

TEST REPORT

Report No.: SHE22030040-02IE

Date: 2022-12-27

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Applicant : Handheld Group AB
Address of Applicant : Strandgatan 40, 531 60, Lidköping, Sweden

Product Name : Rugged Android Tablet ALGIZ RT10
Brand Name : Handheld
Model No. : ALGIZ RT10
Sample acquisition Method : Sent by Client

Sample No. : E22030040-01#08
E22030040-01#10

FCC ID : YY3-ART10
ISED Number : 11695A-ART10

Standards : FCC CFR47 Part 15, Subpart E
RSS-Gen (Issue 5, Amd.2-Feb 2021)
RSS-247 (Issue 2, February 2017)

Date of Receipt : 2022-06-10(E22030040-01#08)
2022-08-02(E22030040-01#10)
Date of Test : 2022-08-09 ~ 2022-10-19
Date of Issue : 2022-12-27

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.

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(Erik Yang)

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1 General Information

1.1 Testing Laboratory

ISED CAB identifier #	CN0081
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	Handheld Group AB
Address	Strandgatan 40, 531 60, Lidköping, Sweden
Contact Person	Johan Hed
Telephone	+46510547170
Email	regulatory@handheldgroup.com
Manufacturer Company Name	Handheld Group AB
Address	Strandgatan 40, 531 60, Lidköping, Sweden
Factory Company Name	Hangzhou Ymir Enterprise Co., Ltd
Address	356 Hongda Road, Xiaoshan Economic and Technological Development Zone, Hangzhou

1.3 Details of EUT

Product Name	Rugged Android Tablet ALGIZ RT10
Brand Name	Handheld
Test Model No.	ALGIZ RT10
FCC ID	YY3-ART10
ISED Number	11695A-ART10
Mode of Operation	WLAN 802.11a/n(HT20/40)/ac(VHT20/40/80)
Frequency Range	Band I: 5150MHz ~ 5250MHz Band IV: 5725MHz ~ 5850MHz
Modulation Type	256QAM, 64QAM, 16QAM, BPSK, QPSK
Channel Bandwidth	802.11a: 20MHz 802.11n: 20MHz, 40MHz 802.11ac: 20MHz, 40MHz, 80MHz
Number of channels	14
Antenna Type	Internal Antenna

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Antenna Gain	Antenna 3: 3.75dBi Antenna 2: 5.26dBi
Directional gain	8.27(see note 4)
Extreme Temperature Range	-10°C ~ +55°C
Test Voltage	DC 3.8V
Extreme Voltage	Low Voltage: DC 3.4V High Voltage: DC 4.35V
Product Type	Mobile and portable for FCC standard Indoor for IC standard
Hardware version	V1.4
Software version	ALGIZ_RT10_V1.0
Test SW Version	BL410_R; BL410_E
RF power setting in TEST SW	802.11a: QRCT_Power level setting_14dBm 802.11n(HT20): QRCT_Power level setting_13dBm 802.11n(HT40): QRCT_Power level setting_12dBm 802.11ac(VHT20): QRCT_Power level setting_13dBm 802.11ac(VHT40): QRCT_Power level setting_12dBm 802.11ac(VHT80): QRCT_Power level setting_11dBm

Note:

1. The above information was declared by the manufacture.
2. For more details, please refer to the User's manual of the EUT.
3. There are two antenna positions in the test sample, and the test data of both antenna positions meet the requirements.
4. Directional gain = $G_{ANT} + 10 \log(N_{ANT}) = 8.27$.

Channel List

Frequency Band	Channel Number	Frequency
5150 MHz ~ 5250MHz	36	5180 MHz
	38	5190 MHz
	40	5200 MHz
	42	5210 MHz
	44	5220 MHz
	46	5230 MHz
	48	5240 MHz
5725 MHz ~ 5850MHz	149	5745 MHz
	151	5755 MHz
	153	5765 MHz
	155	5775 MHz
	157	5785 MHz
	159	5795 MHz

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	165	5825 MHz
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1.4 Test Methodology

47 CFR Part 15, Subpart E	Subpart E—Unlicensed National Information Infrastructure Devices
KDB Publication 789033 D02 v02r01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
KDB Publication 662911 D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
RSS-Gen (Issue 5, Amd.2-Feb 2021)	General Requirements for Compliance of Radio Apparatus
RSS-247 (Issue 2, February 2017)	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices
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	ISED Rules	Result
Antenna Requirement	FCC Part 15.407(a), 15.203	RSS-GEN 6.8	PASS
Maximum Conducted Output Power and E.I.R.P	FCC Part 15.407(a)	RSS-247 6.2	PASS
26dB Bandwidth and 99% Bandwidth	FCC Part 15.407(a)	RSS-247 6.2	PASS
6dB Bandwidth	FCC Part 15.407(e)	RSS-247 6.2	PASS
Maximum Conducted Output Power Spectral Density	FCC Part 15.407(a)	RSS-247 6.2	PASS
Conducted Spurious Emission	FCC Part 15.407(b), 15.209	RSS-247 6.2	PASS
Radiated Emission	FCC Part 15.407(b), 15.209, 15.205	RSS-247 6.2	PASS
Band Edge (Restricted-band band-edge)	FCC Part 15.407(b), 15.205, 15.209	RSS-247 6.2	PASS
Frequency Stability	FCC Part 15.407(g)	RSS-GEN 6.11	PASS
Conducted Emission on AC Mains	FCC Part 15.207(a)	RSS-Gen 8.8	PASS

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2 Test Condition

2.1 Environmental conditions

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

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020B	MY59260184	2022-08-02	2023-08-01
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2022-06-10	2023-06-09
Signal Generator	Rohde & Schwarz	SMR27	100184	2022-08-02	2023-08-01
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2022-06-10	2023-06-09
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2022-06-10	2023-06-09
V-network	SCHWARZBECK	NSLK8127	8127-902	2022-06-10	2023-06-09
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	2024-06-11
Loop Antenna	SCHWARZBECK	FMZB 1513	/	2022-06-10	2023-06-09
Broadband Preamplifier	SCHWARZBECK	BBV 9718	346	2022-06-10	2023-06-09
Temperature Box	ESPEC	ECT-2	055239A	2021-12-29	2022-12-28
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2022-06-10	2023-06-09
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2022-06-10	2023-06-09
Test Software	BL	BL410_E	N/A	N/A	N/A
Test Software	BL	BL410_R	N/A	N/A	N/A

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2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI. The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95.45%.

Parameter		Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	< 1GHz	± 5.00 dB
	> 1GHz	± 4.88 dB
Conducted Emission on AC Mains	150KHz-30MHz	± 2.68 dB
Occupied Channel Bandwidth		± 5 %

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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 802.11a/n(HT20), 802.11ac(VHT20)

Band I (5150 – 5250 MHz)		Band IV (5725 – 5850 MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel(CH36)	5180MHz	The lowest channel(CH149)	5745MHz
The middle channel(CH44)	5220MHz	The middle channel(CH157)	5785MHz
The highest channel(CH48)	5240MHz	The highest channel(CH165)	5825MHz

For 802.11n(HT40), 802.11ac(VHT40)

Band I (5150 – 5250 MHz)		Band IV (5725 – 5850 MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel(CH38)	5190MHz	The lowest channel(CH151)	5755MHz
The highest channel(CH46)	5230MHz	The highest channel(CH159)	5795MHz

For 802.11ac(VHT80)

Band I (5150 – 5250 MHz)		Band IV (5725 – 5850 MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel(CH42)	5210MHz	The lowest channel(CH155)	5775MHz

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
802.11a	24Mbps
802.11n(HT20), 802.11ac(VHT20)	MCS3
802.11n(HT40), 802.11ac(VHT40)	MCS3
802.11ac(VHT80)	MCS3

The basic operation modes are:

- A. On
 - 1. WLAN mode
 - a. Transmitting
 - b. Receiving
- B. Standby
- C. Off

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3.2 Special Accessories and Auxiliary Equipment

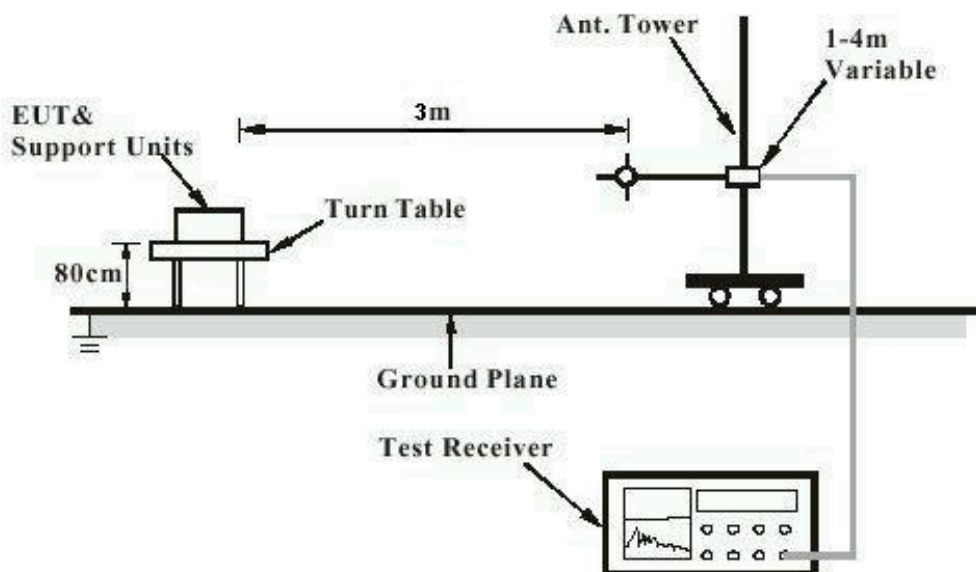
Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A
USB Cable	N/A	1.00m Unshielded	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	Qualcomm	QRCT Version 4.0.00166.0

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.

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Diagram of Measurement Configuration for Conduction Test

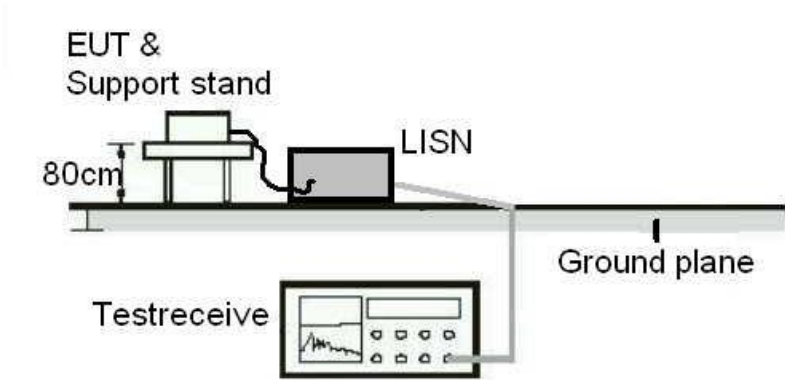
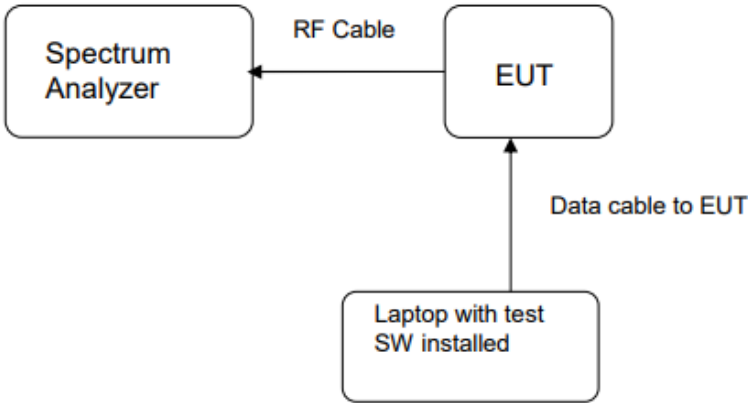


Diagram of Measurement Configuration for Transmitter Test



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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard	: FCC Part 15.407(a), 15.203 RSS-GEN 6.8
Requirement	: 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. In addition, If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 8.27dBi. 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.

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4.1.2 Maximum Conducted Output Power and E.I.R.P

RESULT:

PASS

Test standard : FCC Part 15.407(a), RSS-247 6.2
Requirement : ANSI C63.10-2013 clause 12.3.2.4, KDB 789033

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 24.5°C
Relative humidity : 58%

Table 1: Maximum Conducted Output Power for Band I (5150 – 5250 MHz)

Test Mode	Duty Cycle (%)	Test Channel (MHz)	Maximum Conducted Output Power						FCC Limit (mW)
			Chain 1		Chain 2		Total Power		
			(dBm)	(mW)	(dBm)	(mW)	(dBm)	(mW)	
802.11a	95.52	5180	9.85	9.66	9.19	8.30	N/A	N/A	148.25
		5220	9.70	9.33	9.47	8.85	N/A	N/A	
		5240	10.32	10.76	10.26	10.62	N/A	N/A	
802.11n(HT20)	94.48	5180	8.54	7.14	7.97	6.27	11.27	13.41	
		5220	8.65	7.33	8.14	6.52	11.41	13.84	
		5240	9.43	8.77	8.95	7.85	12.21	16.62	
802.11ac(VHT20)	95.15	5180	8.37	6.87	7.97	6.27	11.18	13.14	
		5220	8.73	7.46	8.07	6.41	11.42	13.88	
		5240	9.33	8.57	8.94	7.83	12.15	16.40	
802.11n(HT40)	90.00	5190	7.64	5.81	7.06	5.08	10.37	10.89	
		5230	8.04	6.37	7.42	5.52	10.75	11.89	
802.11ac(VHT40)	89.61	5190	7.62	5.78	7.06	5.08	10.36	10.86	
		5230	8.03	6.35	7.44	5.55	10.76	11.90	
802.11ac(VHT80)	82.61	5210	6.95	4.95	6.49	4.46	9.74	9.41	

Notes:

- Directional gain = $G_{ANT} + 10 \log(N_{ANT}) = 8.27$.
- $P_{OUT} = P_{Limit} - (G_{Tx} - 6) = 21.71 \text{ dBm} \approx 148.25 \text{ mW}$.
- 802.11a support SISO and 802.11n/ac support MIMO.
- Add $[10 \log(1/D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

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Table 2: Maximum Conducted Output Power for Band IV (5725 – 5850 MHz)

Test Mode	Duty Cycle (%)	Test Channel (MHz)	Maximum Conducted Output Power						FCC/IC Limit (W)
			Chain 1		Chain 2		Total Power		
			(dBm)	(mW)	(dBm)	(mW)	(dBm)	(mW)	
802.11a	95.28	5745	9.05	8.04	8.68	7.38	N/A	N/A	0.59
		5785	7.37	5.46	8.46	7.01	N/A	N/A	
		5825	6.77	4.75	8.42	6.95	N/A	N/A	
802.11n(HT20)	95.06	5745	8.20	6.61	7.39	5.48	10.82	12.09	
		5785	6.62	4.59	7.04	5.06	9.85	9.65	
		5825	6.08	4.06	6.92	4.92	9.53	8.98	
802.11ac(VHT20)	95.15	5745	7.54	5.68	7.40	5.50	10.48	11.17	
		5785	6.05	4.03	7.03	5.05	9.58	9.07	
		5825	5.51	3.56	6.90	4.90	9.27	8.45	
802.11n(HT40)	90.00	5755	6.89	4.89	6.39	4.36	9.66	9.24	
		5795	5.45	3.51	6.03	4.01	8.76	7.52	
802.11ac(VHT40)	90.13	5755	6.21	4.18	6.36	4.33	9.30	8.50	
		5795	4.77	3.00	6.02	4.00	8.45	7.00	
802.11ac(VHT80)	82.07	5775	4.76	2.99	5.21	3.32	8.00	6.31	

Notes:

1. Directional gain = $G_{ANT} + 10 \log(N_{ANT}) = 8.27$.
2. $P_{Out} = P_{Limit} - (G_{Tx} - 6) = 27.73 \text{ dBm} \approx 0.59 \text{ W}$
3. 802.11a support SISO and 802.11n/ac support MIMO.
4. Add $[10 \log(1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times

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Table 3: E.I.R.P for Band I (5150 – 5250 MHz)

Test Mode	99% Emission Bandwidth (MHz)	Test Channel (MHz)	E.I.R.P						IC Limit	
			Antenna 3		Antenna 2		Total Power			
			(dBm)	(mW)	(dBm)	(mW)	(dBm)	(mW)	(dBm)	(mW)
802.11a	16.523	5180	13.60	22.91	14.45	27.86	N/A	N/A	22.18	165.20
	16.559	5220	13.45	22.13	14.73	29.72	N/A	N/A	22.19	165.58
	16.458	5240	14.07	25.53	15.52	35.65	N/A	N/A	22.16	164.44
802.11n(HT20)	17.689	5180	12.29	16.94	13.23	21.04	15.80	37.98	22.48	177.01
	17.739	5220	12.40	17.38	13.4	21.88	15.94	39.26	22.49	177.42
	17.711	5240	13.18	20.80	14.21	26.36	16.74	47.16	22.48	177.01
802.11ac(VHT20)	17.712	5180	12.12	16.29	13.23	21.04	15.72	37.33	22.48	177.01
	17.689	5220	12.48	17.70	13.33	21.53	15.94	39.23	22.48	177.01
	17.729	5240	13.08	20.32	14.2	26.30	16.69	46.63	22.49	177.42
802.11n(HT40)	36.266	5190	11.39	13.77	12.32	17.06	14.89	30.83	23.01	200.00
	36.249	5230	11.79	15.10	12.68	18.54	15.27	33.64	23.01	200.00
802.11ac(VHT40)	36.260	5190	11.37	13.71	12.32	17.06	14.88	30.77	23.01	200.00
	36.260	5230	11.78	15.07	12.7	18.62	15.27	33.69	23.01	200.00
802.11ac(VHT80)	75.869	5210	10.70	11.75	11.75	14.96	14.27	26.71	23.01	200.00

Notes:

- 1.For other devices, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.
2. Antenna Gain (Antenna 3: 3.75dBi, Antenna 2: 5.26dBi).
3. 802.11a support SISO and 802.11n/ac support MIMO.

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4.1.3 26dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.407(a), RSS-247 6.2
Requirement : ANSI C63.10-2013 clause 12.4, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 24.5°C
Relative humidity : 58%

Table 4: 26dB Bandwidth and 99% Bandwidth for Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5180	19.70	16.523
	5220	20.31	16.559
	5240	20.05	16.458
802.11n(HT20)	5180	20.85	17.689
	5220	20.87	17.739
	5240	20.82	17.711
802.11ac(VHT20)	5180	20.59	17.712
	5220	21.02	17.689
	5240	21.22	17.729
802.11n(HT40)	5190	40.97	36.266
	5230	40.06	36.249
802.11ac(VHT40)	5190	39.76	36.260
	5230	41.14	36.260
802.11ac(VHT80)	5210	82.34	75.869

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Figure 1: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11a, 5180MHz

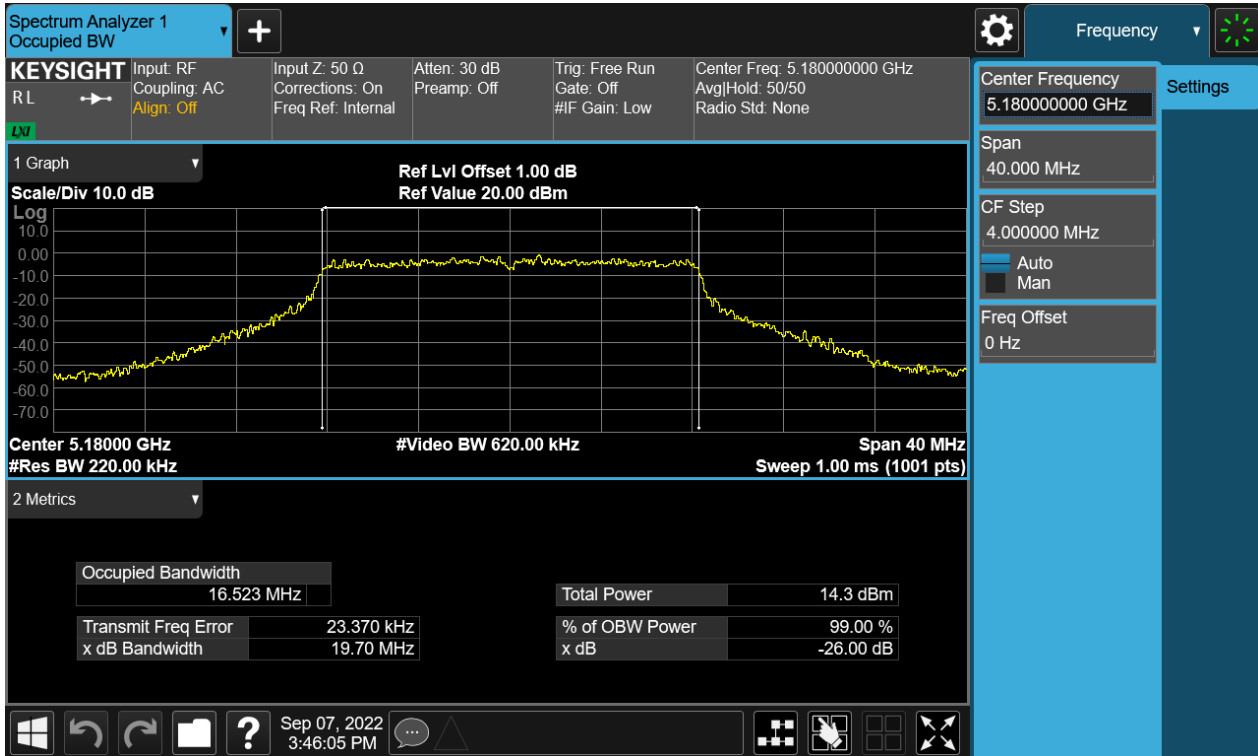
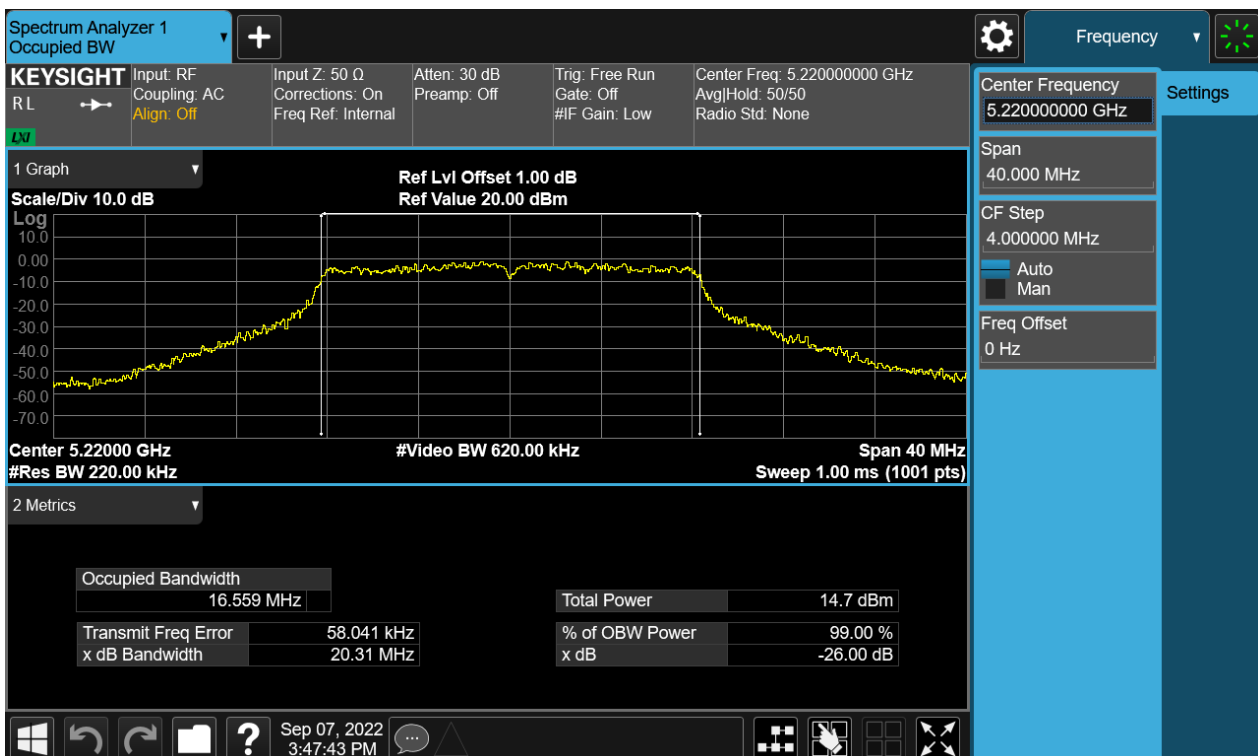


