

TEST REPORT

Report No.: SHE21120049-02AE

Date: 2022-01-13

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Applicant : Shanghai XinMiaoLink Technology Co., Ltd.
Address of Applicant : Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai, China

Product Name : Wi-Fi&BLE Module
Model No. : X-C13SG-0
Sample No. : E21120049-01#01
E21120049-01#04
FCC ID : 2A3M5-X-C13SG-0

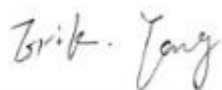
Standards : FCC CFR47 Part 15, Subpart C

Date of Receipt : 2021-12-15
Date of Test : 2021-12-16 ~ 2021-12-22
Date of Issue : 2022-01-13

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)

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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	Shanghai XinMiaoLink Technology Co., Ltd.
Address	Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai,China
Contact Person	Yue liren
Telephone	13818419836
Email	tomas@chipfresh.com
Manufacturer Company Name	Shanghai XinMiaoLink Technology Co., Ltd.
Address	Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai,China

1.3 Details of EUT

Product Name	Wi-Fi&BLE Module
Brand Name	N/A
Test Model No.	X-C13SG-0
FCC ID	2A3M5-X-C13SG-0
Mode of Operation	WLAN 802.11b/g/n(HT20)
Frequency Range	2400MHz ~ 2483.5MHz
Channel Separation	5 MHz
Modulation Type	DSSS, OFDM
Antenna Type	External Antenna
Antenna Gain	3dBi
Test Voltage	DC 3.3V
Hardware version	V1.0
Software version	V1.00.10
Test SW Version	BL410_R;BL410_E
RF power setting in TEST SW	Bouffalo Lab Dev Cube V1.6.5

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1.4 Test Methodology

47 CFR Part 15, Subpart C	Miscellaneous Wireless Communications Services
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

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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	2022-06-07
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2021-06-08	2022-06-07
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2020-11-23	2022-11-22
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2021-06-12	2022-06-11
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

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software 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

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	11Mbps
802.11g	48Mbps
802.11n(20M)	MCS6

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

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3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A
USB Cable	N/A	N/A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	Bouffalo Lab	Bouffalo Lab Dev Cube V1.6.5

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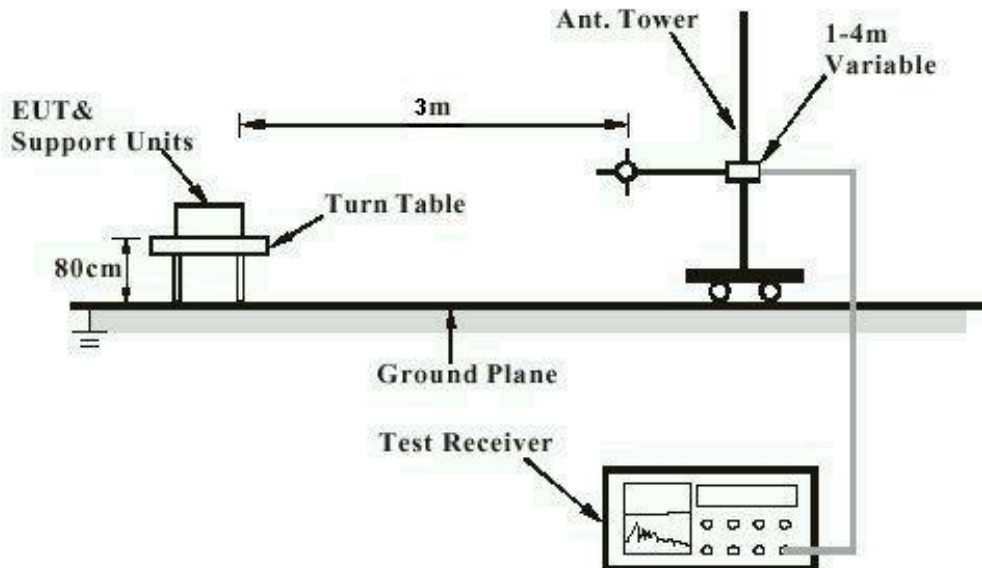
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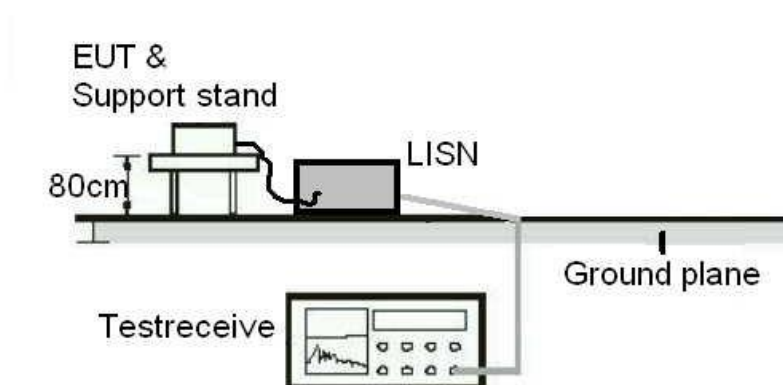
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



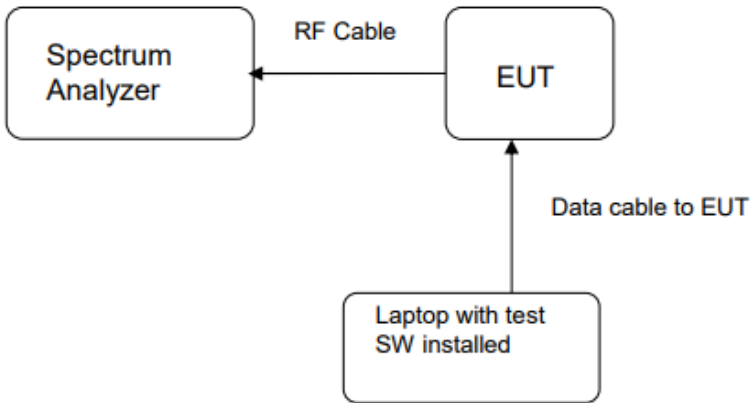
Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement



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Diagram of Measurement Equipment Configuration for Transmitter Measurement



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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 3dBi. The antenna is an External 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.

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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 : 52%

Table 1: Peak Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power	Peak Output Power	Limit (W)
		(dBm)	(mW)	
802.11b	2412	16.34	43.05	≤1
	2437	16.42	43.85	
	2462	16.30	42.66	
802.11g	2412	15.14	32.66	
	2437	15.24	33.42	
	2462	15.15	32.73	
802.11n(HT20)	2412	13.93	24.72	
	2437	14.02	25.23	
	2462	13.97	24.95	

Note: configure the operation of the EUT transmits continuously at its maximum power control level (100% duty cycle).

