ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	Qisda Corporation NO. 157, SHAN-YING ROAD, SHAN-TING LI, GUEISHAN DIST., TAOYUAN 333, Taiwan
Manufacturer:	Qisda Corporation NO. 157 & 159, SHANYING RD., GUEISHAN DIST., TAOYUAN CITY 33341, TAIWAN, R.O.C.
Product Name:	Bluetooth/WLAN Antenna device
Brand Name:	QISDA
Model No.:	S4CWM-19-BB255-C-C2
Report Number:	TERF2410003020E2
FCC ID	VRSS4CWM19C2
IC:	8729A-S4CWM19C2
Date of EUT Received:	October 1, 2024
Date of Test:	October 18, 2024～November 27, 2024
Issue Date:	December 19, 2024

Approved By Aken Huang

Aken Huang

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.407, ISED RSS-247.

The results of this report relate only to the sample identified in this report.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2410003020E2	00	Original	December 19, 2024	Karen Huang	

Note:

1、 The remark "*" indicates modification of the report upon requests from certification body.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Bluetooth/WLAN Antenna device
Brand Name:	QISDA
Model No.:	S4CWM-19-BB255-C-C2
Hardware Version:	S16
Firmware Version:	FW_18_53
EUT Series No.:	000000851
Power Supply:	3.3Vdc
Test Software (Name/Version)	Putty v0.81

1.2 Modulation & Data Rate

Modulation type:	64QAM, 16QAM, QPSK, BPSK for OFDM in 802.11a,11n
	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM in 802.11ac
	1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA in 802.11ax
Transition Rate:	802.11 a: 6 - 54 Mbps
	802.11 n_HT20: up to 144.4 Mbps
	802.11 n_HT40: up to 300 Mbps
	802.11 ac_VHT20: up to 173.4 Mbps
	802.11 ac_VHT80: up to 866.6 Mbps
	802.11 ax_HE20: up to 286.8 Mbps
	802.11 ax_HE40: up to 573.6 Mbps
	802.11 ax_HE80: up to 1201 Mbps

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1.3 Antenna Designation

Antenna Type	Antenna Port	Freq. (MHz)	Peak Antenna Gain (dBi)
Dipole Antenna	Ch0	5150~5250	3.41
		5725~5850	3.8
	Ch1	5150~5250	3.41
		5725~5850	3.8

Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. Antenna information is provided by the applicant.

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1.4 FCC

Wi-Fi	Frequency Range	Channels	Rated Power(Avg) (dBm) (Worst Case)	Modulation Technology
802.11a/ 802.11n_HT20/ 802.11ac_VHT20/ 802.11ax_HE20	5180~5240	4	11.15 dBm	OFDMA
	5745-5825	5	17.89 dBm	OFDM
802.11n_HT40 802.11ac_VHT40/ 802.11ax_HE40	5190~5230	2	11.27 dBm	OFDM
	5755-5795	2	16.88 dBm	OFDM
802.11ac_VHT80/ 802.11ax_HE80	5210	1	10.92 dBm	OFDMA
	5775	1	15.79 dBm	OFDM

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1.5 ISED

WLAN 5 GHz for ISED (Slave)

Wi-Fi	Frequency Range	Channels	EIRP/Avg	Rated Power(EIRP/Avg) (dBm) (Worst Case)	Modulation Technology
802.11a/ 802.11n_HT20/ 802.11ac_VHT20/ 802.11ax_HE20	5180~5240	4	EIRP	14.56 dBm	OFDMA
	5745-5825	5	Avg	17.89 dBm	OFDM
802.11n_HT40 802.11ac_VHT40/ 802.11ax_HE40	5190~5230	2	EIRP	14.68 dBm	OFDM
	5755-5795	2	Avg	16.88 dBm	OFDM
802.11ac_VHT80/ 802.11ax_HE80	5210	1	EIRP	14.33 dBm	OFDMA
	5775	1	Avg	15.79 dBm	OFDM

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1.6 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407
FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
RSS-247 issue 3 Aug. 2023
RSS-Gen, Issue 5 April 2018, Amendment 2 (February 2021)
ANSI C63.10:2013

1.7 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		
Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.				

1.8 Special Accessories

There are no special accessories used while test was conducted.

1.9 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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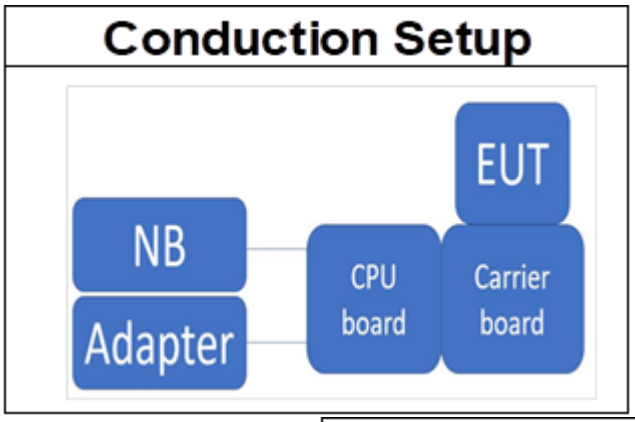
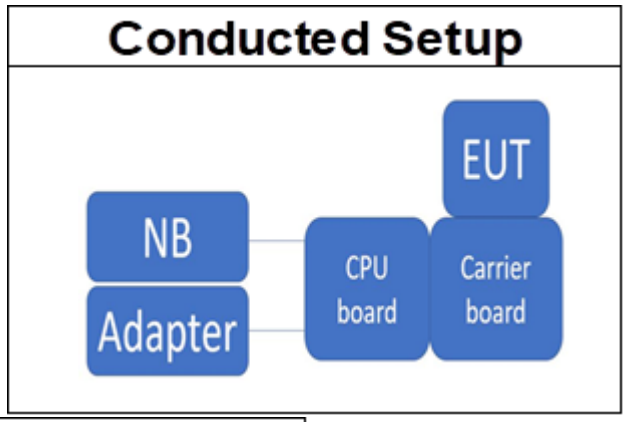
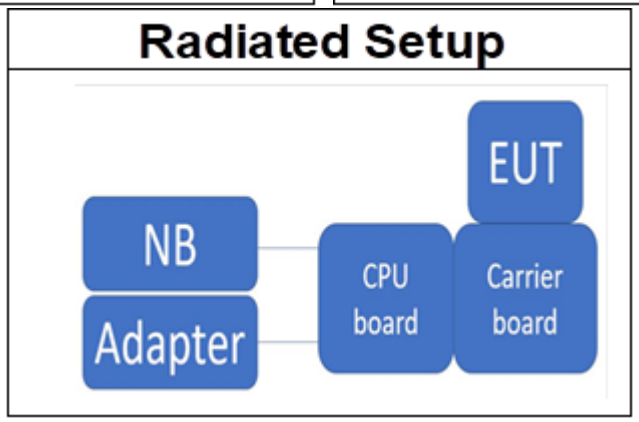
2.5 Test Configuration







2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
AC Adapter	Asian Power Devices Inc.	WA-36W12R	N/A	N/A	N/A
CPU board	Qisda	5E.64T51.001	N/A	N/A	N/A
Carrier board	Qisda	5E.64T50.001	N/A	N/A	N/A
LAN Cable	AMP	AMP-6e	4719862256612	N/A	N/A
Notebook	Lenovo	T470	P0001293	N/A	N/A
Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
LAN Cable	TATUNG	E210587	N/A	N/A	N/A
CPU board	Qisda	5E.64T51.001	N/A	N/A	N/A
Carrier board	Qisda	5E.64T50.001	N/A	N/A	N/A
Adapter	APD	WA-36W12R	N/A	N/A	N/A
Notebook	Lenovo	T14	P0003332	N/A	N/A

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Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
AC Adapter	Asian Power Devices Inc.	WA-36W12R	N/A	N/A	N/A
CPU board	Qisda	5E.64T51.001	N/A	N/A	N/A
Carrier board	Qisda	5E.64T50.001	N/A	N/A	N/A
LAN Cable	AMP	AMP-6e	4719862256612	N/A	N/A
Notebook	Lenovo	T470	P0001293	N/A	N/A

Radiated Emission Test Site: SAC G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
AC Adapter	Asian Power Devices Inc.	WA-36W12R	N/A	N/A	N/A
CPU board	Qisda	5E.64T51.001	N/A	N/A	N/A
Carrier board	Qisda	5E.64T50.001	N/A	N/A	N/A
LAN Cable	AMP	AMP-6e	4719862256612	N/A	N/A
Notebook	Lenovo	T470	P0001293	N/A	N/A

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3 SUMMARY OF TEST RESULT

FCC Rules	ISED Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.407(e)	RSS-Gen §6.7	Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~4 (1) RSS-247 §6.2.5 (2)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1) RSS-247 §6.2.5 (2)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	RSS-Gen 8.10 RSS-247 §6.2.1~3 (2) §6.2.4 (3) RSS-247 §6.2.5 (3)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.203	N/A	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

UNII-1 5150 MHz ~ 5250MHz

20MHz	
CH	Freq. (MHz)
36	5180
40	5200
44	5220
48	5240

40MHz	
CH	Freq. (MHz)
38	5190
46	5230

80MHz	
CH	Freq. (MHz)
42	5210

UNII-3 5725 MHz ~ 5850MHz

20MHz	
CH	Freq. (MHz)
149	5745
153	5765
157	5785
161	5805
165	5825

40MHz	
CH	Freq. (MHz)
151	5755
159	5795

80MHz	
CH	Freq. (MHz)
155	5775

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case. The given UE is pre-scanned among below modes.

