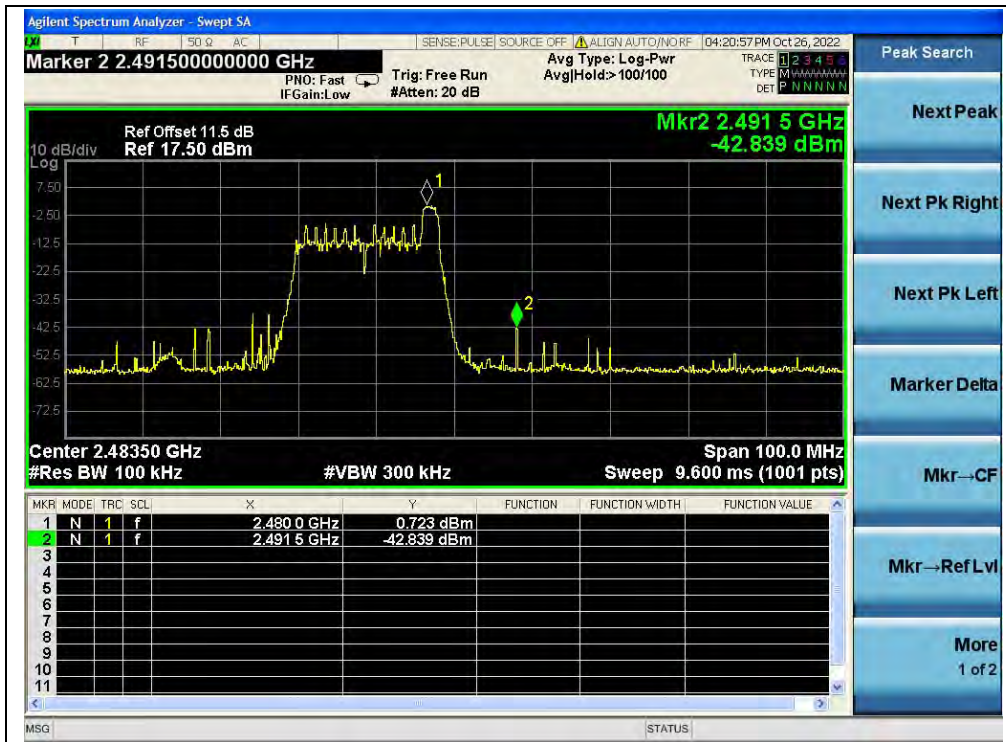


(30MHz to 25GHz, Channel 13, 802.11ax (HEW20) RU26)



(Band Edge, Channel 13, 802.11ax (HEW20) RU26)

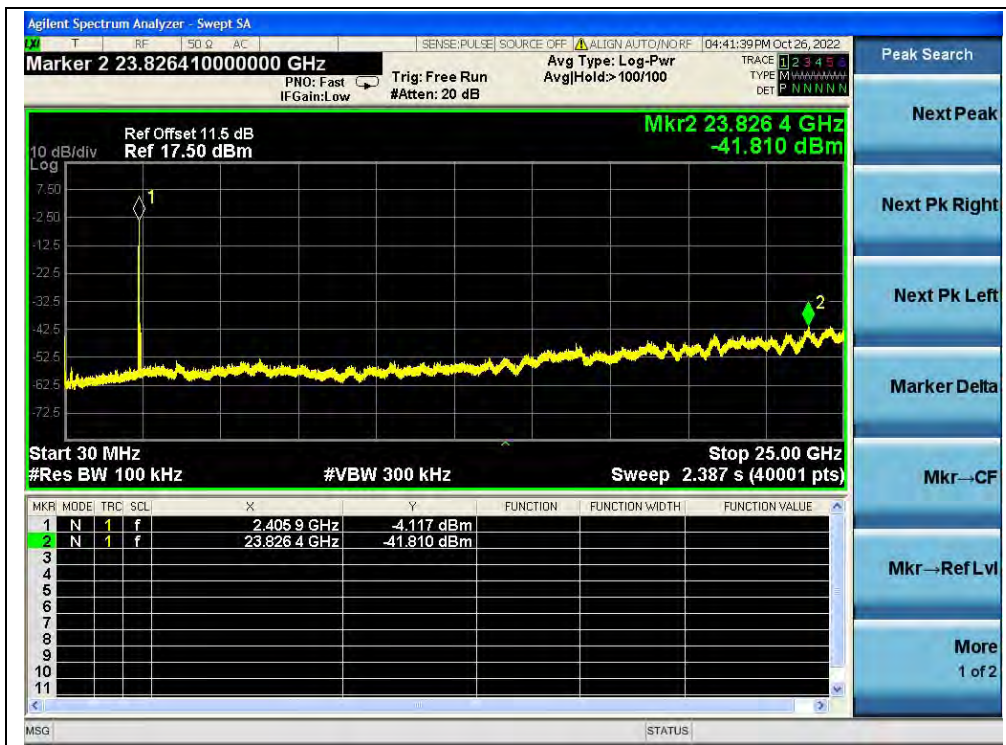


802.11ax (HEW20) RU52 Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.81	-4.12	-24.12	PASS
6	2437	-42.53	-3.41	-23.41	PASS
11	2462	-41.47	-14.94	-34.94	PASS

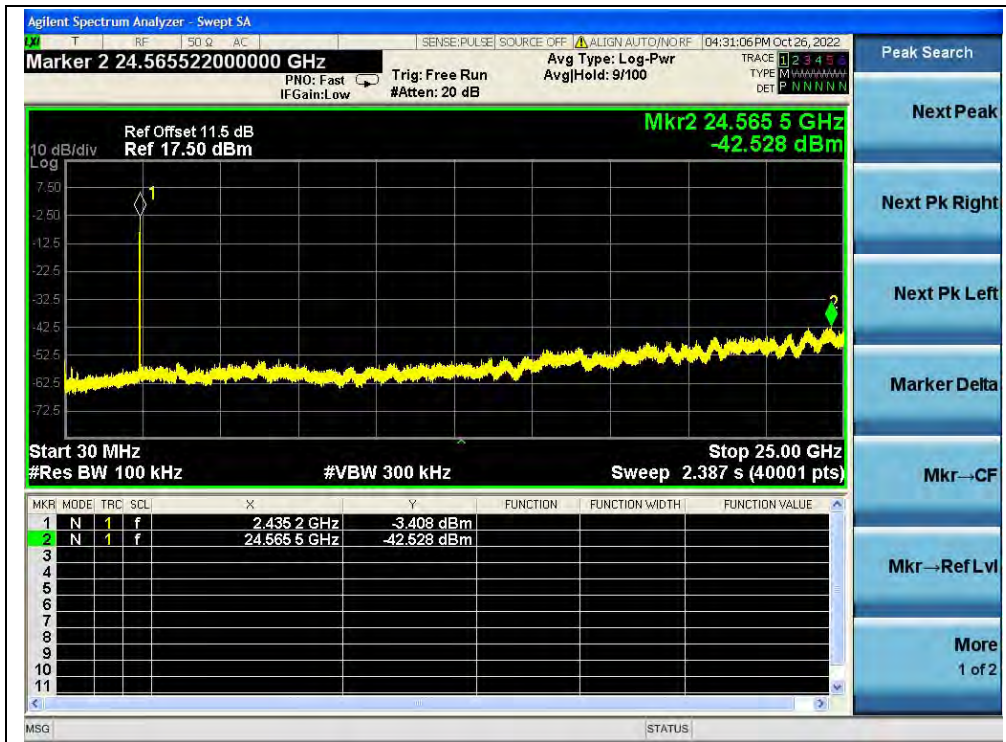
B. Test Plot:



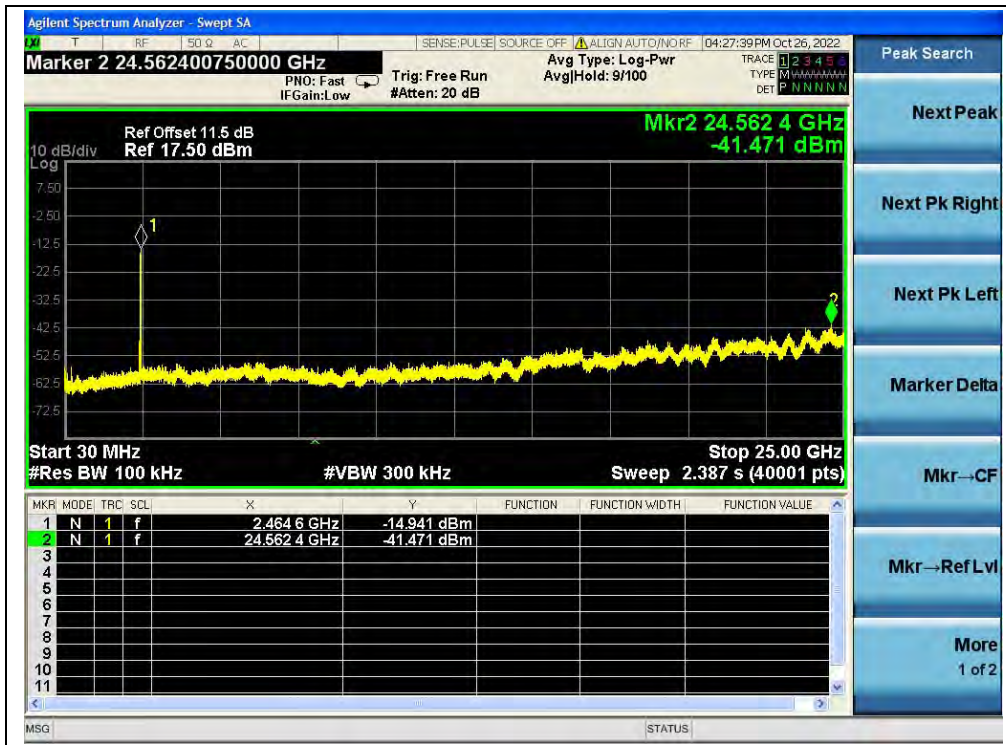
(30MHz to 25GHz, Channel 1, 802.11ax (HEW20) RU52)



(Band Edge, Channel 1, 802.11ax (HEW20) RU52)



(30MHz to 25GHz, Channel 7, 802.11ax (HEW20) RU52)



(30MHz to 25GHz, Channel 13, 802.11ax (HEW20) RU52)



(Band Edge, Channel 13, 802.11ax (HEW20) RU52)

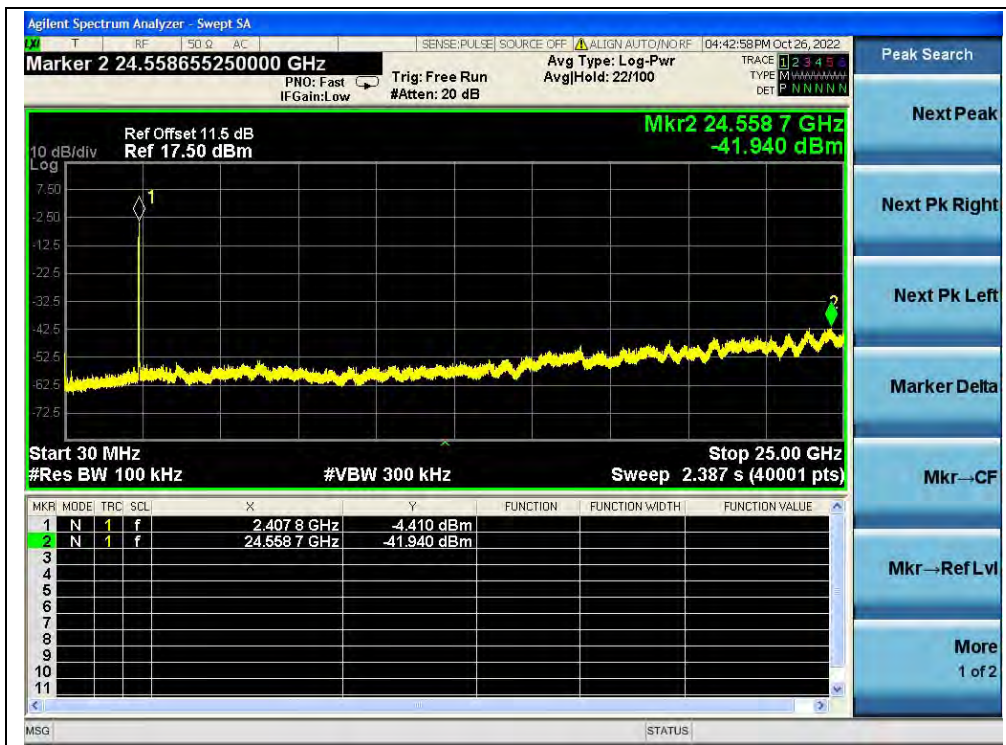


802.11ax (HEW20) RU106 Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.94	-4.41	-24.41	PASS
6	2437	-42.02	-5.61	-25.61	PASS
11	2462	-42.33	-17.49	-37.49	PASS

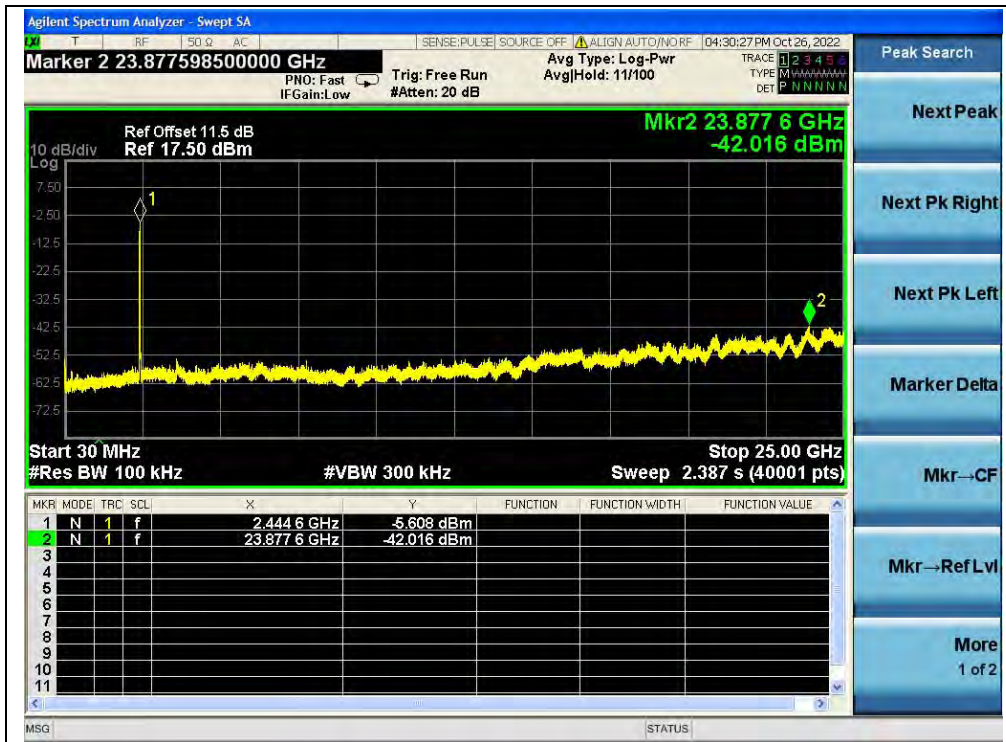
B. Test Plot:



