RF TEST REPORT

Applicant	Huawei Device Co., Ltd.
Product	1500Mbps Wireless Router
FCC ID	2ATEYWS7001
Model	WS7001
Report No.	R2108A0722-R2V3
Issue Date	October 11, 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

TA Technology (Shanghai) Co., Ltd.

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TABLE OF CONTENT

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Version	Revision description	Issue Date
Rev.0	Initial issue of report.	September 15, 2021
Rev.1	Update information in Page 102. Update data in Page131.	September 22, 2021
Rev.2	Update data in Page28.	September 22, 2021
Rev.3	Update information in Page 6 and Page 10.	October 11, 2021
Note: This revised report (Report No. R2108A0722-R2V3) supersedes and replaces the previously issued report (Report No. R2108A0722-R2V2). Please discard or destroy the previously issued report and dispose of it accordingly.		

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Summary of measurement results

Number	Test Case	Clause in FCC rules	Verdict
1	Average output power	15.407(a)	PASS
2	Occupied bandwidth	15.407(e)	PASS
3	Frequency stability	15.407(g)	PASS
4	Power spectral density	15.407(a)	PASS
5	Unwanted Emissions	15.407(b)	PASS
6	Conducted Emissions	15.207	PASS
Date of Testing: August 13, 2021 ~ September 10, 2021 Date of Sample Received: August 10, 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.			

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1. Test Laboratory

1.1. Notes of the test report

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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
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Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

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2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Huawei Device Co., Ltd.
Applicant address	No.2 of Xincheng Road, Songshan Lake Zone, Dongguan, Guangdong 523808, People's Republic of China
Manufacturer	Huawei Device Co., Ltd.
Manufacturer address	No.2 of Xincheng Road, Songshan Lake Zone, Dongguan, Guangdong 523808, People's Republic of China

2.2. General information

EUT Description	
Model	WS7001
SN	PDUQU21705000031
Hardware Version	AM1TC7001M
Software Version	11.0.3.3
Power Supply	DC / AC adapter
Antenna Type	External Antenna
Antenna Gain	Antenna 1: 5.0 dBi Antenna 2: 5.0 dBi
Test Band	U-NII-1(5150MHz-5250MHz) U-NII-3(5725MHz-5850MHz)
Modulation Type	802.11a/n (HT20/HT40) : OFDM 802.11ac (VHT20/VHT40/VHT80): OFDM 802.11ax SU mode (HE20/HE40/HE80): OFDM
Max. Power Output	23.97 dBm
Operating Frequency Range(s)	U-NII-1: 5150MHz-5250MH U-NII-3: 5725MHz -5850MHz
Extreme temperature range:	-20 ° C to 50° C
Operating temperature range:	0 ° C to 40° C
Operating voltage range:	11.4 V to 12.6 V
State DC voltage:	12V

EUT Accessory			
Accessory	**Model**	**Manufacturer**	**No.**
Adapter	HW-120100U01	UE/HONOR	1
	HW-120100E01		2
	HW-120100B01		3

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Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.
2. There is more than one Adapter, each one should be applied throughout the compliance test respectively, and however, only the worst case (Adapter 1) will be recorded in this report.

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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

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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		
	Antenna 1	Antenna 2	MIMO
802.11a	6 Mbps	6 Mbps	/
802.11n HT20	MCS0	MCS0	MCS8
802.11n HT40	MCS0	MCS0	MCS8
802.11ac VHT20	MCS0	MCS0	MCS0
802.11ac VHT40	MCS0	MCS0	MCS0
802.11ac VHT80	MCS0	MCS0	MCS0
802.11ax HE20	MCS0	MCS0	MCS0
802.11ax HE40	MCS0	MCS0	MCS0
802.11ax HE80	MCS0	MCS0	MCS0
The device supports non-beamforming and beamforming function in 802.11n/ac, after pre-testing, beamforming mode has the worst emission value, so the worst case was recorded.			

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

Test Cases	Antenna 1	Antenna 2	CDD/MIMO
Average conducted output power	O	O	O
Occupied bandwidth	--	--	O
Frequency stability	802.11a	--	--
Power Spectral Density	O	O	O
Unwanted Emissions	O	--	--
Conducted Emissions	802.11ac VHT20	--	--
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, and 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-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				

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5. Test Case Results

5.1. Occupied Bandwidth

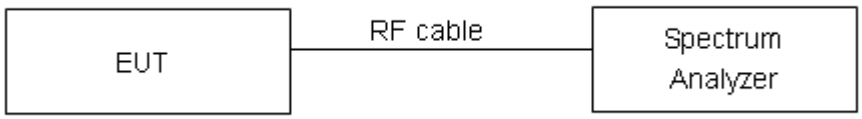
Ambient condition

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, 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.

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Test Results:

U-NII-1

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5180	16.951	22.28	PASS
	5200	17.068	22.49	PASS
	5240	17.312	28.79	PASS
802.11n HT20	5180	18.004	23.21	PASS
	5200	18.117	24.01	PASS
	5240	18.319	27.74	PASS
802.11n HT40	5190	36.546	44.32	PASS
	5230	36.554	44.29	PASS
802.11ac VHT20	5180	17.921	23.22	PASS
	5200	18.015	24.15	PASS
	5240	18.297	26.69	PASS
802.11ac VHT40	5190	36.764	45.30	PASS
	5230	36.774	44.94	PASS
802.11ac VHT80	5210	76.538	86.53	PASS
802.11ax HE 20	5180	19.134	23.08	PASS
	5200	19.218	23.18	PASS
	5240	19.674	30.77	PASS
802.11ax HE 40	5190	38.316	44.73	PASS
	5230	38.279	44.79	PASS
802.11ax HE 80	5210	77.711	82.47	PASS

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U-NII-3

Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11a	5745	17.020	16.44	500	PASS
	5825	16.975	16.44	500	PASS
802.11n HT20	5745	18.289	17.64	500	PASS
	5825	18.361	17.64	500	PASS
802.11n HT40	5755	36.727	36.48	500	PASS
	5795	37.145	36.48	500	PASS
802.11ac VHT20	5745	18.159	17.64	500	PASS
	5825	18.262	17.64	500	PASS
802.11ac VHT40	5755	36.935	36.48	500	PASS
	5795	37.249	36.48	500	PASS
802.11ac VHT80	5775	76.558	76.64	500	PASS
802.11ax HE 20	5745	19.273	18.80	500	PASS
	5825	19.210	18.72	500	PASS
802.11ax HE 40	5755	38.353	38.00	500	PASS
	5795	38.448	38.00	500	PASS
802.11ax HE 80	5775	77.678	77.44	500	PASS

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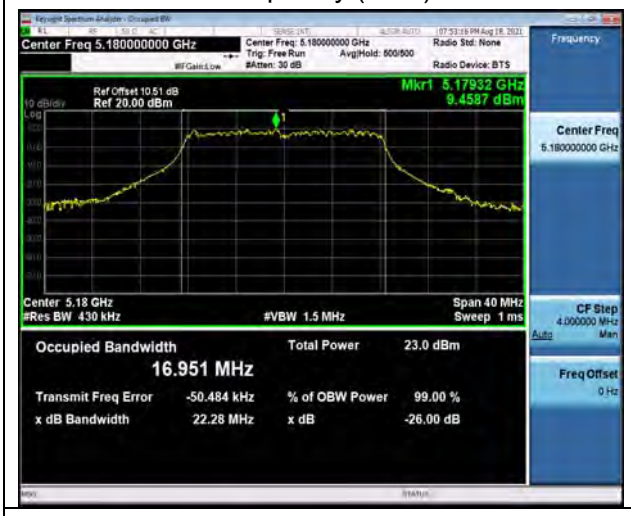
U-NII-1, 802.11a

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

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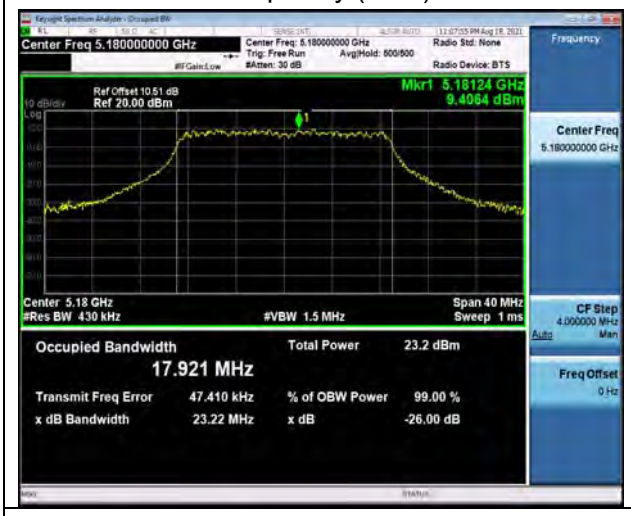
U-NII-1, 802.11n HT40
Carrier frequency (MHz): 5190

U-NII-1, 802.11n HT40
Carrier frequency (MHz): 5230

U-NII-1, 802.11ac VHT20
Carrier frequency (MHz): 5180



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

U-NII-1, 802.11ac VHT20
Carrier frequency (MHz): 5200

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

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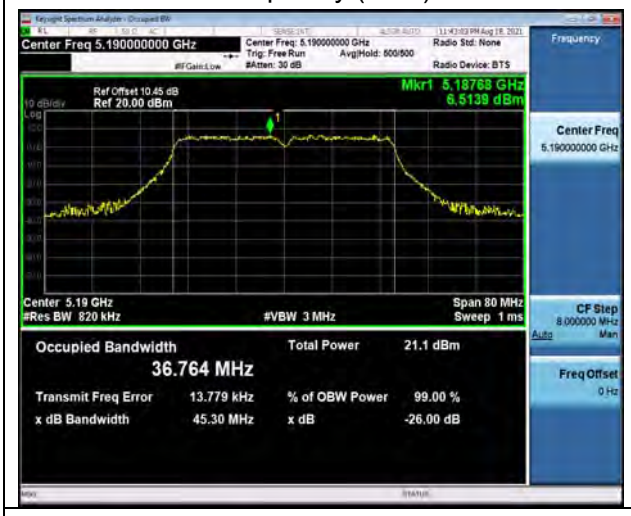
U-NII-1, 802.11ac VHT20
Carrier frequency (MHz):5240

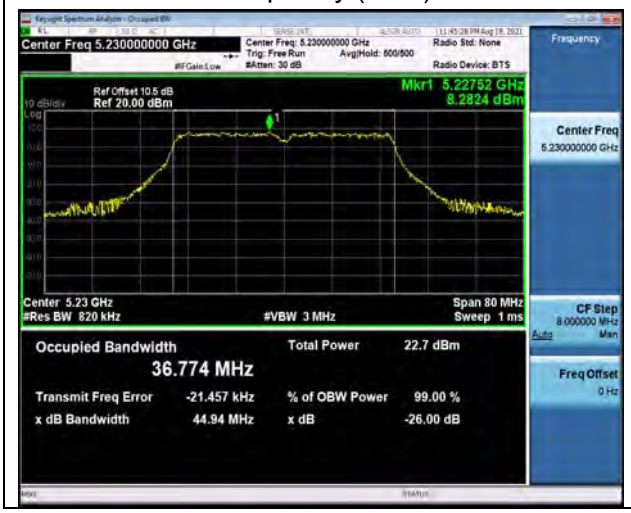
U-NII-1, 802.11ax HE20
Carrier frequency (MHz):5240

U-NII-1, 802.11ac VHT40
Carrier frequency (MHz): 5190



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

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



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

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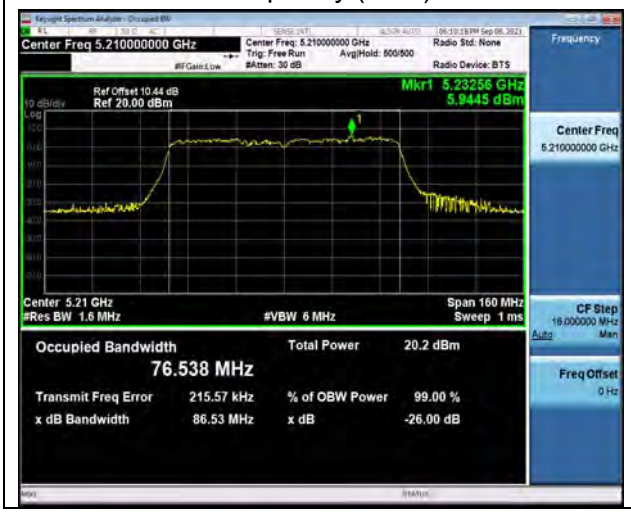
U-NII-1, 802.11ac VHT80 Carrier frequency (MHz): 5210	U-NII-1, 802.11ax HE80 Carrier frequency (MHz): 5210
	

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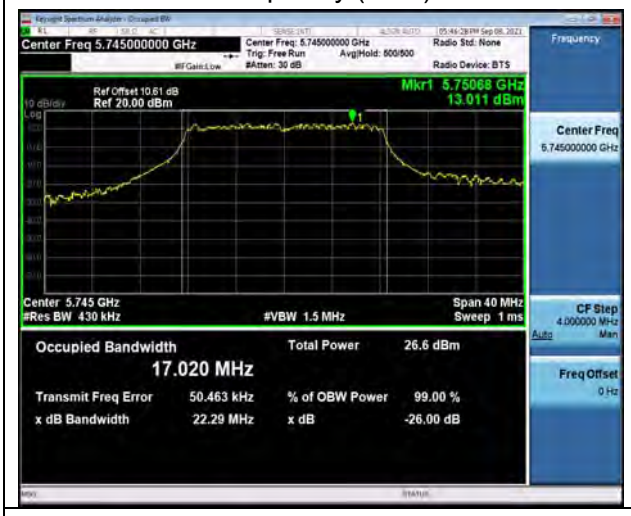
99% bandwidth

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): 5825

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825

U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5755

U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5795

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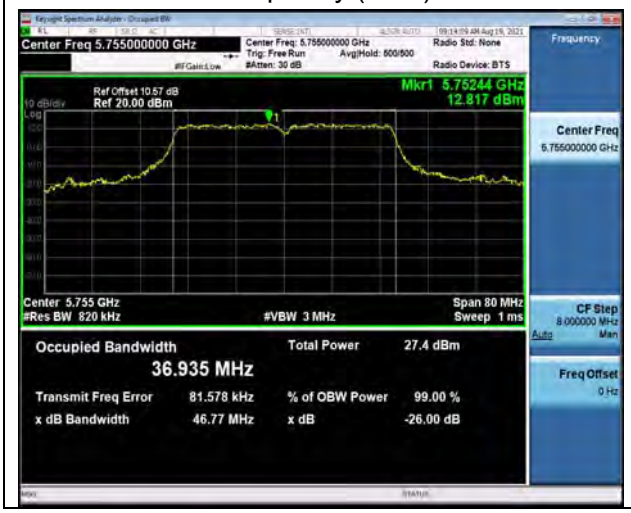
U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5745

U-NII-3, 802.11ax HE20
Carrier frequency (MHz): 5745

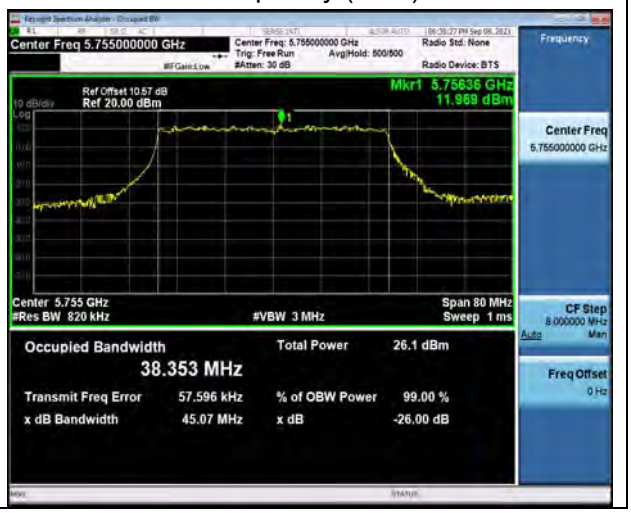
U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5825

U-NII-3, 802.11ax HE20
Carrier frequency (MHz): 5825

U-NII-3, 802.11ac VHT40
Carrier frequency (MHz): 5755



U-NII-3, 802.11ax HT40
Carrier frequency (MHz): 5755



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U-NII-3, 802.11ac VHT40

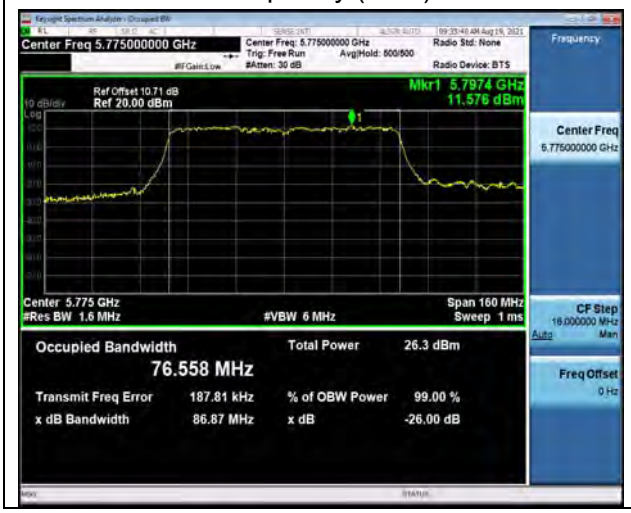
Carrier frequency (MHz): 5795

U-NII-3, 802.11ax HE40

Carrier frequency (MHz): 5795

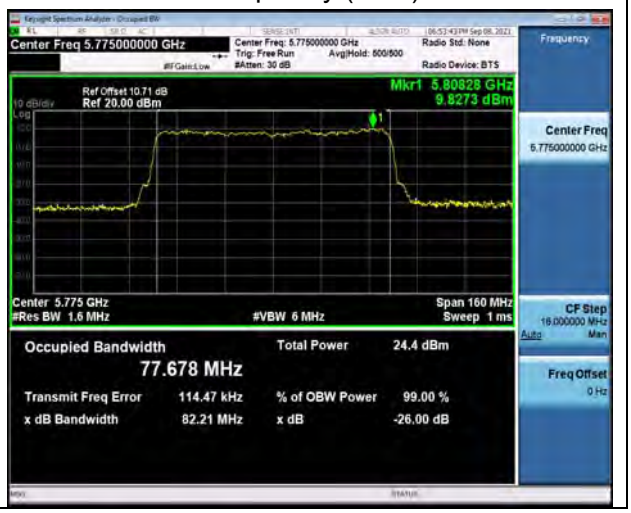
U-NII-3, 802.11ac VHT80

Carrier frequency (MHz): 5775



U-NII-3, 802.11ax HE80

Carrier frequency (MHz): 5775



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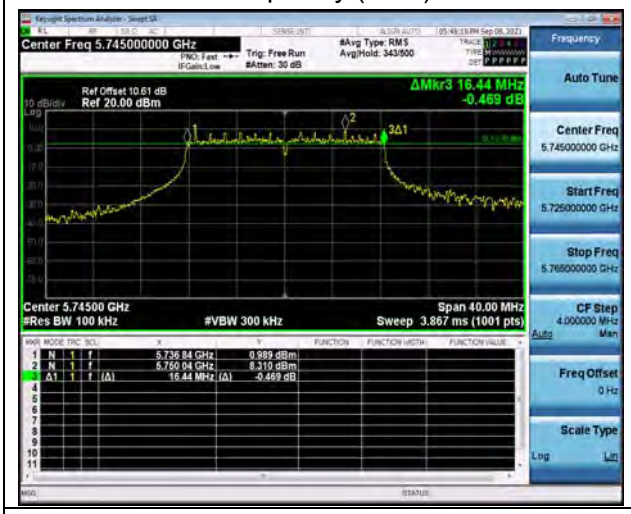
Minimum 6 dB bandwidth

