

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 1 of 57

Applicant : Anitoa Biotechnology (Hangzhou) Co.,Ltd.
Address of Applicant : Room 210,2F,Building 2,No.658 binan Road,Changhe Street,Binjiang District,Hangzhou City,Zhejiang Province

Product Name : Real-time Fluorescence Quantitative PCR Instrument
Model No. : MQ4164,MQ4041,MQ4042,MQ4043,MQ4044,MQ4081,MQ4082,MQ4083,MQ4084,MQ4161,MQ4162,MQ4163

Sample No. : H22020028-01#01

FCC ID : 2A7M7MQ4

Standards : FCC CFR47 Part 15, Subpart C

Date of Receipt : 2022-05-20
Date of Test : 2022-05-21 ~ 2022-06-08
Date of Issue : 2022-06-14

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by:



(Erik Yang)

Reviewed by:



(Jennifer Zhou)

Approved by:



(Authorized signatory: Guoyou Chi)

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 2 of 57

Contents

1	GENERAL INFORMATION	3
1.1	TESTING LABORATORY	3
1.2	DETAILS OF APPLICATION	3
1.3	DETAILS OF EUT	3
1.4	TEST METHODOLOGY	4
1.5	TEST SUMMARY	4
2	TEST CONDITION	5
2.1	TEST FACILITY	5
2.2	ENVIRONMENTAL CONDITIONS	5
2.3	EQUIPMENT LIST	5
2.4	MEASUREMENT UNCERTAINTY	5
3	TEST SET-UP AND OPERATION MODES	6
3.1	DETAILS OF TEST MODE	6
3.2	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	7
3.3	SUPPORT SOFTWARE	7
3.4	TEST SETUP DIAGRAM	8
4	TEST RESULTS	10
4.1	TRANSMITTER REQUIREMENT & TEST SUITES	10
4.1.1	<i>Antenna Requirement</i>	10
4.1.2	<i>Peak Output Power</i>	11
4.1.3	<i>6dB Bandwidth</i>	12
4.1.4	<i>Power Spectral Density</i>	19
4.1.5	<i>Conducted Spurious Emission & Authorized-band band-edge</i>	26
4.1.6	<i>Radiated Spurious Emission</i>	50
4.1.7	<i>Band Edge (Restricted-band band-edge)</i>	51
4.2	MAINS EMISSIONS	52
4.2.1	<i>Conducted Emission on AC Mains</i>	52
5	APPENDIXES	55
5.1	PHOTOGRAPHS OF THE SAMPLE	55
5.2	SET-UP FOR CONDUCTED EMISSIONS	56
5.3	SET-UP FOR CONDUCTED RF TEST AT ANTENNA PORT	56
5.4	SET-UP FOR SPURIOUS EMISSIONS BELOW 1GHZ	57
5.5	SET-UP FOR SPURIOUS EMISSIONS ABOVE 1GHZ	57

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 3 of 57

1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298 Pingan Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Applicant Company Name	Anitoe Biotechnology (Hangzhou) Co.,Ltd.
Address	Room 210,2F,Building 2,No.658 binan Road,Changhe Street,Binjiang District,Hangzhou City,Zhejiang Province
Contact Person	Xu.Bai
Telephone	13616528058
Email	xu.bai@artobio.cn
Manufacturer Company Name	Anitoe Biotechnology (Hangzhou) Co.,Ltd.
Address	Room 210,2F,Building 2,No.658 binan Road,Changhe Street,Binjiang District,Hangzhou City,Zhejiang Province
Factory Company Name	Anitoe Biotechnology (Hangzhou) Co.,Ltd.
Address	Room 210,2F,Building 2,No.658 binan Road,Changhe Street,Binjiang District,Hangzhou City,Zhejiang Province

1.3 Details of EUT

Product Name	Real-time Fluorescence Quantitative PCR Instrument
Brand Name	anitoe
Test Model No.	MQ4164
Series Model No.	MQ4041,MQ4042,MQ4043,MQ4044,MQ4081,MQ4082,MQ4083,MQ4084,MQ4161,MQ4162,MQ4163
Difference Description	All the models are identical with the same schematics, PCB layout, structure, size and components, the difference are only quantities in fluorescence channel and check holes
FCC ID	2A7M7MQ4
Mode of Operation	WLAN 802.11b/g/n(HT20/40)
Frequency Range	2400MHz ~ 2483.5MHz
Channel Separation	5 MHz
Modulation Type	DSSS, OFDM
Antenna Type	Internal Antenna
Antenna Gain	2dBi
Test Voltage	AC 120V 60Hz Switching adapter (Model: GST160A15)
Extreme Voltage	Low Voltage: AC 100V by Switching adapter (Model: GST160A15)

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 4 of 57

	High Voltage: AC 240V by Switching adapter (Model: GST160A15)
Hardware version	MQ_05_V10.3
Software version	V1.7.2.2
RF power setting in TEST SW	Engineer Mode

1.4 Test Methodology

47 CFR Part 15, Subpart C	Telecommunication-Radio Frequency Devices-Intentional Radiators
KDB Publication 558074 D01 v05r02	15.247 Meas Guidance.
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

1.5 Test Summary

Test Item	FCC Rules	Result
Antenna Requirement	FCC Part 15.247(b)(4), Part 15.203	PASS
Peak Output Power	FCC Part 15.247(b)(3)	PASS
6dB Bandwidth	FCC Part 15.247(a)(2)	PASS
Power Spectral Density	FCC Part 15.247(e)	PASS
Conducted Spurious Emission & Authorized-band band-edge	FCC Part 15.247(d)	PASS
Radiated Spurious Emission	FCC Part 15.247(d), 15.205, 15.209	PASS
Band Edge (Restricted-band band-edge)	FCC Part 15.247(d), 15.205, 15.209	PASS
Conducted Emission on AC Mains	FCC Part 15.207(a)	PASS

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 5 of 57

2 Test Condition

2.1 Test Facility

2.2 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.3 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal.Date	Cal. Due Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2021-08-17	2022-08-16
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2021-06-10	2022-06-09
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2021-06-10	2022-06-09
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2021-06-10	2022-06-09
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-06-10	2022-06-09
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2021-08-13	2022-08-12
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2021-06-08	2023-06-07
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2021-06-08	2023-06-07
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2021-06-12	2022-06-11
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2020-11-23	2022-11-22
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2020-06-09	2023-06-08
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2020-06-09	2023-06-08
Test Software	BL	BL410_E	N/A	N/A	N/A
Test Software	BL	BL410_R	N/A	N/A	N/A

2.4 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3.42 dB
	> 1GHz	± 4.20 dB
Conducted Emission on AC Mains	9 kHz to 30 MHz	± 1.71 dB

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 6 of 57

3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software (Engineer Mode) was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

For 802.11b/g/n (HT20)

Channel	Frequency
The lowest channel(CH1)	2412MHz
The middle channel(CH6)	2437MHz
The Highest channel(CH11)	2462MHz

For 802.11n(HT40)

Channel	Frequency
The lowest channel(CH3)	2422MHz
The middle channel(CH6)	2437MHz
The Highest channel(CH9)	2452MHz

Through Pre-scan under all rate at lowest channel, the data rate as below table described is the worst case, so we choose these data rate for test.

Type	Data rate
802.11b	5.5Mbps
802.11g	54Mbps
802.11n(20M)	MCS5
802.11n(40M)	MCS3

The basic operation modes are:

- A. On
 - 1. WLAN mode
 - a. Transmitting
 - i. Low Channel
 - ii. Middle Channel
 - iii. High Channel
 - b. Receiving
- B. Standby
- C. Off

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 7 of 57

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
Switching Adapter	N/A	GST160A15	1.00m Unshielded

3.3 Support Software

Description	Manufacturer	Software Name
Software	N/A	Engineer Mode

TEST REPORT

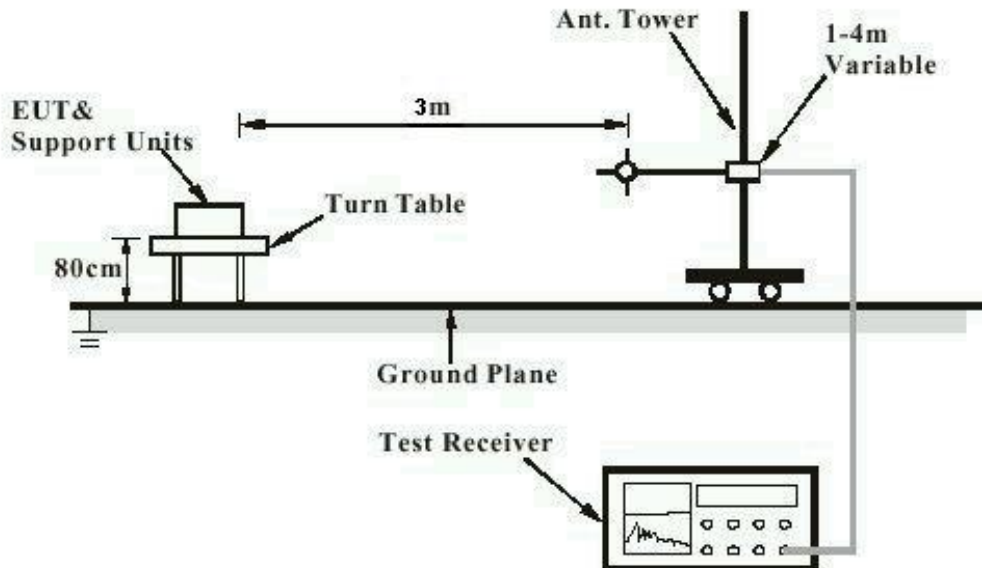
Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 8 of 57

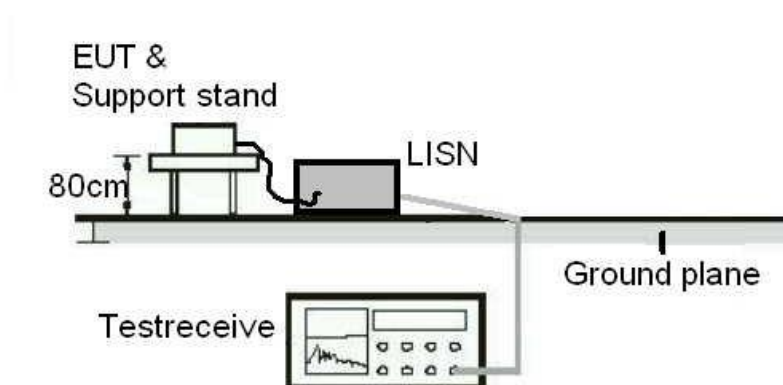
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement



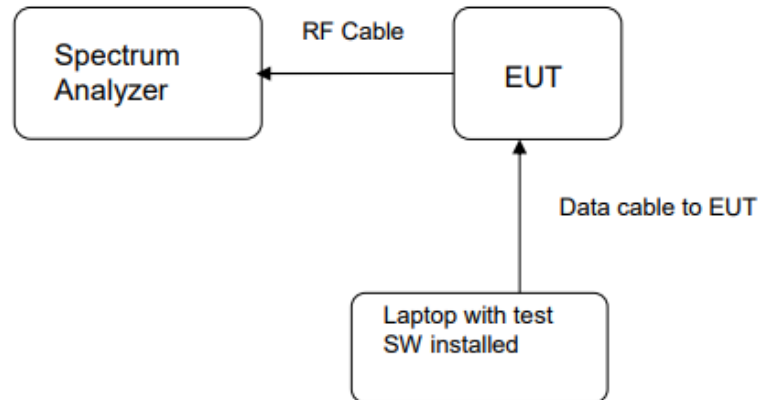
TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 9 of 57

Diagram of Measurement Equipment Configuration for Transmitter Measurement



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 10 of 57

4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard	: FCC Part 15.247(b)(4), Part 15.203
Requirement	: The use of approved antennas only with directional gains that do not exceed 6dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 2dBi. The antenna is an internal antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 11 of 57

4.1.2 Peak Output Power

RESULT:

PASS

Test standard : FCC Part 15.247(b)(3)

Requirement : ANSI C63.10-2013, KDB 558074

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 50%

Table 1: Peak Output Power

Test Mode	Test Channel (MHz)	Peak Output Power		Limit (W)
		(dBm)	(mW)	
802.11b	2412	17.51	56.36	< 1
	2437	18.00	63.10	
	2462	17.55	56.89	
802.11g	2412	13.53	22.54	
	2437	13.66	23.23	
	2462	13.43	22.03	
802.11n(HT20)	2412	12.59	18.16	
	2437	12.81	19.10	
	2462	12.57	18.07	
802.11n(HT40)	2422	10.57	11.40	
	2437	10.73	11.83	
	2452	10.71	11.78	

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 12 of 57

4.1.3 6dB Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.247(a)(2)

Requirement : ANSI C63.10-2013, KDB 558074

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 50%

Table 2: 6dB Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	6 dB Bandwidth Limit (MHz)
802.11b	2412	8.168	≥0.5
	2437	7.286	
	2462	8.220	
802.11g	2412	15.700	
	2437	15.730	
	2462	15.510	
802.11n(HT20)	2412	16.380	
	2437	14.800	
	2462	16.380	
802.11n(HT40)	2422	35.780	
	2437	35.170	
	2452	30.120	

