

TEST REPORT

Report No.: SHE23060106-02FE

Date: 2023-12-08

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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 : LTE Wireless Data Module
Brand Name : SIMCom
Model Name : SIM8918NA
Sample Acquisition Method : Sent by Client

Sample No. : E23060106-02#03

FCC ID : 2AJYU-8XRA002

Standards : FCC CFR47 Part 15, Subpart E

Date of Receipt : 2023-09-06
Date of Test : 2023-09-06 ~ 2023-12-06
Date of Issue : 2023-12-08

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.

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1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298 Pingan Road, 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	LTE Wireless Data Module
Brand Name	SIMCom
Test Model Name	SIM8918NA
FCC ID	2AJYU-8XRA002
Mode of Operation	WLAN 802.11a/n(HT20/40)/ac(VHT20/40/80)
Operation Frequency	Band I:5150MHz~5250MHz; Band II:5250MHz~5350MHz; Band III:5470MHz~5725MHz; 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

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Extreme Temperature Range	-35℃~ +75℃
Test Voltage	DC 3.9V
Extreme Voltage	Low Voltage: DC 3.4V High Voltage: DC 4.4V
Product Type	Mobile and portable for FCC standard
Hardware Version	8XR000-SIM8918_V1.03
Software Version	SIM8918B01V01
RF power setting in TEST SW	802.11a: QRCT_Power level setting_11dBm for Band I 802.11a: QRCT_Power level setting_10dBm for Band II 802.11a: QRCT_Power level setting_9dBm for Band III 802.11a: QRCT_Power level setting_15dBm for Band IV 802.11n(HT20): QRCT_Power level setting_11dBm for Band I 802.11n(HT20): QRCT_Power level setting_10dBm for Band II 802.11n(HT20): QRCT_Power level setting_9dBm for Band III 802.11n(HT20): QRCT_Power level setting_15dBm for Band IV 802.11n(HT40): QRCT_Power level setting_11dBm for Band I 802.11n(HT40): QRCT_Power level setting_8dBm for Band II 802.11n(HT40): QRCT_Power level setting_8dBm for Band III 802.11n(HT40): QRCT_Power level setting_13dBm for Band IV 802.11ac(VHT20): QRCT_Power level setting_11dBm for Band I 802.11ac(VHT20): QRCT_Power level setting_10dBm for Band II 802.11ac(VHT20): QRCT_Power level setting_9dBm for Band III 802.11ac(VHT20): QRCT_Power level setting_15dBm for Band IV 802.11ac(VHT40): QRCT_Power level setting_11dBm for Band I 802.11ac(VHT40): QRCT_Power level setting_8dBm for Band II 802.11ac(VHT40): QRCT_Power level setting_8dBm for Band III 802.11ac(VHT40): QRCT_Power level setting_13dBm for Band IV 802.11ac(VHT80): QRCT_Power level setting_10dBm for Band I 802.11ac(VHT80): QRCT_Power level setting_8dBm for Band II 802.11ac(VHT80): QRCT_Power level setting_7dBm for Band III 802.11ac(VHT80): QRCT_Power level setting_11dBm for Band IV

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
Band I: 5150MHz~5250MHz	36	5180 MHz
	38	5190 MHz
	40	5200 MHz
	42	5210 MHz
	44	5220 MHz
	46	5230 MHz
	48	5240 MHz

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Band II: 5250MHz~5350MHz	52	5260 MHz
	54	5270 MHz
	56	5280 MHz
	58	5290 MHz
	60	5300 MHz
	62	5310 MHz
	64	5320 MHz
Frequency Band	Channel Number	Frequency
Band III: 5470MHz~5725MHz	100	5500 MHz
	102	5510 MHz
	104	5520 MHz
	106	5530 MHz
	108	5540 MHz
	110	5550 MHz
	112	5560 MHz
	116	5580 MHz
	118	5590 MHz
	120	5600 MHz
	122	5610 MHz
	124	5620 MHz
	126	5630 MHz
	128	5640 MHz
	132	5660 MHz
	134	5670 MHz
	136	5680 MHz
	140	5700 MHz
Band IV: 5725MHz ~ 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

36,40,44,48,52,56,60,64,100,104,108,112,116,120,124,128,132,136,140,149,153,157,161,165;

For 40MHZ bandwidth system use Channel 38,46,54,62,102,110,118,126,134,151,159;

For 80MHZ bandwidth system use Channel 42,58,106,122,155.

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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
Spectrum Analyzer	Keysight	N9020B	MY59260184	2023-07-27	2024-07-26
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2023-06-08	2024-06-07
Signal Generator	Rohde & Schwarz	SMR27	100184	2023-07-27	2024-07-26
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
DC Power Supply	ITECH	IT6952A	N/A	2022-06-07	2024-06-06
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

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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 %
Maximum Conducted Output Power and E.I.R.P		± 0.64 dB
Maximum Conducted Output Power Spectral Density		± 1.18 dB
Frequency Stability		± 10 ppm

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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 – 5250MHz)		Band II (5250 – 5350MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel (CH36)	5180MHz	The lowest channel (CH52)	5260MHz
The middle channel (CH44)	5220MHz	The middle channel (CH60)	5300MHz
The highest channel (CH48)	5240MHz	The highest channel (CH64)	5320MHz

Band III (5470 – 5725MHz)		Band IV (5725 – 5850MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel (CH100)	5500MHz	The lowest channel (CH149)	5745MHz
The middle channel (CH116)	5580MHz	The middle channel (CH157)	5785MHz
The highest channel (CH140)	5700MHz	The highest channel (CH165)	5825MHz

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

Band I (5150 – 5250MHz)		Band II (5250 – 5350MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel (CH38)	5190MHz	The lowest channel (CH54)	5270MHz
The highest channel (CH46)	5230MHz	The highest channel (CH62)	5310MHz

Band III (5470 – 5725MHz)		Band IV (5725 – 5850MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel (CH102)	5510MHz	The lowest channel (CH151)	5755MHz
The middle channel (CH118)	5590MHz	The highest channel (CH159)	5795MHz
The highest channel (CH134)	5670MHz		

For 802.11ac (VHT80)

Band I (5150 – 5250MHz)		Band II (5250 – 5350MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel (CH42)	5210MHz	The lowest channel (CH58)	5290MHz

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Band III (5470 – 5725MHz)		Band IV (5725 – 5850MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel (CH106)	5530MHz	The lowest channel (CH155)	5775MHz
The lowest channel (CH122)	5610MHz	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), 802.11n(HT40)	MCS4
802.11ac (VHT20), 802.11ac (VHT40)	MCS6
802.11ac (VHT80)	MCS4

The basic operation modes are:

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

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model Name	Serial No.
Laptop	Lenovo	TP00083A	PF-0PRDGN 17/03
Adapter	Something High Electric (Xiamen) Company Inc.	P-050B-050200EU	N/A
EVb Debug Board 1	N/A	Smart Module-EVB_V1.03	N/A
EVb Debug Board 2	N/A	8918-TE_V1.02	N/A
USB Cable	SIMCom	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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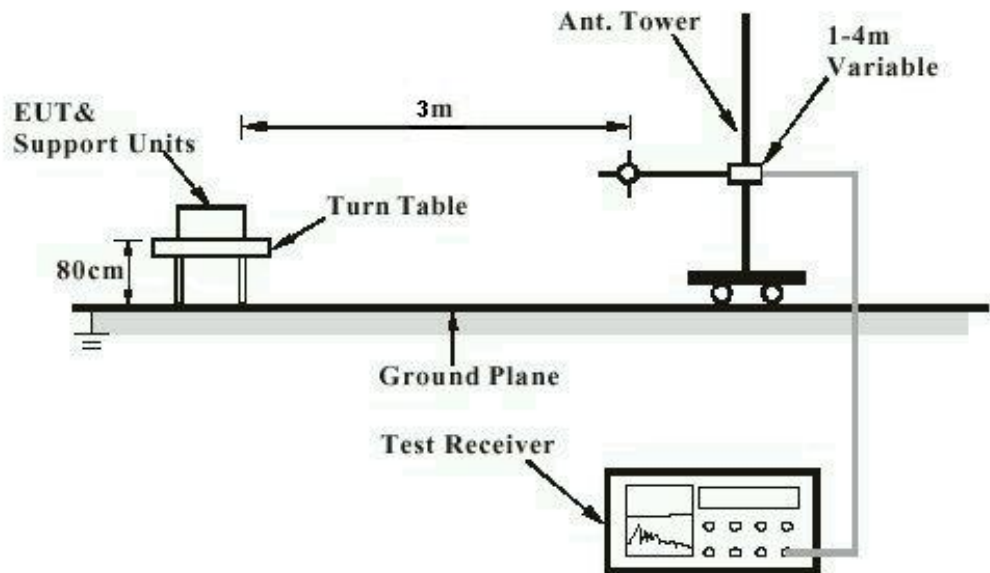
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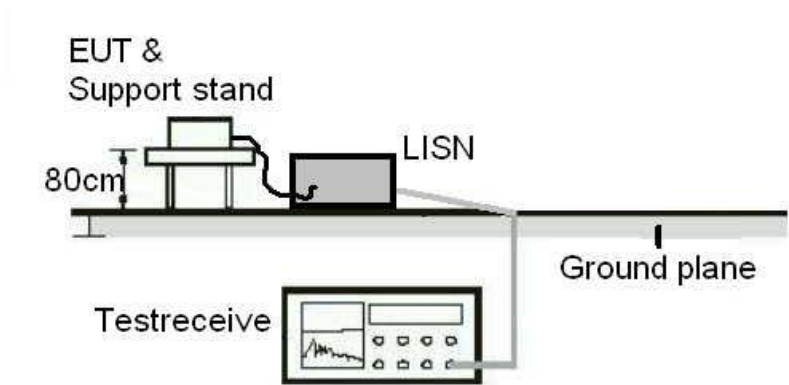
3.4 Test Setup Diagram

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

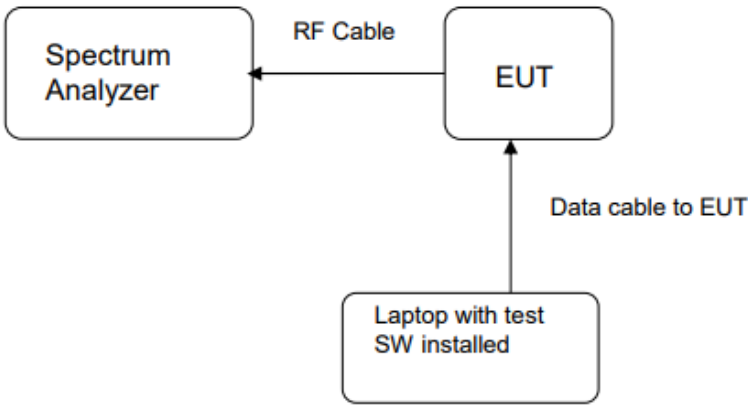
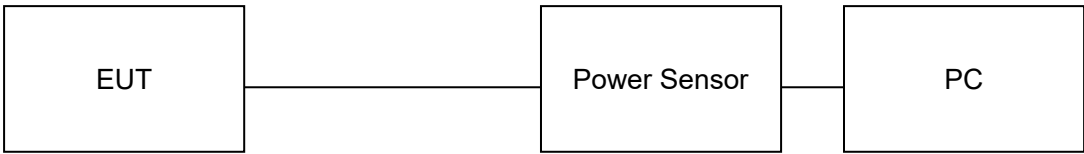


Diagram of Measurement Equipment Configuration for conducted output power setup



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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 : 23.8°C
Relative humidity : 46%

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	93.56	5180	10.74	11.86	1W(30dBm)
		5220	10.58	11.43	
		5240	10.33	10.79	
802.11n(HT20)	90.84	5180	11.21	13.21	
		5220	11.10	12.88	
		5240	10.86	12.19	
802.11ac(VHT20)	87.65	5180	11.36	13.68	
		5220	11.24	13.30	
		5240	10.98	12.53	
802.11n(HT40)	84.33	5190	10.40	10.96	
		5230	10.27	10.64	
802.11ac(VHT40)	80.72	5190	10.58	11.43	
		5230	10.45	11.09	
802.11ac(VHT80)	75.68	5210	10.50	11.22	

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.
2. 30 dBm (1 W) for master device.

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Table 2: Maximum Conducted Output Power for Band II (5250MHz~5350MHz)

Test Mode	Duty Cycle (%)	-26 dB Emission Bandwidth (MHz)	Test Channel (MHz)	Maximum Conducted Output Power		Applicable Limit
				(dBm)	(mW)	
802.11a	87.72	27.28	5260	9.84	9.64	250mW (24dBm)
		31.11	5300	9.81	9.57	
		32.22	5320	9.85	9.66	
802.11n(HT20)	90.84	28.71	5260	9.92	9.82	
		31.14	5300	9.88	9.73	
		31.83	5320	9.93	9.84	
802.11ac(VHT20)	90.96	22.59	5260	9.89	9.75	
		22.10	5300	9.86	9.68	
		22.52	5320	9.90	9.77	
802.11n(HT40)	80.28	41.68	5270	7.21	5.26	
		43.68	5310	7.29	5.36	
802.11ac(VHT40)	80.72	43.06	5270	6.29	4.26	
		41.88	5310	6.30	4.27	
802.11ac(VHT80)	81.14	92.19	5290	5.77	3.78	

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.
2. The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

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Table 3: Maximum Conducted Output Power for Band III (5470MHz~5725MHz)

Test Mode	Duty Cycle (%)	-26 dB Emission Bandwidth (MHz)	Test Channel (MHz)	Maximum Conducted Output Power		Applicable Limit
				(dBm)	(mW)	
802.11a	95.27	20.54	5500	8.54	7.14	250mW (24dBm)
		19.65	5580	7.88	6.14	
		19.91	5700	7.44	5.55	
802.11n(HT20)	86.71	21.21	5500	8.87	7.71	
		21.49	5580	8.21	6.62	
		21.05	5700	7.81	6.04	
802.11ac(VHT20)	90.69	22.59	5500	8.75	7.50	
		22.78	5580	8.10	6.46	
		22.71	5700	7.72	5.92	
802.11n(HT40)	80.11	42.39	5510	8.12	6.49	
		41.75	5590	7.51	5.64	
		42.43	5670	7.68	5.86	
802.11ac(VHT40)	80.56	42.76	5510	8.04	6.37	
		42.66	5590	7.40	5.50	
		42.96	5670	7.59	5.74	
802.11ac(VHT80)	80.98	89.82	5530	6.92	4.92	
		86.92	5610	6.97	4.98	

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.
2. The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

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Table 4: 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	89.10	5745	14.70	29.51	1W(30dBm)
		5785	15.12	32.51	
		5825	16.01	39.90	
802.11n(HT20)	90.84	5745	14.75	29.85	
		5785	15.16	32.81	
		5825	16.03	40.09	
802.11ac(VHT20)	90.96	5745	15.70	37.15	
		5785	16.24	42.07	
		5825	16.89	48.87	
802.11n(HT40)	93.66	5755	12.57	18.07	
		5795	13.39	21.83	
802.11ac(VHT40)	93.14	5755	12.65	18.41	
		5795	13.45	22.13	
802.11ac(VHT80)	75.68	5775	11.16	13.06	

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 : 23.7°C
Relative humidity : 45%

Notes:

Test plots please refer to the annex document "SHE23060106-02FE DATA WIFI5GHz-26dB Bandwidth and 99% Bandwidth EXHIBIT A"

Table 5: 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	20.16	16.455
	5220	20.98	16.503
	5240	21.26	16.475
802.11n(HT20)	5180	22.45	17.807
	5220	22.50	17.828
	5240	22.91	17.805
802.11ac(VHT20)	5180	21.37	17.801
	5220	22.11	17.765
	5240	21.78	17.748
802.11n(HT40)	5190	43.29	36.426
	5230	43.11	36.453
802.11ac(VHT40)	5190	43.40	36.469
	5230	43.11	36.437
802.11ac(VHT80)	5210	94.96	76.068

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Table 6: 26dB Bandwidth and 99% Bandwidth for Band II (5250MHz~5350 MHz)

Test Mode	Test Channel (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5260	20.40	16.572
	5300	20.68	16.525
	5320	21.03	16.542
802.11n(HT20)	5260	22.50	17.812
	5300	21.97	17.766
	5320	21.59	17.826
802.11ac(VHT20)	5260	22.41	17.829
	5300	21.98	17.812
	5320	21.99	17.801
802.11n(HT40)	5270	41.80	36.441
	5310	41.84	36.460
802.11ac(VHT40)	5270	42.92	36.451
	5310	43.45	36.380
802.11ac(VHT80)	5290	81.81	75.578

Table 7: 26dB Bandwidth and 99% Bandwidth for Band III (5470MHz~5725MHz)

Test Mode	Test Channel (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5500	20.04	16.502
	5580	19.91	16.426
	5700	19.60	16.466
802.11n(HT20)	5500	21.41	17.721
	5580	21.76	17.708
	5700	21.33	17.767
802.11ac(VHT20)	5500	22.16	17.810
	5580	22.45	17.860
	5700	21.40	17.768
802.11n(HT40)	5510	43.14	36.446
	5590	42.15	36.463
	5670	42.62	36.453
802.11ac(VHT40)	5510	41.97	36.409
	5590	42.53	36.393
	5670	43.20	36.392
802.11ac(VHT80)	5530	83.02	75.685
	5610	83.65	75.798

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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 : 23.8°C

Relative humidity : 46%

Table 8: 6dB Bandwidth and 99% Occupied Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Applicable Limit (MHz)
802.11a	5745	16.46	16.667	>0.5
	5785	16.28	16.619	
	5825	16.45	16.659	
802.11n(HT20)	5745	17.69	17.950	
	5785	17.65	17.924	
	5825	17.62	17.969	
802.11ac(VHT20)	5745	17.63	18.068	
	5785	17.61	18.068	
	5825	17.69	18.111	
802.11n(HT40)	5755	35.51	36.217	
	5795	36.24	36.209	
802.11ac(VHT40)	5755	35.69	36.194	
	5795	36.36	36.268	
802.11ac(VHT80)	5775	76.09	76.253	

