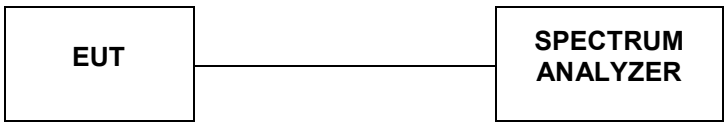
4.3. Duty Cycle

TEST CONFIGURATION



TEST PROCEDURE

According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Duty Cycle (x), Transmission Duration (T):

a. A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on and off times of the transmitted signal
b. The zero-span mode on a spectrum analyzer or EMI receiver, if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zerospan measurement method shall not be used unless both RBW and VBW are > 50/T, where T is defined in section II.B.1.a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

TEST RESULTS

Temperature	23.6℃	Humidity	55.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11a/n/ac

Antenna 0:
5150-5250MHz:

802.11a Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
40	5200	0.90	0.45

802.11n HT20 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
40	5200	0.89	0.48

802.11n HT40 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
38	5190	0.81	0.93

802.11ac20 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
40	5200	0.48	3.16

802.11ac40 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
38	5190	0.39	4.07

802.11ac80 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
42	5210	0.29	5.44

5725-5850MHz:

802.11a Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
157	5785	0.90	0.45

802.11n HT20 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
157	5785	0.89	0.48

802.11n HT40 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
151	5755	0.81	0.93

802.11ac20 Test Mode

Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
157	5785	0.48	3.16

802.11ac40 Test Mode

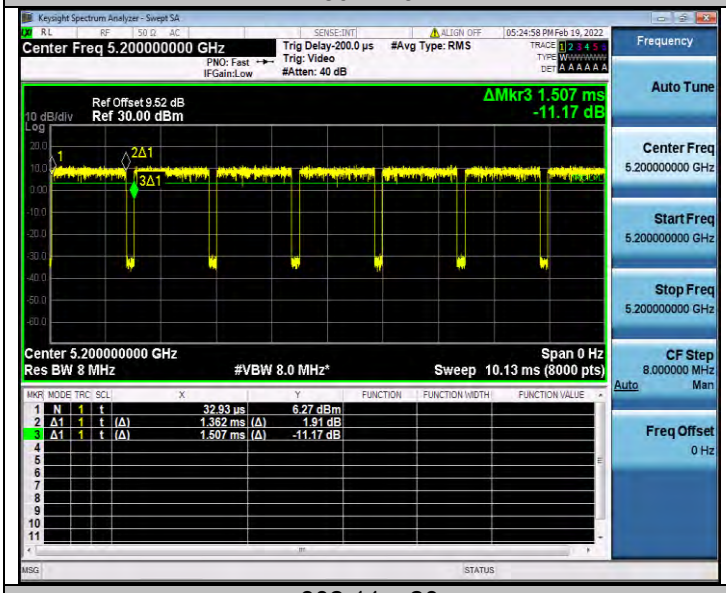
Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
151	5755	0.39	4.07

802.11ac80 Test Mode

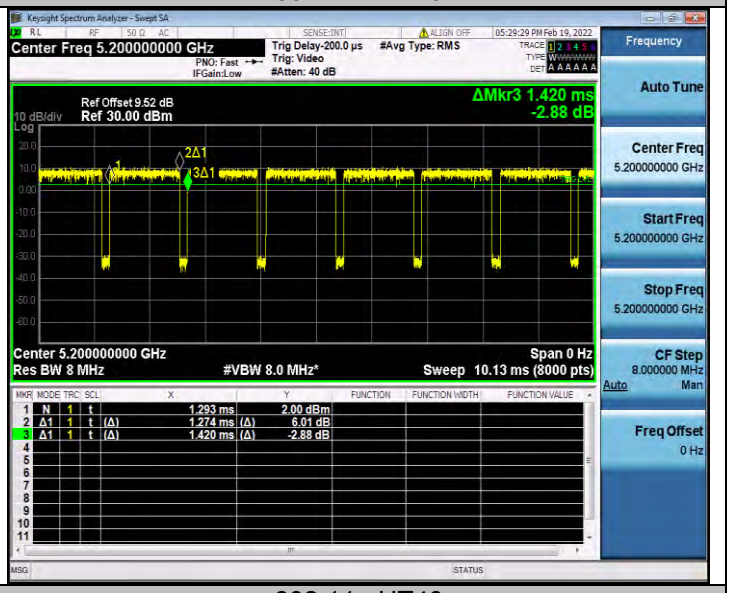
Channel	Frequency (MHz)	Duty Cycle	Duty factor (dB)
155	5775	0.29	5.44

5150-5250MHz:

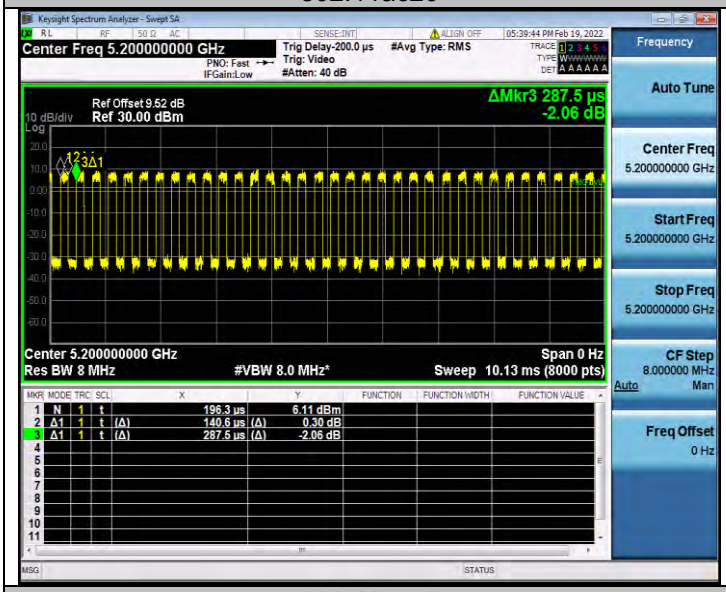
802.11a



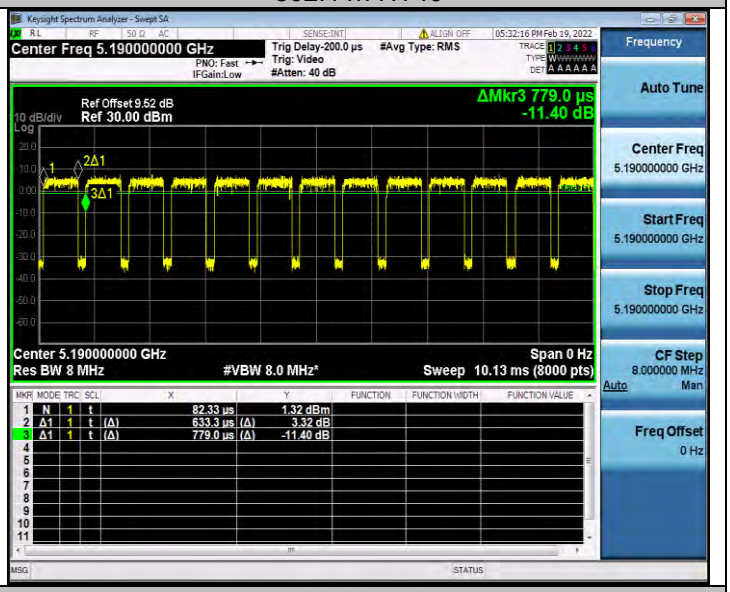
802.11n HT20



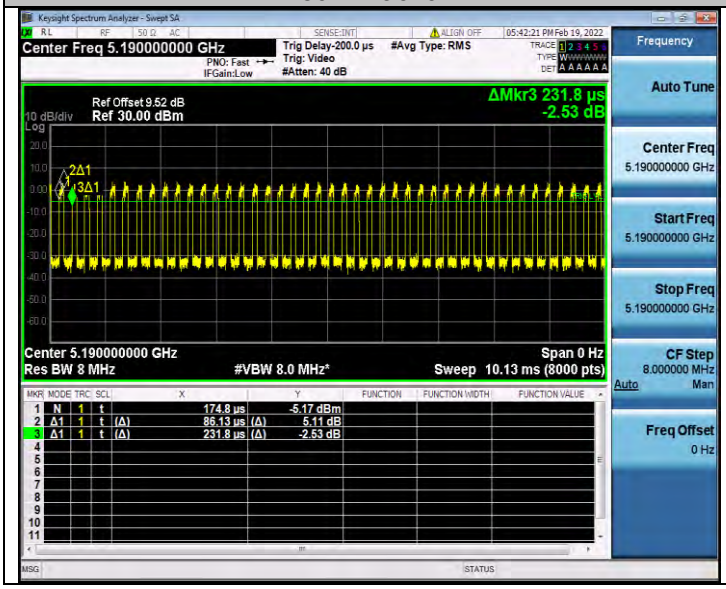
802.11ac20



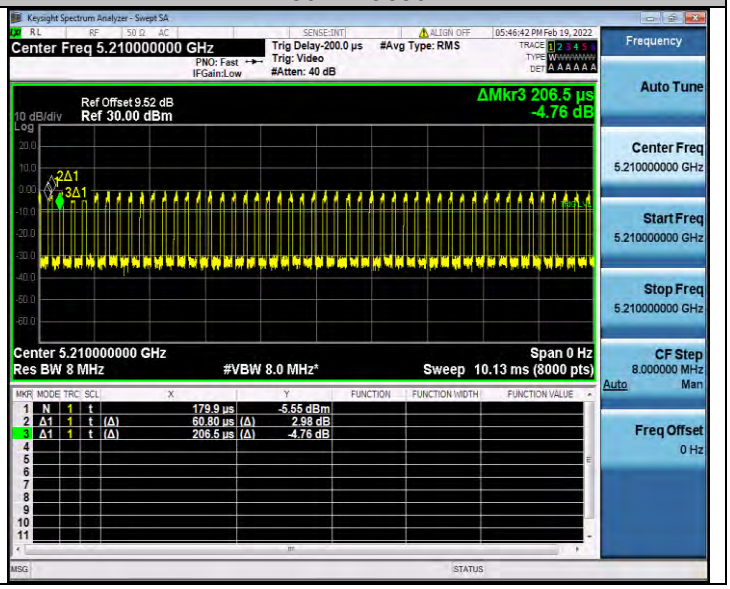
802.11n HT40



802.11ac40

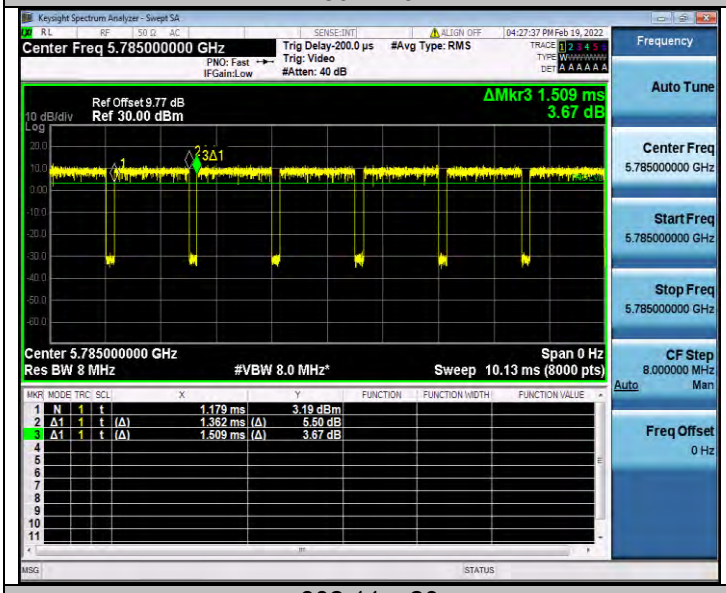


802.11ac80

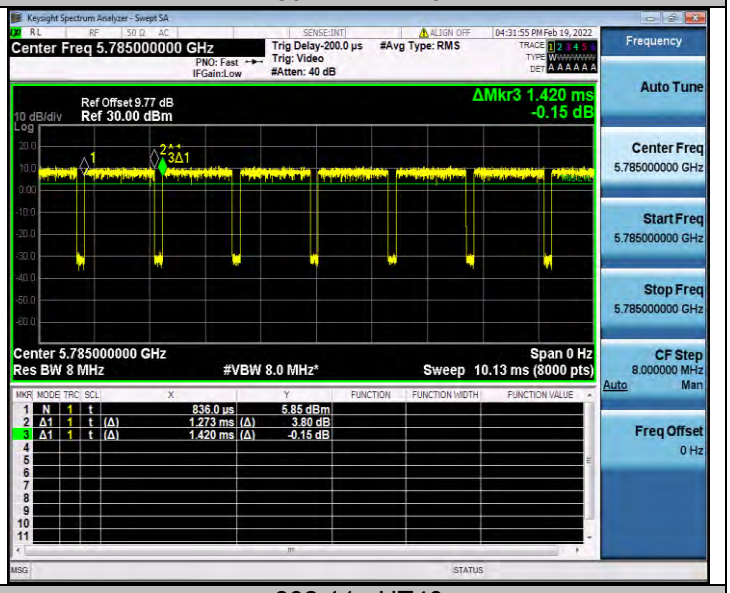


5725-5850MHz:

