

TEST REPORT

Report No.: SHE23060104-02DE

Date: 2023-08-08

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Applicant : SIMCom Wireless Solutions Limited
Address of Applicant : SIMCom Headquarters Building, Building 3, No.289
Linhong Road, Changning District, Shanghai, China

Product Name : Wireless Data Module
Brand Name : SIMCom
Model Name : SIM8070
Sample Acquisition Method : Sent by Client

Sample No. : E23060104-01#02

FCC ID : 2AJYU-8XK0002

Standards : FCC CFR47 Part 15, Subpart E

Date of Receipt : 2023-07-07
Date of Test : 2023-07-13~ 2023-08-04
Date of Issue : 2023-08-08

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:



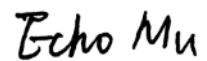
(Erik Yang)

Reviewed by:



(Jennifer Zhou)

Approved by:



(Authorized signatory: Echo Mu)

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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	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai,China
Contact Person	Yongsheng Li
Telephone	+86 21 3252 3134
Email	yongsheng.li@simcom.com
Manufacturer Company Name	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai,China
Factory Company Name	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai,China

1.3 Details of EUT

Product Name	Wireless Data Module
Brand Name	SIMCom
Test Model Name	SIM8070
FCC ID	2AJYU-8XK0002
Mode of Operation	WLAN 802.11a/n(HT20/40)/ac(VHT20/40/80)
Operation Frequency	Band I:5150MHz~5250MHz; Band IV: 5725MHz ~ 5850MHz
Modulation Type	256QAM, 64QAM, 16QAM, BPSK, QPSK, 128QAM, OFDM
Number of Channels	39
Channel Bandwidth	802.11a: 20MHz 802.11n: 20MHz, 40MHz 802.11ac: 20MHz, 40MHz, 80MHz
Antenna Type	External Antenna
Antenna Gain	4.32dBi
Extreme Temperature Range	-30℃~ +75℃
Test Voltage	DC 3.8V

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Extreme Voltage	Low Voltage: DC 3.4V High Voltage: DC 4.4V
Product Type	Mobile and portable for FCC standard
Hardware Version	SIM8970CE_V1.02
Software Version	SIM8070B01V01_A10
RF power setting in TEST SW	802.11a for 5.2GHz: QRCT_Power level setting_13dBm 802.11n(HT20) for 5.2GHz: QRCT_Power level setting_13dBm 802.11n(HT40) for 5.2GHz: QRCT_Power level setting_13dBm 802.11ac(VHT20) for 5.2GHz: QRCT_Power level setting_13dBm 802.11ac(VHT40) for 5.2GHz: QRCT_Power level setting_13dBm 802.11ac(VHT80) for 5.2GHz: QRCT_Power level setting_12dBm 802.11a for 5.8GHz: QRCT_Power level setting_17dBm 802.11n(HT20) for 5.8GHz: QRCT_Power level setting_17dBm 802.11n(HT40) for 5.8GHz: QRCT_Power level setting_15dBm 802.11ac(VHT20) for 5.8GHz: QRCT_Power level setting_17dBm 802.11ac(VHT40) for 5.8GHz: QRCT_Power level setting_15dBm 802.11ac(VHT80) for 5.8GHz: QRCT_Power level setting_13dBm

Note:

1. The above information was declared by the manufacture.
2. The EUT is designed as master device.
3. The EUT do not support TPC.
4. For more details, please refer to the User's manual of the EUT.

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
	165	5825 MHz

Note: For 20MHZ bandwidth system use Channel 36,44,48,149,157,165;

For 40MHZ bandwidth system use Channel 38,46,151,159;

For 80MHZ bandwidth system use Channel 42,155.

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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
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 15.407(a), 15.203	PASS
Maximum Conducted Output Power	FCC Part 15.407(a)	PASS
26dB Bandwidth and 99% Bandwidth	FCC Part 15.407(a)	PASS
6dB Bandwidth	FCC Part 15.407(e)	PASS
Maximum Conducted Output Power Spectral Density	FCC Part 15.407(a)	PASS
Conducted Spurious Emission	FCC Part 15.407(b), 15.209	PASS
Radiated Emission	FCC Part 15.407(b), 15.209, 15.205	PASS
Band Edge (Restricted-band band-edge)	FCC Part 15.407(b), 15.205, 15.209	PASS
Frequency Stability	FCC Part 15.407(g)	PASS
Conducted Emission on AC Mains	FCC Part 15.207(a)	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 Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2022-08-02	2023-08-01
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2023-06-08	2024-06-07
Signal Generator	Rohde & Schwarz	SMR27	100184	2022-08-02	2023-08-01
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2023-06-08	2024-06-07
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2023-06-08	2024-06-07
V-network	SCHWARZBECK	NSLK 8127	8127-902	2023-06-07	2024-06-06
Attenuator	SCHWARZBECK	VTSD 9561-FN	/	2023-06-06	2024-06-05
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2023-03-22	2025-03-21
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2023-06-13	2025-06-12
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2023-06-09	2024-06-08
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2023-06-18	2025-06-17
Broadband Preamplifier	SCHWARZBECK	BBV 9718	346	2023-06-08	2024-06-07
Temperature Box	ESPEC	ECT-2	055239A	2021-12-29	2023-12-28
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2023-06-09	2024-06-08
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2023-06-09	2025-06-08
Test Software	BL	BL410_E	Version:1.0.0.117	N/A	N/A
Test Software	BL	BL410_R	Version:2.1.1.409	N/A	N/A

Equipment Calibration Date Updated:

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020B	MY59260184	2023-07-27	2024-07-26
Signal Generator	Rohde & Schwarz	SMR27	100184	2023-07-27	2024-07-26

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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 expanded 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	9KHz – 30MHz	± 3.42 dB
	30 MHz – 1GHz	± 5.00 dB
	> 1GHz	± 4.88 dB
Conducted Emission on AC Mains	150kHz-30MHz	± 2.68 dB
Occupied Channel Bandwidth		± 5 %
RF output power		± 0.65 dB
PSD		± 0.60 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 802.11a/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	48Mbps
802.11n(HT20), 802.11ac (VHT20)	MCS4
802.11n(HT40), 802.11ac (VHT40)	MCS4
802.11ac (VHT80)	MCS0

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 Name	Serial No.
Laptop	Lenovo	TP00083A	N/A
SWITCHING POWER SUPPLY	N/A	P-050B-050200EU	N/A
EVB Debug Board 1	N/A	8PYA00-SIMCOM-EVB_V1.02	N/A
EVB Debug Board 2	N/A	8XK000-SIM8970-EVB I	N/A
USB Cable	N/A	N/A	1.00m Unshielded

3.3 Support Software

Description	Manufacturer	Software Name
Software	Qualcomm	QRCT Version 4.0.00166.0

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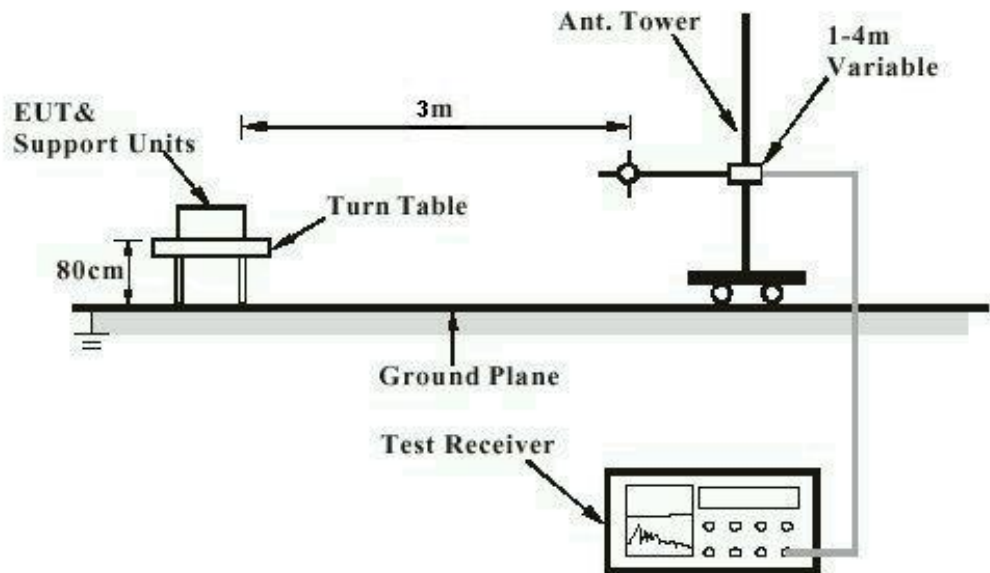
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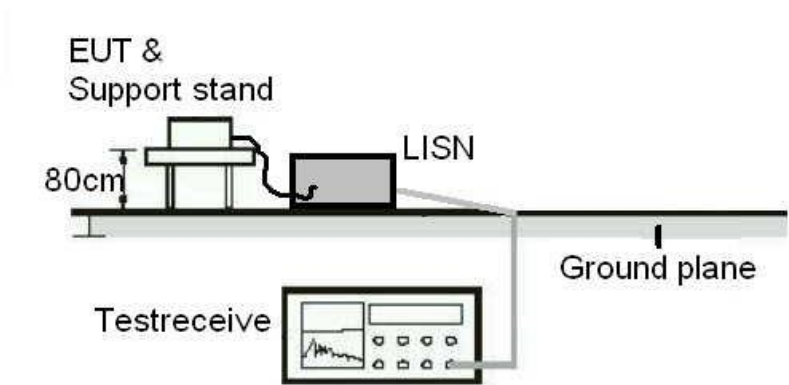
3.4 Test Setup Diagram

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 Configuration for Conduction Test



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Diagram of Measurement Configuration for Transmitter Test

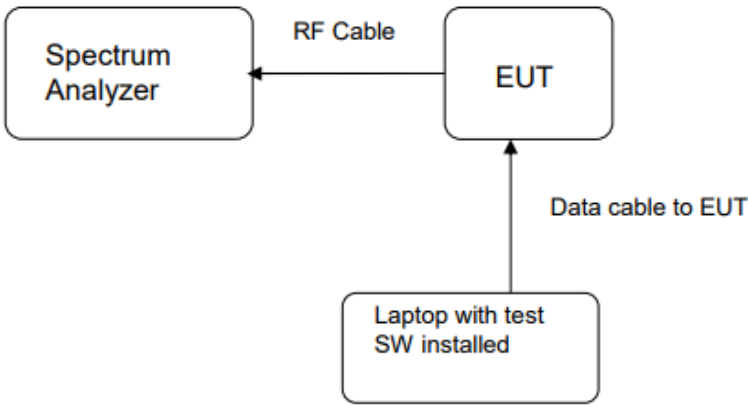
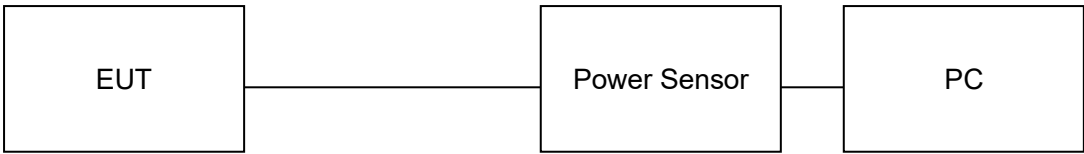


Diagram of Measurement Equipment Configuration for conducted output power setup



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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

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 4.32dBi. The antenna is an external antenna with no possibility of replacement with a non-approved antenna by the end-user.

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

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4.1.2 Maximum Conducted Output Power

RESULT:

PASS

Test standard : FCC Part 15.407(a)
Requirement : ANSI C63.10-2013 clause 12.3.3.1, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 24.0°C
Relative humidity : 50%

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

Test Mode	Duty Cycle (%)	Test Channel (MHz)	Maximum Conducted Output Power		Applicable Limit
			(dBm)	(mW)	
802.11a	88.77	5180	10.66	11.64	250mW (23.98dBm)
		5220	10.84	12.13	
		5240	11.43	13.90	
802.11n(HT20)	90.84	5180	10.69	11.72	
		5220	11.10	12.88	
		5240	11.59	14.42	
802.11ac(VHT20)	90.69	5180	10.79	11.99	
		5220	11.17	13.09	
		5240	11.64	14.59	
802.11n(HT40)	96.61	5190	10.14	10.33	
		5230	10.67	11.67	
802.11ac(VHT40)	96.43	5190	10.19	10.45	
		5230	10.76	11.91	
802.11ac(VHT80)	75.84	5210	9.93	9.84	

Notes:

1. 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 (5725MHz~5850MHz)

Test Mode	Duty Cycle (%)	Test Channel (MHz)	Maximum Conducted Output Power		Applicable Limit
			(dBm)	(mW)	
802.11a	95.27	5745	15.01	31.70	1W(30dBm)
		5785	15.71	37.24	
		5825	15.76	37.67	
802.11n(HT20)	90.84	5745	15.30	33.88	
		5785	15.96	39.45	
		5825	16.01	39.90	
802.11ac(VHT20)	90.96	5745	15.27	33.65	
		5785	16.18	41.50	
		5825	16.00	39.81	
802.11n(HT40)	93.08	5755	13.12	20.51	
		5795	13.56	22.70	
802.11ac(VHT40)	93.14	5755	13.10	20.42	
		5795	13.54	22.59	
802.11ac(VHT80)	76.05	5775	11.97	15.74	

Notes:

1. 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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4.1.3 26dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.407(a)
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 : 24.0°C
Relative humidity : 50%

Notes:

Test plots please refer to the annex document "SHE23060104-02DE DATA WIFI5GHz-26dB Bandwidth and 99% Bandwidth EXHIBIT A"

Table 3: 26dB Bandwidth and 99% Bandwidth for Band I (5150MHz~5250 MHz)

Test Mode	Test Channel (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5180	20.61	16.539
	5220	20.70	16.517
	5240	20.45	16.538
802.11n(HT20)	5180	22.54	17.833
	5220	22.70	17.853
	5240	22.64	17.852
802.11ac(VHT20)	5180	22.69	17.849
	5220	22.65	17.845
	5240	22.74	17.848
802.11n(HT40)	5190	40.81	36.236
	5230	40.64	36.217
802.11ac(VHT40)	5190	41.25	36.191
	5230	41.00	36.184
802.11ac(VHT80)	5210	85.04	75.736

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4.1.4 6dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.407(e)