Figure 2: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11a, 5220MHz



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Figure 3: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11a, 5240MHz

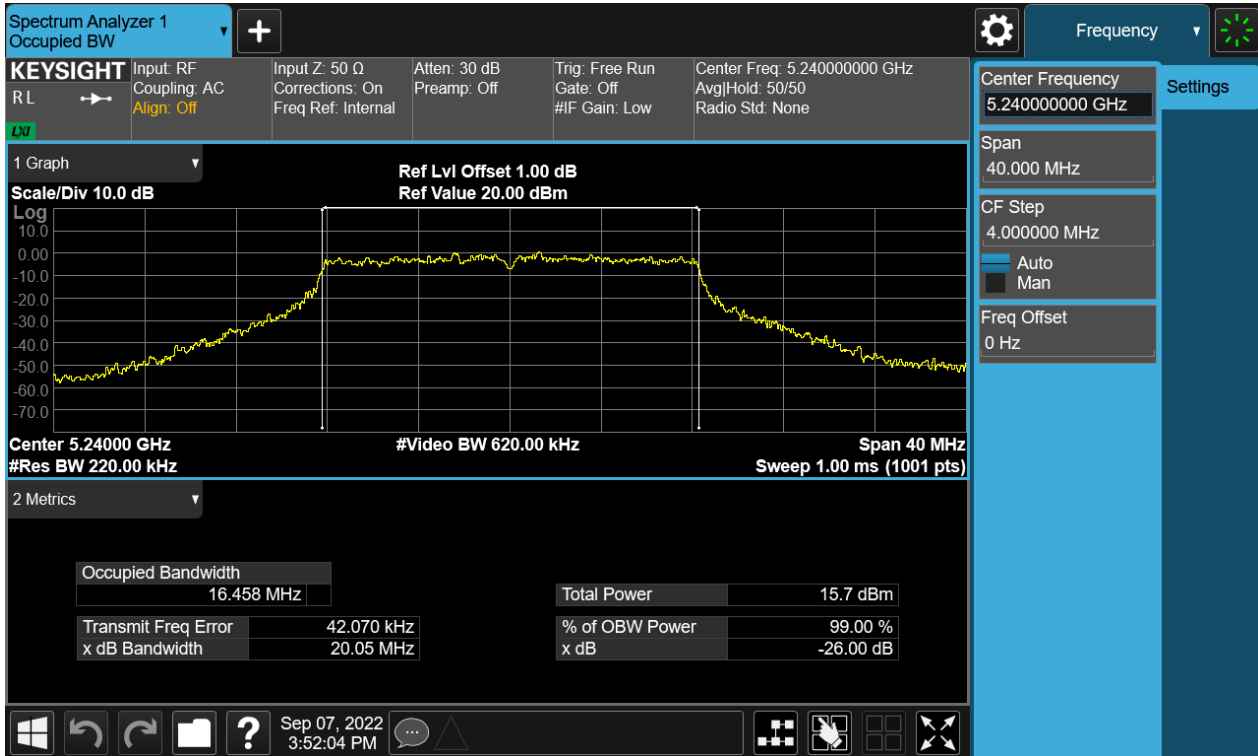


Figure 4: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 5180MHz



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Figure 5: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 5220MHz

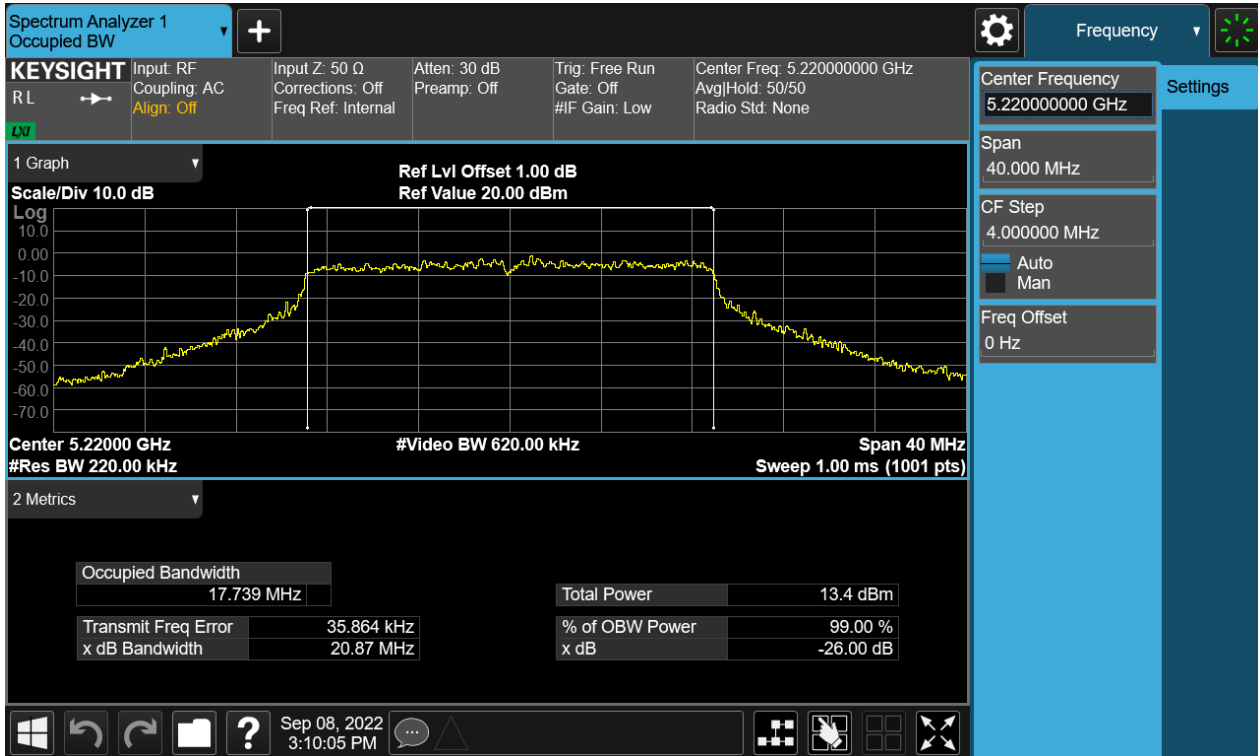
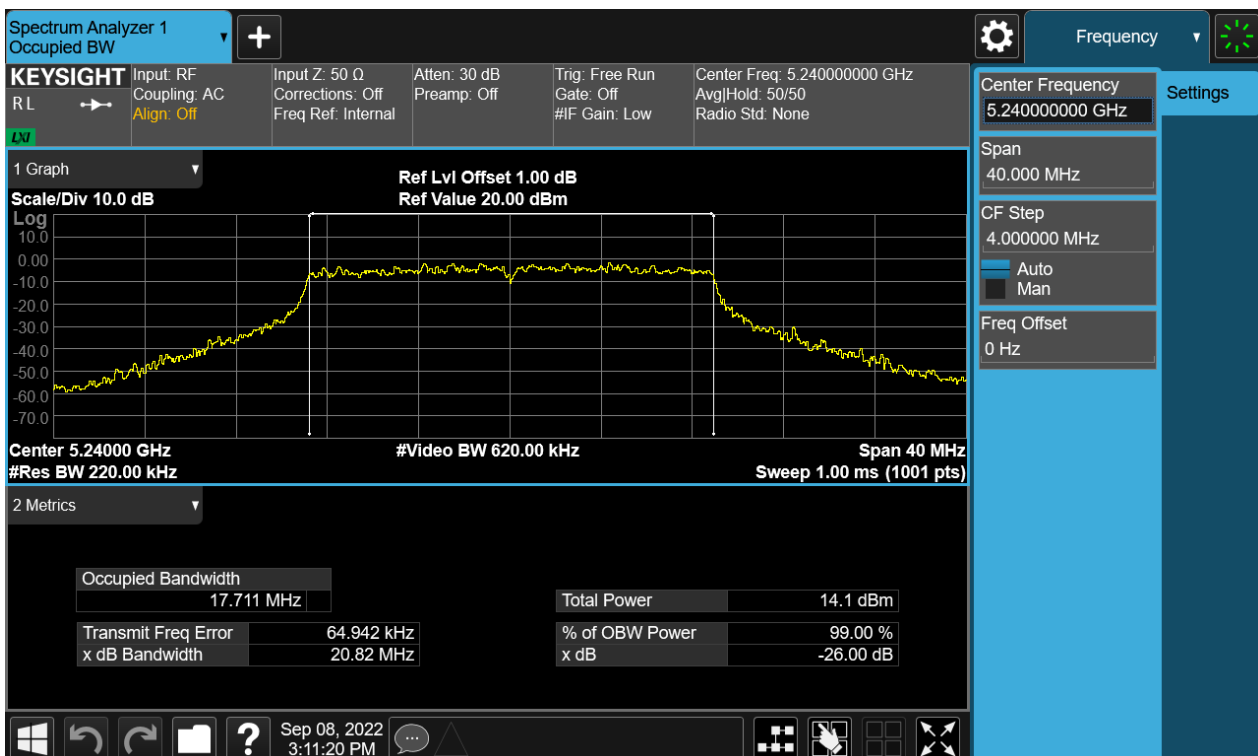


Figure 6: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 5240MHz



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Figure 7: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11ac(VHT20), 5180MHz

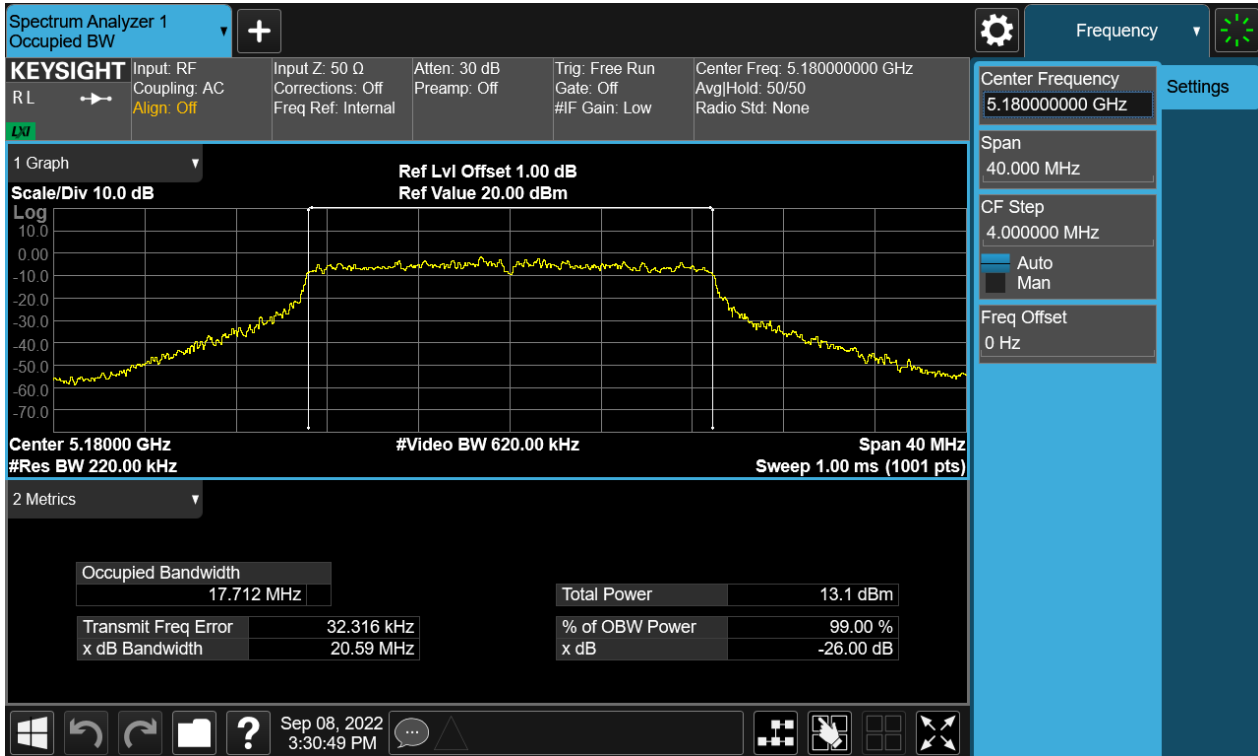
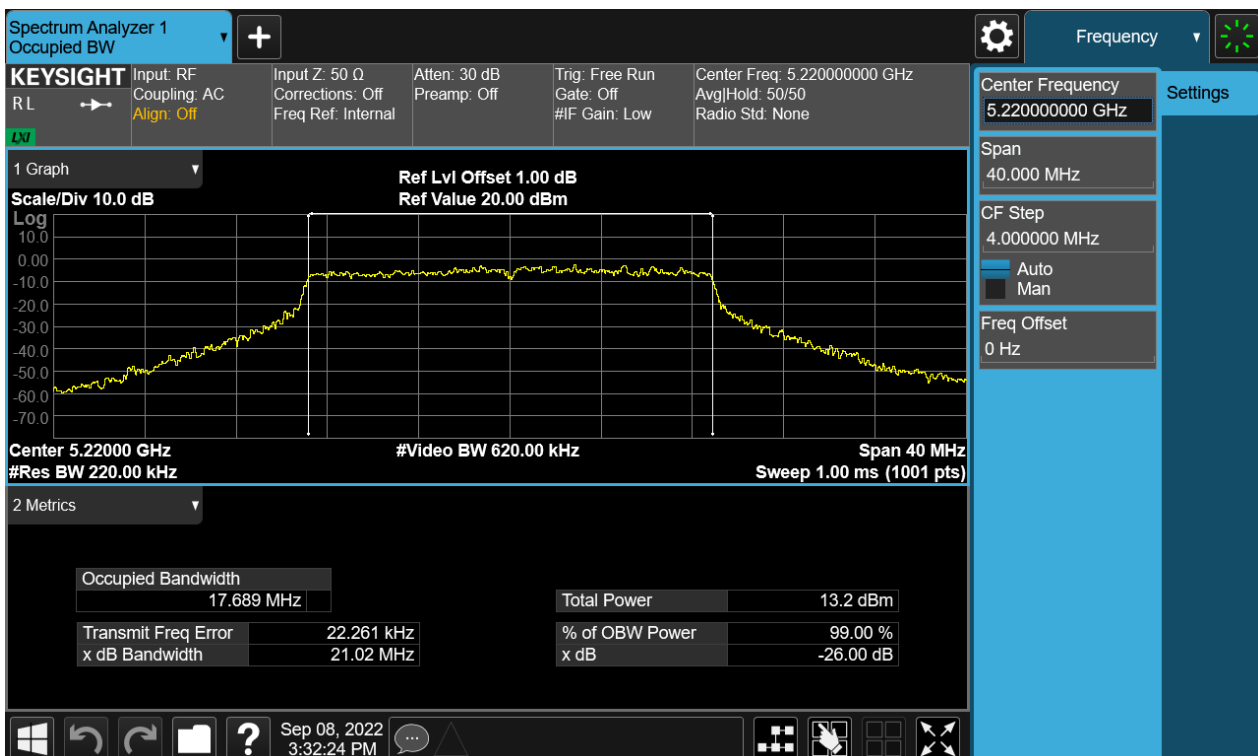


Figure 8: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11ac(VHT20), 5220MHz



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Figure 9: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11ac(VHT20), 5240MHz

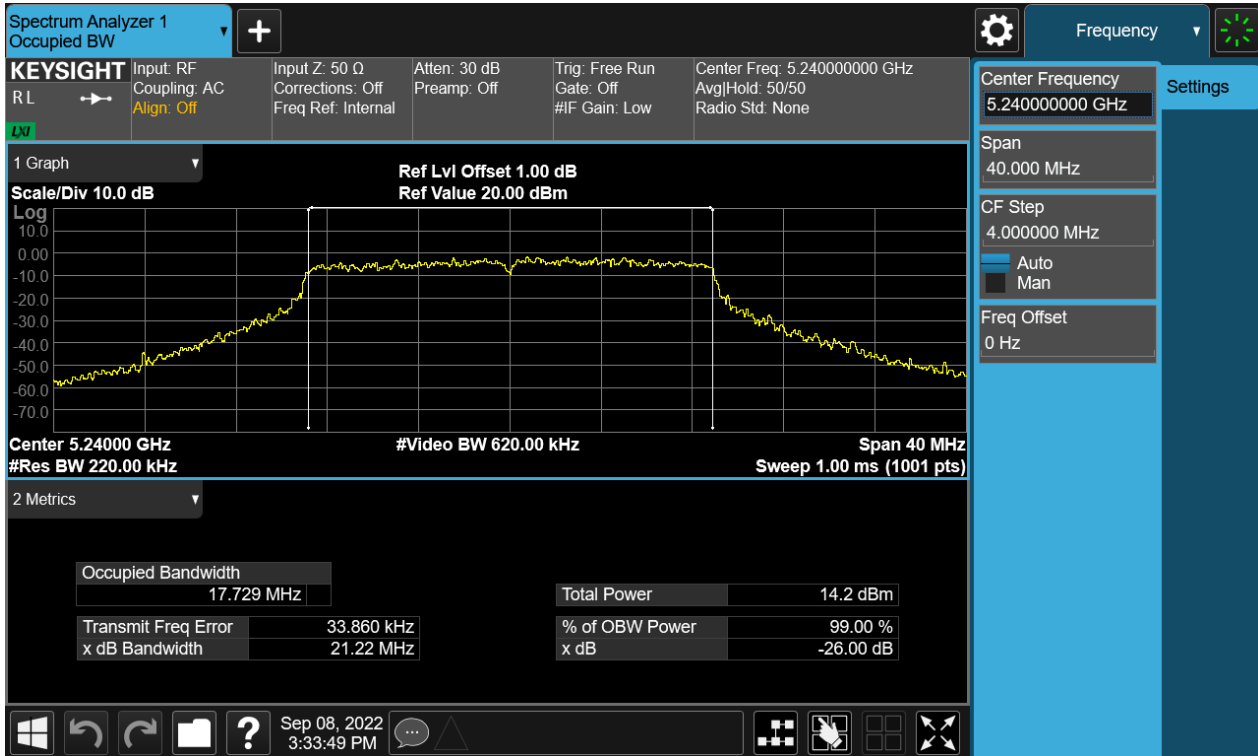
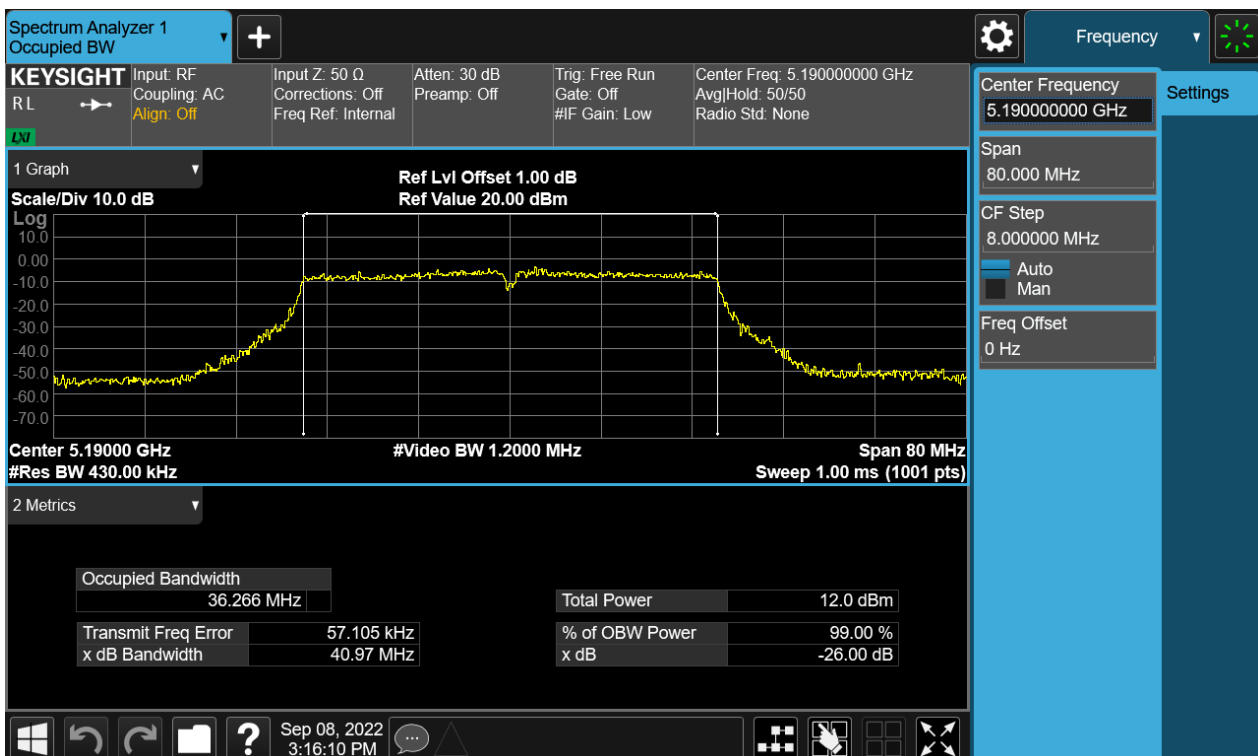


