

Project No: TM-2412000476P
Report No.: TMWK2412004834KR

FCC ID: 2AWUU68B2701

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Rev.: 02

RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART E

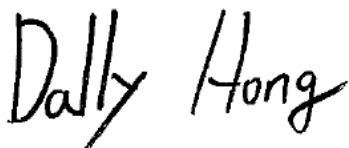
Test Standard	FCC Part 15.407
Product name	Outdoor Wi-Fi Gateway
Brand Name	Verkada
Model No.	GW31-E-HW
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:



Dally Hong
Sr. Engineer

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	February 26, 2025	Initial Issue	ALL	Peggy Tsai
01	March 6, 2025	See the following Note Rev. (01)	P.6, 12, 14, 65	Peggy Tsai
02	March 10, 2025	See the following Note Rev. (02)	P.6, 61, 62	Peggy Tsai

Note:

Rev. (01)

1. Added direction gain in section 1.3.
2. Modify test summery in section 2.
3. Modify the worst mode of measurement in section 3.2.
4. Modify test limit in section 4.4.1.

Rev. (02)

1. Modify antenna gain and note in section 1.3.
2. Modify test result in section 4.3.4.



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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Verkada Inc 405 E. 4th Ave. San Mateo California United States 94401
Manufacturer	Verkada Inc 405 E. 4th Ave. San Mateo California United States 94401
Equipment	Outdoor Wi-Fi Gateway
Model No.	GW31-E-HW
Model Discrepancy	N/A
Trade Name	Verkada
Received Date	January 2, 2025
Date of Test	February 5 ~ 21, 2025
Power Operation	1. Powered from Adapter (APD / DA-80A54) I/P: 100-240Vac, 50-60Hz, 1.5A MAX O/P: 54.0Vdc, 1.48A, 79.92W 2. Powered from PoE (EnGenius / PNA90BGS-54-TG) I/P: 100-240Vac, 1.5A, 50-60Hz O/P: 56Vdc, 1.7A 3. Powered from DC 12V
EUT Serial #	68B2701-DVT01
HW Version	0.1
FW Version	0.1

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

1.2 EUT CHANNEL INFORMATION

Frequency Range	UNII-1 <table> <tr><td>IEEE 802.11a</td><td>5180 ~ 5240 MHz</td></tr> <tr><td>IEEE 802.11n HT20</td><td>5180 ~ 5240 MHz</td></tr> <tr><td>IEEE 802.11ac VHT20</td><td>5180 ~ 5240 MHz</td></tr> <tr><td>IEEE 802.11n HT40</td><td>5190 ~ 5230 MHz</td></tr> <tr><td>IEEE 802.11ac VHT40</td><td>5190 ~ 5230 MHz</td></tr> <tr><td>IEEE 802.11ac VHT80</td><td>5210 MHz</td></tr> <tr><td>IEEE 802.11ax HE20</td><td>5180 ~ 5240 MHz</td></tr> <tr><td>IEEE 802.11ax HE40</td><td>5190 ~ 5230 MHz</td></tr> <tr><td>IEEE 802.11ax HE80</td><td>5210 MHz</td></tr> </table> UNII-3 <table> <tr><td>IEEE 802.11a</td><td>5745 ~ 5825 MHz</td></tr> <tr><td>IEEE 802.11n HT20</td><td>5745 ~ 5825 MHz</td></tr> <tr><td>IEEE 802.11ac VHT20</td><td>5745 ~ 5825 MHz</td></tr> <tr><td>IEEE 802.11n HT40</td><td>5755 ~ 5795 MHz</td></tr> <tr><td>IEEE 802.11ac VHT40</td><td>5755 ~ 5795 MHz</td></tr> <tr><td>IEEE 802.11ac VHT80</td><td>5775 MHz</td></tr> <tr><td>IEEE 802.11ax HE20</td><td>5745 ~ 5825 MHz</td></tr> <tr><td>IEEE 802.11ax HE40</td><td>5755 ~ 5795 MHz</td></tr> <tr><td>IEEE 802.11ax HE80</td><td>5775 MHz</td></tr> </table>	IEEE 802.11a	5180 ~ 5240 MHz	IEEE 802.11n HT20	5180 ~ 5240 MHz	IEEE 802.11ac VHT20	5180 ~ 5240 MHz	IEEE 802.11n HT40	5190 ~ 5230 MHz	IEEE 802.11ac VHT40	5190 ~ 5230 MHz	IEEE 802.11ac VHT80	5210 MHz	IEEE 802.11ax HE20	5180 ~ 5240 MHz	IEEE 802.11ax HE40	5190 ~ 5230 MHz	IEEE 802.11ax HE80	5210 MHz	IEEE 802.11a	5745 ~ 5825 MHz	IEEE 802.11n HT20	5745 ~ 5825 MHz	IEEE 802.11ac VHT20	5745 ~ 5825 MHz	IEEE 802.11n HT40	5755 ~ 5795 MHz	IEEE 802.11ac VHT40	5755 ~ 5795 MHz	IEEE 802.11ac VHT80	5775 MHz	IEEE 802.11ax HE20	5745 ~ 5825 MHz	IEEE 802.11ax HE40	5755 ~ 5795 MHz	IEEE 802.11ax HE80	5775 MHz
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Modulation Type	1. IEEE 802.11a mode: OFDM 2. IEEE 802.11n HT 20 MHz mode: OFDM 3. IEEE 802.11n HT 40 MHz mode: OFDM 4. IEEE 802.11ac VHT 20 MHz mode: OFDM 5. IEEE 802.11ac VHT 40 MHz mode: OFDM 6. IEEE 802.11ac VHT 80 MHz mode: OFDM 7. IEEE 802.11ax HE 20 MHz mode: OFDMA 8. IEEE 802.11ax HE 40 MHz mode: OFDMA 9. IEEE 802.11ax HE 80 MHz mode: OFDMA																																				

Remark:

1. Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom



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1.3 ANTENNA INFORMATION

Antenna Type	☐ PIFA ☐ PCB ☒ Dipole ☐ Coils
Antenna Brand / Model	Senao / 7102A1338000
Antenna Gain	Band I: 5150-5250MHz Ant 1: Gain 5.07dBi Ant 2: Gain 4.96dBi Direction gain: Gain: 8.03 dBi Band I (Elevation above 30°) Ant 1: Gain -2.57dBi Ant 2: Gain -1.96dBi Direction gain: Gain: 0.75 dBi Band IV: 5725-5850MHz Ant 1: Gain 4.85dBi Ant 2: Gain 5.03dBi Direction gain: Gain: 7.95 dBi

Note:

- 1.The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203.
2. Directional Gain= $10 \cdot \log \left(\frac{10^{\text{Ant1}/20} + 10^{\text{Ant 2}/20}}{2} \right)$.



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1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.21 dB
Channel Bandwidth	± 2.79 dB
RF output power (Spectrum)	± 2.74 dB
Power Spectral density	± 2.74 dB
Radiated Emission_9kHz-30MHz	± 3.492 dB
Radiated Emission_30MHz-200MHz	± 3.62 dB
Radiated Emission_200MHz-1GHz	± 3.899 dB
Radiated Emission_1GHz-6GHz	± 5.063 dB
Radiated Emission_6GHz-18GHz	± 5.122 dB
Radiated Emission_18GHz-26GHz	± 3.032 dB
Radiated Emission_26GHz-40GHz	± 3.271 dB

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	David Li	-
Radiation	Tony Chao	-
RF Conducted	Marco Chan	-

Remark: The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309



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1.6 INSTRUMENT CALIBRATION

Conducted_FCC/IC/NCC (All)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
PXA Signal Analyzer	Keysight	N9030B	MY62291089	2024-10-04	2025-10-03
Power Sensor	Anritsu	MA2411B	1911387	2024-08-30	2025-08-29
Power Sensor	Anritsu	MA2411B	1911386	2024-07-19	2025-07-18
Power Meter	Anritsu	ML2496A	2136002	2024-07-19	2025-07-18
DC Blocks	Marvelous Microwave	MVE6411	MVE-001	2024-08-08	2025-08-07
Attenuator	Marvelous Microwave Inc	MVE2213-10	08	2024-11-07	2025-11-06
Software	Radio Test Software Ver. 21				

966A_Radiated					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Analyzer	KEYSIGHT	N9010A	MY52220817	2024-03-15	2025-03-14
Thermo-Hygro Meter	WISEWIND	1206	D07	2024-11-26	2025-11-25
Active Loop Antenna	SCHWARZBECK	FMZB 1513-60	1513-60-028	2024-12-11	2025-12-10
Bi-Log Antenna	Sunol Sciences	JB3	A030105	2024-07-12	2025-07-11
Preamplifier	EMEC	EM330	060609	2024-02-21	2025-02-20
Cable	Huber+Suhner	104PEA	20995+21000+182330	2024-08-07	2025-08-06
Horn Antenna	ETC	MCTD 1209	DRH13M02003	2024-12-20	2025-12-19
Preamplifier	HP	8449B	3008A00965	2024-12-18	2025-12-17
Cable	EMCI	EMC101G	221011+221012+221213	2024-10-11	2025-10-10
Attenuator	Mini-Circuits	BW-S9W5	BWS9W5-09-966A-01	2024-02-07 2025-02-06	2025-02-06 2026-02-05
High Pass Filters	Titan Microwave	T04H70002600050S01	22011402-6	2025-01-22	2026-01-21
Horn Antenna	SCHWARZBECK	BBHA9170	1047	2024-12-06	2025-12-05
Pre-Amplifier	EMCI	EMC184045SE	980860	2024-12-02	2025-12-01
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Site Validation	CCS	966A	N/A	2024-08-03	2025-08-02
Software	e3 V9-210616c				

Remark:

- Each piece of equipment is scheduled for calibration once a year.
- N.C.R. = No Calibration Required.



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AC Mains Conduction					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESCI	100064	2024-06-14	2025-06-13
LISN	TESEQ	LN2-16N	22012	2024-02-29	2025-02-27
Cable	Woken	SFL402	185A	2024-07-08	2025-07-07
Software	e3 V6-110812				

- Remark:**
- 1. Each piece of equipment is scheduled for calibration once a year.
 - 2. N.C.R. = No Calibration Required.



