RF TEST REPORT

Applicant	Alcatel-Lucent Shanghai Bell Co.,Ltd.
FCC ID	2ADZRXS250WXAB
Product	XGSPON ONU
Brand	NOKIA
Model	XS-250WX-A/XS-240W-A
Report No.	RBA1709-0095RF03R2
Issue Date	January 11, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15E (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Xianqing Li *Approved by: Kai Xu*

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TABLE OF CONTENT

Summary of measurement results

Number	Summary of measurements of results	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	Maximum power spectral density	15.407(a)	PASS
5	Unwanted Emissions	15.407(b)	PASS
6	Conducted Emissions	15.207	PASS
Date of Testing: December 20, 2016 ~ February 4, 2017 and September 18, 2017~ January 4, 2018			

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. This report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

1.2. Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

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.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

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.
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2. General Description of Equipment under Test

Client Information

Applicant	Alcatel-Lucent Shanghai Bell CO. Ltd.
Applicant address	388-389#,Ningqiao Road,Pudong Jinqiao, Shanghai, P.R. China
Manufacturer	Alcatel-Lucent Shanghai Bell CO. Ltd.
Manufacturer address	388-389#,Ningqiao Road,Pudong Jinqiao, Shanghai, P.R. China

General information

EUT Description	
Model	XS-250WX-A/XS-240W-A
SN:	/
Hardware Version	3FE 48307 AA /3FE 48631 AA
Software Version	3FE47059
Power Supply	AC adapter
Antenna Type	Internal Antenna
Antenna Gain	Antenna 1: 3.0 dBi Antenna 2: 3.0 dBi Antenna 3: 3.0 dBi Antenna 4: 3.0 dBi
additional beamforming gain	6 dB
Test Mode(s)	U-NII-1(5150MHz-5250MHz) U-NII-3(5725MHz-5850MHz)
Modulation Type	802.11a/n (HT20/HT40) : OFDM 802.11ac (HT20.HT40/HT80): OFDM
Max. Conducted Power	28.17 dBm
Operating Frequency Range(s)	U-NII-1: 5150-5250MHz U-NII-3: 5725-5850MHz
EUT Accessory	
Adapter	Manufacturer: DELTA electronics, INC. Model: ADP-66CR BC
Note: The information of the EUT is declared by the manufacturer.	

XS-250WX-A	XS-240W-A
With 10GE port	Without 10GE port
Note: Customer declaration, two models is the same except 10GE port. During the test, both of two models are evaluated, XS-250WX-A selected as the worst condition, but only the worst case is recorded in this report.	

	Model	ONU Part number	Kit Part number
US ONU	XS-250WX-A	3FE 48307 AA	-
US Kit	XS-250WX-A	3FE 48307 AA	3FE 48439 AA
US ONU	XS-240W-A	3FE 48631 AA	-
US Kit	XS-240W-A	3FE 48631 AA	3FE 48626 AA

3. Applied Standards

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

FCC CFR47 Part 15E (2017) Unlicensed National Information Infrastructure Devices

ANSI C63.10 (2013)

KDB 789033 D02 General UNII Test Procedures New Rules v01r04

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				
	Antenna 1	**Antenna 2**	**Antenna 3**	**Antenna 4**	**Antenna type**
802.11a	6 Mbps	6 Mbps	6 Mbps	6 Mbps	SISO
802.11n HT20	MCS24	MCS24	MCS24	MCS24	MIMO
802.11n HT40	MCS24	MCS24	MCS24	MCS24	
802.11ac HT20	MCS0NSS4	MCS0NSS4	MCS0NSS4	MCS0NSS4	
802.11ac HT40	MCS0NSS4	MCS0NSS4	MCS0NSS4	MCS0NSS4	
802.11ac HT80	MCS0NSS4	MCS0NSS4	MCS0NSS4	MCS0NSS4	
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	Antenna 1	Antenna 2	Antenna 3	Antenna 4	MIMO
Average conducted output power	802.11a	802.11a	802.11a	802.11a	802.11n HT20/40 802.11ac HT20/40/80
Occupied bandwidth	--	--	--	--	802.11n HT20/40 802.11ac HT20/40/80
Frequency stability	--	--	--	802.11a	--
Power Spectral Density	802.11a	802.11a	802.11a	802.11a	802.11n HT20/40 802.11ac HT20/40/80
Unwanted Emissions	--	802.11a	--	--	802.11n HT20/40 802.11ac HT20/40/80
Conducted Emissions	--	802.11a	--	--	802.11n HT20/40 802.11ac HT20/40/80
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-3	20 MHz	149	5745MHz
			157	5785MHz
			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.

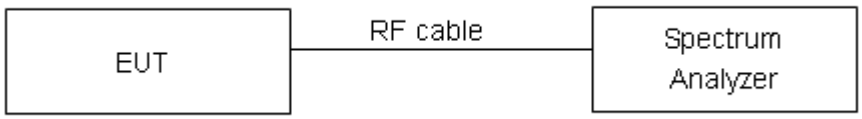
For U-NII-1, set RBW ≈1% OCB kHz, VBW ≥ 3 × RBW, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.

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:

SISO Antenna 4 U-NII-1

Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Limit(kHz)	Conclusion
802.11a	5180	17.344	30.00	500	PASS
	5200	17.208	29.79	500	PASS
	5240	17.263	29.26	500	PASS

SISO Antenna 4 U-NII-3

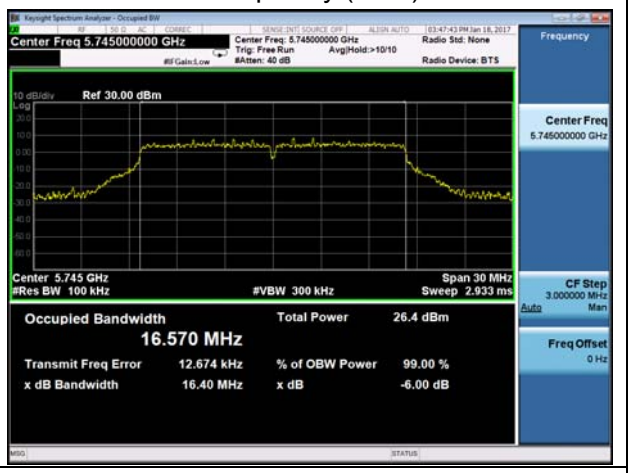
Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit(kHz)	Conclusion
802.11a	5745	16.570	16.40	500	PASS
	5785	16.554	16.41	500	PASS
	5825	16.551	16.37	500	PASS

U-NII-1, 802.11a

Carrier frequency (MHz): 5180

U-NII-3, 802.11a

Carrier frequency (MHz): 5745



U-NII-1, 802.11a

Carrier frequency (MHz): 5200

U-NII-3, 802.11a

Carrier frequency (MHz): 5785

U-NII-1, 802.11a

Carrier frequency (MHz):5240

U-NII-3, 802.11a

Carrier frequency (MHz): 5825

MIMO Antenna 3 U-NII-1

Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Limit(kHz)	Conclusion
802.11n HT20	5180	17.963	27.24	500	PASS
	5200	17.905	26.77	500	PASS
	5240	17.939	25.93	500	PASS
802.11n HT40	5190	36.240	39.40	500	PASS
	5230	36.261	39.59	500	PASS
802.11ac HT20	5180	17.966	29.55	500	PASS
	5200	17.967	26.69	500	PASS
	5240	17.959	26.96	500	PASS
802.11ac HT40	5190	36.275	39.73	500	PASS
	5230	36.304	39.57	500	PASS
802.11ac HT80	5210	74.873	78.06	500	PASS

MIMO Antenna 3 U-NII-3

Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit(kHz)	Conclusion
802.11n HT20	5745	17.707	17.62	500	PASS
	5785	17.707	17.65	500	PASS
	5825	17.738	17.64	500	PASS
802.11n HT40	5755	36.179	36.09	500	PASS
	5795	36.230	36.42	500	PASS
802.11ac HT20	5745	17.715	17.63	500	PASS
	5785	17.701	17.63	500	PASS
	5825	17.756	17.63	500	PASS
802.11ac HT40	5755	36.175	36.09	500	PASS
	5795	36.219	36.41	500	PASS
802.11ac HT80	5775	75.490	75.87	500	PASS

U-NII-1, 802.11n HT20

Carrier frequency (MHz): 5180

U-NII-1, 802.11n HT40

Carrier frequency (MHz): 5190

U-NII-1, 802.11n HT20

Carrier frequency (MHz): 5200

U-NII-1, 802.11n HT40

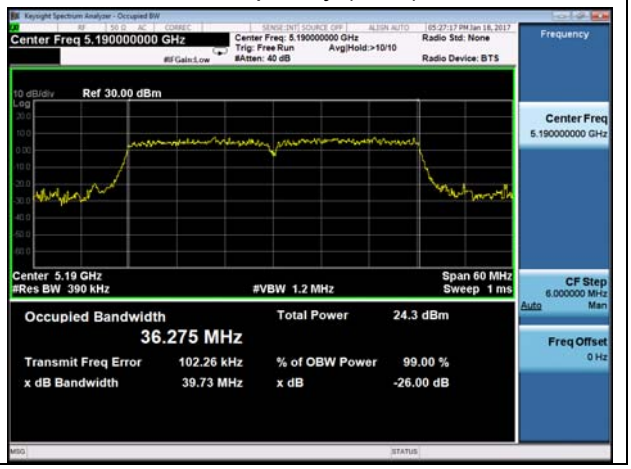
Carrier frequency (MHz): 5230

U-NII-1, 802.11n HT20

Carrier frequency (MHz):5240

U-NII-1, 802.11ac HT40

Carrier frequency (MHz): 5190



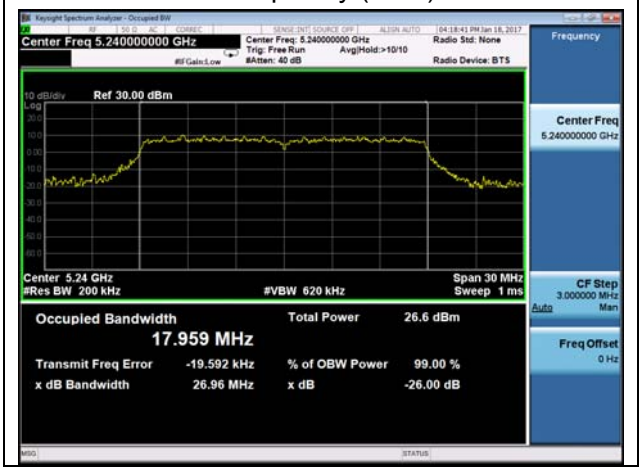
U-NII-1, 802.11ac HT20
Carrier frequency (MHz): 5180

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

U-NII-1, 802.11ac HT20
Carrier frequency (MHz): 5200

U-NII-1, 802.11ac HT80
Carrier frequency (MHz): 5210

U-NII-1, 802.11ac HT20
Carrier frequency (MHz):5240



U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5755

U-NII-3, 802.11ac HT20

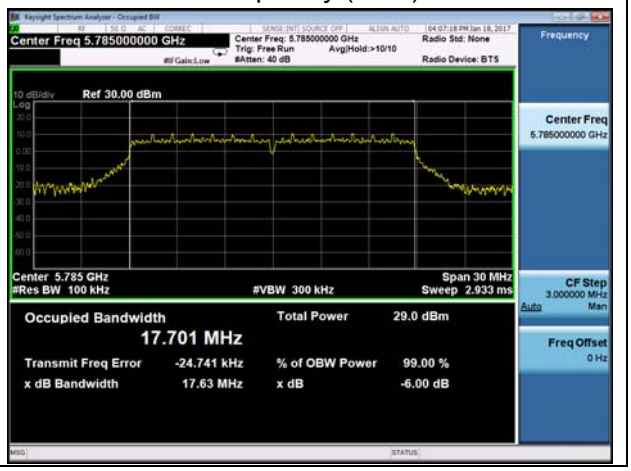
Carrier frequency (MHz): 5745

U-NII-3, 802.11n HT40

Carrier frequency (MHz): 5795

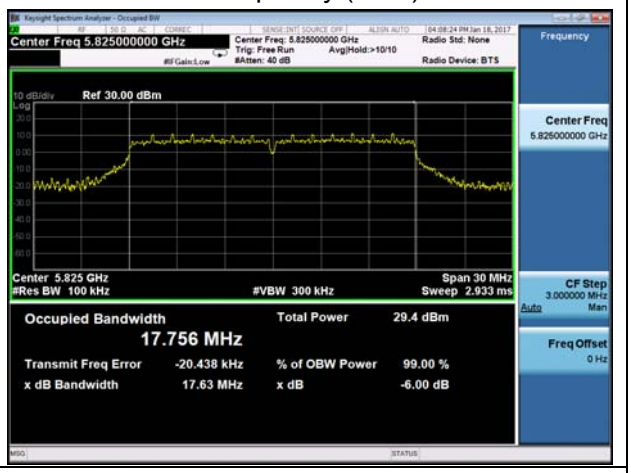
U-NII-3, 802.11ac HT20

Carrier frequency (MHz): 5785



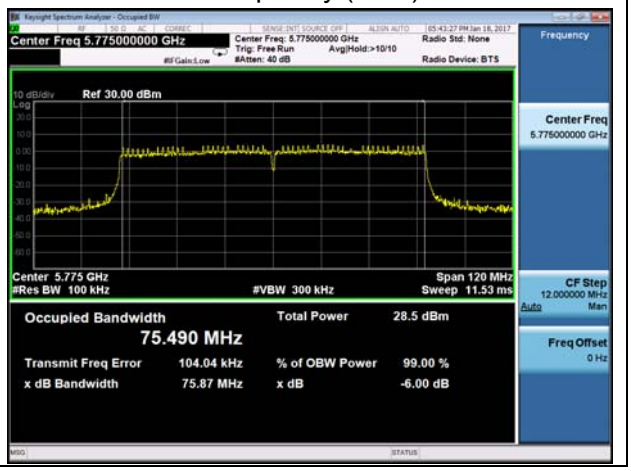
U-NII-3, 802.11ac HT40
Carrier frequency (MHz): 5755

U-NII-3, 802.11ac HT20
Carrier frequency (MHz): 5825



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

U-NII-3, 802.11ac HT80
Carrier frequency (MHz): 5775



5.2. Average Power Output –Conducted

Ambient condition

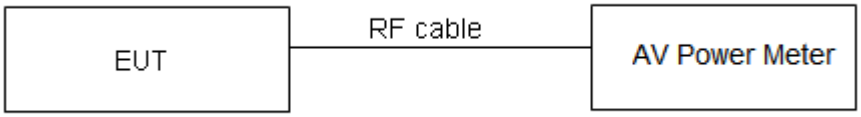
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT was connected to AV 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)

