FCC Test Report

Report No.: AGC00210210705FE06

FCC ID	:	2AVUHVA-SP003
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	VAVA Chroma 4K UST Triple Laser Projector
BRAND NAME	:	VAVA
MODEL NAME	:	VA-SP003
APPLICANT	:	Shenzhen NearbyExpress Technology Development Company Limited
DATE OF ISSUE	:	Apr. 01, 2022
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15.407 KDB 789033 D02 v02r01
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	/	Apr. 01, 2022	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen NearbyExpress Technology Development Company Limited
Address	Room 701, 702, 703, 705, 706, 708, 709, Building E, Galaxy World Phase II, Minle Community, Minzhi Street, Longhua District, Shenzhen, Guangdong, China 518000
Manufacturer	Shenzhen NearbyExpress Technology Development Company Limited
Address	Room 701, 702, 703, 705, 706, 708, 709, Building E, Galaxy World Phase II, Minle Community, Minzhi Street, Longhua District, Shenzhen, Guangdong, China 518000
Factory	Appotronics Co., Ltd Bao'an Branch
Address	301, 1 Block &101 and 301, 3 Block, Yaochuan Industrial Park, Tangwei Community, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, P.R.China
Product Designation	VAVA Chroma 4K UST Triple Laser Projector
Brand Name	VAVA
Test Model	VA-SP003
Date of test	Jul. 19, 2021 to Apr. 01, 2022
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	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)	Apr. 01, 2022
Reviewed By	Calvin Liu (Reviewer)	Apr. 01, 2022
Approved By	Max Zhang (Authorized Officer)	Apr. 01, 2022

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “VAVA Chroma 4K UST Triple Laser Projector”. 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

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
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, 5530~5610MHz,5775MHz
Output Power	IEEE 802.11a:13.78dBm; IEEE 802.11n-HT20:13.43dBm; IEEE 802.11n-HT40:13.54dBm; IEEE 802.11ac-VHT20:13.89dBm; IEEE 802.11ac-VHT40:13.93dBm; IEEE 802.11ac-VHT80:13.97dBm
Output Power_MIMO	IEEE 802.11n-HT20:16.37dBm;IEEE 802.11n-HT40:16.37dBm; IEEE 802.11ac-VHT20:16.85dBm;IEEE 802.11ac-VHT40:16.74dBm; IEEE 802.11ac-VHT80:16.66dBm
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
Number of channels	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
Hardware Version	VER:1.0
Software Version	V1.0
Antenna Designation	Dipole Balun Antenna (Comply with requirements of the FCC part 15.203)
Number of transmit chain	2(802.a/11n/ac all used two antennas, but 802.11a support SISO and 802.11n/ac support MIMO)
Antenna Gain	Refer to Chapter 2.8 of the report.
Power Supply	AC 100-240V, 4A, 50/60Hz
Test Voltage	AC 120V/60Hz

2.2. TABLE OF CARRIER FREQUENCYS

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	--	--

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	--	--

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. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AVUHVA-SP003** 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.

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 Dipole Balun Antenna List (5GHz 2*2 MIMO)						
Dipole Balun Antenna	5150 ~ 5250	2	20,40,80	3.33	3.16	6.34
	5250 ~ 5350	2	20,40,80	3.33	3.16	6.34
	5470 ~ 5725	2	20,40,80	3.33	3.16	6.34
	5725 ~ 5850	2	20,40,80	3.33	3.16	6.34

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

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

- For power measurements on IEEE 802.1devices:

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

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

  Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20 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.

3. 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 = ±3.1 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±4.0 dB
Uncertainty of Radiated Emission above 1GHz	U_c = ±4.8 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 %

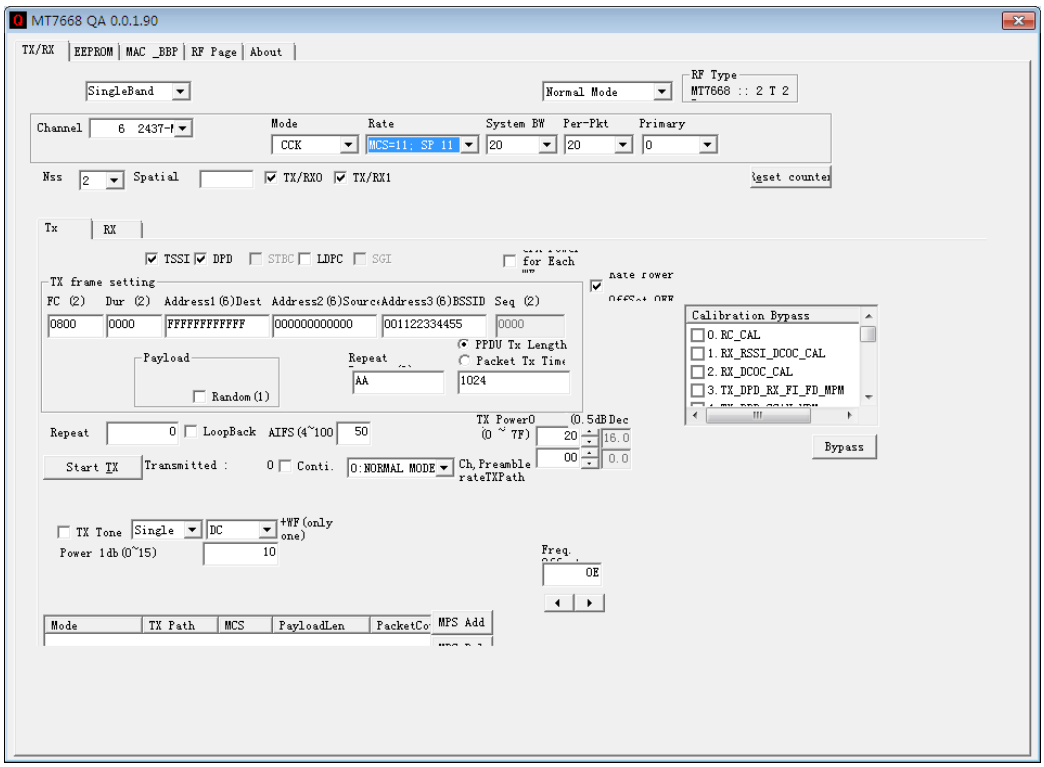
4. DESCRIPTION OF TEST MODES

Mode	Available channel	Tested channel	Modulation	Date rate(Mbps)
802.11a/n/ac20	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165	36, 40, 48, 52, 60, 64, 100, 120, 140, 149, 157, 165	OFDM	6Mbps/MCS0
802.11n/ac40	38, 46, 54, 62, 102, 110, 118, 126, 134, 151, 159;	38, 46, 54, 62, 102, 118, 134, 151, 159	OFDM	MCS0
802.11ac80	42, 58, 106, 122, 155	42, 58, 106, 122, 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.

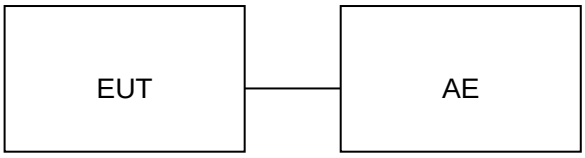
Software Setting



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	VAVA Chroma 4K UST Triple	VA-SP003	2AVUHVA-SP003	EUT

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

Note: All models will be sold with power board A (MPL_360-FM-3S) or power board B (MPL_360-FM-3TH), and both power boards have been tested Radiated Emission and Conducted Emission and recorded in this report (The only difference between the two power boards is the red and green laser constant current driver IC, and t he product supply voltage is the same. The above changes will not cause any difference in the RF of the Bluet ooth and wifi parts, so the RF part does not need to be re-evaluated.).

6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	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	Dec. 07, 2020	Dec. 06, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Nov. 17, 2021	Nov. 16, 2022
Power sensor	Aglient	U2021XA	MY54110007	Mar. 23, 2020	Mar. 22, 2022
Power sensor	Aglient	U2021XA	MY54110007	Mar. 04, 2022	Mar. 03, 2023
5GHz Fliter	Micro-tronics	N/A	N/A	Sep. 03, 2020	Sep. 02, 2022
Attenuator	ZHINAN	E-002	N/A	Sep.21, 2019	Sep. 20, 2021
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	May 22, 2020	May 21, 2022
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Apr. 23, 2021	Apr. 22, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Sep. 03, 2020	Sep. 02, 2022
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 20, 2019	Sep. 19, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 20, 2019	Sep. 19, 2021
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 08, 2020	Jan. 07, 2023
Test software	FARA	EZ_EMC (Ver.RA-03A)	N/A	N/A	N/A

7. MAXIMUM CONDUCTED OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

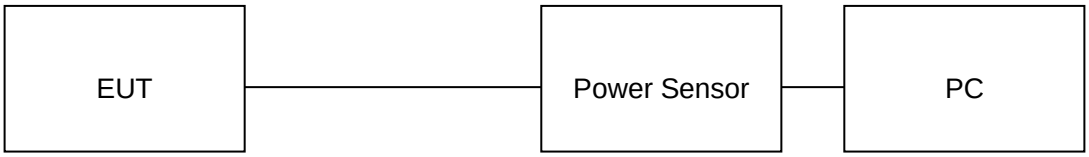
For average power test:

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



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	13.75	23.98	Pass
	5200	13.71	23.98	Pass
	5240	13.57	23.98	Pass
802.11n20	5180	12.70	23.98	Pass
	5200	12.83	23.98	Pass
	5240	13.05	23.98	Pass
802.11n40	5190	12.84	23.98	Pass
	5230	12.42	23.98	Pass
802.11ac20	5180	12.66	23.98	Pass
	5200	12.82	23.98	Pass
	5240	13.02	23.98	Pass
802.11ac40	5190	12.68	23.98	Pass
	5230	12.43	23.98	Pass
802.11ac80	5210	12.35	23.98	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	13.78	23.98	Pass
	5200	13.68	23.98	Pass
	5240	13.70	23.98	Pass
802.11n20	5180	12.22	23.98	Pass
	5200	12.27	23.98	Pass
	5240	12.57	23.98	Pass
802.11n40	5190	12.19	23.98	Pass
	5230	11.92	23.98	Pass
802.11ac20	5180	12.18	23.98	Pass
	5200	12.33	23.98	Pass
	5240	12.56	23.98	Pass
802.11ac40	5190	12.18	23.98	Pass
	5230	12.03	23.98	Pass
802.11ac80	5210	11.38	23.98	Pass

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	15.48	23.98	Pass
	5200	15.57	23.98	Pass
	5240	15.83	23.98	Pass
802.11n40	5190	15.54	23.98	Pass
	5230	15.19	23.98	Pass
802.11ac20	5180	15.44	23.98	Pass
	5200	15.59	23.98	Pass
	5240	15.81	23.98	Pass
802.11ac40	5190	15.45	23.98	Pass
	5230	15.24	23.98	Pass
802.11ac80	5210	14.90	23.98	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	13.10	23.98	Pass
	5300	12.59	23.98	Pass
	5320	12.27	23.98	Pass
802.11n20	5260	12.98	23.98	Pass
	5300	12.41	23.98	Pass
	5320	12.07	23.98	Pass
802.11n40	5270	13.54	23.98	Pass
	5310	12.50	23.98	Pass
802.11ac20	5260	13.78	23.98	Pass
	5300	12.98	23.98	Pass
	5320	12.13	23.98	Pass
802.11ac40	5270	13.48	23.98	Pass
	5310	12.46	23.98	Pass
802.11ac80	5290	13.72	23.98	Pass

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	13.47	23.98	Pass
	5300	12.52	23.98	Pass
	5320	12.62	23.98	Pass
802.11n20	5260	13.37	23.98	Pass
	5300	12.51	23.98	Pass
	5320	12.41	23.98	Pass
802.11n40	5270	13.13	23.98	Pass
	5310	12.39	23.98	Pass
802.11ac20	5260	13.89	23.98	Pass
	5300	13.11	23.98	Pass
	5320	12.48	23.98	Pass
802.11ac40	5270	13.20	23.98	Pass
	5310	12.10	23.98	Pass
802.11ac80	5290	13.57	23.98	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	16.19	23.98	Pass
	5300	15.47	23.98	Pass
	5320	15.25	23.98	Pass
802.11n40	5270	16.35	23.98	Pass
	5310	15.46	23.98	Pass
802.11ac20	5260	16.85	23.98	Pass
	5300	16.06	23.98	Pass
	5320	15.32	23.98	Pass
802.11ac40	5270	16.35	23.98	Pass
	5310	15.29	23.98	Pass
802.11ac80	5290	16.66	23.98	Pass

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	12.43	23.98	Pass
	5600	12.16	23.98	Pass
	5700	13.00	23.98	Pass
802.11n20	5500	13.28	23.98	Pass
	5600	13.11	23.98	Pass
	5700	13.07	23.98	Pass
802.11n40	5510	12.87	23.98	Pass
	5590	12.44	23.98	Pass
	5670	13.17	23.98	Pass
802.11ac20	5500	13.45	23.98	Pass
	5600	12.40	23.98	Pass
	5700	13.44	23.98	Pass
802.11ac40	5510	13.47	23.98	Pass
	5590	13.93	23.98	Pass
	5670	13.63	23.98	Pass
802.11ac80	5530	13.48	23.98	Pass
	5610	13.23	23.98	Pass

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	12.99	23.98	Pass
	5600	12.71	23.98	Pass
	5700	13.27	23.98	Pass
802.11n20	5500	13.43	23.98	Pass
	5600	12.87	23.98	Pass
	5700	13.13	23.98	Pass
802.11n40	5510	12.91	23.98	Pass
	5590	13.54	23.98	Pass
	5670	13.02	23.98	Pass
802.11ac20	5500	13.44	23.98	Pass
	5600	12.90	23.98	Pass
	5700	13.07	23.98	Pass
802.11ac40	5510	12.90	23.98	Pass
	5590	13.52	23.98	Pass
	5670	13.08	23.98	Pass
802.11ac80	5530	12.92	23.98	Pass
	5610	13.97	23.98	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	16.37	23.98	Pass
	5600	16.00	23.98	Pass
	5700	16.11	23.98	Pass
802.11n40	5510	15.90	23.98	Pass
	5590	16.04	23.98	Pass
	5670	16.11	23.98	Pass
802.11ac20	5500	16.46	23.98	Pass
	5600	15.67	23.98	Pass
	5700	16.27	23.98	Pass
802.11ac40	5510	16.20	23.98	Pass
	5590	16.74	23.98	Pass
	5670	16.37	23.98	Pass
802.11ac80	5530	16.22	23.98	Pass
	5610	16.63	23.98	Pass

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	12.37	23.98	Pass
	5785	12.78	23.98	Pass
	5825	13.32	23.98	Pass
802.11n20	5745	12.14	23.98	Pass
	5785	12.10	23.98	Pass
	5825	12.74	23.98	Pass
802.11n40	5755	12.60	23.98	Pass
	5795	12.26	23.98	Pass
802.11ac20	5745	12.69	23.98	Pass
	5785	12.15	23.98	Pass
	5825	12.63	23.98	Pass
802.11ac40	5755	12.54	23.98	Pass
	5795	12.19	23.98	Pass
802.11ac80	5775	12.27	23.98	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	12.92	23.98	Pass
	5785	12.28	23.98	Pass
	5825	12.83	23.98	Pass
802.11n20	5745	12.20	23.98	Pass
	5785	11.64	23.98	Pass
	5825	12.13	23.98	Pass
802.11n40	5755	12.11	23.98	Pass
	5795	11.75	23.98	Pass
802.11ac20	5745	12.19	23.98	Pass
	5785	11.71	23.98	Pass
	5825	12.17	23.98	Pass
802.11ac40	5755	12.05	23.98	Pass
	5795	11.74	23.98	Pass
802.11ac80	5775	11.74	23.98	Pass

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	15.18	23.98	Pass
	5785	14.89	23.98	Pass
	5825	15.46	23.98	Pass
802.11n40	5755	15.37	23.98	Pass
	5795	15.02	23.98	Pass
802.11ac20	5745	15.46	23.98	Pass
	5785	14.95	23.98	Pass
	5825	15.42	23.98	Pass
802.11ac40	5755	15.31	23.98	Pass
	5795	14.98	23.98	Pass
802.11ac80	5775	15.02	23.98	Pass

Note: 1.The Total Average Power (dBm) = $10*\log\{10^{(\text{Ant 1 Average Power }/10)} + 10^{(\text{Ant 2 Average Power }/10)}\}$.

