RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd
FCC ID	XMR202102AF50T
Product	Wi-Fi&BT module
Brand	Quectel
Model	AF50T
Report No.	R2101A0024-R3V1
Issue Date	July 21, 2021

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15E (2020)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Peng Tao

Approved by: Kai Xu

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TABLE OF CONTENT

Version	Revision description	Issue Date
Rev.0	Initial issue of report.	June 11, 2021
Rev.1	Update data and description	July 21, 2021
Note: This revised report (Report No. R2101A0024-R3V1) supersedes and replaces the previously issued report (Report No. R2101A0024-R3). Please discard or destroy the previously issued report and dispose of it accordingly.		

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: April 15, 2021~July 20, 2021 Date of Sample Received: March 5, 2021			
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:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
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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	AF50T
SN	C1A21AU25000250
Hardware Version	R1.0
Software Version	AF50TAATA
Power Supply	External power supply
Antenna Type	External Antenna
Antenna Gain	SISO Antenna 1: 2.34dBi SISO Antenna 2: 2.34dBi
Directional Gain	PSD Direction Gain:5.35dBi
Test Band	U-NII-1(5150MHz-5250MHz) U-NII-2A(5250MHz-5350MHz) U-NII-2C(5470MHz-5725MHz U-NII-3(5725MHz-5850MHz)
Modulation Type	802.11a/n (HT20/HT40):OFDM 802.11ac (VHT20/VHT40/VHT80):OFDM 802.11ax (HE20/HE40/HE80):OFDMA
Max. Conducted Power	20.67dBm
Operating Frequency Range(s)	U-NII-1: 5150MHz-5250MHz U-NII-2A:5250MHz -5350MHz U-NII-2C:5470MHz-5725MHz U-NII-3: 5725MHz -5850MHz
Extreme temperature range:	-20 ° C to 50° C
Operating temperature range:	-40 ° C to 85° C
Operating voltage range:	3.3 V to 4.25 V
State DC voltage:	3.85V

Note:1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.

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 (2020) Unlicensed National Information Infrastructure Devices

ANSI C63.10 (2013)

Reference standard:

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

4. Test Configuration

Test Mode

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

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z 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	
	SISO Antenna	MIMO Antenna
802.11a	6 Mbps	--
802.11n HT20	MCS0	MCS0
802.11n HT40	MCS0	MCS0
802.11ac VHT20	MCS0	MCS0
802.11ac VHT40	MCS0	MCS0
802.11ac VHT80	MCS0	MCS0
802.11ax HE20	MCS0	MCS0
802.11ax HE40	MCS0	MCS0
802.11ax HE80	MCS0	MCS0

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

Test Cases	Antenna 1	Antenna 2	MIMO
Average conducted output power	O	O	802.11n HT20/40 802.11ac VHT20/40/80 802.11ax HE0/40/80
Occupied bandwidth	802.11a	--	802.11n HT20/40 802.11ac VHT20/40/80
Frequency stability	802.11a	--	802.11n HT20/40 802.11ac VHT20/40/80 802.11ax HE0/40/8
Power Spectral Density	O	O	802.11n HT20/40 802.11ac VHT20/40/80 802.11ax HE0/40/80
Unwanted Emissions	802.11a	--	802.11n HT20/40 802.11ac VHT20/40/80

			802.11ax HE0/40/8
Conducted Emissions	O	--	--
Note：“O”: test all bands			

According to RF Output power results in chapter 5.1, MIMO was selected as the worst antenna for 802.11n HT20/40, 802.11ac VHT20/40/80, 802.11ax HE20/40/80. SISO Antenna 1 was selected as the worst SISO antenna for 802.11a.

Wireless Technology and Frequency Range

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

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

5. Test Case Results

5.1. Occupied Bandwidth

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

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

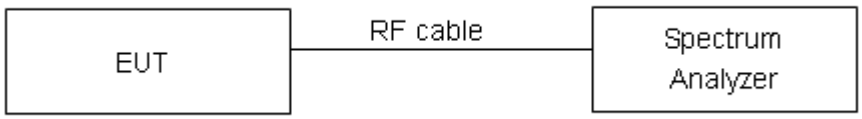
For U-NII-1/U-NII-2A/U-NII-2C, set RBW ≈1% OCB kHz, VBW ≥ 3 × RBW, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the 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	16.313	20.00	PASS
	5200	16.337	18.74	PASS
	5240	16.337	19.39	PASS
802.11n HT20	5180	17.553	19.61	PASS
	5200	17.564	19.64	PASS
	5240	17.550	19.61	PASS
802.11n HT40	5190	36.019	38.67	PASS
	5230	36.031	39.90	PASS
802.11ac VHT20	5180	17.550	19.89	PASS
	5200	17.541	19.84	PASS
	5240	17.556	19.89	PASS
802.11ac VHT40	5190	35.995	38.65	PASS
	5230	36.044	38.52	PASS
802.11ac VHT80	5210	75.446	86.54	PASS
802.11ax HE20	5180	18.887	20.85	PASS
	5200	18.869	20.51	PASS
	5240	18.914	20.56	PASS
802.11ax HE40	5190	37.692	40.04	PASS
	5230	37.721	39.82	PASS
802.11aX HE80	5210	77.343	81.01	PASS

U-NII-2A

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5260	16.330	18.54	PASS
	5300	16.324	18.50	PASS
	5320	16.338	18.45	PASS
802.11n HT20	5260	17.520	19.81	PASS
	5300	17.536	19.49	PASS
	5320	17.529	20.19	PASS
802.11n HT40	5270	36.030	38.89	PASS
	5310	35.998	38.92	PASS
802.11ac VHT20	5260	17.520	19.69	PASS
	5300	17.528	19.78	PASS
	5320	17.527	19.81	PASS
802.11ac VHT40	5270	35.995	38.89	PASS
	5310	35.989	38.54	PASS
802.11ac VHT80	5290	75.403	80.77	PASS
802.11ax HE20	5260	18.859	20.85	PASS
	5300	18.880	20.52	PASS
	5320	18.891	20.75	PASS
802.11ax HE40	5270	37.642	40.19	PASS
	5310	37.670	39.74	PASS
802.11aX HE80	5290	77.129	80.73	PASS

U-NII-2C

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5500	16.322	18.46	PASS
	5600	16.305	18.25	PASS
	5700	16.340	18.60	PASS
	5720	16.316	18.35	PASS
802.11n HT20	5500	17.510	19.61	PASS
	5600	17.532	19.75	PASS
	5700	17.550	19.60	PASS
	5720	17.545	20.05	PASS
802.11n HT40	5510	35.974	38.73	PASS
	5590	35.982	38.43	PASS
	5670	36.011	38.77	PASS
	5710	36.045	39.01	PASS
802.11ac VHT20	5500	17.533	19.50	PASS
	5600	17.519	19.45	PASS
	5700	17.542	20.14	PASS
	5720	17.530	19.67	PASS
802.11ac VHT40	5510	35.944	39.00	PASS
	5590	35.950	38.97	PASS
	5670	36.057	39.07	PASS
	5710	36.034	39.06	PASS
802.11ac VHT80	5610	75.419	81.12	PASS
	5690	75.420	81.01	PASS
802.11ax HE20	5500	18.892	20.37	PASS
	5600	18.887	20.45	PASS
	5700	18.884	20.82	PASS
	5720	18.873	20.48	PASS
802.11ax HE40	5510	37.686	40.17	PASS
	5590	37.689	40.19	PASS
	5670	37.667	40.06	PASS
	5710	37.701	40.07	PASS
802.11ax HE80	5610	77.093	81.62	PASS
	5690	77.159	80.99	PASS

U-NII-3

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11a	5745	16.347	16.30	500	PASS
	5785	16.353	16.31	500	PASS
	5825	16.328	16.32	500	PASS
802.11n HT20	5745	17.557	17.54	500	PASS
	5785	17.553	17.58	500	PASS
	5825	17.542	17.55	500	PASS
802.11n HT40	5755	36.004	35.96	500	PASS
	5795	36.008	36.29	500	PASS
802.11ac VHT20	5745	17.569	17.58	500	PASS
	5785	17.559	16.94	500	PASS
	5825	17.563	17.57	500	PASS
802.11ac VHT40	5755	36.027	36.29	500	PASS
	5795	36.013	36.32	500	PASS
802.11ac VHT80	5775	75.480	75.22	500	PASS
802.11ax HE20	5745	18.916	17.84	500	PASS
	5785	18.890	18.43	500	PASS
	5825	18.874	17.97	500	PASS
802.11ax HE40	5755	37.728	35.62	500	PASS
	5795	37.691	36.21	500	PASS
802.11ax HE80	5775	77.289	74.13	500	PASS

U-NII-1, 802.11a

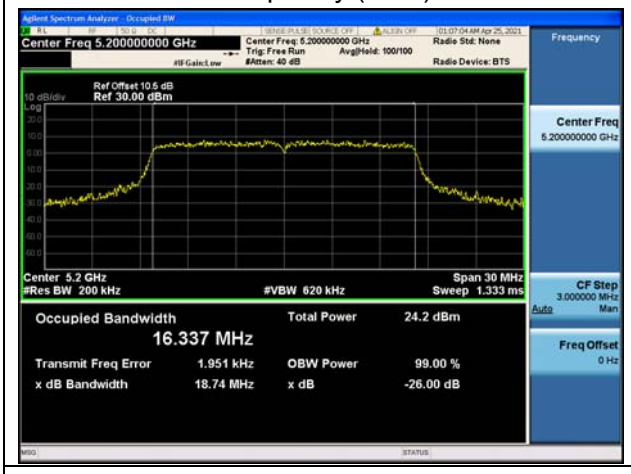
Carrier frequency (MHz): 5180

U-NII-1, 802.11n HT20

Carrier frequency (MHz): 5180

U-NII-1, 802.11a

Carrier frequency (MHz): 5200



U-NII-1, 802.11n HT20

Carrier frequency (MHz): 5200

U-NII-1, 802.11a

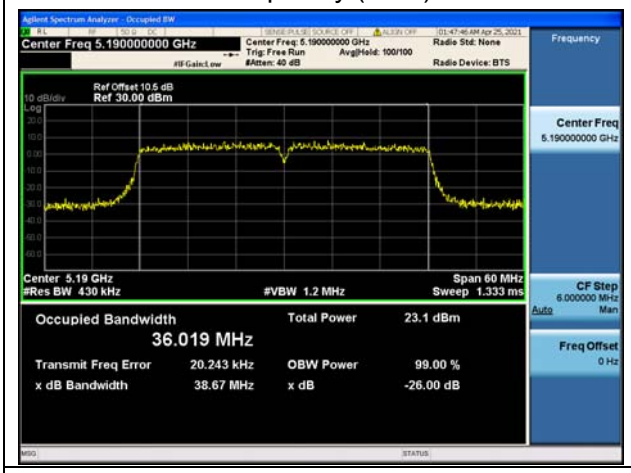
Carrier frequency (MHz):5240

U-NII-1, 802.11n HT20

Carrier frequency (MHz):5240

U-NII-1, 802.11n HT40

Carrier frequency (MHz): 5190

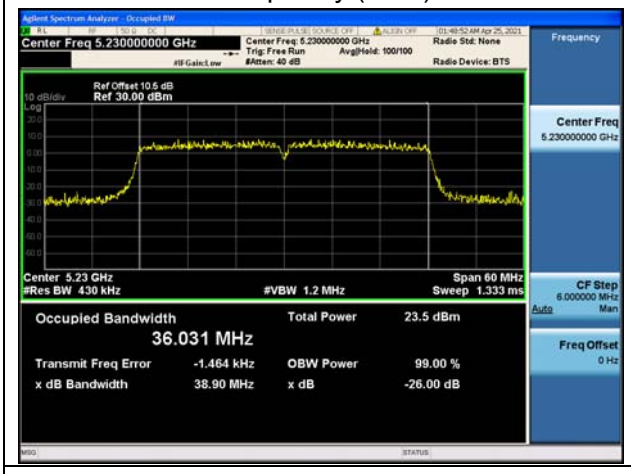


U-NII-1, 802.11ac VHT20

Carrier frequency (MHz): 5180

U-NII-1, 802.11n HT40

Carrier frequency (MHz): 5230



U-NII-1, 802.11ac VHT20

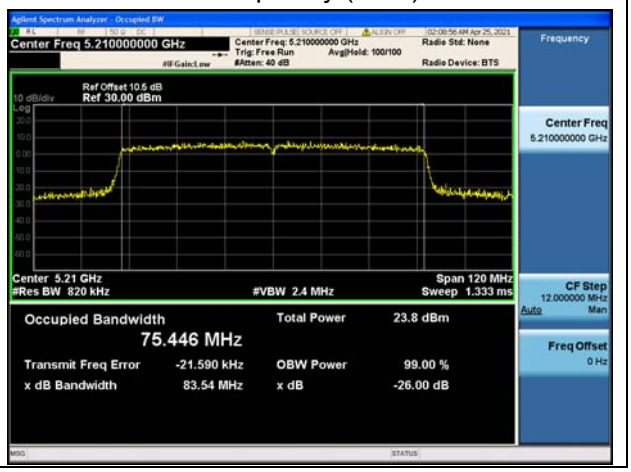
Carrier frequency (MHz): 5200

U-NII-1, 802.11ac VHT40

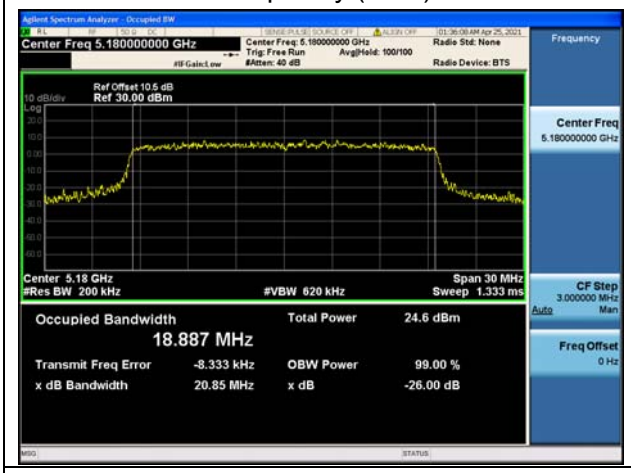
Carrier frequency (MHz): 5190

U-NII-1, 802.11ac VHT20

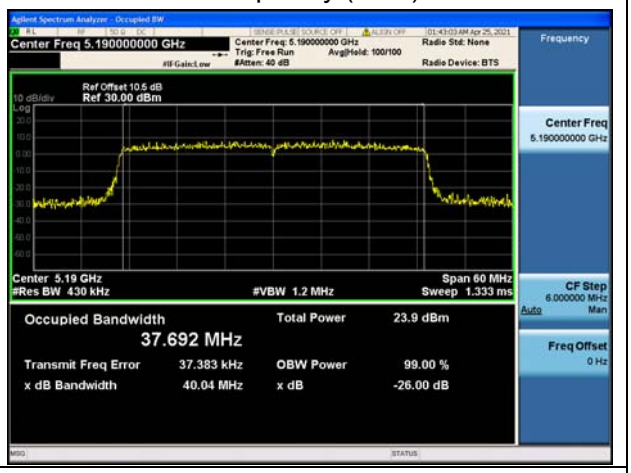
Carrier frequency (MHz):5240

U-NII-1, 802.11ac VHT40 Carrier frequency (MHz): 5230	U-NII-1, 802.11ac VHT80 Carrier frequency (MHz): 5210
	

