 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5230.590570	5150 – 5250	PASS
20	DC 10.8V	5230.590490	5150 – 5250	PASS
50	DC 12V	5229.657880	5150 – 5250	PASS
40	DC 12V	5229.815305	5150 – 5250	PASS
30	DC 12V	5230.315343	5150 – 5250	PASS
20	DC 12V	5230.200036	5150 – 5250	PASS
10	DC 12V	5230.095818	5150 – 5250	PASS
0	DC 12V	5230.538611	5150 – 5250	PASS
-10	DC 12V	5230.111558	5150 – 5250	PASS
-20	DC 12V	5230.595681	5150 – 5250	PASS
-30	DC 12V	5229.618395	5150 – 5250	PASS

IEEE 802.11ac20 Mode / 5180 – 5240 MHz / 5180 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5180.037618	5150 – 5250	PASS
20	DC 10.8V	5180.407217	5150 – 5250	PASS
50	DC 12V	5180.034537	5150 – 5250	PASS
40	DC 12V	5179.987516	5150 – 5250	PASS
30	DC 12V	5179.737935	5150 – 5250	PASS
20	DC 12V	5180.468661	5150 – 5250	PASS
10	DC 12V	5179.670554	5150 – 5250	PASS
0	DC 12V	5179.935961	5150 – 5250	PASS
-10	DC 12V	5179.607048	5150 – 5250	PASS
-20	DC 12V	5179.830243	5150 – 5250	PASS
-30	DC 12V	5180.053976	5150 – 5250	PASS

IEEE 802.11ac20 Mode / 5180 – 5240 MHz / 5240 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5239.889008	5150 – 5250	PASS
20	DC 10.8V	5240.200707	5150 – 5250	PASS
50	DC 12V	5239.643700	5150 – 5250	PASS
40	DC 12V	5239.872277	5150 – 5250	PASS
30	DC 12V	5239.998308	5150 – 5250	PASS
20	DC 12V	5240.109326	5150 – 5250	PASS
10	DC 12V	5240.082171	5150 – 5250	PASS
0	DC 12V	5240.321505	5150 – 5250	PASS
-10	DC 12V	5240.398189	5150 – 5250	PASS
-20	DC 12V	5240.099306	5150 – 5250	PASS
-30	DC 12V	5240.588927	5150 – 5250	PASS

IEEE 802.11ac40 Mode / 5190 – 5230 MHz / 5190 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5189.907188	5150 – 5250	PASS
20	DC 10.8V	5189.877593	5150 – 5250	PASS
50	DC 12V	5190.086282	5150 – 5250	PASS
40	DC 12V	5190.207959	5150 – 5250	PASS
30	DC 12V	5190.077254	5150 – 5250	PASS
20	DC 12V	5189.812128	5150 – 5250	PASS
10	DC 12V	5190.105265	5150 – 5250	PASS
0	DC 12V	5189.988735	5150 – 5250	PASS
-10	DC 12V	5190.208522	5150 – 5250	PASS
-20	DC 12V	5189.972884	5150 – 5250	PASS
-30	DC 12V	5190.343029	5150 – 5250	PASS

IEEE 802.11ac40 Mode / 5190 – 5230 MHz / 5230 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5230.584993	5150 – 5250	PASS
20	DC 10.8V	5230.006905	5150 – 5250	PASS
50	DC 12V	5230.313584	5150 – 5250	PASS
40	DC 12V	5230.545786	5150 – 5250	PASS
30	DC 12V	5230.116297	5150 – 5250	PASS
20	DC 12V	5229.897621	5150 – 5250	PASS
10	DC 12V	5229.782343	5150 – 5250	PASS
0	DC 12V	5230.143825	5150 – 5250	PASS
-10	DC 12V	5229.987193	5150 – 5250	PASS
-20	DC 12V	5230.363069	5150 – 5250	PASS
-30	DC 12V	5229.762483	5150 – 5250	PASS

IEEE 802.11ac80 Mode / 5210 MHz / 5210 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5210.109901	5150 – 5250	PASS
20	DC 10.8V	5210.306257	5150 – 5250	PASS
50	DC 12V	5210.552492	5150 – 5250	PASS
40	DC 12V	5210.385075	5150 – 5250	PASS
30	DC 12V	5209.965131	5150 – 5250	PASS
20	DC 12V	5210.586834	5150 – 5250	PASS
10	DC 12V	5210.551139	5150 – 5250	PASS
0	DC 12V	5210.028499	5150 – 5250	PASS
-10	DC 12V	5209.825004	5150 – 5250	PASS
-20	DC 12V	5209.782516	5150 – 5250	PASS
-30	DC 12V	5210.536007	5150 – 5250	PASS

