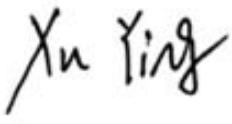
RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR2023FCS945R
Product	Wi-Fi & Bluetooth Module
Brand	Quectel
Model	FCS945R
Report No.	R2306A0636-R2
Issue Date	August 7, 2023

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15E (2022)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.



Prepared by: Xu Ying

Approved by: Xu Kai

TA Technology (Shanghai) Co., Ltd.

Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
TEL: +86-021-50791141/2/3
FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

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: June 27, 2023 ~ July 12, 2023 Date of Sample Received: June 15, 2023			
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 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 **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)

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)

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

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233

2.2. General information

EUT Description	
Model	FCS945R
SN	E1M23DR04000183
Hardware Version	R1.0
Software Version	NA
Power Supply	External power supply
Antenna Type	External Antenna
Antenna Connector	SMA Male (Center Pin)
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
Max. Output Power	20.20 dBm
Testing temperature range	-20 ° C to 50° C
Operating temperature range	0 ° C to 70 ° C
Operating voltage range	3.0 V to 3.6 V
State DC voltage	3.3 V
Auxiliary test equipment	
Antenna	Manufacturer: Quectel Wireless Solutions Co., Ltd. Model: YE0038AA Antenna Gain: 0.66 dBi
Note: 1. The EUT is sent from the applicant to 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 (2022) 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.

The test software is used Command Prompt.

Worst-case data rates are shown as following table.

Mode	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	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
	U-NII-2A	20 MHz	52	5260MHz
			56	5280MHz
			60	5300MHz
			64	5320MHz
		40 MHz	54	5270MHz
			62	5310MHz
	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
	U-NII-3	20 MHz	149	5745MHz
			153	5765MHz
			157	5785MHz
			161	5805MHz
			165	5825MHz
		40 MHz	151	5755MHz
			159	5795MHz
Does this device support TPC Function? ☒Yes ☐No				
Does this device support TDWR Band? ☒Yes ☐No				

5. Test Case Results

5.1. Occupied Bandwidth

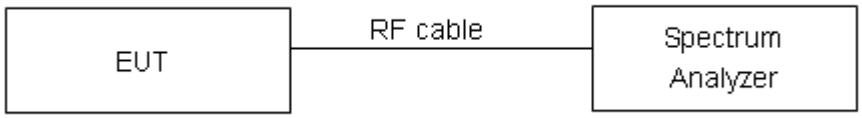
Ambient condition

Temperature	Relative humidity
23°C ~25°C	45%~50%

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 ≈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

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	16.420	24.292	PASS
	5200	16.451	23.680	PASS
	5240	16.398	24.965	PASS
802.11n HT20	5180	17.443	20.730	PASS
	5200	17.441	22.084	PASS
	5240	17.455	20.804	PASS
802.11n HT40	5190	35.328	38.293	PASS
	5230	35.402	46.047	PASS

U-NII-2A

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5260	16.425	25.759	PASS
	5300	16.415	23.886	PASS
	5320	16.425	24.064	PASS
802.11n HT20	5260	17.436	20.662	PASS
	5300	17.454	20.597	PASS
	5320	17.480	20.616	PASS
802.11n HT40	5270	35.419	40.985	PASS
	5310	35.307	38.469	PASS

U-NII-2C

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5500	16.326	20.051	PASS
	5600	16.395	22.908	PASS
	5700	16.325	19.647	PASS
	5720	16.400	24.225	PASS
802.11n HT20	5500	17.429	20.815	PASS
	5600	17.424	20.539	PASS
	5700	17.430	20.546	PASS
	5720	17.452	20.464	PASS
802.11n HT40	5510	35.321	38.228	PASS
	5590	35.309	38.479	PASS
	5670	35.406	38.507	PASS
	5710	35.418	38.278	PASS

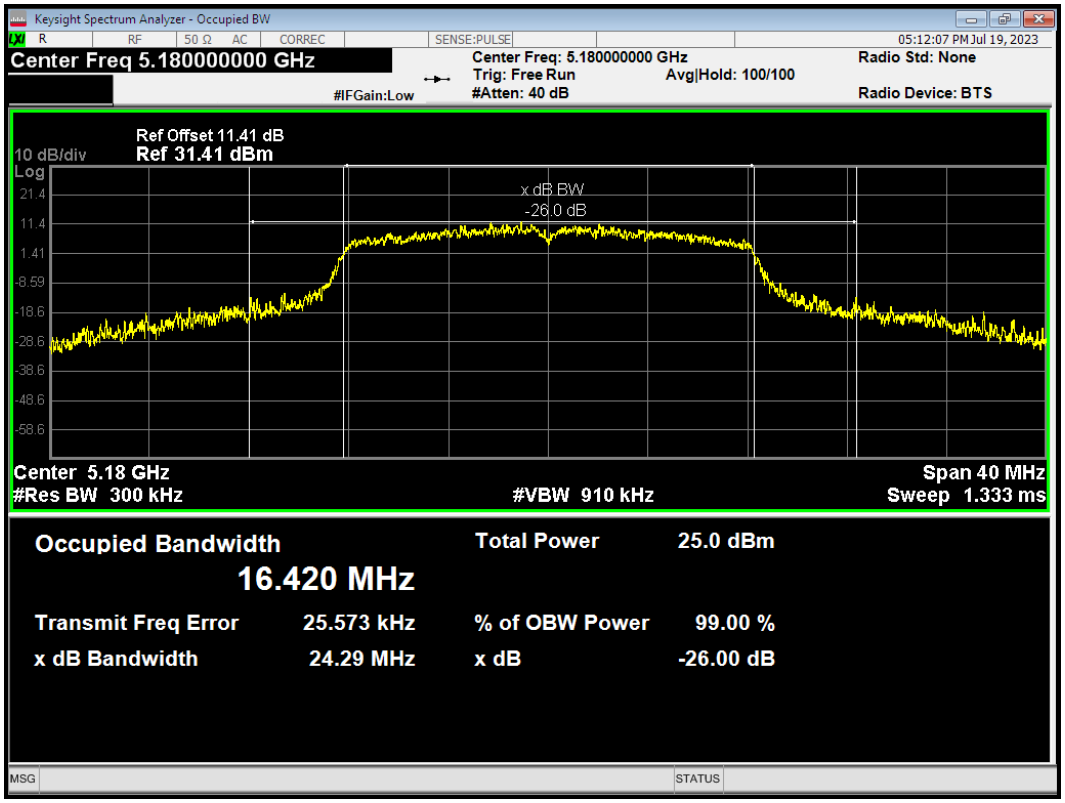
U-NII-3

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11a	5720	16.447	13.419	500	PASS
	5745	16.407	15.082	500	PASS
	5785	16.415	13.860	500	PASS
	5825	16.434	13.783	500	PASS
802.11n HT20	5720	17.454	15.067	500	PASS
	5745	17.490	14.970	500	PASS
	5785	17.523	15.015	500	PASS
	5825	17.515	11.912	500	PASS
802.11n HT40	5710	35.425	32.507	500	PASS
	5755	35.423	31.288	500	PASS
	5795	35.451	32.547	500	PASS