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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 : 52%

Table 2: 6dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	6 dB Bandwidth Limit (MHz)
802.11b	2412	8.852	≥ 0.5
	2437	9.502	
	2462	8.618	
802.11g	2412	16.410	
	2437	16.380	
	2462	16.140	
802.11n(HT20)	2412	16.630	
	2437	17.090	
	2462	17.270	

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Figure 1: 6dB Bandwidth and 99% Bandwidth, 802.11b, 2412MHz

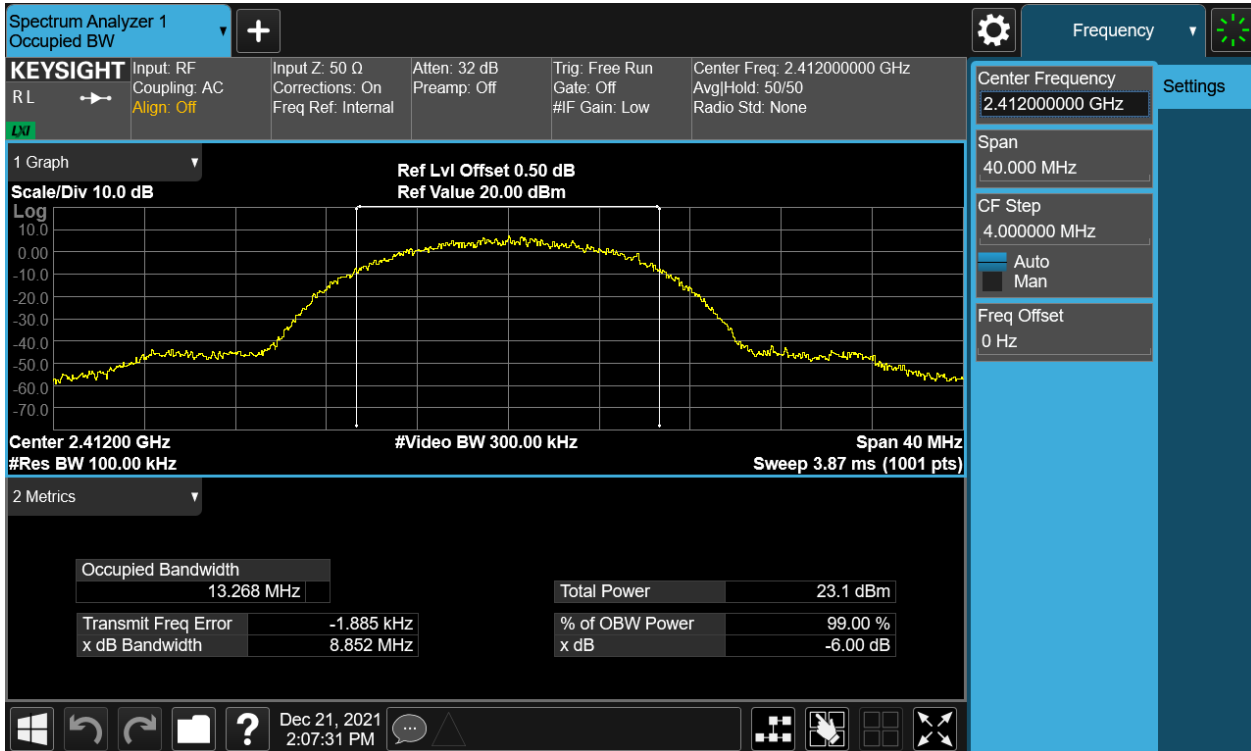
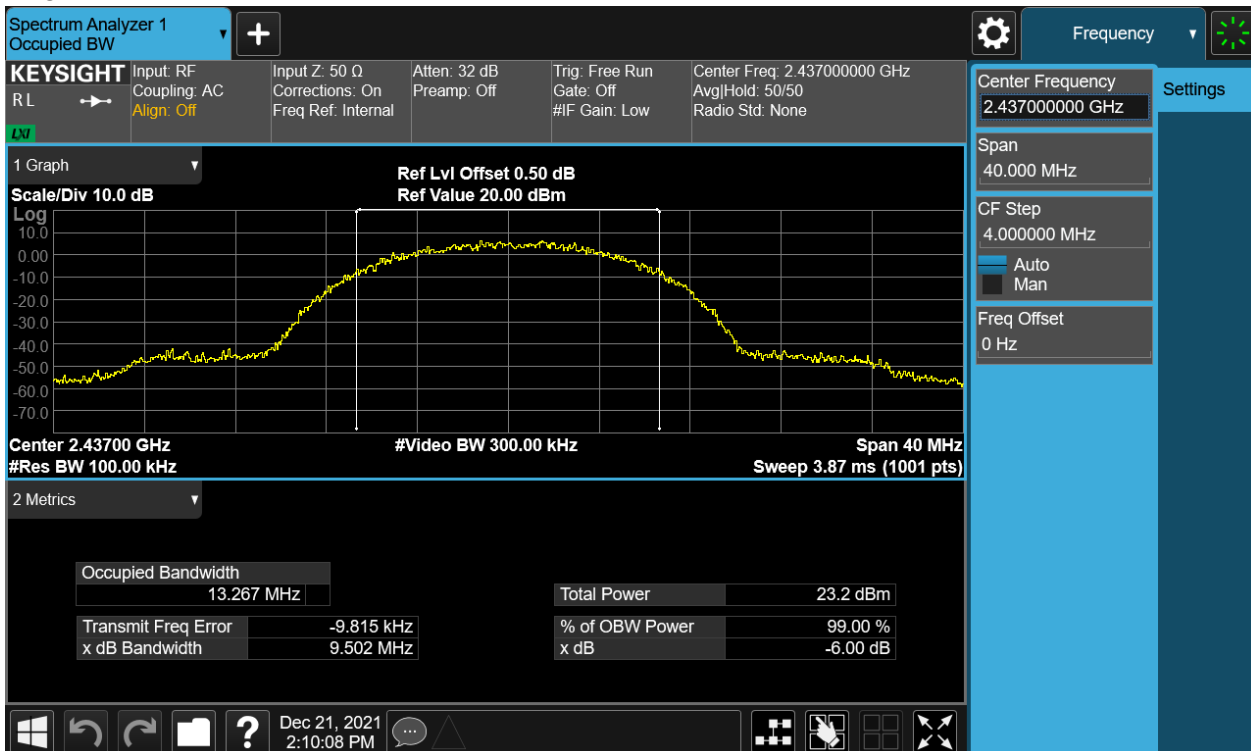


Figure 2: 6dB Bandwidth and 99% Bandwidth, 802.11b, 2437MHz



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Figure 3: 6dB Bandwidth and 99% Bandwidth, 802.11b, 2462MHz