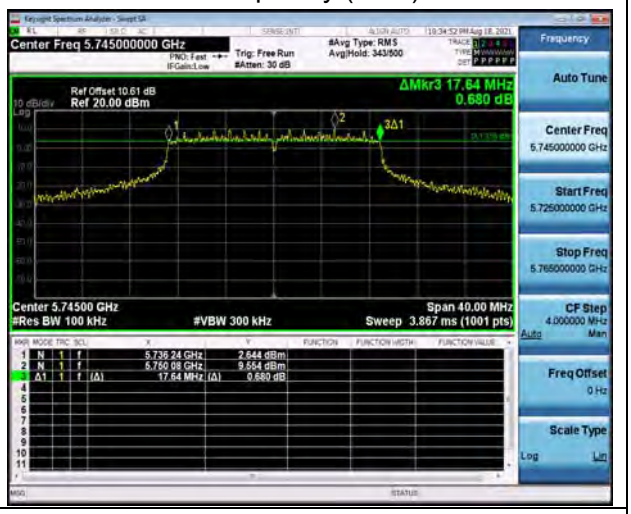
U-NII-3, 802.11a

Carrier frequency (MHz): 5745



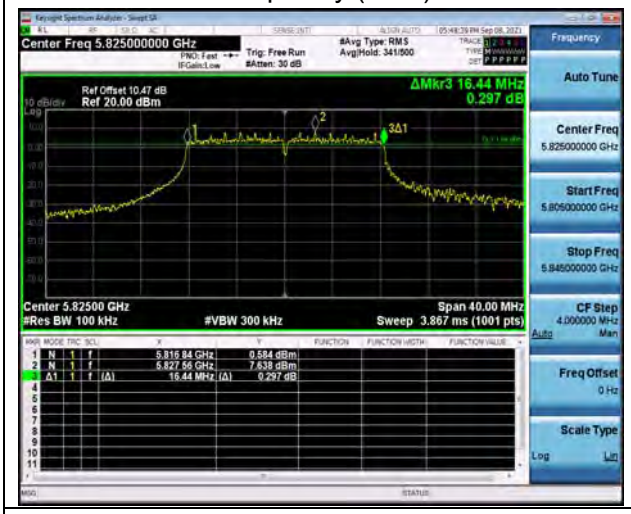
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5745



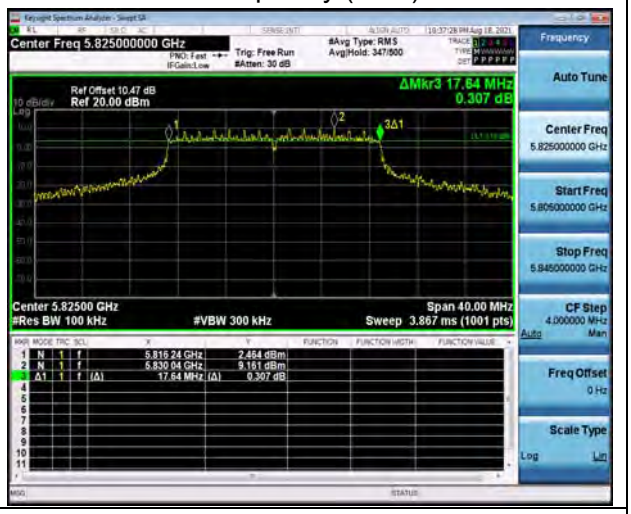
U-NII-3, 802.11a

Carrier frequency (MHz): 5825



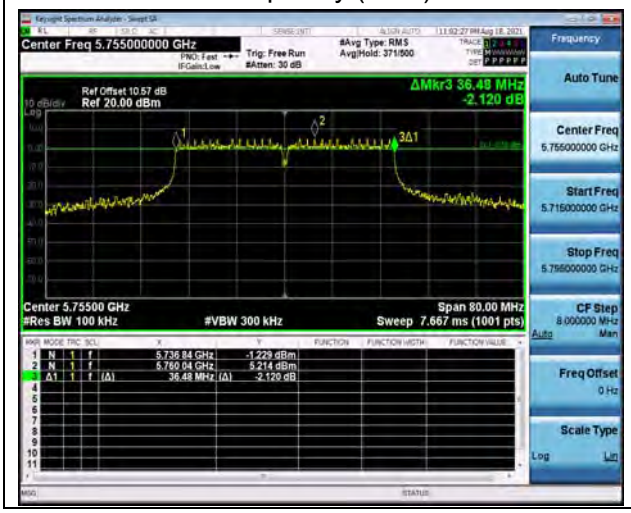
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825



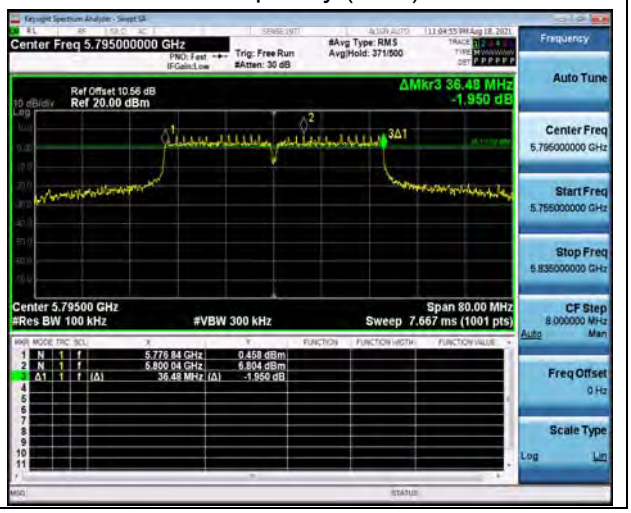
U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5755



U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5795



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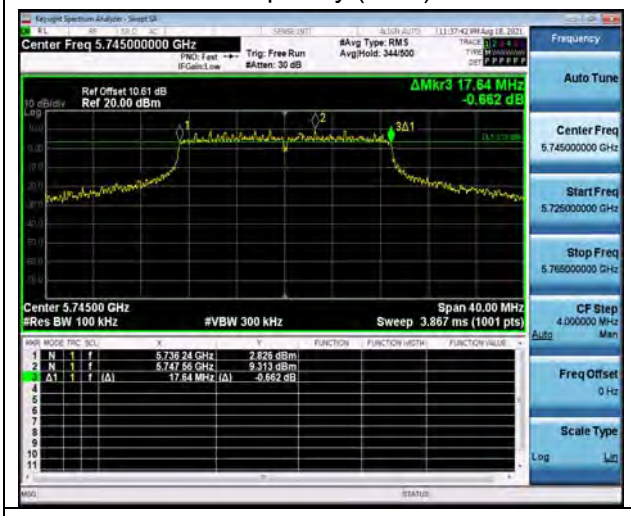
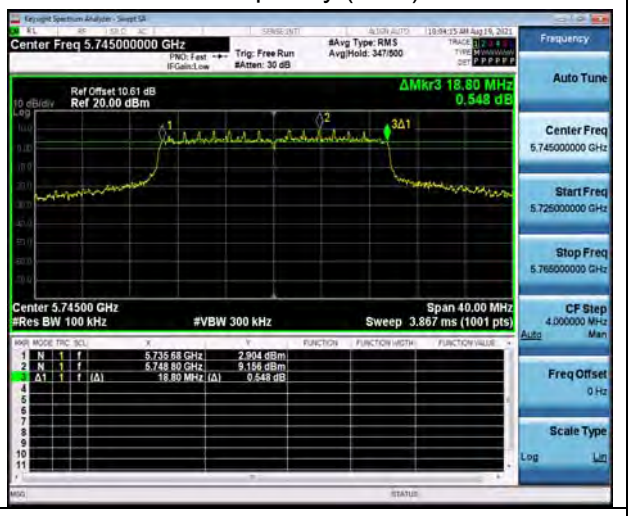
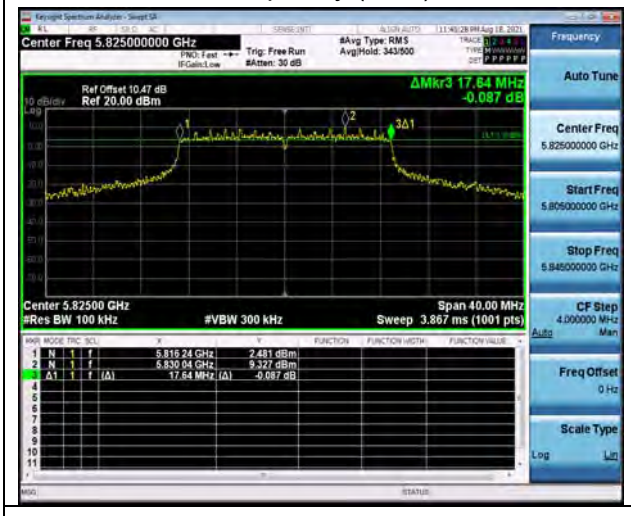
U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5745



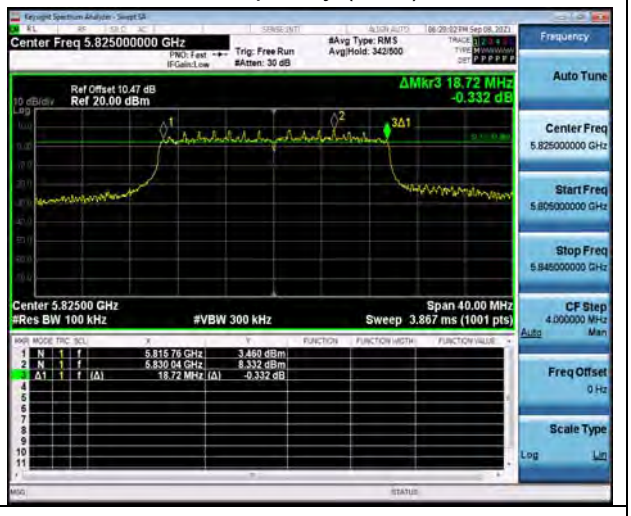
U-NII-3, 802.11ax HE20
Carrier frequency (MHz): 5745



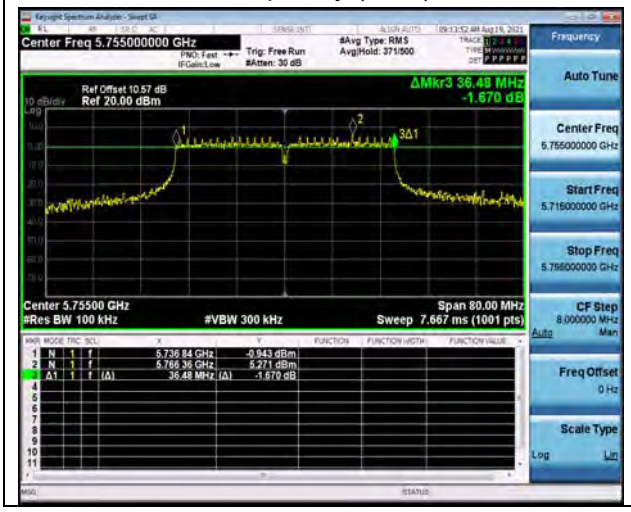
U-NII-3, 802.11 ac VHT20
Carrier frequency (MHz): 5825



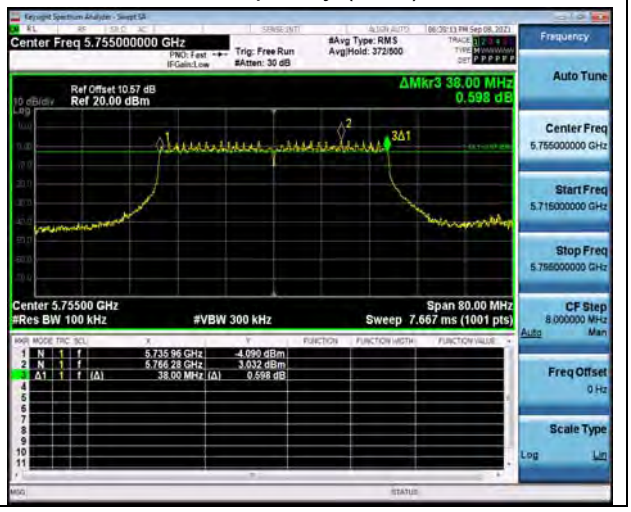
U-NII-3, 802.11ax HE20
Carrier frequency (MHz): 5825



U-NII-3, 802.11ac VHT40
Carrier frequency (MHz): 5755



U-NII-3, 802.11ax HE 40
Carrier frequency (MHz): 5755



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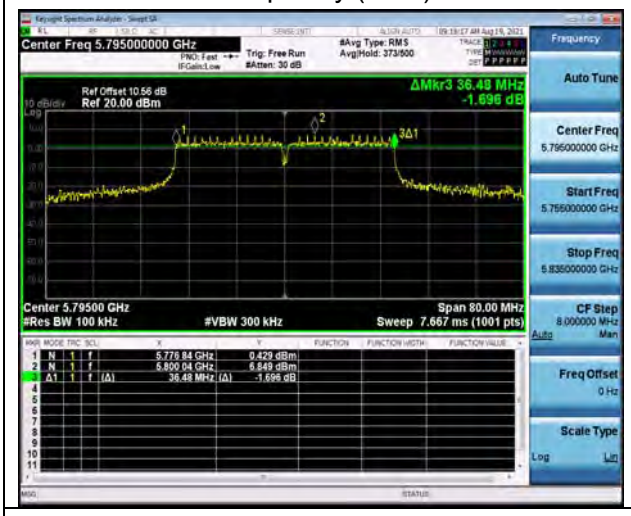
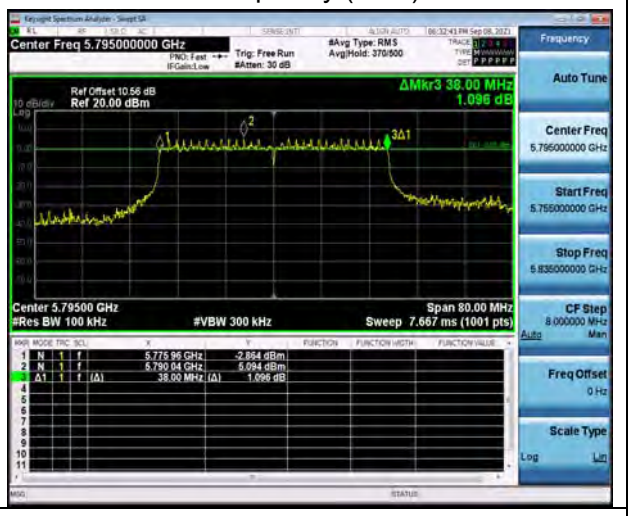
U-NII-3, 802.11ac VHT40

Carrier frequency (MHz): 5795



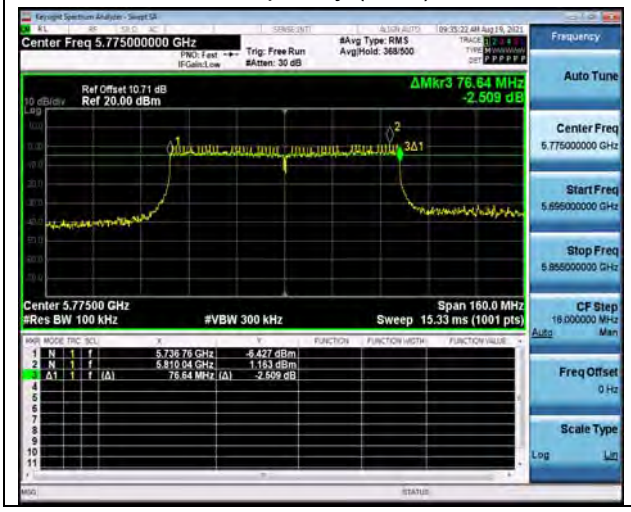
U-NII-3, 802.11ax HE40

Carrier frequency (MHz): 5795



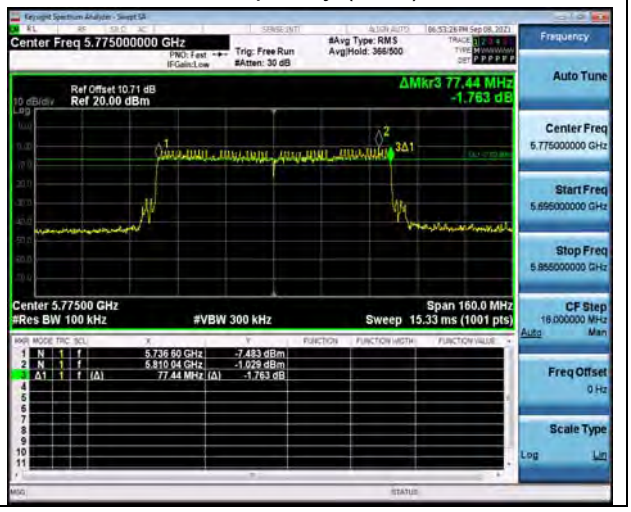
U-NII-3, 802.11ac VHT80

Carrier frequency (MHz): 5775



U-NII-3, 802.11ax HE80

Carrier frequency (MHz): 5775



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5.2. Average Power Output

Ambient condition

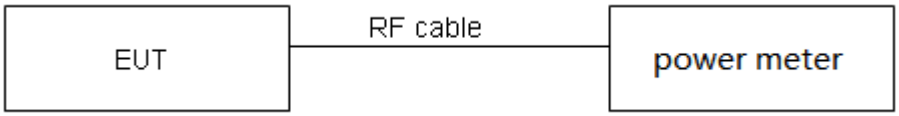
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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

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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 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.

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Test Results

SISO Antenna 1

Mode	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11a	1.36	1.46	0.93	0.31
802.11n HT20	1.28	1.38	0.93	0.33
802.11n HT40	0.63	0.74	0.85	0.70
802.11ac VHT20	1.28	1.38	0.93	0.33
802.11ac VHT40	0.63	0.73	0.86	0.64
802.11ac VHT80	0.31	0.42	0.74	1.32
802.11ax HE20	0.98	1.09	0.90	0.46
802.11ax HE40	0.52	0.62	0.84	0.76
802.11ax HE80	0.28	0.38	0.74	1.33
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.				

SISO Antenna 2

Mode	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11a	1.36	1.47	0.93	0.34
802.11n HT20	1.27	1.37	0.93	0.33
802.11n HT40	0.63	0.74	0.85	0.70
802.11ac VHT20	1.27	1.37	0.93	0.33
802.11ac VHT40	0.63	0.74	0.85	0.70
802.11ac VHT80	0.31	0.42	0.74	1.32
802.11ax HE20	0.99	1.09	0.91	0.42
802.11ax HE40	0.52	0.62	0.84	0.76
802.11ax HE80	0.28	0.38	0.74	1.33
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.				