U-NII-1, 802.11ax HE20
Carrier frequency (MHz): 5180

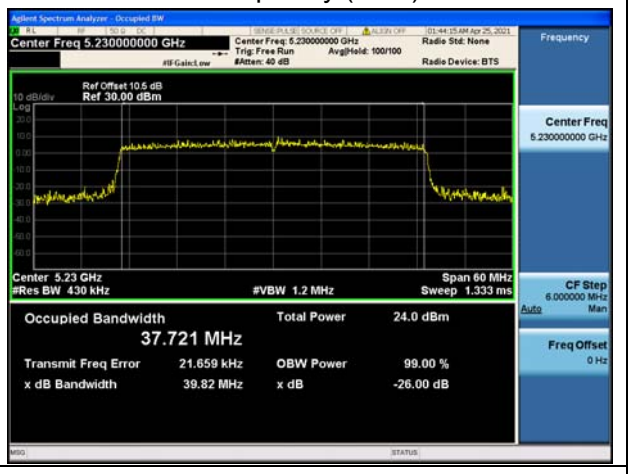


U-NII-1, 802.11ax HE40
Carrier frequency (MHz): 5190



U-NII-1, 802.11ax HE20
Carrier frequency (MHz): 5200

U-NII-1, 802.11ax HE40
Carrier frequency (MHz): 5230



U-NII-1, 802.11ax HE20
Carrier frequency (MHz):5240

U-NII-1, 802.11ax HE80
Carrier frequency (MHz): 5210

U-NII-2A, 802.11a

Carrier frequency (MHz): 5260

U-NII-2A, 802.11n HT20

Carrier frequency (MHz): 5260

U-NII-2A, 802.11a

Carrier frequency (MHz): 5300

U-NII-2A, 802.11n HT20

Carrier frequency (MHz): 5300

U-NII-2A, 802.11a

Carrier frequency (MHz):5320

U-NII-2A, 802.11n HT20

Carrier frequency (MHz):5320

U-NII-2A, 802.11n HT40

Carrier frequency (MHz): 5270

U-NII-2A, 802.11ac VHT20

Carrier frequency (MHz):5260

U-NII-2A, 802.11n HT40

Carrier frequency (MHz): 5310

U-NII-2A, 802.11ac VHT20

Carrier frequency (MHz): 5300

U-NII-2A, 802.11ac VHT40

Carrier frequency (MHz): 5270

U-NII-2A, 802.11ac VHT20

Carrier frequency (MHz):5320

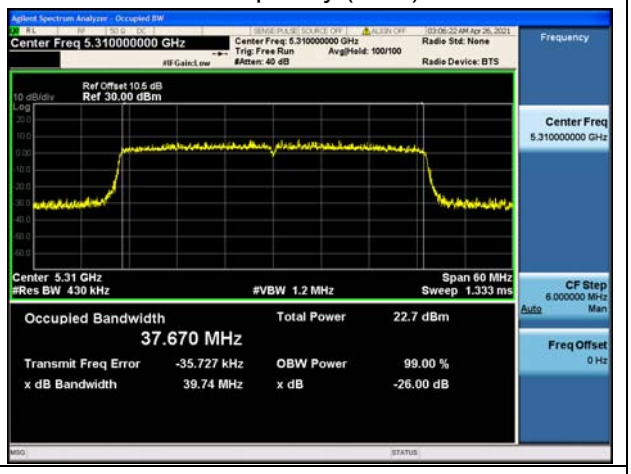
U-NII-2A, 802.11ac VHT40 Carrier frequency (MHz): 5310	U-NII-2A, 802.11ac VHT80 Carrier frequency (MHz): 5290
	

U-NII-2A, 802.11ax HE20
Carrier frequency (MHz):5260

U-NII-2A, 802.11ax HE40
Carrier frequency (MHz): 5270

U-NII-2A, 802.11ax HE20
Carrier frequency (MHz): 5300

U-NII-2A, 802.11ax HE40
Carrier frequency (MHz): 5310



U-NII-2A, 802.11ax HE20
Carrier frequency (MHz):5320

U-NII-2A, 802.11ax HE80
Carrier frequency (MHz): 5290

U-NII-2C, 802.11a

Carrier frequency (MHz): 5500

U-NII-2C, 802.11n HT20

Carrier frequency (MHz): 5500

U-NII-2C, 802.11a

Carrier frequency (MHz): 5600

U-NII-2C, 802.11n HT20

Carrier frequency (MHz): 5600

U-NII-2C, 802.11a

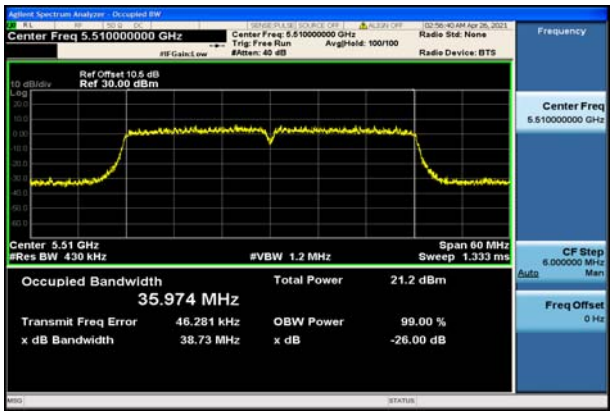
Carrier frequency (MHz):5700

U-NII-2C, 802.11n HT20

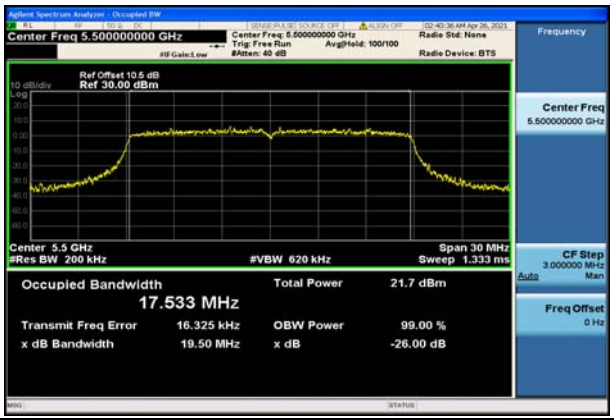
Carrier frequency (MHz):5700

U-NII-2C, 802.11a Carrier frequency (MHz):5720	U-NII-2C, 802.11n HT20 Carrier frequency (MHz):5720
	

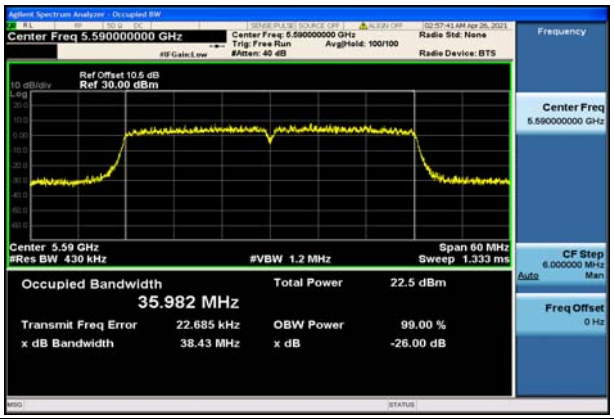
U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5510



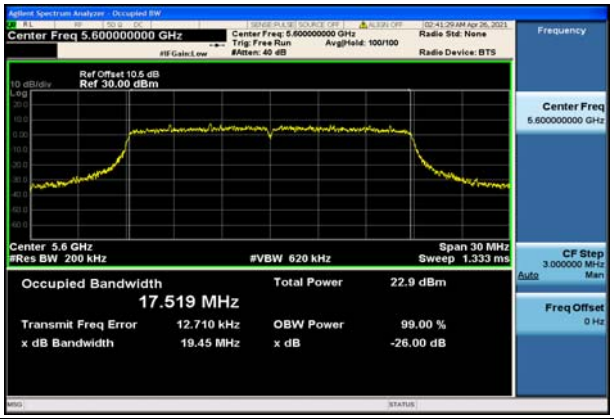
U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz): 5500



U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5590



U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz): 5600



U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5670

U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz):5700

U-NII-2C, 802.11n HT40

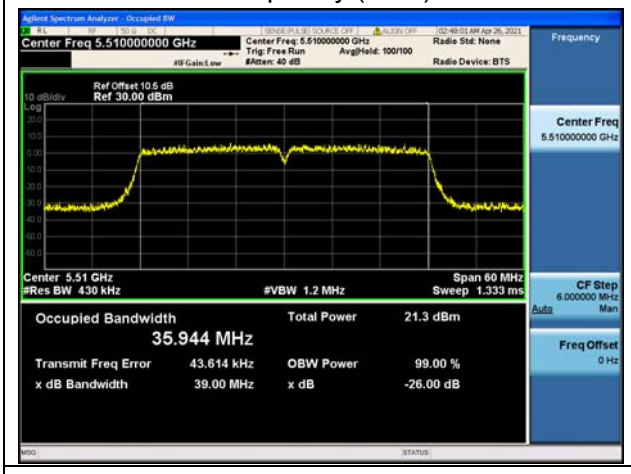
Carrier frequency (MHz): 5710

U-NII-2C, 802.11ac VHT20

Carrier frequency (MHz):5720

U-NII-2C, 802.11ac VHT40

Carrier frequency (MHz): 5510



U-NII-2C, 802.11ac VHT80

Carrier frequency (MHz): 5690

U-NII-2C, 802.11ac VHT40

Carrier frequency (MHz): 5590

U-NII-2C, 802.11ac VHT40

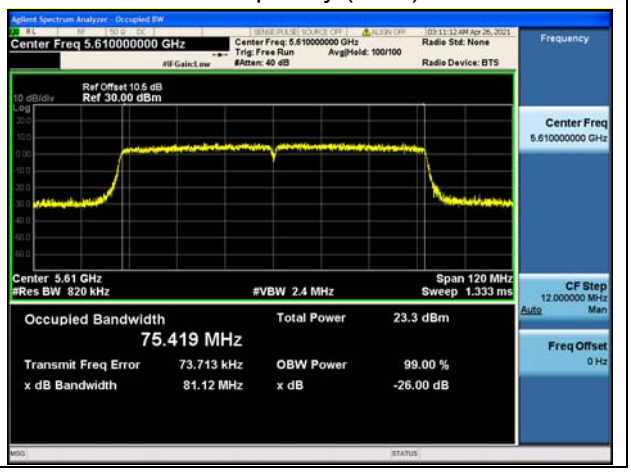
Carrier frequency (MHz): 5710

U-NII-2C, 802.11ac VHT40

Carrier frequency (MHz): 5670

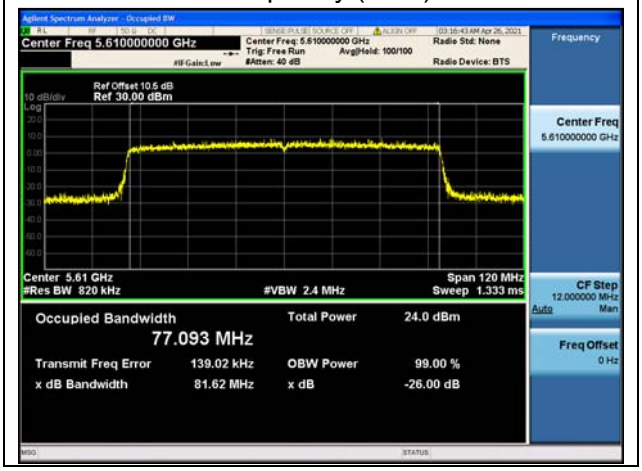
U-NII-2C, 802.11ac VHT80

Carrier frequency (MHz): 5610



U-NII-2C, 802.11ax HE80

Carrier frequency (MHz): 5610

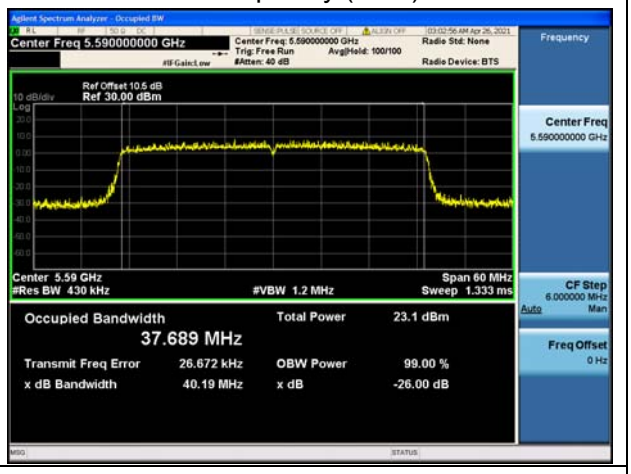


U-NII-2C, 802.11ax HE20
Carrier frequency (MHz): 5500

U-NII-2C, 802.11ax HE40
Carrier frequency (MHz): 5510

U-NII-2C, 802.11ax HE20
Carrier frequency (MHz): 5600

U-NII-2C, 802.11ax HE40
Carrier frequency (MHz): 5590



U-NII-2C, 802.11ax HE20
Carrier frequency (MHz):5700

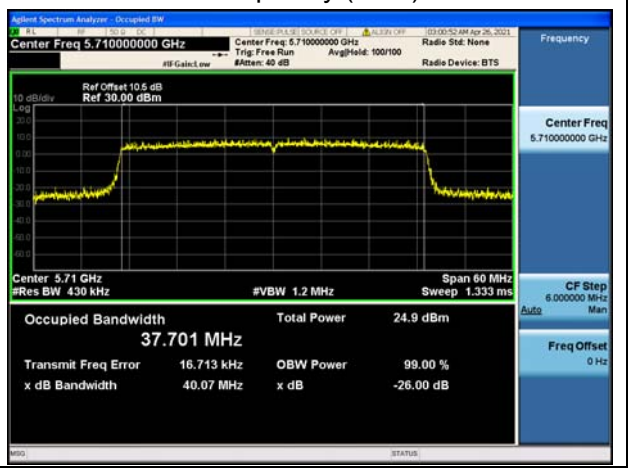
U-NII-2C, 802.11ax HE40
Carrier frequency (MHz): 5670