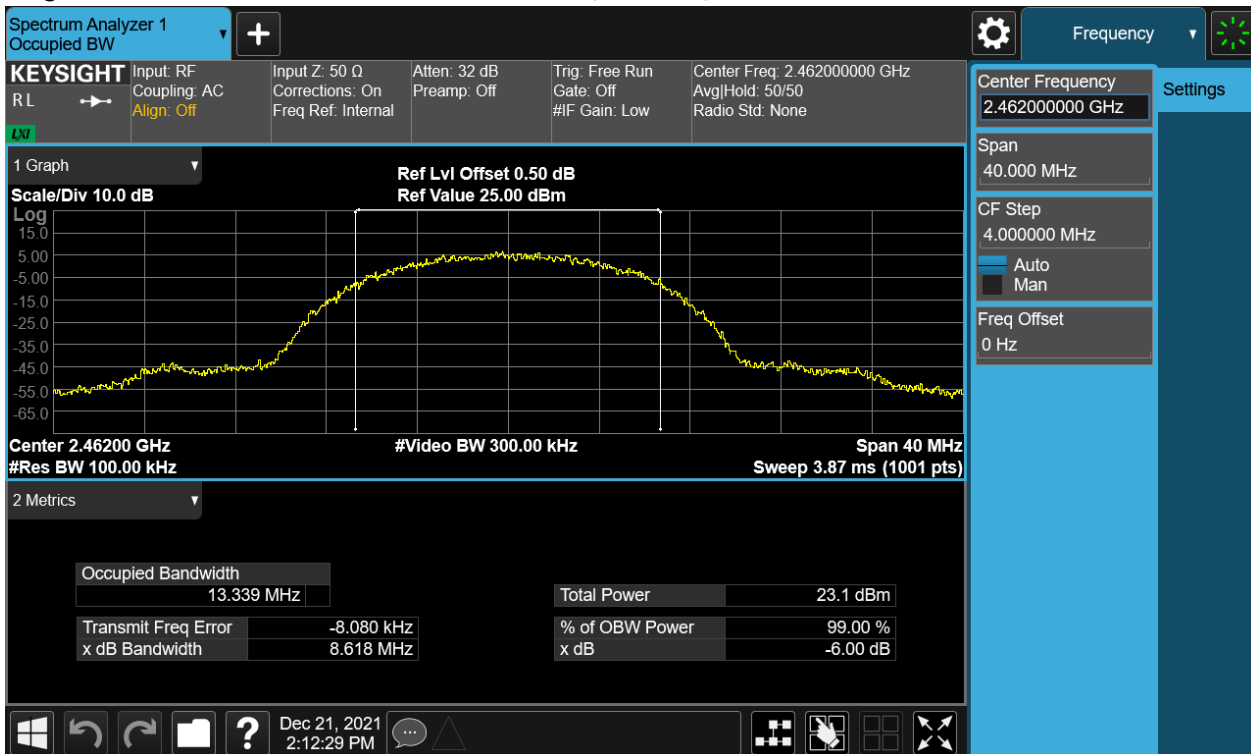
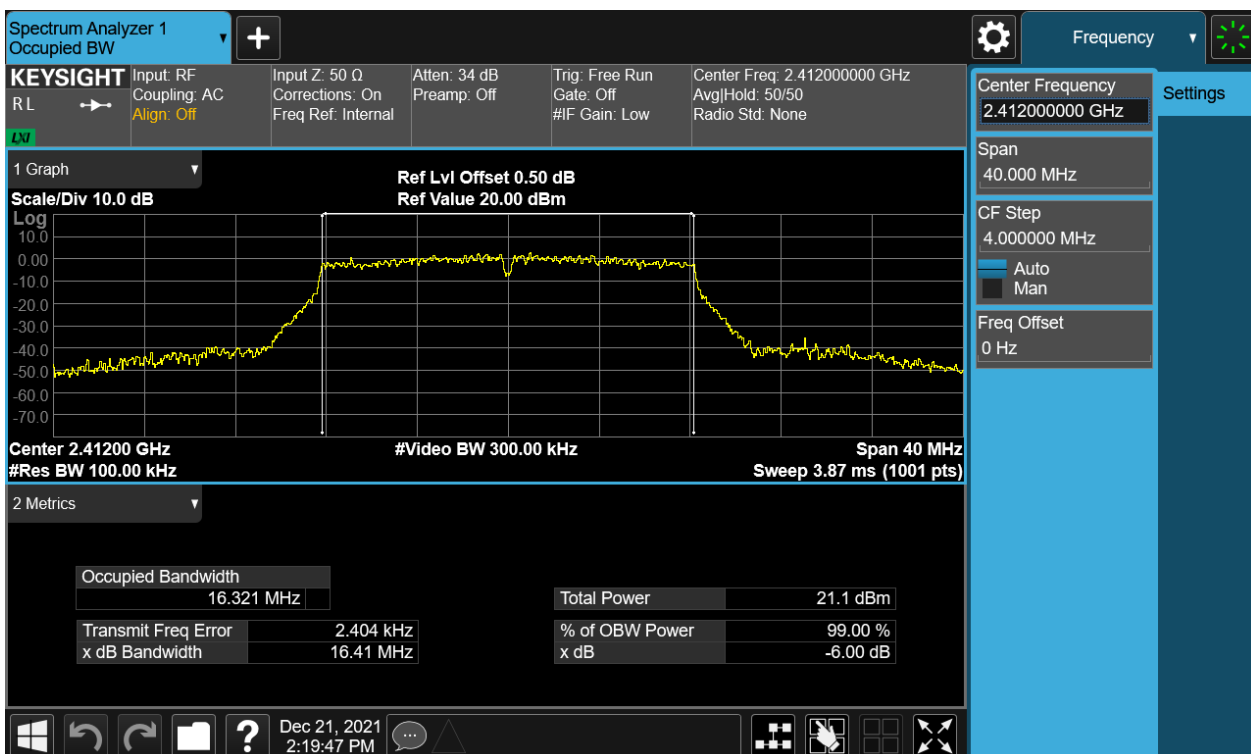


Figure 4: 6dB Bandwidth and 99% Bandwidth, 802.11g, 2412MHz



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Figure 5: 6dB Bandwidth and 99% Bandwidth, 802.11g, 2437MHz

