FCC Test Report

Report No.: AGC16626240801FR04

FCC ID	:	2AW3IP01V71
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Smart Diagnostic System
BRAND NAME	:	XTOOL, AutoProPAD
MODEL NAME	:	P01V71, P720, P701, P711, IP819, IP616, IK618, IK618E, D7S, XT70, X100PADS, Scantech Pro, AutoProPAD Core, D7, D7X
APPLICANT	:	Shenzhen Xtooltech Intelligent Co., Ltd.
DATE OF ISSUE	:	Oct. 15, 2024
STANDARD(S)	:	FCC Part 15 Subpart E §15.407
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Oct. 15, 2024	Valid	Initial Release

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1. General Information

Applicant	Shenzhen Xtooltech Intelligent Co., Ltd.
Address	17&18/F, A2 Building, Creative City, Liuxian Avenue, Nanshan District, Shenzhen
Manufacturer	Shenzhen Xtooltech Intelligent Co., Ltd.
Address	17&18/F, A2 Building, Creative City, Liuxian Avenue, Nanshan District, Shenzhen
Factory	Bao'an Branch of Shenzhen Xtooltech Intelligent Co., Ltd.
Address	2, 3, 4/F, Building 12, Tangtou Third Industrial Zone, Shiyan street, Bao'an District, Shenzhen
Product Designation	Smart Diagnostic System
Brand Name	XTOOL, AutoProPAD
Main Model	P01V71
Series Model(s)	P720, P701, P711, IP819, IP616, IK618, IK618E, D7S, XT70, X100PADS, Scantech Pro, AutoProPAD Core, D7, D7X
Difference Description	Refer to the model variance declaration letter.
Date of receipt of test item	Aug. 29, 2024
Date of Test	Aug. 29, 2024 – Oct. 15, 2024
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-5G WLAN-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By	Bibo Zhang (Project Engineer)	Oct. 15, 2024
Reviewed By	Calvin Liu (Reviewer)	Oct. 15, 2024
Approved By	Max Zhang (Authorized Officer)	Oct. 15, 2024

2. Product Information

2.1 Product Technical Description

Equipment Type	☐ Outdoor access points ☐ Indoor access points ☐ Fixed P2P access points ☒ Client devices
Operation Frequency	☒ U-NII 1:5150MHz~5250MHz ☒ U-NII 2A: 5250MHz~5350MHz ☒ U-NII 2C:5470MHz~5725MHz ☒ U-NII 3: 5725MHz~5850MHz
DFS Design Type	☐ Master ☐ Slave with radar detection ☒ Slave without radar detection
TPC Function	☐ Yes ☒ No
Hardware Version	PAD01_PX30_MB_V2.1
Software Version	/
Test Frequency Range	For 802.11a/n-HT20/ac-VHT20: 5180~5240MHz/5260~5320MHz/5500~5720MHz/5745~5825MHz; For 802.11n-HT40/ac-VHT40: 5190~5230MHz/5270~5310MHz/5510~5710MHz/5755~5795MHz; For 802.11ac-VHT80: 5210MHz/5290MHz/5530~5690MHz/5775MHz
RF Output Power	802.11a:15.53dBm,802.11n(HT20):14.91dBm; 802.11n(HT40):12.52dBm; 802.11ac (VHT20):15.06dBm;802.11ac (VHT40):12.41dBm; 802.11ac (VHT80):11.59dBm
Modulation	802.11a/n:(64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11ac :(256-QAM, 64-QAM, 16-QAM, QPSK, BPSK) OFDM
Data Rate	802.11a:6/9/12/18/24/36/48/54Mbps; 802.11n: up to 300Mbps; 802.11ac: up to 866.6Mbps; 802.11ax: up to 1201Mbps
Number of channels	7 channels of U-NII-1 Band; 7 channels of U- NII-2A Band 12 channels of U-NII-2C Band; 8 channels of U- NII 3 Band
Antenna Designation	PIFA Antenna
Antenna Gain	P01V71: 4.27dBi P701: 1.96dBi P711: 5.68dBi
Power Supply	AC 120V, 60Hz for Adapter/DC 7.3V by Battery
Rating	DC 5V/9V, 3A

2.2 Table of Carrier Frequency

For 5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
42	5210 MHz	--	--

For 5260~5320MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
58	5290 MHz	--	--

For 5500~5700MHz:

11 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz		

5 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz		

2 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530 MHz	122	5610 MHz

For 5745~5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz	--	--

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
155	5775 MHz	--	--

2.3 IEEE 802.11n Modulation Scheme

MCS Index	Nss	Modulation	R	N_{BPSC}	N_{CBPS}		N_{DBPS}		Data rate (Mbps) 800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

2.4 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2AW3IP01V71 filing to comply with the FCC Part 15 requirements.

2.5 Test Methodology

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
5	KDB 789033	789033 D02 General U-NII Test Procedures New Rules v02r01

2.6 Special Accessories

Refer to section 4.4.

2.7 Equipment Modifications

Not available for this EUT intended for grant.

2.8 Antenna Requirement

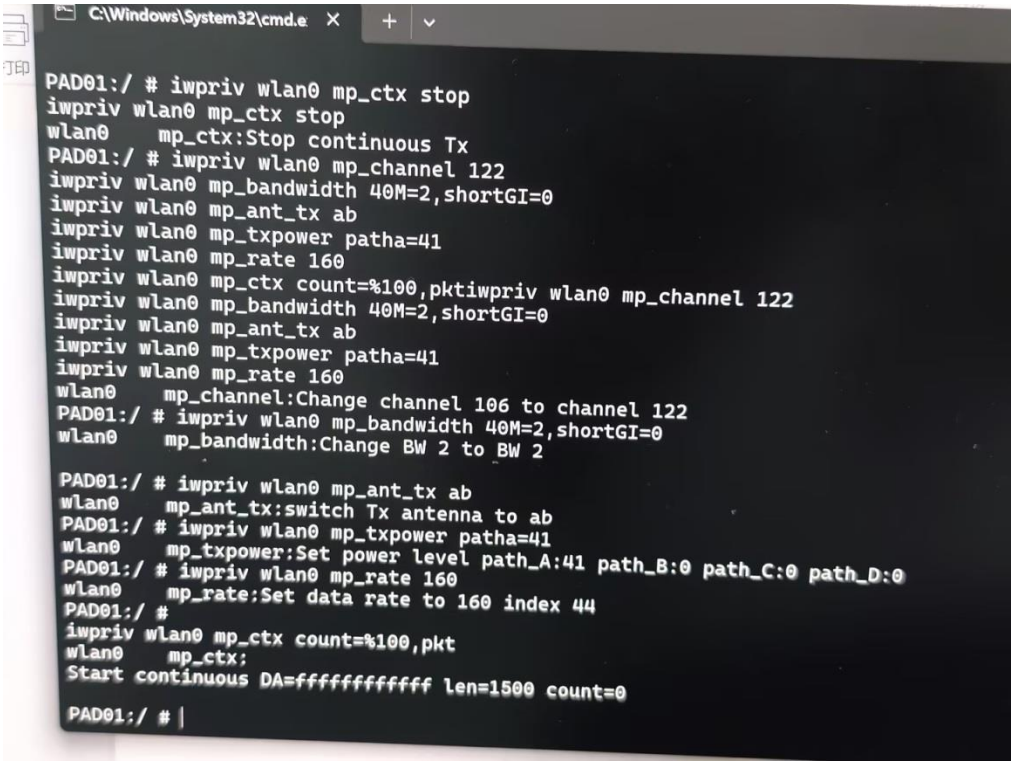
Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.
EUT Antenna:
The non-detachable antenna inside the device cannot be replaced by the user at will. The model P01V71gain of the antenna is 4.27dBi, the model P701gain of the antenna is 1.96dBi and the model P701gain of the antenna is 5.68dBi.

2.9 Description of Test Software

For IEEE 802.11 mode:

The test utility software used during testing was “adb”.

Software Setting Diagram



Test Mode U-NII-1 Band	Channel	Power Index
802.11a	L/M/H	57
802.11n(HT20)	L/M/H	56
802.11n(HT40)	L/M/H	47
802.11ac(VHT20)	L/M/H	56
802.11ac(VHT40)	L/M/H	47
802.11ac(VHT80)	L/M/H	48
Test Mode U-NII-2A Band	Channel	Power Index
802.11a	L/M/H	57
802.11n(HT20)	L/M/H	56
802.11n(HT40)	L/M/H	47
802.11ac(VHT20)	L/M/H	56
802.11ac(VHT40)	L/M/H	47
802.11ac(VHT80)	L/M/H	48
Test Mode U-NII-2C Band	Channel	Power Index
802.11a	L/M/H	60
802.11n(HT20)	L/M/H	59
802.11n(HT40)	L/M/H	53
802.11ac(VHT20)	L/M/H	59
802.11ac(VHT40)	L/M/H	53
802.11ac(VHT80)	L/M/H	48
Test Mode U-NII-3 Band	Channel	Power Index
802.11a	L/M/H	60
802.11n(HT20)	L/M/H	59
802.11n(HT40)	L/M/H	58
802.11ac(VHT20)	L/M/H	59
802.11ac(VHT40)	L/M/H	58
802.11ac(VHT80)	L/M/H	57

3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 Environmental Conditions

	Normal Conditions
Temperature range (℃)	15 - 35
Relative humidity range	20% - 75%
Pressure range (kPa)	86 - 106
Power supply	AC 120V, 60Hz for Adapter/DC 7.3V by Battery

3.4 Measurement Uncertainty

The reported uncertainty of measurement y ±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%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	U_c = ±2.9 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±3.9 dB
Uncertainty of Radiated Emission above 1GHz	U_c = ±4.9 dB
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2.7 %

3.5 List of Equipment Used

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2024-05-24	2025-05-23
☒	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2024-02-01	2025-01-31
☒	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2024-02-01	2025-01-31
☒	AGC-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-09-21	2025-09-20
☒	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2024-05-23	2025-05-22
☒	AGC-ER-E087	SIGNAL ANALYAER	KEYSIGHT	N9020B	MY56101792	2024-05-23	2025-05-22
☒	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2024-02-01	2025-01-31
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2024-05-24	2025-05-23
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2024-05-28	2025-05-27
☒	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2024-03-31	2025-03-30
☒	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2024-07-24	2026-07-23
☒	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2024-05-23	2025-05-22
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
☐	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
☒	AGC-ER-E087	SIGNAL ANALYAER	KEYSIGHT	N9020B	MY56101792	2024-05-23	2025-05-22

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2024-05-28	2025-05-27
☒	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2025-06-08
☒	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2024-05-28	2025-05-27

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
☒	AGC-EM-S003	RE Test System	FARA	EZ-EMC	VRA-03A
☒	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6
☒	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0

4.System Test Configuration

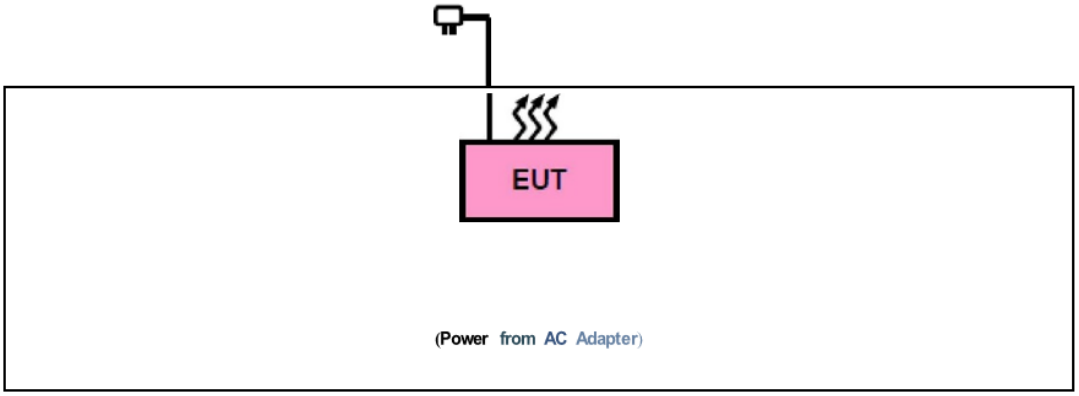
4.1 EUT Configuration

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

4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System



4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

☐ Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	Adapter 1	Aoboshen	PD0202C	20W: Rating Input Parameters: AC; DC. 100-240V; 500mA, Max; 120W; 50-60Hz. Rating Output Parameters: 5.0V 3.0A, 15.0W/9.0V 2.22A, 19.98W/12.0V 1.67A, 20.04W	--
2	Adapter 2	Aoboshen	PD030UC-0303	30W: Rating Input Parameters: AC; DC. 100-240V; 800mA, Max; 120W; 50-60Hz. Rating Output Parameters: 5.0V 3.0A/ 9.0V 3A/12.0V 2.5A/15V 2A/20V 1.5A (30W Max)	--

4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203	Antenna Equipment	Pass
2	§15.407(a/1/2/3)	RF Output Power	Pass
3	§15.407(e)	6 dB Bandwidth	Pass
4	§15.403(i)	99% Occupied Bandwidth	Pass
5	§15.407(a/1/2/3)	Power Spectral Density	Pass
6	§15.407(g)	Frequency Stability	Pass (See Note 1)
7	§15.407(c)	Transmission Discontinuation Requirement	Pass (See Note 2)
8	§15.407(b)(1/2/3/4)	Conducted Band Edge and Out-of-Band Emissions	Pass
9	§15.209,§15.407(b)(1/2/3/4)	Radiated Spurious Emission	Pass
10	§15.207	AC Power Line Conducted Emission	Pass

Note:

1. Refer to the manufacturer's declaration in the user manual.
2. The device operates without the transmission of information.

5. Description of Test Modes

EUT Configure Mode	Applicable To				Description
	RE > 1G	RE < 1G	PLC	APCM	
A	☒	☒	☒	☒	Powered by Adapter with WIFI(5G) Link
B	☒	☒	☒	☒	Powered by Battery with WIFI(5G) Link
C	--	--	--	--	Powered by USB with WIFI(5G) Link

Where, **RE＞1G: Radiated Emission above 1GHz** **PLC: Power Line Conducted Emission**

RE＜1G: Radiated Emission below 1GHz **APCM: Antenna Port Conducted Measurement**

NOTE 1: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

NOTE 2: "--"means no effect.

- **Radiated Emission Test (Above 1GHz):**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (IF EUT with antenna diversity architecture).

☐ Support 802.11ax, device debugging is tested in Full RU state

☐ The device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0

- **Radiated Emission Test (Below 1GHz):**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
☐ The device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
A	802.11a	5260-5320	52 to 64	64	OFDM	6.0

- **Power Line Conducted Emission Test:**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
☐ The device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
A	802.11a	5260-5320	52 to 64	64	OFDM	6.0

- **Band edge Measurement:**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
☐ Support 802.11ax, device debugging is tested in Full RU state
☐ The device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
A	802.11a	5180-5240	36 to 48	36	OFDM	6.0
A	802.11n (40MHz)		38 to 46	38	OFDM	MCS0
A	802.11ac (80MHz)		42	42	OFDM	MCS0
A	802.11a	5260-5320	52 to 64	52	OFDM	6.0
A	802.11n (40MHz)		54 to 62	62	OFDM	MCS0
A	802.11ac (80MHz)		58	58	OFDM	MCS0
A	802.11a	5500-5700	100 to 140	100	OFDM	6.0
A	802.11n (40MHz)		102 to 134	102	OFDM	MCS0
A	802.11ac (80MHz)		106	106	OFDM	MCS0

- **Antenna Port Conducted Measurement:**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).