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 : 24.0°C

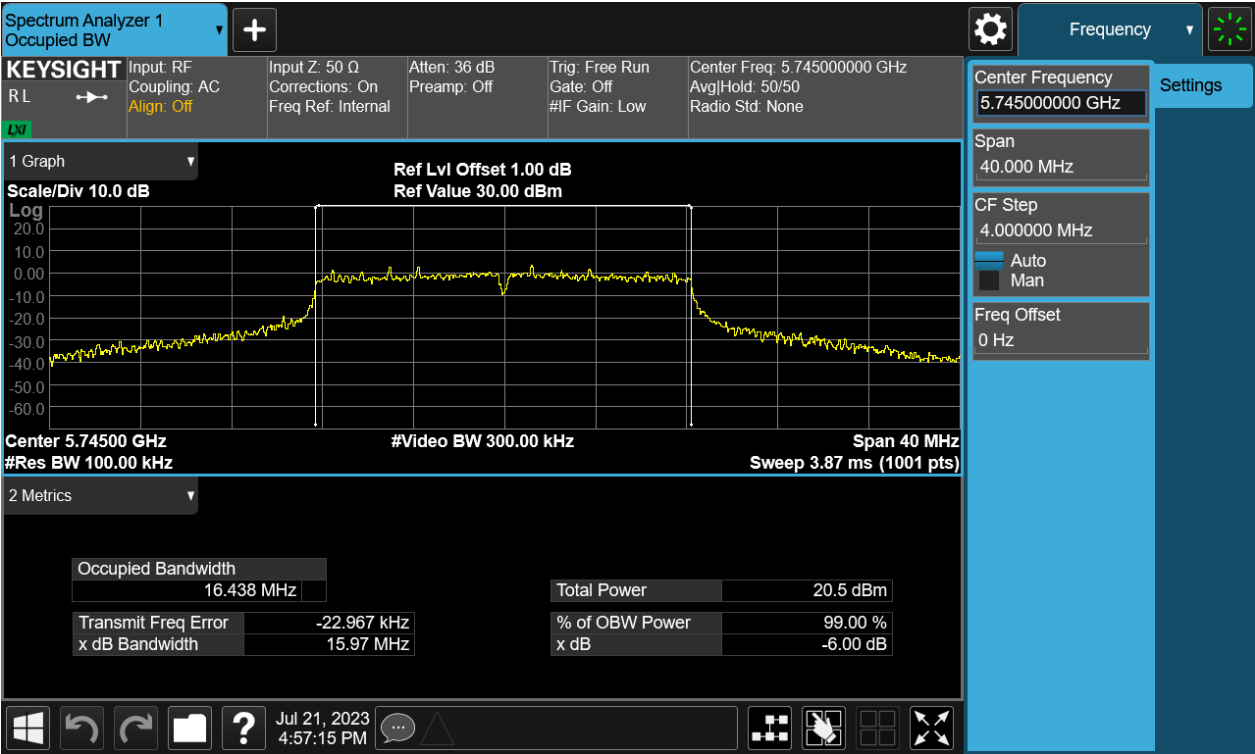
Relative humidity : 50%

Table 4: 6dB Bandwidth and 99% Occupied Bandwidth

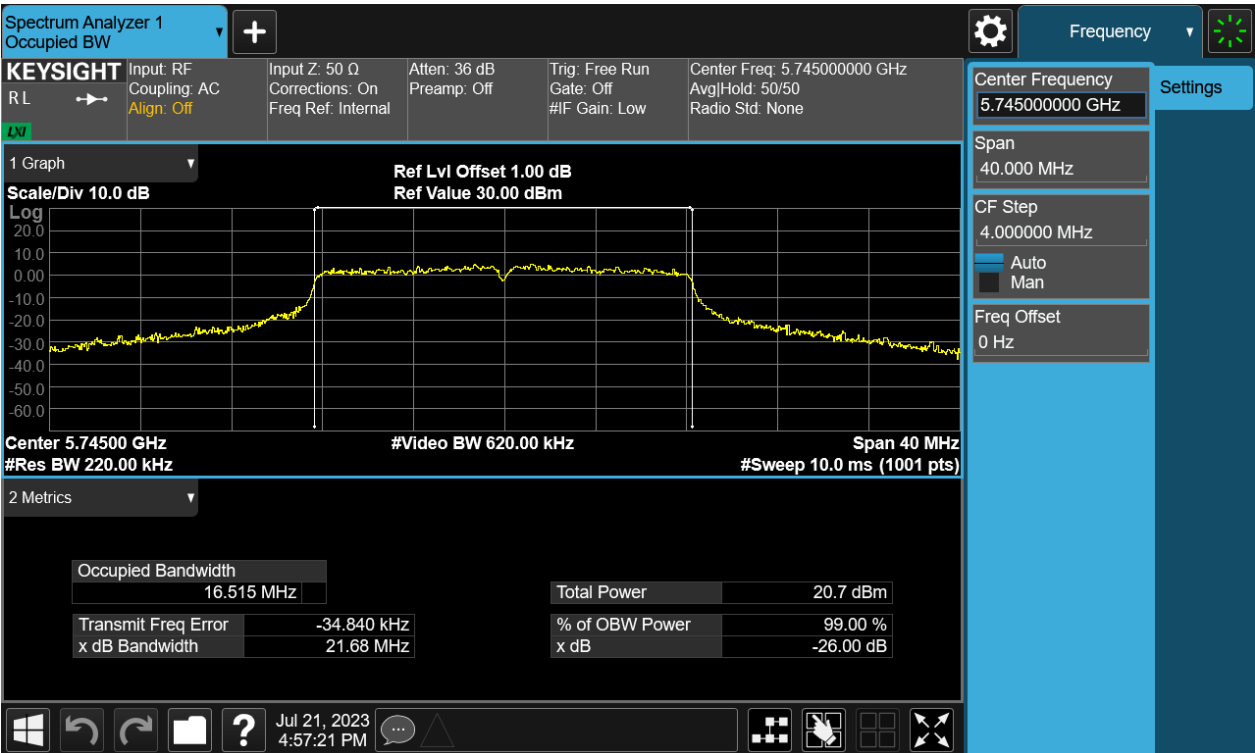
Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Applicable Limit (MHz)
802.11a	5745	15.97	16.515	>0.5
	5785	16.04	16.527	
	5825	15.86	16.546	
802.11n(HT20)	5745	17.73	17.953	
	5785	17.67	17.978	
	5825	17.70	17.953	
802.11ac(VHT20)	5745	17.72	17.948	
	5785	17.64	17.985	
	5825	17.66	17.956	
802.11n(HT40)	5755	35.69	36.238	
	5795	35.68	36.191	
802.11ac(VHT40)	5755	35.44	36.232	
	5795	35.44	36.234	
802.11ac(VHT80)	5775	76.50	76.316	

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Figure 1: 802.11a, 5745MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



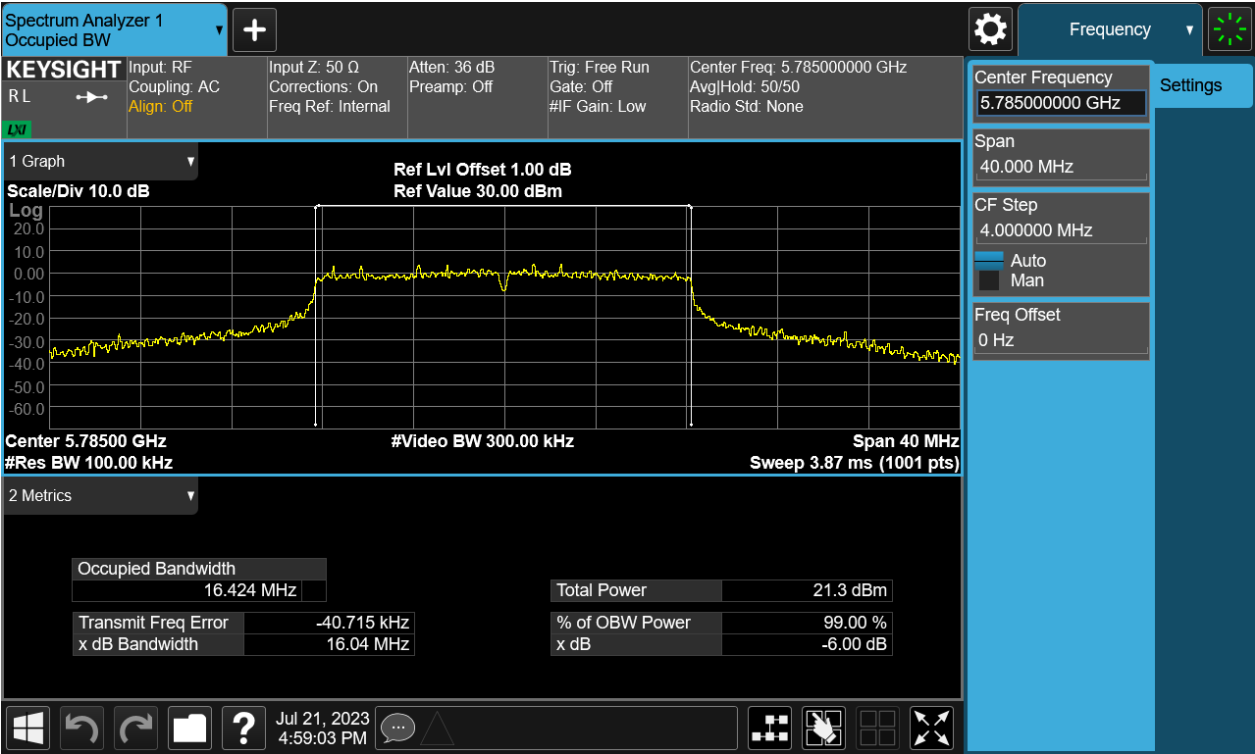
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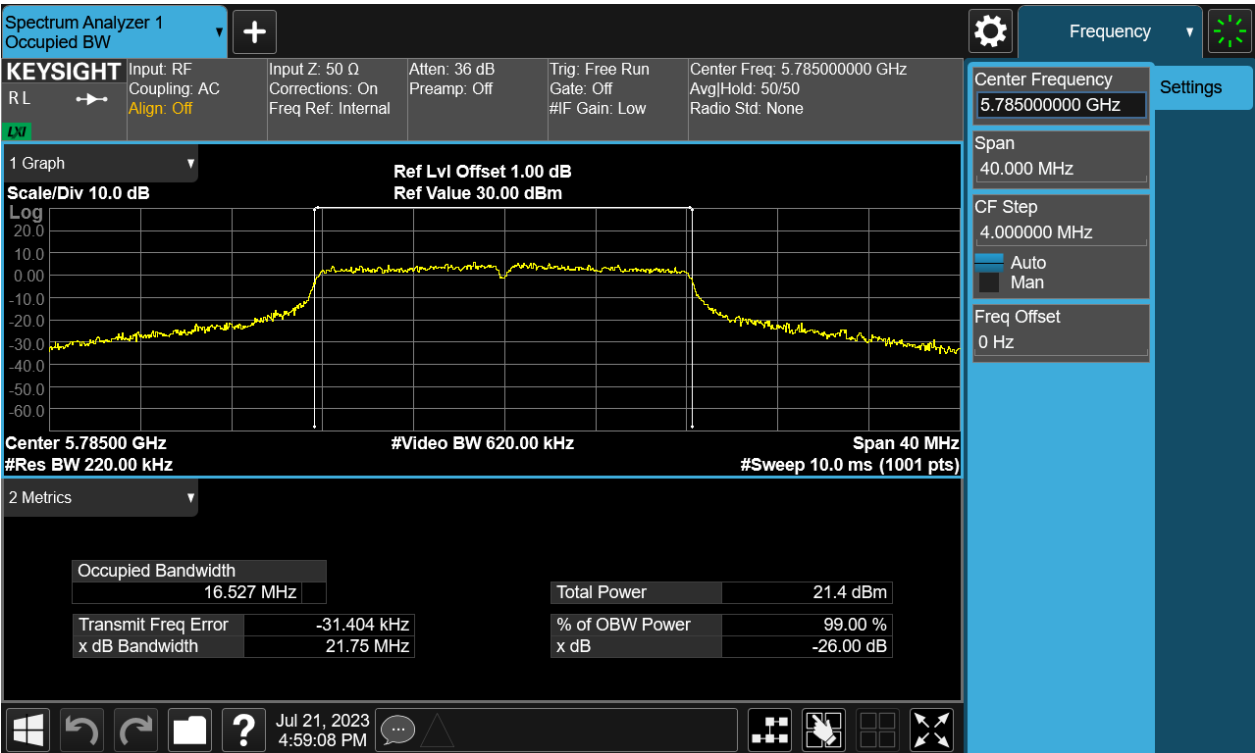
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Figure 2: 802.11a, 5785MHz
Test Plot of -6dB Bandwidth

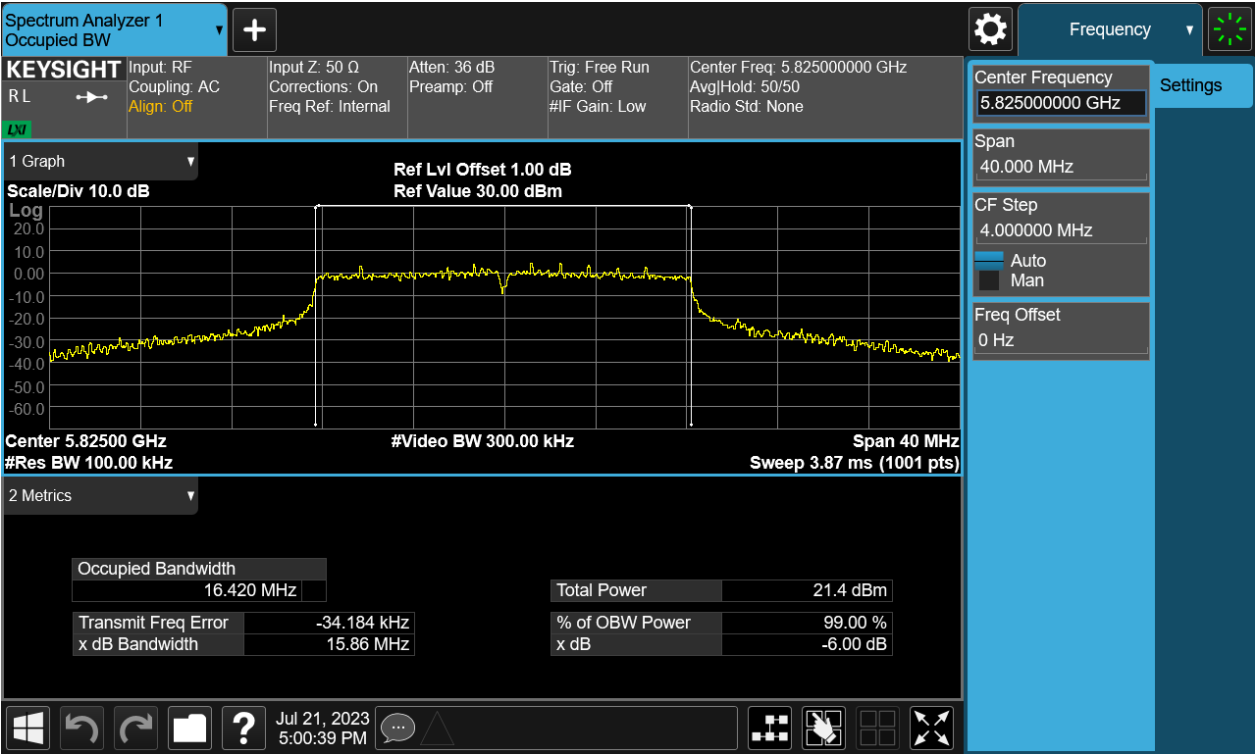


Test Plot of 99% Occupied Bandwidth

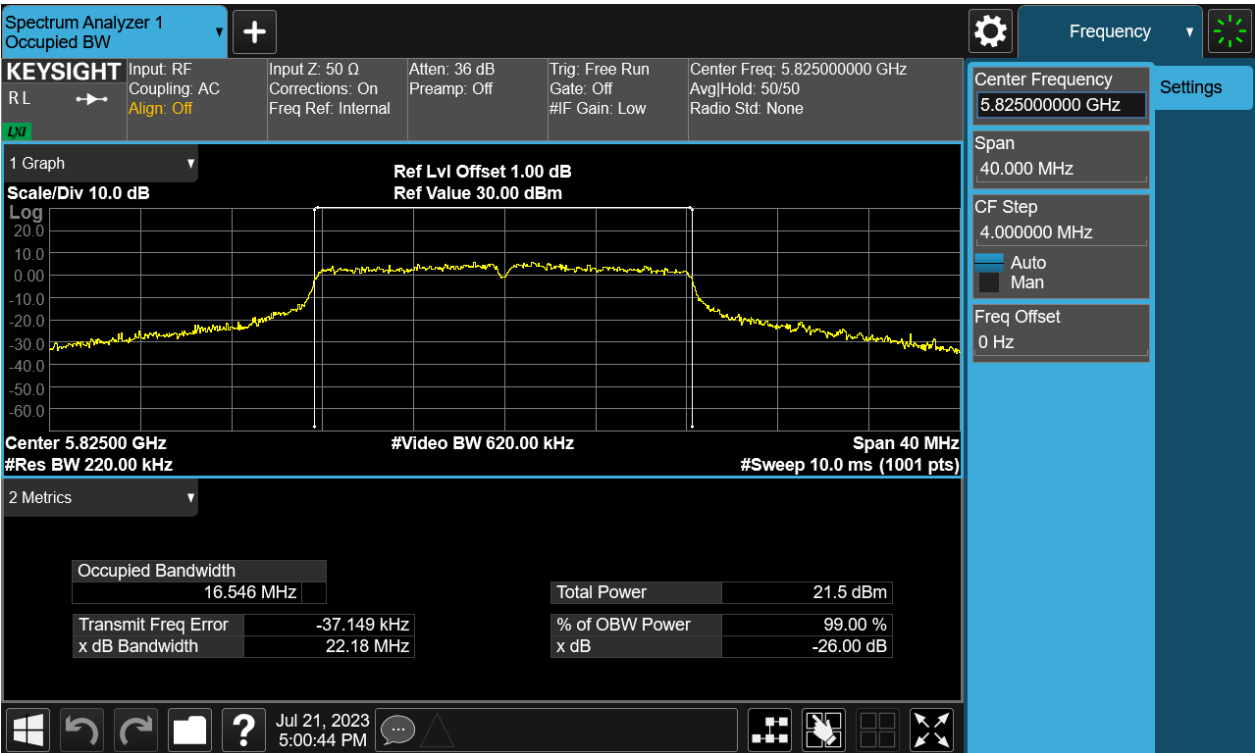


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Figure 3: 802.11a, 5825MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