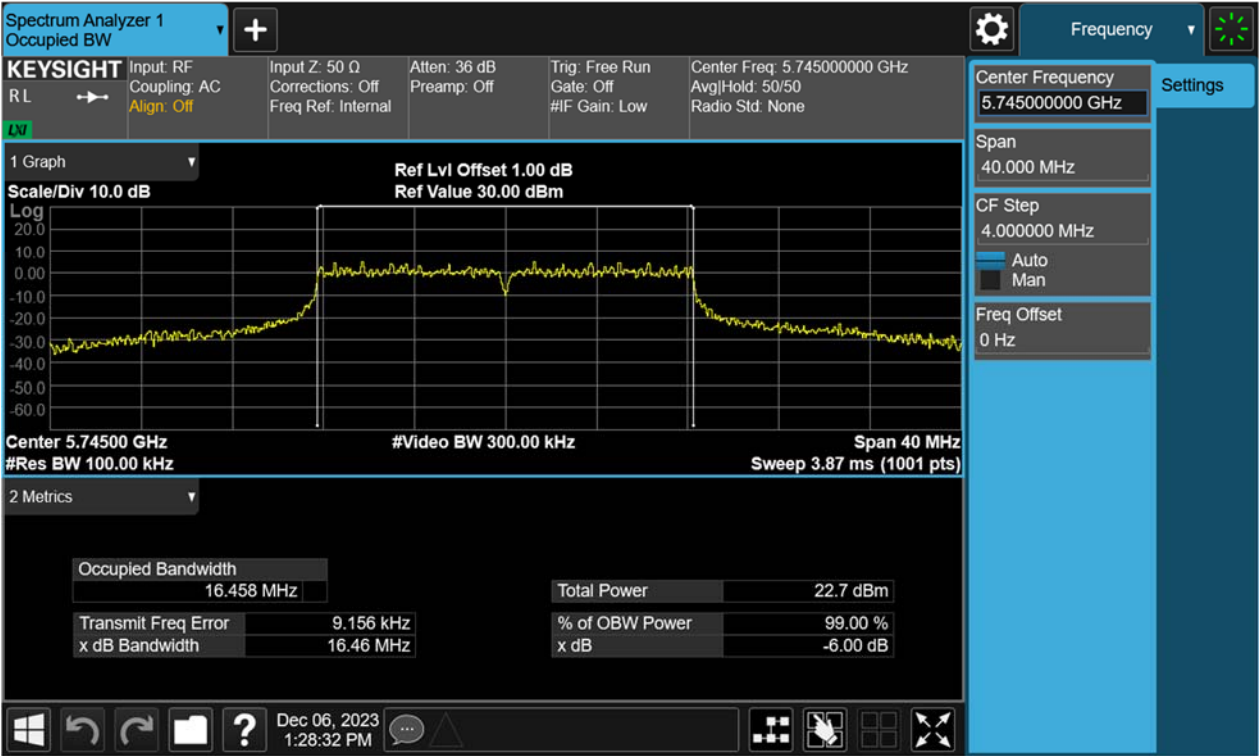
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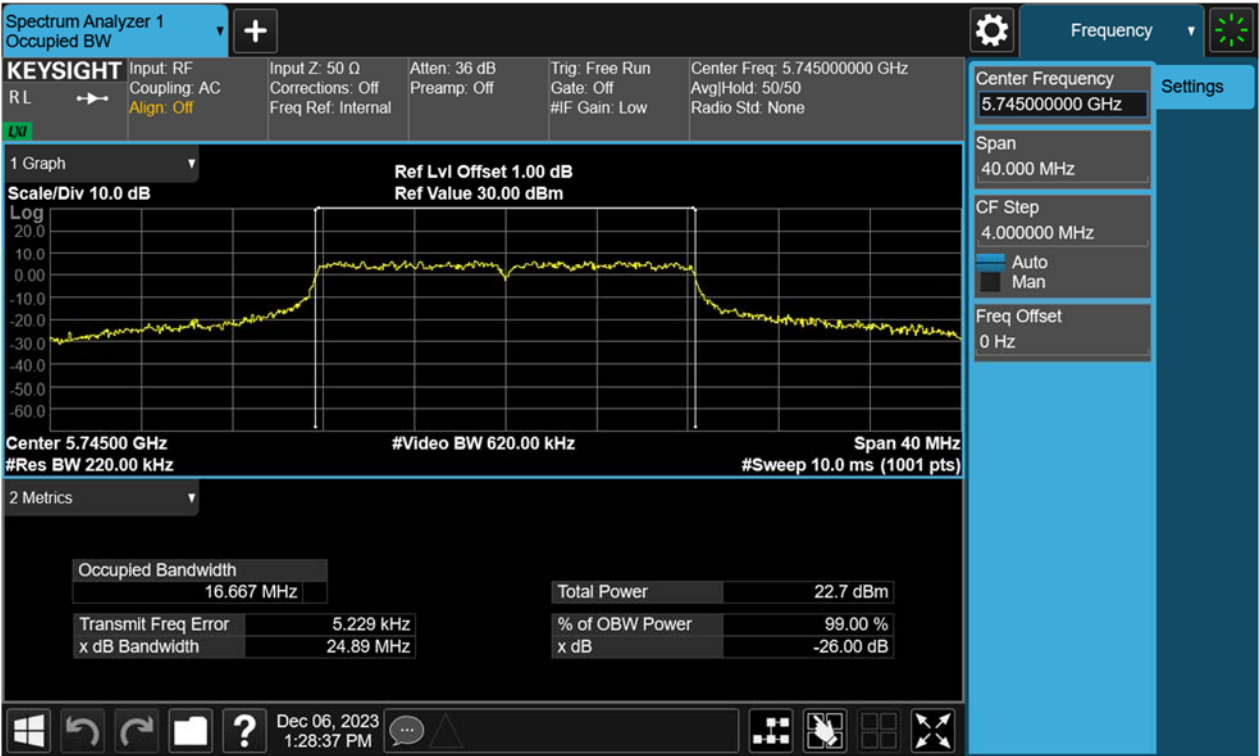
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Figure 1: 802.11a, 5745MHz
Test Plot of -6dB Bandwidth



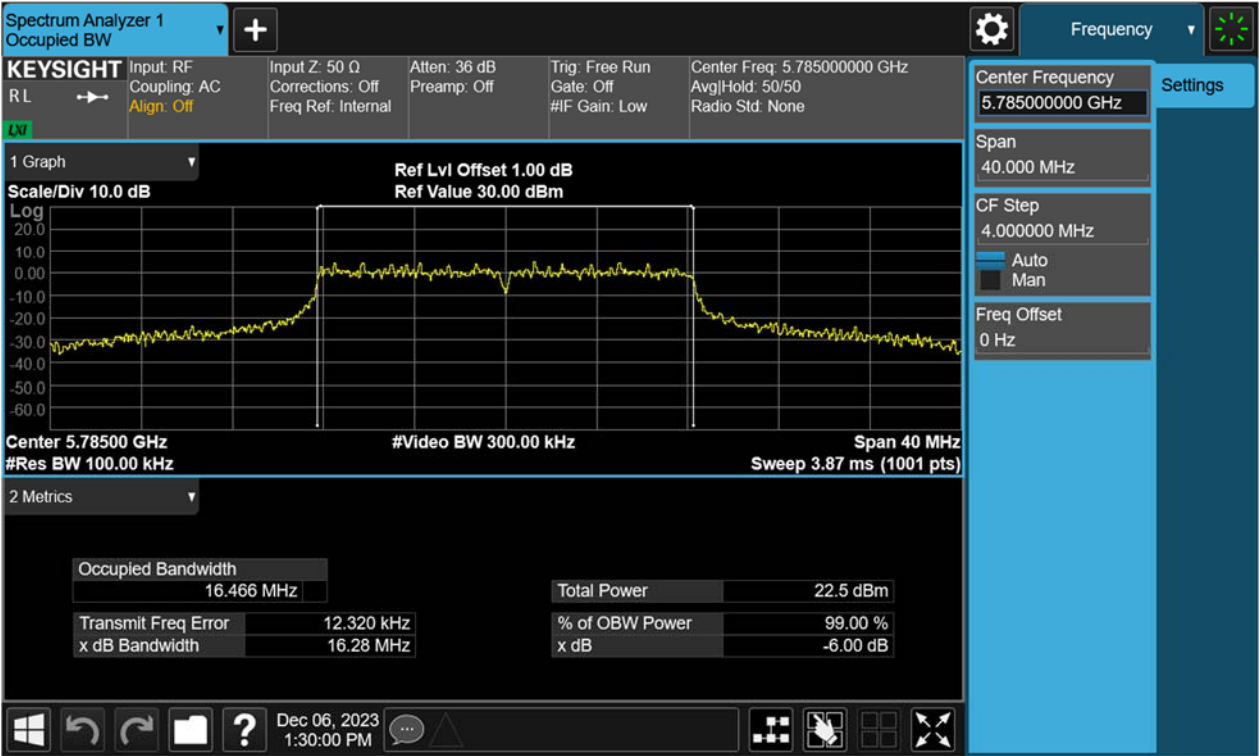
Test Plot of 99% Occupied Bandwidth



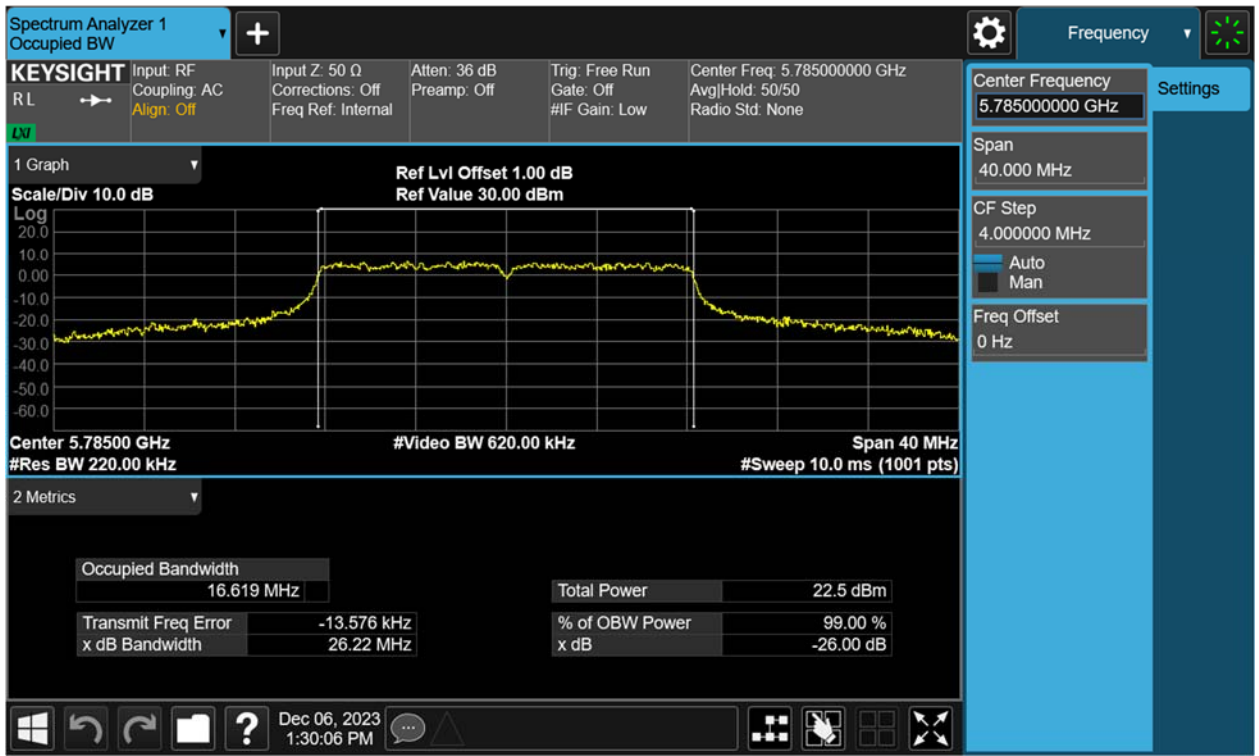
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Figure 2: 802.11a, 5785MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



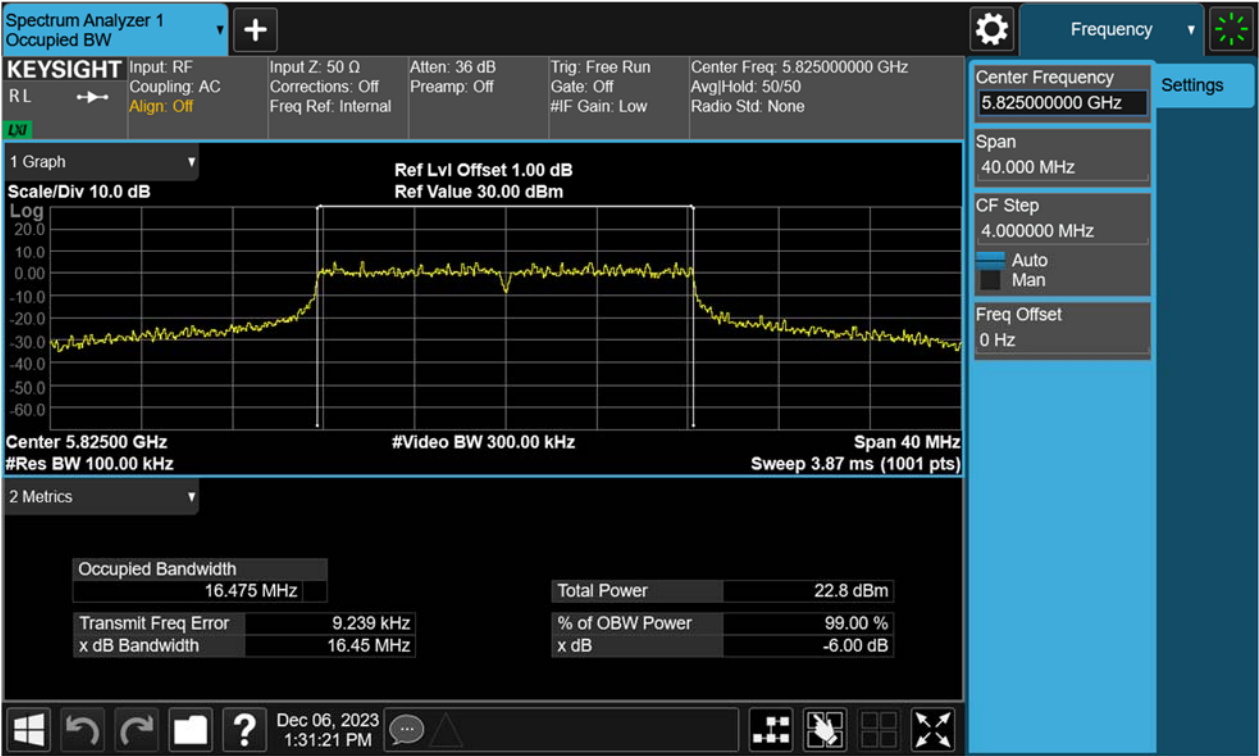
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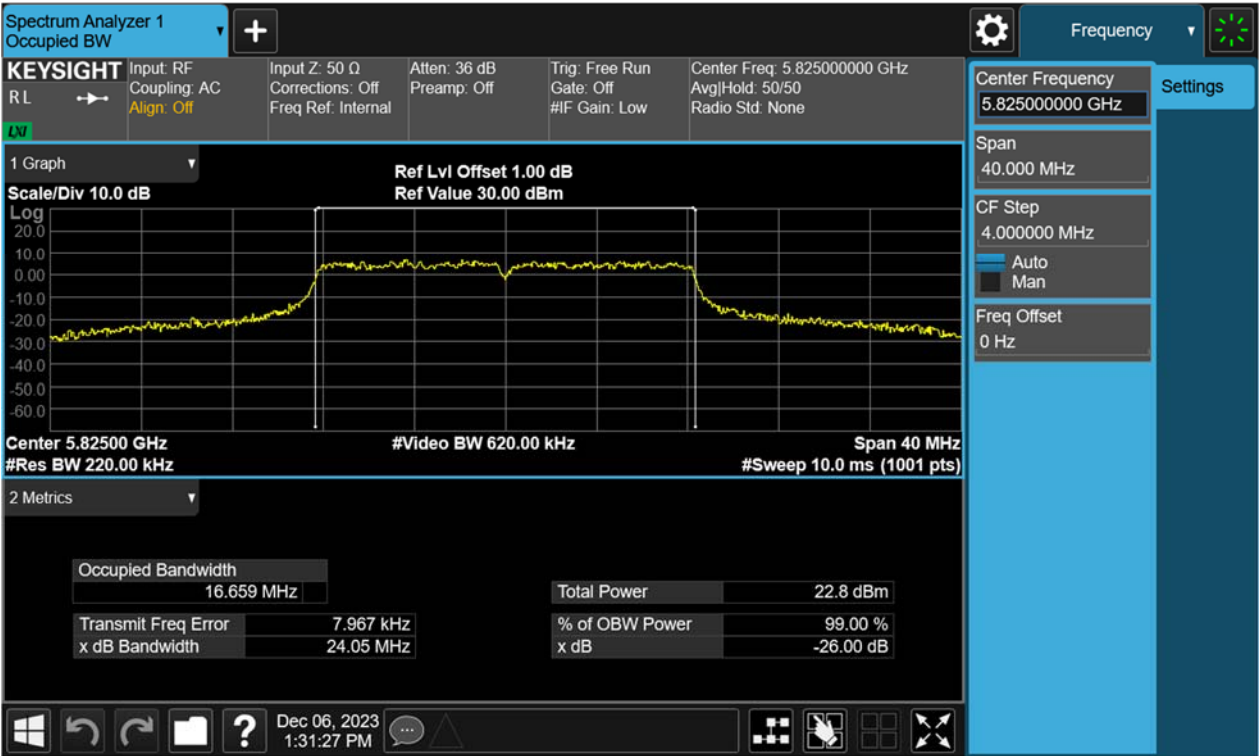
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Figure 3: 802.11a, 5825MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