IEEE 802.11ax20 Mode / 5180 – 5240 MHz / 5180 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5180.151851	5150 – 5250	PASS
20	DC 10.8V	5180.293985	5150 – 5250	PASS
50	DC 12V	5180.356645	5150 – 5250	PASS
40	DC 12V	5180.476204	5150 – 5250	PASS
30	DC 12V	5180.357673	5150 – 5250	PASS
20	DC 12V	5180.244182	5150 – 5250	PASS
10	DC 12V	5180.064045	5150 – 5250	PASS
0	DC 12V	5180.182492	5150 – 5250	PASS
-10	DC 12V	5180.439913	5150 – 5250	PASS
-20	DC 12V	5180.510634	5150 – 5250	PASS
-30	DC 12V	5180.211039	5150 – 5250	PASS

IEEE 802.11ax20 Mode / 5180 – 5240 MHz / 5240 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5240.107435	5150 – 5250	PASS
20	DC 10.8V	5239.930036	5150 – 5250	PASS
50	DC 12V	5240.476592	5150 – 5250	PASS
40	DC 12V	5239.808455	5150 – 5250	PASS
30	DC 12V	5239.732135	5150 – 5250	PASS
20	DC 12V	5239.700592	5150 – 5250	PASS
10	DC 12V	5239.985172	5150 – 5250	PASS
0	DC 12V	5239.608499	5150 – 5250	PASS
-10	DC 12V	5239.991875	5150 – 5250	PASS
-20	DC 12V	5239.817867	5150 – 5250	PASS
-30	DC 12V	5240.111994	5150 – 5250	PASS

IEEE 802.11ax40 Mode / 5190 – 5230 MHz / 5190 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5190.558910	5150 – 5250	PASS
20	DC 10.8V	5190.149072	5150 – 5250	PASS
50	DC 12V	5190.377807	5150 – 5250	PASS
40	DC 12V	5190.512179	5150 – 5250	PASS
30	DC 12V	5189.953057	5150 – 5250	PASS
20	DC 12V	5190.191578	5150 – 5250	PASS
10	DC 12V	5190.306158	5150 – 5250	PASS
0	DC 12V	5189.923678	5150 – 5250	PASS
-10	DC 12V	5190.580733	5150 – 5250	PASS
-20	DC 12V	5189.868924	5150 – 5250	PASS
-30	DC 12V	5189.862895	5150 – 5250	PASS

IEEE 802.11ax40 Mode / 5190 – 5230 MHz / 5230 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5230.210080	5150 – 5250	PASS
20	DC 10.8V	5229.604248	5150 – 5250	PASS
50	DC 12V	5229.932963	5150 – 5250	PASS
40	DC 12V	5229.928329	5150 – 5250	PASS
30	DC 12V	5229.989163	5150 – 5250	PASS
20	DC 12V	5229.786070	5150 – 5250	PASS
10	DC 12V	5229.661598	5150 – 5250	PASS
0	DC 12V	5229.636028	5150 – 5250	PASS
-10	DC 12V	5230.105925	5150 – 5250	PASS
-20	DC 12V	5230.089600	5150 – 5250	PASS
-30	DC 12V	5229.832889	5150 – 5250	PASS

IEEE 802.11ax80 Mode / 5210 MHz / 5210 MHz

Enviroment Temperature (Dregree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5210.077486	5150 – 5250	PASS
20	DC 10.8V	5210.552856	5150 – 5250	PASS
50	DC 12V	5210.408701	5150 – 5250	PASS
40	DC 12V	5210.333439	5150 – 5250	PASS
30	DC 12V	5210.307622	5150 – 5250	PASS
20	DC 12V	5210.422144	5150 – 5250	PASS
10	DC 12V	5210.536391	5150 – 5250	PASS
0	DC 12V	5209.917734	5150 – 5250	PASS
-10	DC 12V	5209.954285	5150 – 5250	PASS
-20	DC 12V	5210.085405	5150 – 5250	PASS
-30	DC 12V	5209.959703	5150 – 5250	PASS

NOTE: We measured Radiated Emission at Antenna 2 & Antenna 3 mode from 1GHz to 25GHz and the worst case was recorded.

