

RF TEST REPORT

Applicant	Smawave Technology Co. ,Ltd
FCC ID	2AU8HSRG821
Product	Ruggedized Router
Brand	Smawave
Model	SRG821
Report No.	R2409A1327-R5
Issue Date	November 28, 2024

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15E (2023)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of measurement results

Number	Test Case	Clause in FCC rules	Verdict
1	Average output power	15.407(a)	PASS
2	Occupied bandwidth	15.407(e)	PASS
3	Frequency stability	15.407(g)	PASS
4	Power spectral density	15.407(a)	PASS
5	Unwanted Emissions	15.407(b)	PASS
6	Conducted Emissions	15.207	PASS
Date of Testing: September 16, 2024 ~ October 31, 2024			
Date of Sample Received: September 12, 2024			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard. All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

1. Test Laboratory

1.1. Notes of the test report

This report shall not be reproduced in full or partial, without the written approval of **Eurofins TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA (Certificate Number: 3857.01)

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3. Testing Location

Company: Eurofins TA Technology (Shanghai) Co., Ltd.
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2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Smawave Technology Co. ,Ltd.
Applicant address	2/F, Building 8, 1001 North Qinzhou Road, Xuhui District, Shanghai, China
Manufacturer	Smawave Technology Co. ,Ltd.
Manufacturer address	2/F, Building 8, 1001 North Qinzhou Road, Xuhui District, Shanghai, China

2.2. General information

EUT Description					
Model	SRG821				
Lab internal SN	R2409A1327/S01				
Hardware Version	V1.0				
Software Version	SQX5040_V1.1.4				
Power Supply	AC adapter				
Antenna Type	External Antenna				
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)				
Antenna Gain	Band	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	Antenna 1	4.95	4.89	4.94	5.28
	Antenna 2	4.95	4.89	4.94	5.28
Directional Gain	MIMO Mode for Power	4.95	4.89	4.94	5.28
	MIMO Mode for PSD	7.96	7.90	7.95	8.29
	Beamforming Mode for Power	7.96	7.90	7.95	8.29
	Beamforming Mode for PSD	7.96	7.90	7.95	8.29
Operating Frequency Range(s)	U-NII-1: 5150MHz-5250MHz U-NII-2A: 5250MHz -5350MHz U-NII-2C: 5470MHz-5725MHz U-NII-3: 5725MHz -5850MHz				
Modulation Type	802.11a: OFDM 802.11n (HT20/HT40): OFDM 802.11ac (VHT20/VHT40/VHT80): OFDM 802.11ax (HE20/ HE40/ HE80): OFDMA				
Max. Output Power	27.13 dBm				
Operating temperature range	-40 ° C to 70 ° C				

Operating voltage range	9 VDC to 36 VDC
Testing temperature range	-30 ° C to 50° C
Testing voltage range	9 VDC - 24 VDC - 36 VDC
State voltage	24 VDC
EUT Accessory	
Adapter 1	Manufacturer: SHENZHEN TOPOW ELECTRONICS CO., LTD Model: TPA309-29240-US
Adapter 2	Manufacturer: Dongguan Sunun Power Co., Ltd Model: SA361V-240150U
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant. 2. This device support automatically discontinue transmission, while the device is not transmitting any information, the device can automatically discontinue transmission and become standby mode for power saving. The device can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission. 3. (a) Manufacturers implements security features in any digitally modulated devices capable of operating in any of the U-NII bands, so that third parties are not able to reprogram the device to operate outside the parameters for which the device was certified. The software prevents the user from operating the transmitter with operating frequencies, output power, modulation types or other radio frequency parameters outside those that were approved for the device. Manufacturers uses means including, but not limited to the use of a private network that allows only authenticated users to download software, electronic signatures in software or coding in hardware that is decoded by software to verify that new software can be legally loaded into a device to meet these requirements and must describe the methods in their application for equipment authorization. (b) Manufacturers take steps to ensure that DFS functionality cannot be disabled by the operator of the U-NII device.	

3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 15E (2023) Unlicensed National Information Infrastructure Devices

ANSI C63.10-2013

Reference standard:

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

4. Test Configuration

Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (vertical), lie-down position (horizontal). The worst emission was found in lie-down position (H axis) and the worst case was recorded.

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Preliminary tests have been done on all the configuration for confirming worst case. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

Mode	Data Rate		
	Antenna 1	Antenna 2	MIMO
802.11a	6 Mbps	6 Mbps	6 Mbps
802.11n HT20	MCS0	MCS0	MCS8
802.11n HT40	MCS0	MCS0	MCS8
802.11ac VHT20	MCS0	MCS0	MCS0
802.11ac VHT40	MCS0	MCS0	MCS0
802.11ac VHT80	MCS0	MCS0	MCS0
802.11ax HE20	MCS0	MCS0	MCS0
802.11ax HE40	MCS0	MCS0	MCS0
802.11ax HE80	MCS0	MCS0	MCS0

The worst case Antenna mode for each of the following tests for Wi-Fi:

Test Cases	Antenna 1	Antenna 2	MIMO	Beamforming
Average conducted output power	O	O	O	O
Occupied bandwidth	--	--	--	O
Frequency stability	--	--	--	O
Power Spectral Density	O	O	O	O
Unwanted Emissions	--	--	O	--
Conducted Emissions	--	--	O	--
Note: "O": test all bands				

According to RF Output power results in chapter 5.2, MIMO was selected as the worst antenna.

Wireless Technology and Frequency Range

Wireless Technology		Bandwidth	Channel	Frequency
Wi-Fi	U-NII-1	20 MHz	36	5180MHz
			40	5200MHz
			44	5220MHz
			48	5240MHz
		40 MHz	38	5190MHz
			46	5230MHz
		80 MHz	42	5210MHz
	U-NII-2A	20 MHz	52	5260MHz
			56	5280MHz
			60	5300MHz
			64	5320MHz
		40 MHz	54	5270MHz
			62	5310MHz
		80 MHz	58	5290MHz
	U-NII-2C	20 MHz	100	5500MHz
			104	5520MHz
			108	5540MHz
			112	5560MHz
			116	5580MHz
			120	5600MHz
			124	5620MHz
			128	5640MHz
			132	5660MHz
			136	5680MHz
			140	5700MHz
			144	5720MHz
		40 MHz	102	5510MHz
			110	5550MHz
			118	5590MHz
			126	5630MHz
			134	5670MHz
			142	5710MHz
		80 MHz	106	5530MHz
			122	5610MHz
			138	5690MHz
	U-NII-3	20 MHz	149	5745MHz
			153	5765MHz
			157	5785MHz

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			161	5805MHz
			165	5825MHz
		40 MHz	151	5755MHz
			159	5795MHz
		80 MHz	155	5775MHz
		Does this device support TPC Function? ☒ Yes ☐ No		
Does this device support TDWR Band? ☒ Yes ☐ No				

5. Test Case Results

5.1. Occupied Bandwidth

Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable.

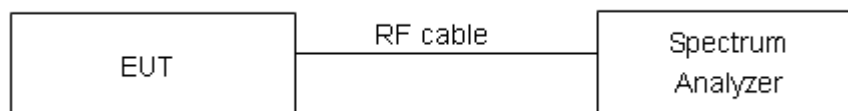
For U-NII-1/U-NII-2A/U-NII-2C, set RBW $\approx 1\%$ OCB kHz, VBW $\geq 3 \times$ RBW, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.

For U-NII-3, Set RBW = 100 kHz, VBW $\geq 3 \times$ RBW, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

Use the 99 % power bandwidth function of the instrument

Test Setup



Limits

For U-NII-1/U-NII-2A/U-NII-2C

No specific occupied bandwidth requirements in Part 15.407.

For U-NII-3

Rule FCC Part §15.407(e)

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

Test Results:
U-NII-1

Mode	Frequency (MHz)	99% OBW (MHz)	-26 dB Bandwidth (MHz)	Verdict
802.11a	5180	16.454	20.377	Pass
802.11a	5200	16.461	19.669	Pass
802.11a	5240	16.458	19.753	Pass
802.11ac(VHT20)	5180	17.634	21.121	Pass
802.11ac(VHT20)	5200	17.631	20.832	Pass
802.11ac(VHT20)	5240	17.657	21.154	Pass
802.11ac(VHT40)	5190	36.154	40.706	Pass
802.11ac(VHT40)	5230	36.118	40.468	Pass
802.11ac(VHT80)	5210	75.436	81.656	Pass
802.11ax(HE20)	5180	18.964	21.542	Pass
802.11ax(HE20)	5200	18.931	21.377	Pass
802.11ax(HE20)	5240	18.942	21.400	Pass
802.11ax(HE40)	5190	37.794	40.774	Pass
802.11ax(HE40)	5230	37.745	41.186	Pass
802.11ax(HE80)	5210	77.107	82.025	Pass
802.11n(HT20)	5180	17.644	20.969	Pass
802.11n(HT20)	5200	17.645	21.195	Pass
802.11n(HT20)	5240	17.670	21.382	Pass
802.11n(HT40)	5190	36.158	40.728	Pass
802.11n(HT40)	5230	36.104	40.606	Pass

U-NII-2A

Mode	Frequency (MHz)	99% OBW (MHz)	-26 dB Bandwidth (MHz)	Verdict
802.11a	5260	16.459	20.342	Pass
802.11a	5300	16.459	20.106	Pass
802.11a	5320	16.454	20.230	Pass
802.11ac(VHT20)	5260	17.631	21.150	Pass
802.11ac(VHT20)	5300	17.648	21.244	Pass
802.11ac(VHT20)	5320	17.629	21.015	Pass
802.11ac(VHT40)	5270	36.095	40.358	Pass
802.11ac(VHT40)	5310	36.075	40.516	Pass
802.11ac(VHT80)	5290	75.505	81.776	Pass
802.11ax(HE20)	5260	18.986	21.695	Pass
802.11ax(HE20)	5300	18.966	21.065	Pass
802.11ax(HE20)	5320	18.935	21.308	Pass
802.11ax(HE40)	5270	37.717	41.057	Pass
802.11ax(HE40)	5310	37.733	41.138	Pass
802.11ax(HE80)	5290	76.992	82.051	Pass
802.11n(HT20)	5260	17.632	21.259	Pass
802.11n(HT20)	5300	17.647	21.770	Pass
802.11n(HT20)	5320	17.636	21.281	Pass
802.11n(HT40)	5270	36.124	40.882	Pass
802.11n(HT40)	5310	36.119	40.482	Pass

U-NII-2C

Mode	Frequency (MHz)	99% OBW (MHz)	-26 dB Bandwidth (MHz)	Verdict
802.11a	5500	16.450	20.047	Pass
802.11a	5600	16.477	20.660	Pass
802.11a	5700	16.450	20.061	Pass
802.11a	5720	16.480	20.053	Pass
802.11ac(VHT20)	5500	17.654	21.479	Pass
802.11ac(VHT20)	5600	17.632	21.404	Pass
802.11ac(VHT20)	5700	17.660	21.607	Pass
802.11ac(VHT20)	5720	17.635	21.230	Pass
802.11ac(VHT40)	5510	36.127	40.732	Pass
802.11ac(VHT40)	5590	36.151	40.733	Pass
802.11ac(VHT40)	5670	36.195	40.869	Pass
802.11ac(VHT40)	5710	36.092	40.844	Pass
802.11ac(VHT80)	5610	75.463	81.547	Pass
802.11ac(VHT80)	5690	75.537	82.110	Pass
802.11ax(HE20)	5500	18.938	21.341	Pass
802.11ax(HE20)	5600	18.939	21.022	Pass
802.11ax(HE20)	5700	18.909	21.206	Pass
802.11ax(HE20)	5720	18.972	20.893	Pass
802.11ax(HE40)	5510	37.751	41.406	Pass
802.11ax(HE40)	5590	37.706	40.413	Pass
802.11ax(HE40)	5670	37.803	41.106	Pass
802.11ax(HE40)	5710	37.769	40.792	Pass
802.11ax(HE80)	5610	77.211	82.238	Pass
802.11ax(HE80)	5690	77.199	82.813	Pass
802.11n(HT20)	5500	17.674	20.961	Pass
802.11n(HT20)	5600	17.640	20.940	Pass
802.11n(HT20)	5700	17.649	20.609	Pass
802.11n(HT20)	5720	17.652	20.969	Pass
802.11n(HT40)	5510	36.176	40.886	Pass
802.11n(HT40)	5590	36.169	41.002	Pass
802.11n(HT40)	5670	36.154	41.092	Pass
802.11n(HT40)	5710	36.117	40.667	Pass

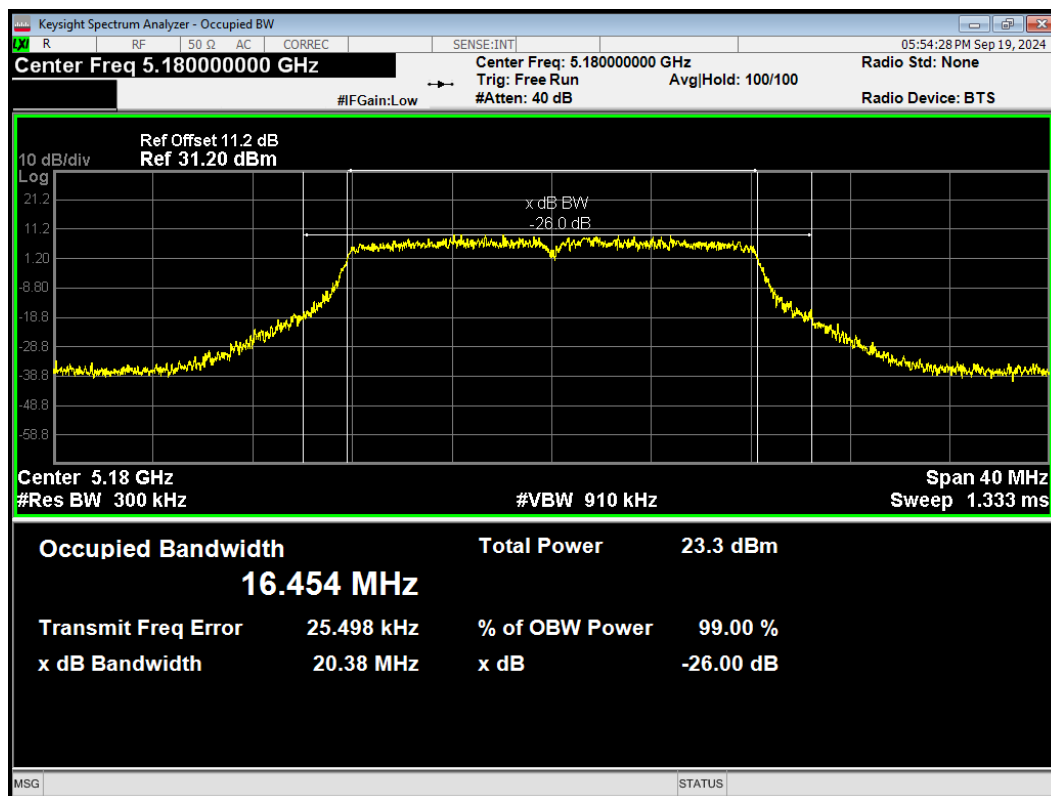
U-NII-3

Mode	Frequency (MHz)	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Verdict
802.11a	5720	16.471	16.288	Pass
802.11a	5745	16.485	16.320	Pass
802.11a	5785	16.504	16.305	Pass
802.11a	5825	16.464	15.943	Pass
802.11ac(VHT20)	5720	17.624	16.891	Pass
802.11ac(VHT20)	5745	17.645	17.577	Pass
802.11ac(VHT20)	5785	17.655	15.678	Pass
802.11ac(VHT20)	5825	17.720	16.956	Pass
802.11ac(VHT40)	5710	36.120	36.263	Pass
802.11ac(VHT40)	5755	36.162	36.048	Pass
802.11ac(VHT40)	5795	36.192	35.289	Pass
802.11ac(VHT80)	5690	75.600	74.908	Pass
802.11ac(VHT80)	5775	75.620	74.089	Pass
802.11ax(HE20)	5720	18.920	16.370	Pass
802.11ax(HE20)	5745	18.931	18.024	Pass
802.11ax(HE20)	5785	19.010	16.938	Pass
802.11ax(HE20)	5825	19.001	17.808	Pass
802.11ax(HE40)	5710	37.734	36.764	Pass
802.11ax(HE40)	5755	37.839	36.786	Pass
802.11ax(HE40)	5795	37.823	36.298	Pass
802.11ax(HE80)	5690	77.265	76.617	Pass
802.11ax(HE80)	5775	77.313	74.848	Pass
802.11n(HT20)	5720	17.644	16.792	Pass
802.11n(HT20)	5745	17.657	17.366	Pass
802.11n(HT20)	5785	17.629	17.552	Pass
802.11n(HT20)	5825	17.721	17.541	Pass
802.11n(HT40)	5710	36.121	35.202	Pass
802.11n(HT40)	5755	36.148	36.349	Pass
802.11n(HT40)	5795	36.150	36.352	Pass

