RF TEST REPORT

Applicant	Nokia ShangHai Bell Co., Ltd.
FCC ID	2ADZRG2425GA
Product	7368 ISAM ONT
Brand	NOKIA
Model	G-2425G-A
Report No.	R2002B0019-R2
Issue Date	May 9, 2020

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15E (2019)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Peng Tao

Approved by: Kai Xu

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

Summary of measurement results

Number	Test Case	Clause in FCC rules	Verdict
1	Average conducted output power	15.407(a)	PASS
2	Occupied bandwidth	15.407(e)	PASS
3	Frequency stability	15.407(g)	PASS
4	Power spectral density	15.407(a)	PASS
5	Unwanted Emissions	15.407(b)	PASS
6	Conducted Emissions	15.207	PASS
Date of Testing: April 1, 2020~ April 12, 2020			
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

1. Test Laboratory

1.1. Notes of the test report

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

1.2. Test facility

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

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

A2LA (Certificate Number: 3857.01)

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

1.3. Testing Location

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

2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Nokia ShangHai Bell Co., Ltd.
Applicant address	No. 388, Ningqiao Rd. Pilot Free Trade Zone, Shanghai, China
Manufacturer	TAICANG T&W ELECTRONICS CO., LTD
Manufacturer address	89# Jiang Nan RD, Lu Du TownTaicang, Jiangsu, China

2.2. General information

EUT Description	
Model	G-2425G-A
IMEI	1#
Hardware Version	3FE48299ABAA
Software Version	3FE49025AGDA84
Power Supply	AC adapter
Antenna Type	External Antenna
Antenna Gain	MIMO Antenna 1: 5.0dBi MIMO Antenna 2: 5.0dBi
Directional Gain	5.0 dBi
Test Mode(s)	U-NII-1(5150MHz-5250MHz) U-NII-2A(5250MHz-5350MHz) U-NII-2C(5470MHz-5725MHz with 5600MHz -5650MHz) U-NII-3(5725MHz-5850MHz)
Modulation Type	802.11a/n (HT20/HT40) : OFDM 802.11ac (VHT20/VHT40/VHT80): OFDM
Max. Conducted Power	29.87dBm
Operating Frequency Range(s)	U-NII-1: 5150-5250MHz U-NII-2A:5250-5350MHz U-NII-2C:5470-5725MHz (with 5600MHz -5650MHz) U-NII-3: 5725-5850MHz
Operating temperature range:	-5 ° C to 45° C
Operating voltage range:	11.4 V to 12.6 V
State DC voltage:	12V
EUT Accessory	
Adapter 1	Manufacturer: SHENZHEN RUIDE ELECTRONICAL INDUSTRIAL CO.,LTD Model: RD1202000-C55-154MG/BR120200-UC6C-LL01
Adapter 2	Manufacturer: FUHUA ELECTRONIC CO., LTD Model: UES24WU-120200SPA
Note:1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.	

3. Applied Standards

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

Test standards:

FCC CFR47 Part 15E (2019) Unlicensed National Information Infrastructure Devices

ANSI C63.10 (2013)

Reference standard:

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

4. Test Configuration

Test Mode

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

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

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

Worst-case data rates are shown as following table.

Band	Data Rate	
	MIMO Antenna 1	**MIMO Antenna 2**
802.11a	6 Mbps	6 Mbps
802.11n HT20	MCS0	MCS0
802.11n HT40	MCS0	MCS0
802.11ac VHT20	MCS0	MCS0
802.11ac VHT40	MCS0	MCS0
802.11ac VHT80	MCS0	MCS0
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.		

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

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

Wireless Technology and Frequency Range

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

			157	5785MHz
			161	5805MHz
			165	5825MHz
		40 MHz	151	5755MHz
			159	5795MHz
		80 MHz	155	5775MHz
Does this device support TPC Function? ☐ Yes ☒No				
Does this device support TDWR Band? ☒Yes ☐No				

5. Test Case Results

5.1. Occupied Bandwidth

Ambient condition

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

Method of Measurement

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

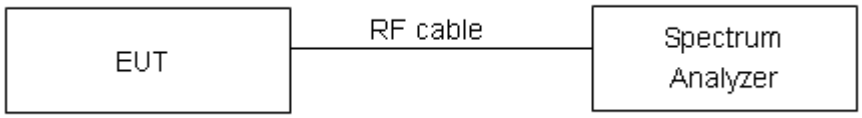
For U-NII-1/U-NII-2A/U-NII-2C, set RBW ≈1% OCB kHz, VBW ≥ 3 × RBW, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the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

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

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

Use the 99 % power bandwidth function of the instrument

Test Setup



Limits

Rule FCC Part §15.407(e)

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

Measurement Uncertainty

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

Test Results:

U-NII-1

Network Standards	Channel/ Frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	36/5180	16.503	22.39	PASS
	40/5200	16.490	22.29	PASS
	48/5240	16.495	21.30	PASS
802.11n HT20	36/5180	17.599	24.38	PASS
	40/5200	17.524	20.02	PASS
	48/5240	17.538	19.84	PASS
802.11n HT40	38/5190	36.032	49.05	PASS
	46/5230	36.020	46.48	PASS
802.11ac VHT20	36/5180	17.548	20.34	PASS
	40/5200	17.571	19.72	PASS
	48/5240	17.586	20.28	PASS
802.11ac VHT40	38/5190	36.196	45.91	PASS
	46/5230	36.141	48.02	PASS
802.11ac VHT80	42/5210	75.901	110.20	PASS

U-NII-2A

Network Standards	Channel/ Frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	52/5260	16.375	19.43	PASS
	60/5300	16.382	19.41	PASS
	64/5320	16.379	19.42	PASS
802.11n HT20	52/5260	17.496	19.83	PASS
	60/5300	17.502	19.86	PASS
	64/5320	17.516	20.00	PASS
802.11n HT40	54/5270	35.949	40.50	PASS
	62/5310	35.929	40.55	PASS
802.11ac VHT20	52/5260	17.547	19.53	PASS
	60/5300	17.503	19.56	PASS
	64/5320	17.549	19.62	PASS
802.11ac VHT40	54/5270	36.107	40.25	PASS
	62/5310	36.065	39.96	PASS
802.11ac VHT80	58/5290	75.649	81.17	PASS

U-NII-2C

Network Standards	Channel/ Frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	100/5500	16.377	19.59	PASS
	120/5600	16.371	19.25	PASS
	140/5700	16.341	19.23	PASS
	144/5720	16.378	19.28	PASS
802.11n HT20	100/5500	17.508	20.01	PASS
	120/5600	17.517	19.99	PASS
	140/5700	17.499	19.89	PASS
	144/5720	17.509	19.84	PASS
802.11n HT40	102/5510	35.953	40.29	PASS
	118/5590	35.942	40.53	PASS
	134/5670	35.950	40.23	PASS
	142/5710	35.934	40.29	PASS
802.11ac VHT20	100/5500	17.578	19.99	PASS
	120/5600	17.573	20.04	PASS
	140/5700	17.560	19.95	PASS
	144/5720	17.576	20.05	PASS
802.11ac VHT40	102/5510	36.004	40.23	PASS
	118/5590	36.069	39.87	PASS
	134/5670	35.999	39.63	PASS
	142/5710	36.071	39.64	PASS
802.11ac VHT80	122/5610	75.555	80.87	PASS
	138/5690	75.659	80.81	PASS

U-NII-3

Network Standards	Channel/ Frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11a	5745	16.556	15.04	500	PASS
	5785	16.525	15.04	500	PASS
	5825	16.518	13.87	500	PASS
802.11n HT20	5745	17.528	15.68	500	PASS
	5785	17.640	15.09	500	PASS
	5825	17.637	15.08	500	PASS
802.11n HT40	5755	35.940	35.07	500	PASS
	5795	35.991	35.07	500	PASS
802.11ac VHT20	5745	17.589	15.41	500	PASS
	5785	17.639	15.96	500	PASS
	5825	17.612	16.55	500	PASS
802.11ac VHT40	5755	36.369	35.10	500	PASS
	5795	36.291	35.67	500	PASS
802.11ac VHT80	5775	75.479	75.11	500	PASS

U-NII-1, 802.11a

Carrier frequency (MHz): 5180

U-NII-1, 802.11n HT20

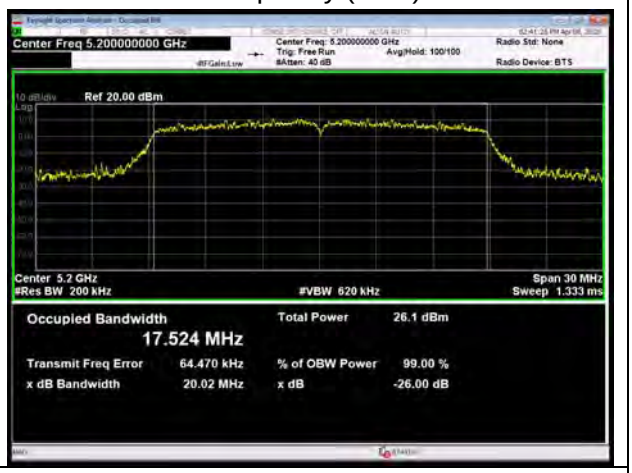
Carrier frequency (MHz): 5180

U-NII-1, 802.11a

Carrier frequency (MHz): 5200

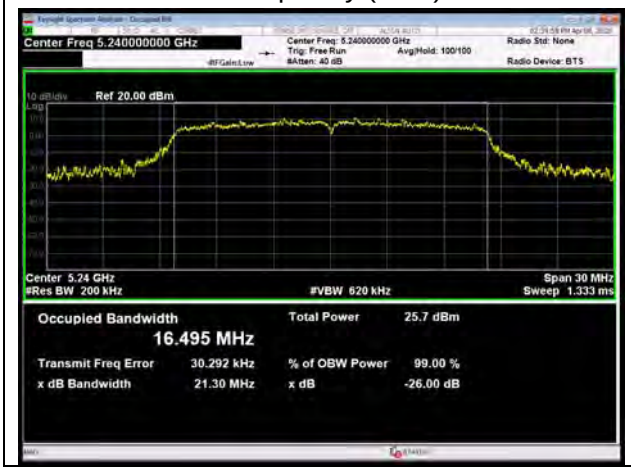
U-NII-1, 802.11n HT20

Carrier frequency (MHz): 5200



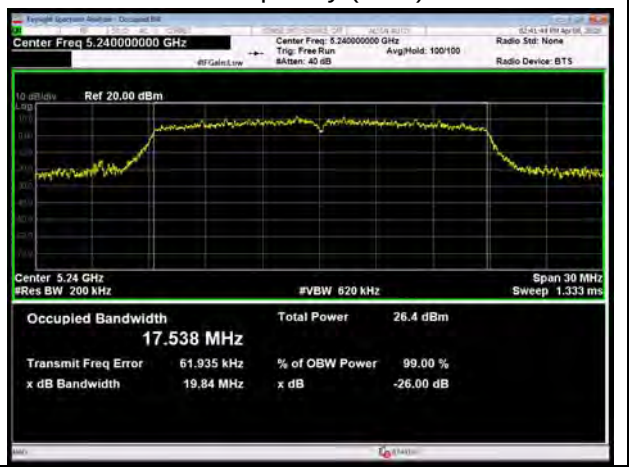
U-NII-1, 802.11a

Carrier frequency (MHz):5240



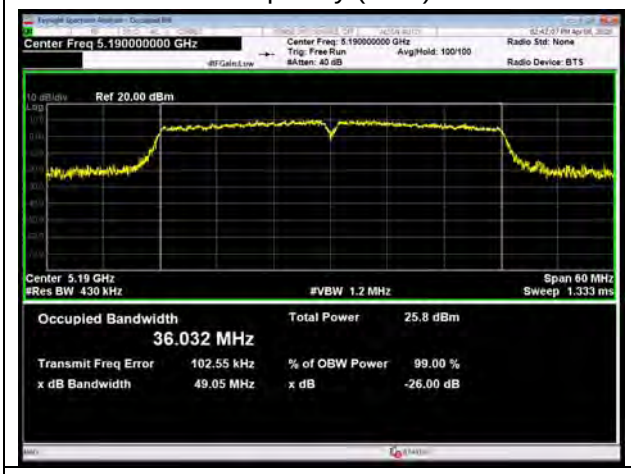
U-NII-1, 802.11n HT20

Carrier frequency (MHz):5240



U-NII-1, 802.11n HT40

Carrier frequency (MHz): 5190



U-NII-1, 802.11ac VHT20

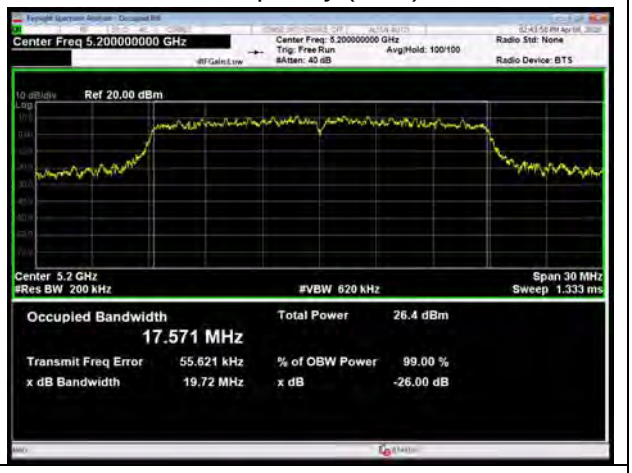
Carrier frequency (MHz): 5180

U-NII-1, 802.11n HT40

Carrier frequency (MHz): 5230

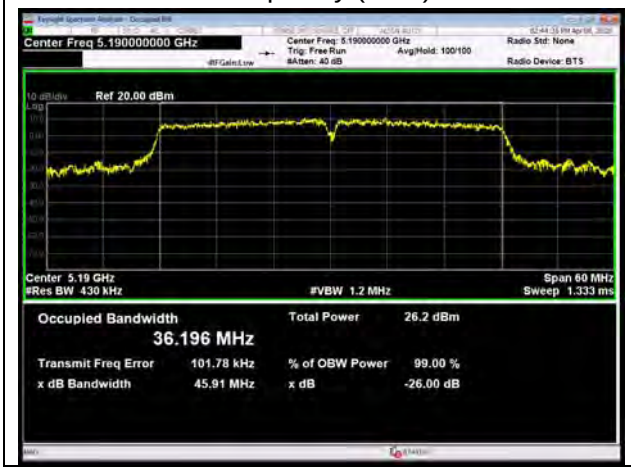
U-NII-1, 802.11ac VHT20

Carrier frequency (MHz): 5200



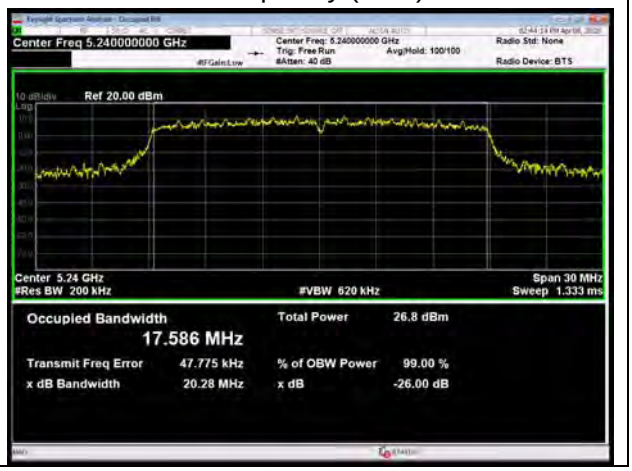
U-NII-1, 802.11ac VHT40

Carrier frequency (MHz): 5190



U-NII-1, 802.11ac VHT20

Carrier frequency (MHz):5240



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

U-NII-2A, 802.11a

Carrier frequency (MHz): 5260

U-NII-2A, 802.11n HT20

Carrier frequency (MHz): 5260

U-NII-2A, 802.11a

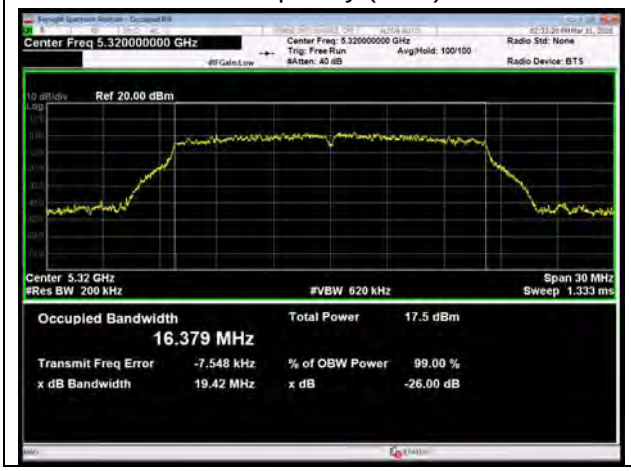
Carrier frequency (MHz): 5300

U-NII-2A, 802.11n HT20

Carrier frequency (MHz): 5300

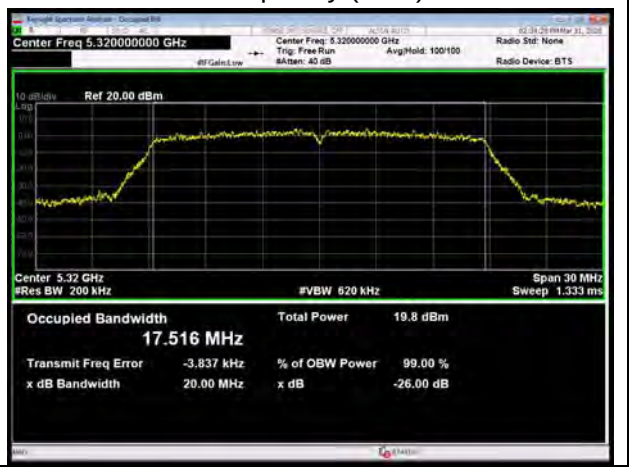
U-NII-2A, 802.11a

Carrier frequency (MHz):5320

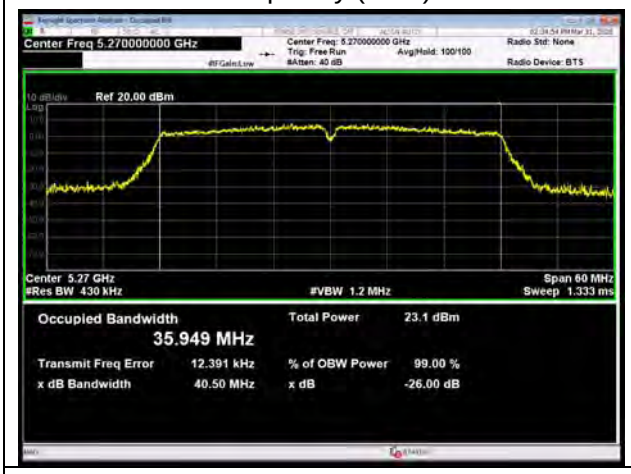


U-NII-2A, 802.11n HT20

Carrier frequency (MHz):5320

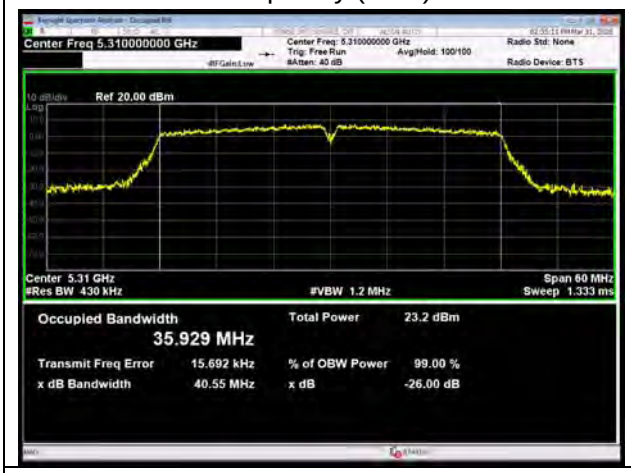


U-NII-2A, 802.11n HT40
Carrier frequency (MHz): 5270

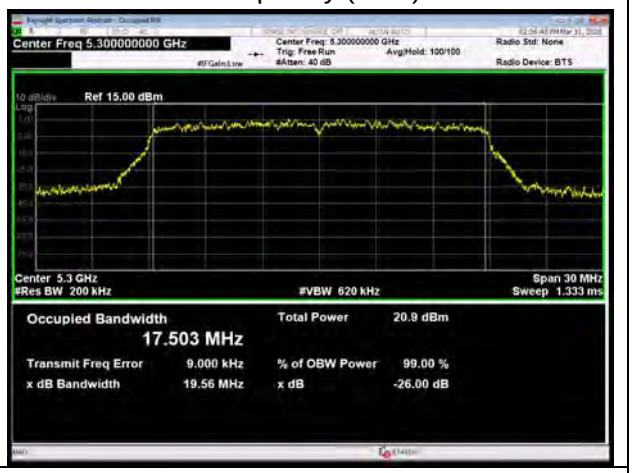


U-NII-2A, 802.11ac VHT20
Carrier frequency (MHz):5260

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



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



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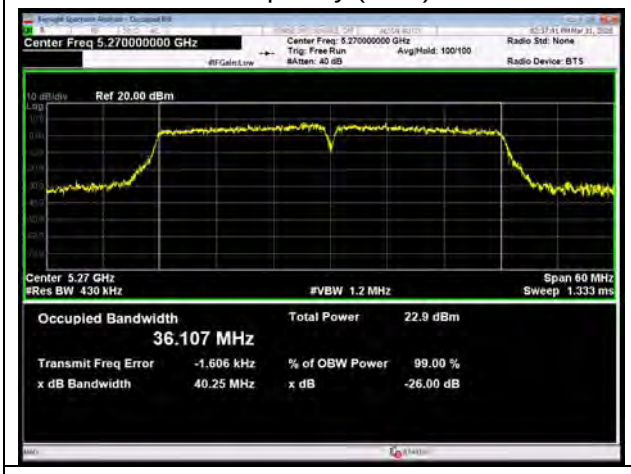
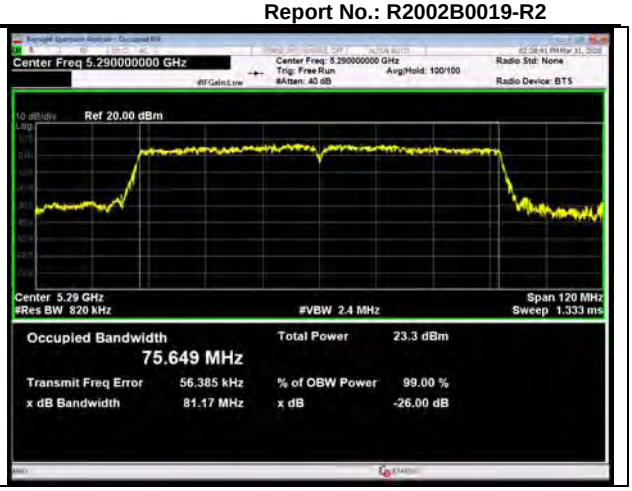