☐ Support 802.11ax, device debugging is tested in Full RU state

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
A	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	MCS0
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	MCS0
A	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	MCS0
A	802.11ac (40MHz)		38 to 46	38, 46	OFDM	MCS0
A	802.11ac (80MHz)		42	42	OFDM	MCS0
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
A	802.11n (20MHz)		52 to 64	52, 60, 64	OFDM	MCS0
A	802.11n (40MHz)		54 to 62	54, 62	OFDM	MCS0
A	802.11ac (20MHz)		52 to 64	52, 60, 64	OFDM	MCS0
A	802.11ac (40MHz)		54 to 62	54, 62	OFDM	MCS0
A	802.11ac (80MHz)		58	58	OFDM	MCS0
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
A	802.11n (20MHz)		100 to 140	100, 116, 140	OFDM	MCS0
A	802.11n (40MHz)		102 to 134	102, 110, 134	OFDM	MCS0
A	802.11ac (20MHz)		100 to 140	100, 116, 140	OFDM	MCS0
A	802.11ac (40MHz)		102 to 134	102, 110, 134	OFDM	MCS0
A	802.11ac (80MHz)		106,122	106,122	OFDM	MCS0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
A	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	MCS0
A	802.11n (40MHz)		151 to 159	151, 159	OFDM	MCS0
A	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	MCS0
A	802.11ac (40MHz)		151 to 159	151, 159	OFDM	MCS0
A	802.11ac (80MHz)		155	155	OFDM	MCS0

6. Duty Cycle Measurement

5GHz WLAN (NII) operation is possible in 20MHz, 40MHz and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Average. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

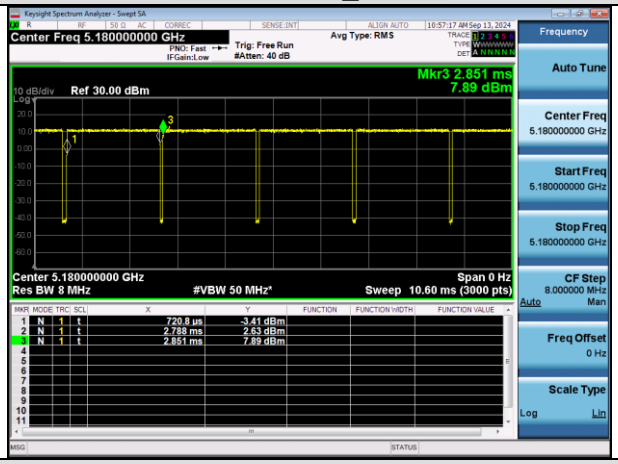
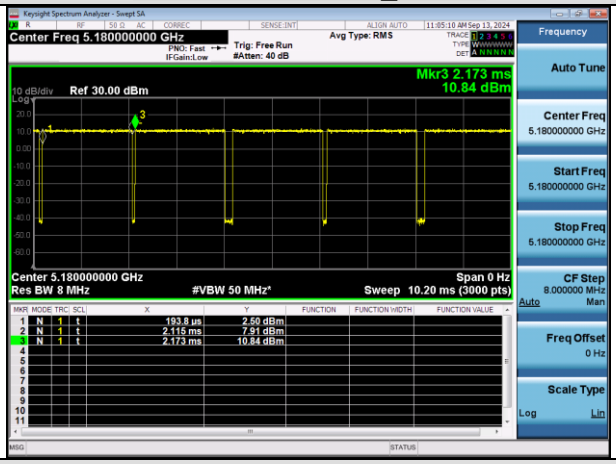
Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)
Band U-NII1:5150MHz-5250MHz			
802.11a	6	97.04	0.13
802.11n_HT20	MCS0	97.12	0.13
802.11n_HT40	MCS0	88.90	0.51
802.11ac_VHT20	MCS0	98.22	0.08
802.11ac_VHT40	MCS0	86.70	0.62
802.11ac_VHT80	MCS0	79.70	0.99
Band U-NII 2A:5250MHz-5350MHz94.73			
802.11a	6	92.93	0.32
802.11n_HT20	MCS0	95.90	0.18
802.11n_HT40	MCS0	88.17	0.55
802.11ac_VHT20	MCS0	92.92	0.32
802.11ac_VHT40	MCS0	84.80	0.72
802.11ac_VHT80	MCS0	79.58	0.99

Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)
Band U-NII 2C:5470MHz-5725MHz			
802.11a	6	95.34	0.21
802.11n_HT20	MCS0	95.91	0.18
802.11n_HT40	MCS0	88.07	0.55
802.11ac_VHT20	MCS0	97.68	0.10
802.11ac_VHT40	MCS0	85.40	0.69
802.11ac_VHT80	MCS0	79.68	0.99
Band U-NII 3:5725MHz-5825MHz			
802.11a	6	97.88	0.09
802.11n_HT20	MCS0	95.52	0.20
802.11n_HT40	MCS0	86.69	0.62
802.11ac_VHT20	MCS0	96.03	0.18
802.11ac_VHT40	MCS0	85.40	0.69
802.11ac_VHT80	MCS0	78.40	1.06

Remark:

1. Duty Cycle factor = 10 * log (1/ Duty cycle)
2. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value.
3. Involving the test items of duty cycle compensation coefficient, the final results have been added and calculated by the software and presented.

The test plots as follows:

IEEE 802.11a_U-NII 1	IEEE 802.11n-HT20_U-NII 1
	
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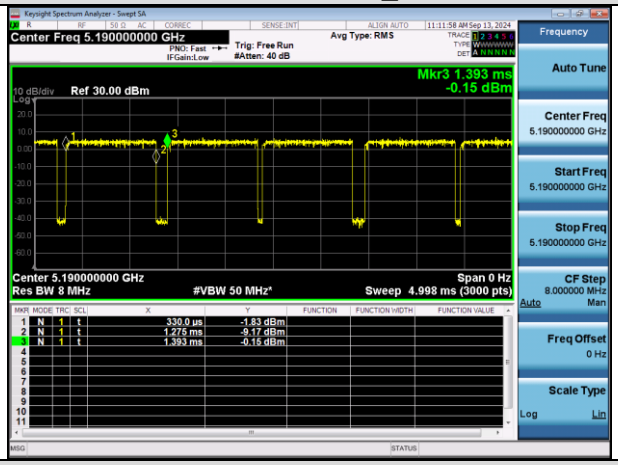	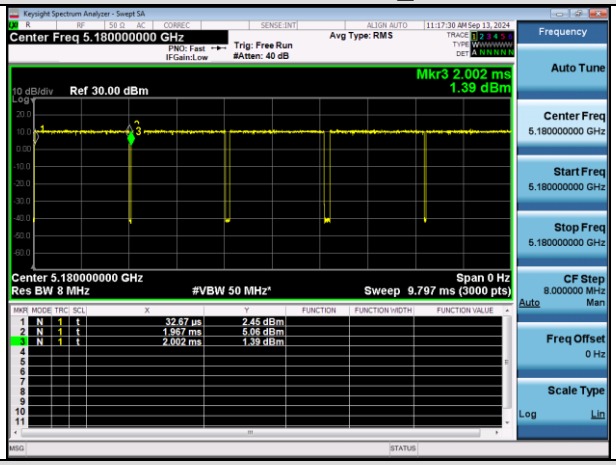
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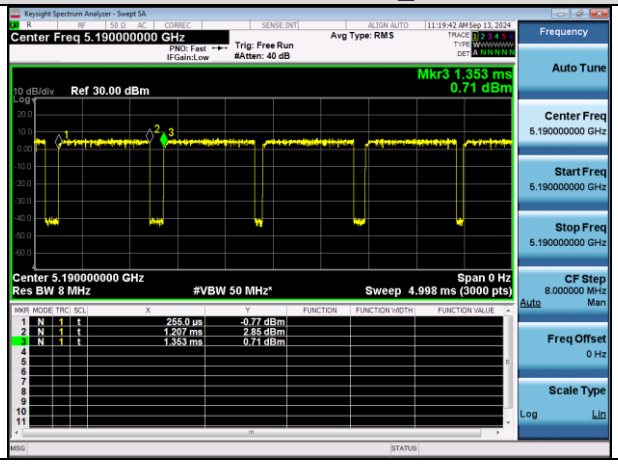
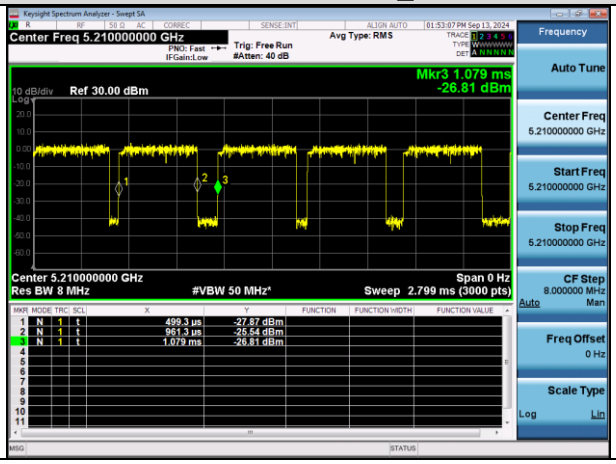
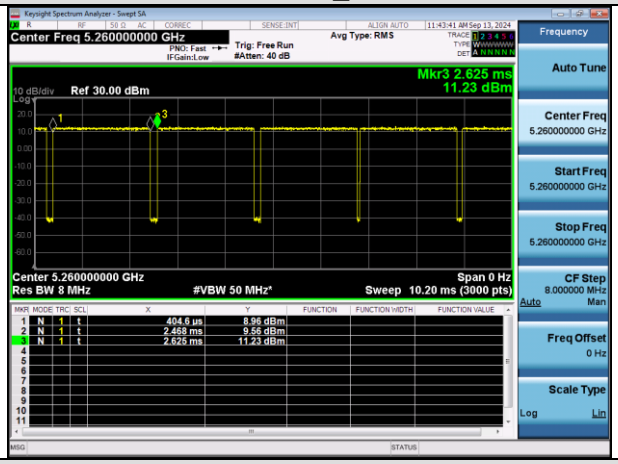
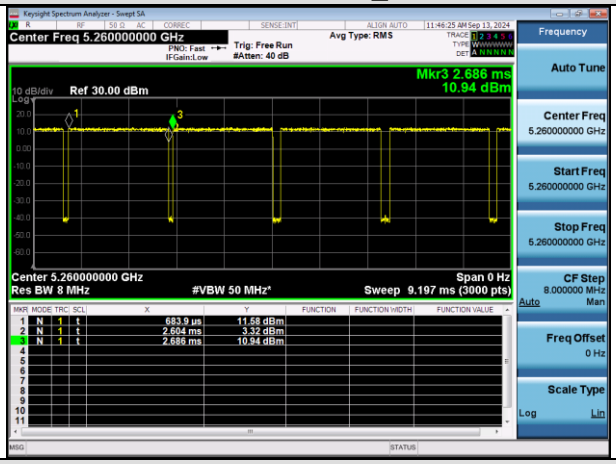
	

IEEE 802.11a_U-NII 2A	IEEE 802.11n-HT20_U-NII 2A
	
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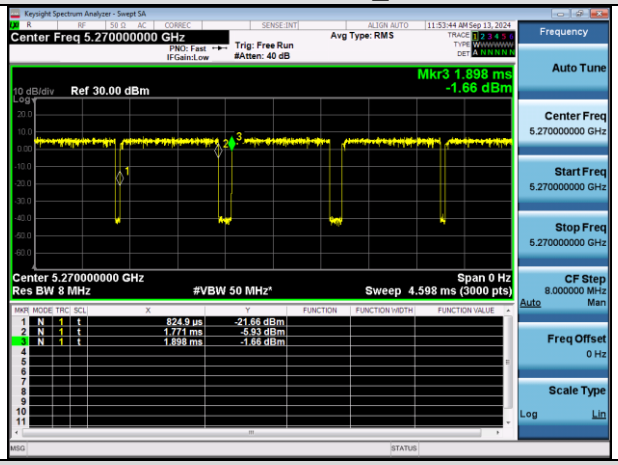
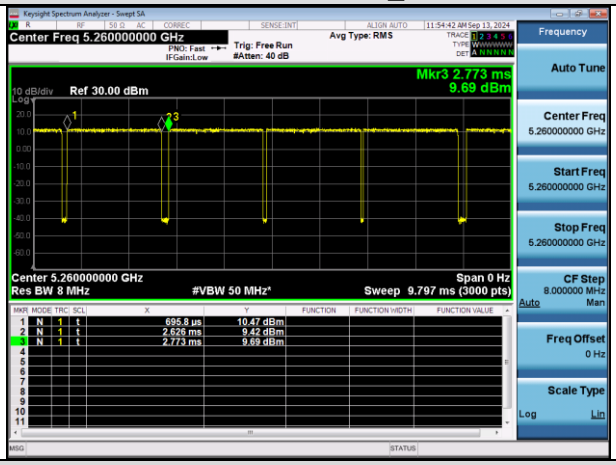
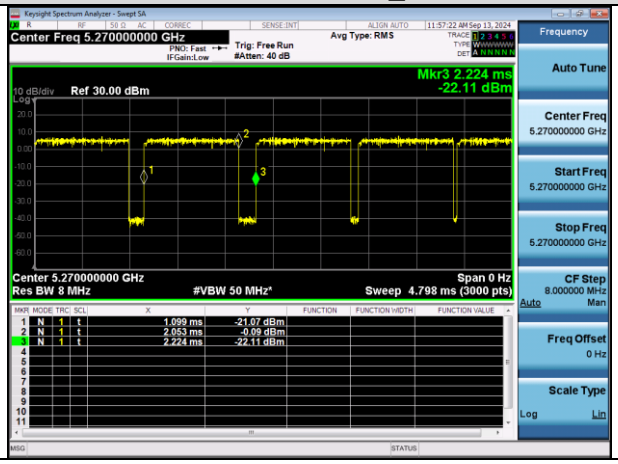
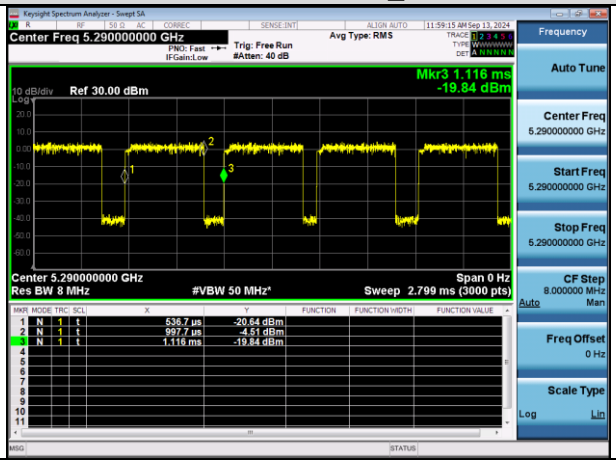
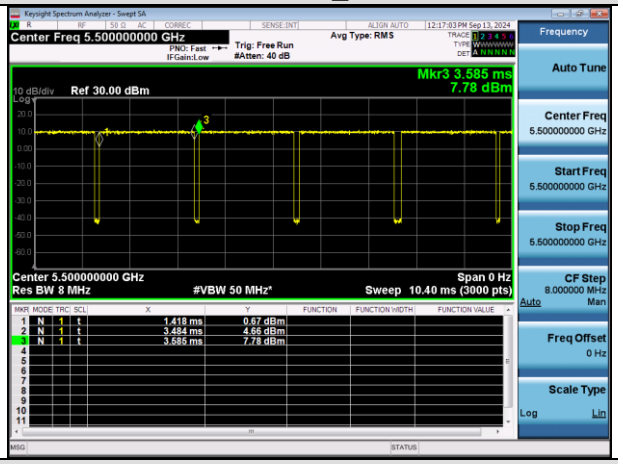
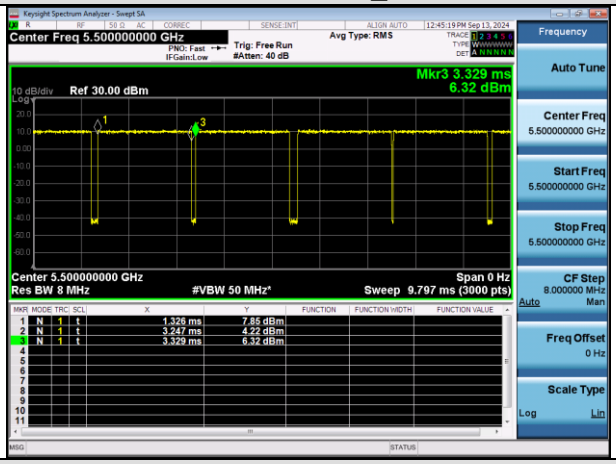
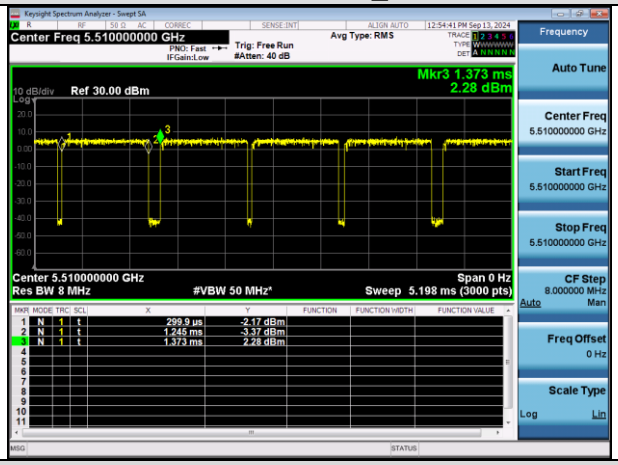
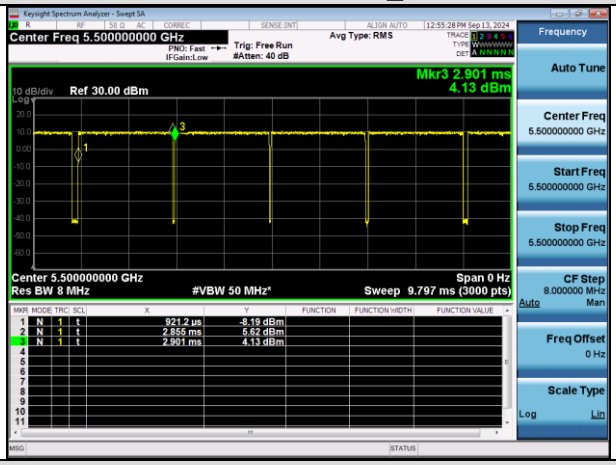
	