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MIMO with Beamforming

Mode	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11a	1.36	1.46	0.93	0.31
802.11n HT20	1.27	1.37	0.93	0.33
802.11n HT40	0.63	0.74	0.85	0.70
802.11ac VHT20	1.28	1.38	0.93	0.33
802.11ac VHT40	0.63	0.74	0.85	0.70
802.11ac VHT80	0.31	0.42	0.74	1.32
802.11ax HE20	0.99	1.09	0.91	0.42
802.11ax HE40	0.52	0.62	0.84	0.76
802.11ax HE80	0.28	0.38	0.74	1.33
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.				

MIMO without Beamforming

Mode	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11a	1.36	1.46	0.93	0.31
802.11n HT20	1.27	1.37	0.93	0.33
802.11n HT40	0.63	0.74	0.85	0.70
802.11ac VHT20	1.27	1.38	0.92	0.36
802.11ac VHT40	0.63	0.74	0.85	0.70
802.11ac VHT80	0.31	0.41	0.76	1.21
802.11ax HE20	0.99	1.09	0.91	0.42
802.11ax HE40	0.52	0.62	0.84	0.76
802.11ax HE80	0.28	0.38	0.74	1.33
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.				

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

SISO Antenna 1

U-NII-1

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	14.65	14.96	30.00	PASS
	40/5200	18.13	18.44	30.00	PASS
	44/5220	20.04	20.35	30.00	PASS
	48/5240	19.59	19.90	30.00	PASS
802.11n HT20	36/5180	14.77	15.10	30.00	PASS
	40/5200	18.32	18.65	30.00	PASS
	44/5220	20.06	20.39	30.00	PASS
	48/5240	20.22	20.55	30.00	PASS
802.11n HT40	38/5190	11.68	12.38	30.00	PASS
	46/5230	13.57	14.27	30.00	PASS
802.11ac VHT20	36/5180	14.51	14.84	30.00	PASS
	40/5200	18.01	18.34	30.00	PASS
	44/5220	20.32	20.65	30.00	PASS
	48/5240	20.26	20.59	30.00	PASS
802.11ac VHT40	38/5190	12.12	12.76	30.00	PASS
	46/5230	13.95	14.59	30.00	PASS
802.11ac VHT80	42/5210	10.36	11.68	30.00	PASS
802.11ax HE20	36/5180	13.95	14.41	30.00	PASS
	40/5200	18.20	18.66	30.00	PASS
	44/5220	20.11	20.57	30.00	PASS
	48/5240	20.47	20.93	30.00	PASS
802.11ax HE40	38/5190	11.00	11.76	30.00	PASS
	46/5230	13.46	14.22	30.00	PASS
802.11ax HE80	42/5210	10.34	11.67	30.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

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U-NII-3

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	20.12	20.43	30.00	PASS
	165/5825	19.71	20.02	30.00	PASS
802.11n HT20	149/5745	20.07	20.40	30.00	PASS
	165/5825	19.75	20.08	30.00	PASS
802.11n HT40	151/5755	16.84	17.54	30.00	PASS
	159/5795	18.27	18.97	30.00	PASS
802.11ac VHT20	149/5745	19.97	20.30	30.00	PASS
	165/5825	19.68	20.01	30.00	PASS
802.11ac VHT40	151/5755	16.79	17.43	30.00	PASS
	159/5795	18.32	18.96	30.00	PASS
802.11ac VHT80	155/5775	16.22	17.54	30.00	PASS
802.11ax HE20	149/5745	19.62	20.08	30.00	PASS
	165/5825	18.80	19.26	30.00	PASS
802.11ax HE40	151/5755	17.02	17.78	30.00	PASS
	159/5795	18.75	19.51	30.00	PASS
802.11ax HE80	155/5775	16.11	17.44	30.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

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SISO Antenna 2

U-NII-1

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	14.95	15.29	30.00	PASS
	40/5200	18.32	18.66	30.00	PASS
	44/5220	20.32	20.66	30.00	PASS
	48/5240	19.89	20.23	30.00	PASS
802.11n HT20	36/5180	15.14	15.47	30.00	PASS
	40/5200	18.17	18.50	30.00	PASS
	44/5220	19.96	20.29	30.00	PASS
	48/5240	20.26	20.59	30.00	PASS
802.11n HT40	38/5190	12.07	12.77	30.00	PASS
	46/5230	13.77	14.47	30.00	PASS
802.11ac VHT20	36/5180	14.97	15.30	30.00	PASS
	40/5200	18.27	18.60	30.00	PASS
	44/5220	20.00	20.33	30.00	PASS
	48/5240	20.04	20.37	30.00	PASS
802.11ac VHT40	38/5190	12.13	12.83	30.00	PASS
	46/5230	13.82	14.52	30.00	PASS
802.11ac VHT80	42/5210	10.02	11.34	30.00	PASS
802.11ax HE20	36/5180	13.21	13.63	30.00	PASS
	40/5200	18.23	18.65	30.00	PASS
	44/5220	19.89	20.31	30.00	PASS
	48/5240	19.94	20.36	30.00	PASS
802.11ax HE40	38/5190	10.36	11.12	30.00	PASS
	46/5230	13.78	14.54	30.00	PASS
802.11ax HE80	42/5210	10.00	11.33	30.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

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U-NII-3

Test Mode	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	19.46	19.80	30.00	PASS
	165/5825	19.36	19.70	30.00	PASS
802.11n HT20	149/5745	19.35	19.68	30.00	PASS
	165/5825	19.35	19.68	30.00	PASS
802.11n HT40	151/5755	16.35	17.05	30.00	PASS
	159/5795	18.28	18.98	30.00	PASS
802.11ac VHT20	149/5745	19.74	20.07	30.00	PASS
	165/5825	19.64	19.97	30.00	PASS
802.11ac VHT40	151/5755	16.49	17.19	30.00	PASS
	159/5795	18.41	19.11	30.00	PASS
802.11ac VHT80	155/5775	16.15	17.47	30.00	PASS
802.11ax HE20	149/5745	19.60	20.02	30.00	PASS
	165/5825	18.71	19.13	30.00	PASS
802.11ax HE40	151/5755	16.70	17.46	30.00	PASS
	159/5795	18.58	19.34	30.00	PASS
802.11ax HE80	155/5775	15.88	17.21	30.00	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

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MIMO with beamforming

U-NII-1

Test Mode	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)			
U-NII-1 802.11a	36/5180	14.82	15.13	15.58	15.89	18.54	30.00	PASS
	40/5200	18.16	18.47	18.85	19.16	21.84	30.00	PASS
	44/5220	20.01	20.32	20.62	20.93	23.64	30.00	PASS
	48/5240	19.67	19.98	20.01	20.32	23.16	30.00	PASS
802.11n HT20	36/5180	14.65	14.98	15.32	15.65	18.34	30.00	PASS
	40/5200	18.04	18.37	18.66	18.99	21.70	30.00	PASS
	44/5220	19.85	20.18	20.48	20.81	23.52	30.00	PASS
	48/5240	19.93	20.26	20.54	20.87	23.59	30.00	PASS
802.11n HT40	38/5190	11.70	12.40	12.01	12.71	15.57	30.00	PASS
	46/5230	13.80	14.50	13.95	14.65	17.58	30.00	PASS
802.11ac VHT20	36/5180	14.66	14.99	15.29	15.62	18.32	30.00	PASS
	40/5200	18.03	18.36	18.68	19.01	21.70	30.00	PASS
	44/5220	20.18	20.51	20.79	21.12	23.83	30.00	PASS
	48/5240	20.05	20.38	20.73	21.06	23.74	30.00	PASS
802.11ac VHT40	38/5190	12.04	12.74	12.29	12.99	15.88	30.00	PASS
	46/5230	13.72	14.42	13.96	14.66	17.55	30.00	PASS
802.11ac VHT80	42/5210	10.32	11.64	10.30	11.62	14.64	30.00	PASS
802.11ax HE 20	36/5180	13.77	14.19	13.90	14.32	17.26	30.00	PASS
	40/5200	18.34	18.76	19.02	19.44	22.12	30.00	PASS
	44/5220	20.20	20.62	20.76	21.18	23.92	30.00	PASS
	48/5240	20.18	20.60	20.88	21.30	23.97	30.00	PASS
802.11ax HE 40	38/5190	10.84	11.60	10.82	11.58	14.60	30.00	PASS
	46/5230	13.52	14.28	13.75	14.51	17.41	30.00	PASS
802.11ax HE 80	42/5210	10.33	11.66	10.29	11.62	14.65	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 $N_{ANT} \leq 4$;

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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} ≥ 5.

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi. So the power limit is 30dBm.

U-NII-3

Test Mode	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)			
802.11a	149/5745	18.73	19.04	19.08	19.39	22.23	30.00	PASS
	165/5825	18.55	18.86	18.79	19.10	21.99	30.00	PASS
802.11n HT20	149/5745	19.76	20.09	19.95	20.28	23.20	30.00	PASS
	165/5825	19.45	19.78	19.76	20.09	22.95	30.00	PASS
802.11n HT40	151/5755	16.33	17.03	16.45	17.15	20.10	30.00	PASS
	159/5795	18.56	19.26	18.68	19.38	22.33	30.00	PASS
802.11ac HT20	149/5745	19.86	20.19	20.03	20.36	23.28	30.00	PASS
	165/5825	19.57	19.90	19.79	20.12	23.02	30.00	PASS
802.11ac HT40	151/5755	16.31	17.01	16.37	17.07	20.05	30.00	PASS
	159/5795	18.43	19.13	18.52	19.22	22.18	30.00	PASS
802.11ac HT80	155/5775	16.44	17.76	16.37	17.69	20.73	30.00	PASS
802.11ax HT20	149/5745	19.80	20.22	20.02	20.44	23.34	30.00	PASS
	165/5825	18.96	19.38	19.22	19.64	22.52	30.00	PASS
802.11ax HT40	151/5755	16.71	17.47	16.61	17.37	20.43	30.00	PASS
	159/5795	18.81	19.57	18.71	19.47	22.53	30.00	PASS
802.11ax HT80	155/5775	14.54	15.87	14.49	15.82	18.85	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} ≤ 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} ≥ 5.

So directional gain = G_{ANT} + Array Gain =5+0=5dBi<6dBi. So the power limt is 30dBm.

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MIMO without beamforming

U-NII-1

Test Mode	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)			
U-NII-1 802.11a	36/5180	14.71	15.02	15.34	15.65	18.35	30.00	PASS
	40/5200	18.01	18.32	18.76	19.07	21.72	30.00	PASS
	44/5220	19.89	20.20	20.46	20.77	23.50	30.00	PASS
	48/5240	19.58	19.89	19.96	20.27	23.09	30.00	PASS
802.11n HT20	36/5180	14.66	14.99	15.30	15.63	18.33	30.00	PASS
	40/5200	18.00	18.33	18.66	18.99	21.68	30.00	PASS
	44/5220	19.85	20.18	20.41	20.74	23.48	30.00	PASS
	48/5240	20.07	20.40	20.66	20.99	23.71	30.00	PASS
802.11n HT40	38/5190	11.73	12.43	11.90	12.60	15.53	30.00	PASS
	46/5230	13.70	14.40	13.84	14.54	17.48	30.00	PASS
802.11ac VHT20	36/5180	14.75	15.11	15.30	15.66	18.40	30.00	PASS
	40/5200	17.94	18.30	18.59	18.95	21.65	30.00	PASS
	44/5220	20.05	20.41	20.60	20.96	23.70	30.00	PASS
	48/5240	20.05	20.41	20.68	21.04	23.75	30.00	PASS
802.11ac VHT40	38/5190	11.97	12.67	12.24	12.94	15.82	30.00	PASS
	46/5230	13.67	14.37	13.86	14.56	17.48	30.00	PASS
802.11ac VHT80	42/5210	10.29	11.50	10.34	11.55	14.54	30.00	PASS
802.11ax HE 20	36/5180	13.72	14.14	13.90	14.32	17.24	30.00	PASS
	40/5200	18.12	18.54	18.74	19.16	21.87	30.00	PASS
	44/5220	19.96	20.38	20.54	20.96	23.69	30.00	PASS
	48/5240	19.98	20.40	20.61	21.03	23.73	30.00	PASS
802.11ax HE 40	38/5190	10.78	11.54	10.82	11.58	14.57	30.00	PASS
	46/5230	13.33	14.09	13.50	14.26	17.19	30.00	PASS
802.11ax HE 80	42/5210	10.27	11.60	10.22	11.55	14.58	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 $N_{ANT} \leq 4$;

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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} ≥ 5.

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi. So the power limt is 30dBm.

U-NII-3

Test Mode	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)			
802.11a	149/5745	19.87	20.18	20.09	20.40	23.30	30.00	PASS
	165/5825	19.58	19.89	19.83	20.14	23.03	30.00	PASS
802.11n HT20	149/5745	19.71	20.04	19.84	20.17	23.11	30.00	PASS
	165/5825	19.44	19.77	19.73	20.06	22.93	30.00	PASS
802.11n HT40	151/5755	16.57	17.27	16.62	17.32	20.30	30.00	PASS
	159/5795	18.72	19.42	18.65	19.35	22.39	30.00	PASS
802.11ac HT20	149/5745	19.64	20.00	19.72	20.08	23.05	30.00	PASS
	165/5825	19.45	19.81	19.64	20.00	22.92	30.00	PASS
802.11ac HT40	151/5755	16.39	17.09	16.48	17.18	20.14	30.00	PASS
	159/5795	18.52	19.22	18.56	19.26	22.25	30.00	PASS
802.11ac HT80	155/5775	16.29	17.50	16.23	17.44	20.48	30.00	PASS
802.11ax HT20	149/5745	19.54	19.96	19.67	20.09	23.03	30.00	PASS
	165/5825	18.90	19.32	19.22	19.64	22.49	30.00	PASS
802.11ax HT40	151/5755	16.85	17.61	16.65	17.41	20.53	30.00	PASS
	159/5795	18.86	19.62	18.80	19.56	22.60	30.00	PASS
802.11ax HT80	155/5775	16.45	17.78	16.28	17.61	20.70	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} ≤ 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} ≥ 5.

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi. So the power limt is 30dBm.

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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.

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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

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Test Results

Voltage (V)	Temperature (°C)	U-NII-1 Test Results			
		5200MHz			
		1min	2min	5min	10min
12	-20	5199.991109	5199.982812	5199.979666	5199.975256
12	-10	5199.999787	5199.981301	5199.975178	5199.971668
12	0	5199.998069	5199.980823	5199.971795	5199.970378
12	10	5199.997140	5199.980041	5199.967363	5199.960959
12	20	5199.990564	5199.973366	5199.958880	5199.955212
12	30	5199.982715	5199.968923	5199.953988	5199.954769
12	40	5199.981527	5199.964900	5199.947941	5199.949935
12	50	5199.977591	5199.958884	5199.940924	5199.947831
11.4	20	5199.976751	5199.951583	5199.937686	5199.942647
12.6	20	5199.968854	5199.950704	5199.932336	5199.942368
Max △MHz		-0.031146	-0.049296	-0.067664	-0.057632
PPM		-5.989632	-9.479956	-13.012267	-11.083050

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
12	-20	5784.994516	5784.986466	5784.981190	5784.975293
12	-10	5784.987087	5784.977933	5784.972502	5784.972728
12	0	5784.985824	5784.970332	5784.968388	5784.963267
12	10	5784.977316	5784.964517	5784.961800	5784.954742
12	20	5784.972394	5784.959448	5784.960645	5784.954648
12	30	5784.964791	5784.957281	5784.960629	5784.945059
12	40	5784.959179	5784.953693	5784.955488	5784.940510
12	50	5784.953823	5784.948078	5784.948029	5784.938662
11.4	20	5784.951253	5784.944360	5784.945901	5784.933468
12.6	20	5784.944959	5784.934452	5784.939520	5784.925323
Max △MHz		-0.055041	-0.065548	-0.060480	-0.074677
PPM		-9.514501	-11.330597	-10.454661	-12.908681

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5.4. Power Spectral Density

Ambient condition

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

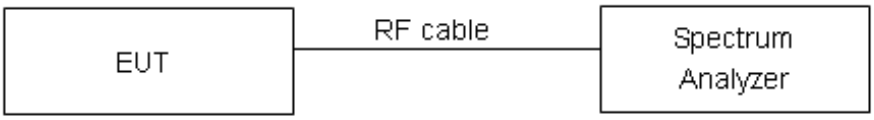
Method of Measurement

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

Frequency Bands/MHz	Limits
5150-5250	17 dBm/MHz
5725-5850	30dBm/500kHz

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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.

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Test Results:

SISO Antenna 1

U-NII-1

Mode	Channel Number	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	3.97	17	PASS
	40	7.49	17	PASS
	44	9.84	17	PASS
	48	8.87	17	PASS
802.11n HT20	36	3.99	17	PASS
	40	7.57	17	PASS
	44	9.02	17	PASS
	48	9.41	17	PASS
802.11n HT40	38	-1.88	17	PASS
	46	-0.17	17	PASS
802.11ac VHT20	36	3.74	17	PASS
	40	7.09	17	PASS
	44	9.16	17	PASS
	48	9.43	17	PASS
802.11ac VHT40	38	-1.40	17	PASS
	46	0.36	17	PASS
802.11ac VHT80	42	-5.24	17	PASS
802.11ax HE20	36	3.02	17	PASS
	40	7.43	17	PASS
	44	9.22	17	PASS
	48	9.77	17	PASS
802.11ax HE 40	38	-2.55	17	PASS
	46	-0.03	17	PASS
802.11ax HE80	42	-5.68	17	PASS
Note: Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density.				

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U-NII-3

Mode	Channel Number	PSD(dBm/ 470kHz)	PSD(dBm/ 500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149	6.10	6.37	30	PASS
	165	5.70	5.97	30	PASS
802.11n HT20	149	6.10	6.37	30	PASS
	165	5.67	5.94	30	PASS
802.11n HT40	151	2.09	2.36	30	PASS
	159	3.71	3.98	30	PASS
802.11ac VHT20	149	6.27	6.54	30	PASS
	165	5.58	5.85	30	PASS
802.11ac VHT40	151	2.18	2.45	30	PASS
	159	3.50	3.77	30	PASS
802.11ac VHT80	155	-2.72	-2.45	30	PASS
802.11ax HE20	149	5.88	6.15	30	PASS
	165	4.80	5.07	30	PASS
802.11ax HE40	151	0.70	0.34	30	PASS
	159	1.92	2.19	30	PASS
802.11ax HE80	155	-2.83	-2.56	30	PASS

Note:1. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density.
2.PSD(dBm/500kHz)=RSD(dBm/470kHz)+10*LOG10(500/470)
10*LOG10(500/470)=0.27

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SISO Antenna 2

U-NII-1

Mode	Channel Number	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	4.54	17	PASS
	40	7.91	17	PASS
	44	9.65	17	PASS
	48	9.20	17	PASS
802.11n HT20	36	4.35	17	PASS
	40	7.44	17	PASS
	44	9.07	17	PASS
	48	9.29	17	PASS
802.11n HT40	38	-1.73	17	PASS
	46	0.29	17	PASS
802.11ac VHT20	36	4.15	17	PASS
	40	7.30	17	PASS
	44	9.30	17	PASS
	48	9.14	17	PASS
802.11ac VHT40	38	-1.56	17	PASS
	46	0.17	17	PASS
802.11ac VHT80	42	-5.56	17	PASS
802.11ax HE20	36	2.44	17	PASS
	40	7.24	17	PASS
	44	9.07	17	PASS
	48	8.87	17	PASS
802.11ax HE 40	38	-3.13	17	PASS
	46	-0.01	17	PASS
802.11ax HE80	42	-5.20	17	PASS
Note: Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density.				