U-NII-2C, 802.11ax HE20

Carrier frequency (MHz):5720

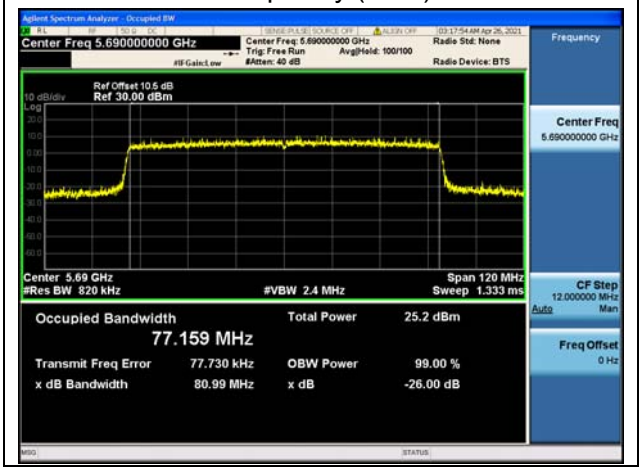
U-NII-2C, 802.11ax HE40

Carrier frequency (MHz): 5710



U-NII-2C, 802.11ax HE80

Carrier frequency (MHz): 5690



99% bandwidth

U-NII-3, 802.11a

Carrier frequency (MHz): 5745

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5745

U-NII-3, 802.11a

Carrier frequency (MHz): 5785

U-NII-3, 802.11n HT20

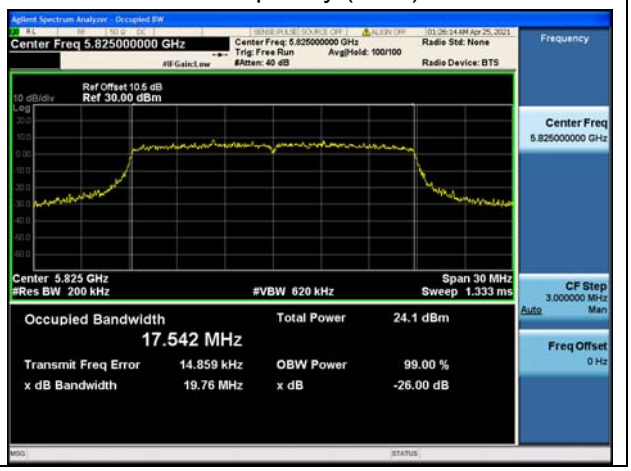
Carrier frequency (MHz): 5785

U-NII-3, 802.11a

Carrier frequency (MHz): 5825

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825



U-NII-3, 802.11n HT40

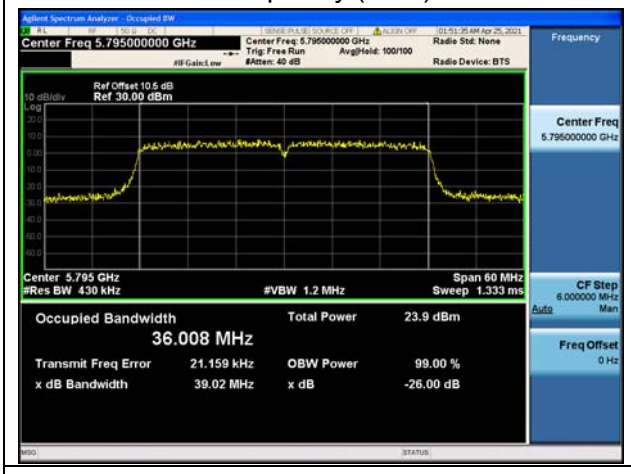
Carrier frequency (MHz): 5755

U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5745

U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5795



U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5785

U-NII-3, 802.11ac VHT40

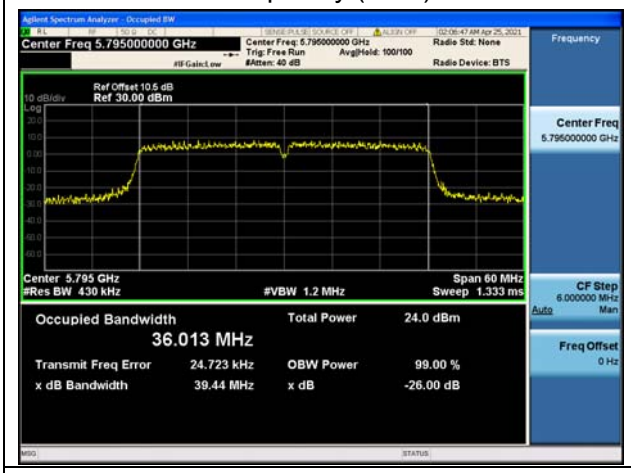
Carrier frequency (MHz): 5755

U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5825

U-NII-3, 802.11ac VHT40

Carrier frequency (MHz): 5795



U-NII-3, 802.11ac VHT80

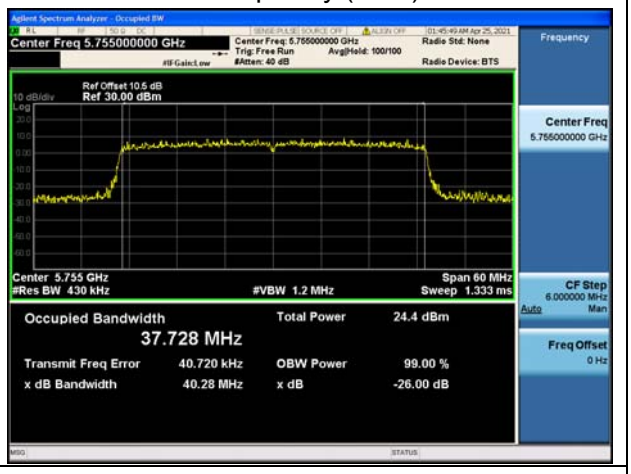
Carrier frequency (MHz): 5775

U-NII-3, 802.11ax HE20

Carrier frequency (MHz): 5745

U-NII-3, 802.11ax HE40

Carrier frequency (MHz): 5755



U-NII-3, 802.11ax HE20

Carrier frequency (MHz): 5785

U-NII-3, 802.11ax HE40

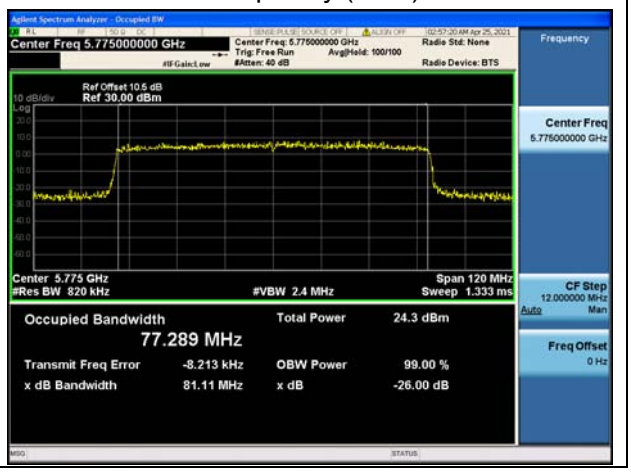
Carrier frequency (MHz): 5795

U-NII-3, 802.11ax HE20

Carrier frequency (MHz): 5825

U-NII-3, 802.11ax HE80

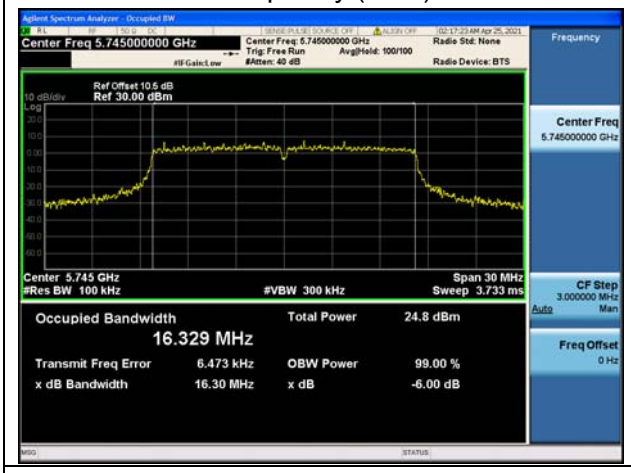
Carrier frequency (MHz): 5775



Minimum 6 dB bandwidth

U-NII-3, 802.11a

Carrier frequency (MHz): 5745



U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5745

U-NII-3, 802.11a

Carrier frequency (MHz): 5785

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5785

U-NII-3, 802.11a

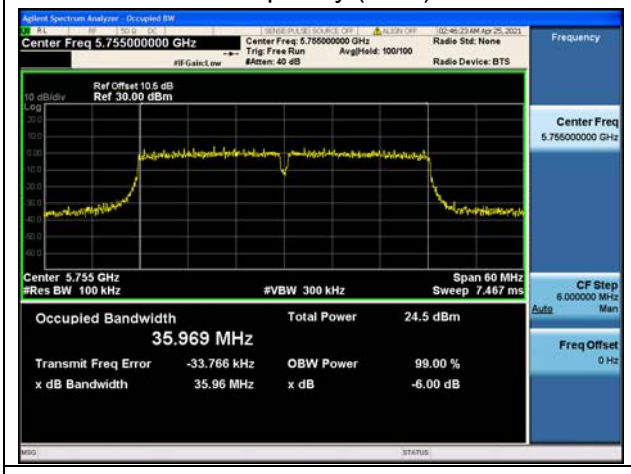
Carrier frequency (MHz): 5825

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825

U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5755

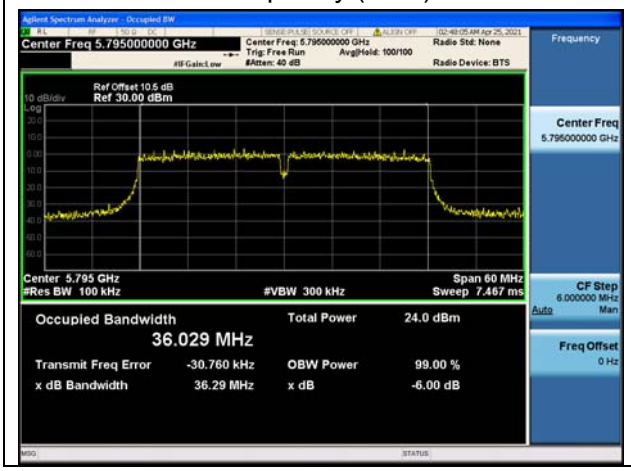


U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5745

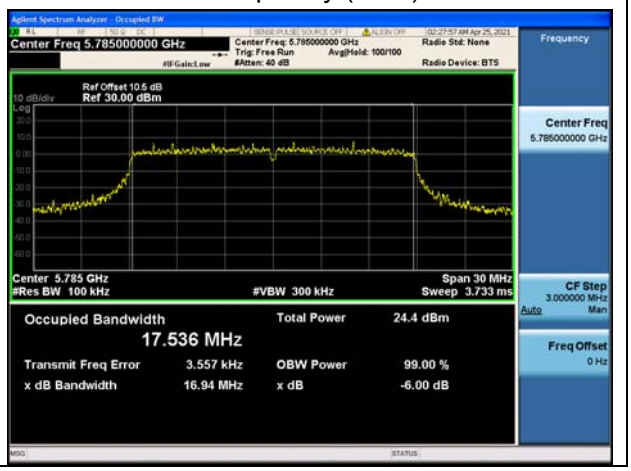
U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5795



U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5785



U-NII-3, 802.11ac VHT40

Carrier frequency (MHz): 5755

U-NII-3, 802.11ac VHT20

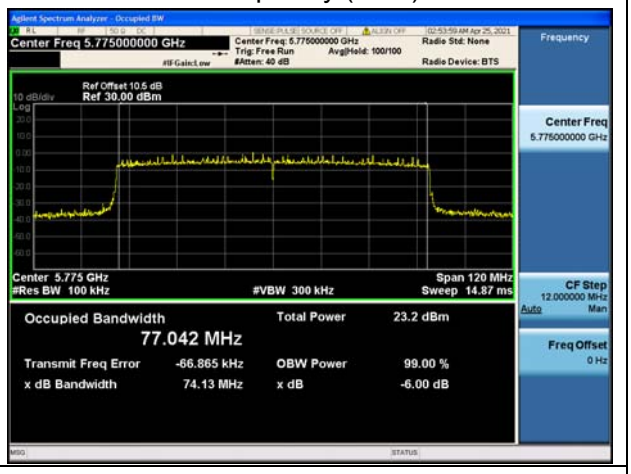
Carrier frequency (MHz): 5825

U-NII-3, 802.11ac VHT40

Carrier frequency (MHz): 5795

U-NII-3, 802.11ac VHT80

Carrier frequency (MHz): 5775

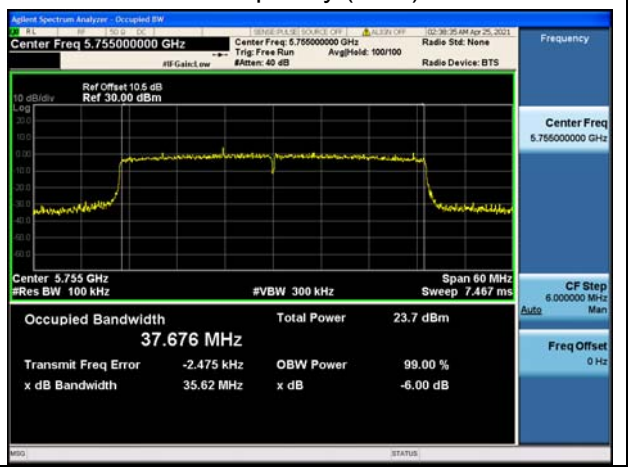


U-NII-3, 802.11ax HE20

Carrier frequency (MHz): 5745

U-NII-3, 802.11ax HE40

Carrier frequency (MHz): 5755

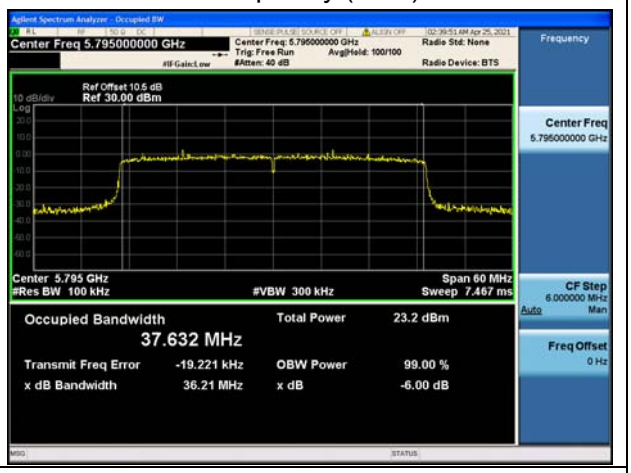


U-NII-3, 802.11ax HE20

Carrier frequency (MHz): 5785

U-NII-3, 802.11ax HE40

Carrier frequency (MHz): 5795

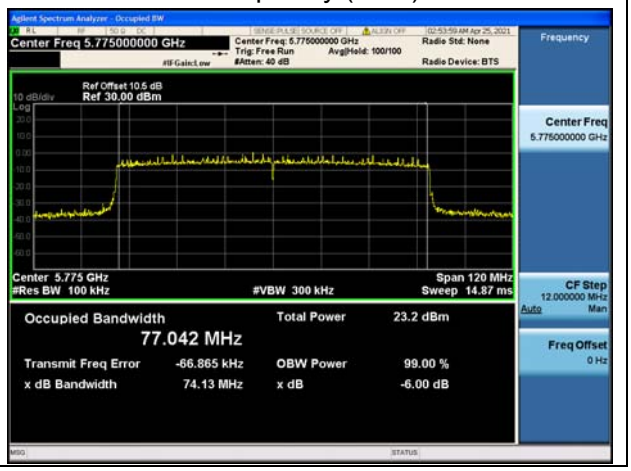


U-NII-3, 802.11ax HE20

Carrier frequency (MHz): 5825

U-NII-3, 802.11ax HE80

Carrier frequency (MHz): 5775



5.2. Average Power Output

Ambient condition

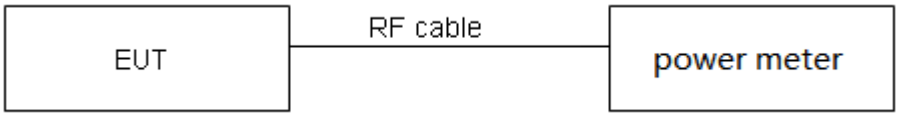
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

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

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

Test Setup



Limits

Rule FCC Part 15.407(a)(1)(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	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11a	1.97	1.99	0.99	NA
802.11n HT20	5.42	5.45	0.99	NA
802.11n HT40	5.39	5.46	0.99	NA
802.11ac VHT20	5.42	5.44	1.00	NA
802.11ac VHT40	5.37	5.45	0.99	NA
802.11ac VHT80	5.38	5.43	0.99	NA
802.11ax HE20	5.45	5.47	1.00	NA
802.11ax HE40	5.41	5.47	0.99	NA
802.11ax HE80	5.45	5.49	0.99	NA
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.				

Power Index											
Channel	802.11a	802.11n HT20	802.11ac VHT20	802.11ax HE20	Channel	802.11n HT40	802.11ac VHT40	802.11ax HE40	Channel	802.11ac VHT80	802.11ax HE80
CH36	17	17	17	17	CH38	17	17	17	CH42	17	17
CH40	17	17	17	17	CH46	17	17	17	/	/	/
CH48	17	17	17	17	/	/	/		/	/	/
CH52	17	17	17	17	CH54	17	17	17	CH58	17	17
CH60	17	17	17	17	CH62	17	17	17	/	/	/
CH64	17	17	17	17	/	/	/		/	/	/
CH100	17	17	17	17	CH102	17	17	17	CH106	17	17
CH120	17	17	17	17	CH118	17	17	17	CH122	17	17
CH140	17	17	17	17	CH134	17	17	17	CH138	17	17
CH144	17	17	17	17	CH142	17	17	17	/	/	/
CH149	17	17	17	17	CH151	17	17	17	CH155	17	17
CH157	17	17	17	17	CH159	17	17	17	/	/	/
CH165	17	17	17	17	/	/	/		/	/	/

Network Standards		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	16.33	23.13<24	23.13
		60/5300	16.32	23.13<24	23.13
		64/5320	16.34	23.13<24	23.13
	802.11n HT20	52/5260	17.52	23.44<24	23.44
		60/5300	17.54	23.44<24	23.44
		64/5320	17.53	23.44<24	23.44
	802.11n HT40	54/5270	36.03	26.57>24	24.00
		62/5310	36.00	26.56>24	24.00
	802.11ac VHT20	52/5260	17.52	23.44<24	23.44
		60/5300	17.53	23.44<24	23.44
		64/5320	17.53	23.44<24	23.44
	802.11ac VHT40	54/5270	36.00	26.56>24	24.00
		62/5310	35.99	26.56>24	24.00
	802.11ac VHT80	58/5290	75.40	29.77>24	24.00
	802.11ax HE20	52/5260	18.86	23.76<24	23.76
		60/5300	18.88	23.76<24	23.76
		64/5320	18.89	23.76<24	23.76
	802.11ax HE40	54/5270	37.64	26.76>24	24.00
		62/5310	37.67	26.76>24	24.00
	802.11ax HE80	58/5290	77.13	29.87>24	24.00
U-NII-2C	802.11a	100/5500	16.32	23.13<24	23.13
		120/5600	16.31	23.12<24	23.12
		140/5700	16.34	23.13<24	23.13
		144/5720	16.32	23.13<24	23.13
	802.11n HT20	100/5500	17.51	23.43<24	23.43
		120/5600	17.53	23.44<24	23.44
		140/5700	17.55	23.44<24	23.44
		144/5720	17.55	23.44<24	23.44
	802.11n HT40	102/5510	35.97	26.56>24	24.00
		118/5590	35.98	26.56>24	24.00
		134/5670	36.01	26.56>24	24.00
		142/5710	36.05	26.57>24	24.00
	802.11ac VHT20	100/5500	17.53	23.44<24	23.44
		120/5600	17.52	23.44<24	23.44
		140/5700	17.54	23.44<24	23.44
		144/5720	17.53	23.44<24	23.44

	802.11ac VHT40	102/5510	35.94	26.56>24	24.00
		118/5590	35.95	26.56>24	24.00
		134/5670	36.06	26.57>24	24.00
		142/5710	36.03	26.57>24	24.00
	802.11ac VHT80	122/5610	75.42	29.77>24	24.00
		138/5690	75.42	29.77>24	24.00
	802.11ax HE20	100/5500	18.89	23.76<24	23.76
		120/5600	18.89	23.76<24	23.76
		140/5700	18.88	23.76<24	23.76
		144/5720	18.87	23.76<24	23.76
	802.11ax HE40	102/5510	37.69	26.76>24	24.00
		118/5590	37.69	26.76>24	24.00
		134/5670	37.67	26.76>24	24.00
		142/5710	37.70	26.76>24	24.00
	802.11ax HE80	122/5610	77.09	29.87>24	24.00
		138/5690	77.159	29.87>24	24.00
Note: 250mW=24dBm					

Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor.