Modulation		Transmission Chain								Single Transmission Spatial		Multiple Transmission Spatial	
V	802.11 a	V	Ch0	V	Ch1		Ch2		Ch3	V	1TX		2TX
V	802.11 n	V	Ch0	V	Ch1		Ch2		Ch3		1TX	V	2TX
V	802.11 ac	V	Ch0	V	Ch1		Ch2		Ch3		1TX	V	2TX
V	802.11 ax	V	Ch0	V	Ch1		Ch2		Ch3		1TX	V	2TX
	802.11 be		Ch0		Ch1		Ch2		Ch3		1TX		2TX

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	ch0
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	2TX
	5745~5825	149 to 165	149,157,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	2TX
	5755~5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	2TX
	5775	155	155			

CONDUCTED TEST							
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	RU CONFIGURATION	DATA RATE (Mbps)	ANTENNA PORT
802.11ax_HE20	5180~5240	36 to 48	36,44,48	OFDMA	FULL RU 26/0,26/8 52/37,52/40	MCS0	2TX
	5745~5825	149 to 165	149,157,165				
	5845~5885	169 to 177	169,173,177				
802.11ax_HE40	5190~5230	38 to 46	38,46	OFDMA	FULL RU 242/61,242/62	MCS0	2TX
	5755~5795	151 to 159	151,159				
802.11ax_HE80	5210	42	42	OFDMA	FULL RU 484/65,484/66	MCS0	2TX
	5775	155	155				

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	ch0
	5745~5825	149 to 165	157			

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TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	ch0
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	ch0
	5745~5825	149 to 165	149,157,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	ch0
	5755~5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	ch0
	5775	155	155			

TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)							
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	RU CONFIGURATION	DATA RATE (Mbps)	ANTENNA PORT
802.11ax_HE20	5180~5240	36 to 48	36,44,48	OFDMA	FULL RU 26/0,26/8 52/37,52/40	MCS0	ch0
	5745~5825	149 to 165	149,157,165				
802.11ax_HE40	5190~5230	38 to 46	38,46	OFDMA	FULL RU 242/61,242/62	MCS0	ch0
	5755~5795	151 to 159	151,159				
802.11ax_HE80	5210	42	42	OFDMA	FULL RU 484/65,484/66	MCS0	ch0
	5775	155	155				

Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty		
AC Power Line Conducted Emission	+/-	1.54	dB
Output Power measurement	+/-	0.97	dB
Emission Bandwidth	+/-	1.38	Hz
Conducted emission measurement	+/-	0.77	dB
Peak Power Density	+/-	0.61	dB
Temperature	+/-	0.6	°C
Humidity	+/-	3	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty				
Polarization: Vertical	**+/-**	**1.89**	**dB**	9kHz~30MHz
	+/-	**4.15**	**dB**	30MHz - 1000MHz
	+/-	**3.43**	**dB**	1GHz - 18GHz
	+/-	**3.86**	**dB**	18GHz - 40GHz
Polarization: Horizontal	**+/-**	**1.89**	**dB**	9kHz~30MHz
	+/-	**4.02**	**dB**	30MHz - 1000MHz
	+/-	**3.43**	**dB**	1GHz - 18GHz
	+/-	**3.86**	**dB**	18GHz - 40GHz
Radiated Spurious Emission	**+/-**	**2**	**dB**	33GHz-50GHz
	+/-	**1.59**	**dB**	50GHz-60GHz
	+/-	**1.7**	**dB**	60GHz-90GHz
	+/-	**1.64**	**dB**	90GHz-140GHz
	+/-	**3.83**	**dB**	140GHz-220GHz

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 MEASUREMENT EQUIPMENT USED

6.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2024	03/26/2025
EMI Test Receiver	R&S	ESCI	101342	04/29/2024	04/28/2025
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	973	04/22/2024	04/21/2025
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2024	03/26/2025
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Condcuted Measurement

Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Attenuator	Woken	WATT-218FS-10	RF18	11/15/2023	11/14/2024
Attenuator	Woken	WATT-218FS-10	RF19	11/15/2023	11/14/2024
DC Block	PASTERNACK	PE8210	RF155	11/15/2023	11/14/2024
Power Meter	Anritsu	ML2496A	2138005	09/25/2024	09/24/2025
Power Sensor	Anritsu	MA2411B	1911395	09/25/2024	09/24/2025
Power Sensor	Anritsu	MA2411B	1911396	09/25/2024	09/24/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071573	05/24/2024	05/23/2025
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R

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6.3 Radiated Measurement

Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
3m Site NSA	SGS	966 chamber C	N/A	03/02/2024	03/01/2025
Active Loop Antenna	COM-POWER	AL-130R	10160105	12/04/2023	12/03/2024
Attenuator	Woken	WATT-218FS-10	RF17	11/14/2024	11/13/2025
Band Rejection Filter	Micro-Tronics	G015	RF198	11/14/2024	11/13/2025
Band Rejection Filter	Micro-Tronics	G021	RF200	11/14/2024	11/13/2025
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-300	11/06/2024	11/05/2025
Coaxial Cable	Huber+Suhner	EMC106-SM-SM-9100	150704	11/14/2024	11/13/2025
Coaxial Cable	Huber+Suhner	RG 214/U	W22.03	11/14/2024	11/13/2025
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	MY17388/4	11/14/2024	11/13/2025
EMI Test Receiver	R&S	ESU 40	100363	04/30/2024	04/29/2025
High Pass Filter	Titan Microwave	T04H86002600060S01	210619-2-8	11/14/2024	11/13/2025
Horn Antenna	Schwarzbeck	BBHA9170	184	12/28/2023	12/27/2024
Horn Antenna	Schwarzbeck	BBHA9170	185	08/15/2024	08/14/2025
Lowpass Filter	Woken	EWT-56-0019	RF173	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC118A45SE	980789	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC184045SEE	980881	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC330	980096	11/14/2024	11/13/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY63440390	02/16/2024	02/15/2025
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

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Radiated Emission Test Site: SAC G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
3m Site NSA	SGS	966 chamber G	N/A	03/30/2024	03/29/2025
Active Loop Antenna	COM-POWER	AL-130R	10160105	12/04/2023	12/03/2024
Attenuator	Woken	WATT-218FS-10	RF17	11/14/2024	11/13/2025
Band Rejection Filter	Micro-Tronics	G015	RF198	11/14/2024	11/13/2025
Band Rejection Filter	Micro-Tronics	G021	RF200	11/14/2024	11/13/2025
Broadband Antenna	SCHWARZBECK	VULB 9168	1208	07/17/2024	07/16/2025
Coaxial Cable	EMC Instruments	EMC104-SM-SM-8000-5000-5000	210219、210220、210221	03/13/2024	03/12/2025
Coaxial Cable	EMC Instruments	EMCCFD400-NM-NM-8000-5000-2000	210216、210217、210218	03/13/2024	03/12/2025
High Pass Filter	WI	WHKX10-2624-3200-18000-80SS	RF210	11/14/2024	11/13/2025
Horn Antenna	RF SPIN	DRH18-E	210105A18E	04/12/2024	04/11/2025
Horn Antenna	Schwarzbeck	BBHA9170	184	12/28/2023	12/27/2024
Lowpass Filter	Woken	EWT-56-0019	RF173	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC118A45SE	980815	05/08/2024	05/07/2025
Pre-Amplifier	EMC Instruments	EMC330N	980781	03/13/2024	03/12/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY63440390	02/16/2024	02/15/2025
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

NOTE: *N.C.R refers to Not Calibrated Required.*

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7 CONDUCTED EMISSION TEST

7.1 Standard Applicable

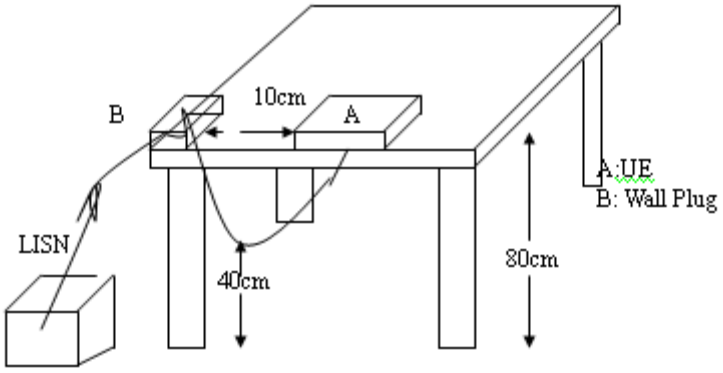
Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

7.2 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

7.3 Test SET-UP



7.4 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

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7.5 Measurement Result

Note: Refer to next page for measurement data and plots.
Note2: The * reveals the worst-case results that closest to the limit.

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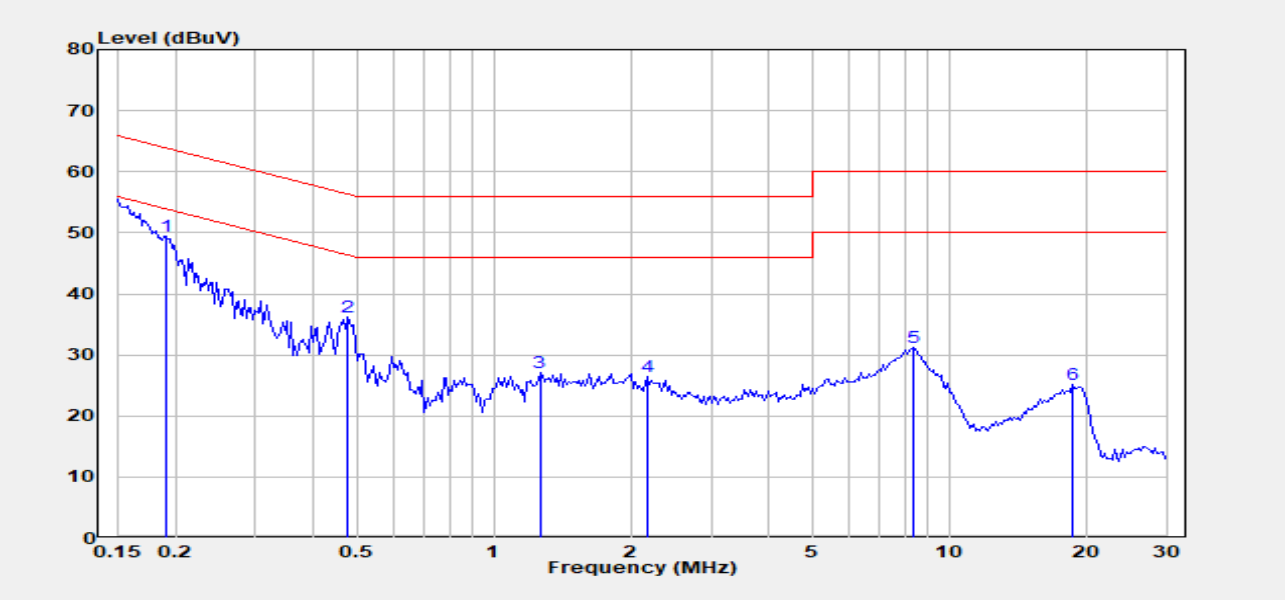
AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2410003020E2	Test Site	:Conduction C
Test Mode	:5G	Test Date	:2024-11-22
Power	:120V/60Hz	Temp./Humi	:21.5℃/62%
Probe	:L1	Engineer	:Alex Li