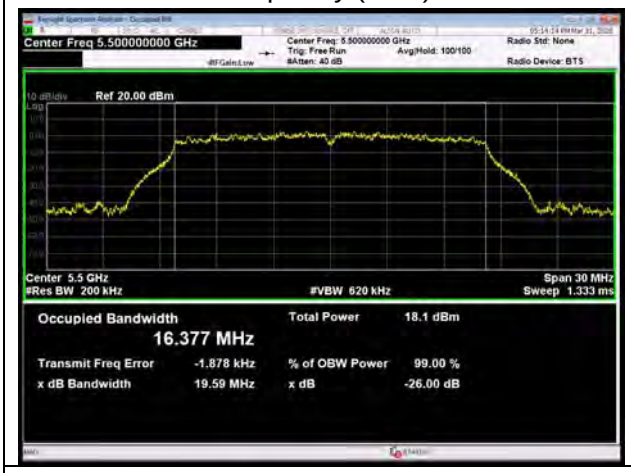
U-NII-2A, 802.11ac VHT20
Carrier frequency (MHz):5320

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

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



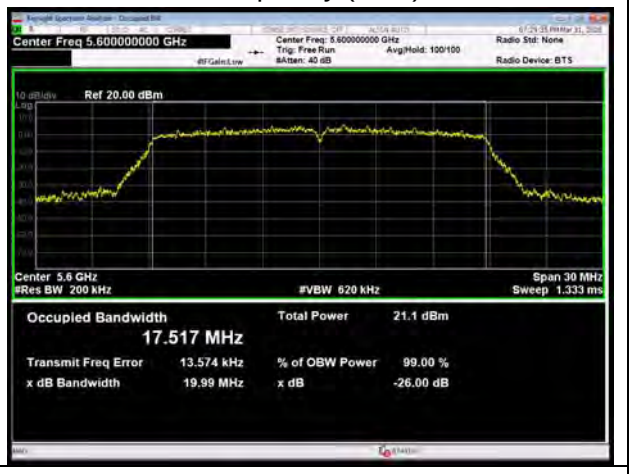
U-NII-2C, 802.11a
Carrier frequency (MHz): 5500



U-NII-2C, 802.11n HT20
Carrier frequency (MHz): 5500

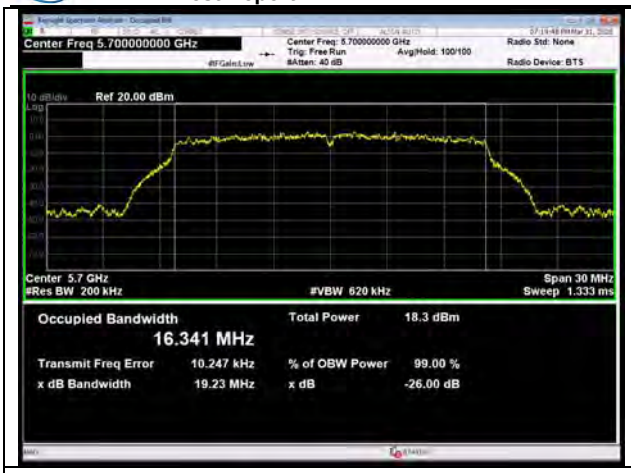
U-NII-2C, 802.11a
Carrier frequency (MHz): 5600

U-NII-2C, 802.11n HT20
Carrier frequency (MHz): 5600



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

U-NII-2C, 802.11n HT20
Carrier frequency (MHz):5700



U-NII-2C, 802.11a

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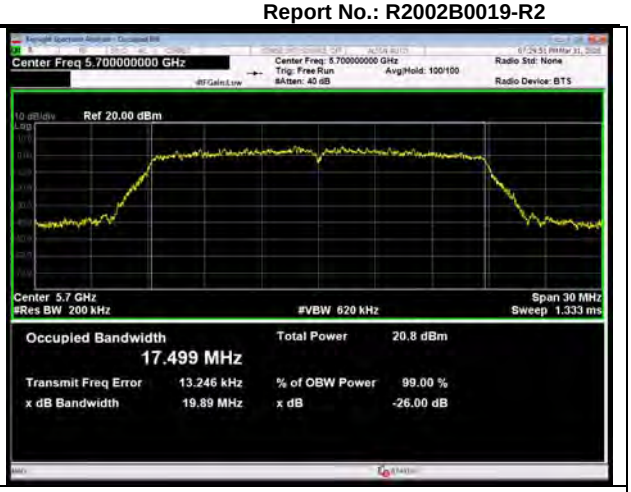

U-NII-2C, 802.11n HT20

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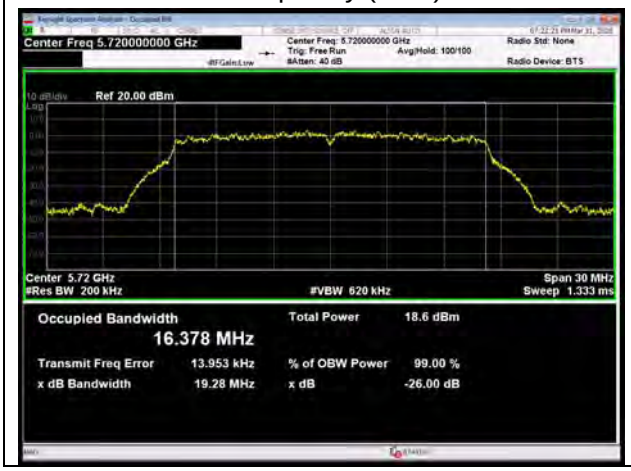


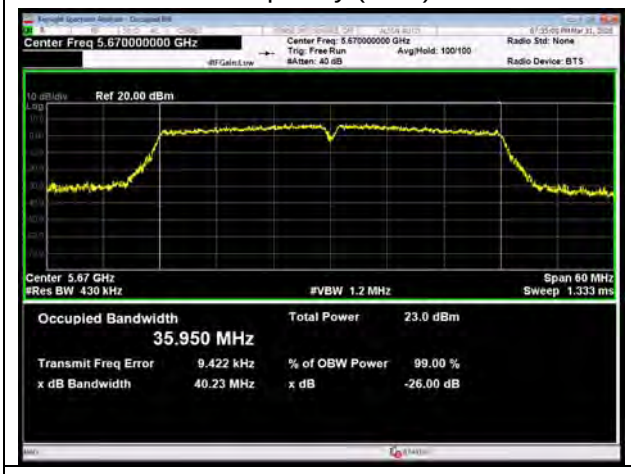
U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5510

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

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

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

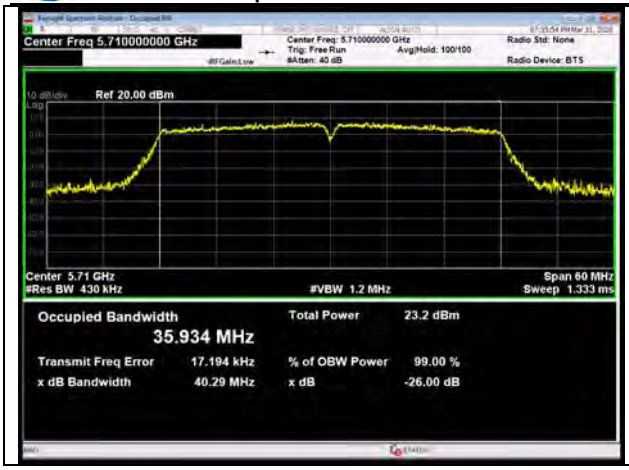
U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5670

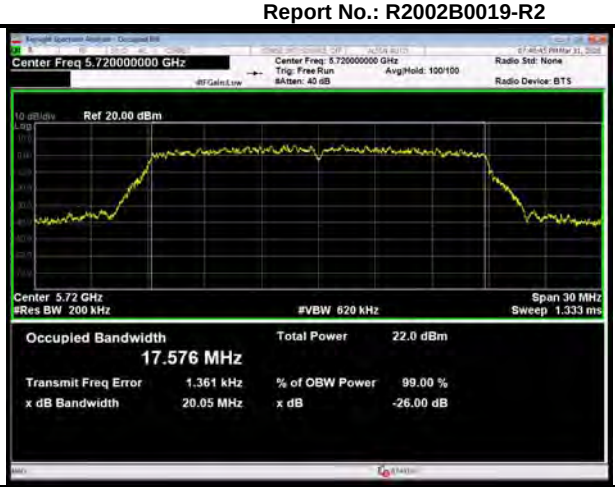


U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz):5700

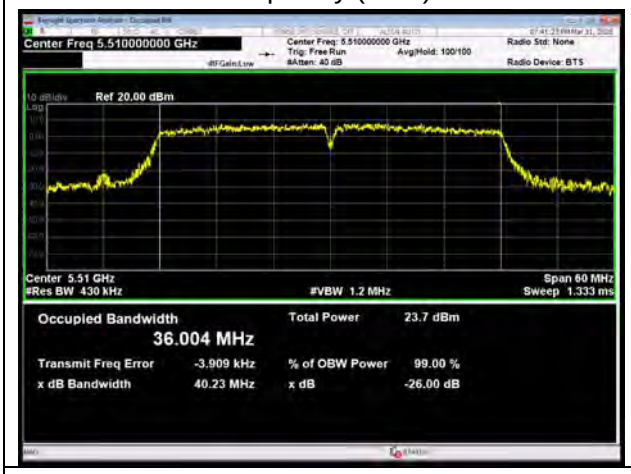
U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5710

U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz):5720





U-NII-2C, 802.11ac VHT40
Carrier frequency (MHz): 5510

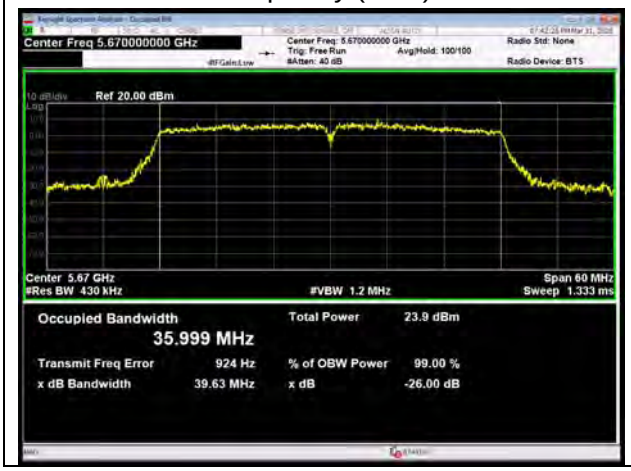


U-NII-2C, 802.11ac VHT80
Carrier frequency (MHz): 5610

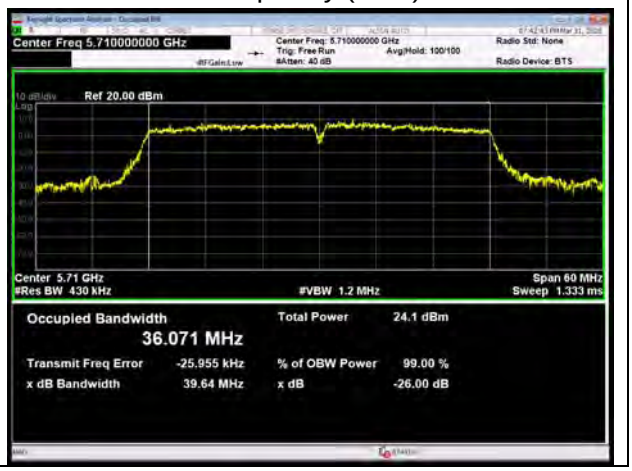
U-NII-2C, 802.11ac VHT40
Carrier frequency (MHz): 5590

U-NII-2C, 802.11ac VHT80
Carrier frequency (MHz): 5690

U-NII-2C, 802.11ac VHT40
Carrier frequency (MHz): 5670



U-NII-2C, 802.11ac VHT40
Carrier frequency (MHz): 5710



99% bandwidth

U-NII-3, 802.11a

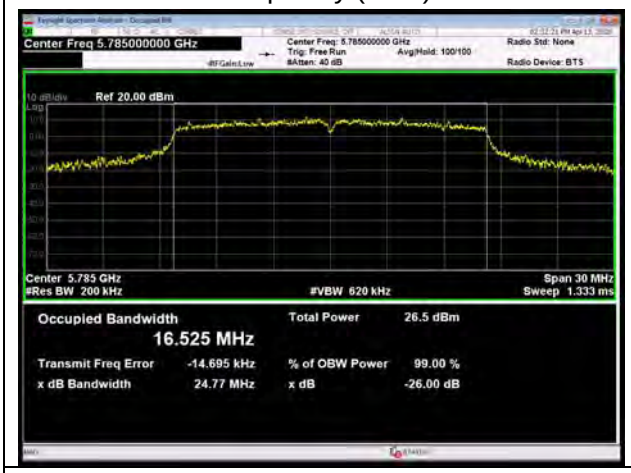
Carrier frequency (MHz): 5745

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5745

U-NII-3, 802.11a

Carrier frequency (MHz): 5785

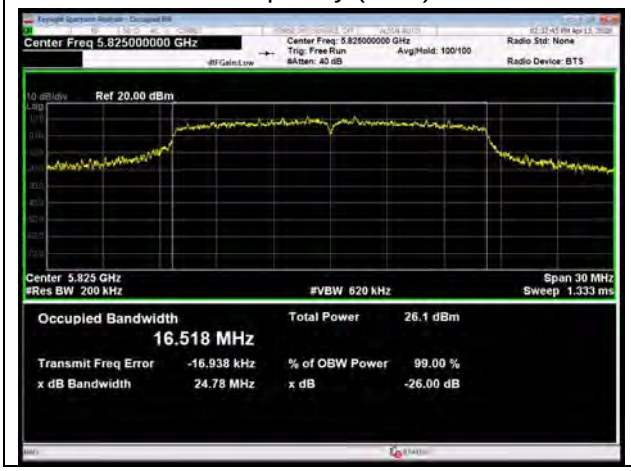


U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5785

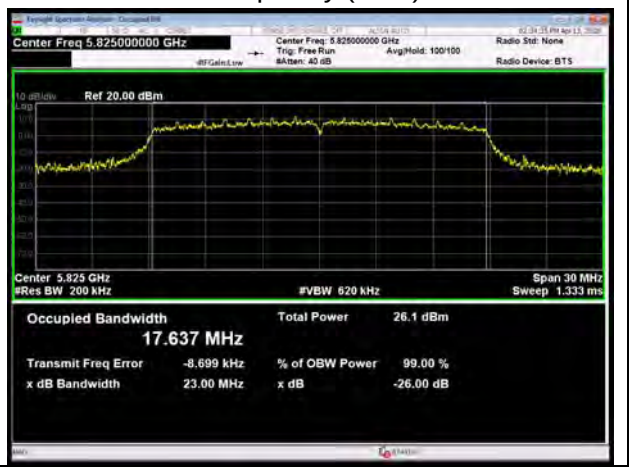
U-NII-3, 802.11a

Carrier frequency (MHz): 5825



U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825

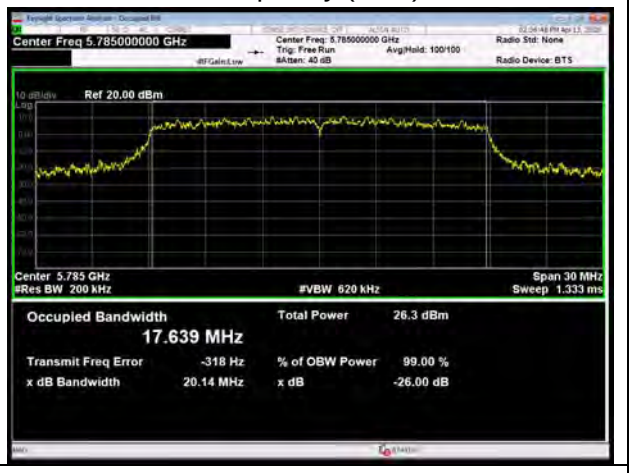


U-NII-3, 802.11n HT40
Carrier frequency (MHz): 5755

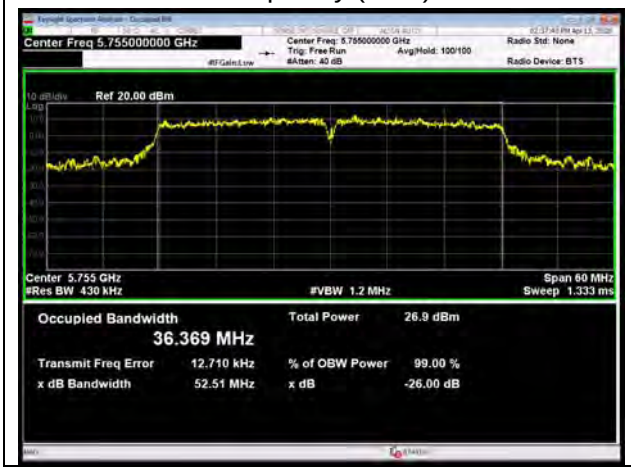
U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5745

U-NII-3, 802.11n HT40
Carrier frequency (MHz): 5795

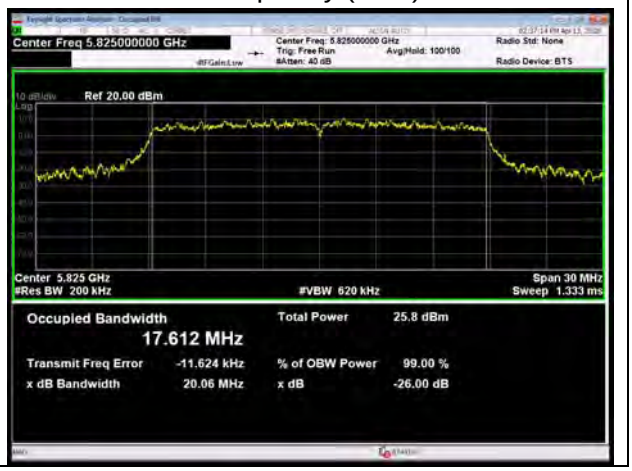
U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5785



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



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



U-NII-3, 802.11ac VHT40 Carrier frequency (MHz): 5795	U-NII-3, 802.11ac VHT80 Carrier frequency (MHz): 5775
	