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U-NII-3

Mode	Channel Number	PSD(dBm/ 470kHz)	PSD(dBm/ 500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149	5.22	5.49	30	PASS
	165	5.61	5.88	30	PASS
802.11n HT20	149	5.22	5.49	30	PASS
	165	5.07	5.34	30	PASS
802.11n HT40	151	1.92	2.19	30	PASS
	159	3.43	3.70	30	PASS
802.11ac VHT20	149	5.41	5.68	30	PASS
	165	5.66	5.93	30	PASS
802.11ac VHT40	151	1.90	2.17	30	PASS
	159	2.82	3.09	30	PASS
802.11ac VHT80	155	-3.02	-2.75	30	PASS
802.11ax HE20	149	5.34	5.61	30	PASS
	165	4.73	5.00	30	PASS
802.11ax HE40	151	0.17	0.44	30	PASS
	159	2.06	2.33	30	PASS
802.11ax HE80	155	-2.91	-2.64	30	PASS
Note: 1. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density. 2.PSD(dBm/500kHz)=RSD(dBm/470kHz)+10*LOG10(500/470) 10*LOG10(500/470)=0.27					

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MIMO with Beamforming

U-NII-1

Mode	Channel/ Frequency (MHz)	Power Spectral Density			Limit (dBm /MHz)	Conclusion
		Antenna 1	Antenna 2	Total PSD (dBm /MHz)		
		PSD(dBm/MHz)	PSD(dBm/MHz)			
802.11a	36/5180	4.24	4.94	7.61	14.99	PASS
	40/5200	7.36	8.23	10.83	14.99	PASS
	44/5220	9.46	10.07	12.78	14.99	PASS
	48/5240	9.05	9.46	12.27	14.99	PASS
802.11n HT20	36/5180	3.85	4.36	7.12	14.99	PASS
	40/5200	7.06	7.93	10.53	14.99	PASS
	44/5220	9.13	9.53	12.34	14.99	PASS
	48/5240	9.14	9.65	12.41	14.99	PASS
802.11n HT40	38/5190	-1.82	-1.33	1.44	14.99	PASS
	46/5230	0.09	0.70	3.41	14.99	PASS
802.11ac VHT20	36/5180	3.91	4.47	7.21	14.99	PASS
	40/5200	7.19	7.80	10.51	14.99	PASS
	44/5220	9.40	9.78	12.60	14.99	PASS
	48/5240	9.11	9.90	12.53	14.99	PASS
802.11ac VHT40	38/5190	-1.21	-1.61	1.60	14.99	PASS
	46/5230	0.04	0.33	3.20	14.99	PASS
802.11ac VHT80	42/5210	-5.30	-5.29	-2.29	14.99	PASS
802.11ax HE20	36/5180	4.03	3.75	6.91	14.99	PASS
	40/5200	7.60	8.19	10.91	14.99	PASS
	44/5220	9.33	9.79	12.57	14.99	PASS
	48/5240	9.26	10.02	12.66	14.99	PASS
802.11ax HE40	38/5190	-3.02	-2.65	0.18	14.99	PASS
	46/5230	-0.20	0.02	2.93	14.99	PASS
802.11ax HE80	42/5210	-4.76	-5.68	-2.19	14.99	PASS

Note: 1. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density.

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)e)(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=5+10log（2/1)=8.01>6 dBi. So the PSD limt is 17-(directional gain-6 dBi) =17-(8.01-6) =14.99 dBm.

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U-NII-3

Mode	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /500kHz)	Conclusion
		Antenna 1		Antenna 2		Total PSD (dBm /500kHz)		
		PSD(dBm/ 470kHz)	PSD(dBm/ 500kHz)	PSD(dBm/ 470kHz)	PSD(dBm/ 500kHz)			
802.11a	149/5745	5.14	5.41	5.30	5.57	8.50	27.99	PASS
	165/5825	4.47	4.74	4.99	5.26	8.02	27.99	PASS
802.11n HT20	149/5745	6.11	6.38	5.99	6.26	9.33	27.99	PASS
	165/5825	5.21	5.48	5.57	5.84	8.67	27.99	PASS
802.11n HT40	151/5755	2.25	3.21	1.87	2.83	6.04	27.99	PASS
	159/5795	2.13	3.10	2.21	3.18	6.15	27.99	PASS
802.11ac VHT20	149/5745	5.81	6.08	6.14	6.41	9.26	27.99	PASS
	165/5825	5.68	5.95	5.66	5.93	8.95	27.99	PASS
802.11ac VHT40	151/5755	2.42	3.38	2.21	3.18	6.29	27.99	PASS
	159/5795	2.44	3.41	2.38	3.35	6.39	27.99	PASS
802.11ac VHT80	155/5775	-2.56	-2.29	-2.27	-2.00	0.87	27.99	PASS
802.11ax HE20	149/5745	5.80	6.07	6.24	6.51	9.30	27.99	PASS
	165/5825	4.82	5.09	5.00	5.27	8.19	27.99	PASS
802.11ax HE40	151/5755	0.22	0.49	-0.20	0.07	3.30	27.99	PASS
	159/5795	2.06	2.33	2.00	2.27	5.31	27.99	PASS
802.11ax HE80	155/5775	-4.44	-4.17	-4.38	-4.11	-1.13	27.99	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),
The Total Power $=10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})}$

2. The manufacturer declared the transmitter output signals is CDD mode And Nss=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)e)(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=5+10log（2/1)=8.01>6 dBi. So the PSD limt is 30-(directional gain-6 dBi) =30-(8.01-6) =27.99dBm.

3. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density.

4. PSD(dBm/500kHz)=RSD(dBm/470kHz)+10*LOG10(500/470) 10*LOG10(500/470)=0.27

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MIMO without Beamforming

U-NII-1

Mode	Channel/ Frequency (MHz)	Power Spectral Density			Limit (dBm /MHz)	Conclusion
		Antenna 1	Antenna 2	Total PSD (dBm /MHz)		
		PSD(dBm/MHz)	PSD(dBm/MHz)			
802.11a	36/5180	4.27	4.61	7.45	14.99	PASS
	40/5200	7.44	8.06	10.77	14.99	PASS
	44/5220	9.17	9.67	12.44	14.99	PASS
	48/5240	8.86	9.17	12.03	14.99	PASS
802.11n HT20	36/5180	3.79	4.37	7.10	14.99	PASS
	40/5200	7.04	8.02	10.57	14.99	PASS
	44/5220	9.14	9.70	12.44	14.99	PASS
	48/5240	9.63	9.85	12.75	14.99	PASS
802.11n HT40	38/5190	-2.07	-1.79	1.08	14.99	PASS
	46/5230	0.11	0.29	3.21	14.99	PASS
802.11ac VHT20	36/5180	4.14	4.53	7.35	14.99	PASS
	40/5200	7.19	7.87	10.55	14.99	PASS
	44/5220	9.28	10.06	12.70	14.99	PASS
	48/5240	9.07	9.90	12.52	14.99	PASS
802.11ac VHT40	38/5190	-1.51	-1.51	1.50	14.99	PASS
	46/5230	0.13	0.22	3.18	14.99	PASS
802.11ac VHT80	42/5210	-5.84	-4.92	-2.34	14.99	PASS
802.11ax HE20	36/5180	2.88	3.01	5.95	14.99	PASS
	40/5200	7.22	7.92	10.59	14.99	PASS
	44/5220	9.11	9.64	12.39	14.99	PASS
	48/5240	8.87	9.61	12.26	14.99	PASS
802.11ax HE40	38/5190	-2.78	-2.67	0.29	14.99	PASS
	46/5230	-0.27	-0.17	2.79	14.99	PASS
802.11ax HE80	42/5210	-5.51	-4.89	-2.18	14.99	PASS

Note: 1. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density.

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

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=5+10log（2/1)=8.01>6 dBi. So the PSD limt is 17-(directional gain-6 dBi) =17-(8.01-6) =14.99 dBm.

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U-NII-3

Mode	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /500kHz)	Conclusion
		Antenna 1		Antenna 2		Total PSD (dBm /500kHz)		
		PSD(dBm/ 470kHz)	PSD(dBm/ 500kHz)	PSD(dBm/ 470kHz)	PSD(dBm/ 500kHz)			
802.11a	149/5745	5.64	5.91	5.75	6.02	8.97	27.99	PASS
	165/5825	5.55	5.82	5.78	6.04	8.94	27.99	PASS
802.11n HT20	149/5745	5.64	5.91	5.75	6.02	8.97	27.99	PASS
	165/5825	5.59	5.86	5.55	5.82	8.85	27.99	PASS
802.11n HT40	151/5755	2.18	3.15	2.29	3.26	6.21	27.99	PASS
	159/5795	2.30	3.27	2.51	3.48	6.39	27.99	PASS
802.11ac VHT20	149/5745	5.54	5.81	5.62	5.89	8.86	27.99	PASS
	165/5825	5.29	5.56	5.94	6.21	8.91	27.99	PASS
802.11ac VHT40	151/5755	2.20	3.17	2.14	3.11	6.15	27.99	PASS
	159/5795	2.43	3.39	2.47	3.44	6.43	27.99	PASS
802.11ac VHT80	155/5775	-2.65	-2.38	-2.49	-2.22	0.72	27.99	PASS
802.11ax HE20	149/5745	5.71	5.98	5.97	6.24	9.12	27.99	PASS
	165/5825	4.79	5.06	5.06	5.33	8.21	27.99	PASS
802.11ax HE40	151/5755	0.13	0.40	0.23	0.50	3.46	27.99	PASS
	159/5795	2.20	2.47	1.88	2.15	5.33	27.99	PASS
802.11ax HE80	155/5775	-2.72	-2.45	-2.91	-2.64	0.47	27.99	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),
The Total Power =$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})}$

2. 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=5+10log（2/1)=8.01>6 dBi. So the PSD limt is 30-(directional gain-6 dBi) =30-(8.01-6) =27.99dBm.

3. Offset already includes Duty cycle correction factor, so all read value in test plots are already the final results of the Power Spectral Density..

4. PSD(dBm/500kHz)=RSD(dBm/470kHz)+10*LOG10(500/470) 10*LOG10(500/470)=0.27

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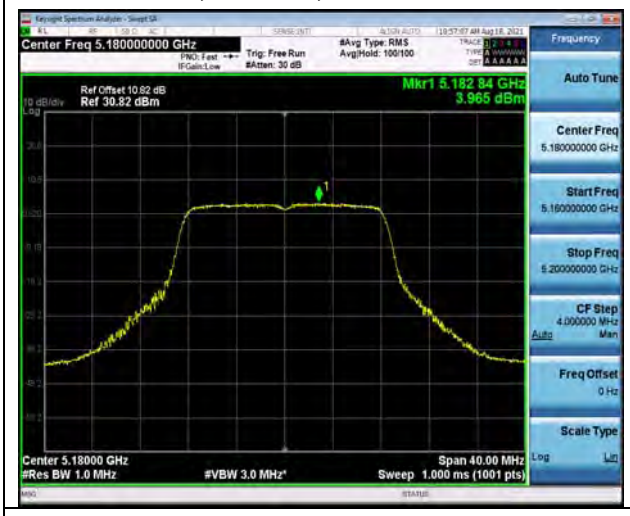
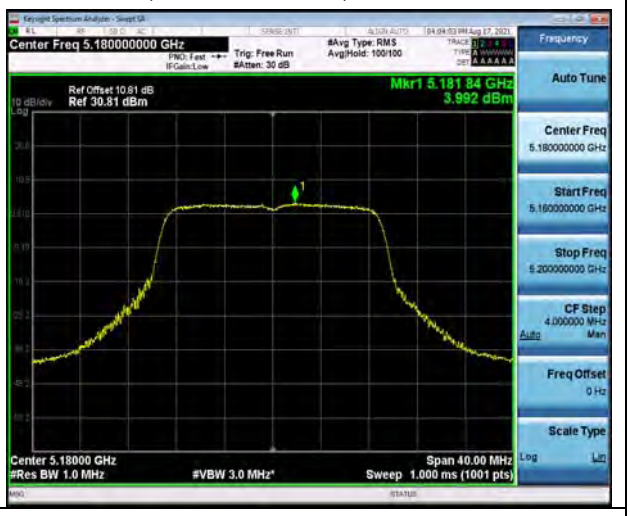
SISO Antenna 1

U-NII-1, 802.11a, Channel No.: 36



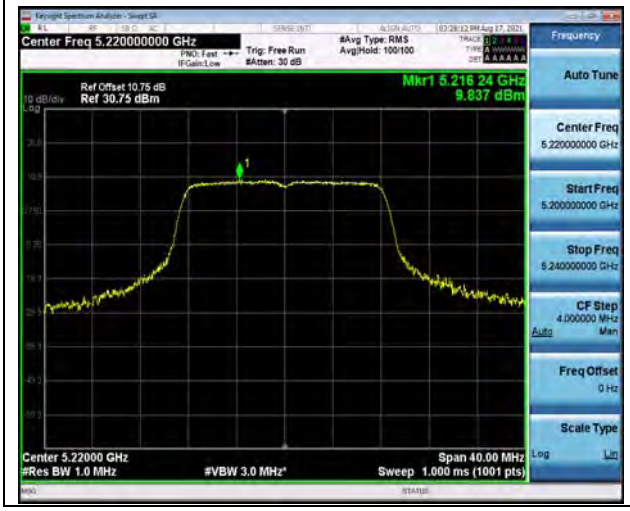
U-NII-1, 802.11n HT20, Channel No.: 36



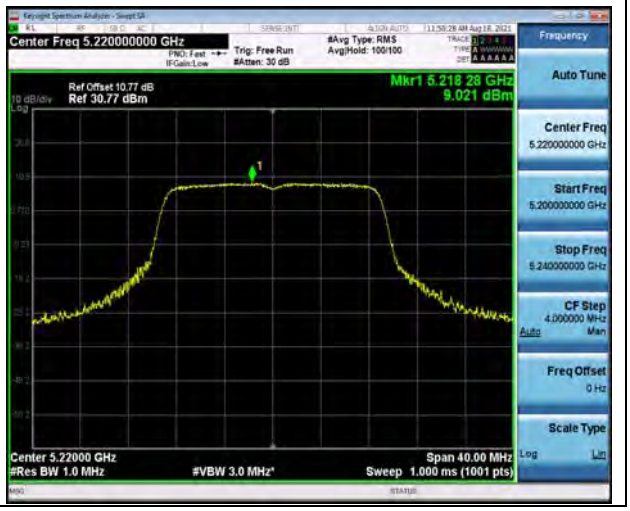
U-NII-1, 802.11a, Channel No.: 40

U-NII-1, 802.11n HT20, Channel No.: 40

U-NII-1, 802.11a, Channel No.: 44



U-NII-1, 802.11n HT20, Channel No.: 44



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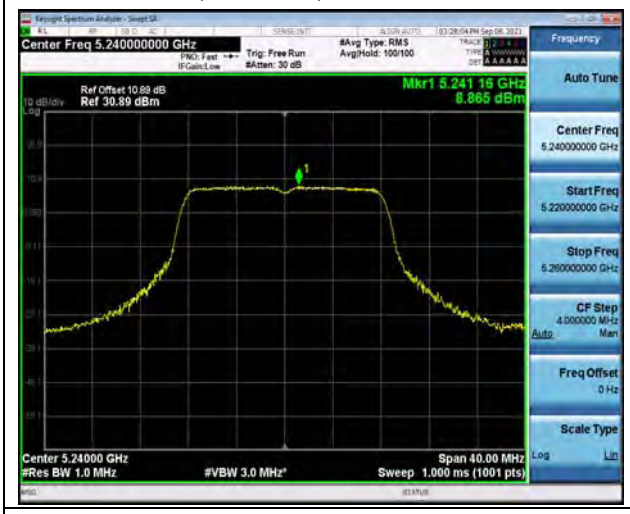
U-NII-1, 802.11a, Channel No.: 48

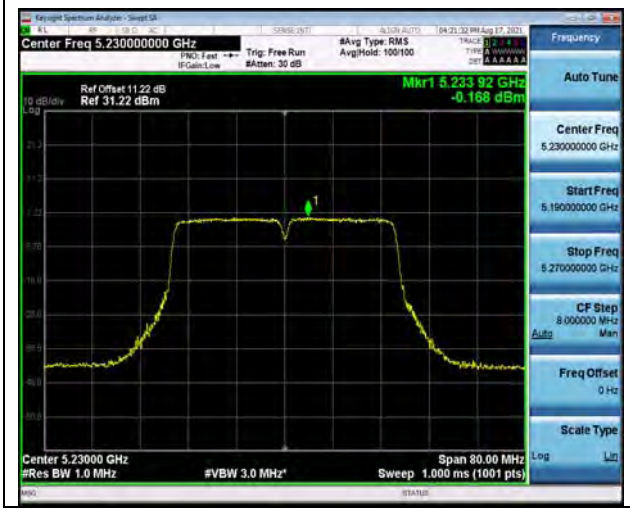


U-NII-1, 802.11n HT20, Channel No.: 48

U-NII-1, 802.11n HT40, Channel No.: 38

U-NII-1, 802.11ac VHT20, Channel No.: 36

U-NII-1, 802.11n HT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 40

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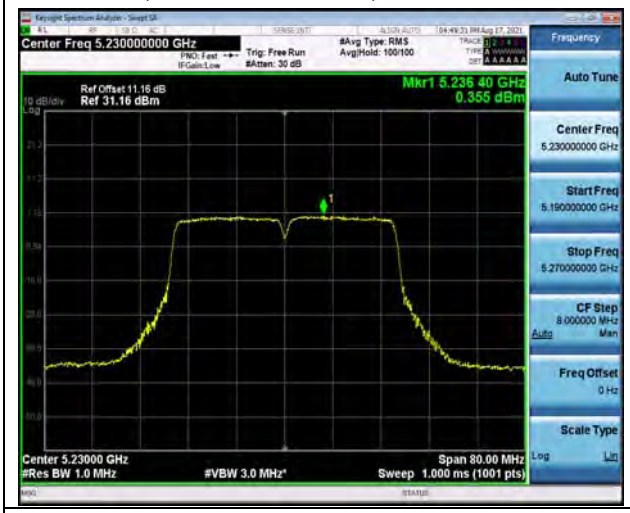
U-NII-1, 802.11ac VHT40, Channel No.: 38

U-NII-1, 802.11ac VHT20, Channel No.: 44

U-NII-1, 802.11ac VHT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 48

U-NII-1, 802.11ac VHT80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 36

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U-NII-1, 802.11ax HE40, Channel No.: 38

U-NII-1, 802.11ax HE20, Channel No.: 40

U-NII-1, 802.11ax HE40, Channel No.: 46

U-NII-1, 802.11ax HE20, Channel No.: 44

U-NII-1, 802.11ax HE80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 48

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U-NII-3, 802.11a, Channel No.: 149