SISO Antenna 1

U-NII-1

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	15.85	15.85	30	PASS
	40/5200	16.48	16.48	30	PASS
	48/5240	17.02	17.02	30	PASS
802.11n HT20	36/5180	15.72	15.72	30	PASS
	40/5200	16.33	16.33	30	PASS
	48/5240	16.88	16.88	30	PASS
802.11n HT40	38/5190	16.59	16.59	30	PASS
	46/5230	16.72	16.72	30	PASS
802.11ac VHT20	36/5180	15.66	15.66	30	PASS
	40/5200	16.30	16.30	30	PASS
	48/5240	16.84	16.84	30	PASS
802.11ac VHT40	38/5190	16.57	16.57	30	PASS
	46/5230	16.70	16.70	30	PASS
802.11ac VHT80	42/5210	16.32	16.32	30	PASS
802.11ax HE20	36/5180	15.80	15.80	30	PASS
	40/5200	16.34	16.34	30	PASS
	48/5240	16.87	16.87	30	PASS
802.11ax HE40	38/5190	16.41	16.41	30	PASS
	46/5230	16.55	16.55	30	PASS
802.11ax HE80	42/5210	16.27	16.27	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-2A

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	52/5260	17.22	17.22	23.13	PASS
	60/5300	18.15	18.15	23.13	PASS
	64/5320	17.03	17.03	23.13	PASS
802.11n HT20	52/5260	17.06	17.06	23.44	PASS
	60/5300	17.96	17.96	23.44	PASS
	64/5320	16.89	16.89	23.44	PASS
802.11n HT40	54/5270	17.33	17.33	24.00	PASS
	62/5310	17.90	17.90	24.00	PASS
802.11ac VHT20	52/5260	17.07	17.07	23.44	PASS
	60/5300	17.99	17.99	23.44	PASS
	64/5320	16.91	16.91	23.44	PASS
802.11ac VHT40	54/5270	17.29	17.29	24.00	PASS
	62/5310	17.88	17.88	24.00	PASS
802.11ac VHT80	58/5290	18.44	18.44	24.00	PASS
802.11ax HE20	52/5260	17.08	17.08	23.76	PASS
	60/5300	18.06	18.06	23.76	PASS
	64/5320	16.99	16.99	23.76	PASS
802.11ax HE40	54/5270	17.15	17.15	24.00	PASS
	62/5310	17.74	17.74	24.00	PASS
802.11ax HE80	58/5290	18.32	18.32	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

U-NII-2C

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	100/5500	17.33	17.33	23.13	PASS
	120/5600	16.69	16.69	23.12	PASS
	140/5700	15.88	15.88	23.13	PASS
	144/5720	15.89	15.89	23.13	PASS
802.11n HT20	100/5500	17.18	17.18	23.43	PASS
	120/5600	16.51	16.51	23.44	PASS
	140/5700	15.68	15.68	23.44	PASS

	144/5720	15.67	15.67	23.44	PASS
802.11n HT40	102/5510	17.26	17.26	24.00	PASS
	118/5590	16.63	16.63	24.00	PASS
	134/5670	16.09	16.09	24.00	PASS
	142/5710	15.74	15.74	24.00	PASS
802.11ac VHT20	100/5500	17.16	17.16	23.44	PASS
	120/5600	16.51	16.51	23.44	PASS
	140/5700	15.69	15.69	23.44	PASS
	144/5720	15.71	15.71	23.44	PASS
802.11ac VHT40	102/5510	17.25	17.25	24.00	PASS
	118/5590	16.60	16.60	24.00	PASS
	134/5670	16.07	16.07	24.00	PASS
	142/5710	15.73	15.73	24.00	PASS
802.11ac VHT80	122/5610	16.90	16.90	24.00	PASS
	138/5690	15.90	15.90	24.00	PASS
802.11ax HE20	100/5500	17.26	17.26	23.76	PASS
	120/5600	16.64	16.64	23.76	PASS
	140/5700	15.81	15.81	23.76	PASS
	144/5720	15.83	15.83	23.76	PASS
802.11ax HE40	102/5510	17.08	17.08	24.00	PASS
	118/5590	16.48	16.48	24.00	PASS
	134/5670	15.95	15.95	24.00	PASS
	142/5710	15.63	15.63	24.00	PASS
802.11ax HE80	122/5610	16.89	16.89	24.00	PASS
	138/5690	15.79	15.79	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

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Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	15.58	15.58	30	PASS
	157/5785	15.96	15.96	30	PASS
	165/5825	16.10	16.10	30	PASS
802.11n HT20	149/5745	15.46	15.46	30	PASS
	157/5785	15.83	15.83	30	PASS
	165/5825	15.93	15.93	30	PASS
802.11n HT40	151/5755	15.92	15.92	30	PASS
	159/5795	16.13	16.13	30	PASS

802.11ac VHT20	149/5745	15.43	15.43	30	PASS
	157/5785	15.77	15.77	30	PASS
	165/5825	15.91	15.91	30	PASS
802.11ac VHT40	151/5755	15.85	15.85	30	PASS
	159/5795	16.15	16.15	30	PASS
802.11ac VHT80	155/5775	15.83	15.83	30	PASS
802.11ax HE20	149/5745	15.59	15.59	30	PASS
	157/5785	15.89	15.89	30	PASS
	165/5825	15.99	15.99	30	PASS
802.11ax HE40	151/5755	15.74	15.74	30	PASS
	159/5795	15.97	15.97	30	PASS
802.11ax HE80	155/5775	15.78	15.78	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

SISO Antenna 2

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Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	17.24	17.24	30	PASS
	40/5200	17.12	17.12	30	PASS
	48/5240	17.30	17.30	30	PASS
802.11n HT20	36/5180	17.04	17.04	30	PASS
	40/5200	16.95	16.95	30	PASS
	48/5240	17.15	17.15	30	PASS
802.11n HT40	38/5190	17.04	17.04	30	PASS
	46/5230	17.39	17.39	30	PASS
802.11ac VHT20	36/5180	16.99	16.99	30	PASS
	40/5200	16.92	16.92	30	PASS
	48/5240	17.11	17.11	30	PASS
802.11ac VHT40	38/5190	16.97	16.97	30	PASS
	46/5230	17.29	17.29	30	PASS
802.11ac VHT80	42/5210	17.35	17.35	30	PASS
802.11ax HE20	36/5180	17.46	17.46	30	PASS
	40/5200	17.36	17.36	30	PASS
	48/5240	17.54	17.54	30	PASS
802.11ax HE40	38/5190	17.14	17.14	30	PASS
	46/5230	17.56	17.56	30	PASS
802.11ax HE80	42/5210	17.51	17.51	30	PASS

Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor

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Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	52/5260	17.01	17.01	23.13	PASS
	60/5300	16.61	16.61	23.13	PASS
	64/5320	17.27	17.27	23.13	PASS
802.11n HT20	52/5260	16.85	16.85	23.44	PASS
	60/5300	16.43	16.43	23.44	PASS
	64/5320	17.10	17.10	23.44	PASS
802.11n HT40	54/5270	16.89	16.89	24.00	PASS
	62/5310	16.05	16.05	24.00	PASS
802.11ac VHT20	52/5260	16.80	16.80	23.44	PASS
	60/5300	16.41	16.41	23.44	PASS
	64/5320	17.09	17.09	23.44	PASS
802.11ac VHT40	54/5270	16.76	16.76	24.00	PASS
	62/5310	15.96	15.96	24.00	PASS
802.11ac VHT80	58/5290	16.87	16.87	24.00	PASS
802.11ax HE20	52/5260	17.30	17.30	23.76	PASS
	60/5300	16.88	16.88	23.76	PASS
	64/5320	17.57	17.57	23.76	PASS
802.11ax HE40	54/5270	17.01	17.01	24.00	PASS
	62/5310	16.21	16.21	24.00	PASS
802.11ax HE80	58/5290	17.09	17.09	24.00	PASS

Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor

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Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	100/5500	16.13	16.13	23.13	PASS
	120/5600	17.10	17.10	23.12	PASS
	140/5700	18.04	18.04	23.13	PASS
	144/5720	17.63	17.63	23.13	PASS
802.11n	100/5500	15.92	15.92	23.43	PASS

HT20	120/5600	16.90	16.90	23.44	PASS
	140/5700	17.89	17.89	23.44	PASS
	144/5720	17.49	17.49	23.44	PASS
802.11n HT40	102/5510	16.02	16.02	24.00	PASS
	118/5590	16.87	16.87	24.00	PASS
	134/5670	17.84	17.84	24.00	PASS
	142/5710	18.10	18.10	24.00	PASS
802.11ac VHT20	100/5500	15.91	15.91	23.44	PASS
	120/5600	16.84	16.84	23.44	PASS
	140/5700	17.82	17.82	23.44	PASS
	144/5720	17.41	17.41	23.44	PASS
802.11ac VHT40	102/5510	15.91	15.91	24.00	PASS
	118/5590	16.80	16.80	24.00	PASS
	134/5670	17.77	17.77	24.00	PASS
	142/5710	18.04	18.04	24.00	PASS
802.11ac VHT80	122/5610	17.23	17.23	24.00	PASS
	138/5690	18.03	18.03	24.00	PASS
802.11ax HE20	100/5500	16.34	16.34	23.76	PASS
	120/5600	17.31	17.31	23.76	PASS
	140/5700	18.34	18.34	23.76	PASS
	144/5720	17.94	17.94	23.76	PASS
802.11ax HE40	102/5510	16.16	16.16	24.00	PASS
	118/5590	17.02	17.02	24.00	PASS
	134/5670	17.77	17.77	24.00	PASS
	142/5710	18.31	18.31	24.00	PASS
802.11ax HE80	122/5610	17.34	17.34	24.00	PASS
	138/5690	18.20	18.20	24.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

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Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	18.03	18.03	30	PASS
	157/5785	17.87	17.87	30	PASS
	165/5825	17.56	17.56	30	PASS
802.11n HT20	149/5745	17.89	17.89	30	PASS
	157/5785	17.71	17.71	30	PASS
	165/5825	17.24	17.24	30	PASS

802.11n HT40	151/5755	18.04	18.04	30	PASS
	159/5795	17.72	17.72	30	PASS
802.11ac VHT20	149/5745	17.86	17.86	30	PASS
	157/5785	17.69	17.69	30	PASS
	165/5825	17.20	17.20	30	PASS
802.11ac VHT40	151/5755	17.95	17.95	30	PASS
	159/5795	17.67	17.67	30	PASS
802.11ac VHT80	155/5775	17.88	17.88	30	PASS
802.11ax HE20	149/5745	18.35	18.35	30	PASS
	157/5785	18.17	18.17	30	PASS
	165/5825	17.73	17.73	30	PASS
802.11ax HE40	151/5755	18.24	18.24	30	PASS
	159/5795	17.93	17.93	30	PASS
802.11ax HE80	155/5775	18.11	18.11	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

MIMO

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Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	36/5180	15.55	15.55	16.91	16.91	19.29	30.00	PASS
	44/5220	16.17	16.17	16.83	16.83	19.52	30.00	PASS
	48/5240	16.75	16.75	16.98	16.98	19.88	30.00	PASS
802.11n HT40	38/5190	16.44	16.44	16.82	16.82	19.64	30.00	PASS
	46/5230	16.58	16.58	17.19	17.19	19.91	30.00	PASS
802.11ac VHT20	36/5180	15.56	15.56	16.76	16.76	19.21	30.00	PASS
	44/5220	16.16	16.16	16.65	16.65	19.42	30.00	PASS
	48/5240	16.70	16.70	16.84	16.84	19.78	30.00	PASS
802.11ac VHT40	38/5190	16.45	16.45	16.91	16.91	19.70	30.00	PASS
	46/5230	16.56	16.56	17.23	17.23	19.92	30.00	PASS
802.11ac VHT80	42/5210	16.26	16.26	17.25	17.25	19.79	30.00	PASS
802.11ax HE20	36/5180	15.56	15.56	17.23	17.23	19.49	30.00	PASS
	44/5220	16.21	16.21	17.13	17.13	19.70	30.00	PASS
	48/5240	16.76	16.76	17.32	17.32	20.06	30.00	PASS
802.11ax HE40	38/5190	16.41	16.41	17.01	17.01	19.73	30.00	PASS
	46/5230	16.52	16.52	17.34	17.34	19.96	30.00	PASS

802.11ax HE80	42/5210	16.26	16.26	17.37	17.37	19.86	30.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),
The Total Power =$10\log(10^{(\text{Power antenna1 in dBm}/10)}+10^{(\text{Power antenna2 in dBm}/10)}$.
2. The manufacturer declared the transmitter output signals is CDD mode And N_{ss}=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,
For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 $\log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less, for 20-MHz channel widths with NANT ≥ 5.
So directional gain = GANT + Array Gain =2.34+0=2.34dBi<6dBi. So the power limt is 30dBm.

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Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	52/5260	16.89	16.89	16.63	16.63	19.77	23.44	PASS
	60/5300	17.86	17.86	16.21	16.21	20.12	23.44	PASS
	64/5320	16.74	16.74	16.89	16.89	19.83	23.44	PASS
802.11n HT40	52/5260	17.18	17.18	16.69	16.69	19.95	24.00	PASS
	60/5300	17.79	17.79	15.86	15.86	19.94	24.00	PASS
802.11ac VHT20	64/5320	16.88	16.88	16.46	16.46	19.69	23.44	PASS
	54/5270	17.81	17.81	16.05	16.05	20.03	23.44	PASS
	62/5310	16.70	16.70	16.76	16.76	19.74	23.44	PASS
802.11ac VHT40	52/5260	17.18	17.18	16.71	16.71	19.96	24.00	PASS
	60/5300	17.78	17.78	16.01	16.01	19.99	24.00	PASS
802.11ac VHT80	64/5320	18.38	18.38	16.76	16.76	20.66	24.00	PASS
802.11ax HE20	64/5320	16.88	16.88	16.99	16.99	19.95	23.76	PASS
	54/5270	17.79	17.79	16.61	16.61	20.25	23.76	PASS
	62/5310	16.81	16.81	17.31	17.31	20.08	23.76	PASS
802.11ax HE40	52/5260	17.16	17.16	16.84	16.84	20.01	24.00	PASS
	60/5300	17.75	17.75	16.03	16.03	19.98	24.00	PASS
802.11ax HE80	64/5320	18.32	18.32	16.89	16.89	20.67	24.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),
The Total Power =$10\log(10^{(\text{Power antenna1 in dBm}/10)}+10^{(\text{Power antenna2 in dBm}/10)}$
2. The manufacturer declared the transmitter output signals is CDD mode And N_{ss}=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,
For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

So directional gain = GANT + Array Gain ==2.34+0=2.34dBi<6dBi.