IEEE 802.11ac-VHT40_U-NII 2A	**IEEE 802.11ac-VHT80_U-NII 2A**
	

IEEE 802.11a_U-NII 2C	IEEE 802.11n-HT20_U-NII 2C
	
IEEE 802.11n-HT40_U-NII 2C	**IEEE 802.11ac-VHT20_U-NII 2C**
	
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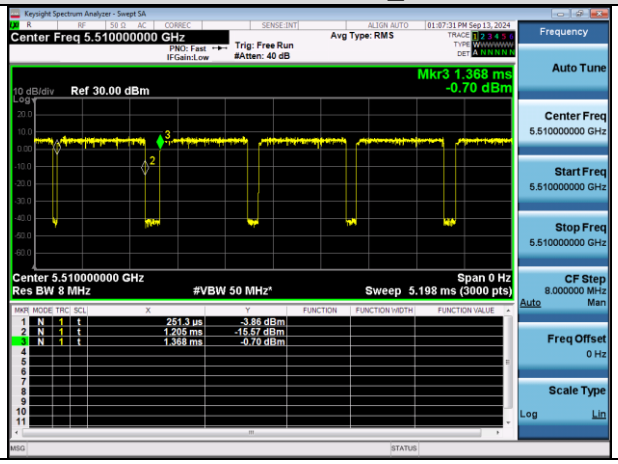
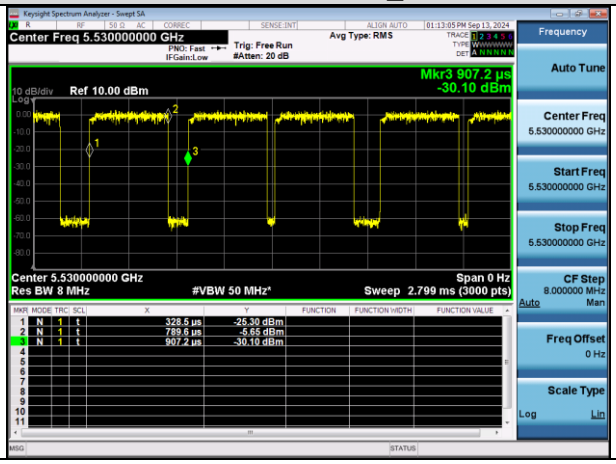
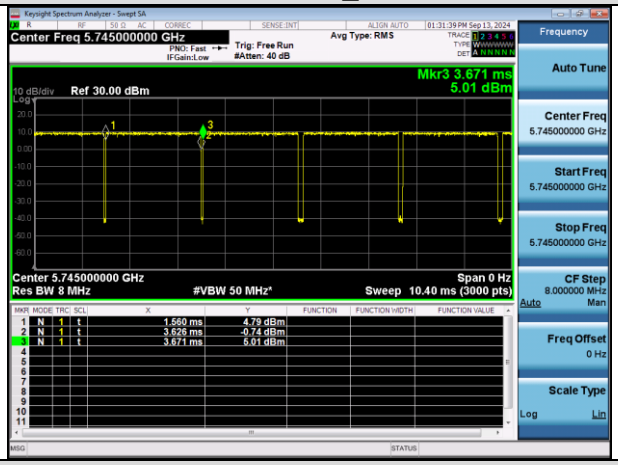
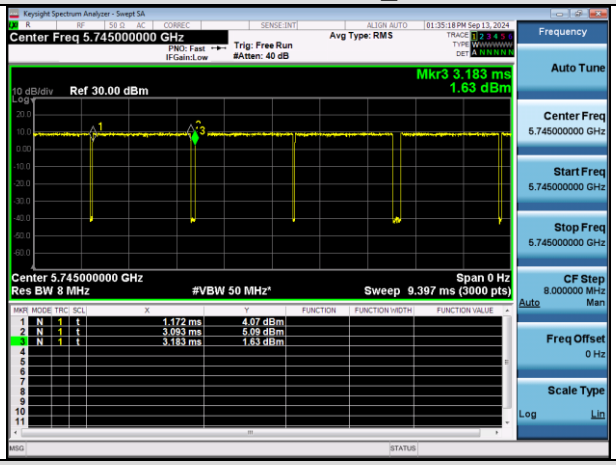
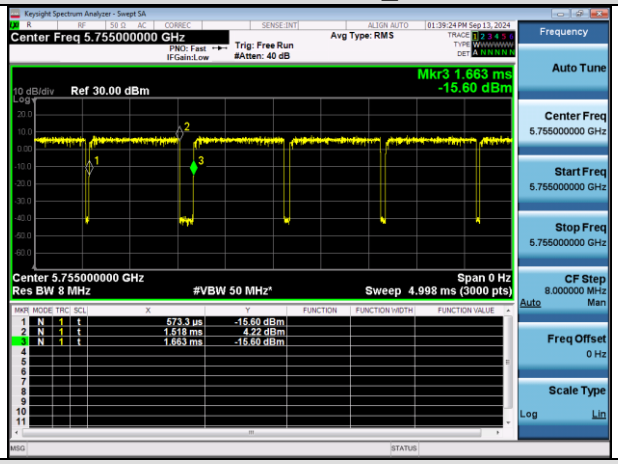
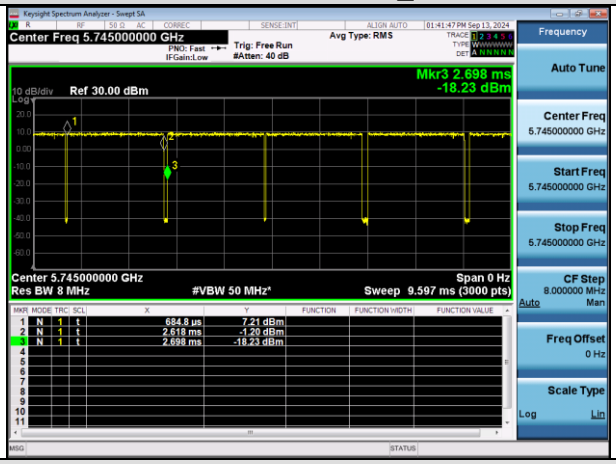
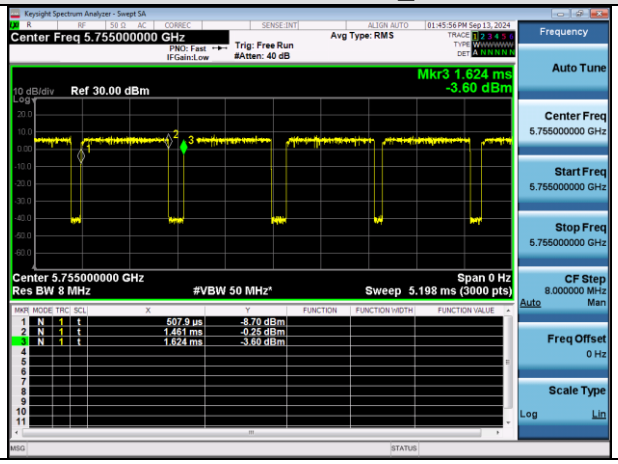
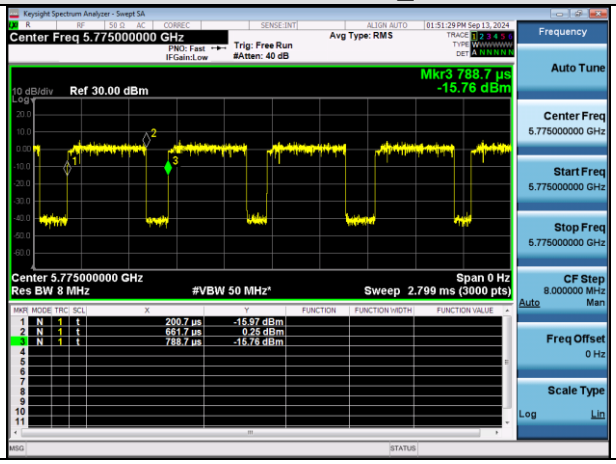
	

IEEE 802.11a_U-NII 3	IEEE 802.11n-HT20_U-NII 3
	
IEEE 802.11n-HT40_U-NII 3	**IEEE 802.11ac-VHT20_U-NII 3**
	
IEEE 802.11ac-VHT40_U-NII 3	**IEEE 802.11ac-VHT80_U-NII 3**
	

7. RF Output Power Measurement

7.1 Provisions Applicable

Operation Band	EUT Category		LIMIT
U-NII-1	☐	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p < 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	☐	Fixed point-to-point Access Point	1 Watt (30 dBm)
	☐	Indoor Access Point	1 Watt (30 dBm)
	☒	Client devices	250mW (23.98 dBm)
U-NII-2A	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-2C	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-3	/		1 Watt (30 dBm)

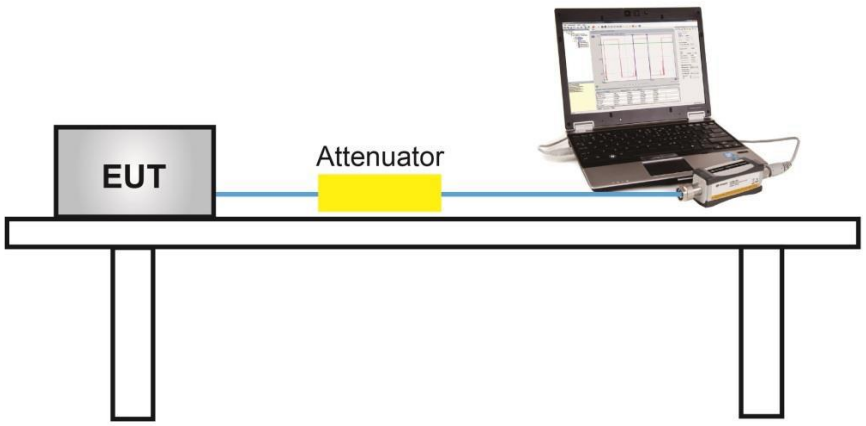
Note: Where B is the 26dB emission bandwidth in MHz.

7.2 Measurement Procedure

☒Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 12.3.3.1
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
8. Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.
9. The final test results have been increased by the duty cycle factor and recorded in the report.

7.3 Measurement Setup (Block Diagram of Configuration)



7.4 Measurement Result

Test Data of Conducted Output Power for band 5.15-5.25 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	14.05	23.98	Pass
	5200	14.39	23.98	Pass
	5240	15.23	23.98	Pass
802.11n20	5180	14.10	23.98	Pass
	5200	14.36	23.98	Pass
	5240	14.87	23.98	Pass
802.11n40	5190	10.84	23.98	Pass
	5230	11.62	23.98	Pass
802.11ac20	5180	13.61	23.98	Pass
	5200	14.10	23.98	Pass
	5240	14.97	23.98	Pass
802.11ac40	5190	10.99	23.98	Pass
	5230	11.77	23.98	Pass
802.11ac80	5210	10.56	23.98	Pass

Test Data of Conducted Output Power for band 5.25-5.35 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5260	15.24	23.98	Pass
	5300	15.52	23.98	Pass
	5320	15.53	23.98	Pass
802.11n20	5260	14.81	23.98	Pass
	5300	14.91	23.98	Pass
	5320	14.83	23.98	Pass
802.11n40	5270	11.52	23.98	Pass
	5310	12.08	23.98	Pass
802.11ac20	5260	14.88	23.98	Pass
	5300	15.01	23.98	Pass
	5320	15.06	23.98	Pass
802.11ac40	5270	11.72	23.98	Pass
	5310	12.07	23.98	Pass
802.11ac80	5290	11.59	23.98	Pass

Test Data of Conducted Output Power for band 5.470-5.725 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5500	13.46	23.98	Pass
	5580	14.39	23.98	Pass
	5700	13.37	23.98	Pass
802.11n20	5500	13.83	23.98	Pass
	5580	14.41	23.98	Pass
	5700	13.21	23.98	Pass
802.11n40	5510	11.61	23.98	Pass
	5550	12.52	23.98	Pass
	5670	11.95	23.98	Pass
802.11ac20	5500	13.21	23.98	Pass
	5580	14.35	23.98	Pass
	5700	13.03	23.98	Pass
802.11ac40	5510	12.27	23.98	Pass
	5550	12.41	23.98	Pass
	5670	12.11	23.98	Pass
802.11ac80	5530	9.85	23.98	Pass
	5610	10.33	23.98	Pass

Test Data of Conducted Output Power for band 5.725-5.850 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	12.37	30	Pass
	5785	11.56	30	Pass
	5825	10.68	30	Pass
802.11n20	5745	12.25	30	Pass
	5785	11.42	30	Pass
	5825	10.49	30	Pass
802.11n40	5755	12.10	30	Pass
	5795	11.25	30	Pass
802.11ac20	5745	12.23	30	Pass
	5785	11.31	30	Pass
	5825	10.53	30	Pass
802.11ac40	5755	12.15	30	Pass
	5795	11.10	30	Pass
802.11ac80	5775	11.37	30	Pass

8. 6dB&26dB Bandwidth Measurement

8.1 Provisions Applicable

The minimum 6dB bandwidth shall be at least 500 kHz.

8.2 Measurement Procedure

◆ **-6dB bandwidth (DTS bandwidth) Test setting:**

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 100kHz.
4. Set the VBW ≥3*RBW. Detector = Peak. Trace mode = max hold.
5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

◆ **99% occupied bandwidth test setting:**

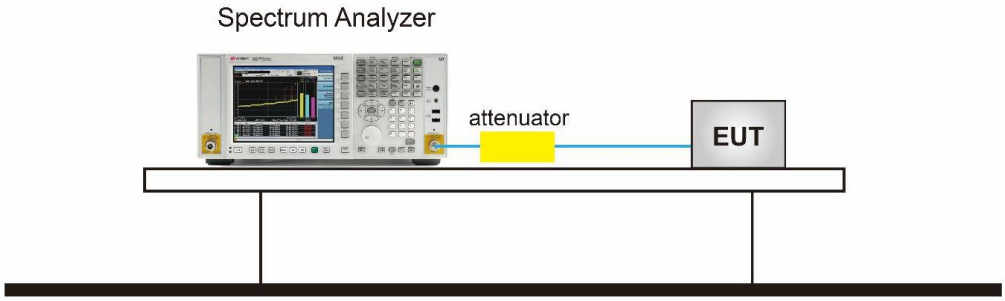
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
   The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

◆ **-26dB Bandwidth test setting:**

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

8.3 Measurement Setup (Block Diagram of Configuration)



8.4 Measurement Results

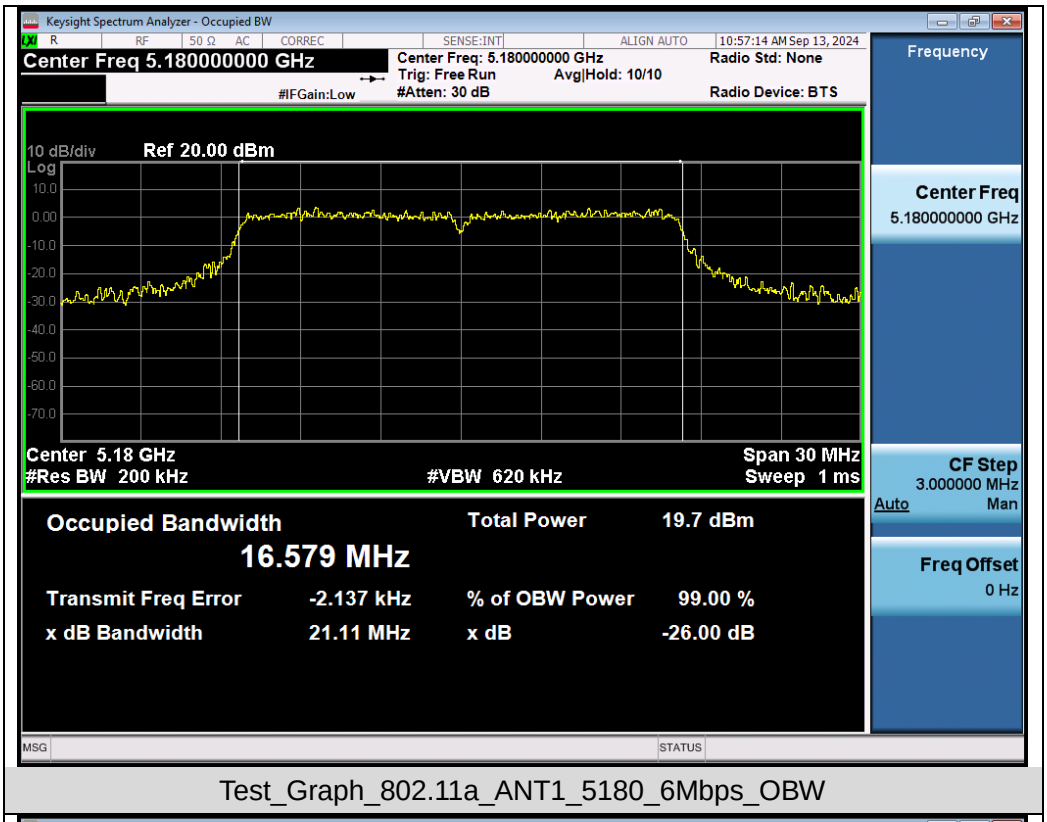
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.579	21.106	N/A	Pass
	5200	16.658	22.341	N/A	Pass
	5240	16.681	25.251	N/A	Pass
802.11n20	5180	17.663	21.600	N/A	Pass
	5200	17.731	22.814	N/A	Pass
	5240	17.712	24.299	N/A	Pass
802.11n40	5190	36.090	40.726	N/A	Pass
	5230	36.068	40.652	N/A	Pass
802.11ac20	5180	17.667	20.434	N/A	Pass
	5200	17.666	22.073	N/A	Pass
	5240	17.716	23.283	N/A	Pass
802.11ac40	5190	36.078	40.379	N/A	Pass
	5230	36.061	40.941	N/A	Pass
802.11ac80	5210	75.312	80.572	N/A	Pass

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.25-5.35 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5260	16.613	22.429	N/A	Pass
	5300	16.613	22.911	N/A	Pass
	5320	16.564	24.220	N/A	Pass
802.11n20	5260	17.670	21.891	N/A	Pass
	5300	17.694	25.464	N/A	Pass
	5320	17.690	25.381	N/A	Pass
802.11n40	5270	36.136	41.543	N/A	Pass
	5310	36.021	40.927	N/A	Pass
802.11ac20	5260	17.697	21.865	N/A	Pass
	5300	17.684	24.500	N/A	Pass
	5320	17.743	25.989	N/A	Pass
802.11ac40	5270	36.051	41.196	N/A	Pass
	5310	36.101	41.590	N/A	Pass
802.11ac80	5290	75.239	80.847	N/A	Pass

