RF TEST REPORT

Applicant	Shanghai Xiangcheng Communication Technology Co.,Ltd
FCC ID	2A2UU-K1211
Product	Smart POS Terminal
Brand	Kobile
Model	K1211
Report No.	EFTA25022169-IE-07-R4
Issue Date	May 26, 2025

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15E (2024)**. 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: March 18, 2025 ~ April 18, 2025 Date of Sample Received: February 26, 2025			
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.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
Post code:	201201
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Website:	https://www.eurofins.com/electrical-and-electronics
E-mail:	Kain.Xu@cpt.eurofinscn.com

2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Shanghai Xiangcheng Communication Technology Co.,Ltd
Applicant address	6th Floor, Building 10, No.3000 Longdong Avenue, Pudong New District, Shanghai
Manufacturer	Shanghai Xiangcheng Communication Technology Co.,Ltd
Manufacturer address	6th Floor, Building 10, No.3000 Longdong Avenue, Pudong New District, Shanghai

2.2. General information

EUT Description	
Model	K1211
Lab internal SN	EFTA25022169-IE-06/S01
HW Version	V1.0
SW Version	6201.30.0001.241.001
Power Supply	Battery / AC adapter
Antenna Type	Internal Antenna
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)
Antenna Gain	2.88 dBi
Operating Frequency Range(s)	U-NII-1: 5150MHz-5250MHz U-NII-2A: 5250MHz -5350MHz U-NII-3: 5725MHz -5850MHz
Modulation Type	802.11a: OFDM 802.11n (HT20/HT40): OFDM 802.11ac (VHT20/VHT40/VHT80): OFDM
Max. Output Power	15.33 dBm
Operating temperature range	-10 ° C to 50 ° C
Operating voltage range	3.6 VDC to 4.2 VDC
Testing temperature range	-30 ° C to 50° C
Testing voltage range	3.4 VDC – 3.6 VDC – 4.2 VDC
State voltage	3.6 VDC
EUT Accessory	
Adapter	Manufacturer: Chongqing Lianmao Electronics Co., LTD Model: LM-603E-050200U02CE
Battery	Manufacturer: DongGuan HongDe Battery Co., Ltd Model: N0411
USB Cable	Manufacturer: Shenzhen Huajia Shengming Technology Co., LTD Model: HJ-262BL1311-1

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 (2024) Unlicensed National Information Infrastructure Devices

ANSI C63.10-2013

Reference standard:

KDB 789033 D02 General UNII Test Procedures New Rules 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 (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (X 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
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

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-3	20 MHz	149	5745MHz
			153	5765MHz
			157	5785MHz
			161	5805MHz
			165	5825MHz
		40 MHz	151	5755MHz
			159	5795MHz
		80 MHz	155	5775MHz
Does this device support TPC Function? ☒Yes ☐No				

5. Test Case Results

5.1. Occupied Bandwidth

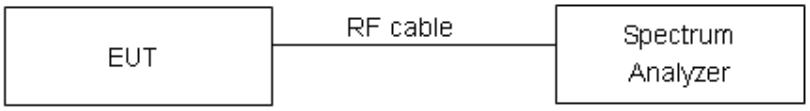
Ambient condition

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/, set RBW ≈1% OCB kHz, VBW ≥ 3 × 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 ≥ 3 × 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
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	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5180	16.514	19.817	PASS
	5200	16.481	19.698	PASS
	5240	16.527	20.168	PASS
802.11n HT20	5180	17.600	20.392	PASS
	5200	17.624	20.285	PASS
	5240	17.613	20.279	PASS
802.11n HT40	5190	36.064	40.421	PASS
	5230	36.062	40.931	PASS
802.11ac VHT20	5180	17.602	20.254	PASS
	5200	17.621	20.185	PASS
	5240	17.608	20.188	PASS
802.11ac VHT40	5190	36.023	40.854	PASS
	5230	36.050	40.975	PASS
802.11ac VHT80	5210	75.366	80.644	PASS

U-NII-2A

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5260	16.513	19.793	PASS
	5300	16.554	19.963	PASS
	5320	16.526	20.063	PASS
802.11n HT20	5260	17.615	20.336	PASS
	5300	17.606	20.232	PASS
	5320	17.612	20.203	PASS
802.11n HT40	5270	36.075	40.947	PASS
	5310	36.042	41.220	PASS
802.11ac VHT20	5260	17.604	20.198	PASS
	5300	17.618	20.443	PASS
	5320	17.645	20.270	PASS
802.11ac VHT40	5270	35.994	40.653	PASS
	5310	36.075	40.828	PASS
802.11ac VHT80	5290	75.390	80.731	PASS

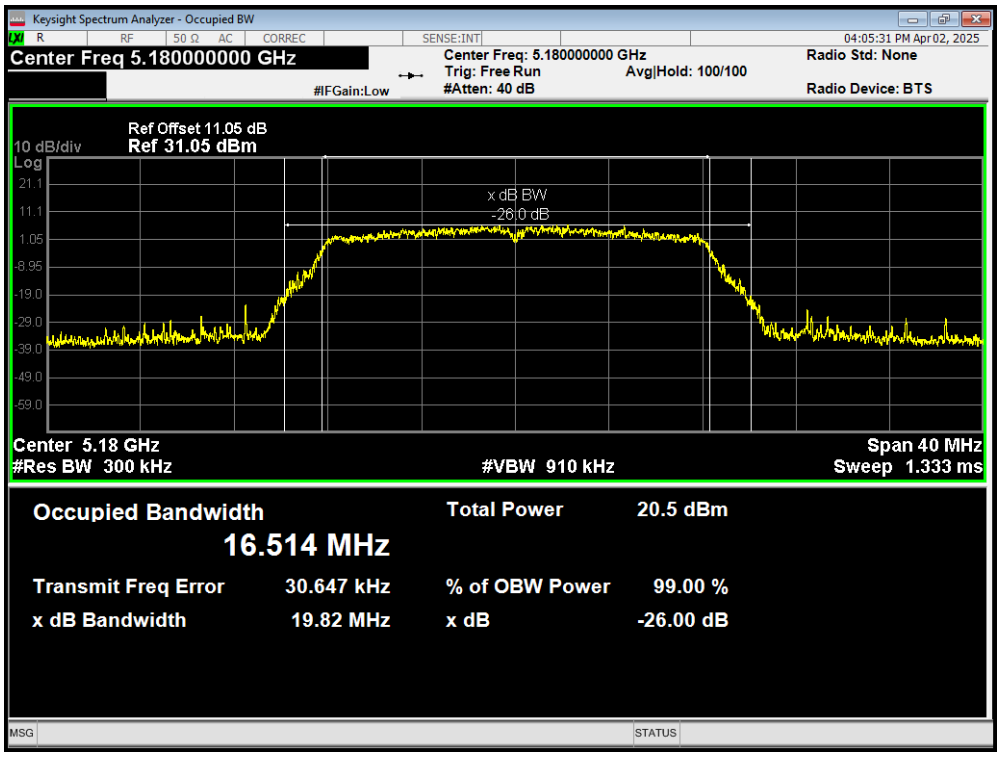
U-NII-3

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11a	5745	16.539	14.421	500	PASS
	5785	16.548	14.668	500	PASS
	5825	16.583	15.041	500	PASS
802.11n HT20	5745	17.650	15.106	500	PASS
	5785	17.643	14.786	500	PASS
	5825	17.631	16.504	500	PASS
802.11n HT40	5755	36.132	33.880	500	PASS
	5795	36.145	35.034	500	PASS
802.11ac VHT20	5745	17.613	15.029	500	PASS
	5785	17.608	15.382	500	PASS
	5825	17.676	14.865	500	PASS
802.11ac VHT40	5755	36.053	33.788	500	PASS
	5795	36.047	33.851	500	PASS
802.11ac VHT80	5775	75.392	75.101	500	PASS

99% bandwidth

U-NII-1

OBW 802.11a 5180MHz



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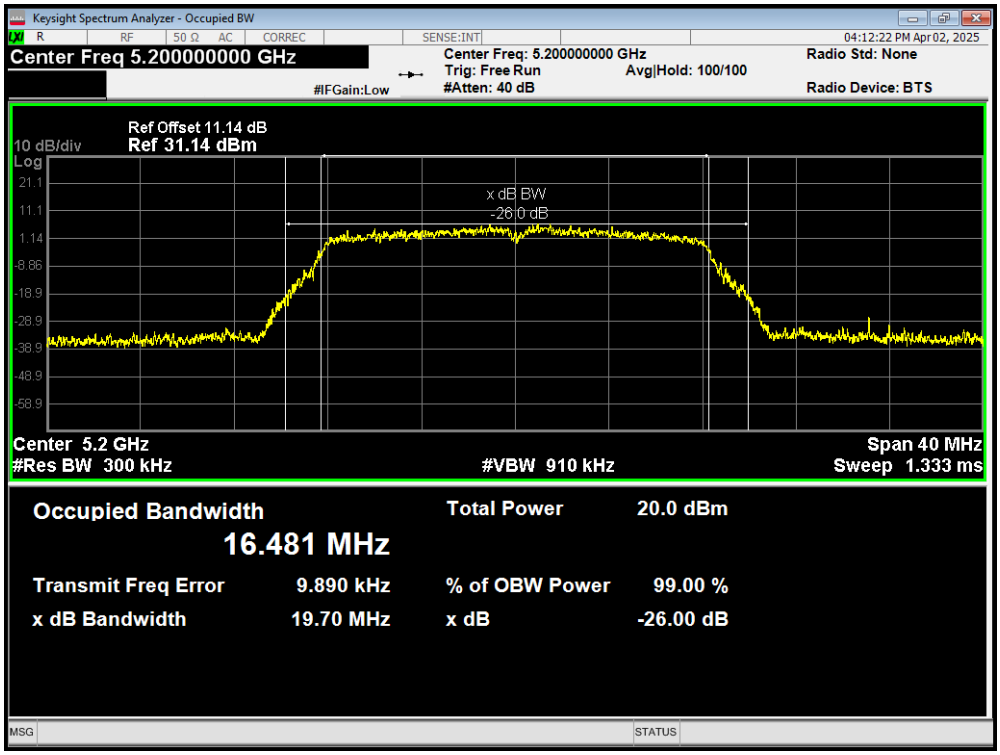

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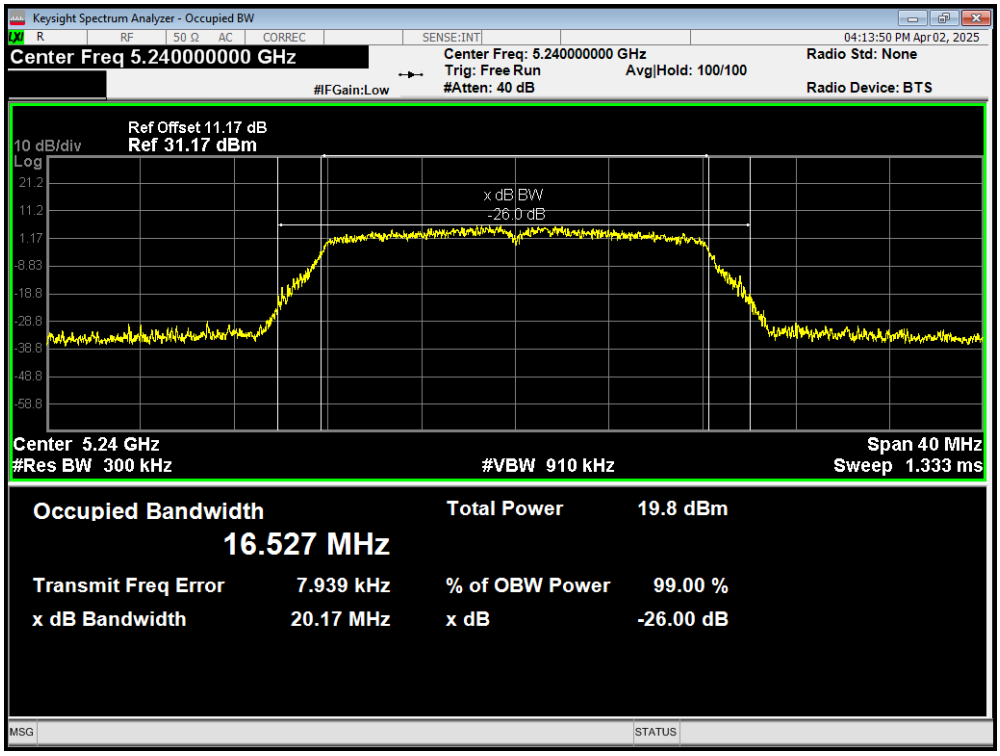

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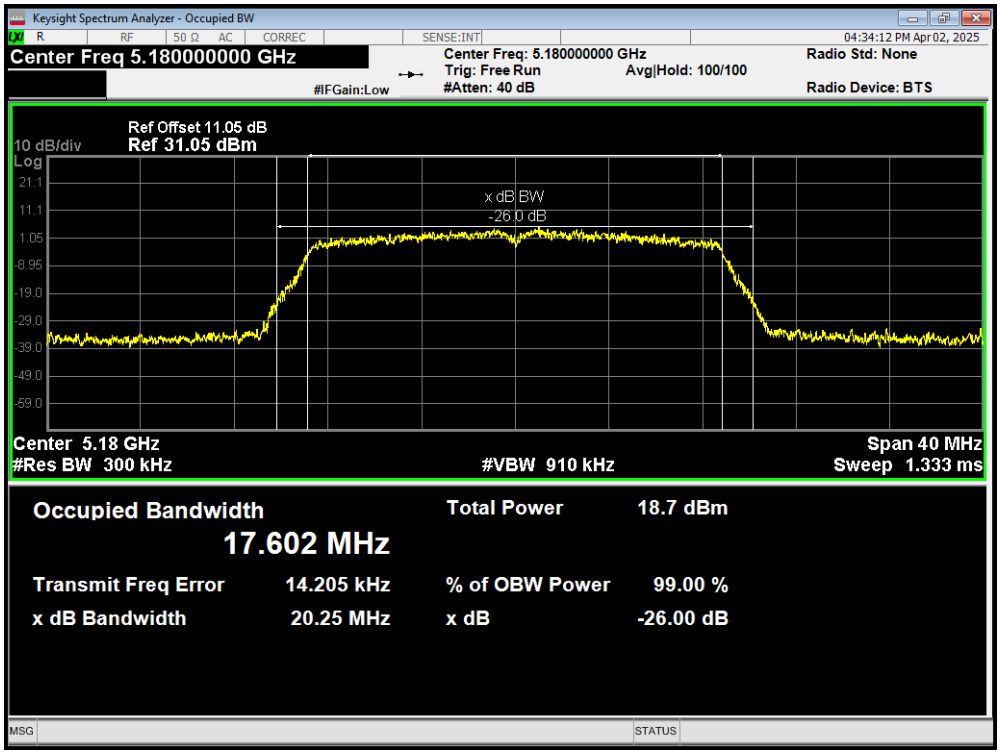

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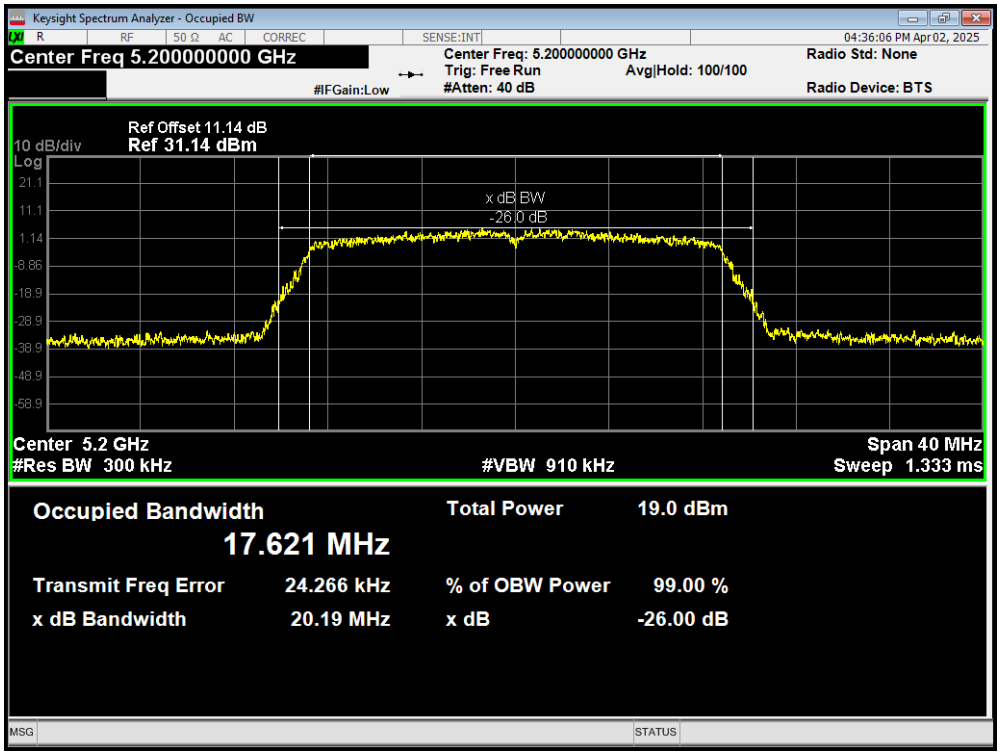

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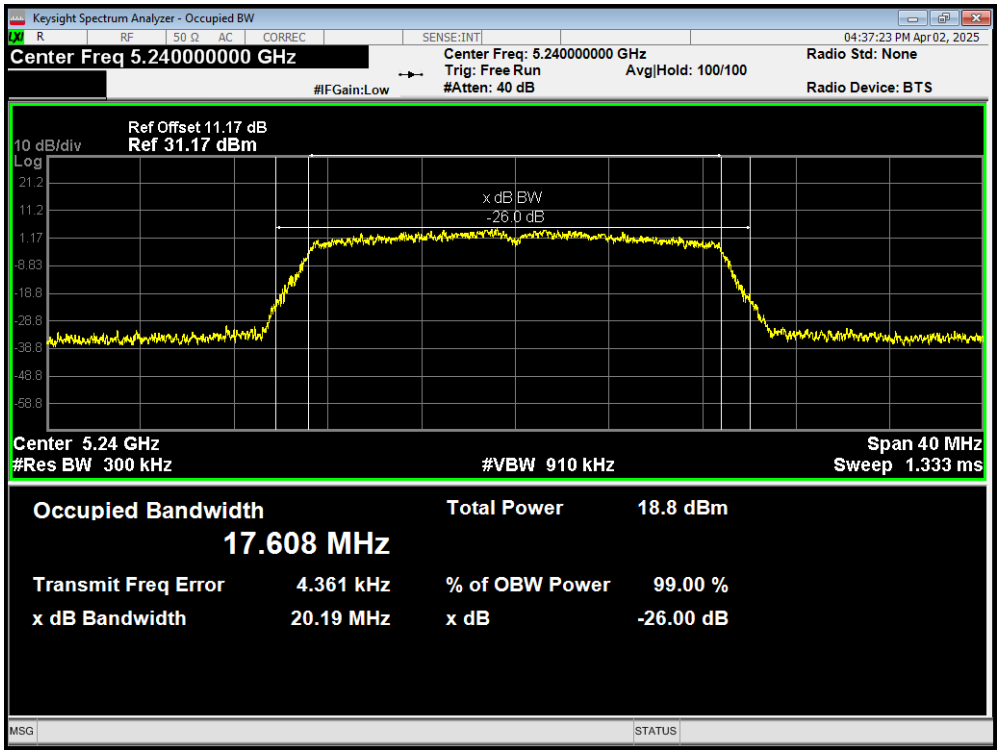

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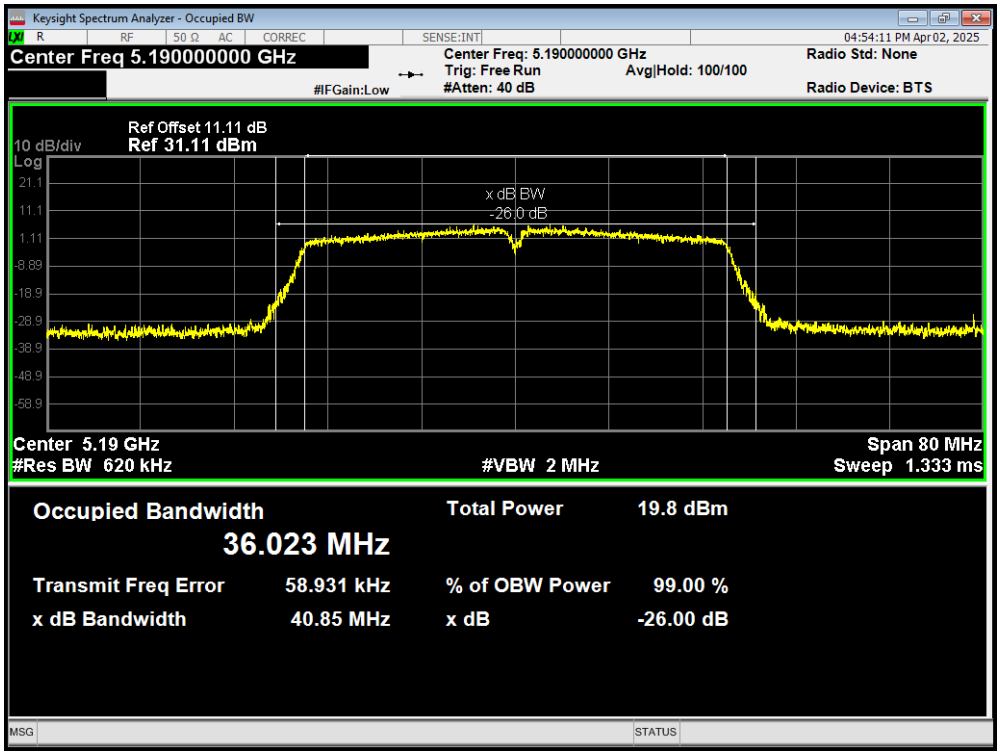

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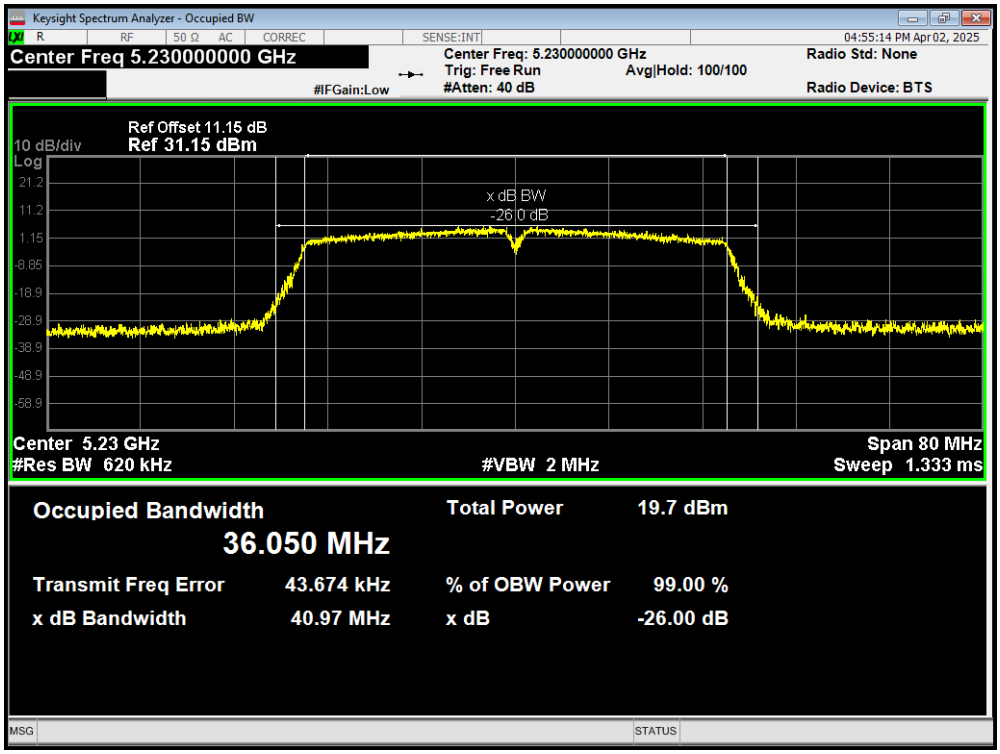

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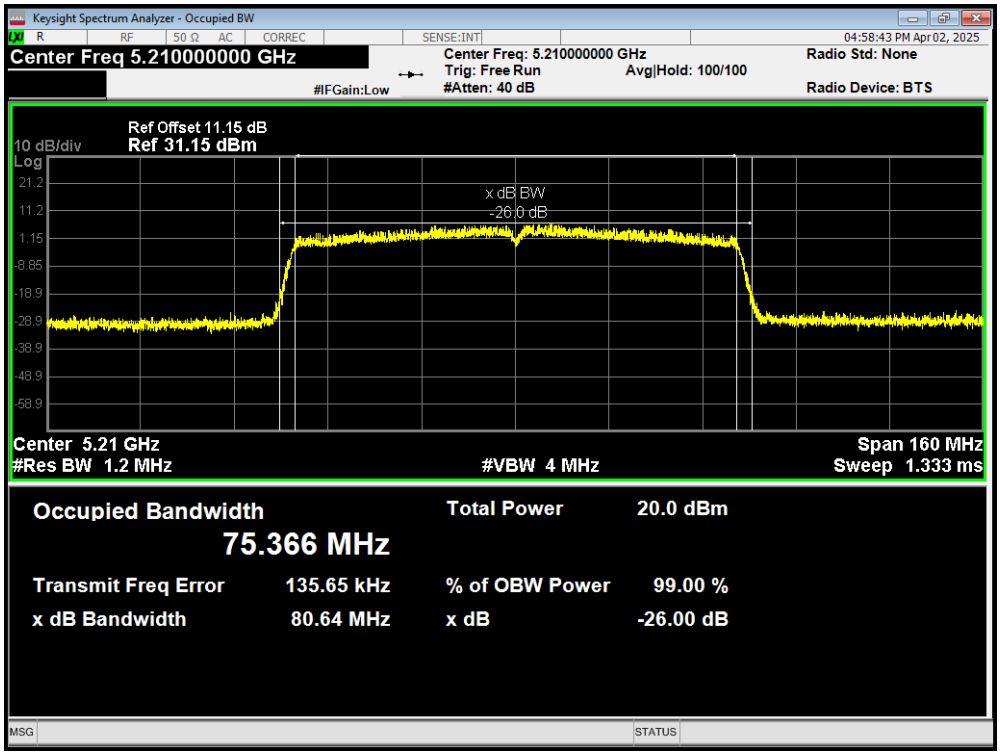

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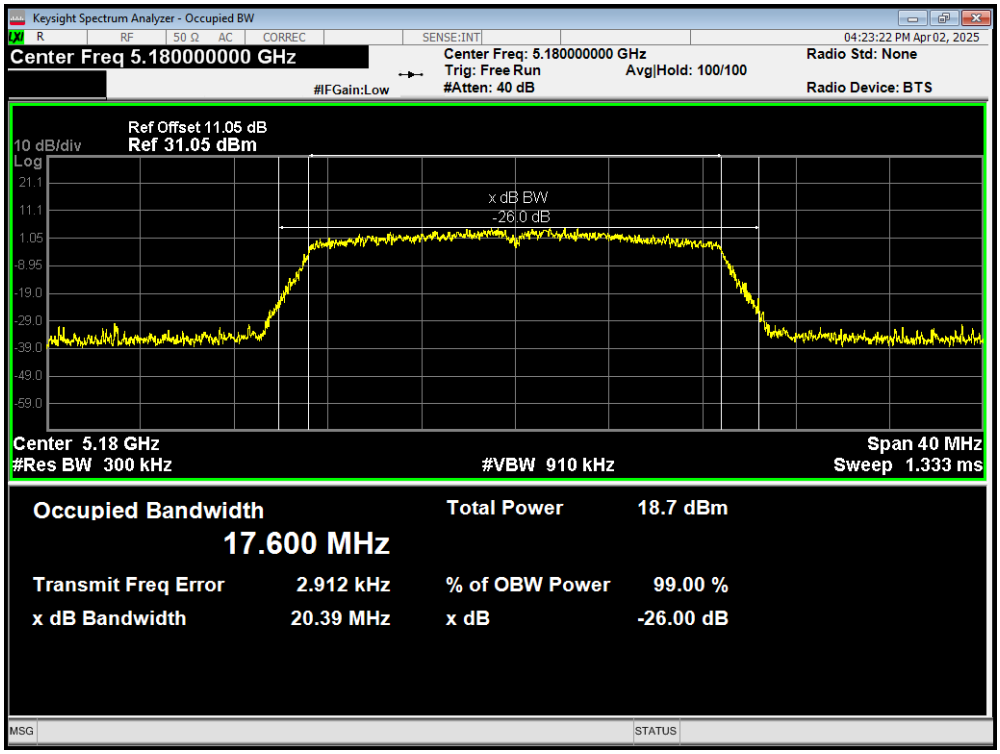

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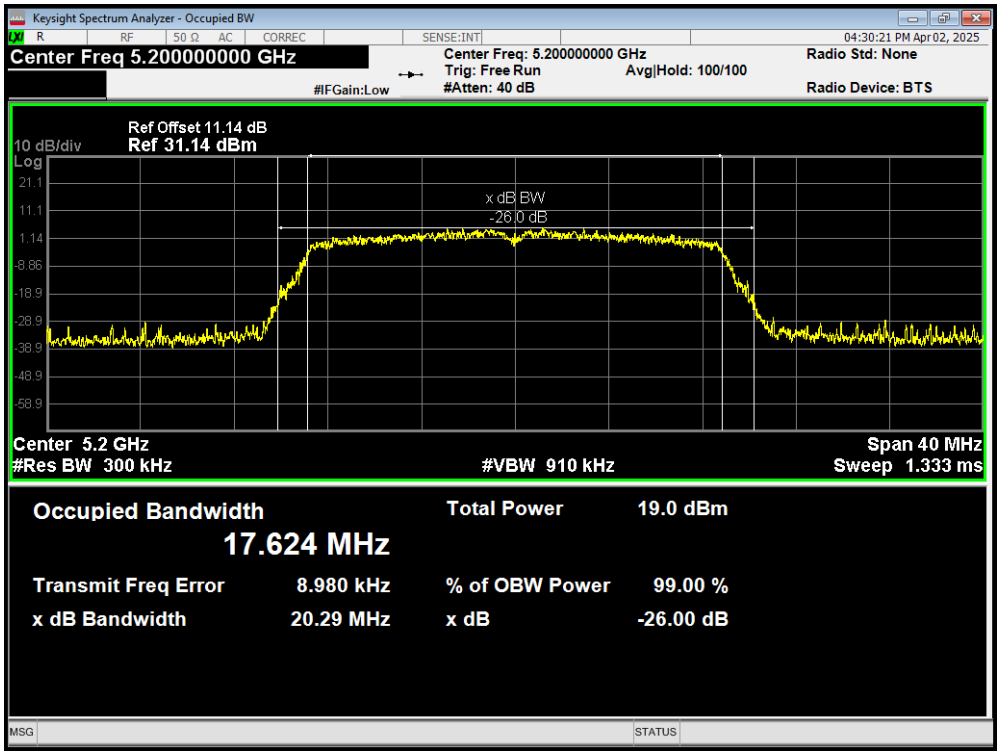

