



RF TEST REPORT

Applicant Huawei Technologies Co., Ltd.
FCC ID QISBAH2-W19
Product Tablet
Model BAH2-W19
Report No. R1806H0070-R3V1
Issue Date July 17, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15E (2018)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Zhengqiang Zhou

Approved by: Kai Xu

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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: June 27, 2018~ July 3, 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.

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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E-mail: xukai@ta-shanghai.com

2. General Description of Equipment under Test

Client Information

Applicant	Huawei Technologies Co., Ltd.
Applicant address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.
Manufacturer	Huawei Technologies Co., Ltd.
Manufacturer address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.

General information

EUT Description	
Model	BAH2-W19
SN:	18052675749
Hardware Version	SH0BAH2LM
Software Version	BAH2-W19 8.0.0.10(C605)
Power Supply	Battery/AC adapter
Antenna Type	Internal Antenna
Antenna Gain	0 dBi
Test Mode(s)	U-NII-1(5150MHz-5250MHz) U-NII-2A(5250MHz-5350MHz) U-NII-2C(5470MHz-5725MHz) U-NII-3(5725MHz-5850MHz)
Modulation Type	802.11a/n (HT20/HT40) : OFDM 802.11ac (VHT20/VHT40/VHT80): OFDM
Max. Conducted Power	16.53dBm
Operating Frequency Range(s)	U-NII-1: 5150-5250MHz U-NII-2A:5250-5350MHz U-NII-2C:5470-5725MHz U-NII-3: 5725-5850MHz
Operating temperature range:	0 ° C to 35° C
Operating voltage range:	3.6V to 4.4 V
State AC voltage:	3.82V
EUT Accessory	
Adapter 1	Brand: HUAWEI



	Manufacturer: Salcomp (Shenzhen) Co., Ltd. Model: HW-059200UHQ
Adapter 2	Brand: HUAWEI Manufacturer: HUIZHOU BYD ELECTRONIC CO.,LTD. Model: HW-059200UHQ
Adapter 3	Brand: HUAWEI Manufacturer: Salcomp (Shenzhen) Co., Ltd. Model: HW-090200UH0
Adapter 4	Brand: HUAWEI Manufacturer: Shenzhen Kuntkey Electric Co., Ltd. Model: HW-090200UH0
Battery 1	Brand: HUAWEI Manufacturer: SCUD (Fujian) Electronics Co., Ltd. Model: HB2994I8ECW
Battery 2	Brand: HUAWEI Manufacturer: SUNWODA Electronic Co., Ltd Model: HB2994I8ECW
Battery 3	Brand: HUAWEI Manufacturer: Huizhou Desay Battery Co., Ltd Model: HB2994I8ECW
USB Cable 1	USB data cable,white,1m
USB Cable 2	USB-A to USB-C Charge Data Cable,1.0m
Note: 1.The information of the EUT is declared by the manufacturer. 2. There is more than one USB cable, one Adapter and one Battery, each one should be applied throughout the compliance test respectively, and however, only the worst case (USB cable 1/ Adapter 1/ Battery 1) will be recorded in this report.	

BAH2-W19 has two storage scenarios, with different memory. EMCP Storage Capacity is 3GB+32GB, LPDDR3+EMMC separation Scheme storage capacity is 4GB+64GB. The two storage mode of peripheral circuit has slight change, but does not affect product performance.

The differences about storage scenarios are showed in the following table. Other parts of the Tablet are the same, including the appearance, the antenna, Chipset, Bluetooth mode, Wifi mode, Adapter, Battery, Mainboard, Software and so on.

Model	BAH2-W19	
Storage Scenarios	EMCP	LPDDR3+eMMC
Storage capacity	3GB+32GB	4GB+64GB



3. Applied Standards

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

FCC CFR47 Part 15E (2018) Unlicensed National Information Infrastructure Devices

ANSI C63.10 (2013)

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
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

**Wireless Technology and Frequency Range**

Wireless Technology		Bandwidth	Channel	Frequency
Wi-Fi	U-NII-1	20 MHz	36	5180MHz
			40	5200MHz
			44	5220MHz
			48	5240MHz
		40 MHz	38	5190MHz
			46	5230MHz
		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
		80 MHz	106	5530MHz
			122	5610MHz
	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.