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 ≥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:

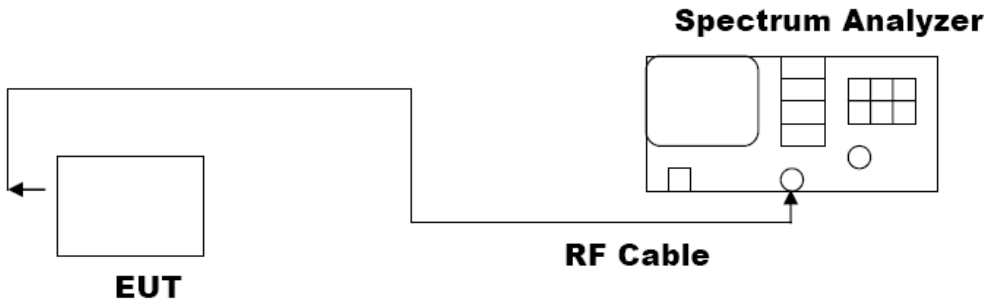
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
   The nominal IF filter bandwidth (3 dB RBW) shall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



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	16.589	23.74	N/A	Pass
	5200	16.595	22.82	N/A	Pass
	5240	16.492	19.97	N/A	Pass
802.11n20	5180	17.614	21.13	N/A	Pass
	5200	17.591	20.30	N/A	Pass
	5240	17.557	20.00	N/A	Pass
802.11n40	5190	36.214	50.62	N/A	Pass
	5230	36.110	41.05	N/A	Pass
802.11ac20	5180	17.602	21.23	N/A	Pass
	5200	17.592	20.46	N/A	Pass
	5240	17.542	19.93	N/A	Pass
802.11ac40	5190	36.143	39.98	N/A	Pass
	5230	36.040	39.91	N/A	Pass
802.11ac80	5210	75.979	81.57	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	16.605	22.93	N/A	Pass
	5200	16.583	22.87	N/A	Pass
	5240	16.492	19.94	N/A	Pass
802.11n20	5180	17.616	20.49	N/A	Pass
	5200	17.608	21.32	N/A	Pass
	5240	17.567	19.93	N/A	Pass
802.11n40	5190	36.224	58.79	N/A	Pass
	5230	36.077	41.01	N/A	Pass
802.11ac20	5180	17.610	20.70	N/A	Pass
	5200	17.605	20.27	N/A	Pass
	5240	17.541	19.86	N/A	Pass
802.11ac40	5190	36.138	40.20	N/A	Pass
	5230	36.055	39.85	N/A	Pass
802.11ac80	5210	75.971	81.35	N/A	Pass

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	16.451	19.59	N/A	Pass
	5300	16.559	22.28	N/A	Pass
	5320	16.516	21.36	N/A	Pass
802.11n20	5260	17.532	19.94	N/A	Pass
	5300	17.581	20.44	N/A	Pass
	5320	17.582	19.91	N/A	Pass
802.11n40	5270	36.068	40.36	N/A	Pass
	5310	36.211	40.22	N/A	Pass
802.11ac20	5260	17.518	19.93	N/A	Pass
	5300	17.569	20.07	N/A	Pass
	5320	17.561	19.86	N/A	Pass
802.11ac40	5270	35.983	39.86	N/A	Pass
	5310	36.121	10.13	N/A	Pass
802.11ac80	5290	75.827	81.10	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	19.91	N/A	Pass
	5300	16.547	21.69	N/A	Pass
	5320	16.540	21.34	N/A	Pass
802.11n20	5260	17.542	19.87	N/A	Pass
	5300	17.586	20.41	N/A	Pass
	5320	17.590	19.95	N/A	Pass
802.11n40	5270	36.046	40.44	N/A	Pass
	5310	36.198	40.39	N/A	Pass
802.11ac20	5260	17.534	19.92	N/A	Pass
	5300	17.570	20.02	N/A	Pass
	5320	17.565	19.93	N/A	Pass
802.11ac40	5270	36.013	40.05	N/A	Pass
	5310	36.110	40.11	N/A	Pass
802.11ac80	5290	75.853	81.05	N/A	Pass

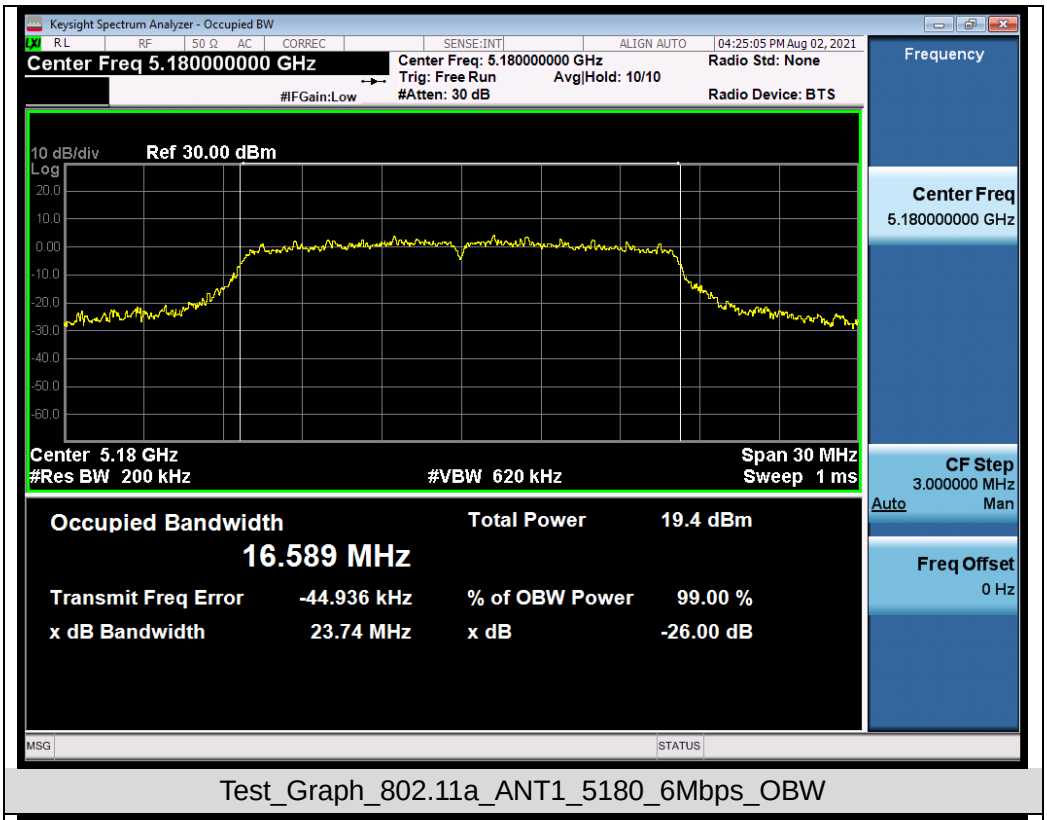
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.47-5.725 GHz-antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5500	16.549	22.37	N/A	Pass
	5600	16.562	22.27	N/A	Pass
	5700	16.564	20.63	N/A	Pass
802.11n20	5500	17.585	20.39	N/A	Pass
	5600	17.588	20.45	N/A	Pass
	5700	17.578	20.06	N/A	Pass
802.11n40	5510	36.128	48.91	N/A	Pass
	5590	36.151	41.84	N/A	Pass
	5670	36.190	51.79	N/A	Pass
802.11ac20	5500	17.579	20.60	N/A	Pass
	5600	17.576	20.01	N/A	Pass
	5700	17.567	19.97	N/A	Pass
802.11ac40	5510	36.052	39.93	N/A	Pass
	5590	36.119	40.04	N/A	Pass
	5670	36.121	44.27	N/A	Pass
802.11ac80	5530	75.670	80.75	N/A	Pass
	5610	76.222	96.03	N/A	Pass

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	16.581	22.43	N/A	Pass
	5600	16.581	21.37	N/A	Pass
	5700	16.562	20.71	N/A	Pass
802.11n20	5500	17.598	20.42	N/A	Pass
	5600	17.590	20.61	N/A	Pass
	5700	17.584	21.09	N/A	Pass
802.11n40	5510	36.137	44.68	N/A	Pass
	5590	36.140	42.38	N/A	Pass
	5670	36.173	52.03	N/A	Pass
802.11ac20	5500	17.580	19.98	N/A	Pass
	5600	17.575	20.10	N/A	Pass
	5700	17.574	20.54	N/A	Pass
802.11ac40	5510	36.077	39.99	N/A	Pass
	5590	36.111	40.00	N/A	Pass
	5670	36.125	40.24	N/A	Pass
802.11ac80	5530	75.638	81.04	N/A	Pass
	5610	76.151	81.84	N/A	Pass

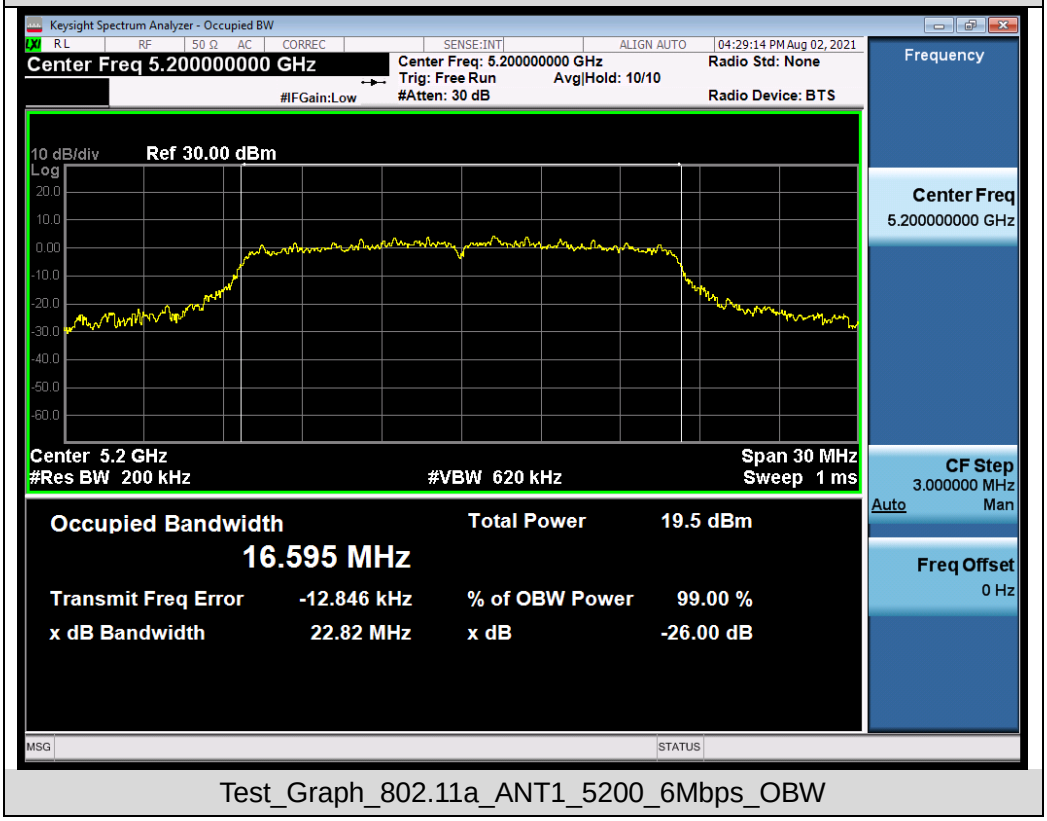
Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz-antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.624	15.10	≥0.5	Pass
	5785	16.596	15.13	≥0.5	Pass
	5825	16.538	15.11	≥0.5	Pass
802.11n20	5745	17.621	15.12	≥0.5	Pass
	5785	17.629	15.09	≥0.5	Pass
	5825	17.561	15.13	≥0.5	Pass
802.11n40	5755	36.222	35.41	≥0.5	Pass
	5795	36.225	35.40	≥0.5	Pass
802.11ac20	5745	17.621	15.12	≥0.5	Pass
	5785	17.623	15.07	≥0.5	Pass
	5825	17.578	15.13	≥0.5	Pass
802.11ac40	5755	36.157	35.14	≥0.5	Pass
	5795	36.138	35.16	≥0.5	Pass
802.11ac80	5775	76.130	76.36	≥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	16.633	15.06	≥0.5	Pass
	5785	16.600	15.07	≥0.5	Pass
	5825	16.526	15.11	≥0.5	Pass
802.11n20	5745	17.607	15.41	≥0.5	Pass
	5785	17.628	15.11	≥0.5	Pass
	5825	17.566	15.14	≥0.5	Pass
802.11n40	5755	36.209	35.13	≥0.5	Pass
	5795	36.208	35.40	≥0.5	Pass
802.11ac20	5745	17.611	15.11	≥0.5	Pass
	5785	17.627	13.89	≥0.5	Pass
	5825	17.564	15.12	≥0.5	Pass
802.11ac40	5755	36.150	35.14	≥0.5	Pass
	5795	36.167	35.40	≥0.5	Pass
802.11ac80	5775	76.110	76.39	≥0.5	Pass