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

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum 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.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Measurement Uncertainty

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

Test Results

Single Antenna 1&2&3&4 Power Index (U-NII-1)				Single Antenna 1&2&3&4 Power Index (U-NII-3)		
Packet Type	**CH36**	**CH40**	**CH48**	**CH149**	**CH157**	**CH165**
802.11a	88	88	88	92	92	92

MIMO Antenna 1&2&3&4 Power Index (U-NII-1)				MIMO Antenna 1&2&3&4 Power Index (U-NII-3)			
Packet Type	**CH36**	**CH40**	**CH48**	**Packet Type**	**CH149**	**CH157**	**CH165**
802.11n HT20	84	84	84	802.11n HT20	84	84	84
802.11ac HT20	84	84	84	802.11ac HT20	84	84	84
Packet Type	**CH38**	**CH46**	**/**	**Packet Type**	**CH151**	**CH159**	**/**
802.11n HT40	72	72	/	802.11n HT40	84	84	/
802.11ac HT40	72	72	/	802.11ac HT40	84	84	/
Packet Type	**CH42**	**/**	**/**	**Packet Type**	**CH155**	**/**	**/**
802.11ac HT80	72	/	/	802.11ac HT80	84	/	/

SISO Antenna 1 U-NII-1

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	22.12	30	PASS
	40/5200	23.08	30	PASS
	48/5240	22.08	30	PASS

SISO Antenna 2 U-NII-1

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	23.19	30	PASS
	40/5200	23.96	30	PASS
	48/5240	22.74	30	PASS

SISO Antenna 3 U-NII-1

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	22.51	30	PASS
	40/5200	23.24	30	PASS
	48/5240	22.36	30	PASS

SISO Antenna 4 U-NII-1

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	23.91	30	PASS
	40/5200	**24.81**	30	PASS
	48/5240	23.92	30	PASS

SISO Antenna 1 U-NII-3

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	22.76	30	PASS
	157/5785	23.22	30	PASS
	165/5825	22.90	30	PASS

SISO Antenna 2 U-NII-3

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	23.20	30	PASS
	157/5785	23.41	30	PASS
	165/5825	23.14	30	PASS

SISO Antenna 3 U-NII-3

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	25.18	30	PASS
	157/5785	**26.02**	30	PASS
	165/5825	25.53	30	PASS

SISO Antenna 4 U-NII-3

Network Standards	Channel/ Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	22.31	30	PASS
	157/5785	22.77	30	PASS
	165/5825	22.40	30	PASS

MIMO without beamforming

U-NII-1

Network Standards		Channel/ Frequency (MHz)	Average Output Power (dBm)					Limit (dBm)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	MIMO		
802.11n HT20	U-NII-1	36/5180	20.36	21.59	21.18	22.44	27.48	30	PASS
		40/5200	21.40	22.26	21.78	23.00	28.17	30	PASS
		48/5240	20.74	21.83	21.27	22.37	27.62	30	PASS
802.11n HT40	U-NII-1	38/5190	17.41	18.25	17.73	18.79	24.10	30	PASS
		46/5230	17.51	18.55	17.98	19.06	24.33	30	PASS
802.11ac HT20	U-NII-1	36/5180	20.73	21.63	21.22	22.37	27.55	30	PASS
		40/5200	21.31	22.03	21.85	22.82	28.06	30	PASS
		48/5240	21.01	21.78	21.13	22.56	27.69	30	PASS
802.11ac HT40	U-NII-1	38/5190	17.45	18.31	17.82	18.75	24.13	30	PASS
		46/5230	17.49	18.61	18.07	19.00	24.35	30	PASS
802.11ac HT80	U-NII-1	42/5210	17.51	18.25	17.91	19.09	24.25	30	PASS

Note: 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 power measurements on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for NANT $\leqslant$ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths $\geqslant$ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less, for 20-MHz channel widths with NANT $\geqslant$ 5.
So directional gain = GANT + Array Gain =3 dBi< 6dBi. So the power limt is 30dBm.

U-NII-3

Network Standards		Channel/ Frequency (MHz)	Average Output Power (dBm)					Limit (dBm)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	MIMO		
802.11n HT20	U-NII-3	149/5745	20.38	20.81	22.62	19.62	27.02	30	PASS
		157/5785	21.21	21.43	23.48	20.34	27.80	30	PASS
		165/5825	20.49	20.76	22.83	19.90	27.17	30	PASS
802.11n HT40	U-NII-3	151/5755	20.88	21.07	23.29	20.25	27.56	30	PASS
		159/5795	20.79	20.92	23.07	20.22	27.42	30	PASS
802.11ac HT20	U-NII-3	149/5745	20.24	20.76	22.7	19.68	27.02	30	PASS
		157/5785	20.81	21.38	23.31	20.46	27.66	30	PASS
		165/5825	20.62	20.63	23.05	19.81	27.23	30	PASS
802.11ac HT40	U-NII-3	151/5755	20.94	21.05	23.23	20.31	27.55	30	PASS
		159/5795	20.83	20.89	23.14	20.33	27.46	30	PASS
802.11ac HT80	U-NII-3	155/5775	19.35	19.87	22.26	19.05	26.35	30	PASS

Note：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 power measurements on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for NANT ⩽ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ⩾ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less, for 20-MHz channel widths with NANT ⩾ 5.
So directional gain = GANT + Array Gain =3 dBi< 6dBi. So the power limt is 30dBm.

MIMO with beamforming

MIMO Antenna 1 Power Index						
Packet Type	**CH36**	**CH40**	**CH48**	**CH149**	**CH157**	**CH165**
802.11n HT20	85	86	85	100	100	100
802.11ac HT20	85	85	85	98	98	100
Packet Type	**CH38**	**CH46**	**CH151**	**CH159**	**CH102**	**CH110**
802.11n HT40	87	87	99	99	/	/
802.11ac HT40	86	86	97	97	/	/
Packet Type	**CH42**	**CH155**	/	/	/	/
802.11ac HT80	87	106	/	/	/	/
MIMO Antenna 2 Power Index						
Packet Type	**CH36**	**CH40**	**CH48**	**CH149**	**CH157**	**CH165**
802.11n HT20	85	86	85	98	98	98
802.11ac HT20	85	85	84	96	96	96
Packet Type	**CH38**	**CH46**	**CH151**	**CH159**	/	/
802.11n HT40	85	85	97	97	/	/
802.11ac HT40	84	83	95	95	/	/
Packet Type	**CH42**	**CH155**	/	/	/	/
802.11ac HT80	85	100	/	/	/	/
MIMO Antenna 3 Power Index						
Packet Type	**CH36**	**CH40**	**CH48**	**CH149**	**CH157**	**CH165**
802.11n HT20	85	86	85	102	102	102
802.11ac HT20	83	83	83	100	100	100
Packet Type	**CH38**	**CH46**	**CH151**	**CH159**	/	/
802.11n HT40	85	85	100	100	/	/
802.11ac HT40	84	84	99	99	/	/
Packet Type	**CH42**	**CH155**	/	/	/	/
802.11ac HT80	85	105	/	/	/	/
MIMO Antenna 4 Power Index						
Packet Type	**CH36**	**CH40**	**CH48**	**CH149**	**CH157**	**CH165**
802.11n HT20	83	84	83	100	100	100
802.11ac HT20	81	81	81	99	99	99
Packet Type	**CH38**	**CH46**	**CH151**	**CH159**	/	/
802.11n HT40	84	84	99	99	/	/
802.11ac HT40	83	83	97	97	/	/
Packet Type	**CH42**	**CH155**	/	/	/	/
802.11ac HT80	85	105	/	/	/	/

MIMO with beamforming

Network Standards		Channel/ Frequency (MHz)	Output Power (dBm)					Limit (dBm)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	Total		
802.11n HT20	U-NII-1	36/5180	20.23	20.34	20.45	20.29	26.35	26.98	PASS
		40/5200	20.22	20.33	20.45	20.56	26.41	26.98	PASS
		48/5240	20.36	20.29	20.35	20.48	26.39	26.98	PASS
802.11n HT40	U-NII-1	38/5190	20.54	20.49	20.57	20.63	26.58	26.98	PASS
		46/5230	20.38	20.49	20.47	20.61	26.51	26.98	PASS
802.11ac HT20	U-NII-1	36/5180	20.19	20.11	20.07	20.26	26.18	26.98	PASS
		40/5200	20.26	20.36	20.13	20.28	26.28	26.98	PASS
		48/5240	20.04	20.21	20.09	20.25	26.17	26.98	PASS
802.11ac HT40	U-NII-1	38/5190	20.32	20.26	20.26	20.46	26.35	26.98	PASS
		46/5230	20.31	20.44	20.34	20.38	26.39	26.98	PASS
802.11ac HT80	U-NII-1	42/5210	20.30	20.39	20.32	20.48	26.40	26.98	PASS
Note: 1. Direction gain calculation according to KDB662911 D01 Multiple Transmitter Output v02r01 F) 2) e）(i),If all antennas have the same gain, directional gain = GANT + 10 log(NANT/NSS)=3+10log（4/1）=9.02 dBi＞6dBi. So the limt= used limit+(6dBi- directional gain) dBm.									

Network Standards		Channel/ Frequency (MHz)	Output Power (dBm)					Limit (dBm)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	Total		
802.11n HT20	U-NII-3	149/5745	20.26	20.37	19.99	20.07	26.20	26.98	PASS
		157/5785	20.13	20.25	20.27	20.20	26.23	26.98	PASS
		165/5825	20.22	20.35	20.27	20.04	26.24	26.98	PASS
802.11n HT40	U-NII-3	151/5755	20.54	20.73	20.45	20.75	26.64	26.98	PASS
		159/5795	20.31	20.50	20.02	20.41	26.33	26.98	PASS
802.11ac HT20	U-NII-3	149/5745	20.20	19.96	19.89	20.17	26.08	26.98	PASS
		157/5785	19.77	20.01	19.94	20.08	25.97	26.98	PASS
		165/5825	20.03	19.81	19.70	19.88	25.88	26.98	PASS
802.11ac HT40	U-NII-3	151/5755	20.24	20.13	20.29	20.00	26.19	26.98	PASS
		159/5795	20.03	20.14	20.20	19.77	26.06	26.98	PASS
802.11ac HT80	U-NII-3	155/5775	20.25	20.40	20.21	20.39	26.34	26.98	PASS
Note: 1. Direction gain calculation according to KDB662911 D01 Multiple Transmitter Output v02r01 F) 2) e）(i),If all antennas have the same gain, directional gain = GANT + 10 log(NANT/NSS)=3+10log（4/1）=9.02 dBi＞6dBi. So the limt= used limit+(6dBi- directional gain) dBm.									

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
120	-20	5199.957	5199.957	5199.952	5199.951
120	-10	5199.952	5199.952	5199.958	5199.955
120	0	5199.957	5199.957	5199.951	5199.954
120	10	5199.959	5199.959	5199.951	5199.951
120	20	5199.954	5199.954	5199.960	5199.951
120	30	5199.955	5199.955	5199.958	5199.958
120	40	5199.958	5199.958	5199.958	5199.958
120	50	5199.956	5199.956	5199.958	5199.958
90	20	5199.952	5199.952	5199.960	5199.955
264	20	5199.951	5199.951	5199.959	5199.952
MHz		0.049	0.050	0.049	0.049
PPM		0.001	0.001	0.001	0.001

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
120	-20	5784.954	5784.955	5784.952	5784.954
120	-10	5784.957	5784.953	5784.953	5784.951
120	0	5784.952	5784.954	5784.954	5784.959
120	10	5784.955	5784.956	5784.958	5784.952
120	20	5784.951	5784.954	5784.953	5784.950
120	30	5784.954	5784.957	5784.959	5784.957
120	40	5784.955	5784.958	5784.956	5784.956
120	50	5784.952	5784.958	5784.950	5784.958
90	20	5784.959	5784.957	5784.959	5784.954
264	20	5784.952	5784.960	5784.958	5784.958
MHz		0.049	0.047	0.050	0.050
PPM		0.00095	0.00090	0.00096	0.00096

5.4. Power Spectral Density

Ambient condition

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

Method of Measurement

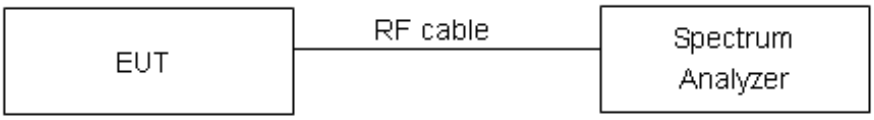
The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable.

Set RBW = 510kHz, 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:

SISO Antenna 1 U-NII-1

Network Standards	Channel Number	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	9.507	17	PASS
	40	9.408	17	PASS
	48	9.399	17	PASS

SISO Antenna 2 U-NII-1

Network Standards	Channel Number	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	10.193	17	PASS
	40	10.334	17	PASS
	48	9.522	17	PASS

SISO Antenna 3 U-NII-1

Network Standards	Channel Number	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	9.594	17	PASS
	40	9.480	17	PASS
	48	9.338	17	PASS

SISO Antenna 4 U-NII-1

Network Standards	Channel Number	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	10.830	17	PASS
	40	10.534	17	PASS
	48	10.166	17	PASS

SISO Antenna 1 U-NII-3

Network Standards	Channel Number	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149	5.753	30	PASS
	157	5.949	30	PASS
	165	6.237	30	PASS

SISO Antenna 2 U-NII-3

Network Standards	Channel Number	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149	6.454	30	PASS
	157	7.001	30	PASS
	165	7.909	30	PASS

SISO Antenna 3 U-NII-3

Network Standards	Channel Number	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149	7.045	30	PASS
	157	7.508	30	PASS
	165	8.017	30	PASS

SISO Antenna 4 U-NII-3

Network Standards	Channel Number	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149	5.276	30	PASS
	157	5.351	30	PASS
	165	5.994	30	PASS

MIMO without beamforming

U-NII-1

Network Standards		Channel/ Frequency (MHz)	Power Spectral Density (dBm /MHz)					Limit (dBm / MHz)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	MIMO		
802.11n HT20	U-NII-1	36/5180	7.573	7.976	7.532	7.581	13.690	13.98	PASS
		40/5200	7.414	8.167	7.513	7.778	13.748	13.98	PASS
		48/5240	7.507	7.709	7.249	8.329	13.738	13.98	PASS
802.11n HT40	U-NII-1	38/5190	1.918	2.809	1.731	2.075	8.174	13.98	PASS
		46/5230	1.519	1.591	0.977	2.053	7.572	13.98	PASS
802.11ac HT20	U-NII-1	36/5180	7.509	8.228	7.405	8.364	13.918	13.98	PASS
		40/5200	7.962	7.948	7.750	8.157	13.977	13.98	PASS
		48/5240	7.352	8.125	7.230	8.093	13.740	13.98	PASS
802.11ac HT40	U-NII-1	38/5190	1.494	2.605	1.702	2.180	8.037	13.98	PASS
		46/5230	1.029	1.951	0.853	2.299	7.596	13.98	PASS
802.11ac HT80	U-NII-1	42/5210	-0.556	0.089	-0.646	0.589	5.919	13.98	PASS

Note: 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=3+10log（4/1）=9.02＞6dBi.
So the limt=used limit+(6dBi- directional gain) dBm.