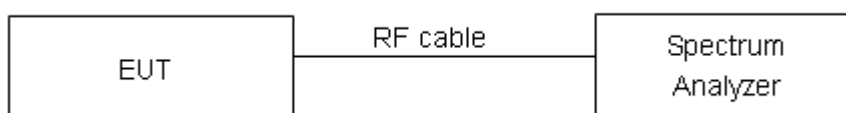
For U-NII-1, set RBW $\approx$ 1% OCB kHz, VBW $\geq 3 \times$ RBW, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in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

For U-NII-3, Set RBW = 100 kHz, VBW $\geq 3 \times$ 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	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5180	16.523	19.640	PASS
	5200	16.485	19.180	PASS
	5240	16.513	19.410	PASS
802.11n HT20	5180	17.631	19.800	PASS
	5200	17.625	20.030	PASS
	5240	17.628	19.890	PASS
802.11n HT40	5190	35.959	38.760	PASS
	5230	35.980	39.180	PASS
802.11ac VHT20	5180	17.622	20.120	PASS
	5200	17.619	19.850	PASS
	5240	17.625	20.050	PASS
802.11ac VHT40	5190	35.945	39.180	PASS
	5230	35.970	39.040	PASS
802.11ac VHT80	5210	74.976	79.870	PASS

U-NII-2A

Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5260	16.508	19.380	PASS
	5300	16.517	19.250	PASS
	5320	16.500	19.380	PASS
802.11n HT20	5260	17.630	19.890	PASS
	5300	17.612	19.860	PASS
	5320	17.623	20.160	PASS
802.11n HT40	5270	35.934	39.160	PASS
	5310	35.928	39.110	PASS
802.11ac VHT20	5260	17.619	20.430	PASS
	5300	17.626	20.070	PASS
	5320	17.612	20.020	PASS
802.11ac VHT40	5270	35.952	38.990	PASS
	5310	35.938	39.040	PASS
802.11ac VHT80	5290	74.967	80.760	PASS

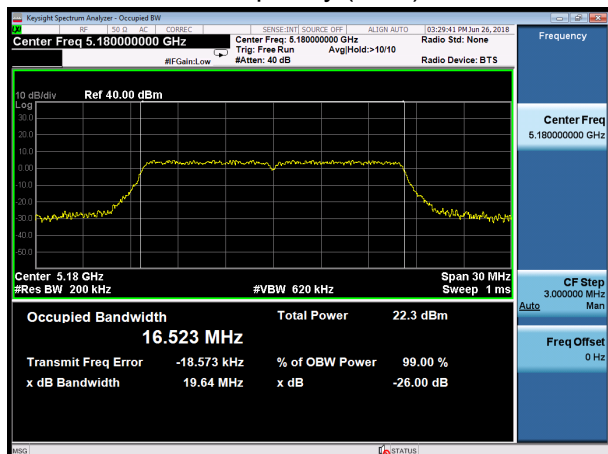
U-NII-2C

Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 26 dB bandwidth (MHz)	Conclusion
802.11a	5500	16.532	19.600	PASS
	5580	16.496	19.250	PASS
	5700	16.508	19.560	PASS
802.11n HT20	5500	17.630	19.900	PASS
	5580	17.620	19.900	PASS
	5700	17.610	19.960	PASS
802.11n HT40	5510	35.953	38.840	PASS
	5550	35.963	39.130	PASS
	5670	35.954	39.100	PASS
802.11ac VHT20	5500	17.632	19.990	PASS
	5580	17.612	19.800	PASS
	5700	17.631	20.010	PASS
802.11ac VHT40	5510	35.908	38.950	PASS
	5550	35.933	39.140	PASS
	5670	35.948	39.210	PASS
802.11ac VHT80	5530	75.092	91.610	PASS