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

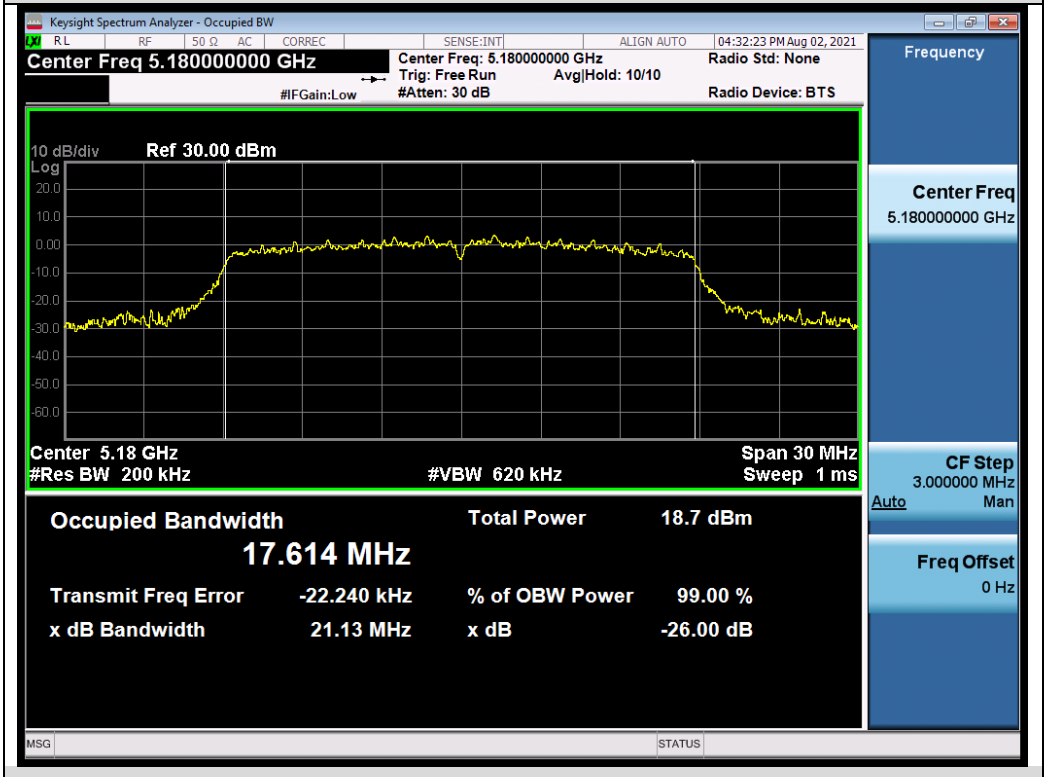


Test_Graph_802.11a_ANT1_5180_6Mbps_OBW

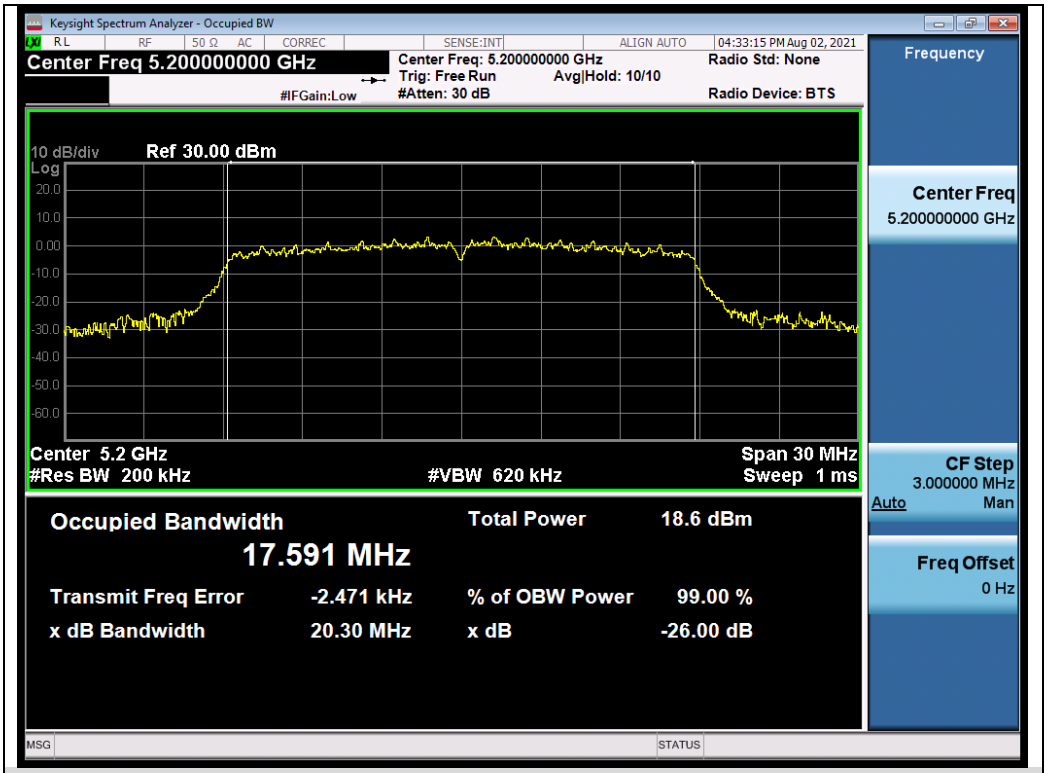


Test_Graph_802.11a_ANT1_5200_6Mbps_OBW

Test_Graph_802.11a_ANT1_5240_6Mbps_OBW



Test_Graph_802.11n20_ANT1_5180_MCS0_OBW



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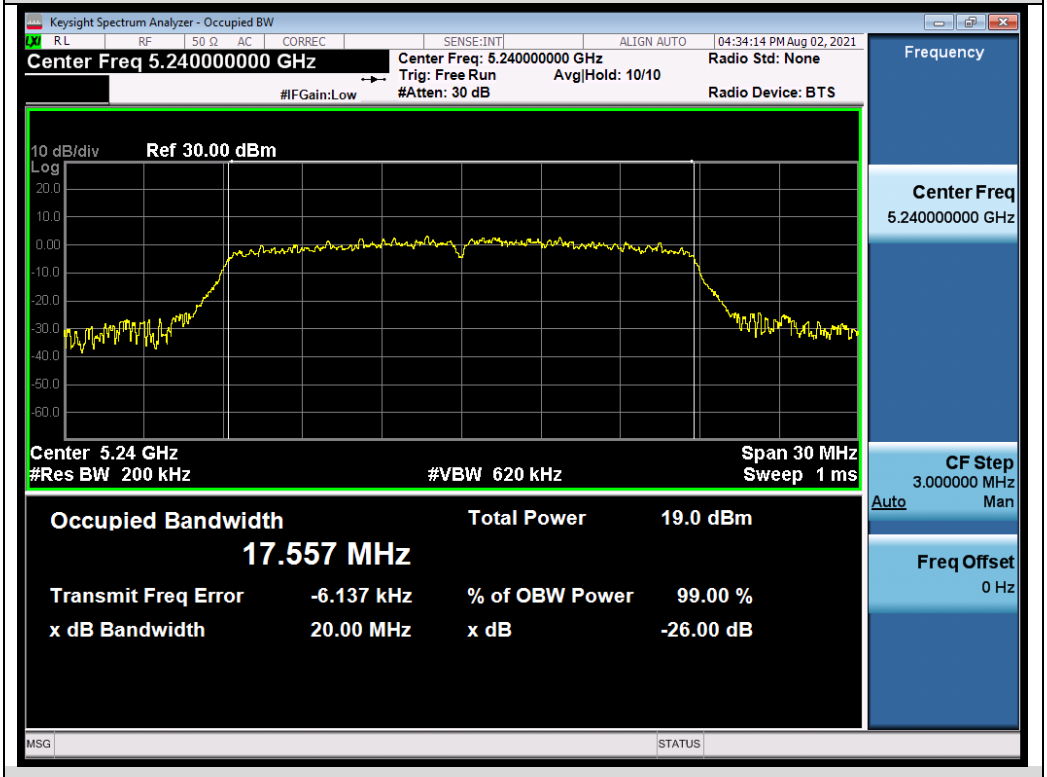
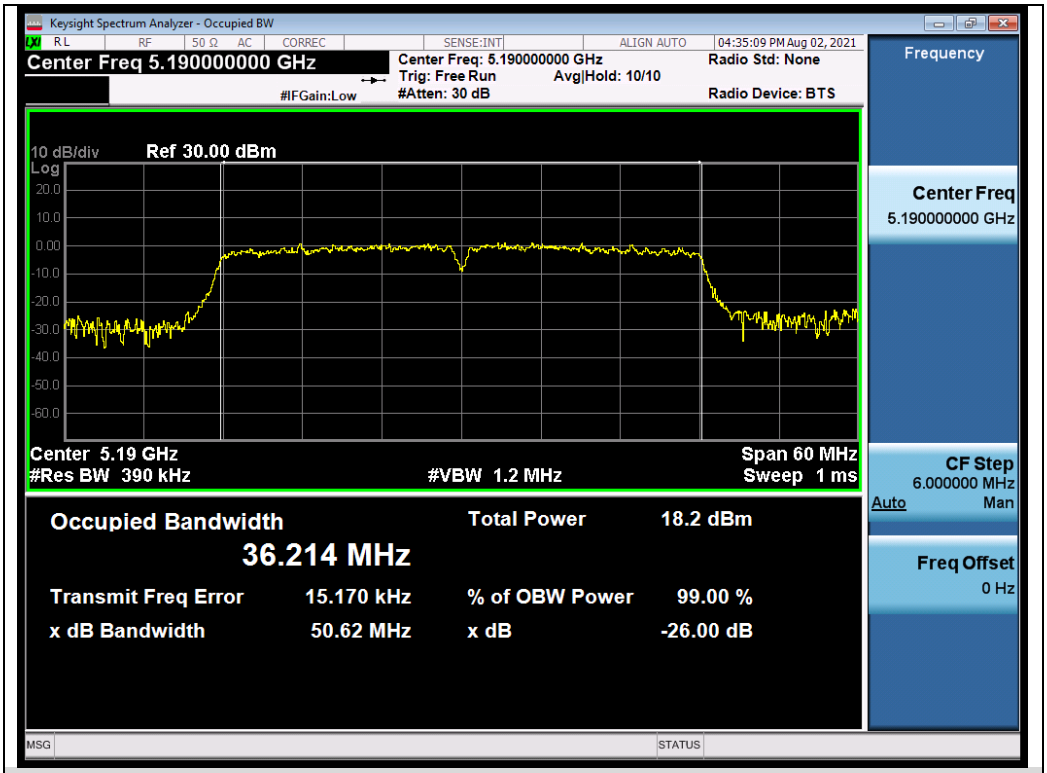
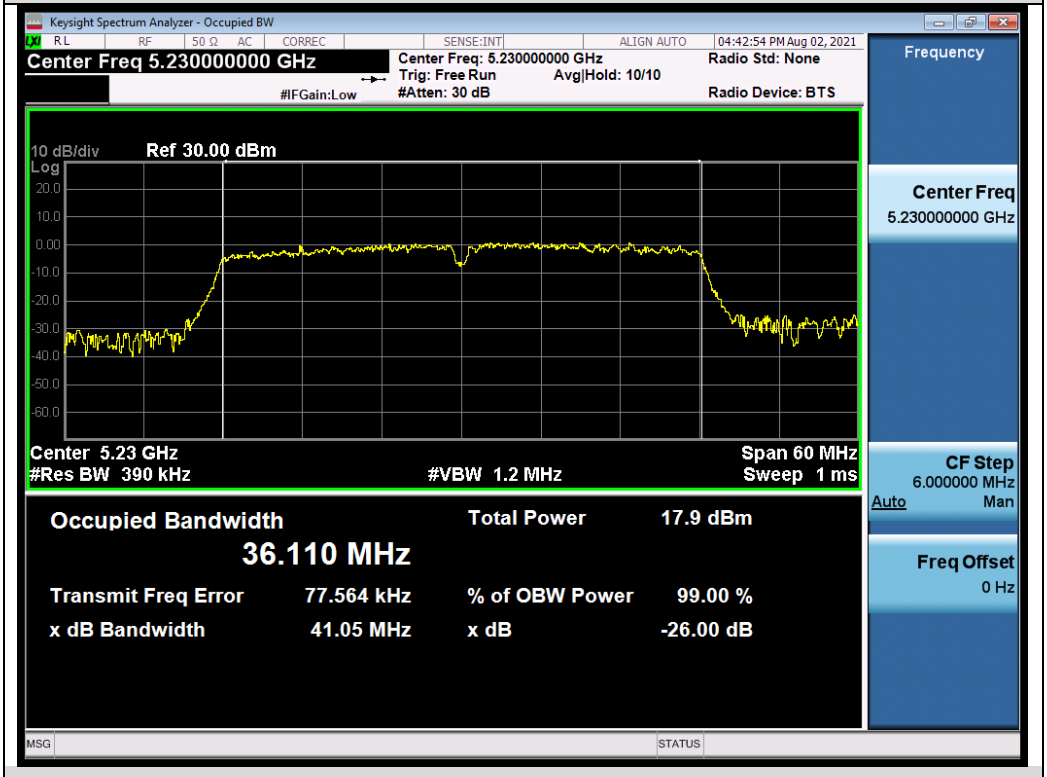