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1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

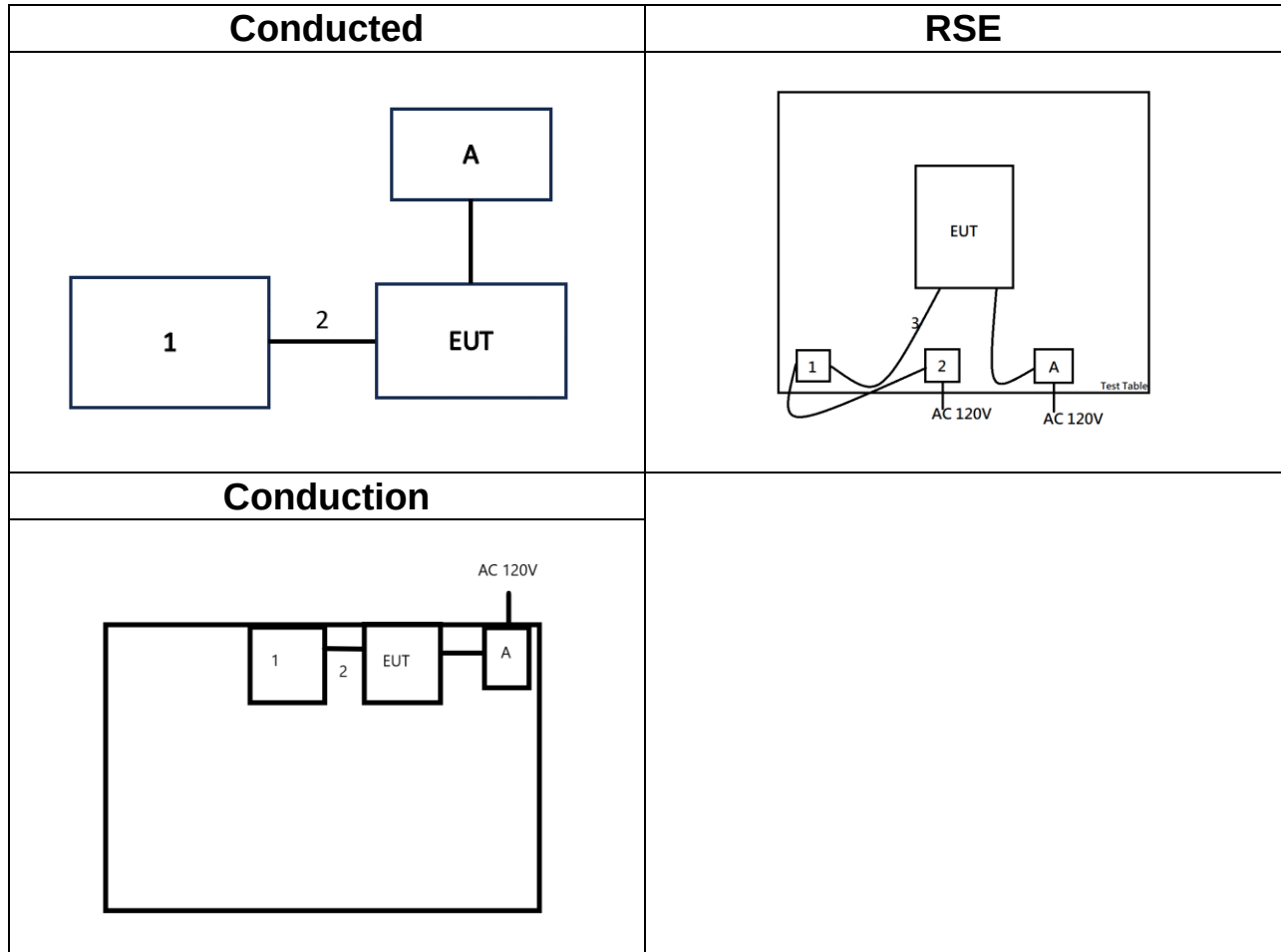
EUT Accessories Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
	N/A					

Support Equipment (Conducted)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(1822)	Lenovo	L480	N/A	N/A
2	Lan Cable	ATAKE	AC6-FL10	N/A	N/A
A	Adapter	APD	DA-80A54	N/A	N/A

Support Equipment (RSE)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
3	RJ 45	atake	AC6-FL10	202108270206	N/A
A	Adapter	APD	DA-80A54	S3B01999000025	N/A

Support Equipment (Conduction)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	RJ 45	AWM	E189529	N/A	N/A
A	Adapter	APD	DA-80A54	S3B01999000025	N/A

1.8 TEST SET UP DIAGRAM



1.9 TEST PROGRAM

The EUT connection corresponds to the surrounding fixture control board.
This EUT uses "Tera Term" setup command and Fleming.cxtt software to set the frequency, modulation, and power to allow the sample to continuously transmit.

1.10 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.407, KDB 789033 D02 v02r01.



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2. TEST SUMMERY

FCC Standard Sec.	Chapter	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207	4.1	AC Conducted Emission	Pass
15.407(a)	4.2	26dB Bandwidth	Pass
15.407(e)	4.2	6dB Bandwidth	Pass
2.1049	4.2	Occupied Bandwidth (99%)	Pass
15.407(a)	4.3	Output Power Measurement	Pass
15.407(a)	4.4	Power Spectral Density	Pass
15.407(b)	4.5	Radiation Band Edge	Pass
15.407(b)	4.5	Radiation Spurious Emission	Pass
15.203	1.3	Antenna Requirement	Pass



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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	1. IEEE 802.11a mode: 6Mbps 2. IEEE 802.11n HT20 mode: MCS0 3. IEEE 802.11n HT40 mode: MCS0 4. IEEE 802.11ac VHT20 mode: MCS0 5. IEEE 802.11ac VHT40 mode: MCS0 6. IEEE 802.11ac VHT80 mode: MCS0 7. IEEE 802.11ax HE20 mode: MCS0 8. IEEE 802.11ax HE40 mode: MCS0 9. IEEE 802.11ax HE80 mode: MCS0																																											
Operating Frequency	<table><tr><td></td><td>Mode</td><td>Frequency Range (MHz)</td></tr><tr><td rowspan="9">U-NII-1</td><td>IEEE 802.11a</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11n HT20</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11n HT40</td><td>5190, 5230</td></tr><tr><td>IEEE 802.11ac VHT20</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11ac VHT40</td><td>5190, 5230</td></tr><tr><td>IEEE 802.11ac VHT80</td><td>5210</td></tr><tr><td>IEEE 802.11ax HE20</td><td>5180, 5220, 5240</td></tr><tr><td>IEEE 802.11ax HE40</td><td>5190, 5230</td></tr><tr><td>IEEE 802.11ax HE80</td><td>5210</td></tr><tr><td rowspan="9">U-NII-3</td><td>IEEE 802.11a</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11n HT20</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11n HT40</td><td>5755, 5795</td></tr><tr><td>IEEE 802.11ac VHT20</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11ac VHT40</td><td>5755, 5795</td></tr><tr><td>IEEE 802.11ac VHT80</td><td>5775</td></tr><tr><td>IEEE 802.11ax HE20</td><td>5745, 5785, 5825</td></tr><tr><td>IEEE 802.11ax HE40</td><td>5755, 5795</td></tr><tr><td>IEEE 802.11ax HE80</td><td>5775</td></tr></table>				Mode	Frequency Range (MHz)	U-NII-1	IEEE 802.11a	5180, 5220, 5240	IEEE 802.11n HT20	5180, 5220, 5240	IEEE 802.11n HT40	5190, 5230	IEEE 802.11ac VHT20	5180, 5220, 5240	IEEE 802.11ac VHT40	5190, 5230	IEEE 802.11ac VHT80	5210	IEEE 802.11ax HE20	5180, 5220, 5240	IEEE 802.11ax HE40	5190, 5230	IEEE 802.11ax HE80	5210	U-NII-3	IEEE 802.11a	5745, 5785, 5825	IEEE 802.11n HT20	5745, 5785, 5825	IEEE 802.11n HT40	5755, 5795	IEEE 802.11ac VHT20	5745, 5785, 5825	IEEE 802.11ac VHT40	5755, 5795	IEEE 802.11ac VHT80	5775	IEEE 802.11ax HE20	5745, 5785, 5825	IEEE 802.11ax HE40	5755, 5795	IEEE 802.11ax HE80	5775
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	IEEE 802.11ax HE40	5755, 5795																																										
	IEEE 802.11ax HE80	5775																																										
Operation Transmitter	1. IEEE 802.11a mode: 2T2R(SISO) 2. IEEE 802.11n HT20 mode: 2T2R(MIMO) 3. IEEE 802.11n HT40 mode: 2T2R(MIMO) 4. IEEE 802.11ac VHT20 mode: 2T2R(MIMO) 5. IEEE 802.11ac VHT40 mode: 2T2R(MIMO) 6. IEEE 802.11ac VHT80 mode: 2T2R(MIMO) 7. IEEE 802.11ax HE20 mode: 2T2R(MIMO) 8. IEEE 802.11ax HE40 mode: 2T2R(MIMO) 9. IEEE 802.11ax HE80 mode: 2T2R(MIMO)																																											

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conduction Emission	
Test Condition	AC Power line conduction emission for line and neutral
Power supply Mode	Mode 1: EUT Power by Adapter
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Adapter
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☐ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☒ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Adapter Mode 2: EUT power by PoE Mode 3: EUT power by DC 12V
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:

1. The worst mode was record in this test report.
2. AC power line conducted emission were performed the EUT transmit at the highest output power channel as worse case.
3. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Z-Plane) were recorded in this report



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3.3 EUT DUTY CYCLE

Temperature: 20.6 ~ 23.7°C

Test date: February 5 ~ 12, 2025

Humidity: 48 ~ 59% RH

Tested by: Marco Chan

Mode		Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a		95.74	0.19	0.51	1.00
802.11n_20		80.41	0.95	0.18	1.00
802.11ac_20		80.33	0.95	0.18	1.00
802.11n_40		80.32	0.95	0.18	1.00
802.11ac_40		80.41	0.95	0.18	1.00
802.11ac_80		80.32	0.95	0.18	1.00
Mode	RU Config	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11ax_20	Full	80.37	0.95	0.18	1.00
802.11ax_40	Full	80.34	0.95	0.18	1.00
802.11ax_80	Full	80.37	0.95	0.18	1.00



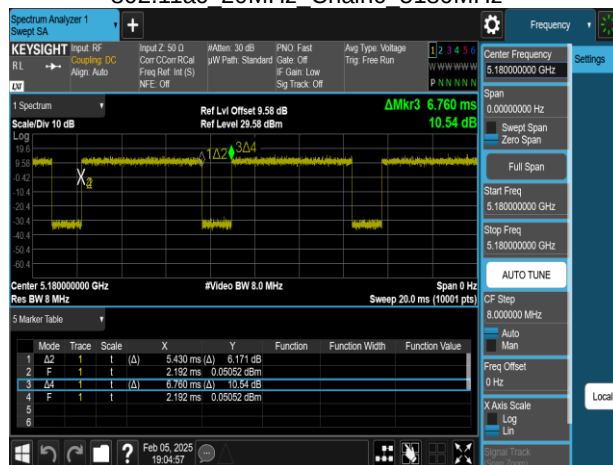
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802.11a 20MHz Chain0 5180MHz