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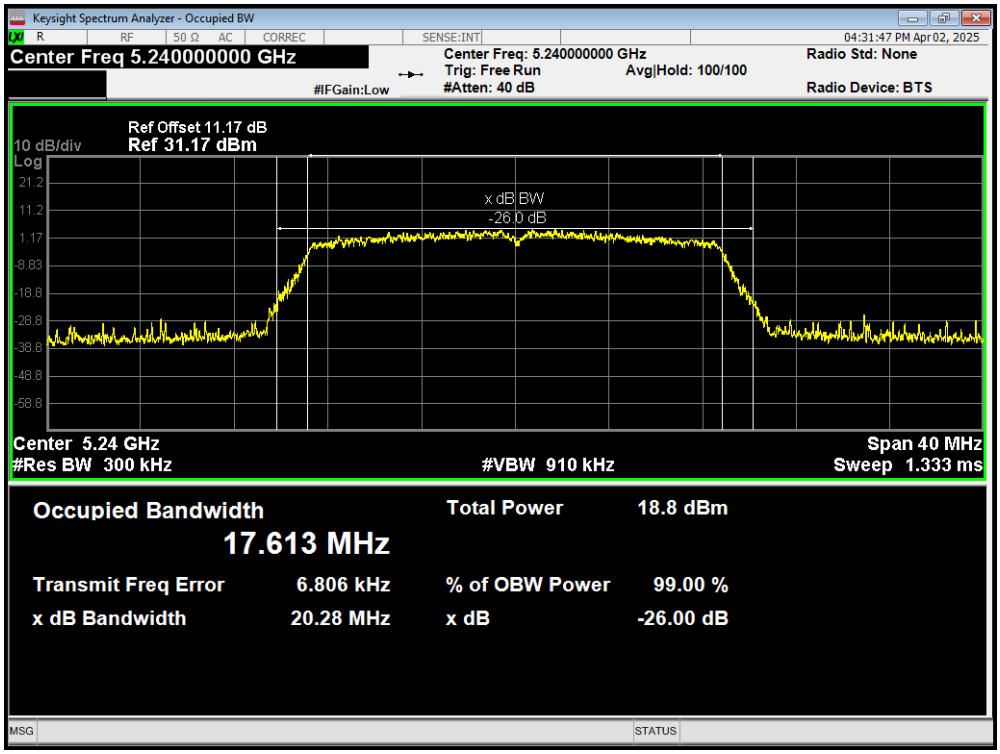

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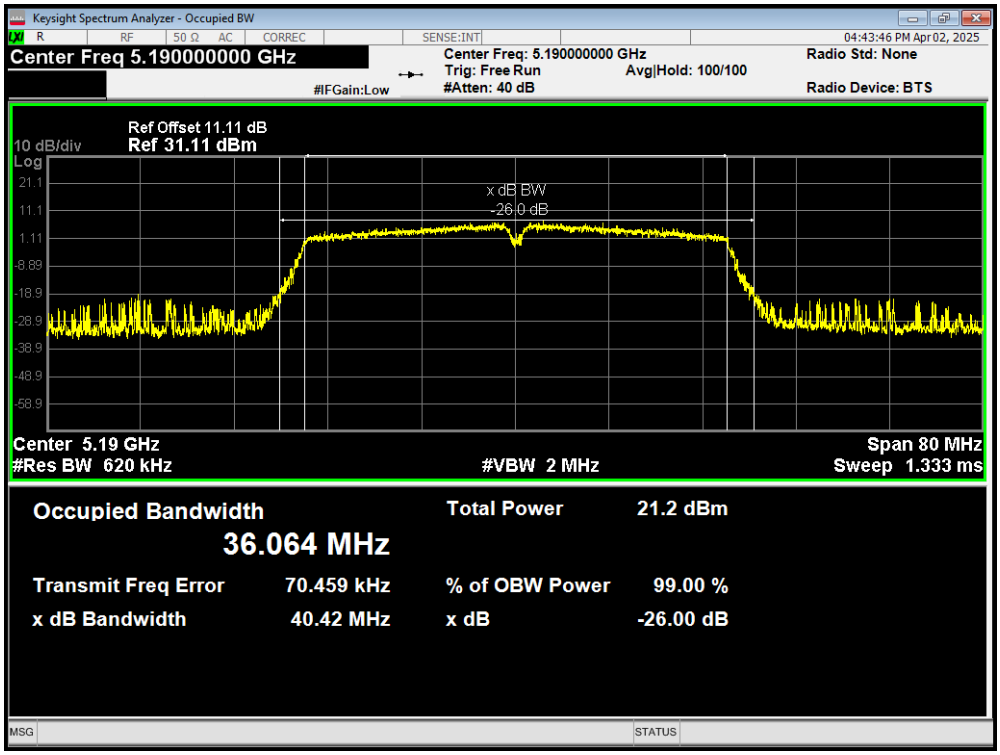

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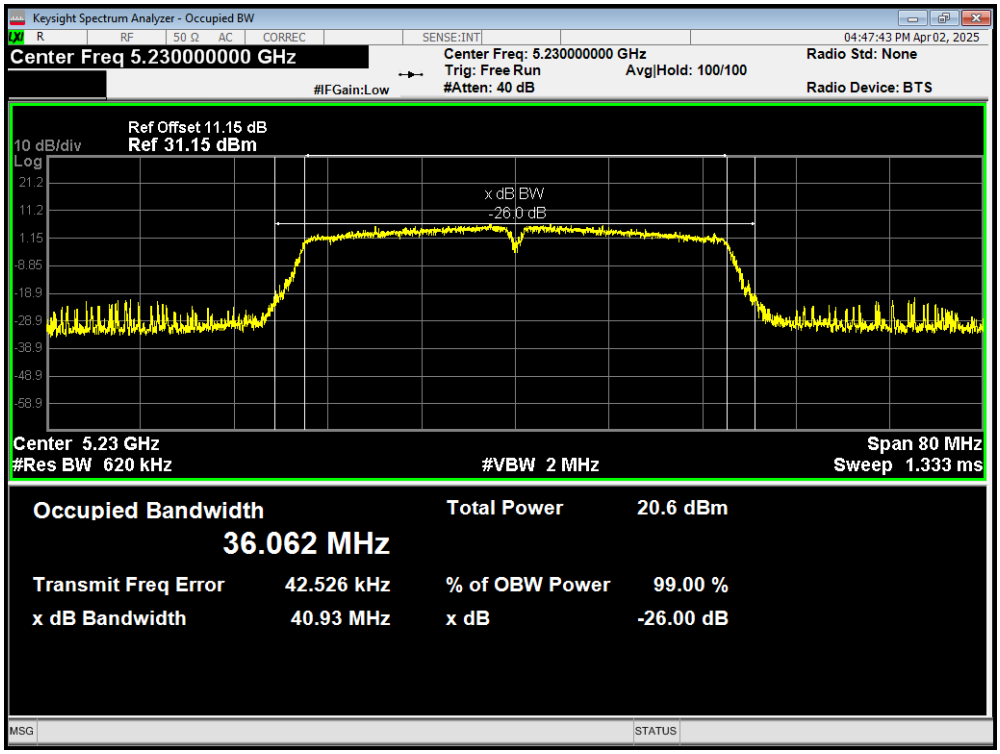
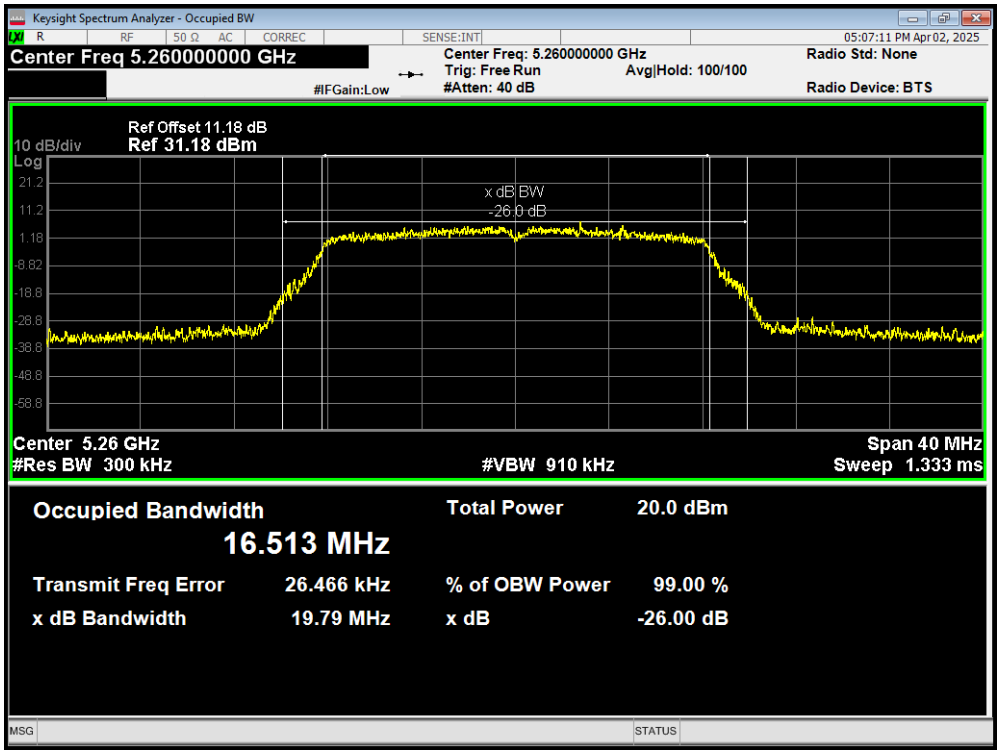


U-NII-2A

OBW 802.11a 5260MHz



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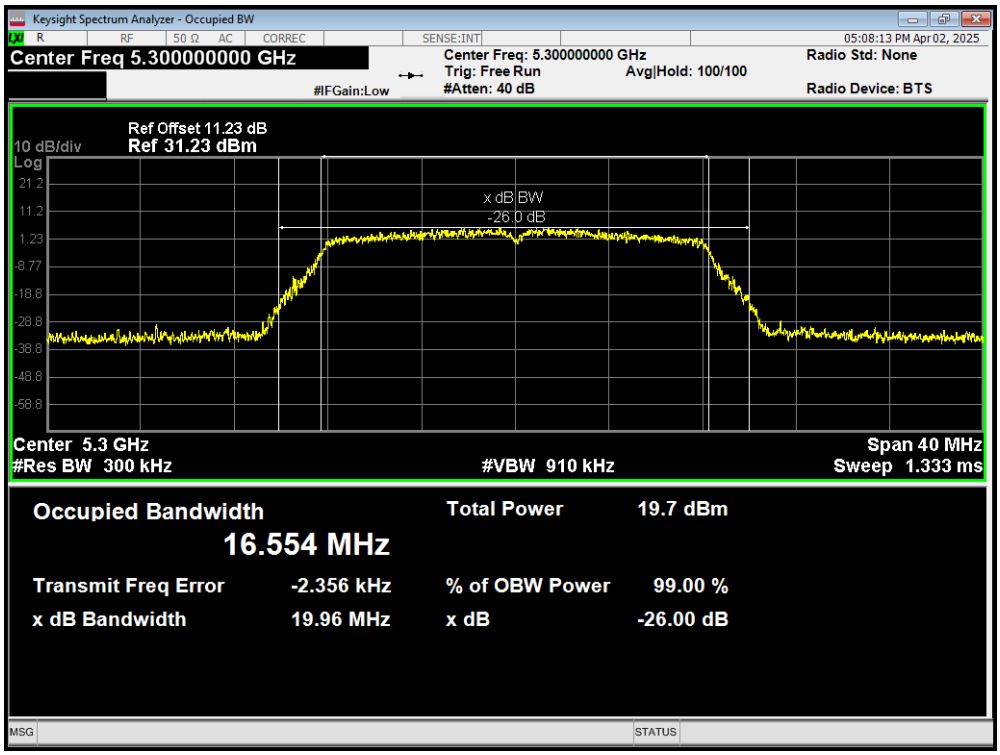

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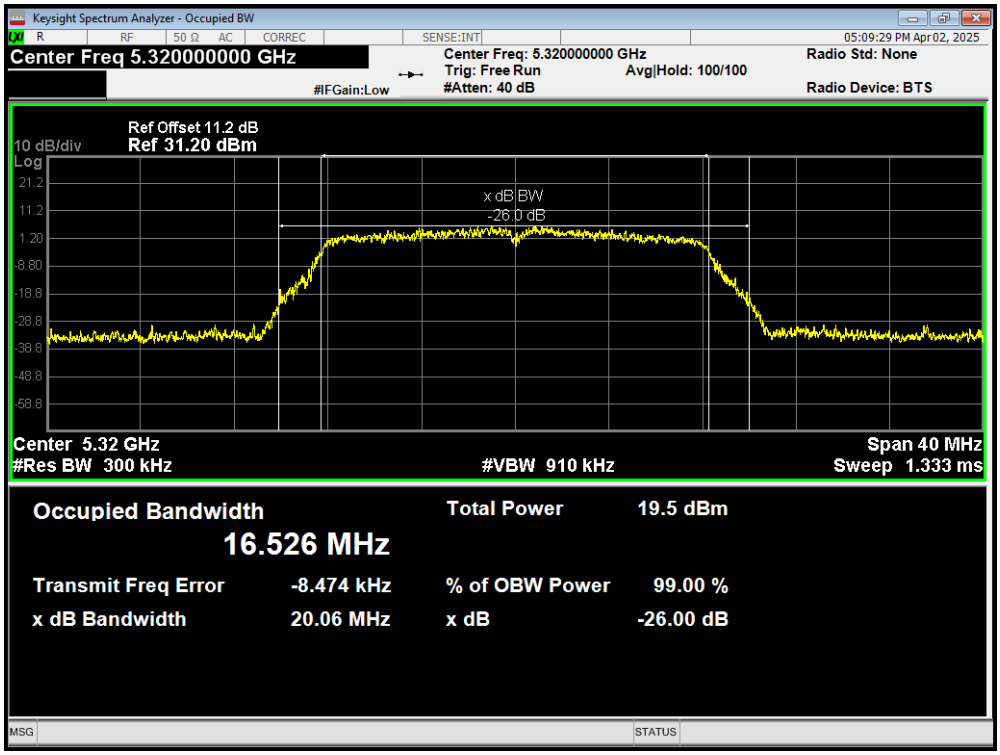
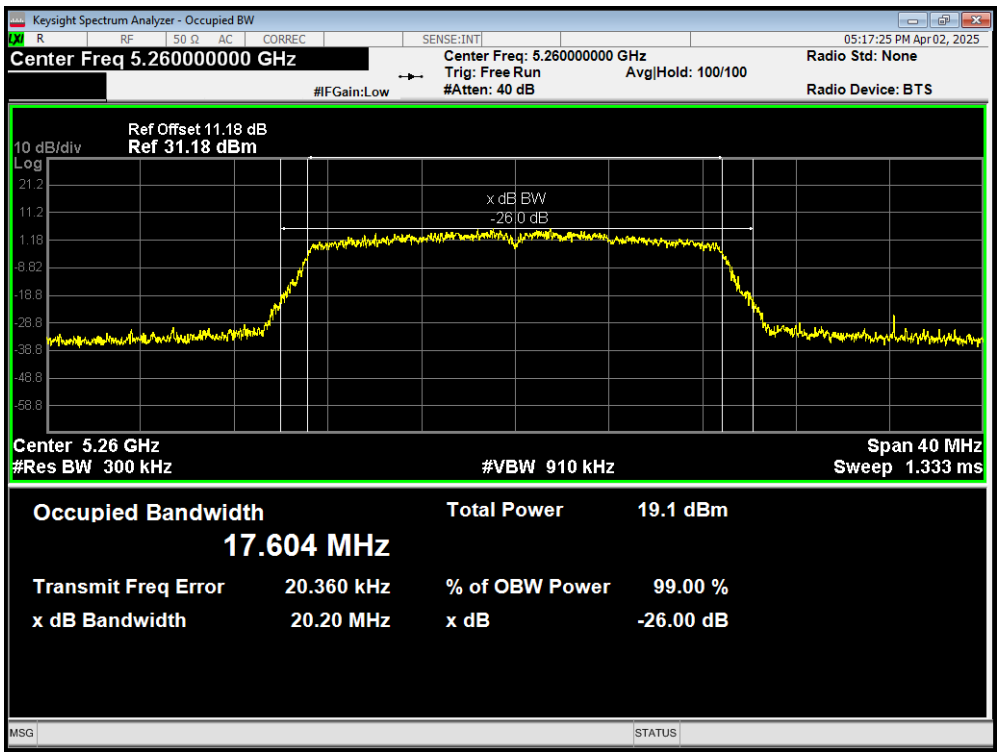


OBW 802.11ac(VHT20) 5260MHz



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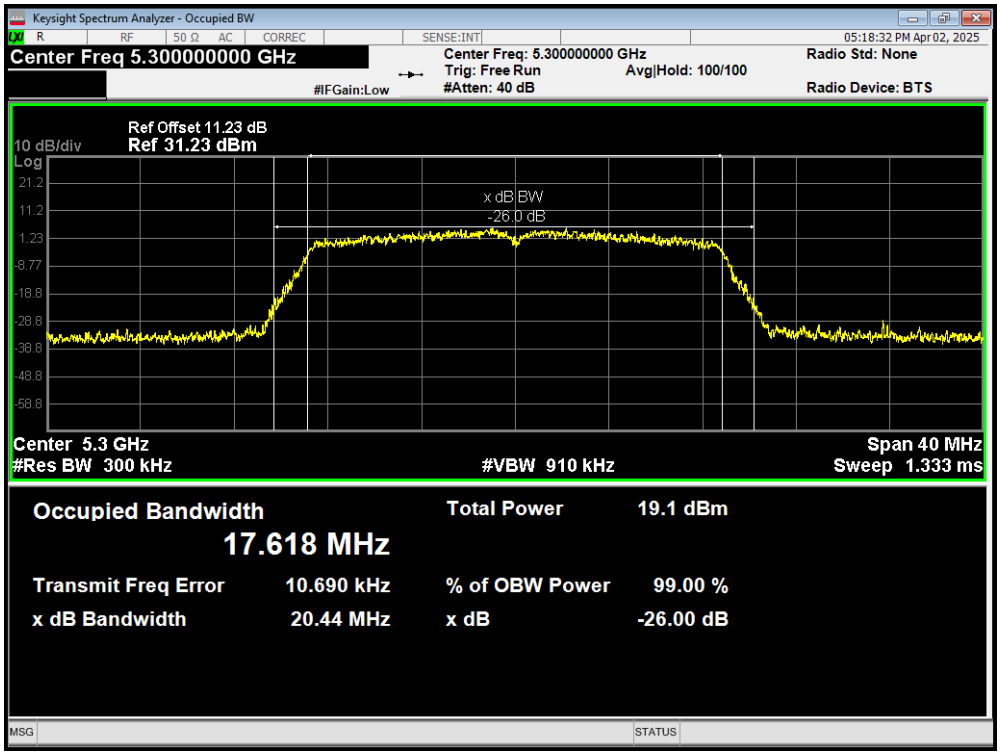

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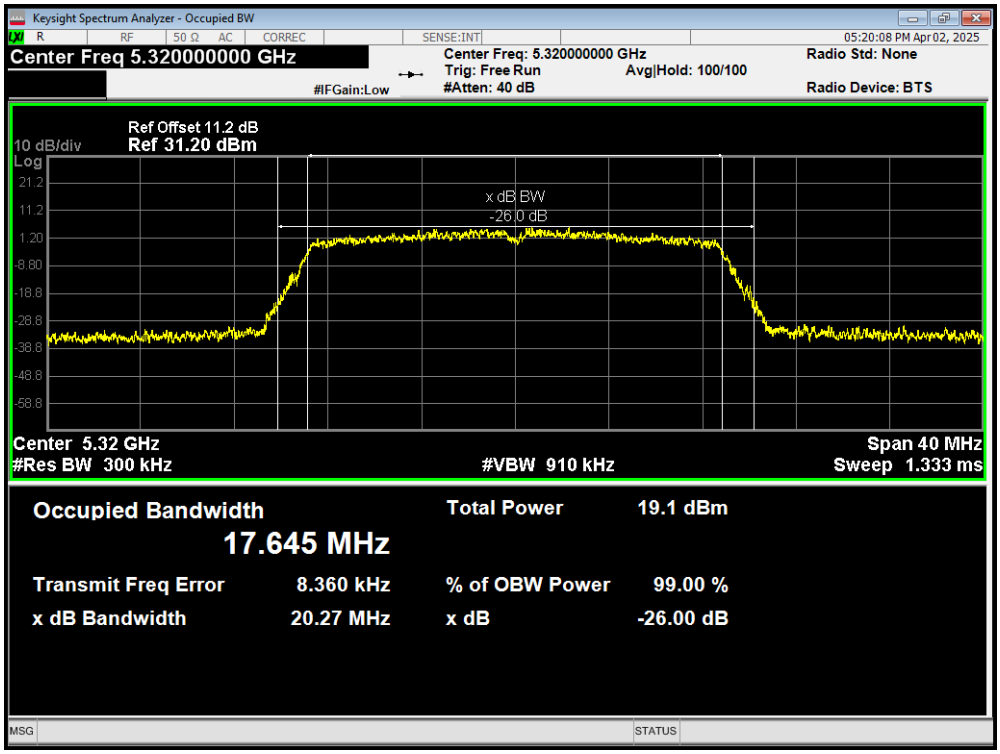

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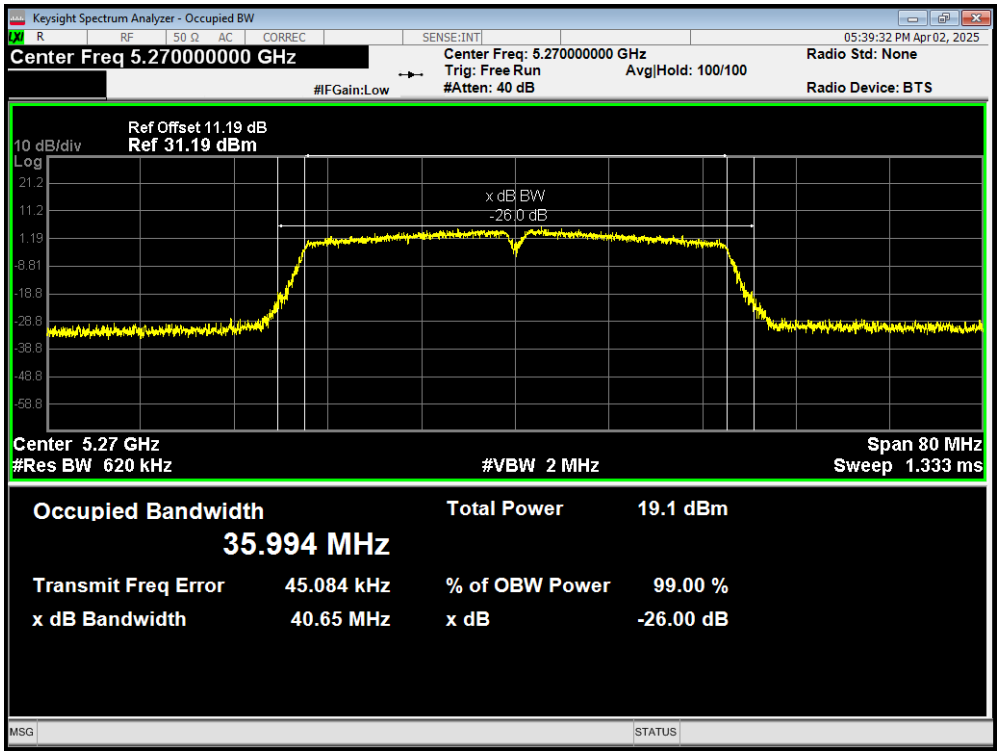

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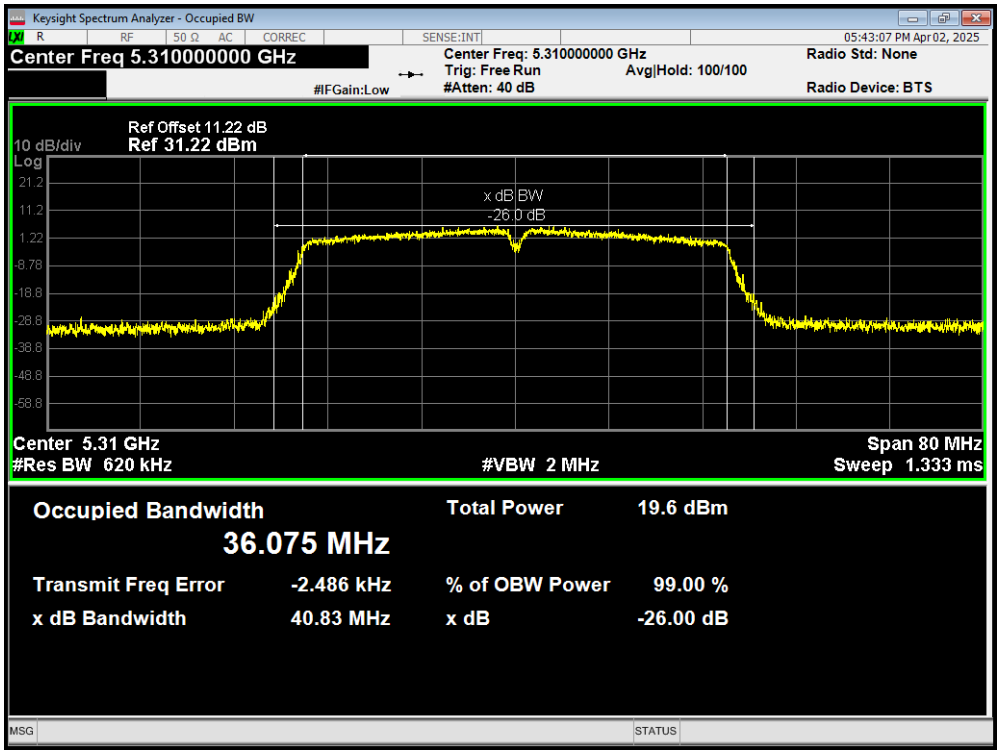

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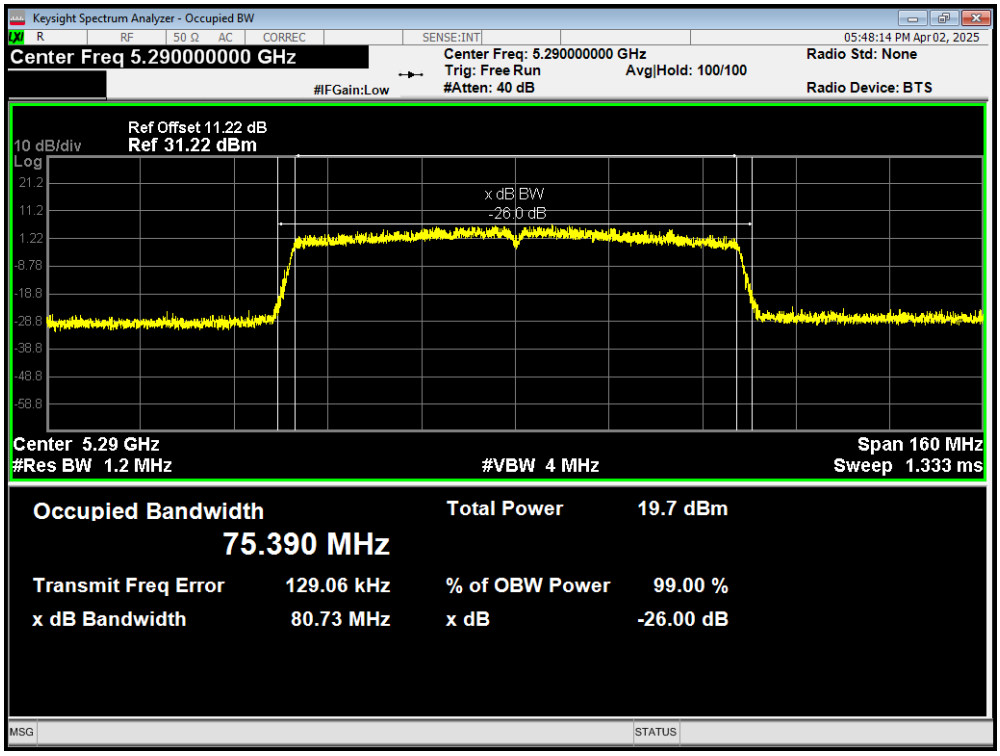

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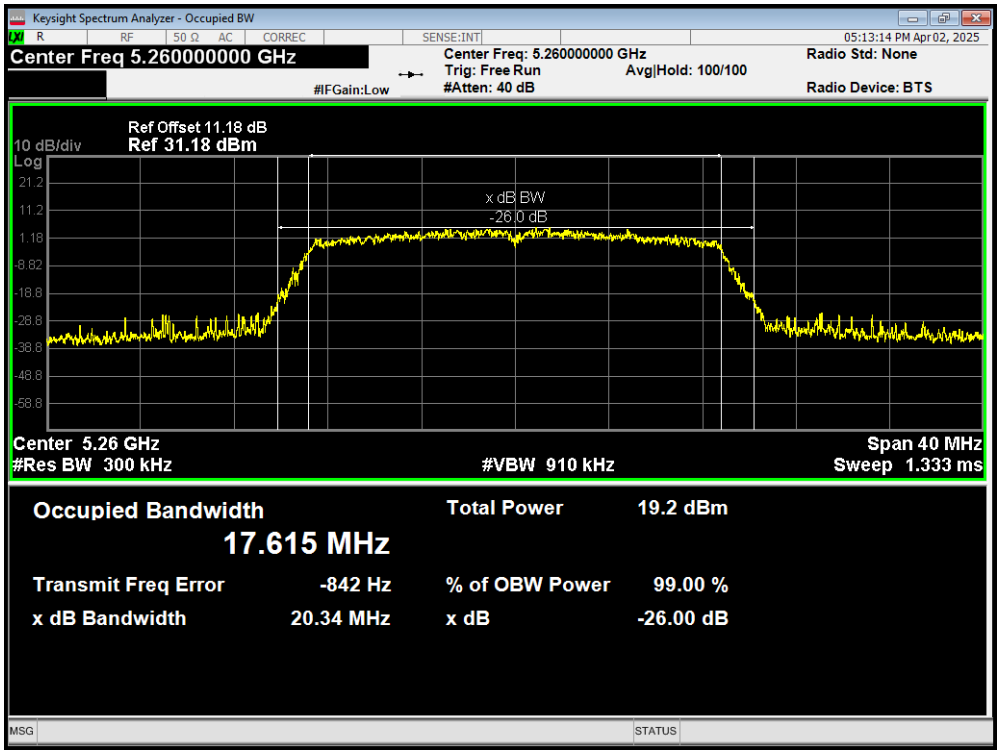

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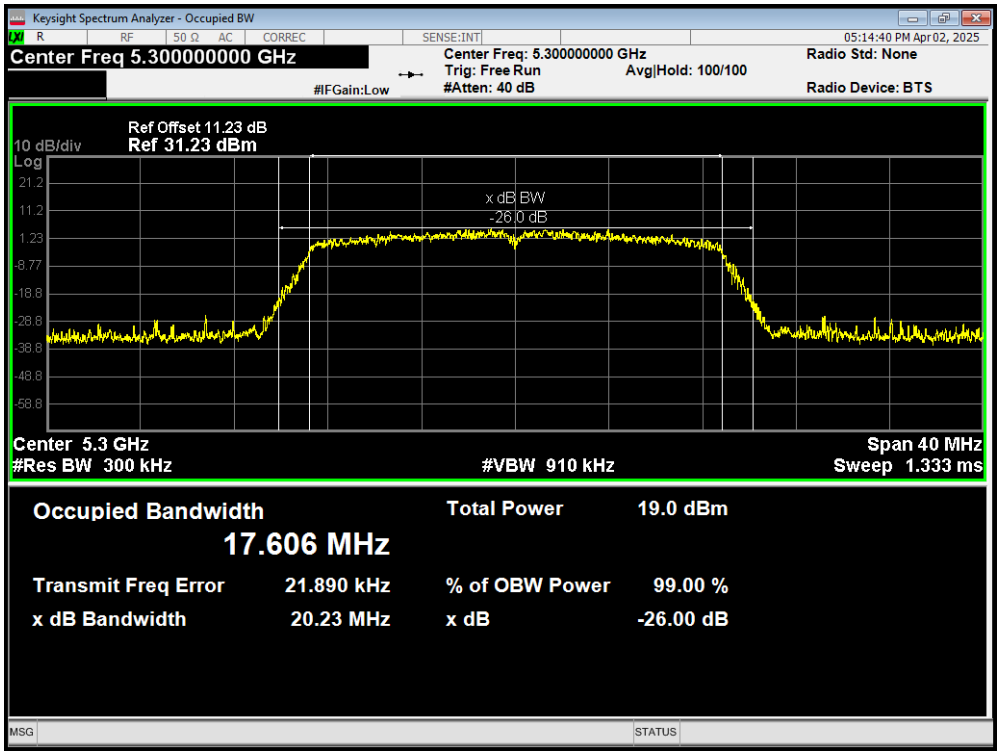

