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# FCC Test Report

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Report No.: AGC03773220201FE06

**FCC ID** : 2AHRDEP-AC1689

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : USB WiFi Adapter

**BRAND NAME** : EDUP, EDUP HOME, EDUP LOVE, WISE TIGER, EPSKY,  
Card-King

**MODEL NAME** : EP-AC1689, EP-AC1689GS, EP-AC1689GS-Pro,  
EP-AC1689S, EP-AC1689GS Pro, EP-1689GS, EP-1689S,  
EP-1689, EP-1689GS Pro, EH-AC1689, EH-AC1689S,  
EH-AC1689GS, EH-AC1689GS Pro, EH-1689GS, EH-1689S,  
EH-1689, EH-1689GS Pro, WT-AC1689, WT-AC1689S,  
WT-AC1689GS, WT-AC1689GS Pro, WT-1689GS,  
WT-1689S, WT-1689, WT-1689GS Pro, KW-AC1689,  
KW-AC1689S, KW-AC1689GS, KW-AC1689GS Pro,  
KW-1689GS, KW-1689S, KW-1689, KW-1689GS Pro

**APPLICANT** : Shenzhen EDUP Electronics Technology Co., Ltd

**DATE OF ISSUE** : Feb. 28, 2022

**STANDARD(S)** : FCC Part 15.407

**TEST PROCEDURE(S)** : KDB 789033 D02 v02r01

**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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### REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Feb. 28, 2022	Valid	Initial Release

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## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	Shenzhen EDUP Electronics Technology Co., Ltd
<b>Address</b>	6 Floor, #6 Building, No.48, Kangzheng Road Liantang Industrial Area, Buji Town, Shenzhen, China
<b>Manufacturer</b>	Shenzhen EDUP Electronics Technology Co., Ltd
<b>Address</b>	6 Floor, #6 Building, No.48, Kangzheng Road Liantang Industrial Area, Buji Town, Shenzhen, China
<b>Factory</b>	Shenzhen EDUP Electronics Technology Co., Ltd
<b>Address</b>	6 Floor, #6 Building, No.48, Kangzheng Road Liantang Industrial Area, Buji Town, Shenzhen, China
<b>Product Designation</b>	USB WiFi Adapter
<b>Brand Name</b>	EDUP, EDUP HOME, EDUP LOVE, WISE TIGER, EPSKY, Card-King
<b>Test Model</b>	EP-AC1689
<b>Series Model</b>	EP-AC1689GS, EP-AC1689GS-Pro, EP-AC1689S, EP-AC1689GS Pro, EP-1689GS, EP-1689S, EP-1689, EP-1689GS Pro, EH-AC1689, EH-AC1689S, EH-AC1689GS, EH-AC1689GS Pro, EH-1689GS, EH-1689S, EH-1689, EH-1689GS Pro, WT-AC1689, WT-AC1689S, WT-AC1689GS, WT-AC1689GS Pro, WT-1689GS, WT-1689S, WT-1689, WT-1689GS Pro, KW-AC1689, KW-AC1689S, KW-AC1689GS, KW-AC1689GS Pro, KW-1689GS, KW-1689S, KW-1689, KW-1689GS Pro
<b>Declaration of Difference</b>	All the series models are the same as the test model except for the model names and the appearance in shape, size and color.
<b>Date of test</b>	Feb. 15, 2022 to Feb. 25, 2022
<b>Deviation</b>	No any deviation from the test method
<b>Condition of Test Sample</b>	Normal
<b>Test Result</b>	Pass
<b>Report Template</b>	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. 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 tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By



Cool Cheng  
(Project Engineer)

Feb. 25, 2022

Reviewed By



Calvin Liu  
(Reviewer)

Feb. 28, 2022

Approved By



Max Zhang  
(Authorized Officer)

Feb. 28, 2022

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## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is designed as “USB WiFi Adapter”. It is designed by way of utilizing the OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

<b>Equipment Type</b>	<input type="checkbox"/> Outdoor access points <input type="checkbox"/> Indoor access points <input type="checkbox"/> Fixed P2P access points <input checked="" type="checkbox"/> Client devices
<b>Operation Frequency</b>	<input checked="" type="checkbox"/> U-NII 1:5150MHz~5250MHz <input checked="" type="checkbox"/> U-NII 2A: 5250MHz~5350MHz <input checked="" type="checkbox"/> U-NII 2C:5470MHz~5725MHz <input checked="" type="checkbox"/> U-NII 3: 5725MHz~5850MHz
<b>DFS Design Type</b>	<input type="checkbox"/> Master <input type="checkbox"/> Slave with radar detection <input checked="" type="checkbox"/> Slave without radar detection
<b>TPC Function</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Test Frequency Range:</b>	For 802.11a/n/ac-HT20-VHT20: 5180~5240MHz, 5260~5320MHz, 5500~5700MHz, 5745~5825MHz For 802.11n/ac-HT40: 5190~5230MHz, 5270~5310MHz, 5510~5670MHz,5755~5795MHz For 802.11ac-HT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz,5775MHz
<b>Output Power</b>	IEEE 802.11a:4.07dBm; IEEE 802.11n-HT20:3.81dBm; IEEE 802.11n-HT40:4.07dBm; IEEE 802.11ac-VHT20:3.76dBm; IEEE 802.11ac-VHT40:4.00dBm; IEEE 802.11ac-VHT80:4.09dBm
<b>Output Power_MIMO</b>	IEEE 802.11n(20):6.82dBm; IEEE802.11n(40):6.72dBm IEEE 802.11ac(20):6.64dBm; IEEE802.11ac(40):6.68dBm; IEEE802.11ac(80):7.04dBm
<b>Modulation</b>	802.11a/n:(64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11ac :(256-QAM, 64-QAM, 16-QAM, QPSK, BPSK) OFDM
<b>Data Rate</b>	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 400Mbps
<b>Number of channels</b>	7 channels of U-NII-1 Band 7 channels of U-NII-2A Band 21 channels of U-NII-2C Band 8 channels of U-NII-3 Band
<b>Hardware Version</b>	1.0
<b>Software Version</b>	1.0
<b>Antenna Designation</b>	SMT antenna Antenna (Comply with requirements of the FCC part 15.203)
<b>Number of transmit chain</b>	2(802.a/11n/ac all used four antennas, but 802.11a support SISO and 802.11n/ac support MIMO)
<b>Antenna Gain</b>	Refer to Chapter 2.8 of the report.
<b>Power Supply</b>	DC 5V by PC

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## 2.2. TABLE OF CARRIER FREQUENCIES

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:

4 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	--	--

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**For 5500~5720MHz:**

**12 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	144	5720 MHz

**6 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	142	5710 MHz

**3 channel is provided for 802.11ac (VHT80):**

Channel	Frequency	Channel	Frequency
106	5530 MHz	122	5610 MHz
138	5690 MHz	--	--

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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	--	--

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### 2.3. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AHRDEP-AC1689** filing to comply with the FCC Part 15 requirements.

### 2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters. Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.407 rules KDB 789033 D02

### 2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

### 2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

### 2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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## 2.8. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna Type	Frequency Band (MHz)	TX Paths	Bandwidth (MHz)	Max Peak Gain (dBi)		Max Directional Gain (dBi)
				Ant 1	Ant 2	
5G WIFI SMT Antenna List (5GHz 2*2 MIMO)						
SMT Antenna	5150 ~ 5250	2	20,40,80	1.6	1.6	4.61
	5250 ~ 5350	2	20,40,80	1.6	1.6	4.61
	5470 ~ 5725	2	20,40,80	1.6	1.6	4.61
	5725 ~ 5850	2	20,40,80	1.6	1.6	4.61

Note 1: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11n mode.

Note 2: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

If all antennas have the same gain,  $G_{ANT}$ , Directional gain =  $G_{ANT}$  + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on devices:

$$\text{Array Gain} = 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01;$$

- For power measurements on IEEE 802.11 devices:

$$\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4;$$

$$\text{Array Gain} = 0 \text{ dB (i.e., no array gain) for channel widths } \geq 40 \text{ MHz for any } N_{ANT};$$

$$\text{Array Gain} = 5 \log(N_{ANT}/N_{SS}) \text{ dB or } 3 \text{ dB, whichever is less, for } 20 \text{ MHz channel widths with } N_{ANT} \geq 5.$$

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with  $G_{ANT}$  set equal to the gain of the antenna having the highest gain.

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### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 3.1$ dB
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0$ dB
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8$ dB
Uncertainty of total RF power, conducted	$U_c = \pm 0.8$ dB
Uncertainty of RF power density, conducted	$U_c = \pm 2.6$ dB
Uncertainty of spurious emissions, conducted	$U_c = \pm 2$ %
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2$ %

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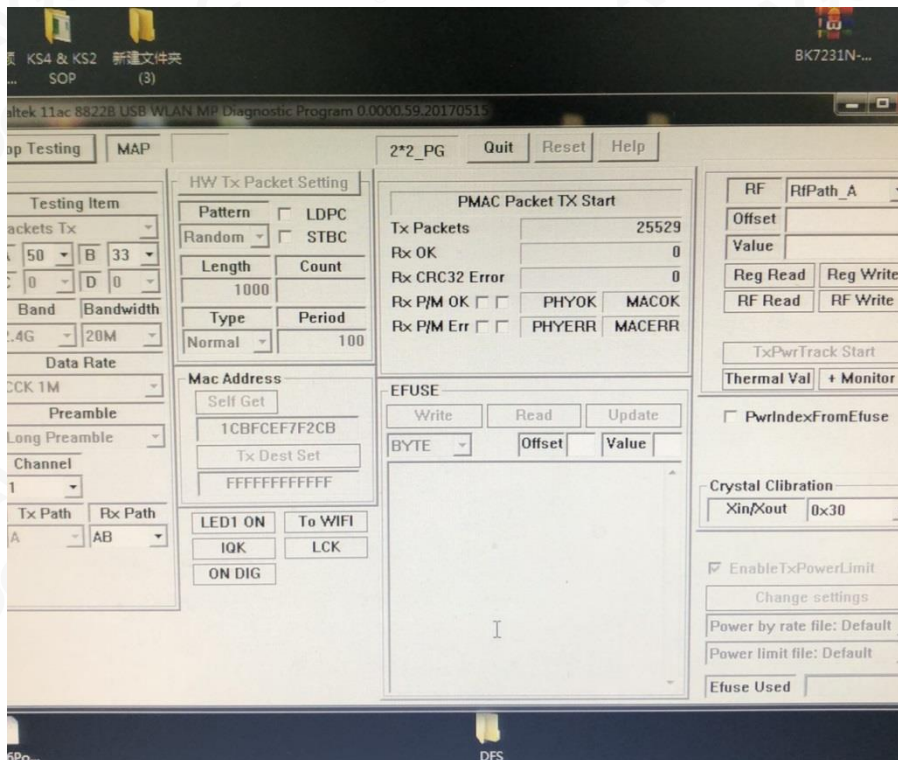
#### 4. DESCRIPTION OF TEST MODES

Mode	Available channel	Tested channel	Modulation	Date rate (Mbps)
802.11a/n/ac20	36,40,44,48, 149,153,157,161,165	36,40,48, 149,157,165	OFDM	6Mbps/MCS0
802.11n/ac40	38,46,151,159	38,46, 151,159	OFDM	MCS0
802.11ac80	42, 155	42, 155	OFDM	MCS0

**Note:**

1. The EUT has been set to operate continuously on tested channel individually, and the EUT is operating at its maximum duty cycle>or equal 98%.
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.

Software Setting



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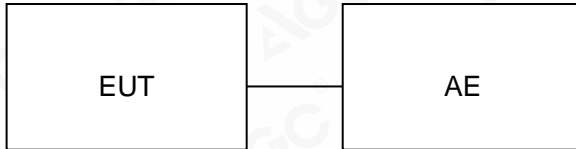
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Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/



## 5. SYSTEM TEST CONFIGURATION

### 5.1. CONFIGURATION OF EUT SYSTEM

Configure 1:



### 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	USB WiFi Adapter	EP-AC1689	2AHRDEP-AC1689	EUT
2	PC	Nbl-WAQ9R	--	AE
3	PC adapter	HW-200200CP1	--	AE

### 5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.407	6dB Bandwidth	Compliant
§15.407	Emission Bandwidth	Compliant
§15.407	Maximum conducted output power	Compliant
§15.407	Conducted Spurious Emission	Compliant
§15.407	Maximum Conducted Output Power Density	Compliant
§15.209	Radiated Emission	Compliant
§15.407	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

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## 6. TEST FACILITY

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<b>Designation Number</b>	CN1259
<b>FCC Test Firm Registration Number</b>	975832
<b>A2LA Cert. No.</b>	5054.02
<b>Description</b>	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2021	May 14, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test software	R&S	ES-K1 (Ver V1.71)	N/A	N/A	N/A

### TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2021	May 14, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Nov. 17, 2021	Nov. 16, 2022
Power sensor	Aglient	U2021XA	MY54110007	Jun. 06, 2021	Jun. 05, 2022
5GHz Fliter	EM Electronics	5150-5880MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
Active loop antenna (9K-30MHZ)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2021	Apr. 22, 2022
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 08, 2020	Jan. 07, 2023
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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## 7. MAXIMUM CONDUCTED OUTPUT POWER

### 7.1. MEASUREMENT PROCEDURE

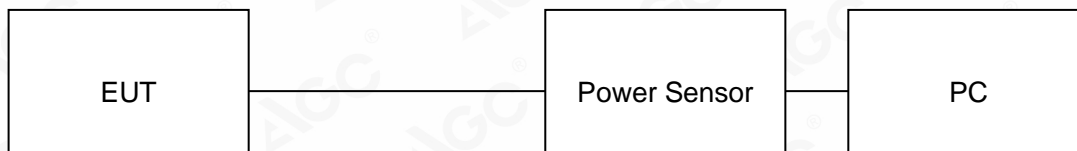
For average power test:

1. Connect EUT RF output port to power sensor through an RF attenuator.
2. Connect the power sensor to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

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

### 7.2. TEST SET-UP

#### AVERAGE POWER SETUP



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### 7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power for band 5.15-5.25 GHz antenna 1				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	3.91	24	Pass
	5200	3.79	24	Pass
	5240	3.59	24	Pass
802.11n20	5180	3.60	24	Pass
	5200	3.24	24	Pass
	5240	3.09	24	Pass
802.11n40	5190	3.74	24	Pass
	5230	3.09	24	Pass
802.11ac20	5180	2.74	24	Pass
	5200	3.21	24	Pass
	5240	3.10	24	Pass
802.11ac40	5190	3.66	24	Pass
	5230	3.51	24	Pass
802.11ac80	5210	3.66	24	Pass