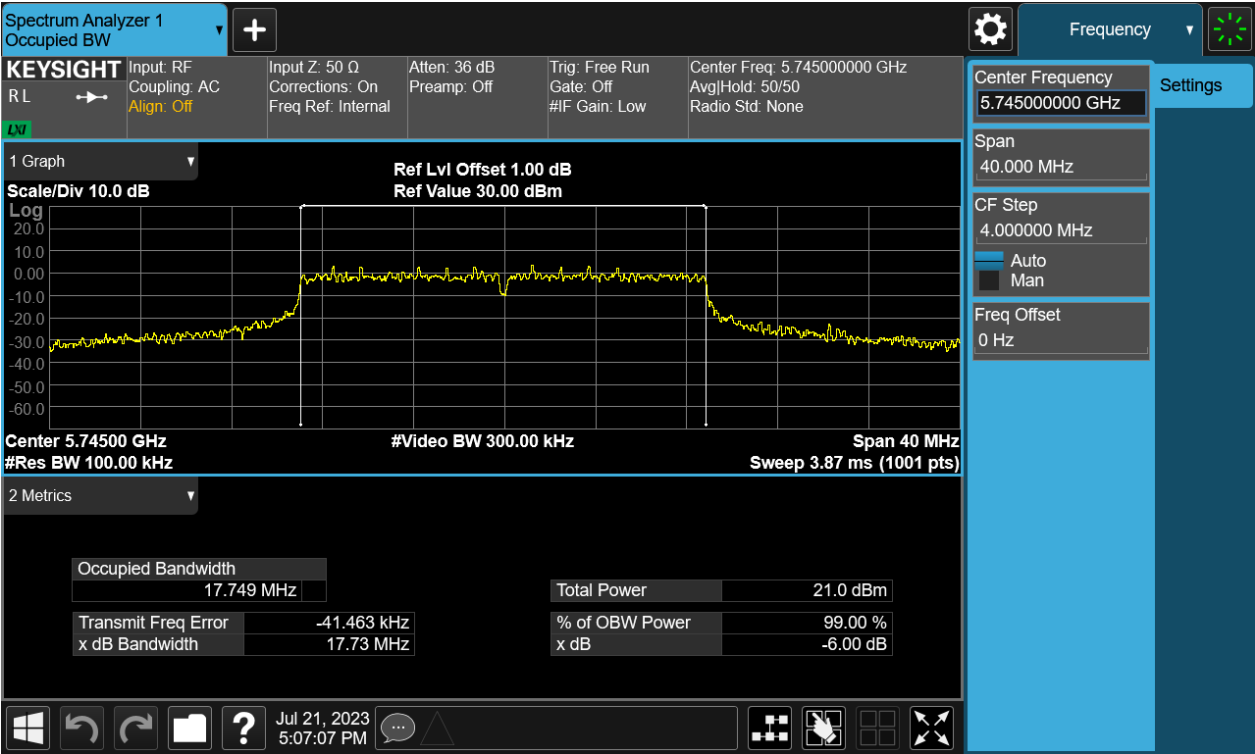
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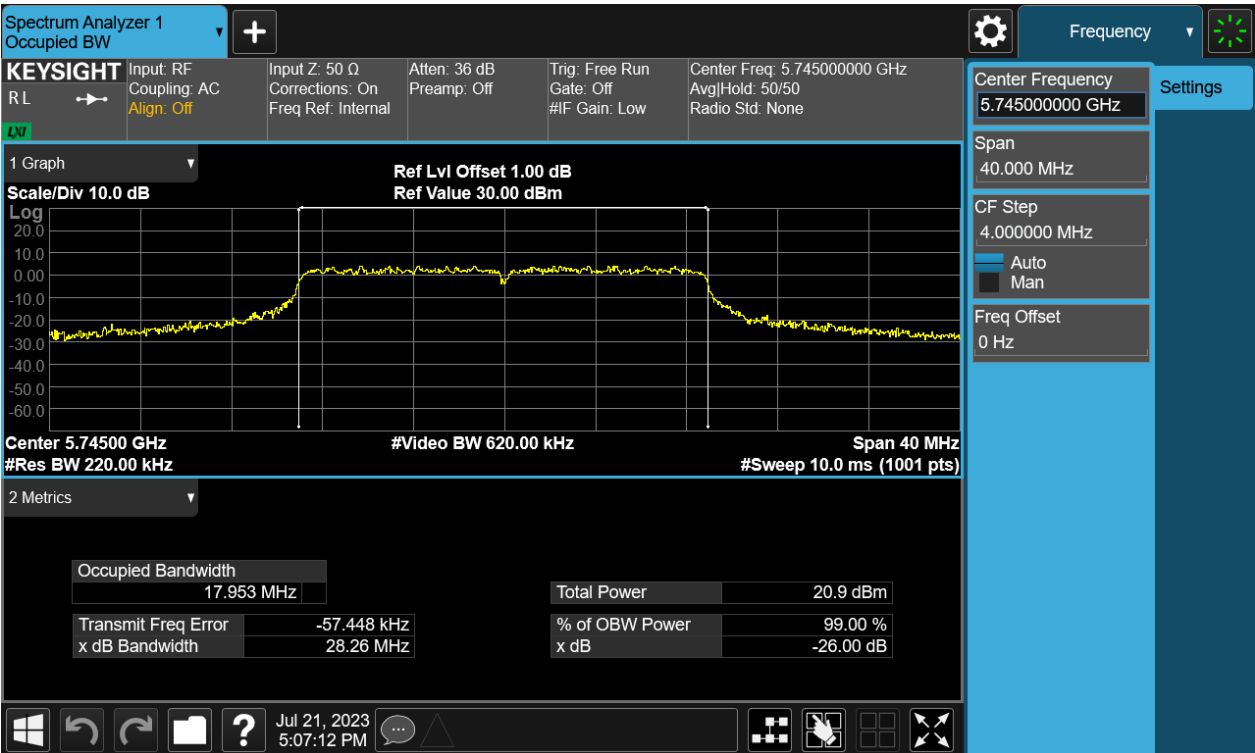
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Figure 4: 802.11n(HT20), 5745MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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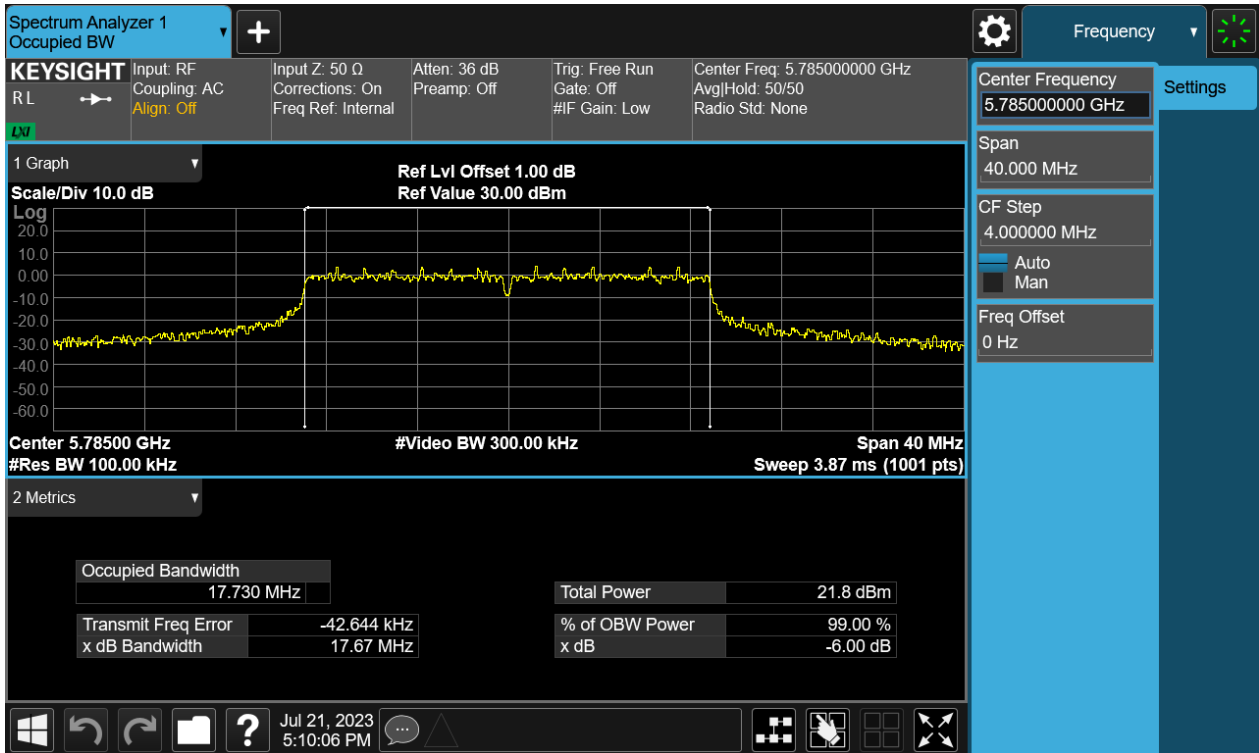
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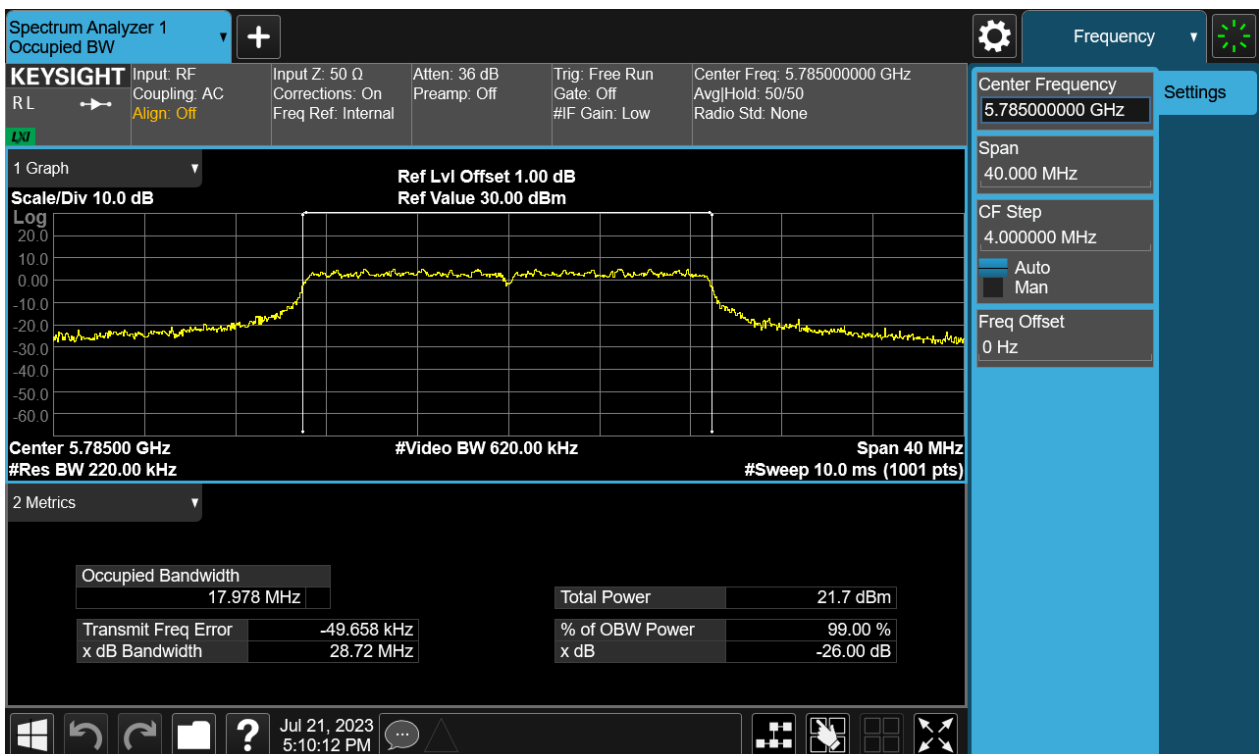
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Figure 5: The plots of 6dB Bandwidth, 802.11n(HT20), 5785MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



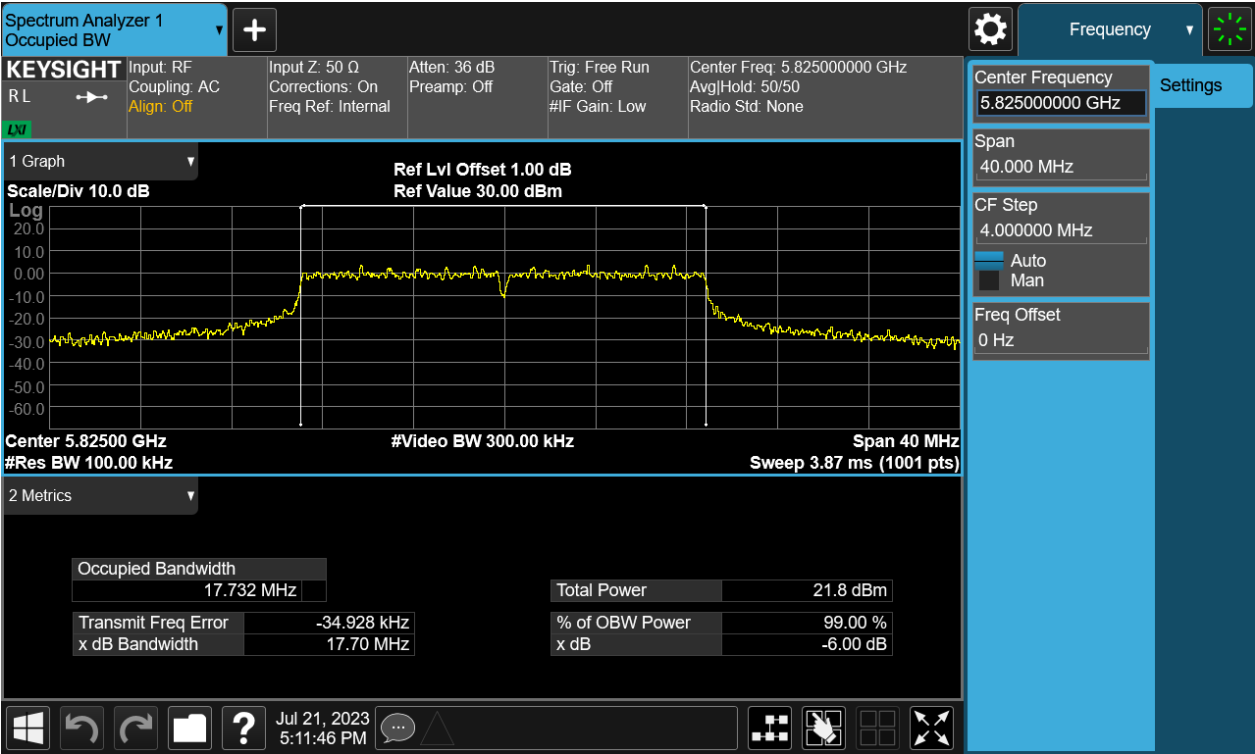
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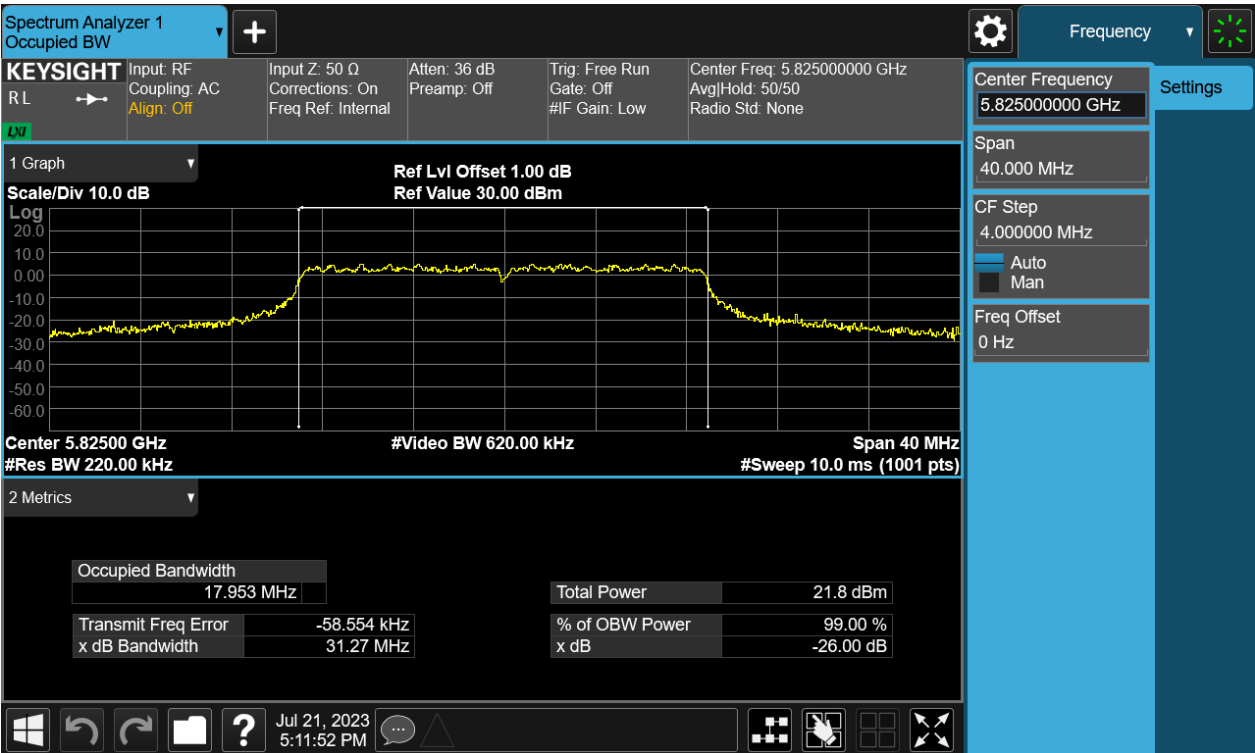
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Figure 6: The plots of 6dB Bandwidth, 802.11n(HT20), 5825MHz
Test Plot of -6dB Bandwidth