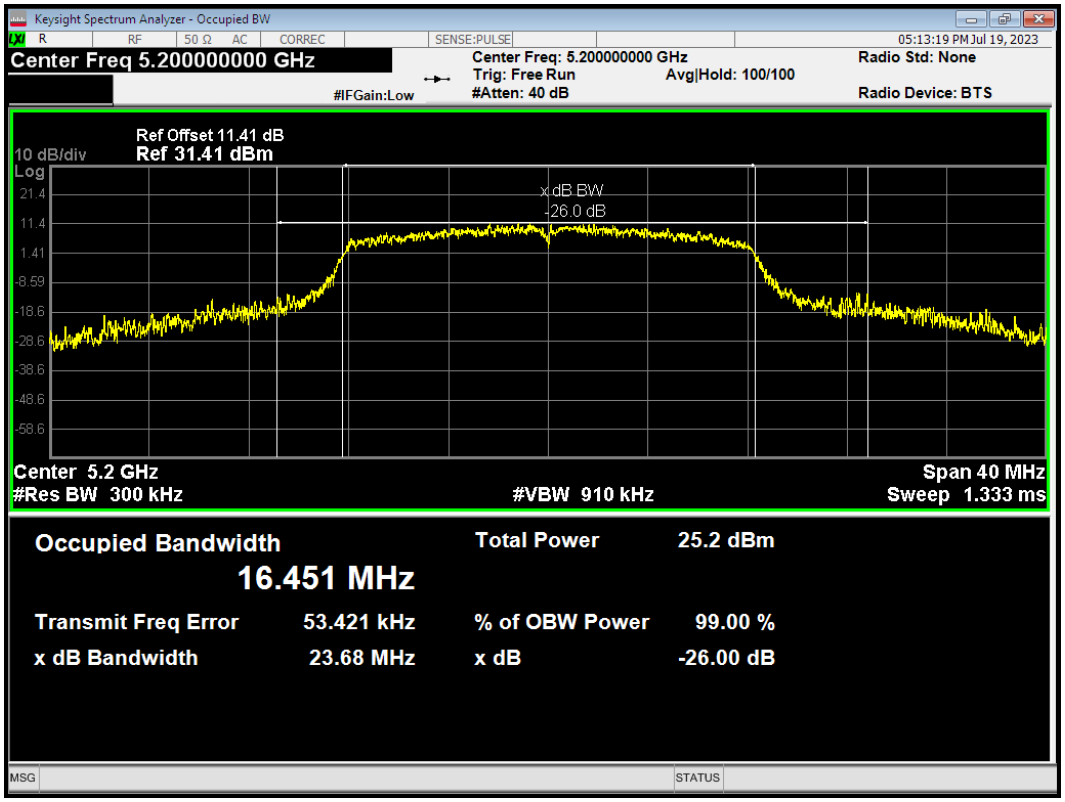
99% bandwidth

U-NII-1

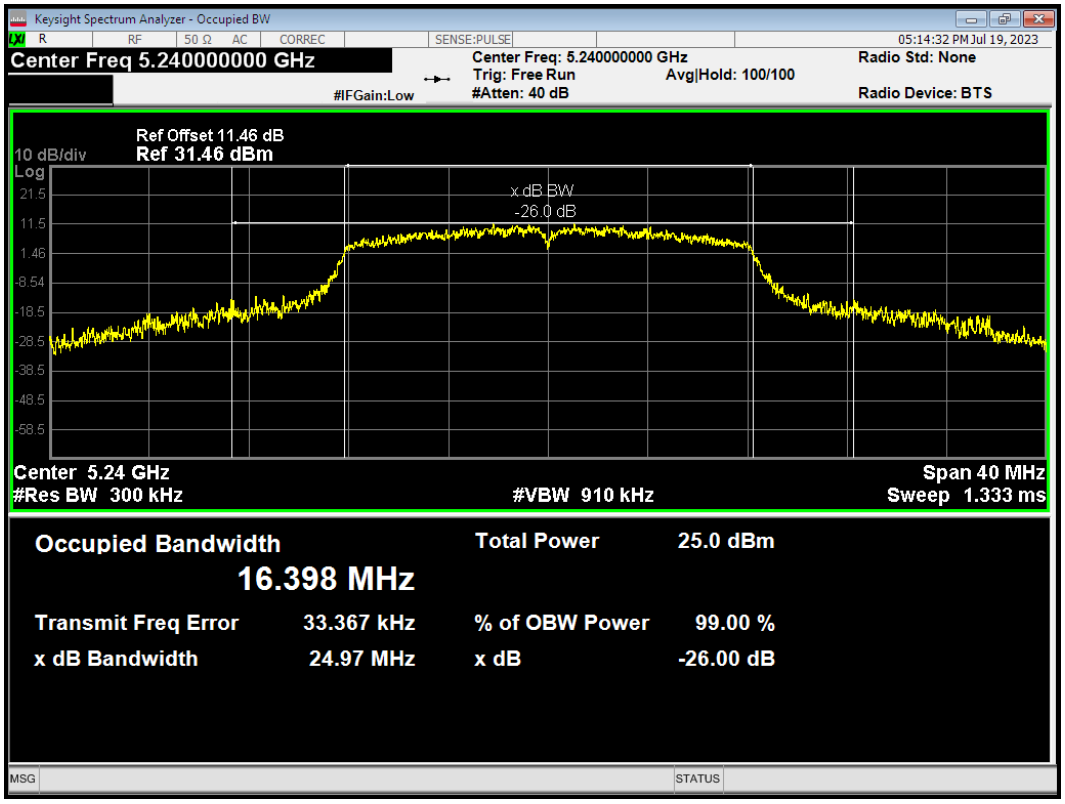
OBW 802.11a 5180MHz



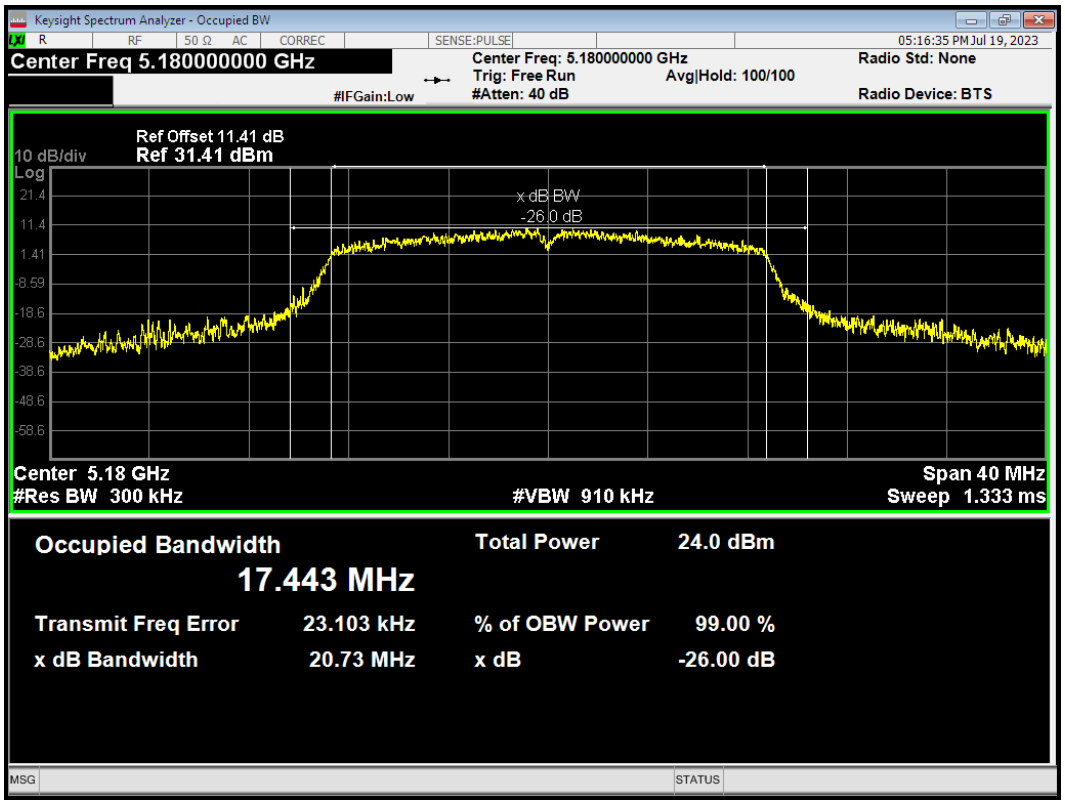
OBW 802.11a 5200MHz



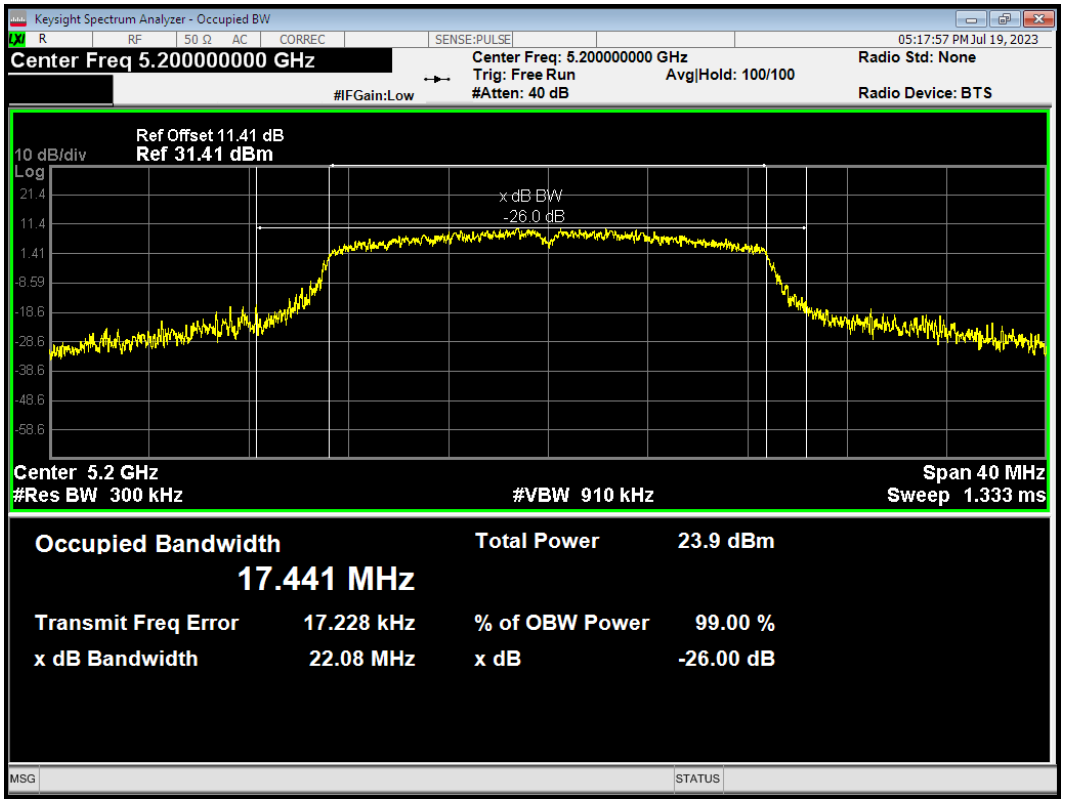
OBW 802.11a 5240MHz



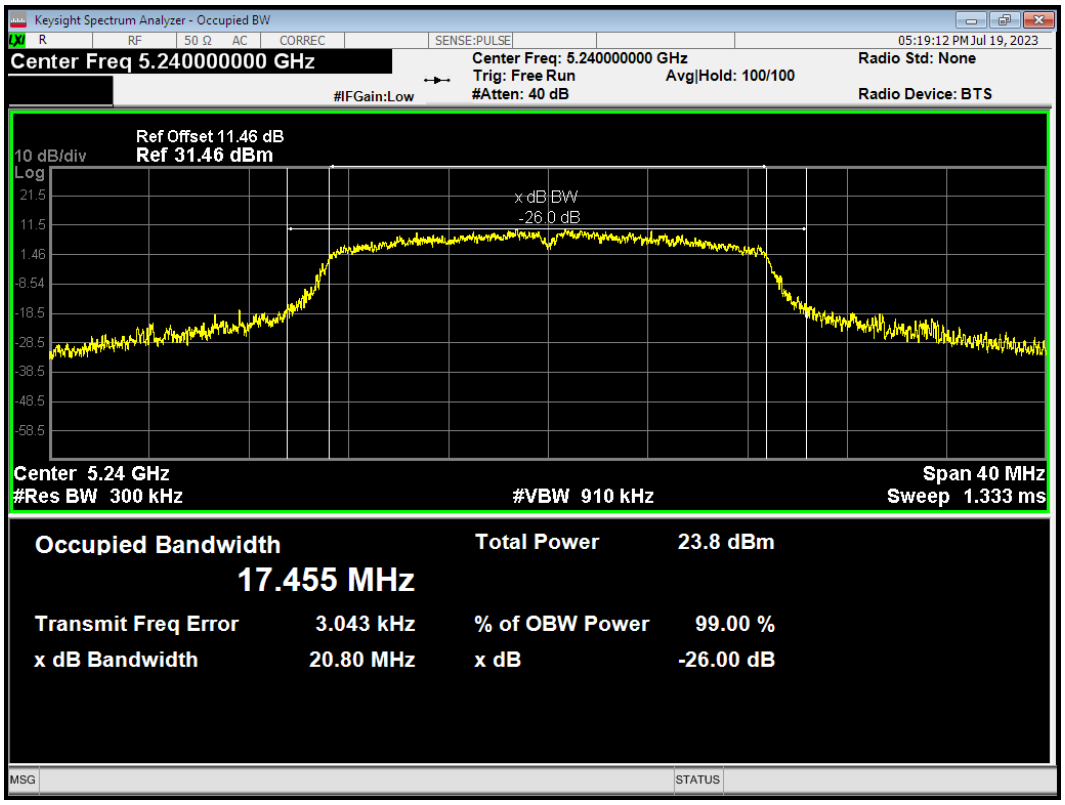
OBW 802.11n(HT20) 5180MHz



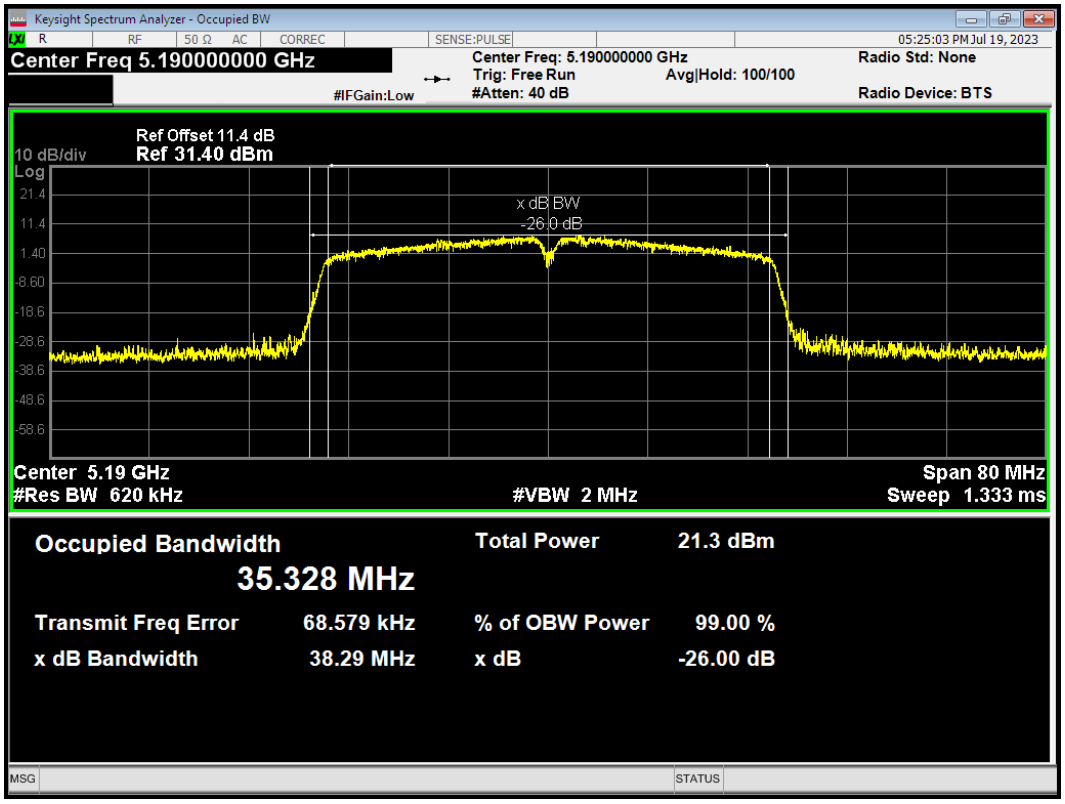
OBW 802.11n(HT20) 5200MHz



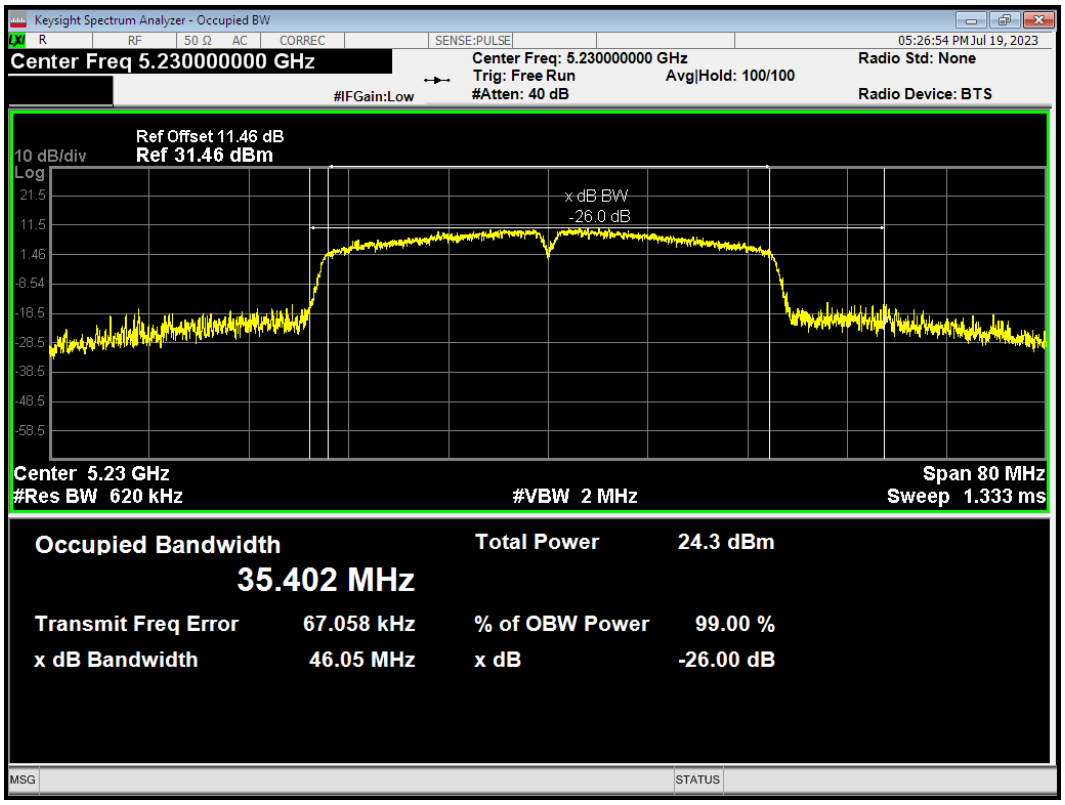
OBW 802.11n(HT20) 5240MHz



OBW 802.11n(HT40) 5190MHz

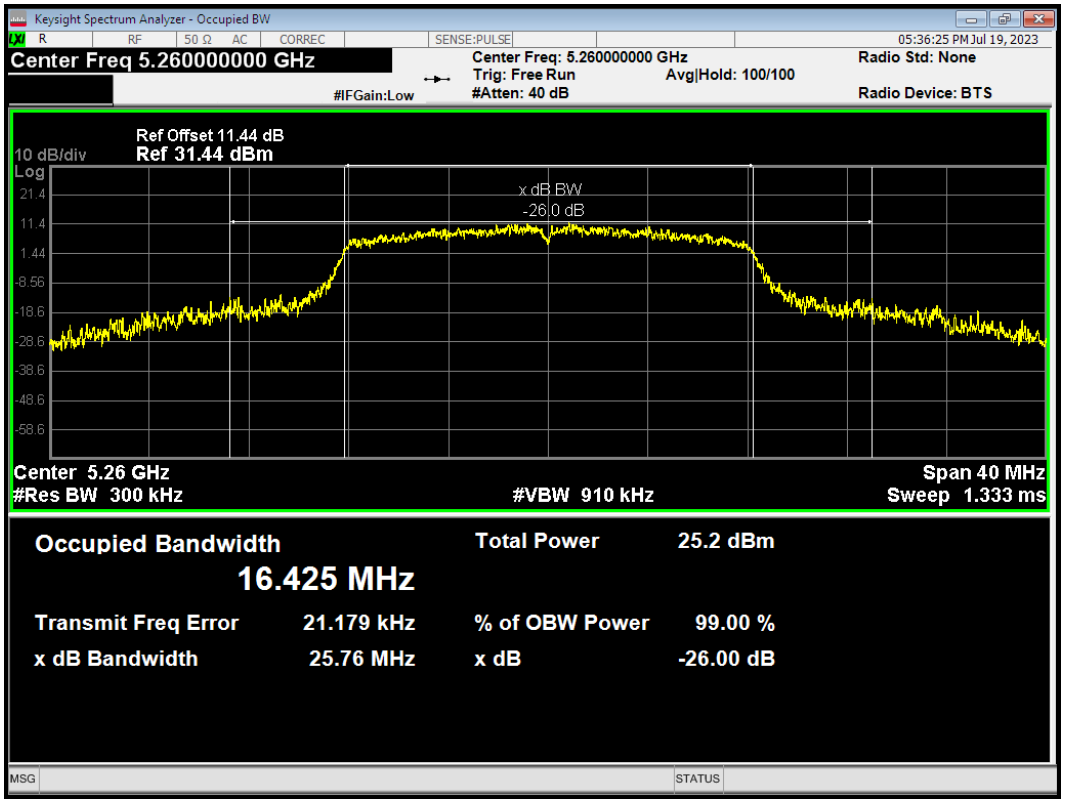


OBW 802.11n(HT40) 5230MHz

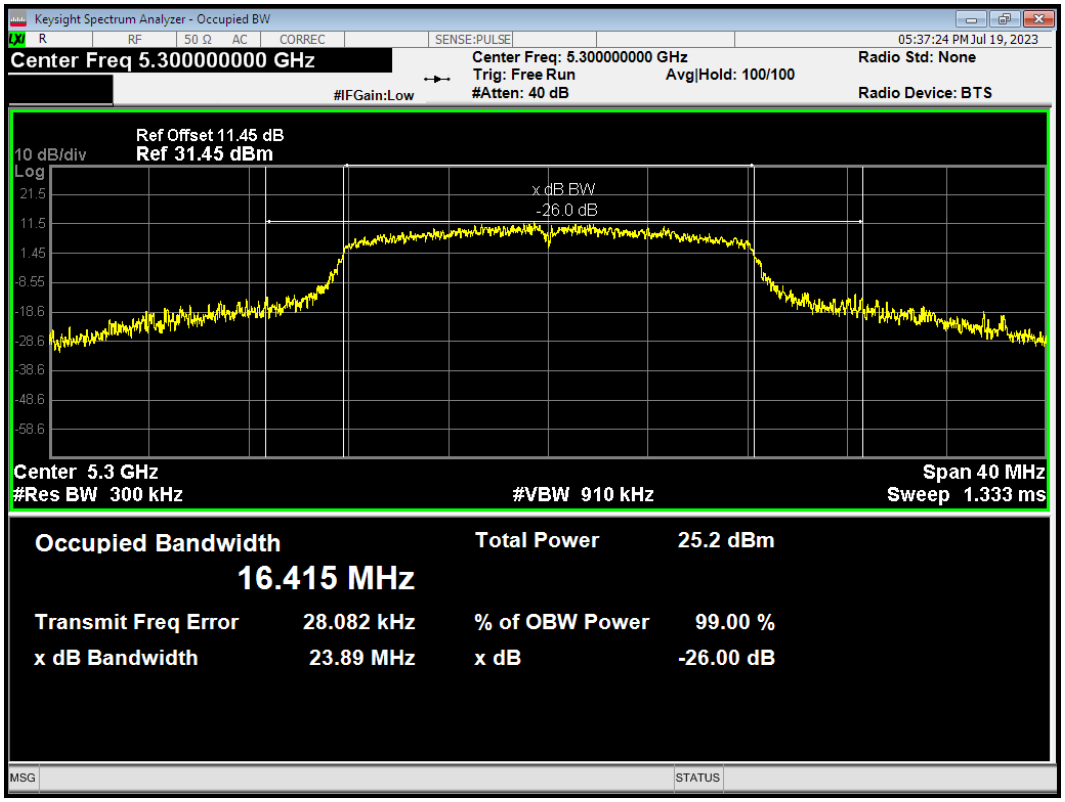


U-NII-2A

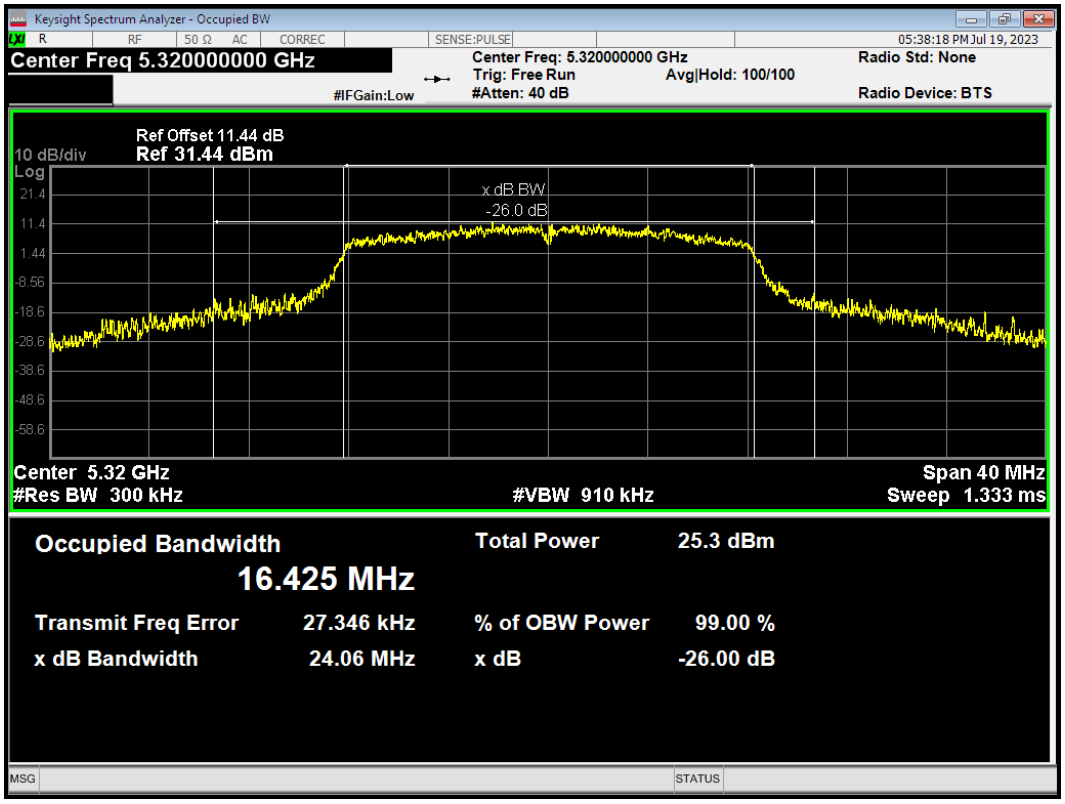
OBW 802.11a 5260MHz



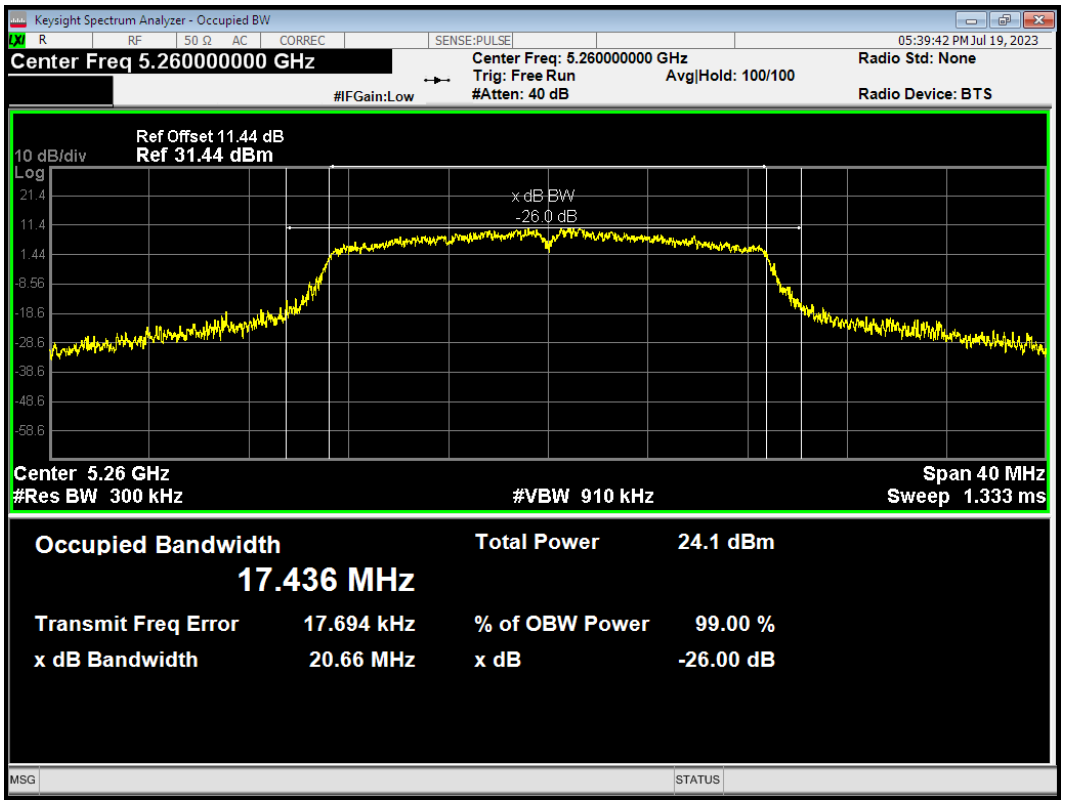
OBW 802.11a 5300MHz



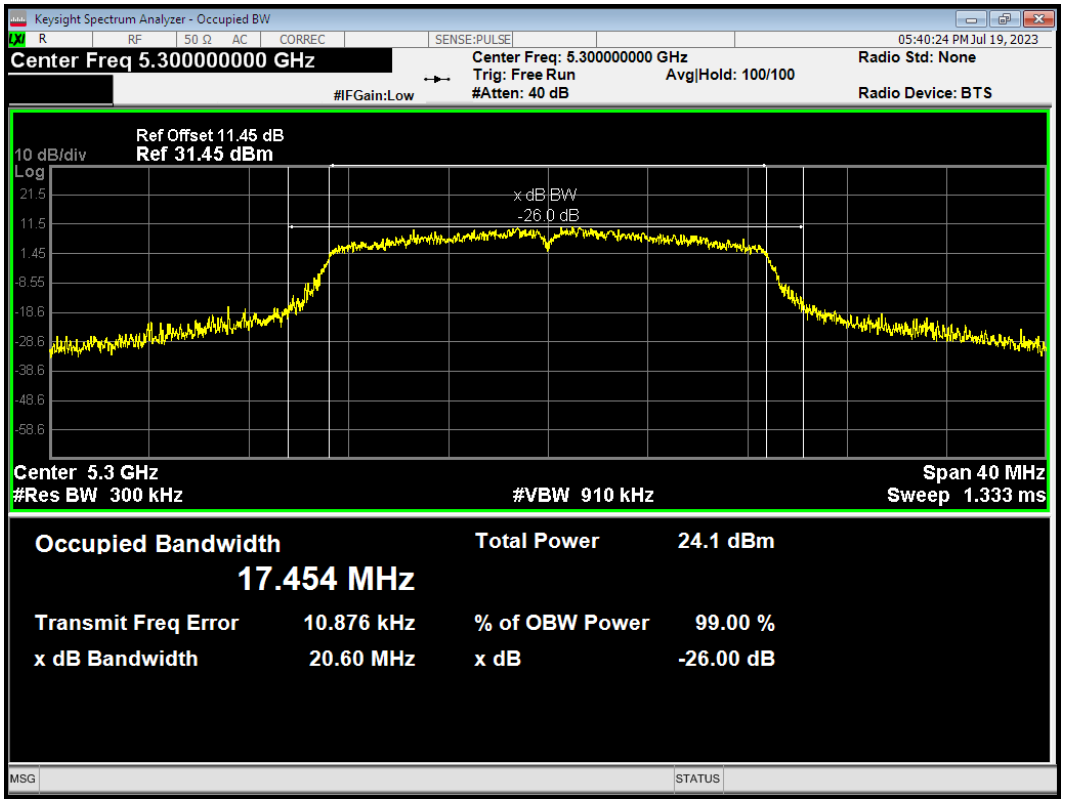
OBW 802.11a 5320MHz



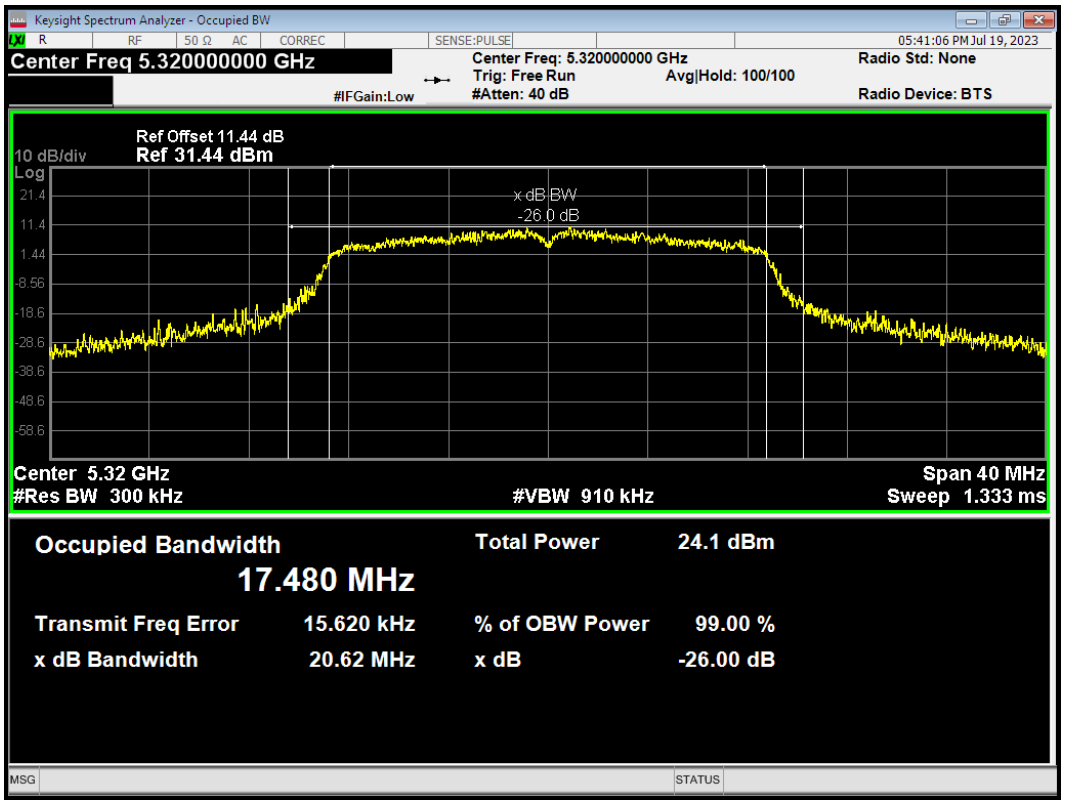
OBW 802.11n(HT20) 5260MHz



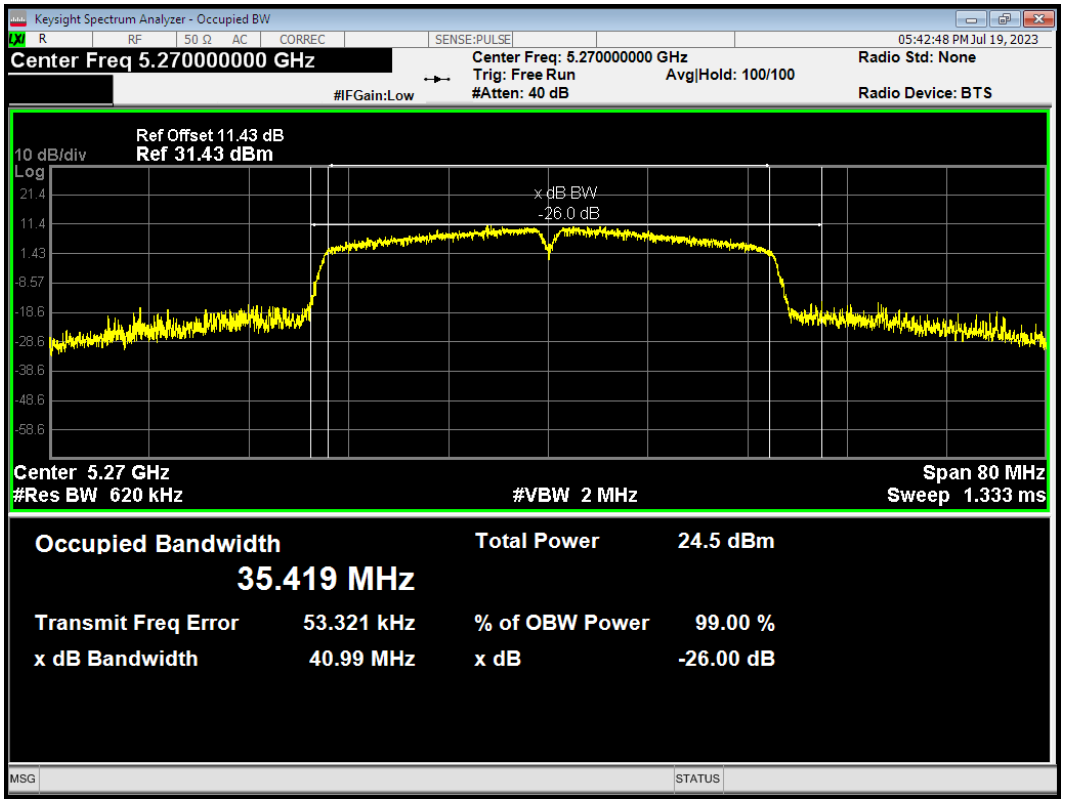
OBW 802.11n(HT20) 5300MHz



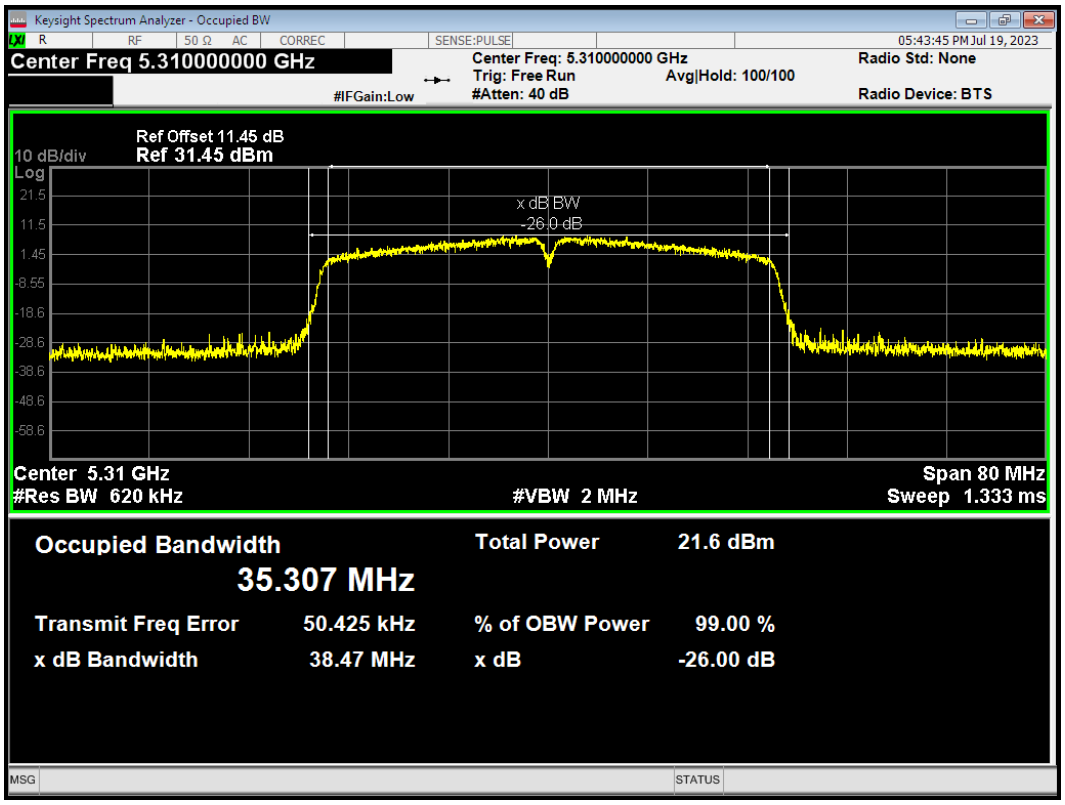
OBW 802.11n(HT20) 5320MHz



OBW 802.11n(HT40) 5270MHz

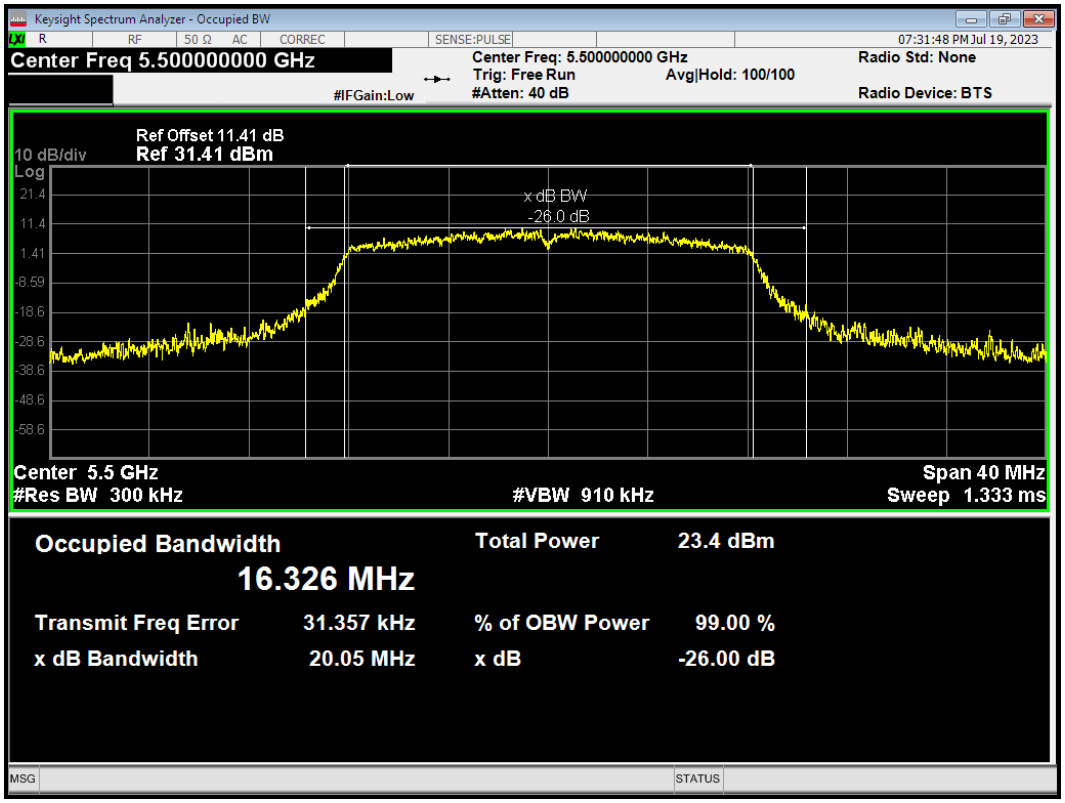


OBW 802.11n(HT40) 5310MHz

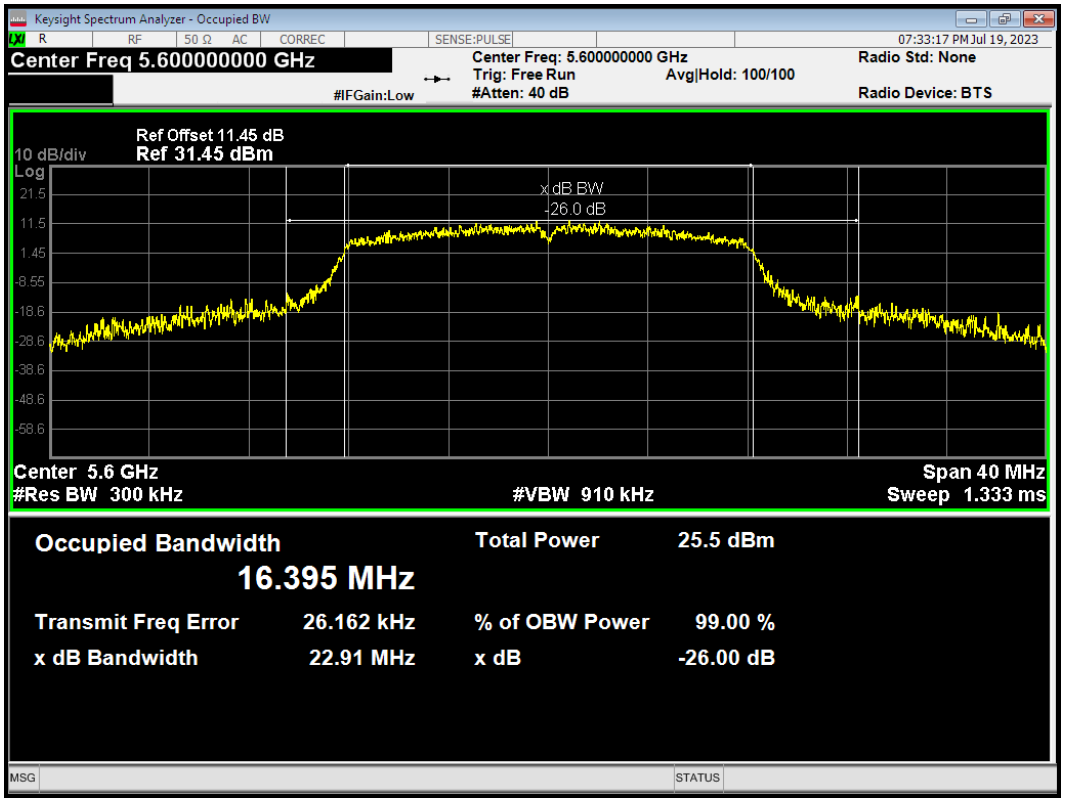


U-NII-2C

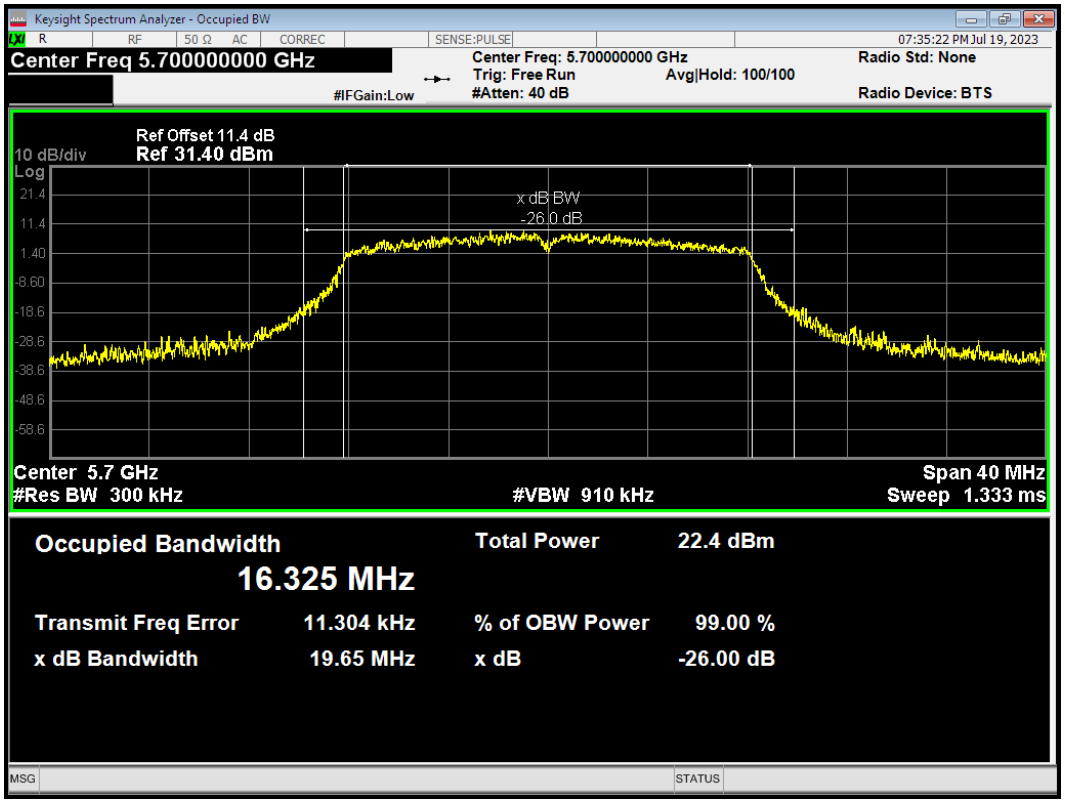
OBW 802.11a 5500MHz



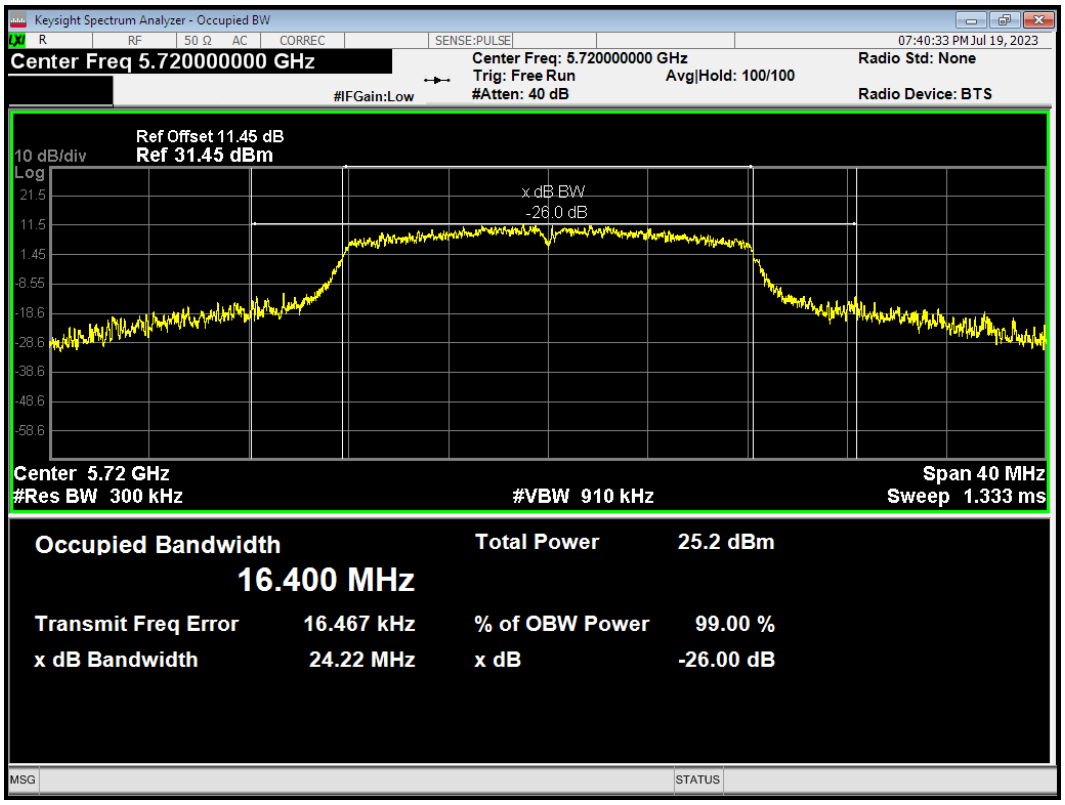
OBW 802.11a 5600MHz



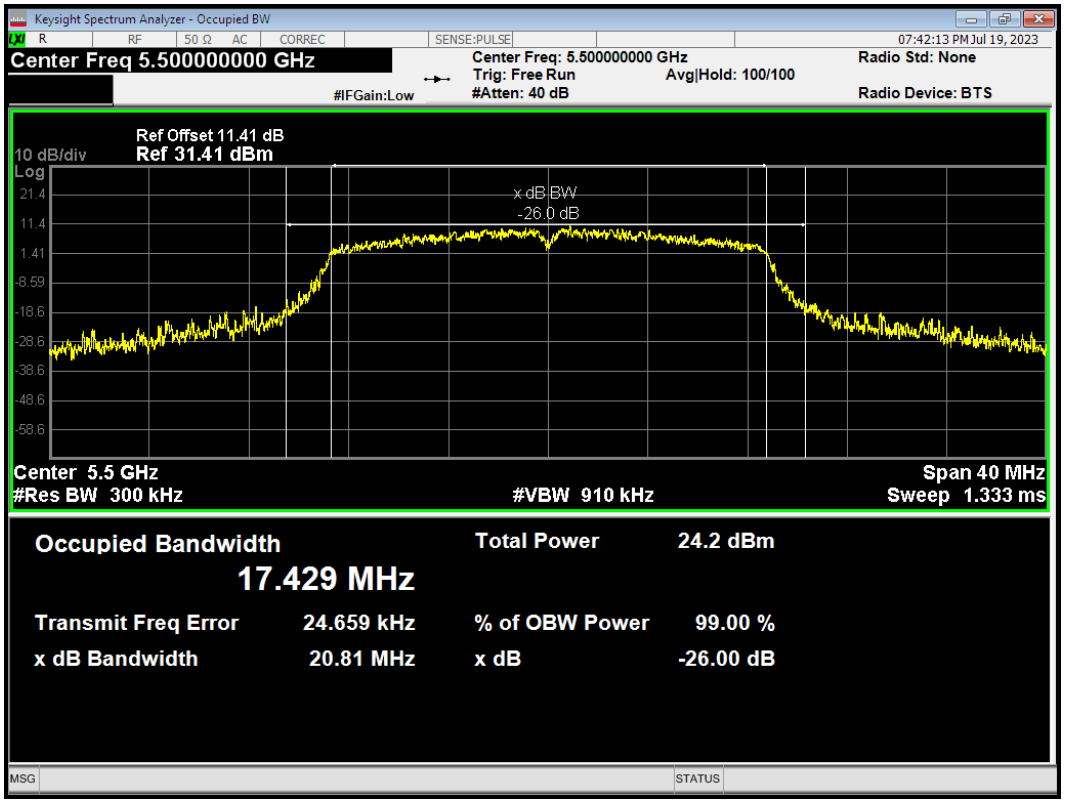
OBW 802.11a 5700MHz



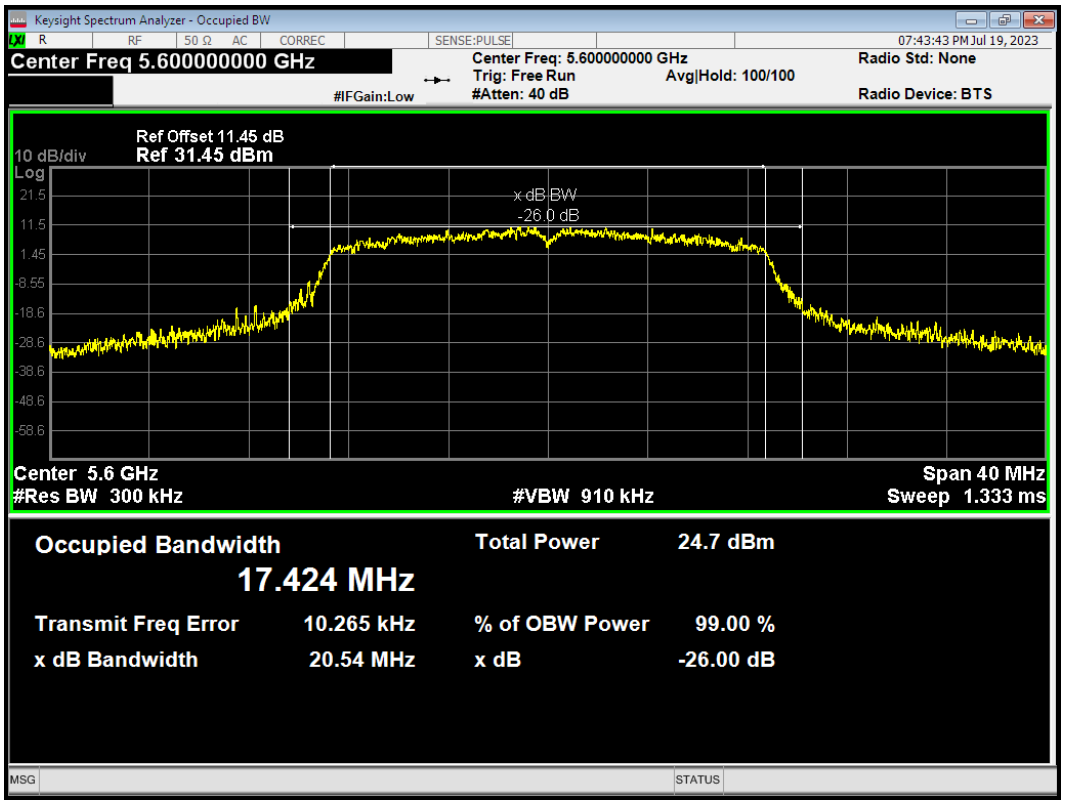
OBW 802.11a 5720MHz



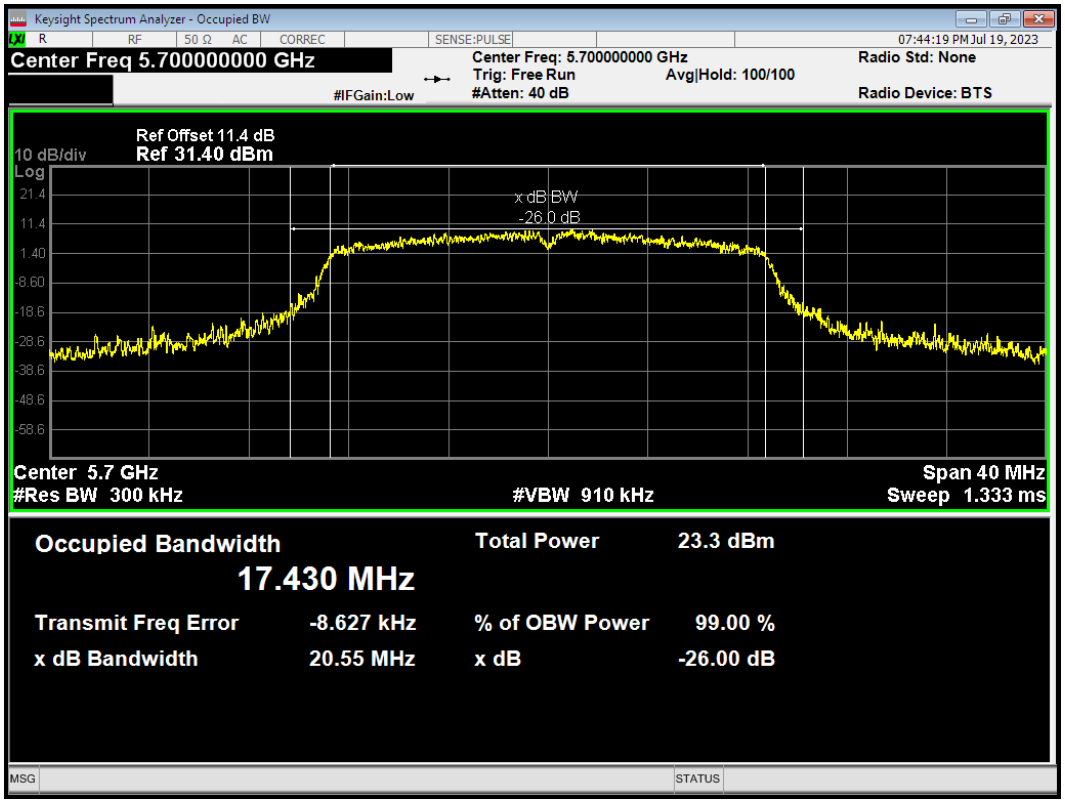
OBW 802.11n(HT20) 5500MHz



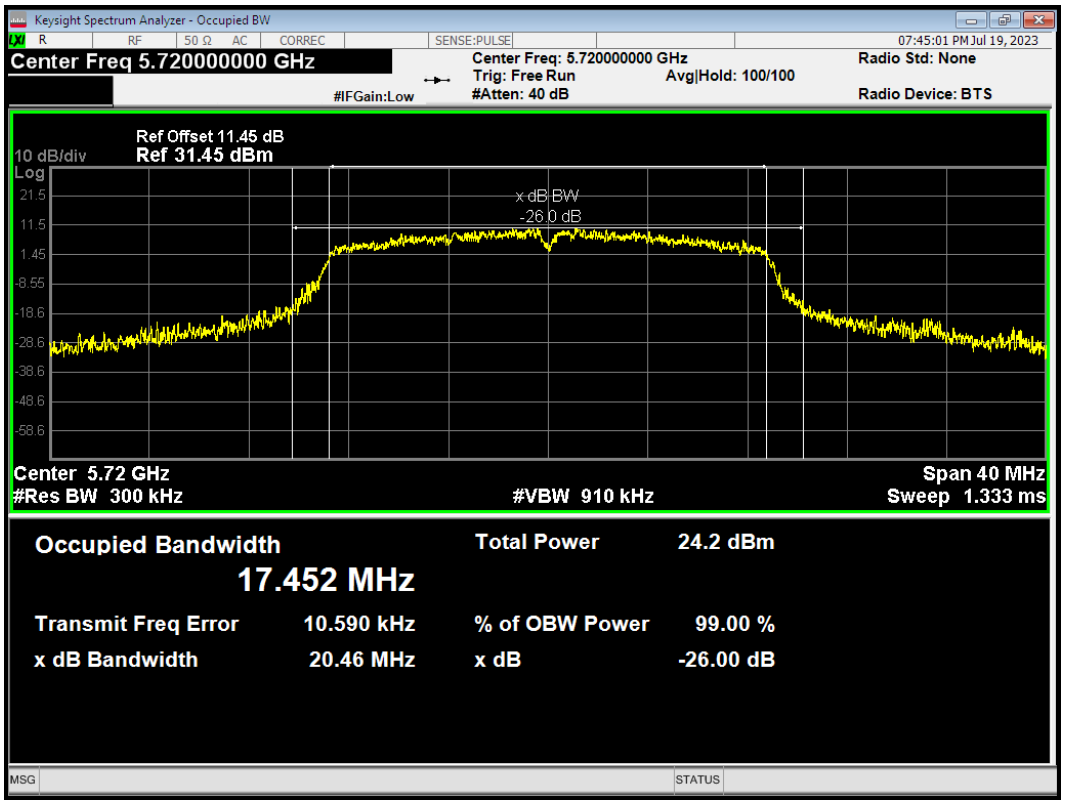
OBW 802.11n(HT20) 5600MHz



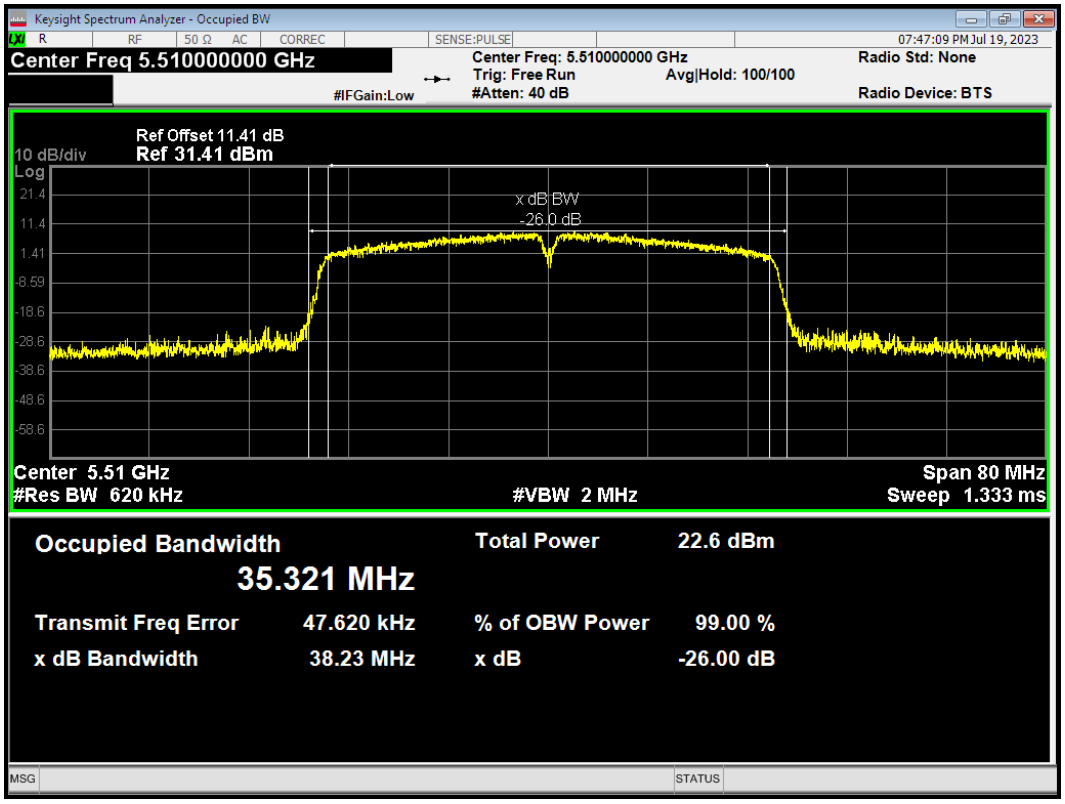
OBW 802.11n(HT20) 5700MHz



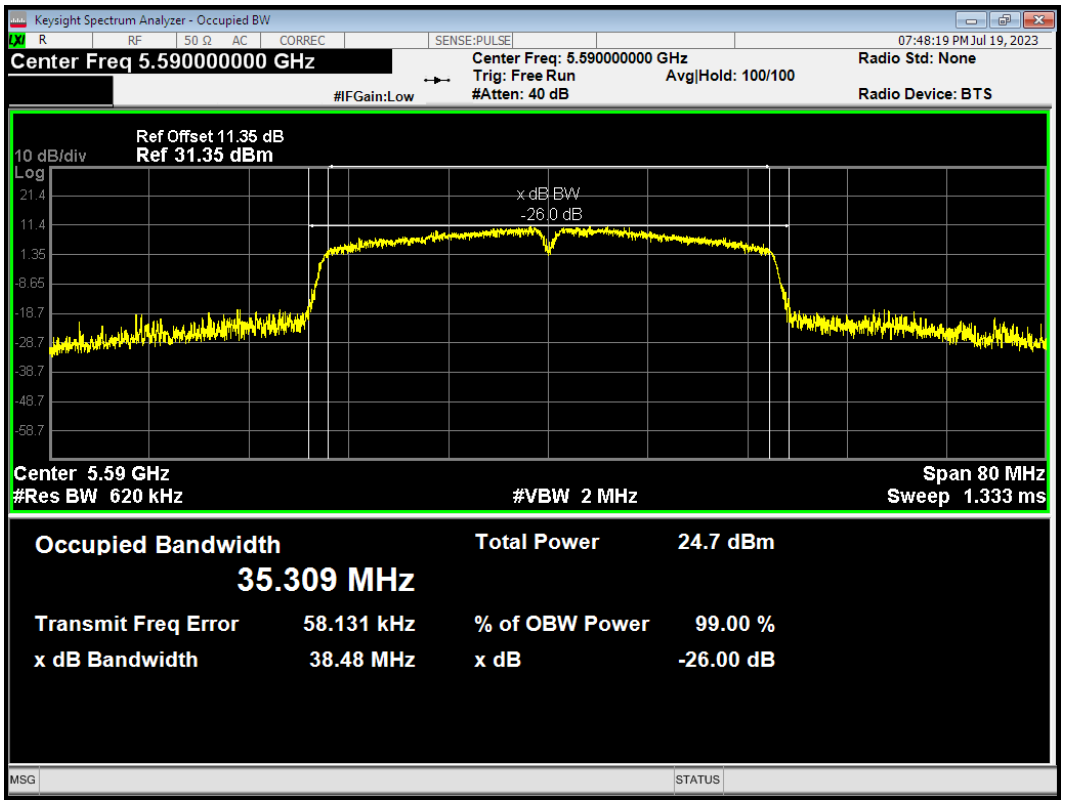
OBW 802.11n(HT20) 5720MHz



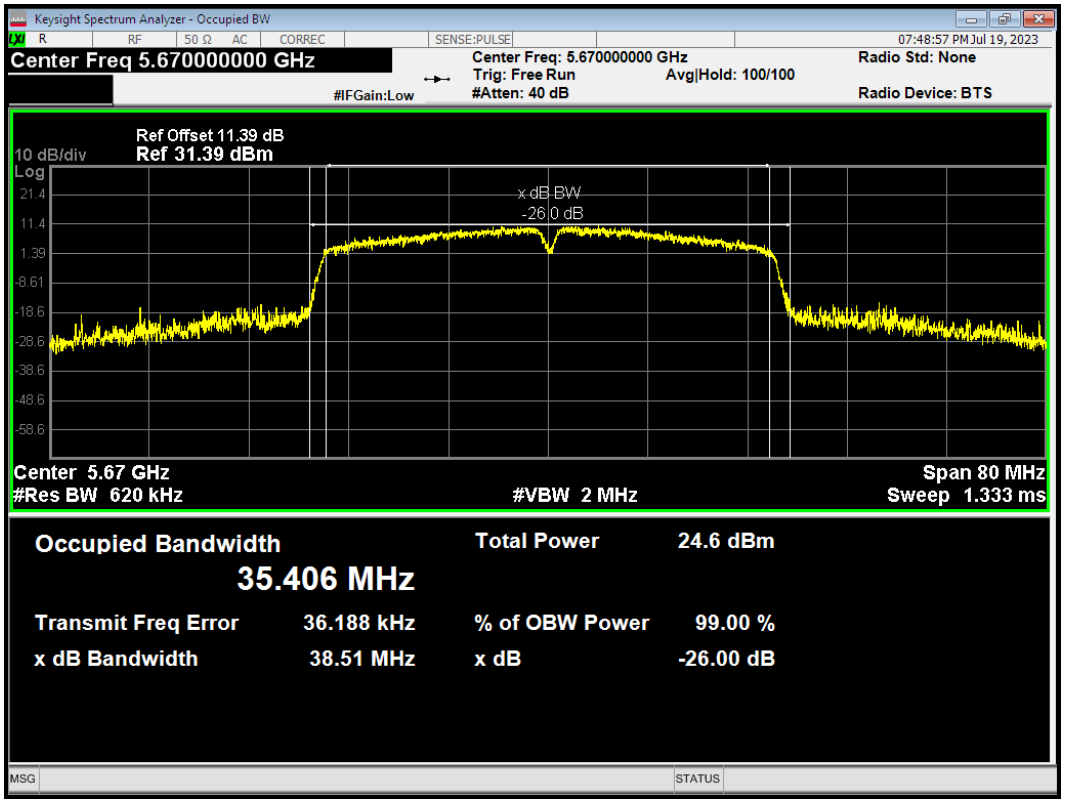
OBW 802.11n(HT40) 5510MHz



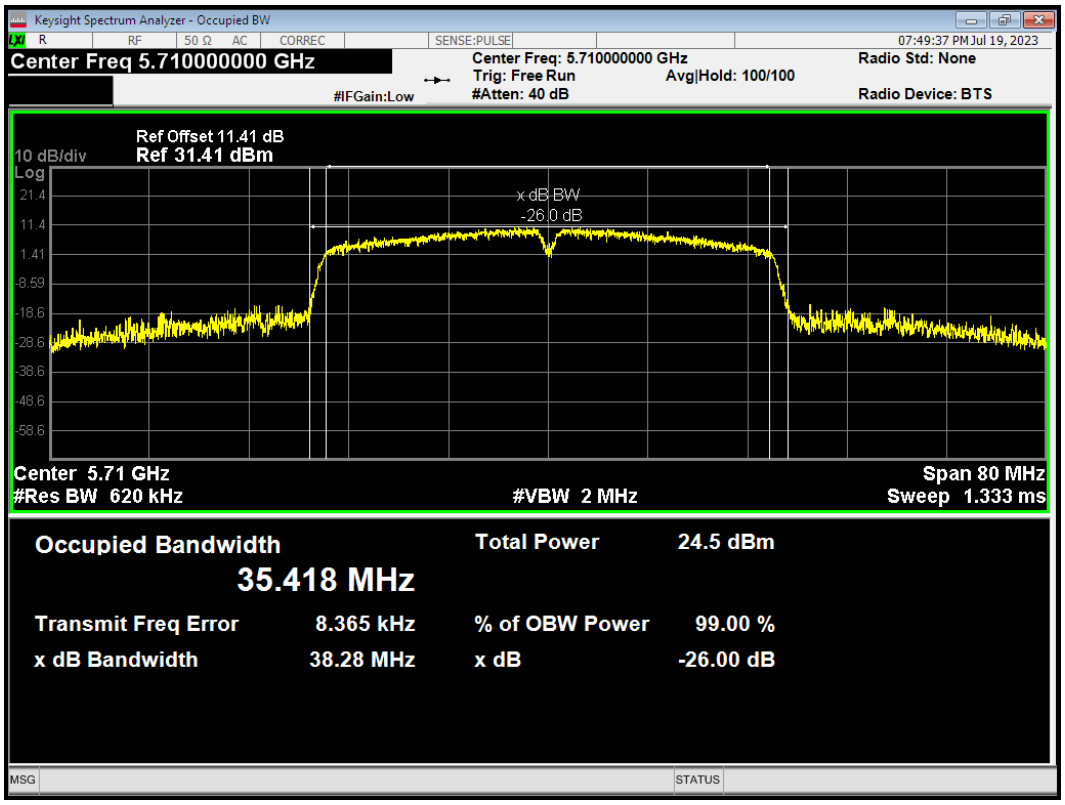
OBW 802.11n(HT40) 5590MHz



OBW 802.11n(HT40) 5670MHz

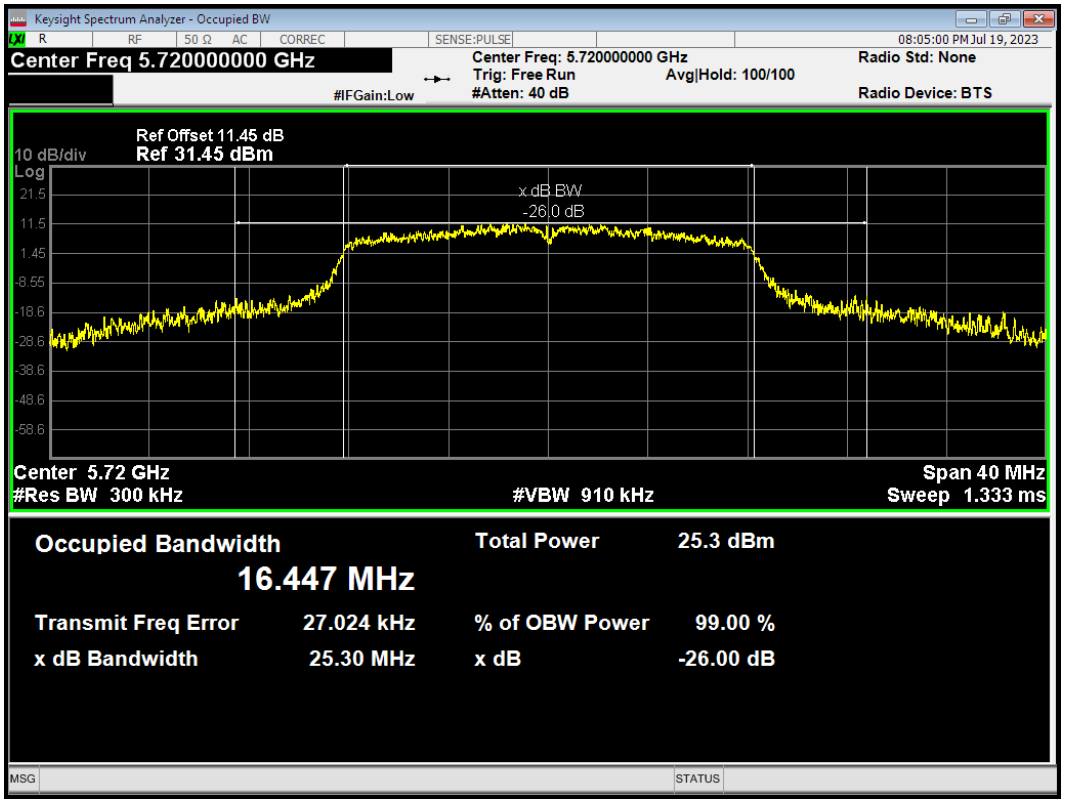


OBW 802.11n(HT40) 5710MHz

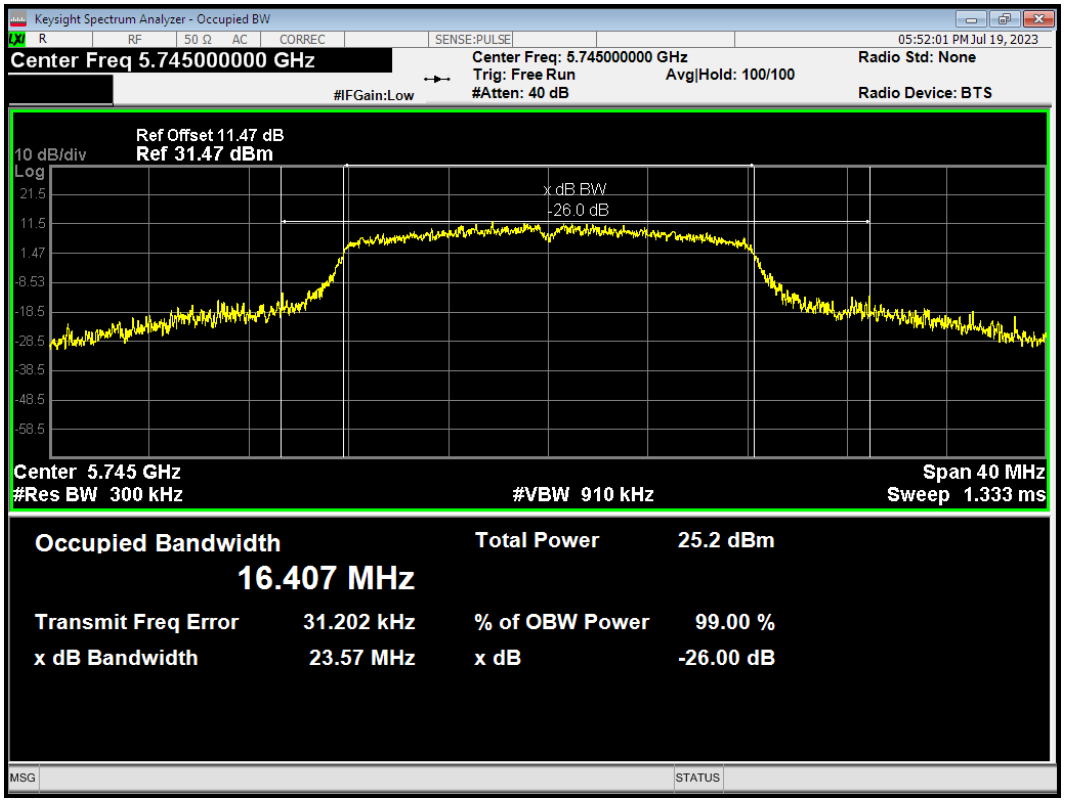


U-NII-3

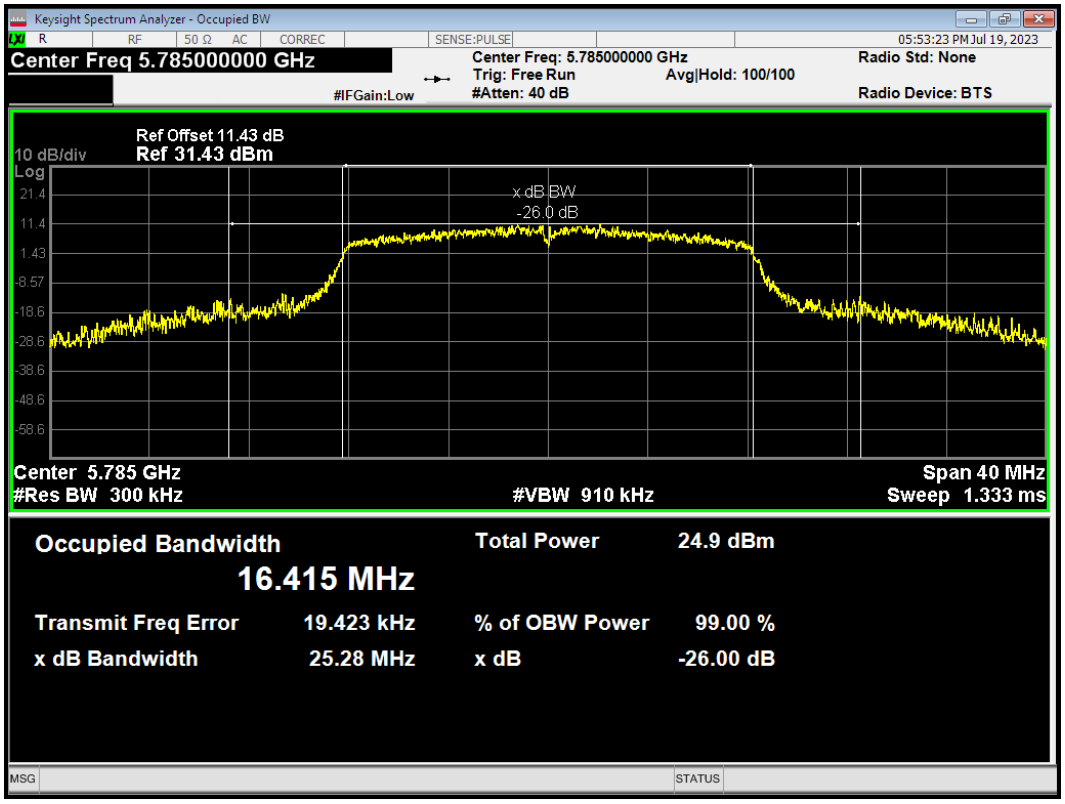
OBW 802.11a 5720MHz



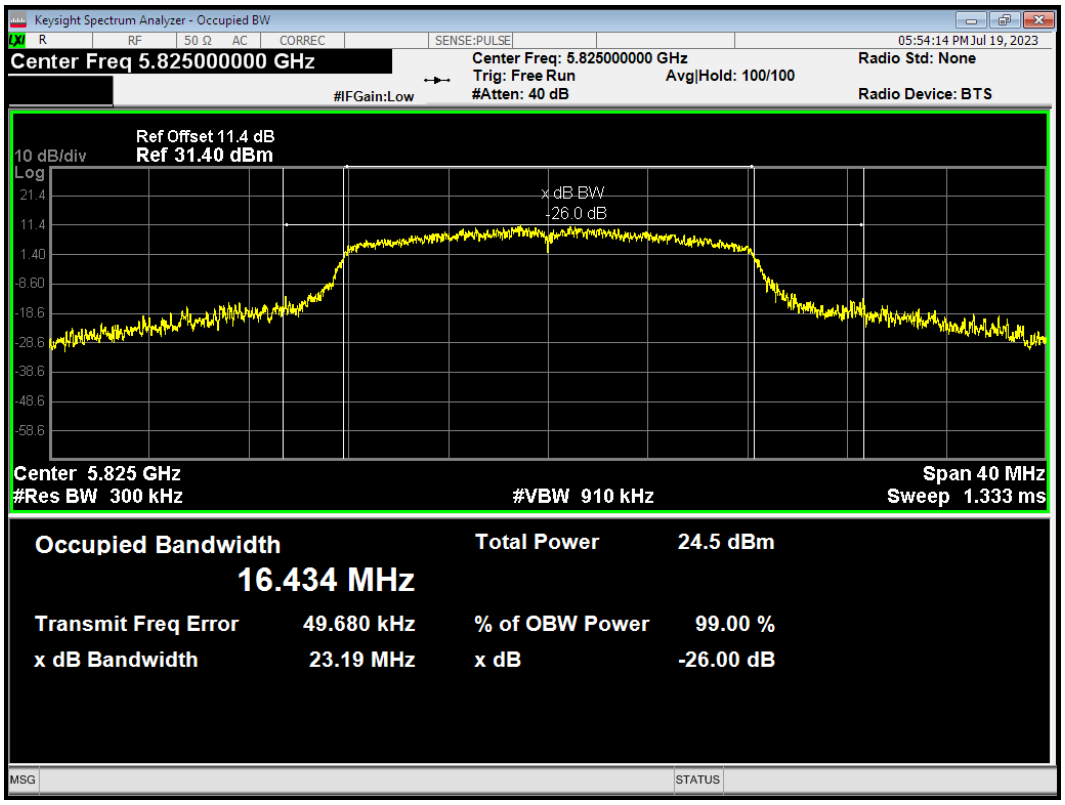
OBW 802.11a 5745MHz



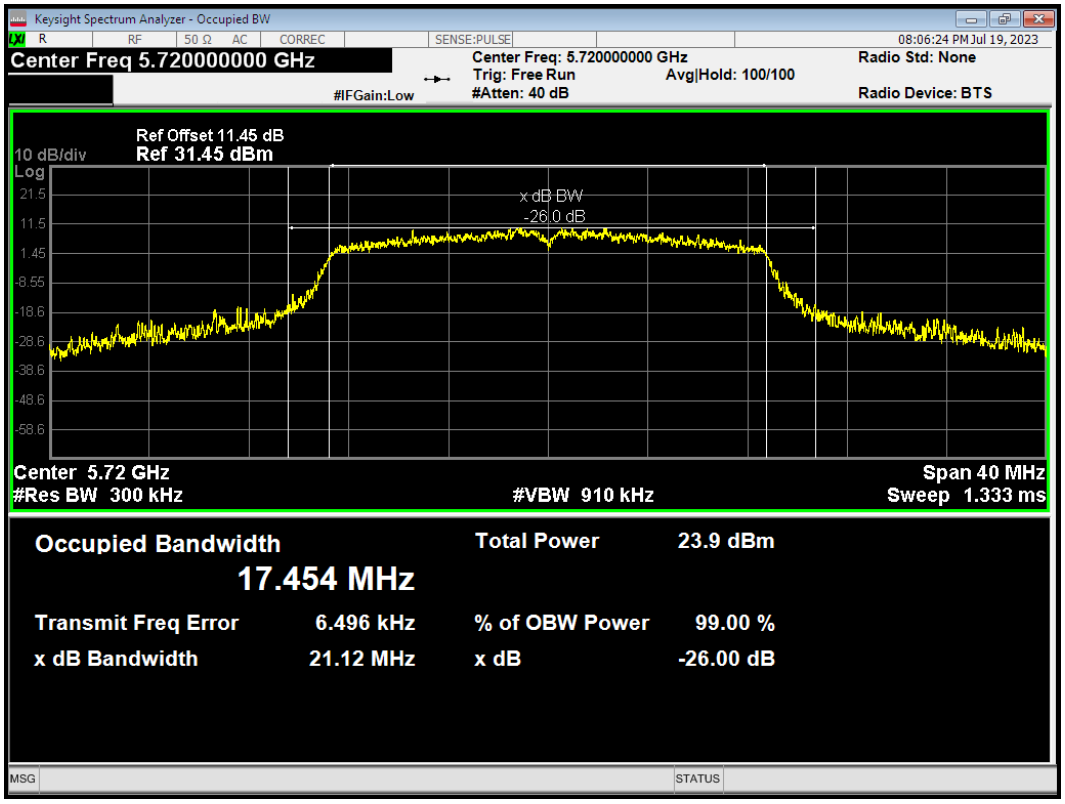
OBW 802.11a 5785MHz



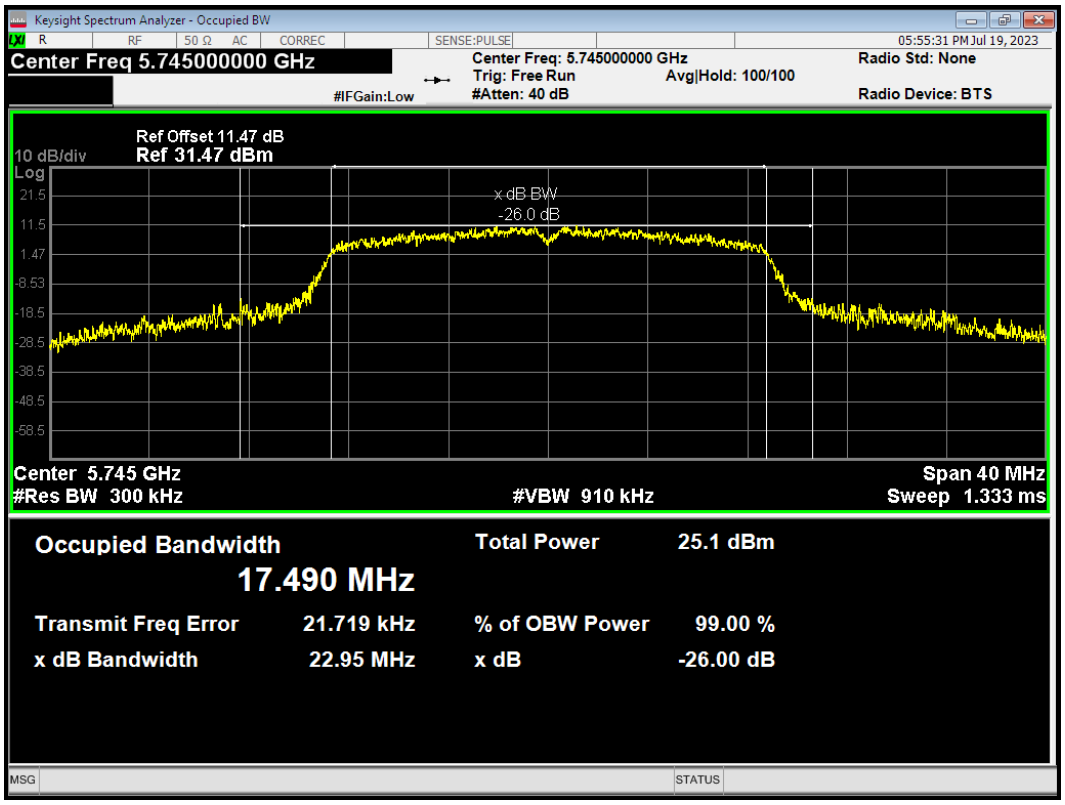
OBW 802.11a 5825MHz



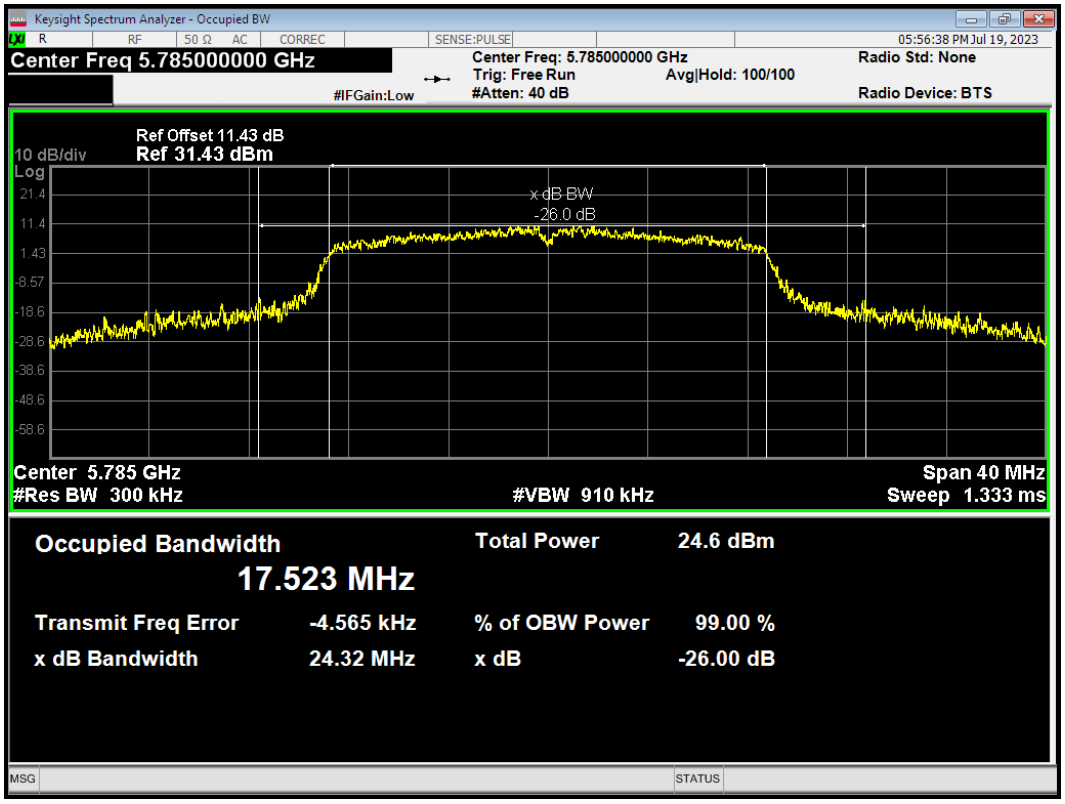
OBW 802.11n(HT20) 5720MHz



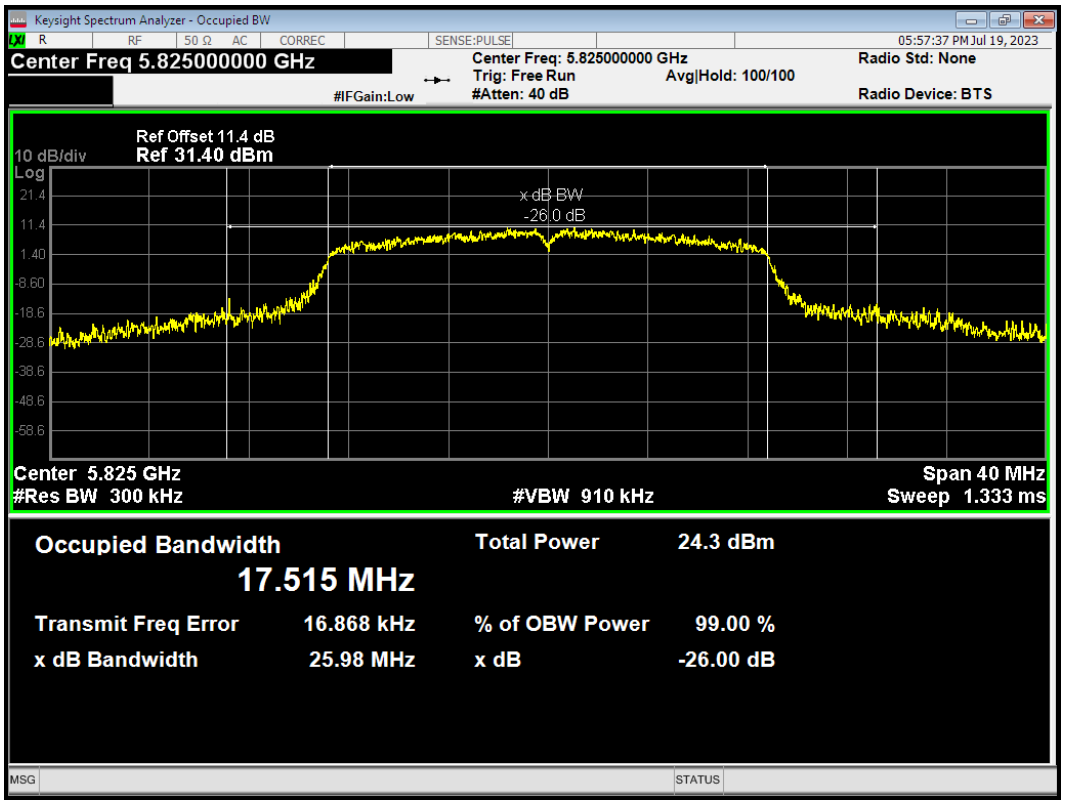
OBW 802.11n(HT20) 5745MHz



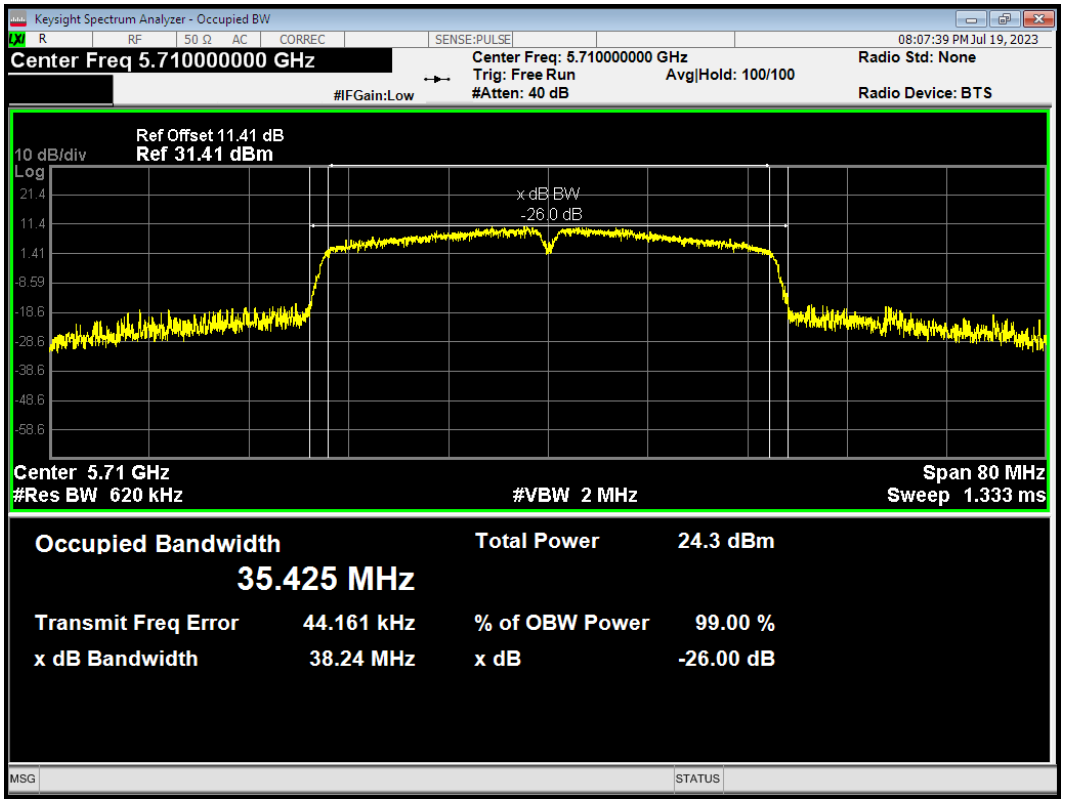
OBW 802.11n(HT20) 5785MHz



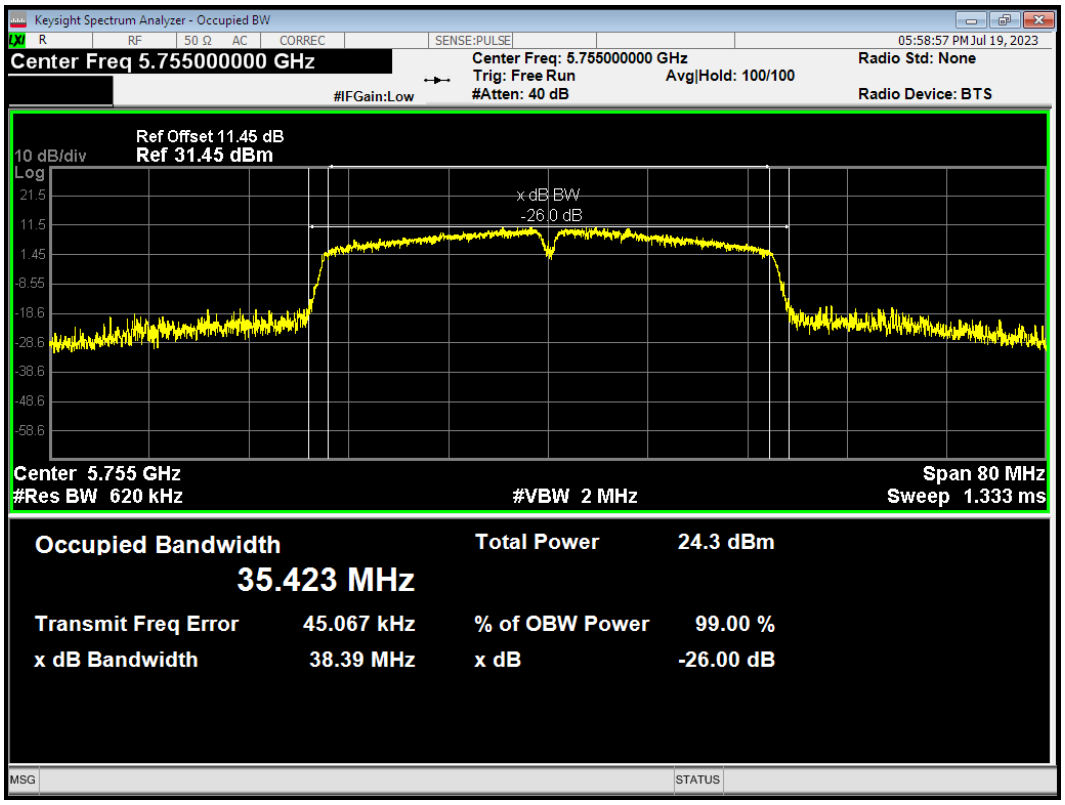
OBW 802.11n(HT20) 5825MHz



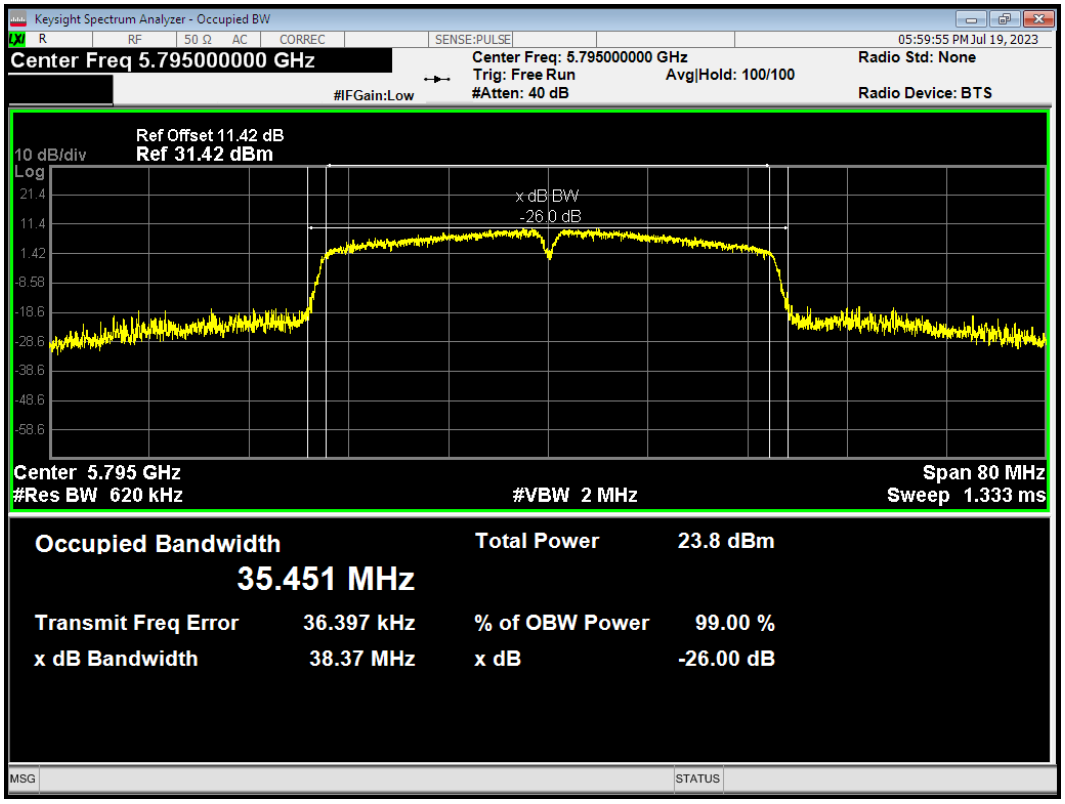
OBW 802.11n(HT40) 5710MHz



OBW 802.11n(HT40) 5755MHz



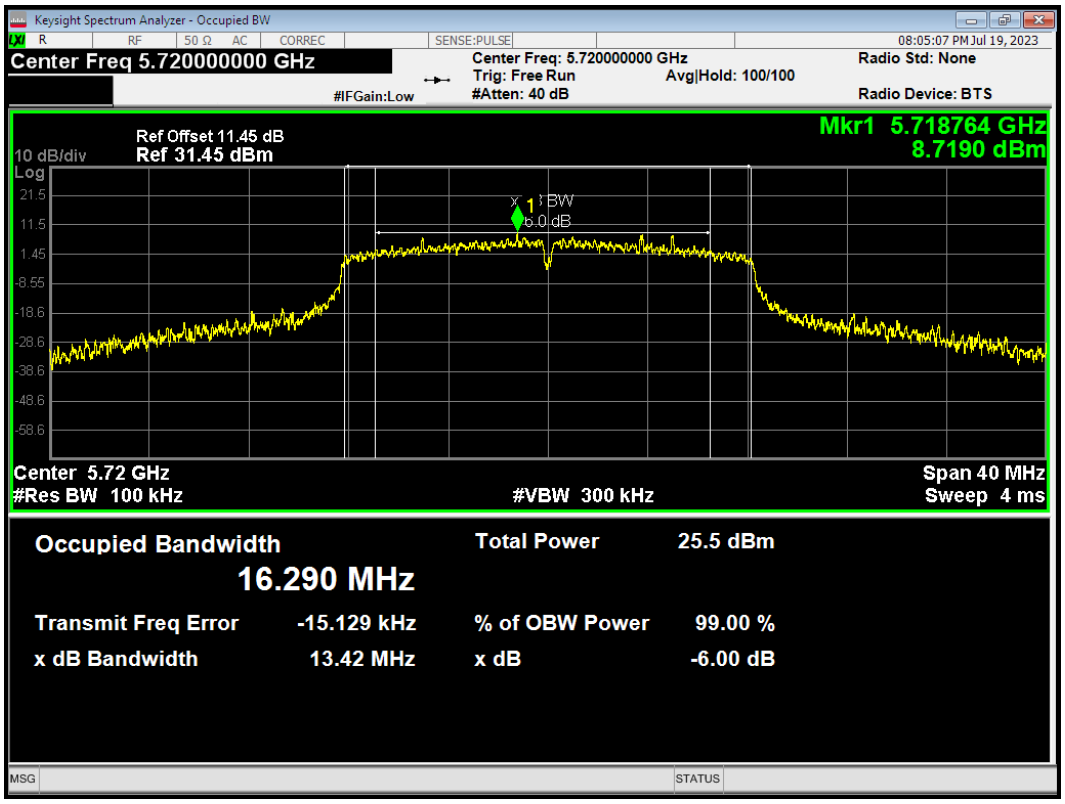
OBW 802.11n(HT40) 5795MHz



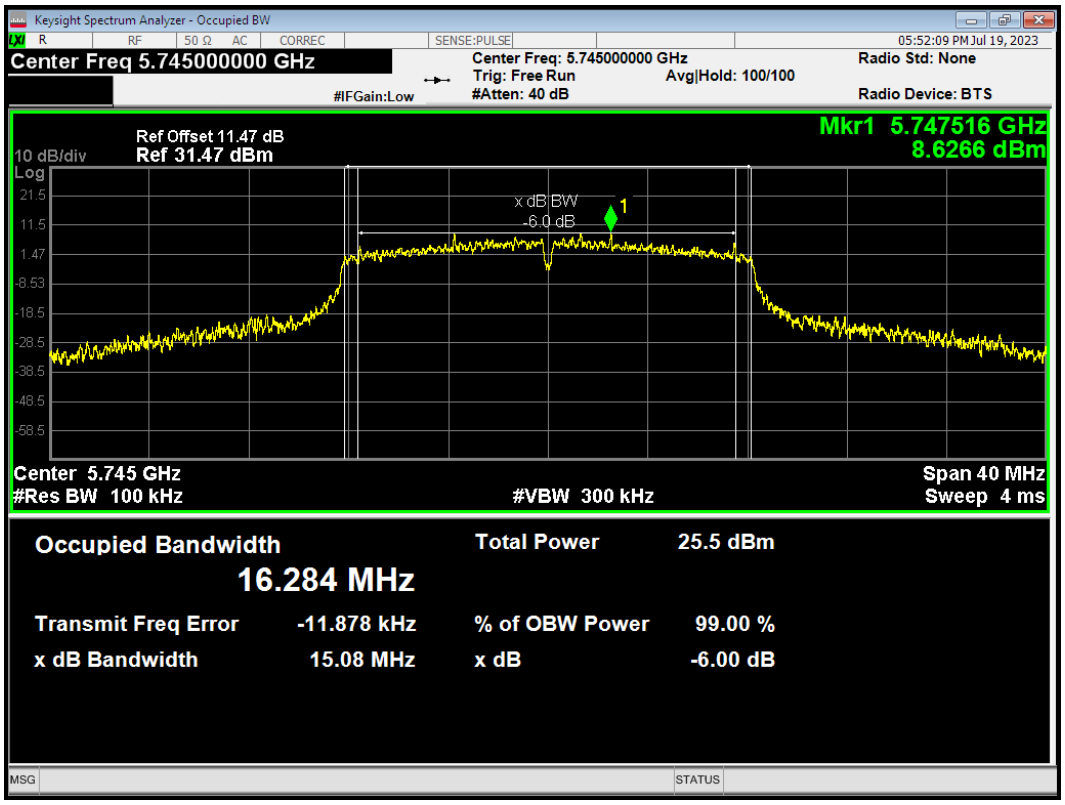
Minimum 6 dB bandwidth

U-NII-3

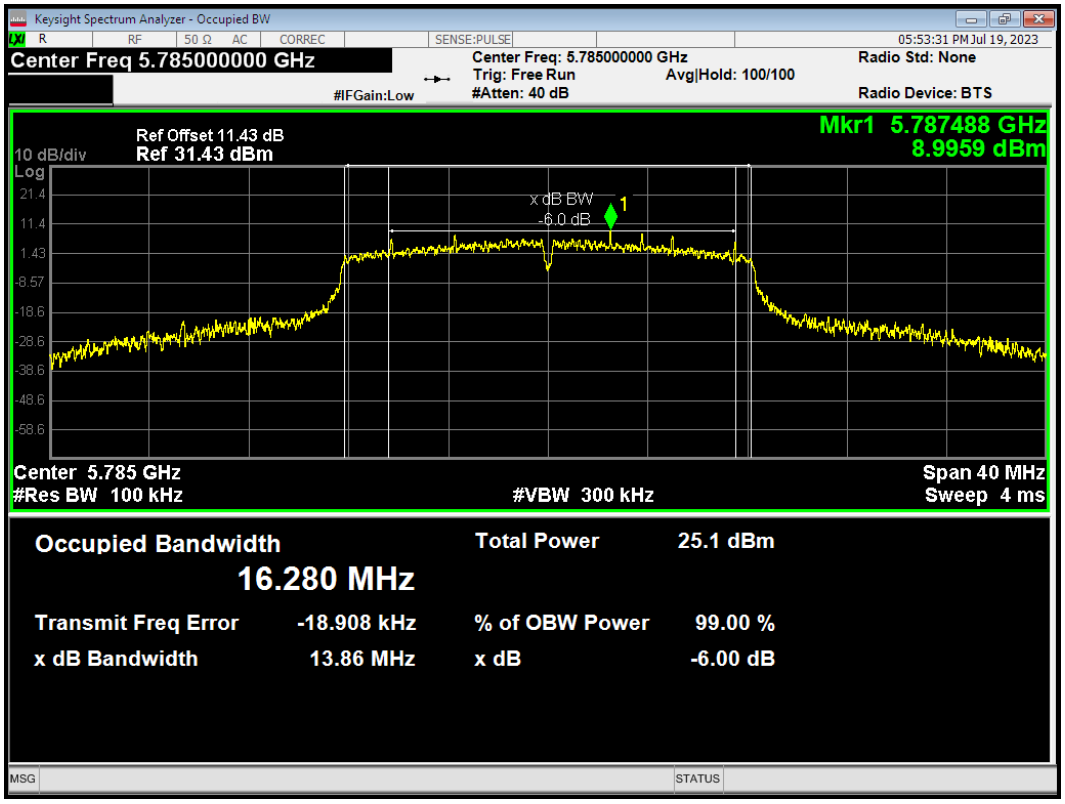
-6dB Bandwidth 802.11a 5720MHz



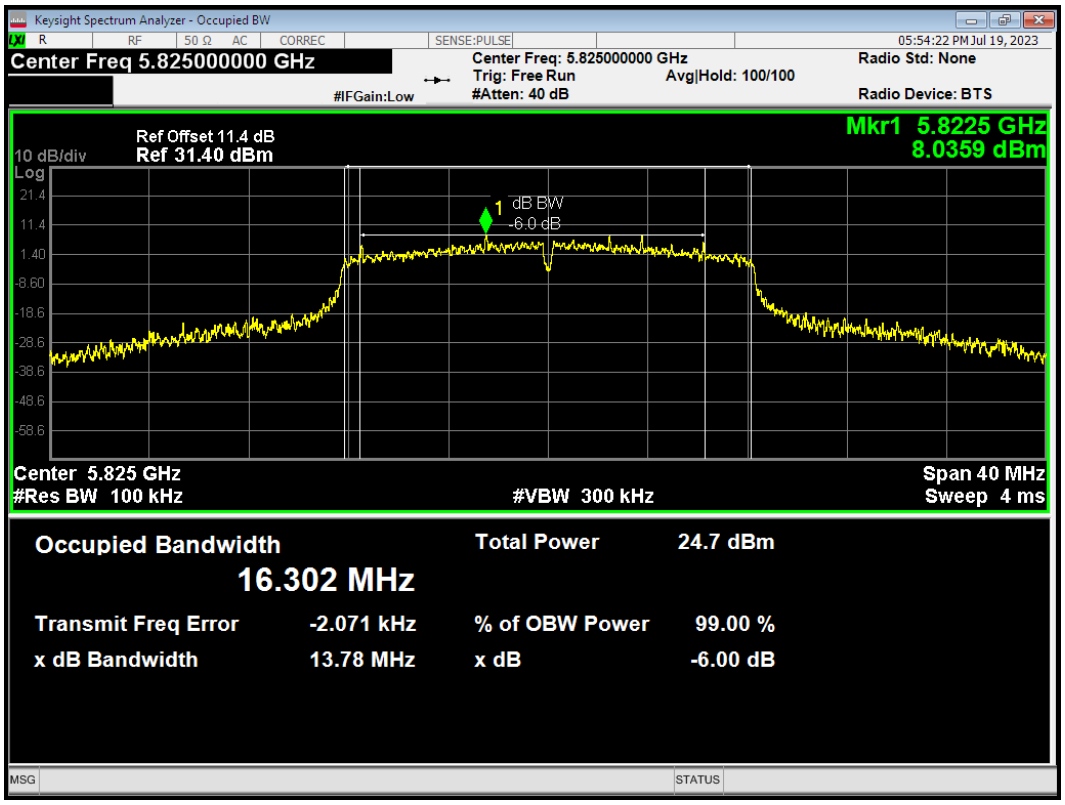
-6dB Bandwidth 802.11a 5745MHz



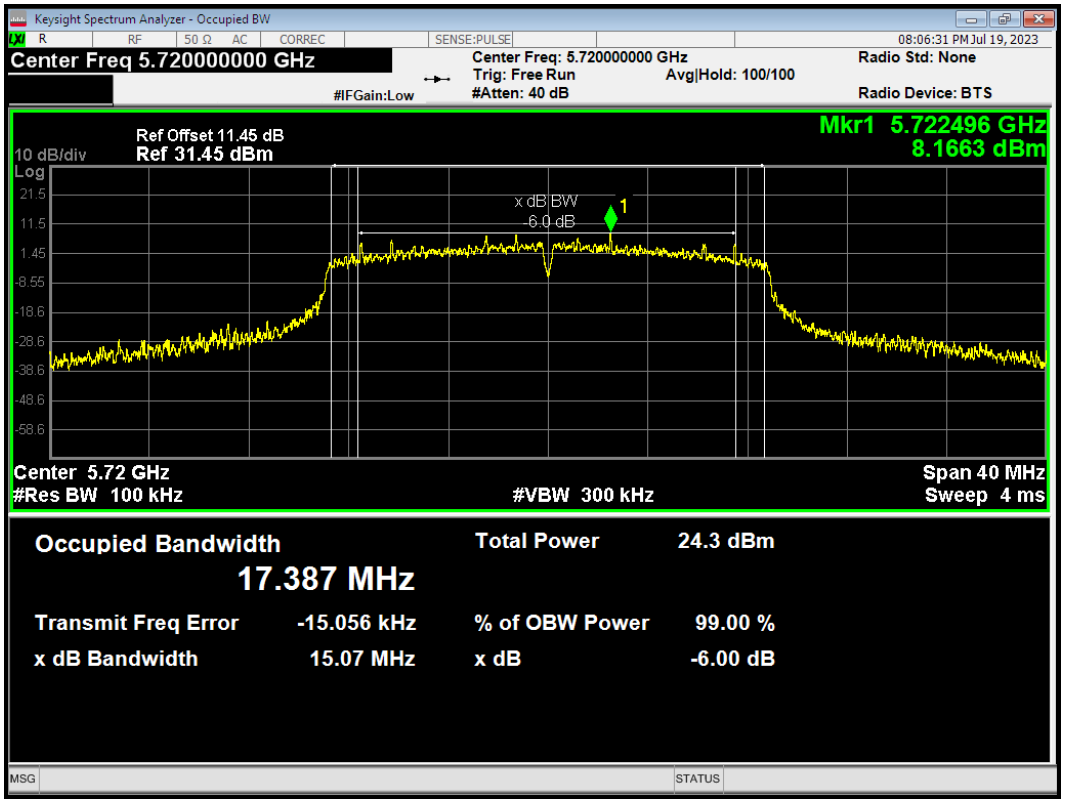
-6dB Bandwidth 802.11a 5785MHz



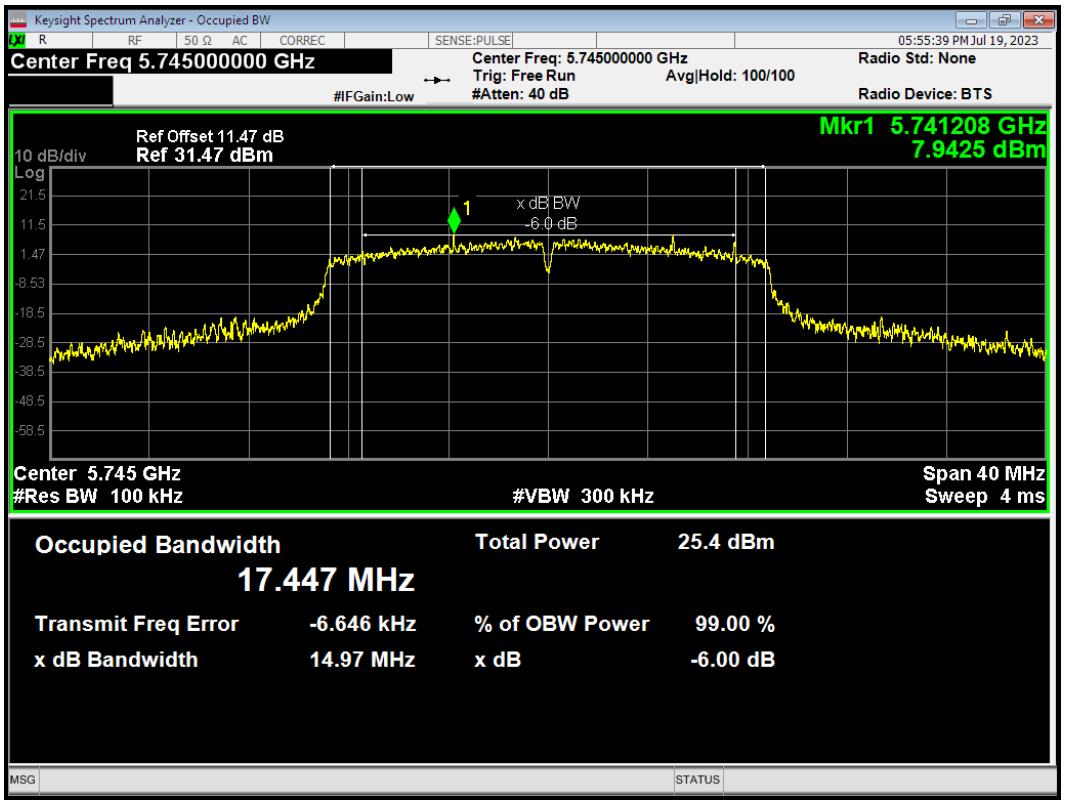
-6dB Bandwidth 802.11a 5825MHz



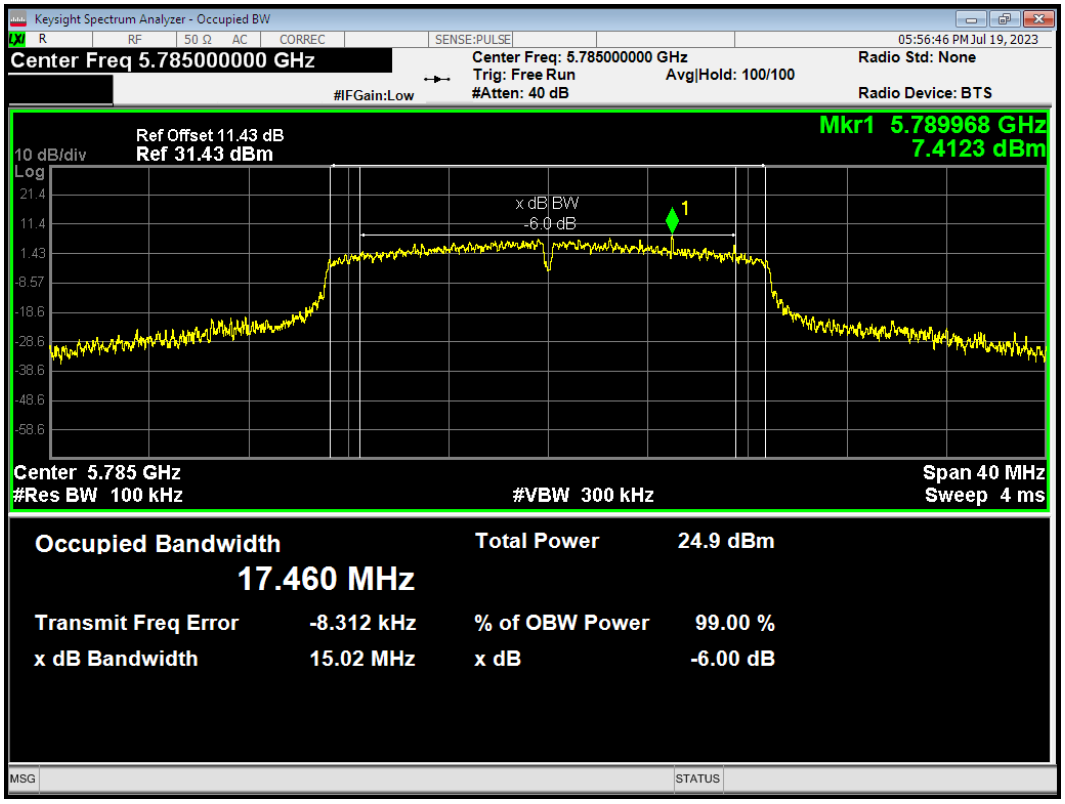
-6dB Bandwidth 802.11n(HT20) 5720MHz



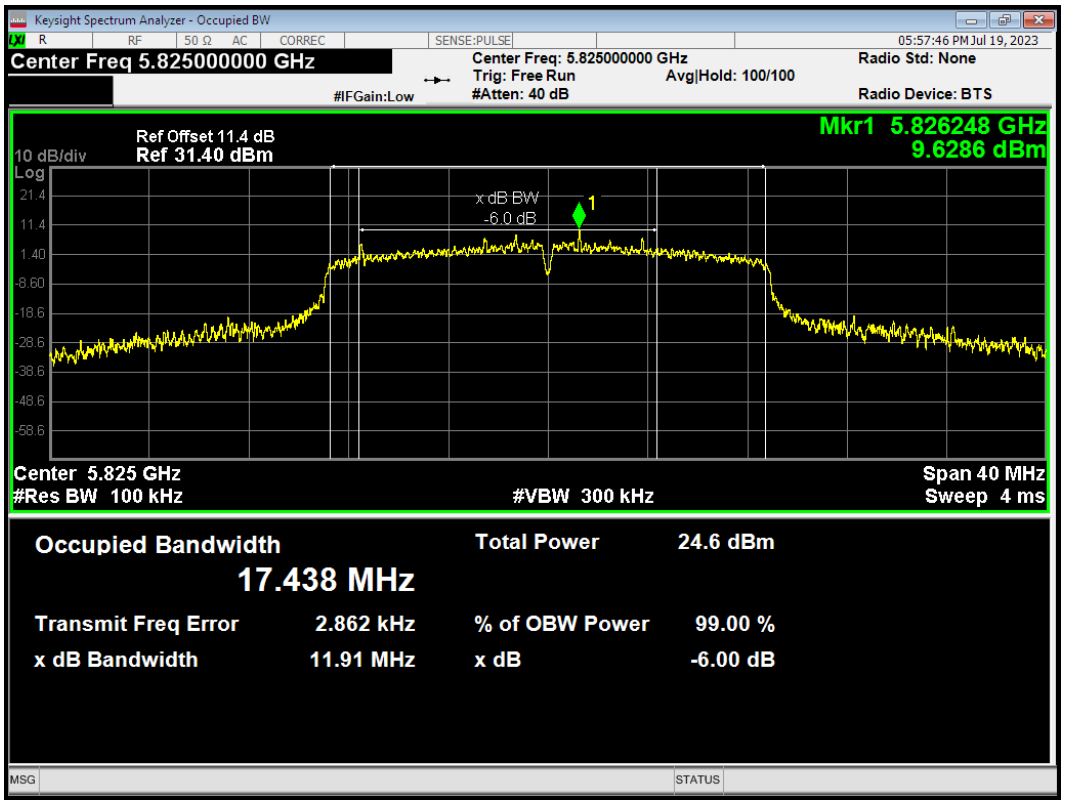
-6dB Bandwidth 802.11n(HT20) 5745MHz



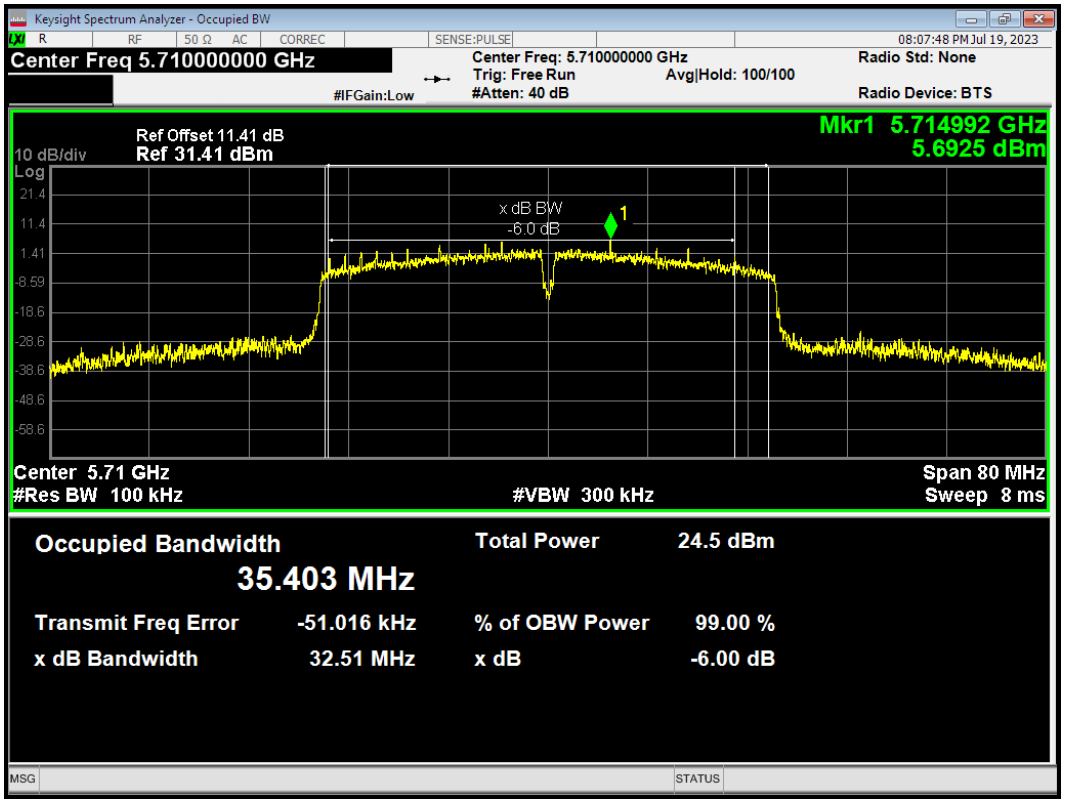
-6dB Bandwidth 802.11n(HT20) 5785MHz



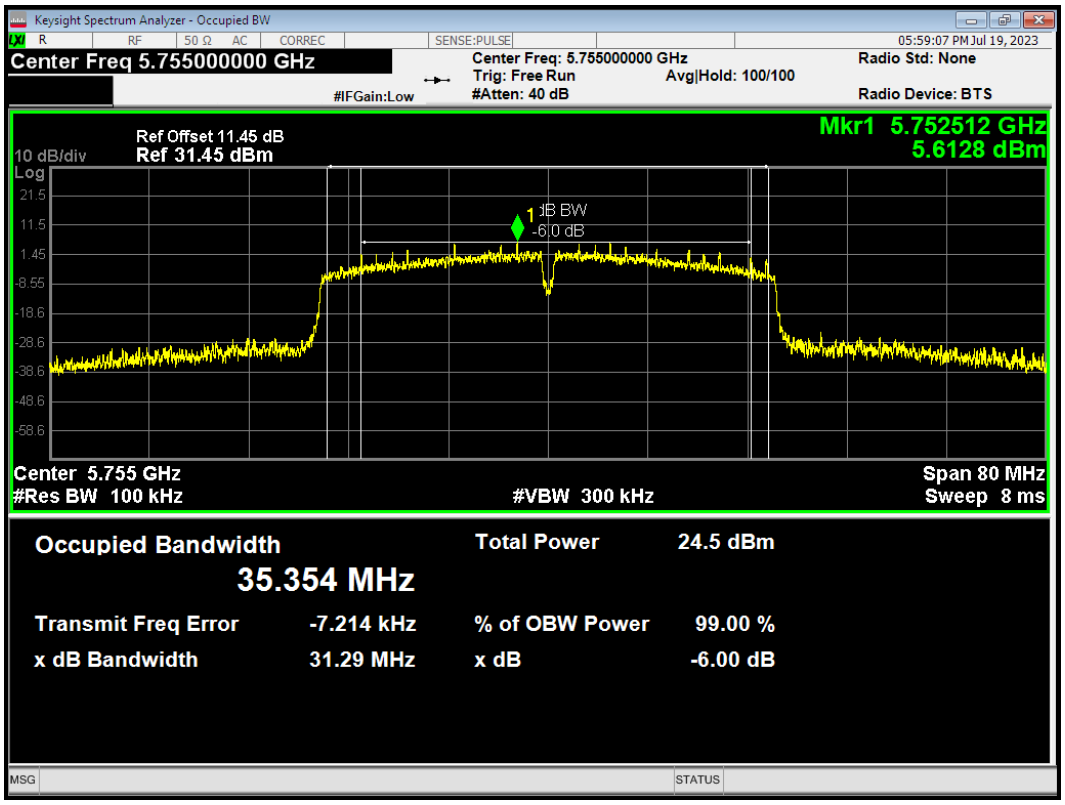
-6dB Bandwidth 802.11n(HT20) 5825MHz



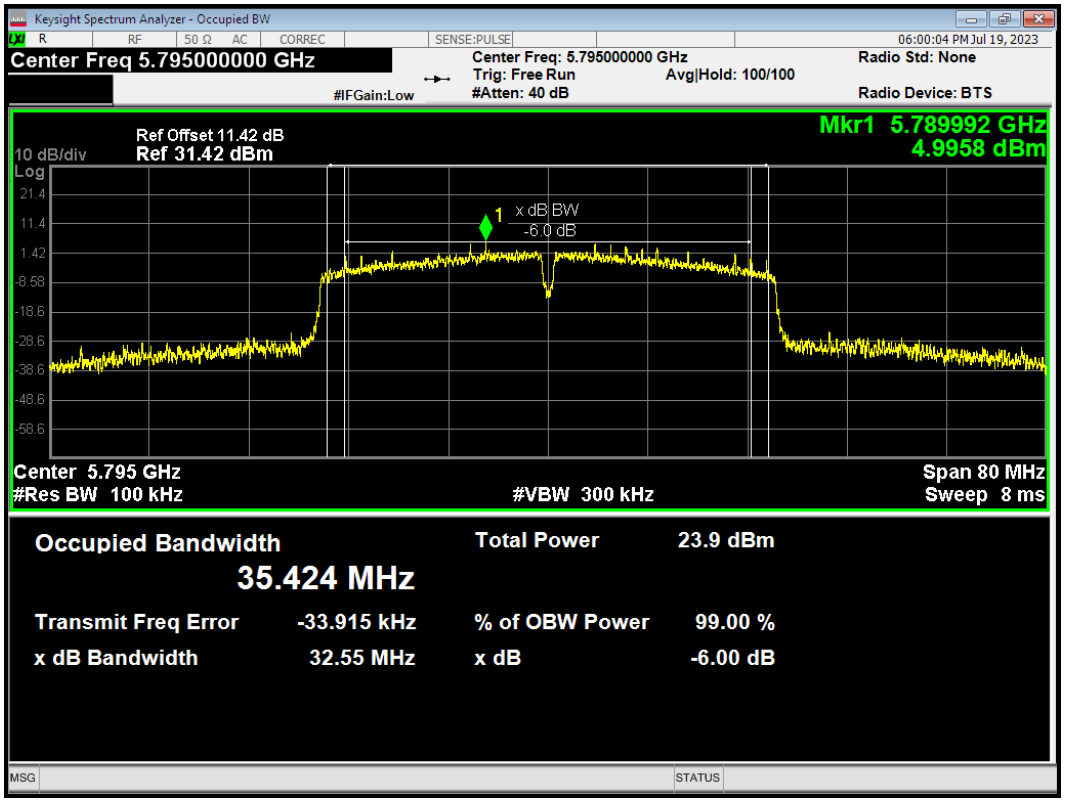
-6dB Bandwidth 802.11n(HT40) 5710MHz



-6dB Bandwidth 802.11n(HT40) 5755MHz



-6dB Bandwidth 802.11n(HT40) 5795MHz



5.2. Average Power Output

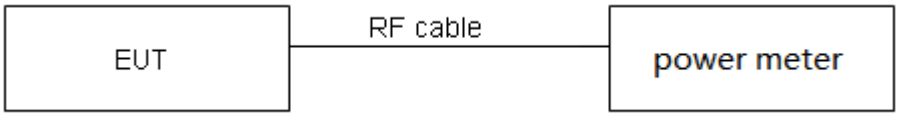
Ambient condition

Temperature	Relative humidity
23°C ~25°C	45%~50%

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)(2)(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 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	0.80	0.96
802.11n HT20	0.79	1.02
802.11n HT40	0.65	1.88