Figure 10: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11n(HT40), 5190MHz



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Figure 11: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11n(HT40), 5230MHz

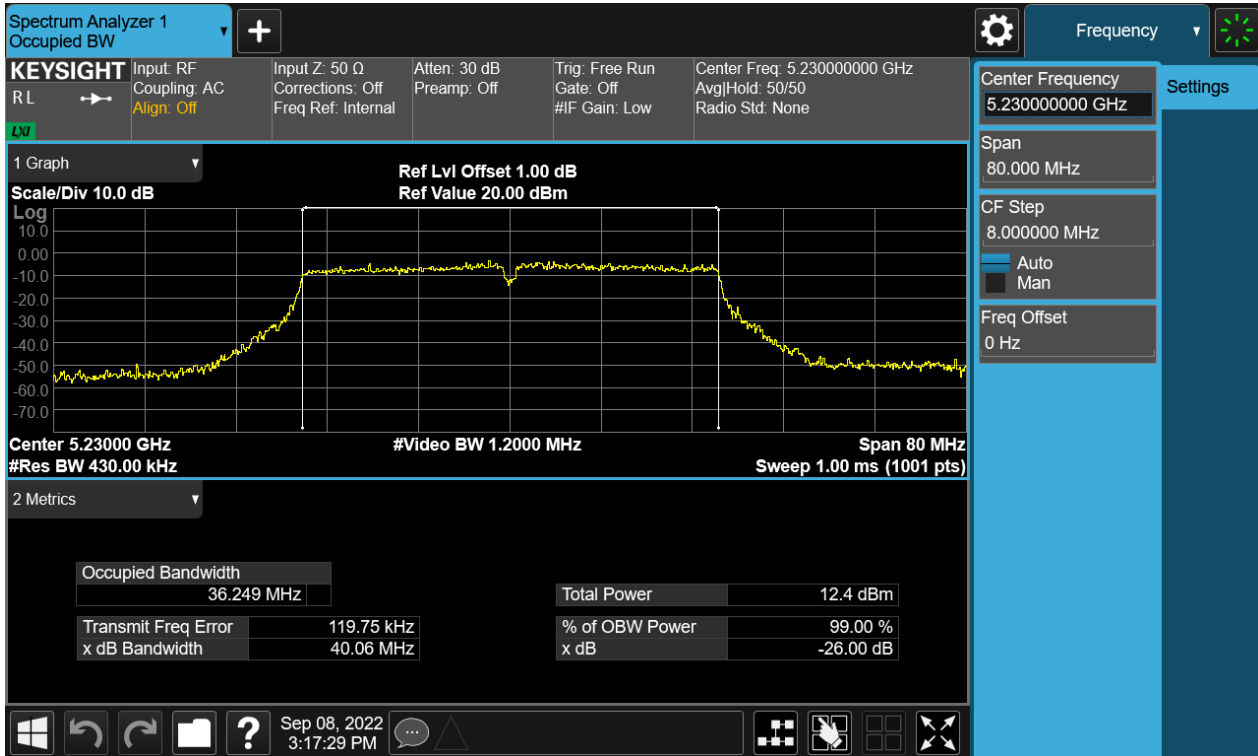
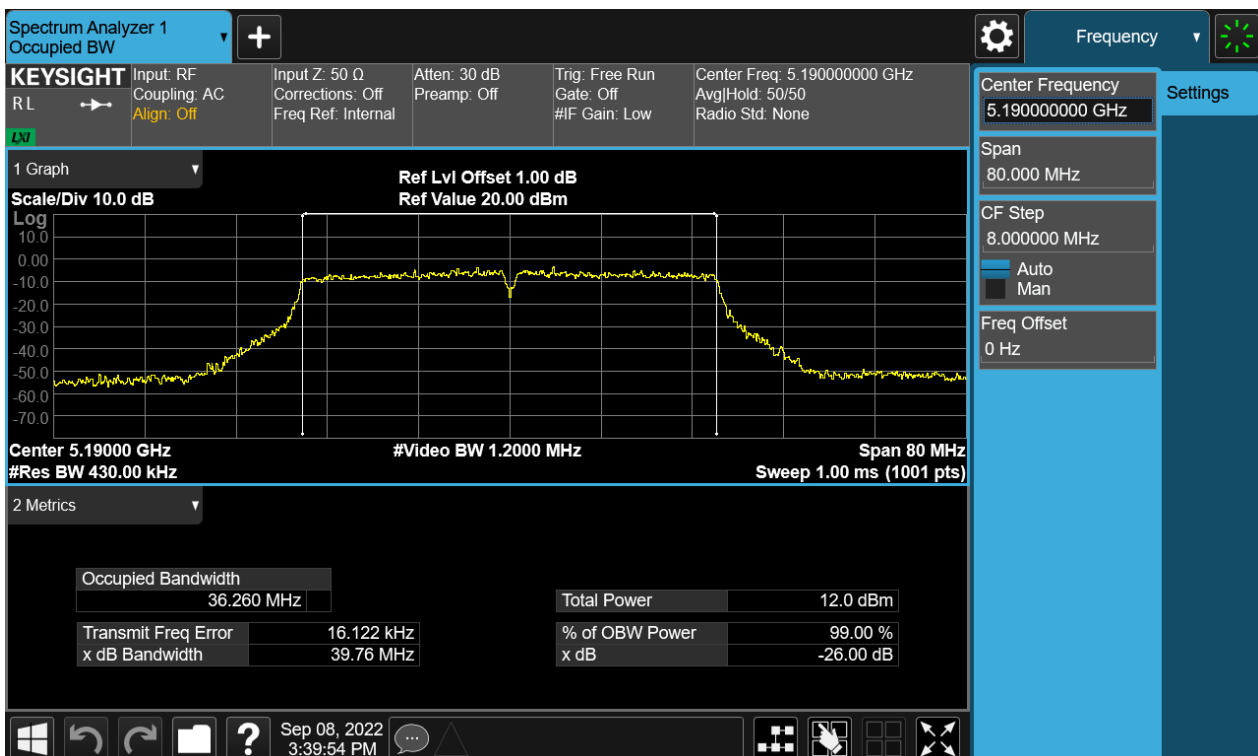


Figure 12: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11ac(VHT40), 5190MHz



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Figure 13: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11ac(VHT40), 5230MHz

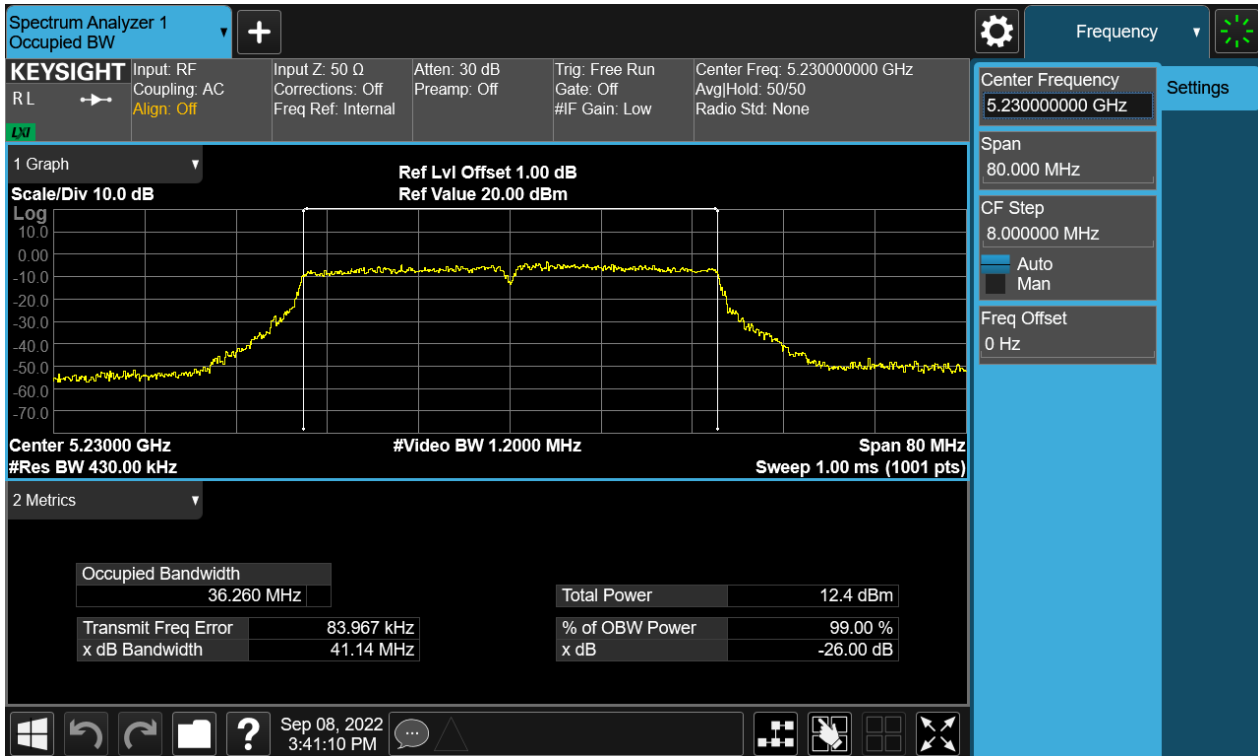


Figure 14: The plots of 26dB Bandwidth and 99% Bandwidth, 802.11ac(VHT80), 5210MHz



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4.1.4 6dB Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.407(e), RSS-247 6.2
Requirement : ANSI C63.10-2013 clause 12.4, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 24.5°C
Relative humidity : 58%

Table 5: 6dB Bandwidth for Band IV (5725 – 5850 MHz)

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11a	5745	16.35	>0.5
	5785	16.36	
	5825	16.27	
802.11n(HT20)	5745	17.28	
	5785	17.31	
	5825	17.32	
802.11ac(VHT20)	5745	17.53	
	5785	17.25	
	5825	16.83	
802.11n(HT40)	5755	36.35	
	5795	36.09	
802.11ac(VHT40)	5755	36.00	
	5795	36.11	
802.11ac(VHT80)	5775	75.58	

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Figure 15: The plots of 6dB Bandwidth, 802.11a, 5745MHz

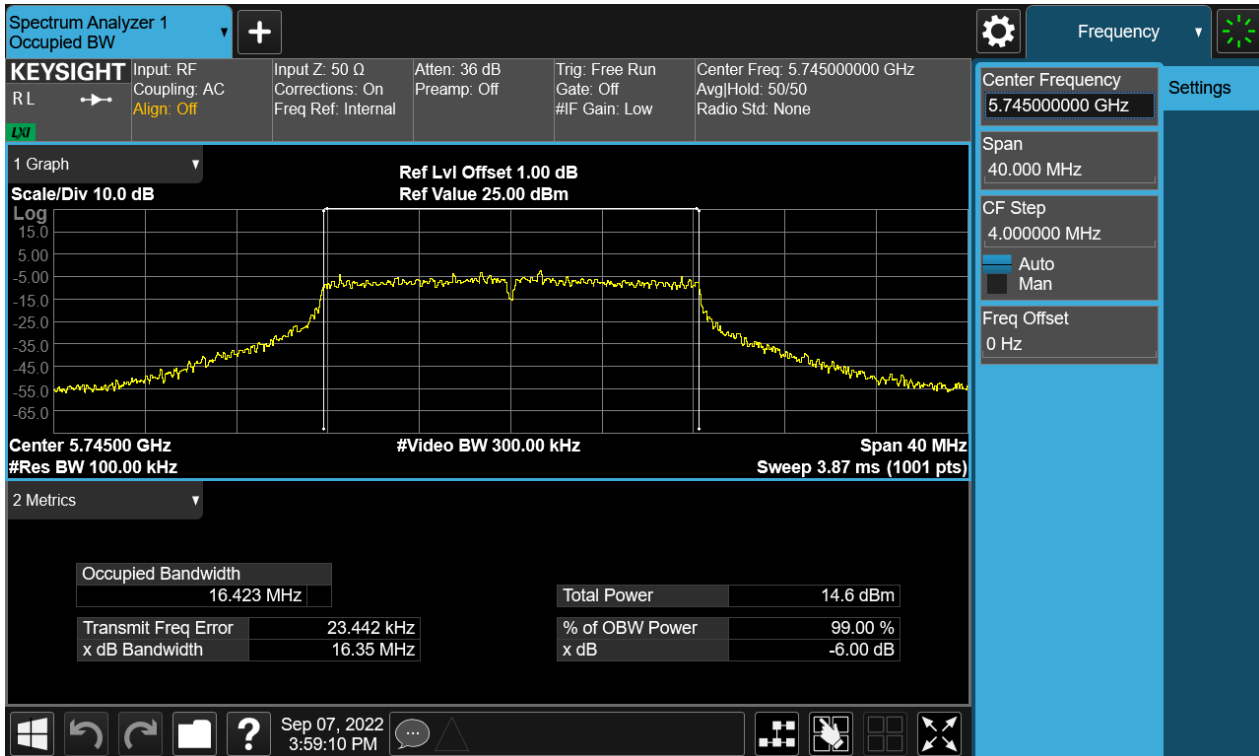
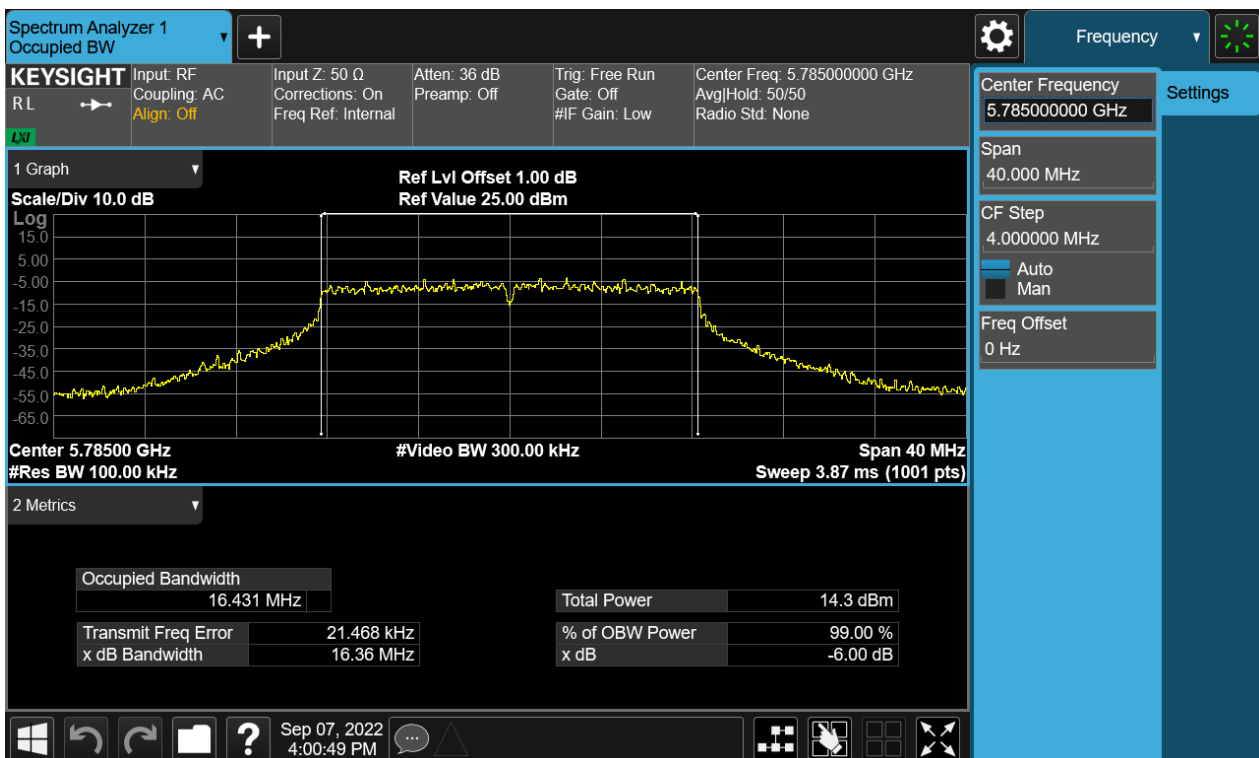


Figure 16: The plots of 6dB Bandwidth, 802.11a, 5785MHz



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Figure 17: The plots of 6dB Bandwidth, 802.11a, 5825MHz

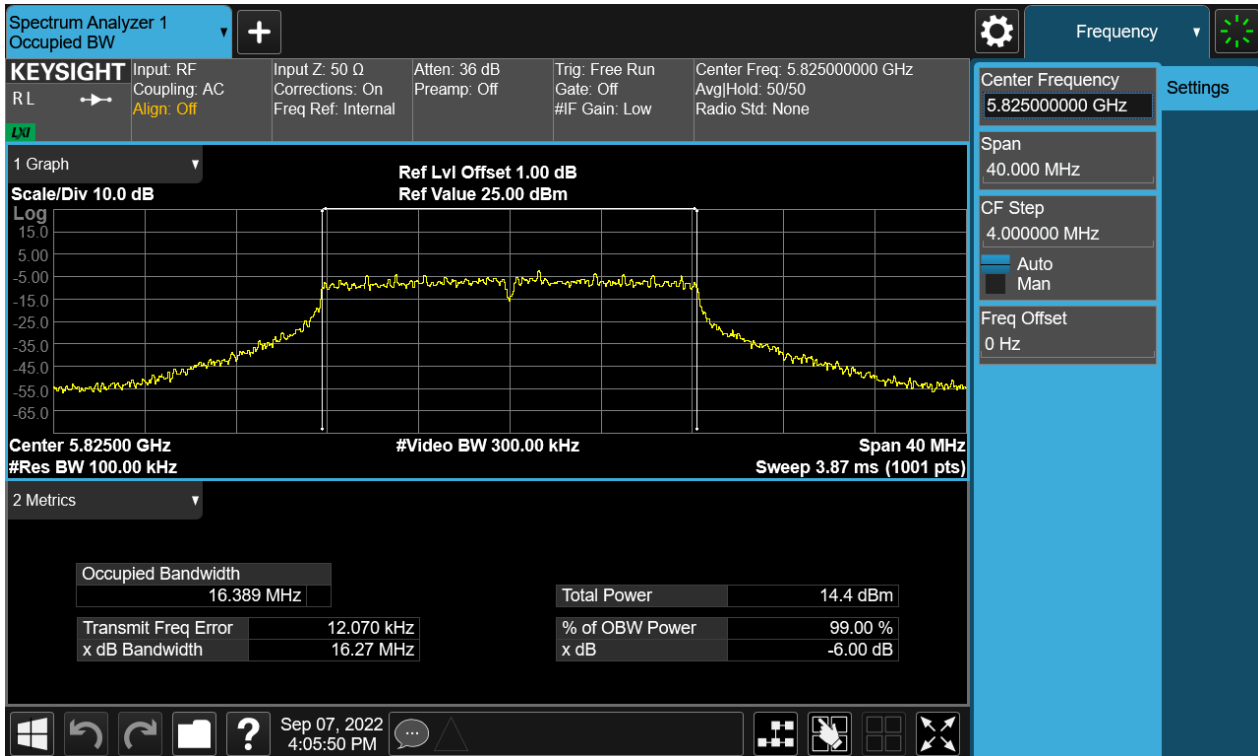
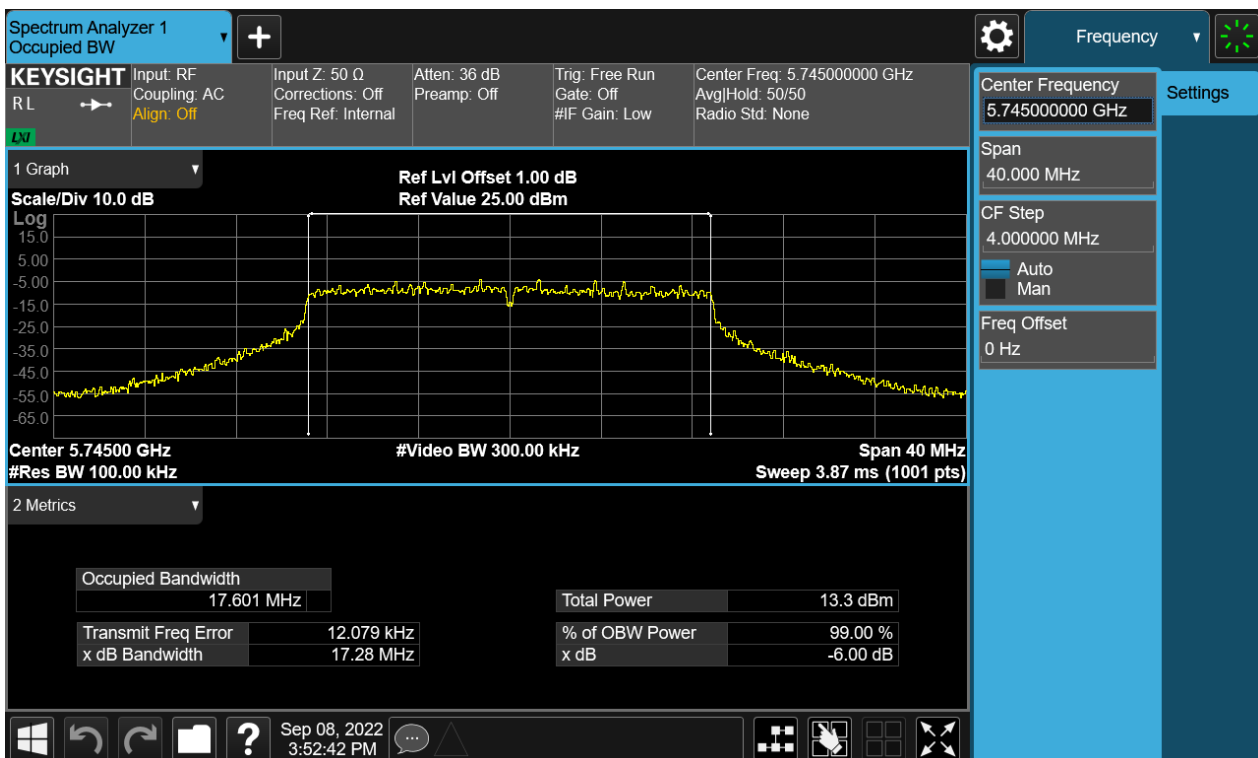