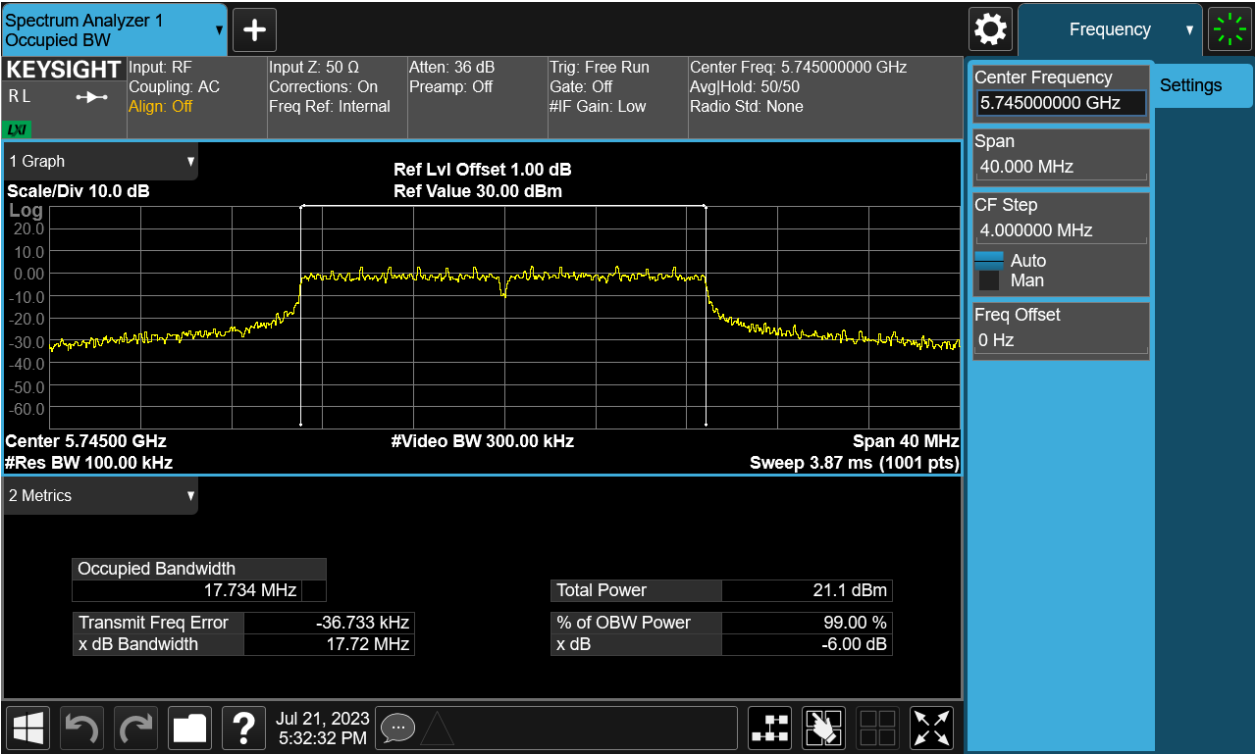


Test Plot of 99% Occupied Bandwidth

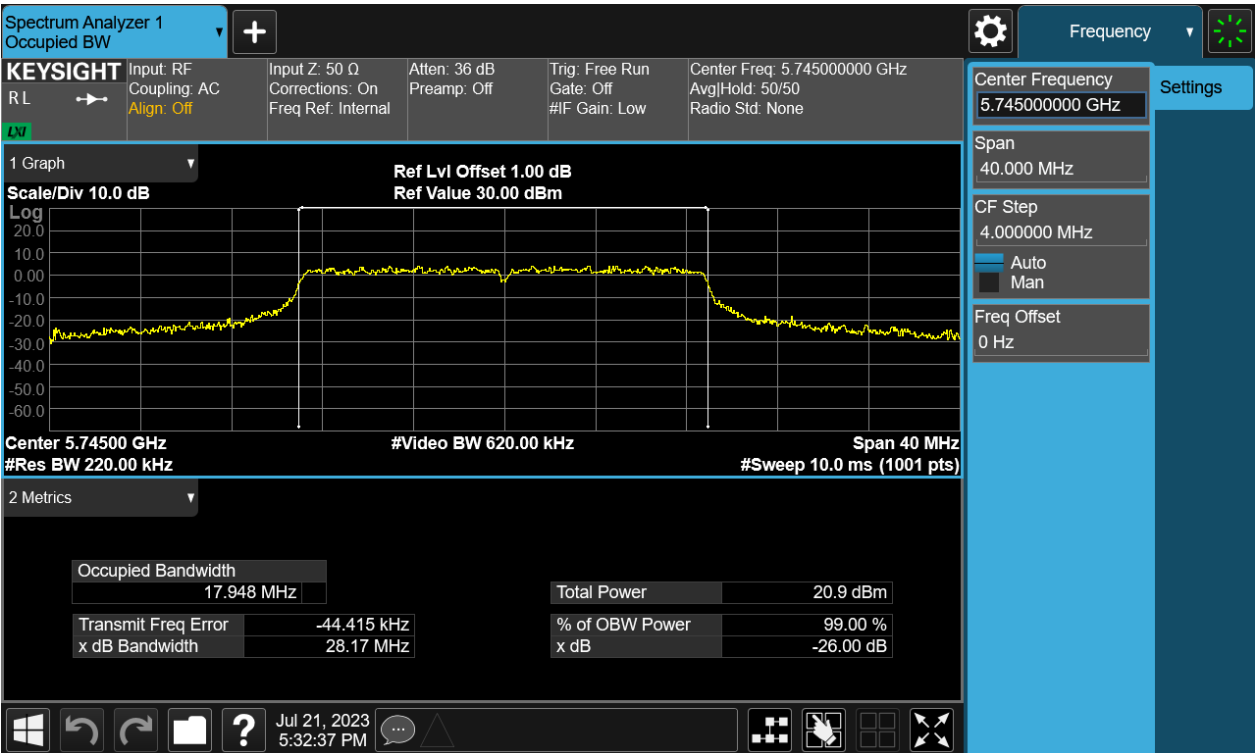


TEST REPORT

Figure 7: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5745MHz
Test Plot of -6dB Bandwidth



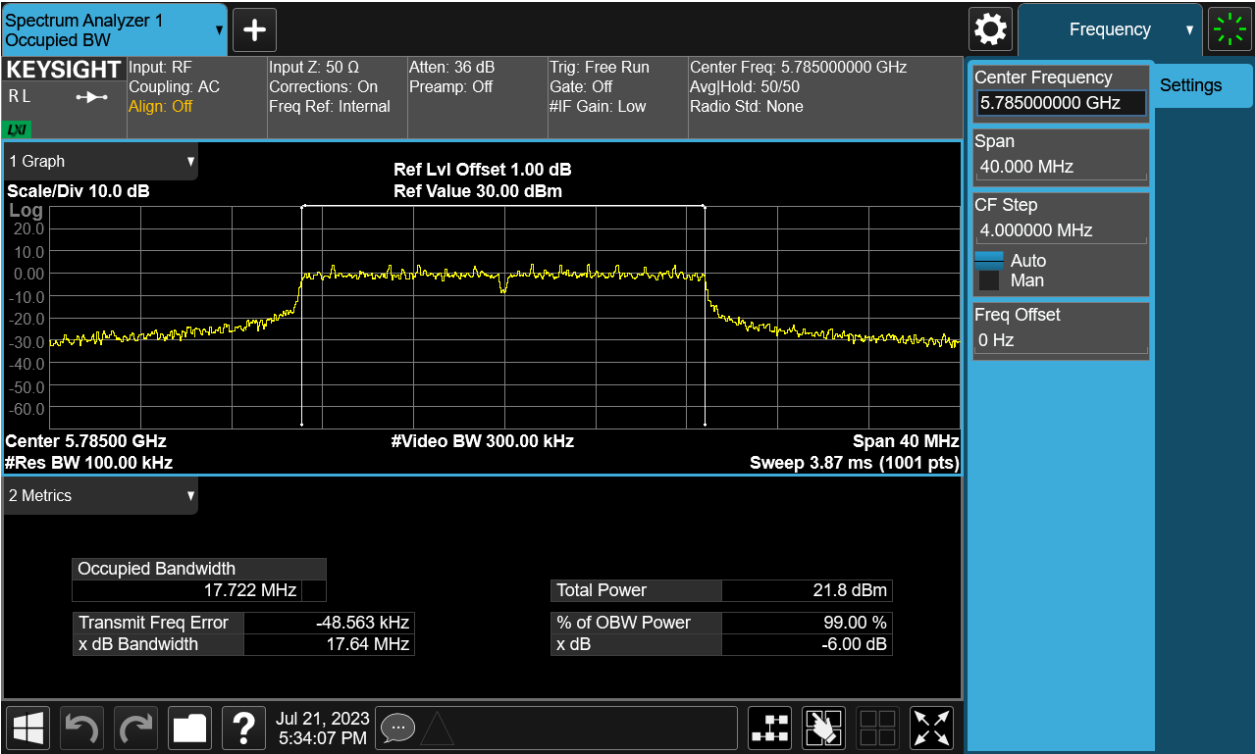
Test Plot of 99% Occupied Bandwidth



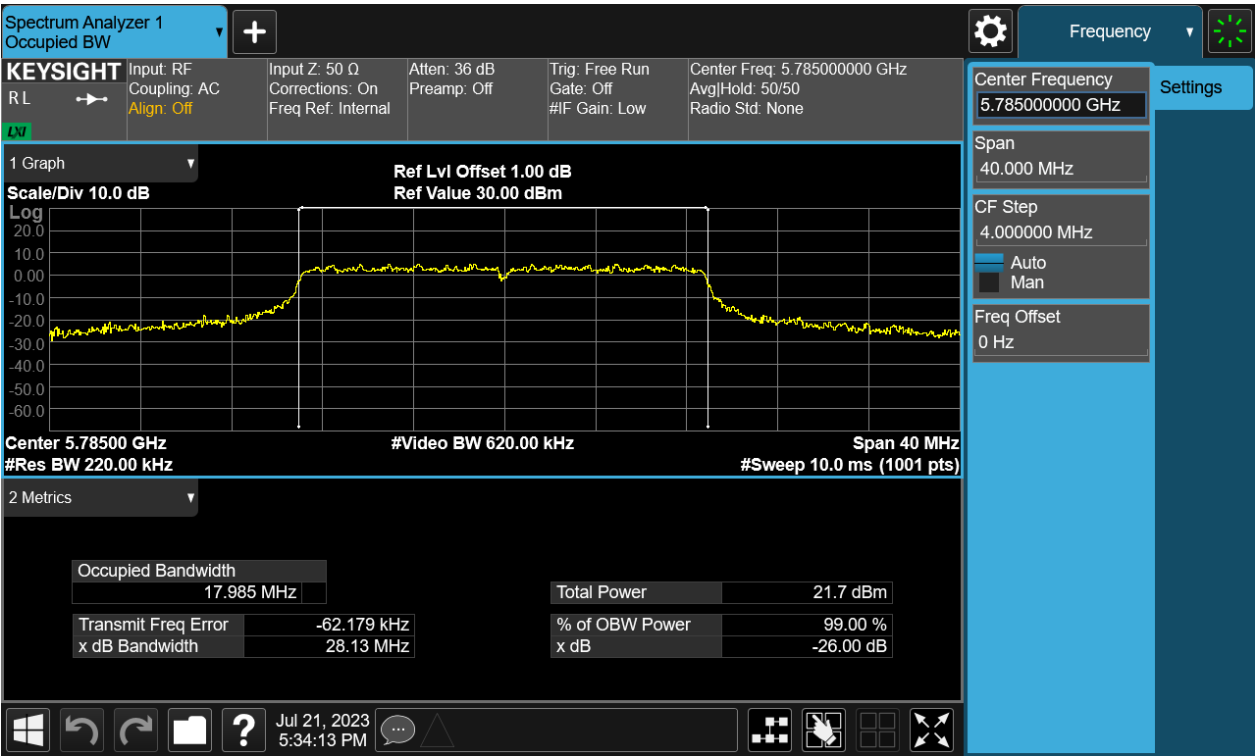
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Figure 8: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5785MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



TEST REPORT

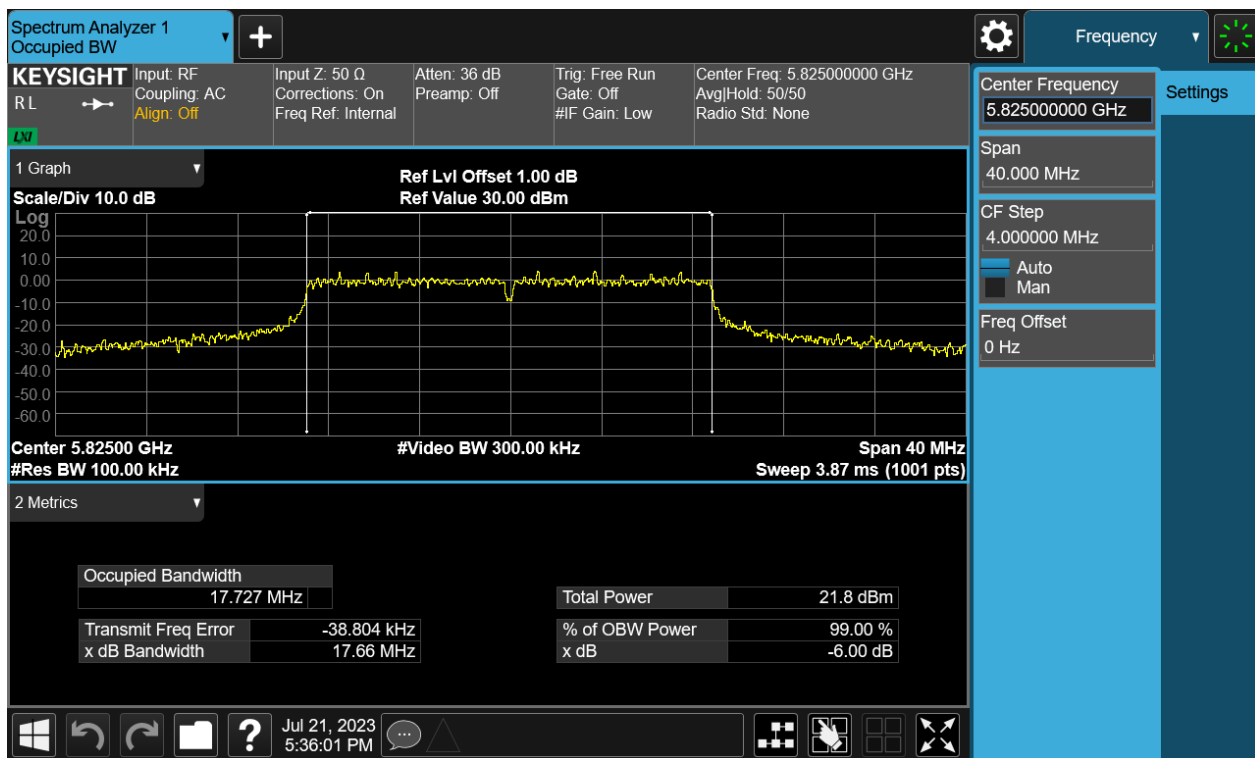
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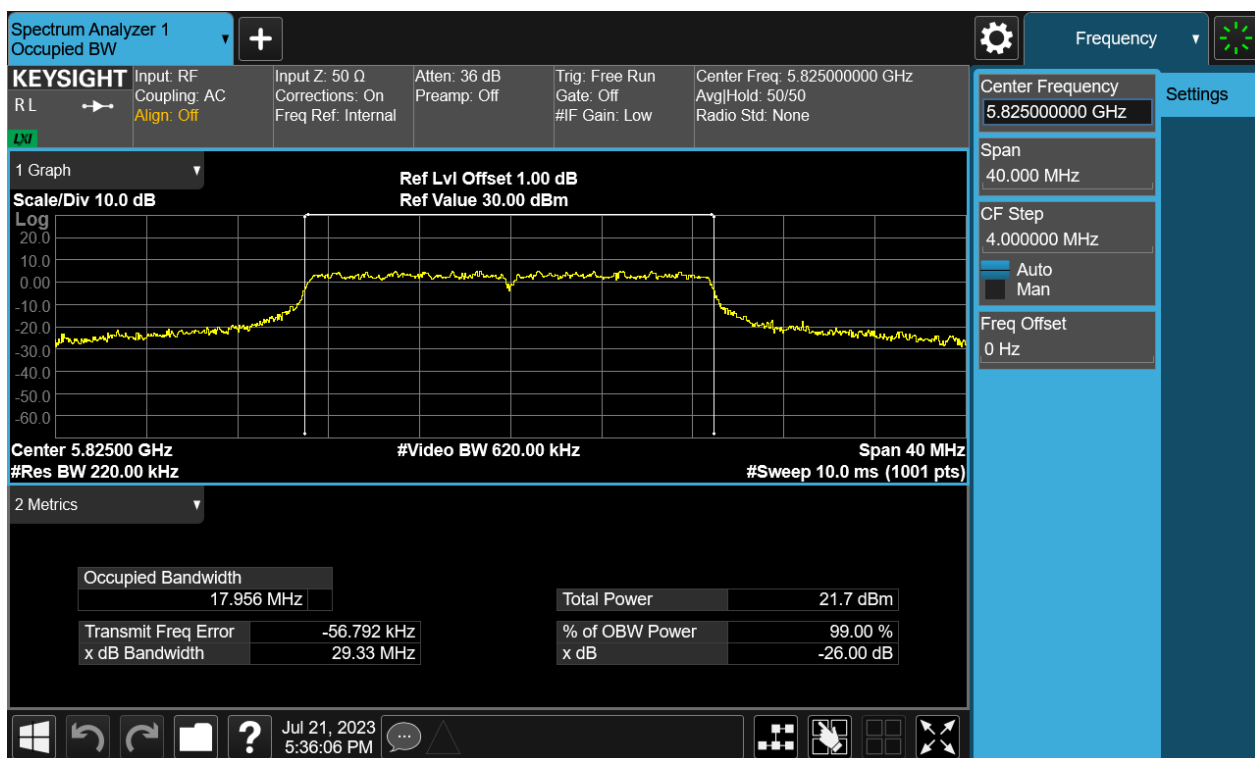
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Figure 9: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5825MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



