



TEST REPORT

APPLICANT : Reliance Communications LLC

PRODUCT NAME : Orbic AirSurf 5G UW

MODEL NAME : R141TL5

BRAND NAME : Orbic

FCC ID : 2ABGH-R141TL5

STANDARD(S) : 47 CFR Part 15 Subpart C

RECEIPT DATE : 2021-07-29

TEST DATE : 2021-08-11 to 2021-11-30

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Change History		
Version	Date	Reason for change
1.0	2021-12-01	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Reliance Communications LLC
Applicant Address:	91 Colin Drive, Unit 1, HOLBROOK, New York 11741, United States
Manufacturer:	Unimaxcomm
Manufacturer Address:	35F,HBC HuiLong Center Building-II Minzhi Street,Longhua, Shenzhen, P.R. China 518110

1.2. Equipment Under Test (EUT) Description

Product Name:	Orbic AirSurf 5G UW	
Sample No.:	1#	
Hardware Version:	R141-REV12	
Software Version:	ORB141TL5_V1.1.9_SVZ	
Modulation Technology:	DSSS, OFDM	
Modulation Type:	Refer to section1.3	
Wireless Technology:	802.11b, 802.11g, 802.11n (HT20), 802.11n (HT40) 802.11ax (HEW20), 802.11ax (HEW40)	
Operating Frequency Range:	2412MHz–2472MHz	
Antenna Type:	Fixed Internal Antenna	
Antenna Gain:	ANT 0: 3.09dBi; ANT 1: 4.71dBi	
Directional Gain:	7.72dBi _{Note 2}	
Accessory Information:	Battery	
	Brand Name:	Orbic
	Model No.:	BTE-6002
	Serial No.:	N/A
	Capacity:	6000mAh
	Rated Voltage:	7.6V
	Charge Limit:	8.7V
	Manufacturer:	GANZHOU NOVEL BATTERY TECHNOLOGY CO.LTD



Accessory Information:	AC Adapter	
	Brand Name:	Orbic
	Model No.:	JHD-AP065U-190342BA-A
	Serial No.:	N/A
	Rated Output:	19V \pm 3420mA
	Rated Input:	100-240V \sim 50/60Hz, 1.5A
	Manufacturer:	Shenzhen Jihongda Power Co., Ltd

Note 1: The EUT supports a MIMO function. Physically, the EUT provides two completed transmitters and two receivers for 802.11n and 802.11ax modulation mode.

Modulation Mode:	TX Function
802.11n	2TX
802.11ax	2TX

Note 2: According to KDB 662911 D01, the directional gain = $G_{ANT} + 10\log(N_{ANT})$ dBi, where G_{ANT} is the maximum antenna gain in dBi, N_{ANT} is the number of outputs.

Note 3: For conducted test item Conducted Output Power and Power Spectral Density of each modulation mode, we recorded the test result of two antennas separately, for other conducted test items both of the two antennas were tested separately, we only recorded the worst test result (ANT 1) in this report.

Note 4: All radiation test items for 802.11n and 802.11 ax modulation mode operate at MIMO mode during the test. Other modulation mode operate at SISO mode, both of the two antennas were tested separately, we only recorded the worst test result(ANT 1) in this report.

Note 5: We use the dedicated software to control the EUT continuous transmission.

Note 6: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.3. Modulation Type and Data Rate of EUT

Mode	Bandwidth (MHz)	Modulation Technology	Modulation Type	Data Rate	RU Size
802.11b	20	DSSS	DBPSK	1/2/5.5/11Mbps	N/A
			DQPSK		
			CCK		
802.11g	20	OFDM	BPSK	6/9/12/18/24/36/48/54 Mbps	N/A
			QPSK		
			16QAM		
			64QAM		
802.11n	20/40 (HT20/40)	OFDM	BPSK	MCS0~MCS7	N/A
			QPSK		
			16QAM		
			64QAM		
802.11ax	20/40 (HEW20/40)	OFDMA	BPSK	MCS0~MCS11	26/52/106/242/484
			QPSK		
			16QAM		
			64QAM		
			256QAM		
			1024QAM		

Note1: The worst-case mode (bold face) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.



1.4. The Channel Number and Frequency

Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11b/g/n(HT20)/ ax(HEW20)	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		
Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11n (HT40)/ ax(HEW40)	3	2422	8	2447
	4	2427	9	2452
	5	2432	10	2457
	6	2437	11	2462
	7	2442		

Note 1: The black bold channels were selected for test.



1.5. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	N/A	Duty Cycle of Test Signal	Oct 14&30, 2021 Nov 30, 2021	Meng Shurui	PASS	No deviation
3	15.247(b)	Maximum Conducted Output Power	Oct 20, 2021 Nov 01&30, 2021	Meng Shurui	PASS	No deviation
4	15.247(a)	Bandwidth	Oct 20, 2021 Nov 30, 2021	Meng Shurui	PASS	No deviation
5	15.247(d)	Conducted Spurious Emission and Band Edge	Oct 20, 2021 Nov 01&30, 2021	Meng Shurui	PASS	No deviation
6	15.247(e)	Power Spectral Density (PSD)	Oct 20&30, 2021	Meng Shurui	PASS	No deviation
7	15.207	Conducted Emission	Oct 19, 2021	Su Zhan	PASS	No deviation
8	15.247(d)	Restricted Frequency Bands	Nov 11&20, 2021	Gao Jianrou	PASS	No deviation
9	15.209, 15.247(d)	Radiated Emission	Nov 11&12, 2021	Gao Jianrou	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013, KDB558074 D01 v05r02 and KDB662911 D01 v02r01.

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting



in the test equipments. The ref offset 11.0dB contains two parts that cable loss 1.0dB and Attenuator 10dB.

Note 3: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.6. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106



2. 47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. Test Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Duty Cycle of Test Signal

2.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than $\pm 2\%$; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

Test Setup:



ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

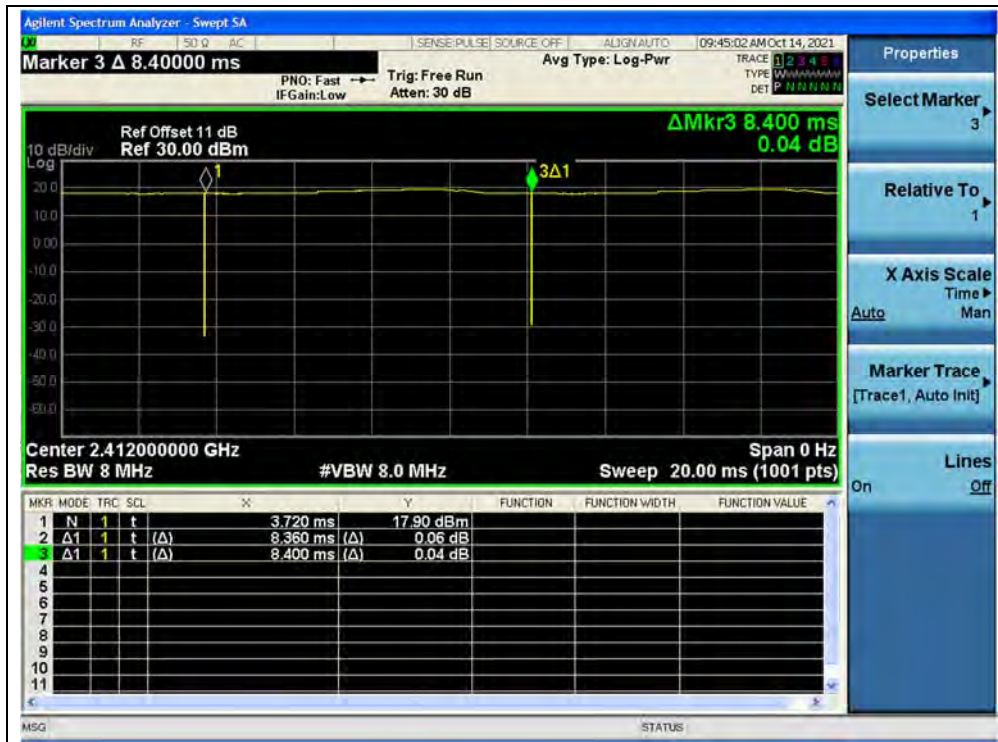


2.2.3. Test Result

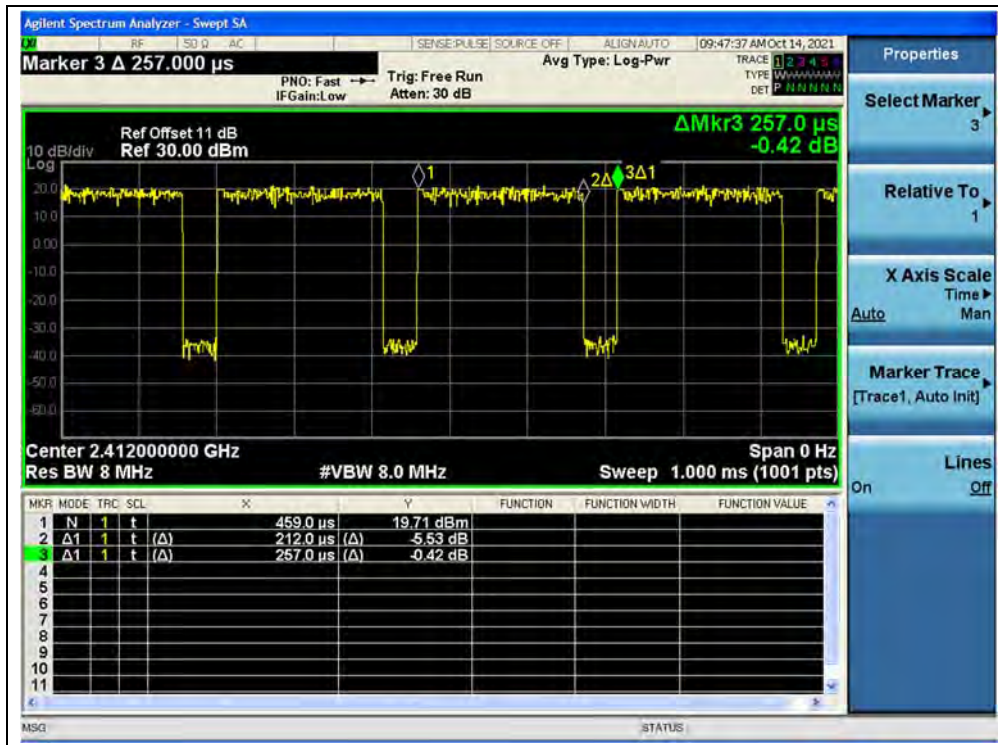
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*Ig[1/D])
802.11b	99.52	0.02
802.11g	80.77	0.93
802.11n (HT20)	82.14	0.85
802.11n (HT40)	82.76	0.82
802.11ax (HEW20)	82.14	0.85
802.11ax (HEW20) RU26	89.13	0.50
802.11ax (HEW20) RU52	82.76	0.82
802.11ax (HEW20) RU106	82.76	0.82
802.11ax (HEW40)	82.14	0.85

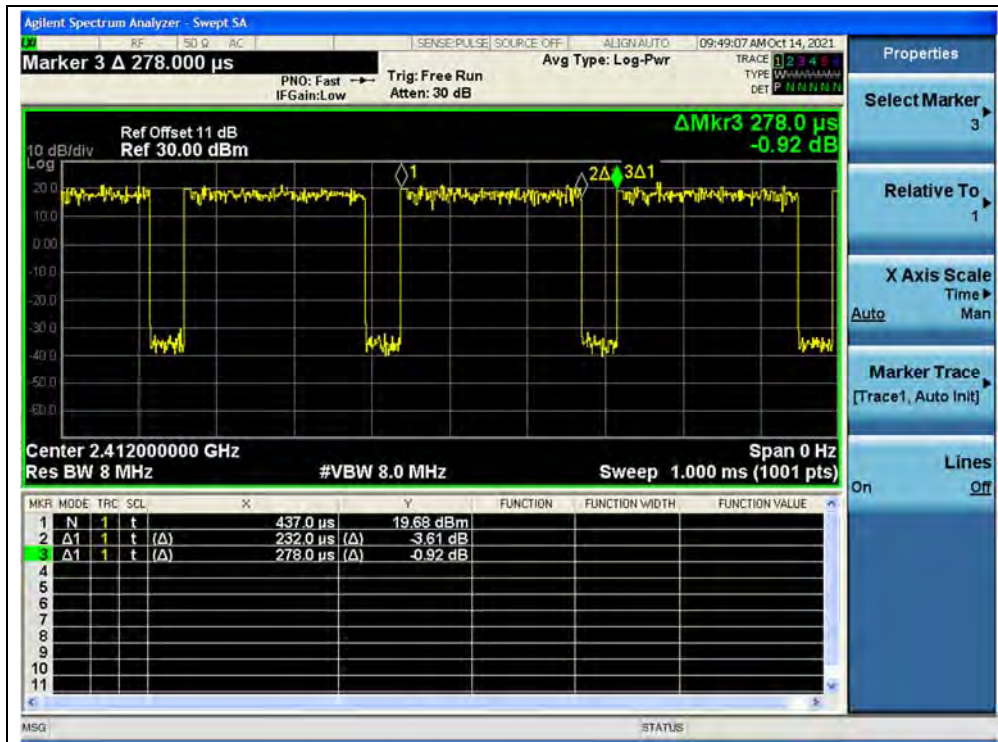
B. Test Plot:



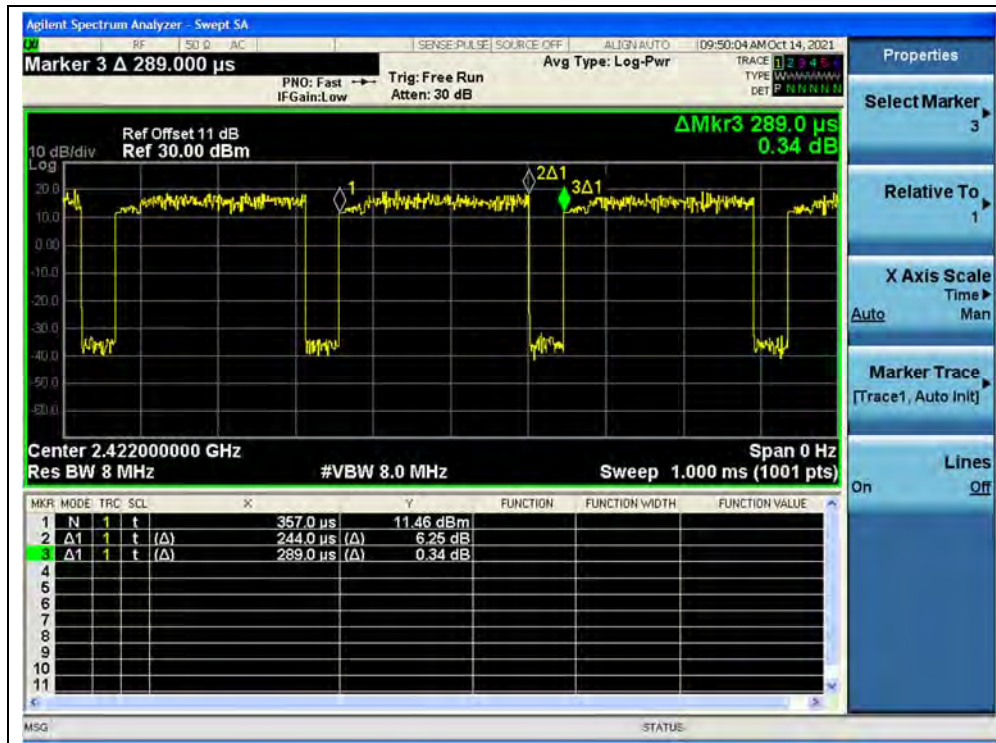
(Channel 1, 802.11b)



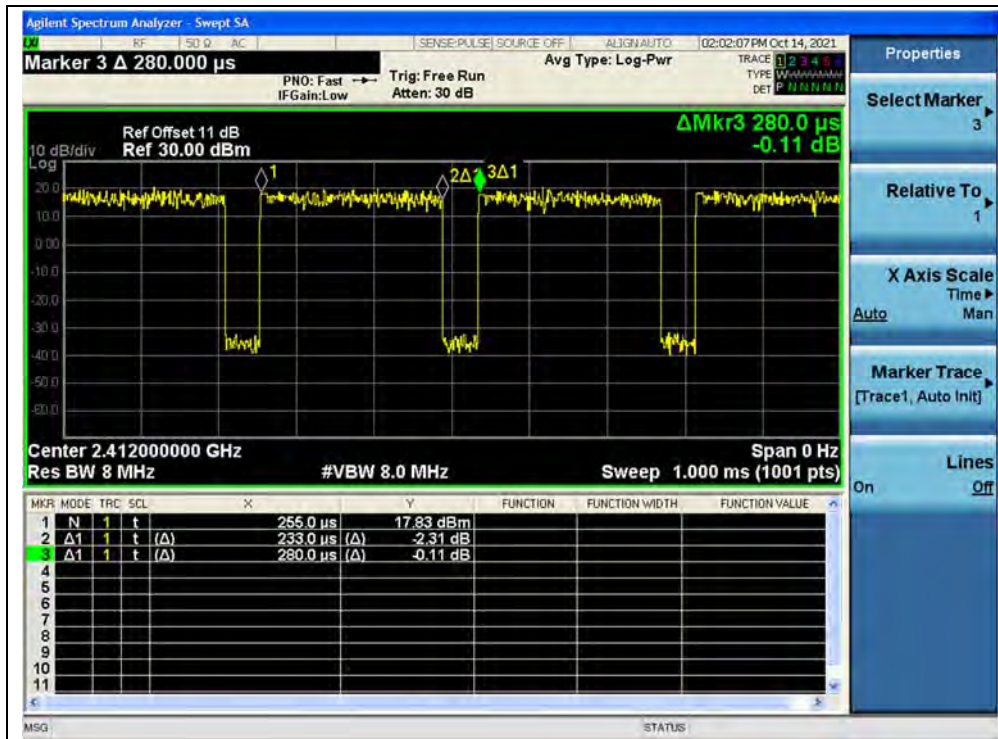
(Channel 1, 802.11g)



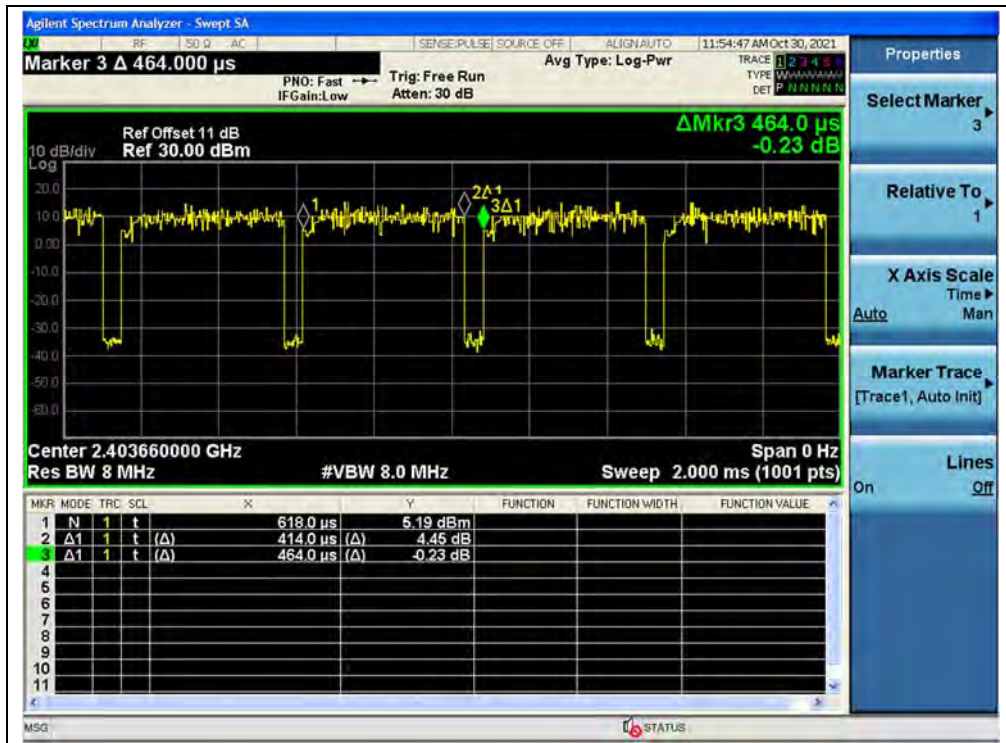
(Channel 1, 802.11n (HT20))



(Channel 3, 802.11n (HT40))



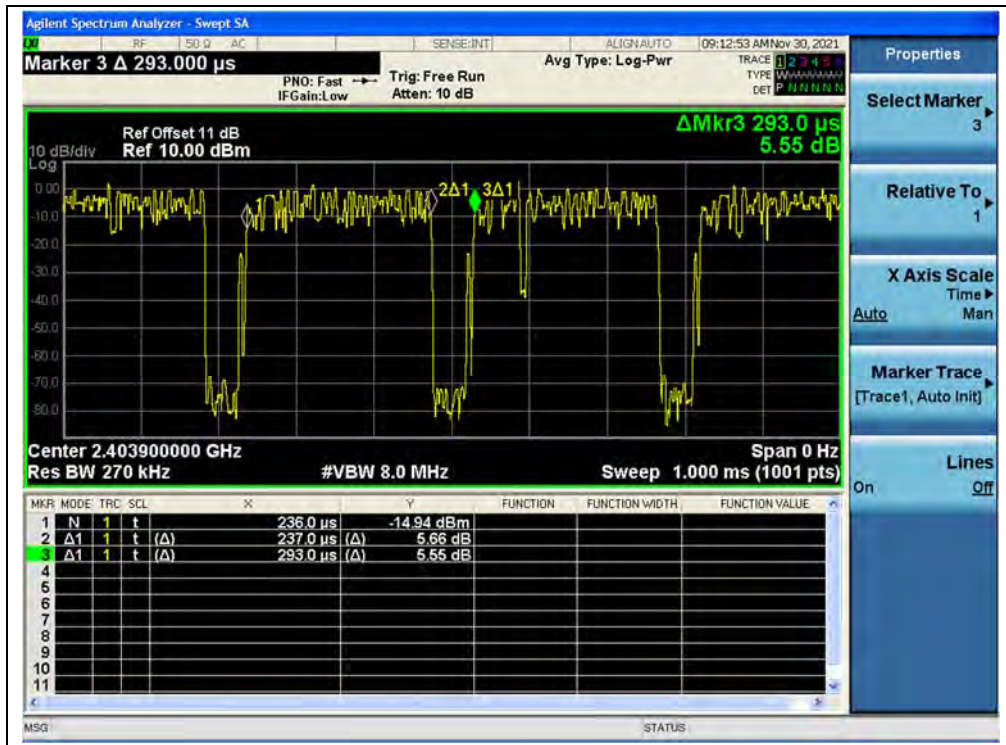
(Channel 1, 802.11ax (HEW20))



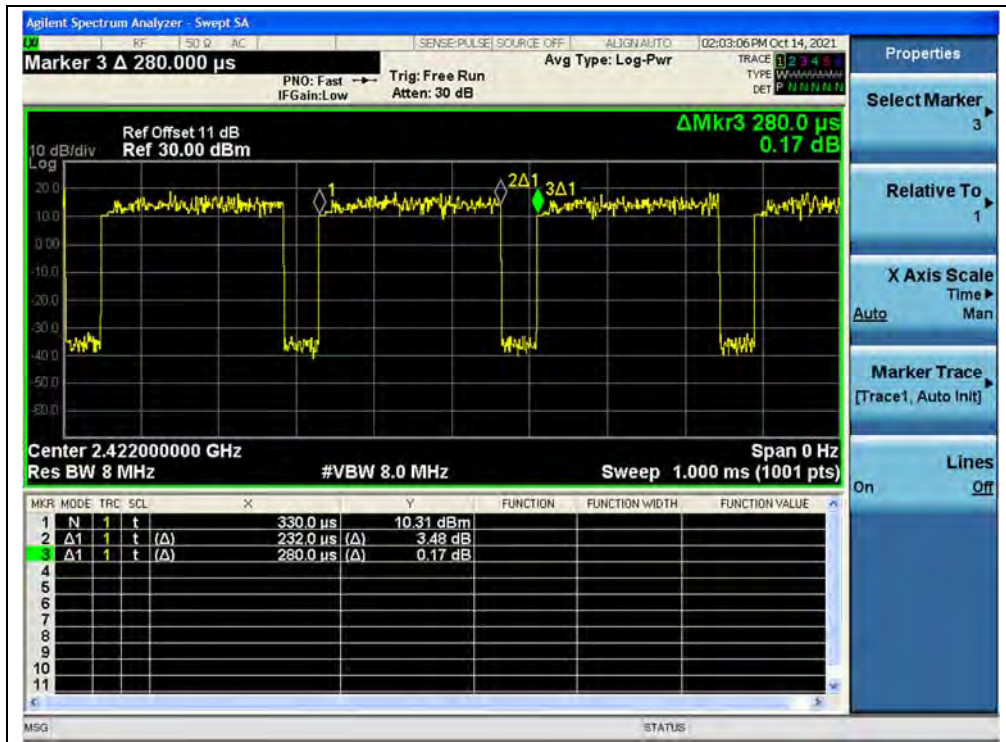
(Channel 1, 802.11ax (HEW20) RU26)



(Channel 1, 802.11ax (HEW20) RU52)



(Channel 1, 802.11ax (HEW20) RU106)



(Channel 3, 802.11ax (HEW40))

2.3. Maximum Conducted Output Power

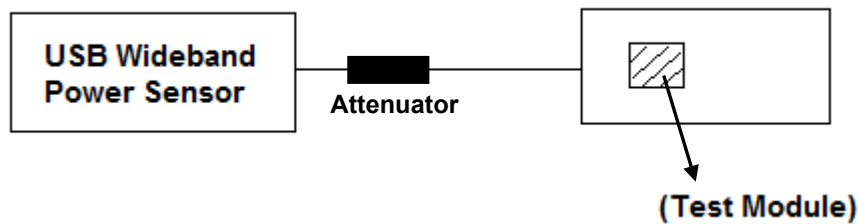
2.3.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum conducted output power of the intentional radiator shall not exceed 1 Watt.

2.3.2. Test Description

The measured output power was calculated by the reading of the USB Wideband Power Sensor and calibration.

Test Setup:



The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.



2.3.3. Test Result

Maximum Peak Conducted Output Power

802.11b Mode

Channel	Frequency (MHz)	Measured Peak Power				Limit (dBm)		Verdict
		ANT 0		ANT 1		dBm	W	
		dBm	W	dBm	W			
1	2412	11.38	0.014	15.74	0.037	30	1	PASS
7	2442	11.31	0.014	15.91	0.039			PASS
13	2472	11.46	0.014	15.90	0.039			PASS

802.11g Mode

Channel	Frequency (MHz)	Measured Peak Power				Limit (dBm)		Verdict
		ANT 0		ANT 1		dBm	W	
		dBm	W	dBm	W			
1	2412	12.84	0.019	17.27	0.053	30	1	PASS
7	2442	12.95	0.020	17.41	0.055			PASS
13	2472	13.15	0.021	20.50	0.112			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
1	2412	12.72	17.29	18.57	0.072	28.28	0.67	PASS
7	2442	12.89	17.38	18.69	0.074			PASS
13	2472	13.14	20.37	21.11	0.129			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

802.11n (HT40) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
3	2422	12.89	17.95	19.14	0.082	28.28	0.67	PASS
7	2442	13.07	17.67	18.98	0.079			PASS
11	2462	13.22	20.72	21.43	0.139			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.



802.11ax (HEW20) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
1	2412	10.82	11.79	14.31	0.027	28.28	0.67	PASS
7	2442	10.89	12.25	14.62	0.029			PASS
13	2472	15.81	17.39	19.68	0.093			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi>6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

802.11ax (HEW20) RU26 Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
1	2412	10.71	12.40	14.62	0.029	28.28	0.67	PASS
7	2442	10.89	12.68	14.91	0.031			PASS
13	2472	15.12	15.99	18.57	0.072			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi>6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

802.11ax (HEW20) RU52 Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
1	2412	13.10	12.77	15.91	0.039	28.28	0.67	PASS
7	2442	13.05	13.06	16.02	0.040			PASS
13	2472	19.58	18.28	21.99	0.158			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi>6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.