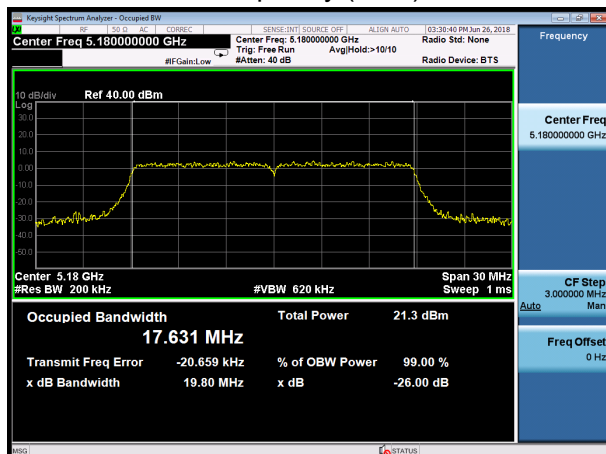
U-NII-3

Network Standards	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11a	5745	16.529	16.380	500	PASS
	5785	16.536	16.370	500	PASS
	5825	16.537	16.380	500	PASS
802.11n HT20	5745	17.629	17.610	500	PASS
	5785	17.629	17.590	500	PASS
	5825	17.629	17.600	500	PASS
802.11n HT40	5755	35.945	35.550	500	PASS
	5795	35.954	35.430	500	PASS
802.11ac VHT20	5745	17.636	17.600	500	PASS
	5785	17.653	17.600	500	PASS
	5825	17.638	17.610	500	PASS
802.11ac VHT40	5755	35.965	35.390	500	PASS
	5795	35.910	35.380	500	PASS
802.11ac VHT80	5775	74.956	75.240	500	PASS

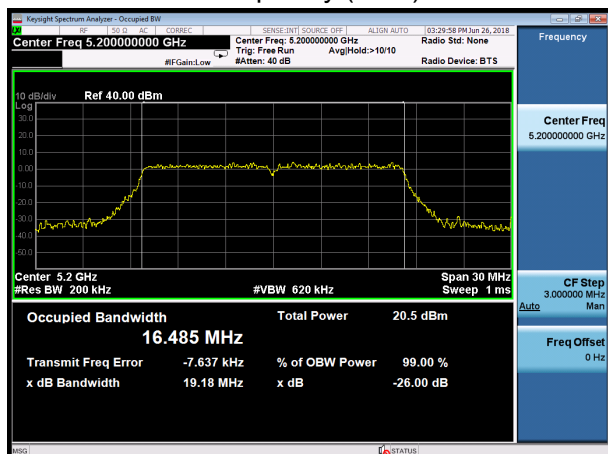
U-NII-1, 802.11a
Carrier frequency (MHz): 5180



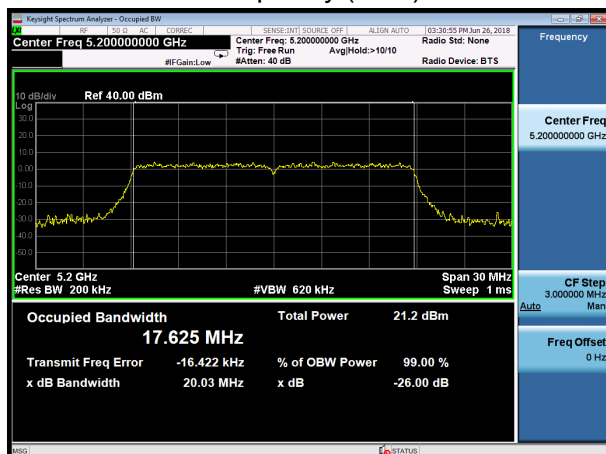
U-NII-1, 802.11n HT20
Carrier frequency (MHz): 5180