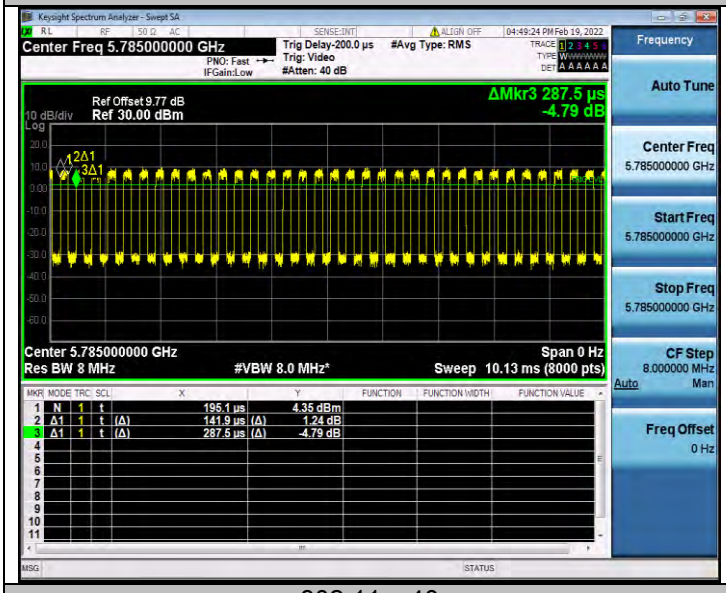
802.11a



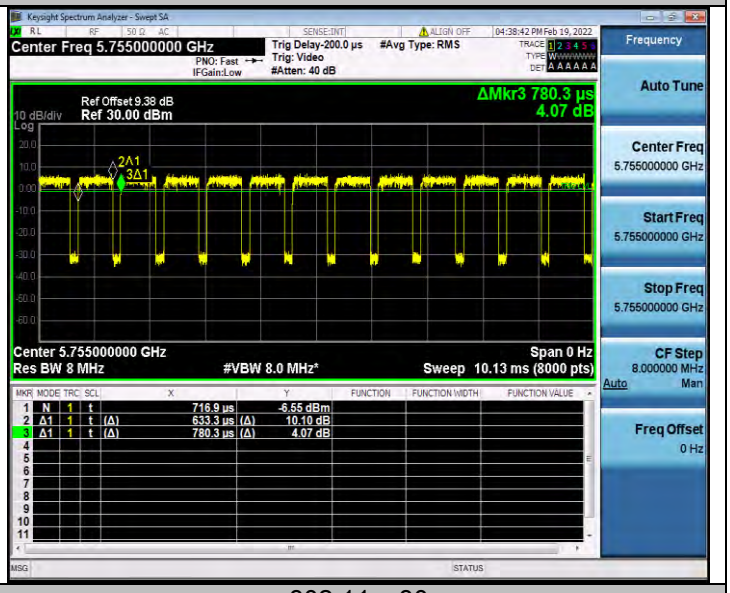
802.11n HT20



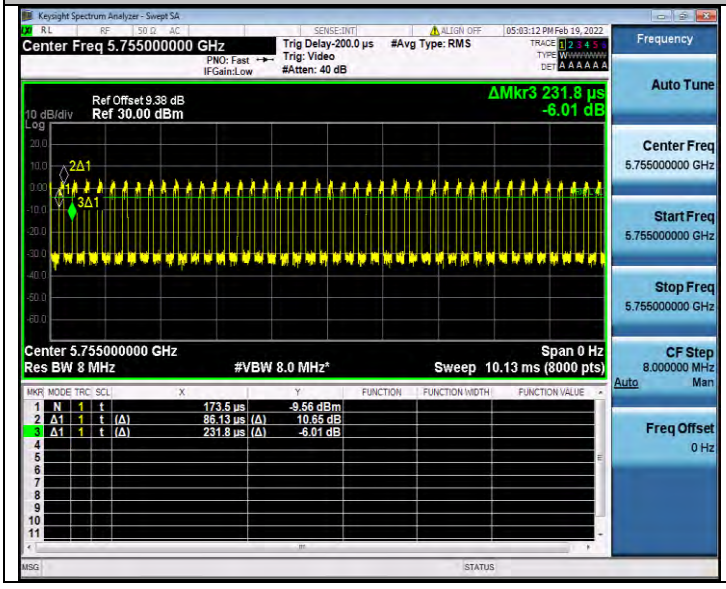
802.11ac20



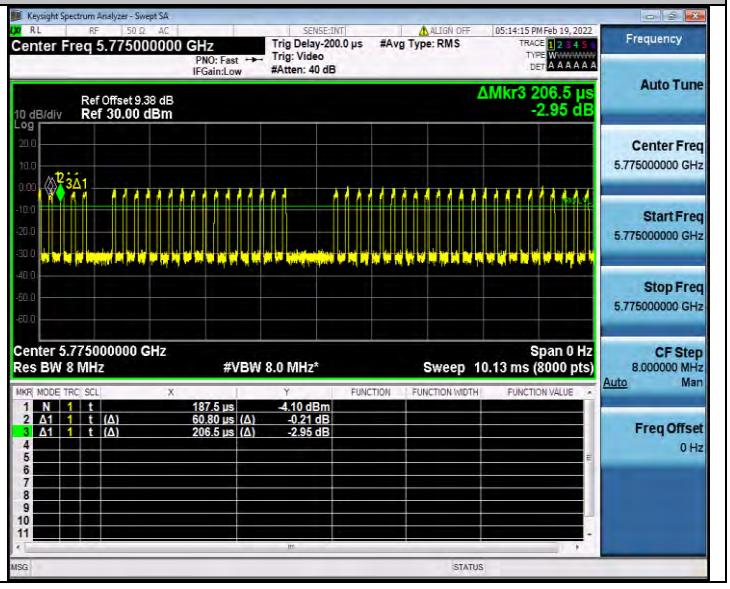
802.11n HT40



802.11ac40

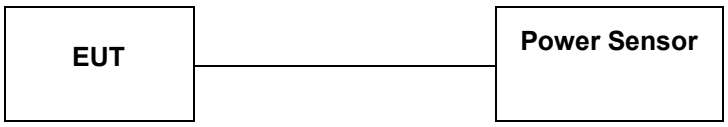


802.11ac80



4.4. Maximum Average Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Measurement using a Power Meter (PM):

a. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied
   1. The EUT is configured to transmit continuously or to transmit with a constant duty cycle
   2. At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
   3. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b. If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B

c. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 percent).

LIMIT

According to §15.407(a): The maximum output power should be not exceed follow:

Frequency Range (MHz)	Limit
5150-5250	Fixed:1 Watt (30dBm) Mobile and portable: 250mW (24dBm)
5250-5350	250mW (24dBm)
5470-5725	250mW (24dBm)
5725-5850	1 Watt (30dBm)
Note: The maximum e.i.r.p at anyelevation angle above 30 degrees as measured from the horizon must not exceed 125mW(21dBm)	

TEST RESULTS

Temperature	23.6℃	Humidity	55.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11a/n/ac

5150-5250MHz:

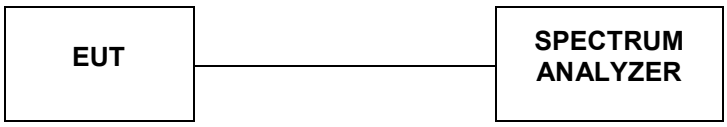
Channel	Frequency (MHz)	Output Power AV (dBm)	Duty factor (dB)	Output Power AV + Duty factor (dBm)	Limits (dBm)	Verdict
802.11a						
36	5180	15.66	0.45	16.11	24.00	PASS
40	5200	16.05	0.45	16.51	24.00	PASS
48	5240	16.01	0.45	16.47	24.00	PASS
802.11n20						
36	5180	16.11	0.48	16.60	24.00	PASS
40	5200	15.91	0.48	16.39	24.00	PASS
48	5240	15.60	0.48	16.09	24.00	PASS
802.11ac20						
36	5180	16.07	3.16	19.23	24.00	PASS
40	5200	15.93	3.16	19.10	24.00	PASS
48	5240	16.35	3.16	19.51	24.00	PASS
802.11n40						
38	5190	15.65	0.93	16.58	24.00	PASS
46	5230	16.54	0.93	17.47	24.00	PASS
802.11ac40						
38	5190	16.40	4.07	20.48	24.00	PASS
46	5230	16.48	4.07	20.56	24.00	PASS
802.11ac80						
42	5210	14.32	5.44	19.76	24.00	PASS

5725-5850MHz:

Channel	Frequency (MHz)	Output Power AV (dBm)	Duty factor (dB)	Output Power AV + Duty factor (dBm)	Limits (dBm)	Verdict
802.11a						
149	5745	16.21	0.45	16.67	30.00	PASS
157	5785	15.62	0.45	16.07	30.00	PASS
165	5825	15.62	0.45	16.07	30.00	PASS
802.11n20						
129	5745	16.04	0.48	16.53	30.00	PASS
157	5785	16.07	0.48	16.55	30.00	PASS
165	5825	16.12	0.48	16.61	30.00	PASS
802.11ac20						
149	5745	16.09	3.16	19.25	30.00	PASS
157	5785	15.65	3.16	18.81	30.00	PASS
165	5825	15.86	3.16	19.02	30.00	PASS
802.11n40						
151	5755	15.71	0.93	16.64	30.00	PASS
159	5795	16.27	0.93	17.20	30.00	PASS
802.11ac40						
151	5755	16.07	4.07	20.15	30.00	PASS
159	5795	16.21	4.07	20.28	30.00	PASS
802.11ac80						
155	5775	13.61	5.44	19.05	30.00	PASS

4.5. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01: The rules requires "maximum power spectral density" measurements where the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission

a. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
b. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
c. Make the following adjustments to the peak value of the spectrum, if applicable:
    1. If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.
    2.) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
d. The result is the Maximum PSD over 1 MHz reference bandwidth.
e. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:
    1. Set RBW ≥ 1/T, where T is defined in section II.B.I.a).
    2. Set VBW ≥ 3 RBW.
    3. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
    4. If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
    5. Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

    Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHz is available on nearly all spectrum analyzers.
f. Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 percent).

LIMIT

According to §15.407(a): The maximum output power should be not exceed follow:

Frequency Range (MHz)	Limit
5150-5250	Other then Mobile and portable:17dBm/MHz Mobile and portable:11dBm/MHz
5250-5350	11dBm/MHz
5470-5725	11dBm/MHz
5725-5850	30dBm/500kHz

TEST RESULTS

Temperature	23.6℃	Humidity	55.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11a/n/ac

5150-5250MHz:

802.11a Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/1MHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/1MHz)	Limits (dBm/1MHz)	Verdict
36	5180	6.16	0.45	0	6.61	11	PASS
40	5200	7.54	0.45	0	7.99	11	PASS
48	5240	7.30	0.45	0	7.75	11	PASS

802.11n HT20 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/1MHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/1MHz)	Limits (dBm/1MHz)	Verdict
36	5180	6.30	0.48	0	6.78	11	PASS
40	5200	5.84	0.48	0	6.32	11	PASS
48	5240	6.72	0.48	0	7.20	11	PASS

802.11n40 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/1MHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/1MHz)	Limits (dBm/1MHz)	Verdict
38	5190	3.45	0.93	0	4.38	11	PASS
46	5230	4.09	0.93	0	5.02	11	PASS

802.11ac20 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/1MHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/1MHz)	Limits (dBm/1MHz)	Verdict
36	5180	6.09	3.16	0	9.25	11	PASS
40	5200	6.69	3.16	0	9.85	11	PASS
48	5240	7.01	3.16	0	10.17	11	PASS

802.11ac40 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/1MHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/1MHz)	Limits (dBm/1MHz)	Verdict
38	5190	4.30	4.07	0	8.37	11	PASS
46	5230	4.75	4.07	0	8.82	11	PASS

802.11ac80 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/1MHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/1MHz)	Limits (dBm/1MHz)	Verdict
42	5210	2.43	5.44	0	7.87	11	PASS

5725-5850MHz:

802.11a Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/300KHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/500kHz)	Limits (dBm/500kHz)	Verdict
149	5745	2.19	0.45	2.2	4.84	30	PASS
157	5785	2.90	0.45	2.2	5.55	30	PASS
165	5825	2.99	0.45	2.2	5.64	30	PASS

802.11n HT20 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/300KHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/500kHz)	Limits (dBm/500kHz)	Verdict
149	5745	2.54	0.48	2.2	5.22	30	PASS
157	5785	2.20	0.48	2.2	4.88	30	PASS
165	5825	3.38	0.48	2.2	6.06	30	PASS

802.11n40Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/300KHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/500kHz)	Limits (dBm/500kHz)	Verdict
149	5755	-0.27	0.93	2.2	2.86	30	PASS
157	5795	0.05	0.93	2.2	3.18	30	PASS

802.11ac20 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/300KHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/500kHz)	Limits (dBm/500kHz)	Verdict
149	5745	3.84	3.16	2.2	9.20	30	PASS
157	5785	4.53	3.16	2.2	9.89	30	PASS
165	5825	5.00	3.16	2.2	10.36	30	PASS

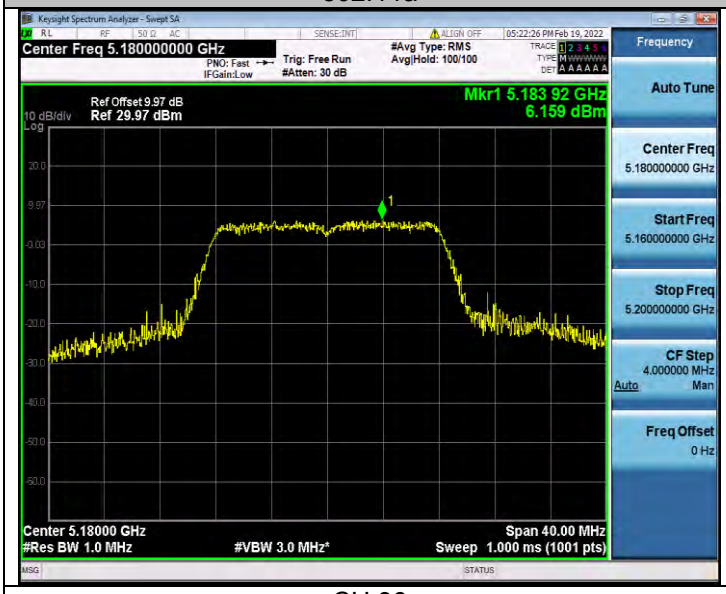
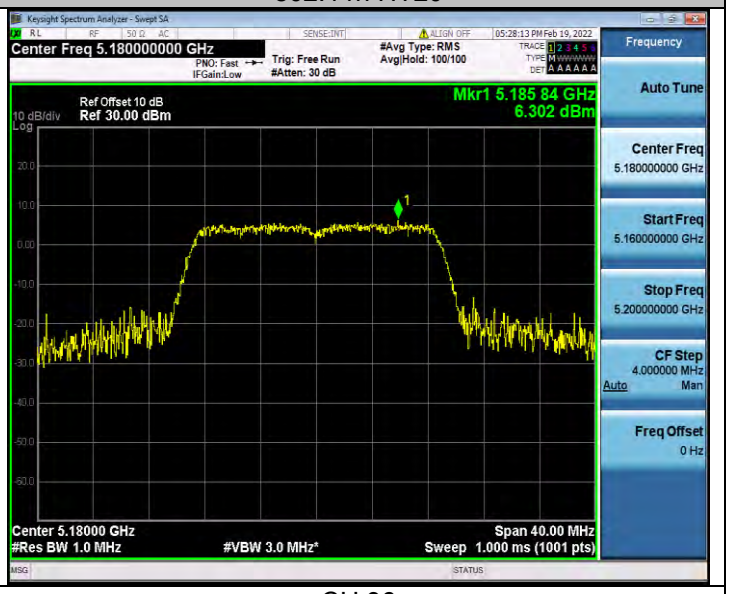
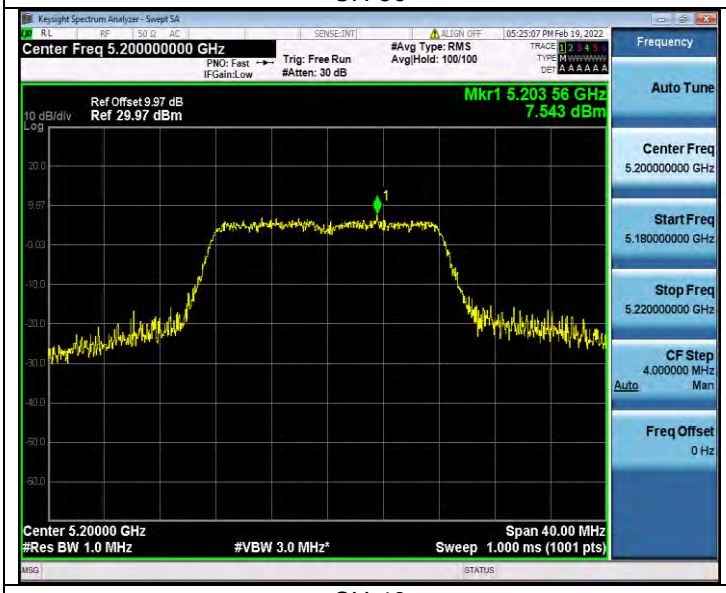
802.11ac40 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/300KHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/500kHz)	Limits (dBm/500kHz)	Verdict
149	5755	0.43	4.07	2.2	6.70	30	PASS
157	5795	-0.11	4.07	2.2	6.16	30	PASS

802.11ac80 Test Mode

Channel	Frequency (MHz)	Report PSD (dBm/300KHz)	Duty factor (dB)	RBW factor (dB)	Report PSD+ Duty factor+ RBW factor (dBm/500kHz)	Limits (dBm/500kHz)	Verdict
155	5775	-1.79	5.44	2.2	5.85	30	PASS

5150-5250MHz:

802.11a	802.11n HT20
	
CH 36	CH 36
	
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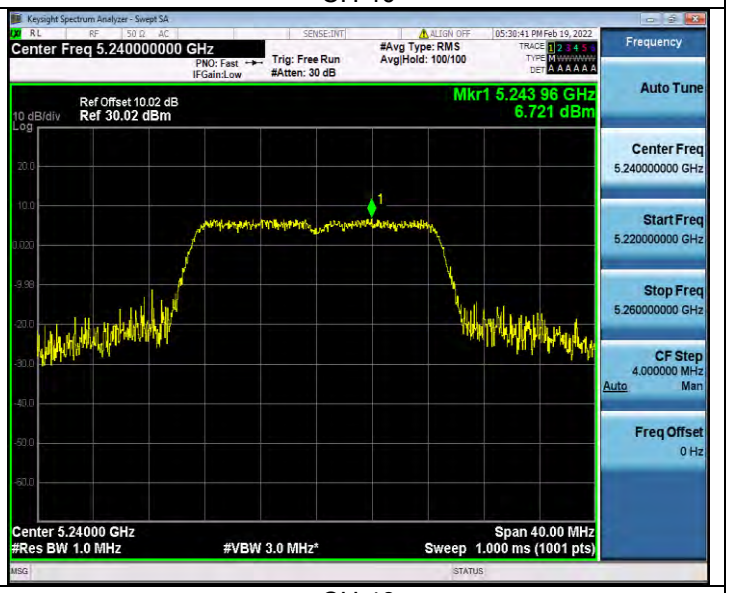
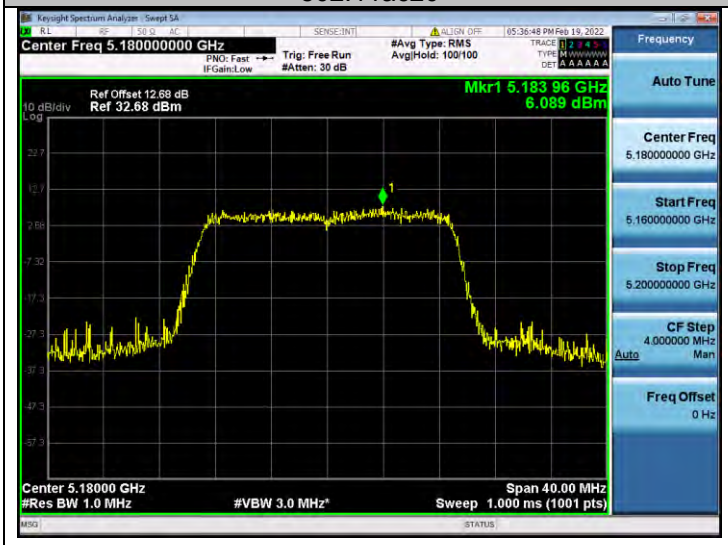
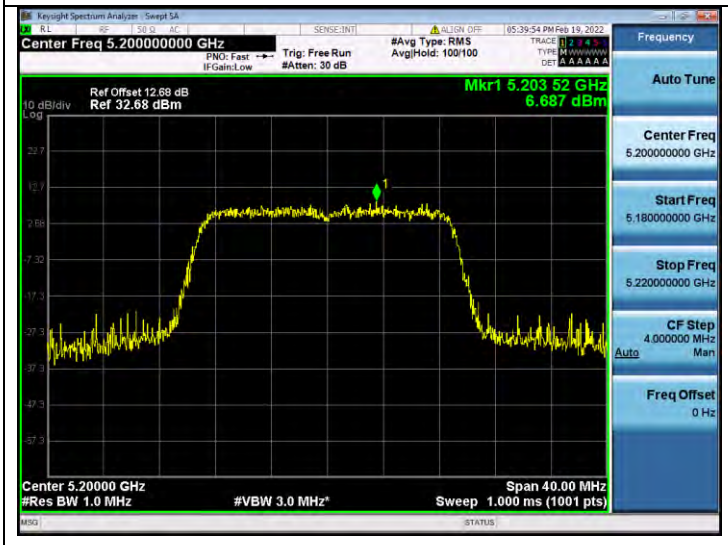
	
CH 48	CH 48

802.11ac20	802.11n HT40
	
CH 36	CH 38
	
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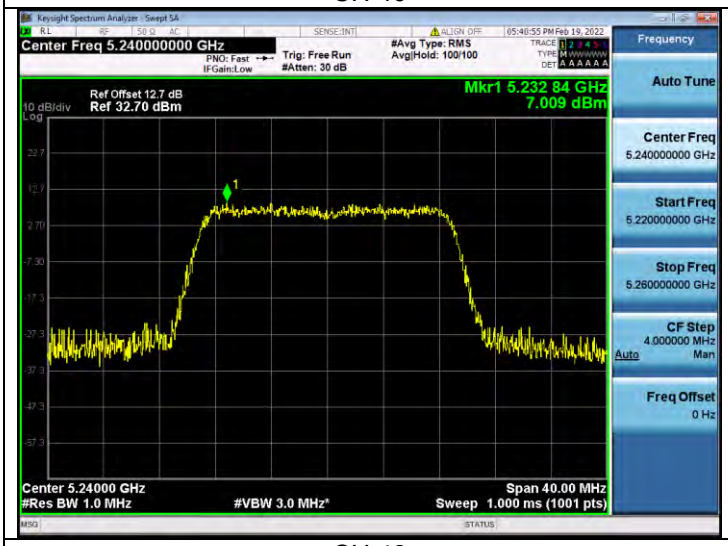
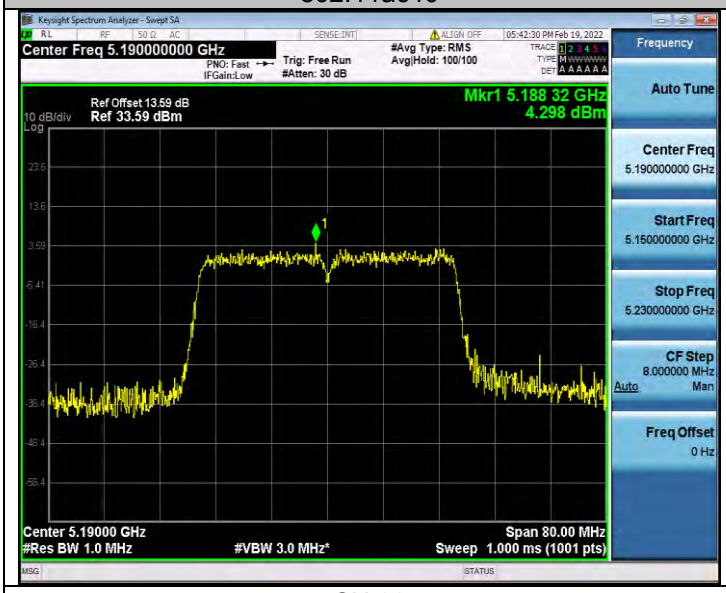
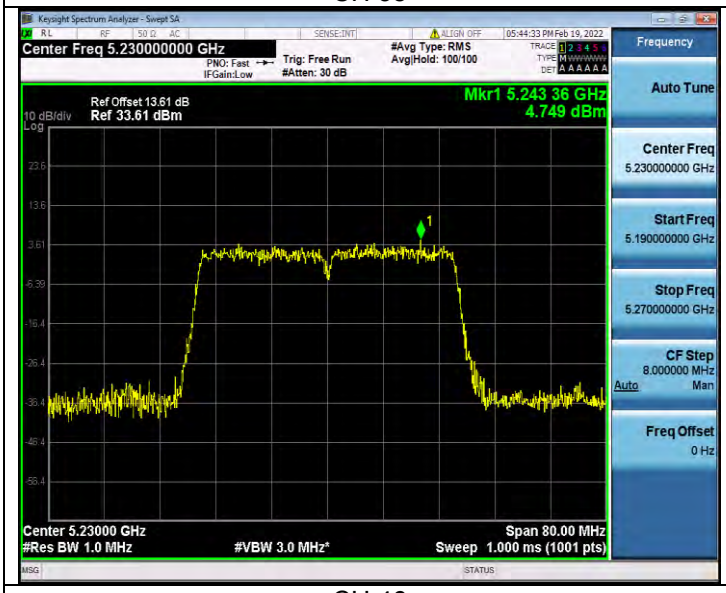
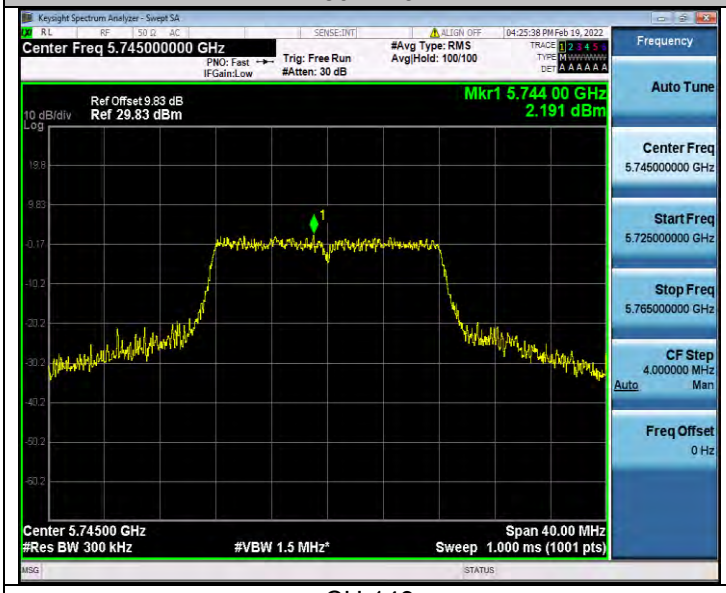
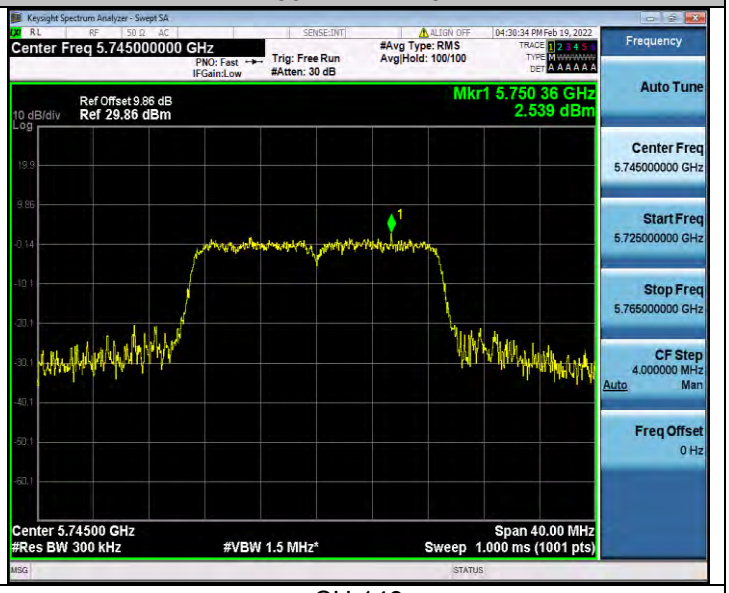
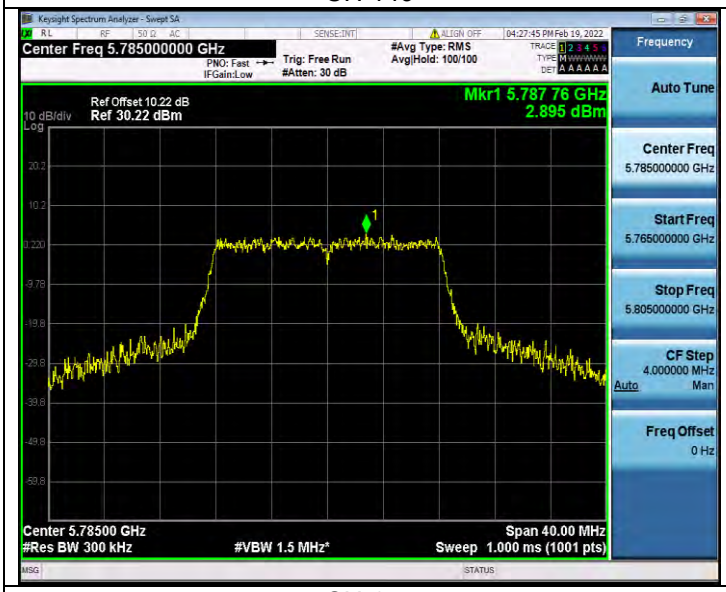
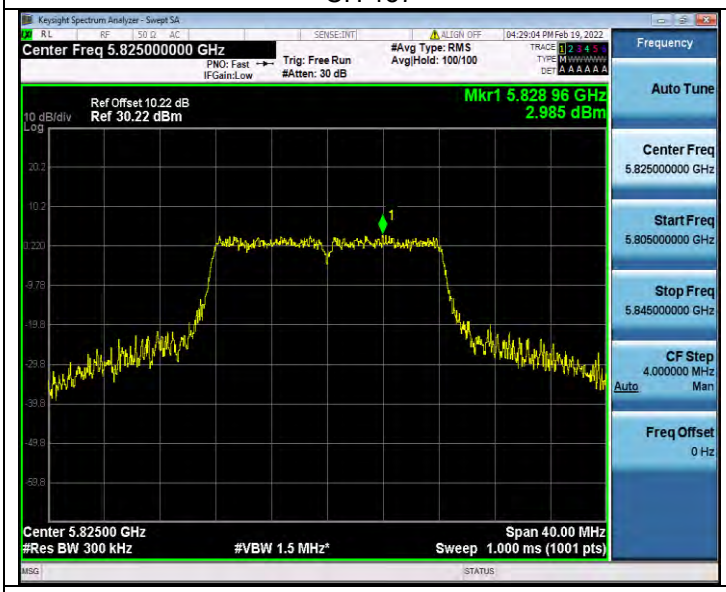
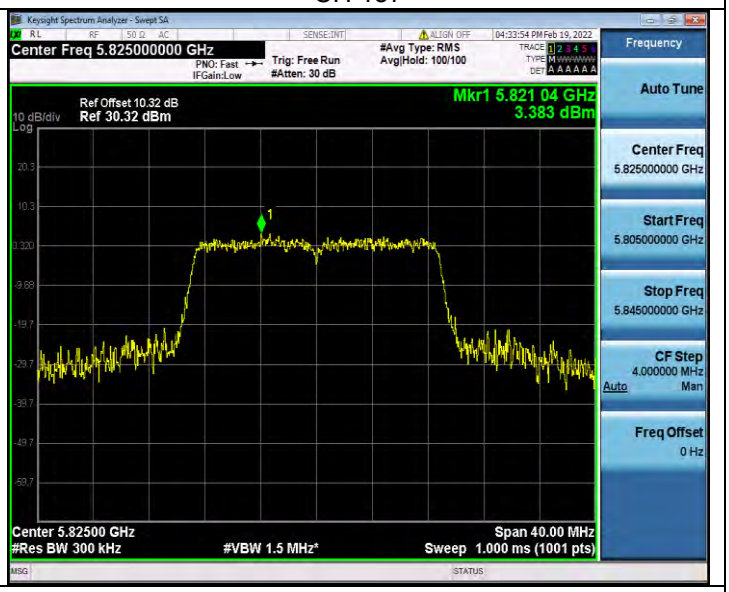
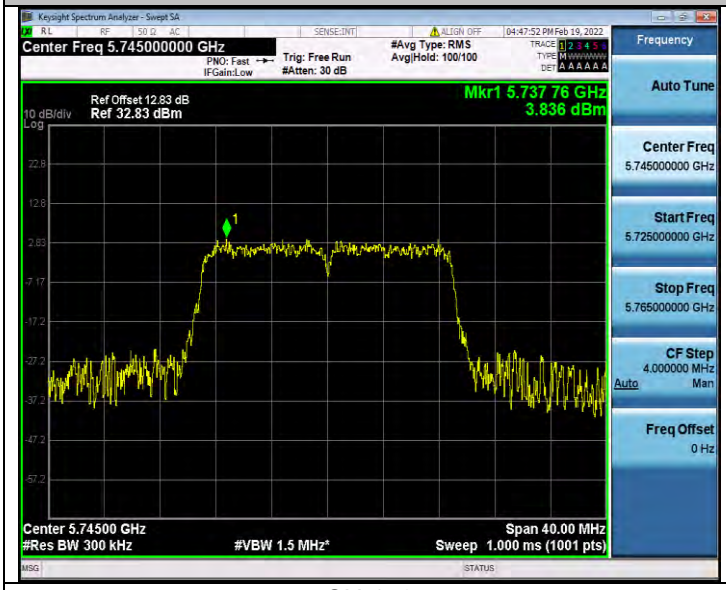
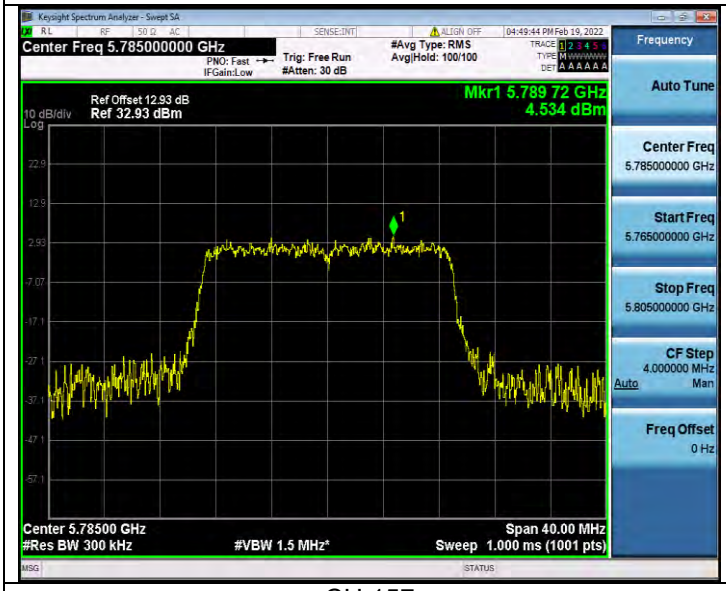
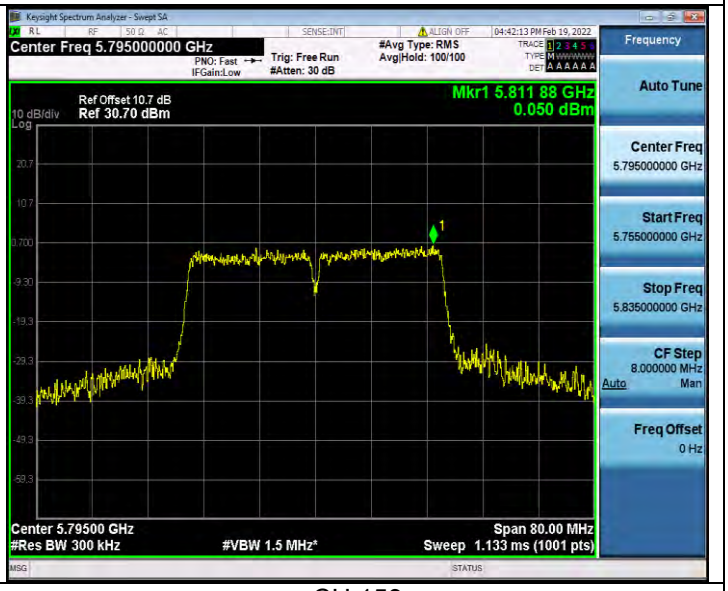
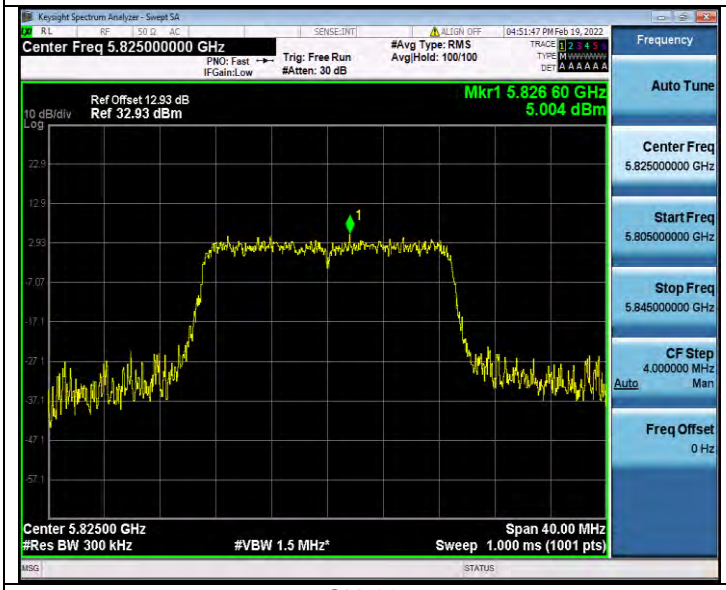
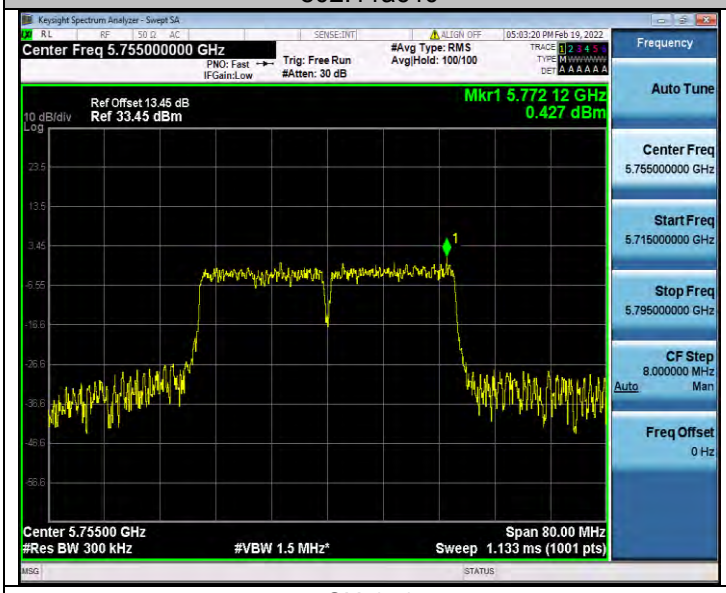
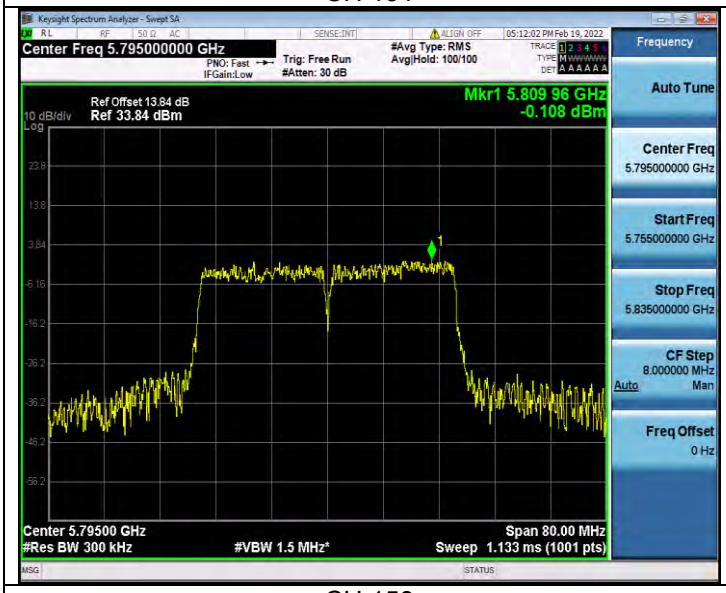
	