802.11ax (HEW20) RU106 Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
1	2412	19.71	19.61	22.67	0.185	28.28	0.67	PASS
7	2442	19.97	19.74	22.88	0.194			PASS
13	2472	18.40	18.17	21.30	0.135			PASS
<p>Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.</p>								

802.11ax (HEW40) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
3	2422	11.30	12.85	15.19	0.033	28.28	0.67	PASS
7	2442	11.42	13.21	15.44	0.035			PASS
11	2462	13.84	16.86	18.63	0.073			PASS
<p>Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.</p>								



Maximum Average Conducted Output Power

802.11b Mode

Frequency (MHz)	Average Power						Limit		Verdict	
	Measured		Duty Factor	Duty factor Calculated						
	ANT 0	ANT 1		ANT 0		ANT 1				
	dBm	dBm		dBm	W	dBm	W	dBm		W
2412	9.20	12.46	0.02	9.22	0.008	12.48	0.018	30	1	PASS
2442	9.14	13.01		9.16	0.008	13.03	0.020			PASS
2472	9.37	13.04		9.39	0.009	13.06	0.020			PASS

802.11g Mode

Frequency (MHz)	Average Power						Limit		Verdict	
	Measured		Duty Factor	Duty factor Calculated						
	ANT 0	ANT 1		ANT 0		ANT 1				
	dBm	dBm		dBm	W	dBm	W	dBm		W
2412	8.20	11.48	0.93	9.13	0.008	12.41	0.017	30	1	PASS
2442	8.27	11.37		9.20	0.008	12.30	0.017			PASS
2472	8.71	9.58		9.64	0.009	10.51	0.011			PASS

802.11n (HT20) Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0	ANT 1						
	dBm	dBm		dBm	W	dBm		W
2412	8.27	11.76	0.85	14.15	0.026	28.28	0.67	PASS
2442	8.33	12.01		14.47	0.028			PASS
2472	8.76	10.17		13.42	0.022			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.



802.11n (HT40) Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0 dBm	ANT 1 dBm		dBm	W	dBm		W
2422	8.41	11.73	0.82	14.15	0.026	28.28	0.67	PASS
2442	8.56	11.76		14.31	0.027			PASS
2462	8.62	11.85		14.31	0.027			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

802.11ax (HEW20) Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0 dBm	ANT 1 dBm		dBm	W	dBm		W
2412	5.74	6.33	0.85	10.00	0.010	28.28	0.67	PASS
2442	5.47	6.85		10.00	0.010			PASS
2472	5.69	7.03		10.41	0.011			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

802.11ax (HEW20) RU26 Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0 dBm	ANT 1 dBm		dBm	W	dBm		W
2412	5.89	6.40	0.85	10.00	0.010	28.28	0.67	PASS
2442	5.69	6.52		10.00	0.010			PASS
2472	5.78	6.98		10.41	0.011			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.



802.11ax (HEW20) RU52 Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0	ANT 1		dBm	W	dBm		W
2412	8.08	7.43	0.85	11.76	0.015	28.28	0.67	PASS
2442	7.99	7.87		11.76	0.015			PASS
2472	5.20	5.12		9.03	0.008			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

802.11ax (HEW20) RU106 Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0	ANT 1		dBm	W	dBm		W
2412	7.95	7.84	0.85	11.76	0.015	28.28	0.67	PASS
2442	8.23	8.15		12.04	0.016			PASS
2472	5.12	5.43		9.03	0.008			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

802.11ax (HEW40) Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0	ANT 1		dBm	W	dBm		W
2422	5.34	6.47	0.85	10.00	0.010	28.28	0.67	PASS
2442	5.16	6.68		10.00	0.010			PASS
2462	5.25	7.15		10.00	0.010			PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power limit shall be reduced to 30-(7.72-6)=27.99dBm.

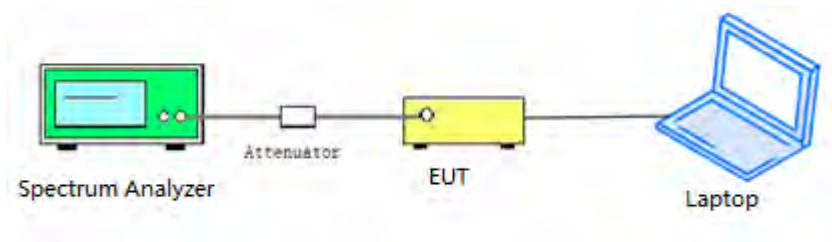
2.4. Bandwidth

2.4.1. Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.4.2. 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.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

2.4.3. Test Procedure

KDB 558074 Section 8.2 was used in order to prove compliance.

2.4.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	10.11	≥500	PASS
7	2442	10.10	≥500	PASS
13	2472	10.08	≥500	PASS

B. Test Plot:



(Channel 1, 802.11b)



(Channel 7, 802.11b)



(Channel 13, 802.11b)

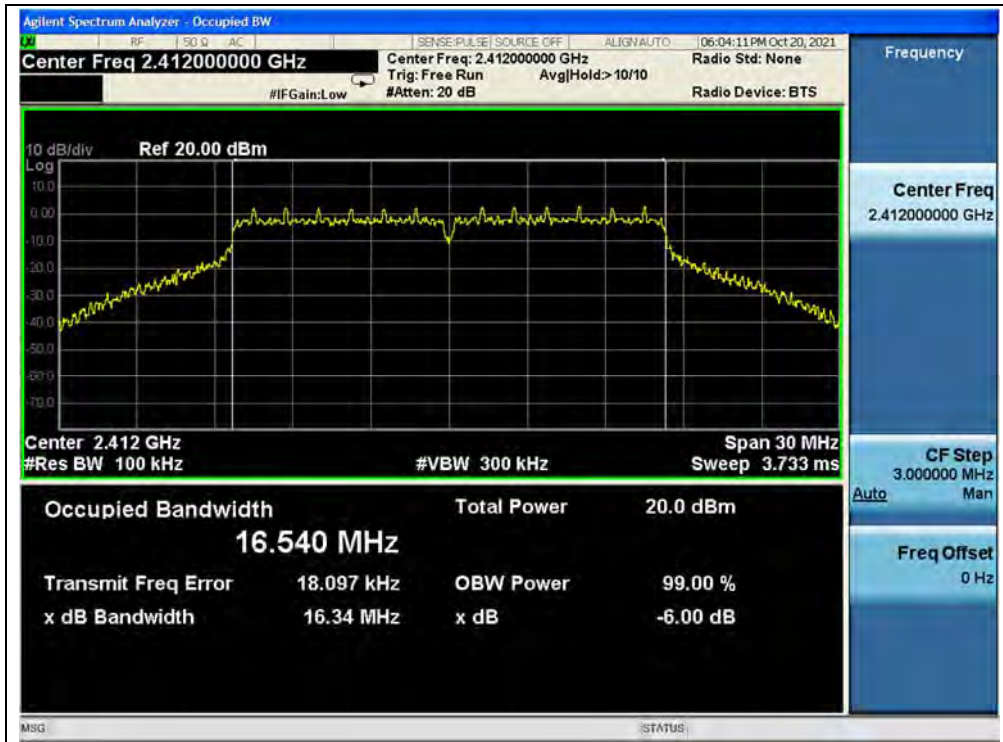


802.11g Mode

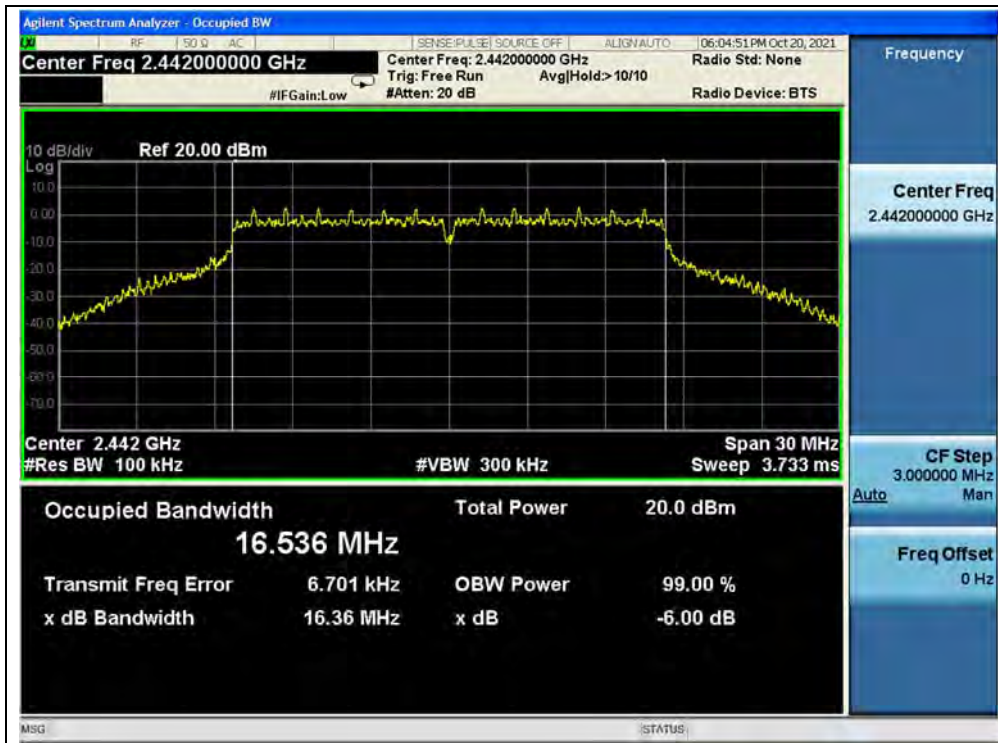
A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	16.34	≥500	PASS
7	2442	16.36	≥500	PASS
13	2472	16.36	≥500	PASS

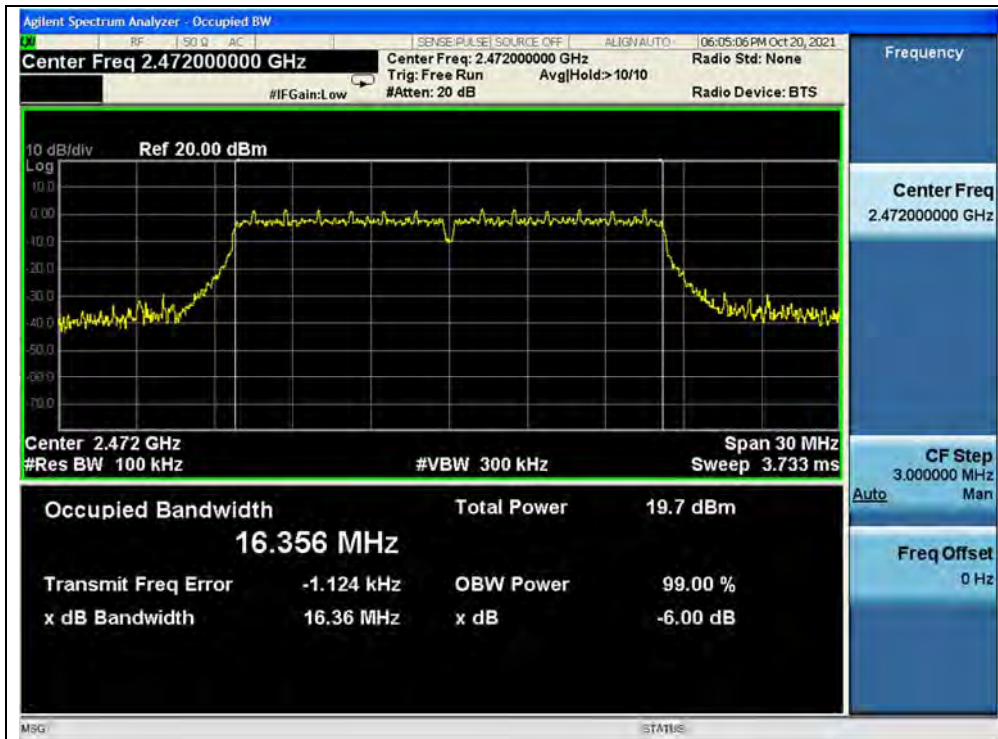
B.Test Plot:



(Channel 1, 802.11g)



(Channel 7, 802.11g)



(Channel 13, 802.11g)

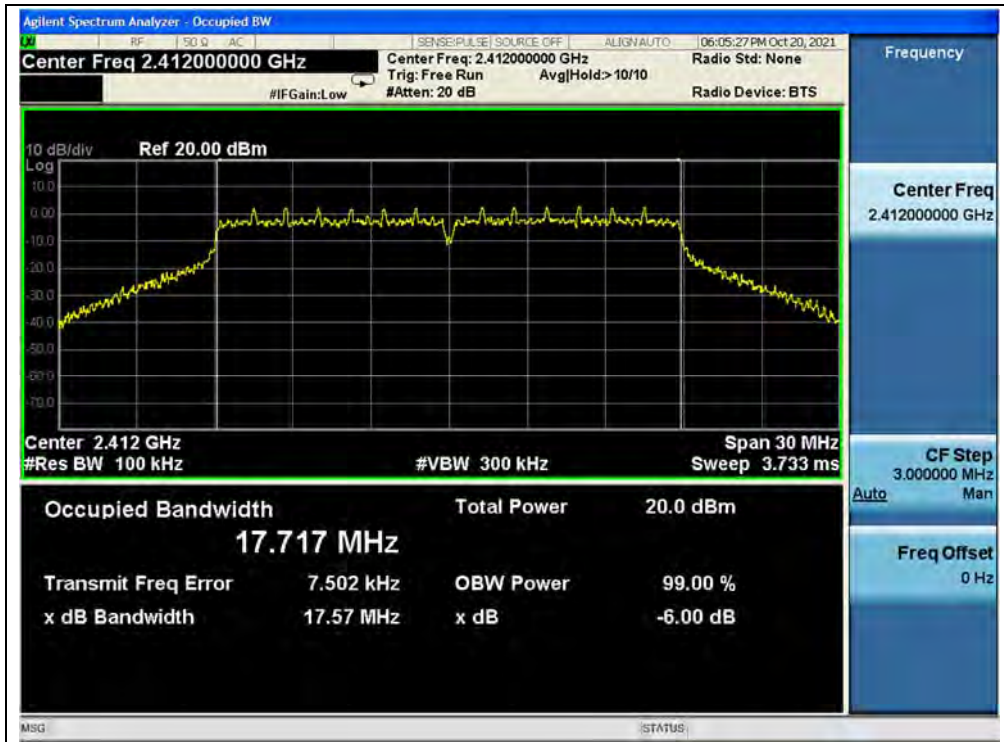


802.11n (HT20) Mode

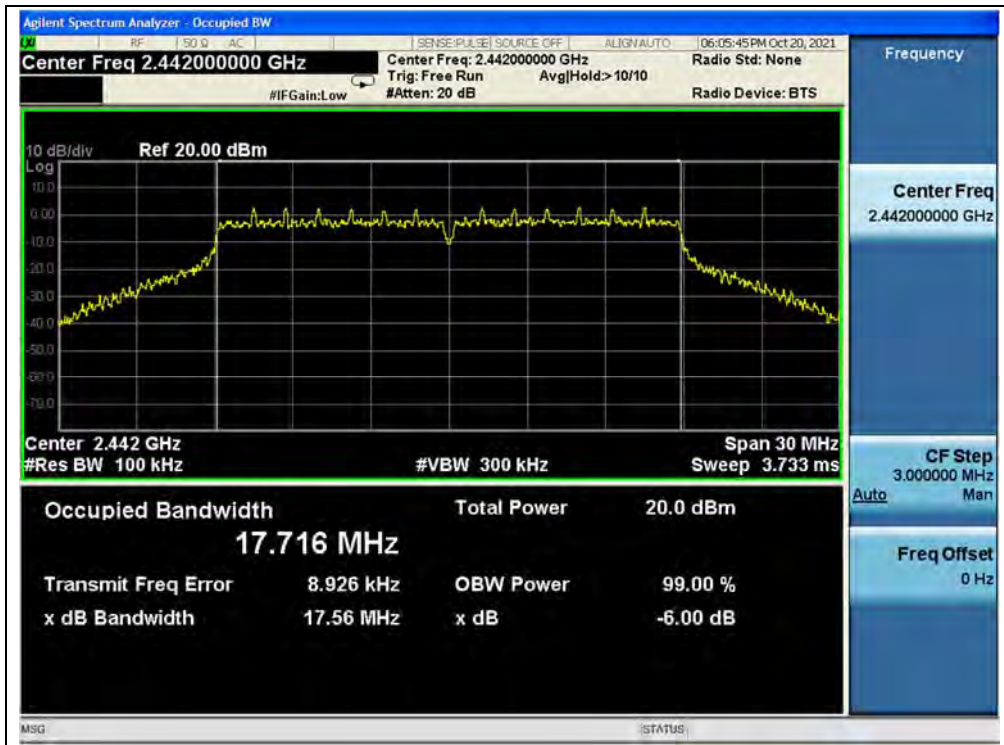
A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	17.57	≥500	PASS
7	2442	17.56	≥500	PASS
13	2472	17.57	≥500	PASS

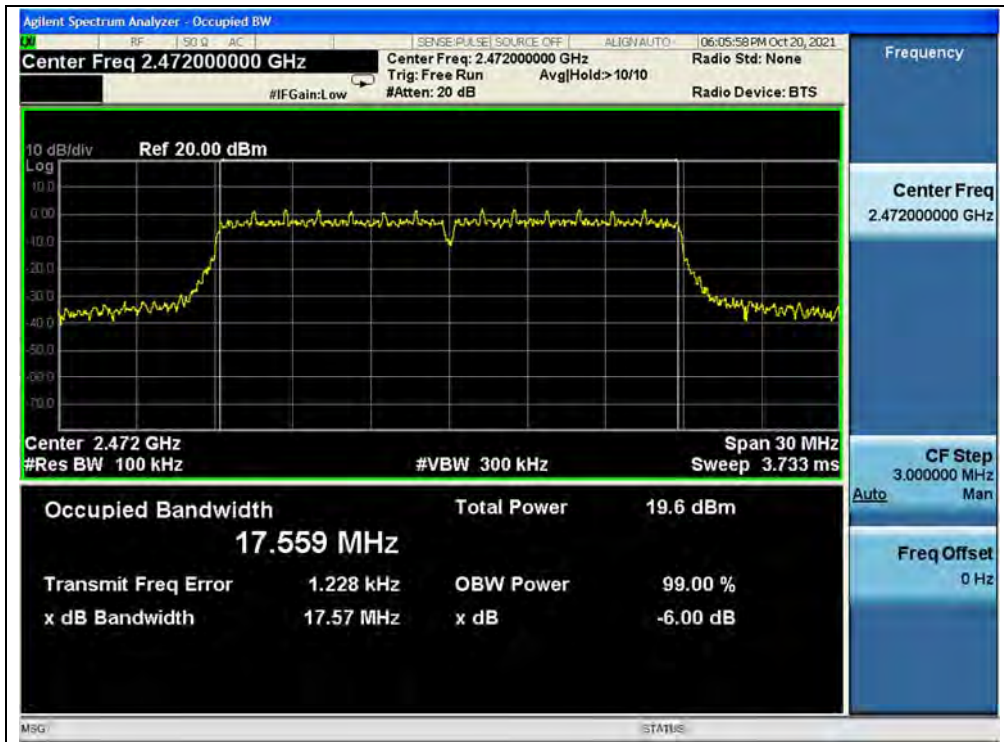
B.Test Plot:



(Channel 1, 802.11n (HT20))



(Channel 7, 802.11n (HT20))



(Channel 13, 802.11n (HT20))

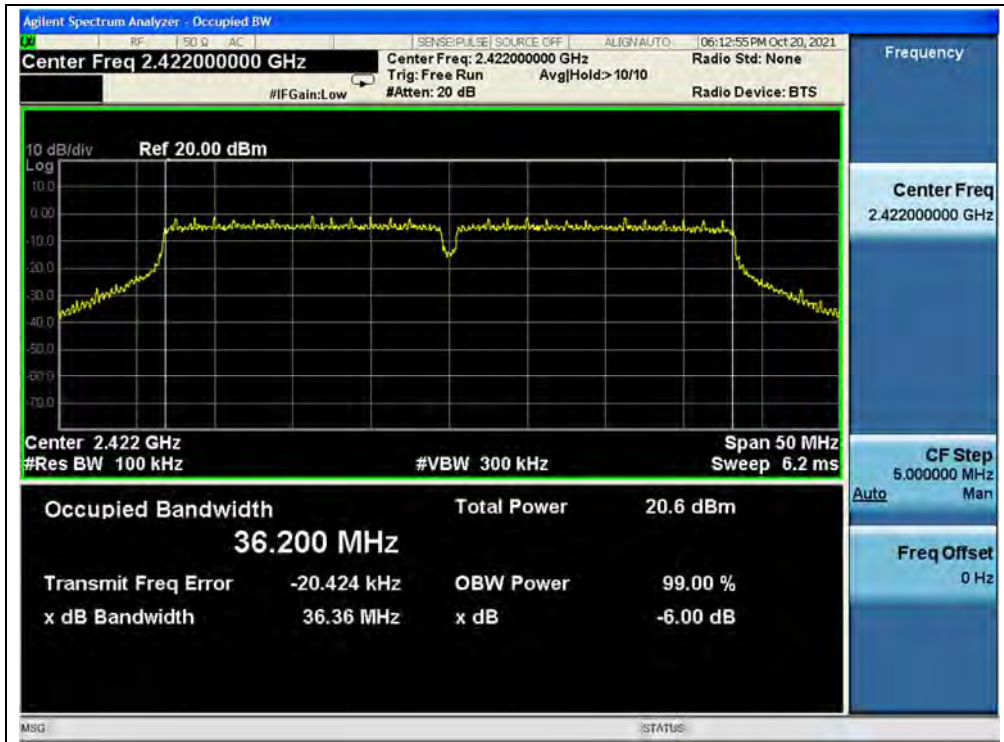


802.11n (HT40) Mode

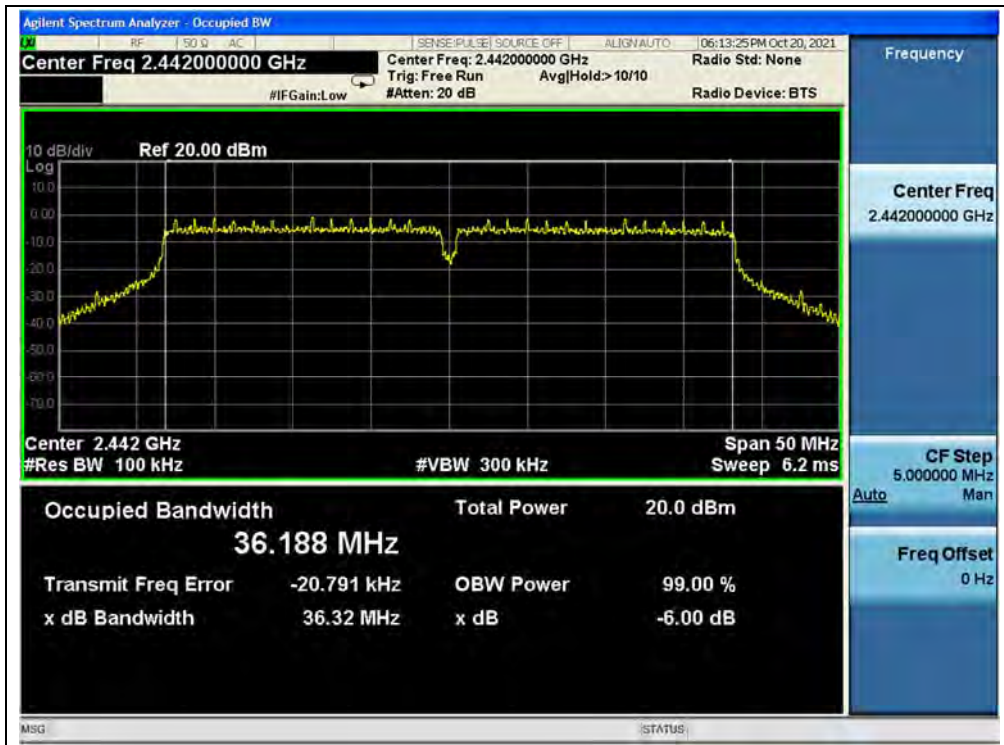
A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
3	2422	36.36	≥500	PASS
7	2442	36.32	≥500	PASS
11	2462	36.34	≥500	PASS

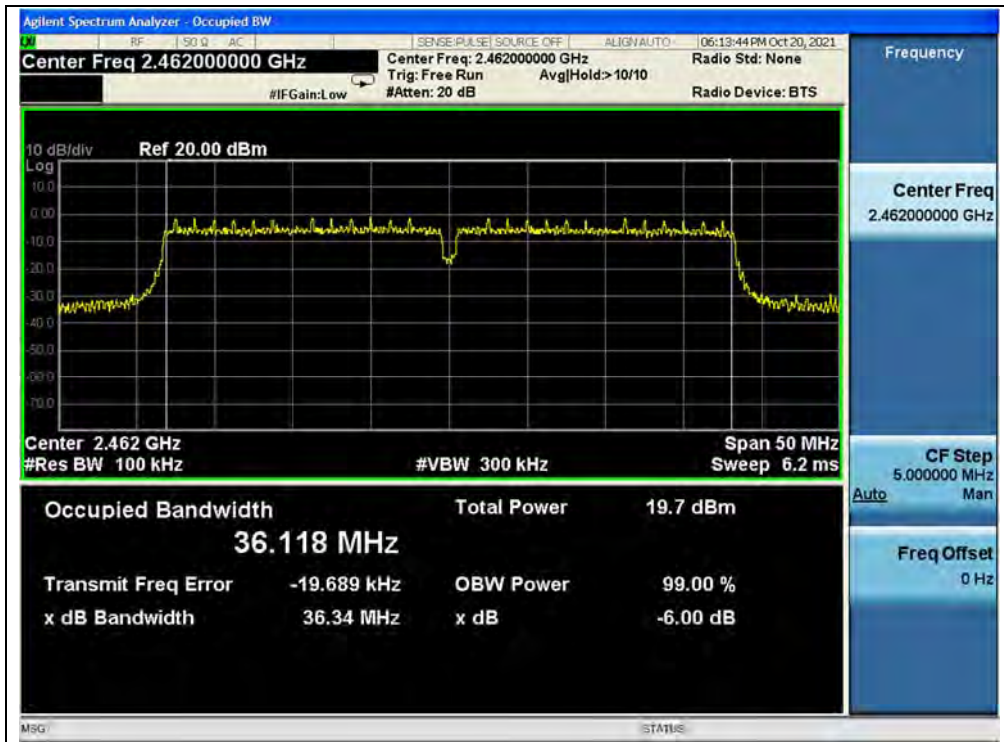
B.Test Plot:



(Channel 3, 802.11n (HT40))



(Channel 7, 802.11n (HT40))



(Channel 11, 802.11n (HT40))

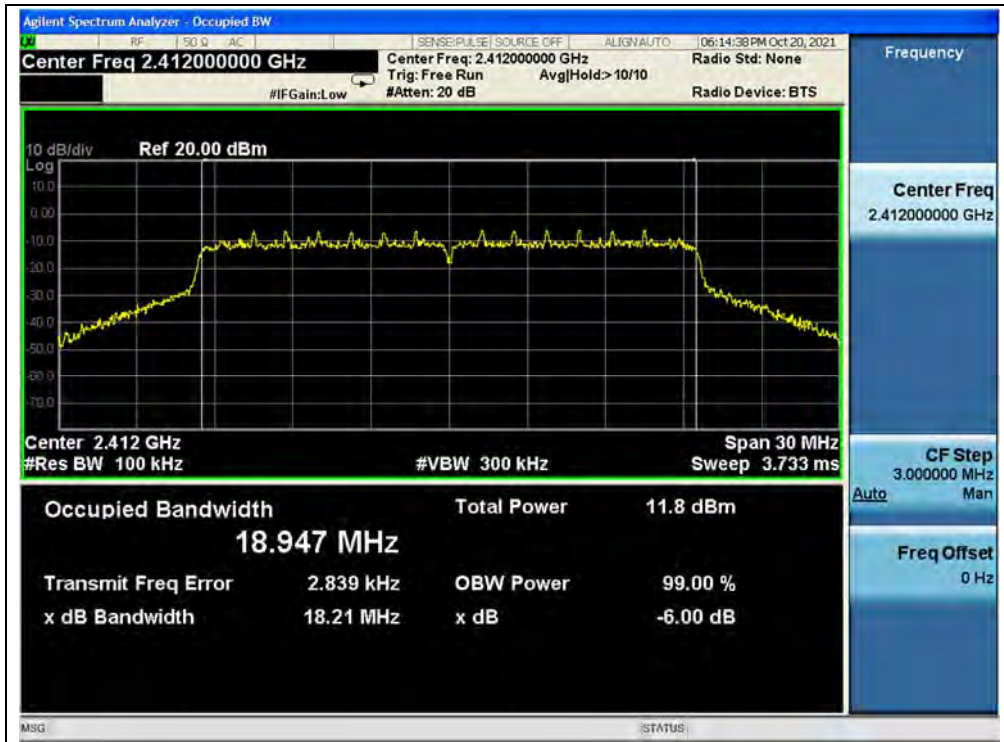


802.11ax (HEW20) Mode

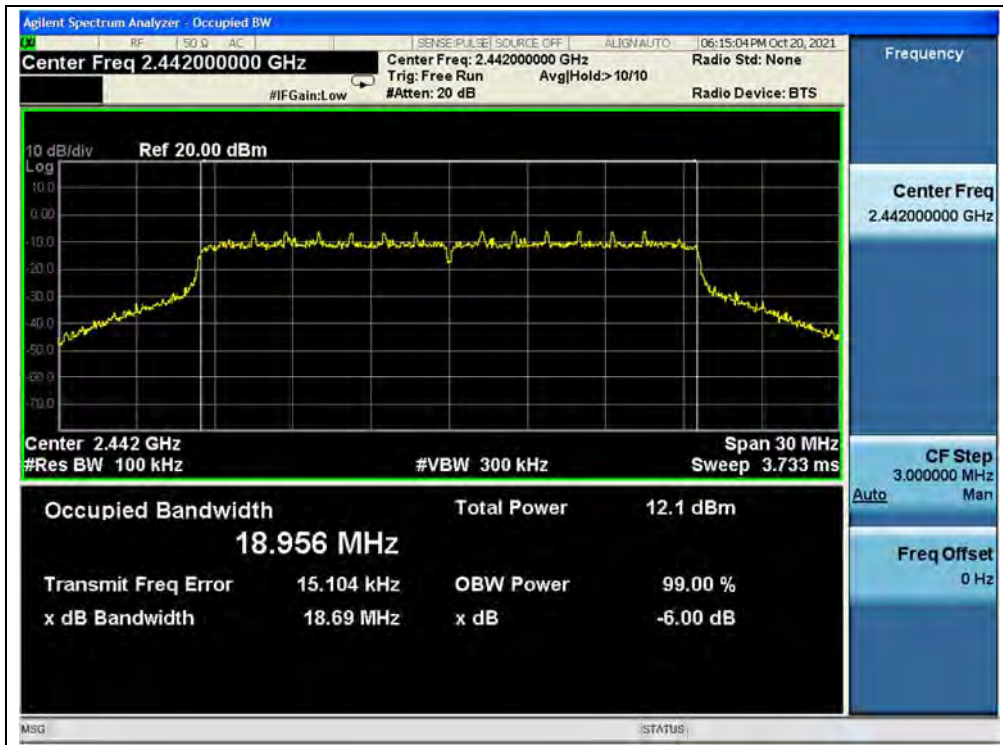
A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	18.21	≥500	PASS
7	2442	18.69	≥500	PASS
13	2472	18.31	≥500	PASS