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 13 of 57

Figure 1: 6dB Bandwidth, 802.11b, 2412MHz

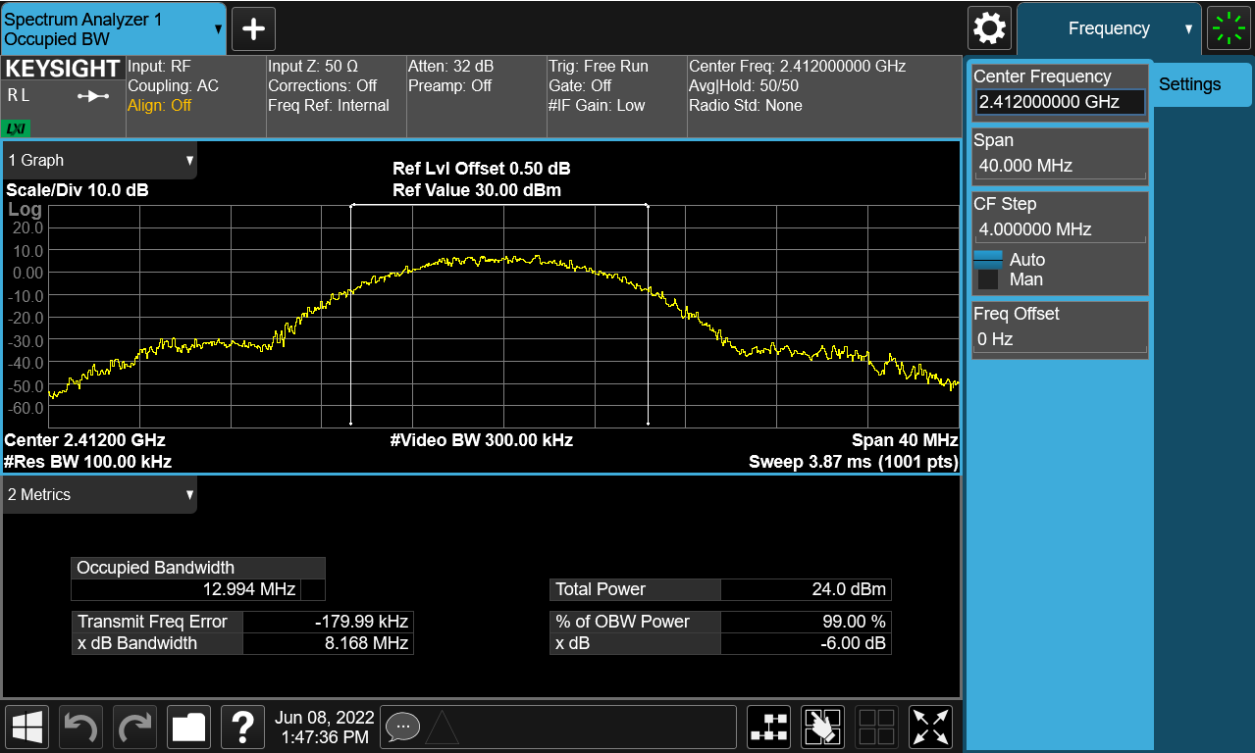
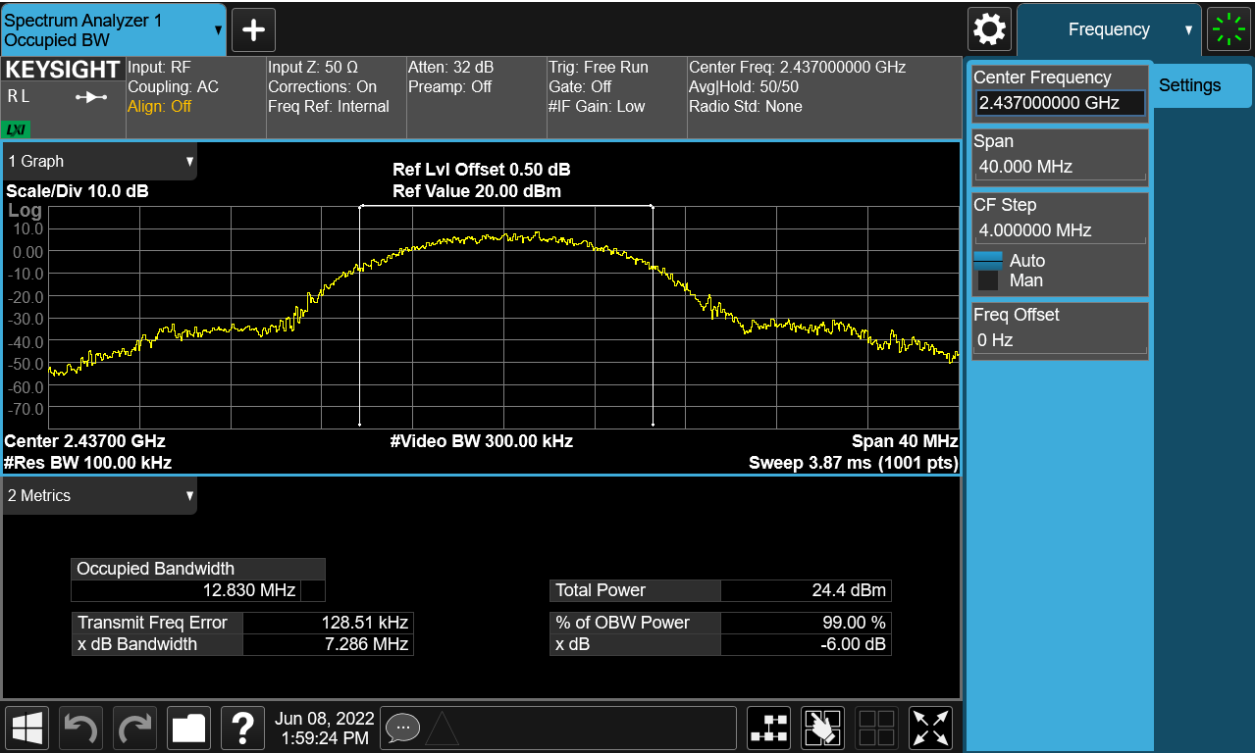


Figure 2: 6dB Bandwidth, 802.11b, 2437MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 14 of 57

Figure 3: 6dB Bandwidth, 802.11b, 2462MHz

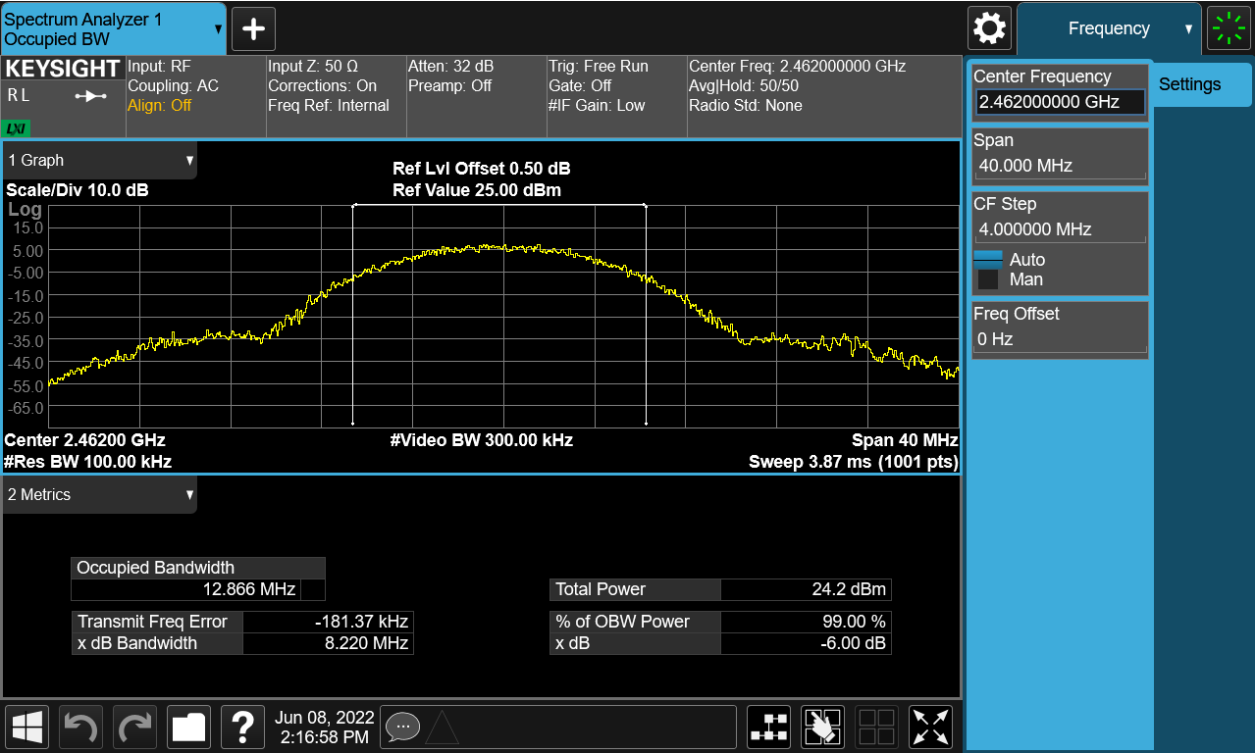
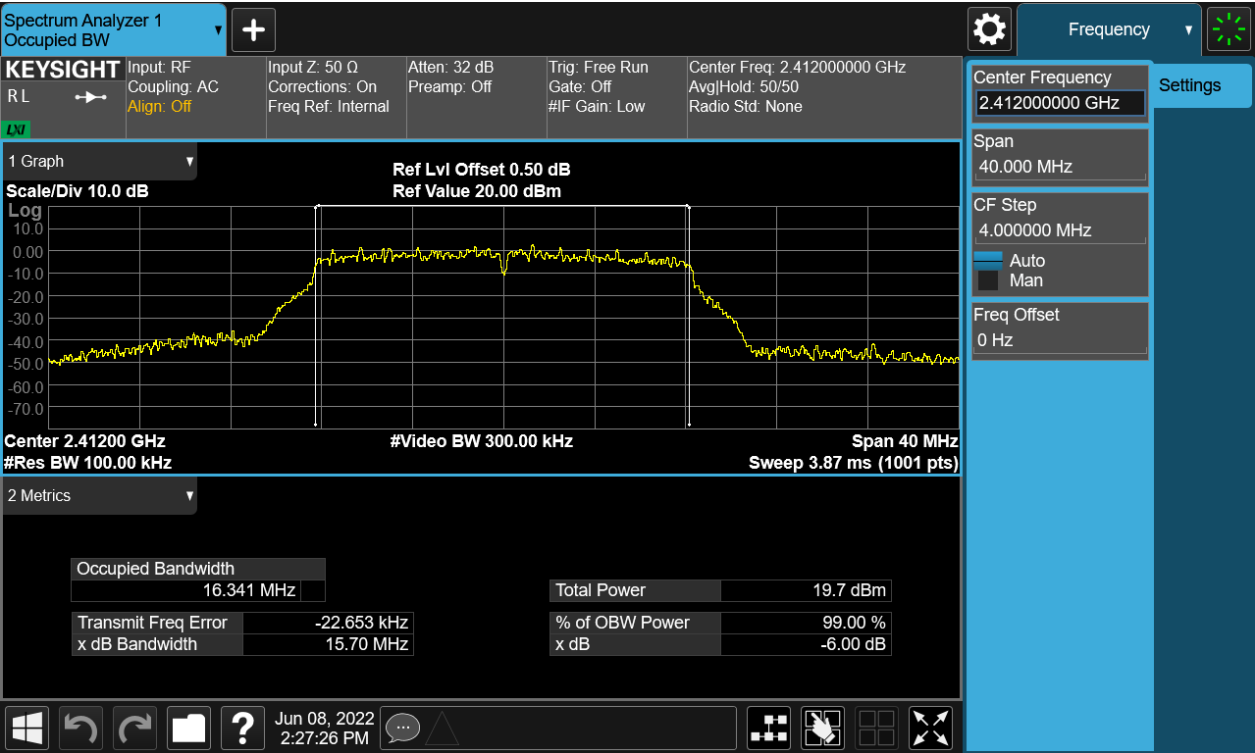


Figure 4: 6dB Bandwidth, 802.11g, 2412MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 15 of 57