802.11ac 20MHz Chain0 5180MHz



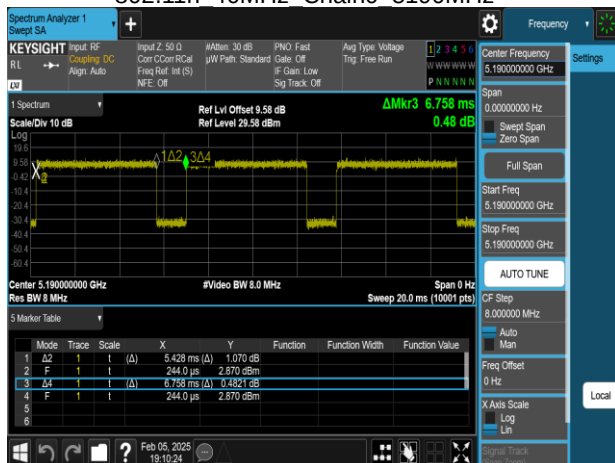
802.11n 20MHz Chain0 5180MHz



802.11ac 40MHz Chain0 5190MHz



802.11n 40MHz Chain0 5190MHz



802.11ac 80MHz Chain0 5210MHz



4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dB μ V)	
	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

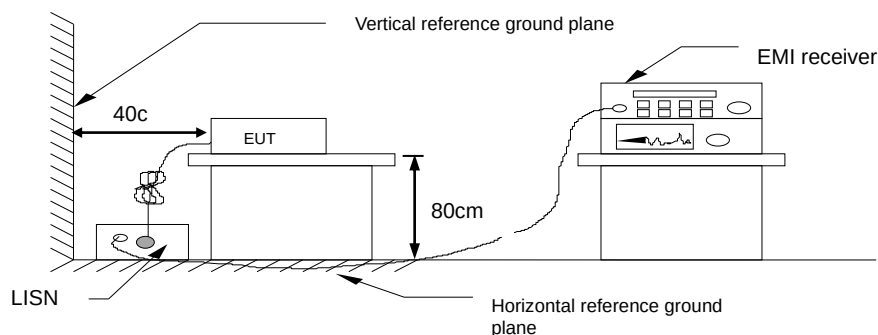
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

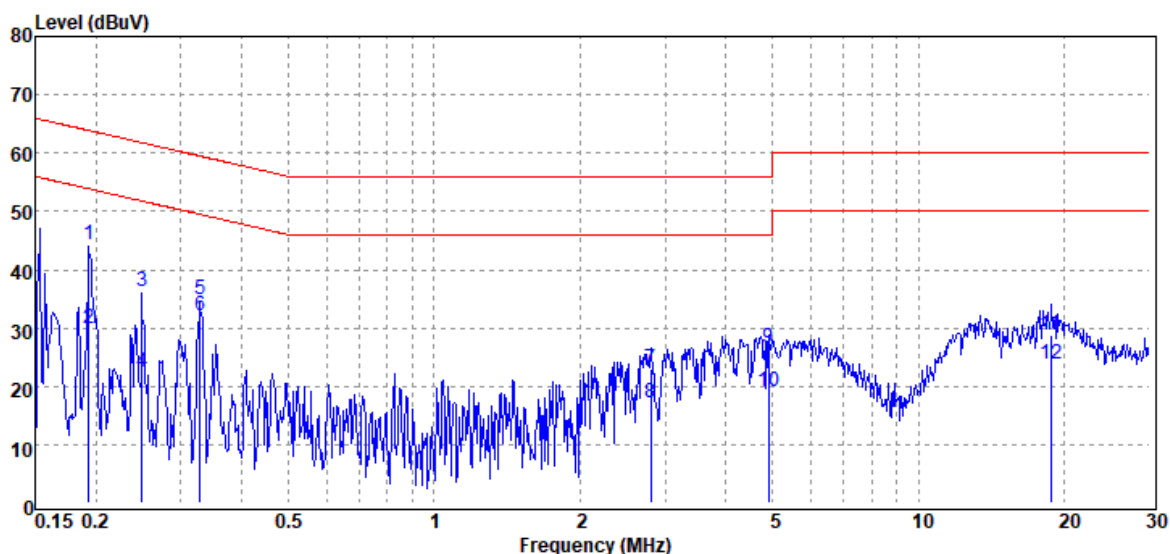
4.1.3 Test Setup



4.1.4 Test Result

Project No : TM-2412000476P
Operation Mode : 5G
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2025-02-10
Temp./Humi. : 23.4°C / 54%
Engineer : David Li
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.193	QP	43.96	0.36	44.32	63.89	-19.57
0.193	Average	29.40	0.36	29.76	53.89	-24.13
0.250	QP	35.88	0.39	36.27	61.77	-25.50
0.250	Average	22.04	0.39	22.43	51.77	-29.34
0.329	QP	34.57	0.38	34.95	59.48	-24.53
0.329	Average	31.77	0.38	32.15	49.48	-17.33
2.805	QP	22.64	0.20	22.84	56.00	-33.16
2.805	Average	16.84	0.20	17.04	46.00	-28.96
4.903	QP	26.27	0.26	26.53	56.00	-29.47
4.903	Average	18.94	0.26	19.20	46.00	-26.80
18.775	QP	28.30	0.46	28.76	60.00	-31.24
18.775	Average	23.27	0.46	23.73	50.00	-26.27

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

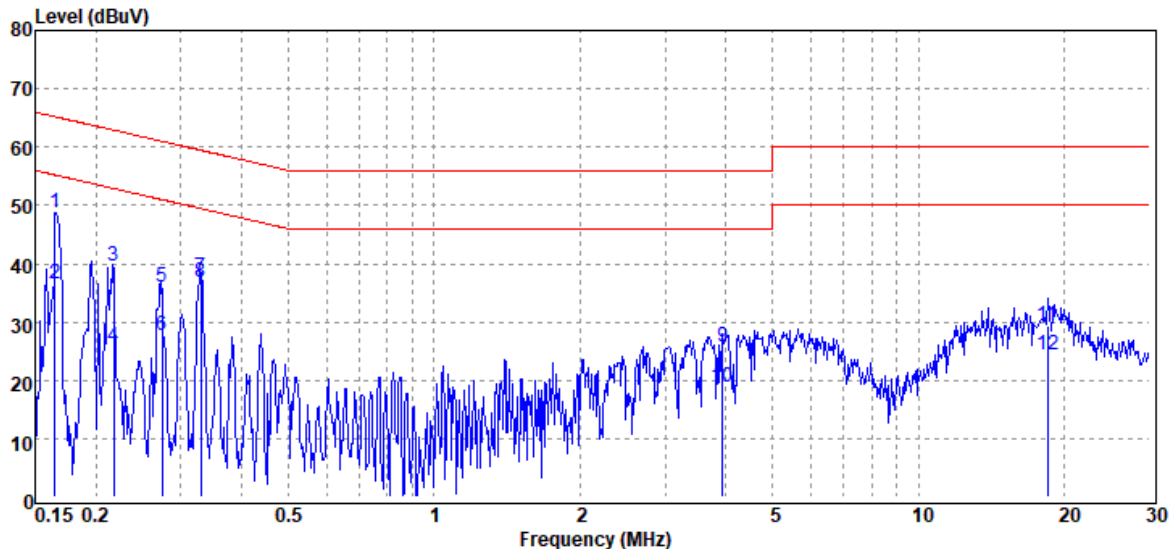


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Project No : TM-2412000476P
Operation Mode : 5G
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2025-02-10
Temp./Humi. : 23.4°C / 54%
Engineer : David Li
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.165	QP	48.64	0.19	48.83	65.21	-16.38
0.165	Average	36.22	0.19	36.41	55.21	-18.80
0.218	QP	39.25	0.36	39.61	62.90	-23.29
0.218	Average	25.45	0.36	25.81	52.90	-27.09
0.274	QP	35.59	0.36	35.95	61.00	-25.05
0.274	Average	27.41	0.36	27.77	51.00	-23.23
0.330	QP	37.21	0.35	37.56	59.46	-21.90
0.330	Average	36.51	0.35	36.86	49.46	-12.60
3.946	QP	25.46	0.21	25.67	56.00	-30.33
3.946	Average	18.74	0.21	18.95	46.00	-27.05
18.488	QP	28.83	0.43	29.26	60.00	-30.74
18.488	Average	23.81	0.43	24.24	50.00	-25.76

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

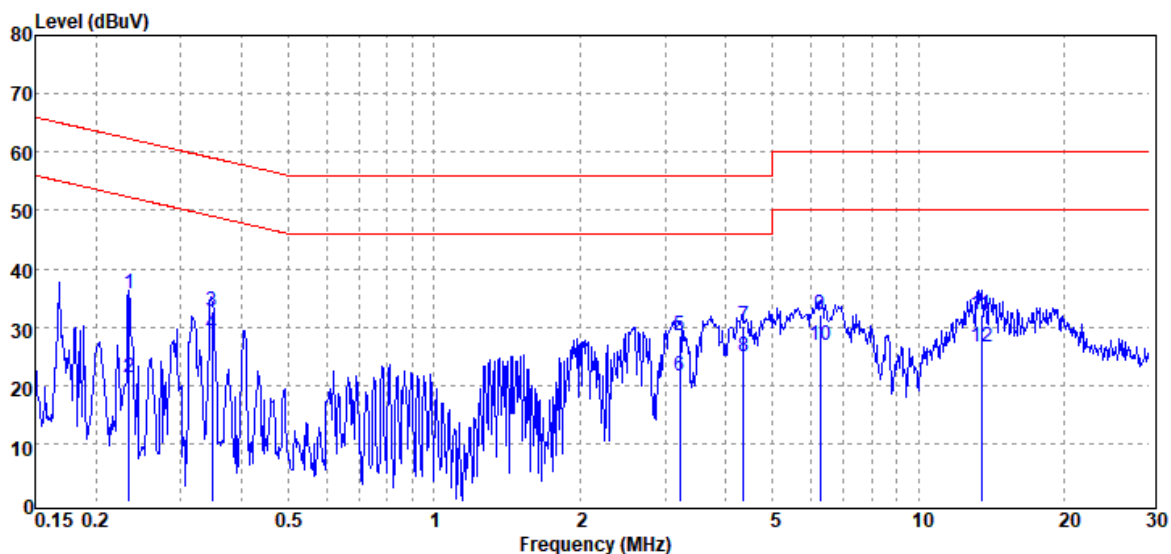


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Project No : TM-2412000476P
Operation Mode : 5G
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2025-02-10
Temp./Humi. : 23.4°C / 54%
Engineer : David Li
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.235	QP	35.28	0.39	35.67	62.29	-26.62
0.235	Average	20.99	0.39	21.38	52.29	-30.91
0.348	QP	32.26	0.38	32.64	59.01	-26.37
0.348	Average	28.49	0.38	28.87	49.01	-20.14
3.218	QP	28.25	0.22	28.47	56.00	-27.53
3.218	Average	21.46	0.22	21.68	46.00	-24.32
4.346	QP	29.92	0.25	30.17	56.00	-25.83
4.346	Average	24.61	0.25	24.86	46.00	-21.14
6.261	QP	31.86	0.29	32.15	60.00	-27.85
6.261	Average	26.48	0.29	26.77	50.00	-23.23
13.502	QP	31.64	0.41	32.05	60.00	-27.95
13.502	Average	26.12	0.41	26.53	50.00	-23.47