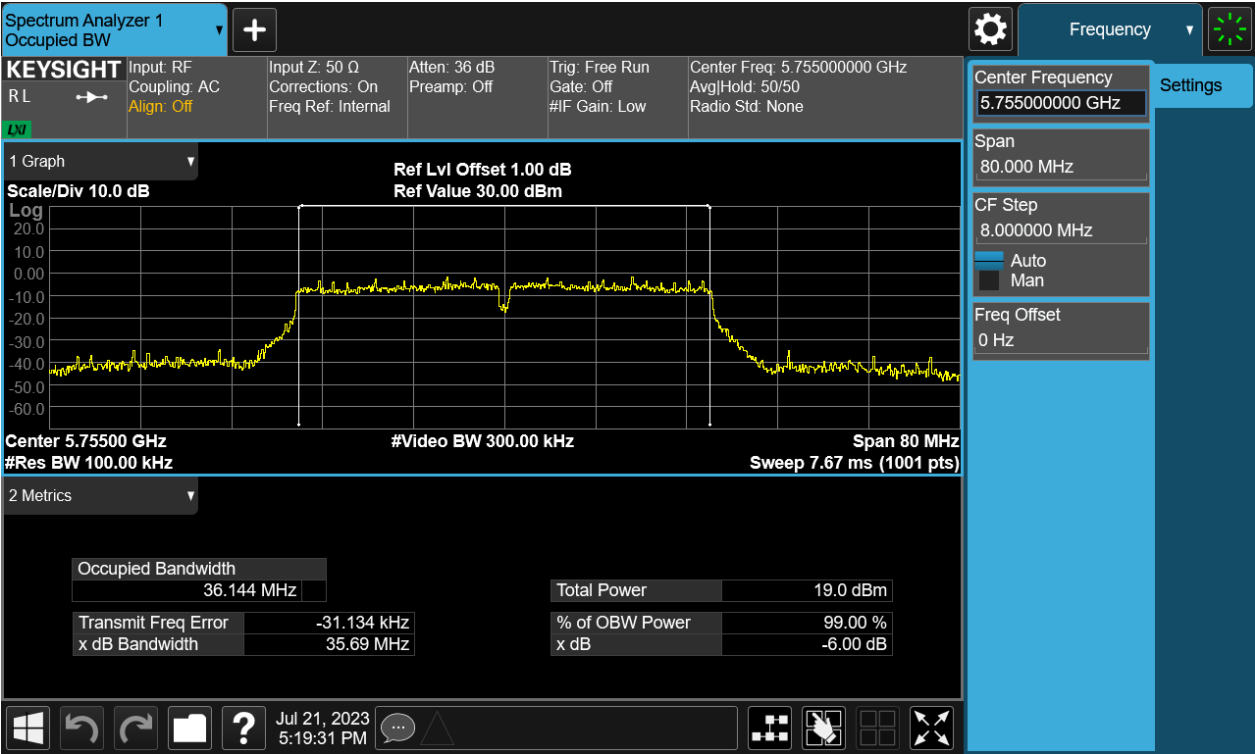
TEST REPORT

Report No.: SHE23060104-02DE

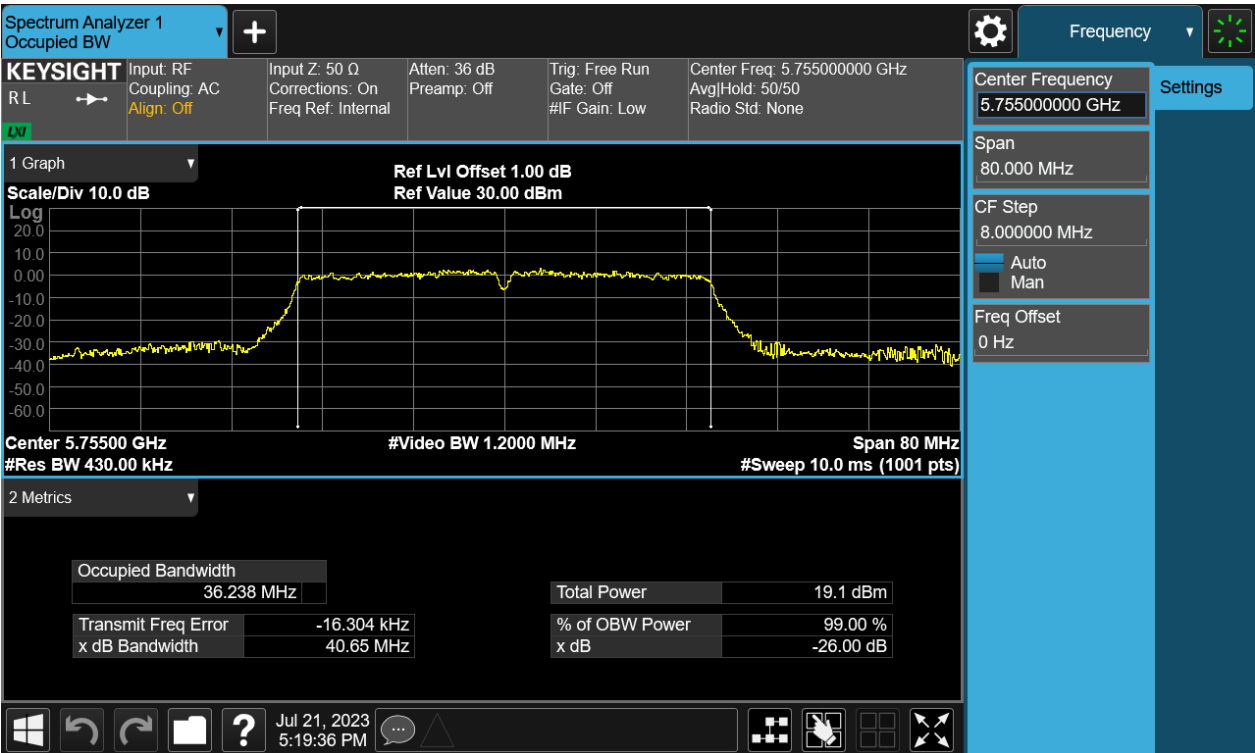
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Figure 10: The plots of 6dB Bandwidth, 802.11n(HT40), 5755MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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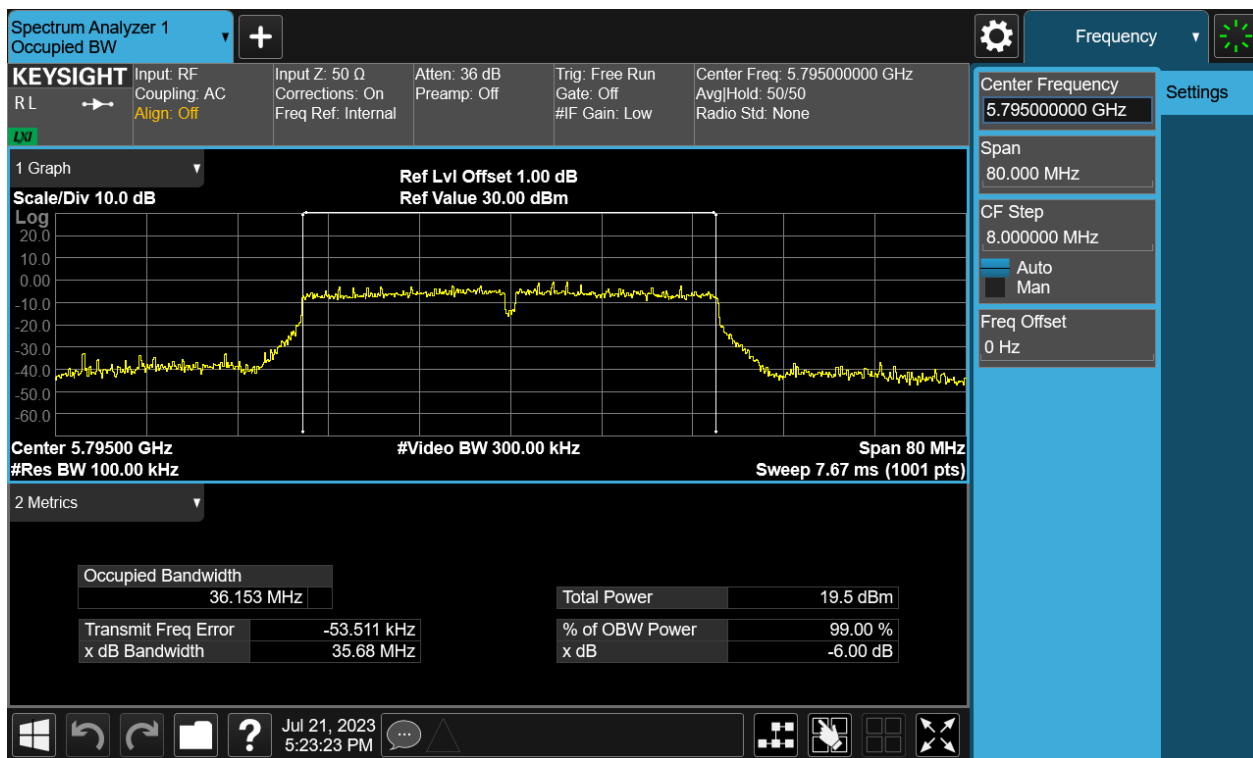
Report No.: SHE23060104-02DE

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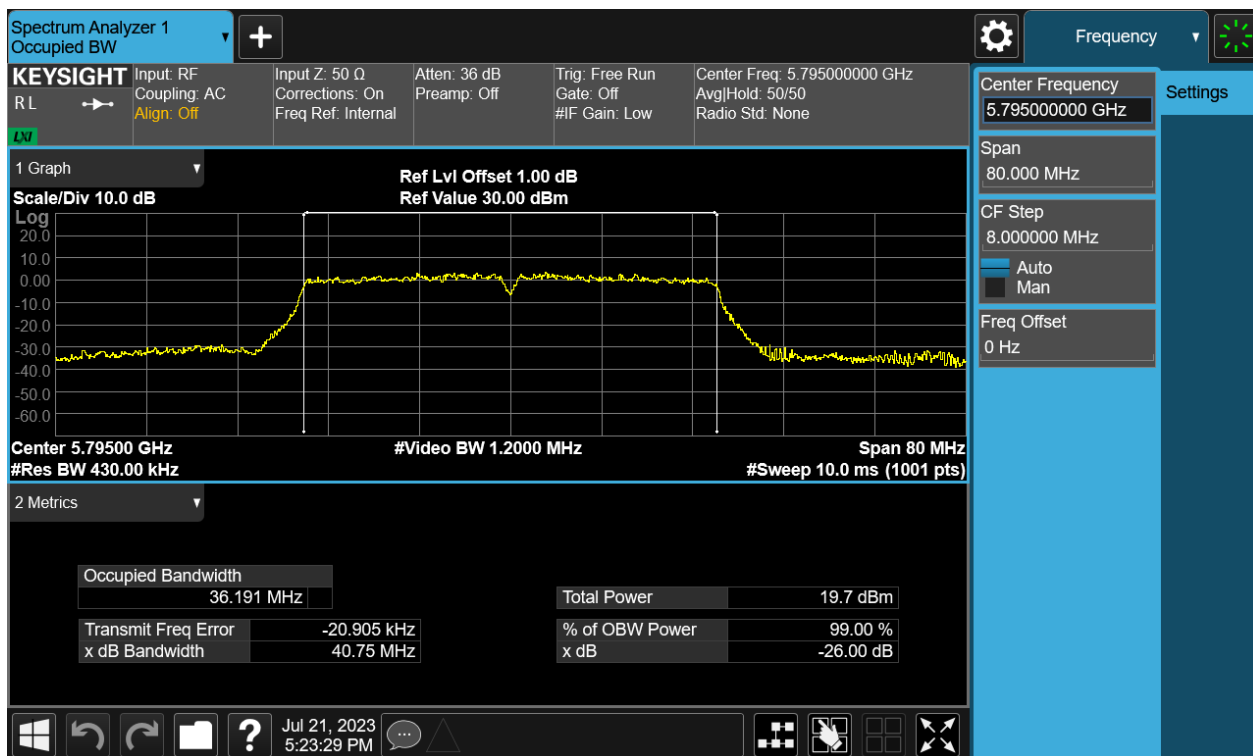
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Figure 11: The plots of 6dB Bandwidth, 802.11n(HT40), 5795MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



TEST REPORT

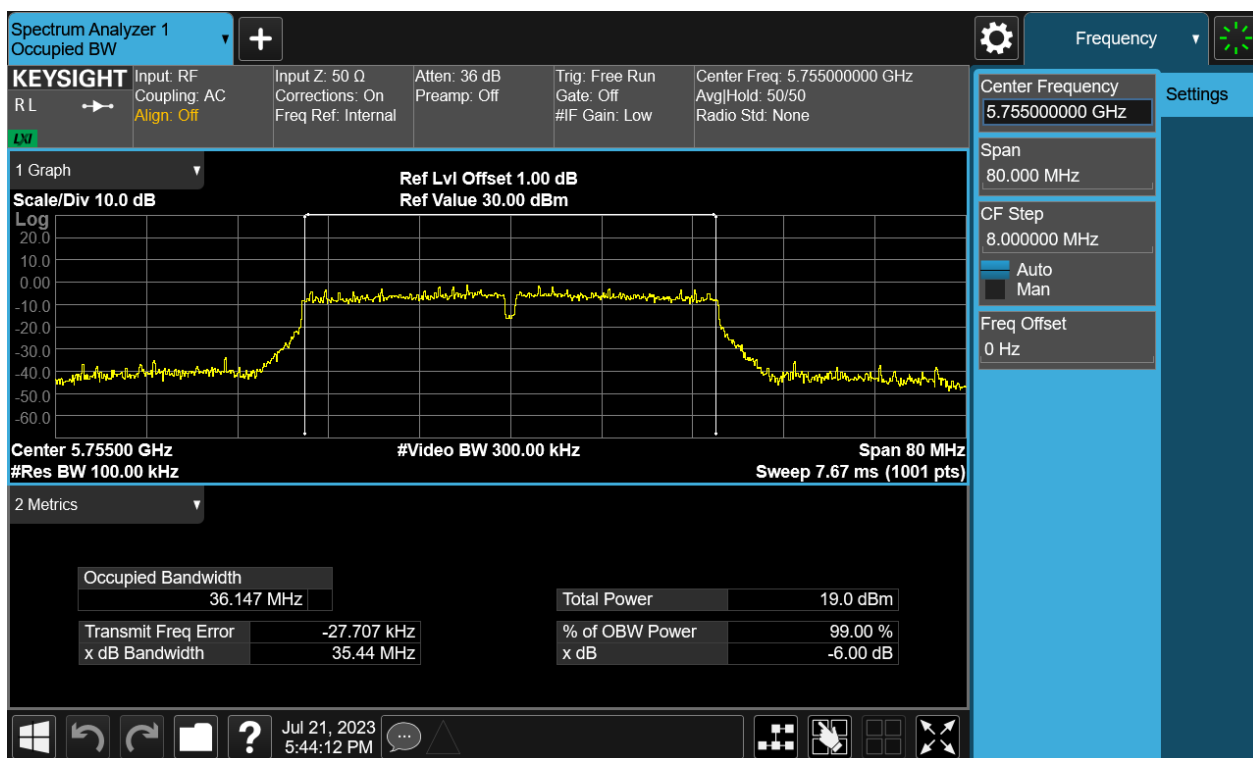
Report No.: SHE23060104-02DE

Date: 2023-08-08

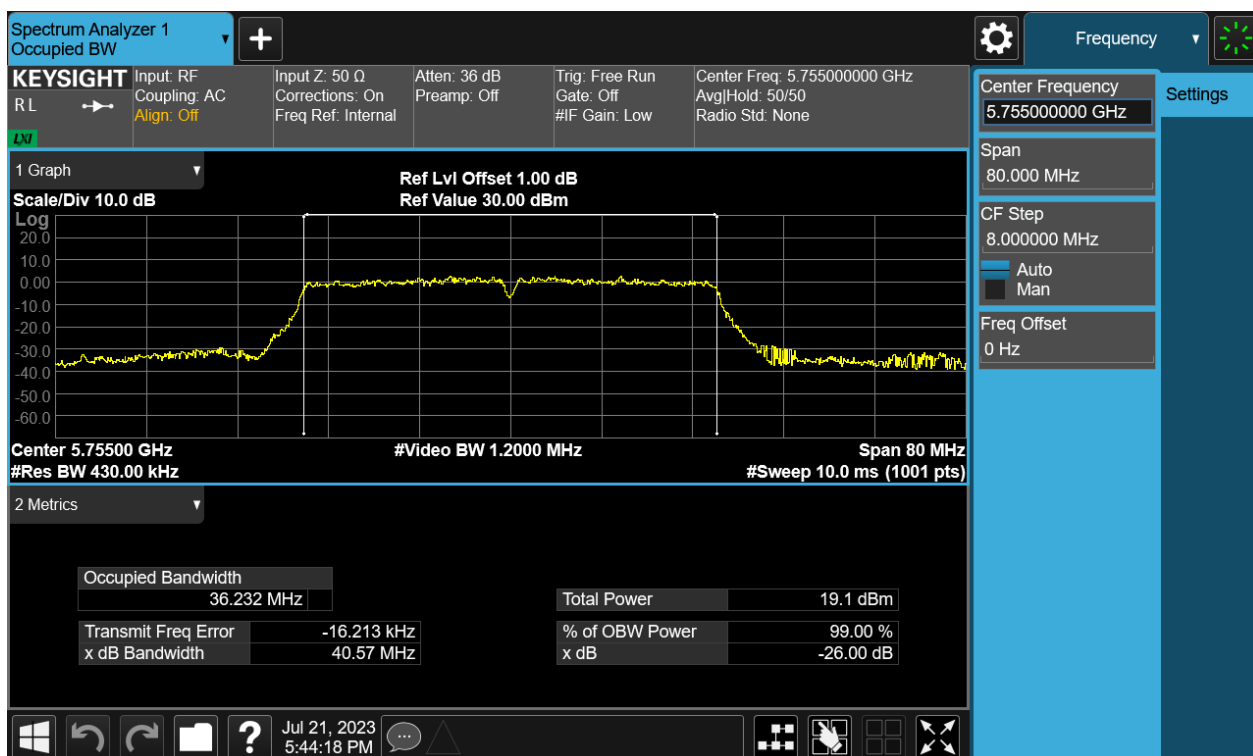
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Figure 12: The plots of 6dB Bandwidth, 802.11ac(VHT40), 5755MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