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.191	Peak	38.84	10.65	49.49	63.98	-14.48
0.476	Peak	25.51	10.62	36.13	56.41	-20.28
1.262	Peak	16.43	10.72	27.15	56.00	-28.85
2.167	Peak	15.67	10.78	26.46	56.00	-29.54
8.323	Peak	20.31	10.96	31.27	60.00	-28.73
18.622	Peak	13.96	11.14	25.10	60.00	-34.90

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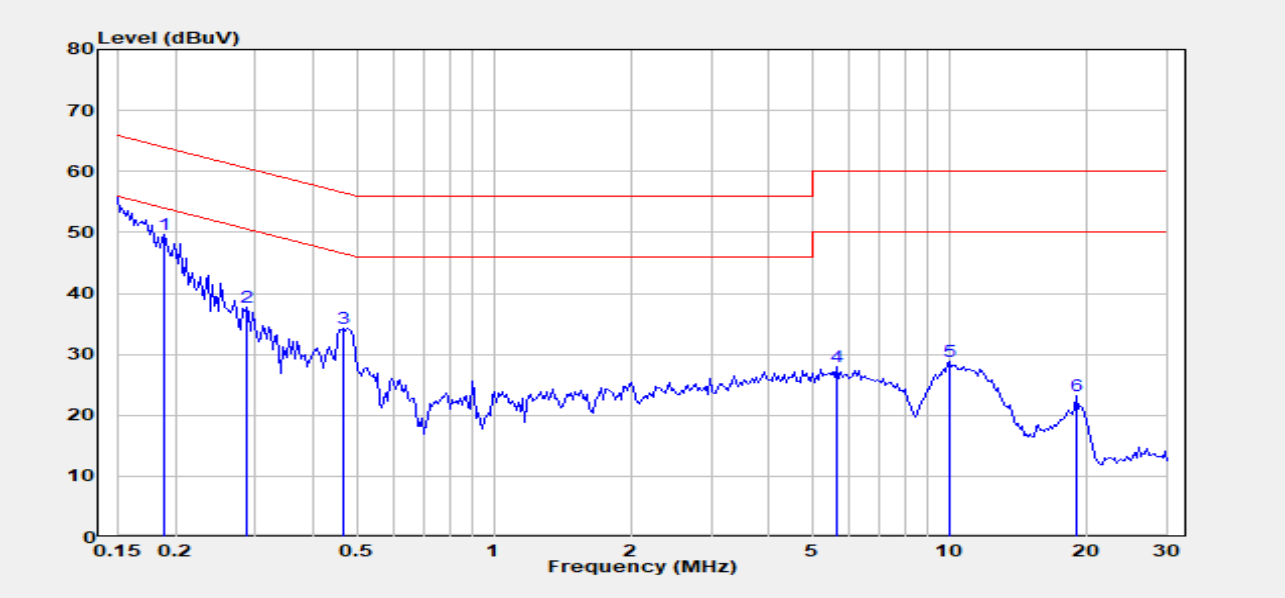
Report Number	:TERF2410003020E2	Test Site	:Conduction C
Test Mode	:5G	Test Date	:2024-11-22
Power	:120V/60Hz	Temp./Humi	:21.5℃/62%
Probe	:N	Engineer	:Alex Li



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.189	Peak	39.10	10.65	49.75	64.06	-14.31
0.286	Peak	27.04	10.63	37.67	60.63	-22.96
0.466	Peak	23.60	10.61	34.21	56.58	-22.38
5.683	Peak	17.05	10.94	27.99	60.00	-32.01
10.072	Peak	17.84	10.95	28.79	60.00	-31.21
19.021	Peak	12.15	11.14	23.30	60.00	-36.70

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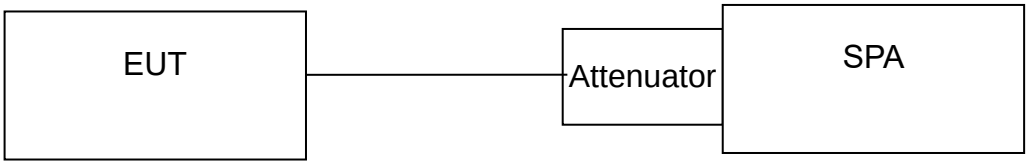
8 EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.
The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3.

8.2 Test Setup



8.3 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.

   3.a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW
   Sweep=auto,
   Detector = Peak,
   Trace Mode = Max Hold,
   Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.

   3.b. Mark the peak frequency and –26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
   a. Set the spectrum analyzer as
   RBW = 100 kHz,
   VBW = 3*RBW,
   Span = large enough to capture all products of the modulation process,
   Detector=Peak,
   Sweep=auto
   b. Mark the peak frequency and –6dB (upper and lower) frequency.
6. For 99% Bandwidth: Set the spectrum analyzer as
   RBW = 1%,
   VBW = 3*RBW,
   Span = large enough to capture all products of the modulation process,
   Detector=Sample,
   Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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8.4 Measurement Result

8.4.1 FCC Occupied Bandwidth

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	28.88	14.610
5220	30.00	14.770
5240	29.45	14.690

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.32	12.130
5785	16.32	12.130
5825	16.41	12.150

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.659580	< 5250
5745	5735.007214	> 5725

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802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.27	13.280
5220	20.95	13.210
5240	21.10	13.240

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.70	12.480
5785	17.40	12.410
5825	17.70	12.480

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.875425	< 5250
5745	5736.168274	> 5725

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802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.42	13.310
5220	20.78	13.180
5240	21.04	13.230

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.68	12.470
5785	17.64	12.460
5825	17.65	12.470

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.893881	< 5250
5745	5736.184009	> 5725

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802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	39.41	15.960
5230	39.58	15.970

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.93	15.550
5795	35.22	15.470

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.147259	< 5250
5755	5736.982763	> 5725

802.11n_HT40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	39.02	15.910
5230	39.65	15.980

802.11n_HT40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.34	15.600
5795	35.83	15.540

802.11n_HT40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.212759	< 5250
5755	5736.931180	> 5725

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802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.55	19.060

802.11ac_VHT80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.34	18.770

802.11ac_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.886577	< 5250
5775	5737.344011	> 5725

802.11ac_VHT80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.59	19.060

802.11ac_VHT80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.52	18.780

802.11ac_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.904179	< 5250
5775	5737.393237	> 5725

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802.11ax_HE20_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5180	full	21.16	13.260
5220	full	21.42	13.310
5240	full	21.34	13.290

802.11ax_HE20_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.91	12.770
5785	full	18.70	12.720
5825	full	18.89	12.760

802.11ax_HE20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.464296	< 5250
5745	5735.522620	> 5725

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802.11ax_HE20_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5180	full	21.01	13.220
5220	full	21.13	13.250
5240	full	21.08	13.240

802.11ax_HE20_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.68	12.710
5785	full	18.94	12.770
5825	full	18.89	12.760

802.11ax_HE20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.492222	< 5250
5745	5735.515279	> 5725

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802.11ax_HE40_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5190	full	40.07	16.030
5230	full	39.70	15.990

802.11ax_HE40_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	37.21	15.710
5795	full	37.31	15.720

802.11ax_HE40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.811811	< 5250
5755	5736.253473	> 5725

802.11ax_HE40_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5190	full	40.02	16.020
5230	full	39.88	16.010

802.11ax_HE40_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	37.48	15.740
5795	full	36.89	15.670

802.11ax_HE40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.743659	< 5250
5755	5736.292451	> 5725

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802.11ax_HE80_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5210	full	81.26	19.100

802.11ax_HE80_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5775	full	76.36	18.830

802.11ax_HE80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.495199	< 5250
5775	5736.562195	> 5725

802.11ax_HE80_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5210	full	81.50	19.110

802.11ax_HE80_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5775	full	75.63	18.790

802.11ax_HE80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.468104	< 5250
5775	5736.581957	> 5725