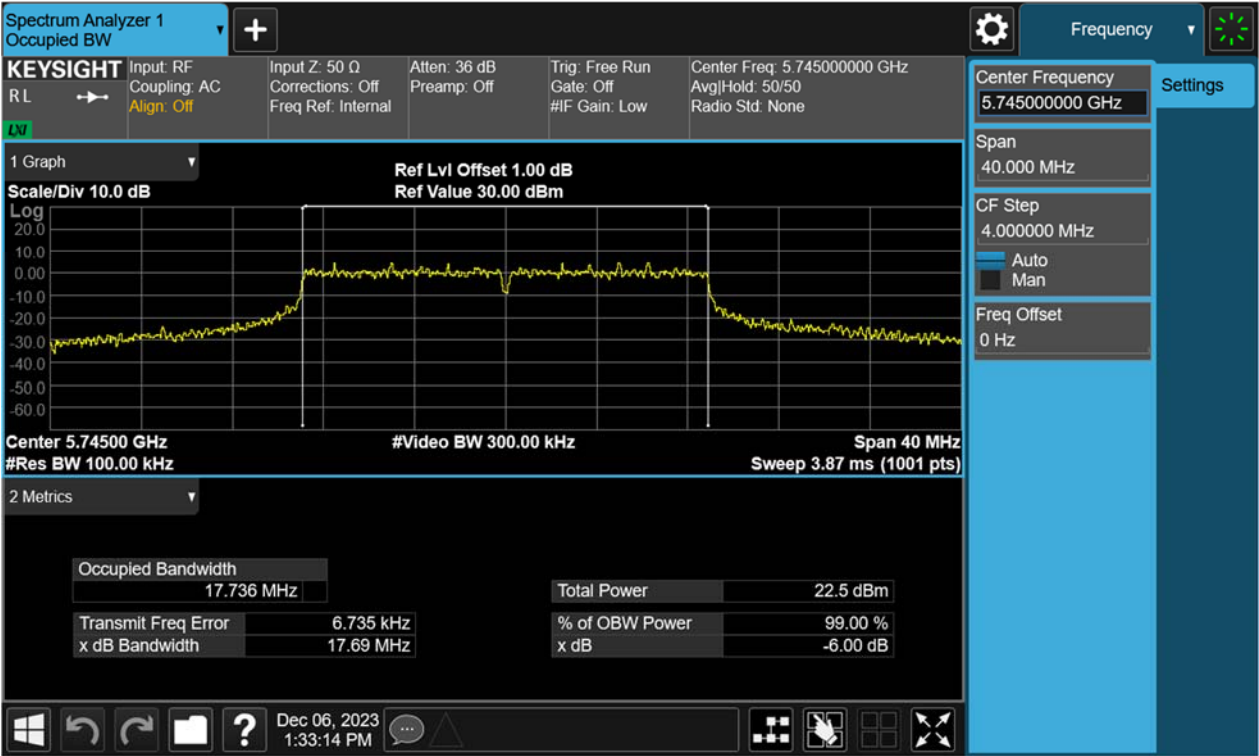
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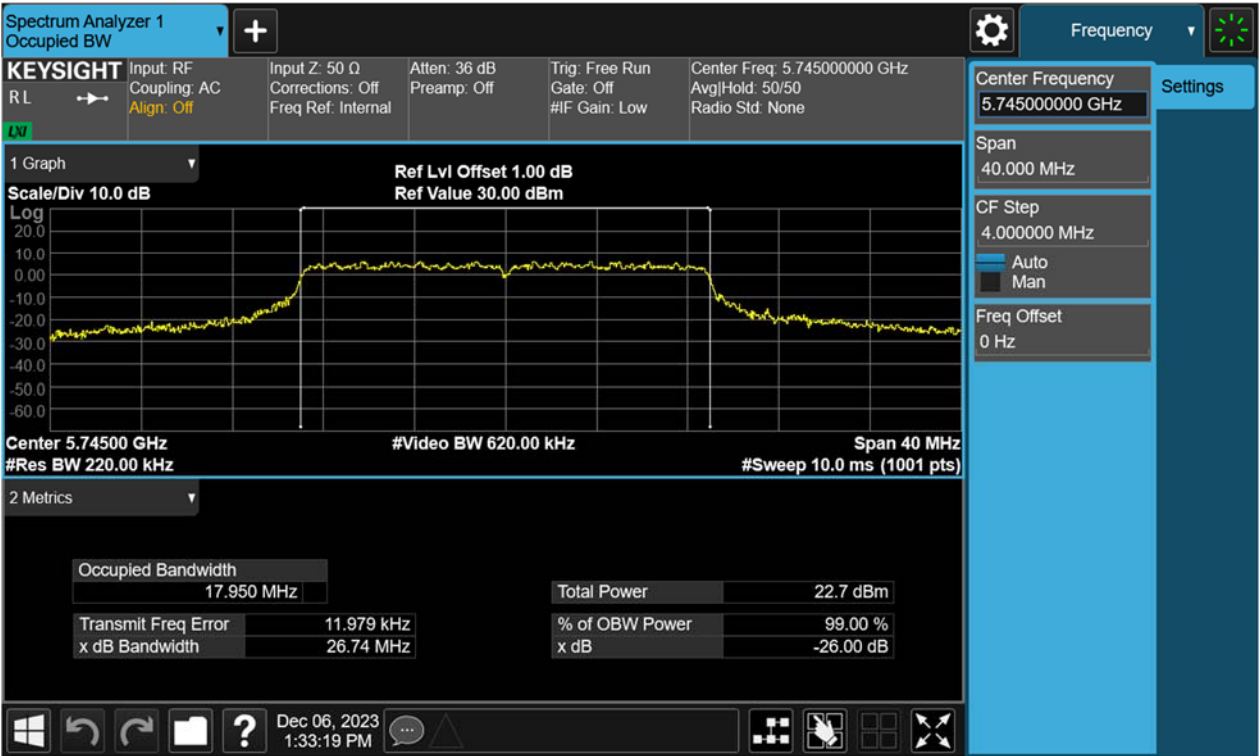
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Figure 4: 802.11n(HT20), 5745MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