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.		

Power Index				
Channel	**802.11a**	**802.11n HT20**	**Channel**	**802.11n HT40**
CH36	18	17	**CH38**	14
CH40	18	17	**CH46**	17
CH48	18	17	/	/
CH52	18	17	**CH54**	17
CH60	18	17	**CH62**	14
CH64	18	17	/	/
CH100	18	17	**CH102**	15
CH120	18	17	**CH118**	17
CH140	15	16	**CH134**	17
CH144	18	17	**CH142**	17
CH149	18	17	**CH151**	17
CH157	18	17	**CH159**	17
CH165	18	17	/	/

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	25.76	25.11 >24	24.00
		60/5300	23.89	24.78 >24	24.00
		64/5320	24.06	24.81 >24	24.00
	802.11n HT20	52/5260	20.66	24.15 >24	24.00
		60/5300	20.60	24.14 >24	24.00
		64/5320	20.62	24.14 >24	24.00
	802.11n HT40	54/5270	40.99	27.13 >24	24.00
		62/5310	38.47	26.85 >24	24.00
U-NII-2C	802.11a	100/5500	20.05	24.02 >24	24.00
		120/5600	22.91	24.60 >24	24.00
		140/5700	19.65	23.93 <24	23.93
		144/5720	24.23	24.84 >24	24.00
	802.11n HT20	100/5500	20.82	24.18 >24	24.00
		120/5600	20.54	24.13 >24	24.00
		140/5700	20.55	24.13 >24	24.00
		144/5720	20.46	24.11 >24	24.00
	802.11n HT40	102/5510	38.23	26.82 >24	24.00
		118/5590	38.48	26.85 >24	24.00
		134/5670	38.51	26.86 >24	24.00
		142/5710	38.28	26.83 >24	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	18.51	19.47	24	PASS
	40/5200	18.69	19.65	24	PASS
	48/5240	18.37	19.33	24	PASS
802.11n HT20	36/5180	17.88	18.90	24	PASS
	40/5200	17.35	18.37	24	PASS
	48/5240	17.57	18.59	24	PASS
802.11n HT40	38/5190	13.91	15.79	24	PASS
	46/5230	16.60	18.48	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	18.96	19.92	24.00	PASS
	60/5300	18.71	19.67	24.00	PASS
	64/5320	18.69	19.65	24.00	PASS
802.11n HT20	52/5260	17.54	18.56	24.00	PASS
	60/5300	17.49	18.51	24.00	PASS
	64/5320	17.62	18.64	24.00	PASS
802.11n HT40	54/5270	16.84	18.72	24.00	PASS
	62/5310	13.98	15.86	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	16.99	17.95	24.00	PASS
	120/5600	19.24	20.20	24.00	PASS
	140/5700	15.90	16.86	23.93	PASS
	144/5720	18.08	19.04	24.00	PASS
802.11n HT20	100/5500	17.81	18.83	24.00	PASS
	120/5600	18.22	19.24	24.00	PASS
	140/5700	16.93	17.95	24.00	PASS
	144/5720	17.45	18.47	24.00	PASS
802.11n HT40	102/5510	15.18	17.06	24.00	PASS
	118/5590	17.22	19.10	24.00	PASS
	134/5670	17.08	18.96	24.00	PASS
	142/5710	16.71	18.59	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	9.85	10.81	30	PASS
	149/5745	18.75	19.71	30	PASS
	157/5785	18.25	19.21	30	PASS
	165/5825	18.11	19.07	30	PASS
802.11n HT20	144/5720	8.96	9.98	30	PASS
	149/5745	19.00	20.02	30	PASS
	157/5785	18.31	19.33	30	PASS
	165/5825	17.80	18.82	30	PASS
802.11n HT40	142/5710	3.05	4.93	30	PASS
	151/5755	16.90	18.78	30	PASS
	159/5795	16.22	18.10	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.3. Frequency Stability

Ambient condition

Temperature	Relative humidity
23°C ~25°C	45%~50%

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
3.3	-20	5199.996047	5199.987227	5199.979932	5199.974756
3.3	-10	5199.993820	5199.977872	5199.971321	5199.973142
3.3	0	5199.992384	5199.972626	5199.964914	5199.964013
3.3	10	5199.991552	5199.969094	5199.959086	5199.960121
3.3	20	5199.982989	5199.960235	5199.958488	5199.951270
3.3	30	5199.976336	5199.953549	5199.952195	5199.944504
3.3	40	5199.974888	5199.948552	5199.947110	5199.941550
3.3	50	5199.973326	5199.940879	5199.939095	5199.941529
3	20	5199.966484	5199.936885	5199.935613	5199.932774
3.6	20	5199.961466	5199.929093	5199.929307	5199.924568
Max. ΔMHz		-0.038534	-0.070907	-0.070693	-0.075432
PPM		-7.410385	-13.635962	-13.594808	-14.506154

Voltage (V)	Temperature (°C)	U-NII-2A Test Results			
		5300MHz			
		1min	2min	5min	10min
3.3	-20	5299.993930	5299.986555	5299.978242	5299.977519
3.3	-10	5299.992940	5299.979842	5299.969168	5299.969107
3.3	0	5299.992496	5299.977171	5299.965314	5299.963810
3.3	10	5299.988302	5299.973703	5299.956781	5299.958410
3.3	20	5299.979303	5299.971533	5299.955026	5299.948488
3.3	30	5299.972028	5299.962623	5299.950810	5299.942943
3.3	40	5299.967629	5299.960402	5299.948282	5299.936385