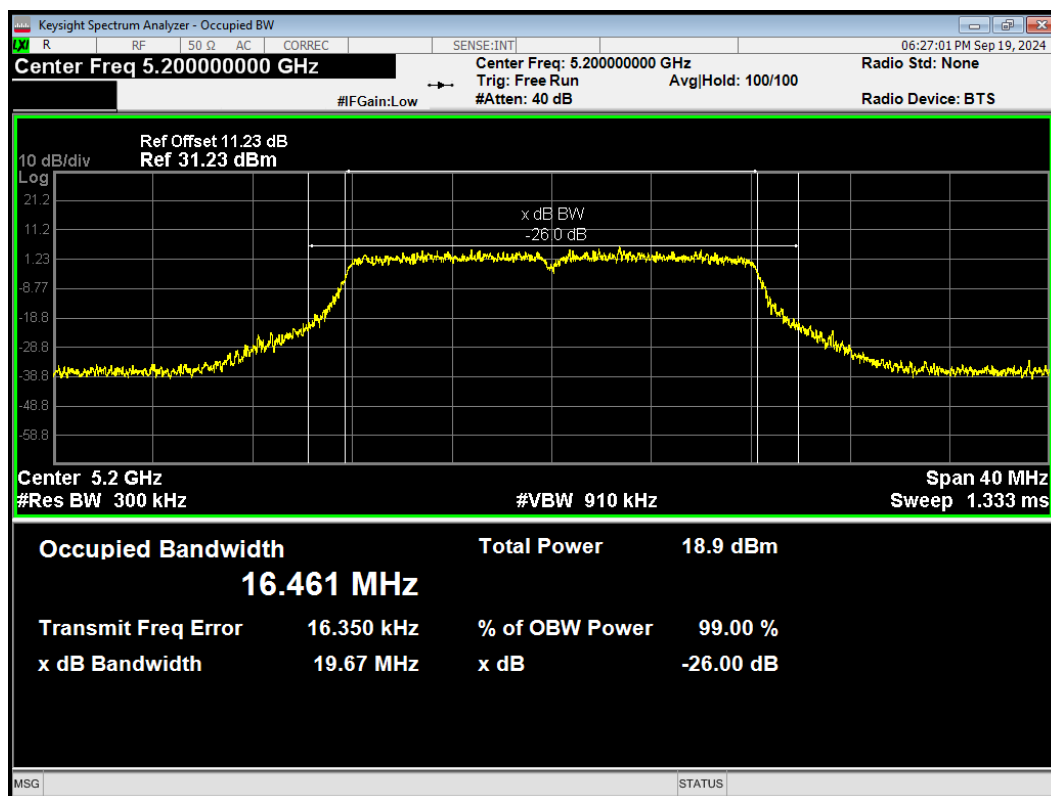
99% bandwidth

U-NII-1

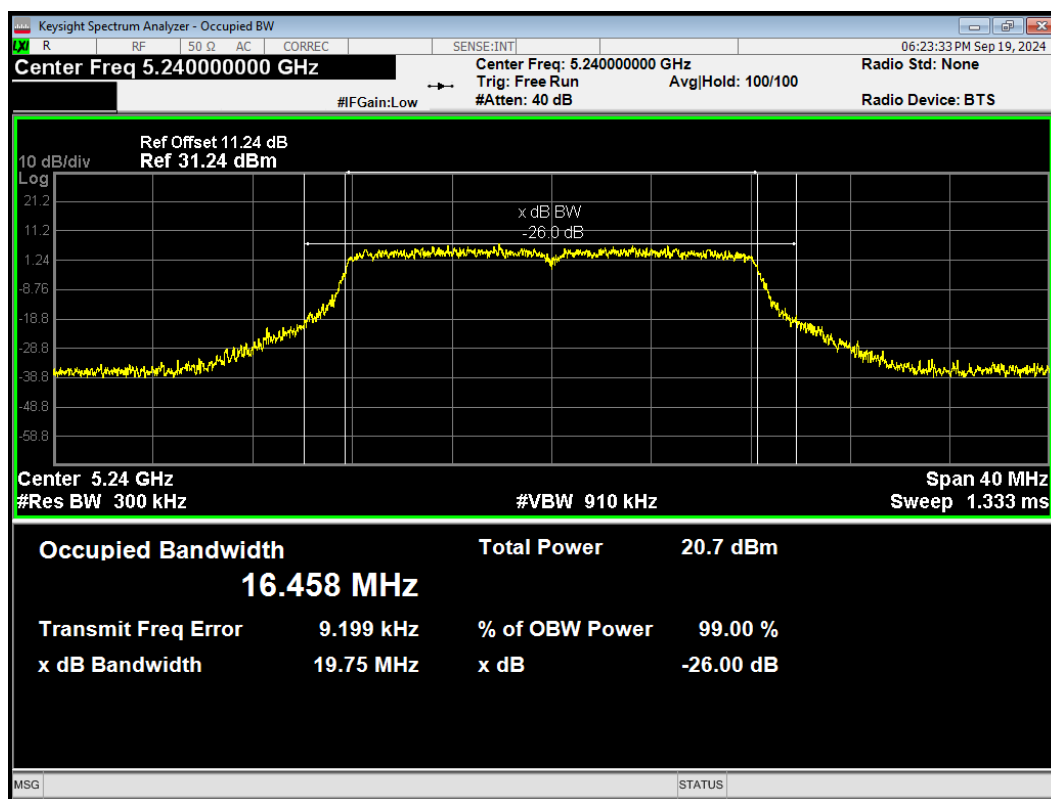
OBW 802.11a 5180MHz



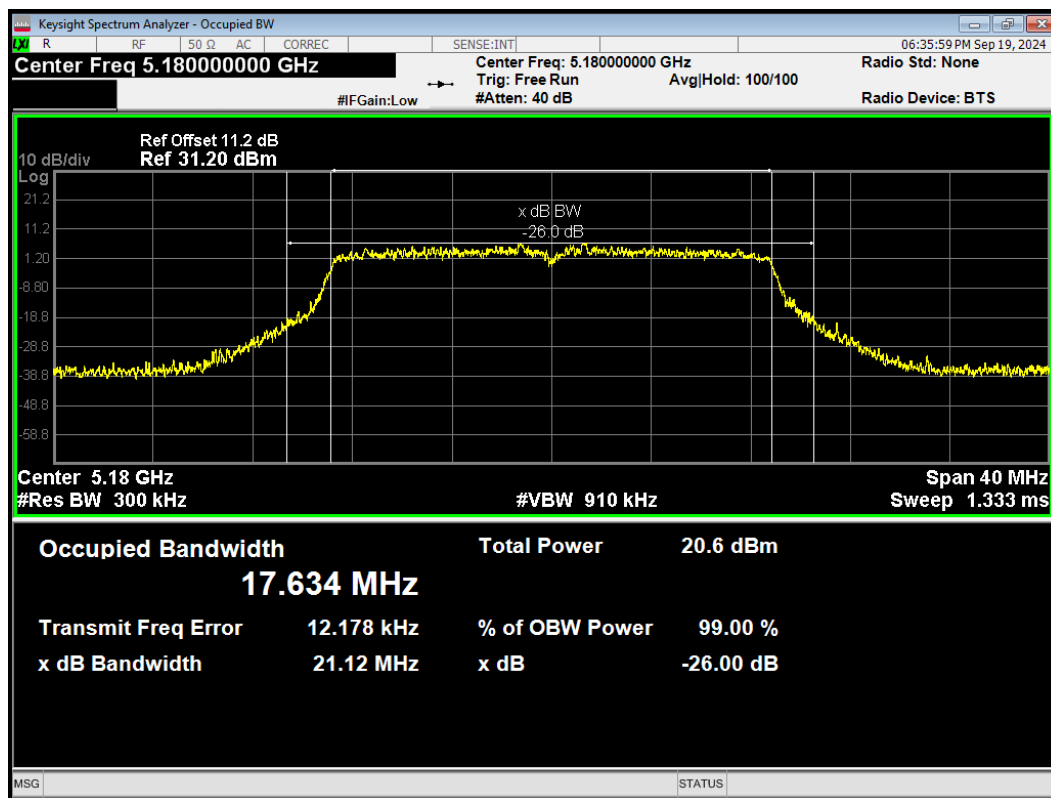
OBW 802.11a 5200MHz



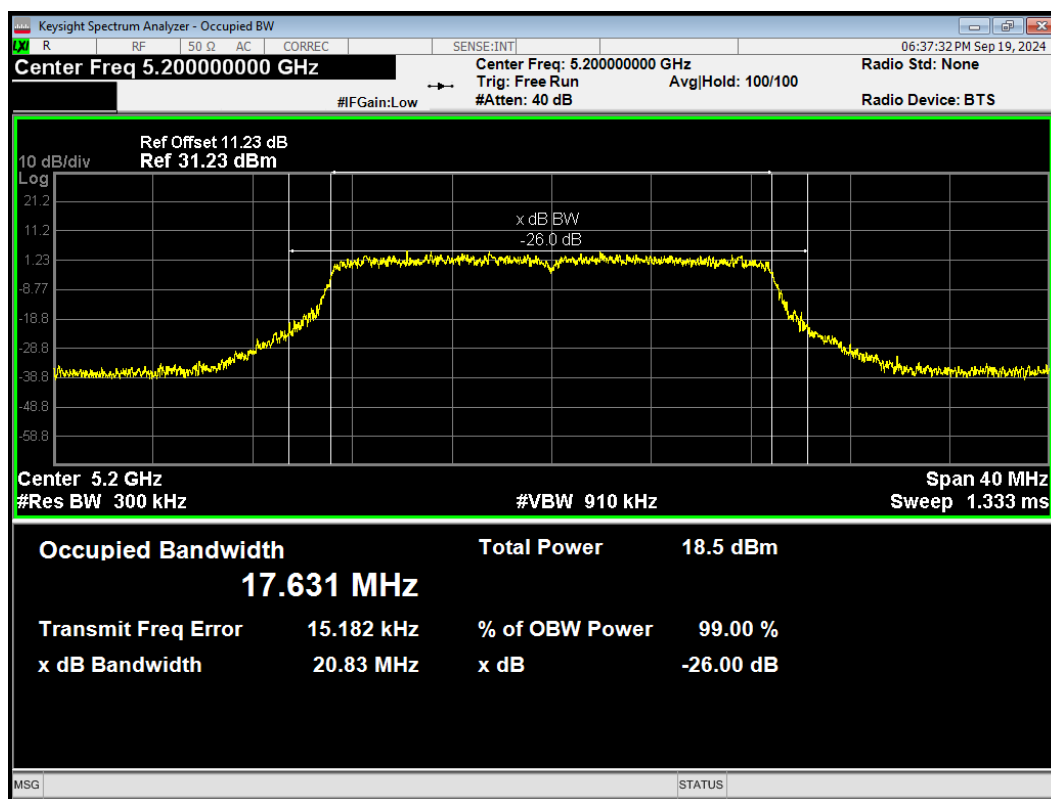
OBW 802.11a 5240MHz



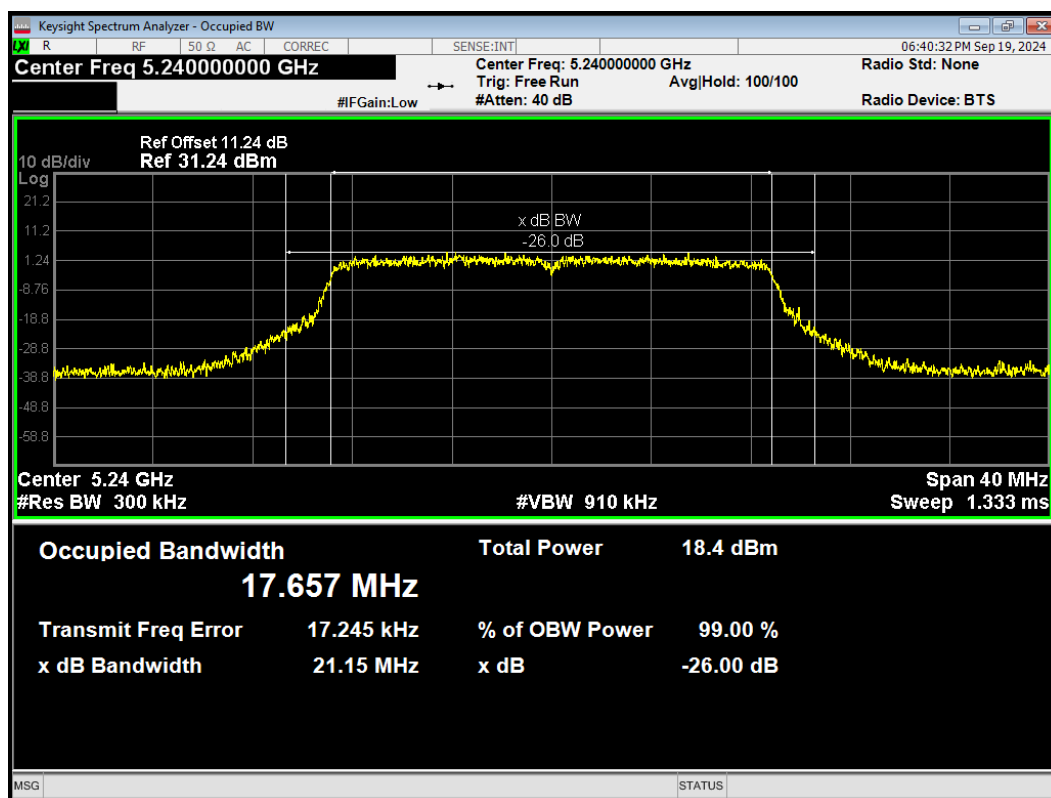
OBW 802.11ac(VHT20) 5180MHz



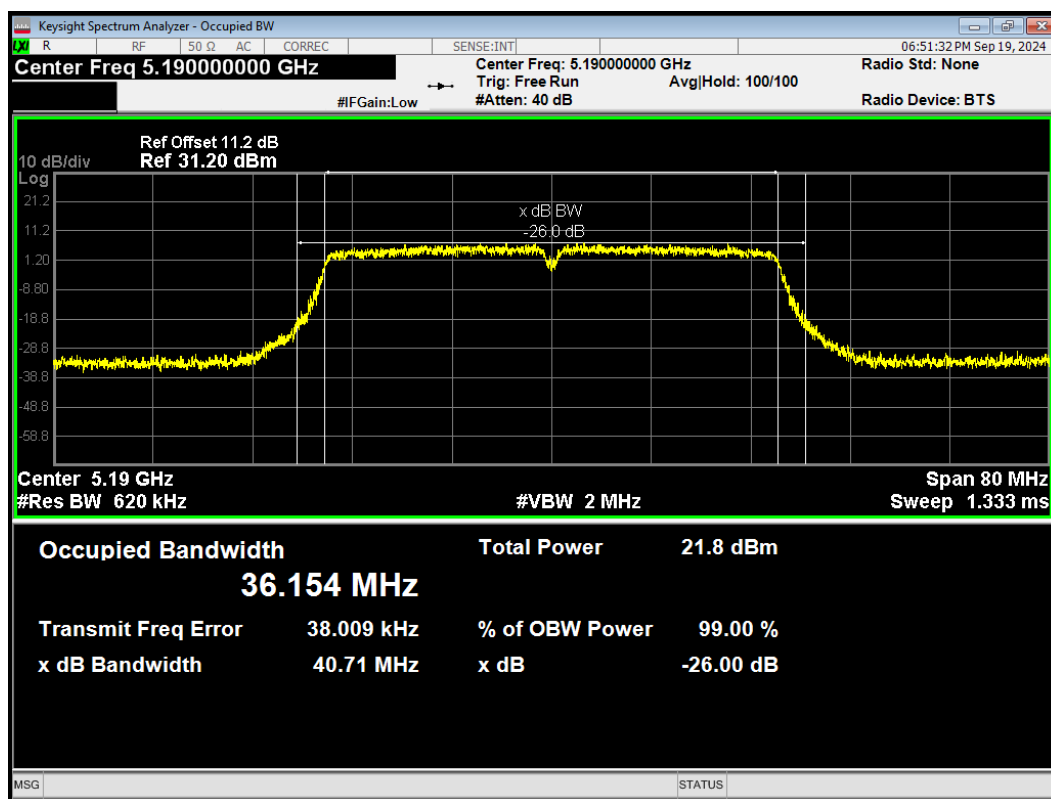
OBW 802.11ac(VHT20) 5200MHz



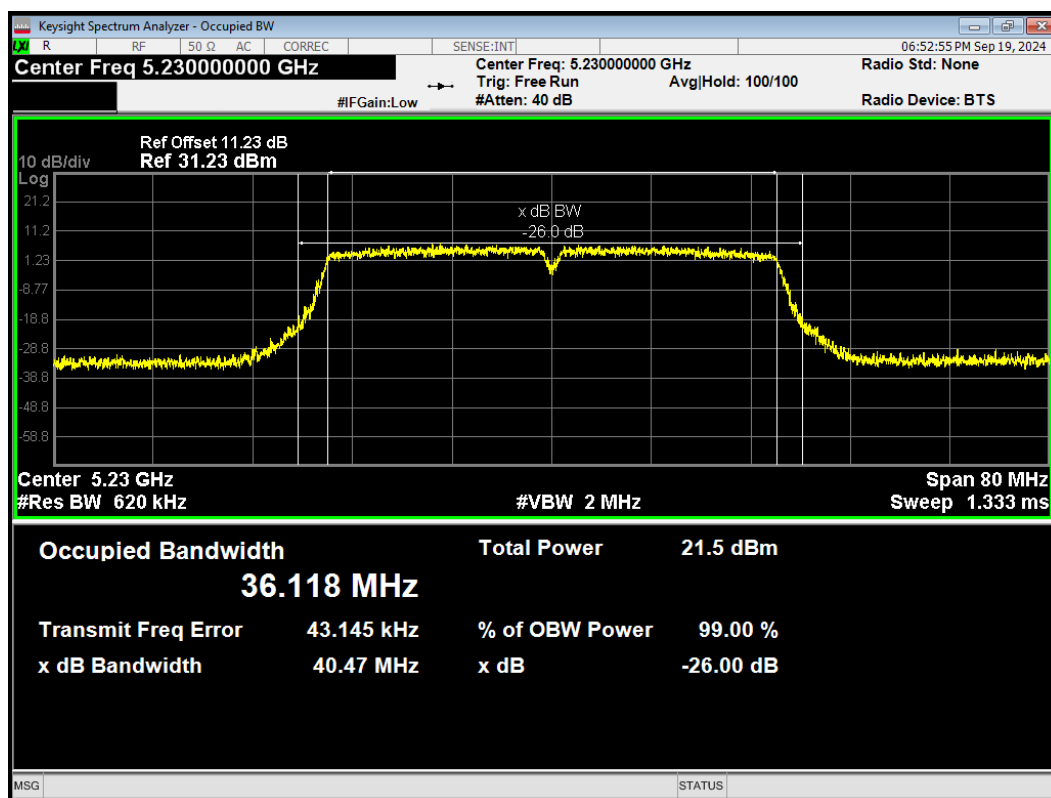
OBW 802.11ac(VHT20) 5240MHz



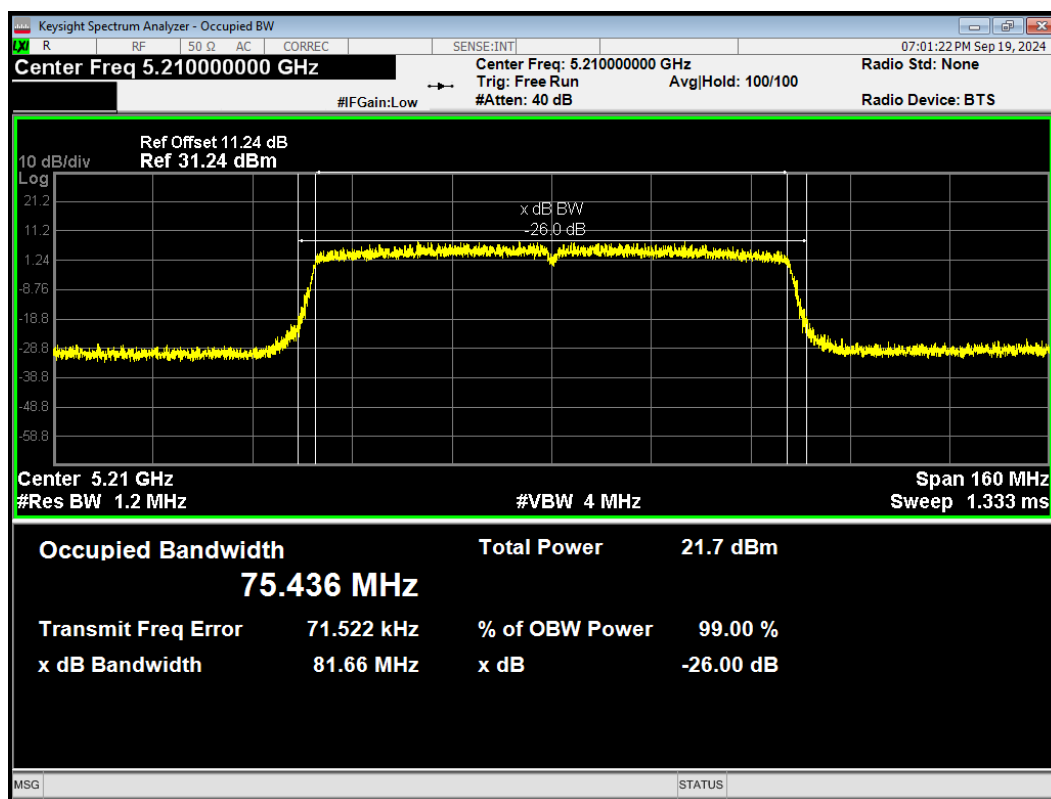
OBW 802.11ac(VHT40) 5190MHz



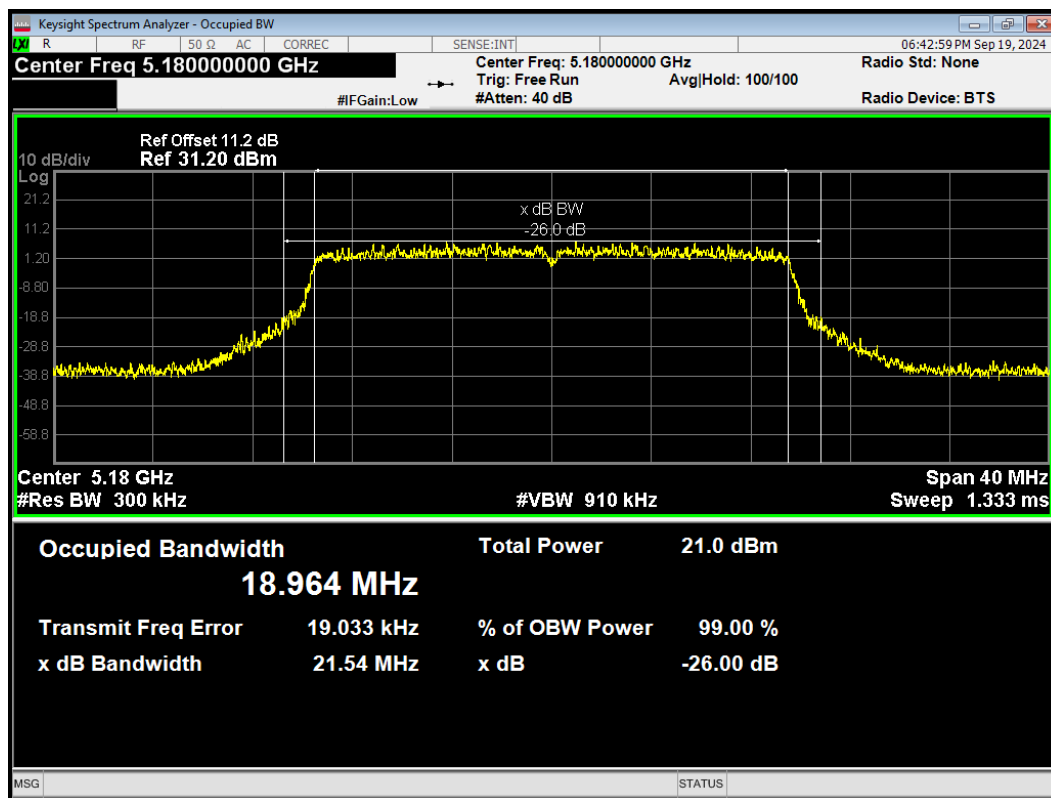
OBW 802.11ac(VHT40) 5230MHz



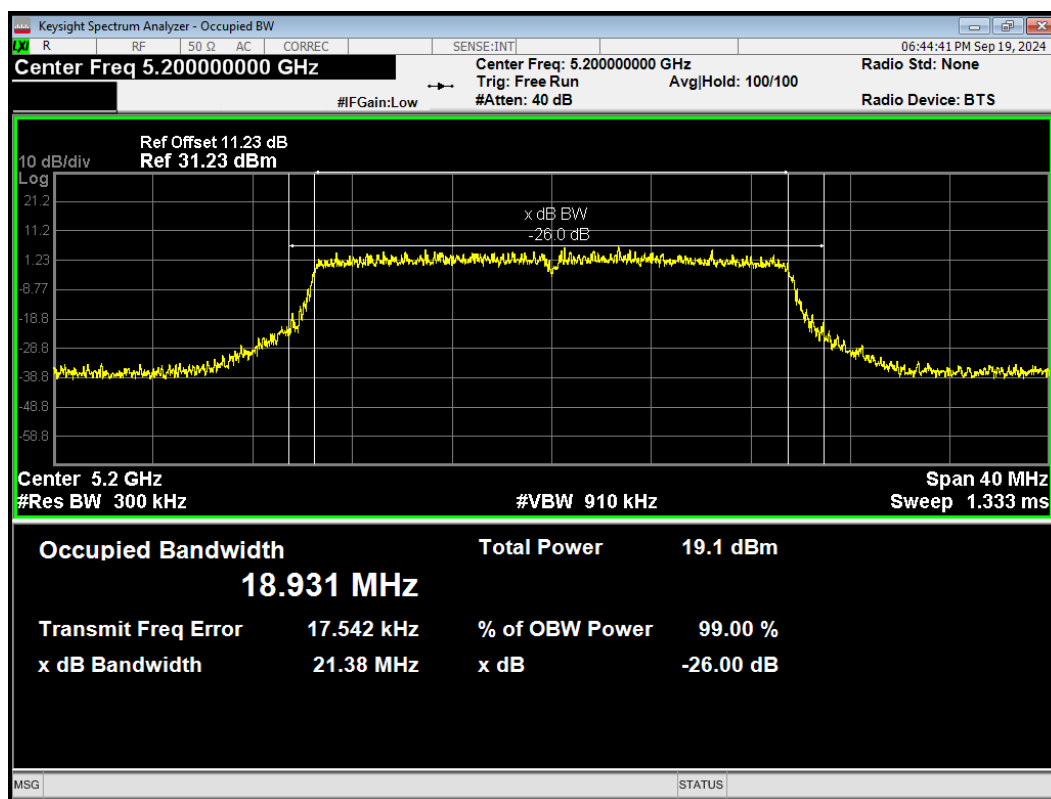
OBW 802.11ac(VHT80) 5210MHz



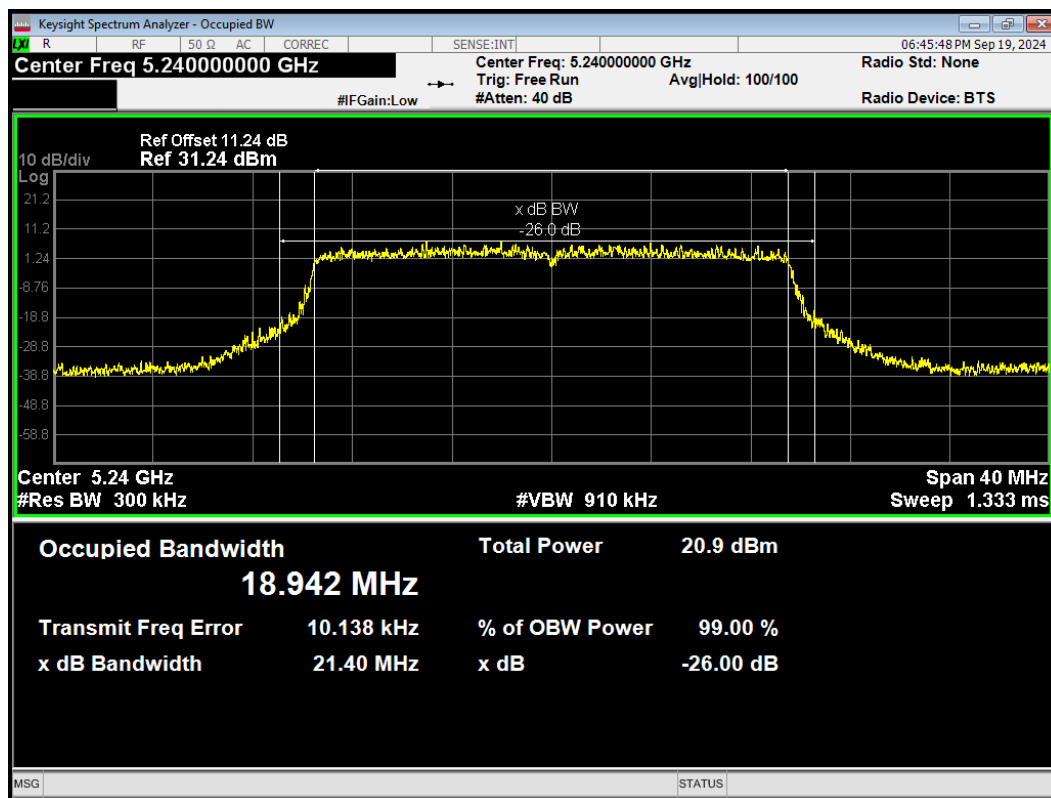
OBW 802.11ax(HE20) 5180MHz



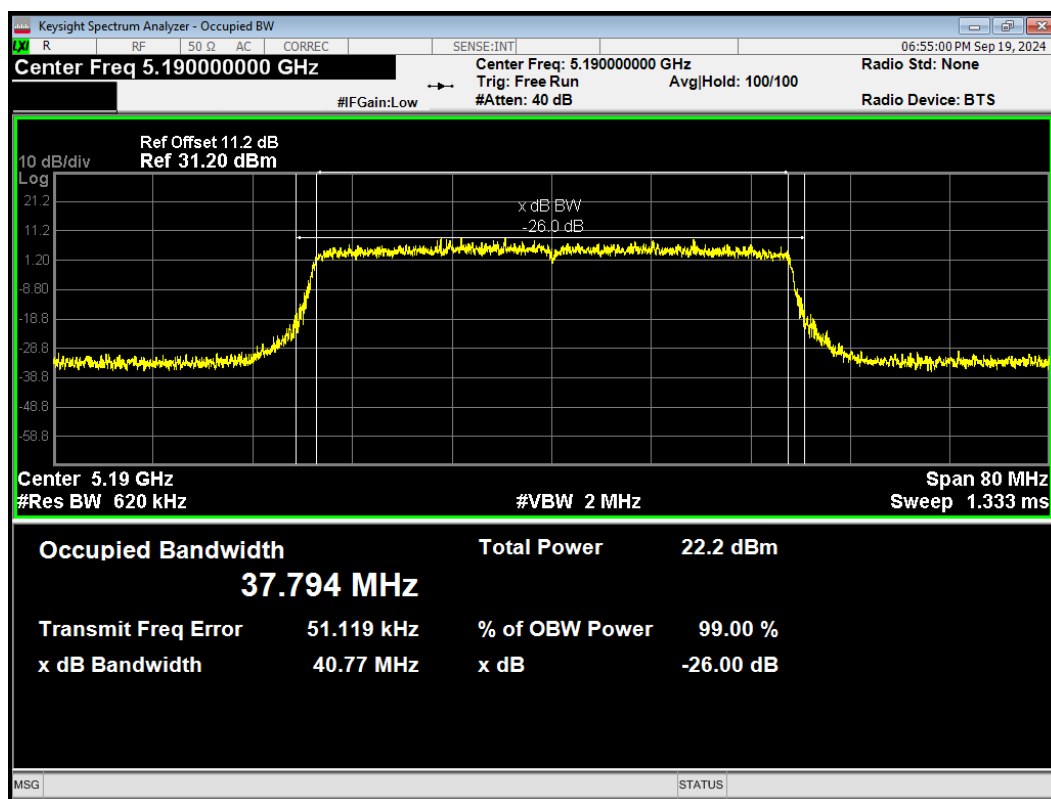
OBW 802.11ax(HE20) 5200MHz



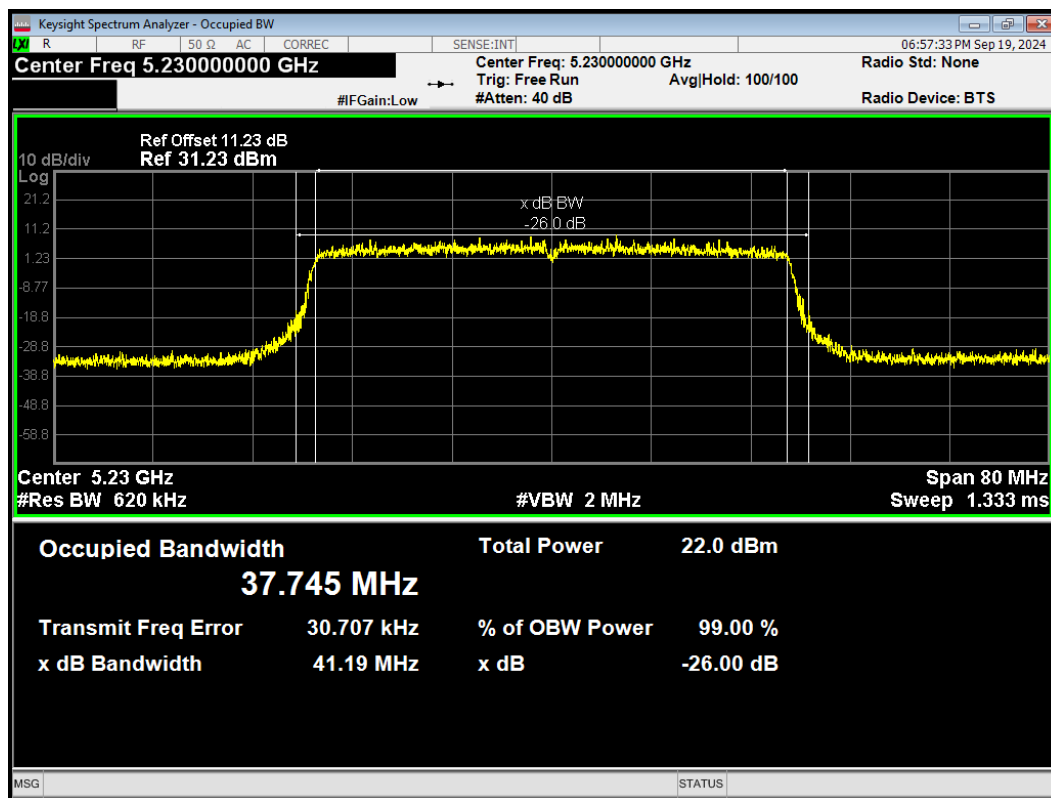