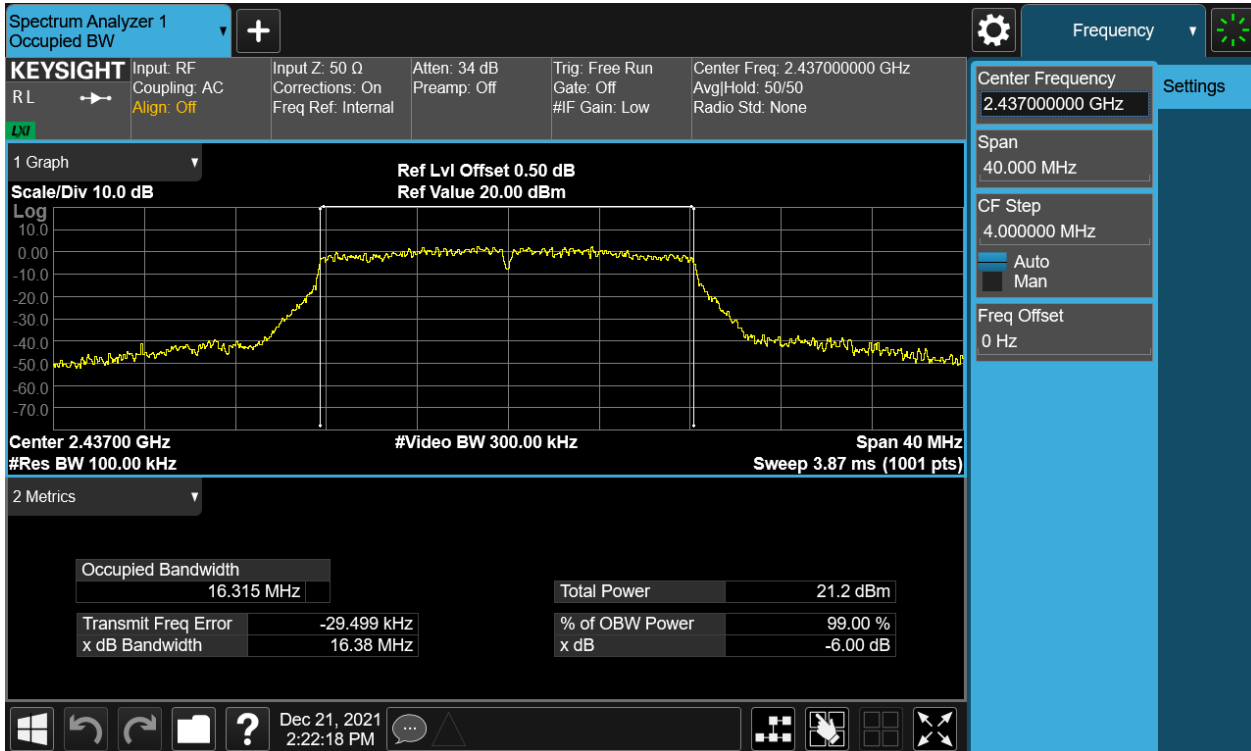
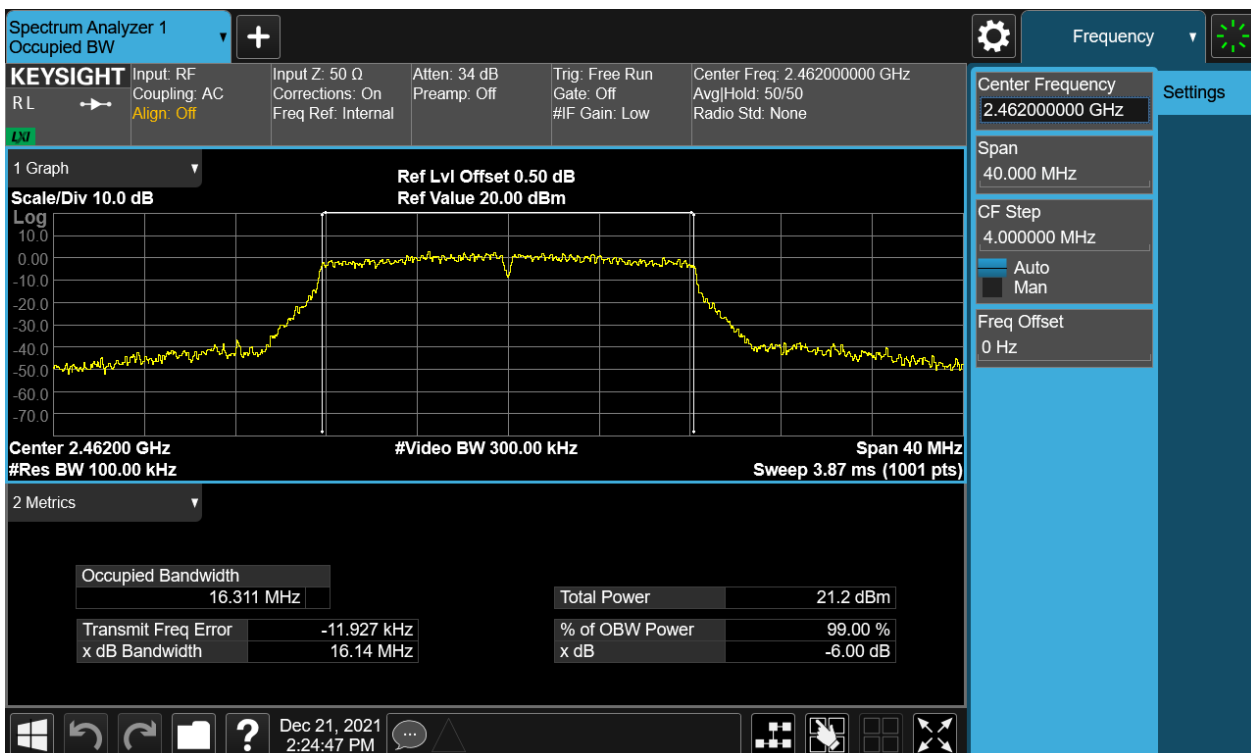


Figure 6: 6dB Bandwidth and 99% Bandwidth, 802.11g, 2462MHz



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Figure 7: 6dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 2412MHz