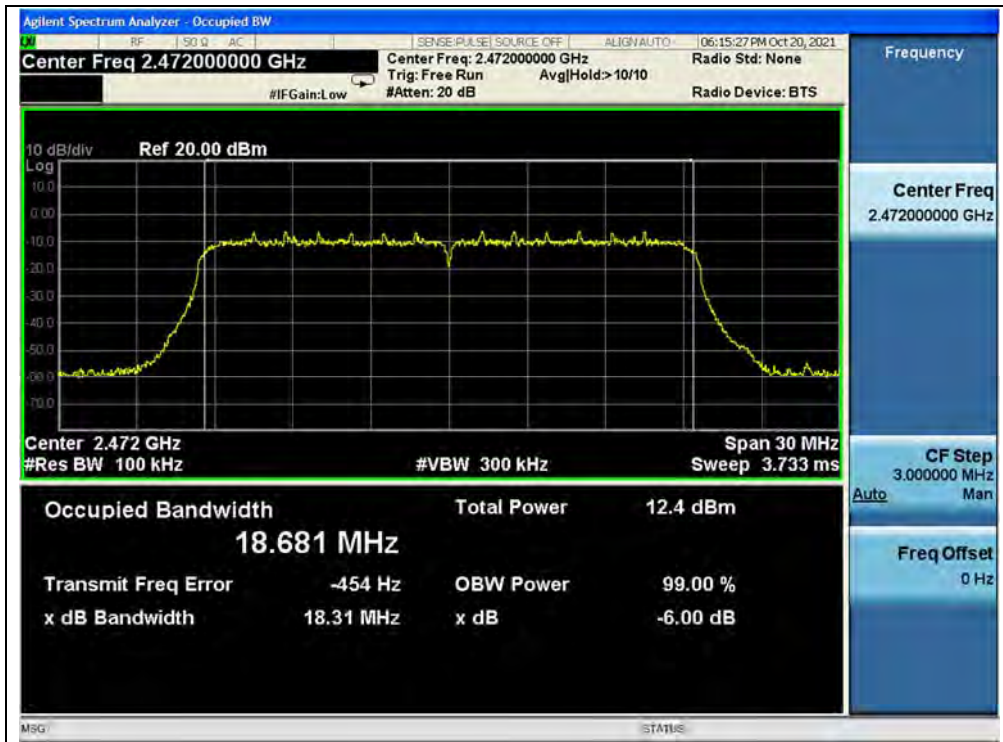
B.Test Plot:



(Channel 1, 802.11ax (HEW20))



(Channel 7, 802.11ax (HEW20))



(Channel 13, 802.11ax (HEW20))

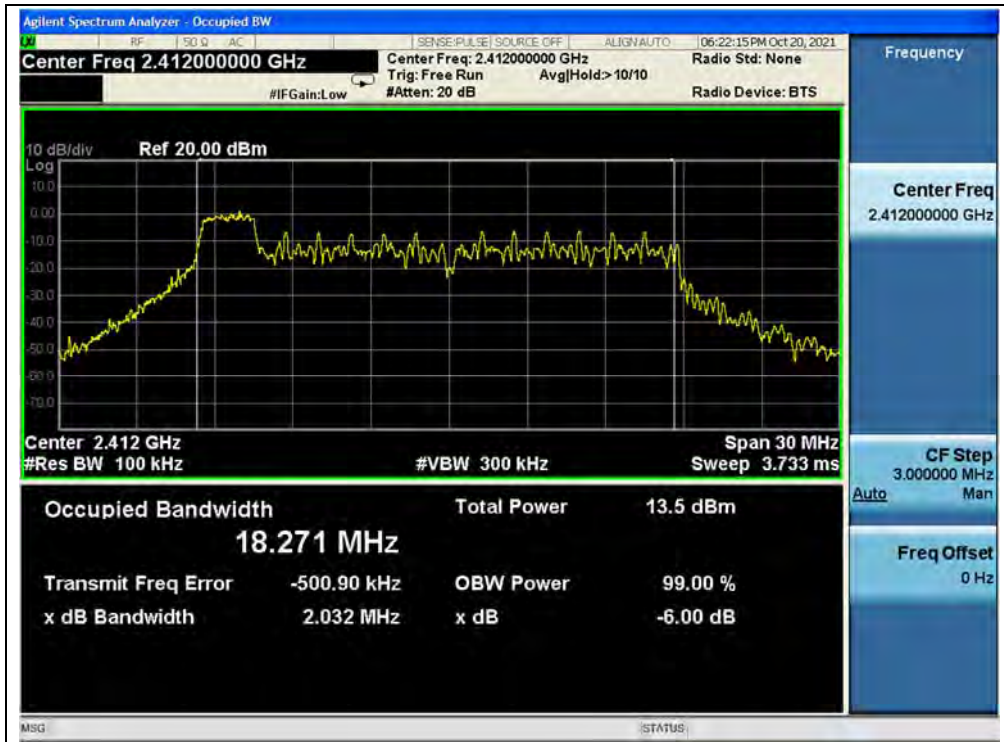


802.11ax (HEW20) RU26 Mode

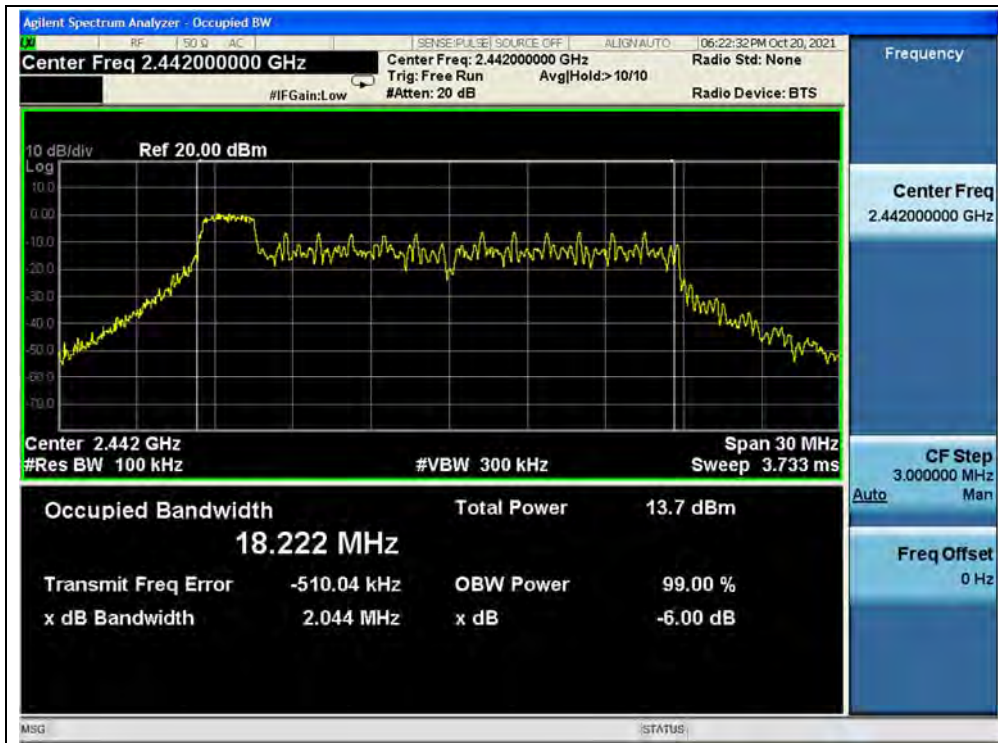
A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	2.032	≥500	PASS
7	2442	2.044	≥500	PASS
13	2472	1.989	≥500	PASS

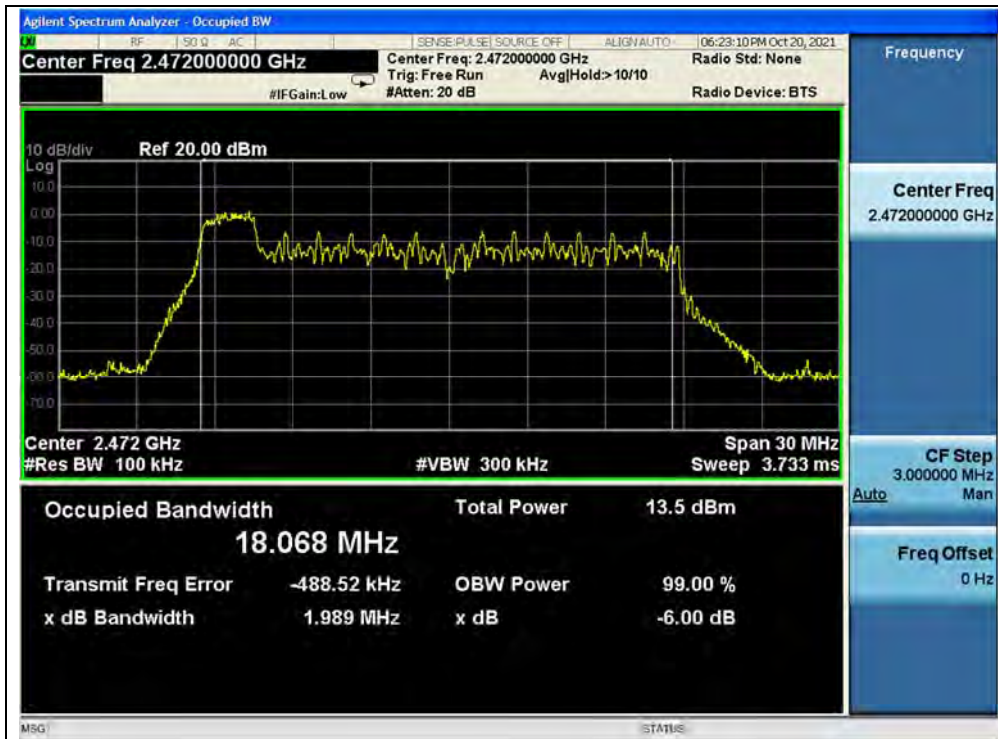
B.Test Plot:



(Channel 1, 802.11ax (HEW20) RU26)



(Channel 7, 802.11ax (HEW20) RU26)



(Channel 13, 802.11ax (HEW20) RU26)

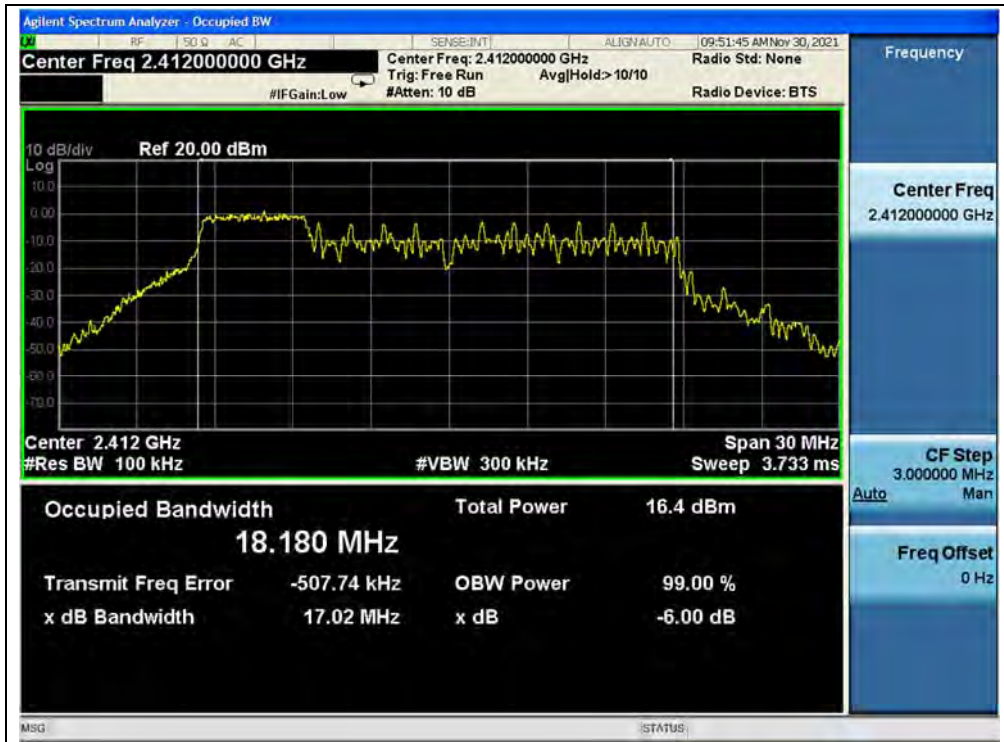


802.11ax (HEW20)(RU52) Mode

A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	17.02	≥500	PASS
7	2442	17.06	≥500	PASS
13	2472	16.95	≥500	PASS

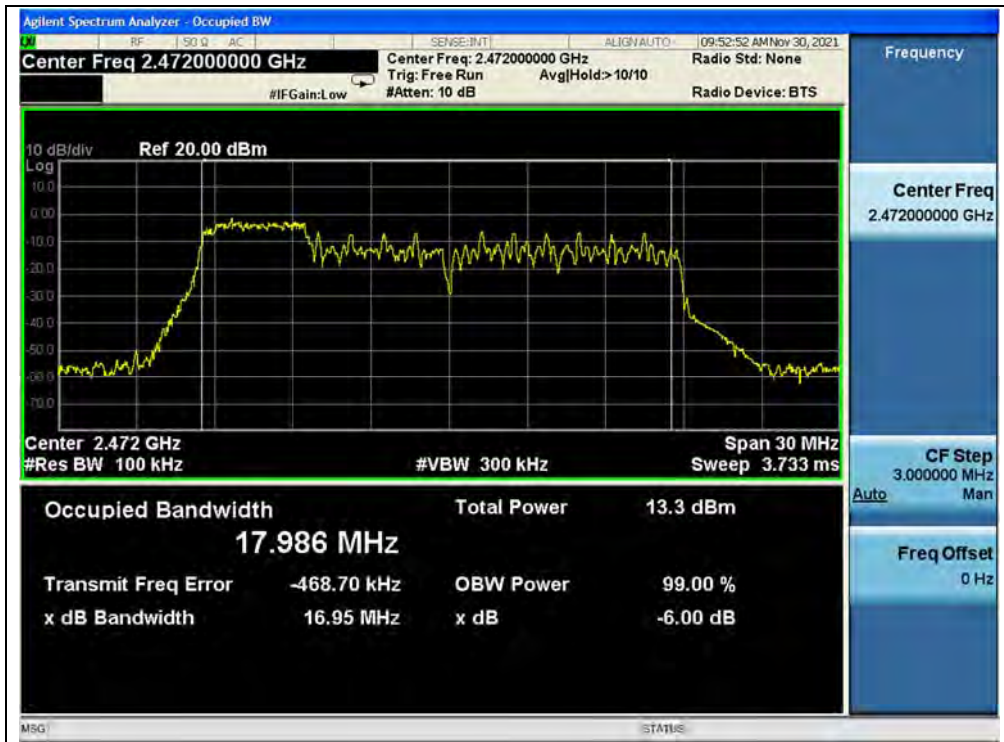
B.Test Plot:



(Channel 1, 802.11ax (HEW20) RU52)



(Channel 7, 802.11ax (HEW20) RU52)



(Channel 13, 802.11ax (HEW20) RU52)

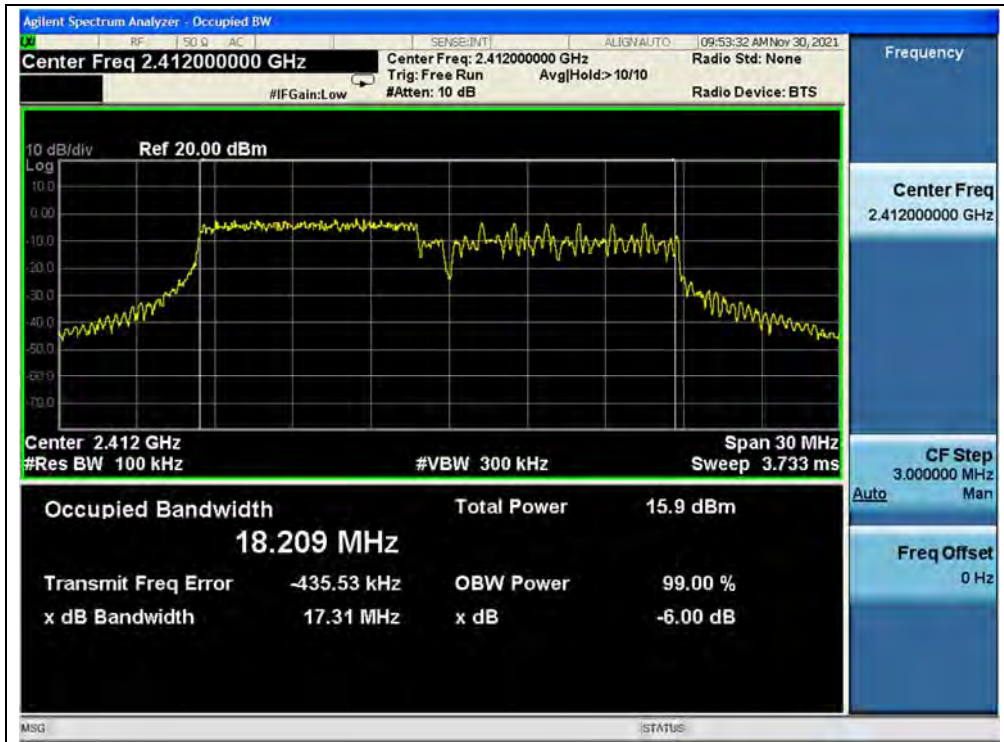


802.11ax (HEW20) RU106 Mode

A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	17.31	≥500	PASS
7	2442	17.10	≥500	PASS
13	2472	17.16	≥500	PASS

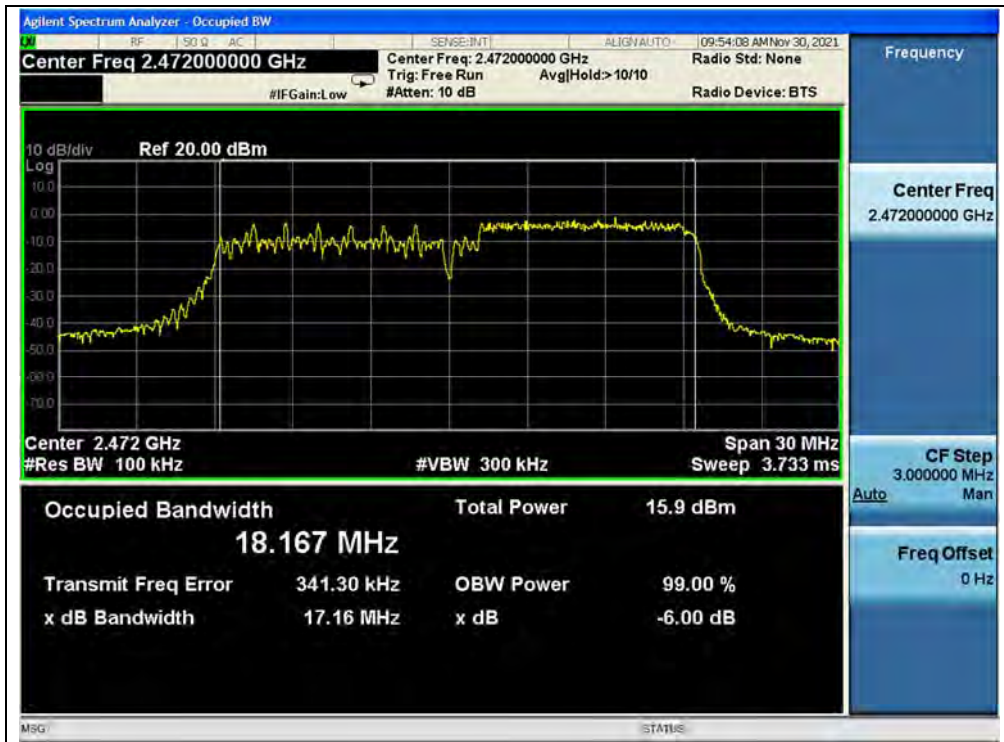
B.Test Plot:



(Channel 1, 802.11ax (HEW20) RU106)



(Channel 7, 802.11ax (HEW20) RU106)



(Channel 13, 802.11ax (HEW20) RU106)

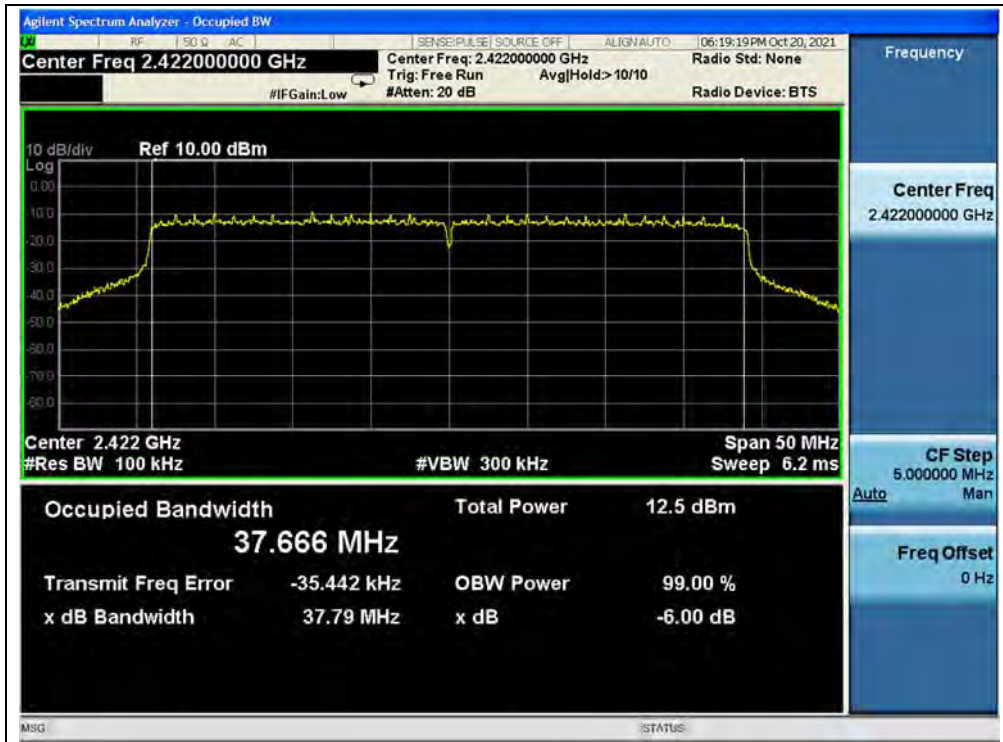


802.11ax (HEW40) Mode

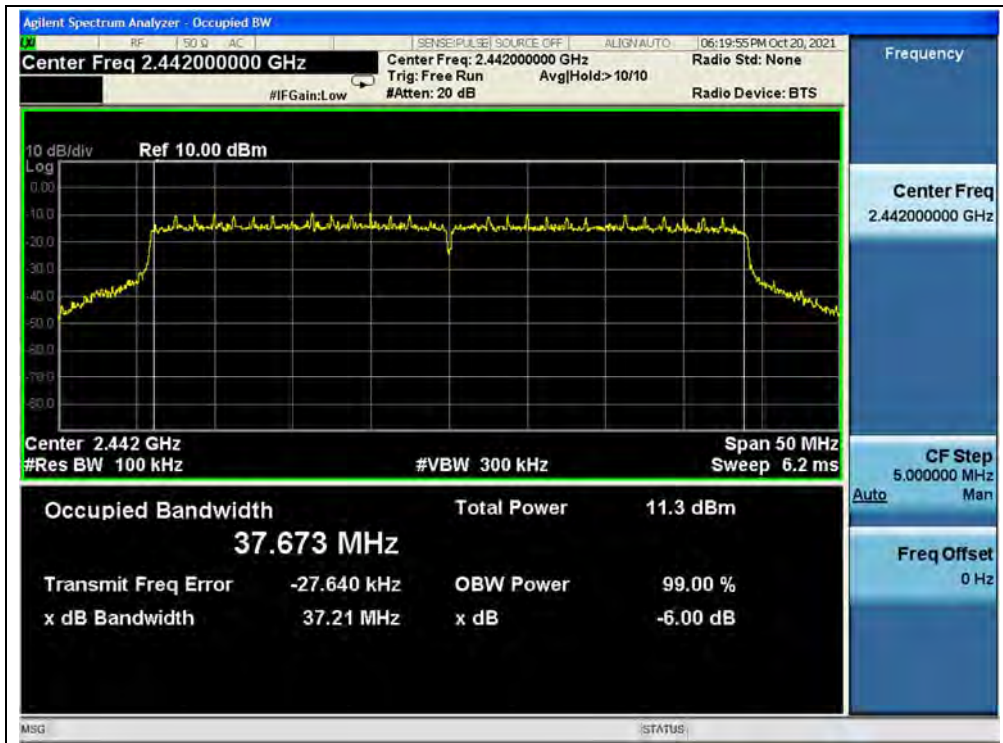
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
3	2422	37.79	≥500	PASS
7	2442	37.21	≥500	PASS
11	2462	37.35	≥500	PASS

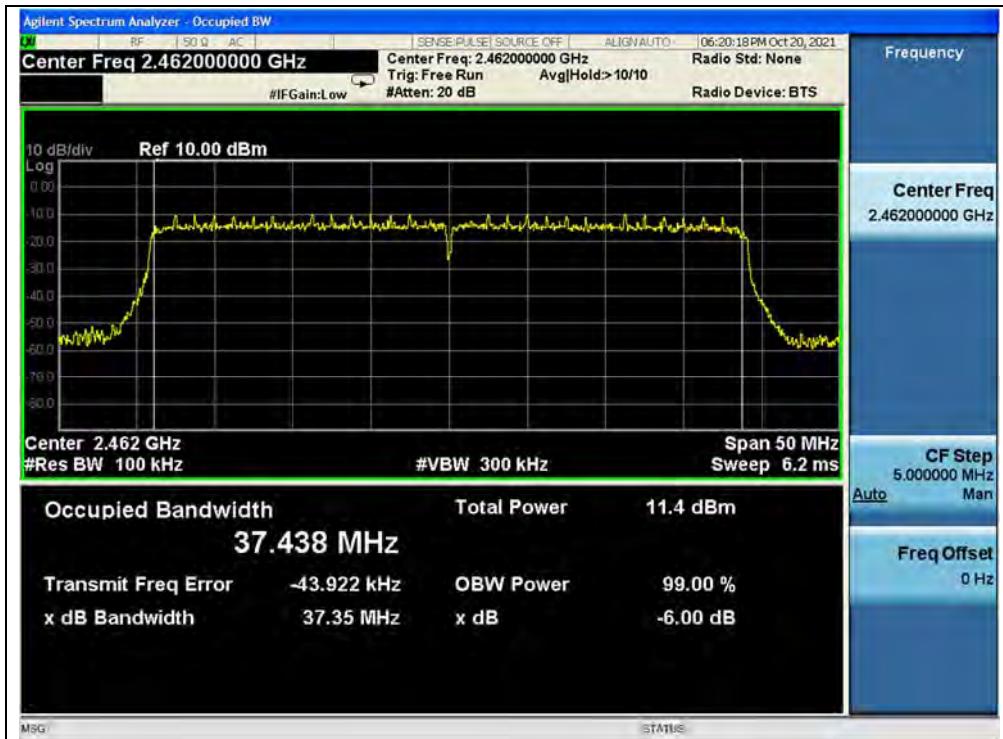
B. Test Plot:



(Channel 3, 802.11ax (HEW40))



(Channel 7, 802.11ax (HEW40))



(Channel 11, 802.11ax (HEW40))

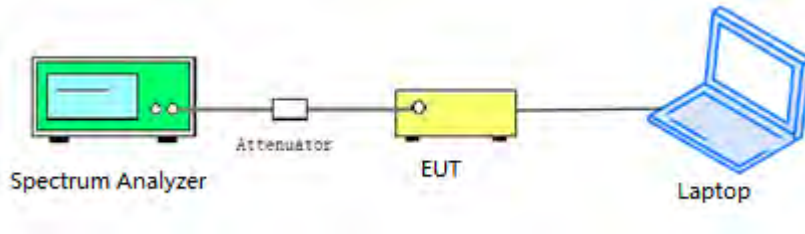
2.5. Conducted Spurious Emissions and Band Edge

2.5.1. Requirement

According to FCC section 15.247(c), 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, based on either an RF conducted or a radiated measurement.