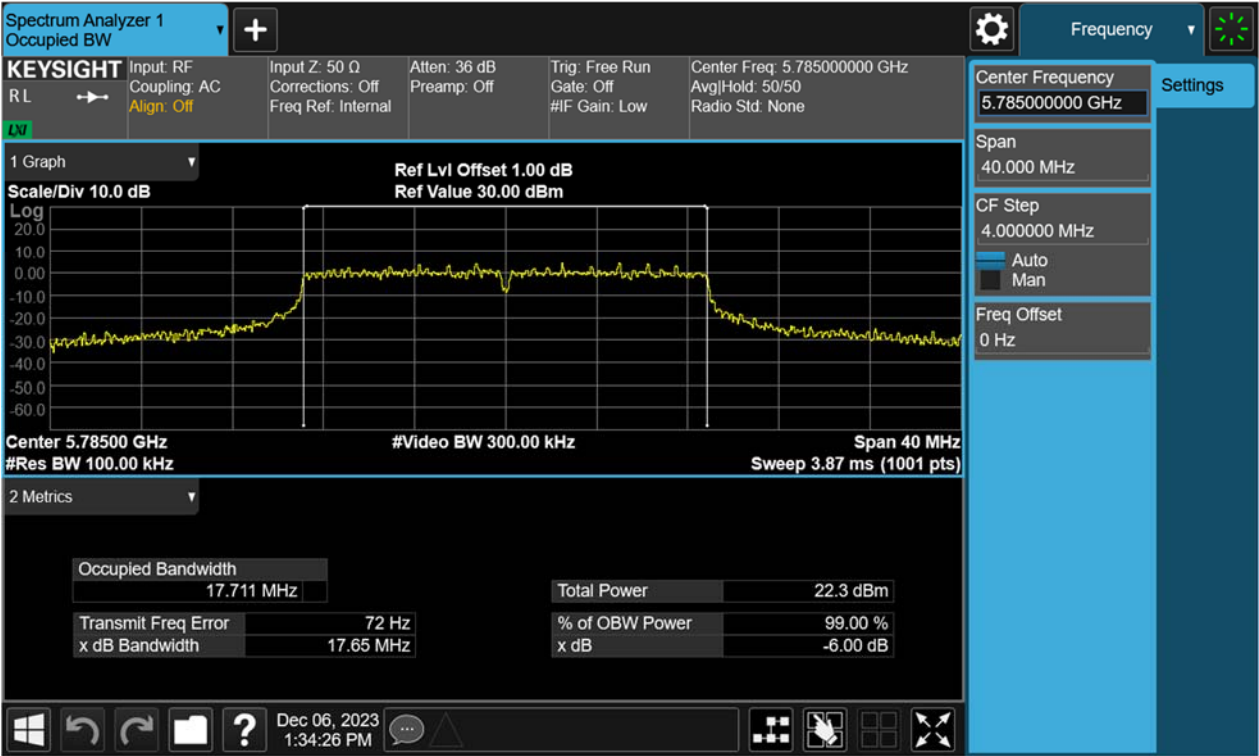
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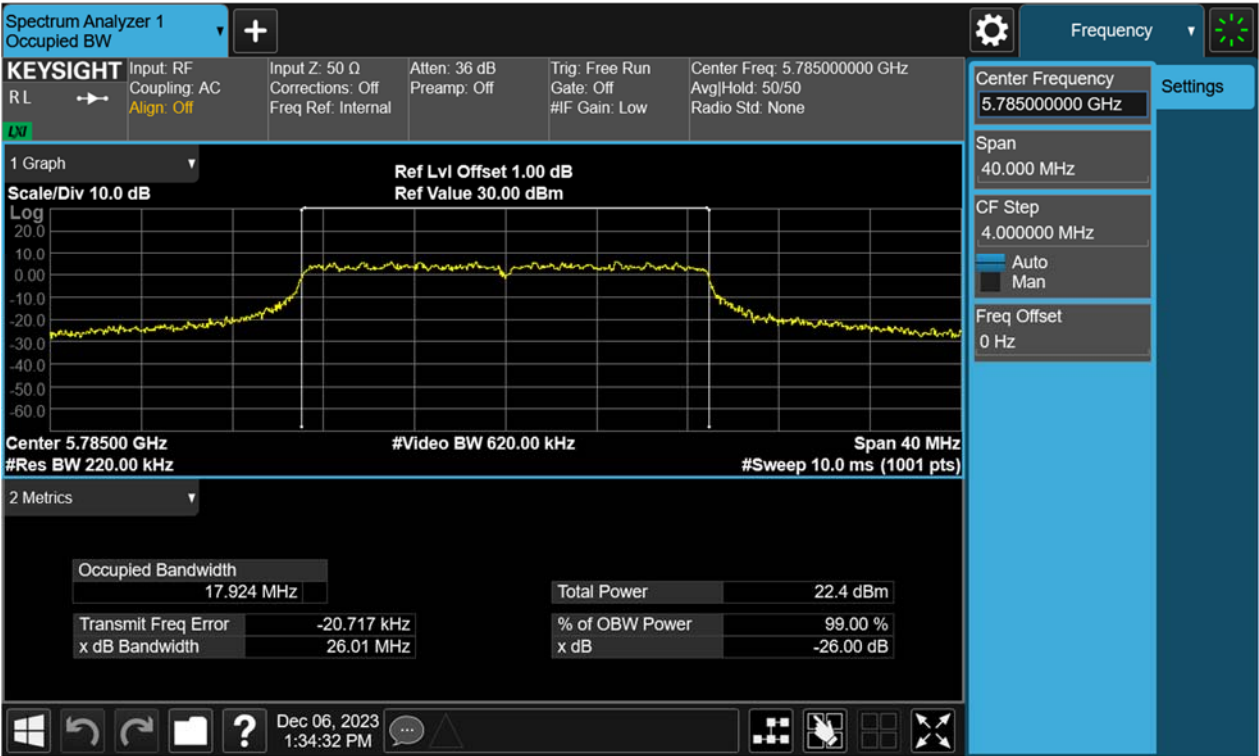
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Figure 5: The plots of 6dB Bandwidth, 802.11n(HT20), 5785MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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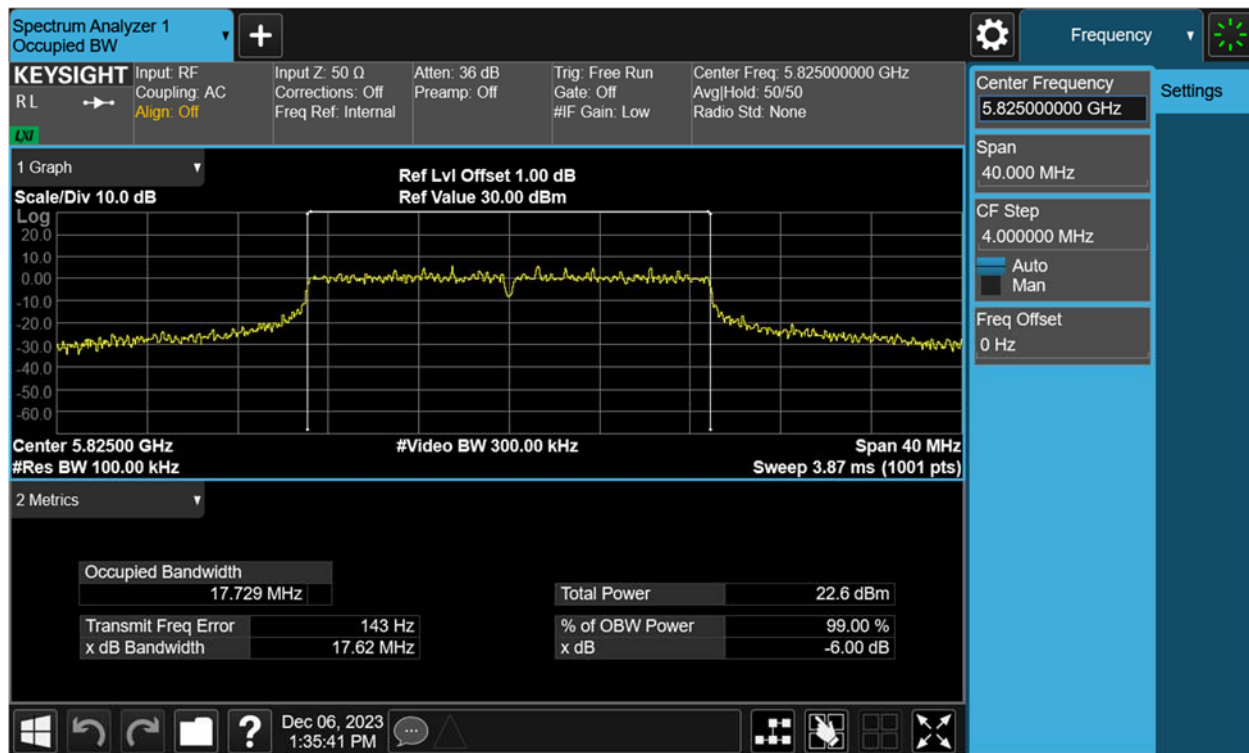
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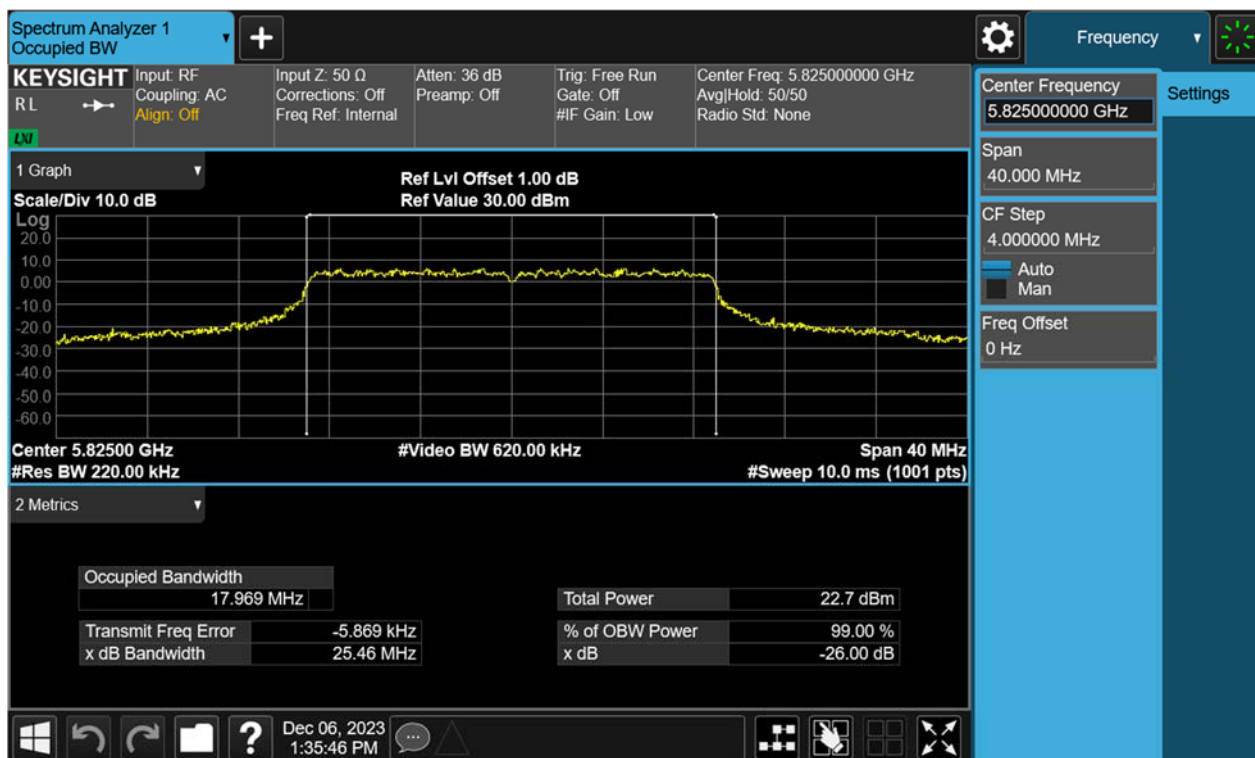
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Figure 6: The plots of 6dB Bandwidth, 802.11n(HT20), 5825MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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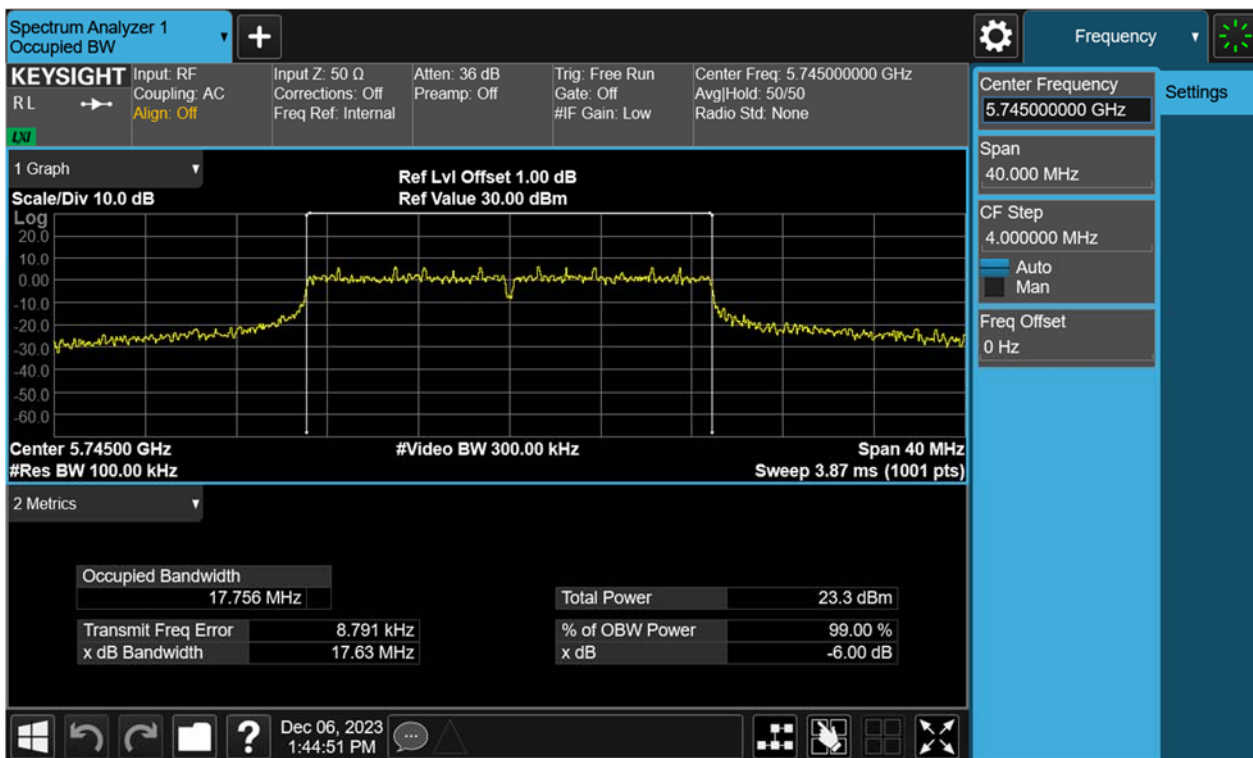
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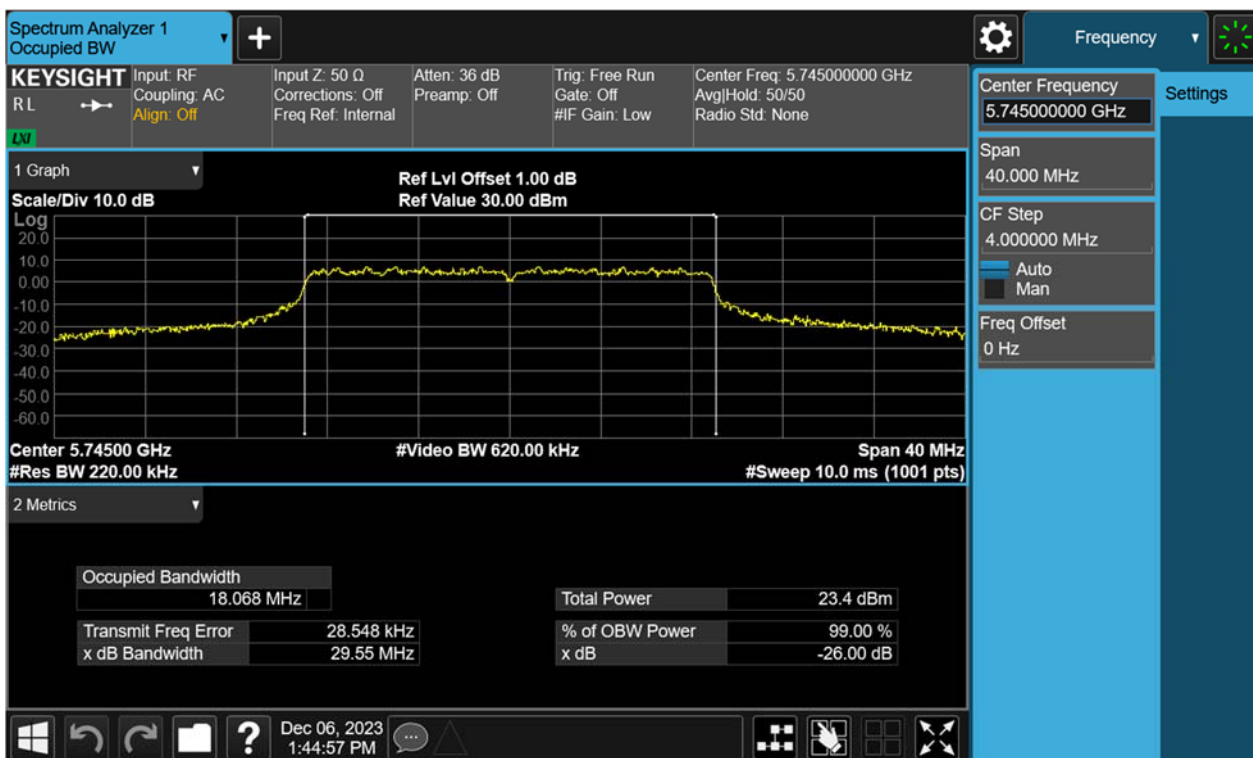
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Figure 7: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5745MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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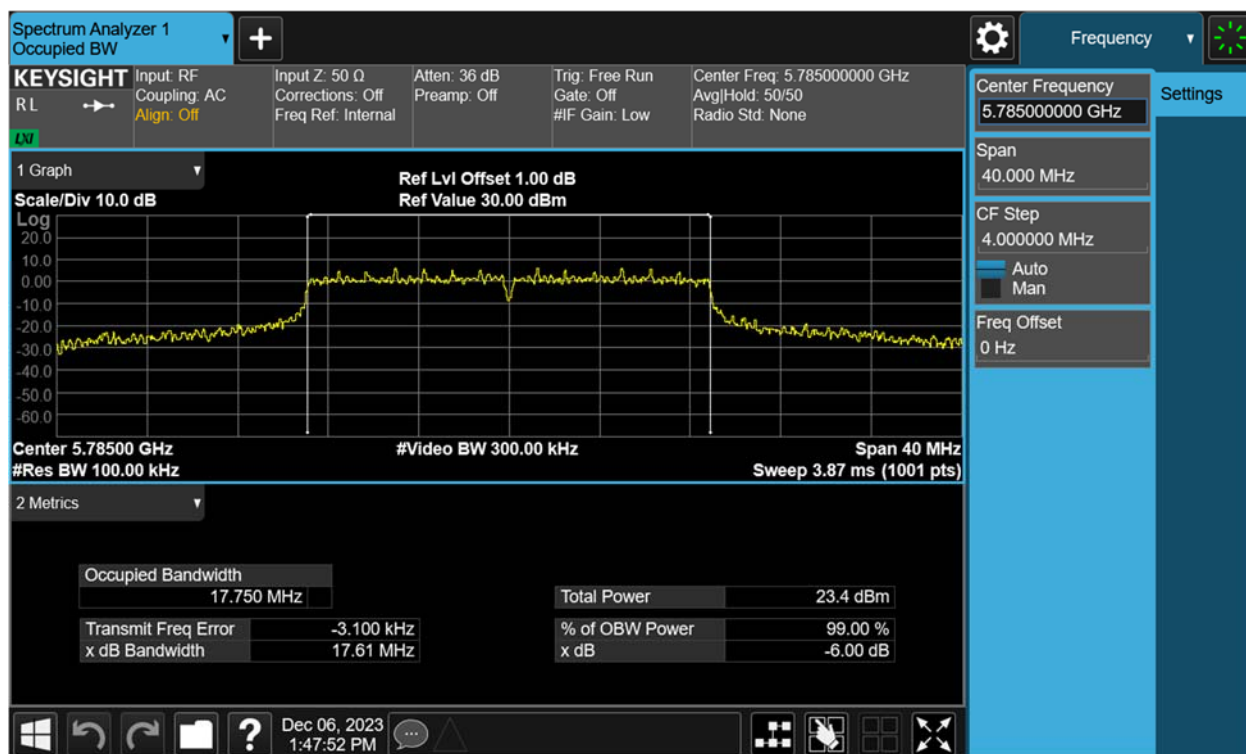
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Figure 8: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5785MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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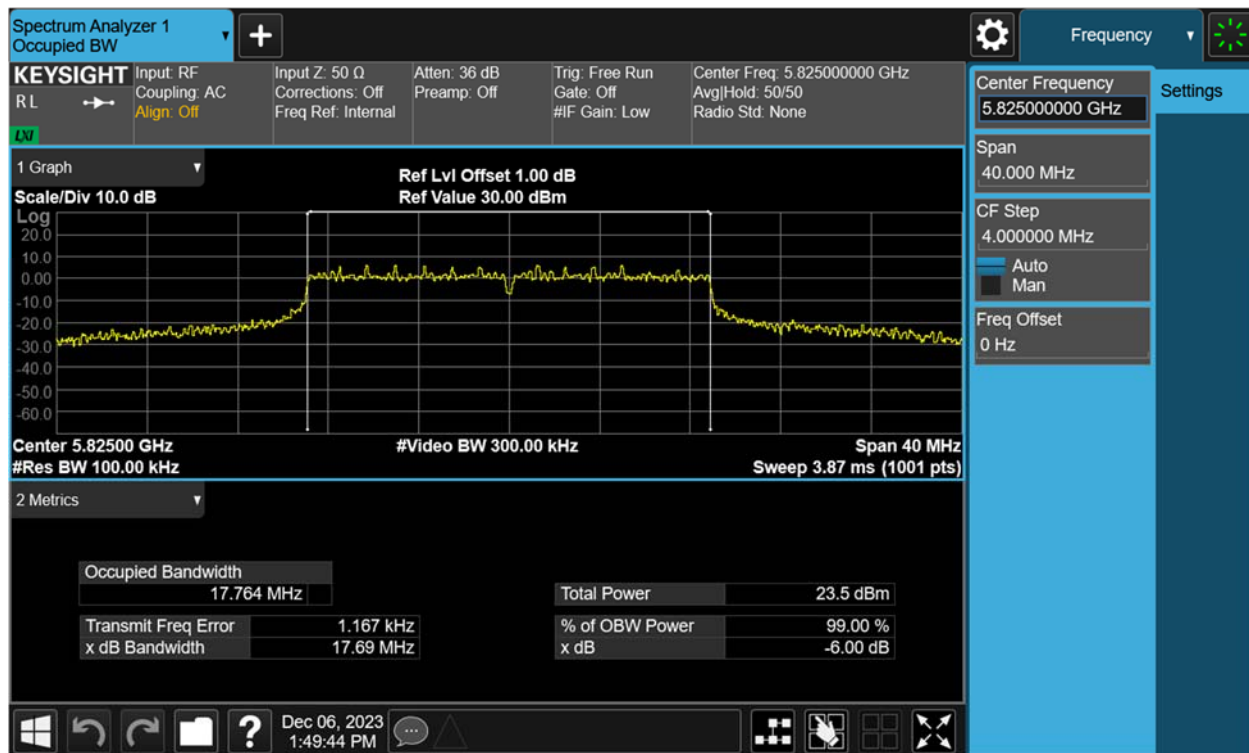
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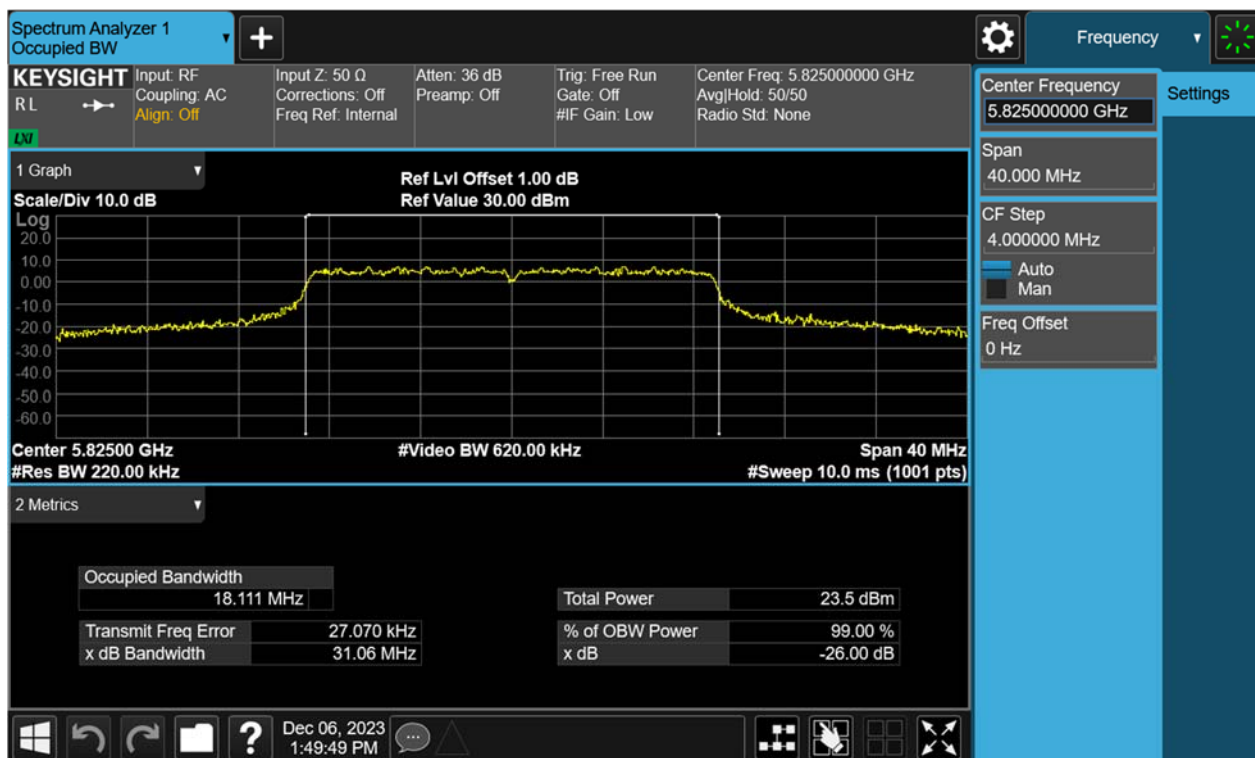
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Figure 9: The plots of 6dB Bandwidth, 802.11ac(VHT20), 5825MHz