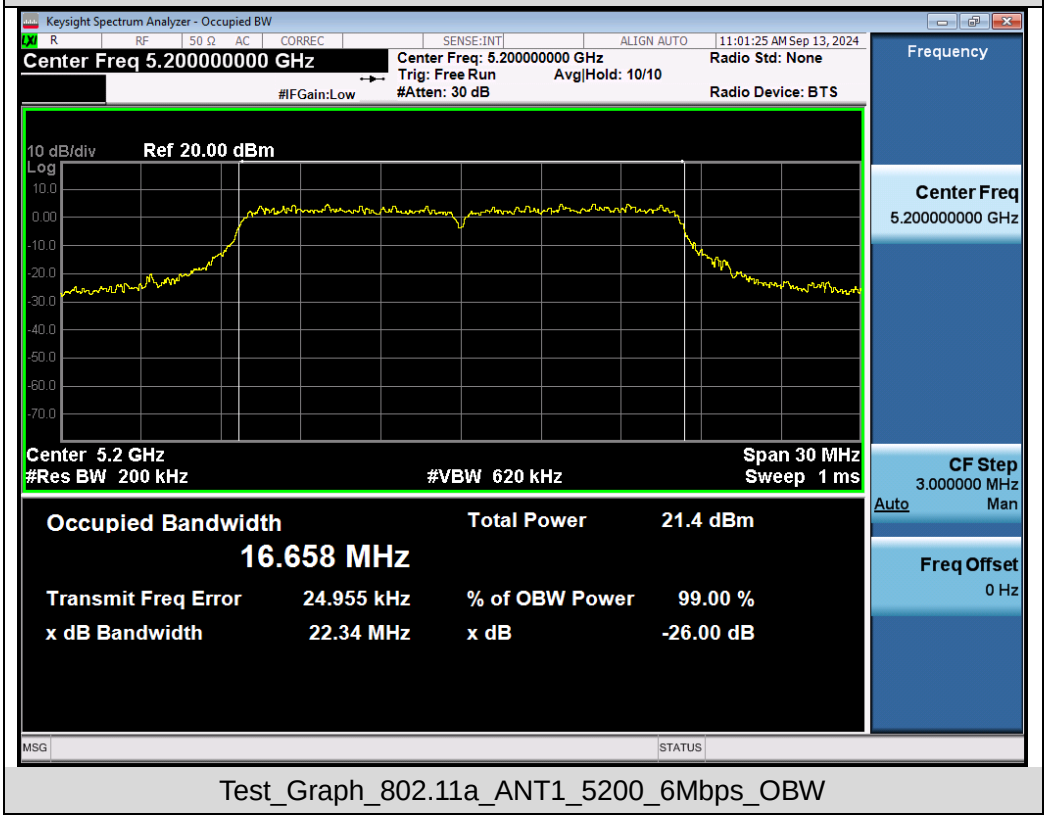
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.47-5.725 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5500	16.650	28.400	N/A	Pass
	5580	16.737	28.444	N/A	Pass
	5700	16.674	27.221	N/A	Pass
802.11n20	5500	17.778	28.759	N/A	Pass
	5580	17.794	28.895	N/A	Pass
	5700	17.747	28.274	N/A	Pass
802.11n40	5510	36.176	47.431	N/A	Pass
	5550	36.122	45.342	N/A	Pass
	5670	36.199	43.413	N/A	Pass
802.11ac20	5500	17.819	26.754	N/A	Pass
	5580	17.811	25.715	N/A	Pass
	5700	17.781	24.851	N/A	Pass
802.11ac40	5510	36.205	47.711	N/A	Pass
	5590	36.202	42.667	N/A	Pass
	5670	36.098	42.254	N/A	Pass
802.11ac80	5530	75.265	80.969	N/A	Pass
	5610	75.279	80.601	N/A	Pass

Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.642	16.387	0.5	Pass
	5785	16.758	16.368	0.5	Pass
	5825	16.742	16.311	0.5	Pass
802.11n20	5745	17.684	17.046	0.5	Pass
	5785	17.757	16.984	0.5	Pass
	5825	17.710	17.333	0.5	Pass
802.11n40	5755	36.204	35.504	0.5	Pass
	5795	36.227	35.397	0.5	Pass
802.11ac20	5745	17.691	17.530	0.5	Pass
	5785	17.711	17.112	0.5	Pass
	5825	17.738	16.122	0.5	Pass
802.11ac40	5755	36.172	35.403	0.5	Pass
	5795	36.295	35.287	0.5	Pass
802.11ac80	5775	75.471	75.173	0.5	Pass

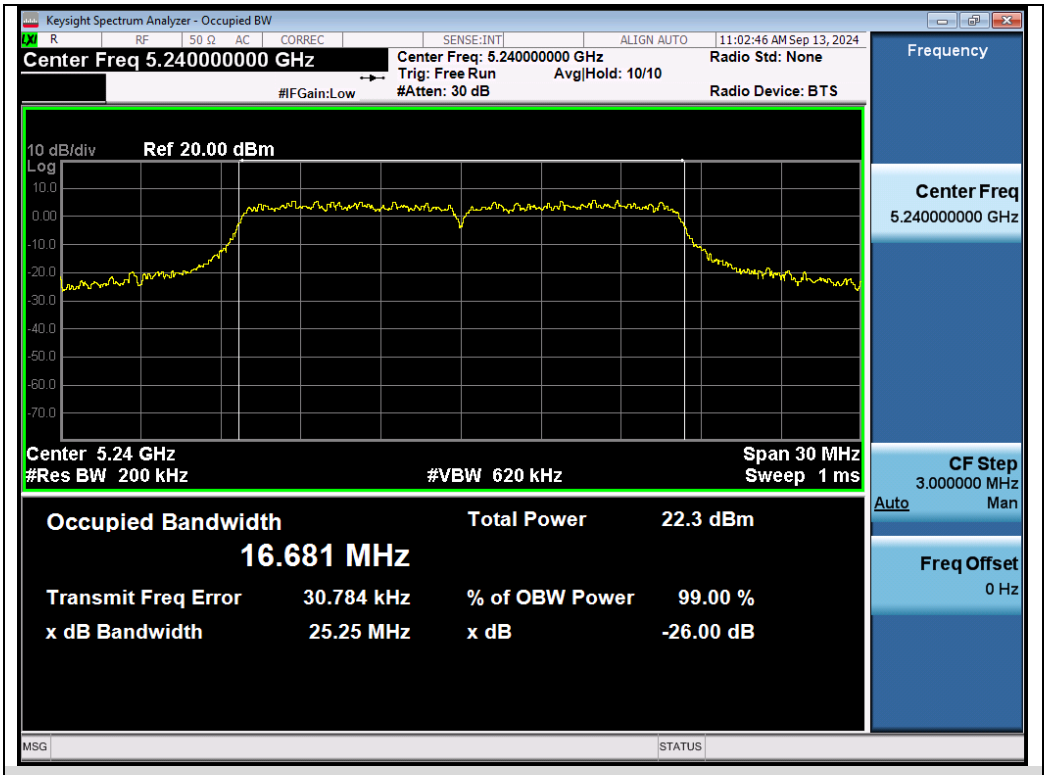
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz



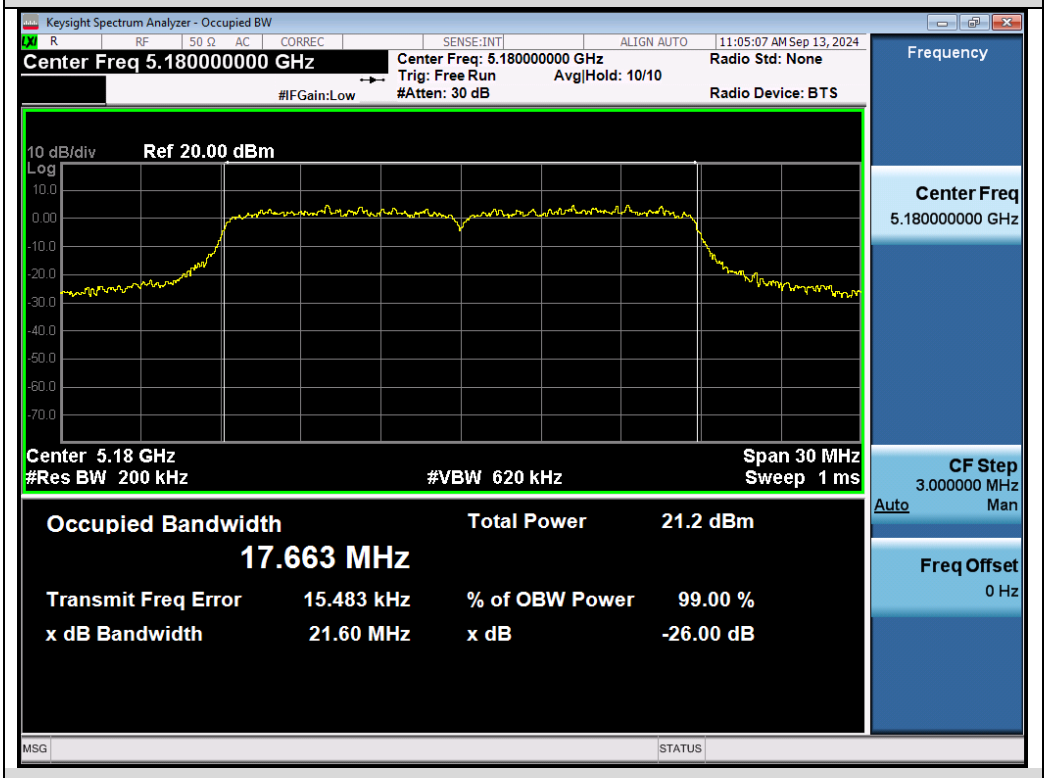
Test_Graph_802.11a_ANT1_5180_6Mbps_OBW



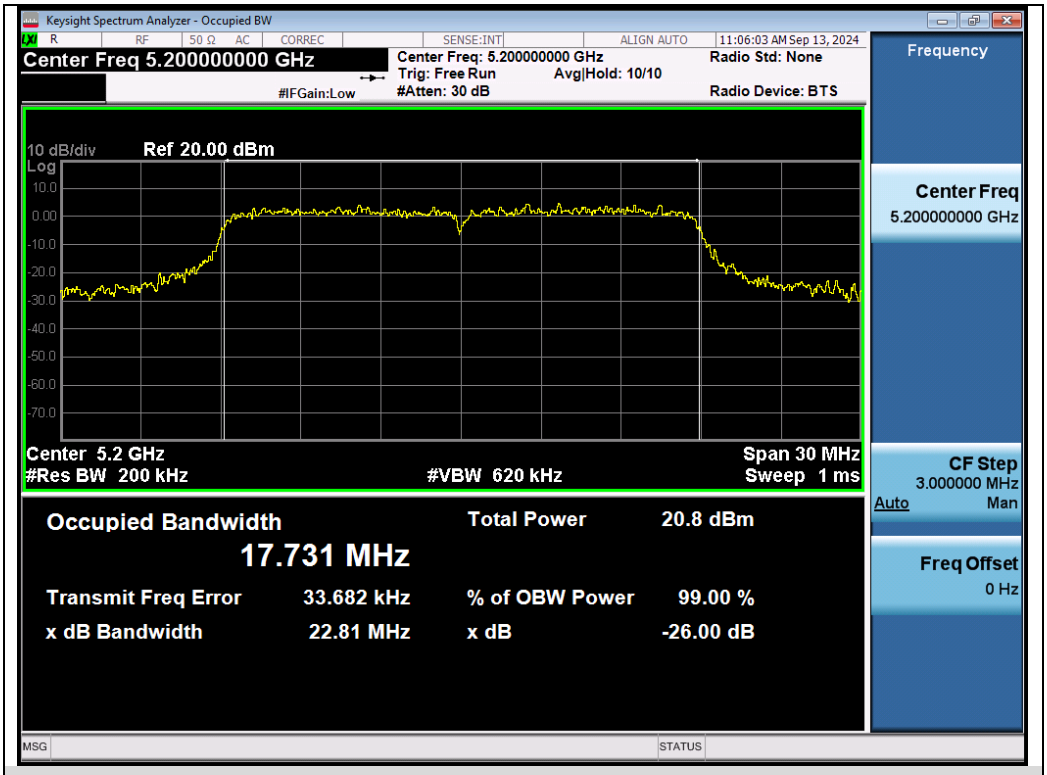
Test_Graph_802.11a_ANT1_5200_6Mbps_OBW



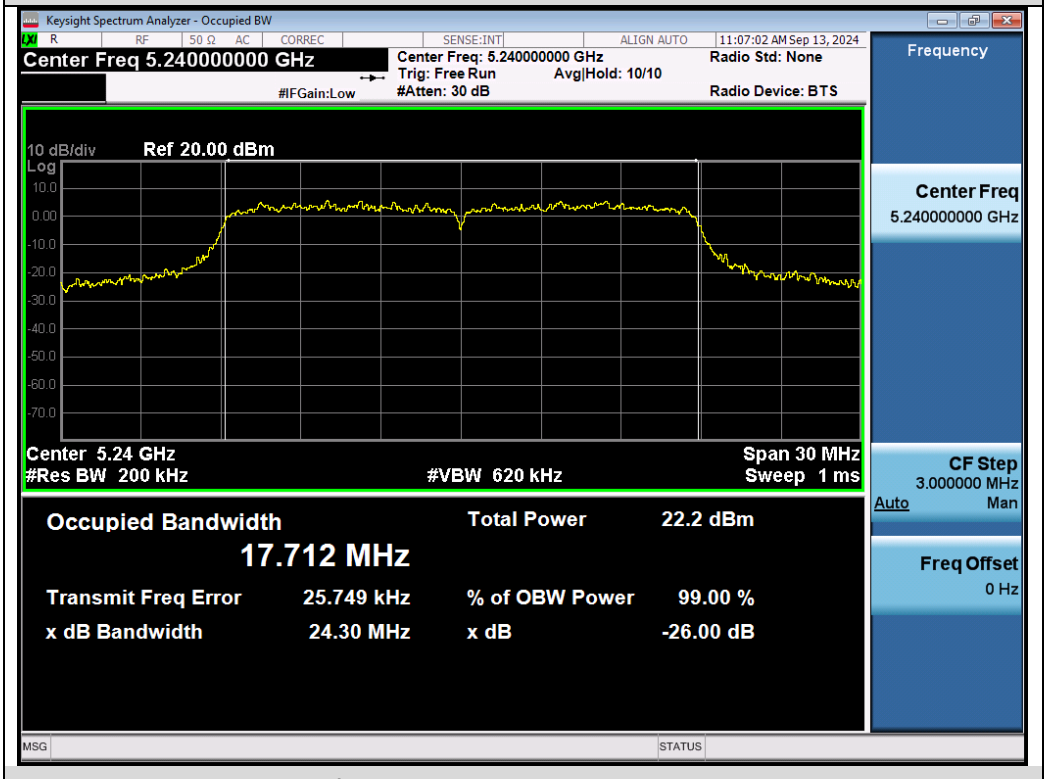
Test_Graph_802.11a_ANT1_5240_6Mbps_OBW



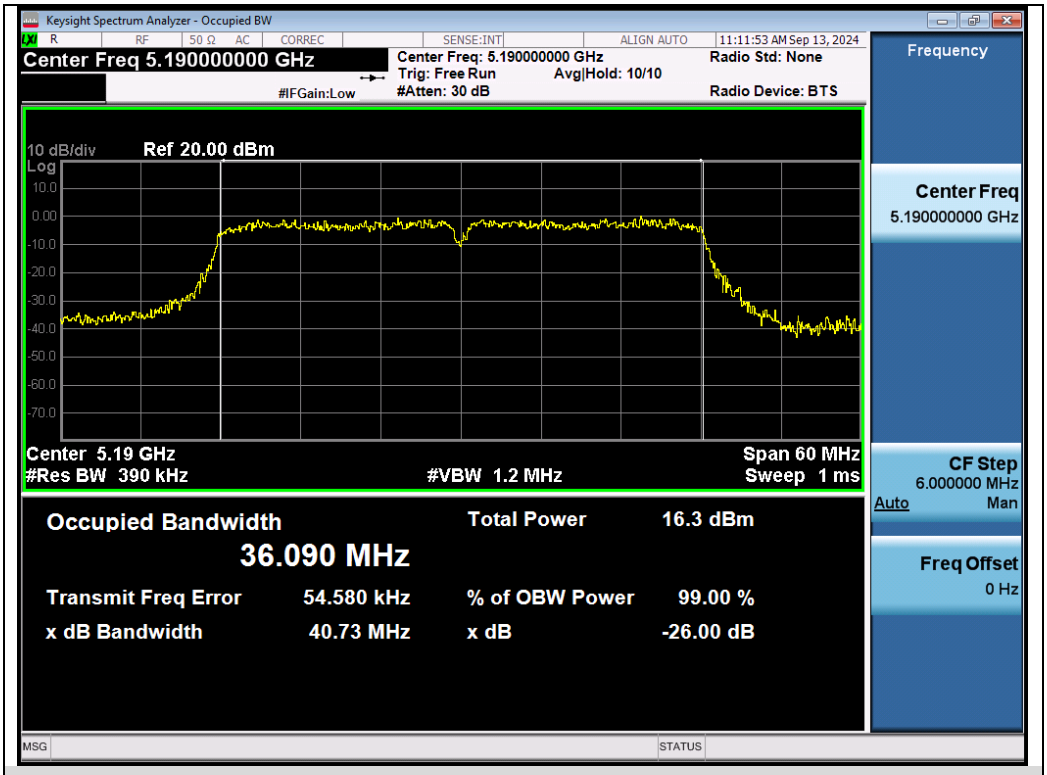
Test_Graph_802.11n20_ANT1_5180_MCS0_OBW



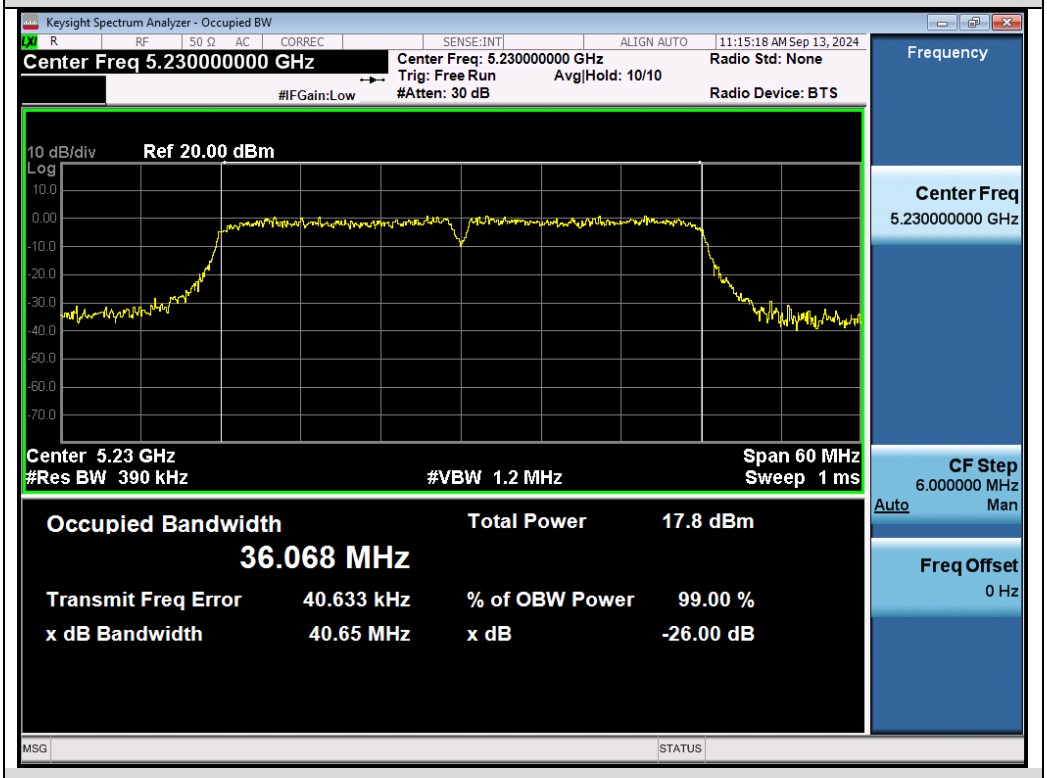
Test_Graph_802.11n20_ANT1_5200_MCS0_OBW



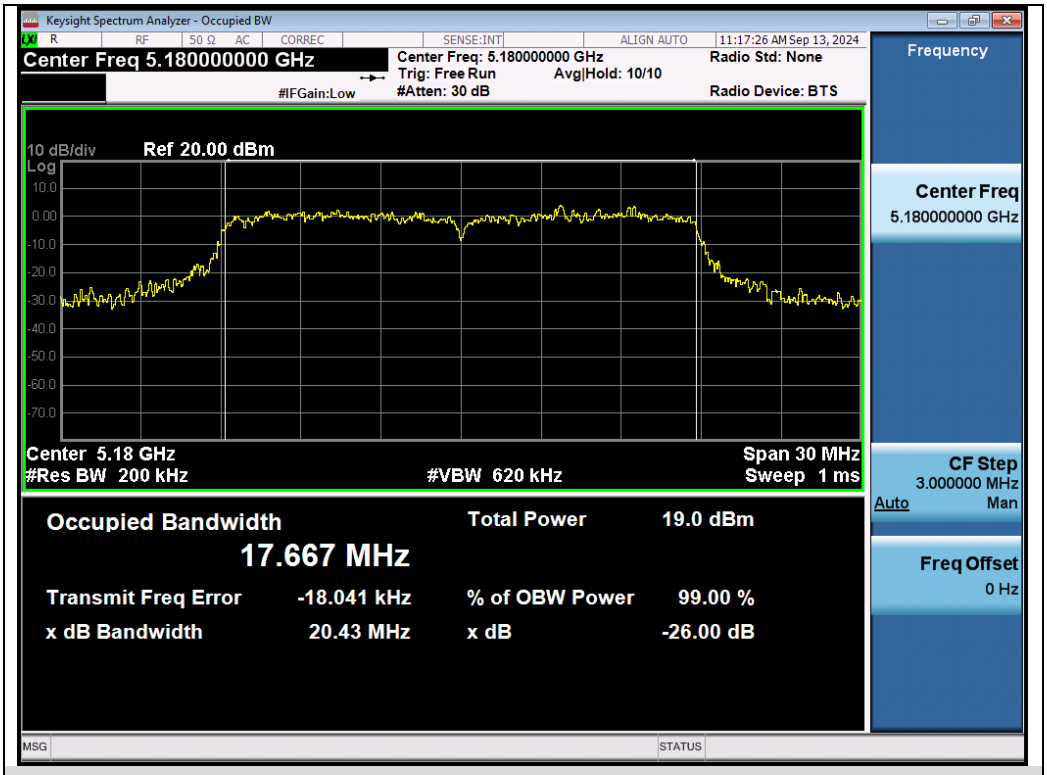
Test_Graph_802.11n20_ANT1_5240_MCS0_OBW



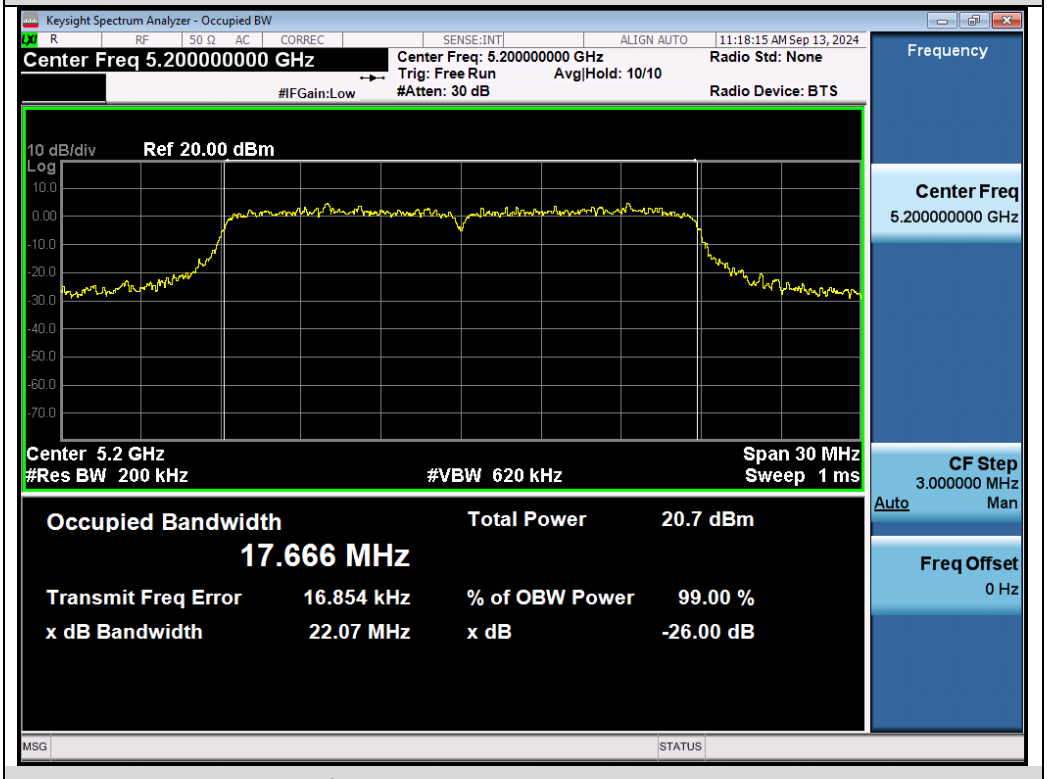
Test_Graph_802.11n40_ANT1_5190_MCS0_OBW



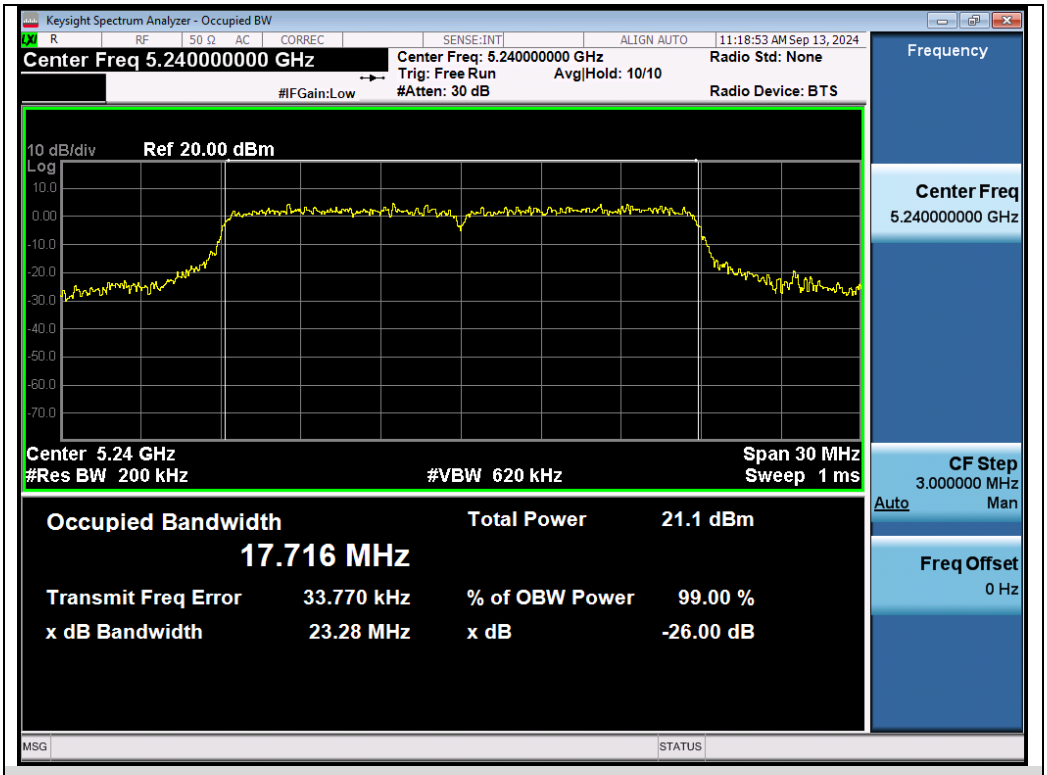
Test_Graph_802.11n40_ANT1_5230_MCS0_OBW



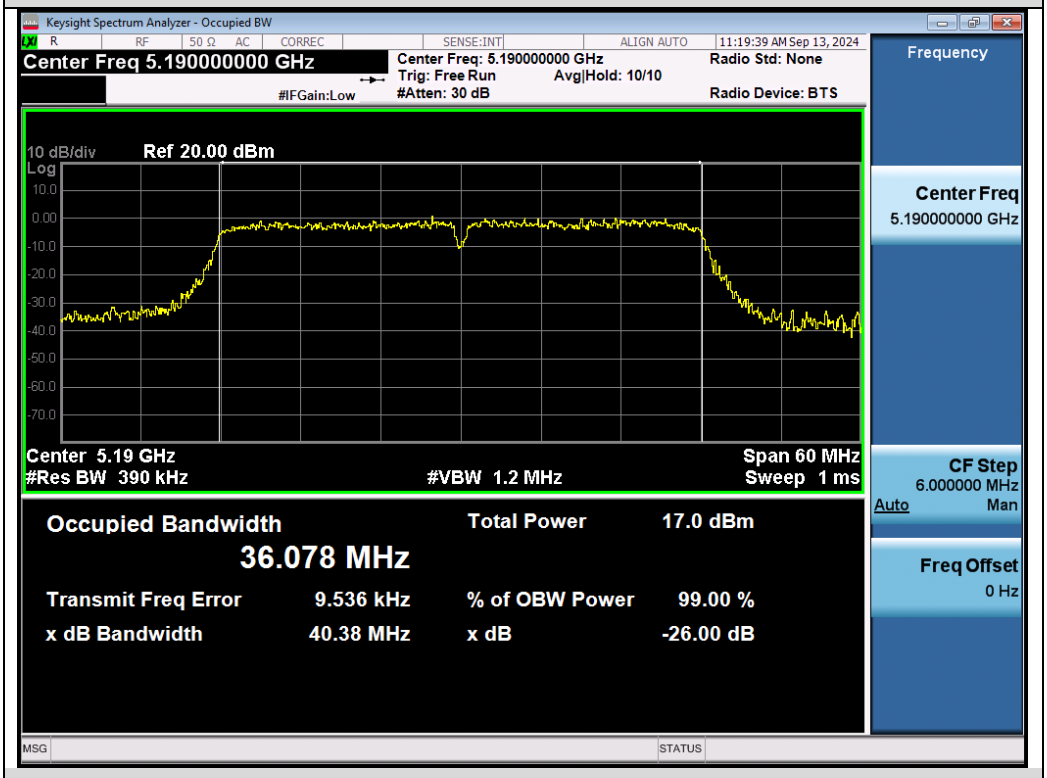
Test_Graph_802.11ac20_ANT1_5180_MCS0_OBW



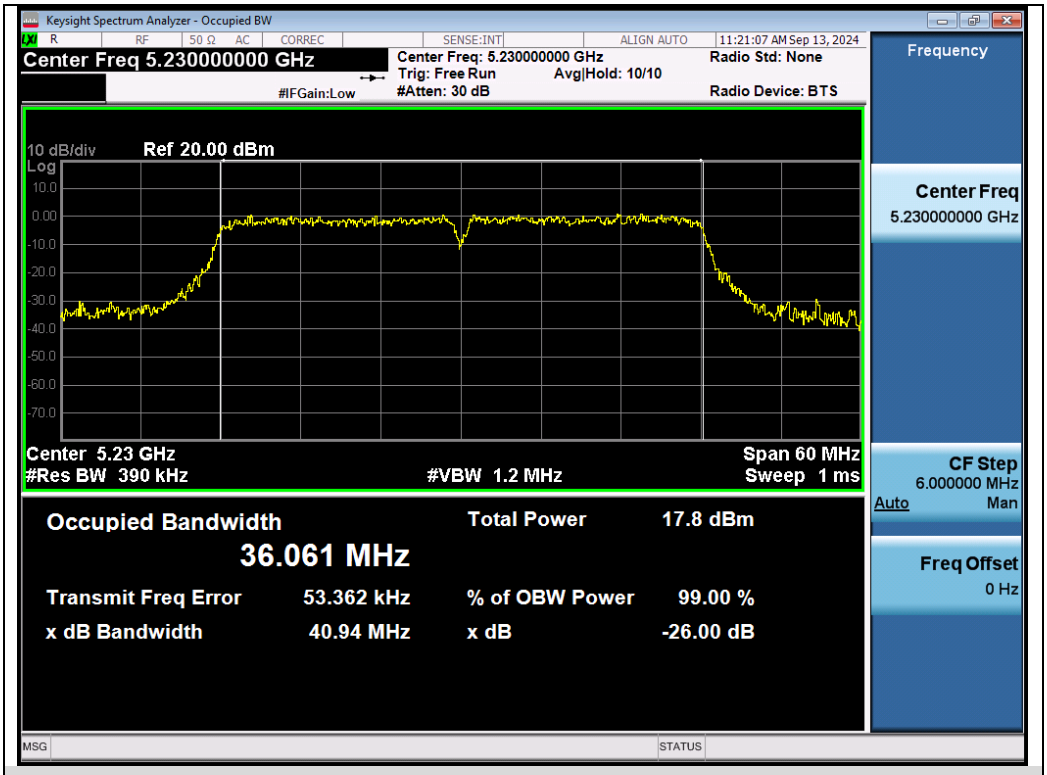
Test_Graph_802.11ac20_ANT1_5200_MCS0_OBW



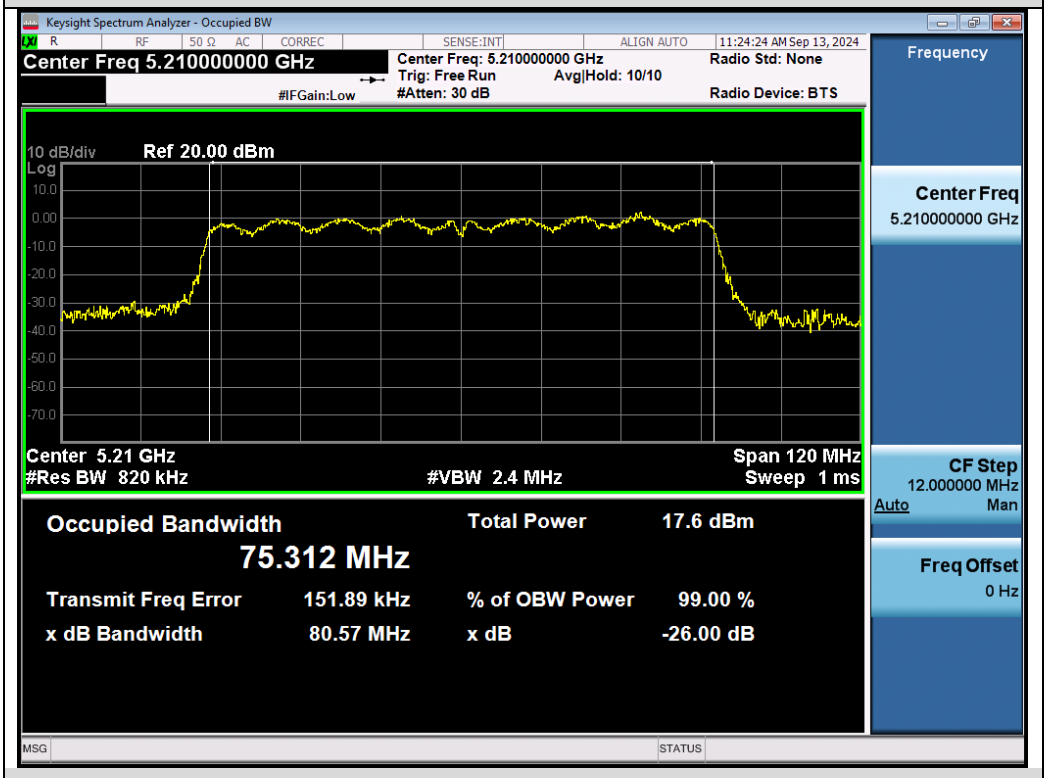
Test_Graph_802.11ac20_ANT1_5240_MCS0_OBW