2.5.2. 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.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

2.5.3. Test Procedure

KDB 558074 Section 8.5 and 8.7 was used in order to prove compliance.



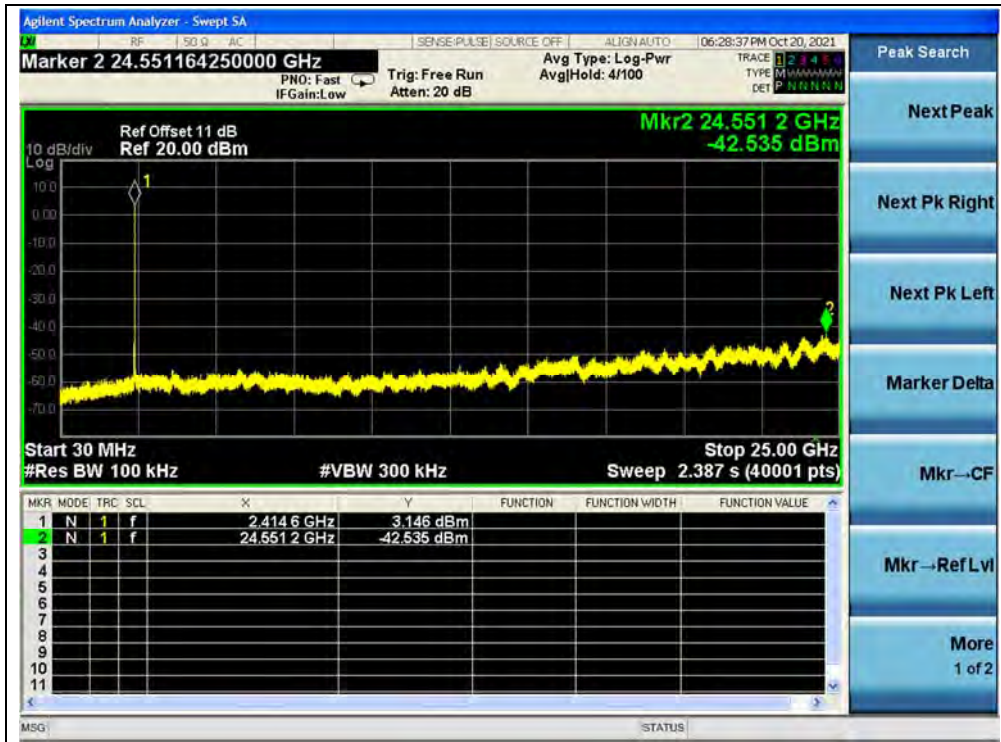
2.5.4. Test Result

802.11b Mode

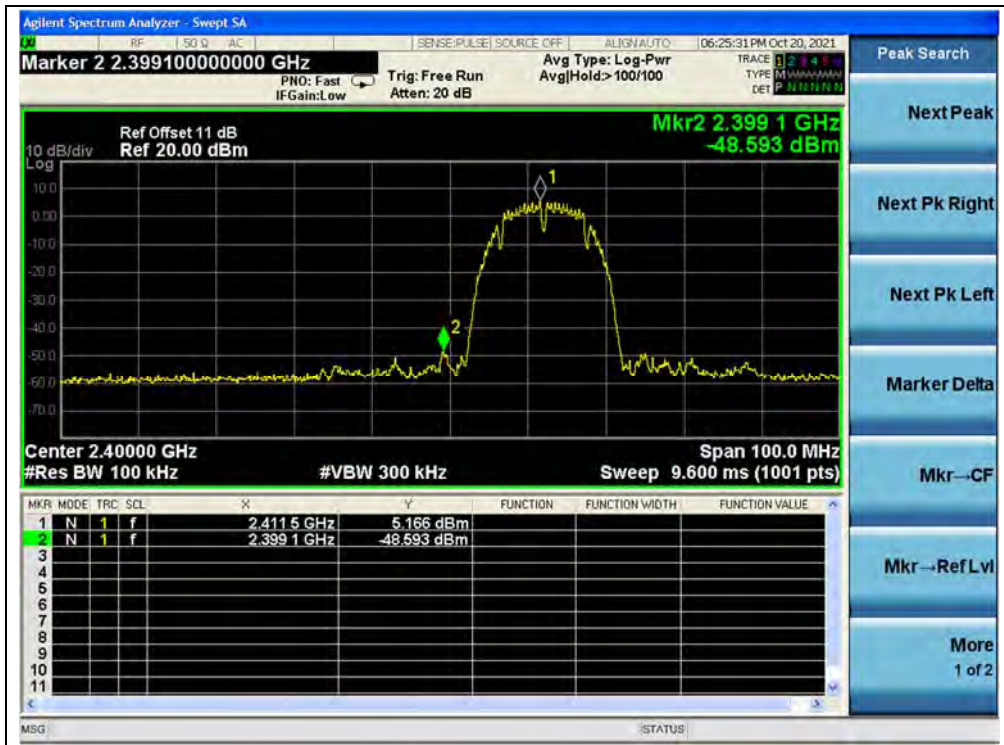
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-42.54	3.15	-16.85	PASS
7	2442	-42.69	4.80	-15.20	PASS
13	2472	-42.70	3.86	-16.14	PASS

B. Test Plot:



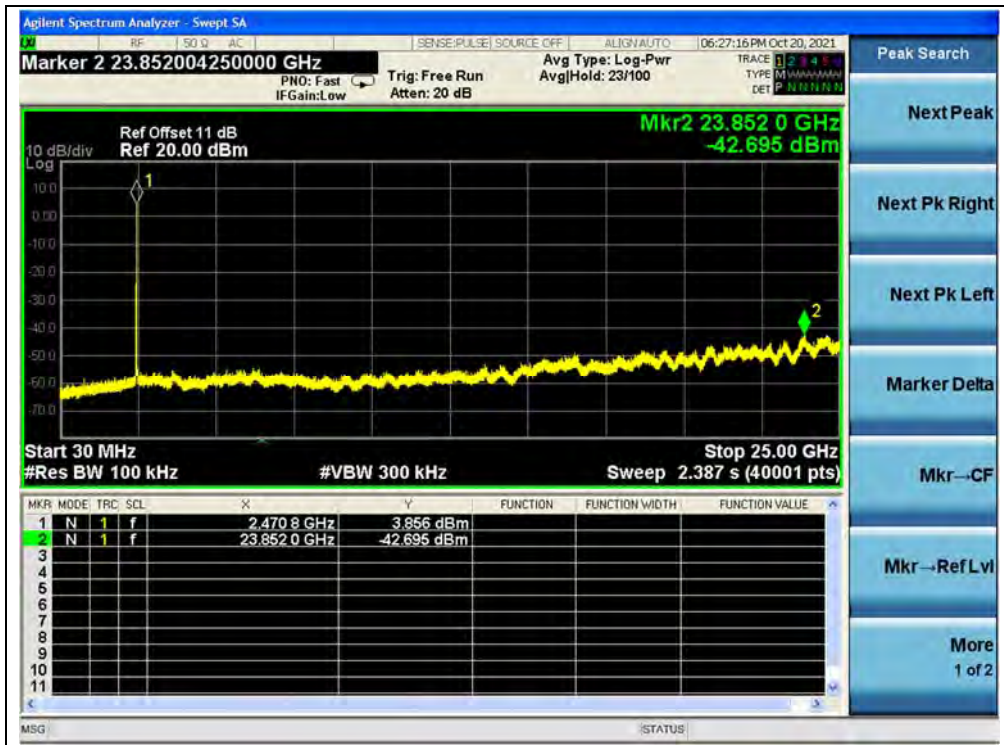
(30MHz to 25GHz, Channel 1, 802.11b)



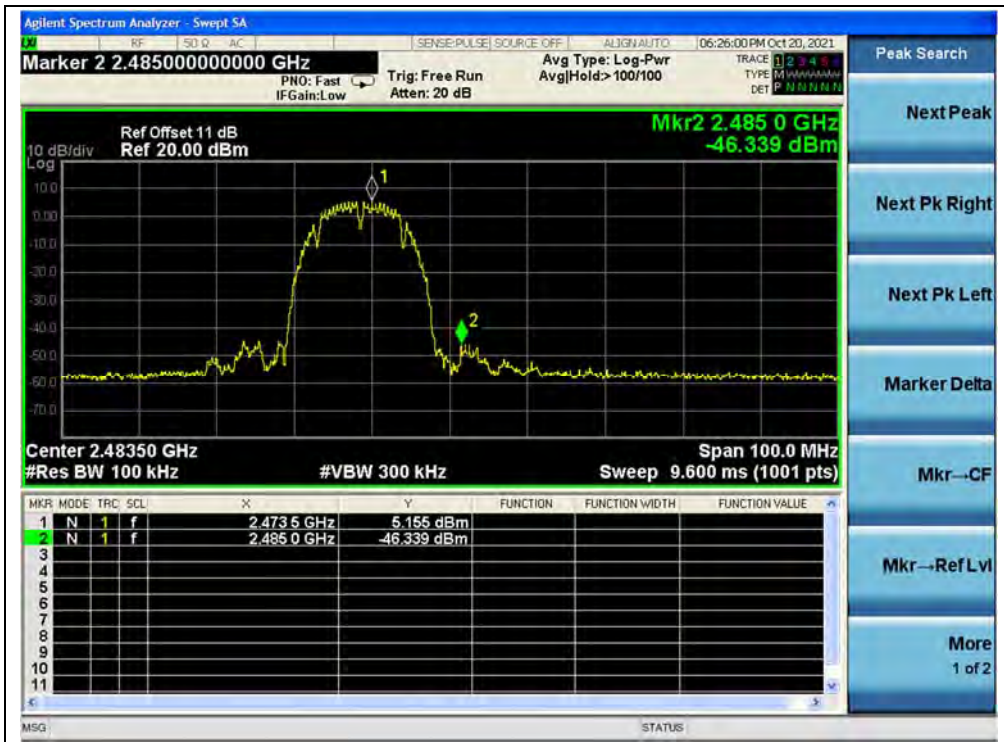
(Band Edge, Channel 1, 802.11b)



(30MHz to 25GHz, Channel 7, 802.11b)



(30MHz to 25GHz, Channel 13, 802.11b)



(Band Edge, Channel 13, 802.11b)



802.11g Mode

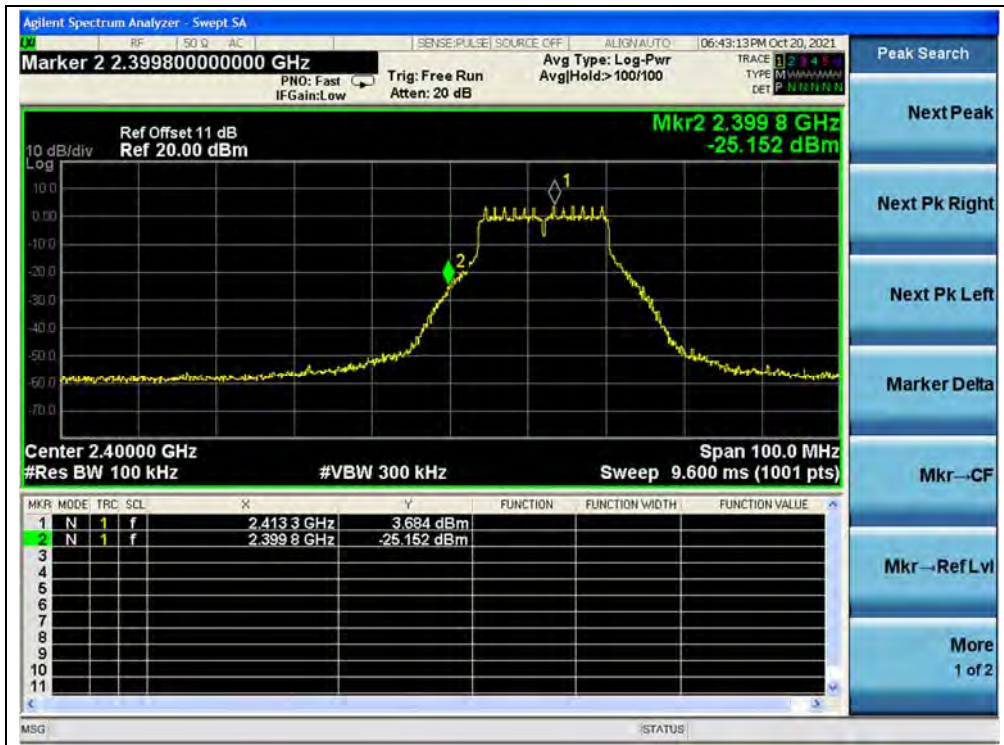
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.81	3.64	-16.36	PASS
7	2442	-42.56	2.81	-17.19	PASS
13	2472	-43.12	1.64	-18.36	PASS

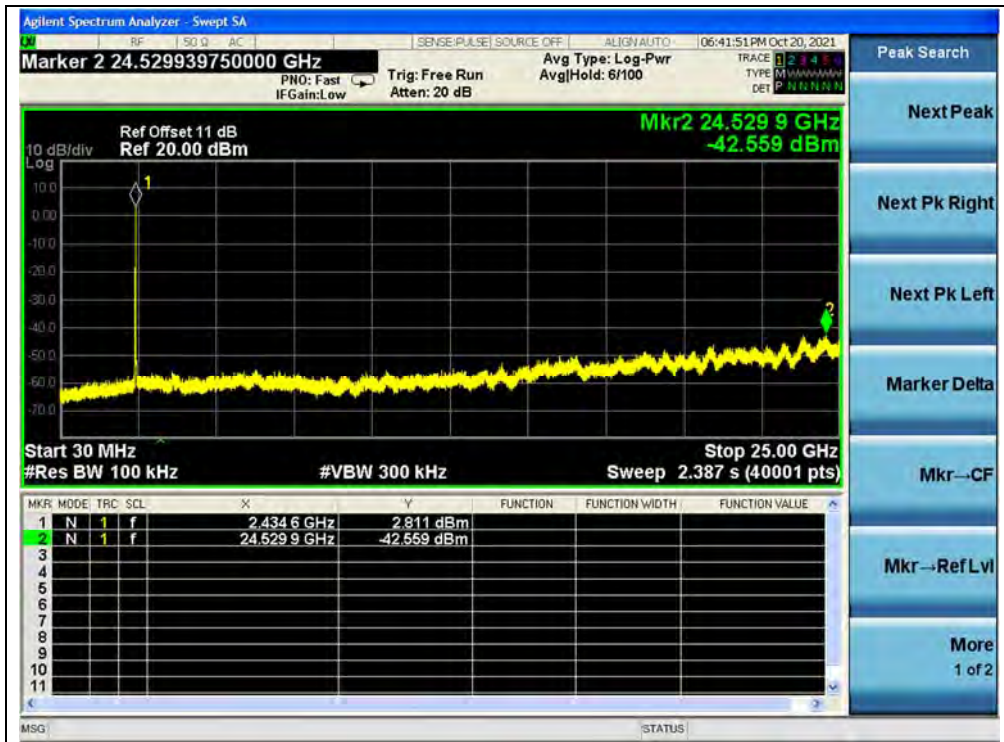
B. Test Plot:



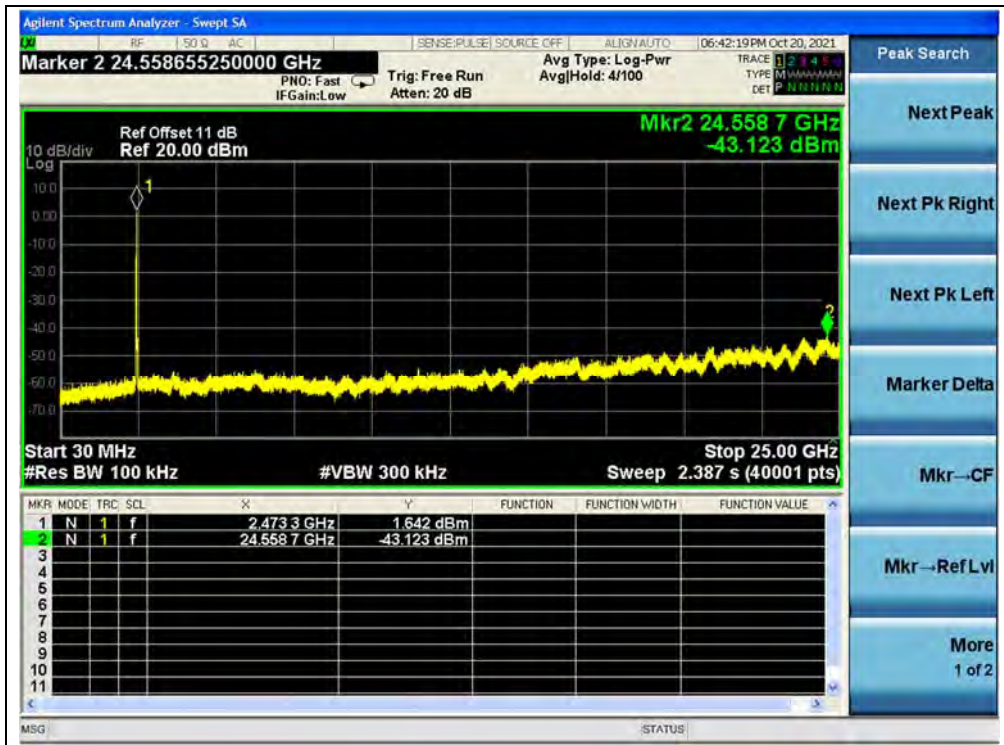
(30MHz to 25GHz, Channel 1, 802.11g)



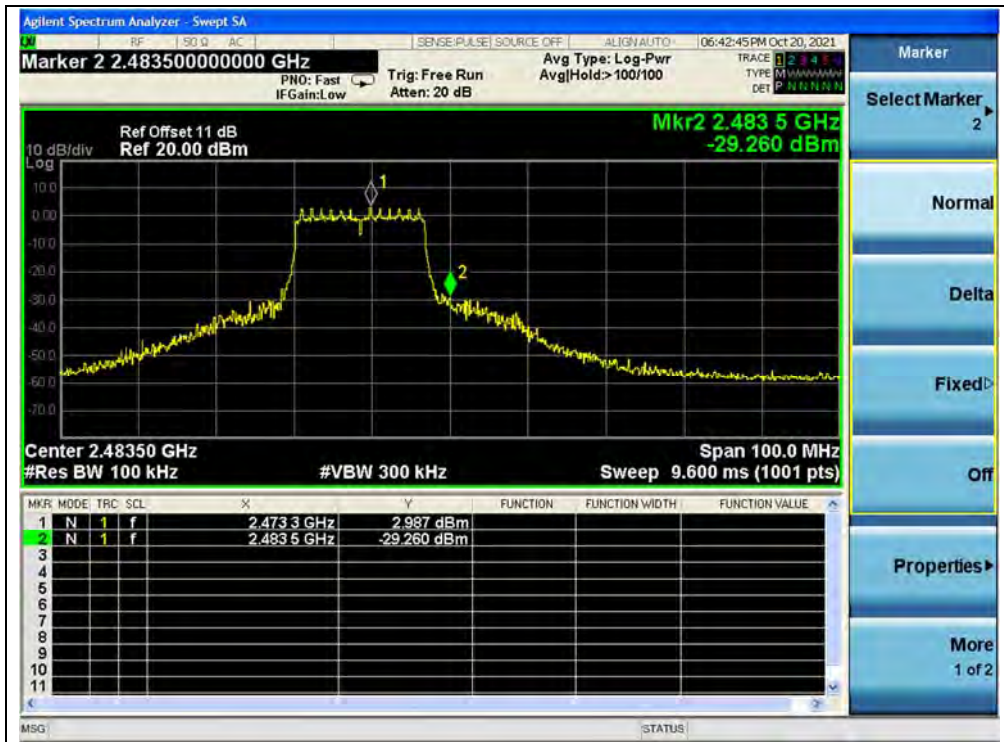
(Band Edge, Channel 1, 802.11g)



(30MHz to 25GHz, Channel 7, 802.11g)



(30MHz to 25GHz, Channel 13, 802.11g)



(Band Edge, Channel 13, 802.11g)

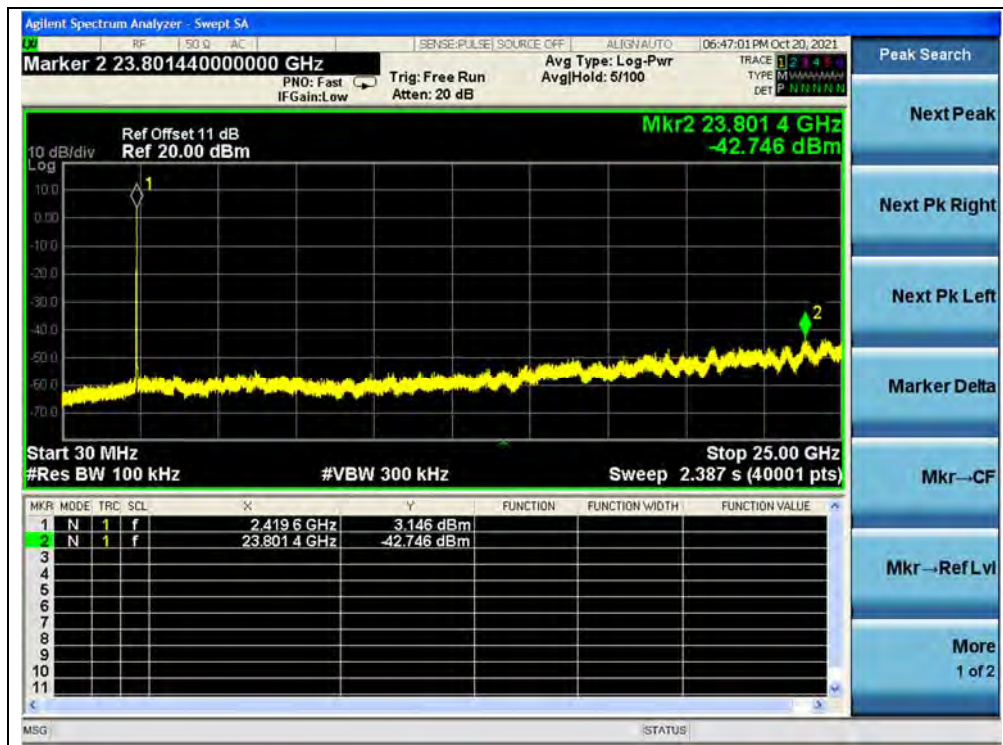


802.11n (HT20) Mode

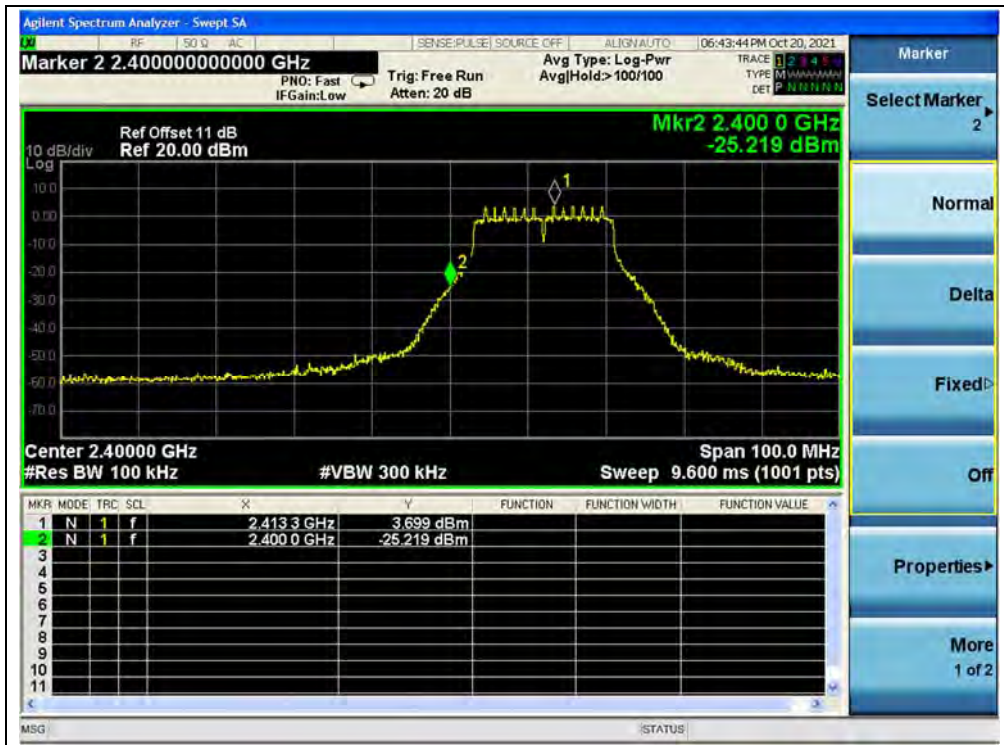
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-42.75	3.15	-16.85	PASS
7	2442	-43.03	2.76	-17.24	PASS
13	2472	-43.17	2.34	-17.66	PASS

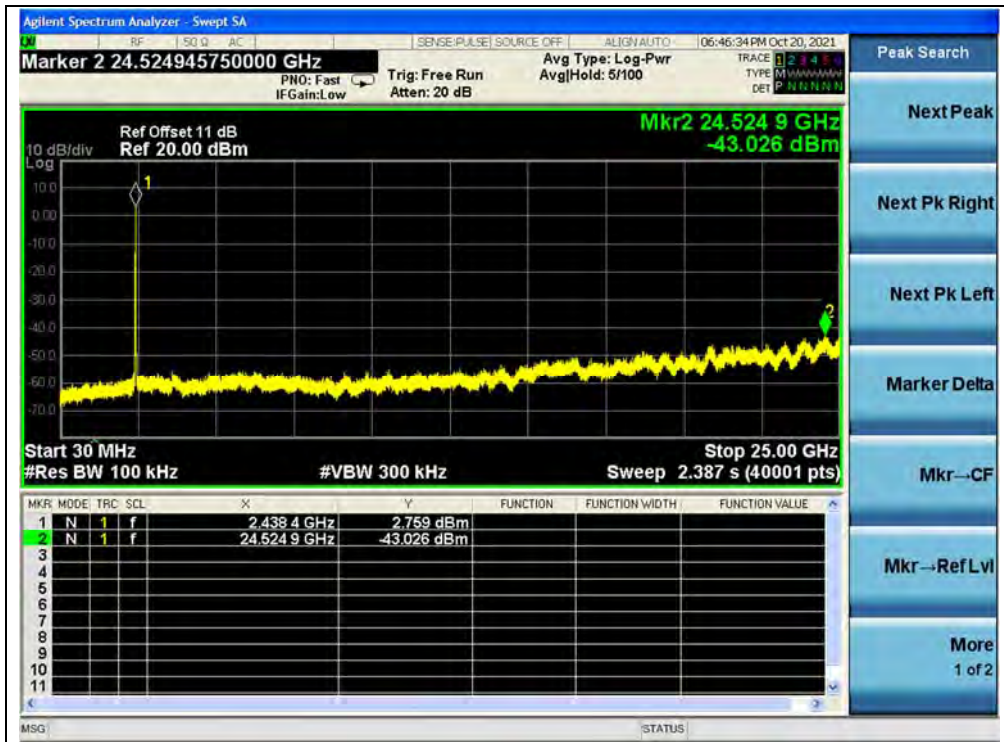
B. Test Plot:



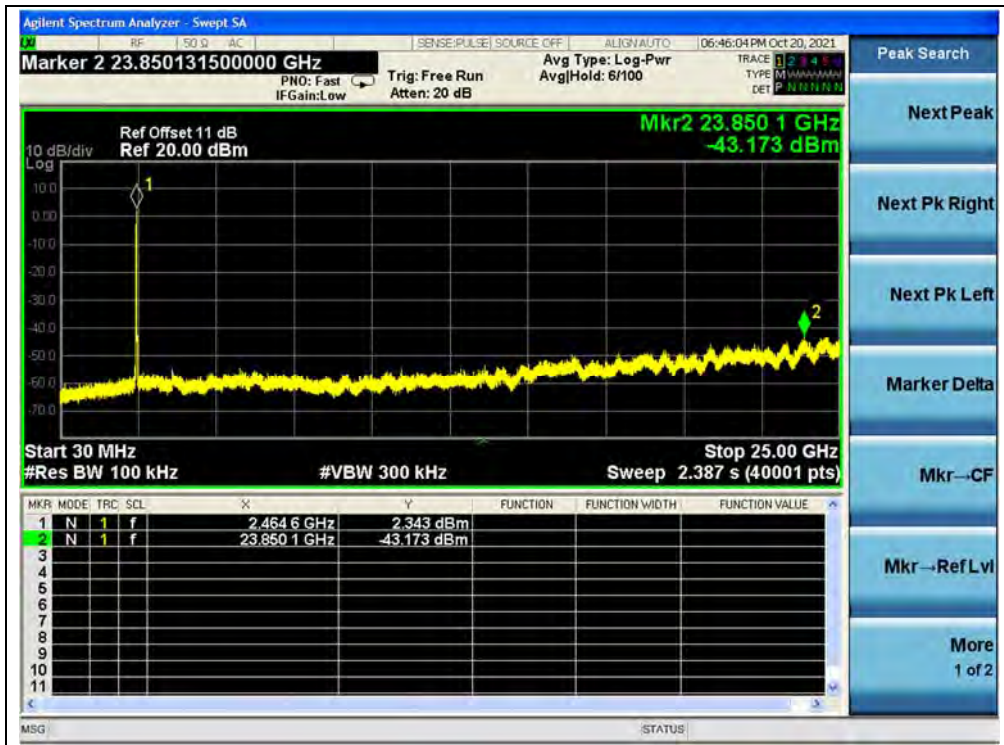
(30MHz to 25GHz, Channel 1, 802.11n (HT20))



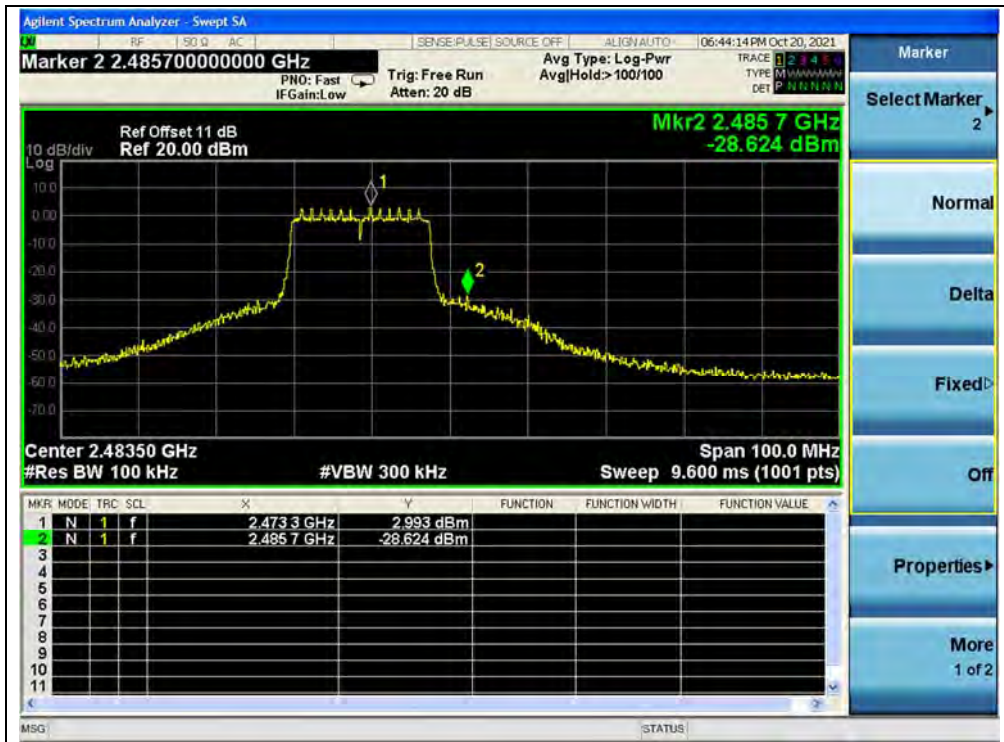
(Band Edge, Channel 1, 802.11n (HT20))



(30MHz to 25GHz, Channel 7, 802.11n (HT20))



(30MHz to 25GHz, Channel 13, 802.11n (HT20))



(Band Edge, Channel 13, 802.11n (HT20))

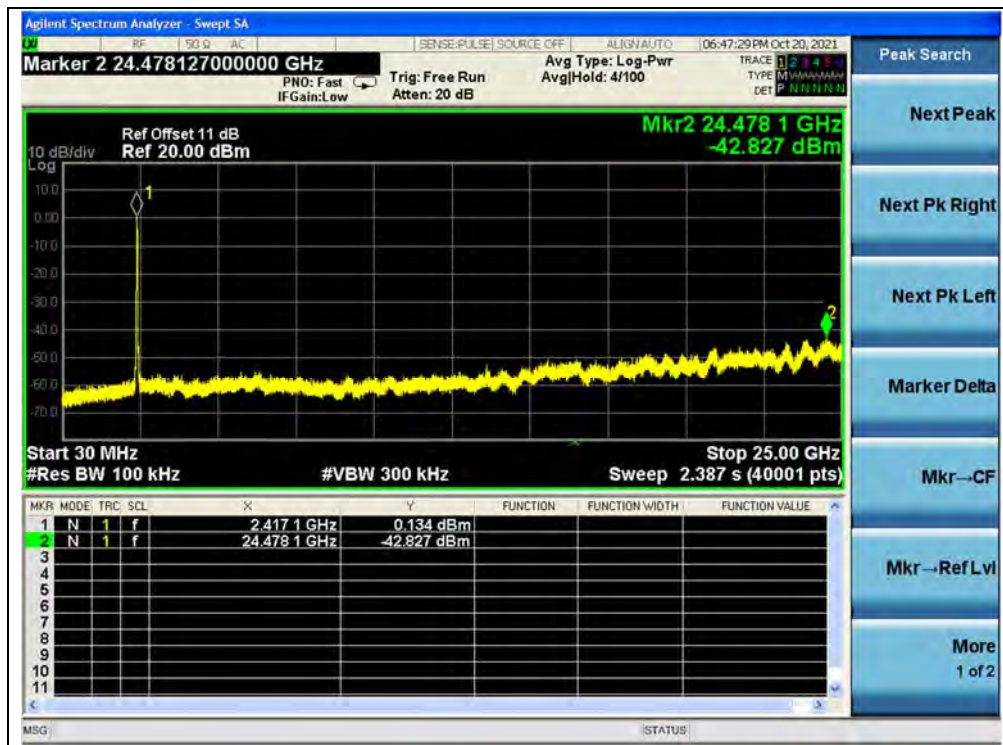


802.11n (HT40) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-42.83	0.13	-19.87	PASS
7	2442	-43.22	-0.05	-20.05	PASS
11	2462	-43.05	-0.98	-20.98	PASS

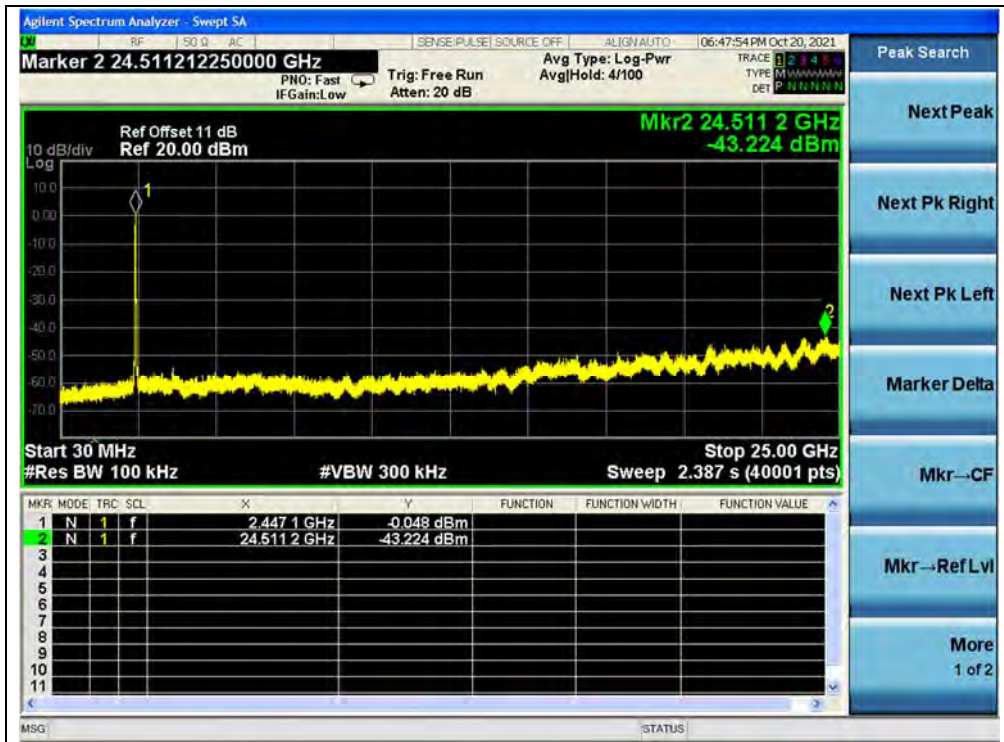
B. Test Plot:



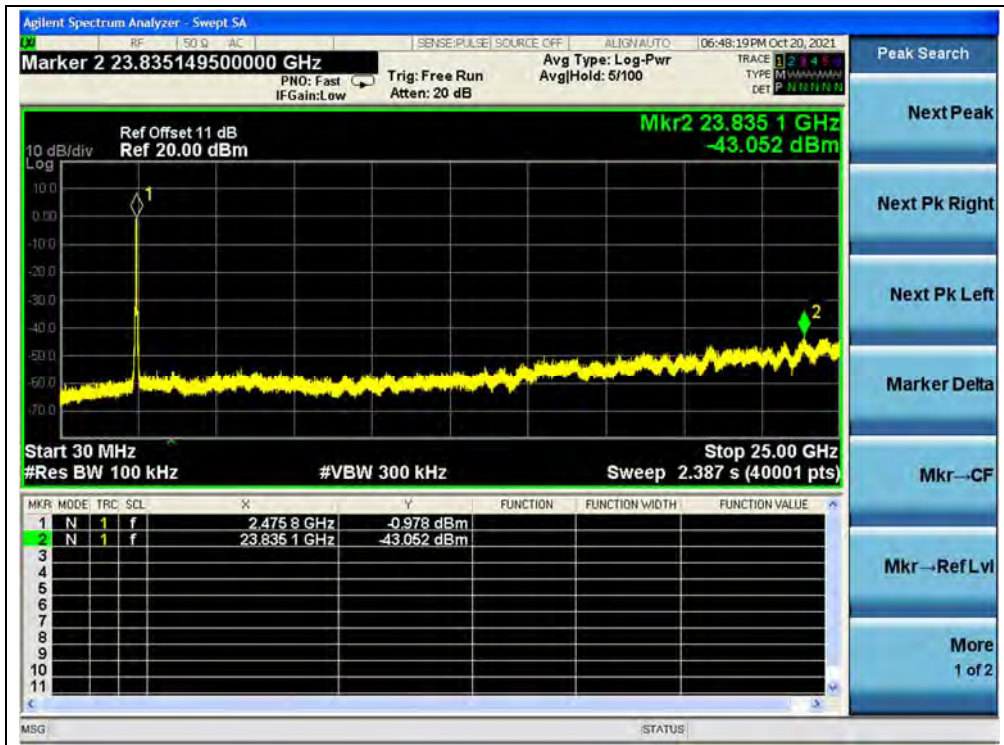
(30MHz to 25GHz, Channel 3, 802.11n (HT40))



(Band Edge, Channel 3, 802.11n (HT40))



(30MHz to 25GHz, Channel 7, 802.11n (HT40))



(30MHz to 25GHz, Channel 11, 802.11n (HT40))



(Band Edge, Channel 11, 802.11n (HT40))

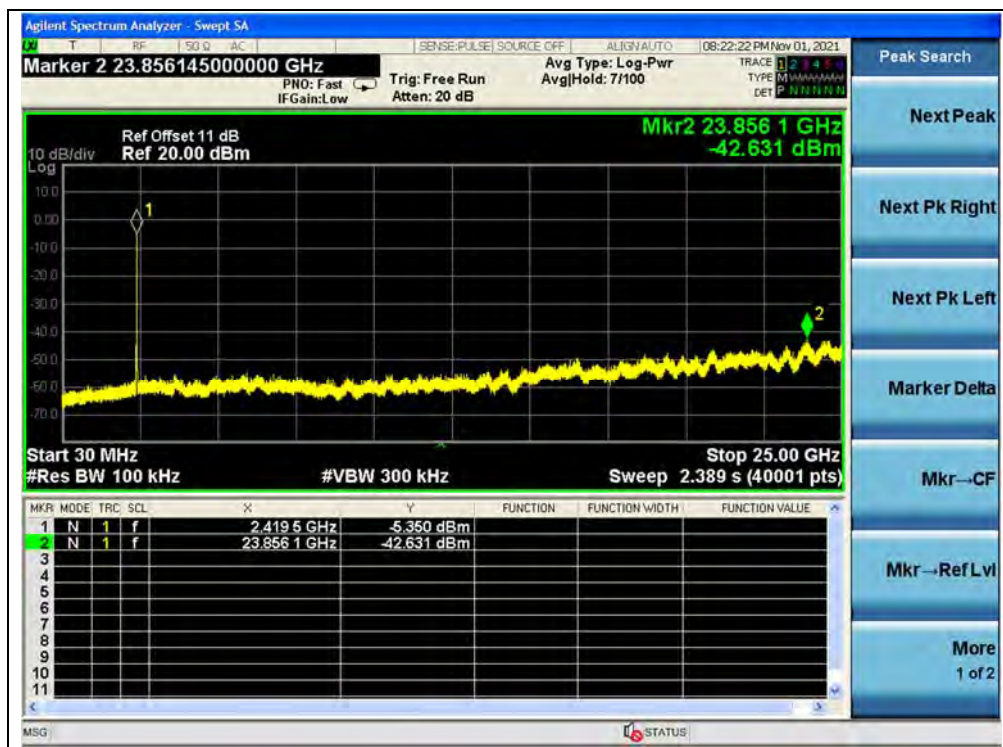


802.11ax (HEW20) Mode

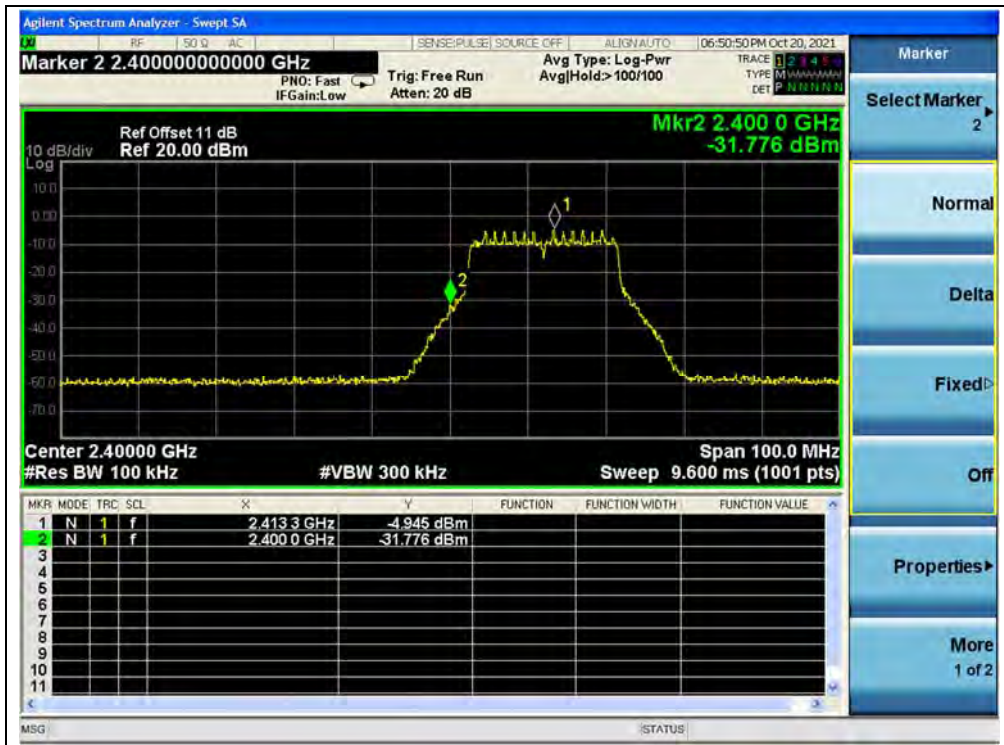
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-42.63	-5.35	-25.35	PASS
7	2442	-42.10	-5.17	-25.17	PASS
13	2472	-42.83	-7.41	-27.41	PASS

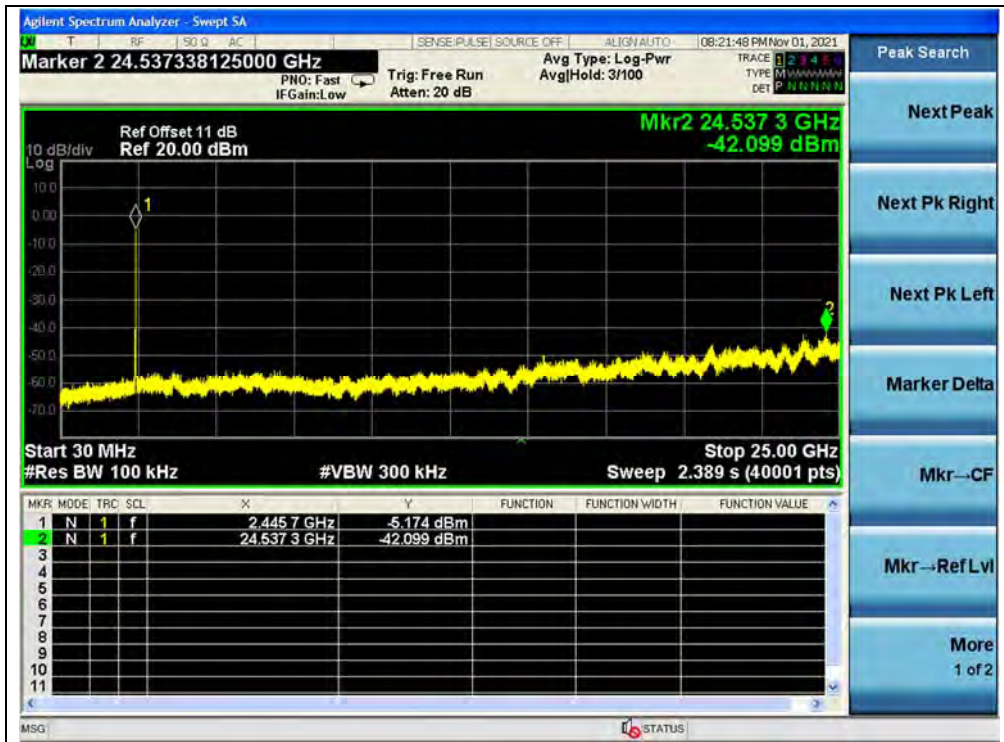
B. Test Plot:



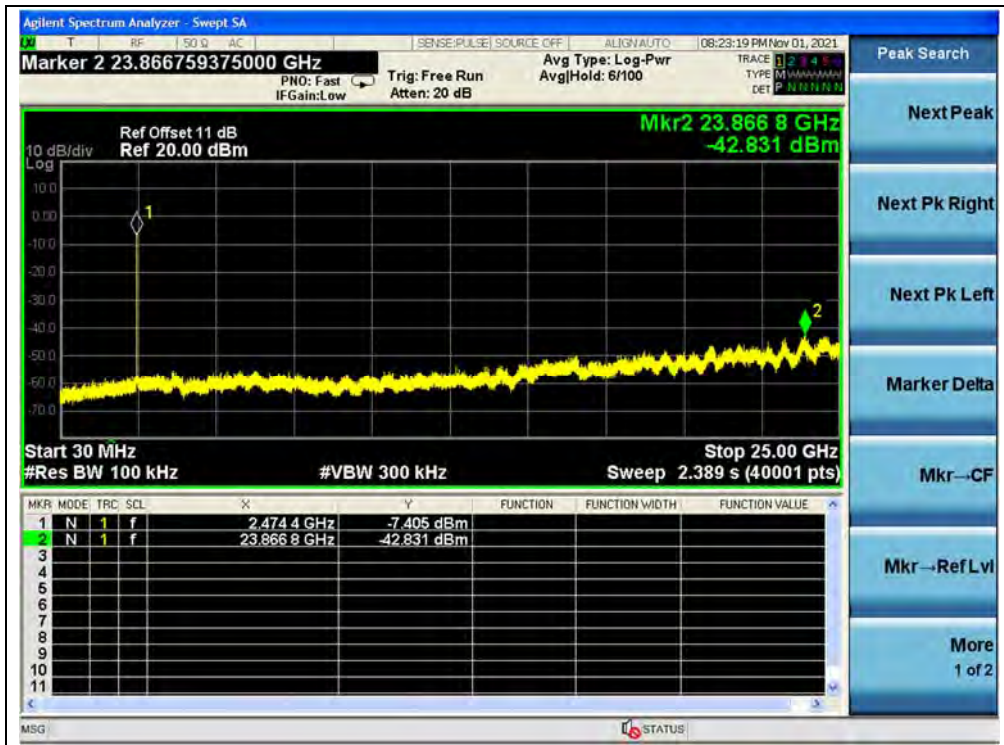
(30MHz to 25GHz, Channel 1, 802.11ax (HEW20))



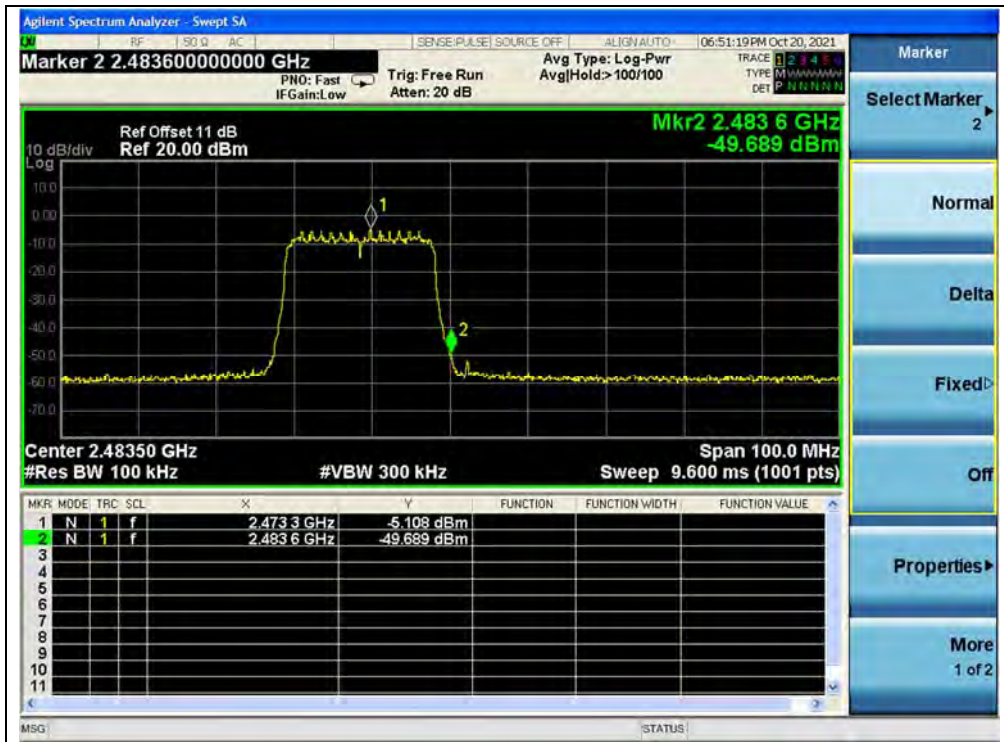
(Band Edge, Channel 1, 802.11ax (HEW20))



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



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



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

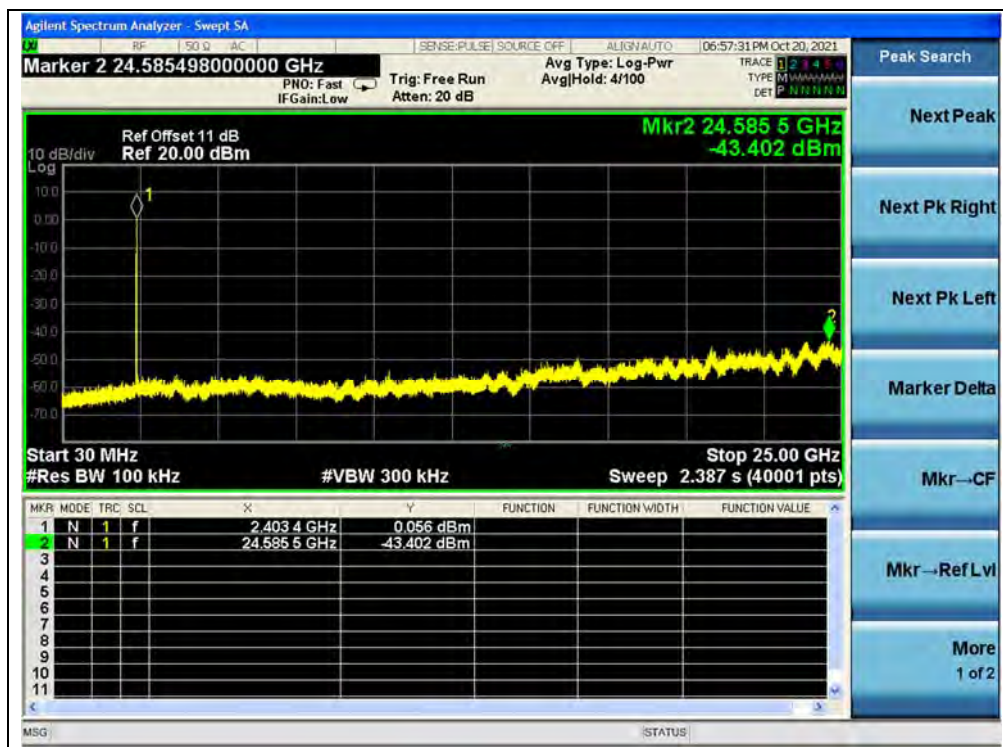


802.11ax (HEW20) RU26 Mode

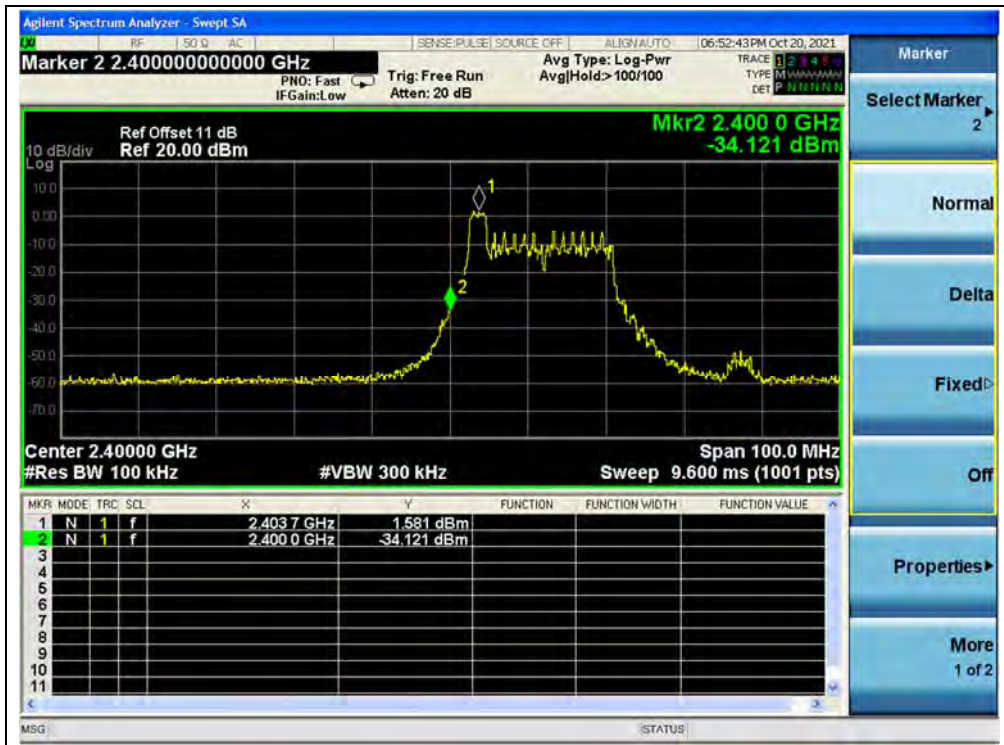
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-43.40	0.06	-19.94	PASS
7	2442	-42.98	-0.65	-20.65	PASS
13	2472	-42.46	0.99	-19.01	PASS