Test Data of Conducted Output Power for band 5.15-5.25 GHz antenna 2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	3.00	24	Pass
	5200	3.75	24	Pass
	5240	3.56	24	Pass
802.11n20	5180	2.73	24	Pass
	5200	2.68	24	Pass
	5240	3.01	24	Pass
802.11n40	5190	3.44	24	Pass
	5230	3.47	24	Pass
802.11ac20	5180	2.61	24	Pass
	5200	2.63	24	Pass
	5240	3.25	24	Pass
802.11ac40	5190	2.83	24	Pass
	5230	3.23	24	Pass
802.11ac80	5210	2.85	24	Pass

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Test Data of Conducted Output Power for band 5.15-5.25 GHz antenna 1+2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	5180	6.20	24	Pass
	5200	5.98	24	Pass
	5240	6.06	24	Pass
802.11n40	5190	6.60	24	Pass
	5230	6.29	24	Pass
802.11ac20	5180	5.69	24	Pass
	5200	5.94	24	Pass
	5240	6.19	24	Pass
802.11ac40	5190	6.28	24	Pass
	5230	6.38	24	Pass
802.11ac80	5210	6.28	24	Pass

Test Data of Conducted Output Power for band 5.25-5.35 GHz antenna 1				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5260	3.76	24	Pass
	5300	3.43	24	Pass
	5320	3.10	24	Pass
802.11n20	5260	2.91	24	Pass
	5300	3.11	24	Pass
	5320	2.94	24	Pass
802.11n40	5270	3.94	24	Pass
	5310	3.23	24	Pass
802.11ac20	5260	2.98	24	Pass
	5300	3.26	24	Pass
	5320	3.01	24	Pass
802.11ac40	5270	2.91	24	Pass
	5310	3.13	24	Pass
802.11ac80	5290	3.44	24	Pass

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Test Data of Conducted Output Power for band 5.25-5.35 GHz antenna 2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5260	3.01	24	Pass
	5300	3.52	24	Pass
	5320	3.66	24	Pass
802.11n20	5260	2.65	24	Pass
	5300	3.22	24	Pass
	5320	3.28	24	Pass
802.11n40	5270	3.16	24	Pass
	5310	3.77	24	Pass
802.11ac20	5260	2.76	24	Pass
	5300	3.25	24	Pass
	5320	3.46	24	Pass
802.11ac40	5270	3.39	24	Pass
	5310	3.61	24	Pass
802.11ac80	5290	3.33	24	Pass

Test Data of Conducted Output Power for band 5.25-5.35 GHz antenna 1+2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	5260	5.79	24	Pass
	5300	6.18	24	Pass
	5320	6.12	24	Pass
802.11n40	5270	6.58	24	Pass
	5310	6.52	24	Pass
802.11ac20	5260	5.88	24	Pass
	5300	6.27	24	Pass
	5320	6.25	24	Pass
802.11ac40	5270	6.17	24	Pass
	5310	6.39	24	Pass
802.11ac80	5290	6.40	24	Pass

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**Test Data of Conducted Output Power for band 5.47-5.725 GHz antenna 1**

Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5500	3.51	24	Pass
	5600	4.07	24	Pass
	5700	3.86	24	Pass
802.11n20	5500	2.76	24	Pass
	5600	3.54	24	Pass
	5700	3.81	24	Pass
802.11n40	5510	3.30	24	Pass
	5590	3.44	24	Pass
	5670	4.07	24	Pass
802.11ac20	5500	3.24	24	Pass
	5600	3.76	24	Pass
	5700	3.62	24	Pass
802.11ac40	5510	3.00	24	Pass
	5590	3.70	24	Pass
	5670	3.28	24	Pass
802.11ac80	5530	3.72	24	Pass
	5610	3.96	24	Pass

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Test Data of Conducted Output Power for band 5.47-5.725 GHz antenna 2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5500	3.72	24	Pass
	5600	3.81	24	Pass
	5700	3.66	24	Pass
802.11n20	5500	3.48	24	Pass
	5600	3.72	24	Pass
	5700	3.81	24	Pass
802.11n40	5510	2.44	24	Pass
	5590	2.91	24	Pass
	5670	3.31	24	Pass
802.11ac20	5500	3.69	24	Pass
	5600	3.49	24	Pass
	5700	3.56	24	Pass
802.11ac40	5510	2.04	24	Pass
	5590	3.52	24	Pass
	5670	3.91	24	Pass
802.11ac80	5530	3.08	24	Pass
	5610	4.09	24	Pass

Test Data of Conducted Output Power for band 5.47-5.725 GHz antenna 1+2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	5500	6.15	24	Pass
	5600	6.64	24	Pass
	5700	6.82	24	Pass
802.11n40	5510	5.90	24	Pass
	5590	6.19	24	Pass
	5670	6.72	24	Pass
802.11ac20	5500	6.48	24	Pass
	5600	6.64	24	Pass
	5700	6.60	24	Pass
802.11ac40	5510	5.56	24	Pass
	5590	6.62	24	Pass
	5670	6.62	24	Pass
802.11ac80	5530	6.42	24	Pass
	5610	7.04	24	Pass

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Test Data of Conducted Output Power for band 5.725-5.85 GHz-antenna 1				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	3.60	30	Pass
	5785	3.64	30	Pass
	5825	3.18	30	Pass
802.11n20	5745	2.93	30	Pass
	5785	3.08	30	Pass
	5825	2.72	30	Pass
802.11n40	5755	3.74	30	Pass
	5795	3.69	30	Pass
802.11ac20	5745	3.24	30	Pass
	5785	2.85	30	Pass
	5825	2.32	30	Pass
802.11ac40	5755	3.29	30	Pass
	5795	3.32	30	Pass
802.11ac80	5775	3.53	30	Pass

Test Data of Conducted Output Power for band 5.725-5.85 GHz-antenna 2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	3.70	30	Pass
	5785	3.82	30	Pass
	5825	3.67	30	Pass
802.11n20	5745	3.15	30	Pass
	5785	2.75	30	Pass
	5825	2.51	30	Pass
802.11n40	5755	3.46	30	Pass
	5795	3.35	30	Pass
802.11ac20	5745	3.55	30	Pass
	5785	3.32	30	Pass
	5825	2.54	30	Pass
802.11ac40	5755	3.80	30	Pass
	5795	4.00	30	Pass
802.11ac80	5775	3.40	30	Pass

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Test Data of Conducted Output Power for band 5.725-5.85 GHz-antenna 1+2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	5745	6.05	30	Pass
	5785	5.93	30	Pass
	5825	5.63	30	Pass
802.11n40	5755	6.61	30	Pass
	5795	6.53	30	Pass
802.11ac20	5745	6.41	30	Pass
	5785	6.10	30	Pass
	5825	5.44	30	Pass
802.11ac40	5755	6.56	30	Pass
	5795	6.68	30	Pass
802.11ac80	5775	6.48	30	Pass

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## 8. BANDWIDTH

### 8.1. MEASUREMENT PROCEDURE

-6dB bandwidth (DTS bandwidth):

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  $\geq 3 \times$  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:

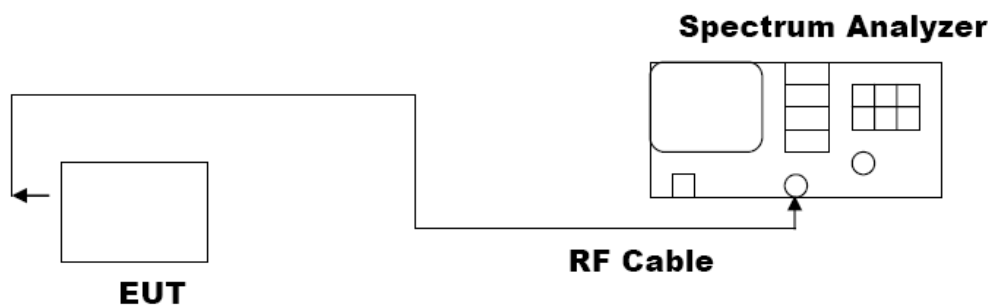
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel  
The nominal IF filter bandwidth (3 dB RBW) shall 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:

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.

### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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### 8.3. LIMITS AND MEASUREMENT RESULTS

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz-antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.484	20.72	N/A	Pass
	5200	16.483	20.45	N/A	Pass
	5240	16.483	20.40	N/A	Pass
802.11n20	5180	17.547	20.49	N/A	Pass
	5200	17.548	20.40	N/A	Pass
	5240	17.544	20.45	N/A	Pass
802.11n40	5190	36.129	41.95	N/A	Pass
	5230	36.138	42.35	N/A	Pass
802.11ac20	5180	17.561	20.54	N/A	Pass
	5200	17.558	20.54	N/A	Pass
	5240	17.561	20.58	N/A	Pass
802.11ac40	5190	36.124	42.18	N/A	Pass
	5230	36.115	42.19	N/A	Pass
802.11ac80	5210	75.397	82.34	N/A	Pass

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz-antenna 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.454	19.90	N/A	Pass
	5200	16.442	19.91	N/A	Pass
	5240	16.457	20.38	N/A	Pass
802.11n20	5180	17.528	20.32	N/A	Pass
	5200	17.515	20.43	N/A	Pass
	5240	17.529	20.39	N/A	Pass
802.11n40	5190	36.089	41.96	N/A	Pass
	5230	36.079	41.87	N/A	Pass
802.11ac20	5180	17.529	20.51	N/A	Pass
	5200	17.536	20.36	N/A	Pass
	5240	17.536	20.45	N/A	Pass
802.11ac40	5190	36.120	41.31	N/A	Pass
	5230	36.119	41.42	N/A	Pass
802.11ac80	5210	75.312	81.57	N/A	Pass

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Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.25-5.35 GHz-antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5260	16.474	20.35	N/A	Pass
	5300	16.483	20.47	N/A	Pass
	5320	16.488	20.36	N/A	Pass
802.11n20	5260	17.544	20.50	N/A	Pass
	5300	17.540	20.41	N/A	Pass
	5320	17.537	20.52	N/A	Pass
802.11n40	5270	36.119	41.94	N/A	Pass
	5310	36.080	42.14	N/A	Pass
802.11ac20	5260	17.575	20.47	N/A	Pass
	5300	17.567	20.56	N/A	Pass
	5320	17.554	20.45	N/A	Pass
802.11ac40	5270	36.129	42.09	N/A	Pass
	5310	36.126	41.97	N/A	Pass
802.11ac80	5290	75.377	82.69	N/A	Pass

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.25-5.35 GHz-antenna 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5260	16.458	20.04	N/A	Pass
	5300	16.463	20.41	N/A	Pass
	5320	16.468	20.47	N/A	Pass
802.11n20	5260	17.529	20.41	N/A	Pass
	5300	17.534	20.30	N/A	Pass
	5320	17.525	20.37	N/A	Pass
802.11n40	5270	36.117	41.83	N/A	Pass
	5310	36.078	41.82	N/A	Pass
802.11ac20	5260	17.547	20.61	N/A	Pass
	5300	17.541	20.54	N/A	Pass
	5320	17.546	20.43	N/A	Pass
802.11ac40	5270	36.110	41.55	N/A	Pass
	5310	36.086	41.40	N/A	Pass
802.11ac80	5290	75.337	81.96	N/A	Pass

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Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.47-5.725 GHz antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5500	16.466	20.41	N/A	Pass
	5600	16.461	20.25	N/A	Pass
	5700	16.455	20.30	N/A	Pass
802.11n20	5500	17.537	20.40	N/A	Pass
	5600	17.538	20.35	N/A	Pass
	5700	17.528	20.44	N/A	Pass
802.11n40	5510	36.140	41.68	N/A	Pass
	5590	36.119	41.80	N/A	Pass
	5670	36.087	41.59	N/A	Pass
802.11ac20	5500	17.532	20.36	N/A	Pass
	5600	17.550	20.50	N/A	Pass
	5700	17.561	20.49	N/A	Pass
802.11ac40	5510	36.135	41.41	N/A	Pass
	5590	36.130	41.41	N/A	Pass
	5670	36.102	41.38	N/A	Pass
802.11ac80	5530	75.342	81.16	N/A	Pass
	5610	75.321	81.28	N/A	Pass

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Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.47-5.725 GHz antenna 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5500	16.454	19.93	N/A	Pass
	5600	16.445	19.99	N/A	Pass
	5700	16.447	19.96	N/A	Pass
802.11n20	5500	17.518	20.39	N/A	Pass
	5600	17.529	20.37	N/A	Pass
	5700	17.511	20.31	N/A	Pass
802.11n40	5510	36.074	41.63	N/A	Pass
	5590	36.099	41.53	N/A	Pass
	5670	36.097	41.39	N/A	Pass
802.11ac20	5500	17.535	20.47	N/A	Pass
	5600	17.533	20.52	N/A	Pass
	5700	17.525	20.41	N/A	Pass
802.11ac40	5510	36.057	40.86	N/A	Pass
	5590	30.075	40.89	N/A	Pass
	5670	36.086	41.02	N/A	Pass
802.11ac80	5530	75.213	81.40	N/A	Pass
	5610	75.292	81.61	N/A	Pass

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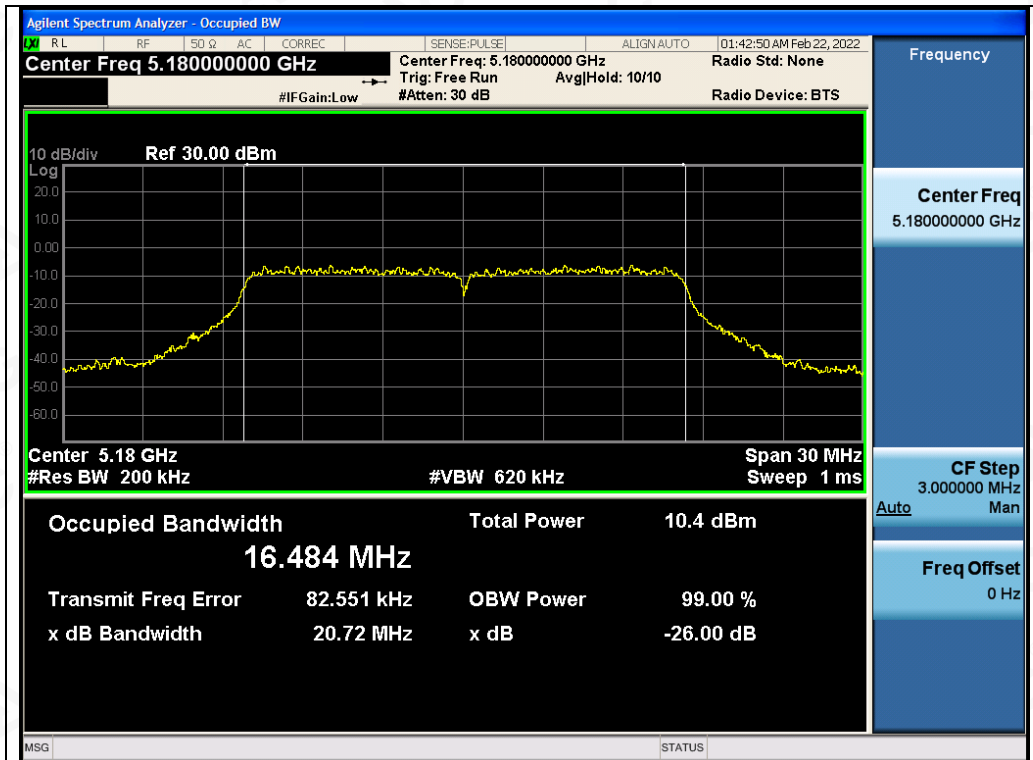
Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz-antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.464	16.32	0.5	Pass
	5785	16.475	16.33	0.5	Pass
	5825	16.471	16.31	0.5	Pass
802.11n20	5745	17.541	17.01	0.5	Pass
	5785	17.537	17.02	0.5	Pass
	5825	17.543	16.87	0.5	Pass
802.11n40	5755	36.138	35.17	0.5	Pass
	5795	36.106	35.16	0.5	Pass
802.11ac20	5745	17.549	17.00	0.5	Pass
	5785	17.537	16.99	0.5	Pass
	5825	17.538	17.00	0.5	Pass
802.11ac40	5755	36.142	35.48	0.5	Pass
	5795	36.120	35.47	0.5	Pass
802.11ac80	5775	75.418	75.21	0.5	Pass

Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz-antenna 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.461	16.31	0.5	Pass
	5785	16.445	16.31	0.5	Pass
	5825	16.454	16.32	0.5	Pass
802.11n20	5745	17.509	16.78	0.5	Pass
	5785	17.508	16.96	0.5	Pass
	5825	17.520	16.75	0.5	Pass
802.11n40	5755	36.105	35.46	0.5	Pass
	5795	36.058	35.17	0.5	Pass
802.11ac20	5745	17.520	16.80	0.5	Pass
	5785	17.533	17.04	0.5	Pass
	5825	17.528	16.54	0.5	Pass
802.11ac40	5755	36.087	35.18	0.5	Pass
	5795	36.069	35.18	0.5	Pass
802.11ac80	5775	75.315	75.22	0.5	Pass

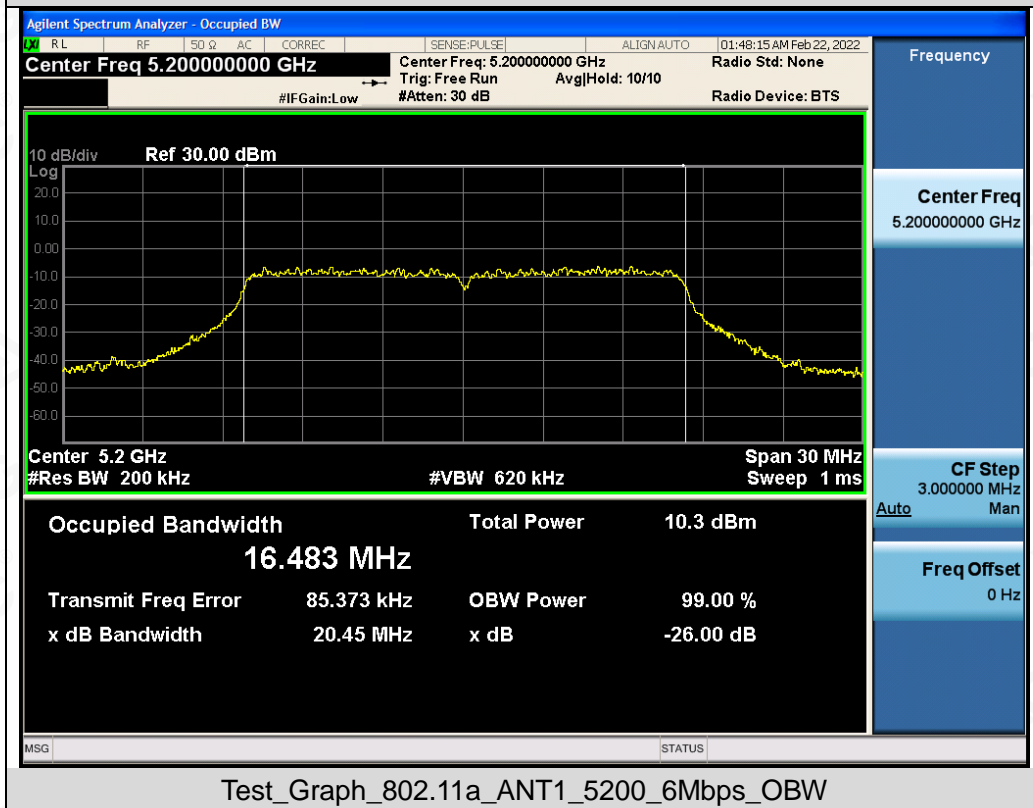
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**Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz**



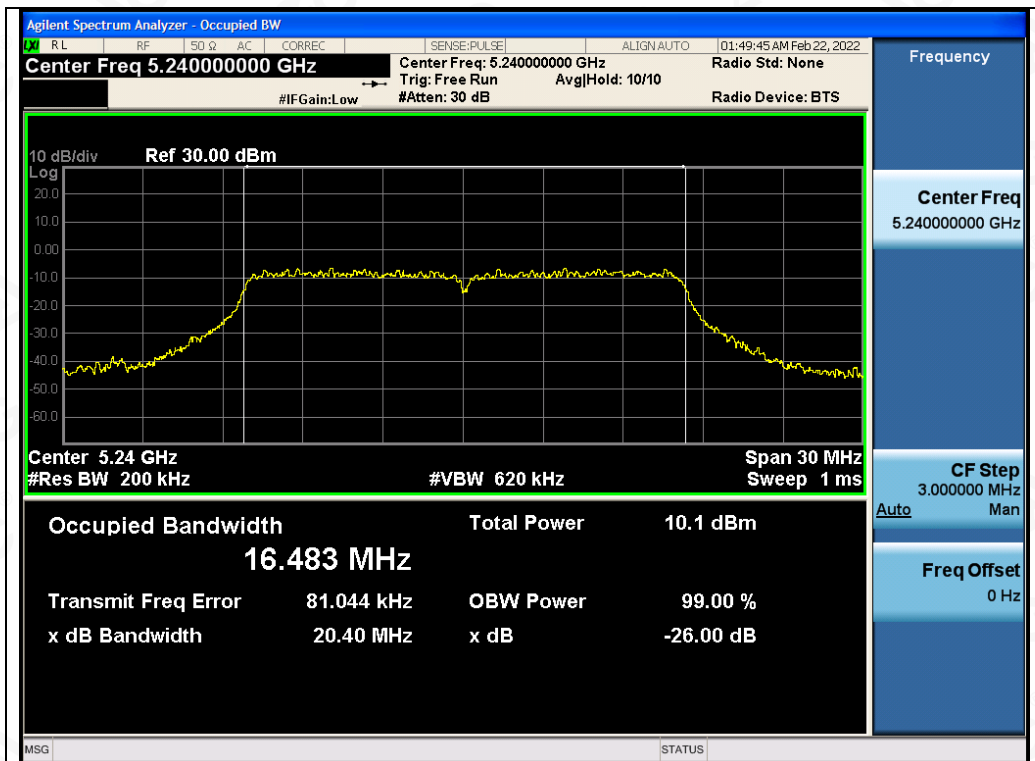
Test\_Graph\_802.11a\_ANT1\_5180\_6Mbps\_OBW



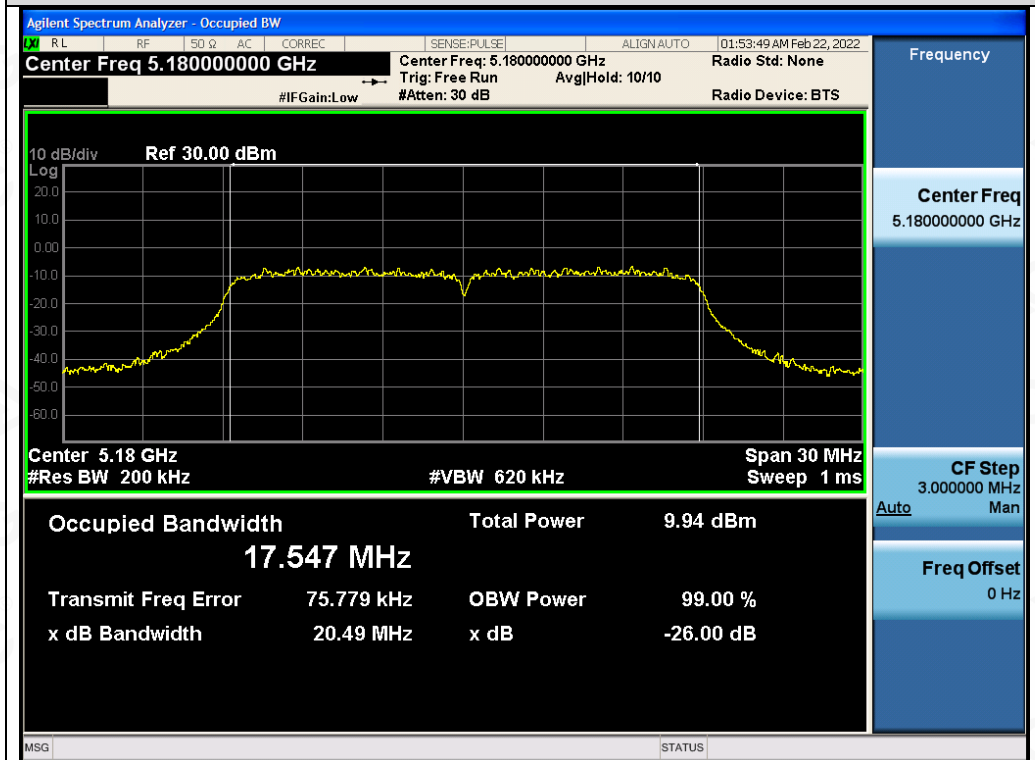
Test\_Graph\_802.11a\_ANT1\_5200\_6Mbps\_OBW

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Test\_Graph\_802.11a\_ANT1\_5240\_6Mbps\_OBW

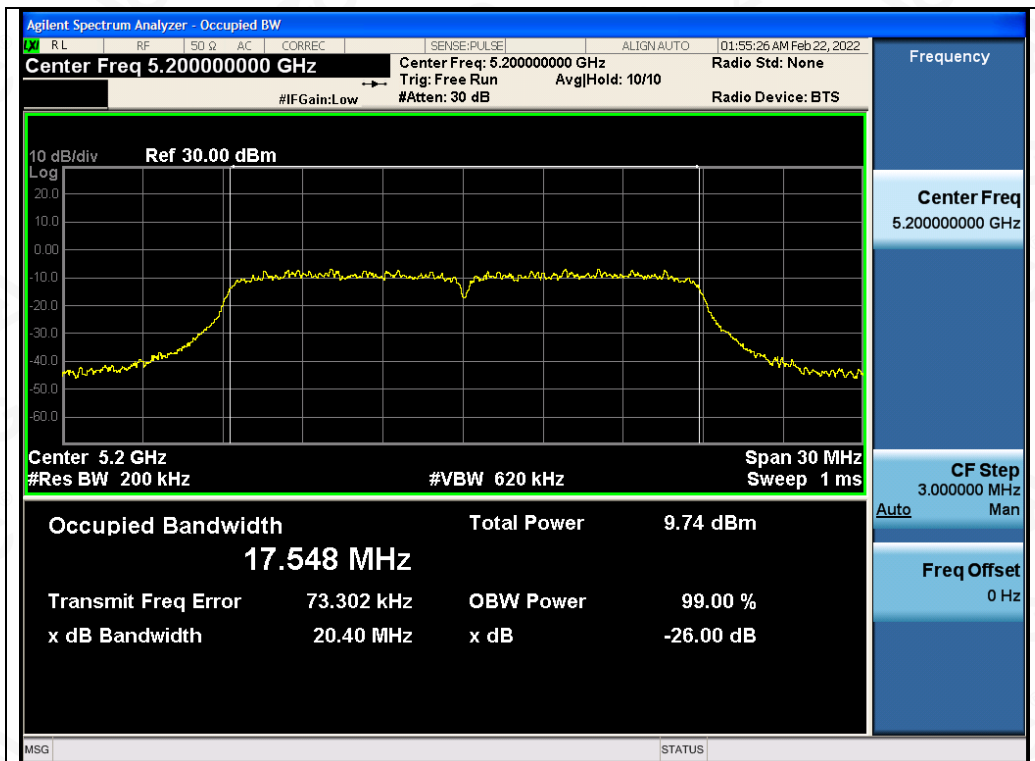


Test\_Graph\_802.11n20\_ANT1\_5180\_MCS0\_OBW

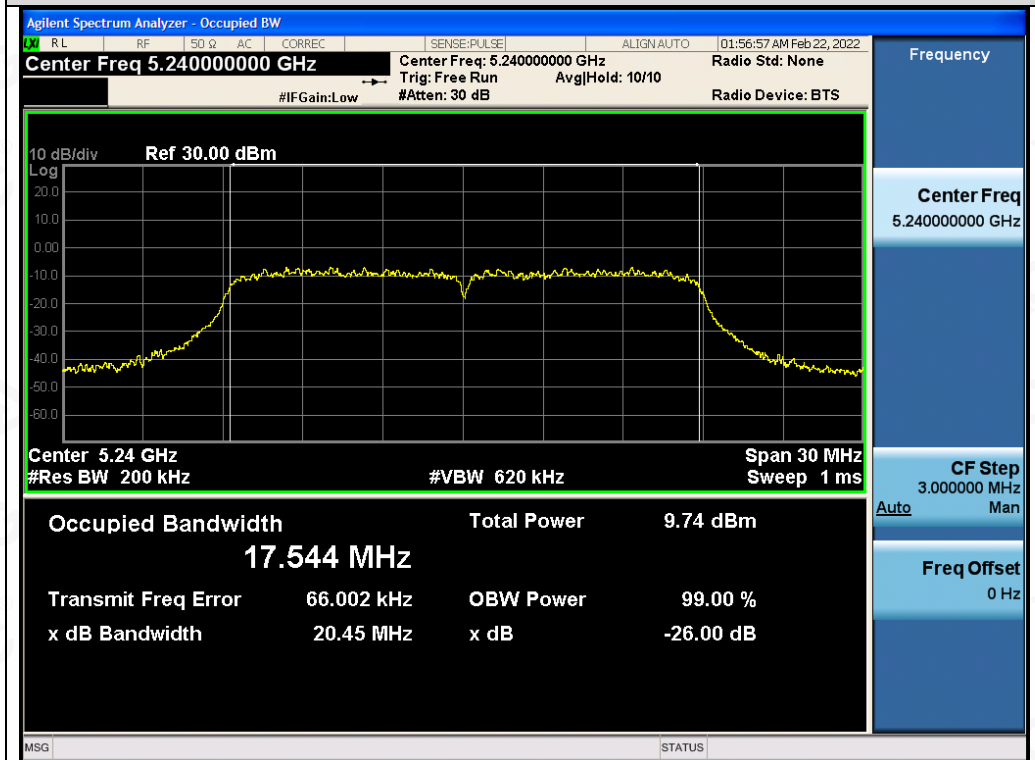
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Test\_Graph\_802.11n20\_ANT1\_5200\_MCS0\_OBW