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

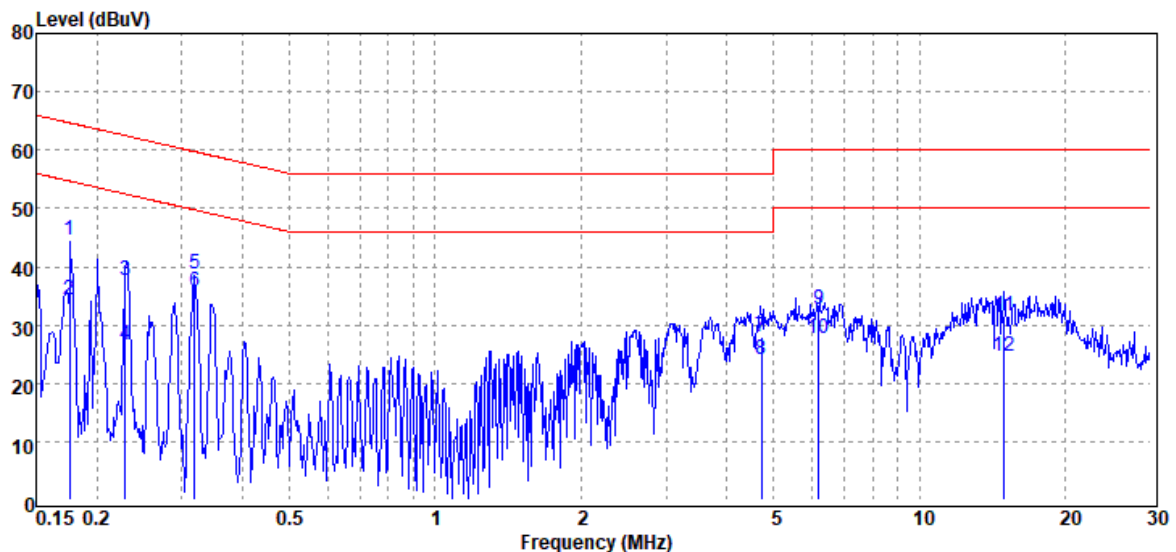


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Project No : TM-2412000476P
Operation Mode : 5G
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2025-02-10
Temp./Humi. : 23.4°C / 54%
Engineer : David Li
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.176	QP	44.20	0.24	44.44	64.68	-20.24
0.176	Average	34.18	0.24	34.42	54.68	-20.26
0.229	QP	37.15	0.36	37.51	62.47	-24.96
0.229	Average	26.32	0.36	26.68	52.47	-25.79
0.319	QP	38.47	0.35	38.82	59.73	-20.91
0.319	Average	35.38	0.35	35.73	49.73	-14.00
4.720	QP	27.85	0.23	28.08	56.00	-27.92
4.720	Average	23.81	0.23	24.04	46.00	-21.96
6.196	QP	32.37	0.27	32.64	60.00	-27.36
6.196	Average	27.33	0.27	27.60	50.00	-22.40
14.961	QP	31.20	0.40	31.60	60.00	-28.40
14.961	Average	24.30	0.40	24.70	50.00	-25.30

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit



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4.2 26dB BANDWIDTH, 6dB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

4.2.1 Test Limit

26 dB Bandwidth : For reporting purposes only.

6 dB Bandwidth : Least 500kHz.

Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

26dB

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW: approximately 1% of the emission bandwidth.
3. Set the VBW>RBW.
4. Detoctor = Peak.
5. Trace mode = max hold.
6. Measure the maximum width of the emission that is 26dB down from the peak of the emission. Compare this with the RBW setting of the analyser. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6dB

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW = 100 kHz.
3. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
4. Detoctor = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



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99%

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set center frequency to the nominal EUT channel center frequency.
3. Set span = 1.5 times to 5.0 times the OBW.
4. Set RBW = 1 % to 5% of the OBW.
5. Set VBW $\geq 3 \times \text{RBW}$

4.2.3 Test Setup

Refer to section 1.8.



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4.2.4 Test Result

Temperature: 19.5 ~ 24.1°C
Humidity: 48 ~ 59% RH

Test date: February 5 ~ 21, 2025
Tested by: Marco Chan

Occupied Bandwidth(99%)

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.390	12.150
5220	16.441	12.160
5240	16.385	12.140

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	16.591	16.24
5785	16.534	16.22
5825	16.848	16.04

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.621	12.460
5220	17.627	12.460
5240	17.622	12.460

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.617	17.49
5785	17.652	17.43
5825	17.785	17.49

802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.599	12.450
5220	17.620	12.460
5240	17.603	12.460

802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.592	16.74
5785	17.602	16.73
5825	17.643	16.53

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.055	15.570
5230	36.002	15.560

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.029	36.04
5795	36.051	35.99

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.077	15.570
5230	36.032	15.570

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.025	35.96
5795	36.044	36.12

802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.456	18.780

802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5775	75.370	75.73

802.11ac_VHT80_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.437	18.780

802.11ac_VHT80_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5775	75.377	75.67

802.11ax_HE20_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5180	full	18.894	12.760
5220	full	18.915	12.770
5240	full	18.917	12.770

802.11ax_HE20_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5745	full	18.940	18.87
5785	full	18.942	18.73
5825	full	19.001	18.83

802.11ax_HE20_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5180	full	18.910	12.770
5220	full	18.884	12.760
5240	full	18.927	12.770

802.11ax_HE20_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5745	full	18.912	18.94
5785	full	18.911	18.55
5825	full	18.923	19.02

802.11ax_HE40_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5190	full	37.733	15.770
5230	full	37.758	15.770

802.11ax_HE40_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5755	full	37.761	37.81
5795	full	37.939	38.07

802.11ax_HE40_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5190	full	37.726	15.770
5230	full	37.753	15.770

802.11ax_HE40_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5755	full	37.687	37.55
5795	full	37.728	37.68

802.11ax_HE80_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5210	full	76.853	18.860

802.11ax_HE80_Ch0

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5775	full	76.912	76.92

802.11ax_HE80_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	10 Log (B) (dB)
5210	full	77.095	18.870

802.11ax_HE80_Ch1

Frequency (MHz)	RU config	99% BW (MHz)	6dB BW (MHz)
5775	full	77.071	76.30

6 dB Bandwidth & 26 dB Bandwidth

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	20.50	13.120
5220	20.82	13.180
5240	20.10	13.030

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	14.42	11.590
5785	15.93	12.020
5825	15.64	11.940

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.171497	< 5250
5745	5736.736879	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.01	13.220
5220	20.12	13.040
5240	20.88	13.200

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.81	12.260
5785	17.58	12.450
5825	17.61	12.460

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.809799	< 5250
5745	5736.166758	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	20.24	13.060
5220	20.33	13.080
5240	21.25	13.270

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.60	12.460
5785	17.53	12.440
5825	14.38	11.580

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.795254	< 5250
5745	5736.163086	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.35	16.060
5230	40.05	16.030

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.40	15.610
5795	36.35	15.610

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.059852	< 5250
5755	5736.875741	> 5725

802.11n_HT40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.15	16.040
5230	39.75	15.990

802.11n_HT40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.34	15.600
5795	36.36	15.610

802.11n_HT40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.102392	< 5250
5755	5736.892927	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.07	19.090

802.11ac_VHT80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	74.84	18.740

802.11ac_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.810636	< 5250
5775	5737.246865	> 5725

802.11ac_VHT80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.96	19.080

802.11ac_VHT80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	72.15	18.580

802.11ac_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.783946	< 5250
5775	5737.211321	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11ax_HE20_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5180	full	21.46	13.320
5220	full	20.74	13.170
5240	full	20.99	13.220

802.11ax_HE20_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.85	12.750
5785	full	19.09	12.810
5825	full	19.02	12.790

802.11ax_HE20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.441435	< 5250
5745	5735.489563	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11ax_HE20_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5180	full	20.93	13.210
5220	full	20.95	13.210
5240	full	21.01	13.220

802.11ax_HE20_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.91	12.770
5785	full	19.02	12.790
5825	full	18.82	12.750

802.11ax_HE20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.481045	< 5250
5745	5735.509927	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11ax_HE40_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5190	full	40.05	16.030
5230	full	40.32	16.060

802.11ax_HE40_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	37.29	15.720
5795	full	34.41	15.370

802.11ax_HE40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.911897	< 5250
5755	5736.007976	> 5725

802.11ax_HE40_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5190	full	40.84	16.110
5230	full	40.24	16.050

802.11ax_HE40_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	37.58	15.750
5795	full	37.48	15.740

802.11ax_HE40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.884964	< 5250
5755	5736.064549	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

802.11ax_HE80_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5210	full	81.78	19.130

802.11ax_HE80_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5775	full	77.49	18.890

802.11ax_HE80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.674568	< 5250
5775	5736.519530	> 5725

802.11ax_HE80_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5210	full	81.34	19.100

802.11ax_HE80_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5775	full	74.58	18.730

802.11ax_HE80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.639297	< 5250
5775	5736.445381	> 5725

Note: The measurement results of all 6dBc test channels are greater than 500kHz.