Minimum 6 dB bandwidth

U-NII-3, 802.11a

Carrier frequency (MHz): 5745

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5745

U-NII-3, 802.11a

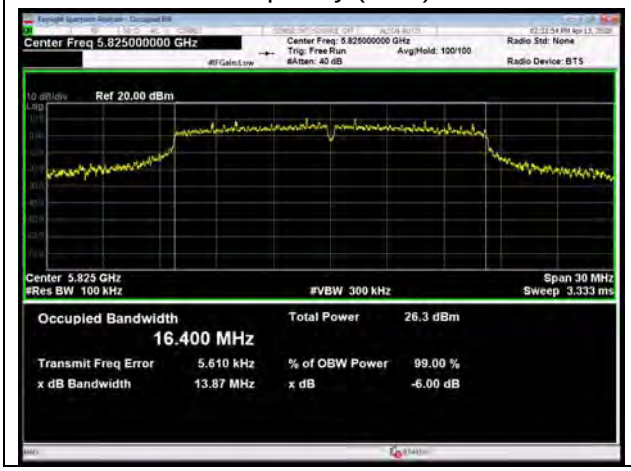
Carrier frequency (MHz): 5785

U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5785

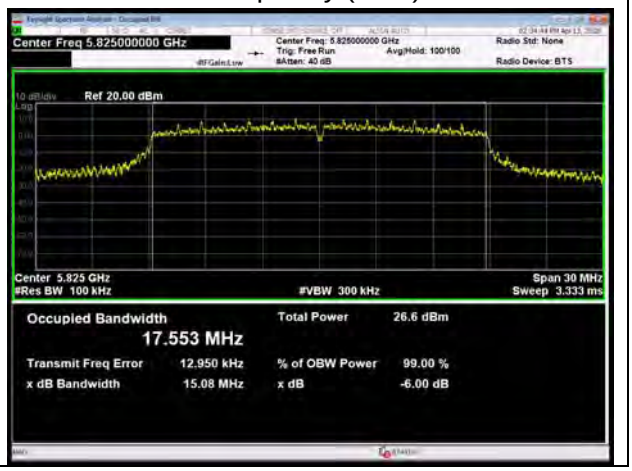
U-NII-3, 802.11a

Carrier frequency (MHz): 5825



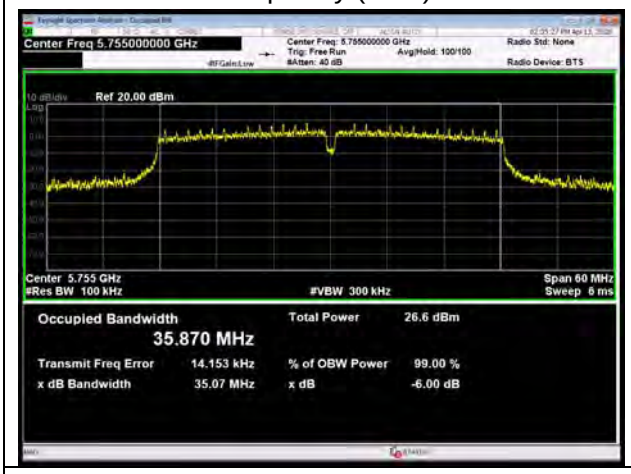
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825



U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5755



U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5745

U-NII-3, 802.11n HT40

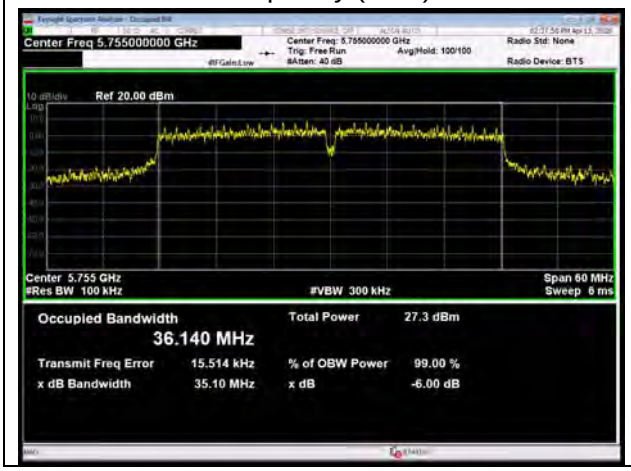
Carrier frequency (MHz): 5795

U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5785

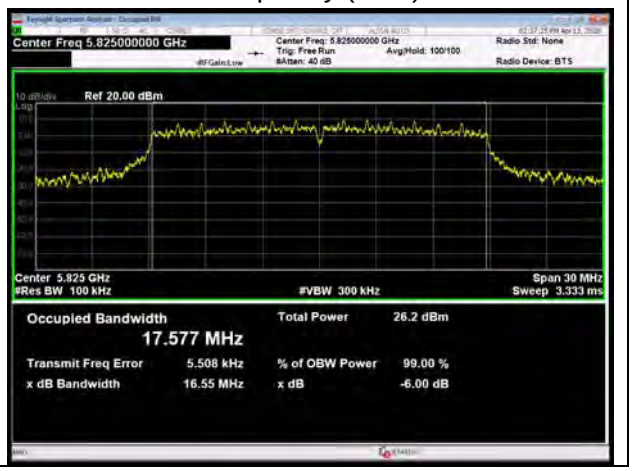
U-NII-3, 802.11ac VHT40

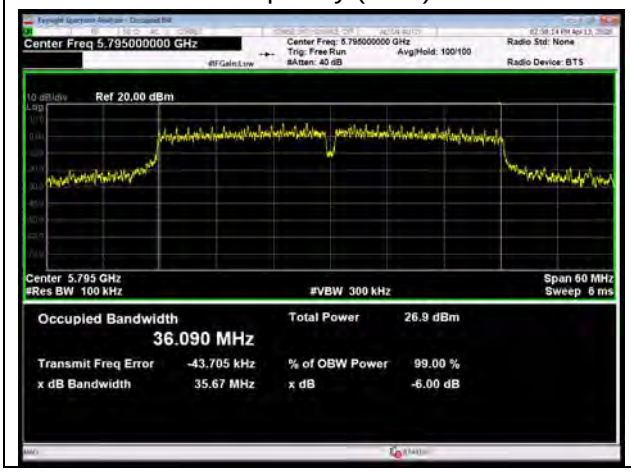
Carrier frequency (MHz): 5755



U-NII-3, 802.11ac VHT20

Carrier frequency (MHz): 5825



U-NII-3, 802.11ac VHT40 Carrier frequency (MHz): 5795	U-NII-3, 802.11ac VHT80 Carrier frequency (MHz): 5775
	

5.2. Average Power Output –Conducted

Ambient condition

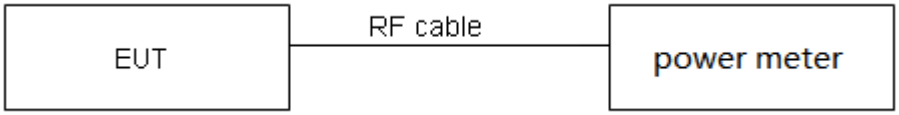
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

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

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

Test Setup



Limits

Rule FCC Part 15.407(a)(1)(2)(3)
(1) For the band 5.15-5.25 GHz.
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23

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

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

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

Measurement Uncertainty

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

Test Results

Band	T_{on} (ms)	$T_{(on+off)}$ (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11a	0.18	0.22	0.81	0.89
802.11n HT20	0.68	0.72	0.94	0.27
802.11n HT40	0.35	0.39	0.90	0.47
802.11ac VHT20	0.10	0.14	0.71	1.46
802.11ac VHT40	0.07	0.11	0.64	1.92
802.11ac VHT80	0.06	0.10	0.58	2.34
Note: when Duty cycle>0.98, Duty cycle correction Factor not required.				

Network Standards		Channel/Frequency (MHz)	B=26 dB bandwidth (MHz)	Limit 11 dBm + 10 log B (dBm)	Final Limit(dBm)
U-NII-2A	802.11a	52/5260	19.43	23.88 <24	23.88
		60/5300	19.41	23.88 <24	23.88
		64/5320	19.42	23.88 <24	23.88
	802.11n HT20	52/5260	19.83	23.97 <24	23.97
		60/5300	19.86	23.98 <24	23.98
		64/5320	20.00	24.01 >24	24.00
	802.11n HT40	54/5270	40.50	27.07 >24	24.00
		62/5310	40.55	27.08 >24	24.00
	802.11ac VHT20	52/5260	19.53	23.91 <24	23.91
		60/5300	19.56	23.91 <24	23.91
		64/5320	19.62	23.93 <24	23.93
	802.11ac VHT40	54/5270	40.25	27.05 >24	24.00
		62/5310	39.96	27.02 >24	24.00
	802.11ac VHT80	58/5290	81.17	30.09 >24	24.00
U-NII-2C	802.11a	100/5500	19.59	23.92<24	23.92
		120/5600	19.25	23.84 <24	23.84
		140/5700	19.23	23.84 <24	23.84
		144/5720	19.28	23.85 <24	23.85
	802.11n HT20	100/5500	20.01	24.01>24	24.00
		120/5600	19.99	24.01>24	24.00
		140/5700	19.89	23.99 <24	23.99
		144/5720	19.84	23.98 <24	23.98
	802.11n HT40	102/5510	40.29	27.05>24	24.00
		118/5590	40.53	27.08>24	24.00

		134/5670	40.23	27.05>24	24.00
		142/5710	40.29	27.05>24	24.00
	802.11ac VHT20	100/5500	19.99	24.01>24	24.00
		120/5600	20.04	24.02>24	24.00
		140/5700	19.95	24.00>24	24.00
		144/5720	20.05	24.02>24	24.00
	802.11ac VHT40	102/5510	40.23	27.05>24	24.00
		118/5590	39.87	27.01>24	24.00
		134/5670	39.63	26.98>24	24.00
		142/5710	39.64	26.98>24	24.00
	802.11ac VHT80	122/5610	80.87	30.08>24	24.00
		138/5690	80.81	30.07>24	24.00
Note: 250mW=24dBm					

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

MIMO without beamforming

U-NII-1

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11a	36/5180	22.94	23.83	22.64	23.53	26.69	30.00	PASS
	44/5220	22.87	23.76	22.33	23.22	26.51	30.00	PASS
	48/5240	23.21	24.10	22.87	23.76	26.94	30.00	PASS
802.11n HT20	36/5180	19.66	19.93	19.18	19.45	22.71	30.00	PASS
	44/5220	20.22	20.49	19.83	20.10	23.31	30.00	PASS
	48/5240	21.37	21.64	20.88	21.15	24.42	30.00	PASS
802.11n HT40	38/5190	17.28	17.75	16.69	17.16	20.48	30.00	PASS
	46/5230	21.11	21.58	20.67	21.14	24.38	30.00	PASS
802.11ac VHT20	36/5180	19.44	20.90	18.95	20.41	23.67	30.00	PASS
	44/5220	19.04	20.50	18.58	20.04	23.29	30.00	PASS
	48/5240	20.23	21.69	19.84	21.30	24.51	30.00	PASS
802.11ac VHT40	38/5190	15.44	17.36	14.89	16.81	20.10	30.00	PASS
	46/5230	19.57	21.49	19.02	20.94	24.23	30.00	PASS
802.11ac VHT80	42/5210	14.15	16.49	13.64	15.98	19.25	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}=2. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

So directional gain = GANT + Array Gain =5+0=5 dBi<6dBi. So the power limt is 30dBm.

U-NII-2A

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11a	52/5260	17.12	18.01	16.76	17.65	20.84	23.88	PASS
	60/5300	16.98	17.87	16.65	17.54	20.72	23.88	PASS
	64/5320	17.02	17.91	16.53	17.42	20.68	23.88	PASS
802.11n HT20	52/5260	16.89	17.16	16.58	16.85	20.02	23.97	PASS
	60/5300	17.11	17.38	16.72	16.99	20.20	23.98	PASS
	64/5320	17.23	17.50	16.47	16.74	20.15	24.00	PASS
802.11n HT40	54/5270	20.33	20.80	19.75	20.22	23.53	24.00	PASS
	62/5310	16.26	16.73	15.58	16.05	19.42	24.00	PASS
802.11ac VHT20	52/5260	16.84	18.30	16.56	18.02	21.17	23.91	PASS
	60/5300	16.92	18.38	16.67	18.13	21.27	23.91	PASS
	64/5320	16.95	18.41	16.48	17.94	21.19	23.93	PASS
802.11ac VHT40	54/5270	18.89	20.81	18.36	20.28	23.56	24.00	PASS
	62/5310	15.11	17.03	14.87	16.79	19.92	24.00	PASS
802.11ac VHT80	58/5290	13.54	15.88	13.17	15.51	18.71	24.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

The Total Power $=10\log(10^{(\text{Power antenna1 in dBm}/10)}+10^{(\text{Power antenna2 in dBm}/10)})$.

2. The manufacturer declared the transmitter output signals is CDD mode And $N_{ss}=2$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi.

U-NII-2C

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11a	100/5500	17.54	18.43	17.11	18.00	21.23	23.92	PASS
	120/5600	18.02	18.91	17.44	18.33	21.64	23.84	PASS
	140/5700	17.74	18.63	17.27	18.16	21.41	23.84	PASS
	144/5720	17.83	18.72	17.37	18.26	21.51	23.85	PASS
802.11n HT20	100/5500	17.49	17.76	16.84	17.11	20.46	24.00	PASS
	120/5600	17.96	18.23	17.38	17.65	20.96	24.00	PASS
	140/5700	17.73	18.00	17.19	17.46	20.75	23.99	PASS
	144/5720	17.64	17.91	17.22	17.49	20.72	23.98	PASS
802.11n HT40	102/5510	16.26	16.73	15.67	16.14	19.46	24.00	PASS
	118/5590	20.73	21.20	20.03	20.50	23.88	24.00	PASS
	134/5670	19.25	19.72	18.89	19.36	22.56	24.00	PASS
	142/5710	20.54	21.01	19.94	20.41	23.73	24.00	PASS
802.11ac VHT20	100/5500	17.53	18.99	16.88	18.34	21.69	24.00	PASS
	120/5600	17.74	19.20	17.12	18.58	21.91	24.00	PASS
	140/5700	17.73	19.19	17.26	18.72	21.97	24.00	PASS
	144/5720	17.63	19.09	17.28	18.74	21.93	24.00	PASS
802.11ac VHT40	102/5510	17.22	19.14	16.49	18.41	21.80	24.00	PASS
	118/5590	18.62	20.54	18.33	20.25	23.41	24.00	PASS
	134/5670	17.11	19.03	16.76	18.68	21.87	24.00	PASS
	142/5710	19.03	20.95	18.76	20.68	23.83	24.00	PASS
802.11ac VHT80	122/5610	18.45	20.79	17.78	20.12	23.48	24.00	PASS
	138/5690	18.58	20.92	18.02	20.36	23.66	24.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

The Total Power $=10\log(10^{(\text{Power antenna1 in dBm}/10)}+10^{(\text{Power antenna2 in dBm}/10)})$.

2. The manufacturer declared the transmitter output signals is CDD mode And $N_{ss}=2$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi.

U-NII-3

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11a	149/5745	25.22	26.11	26.11	27.00	29.59	30.00	PASS
	157/5785	24.56	25.45	25.88	26.77	29.17	30.00	PASS
	165/5825	24.75	25.64	25.92	26.81	29.27	30.00	PASS
802.11n HT20	149/5745	25.46	25.73	26.66	26.93	29.39	30.00	PASS
	157/5785	25.27	25.54	26.58	26.85	29.26	30.00	PASS
	165/5825	25.34	25.61	26.44	26.71	29.21	30.00	PASS
802.11n HT40	151/5755	23.68	24.15	24.62	25.09	27.66	30.00	PASS
	159/5795	24.72	25.19	26.11	26.58	28.95	30.00	PASS
802.11ac VHT20	149/5745	24.65	26.11	26.03	27.49	29.87	30.00	PASS
	157/5785	24.57	26.03	25.89	27.35	29.75	30.00	PASS
	165/5825	24.43	25.89	25.93	27.39	29.72	30.00	PASS
802.11ac VHT40	151/5755	22.23	24.15	23.36	25.28	27.76	30.00	PASS
	159/5795	22.86	24.78	23.89	25.81	28.33	30.00	PASS
802.11ac VHT80	155/5775	17.95	20.29	18.76	21.10	23.72	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 $N_{ss}=2$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

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

MIMO with beamforming

U-NII-1

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	36/5180	19.63	19.90	19.14	19.41	22.68	30.00	PASS
	44/5220	20.21	20.48	19.76	20.03	23.27	30.00	PASS
	48/5240	21.26	21.53	20.79	21.06	24.32	30.00	PASS
802.11n HT40	38/5190	17.24	17.71	16.64	17.11	20.43	30.00	PASS
	46/5230	21.05	21.52	20.64	21.11	24.33	30.00	PASS
802.11ac VHT20	36/5180	19.43	20.89	18.92	20.38	23.65	30.00	PASS
	44/5220	19.02	20.48	18.54	20.00	23.26	30.00	PASS
	48/5240	20.16	21.62	19.79	21.25	24.45	30.00	PASS
802.11ac VHT40	38/5190	15.36	17.28	14.87	16.79	20.05	30.00	PASS
	46/5230	19.54	21.46	19.01	20.93	24.21	30.00	PASS
802.11ac VHT80	42/5210	14.07	16.41	13.58	15.92	19.18	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 $N_{ss}=2$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

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

U-NII-2A

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	52/5260	16.87	17.14	16.54	16.81	19.99	23.97	PASS
	60/5300	17.10	17.37	16.71	16.98	20.19	23.98	PASS
	64/5320	17.21	17.48	16.43	16.70	20.12	24.00	PASS
802.11n HT40	54/5270	20.32	20.79	19.73	20.20	23.52	24.00	PASS
	62/5310	16.21	16.68	15.44	15.91	19.32	24.00	PASS
802.11ac VHT20	52/5260	16.81	18.27	16.52	17.98	21.14	23.91	PASS
	60/5300	16.91	18.37	16.64	18.10	21.25	23.91	PASS
	64/5320	16.92	18.38	16.44	17.90	21.16	23.93	PASS
802.11ac VHT40	54/5270	18.83	20.75	18.32	20.24	23.51	24.00	PASS
	62/5310	15.03	16.95	14.84	16.76	19.87	24.00	PASS
802.11ac VHT80	58/5290	13.47	15.81	13.11	15.45	18.64	24.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

The Total Power $=10\log(10^{(\text{Power antenna1 in dBm}/10)}+10^{(\text{Power antenna2 in dBm}/10)})$.

2. The manufacturer declared the transmitter output signals is CDD mode And $N_{ss}=2$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi.

U-NII-2C

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	100/5500	17.45	17.72	16.82	17.09	20.43	24.00	PASS
	120/5600	17.94	18.21	17.35	17.62	20.94	24.00	PASS
	140/5700	17.71	17.98	17.13	17.40	20.71	23.99	PASS
	144/5720	17.62	17.89	17.21	17.48	20.70	23.98	PASS
802.11n HT40	102/5510	16.21	16.68	15.58	16.05	19.39	24.00	PASS
	118/5590	20.72	21.19	20.02	20.49	23.87	24.00	PASS
	134/5670	19.21	19.68	18.74	19.21	22.46	24.00	PASS
	142/5710	20.52	20.99	19.92	20.39	23.71	24.00	PASS
802.11ac VHT20	100/5500	17.48	18.94	16.83	18.29	21.64	24.00	PASS
	120/5600	17.67	19.13	17.11	18.57	21.87	24.00	PASS
	140/5700	17.72	19.18	17.25	18.71	21.96	24.00	PASS
	144/5720	17.55	19.01	17.22	18.68	21.86	24.00	PASS
802.11ac VHT40	102/5510	17.05	18.97	16.43	18.35	21.68	24.00	PASS
	118/5590	18.57	20.49	18.32	20.24	23.38	24.00	PASS
	134/5670	17.03	18.95	16.71	18.63	21.80	24.00	PASS
	142/5710	19.01	20.93	18.72	20.64	23.80	24.00	PASS
802.11ac VHT80	122/5610	18.42	20.76	17.71	20.05	23.43	24.00	PASS
	138/5690	18.53	20.87	18.00	20.34	23.62	24.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

The Total Power $=10\log(10^{(\text{Power antenna1 in dBm/10})}+10^{(\text{Power antenna2 in dBm/10})})$.

2. The manufacturer declared the transmitter output signals is CDD mode And $N_{SS}=2$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi.

U-NII-3

Network Standards	Channel/ Frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11n HT20	149/5745	25.45	25.72	26.64	26.91	29.37	30.00	PASS
	157/5785	25.25	25.52	26.52	26.79	29.22	30.00	PASS
	165/5825	25.32	25.59	26.44	26.71	29.20	30.00	PASS
802.11n HT40	151/5755	23.61	24.08	24.57	25.04	27.60	30.00	PASS
	159/5795	24.72	25.19	26.04	26.51	28.91	30.00	PASS
802.11ac VHT20	149/5745	24.64	26.10	26.02	27.48	29.86	30.00	PASS
	157/5785	24.52	25.98	25.84	27.30	29.70	30.00	PASS
	165/5825	24.36	25.82	25.91	27.37	29.68	30.00	PASS
802.11ac VHT40	151/5755	22.15	24.07	23.34	25.26	27.71	30.00	PASS
	159/5795	22.68	24.60	23.84	25.76	28.23	30.00	PASS
802.11ac VHT80	155/5775	17.84	20.18	18.72	21.06	23.65	30.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

The Total Power $=10\log(10^{(\text{Power antenna1 in dBm}/10)}+10^{(\text{Power antenna2 in dBm}/10)}+10^{(\text{Power antenna3 in dBm}/10)})$.

