

FCC Test Report

Report No.: AGC01125210501FE06

FCC ID : 2A093-PI1K2QC0003
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : K2 Quad Core System
BRAND NAME : K2QC
MODEL NAME : PI1K2QC000300
APPLICANT : System Level Solutions (India) Pvt. Ltd.
DATE OF ISSUE : Jul. 13, 2021
STANDARD(S) : FCC Part 15.407
TEST PROCEDURE(S) : KDB 789033 D02 v02r01
REPORT VERSION : V1.0

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 13, 2021	Valid	Initial Release

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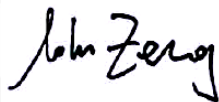
1. VERIFICATION OF CONFORMITY

Applicant	System Level Solutions (India) Pvt. Ltd.
Address	Plot#32, Zone-D/4, Phase-1, GIDC Estate, V.U. Nagar -388 121, Gujarat, India
Manufacturer	System Level Solutions (India) Pvt. Ltd.
Address	Plot#32, Zone-D/4, Phase-1, GIDC Estate, V.U. Nagar -388 121, Gujarat, India
Factory	Shenzhen Oranth Technology Co., Ltd
Address	301, Building 5, Gaoxinjian Industrial Park, No. 1 Fuyuan Road, Heping Community, Fuhai, Bao'an District, Shenzhen, China
Product Designation	K2 Quad Core System
Brand Name	K2QC
Test Model	PI1K2QC000300
Date of test	Jun. 25, 2021 to Jul. 13, 2021
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



John Zeng
(Project Engineer)

Jul. 13, 2021

Reviewed By



Max Zhang
(Reviewer)

Jul. 13, 2021

Approved By



Forrest Lei
(Authorized Officer)

Jul. 13, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “K2 Quad Core System”. 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

Operation Frequency	5150 MHz~5250MHz; 5725 MHz~5850MHz
Output Power	IEEE 802.11a20:14.57dBm; IEEE 802.11n(20):14.25dBm; IEEE802.11n(40):12.79dBm; IEEE 802.11ac(20):13.20dBm; IEEE 802.11ac(40):12.50dBm; IEEE 802.11ac(80):12.29dBm
Modulation	BPSK, QPSK, 16QAM, 64QAM, 128QAM, 256QAM, OFDM
Number of channels	15
Hardware Version	V1.0
Software Version	1.0
Antenna Designation	Dual Band whip Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	Band 1: 4.5dBi Band 4: 5dBi
Power Supply	DC 5V by Adapter

Note:

1. The EUT is designed as indoor access operating without radar detection.
2. The device does not support TPC.

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2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency	Frequency Band	Channel Number	Frequency
5150 GHz~ 5250GHz	36	5180 MHz	5725 GHz~ 5850GHz	149	5745 MHz
	38	5190 MHz		151	5755 MHz
	40	5200 MHz		153	5765 MHz
	42	5210 MHz		155	5775MHz
	44	5220 MHz		157	5785 MHz
	46	5230 MHz		159	5795 MHz
	48	5240 MHz		161	5805 MHz
				165	5825MHz

Note: For 20MHZ bandwidth system use Channel 36,40,44,48,149,153,157,161,165; For 40MHZ bandwidth system use Channel 38,46,151,159. For 80MHZ bandwidth system use Channel 42,155.

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

This submittal(s) (test report) is intended for **FCC ID: 2AO93-PI1K2QC0003** 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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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	$U_c = \pm 3.1 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
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.
3. The test software is Google TV Remote_1.app which can sent the EUT into individual test modes.

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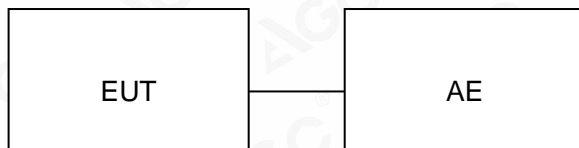
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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	K2 Quad Core System	PI1K2QC000300	2AO93-PI1K2QC0003	EUT
2	Adapter	MX15W-0502000UU	Input: 100-240V, 50/60Hz, 0.4 A Output: DC 5V, 2A	AE
3	TV	N/A	N/A	AE
4	Router 1	MI: R4A	N/A	AE
5	Router 2	Tenda: N4	N/A	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

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
Power sensor	Aglient	U2021XA	MY54110007	Jun. 08, 2020	Jun. 07, 2021
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	Sep.21, 2019	Sep. 20, 2021
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	Sep. 20, 2019	Sep. 19, 2021
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A

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7. MAXIMUM CONDUCTED OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

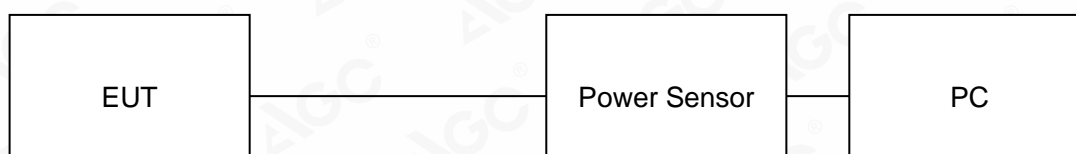
For average power test:

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				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	13.68	30	Pass
	5200	13.33	30	Pass
	5240	13.61	30	Pass
802.11n20	5180	13.45	30	Pass
	5200	12.99	30	Pass
	5240	13.25	30	Pass
802.11n40	5190	11.67	30	Pass
	5230	11.40	30	Pass
802.11ac20	5180	12.00	30	Pass
	5200	11.58	30	Pass
	5240	11.76	30	Pass
802.11ac40	5190	11.89	30	Pass
	5230	11.43	30	Pass
802.11ac80	5210	12.13	30	Pass

Test Data of Conducted Output Power for band 5.725-5.85 GHz				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	14.57	30	Pass
	5785	14.01	30	Pass
	5825	13.64	30	Pass
802.11n20	5745	14.25	30	Pass
	5785	13.69	30	Pass
	5825	13.27	30	Pass
802.11n40	5755	12.79	30	Pass
	5795	12.08	30	Pass
802.11ac20	5745	12.58	30	Pass
	5785	12.09	30	Pass
	5825	13.20	30	Pass
802.11ac40	5755	12.50	30	Pass
	5795	12.14	30	Pass
802.11ac80	5775	12.29	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:

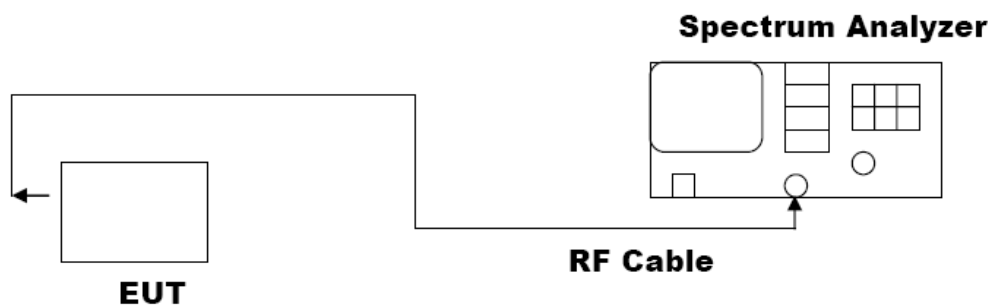
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
The nominal IF filter bandwidth (3 dB RBW) shall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

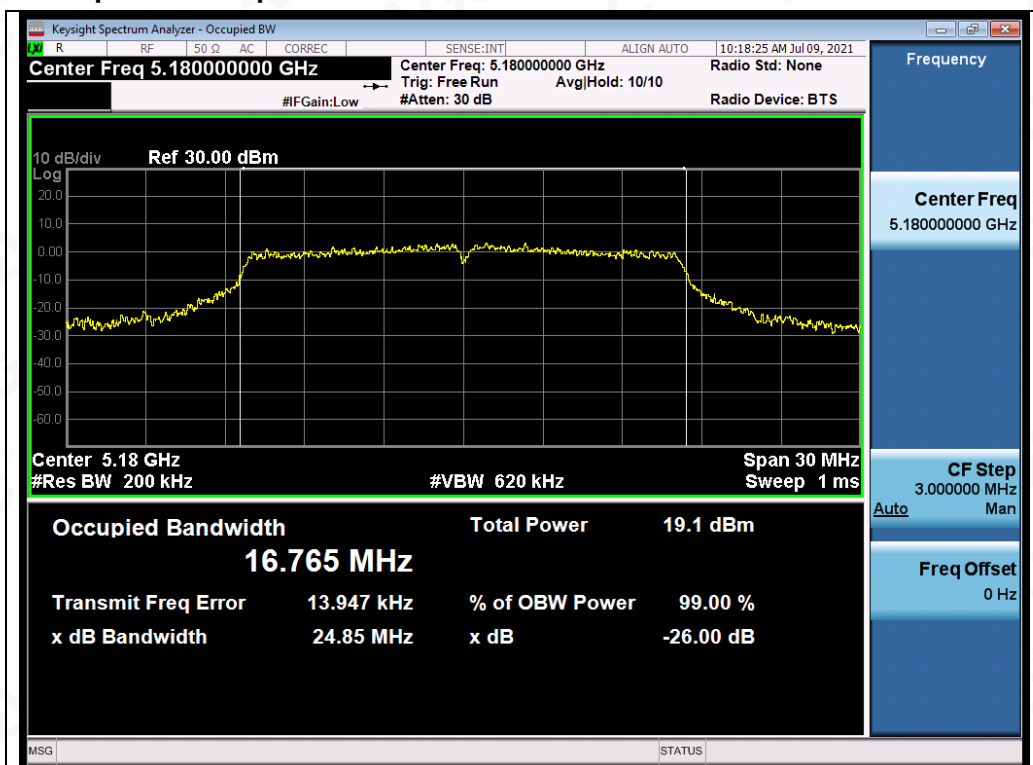
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.765	24.85	N/A	Pass
	5200	16.764	26.83	N/A	Pass
	5240	16.684	23.83	N/A	Pass
802.11n20	5180	17.857	23.91	N/A	Pass
	5200	17.842	24.17	N/A	Pass
	5240	17.812	23.41	N/A	Pass
802.11n40	5190	36.201	43.30	N/A	Pass
	5230	36.186	46.83	N/A	Pass
802.11ac20	5180	17.814	26.51	N/A	Pass
	5200	17.815	24.07	N/A	Pass
	5240	17.798	25.94	N/A	Pass
802.11ac40	5190	36.225	50.59	N/A	Pass
	5230	36.240	48.91	N/A	Pass
802.11ac80	5210	75.666	98.12	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	16.789	16.30	0.5	Pass
	5785	16.766	16.31	0.5	Pass
	5825	16.735	16.31	0.5	Pass
802.11n20	5745	17.876	17.54	0.5	Pass
	5785	17.825	16.68	0.5	Pass
	5825	17.817	16.94	0.5	Pass
802.11n40	5755	36.218	36.31	0.5	Pass
	5795	36.251	36.31	0.5	Pass
802.11ac20	5745	17.766	17.53	0.5	Pass
	5785	17.763	17.55	0.5	Pass
	5825	17.849	17.55	0.5	Pass
802.11ac40	5755	36.244	35.75	0.5	Pass
	5795	36.293	36.05	0.5	Pass
802.11ac80	5775	75.662	75.48	0.5	Pass