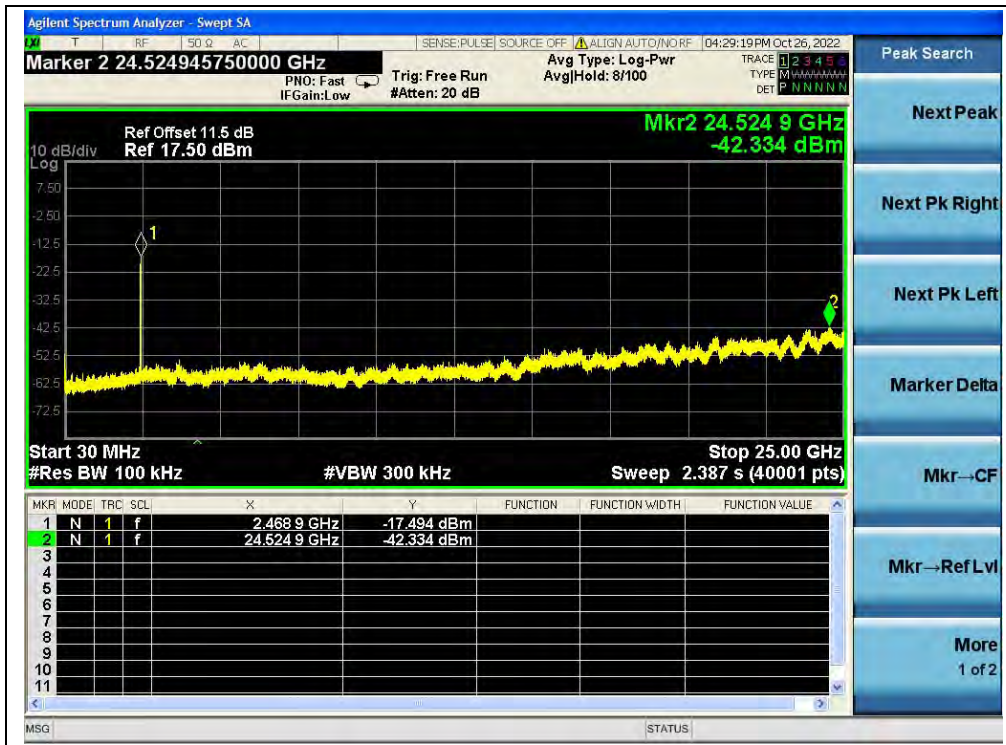
(30MHz to 25GHz, Channel 1, 802.11ax (HEW20) RU106)



(Band Edge, Channel 1, 802.11ax (HEW20) RU106)



(30MHz to 25GHz, Channel 7, 802.11ax (HEW20) RU106)



(30MHz to 25GHz, Channel 13, 802.11ax (HEW20) RU106)



(Band Edge, Channel 13, 802.11ax (HEW20) RU106)

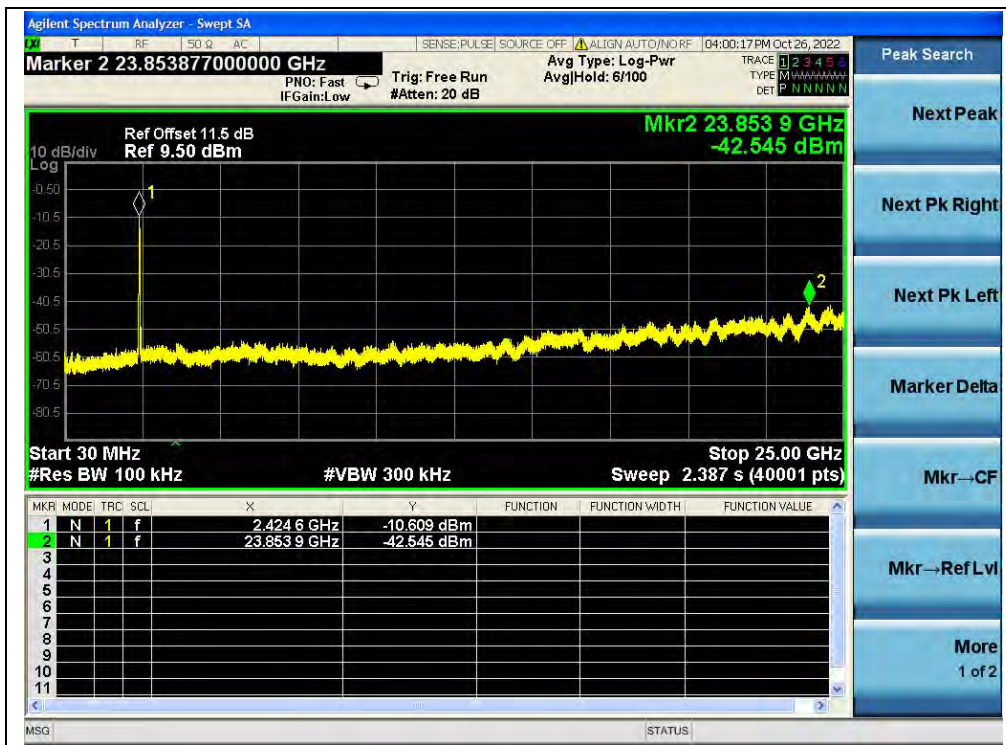


802.11ax (HEW40) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-42.55	-10.61	-30.61	PASS
7	2442	-42.56	-8.02	-28.02	PASS
11	2462	-41.56	-13.58	-33.58	PASS

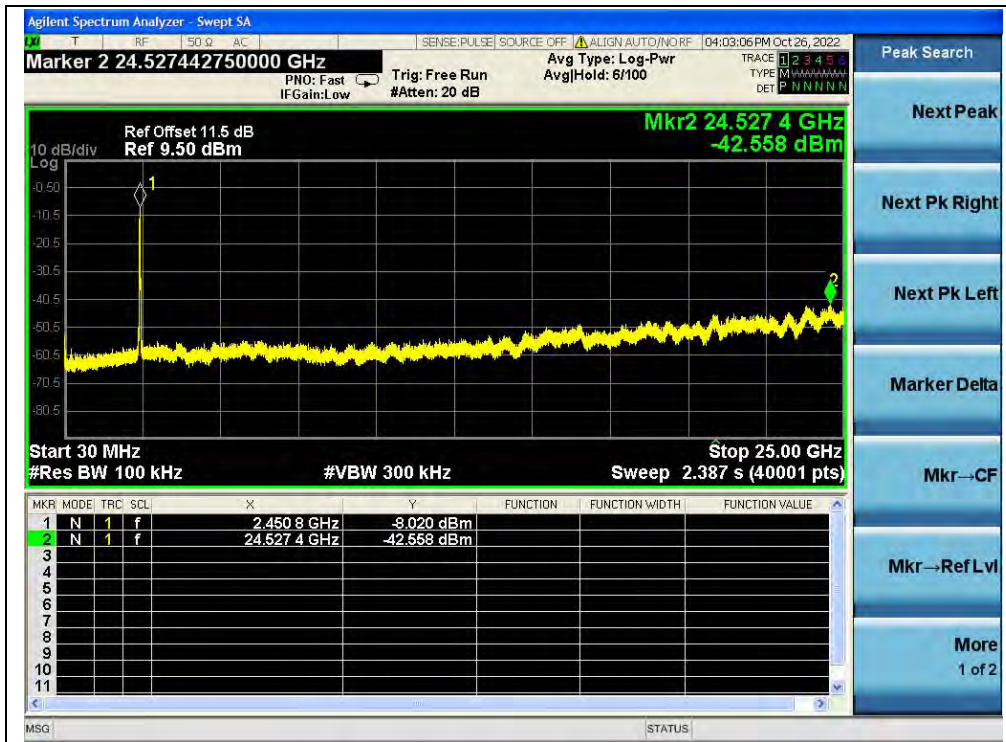
B. Test Plot:



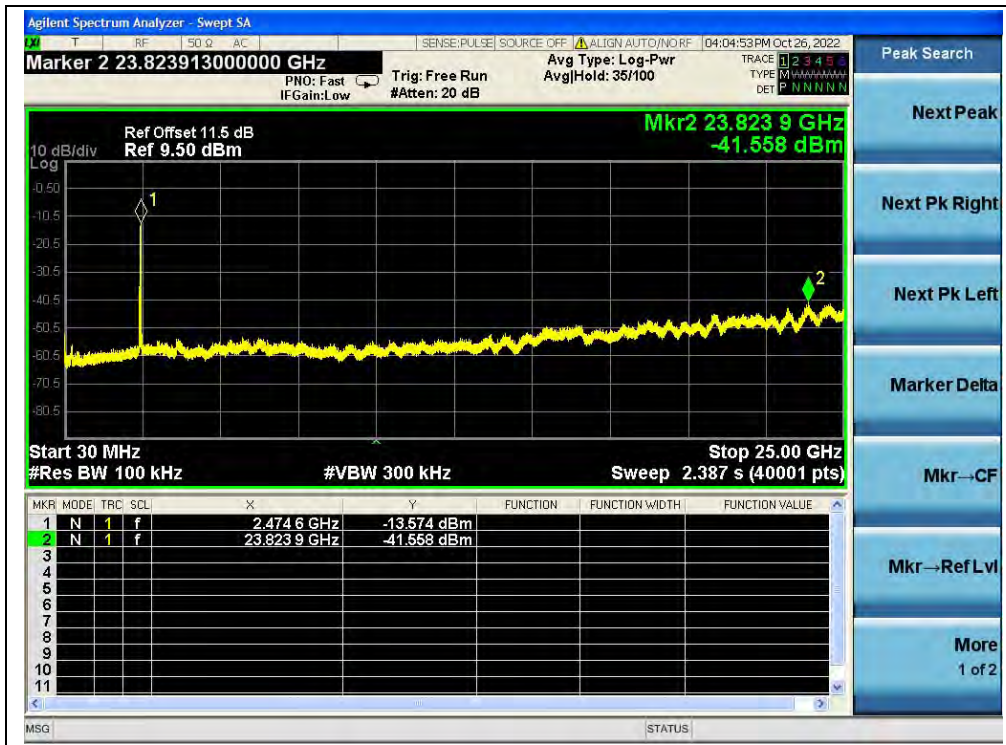
(30MHz to 25GHz, Channel 3, 802.11ax (HEW40))



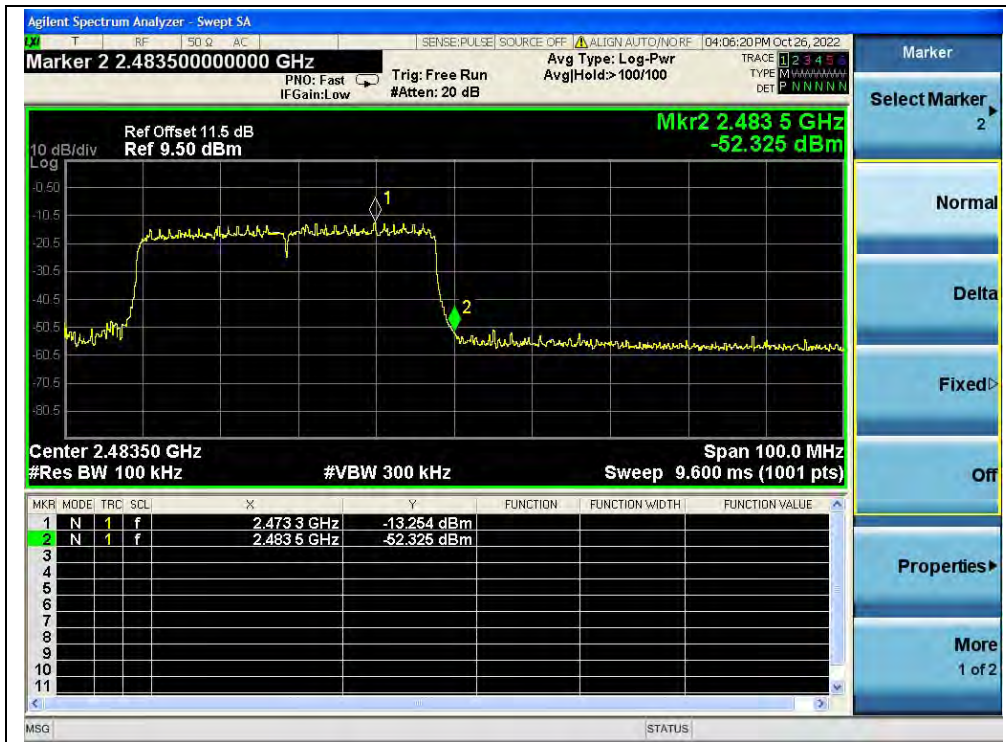
(Band Edge, Channel 3, 802.11ax (HEW40))



(30MHz to 25GHz, Channel 7, 802.11ax (HEW40))



(30MHz to 25GHz, Channel 11, 802.11ax (HEW40))



(Band Edge, Channel 13, 802.11ax (HEW40))

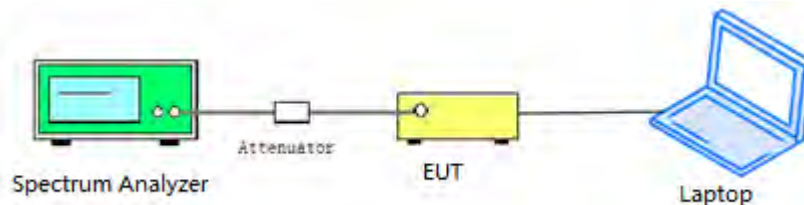
2.6. Power Spectral Density

2.6.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.6.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.6.3. Test Procedure

KDB 558074 Section 8.4 was used in order to prove compliance.