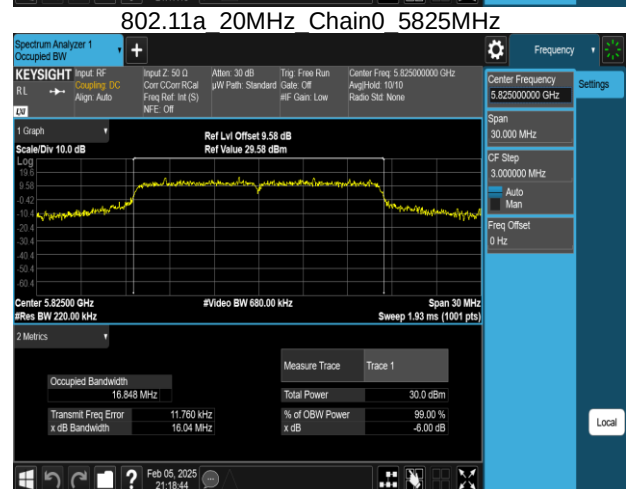
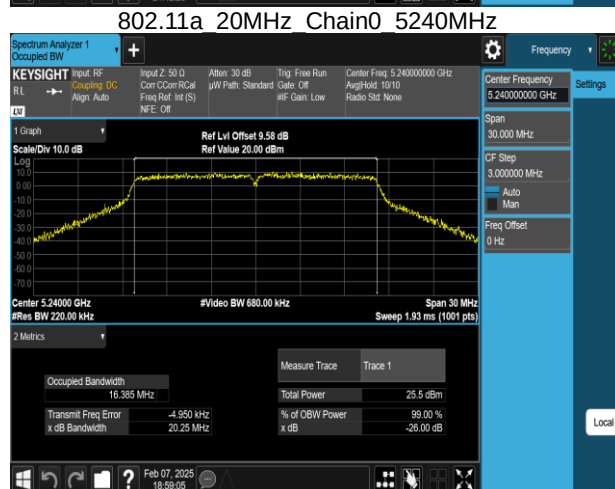
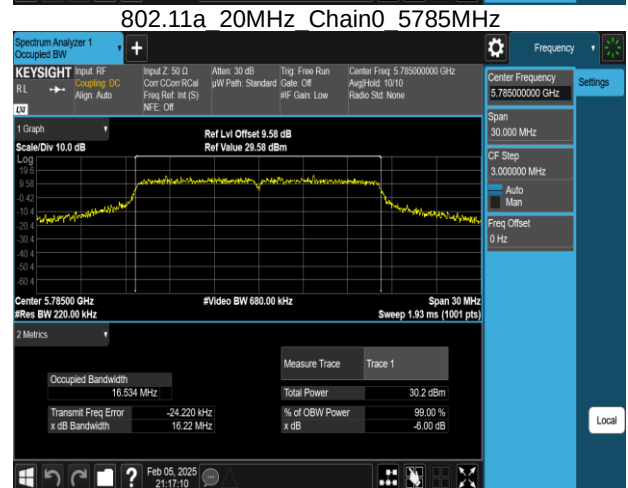
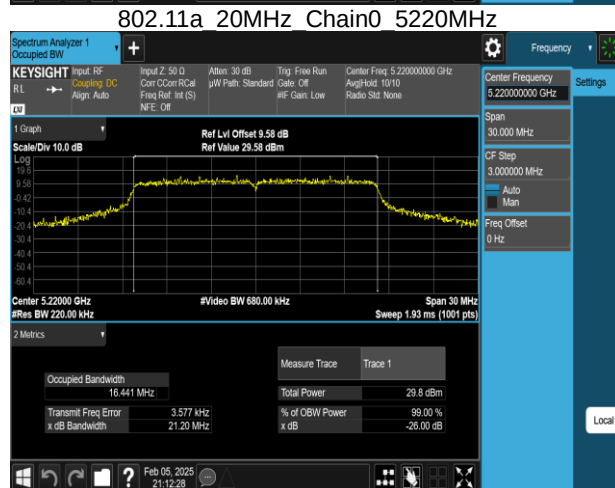
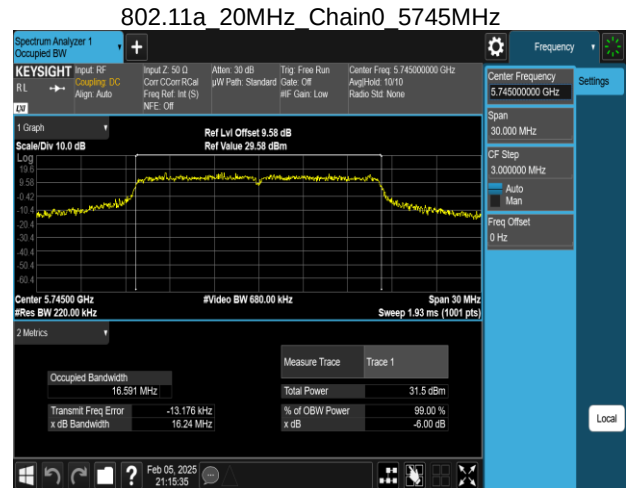
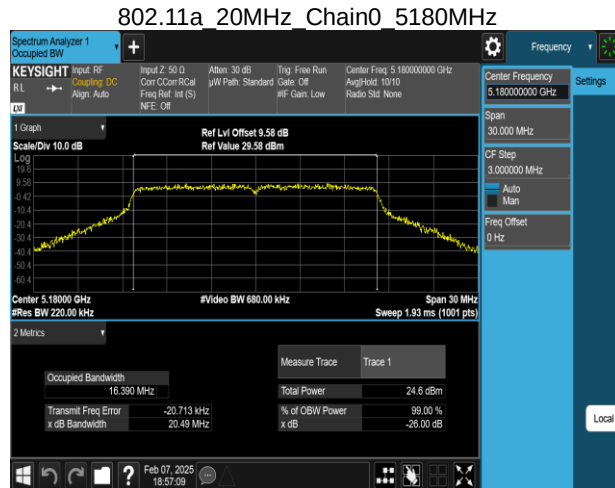


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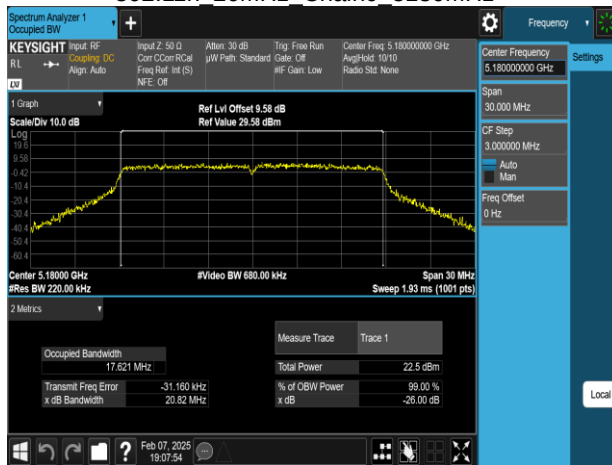
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Test Data

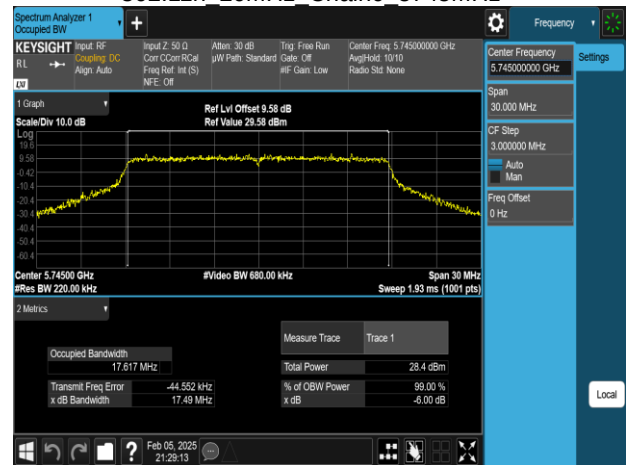
Occupied Bandwidth(99%)



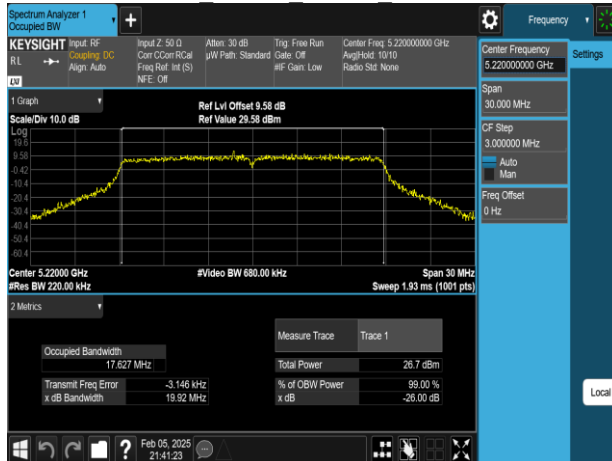
802.11n 20MHz Chain0 5180MHz



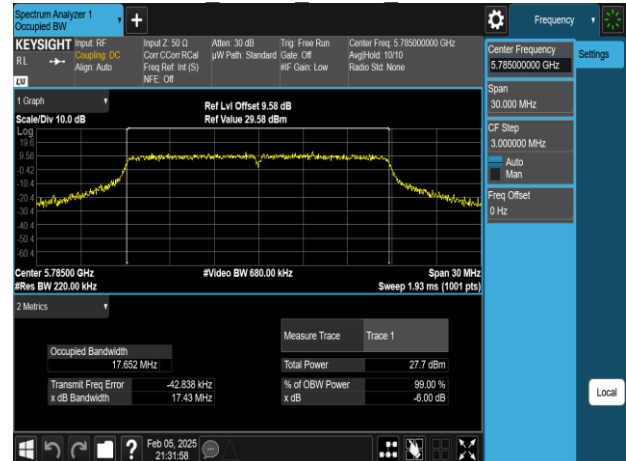
802.11n 20MHz Chain0 5745MHz



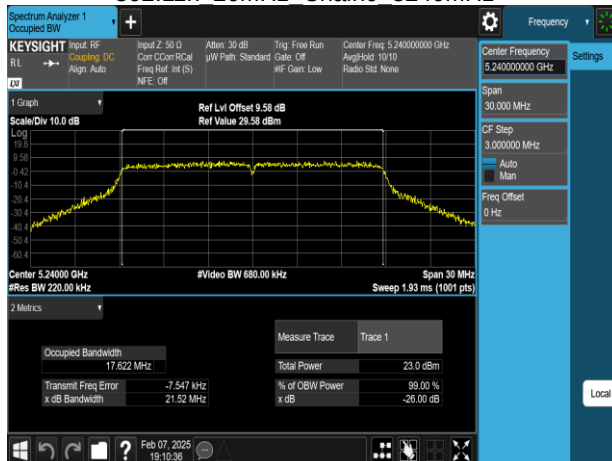
802.11n 20MHz Chain0 5220MHz



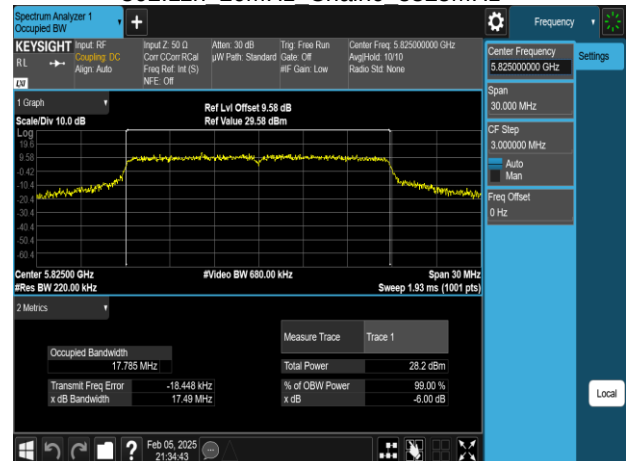
802.11n 20MHz Chain0 5785MHz



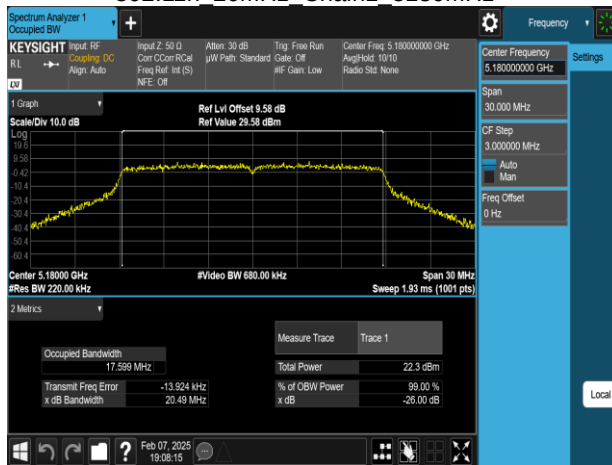
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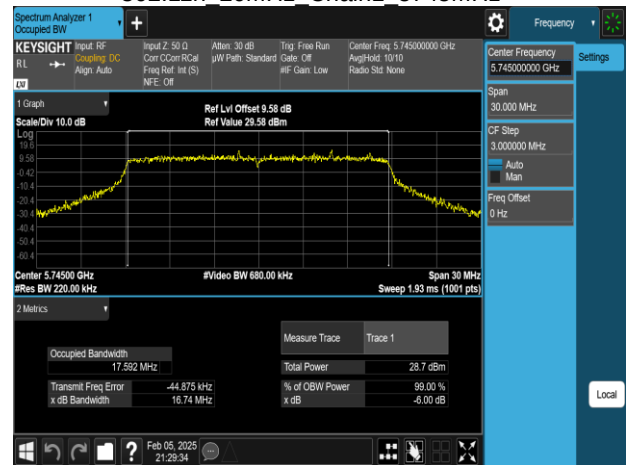
802.11n 20MHz Chain0 5825MHz