U-NII-3

Network Standards		Channel/ Frequency (MHz)	Power Spectral Density (dBm /MHz)					Limit (dBm / MHz)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	MIMO		
802.11n HT20	U-NII-3	149/5745	3.049	4.235	4.263	2.840	9.667	26.98	PASS
		157/5785	3.385	4.144	5.094	2.898	9.981	26.98	PASS
		165/5825	4.284	4.679	5.497	3.355	10.542	26.98	PASS
802.11n HT40	U-NII-3	151/5755	-0.601	1.266	1.242	-0.215	6.524	26.98	PASS
		159/5795	1.182	1.469	2.107	-0.064	7.263	26.98	PASS
802.11ac HT20	U-NII-3	149/5745	3.133	4.233	4.566	2.478	9.703	26.98	PASS
		157/5785	3.815	4.442	4.691	2.786	10.014	26.98	PASS
		165/5825	3.902	4.823	5.660	3.079	10.494	26.98	PASS
802.11ac HT40	U-NII-3	151/5755	-0.176	1.379	1.164	-0.164	6.632	26.98	PASS
		159/5795	0.876	0.860	2.007	-0.130	6.990	26.98	PASS
802.11ac HT80	U-NII-3	155/5775	-3.930	-2.968	-2.464	-5.093	2.519	26.98	PASS

Note: 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=3+10log（4/1）=9.02＞6dBi.

So the limt=used limit+(6dBi- directional gain) dBm.

MIMO with beamforming

U-NII-1

Network Standards		Channel/ Frequency (MHz)	Power Spectral Density (dBm / MHz)					Limit (dBm / MHz)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	Total		
802.11n HT20	U-NII-1	36/5180	5.54	6.19	6.82	6.83	12.40	13.98	PASS
		40/5200	5.42	5.82	6.60	6.23	12.06	13.98	PASS
		48/5240	6.20	6.62	7.02	6.98	12.74	13.98	PASS
802.11n HT40	U-NII-1	38/5190	3.41	2.75	3.95	4.03	9.58	13.98	PASS
		46/5230	3.30	3.75	3.66	3.43	9.56	13.98	PASS
802.11ac HT20	U-NII-1	36/5180	5.64	6.15	5.98	6.47	12.09	13.98	PASS
		40/5200	5.94	5.98	5.94	5.75	11.92	13.98	PASS
		48/5240	5.99	6.51	6.25	6.49	12.33	13.98	PASS
802.11ac HT40	U-NII-1	38/5190	3.50	3.03	3.60	2.93	9.29	13.98	PASS
		46/5230	3.33	3.09	3.36	3.16	9.25	13.98	PASS
802.11ac HT80	U-NII-1	42/5210	0.86	1.48	2.22	1.44	7.55	13.98	PASS
Note:Direction gain calculation according to KDB662911 D01 Multiple Transmitter Output v02r01 F) 2) e）(i),If all antennas have the same gain, directional gain = GANT + 10 log(NANT/NSS)=3+10log（4/1）=9.02 dBi＞6dBi. So the limt=used limit+(6dBi- directional gain) dBm.									

U-NII-3

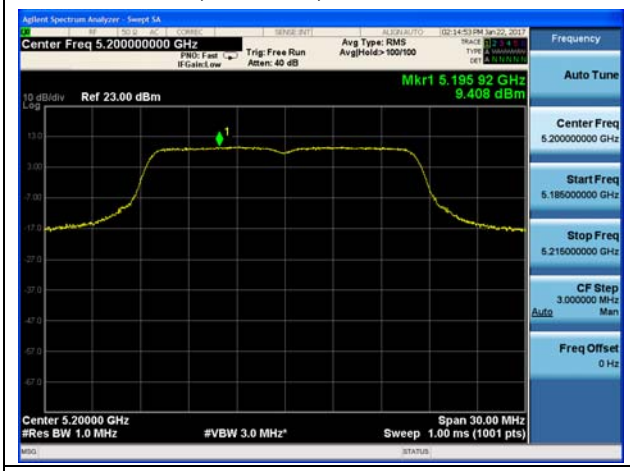
Network Standards		Channel/ Frequency (MHz)	Power Spectral Density(dBm / MHz)					Limit (dBm / MHz)	Conclusion
MIMO Antenna			ANT1	ANT2	ANT3	ANT4	Total		
802.11n HT20	U-NII-3	149/5745	4.96	6.54	5.15	5.56	11.62	26.98	PASS
		157/5785	5.54	5.83	5.85	5.62	11.73	26.98	PASS
		165/5825	5.66	5.91	5.74	5.59	11.75	26.98	PASS
802.11n HT40	U-NII-3	151/5755	2.78	3.36	2.79	2.94	8.99	26.98	PASS
		159/5795	2.53	3.16	2.90	2.97	8.92	26.98	PASS
802.11ac HT20	U-NvII-3	149/5745	5.42	5.99	5.53	6.19	11.81	26.98	PASS
		157/5785	5.44	6.12	5.38	5.97	11.76	26.98	PASS
		165/5825	5.55	6.14	5.88	5.99	11.92	26.98	PASS
802.11ac HT40	U-NII-3	151/5755	2.54	3.17	3.71	2.99	9.14	26.98	PASS
		159/5795	1.90	3.32	3.42	2.81	8.92	26.98	PASS
802.11ac HT80	U-NII-3	155/5775	0.048	-0.531	-0.500	-0.184	5.74	26.98	PASS
Note:Direction gain calculation according to KDB662911 D01 Multiple Transmitter Output v02r01 F) 2) e）(i),If all antennas have the same gain, directional gain = GANT + 10 log(NANT/NSS)=3+10log（4/1）=9.02 dBi＞6dBi. So the limt=used limit+(6dBi- directional gain) dBm.									