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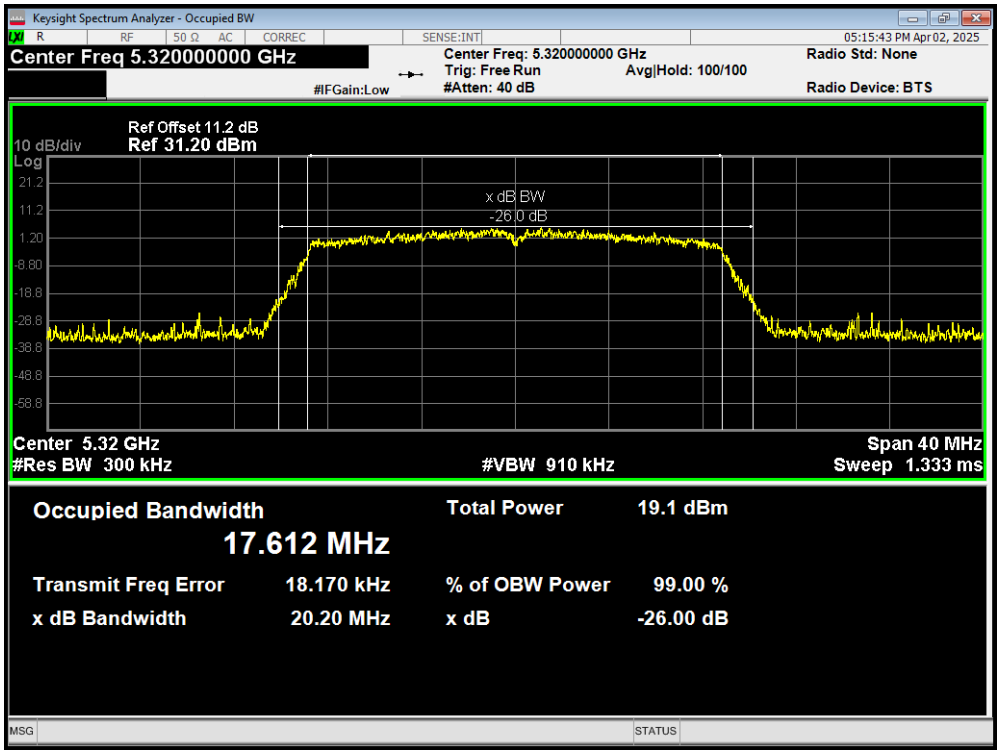

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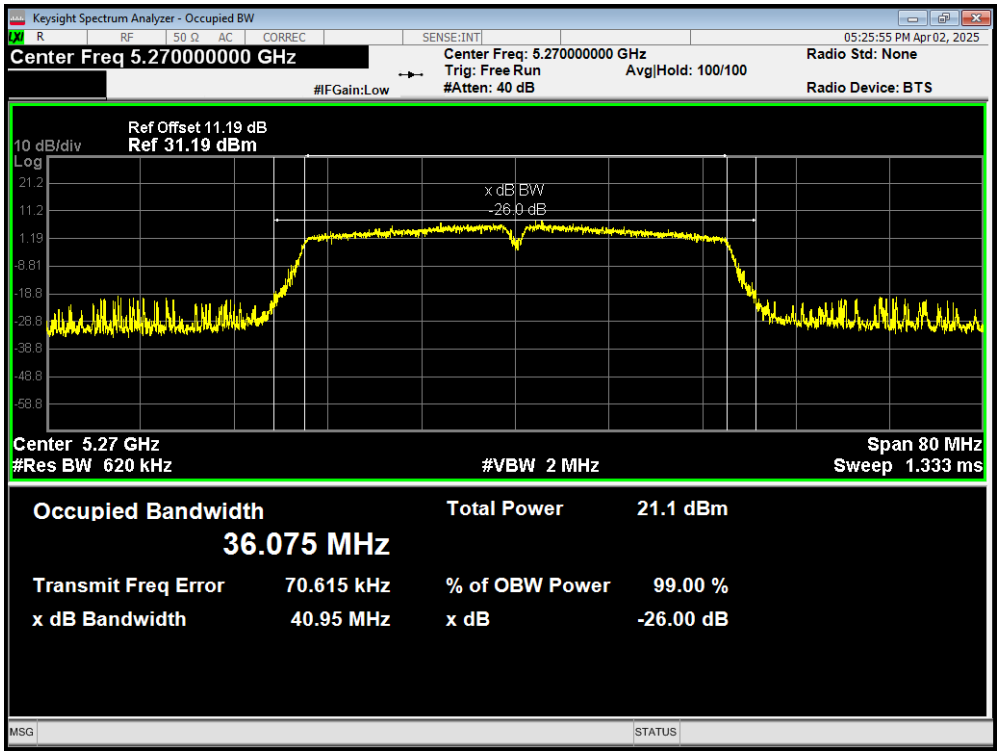

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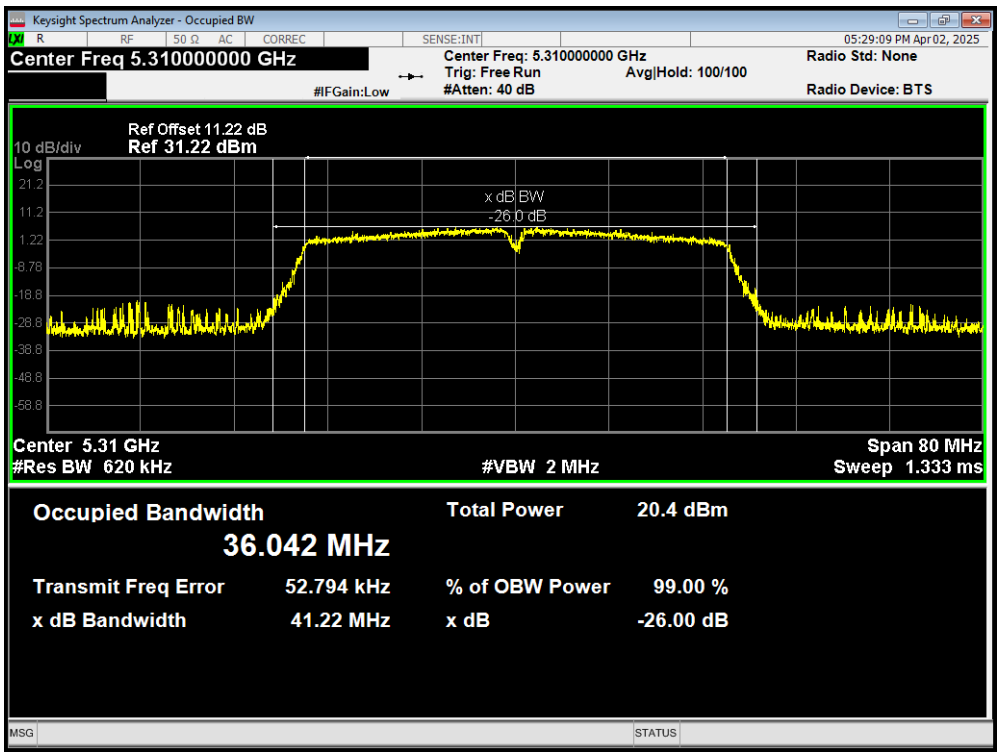
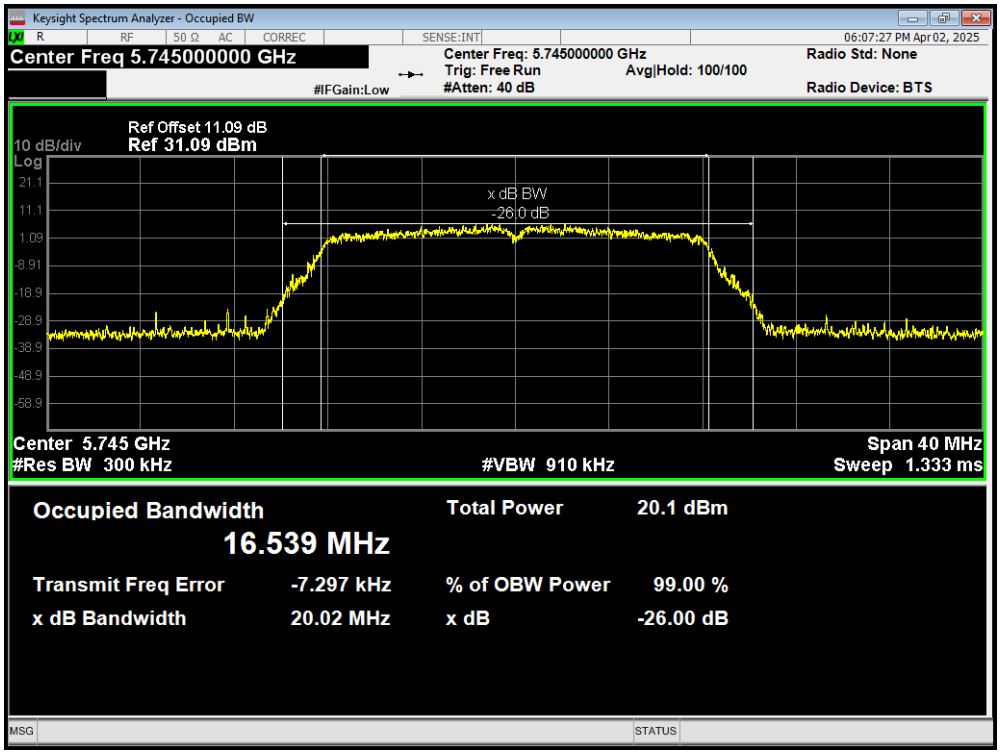


U-NII-3

OBW 802.11a 5745MHz



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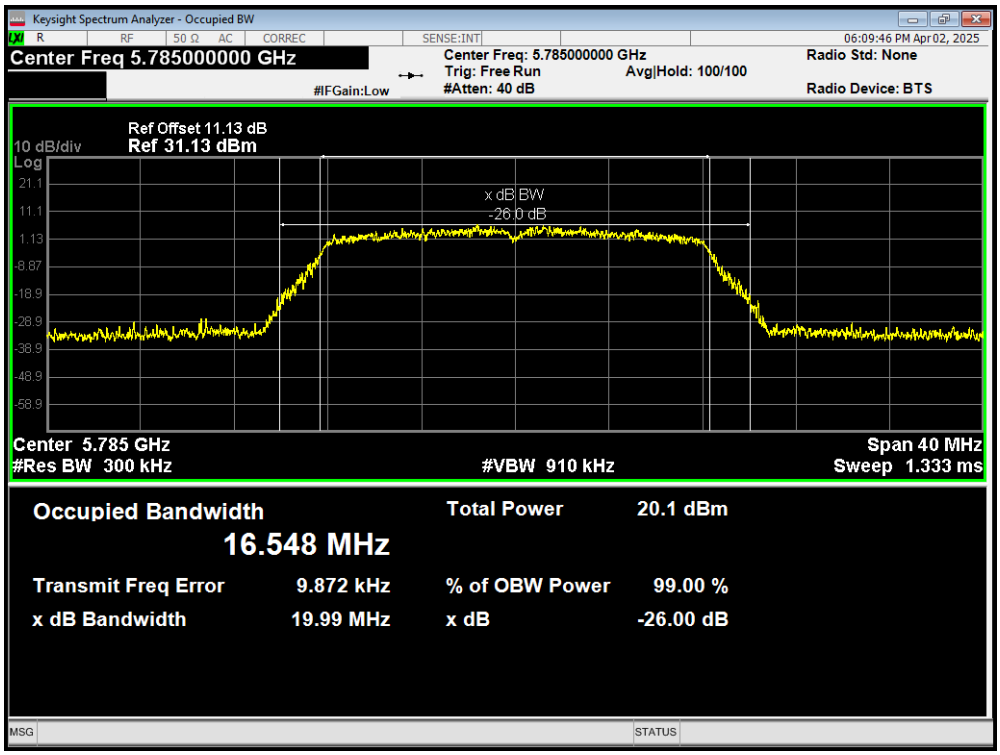
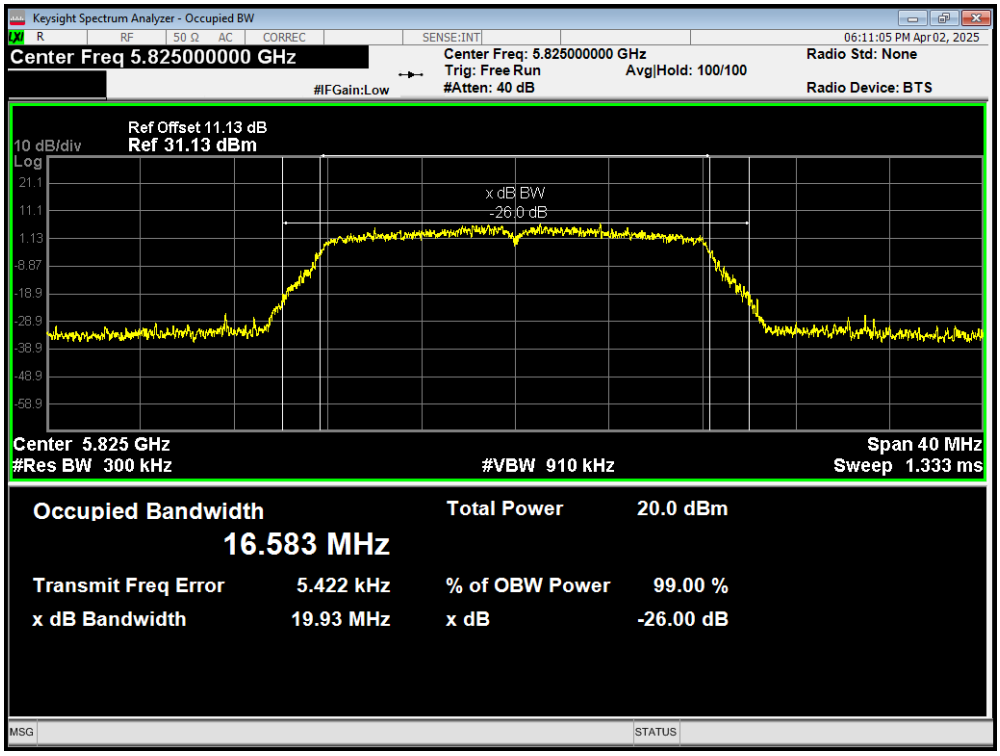
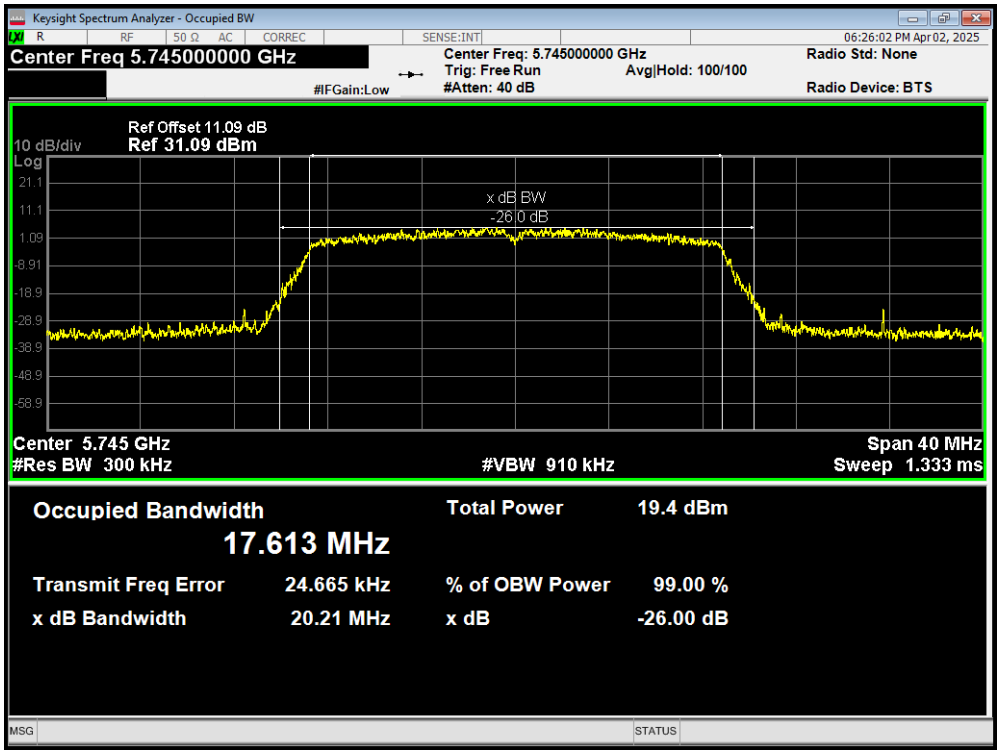