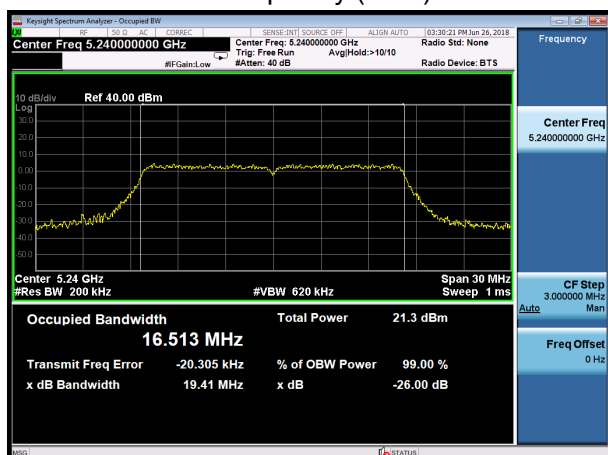
U-NII-1, 802.11a
Carrier frequency (MHz): 5200



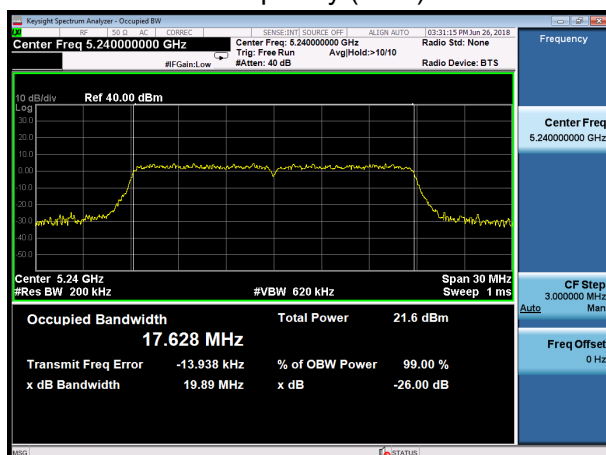
U-NII-1, 802.11n HT20
Carrier frequency (MHz): 5200