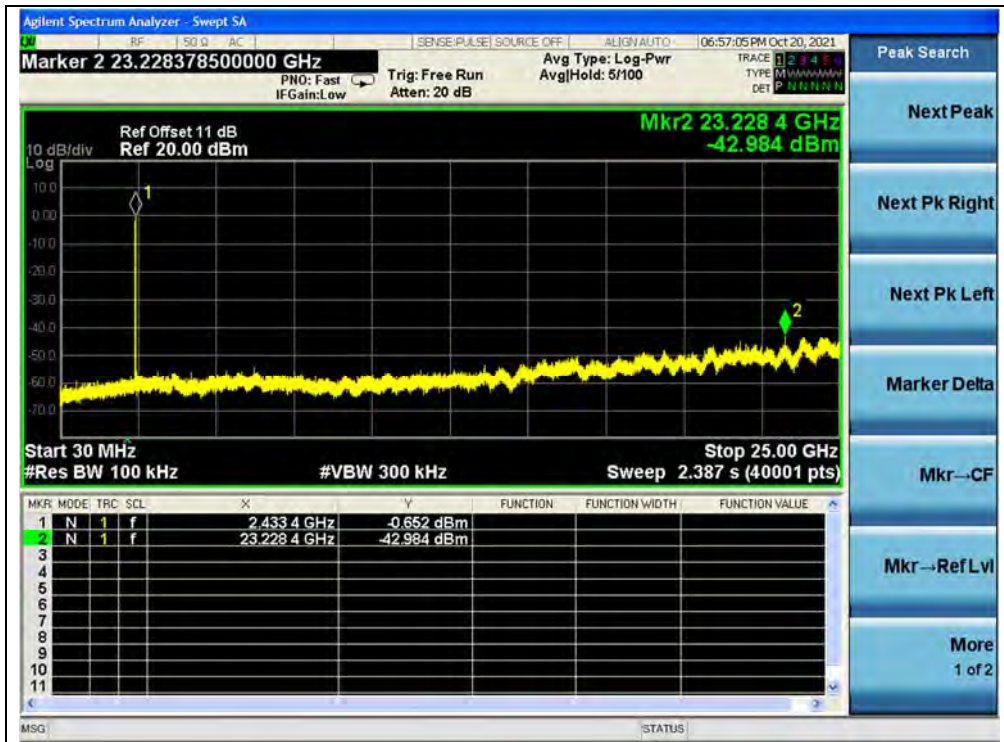
B. Test Plot:



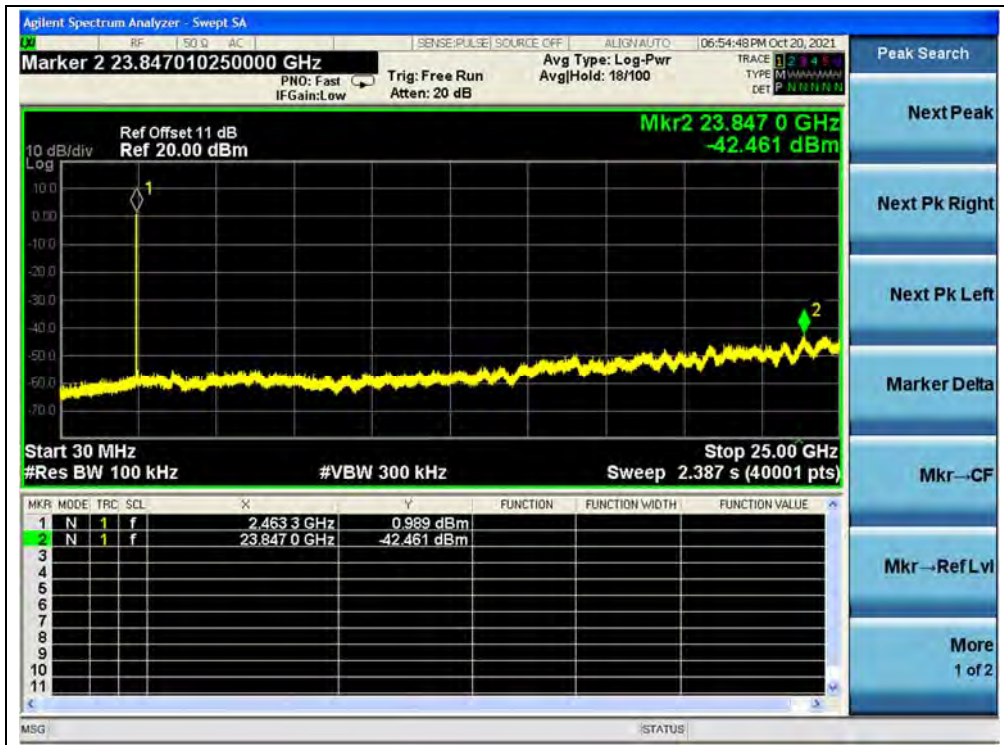
(30MHz to 25GHz, Channel 1, 802.11ax (HEW20) RU26)



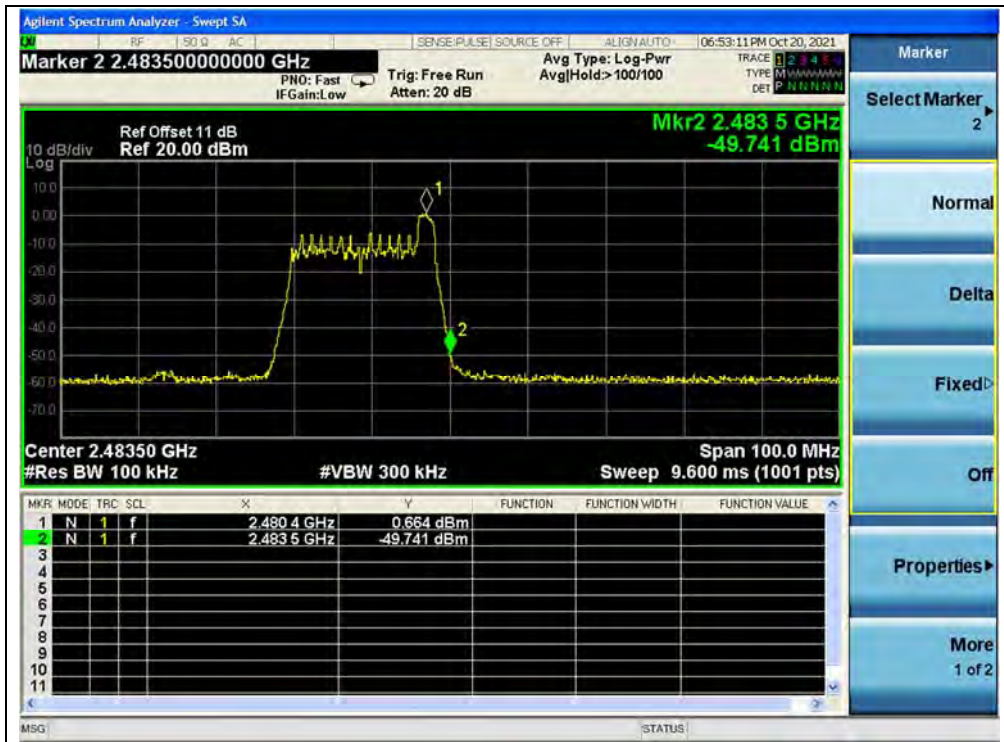
(Band Edge, Channel 1, 802.11ax (HEW20) RU26)



(30MHz to 25GHz, Channel 7, 802.11ax (HEW20) RU26)



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



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

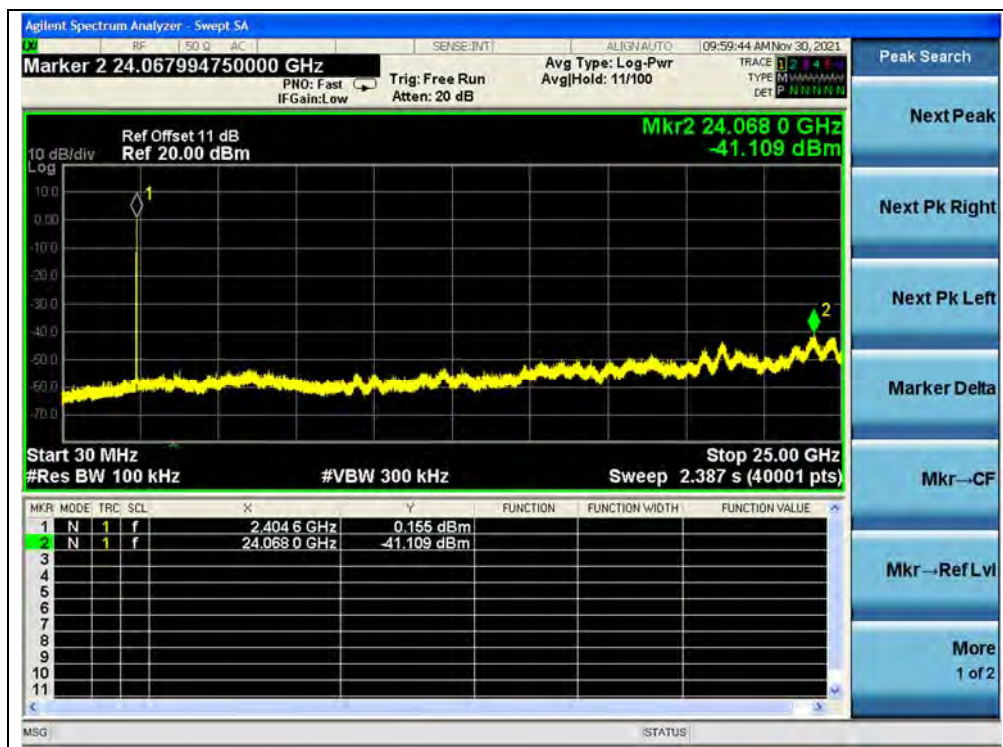


802.11ax (HEW20) RU52 Mode

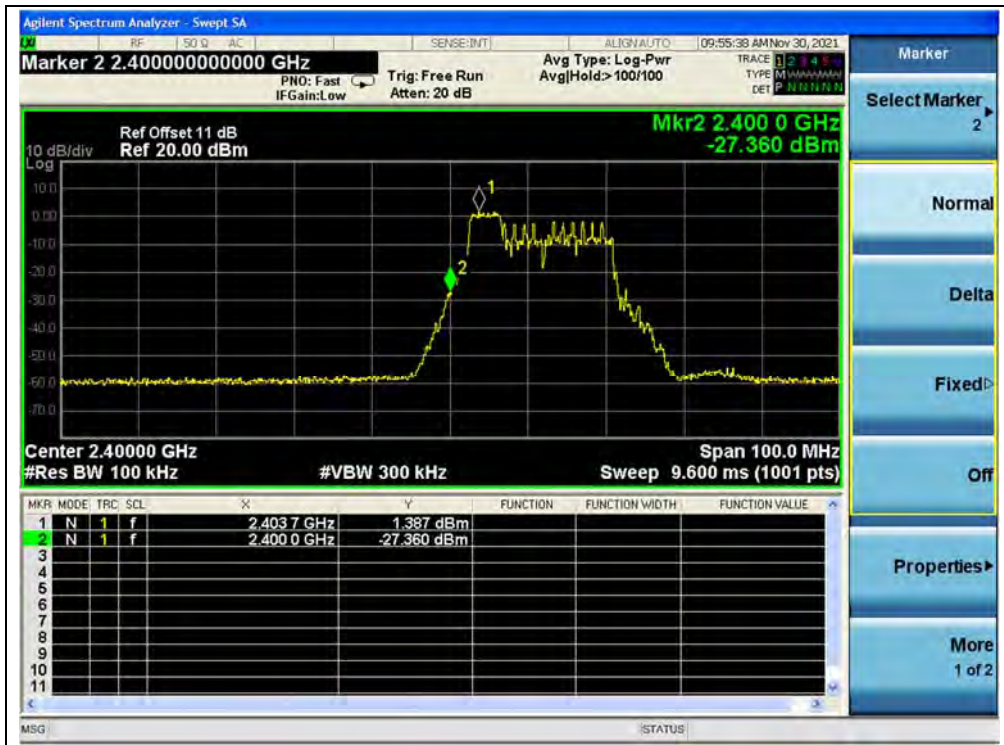
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.11	0.16	-19.84	PASS
7	2442	-41.47	1.55	-18.45	PASS
13	2472	-39.87	-2.02	-22.02	PASS

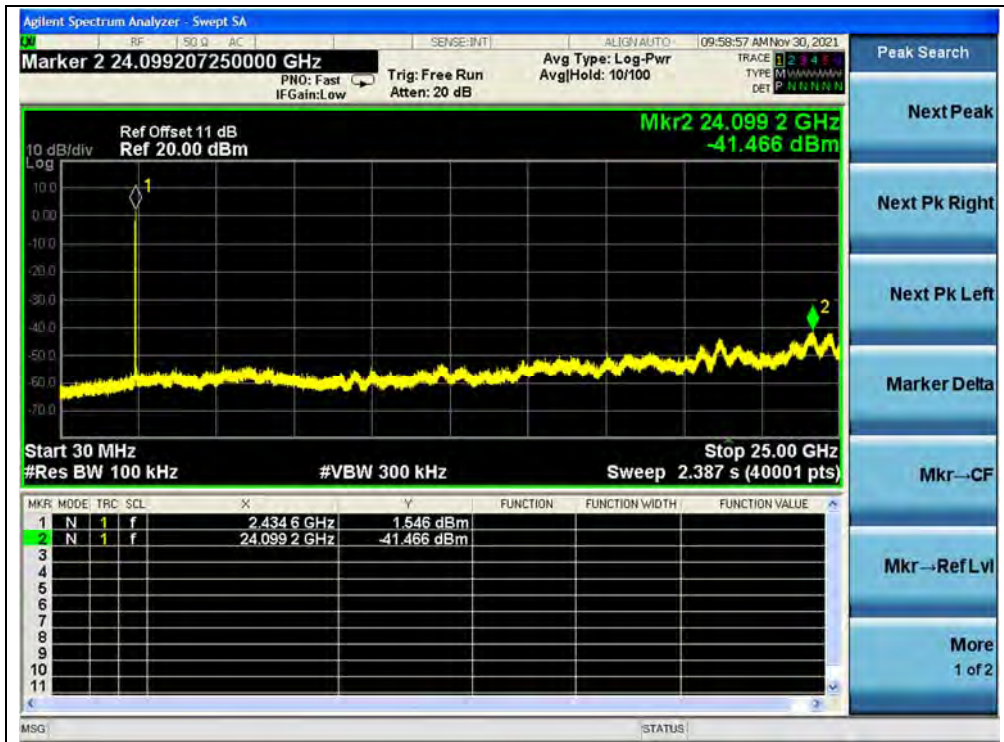
B. Test Plot:



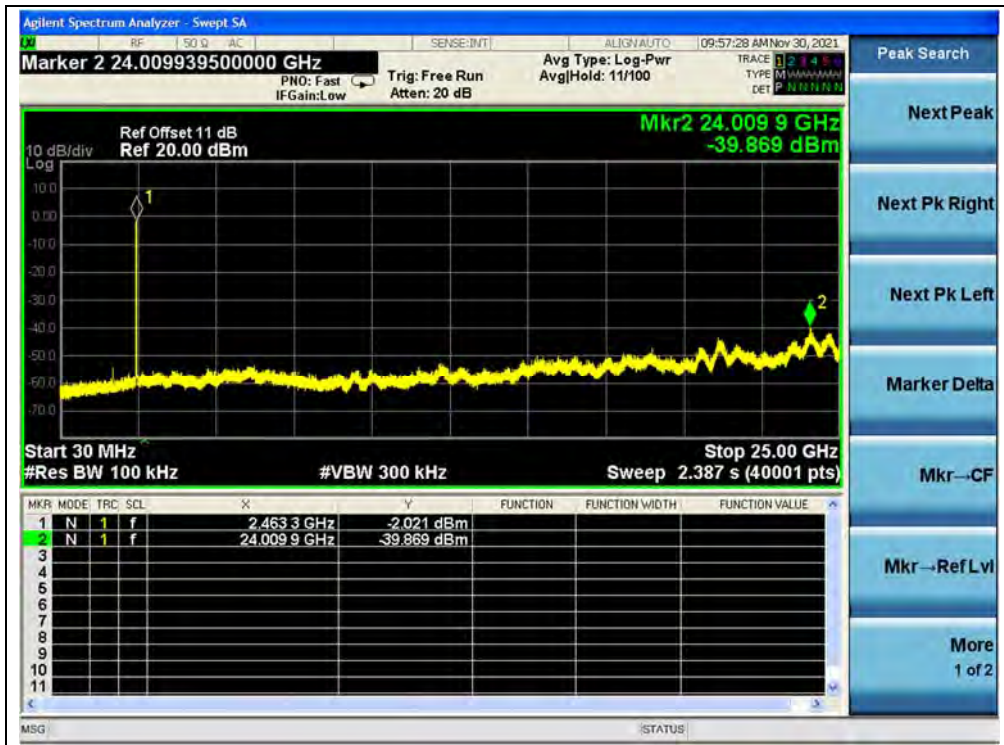
(30MHz to 25GHz, Channel 1, 802.11ax (HEW20) RU52)



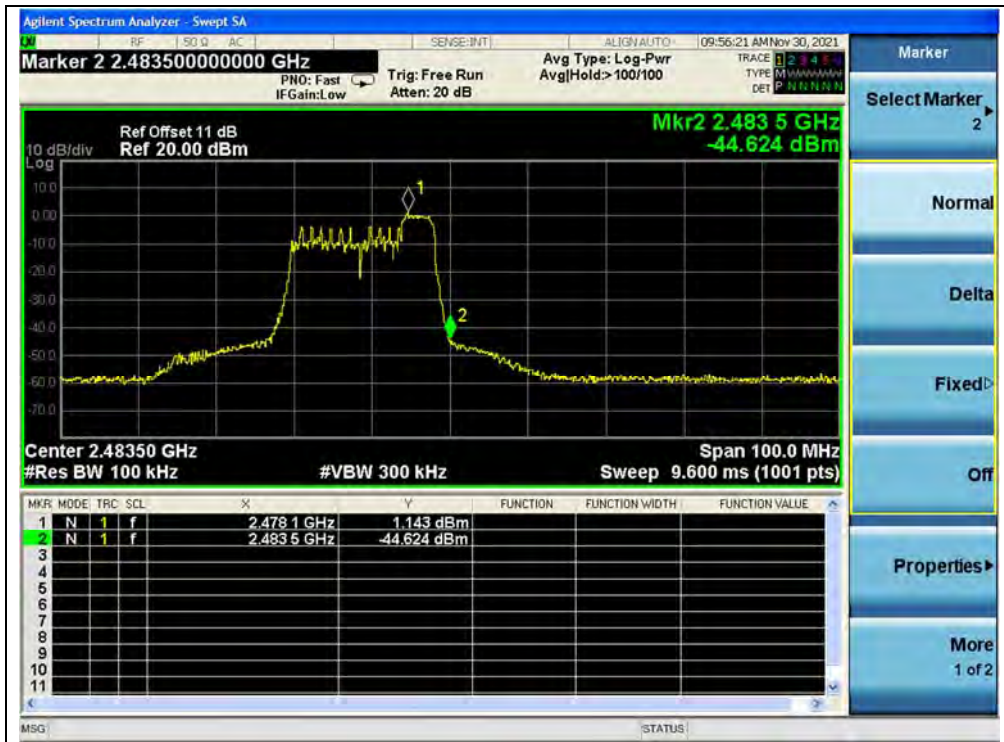
(Band Edge, Channel 1, 802.11ax (HEW20) RU52)



(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)

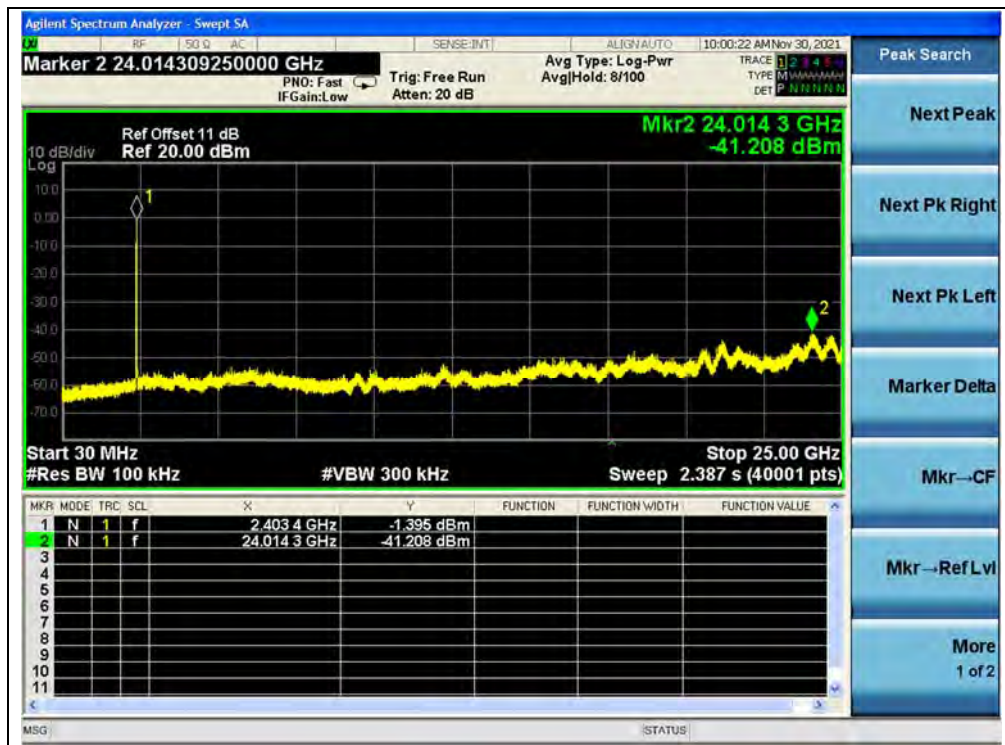


802.11ax (HEW20) RU106 Mode

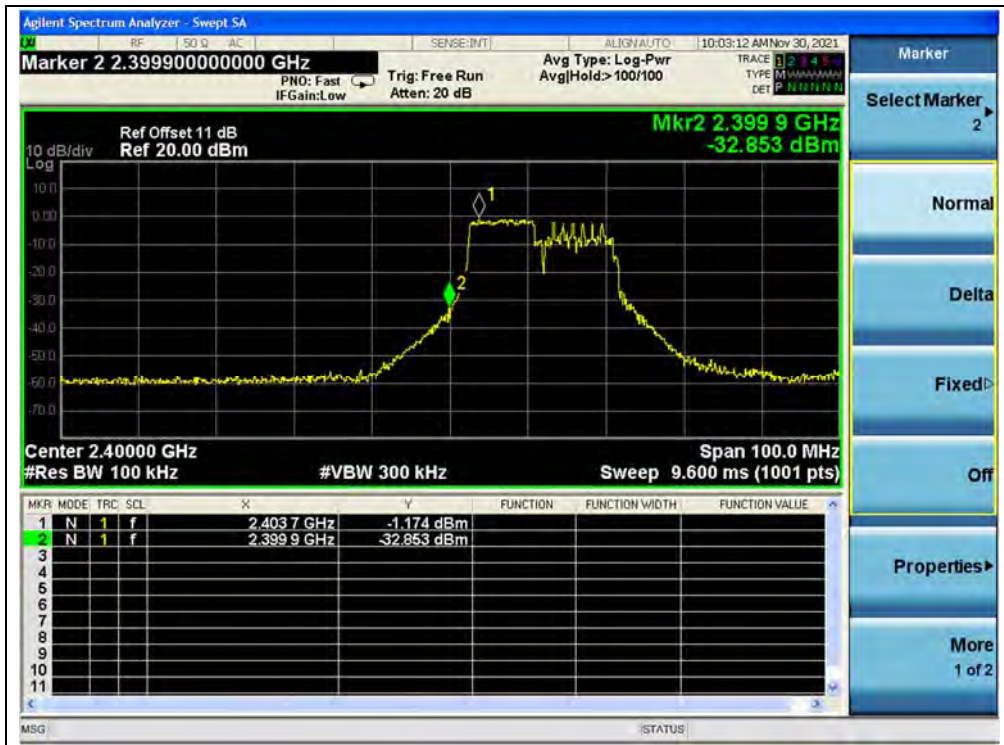
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.21	-1.40	-21.40	PASS
7	2442	-41.47	-2.46	-22.46	PASS
13	2472	-41.20	-4.24	-24.24	PASS

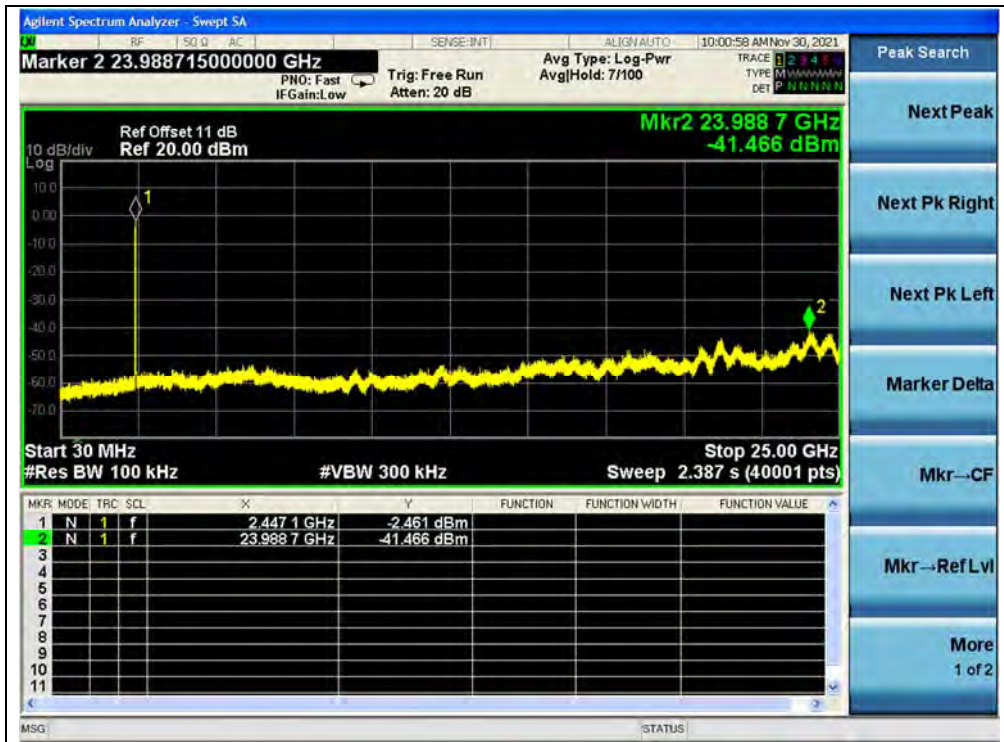
B. Test Plot:



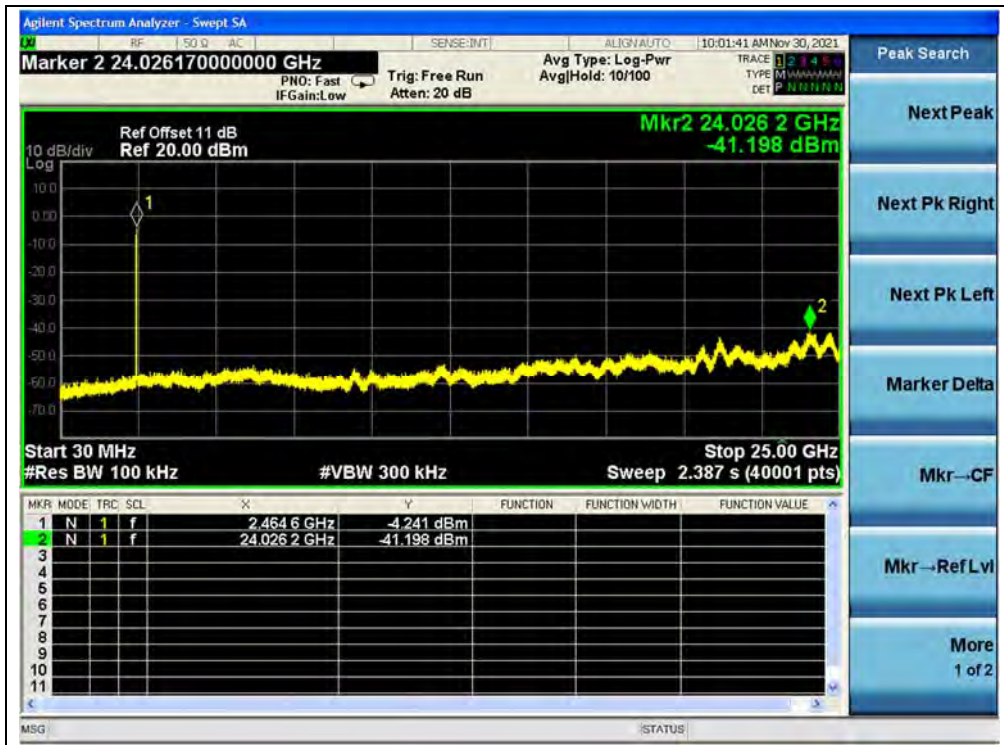
(30MHz to 25GHz, Channel 1, 802.11ax (HEW20) RU106)