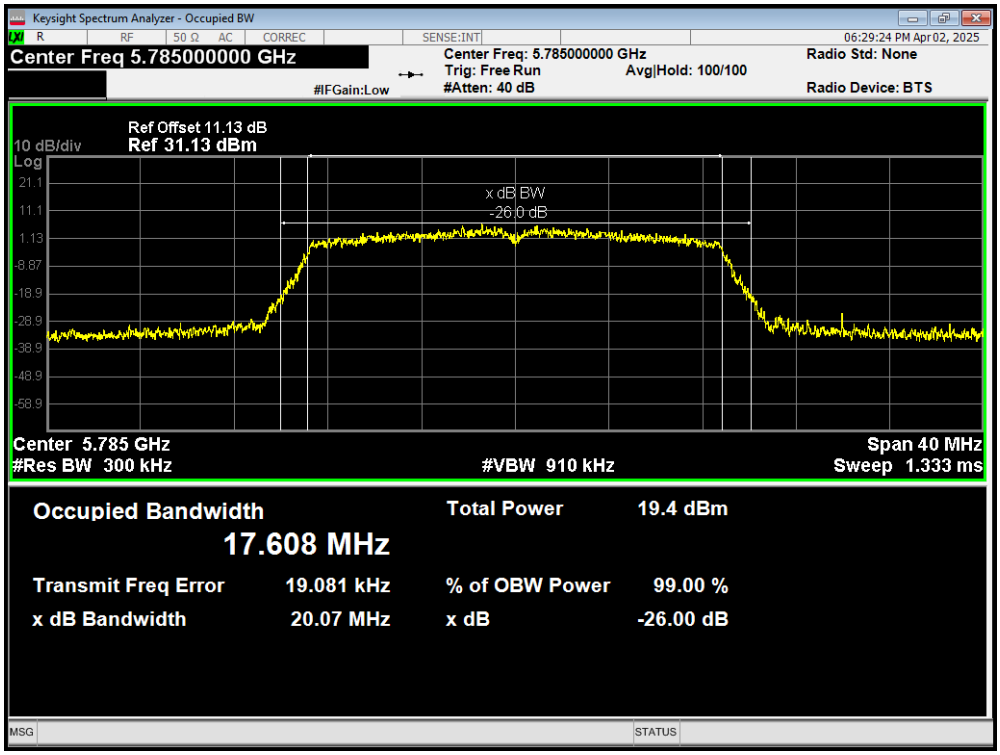
OBW 802.11a 5825MHz



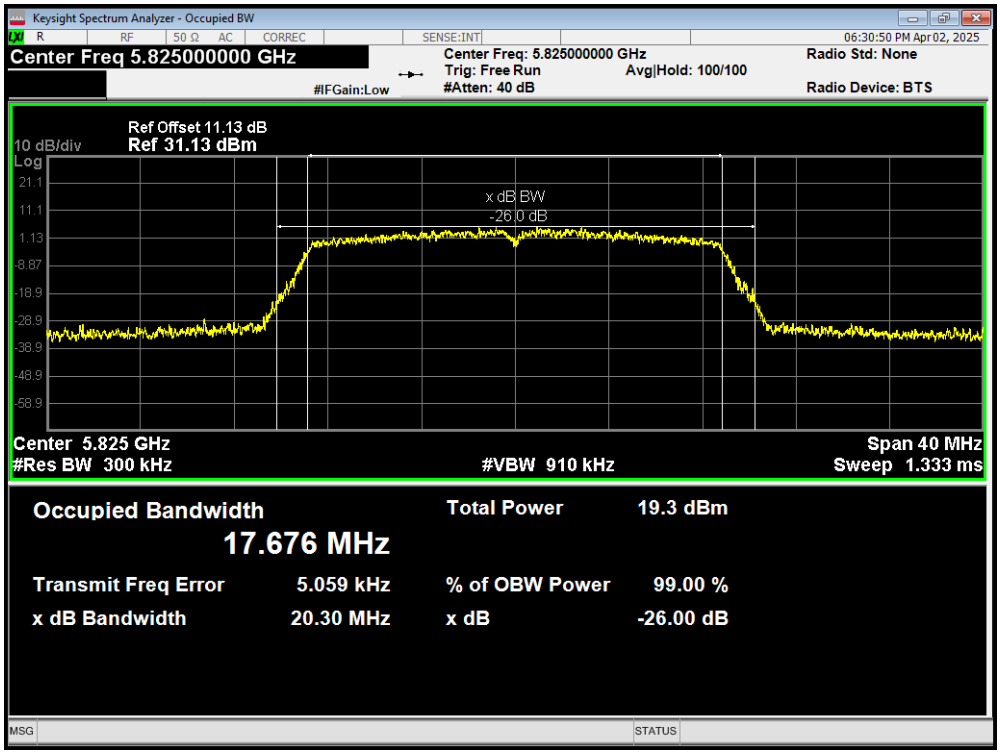
OBW 802.11ac(VHT20) 5745MHz



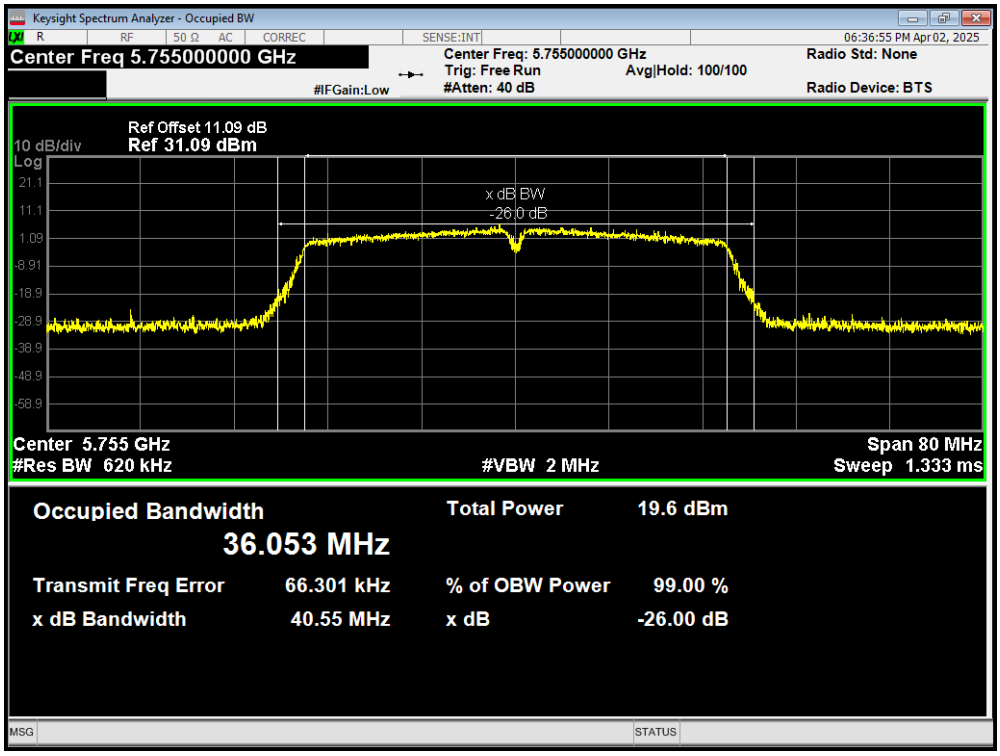
OBW 802.11ac(VHT20) 5785MHz



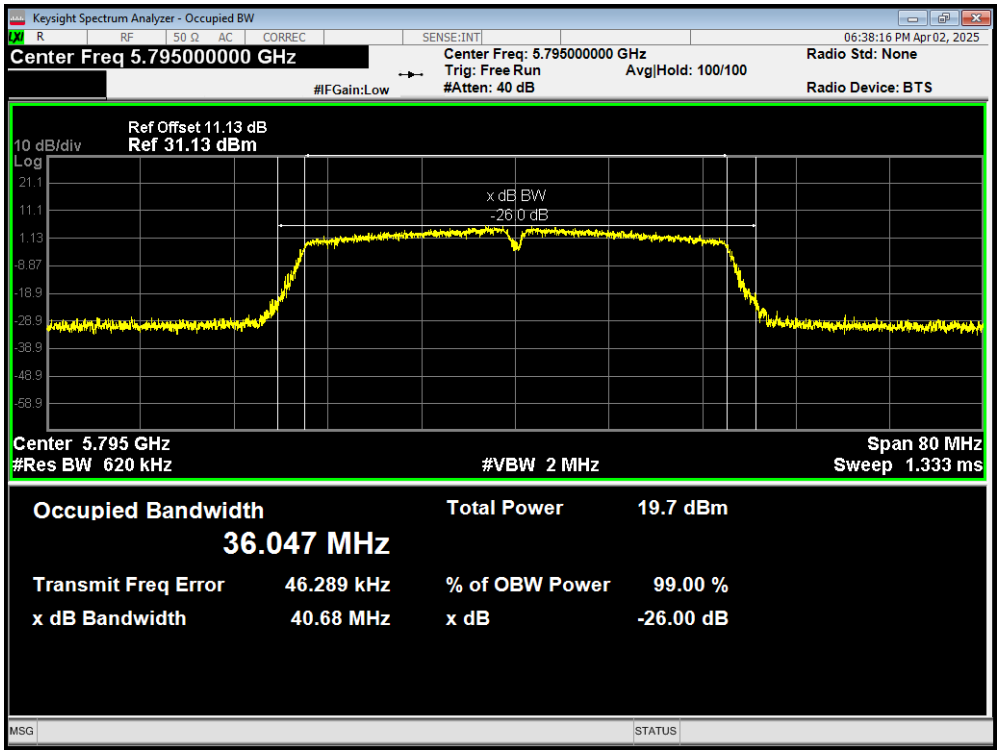
OBW 802.11ac(VHT20) 5825MHz



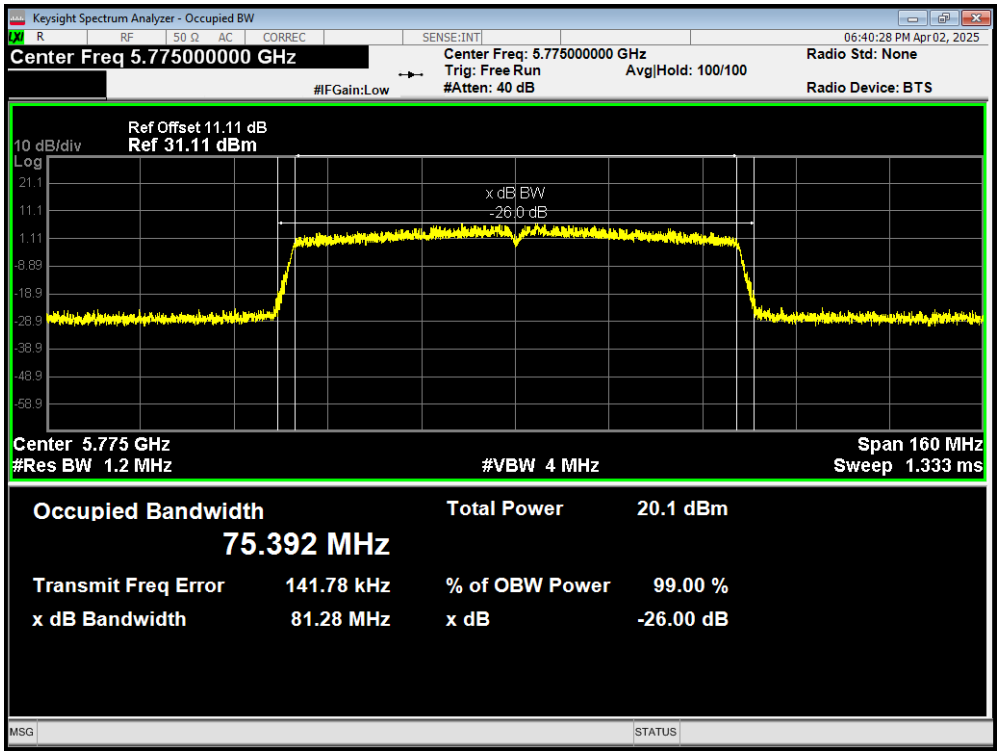
OBW 802.11ac(VHT40) 5755MHz



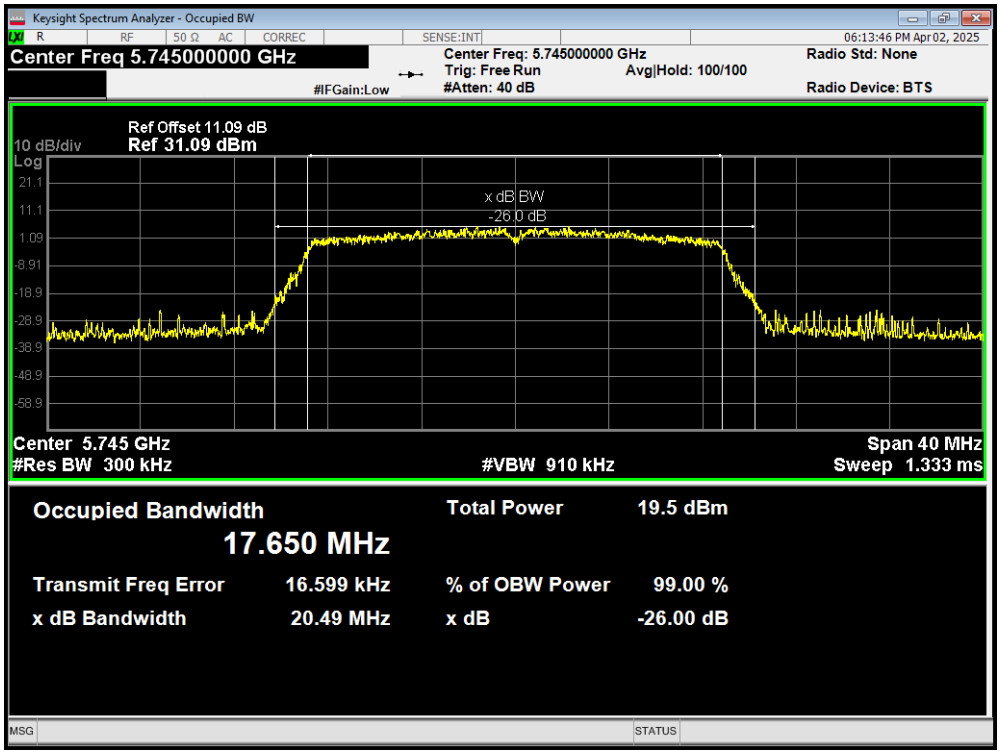
OBW 802.11ac(VHT40) 5795MHz



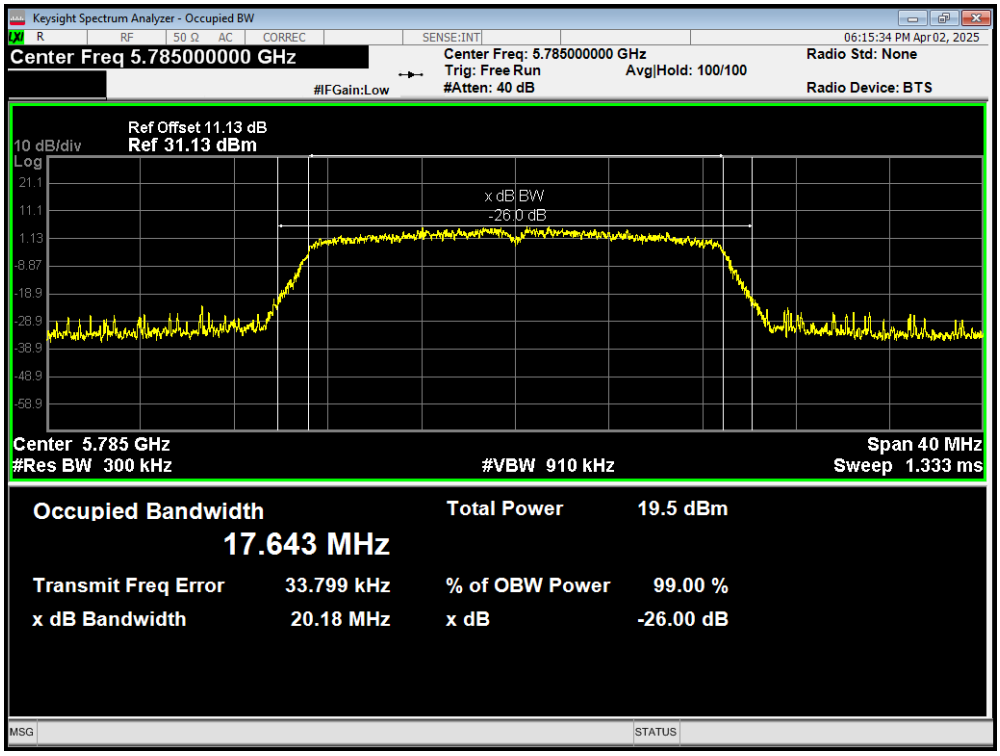
OBW 802.11ac(VHT80) 5775MHz



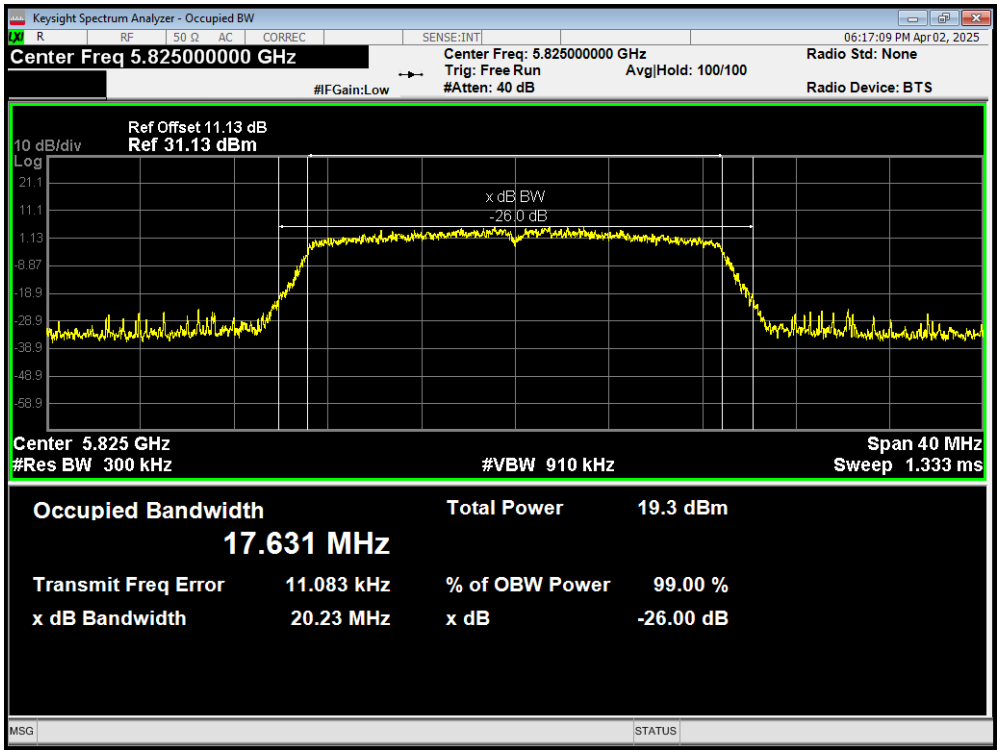
OBW 802.11n(HT20) 5745MHz



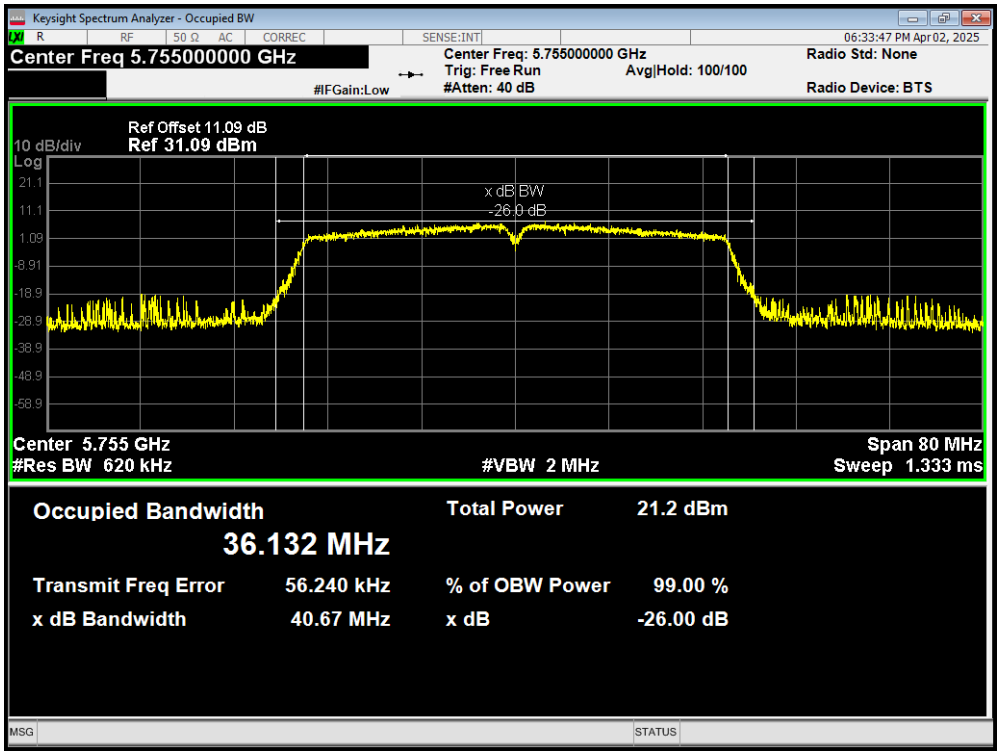
OBW 802.11n(HT20) 5785MHz



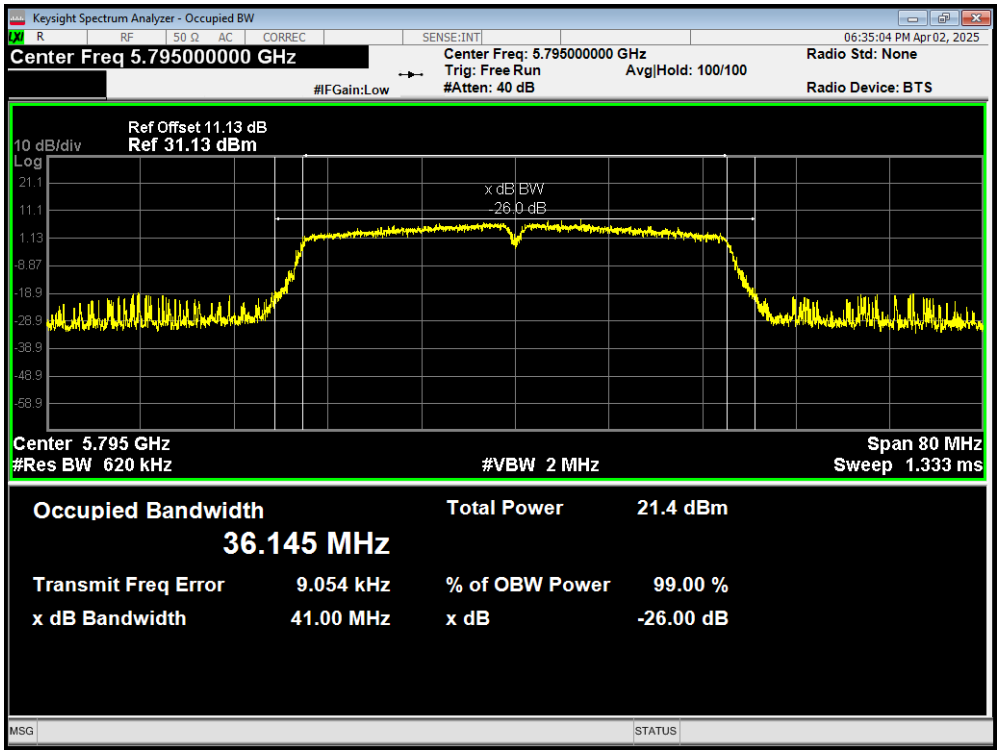
OBW 802.11n(HT20) 5825MHz



OBW 802.11n(HT40) 5755MHz



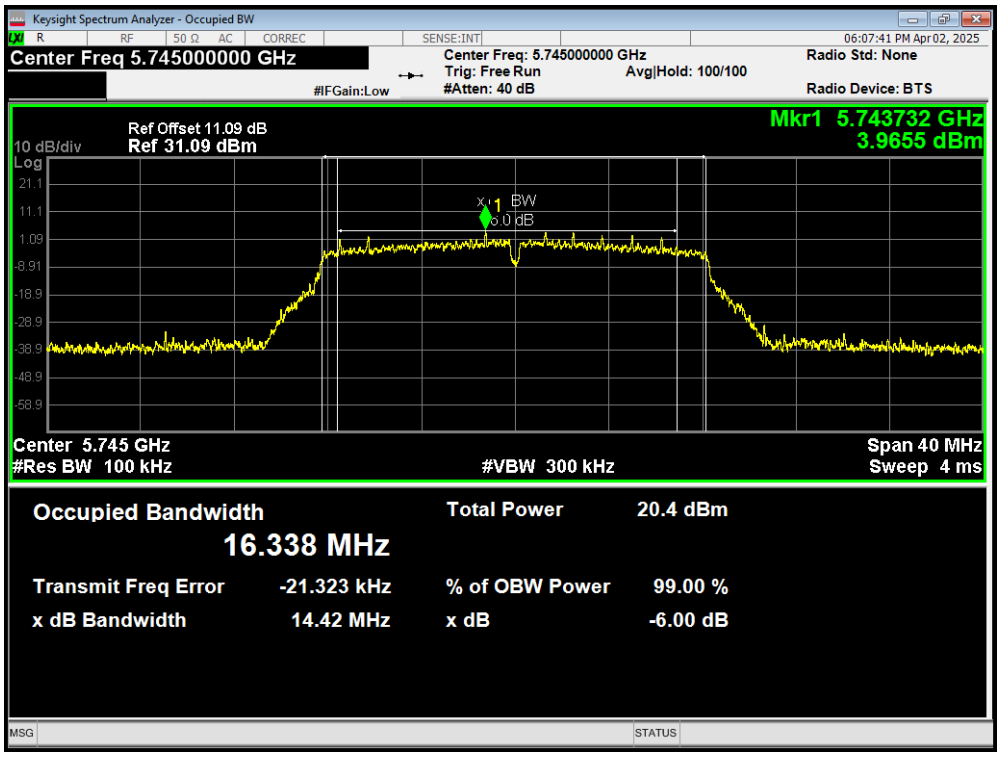
OBW 802.11n(HT40) 5795MHz



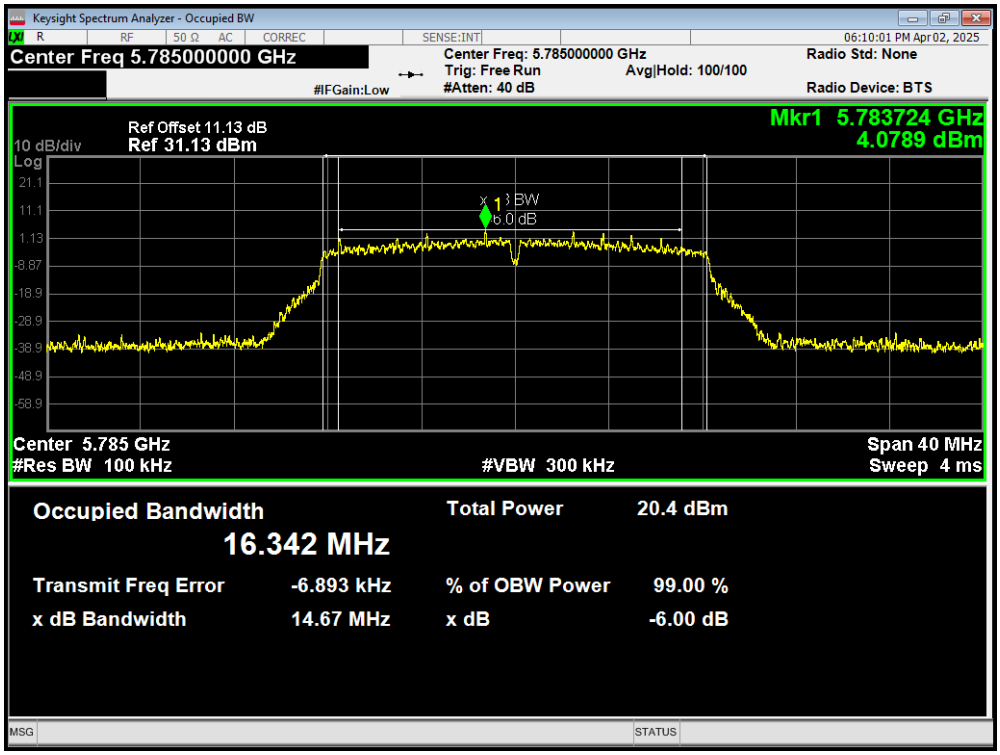
Minimum 6 dB bandwidth

U-NII-3

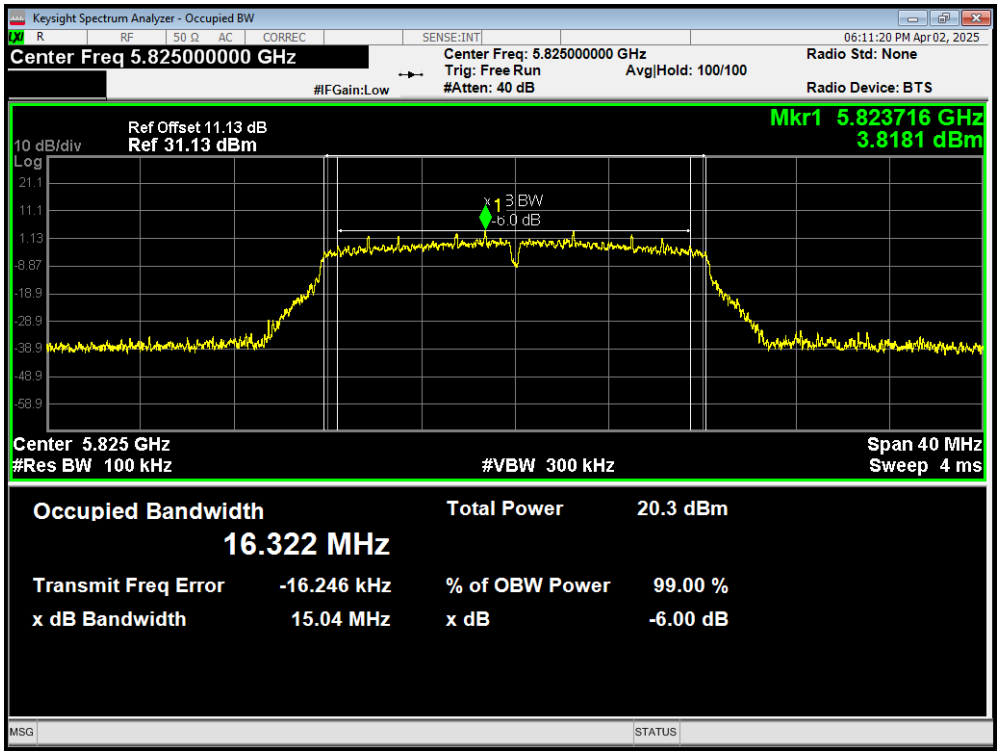
-6dB Bandwidth 802.11a 5745MHz



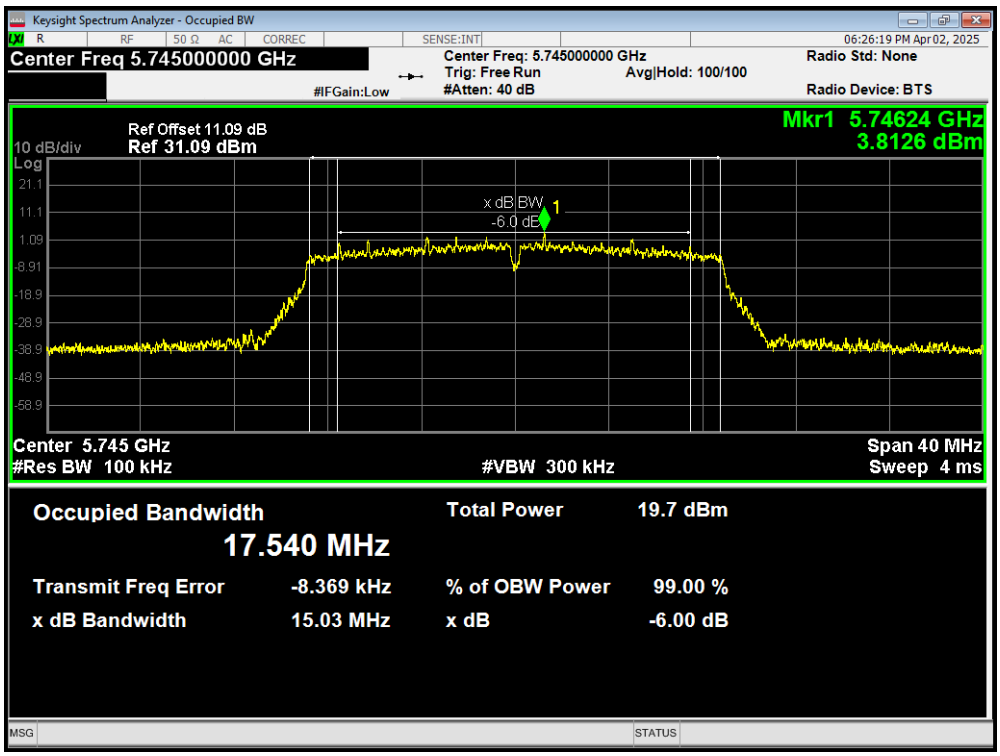
-6dB Bandwidth 802.11a 5785MHz



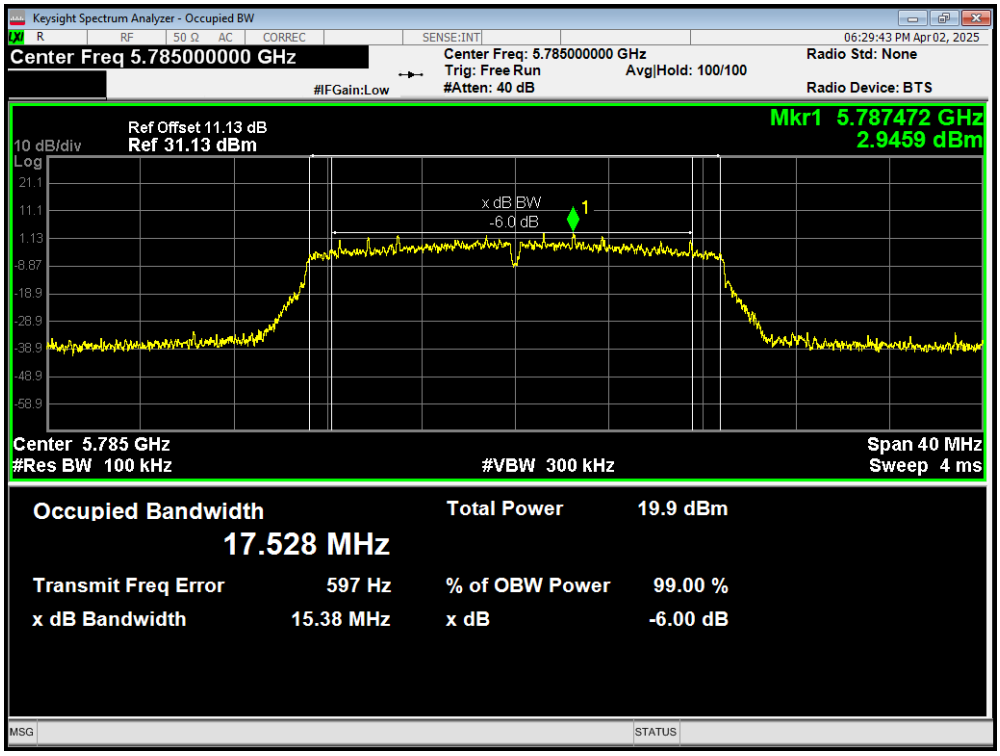
-6dB Bandwidth 802.11a 5825MHz



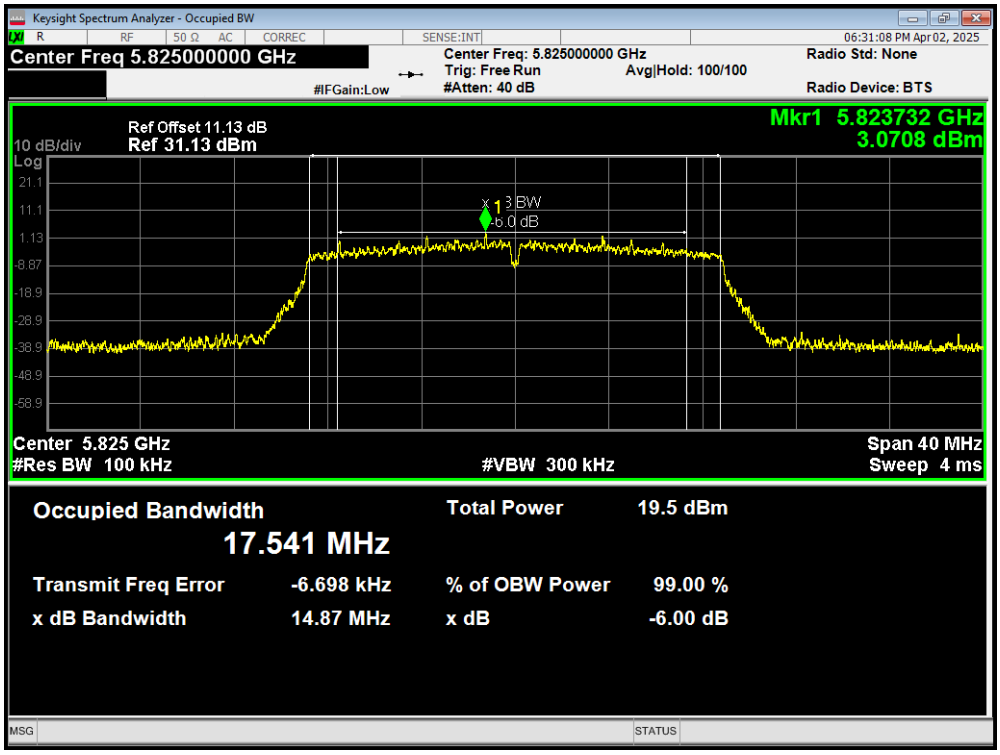
-6dB Bandwidth 802.11ac(VHT20) 5745MHz



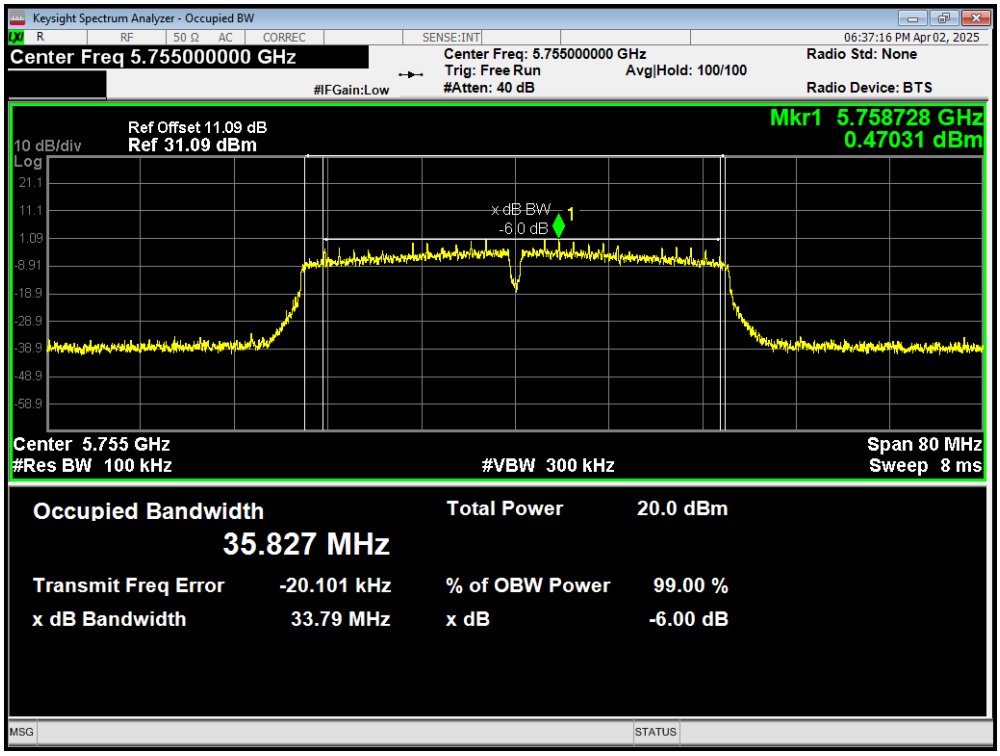
-6dB Bandwidth 802.11ac(VHT20) 5785MHz



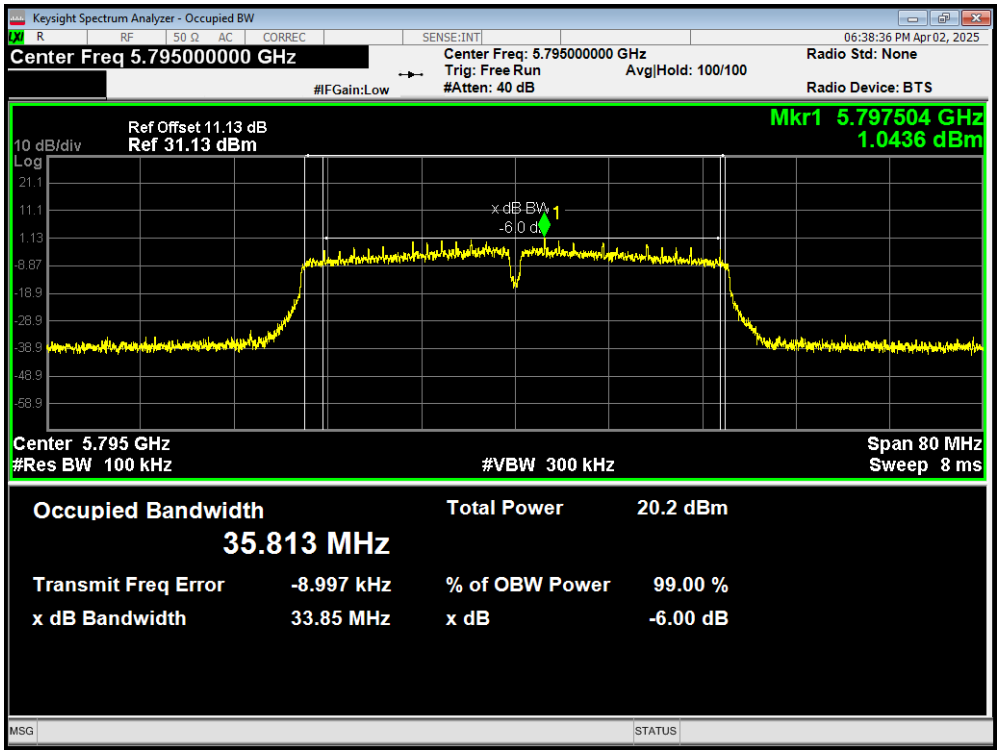
-6dB Bandwidth 802.11ac(VHT20) 5825MHz



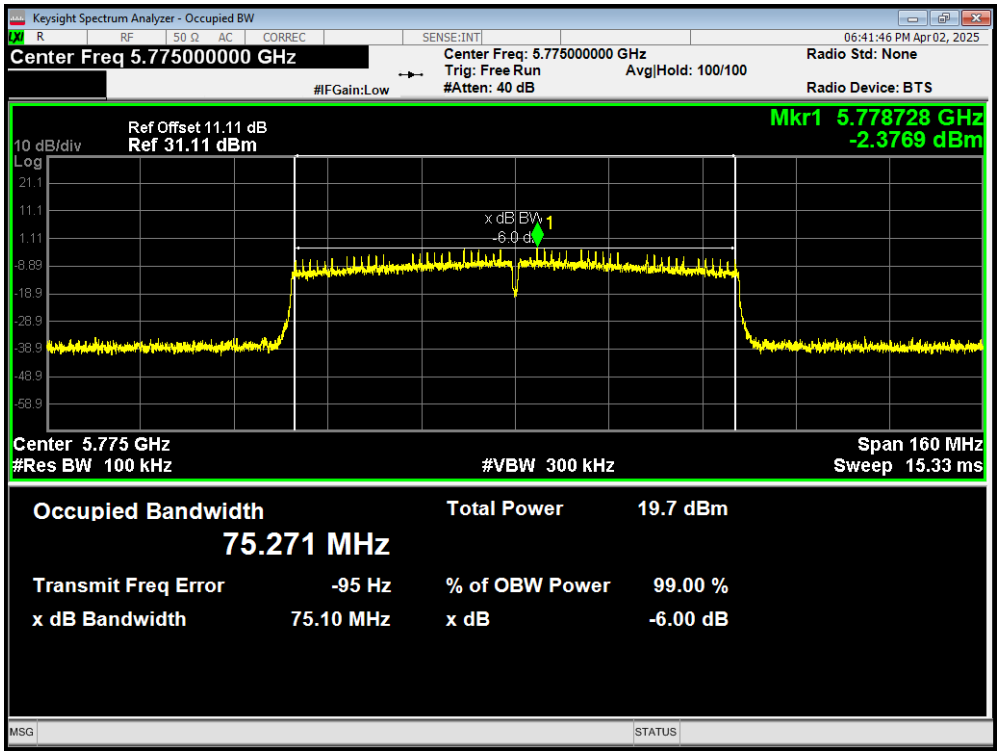
-6dB Bandwidth 802.11ac(VHT40) 5755MHz



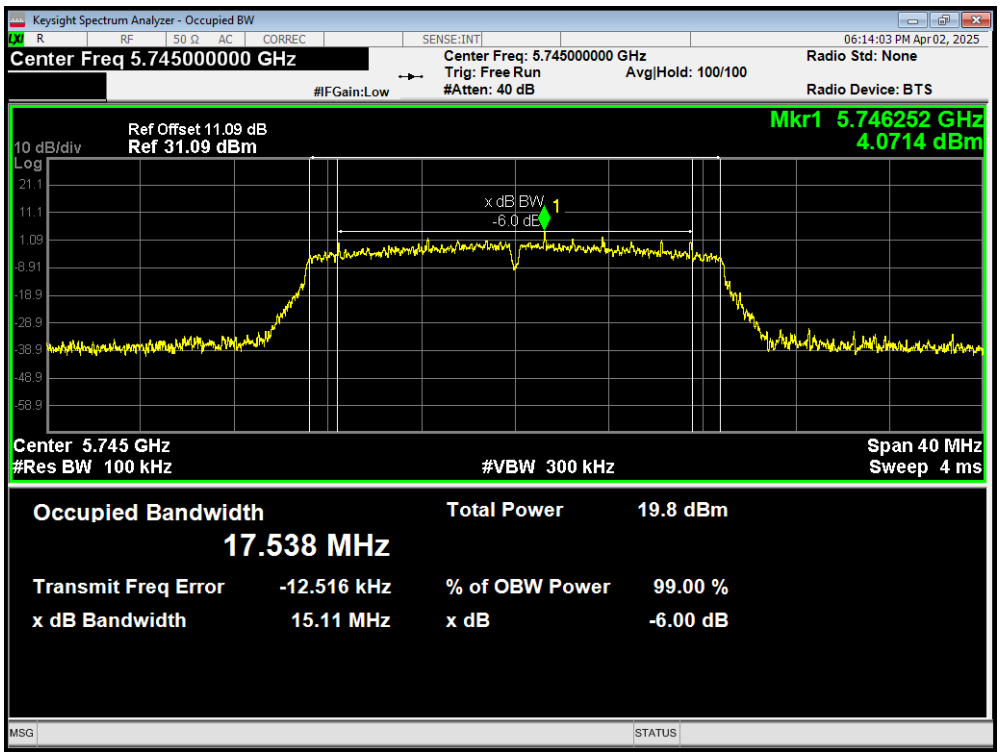
-6dB Bandwidth 802.11ac(VHT40) 5795MHz



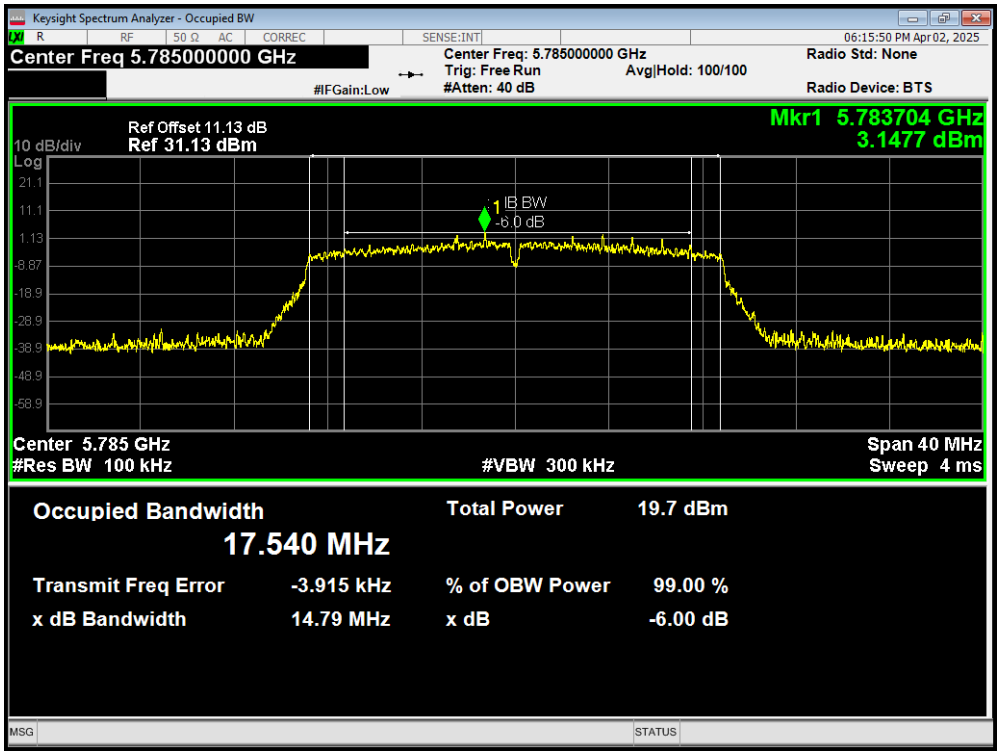
-6dB Bandwidth 802.11ac(VHT80) 5775MHz



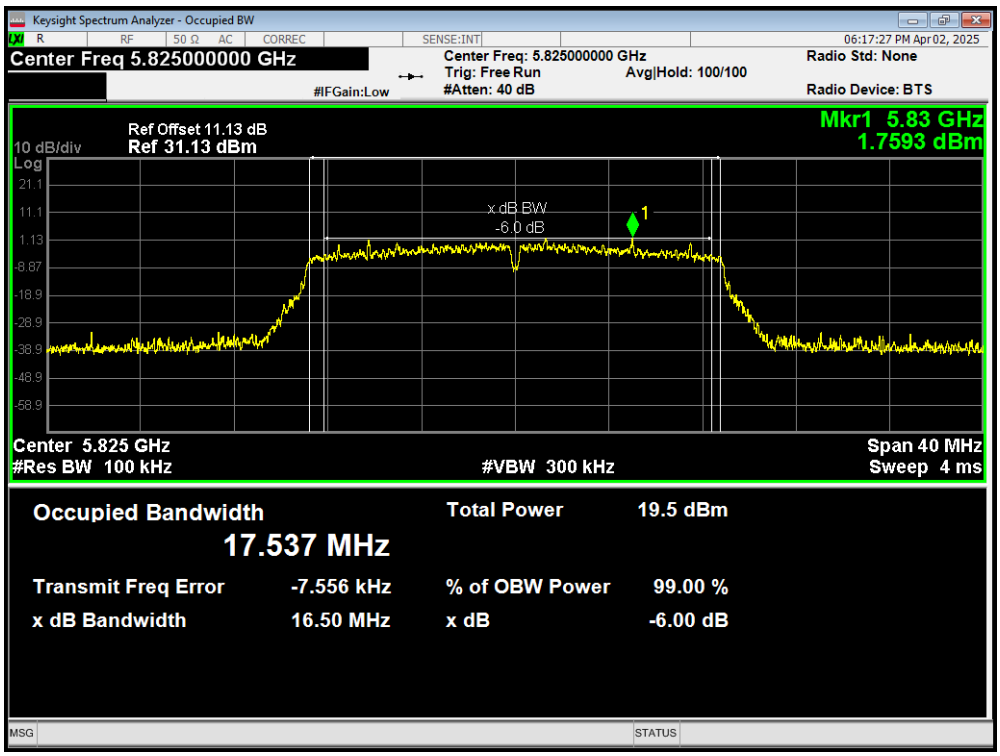
-6dB Bandwidth 802.11n(HT20) 5745MHz



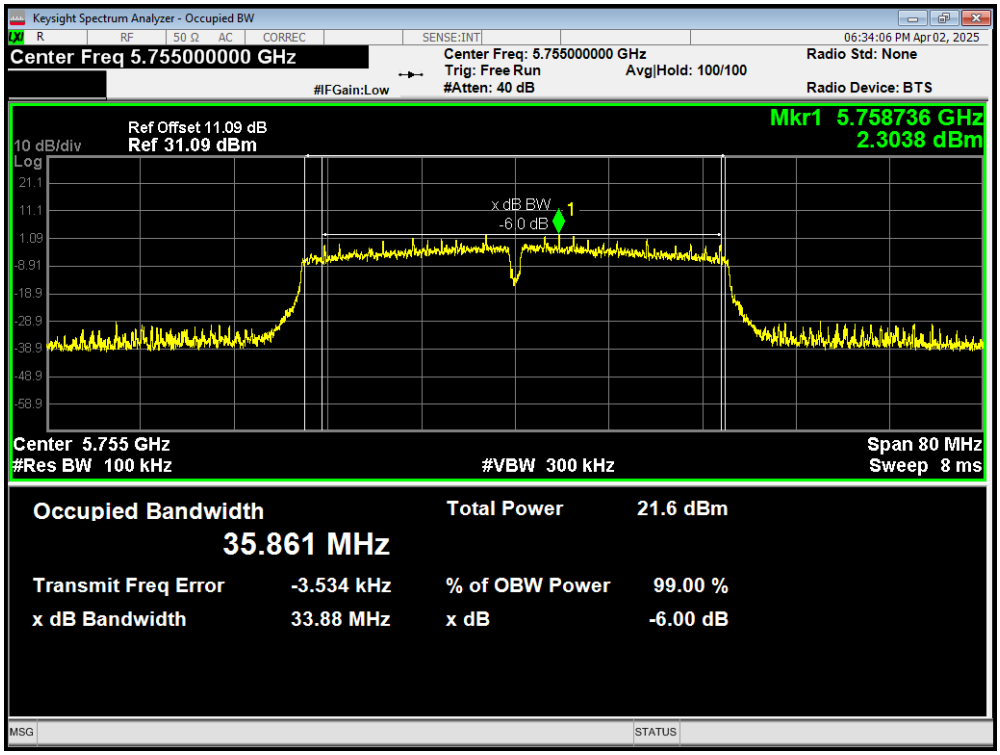
-6dB Bandwidth 802.11n(HT20) 5785MHz



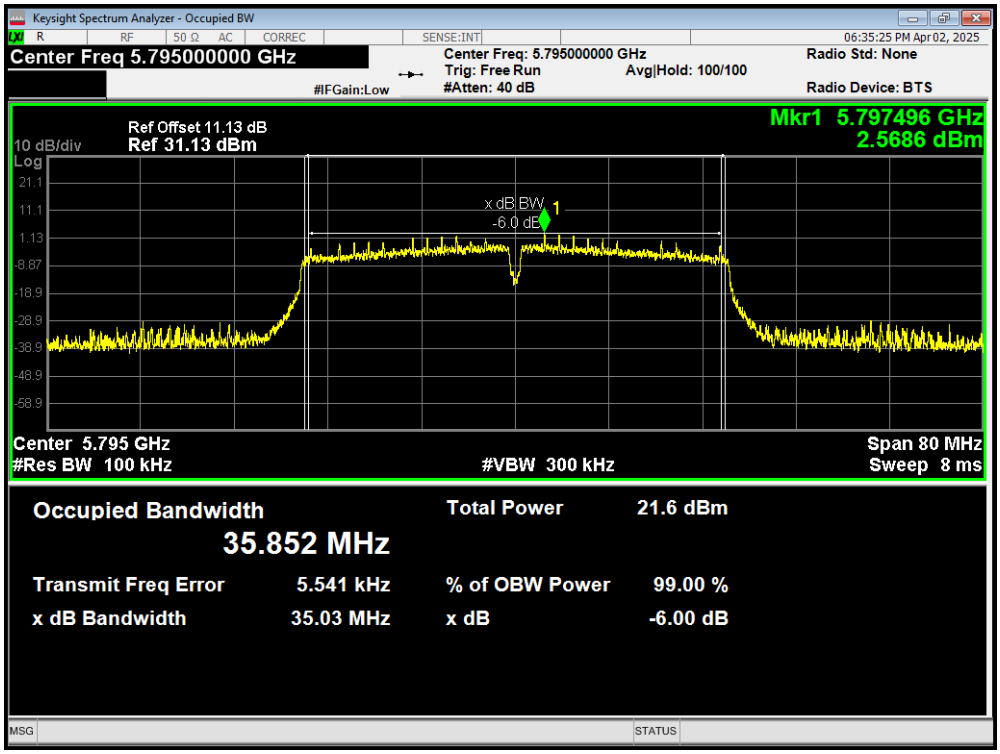
-6dB Bandwidth 802.11n(HT20) 5825MHz



-6dB Bandwidth 802.11n(HT40) 5755MHz



-6dB Bandwidth 802.11n(HT40) 5795MHz



5.2. Average Power Output

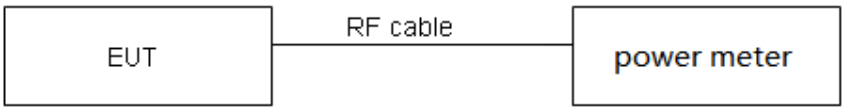
Ambient condition

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

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, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 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 dB.

Test Results

Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11a	0.97	0.14
802.11n HT20	0.97	0.14
802.11n HT40	0.94	0.29
802.11ac VHT20	0.97	0.14
802.11ac VHT40	0.94	0.28
802.11ac VHT80	0.88	0.55
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.		

Power Index								
Channel	802.11a	802.11n HT20	802.11ac VHT20	Channel	802.11n HT40	802.11ac VHT40	Channel	802.11ac VHT80
CH36	16	15	15	CH38	16.5	15	CH42	16.5
CH40	16	15	15	CH46	16.5	15	/	/
CH48	16	15	15	/	/	/	/	/
CH52	16	15	15	CH54	16.5	15	CH58	16.5
CH60	16	15	15	CH62	16.5	15	/	/
CH64	16	15	15	/	/	/	/	/
CH149	16	15	15	CH151	16.5	15	CH155	16.5
CH157	16	15	15	CH159	16.5	15	/	/
CH165	16	15	15	/	/	/	/	/

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	19.79	23.97	23.97
		60/5300	19.96	24.00	24.00
		64/5320	20.06	24.02	24.00
	802.11n HT20	52/5260	20.34	24.08	24.00
		60/5300	20.23	24.06	24.00
		64/5320	20.20	24.05	24.00
	802.11n HT40	54/5270	40.95	27.12	24.00
		62/5310	41.22	27.15	24.00
	802.11ac VHT20	52/5260	20.20	24.05	24.00
		60/5300	20.44	24.11	24.00
		64/5320	20.27	24.07	24.00
	802.11ac VHT40	54/5270	40.65	27.09	24.00
		62/5310	40.83	27.11	24.00
	802.11ac VHT80	58/5290	80.73	30.07	24.00
Note: 250mW=24dBm					

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	14.79	14.93	24	PASS
	40/5200	14.29	14.43	24	PASS
	48/5240	14.13	14.27	24	PASS
802.11n HT20	36/5180	13.06	13.20	24	PASS
	40/5200	13.23	13.37	24	PASS
	48/5240	13.03	13.17	24	PASS
802.11n HT40	38/5190	15.04	15.33	24	PASS
	46/5230	14.53	14.82	24	PASS
802.11ac VHT20	36/5180	13.09	13.23	24	PASS
	40/5200	13.22	13.36	24	PASS
	48/5240	13.02	13.16	24	PASS
802.11ac VHT40	38/5190	13.63	13.91	24	PASS
	46/5230	13.39	13.67	24	PASS
802.11ac VHT80	42/5210	12.89	13.44	24	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	14.04	14.18	23.97	PASS
	60/5300	14.05	14.19	24.00	PASS
	64/5320	13.89	14.03	24.00	PASS
802.11n HT20	52/5260	13.50	13.64	24.00	PASS
	60/5300	13.27	13.41	24.00	PASS
	64/5320	13.35	13.49	24.00	PASS
802.11n HT40	54/5270	14.76	15.05	24.00	PASS
	62/5310	14.30	14.59	24.00	PASS
802.11ac VHT20	52/5260	13.46	13.60	24.00	PASS
	60/5300	13.27	13.41	24.00	PASS
	64/5320	13.20	13.34	24.00	PASS
802.11ac VHT40	54/5270	12.87	13.15	24.00	PASS
	62/5310	13.19	13.47	24.00	PASS
802.11ac VHT80	58/5290	12.81	13.36	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	149/5745	14.46	14.60	30	PASS
	157/5785	14.37	14.51	30	PASS
	165/5825	14.29	14.43	30	PASS
802.11n HT20	149/5745	13.61	13.75	30	PASS
	157/5785	13.64	13.78	30	PASS
	165/5825	13.59	13.73	30	PASS
802.11n HT40	151/5755	14.96	15.25	30	PASS
	159/5795	15.04	15.33	30	PASS
802.11ac VHT20	149/5745	13.74	13.88	30	PASS
	157/5785	13.73	13.87	30	PASS
	165/5825	13.58	13.72	30	PASS
802.11ac VHT40	151/5755	13.46	13.74	30	PASS
	159/5795	13.53	13.81	30	PASS
802.11ac VHT80	155/5775	12.84	13.39	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.3. Frequency Stability

Ambient condition

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

Method of Measurement

1. Frequency stability with respect to ambient temperature

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument, through an attenuator if necessary.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies specified in 5.6.

h) Switch OFF the EUT but do not switch OFF the oscillator heater.

i) Lower the chamber temperature by not more that 10°C, and allow the temperature inside the chamber to stabilize.

j) Repeat step f) through step i) down to the lowest specified temperature.

2. Frequency stability when varying supply voltage

Unless otherwise specified, these tests shall be made at ambient room temperature (+15°C to +25 °C). An antenna shall be connected to the antenna output terminals of the EUT if possible. If the EUT is equipped with or uses an adjustable-length antenna, then it shall be fully extended.