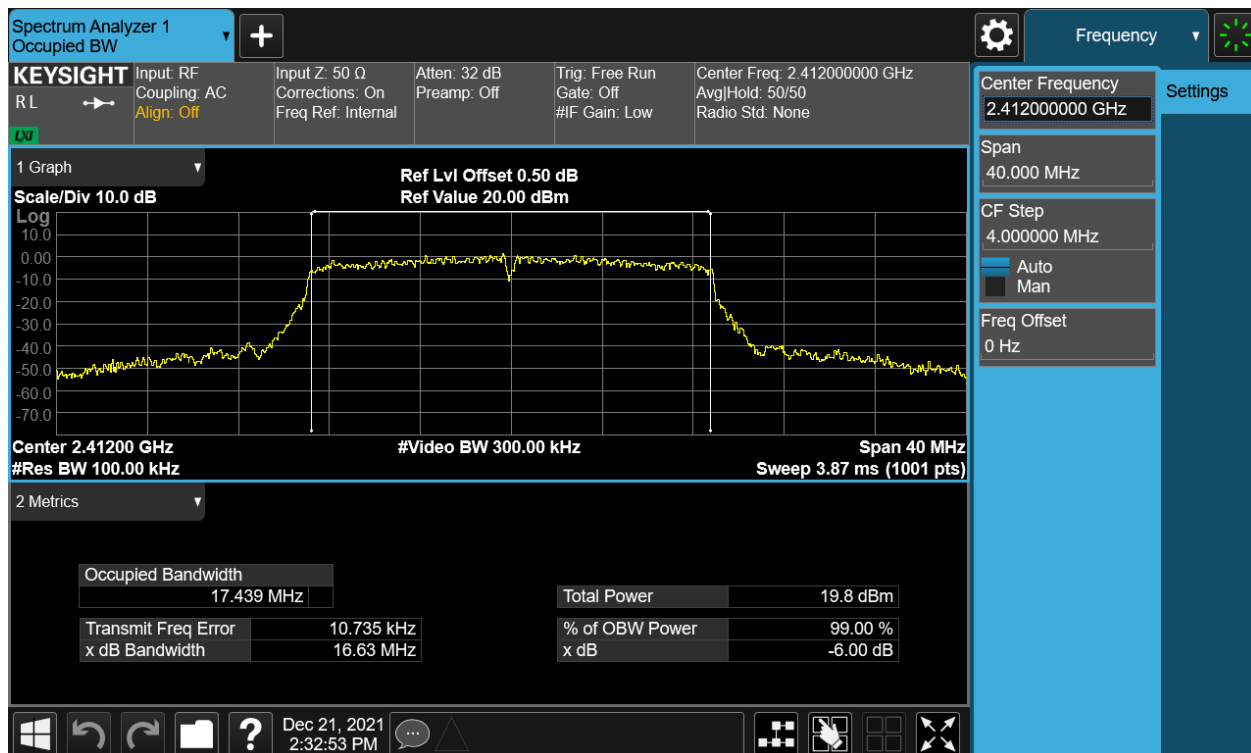
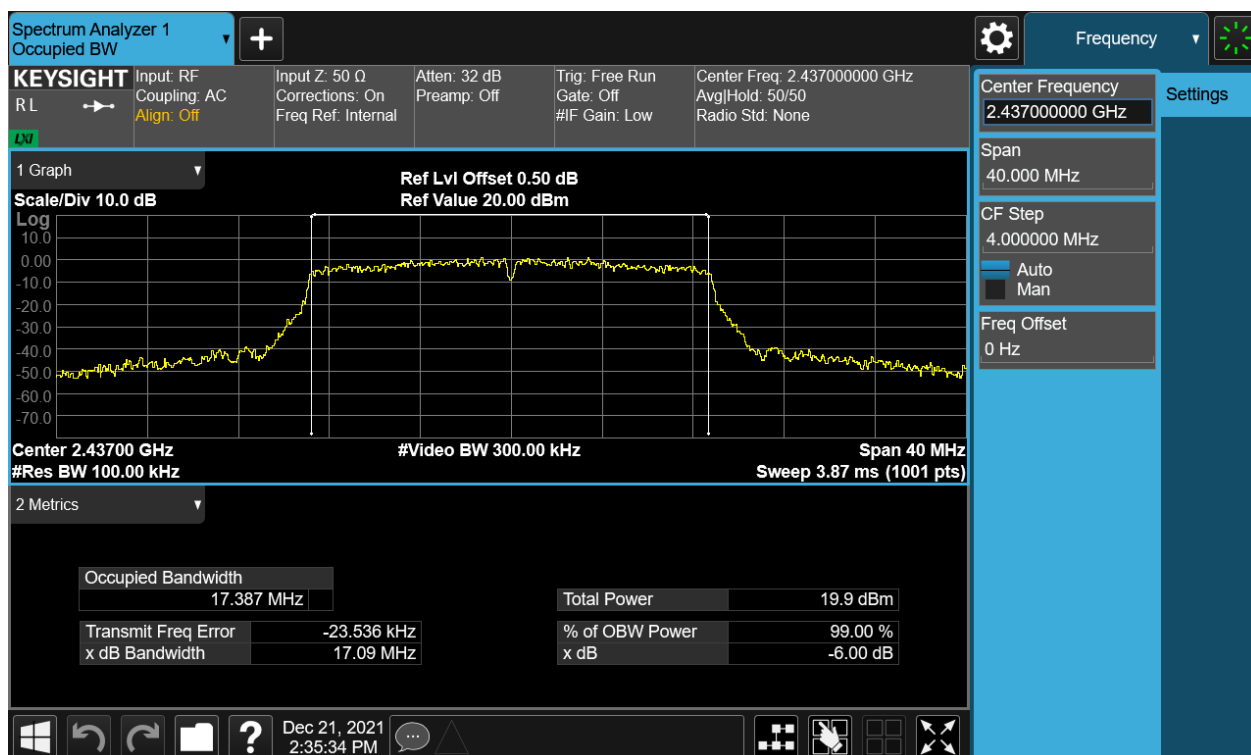


Figure 8: 6dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 2437MHz



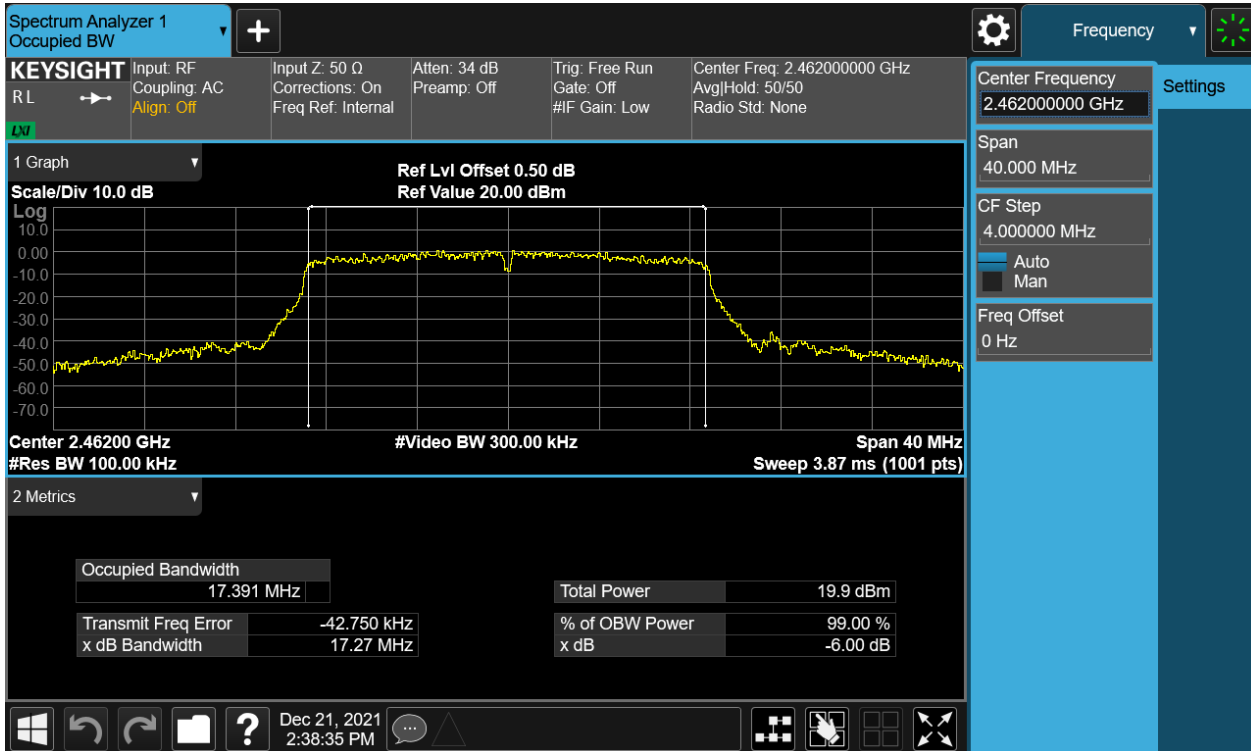
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Figure 9: 6dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 2462MHz



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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 : 52%

Table 3: Power Spectral Density

Test Mode	Test Channel (MHz)	Measured Result (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	-7.59	≤8
	2437	-7.56	
	2462	-8.07	
802.11g	2412	-10.51	
	2437	-10.68	
	2462	-10.35	
802.11n(HT20)	2412	-11.42	
	2437	-11.97	
	2462	-11.48	

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Figure 10: Power Spectral Density, 802.11b, 2412MHz



Figure 11: Power Spectral Density, 802.11b, 2437MHz



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Figure 12: Power Spectral Density, 802.11b, 2462MHz