U-NII-3, 802.11n HT20, Channel No.: 149

U-NII-3, 802.11a, Channel No.: 165

U-NII-3, 802.11n HT20, Channel No.: 165

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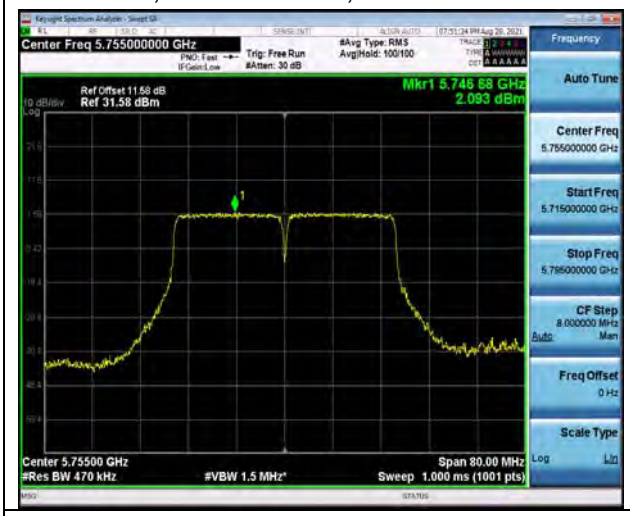
U-NII-3, 802.11n HT40, Channel No.: 151

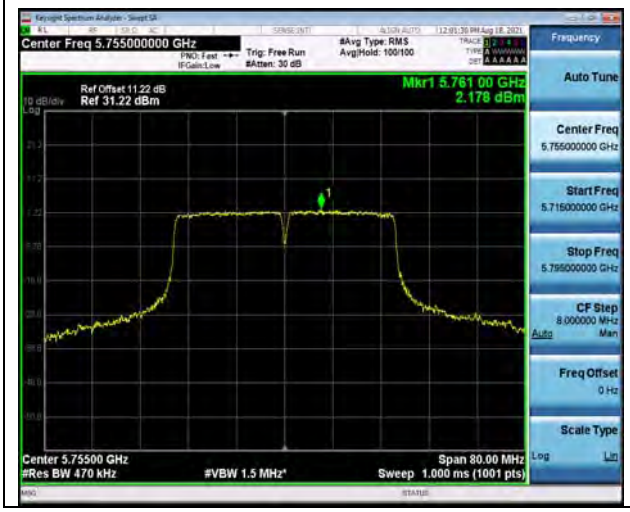


U-NII-3, 802.11ac VHT20, Channel No.: 149

U-NII-3, 802.11n HT40, Channel No.: 159

U-NII-3, 802.11ac VHT20, Channel No.: 165

U-NII-3, 802.11ac VHT40, Channel No.: 151



U-NII-3, 802.11ac VHT80, Channel No.: 155

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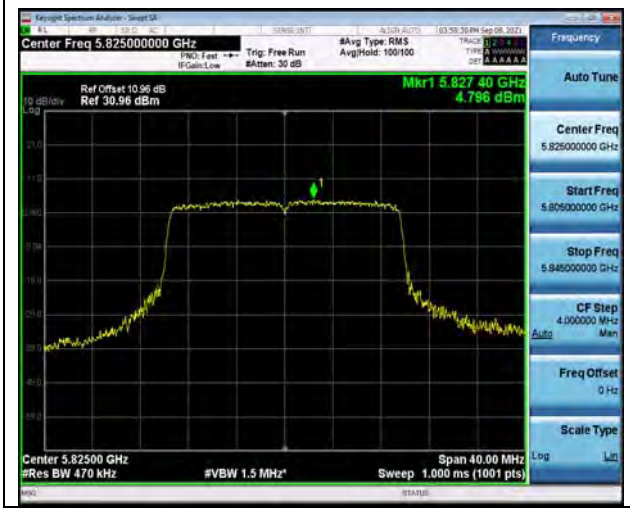
U-NII-3, 802.11ac VHT40, Channel No.: 159

U-NII-3, 802.11ax HE20, Channel No.: 149

U-NII-3, 802.11ax HE40, Channel No.: 151

U-NII-3, 802.11ax HE20, Channel No.: 165



U-NII-3, 802.11ax HE40, Channel No.: 159

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U-NII-3, 802.11ax HE80, Channel No.: 155

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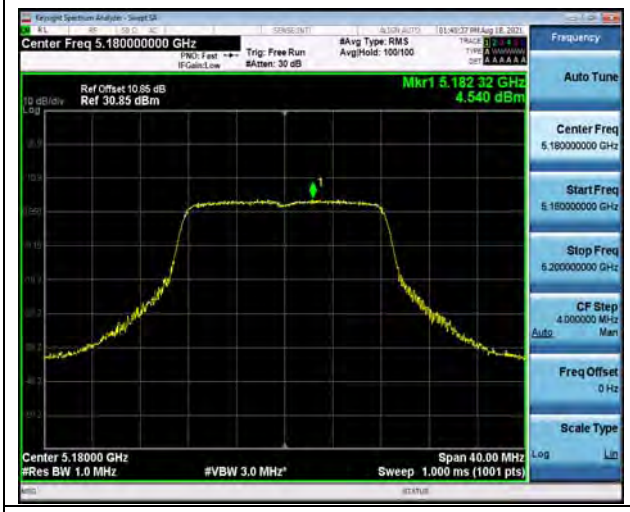
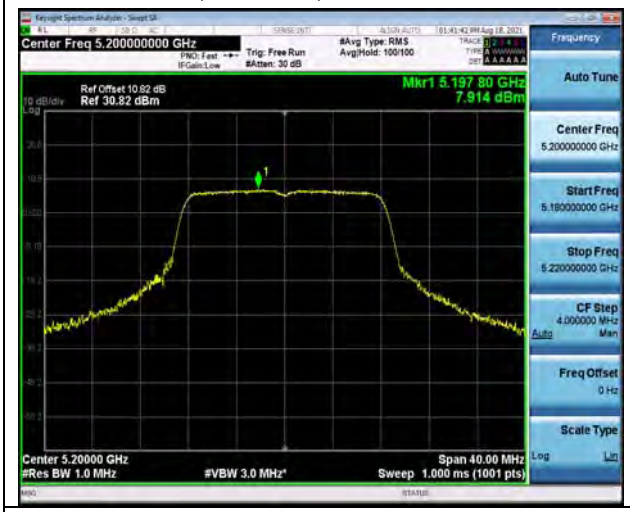
SISO Antenna 2

U-NII-1, 802.11a, Channel No.: 36



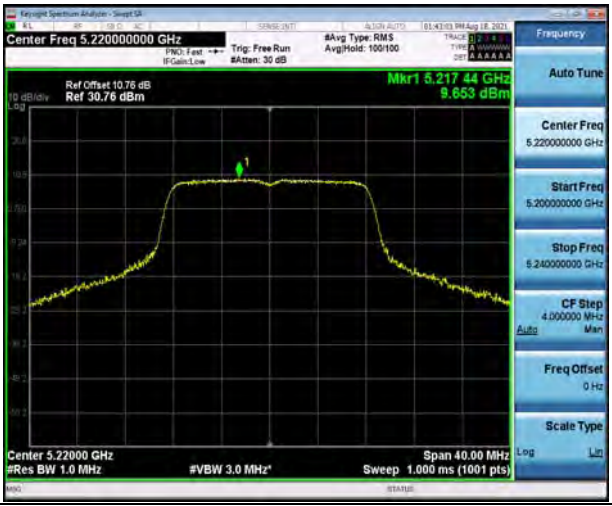
U-NII-1, 802.11n HT20, Channel No.: 36

U-NII-1, 802.11a, Channel No.: 40

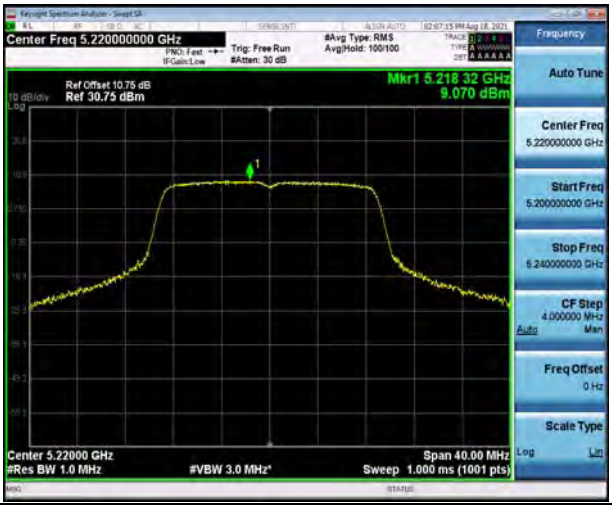


U-NII-1, 802.11n HT20, Channel No.: 40

U-NII-1, 802.11a, Channel No.: 44



U-NII-1, 802.11n HT20, Channel No.: 44



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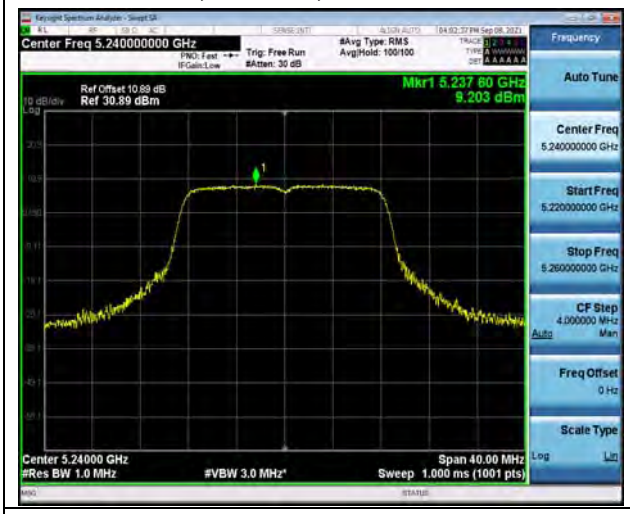
U-NII-1, 802.11a, Channel No.: 48

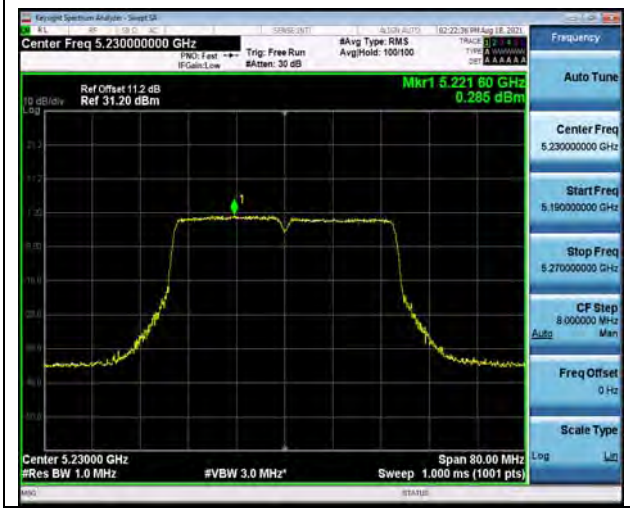


U-NII-1, 802.11n HT20, Channel No.: 48

U-NII-1, 802.11n HT40, Channel No.: 38

U-NII-1, 802.11ac VHT20, Channel No.: 36

U-NII-1, 802.11n HT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 40

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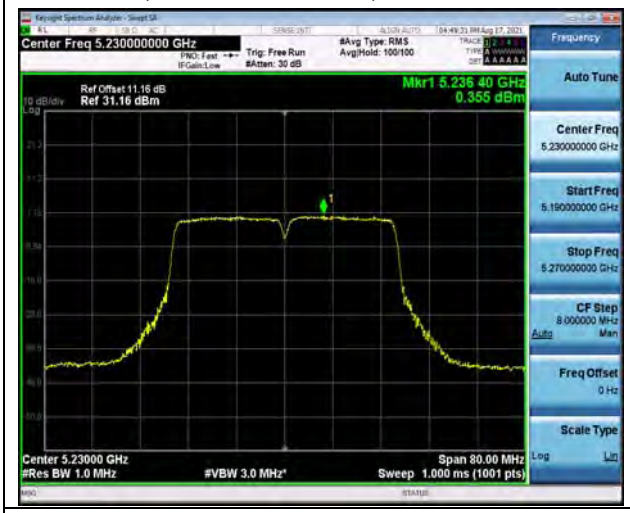
U-NII-1, 802.11ac VHT40, Channel No.: 38

U-NII-1, 802.11ac VHT20, Channel No.: 44

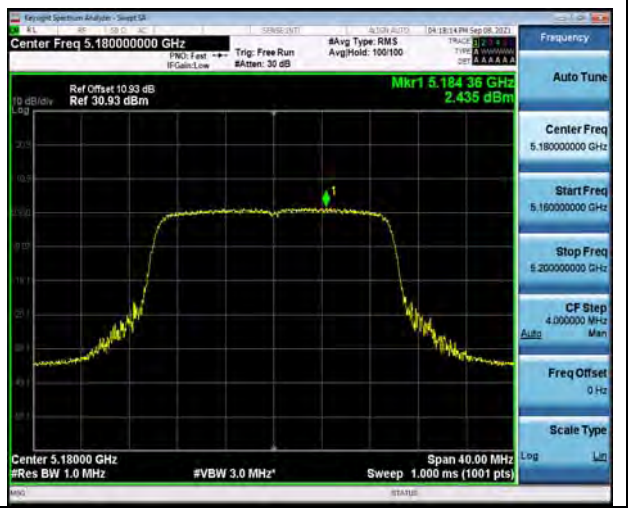
U-NII-1, 802.11ac VHT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 48

U-NII-1, 802.11ac VHT80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 36



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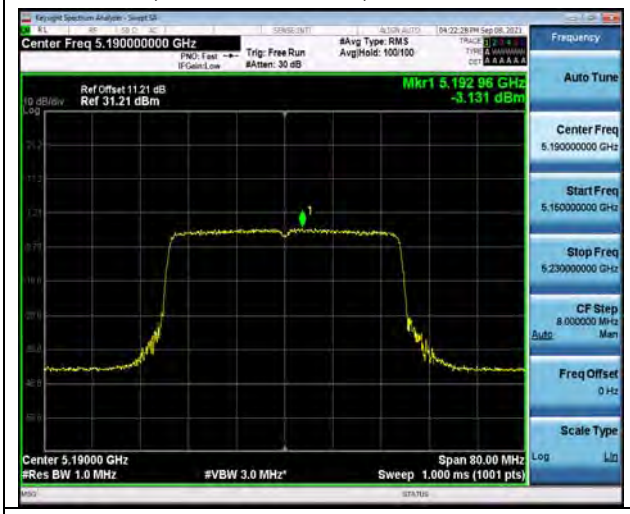
U-NII-1, 802.11ax HE40, Channel No.: 38



U-NII-1, 802.11ax HE20, Channel No.: 40

U-NII-1, 802.11ax HE40, Channel No.: 46

U-NII-1, 802.11ax HE20, Channel No.: 44

U-NII-1, 802.11ax HE80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 48

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U-NII-3, 802.11a, Channel No.: 149

U-NII-3, 802.11n HT20, Channel No.: 149

U-NII-3, 802.11a, Channel No.: 165

U-NII-3, 802.11n HT20, Channel No.: 165

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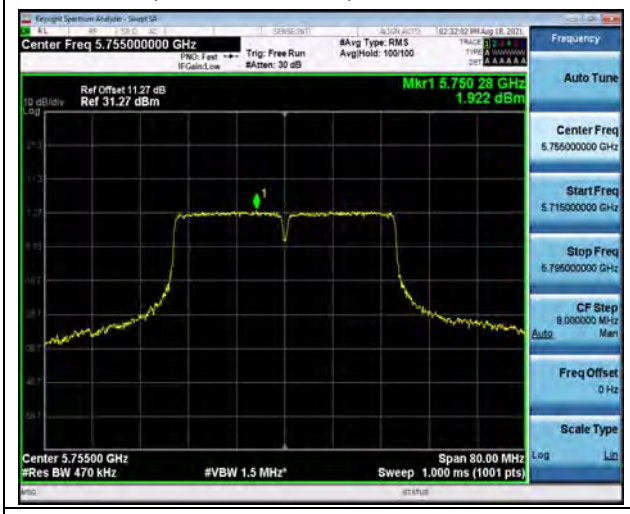
U-NII-3, 802.11n HT40, Channel No.: 151

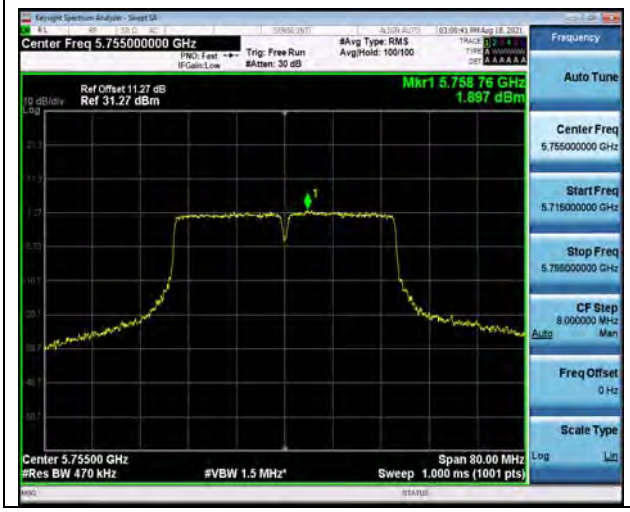


U-NII-3, 802.11ac VHT20, Channel No.: 149

U-NII-3, 802.11n HT40, Channel No.: 159

U-NII-3, 802.11ac VHT20, Channel No.: 165

U-NII-3, 802.11ac VHT40, Channel No.: 151



U-NII-3, 802.11ac VHT80, Channel No.: 155

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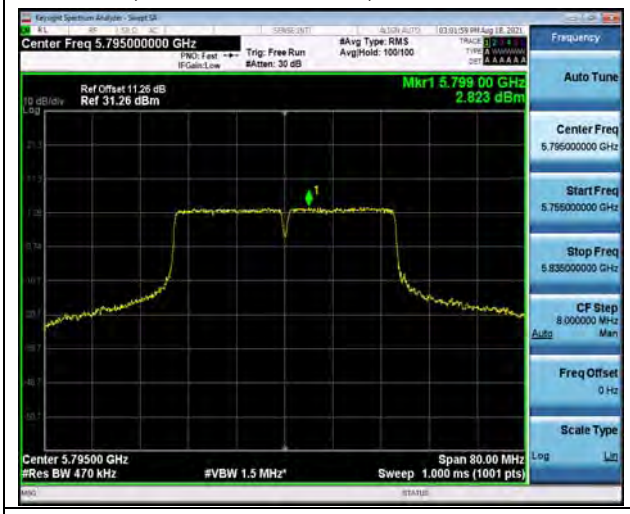
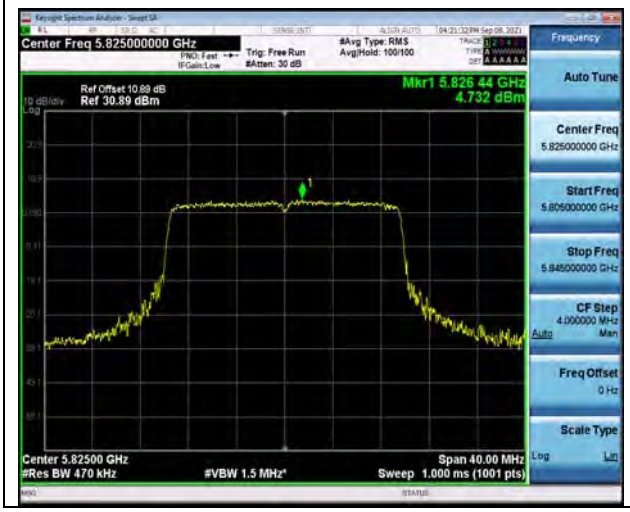
U-NII-3, 802.11 ac VHT40, Channel No.: 159