Figure 18: The plots of 6dB Bandwidth, 802.11n(HT20), 5745MHz



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Figure 19: The plots of 6dB Bandwidth, 802.11n(HT20), 5785MHz

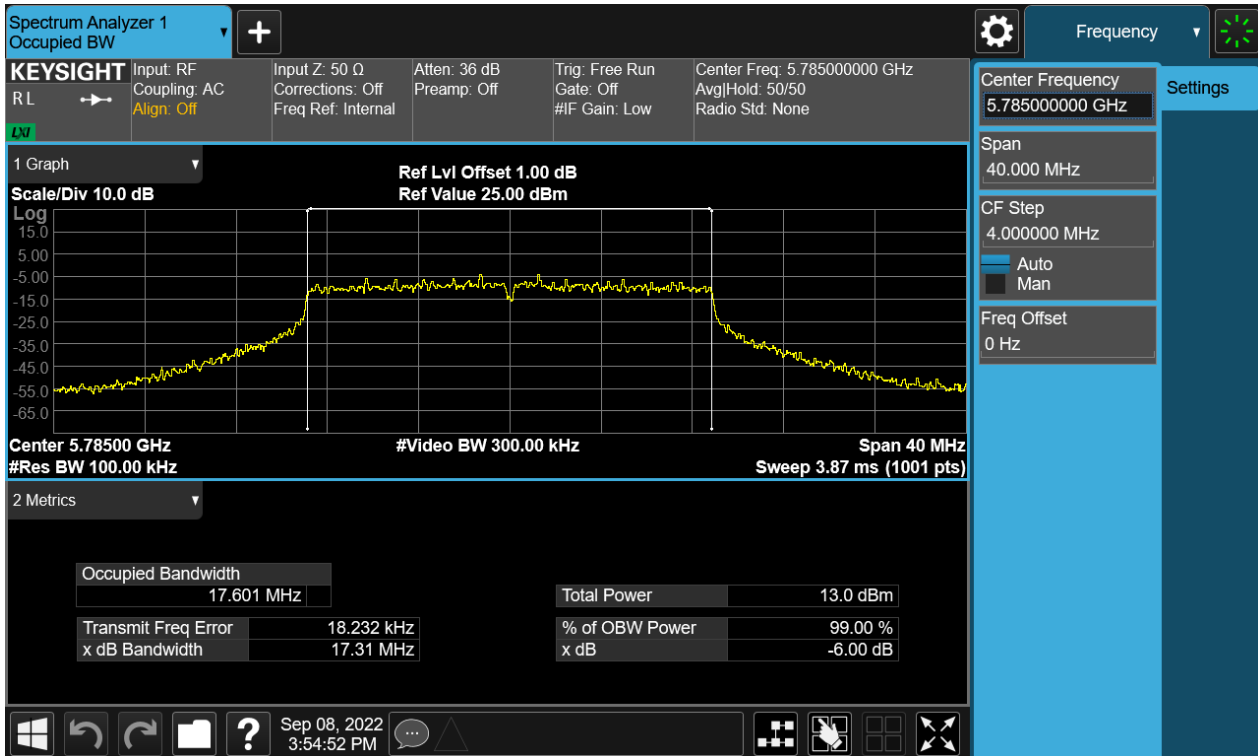
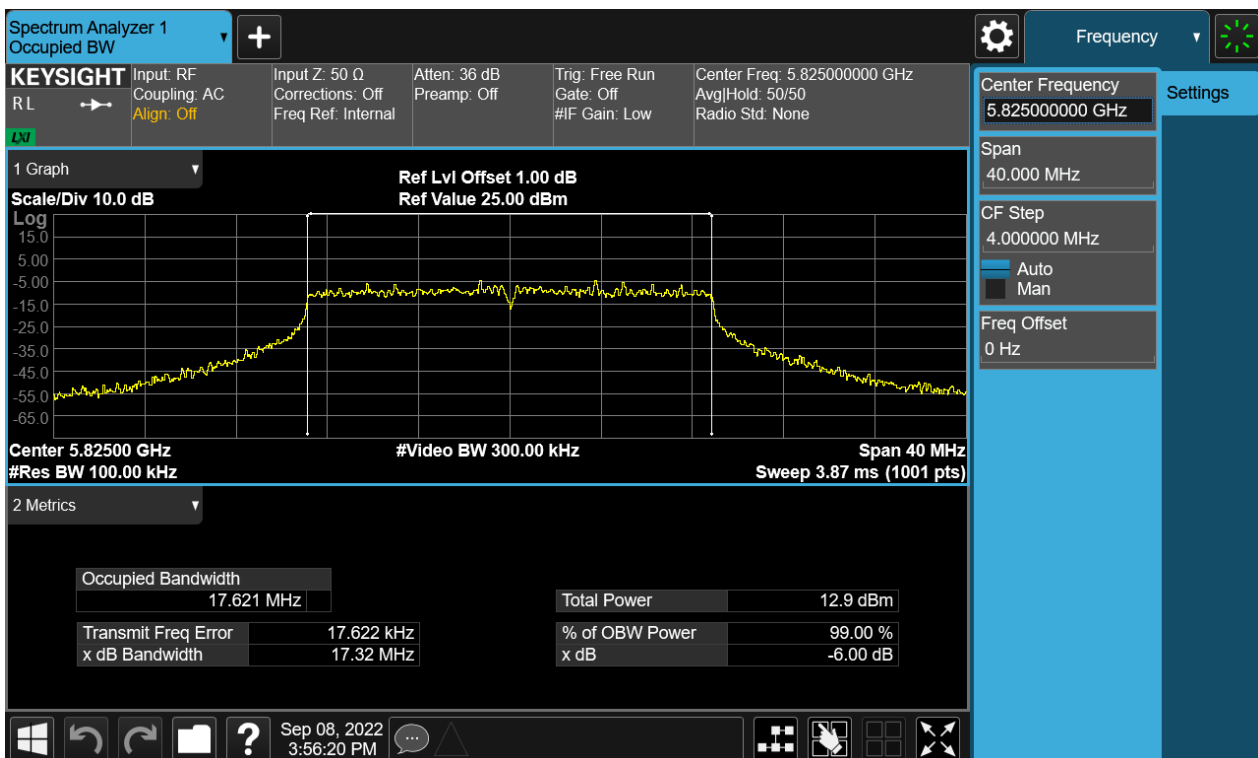


Figure 20: The plots of 6dB Bandwidth, 802.11n(HT20), 5825MHz



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Figure 21: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5745MHz

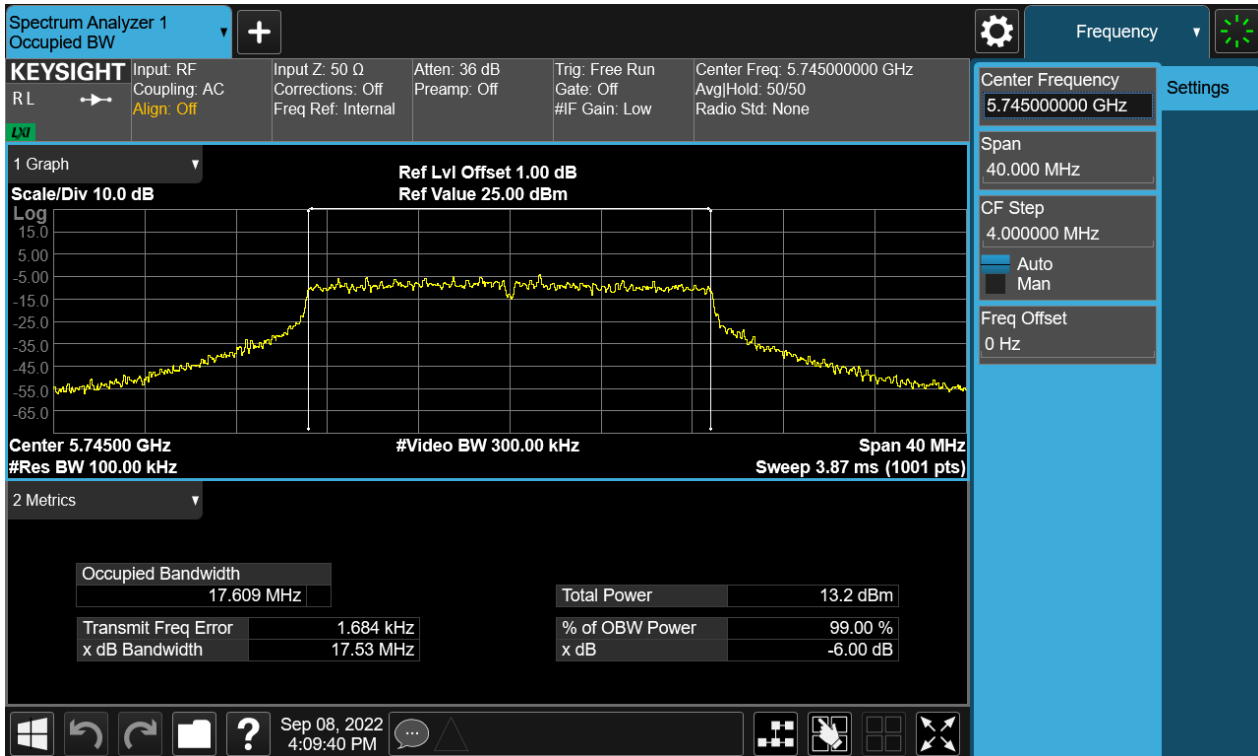
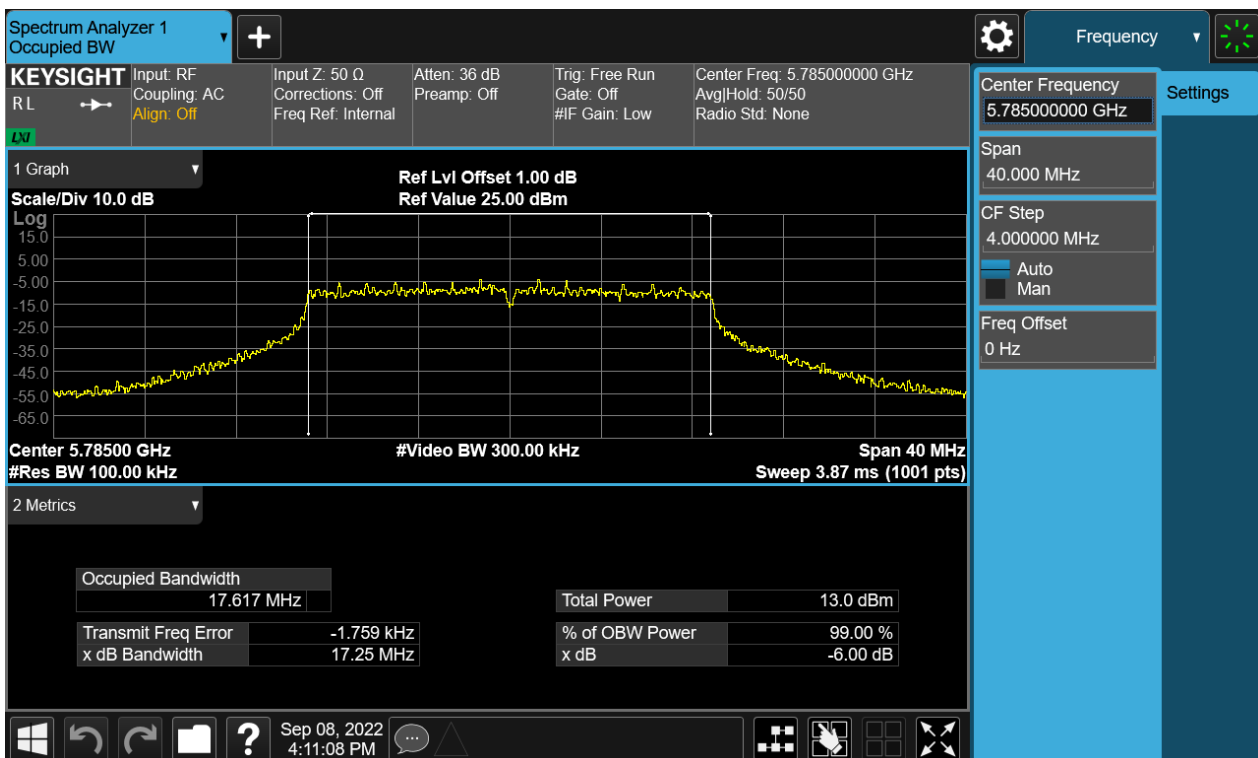


Figure 22: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5785MHz



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Figure 23: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5825MHz

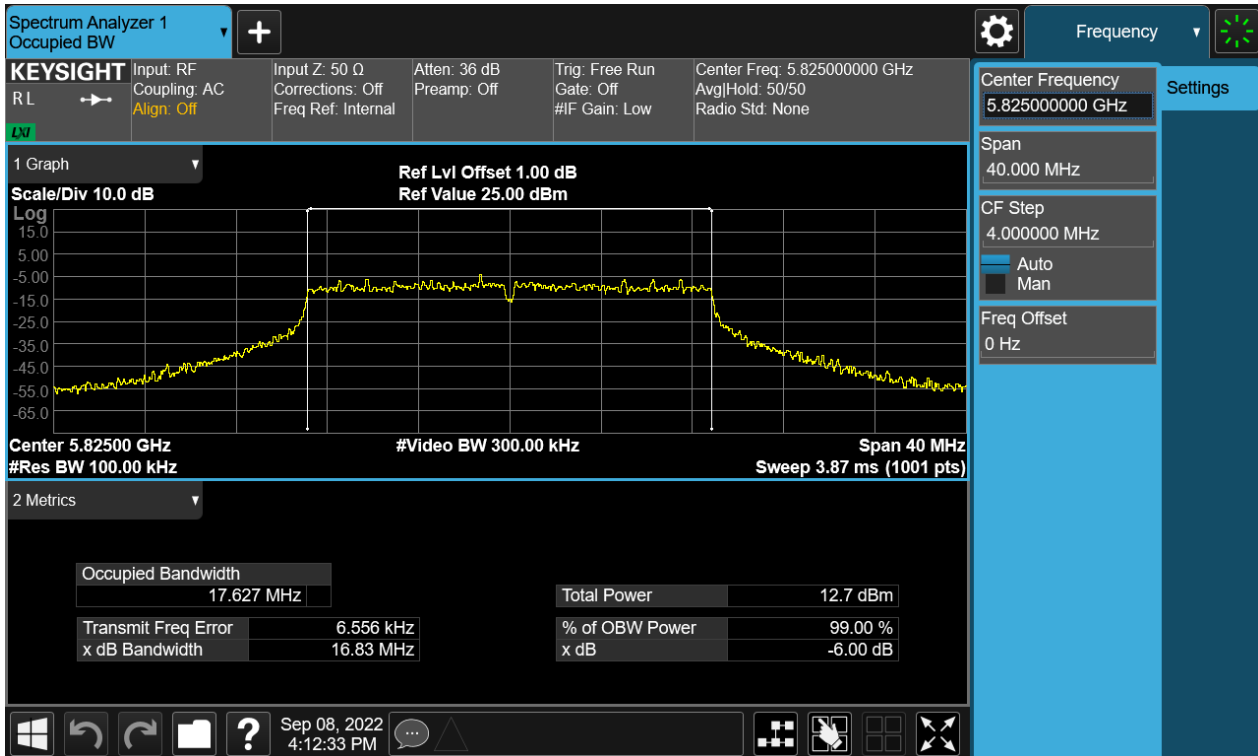
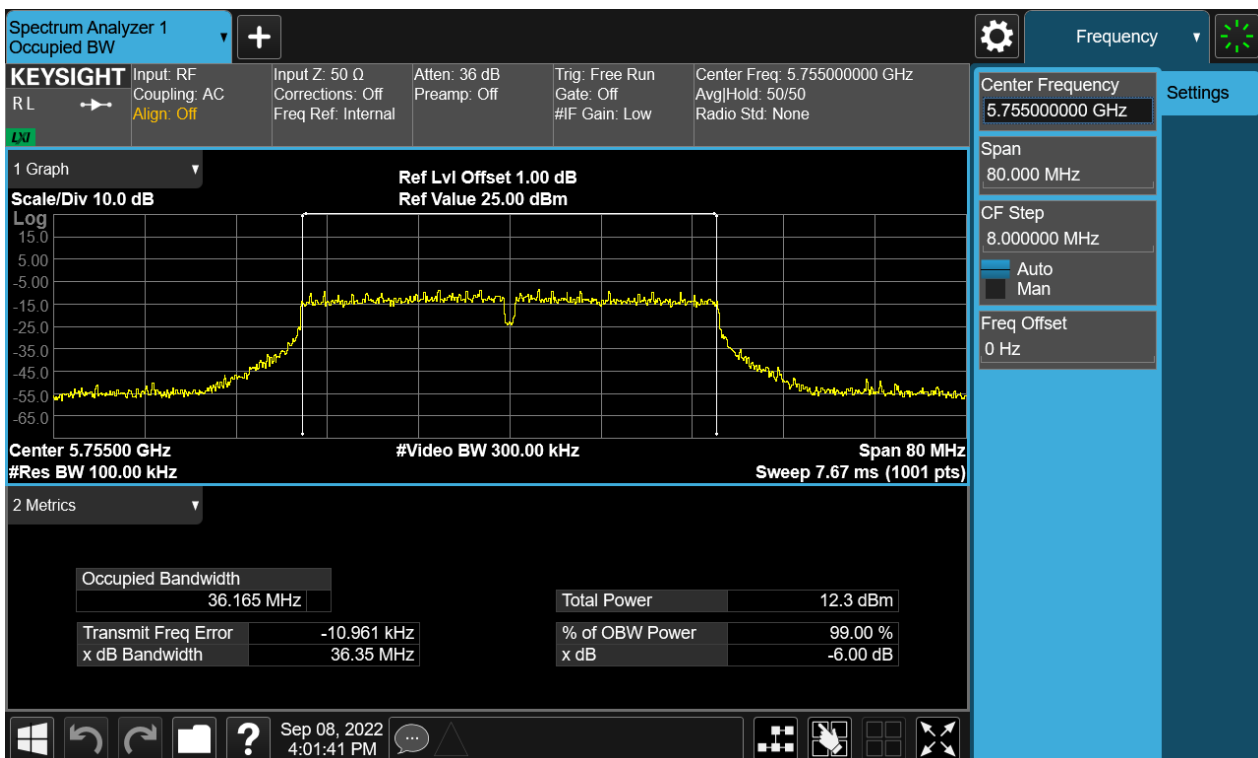


Figure 24: The plots of 6dB Bandwidth, 802.11n(HT40), 5755MHz



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Figure 25: The plots of 6dB Bandwidth, 802.11n(HT40), 5795MHz