2. The manufacturer declared the transmitter output signals is CDD mode And $N_{ss}=2$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain,

For power measurements on IEEE 802.11 devices,

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

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

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

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

5.3. Frequency Stability

Ambient condition

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

Method of Measurement

1. Frequency stability with respect to ambient temperature

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

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

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

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

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

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

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

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

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

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

2. Frequency stability when varying supply voltage

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

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

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

Limit

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

Measurement Uncertainty

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

Test Results

Voltage (V)	Temperature (°C)	U-NII-1 Test Results			
		5200MHz			
		1min	2min	5min	10min
12	-5	5200.009013	5200.001820	5200.001666	5200.001606
12	0	5200.007837	5199.995644	5200.000504	5200.000337
12	5	5200.000345	5199.988375	5199.990568	5199.995258
12	10	5199.992301	5199.985679	5199.983491	5199.992149
12	20	5199.982807	5199.976682	5199.980979	5199.991893
12	30	5199.974493	5199.969442	5199.979401	5199.985731
12	40	5199.971941	5199.961777	5199.969897	5199.985452
12	45	5199.970790	5199.953642	5199.967036	5199.984532
11.4	20	5199.965139	5199.944791	5199.965790	5199.983607
12.6	20	5199.963077	5199.944290	5199.959928	5199.975037
MHz		-0.036923	-0.055710	-0.040072	-0.024963
PPM		-7.100543	-10.713427	-7.706181	-4.800496

Voltage (V)	Temperature (°C)	U-NII-2A Test Results			
		5300MHz			
		1min	2min	5min	10min
12	-5	5300.009807	5300.008190	5300.000261	5299.997025
12	0	5300.002622	5300.004415	5299.998782	5299.989952
12	5	5299.998191	5300.003271	5299.991229	5299.981834
12	10	5299.994433	5299.998919	5299.988497	5299.979670
12	20	5299.992075	5299.989730	5299.985625	5299.970907
12	30	5299.990394	5299.979999	5299.980752	5299.965128
12	40	5299.983174	5299.973649	5299.974323	5299.964548
12	45	5299.980237	5299.964433	5299.965899	5299.958071
11.4	20	5299.977963	5299.957047	5299.959298	5299.956867
12.6	20	5299.975120	5299.949418	5299.953289	5299.952574
MHz		-0.024880	-0.050582	-0.046711	-0.047426
PPM		-4.694331	-9.543764	-8.813351	-8.948211

Voltage (V)	Temperature (°C)	U-NII-2C Test Results			
		5580MHz			
		1min	2min	5min	10min
12	-5	5579.999221	5579.997355	5579.988828	5579.980757
12	0	5579.998389	5579.989203	5579.984688	5579.972698
12	5	5579.995350	5579.987877	5579.977182	5579.963460
12	10	5579.995207	5579.987594	5579.970371	5579.957697
12	20	5579.991662	5579.979128	5579.964613	5579.949889
12	30	5579.989262	5579.975685	5579.961823	5579.946487
12	40	5579.987528	5579.969409	5579.952509	5579.945629
12	45	5579.985626	5579.960039	5579.948071	5579.940622
11.4	20	5579.976962	5579.950797	5579.943737	5579.931659
12.6	20	5579.973123	5579.945212	5579.943006	5579.922099
MHz		-0.026877	-0.054788	-0.056994	-0.077901
PPM		-4.816623	-9.818727	-10.213940	-13.960716

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
12	-5	5784.995439	5784.995339	5784.986619	5784.984528
12	0	5784.994070	5784.992719	5784.978380	5784.983856
12	5	5784.989034	5784.983022	5784.972022	5784.982107
12	10	5784.981683	5784.978568	5784.963029	5784.979449
12	20	5784.972906	5784.977936	5784.961156	5784.978076
12	30	5784.967839	5784.974865	5784.953806	5784.968194
12	40	5784.965633	5784.966701	5784.944773	5784.960743
12	45	5784.959185	5784.957799	5784.942648	5784.957568
11.4	20	5784.950374	5784.952588	5784.934047	5784.947788
12.6	20	5784.944683	5784.947353	5784.933341	5784.947509
MHz		-0.055317	-0.052647	-0.066659	-0.052491
PPM		-9.562194	-9.100599	-11.522748	-9.073601

5.4. Power Spectral Density

Ambient condition

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

Method of Measurement

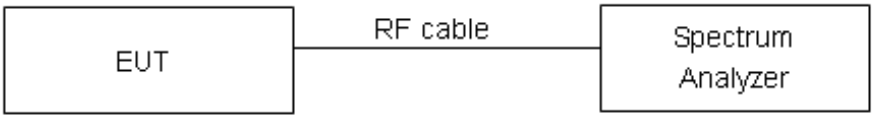
The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable.

Set RBW = 500 kHz, VBW =1.5MHz for the band 5.725-5.85 GHz

Set RBW = 1 MHz, VBW =3MHz for the band 5.150-5.250 GHz

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 the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmittingantennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Frequency Bands/MHz	Limits
5150-5250	17dBm/MHz
5.25-5.35 GHz and 5.47-5.725 GHz	11dBm/MHz
5725-5850	30dBm/500kHz

Measurement Uncertainty

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

Test Results:

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

MIMO without Beamforming

U-NII-1

Network Standards	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm /MHz)		
		Read Value (dBm/MHz)	PSD (dBm /MHz)	Read Value (dBm/MHz)	PSD (dBm /MHz)			
802.11a	36/5180	13.36	14.25	12.55	13.44	16.87	17.00	PASS
	40/5200	13.39	14.28	12.60	13.49	16.91	17.00	PASS
	48/5240	13.50	14.39	12.56	13.45	16.96	17.00	PASS
802.11n HT20	36/5180	9.68	9.95	8.98	9.25	12.63	17.00	PASS
	40/5200	10.28	10.55	10.21	10.48	13.53	17.00	PASS
	48/5240	11.61	11.88	10.98	11.25	14.59	17.00	PASS
802.11n HT40	38/5190	4.39	4.87	3.54	4.02	7.47	17.00	PASS
	46/5230	8.70	9.17	8.34	8.81	12.01	17.00	PASS
802.11ac VHT20	36/5180	9.41	10.87	9.00	10.46	13.68	17.00	PASS
	40/5200	8.87	10.33	8.57	10.03	13.20	17.00	PASS
	48/5240	9.19	10.65	9.75	11.21	13.95	17.00	PASS
802.11ac VHT40	38/5190	1.00	2.91	2.31	4.23	6.63	17.00	PASS
	46/5230	6.26	8.17	6.71	8.63	11.42	17.00	PASS
802.11ac VHT80	42/5210	-2.99	-0.65	-2.38	-0.03	2.68	17.00	PASS

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

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

3. The manufacturer declared the transmitter output signals is CDD mode And Nss=2. 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《》6 dBi. So the PSD limt is 17dBm.

U-NII-2A

Network Standards	Channel /Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total PSD (dBm/MHz)		
		Read Value (dBm/ MHz)	PSD (dBm/ MHz)	Read Value (dBm/ MHz)	PSD (dBm/ MHz)			
802.11a	52/5260	6.98	7.87	6.71	7.60	10.75	11.00	PASS
	60/5300	7.26	8.15	6.83	7.72	10.95	11.00	PASS
	64/5320	7.25	8.14	6.84	7.73	10.95	11.00	PASS
802.11n HT20	52/5260	7.10	7.37	6.53	6.81	10.11	11.00	PASS
	60/5300	6.70	6.97	6.81	7.08	10.04	11.00	PASS
	64/5320	6.88	7.16	6.96	7.24	10.21	11.00	PASS
802.11n HT40	54/5270	7.07	7.55	6.77	7.25	10.41	11.00	PASS
	62/5310	3.15	3.62	3.05	3.52	6.58	11.00	PASS
802.11ac VHT20	52/5260	7.07	8.53	5.36	6.82	10.77	11.00	PASS
	60/5300	6.88	8.34	6.05	7.51	10.96	11.00	PASS
	64/5320	6.87	8.33	5.81	7.27	10.85	11.00	PASS
802.11ac VHT40	54/5270	6.56	8.48	5.43	7.35	10.96	11.00	PASS
	62/5310	2.17	4.09	2.05	3.97	7.04	11.00	PASS
802.11ac VHT80	58/5290	-2.76	-0.41	-2.48	-0.14	2.73	11.00	PASS

Note: 1. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})})$

2. The manufacturer declared the transmitter output signals is CDD mode and N_{ss}=2. 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 spectral density (PSD) measurements on all devices, Array Gain = $10\log(N_{ANT}/N_{SS})$ dB=0.So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi. So the power limt is 11dBm

U-NII-2C

Network Standards	Channel /Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total PSD (dBm/MHz)		
		Read Value (dBm/ MHz)	PSD (dBm/ MHz)	Read Value (dBm/ MHz)	PSD (dBm/ MHz)			
802.11a	100/5500	7.08	7.97	6.50	7.39	10.70	11.00	PASS
	120/5600	7.48	8.37	6.52	7.41	10.92	11.00	PASS
	140/5700	7.45	8.34	6.30	7.19	10.81	11.00	PASS
	144/5720	7.30	8.18	6.67	7.55	10.89	11.00	PASS
802.11n HT20	100/5500	7.76	8.03	7.07	7.34	10.71	11.00	PASS
	120/5600	7.98	8.26	6.82	7.10	10.73	11.00	PASS
	140/5700	7.43	7.70	7.35	7.62	10.67	11.00	PASS
	144/5720	7.44	7.72	6.77	7.04	10.40	11.00	PASS
802.11n HT40	102/5510	2.75	3.22	3.27	3.74	6.50	11.00	PASS
	118/5590	7.93	8.40	6.87	7.34	10.91	11.00	PASS
	134/5670	6.15	6.63	6.10	6.57	9.61	11.00	PASS
	142/5710	7.53	8.00	6.52	6.99	10.53	11.00	PASS
802.11ac HT20	100/5500	5.79	7.25	5.33	6.79	10.03	11.00	PASS
	120/5600	6.77	8.23	6.04	7.50	10.89	11.00	PASS
	140/5700	6.19	7.65	5.65	7.11	10.40	11.00	PASS
	144/5720	6.31	7.77	5.37	6.83	10.34	11.00	PASS
802.11ac HT40	102/5510	1.01	2.93	1.06	2.97	5.96	11.00	PASS
	118/5590	6.71	8.63	5.19	7.11	10.95	11.00	PASS
	134/5670	4.54	6.46	4.79	6.71	9.60	11.00	PASS
	142/5710	6.32	8.24	5.32	7.24	10.78	11.00	PASS
802.11ac VHT80	122/5610	3.93	6.27	3.02	5.36	8.85	11.00	PASS
	138/5690	3.68	6.02	2.54	4.88	8.50	11.00	PASS

Note: 1. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})})$

2. The manufacturer declared the transmitter output signals is CDD mode and N_{ss}=2. 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 spectral density (PSD) measurements on all devices, Array Gain = $10\log(N_{ANT}/N_{SS})$ dB=0.

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi. So the power limt is 11dBm

U-NII-3

Network Standards	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm /MHz)		
		Read Value (dBm/MHz)	PSD (dBm /MHz)	Read Value (dBm/MHz)	PSD (dBm /MHz)			
802.11a	149/5745	8.89	9.78	10.74	11.63	13.81	30.00	PASS
	157/5785	8.86	9.75	9.81	10.70	13.26	30.00	PASS
	165/5825	9.33	10.22	10.01	10.90	13.59	30.00	PASS
802.11n HT20	149/5745	11.19	11.47	12.17	12.44	14.99	30.00	PASS
	157/5785	10.69	10.96	11.64	11.91	14.48	30.00	PASS
	165/5825	10.78	11.05	12.05	12.32	14.74	30.00	PASS
802.11n HT40	151/5755	6.41	6.88	7.56	8.03	10.50	30.00	PASS
	159/5795	7.42	7.89	8.73	9.21	11.61	30.00	PASS
802.11ac VHT20	149/5745	10.92	12.38	12.69	14.15	16.37	30.00	PASS
	157/5785	10.72	12.18	11.69	13.15	15.70	30.00	PASS
	165/5825	10.76	12.22	12.20	13.66	16.01	30.00	PASS
802.11ac VHT40	151/5755	5.79	7.71	6.37	8.28	11.02	30.00	PASS
	159/5795	5.49	7.41	7.20	9.11	11.35	30.00	PASS
802.11ac VHT80	155/5775	-2.25	0.09	-0.75	1.59	3.92	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 Nss=2. 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<6 dBi. So the PSD limt is 30dBm.

MIMO with Beamforming

U-NII-1

Network Standards	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm /MHz)		
		Read Value (dBm/MHz)	PSD (dBm /MHz)	Read Value (dBm/MHz)	PSD (dBm /MHz)			
802.11n HT20	36/5180	9.55	9.82	9.27	9.54	12.69	17.00	PASS
	40/5200	10.51	10.78	9.99	10.26	13.54	17.00	PASS
	48/5240	11.61	11.89	11.21	11.48	14.70	17.00	PASS
802.11n HT40	38/5190	3.90	4.37	4.02	4.49	7.44	17.00	PASS
	46/5230	7.98	8.45	8.13	8.60	11.54	17.00	PASS
802.11ac VHT20	36/5180	9.59	11.05	9.10	10.57	13.82	17.00	PASS
	40/5200	9.52	10.98	8.48	9.94	13.50	17.00	PASS
	48/5240	10.44	11.90	9.87	11.33	14.64	17.00	PASS
802.11ac VHT40	38/5190	2.39	4.30	1.89	3.81	7.07	17.00	PASS
	46/5230	7.25	9.17	6.87	8.79	11.99	17.00	PASS
802.11ac VHT80	42/5210	-2.23	0.11	-1.86	0.49	3.31	17.00	PASS

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

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

3. The manufacturer declared the transmitter output signals is CDD mode And Nss=2. 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《》6 dBi. So the PSD limt is 17dBm.

U-NII-2A

Network Standards	Channel /Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total PSD (dBm/MHz)		
		Read Value (dBm/ MHz)	PSD (dBm/ MHz)	Read Value (dBm/ MHz)	PSD (dBm/ MHz)			
802.11n HT20	52/5260	7.11	7.38	6.62	6.90	10.16	11.00	PASS
	60/5300	7.24	7.51	6.19	6.46	10.03	11.00	PASS
	64/5320	7.06	7.33	6.75	7.02	10.19	11.00	PASS
802.11n HT40	54/5270	7.27	7.74	6.51	6.99	10.39	11.00	PASS
	62/5310	3.24	3.71	2.74	3.21	6.48	11.00	PASS
802.11ac VHT20	52/5260	6.68	8.14	6.24	7.70	10.94	11.00	PASS
	60/5300	7.09	8.55	5.47	6.93	10.82	11.00	PASS
	64/5320	6.80	8.26	6.12	7.59	10.95	11.00	PASS
802.11ac VHT40	54/5270	6.00	7.92	5.96	7.88	10.91	11.00	PASS
	62/5310	2.58	4.50	2.39	4.30	7.41	11.00	PASS
802.11ac VHT80	58/5290	-1.99	0.35	-2.70	-0.36	3.02	11.00	PASS

Note: 1. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})})$

2. The manufacturer declared the transmitter output signals is CDD mode and N_{ss}=2. 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 spectral density (PSD) measurements on all devices, Array Gain = $10\log(N_{ANT}/N_{SS})$ dB=0.So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi. So the power limt is 11dBm

U-NII-2C

Network Standards	Channel /Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total PSD (dBm/MHz)		
		Read Value (dBm/ MHz)	PSD (dBm/ MHz)	Read Value (dBm/ MHz)	PSD (dBm/ MHz)			
802.11n HT20	100/5500	7.03	7.30	6.61	6.88	10.11	11.00	PASS
	120/5600	7.33	7.60	7.47	7.75	10.68	11.00	PASS
	140/5700	7.63	7.90	7.31	7.58	10.75	11.00	PASS
	144/5720	7.72	8.00	6.91	7.18	10.62	11.00	PASS
802.11n HT40	102/5510	3.39	3.87	3.24	3.71	6.80	11.00	PASS
	118/5590	7.59	8.06	7.38	7.85	10.97	11.00	PASS
	134/5670	6.16	6.63	6.57	7.04	9.85	11.00	PASS
	142/5710	7.54	8.01	7.20	7.67	10.85	11.00	PASS
802.11ac HT20	100/5500	6.01	7.47	5.11	6.57	10.05	11.00	PASS
	120/5600	6.30	7.76	5.81	7.27	10.53	11.00	PASS
	140/5700	6.16	7.62	5.62	7.09	10.37	11.00	PASS
	144/5720	6.01	7.47	5.91	7.38	10.43	11.00	PASS
802.11ac HT40	102/5510	1.04	2.95	0.80	2.72	5.85	11.00	PASS
	118/5590	6.53	8.44	5.14	7.06	10.82	11.00	PASS
	134/5670	4.44	6.36	4.25	6.16	9.27	11.00	PASS
	142/5710	6.26	8.18	5.05	6.97	10.63	11.00	PASS
802.11ac VHT80	122/5610	3.43	5.77	3.21	5.55	8.67	11.00	PASS
	138/5690	3.13	5.47	2.77	5.11	8.30	11.00	PASS

Note: 1. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})})$

2. The manufacturer declared the transmitter output signals is CDD mode and N_{ss}=2. 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 spectral density (PSD) measurements on all devices, Array Gain = $10\log(N_{ANT}/N_{SS})$ dB=0.

So directional gain = G_{ANT} + Array Gain =5+0=5 dBi<6dBi. So the power limt is 11dBm

U-NII-3

Network Standards	Channel/ Frequency (MHz)	Power Spectral Density					Limit (dBm /MHz)	Conclusion
		Antenna 1		Antenna 2		Total Power (dBm /MHz)		
		Read Value (dBm/MHz)	PSD (dBm /MHz)	Read Value (dBm/MHz)	PSD (dBm /MHz)			
802.11n HT20	149/5745	6.64	6.92	6.74	7.01	9.97	30.00	PASS
	157/5785	11.61	11.88	12.19	12.46	15.19	30.00	PASS
	165/5825	11.27	11.54	11.32	11.60	14.58	30.00	PASS
802.11n HT40	151/5755	8.24	8.71	7.95	8.42	11.58	30.00	PASS
	159/5795	7.37	7.84	7.55	8.03	10.94	30.00	PASS
802.11ac VHT20	149/5745	10.41	11.87	9.91	11.37	14.64	30.00	PASS
	157/5785	10.10	11.56	10.06	11.52	14.55	30.00	PASS
	165/5825	9.32	10.78	9.58	11.04	13.92	30.00	PASS
802.11ac VHT40	151/5755	8.15	10.07	7.52	9.44	12.78	30.00	PASS
	159/5795	6.85	8.77	6.94	8.86	11.82	30.00	PASS
802.11ac VHT80	155/5775	1.95	4.29	2.04	4.38	7.35	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 Nss=2. 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<6 dBi. So the PSD limt is 30 dBm.

MIMO without Beamforming

MIMO Antenna 1

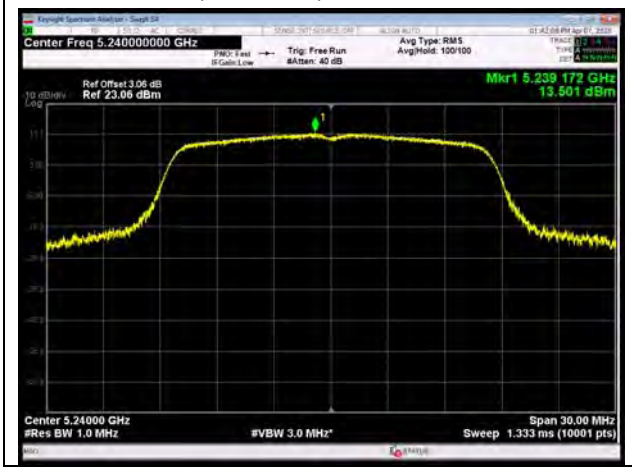
U-NII-1, 802.11a, Channel No.: 36

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

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

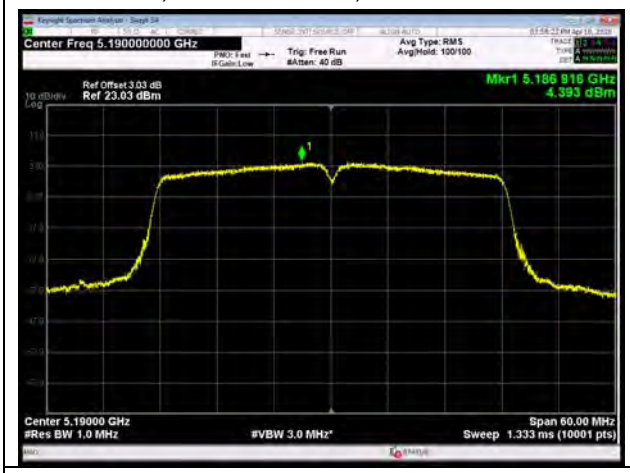
U-NII-1, 802.11n HT20, Channel No.: 40

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



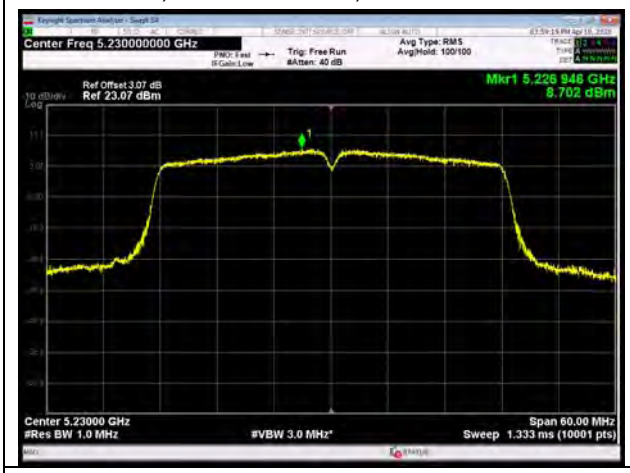
U-NII-1, 802.11n HT20, Channel No.: 48

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

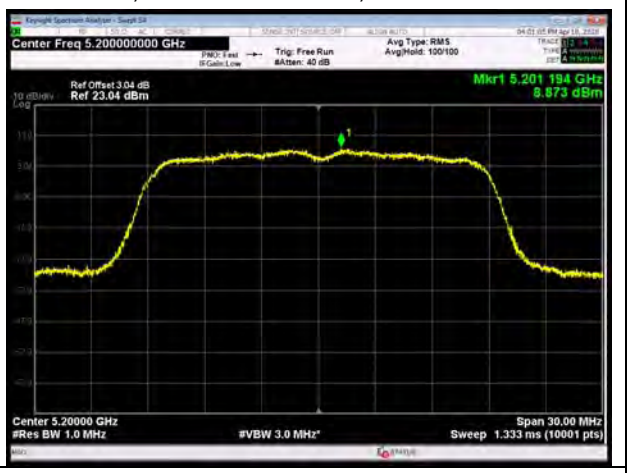


U-NII-1, 802.11ac VHT20, Channel No.: 36

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

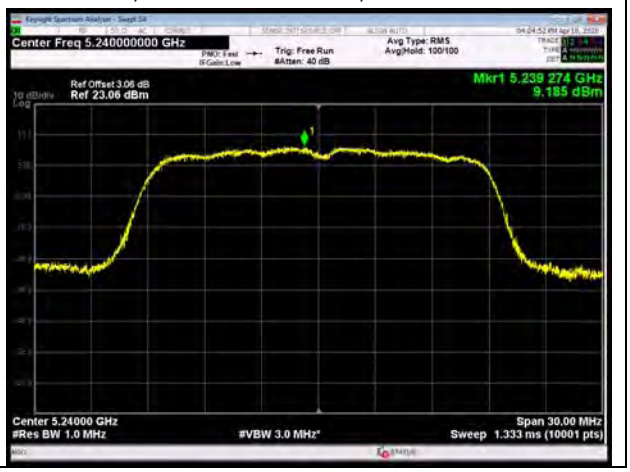


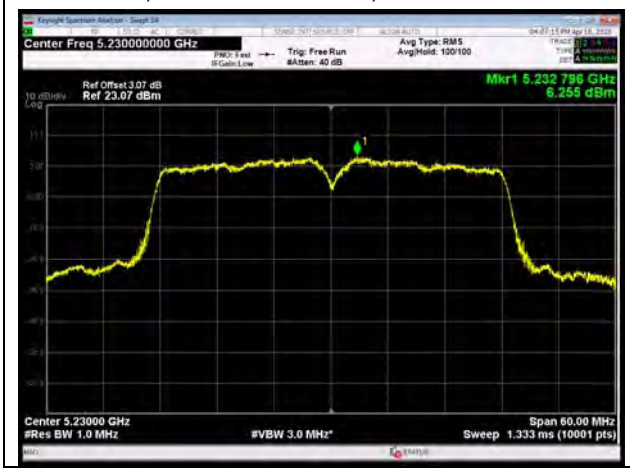
U-NII-1, 802.11ac VHT20, Channel No.: 40