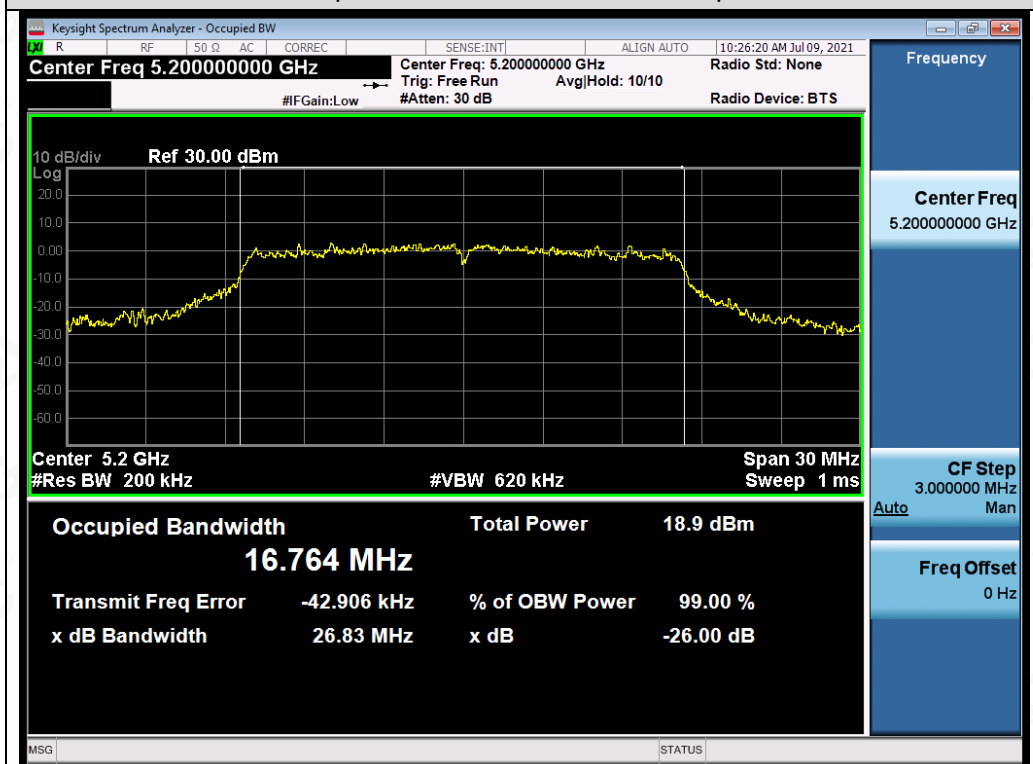
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Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz



Test_Graph_802.11a_ANT1_5180_6Mbps_OBW

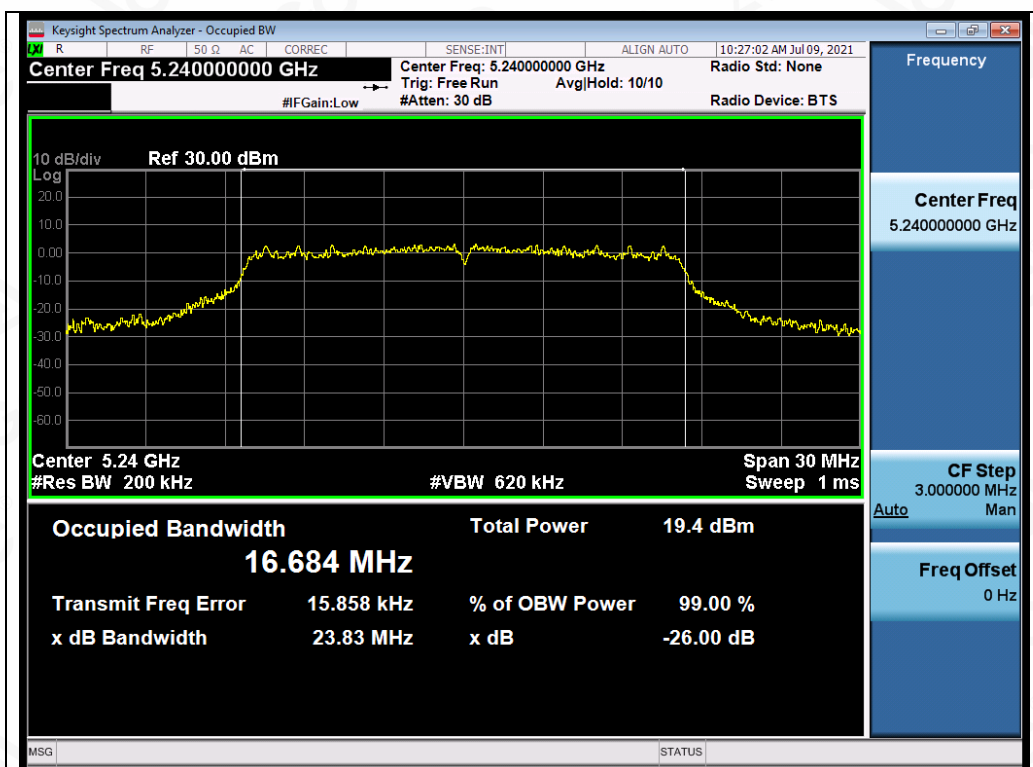


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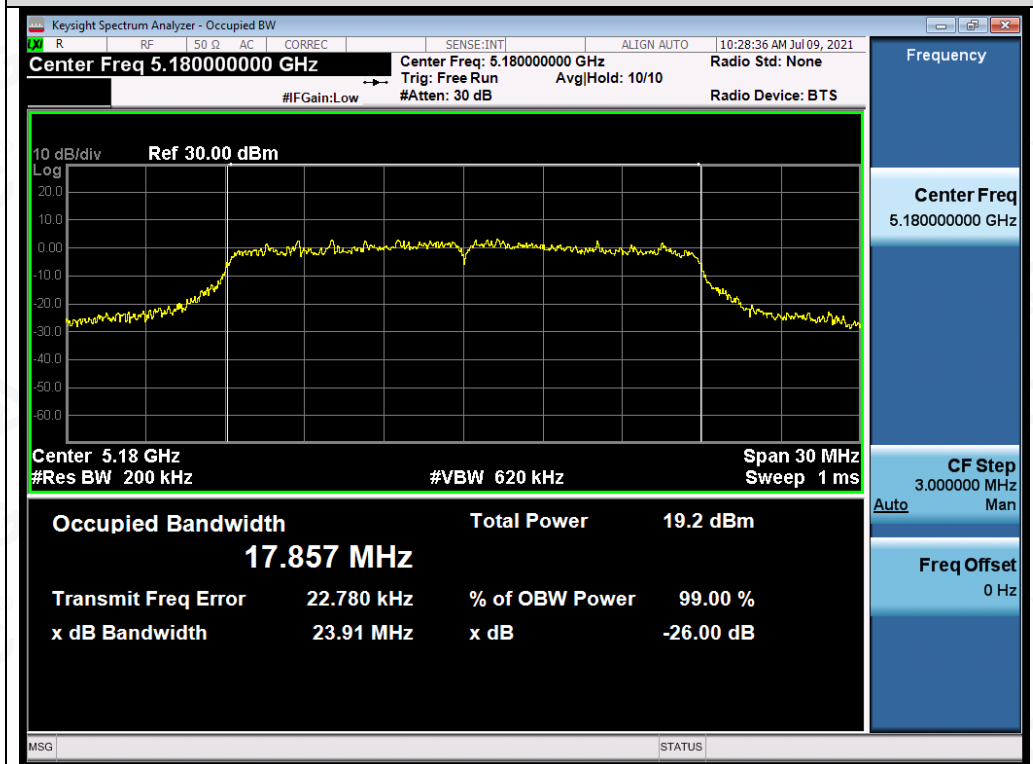
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Test_Graph_802.11a_ANT1_5240_6Mbps_OBW



Test_Graph_802.11n20_ANT1_5180_MCS0_OBW

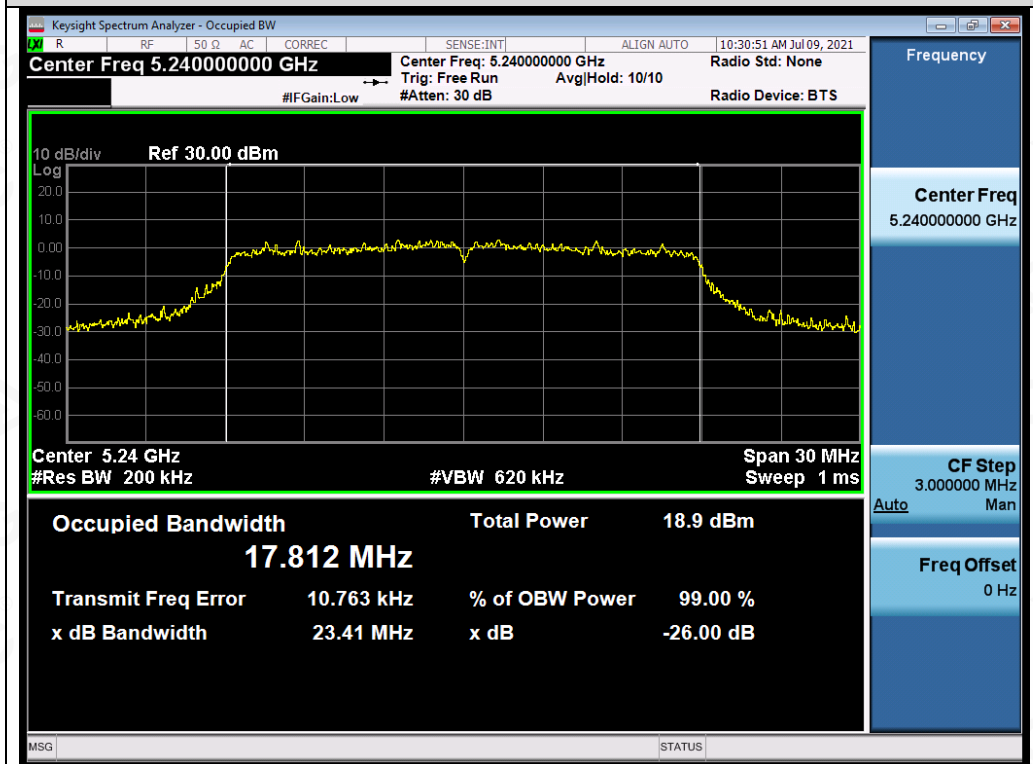
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Test_Graph_802.11n20_ANT1_5200_MCS0_OBW