U-NII-2C

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	100/5500	17.06	17.06	15.73	15.73	19.46	23.43	PASS
	120/5600	16.44	16.44	16.62	16.62	19.54	23.44	PASS
	140/5700	15.68	15.68	17.60	17.60	19.76	23.44	PASS
	144/5720	15.67	15.67	17.26	17.26	19.55	23.44	PASS
802.11n HT40	102/5510	17.16	17.16	15.88	15.88	19.58	24.00	PASS
	118/5590	16.55	16.55	16.82	16.82	19.70	24.00	PASS
	134/5670	16.08	16.08	17.70	17.70	19.98	24.00	PASS
	142/5710	15.78	15.78	17.96	17.96	20.02	24.00	PASS
802.11ac VHT20	100/5500	17.05	17.05	15.60	15.60	19.40	23.44	PASS
	120/5600	16.40	16.40	16.53	16.53	19.48	23.44	PASS
	140/5700	15.64	15.64	17.52	17.52	19.69	23.44	PASS
	144/5720	15.62	15.62	17.13	17.13	19.45	23.44	PASS
802.11ac VHT40	102/5510	17.12	17.12	15.99	15.99	19.60	24.00	PASS
	118/5590	16.49	16.49	16.87	16.87	19.69	24.00	PASS
	134/5670	16.02	16.02	17.80	17.80	20.01	24.00	PASS
	142/5710	15.68	15.68	18.08	18.08	20.05	24.00	PASS
802.11ac VHT80	122/5610	16.90	16.90	17.15	17.15	20.04	24.00	PASS
	138/5690	15.89	15.89	17.92	17.92	20.03	24.00	PASS
802.11ax HE20	100/5500	17.05	17.05	16.13	16.13	19.62	23.76	PASS
	120/5600	16.47	16.47	17.06	17.06	19.79	23.76	PASS
	140/5700	16.06	16.06	18.09	18.09	20.20	23.76	PASS
	144/5720	16.02	16.02	17.67	17.67	19.93	23.76	PASS
802.11ax HE40	102/5510	17.21	17.21	15.97	15.97	19.64	24.00	PASS
	118/5590	16.58	16.58	16.83	16.83	19.72	24.00	PASS
	134/5670	16.09	16.09	17.86	17.86	20.07	24.00	PASS
	142/5710	15.76	15.76	18.11	18.11	20.10	24.00	PASS
802.11ax	122/5610	17.02	17.02	17.21	17.21	20.13	24.00	PASS

HE80	138/5690	16.03	16.03	18.03	18.03	20.15	24.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),
The Total Power =10log($10^{(\text{Power antenna1 in dBm/10})}$+$10^{(\text{Power antenna2 in dBm/10})}$)
2. The manufacturer declared the transmitter output signals is CDD mode And N_{ss}=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,
For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.
So directional gain = GANT + Array Gain ==2.34+0=2.34dBi<6dBi.

U-NII-3

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	149/5745	15.38	15.38	17.65	17.65	19.67	30.00	PASS
	157/5785	15.72	15.72	17.55	17.55	19.74	30.00	PASS
	165/5825	15.86	15.86	17.10	17.10	19.53	30.00	PASS
802.11n HT40	151/5755	15.84	15.84	18.03	18.03	20.08	30.00	PASS
	159/5795	16.11	16.11	17.71	17.71	19.99	30.00	PASS
802.11ac VHT20	149/5745	15.36	15.36	17.53	17.53	19.59	30.00	PASS
	157/5785	15.72	15.72	17.31	17.31	19.60	30.00	PASS
	165/5825	15.79	15.79	16.94	16.94	19.41	30.00	PASS
802.11ac VHT40	151/5755	15.80	15.80	17.99	17.99	20.04	30.00	PASS
	159/5795	16.10	16.10	17.81	17.81	20.05	30.00	PASS
802.11ac VHT80	155/5775	15.77	15.77	17.8	17.79	19.91	30.00	PASS
802.11ax HE20	149/5745	15.76	15.76	18.08	18.08	20.08	30.00	PASS
	157/5785	16.05	16.05	17.94	17.94	20.11	30.00	PASS
	165/5825	16.10	16.10	17.51	17.51	19.87	30.00	PASS
802.11ax HE40	151/5755	15.87	15.87	18.07	18.07	20.12	30.00	PASS
	159/5795	16.14	16.14	17.77	17.77	20.04	30.00	PASS
802.11ax HE80	155/5775	15.88	15.88	17.94	17.94	20.04	30.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),
The Total Power =10log($10^{(\text{Power antenna1 in dBm/10})}$+$10^{(\text{Power antenna2 in dBm/10})}$)
2. The manufacturer declared the transmitter output signals is CDD mode And N_{ss}=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with NANT ≥ 5.

So directional gain = GANT + Array Gain =2.34+0=2.34dBi<6dBi.. So the power limt is 30dBm.

5.3. Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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
3.85	-20	5199.996363	5199.992044	5199.982280	5199.976205
3.85	-10	5199.987744	5199.987626	5199.979190	5199.970326
3.85	0	5199.978290	5199.984197	5199.969914	5199.967533
3.85	10	5199.974644	5199.980587	5199.969657	5199.964860
3.85	20	5199.971232	5199.974071	5199.963593	5199.957513
3.85	30	5199.964027	5199.972391	5199.960422	5199.953870
3.85	40	5199.954042	5199.966367	5199.952619	5199.949708
3.85	50	5199.952795	5199.965264	5199.950730	5199.949618
3.3	20	5199.952424	5199.960993	5199.943736	5199.948529
4.25	20	5199.946666	5199.951595	5199.934479	5199.941254
MHz		-0.053334	-0.048405	-0.065521	-0.058746
PPM		-10.256451	-9.308663	-12.600259	-11.297232

Voltage (V)	Temperature (°C)	U-NII-2A Test Results			
		5300MHz			
		1min	2min	5min	10min
3.85	-20	5300.005015	5300.003835	5299.997000	5299.996473
3.85	-10	5300.002855	5299.995573	5299.996802	5299.991840
3.85	0	5299.995372	5299.987040	5299.989546	5299.988854
3.85	10	5299.985861	5299.977369	5299.983753	5299.980071
3.85	20	5299.985118	5299.970346	5299.976799	5299.977863
3.85	30	5299.982976	5299.960768	5299.971535	5299.970747
3.85	40	5299.977842	5299.959337	5299.962155	5299.965996
3.85	50	5299.971494	5299.953551	5299.952883	5299.958055
3.3	20	5299.967721	5299.944343	5299.949830	5299.950276
4.25	20	5299.961763	5299.943280	5299.940665	5299.940549
MHz		-0.038237	-0.056720	-0.059335	-0.059451
PPM		-7.214467	-10.701834	-11.195306	-11.217136

Voltage (V)	Temperature (°C)	U-NII-2C Test Results			
		5580MHz			
		1min	2min	5min	10min
3.85	-20	5579.996316	5579.988271	5579.986006	5579.978668
3.85	-10	5579.994373	5579.987351	5579.983312	5579.970110
3.85	0	5579.986138	5579.983548	5579.978293	5579.968131
3.85	10	5579.980519	5579.979344	5579.972383	5579.963434
3.85	20	5579.978854	5579.971387	5579.967313	5579.962781
3.85	30	5579.978559	5579.967069	5579.963712	5579.955691
3.85	40	5579.974741	5579.964076	5579.962484	5579.954273
3.85	50	5579.972711	5579.963375	5579.960105	5579.948845
3.3	20	5579.970897	5579.960650	5579.955504	5579.948784
4.25	20	5579.965041	5579.956724	5579.953500	5579.943106
MHz		-0.034959	-0.043276	-0.046500	-0.056894
PPM		-6.265016	-7.755643	-8.333328	-10.196141

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
3.85	-20	5785.006363	5785.001171	5784.991514	5784.989109
3.85	-10	5784.999293	5784.998628	5784.987321	5784.988239
3.85	0	5784.999044	5784.998279	5784.982643	5784.983808
3.85	10	5784.997353	5784.998182	5784.975597	5784.974922
3.85	20	5784.996142	5784.989726	5784.968577	5784.973453
3.85	30	5784.988847	5784.980266	5784.965743	5784.968236
3.85	40	5784.986106	5784.975293	5784.958796	5784.966247
3.85	50	5784.979329	5784.967096	5784.950247	5784.958029
3.3	20	5784.974129	5784.960577	5784.948480	5784.950207
4.25	20	5784.966261	5784.952320	5784.944407	5784.947442
MHz		-0.033739	-0.047680	-0.055593	-0.052558
PPM		-5.832220	-8.241946	-9.609782	-9.085163

5.4. Power Spectral Density

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

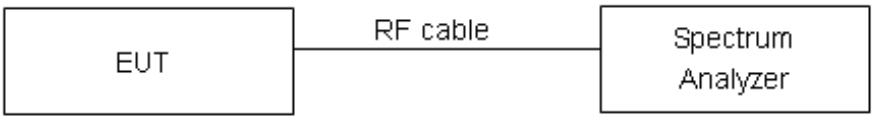
Method of Measurement

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	17/11dBm/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:

Note: Power Spectral Density =Read Value+Duty cycle correction factor

SISO Antenna 1

U-NII-1

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36/5180	6.45	6.45	17	PASS
	40/5200	6.90	6.90	17	PASS
	48/5240	7.31	7.31	17	PASS
802.11n HT20	36/5180	5.75	5.75	17	PASS
	40/5200	6.29	6.29	17	PASS
	48/5240	6.67	6.67	17	PASS
802.11n HT40	38/5190	4.33	4.33	17	PASS
	46/5230	4.17	4.17	17	PASS
802.11ac VHT20	36/5180	6.15	6.15	17	PASS
	40/5200	6.60	6.60	17	PASS
	48/5240	7.09	7.09	17	PASS
802.11ac VHT40	38/5190	4.46	4.46	17	PASS
	46/5230	4.14	4.14	17	PASS
802.11ac VHT80	42/5210	0.75	0.75	17	PASS
802.11ax HE20	36/5180	4.21	4.21	17	PASS
	40/5200	5.96	5.96	17	PASS
	48/5240	6.80	6.80	17	PASS
802.11ax HE40	38/5190	3.81	3.81	17	PASS
	46/5230	3.99	3.99	17	PASS
802.11ax HE80	42/5210	0.66	0.66	17	PASS

U-NII-2A

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	52/5260	7.59	7.59	11	PASS
	60/5300	8.34	8.34	11	PASS
	64/5320	7.11	7.11	11	PASS
802.11n HT20	52/5260	6.99	6.99	11	PASS
	60/5300	7.80	7.80	11	PASS
	64/5320	6.54	6.54	11	PASS
802.11n HT40	54/5270	4.51	4.51	11	PASS
	62/5310	4.63	4.63	11	PASS
802.11ac VHT20	52/5260	7.24	7.24	11	PASS
	60/5300	8.09	8.09	11	PASS
	64/5320	6.94	6.94	11	PASS
802.11ac VHT40	54/5270	4.61	4.61	11	PASS
	62/5310	5.02	5.02	11	PASS
802.11ac VHT80	58/5290	2.54	2.54	11	PASS
802.11ax HE20	52/5260	6.72	6.72	11	PASS
	60/5300	7.64	7.64	11	PASS
	64/5320	6.48	6.48	11	PASS
802.11ax HE40	54/5270	4.25	4.25	11	PASS
	62/5310	4.63	4.63	11	PASS
802.11ax HE80	58/5290	2.19	2.19	11	PASS

U-NII-2C

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	100/5500	7.72	7.72	11	PASS
	120/5600	7.35	7.35	11	PASS
	140/5700	6.70	6.70	11	PASS
	144/5720	6.84	6.84	11	PASS
802.11n HT20	100/5500	7.08	7.08	11	PASS
	120/5600	6.94	6.94	11	PASS
	140/5700	6.19	6.19	11	PASS
	144/5720	6.44	6.44	11	PASS
802.11n HT40	102/5510	3.21	3.21	11	PASS
	118/5590	2.85	2.85	11	PASS
	134/5670	2.93	2.93	11	PASS
	142/5710	2.94	2.94	11	PASS
802.11ac VHT20	100/5500	7.32	7.32	11	PASS
	120/5600	7.12	7.12	11	PASS
	140/5700	6.32	6.32	11	PASS
	144/5720	6.56	6.56	11	PASS
802.11ac VHT40	102/5510	3.48	3.48	11	PASS
	118/5590	2.88	2.88	11	PASS
	134/5670	2.70	2.70	11	PASS
	142/5710	2.78	2.78	11	PASS
802.11ac VHT80	122/5610	0.60	0.60	11	PASS
	138/5690	-0.29	-0.29	11	PASS
802.11ax HE20	100/5500	7.31	7.31	11	PASS
	120/5600	6.59	6.59	11	PASS
	140/5700	6.12	6.12	11	PASS
	144/5720	6.56	6.56	11	PASS
802.11ax HE40	102/5510	2.93	2.93	11	PASS
	118/5590	2.68	2.68	11	PASS
	134/5670	2.57	2.57	11	PASS
	142/5710	2.54	2.54	11	PASS

802.11ax HE80	122/5610	0.47	0.47	11	PASS
	138/5690	-0.21	-0.21	11	PASS

U-NII-3

Mode	Channel Number	Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149/5745	3.39	3.66	30	PASS
	157/5785	3.36	3.63	30	PASS
	165/5825	3.41	3.68	30	PASS
802.11n HT20	149/5745	2.46	2.73	30	PASS
	157/5785	2.75	3.02	30	PASS
	165/5825	2.78	3.05	30	PASS
802.11n HT40	151/5755	-2.05	-1.78	30	PASS
	159/5795	0.13	0.40	30	PASS
802.11ac VHT20	149/5745	2.78	3.05	30	PASS
	157/5785	2.24	2.51	30	PASS
	165/5825	3.05	3.32	30	PASS
802.11ac VHT40	151/5755	-0.38	-0.11	30	PASS
	159/5795	0.26	0.53	30	PASS
802.11ac VHT80	155/5775	-3.10	-2.83	30	PASS
802.11ax HE20	149/5745	2.49	2.76	30	PASS
	157/5785	3.29	3.56	30	PASS
	165/5825	2.92	3.19	30	PASS
802.11ax HE40	151/5755	-0.23	0.04	30	PASS
	159/5795	-0.09	0.18	30	PASS
802.11ax HE80	155/5775	-3.08	-2.81	30	PASS
Note:PSD=Read Value+Duty cycle+10*LOG(500/470) correction factor					

SISO Antenna 2

U-NII-1

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36/5180	7.54	7.54	17	PASS
	40/5200	7.33	7.33	17	PASS
	48/5240	7.56	7.56	17	PASS
802.11n HT20	36/5180	6.81	6.81	17	PASS
	40/5200	6.83	6.83	17	PASS
	48/5240	6.88	6.88	17	PASS
802.11n HT40	38/5190	4.51	4.51	17	PASS
	46/5230	4.66	4.66	17	PASS
802.11ac VHT20	36/5180	7.02	7.02	17	PASS
	40/5200	6.97	6.97	17	PASS
	48/5240	7.30	7.30	17	PASS
802.11ac VHT40	38/5190	4.47	4.47	17	PASS
	46/5230	4.70	4.70	17	PASS
802.11ac VHT80	42/5210	1.71	1.71	17	PASS
802.11ax HE20	36/5180	7.11	7.11	17	PASS
	40/5200	6.94	6.94	17	PASS
	48/5240	6.69	6.69	17	PASS
802.11ax HE40	38/5190	4.16	4.16	17	PASS
	46/5230	4.46	4.46	17	PASS
802.11ax HE80	42/5210	1.92	1.92	17	PASS

U-NII-2A

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	52/5260	6.67	6.67	11	PASS
	60/5300	6.73	6.73	11	PASS
	64/5320	7.05	7.05	11	PASS
802.11n HT20	52/5260	6.37	6.37	11	PASS
	60/5300	5.95	5.95	11	PASS
	64/5320	6.87	6.87	11	PASS
802.11n HT40	54/5270	3.97	3.97	11	PASS
	62/5310	2.70	2.70	11	PASS
802.11ac VHT20	52/5260	6.74	6.74	11	PASS
	60/5300	6.03	6.03	11	PASS
	64/5320	6.86	6.86	11	PASS
802.11ac VHT40	54/5270	3.89	3.89	11	PASS
	62/5310	2.65	2.65	11	PASS
802.11ac VHT80	58/5290	0.94	0.94	11	PASS
802.11ax HE20	52/5260	6.47	6.47	11	PASS
	60/5300	6.25	6.25	11	PASS
	64/5320	6.74	6.74	11	PASS
802.11ax HE40	54/5270	3.52	3.52	11	PASS
	62/5310	2.54	2.54	11	PASS
802.11ax HE80	58/5290	0.84	0.84	11	PASS

U-NII-2C

Mode	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	100/5500	5.98	5.98	11	PASS
	120/5600	7.44	7.44	11	PASS
	140/5700	8.69	8.69	11	PASS
	144/5720	8.21	8.21	11	PASS
802.11n HT20	100/5500	6.52	6.52	11	PASS
	120/5600	7.06	7.06	11	PASS
	140/5700	8.23	8.23	11	PASS
	144/5720	7.93	7.93	11	PASS
802.11n HT40	102/5510	1.83	1.83	11	PASS
	118/5590	3.10	3.10	11	PASS
	134/5670	4.45	4.45	11	PASS
	142/5710	5.21	5.21	11	PASS
802.11ac VHT20	100/5500	6.18	6.18	11	PASS
	120/5600	6.93	6.93	11	PASS
	140/5700	8.19	8.19	11	PASS
	144/5720	7.80	7.80	11	PASS
802.11ac VHT40	102/5510	1.82	1.82	11	PASS
	118/5590	3.16	3.16	11	PASS
	134/5670	4.36	4.36	11	PASS
	142/5710	5.20	5.20	11	PASS
802.11ac VHT80	122/5610	0.75	0.75	11	PASS
	138/5690	1.94	1.94	11	PASS
802.11ax HE20	100/5500	5.83	5.83	11	PASS
	120/5600	6.82	6.82	11	PASS
	140/5700	8.03	8.03	11	PASS
	144/5720	8.04	8.04	11	PASS
802.11ax HE40	102/5510	1.60	1.60	11	PASS
	118/5590	2.85	2.85	11	PASS
	134/5670	4.17	4.17	11	PASS
	142/5710	4.76	4.76	11	PASS