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

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

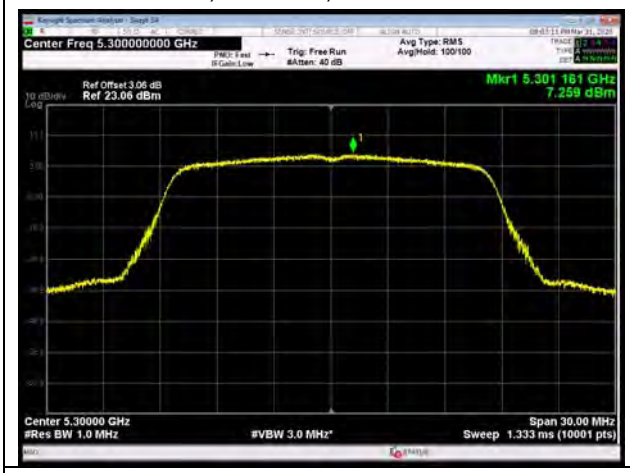


U-NII-1, 802.11ac VHT40, Channel No.: 46	U-NII-1, 802.11ac VHT80, Channel No.: 42
	

U-NII-2A, 802.11a, Channel No.: 52

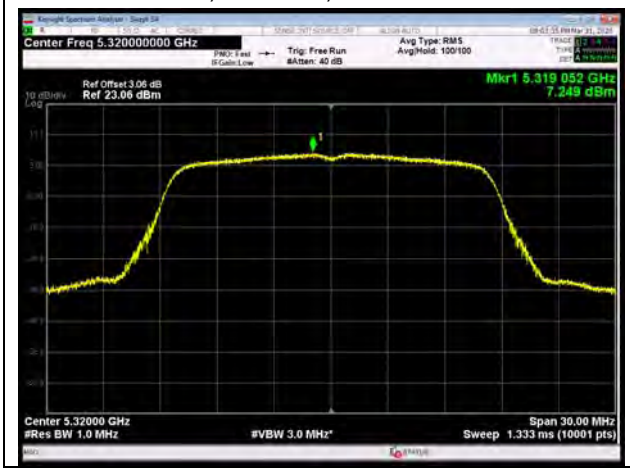
U-NII-2A, 802.11n HT20, Channel No.: 52

U-NII-2A, 802.11a, Channel No.: 60



U-NII-2A, 802.11n HT20, Channel No.: 60

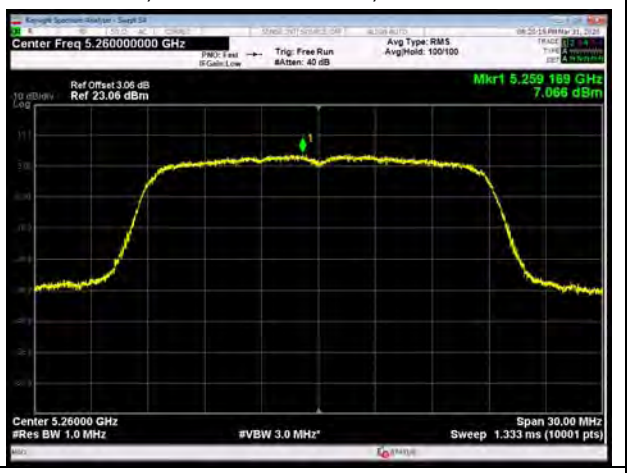
U-NII-2A, 802.11a, Channel No.: 64



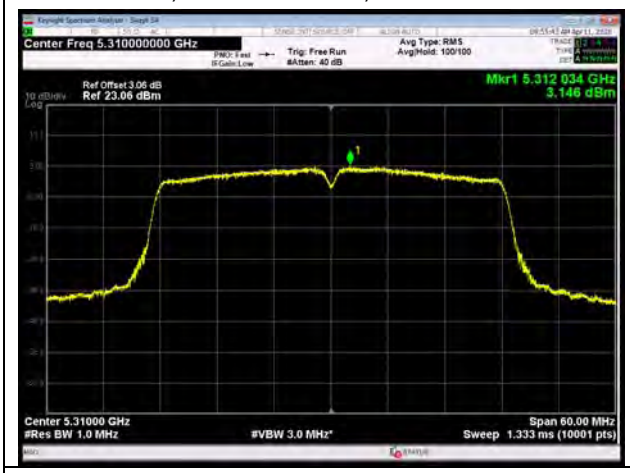
U-NII-2A, 802.11n HT20, Channel No.: 64

U-NII-2A, 802.11n HT40, Channel No.: 54

U-NII-2A, 802.11ac VHT20, Channel No.:52



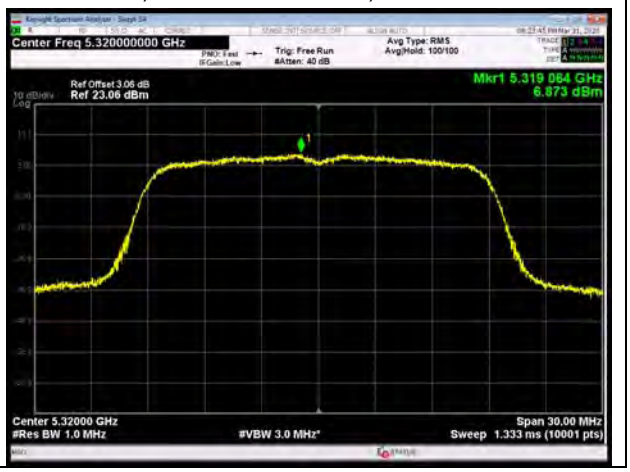
U-NII-2A, 802.11n HT40, Channel No.: 62

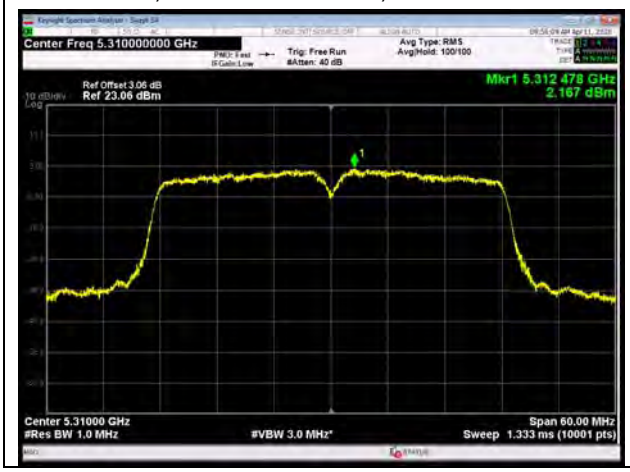


U-NII-2A, 802.11ac VHT20, Channel No.: 60

U-NII-2A, 802.11ac VHT40, Channel No.: 54

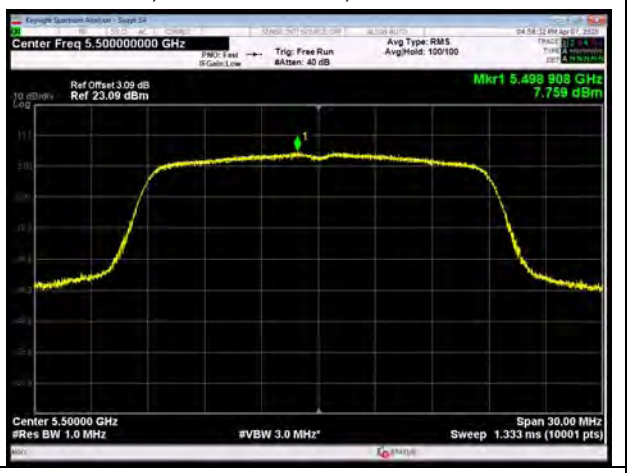
U-NII-2A, 802.11ac VHT20, Channel No.: 64



U-NII-2A, 802.11ac VHT40, Channel No.: 62	U-NII-2A, 802.11ac VHT80, Channel No.: 58
	

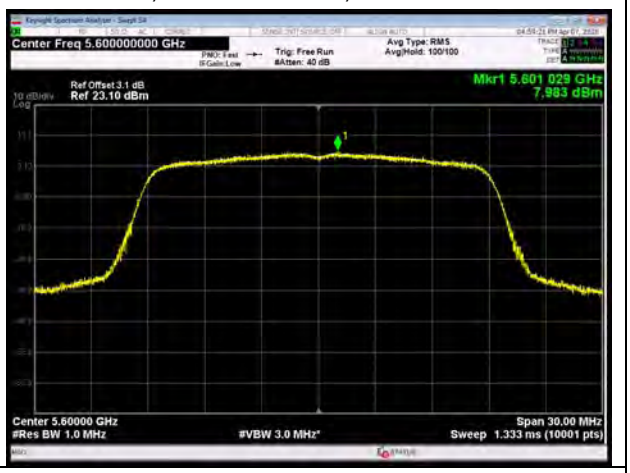
U-NII-2C, 802.11a, Channel No.: 100

U-NII-2C, 802.11n HT20, Channel No.: 100



U-NII-2C, 802.11a, Channel No.: 120

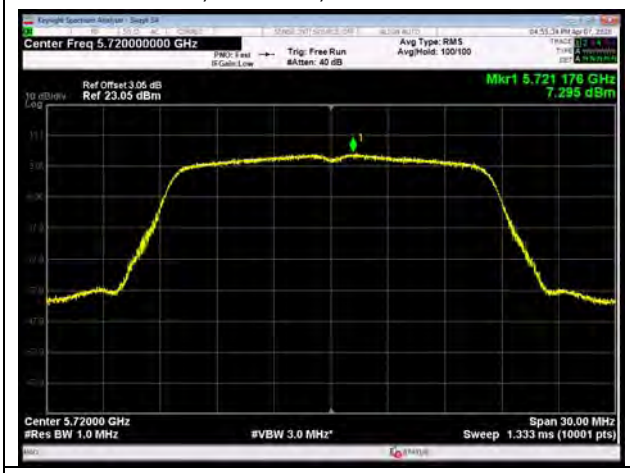
U-NII-2C, 802.11n HT20, Channel No.: 120



U-NII-2C, 802.11a, Channel No.: 140

U-NII-2C, 802.11n HT20, Channel No.: 140

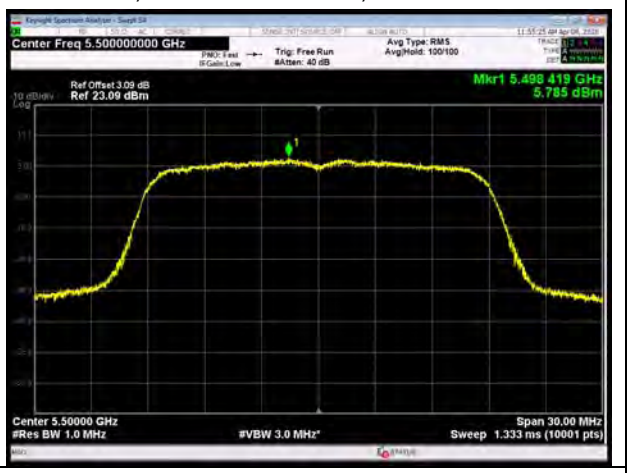
U-NII-2C, 802.11a, Channel No.: 144



U-NII-2C, 802.11n HT20, Channel No.: 144

U-NII-2C, 802.11n HT40, Channel No.: 102

U-NII-2C, 802.11ac VHT20, Channel No.: 100



U-NII-2C, 802.11n HT40, Channel No.: 118

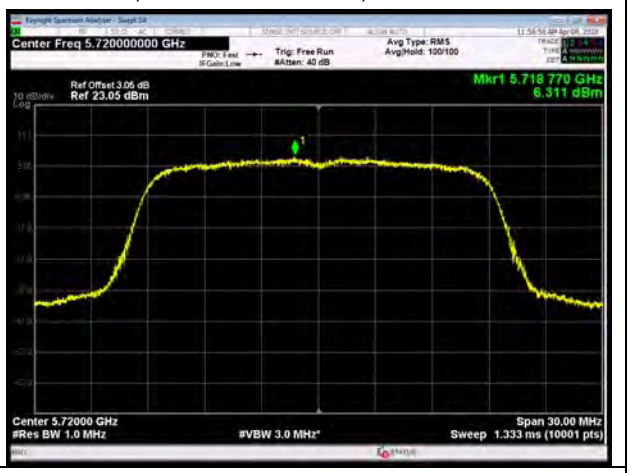
U-NII-2C, 802.11ac VHT20, Channel No.: 120

U-NII-2C, 802.11n HT40, Channel No.: 134

U-NII-2C, 802.11ac VHT20, Channel No.: 140

U-NII-2C, 802.11n HT40, Channel No.: 142

U-NII-2C, 802.11ac VHT20, Channel No.: 144



U-NII-2C, 802.11ac VHT40, Channel No.: 102

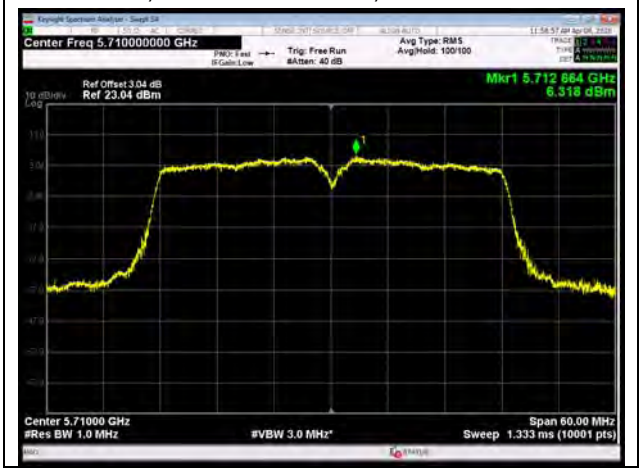
U-NII-2C, 802.11ac VHT80, Channel No.: 122

U-NII-2C, 802.11ac VHT40, Channel No.: 118

U-NII-2C, 802.11ac VHT80, Channel No.: 138

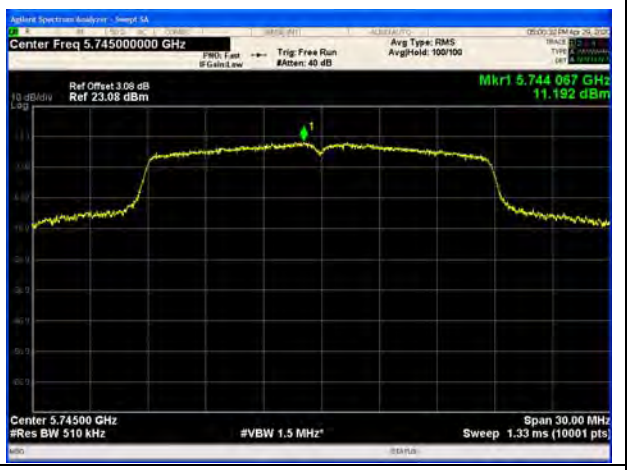
U-NII-2C, 802.11ac VHT40, Channel No.: 134

U-NII-2C, 802.11ac VHT40, Channel No.: 142



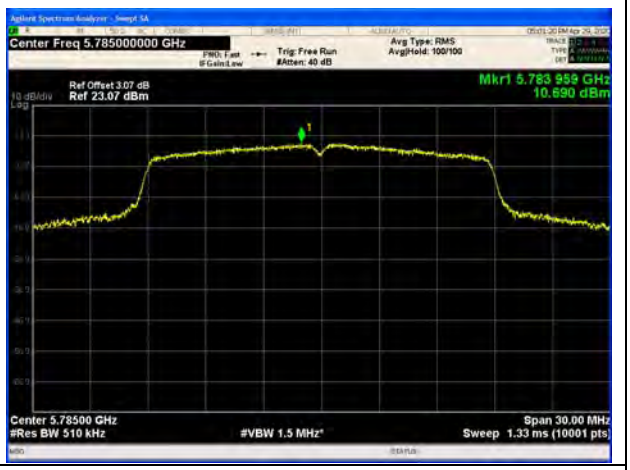
U-NII-3, 802.11a, Channel No.: 149

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



U-NII-3, 802.11a, Channel No.: 157

U-NII-3, 802.11n HT20, Channel No.: 157



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

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

U-NII-3, 802.11ac VHT20, Channel No.: 157

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

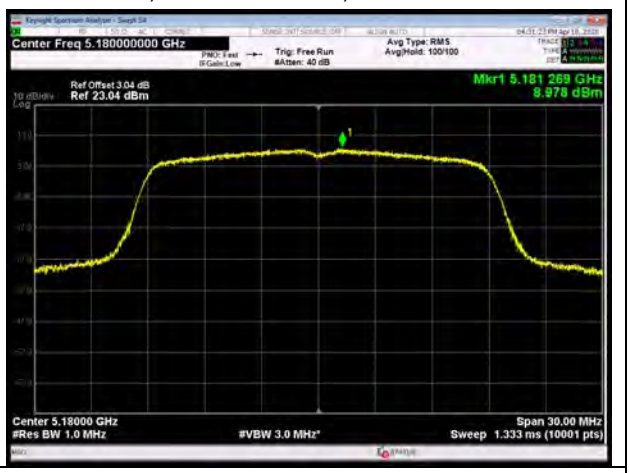
U-NII-3, 802.11ac VHT20, Channel No.: 165

U-NII-3, 802.11ac VHT40, Channel No.: 159	U-NII-3, 802.11ac VHT80, Channel No.: 155
	