Test_Graph_802.11n20_ANT1_5240_MCS0_OBW

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Test_Graph_802.11n40_ANT1_5190_MCS0_OBW

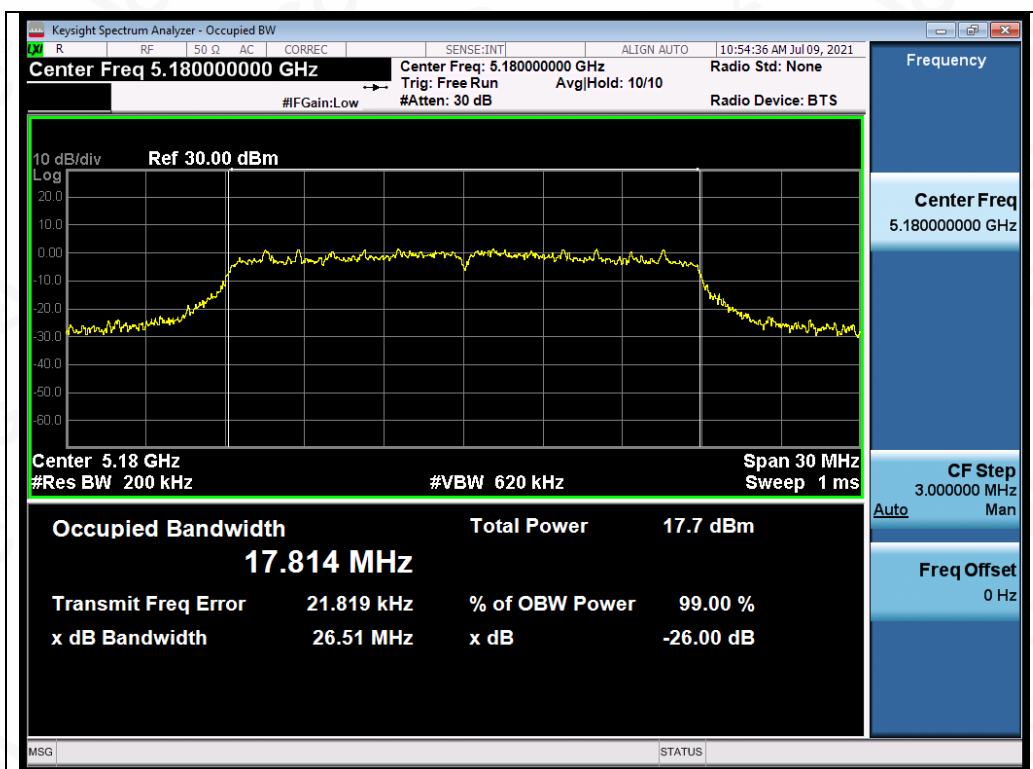


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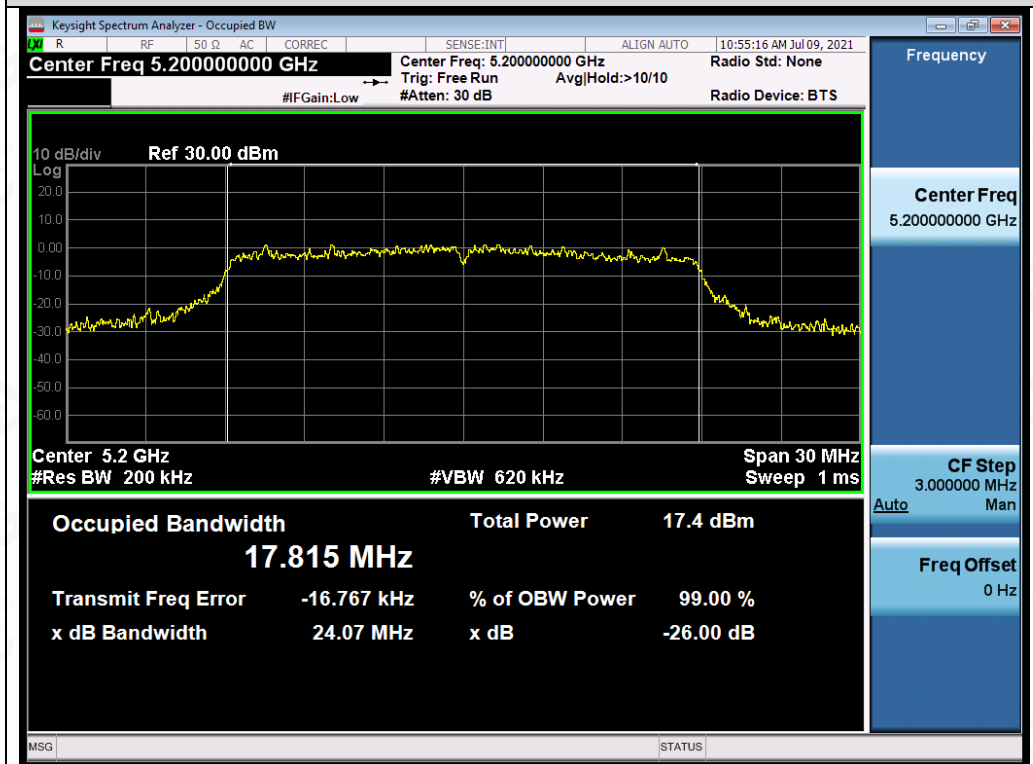
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Test_Graph_802.11ac20_ANT1_5180_MCS0_OBW

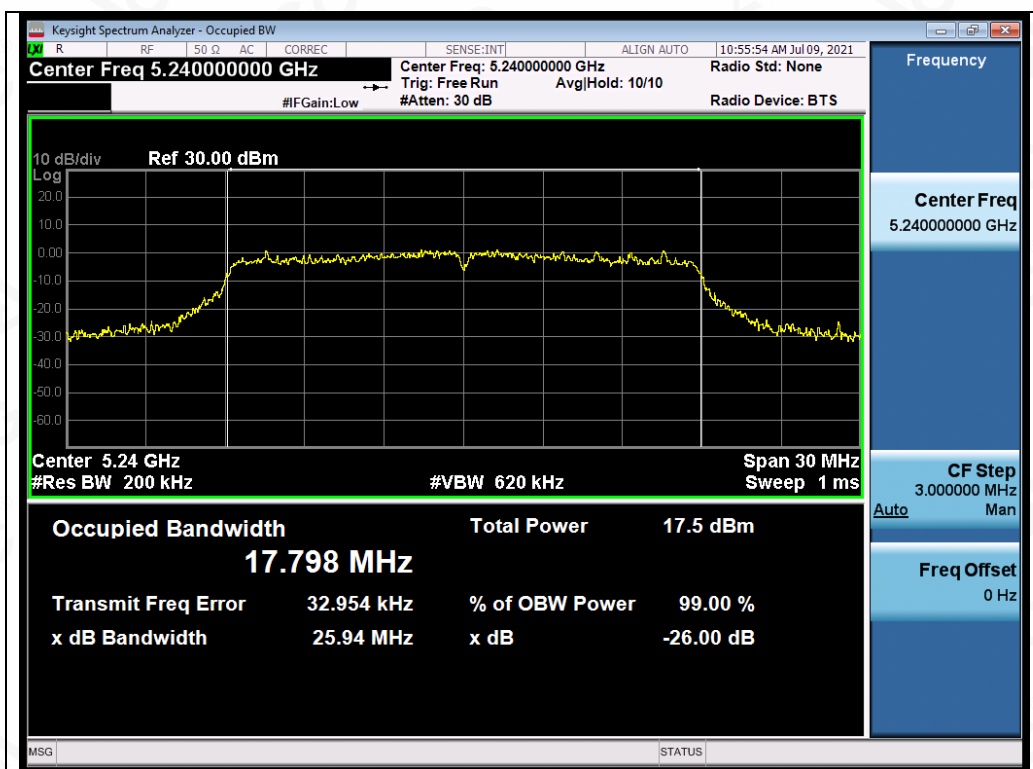


Test_Graph_802.11ac20_ANT1_5200_MCS0_OBW

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Test_Graph_802.11ac20_ANT1_5240_MCS9_OBW