Test_Graph_802.11ac40_ANT1_5190_MCS0_OBW

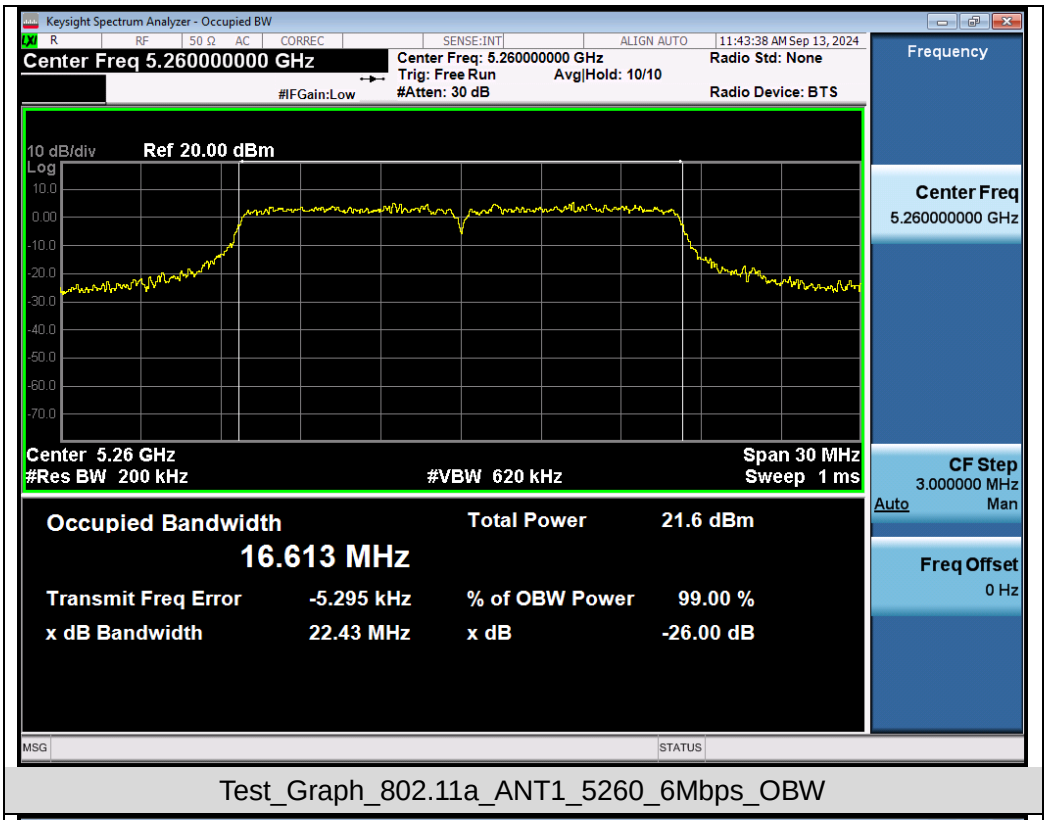


Test_Graph_802.11ac40_ANT1_5230_MCS0_OBW

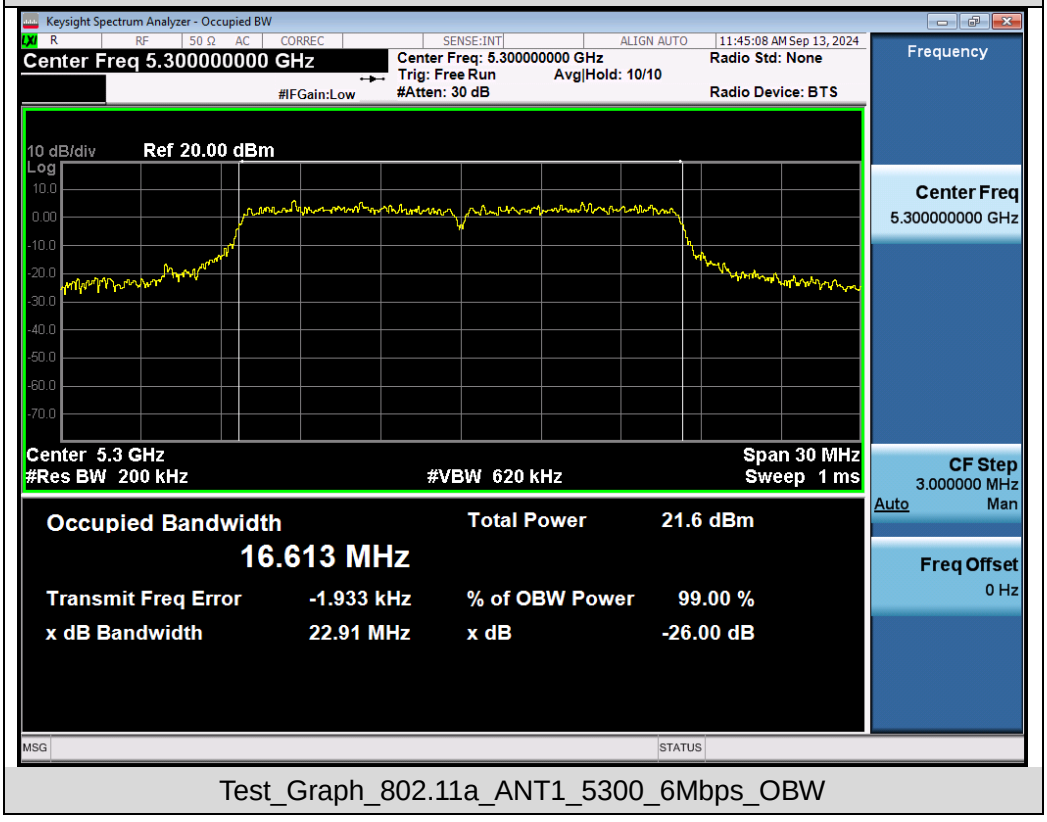


Test_Graph_802.11ac80_ANT1_5210_MCS0_OBW

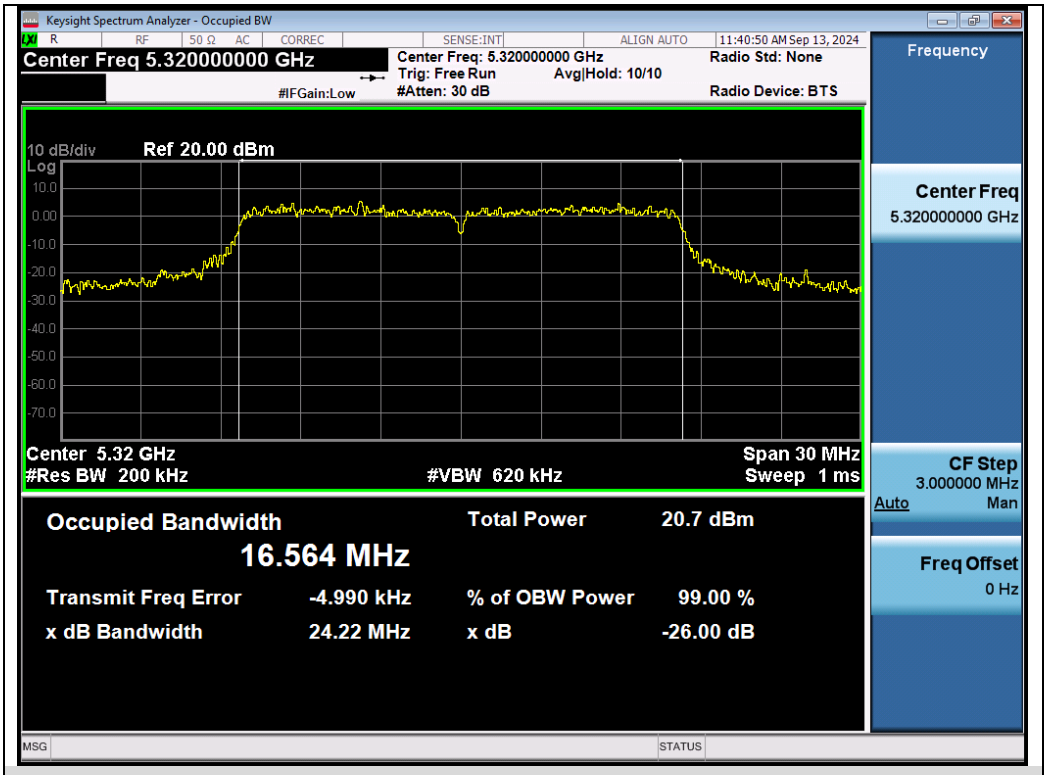
Test Graphs of Occupied Bandwidth for band 5.25-5.35 GHz