U-NII-3, 802.11ax HE20, Channel No.: 149

U-NII-3, 802.11ax HE40, Channel No.: 151

U-NII-3, 802.11ax HE20, Channel No.: 165



U-NII-3, 802.11ax HE40, Channel No.: 159

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U-NII-3, 802.11ax HE80, Channel No.: 155

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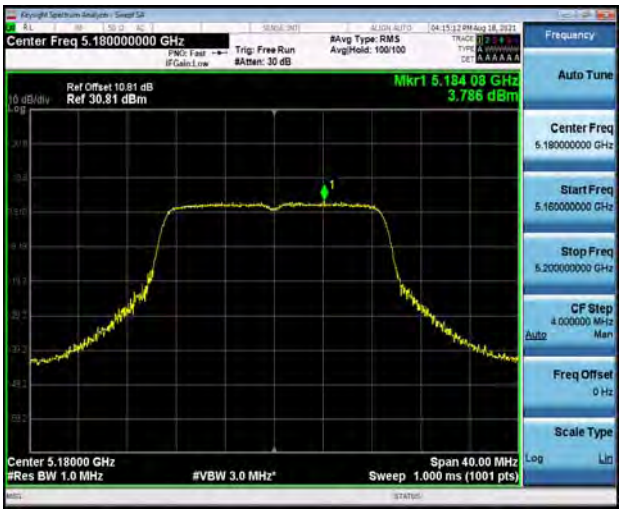
MIMO without beamforming

Antenna 1

U-NII-1, 802.11a, Channel No.: 36

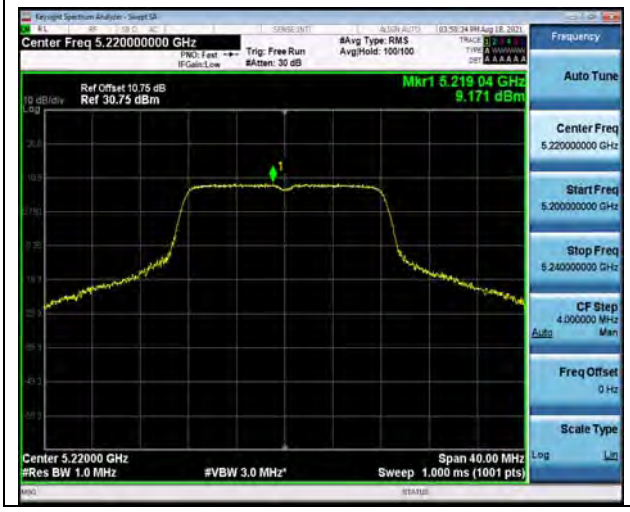
U-NII-1, 802.11n HT20, Channel No.: 36



U-NII-1, 802.11a, Channel No.: 40

U-NII-1, 802.11n HT20, Channel No.: 40

U-NII-1, 802.11a, Channel No.: 44



U-NII-1, 802.11n HT20, Channel No.: 44

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U-NII-1, 802.11a, Channel No.: 48

U-NII-1, 802.11n HT20, Channel No.: 48

U-NII-1, 802.11n HT40, Channel No.: 38

U-NII-1, 802.11ac VHT20, Channel No.: 36

U-NII-1, 802.11n HT40, Channel No.: 46

U-NII-1, 802.11ac VHT20, Channel No.: 40

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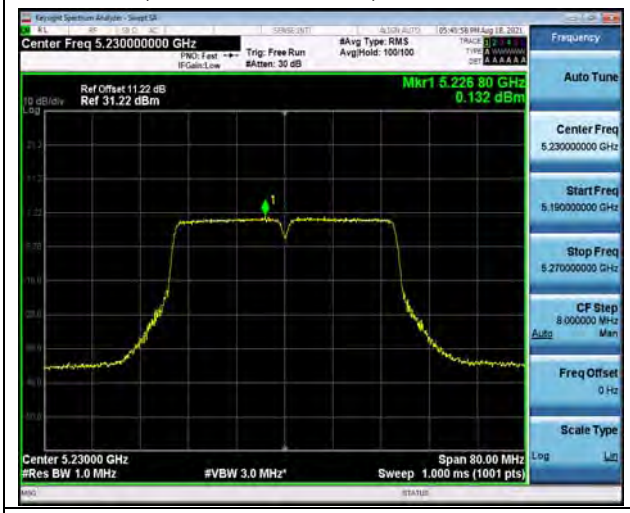
U-NII-1, 802.11ac VHT40, Channel No.: 38

U-NII-1, 802.11ac VHT20, Channel No.: 44

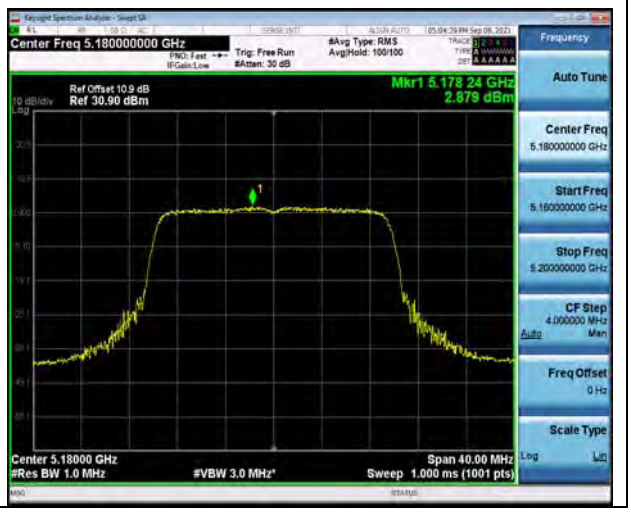
U-NII-1, 802.11ac VHT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 48

U-NII-1, 802.11ac VHT80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 36



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U-NII-1, 802.11ax HE40, Channel No.: 38

U-NII-1, 802.11ax HE20, Channel No.: 40

U-NII-1, 802.11ax HE40, Channel No.: 46

U-NII-1, 802.11ax HE20, Channel No.: 44

U-NII-1, 802.11ax HE80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 48

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U-NII-3, 802.11a, Channel No.: 149

U-NII-3, 802.11n HT20, Channel No.: 149

U-NII-3, 802.11a, Channel No.: 165

U-NII-3, 802.11n HT20, Channel No.: 165

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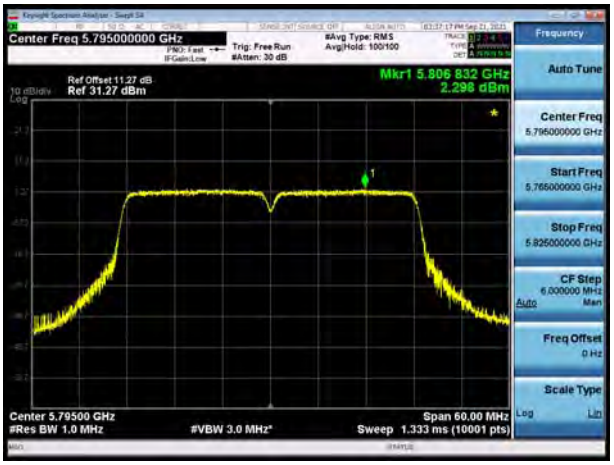
U-NII-3, 802.11n HT40, Channel No.: 151

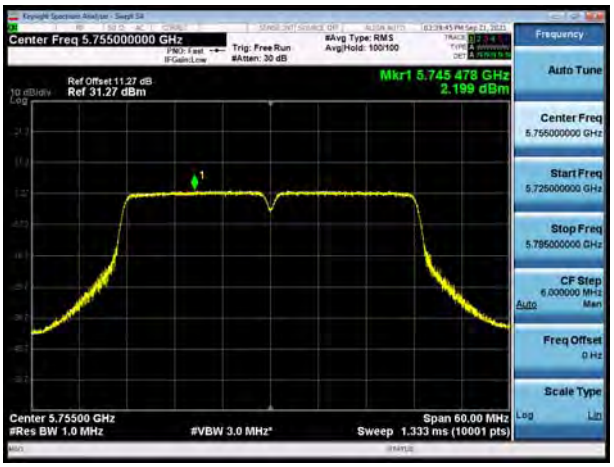
U-NII-3, 802.11ac VHT20, Channel No.: 149

U-NII-3, 802.11n HT40, Channel No.: 159



U-NII-3, 802.11ac VHT20, Channel No.: 165

U-NII-3, 802.11ac VHT40, Channel No.: 151



U-NII-3, 802.11ac VHT80, Channel No.: 155

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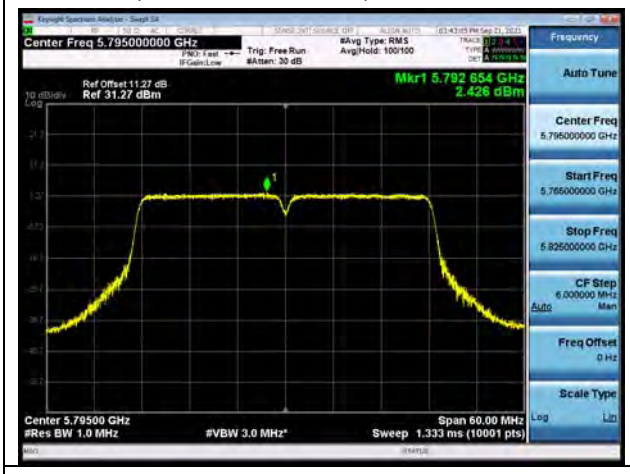
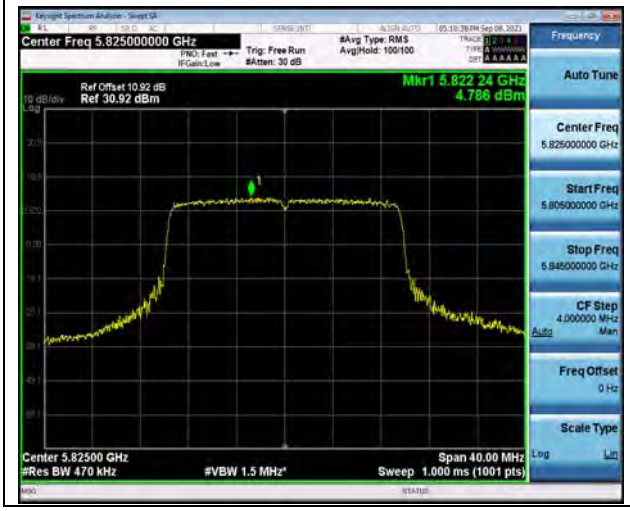
U-NII-3, 802.11ac VHT40, Channel No.: 159



U-NII-3, 802.11ax HE20, Channel No.: 149

U-NII-3, 802.11ax HE40, Channel No.: 151

U-NII-3, 802.11ax HE20, Channel No.: 165



U-NII-3, 802.11ax HE40, Channel No.: 159

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U-NII-3, 802.11ax HE80, Channel No.: 155

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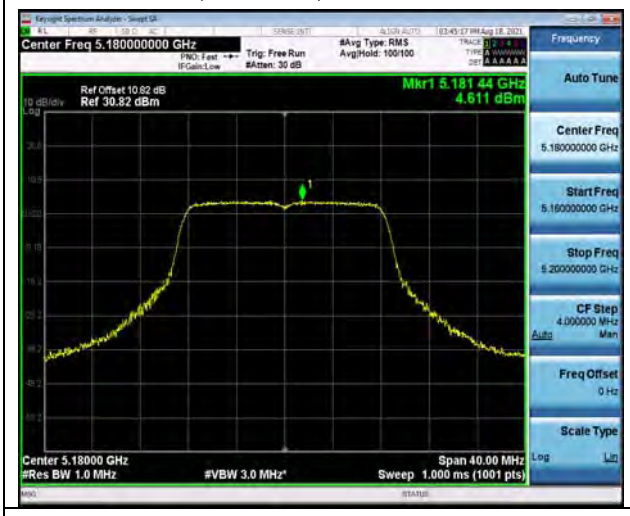
MIMO without beamforming

Antenna 2

U-NII-1, 802.11a, Channel No.: 36



U-NII-1, 802.11n HT20, Channel No.: 36

U-NII-1, 802.11a, Channel No.: 40

U-NII-1, 802.11n HT20, Channel No.: 40

U-NII-1, 802.11a, Channel No.: 44

U-NII-1, 802.11n HT20, Channel No.: 44

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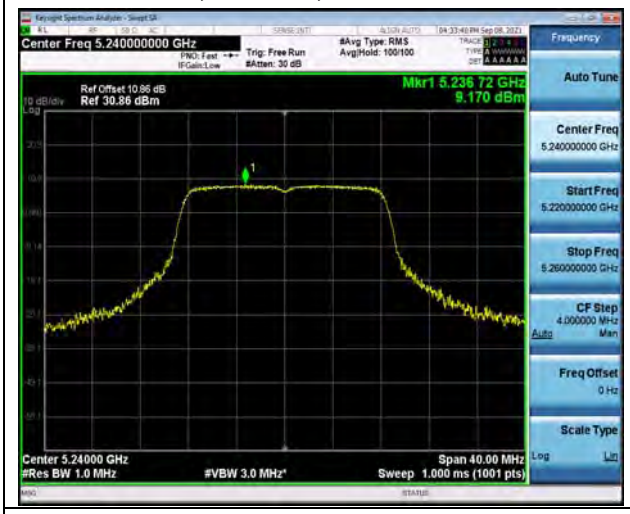
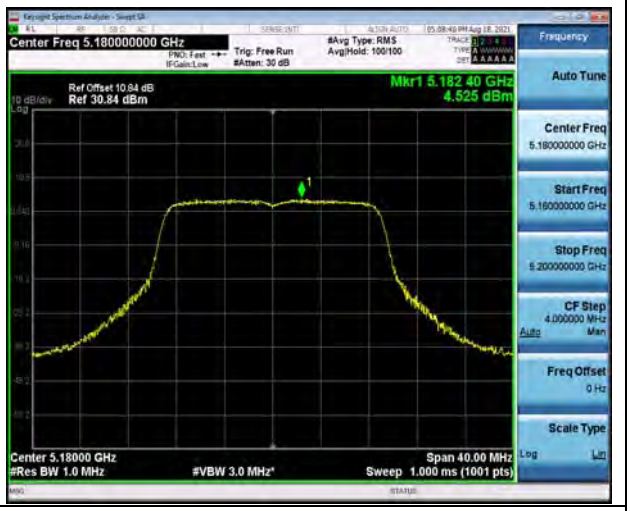
U-NII-1, 802.11a, Channel No.: 48



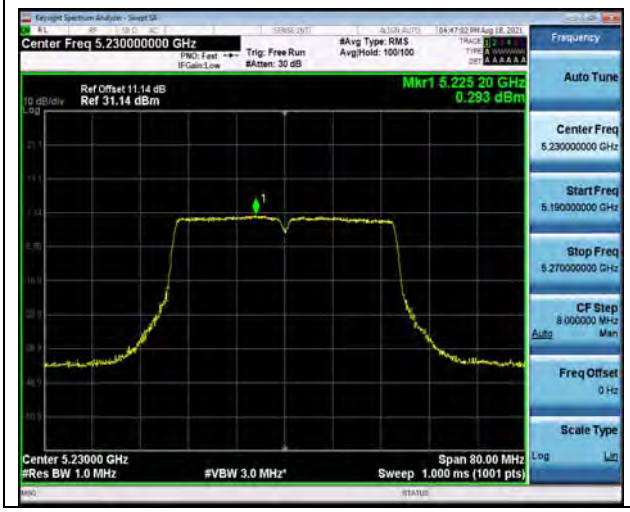
U-NII-1, 802.11n HT20, Channel No.: 48

U-NII-1, 802.11n HT40, Channel No.: 38

U-NII-1, 802.11ac VHT20, Channel No.: 36



U-NII-1, 802.11n HT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 40

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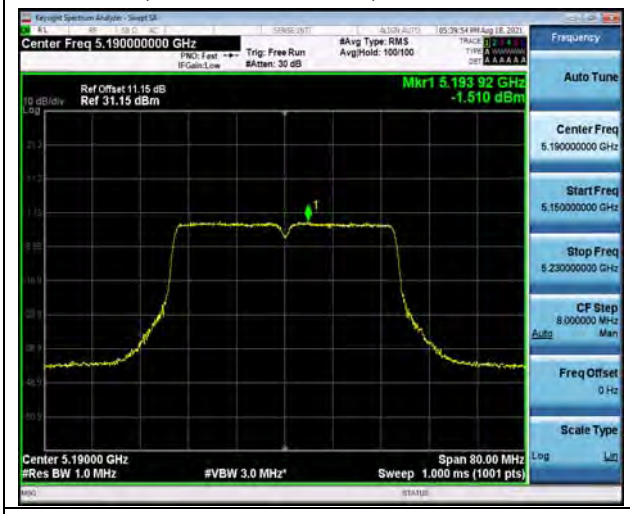
U-NII-1, 802.11ac VHT40, Channel No.: 38



U-NII-1, 802.11ac VHT20, Channel No.: 44

U-NII-1, 802.11ac VHT40, Channel No.: 46

U-NII-1, 802.11ac VHT20, Channel No.: 48

U-NII-1, 802.11ac VHT80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 36

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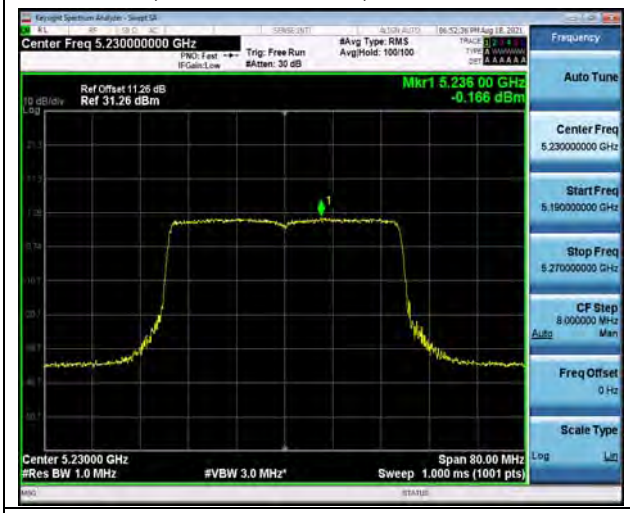
U-NII-1, 802.11ax HE40, Channel No.: 38

U-NII-1, 802.11ax HE20, Channel No.: 40

U-NII-1, 802.11ax HE40, Channel No.: 46



U-NII-1, 802.11ax HE20, Channel No.: 44

U-NII-1, 802.11ax HE80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 48

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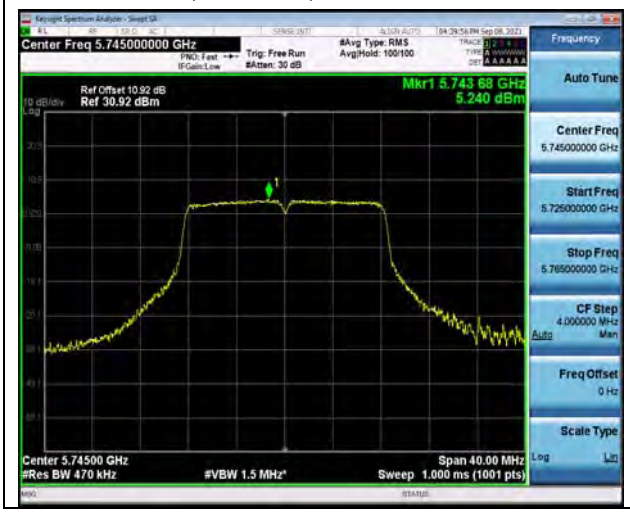
U-NII-3, 802.11a, Channel No.: 149