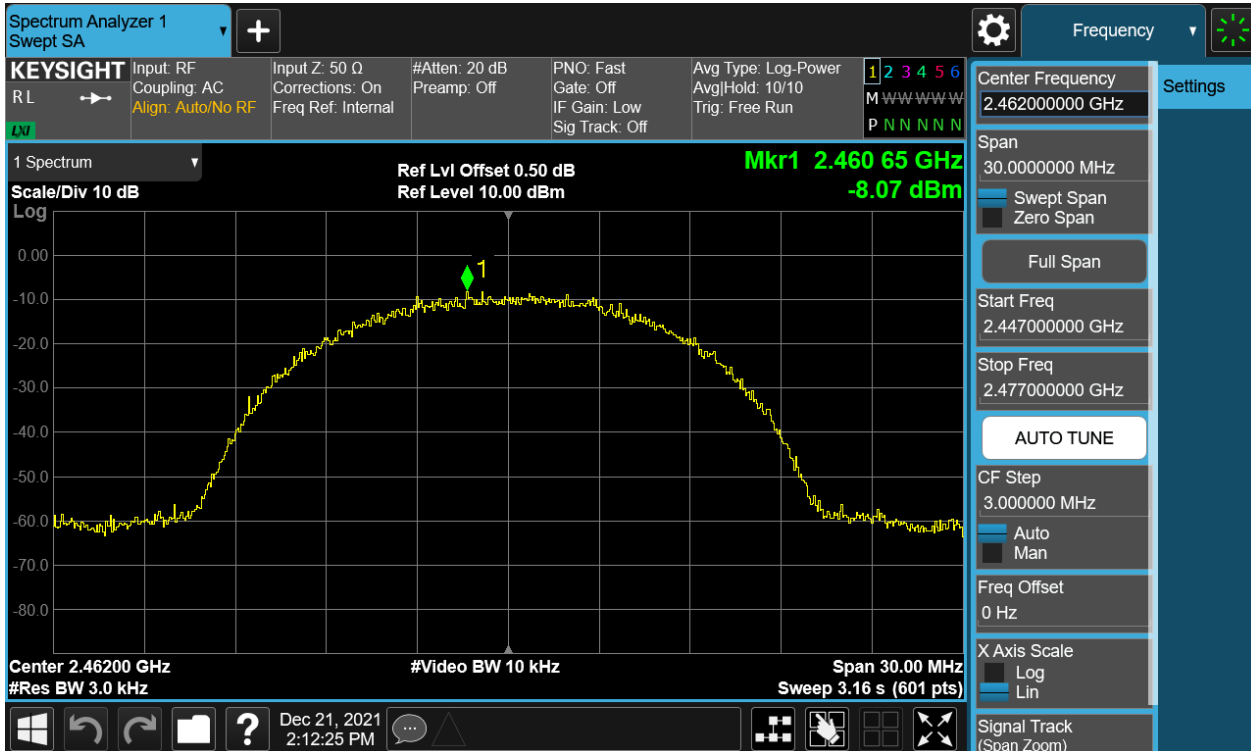
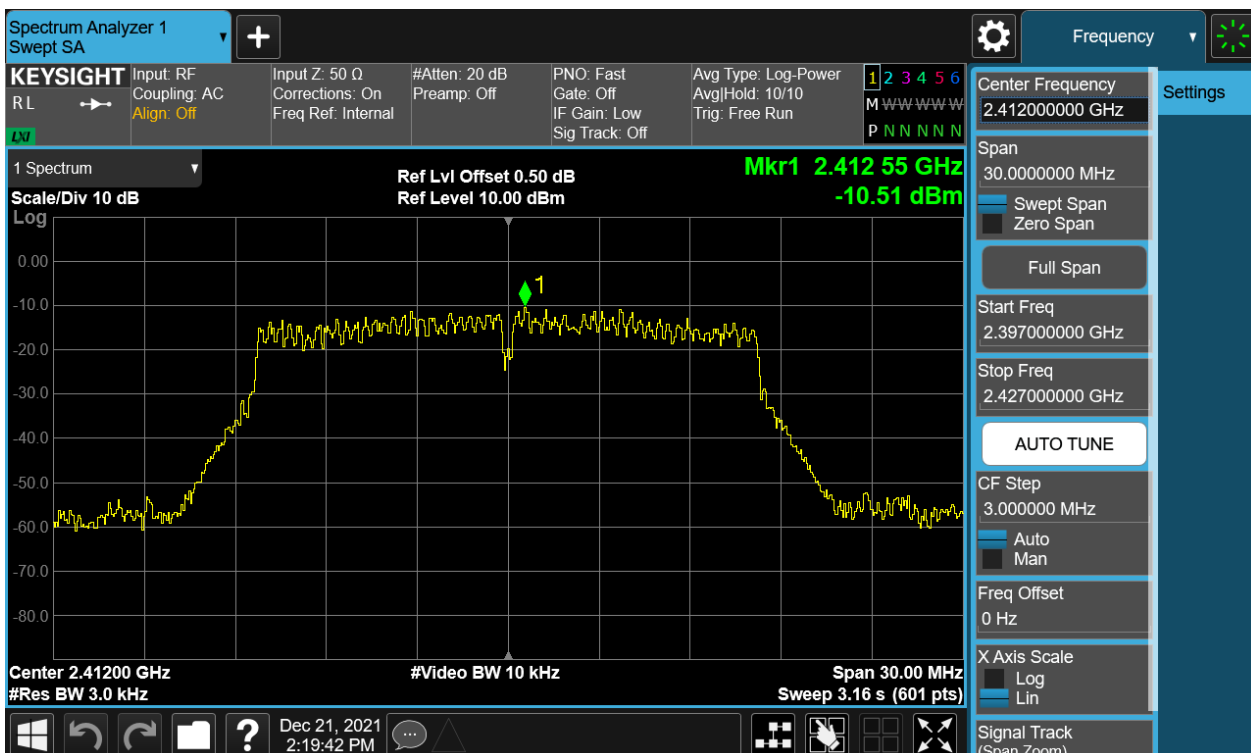