SISO Antenna 1

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

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

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



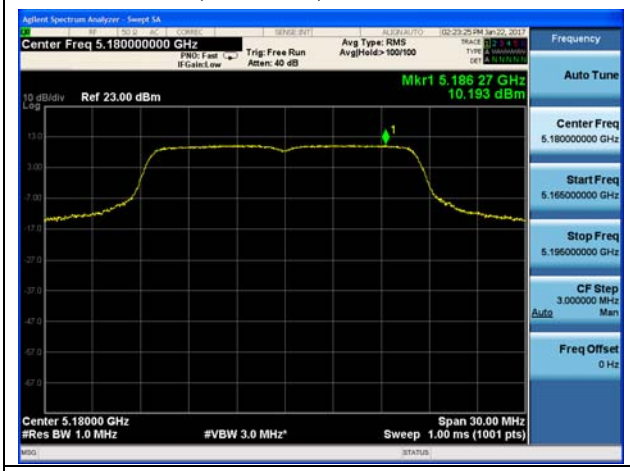
U-NII-3, 802.11a, Channel No.: 157

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

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

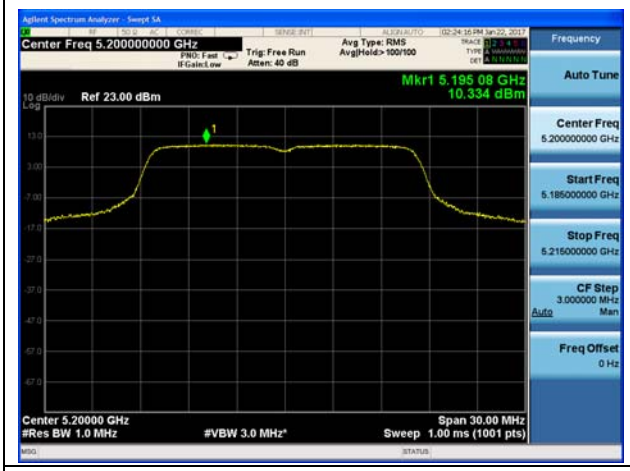
SISO Antenna 2

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



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

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



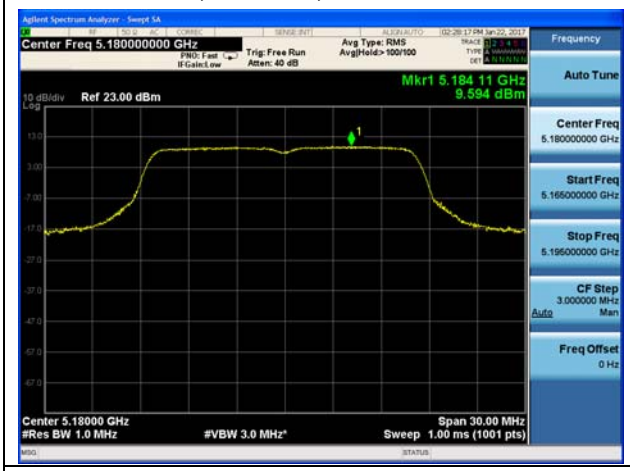
U-NII-3, 802.11a, Channel No.: 157

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

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

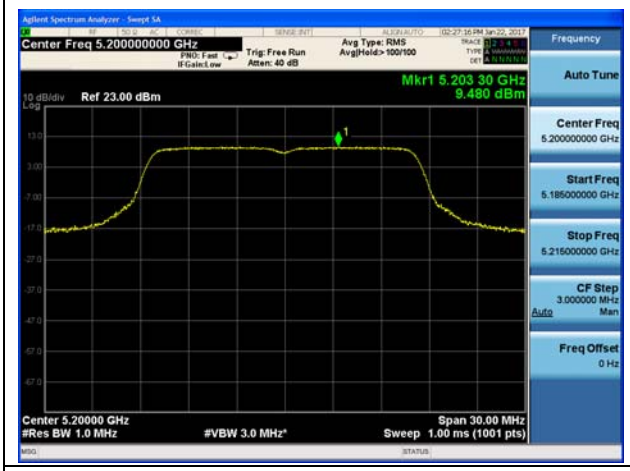
SISO Antenna 3

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



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

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



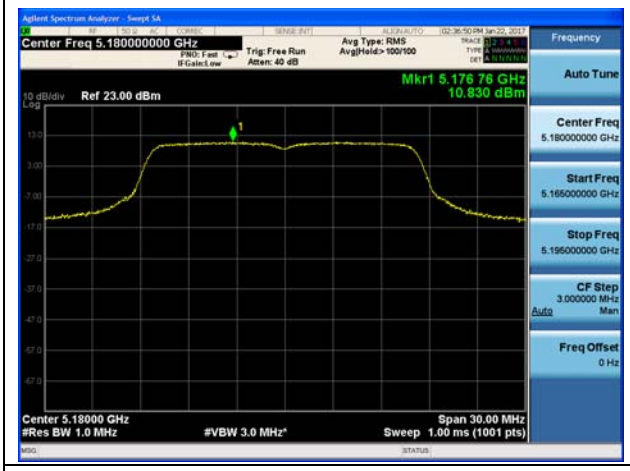
U-NII-3, 802.11a, Channel No.: 157

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

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

SISO Antenna 4

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

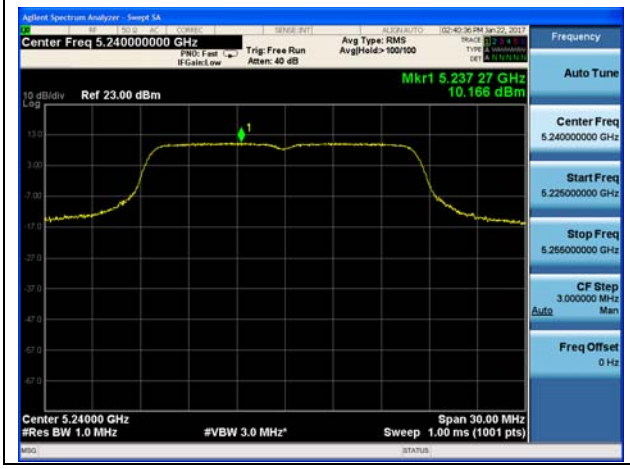


U-NII-3, 802.11a, Channel No.: 149

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

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

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

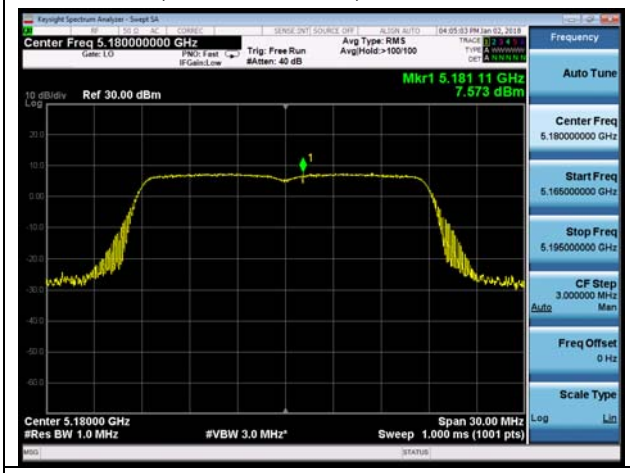


U-NII-3, 802.11a, Channel No.: 165

MIMO without beamforming

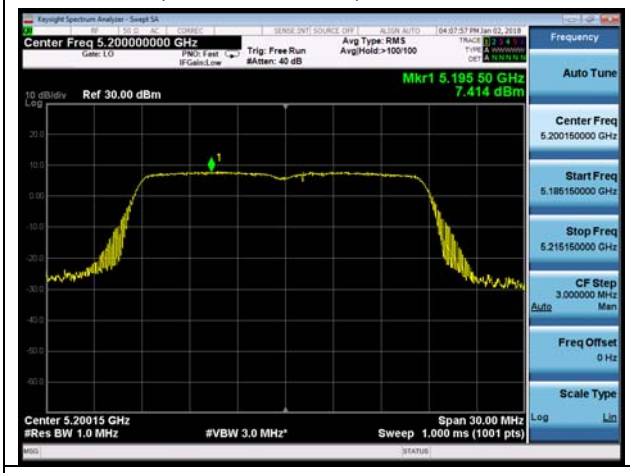
MIMO Antenna 1

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



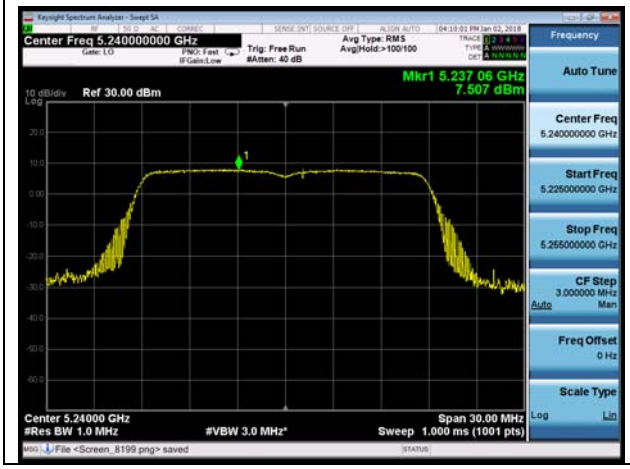
U-NII-1, 802.11n HT40, Channel No.: 38

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

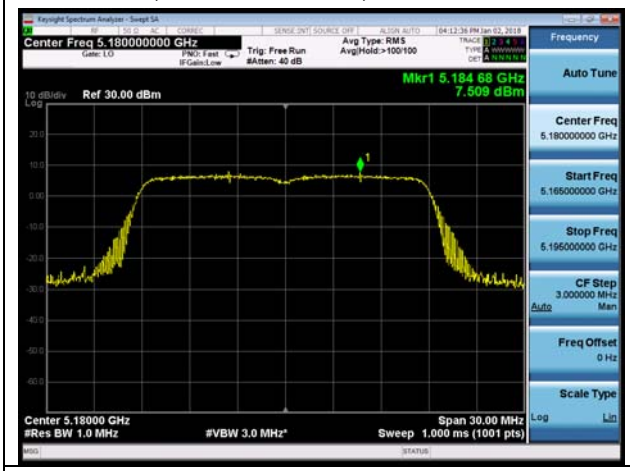


U-NII-1, 802.11n HT40, Channel No.: 46

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

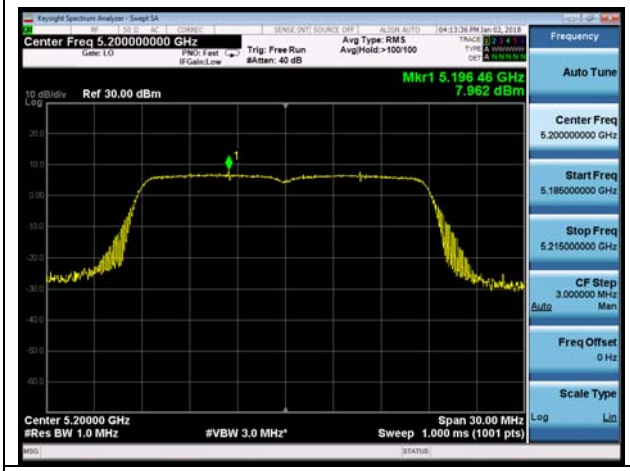


U-NII-1, 802.11ac HT20, Channel No.: 36



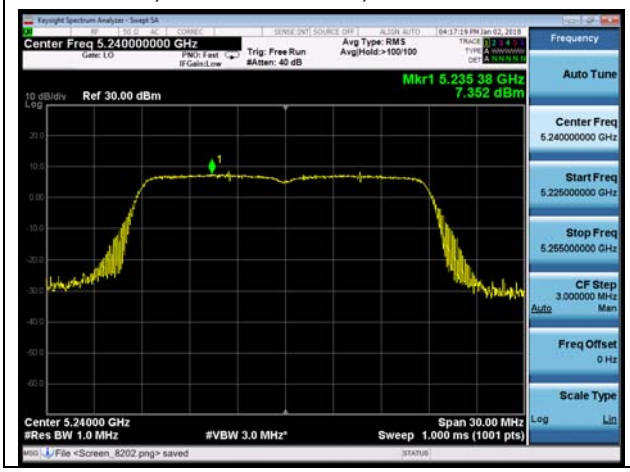
U-NII-1, 802.11ac HT40, Channel No.: 38

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



U-NII-1, 802.11ac HT80, Channel No.: 42

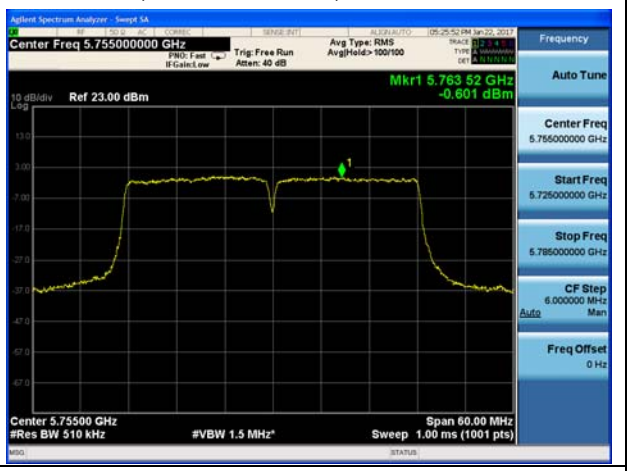
U-NII-1, 802.11ac HT20, Channel No.: 48



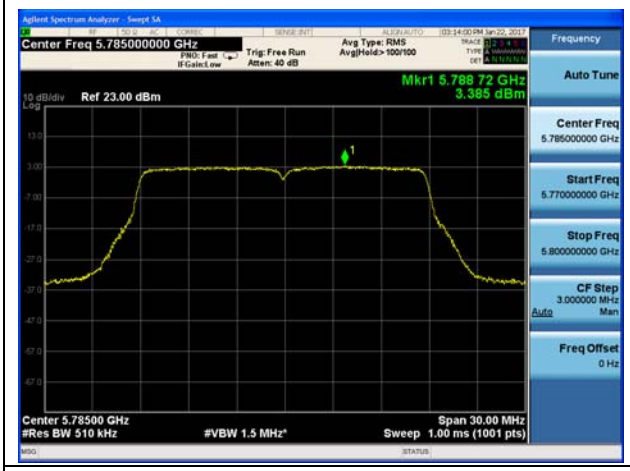
U-NII-1 802.11ac HT40, Channel No.:46

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

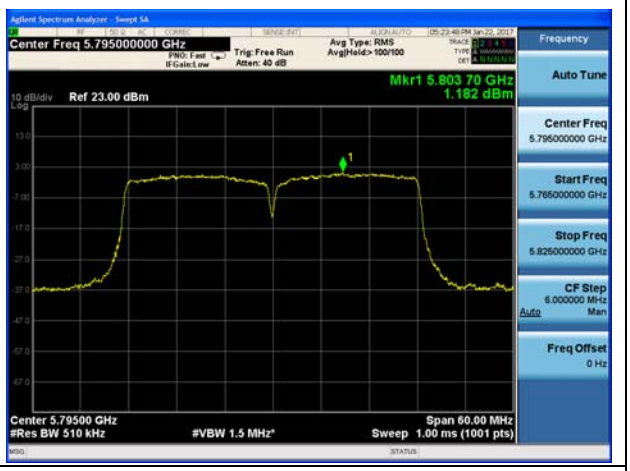
U-NII-3, 802.11n HT40, Channel No.: 151



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

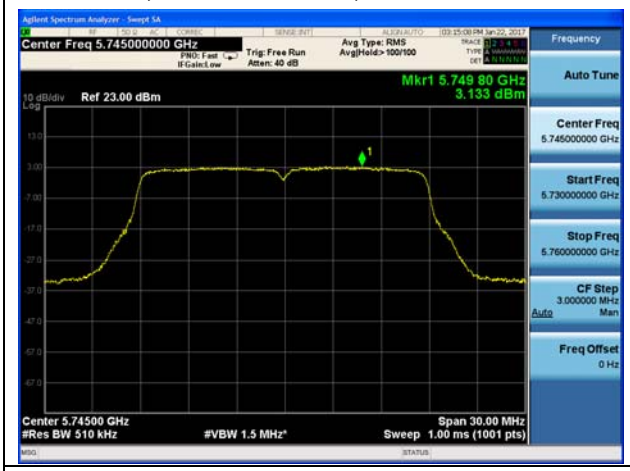


U-NII-3, 802.11n HT40, Channel No.: 159

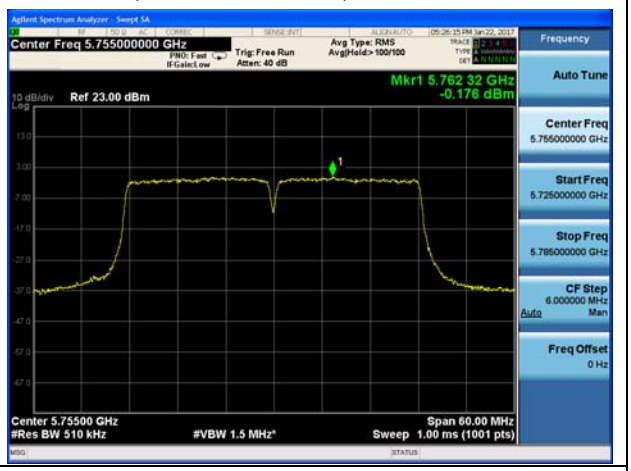


U-NII-3, 802.11n HT20, Channel No.: 165

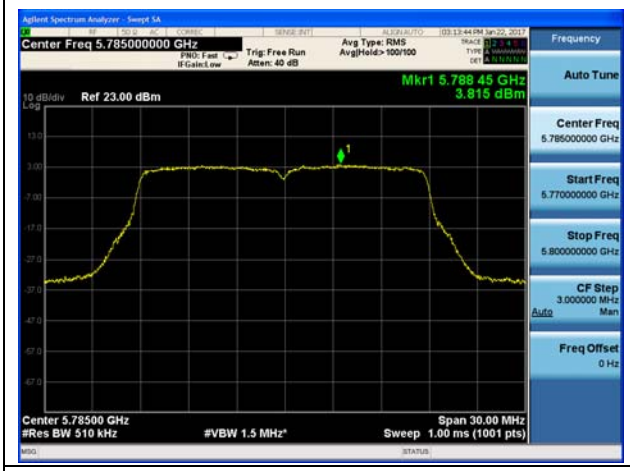
U-NII-3, 802.11ac HT20, Channel No.: 149



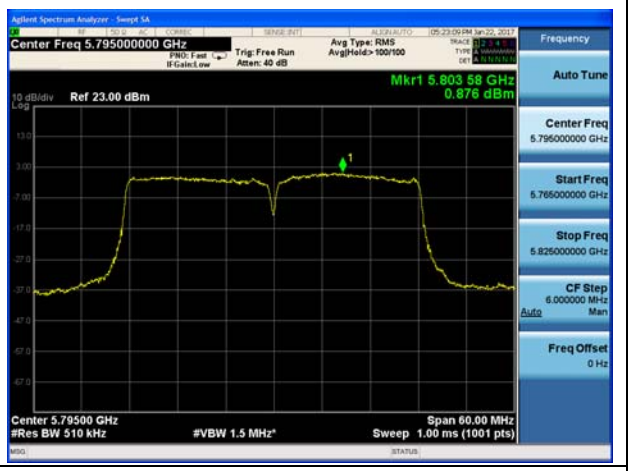
U-NII-3, 802.11ac HT40, Channel No.: 151



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

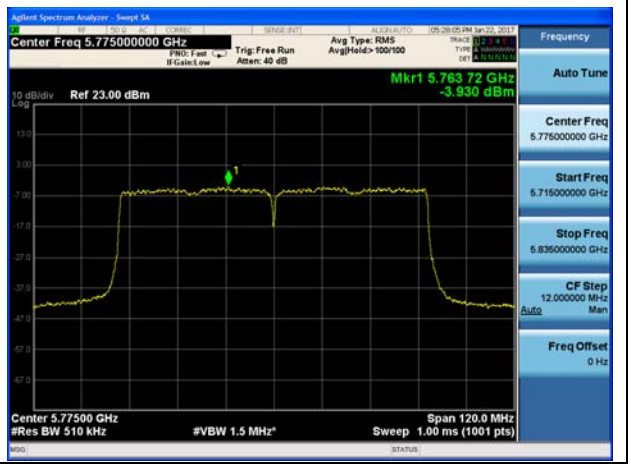


U-NII-3, 802.11ac HT40, Channel No.: 159



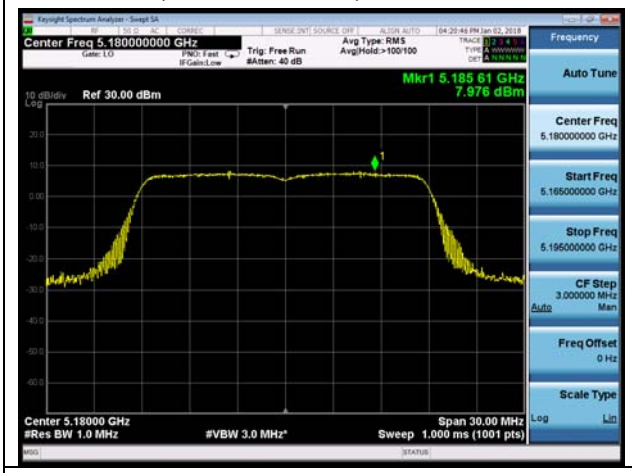
U-NII-3, 802.11ac HT20, Channel No.: 165