Figure 5: 6dB Bandwidth, 802.11g, 2437MHz

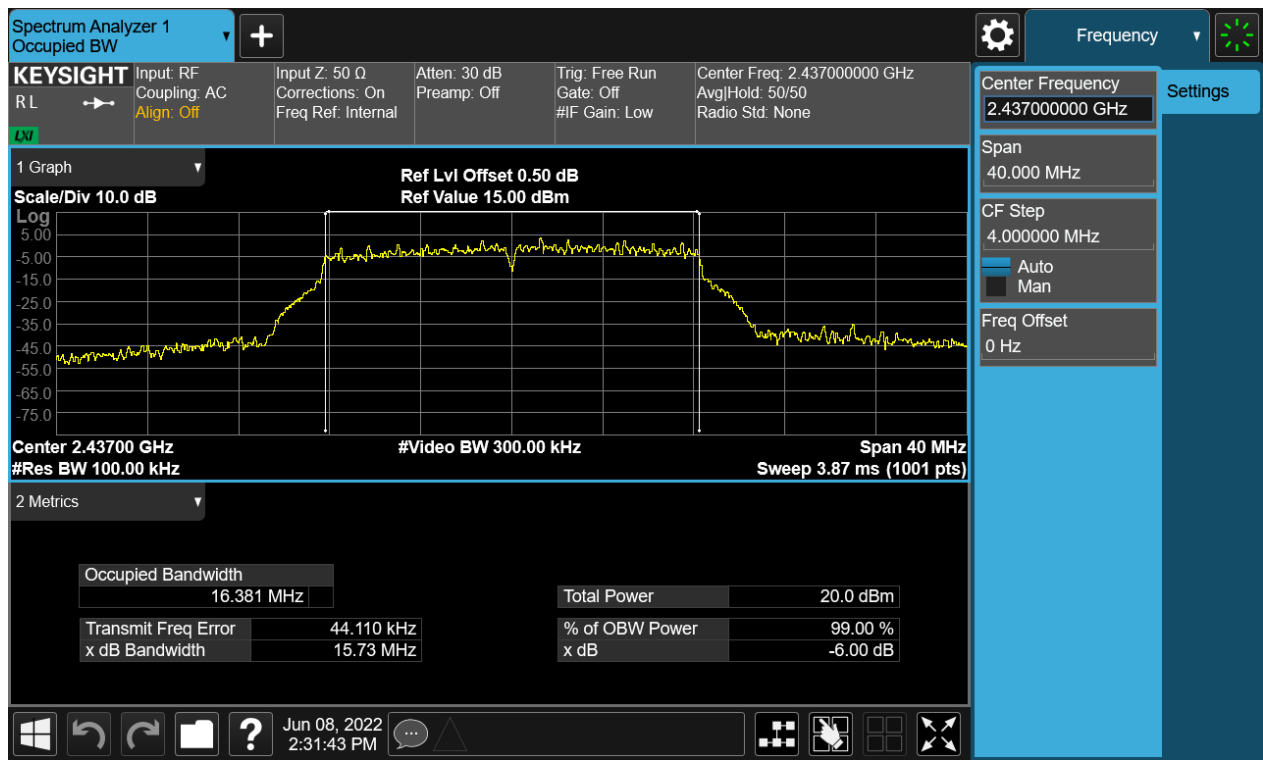
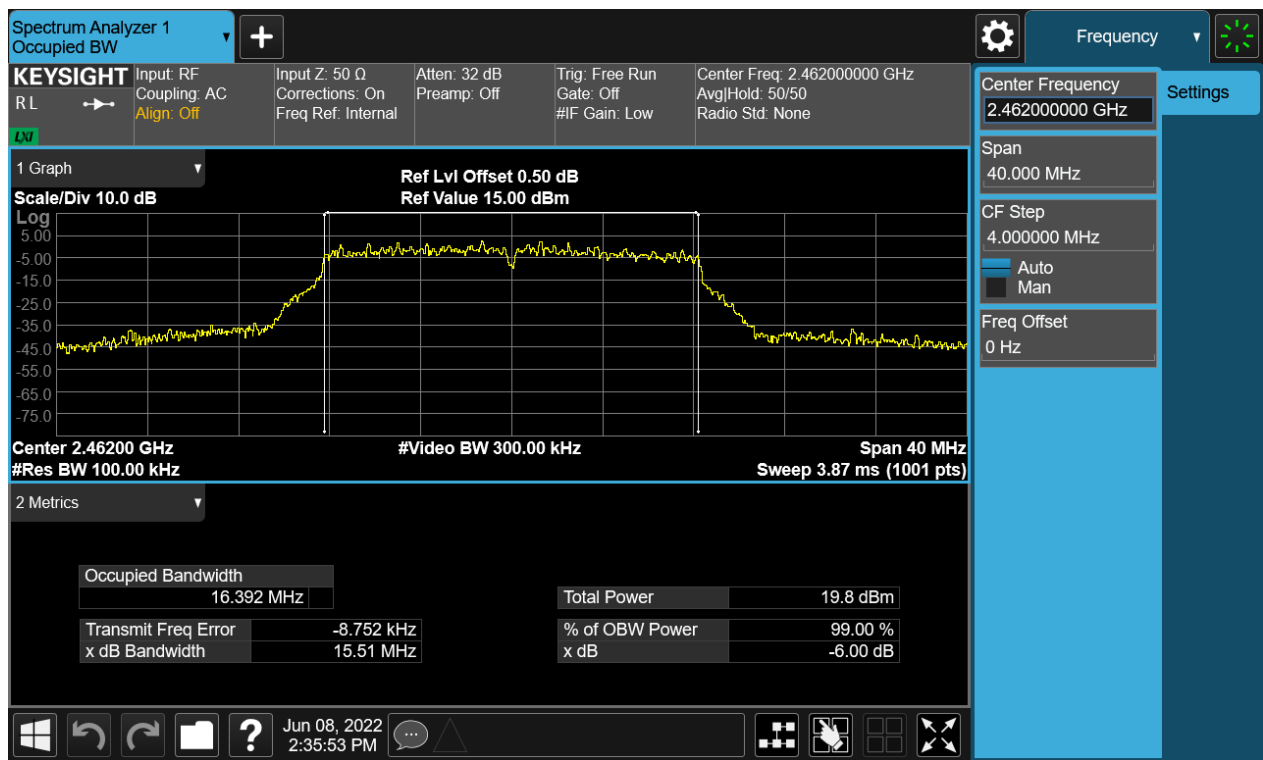


Figure 6: 6dB Bandwidth, 802.11g, 2462MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 16 of 57

Figure 7: 6dB Bandwidth, 802.11n(HT20), 2412MHz

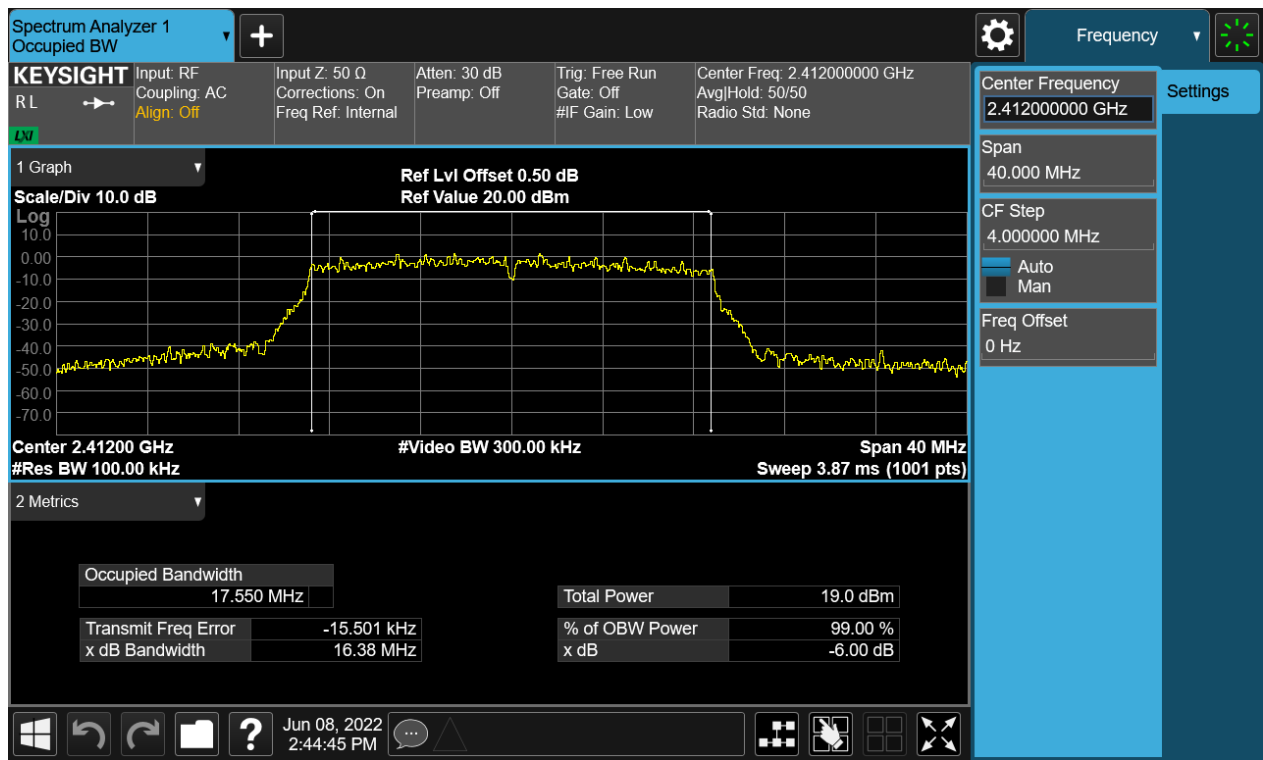
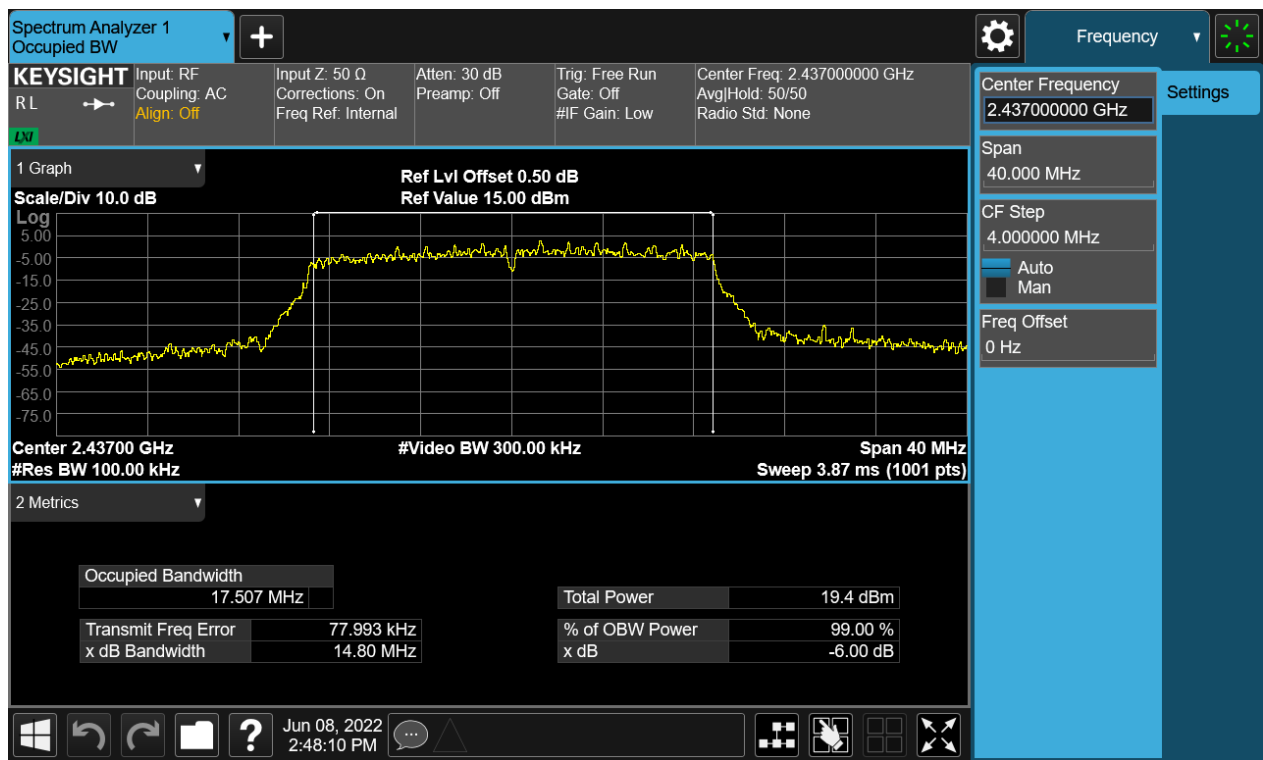


Figure 8: 6dB Bandwidth, 802.11n(HT20), 2437MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 17 of 57