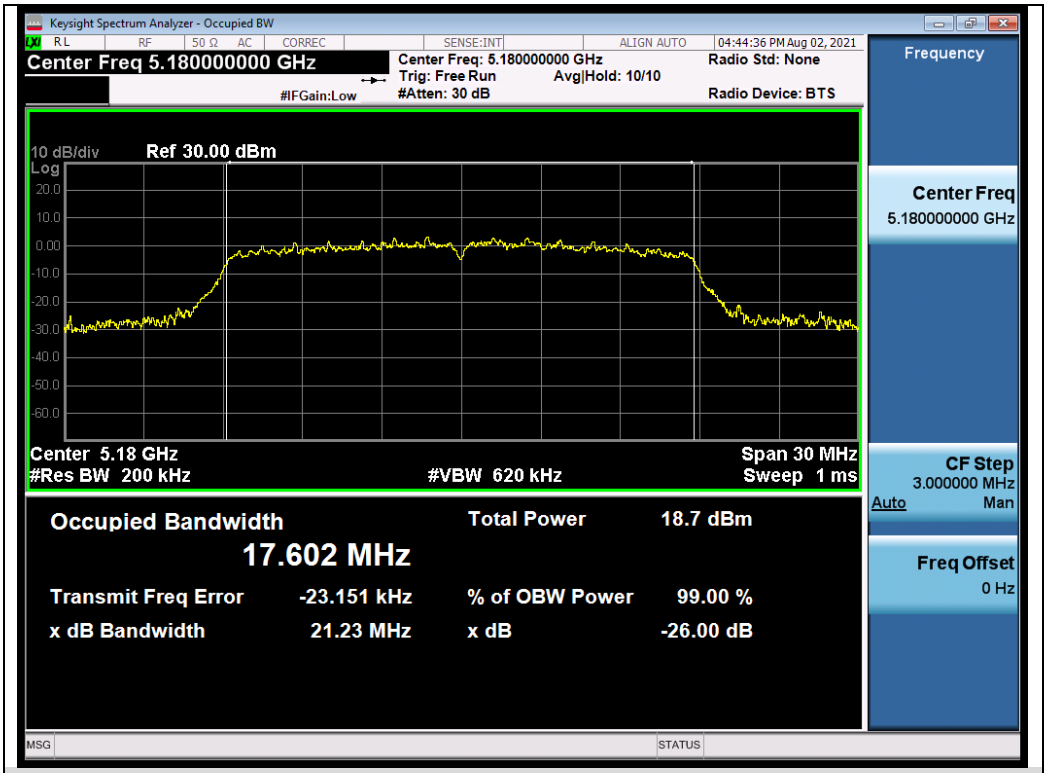
Test_Graph_802.11n20_ANT1_5240_MCS0_OBW



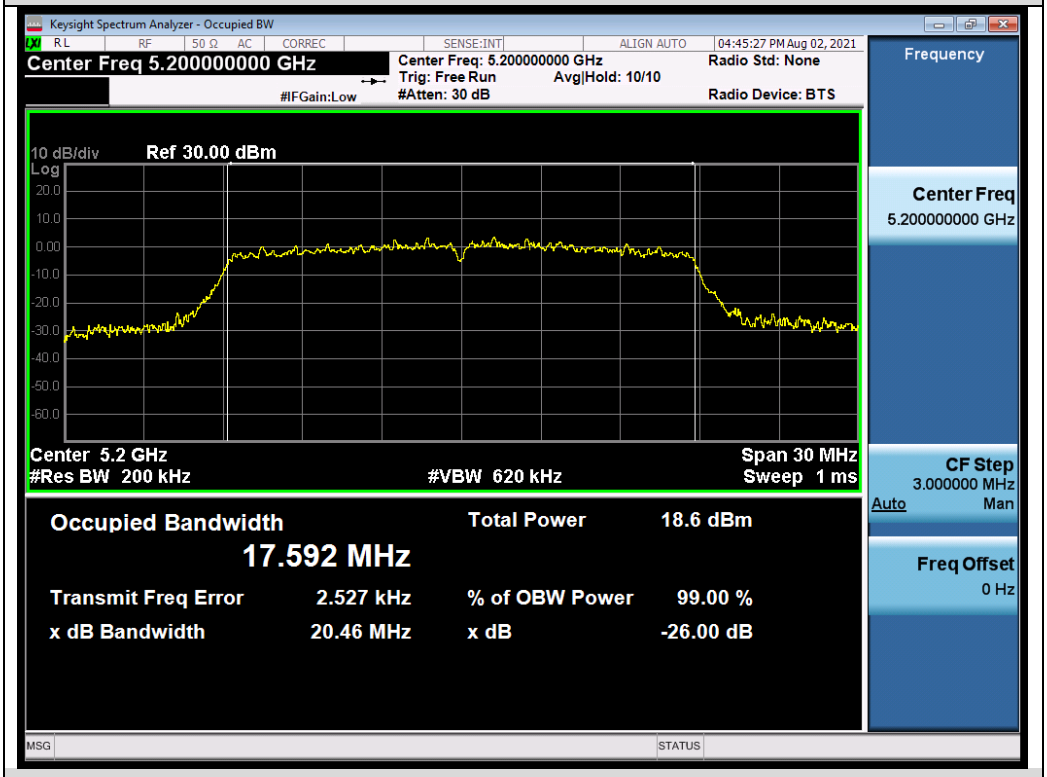
Test_Graph_802.11n40_ANT1_5190_MCS0_OBW



Test_Graph_802.11n40_ANT1_5230_MCS0_OBW



Test_Graph_802.11ac20_ANT1_5180_MCS0_OBW



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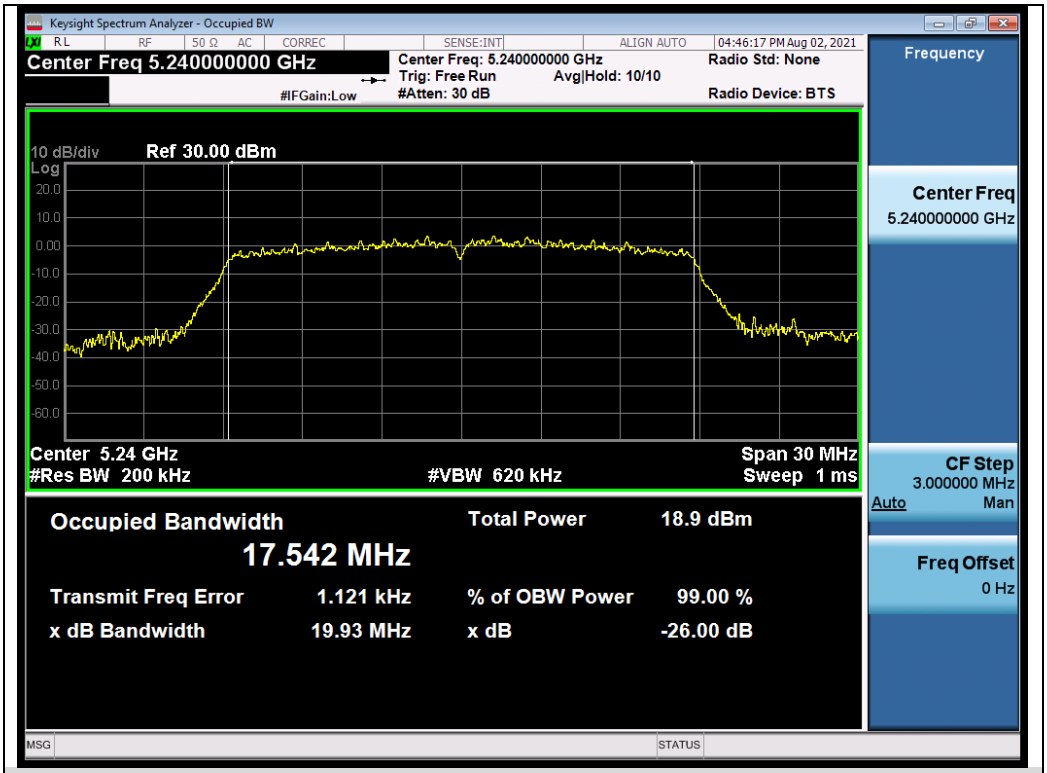
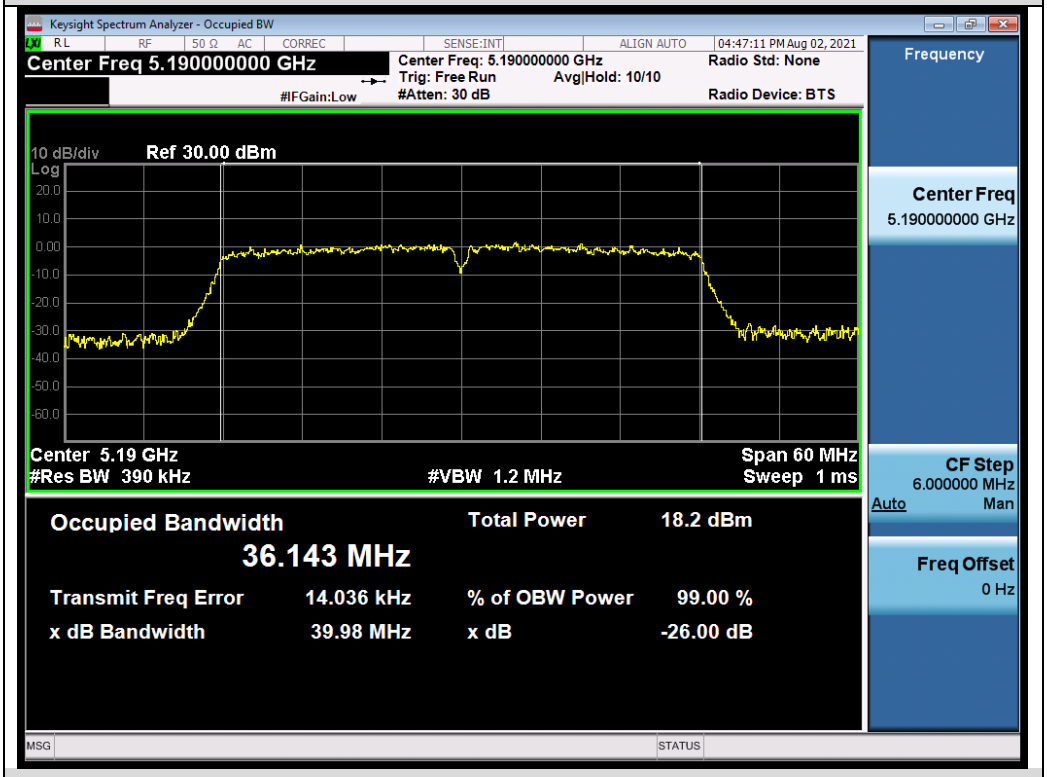
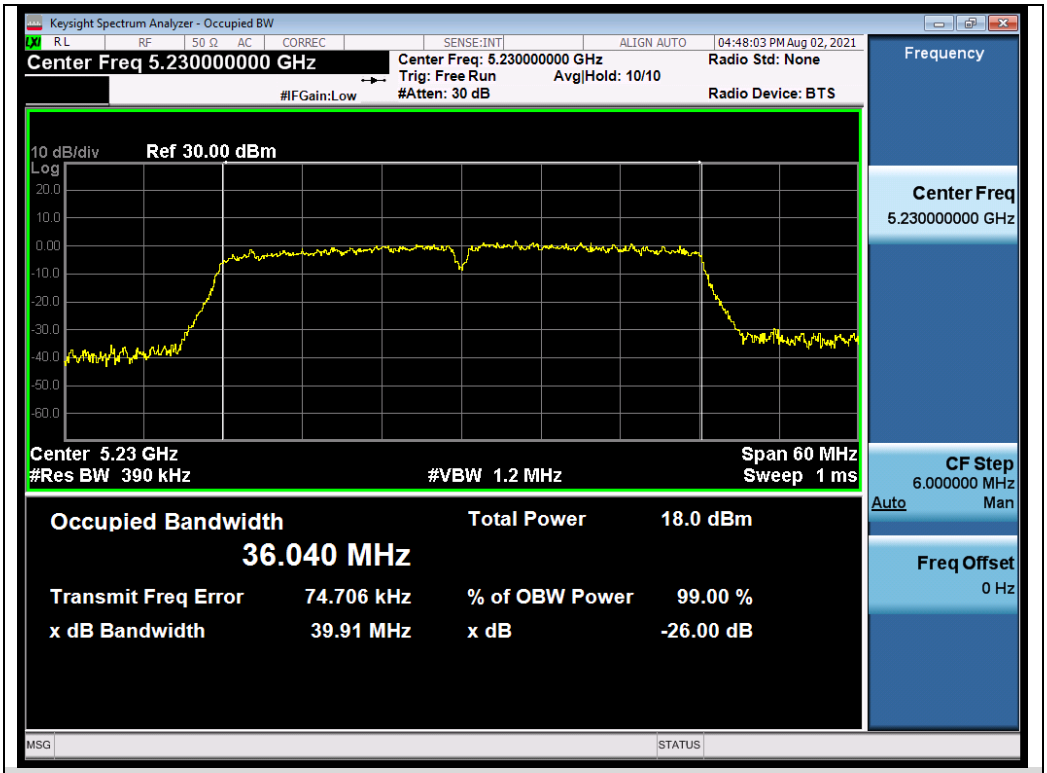


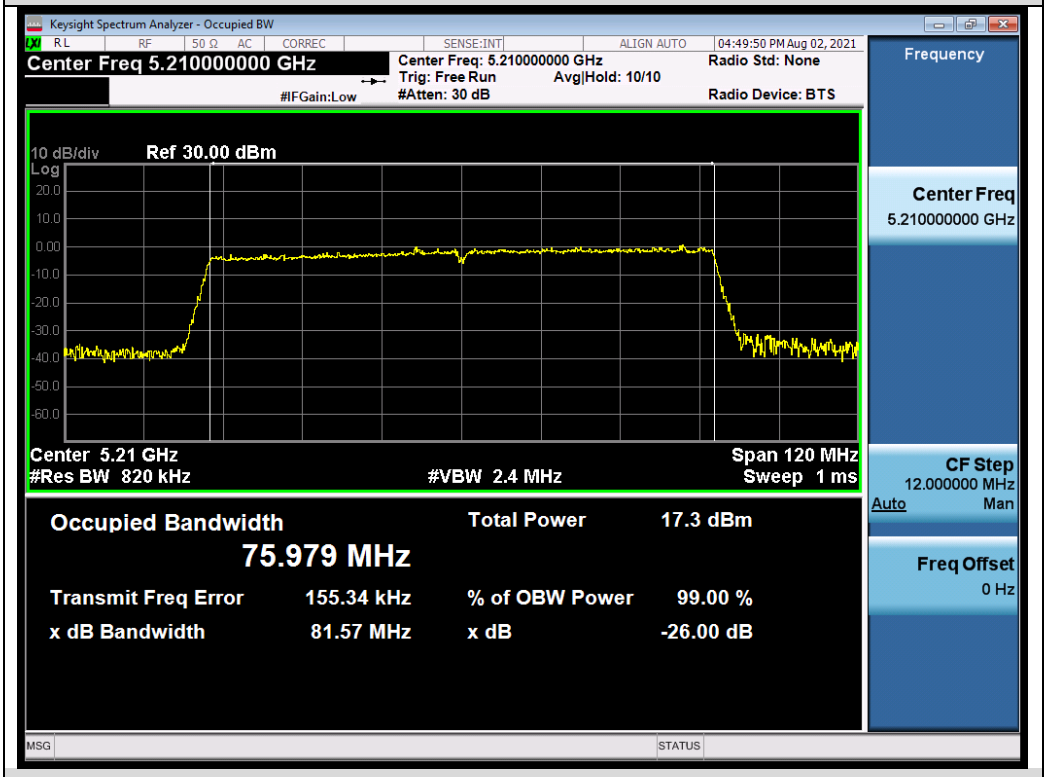
Test_Graph_802.11ac20_ANT1_5240_MCS9_OBW



Test_Graph_802.11ac40_ANT1_5190_MCS9_OBW



Test_Graph_802.11ac40_ANT1_5230_MCS9_OBW



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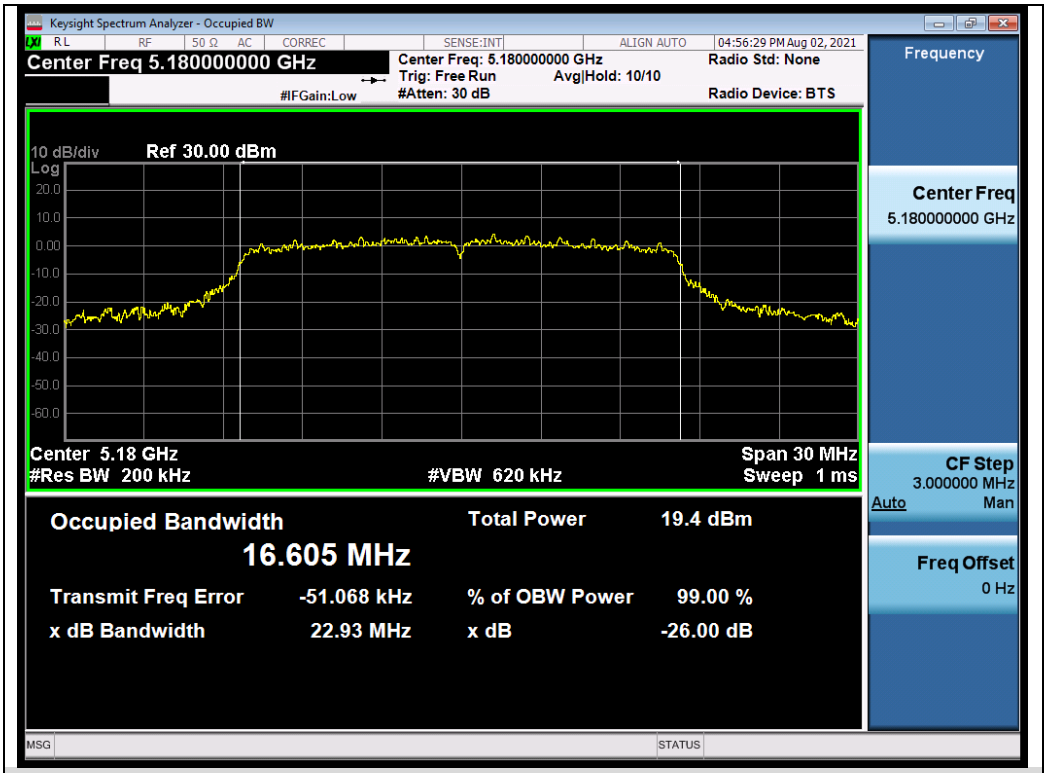
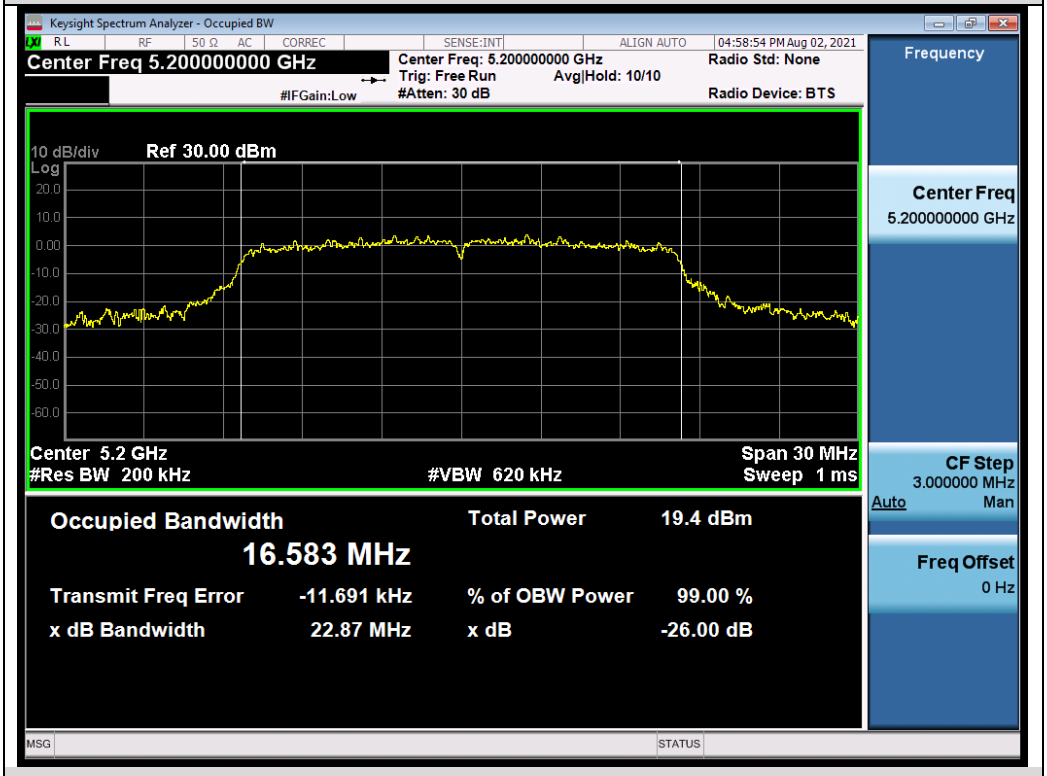
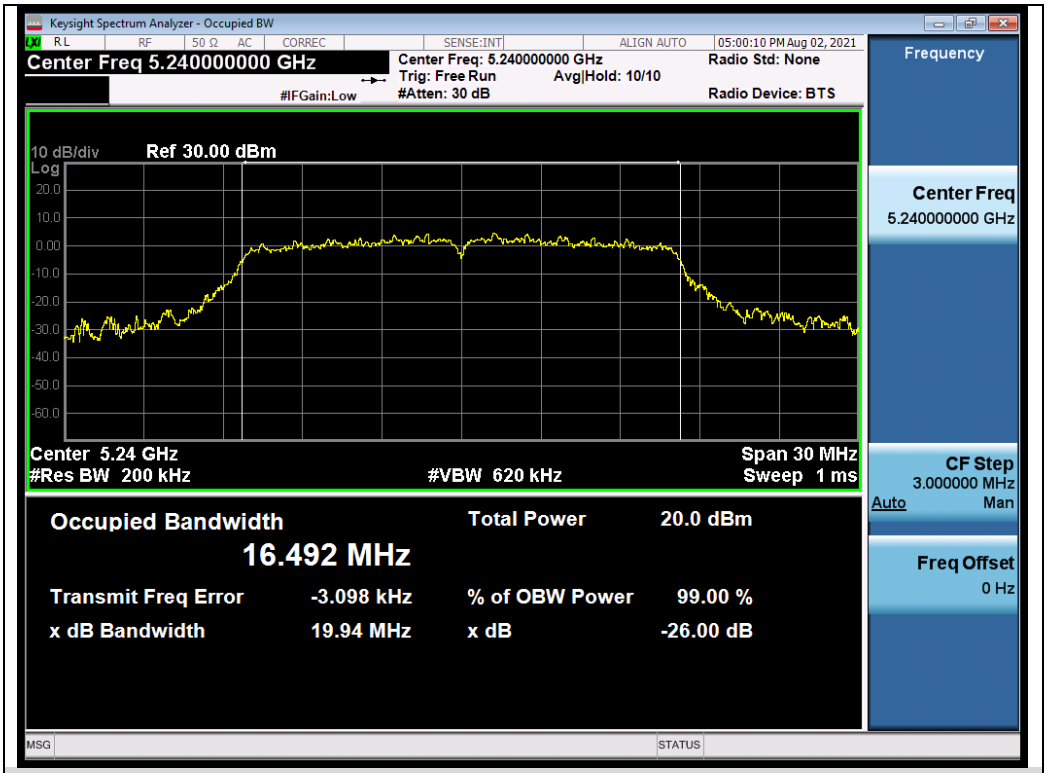