a) Supply the EUT with nominal voltage or install a new or fully charged battery in the EUT. Turn ON the EUT and couple its output to a frequency counter or other frequency-measuring instrument.

b) Tune the EUT to one of the number of frequencies required in 5.6. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).
c) Measure the frequency at each of the frequencies specified in 5.6.
d) Repeat the above procedure at 85% and 115% of the nominal supply voltage.

Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Measurement Uncertainty

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

Test Results

Voltage (V)	Temperature (°C)	U-NII-1 Test Results			
		5200MHz			
		1min	2min	5min	10min
3.6	-30	5199.999689	5199.990033	5199.988722	5199.985821
3.6	-20	5199.995022	5199.980130	5199.987557	5199.980913
3.6	-10	5199.995678	5199.979748	5199.979118	5199.975397
3.6	0	5199.986180	5199.974229	5199.982194	5199.976795
3.6	10	5199.979669	5199.969565	5199.976100	5199.973315
3.6	20	5199.971998	5199.959909	5199.975226	5199.973095
3.6	30	5199.967802	5199.959315	5199.970515	5199.965560
3.6	40	5199.959343	5199.955330	5199.969126	5199.957017
3.6	50	5199.958386	5199.953399	5199.963200	5199.950990
3.4	20	5199.953364	5199.948372	5199.961300	5199.947160
4.2	20	5199.950217	5199.943422	5199.955656	5199.937773
Max. ΔMHz		-0.049783	-0.056578	-0.044344	-0.062227
PPM		-9.573654	-10.880385	-8.527692	-11.966731

Voltage (V)	Temperature (°C)	U-NII-2A Test Results			
		5300MHz			
		1min	2min	5min	10min
3.6	-30	5300.007439	5300.003535	5299.997287	5299.990264
3.6	-20	5299.999962	5300.002120	5299.988787	5299.983861
3.6	-10	5299.999242	5299.993005	5299.987889	5299.983421
3.6	0	5299.994876	5299.998034	5299.980429	5299.979069
3.6	10	5299.985135	5299.991977	5299.971968	5299.969886
3.6	20	5299.981208	5299.983251	5299.963966	5299.969430
3.6	30	5299.976126	5299.983060	5299.955508	5299.960119
3.6	40	5299.969549	5299.978121	5299.955500	5299.958963
3.6	50	5299.962481	5299.976729	5299.948187	5299.957432
3.4	20	5299.953721	5299.967431	5299.939515	5299.948821
4.2	20	5299.951656	5299.959508	5299.934066	5299.945249
Max. ΔMHz		-0.048344	-0.040492	-0.065934	-0.054751
PPM		-9.121509	-7.640000	-12.440377	-10.330377

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
3.6	-30	5784.994223	5784.988178	5784.982208	5784.973469
3.6	-20	5784.985029	5784.978824	5784.972942	5784.964538
3.6	-10	5784.977057	5784.969377	5784.964112	5784.957512
3.6	0	5784.980419	5784.975533	5784.969804	5784.955356
3.6	10	5784.971999	5784.969648	5784.969073	5784.946702
3.6	20	5784.964296	5784.959718	5784.969047	5784.945985
3.6	30	5784.959188	5784.954365	5784.966724	5784.942540
3.6	40	5784.952341	5784.950365	5784.965938	5784.935820
3.6	50	5784.946856	5784.949649	5784.956383	5784.930883
3.4	20	5784.939489	5784.947260	5784.949903	5784.924375
4.2	20	5784.930672	5784.938321	5784.944044	5784.921888
Max. ΔMHz		-0.069328	-0.061679	-0.055956	-0.078112
PPM		-11.984097	-10.661884	-9.672602	-13.502506

5.4. Power Spectral Density

Ambient condition

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

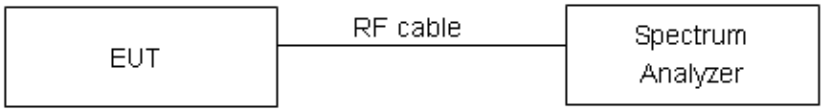
Method of Measurement

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

Set RBW = 1MHz, VBW =3MHz for the band 5.150-5.250GHz, 5.250-5.350GHz.
Set RBW = 470kHz, VBW =1.5MHz for the band 5.725-5.850GHz

The conducted PSD 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)
For an indoor access point operating in the band 5.15-5.25 GHz, 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.
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.

For the 5.25-5.35 GHz, 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.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500kHz band. If transmittingantennas 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.

Frequency Bands/GHz	Limits
5.15-5.25	11dBm/MHz
5.25-5.35	11dBm/MHz
5.725-5.85	30dBm/500kHz

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.75dB.

Test Results:

U-NII-1

Mode	Channel/ Frequency (MHz)	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36/5180	5.15	5.29	11	PASS
	40/5200	4.77	4.91	11	PASS
	48/5240	4.48	4.62	11	PASS
802.11n HT20	36/5180	3.22	3.36	11	PASS
	40/5200	3.40	3.54	11	PASS
	48/5240	3.25	3.39	11	PASS
802.11n HT40	38/5190	2.50	2.79	11	PASS
	46/5230	2.09	2.38	11	PASS
802.11ac VHT20	36/5180	3.33	3.47	11	PASS
	40/5200	3.36	3.50	11	PASS
	48/5240	3.17	3.31	11	PASS
802.11ac VHT40	38/5190	0.93	1.21	11	PASS
	46/5230	0.55	0.83	11	PASS
802.11ac VHT80	42/5210	-3.26	-2.71	11	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

U-NII-2A

Mode	Channel /Frequency (MHz)	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	52/5260	4.63	4.77	11	PASS
	60/5300	4.31	4.45	11	PASS
	64/5320	4.32	4.46	11	PASS
802.11n HT20	52/5260	3.62	3.76	11	PASS
	60/5300	3.85	3.99	11	PASS
	64/5320	3.65	3.79	11	PASS
802.11n HT40	54/5270	2.42	2.71	11	PASS
	62/5310	1.48	1.77	11	PASS
802.11ac VHT20	52/5260	3.85	3.99	11	PASS
	60/5300	3.86	4.00	11	PASS
	64/5320	4.03	4.17	11	PASS
802.11ac VHT40	54/5270	0.08	0.36	11	PASS
	62/5310	0.68	0.96	11	PASS
802.11ac VHT80	58/5290	-3.57	-3.02	11	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

U-NII-3

Mode	Channel /Frequency (MHz)	Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149/5745	1.54	1.95	30	PASS
	157/5785	1.59	2.00	30	PASS
	165/5825	1.58	1.99	30	PASS
802.11n HT20	149/5745	0.69	1.10	30	PASS
	157/5785	0.84	1.25	30	PASS
	165/5825	0.43	0.84	30	PASS
802.11n HT40	151/5755	-0.99	-0.43	30	PASS
	159/5795	-0.64	-0.08	30	PASS
802.11ac VHT20	149/5745	0.65	1.06	30	PASS
	157/5785	0.55	0.96	30	PASS
	165/5825	0.61	1.02	30	PASS
802.11ac VHT40	151/5755	-2.60	-2.05	30	PASS
	159/5795	-2.36	-1.81	30	PASS
802.11ac VHT80	155/5775	-6.22	-5.40	30	PASS
Note: PSD=Read Value+Duty cycle correction factor +10*log(500/470)					

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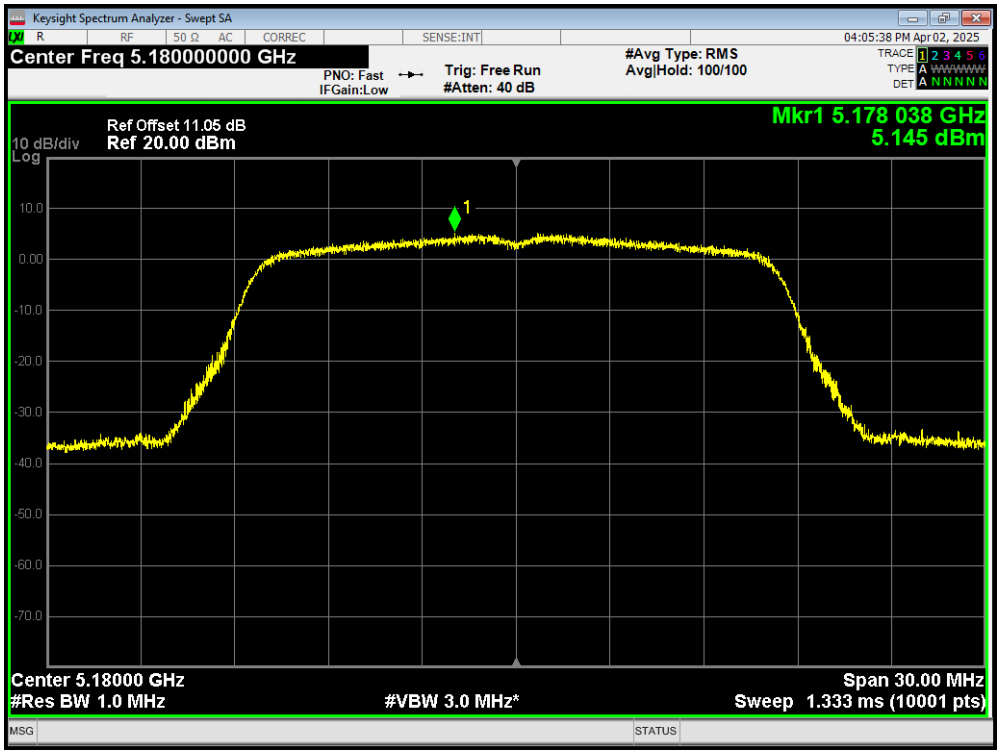
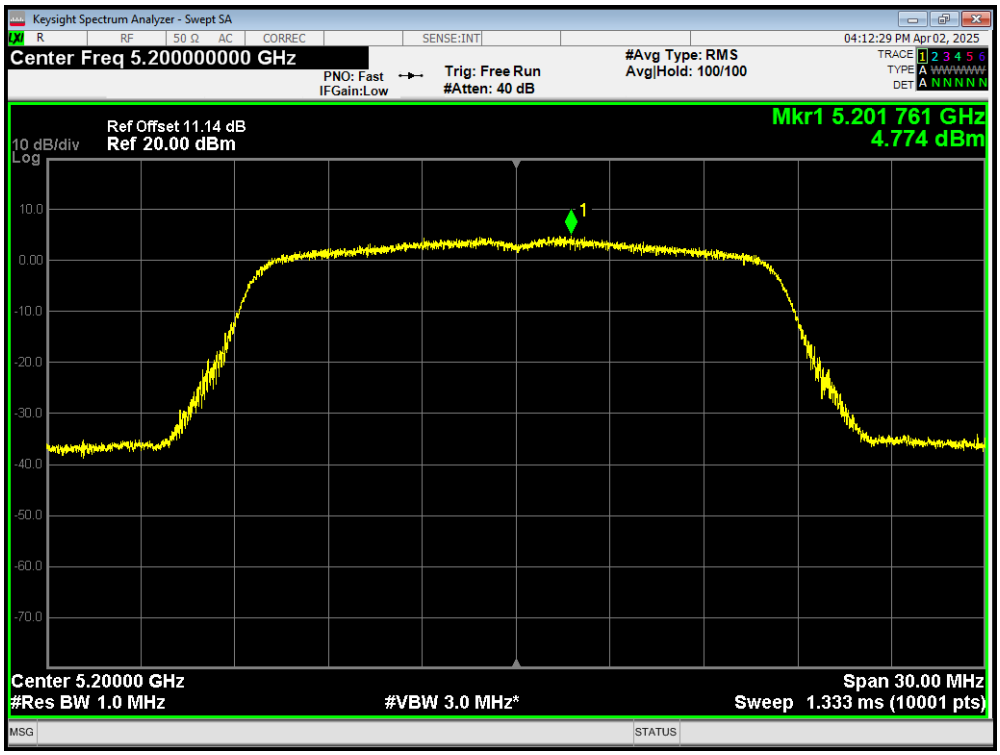
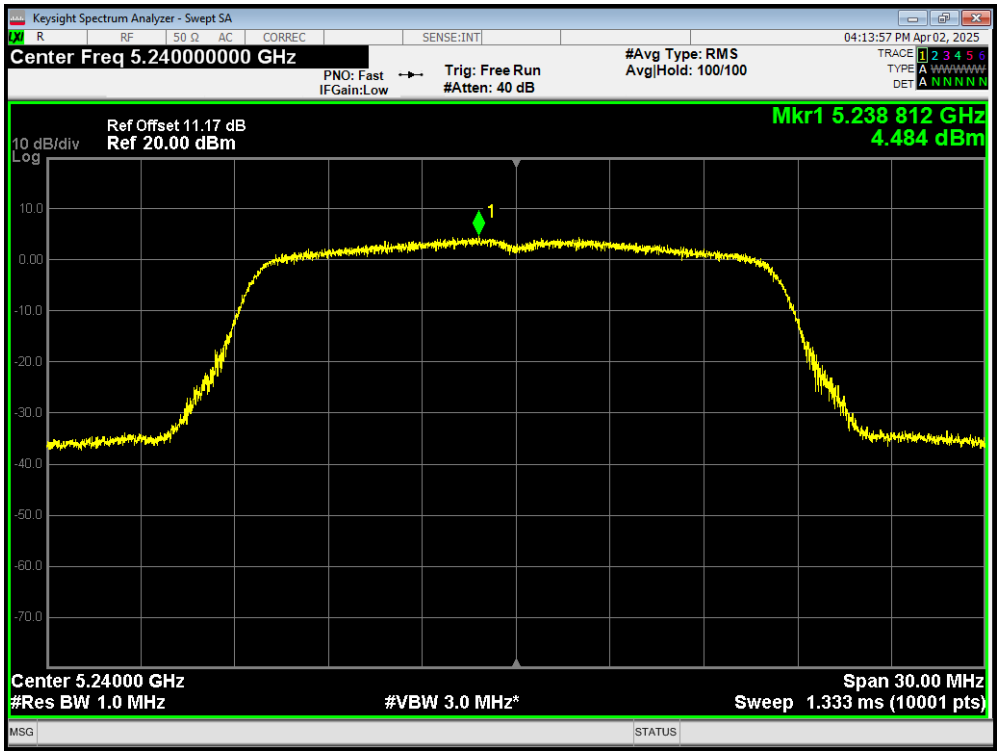
PSD 802.11a 5180MHz