OBW 802.11ax(HE20) 5240MHz



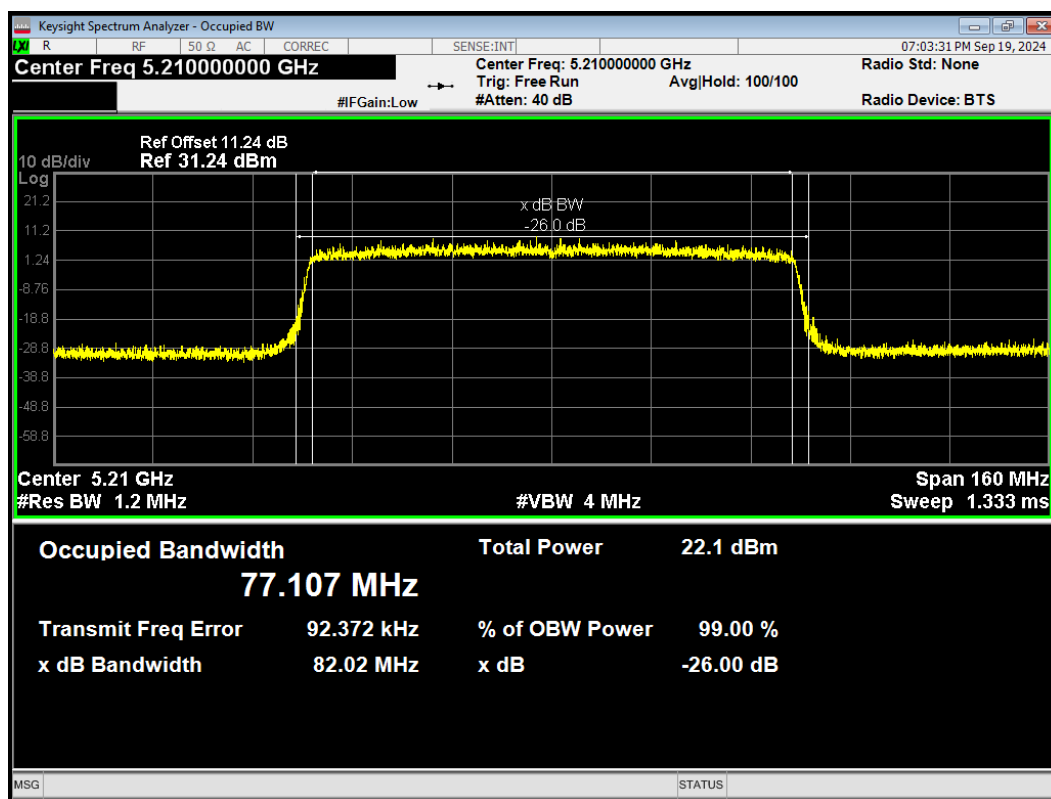
OBW 802.11ax(HE40) 5190MHz



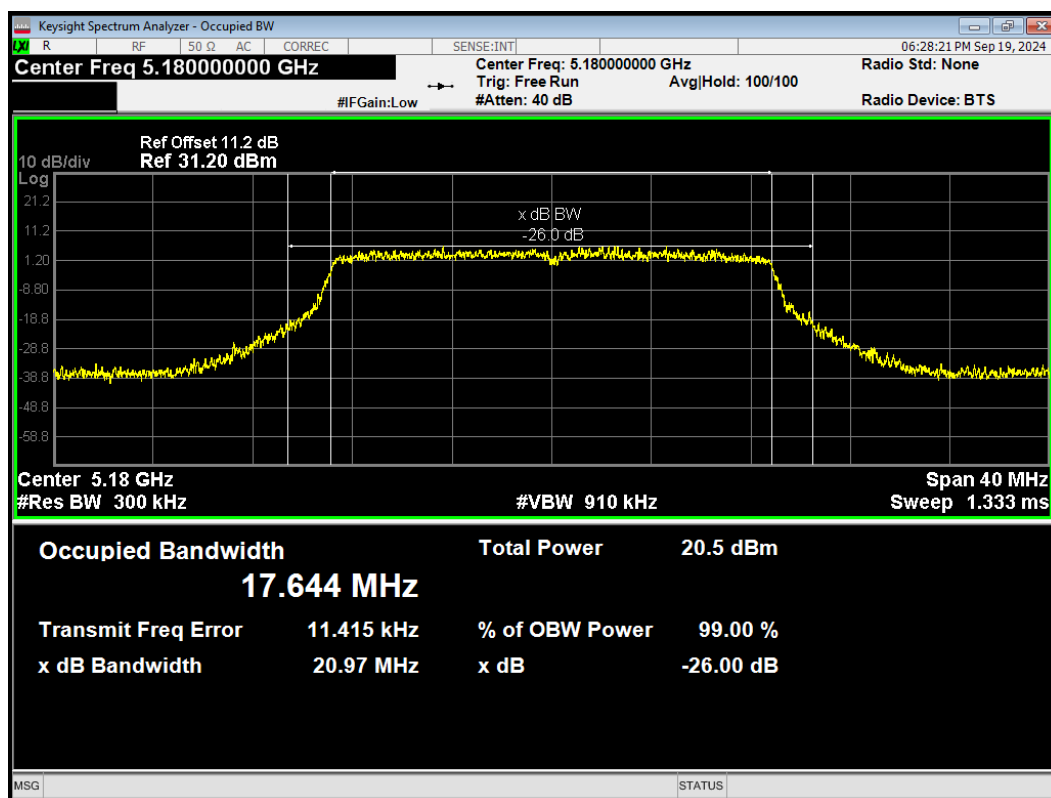
OBW 802.11ax(HE40) 5230MHz



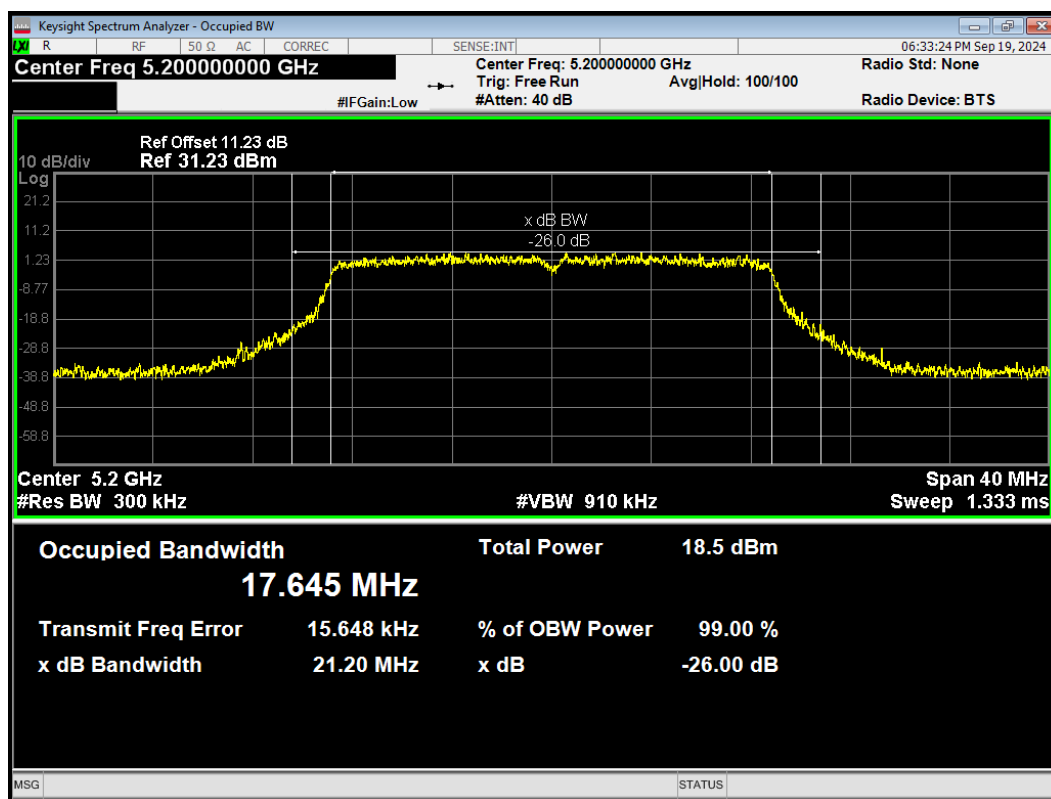
OBW 802.11ax(HE80) 5210MHz



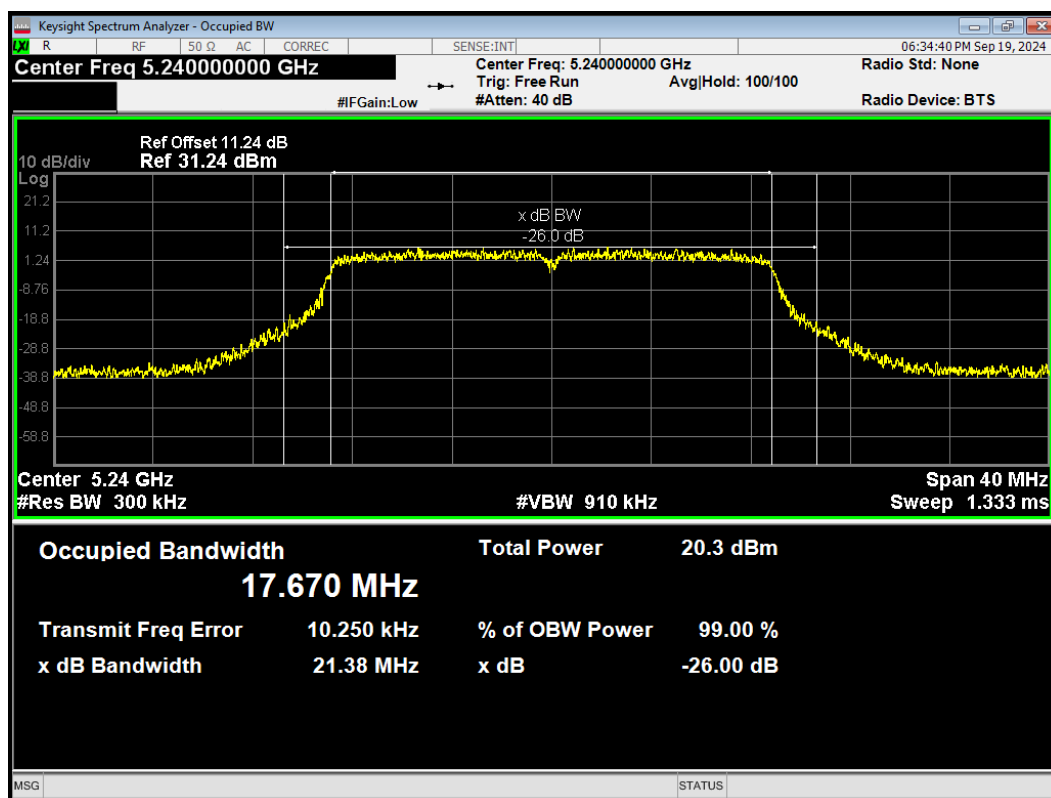
OBW 802.11n(HT20) 5180MHz



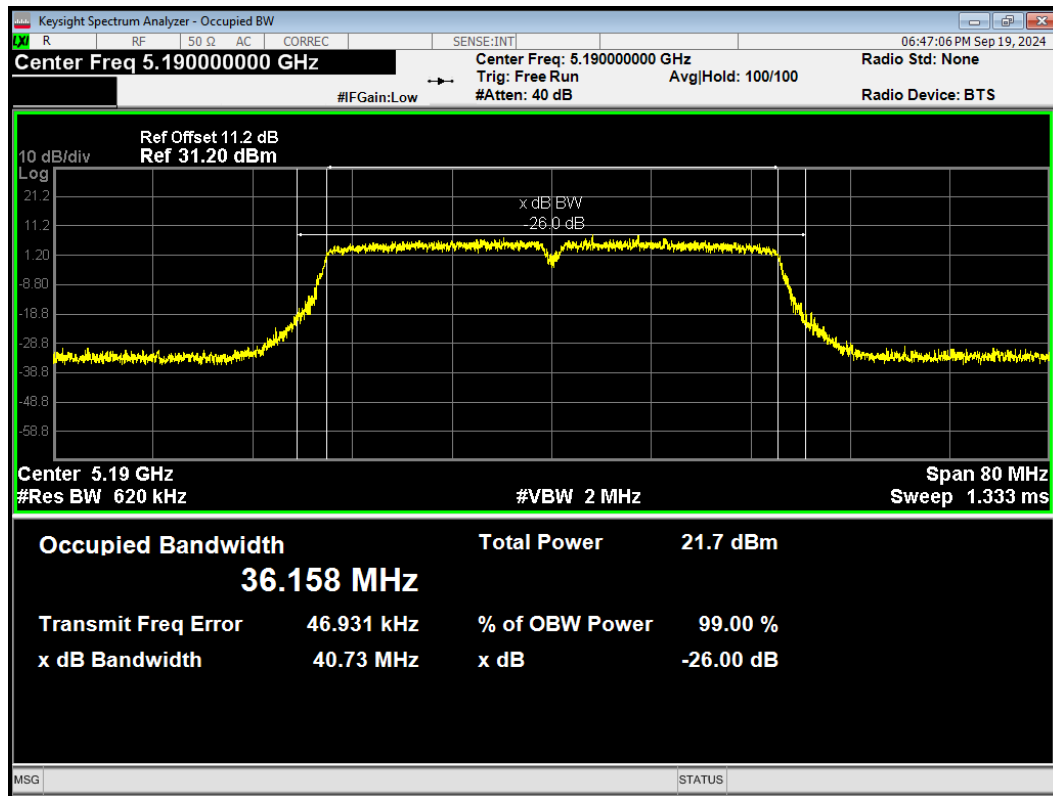
OBW 802.11n(HT20) 5200MHz



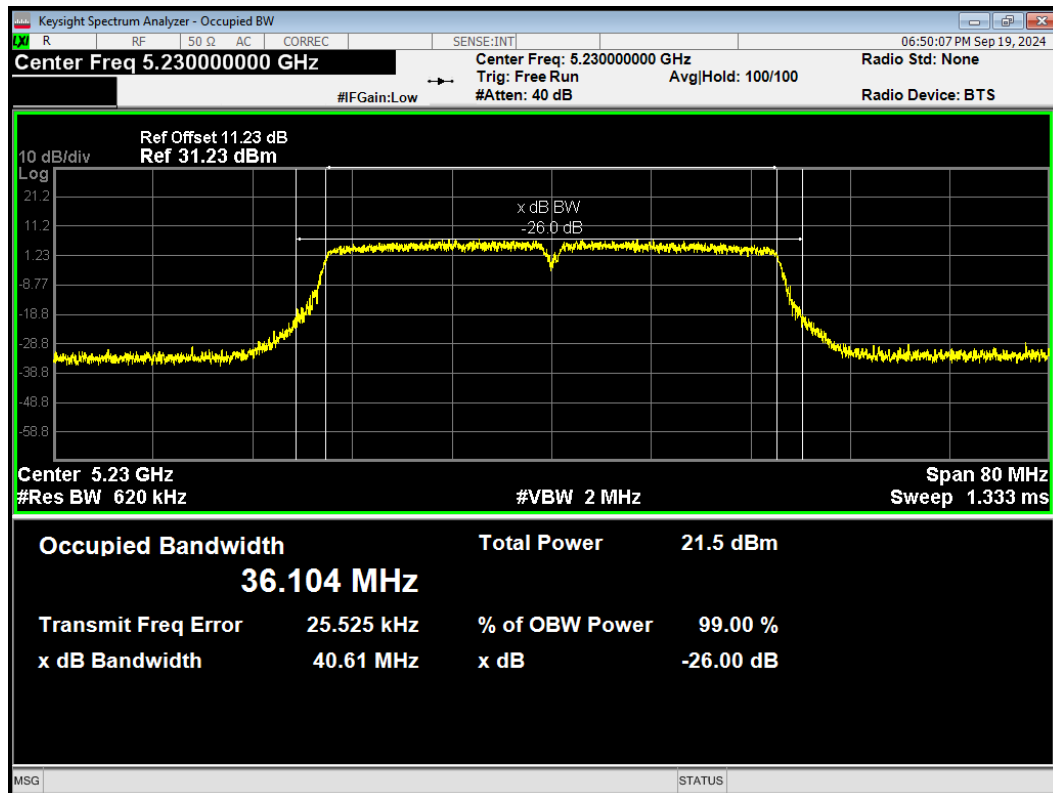
OBW 802.11n(HT20) 5240MHz



OBW 802.11n(HT40) 5190MHz

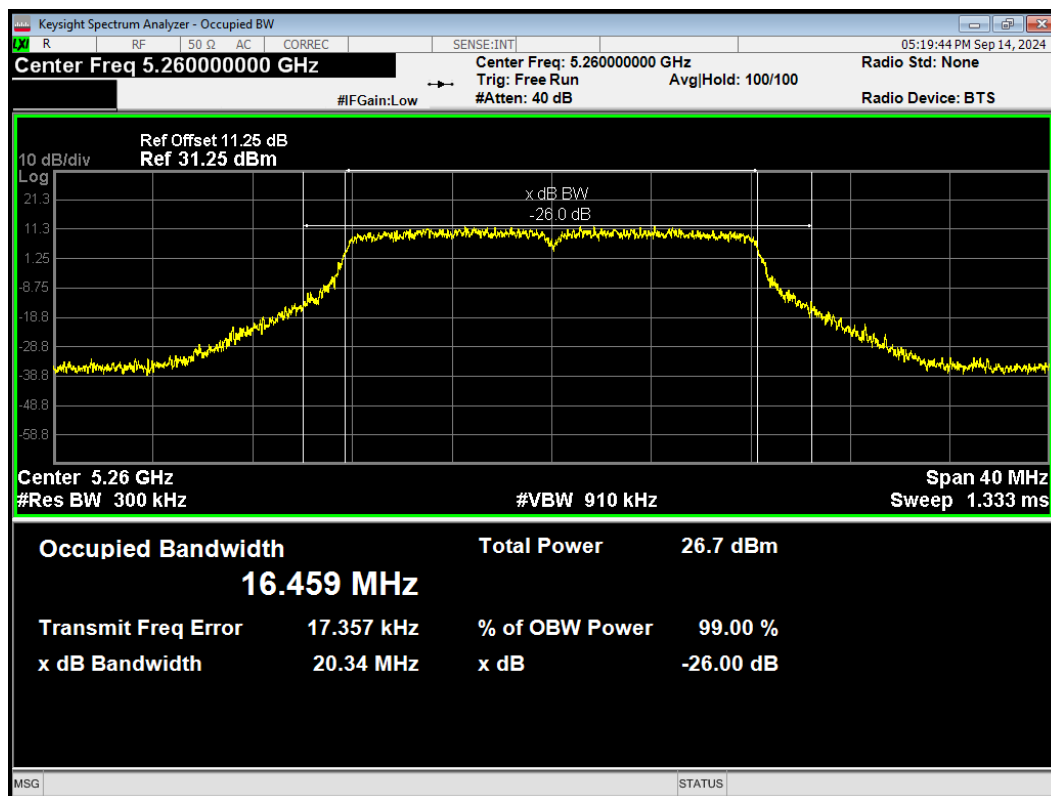


OBW 802.11n(HT40) 5230MHz

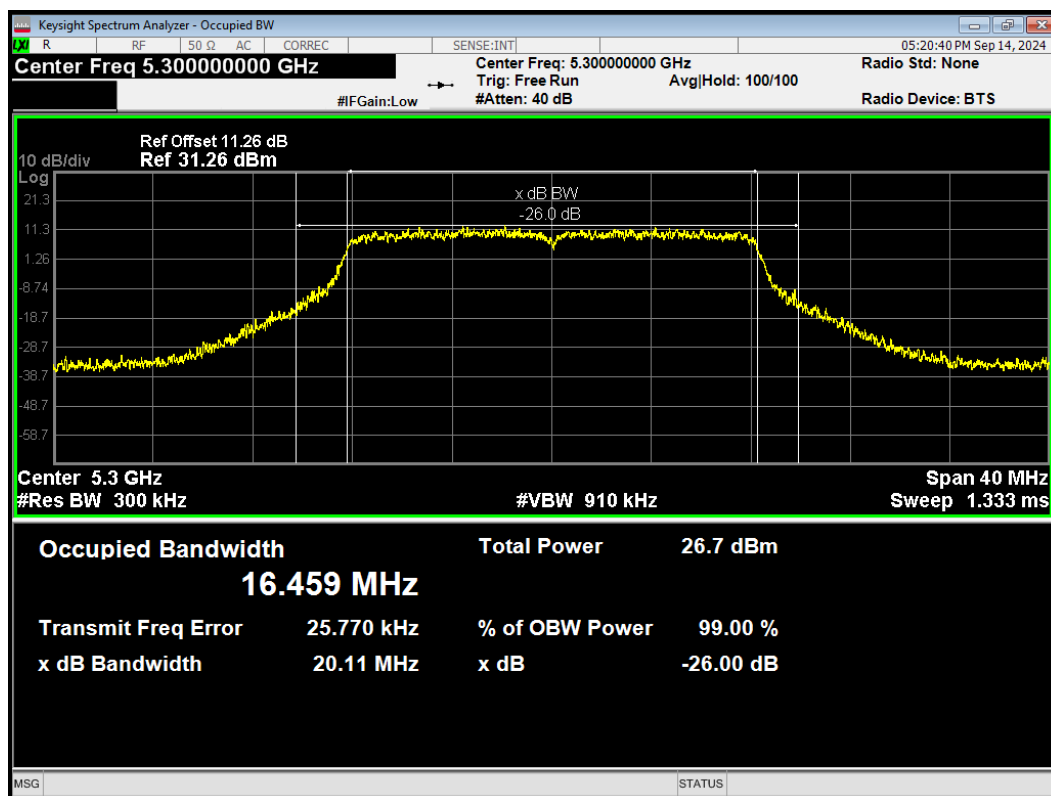


U-NII-2A

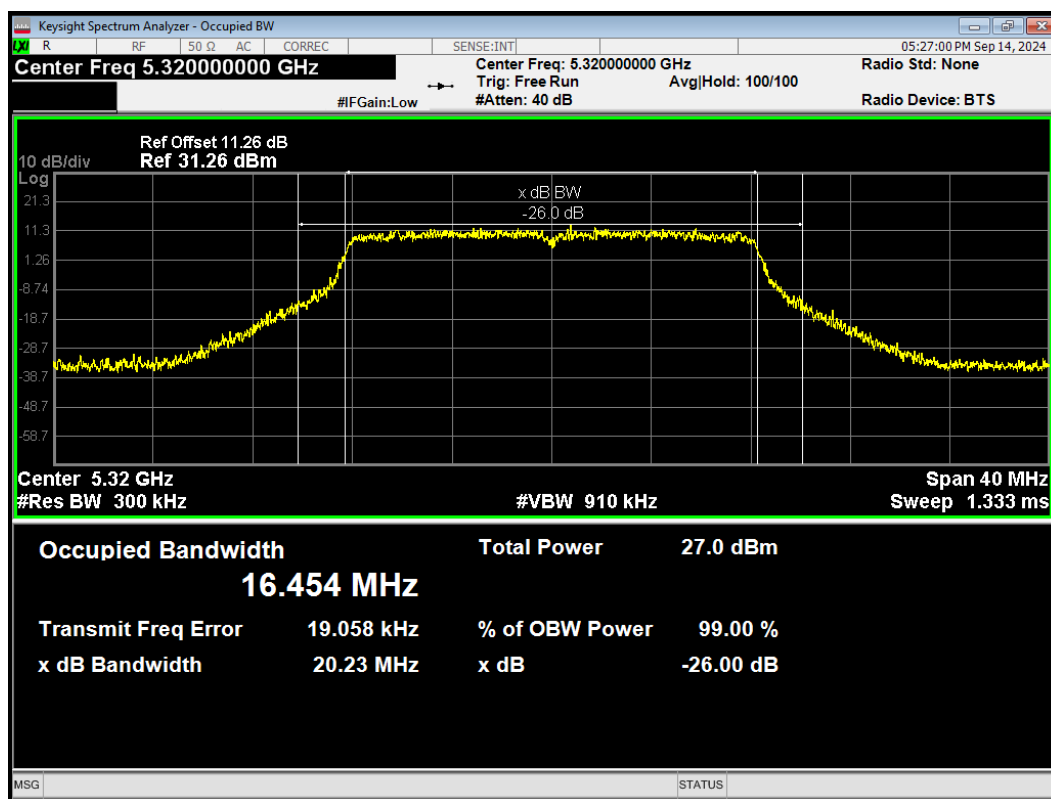
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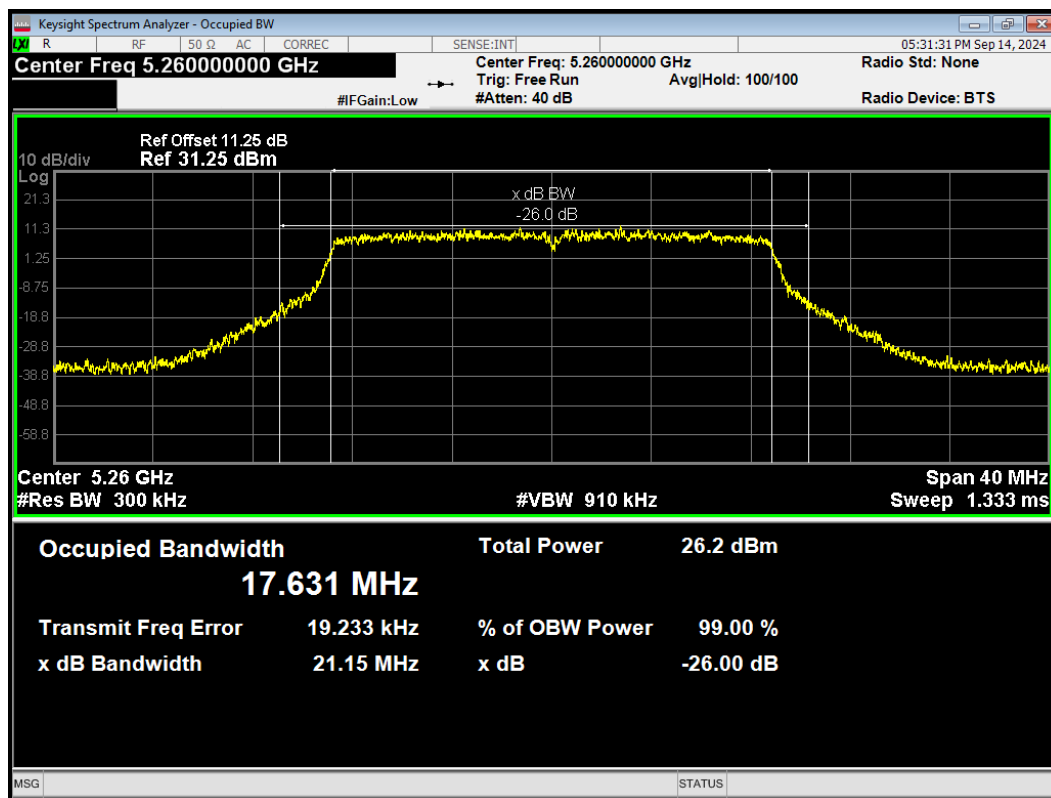
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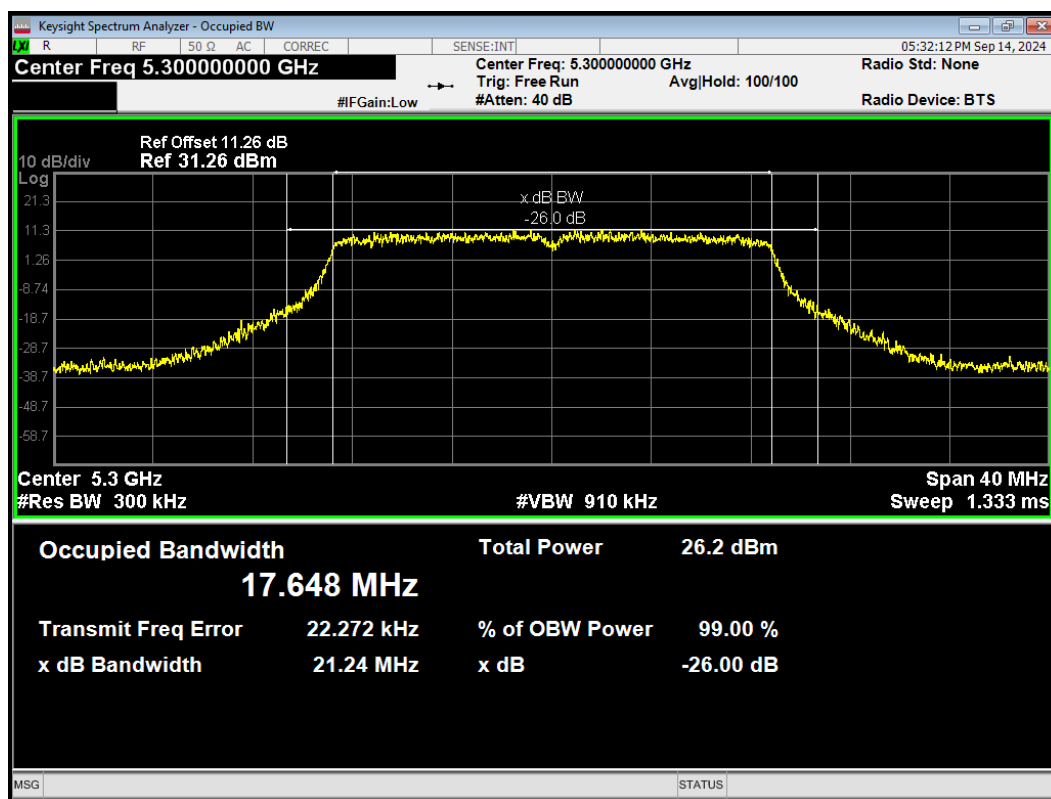
OBW 802.11a 5320MHz