Figure 9: 6dB Bandwidth, 802.11n(HT20), 2462MHz

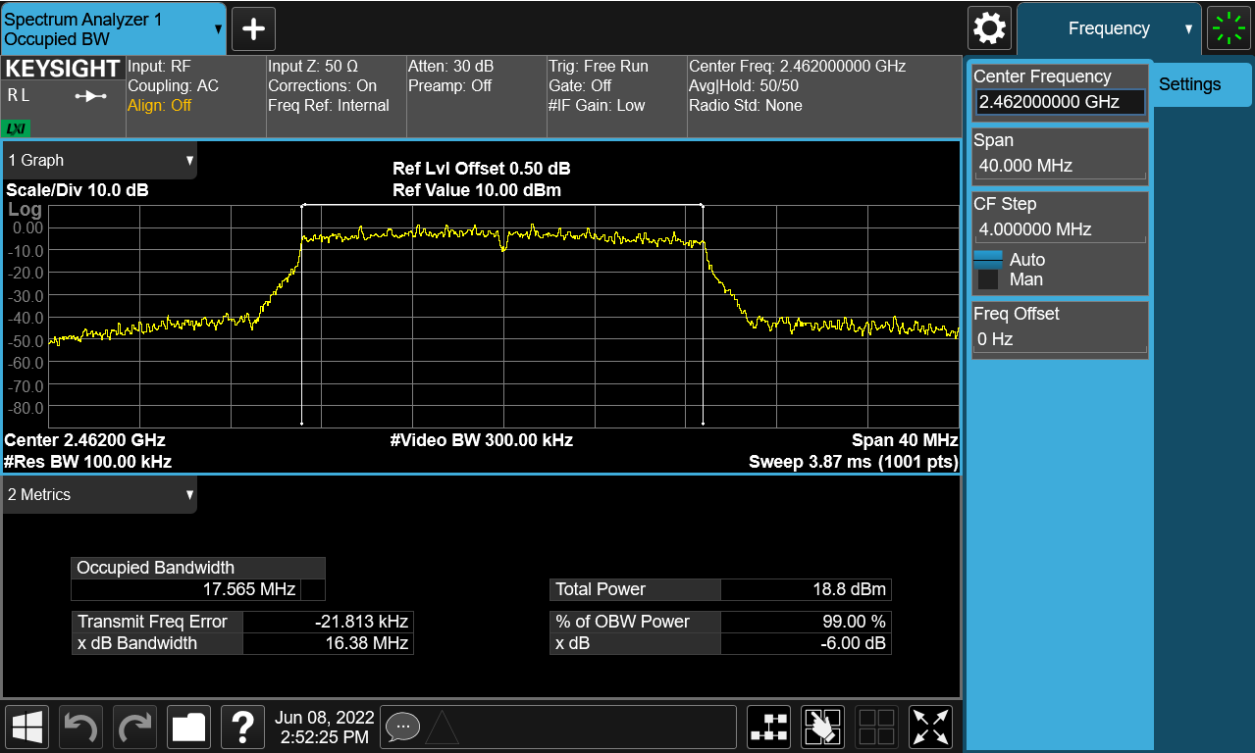
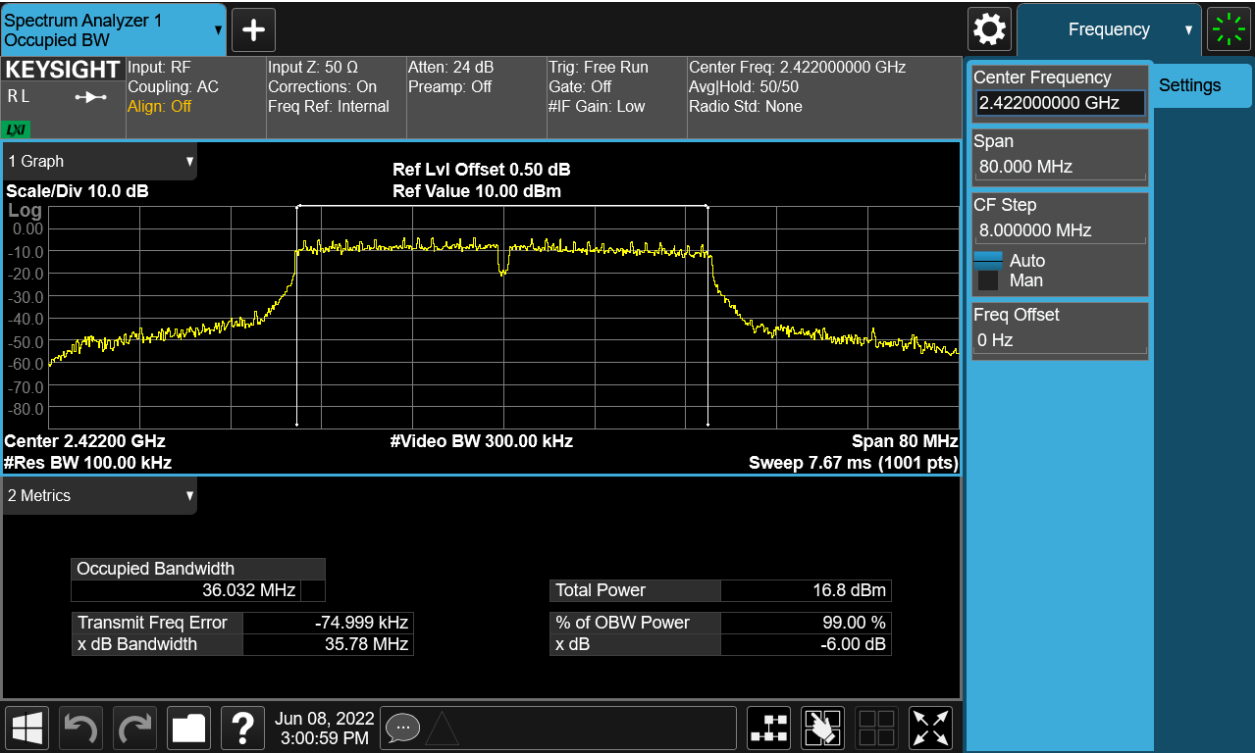


Figure 10: 6dB Bandwidth, 802.11n(HT40), 2422MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 18 of 57

Figure 11: 6dB Bandwidth, 802.11n(HT40), 2437MHz

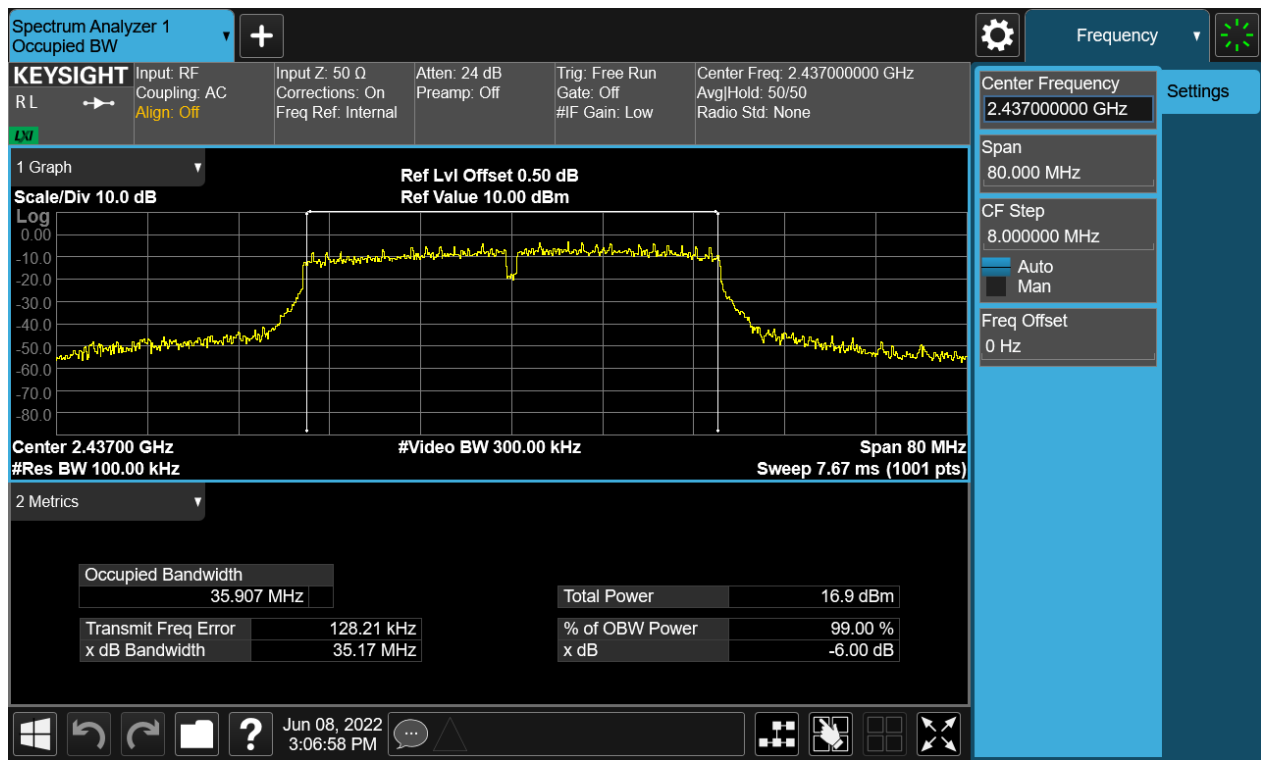
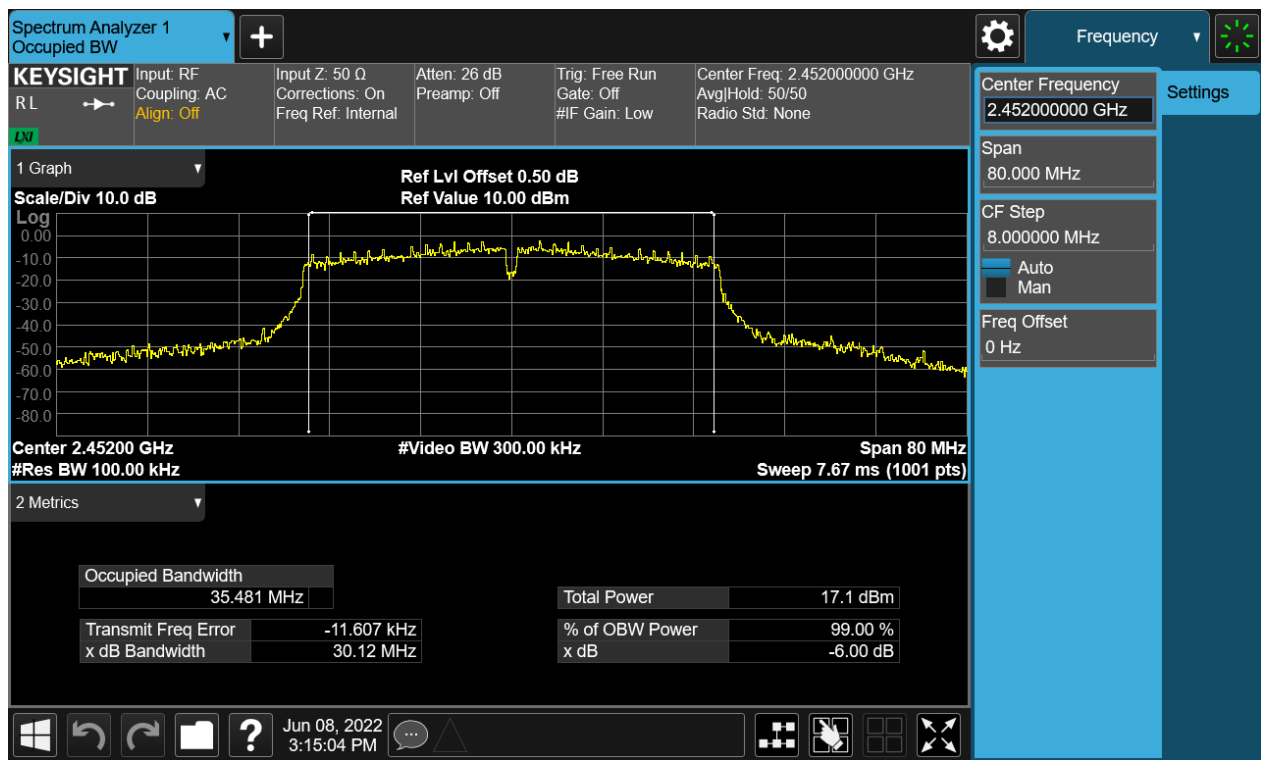


Figure 12: 6dB Bandwidth, 802.11n(HT40), 2452MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 19 of 57

4.1.4 Power Spectral Density

RESULT:

PASS

Test standard : FCC Part 15.247(e)
Requirement : ANSI C63.10-2013, KDB 558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 50%

Table 3: Power Spectral Density

Test Mode	Test Channel (MHz)	Measured Result (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	-6.22	≤8
	2437	-5.88	
	2462	-6.11	
802.11g	2412	-12.45	
	2437	-12.31	
	2462	-13.21	
802.11n(HT20)	2412	-12.69	
	2437	-12.74	
	2462	-12.80	
802.11n(HT40)	2422	-18.48	
	2437	-18.48	
	2452	-16.91	