2.6.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1		
1	2412	-7.22	-8.61	8	PASS
7	2442	-8.05	-9.22	8	PASS
13	2472	-7.27	-9.83	8	PASS

B. Test Plot:



(Channel 1, 802.11b, ANT 0)



(Channel 7, 802.11b, ANT 0)



(Channel 13, 802.11b, ANT 0)



(Channel 1, 802.11b, ANT 1)



(Channel 7, 802.11b, ANT 1)



(Channel 13, 802.11b, ANT 1)



802.11g Mode

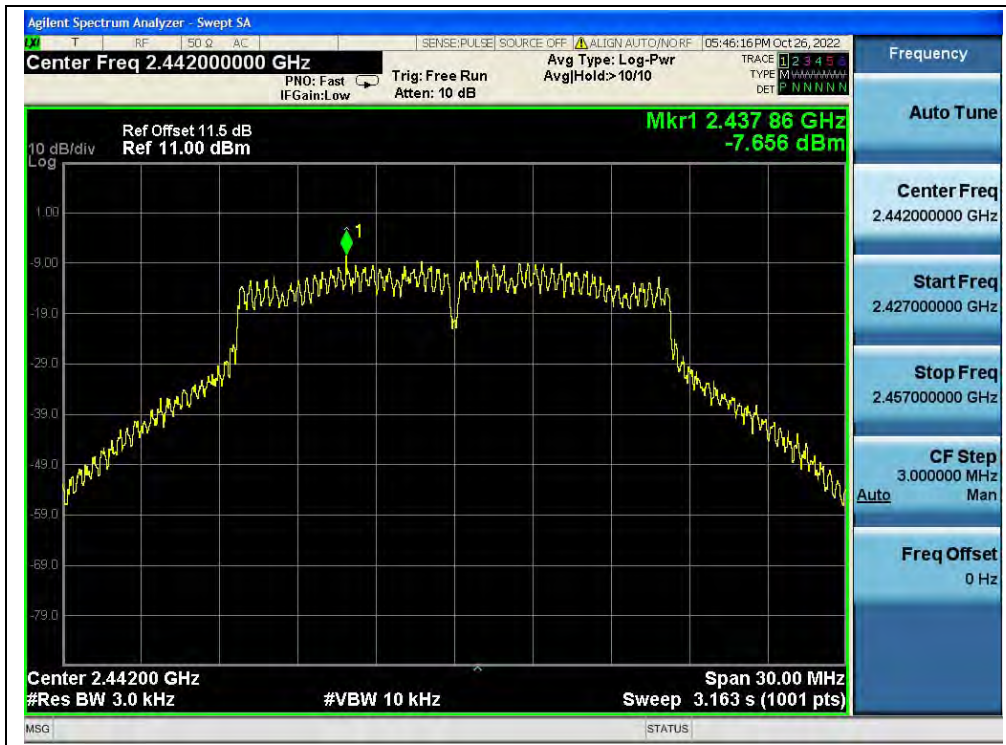
A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1		
1	2412	-9.50	-11.80	8	PASS
7	2442	-7.66	-10.36	8	PASS
13	2472	-14.04	-15.21	8	PASS

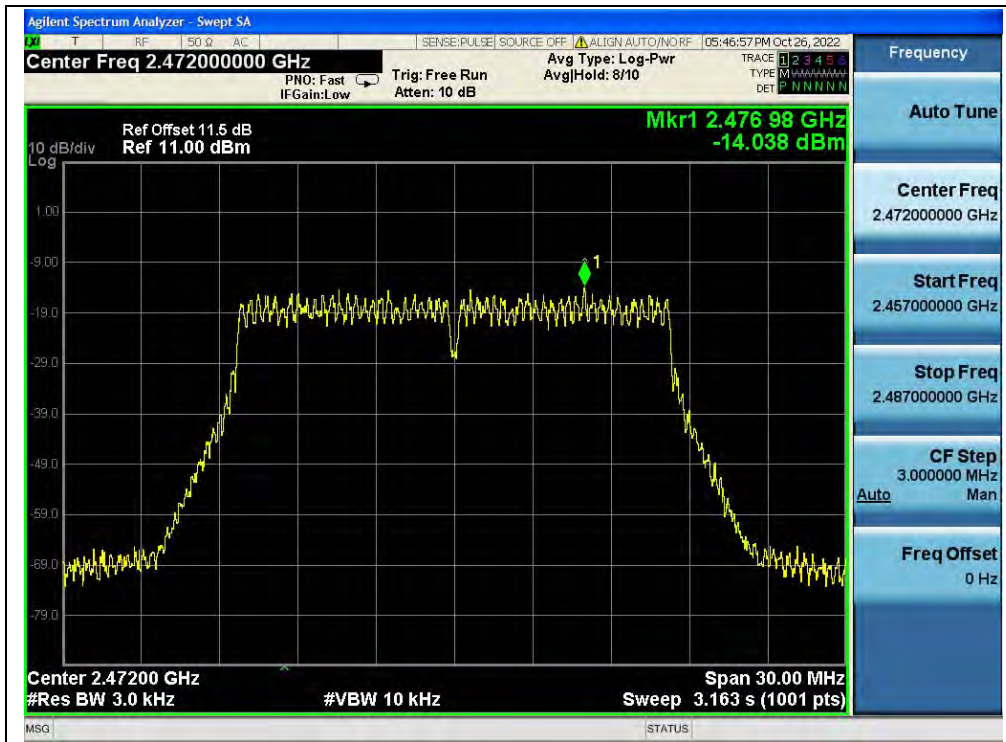
B. Test Plot:



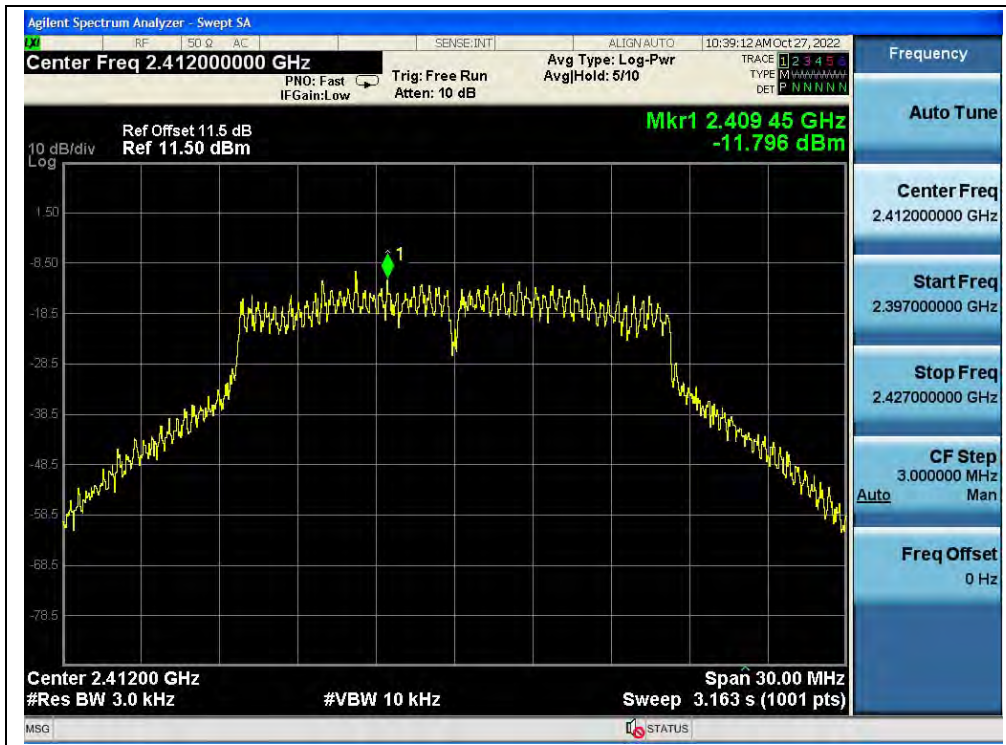
(Channel 1, 802.11g, ANT 0)



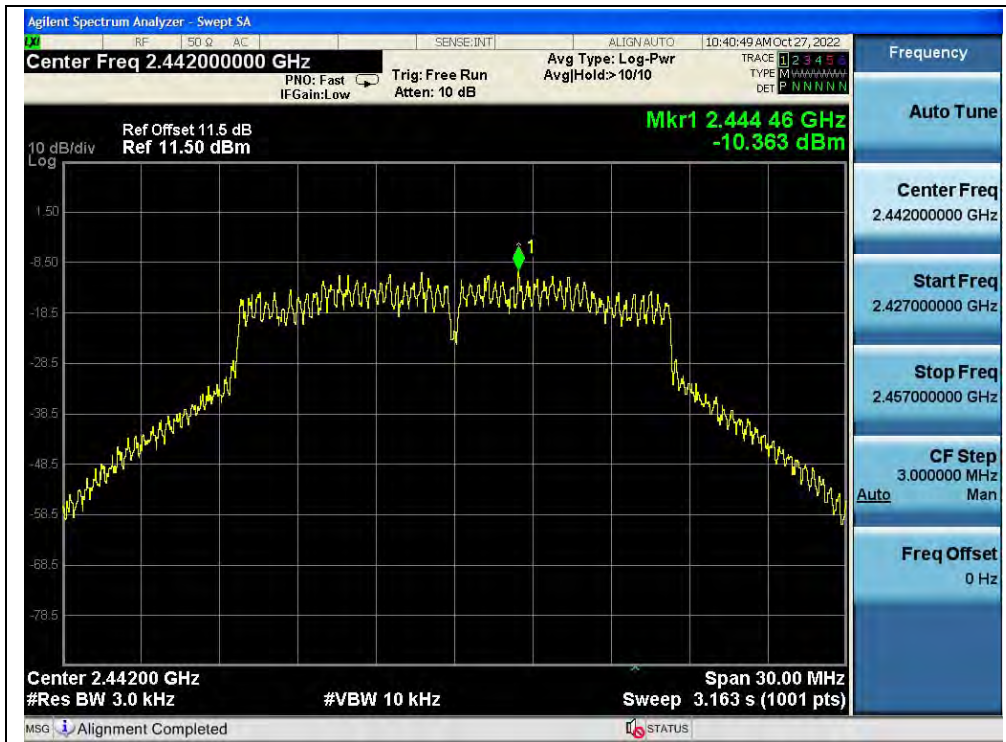
(Channel 7, 802.11g, ANT 0)



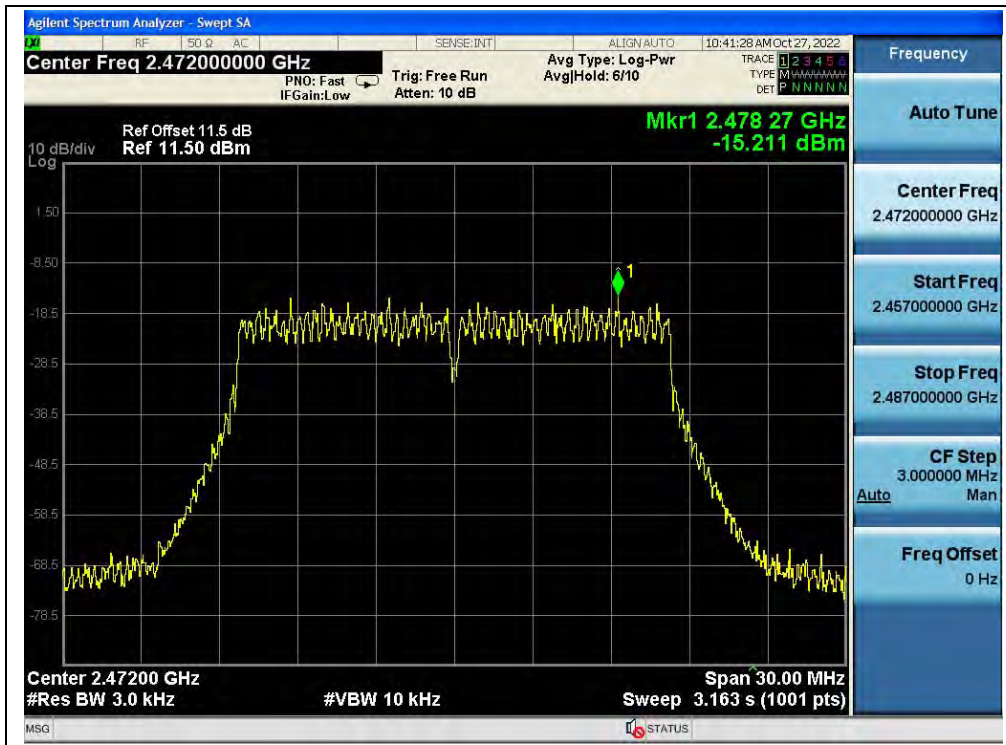
(Channel 13, 802.11g, ANT 0)



(Channel 1, 802.11g, ANT 1)



(Channel 7, 802.11g, ANT 1)



(Channel 13, 802.11g, ANT 1)



802.11n (HT20) Mode

A.Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-9.90	-10.00	-6.94	6.26	PASS
7	2442	-9.20	-9.68	-6.42	6.26	PASS
13	2472	-14.98	-14.51	-11.73	6.26	PASS

Note: Directional gain = $4.73\text{dBi} + 10\log(2) = 7.74\text{dBi} > 6\text{dBi}$, so the PSD limit shall be reduced to $8 - (7.74 - 6) = 6.26\text{dBm}/3\text{kHz}$.

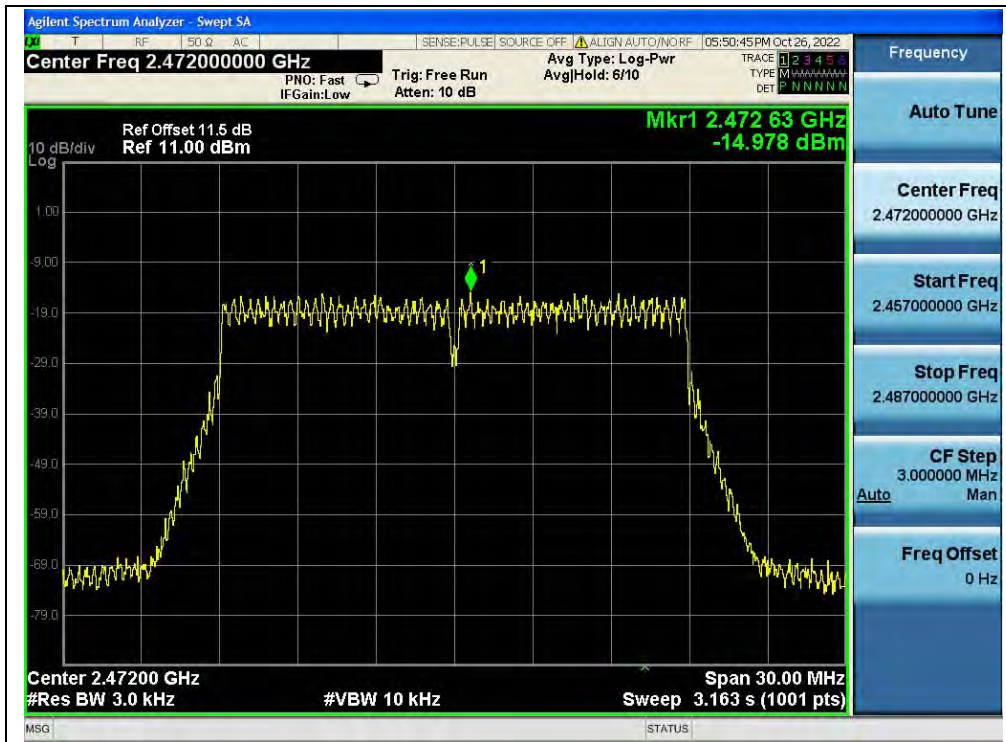
B.Test Plot:



(Channel 1, 802.11n (HT20), ANT 0)



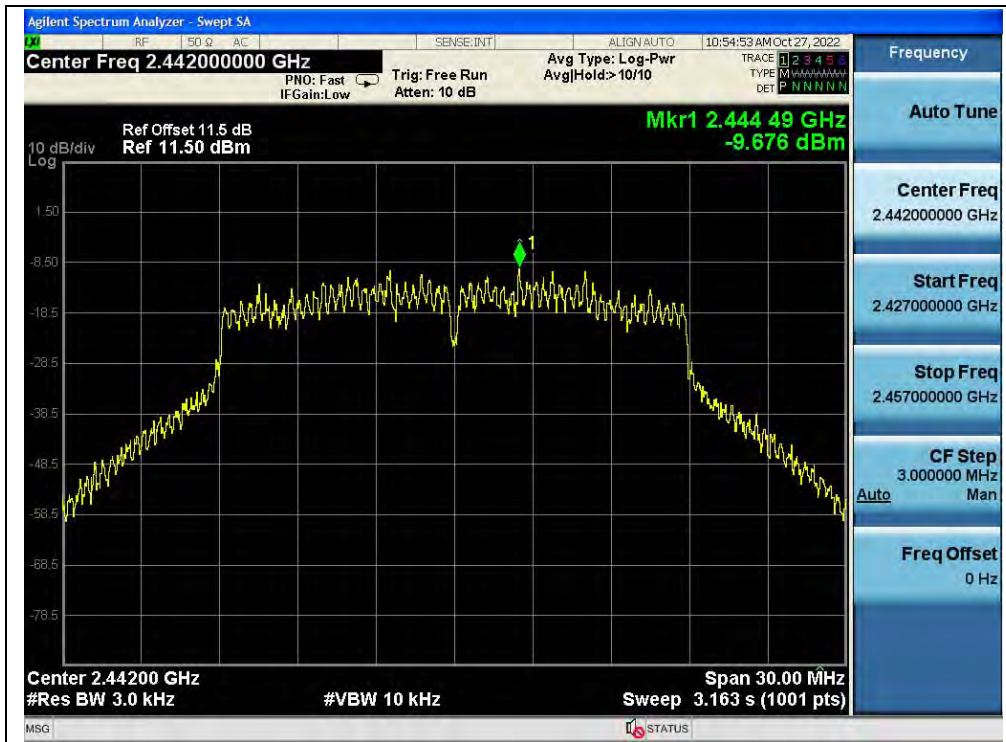
(Channel 7, 802.11n (HT20), ANT 0)