802.11ax HE80	122/5610	0.72	0.72	11	PASS
	138/5690	1.89	1.89	11	PASS

U-NII-3

Mode	Channel Number	Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149/5745	5.71	5.98	30	PASS
	157/5785	5.70	5.97	30	PASS
	165/5825	4.49	4.76	30	PASS
802.11n HT20	149/5745	4.86	5.13	30	PASS
	157/5785	4.40	4.67	30	PASS
	165/5825	3.81	4.08	30	PASS
802.11n HT40	151/5755	1.88	2.15	30	PASS
	159/5795	1.70	1.97	30	PASS
802.11ac VHT20	149/5745	4.99	5.26	30	PASS
	157/5785	4.66	4.93	30	PASS
	165/5825	3.98	4.25	30	PASS
802.11ac VHT40	151/5755	1.88	2.15	30	PASS
	159/5795	1.89	2.16	30	PASS
802.11ac VHT80	155/5775	-1.19	-0.92	30	PASS
802.11ax HE20	149/5745	5.27	5.54	30	PASS
	157/5785	4.57	4.84	30	PASS
	165/5825	4.33	4.60	30	PASS
802.11ax HE40	151/5755	1.60	1.87	30	PASS
	159/5795	1.64	1.91	30	PASS
802.11ax HE80	155/5775	-0.93	-0.66	30	PASS
Note:PSD=Read Value+Duty cycle+10*LOG(500/470) correction factor					

MIMO

U-NII-1

Mode	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm /MHz)		
		Read Value (dBm/MHz)	PSD (dBm /MHz)	Read Value (dBm/MHz)	PSD (dBm /MHz)			
802.11n HT20	36/5180	5.26	5.26	4.72	4.72	8.01	17	PASS
	40/5200	6.05	6.05	8.15	8.15	10.24	17	PASS
	48/5240	6.52	6.52	7.78	7.78	10.20	17	PASS
802.11n HT40	38/5190	3.97	3.97	4.43	4.43	7.22	17	PASS
	46/5230	3.77	3.77	4.50	4.50	7.16	17	PASS
802.11ac VHT20	36/5180	5.13	5.13	6.66	6.66	8.97	17	PASS
	40/5200	6.54	6.54	6.52	6.52	9.54	17	PASS
	48/5240	7.15	7.15	6.35	6.35	9.78	17	PASS
802.11ac VHT40	38/5190	4.26	4.26	4.16	4.16	7.22	17	PASS
	46/5230	3.96	3.96	4.20	4.20	7.09	17	PASS
802.11ac VHT80	42/5210	0.83	0.83	1.61	1.61	4.25	17	PASS
802.11ax HE20	36/5180	5.44	5.44	6.69	6.69	9.12	17	PASS
	40/5200	5.98	5.98	6.72	6.72	9.38	17	PASS
	48/5240	6.78	6.78	6.66	6.66	9.73	17	PASS
802.11ax HE40	38/5190	3.84	3.84	4.47	4.47	7.18	17	PASS
	46/5230	3.52	3.52	4.38	4.38	6.98	17	PASS
802.11ax HE80	42/5210	0.564	0.56	1.50	1.50	4.07	17	PASS

Note: 1. Power Spectral Density =Read Value+Duty cycle correction factor

2. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})}$

3. The manufacturer declared the transmitter output signals is CDD mode And Nss=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = GANT + Array Gain, For PSD measurements on all devices,Array Gain=10log(Nant/Nss)dB,so directional gain=GANT+Array Gain=2.34+10log(2/1)=5.35<6dBi. So the PSD limt is 17.

U-NII-2A

Mode	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm /MHz)		
		Read Value (dBm/MHz)	PSD (dBm /MHz)	Read Value (dBm/MHz)	PSD (dBm /MHz)			
802.11n HT20	52/5260	6.77	6.77	6.91	6.91	9.85	11	PASS
	60/5300	7.54	7.54	6.17	6.17	9.92	11	PASS
	64/5320	6.52	6.52	6.64	6.64	9.59	11	PASS
802.11n HT40	54/5270	4.13	4.13	3.69	3.69	6.93	11	PASS
	62/5310	4.76	4.76	2.71	2.71	6.86	11	PASS
802.11ac VHT20	52/5260	7.19	7.19	6.18	6.18	9.72	11	PASS
	60/5300	8.23	8.23	5.79	5.79	10.19	11	PASS
	64/5320	6.95	6.95	6.49	6.49	9.74	11	PASS
802.11ac VHT40	54/5270	4.48	4.48	4.24	4.24	7.37	11	PASS
	62/5310	4.76	4.76	2.51	2.51	6.79	11	PASS
802.11ac VHT80	58/5290	2.43	2.43	0.52	0.52	4.59	11	PASS
802.11ax HE20	52/5260	6.48	6.48	6.29	6.29	9.40	11	PASS
	60/5300	7.69	7.69	5.83	5.83	9.87	11	PASS
	64/5320	6.29	6.29	6.58	6.58	9.45	11	PASS
802.11ax HE40	54/5270	3.95	3.95	3.64	3.64	6.81	11	PASS
	62/5310	4.94	4.94	2.59	2.59	6.93	11	PASS
802.11ax HE80	58/5290	2.60	2.60	0.40	0.40	4.65	11	PASS

Note: 1. Power Spectral Density =Read Value+Duty cycle correction factor

2. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})}$

3. The manufacturer declared the transmitter output signals is CDD mode And Nss=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = GANT + Array Gain, For PSD measurements on all devices,Array Gain=10log(Nant/Nss)dB, so directional gain=GANT+Array Gain=2.34+10log(2/1)=5.35<6dBi. So the PSD limt is 11.

U-NII-2C

Mode	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm /MHz)		
		Read Value (dBm/MHz)	PSD (dBm /MHz)	Read Value (dBm/MHz)	PSD (dBm /MHz)			
802.11n HT20	100/5500	7.05	7.05	6.04	6.04	9.59	11	PASS
	120/5600	6.57	6.57	7.01	7.01	9.80	11	PASS
	140/5700	5.48	5.48	7.94	7.94	9.89	11	PASS
	144/5720	5.93	5.93	7.68	7.68	9.90	11	PASS
802.11n HT40	102/5510	3.12	3.12	1.82	1.82	5.53	11	PASS
	118/5590	2.79	2.79	3.08	3.08	5.95	11	PASS
	134/5670	2.52	2.52	4.28	4.28	6.50	11	PASS
	142/5710	2.82	2.82	4.96	4.96	7.03	11	PASS
802.11ac VHT20	100/5500	7.26	7.26	5.79	5.79	9.60	11	PASS
	120/5600	7.03	7.03	6.61	6.61	9.84	11	PASS
	140/5700	6.35	6.35	7.81	7.81	10.15	11	PASS
	144/5720	6.40	6.40	7.33	7.33	9.90	11	PASS
802.11ac VHT40	102/5510	3.49	3.49	1.81	1.81	5.74	11	PASS
	118/5590	2.77	2.77	2.91	2.91	5.85	11	PASS
	134/5670	2.66	2.66	4.37	4.37	6.61	11	PASS
	142/5710	2.89	2.89	4.94	4.94	7.04	11	PASS
802.11ac VHT80	122/5610	0.20	0.20	0.52	0.52	3.37	11	PASS
	138/5690	-0.43	-0.43	1.70	1.70	3.77	11	PASS
802.11ax HE20	100/5500	7.05	7.05	5.83	5.83	9.49	11	PASS
	120/5600	6.32	6.32	7.01	7.01	9.69	11	PASS
	140/5700	5.98	5.98	7.94	7.94	10.08	11	PASS
	144/5720	5.97	5.97	7.74	7.74	9.95	11	PASS
802.11ax HE40	102/5510	2.70	2.70	1.82	1.82	5.29	11	PASS
	118/5590	2.80	2.80	2.93	2.93	5.88	11	PASS
	134/5670	2.61	2.61	4.23	4.23	6.51	11	PASS
	142/5710	2.32	2.32	4.91	4.91	6.81	11	PASS
802.11ax HE80	122/5610	0.42	0.42	0.83	0.83	3.64	11	PASS
	138/5690	-0.10	-0.10	1.77	1.77	3.95	11	PASS

Note: 1. Power Spectral Density =Read Value+Duty cycle correction factor

2. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})}$

3. The manufacturer declared the transmitter output signals is CDD mode And Nss=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = GANT + Array Gain, For PSD measurements on all devices,Array Gain=10log(Nant/Nss)dB, so directional gain=GANT+Array Gain=2.34+10log(2/1)=5.35<6dBi. So

the PSD limt is 11.

U-NII-3

Mode	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm/ 500kHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm/ 500kHz)		
		Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)	Read Value (dBm/470kHz)	Power Spectral Density (dBm/500kHz)			
802.11n HT20	149/5745	2.29	2.56	5.62	5.89	7.55	30	PASS
	157/5785	2.47	2.74	5.29	5.56	7.38	30	PASS
	165/5825	2.55	2.82	4.92	5.19	7.18	30	PASS
802.11n HT40	151/5755	-0.42	-0.15	1.61	1.88	3.99	30	PASS
	159/5795	0.22	0.49	1.70	1.97	4.30	30	PASS
802.11ac VHT20	149/5745	2.73	3.00	4.67	4.94	7.08	30	PASS
	157/5785	3.19	3.46	4.24	4.51	7.03	30	PASS
	165/5825	3.12	3.39	3.95	4.22	6.84	30	PASS
802.11ac VHT40	151/5755	-0.33	-0.06	1.81	2.08	4.15	30	PASS
	159/5795	0.14	0.41	1.60	1.87	4.21	30	PASS
802.11ac VHT80	155/5775	-2.78	-2.51	-1.31	-1.04	1.30	30	PASS
802.11ax HE20	149/5745	2.37	2.64	4.90	5.17	7.10	30	PASS
	157/5785	2.69	2.96	4.66	4.93	7.07	30	PASS
	165/5825	2.53	2.80	3.86	4.13	6.53	30	PASS
802.11ax HE40	151/5755	-0.69	-0.42	1.49	1.76	3.82	30	PASS
	159/5795	-0.22	0.05	1.56	1.83	4.04	30	PASS
802.11ax HE80	155/5775	-3.11	-2.84	-1.00	-0.73	1.35	30	PASS

Note: 1. Power Spectral Density =Read Value+Duty cycle correction factor

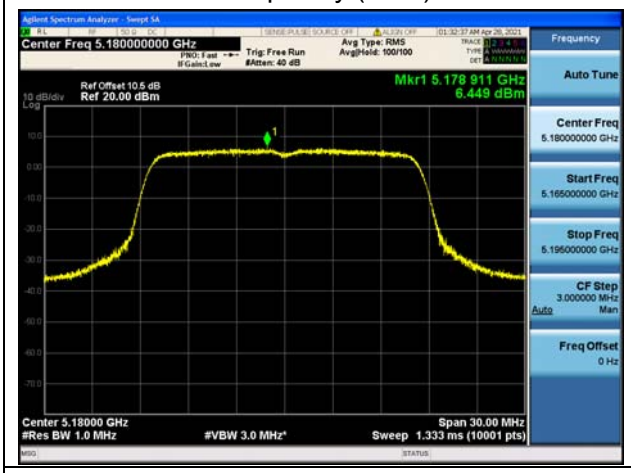
2. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})}$

3. The manufacturer declared the transmitter output signals is CDD mode And Nss=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = GANT + Array Gain, For PSD measurements on all devices,Array Gain=10log(Nant/Nss)dB, so directional gain=GANT+Array Gain=2.34+10log(2/1)=5.35<6dBi. So the PSD limt is 30.