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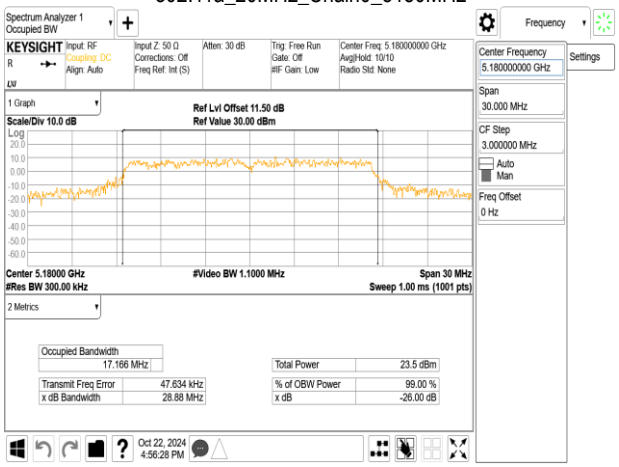
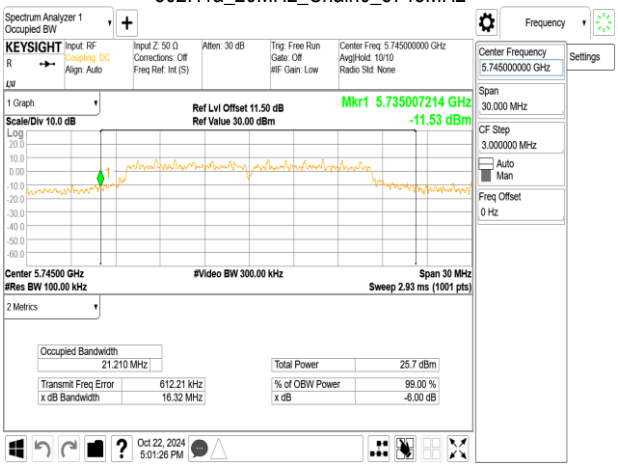
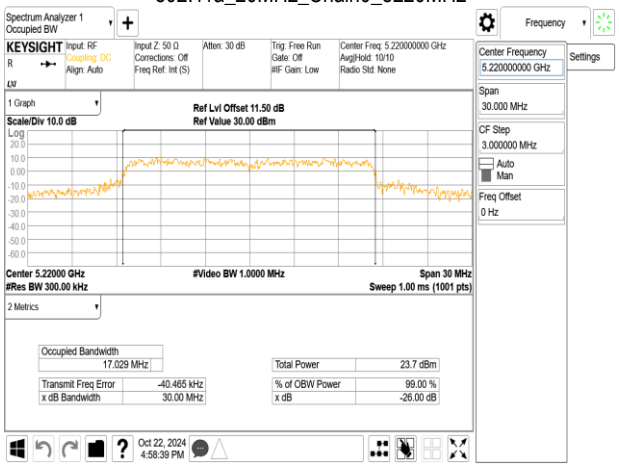
802.11a_20MHz_Chain0_5180MHz



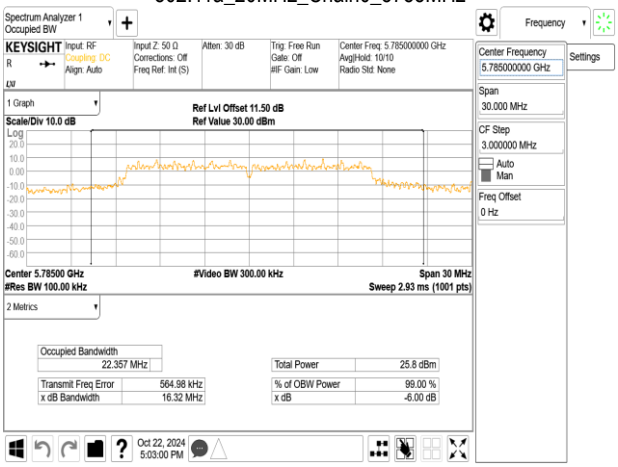
802.11a_20MHz_Chain0_5745MHz



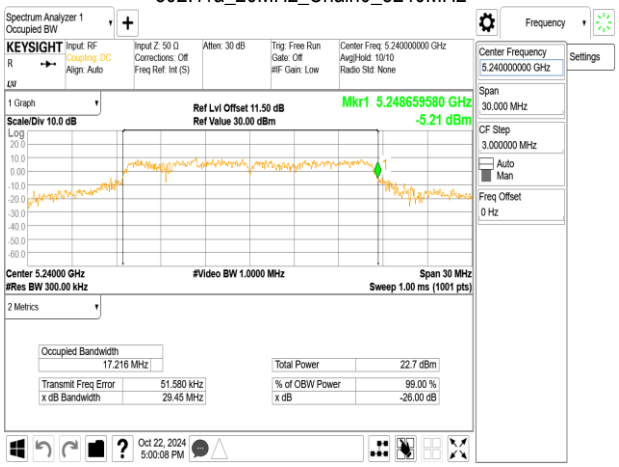
802.11a_20MHz_Chain0_5220MHz



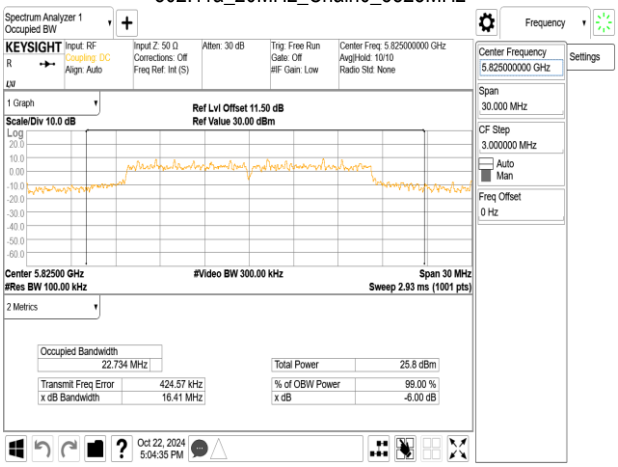
802.11a_20MHz_Chain0_5785MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5825MHz



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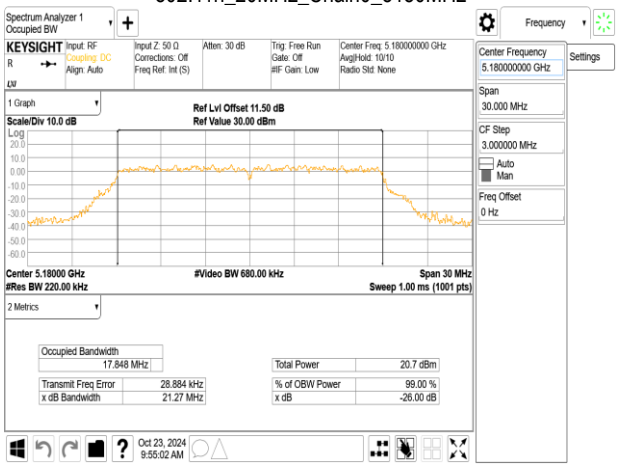
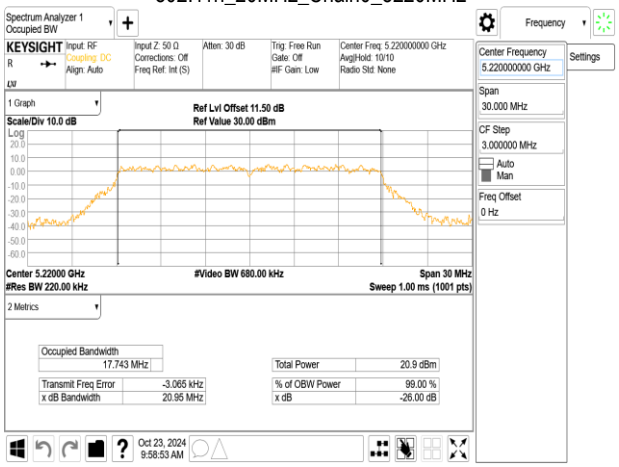
802.11n_20MHz_Chain0_5180MHz