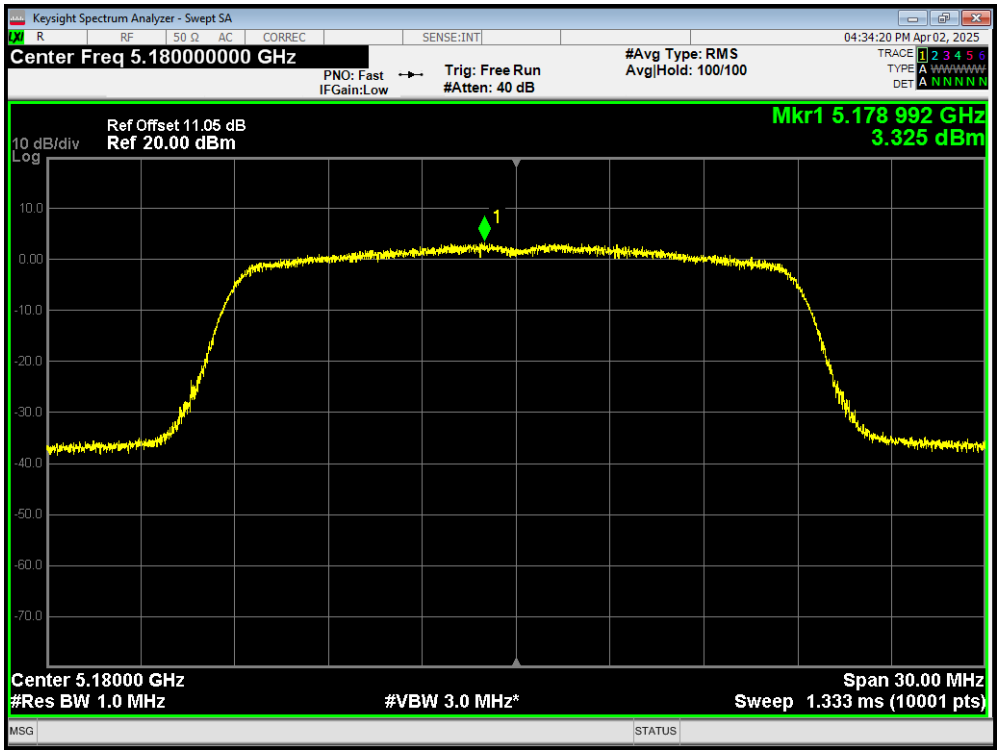
PSD 802.11a 5200MHz



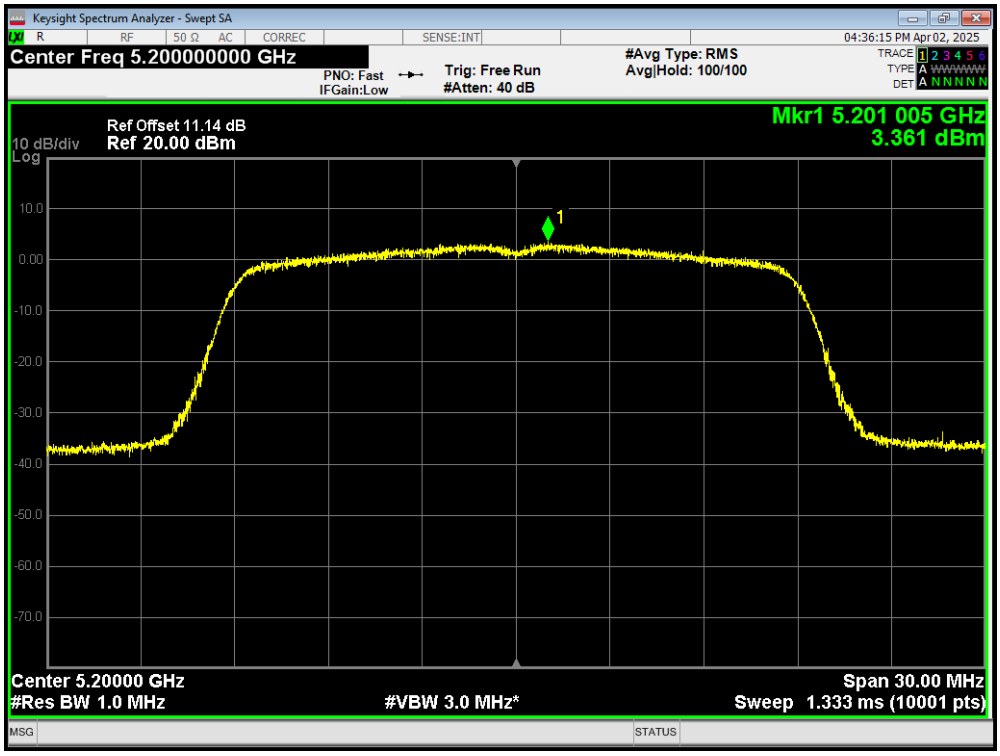
PSD 802.11a 5240MHz



PSD 802.11ac(VHT20) 5180MHz



PSD 802.11ac(VHT20) 5200MHz



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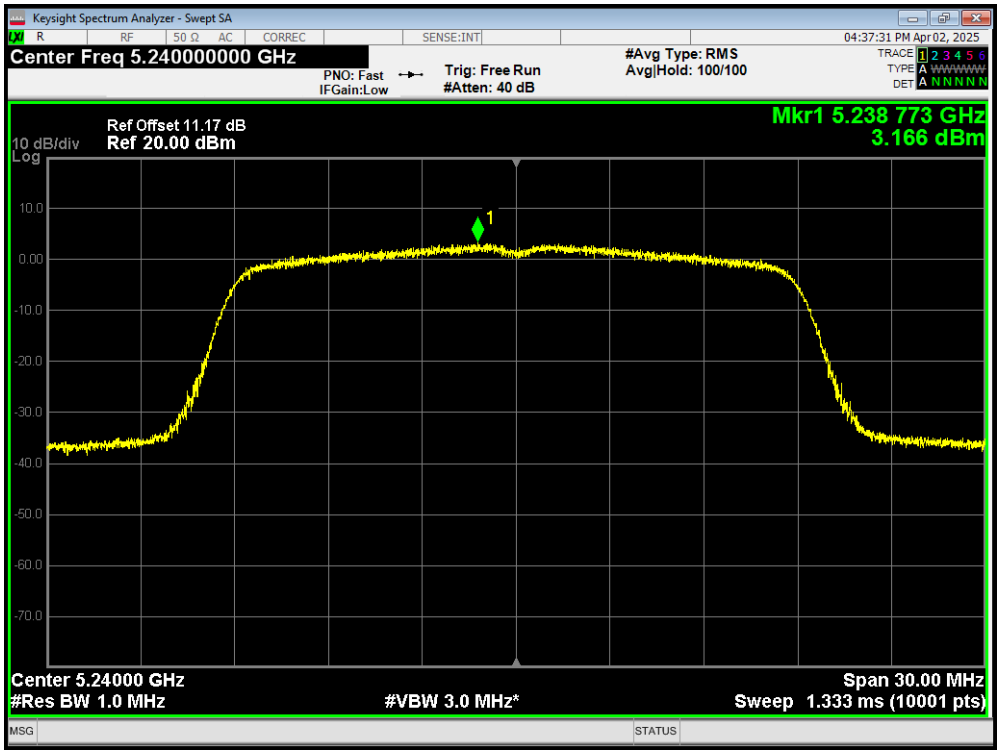
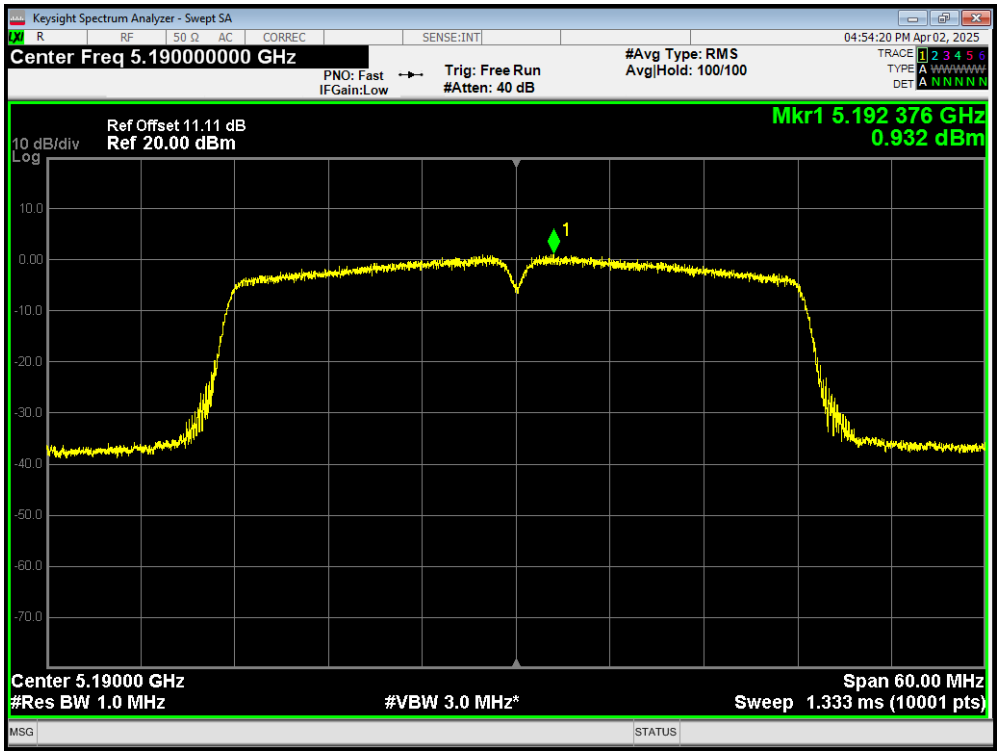


PSD 802.11ac(VHT40) 5190MHz



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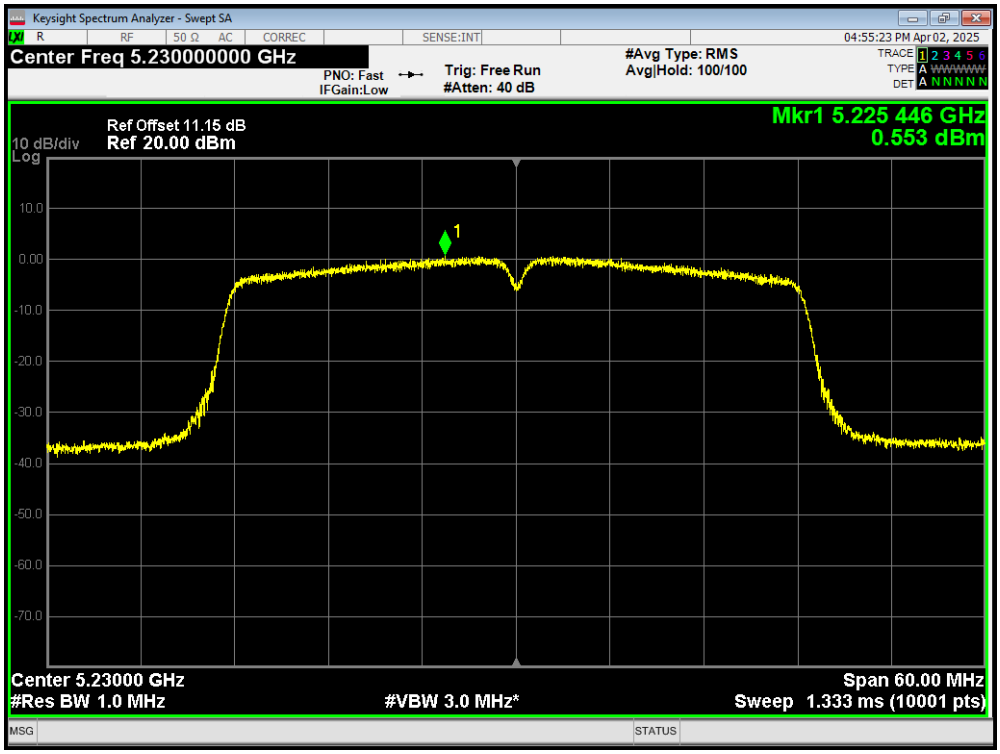
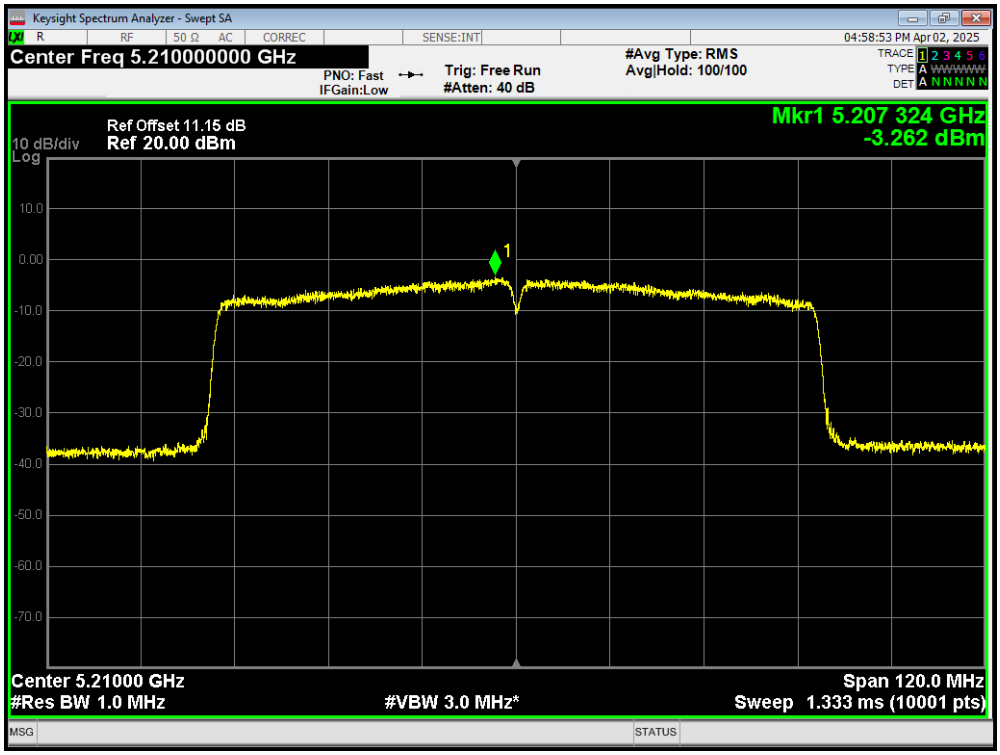
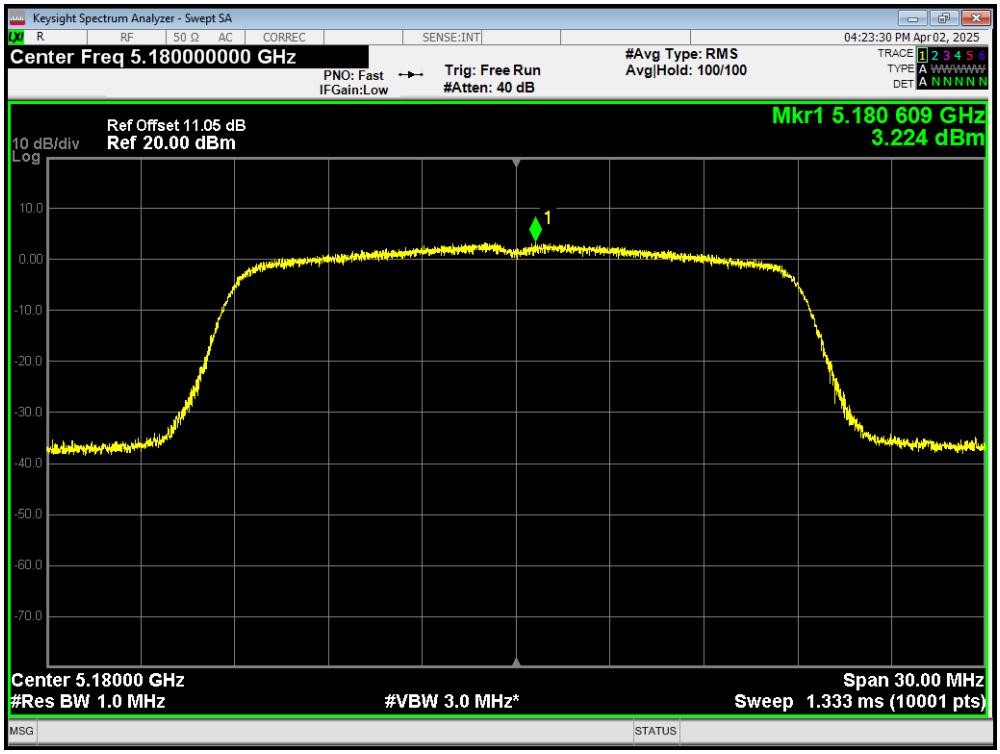


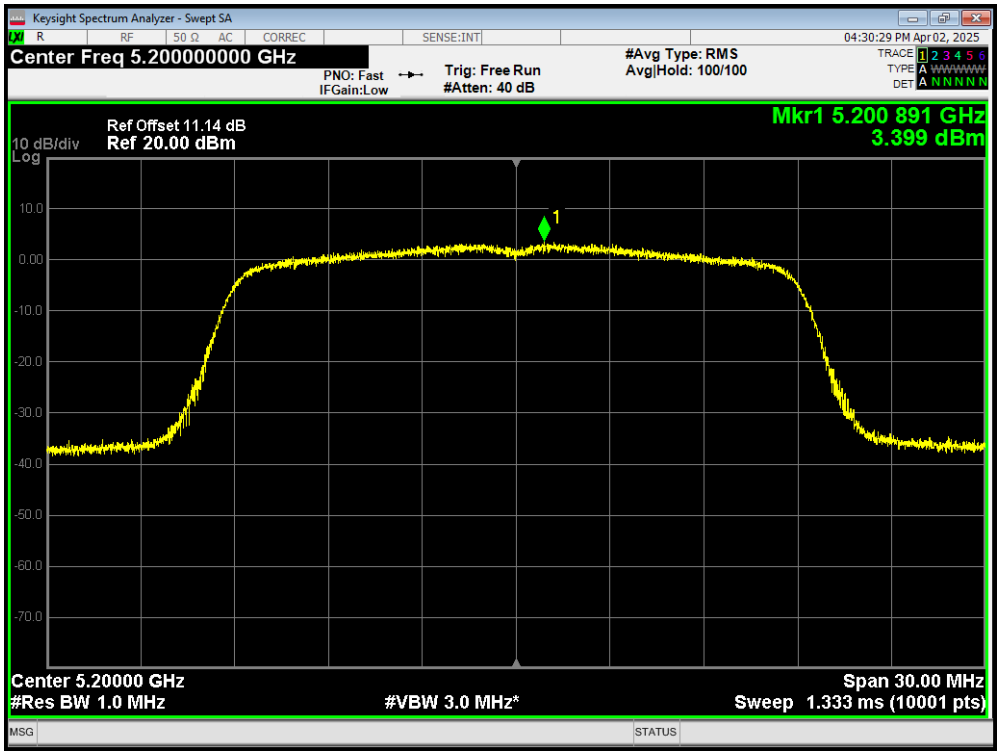
PSD 802.11ac(VHT80) 5210MHz



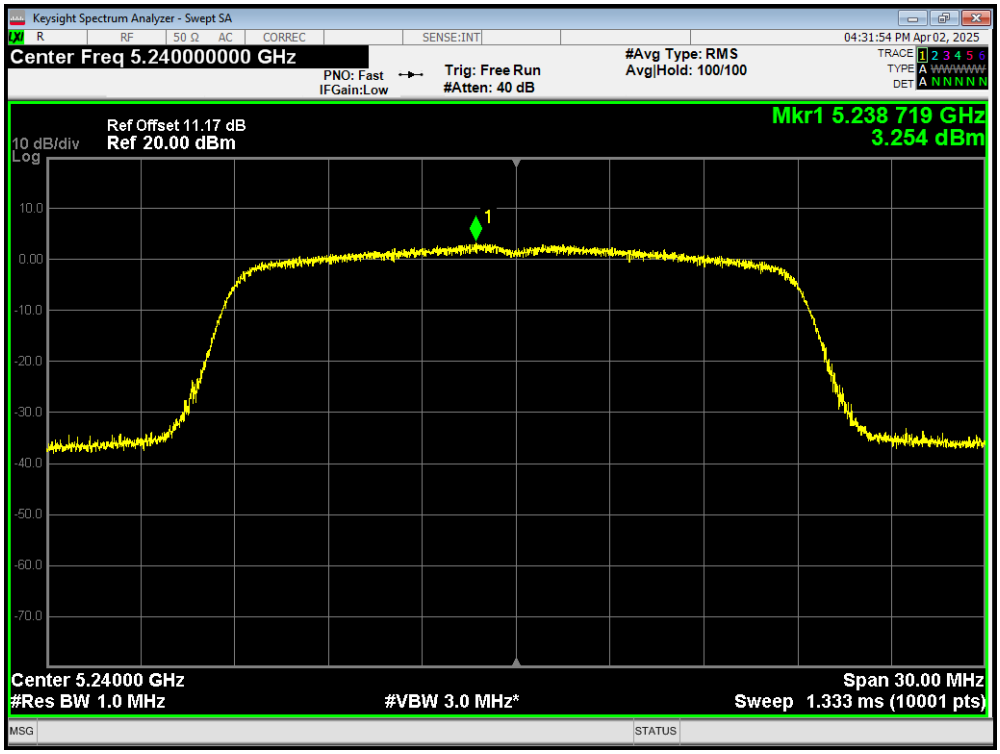
PSD 802.11n(HT20) 5180MHz



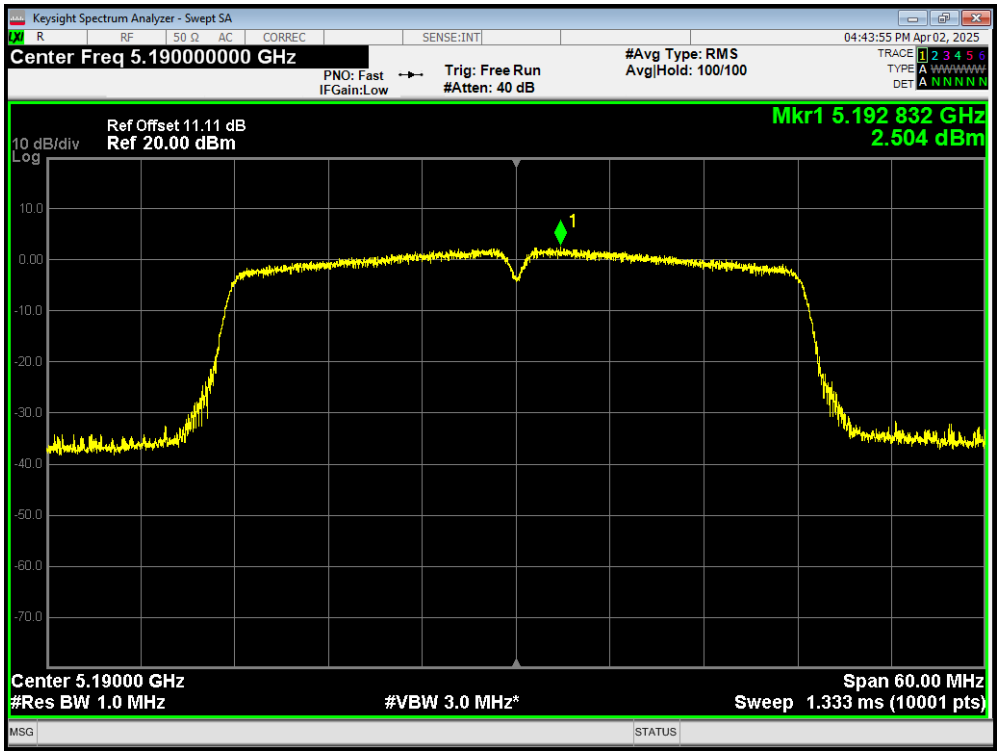
PSD 802.11n(HT20) 5200MHz



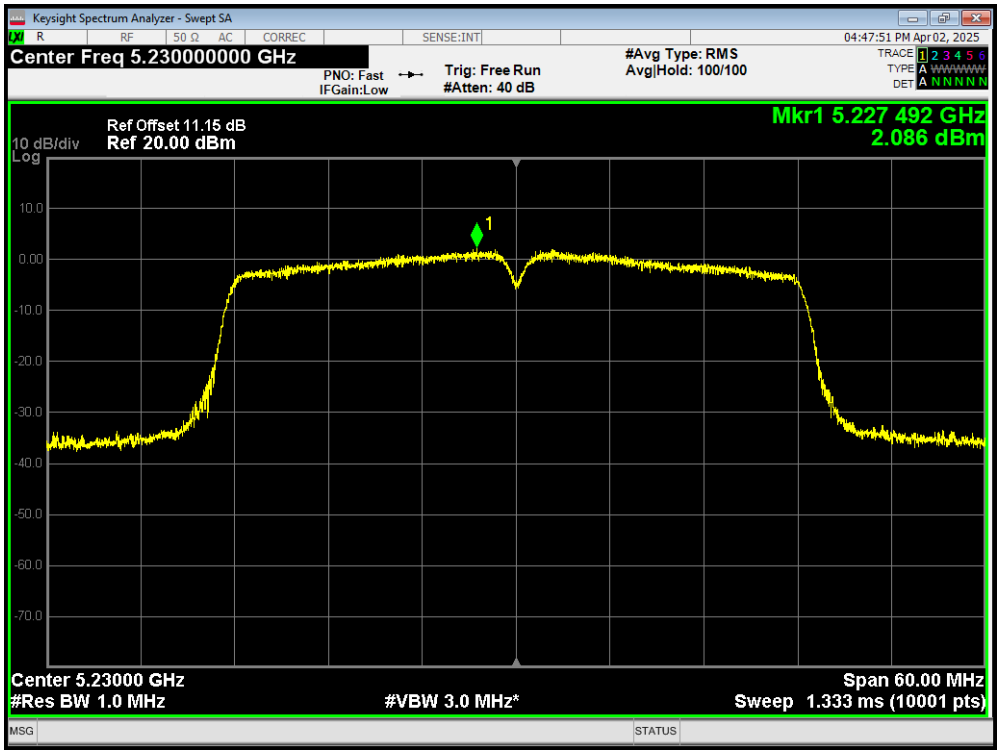
PSD 802.11n(HT20) 5240MHz



PSD 802.11n(HT40) 5190MHz



PSD 802.11n(HT40) 5230MHz



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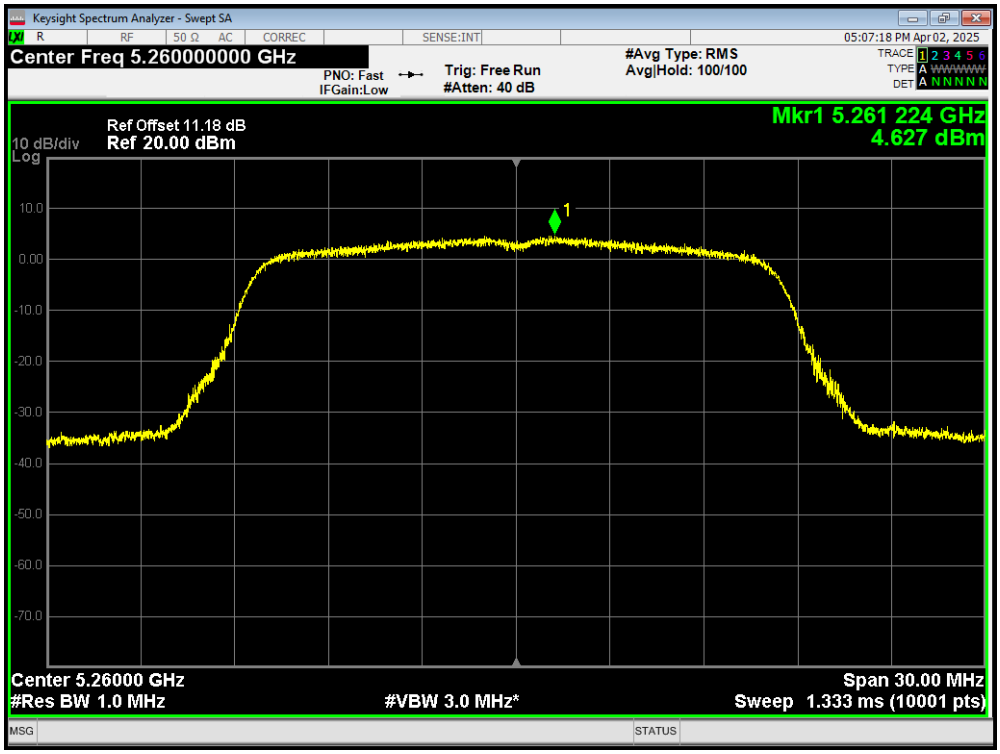
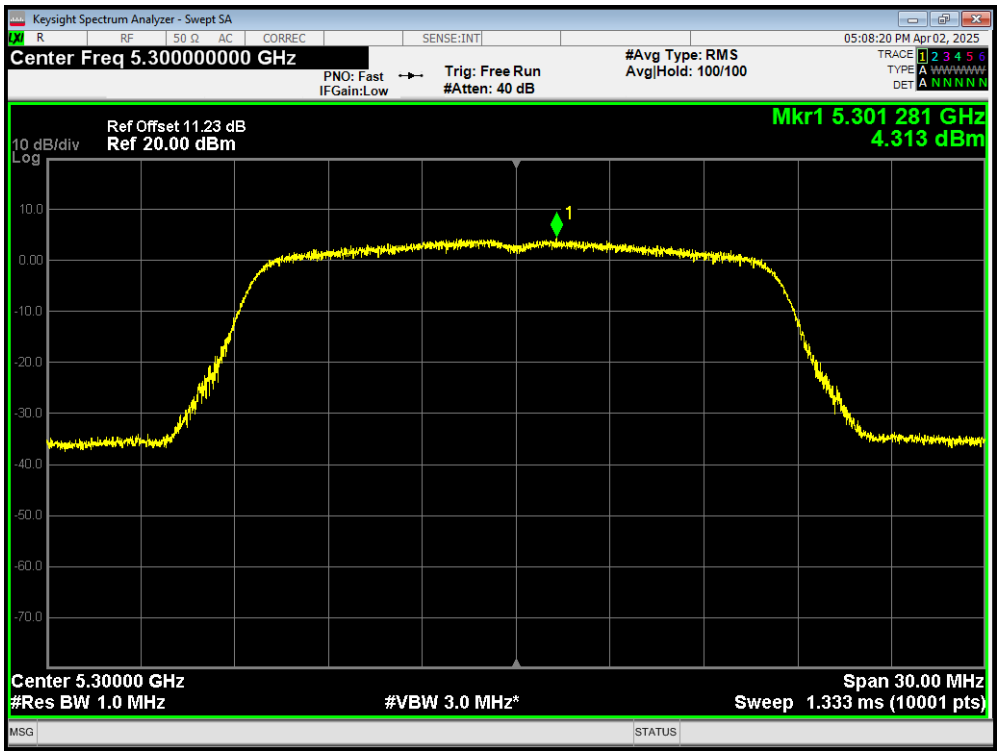
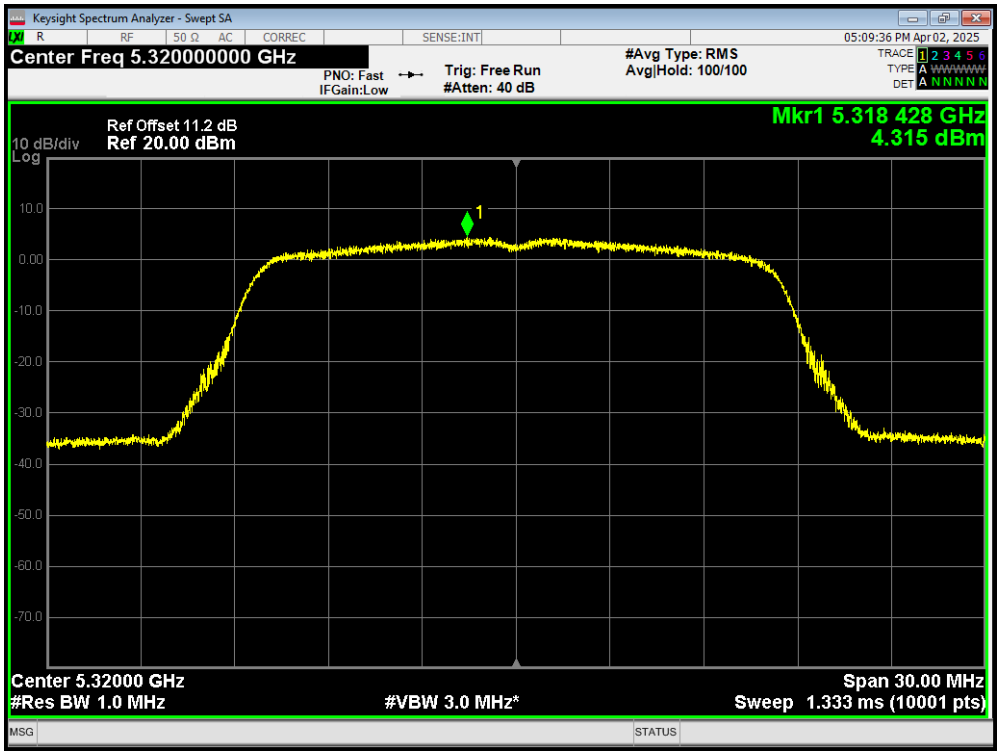
PSD 802.11a 5260MHz