U-NII-3, 802.11ac HT80, Channel No.: 155

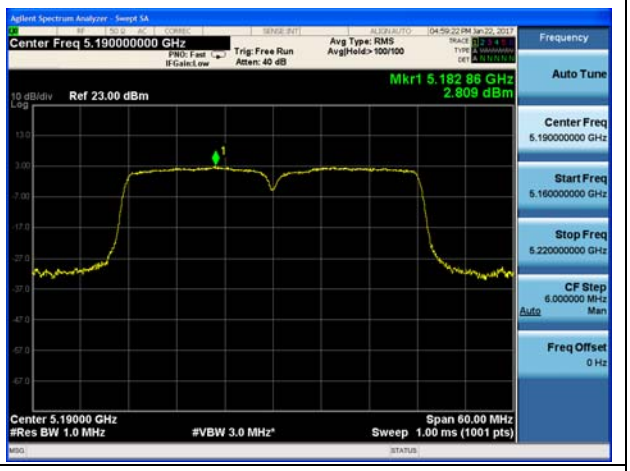


MIMO Antenna 2

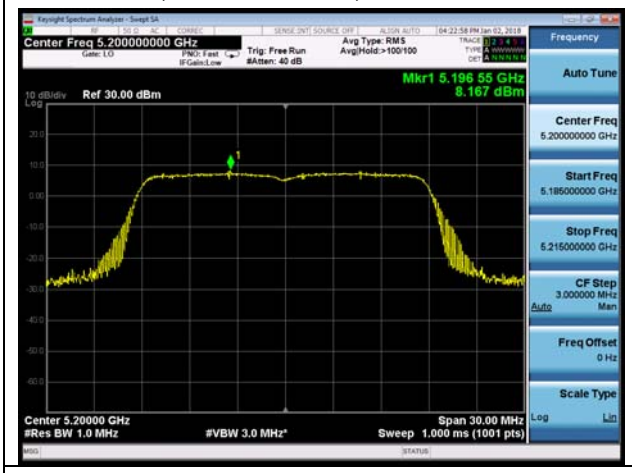
U-NII-1, 802.11n HT20, Channel No.: 36



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

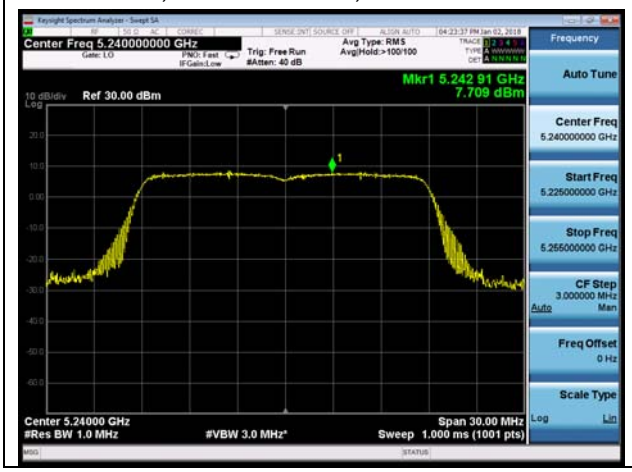


U-NII-1, 802.11n HT20, Channel No.: 40



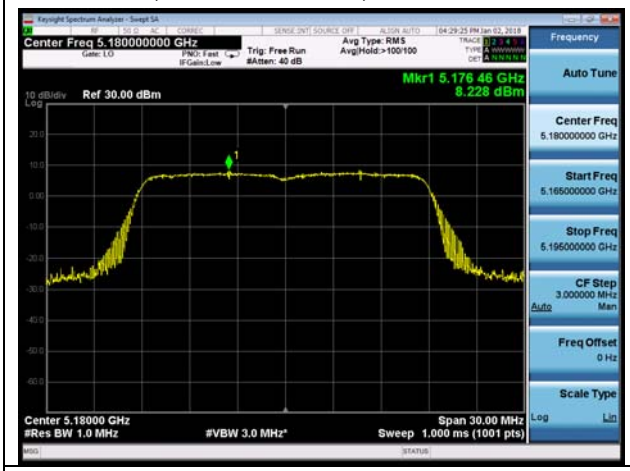
U-NII-1, 802.11n HT40, Channel No.: 46

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



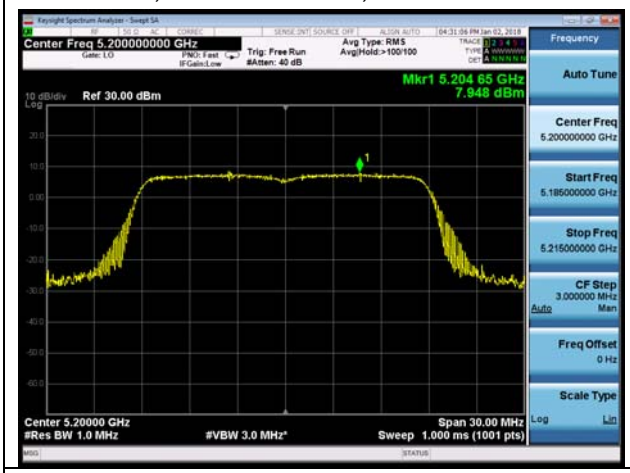
U-NII-1, 802.11ac HT40, Channel No.: 38

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

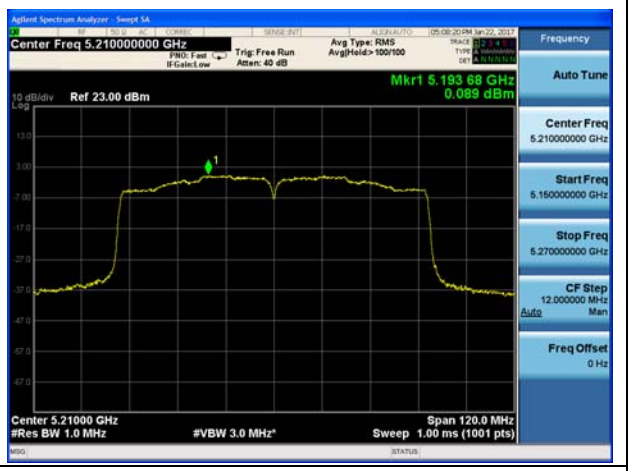


U-NII-1, 802.11ac HT40, Channel No.: 46

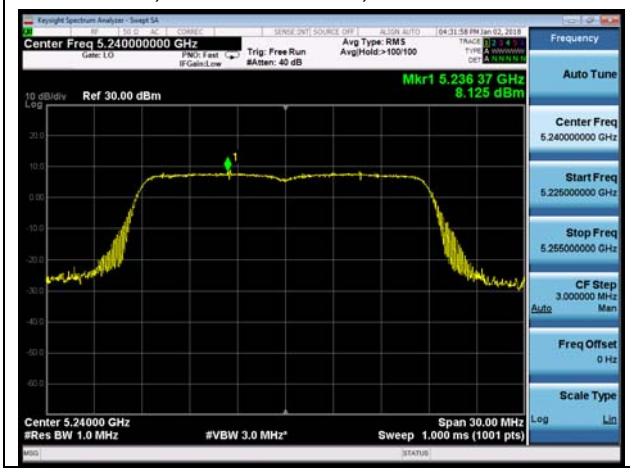
U-NII-1, 802.11ac HT20, Channel No.: 40



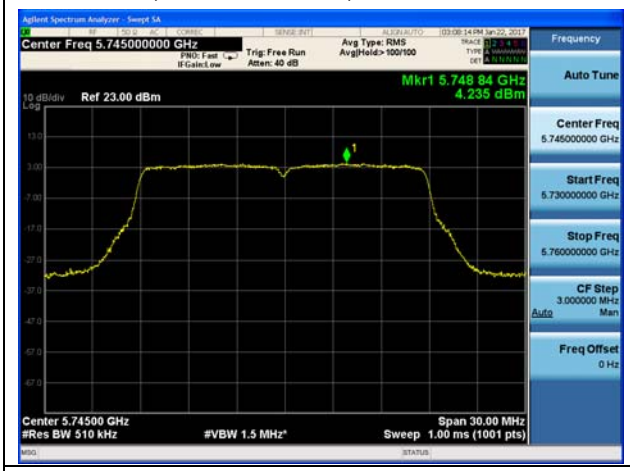
U-NII-1, 802.11ac HT80, Channel No.: 42



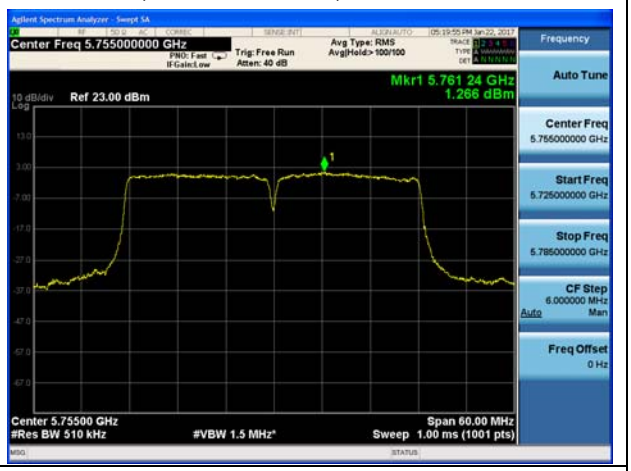
U-NII-1, 802.11ac HT20, Channel No.: 48



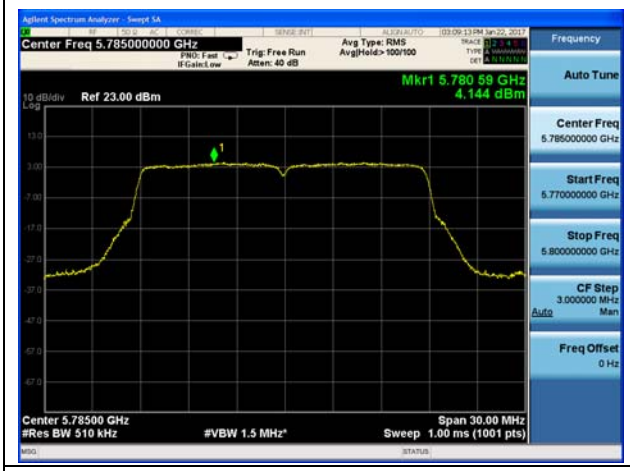
U-NII-3, 802.11n HT20, Channel No.: 149



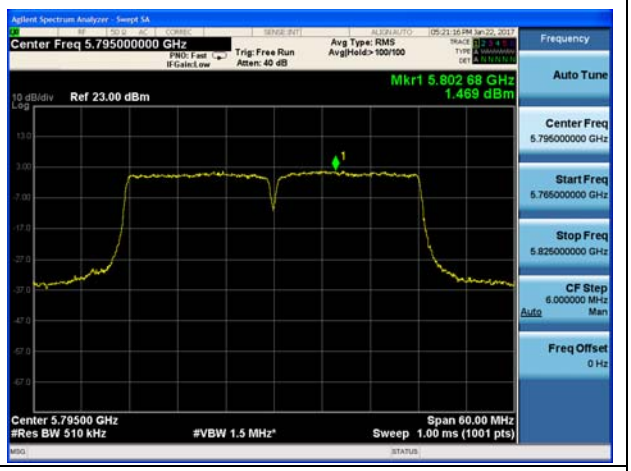
U-NII-3, 802.11n HT40, Channel No.: 151



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

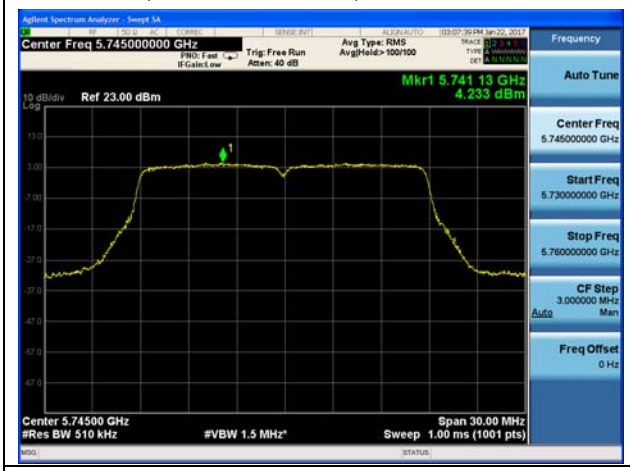


U-NII-3, 802.11n HT40, Channel No.: 159

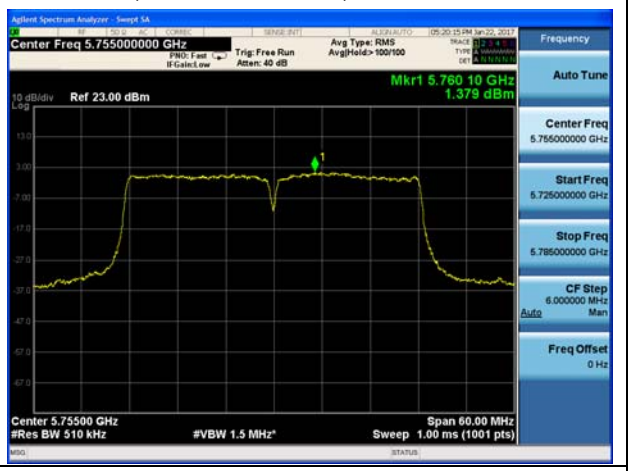


U-NII-3, 802.11n HT20, Channel No.: 165

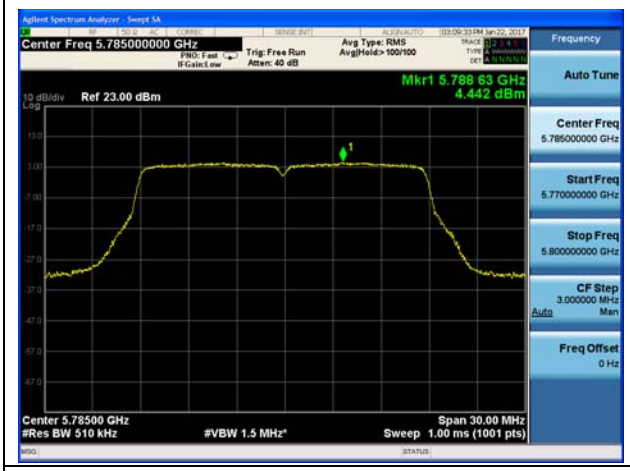
U-NII-3, 802.11ac HT20, Channel No.: 149



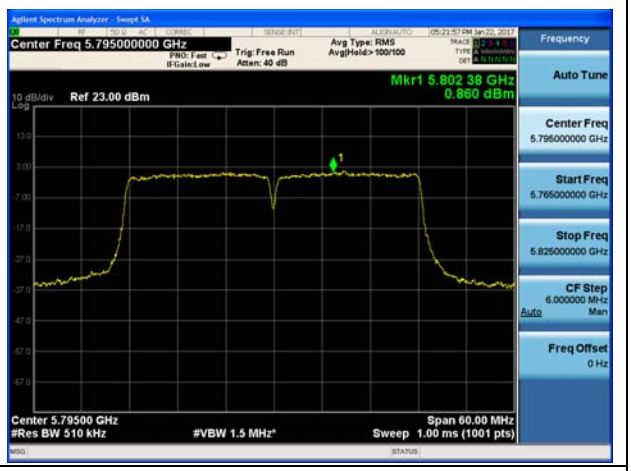
U-NII-3, 802.11ac HT40, Channel No.: 151