TEST REPORT

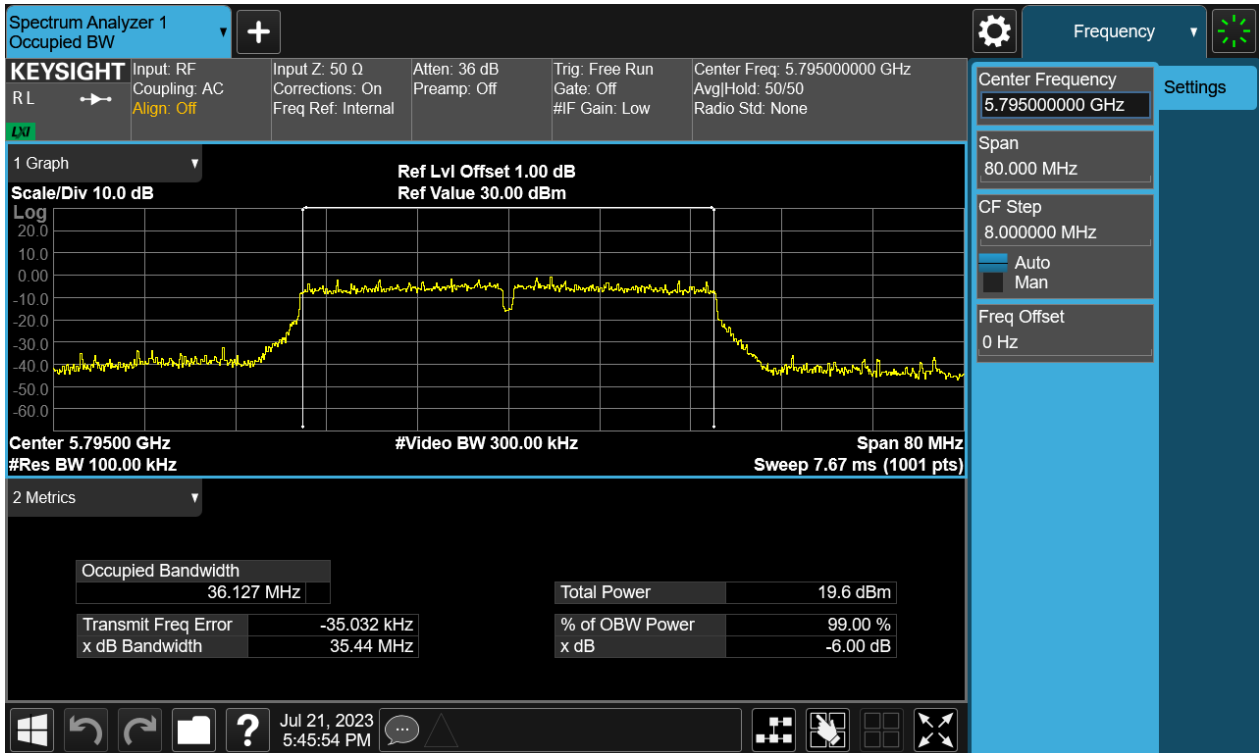
Report No.: SHE23060104-02DE

Date: 2023-08-08

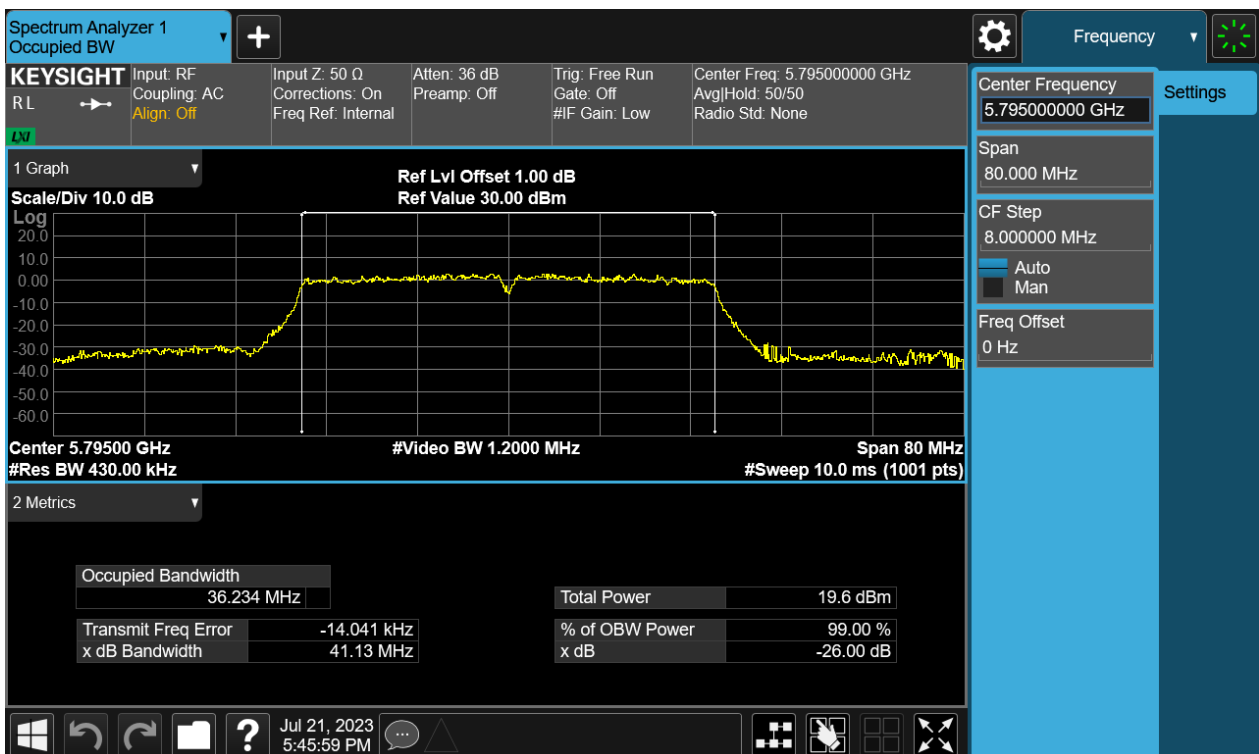
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Figure 13: The plots of 6dB Bandwidth, 802.11ac(VHT40), 5795MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



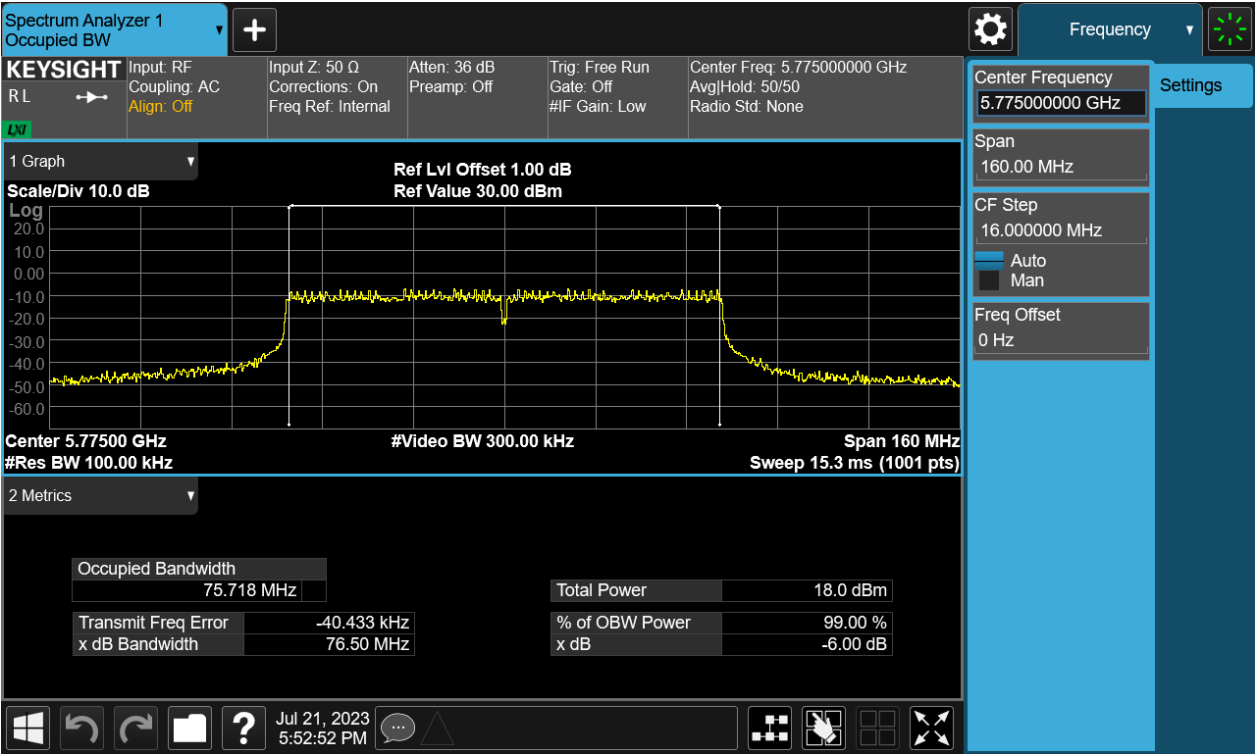
TEST REPORT

Report No.: SHE23060104-02DE

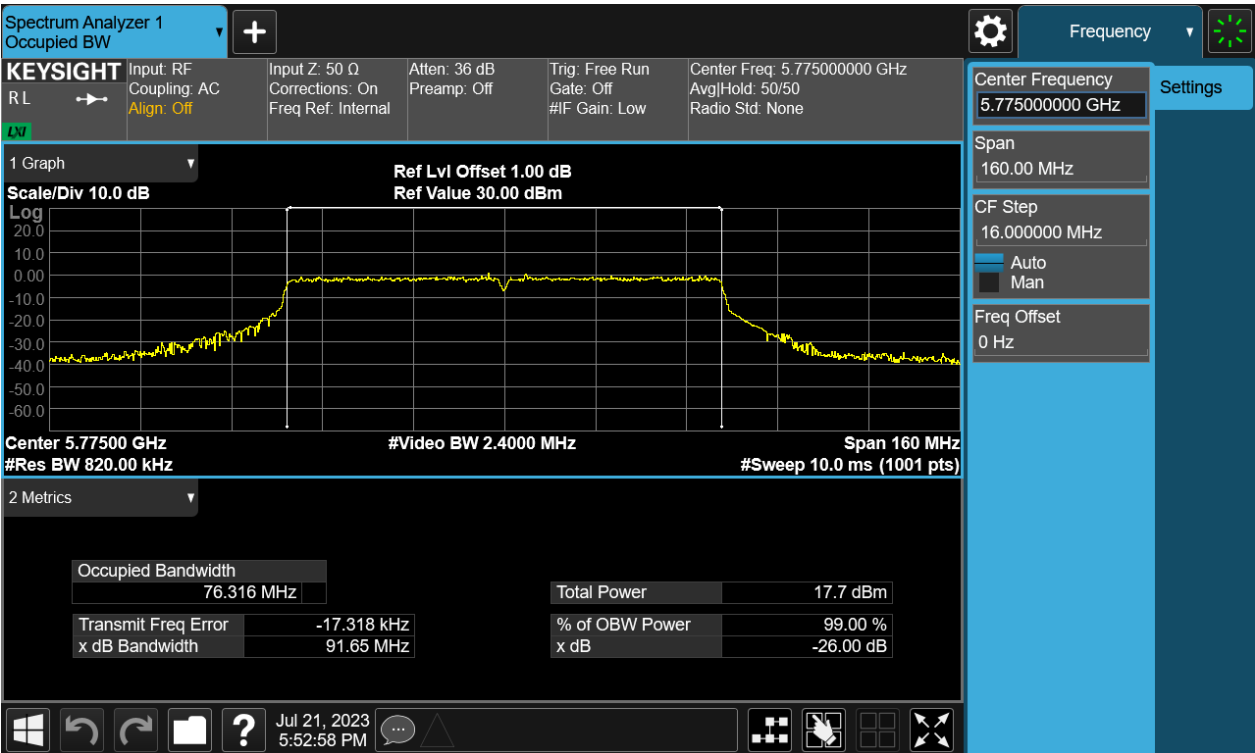
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Figure 14: The plots of 6dB Bandwidth, 802.11ac(VHT80), 5775MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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4.1.5 Maximum Conducted Output Power Spectral Density

RESULT:

PASS

Test standard : FCC Part 15.407(a)
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 : 24.0°C
Relative humidity : 50%

Notes:

Test plots please refer to the annex document "SHE23060104-02DE DATA WIFI5GHz- Maximum Conducted Output Power Spectral Density EXHIBIT A"

Table 5: Maximum Conducted Output Power Spectral Density for Band I (5150MHz~5250MHz)

Test Mode	Duty Cycle	Test Channel (MHz)	Maximum PSD (dBm/MHz)	Applicable Limit (dBm/MHz)
802.11a	88.77	5180	3.35	11
		5220	4.07	
		5240	5.06	
802.11n(HT20)	90.84	5180	3.62	
		5220	4.25	
		5240	4.33	
802.11ac(VHT20)	90.69	5180	3.60	
		5220	4.28	
		5240	4.09	
802.11n(HT40)	96.61	5190	0.21	
		5230	1.16	
802.11ac(VHT40)	96.43	5190	-0.24	
		5230	0.53	
802.11ac(VHT80)	75.84	5210	-3.41	

Notes:

1. 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 6: Maximum Conducted Output Power Spectral Density for Band IV (5725MHz~5850MHz)

Test Mode	Duty Cycle	Test Channel (MHz)	Maximum PSD (dBm/500kHz)	Applicable Limit (dBm/500kHz)
802.11a	95.27	5745	7.08	30
		5785	7.49	
		5825	8.00	
802.11n(HT20)	90.84	5745	6.90	
		5785	7.14	
		5825	7.84	
802.11ac(VHT20)	90.96	5745	6.83	
		5785	6.97	
		5825	7.37	
802.11n(HT40)	93.08	5755	1.56	
		5795	2.08	
802.11ac(VHT40)	93.14	5755	2.10	
		5795	2.52	
802.11ac(VHT80)	76.05	5775	-2.98	

Notes:

1. 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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4.1.6 Conducted Spurious Emission

RESULT:

PASS

Test standard	: FCC Part 15.407(b), 15.209,
Requirement	: ANSI C63.10-2013 clause 12.7.4, KDB 789033
Kind of test site	: Shielded room

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1.a
Ambient temperature	: 24.0°C
Relative humidity	: 50%

Notes:

Test plots please refer to the annex document "SHE230630104-02DE DATA WLAN 5GHz-TX CSE EXHIBIT A".

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4.1.7 Radiated Emission

RESULT:

PASS

Test standard	: FCC Part 15.407(b), 15.209, 15.205
Requirement	: ANSI C63.10-2013 clause 12.7.4, KDB 789033
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1.a
Ambient temperature	: 23°C
Relative humidity	: 50%

Notes:

Test plots please refer to the annex document "SHE23060104-02DE DATA WIFI5GHz-TX EXHIBIT A"

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.
4. Factor = Antenna Factor + Cable loss - Amplifier gain, Over Limit= Results-Limit.

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4.1.8 Band Edge (Restricted-band band-edge)

RESULT:

PASS

Test standard	: FCC Part 15.407(b)
Requirement	: ANSI C63.10-2013 clause 12.7.4.4, KDB 789033
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/High
Operation Mode	: A.1.a
Ambient temperature	: 25°C
Relative humidity	: 53%

Notes:

Test plots please refer to the annex document "SHE23060104-02DE DATA WIFI5GHz-TX EXHIBIT A"

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.
2. Factor = Antenna Factor + Cable loss - Amplifier gain, Over Limit= Results-Limit.

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4.1.9 Frequency Stability

RESULT:

PASS

Test standard

: FCC Part 15.407(g)

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 13: Frequency Stability
Band I (5150MHz – 5250MHz):
Voltage vs. Frequency Stability (5180MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Temp (°C)	Voltage (V)			
25	3.4V	5179.965050	6.75	± 20
	3.8V	5179.964200	6.91	
	4.4V	5179.960025	7.72	

Temperature vs. Frequency Stability (5180MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.8V	-30	5179.964263	6.90	± 20
	-20	5179.975906	4.65	
	-10	5179.984092	3.07	
	0	5179.991200	1.70	
	10	5179.985025	2.89	
	20	5179.975356	4.76	
	30	5179.990018	1.93	
	40	5179.989006	2.12	
	50	5179.993561	1.24	
	60	5179.994132	1.13	
	70	5179.970078	5.78	
	75	5179.985892	2.72	

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Band IV (5725MHz – 5850MHz):
Voltage vs. Frequency Stability (5745MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Temp (°C)	Voltage (V)			
25	3.4V	5744.957725	7.36	± 20
	3.8V	5744.957500	7.40	
	4.4V	5744.957750	7.35	

Temperature vs. Frequency Stability (5745MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.8V	-30	5744.957625	7.38	± 20
	-20	5744.957575	7.38	
	-10	5744.957475	7.40	
	0	5744.957425	7.41	
	10	5744.957275	7.44	
	20	5744.957350	7.42	
	30	5744.957525	7.39	
	40	5744.957150	7.46	
	50	5744.957725	7.36	
	60	5744.957225	7.45	
	70	5744.957200	7.45	
	75	5744.957100	7.47	

Note: The all configurations were tested respectively, but only the worst channel shown here.

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4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

PASS

Test standard	: FCC Part 15.207
Requirement	: ANSI C63.10-2013 clause 6.2
Kind of test site	: Shielded room

Test setup

Input Voltage	: Which received AC 120V, 60Hz Power
Operation Mode	: A.1.a
Earthing	: Not Connected
Ambient temperature	: 23.2°C
Relative humidity	: 52%

For details refer to following test plot.