3.3	50	5299.966909	5299.957975	5299.945818	5299.927612
3	20	5299.959824	5299.953623	5299.942986	5299.921661
3.6	20	5299.958937	5299.948580	5299.939171	5299.919994
Max. ΔMHz		-0.041063	-0.051420	-0.060829	-0.080006
PPM		-7.747736	-9.701887	-11.477170	-15.095472

Voltage (V)	Temperature (°C)	U-NII-2C Test Results			
		5580MHz			
		1min	2min	5min	10min
3.3	-20	5580.003089	5579.995453	5579.991833	5579.988320
3.3	-10	5580.002206	5579.986807	5579.990581	5579.988078
3.3	0	5579.998318	5579.977665	5579.987996	5579.978749
3.3	10	5579.997812	5579.975678	5579.982736	5579.972683
3.3	20	5579.995873	5579.965715	5579.975074	5579.969640
3.3	30	5579.989993	5579.957675	5579.974941	5579.965274
3.3	40	5579.983580	5579.957198	5579.973605	5579.955549
3.3	50	5579.975681	5579.952006	5579.963825	5579.947005
3	20	5579.969906	5579.943960	5579.961819	5579.942313
3.6	20	5579.963767	5579.936896	5579.954723	5579.937523
Max. ΔMHz		-0.036233	-0.063104	-0.045277	-0.062477
PPM		-6.493369	-11.308961	-8.114158	-11.196595

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
3.3	-20	5784.996343	5784.986444	5784.980156	5784.979198
3.3	-10	5784.995753	5784.977651	5784.974565	5784.973787
3.3	0	5784.993682	5784.972594	5784.965531	5784.973012
3.3	10	5784.992545	5784.969958	5784.959557	5784.963983
3.3	20	5784.986138	5784.963343	5784.950662	5784.959828
3.3	30	5784.979375	5784.959102	5784.943029	5784.953955
3.3	40	5784.974990	5784.951624	5784.934645	5784.953334
3.3	50	5784.968861	5784.948995	5784.932433	5784.950811
3	20	5784.968451	5784.942051	5784.931221	5784.948947
3.6	20	5784.960241	5784.938156	5784.925753	5784.941504
Max. ΔMHz		-0.039759	-0.061844	-0.074247	-0.058496
PPM		-6.872774	-10.690406	-12.834399	-10.111668

5.4. Power Spectral Density

Ambient condition

Temperature	Relative humidity
23°C ~25°C	45%~50%

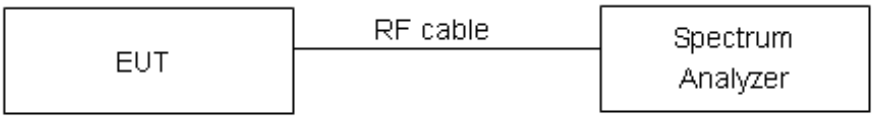
Method of Measurement

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, 5.470-5.725GHz.
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)/ Part 15.407(a)(2) / 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 and 5.47-5.725 GHz bands, 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/MHz	Limits
5150-5250	11dBm/MHz
5.25-5.35 GHz and 5.47-5.725 GHz	11dBm/MHz
5725-5850	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	9.73	10.69	11	PASS
	40/5200	9.60	10.56	11	PASS
	48/5240	9.90	10.86	11	PASS
802.11n HT20	36/5180	8.33	9.35	11	PASS
	40/5200	8.40	9.42	11	PASS
	48/5240	7.99	9.01	11	PASS
802.11n HT40	38/5190	1.83	3.71	11	PASS
	46/5230	4.98	6.86	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	9.65	10.61	11	PASS
	60/5300	8.98	9.94	11	PASS
	64/5320	9.92	10.88	11	PASS
802.11n HT20	52/5260	8.34	9.36	11	PASS
	60/5300	8.31	9.33	11	PASS
	64/5320	8.46	9.48	11	PASS
802.11n HT40	54/5270	4.98	6.86	11	PASS
	62/5310	1.67	3.55	11	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

U-NII-2C

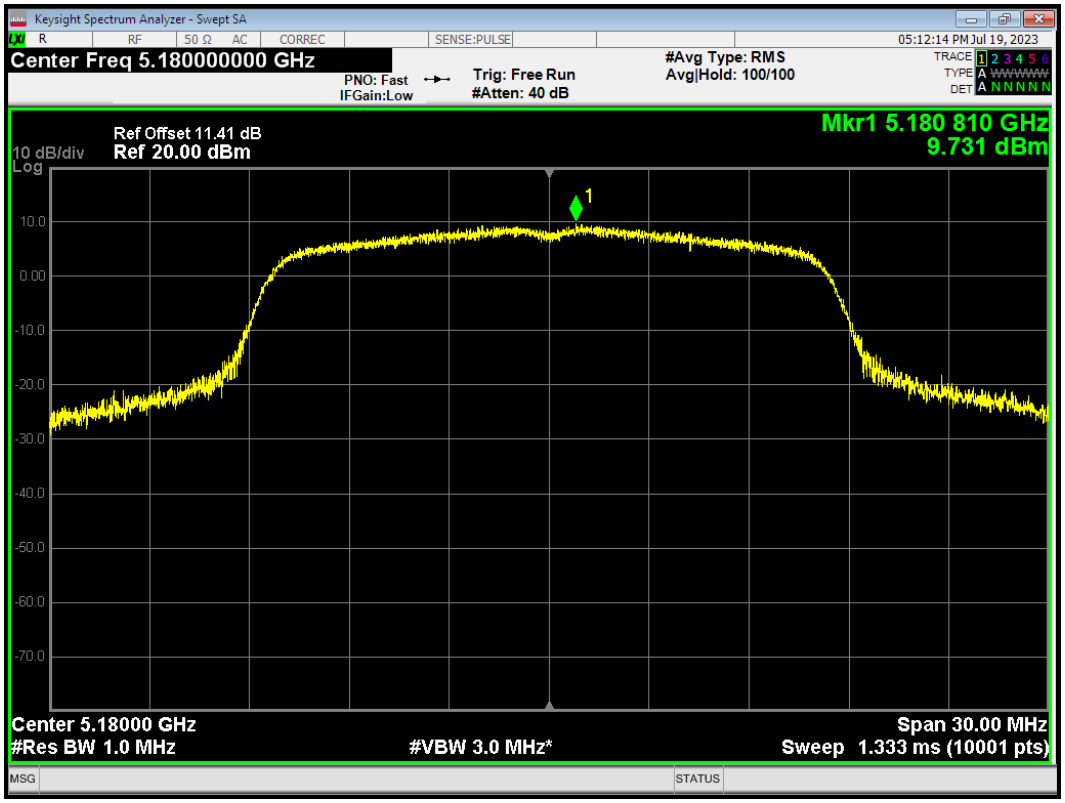
Mode	Channel /Frequency (MHz)	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	100/5500	7.86	8.82	11	PASS
	120/5600	10.01	10.97	11	PASS
	140/5700	7.18	8.14	11	PASS
	144/5720	9.30	10.26	11	PASS
802.11n HT20	100/5500	8.73	9.75	11	PASS
	120/5600	8.87	9.89	11	PASS
	140/5700	7.54	8.56	11	PASS
	144/5720	8.46	9.48	11	PASS
802.11n HT40	102/5510	3.20	5.08	11	PASS
	118/5590	5.31	7.19	11	PASS
	134/5670	4.85	6.73	11	PASS
	142/5710	4.70	6.58	11	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

U-NII-3

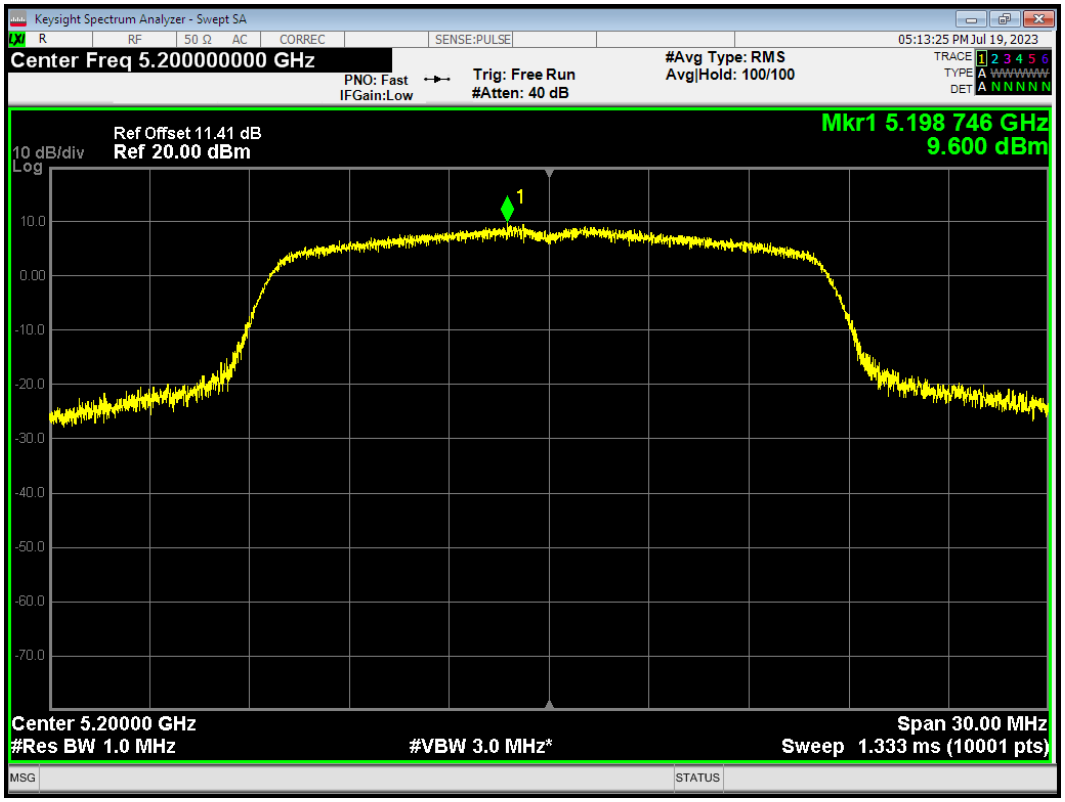
Mode	Channel /Frequency (MHz)	Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	144/5720	3.75	4.98	30	PASS
	149/5745	6.45	7.68	30	PASS
	157/5785	5.73	6.96	30	PASS
	165/5825	5.21	6.44	30	PASS
802.11n HT20	144/5720	2.53	3.82	30	PASS
	149/5745	6.57	7.86	30	PASS
	157/5785	5.76	7.05	30	PASS
	165/5825	5.41	6.70	30	PASS
802.11n HT40	142/5710	-4.37	-2.22	30	PASS
	151/5755	1.36	3.51	30	PASS
	159/5795	1.23	3.38	30	PASS
Note: PSD=Read Value+Duty cycle correction factor +10*log(500/470)					