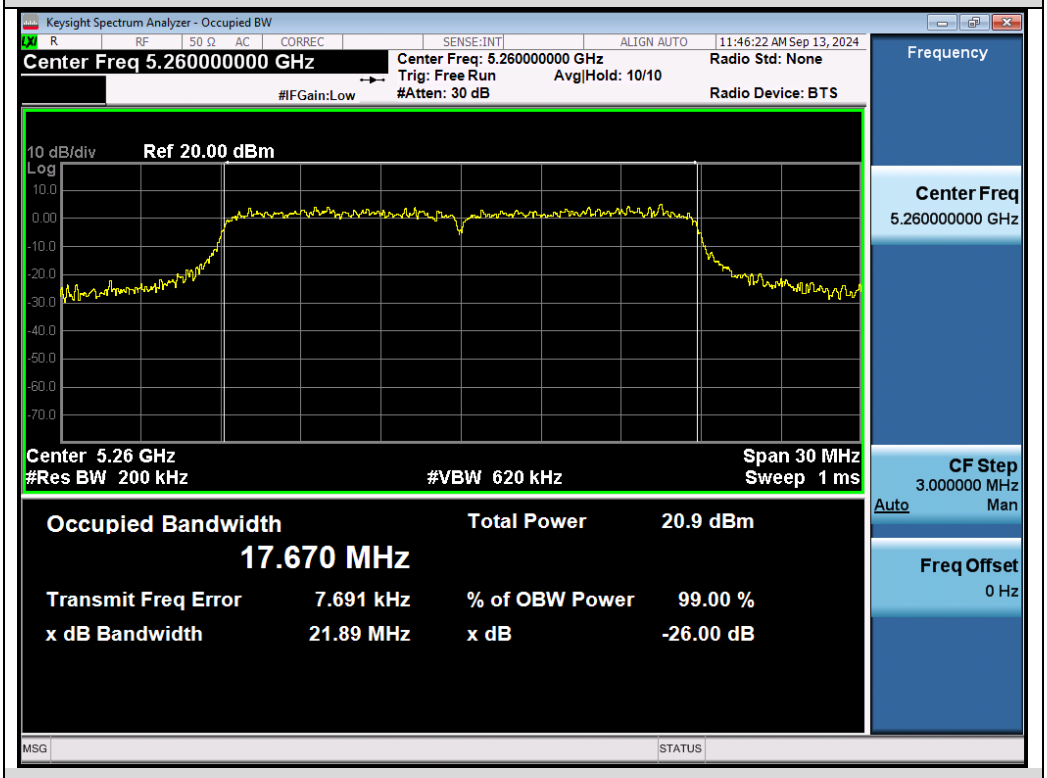
Test_Graph_802.11a_ANT1_5260_6Mbps_OBW



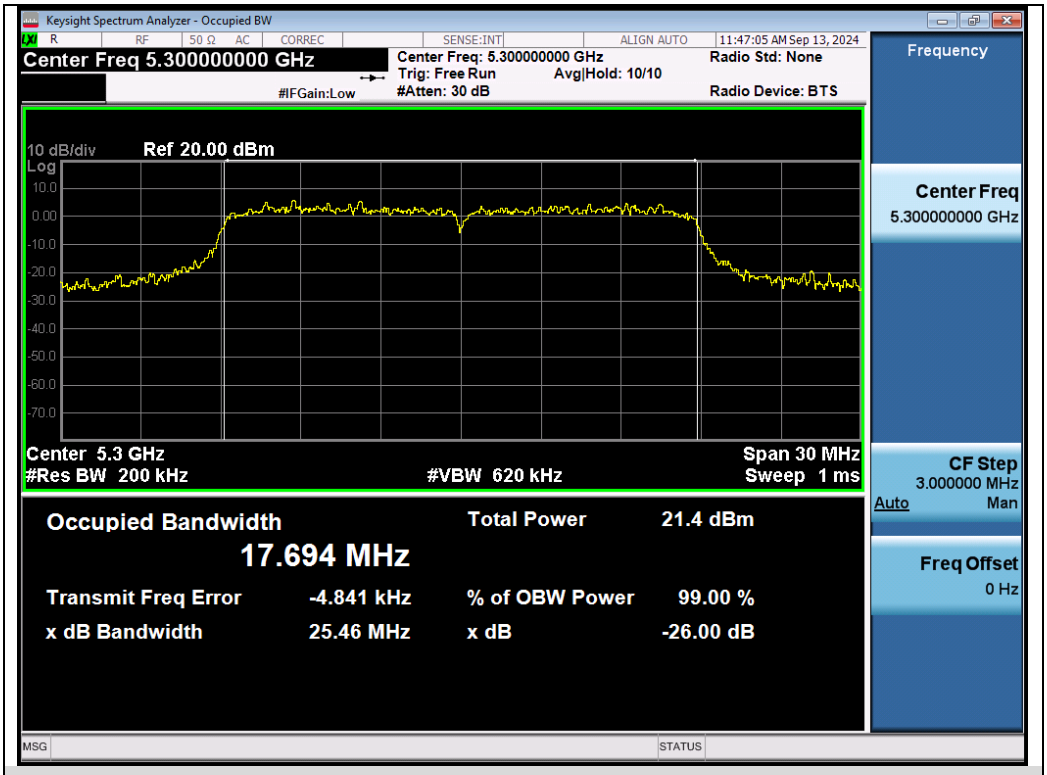
Test_Graph_802.11a_ANT1_5300_6Mbps_OBW



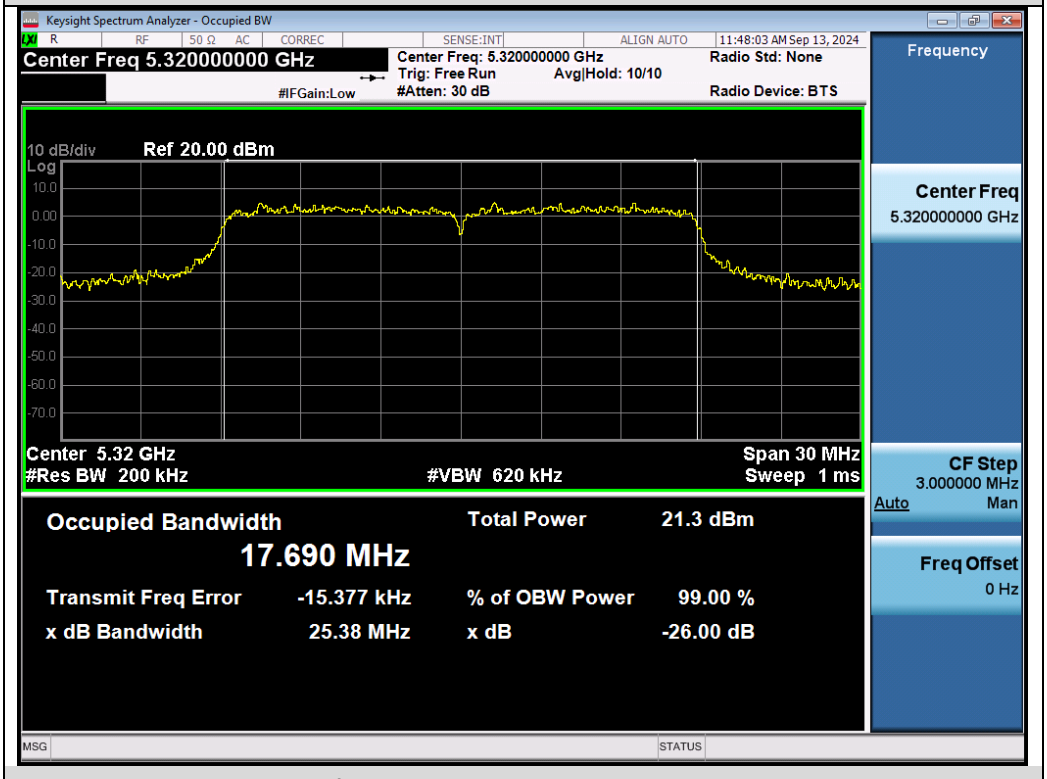
Test_Graph_802.11a_ANT1_5320_6Mbps_OBW



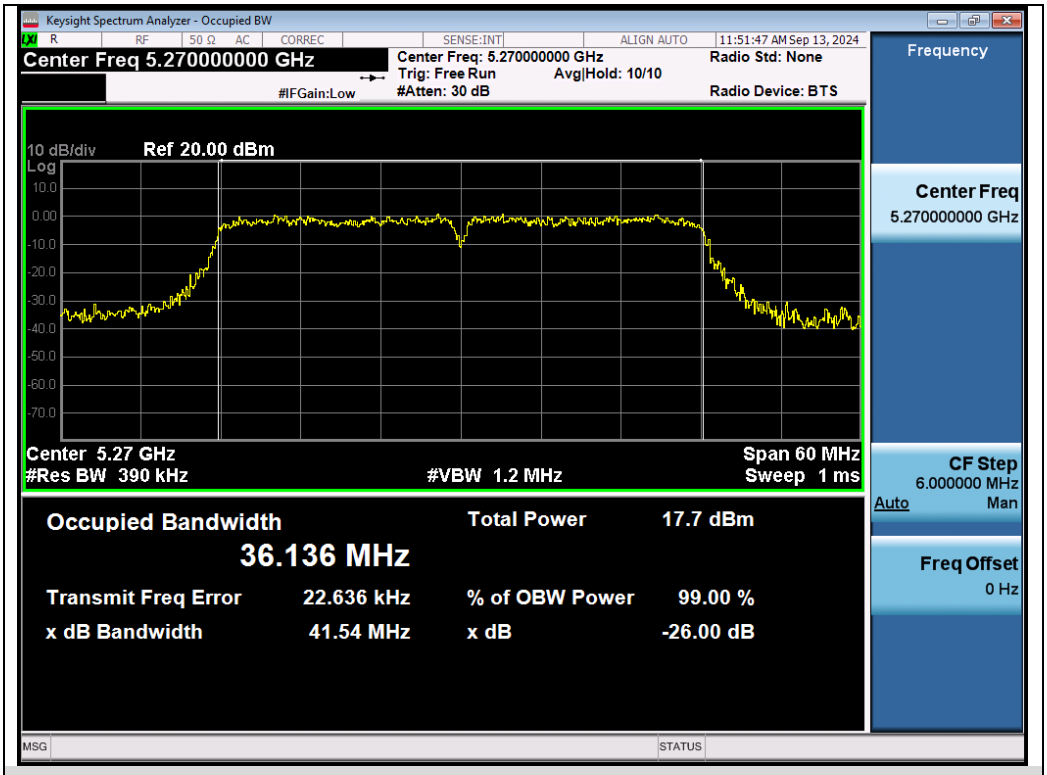
Test_Graph_802.11n20_ANT1_5260_MCS0_OBW



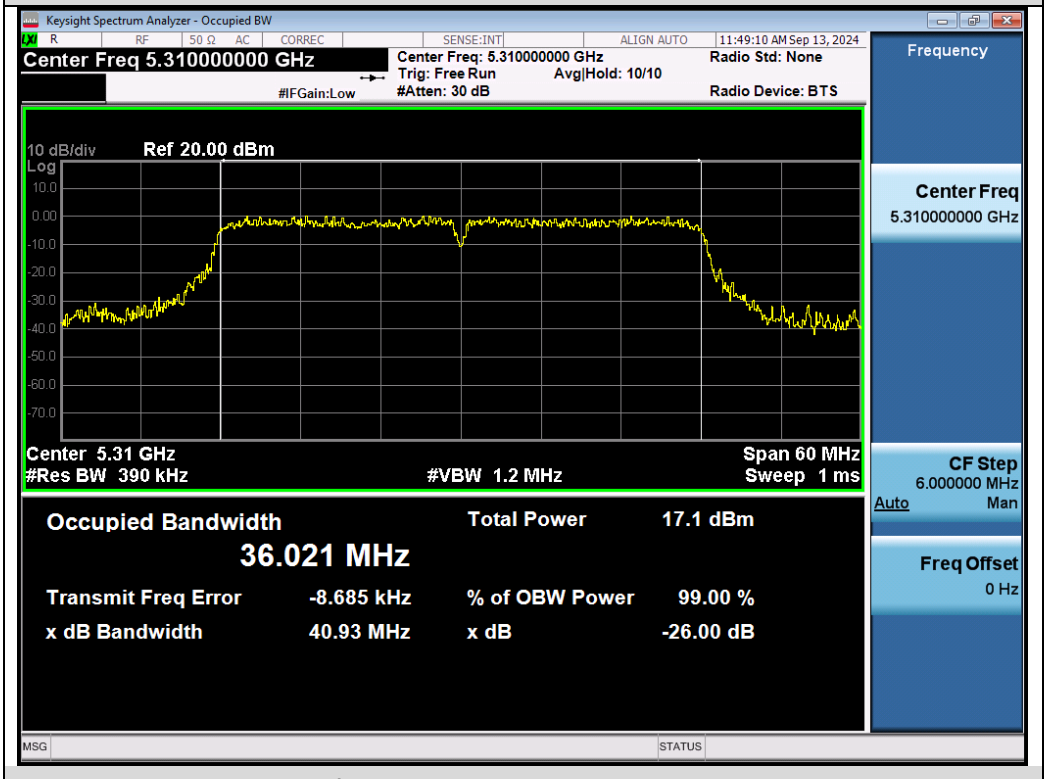
Test_Graph_802.11n20_ANT1_5300_MCS0_OBW



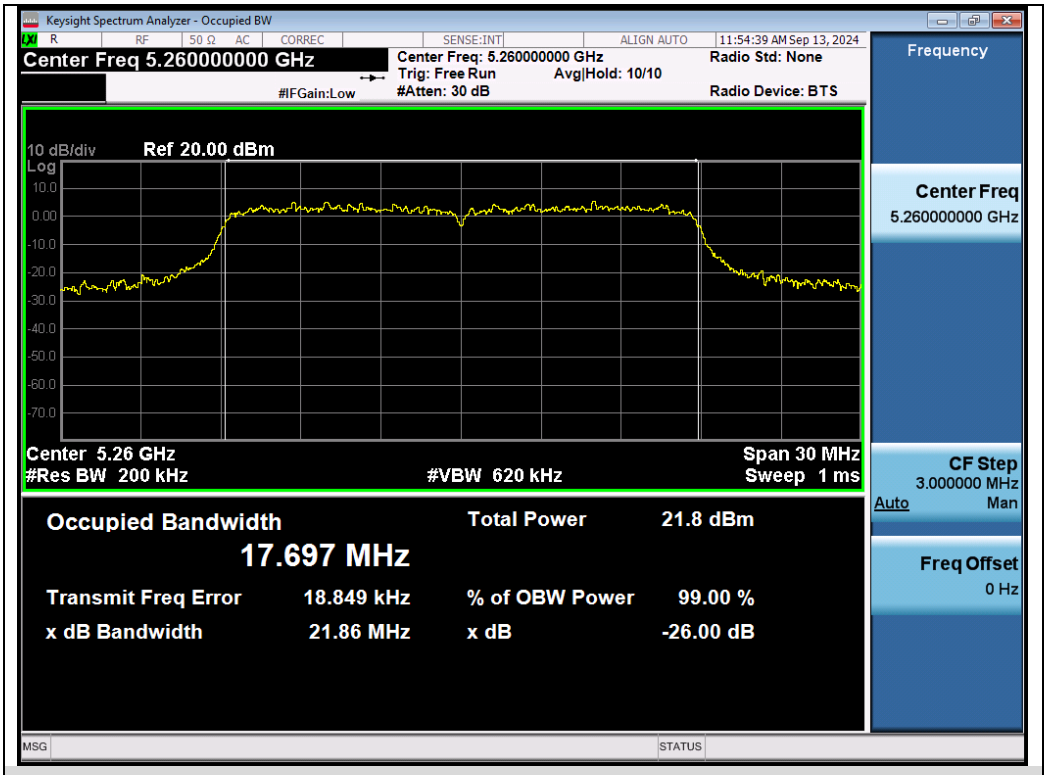
Test_Graph_802.11n20_ANT1_5320_MCS0_OBW



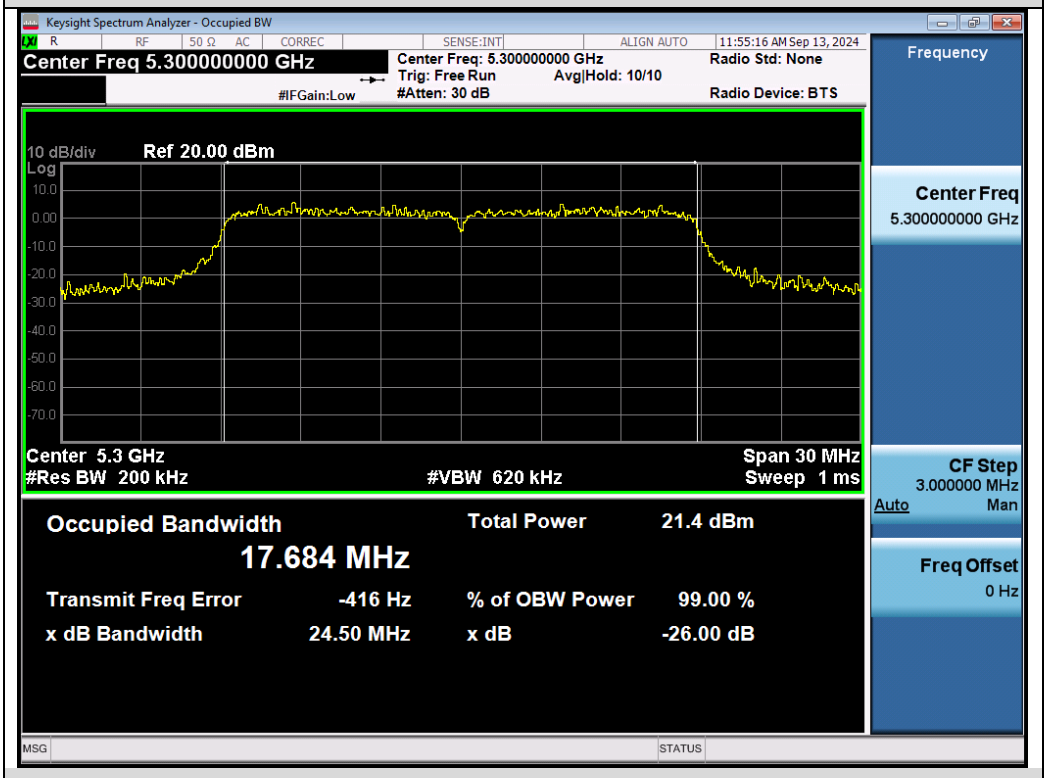
Test_Graph_802.11n40_ANT1_5270_MCS0_OBW



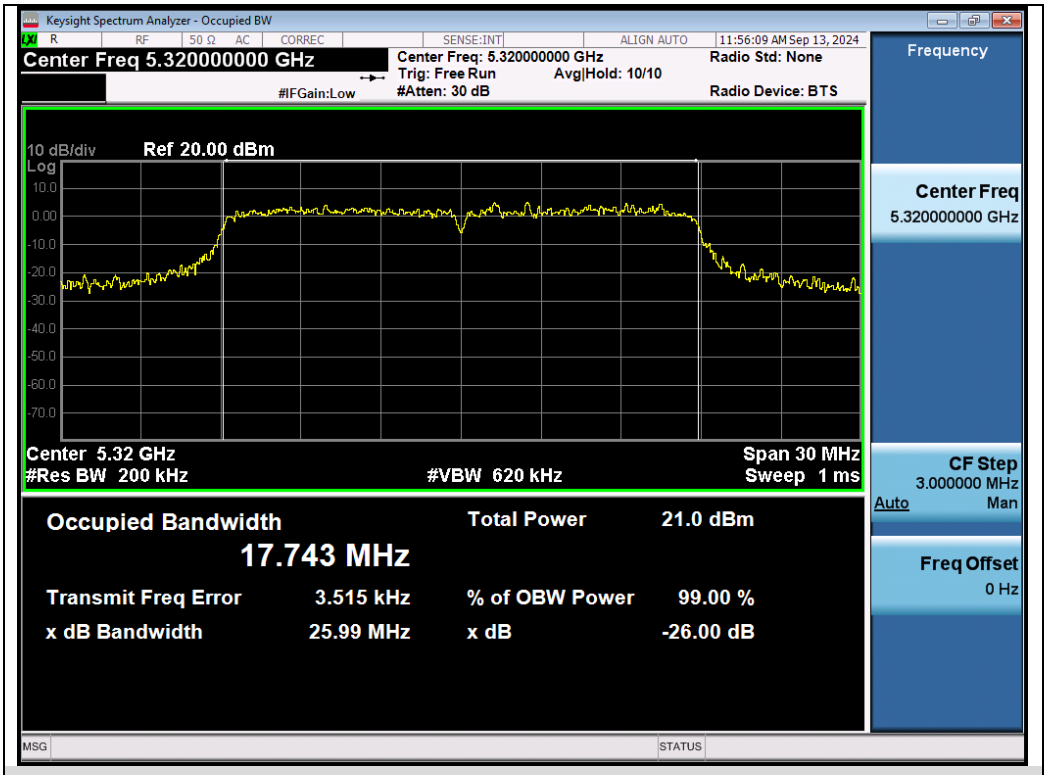
Test_Graph_802.11n40_ANT1_5310_MCS0_OBW



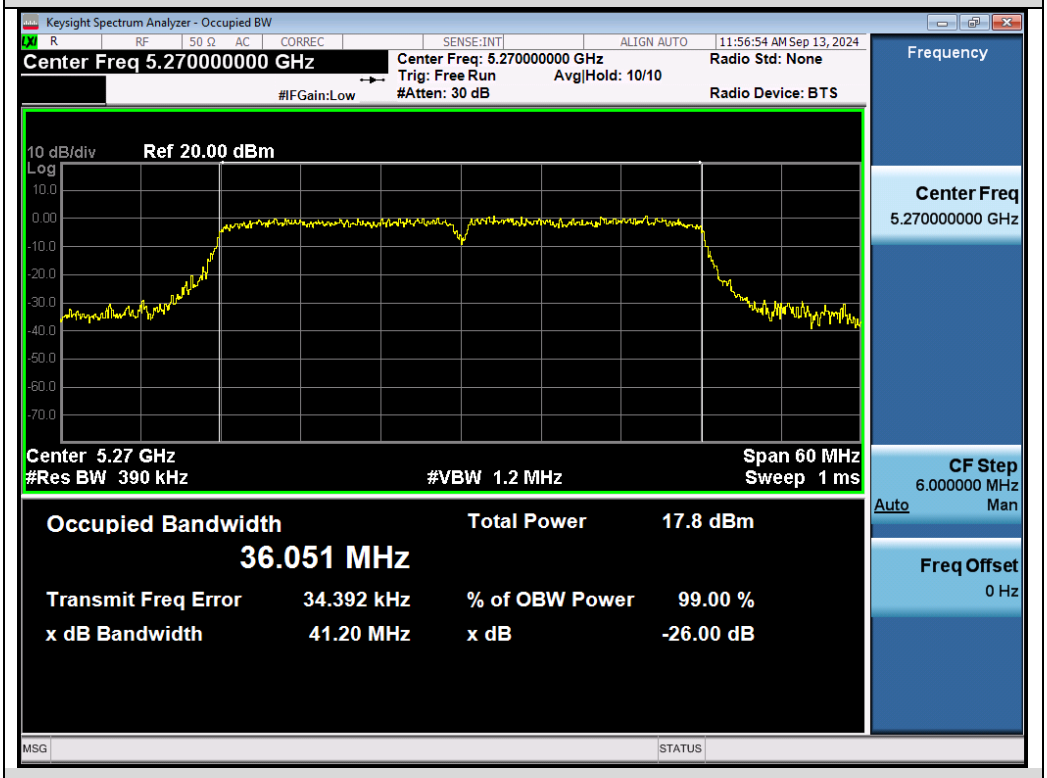
Test_Graph_802.11ac20_ANT1_5260_MCS0_OBW



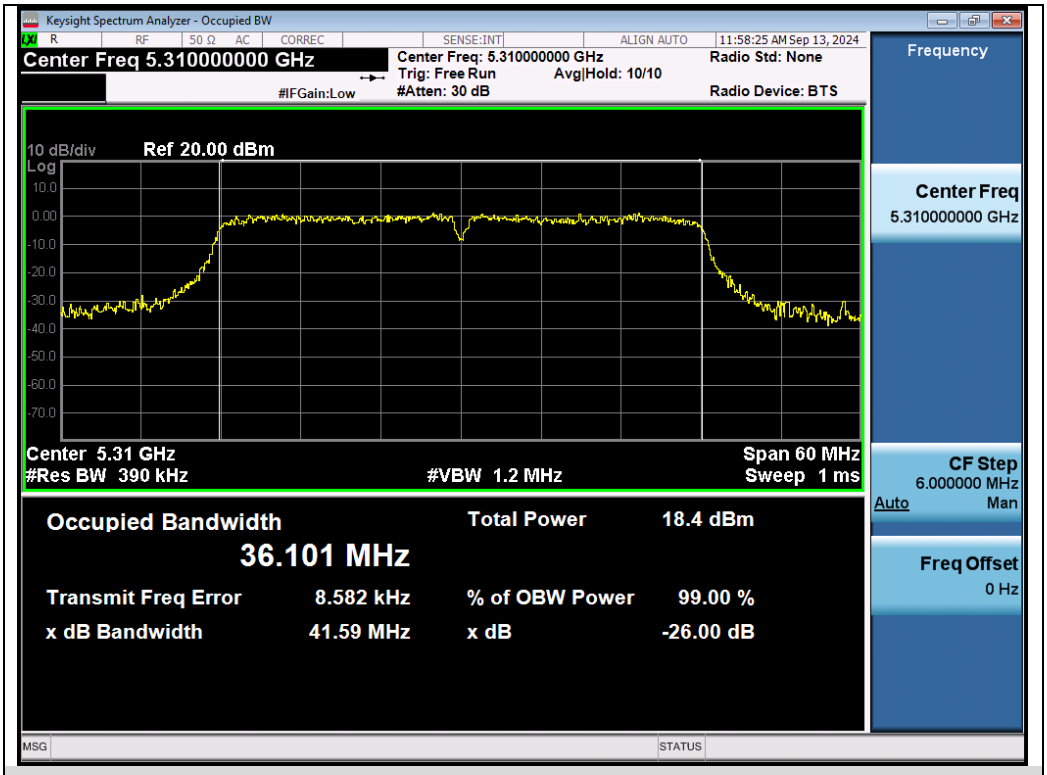
Test_Graph_802.11ac20_ANT1_5300_MCS0_OBW