Test Plot of -6dB Bandwidth

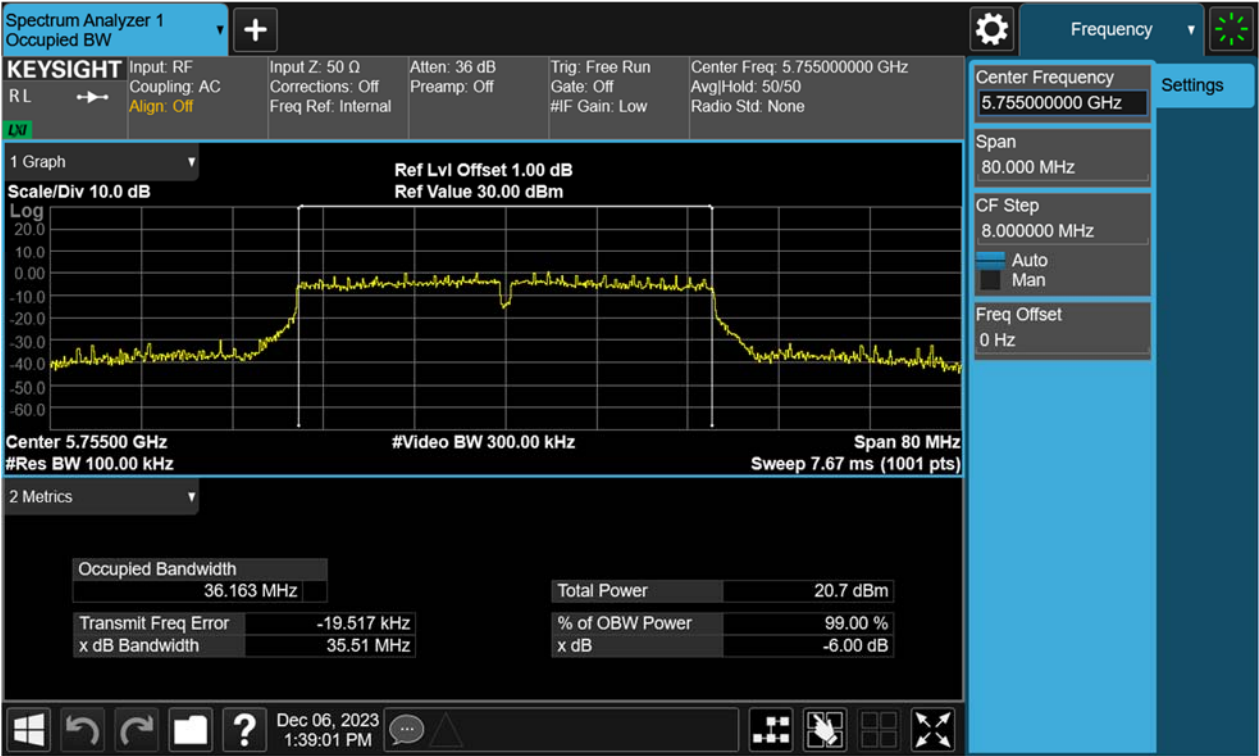


Test Plot of 99% Occupied Bandwidth

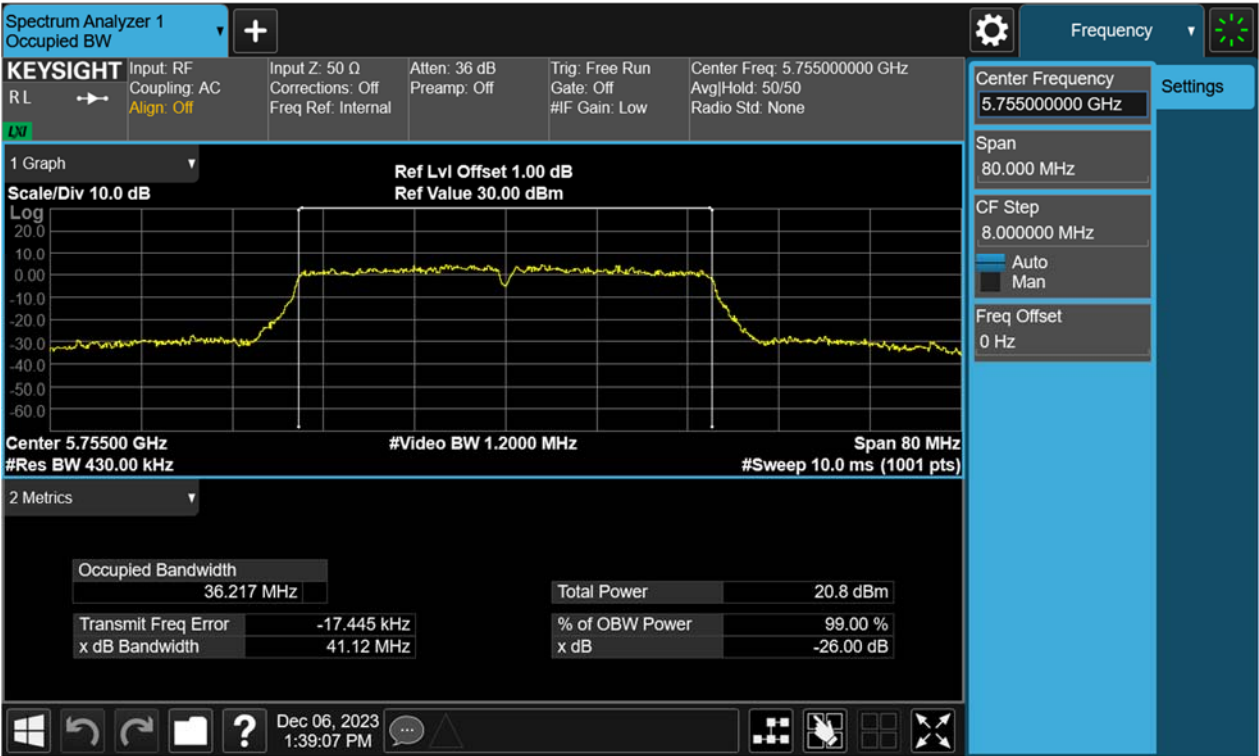


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Figure 10: The plots of 6dB Bandwidth, 802.11n(HT40), 5755MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



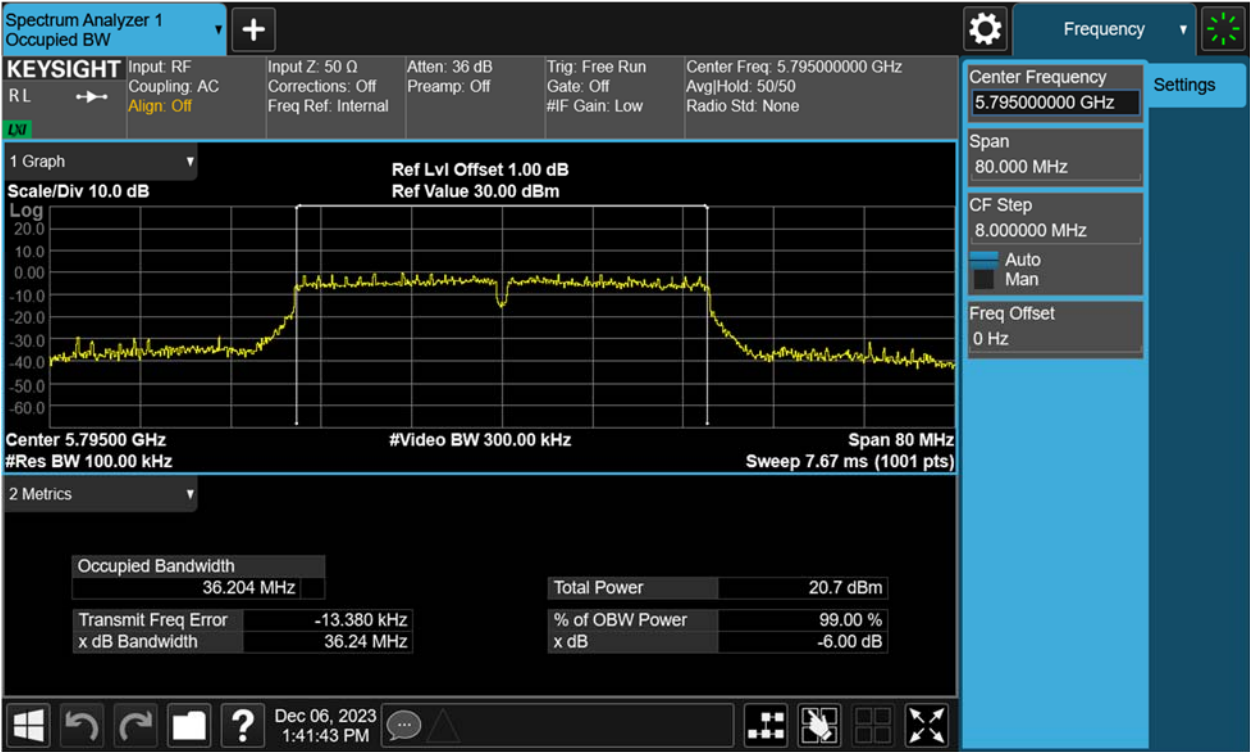
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Figure 11: The plots of 6dB Bandwidth, 802.11n(HT40), 5795MHz
Test Plot of -6dB Bandwidth

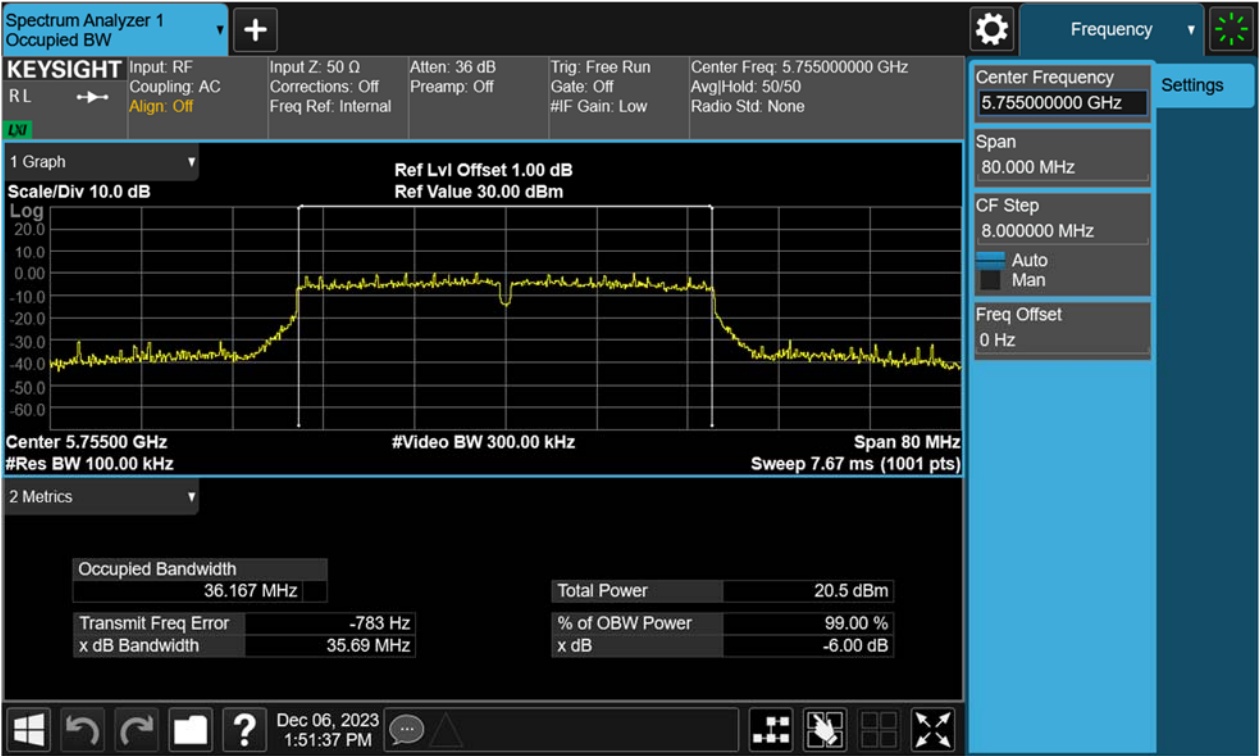


Test Plot of 99% Occupied Bandwidth

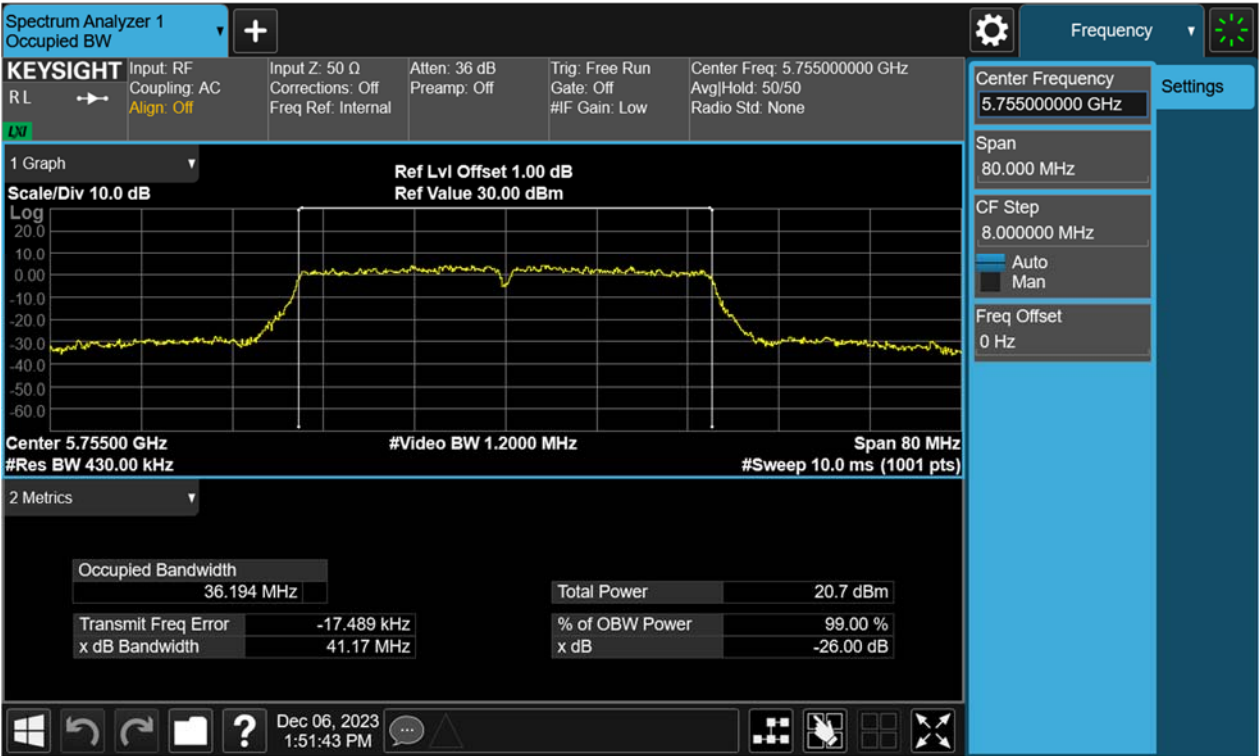


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Figure 12: The plots of 6dB Bandwidth, 802.11ac(VHT40), 5755MHz
Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



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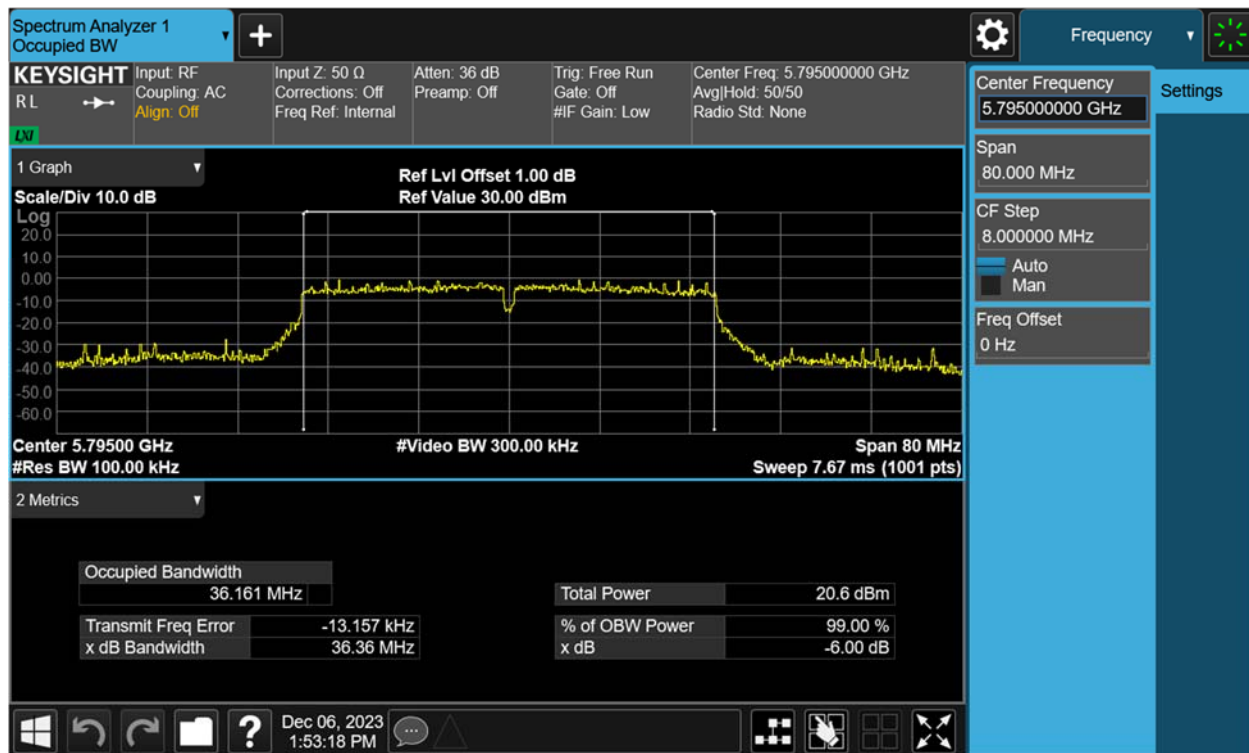
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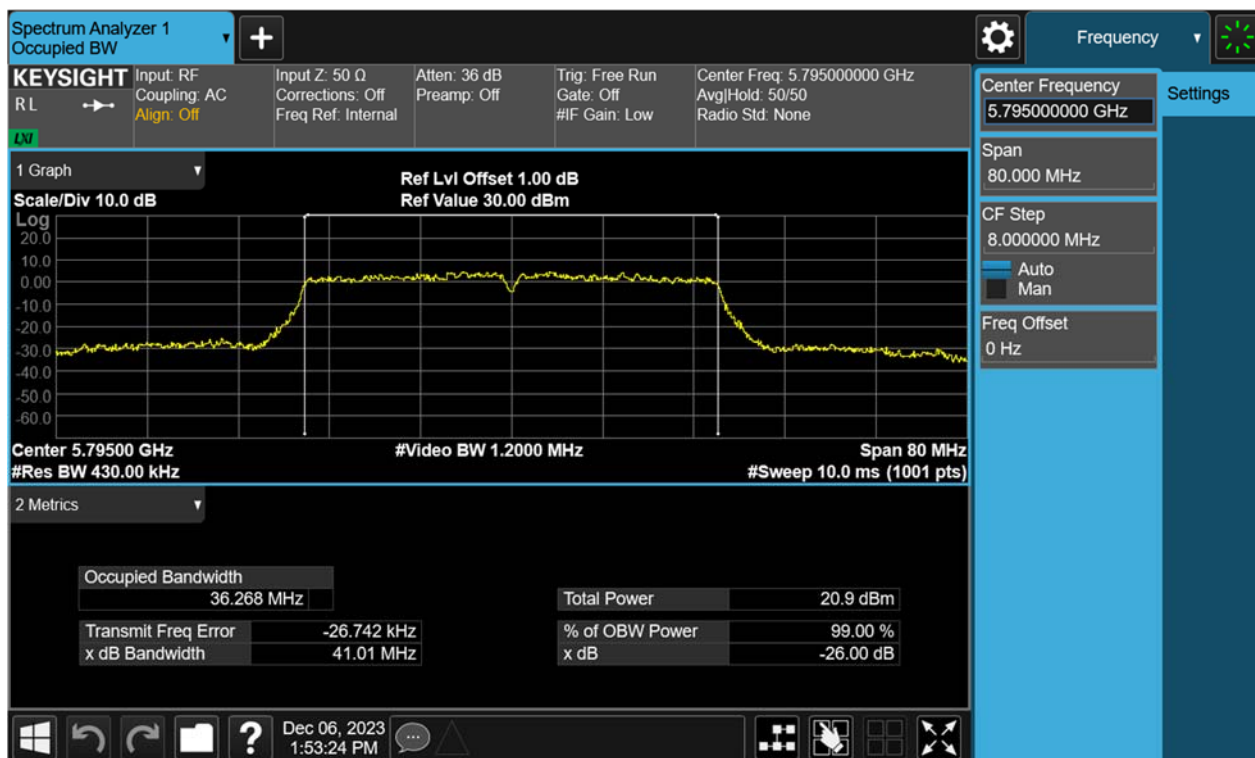
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Figure 13: The plots of 6dB Bandwidth, 802.11ac(VHT40), 5795MHz