CH 48	

802.11ac40	802.11ac80
	
CH 38	CH 42
	
CH 46	

5725-5850MHz:

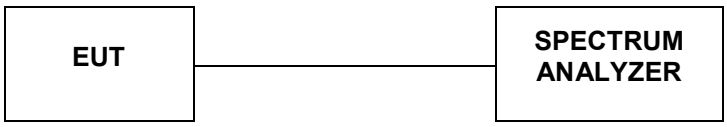
802.11a	802.11n HT20
	
CH 149	CH 149
	
CH 157	CH 157
	
CH 165	CH 165

802.11ac20	802.11n HT40
	
CH 149	CH 151
	
CH 157	CH 159
	
CH 165	

802.11ac40	802.11ac80
	
CH 151	CH 155
	
CH 159	

4.6. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01 for one of the following procedures may be used for section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a. Set RBW = 100 kHz.
b. Set the video bandwidth (VBW) ≥ 3 × RBW
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize
g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

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

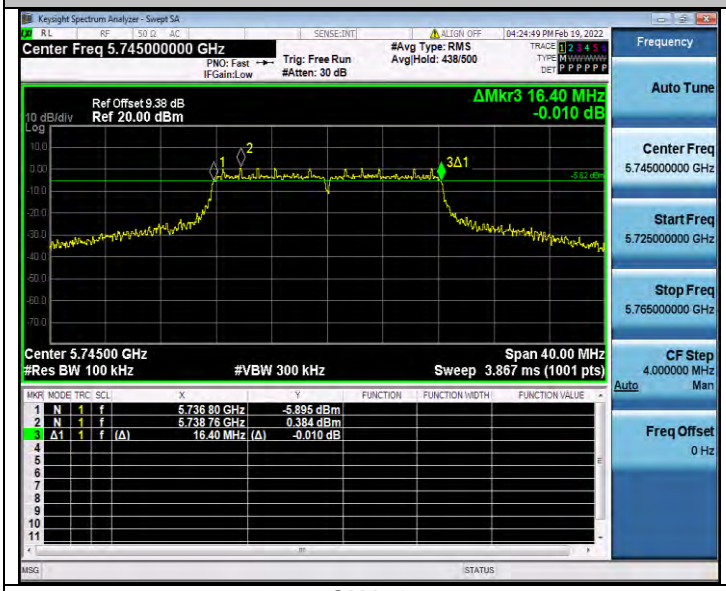
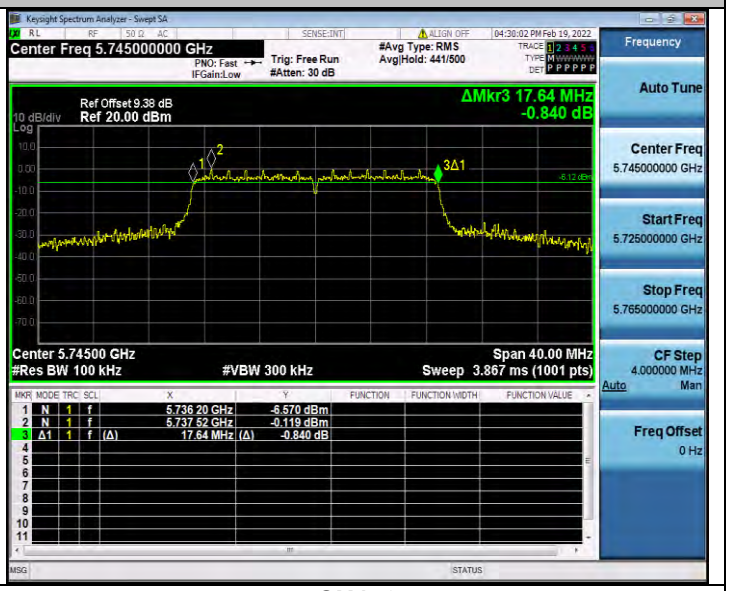
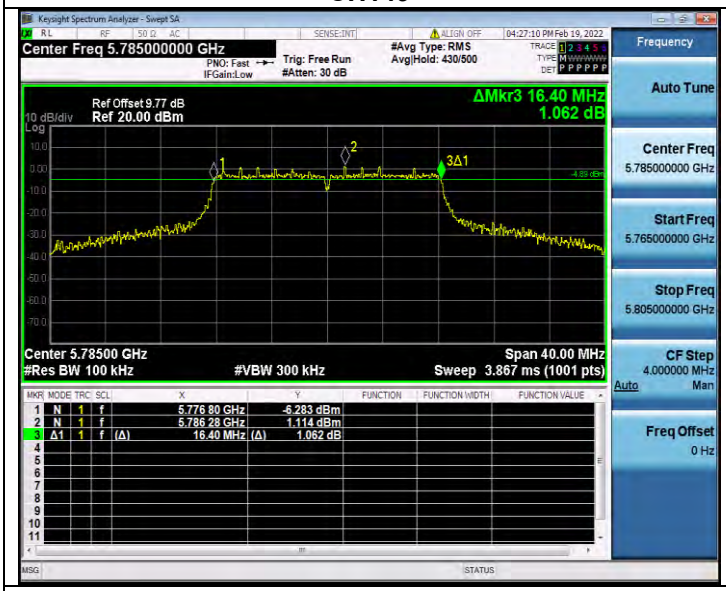
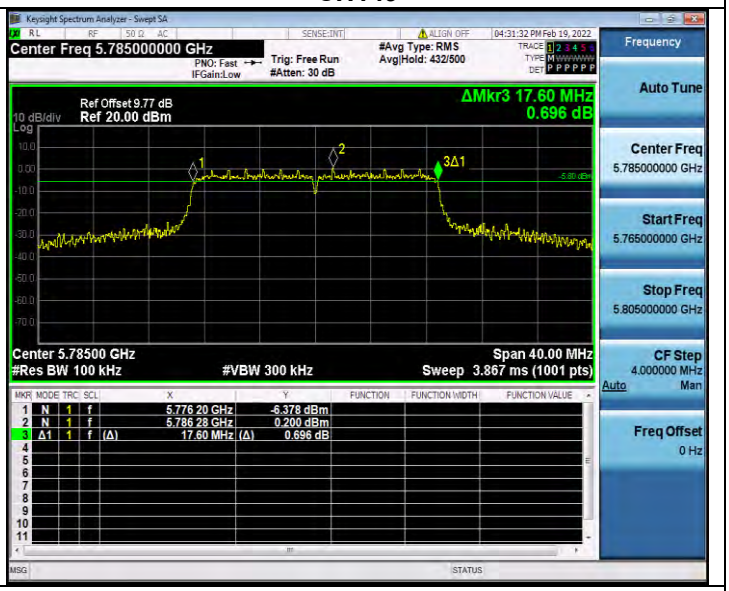
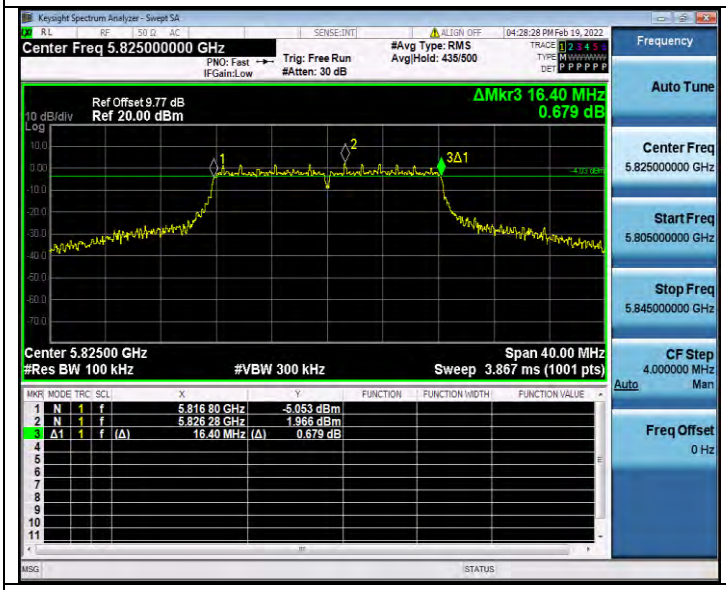
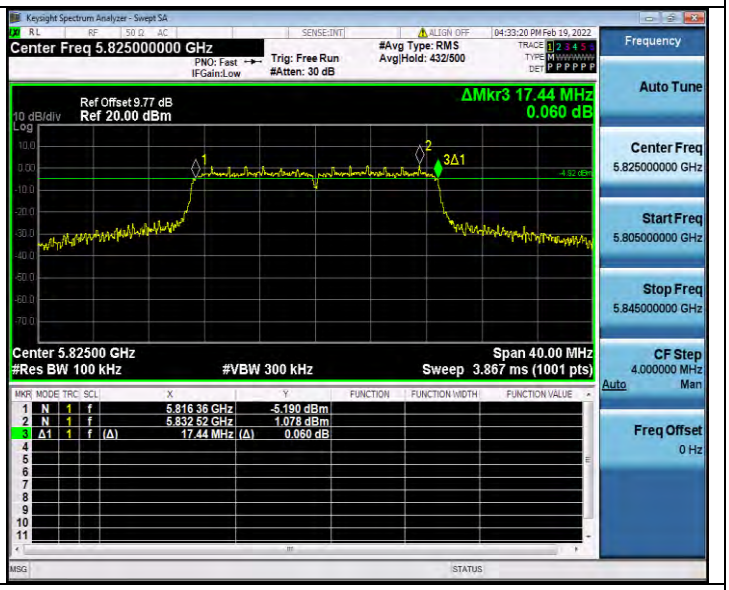
LIMIT