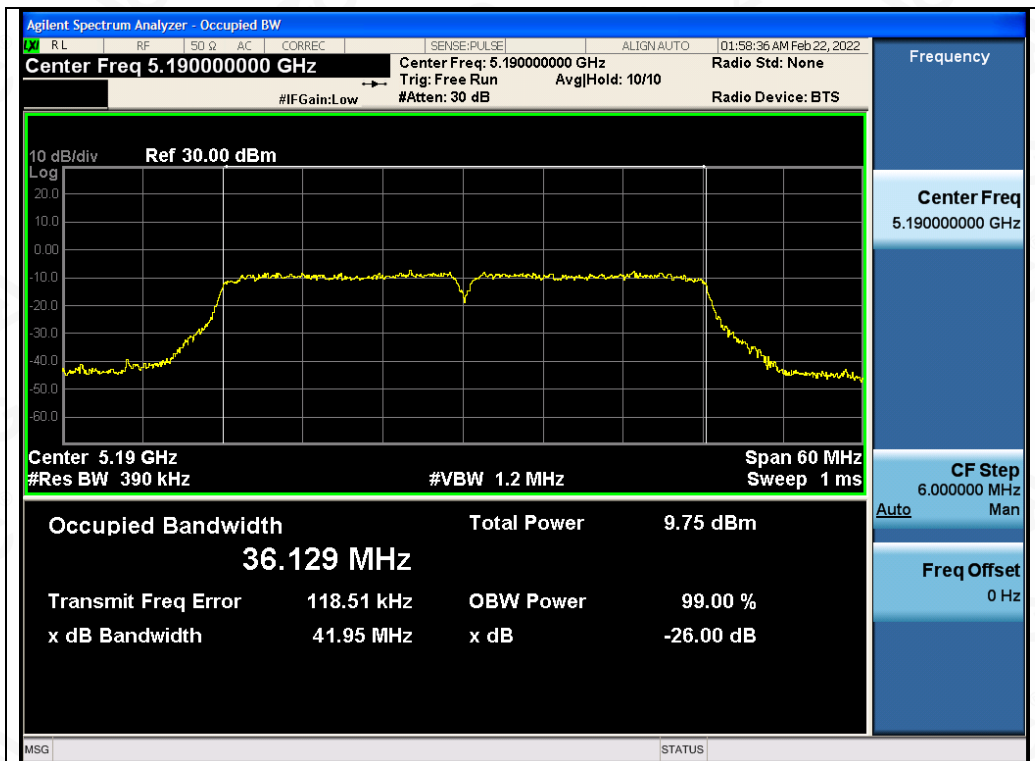
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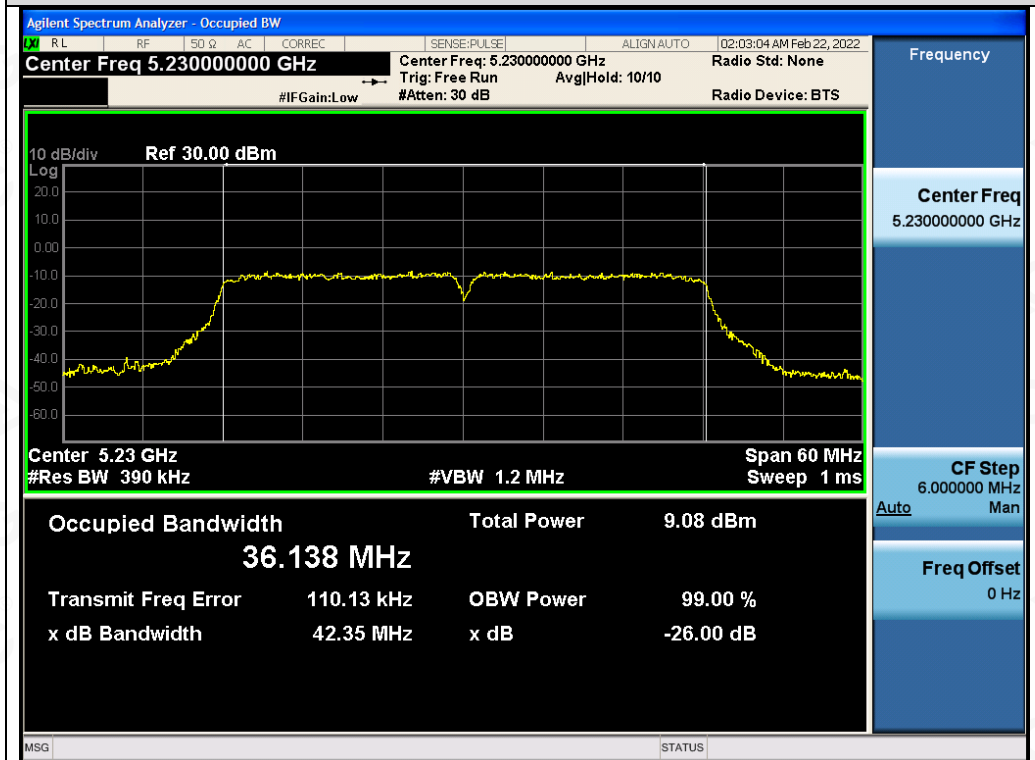
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Test\_Graph\_802.11n40\_ANT1\_5190\_MCS0\_OBW

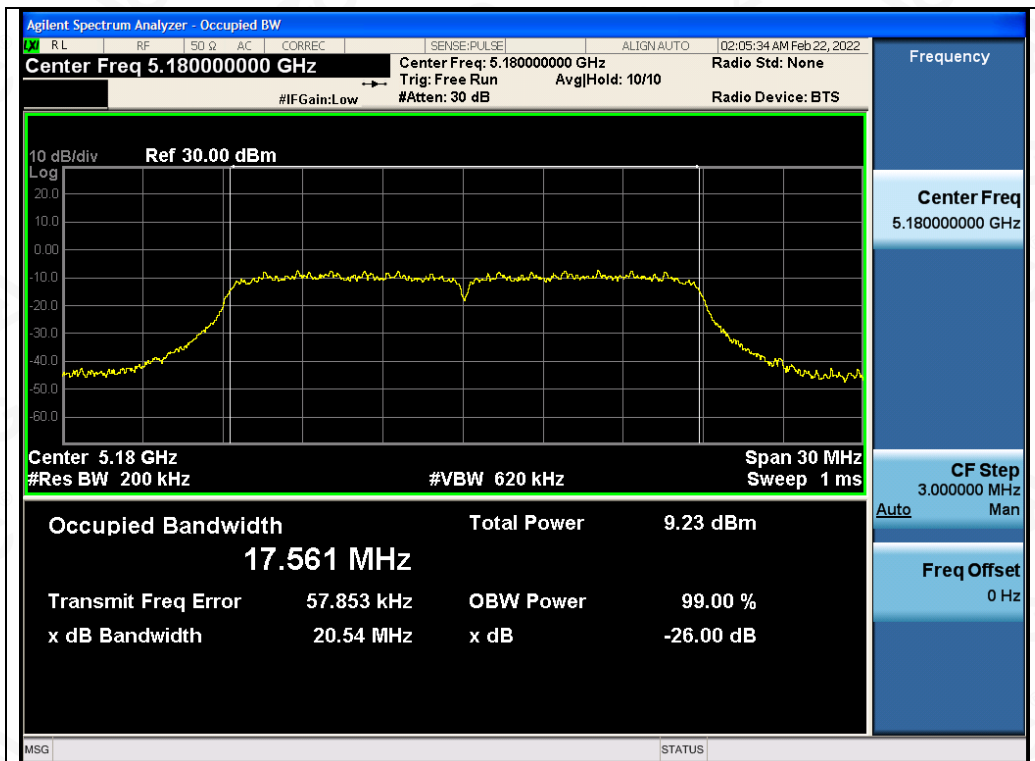


Test\_Graph\_802.11n40\_ANT1\_5230\_MCS0\_OBW

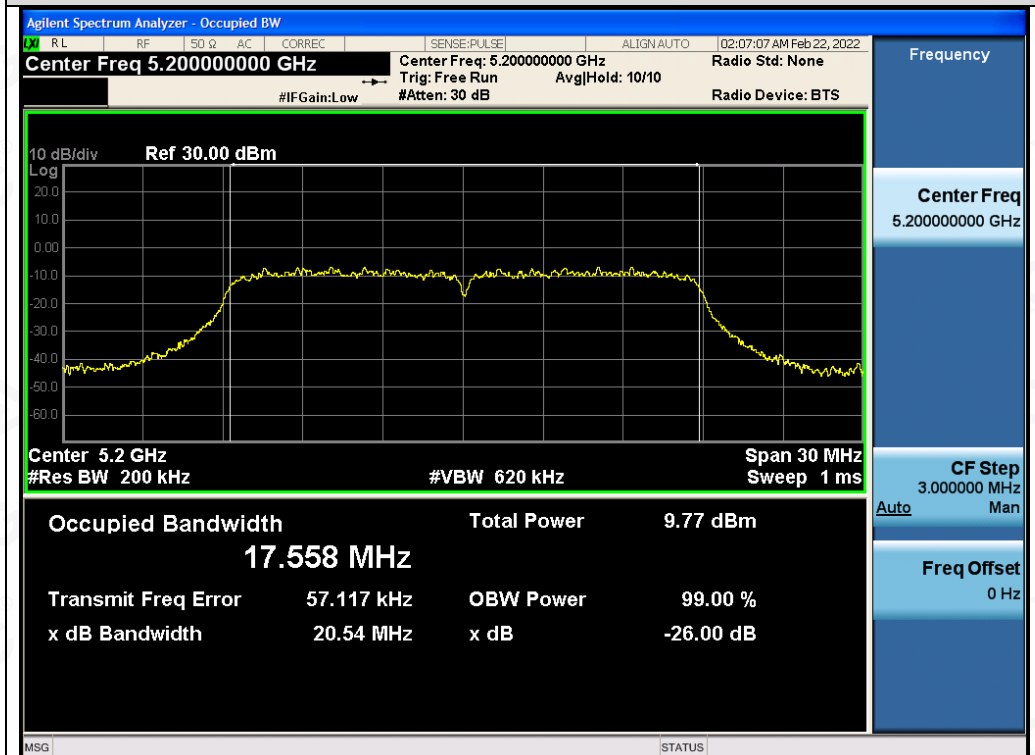
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Test\_Graph\_802.11ac20\_ANT1\_5180\_MCS0\_OBW

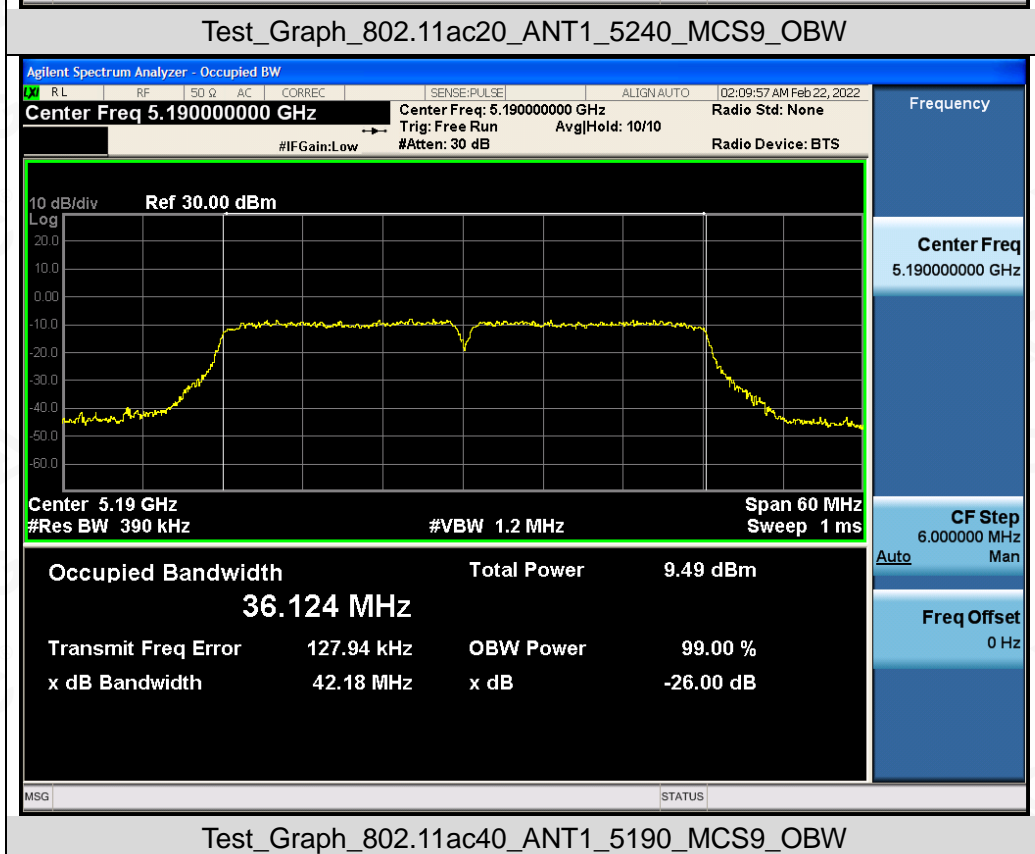
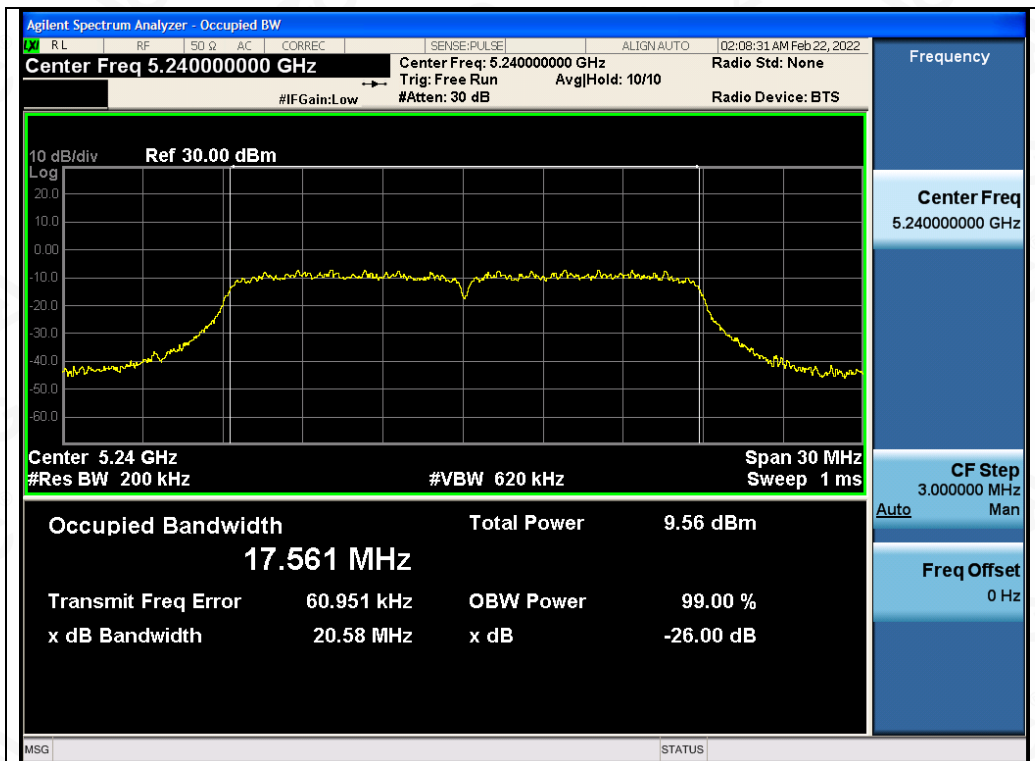