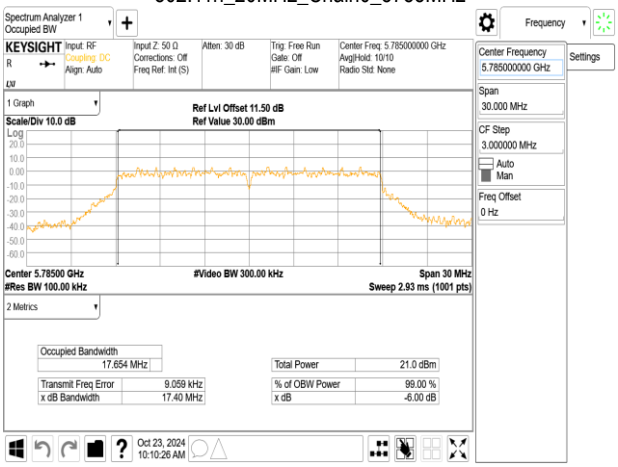


802.11n_20MHz_Chain0_5745MHz

802.11n_20MHz_Chain0_5220MHz

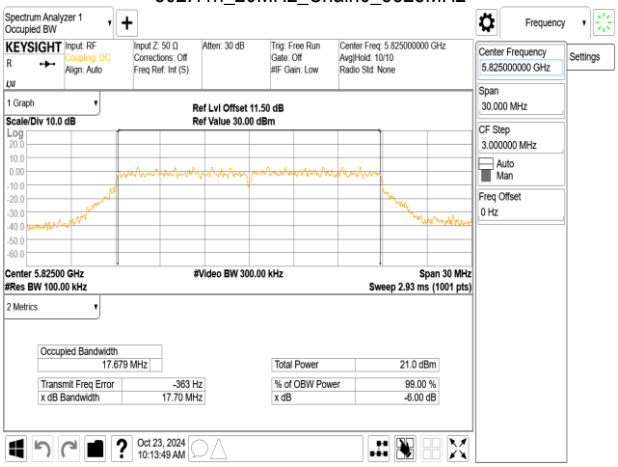


802.11n_20MHz_Chain0_5785MHz



802.11n_20MHz_Chain0_5240MHz

802.11n_20MHz_Chain0_5825MHz



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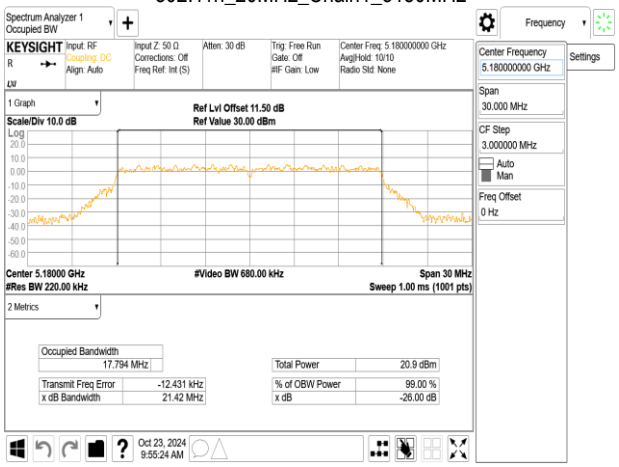
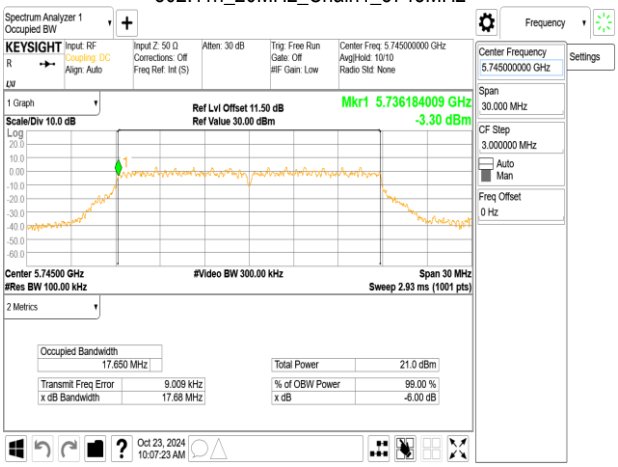
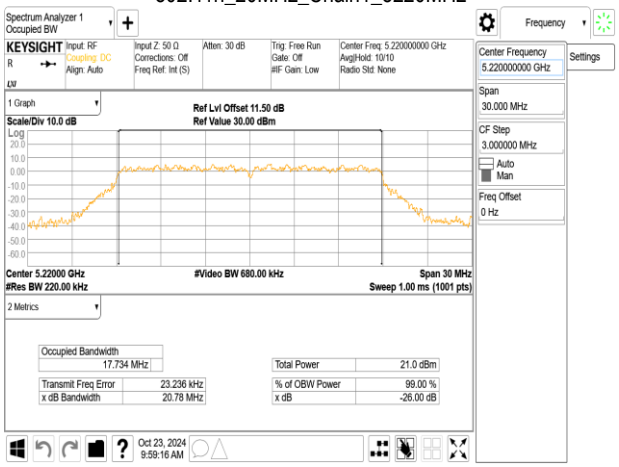
802.11n_20MHz_Chain1_5180MHz



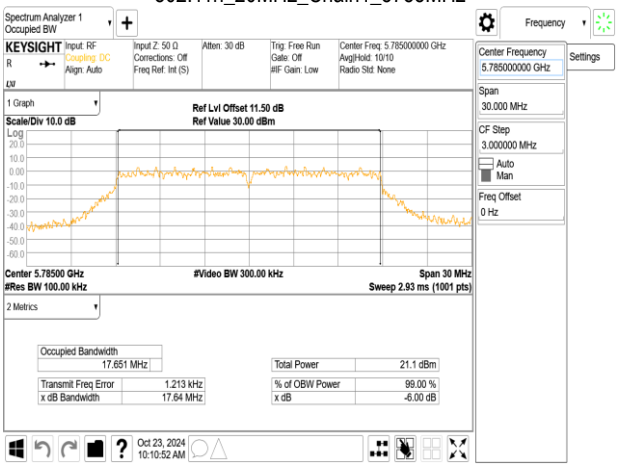
802.11n_20MHz_Chain1_5745MHz



802.11n_20MHz_Chain1_5220MHz

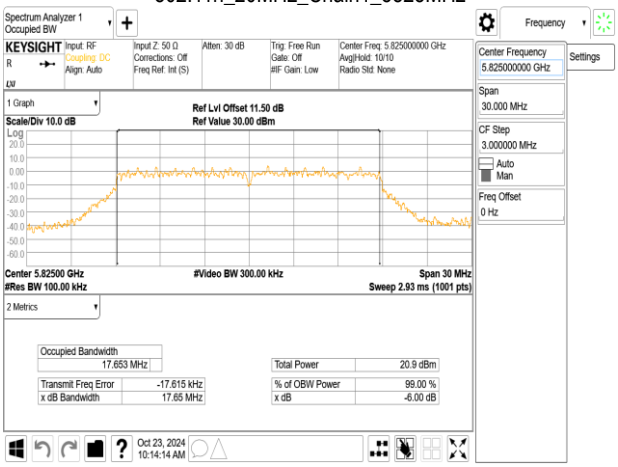


802.11n_20MHz_Chain1_5785MHz



802.11n_20MHz_Chain1_5240MHz

802.11n_20MHz_Chain1_5825MHz



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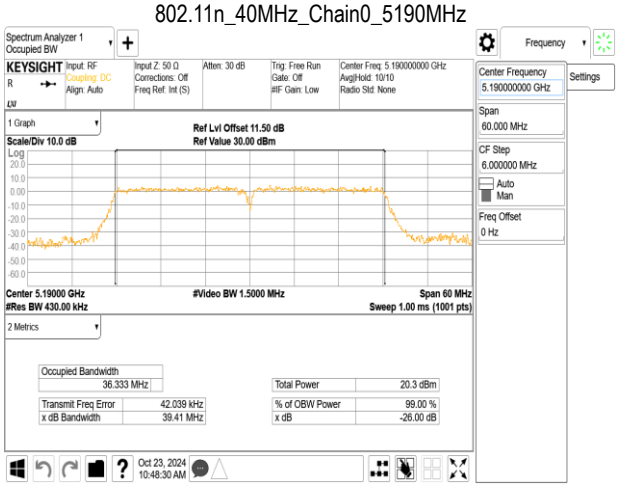
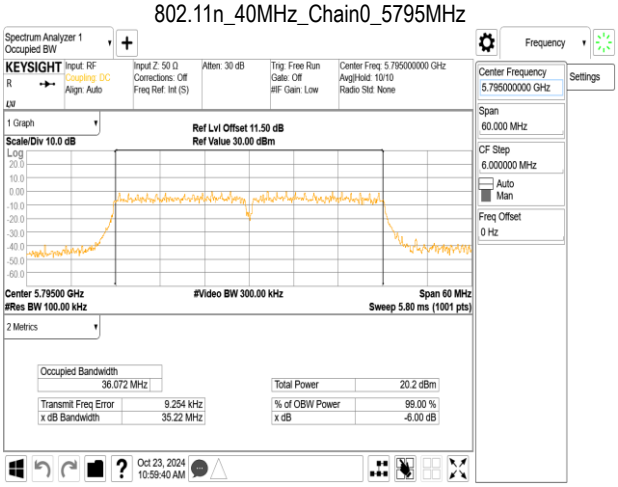
802.11n_40MHz_Chain0_5190MHz

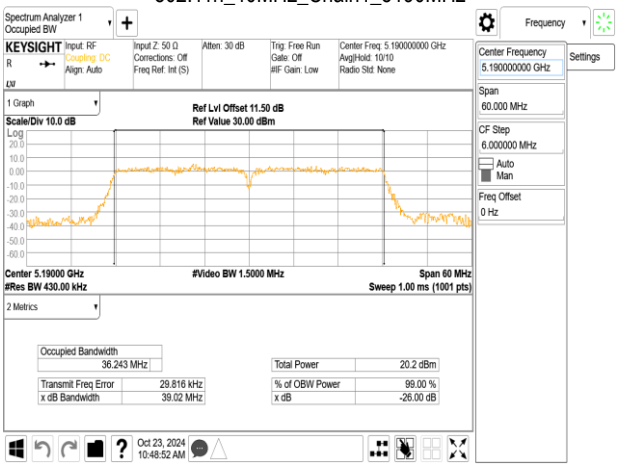


802.11n_40MHz_Chain0_5795MHz



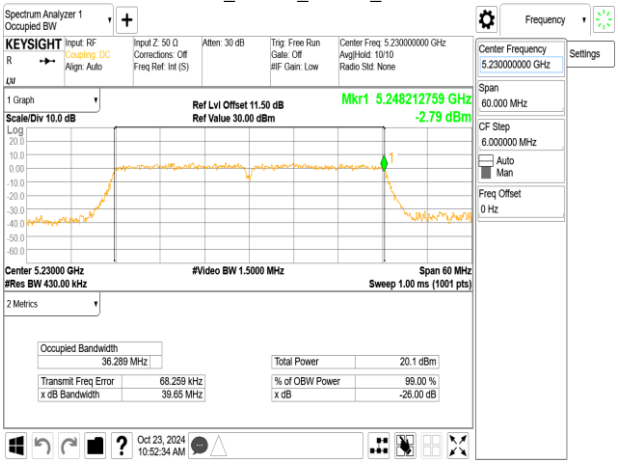
802.11n_40MHz_Chain0_5230MHz

802.11n_40MHz_Chain1_5190MHz



802.11n_40MHz_Chain0_5755MHz

802.11n_40MHz_Chain1_5230MHz



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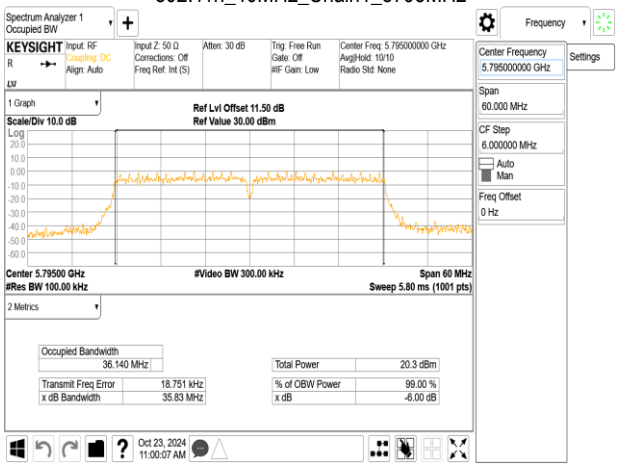
802.11n_40MHz_Chain1_5755MHz