TEST REPORT

Report No.: SHH22020028-01DE Date: 2022-06-14 Page 20 of 57

Figure 13: Power Spectral Density, 802.11b, 2412MHz

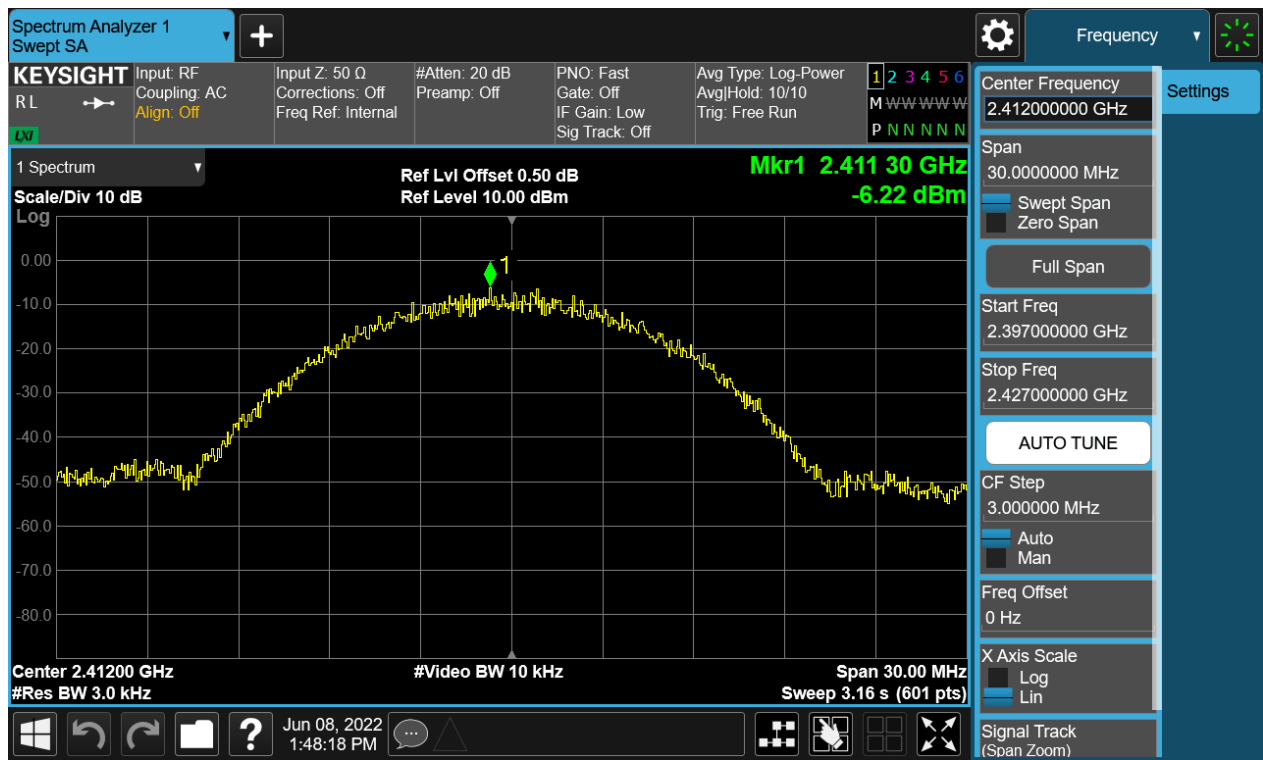
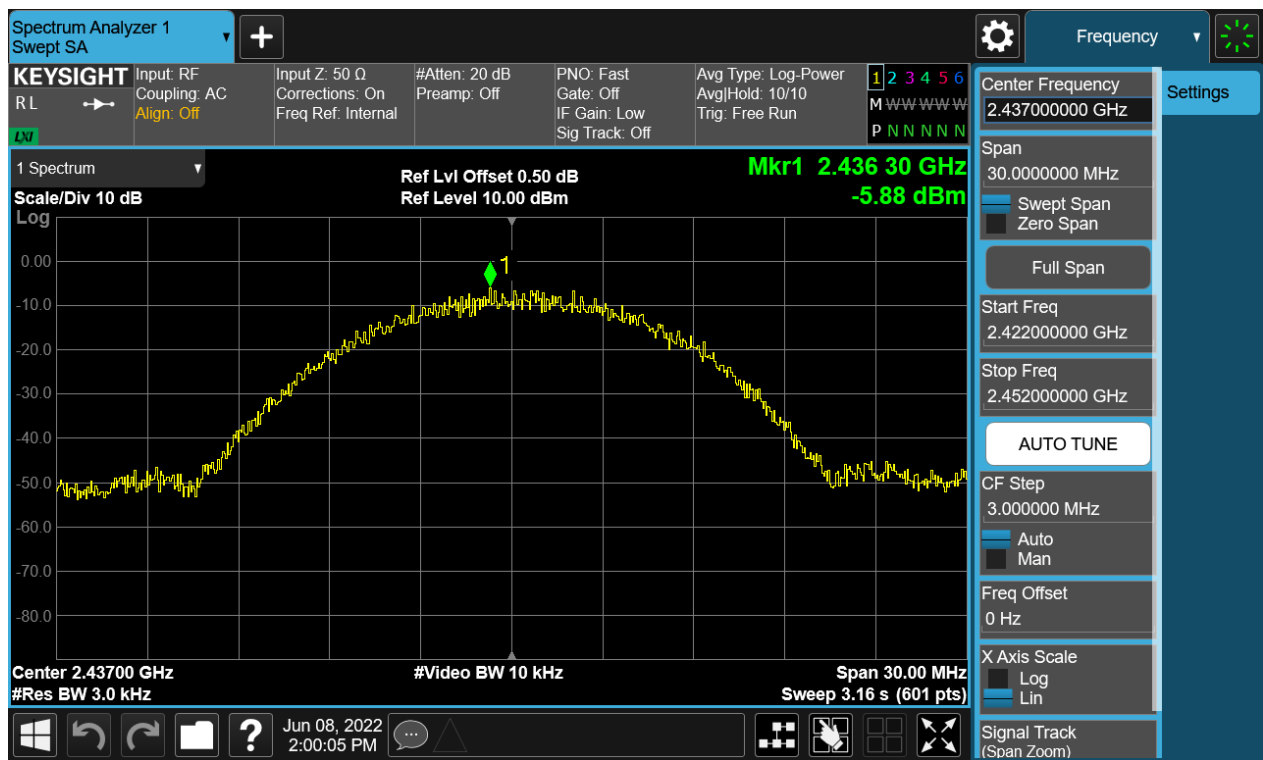


Figure 14: Power Spectral Density, 802.11b, 2437MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 21 of 57

Figure 15: Power Spectral Density, 802.11b, 2462MHz

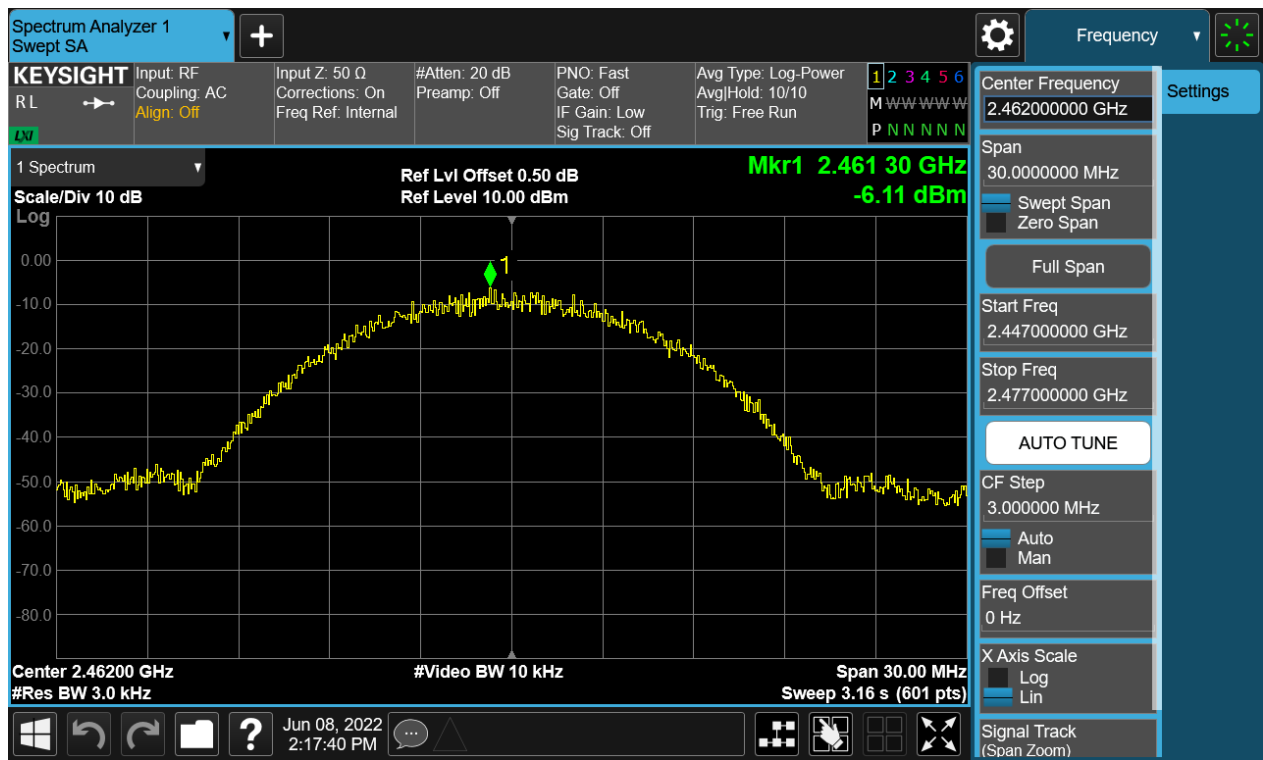
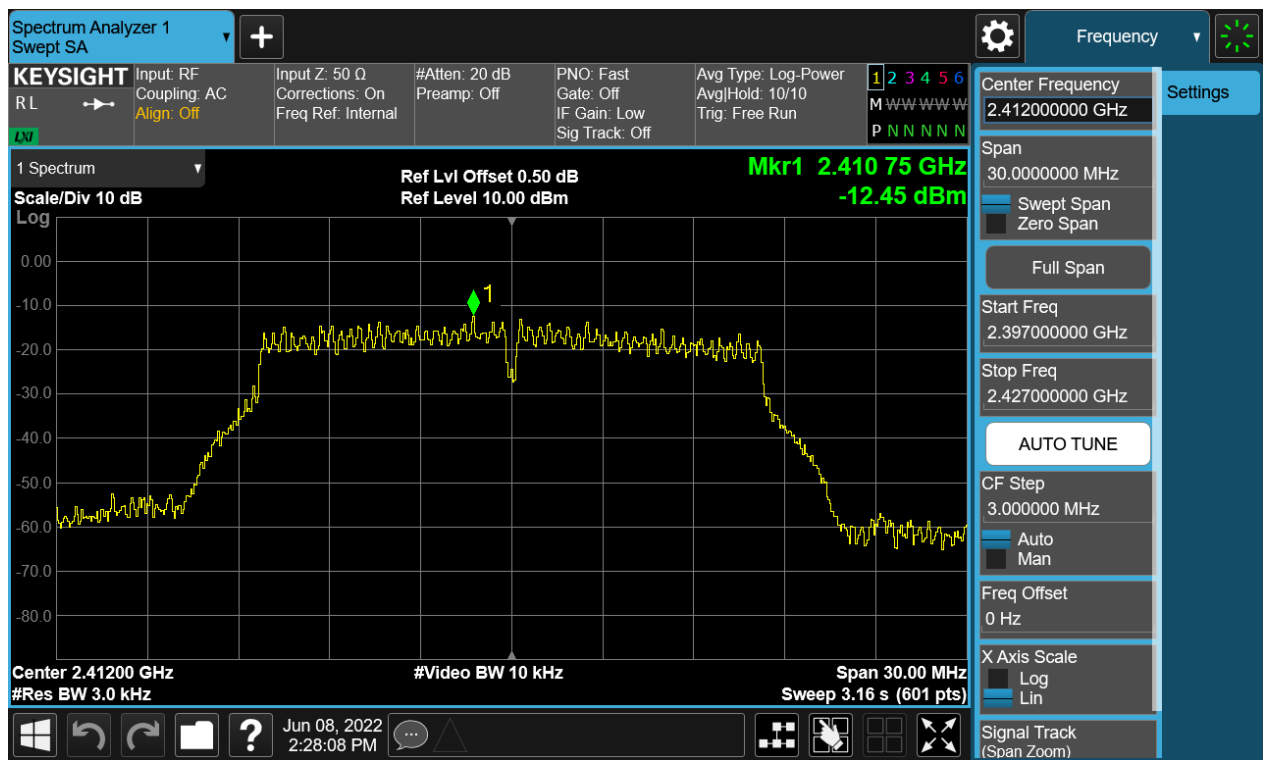


Figure 16: Power Spectral Density, 802.11g, 2412MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 22 of 57