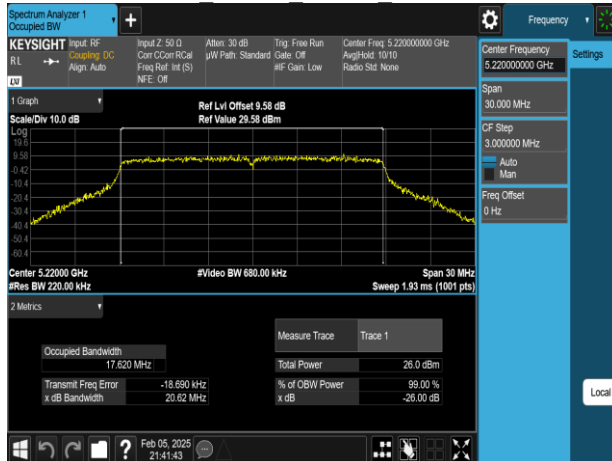
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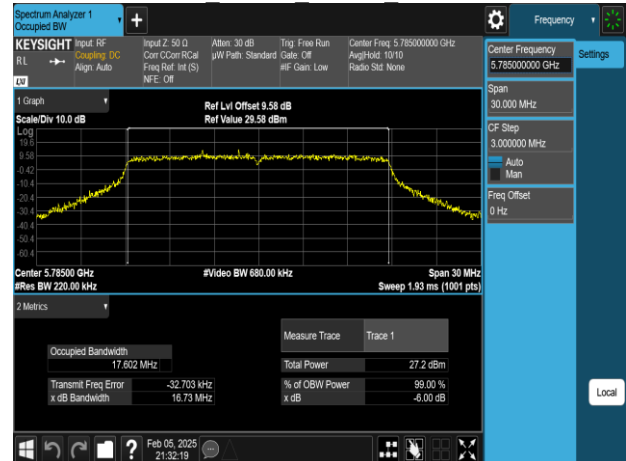
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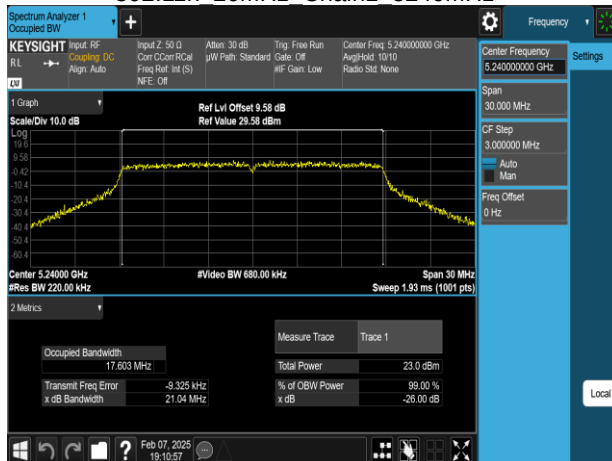
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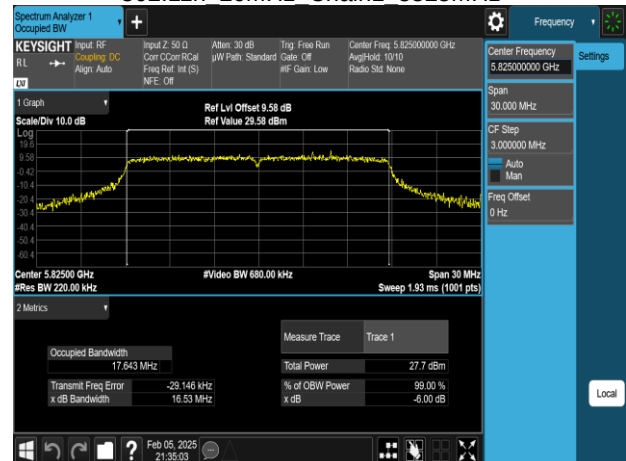
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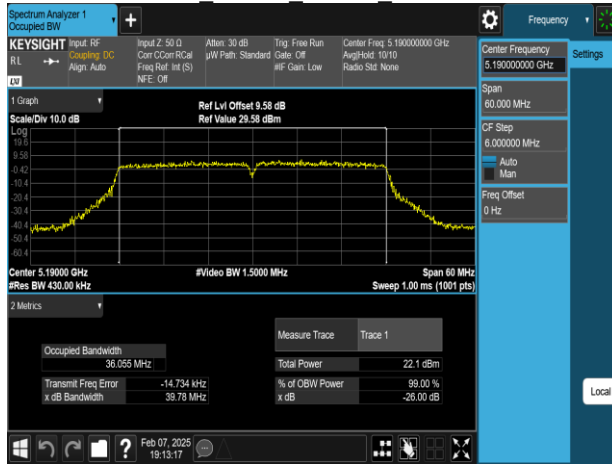
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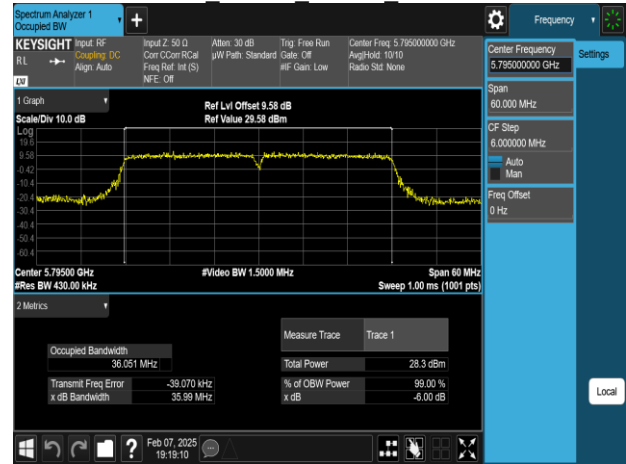
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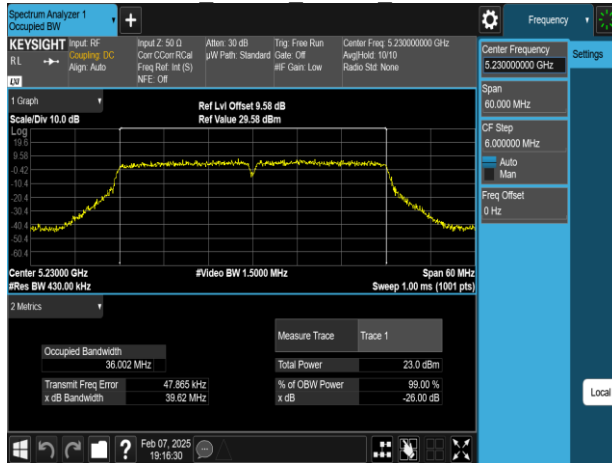
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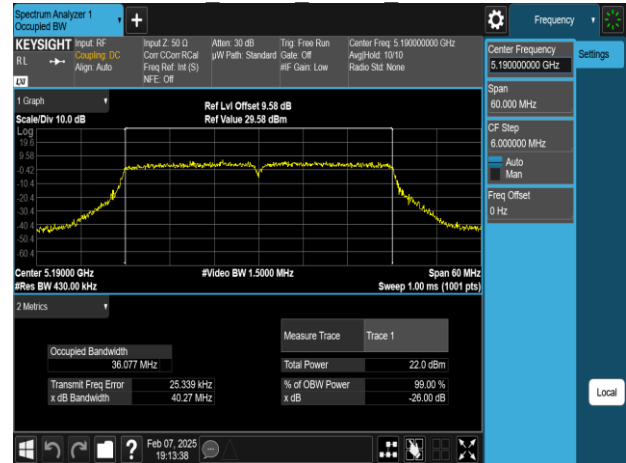
802.11n 40MHz Chain0 5795MHz



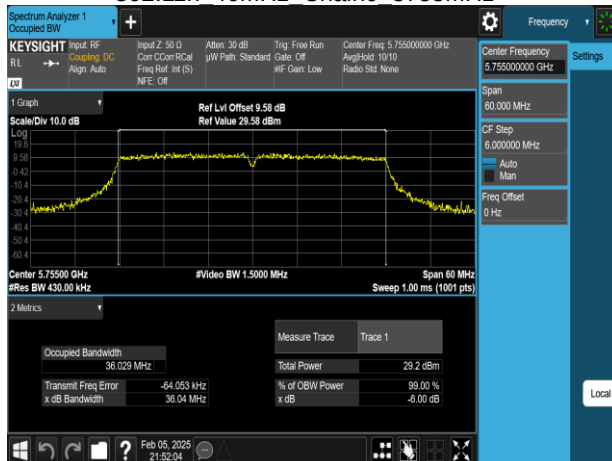
802.11n 40MHz Chain0 5230MHz



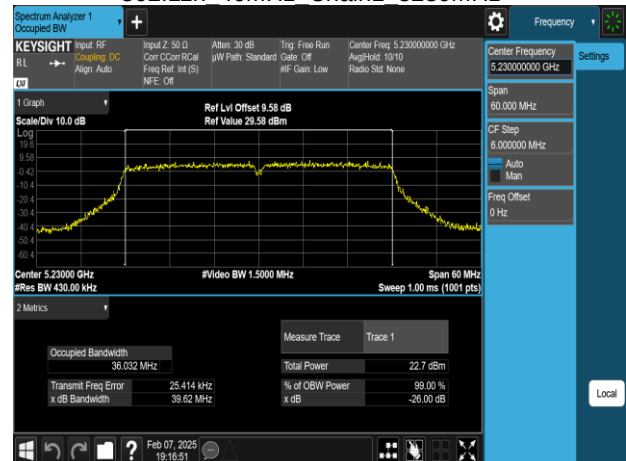
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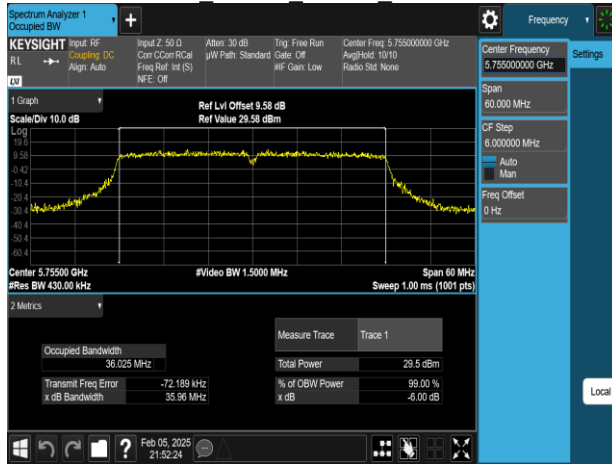
802.11n 40MHz Chain0 5755MHz