802.11ac_80MHz_Chain0_5775MHz

802.11n_40MHz_Chain1_5795MHz



802.11ac_80MHz_Chain1_5210MHz

802.11ac_80MHz_Chain0_5210MHz

802.11ac_80MHz_Chain1_5775MHz

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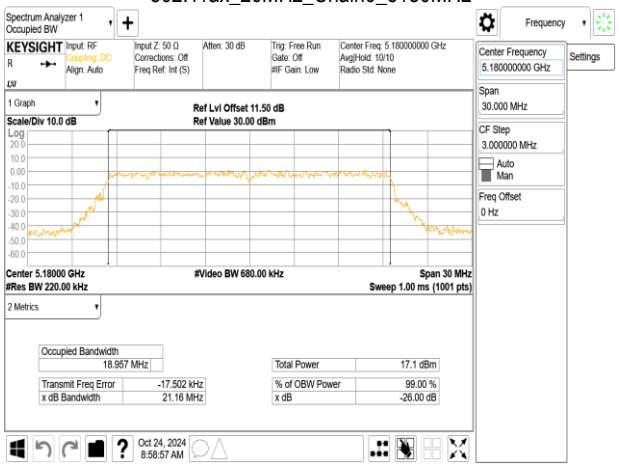
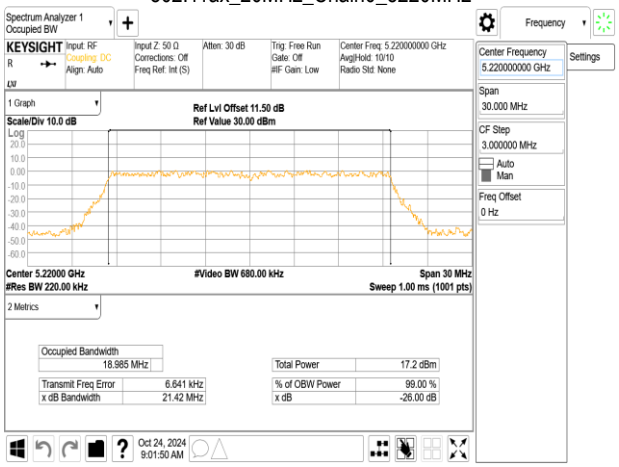
802.11ax_20MHz_Chain0_5180MHz

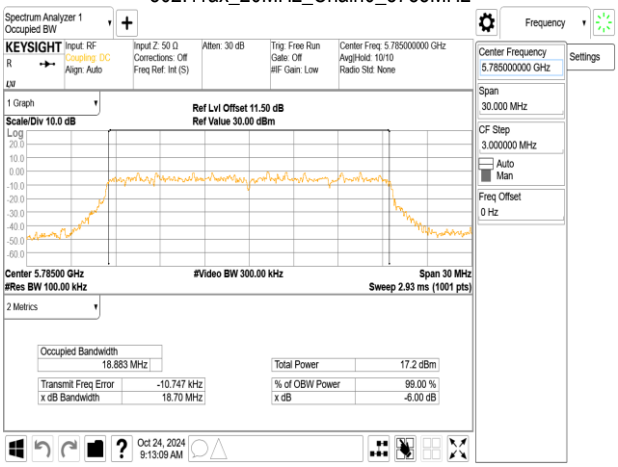


802.11ax_20MHz_Chain0_5745MHz

802.11ax_20MHz_Chain0_5220MHz

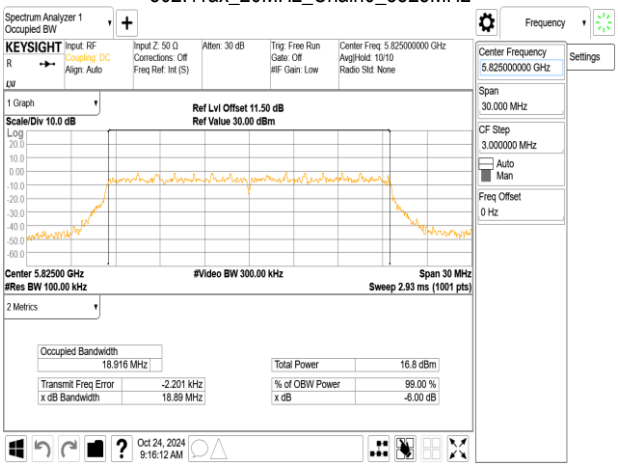


802.11ax_20MHz_Chain0_5785MHz



802.11ax_20MHz_Chain0_5240MHz

802.11ax_20MHz_Chain0_5825MHz



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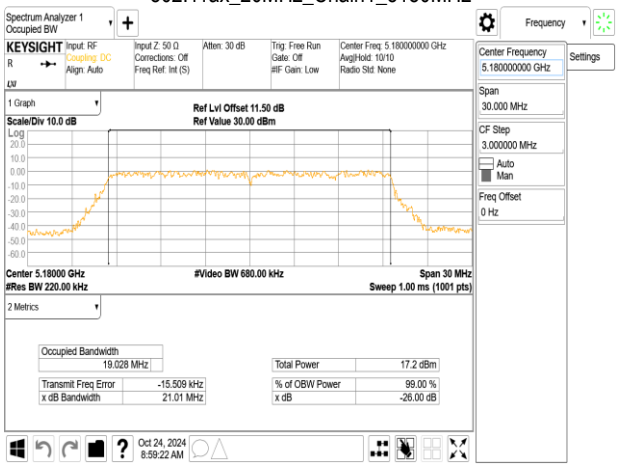
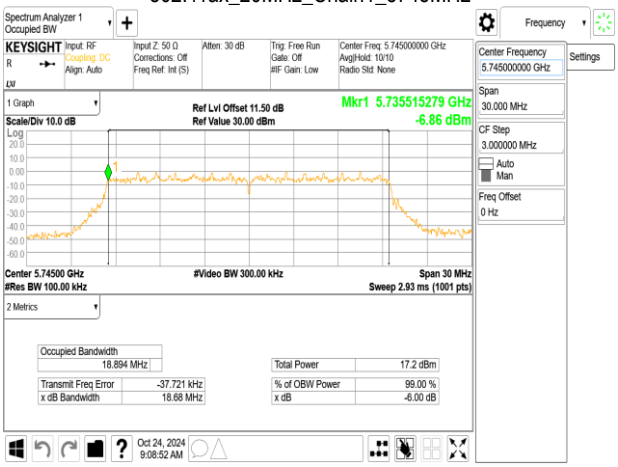
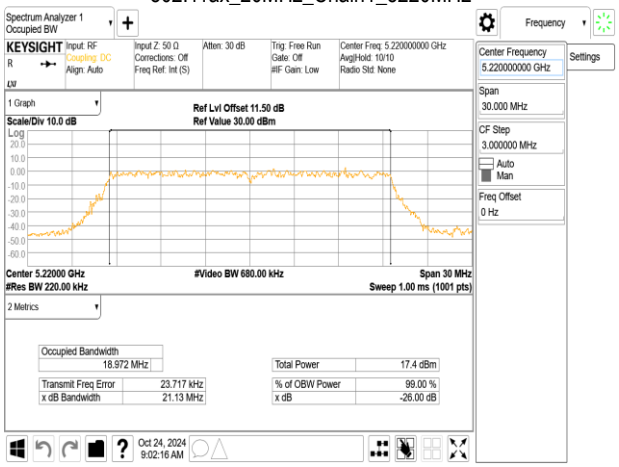
802.11ax_20MHz_Chain1_5180MHz