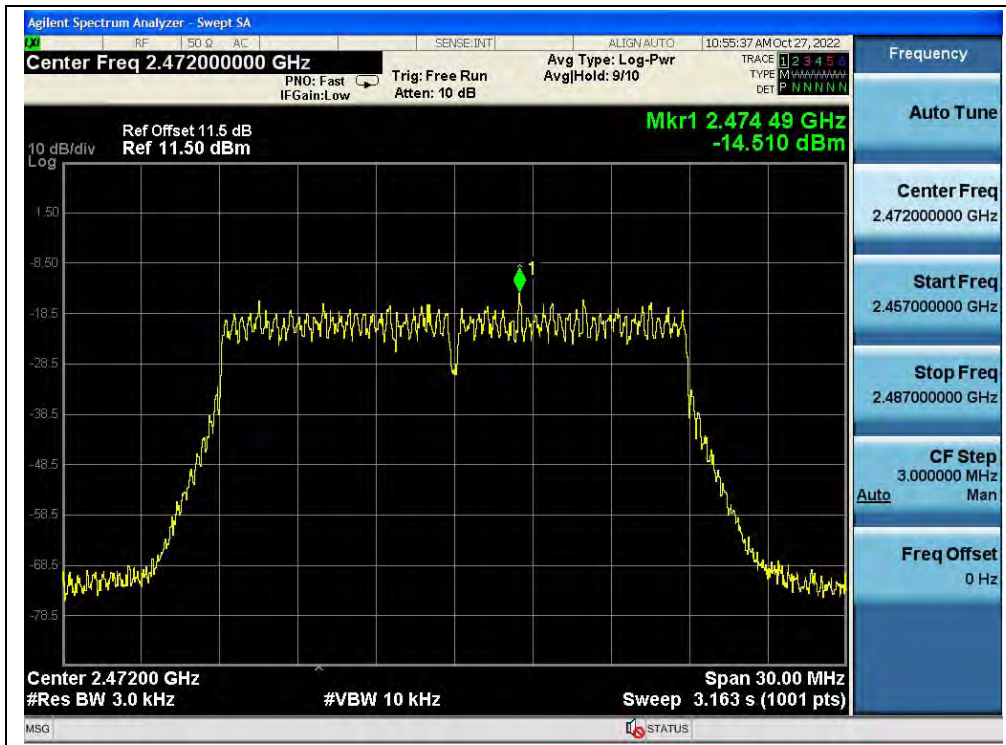
(Channel 13, 802.11n (HT20), ANT 0)



(Channel 1, 802.11n (HT20), ANT 1)



(Channel 7, 802.11n (HT20), ANT 1)



(Channel 13, 802.11n (HT20), ANT 1)



802.11n (HT40) Mode

A.Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
3	2422	-15.16	-17.29	-13.09	6.26	PASS
7	2442	-12.82	-13.86	-10.30	6.26	PASS
11	2462	-18.76	-20.17	-16.40	6.26	PASS

Note: Directional gain = $4.73\text{dBi} + 10\log(2) = 7.74\text{dBi} > 6\text{dBi}$, so the PSD limit shall be reduced to $8 - (7.74 - 6) = 6.26\text{dBm}/3\text{kHz}$.

B.Test Plot:



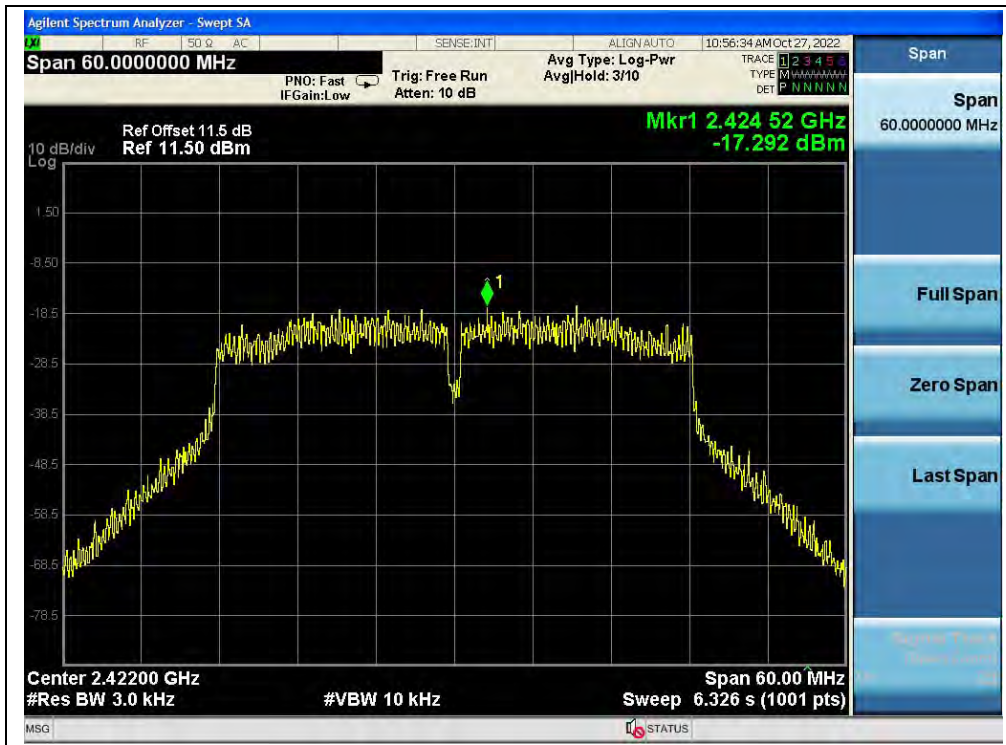
(Channel 3, 802.11n (HT40), ANT 0)



(Channel 7, 802.11n (HT40), ANT 0)



(Channel 11, 802.11n (HT40), ANT 0)



(Channel 3, 802.11n (HT40), ANT 1)



(Channel 7, 802.11n (HT40), ANT 1)



(Channel 11, 802.11n (HT40), ANT 1)



802.11ax (HEW20) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-10.17	-11.72	-7.87	6.26	PASS
7	2442	-9.69	-11.05	-7.31	6.26	PASS
13	2472	-14.98	-16.84	-12.80	6.26	PASS

Note: Directional gain = $4.73\text{dBi} + 10\log(2) = 7.74\text{dBi} > 6\text{dBi}$, so the PSD limit shall be reduced to $8 - (7.74 - 6) = 6.26\text{dBm}/3\text{kHz}$.

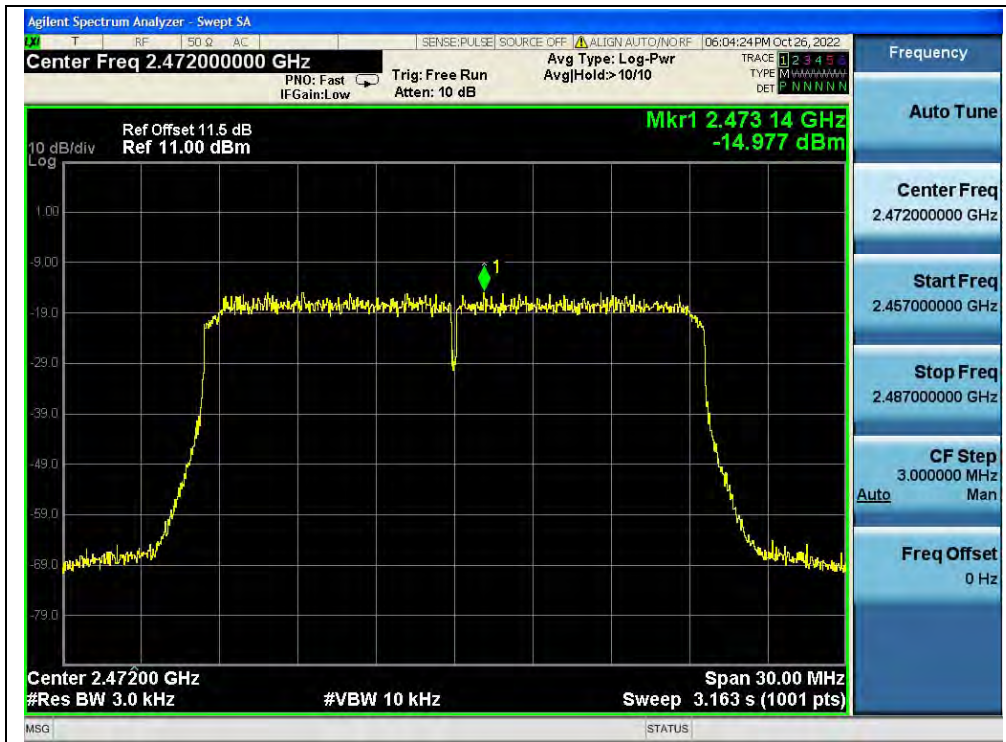
B. Test Plot:



(Channel 1, 802.11ax (HEW20), ANT 0)



(Channel 7, 802.11ax (HEW20), ANT 0)



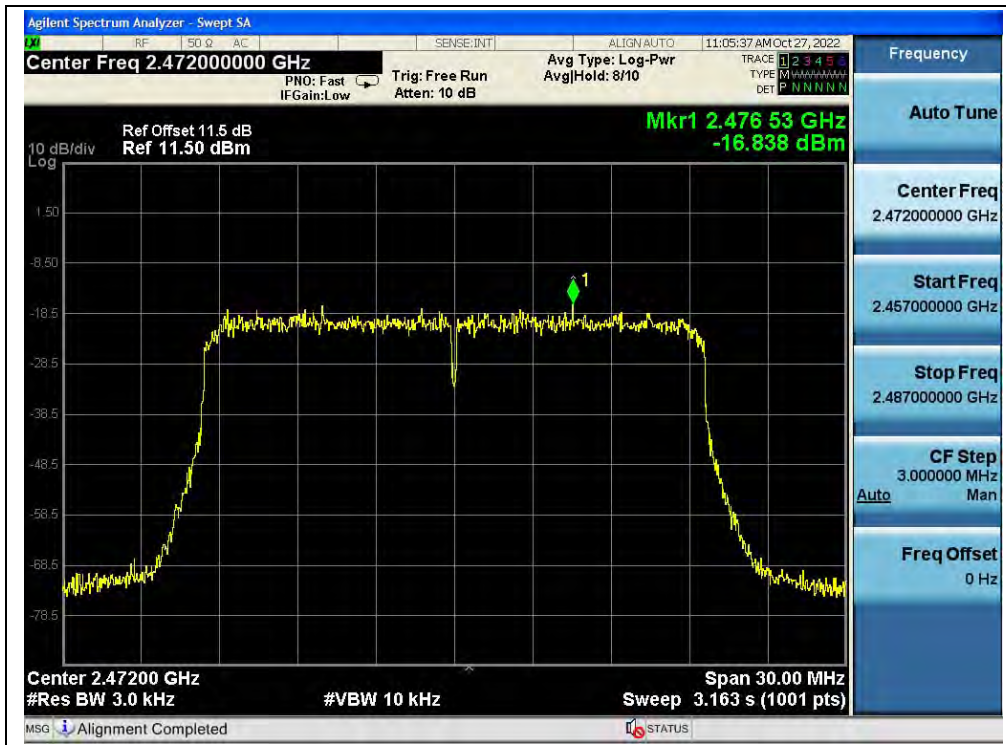
(Channel 13, 802.11ax (HEW20), ANT 0)



(Channel 1, 802.11ax (HEW20), ANT 1)



(Channel 7, 802.11ax (HEW20), ANT 1)



(Channel 13, 802.11ax (HEW20), ANT 1)



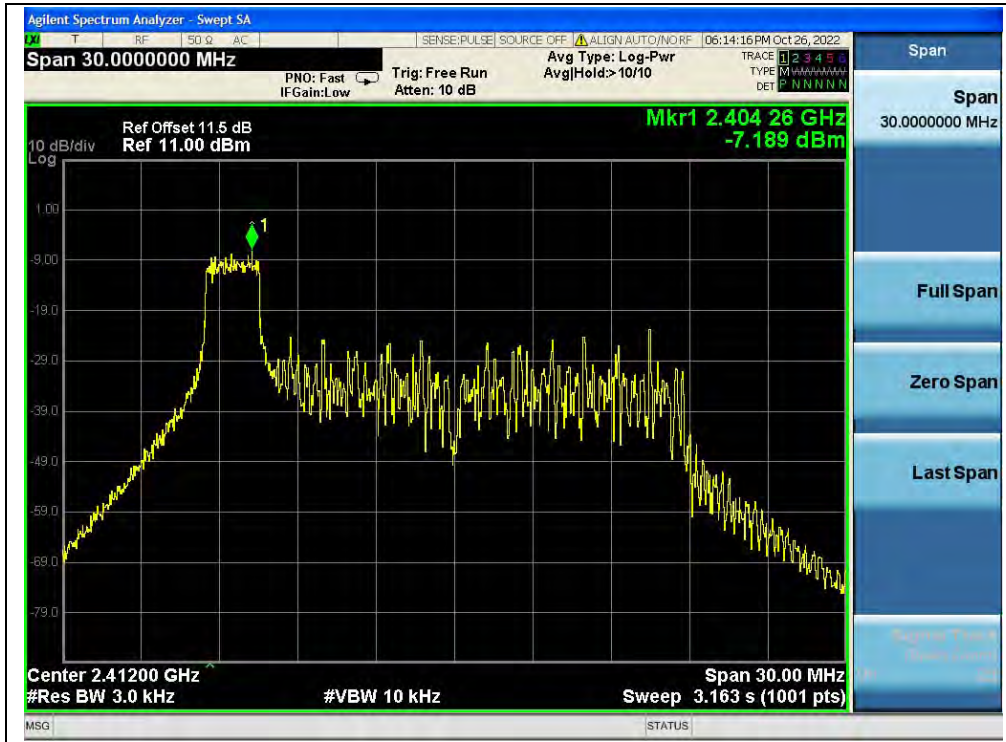
802.11ax (HEW20) RU26 Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-7.19	-9.27	-5.10	6.26	PASS
6	2442	-8.64	-10.38	-6.41	6.26	PASS
11	2472	-14.80	-15.20	-11.99	6.26	PASS

Note: Directional gain = $4.73\text{dBi} + 10\log(2) = 7.74\text{dBi} > 6\text{dBi}$, so the PSD limit shall be reduced to $8 - (7.74 - 6) = 6.26\text{dBm/3kHz}$.