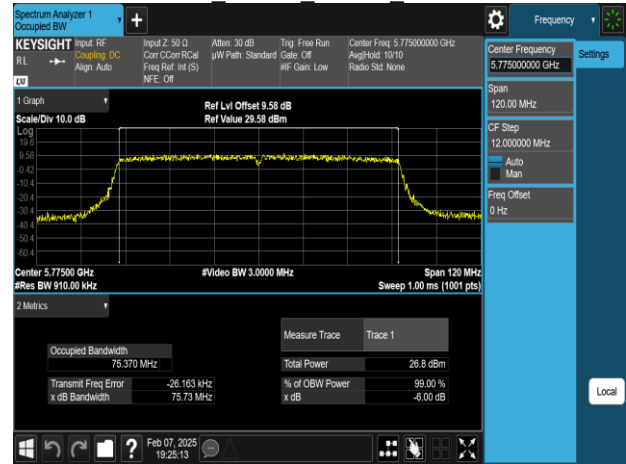
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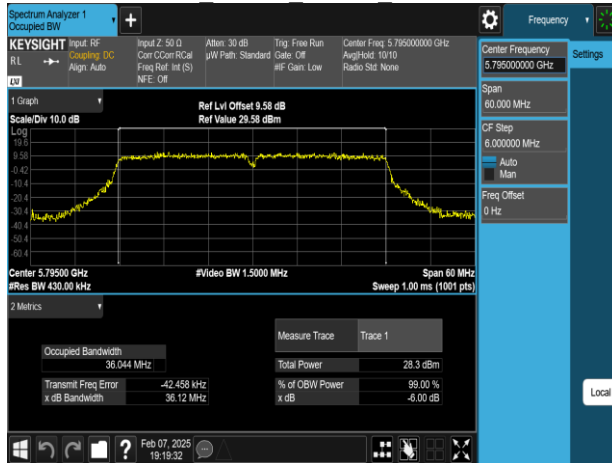
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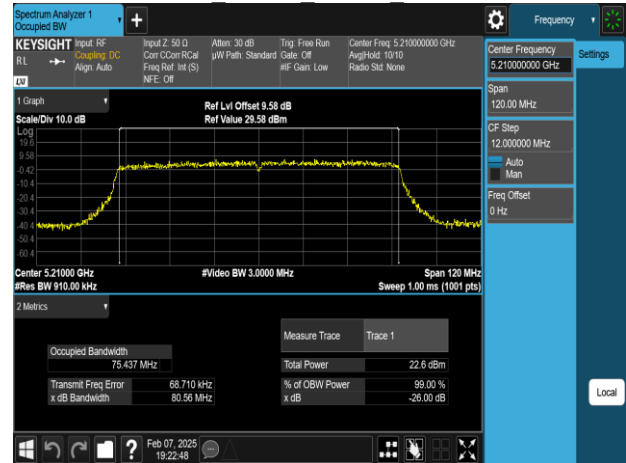
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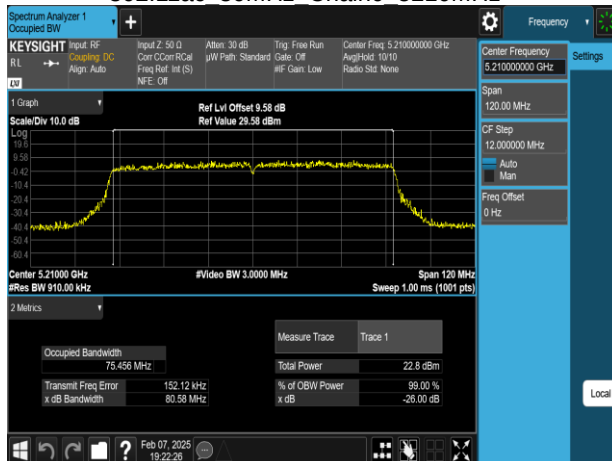
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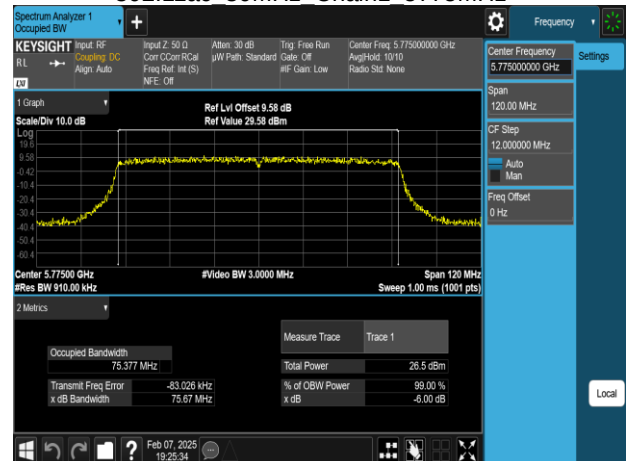
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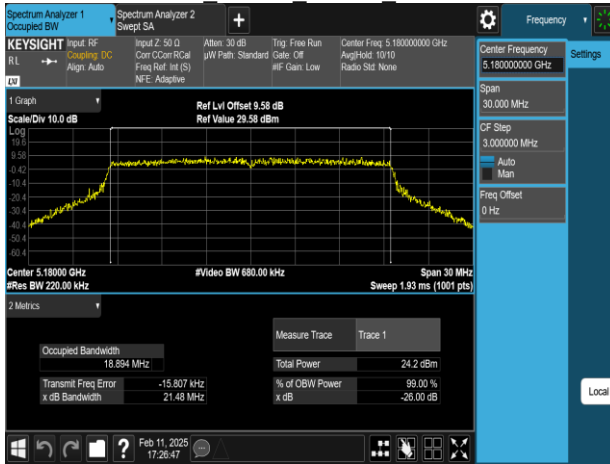
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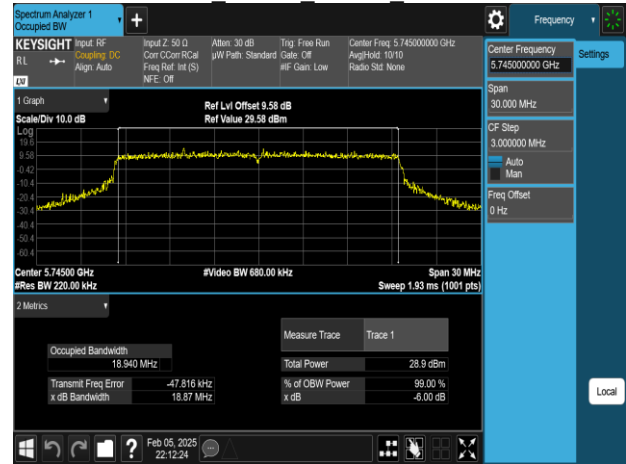
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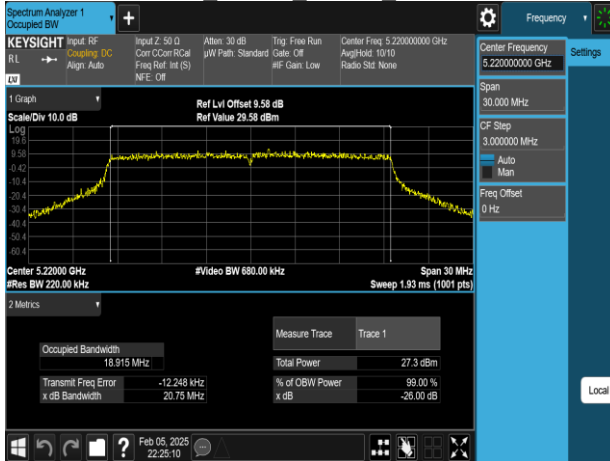
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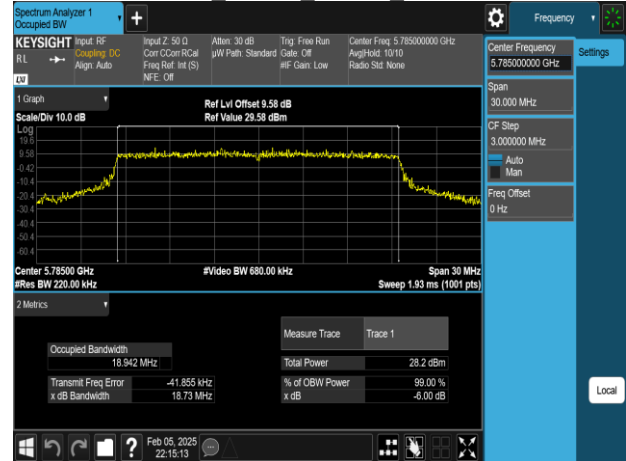
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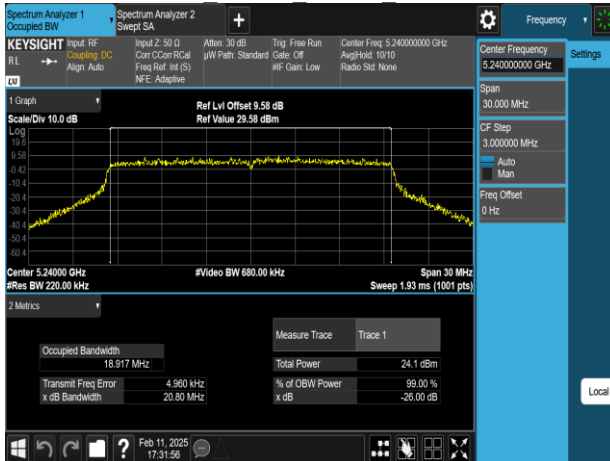
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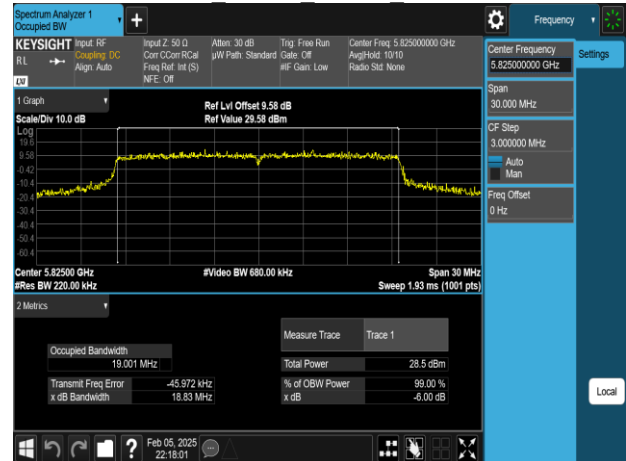
802.11ax 20MHz Chain0 5785MHz