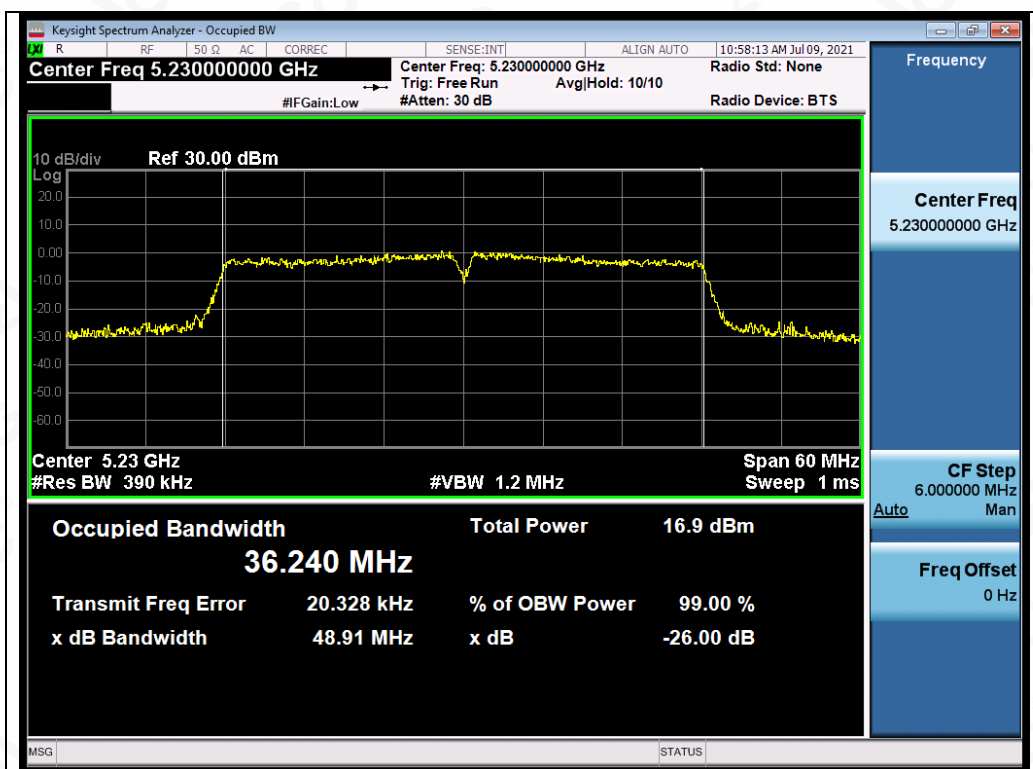


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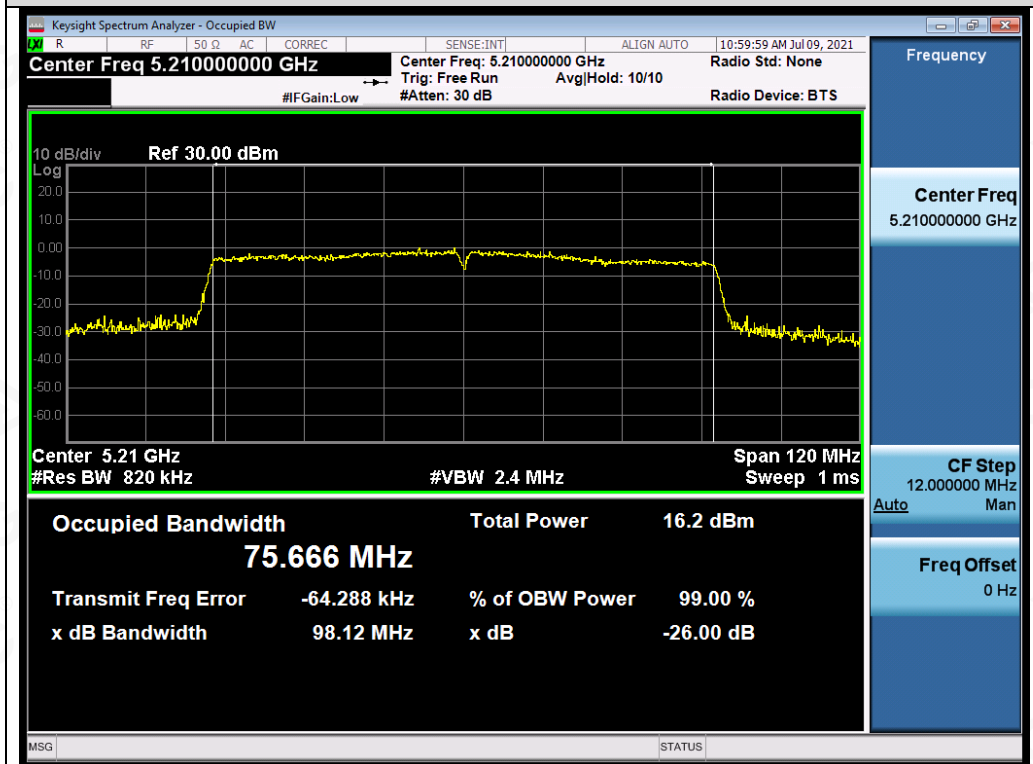
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Test_Graph_802.11ac40_ANT1_5230_MCS9_OBW



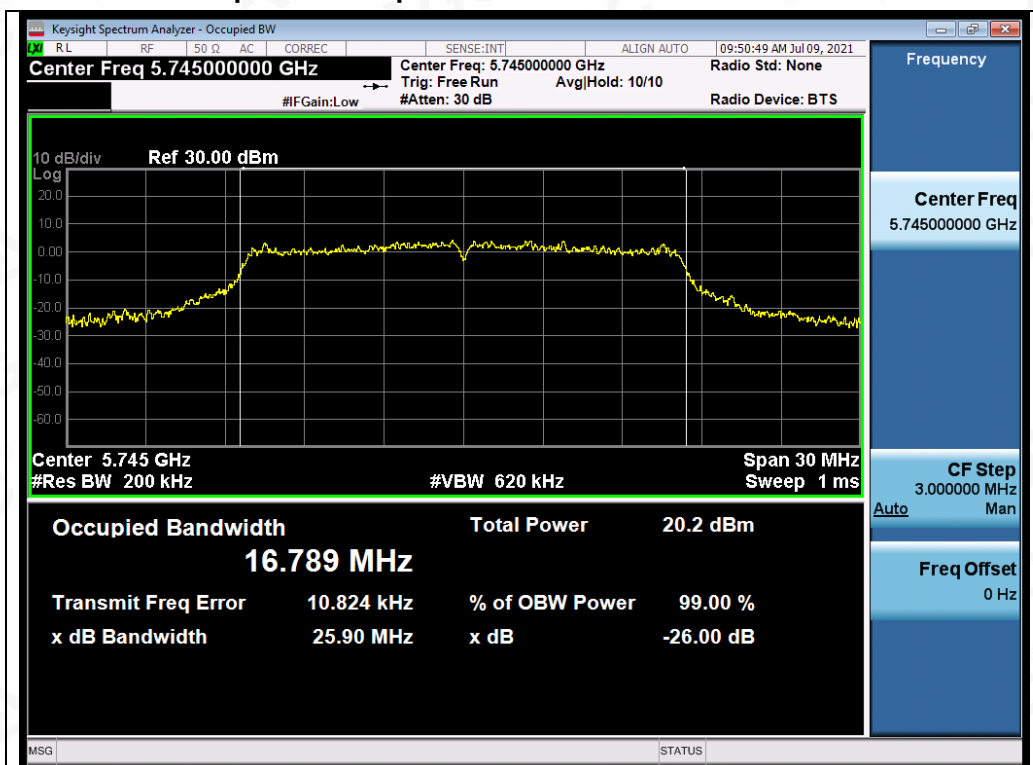
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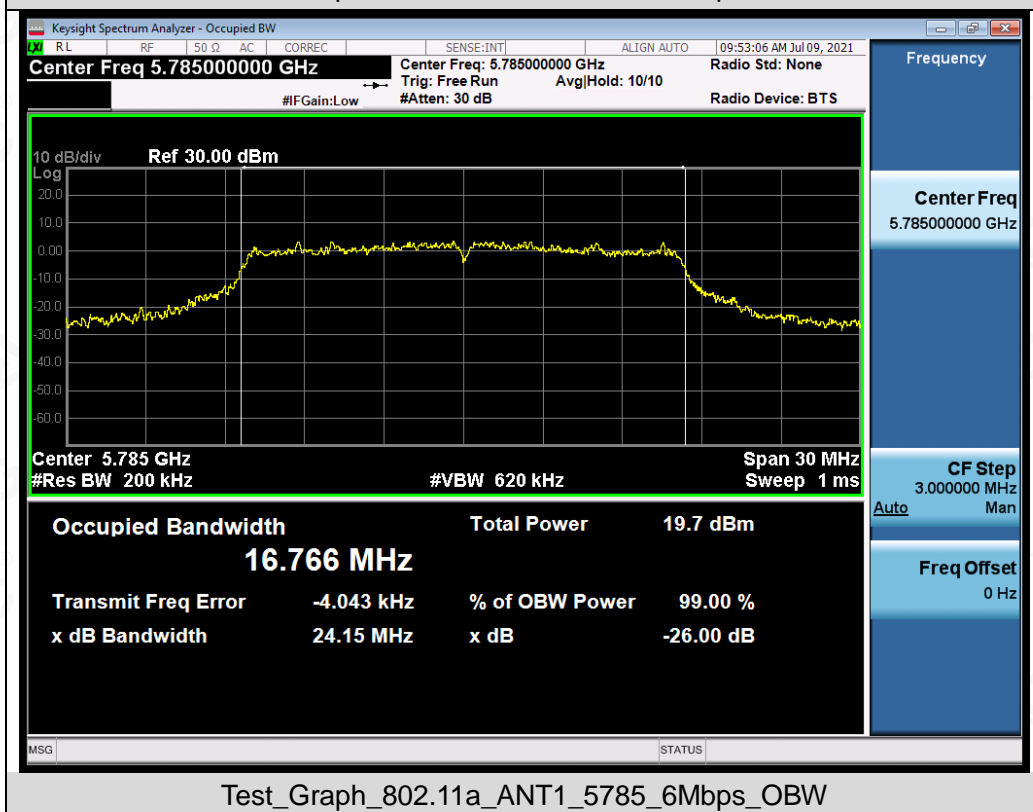
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Test Graphs of Occupied Bandwidth for band 5.725-5.85 GHz