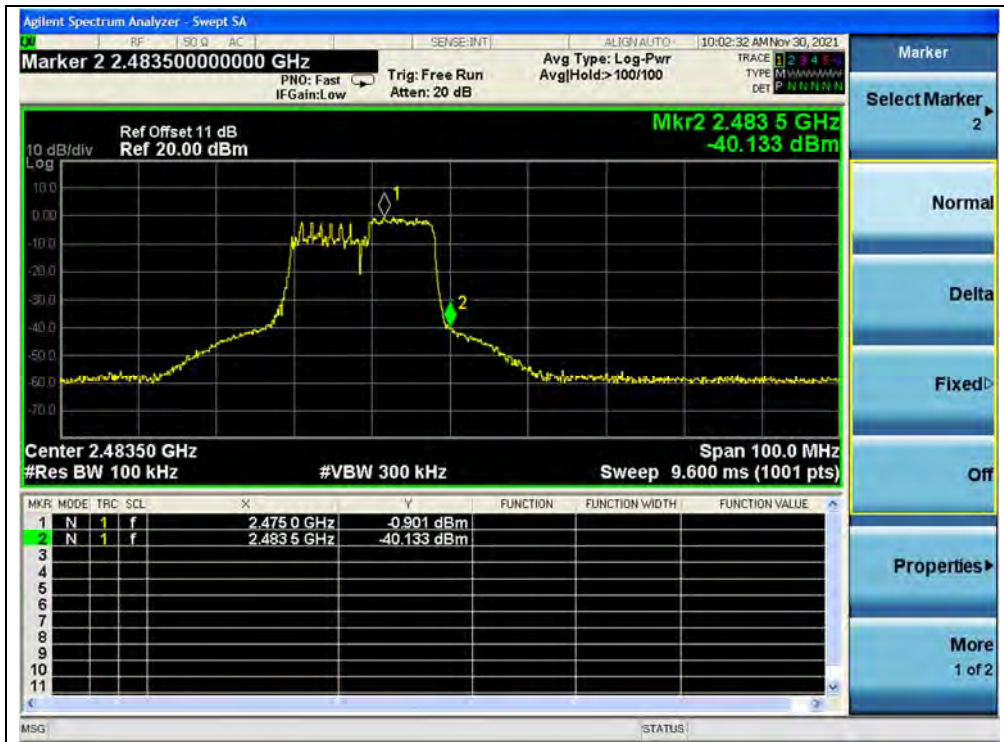
(Band Edge, Channel 1, 802.11ax (HEW20) RU106)



(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)

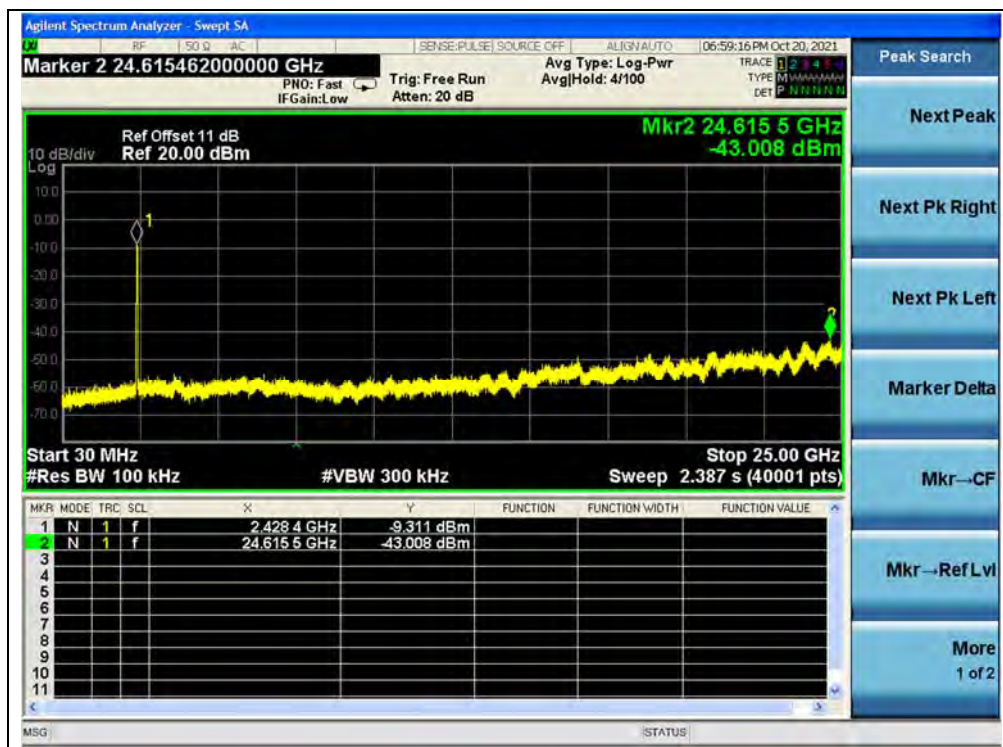


802.11ax (HEW40) Mode

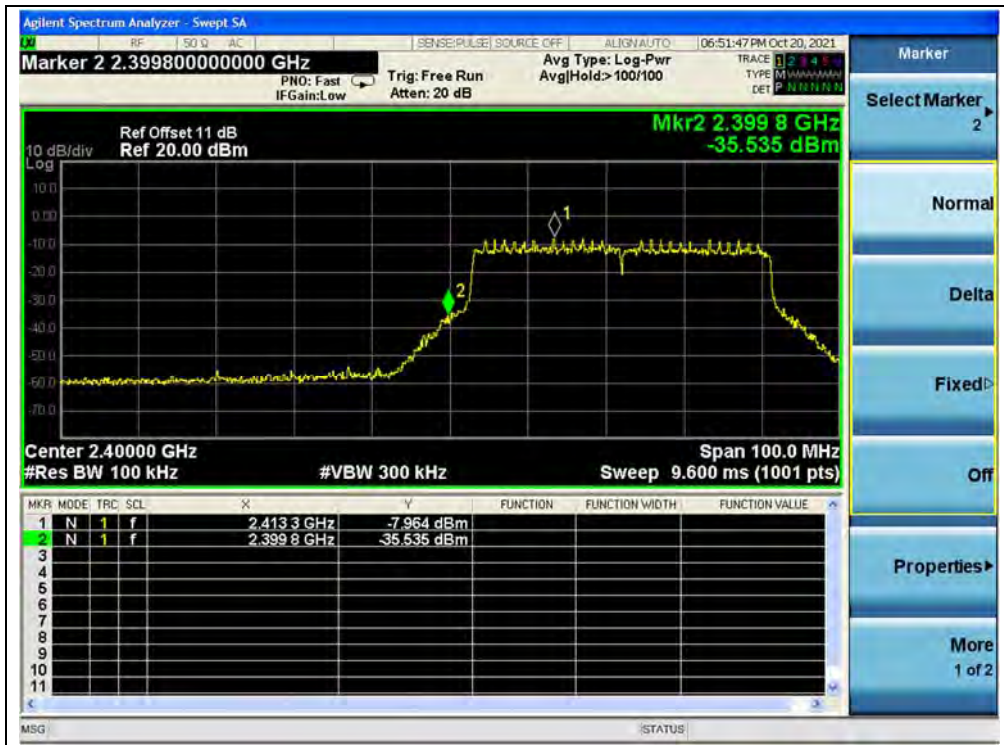
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-43.01	-9.31	-29.31	PASS
7	2442	-42.46	-8.08	-28.08	PASS
11	2462	-43.01	-8.47	-28.47	PASS

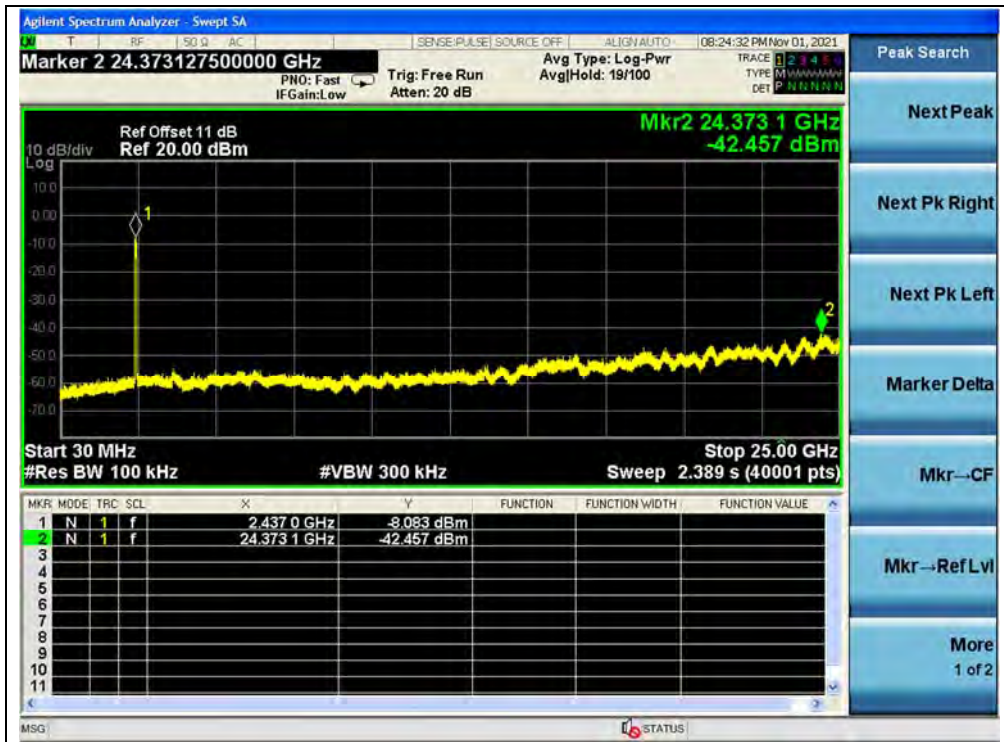
B. Test Plot:



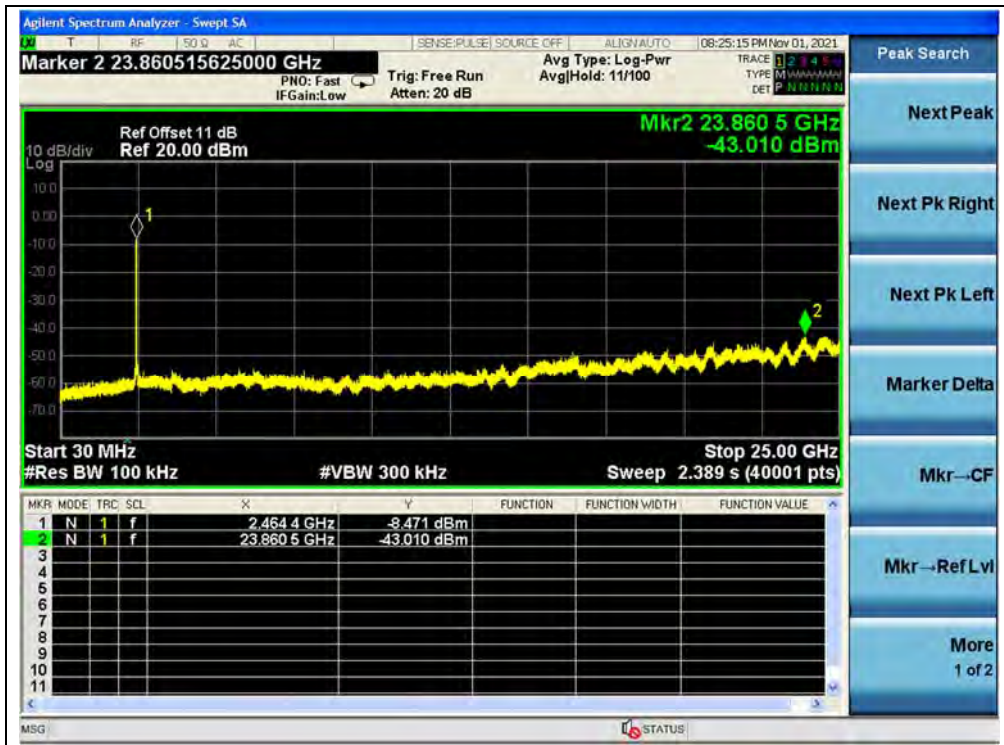
(30MHz to 25GHz, Channel 3, 802.11ax (HEW40))



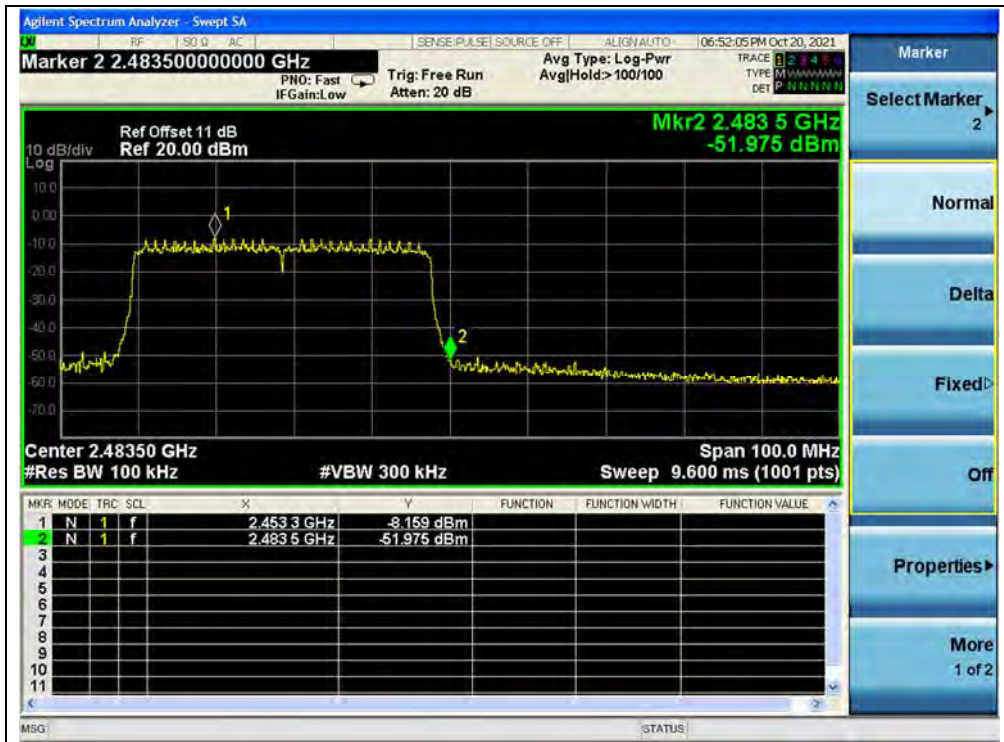
(Band Edge, Channel 3, 802.11ax (HEW40))



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



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



(Band Edge, Channel 11, 802.11ax (HEW40))

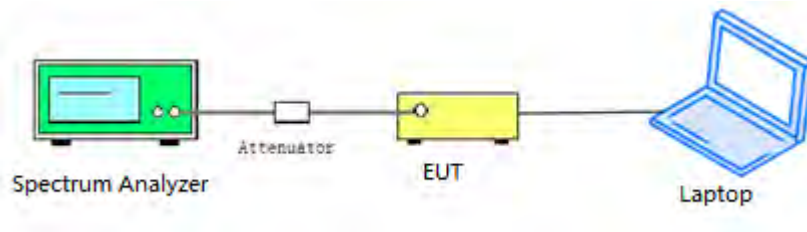
2.6. Power Spectral Density

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	-9.67	-8.47	8	PASS
7	2442	-9.55	-9.43	8	PASS
13	2472	-9.40	-9.66	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)

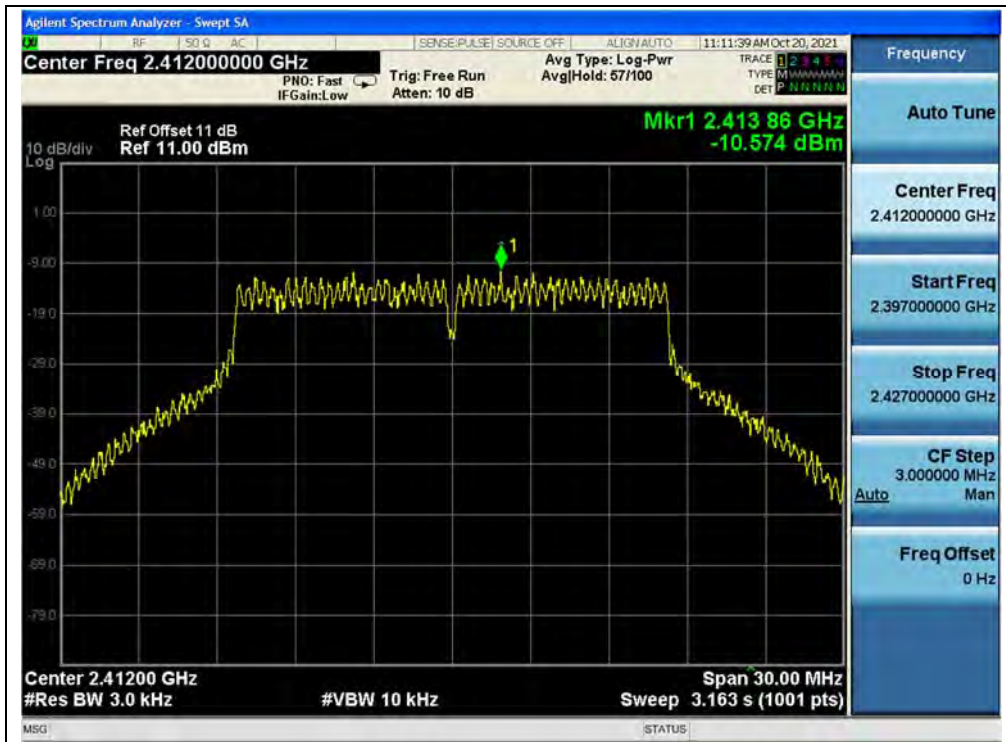


802.11g Mode

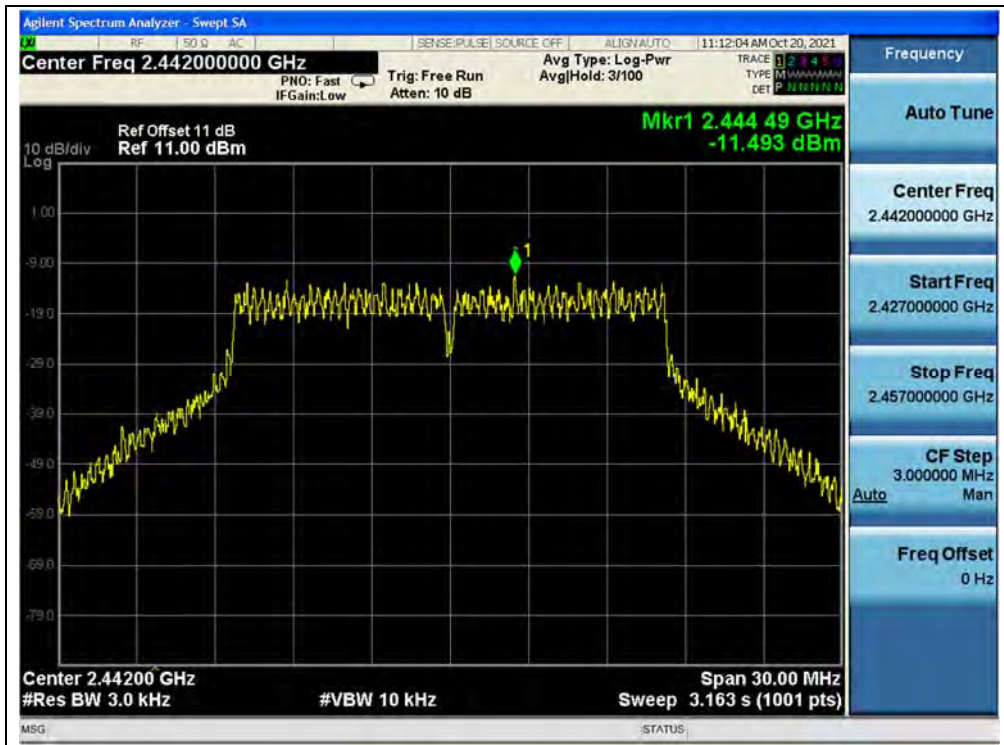
A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1		
1	2412	-10.57	-11.56	8	PASS
7	2442	-11.49	-11.74	8	PASS
13	2472	-11.75	-13.65	8	PASS

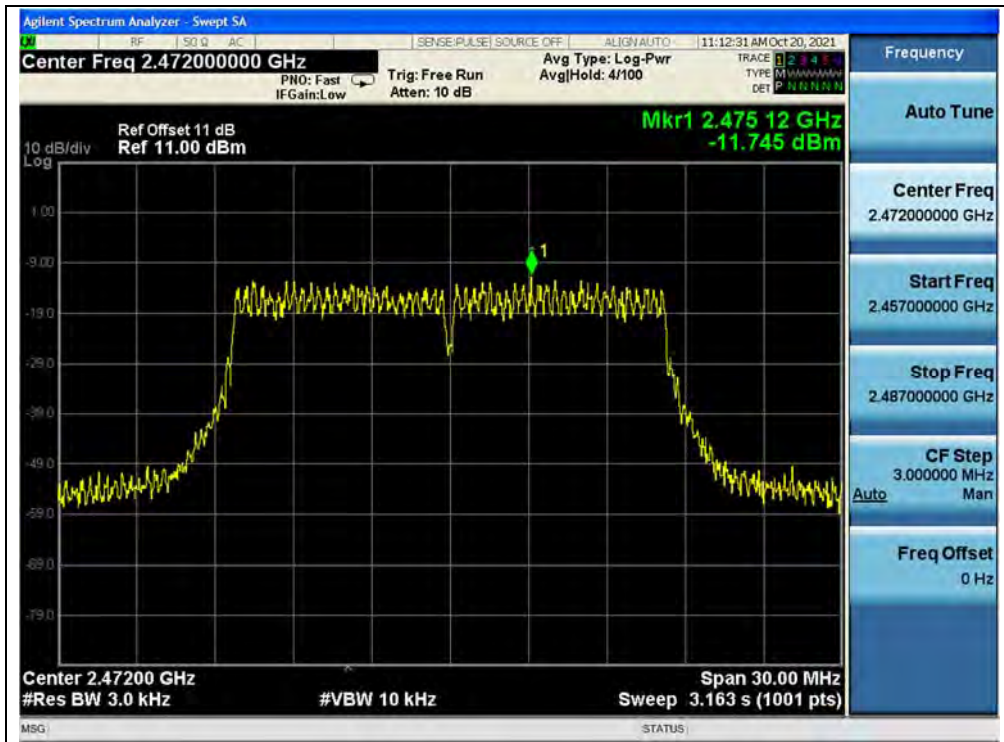
B. Test Plot:



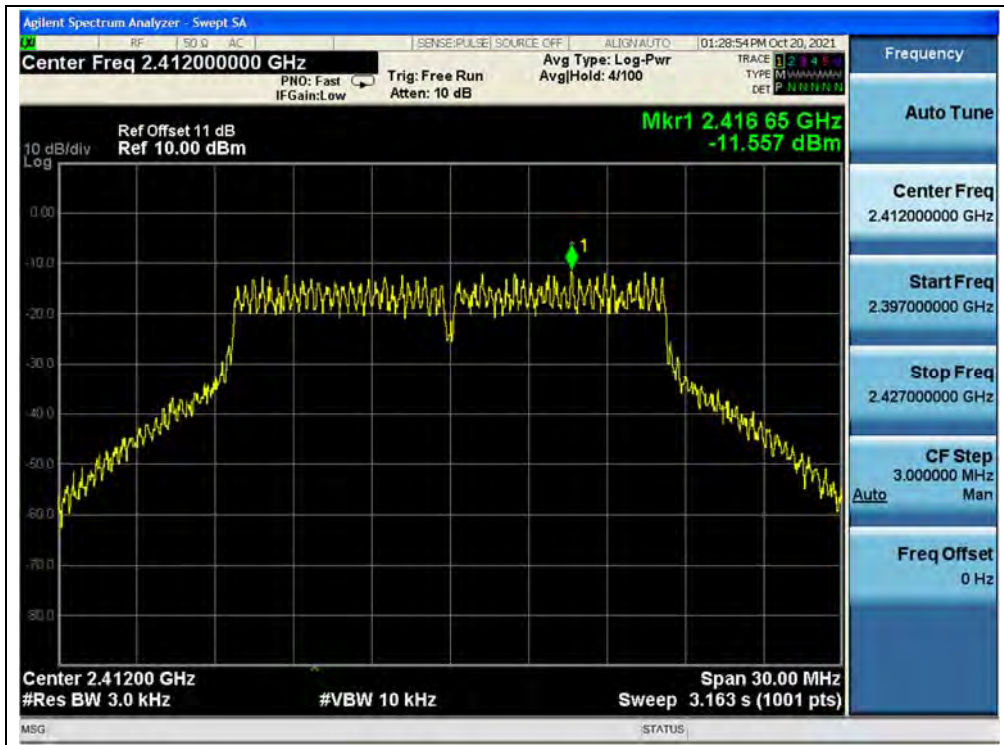
(Channel 1, 802.11g, ANT 0)



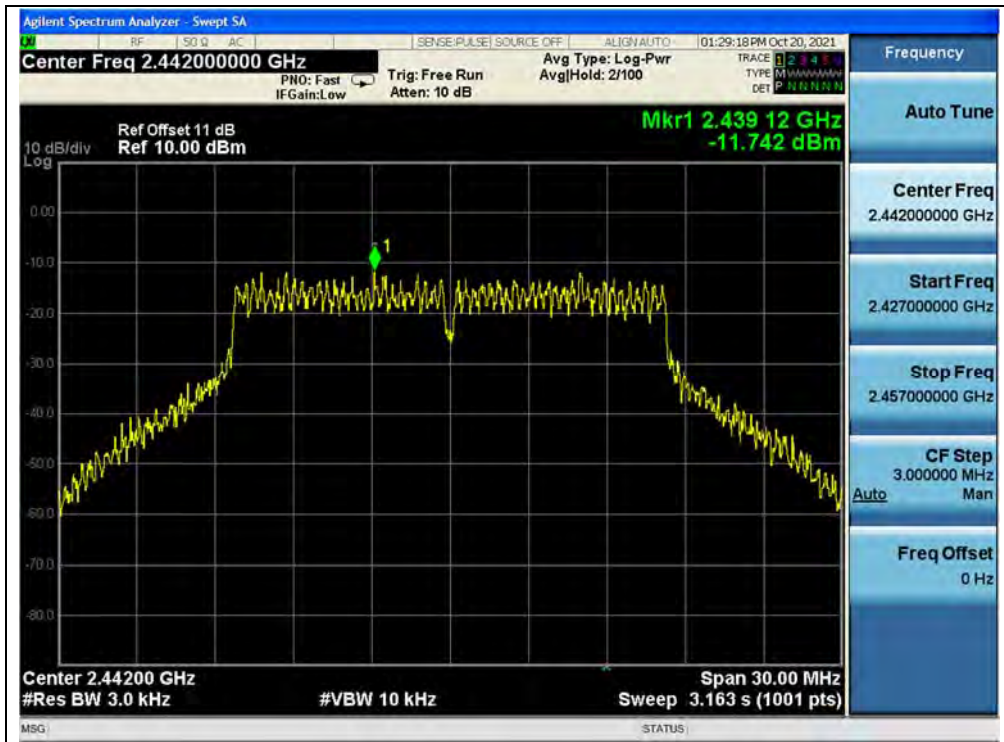
(Channel 7, 802.11g, ANT 0)