Test\_Graph\_802.11ac20\_ANT1\_5200\_MCS0\_OBW

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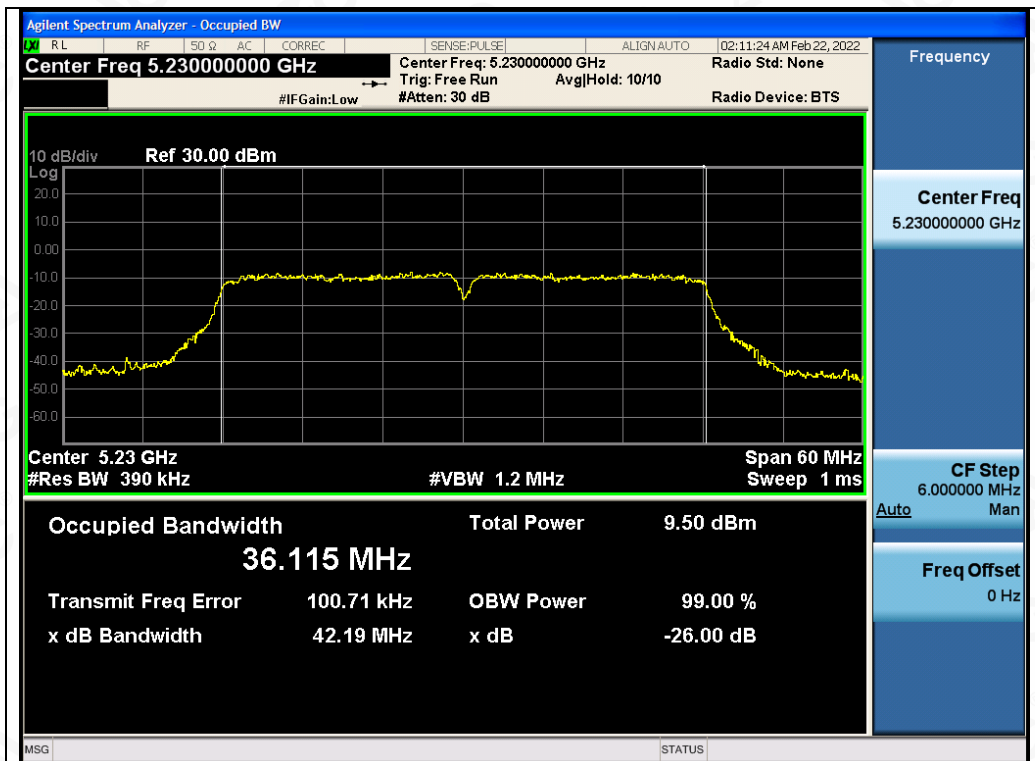




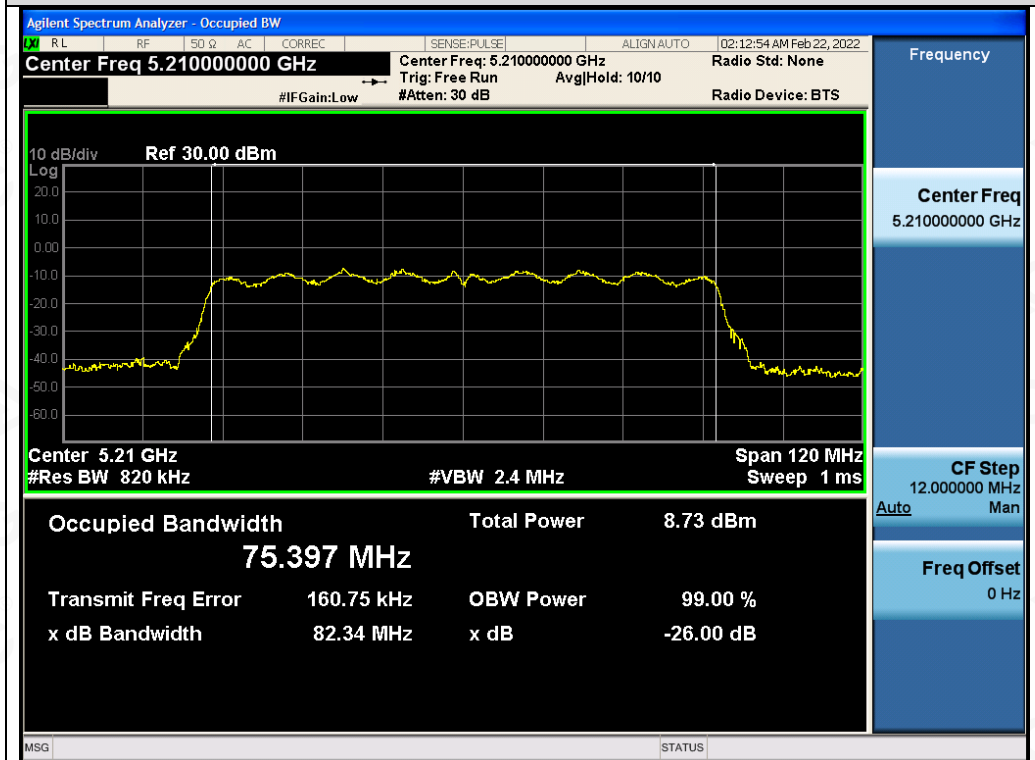
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Test\_Graph\_802.11ac40\_ANT1\_5230\_MCS9\_OBW

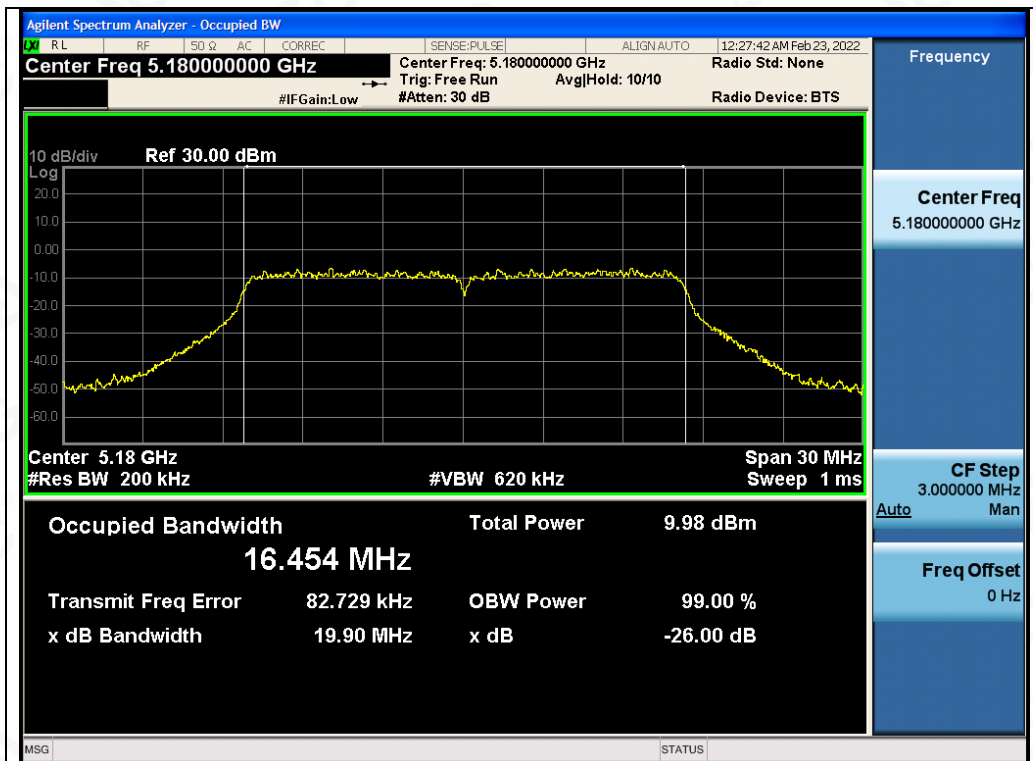


Test\_Graph\_802.11ac80\_ANT1\_5210\_MCS9\_OBW

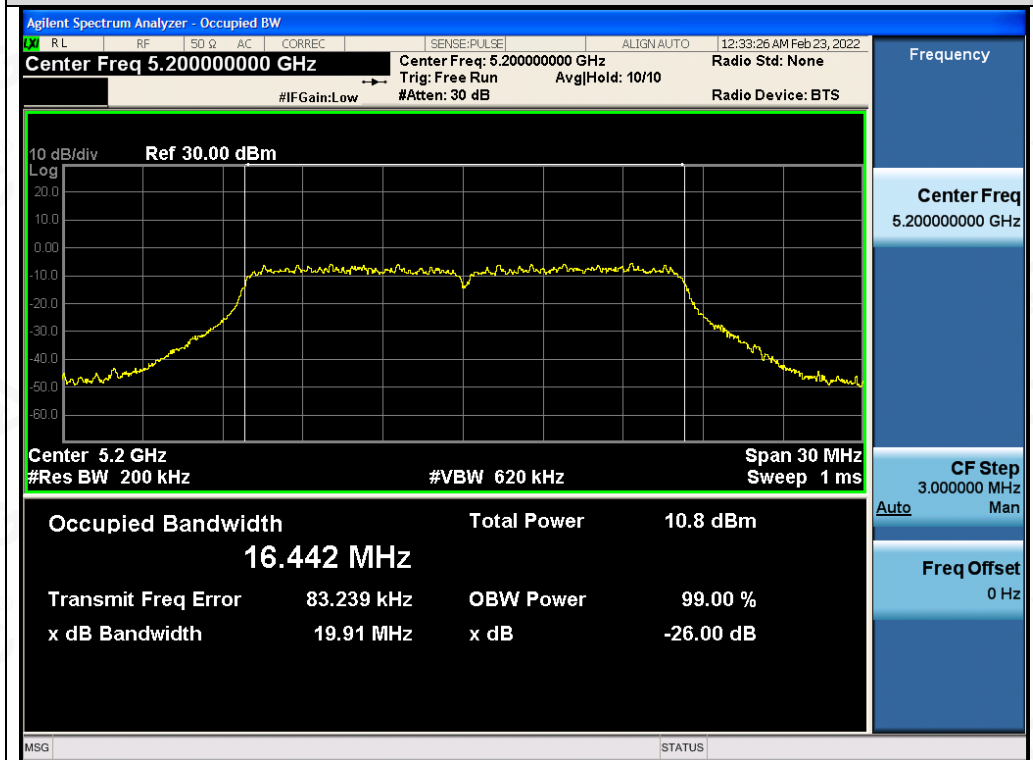
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Test\_Graph\_802.11a\_ANT2\_5180\_6Mbps\_OBW