Figure 17: Power Spectral Density, 802.11g, 2437MHz

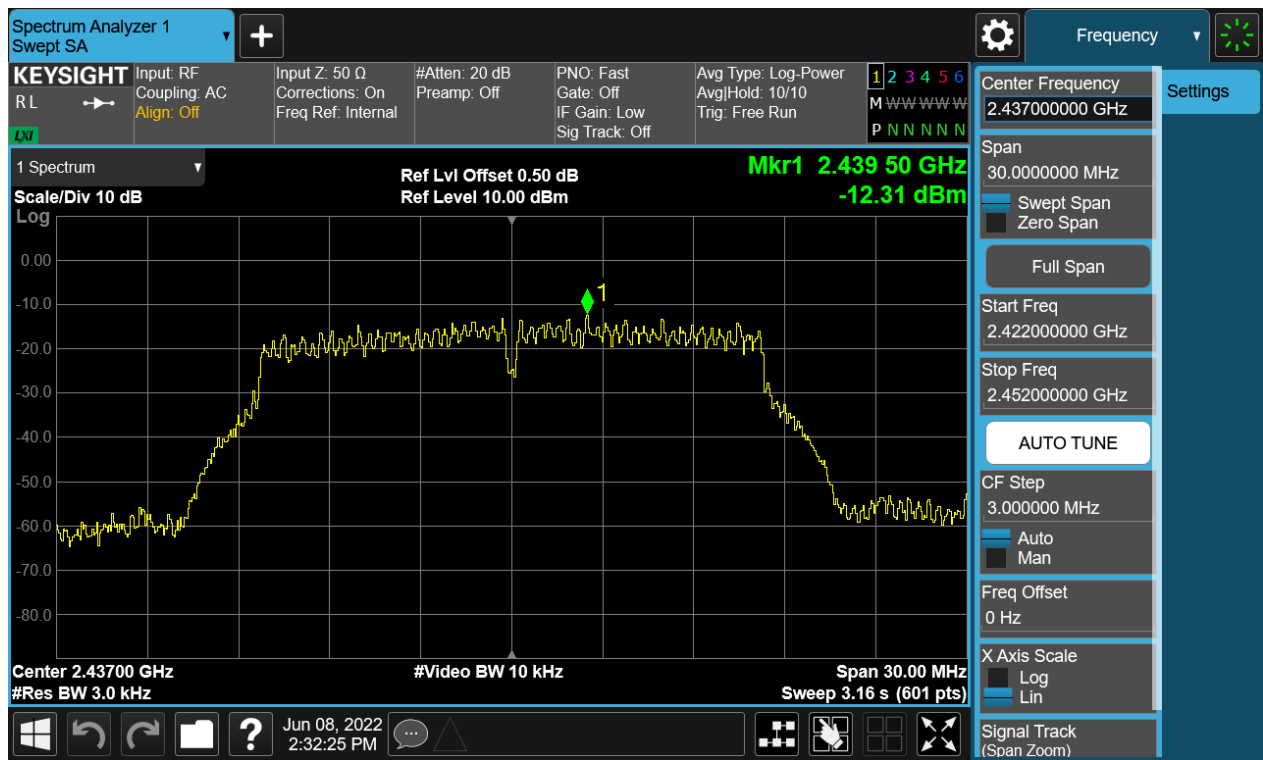
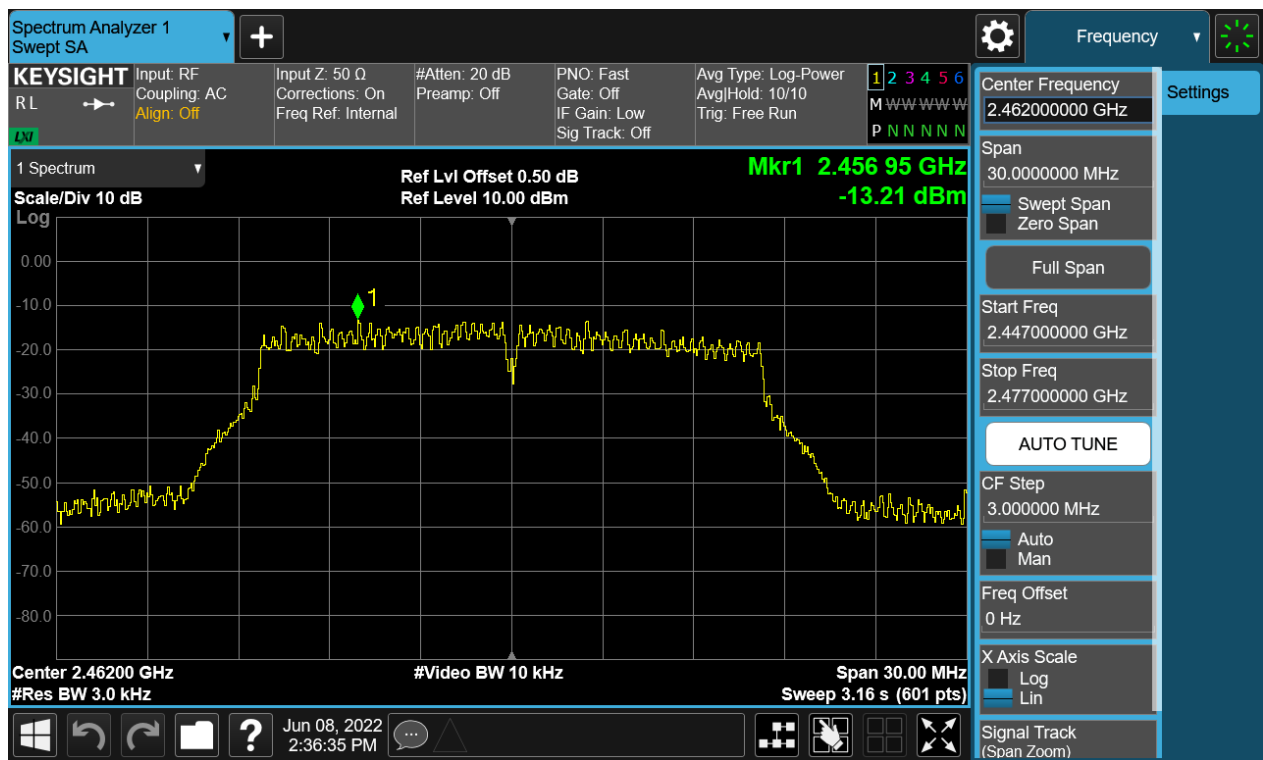


Figure 18: Power Spectral Density, 802.11g, 2462MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 23 of 57

Figure 19: Power Spectral Density, 802.11n(HT20), 2412MHz

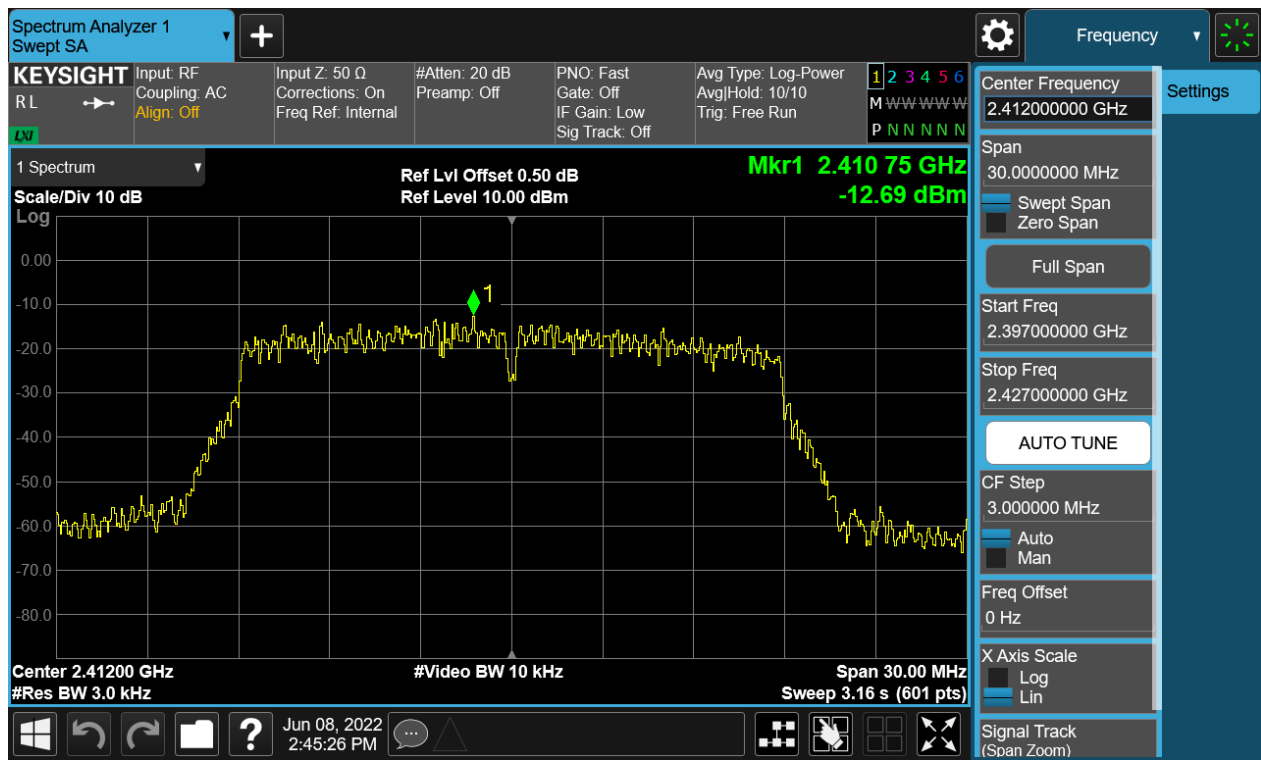
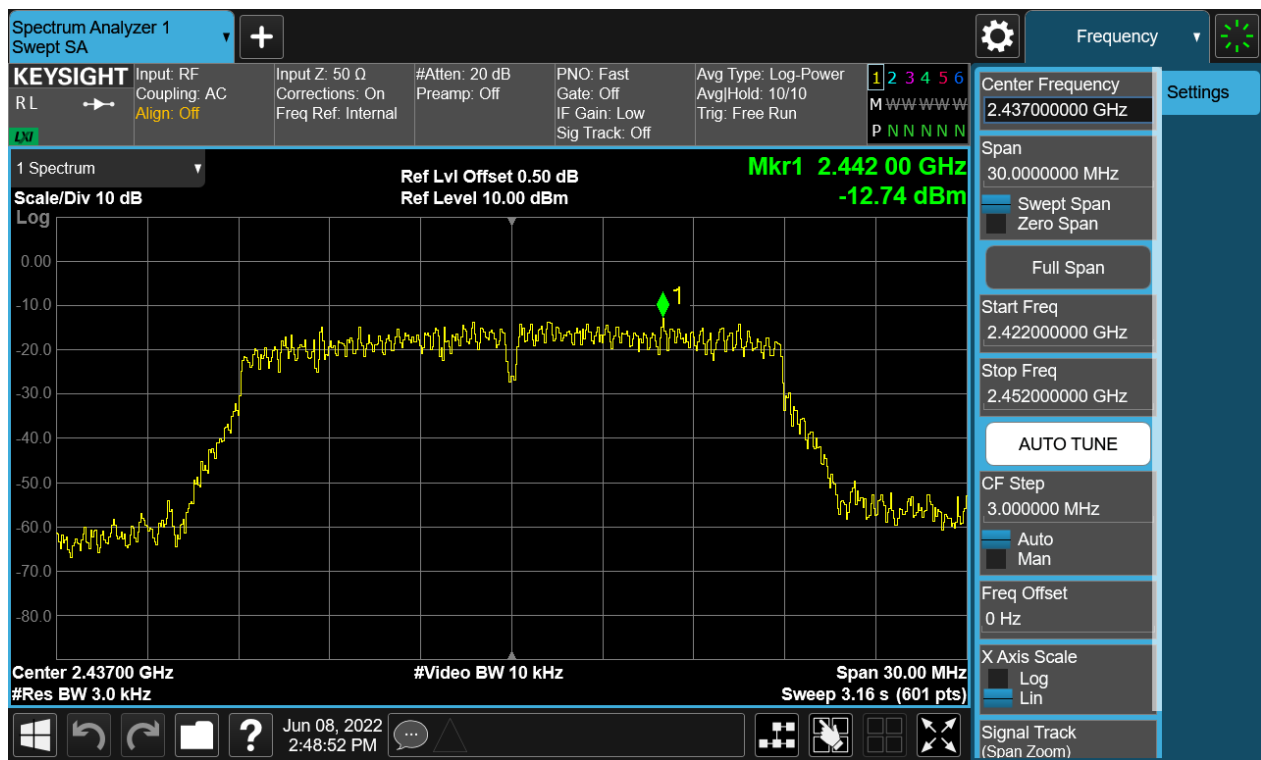


Figure 20: Power Spectral Density, 802.11n(HT20), 2437MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 24 of 57