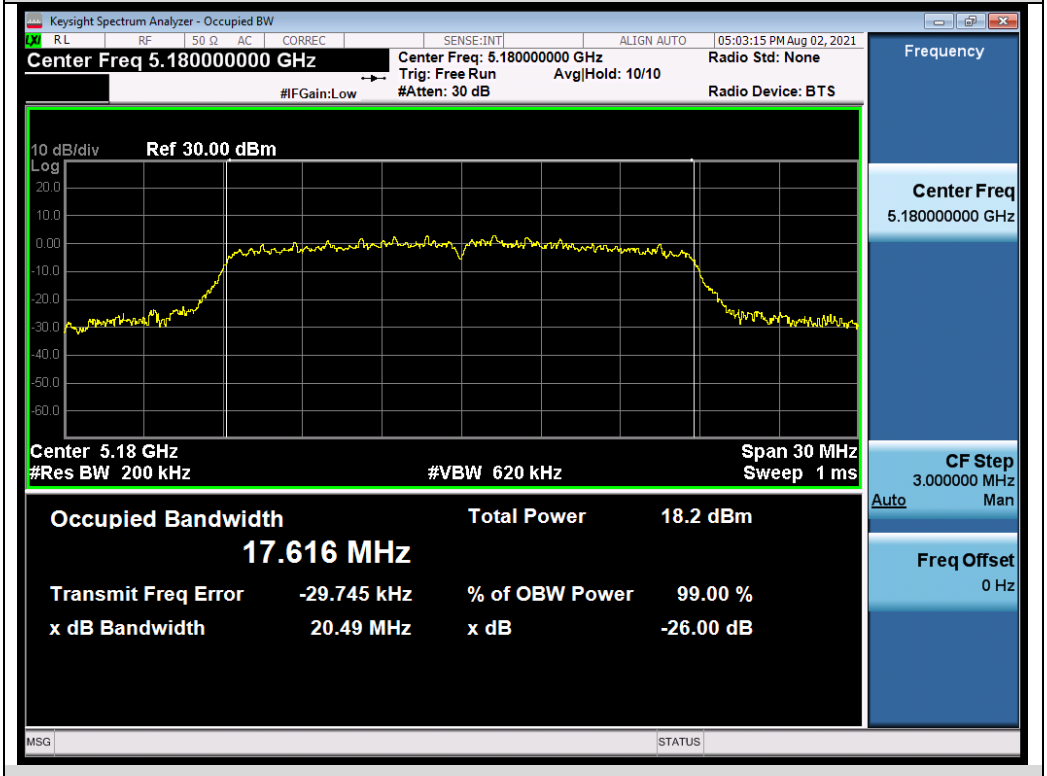
Test_Graph_802.11a_ANT2_5180_6Mbps_OBW



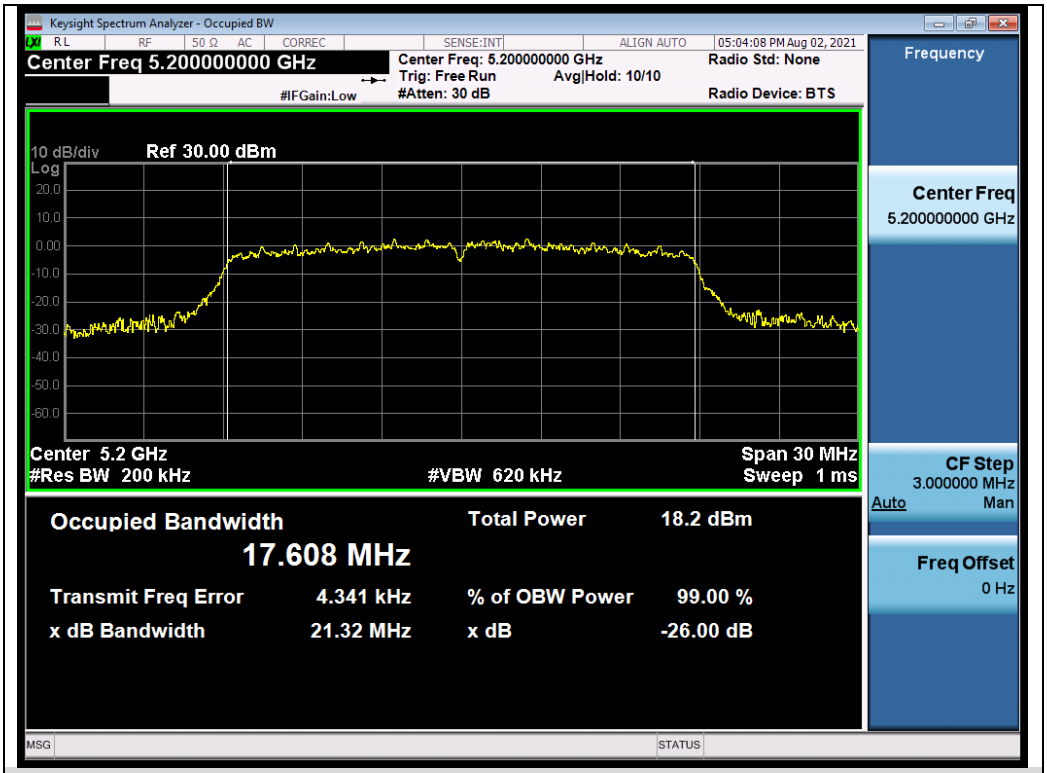
Test_Graph_802.11a_ANT2_5200_6Mbps_OBW



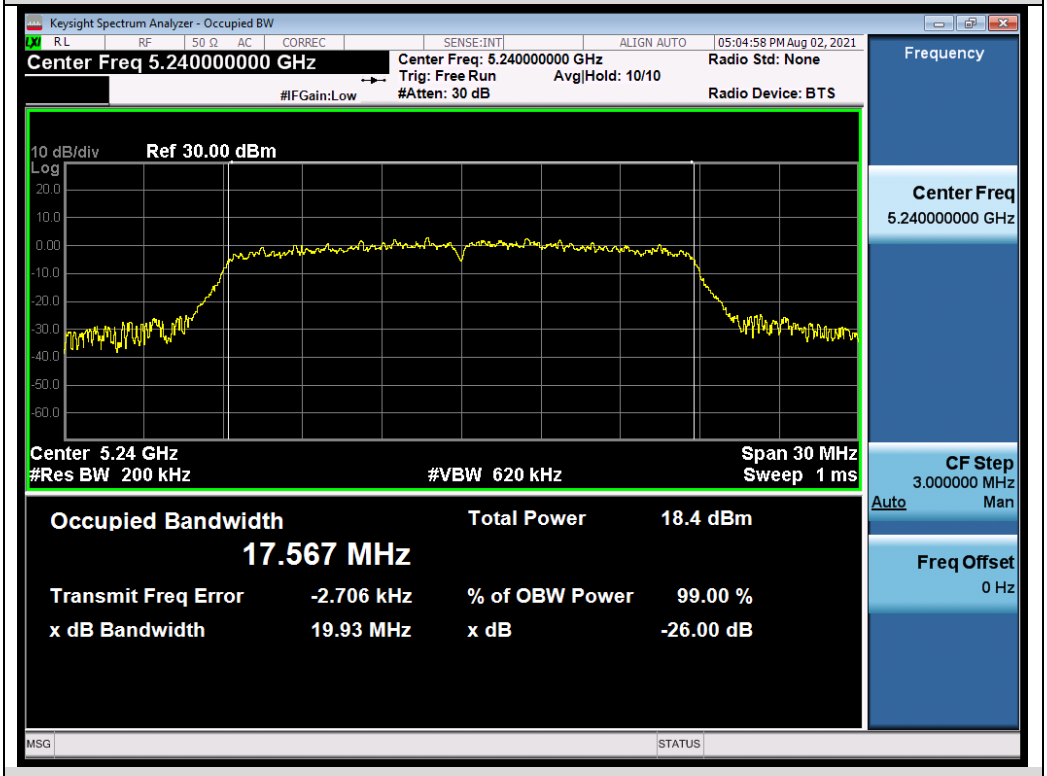
Test_Graph_802.11a_ANT2_5240_6Mbps_OBW



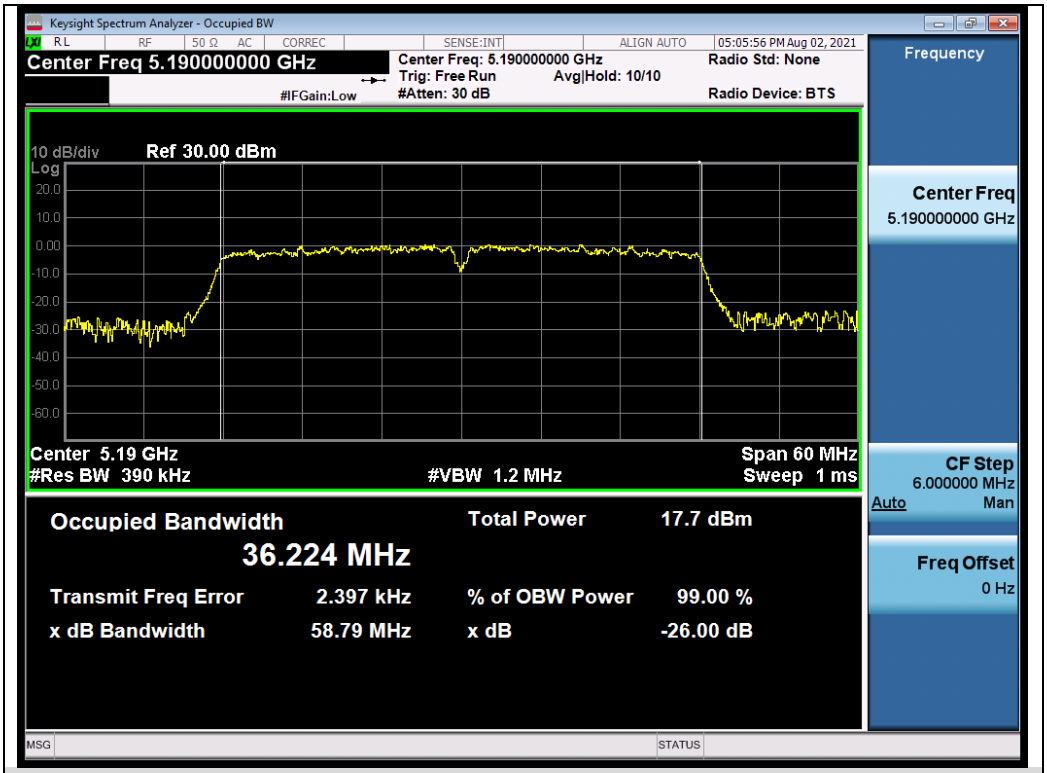
Test_Graph_802.11n20_ANT2_5180_MCS0_OBW



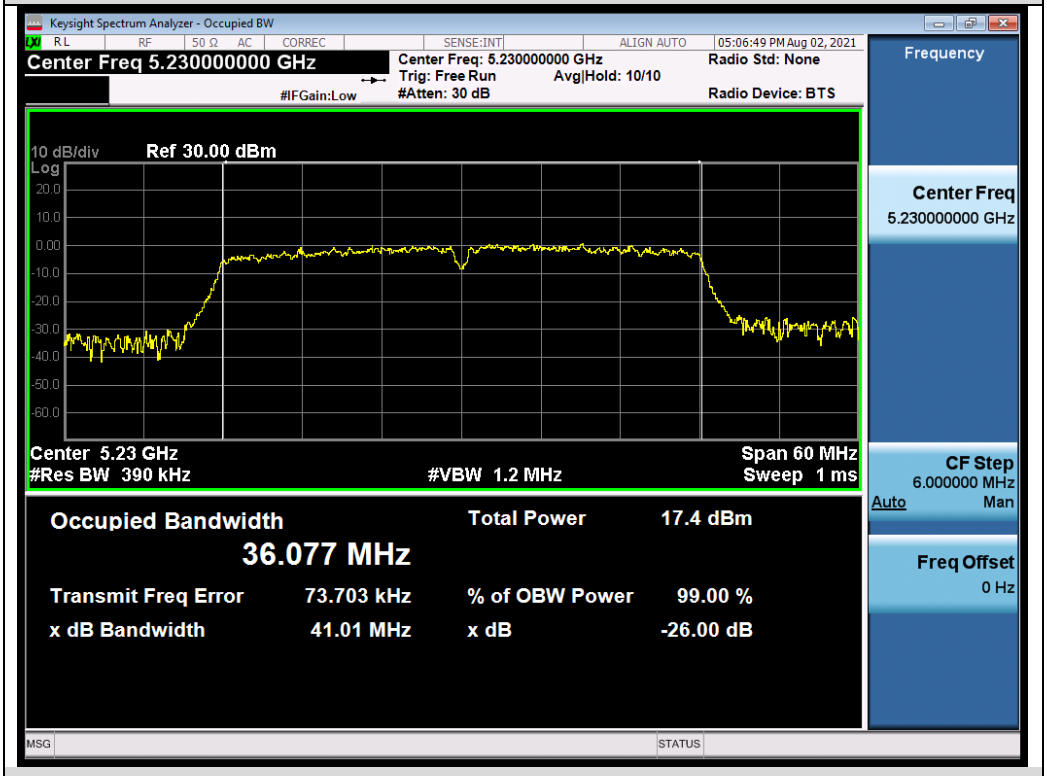
Test_Graph_802.11n20_ANT2_5200_MCS0_OBW



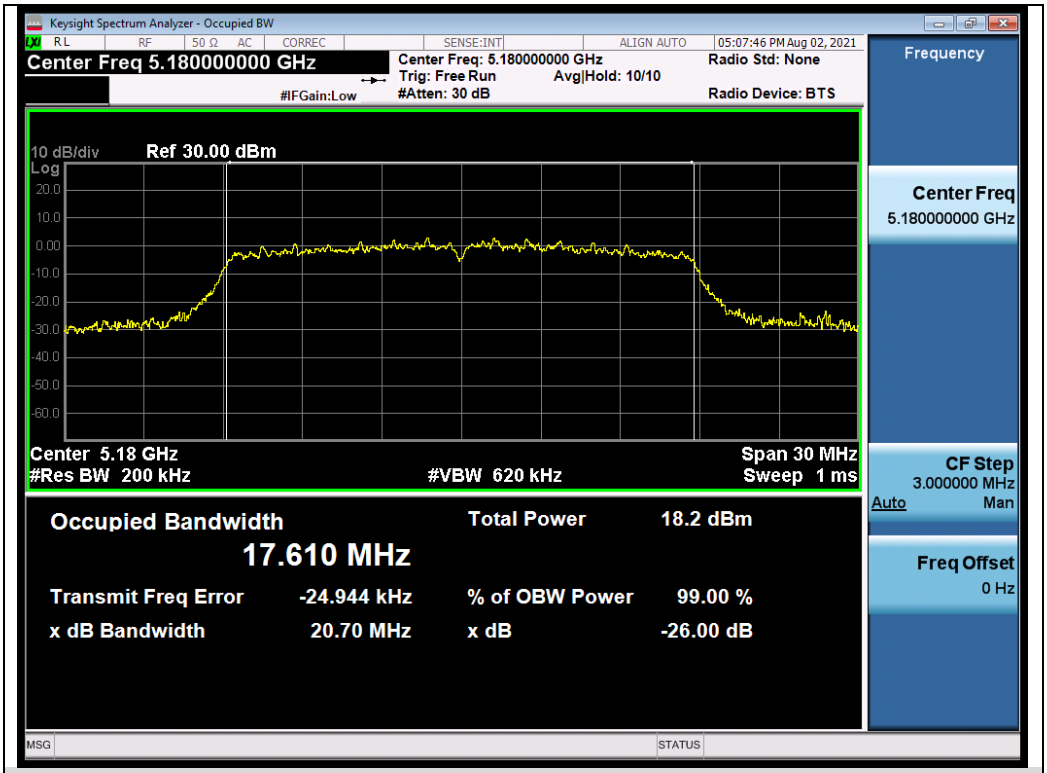
Test_Graph_802.11n20_ANT2_5240_MCS0_OBW



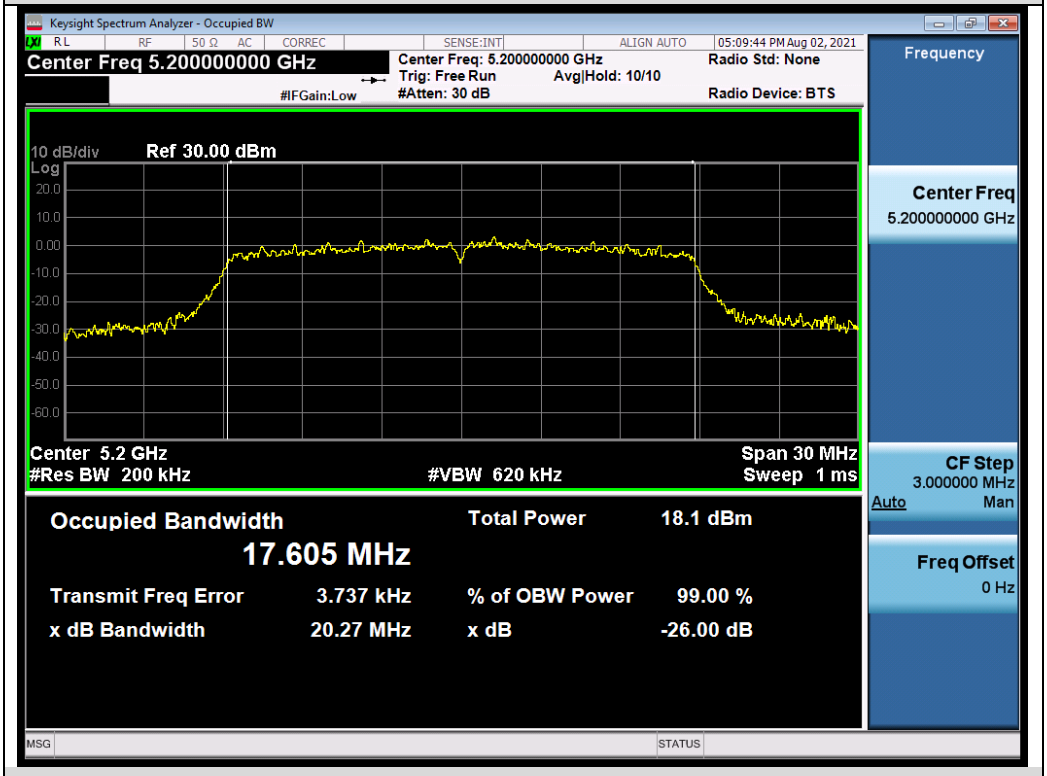
Test_Graph_802.11n40_ANT2_5190_MCS0_OBW



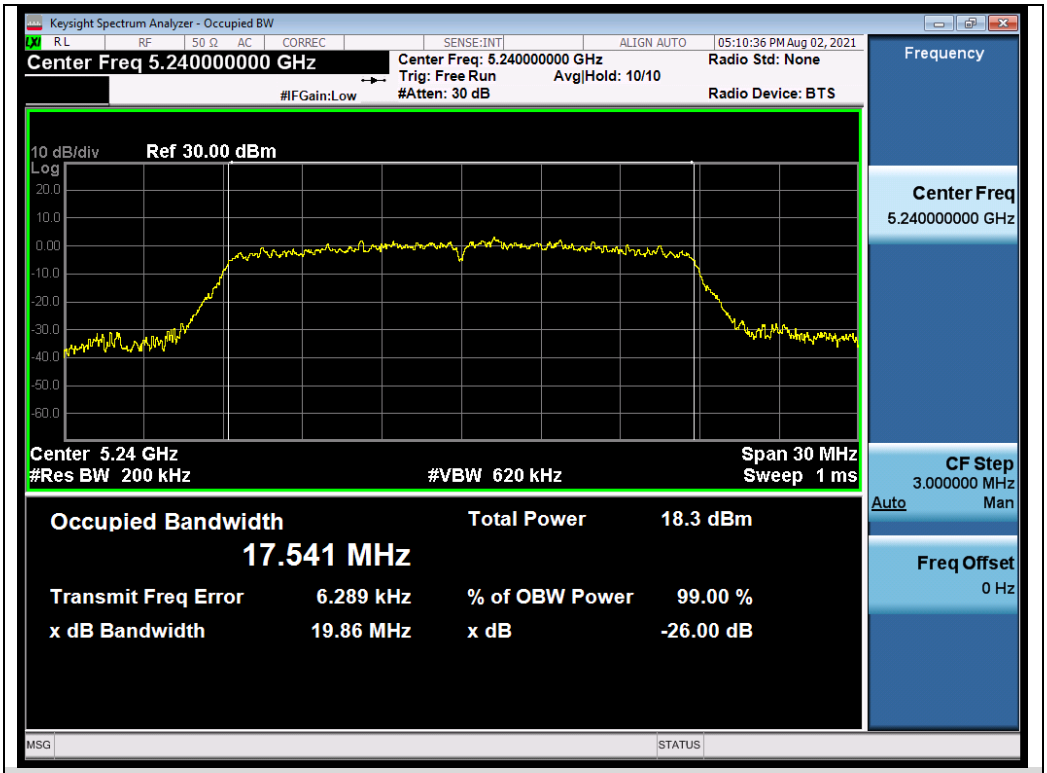
Test_Graph_802.11n40_ANT2_5230_MCS0_OBW



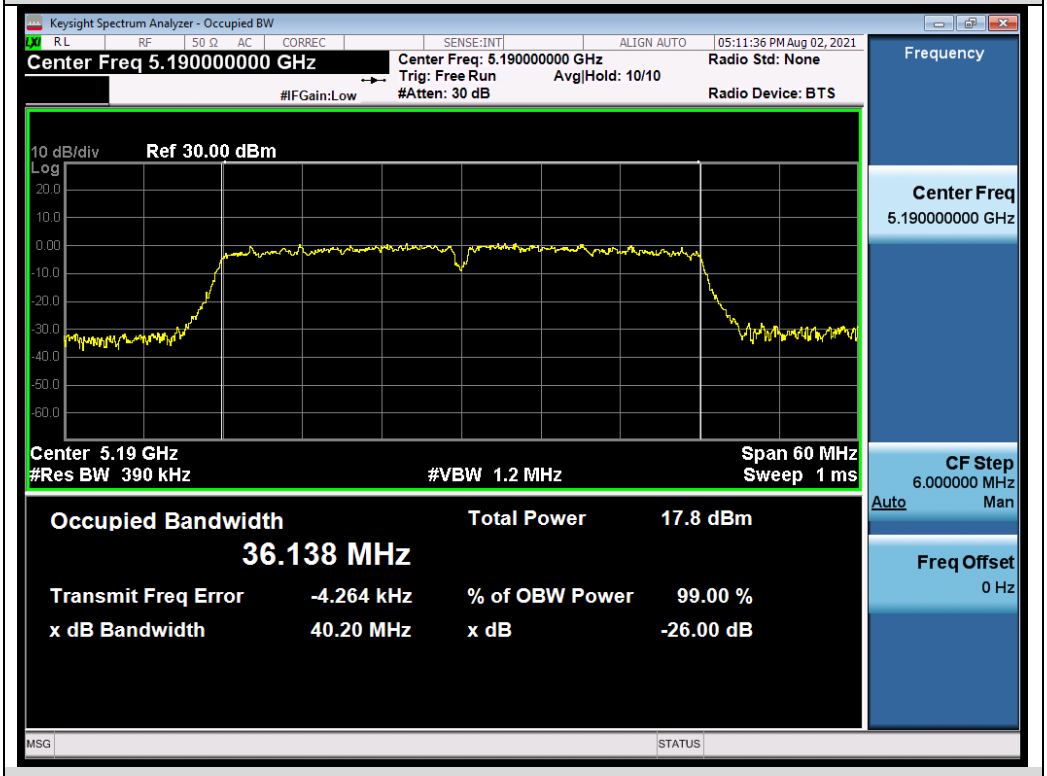
Test_Graph_802.11ac20_ANT2_5180_MCS0_OBW



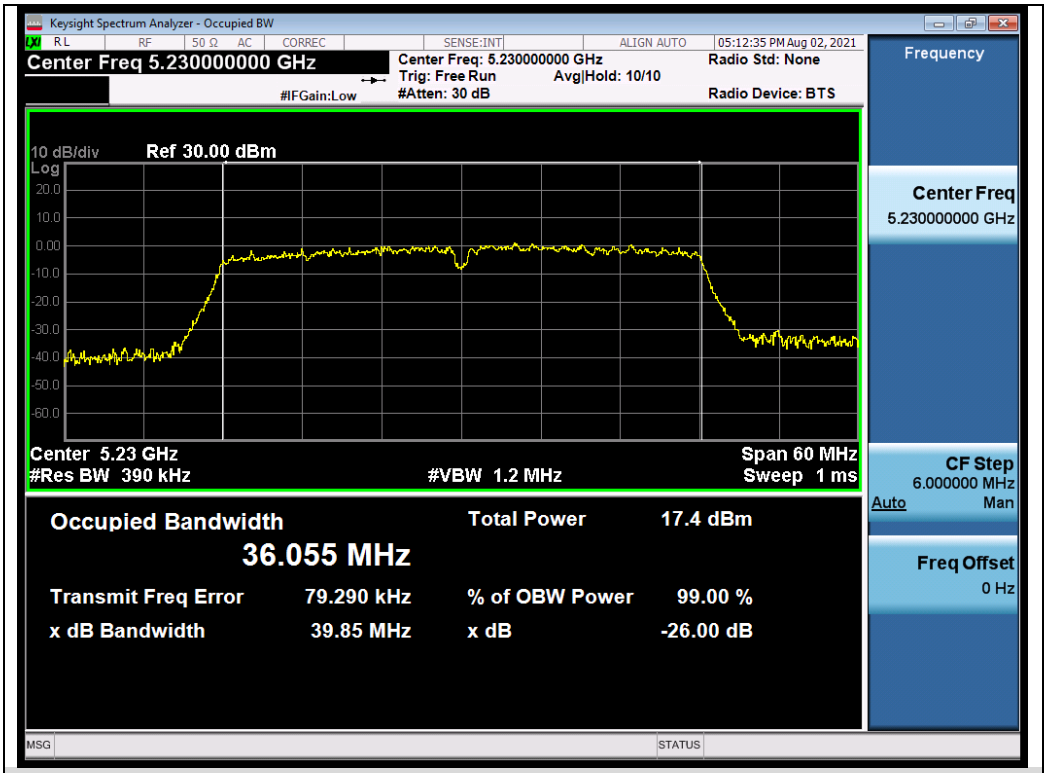
Test_Graph_802.11ac20_ANT2_5200_MCS0_OBW



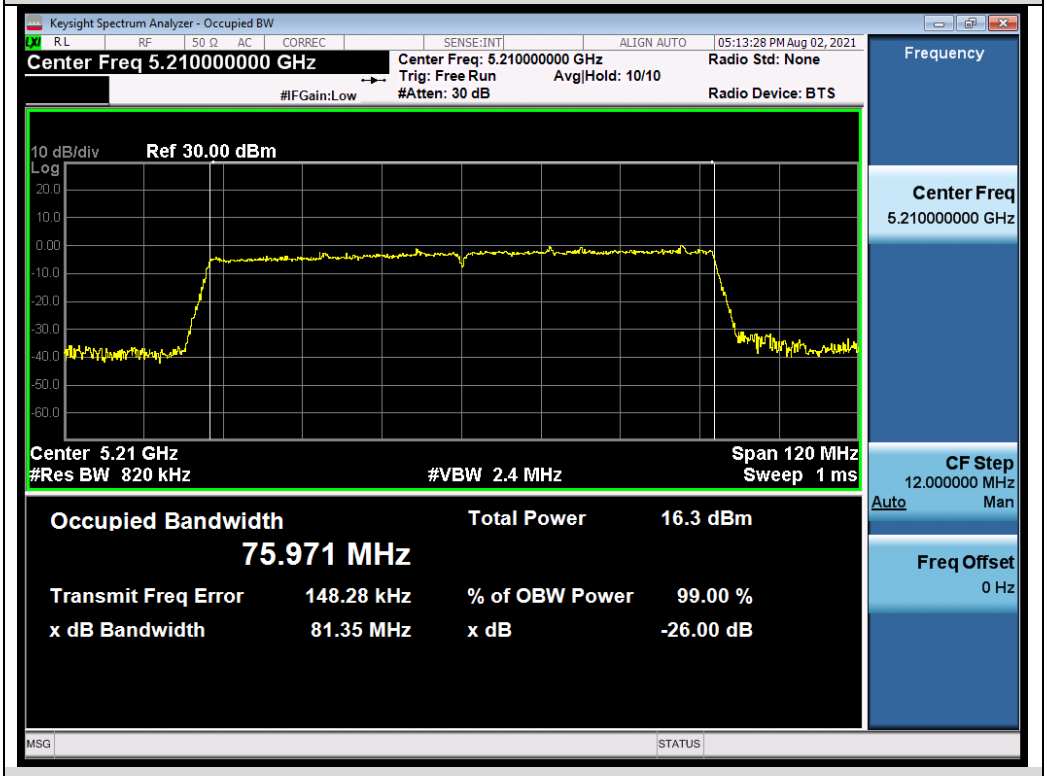
Test_Graph_802.11ac20_ANT2_5240_MCS9_OBW