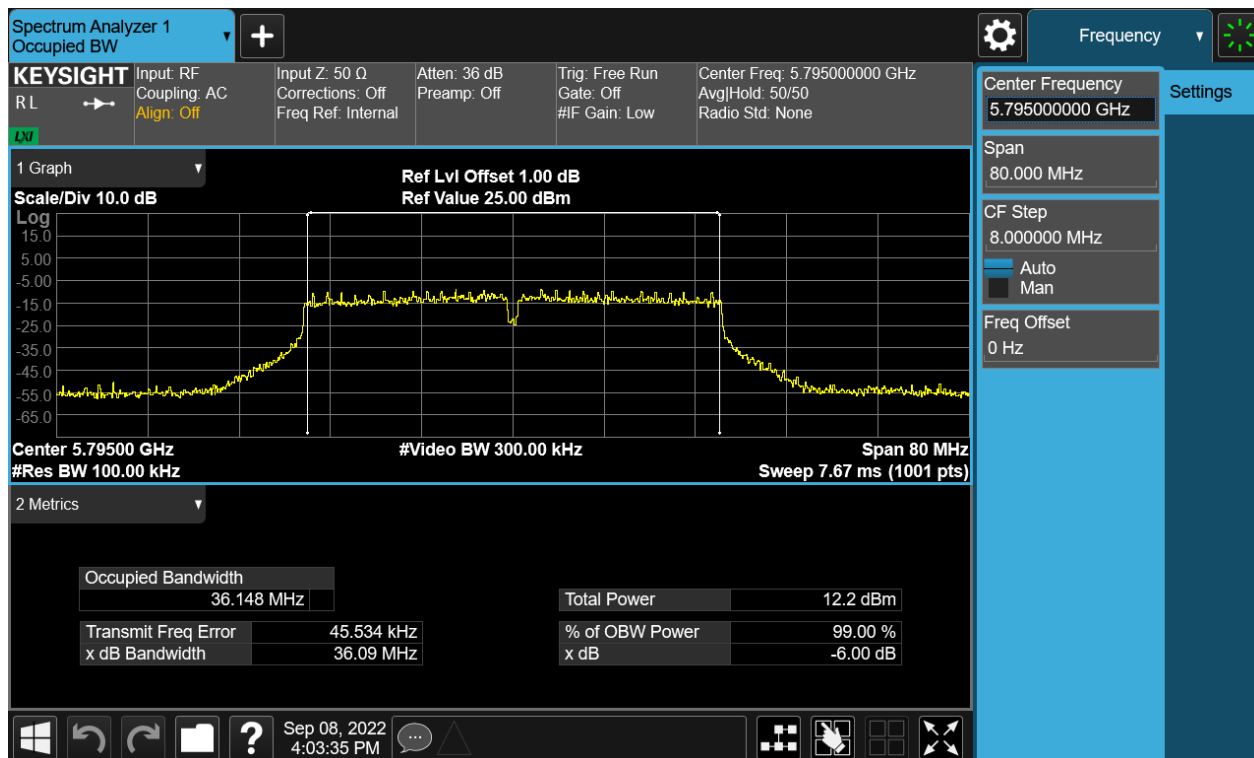
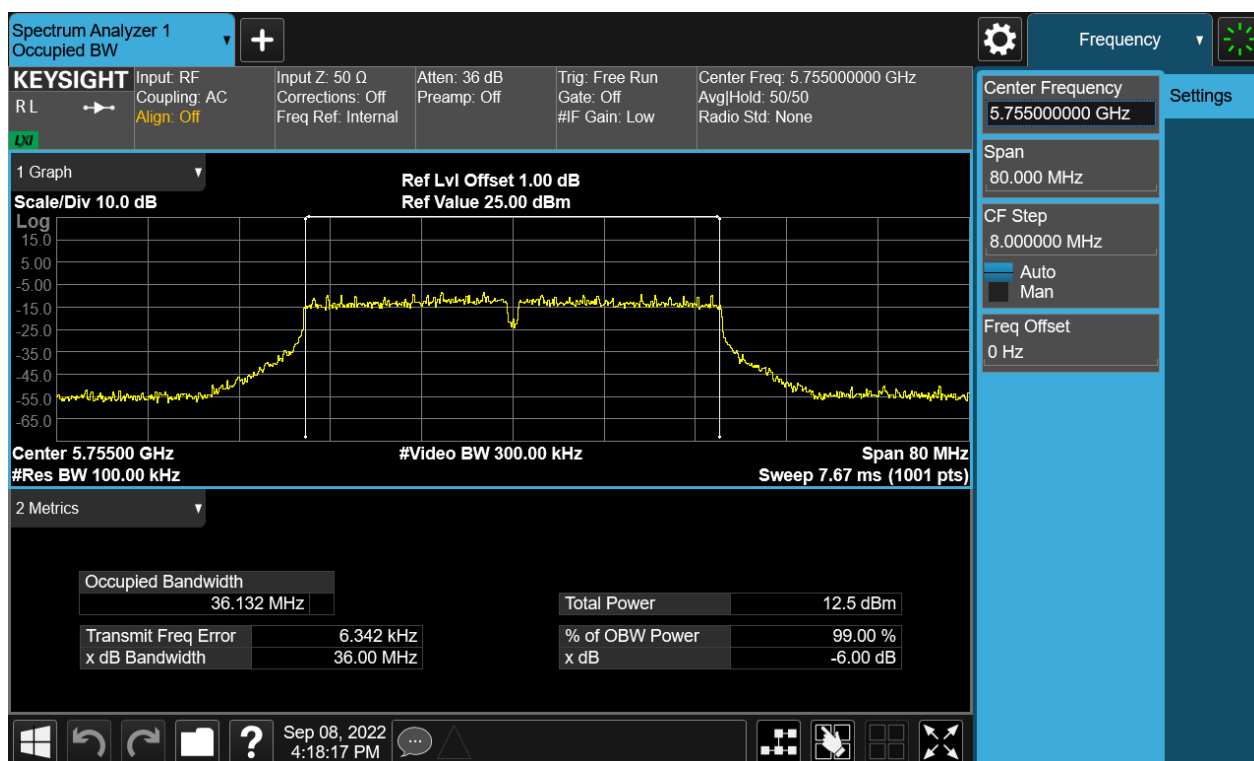


Figure 26: The plots of 6dB Bandwidth, 802.11ac(VHT40), 5755MHz



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Figure 27: The plots of 6dB Bandwidth, 802.11ac(VHT40), 5795MHz

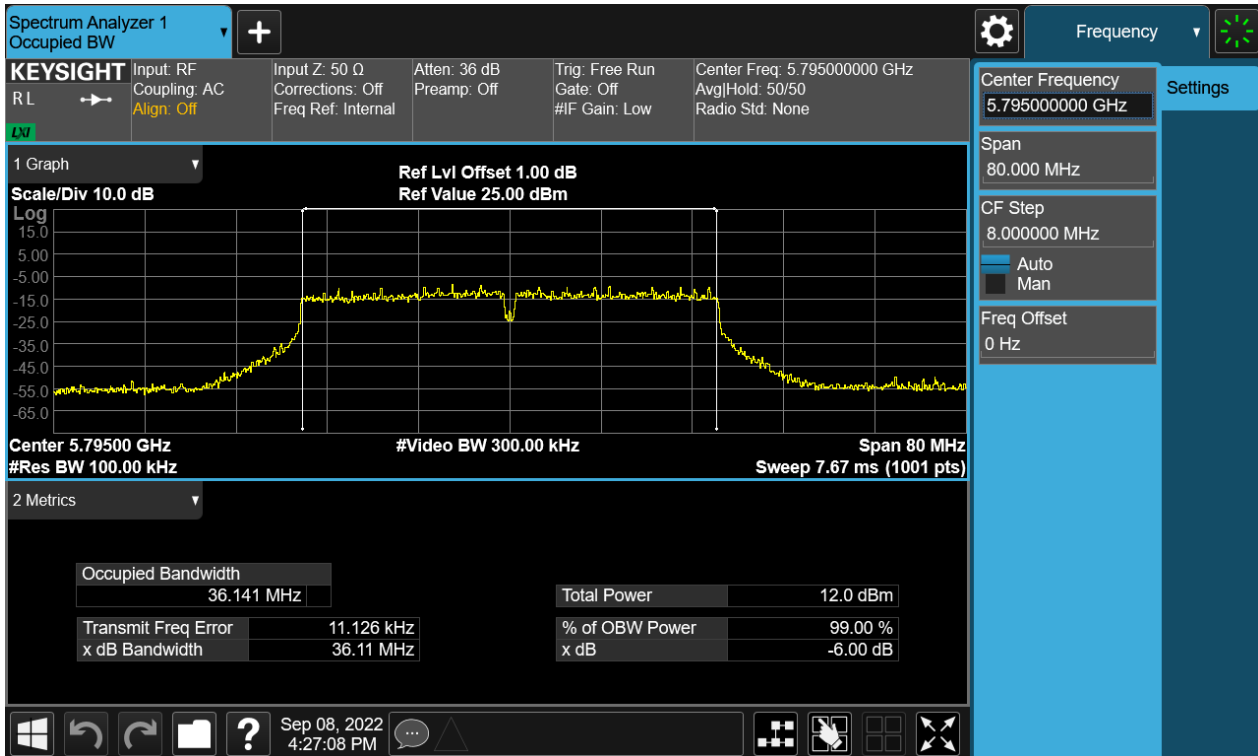
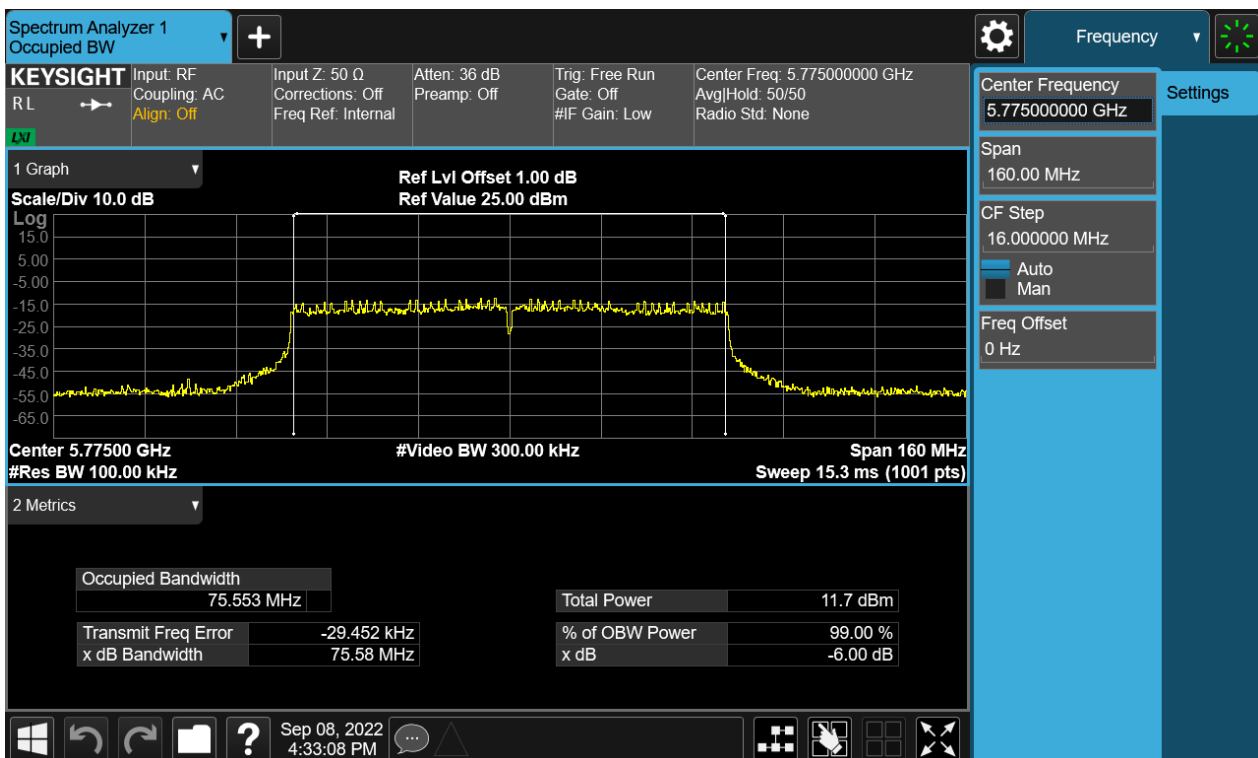


Figure 28: The plots of 6dB Bandwidth, 802.11ac(VHT80), 5775MHz



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4.1.5 Maximum Conducted Output Power Spectral Density and e.i.r.p. spectral density

RESULT:

PASS

Test standard : FCC Part 15.407(a), RSS-247 6.2
Requirement : ANSI C63.10-2013 clause 12.5(SA-2), KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 24.5°C
Relative humidity : 58%

Table 6: Maximum Conducted Output Power Spectral Density for Band I (5150 – 5250 MHz)

Test Mode	Duty Cycle (%)	Test Channel (MHz)	Maximum Conducted Output Power Spectral Density			FCC Limit (dBm/MHz)
			Chain 1 (dBm/MHz)	Chain 2 (dBm/MHz)	Total (dBm/MHz)	
802.11a	95.52	5180	3.39	2.92	N/A	8.73
		5220	2.92	2.62	N/A	
		5240	4.09	3.62	N/A	
802.11n(HT20)	94.48	5180	1.73	1.20	4.48	
		5220	2.53	1.34	4.99	
		5240	2.54	1.83	5.21	
802.11ac(VHT20)	95.15	5180	1.50	1.25	4.39	
		5220	1.95	1.36	4.68	
		5240	2.48	1.77	5.15	
802.11n(HT40)	90.00	5190	-1.92	-1.77	1.17	
		5230	-2.18	-1.64	1.11	
802.11ac(VHT40)	89.61	5190	-2.33	-2.57	0.56	
		5230	-1.54	-2.39	1.07	
802.11ac(VHT80)	82.61	5210	-6.26	-5.62	-2.92	

Notes:

1. Directional gain = $G_{ANT} + 10 \log(N_{ANT}) = 8.27$.
2. $PSD_{Out} = PSD_{Limit} - (G_{Tx} - 6) = 8.73 \text{ dBm/MHz}$.
3. 802.11a support SISO and 802.11n/ac support MIMO.
4. Add $[10 \log(1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

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Table 7: Maximum Conducted Output Power Spectral Density for Band IV (5725 – 5850 MHz)

Test Mode	Duty Cycle (%)	Test Channel (MHz)	Maximum Conducted Output Power Spectral Density			FCC/IC Limit (dBm/500KHz)
			Chain 1 (dBm/500KHz)	Chain 2 (dBm/500KHz)	Total (dBm/500KHz)	
802.11a	95.28	5745	0.34	0.15	N/A	27.73
		5785	-0.60	0.18	N/A	
		5825	-1.34	-0.12	N/A	
802.11n(HT20)	95.06	5745	-0.43	-1.38	2.13	
		5785	-1.08	-1.41	1.77	
		5825	-1.89	-1.56	1.29	
802.11ac(VHT20)	95.15	5745	-1.17	-1.13	1.86	
		5785	-2.20	-1.46	1.20	
		5825	-1.66	-0.99	1.70	
802.11n(HT40)	90.00	5755	-4.31	-4.95	-1.61	
		5795	-6.38	-5.57	-2.95	
802.11ac(VHT40)	90.13	5755	-5.31	-4.55	-1.90	
		5795	-6.59	-5.38	-2.93	
802.11ac(VHT80)	82.07	5775	-9.78	-10.14	-6.95	

Notes:

1. Directional gain = $G_{ANT} + 10 \log(N_{ANT}) = 8.27$.
2. $PSD_{Out} = PSD_{Limit} - (G_{Tx} - 6) = 27.73 \text{ dBm/500KHz}$.
3. 802.11a support SISO and 802.11n/ac support MIMO.
4. Add $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

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Table 8: e.i.r.p. spectral density for Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	e.i.r.p. spectral density			IC Limit (dBm/MHz)
		Antenna 3 (dBm/MHz)	Antenna 2 (dBm/MHz)	Total PSD (dBm/MHz)	
802.11a	5180	7.14	8.18	N/A	10
	5220	6.67	7.88	N/A	
	5240	7.84	8.88	N/A	
802.11n(HT20)	5180	5.48	6.46	9.01	
	5220	6.28	6.60	9.45	
	5240	6.29	7.09	9.72	
802.11ac(VHT20)	5180	5.25	6.51	8.94	
	5220	5.70	6.62	9.19	
	5240	6.23	7.03	9.66	
802.11n(HT40)	5190	1.83	3.49	5.75	
	5230	1.57	3.62	5.73	
802.11ac(VHT40)	5190	1.42	2.69	5.11	
	5230	2.21	2.87	5.56	
802.11ac(VHT80)	5210	-2.51	-0.36	1.71	

Notes:

1. Antenna Gain (Antenna 3: 3.75dBi, Antenna 2: 5.26dBi).
2. 802.11a support SISO and 802.11n/ac support MIMO.

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Band I (5150 – 5250 MHz)

Figure 29: The plots of Power Spectral Density, 802.11a, 5180MHz, at Chain 1

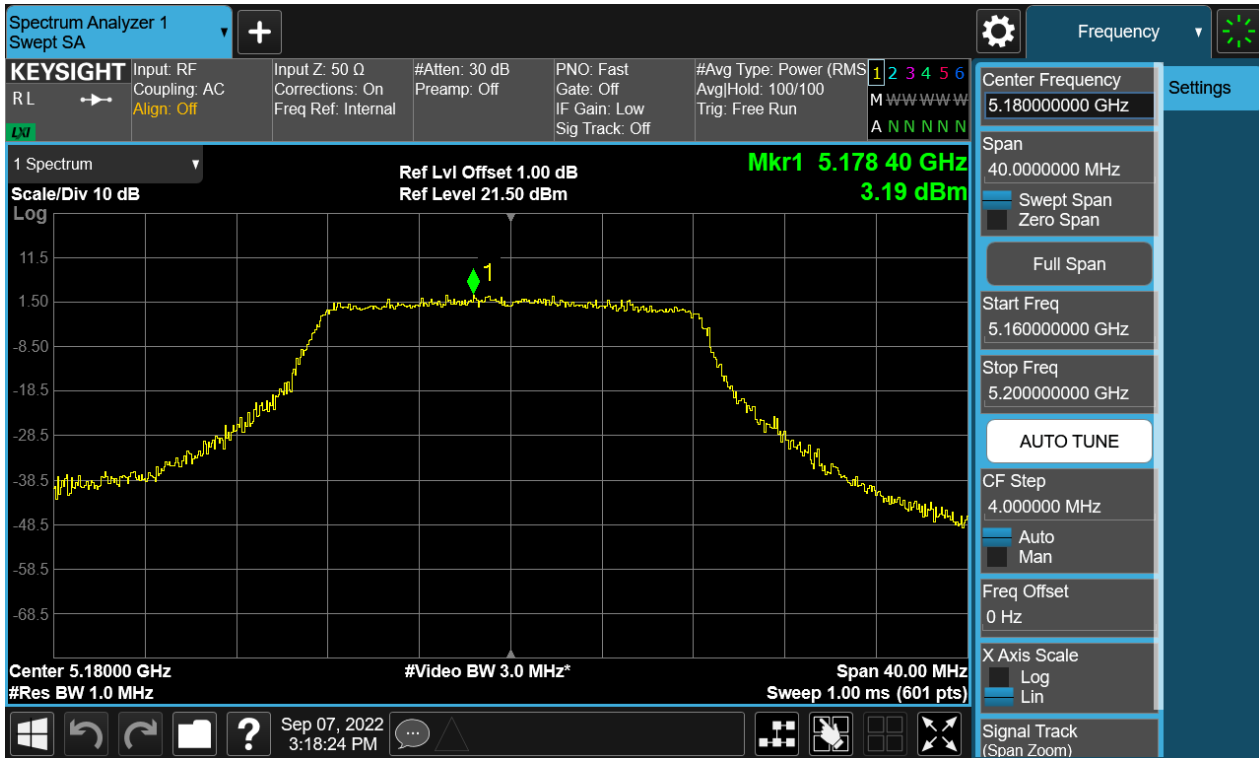
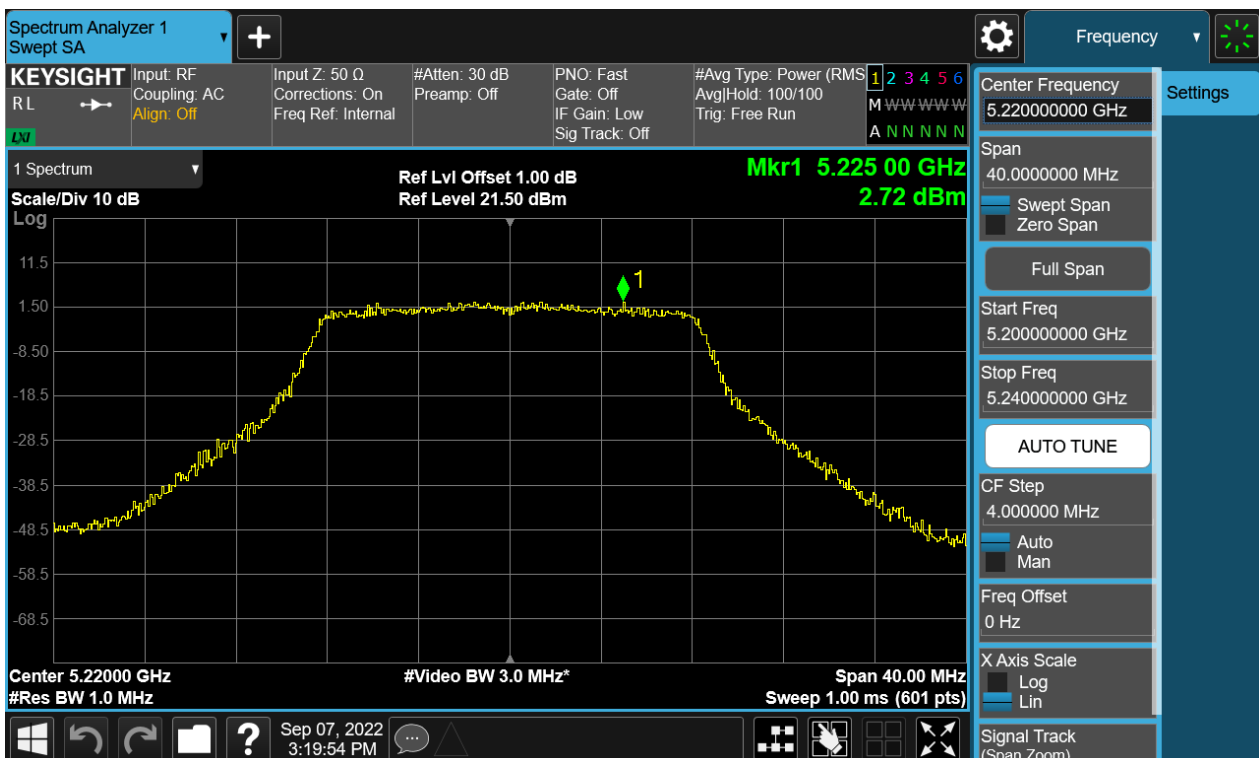