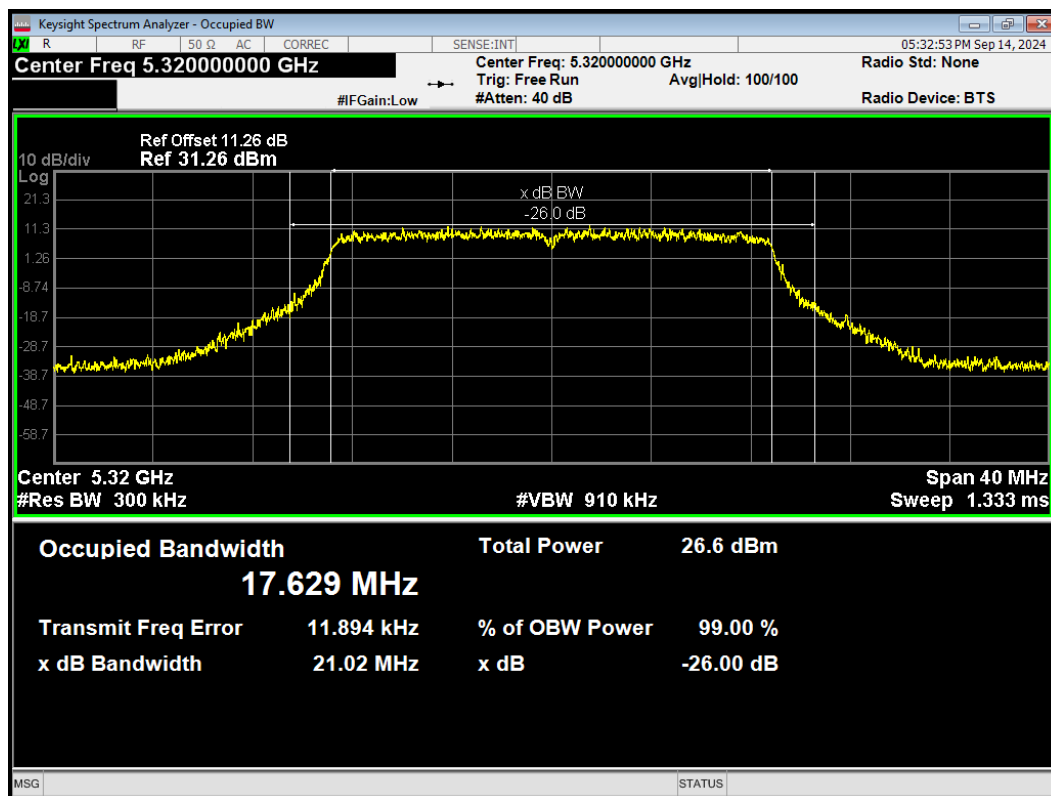
OBW 802.11ac(VHT20) 5260MHz



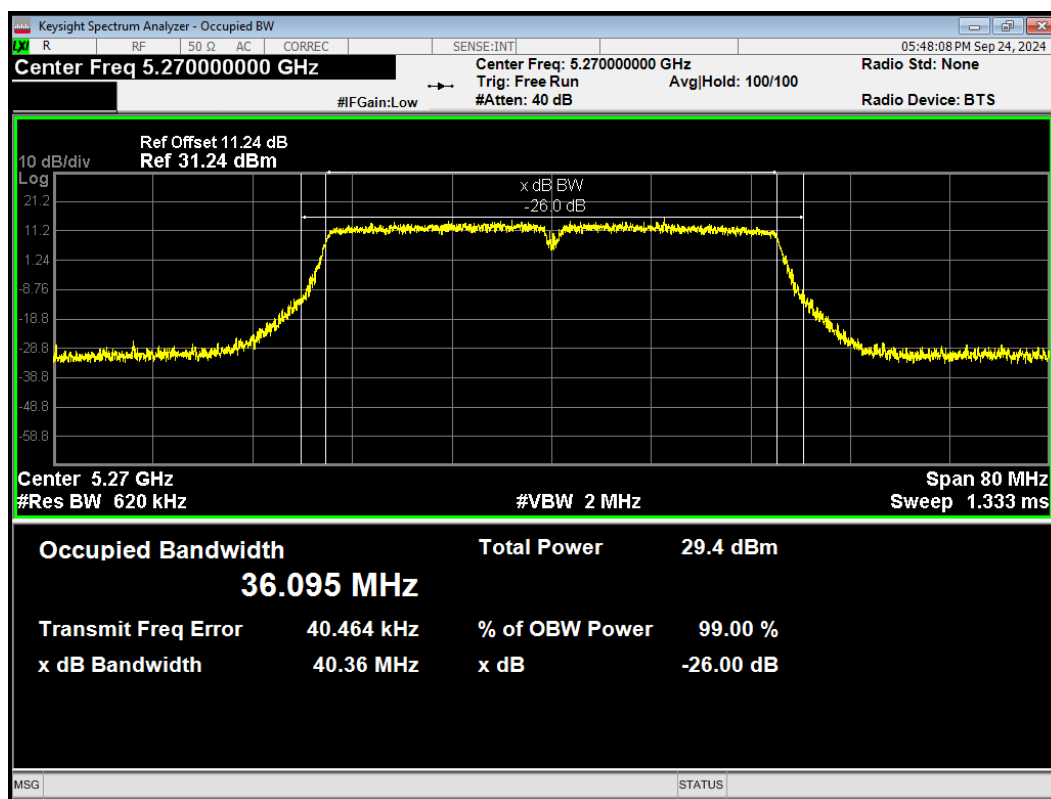
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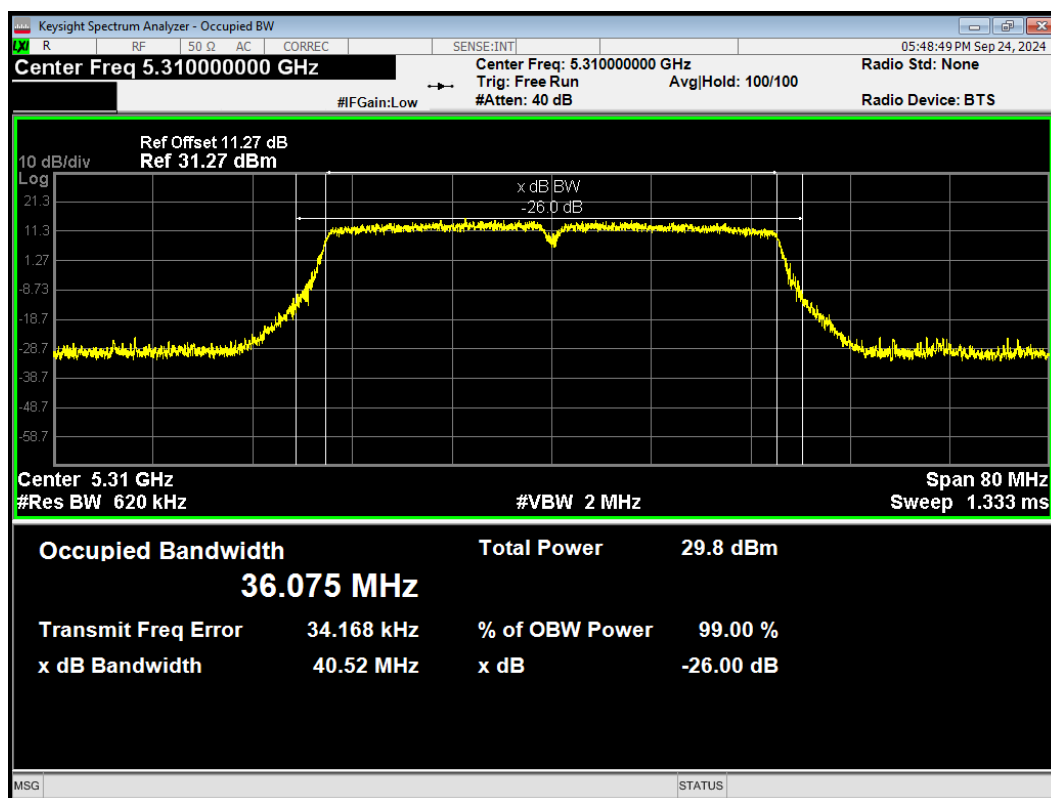
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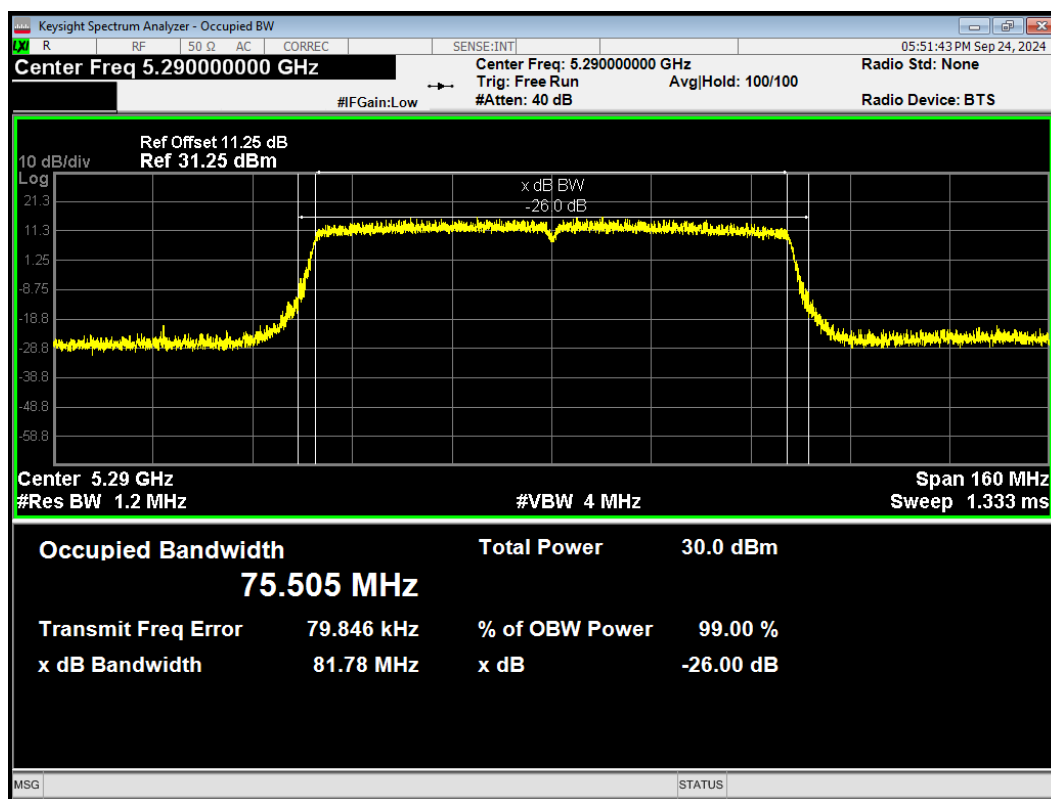
OBW 802.11ac(VHT40) 5270MHz



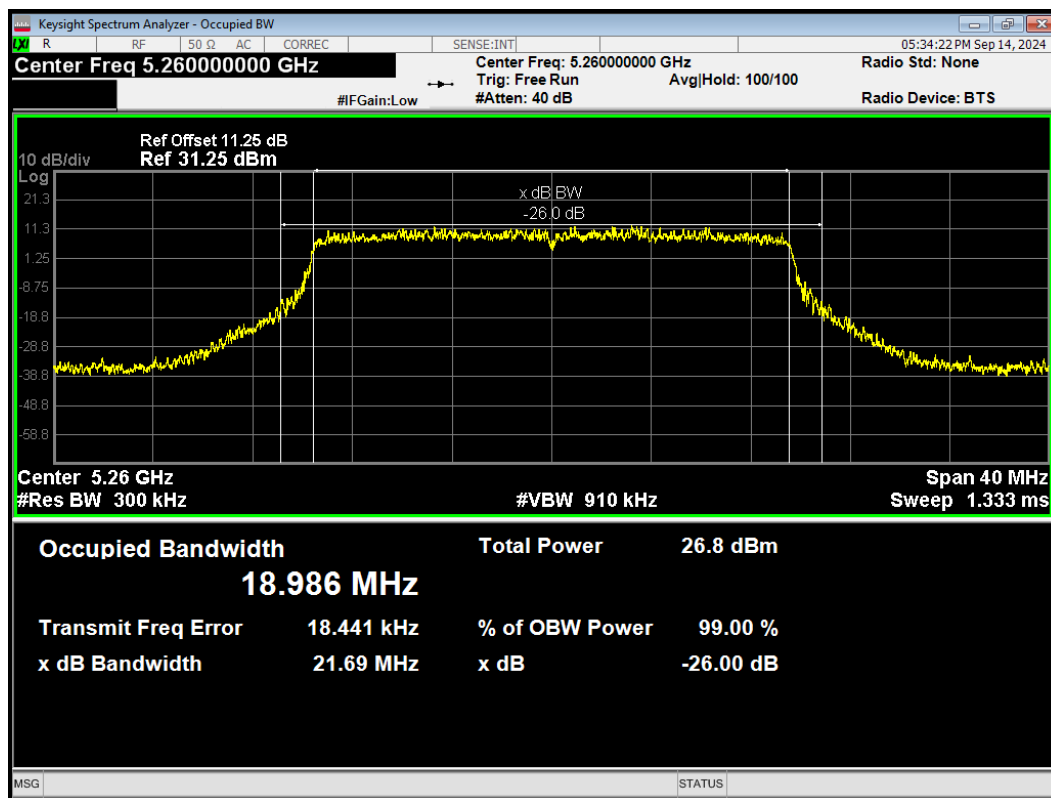
OBW 802.11ac(VHT40) 5310MHz



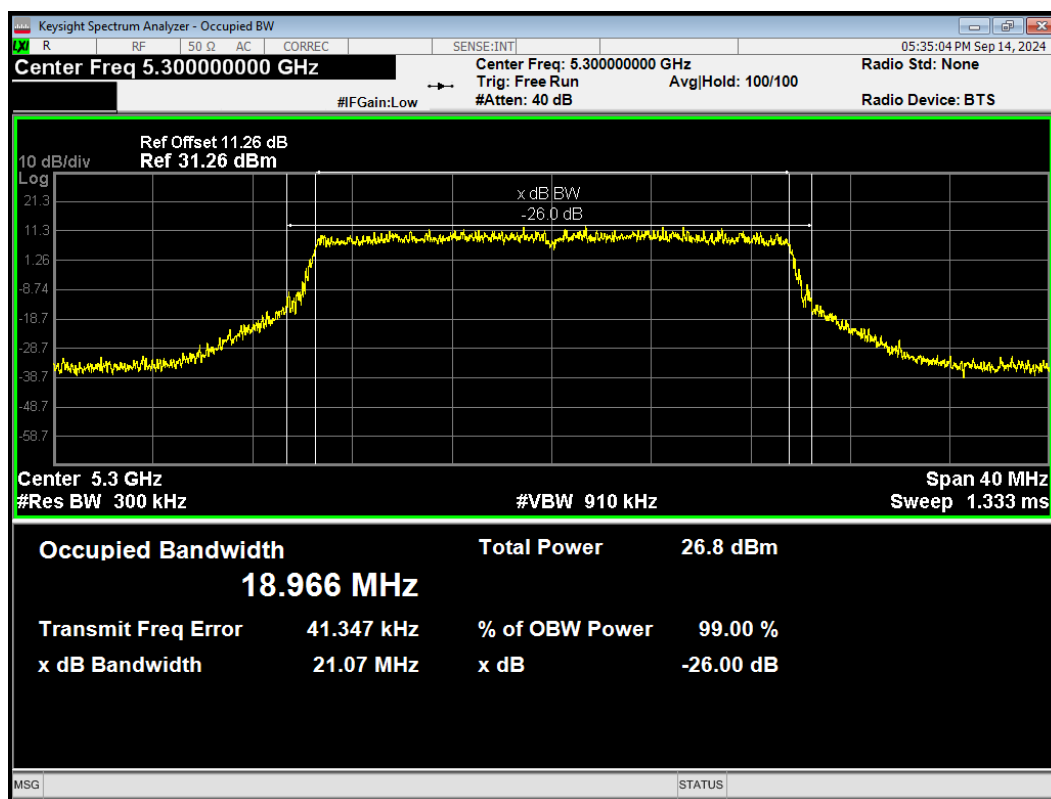
OBW 802.11ac(VHT80) 5290MHz



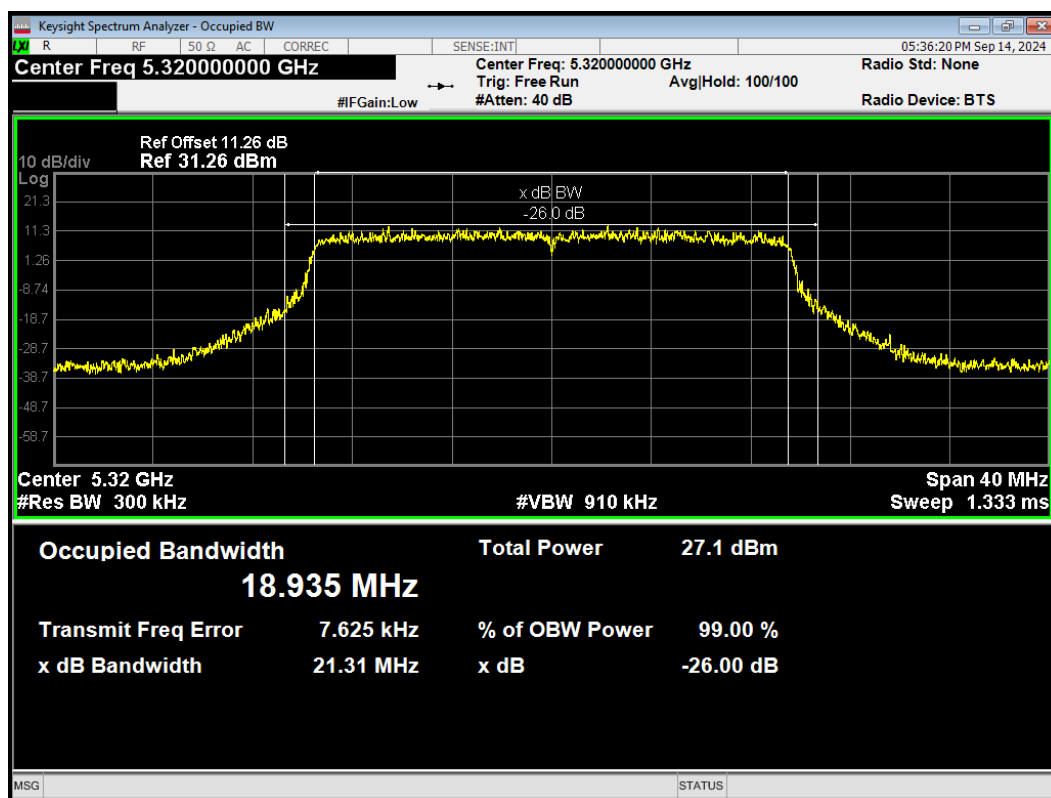
OBW 802.11ax(HE20) 5260MHz



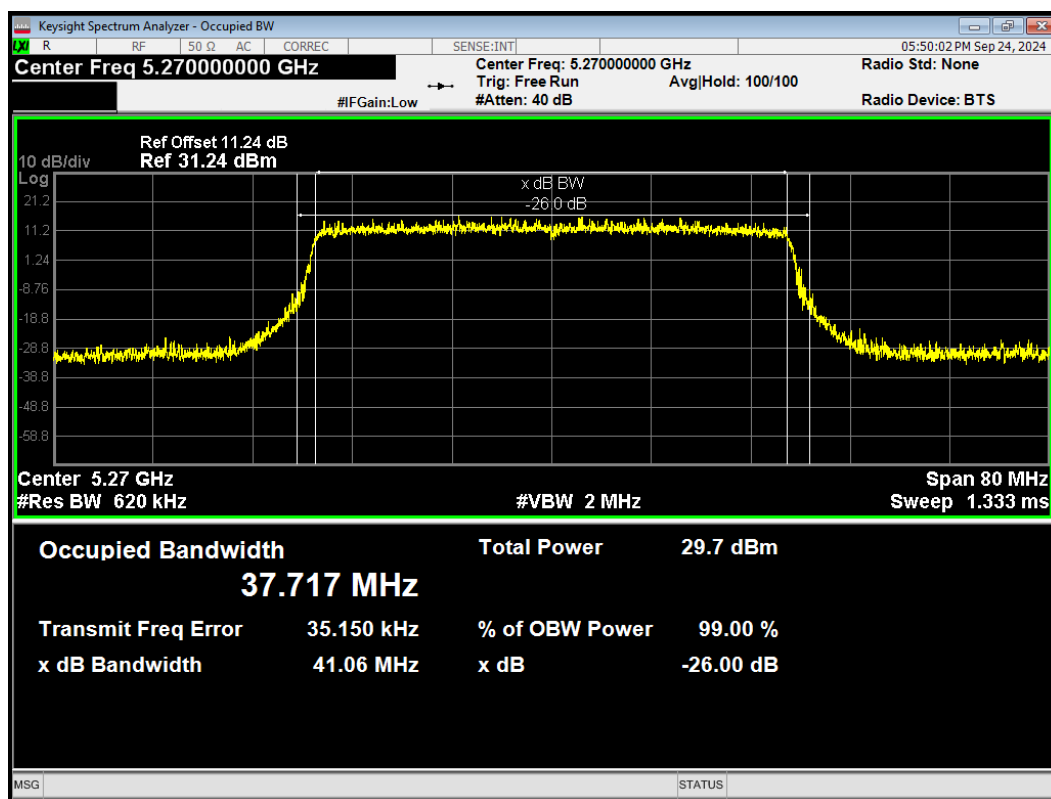
OBW 802.11ax(HE20) 5300MHz



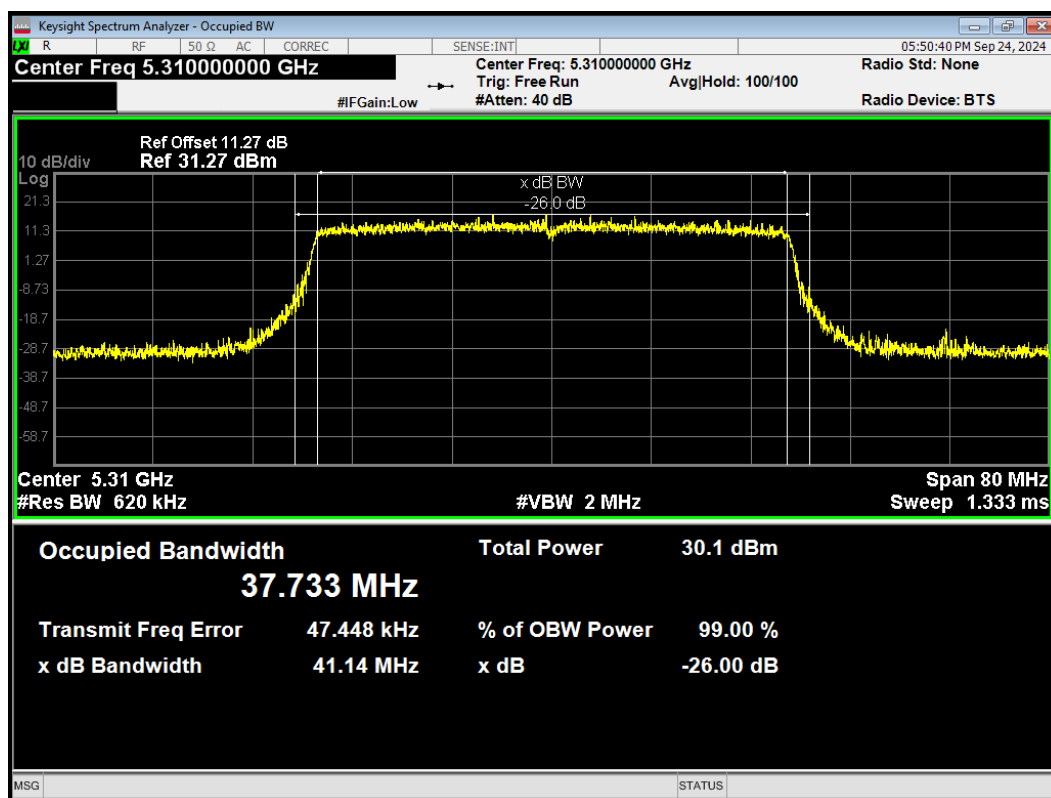
OBW 802.11ax(HE20) 5320MHz



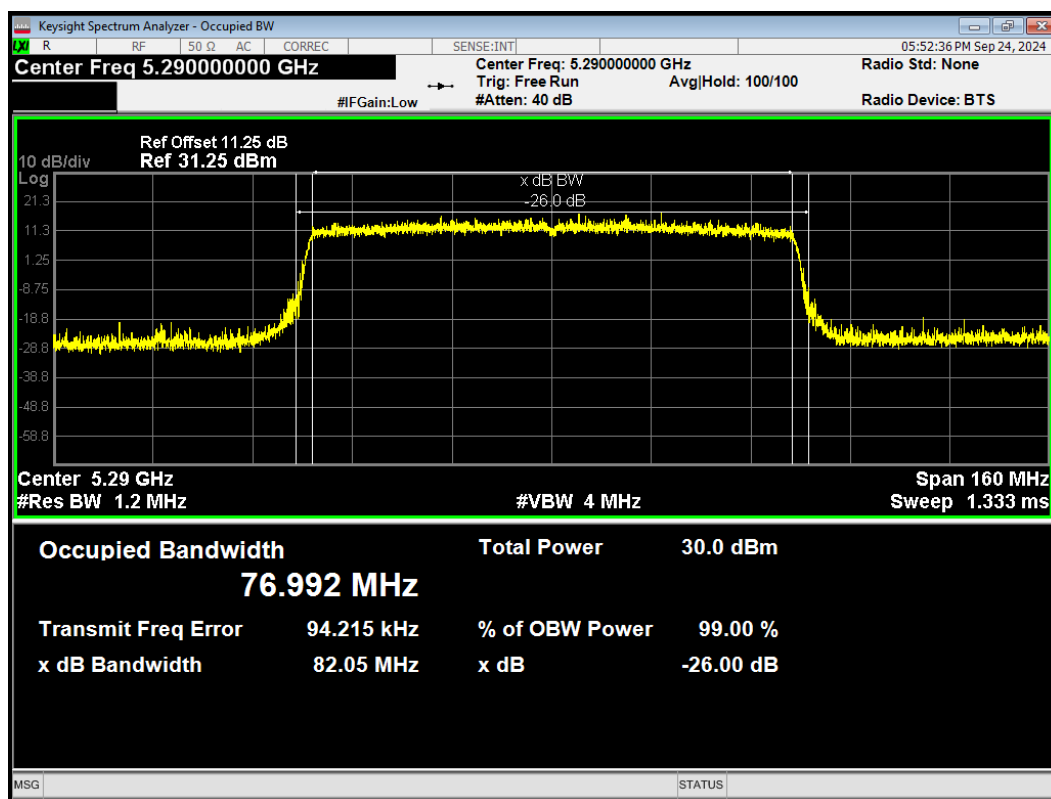
OBW 802.11ax(HE40) 5270MHz



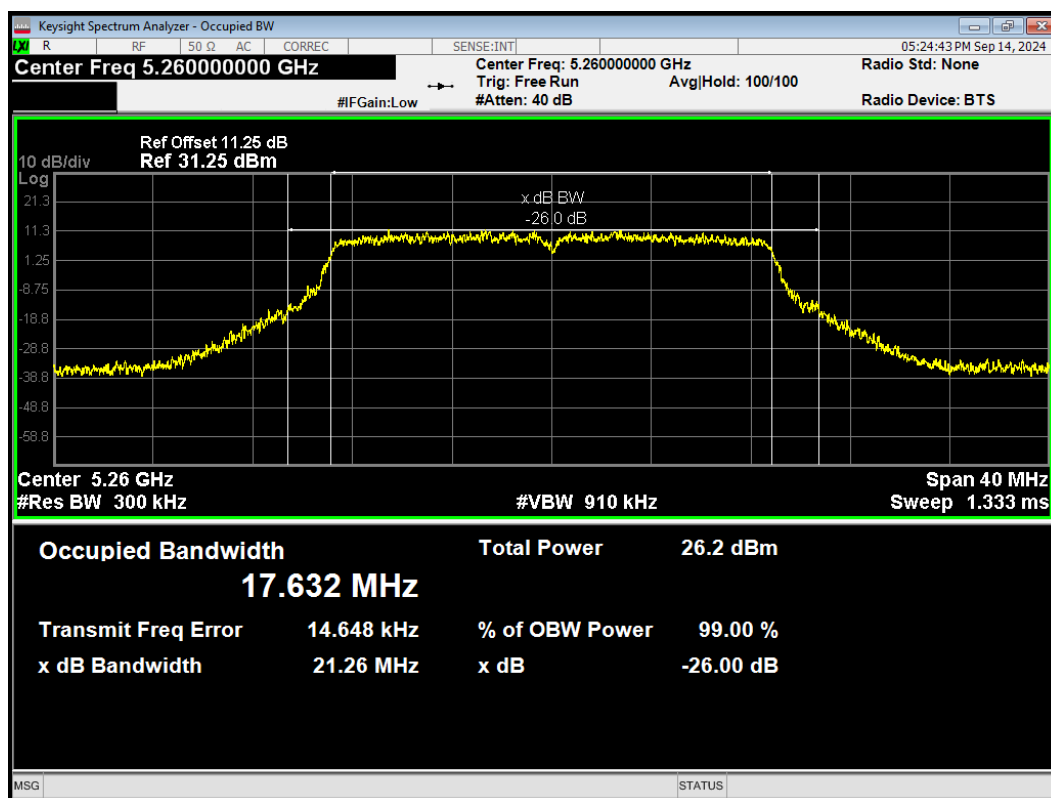
OBW 802.11ax(HE40) 5310MHz



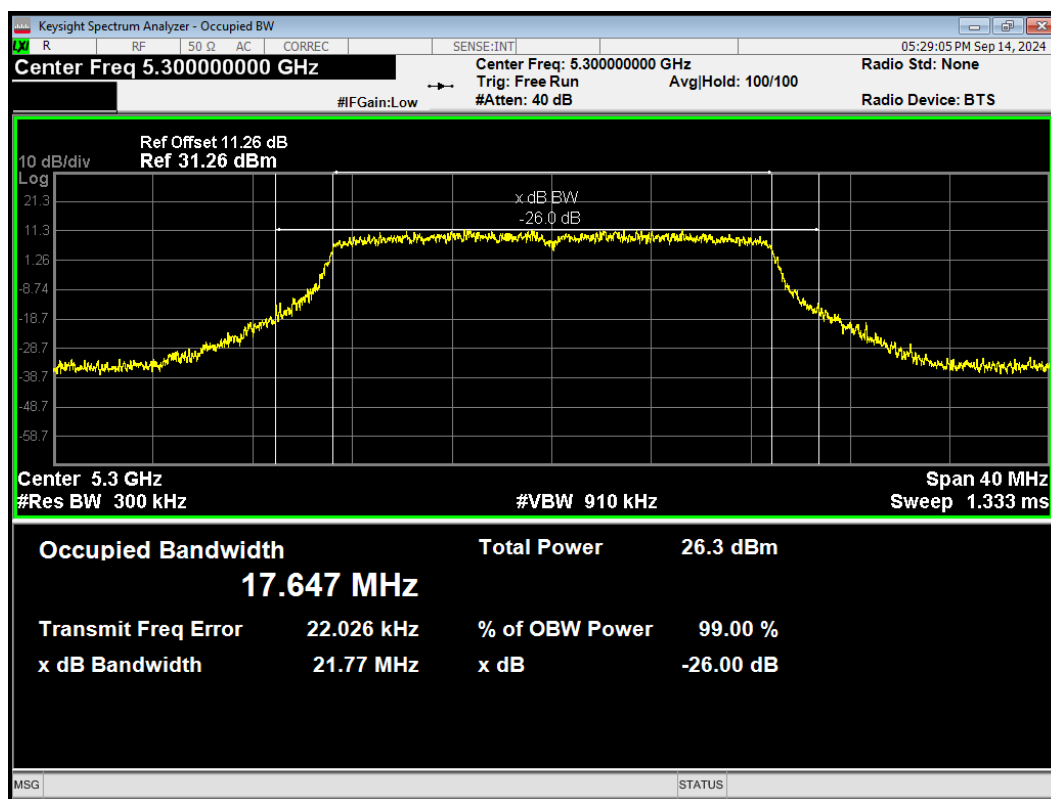
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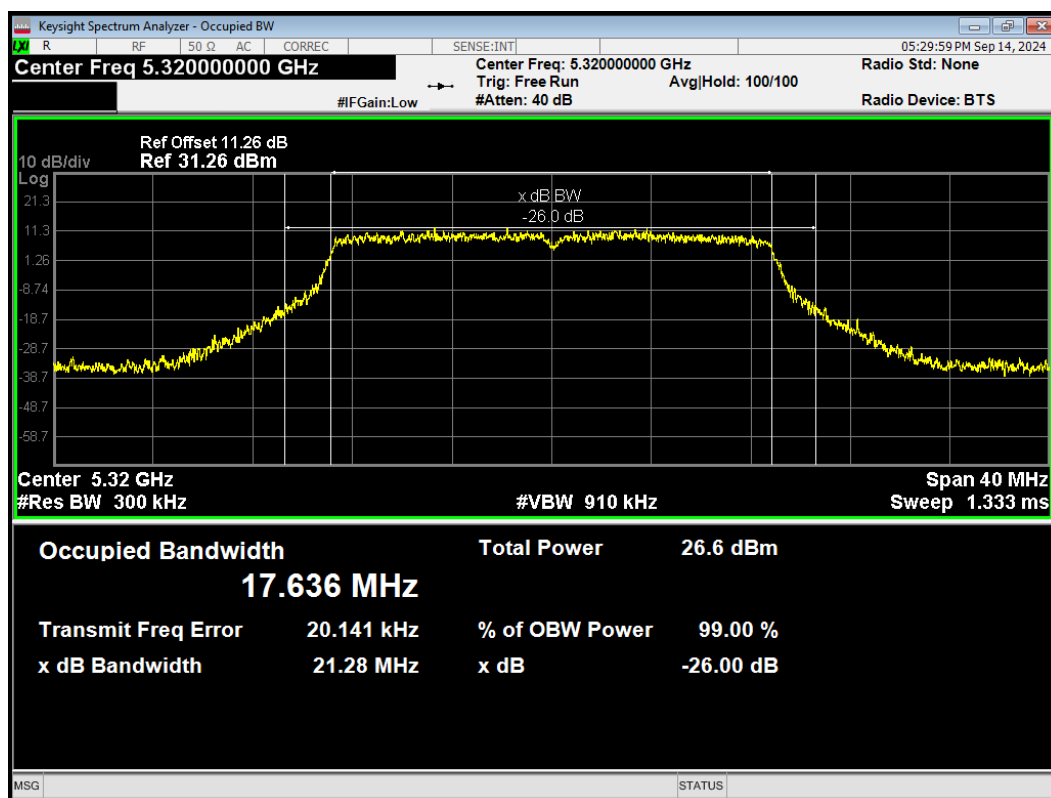
OBW 802.11n(HT20) 5260MHz