Test_Graph_802.11ac40_ANT2_5190_MCS9_OBW

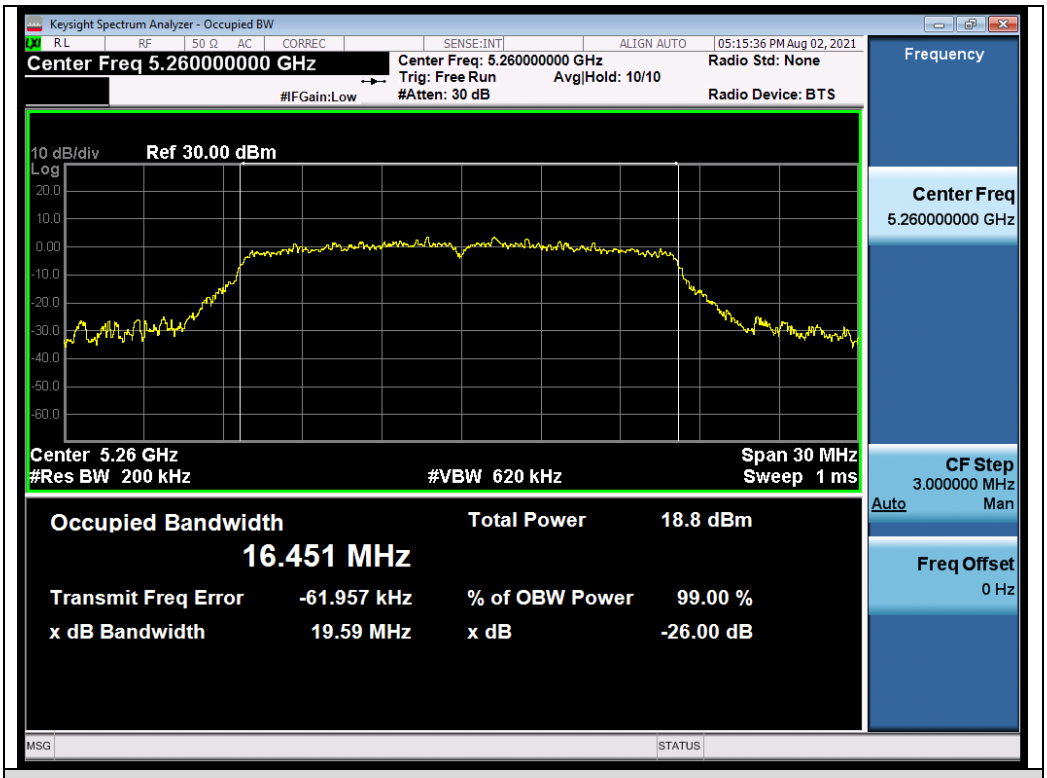


Test_Graph_802.11ac40_ANT2_5230_MCS9_OBW

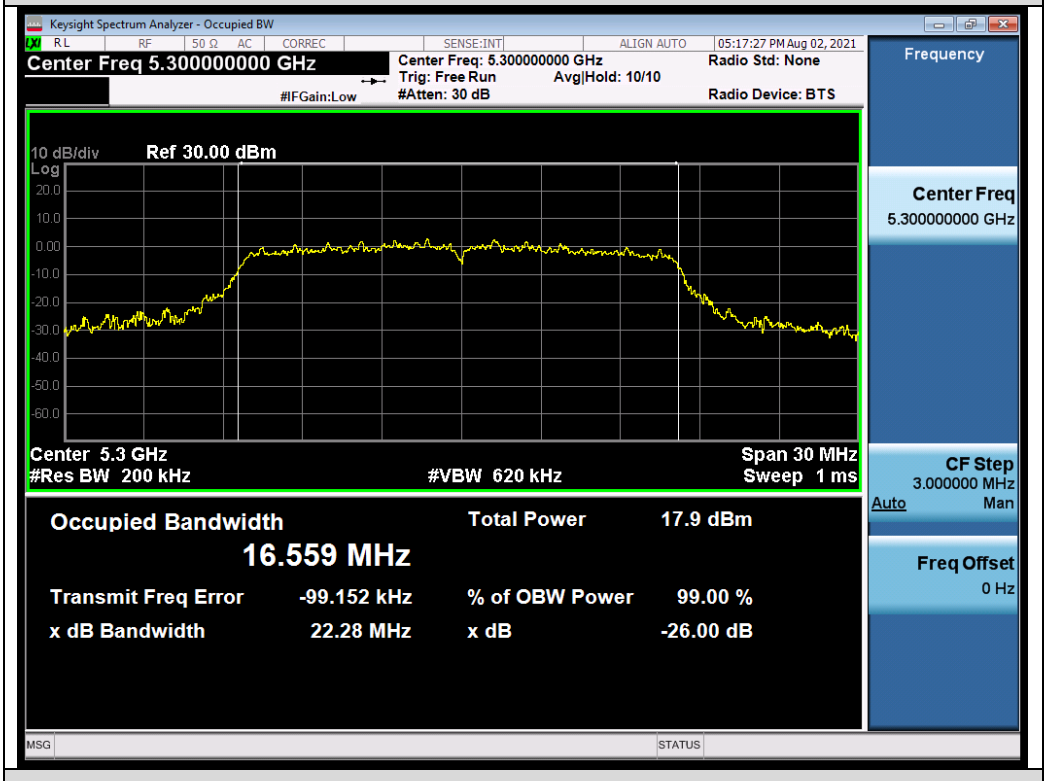


Test_Graph_802.11ac80_ANT2_5210_MCS9_OBW

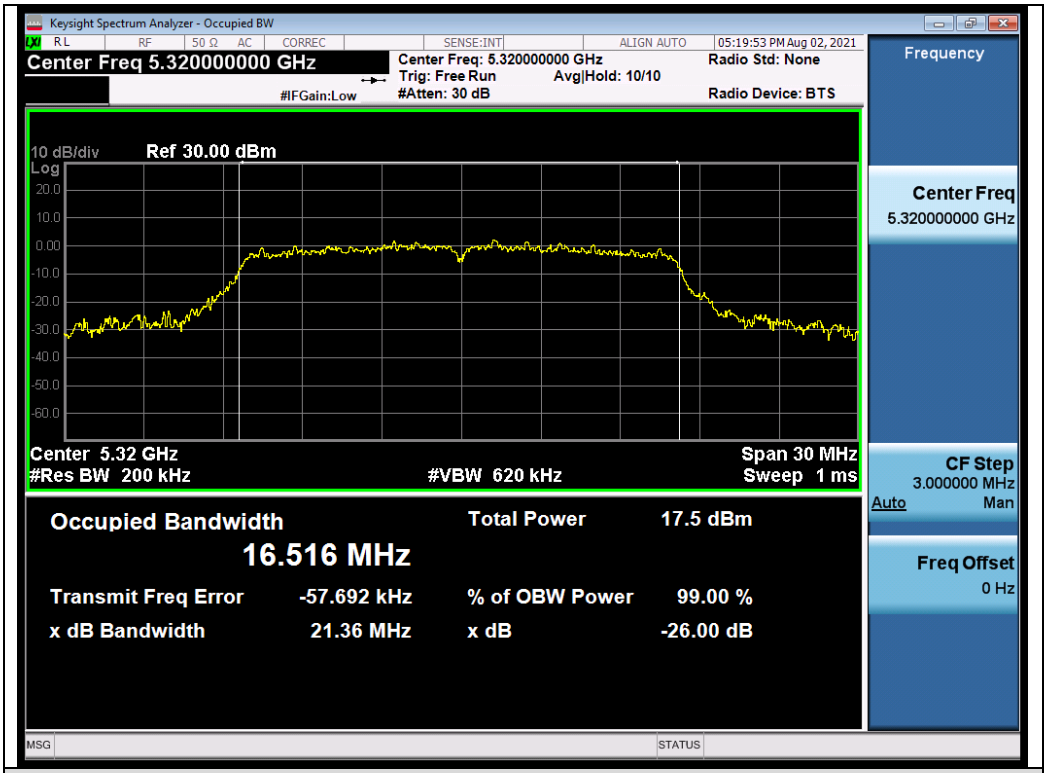
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.25-5.35 GHz