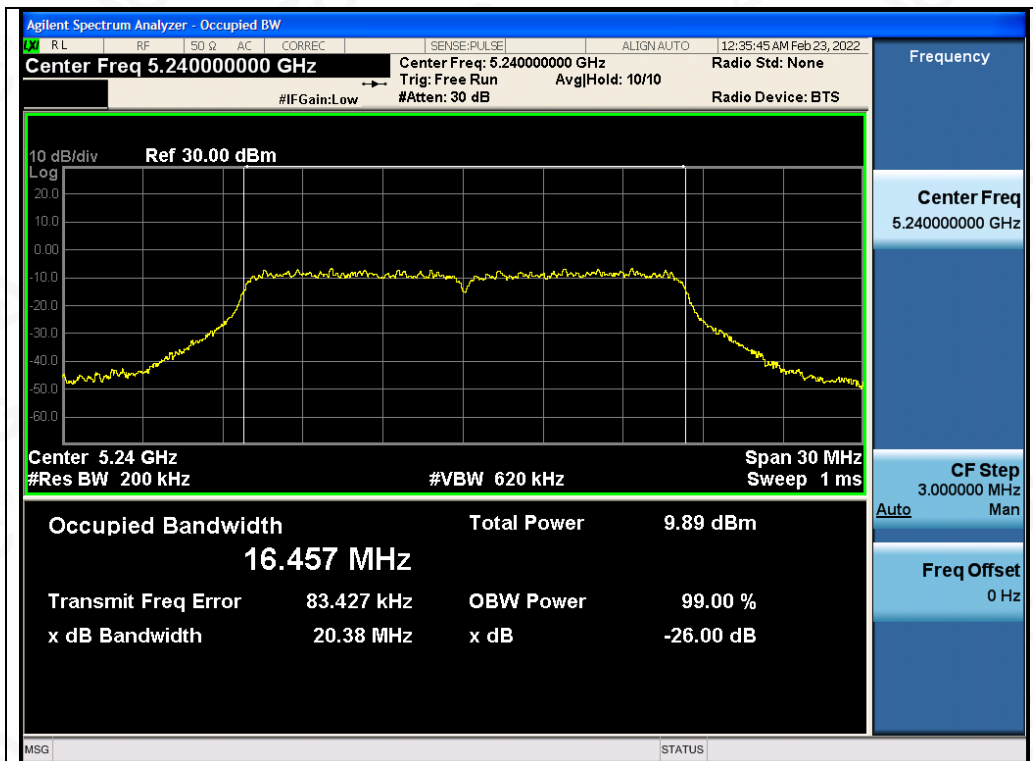


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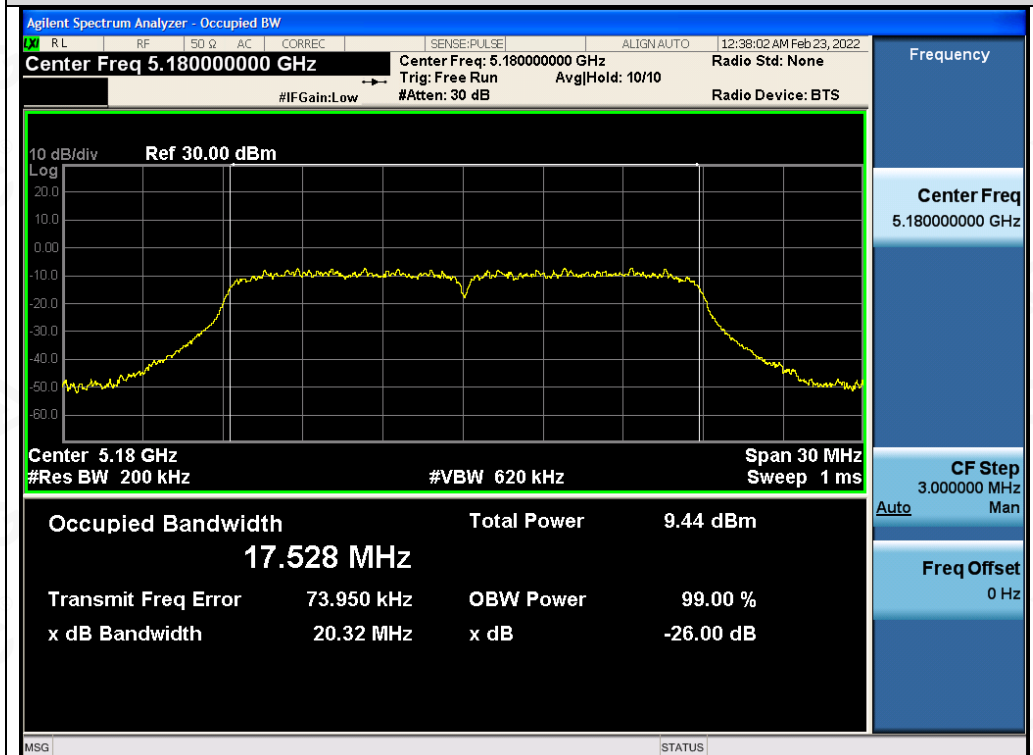
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Test\_Graph\_802.11a\_ANT2\_5240\_6Mbps\_OBW

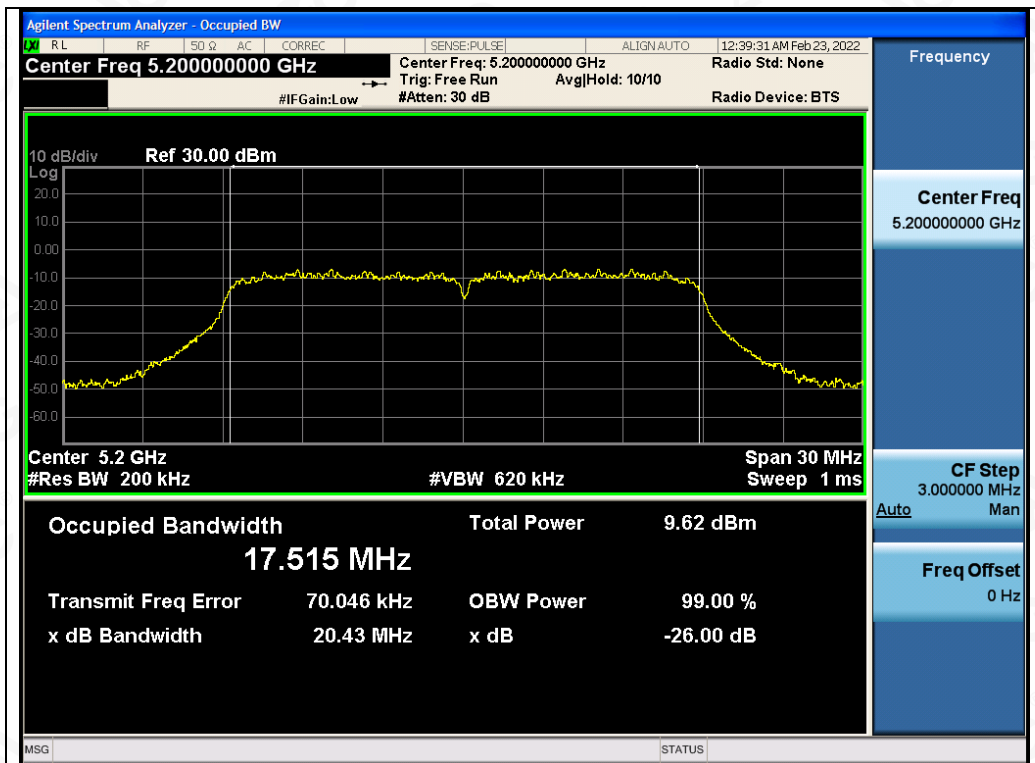


Test\_Graph\_802.11n20\_ANT2\_5180\_MCS0\_OBW

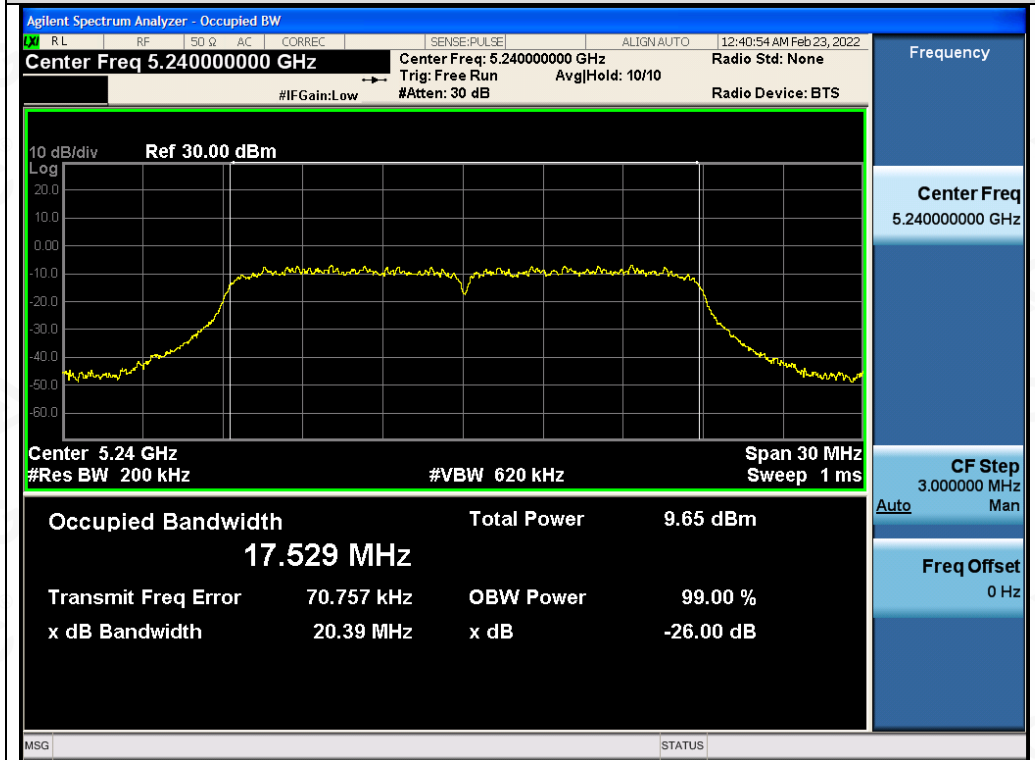
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Test\_Graph\_802.11n20\_ANT2\_5200\_MCS0\_OBW

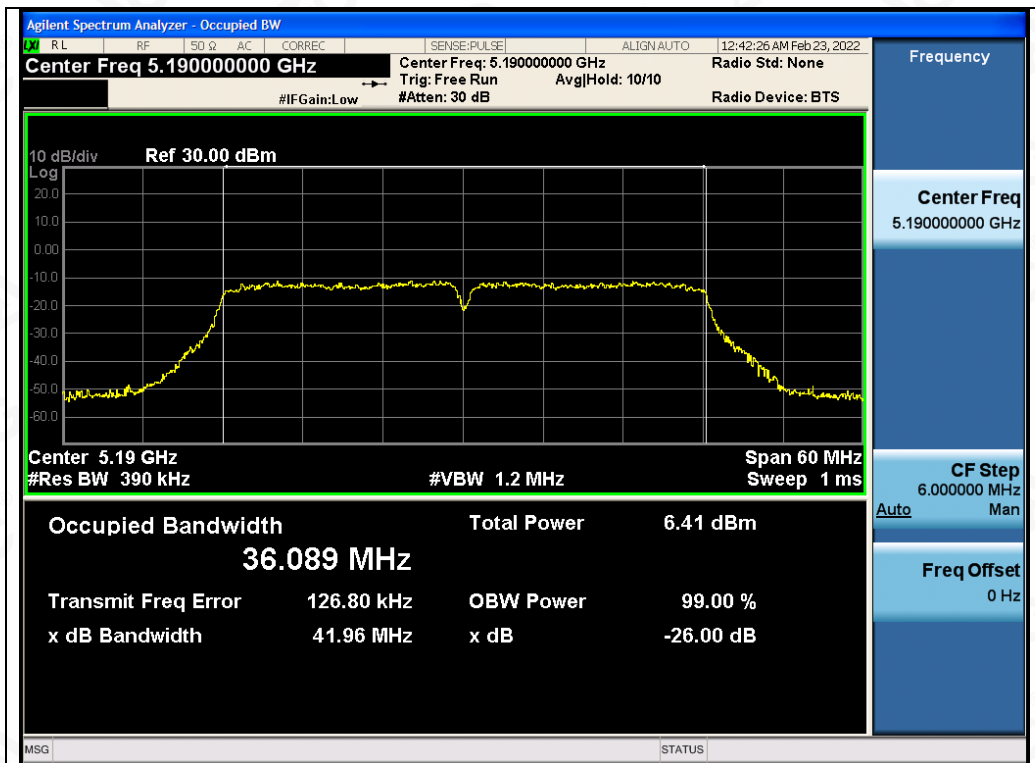


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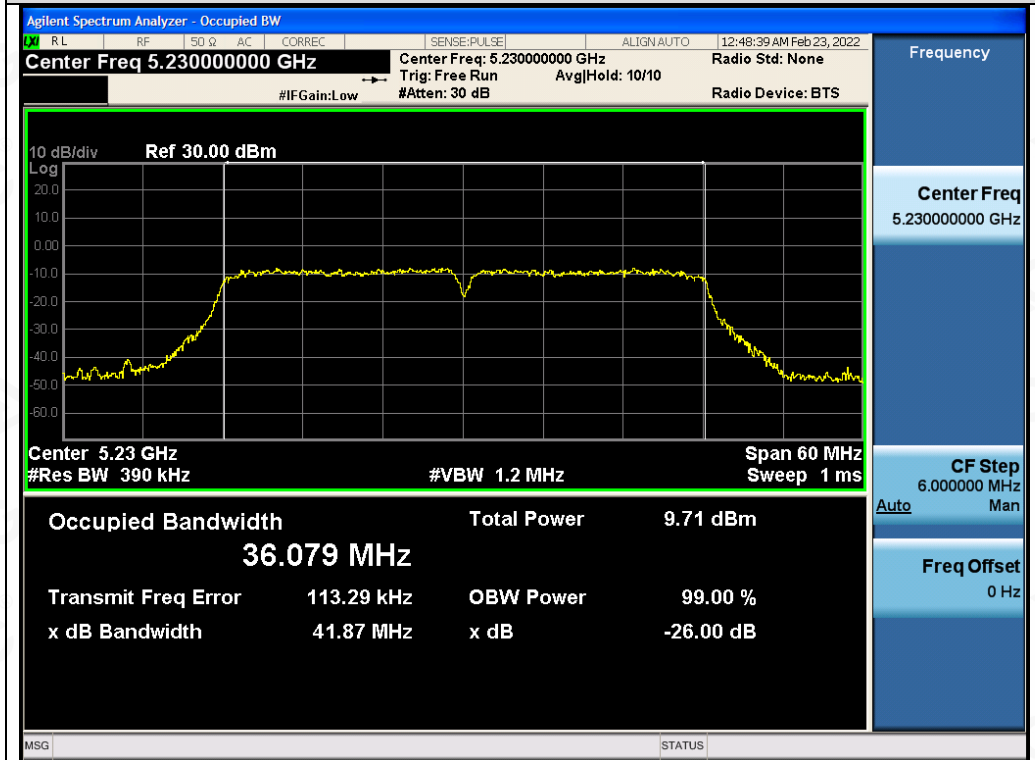
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Test\_Graph\_802.11n40\_ANT2\_5190\_MCS0\_OBW



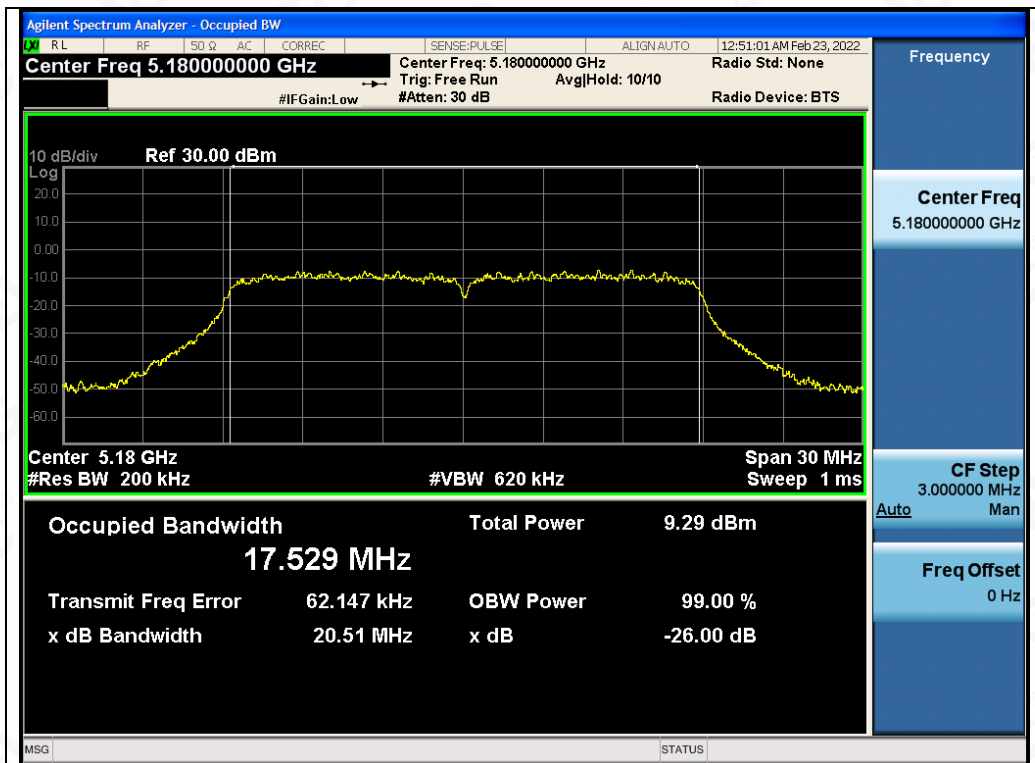
Test\_Graph\_802.11n40\_ANT2\_5230\_MCS0\_OBW