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

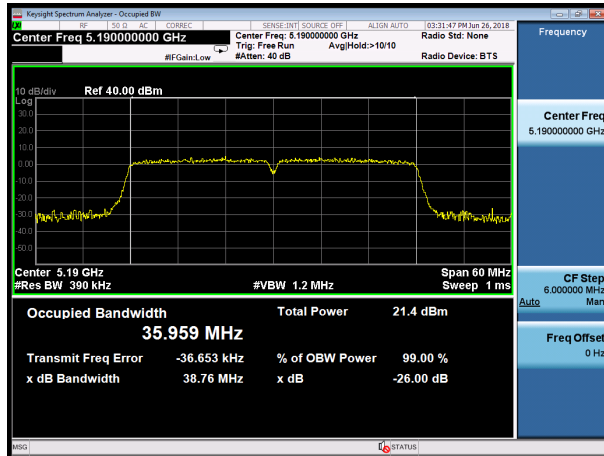


U-NII-1, 802.11n HT20
Carrier frequency (MHz):5240

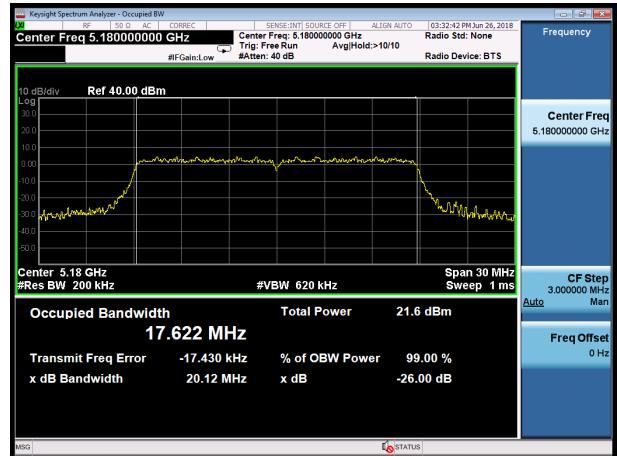




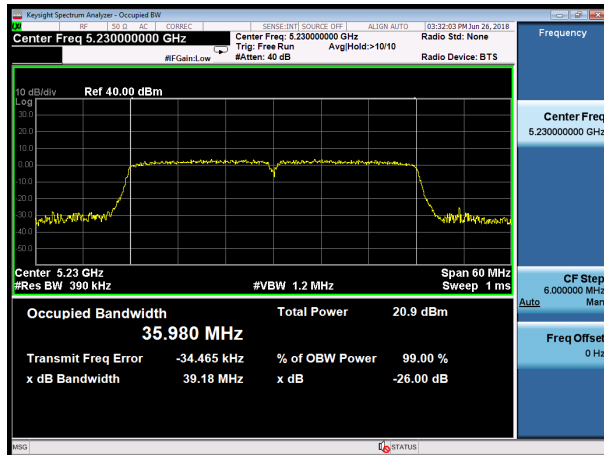
U-NII-1, 802.11n HT40
Carrier frequency (MHz): 5190



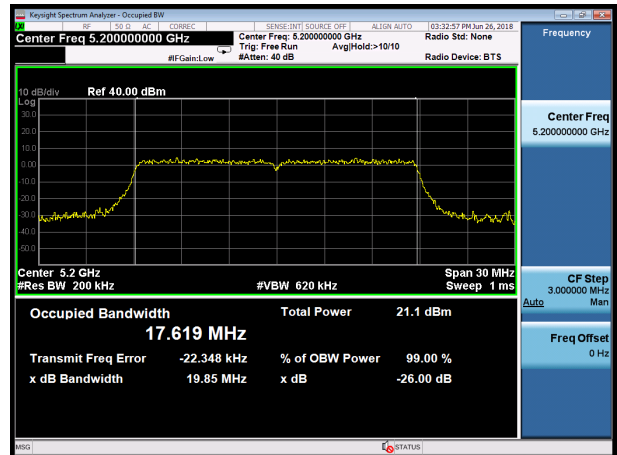
U-NII-1, 802.11ac VHT20
Carrier frequency (MHz): 5180



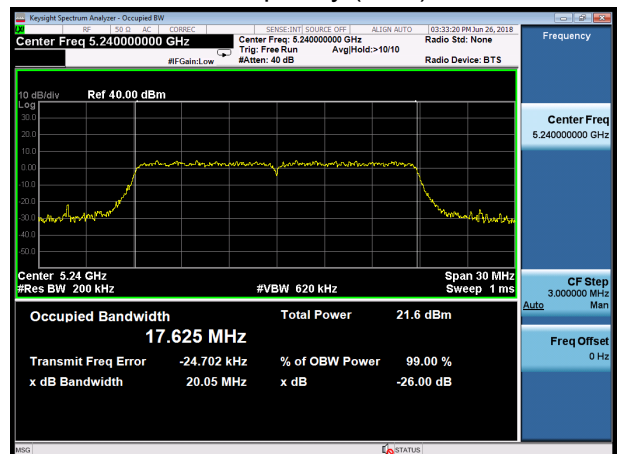
U-NII-1, 802.11n HT40
Carrier frequency (MHz): 5230