802.11ax 20MHz Chain0 5240MHz



802.11ax 20MHz Chain0 5825MHz

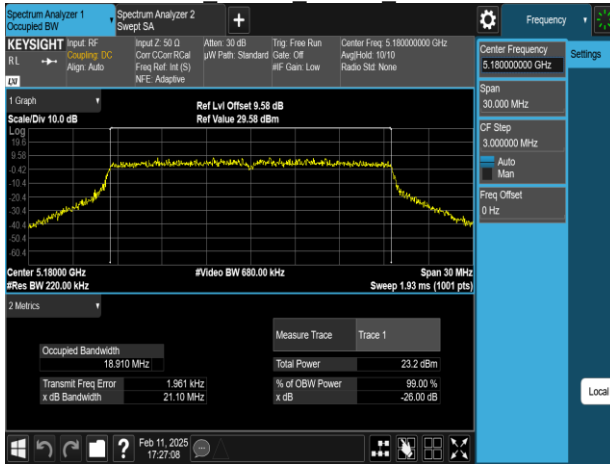




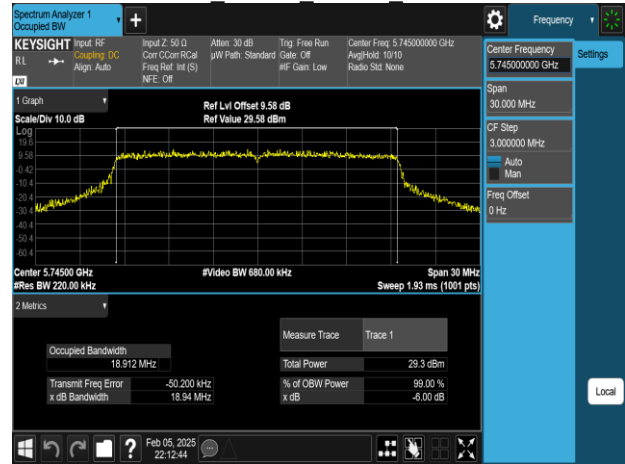
Project No: TM-2412000476P
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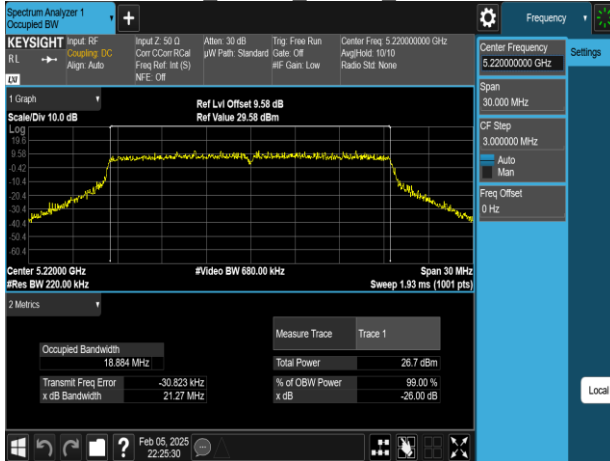
802.11ax 20MHz Chain1 5180MHz



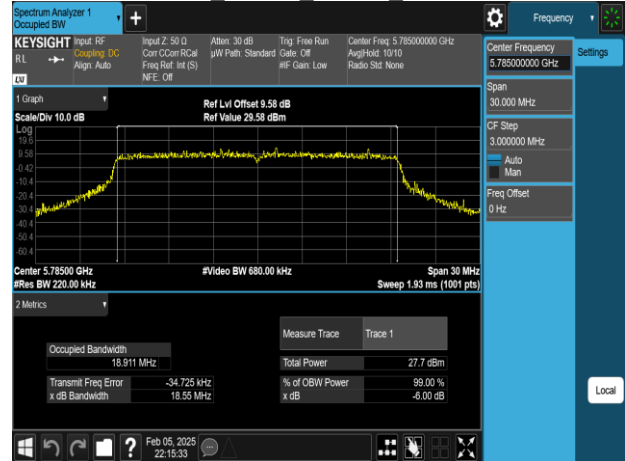
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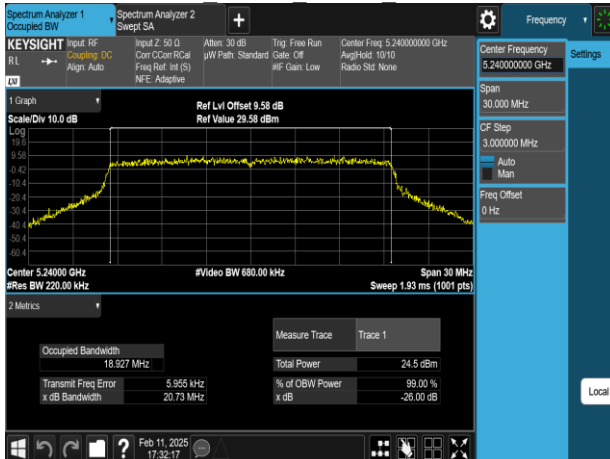
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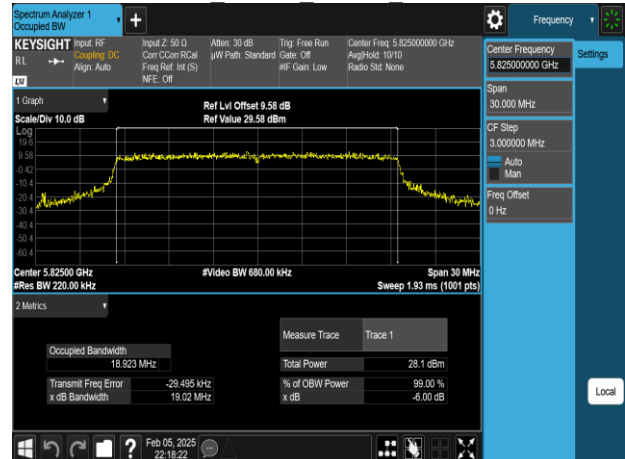
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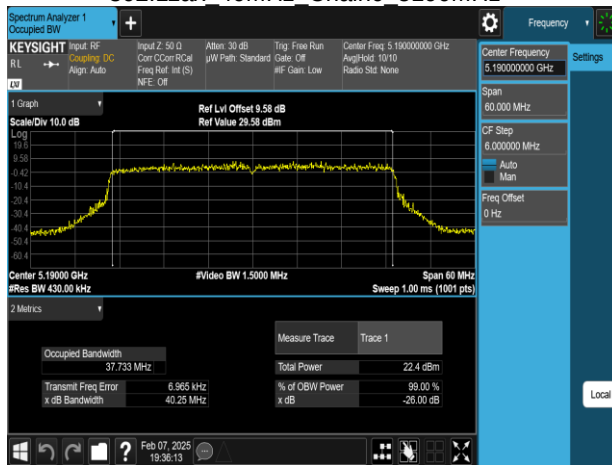
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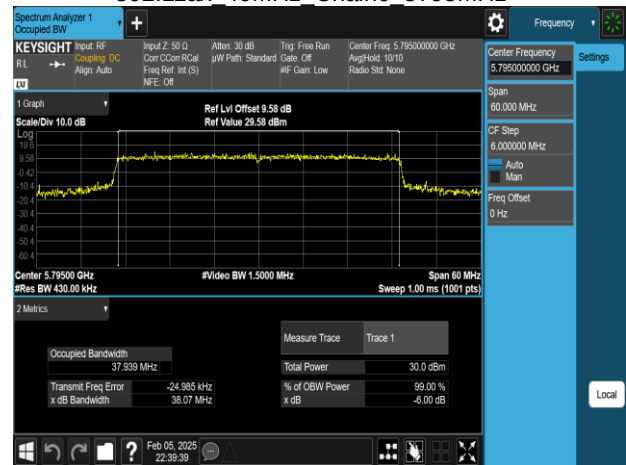
802.11ax 20MHz Chain1 5825MHz



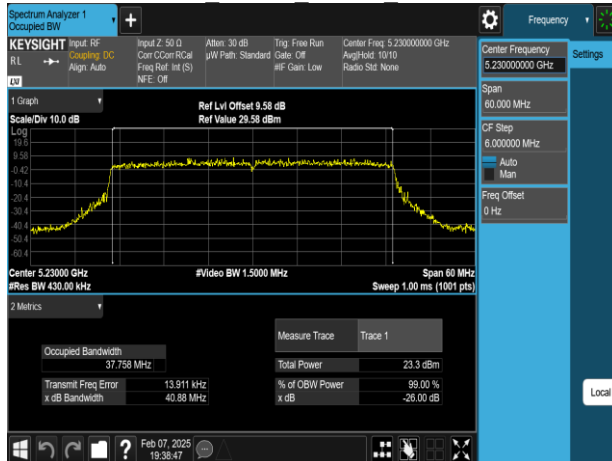
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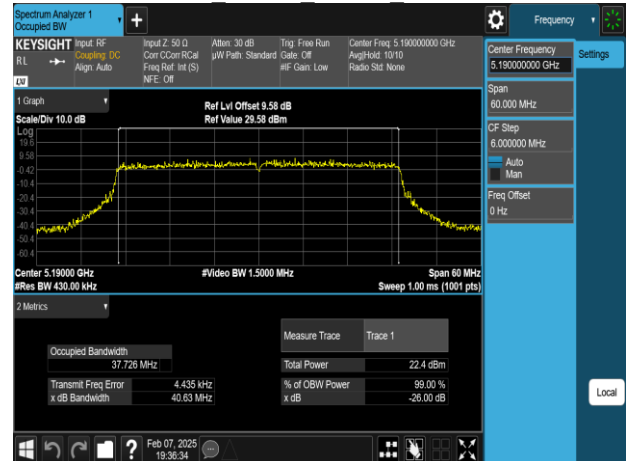
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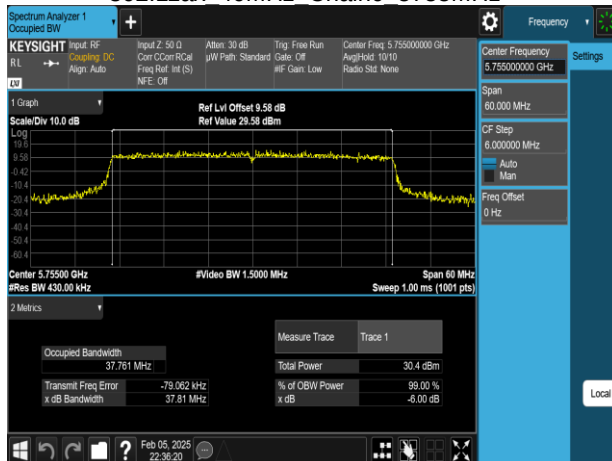
802.11ax 40MHz Chain0 5230MHz



802.11ax 40MHz Chain1 5190MHz



802.11ax 40MHz Chain0 5755MHz



802.11ax 40MHz Chain1 5230MHz