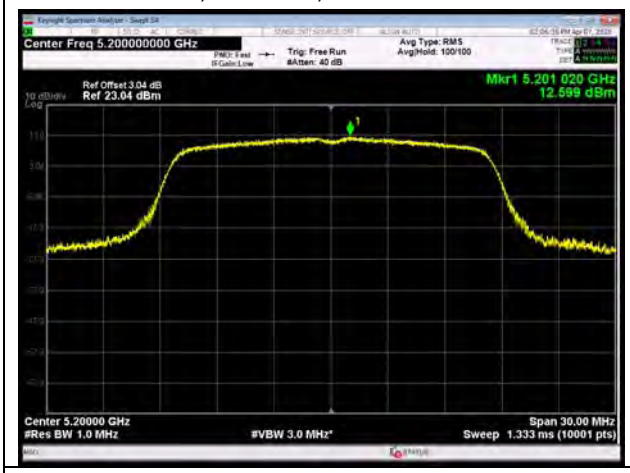
MIMO Antenna 2

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

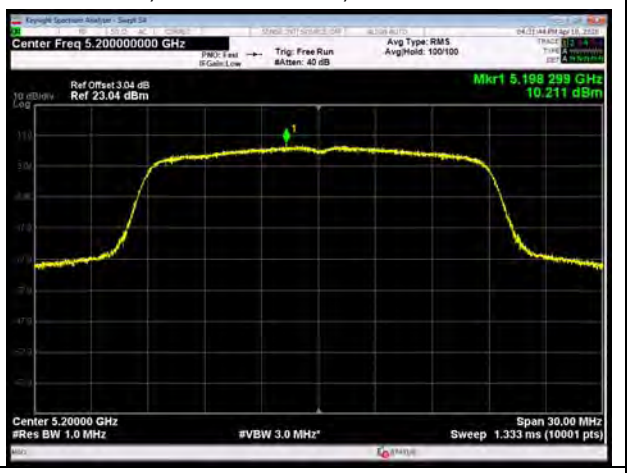
U-NII-1, 802.11n HT20, Channel No.: 36



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



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

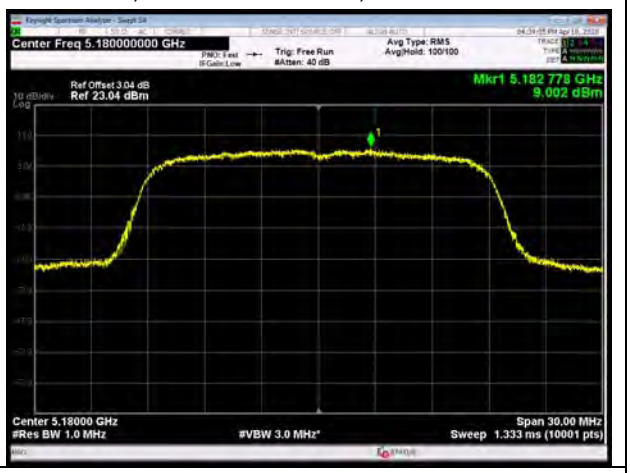


U-NII-1, 802.11a, Channel No.: 48

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

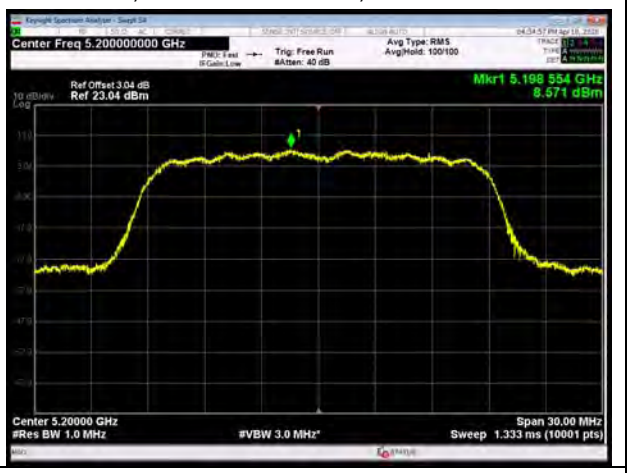
U-NII-1, 802.11n HT40, Channel No.: 38

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



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

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

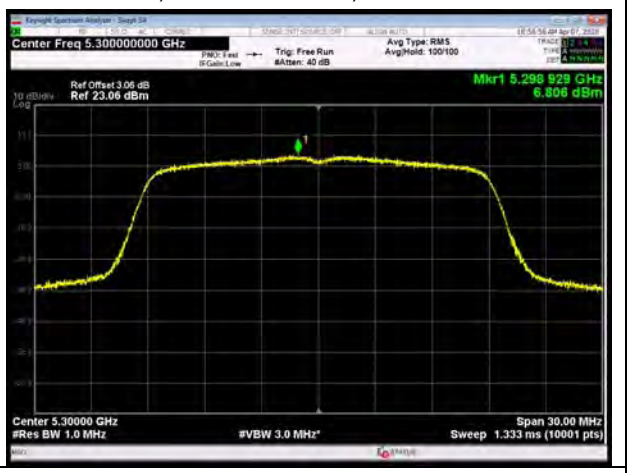
U-NII-1, 802.11ac VHT40, Channel No.: 46	U-NII-1, 802.11ac VHT80, Channel No.: 42
	

U-NII-2A, 802.11a, Channel No.: 52

U-NII-2A, 802.11n HT20, Channel No.: 52

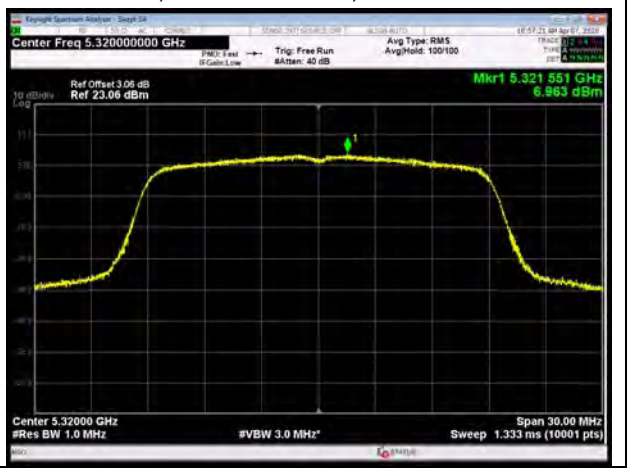
U-NII-2A, 802.11a, Channel No.: 60

U-NII-2A, 802.11n HT20, Channel No.: 60



U-NII-2A, 802.11a, Channel No.: 64

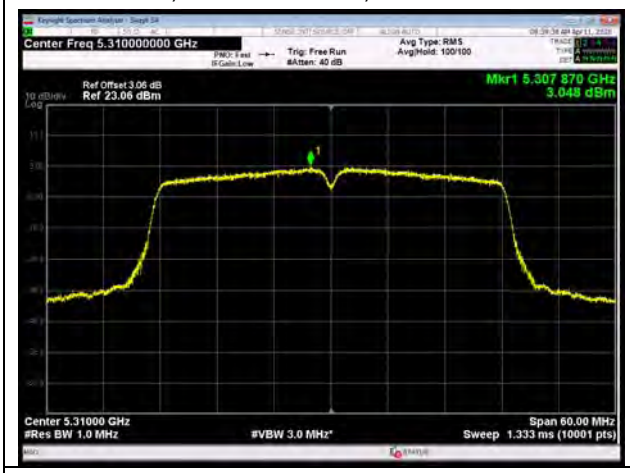
U-NII-2A, 802.11n HT20, Channel No.: 64



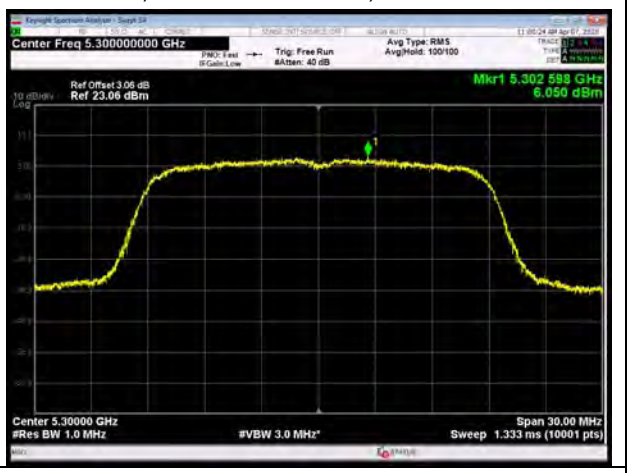
U-NII-2A, 802.11n HT40, Channel No.: 54

U-NII-2A, 802.11ac VHT20, Channel No.:52

U-NII-2A, 802.11n HT40, Channel No.: 62



U-NII-2A, 802.11ac VHT20, Channel No.: 60



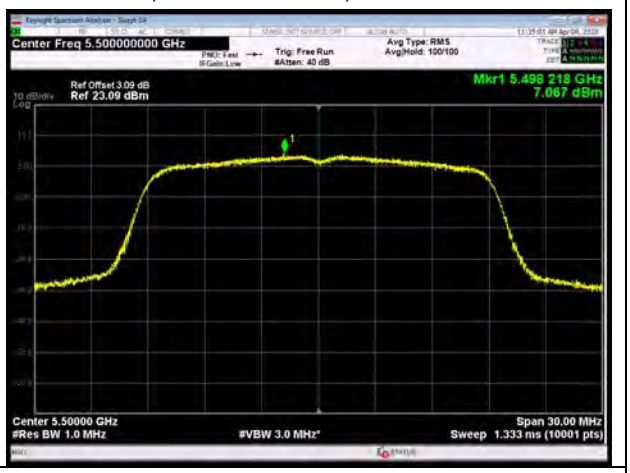
U-NII-2A, 802.11ac VHT40, Channel No.: 54

U-NII-2A, 802.11ac VHT20, Channel No.: 64

U-NII-2A, 802.11ac VHT40, Channel No.: 62	U-NII-2A, 802.11ac VHT80, Channel No.: 58
	

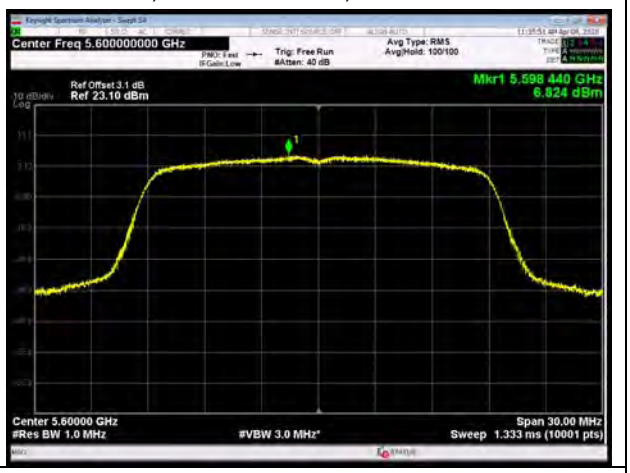
U-NII-2C, 802.11a, Channel No.: 100

U-NII-2C, 802.11n HT20, Channel No.: 100

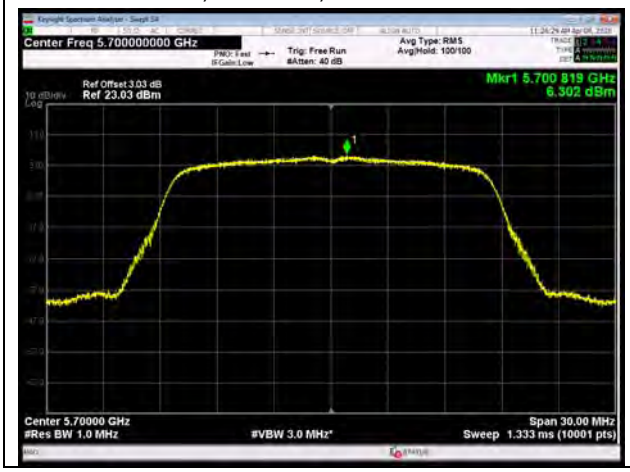


U-NII-2C, 802.11a, Channel No.: 120

U-NII-2C, 802.11n HT20, Channel No.: 120

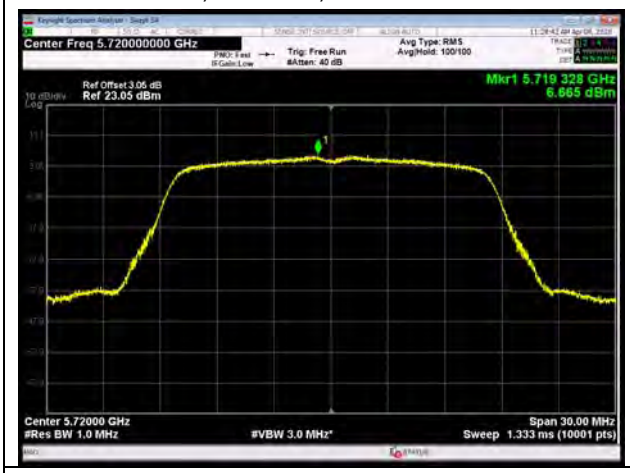


U-NII-2C, 802.11a, Channel No.: 140



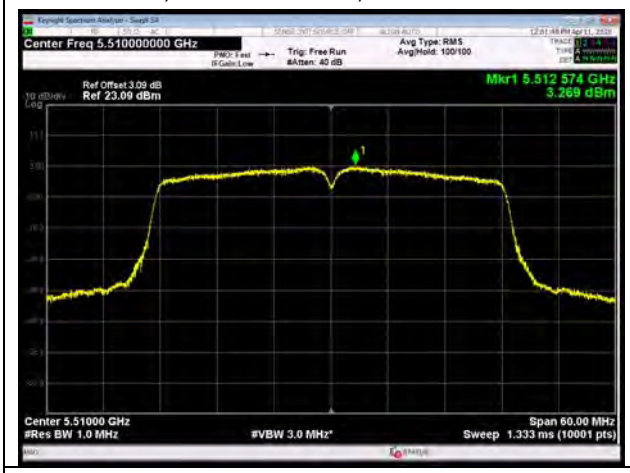
U-NII-2C, 802.11n HT20, Channel No.: 140

U-NII-2C, 802.11a, Channel No.: 144



U-NII-2C, 802.11n HT20, Channel No.: 144

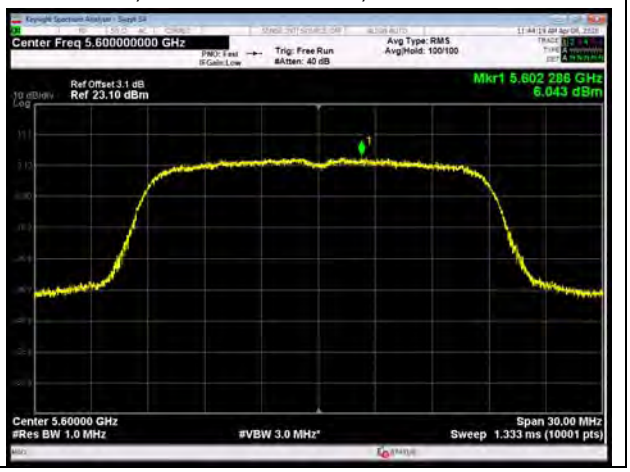
U-NII-2C, 802.11n HT40, Channel No.: 102



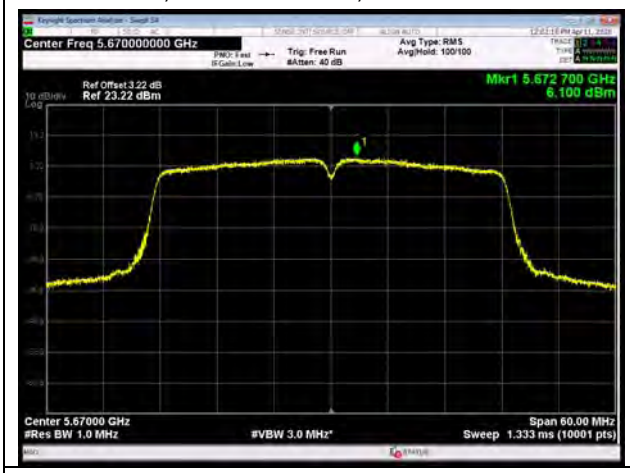
U-NII-2C, 802.11ac VHT20, Channel No.: 100

U-NII-2C, 802.11n HT40, Channel No.: 118

U-NII-2C, 802.11ac VHT20, Channel No.: 120



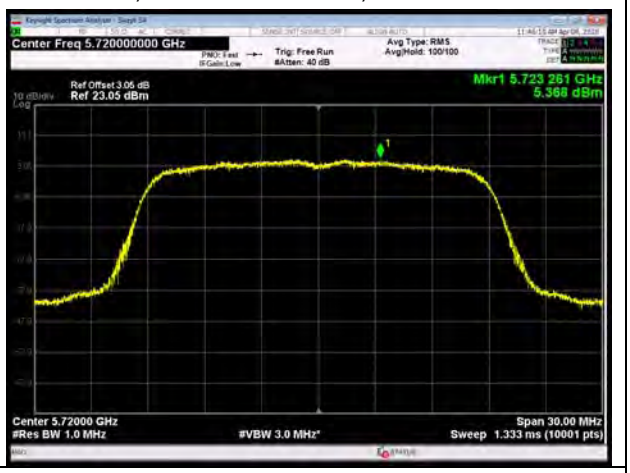
U-NII-2C, 802.11n HT40, Channel No.: 134



U-NII-2C, 802.11ac VHT20, Channel No.: 140

U-NII-2C, 802.11n HT40, Channel No.: 142

U-NII-2C, 802.11ac VHT20, Channel No.: 144

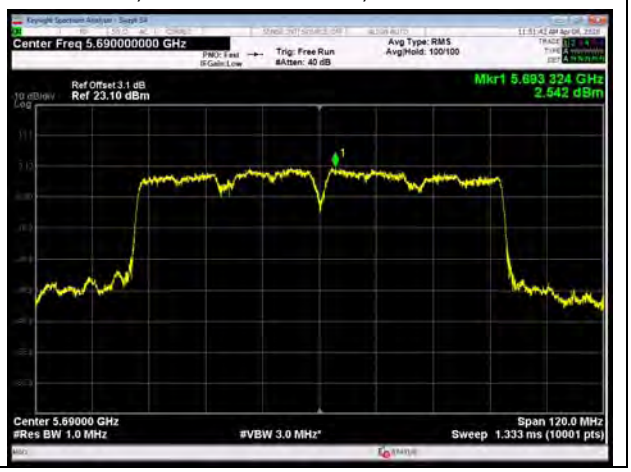


U-NII-2C, 802.11ac VHT40, Channel No.: 102

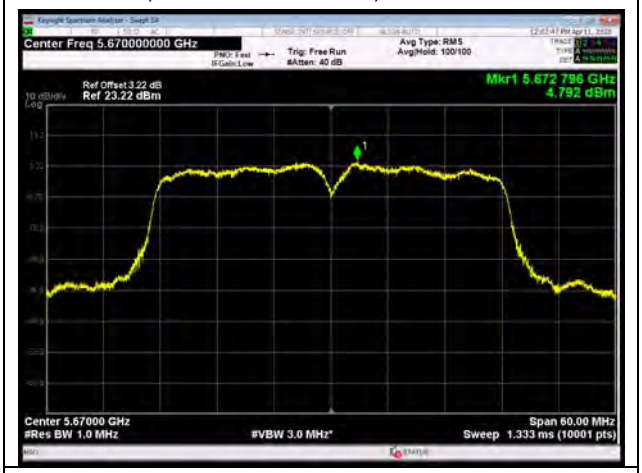
U-NII-2C, 802.11ac VHT80, Channel No.: 122

U-NII-2C, 802.11ac VHT40, Channel No.: 118

U-NII-2C, 802.11ac VHT80, Channel No.: 138



U-NII-2C, 802.11ac VHT40, Channel No.: 134



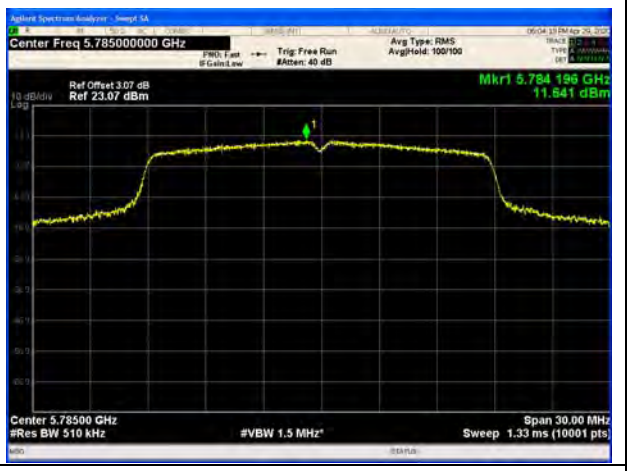
U-NII-2C, 802.11ac VHT40, Channel No.: 142

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

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

U-NII-3, 802.11a, Channel No.: 157

U-NII-3, 802.11n HT20, Channel No.: 157



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

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

U-NII-3, 802.11ac VHT20, Channel No.: 157

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

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

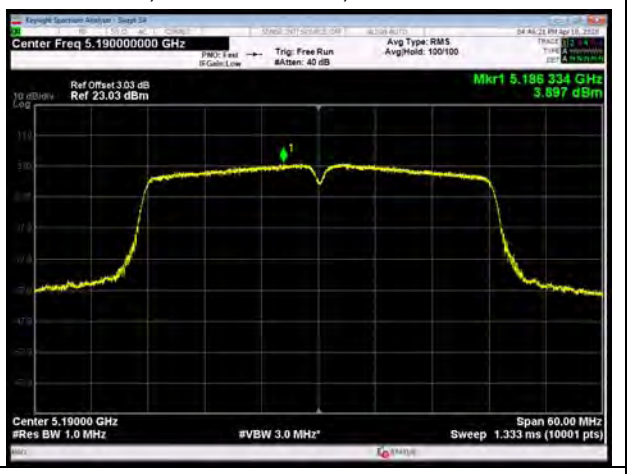
U-NII-3, 802.11ac VHT40, Channel No.: 159	U-NII-3, 802.11ac VHT80, Channel No.: 155
	