Figure 30: The plots of Power Spectral Density, 802.11a, 5220MHz, at Chain 1



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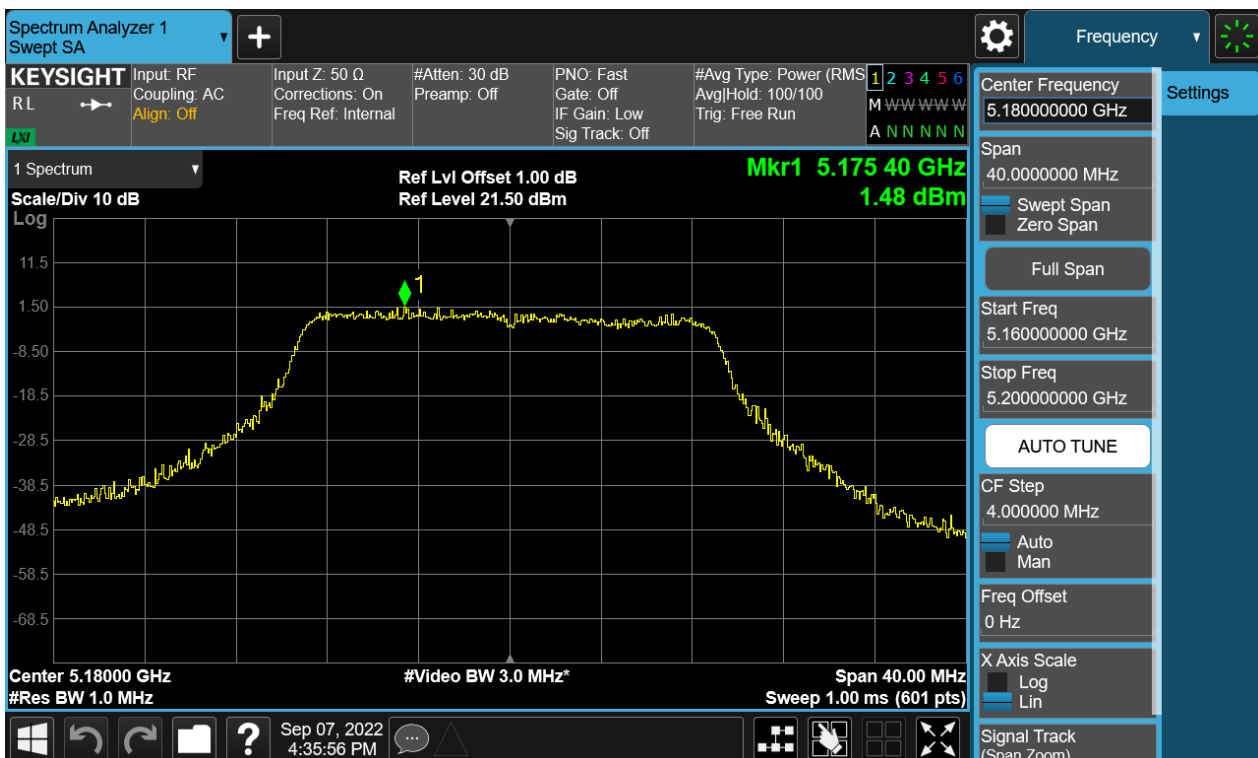
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Figure 31: The plots of Power Spectral Density, 802.11a, 5240MHz, at Chain 1



Figure 32: The plots of Power Spectral Density, 802.11n(HT20), 5180MHz, at Chain 1



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Figure 33: The plots of Power Spectral Density, 802.11n(HT20), 5220MHz, at Chain 1

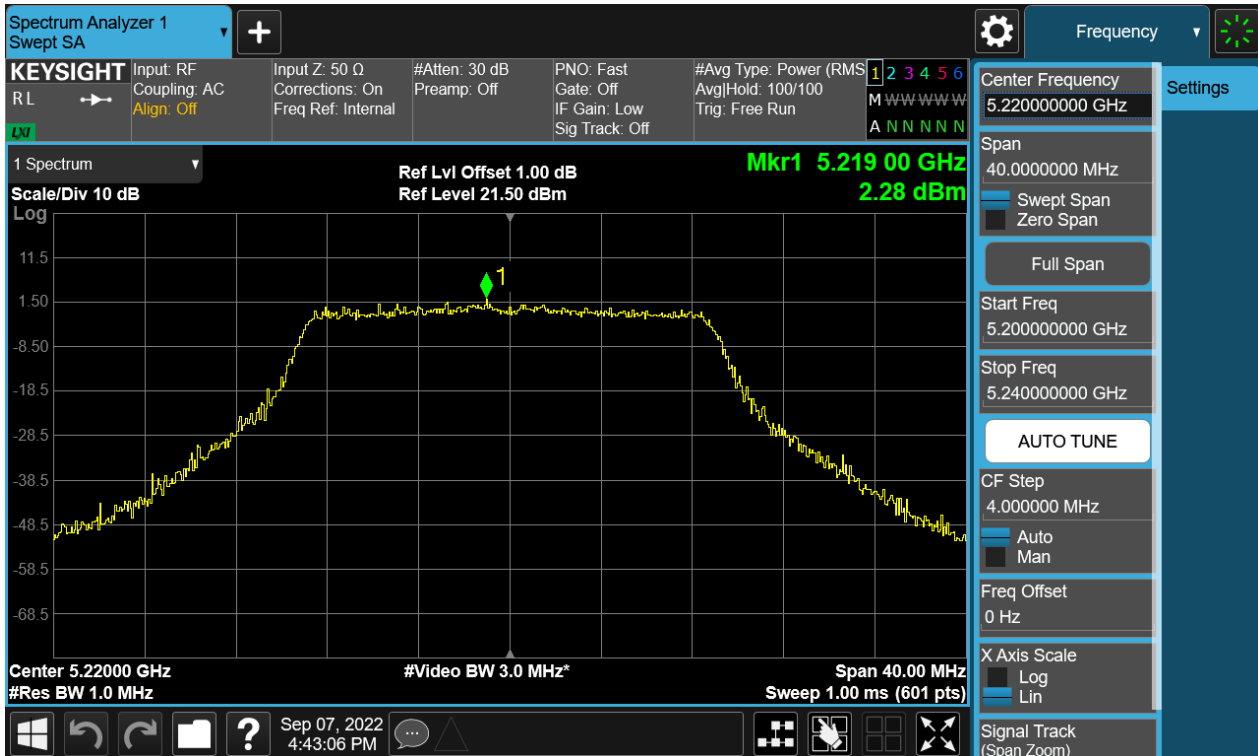
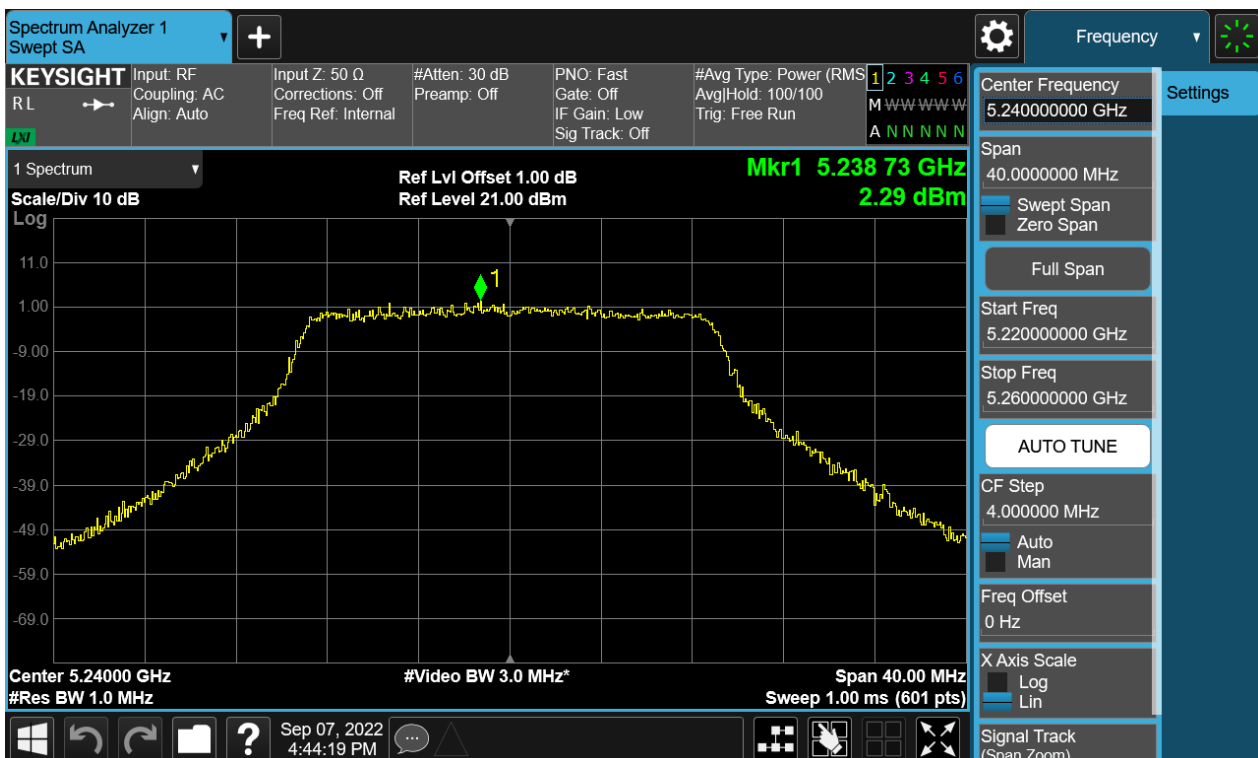


Figure 34: The plots of Power Spectral Density, 802.11n(HT20), 5240MHz, at Chain 1



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Figure 35: The plots of Power Spectral Density, 802.11ac(VHT20), 5180MHz, at Chain 1



Figure 36: The plots of Power Spectral Density, 802.11ac(VHT20), 5220MHz, at Chain 1



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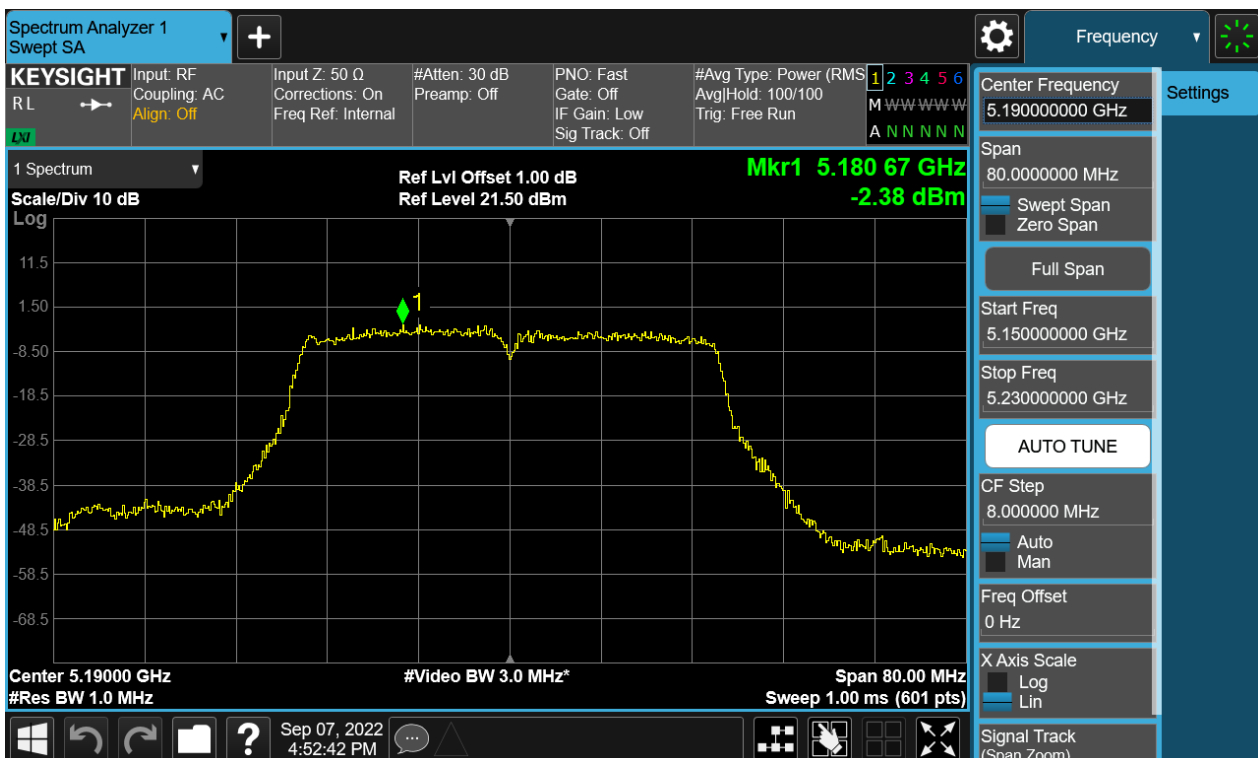
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Figure 37: The plots of Power Spectral Density, 802.11ac(VHT20), 5240MHz, at Chain 1



Figure 38: The plots of Power Spectral Density, 802.11n(HT40), 5190MHz, at Chain 1



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Figure 39: The plots of Power Spectral Density, 802.11n(HT40), 5230MHz, at Chain 1

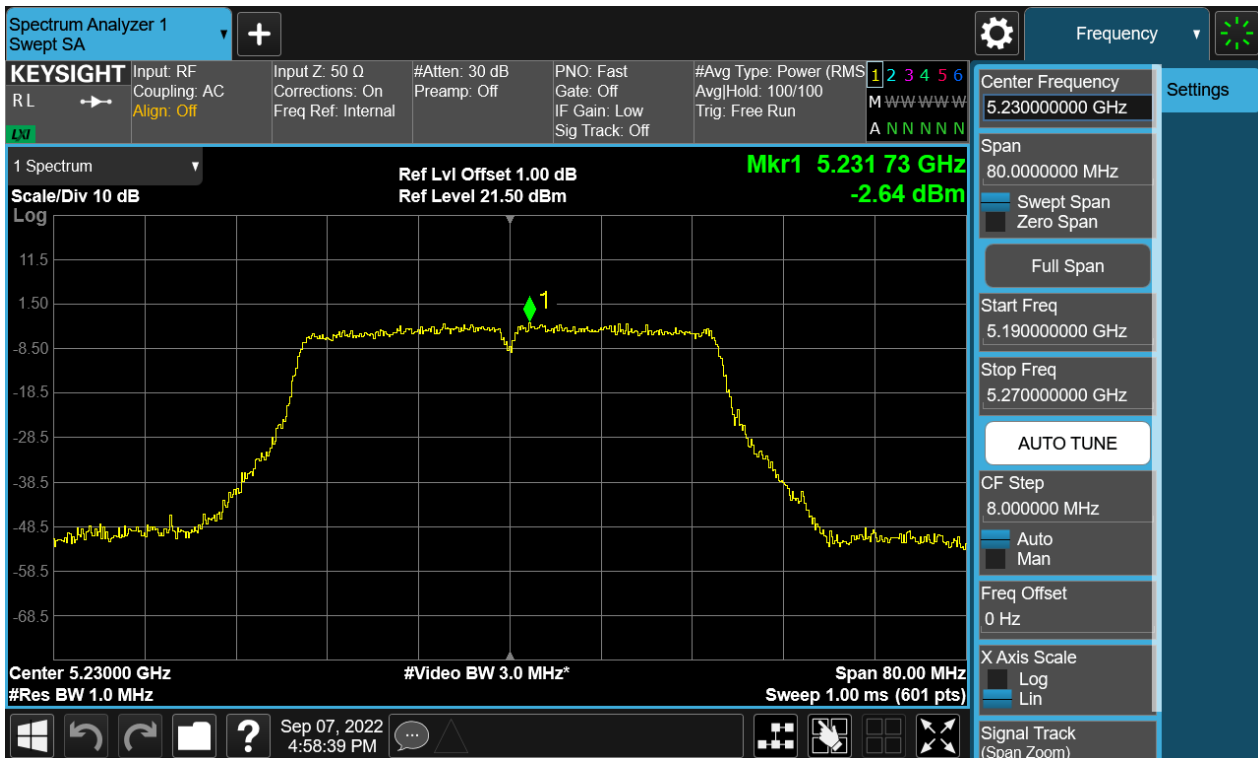


Figure 40: The plots of Power Spectral Density, 802.11ac(VHT40), 5190MHz, at Chain 1



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Figure 41: The plots of Power Spectral Density, 802.11ac(VHT40), 5230MHz, at Chain 1

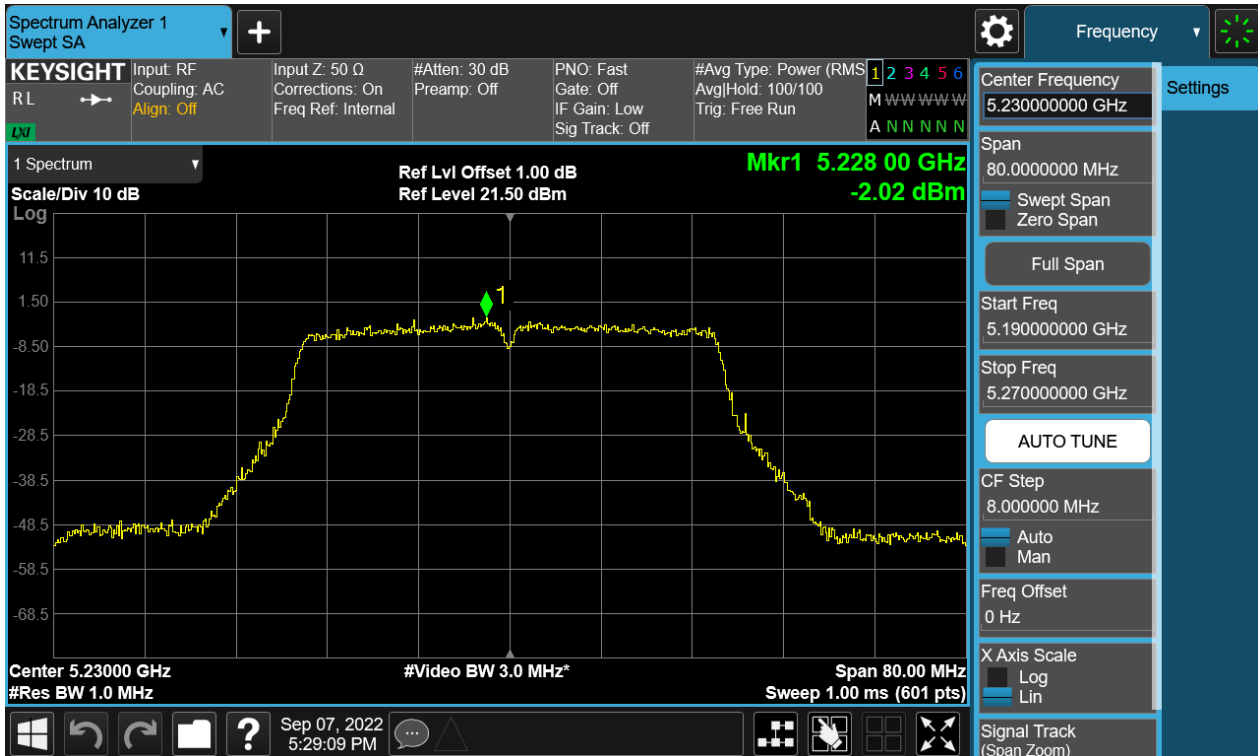
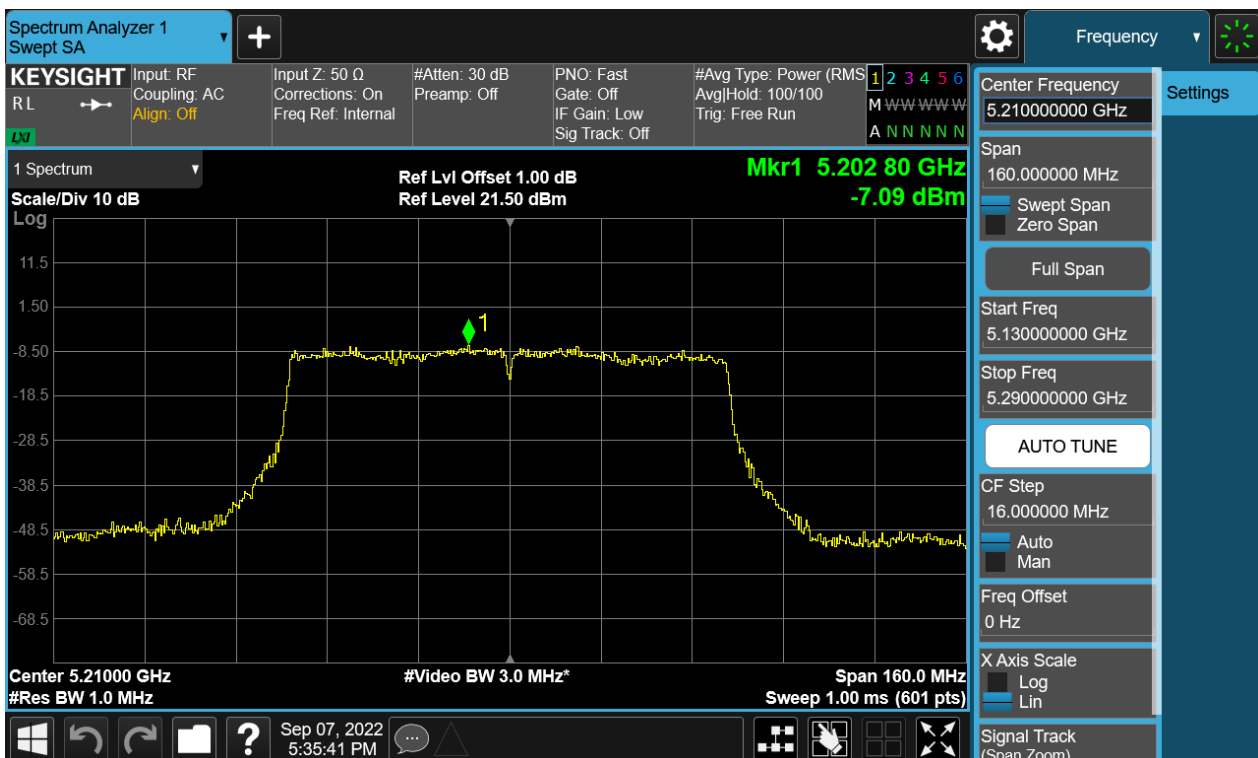


Figure 42: The plots of Power Spectral Density, 802.11ac(VHT80), 5210MHz, at Chain 1



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Figure 43: The plots of Power Spectral Density, 802.11a, 5180MHz, at Chain 2