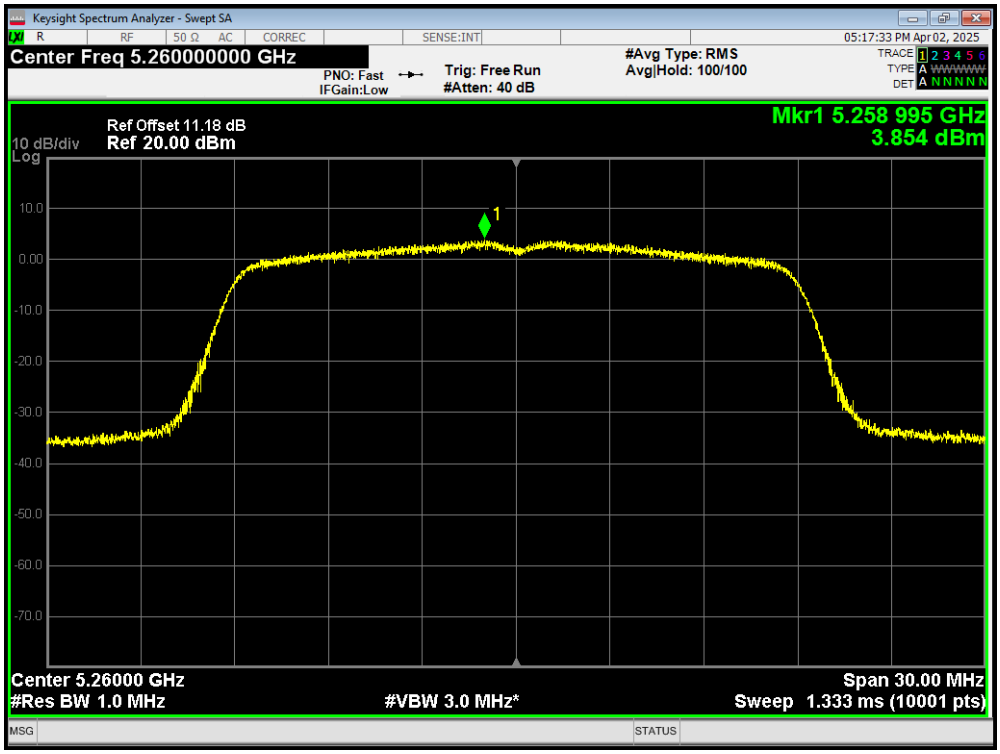
PSD 802.11a 5300MHz



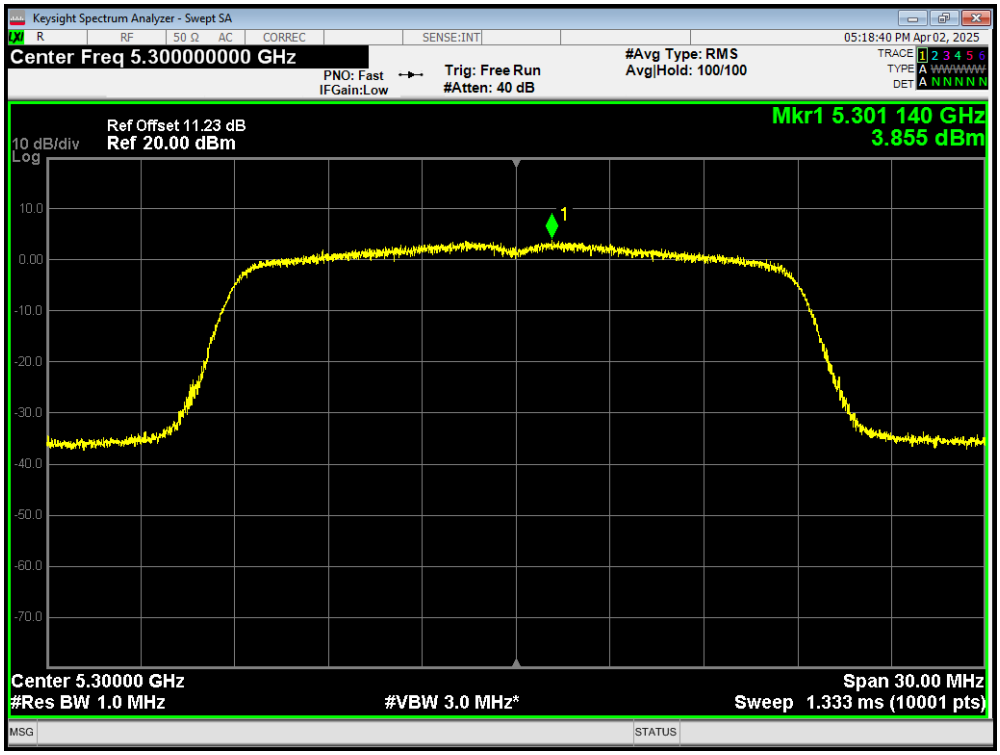
PSD 802.11a 5320MHz



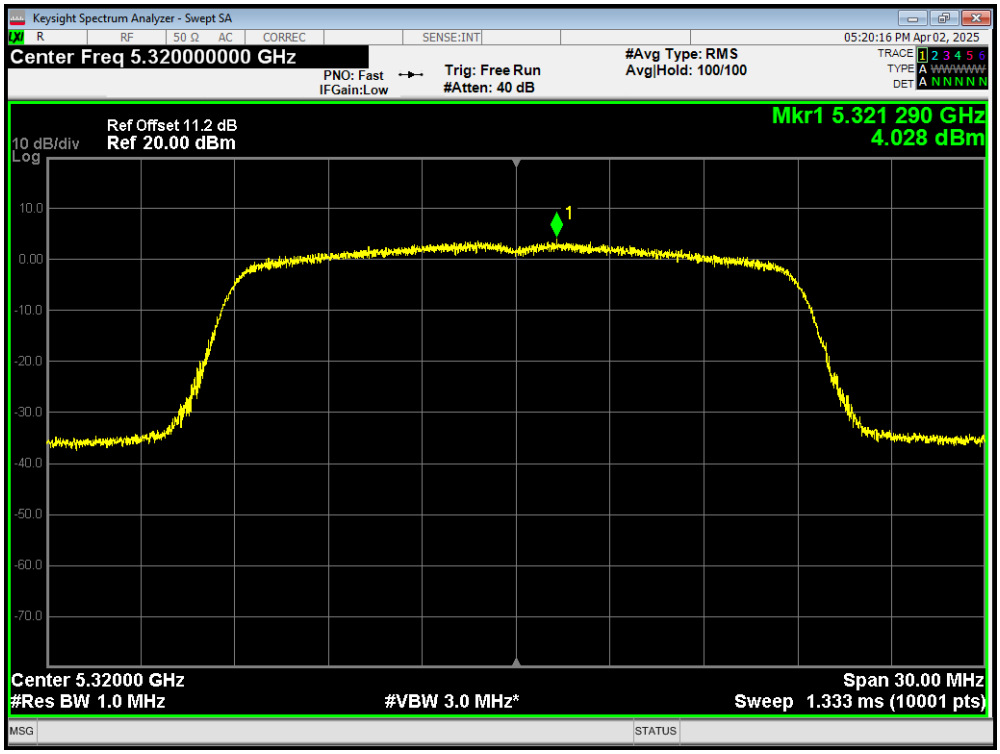
PSD 802.11ac(VHT20) 5260MHz



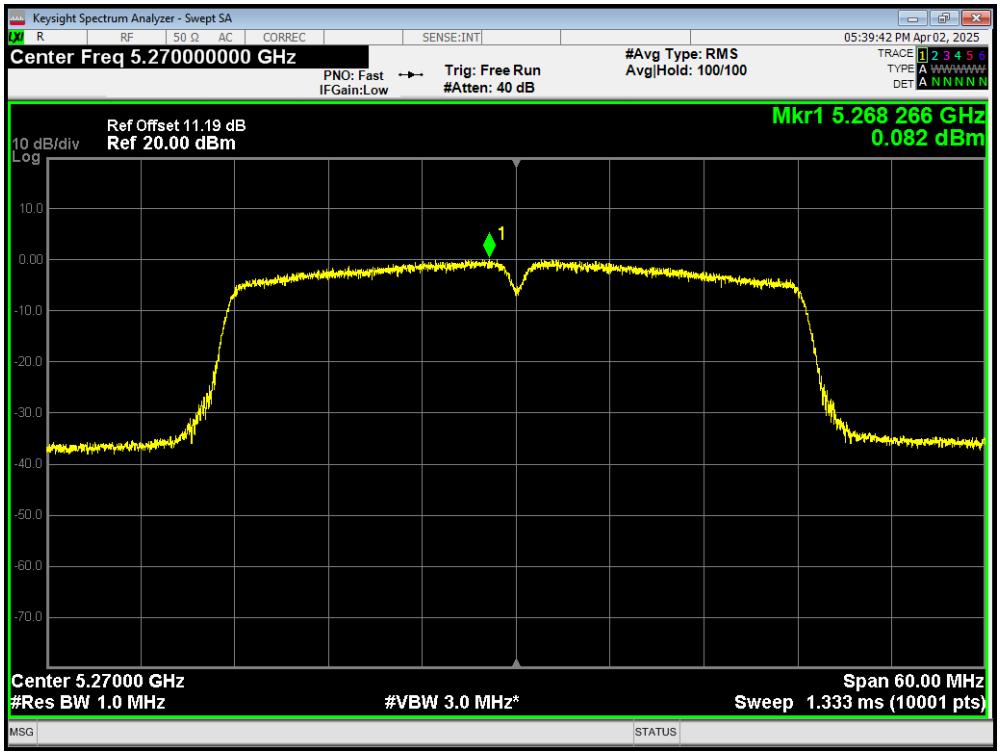
PSD 802.11ac(VHT20) 5300MHz



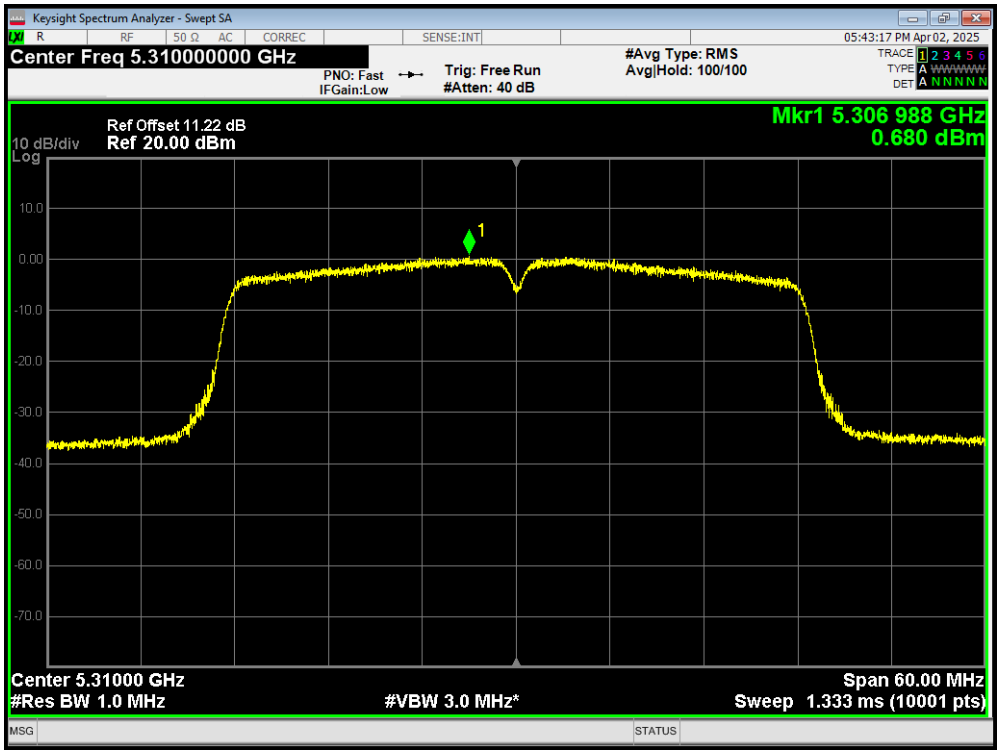
PSD 802.11ac(VHT20) 5320MHz



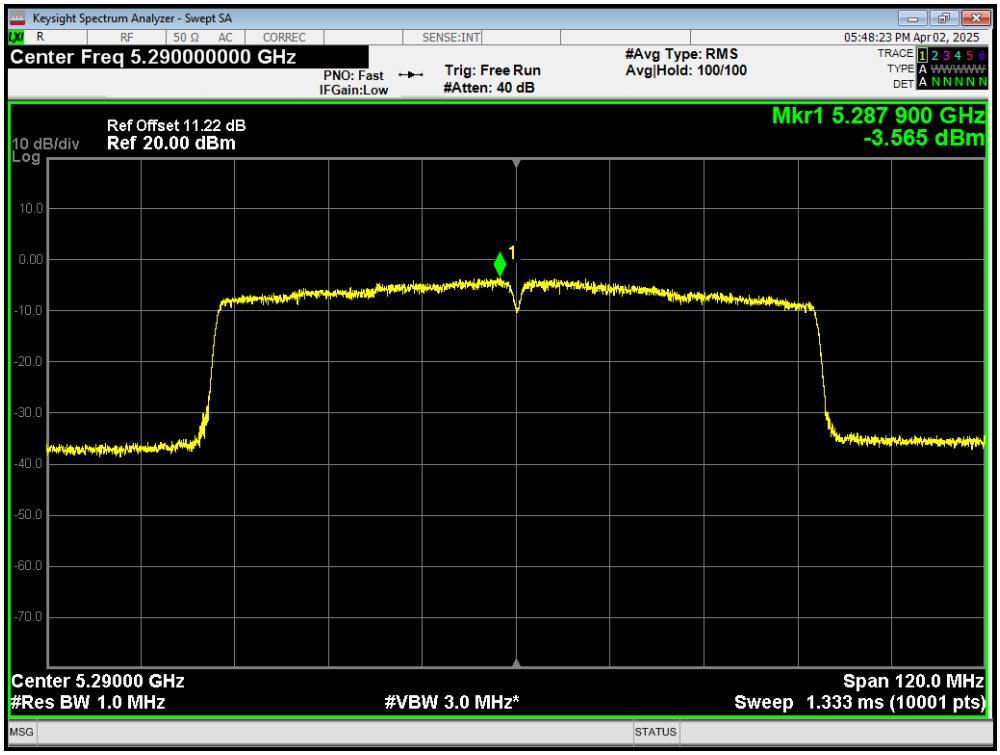
PSD 802.11ac(VHT40) 5270MHz



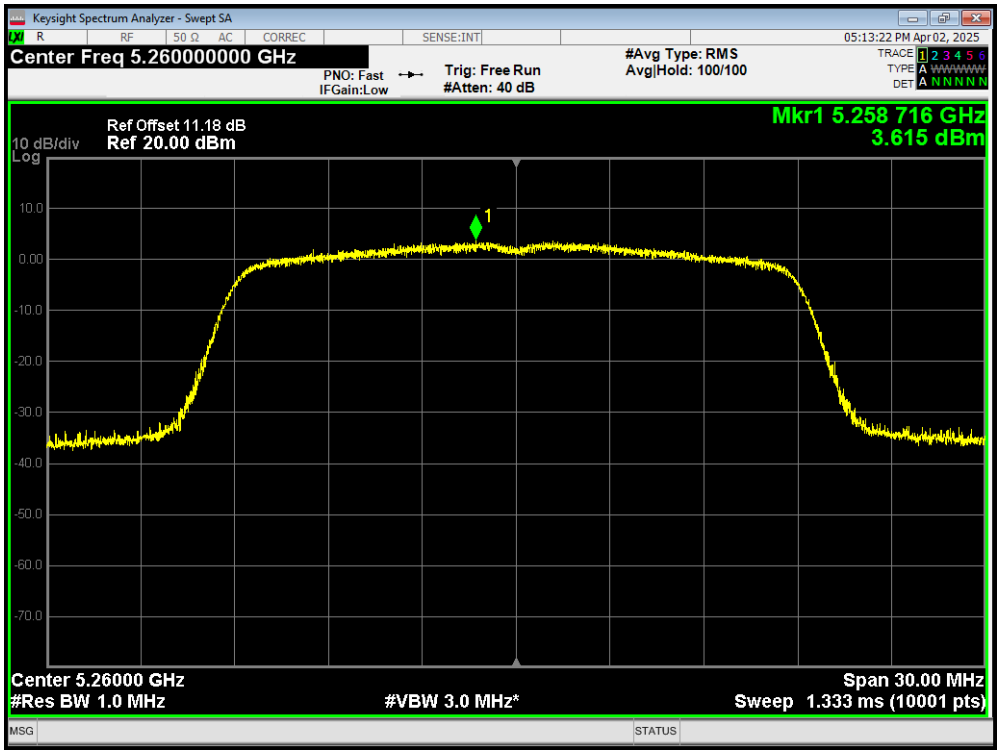
PSD 802.11ac(VHT40) 5310MHz



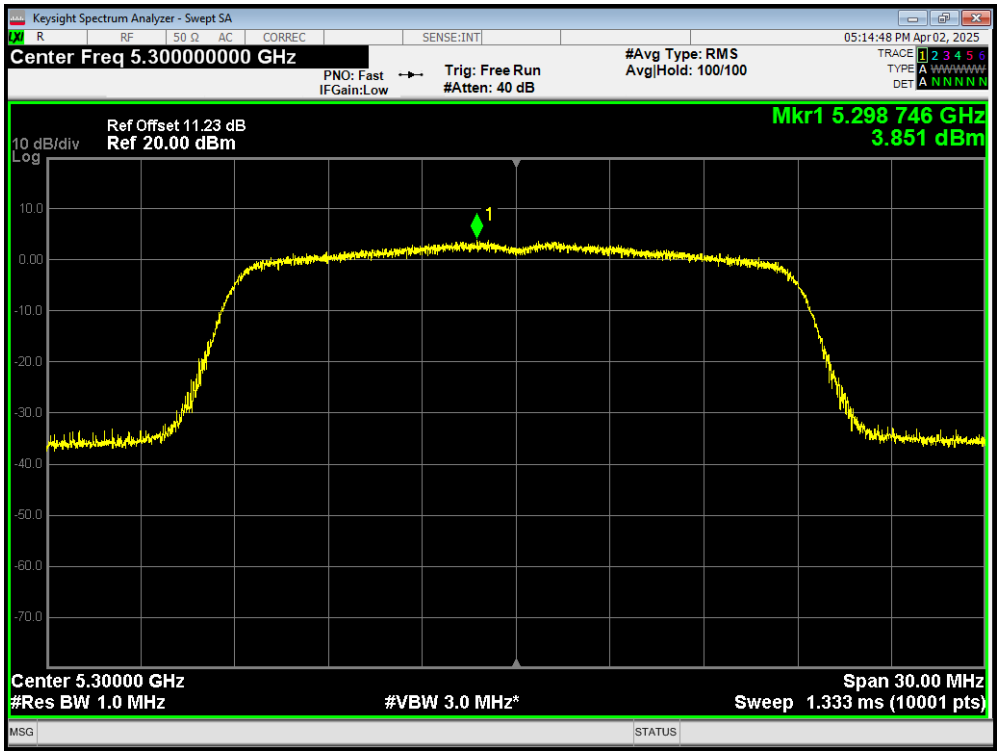
PSD 802.11ac(VHT80) 5290MHz



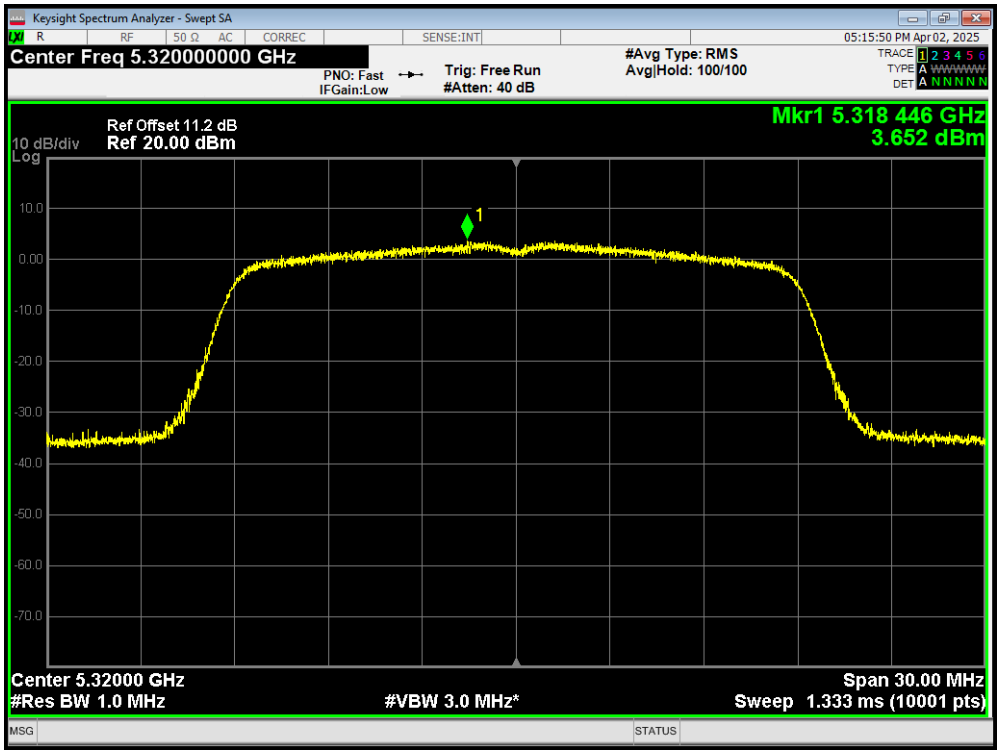
PSD 802.11n(HT20) 5260MHz



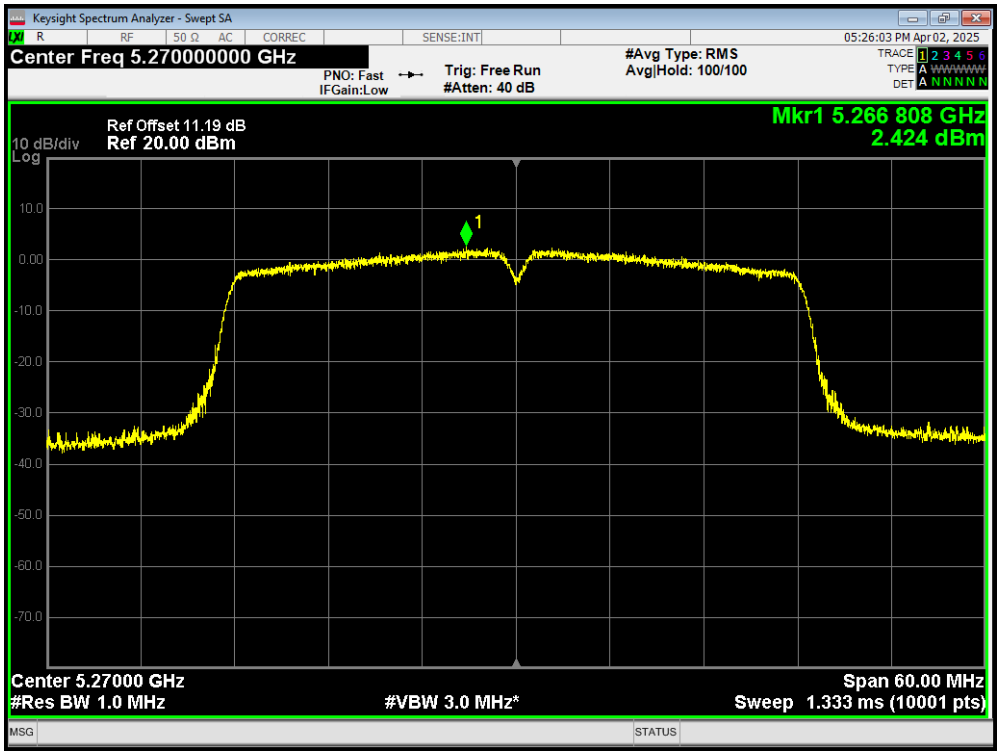
PSD 802.11n(HT20) 5300MHz



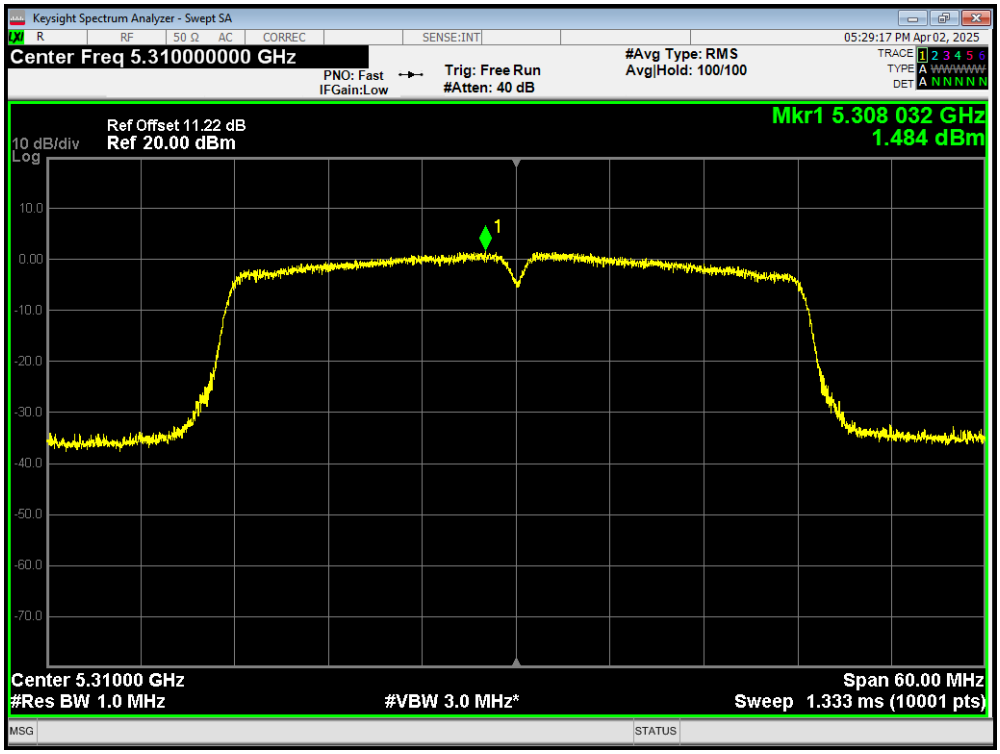
PSD 802.11n(HT20) 5320MHz



PSD 802.11n(HT40) 5270MHz



PSD 802.11n(HT40) 5310MHz



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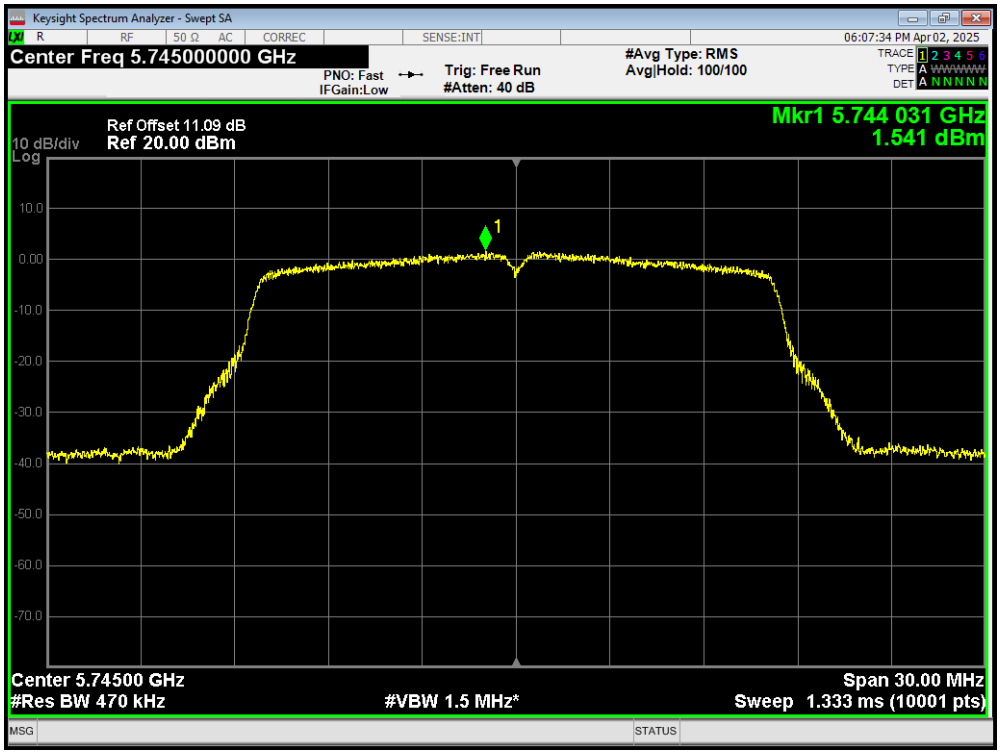
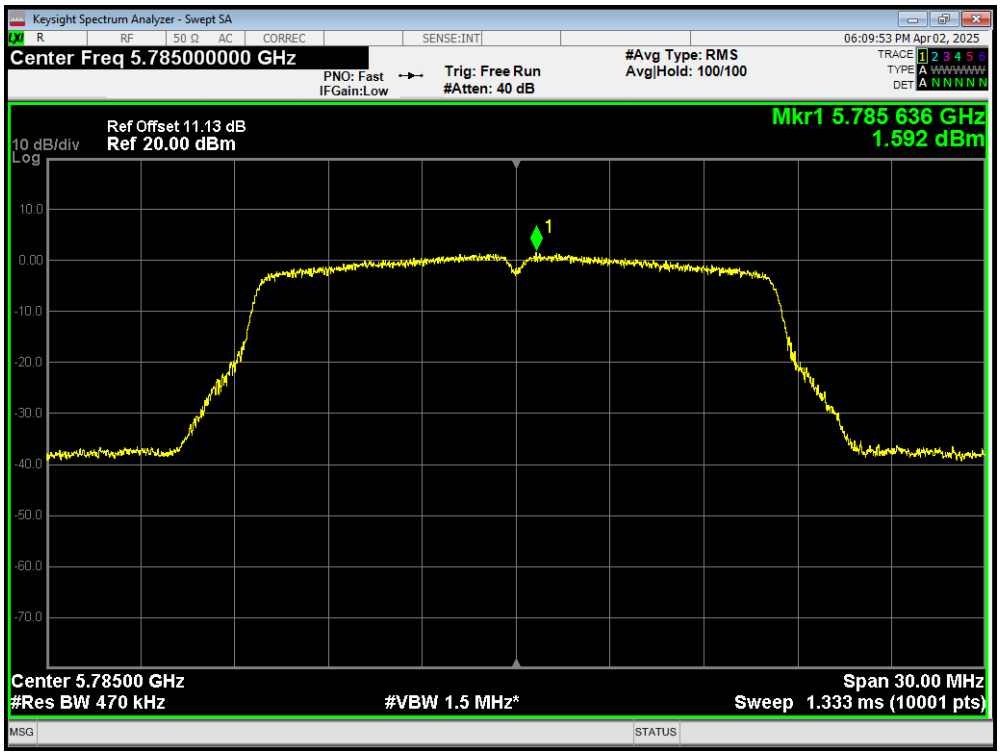
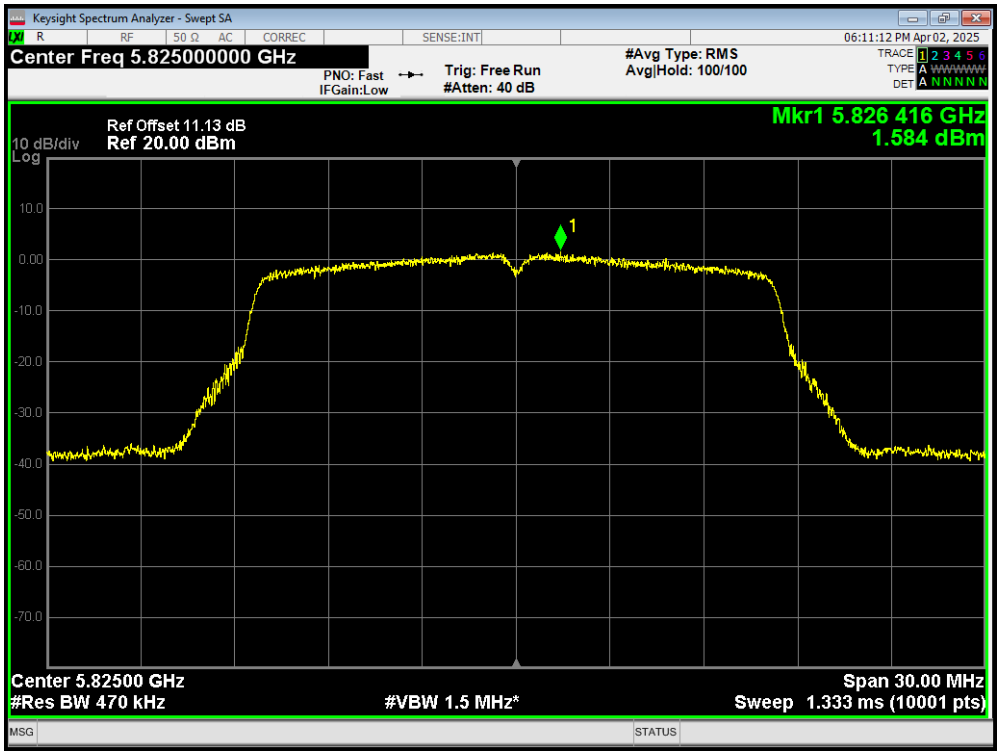
PSD 802.11a 5745MHz