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



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

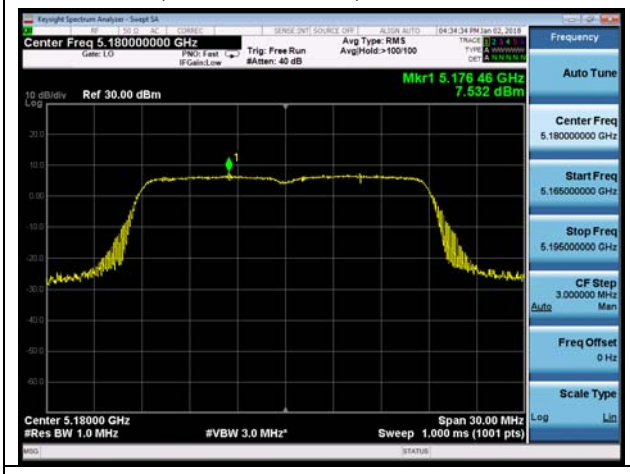


U-NII-3, 802.11ac HT20, Channel No.: 165

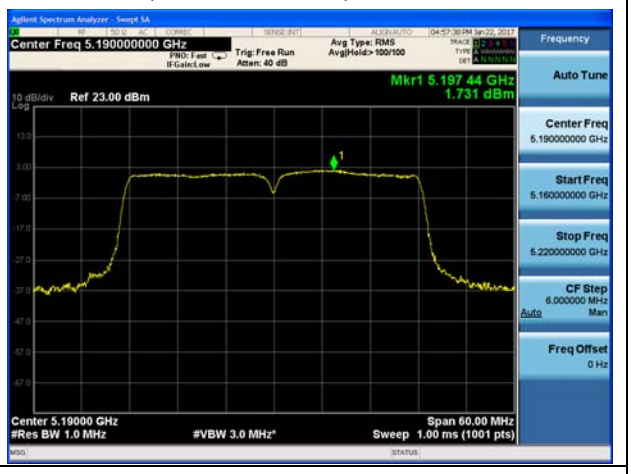
U-NII-3, 802.11ac HT80, Channel No.: 155