Test_Graph_802.11a_ANT1_5745_6Mbps_OBW



Test_Graph_802.11a_ANT1_5785_6Mbps_OBW

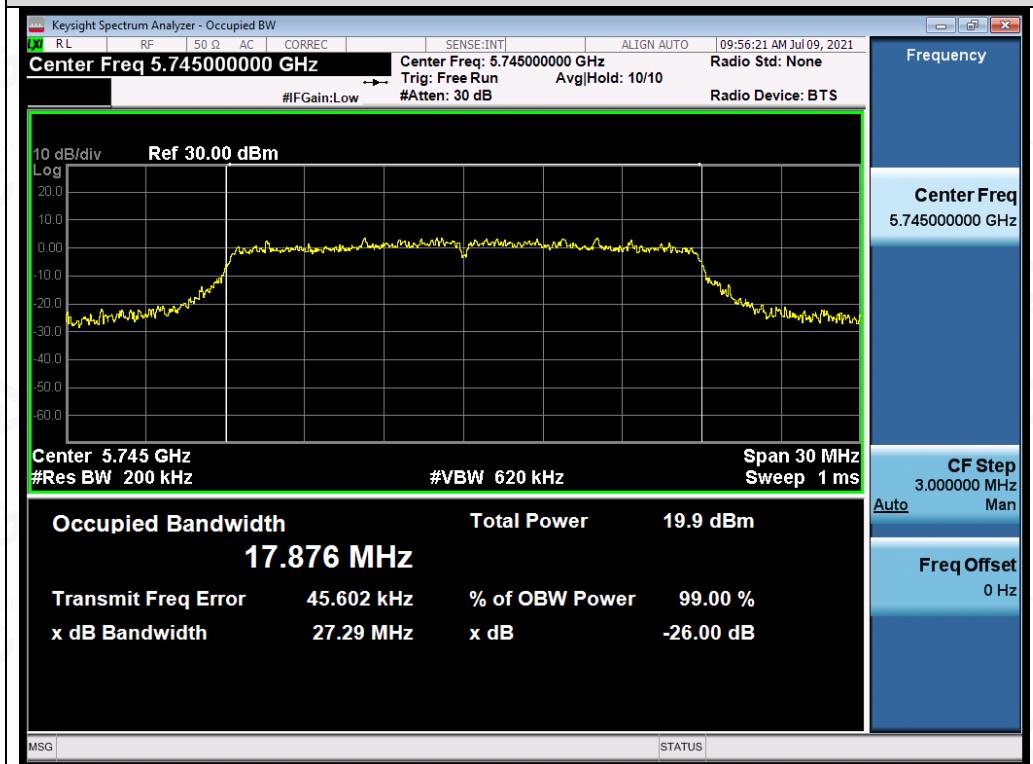
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Test_Graph_802.11a_ANT1_5825_6Mbps_OBW

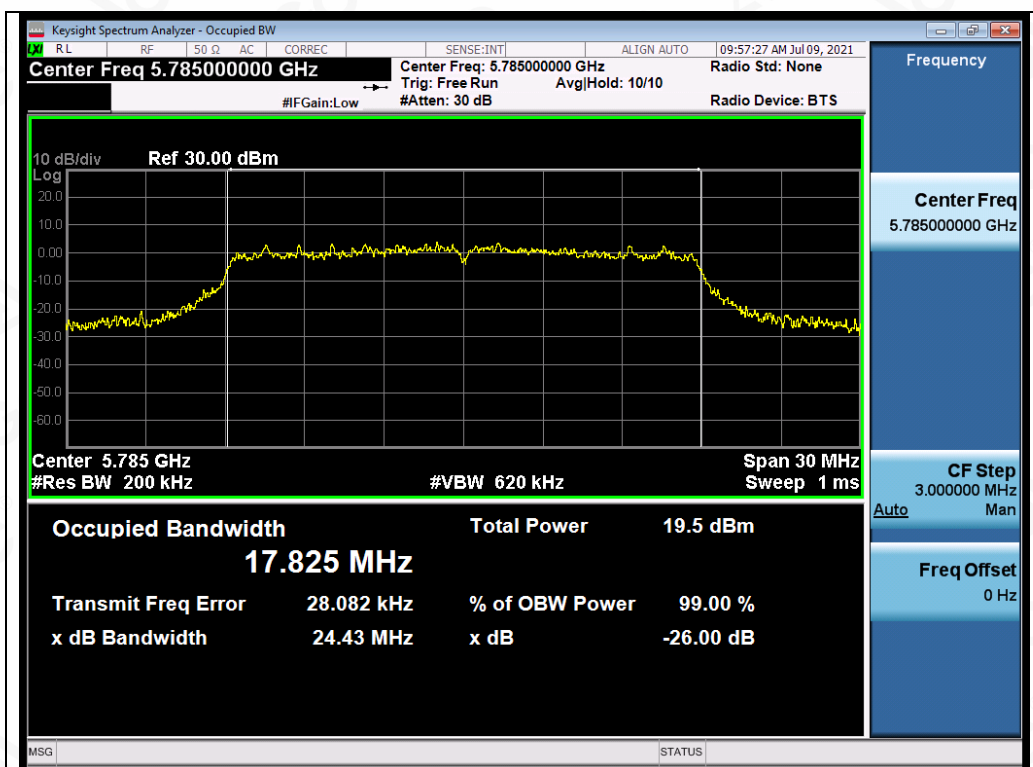


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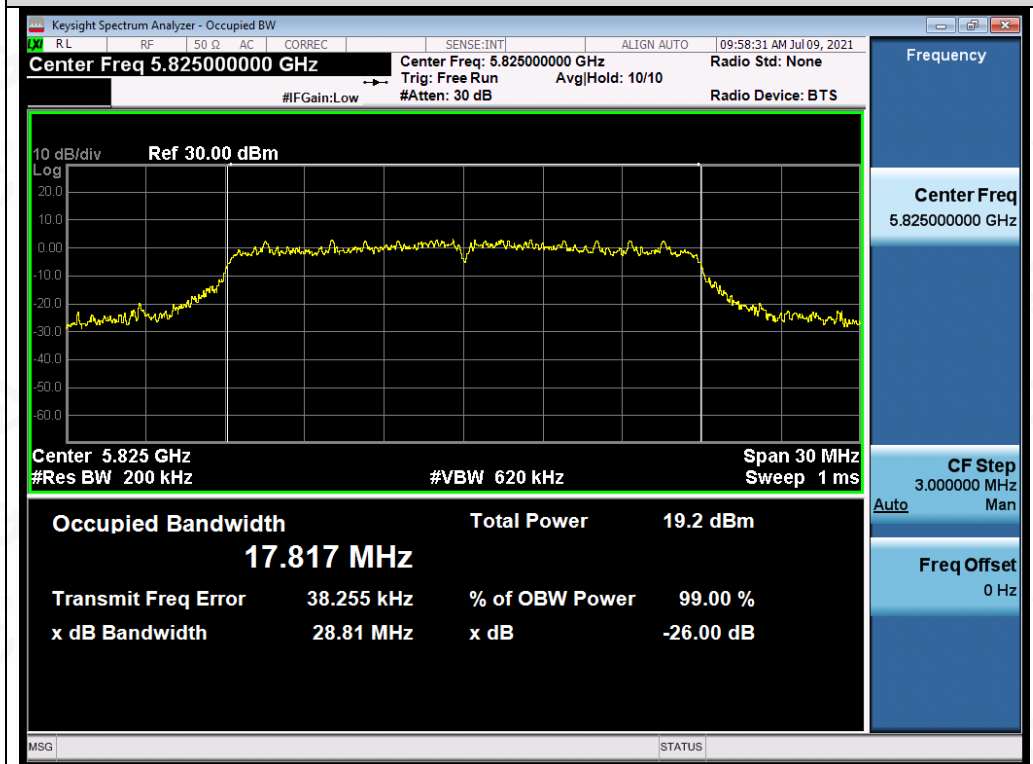
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Test_Graph_802.11n20_ANT1_5785_MCS0_OBW