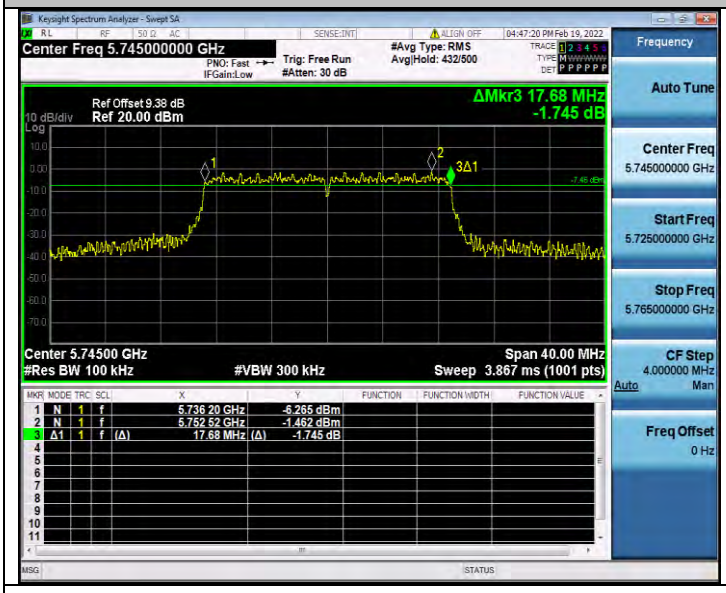
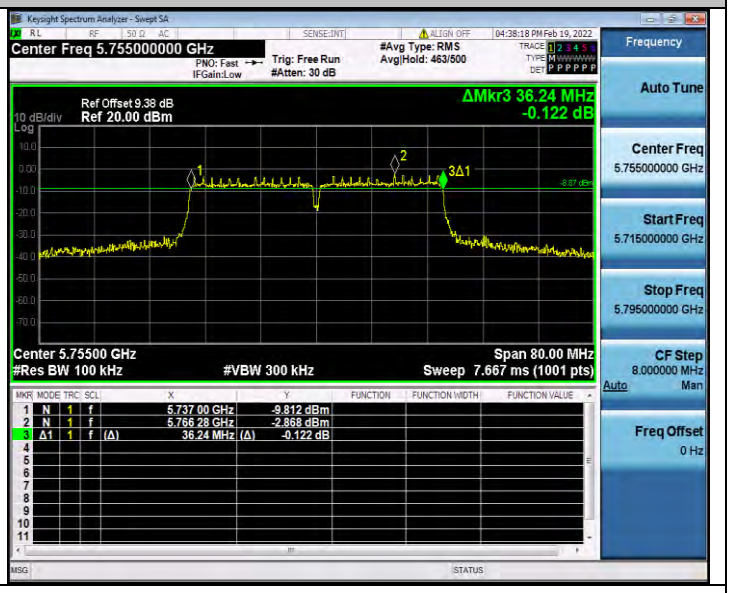
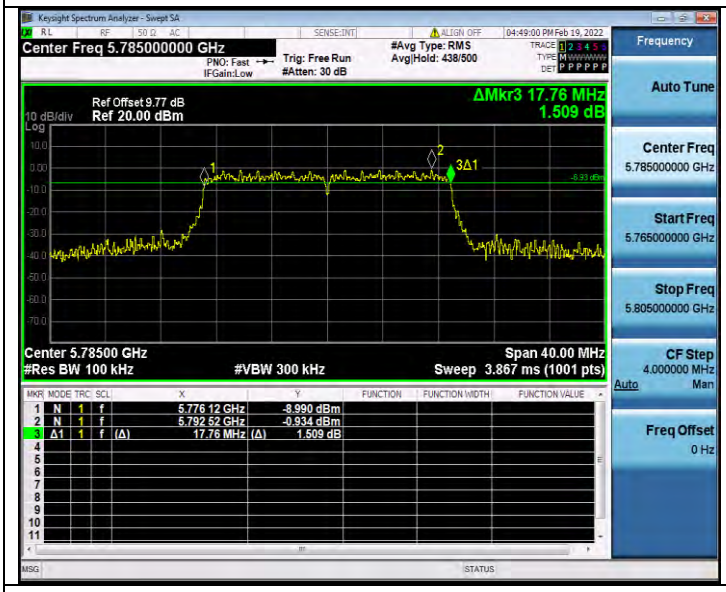
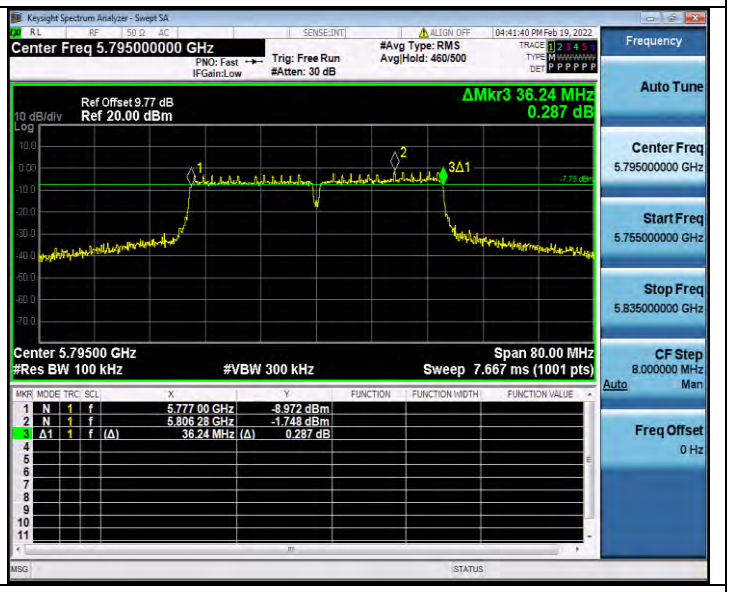
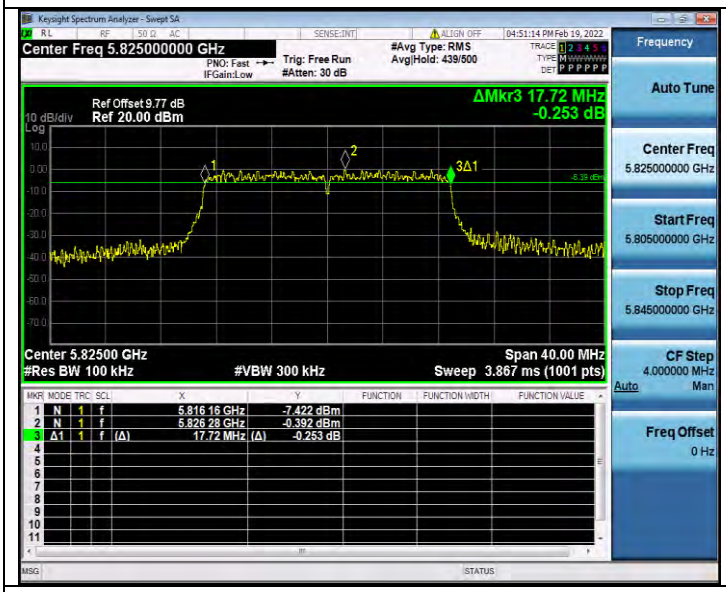
For Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz

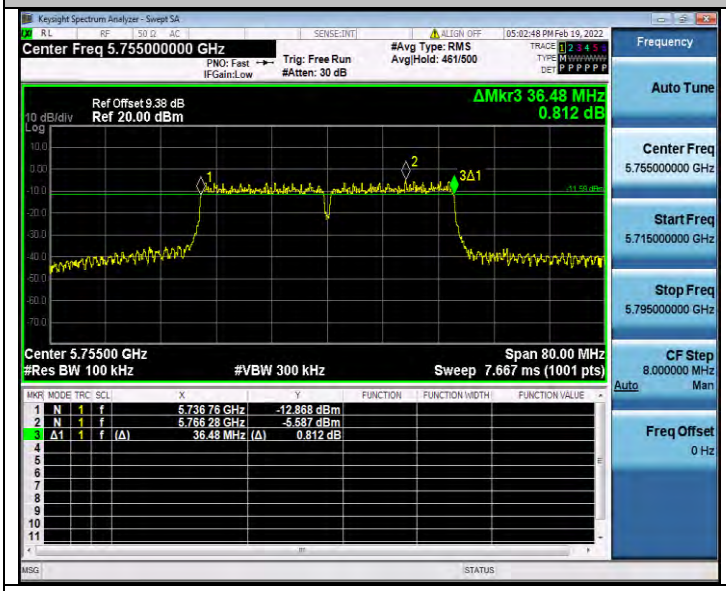
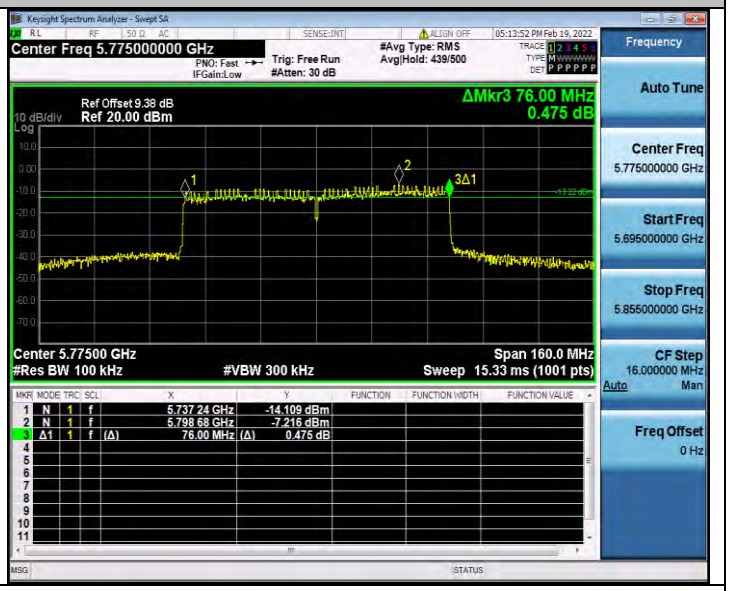
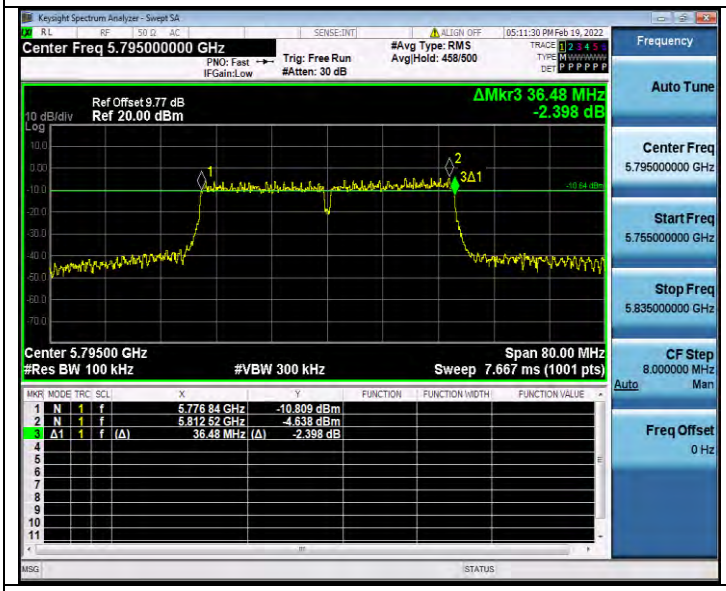
TEST RESULTS

Temperature	23.6℃	Humidity	55.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11a/n/ac

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	149	16.400	>500	Pass
	157	16.400		
	165	16.400		
802.11nHT20	149	17.640	>500	Pass
	157	17.600		
	165	17.440		
802.11n40	151	36.240	>500	Pass
	159	36.240		
802.11ac20	149	17.680	>500	Pass
	157	17.760		
	165	17.720		
802.11ac40	151	36.480	>500	Pass
	159	36.480		
802.11ac80	155	76.000	>500	Pass

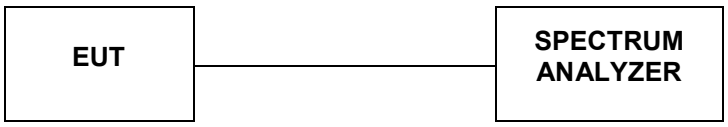
6dB Bandwidth	
802.11a	802.11n HT20
	
CH149	CH149
	
CH157	CH157
	
CH165	CH165

6dB Bandwidth	
802.11ac20	802.11n HT40
	
CH149	CH151
	
CH157	CH159
	
CH165	

6dB Bandwidth	
802.11ac40	802.11ac80
	
CH151	CH155
	
CH159	

4.7. 26dBc Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

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

a. Set RBW = 220 kHz/430 kHz /820 kHz (approximately 1% of the emission bandwidth).
b. Set the video bandwidth (VBW) = 3* RBW)
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize
g. 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.