MIMO Antenna 3

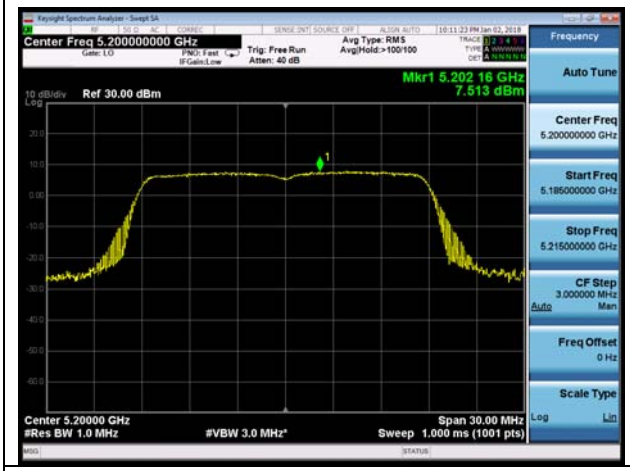
U-NII-1, 802.11n HT20, Channel No.: 36



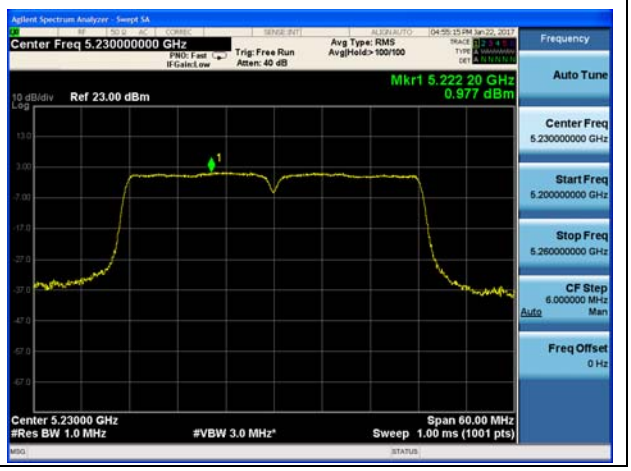
U-NII-1, 802.11n HT40, Channel No.: 38



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

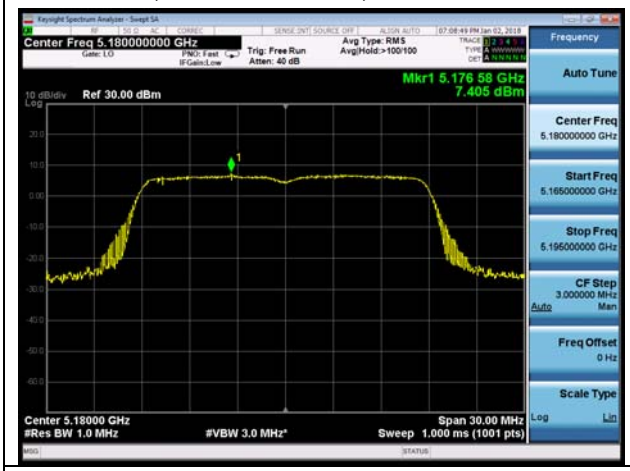


U-NII-1, 802.11n HT40, Channel No.: 46

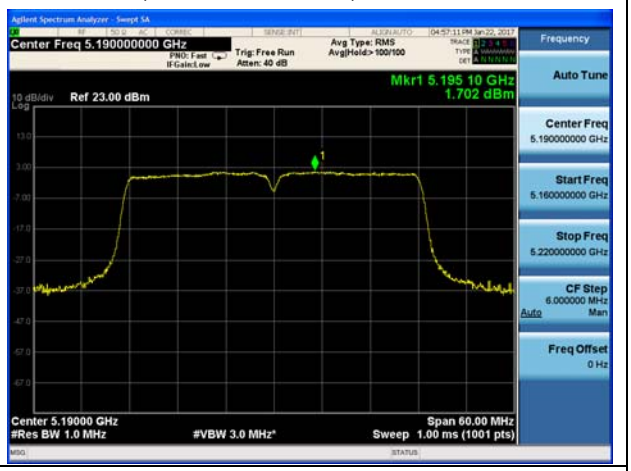


U-NII-1, 802.11n HT20, Channel No.: 48

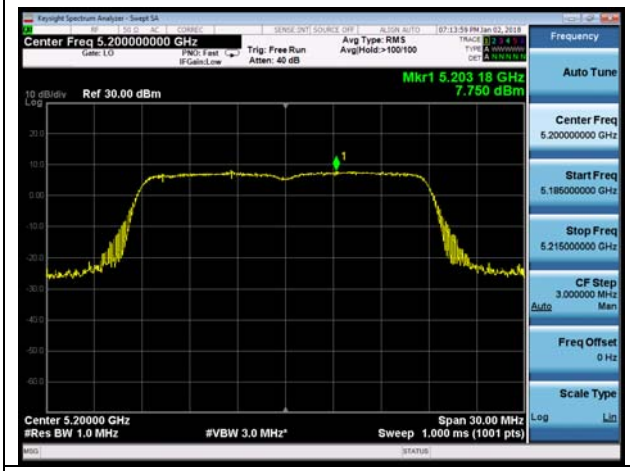
U-NII-1, 802.11ac HT20, Channel No.: 36



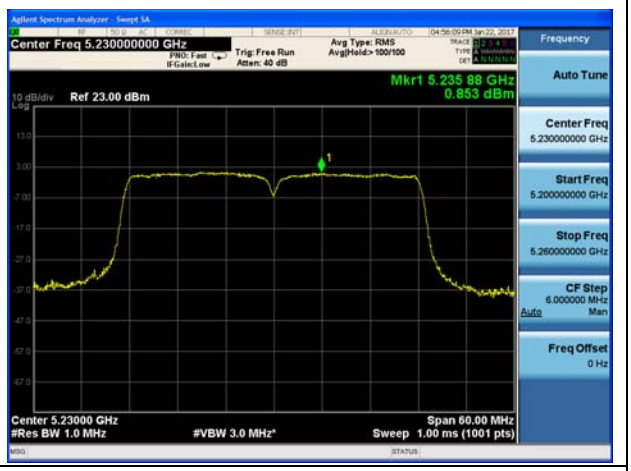
U-NII-1, 802.11ac HT40, Channel No.: 38



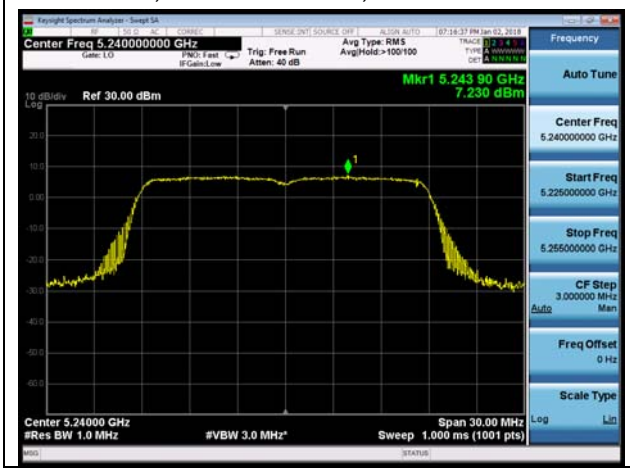
U-NII-1, 802.11ac HT20, Channel No.: 40



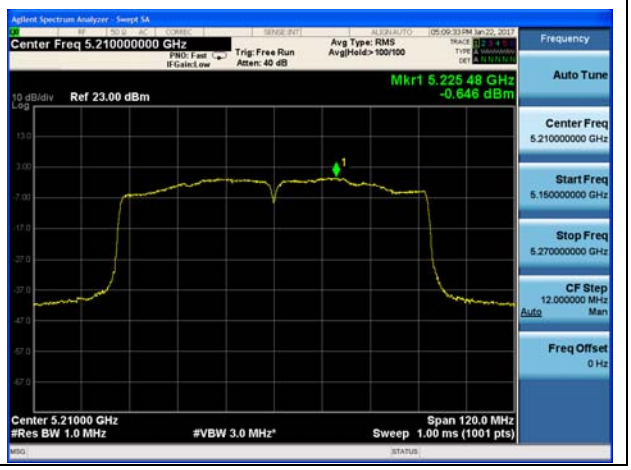
U-NII-1, 802.11ac HT40, Channel No.: 46



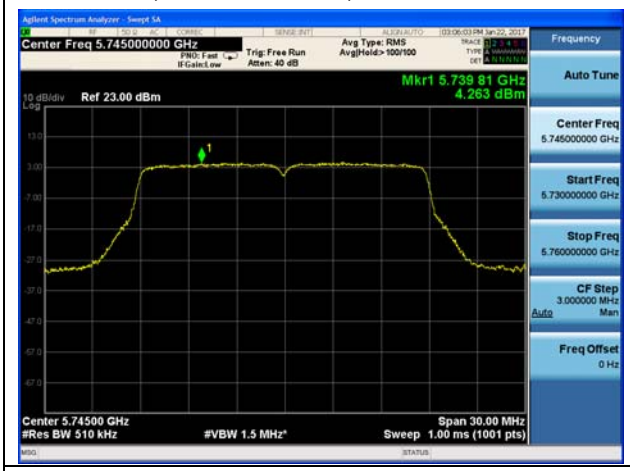
U-NII-1, 802.11ac HT20, Channel No.: 48



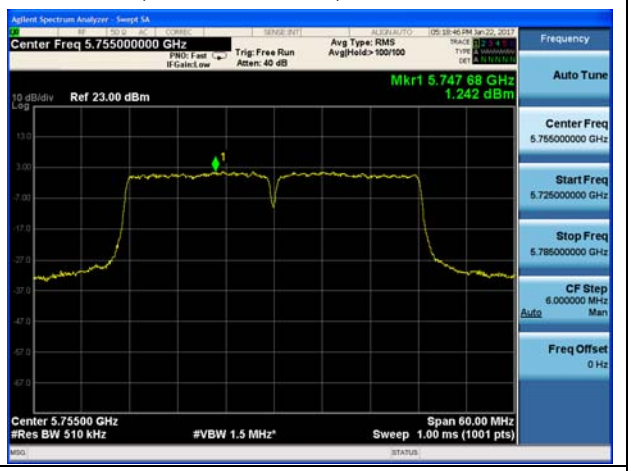
U-NII-1, 802.11ac HT80, Channel No.: 42



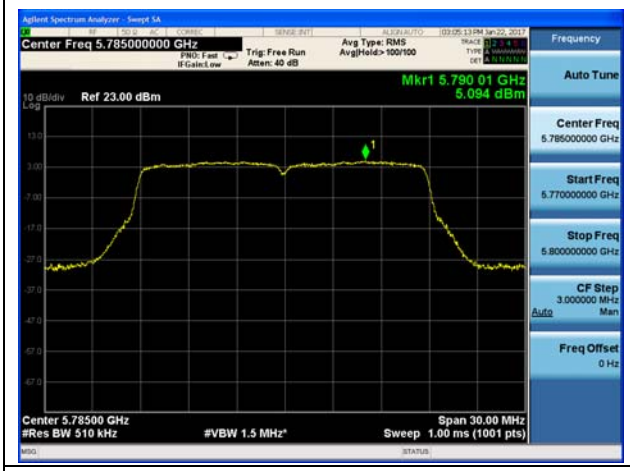
U-NII-3, 802.11n HT20, Channel No.: 149



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

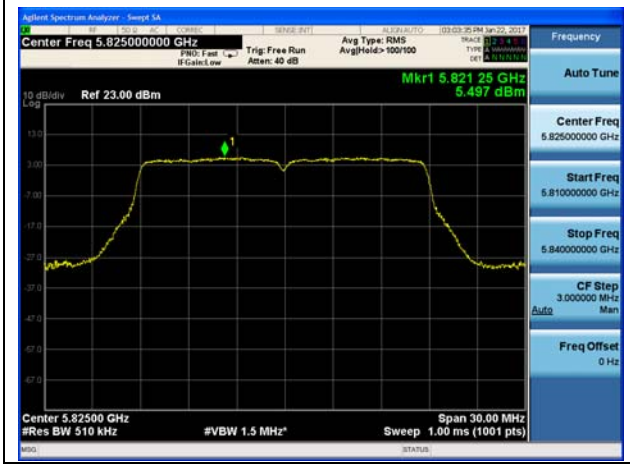


U-NII-3, 802.11n HT20, Channel No.: 157

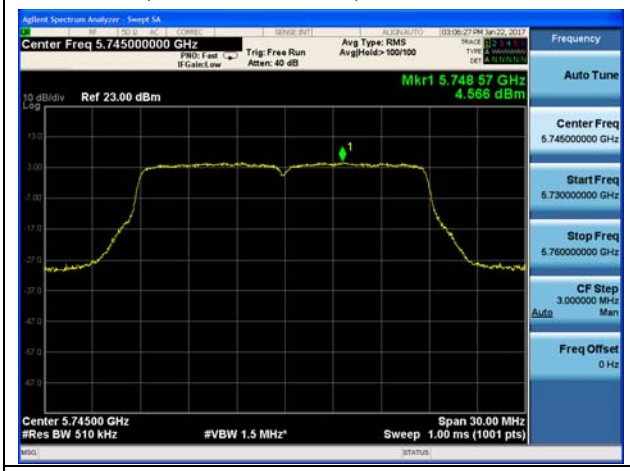


U-NII-3, 802.11n HT40, Channel No.: 159

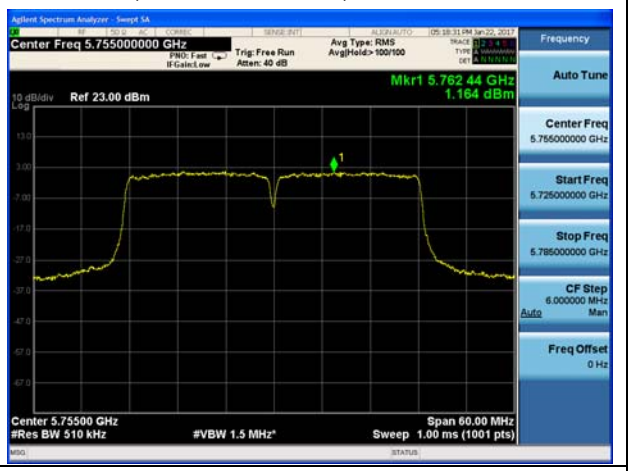
U-NII-3, 802.11n HT20, Channel No.: 165



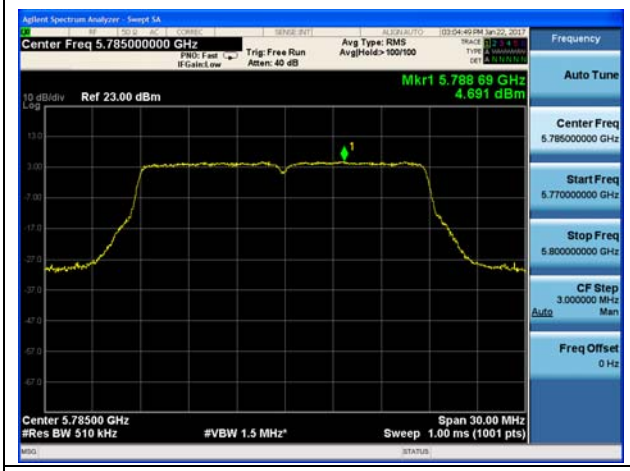
U-NII-3, 802.11ac HT20, Channel No.: 149



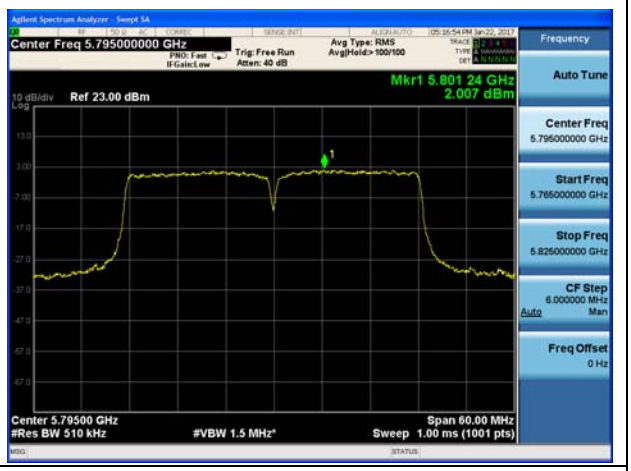
U-NII-3, 802.11ac HT40, Channel No.: 151



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



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

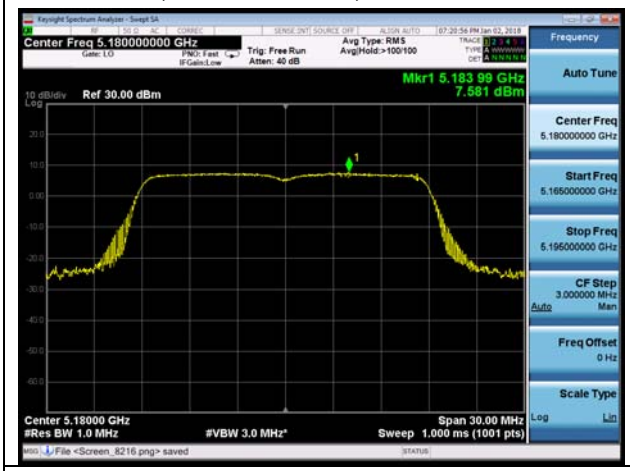


U-NII-3, 802.11ac HT20, Channel No.: 165

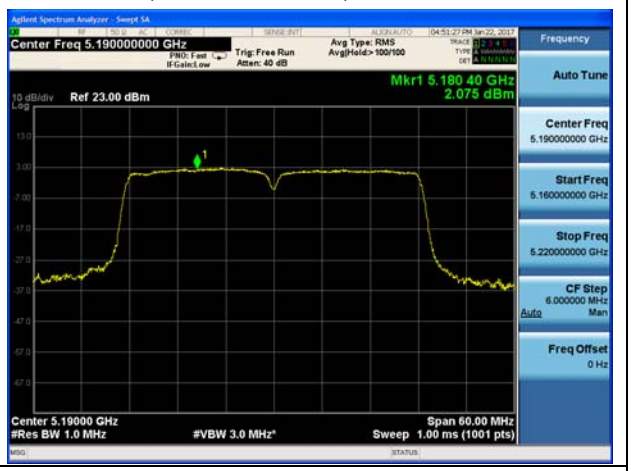
U-NII-3, 802.11ac HT80, Channel No.: 155