U-NII-1

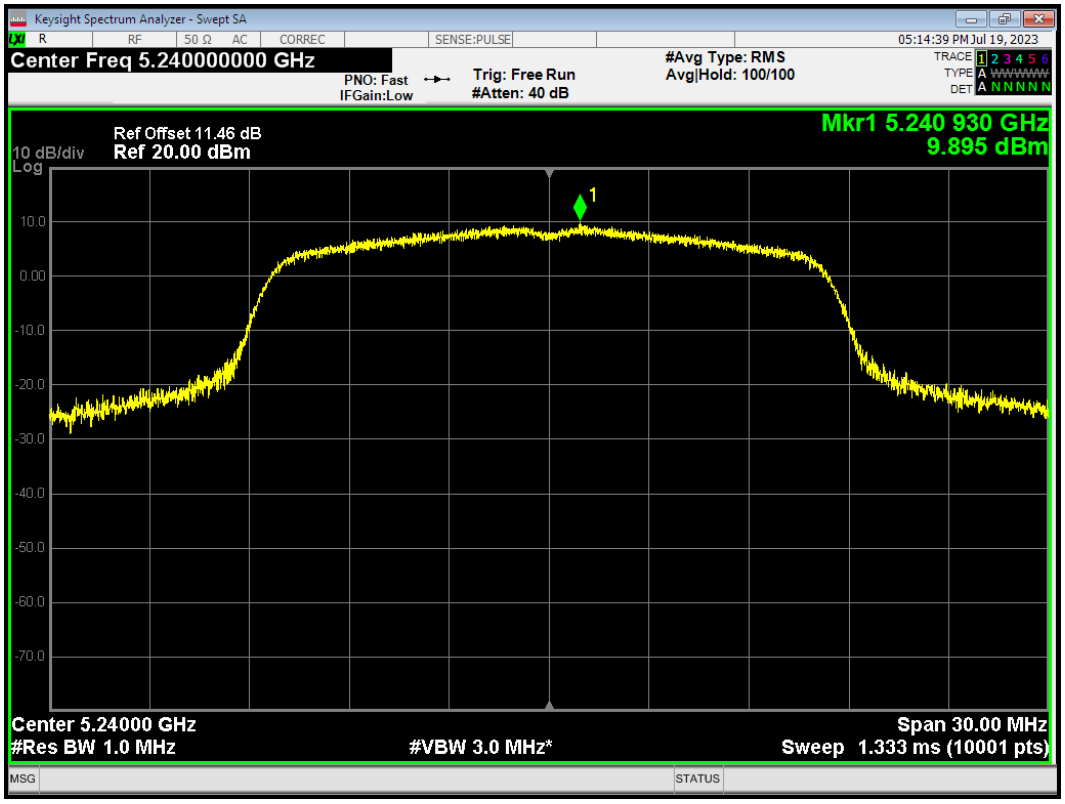
PSD 802.11a 5180MHz



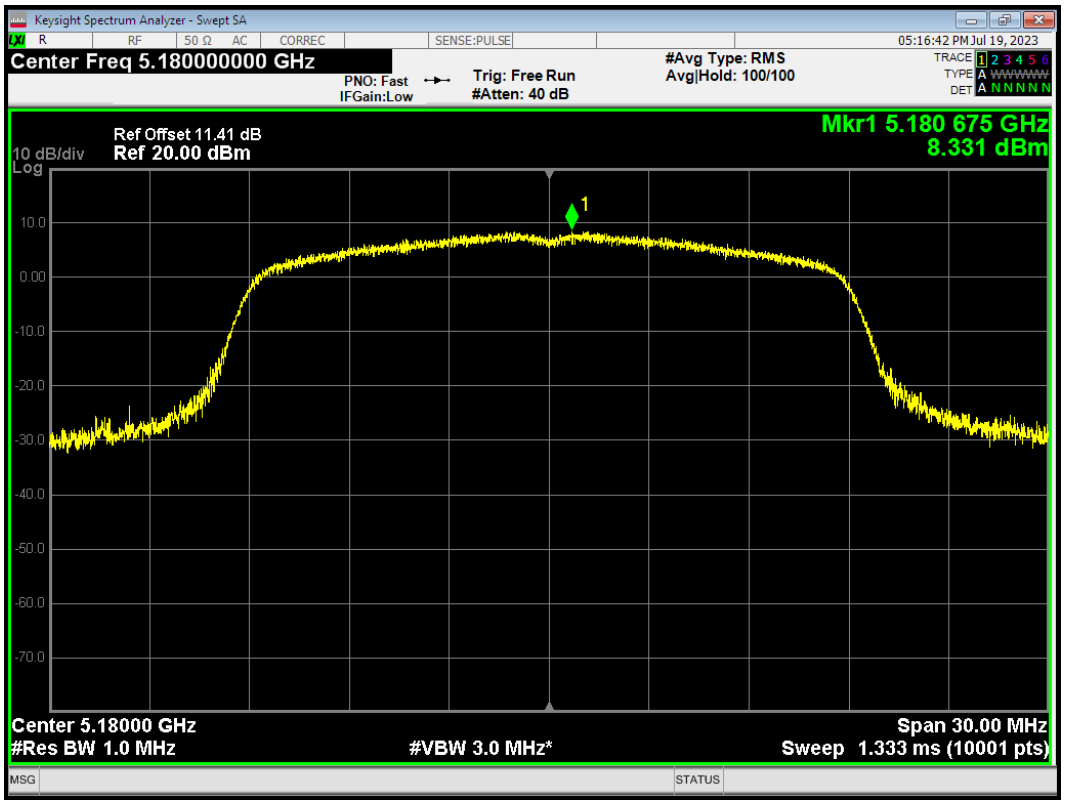
PSD 802.11a 5200MHz



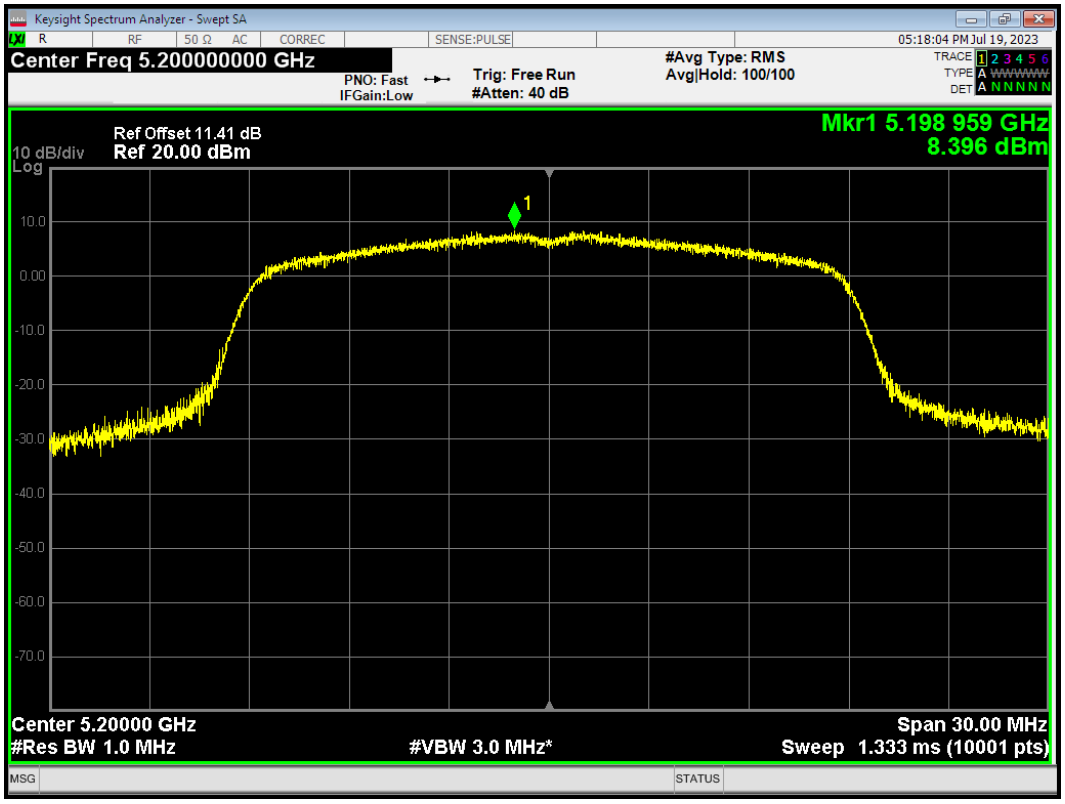
PSD 802.11a 5240MHz



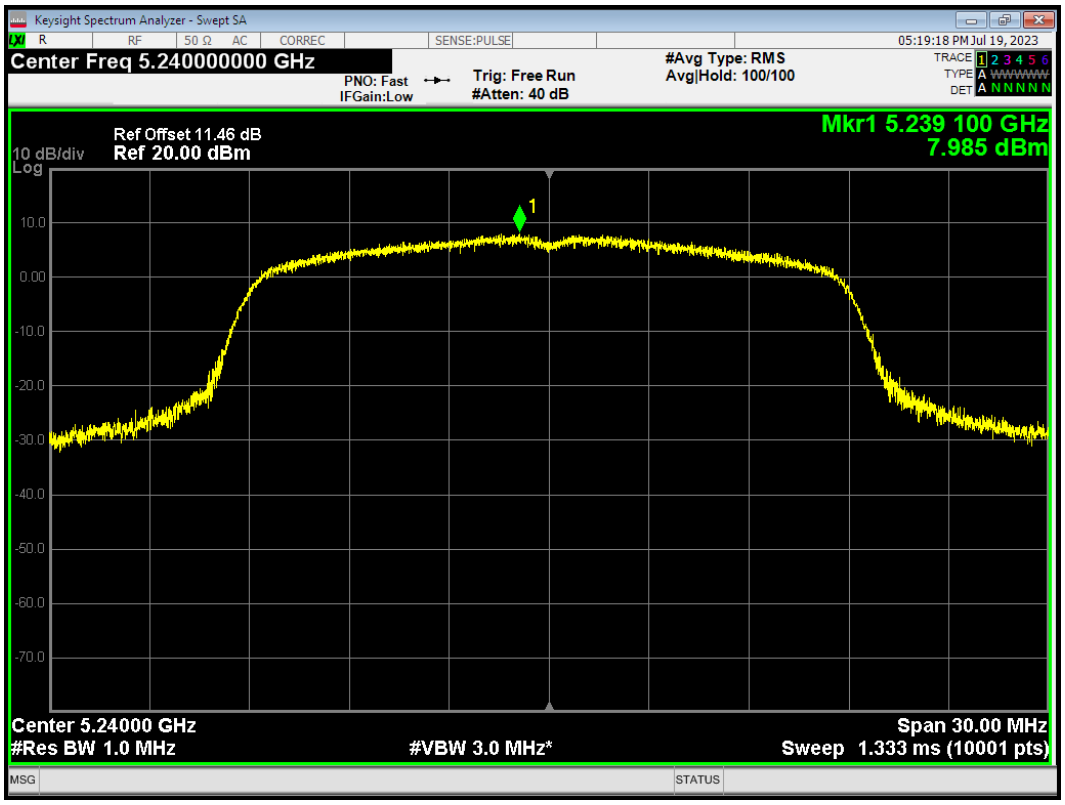
PSD 802.11n(HT20) 5180MHz



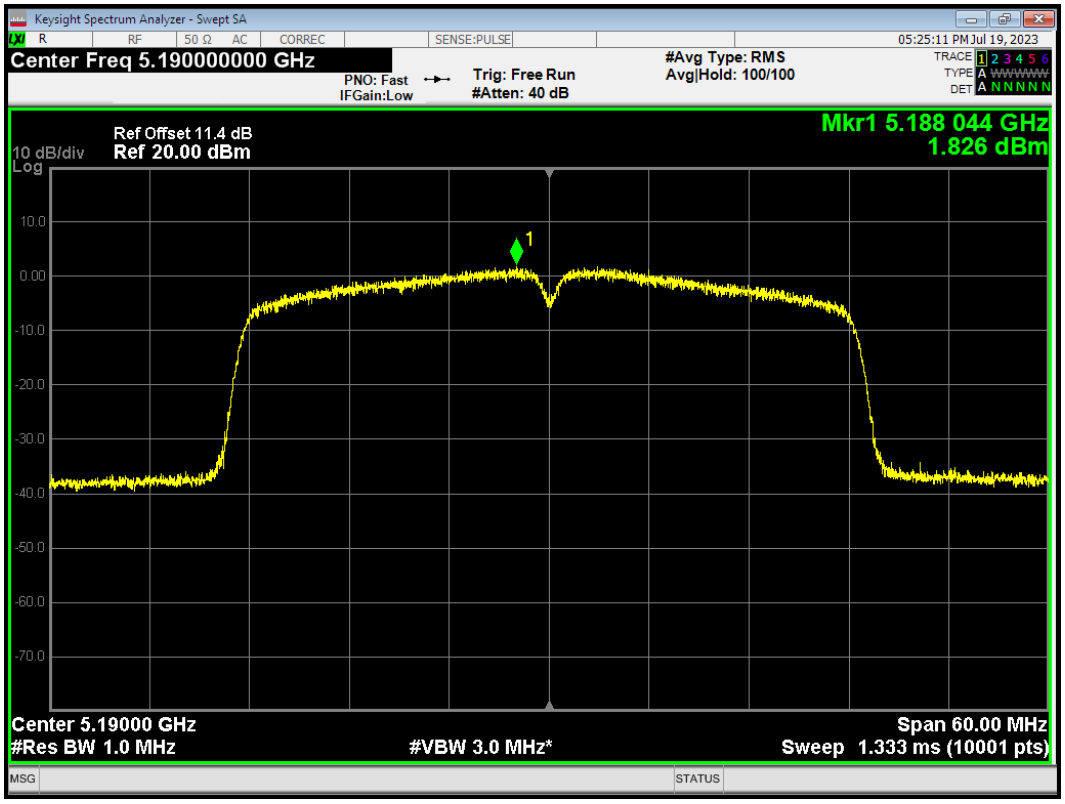
PSD 802.11n(HT20) 5200MHz



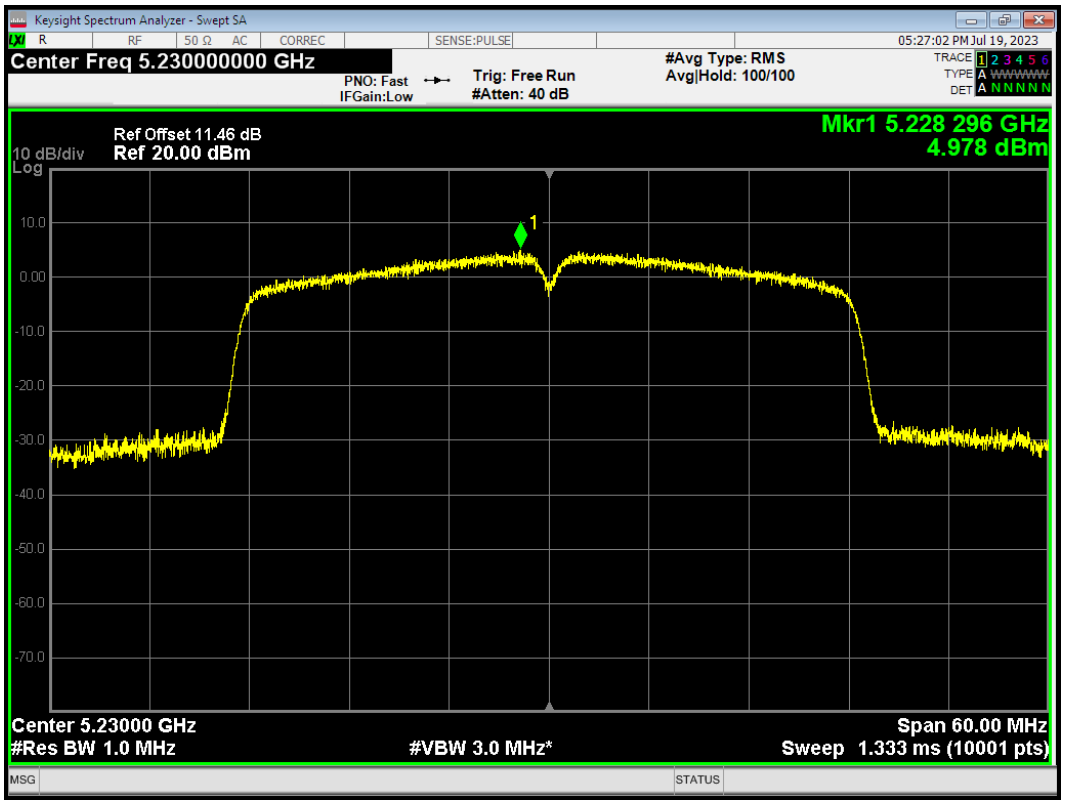
PSD 802.11n(HT20) 5240MHz



PSD 802.11n(HT40) 5190MHz

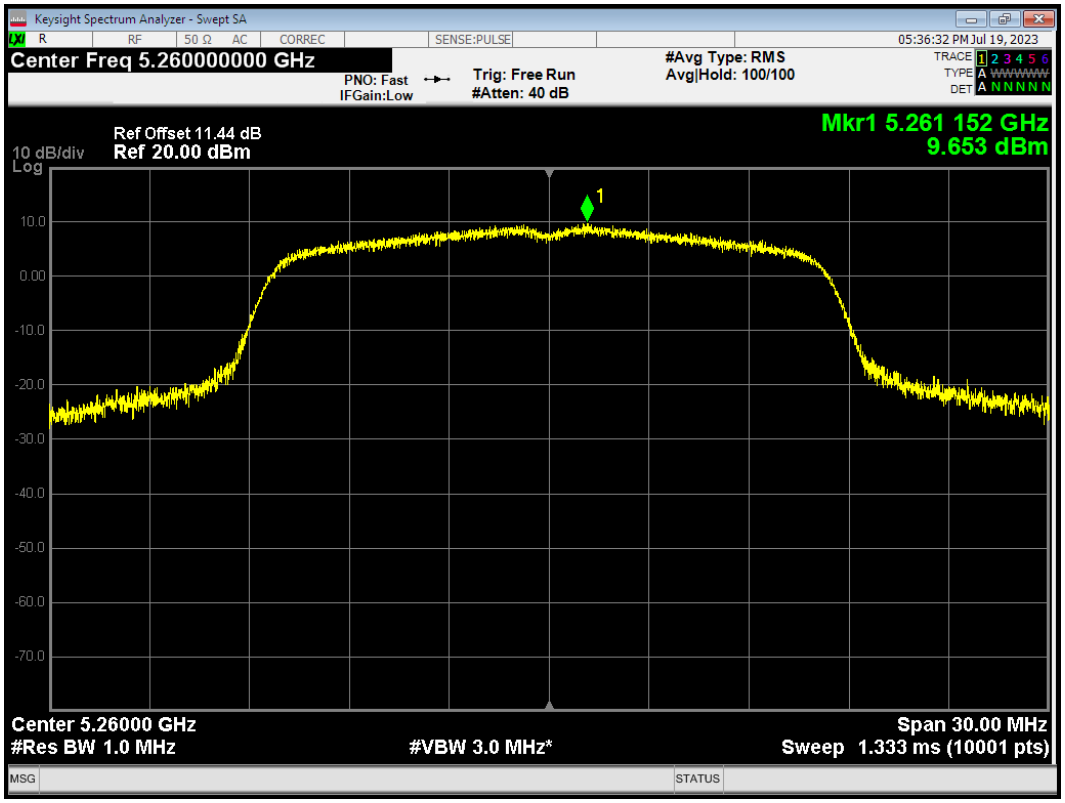


PSD 802.11n(HT40) 5230MHz

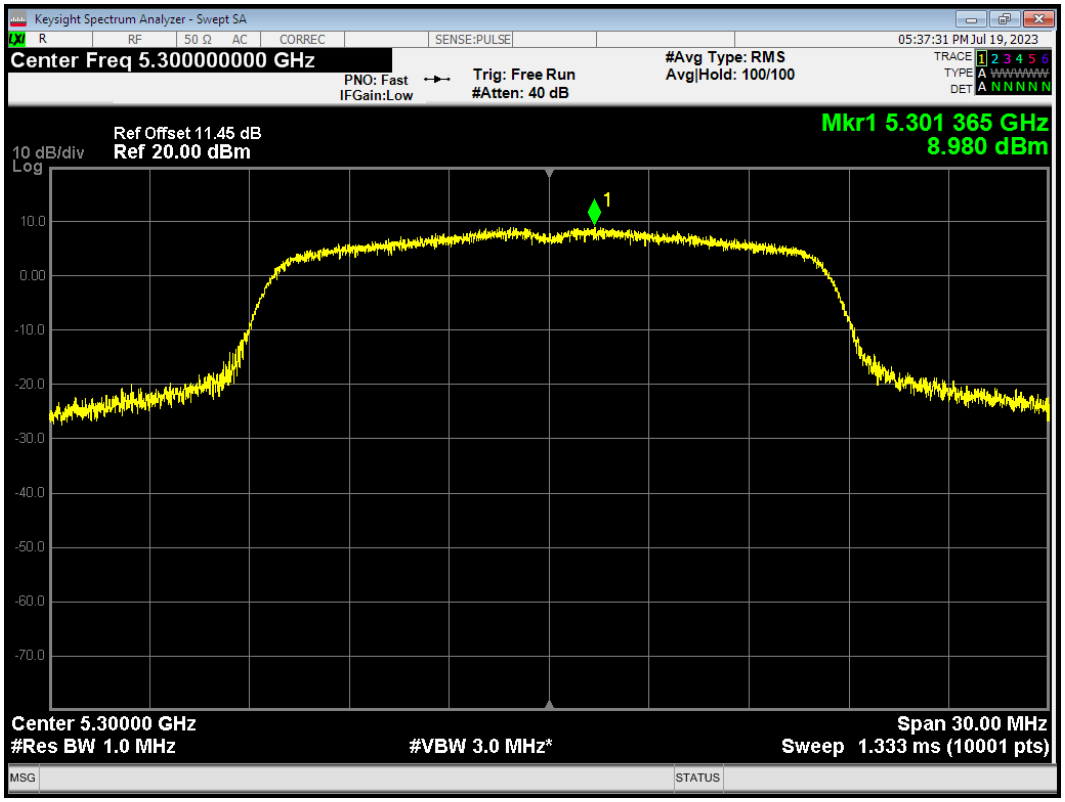


U-NII-2A

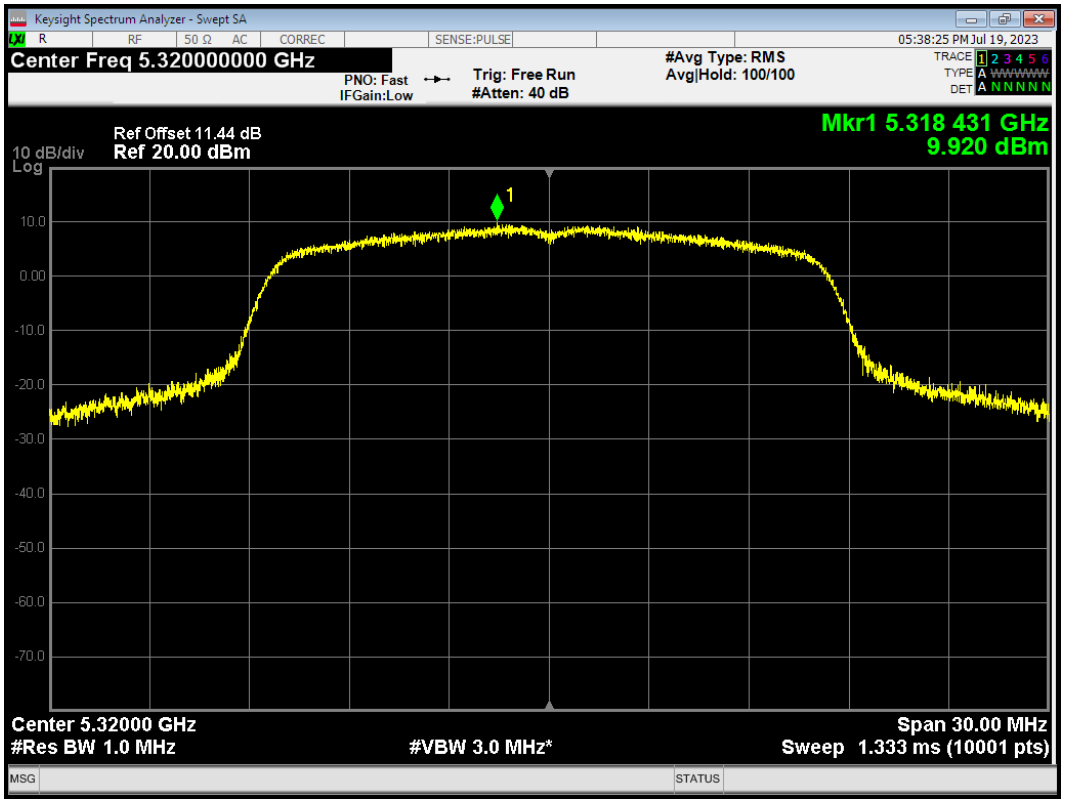
PSD 802.11a 5260MHz



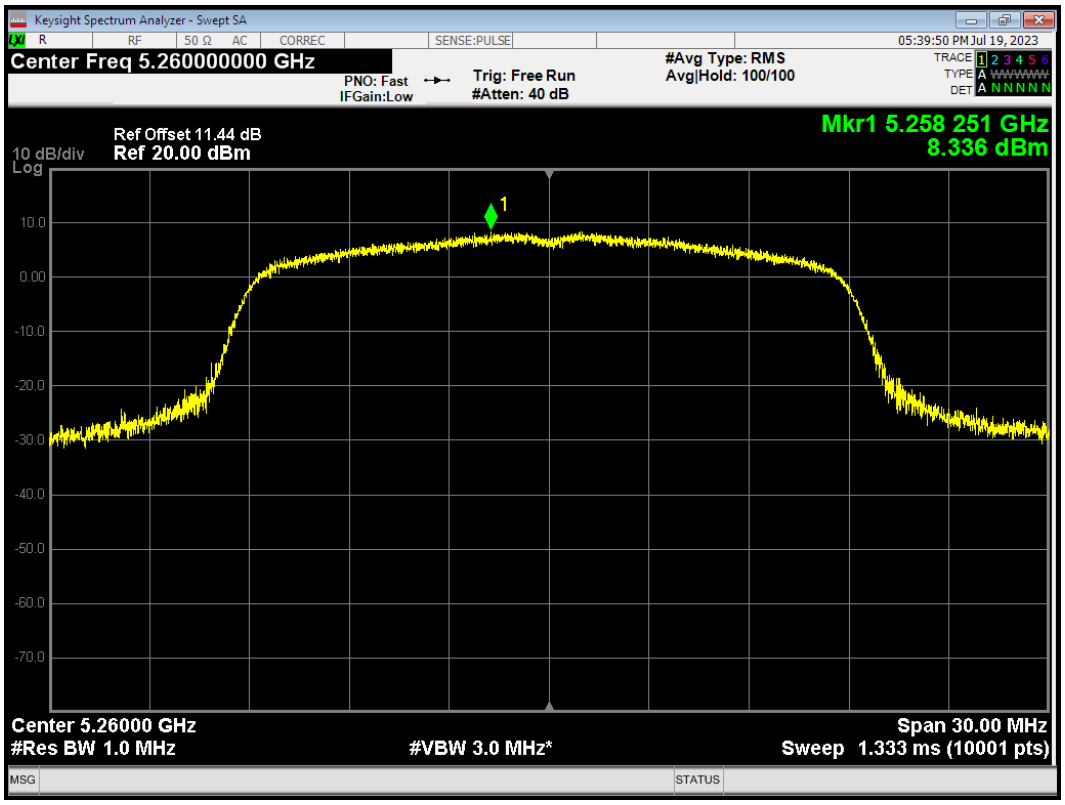
PSD 802.11a 5300MHz



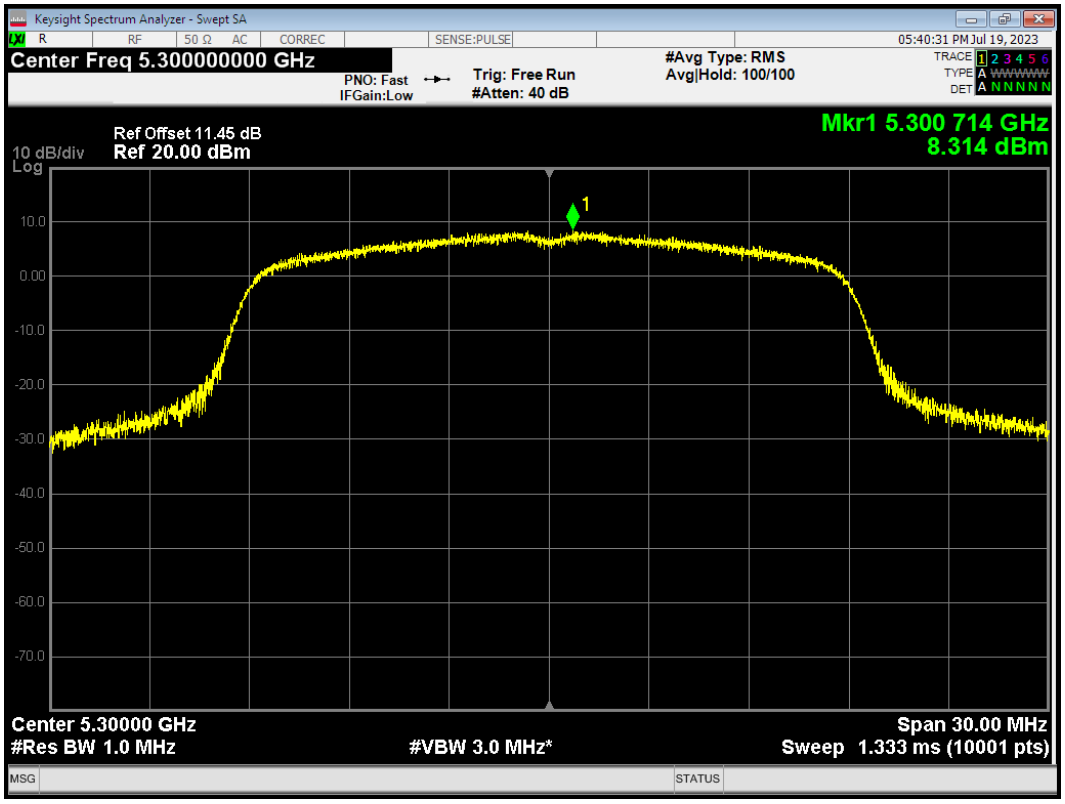
PSD 802.11a 5320MHz



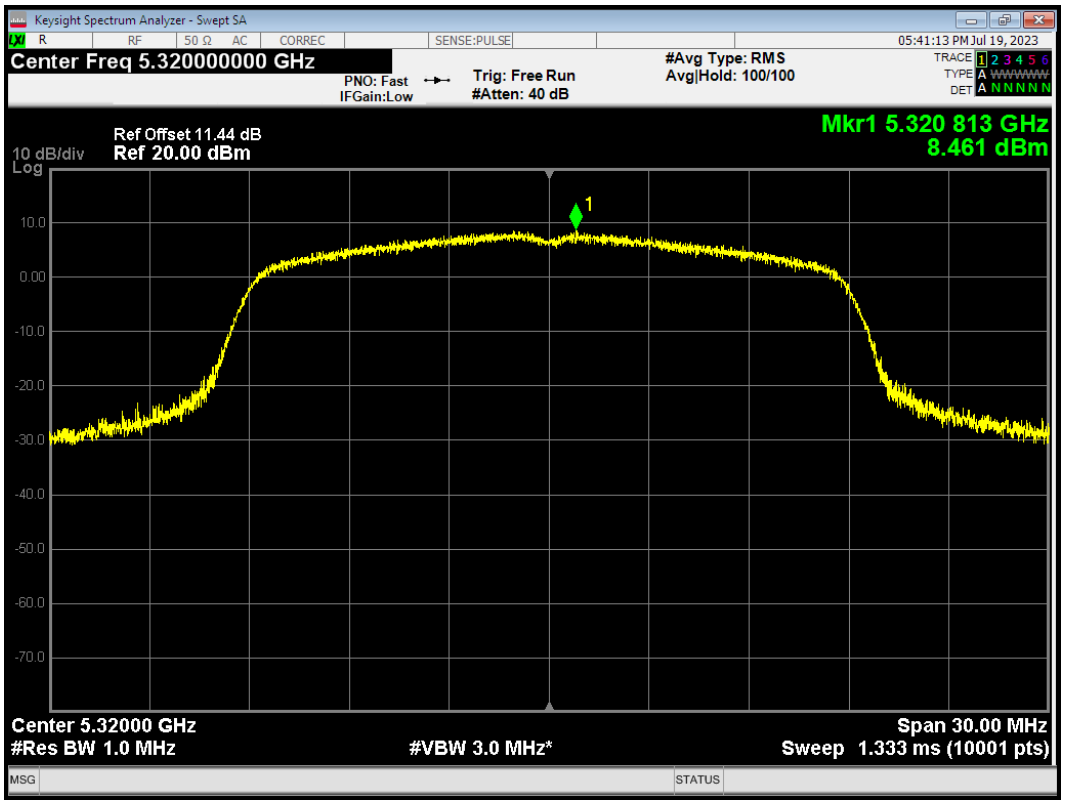
PSD 802.11n(HT20) 5260MHz



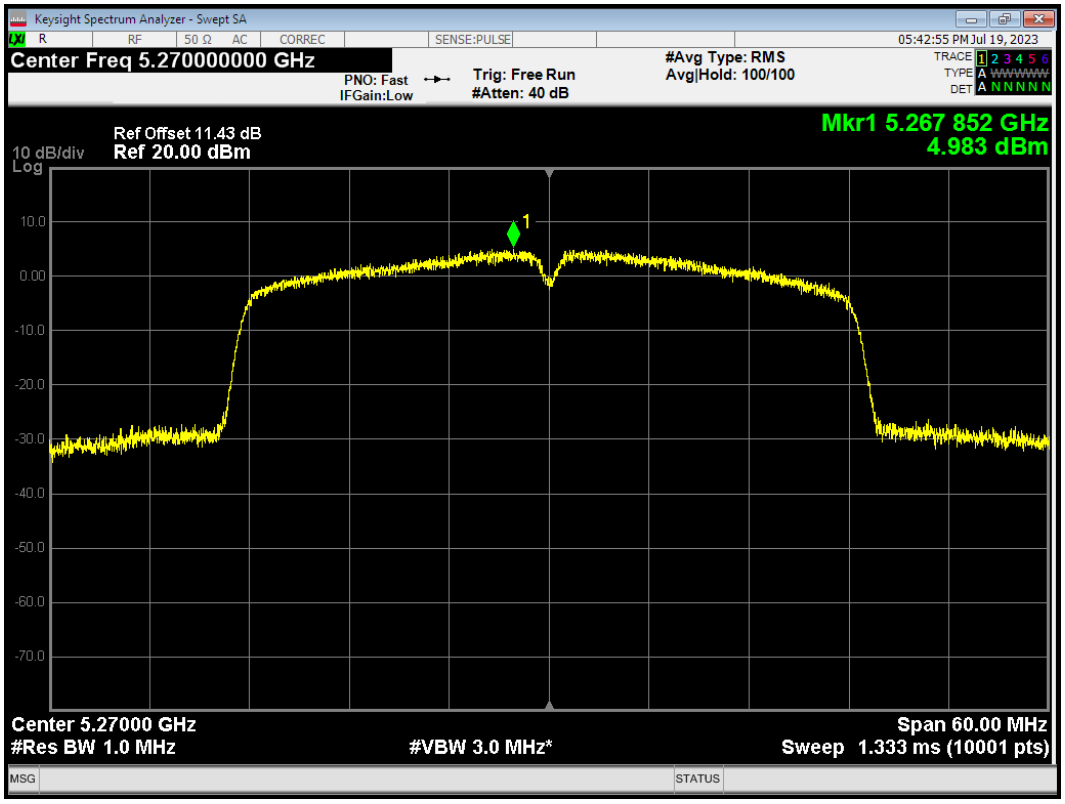
PSD 802.11n(HT20) 5300MHz



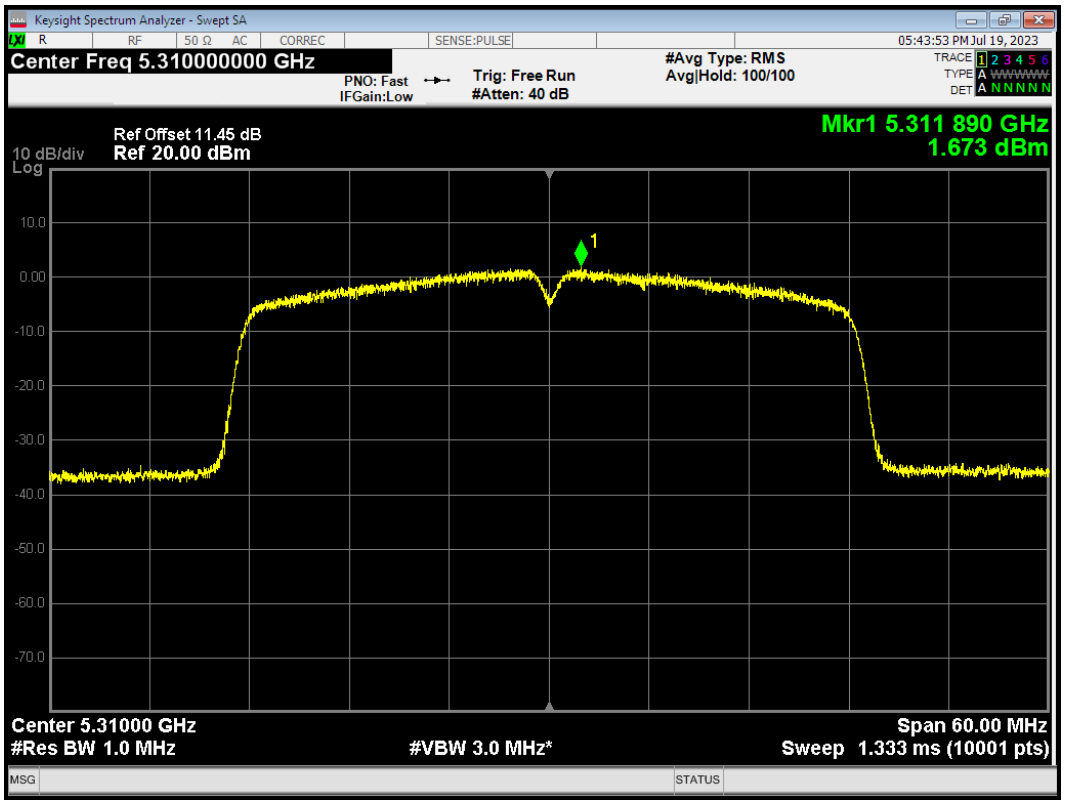
PSD 802.11n(HT20) 5320MHz



PSD 802.11n(HT40) 5270MHz

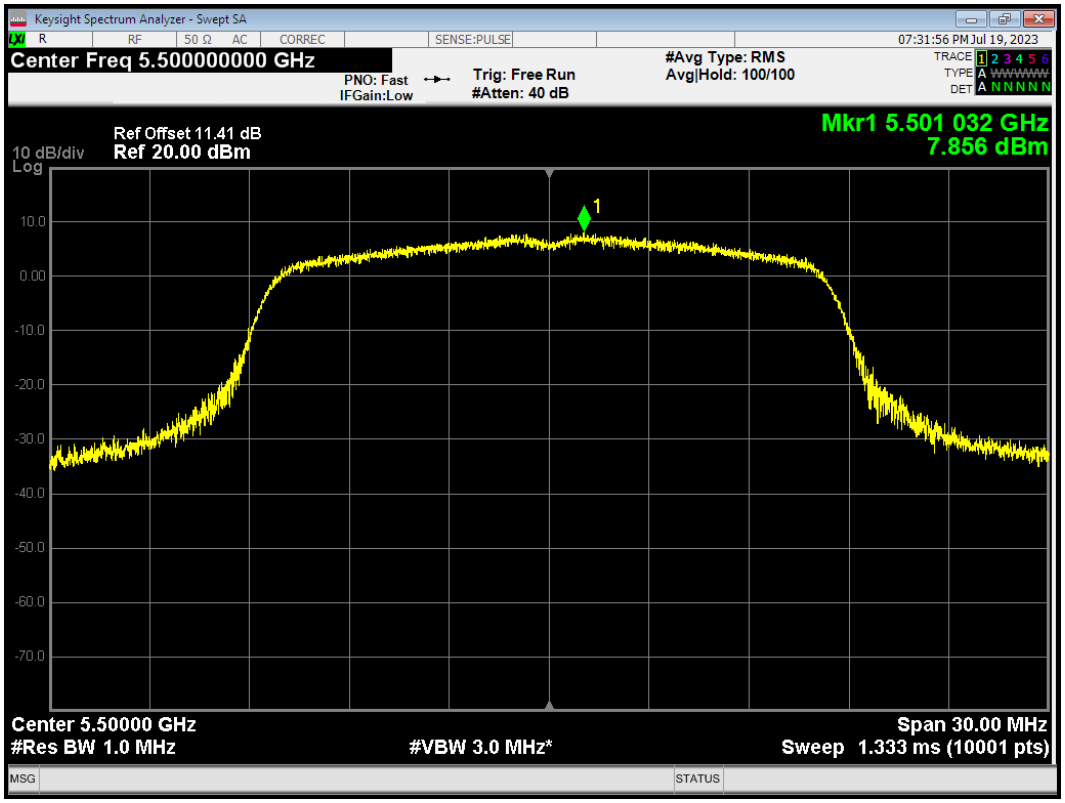


PSD 802.11n(HT40) 5310MHz

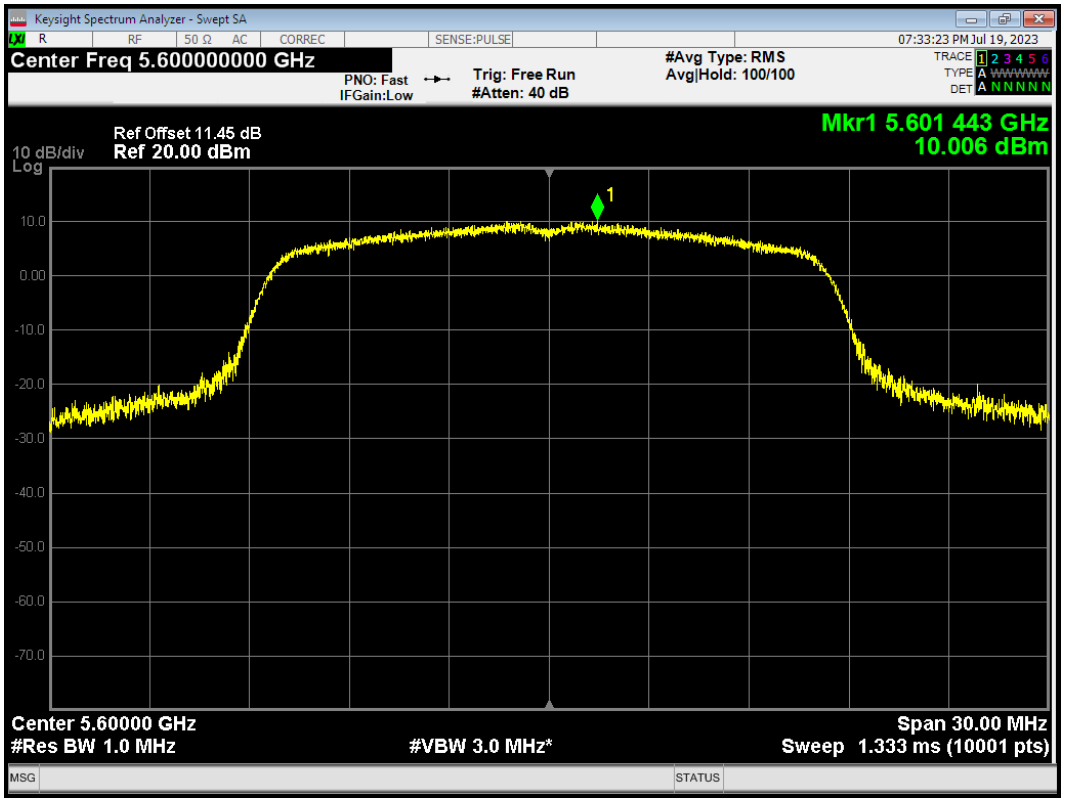


U-NII-2C

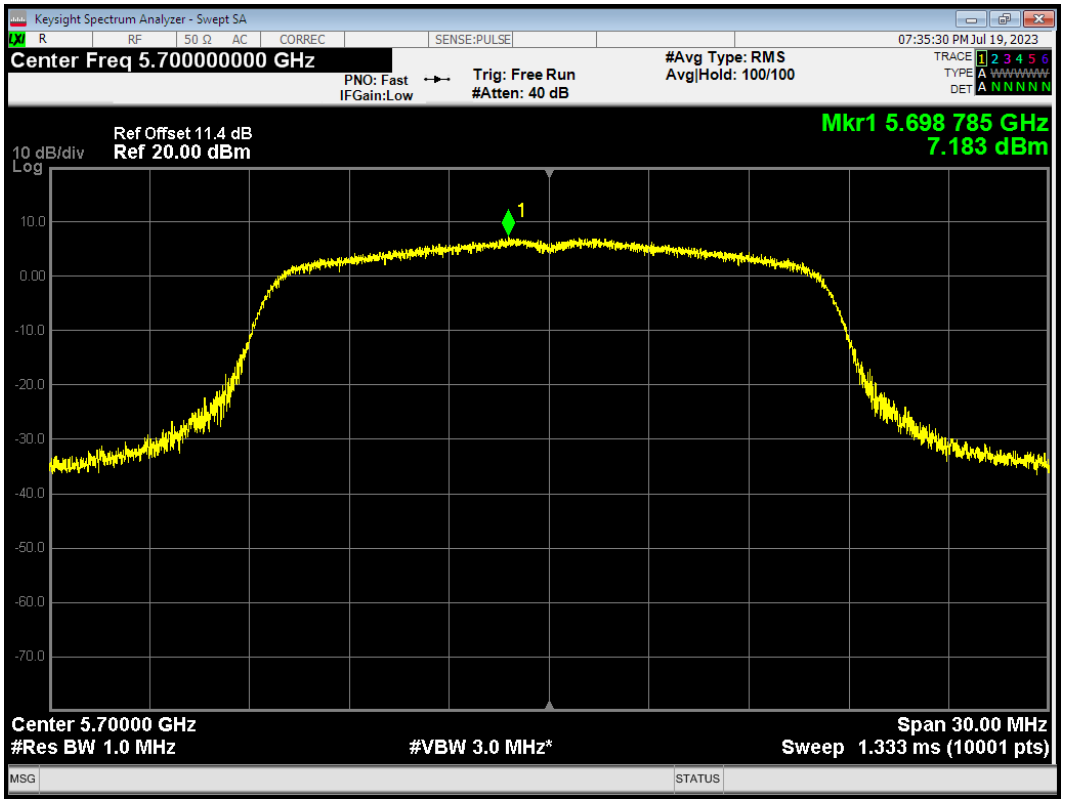
PSD 802.11a 5500MHz



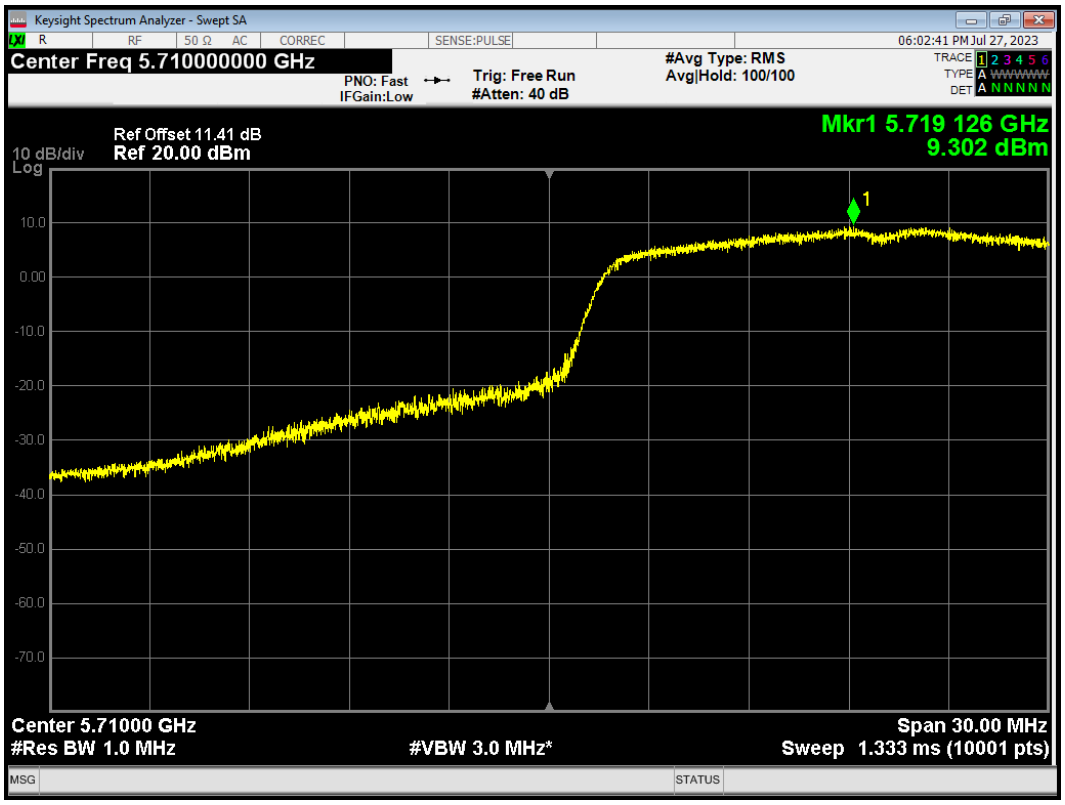
PSD 802.11a 5600MHz



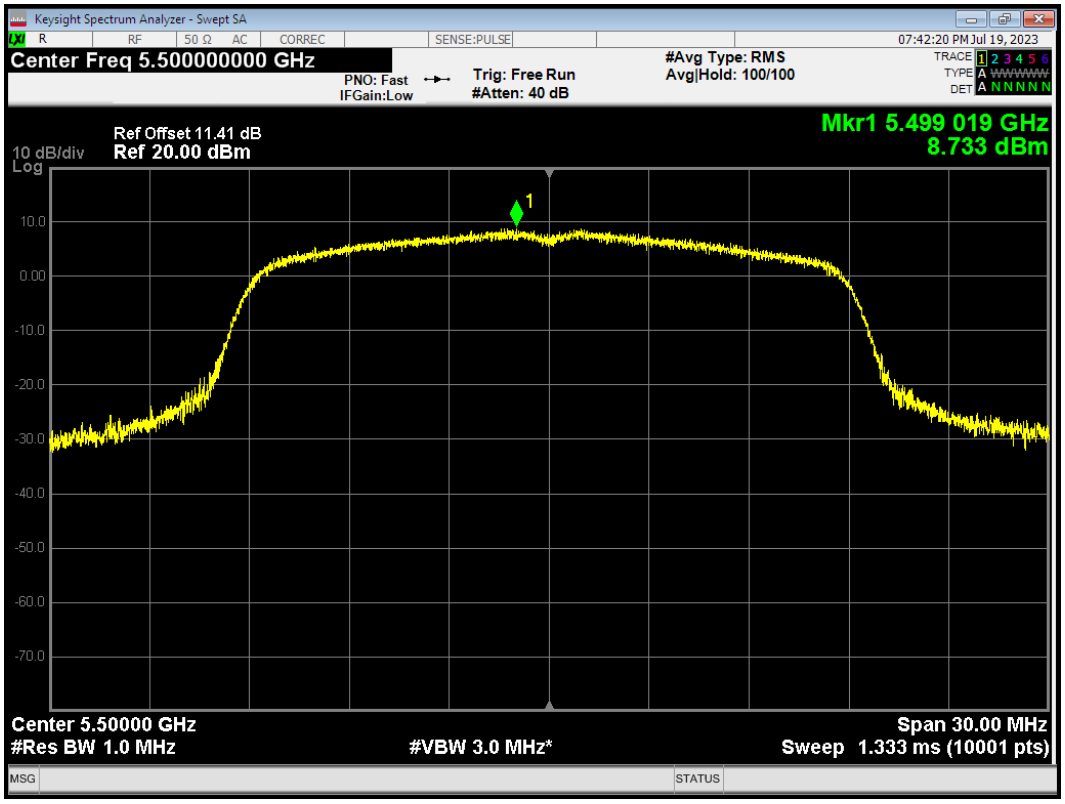
PSD 802.11a 5700MHz



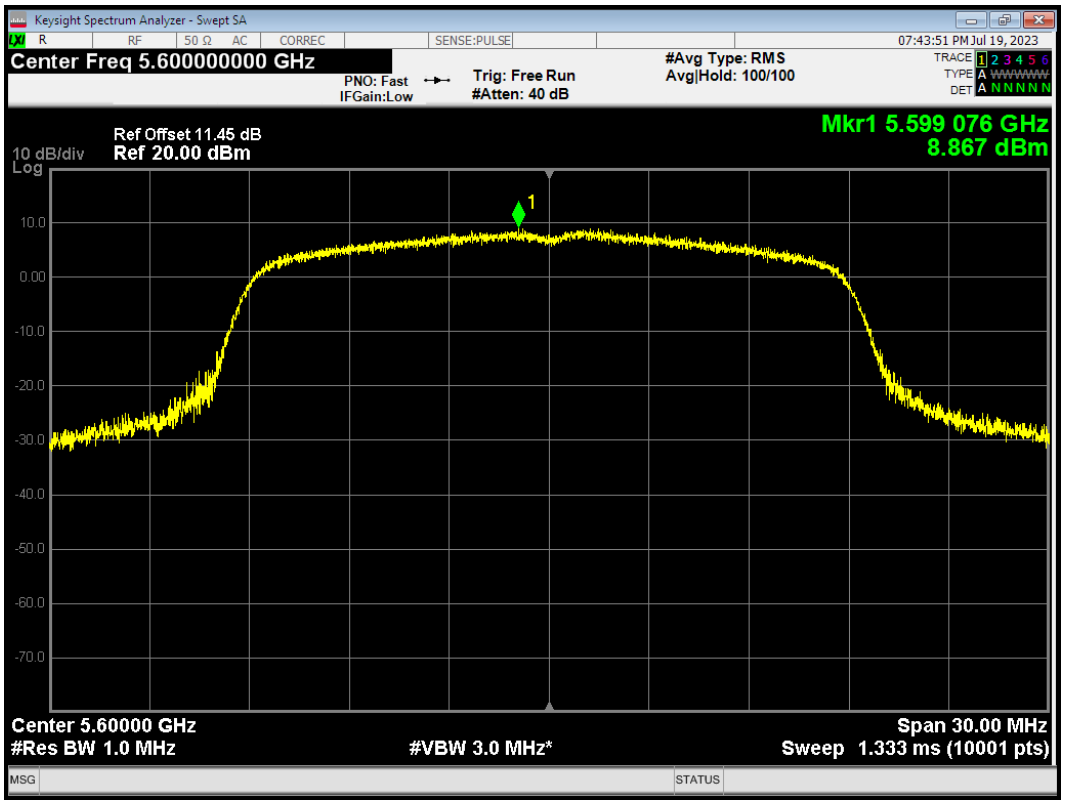
PSD 802.11a 5720MHz



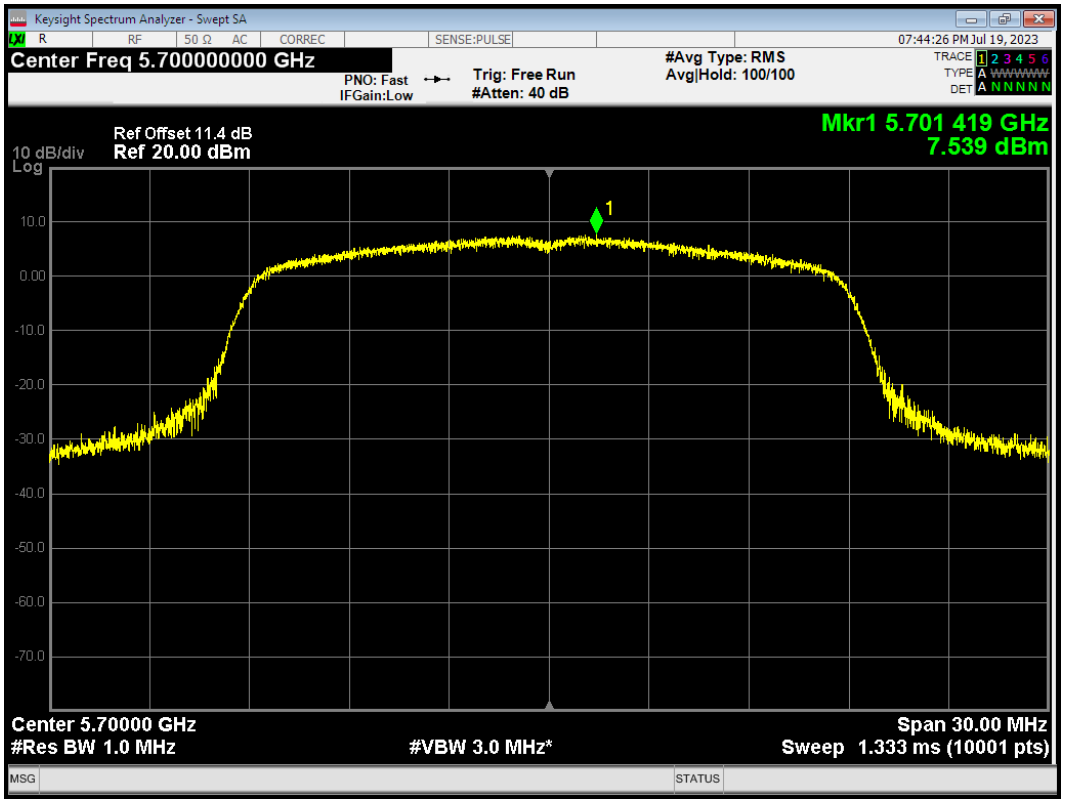
PSD 802.11n(HT20) 5500MHz



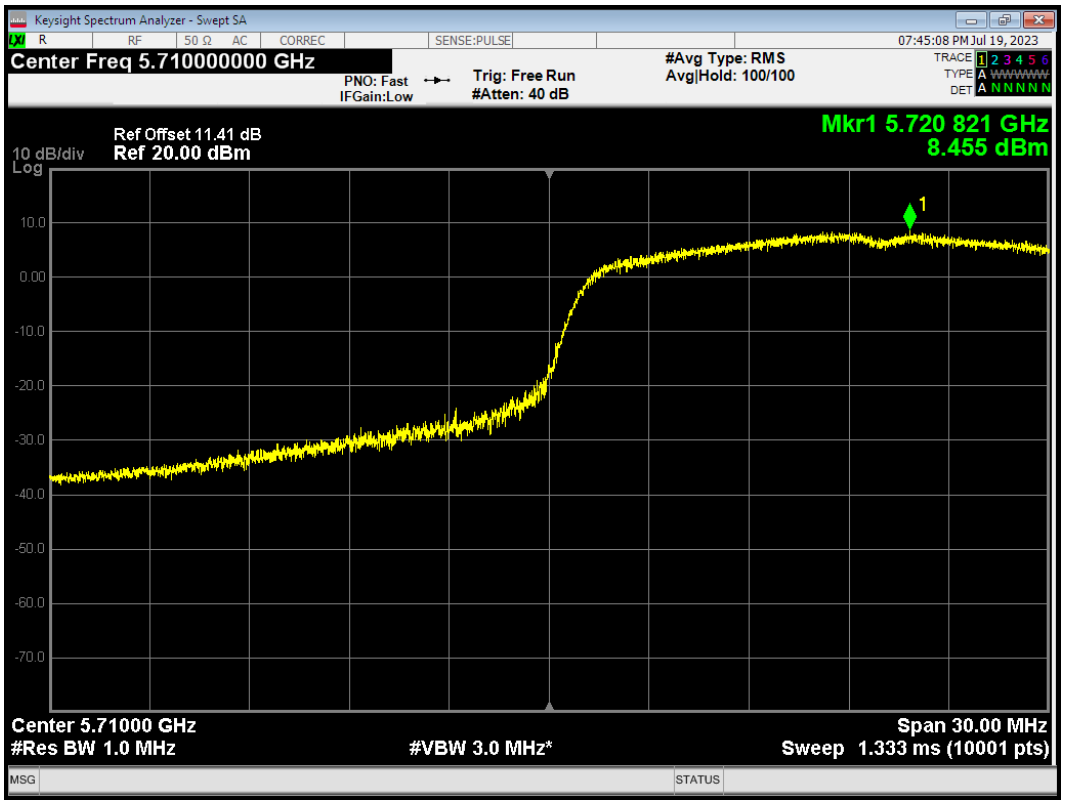
PSD 802.11n(HT20) 5600MHz



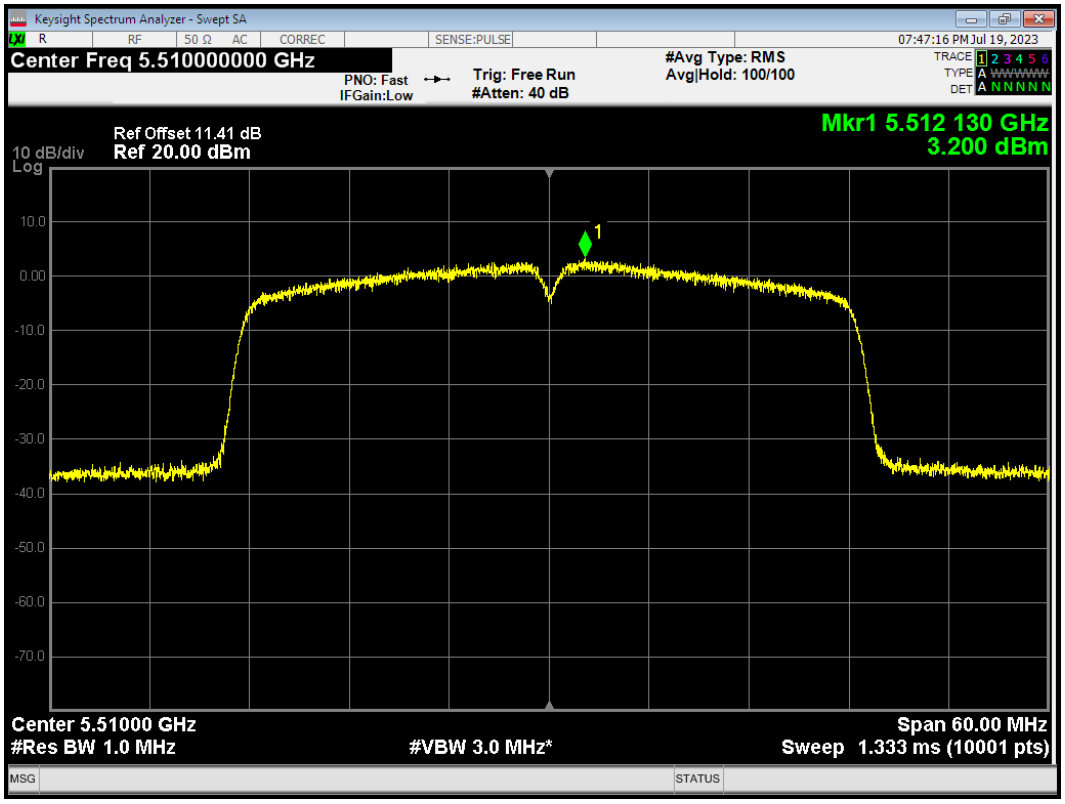
PSD 802.11n(HT20) 5700MHz



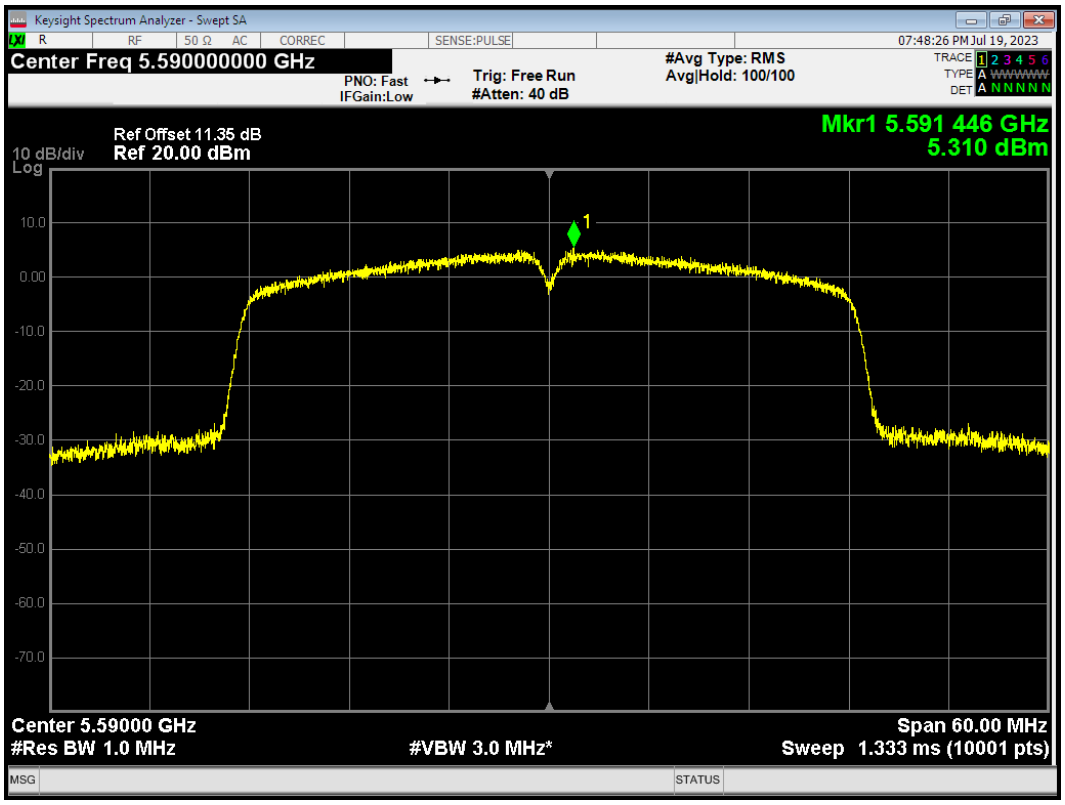
PSD 802.11n(HT20) 5720MHz



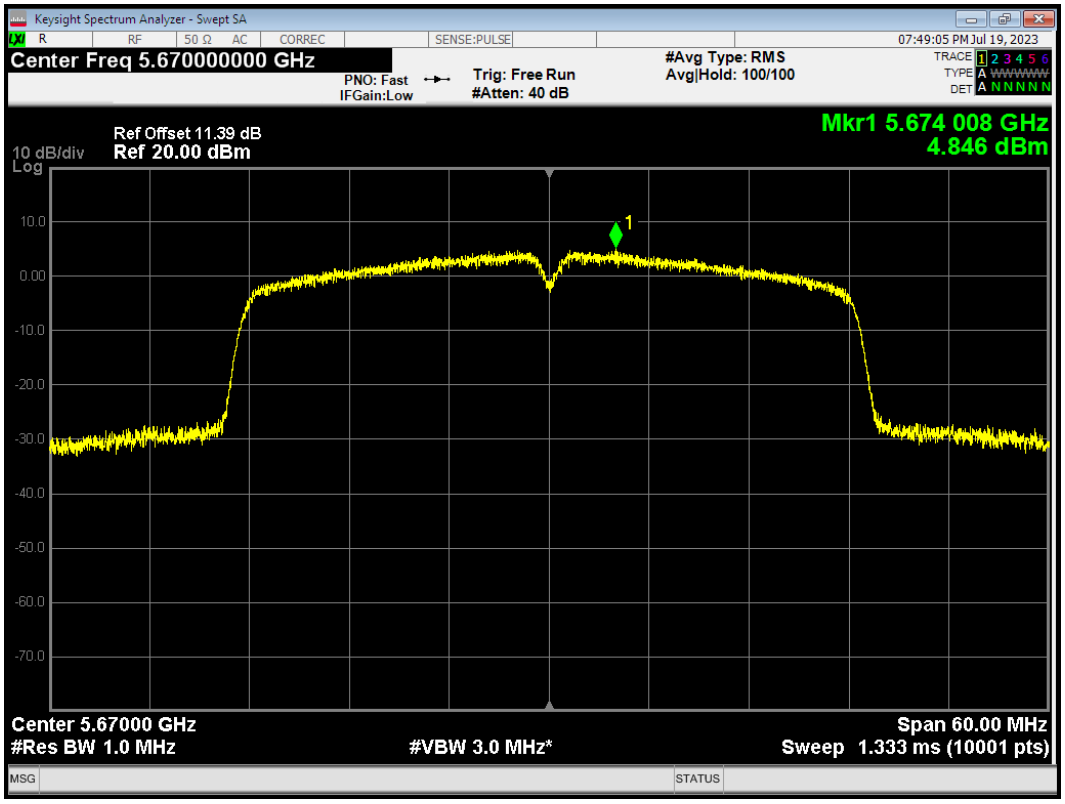
PSD 802.11n(HT40) 5510MHz



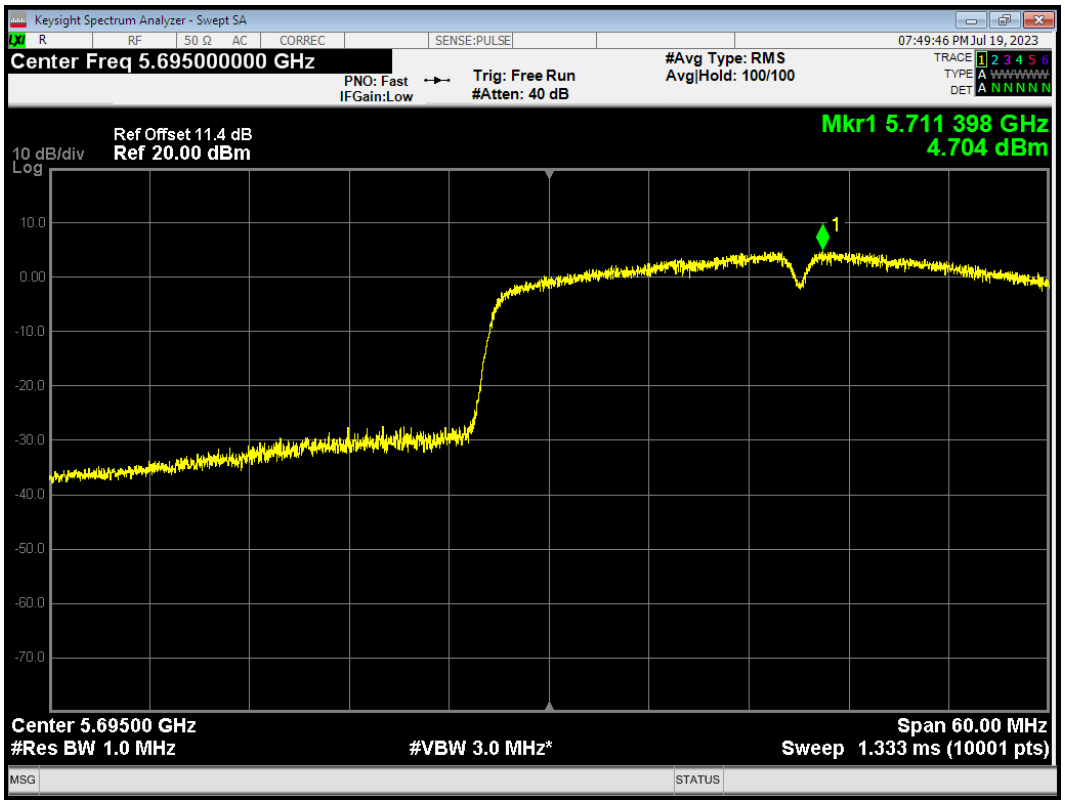
PSD 802.11n(HT40) 5590MHz



PSD 802.11n(HT40) 5670MHz

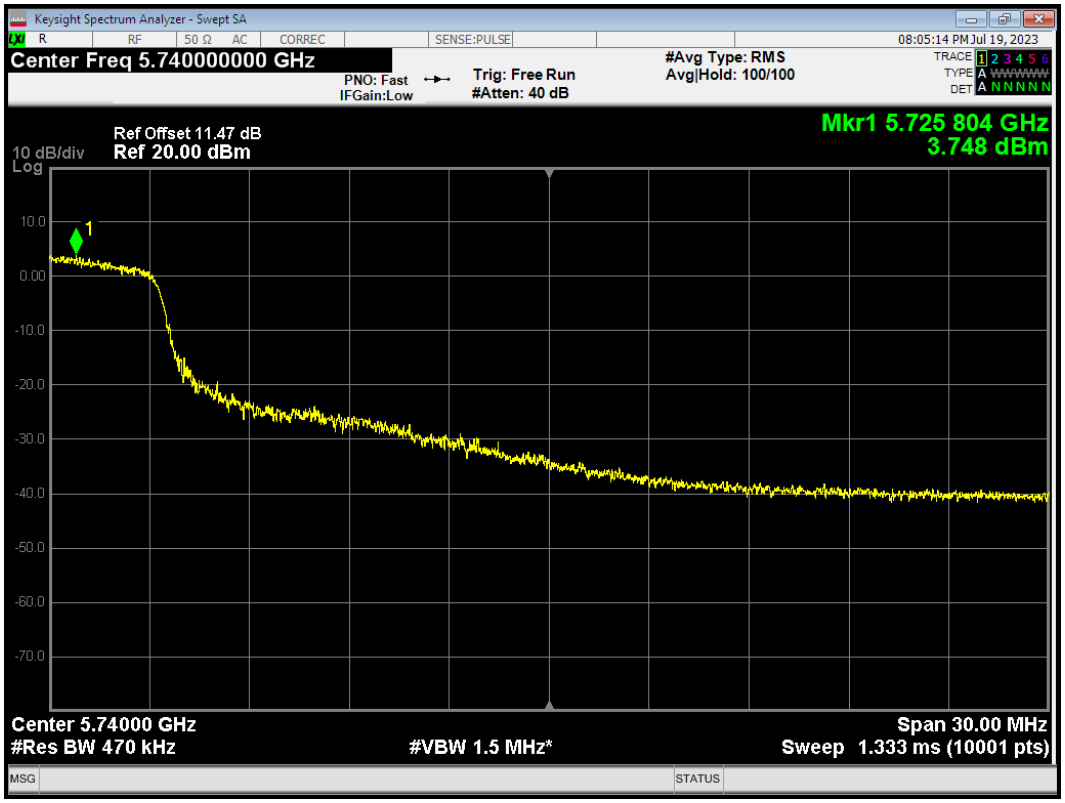


PSD 802.11n(HT40) 5710MHz

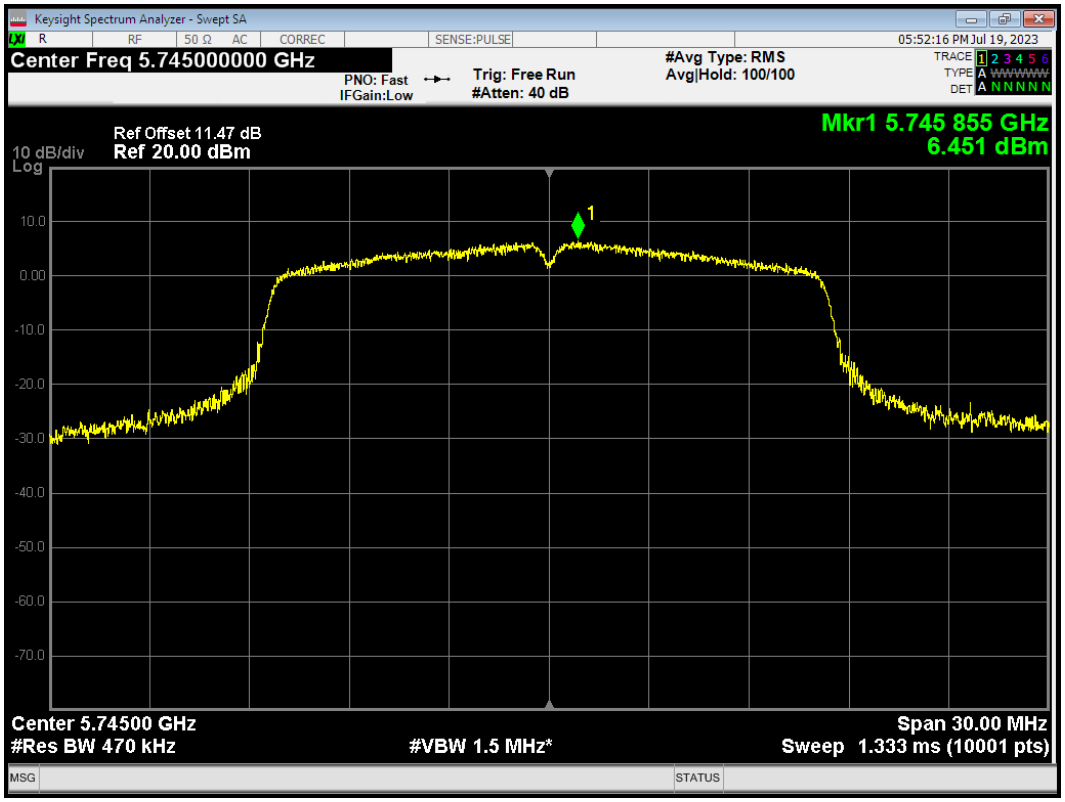


U-NII-3

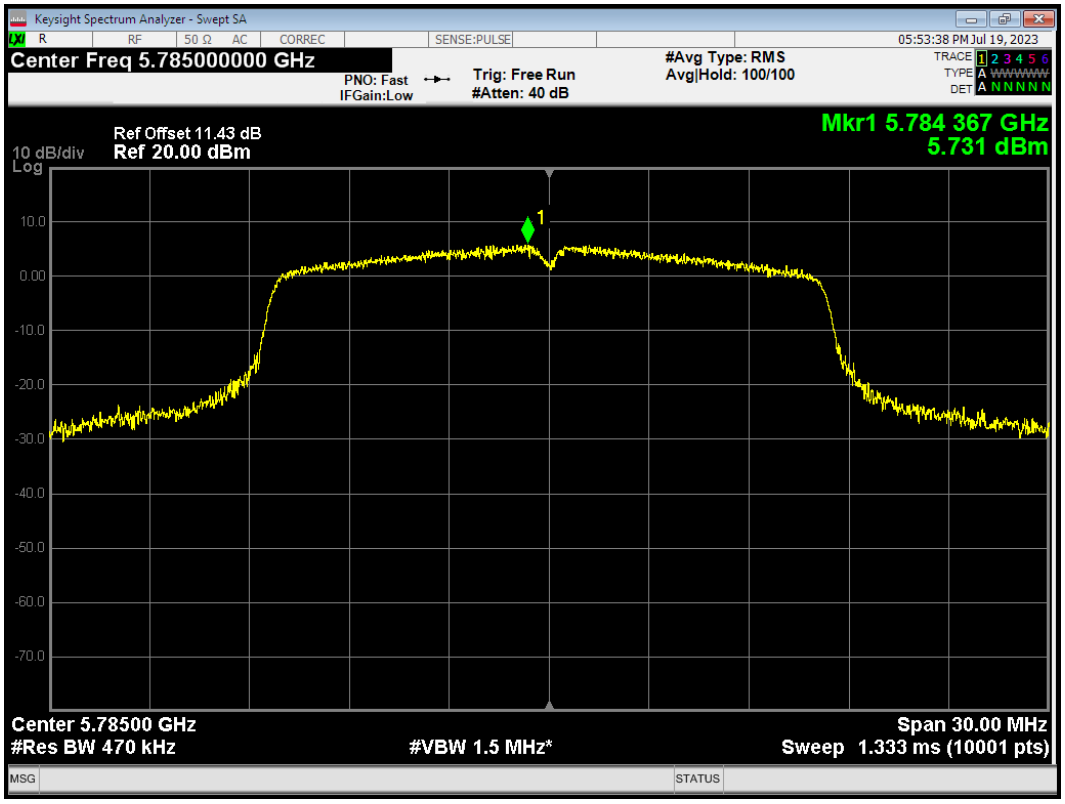
PSD 802.11a 5720MHz



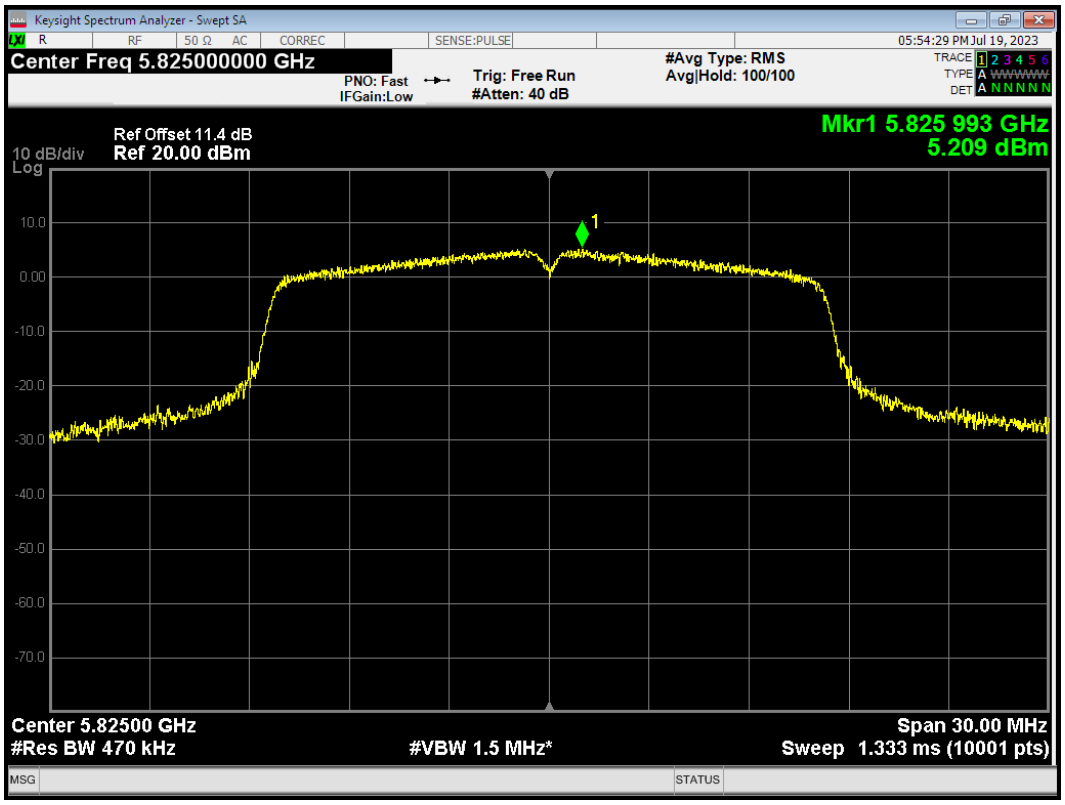
PSD 802.11a 5745MHz



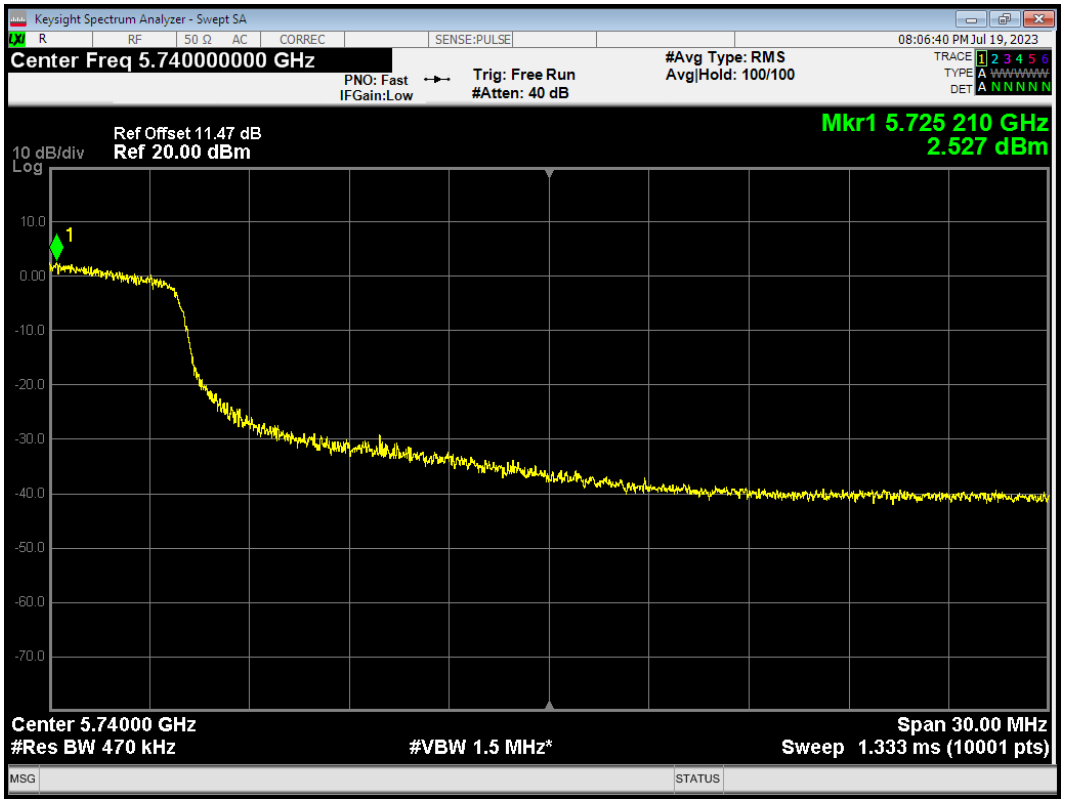
PSD 802.11a 5785MHz



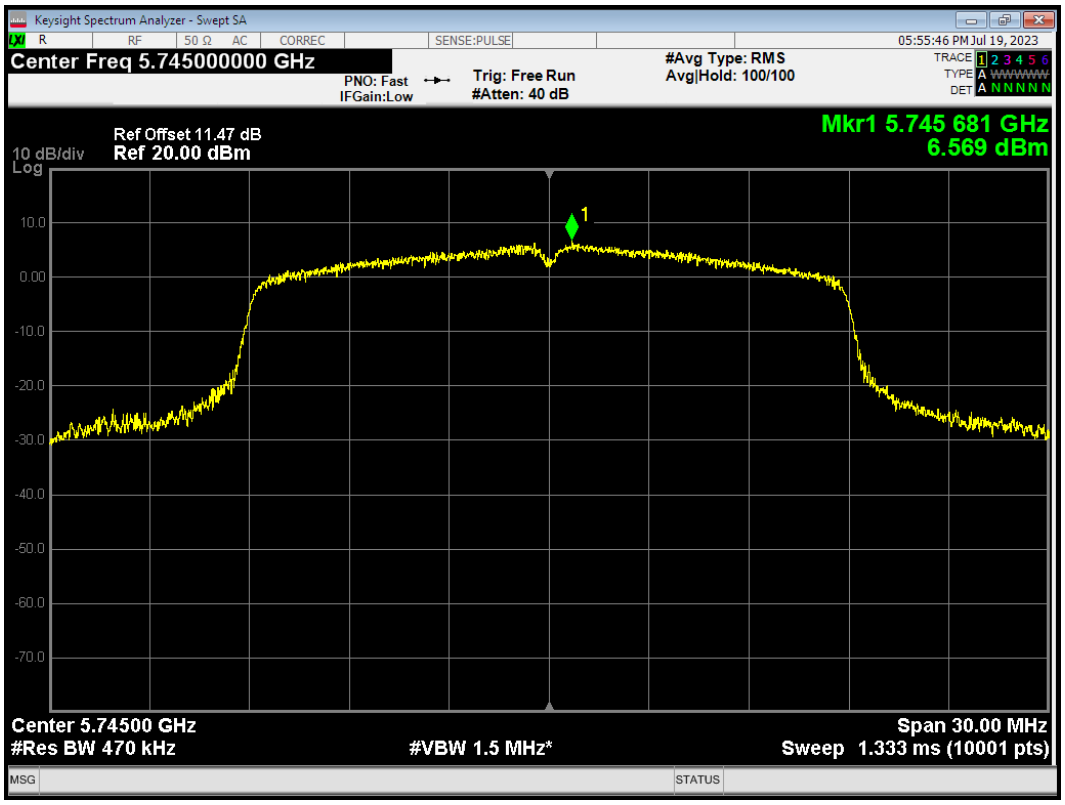
PSD 802.11a 5825MHz



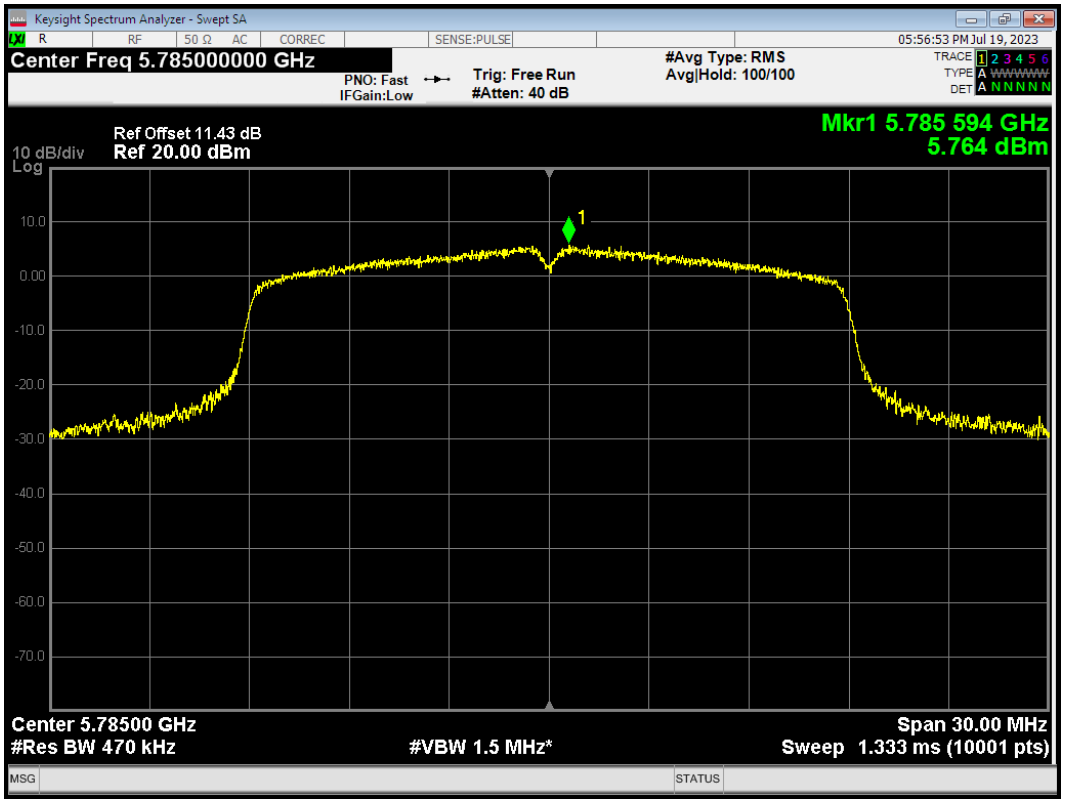
PSD 802.11n(HT20) 5720MHz