IEEE 802.11a Mode / 5745 – 5825 MHz / 5745 MHz

Enviroment Temperature (Dregree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5745.587447	5725 – 5850	PASS
20	DC 10.8V	5745.548800	5725 – 5850	PASS
50	DC 12V	5745.163980	5725 – 5850	PASS
40	DC 12V	5745.495196	5725 – 5850	PASS
30	DC 12V	5744.802087	5725 – 5850	PASS
20	DC 12V	5744.719738	5725 – 5850	PASS
10	DC 12V	5744.692869	5725 – 5850	PASS
0	DC 12V	5745.216139	5725 – 5850	PASS
-10	DC 12V	5745.587580	5725 – 5850	PASS
-20	DC 12V	5744.600774	5725 – 5850	PASS
-30	DC 12V	5744.676037	5725 – 5850	PASS

IEEE 802.11a Mode / 5745 – 5825 MHz / 5825 MHz

Enviroment Temperature (Dregree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5824.762061	5725 – 5850	PASS
20	DC 10.8V	5824.922182	5725 – 5850	PASS
50	DC 12V	5825.124198	5725 – 5850	PASS
40	DC 12V	5825.000399	5725 – 5850	PASS
30	DC 12V	5824.807469	5725 – 5850	PASS
20	DC 12V	5825.395830	5725 – 5850	PASS
10	DC 12V	5824.687168	5725 – 5850	PASS
0	DC 12V	5824.681809	5725 – 5850	PASS
-10	DC 12V	5824.890119	5725 – 5850	PASS
-20	DC 12V	5824.815315	5725 – 5850	PASS
-30	DC 12V	5825.072190	5725 – 5850	PASS

IEEE 802.11n20 Mode / 5745 – 5825 MHz / 5745 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5745.572481	5725 – 5850	PASS
20	DC 10.8V	5744.812255	5725 – 5850	PASS
50	DC 12V	5745.133275	5725 – 5850	PASS
40	DC 12V	5745.066333	5725 – 5850	PASS
30	DC 12V	5745.418244	5725 – 5850	PASS
20	DC 12V	5745.510416	5725 – 5850	PASS
10	DC 12V	5745.151481	5725 – 5850	PASS
0	DC 12V	5744.601909	5725 – 5850	PASS
-10	DC 12V	5745.091640	5725 – 5850	PASS
-20	DC 12V	5745.536150	5725 – 5850	PASS
-30	DC 12V	5744.733445	5725 – 5850	PASS

IEEE 802.11n20 Mode / 5745 – 5825 MHz / 5825 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5825.508531	5725 – 5850	PASS
20	DC 10.8V	5824.641583	5725 – 5850	PASS
50	DC 12V	5825.315067	5725 – 5850	PASS
40	DC 12V	5825.542346	5725 – 5850	PASS
30	DC 12V	5825.463820	5725 – 5850	PASS
20	DC 12V	5824.946461	5725 – 5850	PASS
10	DC 12V	5825.007364	5725 – 5850	PASS
0	DC 12V	5825.219748	5725 – 5850	PASS
-10	DC 12V	5824.846583	5725 – 5850	PASS
-20	DC 12V	5824.979932	5725 – 5850	PASS
-30	DC 12V	5825.120065	5725 – 5850	PASS

IEEE 802.11n40 Mode / 5755 – 5795 MHz / 5755 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5754.961640	5725 – 5850	PASS
20	DC 10.8V	5755.469453	5725 – 5850	PASS
50	DC 12V	5755.337241	5725 – 5850	PASS
40	DC 12V	5754.786926	5725 – 5850	PASS
30	DC 12V	5755.162442	5725 – 5850	PASS
20	DC 12V	5754.765365	5725 – 5850	PASS
10	DC 12V	5755.527773	5725 – 5850	PASS
0	DC 12V	5755.312755	5725 – 5850	PASS
-10	DC 12V	5755.340532	5725 – 5850	PASS
-20	DC 12V	5755.148456	5725 – 5850	PASS
-30	DC 12V	5755.363168	5725 – 5850	PASS

IEEE 802.11n40 Mode / 5755 – 5795 MHz / 5795 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5794.877238	5725 – 5850	PASS
20	DC 10.8V	5795.201320	5725 – 5850	PASS
50	DC 12V	5794.903074	5725 – 5850	PASS
40	DC 12V	5795.069608	5725 – 5850	PASS
30	DC 12V	5794.713632	5725 – 5850	PASS
20	DC 12V	5795.591897	5725 – 5850	PASS
10	DC 12V	5794.867029	5725 – 5850	PASS
0	DC 12V	5795.229405	5725 – 5850	PASS
-10	DC 12V	5795.106485	5725 – 5850	PASS
-20	DC 12V	5794.930590	5725 – 5850	PASS
-30	DC 12V	5794.731149	5725 – 5850	PASS