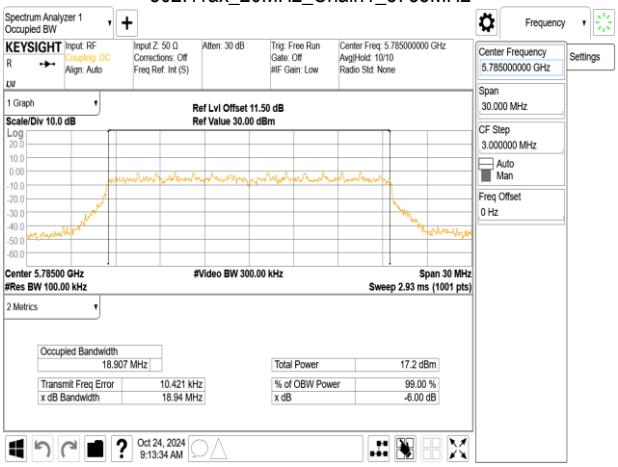
802.11ax_20MHz_Chain1_5745MHz



802.11ax_20MHz_Chain1_5220MHz

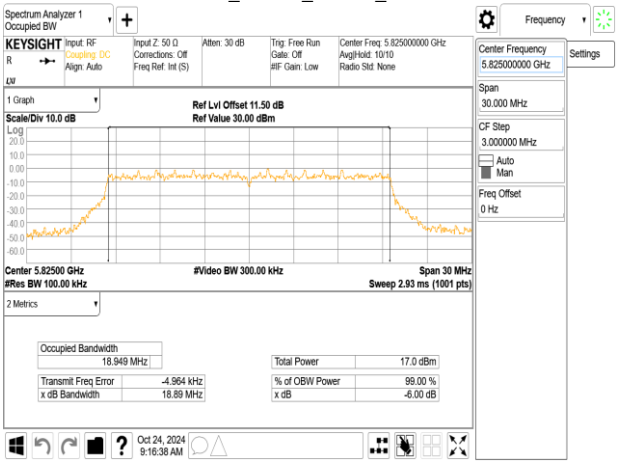


802.11ax_20MHz_Chain1_5785MHz



802.11ax_20MHz_Chain1_5240MHz

802.11ax_20MHz_Chain1_5825MHz



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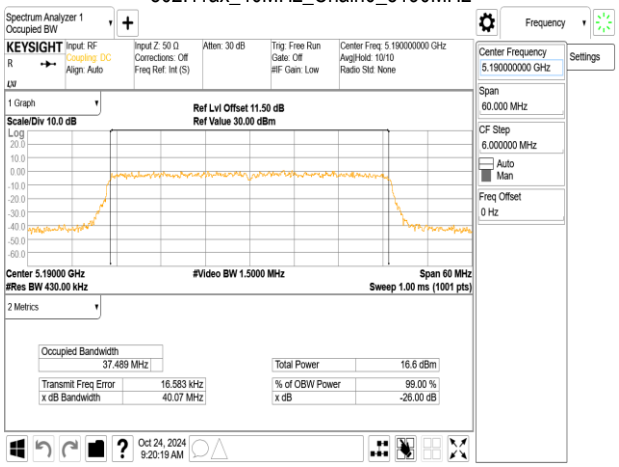
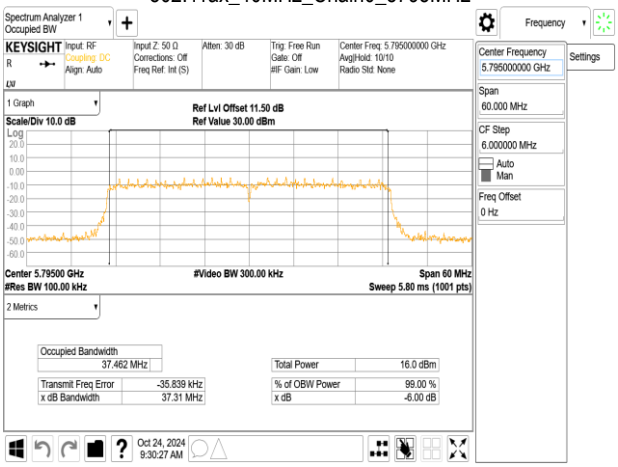
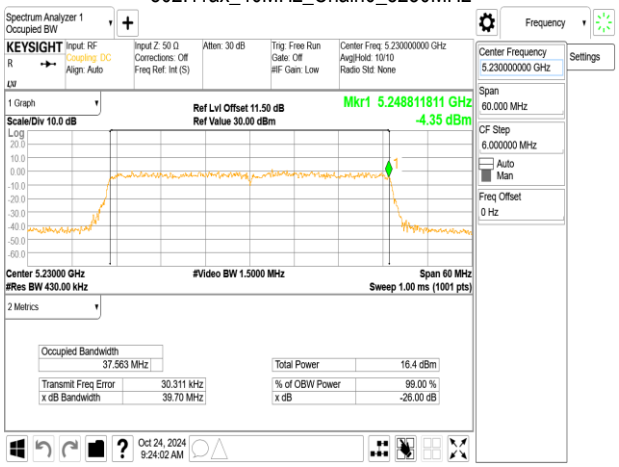
802.11ax_40MHz_Chain0_5190MHz



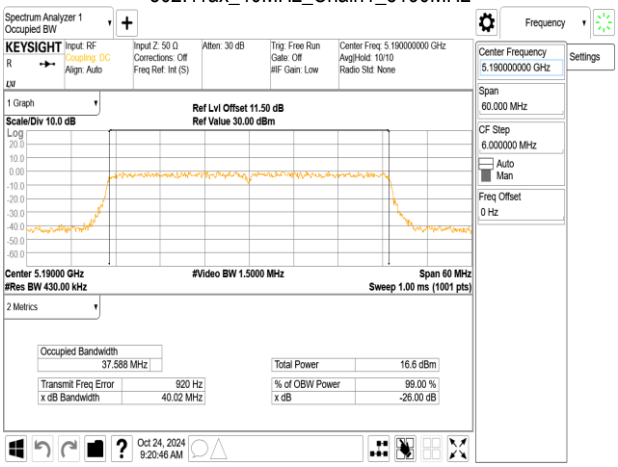
802.11ax_40MHz_Chain0_5795MHz



802.11ax_40MHz_Chain0_5230MHz



802.11ax_40MHz_Chain1_5190MHz



802.11ax_40MHz_Chain0_5755MHz

802.11ax_40MHz_Chain1_5230MHz

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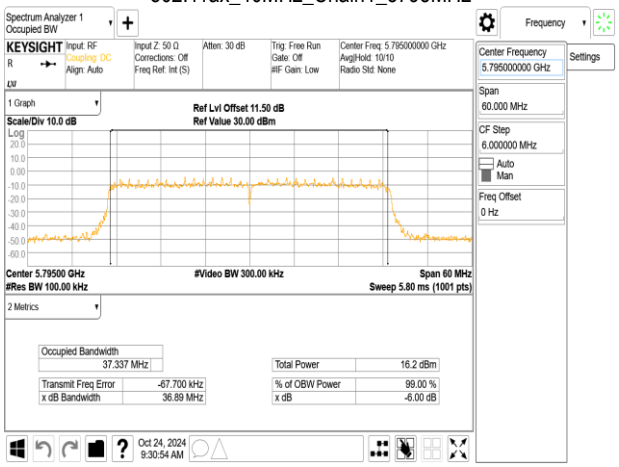
802.11ax_40MHz_Chain1_5755MHz

802.11ax_80MHz_Chain0_5775MHz

802.11ax_40MHz_Chain1_5795MHz



802.11ax_80MHz_Chain1_5210MHz

802.11ax_80MHz_Chain0_5210MHz

802.11ax_80MHz_Chain1_5775MHz

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8.4.2 ISED Occupied Bandwidth

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.155	12.340
5220	17.181	12.350
5240	17.071	12.320

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	21.608	16.33
5785	22.660	16.53
5825	22.752	16.39

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.762	12.490
5220	17.718	12.480
5240	17.734	12.490

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.763	17.79
5785	17.767	17.70
5825	17.759	17.76

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802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.740	12.490
5220	17.741	12.490
5240	17.779	12.500

802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.736	17.65
5785	17.753	17.79
5825	17.723	17.65

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.227	15.590
5230	36.292	15.600

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.310	36.35
5795	36.281	36.20

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802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.276	15.600
5230	36.238	15.590

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.274	36.25
5795	36.200	36.23

802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.569	18.780

802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5775	75.673	76.18

802.11ac_VHT80_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.604	18.790

802.11ac_VHT80_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5775	75.675	75.90

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802.11ax_HE20_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5180	full	18.946	12.780
5220	full	18.941	12.770
5240	full	19.003	12.790

802.11ax_HE20_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5745	full	18.988	19.05
5785	full	18.977	19.08
5825	full	19.013	18.94

802.11ax_HE20_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5180	full	18.981	12.780
5220	full	18.983	12.780
5240	full	18.968	12.780

802.11ax_HE20_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5745	full	18.966	18.95
5785	full	18.976	19.08
5825	full	18.949	19.00

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802.11ax_HE40_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5190	full	37.514	15.740
5230	full	37.547	15.750

802.11ax_HE40_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5755	full	37.461	37.63
5795	full	37.480	37.26

802.11ax_HE40_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5190	full	37.575	15.750
5230	full	37.529	15.740

802.11ax_HE40_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5755	full	37.524	37.69
5795	full	37.502	37.73

802.11ax_HE80_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5210	full	76.900	18.860

802.11ax_HE80_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5775	full	**76.869**	76.83

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802.11ax_HE80_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5210	full	76.918	18.860

802.11ax_HE80_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5775	full	**76.920**	76.90

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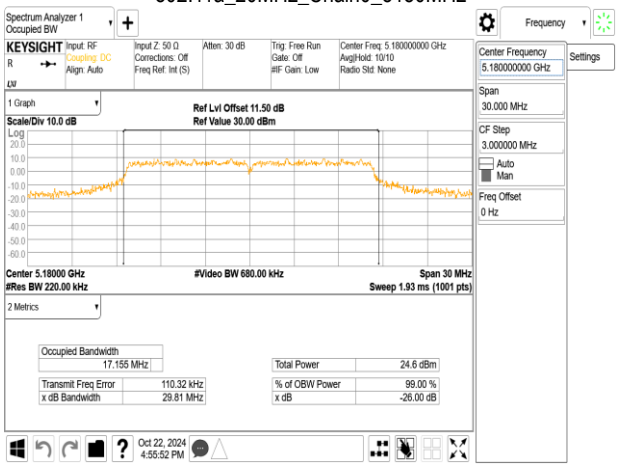
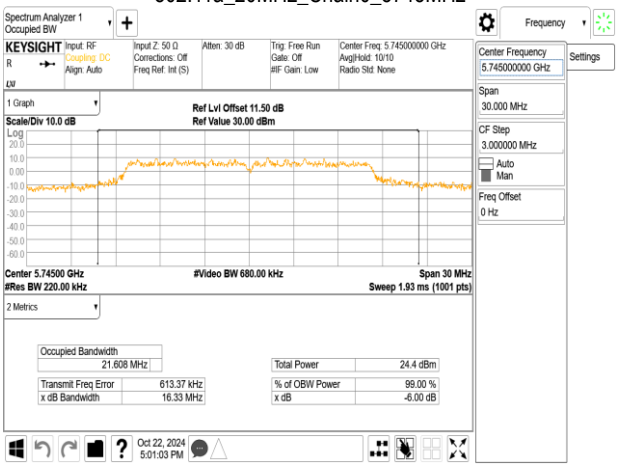
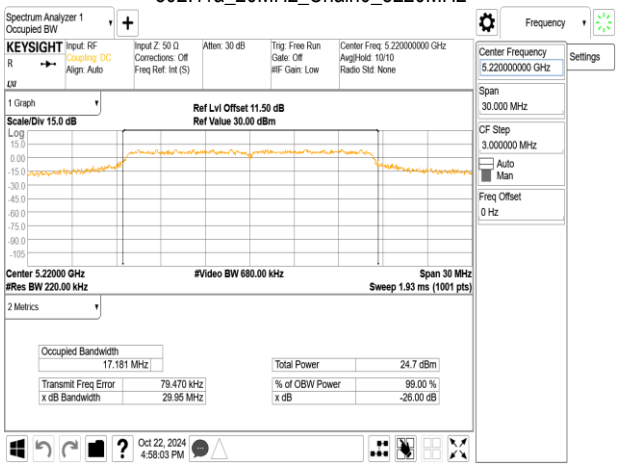
802.11a_20MHz_Chain0_5180MHz