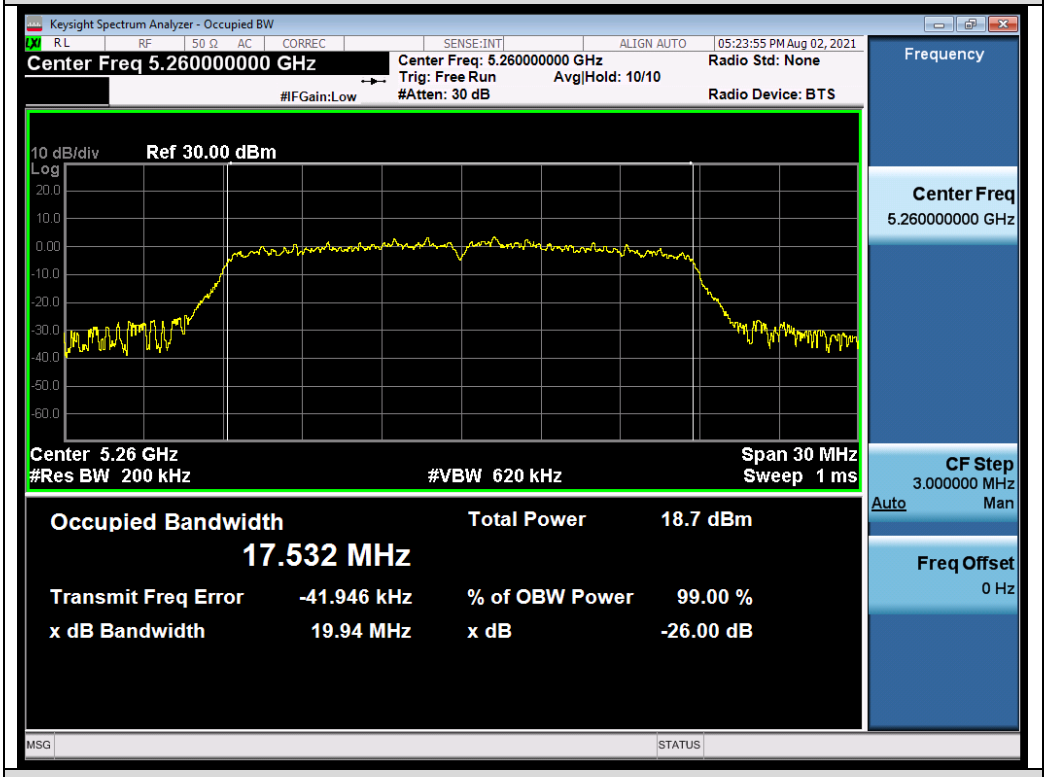
Test_Graph_802.11a_ANT1_5260_6Mbps_OBW



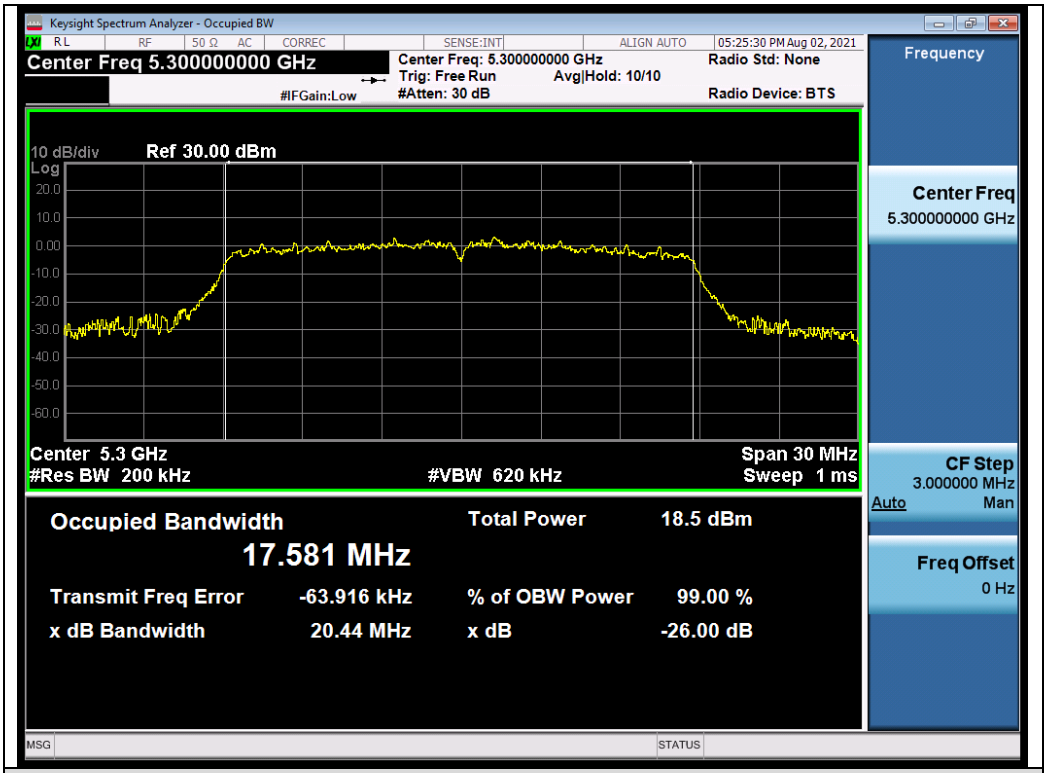
Test_Graph_802.11a_ANT1_5300_6Mbps_OBW



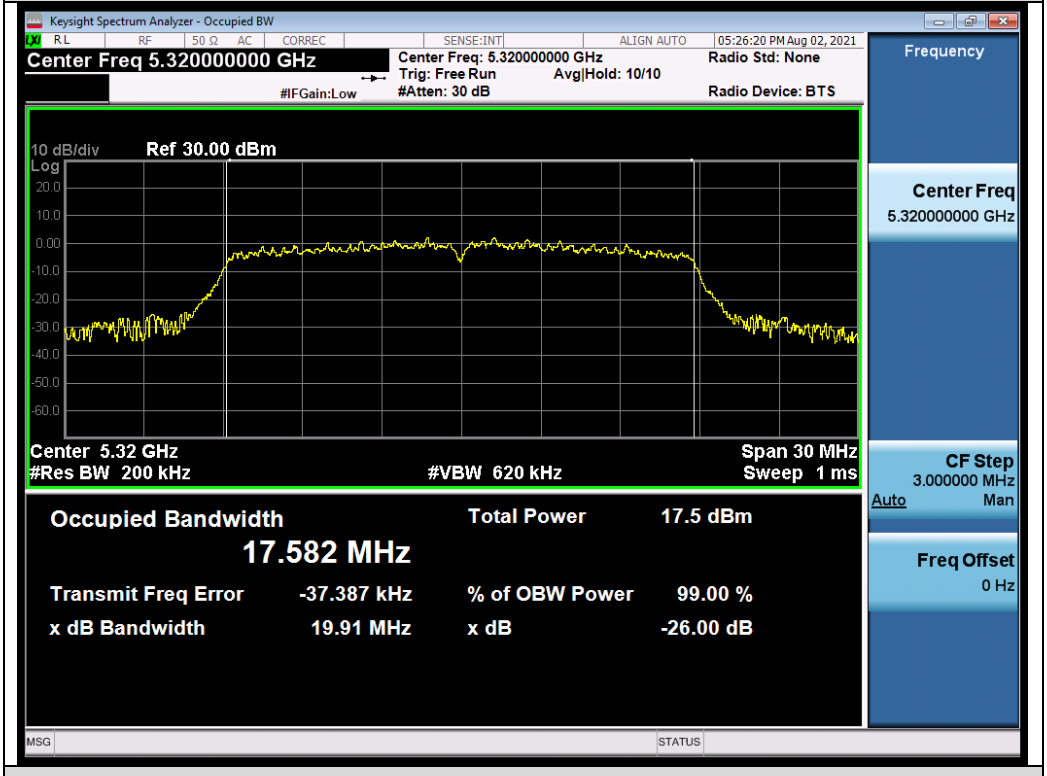
Test_Graph_802.11a_ANT1_5320_6Mbps_OBW



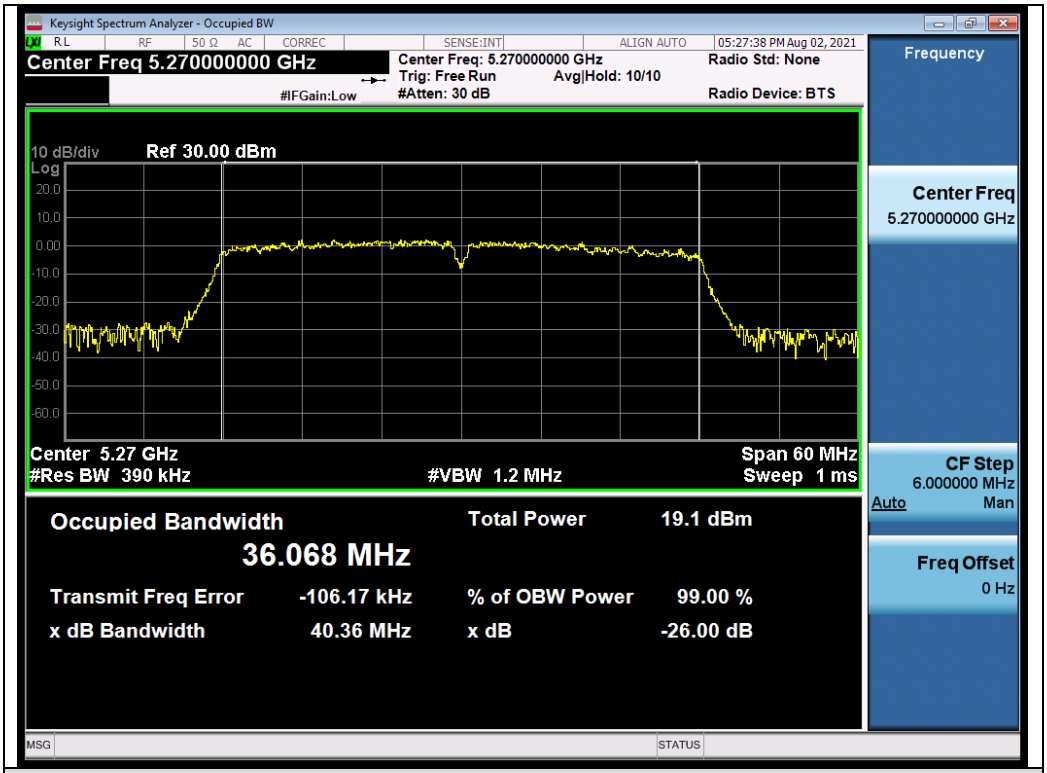
Test_Graph_802.11n20_ANT1_5260_MCS0_OBW



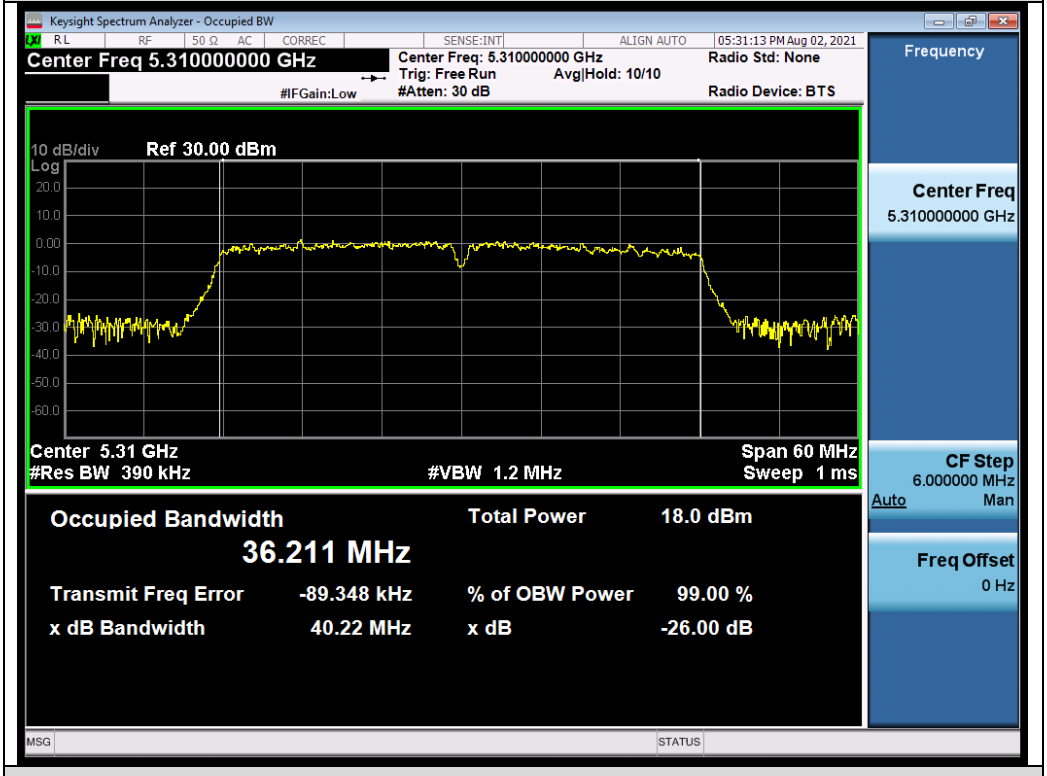
Test_Graph_802.11n20_ANT1_5300_MCS0_OBW



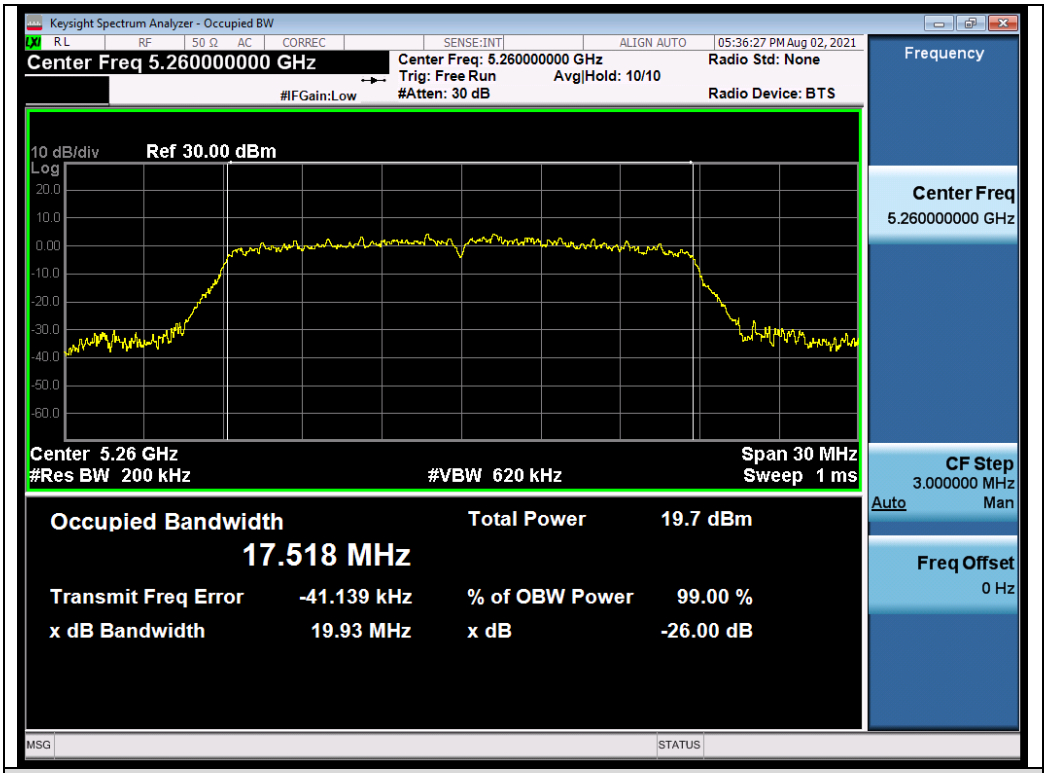
Test_Graph_802.11n20_ANT1_5320_MCS0_OBW



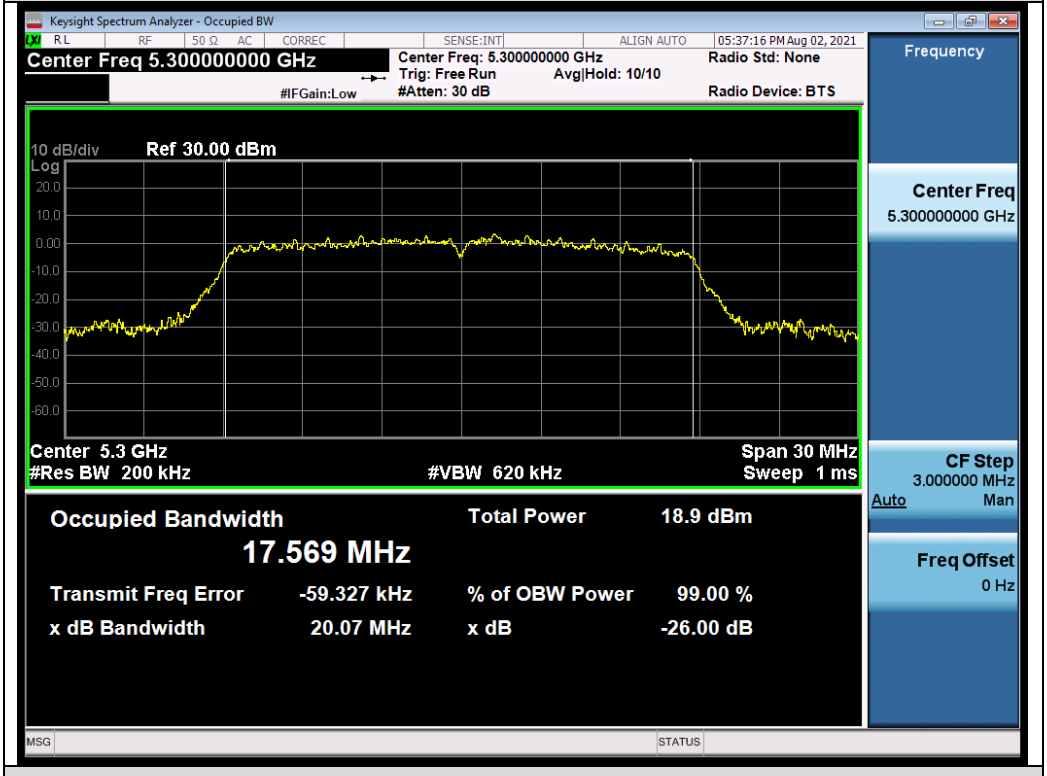