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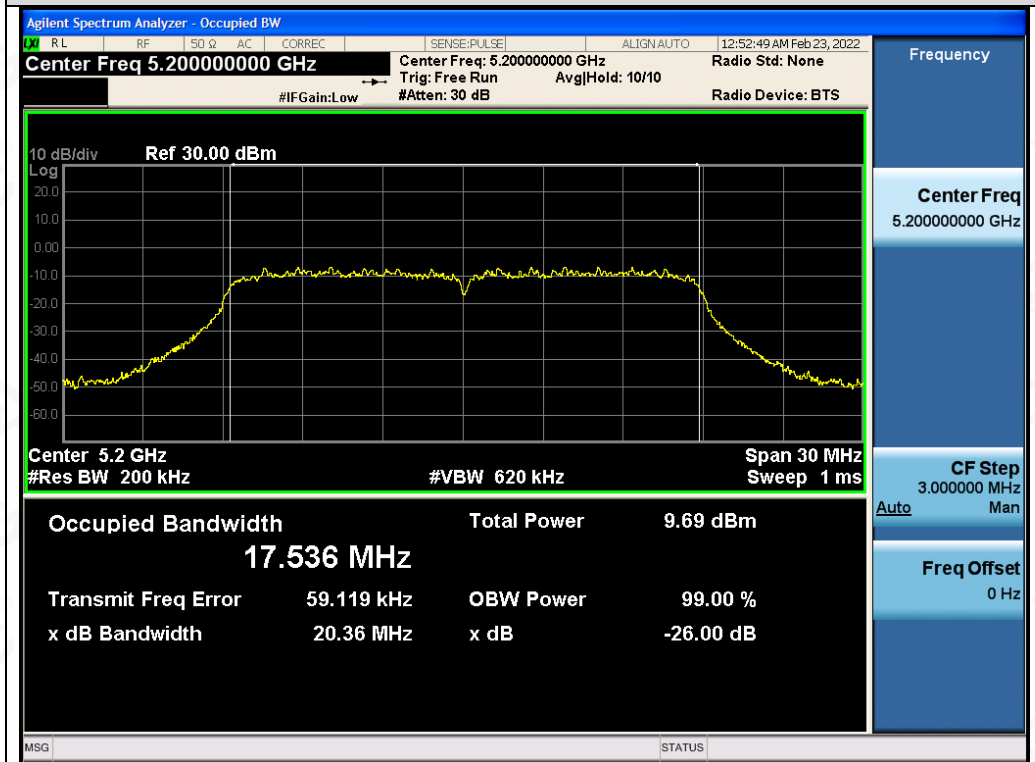
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Test\_Graph\_802.11ac20\_ANT2\_5180\_MCS0\_OBW

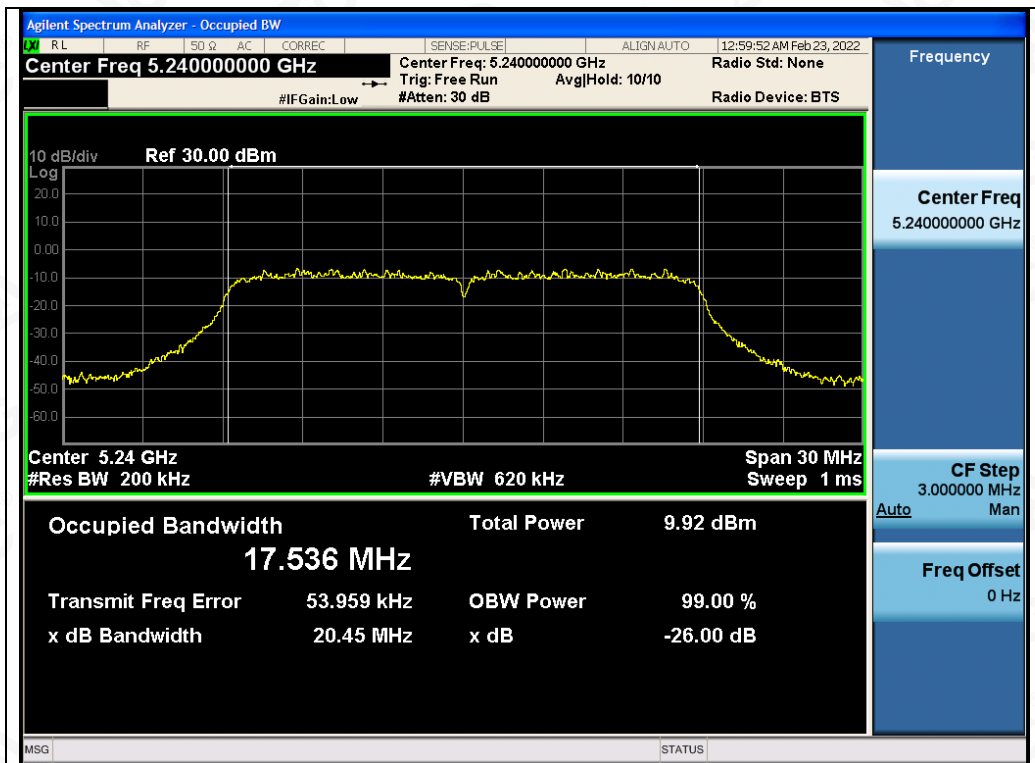


Test\_Graph\_802.11ac20\_ANT2\_5200\_MCS0\_OBW

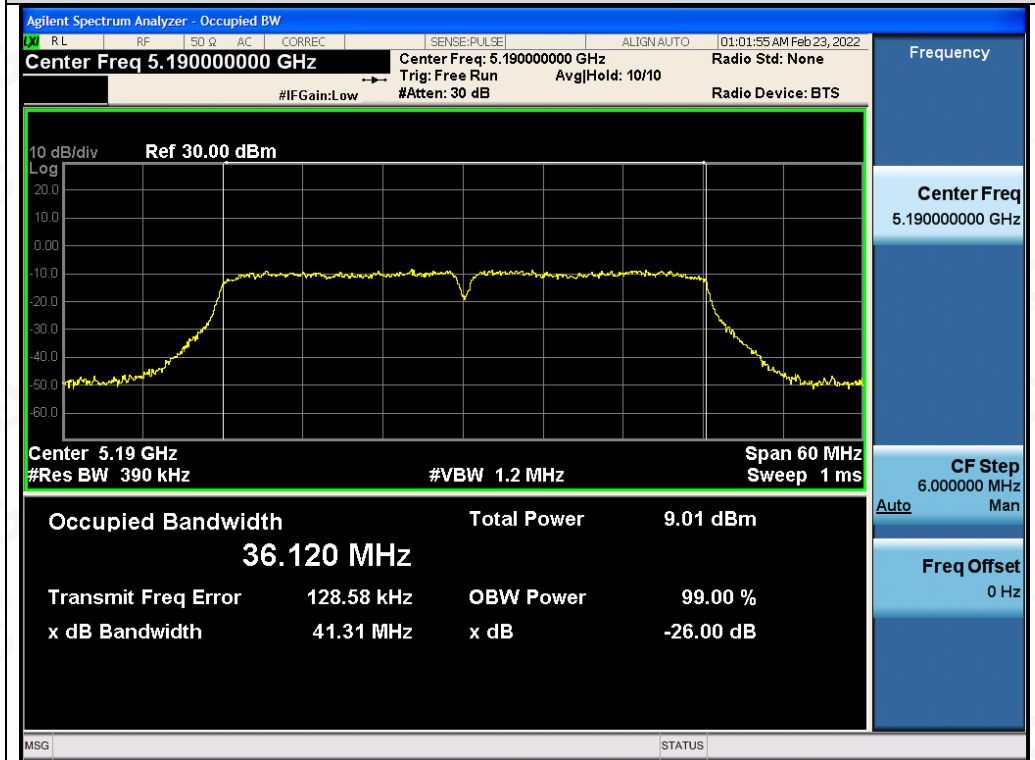
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Test\_Graph\_802.11ac20\_ANT2\_5240\_MCS9\_OBW

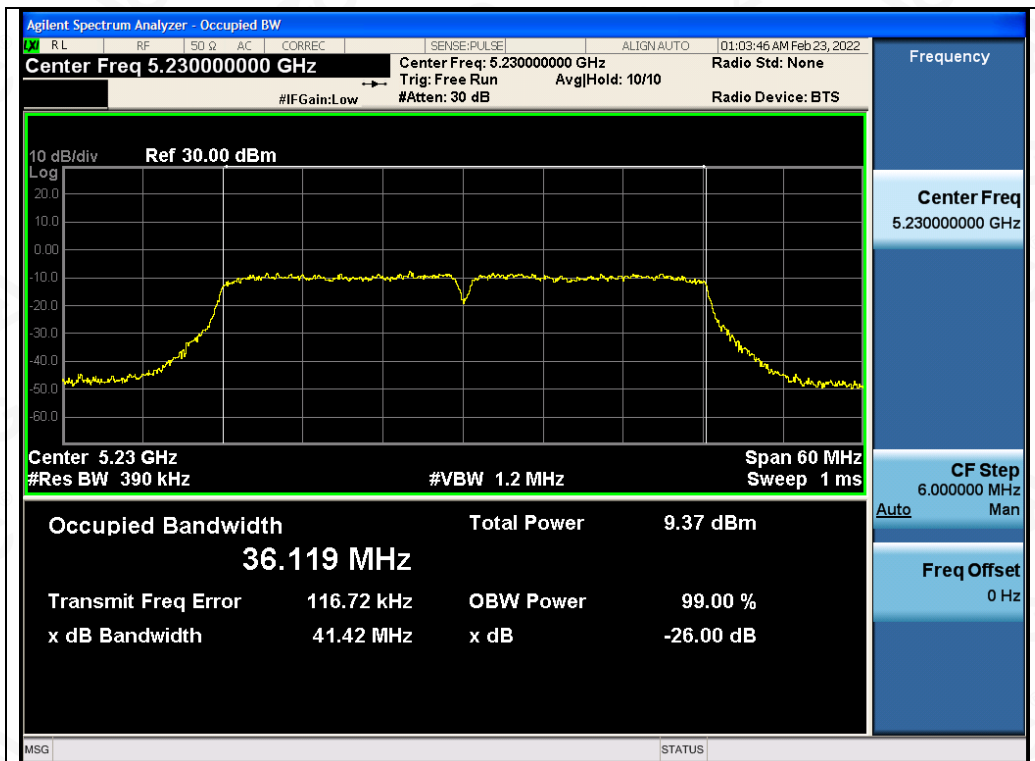


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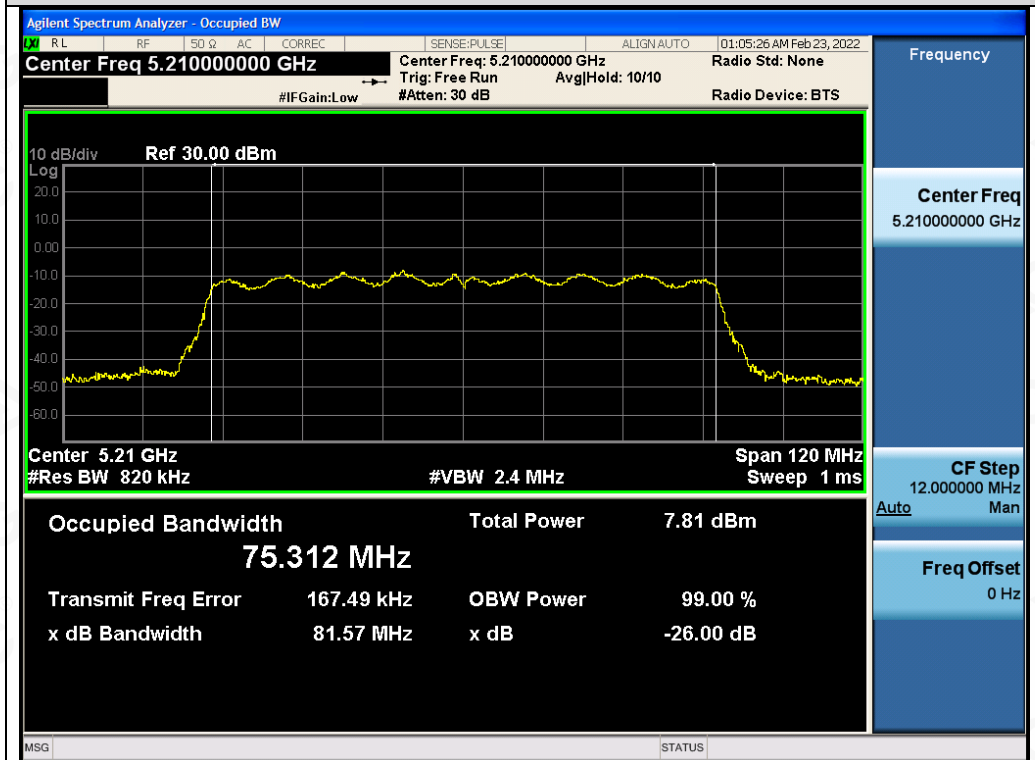
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Test\_Graph\_802.11ac40\_ANT2\_5230\_MCS9\_OBW