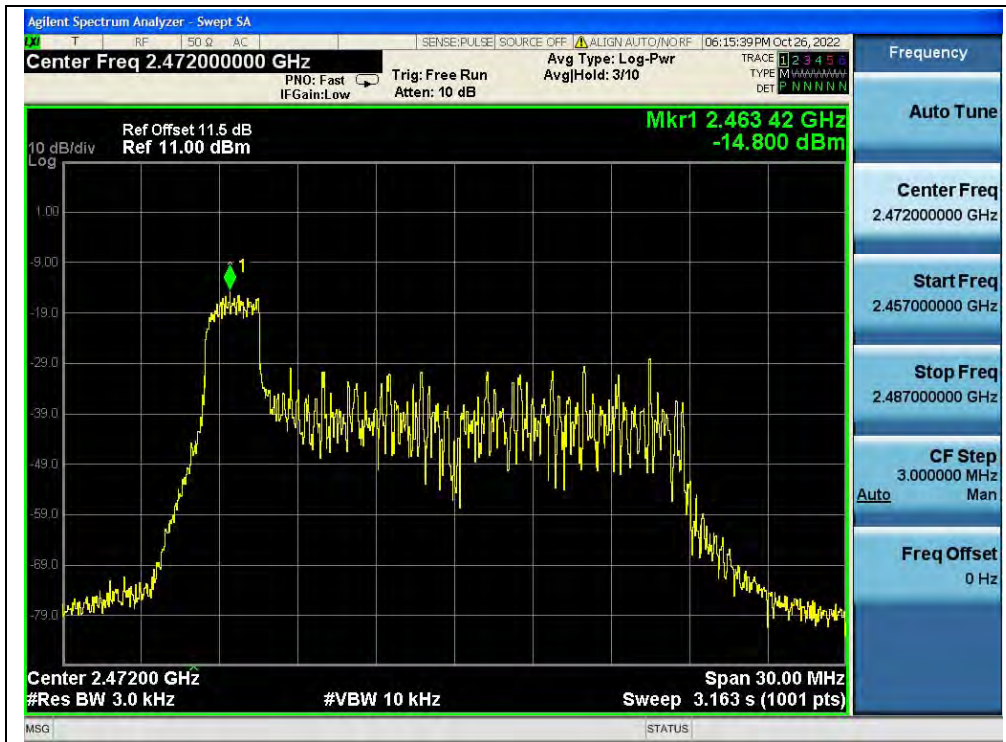
B. Test Plot:



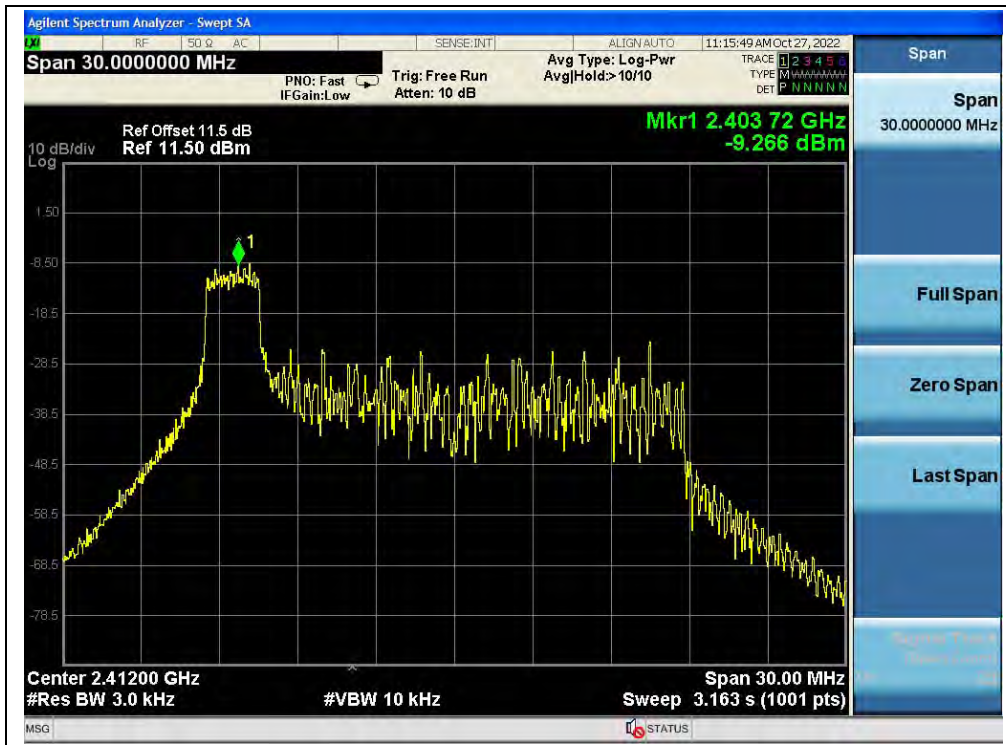
(Channel 1, 802.11ax (HEW20) RU26, ANT 0)



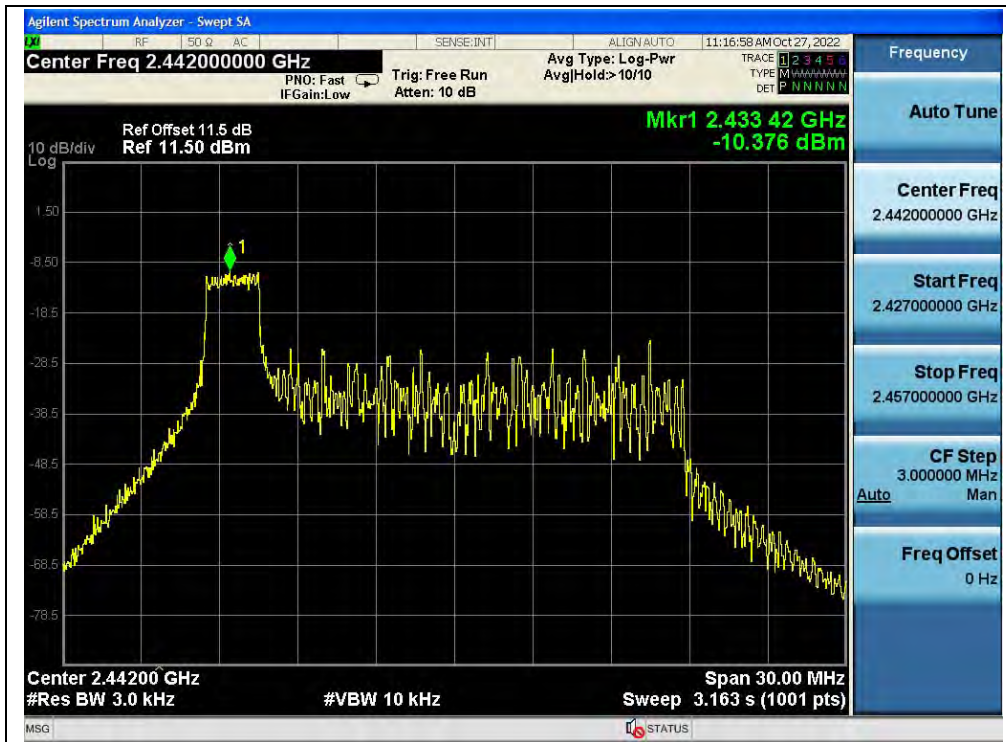
(Channel 7, 802.11ax (HEW20) RU26, ANT 0)



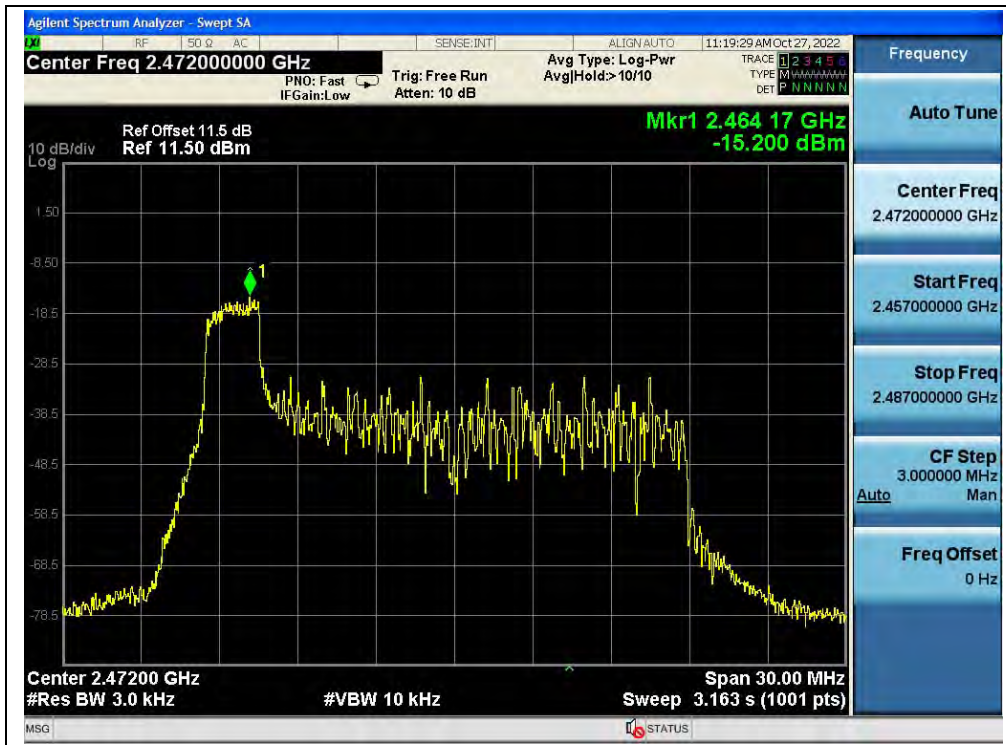
(Channel 13, 802.11ax (HEW20) RU26, ANT 0)



(Channel 1, 802.11ax (HEW20) RU26, ANT 1)



(Channel 7, 802.11ax (HEW20) RU26, ANT 1)



(Channel 13, 802.11ax (HEW20) RU26, ANT 1)



802.11ax (HEW20) RU52 Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-8.70	-8.50	-5.59	6.26	PASS
6	2442	-7.80	-9.02	-5.36	6.26	PASS
11	2472	-15.44	-16.59	-12.97	6.26	PASS

Note: Directional gain = $4.73\text{dBi} + 10\log(2) = 7.74\text{dBi} > 6\text{dBi}$, so the PSD limit shall be reduced to $8 - (7.74 - 6) = 6.26\text{dBm}/3\text{kHz}$.

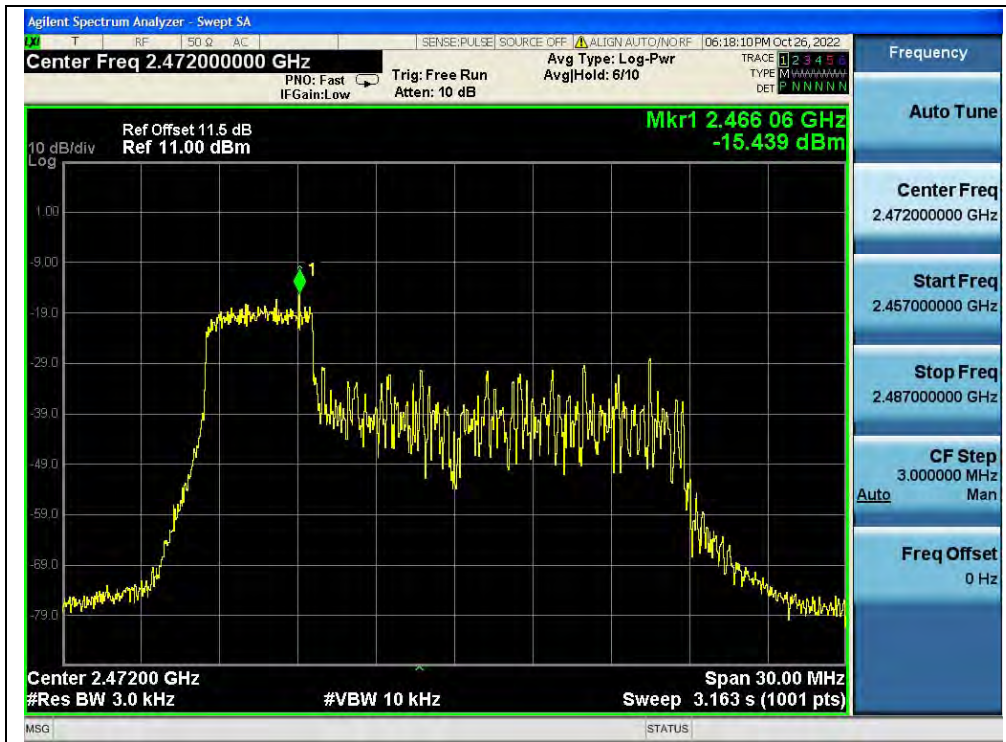
B. Test Plot:



(Channel 1, 802.11ax (HEW20) RU52, ANT 0)



(Channel 7, 802.11ax (HEW20) RU52, ANT 0)



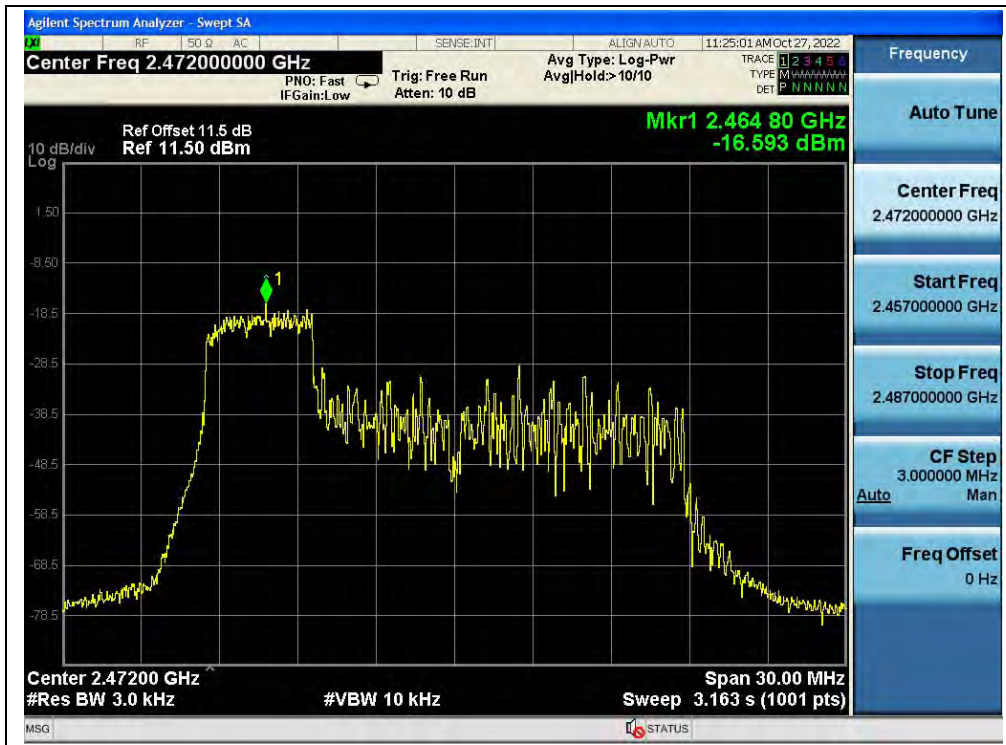
(Channel 13, 802.11ax (HEW20) RU52, ANT 0)



(Channel 1, 802.11ax (HEW20) RU52, ANT 1)



(Channel 7, 802.11ax (HEW20) RU52, ANT 1)



(Channel 13, 802.11ax (HEW20) RU52, ANT 1)



802.11ax (HEW20) RU106 Mode

A.Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-8.90	-10.59	-6.65	6.26	PASS
7	2442	-7.62	-8.87	-5.19	6.26	PASS
13	2472	-18.68	-19.07	-15.86	6.26	PASS

Note: Directional gain = $4.73\text{dBi} + 10\log(2) = 7.74\text{dBi} > 6\text{dBi}$, so the PSD limit shall be reduced to $8 - (7.74 - 6) = 6.26\text{dBm}/3\text{kHz}$.