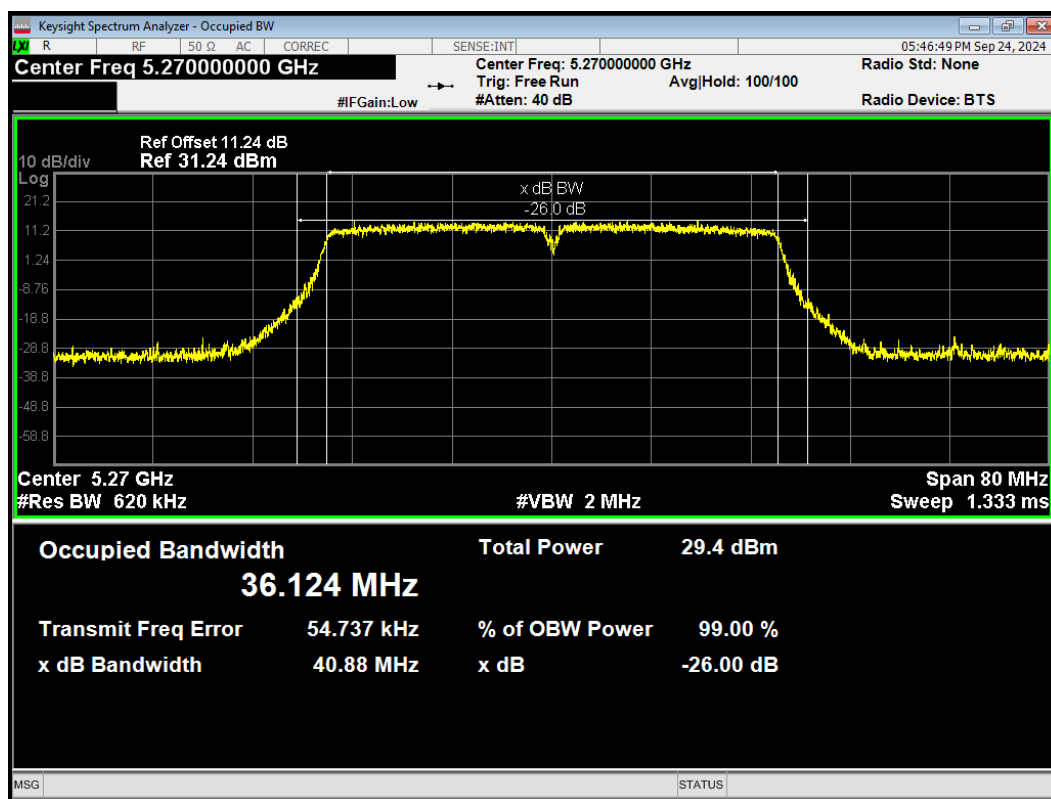
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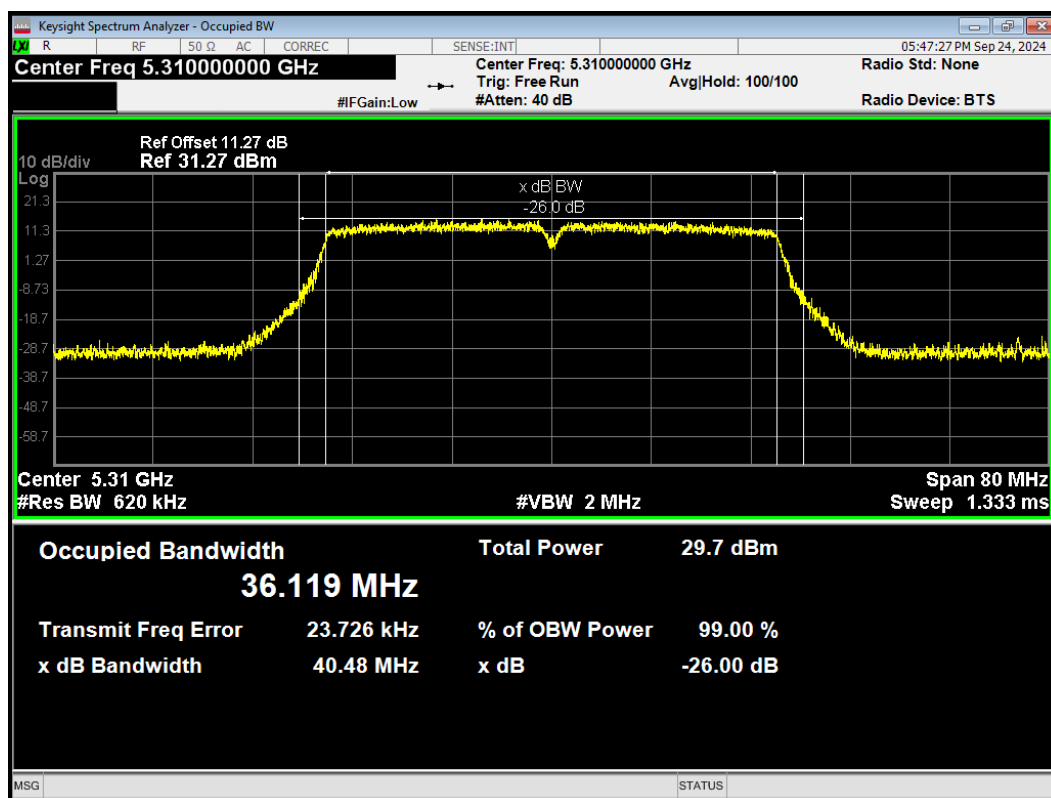
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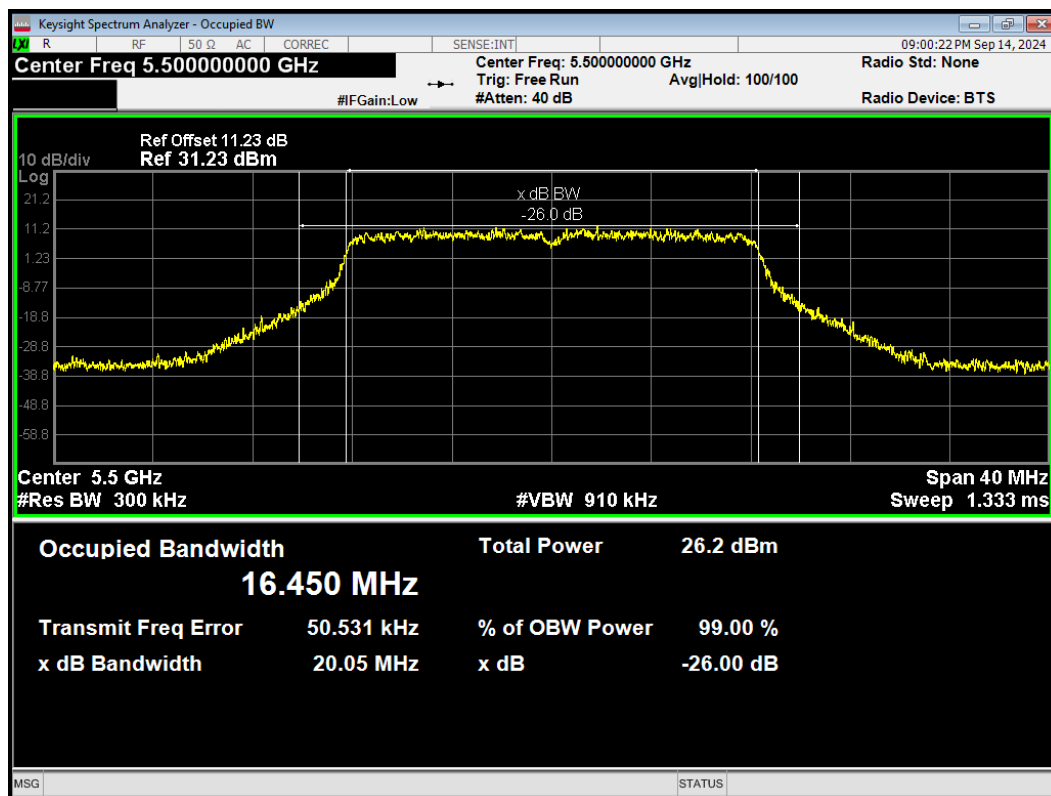
OBW 802.11n(HT40) 5270MHz



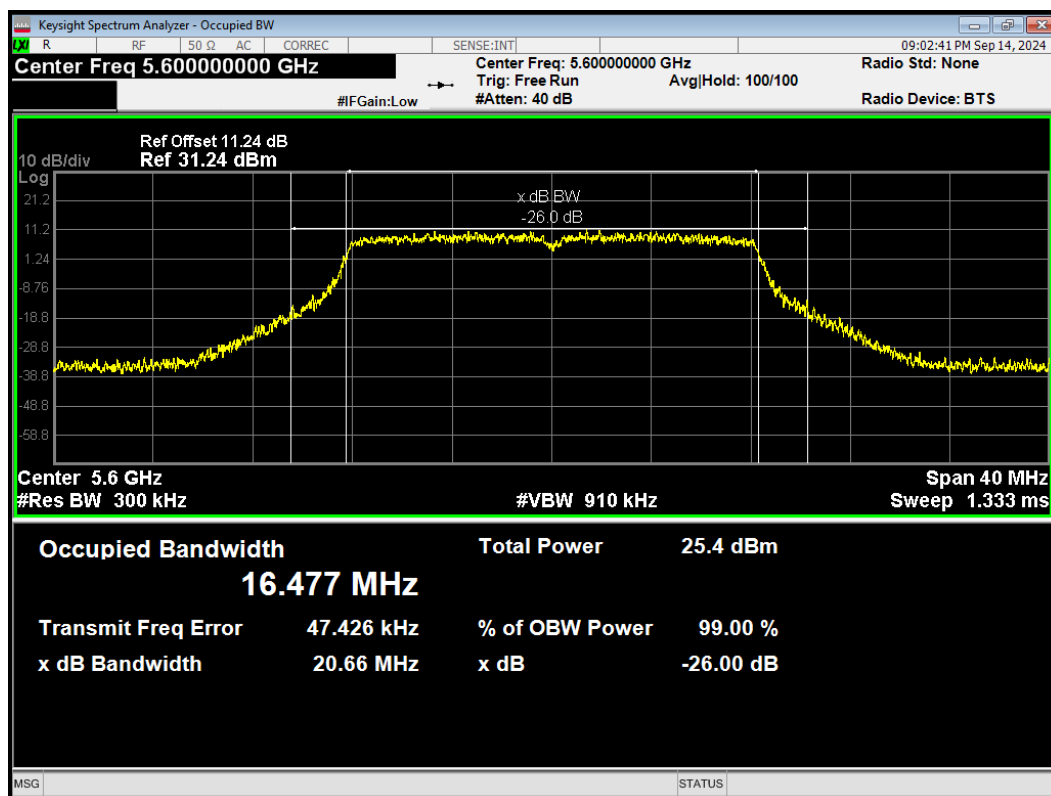
OBW 802.11n(HT40) 5310MHz



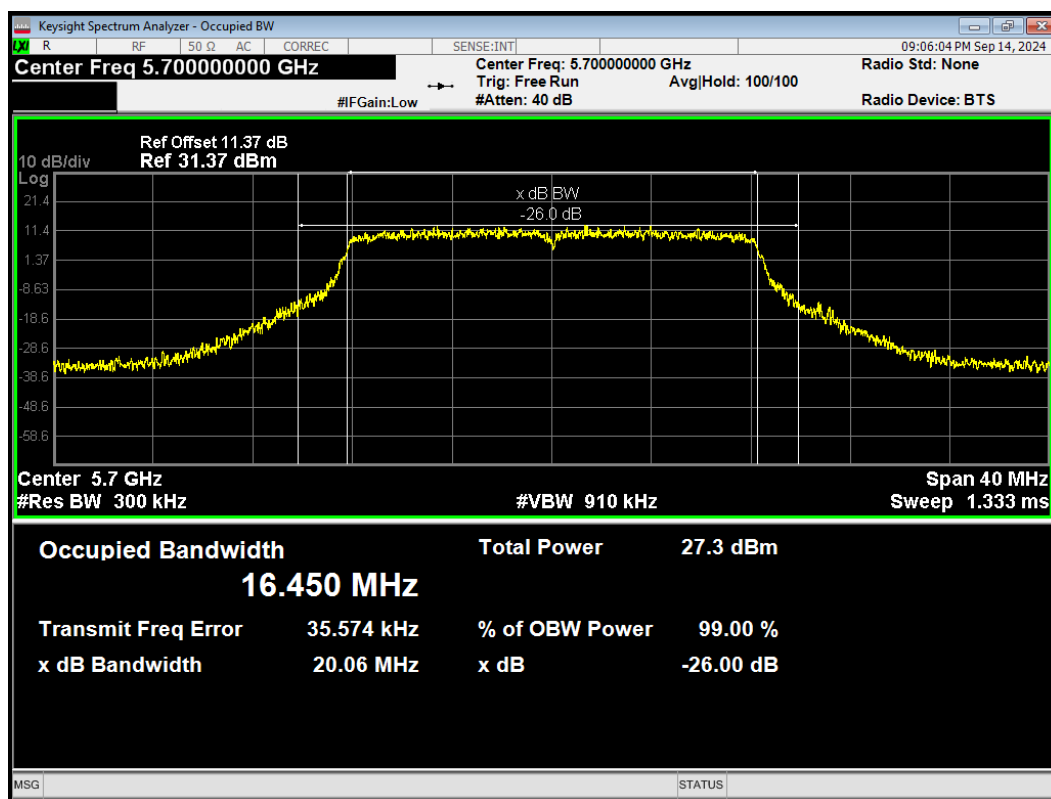
OBW 802.11a 5500MHz



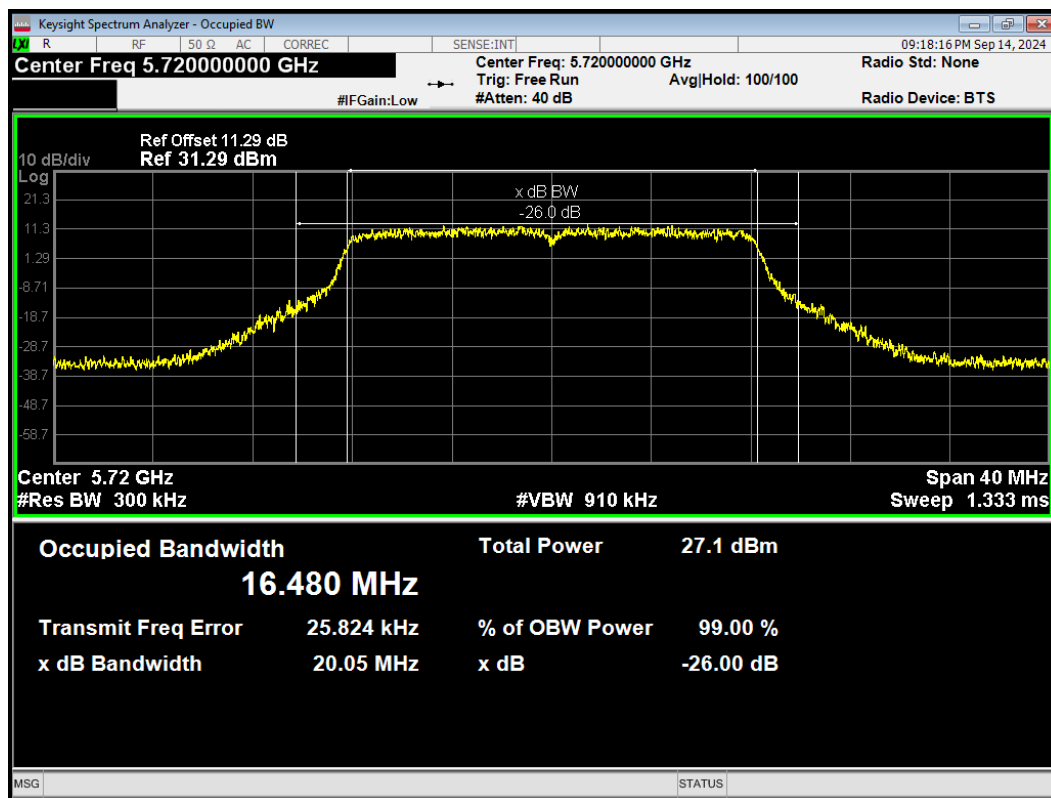
OBW 802.11a 5600MHz



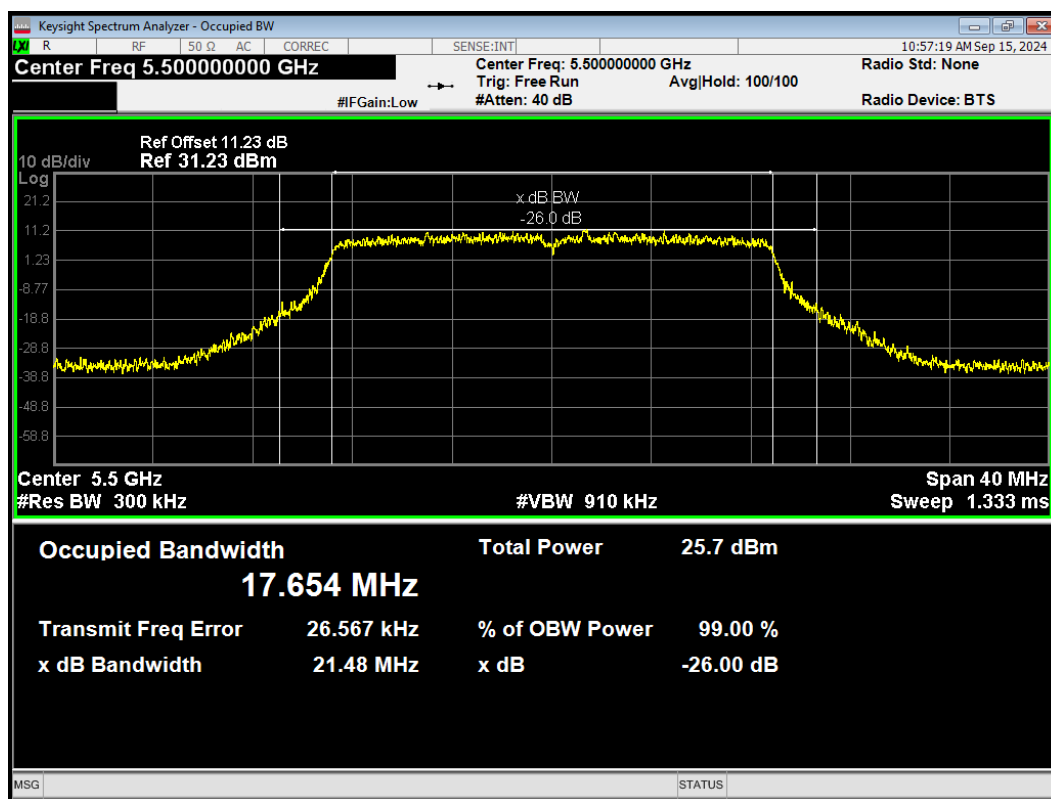
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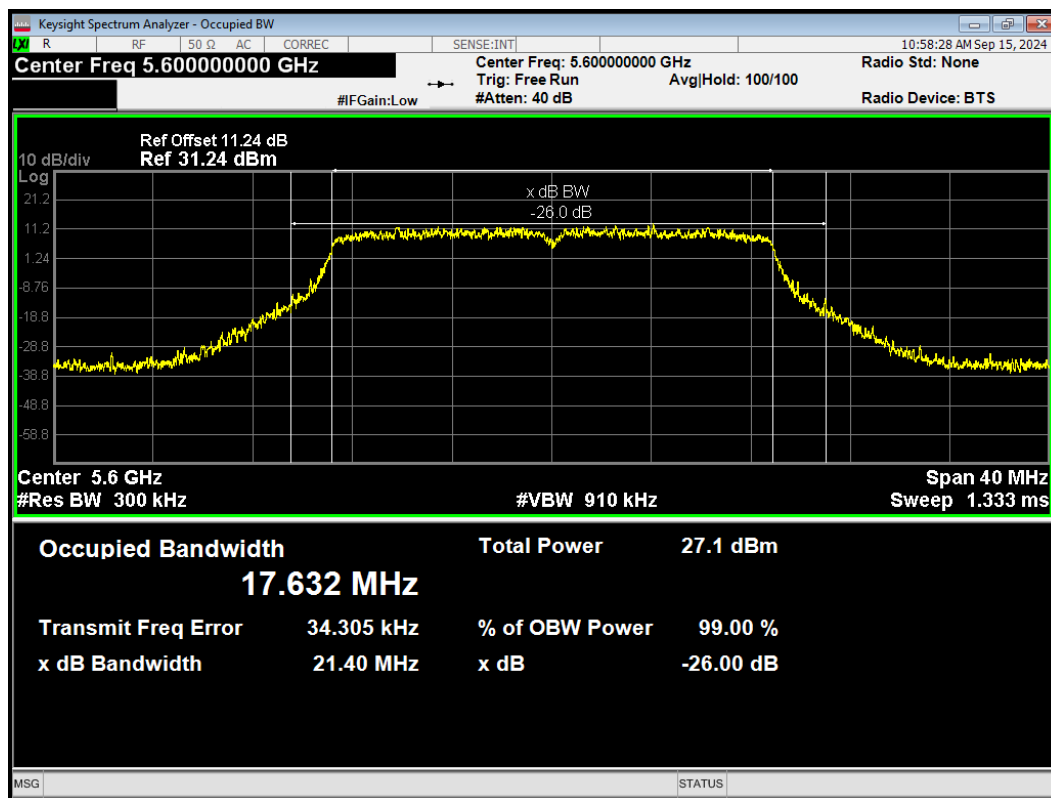
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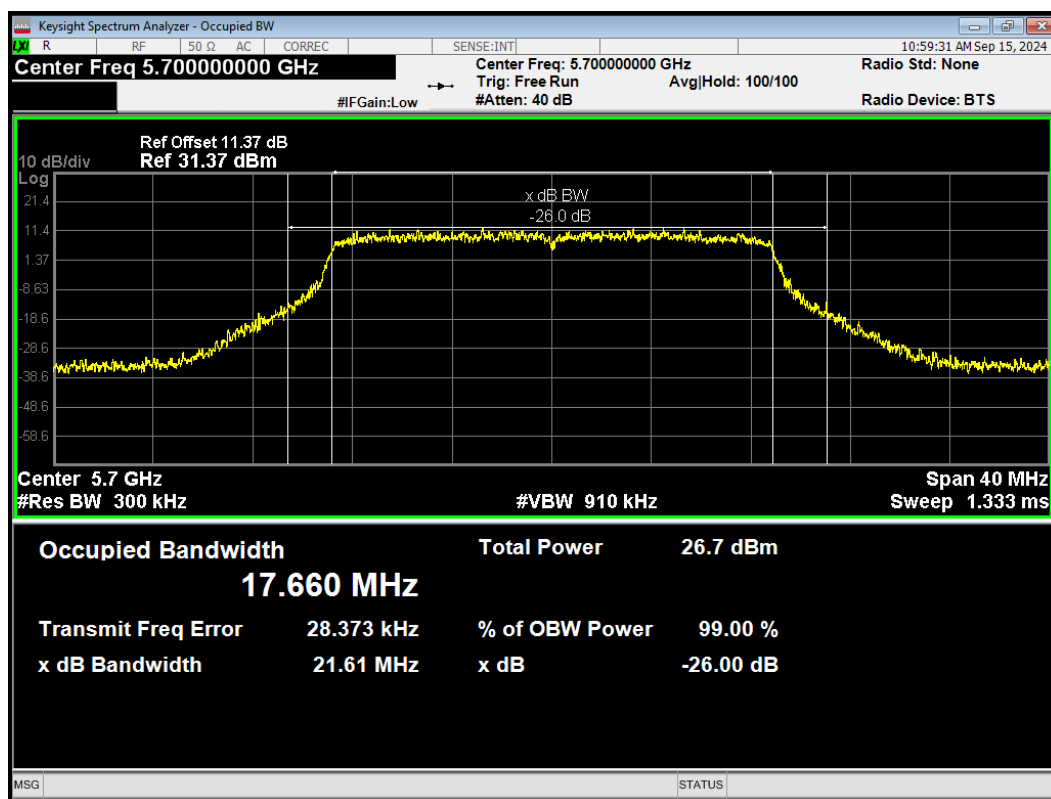
OBW 802.11ac(VHT20) 5500MHz



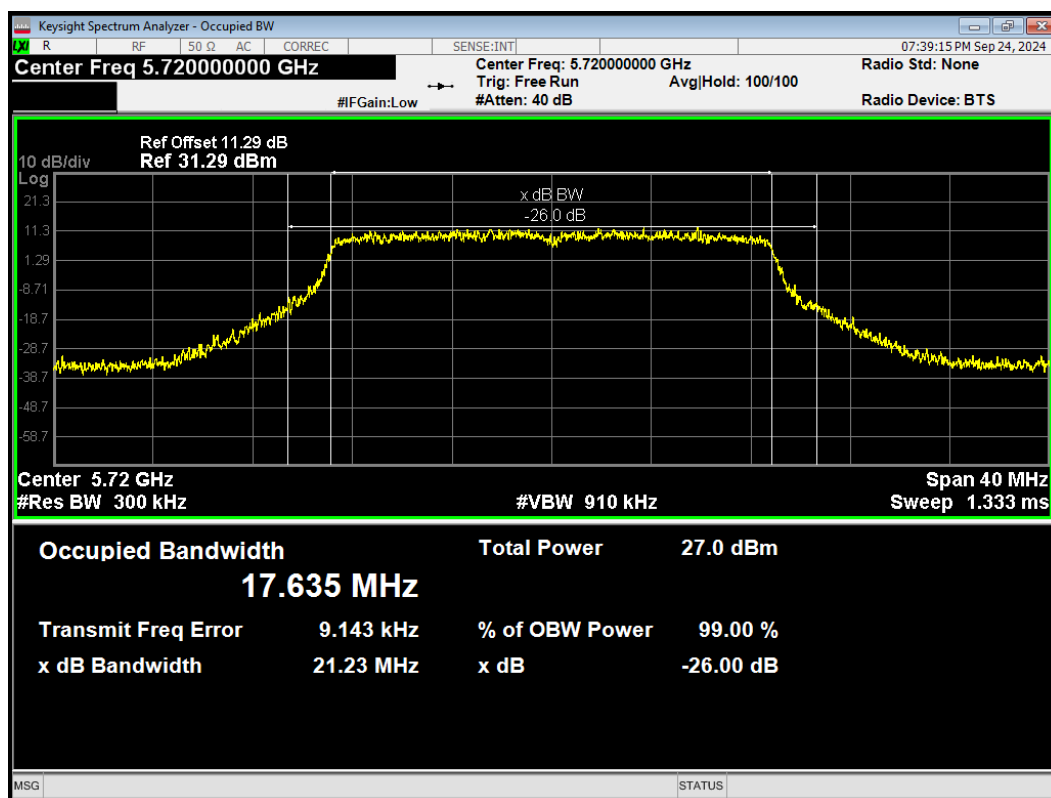
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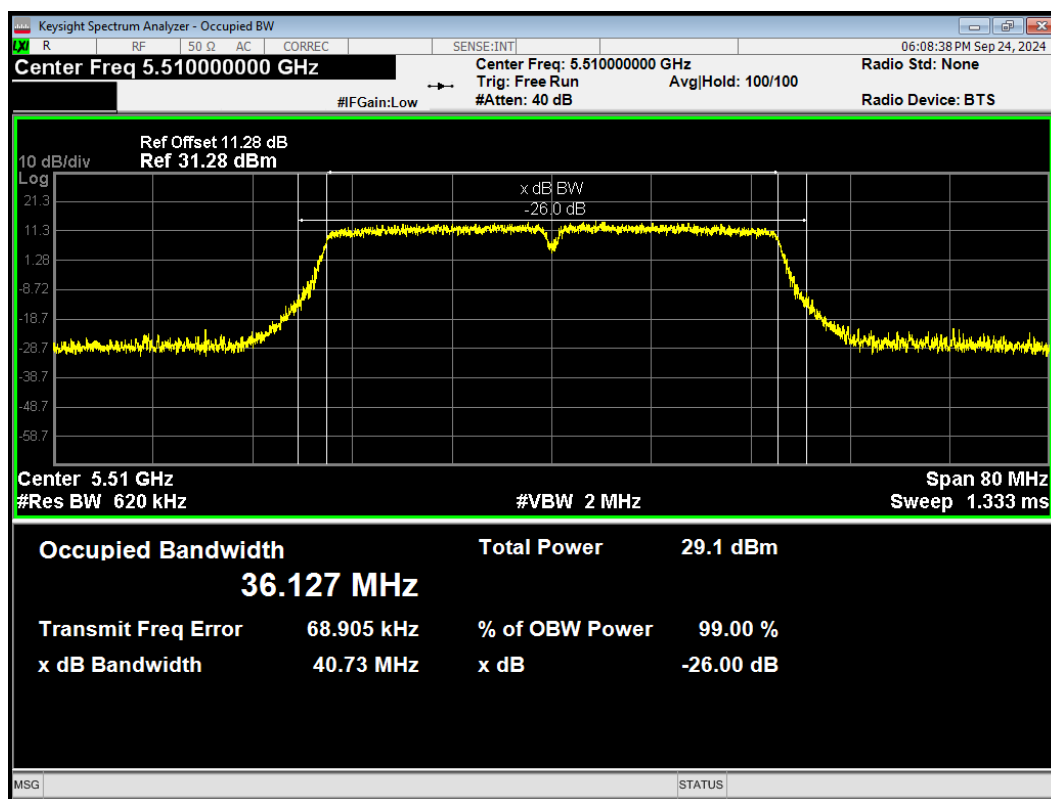
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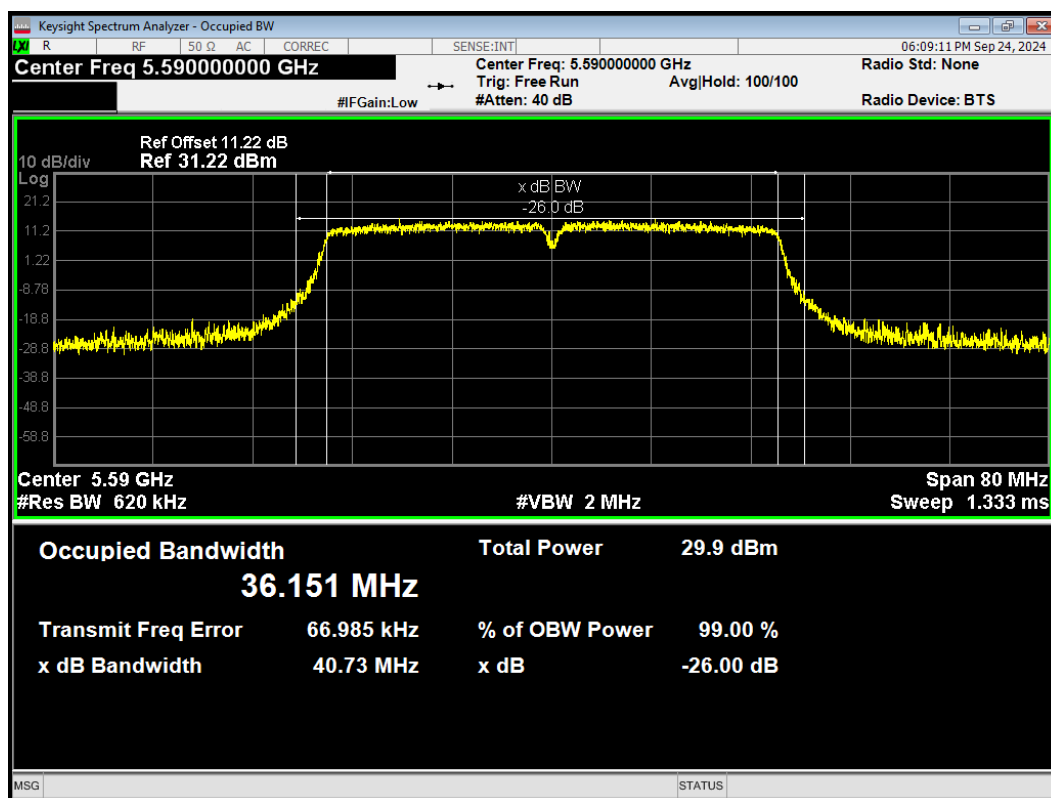
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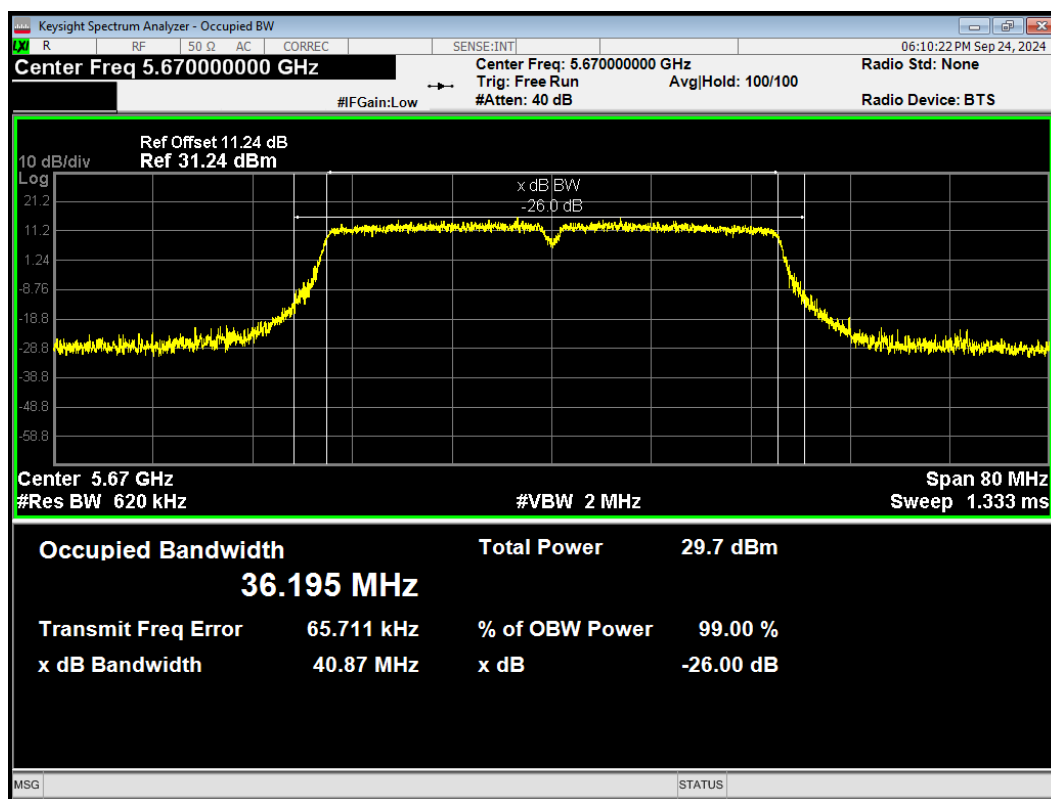
OBW 802.11ac(VHT40) 5510MHz