SISO Antenna 1

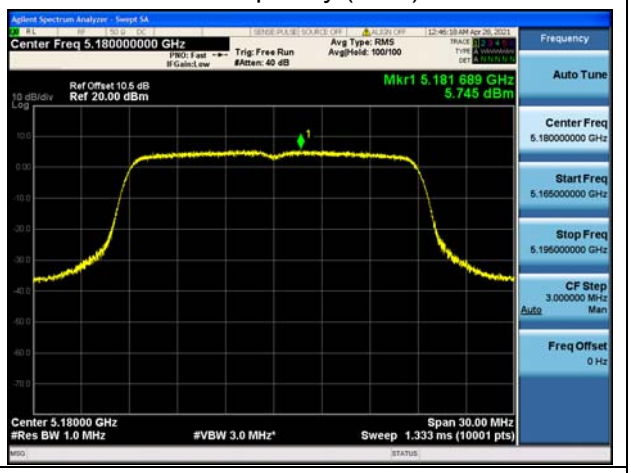
U-NII-1, 802.11a

Carrier frequency (MHz): 5180



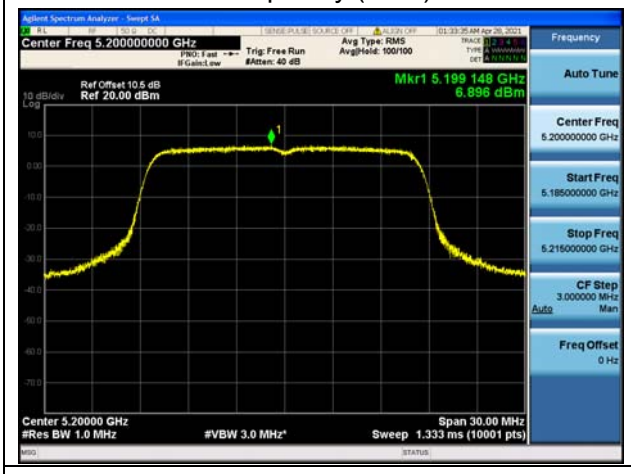
U-NII-1, 802.11n HT20

Carrier frequency (MHz): 5180



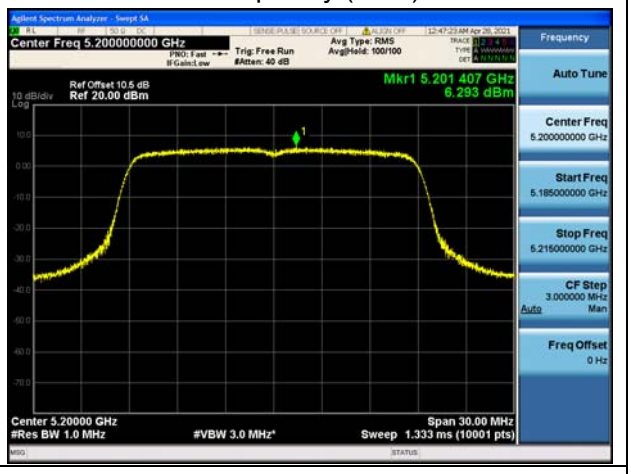
U-NII-1, 802.11a

Carrier frequency (MHz): 5200



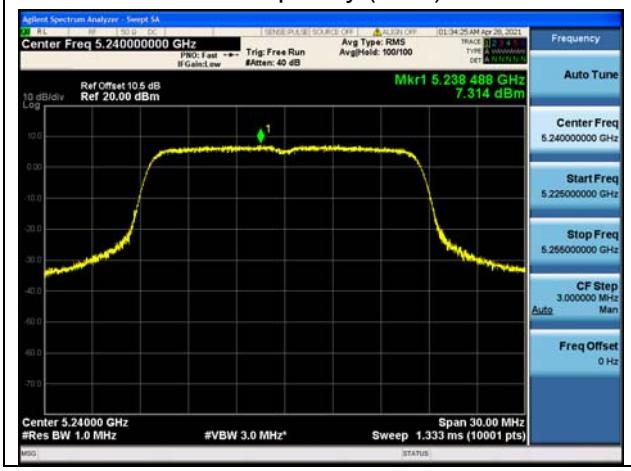
U-NII-1, 802.11n HT20

Carrier frequency (MHz): 5200



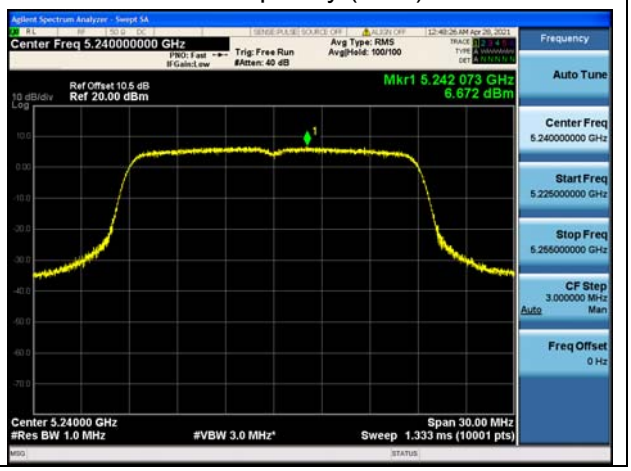
U-NII-1, 802.11a

Carrier frequency (MHz):5240



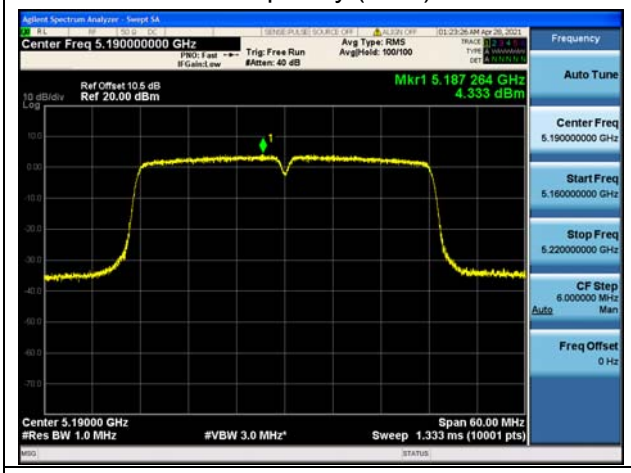
U-NII-1, 802.11n HT20

Carrier frequency (MHz):5240



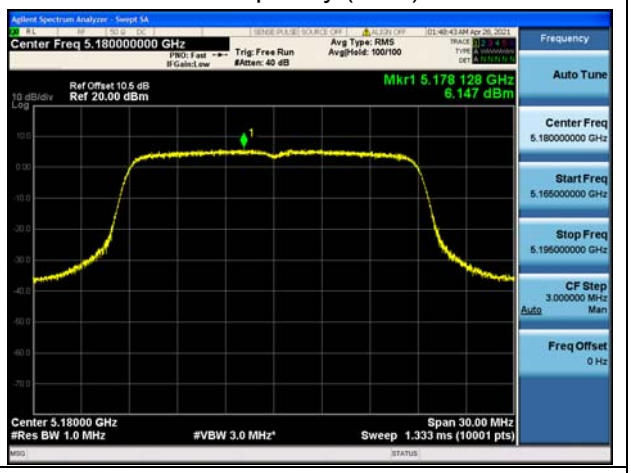
U-NII-1, 802.11n HT40

Carrier frequency (MHz): 5190



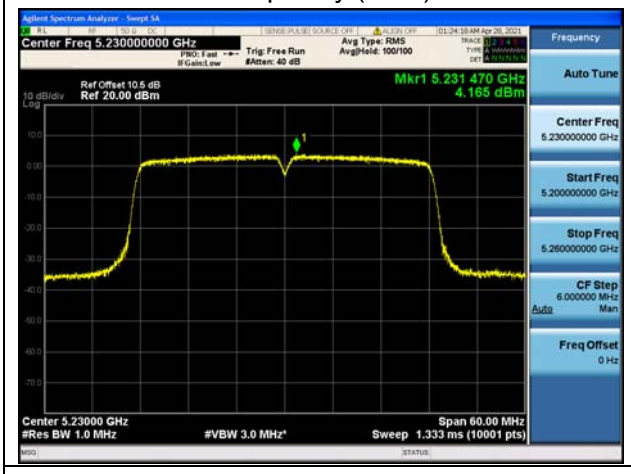
U-NII-1, 802.11ac VHT20

Carrier frequency (MHz): 5180



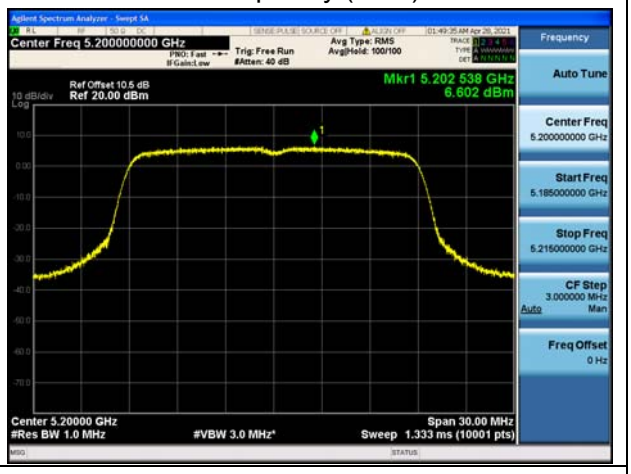
U-NII-1, 802.11n HT40

Carrier frequency (MHz): 5230



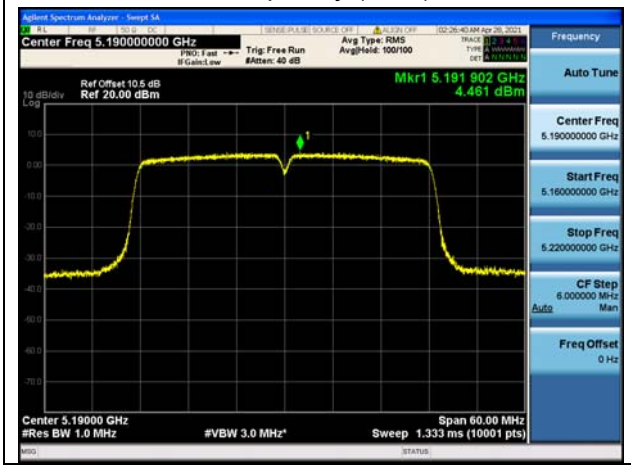
U-NII-1, 802.11ac VHT20

Carrier frequency (MHz): 5200



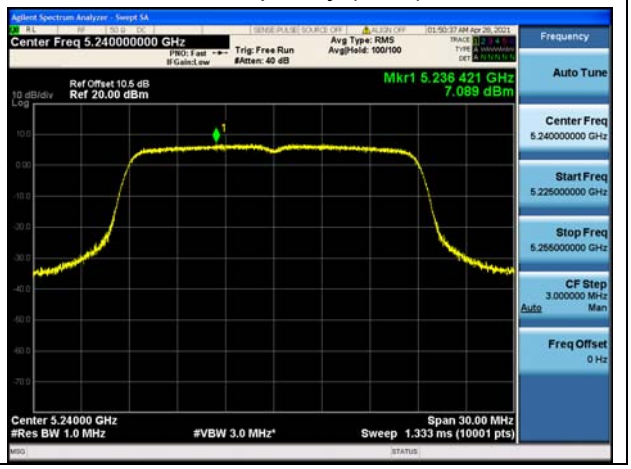
U-NII-1, 802.11ac VHT40

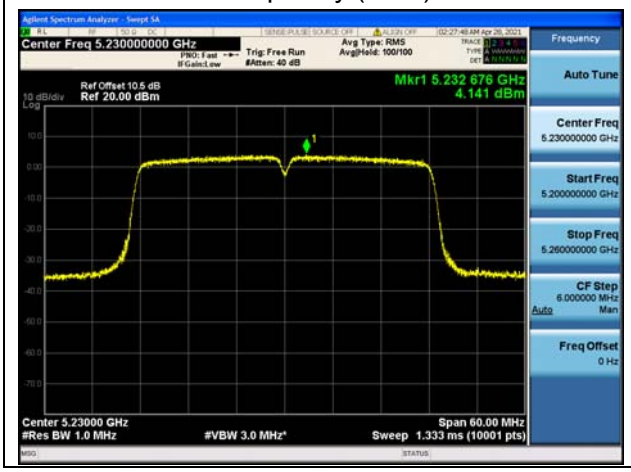
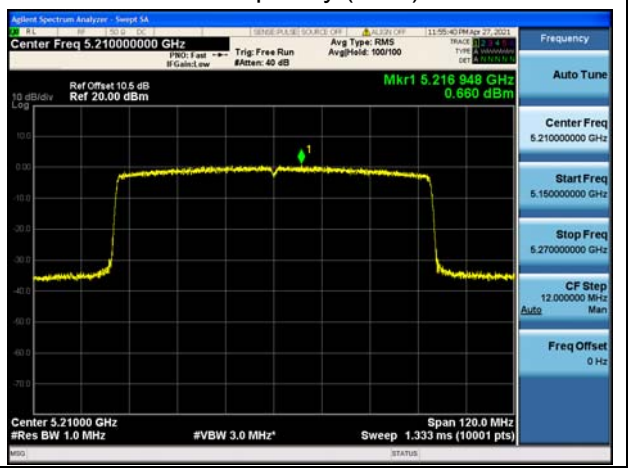
Carrier frequency (MHz): 5190



U-NII-1, 802.11ac VHT20

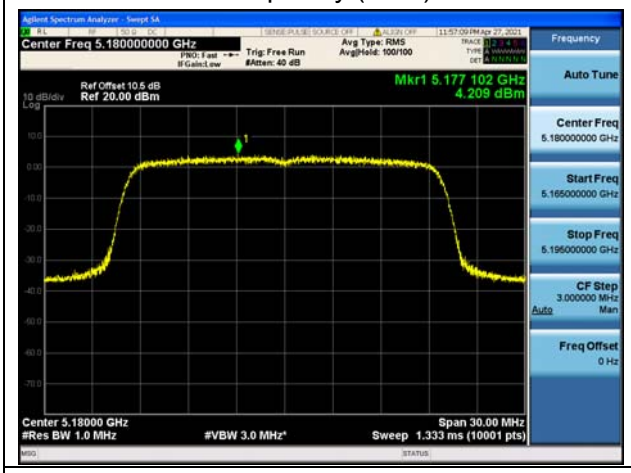
Carrier frequency (MHz):5240



U-NII-1, 802.11ac VHT40 Carrier frequency (MHz): 5230	U-NII-1, 802.11ac VHT80 Carrier frequency (MHz): 5210
	