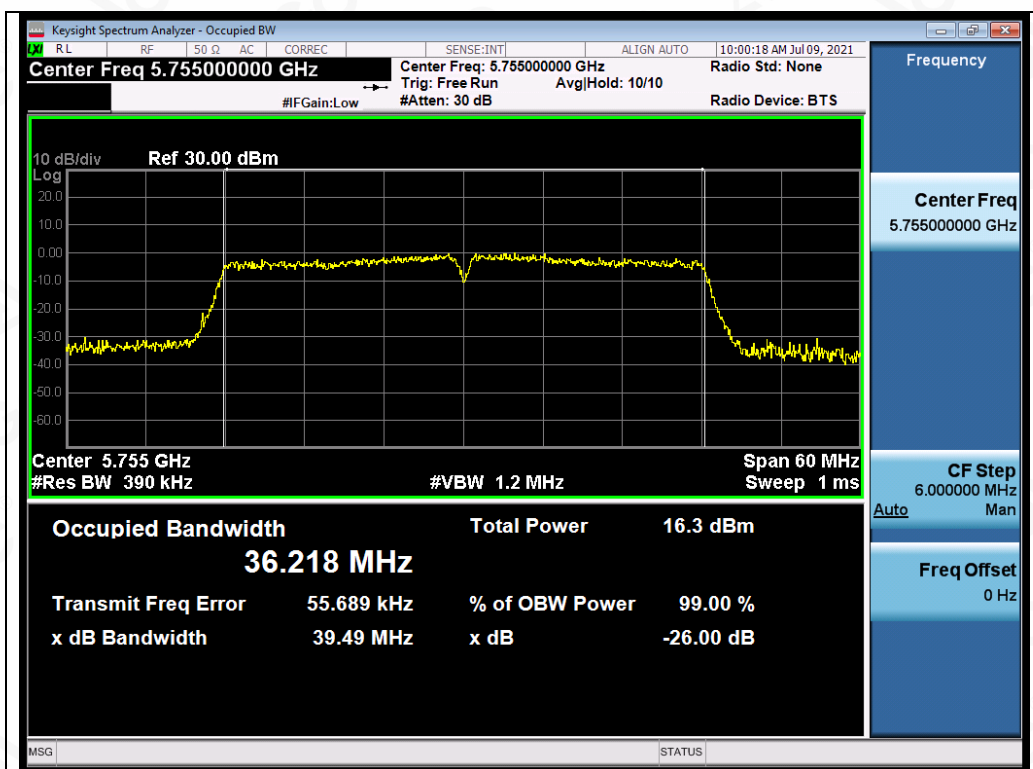


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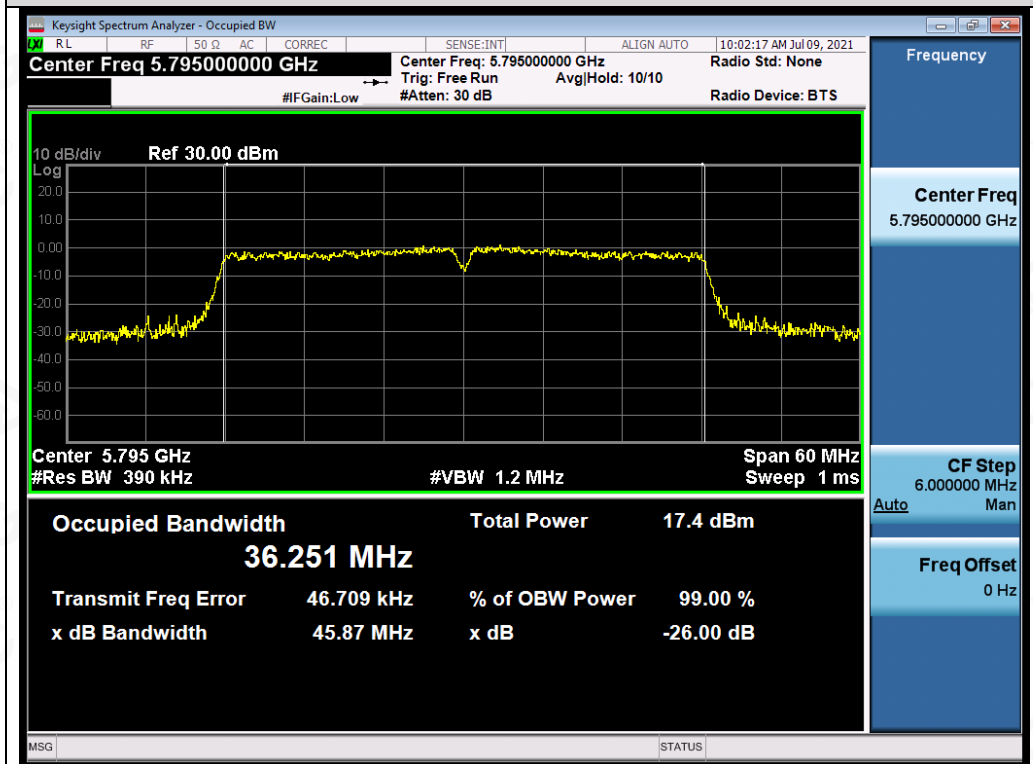
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Test_Graph_802.11n40_ANT1_5755_MCS0_OBW

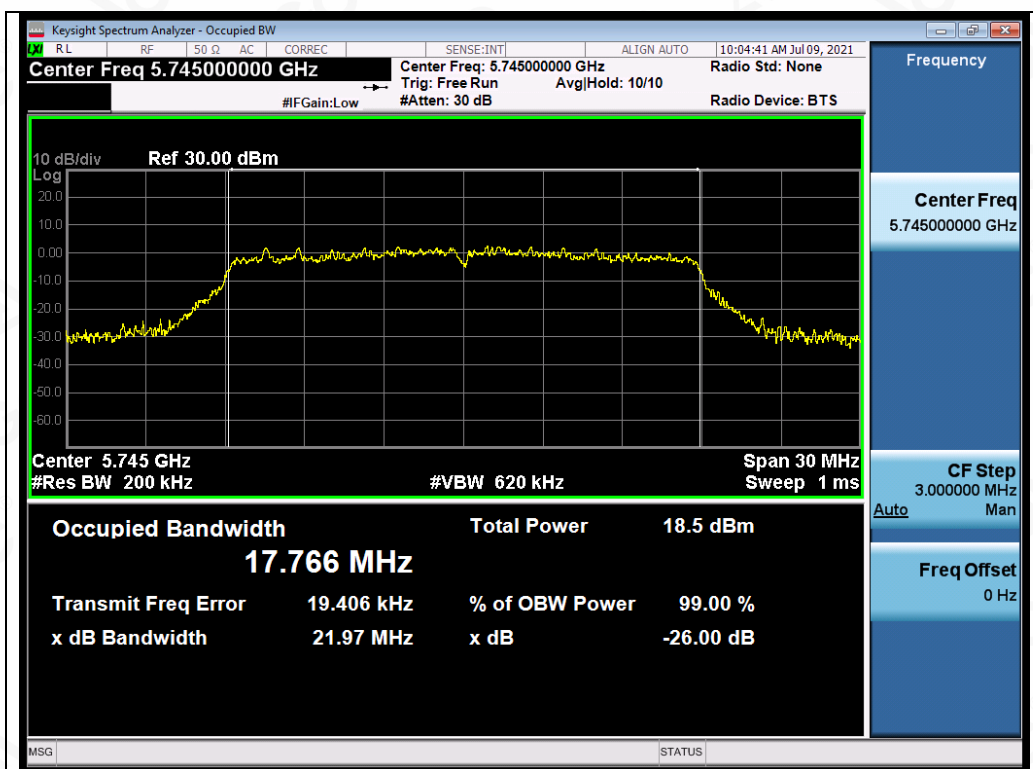


Test_Graph_802.11n40_ANT1_5795_MCS0_OBW

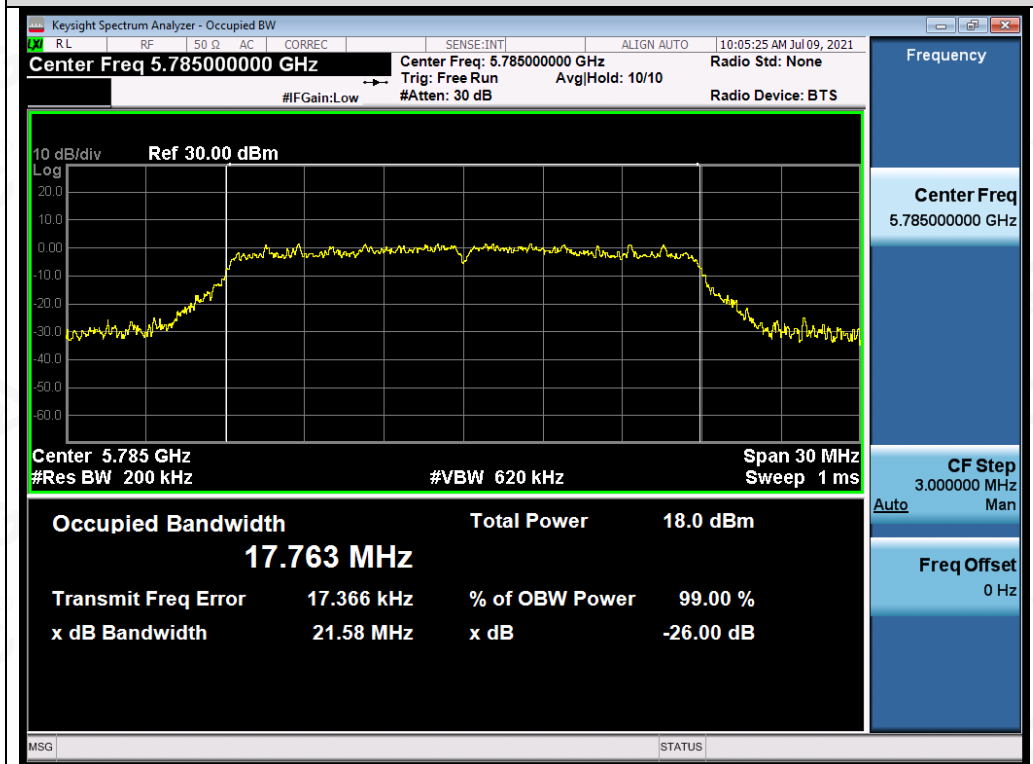
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Test_Graph_802.11ac20_ANT1_5745_MCS0_OBW