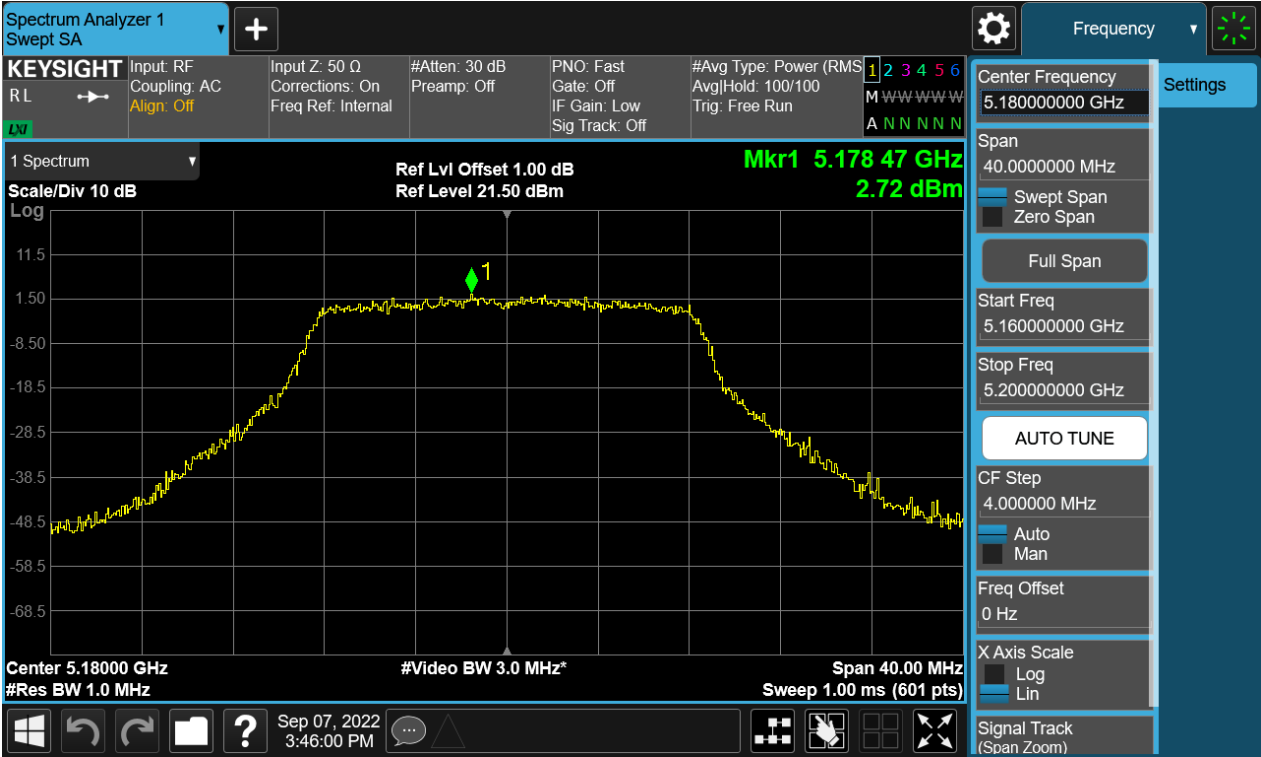
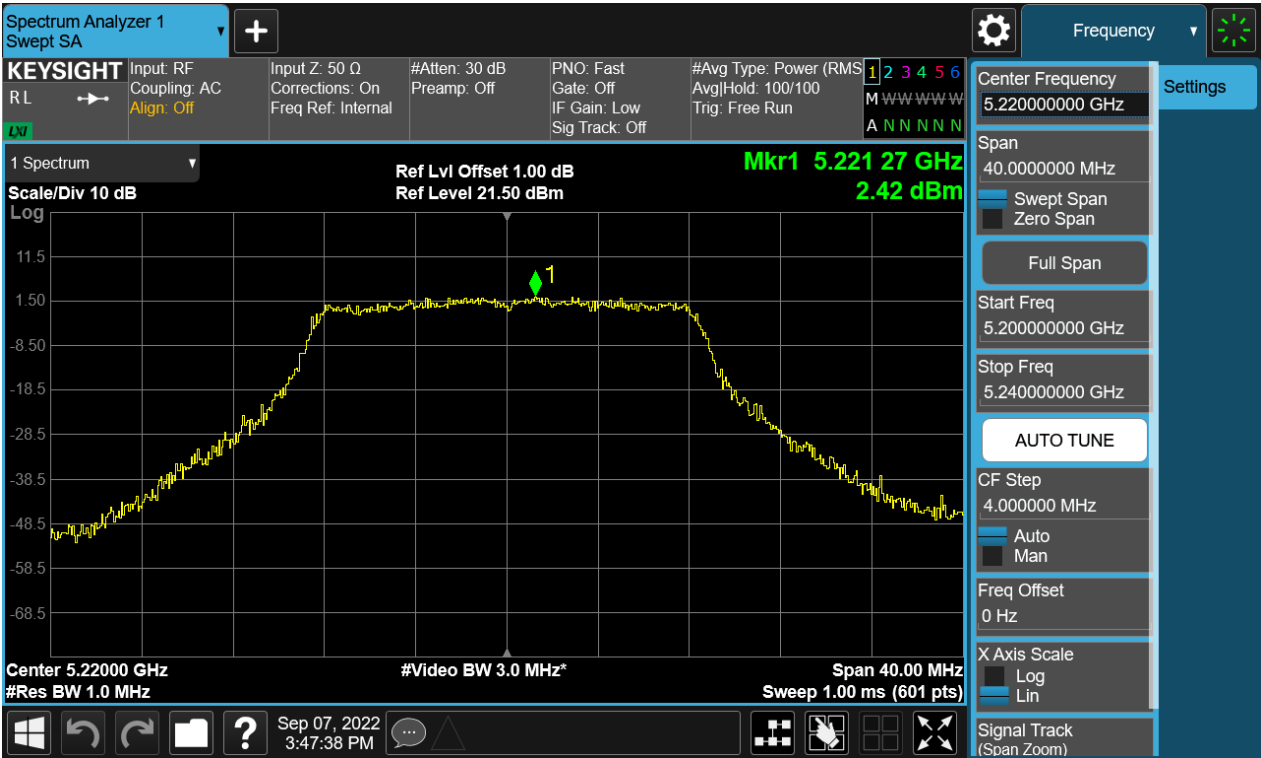


Figure 44: The plots of Power Spectral Density, 802.11a, 5220MHz, at Chain 2



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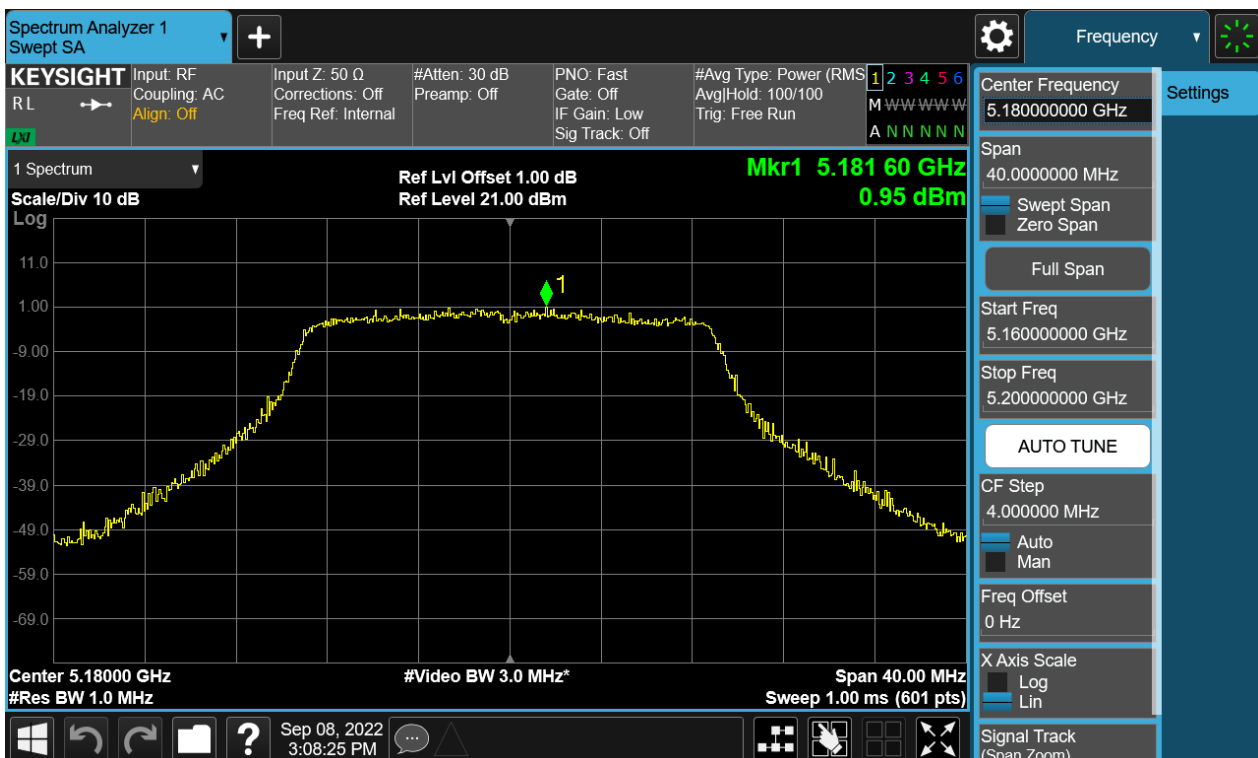
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Figure 45: The plots of Power Spectral Density, 802.11a, 5240MHz, at Chain 2



Figure 46: The plots of Power Spectral Density, 802.11n(HT20), 5180MHz, at Chain 2



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Figure 47: The plots of Power Spectral Density, 802.11n(HT20), 5220MHz, at Chain 2

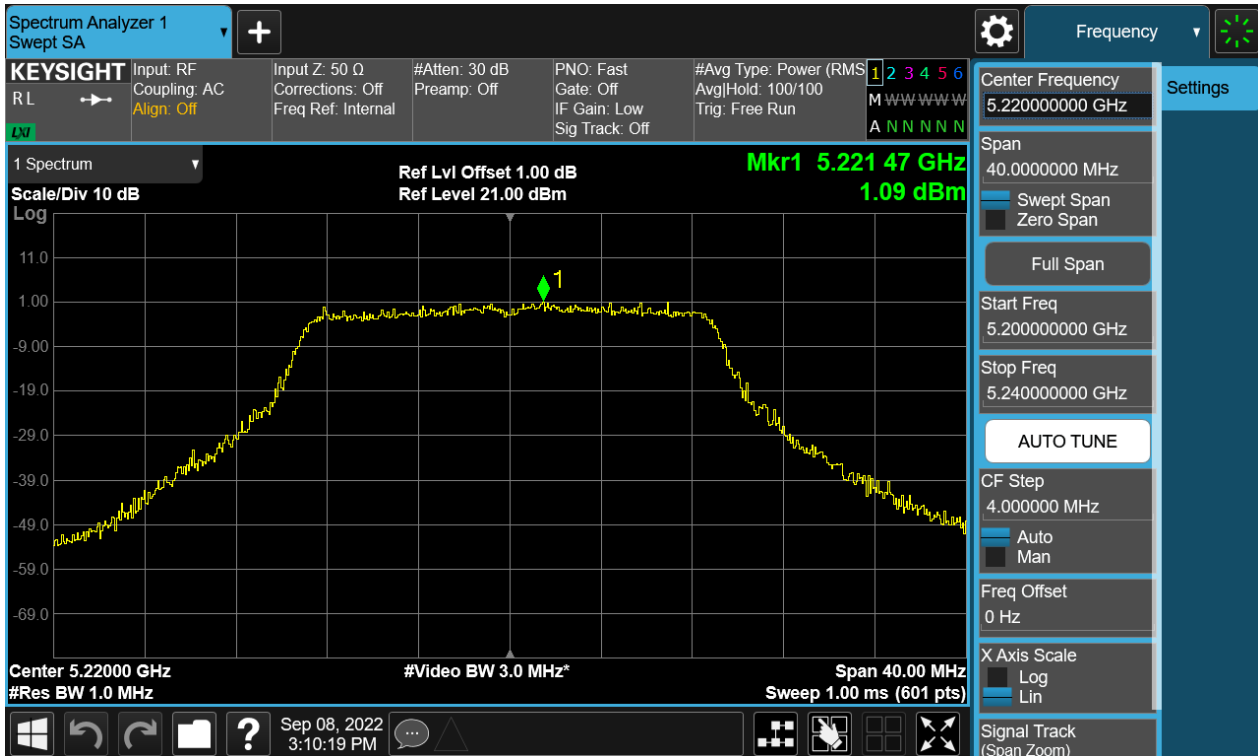


Figure 48: The plots of Power Spectral Density, 802.11n(HT20), 5240MHz, at Chain 2

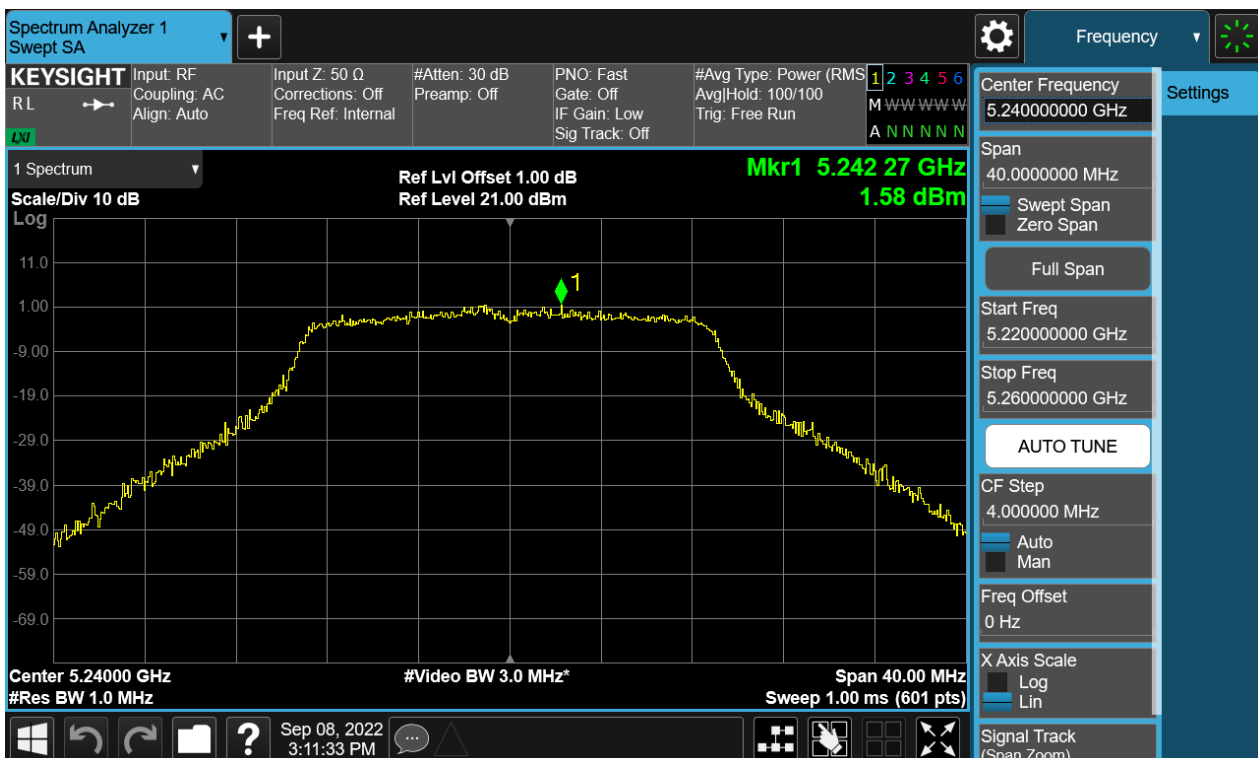
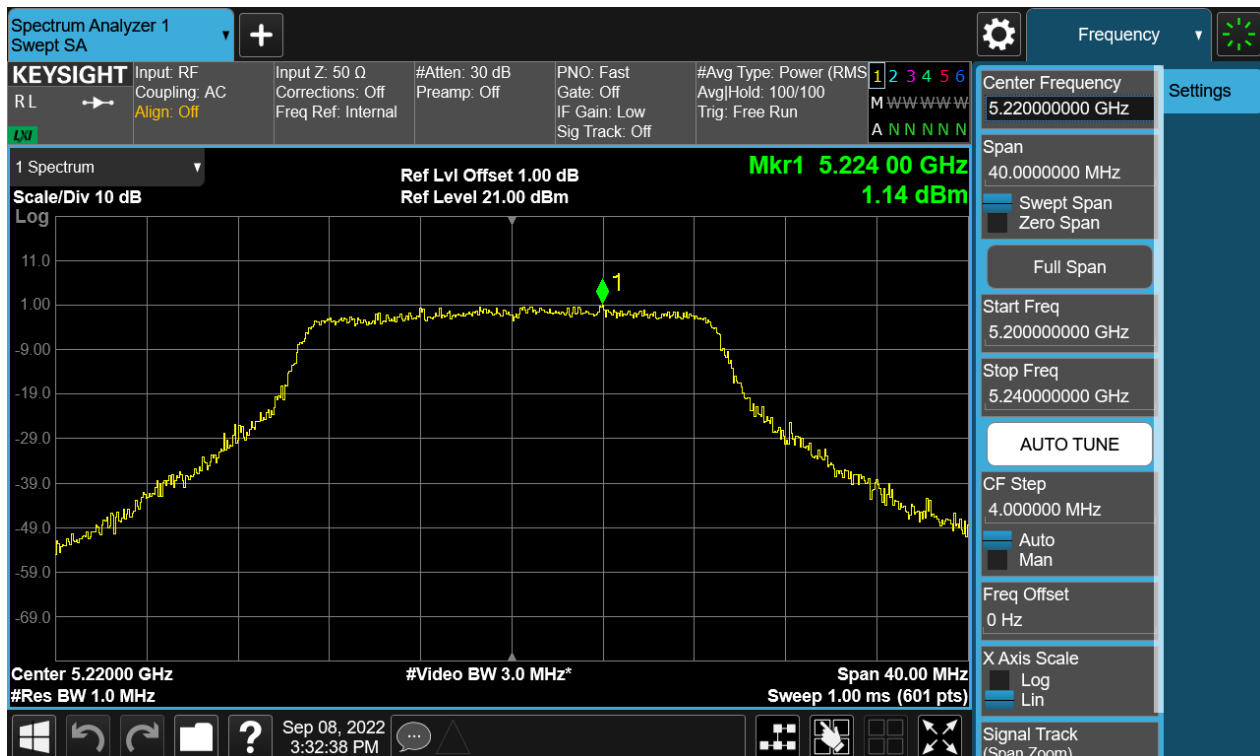


Figure 49: The plots of Power Spectral Density, 802.11ac(VHT20), 5180MHz, at Chain 2



Figure 50: The plots of Power Spectral Density, 802.11ac(VHT20), 5220MHz, at Chain 2



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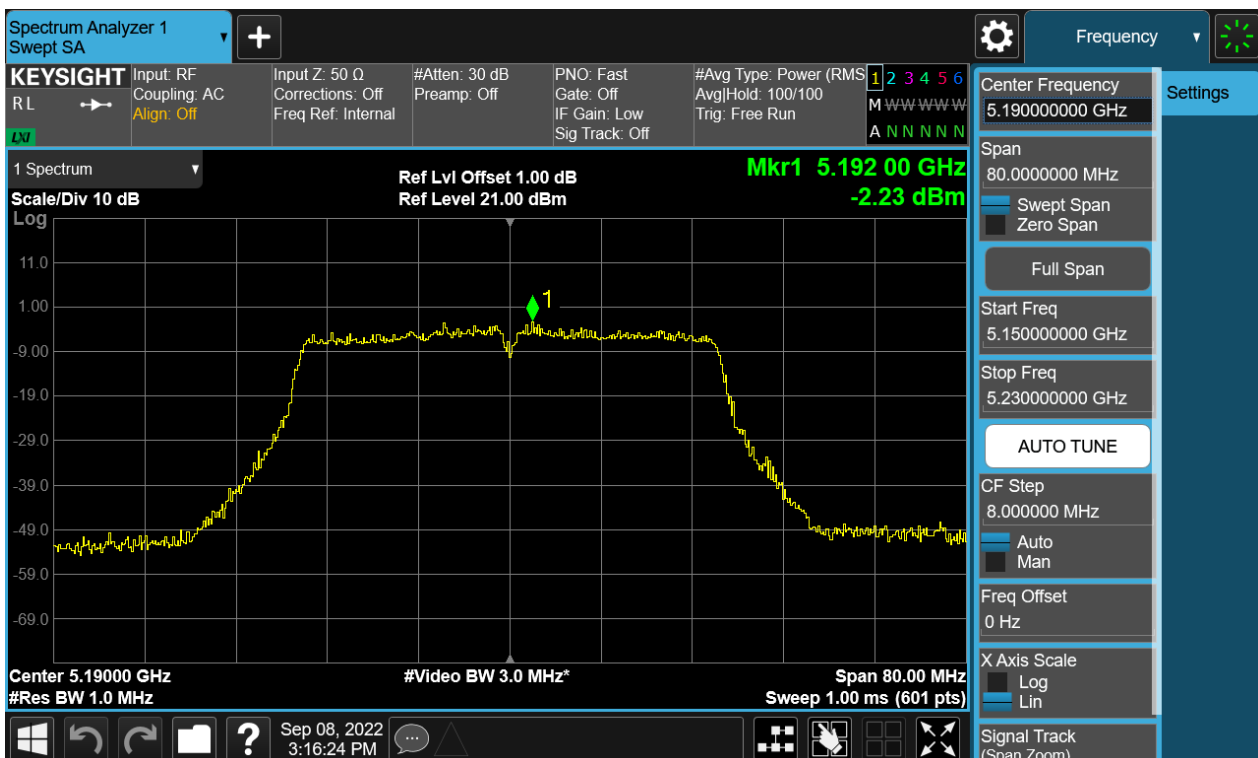
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Figure 51: The plots of Power Spectral Density, 802.11ac(VHT20), 5240MHz, at Chain 2



Figure 52: The plots of Power Spectral Density, 802.11n(HT40), 5190MHz, at Chain 2



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Figure 53: The plots of Power Spectral Density, 802.11n(HT40), 5230MHz, at Chain 2