Test Plot of -6dB Bandwidth



Test Plot of 99% Occupied Bandwidth



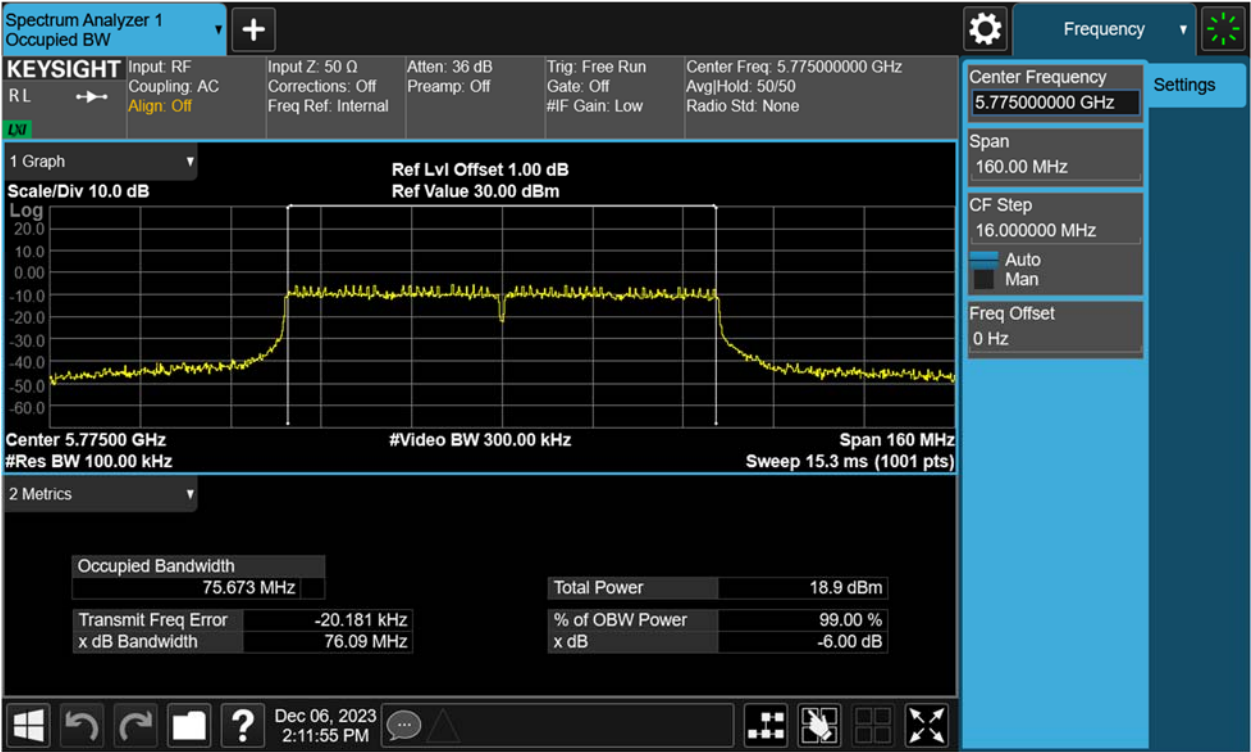
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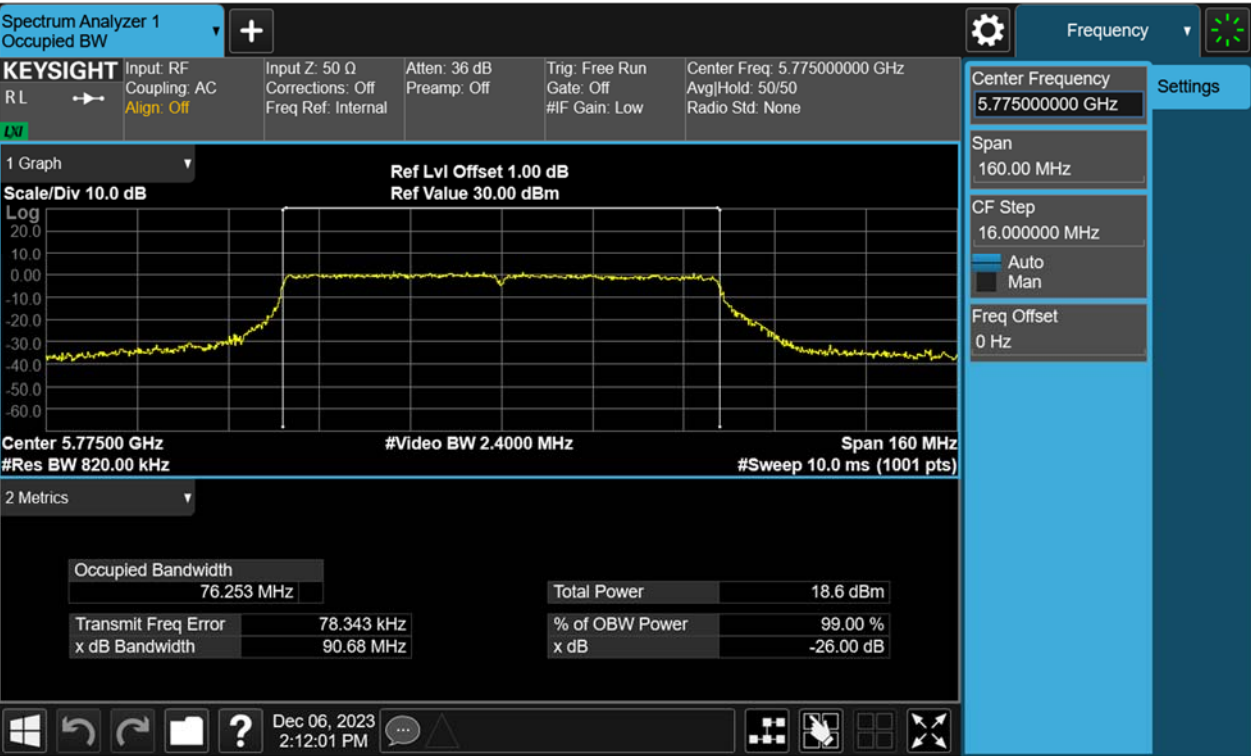
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Figure 14: The plots of 6dB Bandwidth, 802.11ac(VHT80), 5775MHz
Test Plot of -6dB Bandwidth



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 : 23.8°C
Relative humidity : 46%

Notes:

Test plots please refer to the annex document "SHE23060106-02FE DATA WIFI5GHz- Maximum Conducted Output Power Spectral Density EXHIBIT A"

Table 9: 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	93.56	5180	4.81	17
		5220	4.15	
		5240	2.80	
802.11n(HT20)	90.84	5180	4.44	
		5220	4.03	
		5240	3.39	
802.11ac(VHT20)	87.65	5180	4.79	
		5220	4.52	
		5240	3.20	
802.11n(HT40)	84.33	5190	1.03	
		5230	0.92	
802.11ac(VHT40)	80.72	5190	1.64	
		5230	1.43	
802.11ac(VHT80)	75.68	5210	-2.01	

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.
2. 17dBm/MHz for master device.

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Table 10: Maximum Conducted Output Power Spectral Density for Band II (5250MHz~5350MHz)

Test Mode	Duty Cycle	Test Channel (MHz)	Maximum PSD (dBm/MHz)	Applicable Limit (dBm/MHz)
802.11a	87.72	5260	3.22	11
		5300	3.25	
		5320	3.97	
802.11n(HT20)	90.84	5260	2.14	
		5300	2.53	
		5320	2.94	
802.11ac(VHT20)	90.96	5260	2.46	
		5300	2.88	
		5320	3.48	
802.11n(HT40)	80.28	5270	-2.01	
		5310	-2.62	
802.11ac(VHT40)	80.72	5270	-3.66	
		5310	-2.44	
802.11ac(VHT80)	81.14	5290	-5.62	

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 11: Maximum Conducted Output Power Spectral Density for Band III (5470MHz~5725MHz)

Test Mode	Duty Cycle	Test Channel (MHz)	Maximum PSD (dBm/MHz)	Applicable Limit (dBm/MHz)
802.11a	95.27	5500	1.40	11
		5580	1.92	
		5700	0.57	
802.11n(HT20)	86.71	5500	2.24	
		5580	2.52	
		5700	0.52	
802.11ac(VHT20)	90.69	5500	1.61	
		5580	1.30	
		5700	-1.03	
802.11n(HT40)	80.11	5510	-1.20	
		5590	-1.00	
		5670	-2.71	
802.11ac(VHT40)	80.56	5510	-2.14	
		5590	-1.56	
		5670	-3.15	
802.11ac(VHT80)	80.98	5530	-5.26	
		5610	-7.13	

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 12: 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	89.10	5745	8.38	30
		5785	9.60	
		5825	8.75	
802.11n(HT20)	90.84	5745	7.85	
		5785	7.49	
		5825	7.87	
802.11ac(VHT20)	90.96	5745	8.92	
		5785	8.66	
		5825	8.31	
802.11n(HT40)	93.66	5755	3.17	
		5795	4.03	
802.11ac(VHT40)	93.14	5755	3.19	
		5795	3.72	
802.11ac(VHT80)	75.68	5775	-2.08	

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	: 23.8°C
Relative humidity	: 46%

Notes:

Test plots please refer to the annex document "SHE23060106-02FE 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	: 23.5°C
Relative humidity	: 54%

Notes:

Test plots please refer to the annex document "SHE23060106-02FE 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, Margin= 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	: 23.5°C
Relative humidity	: 54%

Notes:

Test plots please refer to the annex document "SHE23060106-02FE 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, Margin= 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

: 23.8°C

Relative humidity

: 46%

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)			
20	3.4V	5179.998200	0.35	± 20
	3.9V	5179.997050	0.57	
	4.4V	5179.998925	0.21	

Temperature vs. Frequency Stability (5180MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.9V	-35	5180.001250	0.24	± 20
	-30	5179.998010	0.38	
	-20	5179.992916	1.37	
	-10	5180.001280	0.25	
	0	5180.002513	0.49	
	10	5180.004091	0.79	
	20	5179.987076	2.49	
	30	5179.993272	1.30	
	40	5179.984025	3.08	
	50	5179.993541	1.25	
	60	5179.998312	0.33	
	70	5179.995069	0.95	
	75	5179.993510	1.25	

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Band II (5250MHz – 5350MHz):
Voltage vs. Frequency Stability (5260MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Temp (°C)	Voltage (V)			
20	3.4V	5259.996975	0.58	± 20
	3.9V	5259.997225	0.53	
	4.4V	5259.997825	0.41	

Temperature vs. Frequency Stability (5260MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.9V	-35	5259.993982	1.14	± 20
	-30	5259.998017	0.38	
	-20	5259.999025	0.19	
	-10	5259.998154	0.35	
	0	5259.996076	0.75	
	10	5259.991783	1.56	
	20	5259.996975	0.58	
	30	5259.989586	1.98	
	40	5259.991734	1.57	
	50	5259.996975	0.58	
	60	5259.987336	2.41	
	70	5259.989621	1.97	
	75	5259.987858	2.31	

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Band III (5470MHz – 5725MHz):
Voltage vs. Frequency Stability (5500MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Temp (°C)	Voltage (V)			
20	3.4V	5499.996025	0.72	± 20
	3.9V	5499.995525	0.81	
	4.4V	5499.996050	0.72	

Temperature vs. Frequency Stability (5500MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.9V	-35	5499.996072	0.71	± 20
	-30	5499.996095	0.71	
	-20	5499.995090	0.89	
	-10	5499.996121	0.71	
	0	5499.997152	0.52	
	10	5499.995034	0.90	
	20	5499.998017	0.36	
	30	5499.996036	0.72	
	40	5499.995072	0.90	
	50	5499.995086	0.89	
	60	5499.995980	0.73	
	70	5499.998014	0.36	
	75	5499.995973	0.73	

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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)			
20	3.4V	5744.999300	0.12	± 20
	3.9V	5744.999800	0.03	
	4.4V	5744.998775	0.21	

Temperature vs. Frequency Stability (5745MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.9V	-35	5745.002025	0.35	± 20
	-30	5745.001825	0.32	
	-20	5745.001750	0.30	
	-10	5745.001900	0.33	
	0	5745.002075	0.36	
	10	5745.002025	0.35	
	20	5745.002250	0.39	
	30	5745.002125	0.37	
	40	5745.001575	0.27	
	50	5745.003475	0.60	
	60	5745.003450	0.60	
	70	5745.004125	0.72	
	75	5745.003775	0.66	

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	: 26°C
Relative humidity	: 49%

For details refer to following test plot.

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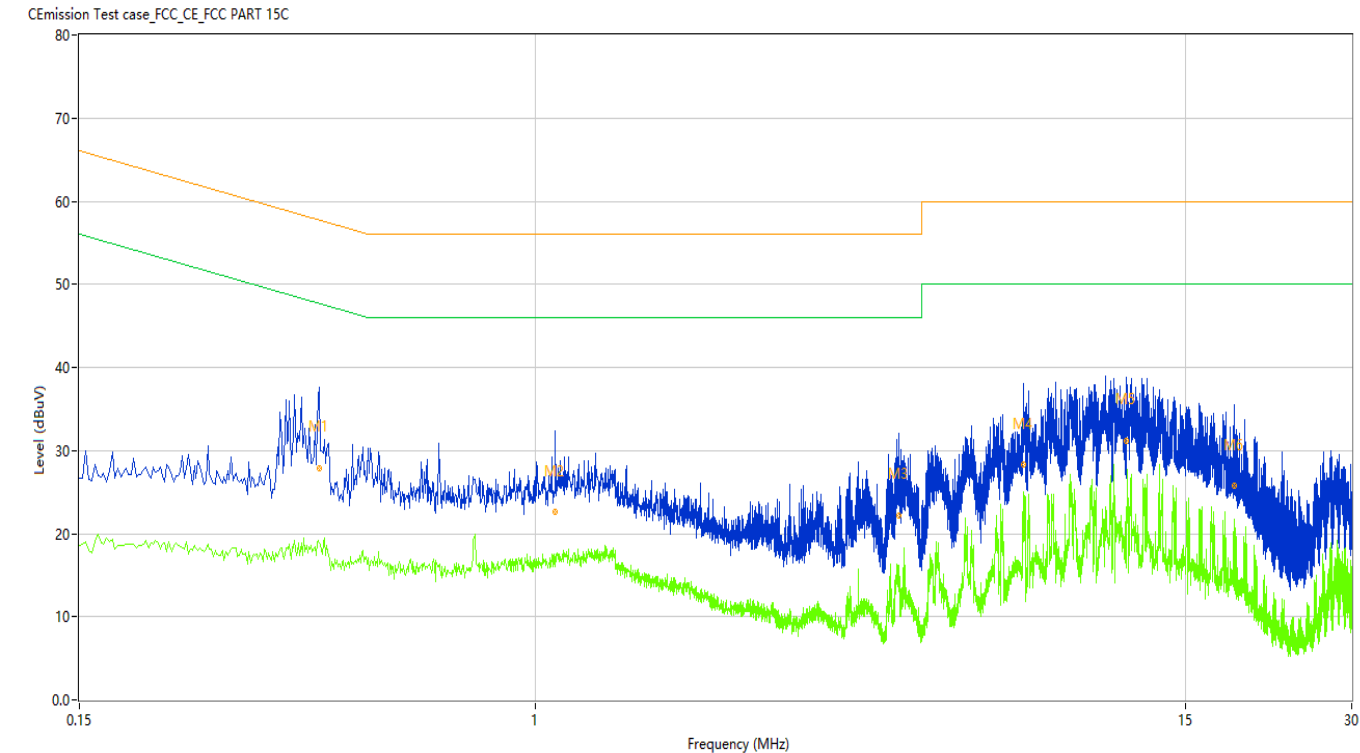
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Note: The all configurations were tested respectively, but only the worst configuration shown here.