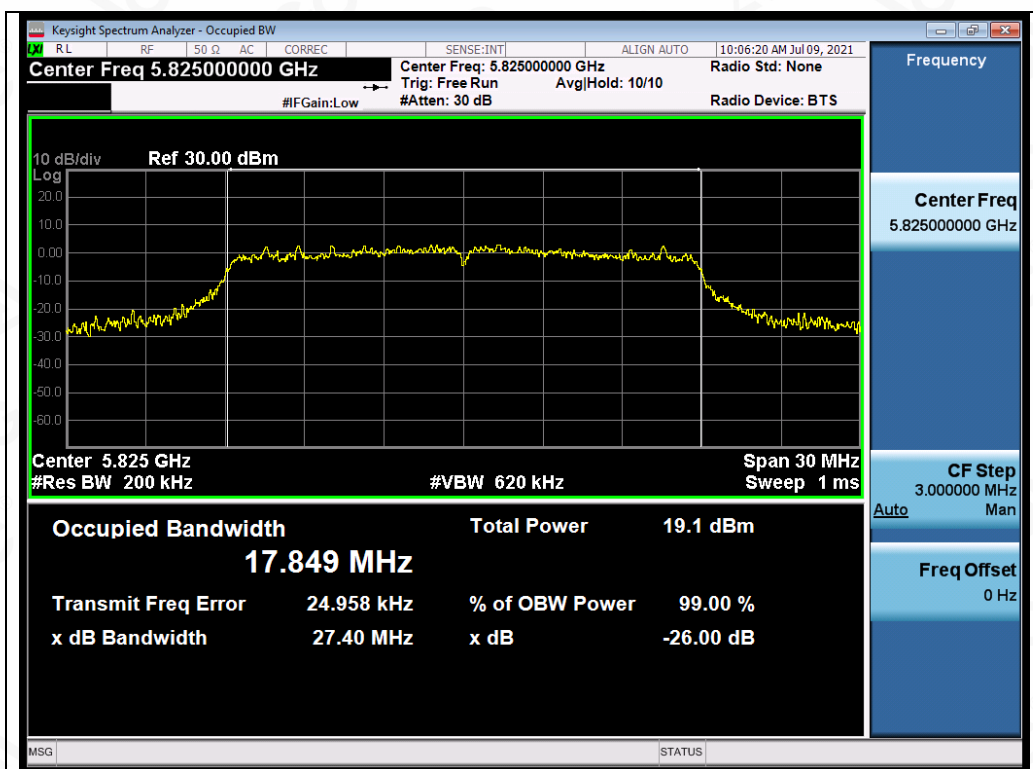


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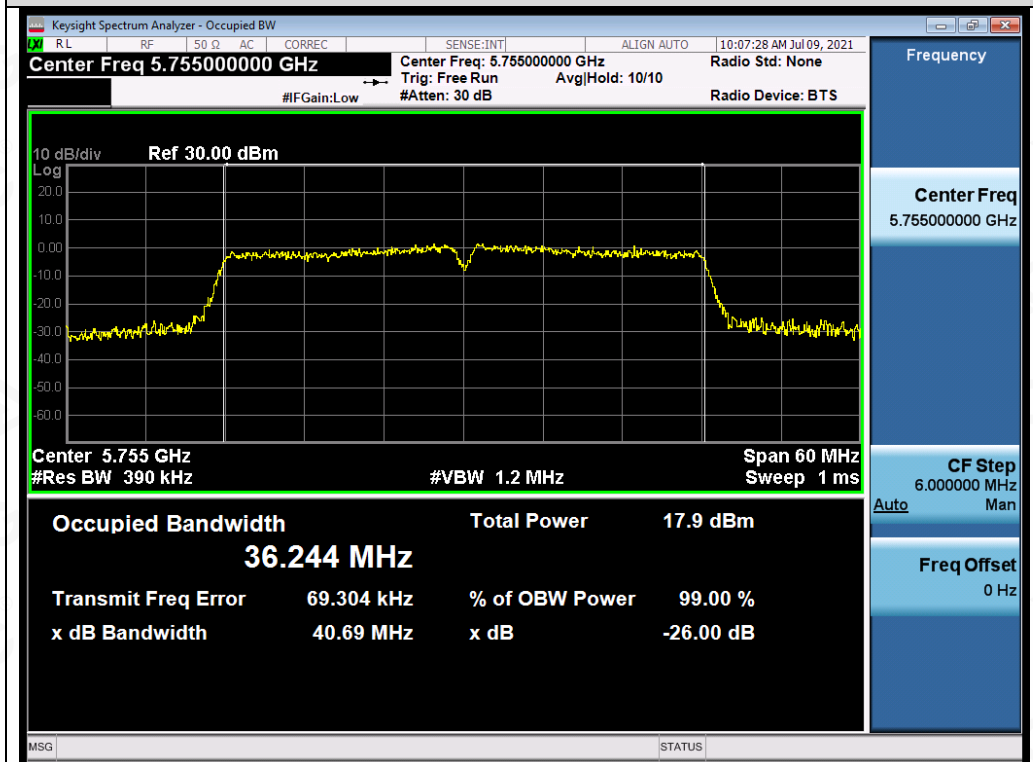
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Test_Graph_802.11ac20_ANT1_5825_MCS9_OBW

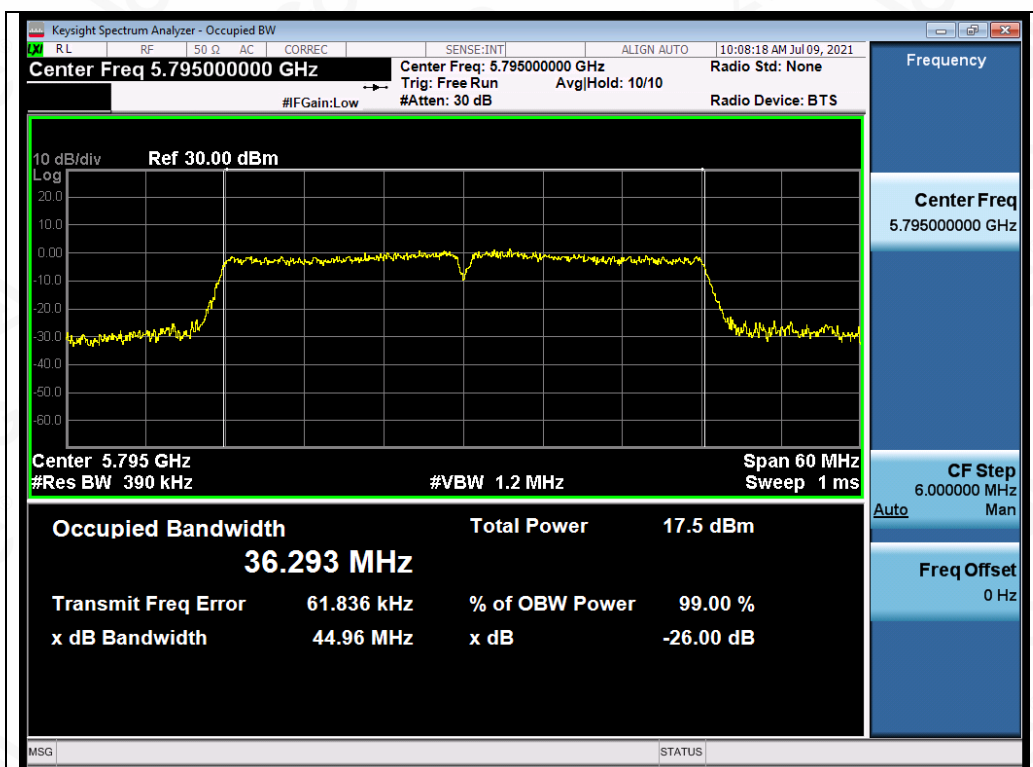


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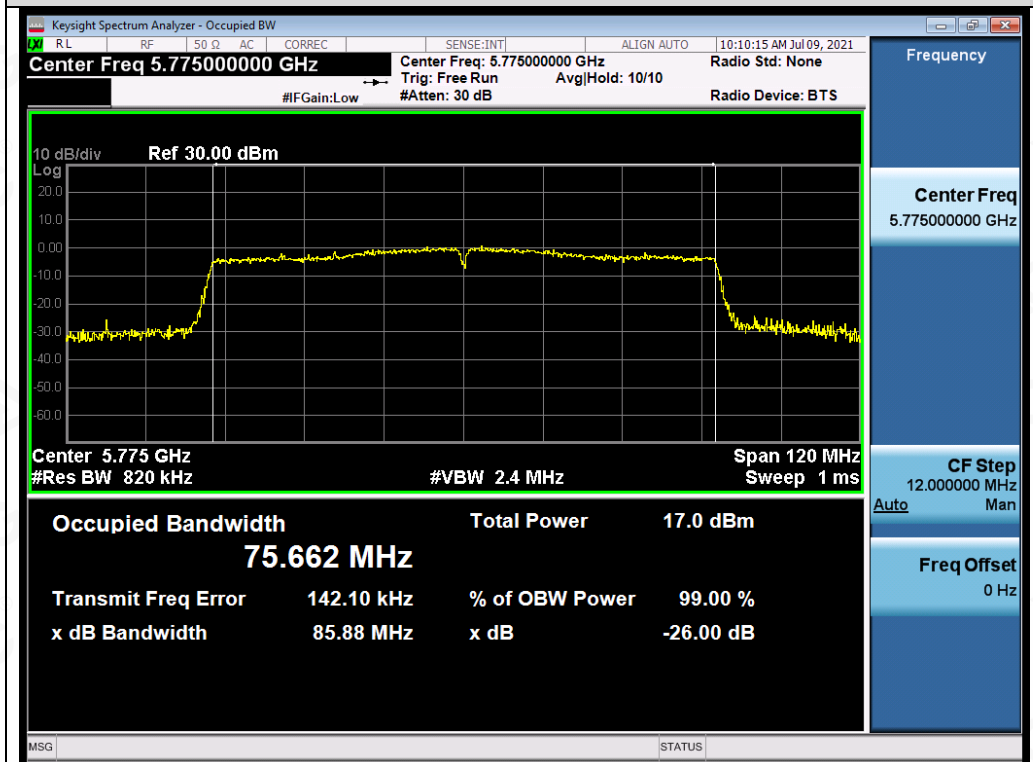
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Test_Graph_802.11ac40_ANT1_5795_MCS9_OBW



Test_Graph_802.11ac80_ANT1_5775_MCS9_OBW

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Test Graphs of DTS Bandwidth for band 5.725-5.85 GHz



Test_Graph_802.11a_ANT1_5745_6Mbps_DTSBW



Test_Graph_802.11a_ANT1_5785_6Mbps_DTSBW

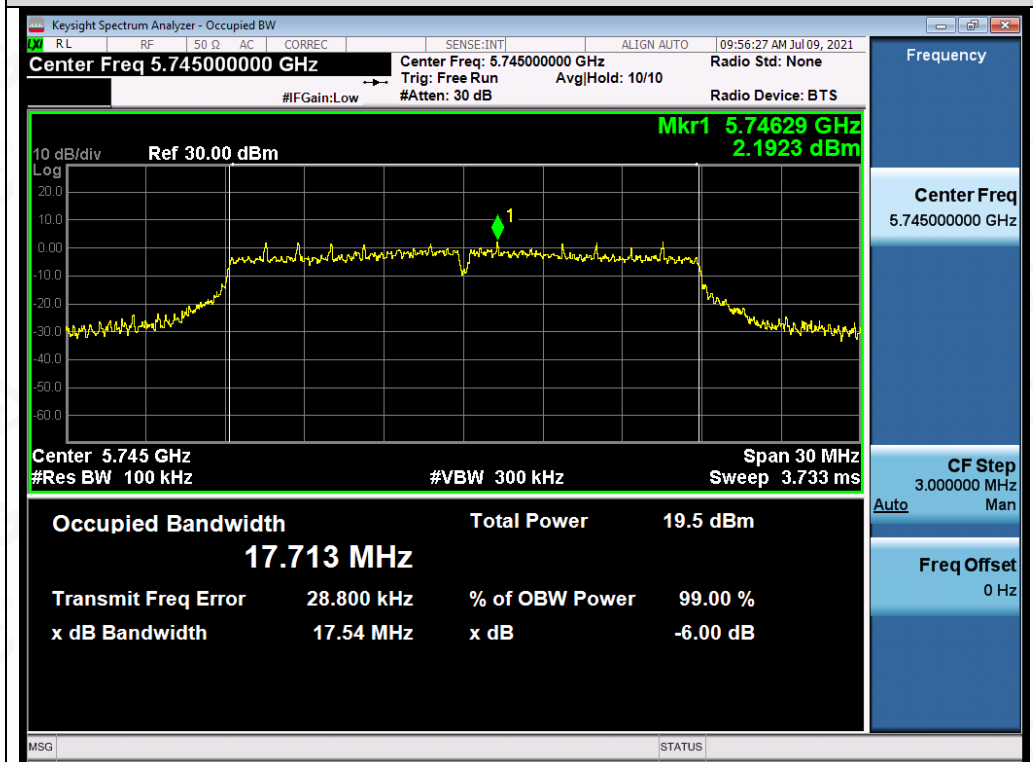
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Test_Graph_802.11a_ANT1_5825_6Mbps_DTSBW