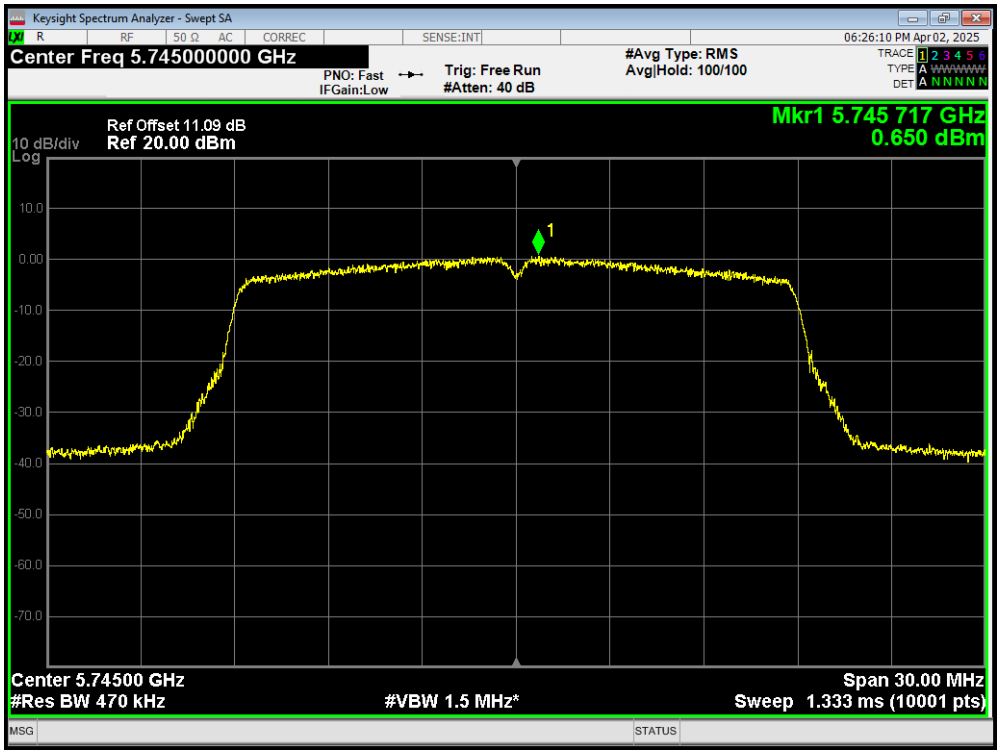
PSD 802.11a 5785MHz



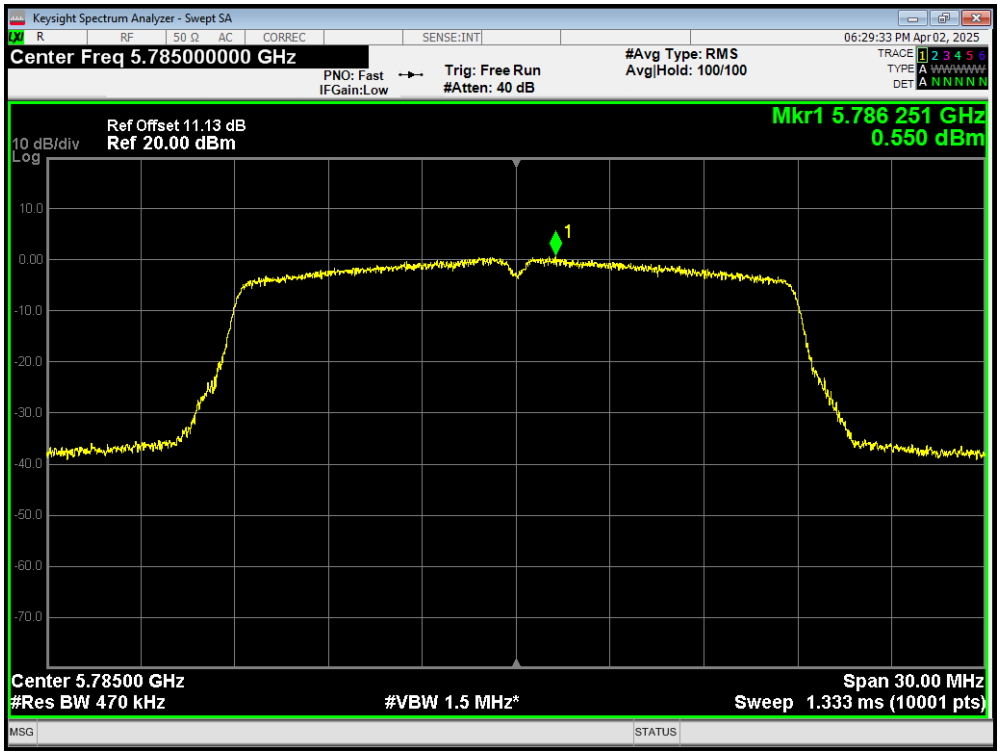
PSD 802.11a 5825MHz



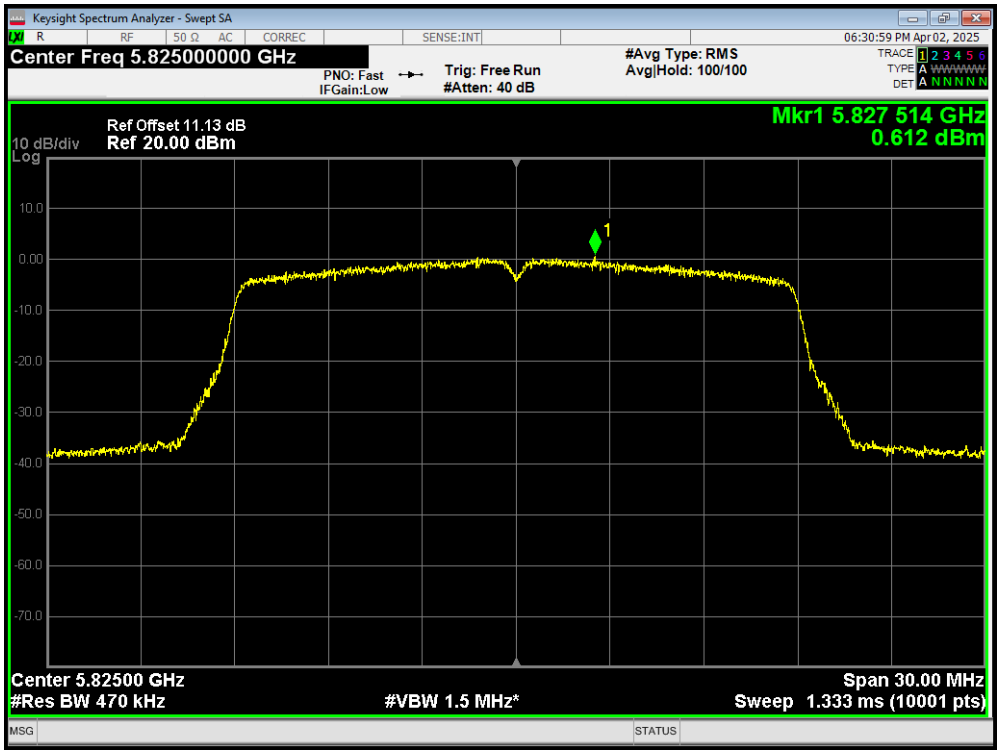
PSD 802.11ac(VHT20) 5745MHz



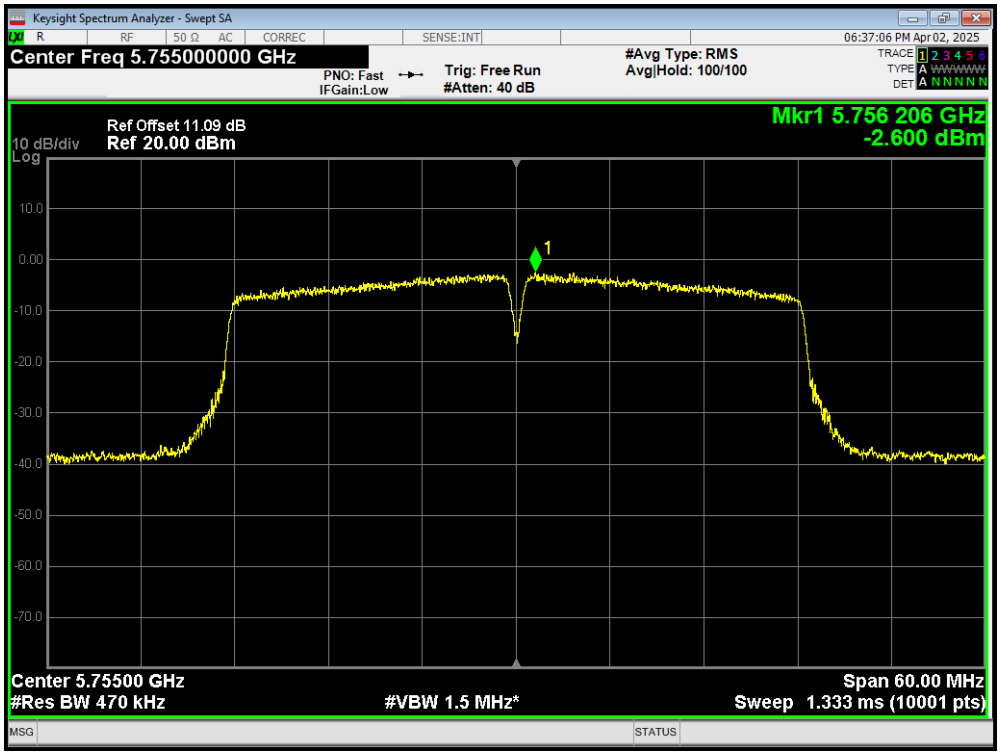
PSD 802.11ac(VHT20) 5785MHz



PSD 802.11ac(VHT20) 5825MHz



PSD 802.11ac(VHT40) 5755MHz



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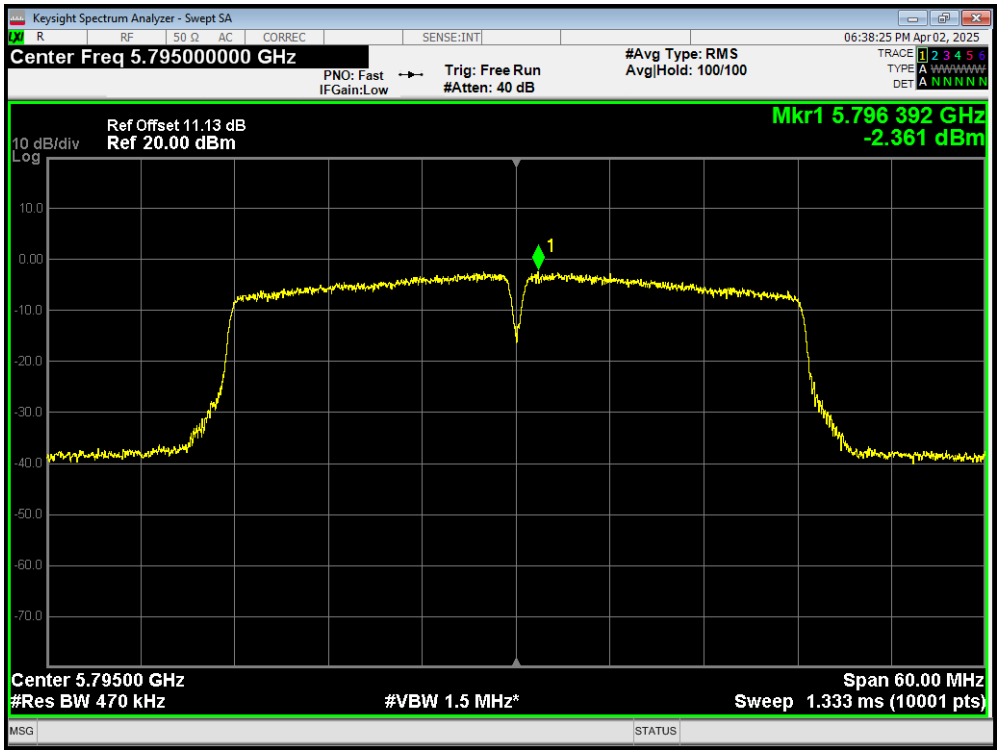

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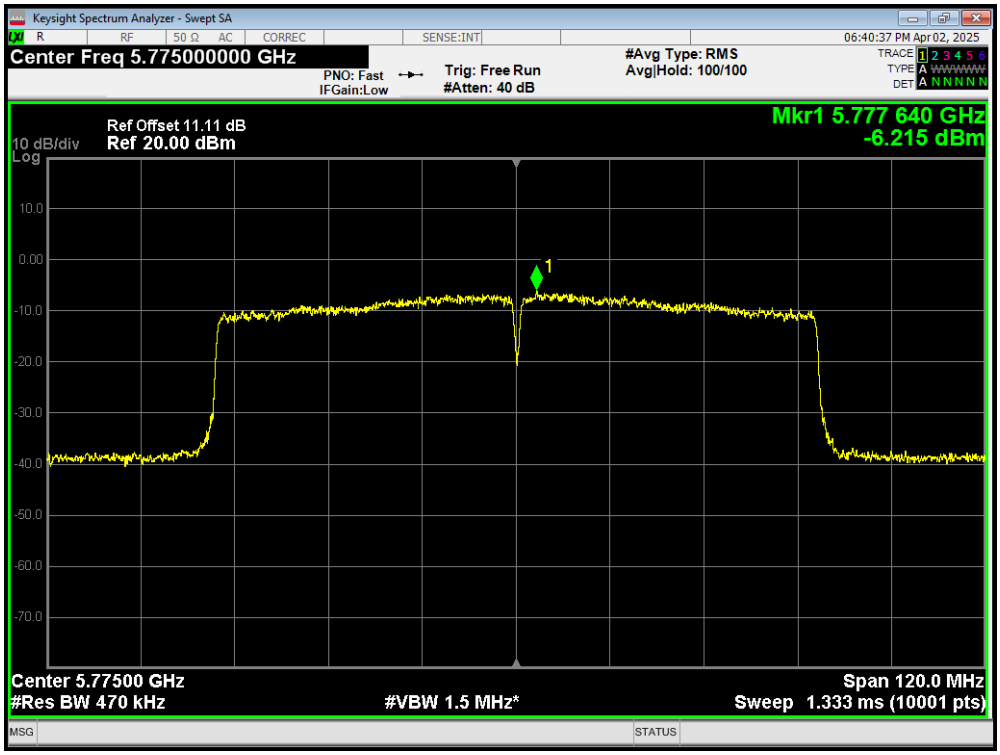

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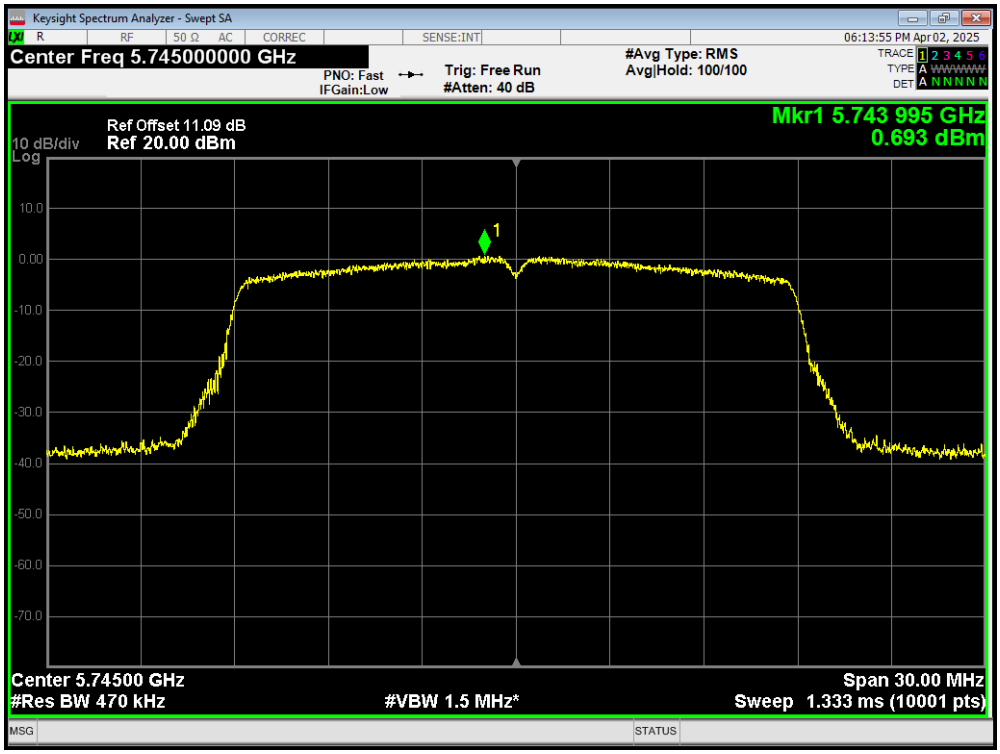

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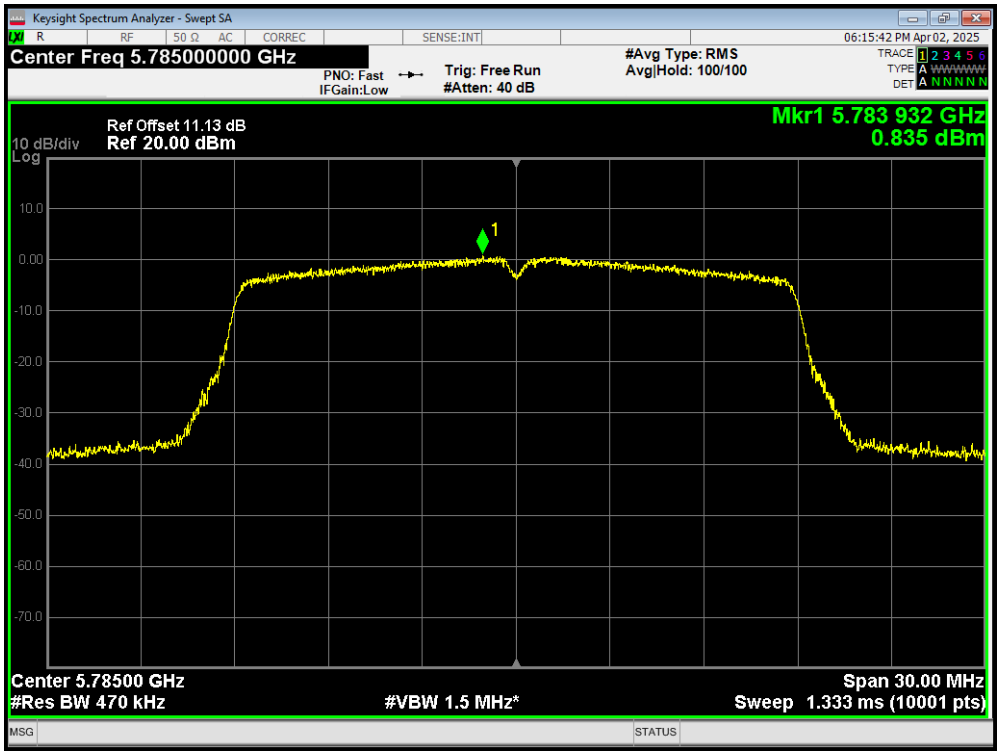

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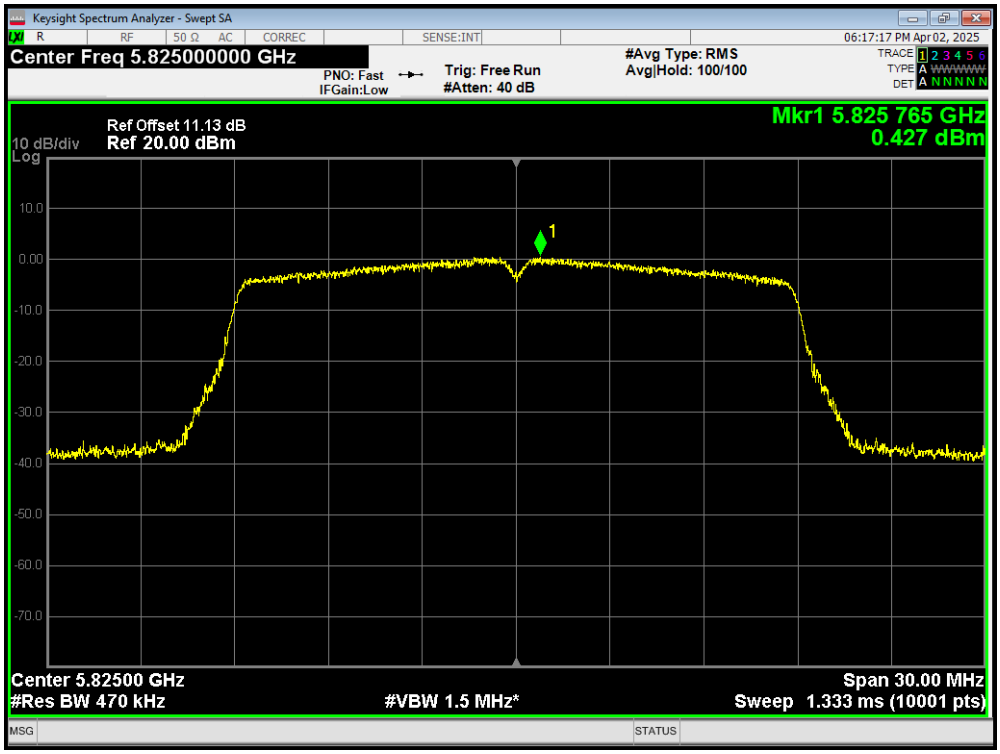

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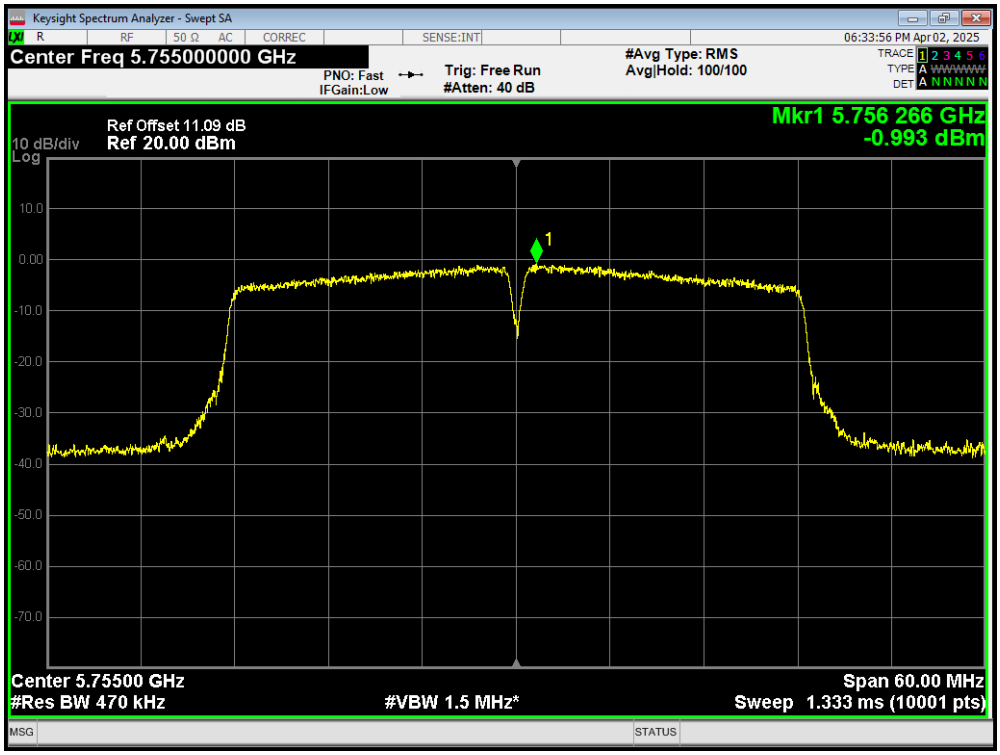

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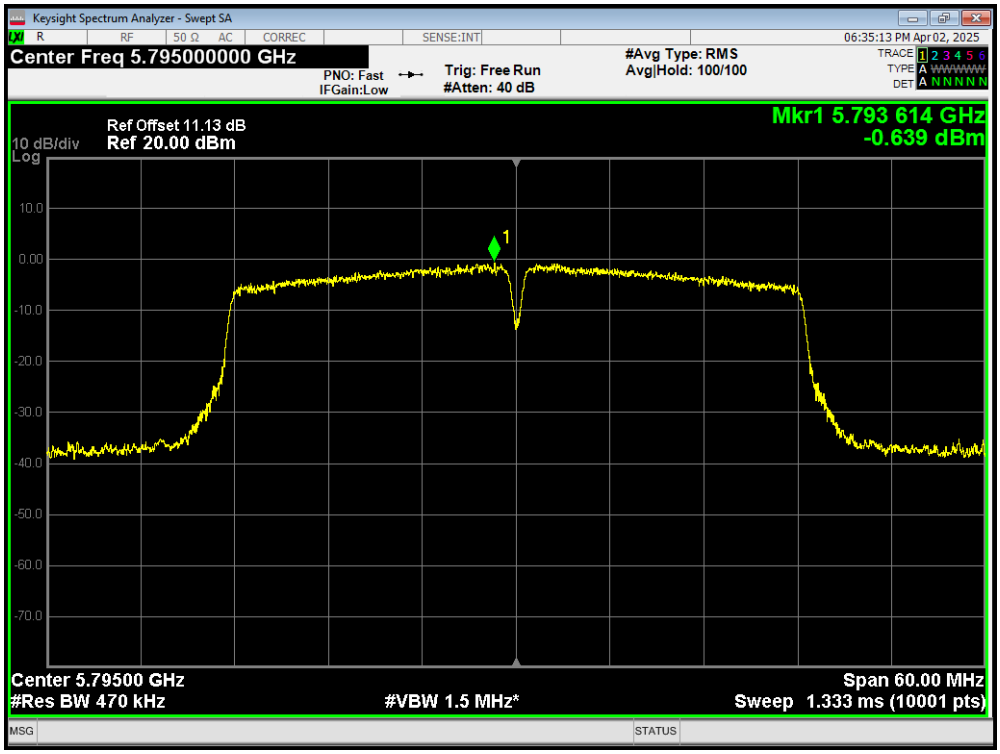

5.5. Unwanted Emission

Ambient condition

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

Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.10. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.
Sweep the whole frequency band range from 9kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.
Set the spectrum analyzer in the following:
9kHz~150 kHz
RBW=200Hz, VBW=1kHz/ Sweep=AUTO
150 kHz~30MHz
RBW=9kHz, VBW=30kHz,/ Sweep=AUTO
Below 1GHz
RBW=100kHz / VBW=300kHz / Sweep=AUTO
a) Peak emission levels are measured by setting the instrument as follows:
Above 1GHz
PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO
b) Average emission levels are measured by setting the instrument as follows:
Above 1GHz
AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO
c) Detector: The measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and

OFF with the transmit cycle, at least 100 traces shall be averaged.)
g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Reduce the video bandwidth until no significant variations in the displayed signal are observed in subsequent traces, provided the video bandwidth is no less than 1 Hz. For regulatory requirements that specify averaging only over the transmit duration (e.g., digital transmission system [DTS] and Unlicensed National Information Infrastructure [U-NII]), the video bandwidth shall be greater than [1 / (minimum transmitter on time)] and no less than 1 Hz.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the loop antenna is vertical, others antenna are vertical and horizontal.

The test is in transmitting mode.