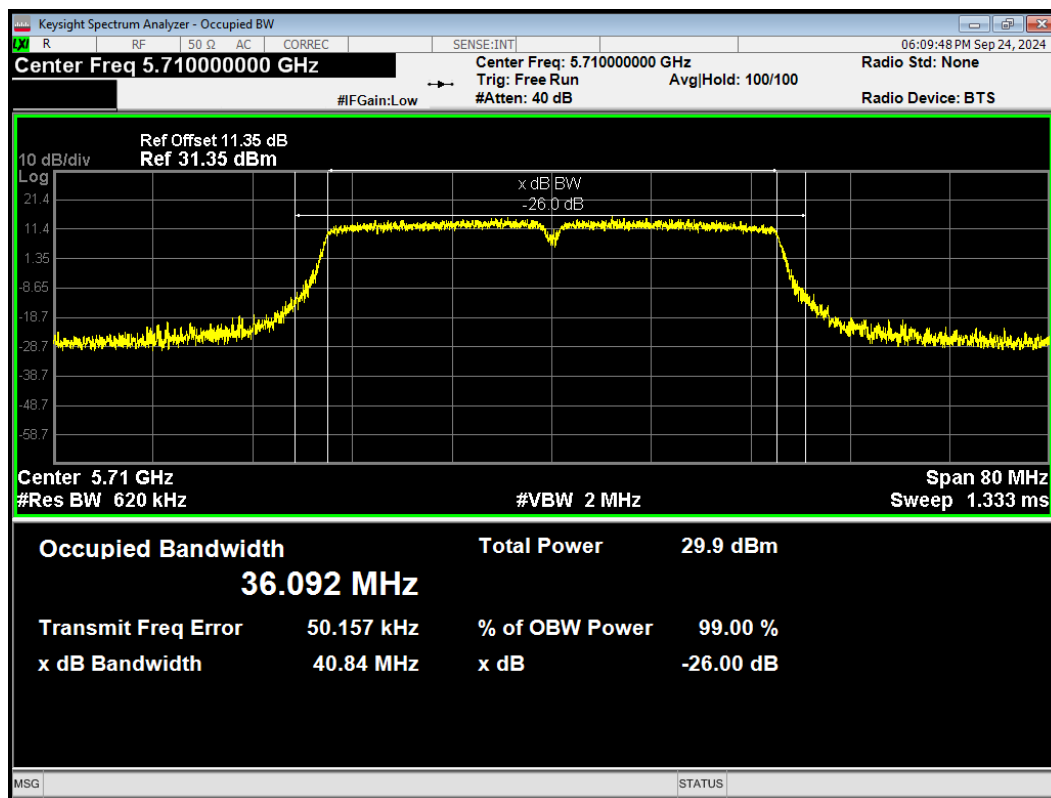
OBW 802.11ac(VHT40) 5590MHz



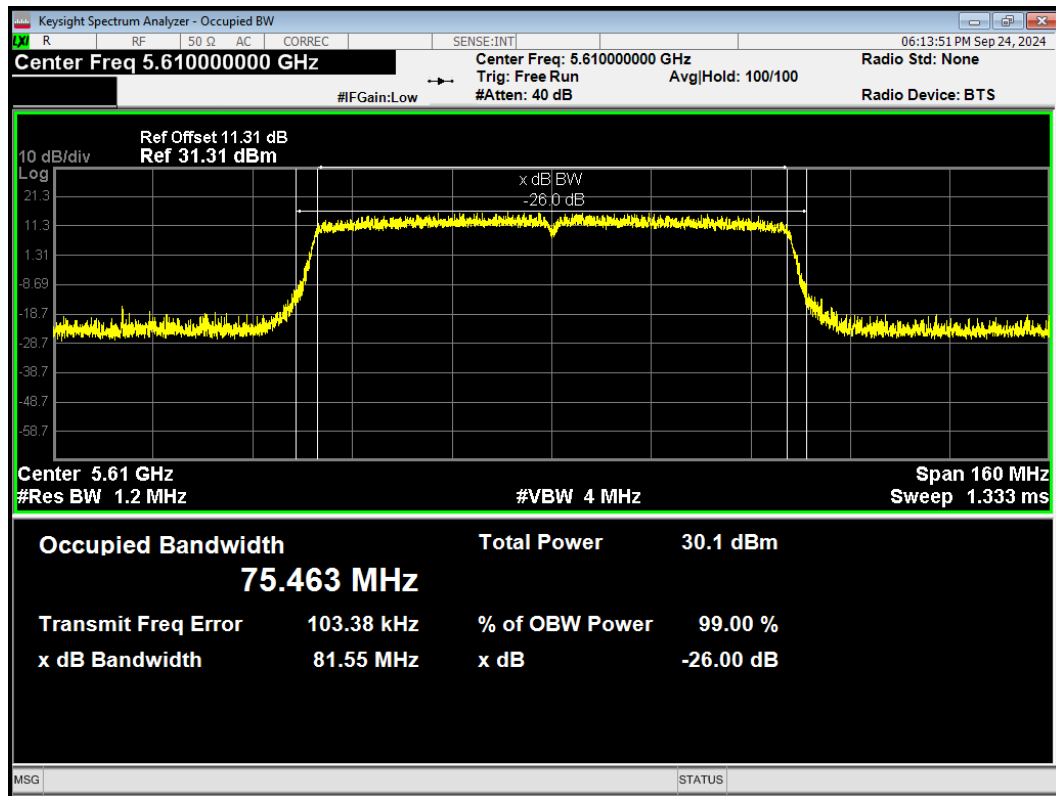
OBW 802.11ac(VHT40) 5670MHz



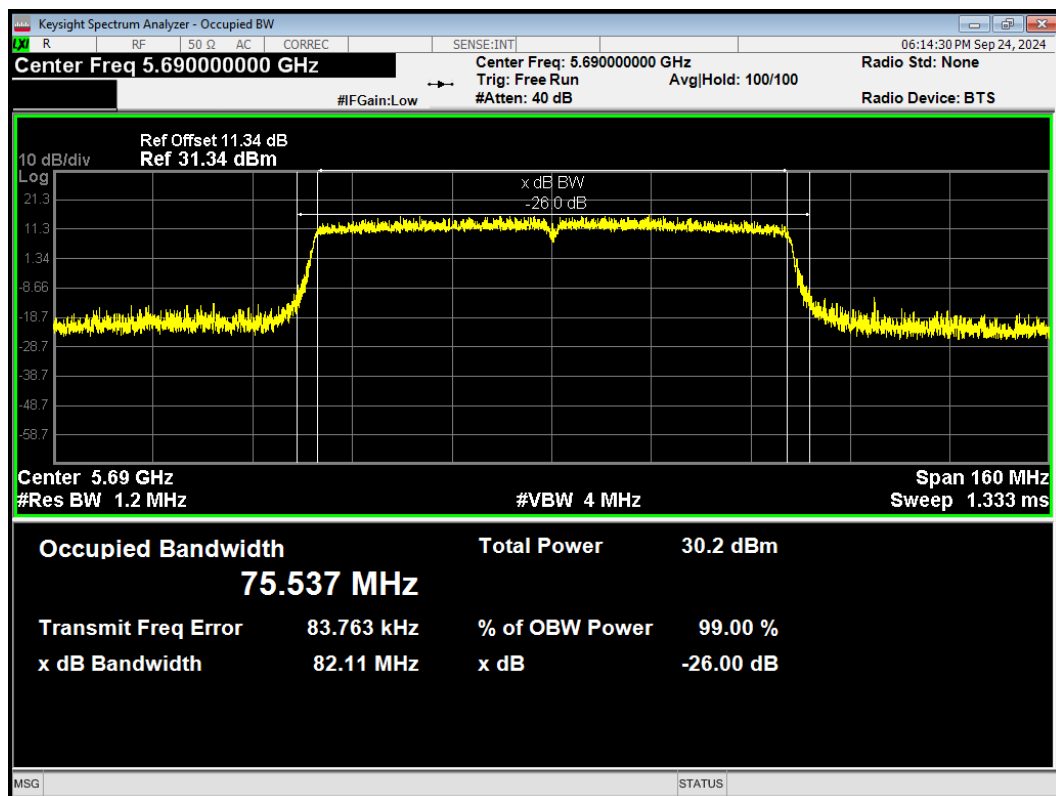
OBW 802.11ac(VHT40) 5710MHz



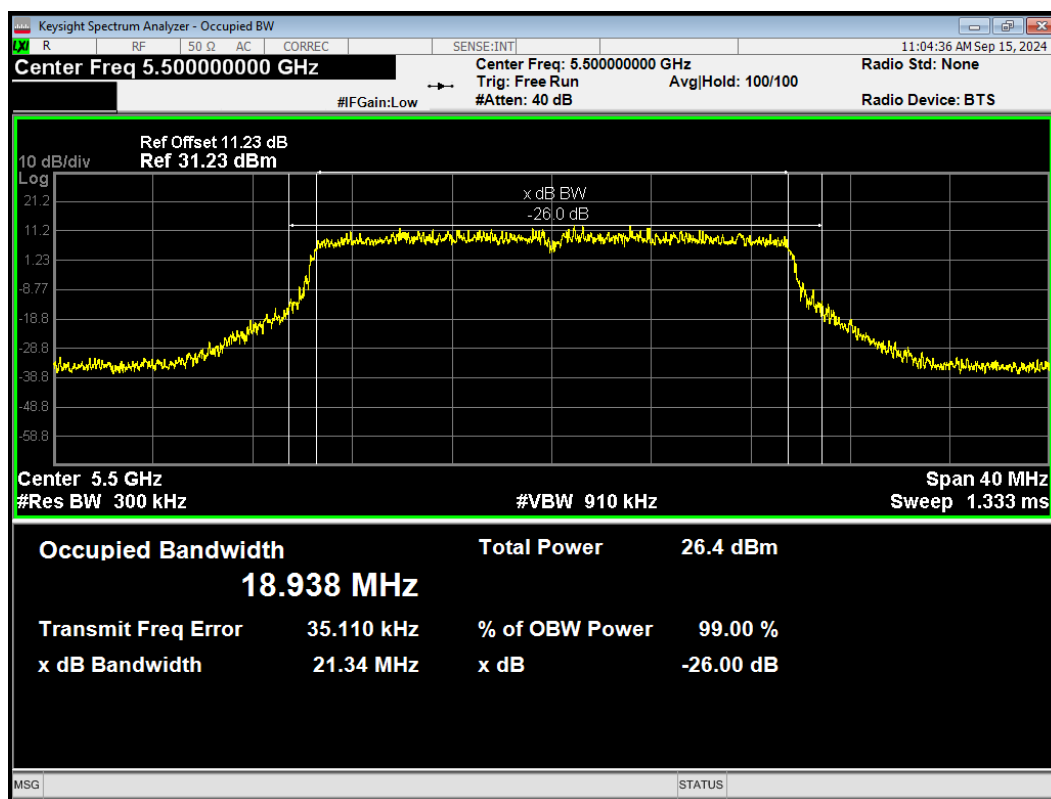
OBW 802.11ac(VHT80) 5610MHz



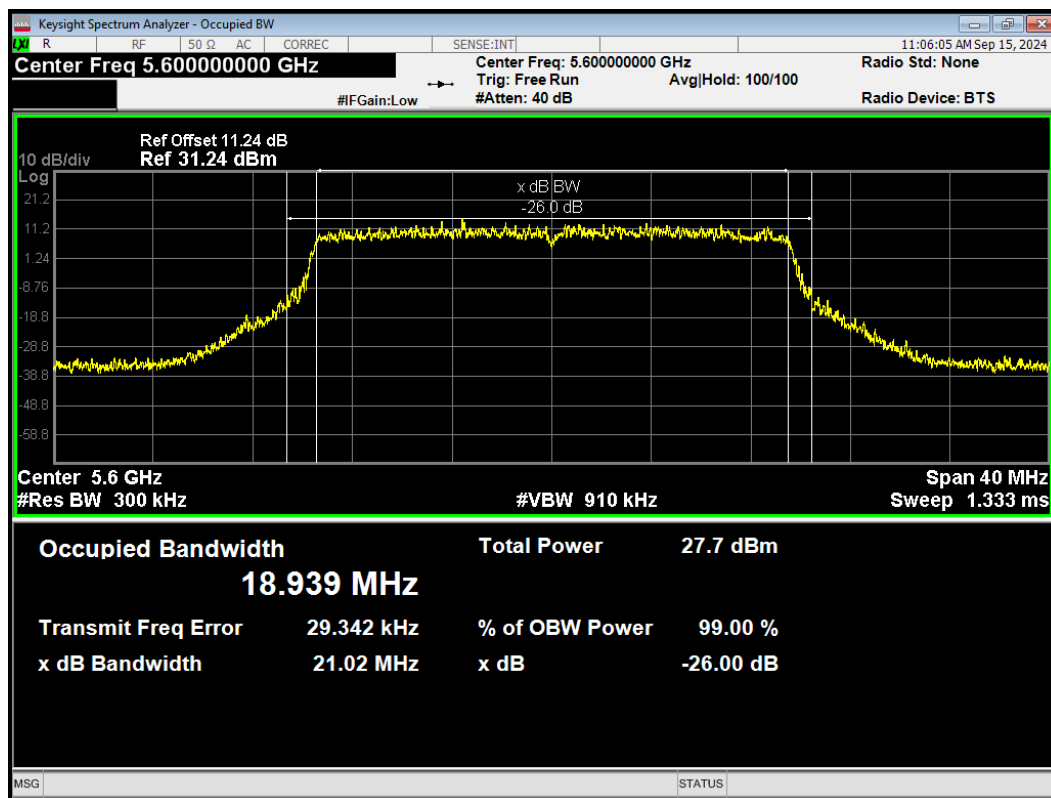
OBW 802.11ac(VHT80) 5690MHz



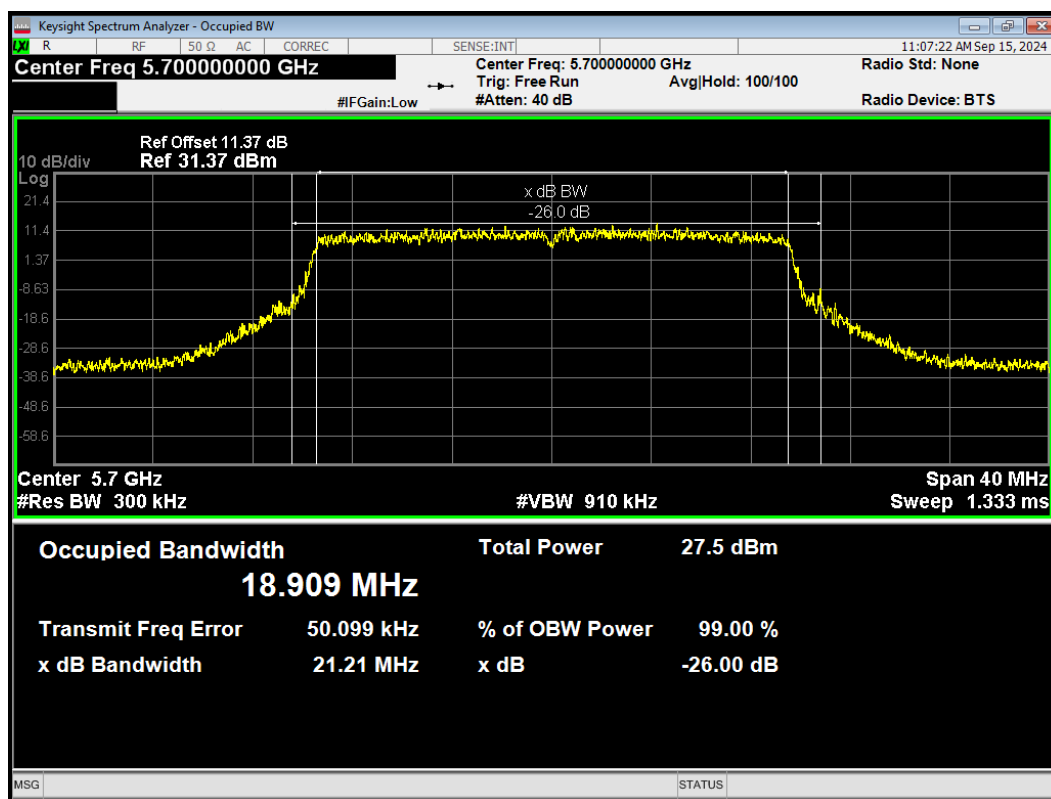
OBW 802.11ax(HE20) 5500MHz



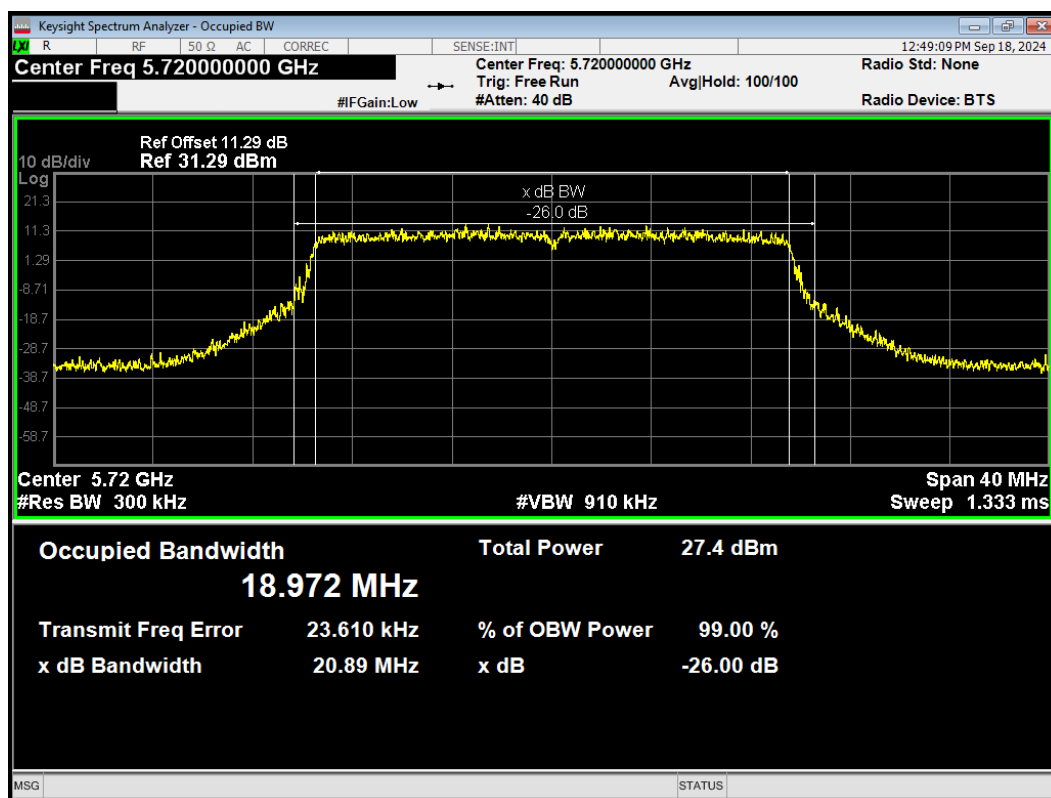
OBW 802.11ax(HE20) 5600MHz



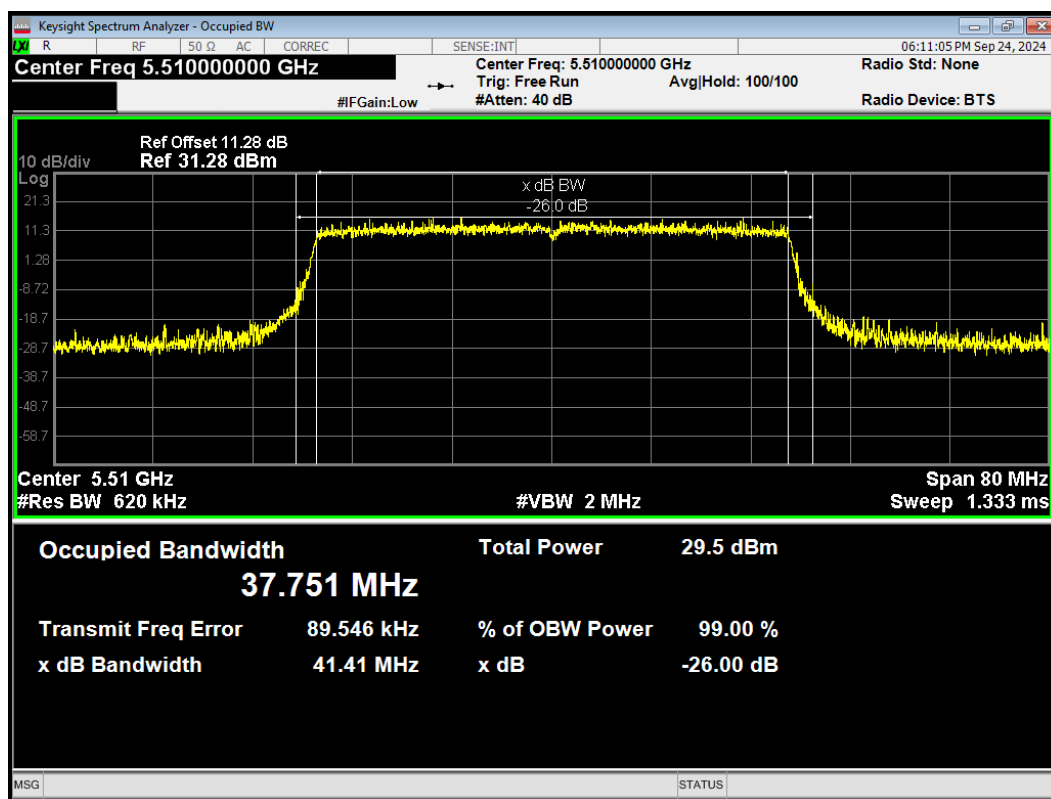
OBW 802.11ax(HE20) 5700MHz



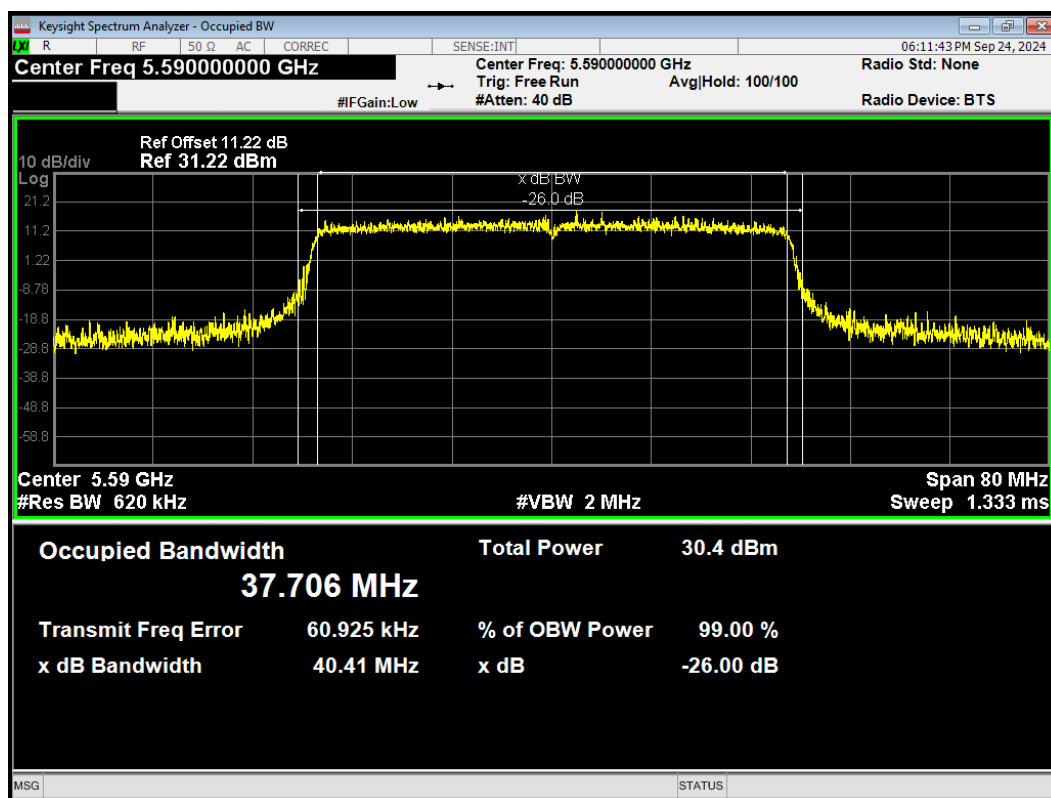
OBW 802.11ax(HE20) 5720MHz



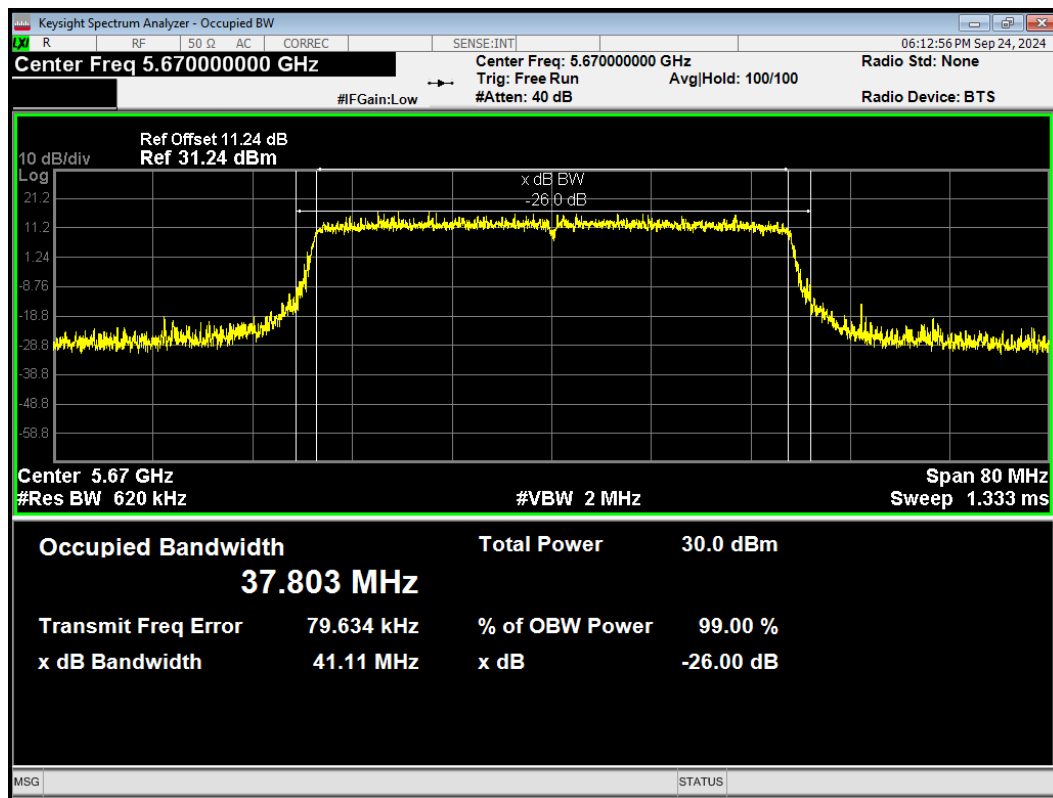
OBW 802.11ax(HE40) 5510MHz



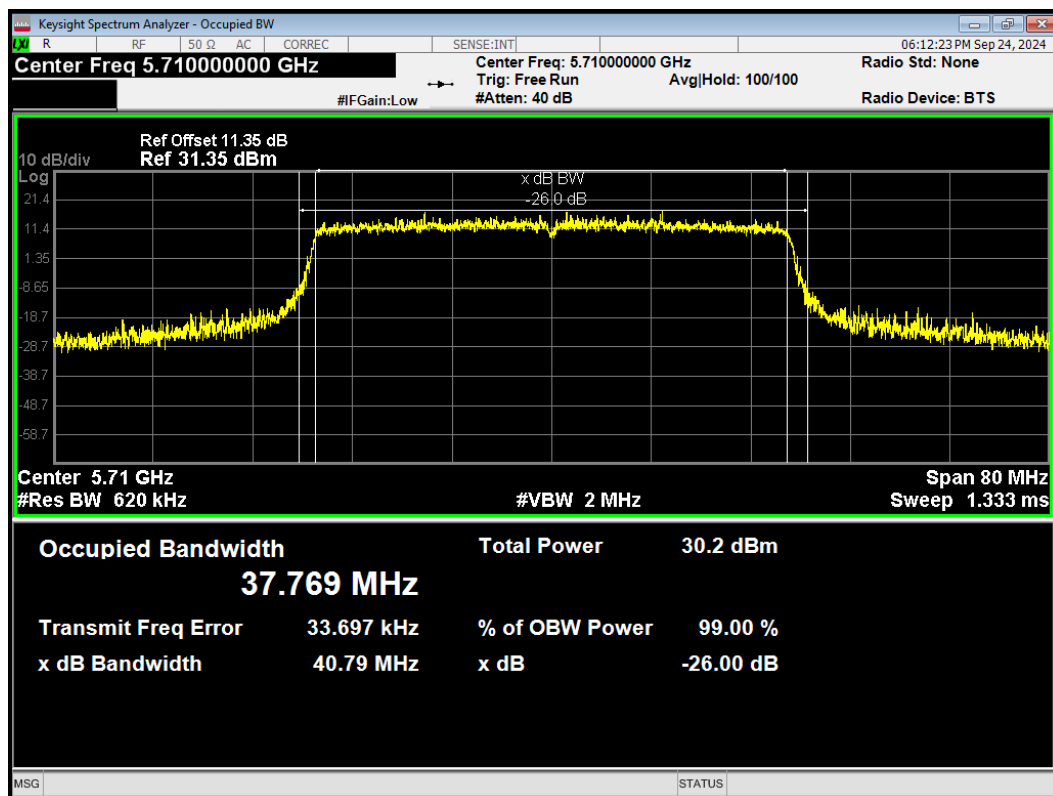
OBW 802.11ax(HE40) 5590MHz



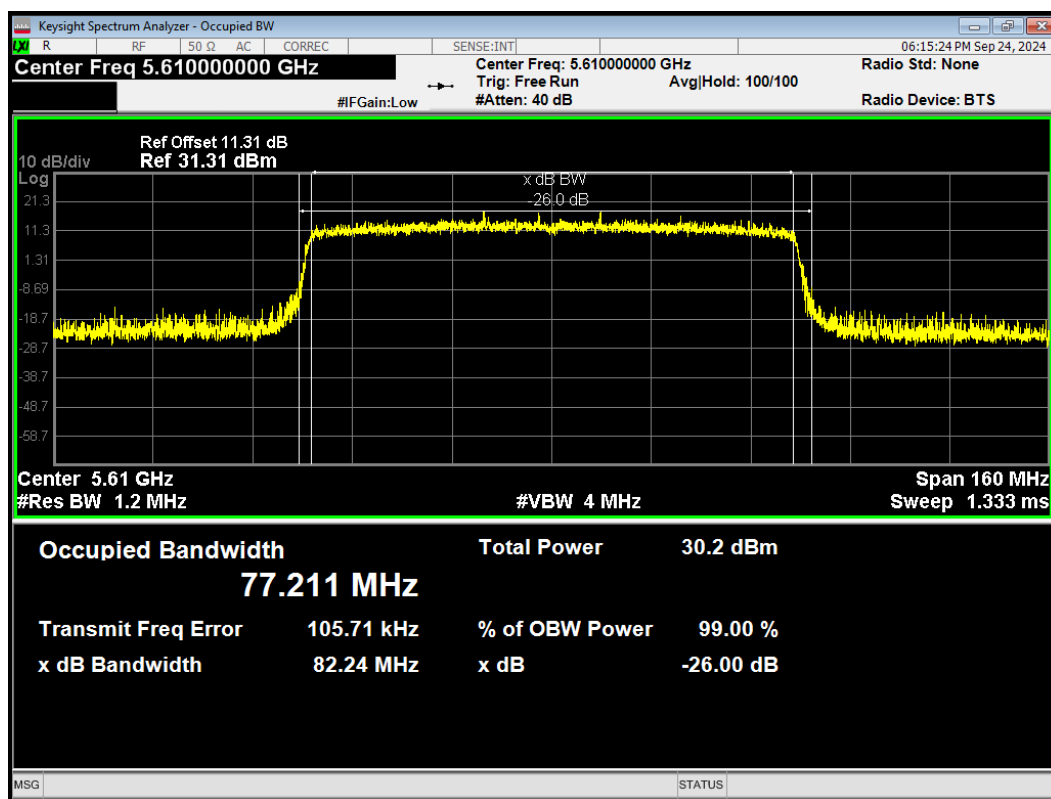
OBW 802.11ax(HE40) 5670MHz



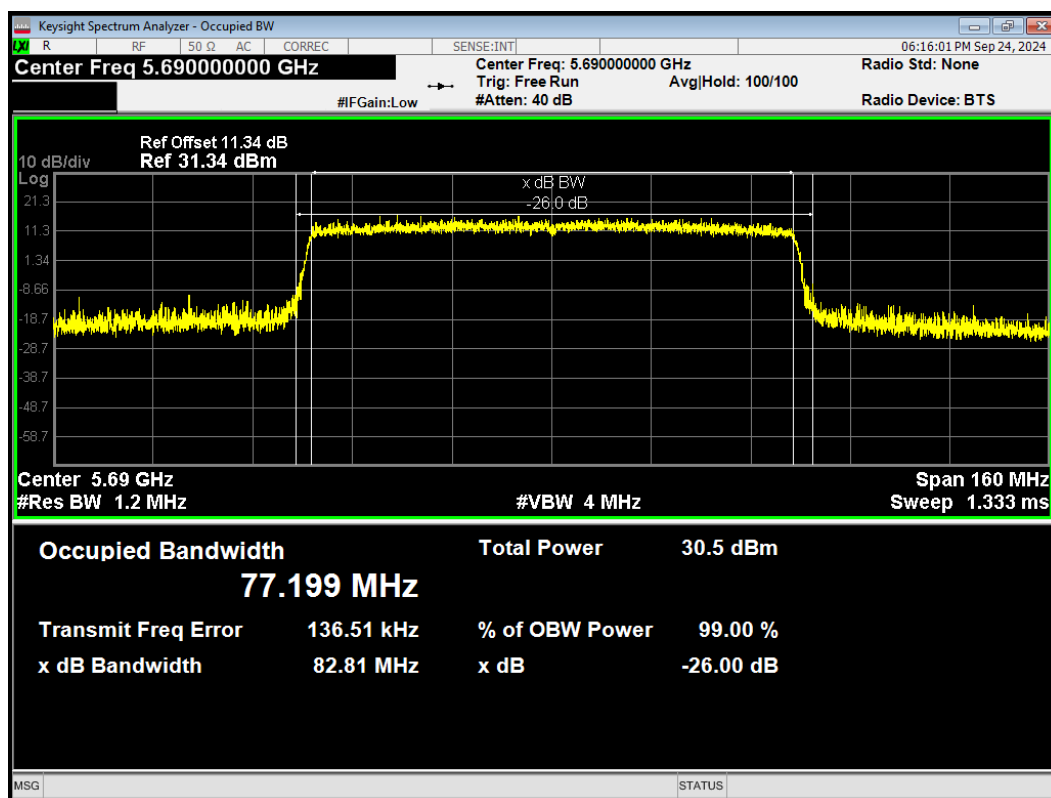
OBW 802.11ax(HE40) 5710MHz



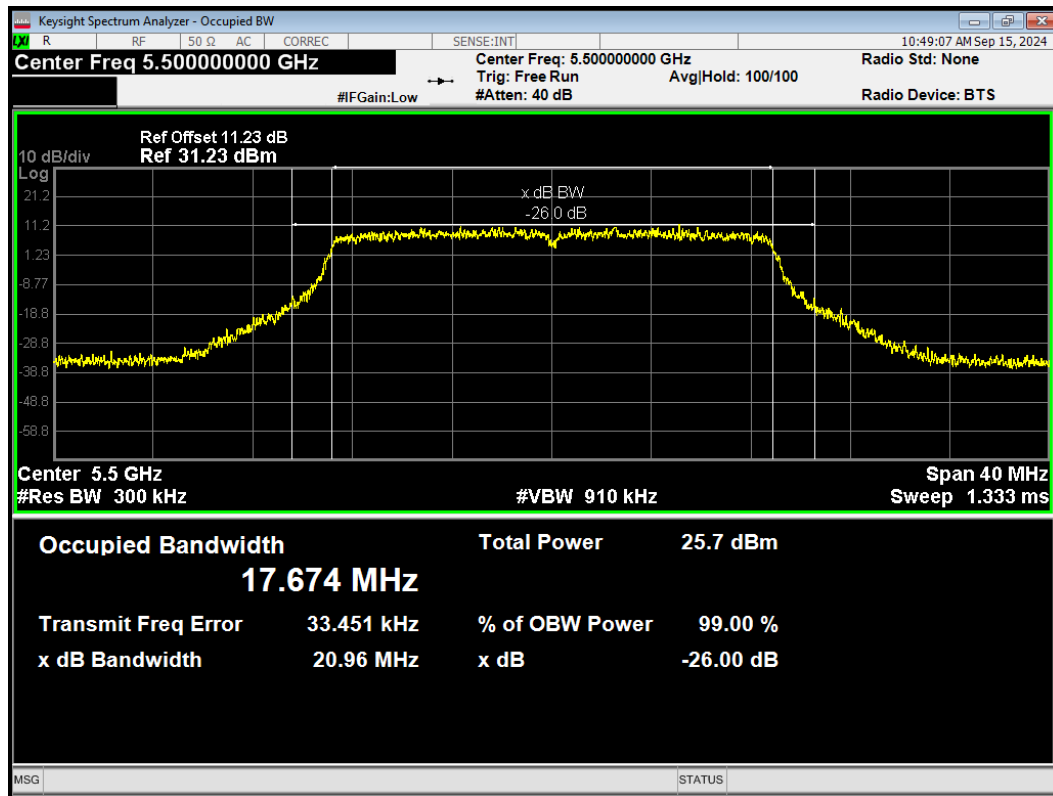
OBW 802.11ax(HE80) 5610MHz



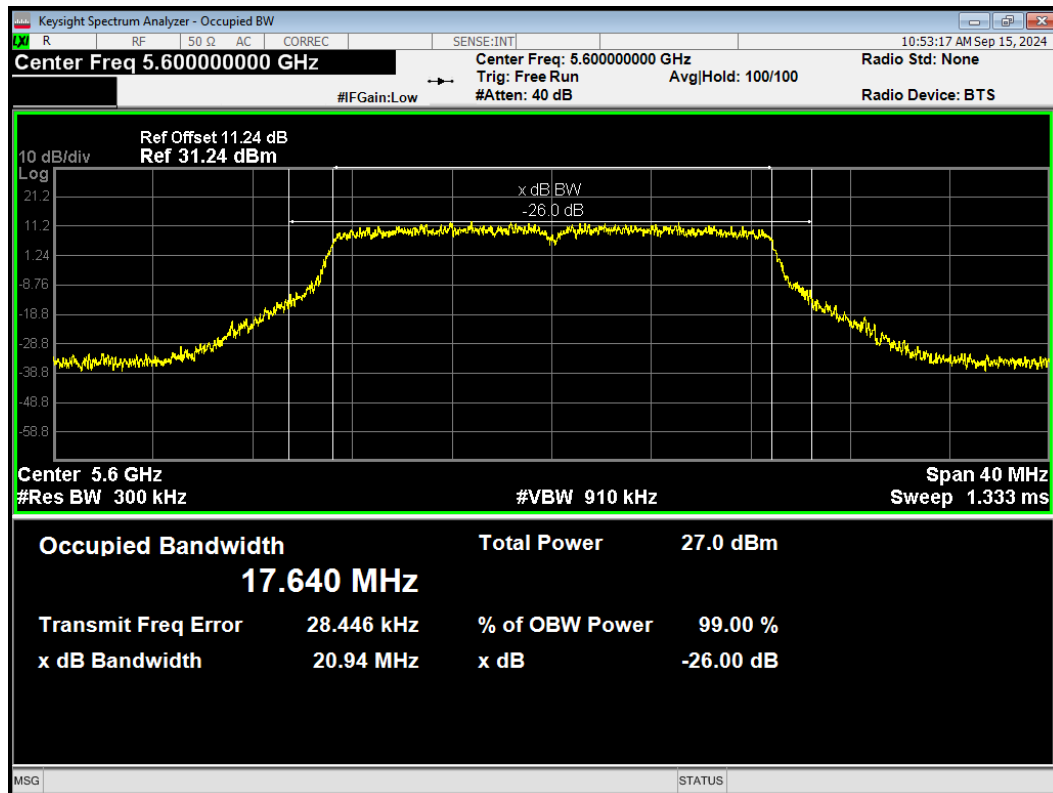
OBW 802.11ax(HE80) 5690MHz



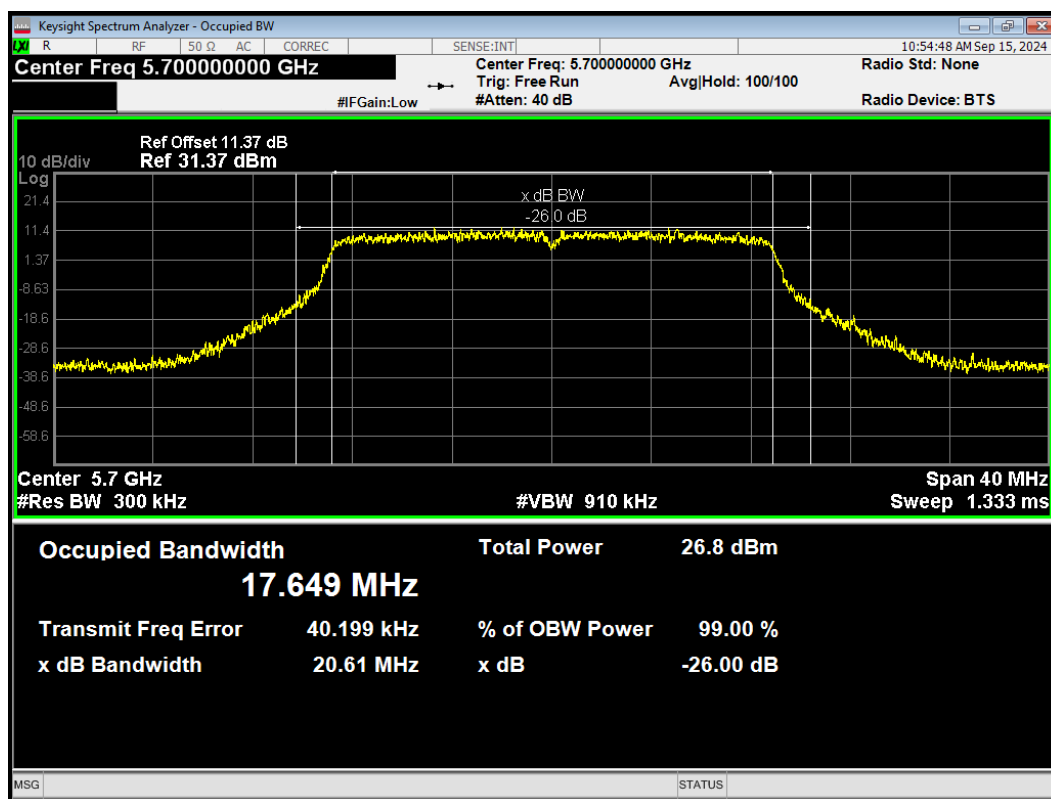
OBW 802.11n(HT20) 5500MHz



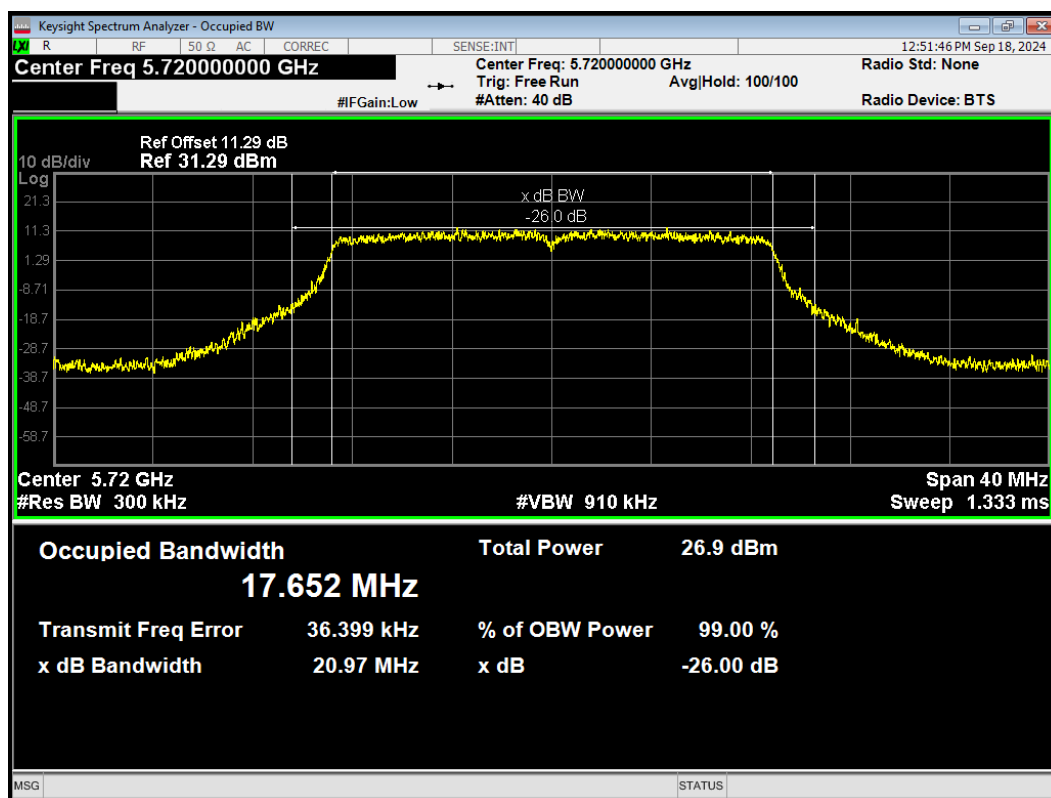
OBW 802.11n(HT20) 5600MHz



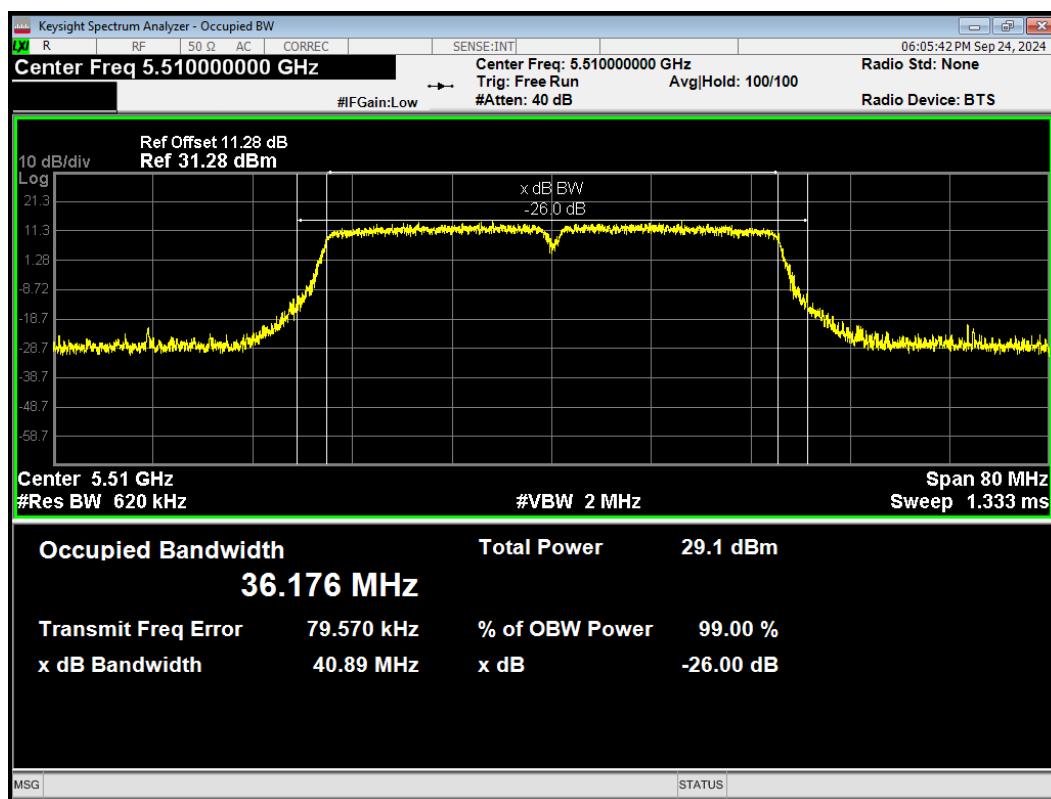
OBW 802.11n(HT20) 5700MHz



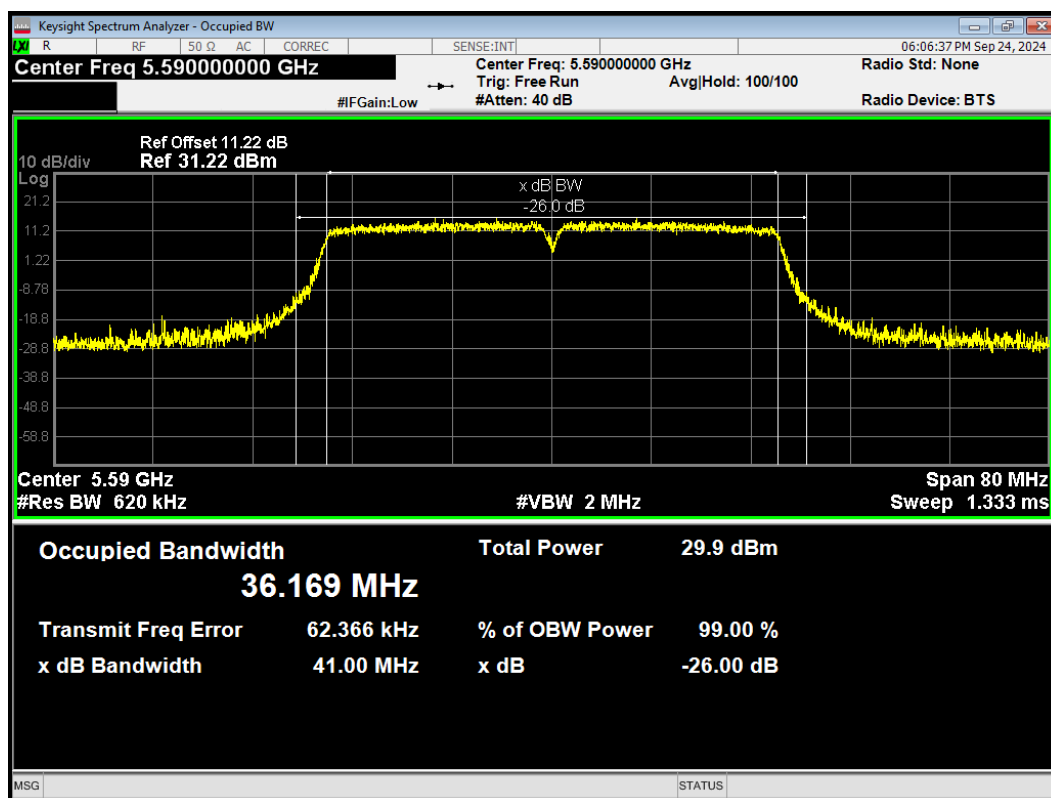
OBW 802.11n(HT20) 5720MHz



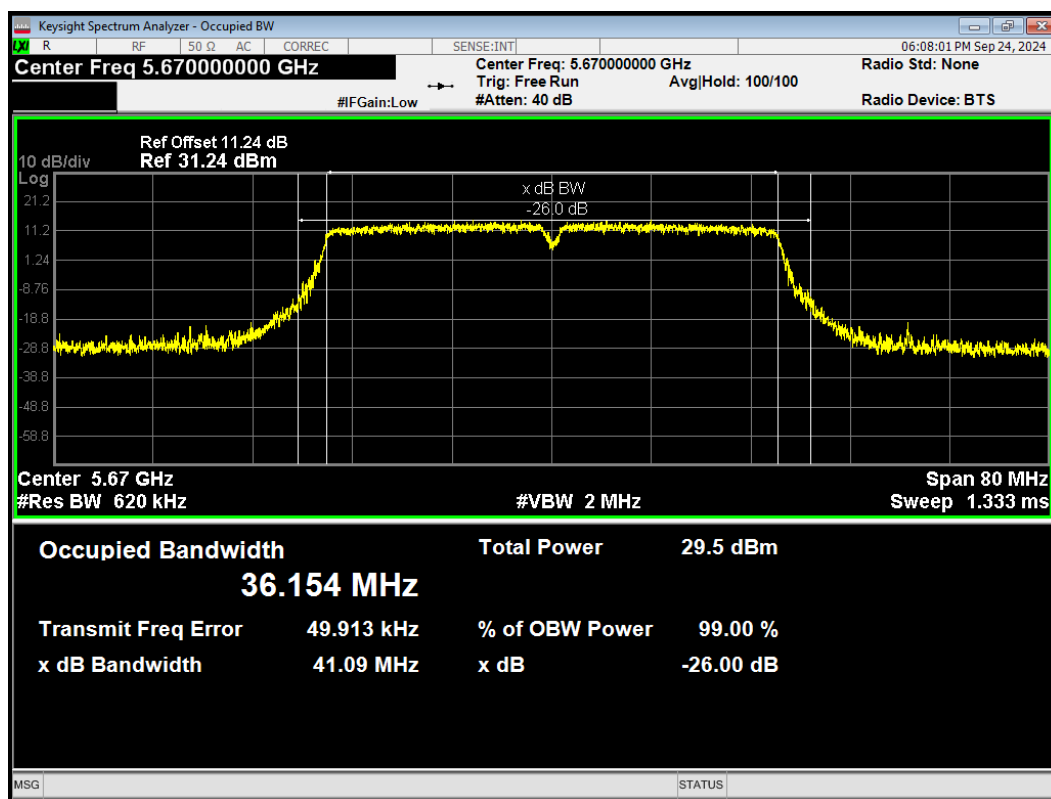
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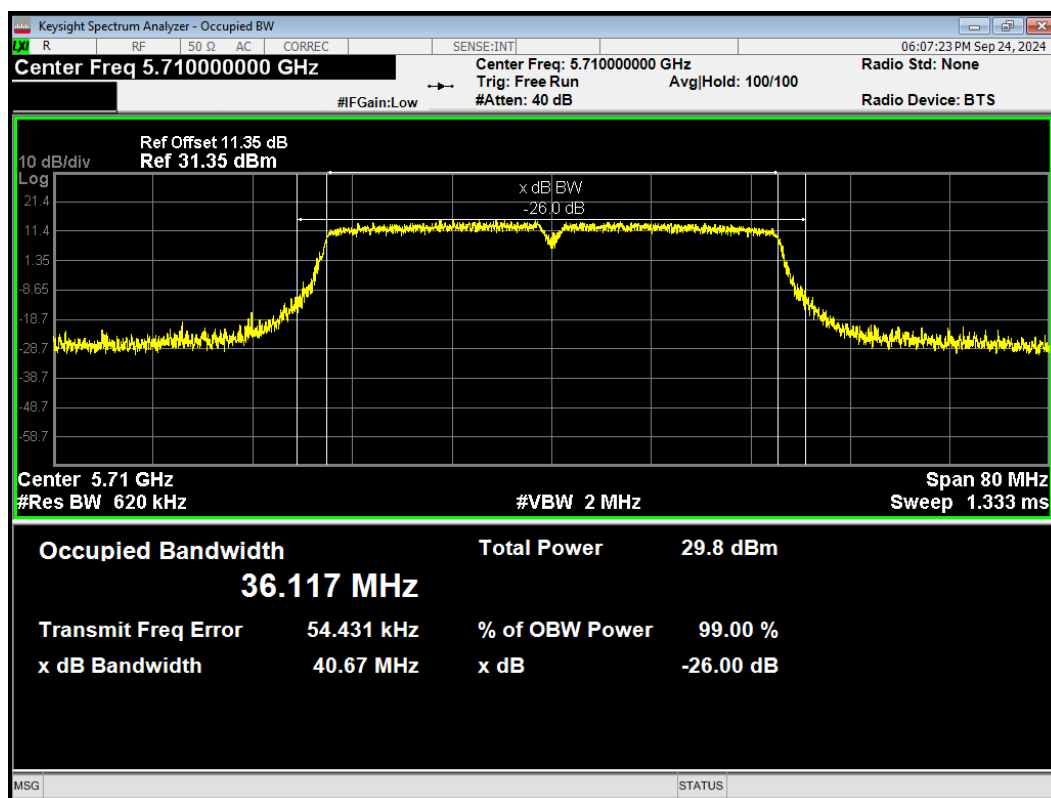
OBW 802.11n(HT40) 5590MHz



OBW 802.11n(HT40) 5670MHz



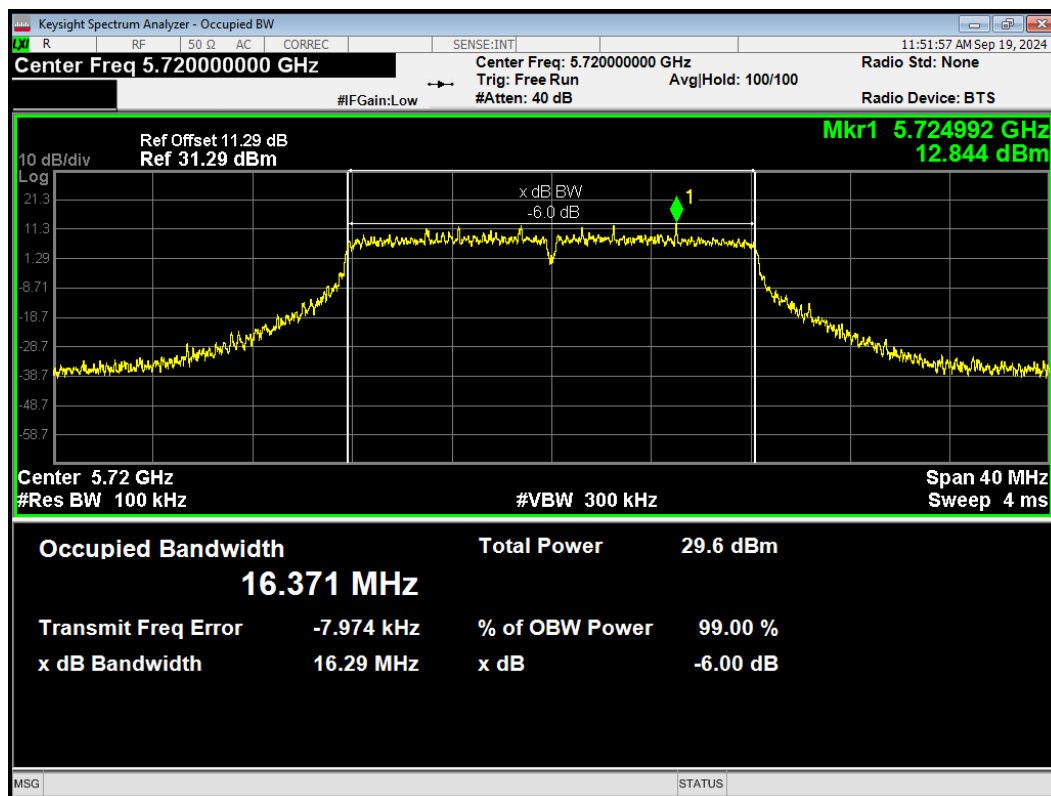
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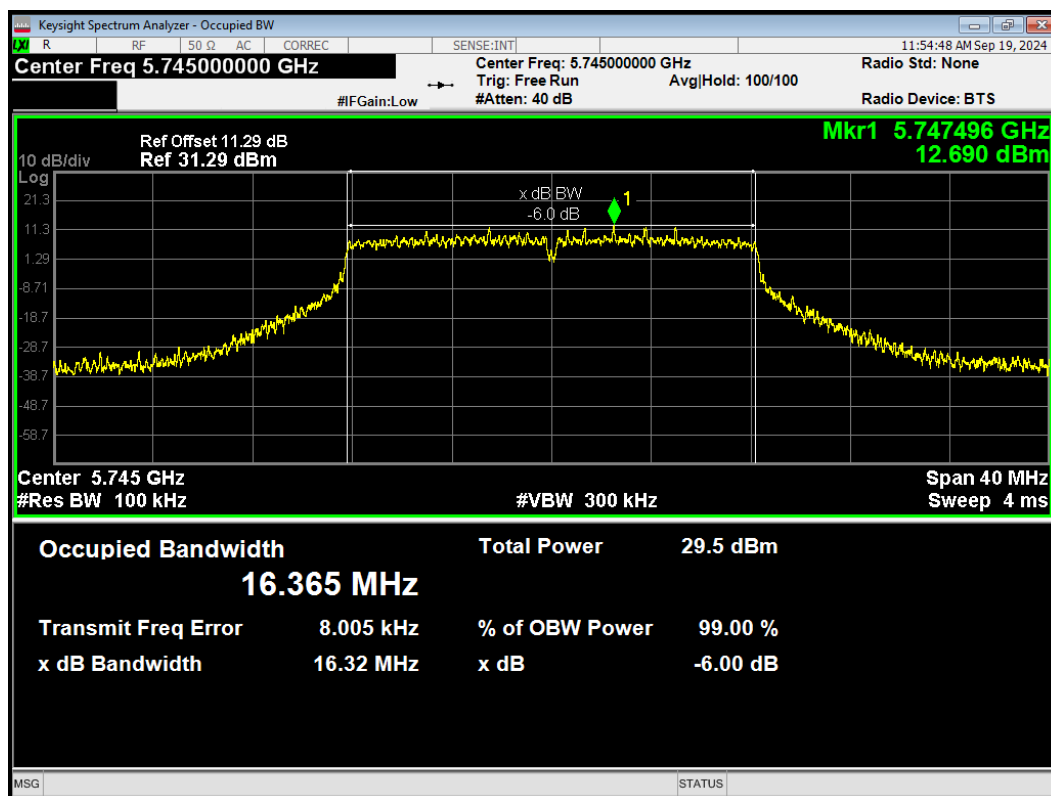
Minimum 6 dB bandwidth