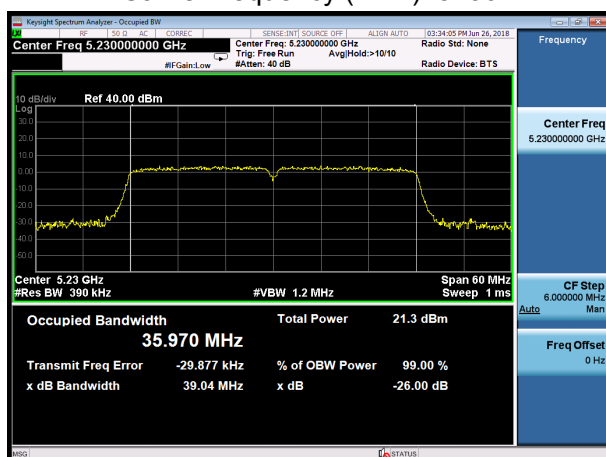
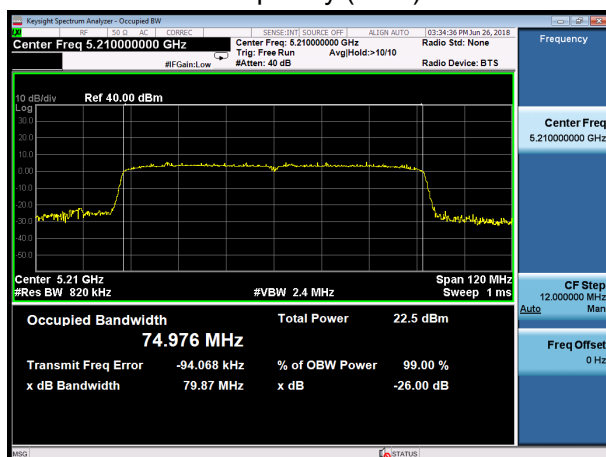
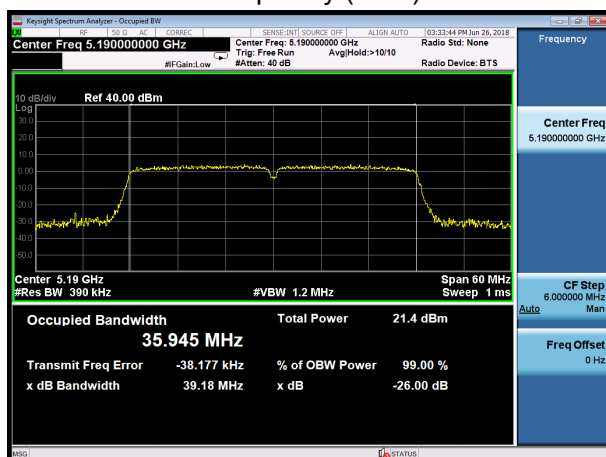


U-NII-1, 802.11ac VHT20
Carrier frequency (MHz): 5200



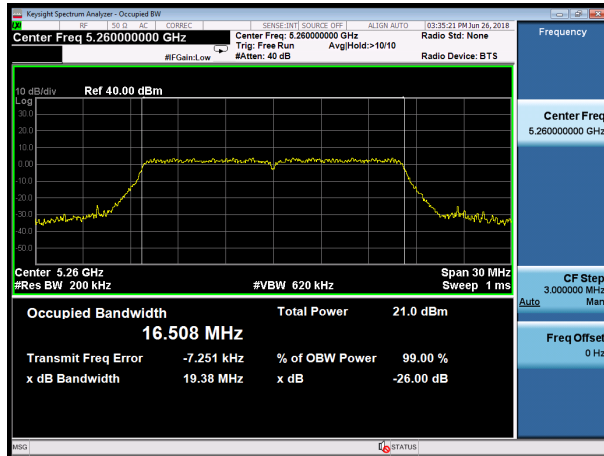
U-NII-1, 802.11ac VHT20
Carrier frequency (MHz): 5240