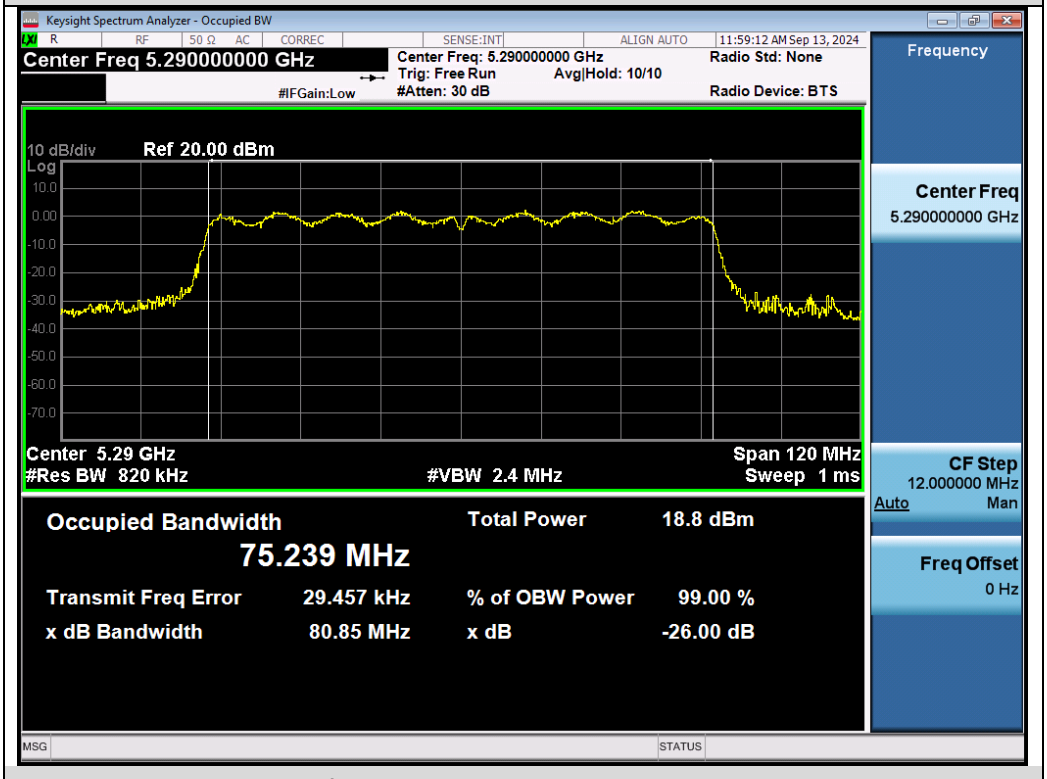
Test_Graph_802.11ac20_ANT1_5320_MCS0_OBW



Test_Graph_802.11ac40_ANT1_5270_MCS0_OBW

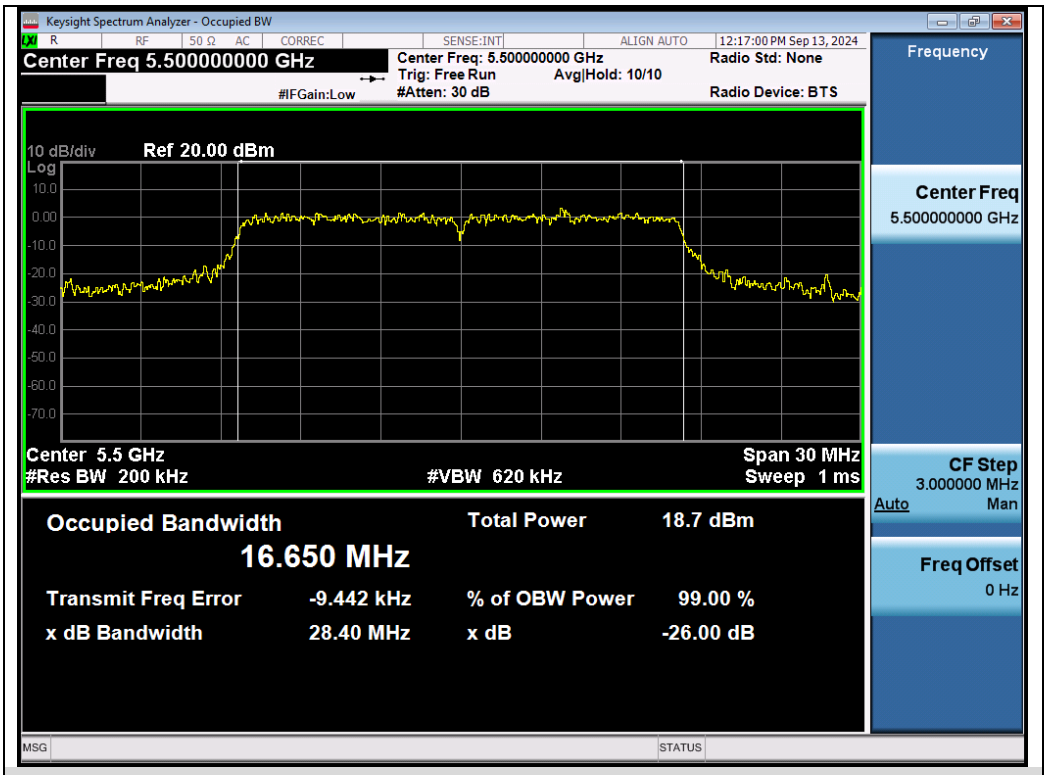


Test_Graph_802.11ac40_ANT1_5310_MCS0_OBW

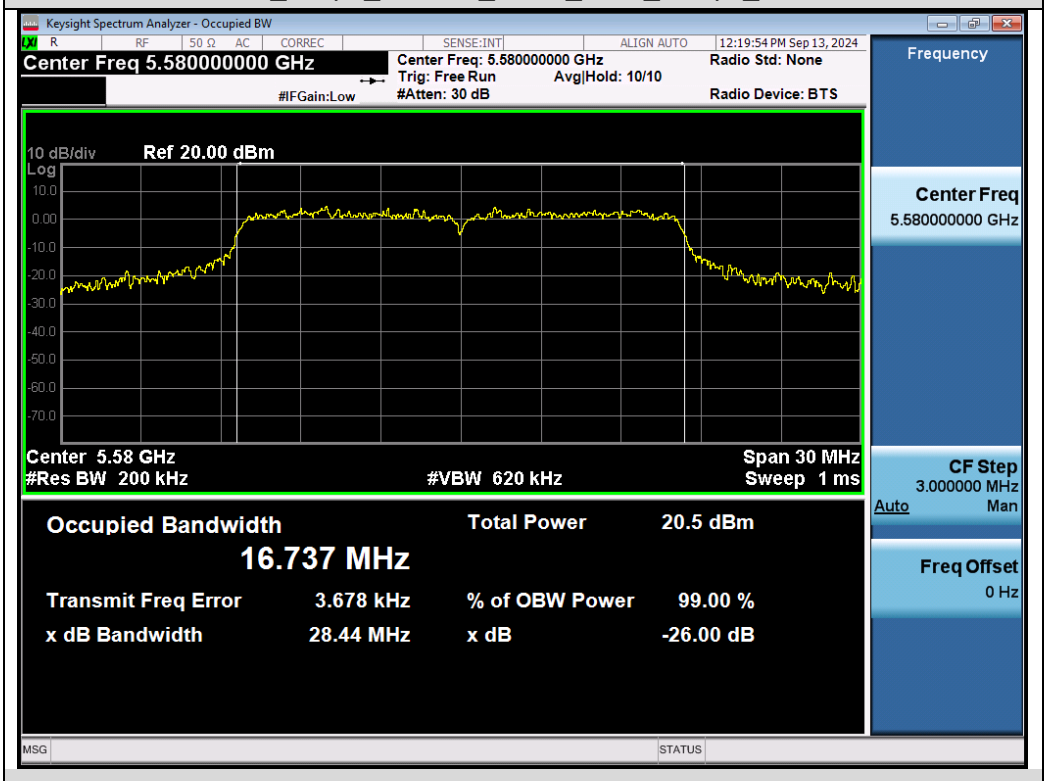


Test_Graph_802.11ac80_ANT1_5290_MCS0_OBW

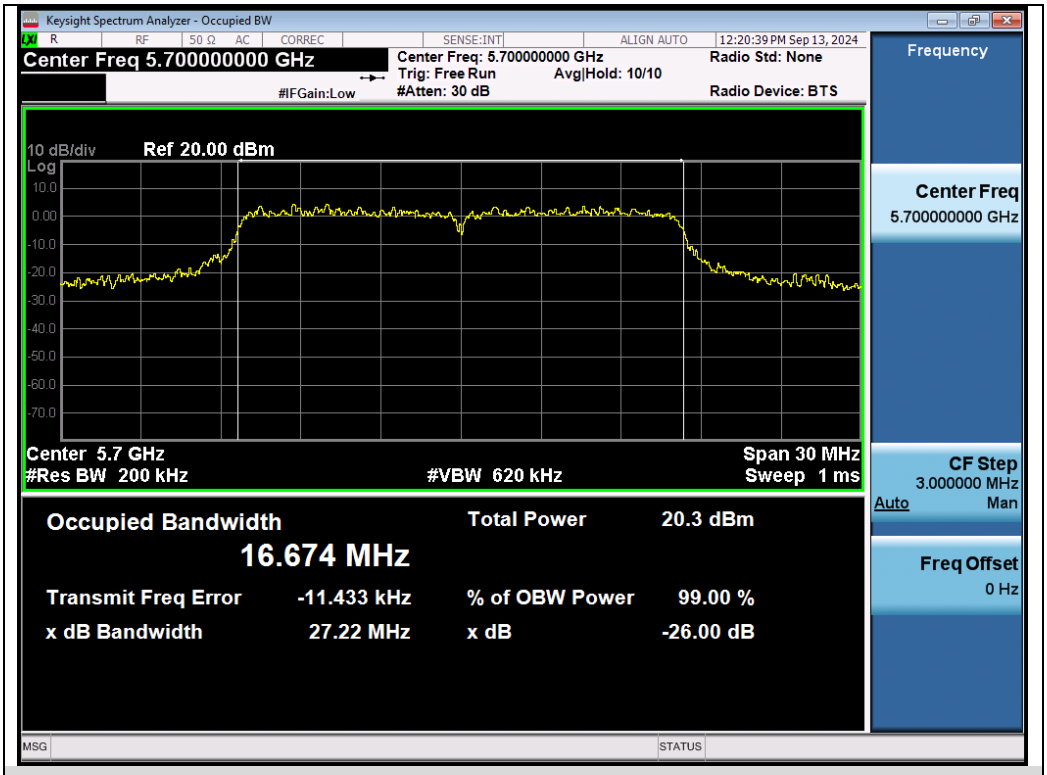
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.470-5.725 GHz



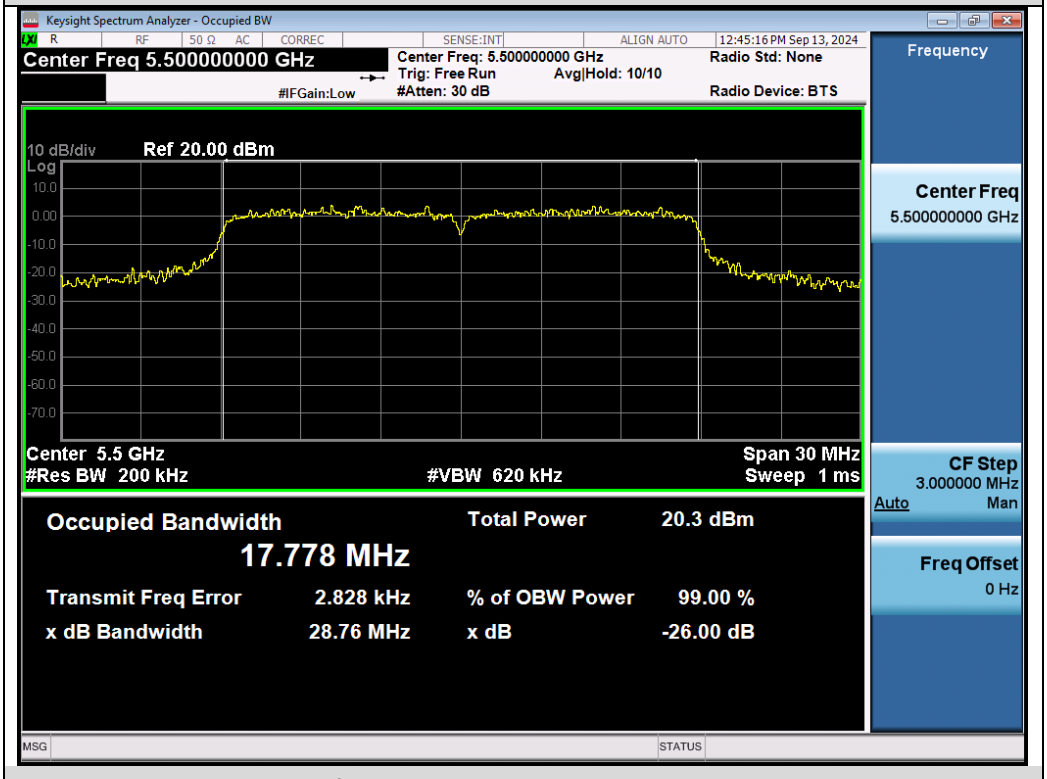
Test_Graph_802.11a_ANT1_5500_6Mbps_OBW



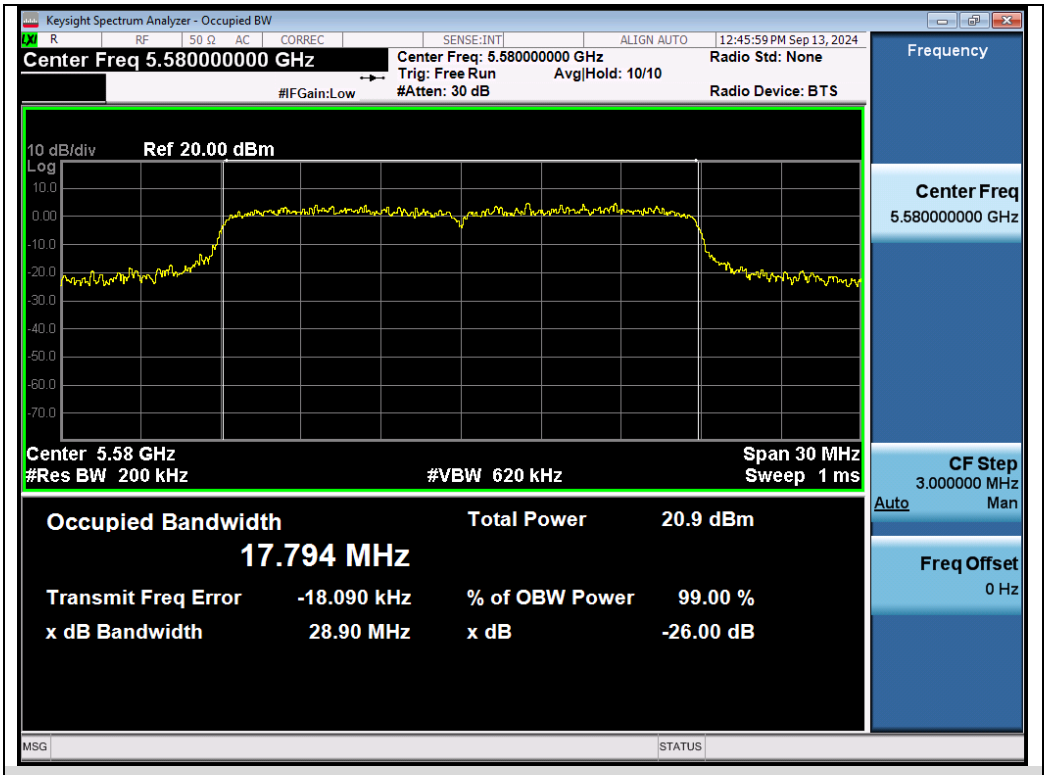
Test_Graph_802.11a_ANT1_5580_6Mbps_OBW



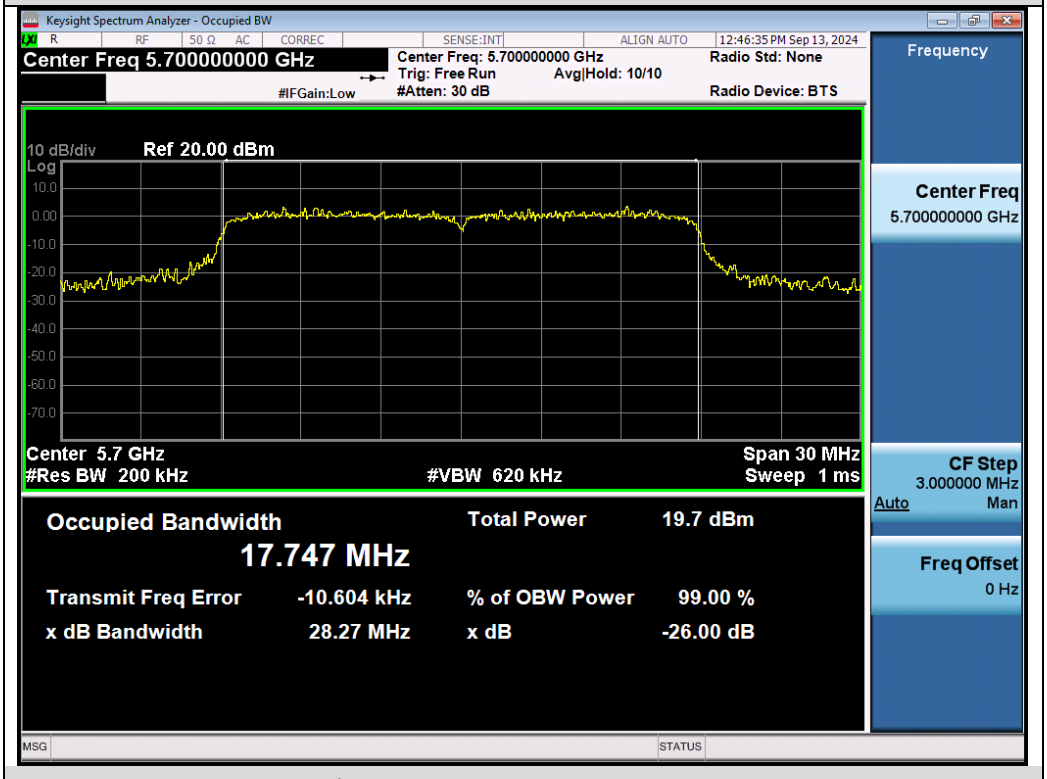
Test_Graph_802.11a_ANT1_5700_6Mbps_OBW



Test_Graph_802.11n20_ANT1_5500_MCS0_OBW



Test_Graph_802.11n20_ANT1_5580_MCS0_OBW



Test_Graph_802.11n20_ANT1_5700_MCS0_OBW