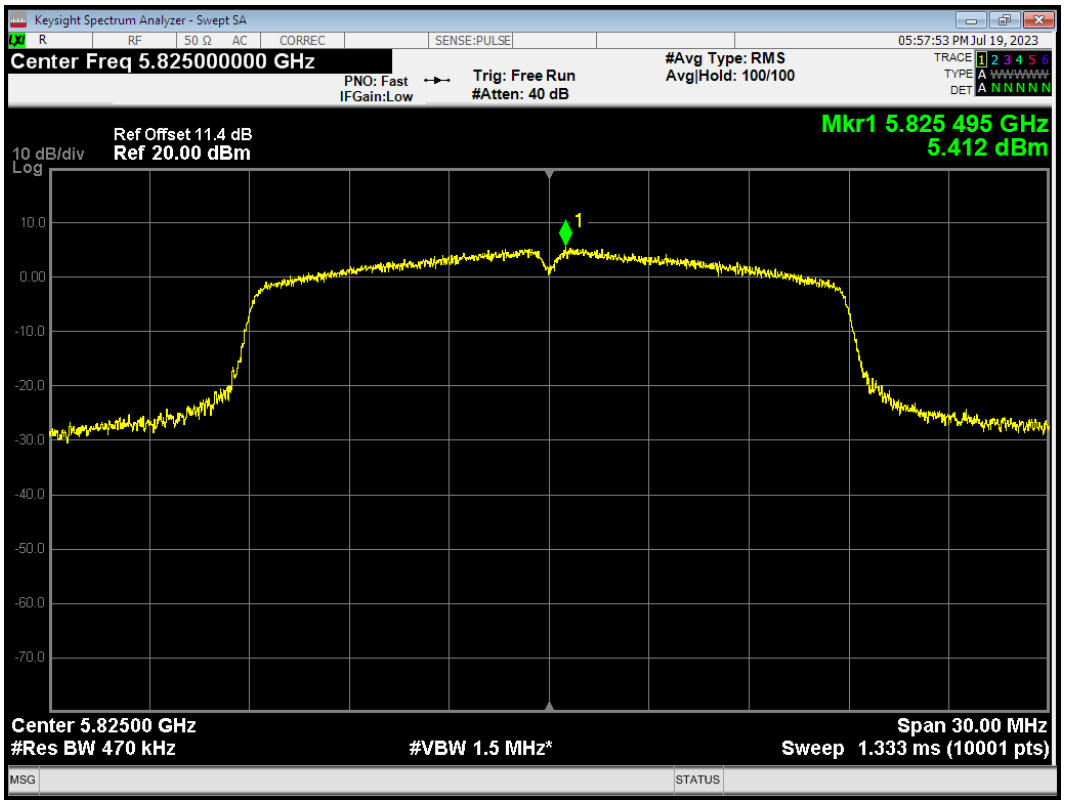
PSD 802.11n(HT20) 5745MHz



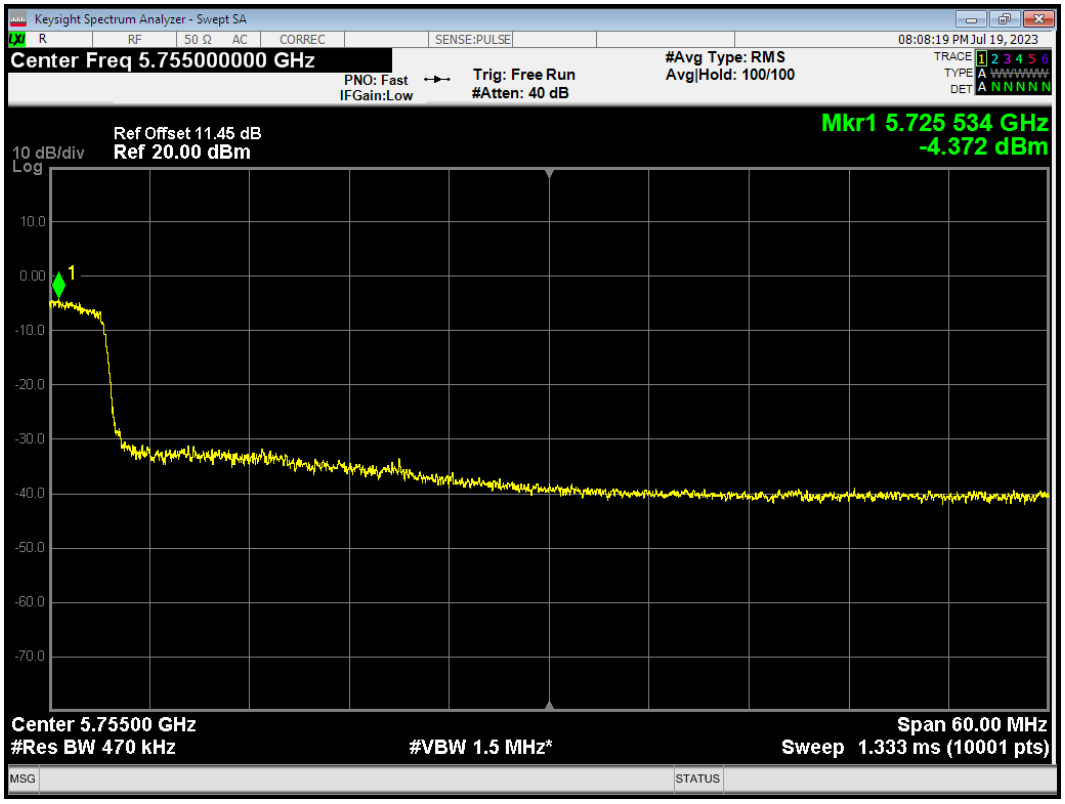
PSD 802.11n(HT20) 5785MHz



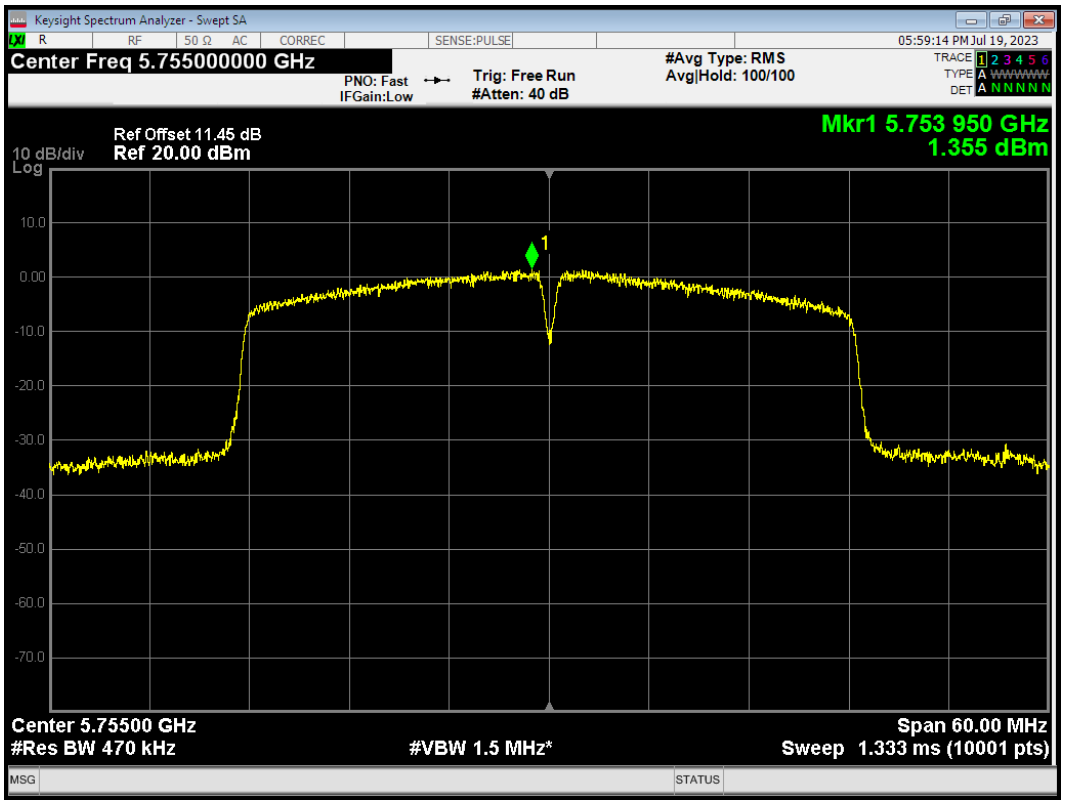
PSD 802.11n(HT20) 5825MHz



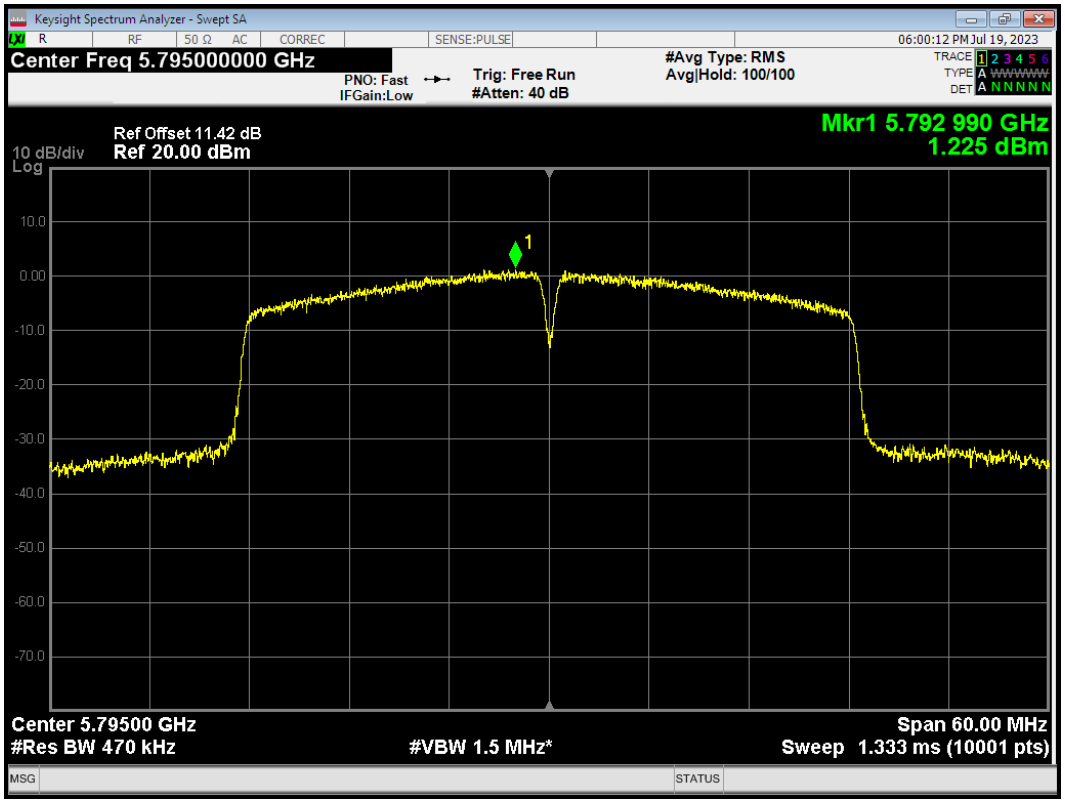
PSD 802.11n(HT40) 5710MHz



PSD 802.11n(HT40) 5755MHz



PSD 802.11n(HT40) 5795MHz



5.5. Unwanted Emission

Ambient condition

Temperature	Relative humidity
23°C ~25°C	45%~50%

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.

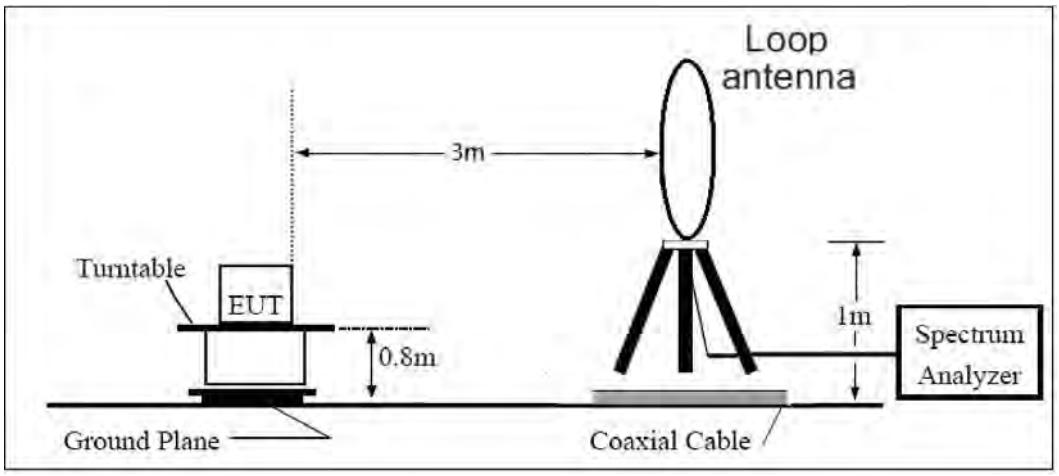
Reduce the video bandwidth until no significant variations in the displayed signal are observed in subsequent traces, provided the video bandwidth is no less than 1 Hz. For regulatory requirements that specify averaging only over the transmit duration (e.g., digital transmission system [DTS] and Unlicensed 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.

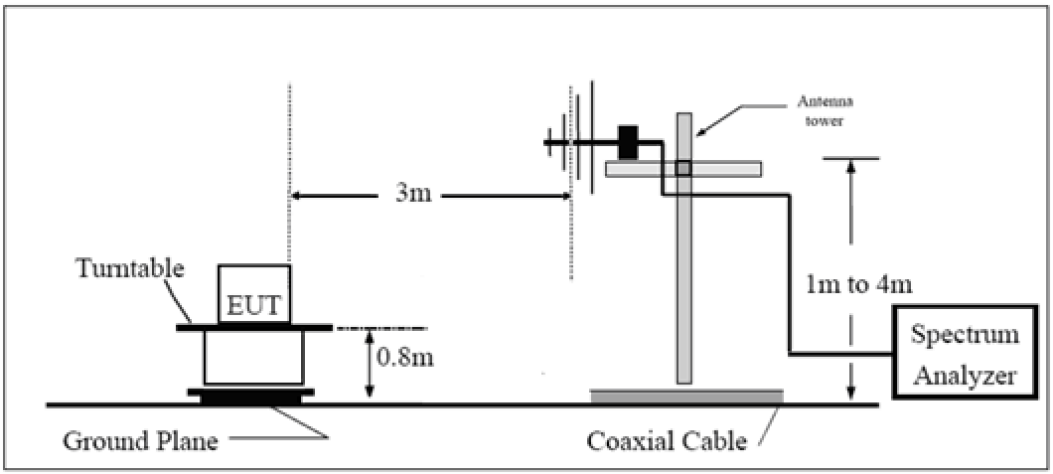
The test is in transmitting mode.

Test setup

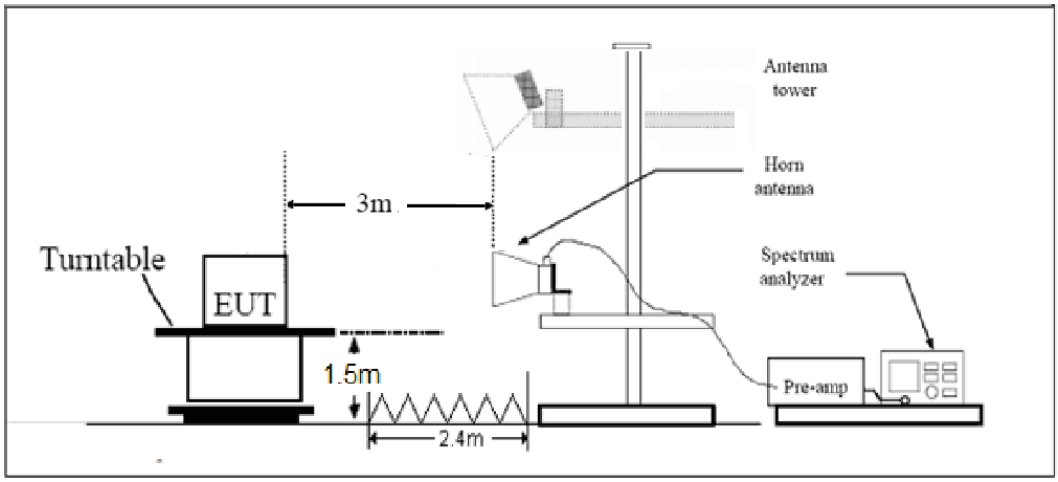
9KHz~ 30MHz



30MHz~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

(1) For transmitters operating in the 5725-5850 MHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz(68.2dBμV/m).

(3) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz(68.2dBμV/m).

(4) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz(68.2dBμV/m).

Note: the following formula is used to convert the EIRP to field strength

§1、E[dBμV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and

d = distance at which field strength limit is specified in the rules;

§2、E[dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters

(5) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table.

Frequency of emission (MHz)	Field strength(μV/m)	Field strength(dBμV/m)
0.009–0.490	2400/F(kHz)	/
0.490–1.705	24000/F(kHz)	/
1.705–30.0	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	[2]
13.36 - 13.41			

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.17 dB
200MHz-1GHz	4.84 dB
1-18GHz	4.35 dB
18-26.5GHz	5.90 dB
26.5GHz~40GHz	5.92 dB

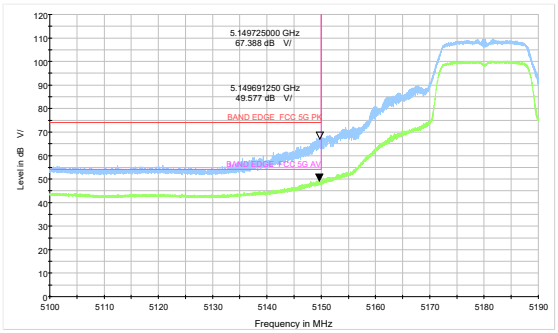
Test Results:

A symbol (dB V/) in the test plot below means (dBμV/m)

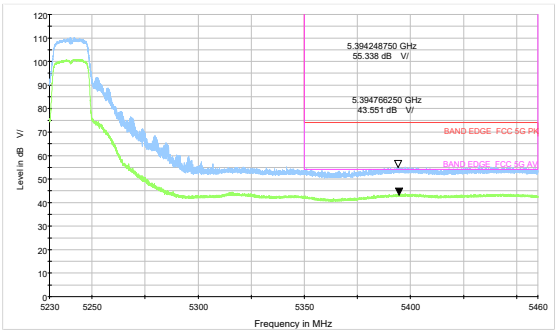
The signal beyond the limit is carrier.

U-NII-1