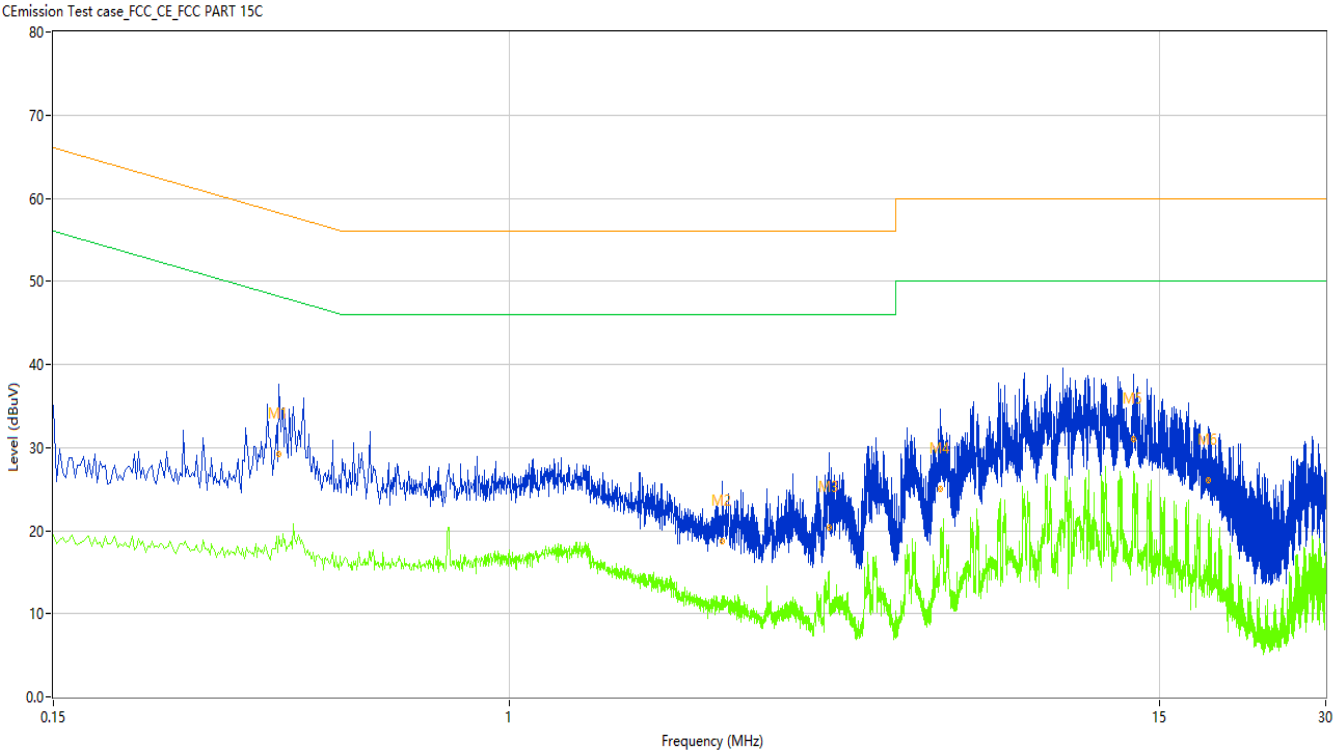
Figure 15: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.408	40.62	9.97	57.69	17.07	Peak	L	Pass
1*	0.408	27.80	9.97	57.69	29.89	QP	L	Pass
1**	0.408	18.88	9.97	47.69	28.81	AV	L	Pass
2	1.088	33.13	9.83	56.00	22.87	Peak	L	Pass
2*	1.088	22.57	9.83	56.00	33.43	QP	L	Pass
2**	1.088	17.30	9.83	46.00	28.70	AV	L	Pass
3	4.546	33.40	9.82	56.00	22.60	Peak	L	Pass
3*	4.546	22.22	9.82	56.00	33.78	QP	L	Pass
3**	4.546	15.97	9.82	46.00	30.03	AV	L	Pass
4	7.638	37.43	9.76	60.00	22.57	Peak	L	Pass
4*	7.638	28.27	9.76	60.00	31.73	QP	L	Pass
4**	7.638	25.02	9.76	50.00	24.98	AV	L	Pass
5	11.740	39.56	9.64	60.00	20.44	Peak	L	Pass
5*	11.740	31.15	9.64	60.00	28.85	QP	L	Pass
5**	11.740	16.92	9.64	50.00	33.08	AV	L	Pass
6	18.396	33.78	9.41	60.00	26.22	Peak	L	Pass
6*	18.396	25.71	9.41	60.00	34.29	QP	L	Pass
6**	18.396	18.60	9.41	50.00	31.40	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	0.384	40.69	10.06	58.19	17.50	Peak	N	Pass
1*	0.384	29.21	10.06	58.19	28.98	QP	N	Pass
1**	0.384	19.37	10.06	48.19	28.82	AV	N	Pass
2	2.436	28.02	9.93	56.00	27.98	Peak	N	Pass
2*	2.436	18.70	9.93	56.00	37.30	QP	N	Pass
2**	2.436	12.15	9.93	46.00	33.85	AV	N	Pass
3	3.800	31.39	9.89	56.00	24.61	Peak	N	Pass
3*	3.800	20.39	9.89	56.00	35.61	QP	N	Pass
3**	3.800	15.13	9.89	46.00	30.87	AV	N	Pass
4	6.022	35.01	9.79	60.00	24.99	Peak	N	Pass
4*	6.022	24.99	9.79	60.00	35.01	QP	N	Pass
4**	6.022	20.29	9.79	50.00	29.71	AV	N	Pass
5	13.474	38.20	9.65	60.00	21.80	Peak	N	Pass
5*	13.474	30.96	9.65	60.00	29.04	QP	N	Pass
5**	13.474	24.00	9.65	50.00	26.00	AV	N	Pass
6	18.404	33.59	9.49	60.00	26.41	Peak	N	Pass
6*	18.404	25.99	9.49	60.00	34.01	QP	N	Pass
6**	18.404	19.11	9.49	50.00	30.89	AV	N	Pass

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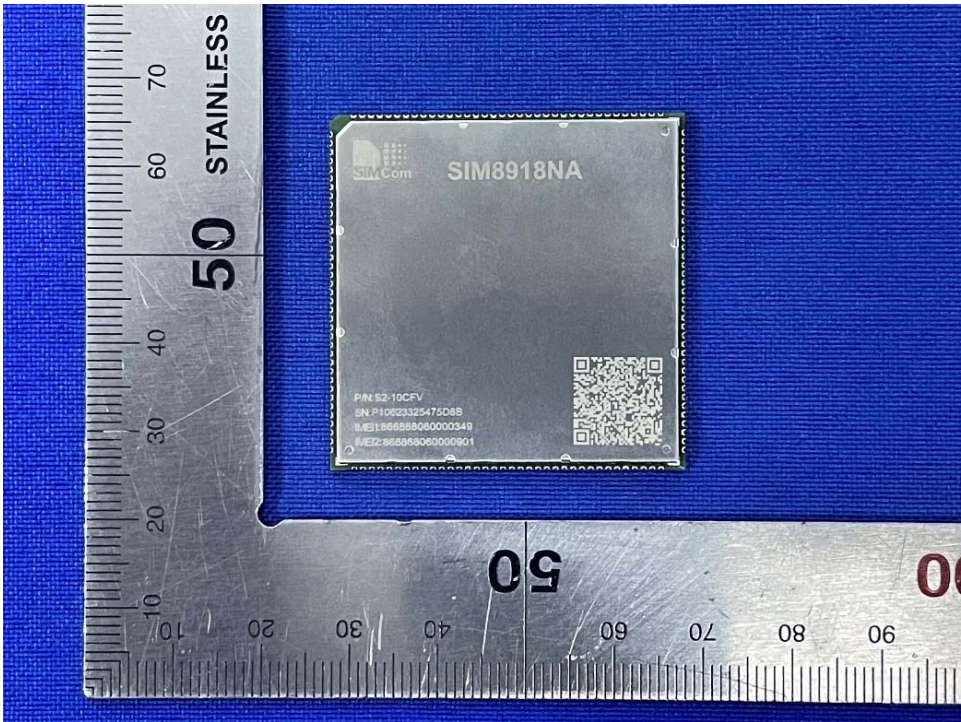
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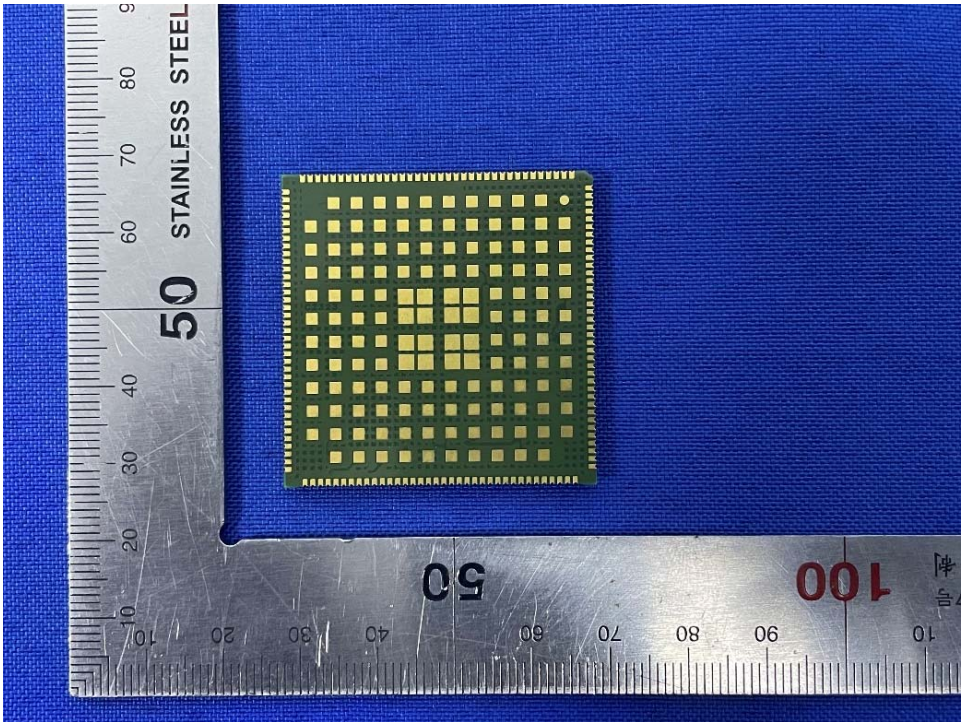
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5 Appendixes

5.1 Photographs of the Sample



Front of the sample



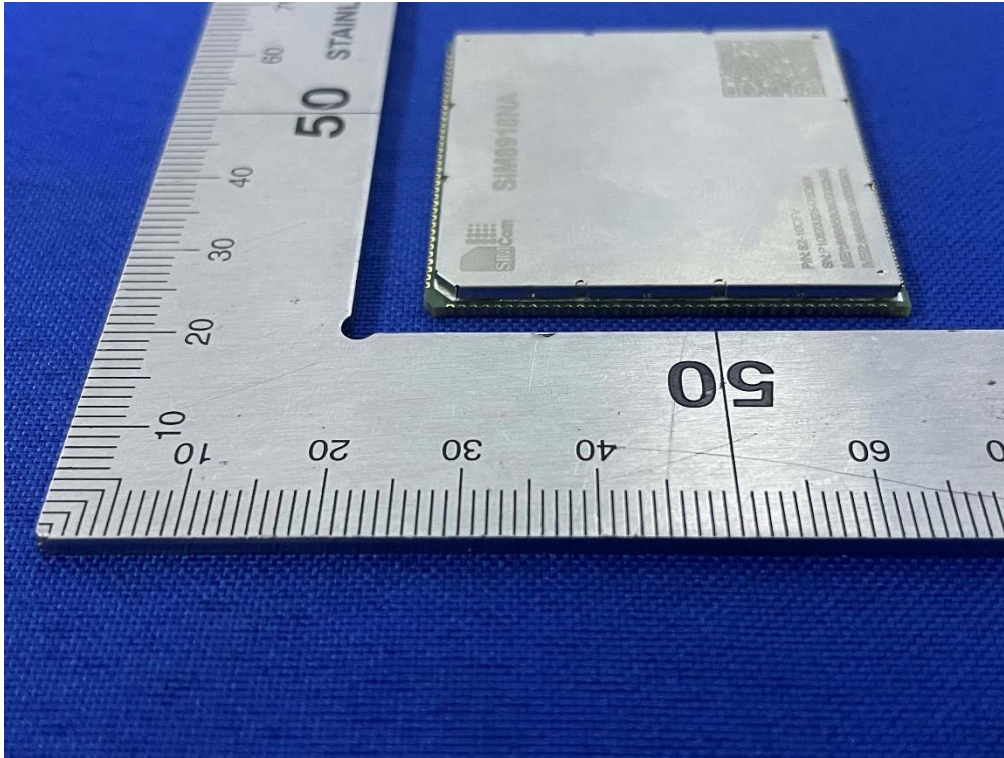
Rear of the sample

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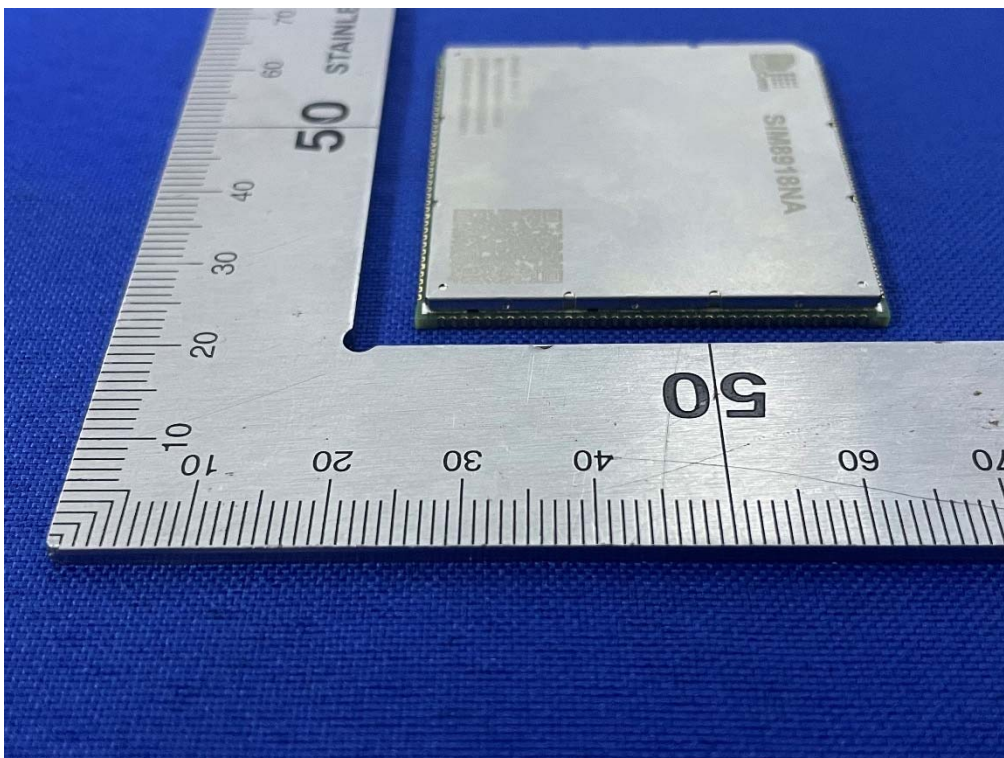
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Left of the sample



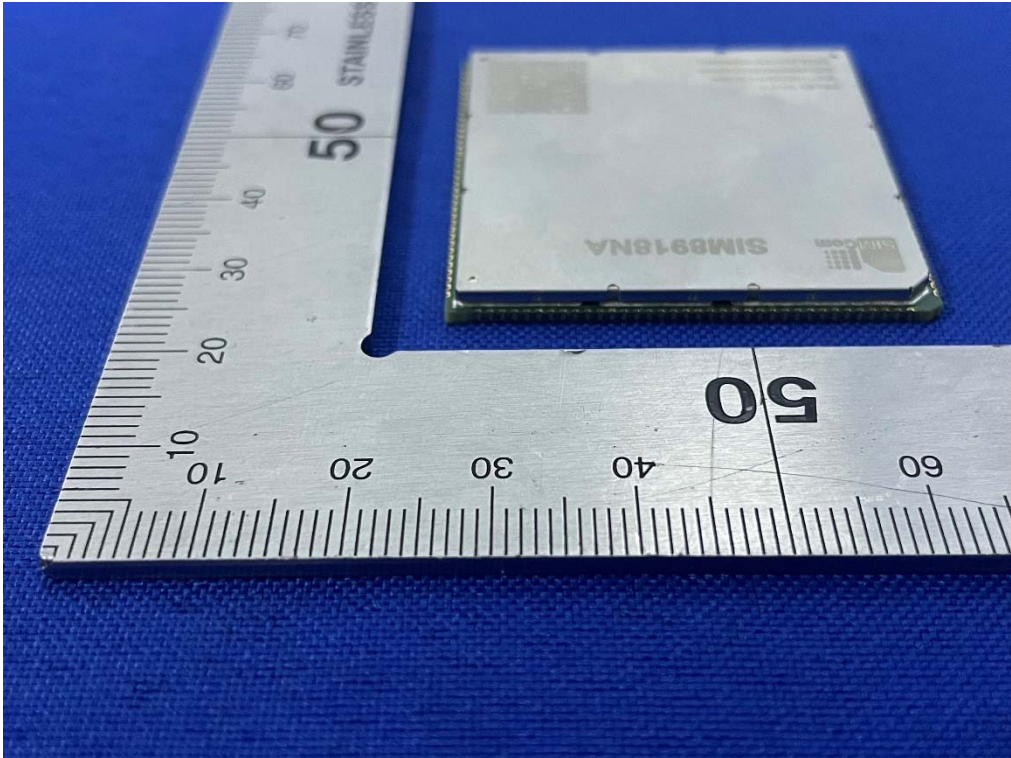
Right of the sample

TEST REPORT

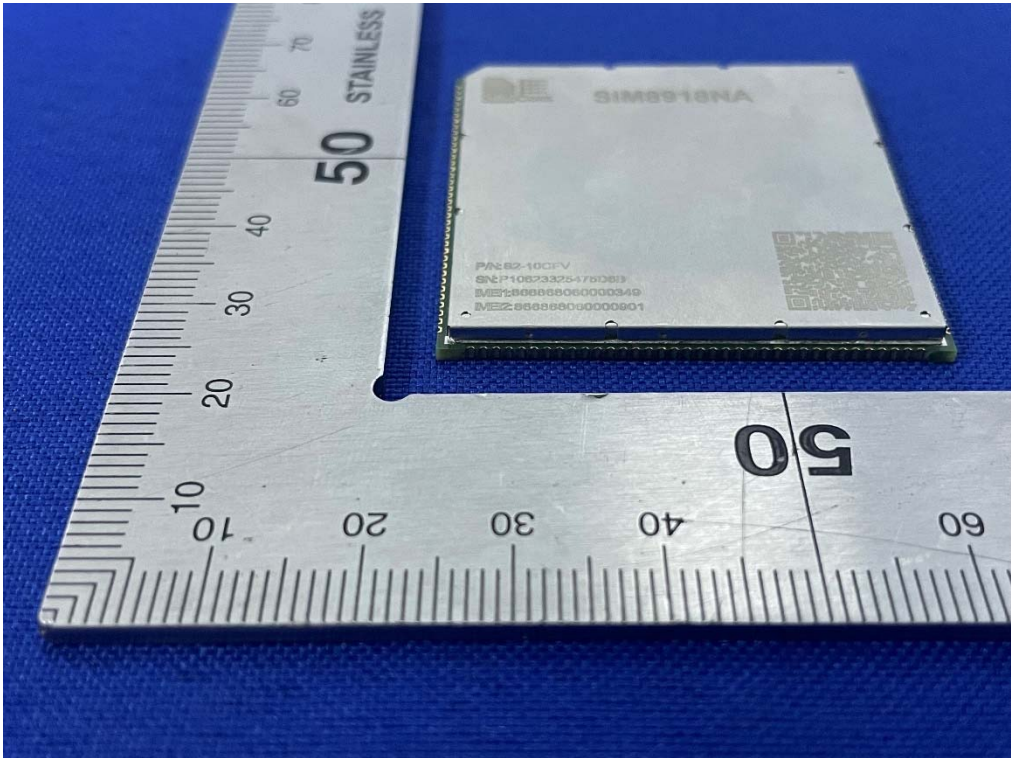
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Top of the sample