Figure 13: Power Spectral Density, 802.11g, 2412MHz



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

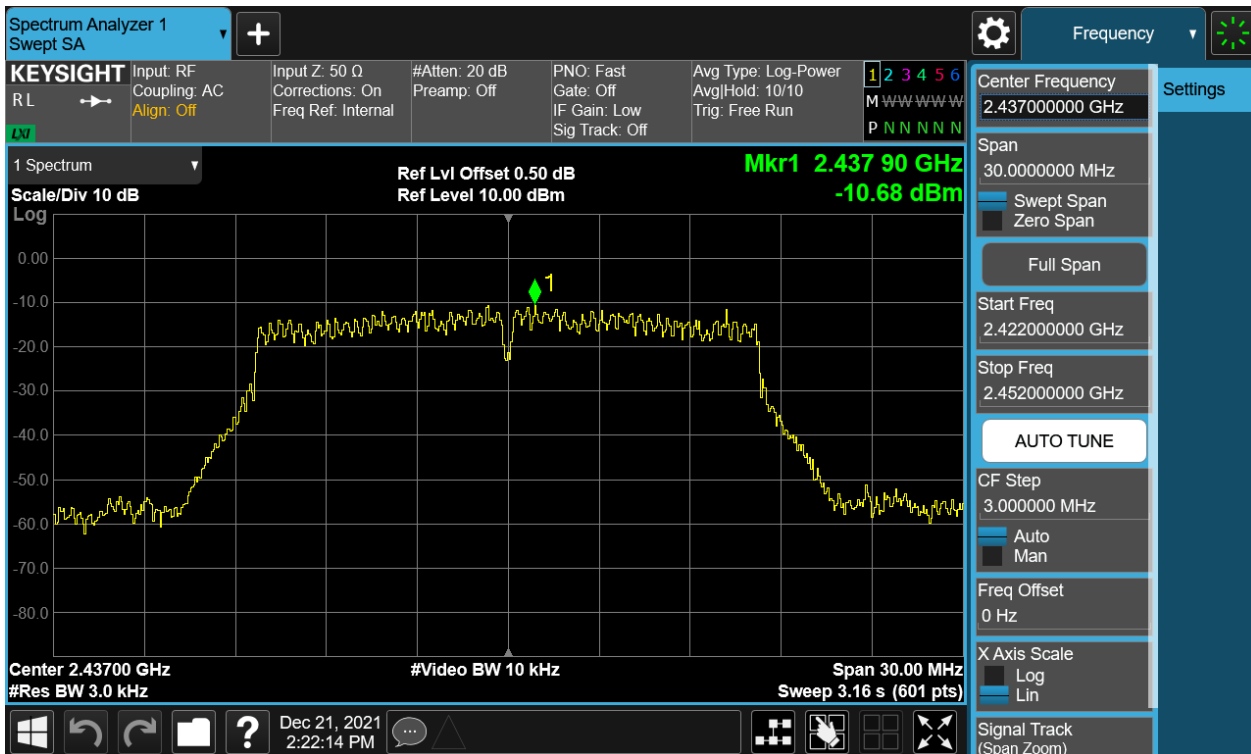
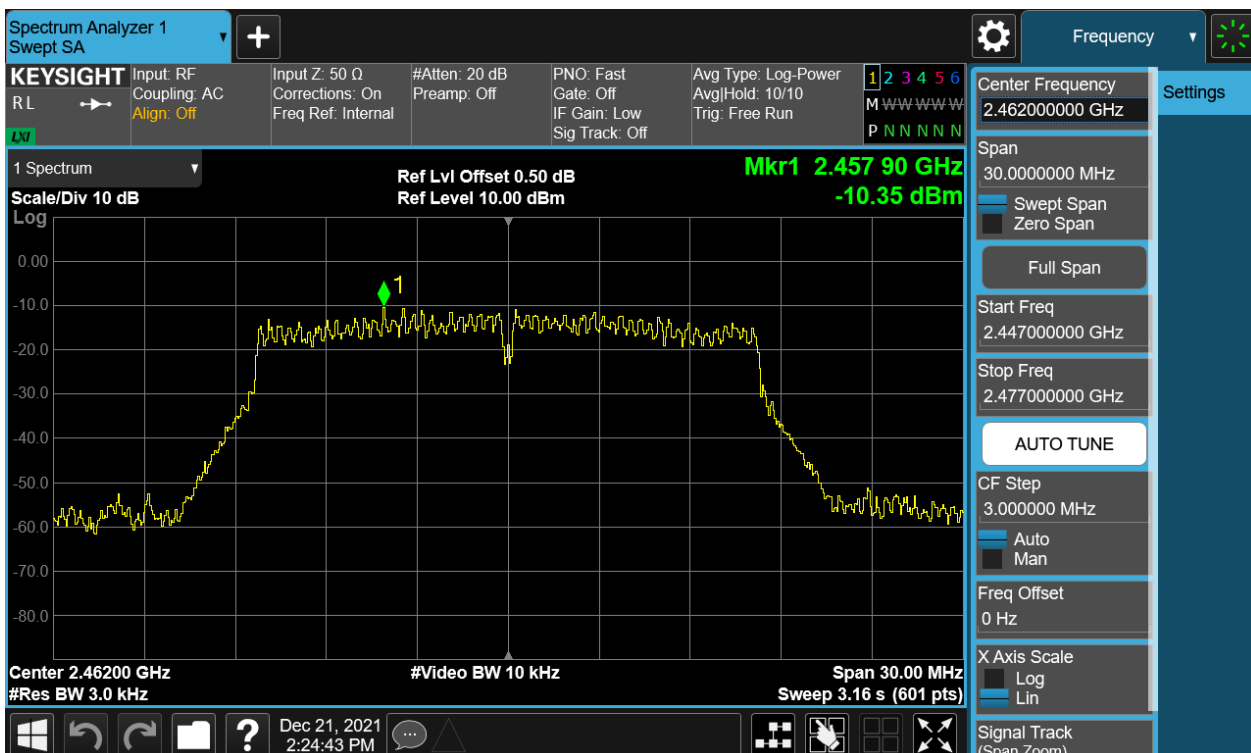


Figure 15: Power Spectral Density, 802.11g, 2462MHz



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Figure 16: Power Spectral Density, 802.11n(HT20), 2412MHz