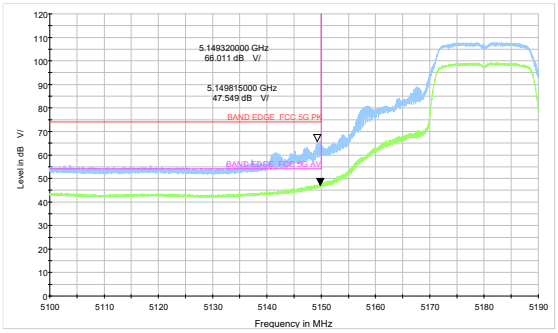
802.11a-Channel 36: Peak + Average



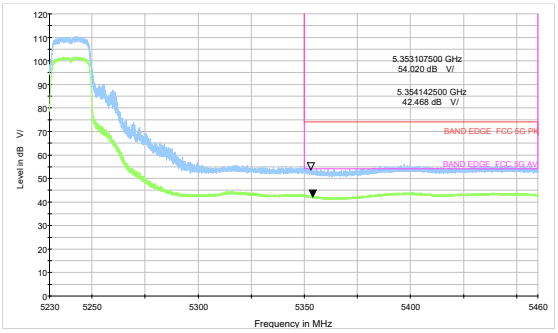
802.11a-Channel 48: Peak + Average



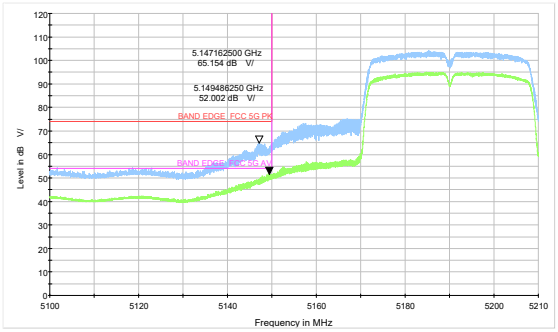
802.11n HT20-Channel 36: Peak + Average



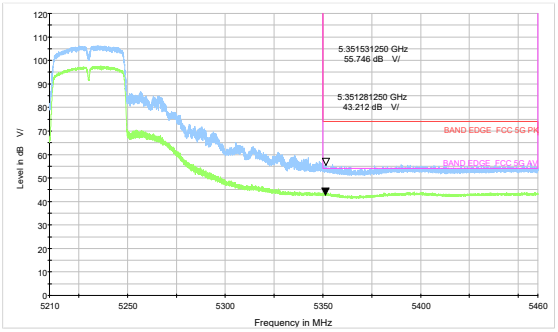
802.11n HT20-Channel 48: Peak + Average



802.11n HT40-Channel 38: Peak + Average

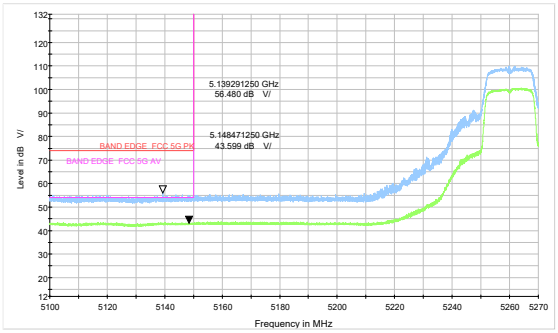


802.11n HT40-Channel 46: Peak + Average

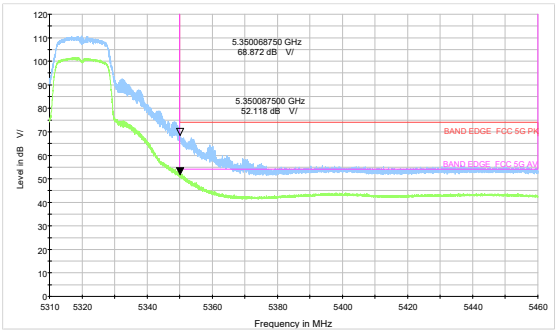


U-NII-2A

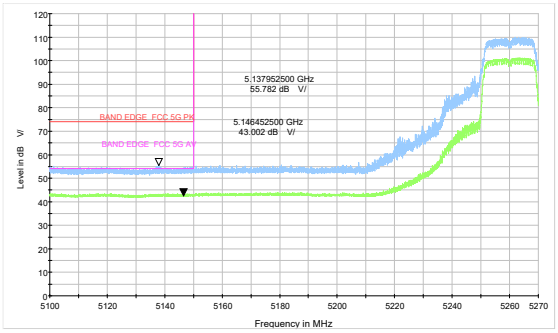
802.11a-Channel 52: Peak + Average



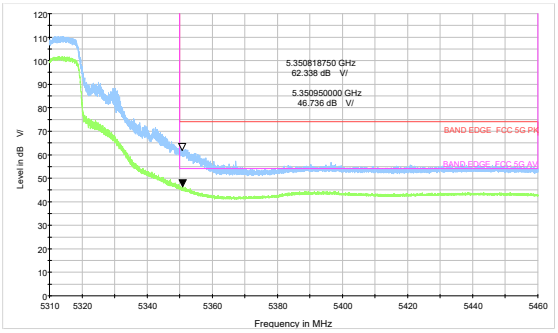
802.11a-Channel 64: Peak + Average



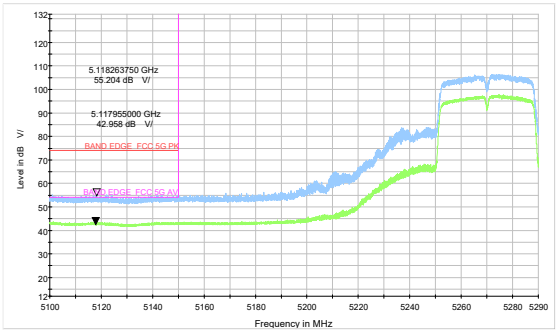
802.11n HT20-Channel 52: Peak + Average



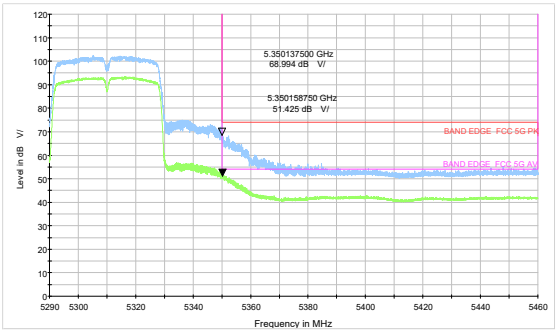
802.11n HT20-Channel 64: Peak + Average



802.11n HT40-Channel 54: Peak + Average

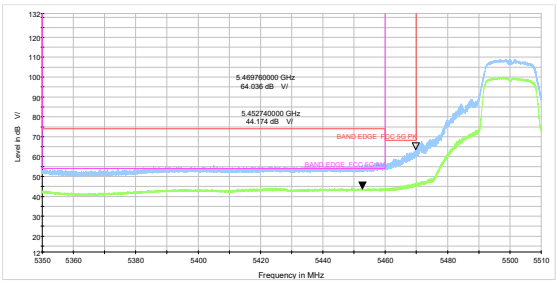


802.11n HT40-Channel 62: Peak + Average

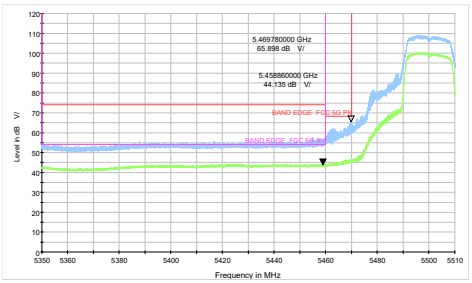


U-NII-2C

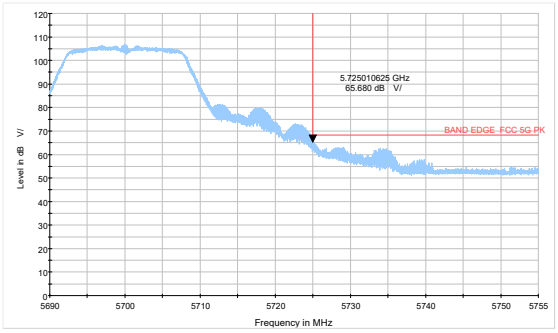
802.11a-Channel 100: Peak + Average



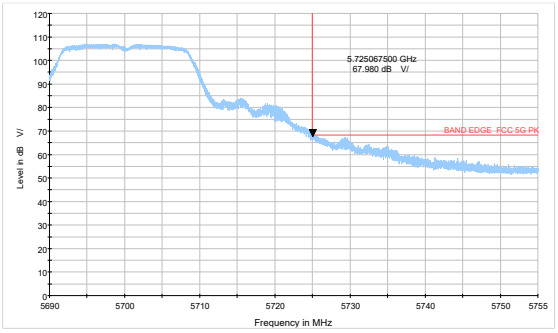
802.11n HT20-Channel 100: Peak + Average



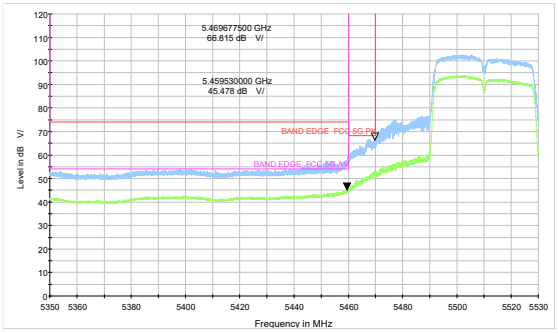
802.11a-Channel 140: Peak



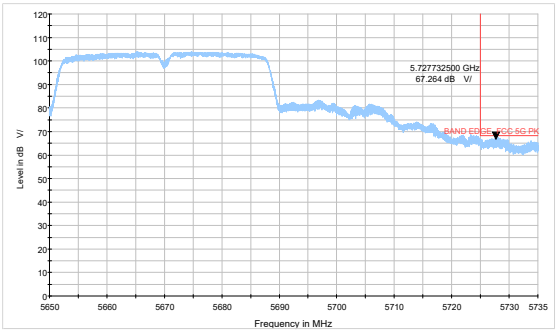
802.11n HT20-Channel 140: Peak



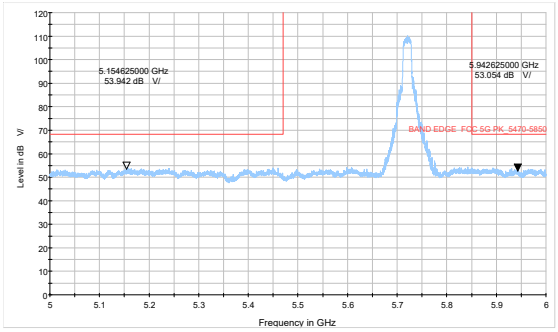
802.11n HT40-Channel 102: Peak + Average



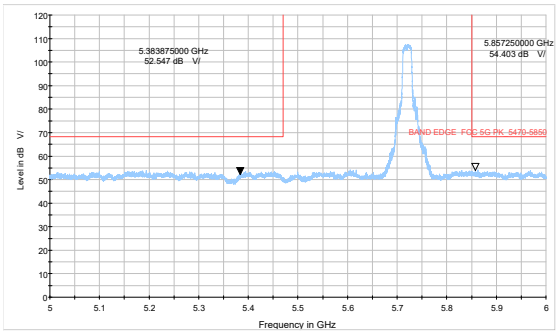
802.11n HT40-Channel 134: Peak



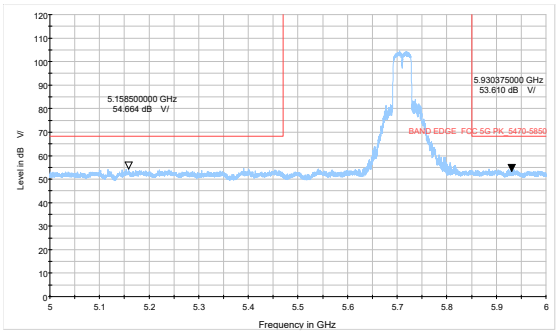
802.11a-Channel 144: Peak



802.11n HT20-Channel 144: Peak

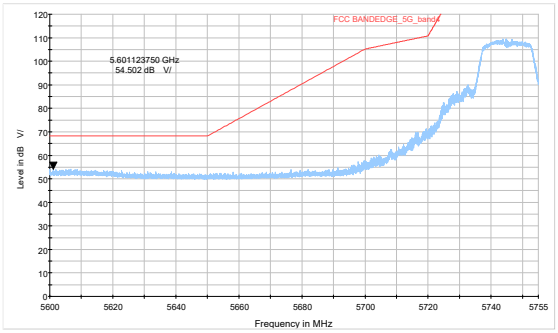


802.11n HT40-Channel 142: Peak

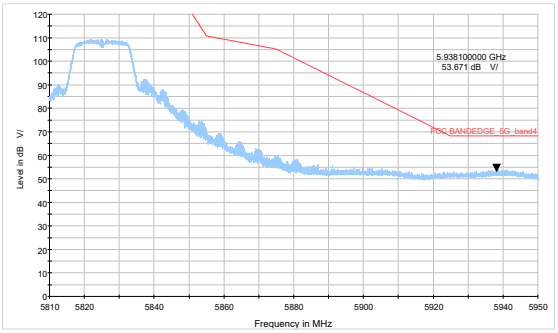


U-NII-3

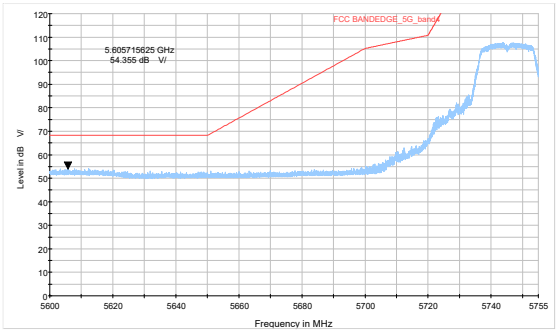
802.11a-Channel 149: Peak



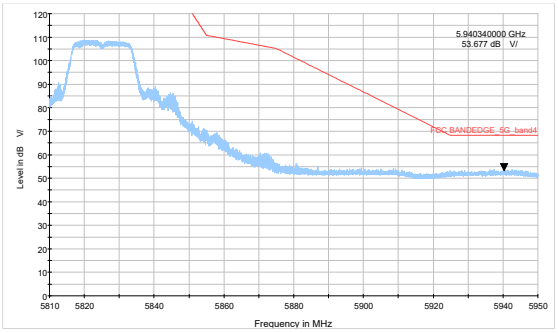
802.11a-Channel 165: Peak



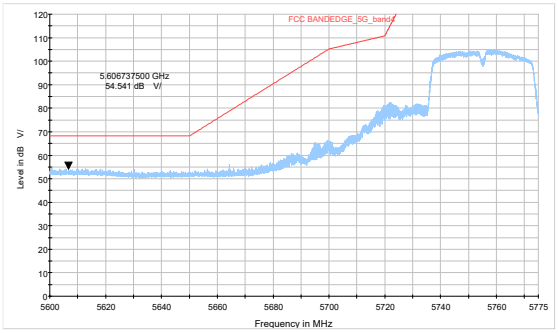
802.11n HT20-Channel 149: Peak



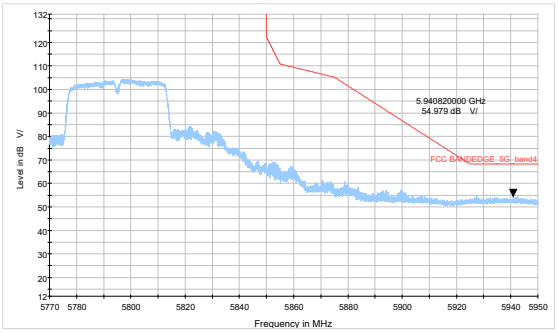
802.11n HT20-Channel 165: Peak



802.11n HT40-Channel 151: Peak



802.11n HT40-Channel 159: Peak



Result of RE

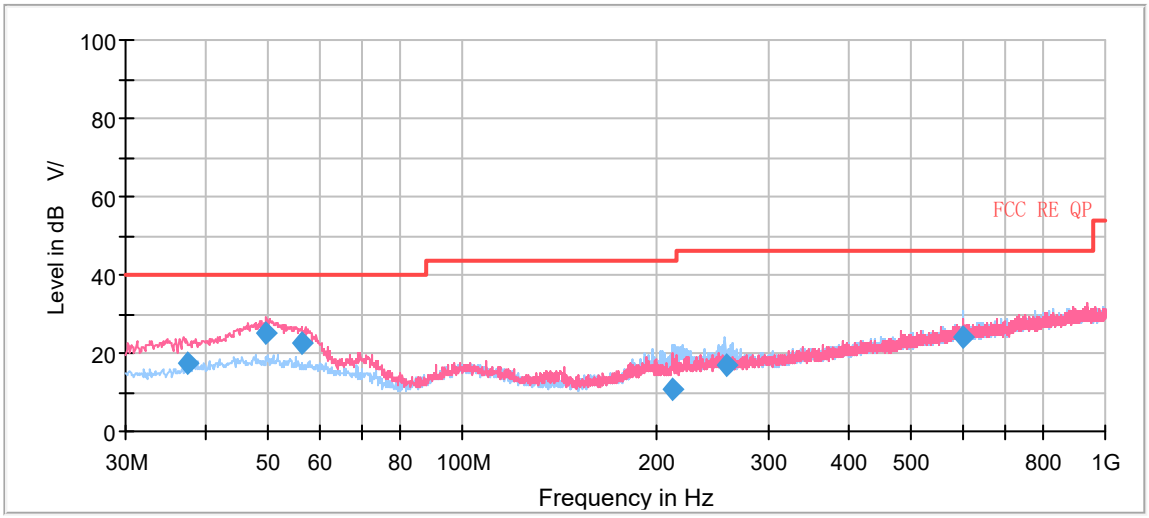
Test result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the Emissions in the frequency band 9kHz-30MHz are more than 20dB below the limit are not reported.