Test_Graph_802.11n20_ANT1_5745_MCS0_DTSBW

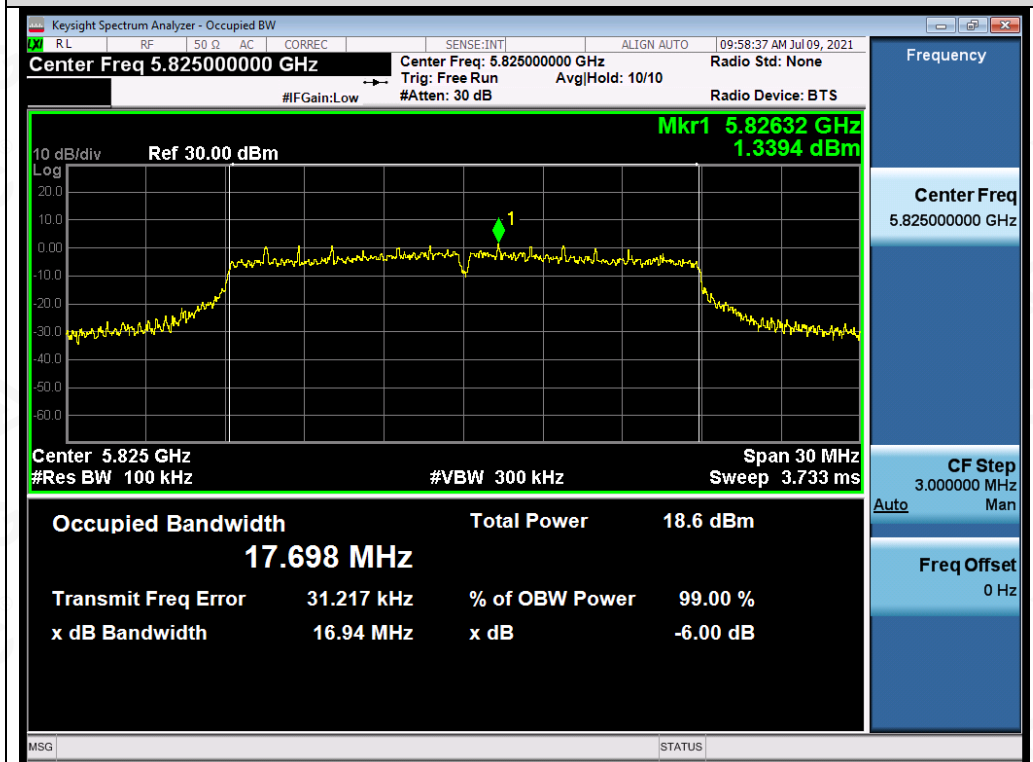
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Test_Graph_802.11n20_ANT1_5785_MCS0_DTSBW

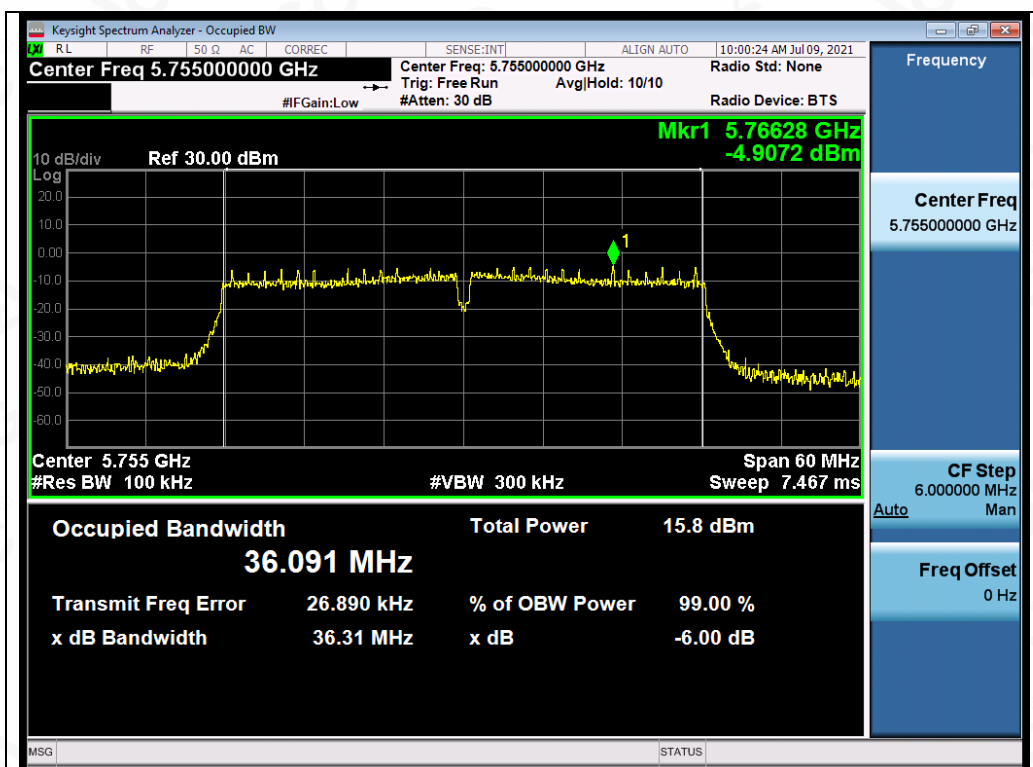


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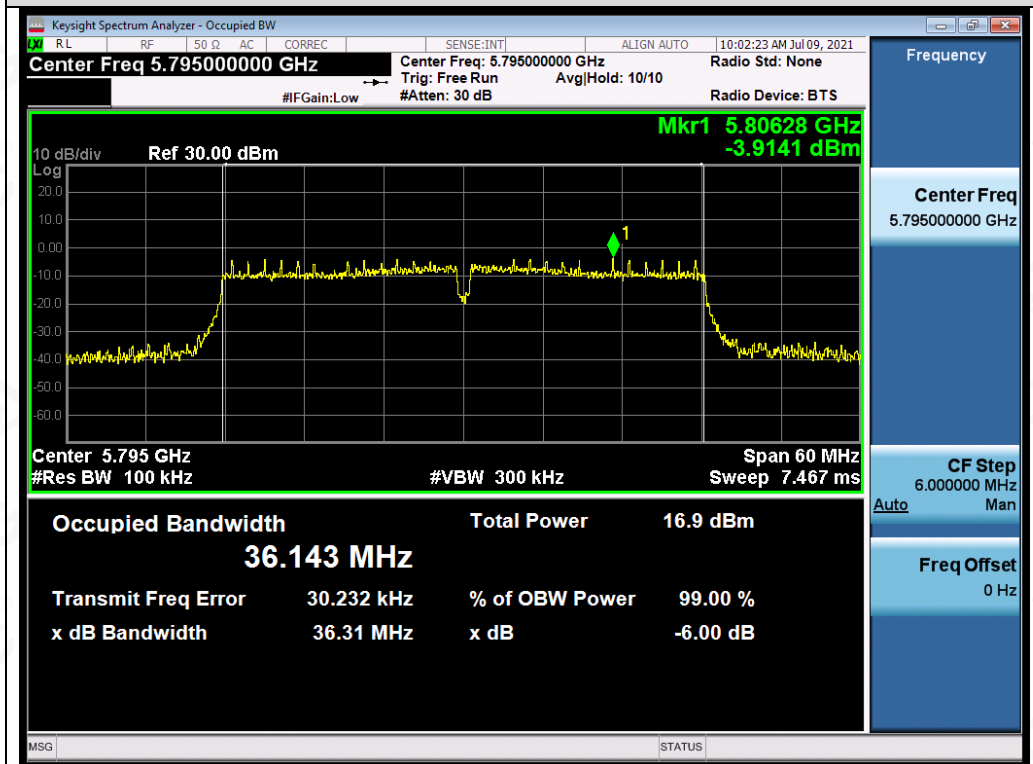
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Test_Graph_802.11n40_ANT1_5755_MCS0_DTSBW



Test_Graph_802.11n40_ANT1_5795_MCS0_DTSBW

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Test_Graph_802.11ac20_ANT1_5745_MCS0_DTSBW



Test_Graph_802.11ac20_ANT1_5785_MCS0_DTSBW

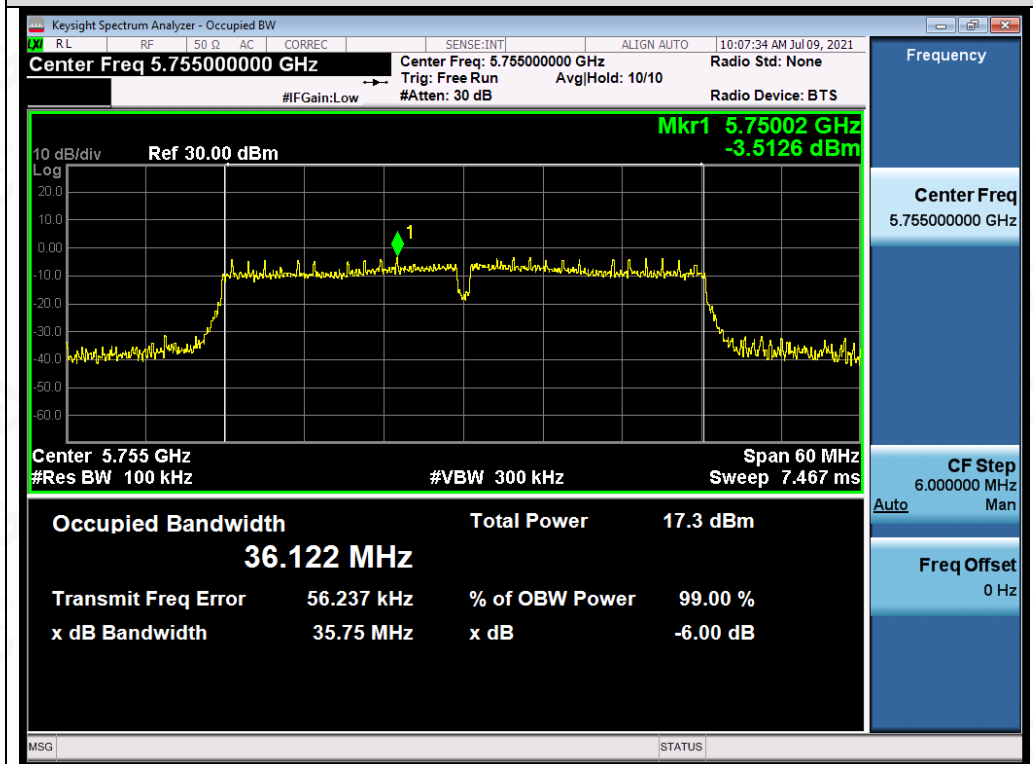
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Test_Graph_802.11ac20_ANT1_5825_MCS9_DTSBW



Test_Graph_802.11ac40_ANT1_5755_MCS9_DTSBW

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