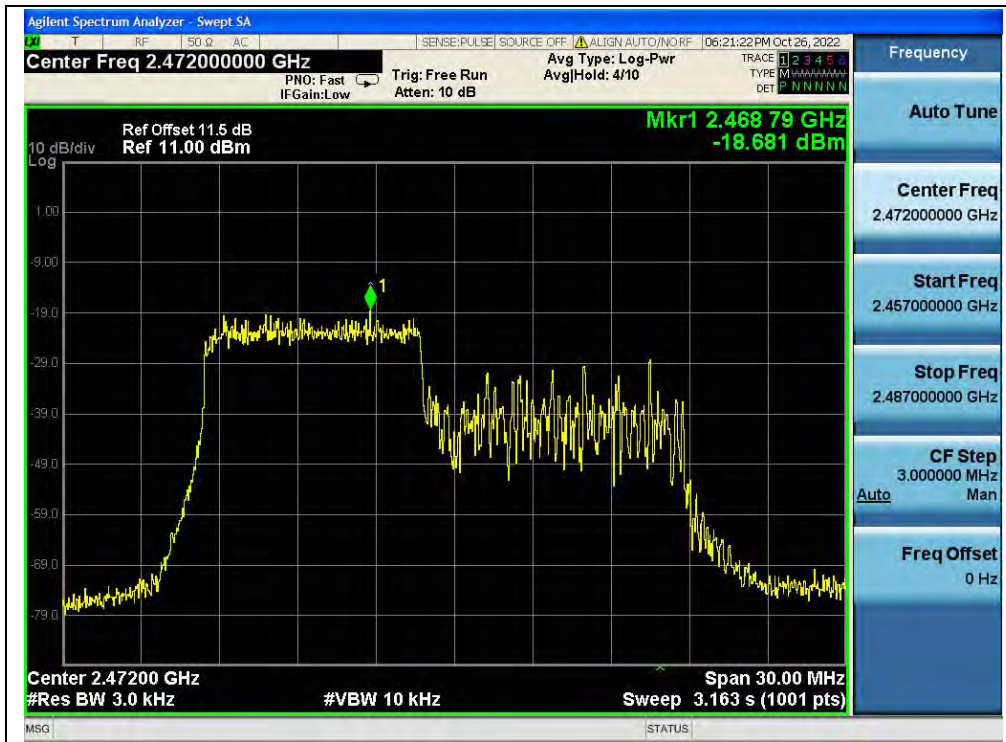
B.Test Plot:



(Channel 1, 802.11ax (HEW20) RU106, ANT 0)



(Channel 7, 802.11ax (HEW20) RU106, ANT 0)



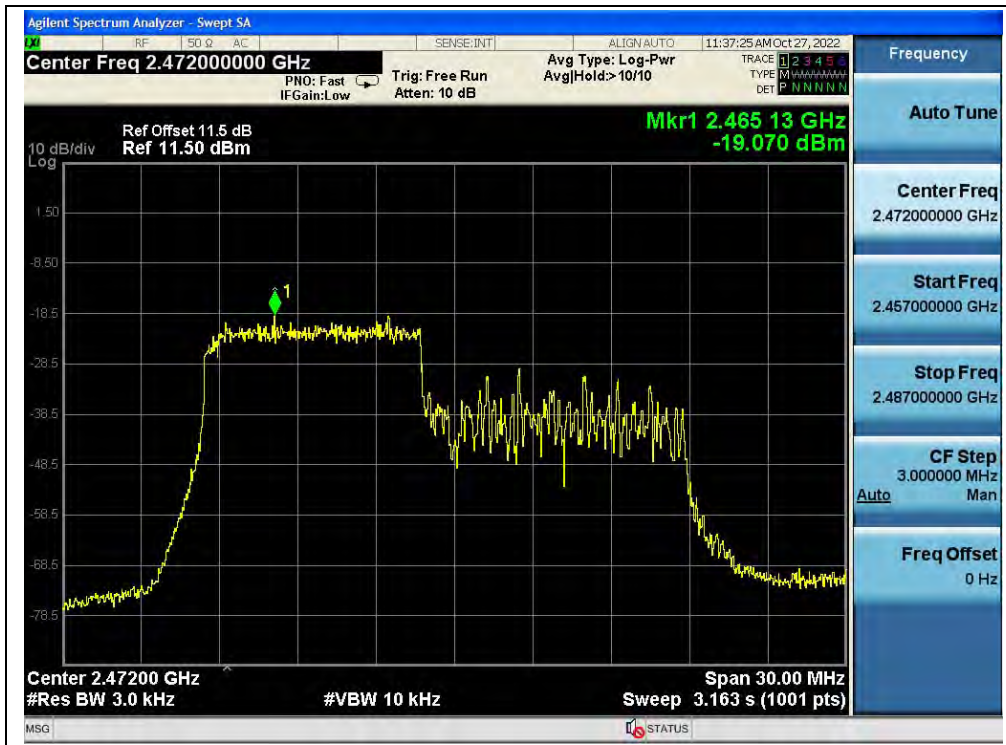
(Channel 13, 802.11ax (HEW20) RU106, ANT 0)



(Channel 1, 802.11ax (HEW20) RU106, ANT 1)



(Channel 7, 802.11ax (HEW20) RU106, ANT 1)



(Channel 13, 802.11ax (HEW20) RU106, ANT 1)



802.11ax (HEW40) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
3	2422	-16.60	-18.26	-14.34	6.26	PASS
7	2442	-13.70	-15.94	-11.67	6.26	PASS
11	2462	-19.27	-20.77	-16.95	6.26	PASS

Note: Directional gain = $4.73\text{dBi} + 10\log(2) = 7.74\text{dBi} > 6\text{dBi}$, so the PSD limit shall be reduced to $8 - (7.74 - 6) = 6.26\text{dBm}/3\text{kHz}$.

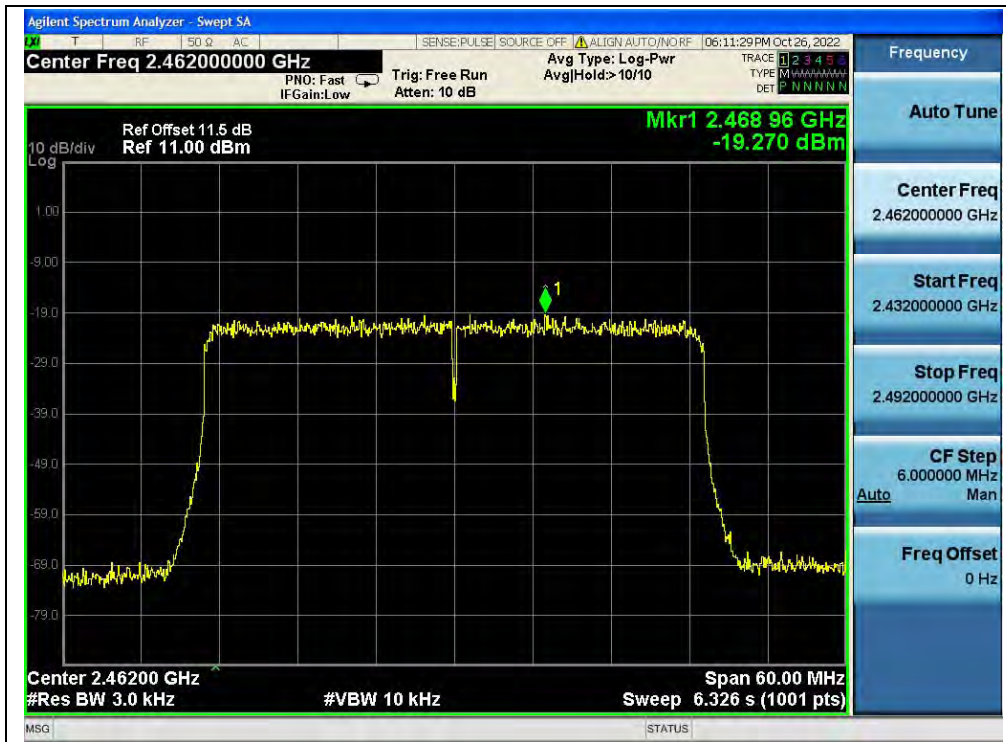
B. Test Plot:



(Channel 3, 802.11ax (HEW40), ANT 0)



(Channel 7, 802.11ax (HEW40), ANT 0)



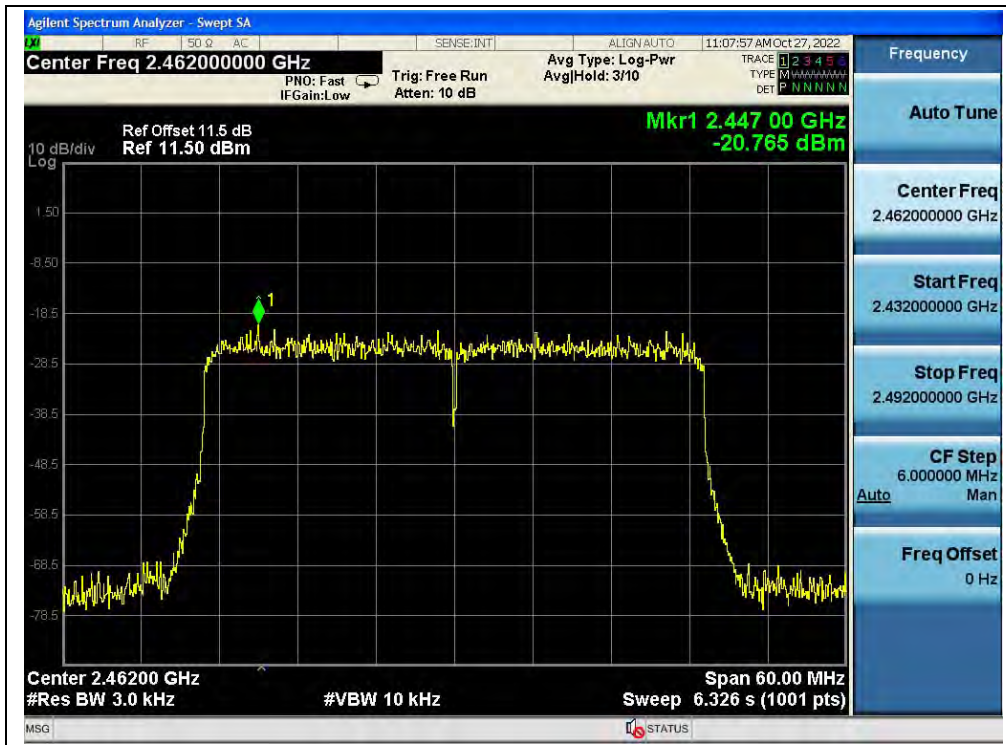
(Channel 11, 802.11ax (HEW40), ANT 0)



(Channel 3, 802.11ax (HEW40), ANT 1)



(Channel 7, 802.11ax (HEW40), ANT 1)



(Channel 11, 802.11ax (HEW40), ANT 1)

2.7. Conducted Emission

2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

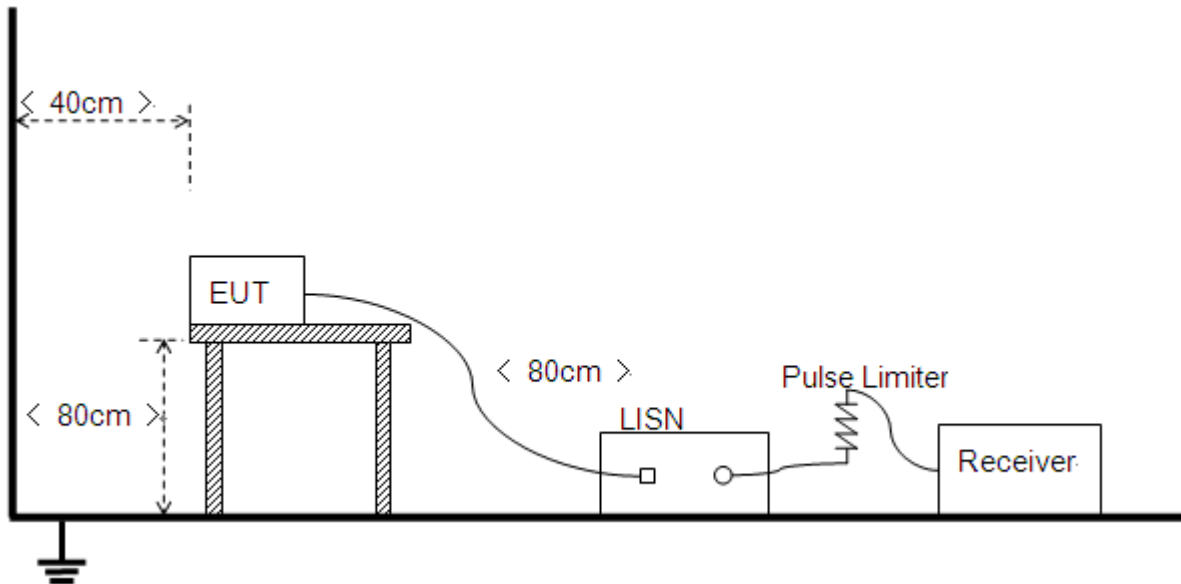
Frequency Range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10 2013.