MIMO with Beamforming

MIMO Antenna 1

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

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



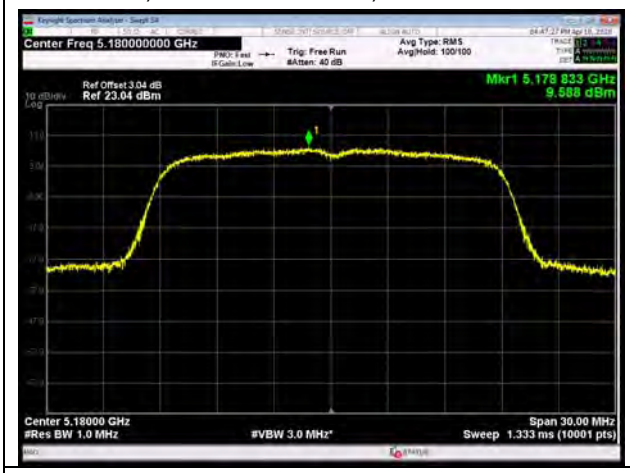
U-NII-1, 802.11n HT20, Channel No.: 40

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

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

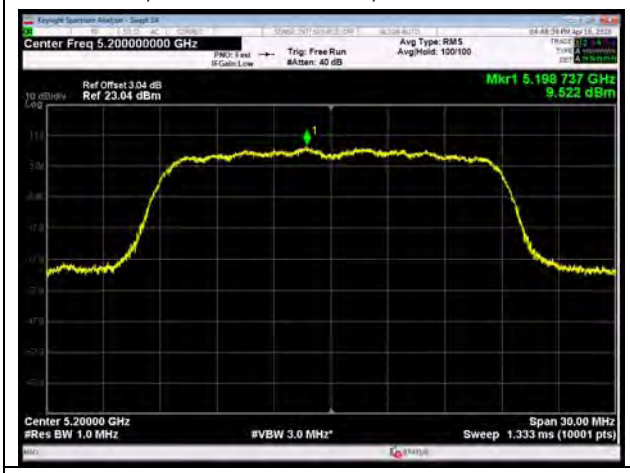
U-NII-1, 802.11ac VHT40, Channel No.: 38

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



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

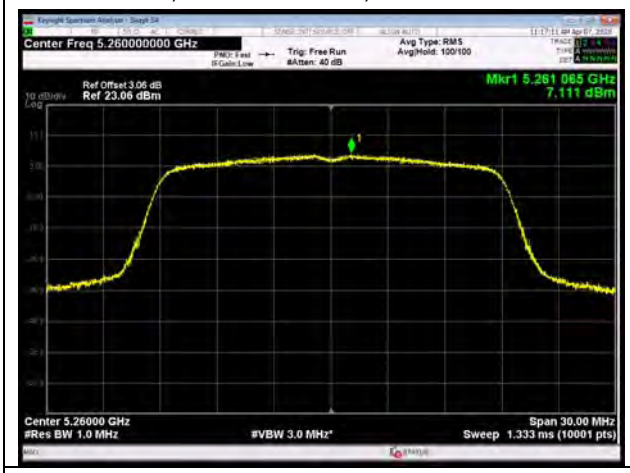
U-NII-1, 802.11ac VHT20, Channel No.: 40



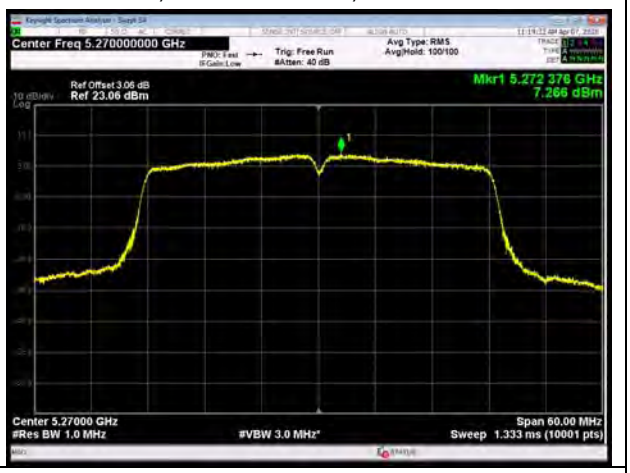
U-NII-1, 802.11ac VHT80, Channel No.: 42

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

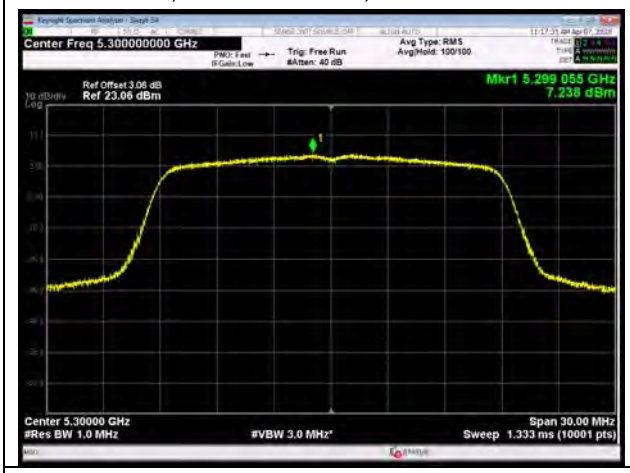
U-NII-2A, 802.11n HT20, Channel No.: 52



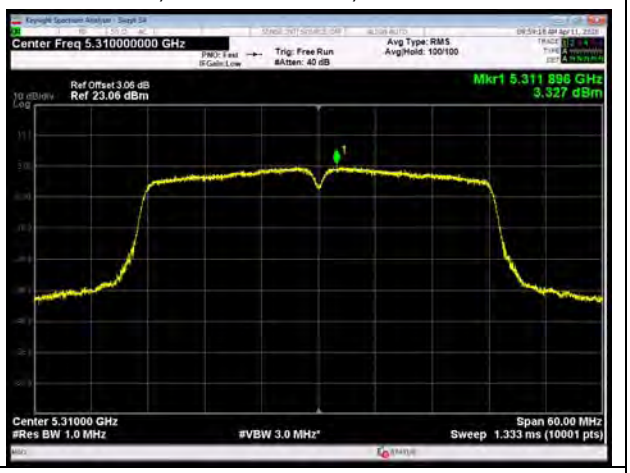
U-NII-2A, 802.11n HT40, Channel No.: 54



U-NII-2A, 802.11n HT20, Channel No.: 60



U-NII-2A, 802.11n HT40, Channel No.: 62



U-NII-2A, 802.11n HT20, Channel No.: 64

U-NII-2A, 802.11ac VHT40, Channel No.: 54

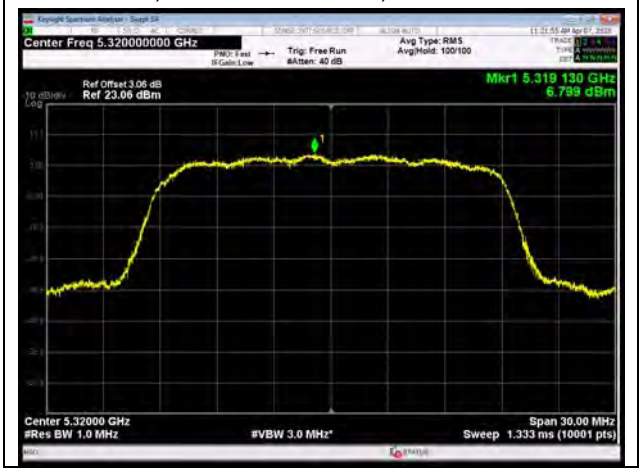
U-NII-2A, 802.11ac VHT20, Channel No.:52

U-NII-2A, 802.11ac VHT40, Channel No.: 62

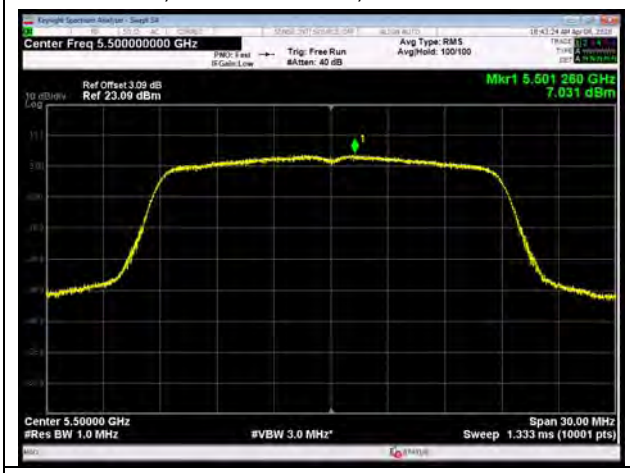
U-NII-2A, 802.11ac VHT20, Channel No.: 60

U-NII-2A, 802.11ac VHT80, Channel No.: 58

U-NII-2A, 802.11ac VHT20, Channel No.: 64

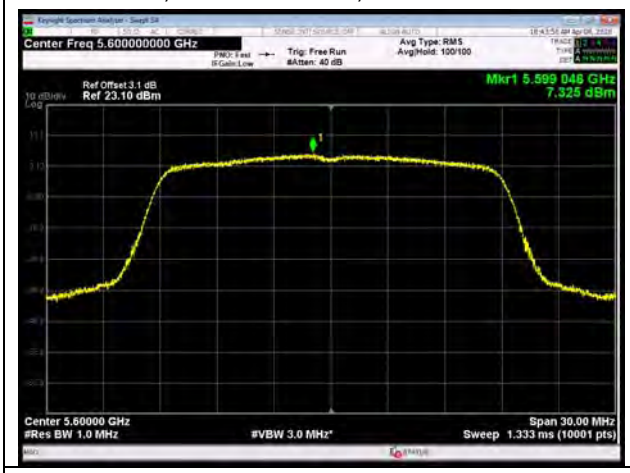


U-NII-2C, 802.11n HT20, Channel No.: 100

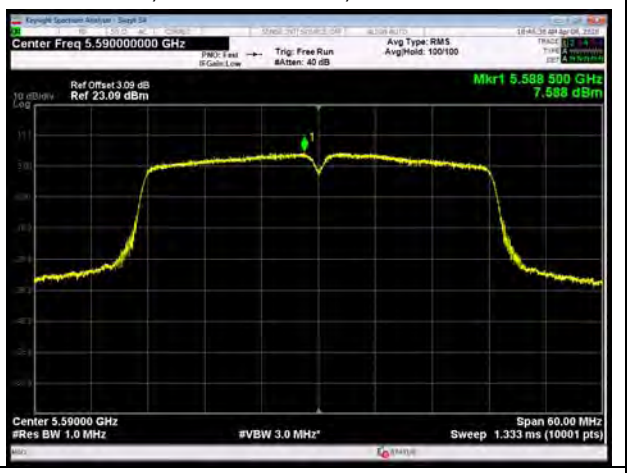


U-NII-2C, 802.11n HT40, Channel No.: 102

U-NII-2C, 802.11n HT20, Channel No.: 120



U-NII-2C, 802.11n HT40, Channel No.: 118

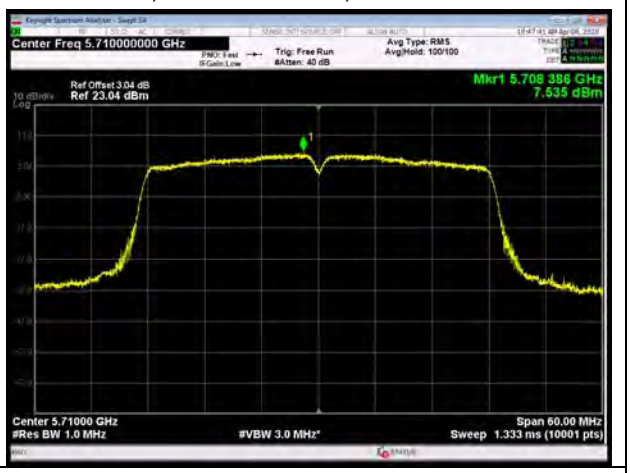


U-NII-2C, 802.11n HT20, Channel No.: 140

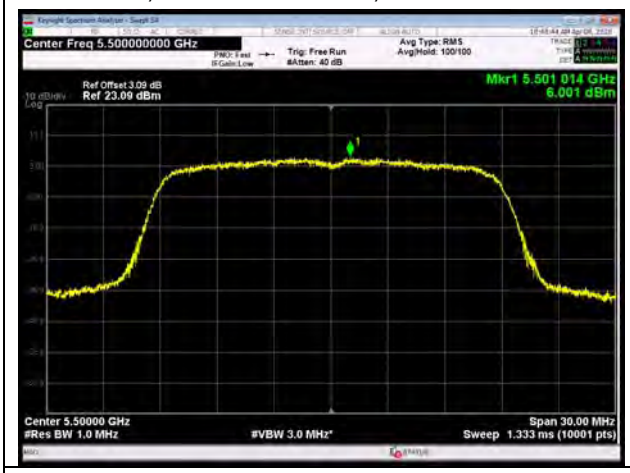
U-NII-2C, 802.11n HT40, Channel No.: 134

U-NII-2C, 802.11n HT20, Channel No.: 144

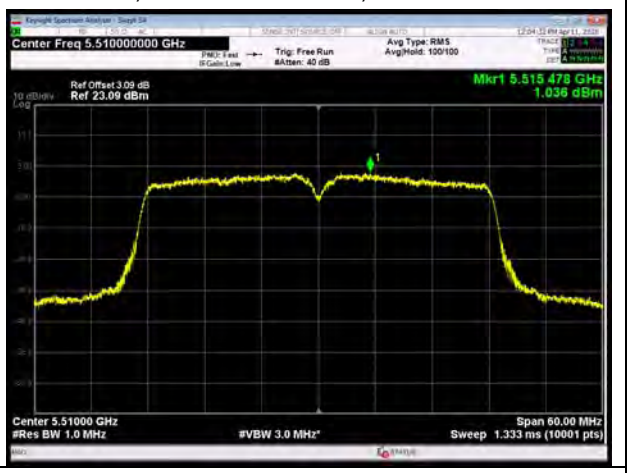
U-NII-2C, 802.11n HT40, Channel No.: 142



U-NII-2C, 802.11ac VHT20, Channel No.: 100



U-NII-2C, 802.11ac VHT40, Channel No.: 102

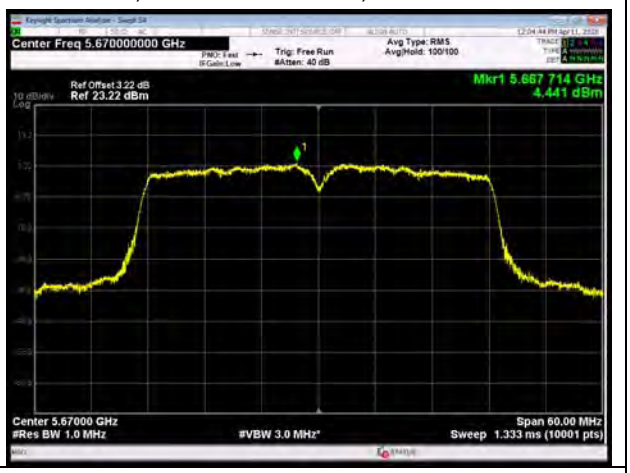


U-NII-2C, 802.11ac VHT20, Channel No.: 120

U-NII-2C, 802.11ac VHT40, Channel No.: 118

U-NII-2C, 802.11ac VHT20, Channel No.: 140

U-NII-2C, 802.11ac VHT40, Channel No.: 134



U-NII-2C, 802.11ac VHT20, Channel No.: 144

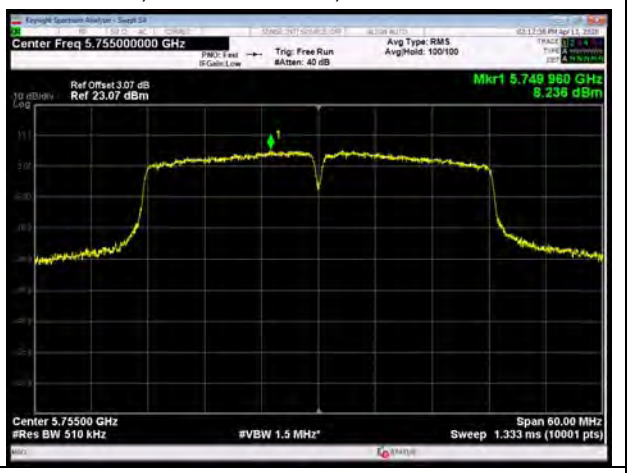
U-NII-2C, 802.11ac VHT40, Channel No.: 142

U-NII-2C, 802.11ac VHT80, Channel No.: 122

U-NII-2C, 802.11ac VHT80, Channel No.: 138

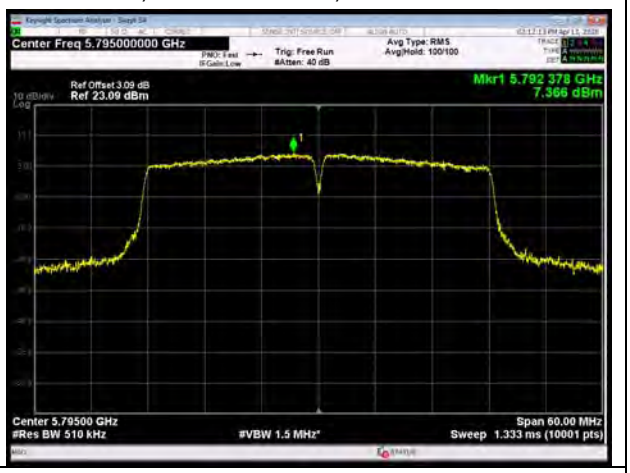
U-NII-3, 802.11n HT20, Channel No.: 149

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



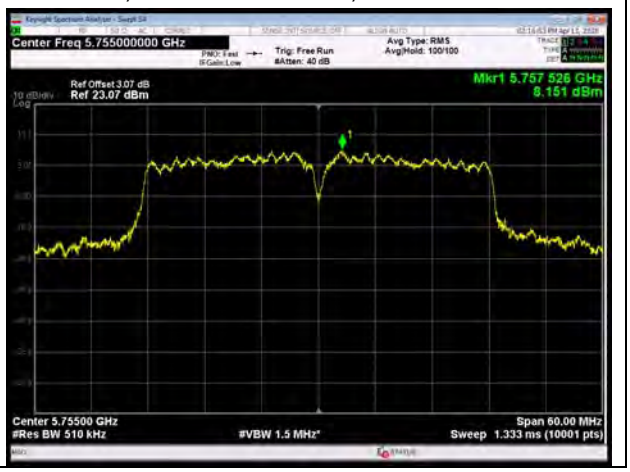
U-NII-3, 802.11n HT20, Channel No.: 157

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

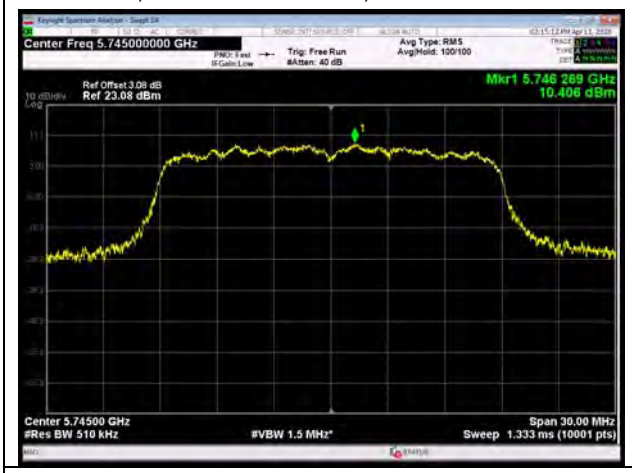


U-NII-3, 802.11n HT20, Channel No.: 165

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

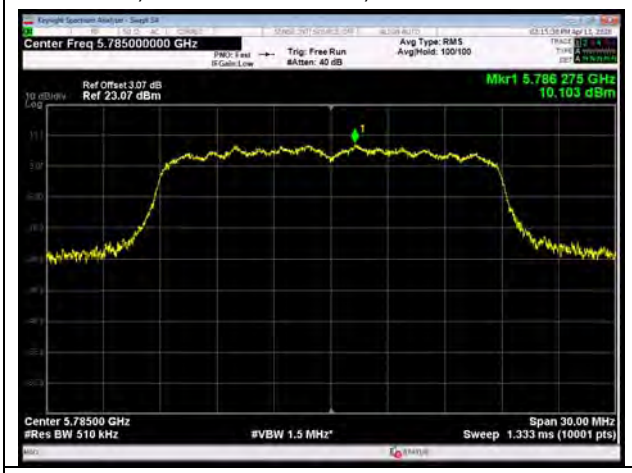


U-NII-3, 802.11ac VHT20, Channel No.: 149



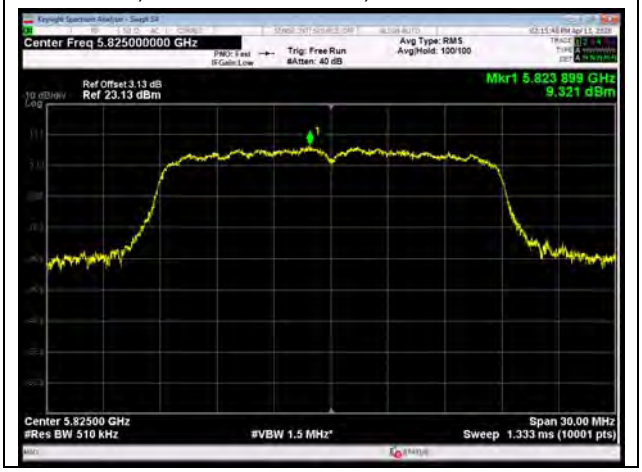
U-NII-3, 802.11ac VHT40, Channel No.: 159