MIMO Antenna 4

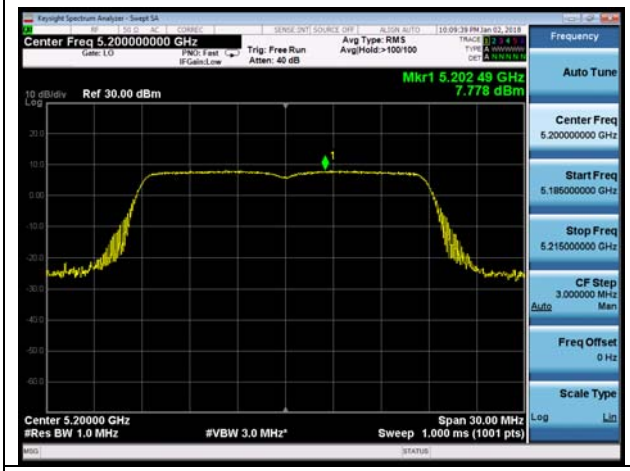
U-NII-1, 802.11n HT20, Channel No.: 36



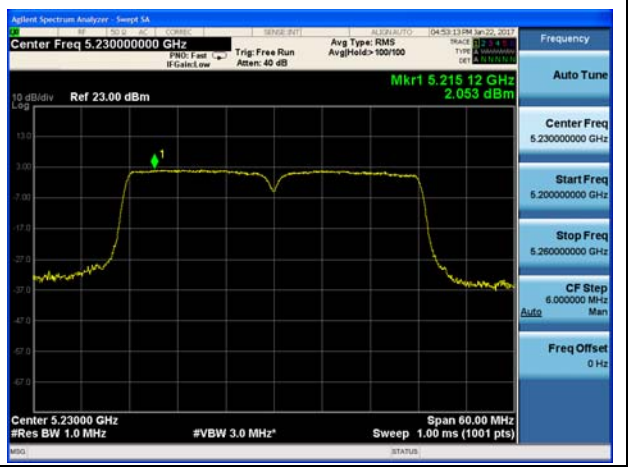
U-NII-1, 802.11n HT40, Channel No.: 38



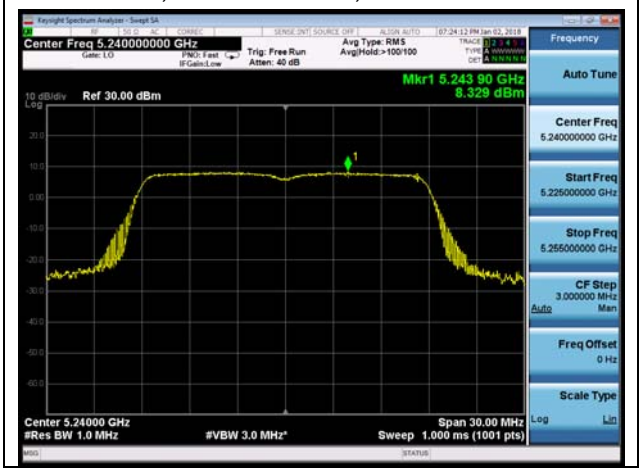
U-NII-1, 802.11n HT20, Channel No.: 40



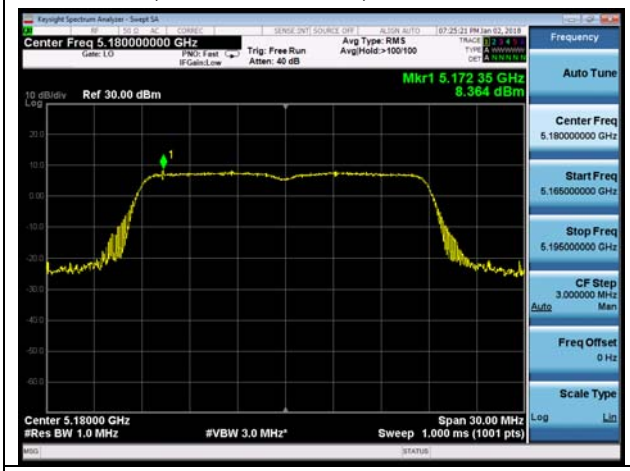
U-NII-1, 802.11n HT40, Channel No.: 46



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

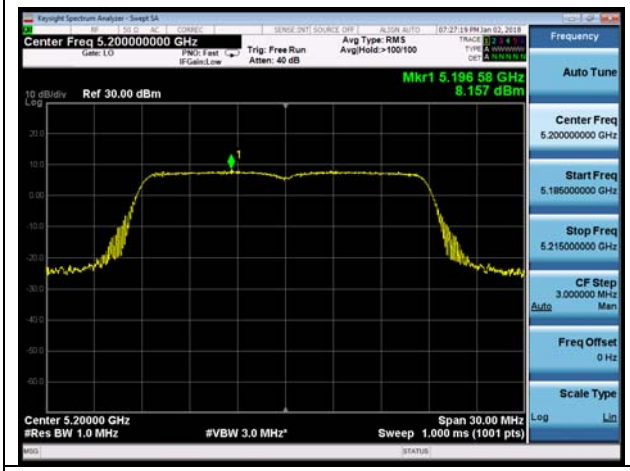


U-NII-1, 802.11ac HT20, Channel No.: 36

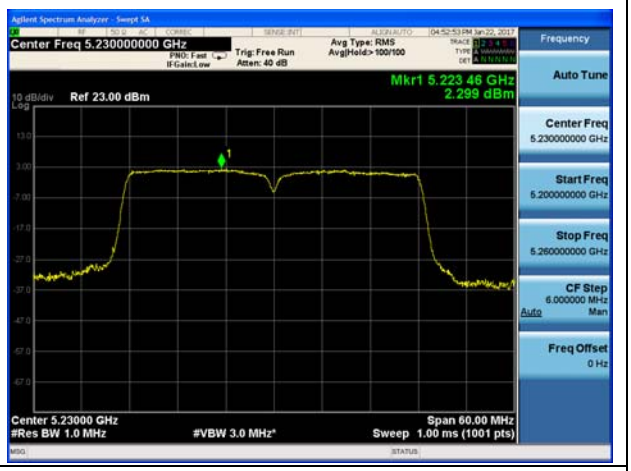


U-NII-1, 802.11ac HT40, Channel No.: 38

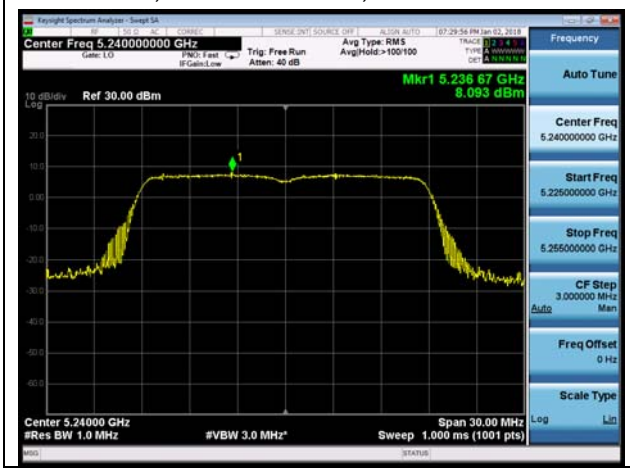
U-NII-1, 802.11ac HT20, Channel No.: 40



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

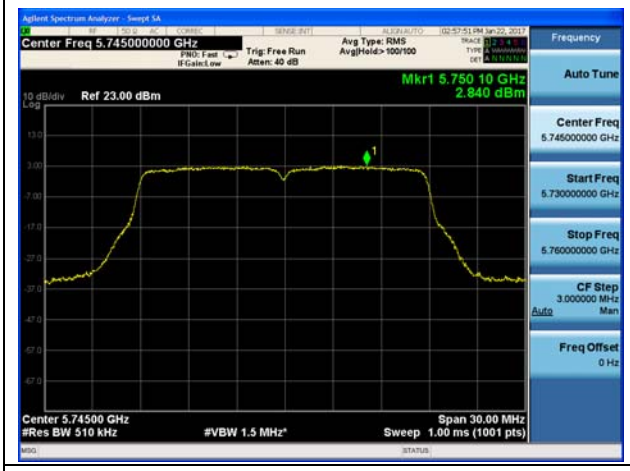


U-NII-1, 802.11ac HT20, Channel No.: 48

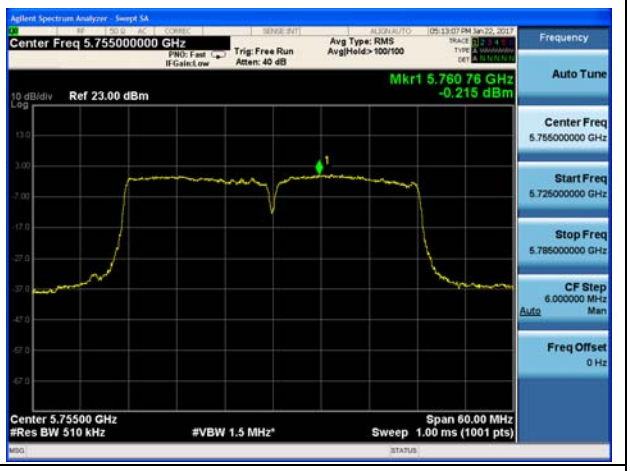


U-NII-1, 802.11ac HT80, Channel No.: 42

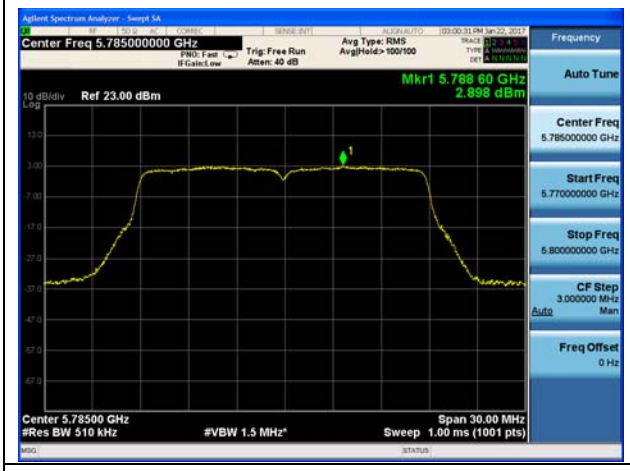
U-NII-3, 802.11n HT20, Channel No.: 149



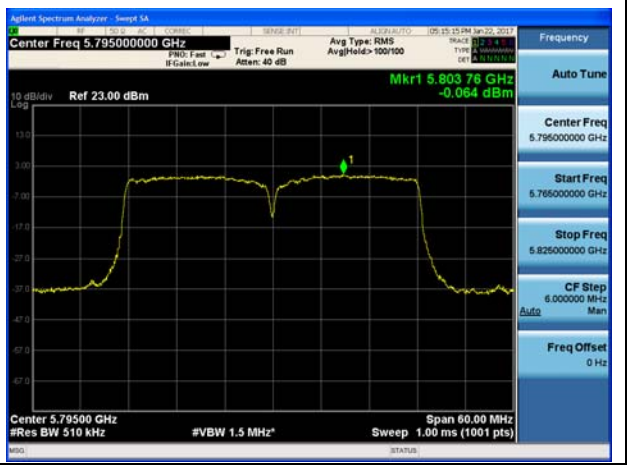
U-NII-3, 802.11n HT40, Channel No.: 151



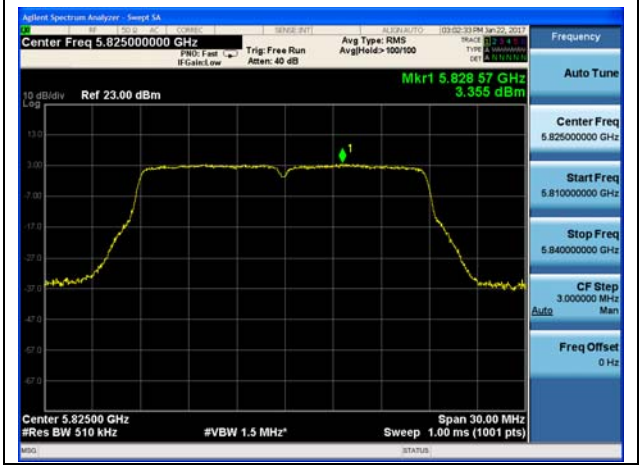
U-NII-3, 802.11n HT20, Channel No.: 157



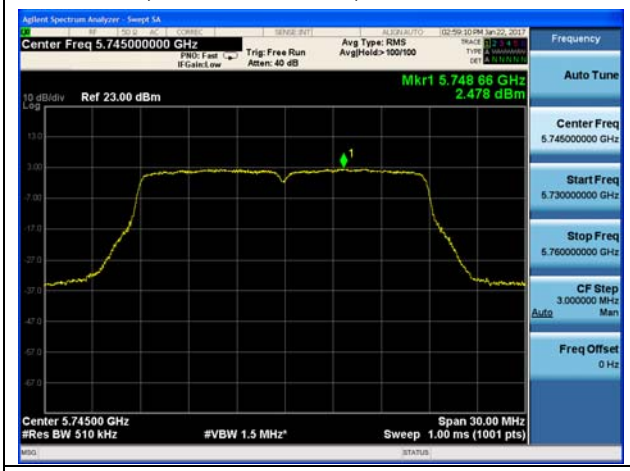
U-NII-3, 802.11n HT40, Channel No.: 159



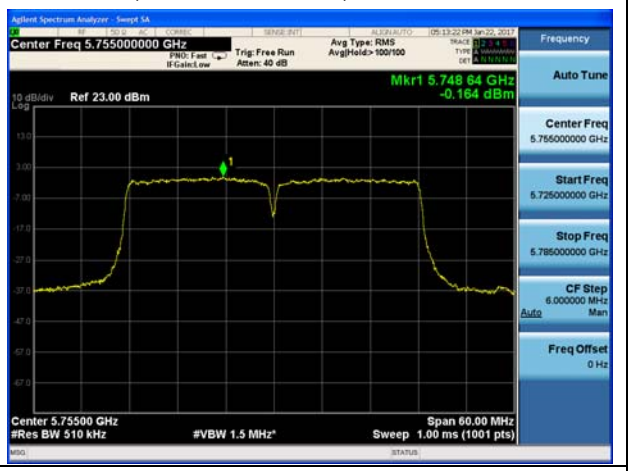
U-NII-3, 802.11n HT20, Channel No.: 165



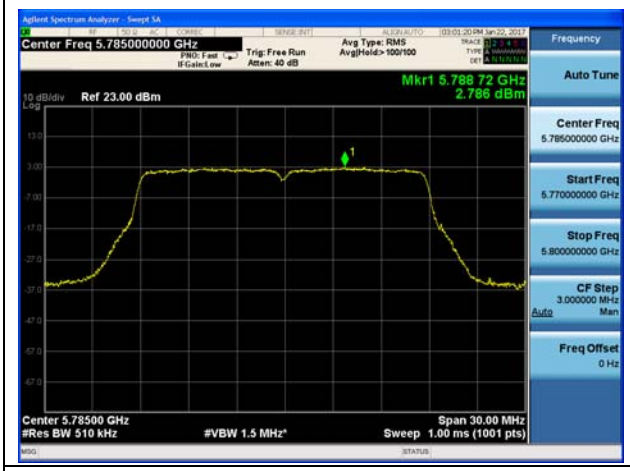
U-NII-3, 802.11ac HT20, Channel No.: 149



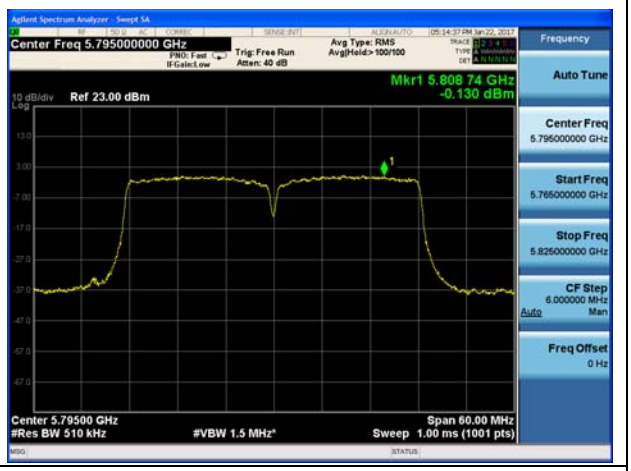
U-NII-3, 802.11ac HT40, Channel No.: 151



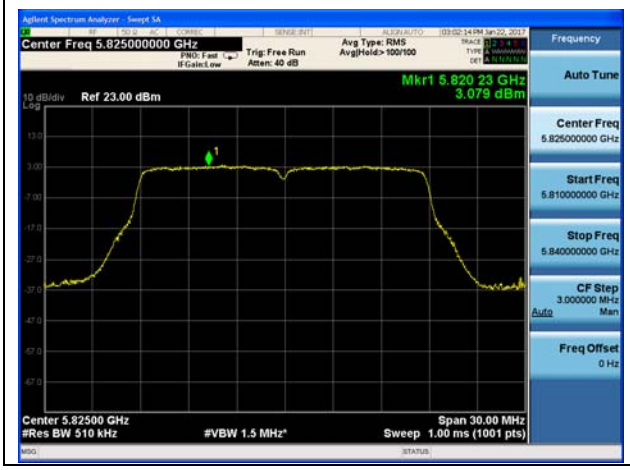
U-NII-3, 802.11ac HT20, Channel No.: 157



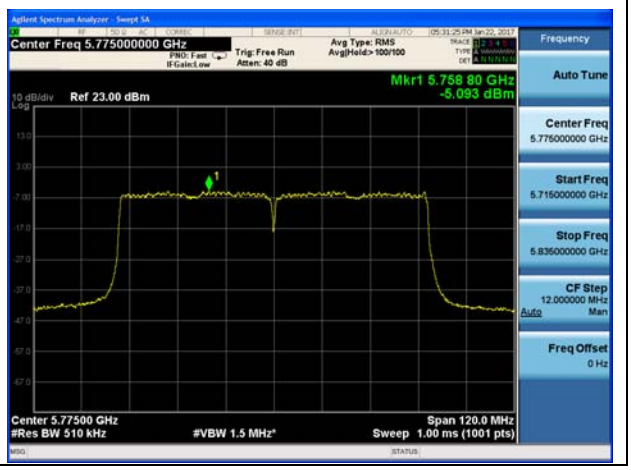
U-NII-3, 802.11ac HT40, Channel No.: 159



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



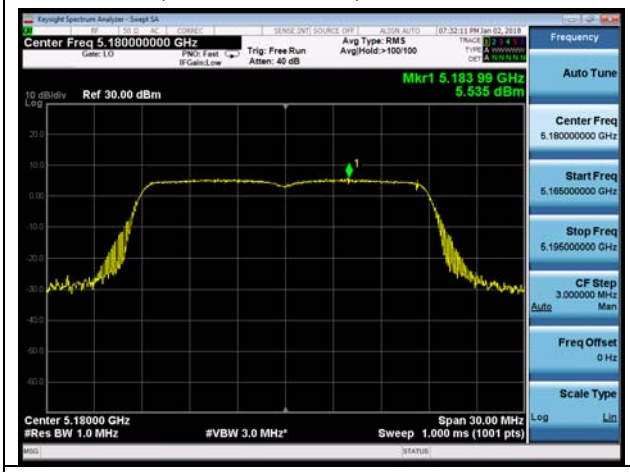
U-NII-3, 802.11ac HT80, Channel No.: 155



MIMO with beamforming

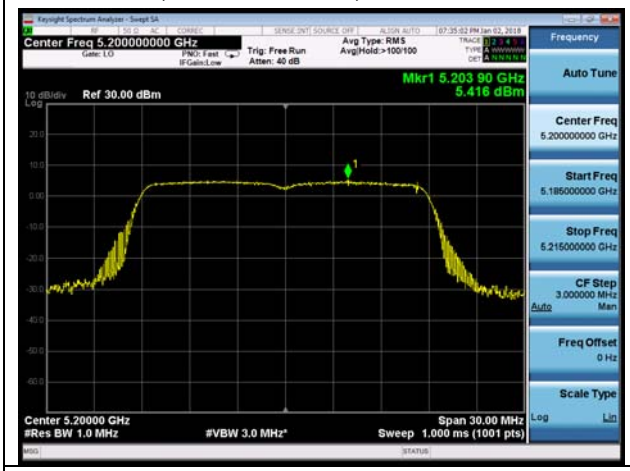
MIMO Antenna 1

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



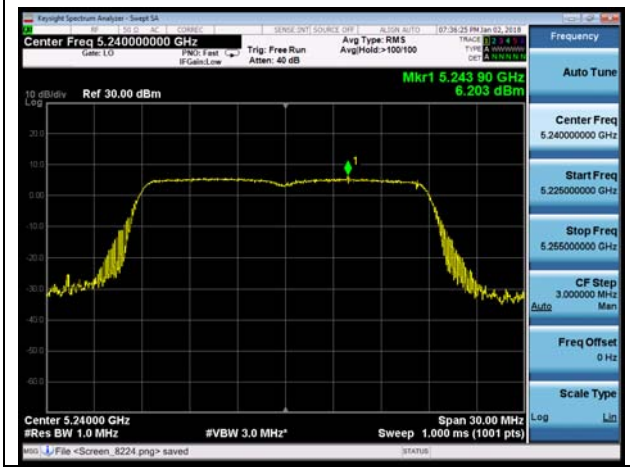
U-NII-1, 802.11n HT40, Channel No.: 38

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



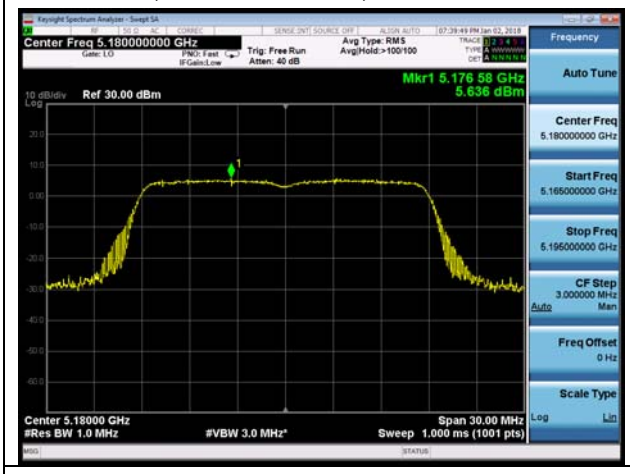
U-NII-1, 802.11n HT40, Channel No.: 46

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



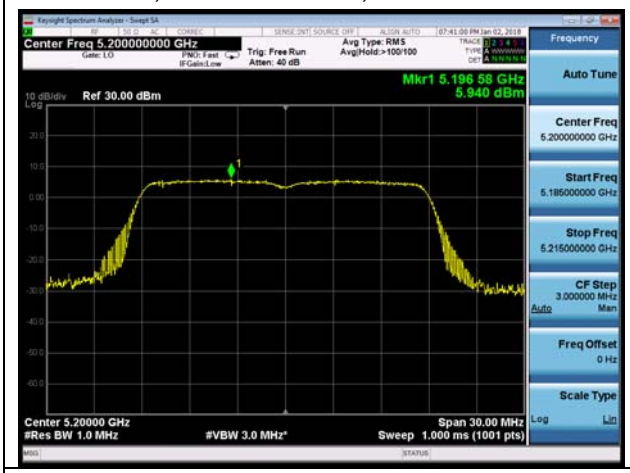
U-NII-1, 802.11ac HT40, Channel No.: 38

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



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

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



U-NII-1, 802.11ac HT80, Channel No.: 42

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