2.7.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT+ Adapter + Earphone + WIFI TX

Test Voltage: AC 120V/60Hz

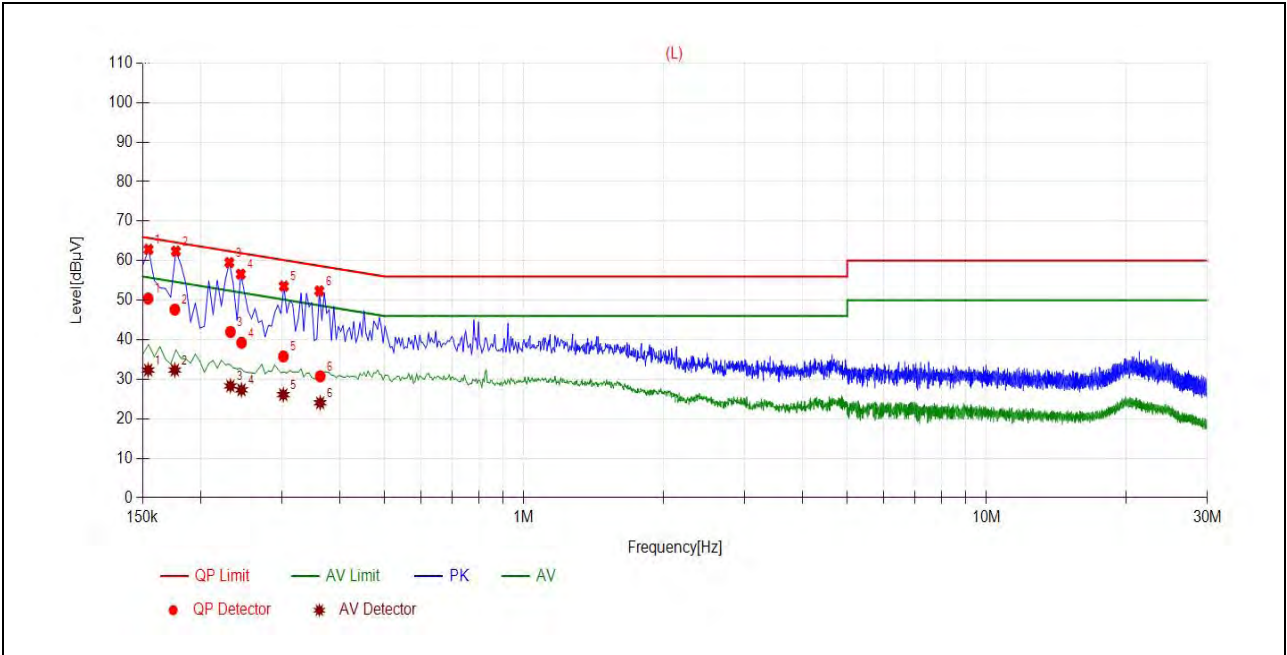
The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

U_R : Receiver Reading

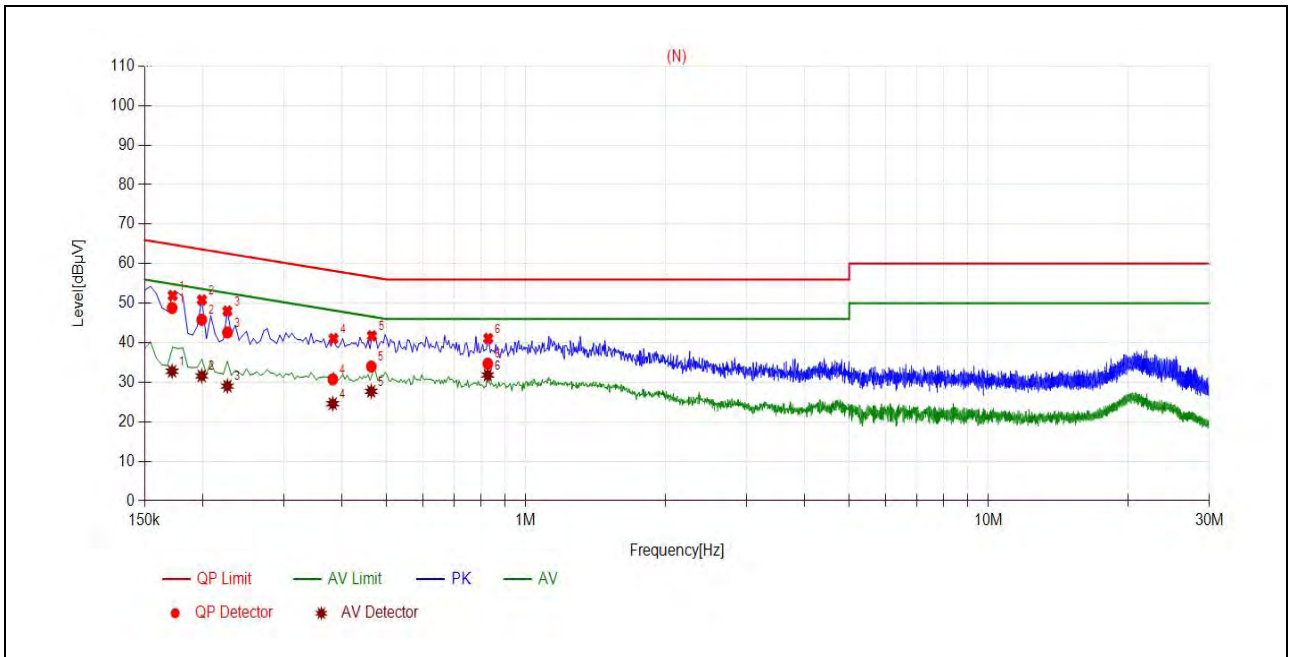
A_{Factor} : Voltage division factor of LISN

B.Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1542	50.41	32.34	65.77	55.77	Line	PASS
2	0.1761	47.63	32.34	64.67	54.67		PASS
3	0.2322	41.98	28.32	62.37	52.37		PASS
4	0.2454	39.22	27.31	61.91	51.91		PASS
5	0.3022	35.77	26.10	60.18	50.18		PASS
6	0.3630	30.75	24.04	58.66	48.66		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1720	48.79	32.79	64.86	54.86	Neutral	PASS
2	0.1993	45.83	31.61	63.64	53.64		PASS
3	0.2265	42.61	29.04	62.58	52.58		PASS
4	0.3826	30.74	24.56	58.22	48.22		PASS
5	0.4633	33.98	27.71	56.63	46.63		PASS
6	0.8273	34.70	31.84	56.00	46.00		PASS

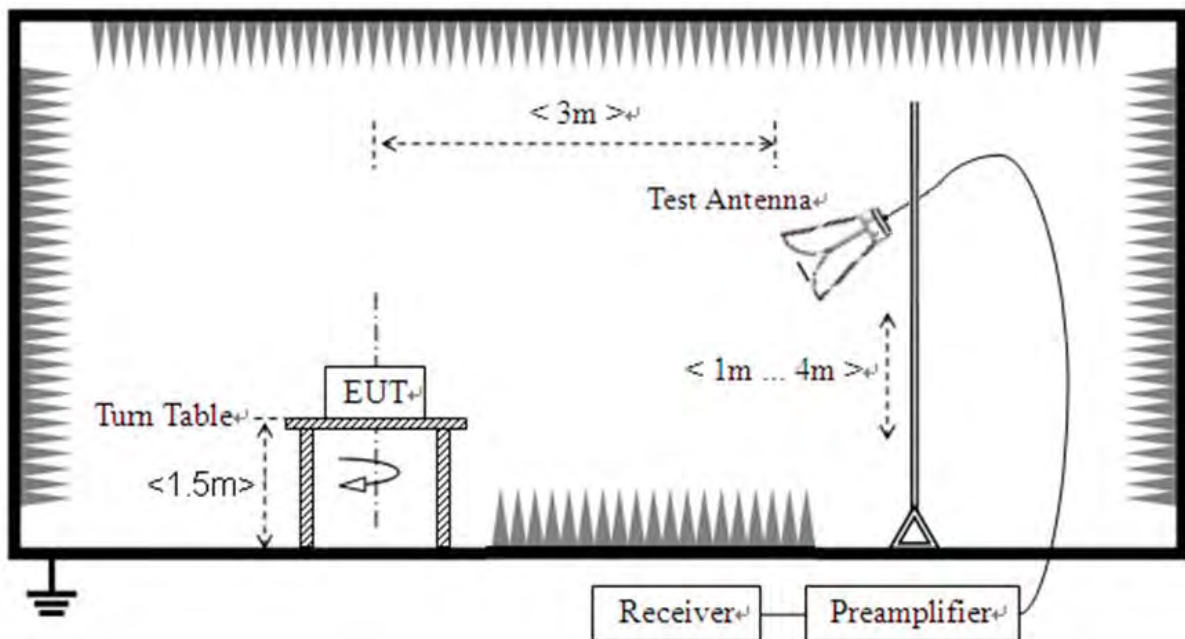
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.8.2. Test Description

Test Setup



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.



2.8.3. Test Procedure

KDB 558074 Section 8.6 and 8.7 was used in order to prove compliance.

2.8.4. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV	U_R (dB μ V)					
1	2386.69	PK	23.72	6.74	27.20	57.66	74	PASS
1	2386.69	AV	11.02	6.74	27.20	44.96	54	PASS
13	2487.76	PK	23.59	6.74	27.20	57.53	74	PASS
13	2485.14	AV	13.59	6.74	27.20	47.53	54	PASS



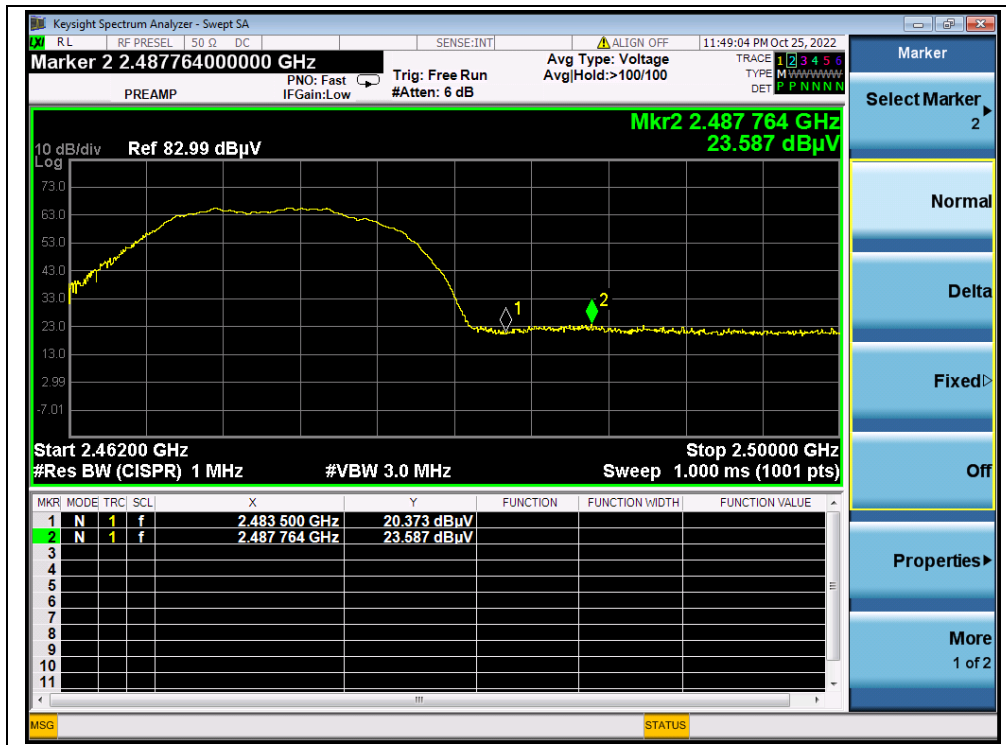
B.Test Plot:



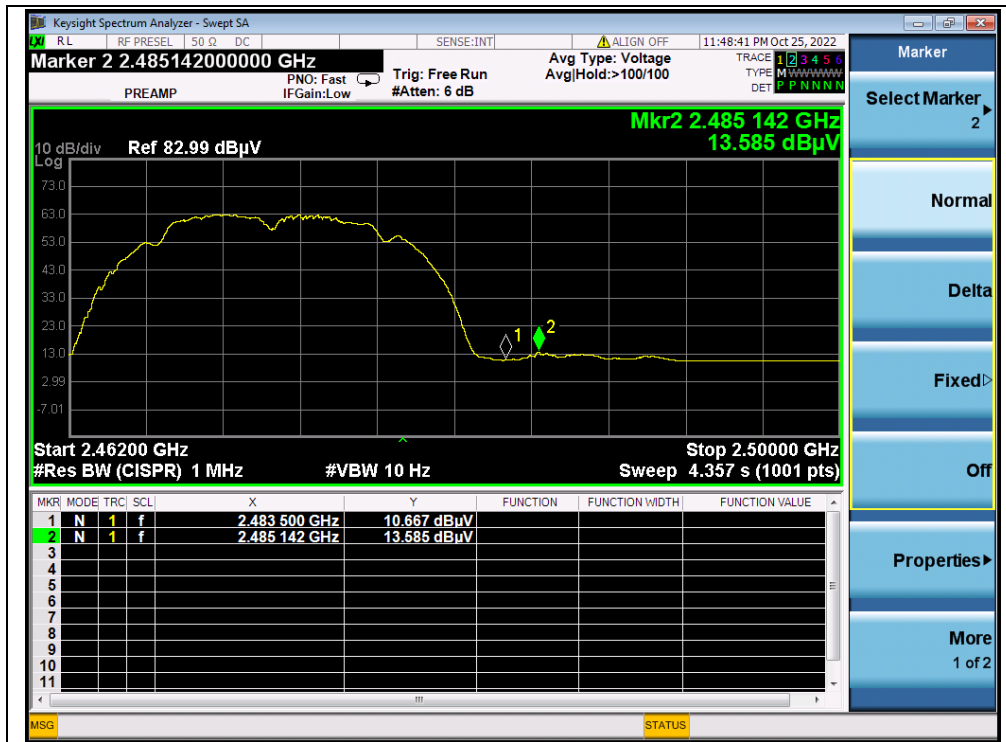
(PEAK, Channel 1, 802.11b)



(AVERAGE, Channel 1, 802.11b)



(PEAK, Channel 13, 802.11b)



(AVERAGE, Channel 13, 802.11b)