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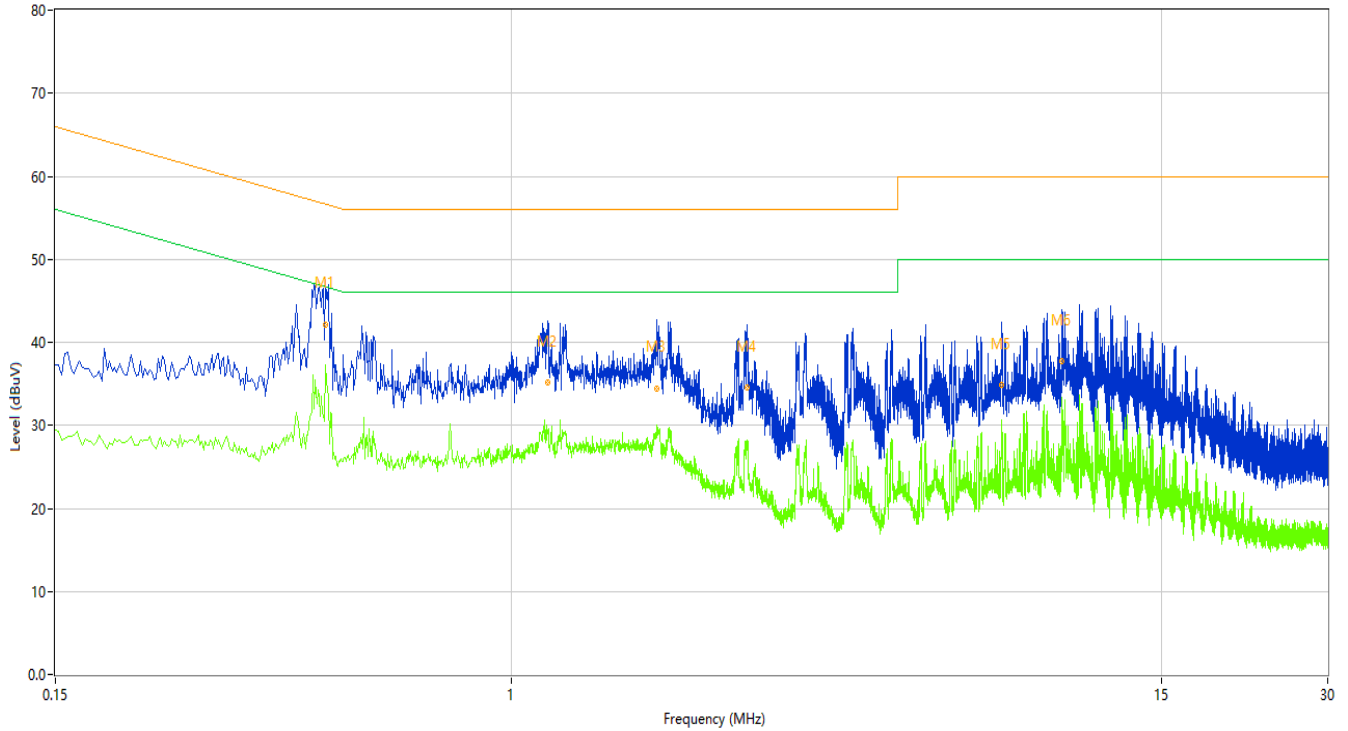
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Note: The all configurations were tested respectively, but only the worst configuration shown here.

Figure 15: Conducted Emission on AC Mains, L Phase

CEmission Test case_FCC_CE_FCC PART 15C



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.462	49.15	9.96	56.66	7.51	Peak	L	Pass
1*	0.462	42.10	9.96	56.66	14.56	QP	L	Pass
1**	0.462	37.35	9.96	46.66	9.31	AV	L	Pass
2	1.166	42.21	9.83	56.00	13.79	Peak	L	Pass
2*	1.166	35.10	9.83	56.00	20.90	QP	L	Pass
2**	1.166	29.05	9.83	46.00	16.95	AV	L	Pass
3	1.838	41.53	9.85	56.00	14.47	Peak	L	Pass
3*	1.838	34.38	9.85	56.00	21.62	QP	L	Pass
3**	1.838	30.06	9.85	46.00	15.94	AV	L	Pass
4	2.668	41.69	9.84	56.00	14.31	Peak	L	Pass
4*	2.668	34.60	9.84	56.00	21.40	QP	L	Pass
4**	2.668	27.61	9.84	46.00	18.39	AV	L	Pass
5	7.710	43.06	9.76	60.00	16.94	Peak	L	Pass
5*	7.710	34.86	9.76	60.00	25.14	QP	L	Pass
5**	7.710	28.75	9.76	50.00	21.25	AV	L	Pass
6	9.934	44.25	9.68	60.00	15.75	Peak	L	Pass
6*	9.934	37.76	9.68	60.00	22.24	QP	L	Pass
6**	9.934	32.57	9.68	50.00	17.43	AV	L	Pass

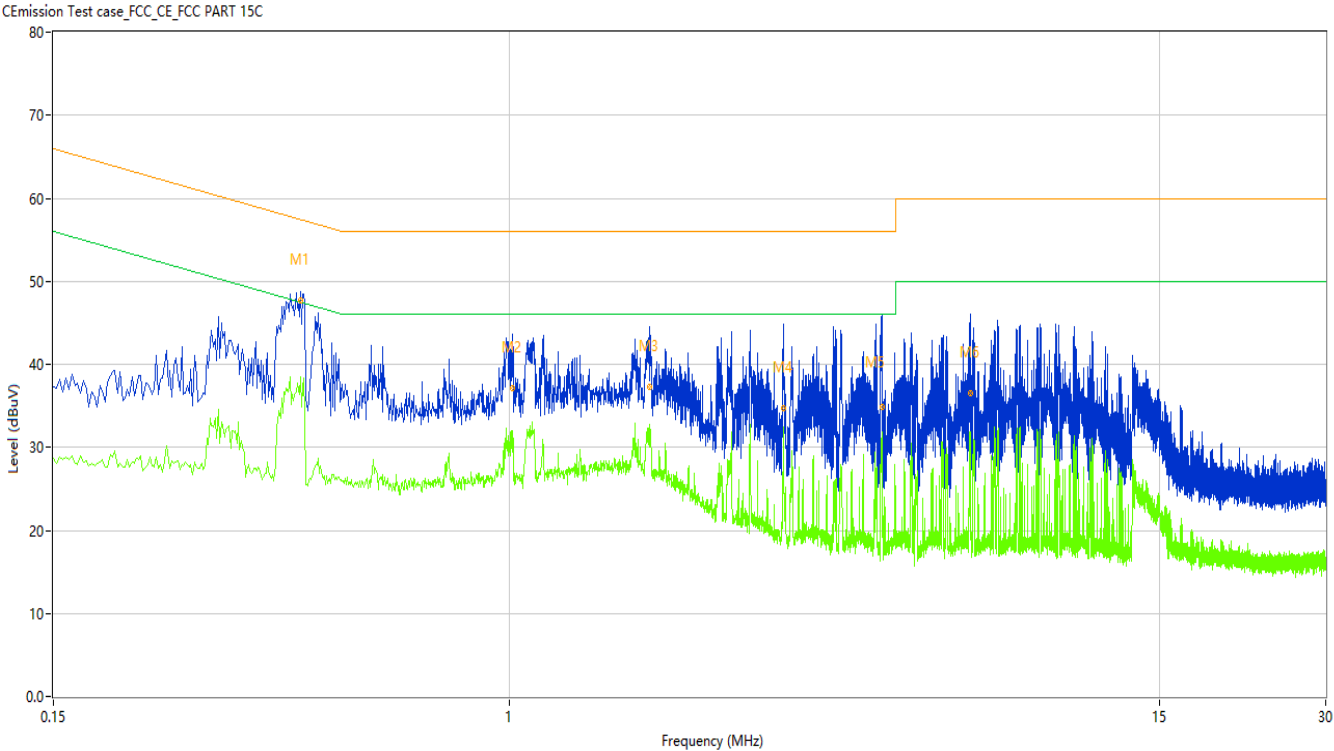
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Figure 16: Conducted Emission on AC Mains, N Phase



No.	Frequency (MHz)	Results (dBUV)	Factor (dB)	Limit (dBUV)	Margin (dB)	Detector	Line	Verdict
1	0.420	53.18	10.07	57.45	4.27	Peak	N	Pass
1*	0.420	47.66	10.07	57.45	9.79	QP	N	Pass
1**	0.420	38.52	10.07	47.45	8.93	AV	N	Pass
2	1.016	43.68	9.94	56.00	12.32	Peak	N	Pass
2*	1.016	37.20	9.94	56.00	18.80	QP	N	Pass
2**	1.016	31.93	9.94	46.00	14.07	AV	N	Pass
3	1.794	44.00	9.94	56.00	12.00	Peak	N	Pass
3*	1.794	37.34	9.94	56.00	18.66	QP	N	Pass
3**	1.794	32.78	9.94	46.00	13.22		N	Pass
4	3.136	44.73	9.91	56.00	11.27	Peak	N	Pass
4*	3.136	34.67	9.91	56.00	21.33	QP	N	Pass
4**	3.136	32.49	9.91	46.00	13.51	AV	N	Pass
5	4.722	44.36	9.76	56.00	11.64	Peak	N	Pass
5*	4.722	34.94	9.76	56.00	21.06	QP	N	Pass
5**	4.722	31.81	9.76	46.00	14.19	AV	N	Pass
6	6.834	44.40	9.83	60.00	15.60	Peak	N	Pass
6*	6.834	36.59	9.83	60.00	23.41	QP	N	Pass
6**	6.834	31.18	9.83	50.00	18.82	AV	N	Pass

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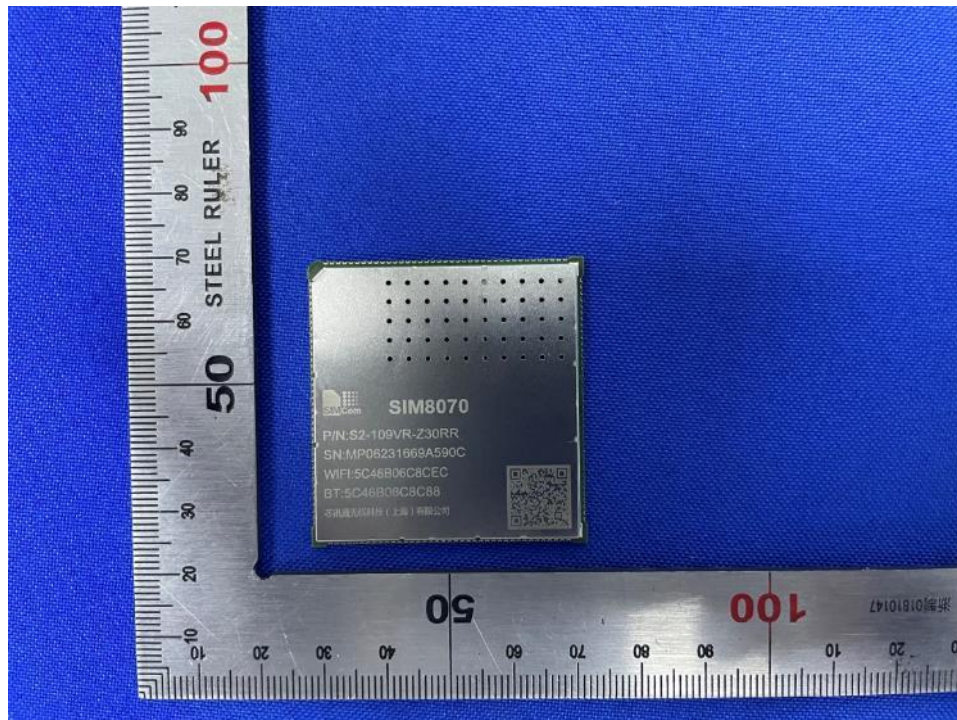
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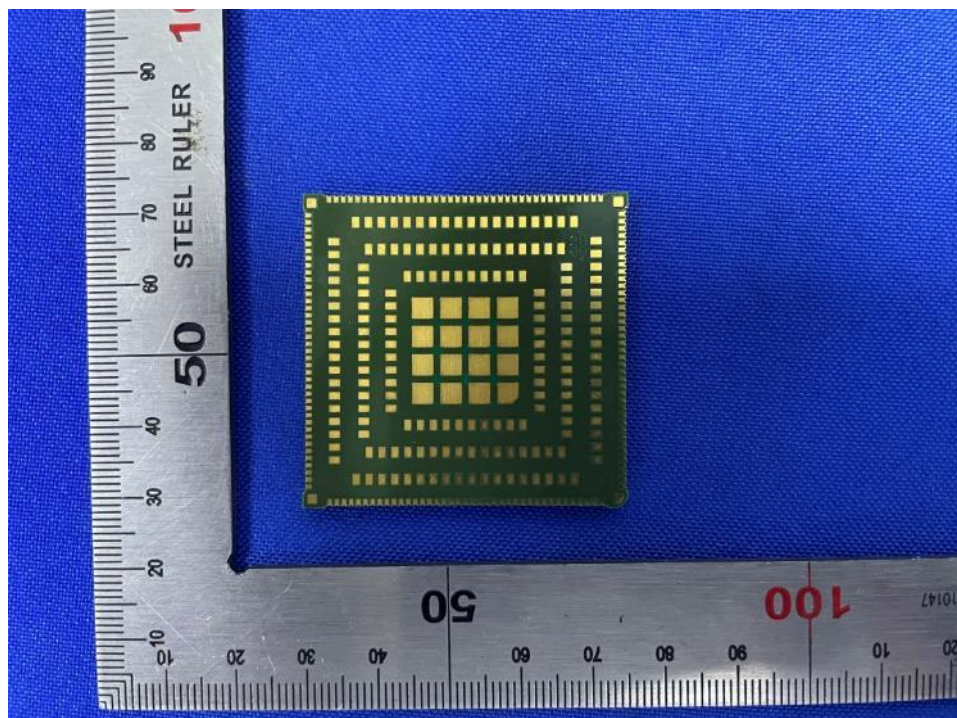
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5 Appendixes

5.1 Photographs of the Sample



Front of the sample



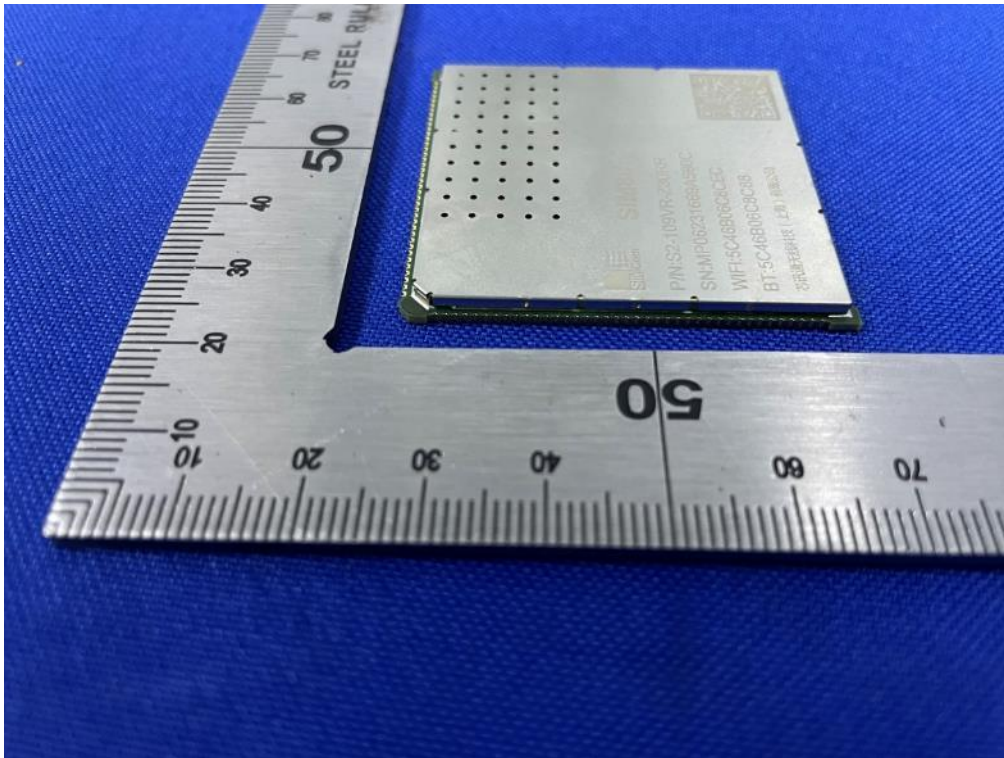
Rear of the sample

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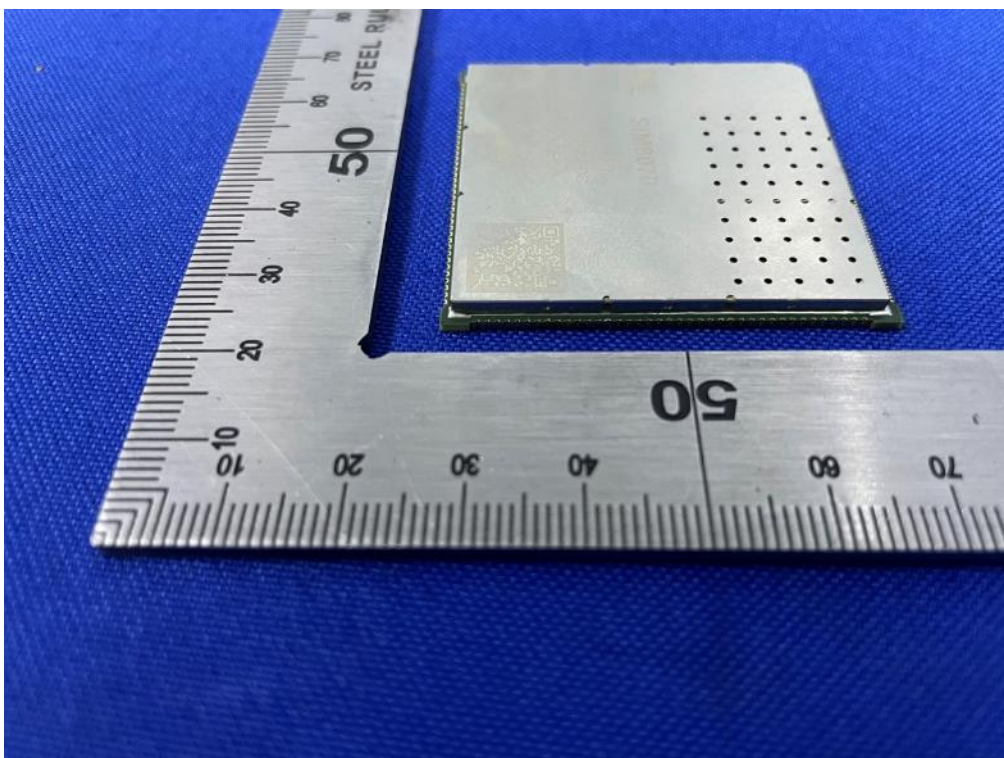
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Left of the sample