Figure 21: Power Spectral Density, 802.11n(HT20), 2462MHz

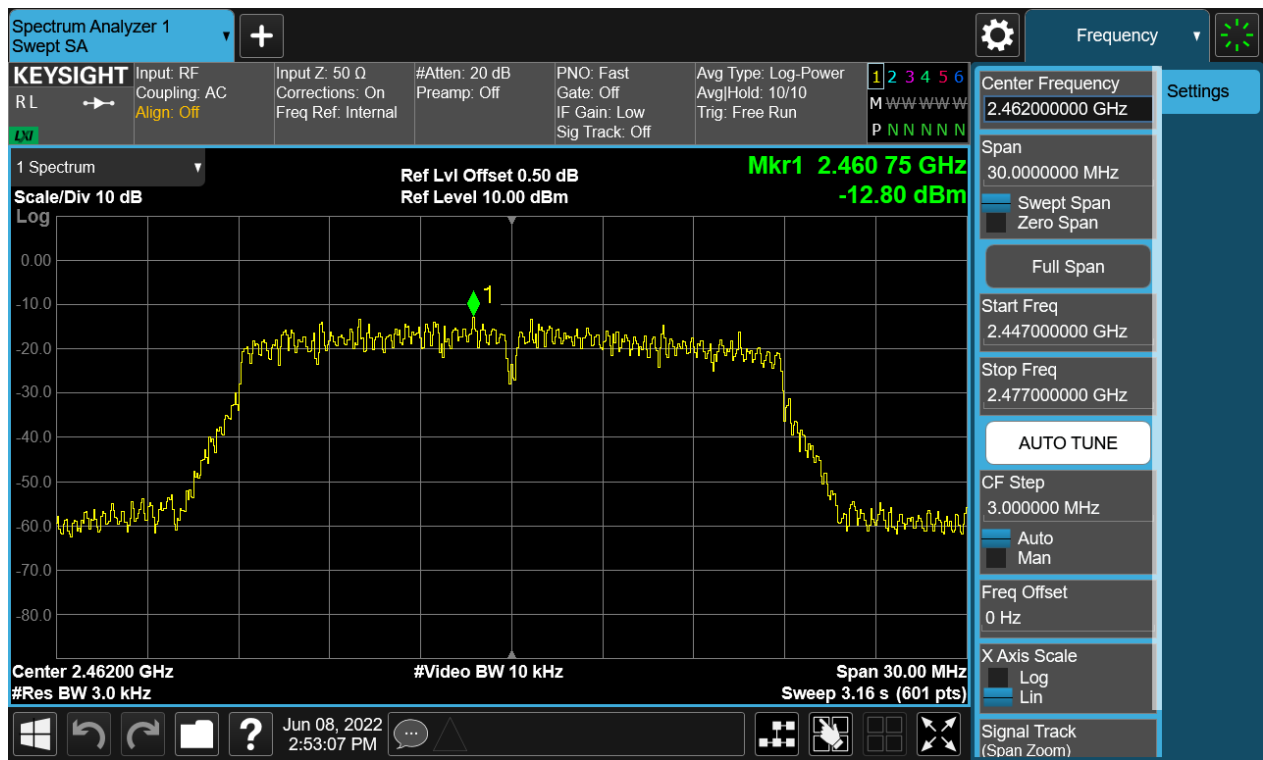
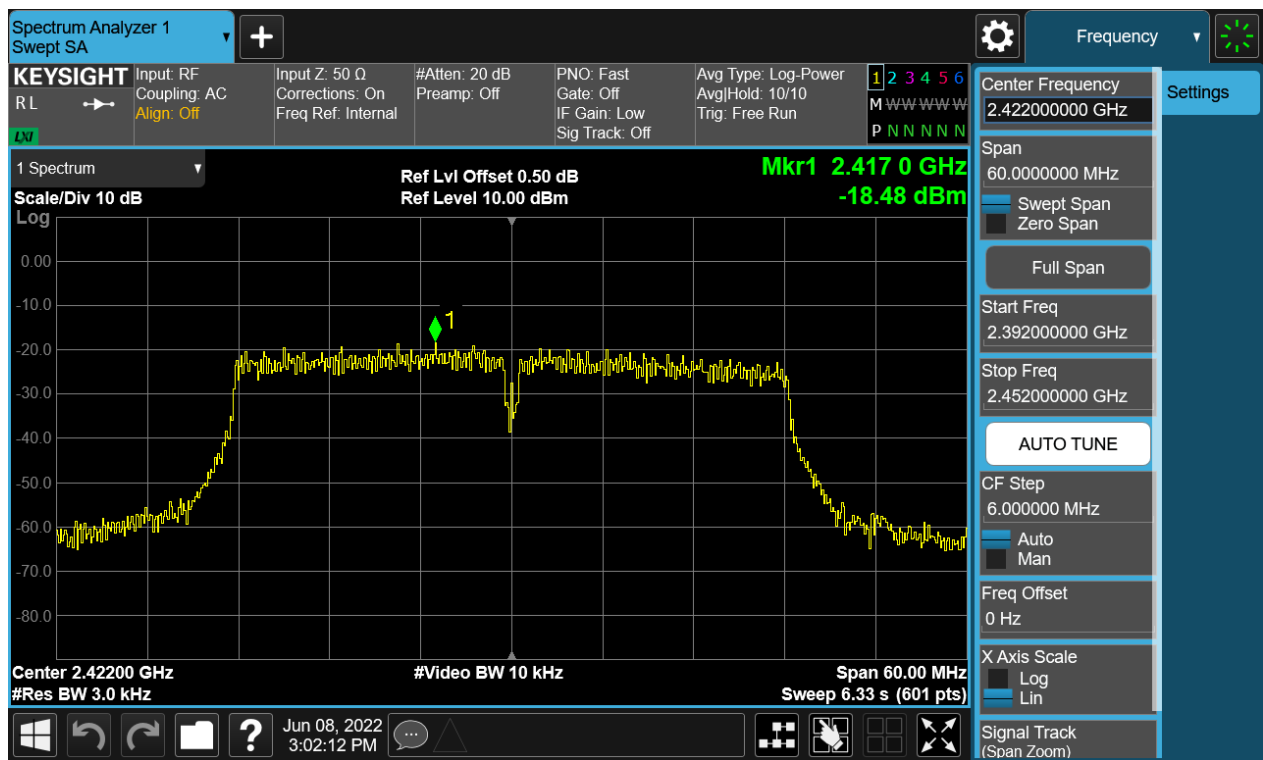


Figure 22: Power Spectral Density, 802.11n(HT40), 2422M



TEST REPORT

Figure 23: Power Spectral Density, 802.11n(HT40), 2437MHz

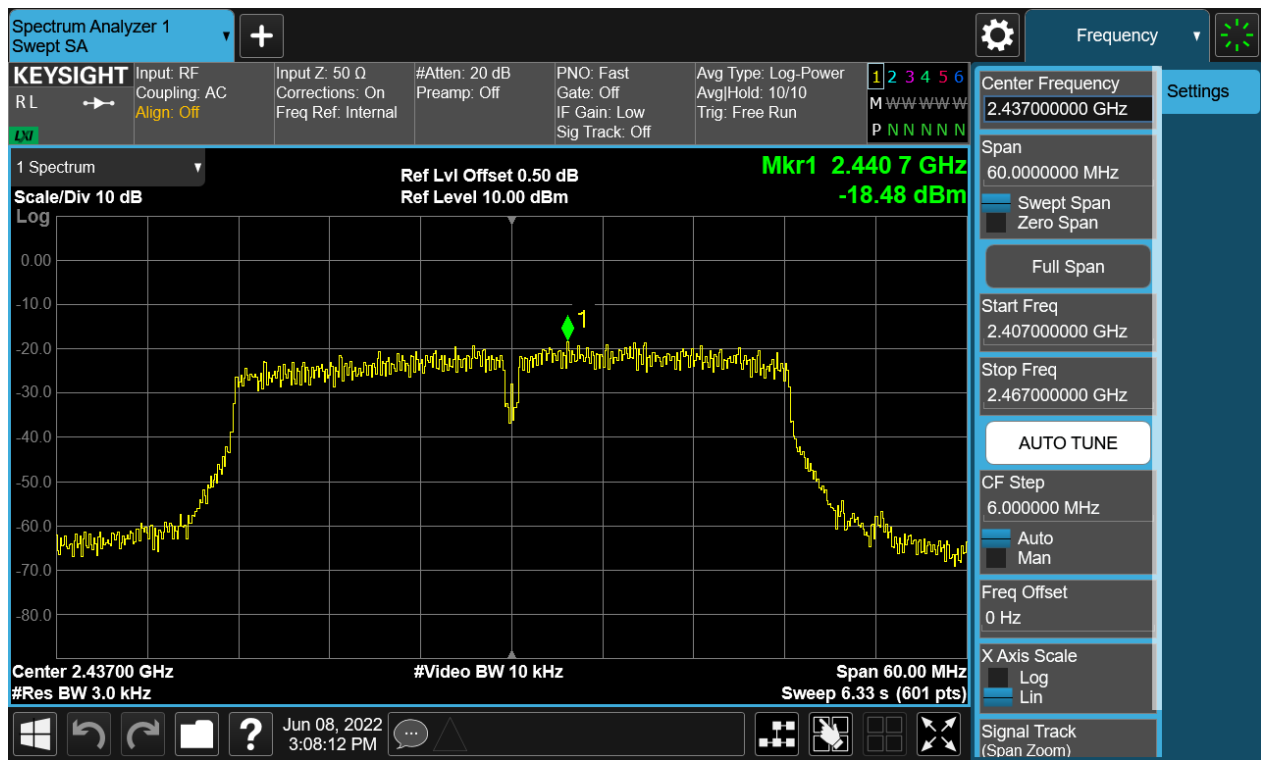
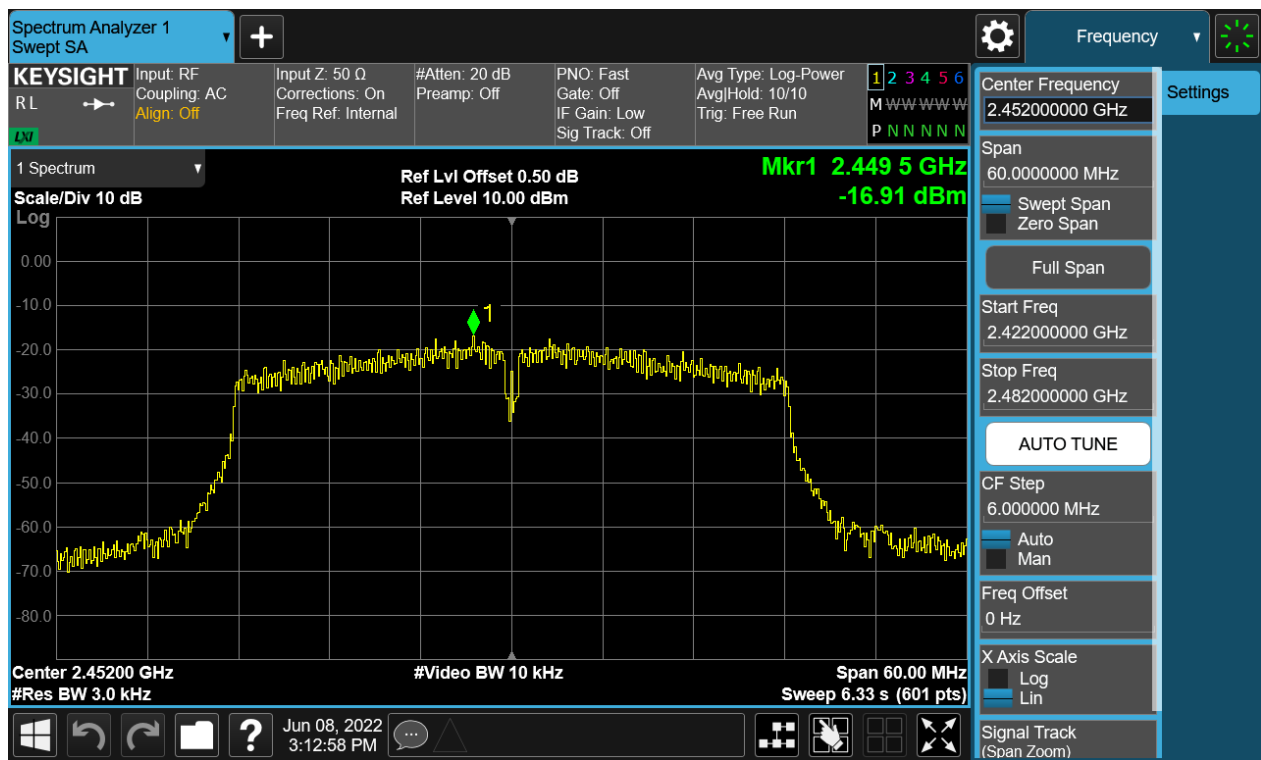


Figure 24: Power Spectral Density, 802.11n(HT40), 2452MHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 26 of 57

4.1.5 Conducted Spurious Emission & Authorized-band band-edge

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.209
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: Shielded room

Test setup

Test Channel	: Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	: A.1.a
Ambient temperature	: 25°C
Relative humidity	: 50%

For details refer to following test plot.

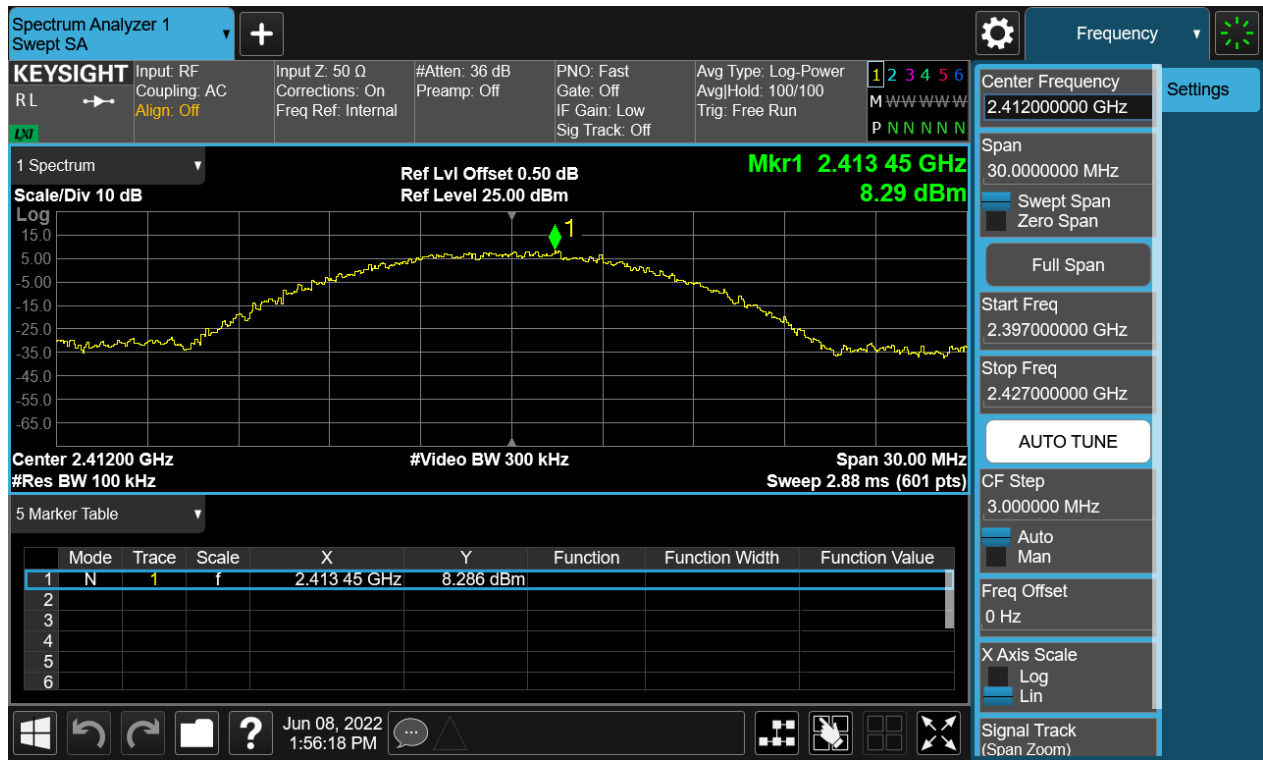
TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 27 of 57