U-NII-3

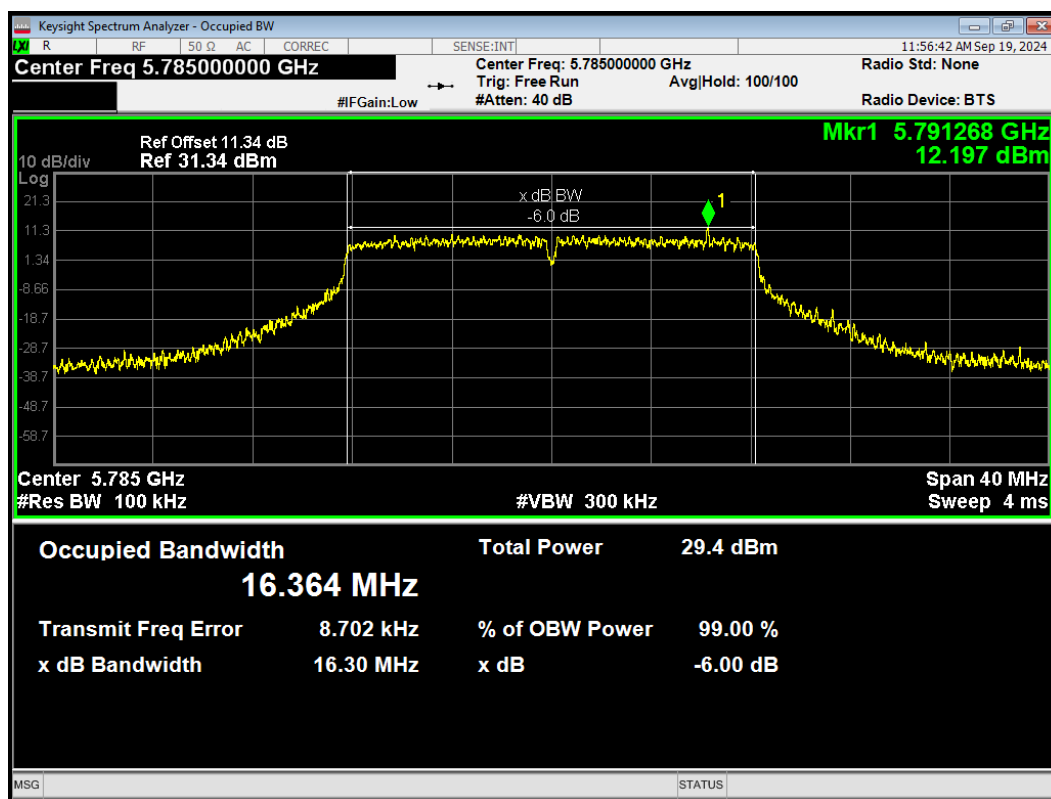
-6dB Bandwidth 802.11a 5720MHz



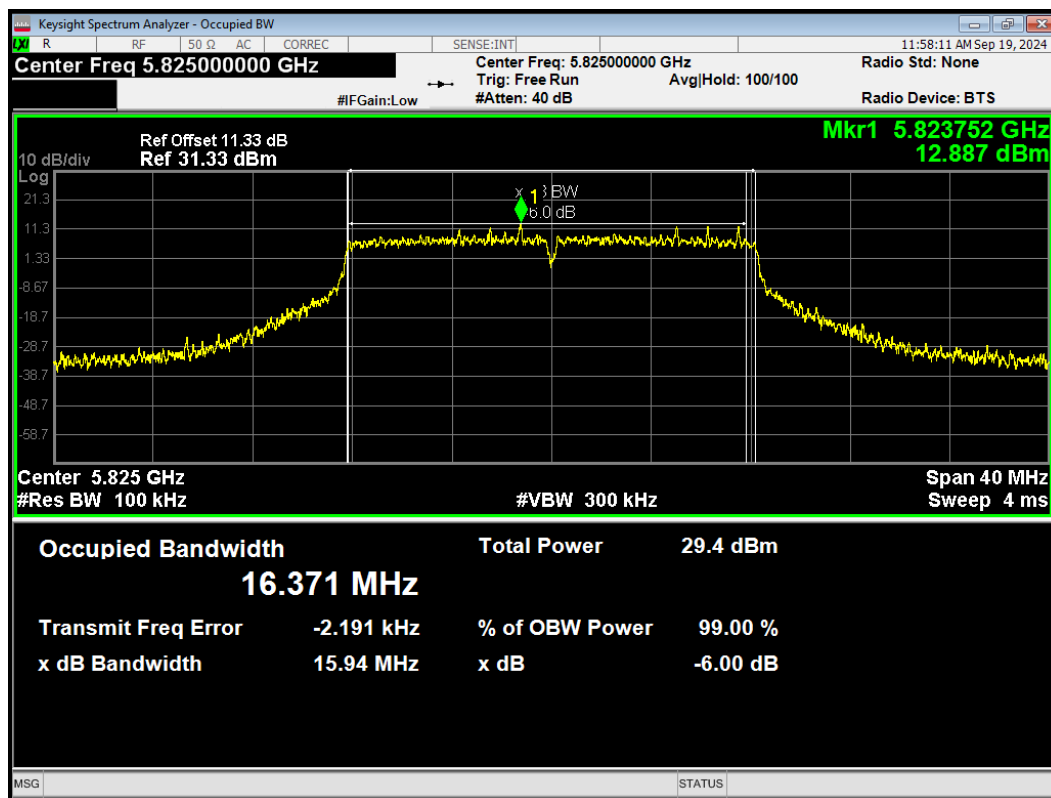
-6dB Bandwidth 802.11a 5745MHz



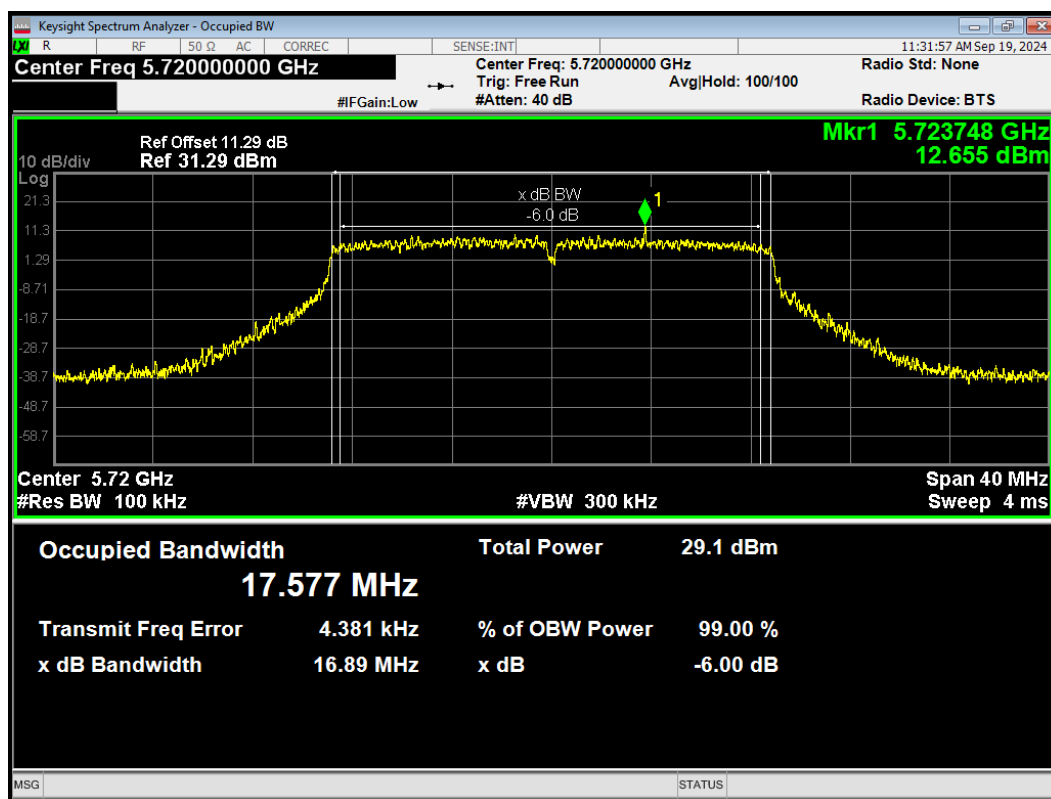
-6dB Bandwidth 802.11a 5785MHz



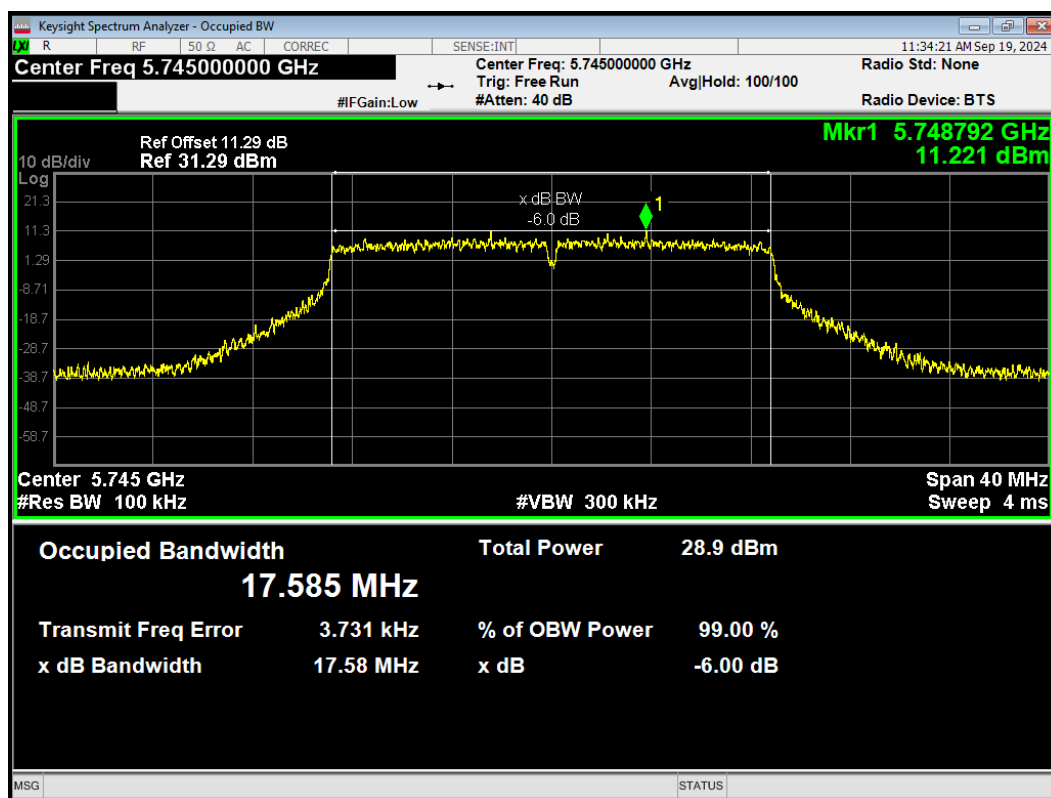
-6dB Bandwidth 802.11a 5825MHz



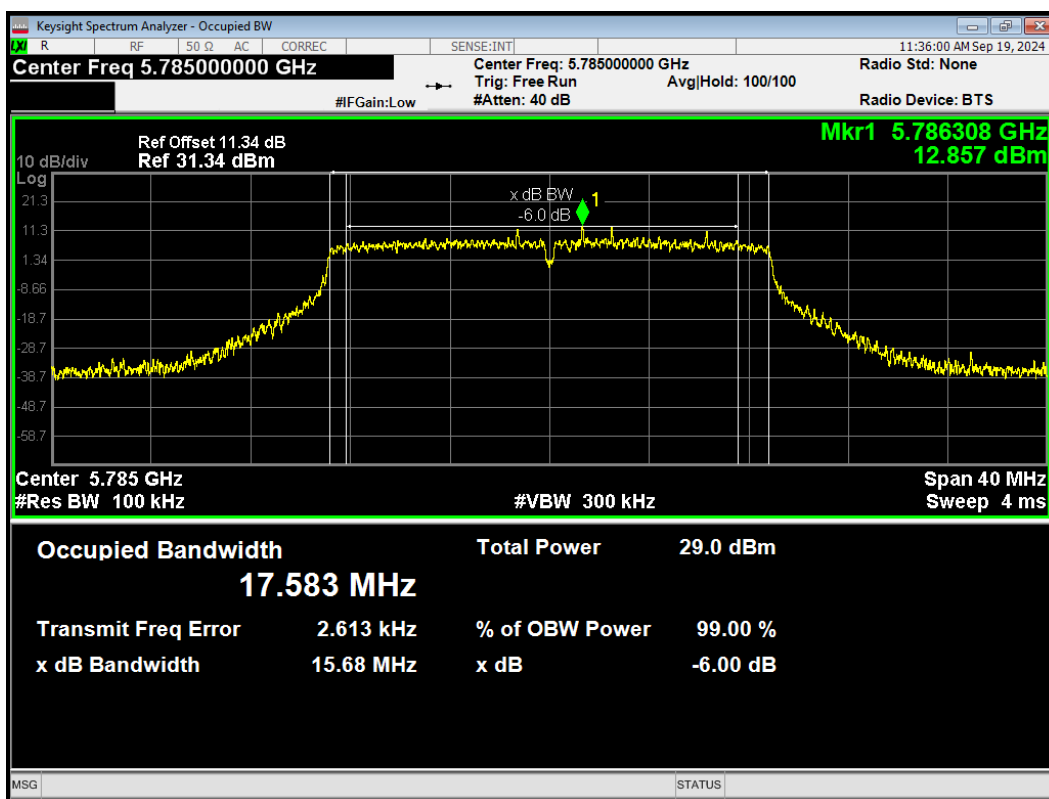
-6dB Bandwidth 802.11ac(VHT20) 5720MHz



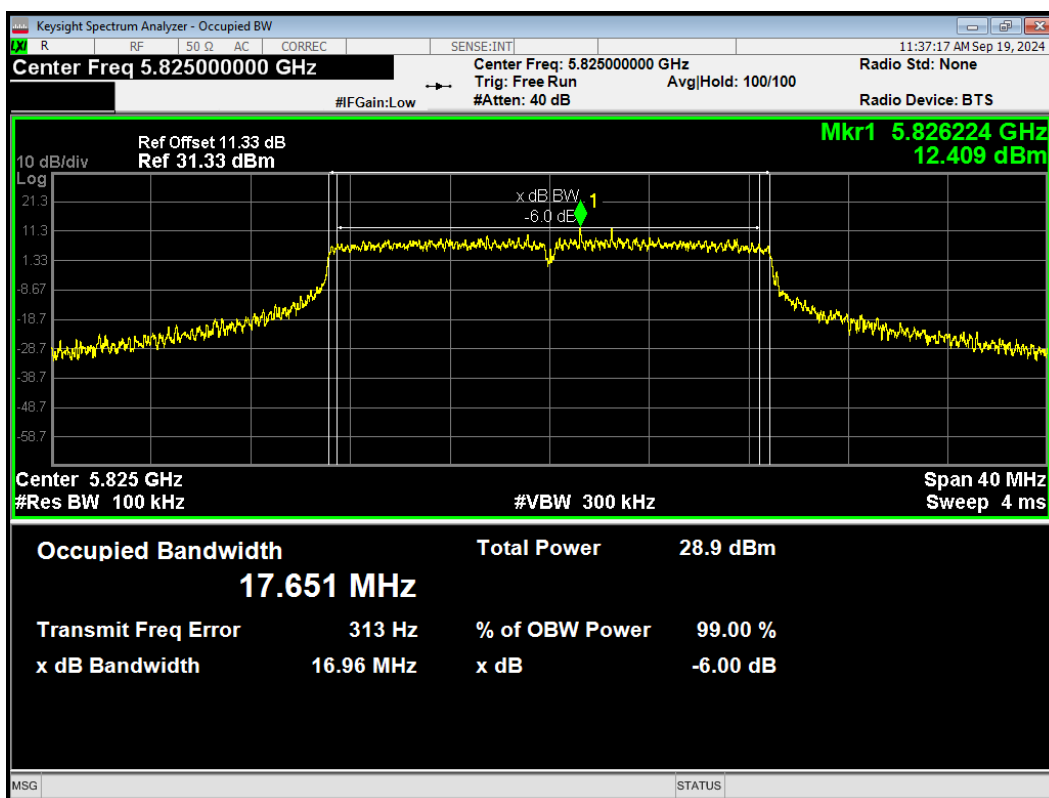
-6dB Bandwidth 802.11ac(VHT20) 5745MHz



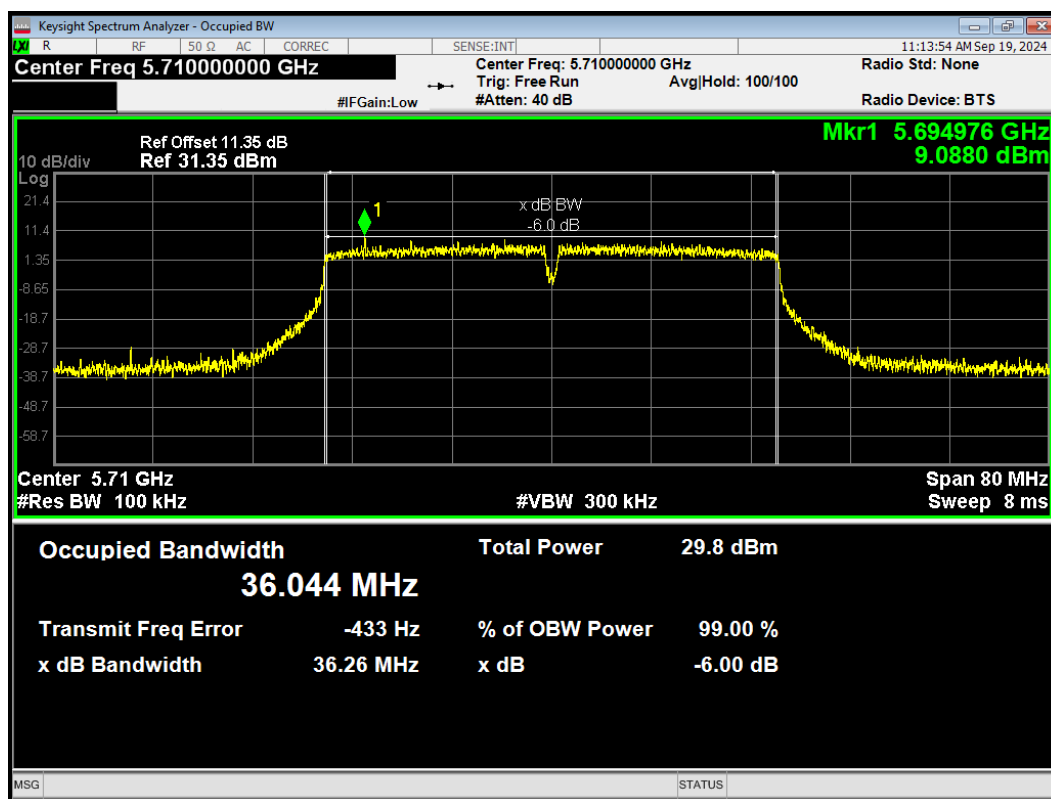
-6dB Bandwidth 802.11ac(VHT20) 5785MHz



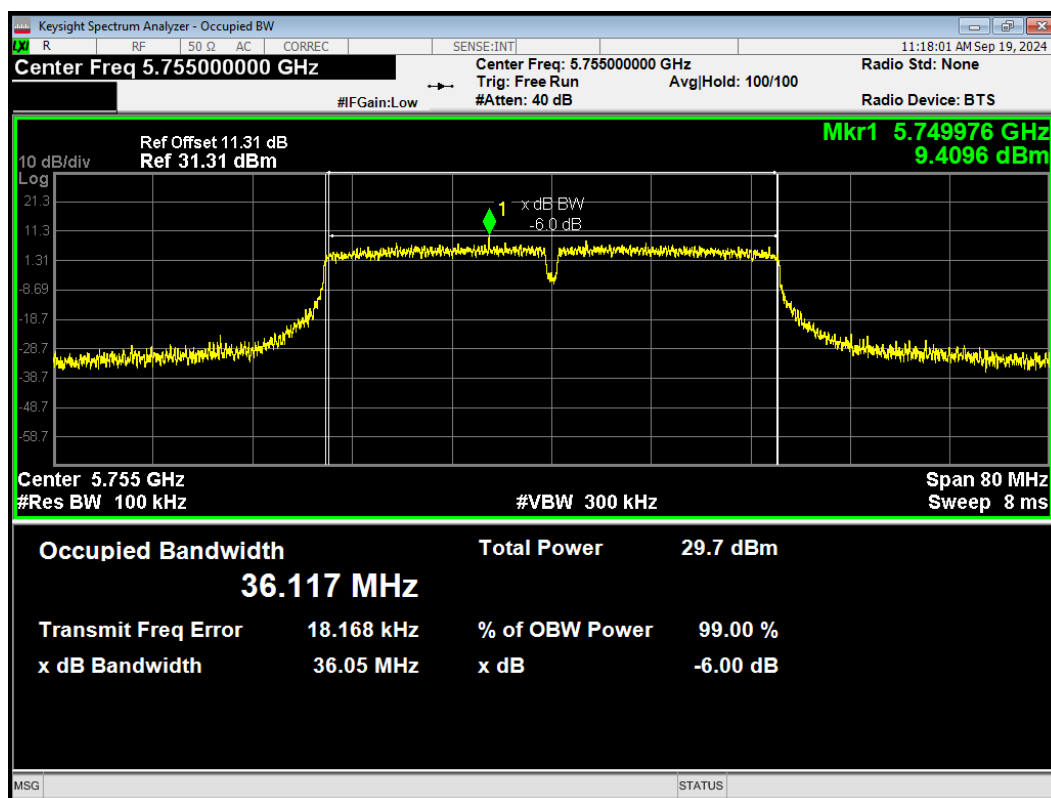
-6dB Bandwidth 802.11ac(VHT20) 5825MHz



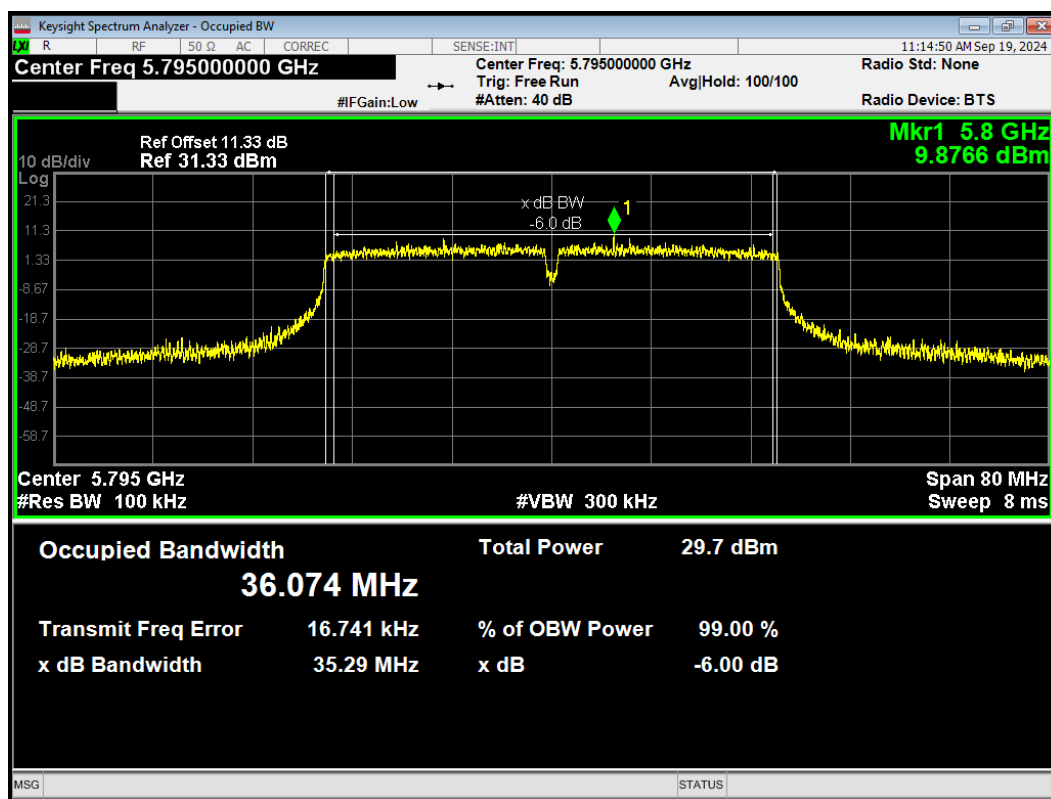
-6dB Bandwidth 802.11ac(VHT40) 5710MHz



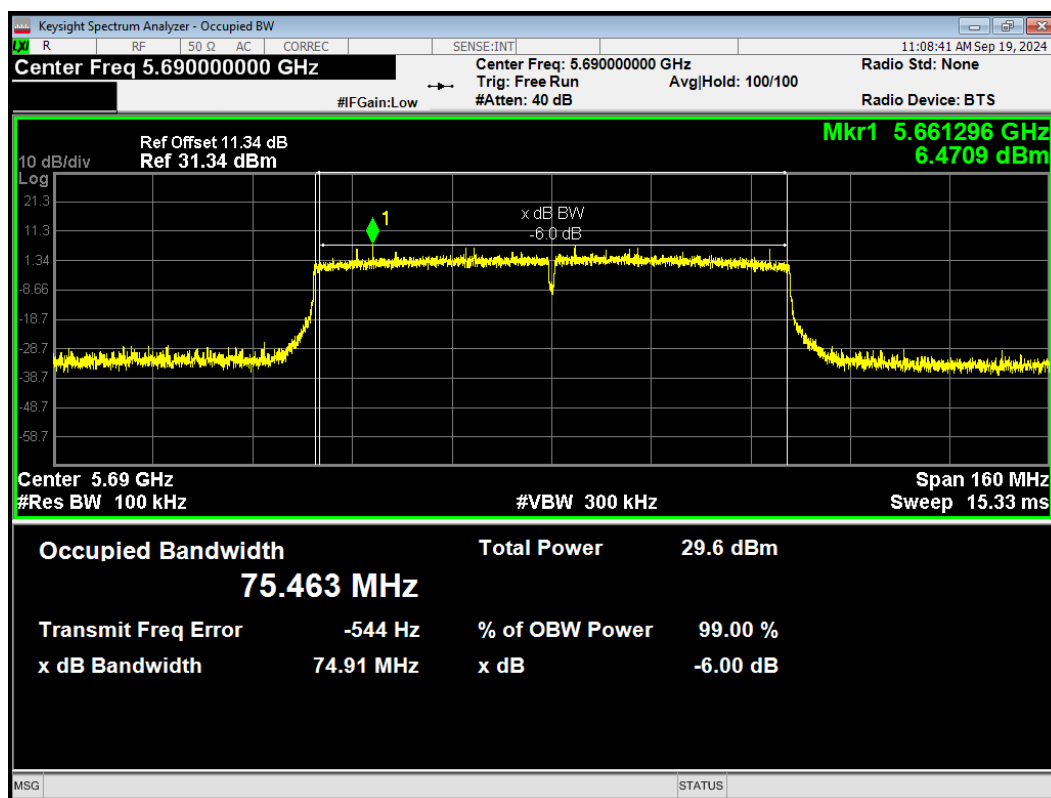
-6dB Bandwidth 802.11ac(VHT40) 5755MHz



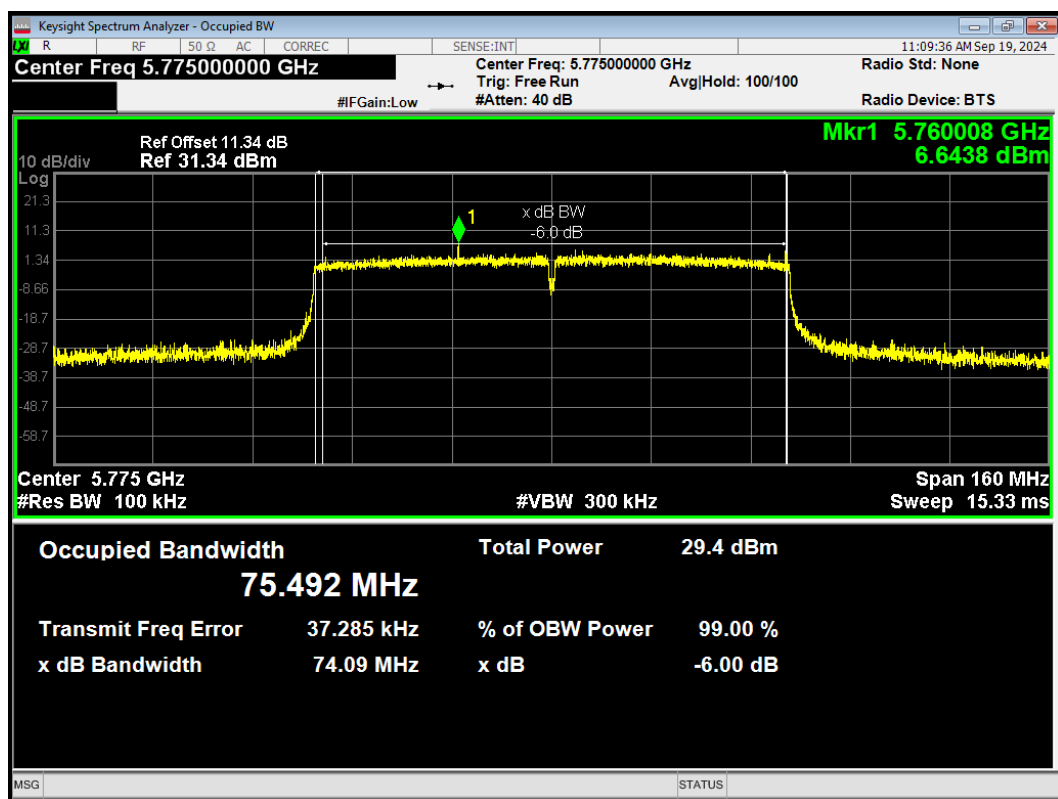
-6dB Bandwidth 802.11ac(VHT40) 5795MHz



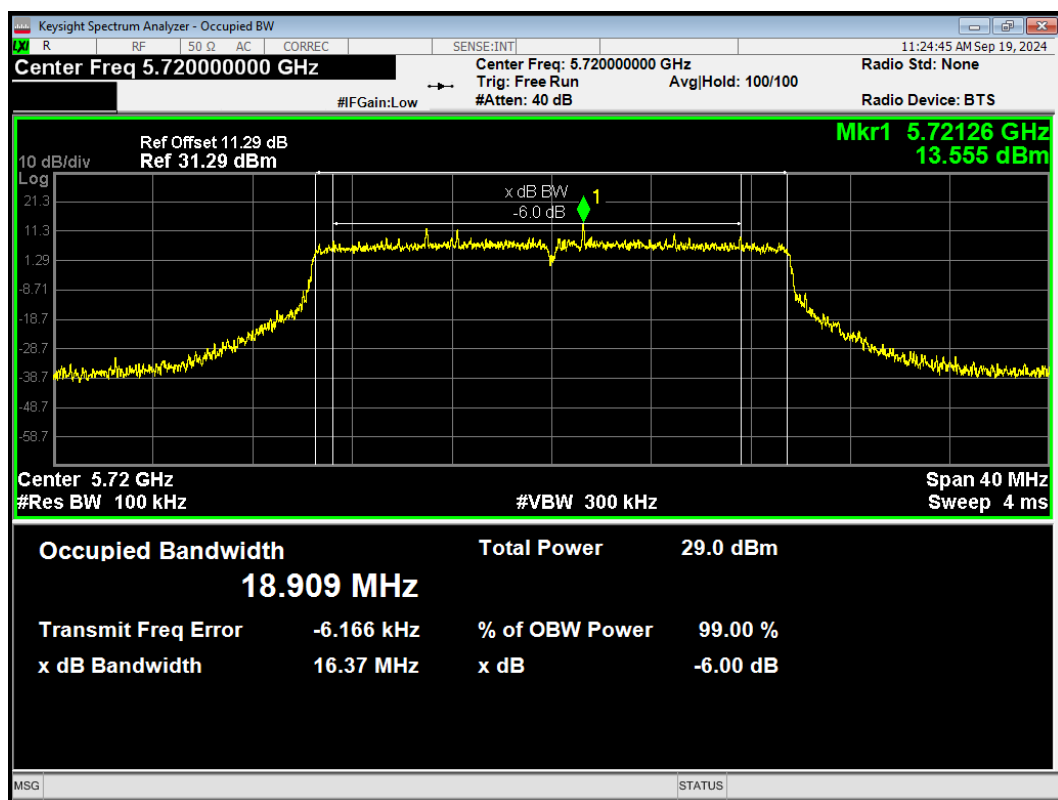
-6dB Bandwidth 802.11ac(VHT80) 5690MHz



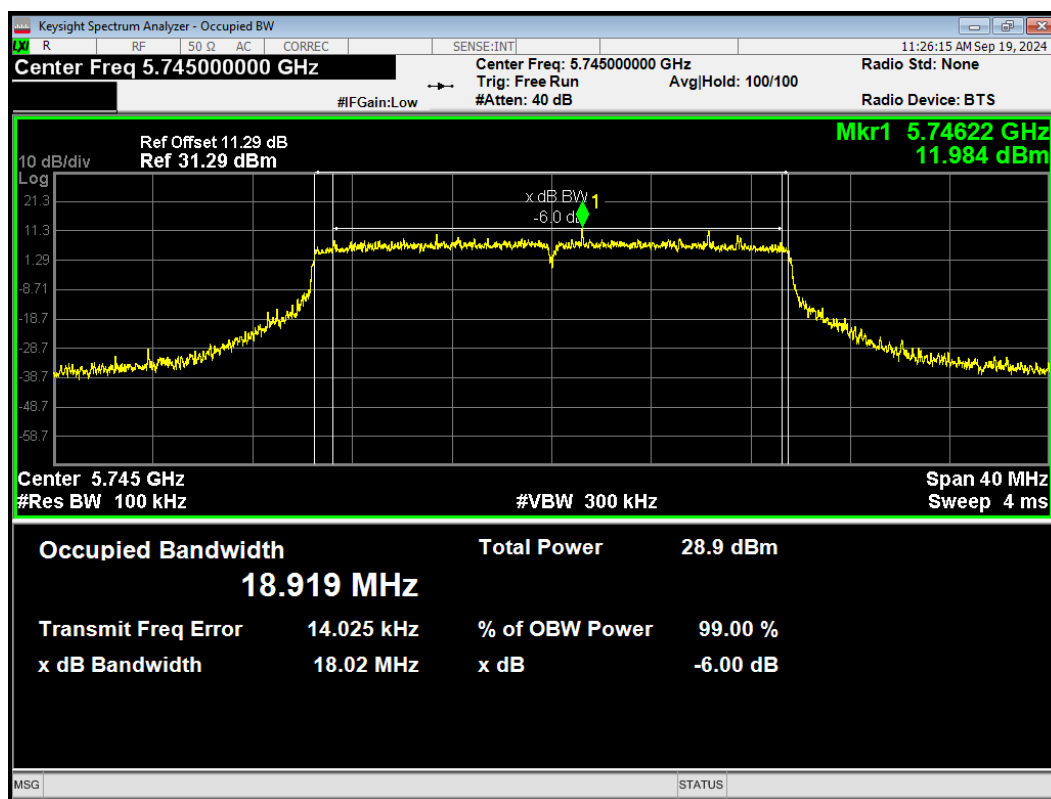
-6dB Bandwidth 802.11ac(VHT80) 5775MHz



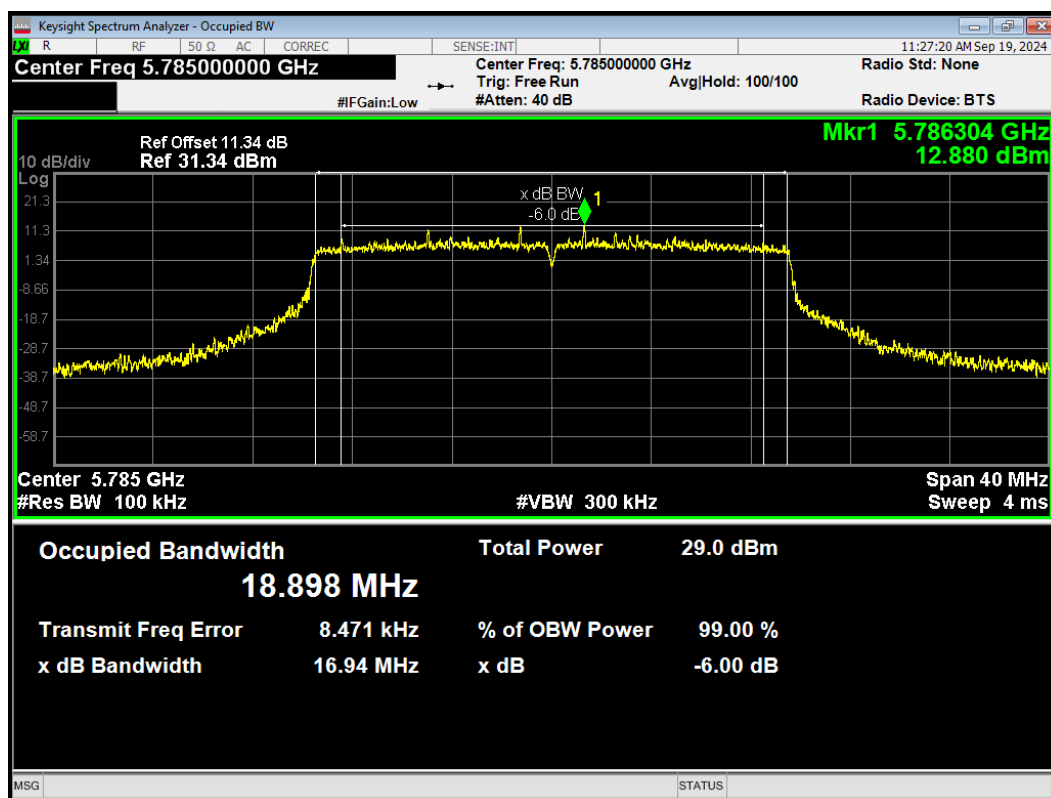
-6dB Bandwidth 802.11ax(HE20) 5720MHz



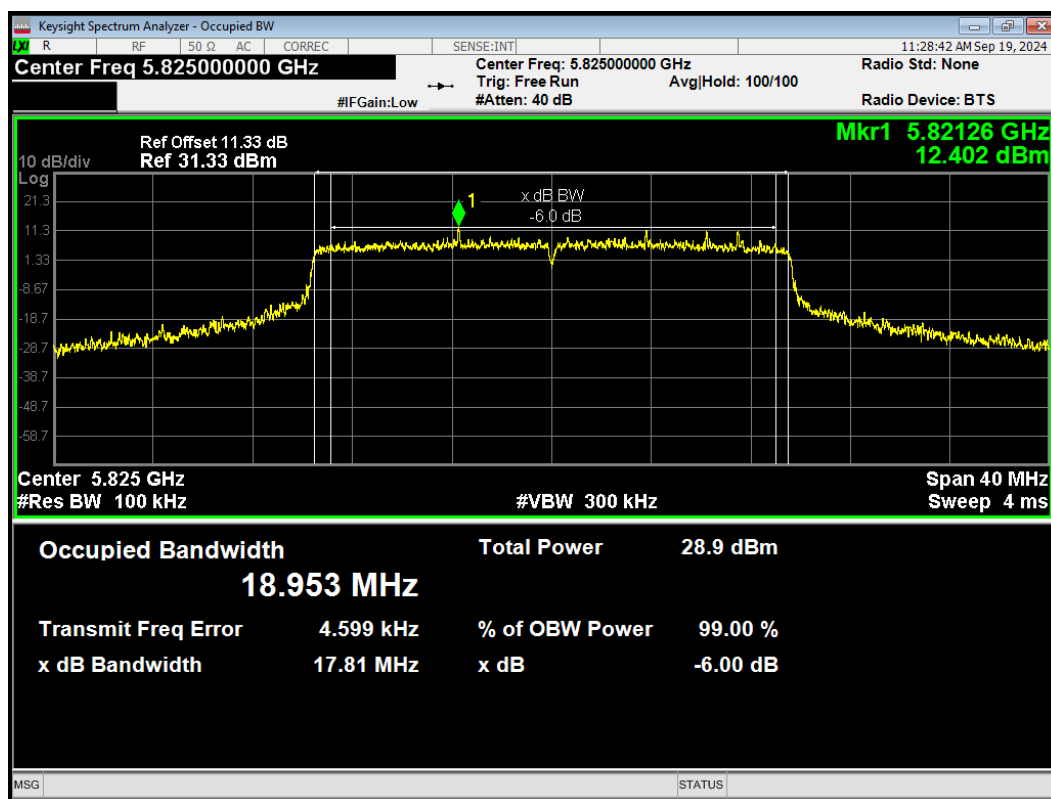
-6dB Bandwidth 802.11ax(HE20) 5745MHz



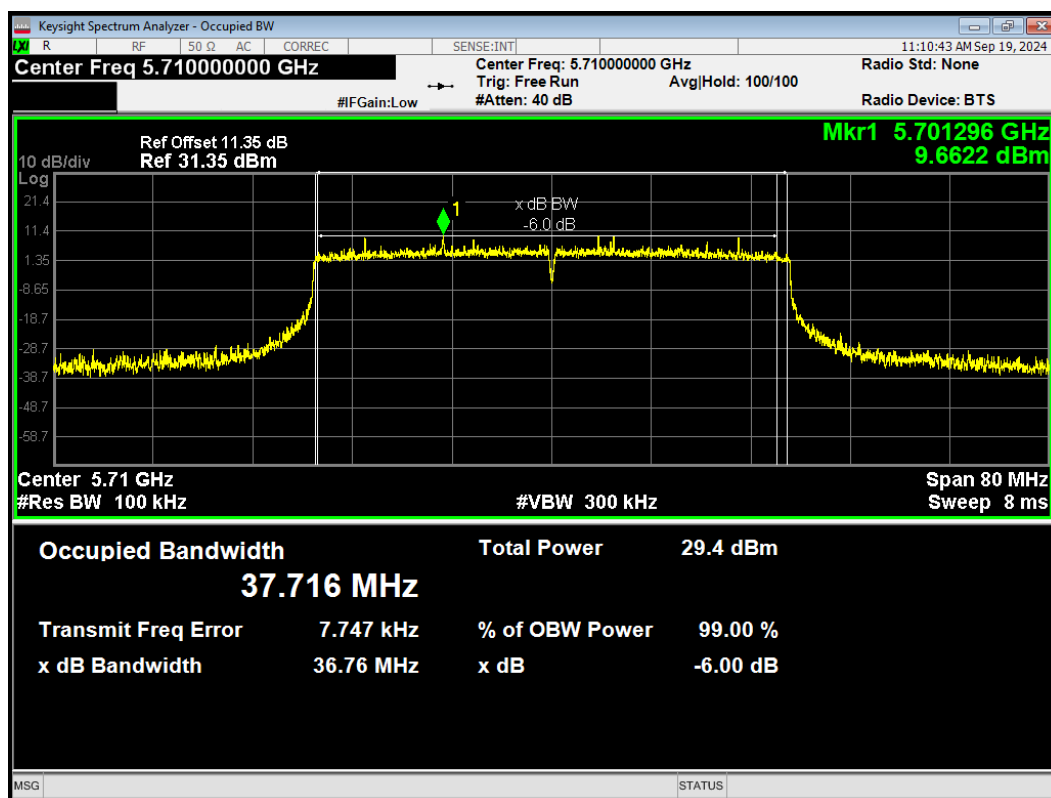
-6dB Bandwidth 802.11ax(HE20) 5785MHz



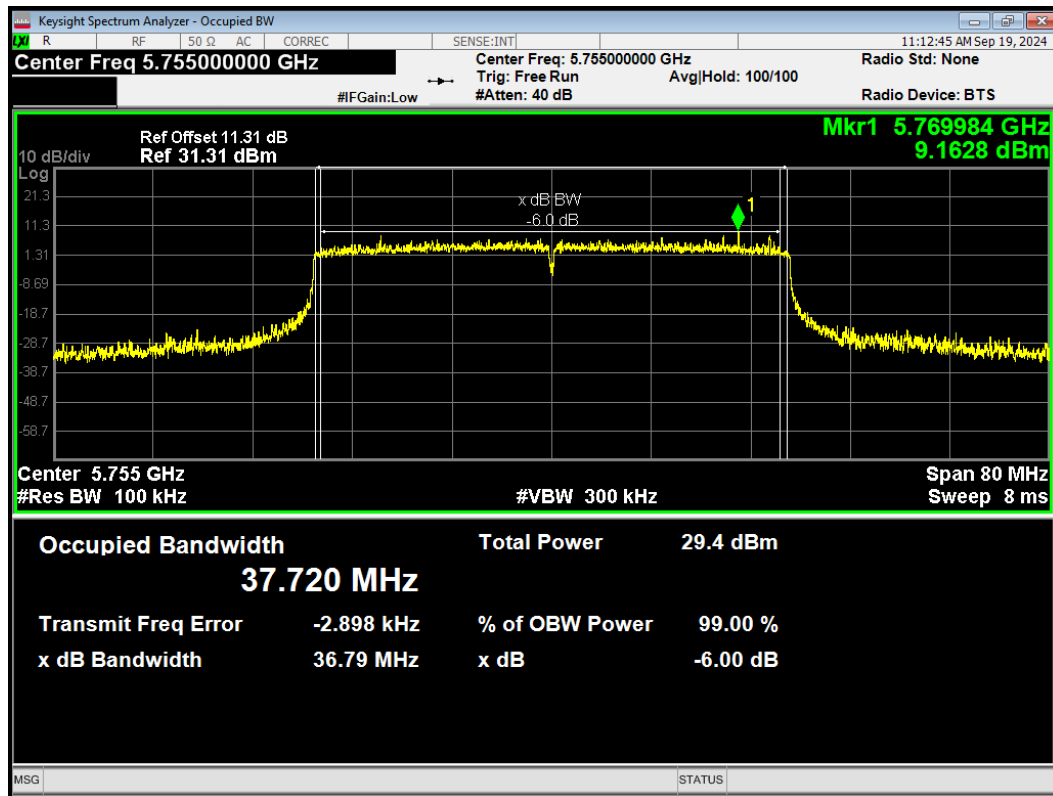
-6dB Bandwidth 802.11ax(HE20) 5825MHz



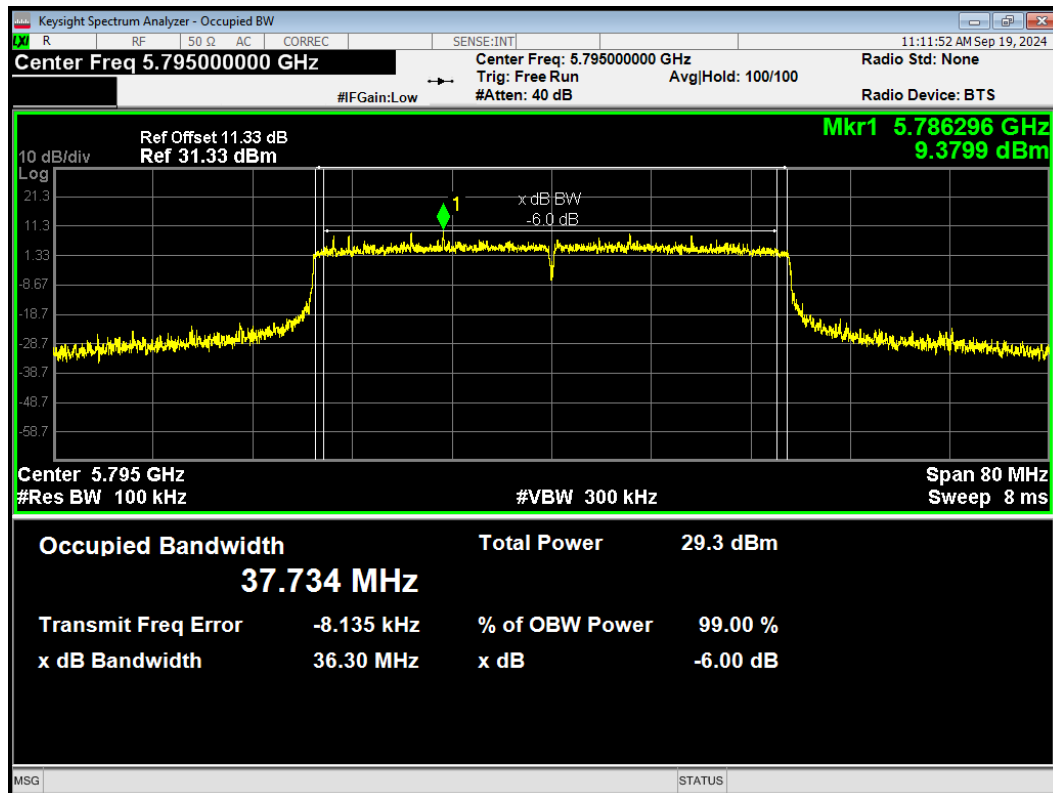
-6dB Bandwidth 802.11ax(HE40) 5710MHz



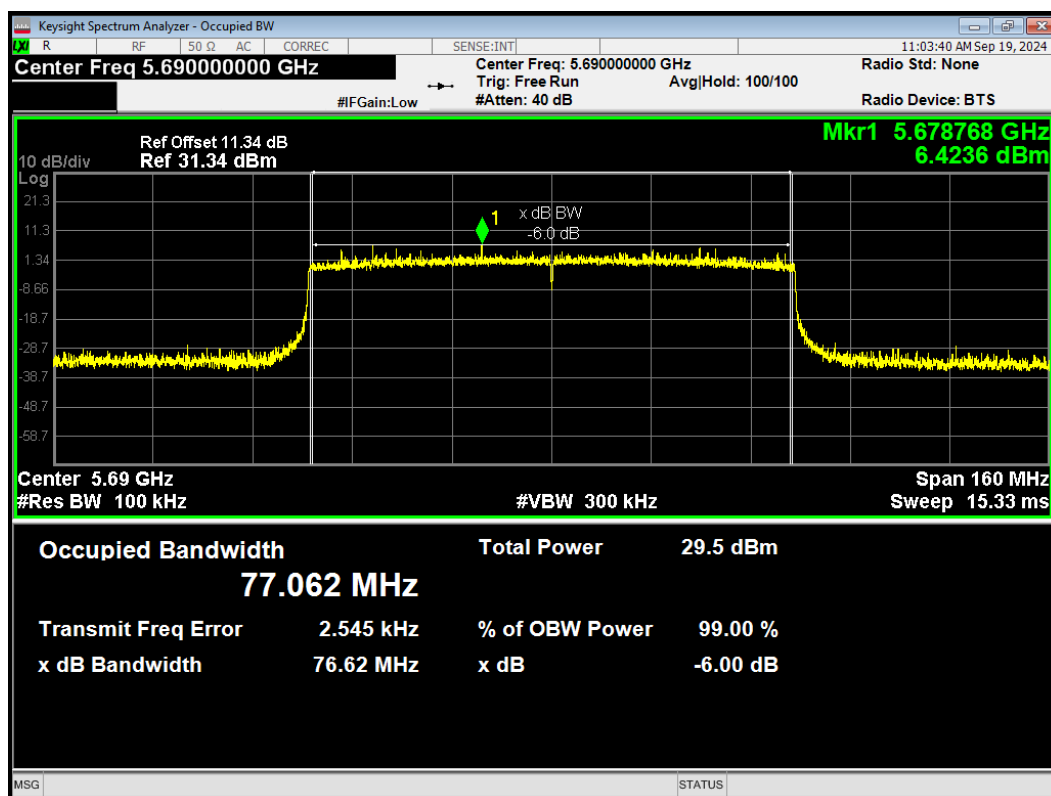
-6dB Bandwidth 802.11ax(HE40) 5755MHz



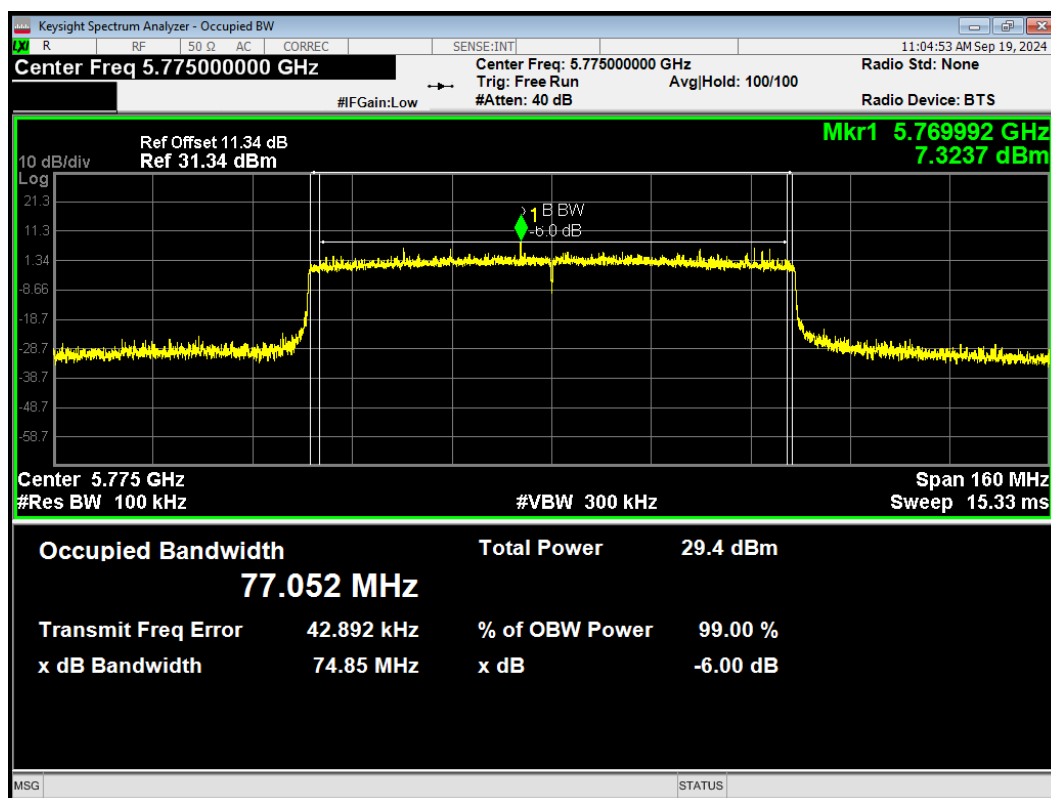
-6dB Bandwidth 802.11ax(HE40) 5795MHz



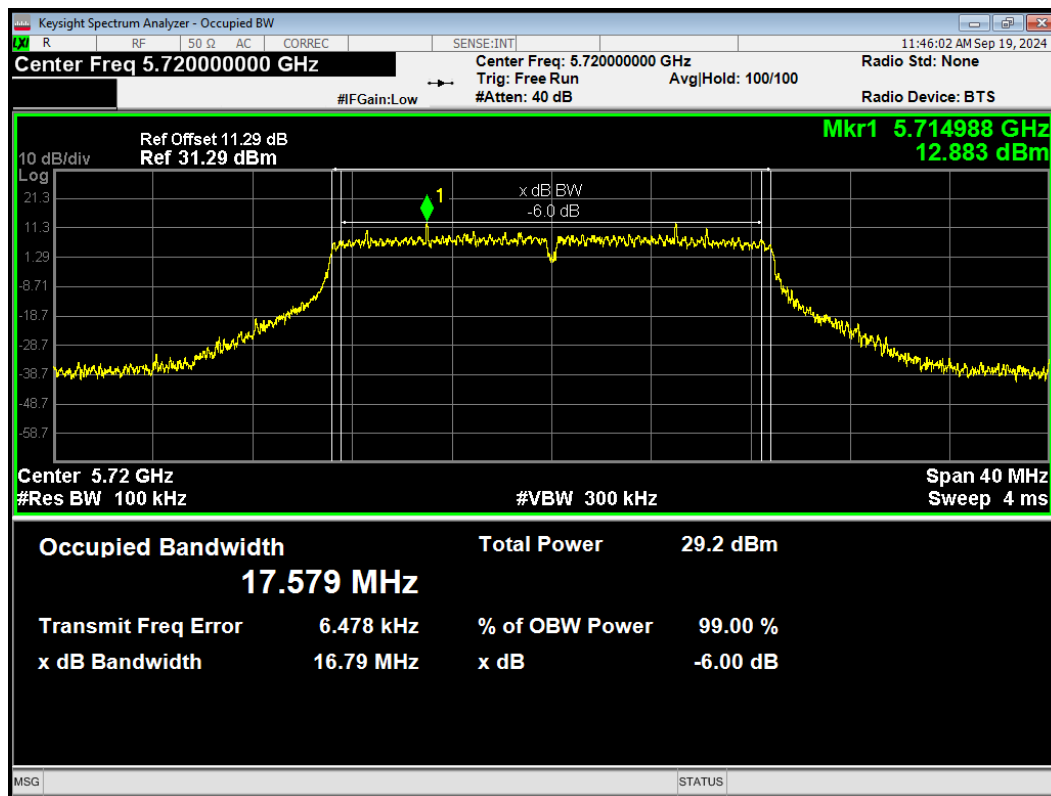
-6dB Bandwidth 802.11ax(HE80) 5690MHz



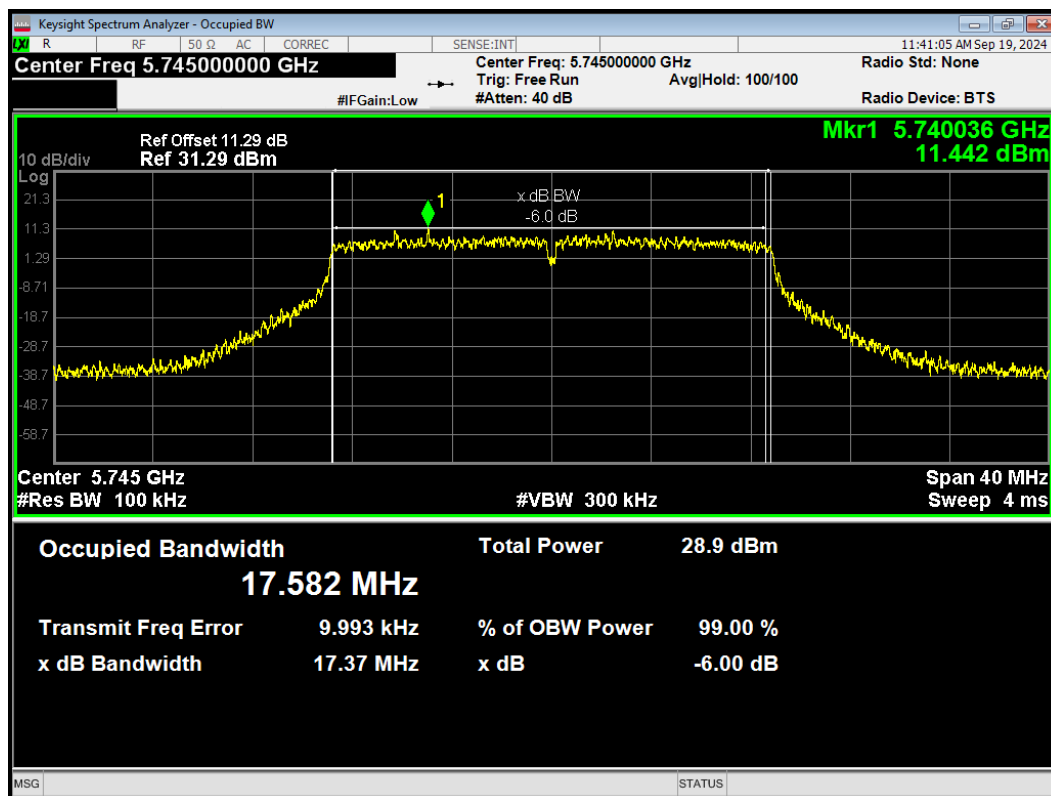
-6dB Bandwidth 802.11ax(HE80) 5775MHz



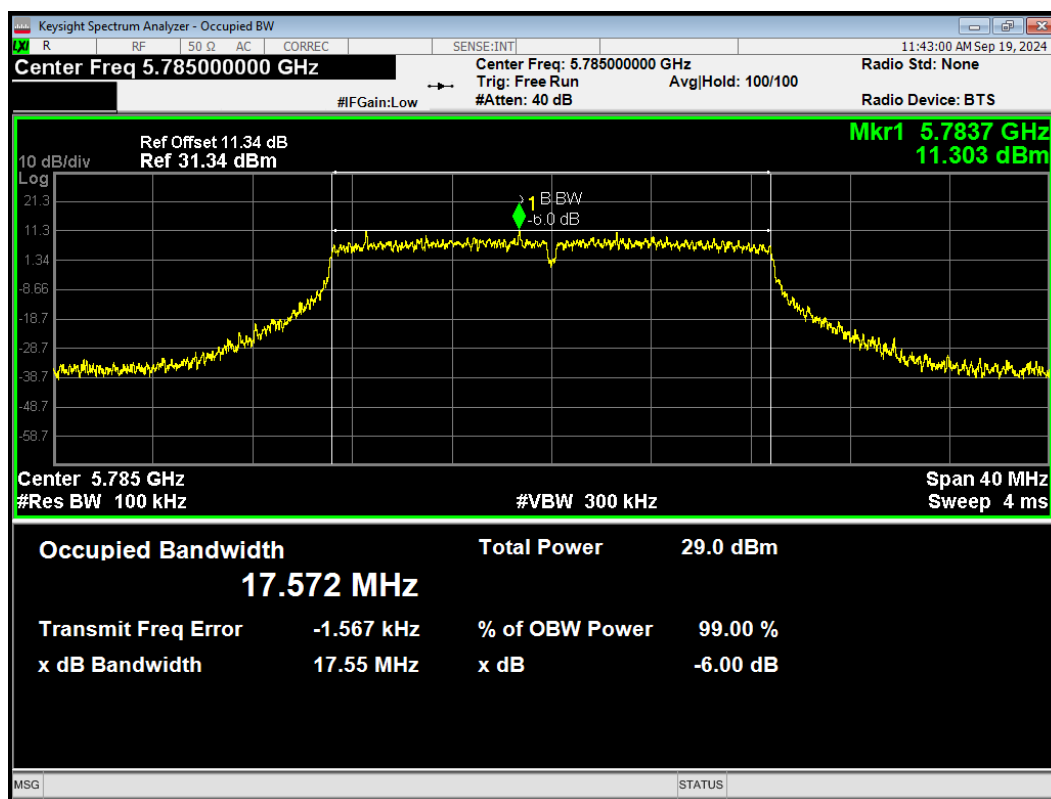
-6dB Bandwidth 802.11n(HT20) 5720MHz



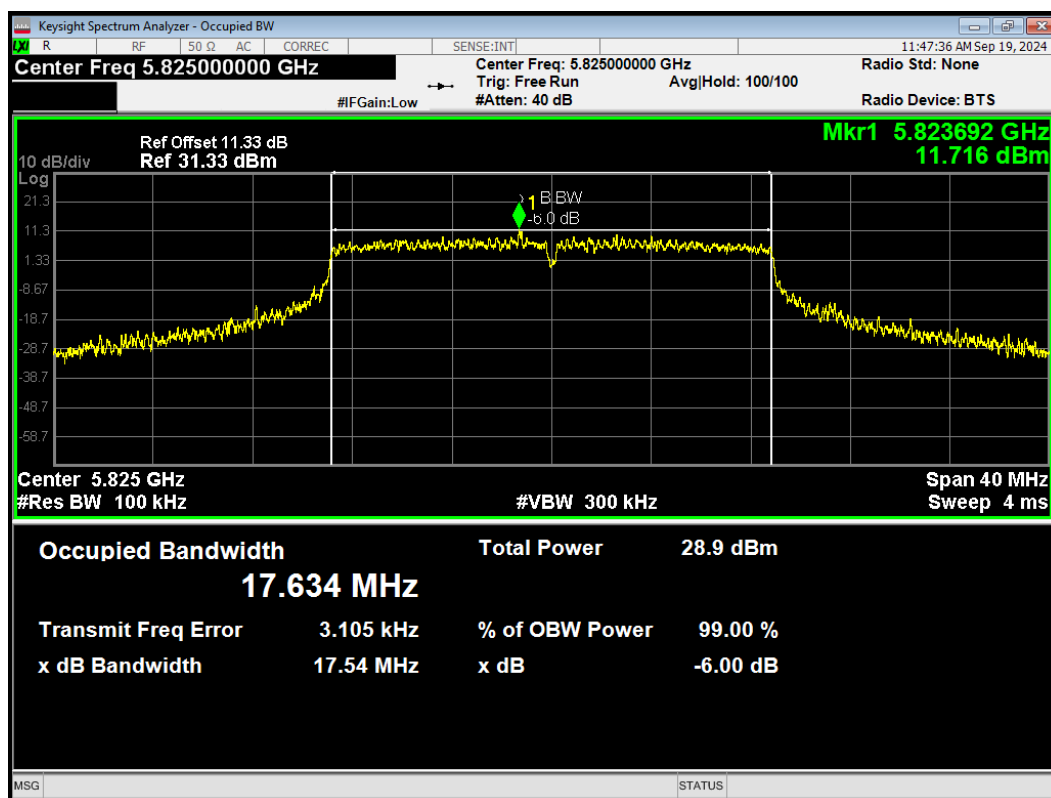
-6dB Bandwidth 802.11n(HT20) 5745MHz



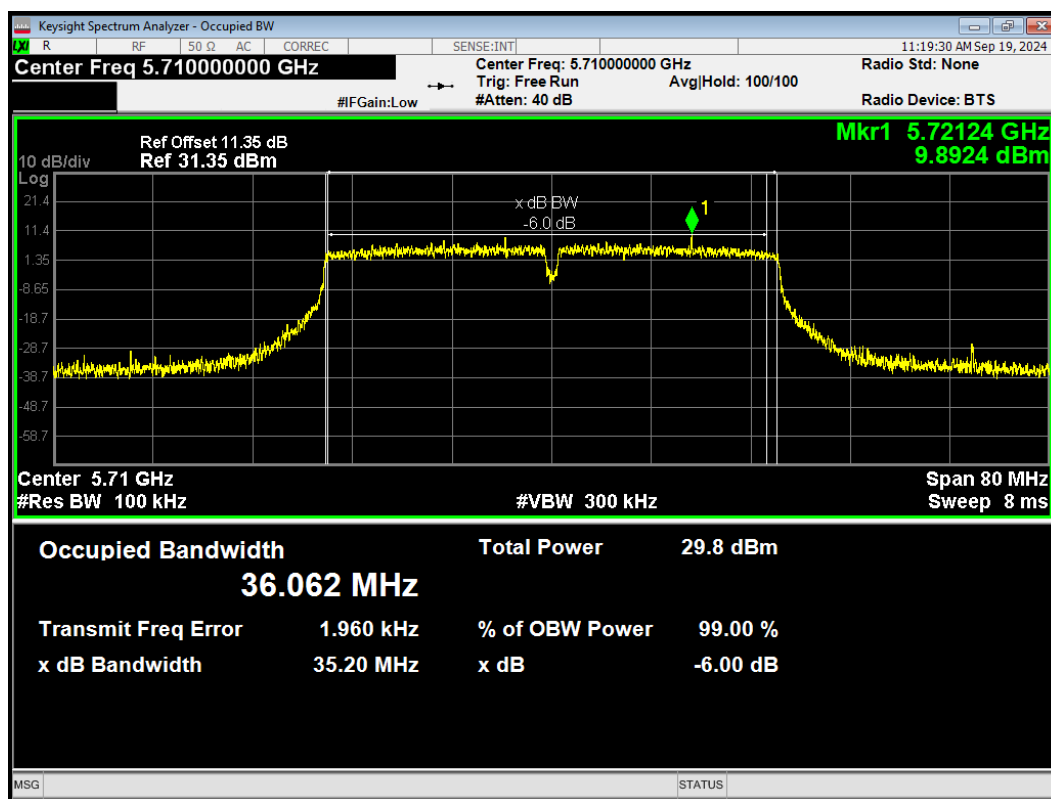
-6dB Bandwidth 802.11n(HT20) 5785MHz



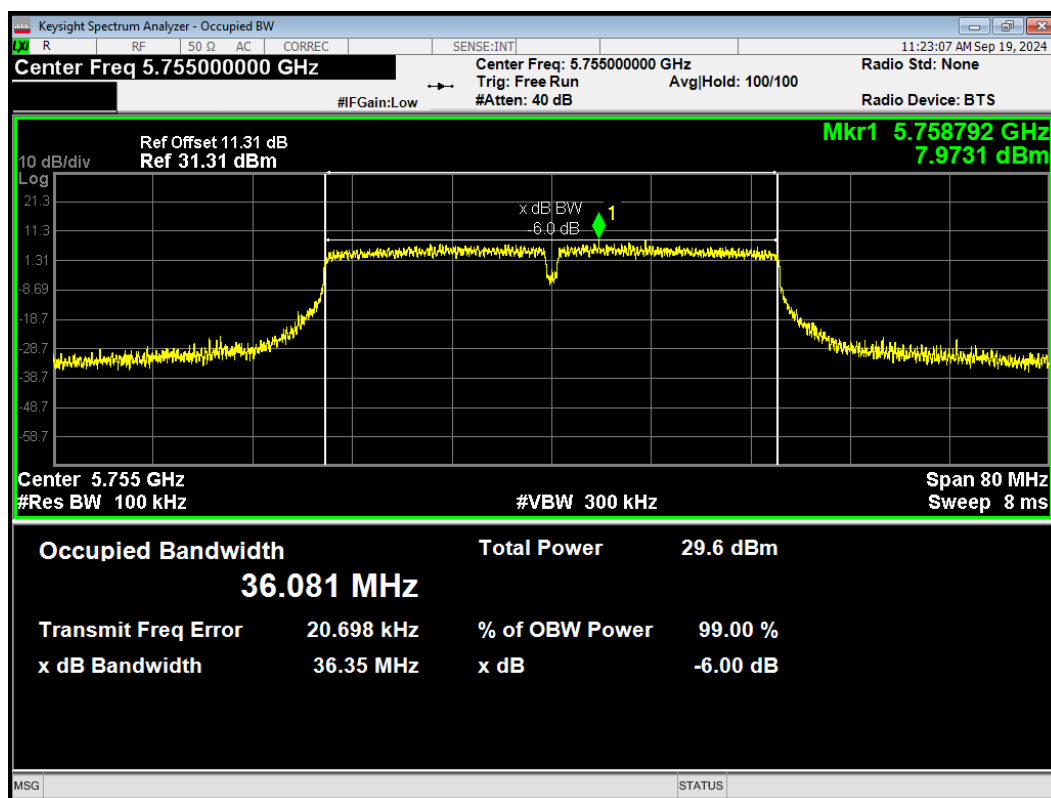
-6dB Bandwidth 802.11n(HT20) 5825MHz



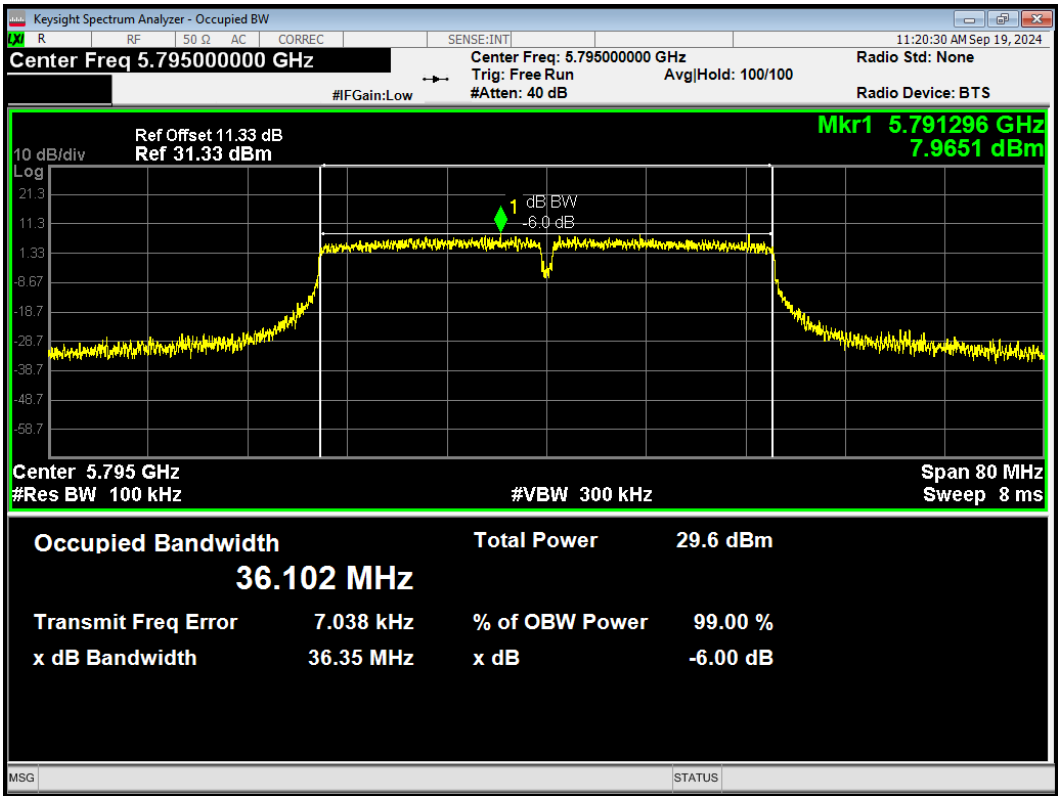
-6dB Bandwidth 802.11n(HT40) 5710MHz



-6dB Bandwidth 802.11n(HT40) 5755MHz



-6dB Bandwidth 802.11n(HT40) 5795MHz



5.2. Average Power Output

Ambient condition

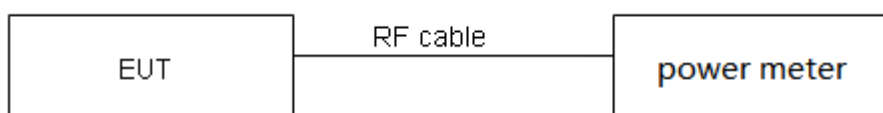
Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Methods of Measurement

During the process of the testing, The EUT was connected to the average power meter through an external attenuator and a known loss cable. The EUT is max power transmission with proper modulation. We use Maximum average Conducted Output Power Level Method in KDB789033 for this test

The conducted Power is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically.

Test Setup



Limits

Rule FCC Part 15.407(a)(1) / FCC Part 15.407(a) (2) / FCC Part 15.407(a) (3)

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23

dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.44 \text{ dB}$.

Test Results

Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11a	96.25%	0.17
802.11n HT20	79.92%	0.97
802.11n HT40	80.00%	0.00
802.11ac VHT20	79.89%	0.97
802.11ac VHT40	79.71%	0.98
802.11ac VHT80	79.41%	1.00
802.11ax HE20	80.07%	0.00
802.11ax HE40	80.00%	0.00
802.11ax HE80	80.06%	0.00
Note: when Duty cycle ≥ 0.98 , Duty cycle correction Factor not required.		

U-NII-1

Network Standards	Channel/ Frequency (MHz)	Power Index			
		SISO Antenna 1	SISO Antenna 2	MIMO	Beamforming
802.11a	36/5180	14	12	8	8
	40/5200	12	12	8	8
	48/5240	14	12	8	8
802.11n HT20	36/5180	14	12	9	9
	40/5200	12	12	9	9
	48/5240	14	12	9	9
802.11n HT40	38/5190	16	14	11	11
	46/5230	16	14	11	11
802.11ac VHT20	36/5180	14	12	9	9
	40/5200	12	12	9	9
	48/5240	14	12	9	9
802.11ac VHT40	38/5190	16	14	11	11
	46/5230	16	14	11	11
802.11ac VHT80	42/5210	17	14	14	12
802.11ax HE20	36/5180	14	12	9	9
	40/5200	12	12	9	9
	48/5240	14	12	9	9
802.11ax HE40	38/5190	15	14	11	11
	46/5230	16	14	11	11
802.11ax HE80	42/5210	17	14	14	12

U-NII-2A

Network Standards	Channel/ Frequency (MHz)	Power Index			
		SISO Antenna 1	SISO Antenna 2	MIMO	Beamforming
802.11a	52/5260	18	18	15	15
	60/5300	18	18	15	15
	64/5320	18	18	15	15
802.11n T20	52/5260	18	18	15	15
	60/5300	18	18	15	15
	64/5320	18	18	15	15
802.11n HT40	54/5270	20	20	18	18
	62/5310	15	15	18	18
802.11ac VHT20	52/5260	22	18	16	16
	60/5300	22	18	16	16
	64/5320	22	18	16	16
802.11ac VHT40	54/5270	24	20	18	18
	62/5310	24	20	18	18
802.11ac VHT80	58/5290	16	16	16	16
802.11ax HE20	52/5260	18	18	16	16
	60/5300	18	18	16	16
	64/5320	18	18	16	16
802.11ax HE40	54/5270	20	20	19	19
	62/5310	15	15	15	15
802.11ax HE80	58/5290	17	17	17	17

U-NII-2C

Network Standards	Channel/ Frequency (MHz)	Power Index			
		SISO Antenna 1	SISO Antenna 2	MIMO	Beamforming
802.11a	100/5500	20	20	18	18
	120/5600	20	20	17	17
	140/5700	20	18	16	16
	144/5720	20	18	16	16
802.11n HT20	100/5500	20	20	18	18
	120/5600	20	20	17	17
	140/5700	18	18	17	17
	144/5720	20	20	17	17
802.11n HT40	102/5510	17	17	17	17
	118/5590	20	20	20	20
	134/5670	18	18	18	18
	142/5710	22	22	19	19
802.11ac VHT20	100/5500	20	20	18	18
	120/5600	20	20	17	17

	140/5700	20	20	17	17
	144/5720	20	20	17	17
802.11ac VHT40	102/5510	22	22	20	20
	118/5590	22	22	20	20
	134/5670	22	22	19	19
	142/5710	22	22	19	19
802.11ac VHT80	122/5610	14	14	14	14
	138/5690	19	19	19	19
802.11ax HE20	100/5500	20	20	18	18
	120/5600	20	20	17	17
	140/5700	20	20	17	17
	144/5720	20	20	17	17
802.11ax HE40	102/5510	16	16	16	16
	118/5590	22	22	20	20
	134/5670	22	22	20	20
	142/5710	22	22	19	19
802.11ax HE80	122/5610	20	20	20	20
	138/5690	22	22	21	21

U-NII-3

Network Standards	Channel/ Frequency (MHz)	Power Index			
		SISO Antenna 1	SISO Antenna 2	MIMO	Beamforming
802.11a	144/5720	20	20	20	20
	149/5745	24	24	24	24
	157/5785	24	24	24	24
	165/5825	22	22	22	22
802.11n HT20	144/5720	22	22	22	22
	149/5745	22	22	22	22
	157/5785	24	24	24	24
	165/5825	24	24	24	24
802.11n HT40	142/5720	22	22	22	22
	151/5755	19	19	19	19
	159/5795	20	20	20	20
802.11ac VHT20	144/5720	24	24	24	24
	149/5745	24	24	24	24
	157/5785	24	24	24	24
	165/5825	24	24	24	24
802.11ac VHT40	142/5710	24	24	24	24
	151/5755	24	24	24	24
	159/5795	24	24	24	24
802.11ac VHT80	138/5690	19	19	19	19
	155/5775	18	18	18	18
802.11ax HE20	144/5720	24	24	24	24

	149/5745	24	24	24	24
	157/5785	24	24	24	24
	165/5825	24	24	24	24
802.11ax HE40	142/5710	24	24	24	24
	151/5755	22	22	22	22
	159/5795	22	22	22	22
802.11ax HE80	138/5690	23	23	23	23
	155/5775	21	21	21	21

Test Mode		Channel/ Frequency (MHz)	B=26 dB bandwidth (MHz)	Limit 11 dBm + 10 log B (dBm)	Final Limit (dBm)
U-NII-2A	802.11a	52/5260	20.342	24.08 > 24	24.00
		60/5300	20.106	24.03 > 24	24.00
		64/5320	20.230	24.06 > 24	24.00
	802.11n HT20	52/5260	21.259	24.28 > 24	24.00
		60/5300	21.770	24.38 > 24	24.00
		64/5320	21.281	24.28 > 24	24.00
	802.11n HT40	54/5270	40.882	27.12 > 24	24.00
		62/5310	40.482	27.07 > 24	24.00
	802.11ac VHT20	52/5260	21.150	24.25 > 24	24.00
		60/5300	21.244	24.27 > 24	24.00
		64/5320	21.015	24.23 > 24	24.00
	802.11ac VHT40	54/5270	40.358	27.06 > 24	24.00
		62/5310	40.516	27.08 > 24	24.00
	802.11ac VHT80	58/5290	81.776	30.13 > 24	24.00
	802.11ax HE20	52/5260	21.695	24.36 > 24	24.00
		60/5300	21.065	24.24 > 24	24.00
		64/5320	21.308	24.29 > 24	24.00