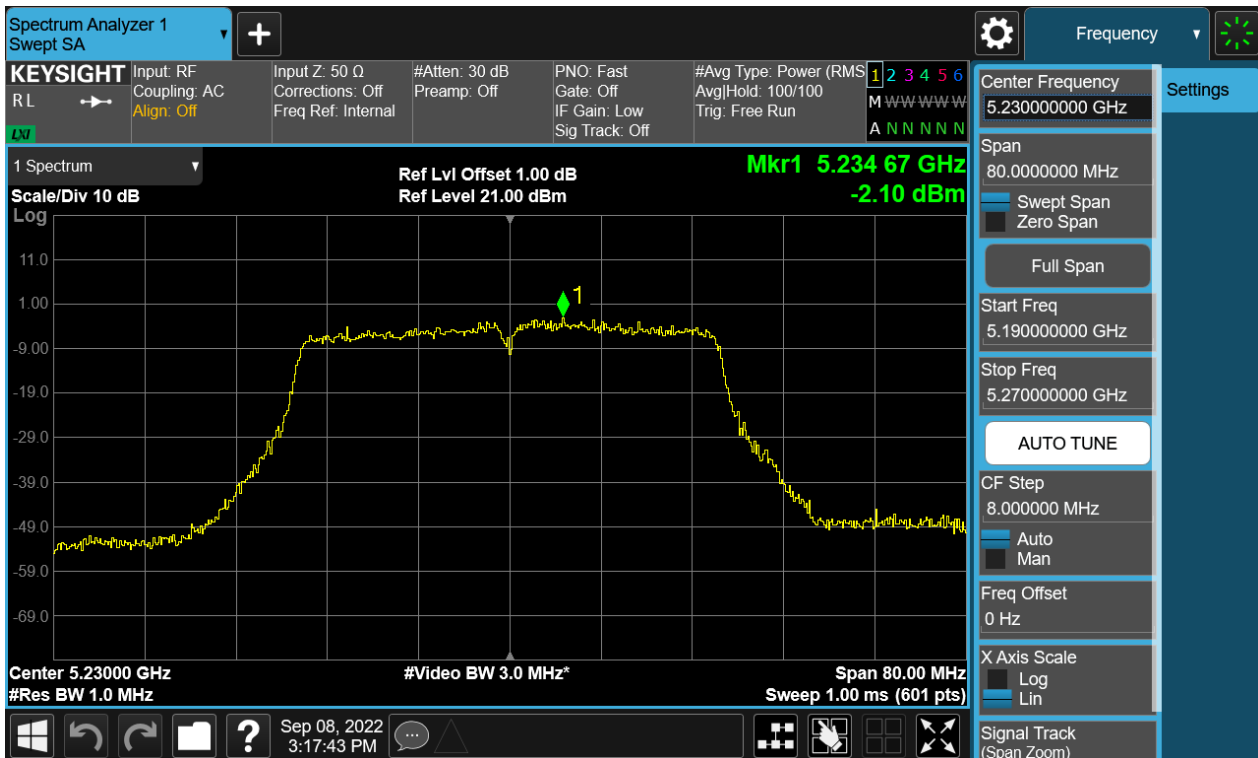
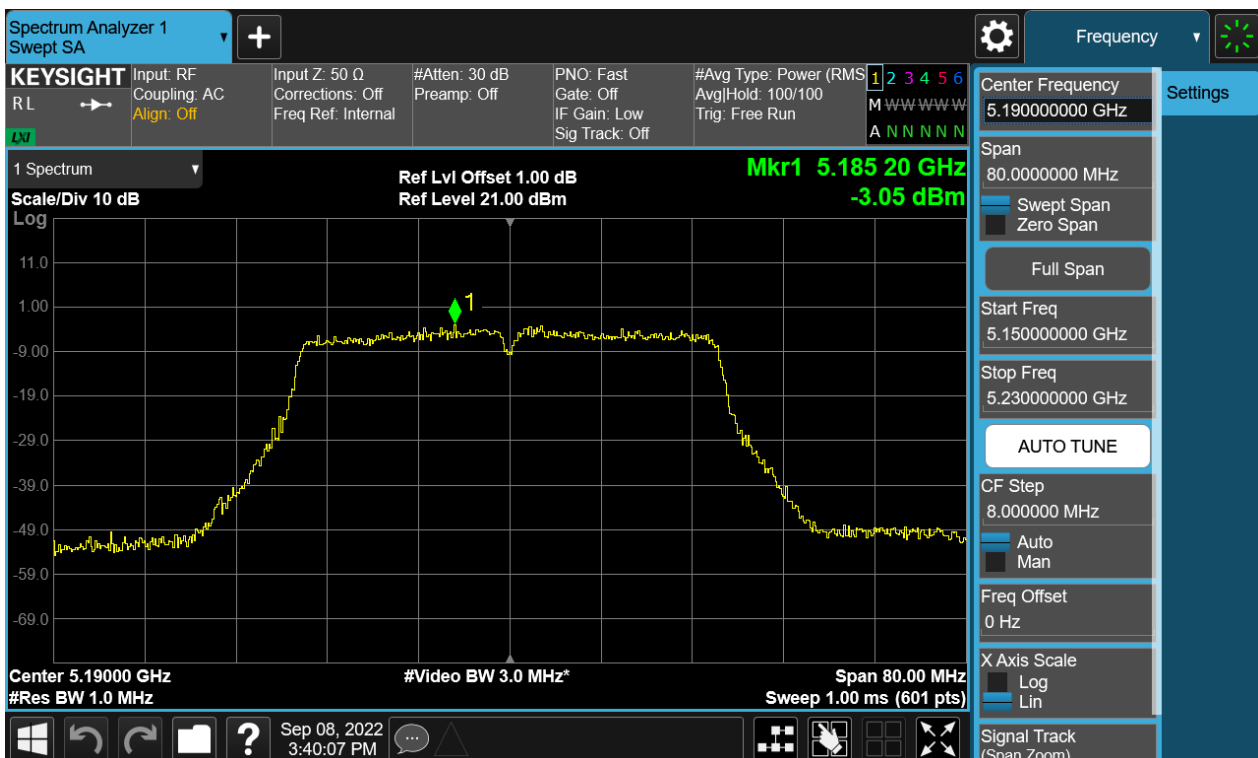


Figure 54: The plots of Power Spectral Density, 802.11ac(VHT40), 5190MHz, at Chain 2



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Figure 55: The plots of Power Spectral Density, 802.11ac(VHT40), 5230MHz, at Chain 2

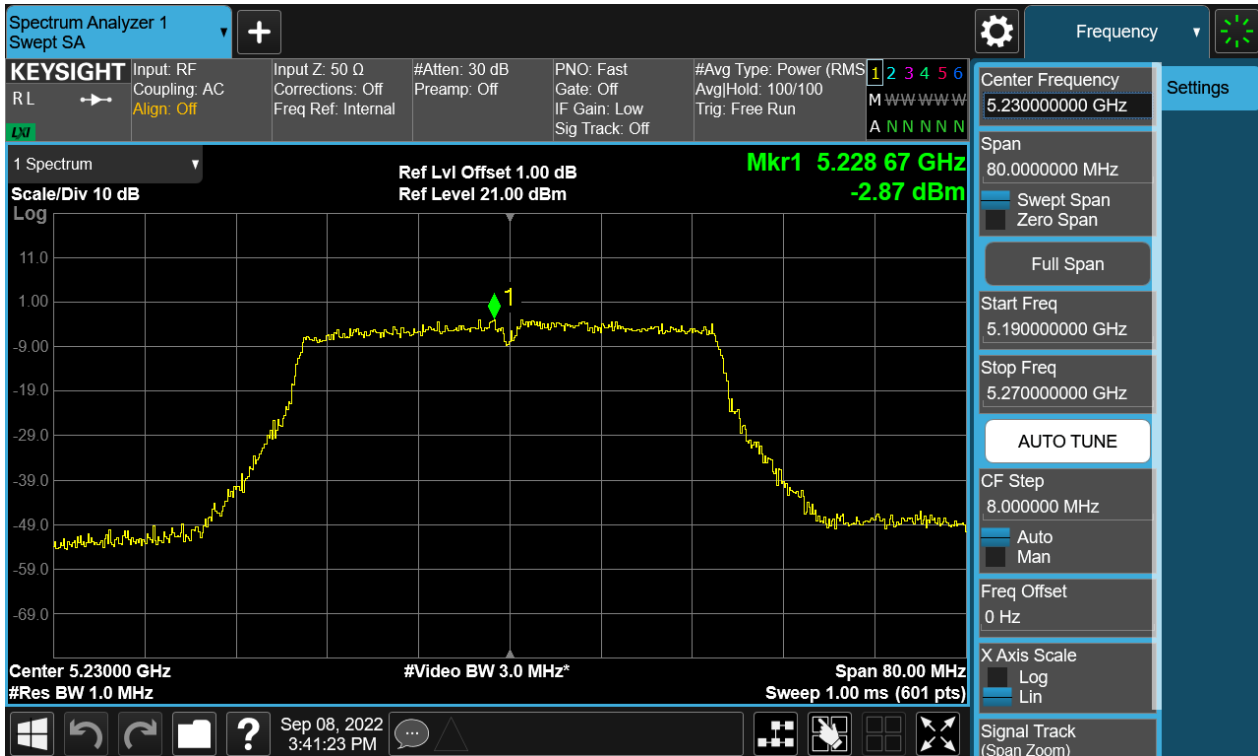
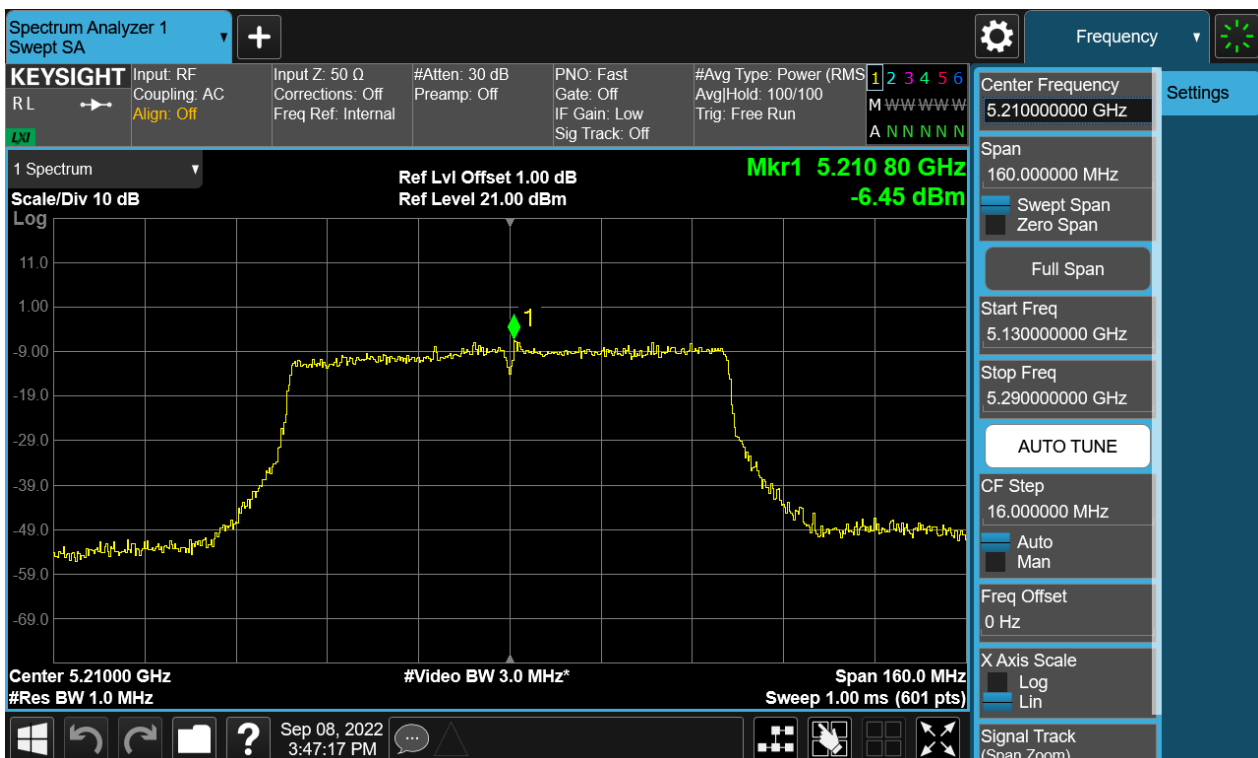


Figure 56: The plots of Power Spectral Density, 802.11ac(VHT80), 5210MHz, at Chain 2



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Band IV (5725 – 5850 MHz)

Figure 57: The plots of Power Spectral Density, 802.11a, 5745MHz, at Chain 1

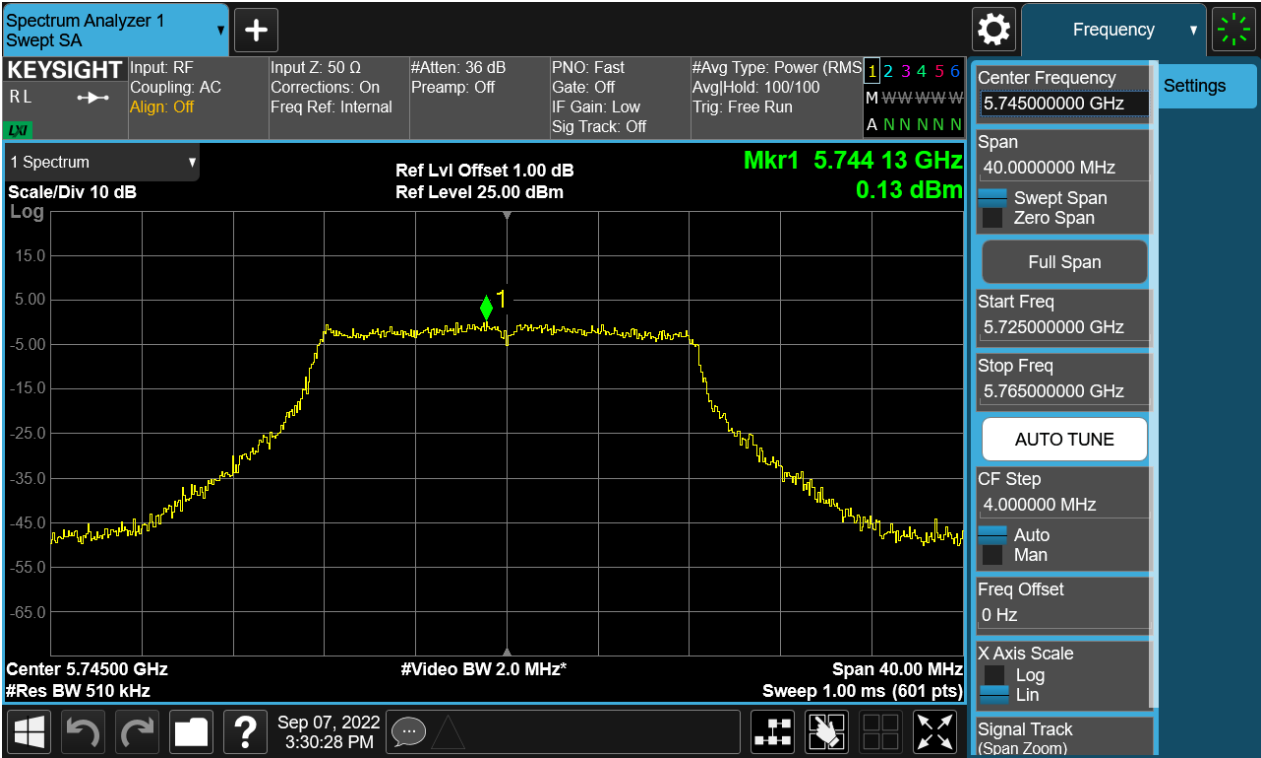
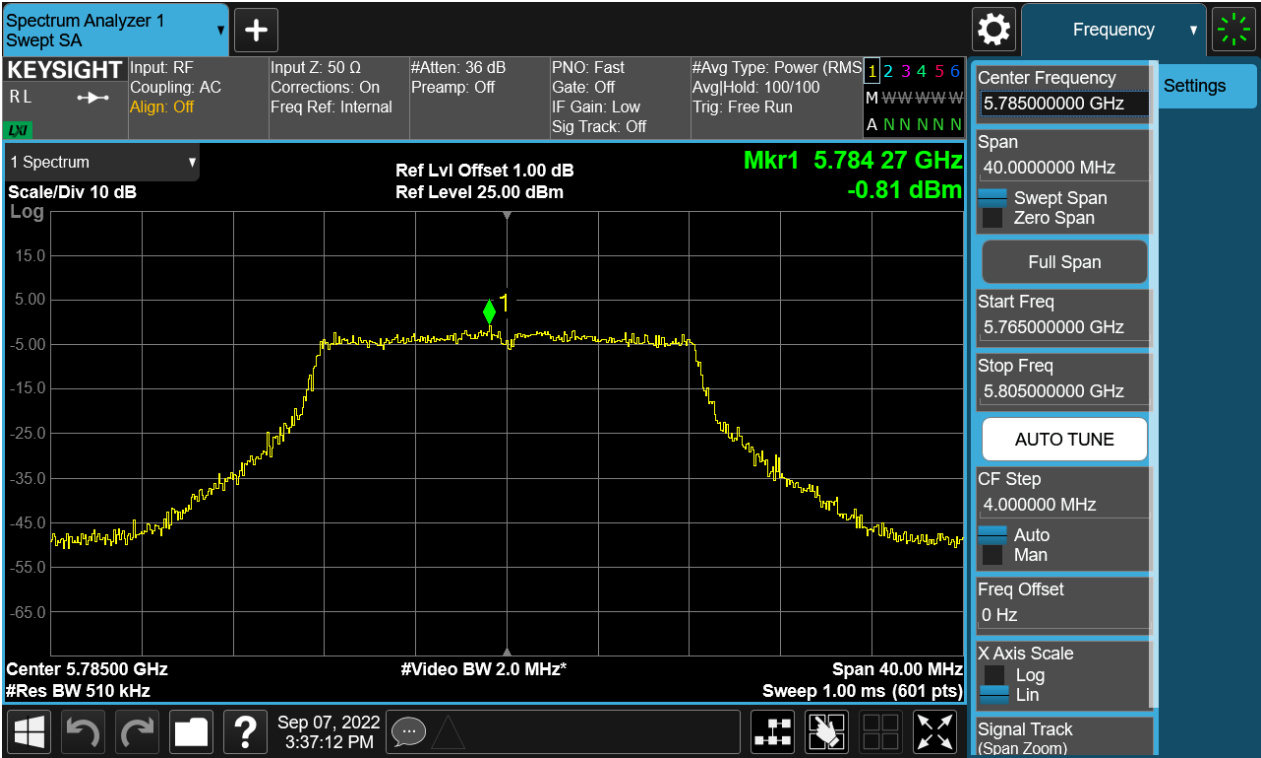


Figure 58: The plots of Power Spectral Density, 802.11a, 5785MHz, at Chain 1



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Figure 59: The plots of Power Spectral Density, 802.11a, 5825MHz, at Chain 1

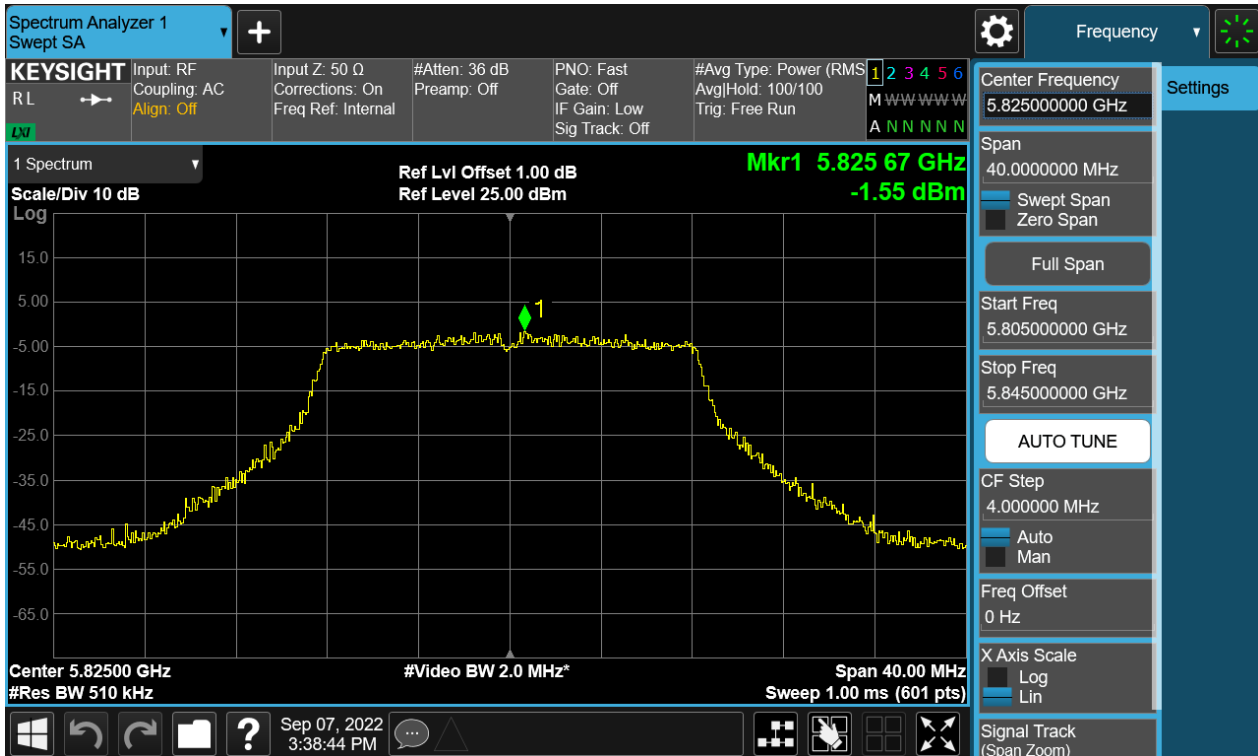


Figure 60: The plots of Power Spectral Density, 802.11n(HT20), 5745MHz, at Chain 1



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Figure 61: The plots of Power Spectral Density, 802.11n(HT20), 5785MHz, at Chain 1



Figure 62: The plots of Power Spectral Density, 802.11n(HT20), 5825MHz, at Chain 1