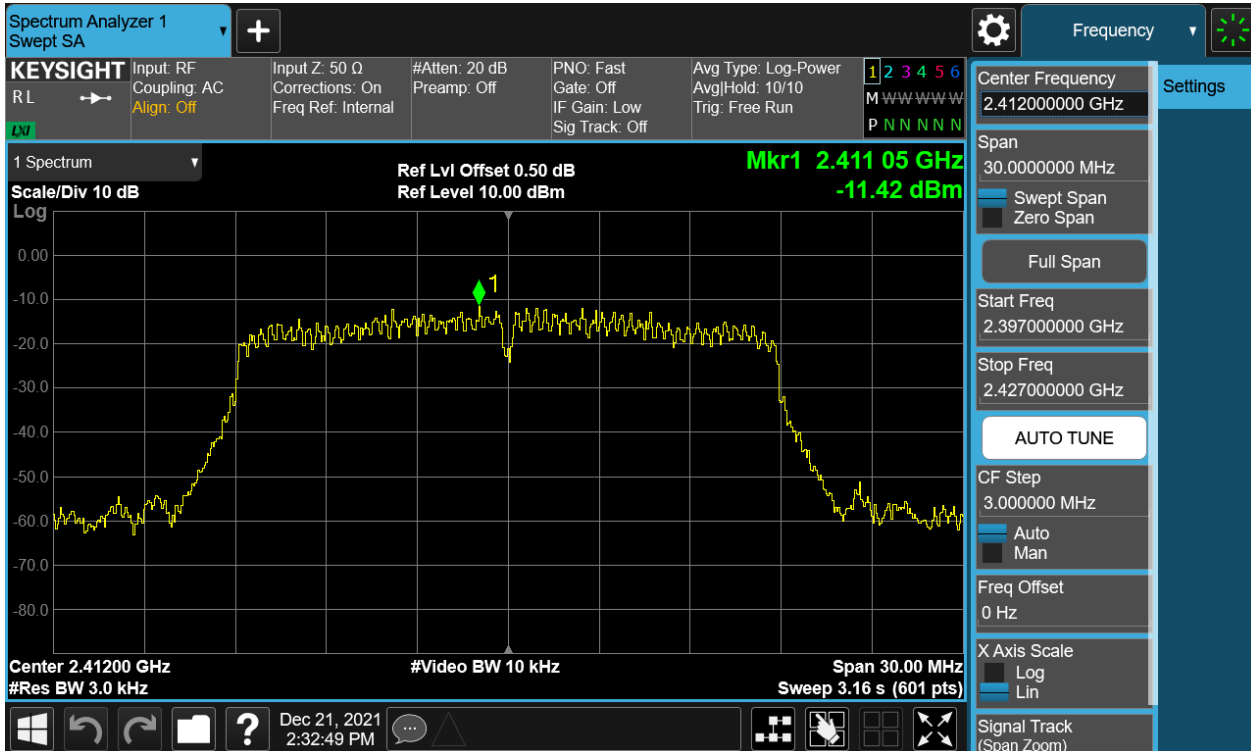
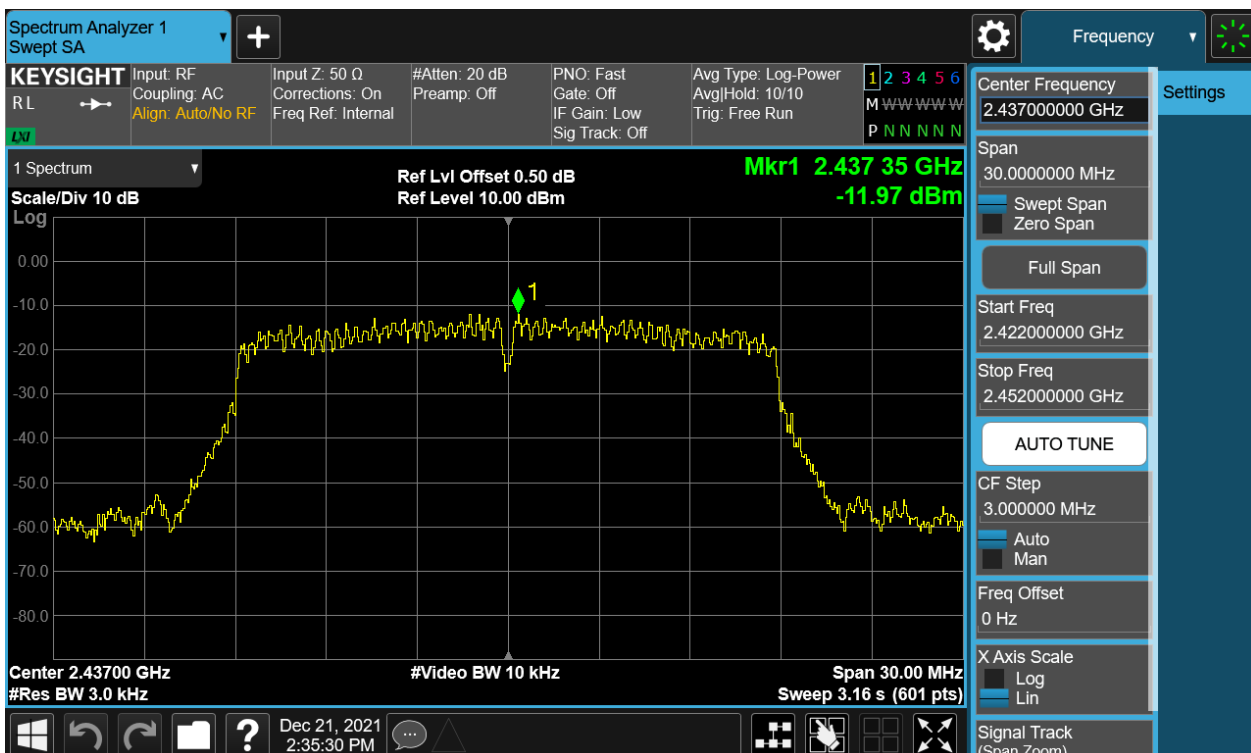


Figure 17: Power Spectral Density, 802.11n(HT20), 2437MHz



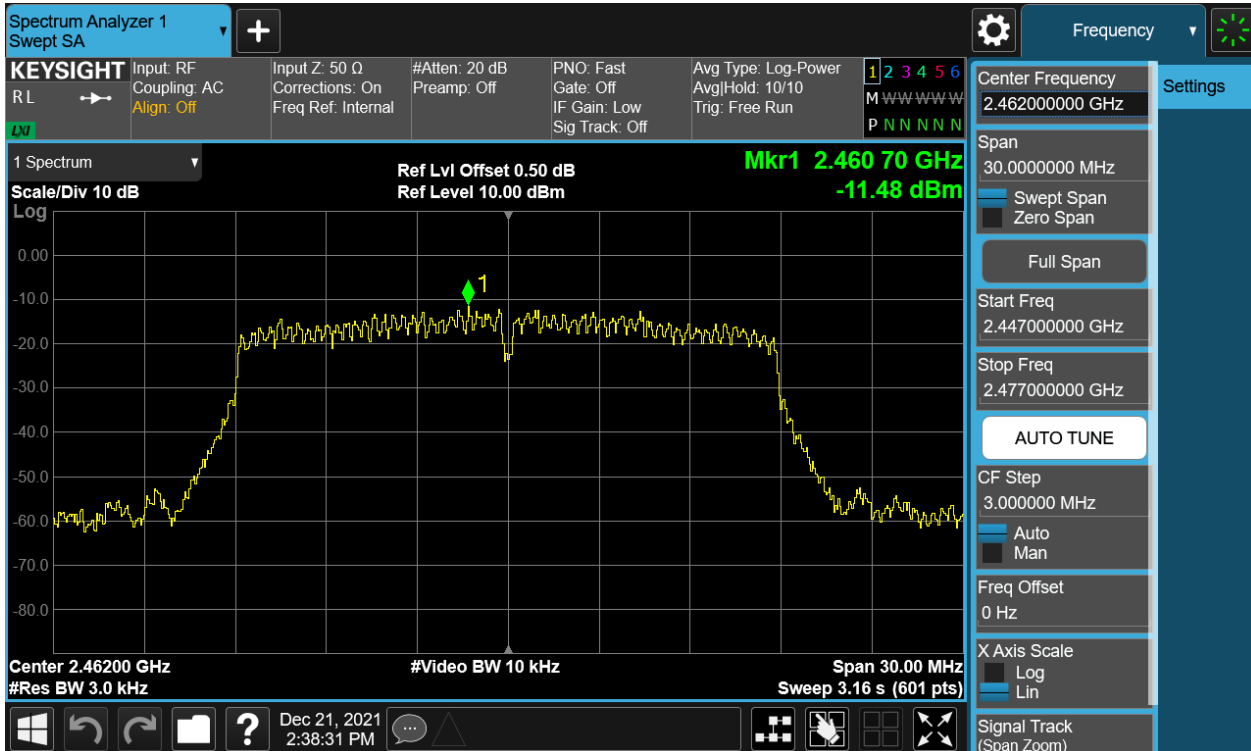
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Figure 18: Power Spectral Density, 802.11n(HT20), 2462MHz



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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 : 52%

For details refer to following test plot.

Figure 19: Conducted Spurious Emission & Authorized-band band-edge, 802.11b, 2412MHz Carrier Level