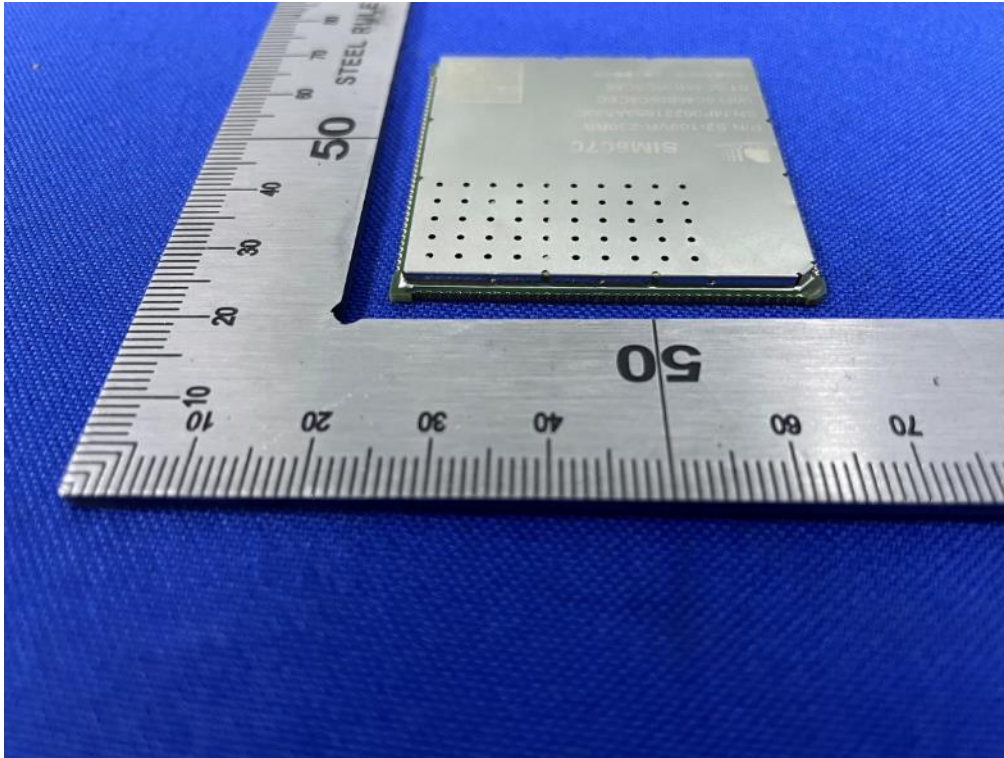
Right of the sample

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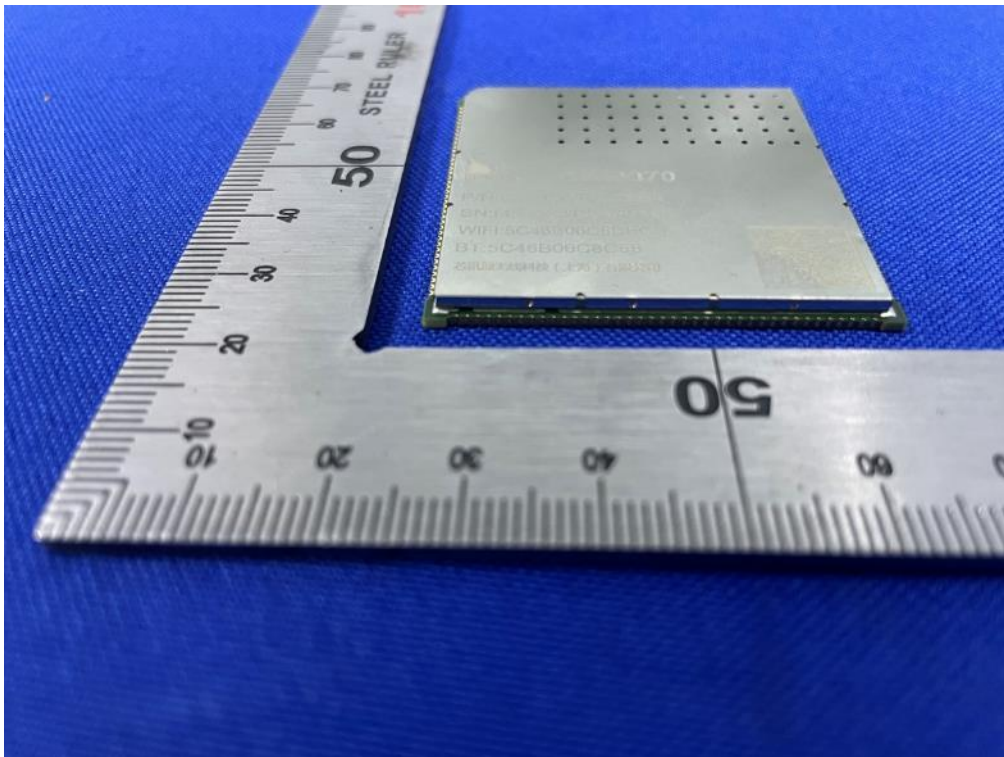
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Top of the sample



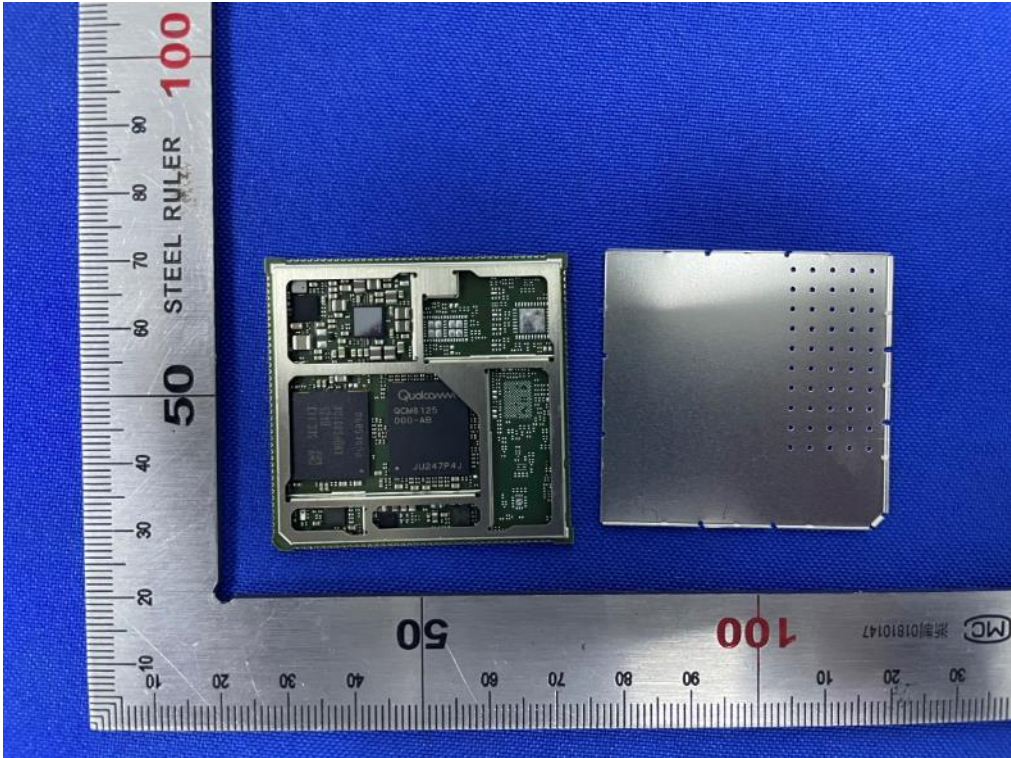
Bottom of the sample

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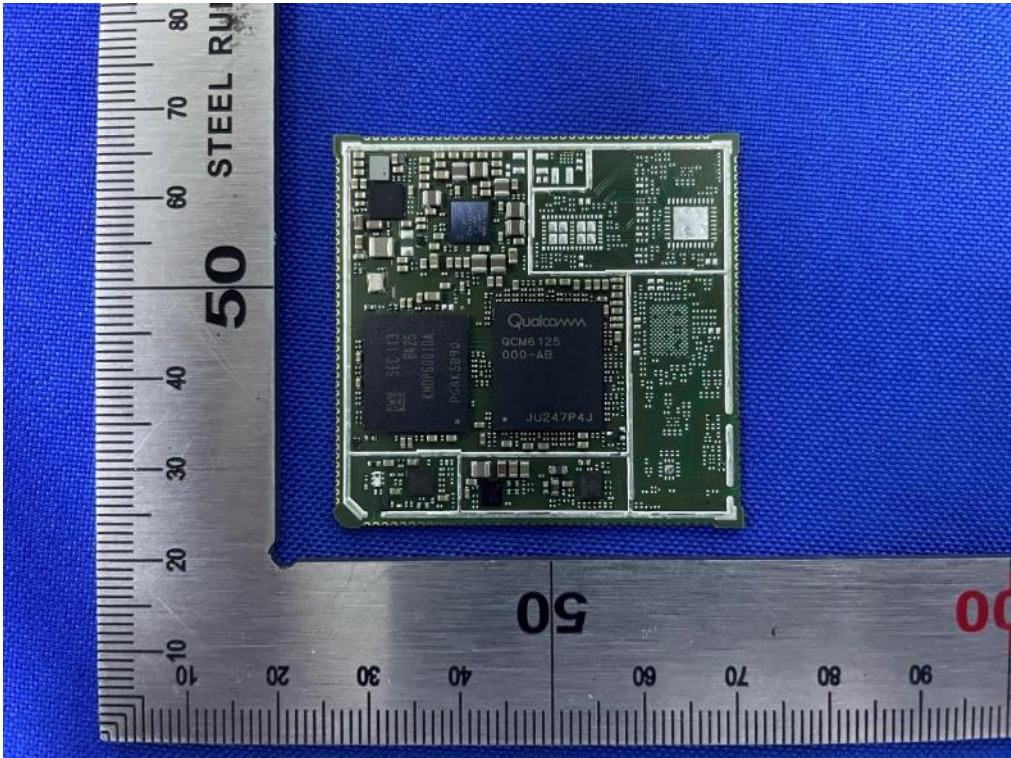
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Open of the sample



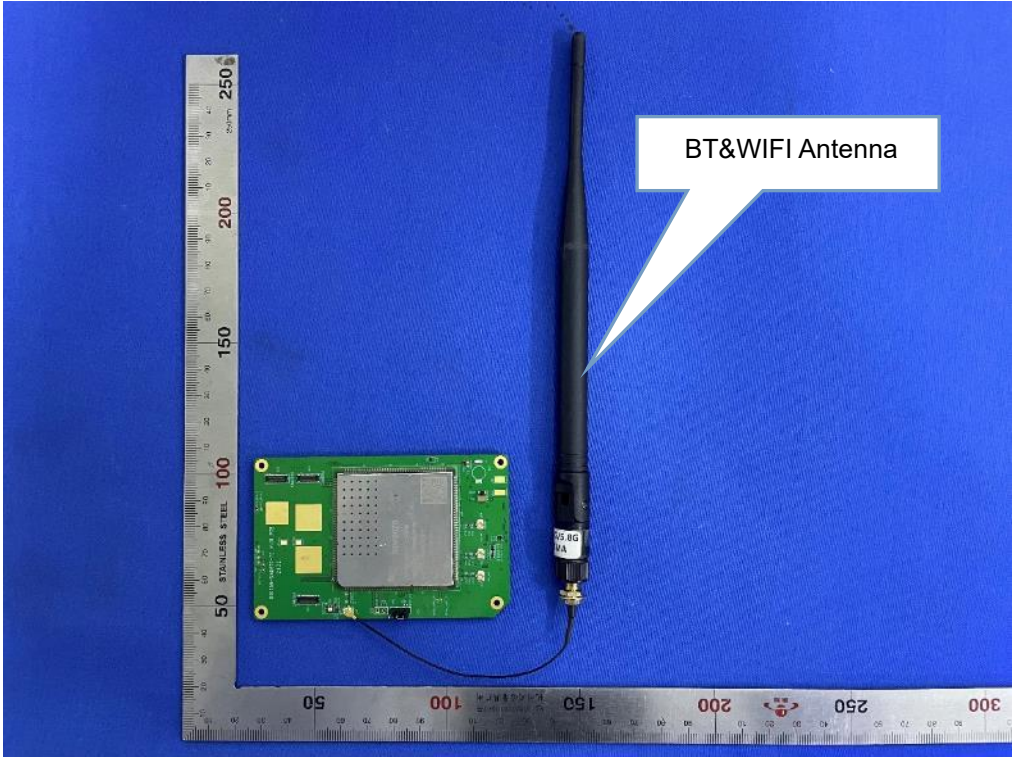
Internal-1 of the sample

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Antenna Position

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5.2 Set-up for Conducted Emissions



5.3 Set-up for Conducted RF test at Antenna Port



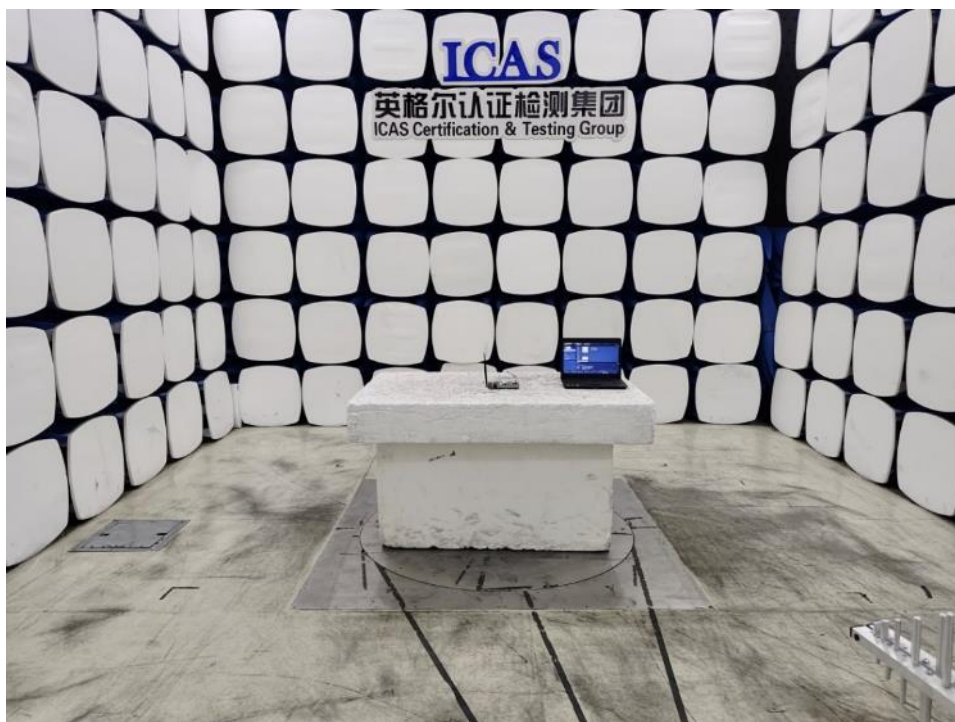
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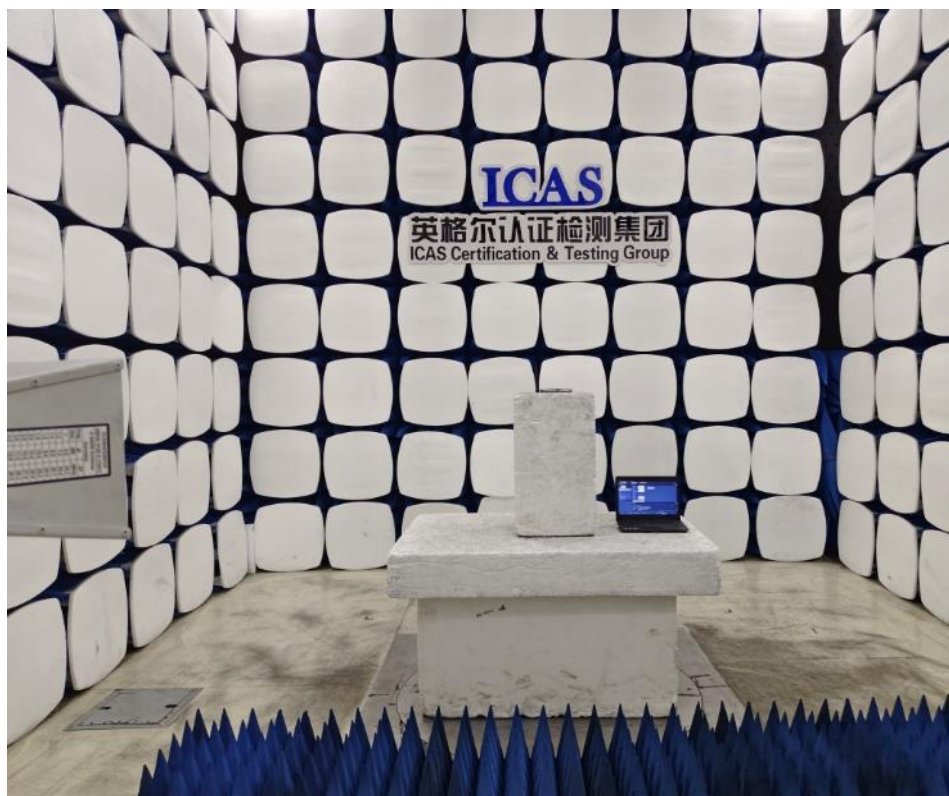
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5.4 Set-up for Spurious Emissions below 1GHz



5.5 Set-up for Spurious Emissions above 1GHz



End of the report