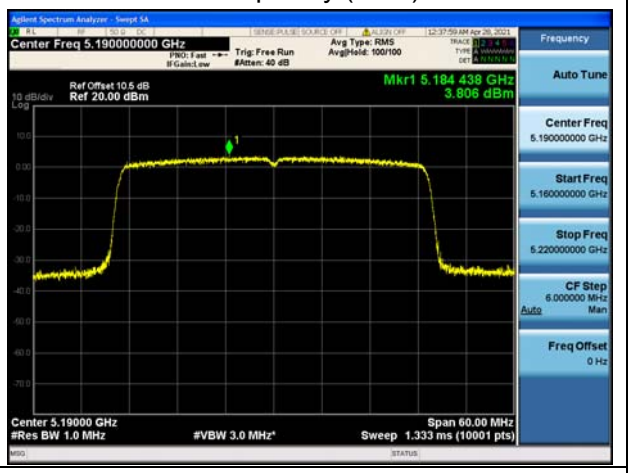
U-NII-1, 802.11ax HE20

Carrier frequency (MHz): 5180



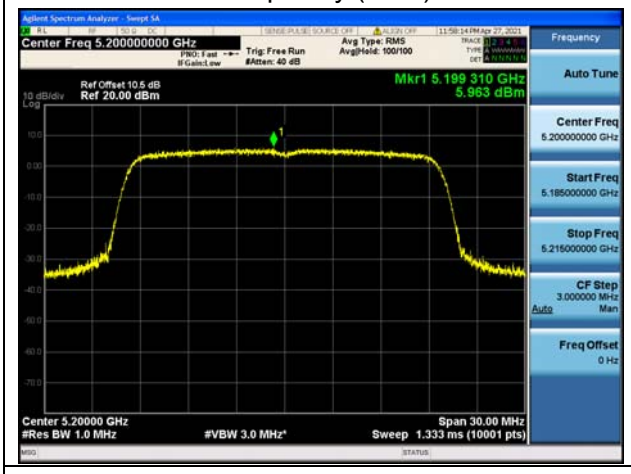
U-NII-1, 802.11ax HE40

Carrier frequency (MHz): 5190



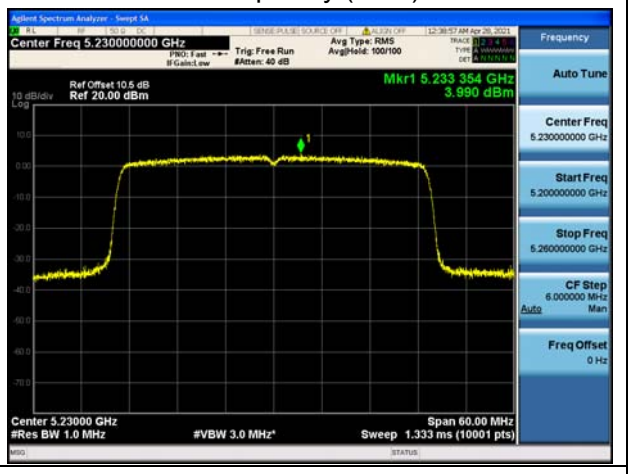
U-NII-1, 802.11ax HE20

Carrier frequency (MHz): 5200



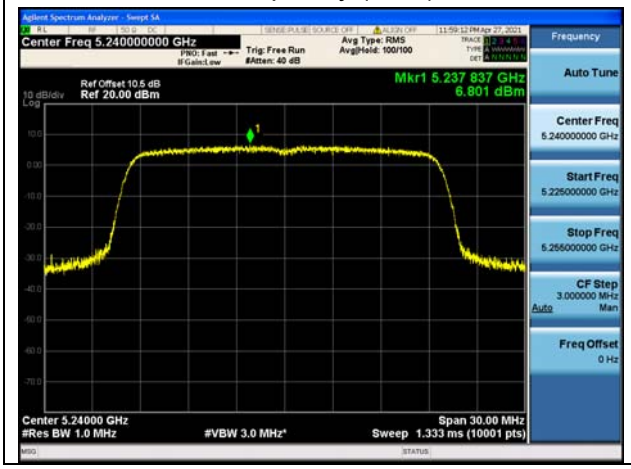
U-NII-1, 802.11ax HE40

Carrier frequency (MHz): 5230



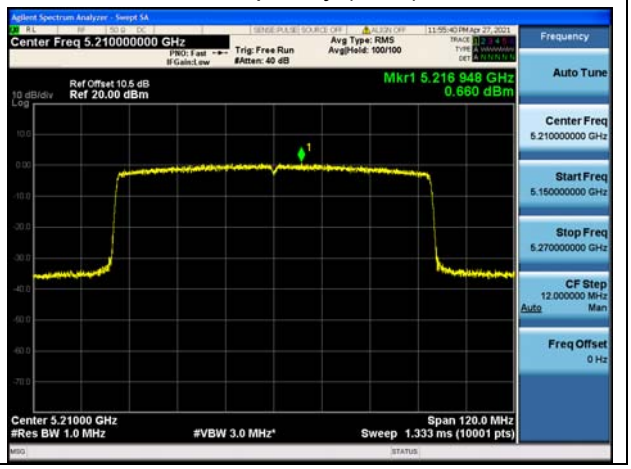
U-NII-1, 802.11ax HE20

Carrier frequency (MHz):5240



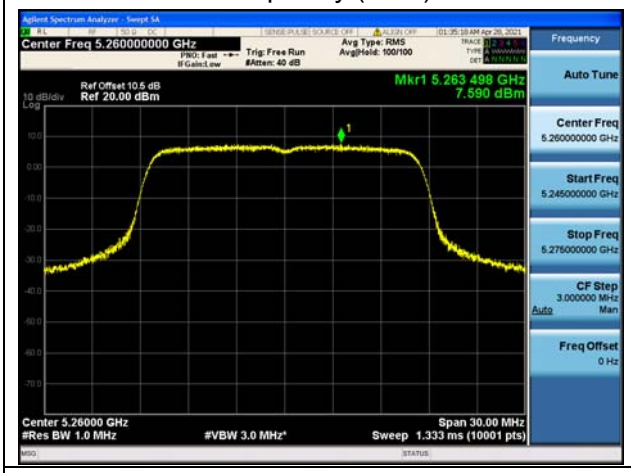
U-NII-1, 802.11ax HE80

Carrier frequency (MHz): 5210



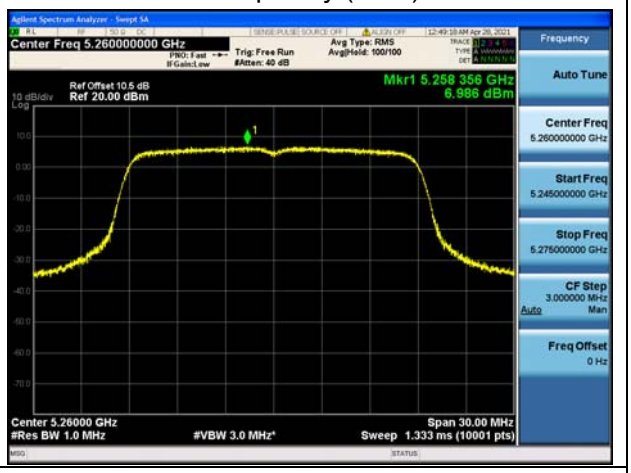
U-NII-2A, 802.11a

Carrier frequency (MHz): 5260



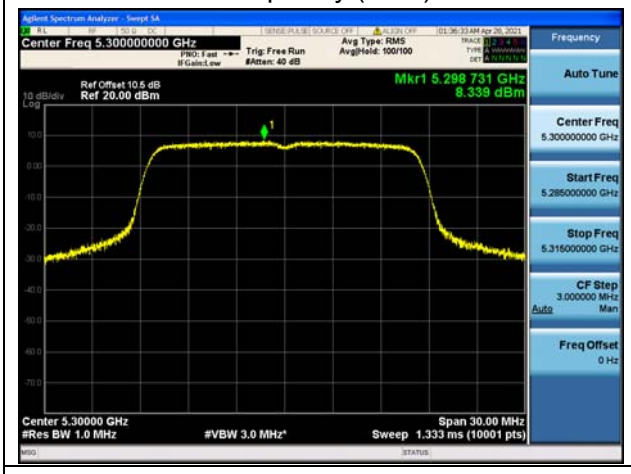
U-NII-2A, 802.11n HT20

Carrier frequency (MHz): 5260



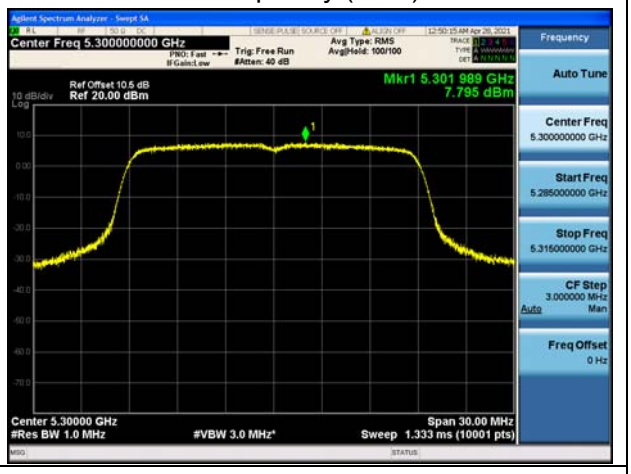
U-NII-2A, 802.11a

Carrier frequency (MHz): 5300



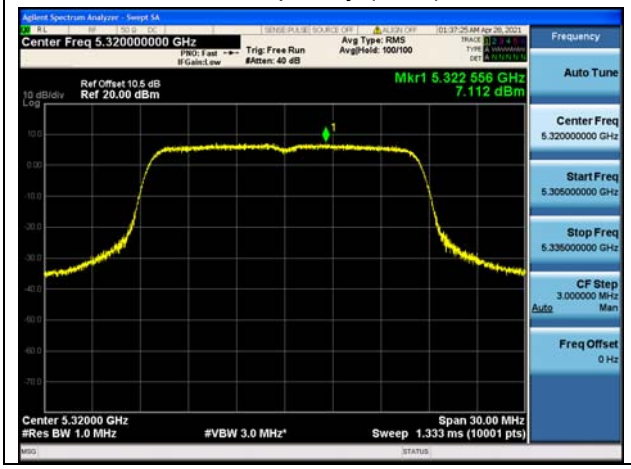
U-NII-2A, 802.11n HT20

Carrier frequency (MHz): 5300



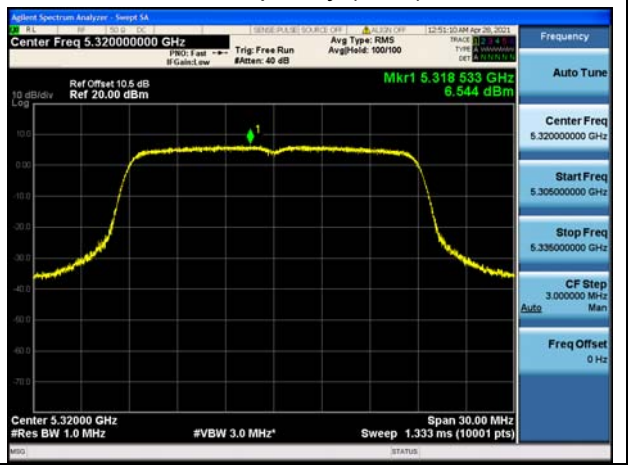
U-NII-2A, 802.11a

Carrier frequency (MHz):5320

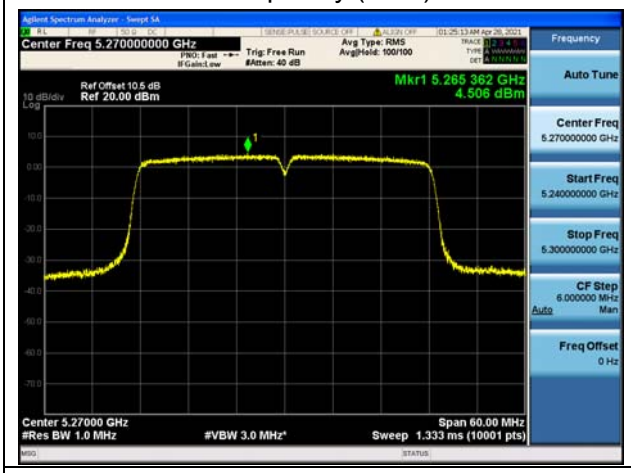


U-NII-2A, 802.11n HT20

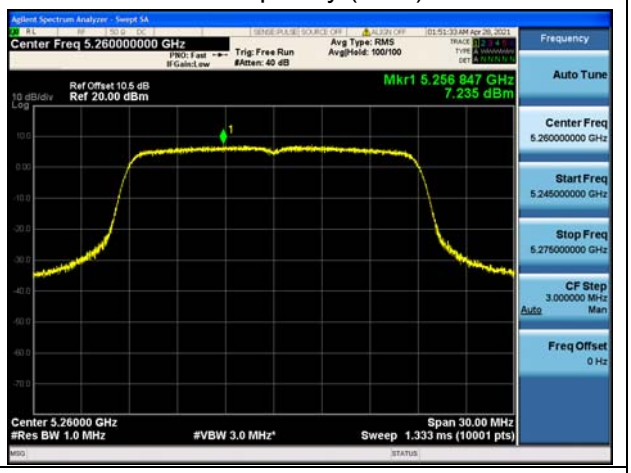
Carrier frequency (MHz):5320



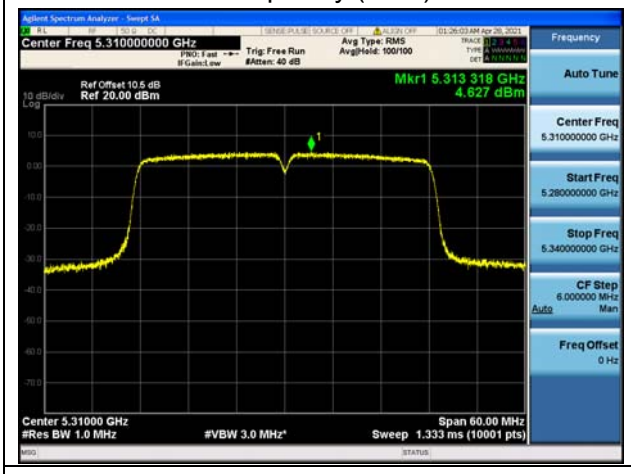
U-NII-2A, 802.11n HT40
Carrier frequency (MHz): 5270



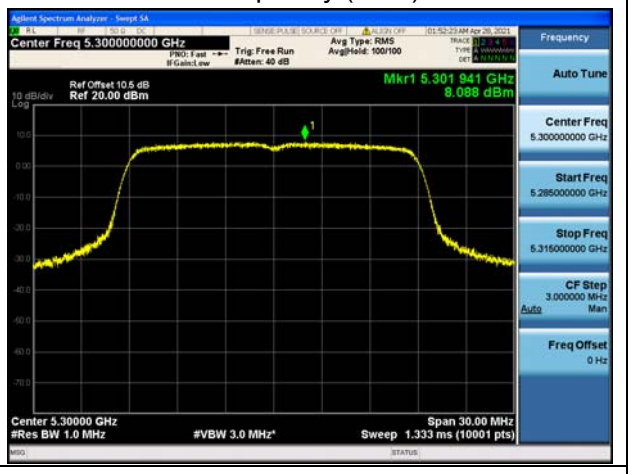
U-NII-2A, 802.11ac VHT20
Carrier frequency (MHz):5260



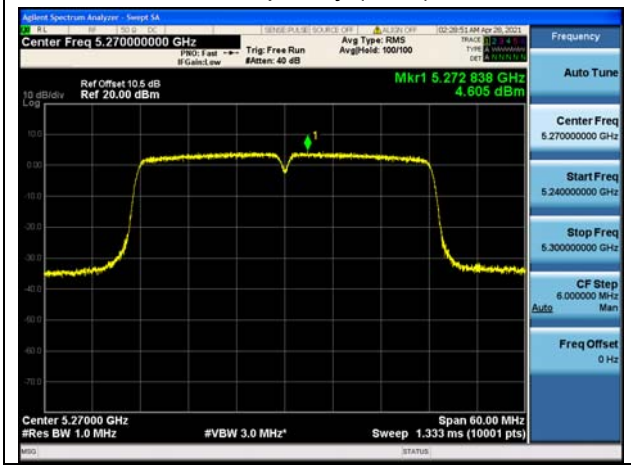
U-NII-2A, 802.11n HT40
Carrier frequency (MHz): 5310



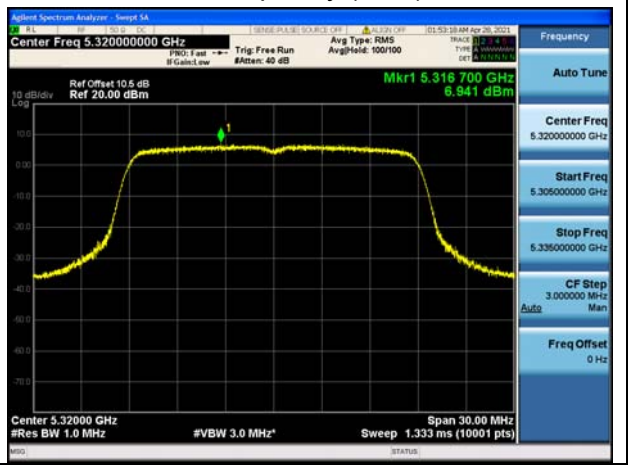
U-NII-2A, 802.11ac VHT20
Carrier frequency (MHz): 5300



U-NII-2A, 802.11ac VHT40
Carrier frequency (MHz): 5270

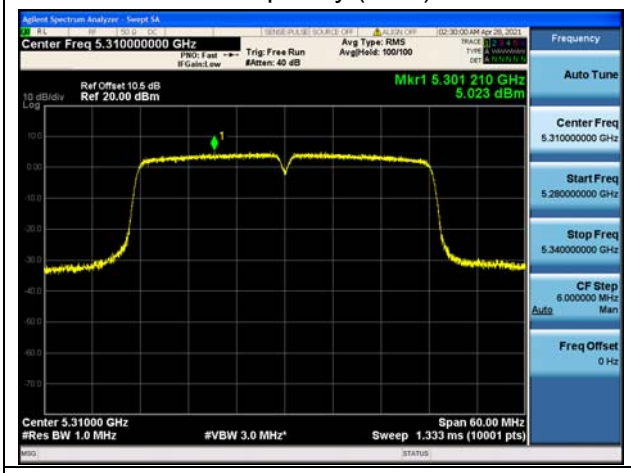


U-NII-2A, 802.11ac VHT20
Carrier frequency (MHz):5320



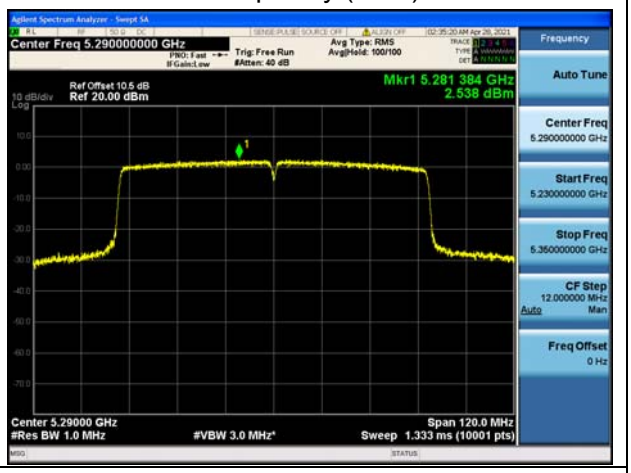
U-NII-2A, 802.11ac VHT40

Carrier frequency (MHz): 5310



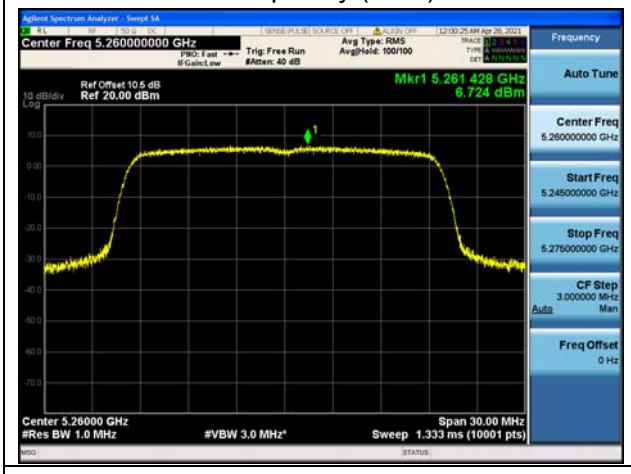
U-NII-2A, 802.11ac VHT80

Carrier frequency (MHz): 5290



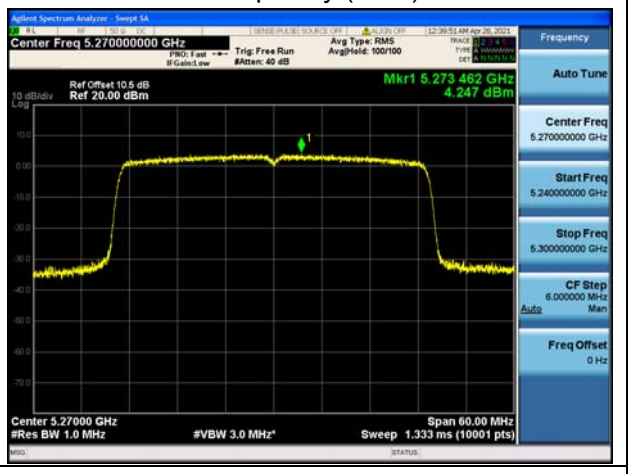
U-NII-2A, 802.11ax HE20

Carrier frequency (MHz):5260



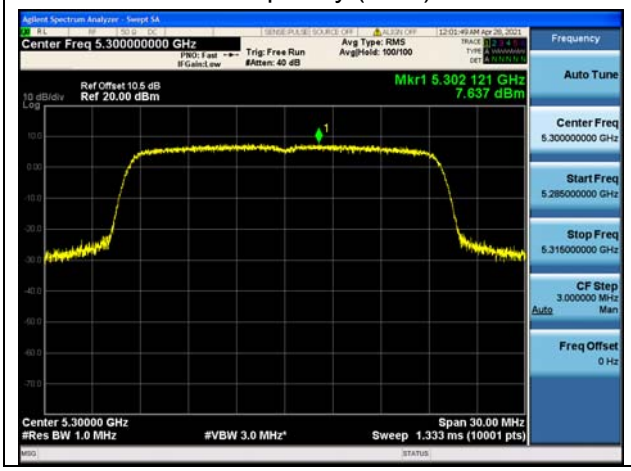
U-NII-2A, 802.11ax HE40

Carrier frequency (MHz): 5270



U-NII-2A, 802.11ax HE20

Carrier frequency (MHz): 5300



U-NII-2A, 802.11ax HE40

Carrier frequency (MHz): 5310