IEEE 802.11ac20 Mode / 5745 – 5825 MHz / 5745 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5745.074111	5725 – 5850	PASS
20	DC 10.8V	5745.084662	5725 – 5850	PASS
50	DC 12V	5744.982966	5725 – 5850	PASS
40	DC 12V	5744.667711	5725 – 5850	PASS
30	DC 12V	5745.395612	5725 – 5850	PASS
20	DC 12V	5745.234822	5725 – 5850	PASS
10	DC 12V	5745.597855	5725 – 5850	PASS
0	DC 12V	5745.589575	5725 – 5850	PASS
-10	DC 12V	5744.857984	5725 – 5850	PASS
-20	DC 12V	5745.271832	5725 – 5850	PASS
-30	DC 12V	5744.767770	5725 – 5850	PASS

IEEE 802.11ac20 Mode / 5745 – 5825 MHz / 5825 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5824.680815	5725 – 5850	PASS
20	DC 10.8V	5825.301102	5725 – 5850	PASS
50	DC 12V	5824.963198	5725 – 5850	PASS
40	DC 12V	5825.047136	5725 – 5850	PASS
30	DC 12V	5825.595895	5725 – 5850	PASS
20	DC 12V	5825.292574	5725 – 5850	PASS
10	DC 12V	5825.273046	5725 – 5850	PASS
0	DC 12V	5824.871505	5725 – 5850	PASS
-10	DC 12V	5824.698793	5725 – 5850	PASS
-20	DC 12V	5824.829552	5725 – 5850	PASS
-30	DC 12V	5824.824867	5725 – 5850	PASS

IEEE 802.11ac40 Mode / 5755 – 5795 MHz / 5755 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5755.290138	5725 – 5850	PASS
20	DC 10.8V	5755.253531	5725 – 5850	PASS
50	DC 12V	5754.863940	5725 – 5850	PASS
40	DC 12V	5754.777118	5725 – 5850	PASS
30	DC 12V	5755.134409	5725 – 5850	PASS
20	DC 12V	5755.321447	5725 – 5850	PASS
10	DC 12V	5754.868789	5725 – 5850	PASS
0	DC 12V	5754.957232	5725 – 5850	PASS
-10	DC 12V	5755.288846	5725 – 5850	PASS
-20	DC 12V	5755.021061	5725 – 5850	PASS
-30	DC 12V	5754.829726	5725 – 5850	PASS

IEEE 802.11ac40 Mode / 5755 – 5795 MHz / 5795 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5795.110433	5725 – 5850	PASS
20	DC 10.8V	5795.129630	5725 – 5850	PASS
50	DC 12V	5794.676490	5725 – 5850	PASS
40	DC 12V	5795.039365	5725 – 5850	PASS
30	DC 12V	5794.671626	5725 – 5850	PASS
20	DC 12V	5795.570831	5725 – 5850	PASS
10	DC 12V	5795.246393	5725 – 5850	PASS
0	DC 12V	5795.314522	5725 – 5850	PASS
-10	DC 12V	5795.514620	5725 – 5850	PASS
-20	DC 12V	5794.623467	5725 – 5850	PASS
-30	DC 12V	5795.481220	5725 – 5850	PASS

IEEE 802.11ac80 Mode / 5775MHz / 5775 MHz

Enviroment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5774.797085	5725 – 5850	PASS
20	DC 10.8V	5775.553041	5725 – 5850	PASS
50	DC 12V	5775.370005	5725 – 5850	PASS
40	DC 12V	5774.935607	5725 – 5850	PASS
30	DC 12V	5774.711703	5725 – 5850	PASS
20	DC 12V	5774.631898	5725 – 5850	PASS
10	DC 12V	5774.782842	5725 – 5850	PASS
0	DC 12V	5775.373522	5725 – 5850	PASS
-10	DC 12V	5774.788311	5725 – 5850	PASS
-20	DC 12V	5774.656367	5725 – 5850	PASS
-30	DC 12V	5774.788244	5725 – 5850	PASS