U-NII-3, 802.11n HT20, Channel No.: 149

U-NII-3, 802.11a, Channel No.: 165

U-NII-3, 802.11n HT20, Channel No.: 165

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U-NII-3, 802.11n HT40, Channel No.: 151

U-NII-3, 802.11ac VHT20, Channel No.: 149

U-NII-3, 802.11n HT40, Channel No.: 159

U-NII-3, 802.11ac VHT20, Channel No.: 165

U-NII-3, 802.11ac VHT40, Channel No.: 151

U-NII-3, 802.11ac VHT80, Channel No.: 155

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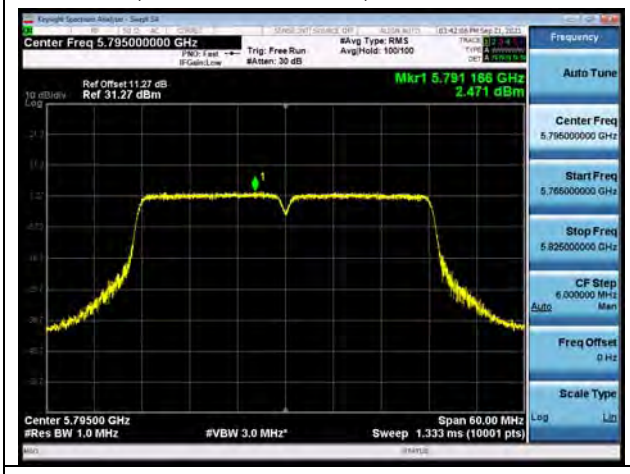
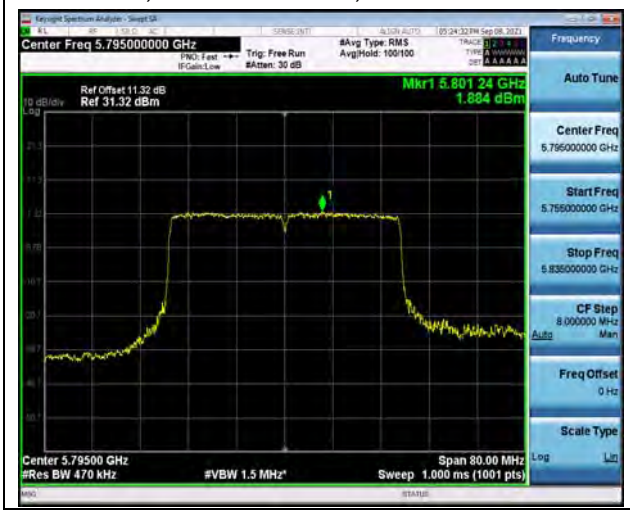
U-NII-3, 802.11ac VHT40, Channel No.: 159



U-NII-3, 802.11ax HE40, Channel No.: 151

U-NII-3, 802.11ax HE20, Channel No.: 149

U-NII-3, 802.11ax HE40, Channel No.: 159



U-NII-3, 802.11ax HE20, Channel No.: 165

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U-NII-3, 802.11ax HE80, Channel No.: 155

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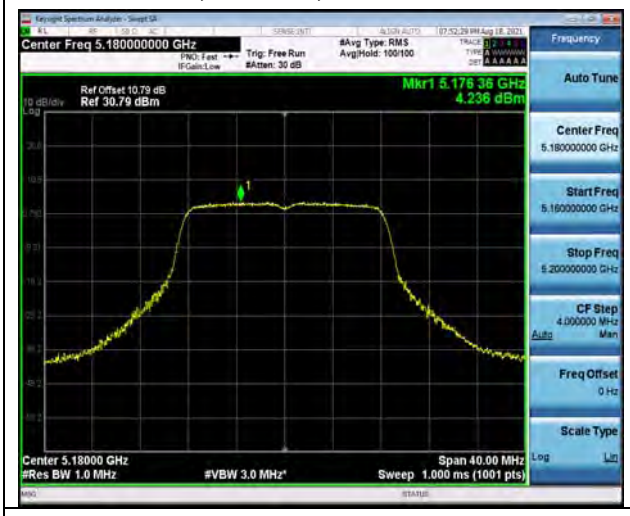
MIMO with beamforming

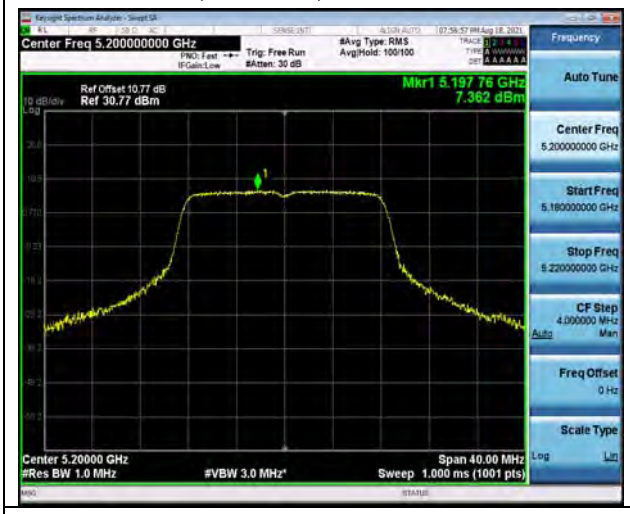
Antenna 1

U-NII-1, 802.11a, Channel No.: 36



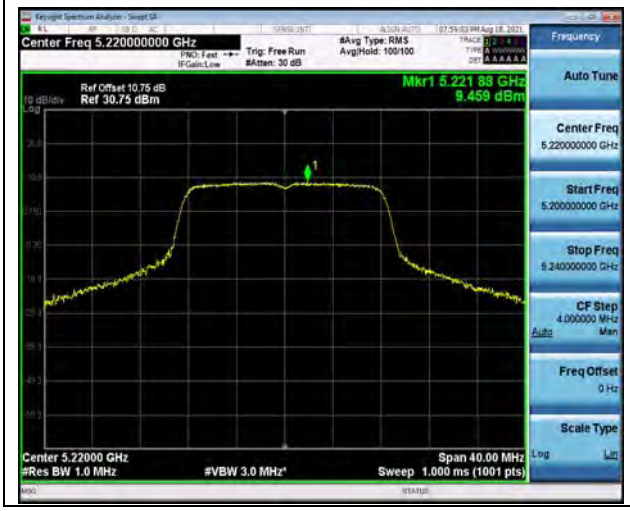
U-NII-1, 802.11n HT20, Channel No.: 36

U-NII-1, 802.11a, Channel No.: 40



U-NII-1, 802.11n HT20, Channel No.: 40

U-NII-1, 802.11a, Channel No.: 44



U-NII-1, 802.11n HT20, Channel No.: 44

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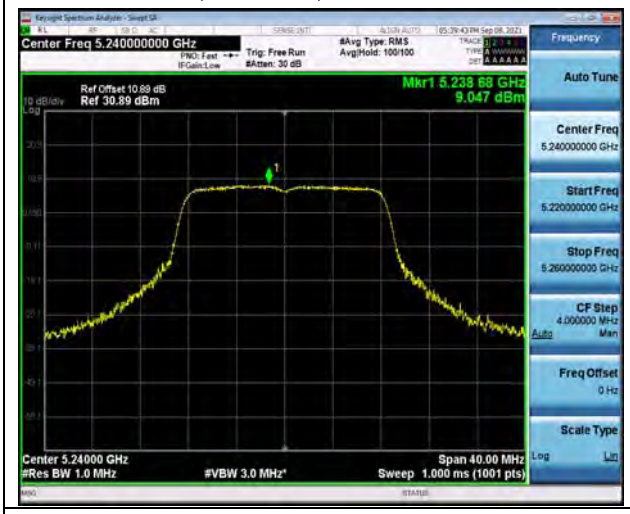
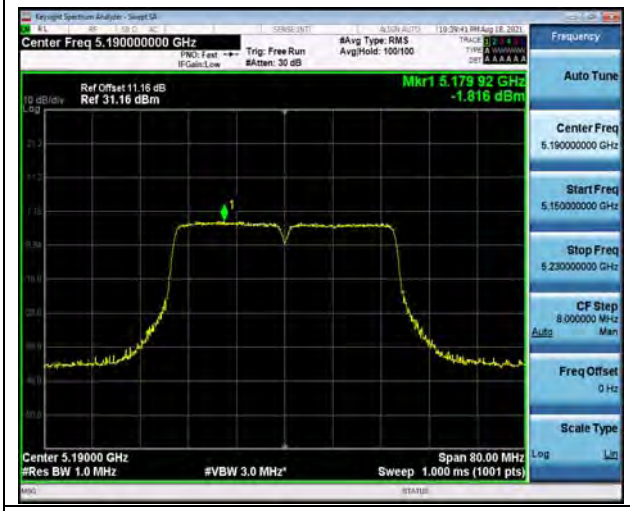
U-NII-1, 802.11a, Channel No.: 48



U-NII-1, 802.11n HT20, Channel No.: 48

U-NII-1, 802.11n HT40, Channel No.: 38



U-NII-1, 802.11ac VHT20, Channel No.: 36

U-NII-1, 802.11n HT40, Channel No.: 46

U-NII-1, 802.11ac VHT20, Channel No.: 40

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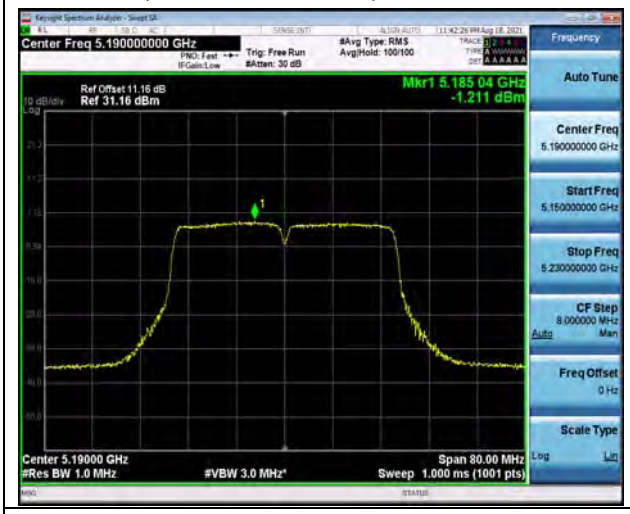
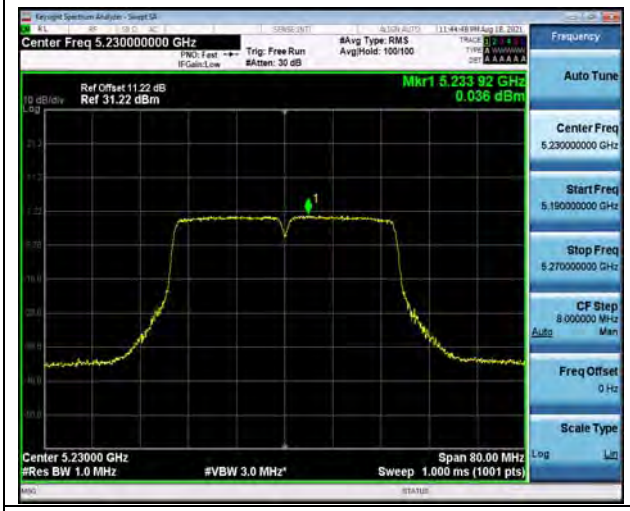
U-NII-1, 802.11ac VHT40, Channel No.: 38



U-NII-1, 802.11ac VHT20, Channel No.: 44

U-NII-1, 802.11ac VHT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 48

U-NII-1, 802.11ac VHT80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 36

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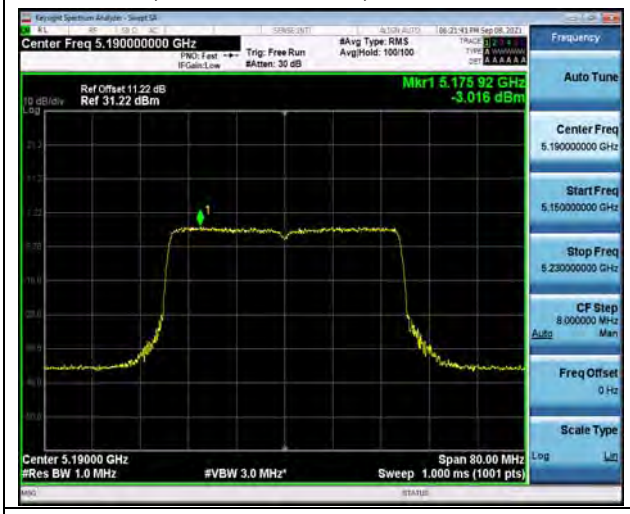
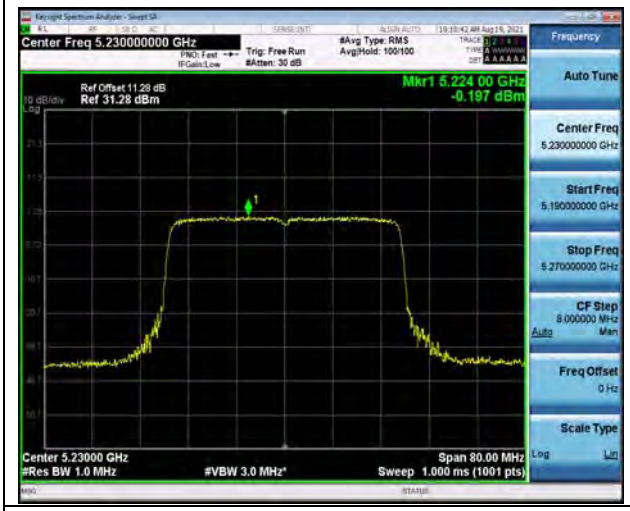
U-NII-1, 802.11ax HE40, Channel No.: 38



U-NII-1, 802.11ax HE20, Channel No.: 40

U-NII-1, 802.11ax HE40, Channel No.: 46



U-NII-1, 802.11ax HE20, Channel No.: 44

U-NII-1, 802.11ax HE80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 48

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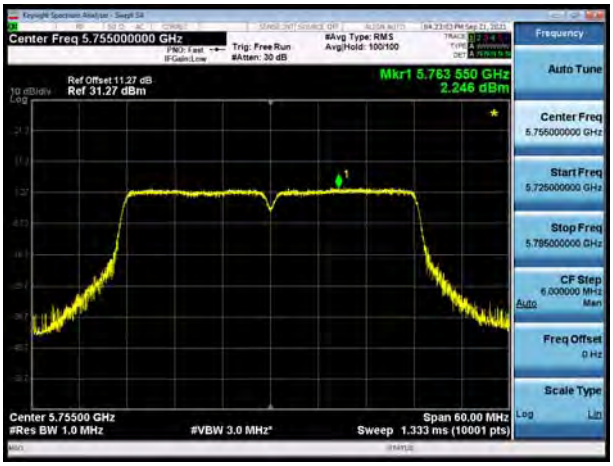
U-NII-3, 802.11a, Channel No.: 149

U-NII-3, 802.11n HT20, Channel No.: 149

U-NII-3, 802.11a, Channel No.: 165

U-NII-3, 802.11n HT20, Channel No.: 165

U-NII-3, 802.11n HT40, Channel No.: 151



U-NII-3, 802.11ac VHT20, Channel No.: 149

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U-NII-3, 802.11n HT40, Channel No.: 159

U-NII-3, 802.11ac VHT20, Channel No.: 165

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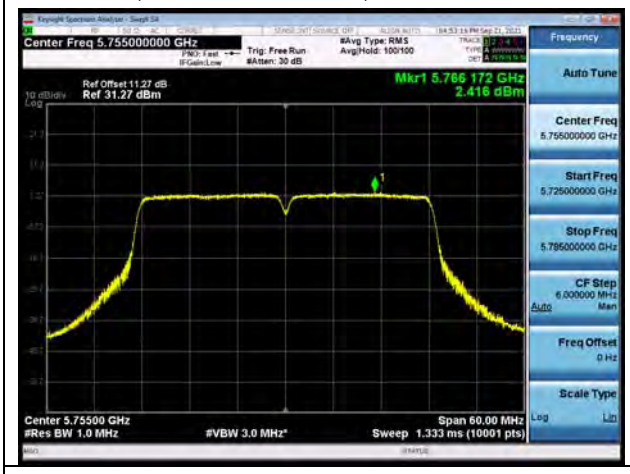
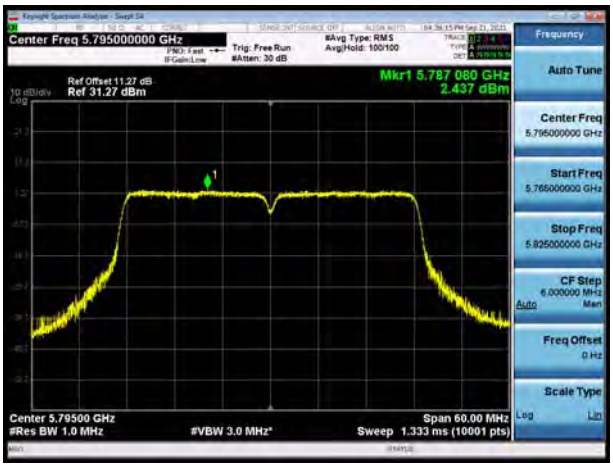
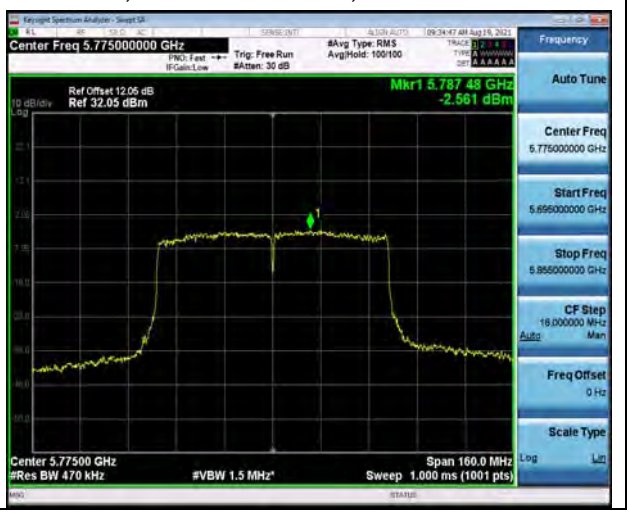
U-NII-3, 802.11ac VHT40, Channel No.: 151



U-NII-3, 802.11ac VHT40, Channel No.: 159



U-NII-3, 802.11ac VHT80, Channel No.: 155



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U-NII-3, 802.11ax HE40, Channel No.: 151