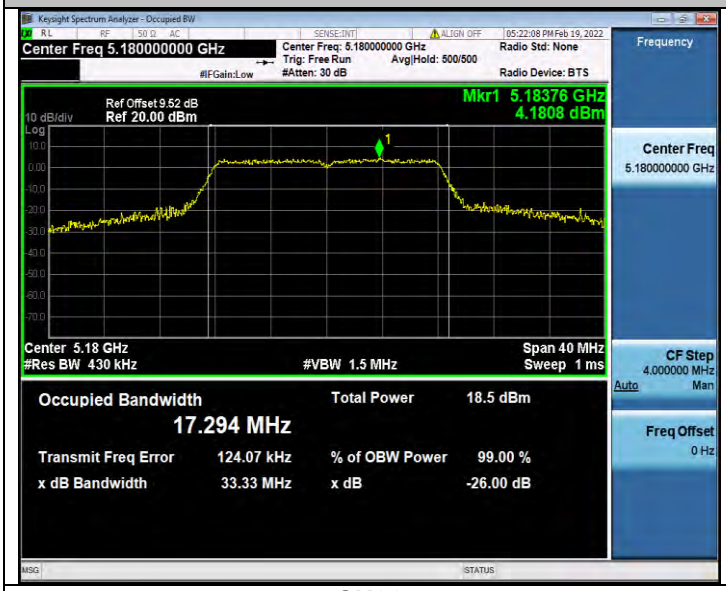
LIMIT

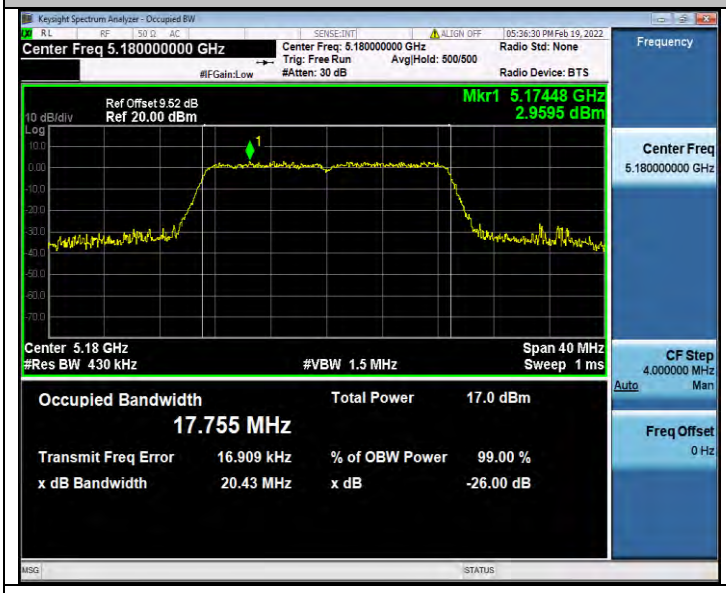
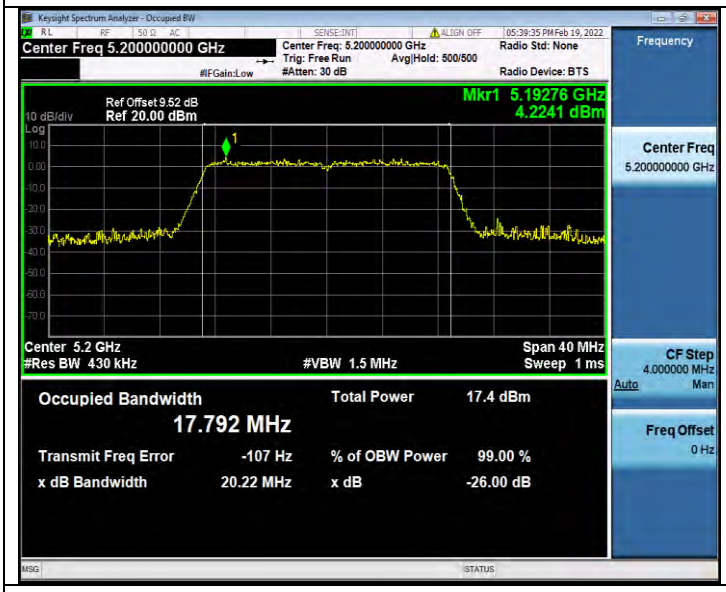
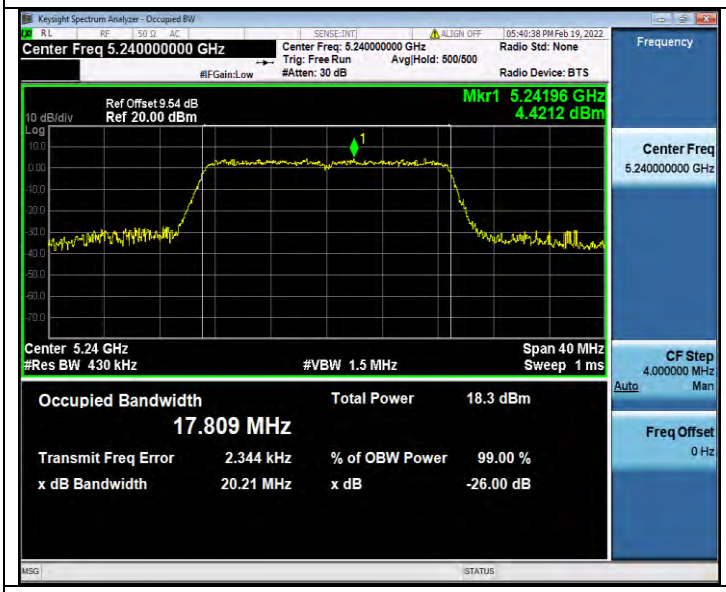
No Limits for 26dBc Bandwith

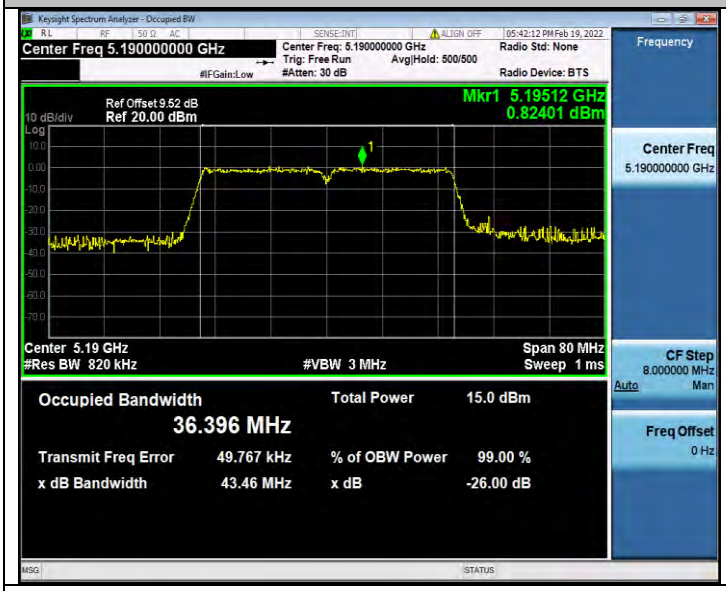
TEST RESULTS

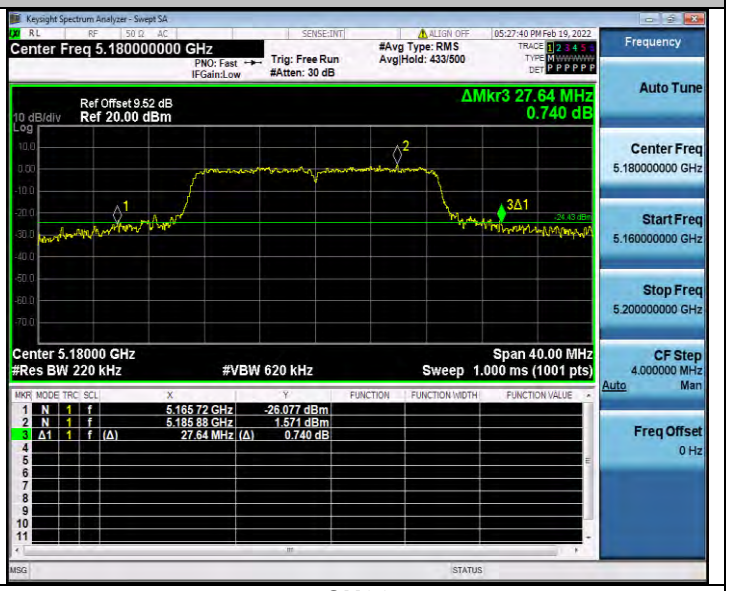
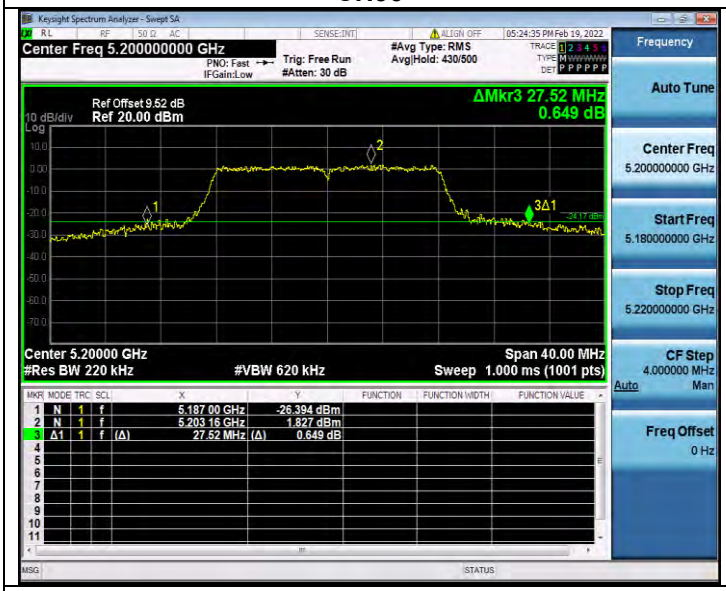
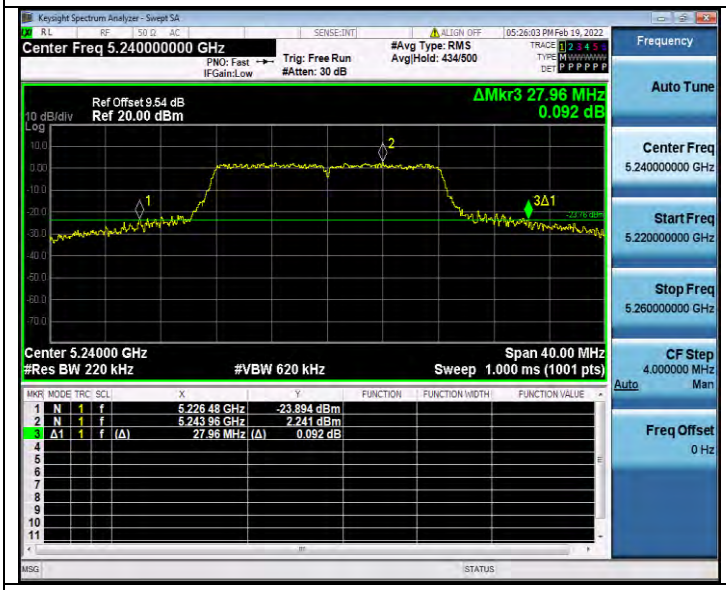
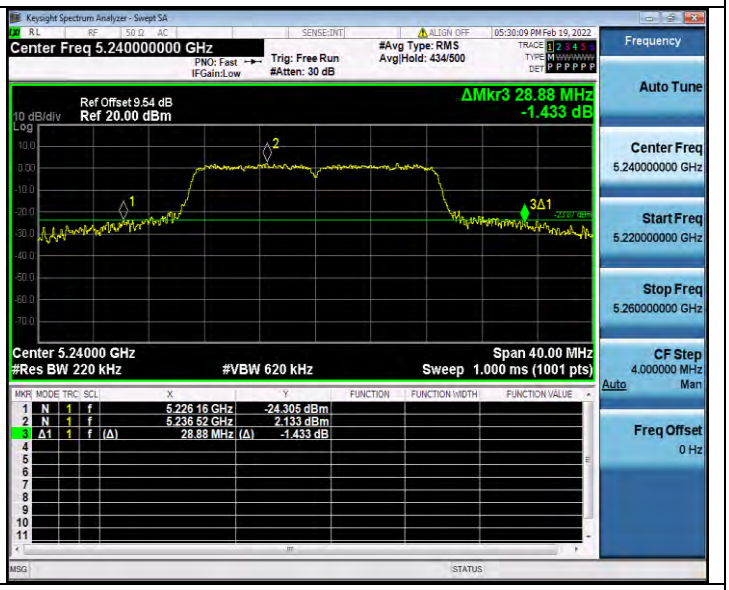
Temperature	23.6℃	Humidity	55.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11a/n/ac

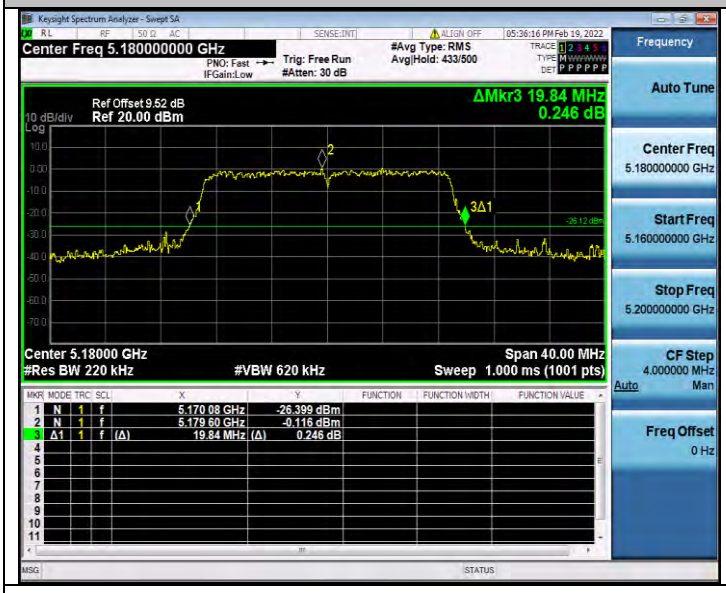
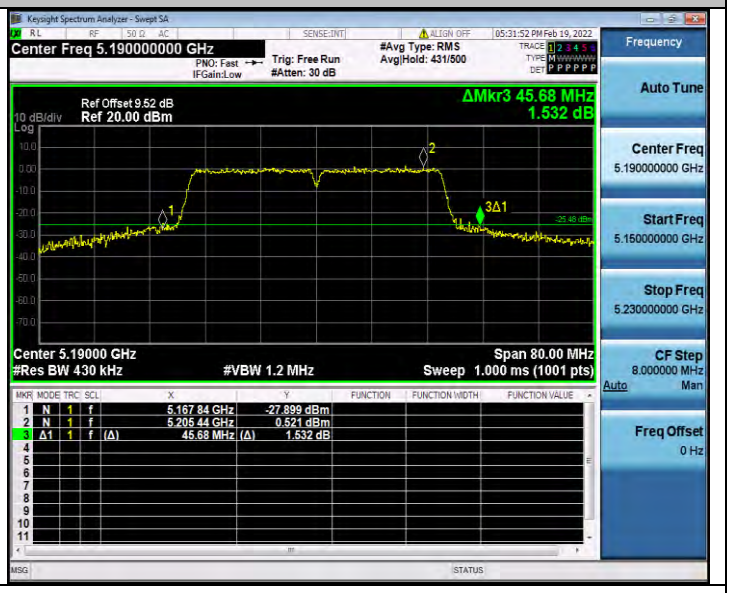
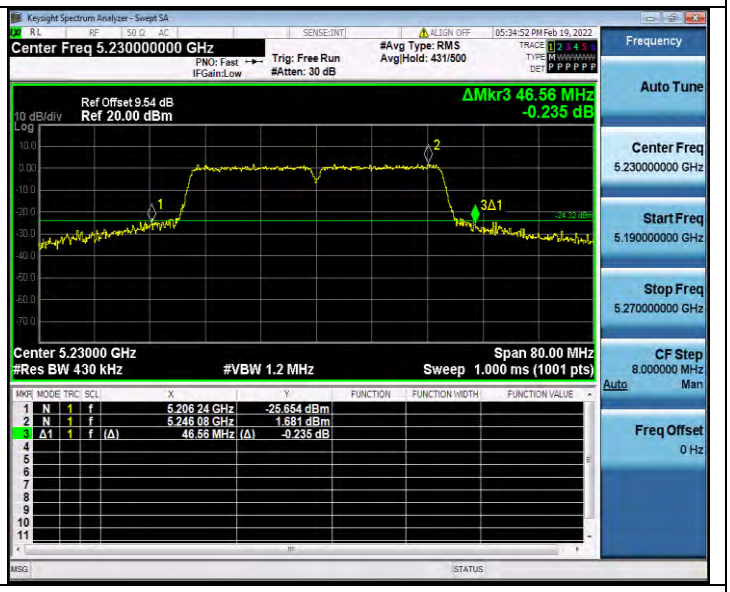
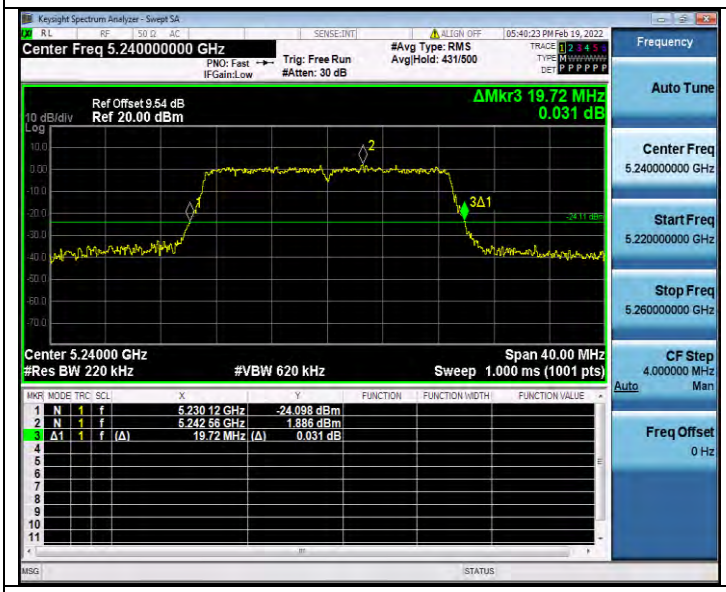
Type	Channel	99%Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	36	17.294	26.240	-	Pass
	40	17.311	27.520		
	48	17.189	27.960		
802.11nHT20	36	18.063	27.640	-	Pass
	40	18.086	27.360		
	48	17.983	28.880		
802.11n40	38	36.587	45.680	-	Pass
	46	36.543	46.560		
802.11ac20	36	17.755	19.840	-	Pass
	40	17.792	19.840		
	48	17.809	19.720		
802.11ac40	38	36.396	44.000	-	Pass
	46	36.434	39.520		
802.11ac80	42	75.765	80.800	-	Pass