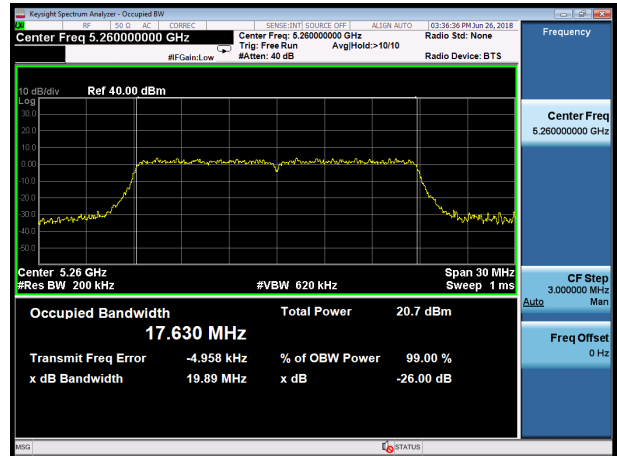




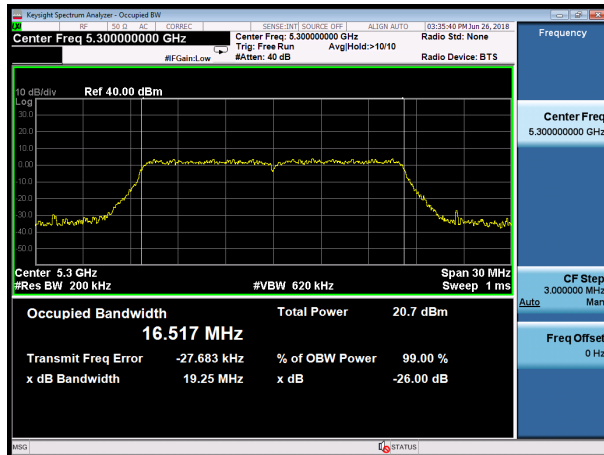
U-NII-2A, 802.11a
Carrier frequency (MHz): 5260



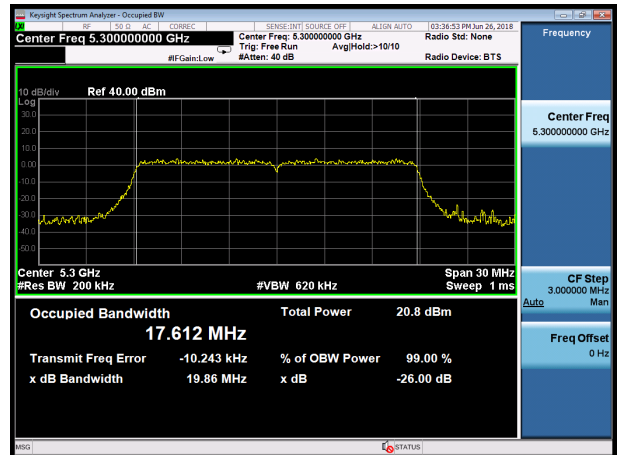
U-NII-2A, 802.11n HT20
Carrier frequency (MHz): 5260



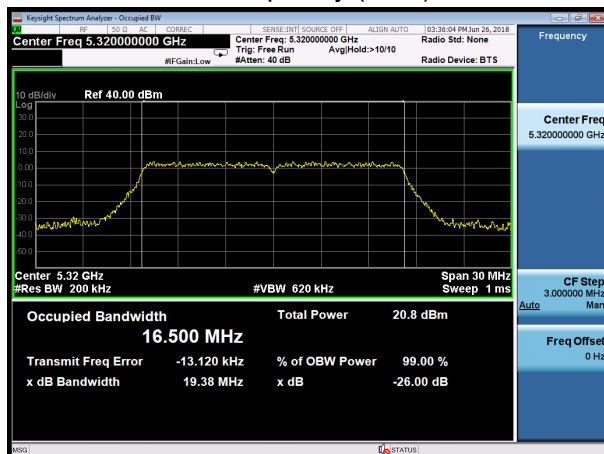
U-NII-2A, 802.11a
Carrier frequency (MHz): 5300



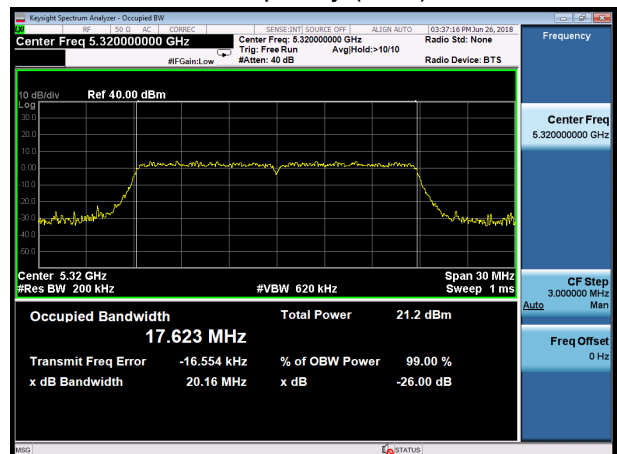
U-NII-2A, 802.11n HT20
Carrier frequency (MHz): 5300