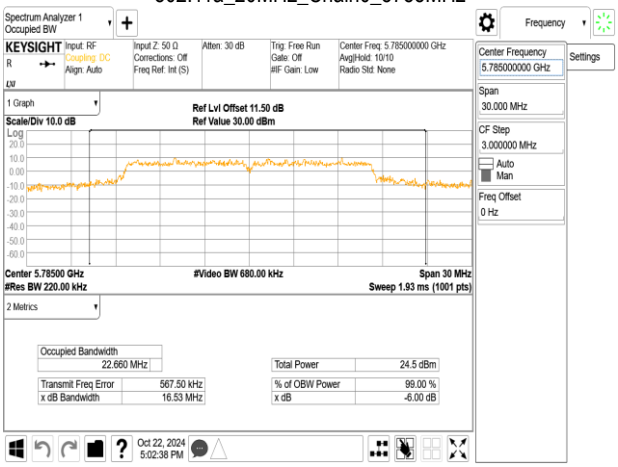
802.11a_20MHz_Chain0_5745MHz



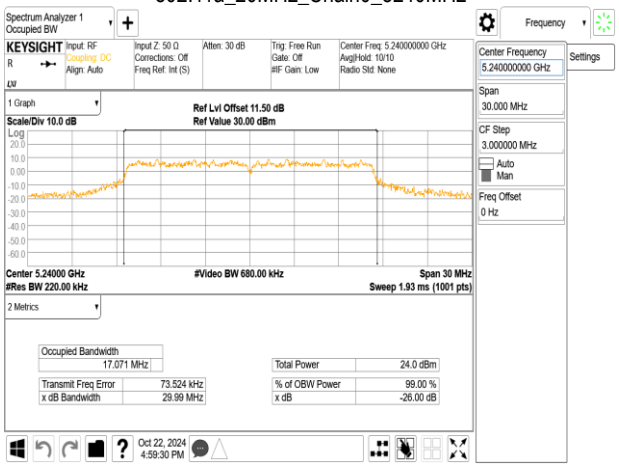
802.11a_20MHz_Chain0_5220MHz



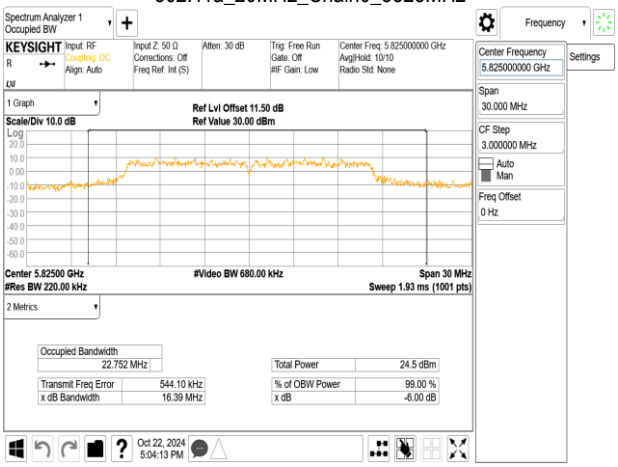
802.11a_20MHz_Chain0_5785MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5825MHz



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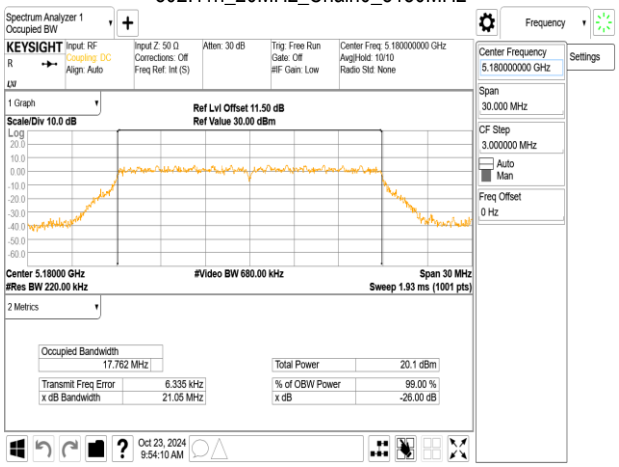
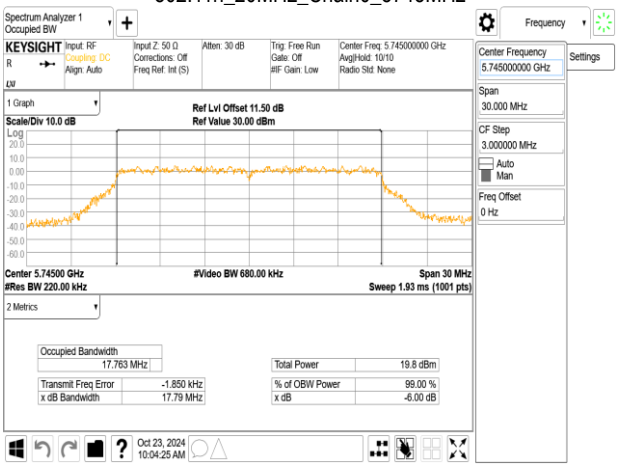
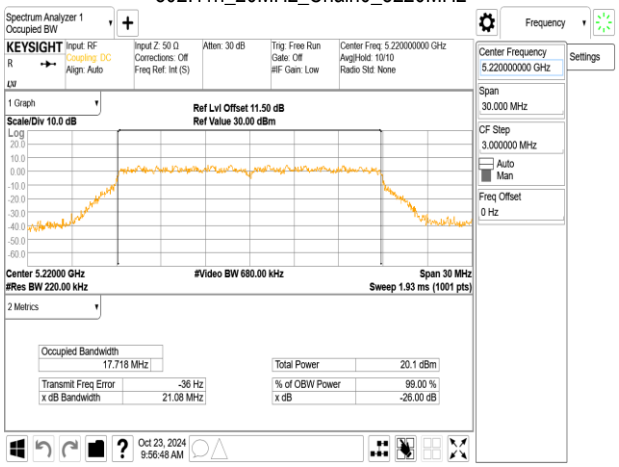
802.11n_20MHz_Chain0_5180MHz



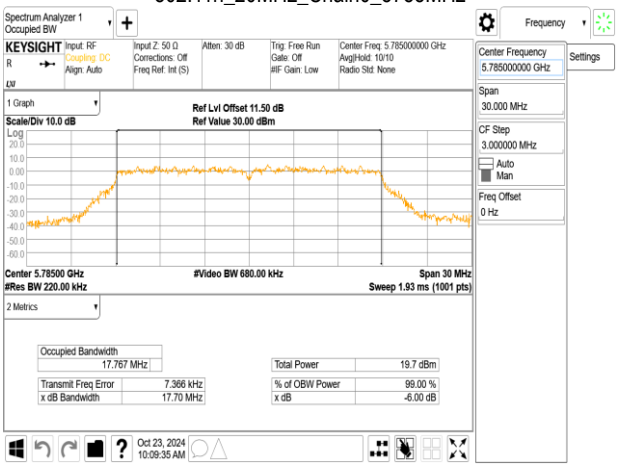
802.11n_20MHz_Chain0_5745MHz



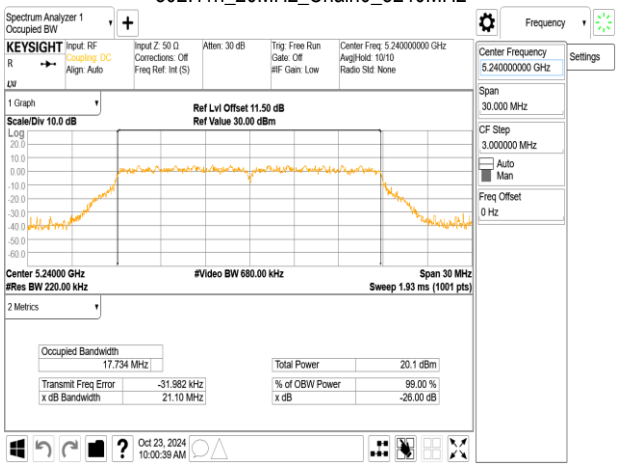
802.11n_20MHz_Chain0_5220MHz



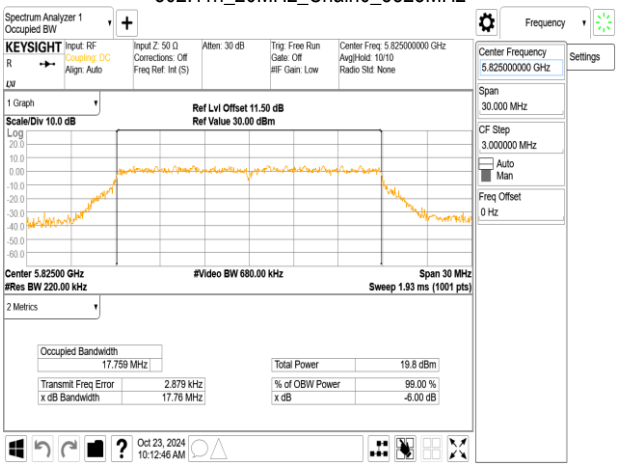
802.11n_20MHz_Chain0_5785MHz



802.11n_20MHz_Chain0_5240MHz



802.11n_20MHz_Chain0_5825MHz



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