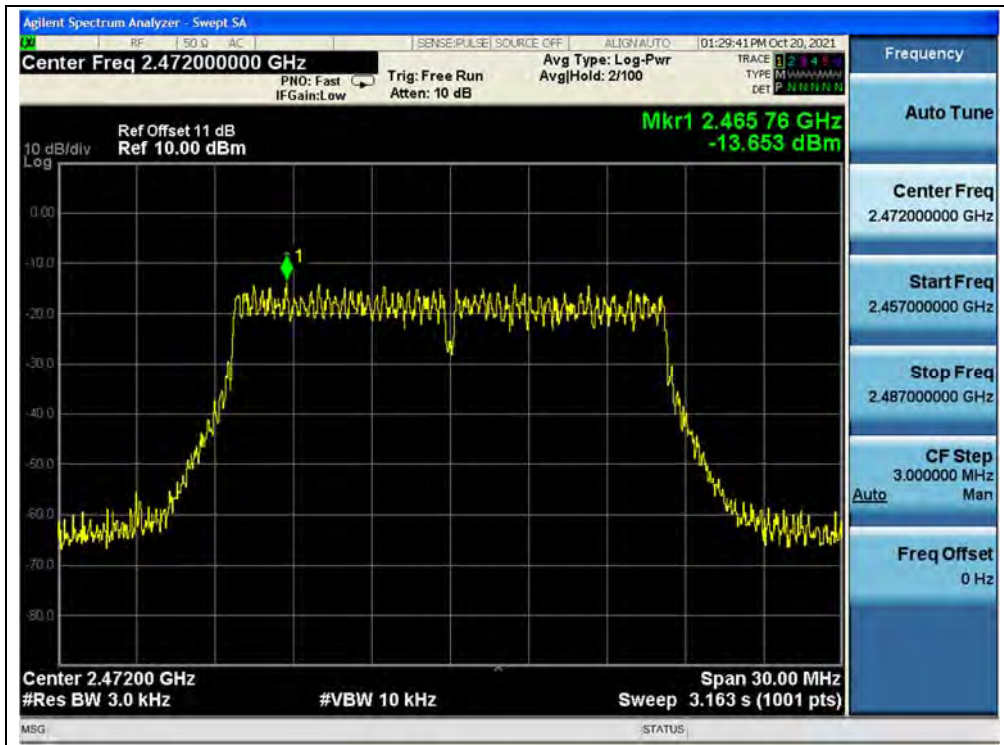
(Channel 13, 802.11g, ANT 0)



(Channel 1, 802.11g, ANT 1)



(Channel 7, 802.11g, ANT 1)



(Channel 13, 802.11g, ANT 1)



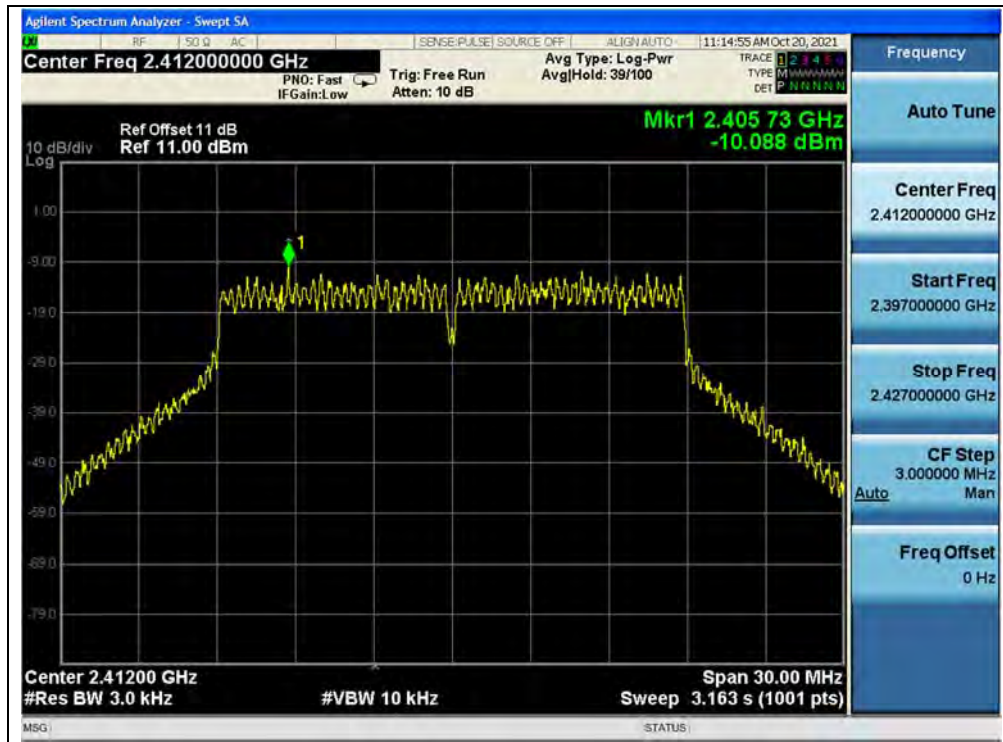
802.11n (HT20) Mode

A.Test Verdict:

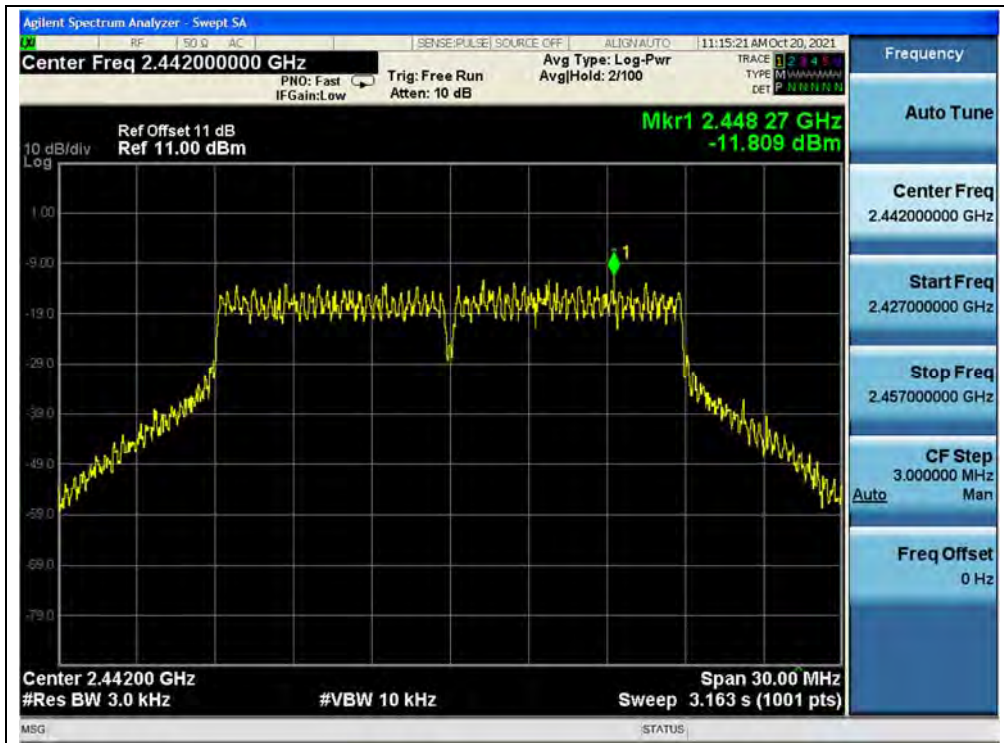
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-10.09	-10.36	-7.21	6.28	PASS
7	2442	-11.81	-11.48	-8.63	6.28	PASS
13	2472	-10.53	-13.04	-8.60	6.28	PASS

Note: Directional gain = $4.71\text{dBi} + 10\log(2) = 7.72\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (7.72 - 6) = 6.28\text{dBm}$.

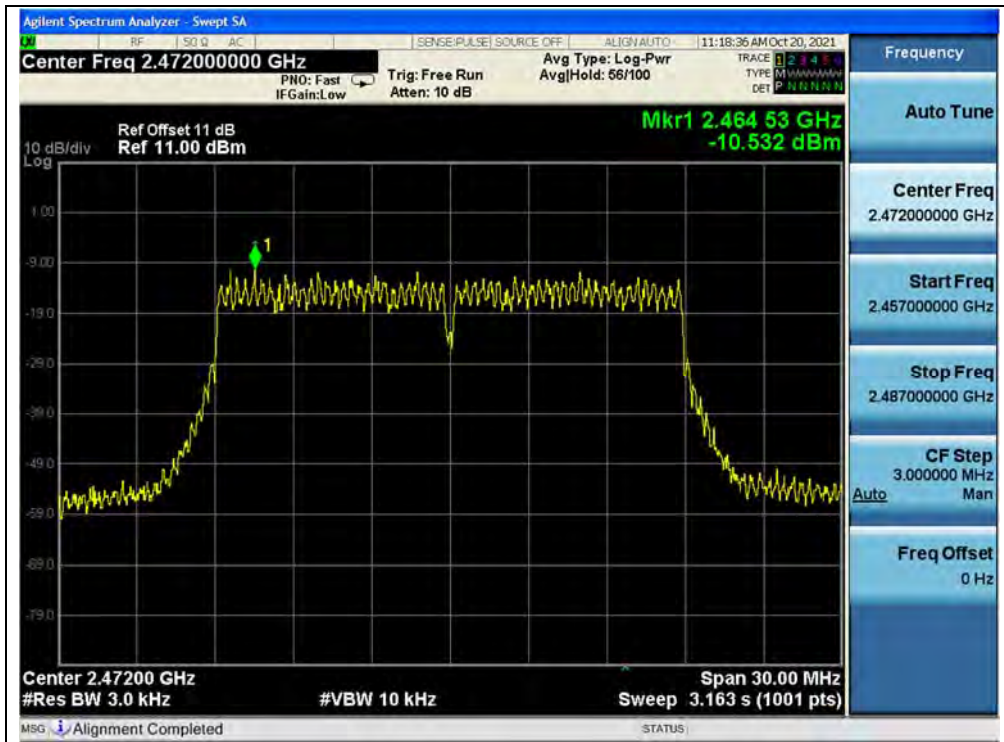
B.Test Plot:



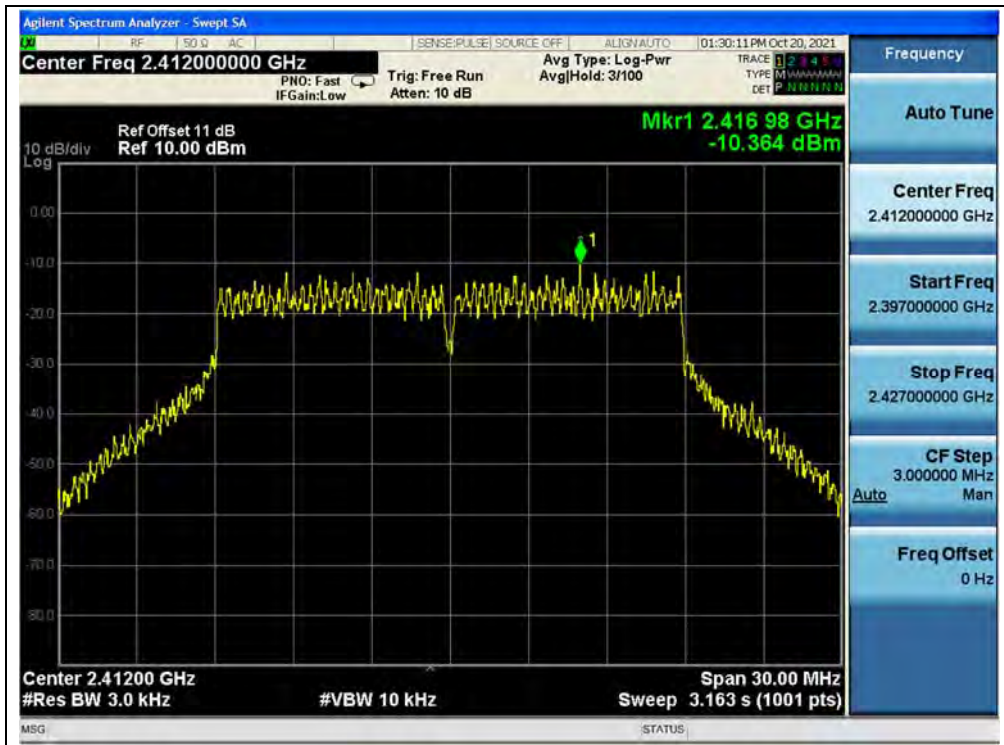
(Channel 1, 802.11n (HT20), ANT 0)



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



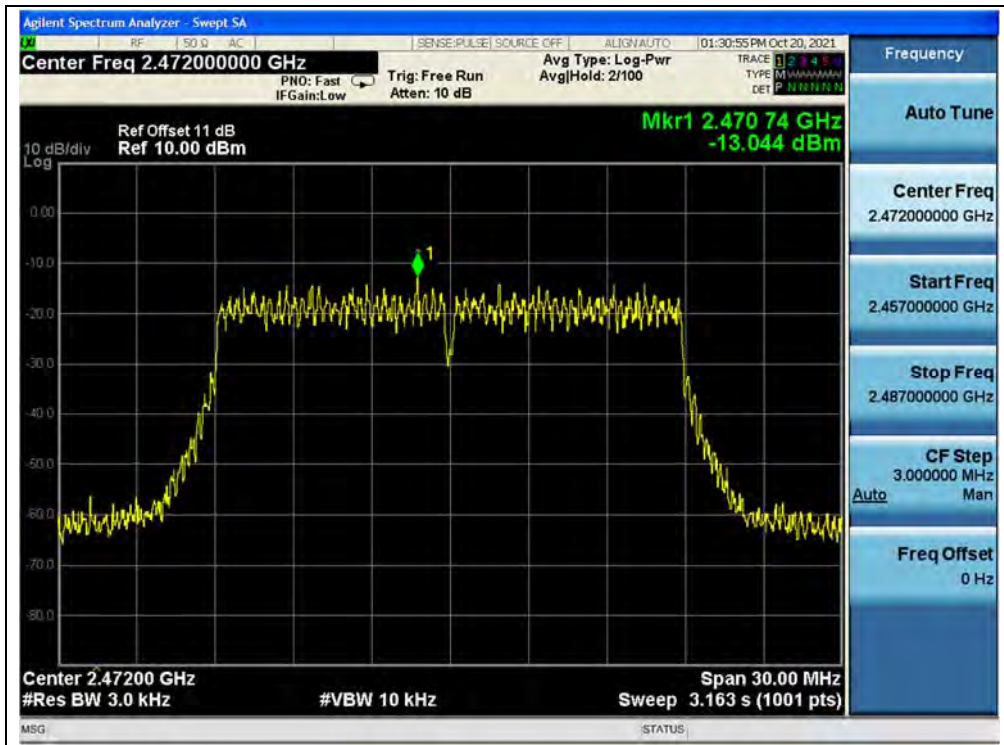
(Channel 13, 802.11n (HT20), ANT 0)



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



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



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



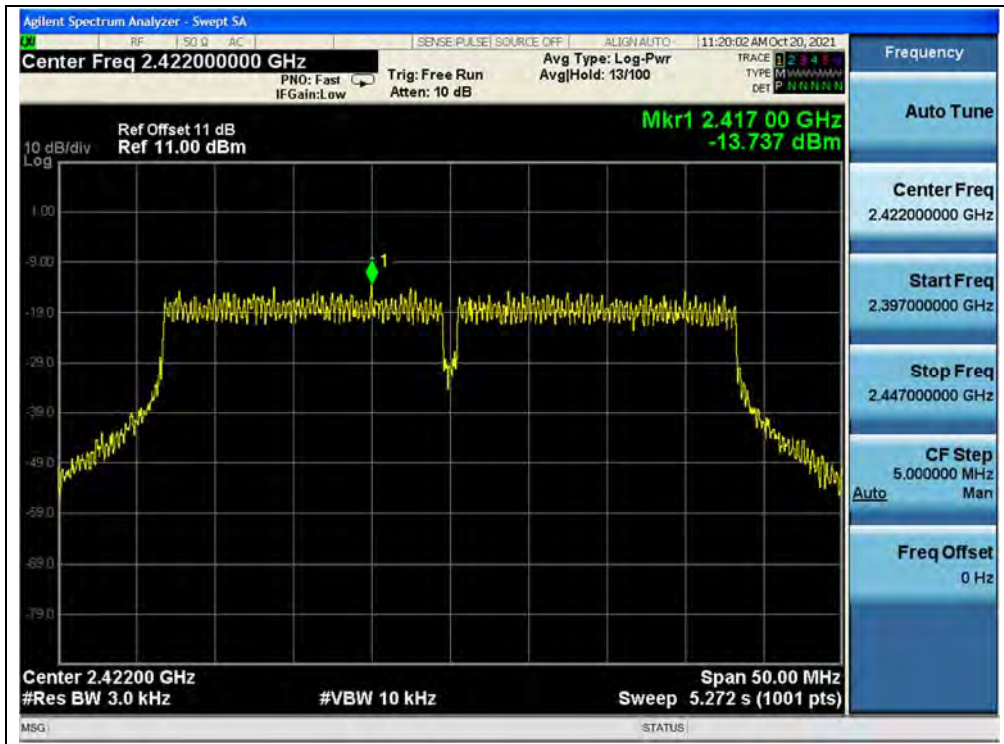
802.11n (HT40) Mode

A.Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
3	2422	-13.74	-13.37	-10.54	6.28	PASS
7	2442	-12.77	-13.84	-10.26	6.28	PASS
11	2462	-13.22	-14.35	-10.74	6.28	PASS

Note: Directional gain = 4.71dBi +10log(2) = 7.72dBi > 6dBi, so the power density limit shall be reduced to 8-(7.72-6)=6.28dBm.

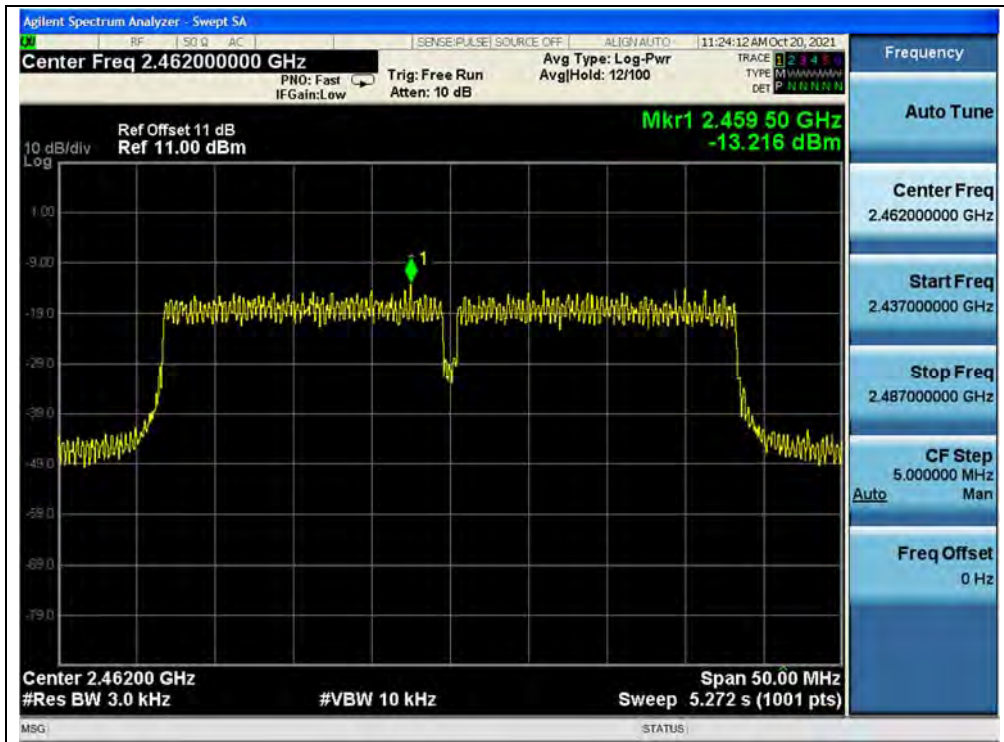
B.Test Plot:



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



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



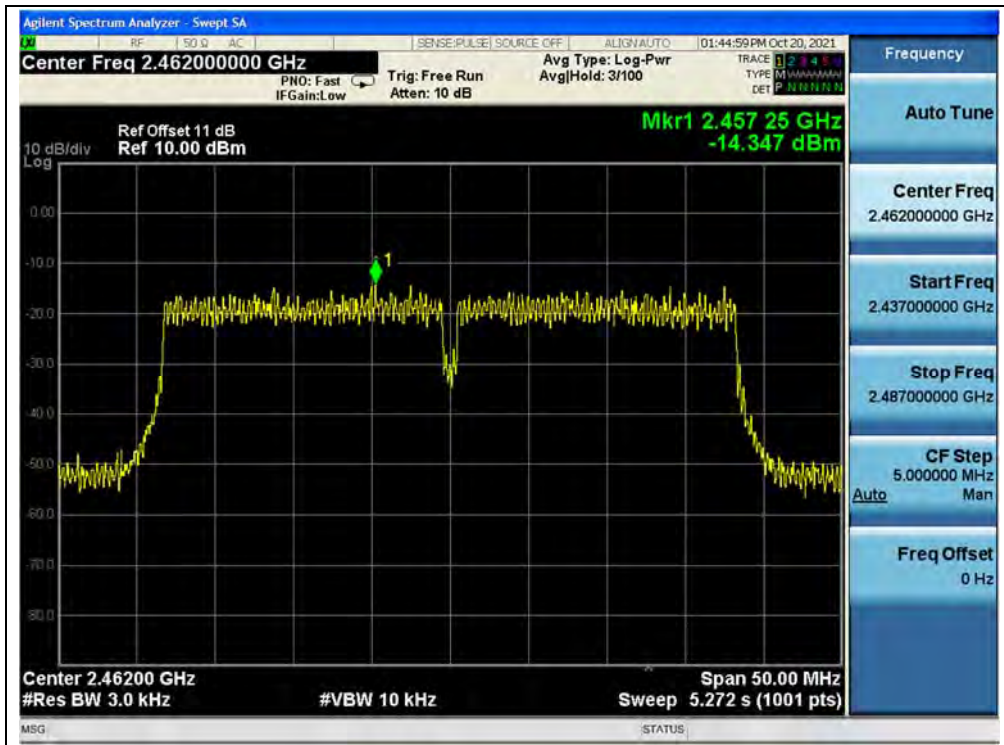
(Channel 11, 802.11n (HT40), ANT 0)



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



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



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



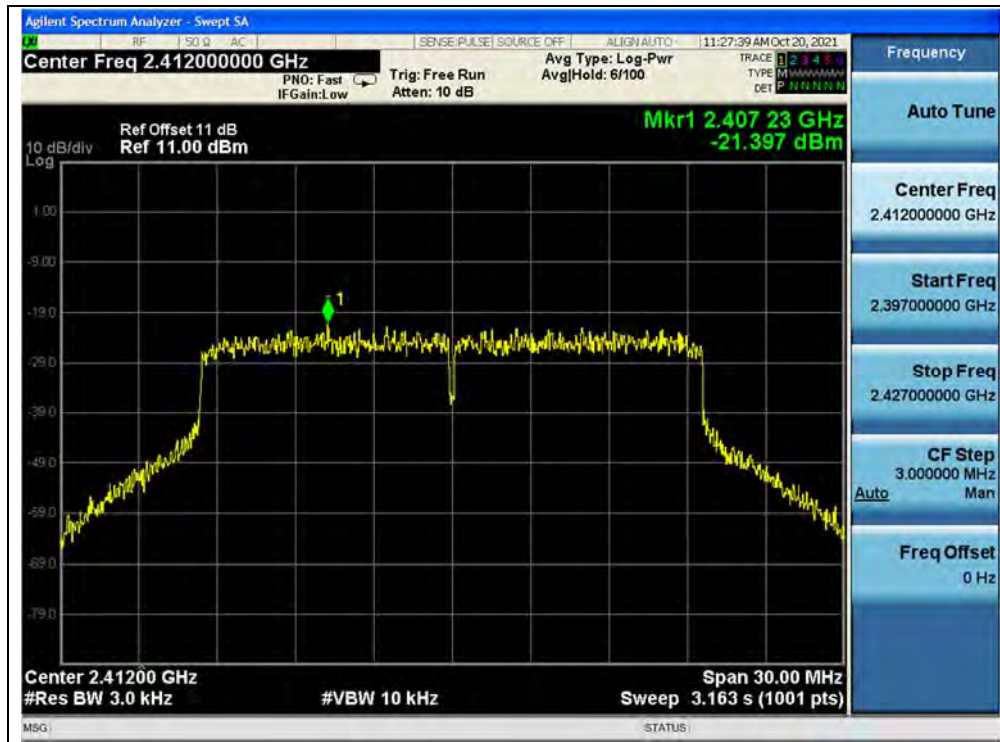
802.11ax (HEW20) Mode

A.Test Verdict:

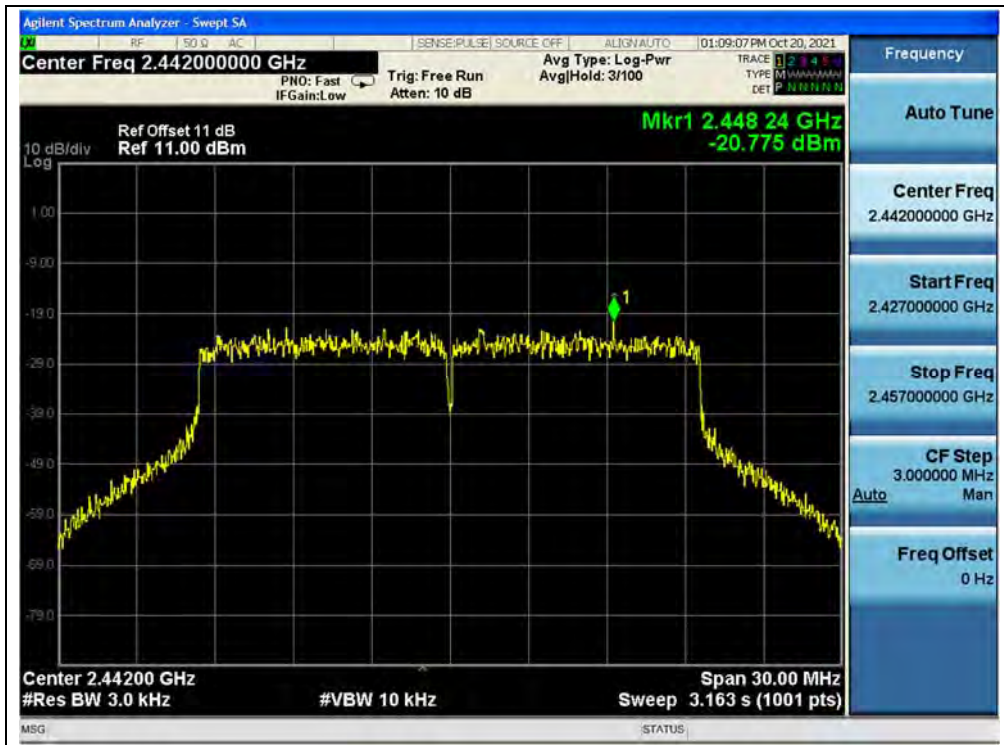
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-21.40	-20.59	-17.97	6.28	PASS
7	2442	-20.78	-20.09	-17.41	6.28	PASS
13	2472	-21.01	-21.35	-18.17	6.28	PASS

Note: Directional gain = $4.71\text{dBi} + 10\log(2) = 7.72\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (7.72 - 6) = 6.28\text{dBm}$.

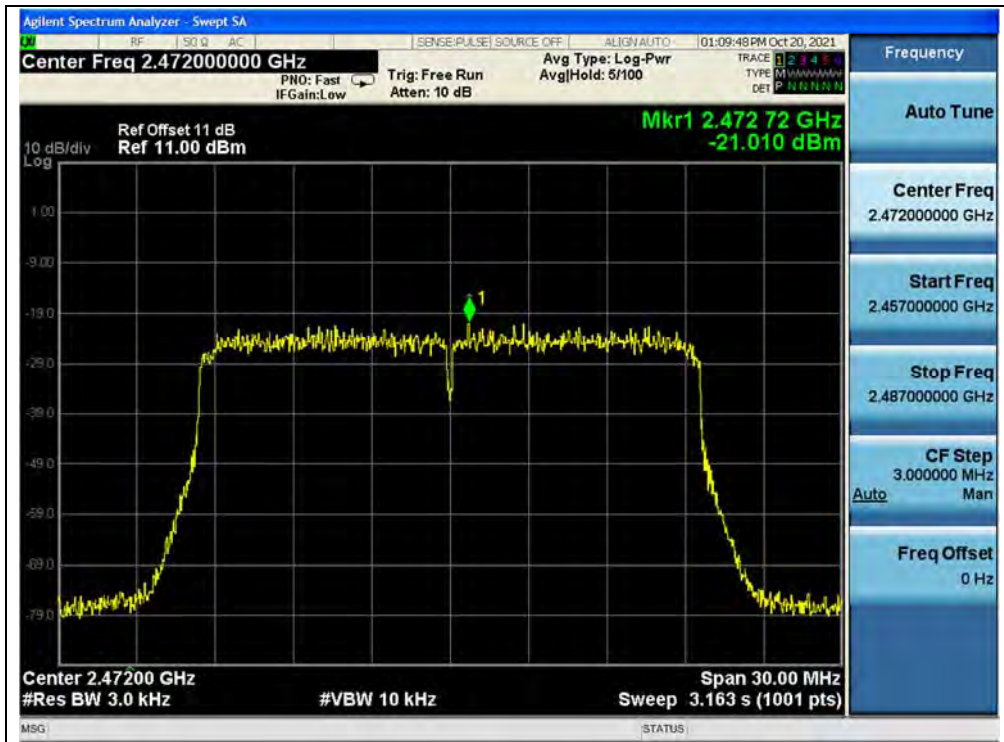
B.Test Plot:



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



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



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