Test_Graph_802.11n40_ANT1_5270_MCS0_OBW



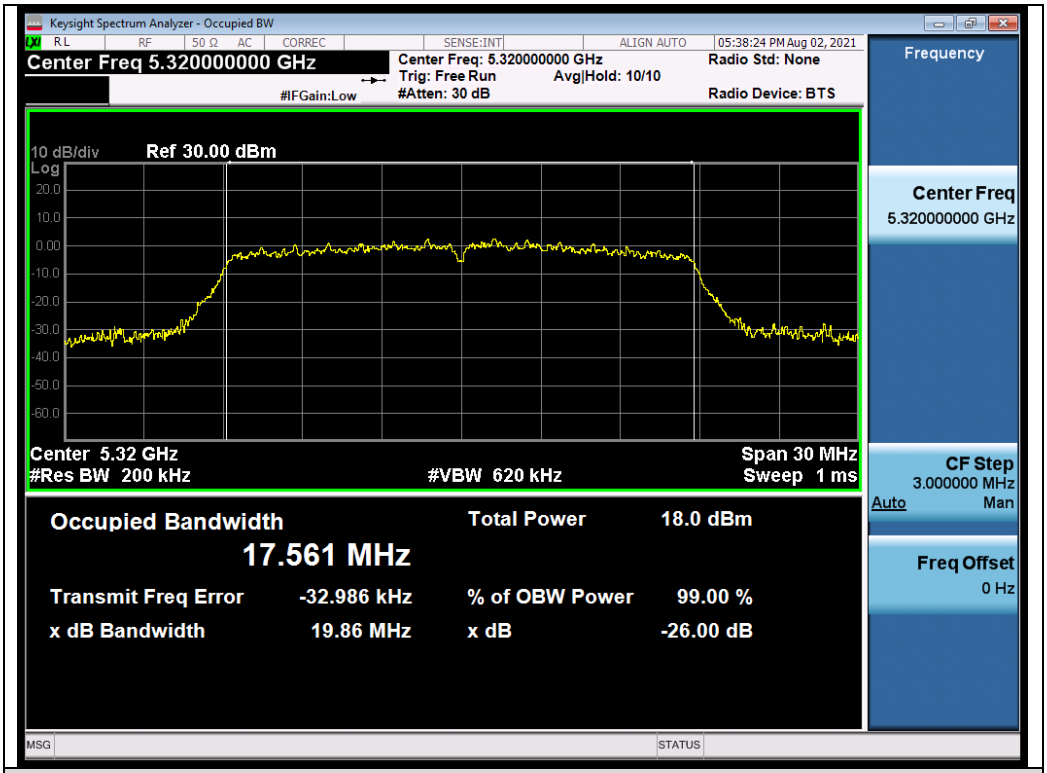
Test_Graph_802.11n40_ANT1_5310_MCS0_OBW



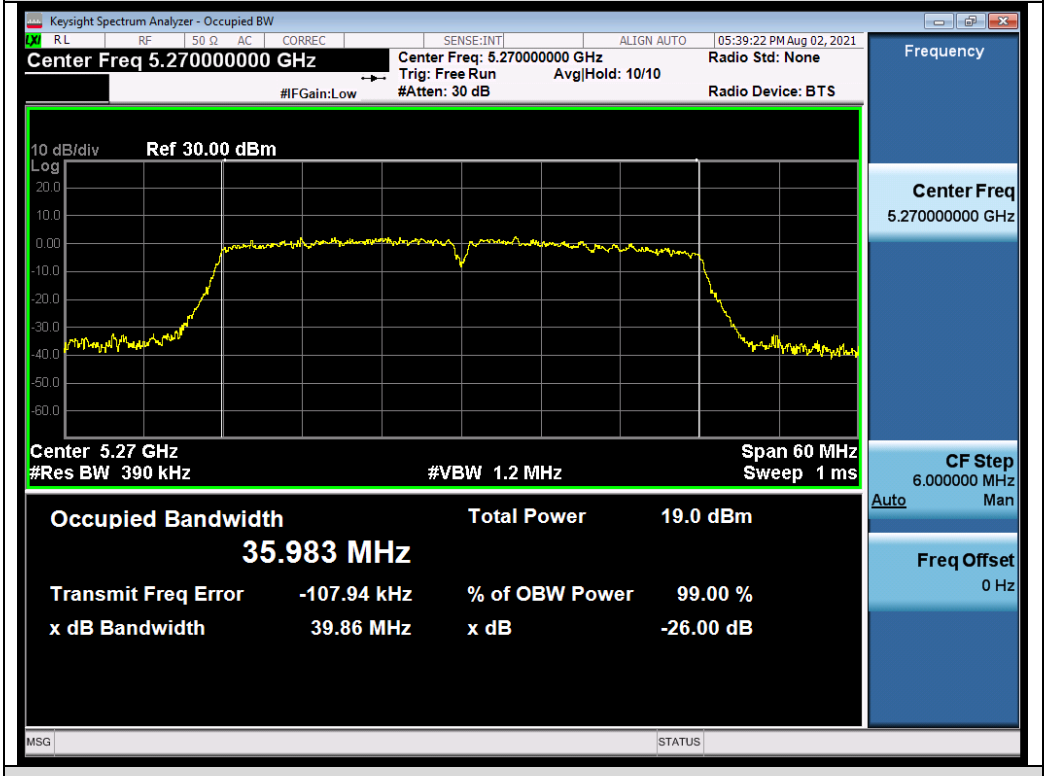
Test_Graph_802.11ac20_ANT1_5260_MCS0_OBW



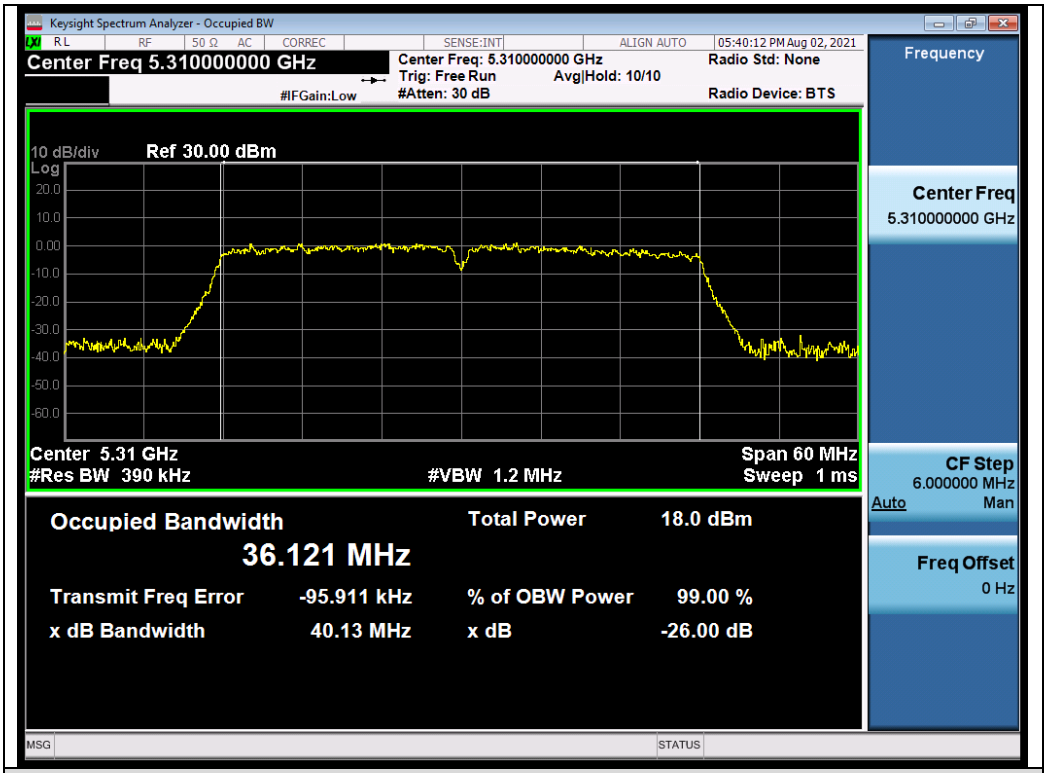
Test_Graph_802.11ac20_ANT1_5300_MCS0_OBW



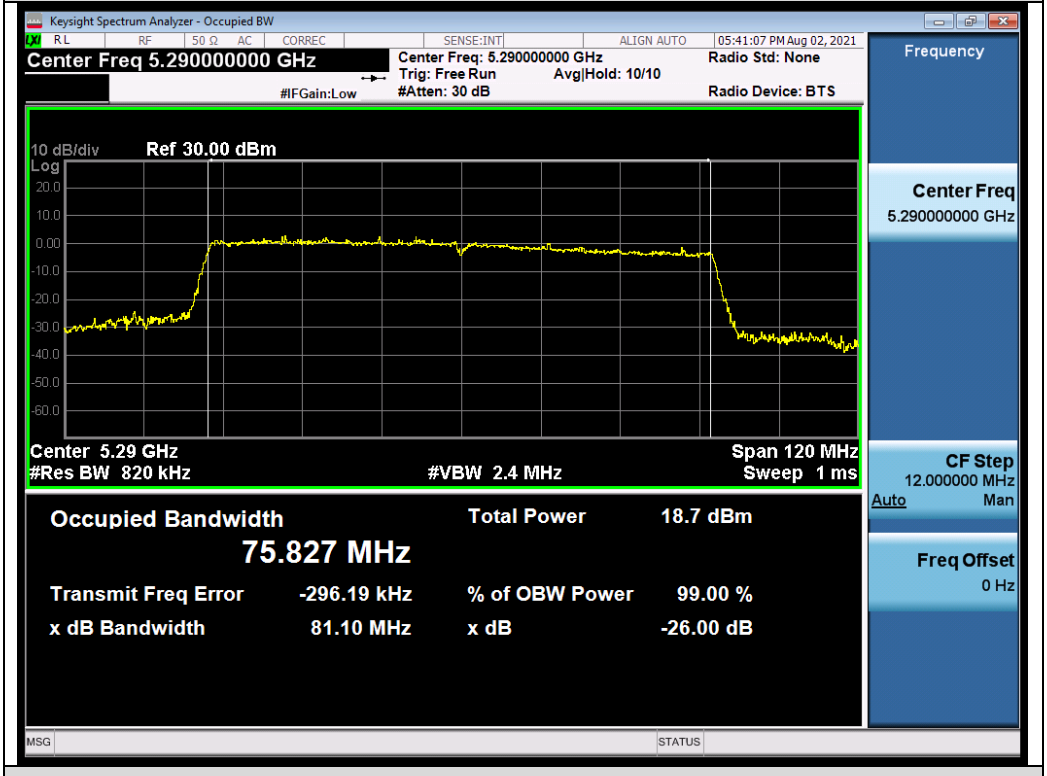
Test_Graph_802.11ac20_ANT1_5320_MCS9_OBW



Test_Graph_802.11ac40_ANT1_5270_MCS9_OBW



Test_Graph_802.11ac40_ANT1_5310_MCS9_OBW



Test_Graph_802.11ac80_ANT1_5290_MCS9_OBW