Figure 25: Conducted Spurious Emission & Authorized-band band-edge, 802.11b, 2412MHz Carrier Level



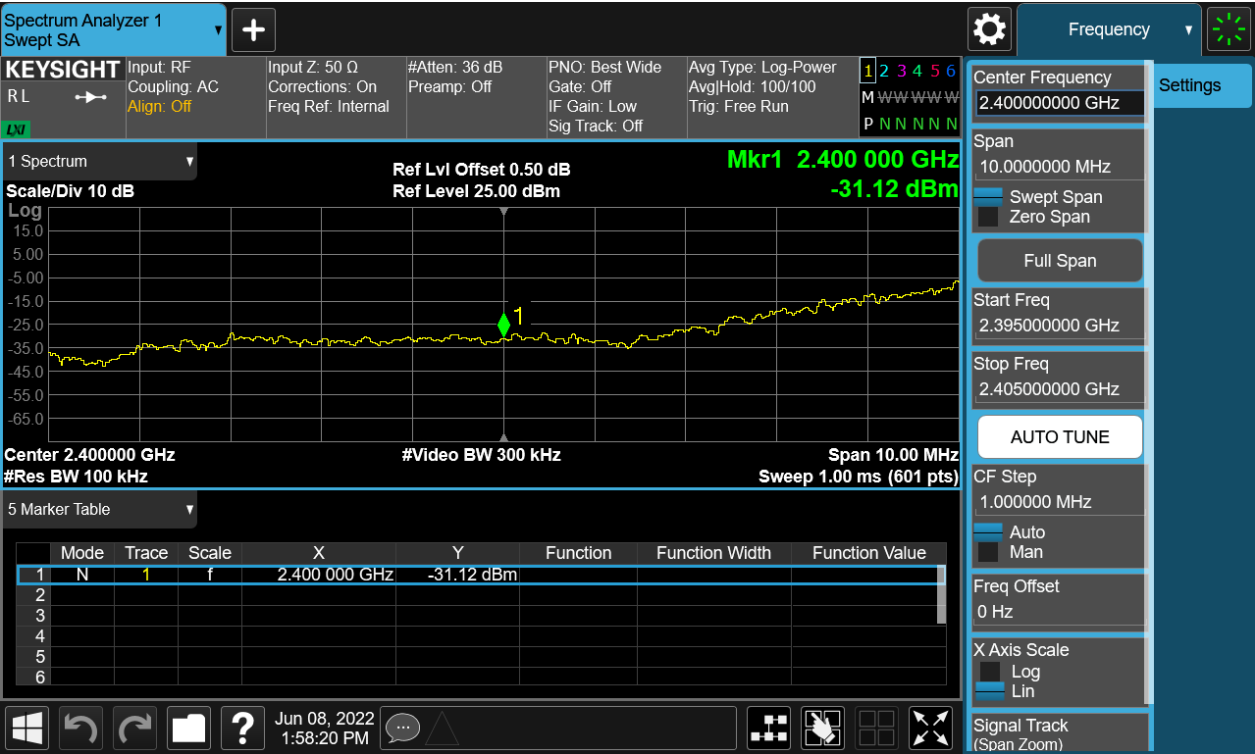
Band Edge

TEST REPORT

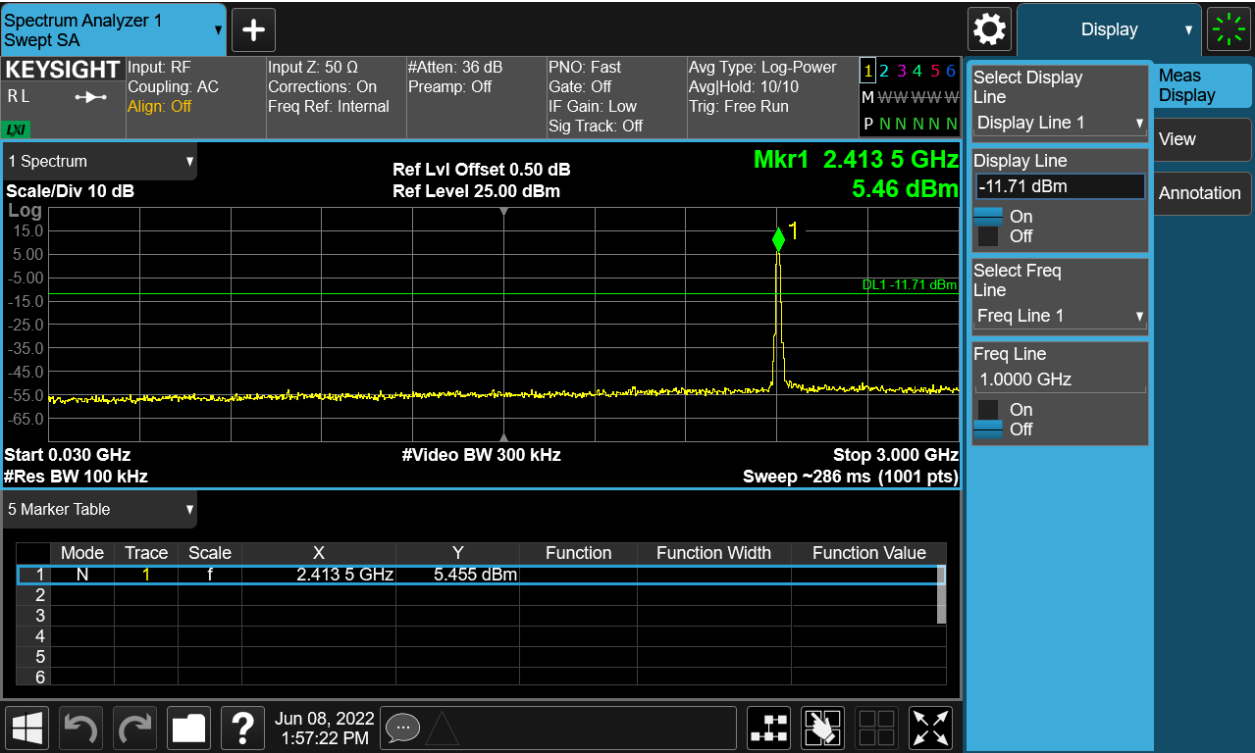
Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 28 of 57



Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 29 of 57

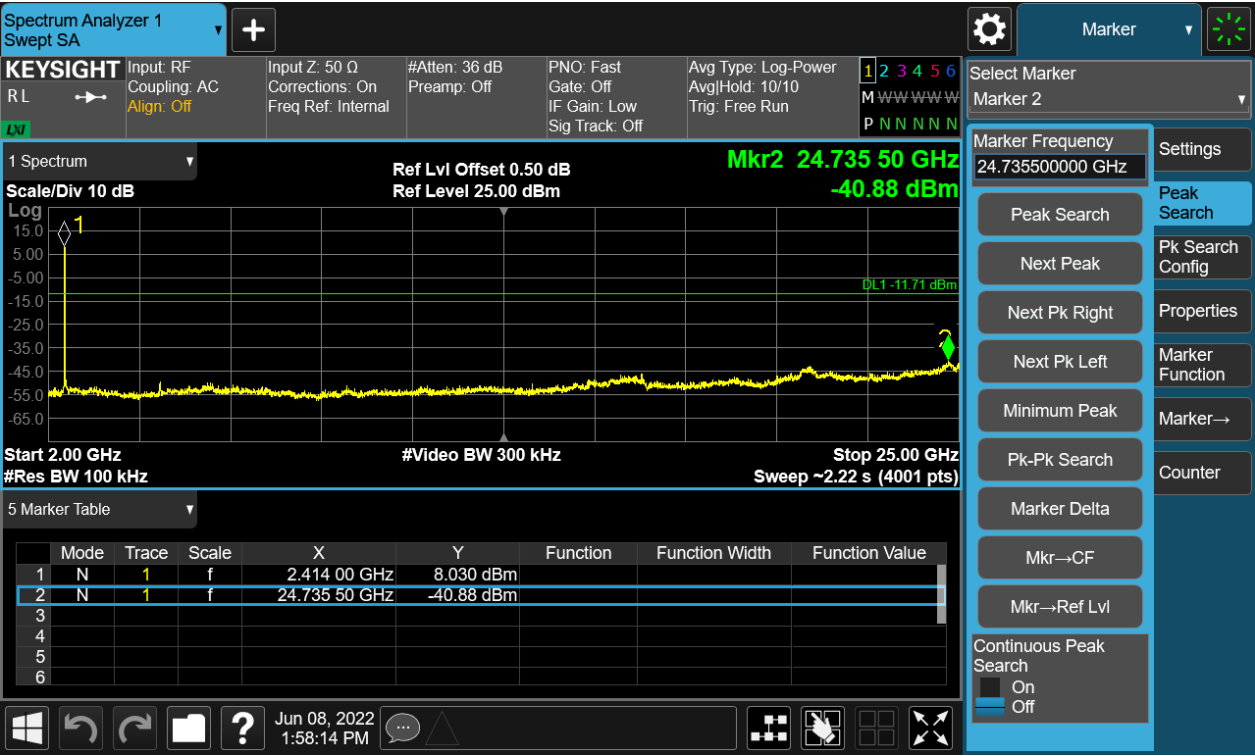


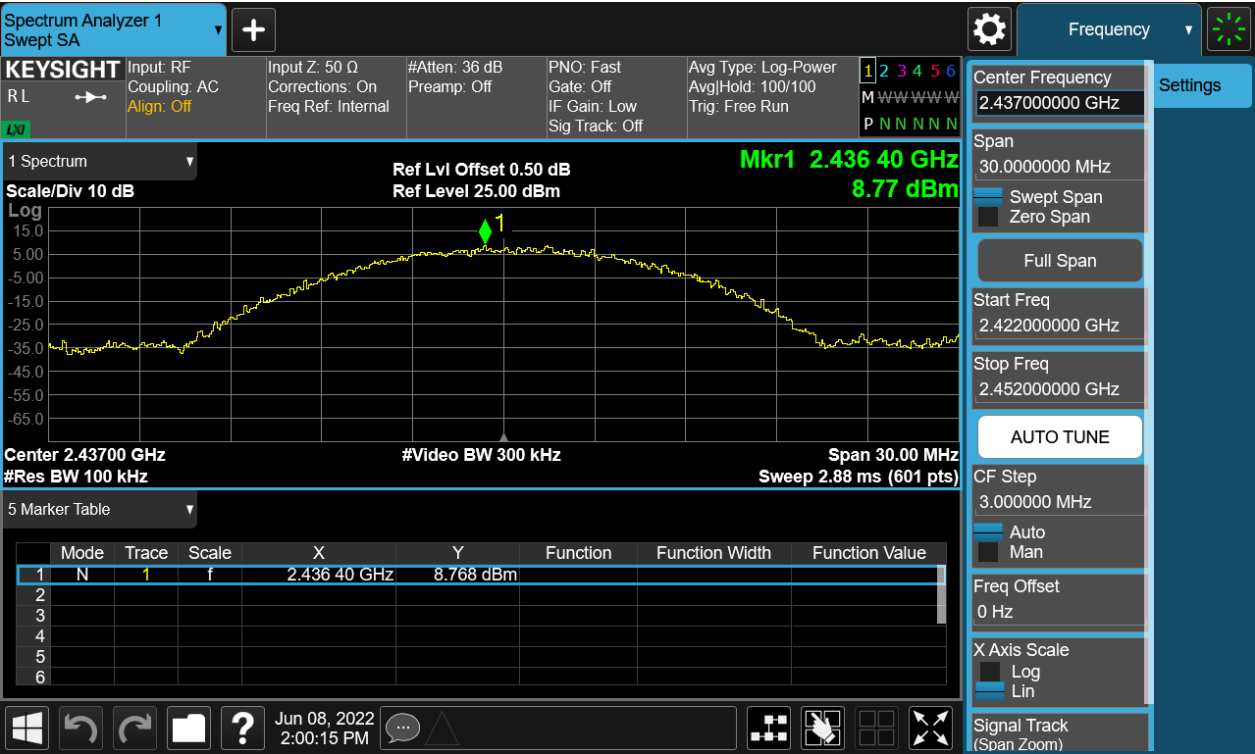
Figure 26: Conducted Spurious Emission & Authorized-band band-edge, 802.11b, 2437MHz Carrier Level

TEST REPORT

Report No.: SHH22020028-01DE

Date: 2022-06-14

Page 30 of 57



Conducted spurious emissions 30MHz-25GHz