U-NII-3, 802.11ac VHT20, Channel No.: 157



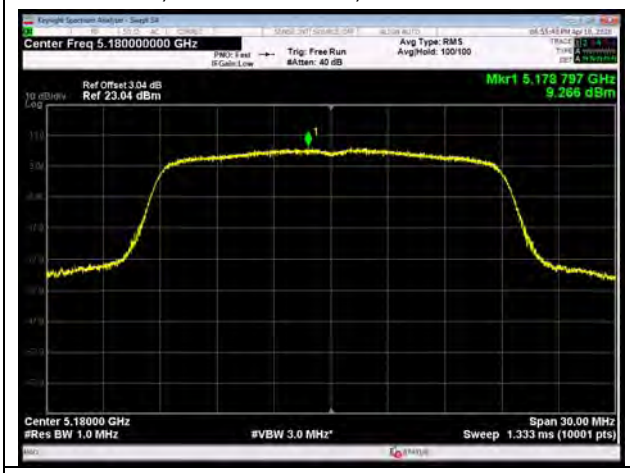
U-NII-3, 802.11ac VHT80, Channel No.: 155

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



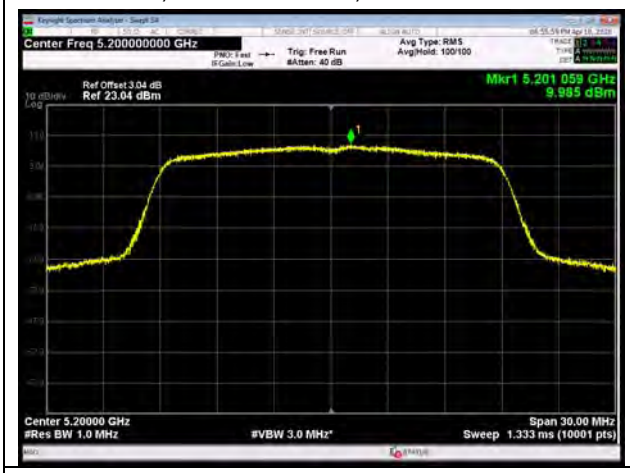
MIMO Antenna 2

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



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

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



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

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

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

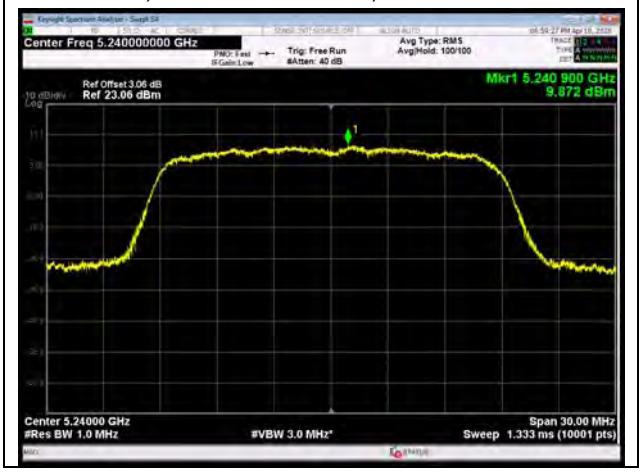
U-NII-1, 802.11ac VHT20, Channel No.: 36

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

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

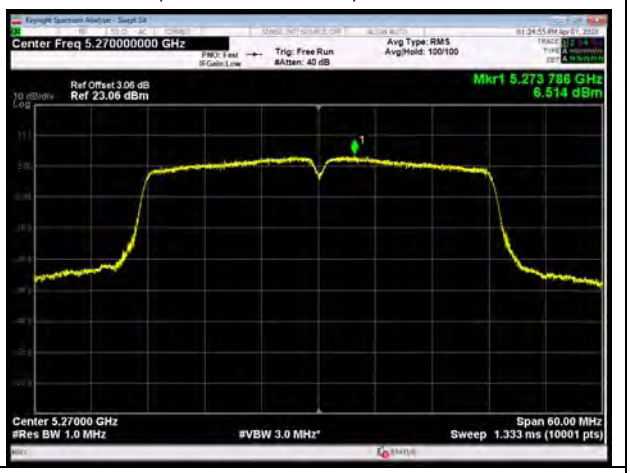
U-NII-1, 802.11ac VHT80, Channel No.: 42

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



U-NII-2A, 802.11n HT20, Channel No.: 52

U-NII-2A, 802.11n HT40, Channel No.: 54



U-NII-2A, 802.11n HT20, Channel No.: 60

U-NII-2A, 802.11n HT40, Channel No.: 62

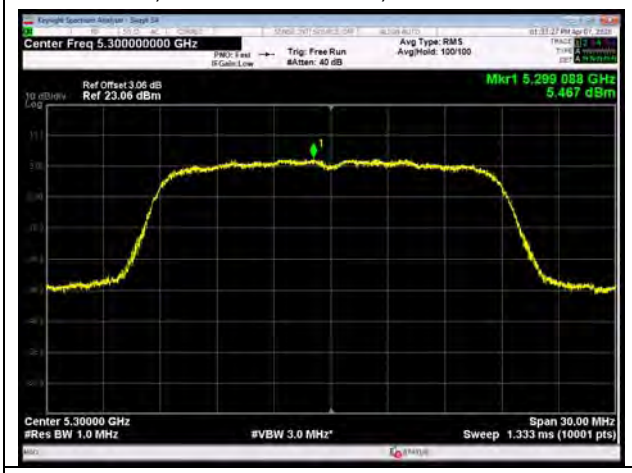
U-NII-2A, 802.11n HT20, Channel No.: 64

U-NII-2A, 802.11ac VHT40, Channel No.: 54

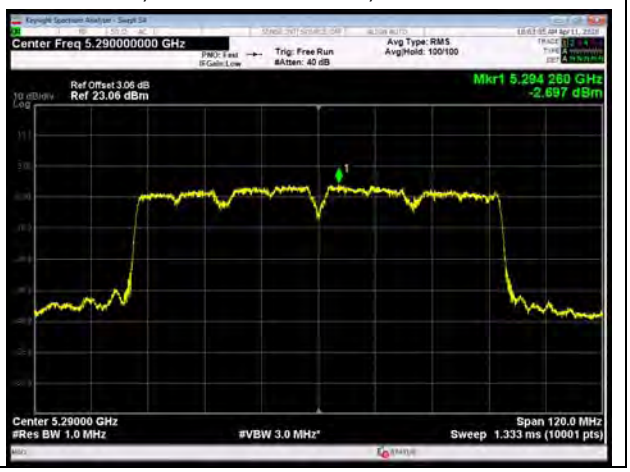
U-NII-2A, 802.11ac VHT20, Channel No.:52

U-NII-2A, 802.11ac VHT40, Channel No.: 62

U-NII-2A, 802.11ac VHT20, Channel No.: 60

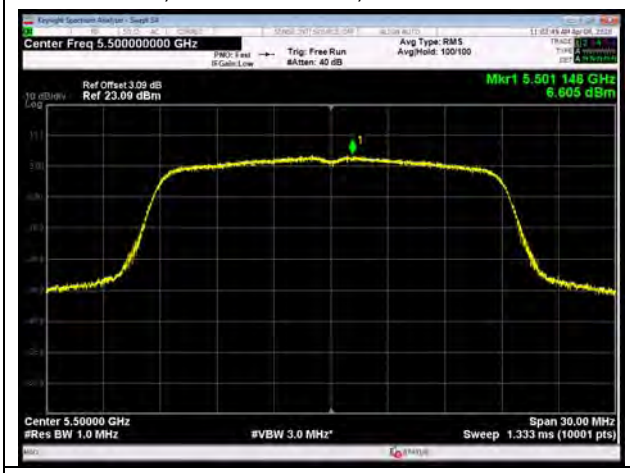


U-NII-2A, 802.11ac VHT80, Channel No.: 58



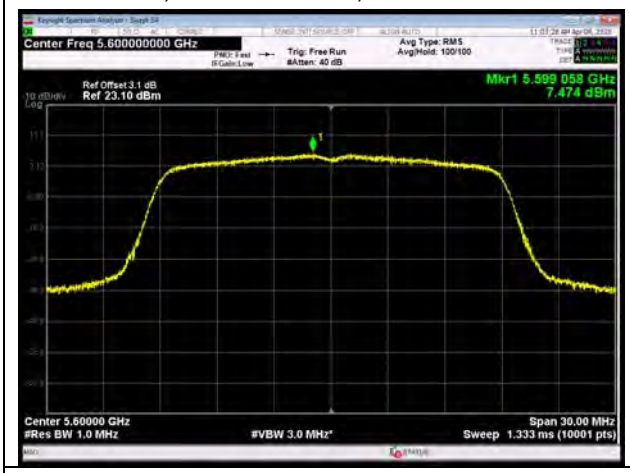
U-NII-2A, 802.11ac VHT20, Channel No.: 64

U-NII-2C, 802.11n HT20, Channel No.: 100



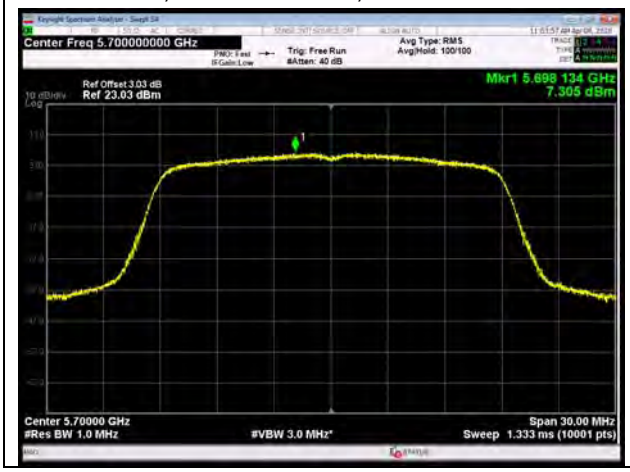
U-NII-2C, 802.11n HT40, Channel No.: 102

U-NII-2C, 802.11n HT20, Channel No.: 120

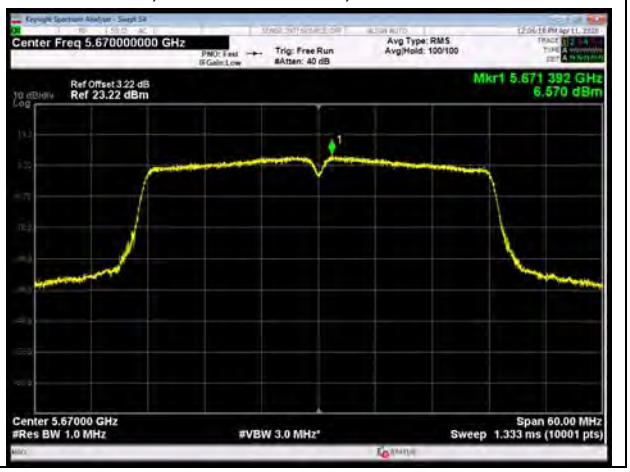


U-NII-2C, 802.11n HT40, Channel No.: 118

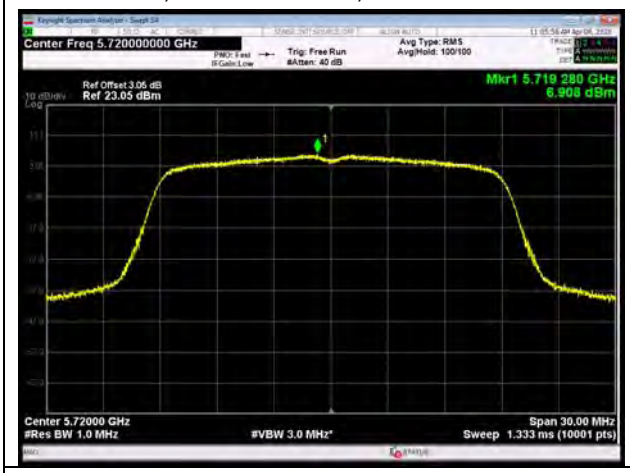
U-NII-2C, 802.11n HT20, Channel No.: 140



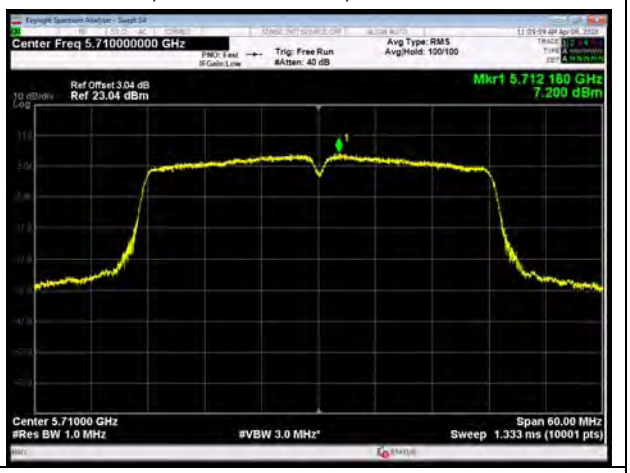
U-NII-2C, 802.11n HT40, Channel No.: 134



U-NII-2C, 802.11n HT20, Channel No.: 144



U-NII-2C, 802.11n HT40, Channel No.: 142



U-NII-2C, 802.11ac VHT20, Channel No.: 100

U-NII-2C, 802.11ac VHT40, Channel No.: 102

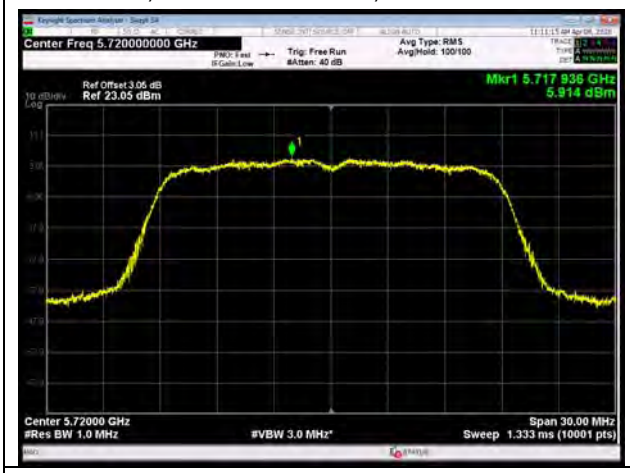
U-NII-2C, 802.11ac VHT20, Channel No.: 120

U-NII-2C, 802.11ac VHT40, Channel No.: 118

U-NII-2C, 802.11ac VHT20, Channel No.: 140

U-NII-2C, 802.11ac VHT40, Channel No.: 134

U-NII-2C, 802.11ac VHT20, Channel No.: 144

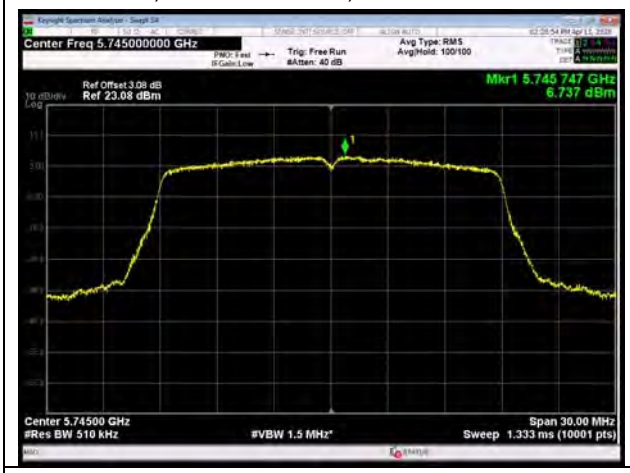


U-NII-2C, 802.11ac VHT40, Channel No.: 142

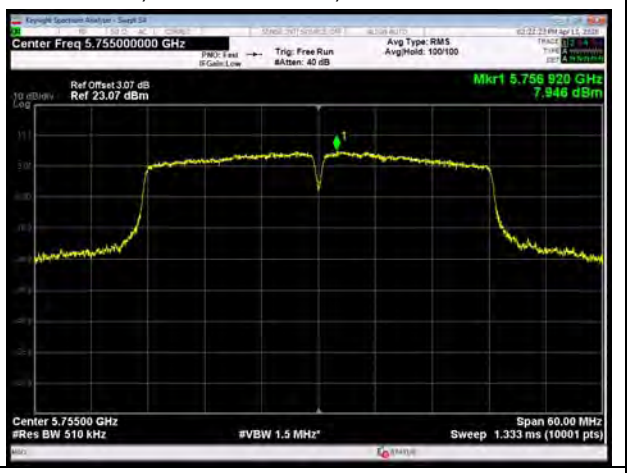
U-NII-2C, 802.11ac VHT80, Channel No.: 122

U-NII-2C, 802.11ac VHT80, Channel No.: 138

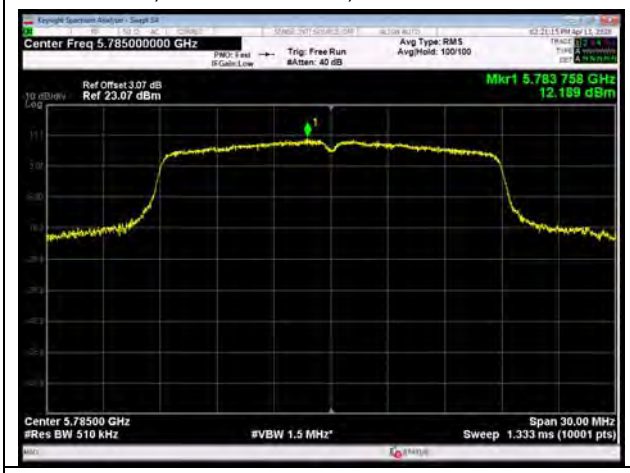
U-NII-3, 802.11n HT20, Channel No.: 149



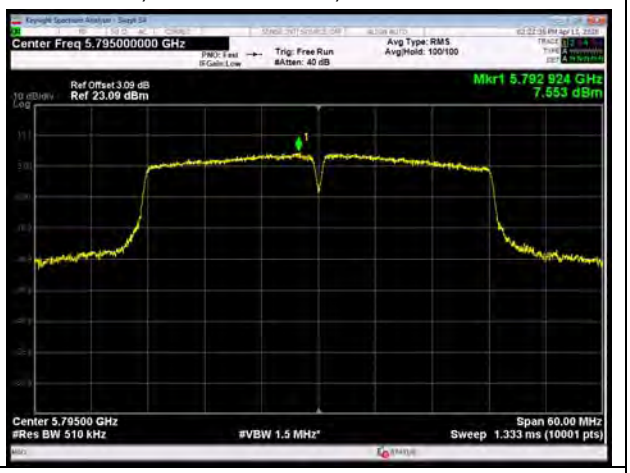
U-NII-3, 802.11n HT40, Channel No.: 151



U-NII-3, 802.11n HT20, Channel No.: 157



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



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

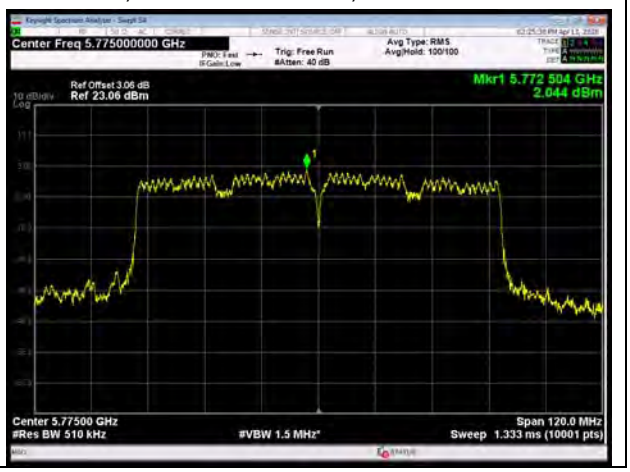
U-NII-3, 802.11ac VHT40, Channel No.: 151

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

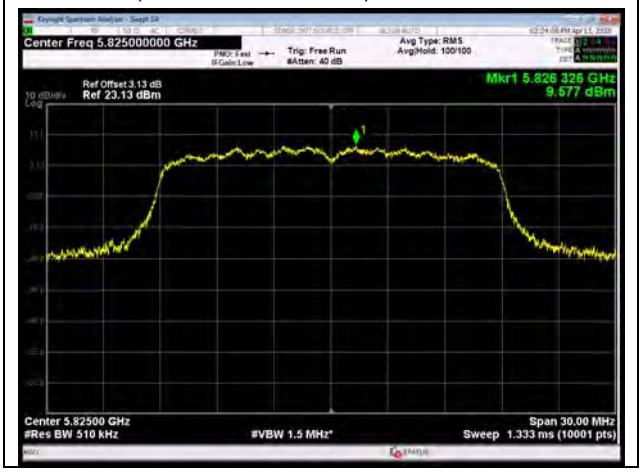
U-NII-3, 802.11ac VHT40, Channel No.: 159

U-NII-3, 802.11ac VHT20, Channel No.: 157

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



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



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 C63.10-2013. 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:
Below 1GHz (detector: Peak and Quasi-Peak)
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz (detector: Peak):
I) Peak emission levels are measured by setting the instrument as follows:
1) RBW = 1 MHz.
2) VBW ≥ [3 × RBW]
3) Detector = peak.
4) Sweep time = auto.
5) Trace mode = max hold.
6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, then the time required for the trace to stabilize will increase by a factor of approximately 1 / D, where D is the duty cycle.

II) Average emission levels are measured by setting the instrument as follows:
a) RBW = 1 MHz.
b) VBW ≥ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
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.