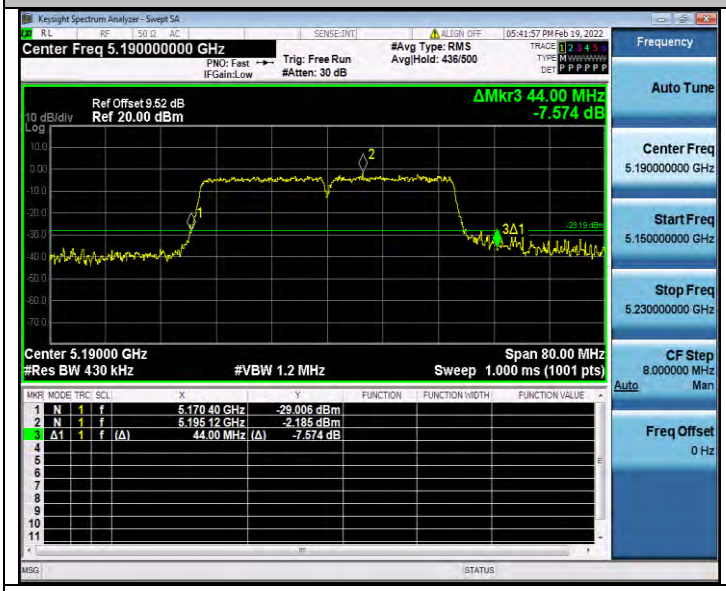
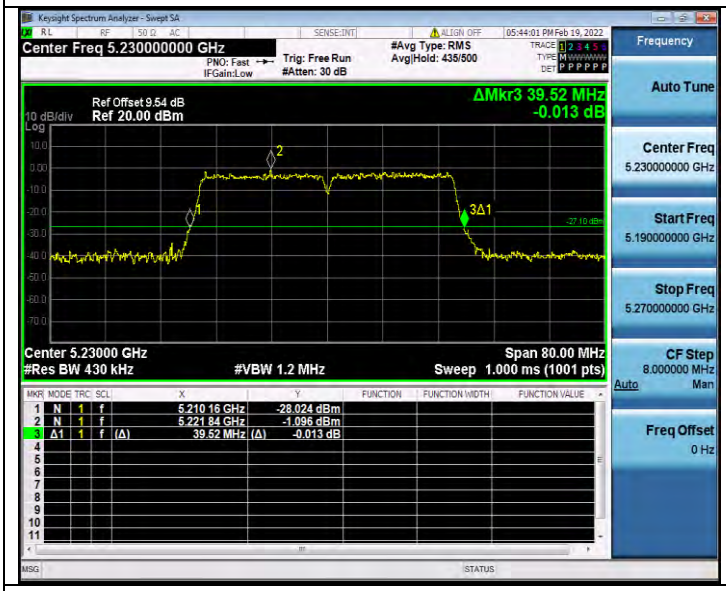
99%Bandwidth	
802.11a	802.11n HT20
	
CH36	CH36
	
CH40	CH40
	
CH48	CH48

99%Bandwidth	
802.11ac20	802.11n HT40
	
CH36	CH38
	
CH40	CH46
	
CH48	

99%Bandwidth	
802.11ac40	802.11ac80
	
CH38	CH42
	
CH46	

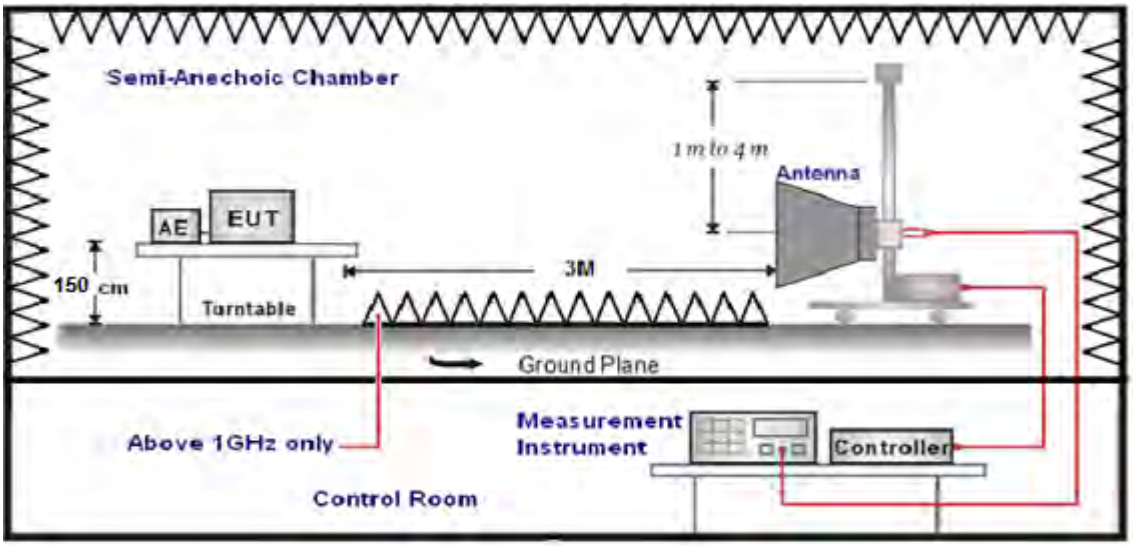
26dB Bandwidth	
802.11a	802.11n HT20
	
CH36	CH36
	
CH40	CH40
	
CH48	CH48

26dB Bandwidth	
802.11ac20	802.11n HT40
	
CH36	CH38
	
CH40	CH46
	
CH48	

26dB Bandwidth	
802.11ac40	802.11ac80
	
CH38	CH42
	
CH46	

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 (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(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 (dBμV/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 0's 802.11 ac20 mode;

For Radiated Bandedge Measurement

Temperature	23.4℃	Humidity	54.5%
Test Engineer	Oliver Ou	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	35.05	35.58	29.04	8.28	49.87	68.20	-18.33	Peak	Horizontal
4500.0	30.02	35.58	29.04	8.28	44.84	54.00	-9.16	AV	Horizontal
5150.0	38.99	35.58	29.04	8.28	53.81	68.20	-14.39	Peak	Horizontal
5150.0	30.48	35.58	29.04	8.28	45.30	54.00	-8.70	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	35.13	35.42	29.06	8.39	49.88	68.20	-18.32	Peak	Horizontal
5350.0	30.29	35.42	29.06	8.39	45.04	54.00	-8.96	AV	Horizontal
5460.0	35.13	35.42	29.06	8.39	49.88	68.20	-18.32	Peak	Horizontal
5460.0	30.29	35.42	29.06	8.39	45.04	54.00	-8.96	AV	Horizontal

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	35.29	35.35	29.07	8.43	50.00	68.20	-18.20	Peak	Horizontal
5700.0	30.13	35.35	29.07	8.43	44.84	68.20	-23.36	Peak	Horizontal
5720.0	39.07	35.35	29.07	8.43	53.78	68.20	-14.42	Peak	Horizontal
5725.0	30.66	35.35	29.07	8.43	45.37	68.20	-22.83	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	35.21	35.30	29.11	8.51	49.91	68.20	-18.29	Peak	Horizontal
5855.0	30.14	35.30	29.11	8.51	44.84	68.20	-23.36	Peak	Horizontal
5875.0	39.08	35.30	29.11	8.51	53.78	68.20	-14.42	Peak	Horizontal
5925.0	30.70	35.30	29.11	8.51	45.40	68.20	-22.80	Peak	Horizontal

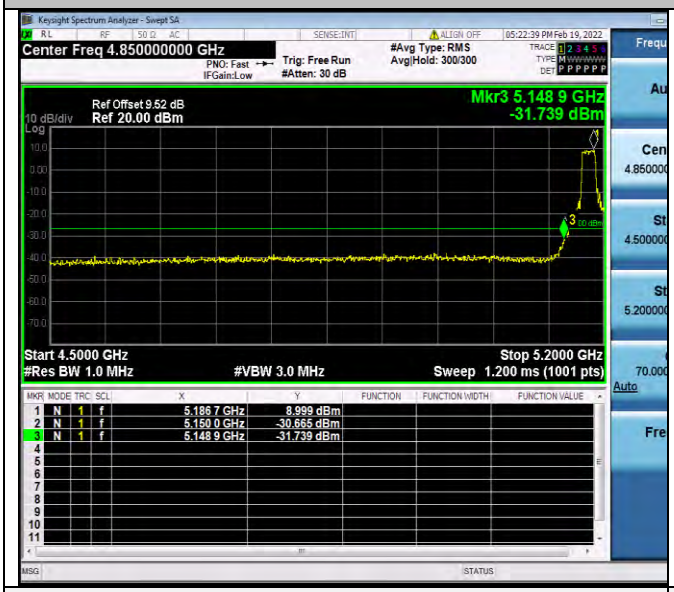
REMARKS:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. Margin value = Result Level-Limit value.
2. The other emission levels were very low against the limit.
3. The average measurement was not performed when the peak measured data under the limit of average detection.
4.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

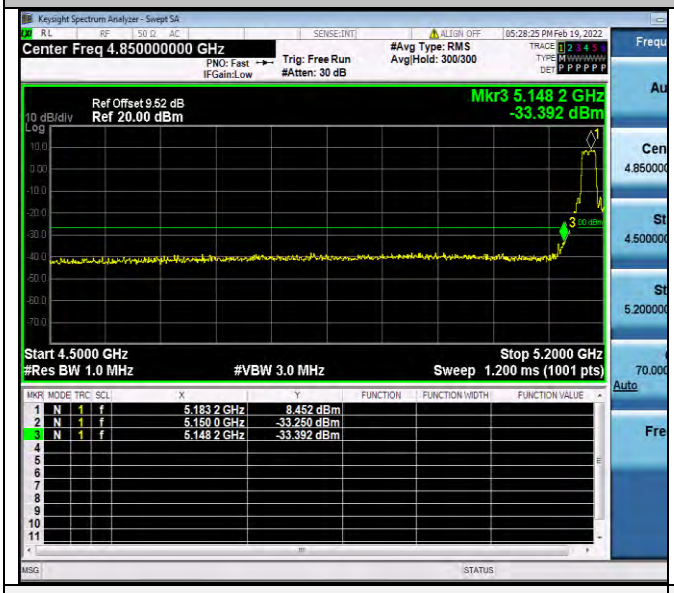
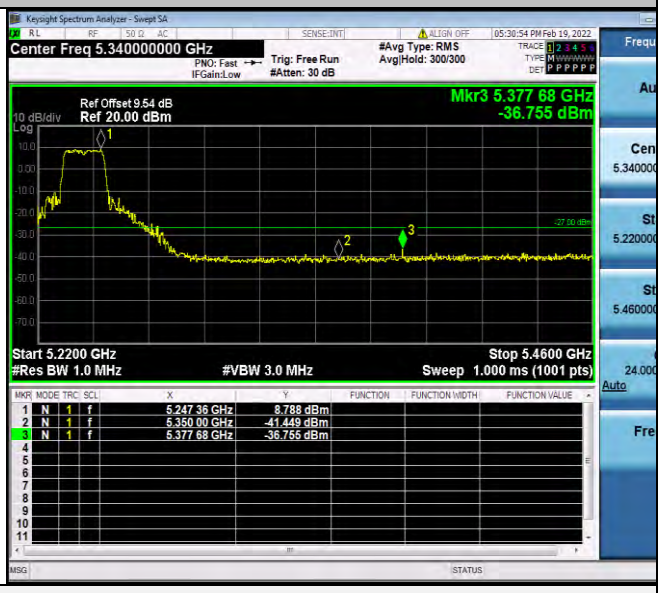
For Conducted Band edge Measurement

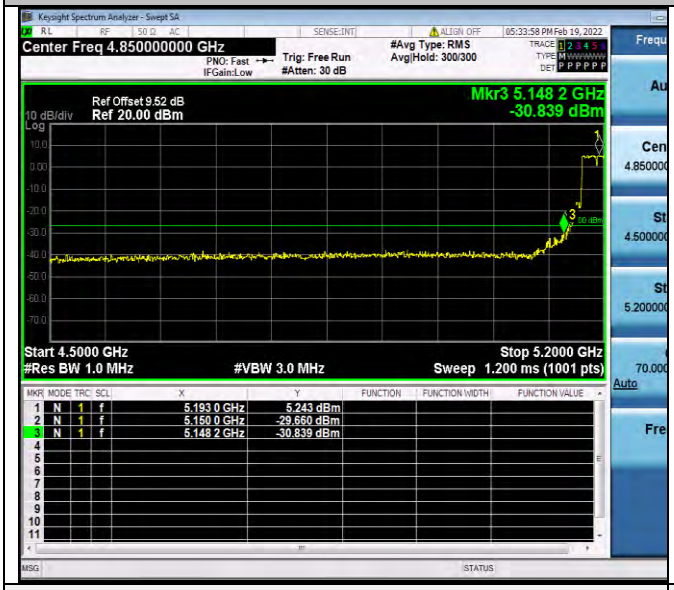
Temperature	23.6℃	Humidity	55.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11a/n/ac