	802.11ax HE40	54/5270	41.057	27.13 > 24	24.00
		62/5310	41.138	27.14 > 24	24.00
	802.11ax HE80	58/5290	82.051	30.14 > 24	24.00
U-NII-2C	802.11a	100/5500	20.001	24.01 > 24	24.00
		120/5600	20.660	24.15 > 24	24.00
		140/5700	20.480	24.11 > 24	24.00
		144/5720	19.871	23.98 < 24	23.98
	802.11n HT20	100/5500	21.342	24.29 > 24	24.00
		120/5600	20.940	24.21 > 24	24.00
		140/5700	21.563	24.34 > 24	24.00
		144/5720	21.059	24.23 > 24	24.00
	802.11n HT40	102/5510	40.687	27.09 > 24	24.00
		118/5590	41.002	27.13 > 24	24.00
		134/5670	40.627	27.09 > 24	24.00
		142/5710	40.542	27.08 > 24	24.00
	802.11ac VHT20	100/5500	20.905	24.20 > 24	24.00
		120/5600	21.404	24.30 > 24	24.00
		140/5700	21.267	24.28 > 24	24.00
		144/5720	21.082	24.24 > 24	24.00

RF Test Report		Report No: RF-100-1201-00			
	802.11ac VHT40	102/5510	40.429	27.07 > 24	24.00
		118/5590	40.733	27.10 > 24	24.00
		134/5670	40.642	27.09 > 24	24.00
		142/5710	40.912	27.12 > 24	24.00
	802.11ac VHT80	122/5610	81.547	30.11 > 24	24.00
		138/5690	83.260	30.20 > 24	24.00
	802.11ax HE20	100/5500	21.720	24.37 > 24	24.00
		120/5600	21.022	24.23 > 24	24.00
		140/5700	21.440	24.31 > 24	24.00
		144/5720	21.020	24.23 > 24	24.00
	802.11ax HE40	102/5510	40.727	27.10 > 24	24.00
		118/5590	40.413	27.07 > 24	24.00
		134/5670	41.381	27.17 > 24	24.00
		142/5710	40.908	27.12 > 24	24.00
802.11ax HE80	122/5610	82.238	30.15 > 24	24.00	
	138/5690	83.028	30.19 > 24	24.00	
Note: 250mW=24dBm					

SISO Antenna 1
U-NII-1

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	14.86	15.03	24.00	PASS
	40/5200	12.82	12.99	24.00	PASS
	48/5240	14.70	14.87	24.00	PASS
802.11n HT20	36/5180	13.47	14.44	24.00	PASS
	40/5200	12.00	12.97	24.00	PASS
	48/5240	13.65	14.62	24.00	PASS
802.11n HT40	38/5190	14.74	14.74	24.00	PASS
	46/5230	14.57	14.57	24.00	PASS
802.11ac VHT20	36/5180	13.86	14.83	24.00	PASS
	40/5200	11.69	12.66	24.00	PASS
	48/5240	11.69	12.66	24.00	PASS
802.11ac VHT40	38/5190	14.78	15.76	24.00	PASS
	46/5230	14.46	15.44	24.00	PASS
802.11ac VHT80	42/5210	16.31	17.31	24.00	PASS
802.11ax HE20	36/5180	13.86	13.86	24.00	PASS
	40/5200	11.67	11.67	24.00	PASS
	48/5240	13.54	13.54	24.00	PASS
802.11ax HE40	38/5190	14.38	14.38	24.00	PASS
	46/5230	13.96	13.96	24.00	PASS
802.11ax HE80	42/5210	15.90	15.90	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-2A

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	52/5260	15.37	15.54	24.00	PASS
	60/5300	15.61	15.78	24.00	PASS
	64/5320	15.72	15.89	24.00	PASS
802.11n HT20	52/5260	14.27	15.24	24.00	PASS
	60/5300	14.59	15.56	24.00	PASS
	64/5320	14.66	15.63	24.00	PASS
802.11n HT40	54/5270	17.05	17.05	24.00	PASS
	62/5310	12.67	12.67	24.00	PASS
802.11ac VHT20	52/5260	19.31	20.28	24.00	PASS
	60/5300	19.75	20.72	24.00	PASS
	64/5320	19.84	20.81	24.00	PASS
802.11ac VHT40	54/5270	22.30	23.28	24.00	PASS
	62/5310	23.01	23.99	24.00	PASS
802.11ac VHT80	58/5290	12.85	13.85	24.00	PASS
802.11ax HE20	52/5260	14.14	14.14	24.00	PASS
	60/5300	14.34	14.34	24.00	PASS
	64/5320	14.56	14.56	24.00	PASS
802.11ax HE40	54/5270	16.69	16.69	24.00	PASS
	62/5310	12.02	12.02	24.00	PASS
802.11ax HE80	58/5290	13.66	13.66	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-2C

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	100/5500	20.34	20.51	24.00	PASS
	120/5600	19.49	19.66	24.00	PASS
	140/5700	19.46	19.63	24.00	PASS
	144/5720	18.55	18.72	23.98	PASS
802.11n HT20	100/5500	19.23	20.20	24.00	PASS
	120/5600	20.36	21.33	24.00	PASS
	140/5700	15.87	16.84	24.00	PASS
	144/5720	19.51	20.48	24.00	PASS
802.11n HT40	102/5510	14.86	14.86	24.00	PASS
	118/5590	18.57	18.57	24.00	PASS
	134/5670	16.39	16.39	24.00	PASS
	142/5710	20.49	20.49	24.00	PASS
802.11ac VHT20	100/5500	19.25	20.22	24.00	PASS
	120/5600	20.38	21.35	24.00	PASS
	140/5700	20.55	21.52	24.00	PASS
	144/5720	19.01	19.98	24.00	PASS
802.11ac VHT40	102/5510	20.41	21.39	24.00	PASS
	118/5590	20.97	21.95	24.00	PASS
	134/5670	20.86	21.84	24.00	PASS
	142/5710	20.59	21.57	24.00	PASS
802.11ac VHT80	122/5610	12.19	13.19	24.00	PASS
	138/5690	16.83	17.83	24.00	PASS
802.11ax HE20	100/5500	19.05	19.05	24.00	PASS
	120/5600	20.11	20.11	24.00	PASS
	140/5700	20.22	20.22	24.00	PASS
	144/5720	18.99	18.99	24.00	PASS
802.11ax HE40	102/5510	13.11	13.11	24.00	PASS
	118/5590	20.52	20.52	24.00	PASS
	134/5670	20.20	20.20	24.00	PASS
	142/5710	20.01	20.01	24.00	PASS
802.11ax HE80	122/5610	18.00	18.00	24.00	PASS
	138/5690	20.16	20.16	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-3

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	144/5720	11.60	11.77	30.00	PASS
	149/5745	23.08	23.25	30.00	PASS
	157/5785	23.17	23.34	30.00	PASS
	165/5825	20.72	20.89	30.00	PASS
802.11n HT20	144/5720	12.85	13.82	30.00	PASS
	149/5745	19.54	20.51	30.00	PASS
	157/5785	21.59	22.56	30.00	PASS
	165/5825	21.92	22.89	30.00	PASS
802.11n HT40	142/5720	9.31	9.31	30.00	PASS
	151/5755	17.31	17.31	30.00	PASS
	159/5795	17.86	17.86	30.00	PASS
802.11ac VHT20	144/5720	15.19	16.16	30.00	PASS
	149/5745	21.77	22.74	30.00	PASS
	157/5785	22.07	23.04	30.00	PASS
	165/5825	21.89	22.86	30.00	PASS
802.11ac VHT40	142/5710	11.41	12.39	30.00	PASS
	151/5755	22.71	23.69	30.00	PASS
	159/5795	22.70	23.68	30.00	PASS
802.11ac VHT80	138/5690	2.39	3.39	30.00	PASS
	155/5775	16.23	17.23	30.00	PASS
802.11ax HE20	144/5720	14.66	14.66	30.00	PASS
	149/5745	21.85	21.85	30.00	PASS
	157/5785	22.13	22.13	30.00	PASS
	165/5825	21.48	21.48	30.00	PASS
802.11ax HE40	142/5710	12.07	12.07	30.00	PASS
	151/5755	20.00	20.00	30.00	PASS
	159/5795	19.84	19.84	30.00	PASS
802.11ax HE80	138/5690	6.99	6.99	30.00	PASS
	155/5775	19.02	19.02	30.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

SISO Antenna 2
U-NII-1

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	13.77	13.94	24.00	PASS
	40/5200	13.90	14.07	24.00	PASS
	48/5240	13.88	14.05	24.00	PASS
802.11n HT20	36/5180	12.19	13.16	24.00	PASS
	40/5200	12.97	13.94	24.00	PASS
	48/5240	12.64	13.61	24.00	PASS
802.11n HT40	38/5190	15.40	15.40	24.00	PASS
	46/5230	15.73	15.73	24.00	PASS
802.11ac VHT20	36/5180	12.46	13.43	24.00	PASS
	40/5200	12.73	13.70	24.00	PASS
	48/5240	12.92	13.89	24.00	PASS
802.11ac VHT40	38/5190	16.28	17.26	24.00	PASS
	46/5230	15.97	16.95	24.00	PASS
802.11ac VHT80	42/5210	16.42	17.42	24.00	PASS
802.11ax HE20	36/5180	12.32	12.32	24.00	PASS
	40/5200	12.55	12.55	24.00	PASS
	48/5240	12.74	12.74	24.00	PASS
802.11ax HE40	38/5190	15.55	15.55	24.00	PASS
	46/5230	15.87	15.87	24.00	PASS
802.11ax HE80	42/5210	15.68	15.68	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-2A

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	52/5260	19.28	19.45	24.00	PASS
	60/5300	19.96	20.13	24.00	PASS
	64/5320	19.94	20.11	24.00	PASS
802.11n HT20	52/5260	19.03	20.00	24.00	PASS
	60/5300	19.11	20.08	24.00	PASS
	64/5320	18.44	19.41	24.00	PASS
802.11n HT40	54/5270	21.72	21.72	24.00	PASS
	62/5310	17.19	17.19	24.00	PASS
802.11ac VHT20	52/5260	19.22	20.19	24.00	PASS
	60/5300	19.08	20.05	24.00	PASS
	64/5320	18.47	19.44	24.00	PASS
802.11ac VHT40	54/5270	21.75	22.73	24.00	PASS
	62/5310	21.31	22.29	24.00	PASS
802.11ac VHT80	58/5290	16.64	17.64	24.00	PASS
802.11ax HE20	52/5260	19.18	19.18	24.00	PASS
	60/5300	18.97	18.97	24.00	PASS
	64/5320	18.76	18.76	24.00	PASS
802.11ax HE40	54/5270	21.32	21.32	24.00	PASS
	62/5310	16.74	16.74	24.00	PASS
802.11ax HE80	58/5290	17.46	17.46	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					