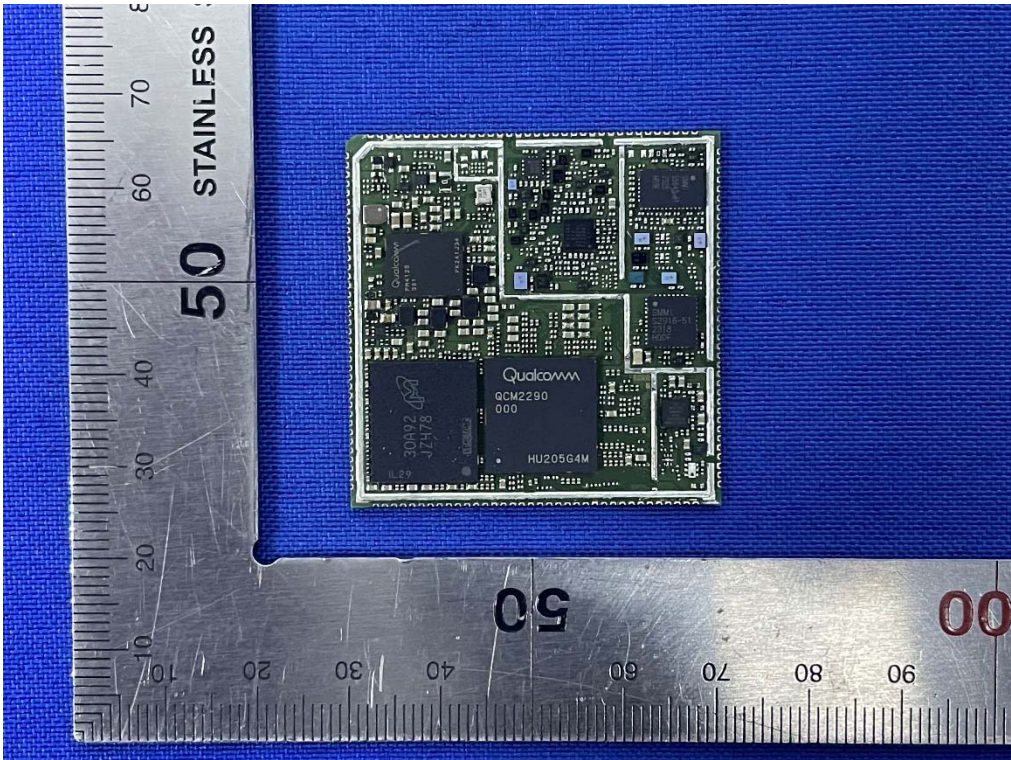
Bottom of the sample

TEST REPORT

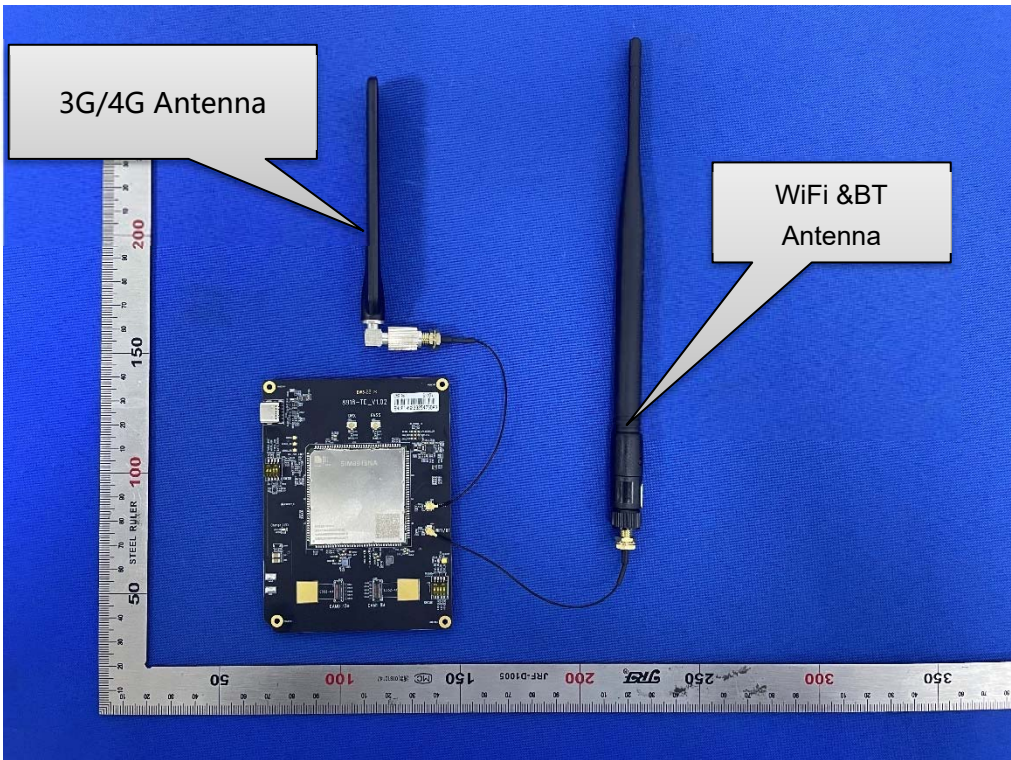
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Internal-1 of the sample



Antenna Photo

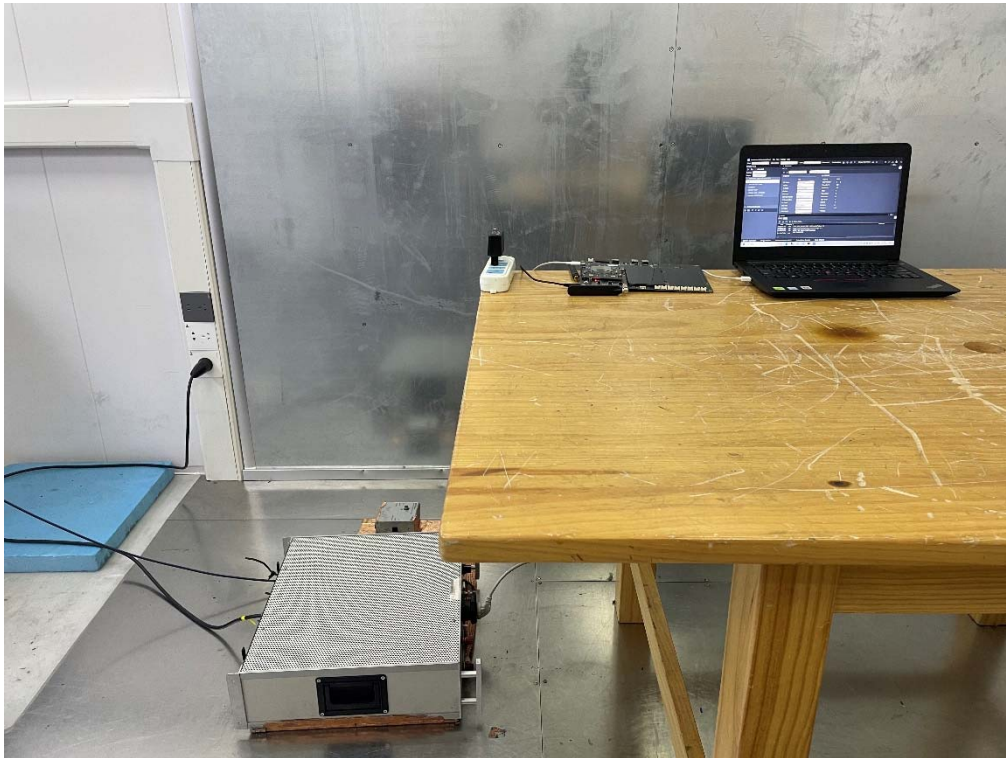
TEST REPORT

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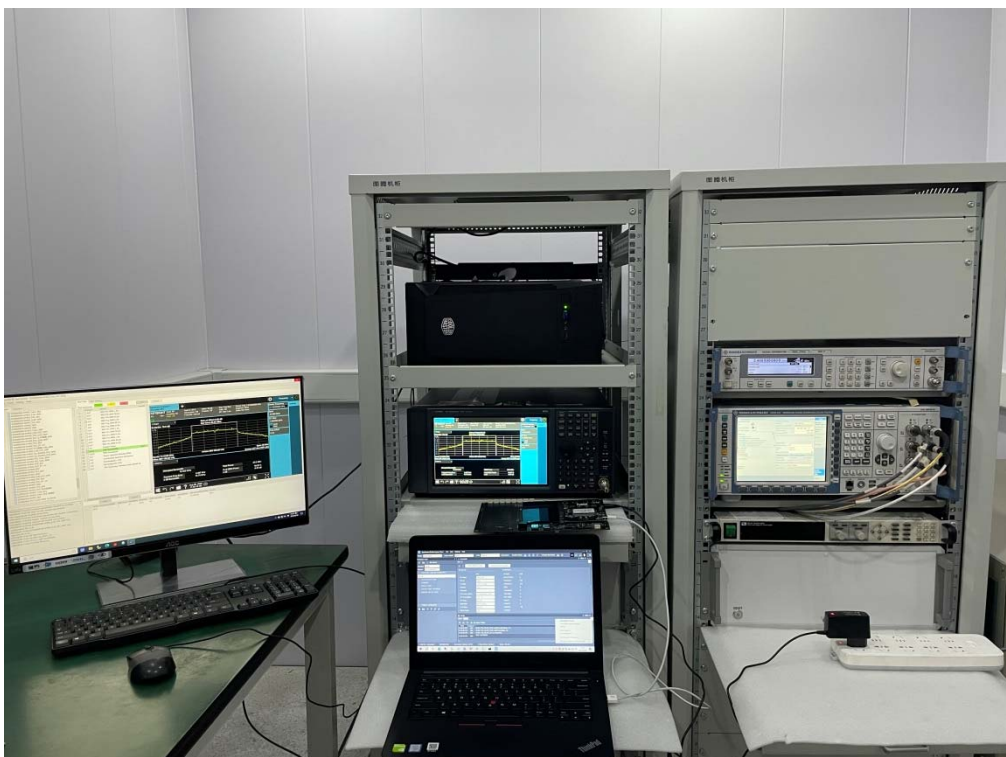
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5.2 Set-up for Conducted Emissions



5.3 Set-up for Conducted RF test at Antenna Port



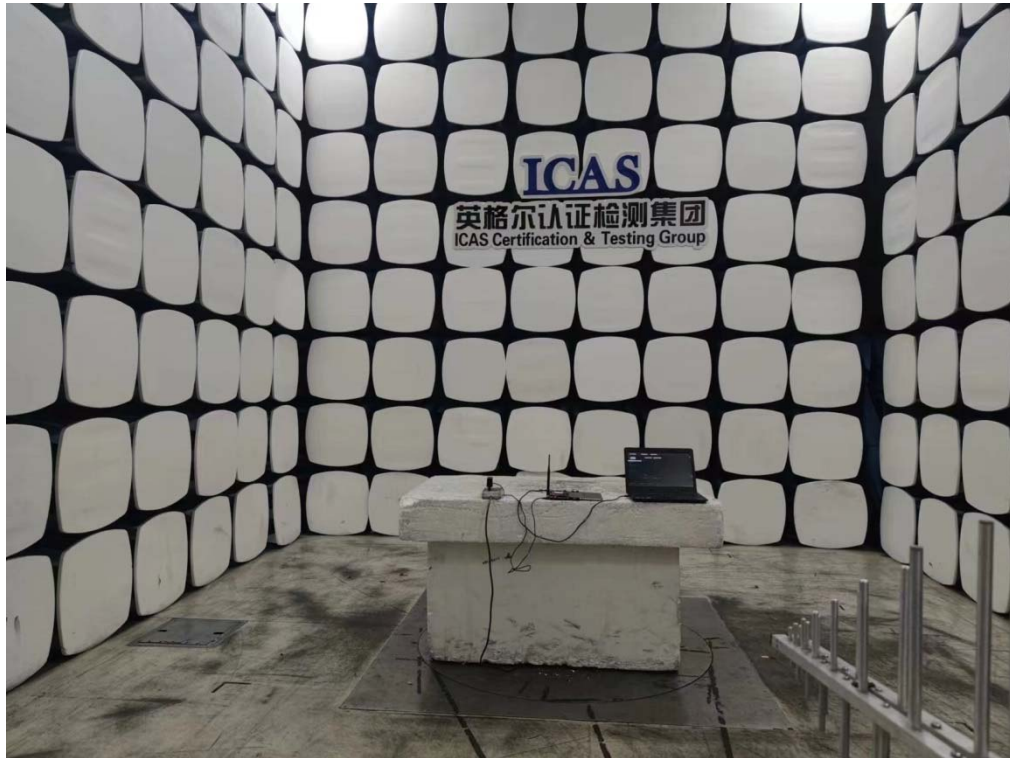
TEST REPORT

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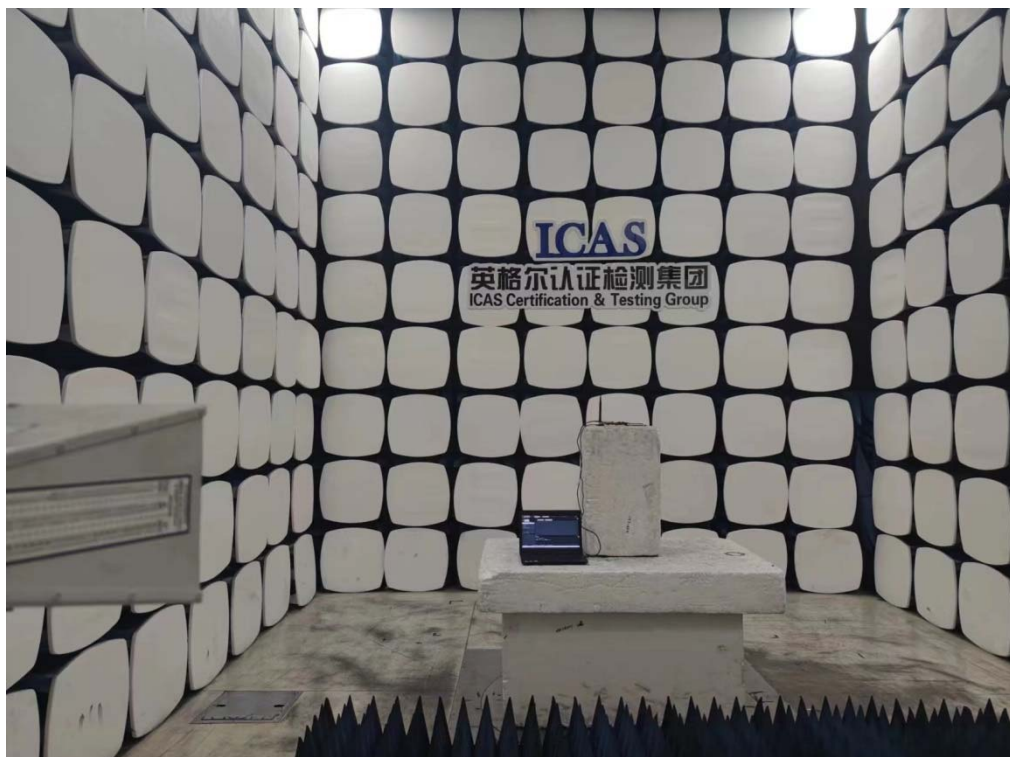
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5.4 Set-up for Spurious Emissions below 1GHz



5.5 Set-up for Spurious Emissions above 1GHz



End of the report