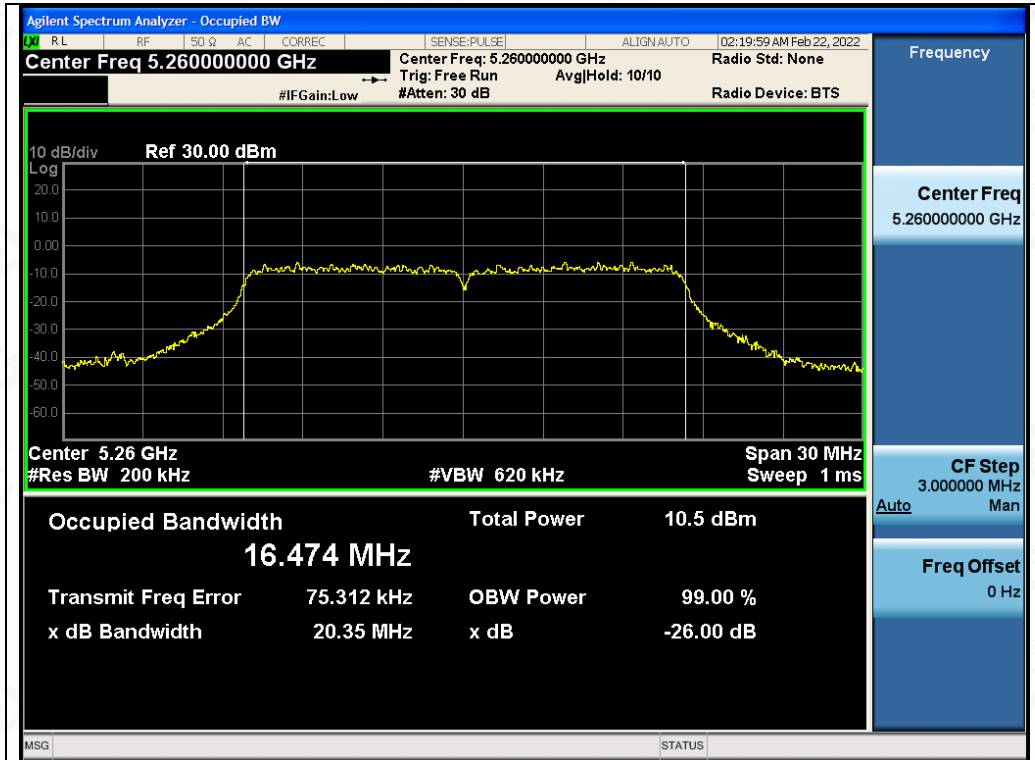
Test\_Graph\_802.11ac80\_ANT2\_5210\_MCS9\_OBW

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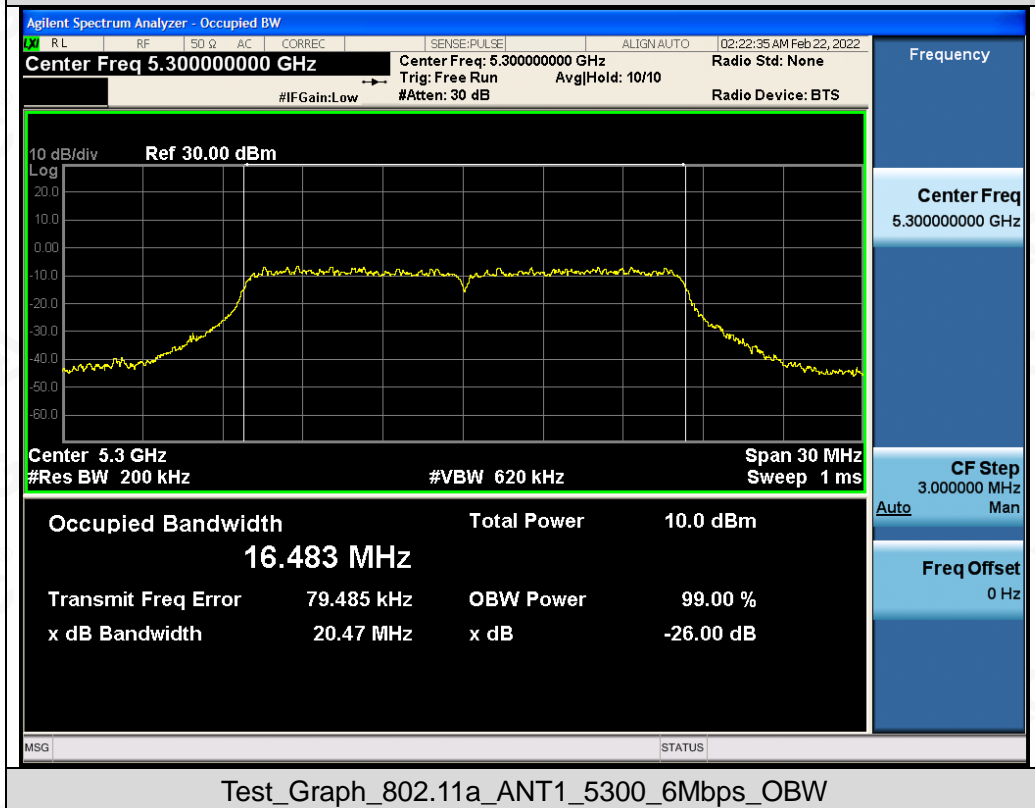
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**Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.25-5.35 GHz**



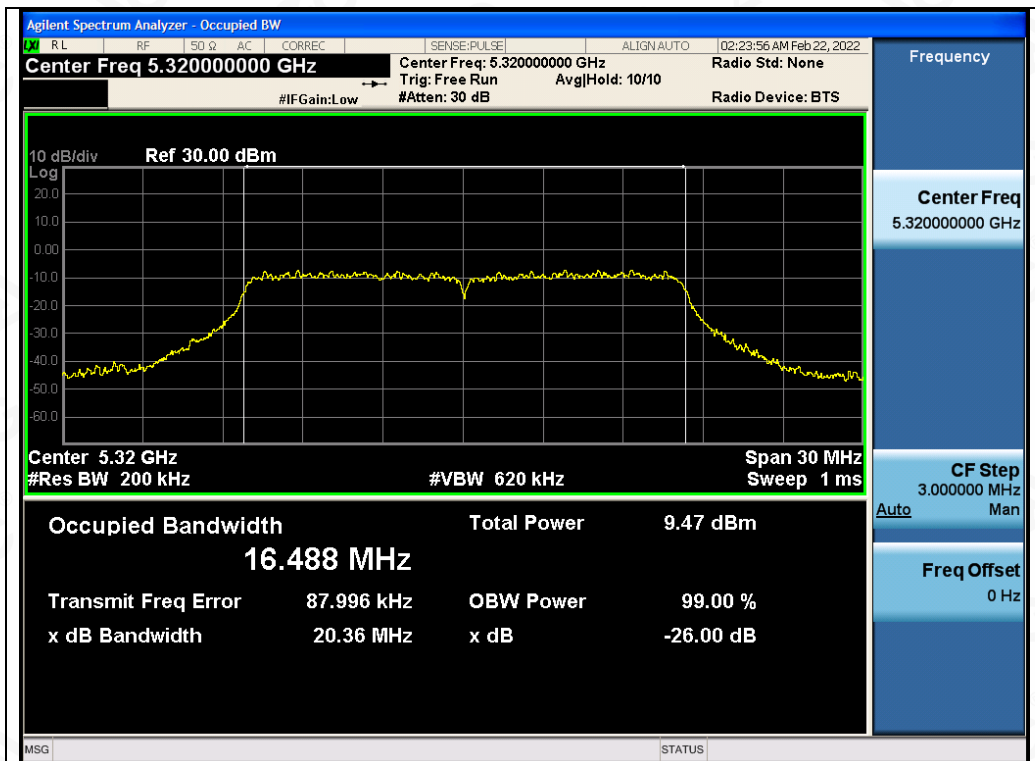
Test\_Graph\_802.11a\_ANT1\_5260\_6Mbps\_OBW



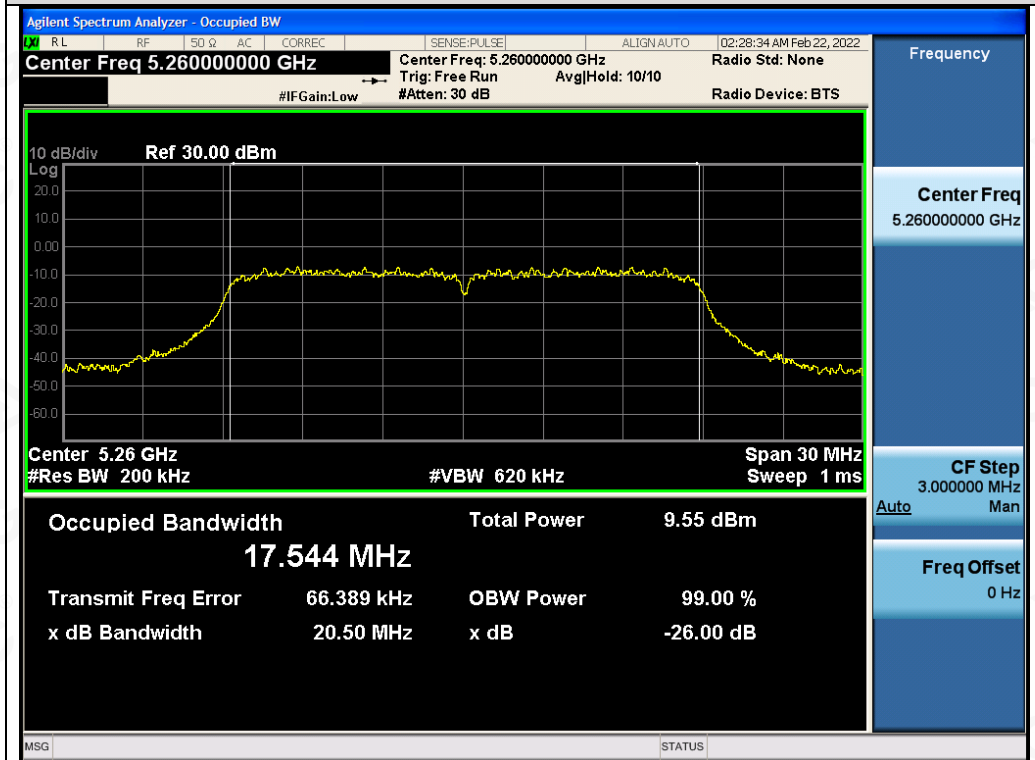
Test\_Graph\_802.11a\_ANT1\_5300\_6Mbps\_OBW

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Test\_Graph\_802.11a\_ANT1\_5320\_6Mbps\_OBW

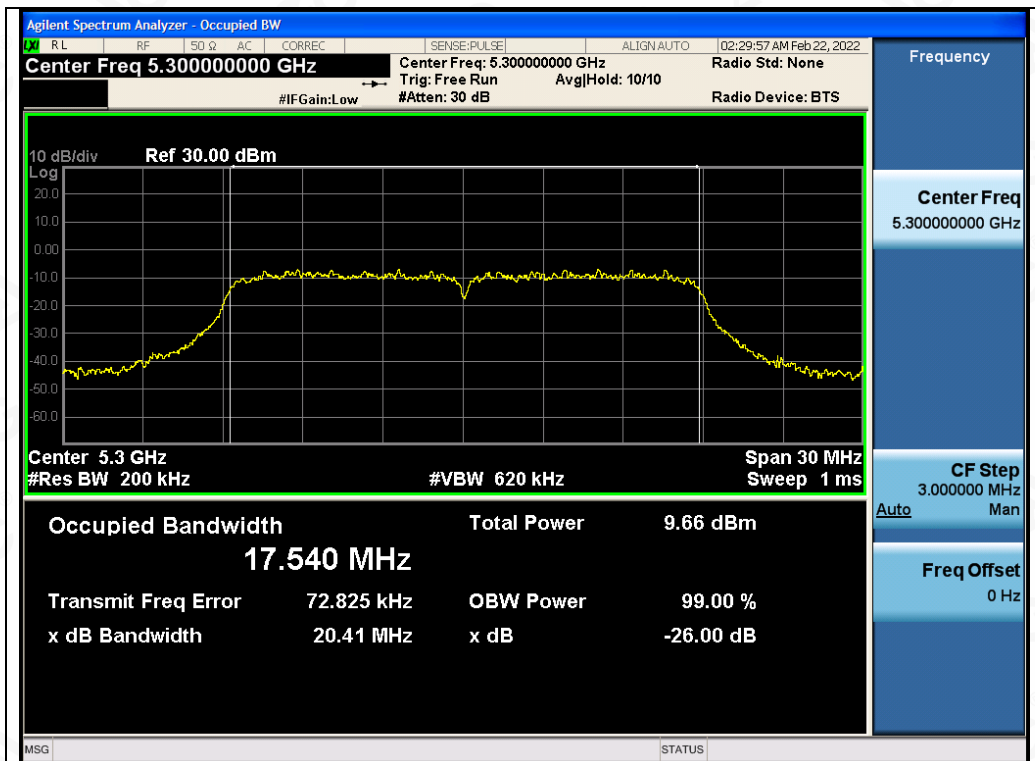


Test\_Graph\_802.11n20\_ANT1\_5260\_MCS0\_OBW

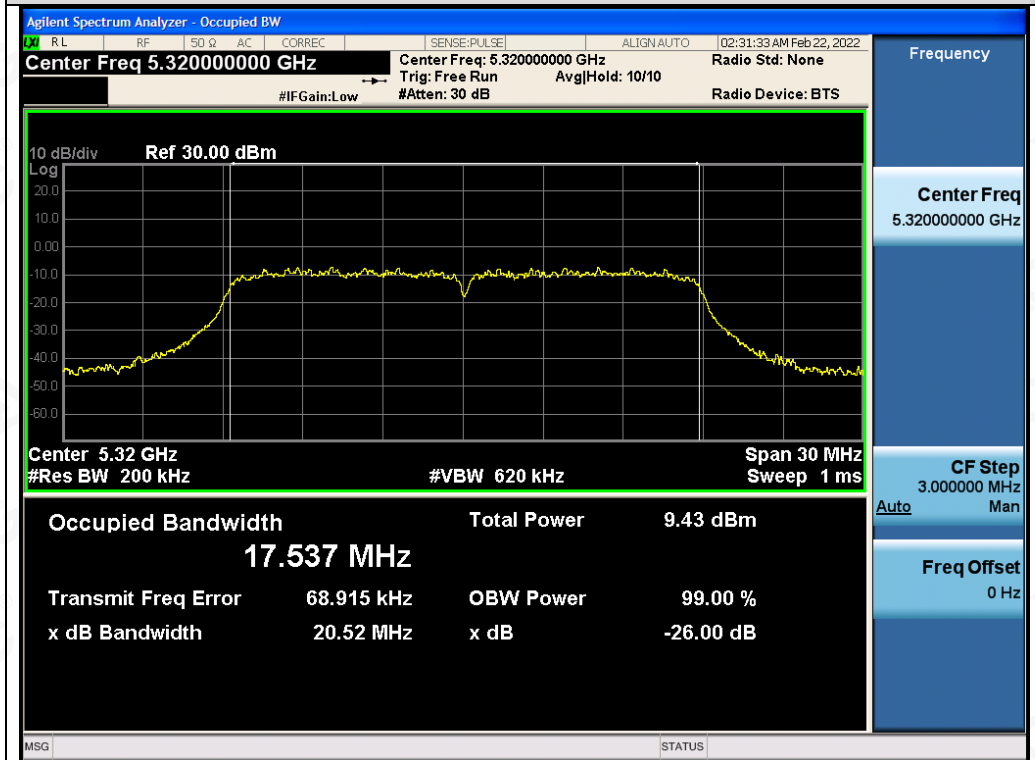
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Test\_Graph\_802.11n20\_ANT1\_5300\_MCS0\_OBW



Test\_Graph\_802.11n20\_ANT1\_5320\_MCS0\_OBW

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