U-NII-3, 802.11ax HE20, Channel No.: 149

U-NII-3, 802.11ax HE40, Channel No.: 159

U-NII-3, 802.11ax HE20, Channel No.: 165

U-NII-3, 802.11ax HE80, Channel No.: 155

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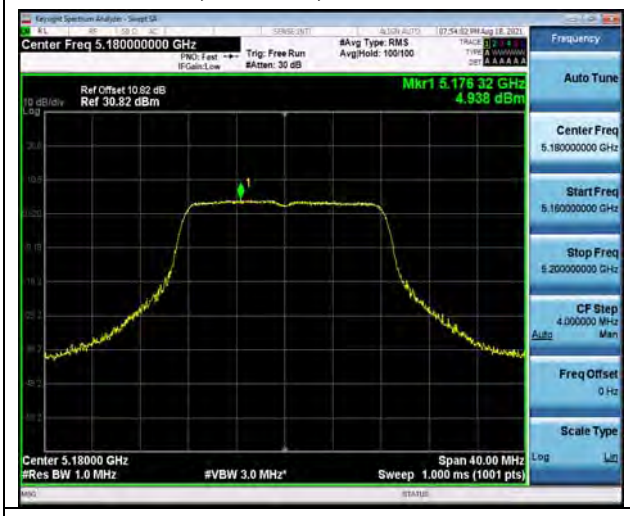
MIMO with beamforming

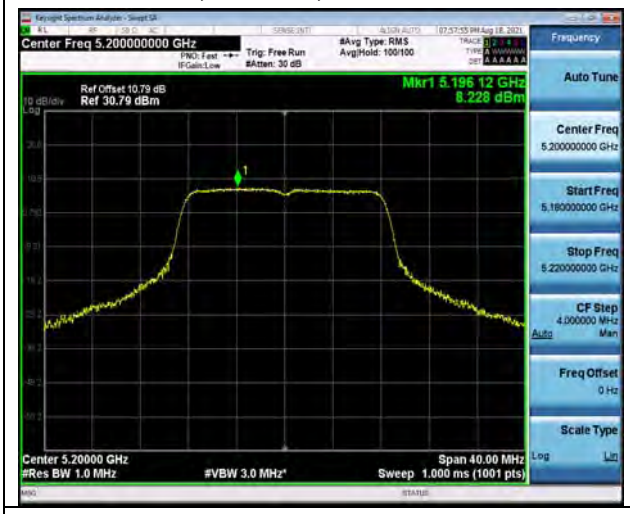
Antenna 2

U-NII-1, 802.11a, Channel No.: 36



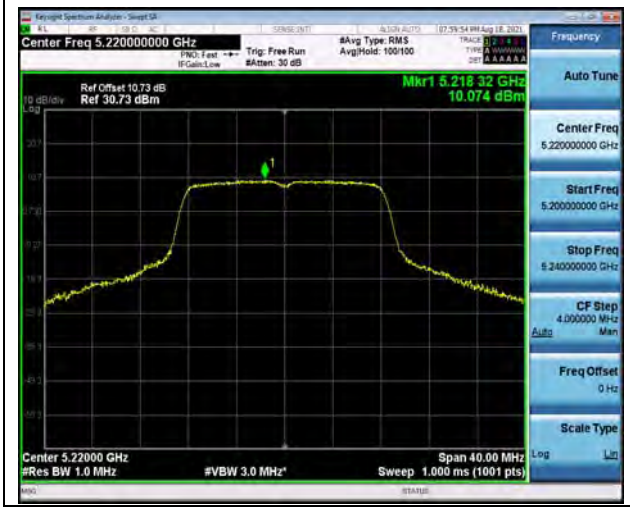
U-NII-1, 802.11n HT20, Channel No.: 36

U-NII-1, 802.11a, Channel No.: 40



U-NII-1, 802.11n HT20, Channel No.: 40

U-NII-1, 802.11a, Channel No.: 44



U-NII-1, 802.11n HT20, Channel No.: 44

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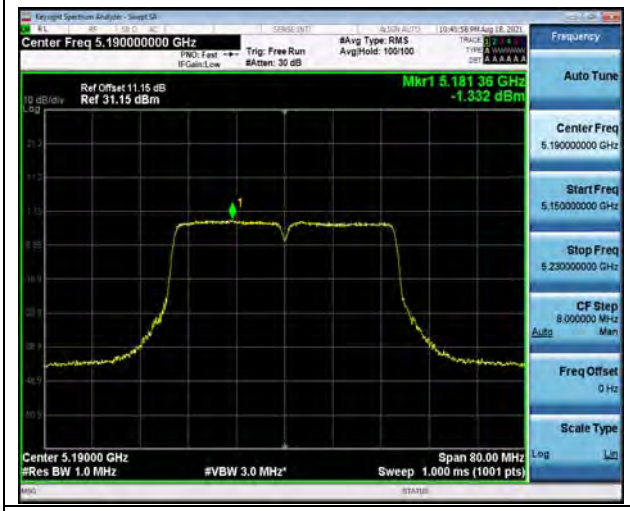
U-NII-1, 802.11a, Channel No.: 48

U-NII-1, 802.11n HT20, Channel No.: 48

U-NII-1, 802.11n HT40, Channel No.: 38



U-NII-1, 802.11ac VHT20, Channel No.: 36

U-NII-1, 802.11n HT40, Channel No.: 46

U-NII-1, 802.11ac VHT20, Channel No.: 40

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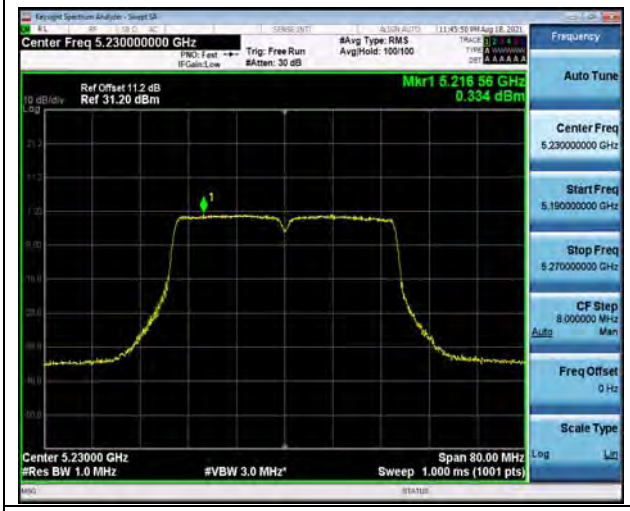
U-NII-1, 802.11ac VHT40, Channel No.: 38

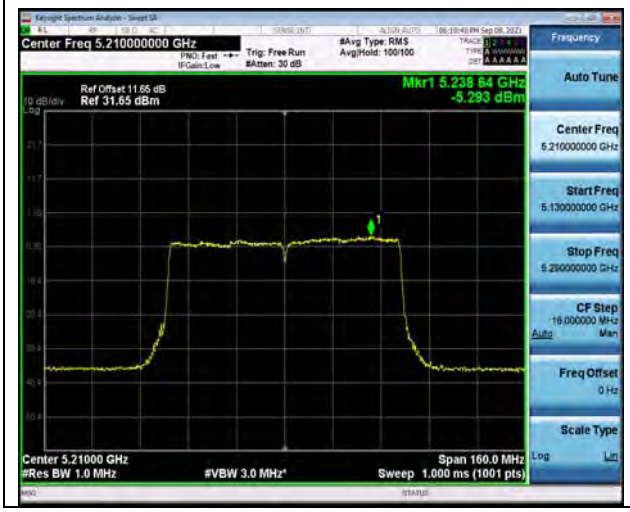
U-NII-1, 802.11ac VHT20, Channel No.: 44

U-NII-1, 802.11ac VHT40, Channel No.: 46



U-NII-1, 802.11ac VHT20, Channel No.: 48

U-NII-1, 802.11ac VHT80, Channel No.: 42



U-NII-1, 802.11ax HE20, Channel No.: 36

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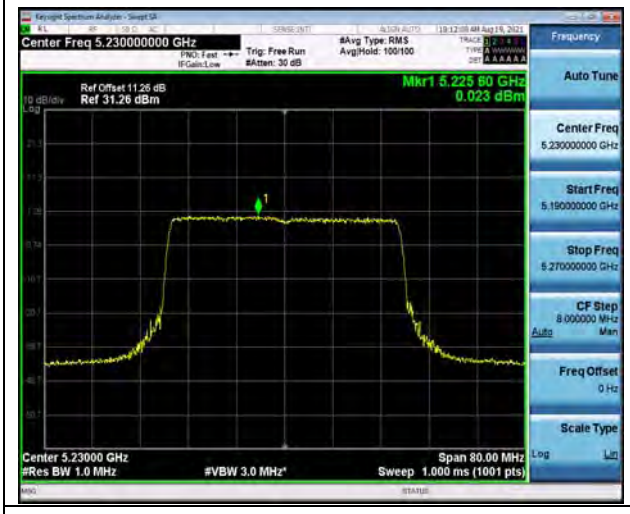
U-NII-1, 802.11ax HE40, Channel No.: 38

U-NII-1, 802.11ax HE20, Channel No.: 40

U-NII-1, 802.11ax HE40, Channel No.: 46



U-NII-1, 802.11ax HE20, Channel No.: 44

U-NII-1, 802.11ax HE80, Channel No.: 42

U-NII-1, 802.11ax HE20, Channel No.: 48

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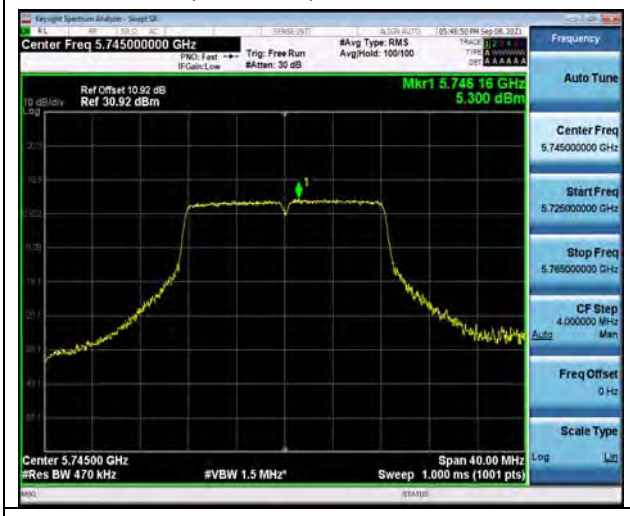
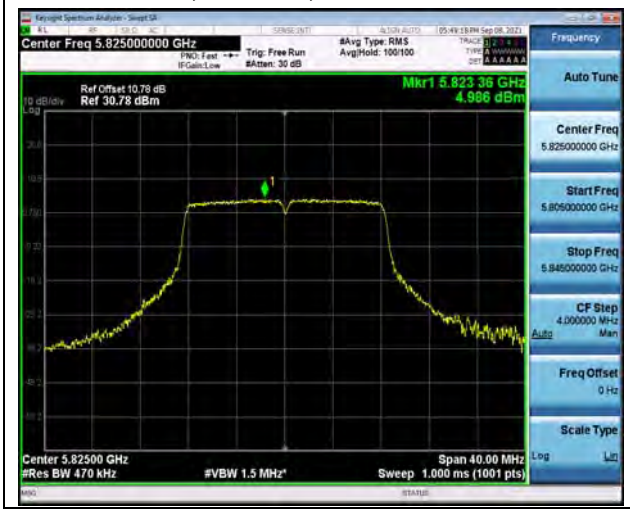
U-NII-3, 802.11a, Channel No.: 149



U-NII-3, 802.11n HT20, Channel No.: 149

U-NII-3, 802.11a, Channel No.: 165



U-NII-3, 802.11n HT20, Channel No.: 165

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U-NII-3, 802.11n HT40, Channel No.: 151

U-NII-3, 802.11ac VHT20, Channel No.: 149

U-NII-3, 802.11n HT40, Channel No.: 159

U-NII-3, 802.11ac VHT20, Channel No.: 165

U-NII-3, 802.11ac VHT40, Channel No.: 151

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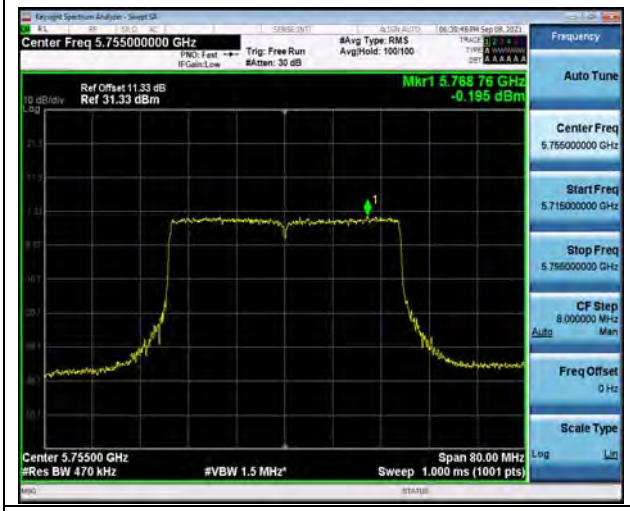
U-NII-3, 802.11ac VHT40, Channel No.: 159

U-NII-3, 802.11ac VHT80, Channel No.: 155

U-NII-3, 802.11ax HE40, Channel No.: 151



U-NII-3, 802.11ax HE20, Channel No.: 149

U-NII-3, 802.11ax HE40, Channel No.: 159

U-NII-3, 802.11ax HE20, Channel No.: 165

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U-NII-3, 802.11ax HE80, Channel No.: 155

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5.5. Unwanted Emission

Ambient condition

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

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

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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.

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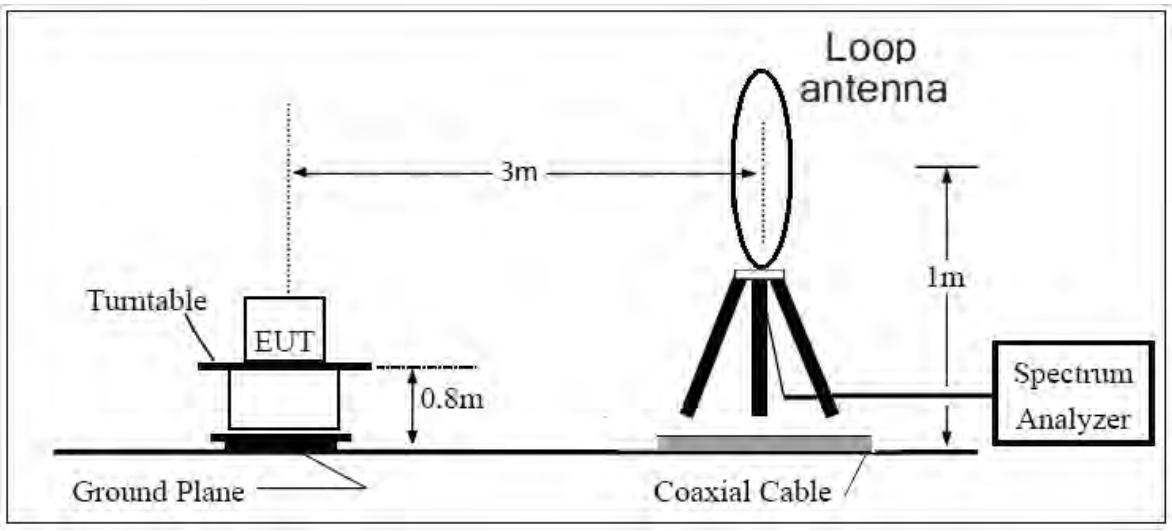
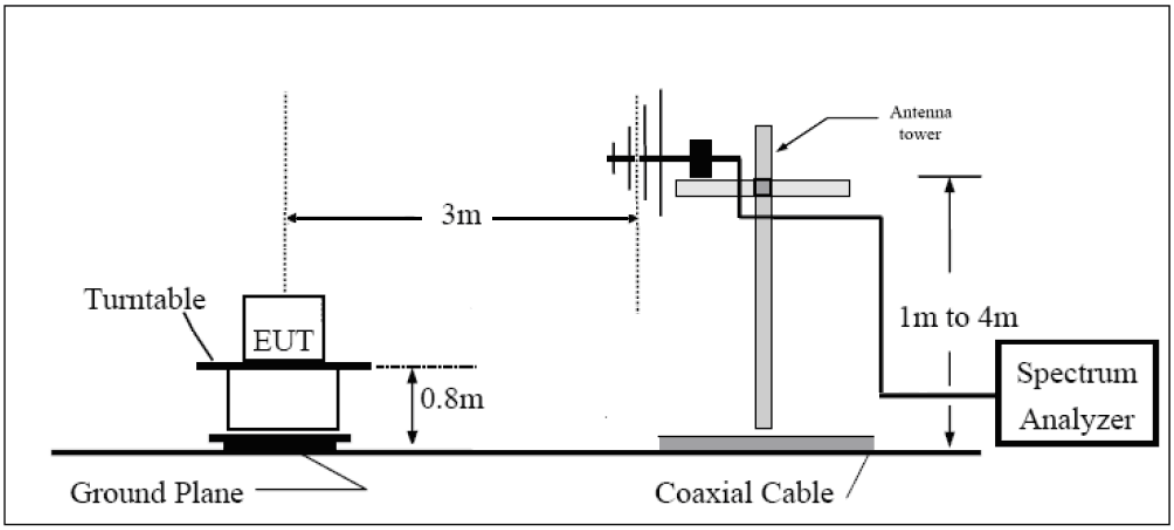
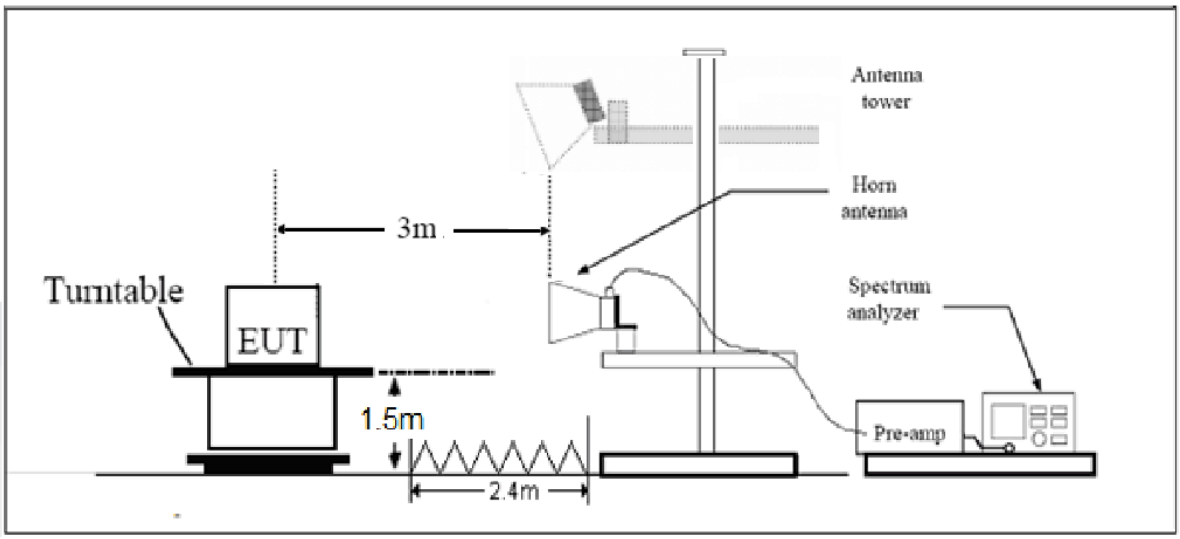
9KHz~~~30MHz



30MHz~~~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

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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(uV/m)	Field strength(dBuV/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

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