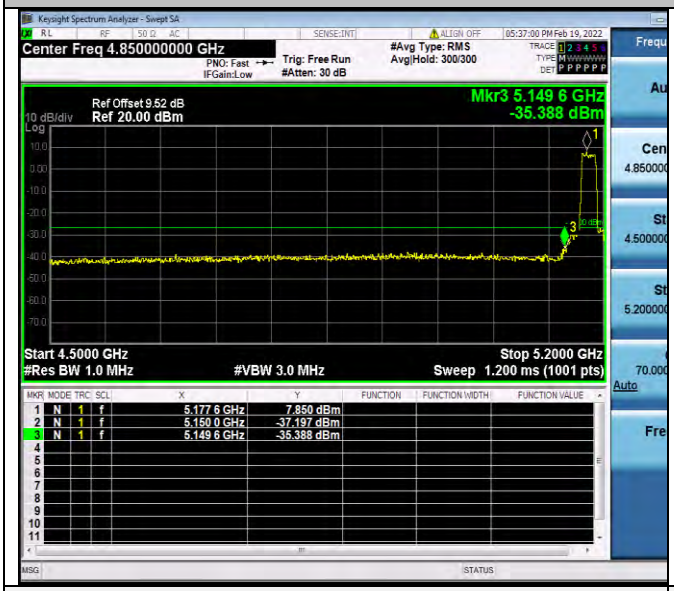
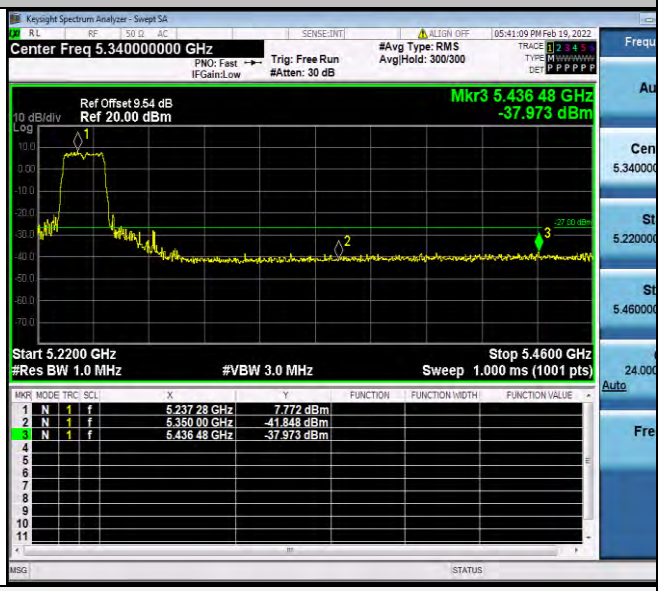
The test results have included the antenna gain

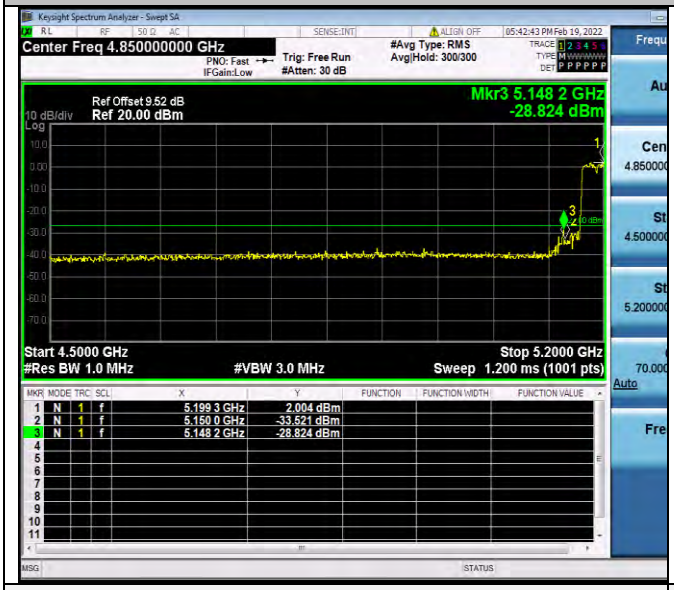
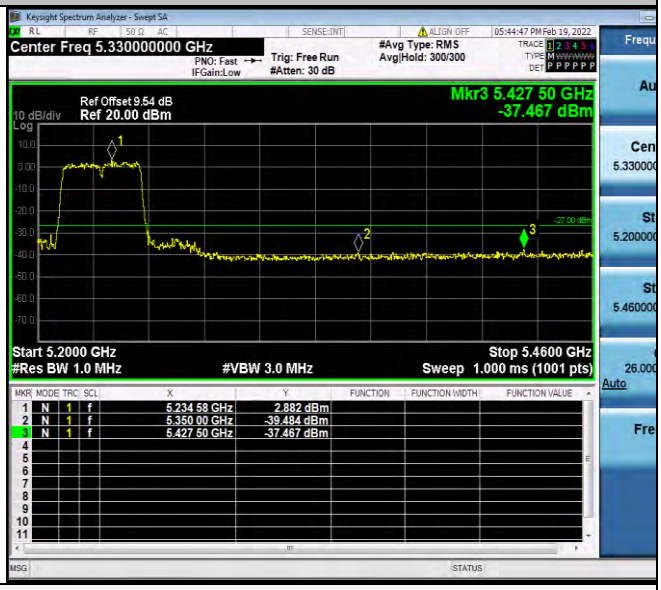
5150-5250MHz:

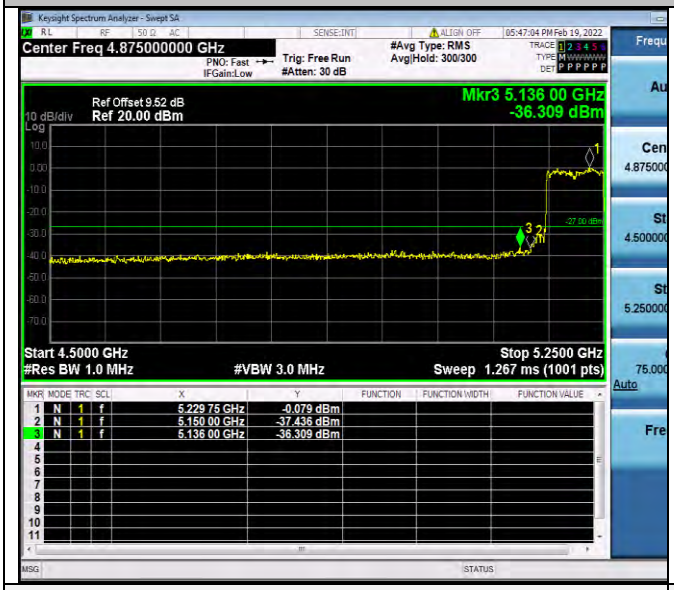
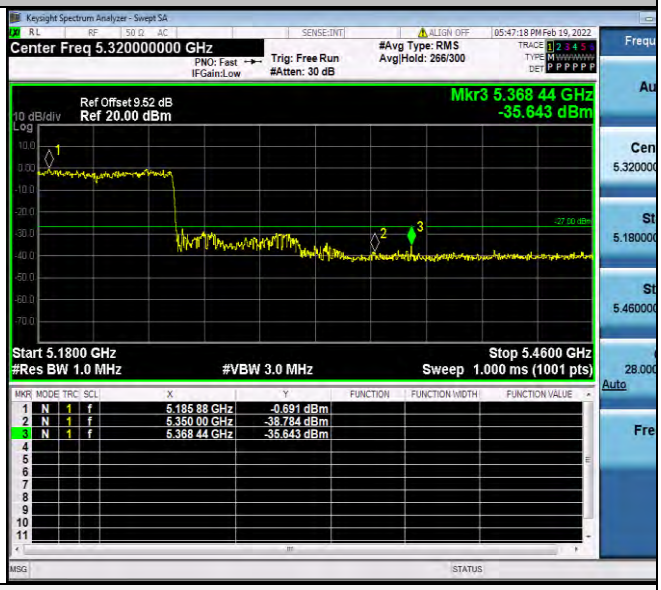
802.11a	
	
5180 MHz	5240 MHz

802.11n HT20	
	
5180 MHz	5240 MHz

802.11n HT40	
	
5190 MHz	5230 MHz

802.11ac20	
	
5180 MHz	5240 MHz

802.11ac40	
	
5190 MHz	5230 MHz

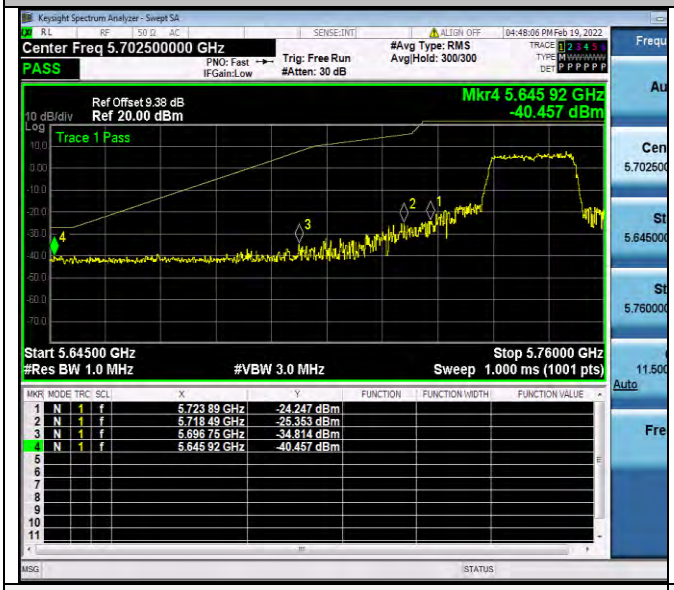
802.11ac80	
	
5210 MHz	

5725-5850MHz:

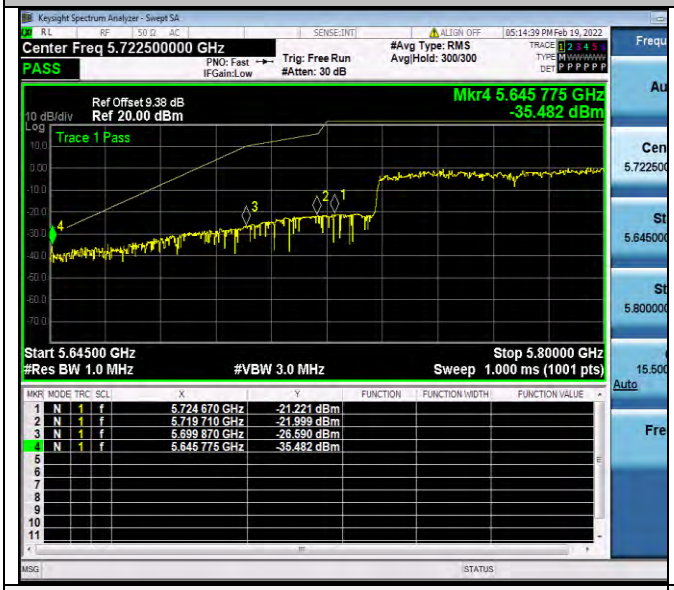
802.11a	
	
5745 MHz	5825 MHz

802.11n HT20	
	
5745 MHz	5825 MHz

802.11n HT40	
	
5755 MHz	5795 MHz

802.11ac20	
	
5745 MHz	5825 MHz

802.11ac40	
	
5755 MHz	5795 MHz

802.11ac80	
	
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.”

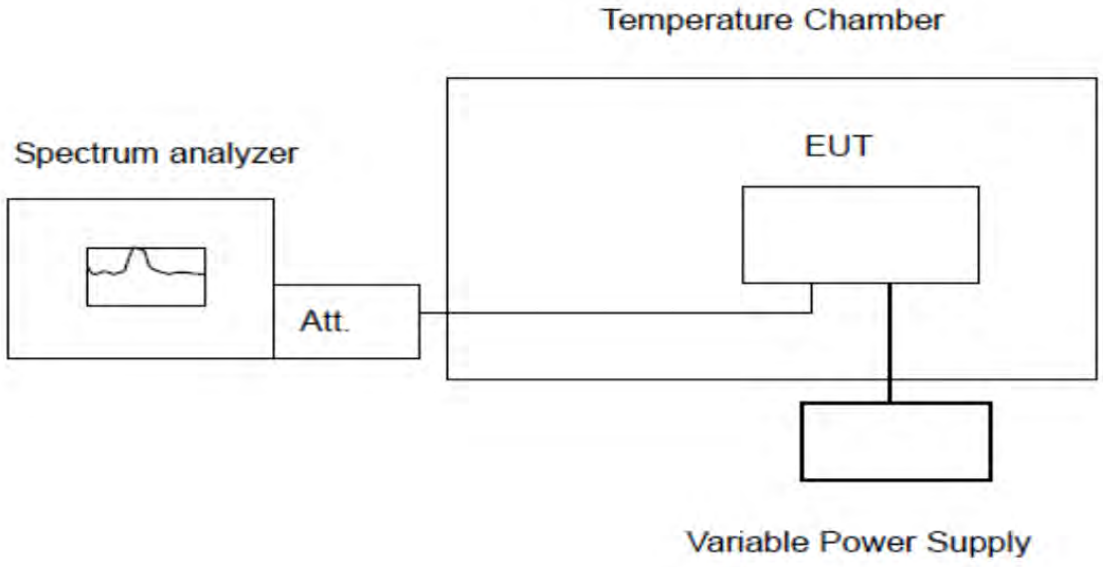
According to FCC §2.1055(a) “The frequency stability shall be measured with variation of ambient temperature as follows:”

(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 anzlyer via feed through attenators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low engouh to obtain the desired frequency resoluation 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 wuth 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 (Dregree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5180.406337	5150 – 5250	PASS
20	DC 10.8V	5180.559732	5150 – 5250	PASS
50	DC 12.0V	5180.294728	5150 – 5250	PASS
40	DC 12.0V	5180.201466	5150 – 5250	PASS
30	DC 12.0V	5180.555540	5150 – 5250	PASS
20	DC 12.0V	5180.117906	5150 – 5250	PASS
10	DC 12.0V	5179.684084	5150 – 5250	PASS
0	DC 12.0V	5180.349931	5150 – 5250	PASS
-10	DC 12.0V	5180.488221	5150 – 5250	PASS
-20	DC 12.0V	5180.027768	5150 – 5250	PASS
-30	DC 12.0V	5180.243815	5150 – 5250	PASS

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

Enviroment Temperature (Dregree)	Voltage (V)	Measured Frequency (MHz)	Limit Range (MHz)	Test Results
20	DC 13.2V	5240.269753	5150 – 5250	PASS
20	DC 10.8V	5239.906965	5150 – 5250	PASS
50	DC 12.0V	5240.218144	5150 – 5250	PASS
40	DC 12.0V	5239.661898	5150 – 5250	PASS
30	DC 12.0V	5240.126192	5150 – 5250	PASS
20	DC 12.0V	5239.605071	5150 – 5250	PASS
10	DC 12.0V	5240.444294	5150 – 5250	PASS
0	DC 12.0V	5240.436921	5150 – 5250	PASS
-10	DC 12.0V	5240.357550	5150 – 5250	PASS
-20	DC 12.0V	5240.176113	5150 – 5250	PASS
-30	DC 12.0V	5240.269753	5150 – 5250	PASS

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	5745.223769	5725 – 5850	PASS
20	DC 10.8V	5745.447003	5725 – 5850	PASS
50	DC 12.0V	5744.787323	5725 – 5850	PASS
40	DC 12.0V	5744.624173	5725 – 5850	PASS
30	DC 12.0V	5744.741255	5725 – 5850	PASS
20	DC 12.0V	5744.768609	5725 – 5850	PASS
10	DC 12.0V	5744.854207	5725 – 5850	PASS
0	DC 12.0V	5745.100188	5725 – 5850	PASS
-10	DC 12.0V	5745.503547	5725 – 5850	PASS
-20	DC 12.0V	5744.976011	5725 – 5850	PASS
-30	DC 12.0V	5745.206239	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	5824.660655	5725 – 5850	PASS
20	DC 10.8V	5825.411688	5725 – 5850	PASS
50	DC 12.0V	5825.148522	5725 – 5850	PASS
40	DC 12.0V	5825.172077	5725 – 5850	PASS
30	DC 12.0V	5825.446381	5725 – 5850	PASS
20	DC 12.0V	5825.202751	5725 – 5850	PASS
10	DC 12.0V	5825.072606	5725 – 5850	PASS
0	DC 12.0V	5824.635578	5725 – 5850	PASS
-10	DC 12.0V	5825.311417	5725 – 5850	PASS
-20	DC 12.0V	5825.308986	5725 – 5850	PASS
-30	DC 12.0V	5825.101591	5725 – 5850	PASS

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 Internal Aantenna, through the buckle stretched out, The directional gains of antenna used for transmitting is 3.33dBi.

Reference to the Test Report: **GTS20220215005-1-1.**

5. TEST SETUP PHOTOS OF THE EUT

Reference to the test report No. **GTS20220215005-1-1.**

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Reference to the test report No. **GTS20220215005-1-1.**

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