A symbol (dB V/) in the test plot below means (dBμV/m)

During the test, the Radiates Emission from 30MHz to 1GHz was performed in all modes with all channels, 802.11a, Channel 52 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

Continuous TX mode:



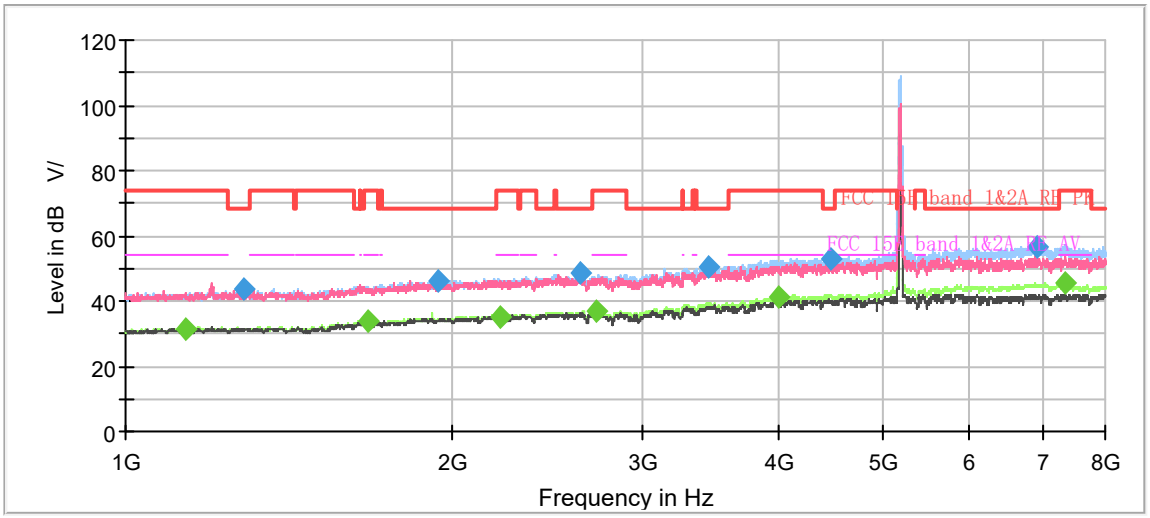
Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
37.391250	17.27	40.00	22.73	100.0	V	315.0	18.6
49.682500	25.32	40.00	14.68	100.0	V	296.0	20.6
56.518750	22.64	40.00	17.36	125.0	V	0.0	19.9
212.115000	10.95	43.50	32.55	100.0	H	126.0	17.7
257.218750	17.04	46.00	28.96	100.0	H	309.0	19.7
600.036250	24.20	46.00	21.80	125.0	H	77.0	27.0

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

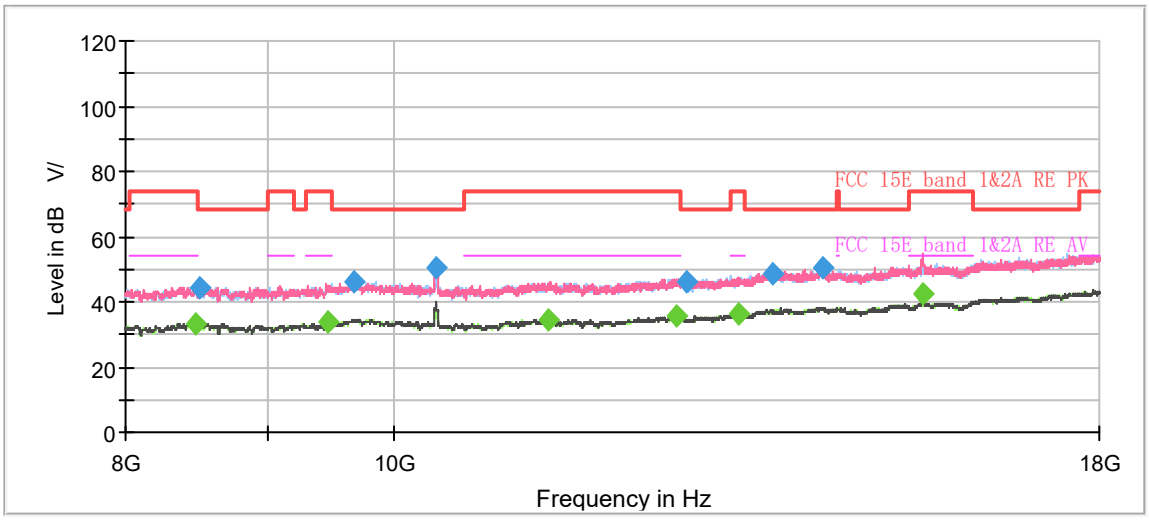
2. Margin = Limit – Quasi-Peak

802.11a CH36



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 8GHz



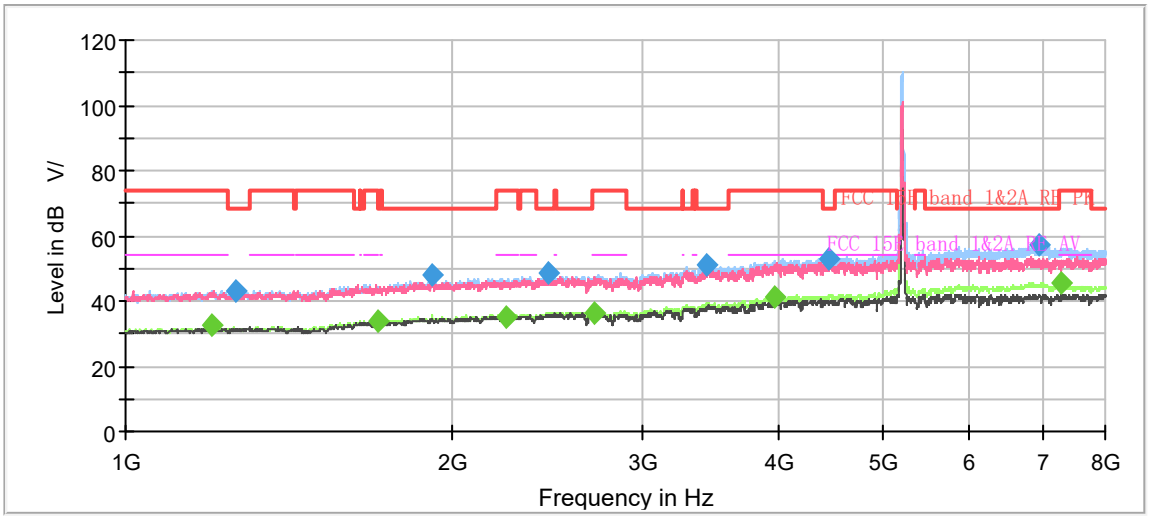
Radiates Emission from 8GHz to 18GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1138.250000	---	31.51	54.00	22.49	500.0	100.0	V	44.0	-8.2
1284.375000	43.39	---	68.20	24.81	500.0	100.0	H	102.0	-7.2
1669.375000	---	33.79	54.00	20.21	500.0	100.0	H	46.0	-5.1
1939.750000	46.33	---	68.20	21.87	500.0	100.0	H	21.0	-3.7
2218.000000	---	34.89	54.00	19.11	500.0	100.0	H	331.0	-2.5
2628.375000	48.42	---	68.20	19.78	500.0	100.0	H	123.0	-0.5
2720.250000	---	36.75	54.00	17.25	500.0	100.0	H	158.0	-0.1
3443.000000	50.63	---	68.20	17.57	500.0	100.0	H	144.0	2.4
3998.625000	---	41.32	54.00	12.68	500.0	200.0	H	147.0	4.5
4473.750000	52.90	---	68.20	15.30	500.0	100.0	H	289.0	5.4
6919.375000	56.71	---	68.20	11.49	500.0	100.0	H	200.0	8.8
7342.875000	---	45.25	54.00	8.75	500.0	100.0	H	137.0	9.3

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

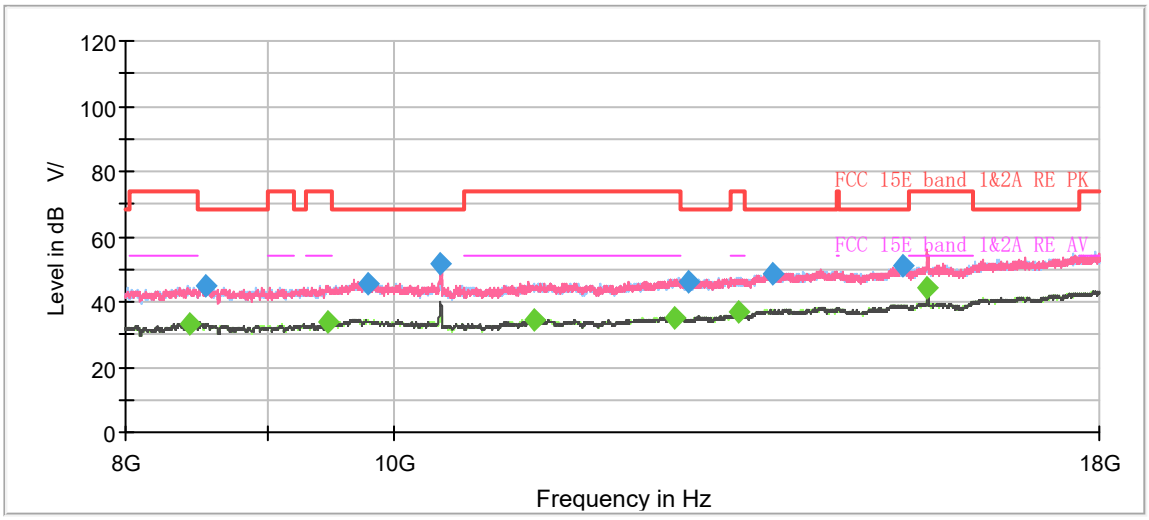
2. Margin = Limit –MAX Peak/ Average

802.11a CH40



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 8GHz



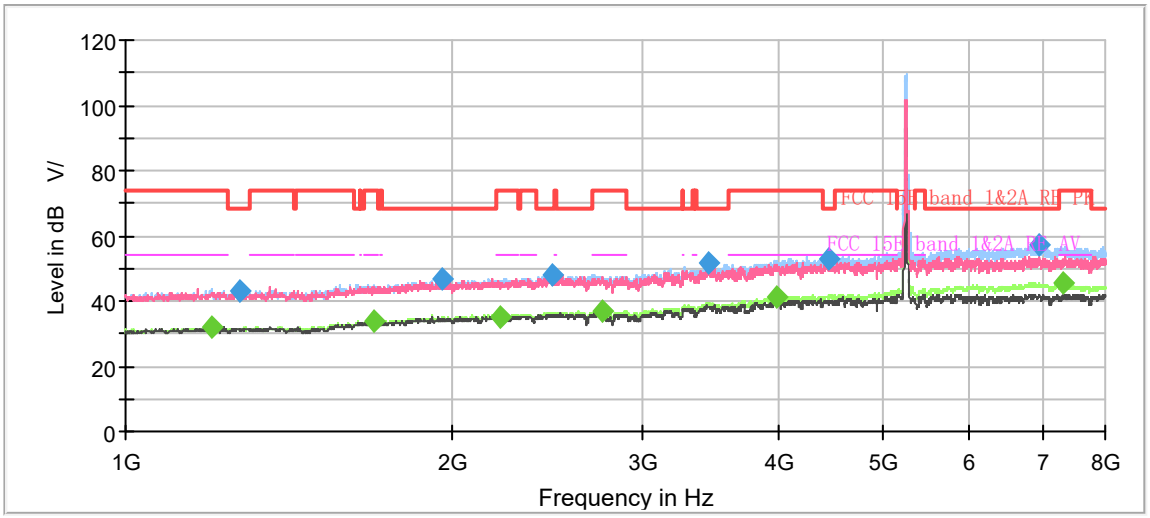
Radiates Emission from 8GHz to 18GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.500000	---	32.64	54.00	21.36	500.0	200.0	H	320.0	-7.7
1266.000000	42.94	---	68.20	25.26	500.0	100.0	H	227.0	-7.4
1706.125000	---	33.72	54.00	20.28	500.0	200.0	H	58.0	-4.9
1920.500000	47.96	---	68.20	20.24	500.0	200.0	H	44.0	-3.8
2240.750000	---	35.15	54.00	18.85	500.0	200.0	H	119.0	-2.4
2449.000000	48.82	---	68.20	19.38	500.0	200.0	H	85.0	-1.4
2701.000000	---	36.60	54.00	17.40	500.0	200.0	H	335.0	-0.1
3432.500000	50.87	---	68.20	17.33	500.0	200.0	H	58.0	2.3
3961.000000	---	41.24	54.00	12.76	500.0	200.0	H	99.0	4.4
4441.375000	53.00	---	68.20	15.20	500.0	200.0	H	52.0	5.3
6952.625000	57.11	---	68.20	11.09	500.0	100.0	H	227.0	8.8
7297.375000	---	45.59	54.00	8.41	500.0	200.0	H	92.0	9.3

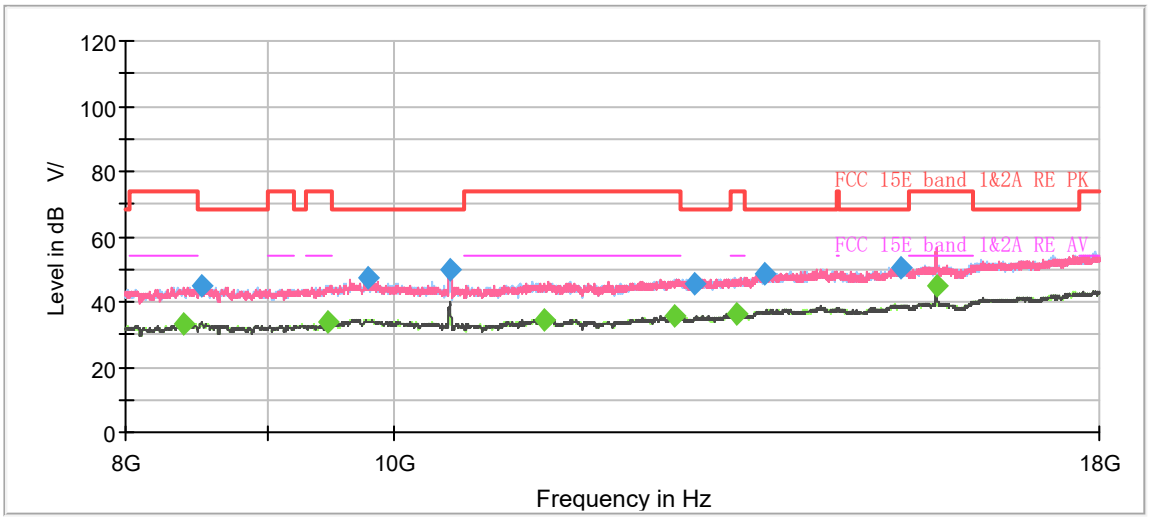
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit –MAX Peak/ Average

802.11a CH48



Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 8GHz



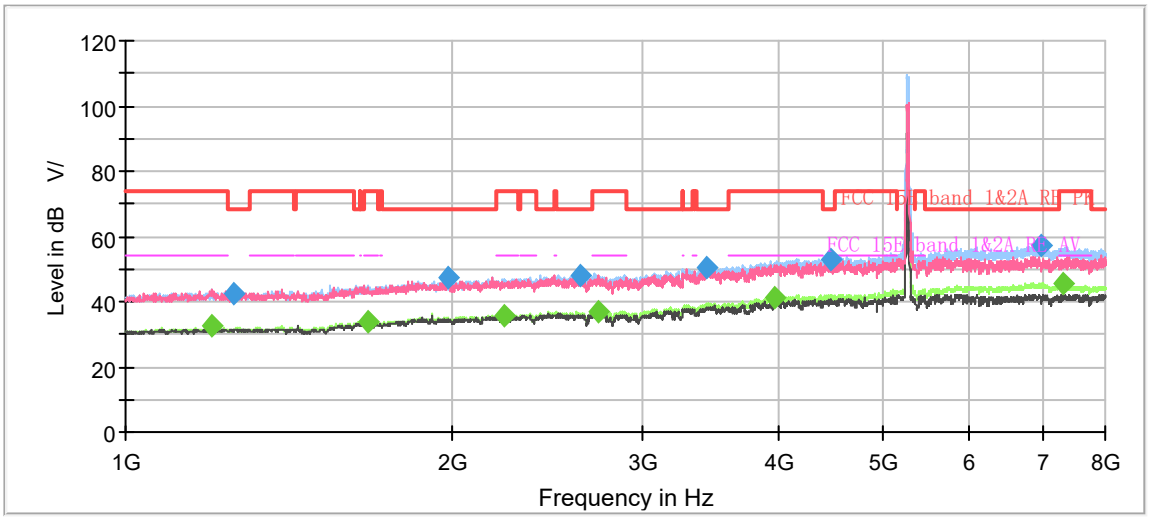
Radiates Emission from 8GHz to 18GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.500000	---	32.31	54.00	21.69	500.0	200.0	H	0.0	-7.7
1275.625000	42.92	---	68.20	25.28	500.0	100.0	H	244.0	-7.3
1696.500000	---	33.59	54.00	20.41	500.0	200.0	H	108.0	-4.9
1961.625000	46.48	---	68.20	21.72	500.0	200.0	H	88.0	-3.6
2218.000000	---	35.02	54.00	18.98	500.0	200.0	H	175.0	-2.5
2473.500000	48.21	---	68.20	19.99	500.0	100.0	H	285.0	-1.3
2750.000000	---	36.76	54.00	17.24	500.0	200.0	H	182.0	-0.1
3447.375000	51.54	---	68.20	16.66	500.0	200.0	H	61.0	2.4
3986.375000	---	41.29	54.00	12.71	500.0	200.0	H	135.0	4.5
4457.125000	52.96	---	68.20	15.24	500.0	200.0	H	142.0	5.4
6957.000000	56.93	---	68.20	11.27	500.0	100.0	H	298.0	8.8
7304.375000	---	45.30	54.00	8.70	500.0	200.0	H	13.0	9.3

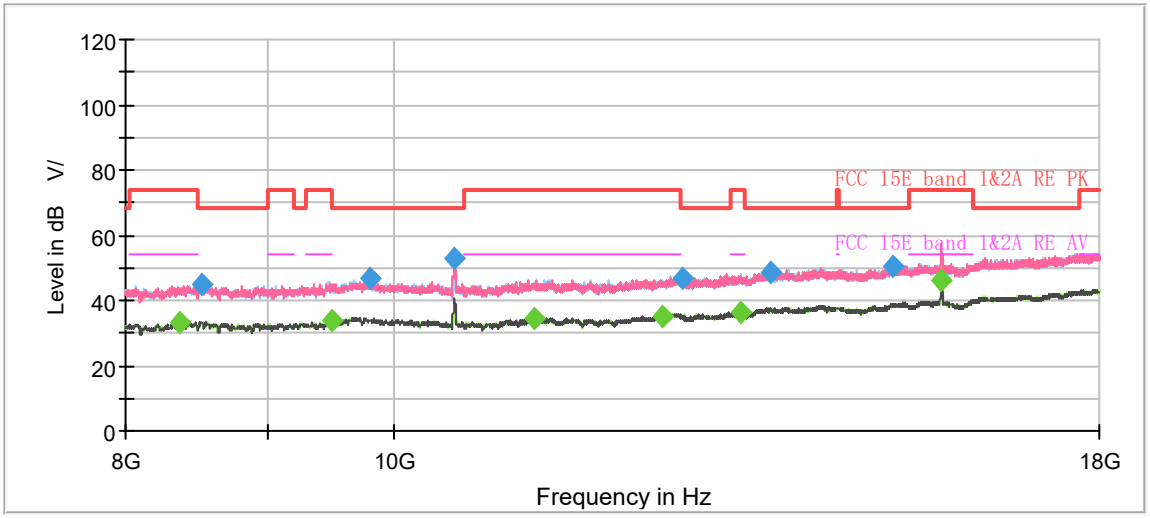
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit –MAX Peak/ Average

802.11a CH52



Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 8GHz



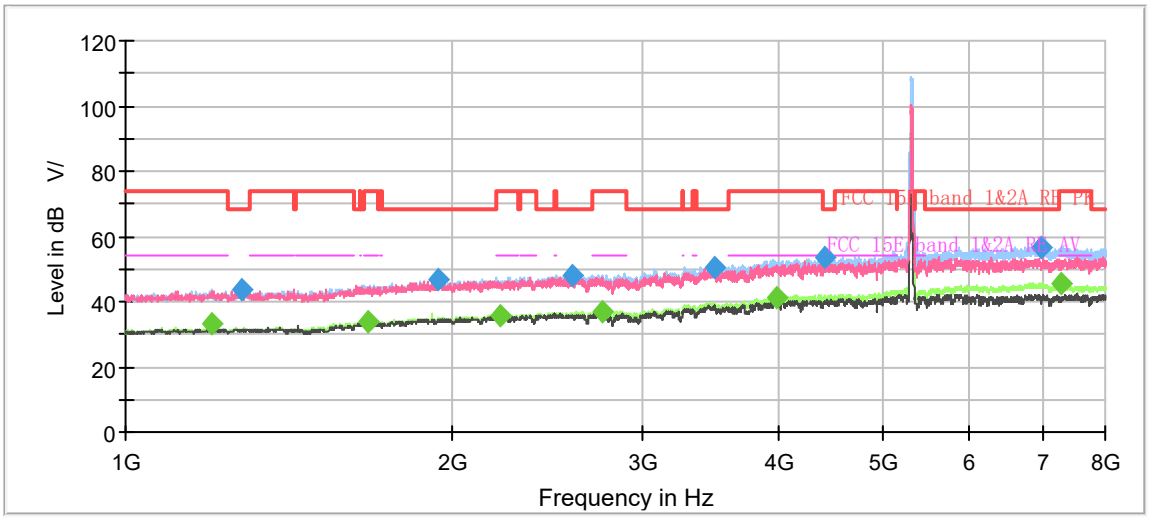
Radiates Emission from 8GHz to 18GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.500000	---	32.78	54.00	21.22	500.0	200.0	H	158.0	-7.7
1257.250000	42.77	---	68.20	25.43	500.0	100.0	H	286.0	-7.4
1672.000000	---	33.65	54.00	20.35	500.0	100.0	H	122.0	-5.1
1984.375000	47.14	---	68.20	21.06	500.0	200.0	H	90.0	-3.5
2233.750000	---	35.39	54.00	18.61	500.0	200.0	H	19.0	-2.4
2625.750000	48.17	---	68.20	20.03	500.0	100.0	H	122.0	-0.5
2729.000000	---	36.97	54.00	17.03	500.0	200.0	H	61.0	-0.1
3438.625000	50.70	---	68.20	17.50	500.0	100.0	H	261.0	2.3
3971.500000	---	41.25	54.00	12.75	500.0	200.0	H	90.0	4.5
4469.375000	53.10	---	68.20	15.10	500.0	100.0	H	157.0	5.4
6984.125000	57.03	---	68.20	11.17	500.0	200.0	H	129.0	8.8
7328.000000	---	45.29	54.00	8.71	500.0	200.0	H	40.0	9.3
15773.750000	---	45.88	54.00	8.12	500.0	200.0	V	169.0	9.0

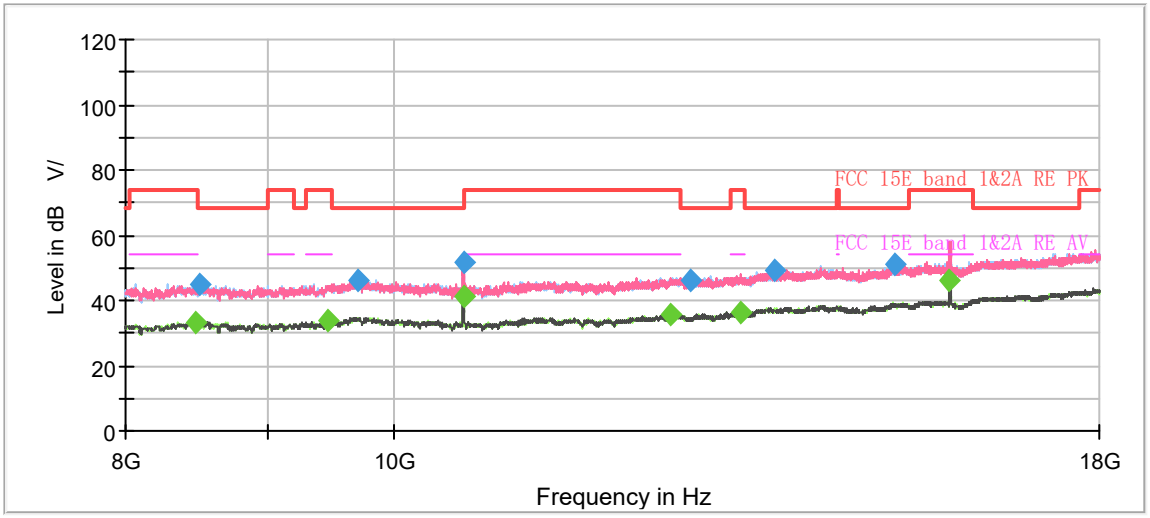
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit –MAX Peak/ Average

802.11a CH60



Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 8GHz



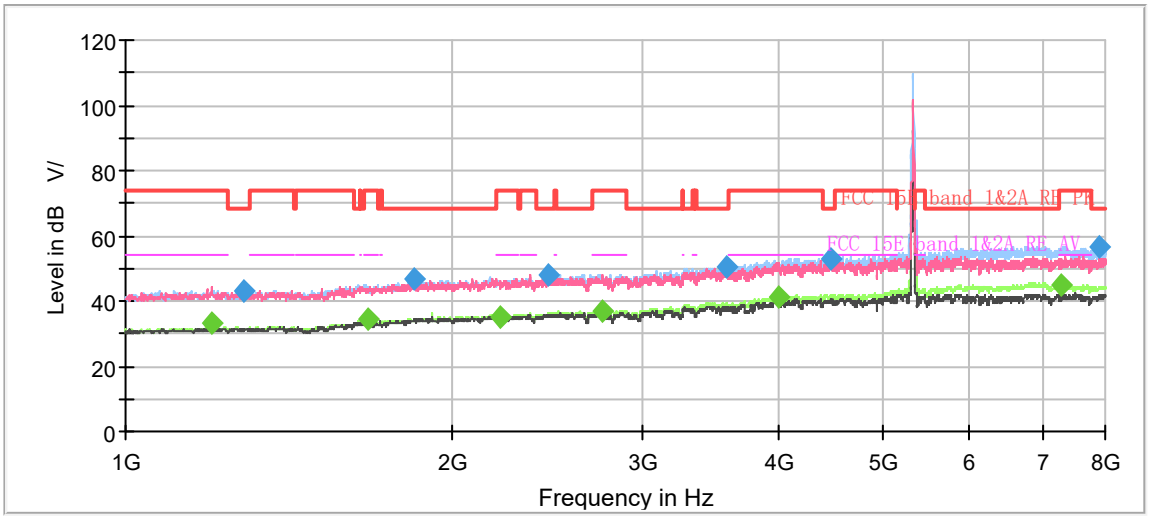
Radiates Emission from 8GHz to 18GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.500000	---	32.94	54.00	21.06	500.0	200.0	V	57.0	-7.7
1279.125000	43.73	---	68.20	24.47	500.0	200.0	V	353.0	-7.3
1675.500000	---	33.69	54.00	20.31	500.0	200.0	H	101.0	-5.0
1939.750000	46.67	---	68.20	21.53	500.0	200.0	V	57.0	-3.7
2215.375000	---	35.46	54.00	18.54	500.0	200.0	H	101.0	-2.5
2577.625000	48.20	---	68.20	20.00	500.0	200.0	V	284.0	-0.8
2750.000000	---	36.64	54.00	17.36	500.0	100.0	H	41.0	-0.1
3492.875000	50.66	---	68.20	17.54	500.0	100.0	H	310.0	2.5
3975.000000	---	41.27	54.00	12.73	500.0	200.0	H	101.0	4.5
4419.500000	53.73	---	68.20	14.47	500.0	200.0	H	53.0	5.2
6973.625000	56.67	---	68.20	11.53	500.0	200.0	H	74.0	8.8
7300.875000	---	45.32	54.00	8.68	500.0	200.0	H	81.0	9.3

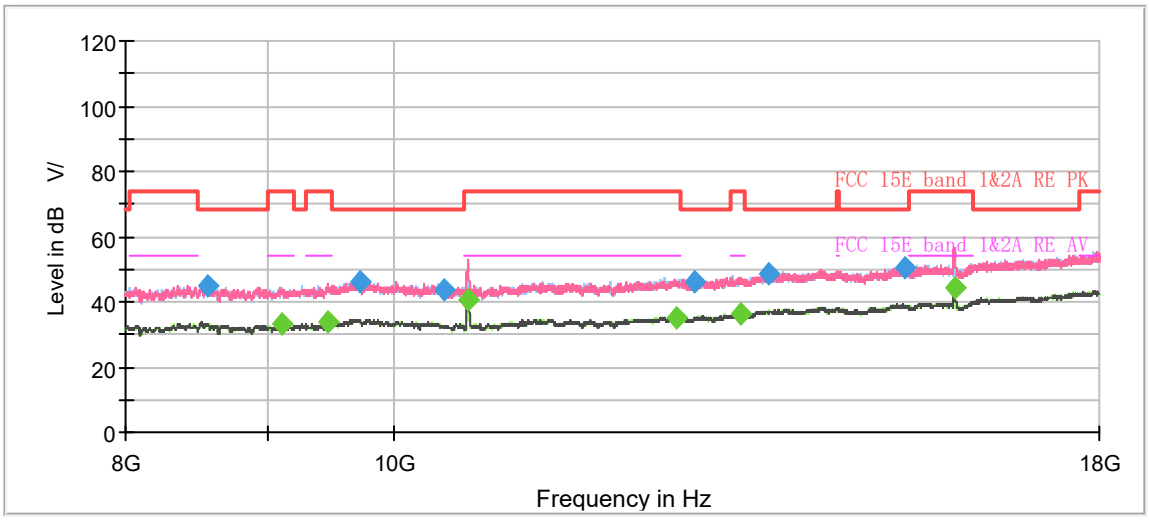
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit –MAX Peak/ Average

802.11a CH64



Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 8GHz



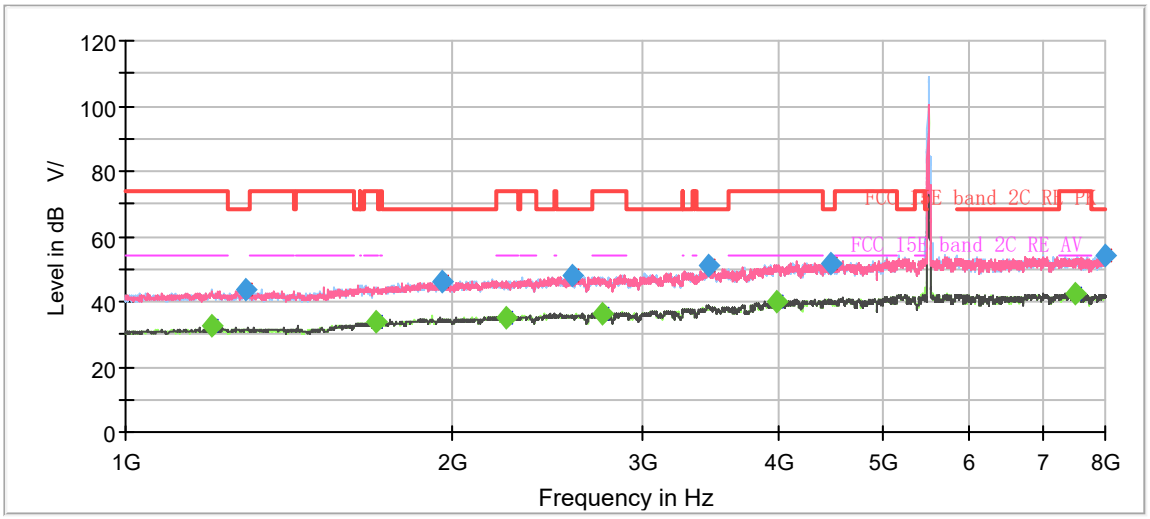
Radiates Emission from 8GHz to 18GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.500000	---	33.10	54.00	20.90	500.0	200.0	H	15.0	-7.7
1285.250000	43.15	---	68.20	25.05	500.0	200.0	V	275.0	-7.2
1674.625000	---	34.28	54.00	19.72	500.0	100.0	H	352.0	-5.0
1845.250000	46.83	---	68.20	21.37	500.0	200.0	H	21.0	-4.2
2218.000000	---	35.15	54.00	18.85	500.0	100.0	H	331.0	-2.5
2452.500000	48.01	---	68.20	20.19	500.0	100.0	H	231.0	-1.4
2750.875000	---	36.78	54.00	17.22	500.0	200.0	H	214.0	-0.1
3583.000000	50.33	---	68.20	17.87	500.0	100.0	H	42.0	2.7
3995.125000	---	41.41	54.00	12.59	500.0	200.0	H	221.0	4.5
4458.875000	52.82	---	68.20	15.38	500.0	100.0	H	268.0	5.4
7293.000000	---	45.18	54.00	8.82	500.0	200.0	H	214.0	9.3
7889.750000	56.92	---	68.20	11.28	500.0	100.0	H	117.0	9.0

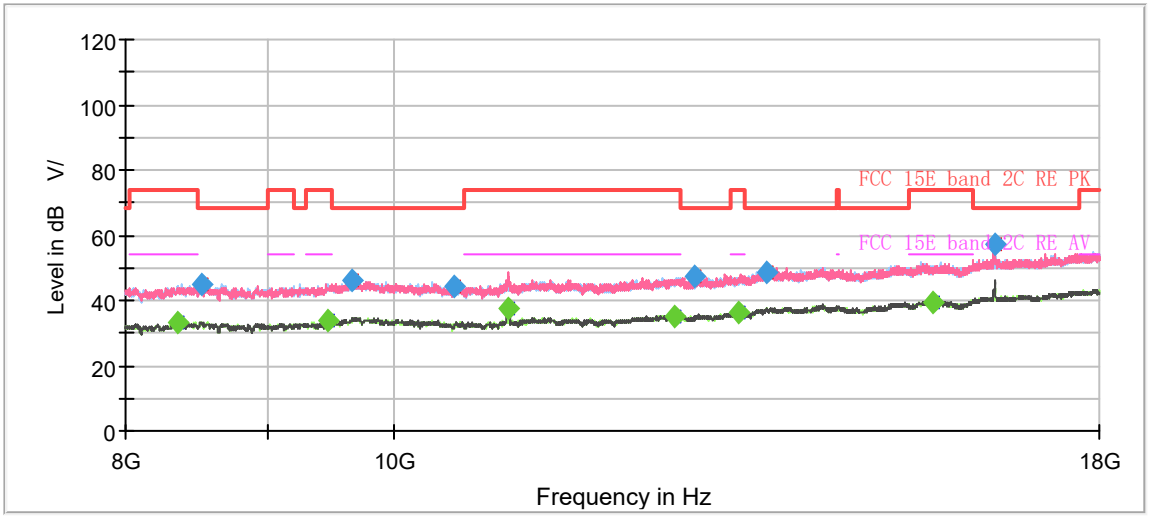
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit –MAX Peak/ Average

802.11a CH100



Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 8GHz



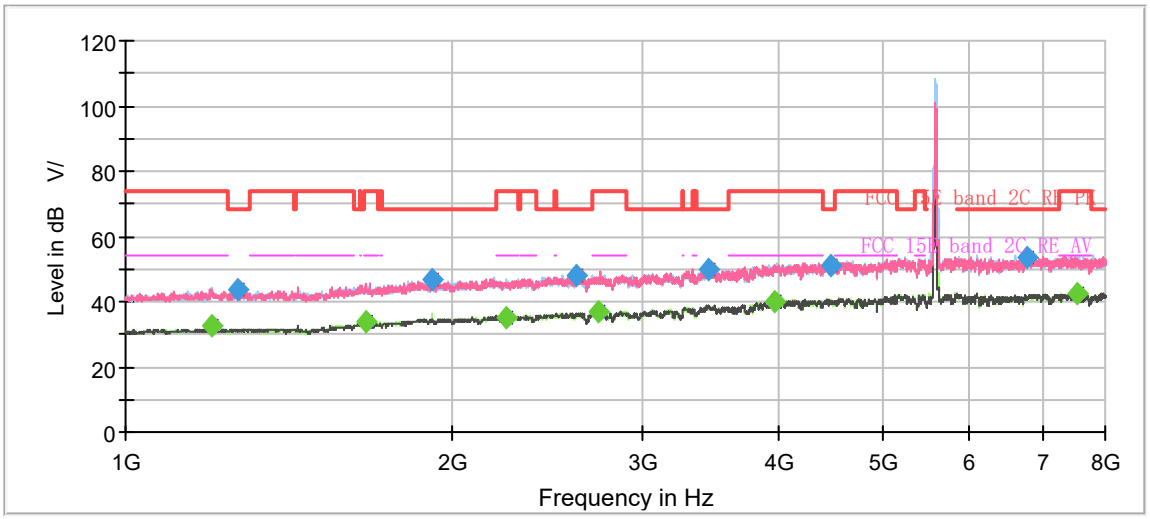
Radiates Emission from 8GHz to 18GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.500000	---	32.80	54.00	21.20	500.0	200.0	H	282.0	-7.7
1292.250000	43.84	---	68.20	24.36	500.0	200.0	V	354.0	-7.2
1698.250000	---	33.65	54.00	20.35	500.0	200.0	V	246.0	-4.9
1959.875000	45.98	---	68.20	22.22	500.0	200.0	V	242.0	-3.6
2242.500000	---	35.13	54.00	18.87	500.0	200.0	H	117.0	-2.4
2580.250000	47.92	---	68.20	20.28	500.0	200.0	V	341.0	-0.8
2751.750000	---	36.55	54.00	17.45	500.0	200.0	V	280.0	-0.1
3445.625000	50.98	---	68.20	17.22	500.0	200.0	V	232.0	2.4
3975.875000	---	40.08	54.00	13.92	500.0	200.0	H	45.0	4.5
4472.000000	51.49	---	68.20	16.71	500.0	100.0	V	163.0	5.4
7497.750000	---	42.25	54.00	11.75	500.0	200.0	V	359.0	8.9
7983.375000	54.36	---	68.20	13.84	500.0	200.0	V	299.0	9.1

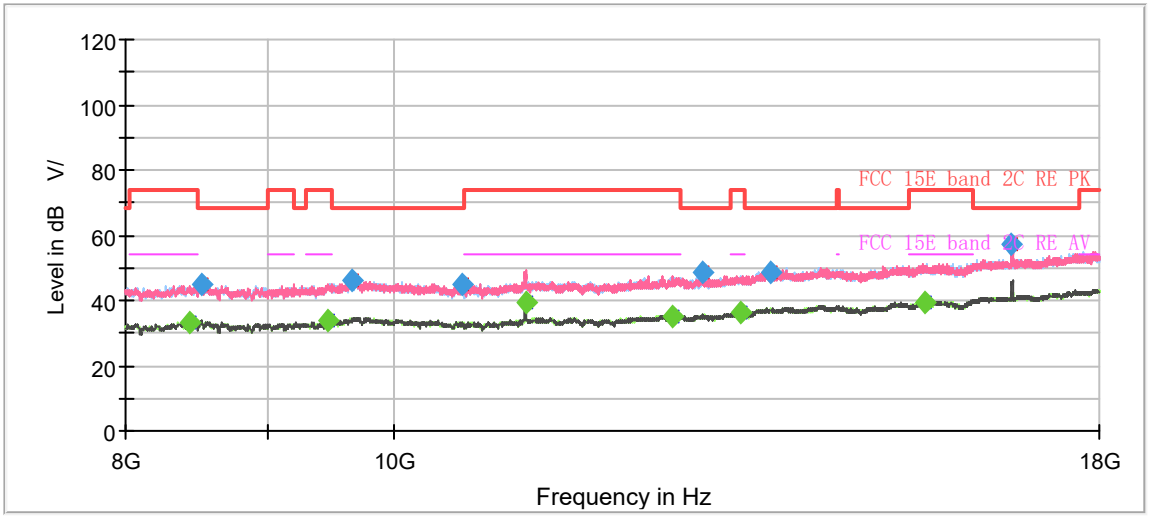
Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit –MAX Peak/ Average

802.11a CH116



Note: The signal beyond the limit is carrier.
Radiates Emission from 1GHz to 8GHz



Radiates Emission from 8GHz to 18GHz