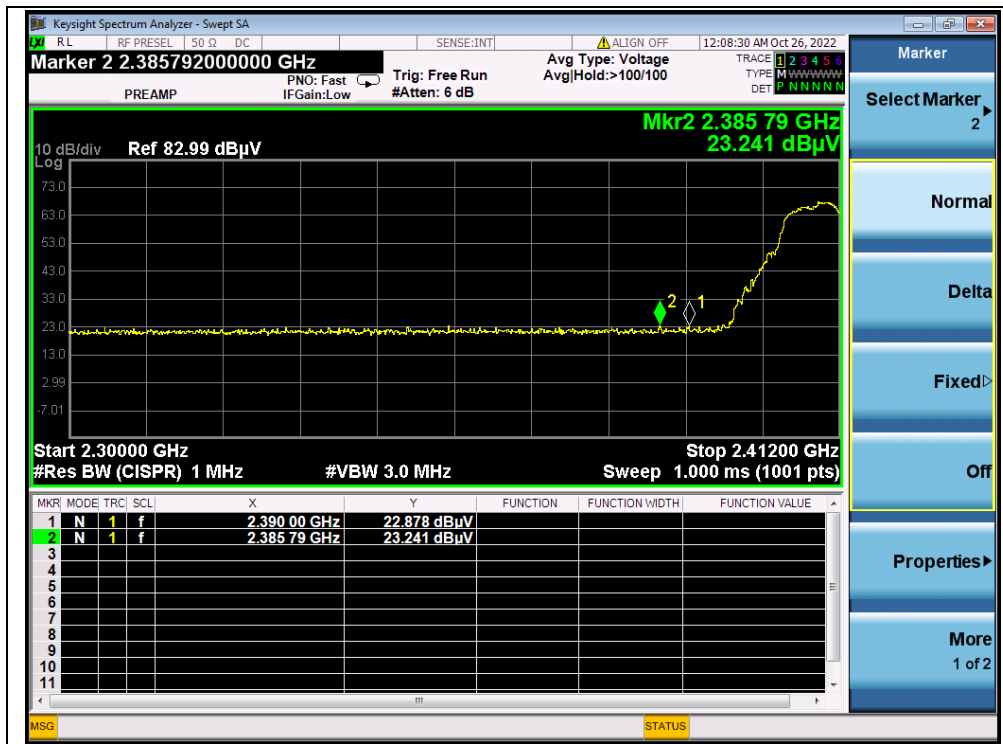


802.11g Mode

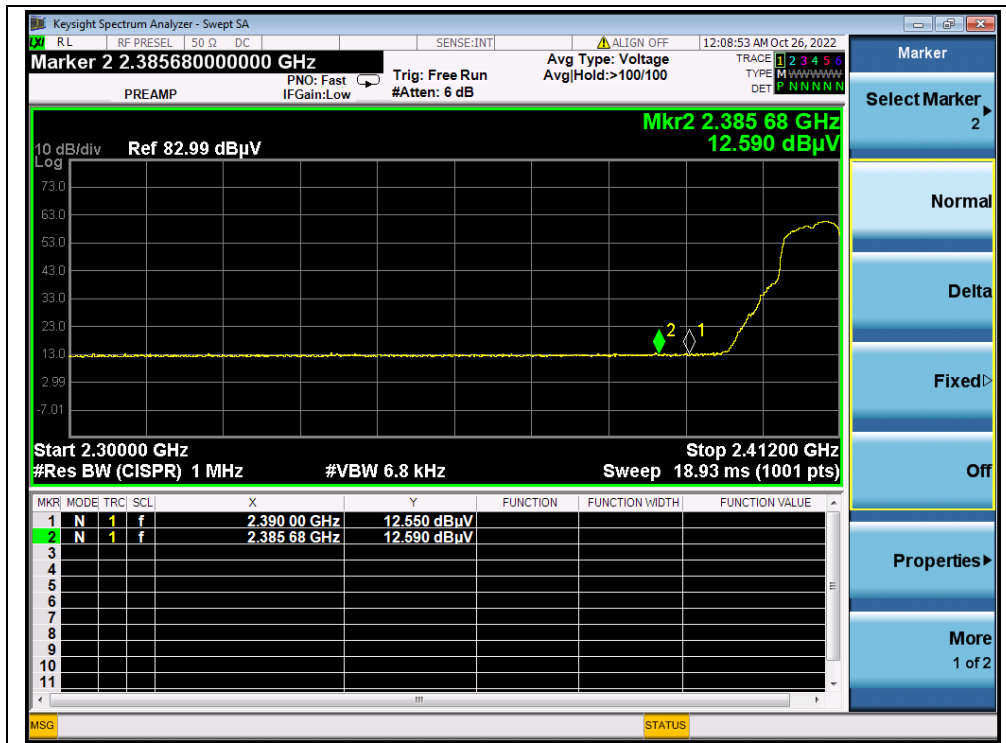
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading	A_T	A_{Factor}	Max. Emission	Limit	Verdict
		PK/ AV	U_R (dB μ V)	(dB)	(dB@3m)	E (dB μ V/m)	(dB μ V/m)	
1	2385.79	PK	23.24	6.74	27.20	57.18	74	PASS
1	2385.69	AV	12.59	6.74	27.20	46.53	54	PASS
13	2483.50	PK	32.28	6.74	27.20	66.22	74	PASS
13	2483.74	AV	14.05	6.74	27.20	47.99	54	PASS

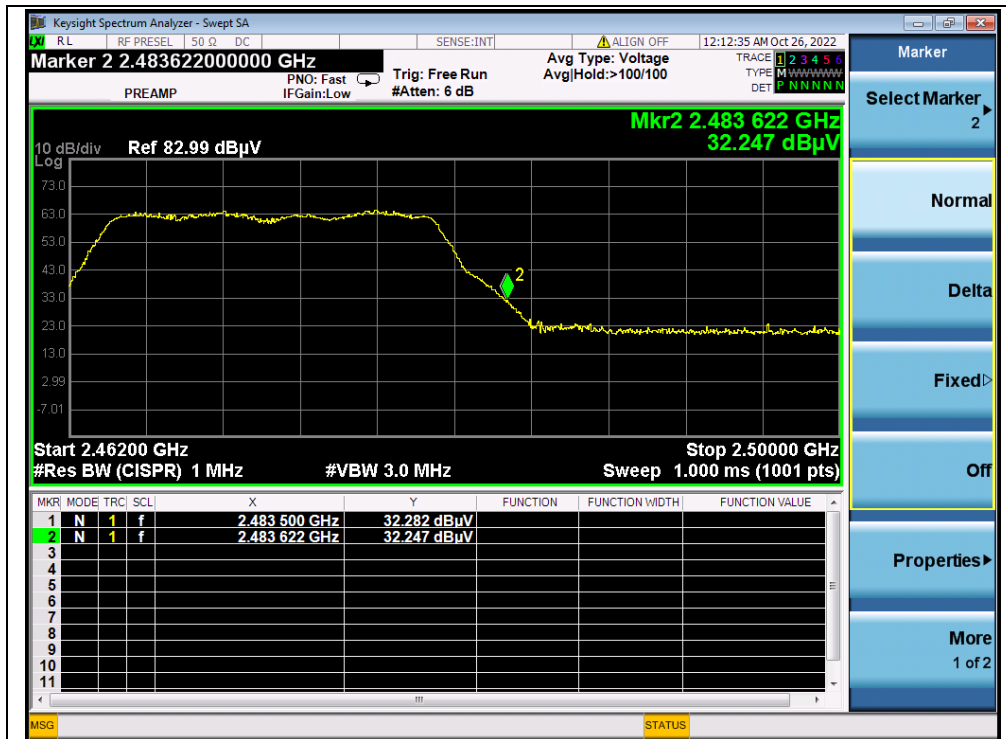
B. Test Plot:



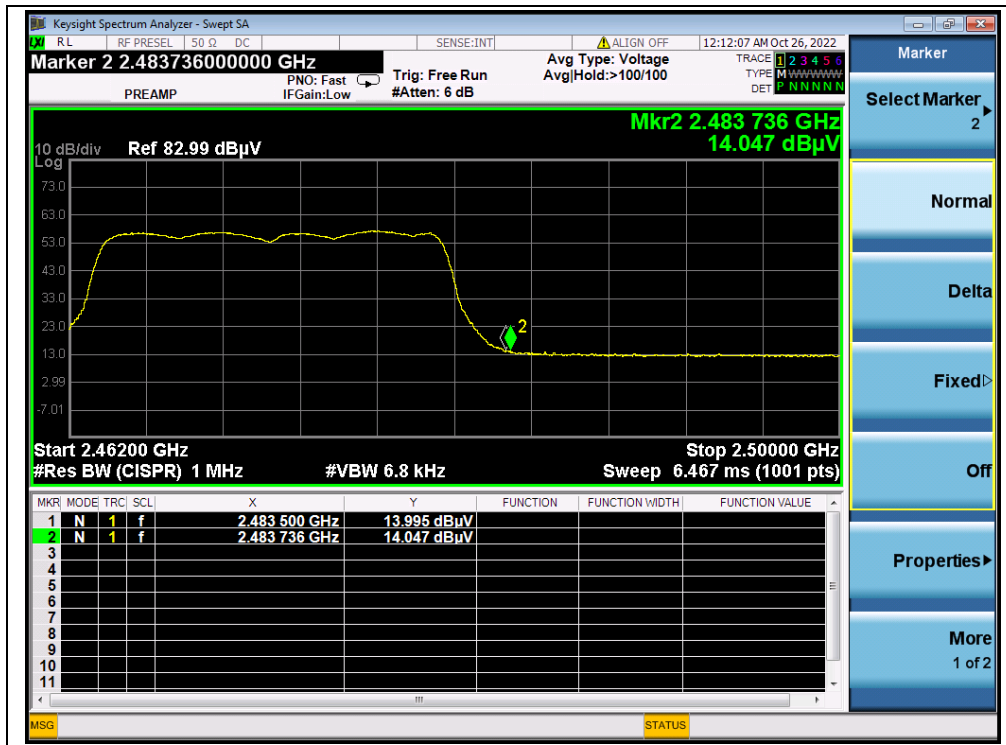
(PEAK, Channel 1, 802.11g)



(AVERAGE, Channel 1, 802.11g)



(PEAK, Channel 13, 802.11g)



(AVERAGE, Channel 13, 802.11g)

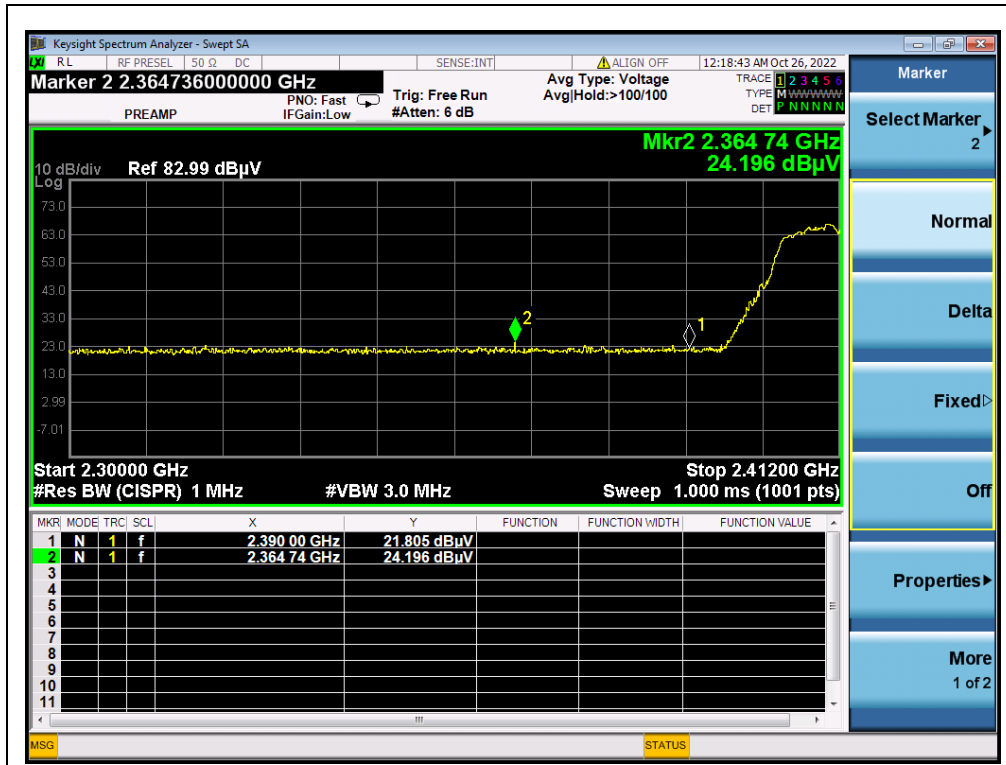


802.11n (HT20) Mode

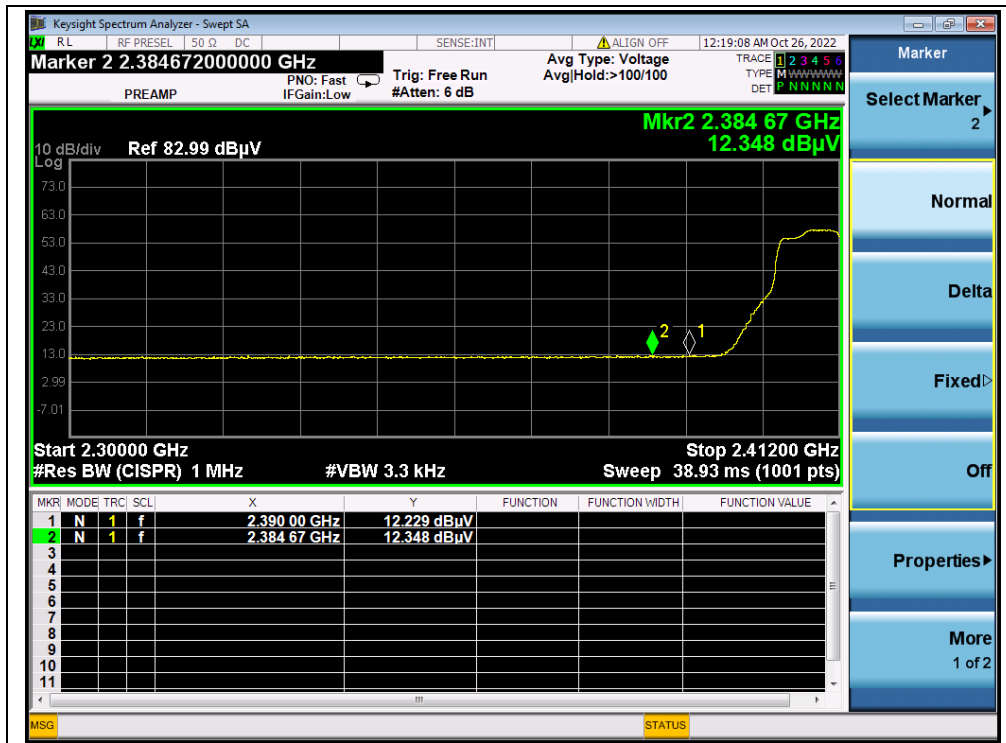
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV	U _R (dBμV)					
1	2364.74	PK	24.20	6.74	27.20	58.14	74	PASS
1	2384.67	AV	12.35	6.74	27.20	46.29	54	PASS
13	2483.50	PK	31.00	6.74	27.20	64.94	74	PASS
13	2483.50	AV	13.71	6.74	27.20	47.65	54	PASS

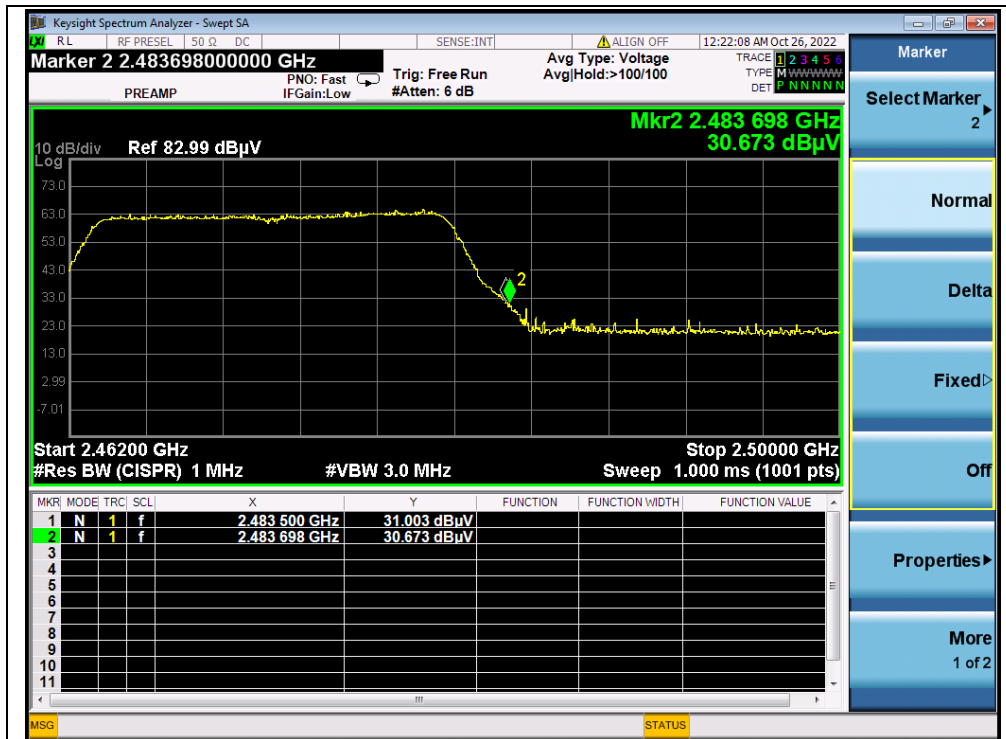
B. Test Plot:



(PEAK, Channel 1, 802.11n (HT20))



(AVERAGE, Channel 1, 802.11n (HT20))



(PEAK, Channel 13, 802.11n (HT20))