IEEE 802.11ax20 Mode / 5745 – 5825 MHz / 5745 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5745.320256	5725 – 5850	PASS
20	DC 10.8V	5744.843727	5725 – 5850	PASS
50	DC 12V	5745.203131	5725 – 5850	PASS
40	DC 12V	5745.549221	5725 – 5850	PASS
30	DC 12V	5745.073665	5725 – 5850	PASS
20	DC 12V	5745.120718	5725 – 5850	PASS
10	DC 12V	5745.279469	5725 – 5850	PASS
0	DC 12V	5745.101263	5725 – 5850	PASS
-10	DC 12V	5745.493322	5725 – 5850	PASS
-20	DC 12V	5745.069734	5725 – 5850	PASS
-30	DC 12V	5745.271038	5725 – 5850	PASS

IEEE 802.11ax20 Mode / 5745 – 5825 MHz / 5825 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5824.730591	5725 – 5850	PASS
20	DC 10.8V	5825.542282	5725 – 5850	PASS
50	DC 12V	5824.793076	5725 – 5850	PASS
40	DC 12V	5825.173556	5725 – 5850	PASS
30	DC 12V	5825.460605	5725 – 5850	PASS
20	DC 12V	5825.430803	5725 – 5850	PASS
10	DC 12V	5825.057631	5725 – 5850	PASS
0	DC 12V	5825.524875	5725 – 5850	PASS
-10	DC 12V	5825.192063	5725 – 5850	PASS
-20	DC 12V	5824.821710	5725 – 5850	PASS
-30	DC 12V	5824.835138	5725 – 5850	PASS

IEEE 802.11ax40 Mode / 5755 – 5795 MHz / 5755 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5755.411314	5725 – 5850	PASS
20	DC 10.8V	5755.369737	5725 – 5850	PASS
50	DC 12V	5754.818225	5725 – 5850	PASS
40	DC 12V	5755.437867	5725 – 5850	PASS
30	DC 12V	5754.604260	5725 – 5850	PASS
20	DC 12V	5755.016808	5725 – 5850	PASS
10	DC 12V	5755.415821	5725 – 5850	PASS
0	DC 12V	5754.656853	5725 – 5850	PASS
-10	DC 12V	5754.686363	5725 – 5850	PASS
-20	DC 12V	5754.634491	5725 – 5850	PASS
-30	DC 12V	5754.917782	5725 – 5850	PASS

IEEE 802.11ax40 Mode / 5755 – 5795 MHz / 5795 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5795.017598	5725 – 5850	PASS
20	DC 10.8V	5794.881223	5725 – 5850	PASS
50	DC 12V	5795.479790	5725 – 5850	PASS
40	DC 12V	5794.701027	5725 – 5850	PASS
30	DC 12V	5794.851393	5725 – 5850	PASS
20	DC 12V	5795.179880	5725 – 5850	PASS
10	DC 12V	5795.345490	5725 – 5850	PASS
0	DC 12V	5795.386889	5725 – 5850	PASS
-10	DC 12V	5794.662223	5725 – 5850	PASS
-20	DC 12V	5794.986172	5725 – 5850	PASS
-30	DC 12V	5794.900551	5725 – 5850	PASS

IEEE 802.11ax80 Mode / 5775MHz / 5775 MHz

Environment Temperature (Degree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5775.292447	5725 – 5850	PASS
20	DC 10.8V	5774.954372	5725 – 5850	PASS
50	DC 12V	5775.395074	5725 – 5850	PASS
40	DC 12V	5774.636107	5725 – 5850	PASS
30	DC 12V	5775.144478	5725 – 5850	PASS
20	DC 12V	5775.077182	5725 – 5850	PASS
10	DC 12V	5775.239678	5725 – 5850	PASS
0	DC 12V	5774.962381	5725 – 5850	PASS
-10	DC 12V	5775.544927	5725 – 5850	PASS
-20	DC 12V	5774.799369	5725 – 5850	PASS
-30	DC 12V	5774.706049	5725 – 5850	PASS

NOTE: We measured Radiated Emission at Antenna 2 & Antenna 3 mode from 1GHz to 25GHz and the worst case was recorded.

4.10. 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.

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Antenna Information

The antenna is Integrated antennas, through the buckle stretched out, The directional gains of antenna used for transmitting is 5 dBi.

The antenna uses a special interface, the end user cannot easily replace the antenna, meeting the requirements of part15.203

Reference to the Test Report: **GTS20210121001-1-1.**

5. TEST SETUP PHOTOS OF THE EUT

Reference to the test report No. GTS20210121001-1-1.

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Reference to the test report No. GTS20210121001-1-1.

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