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

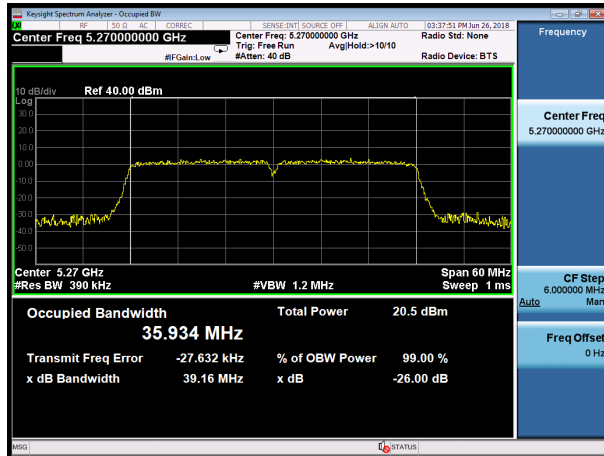


U-NII-2A, 802.11n HT20
Carrier frequency (MHz): 5320

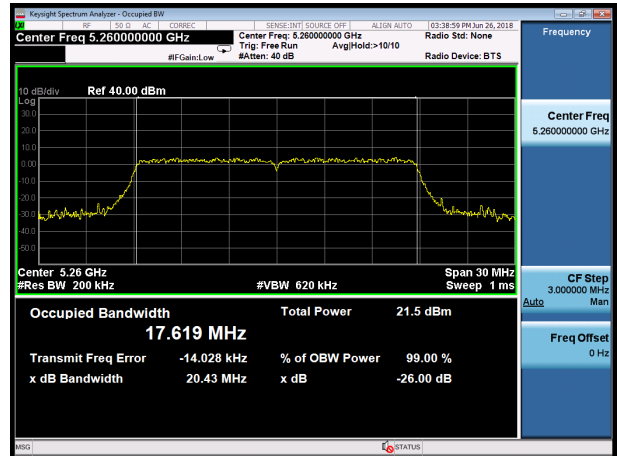




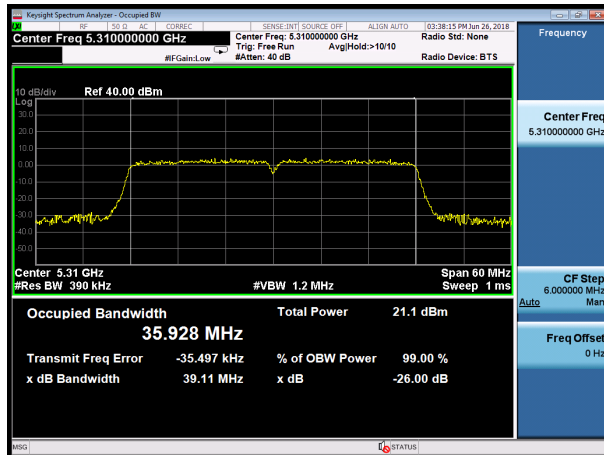
U-NII-2A, 802.11n HT40
Carrier frequency (MHz): 5270



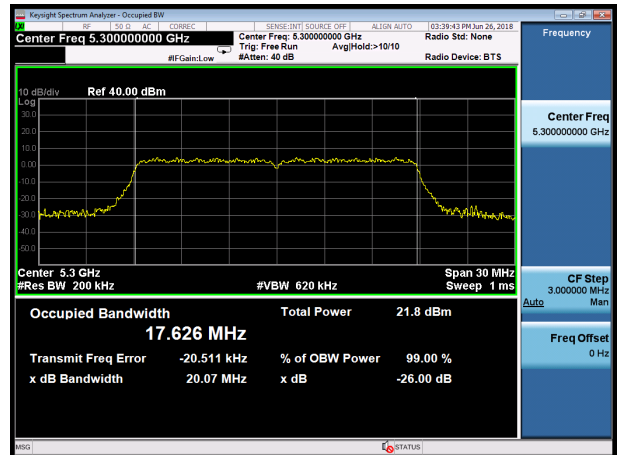
U-NII-2A, 802.11ac VHT20
Carrier frequency (MHz): 5260



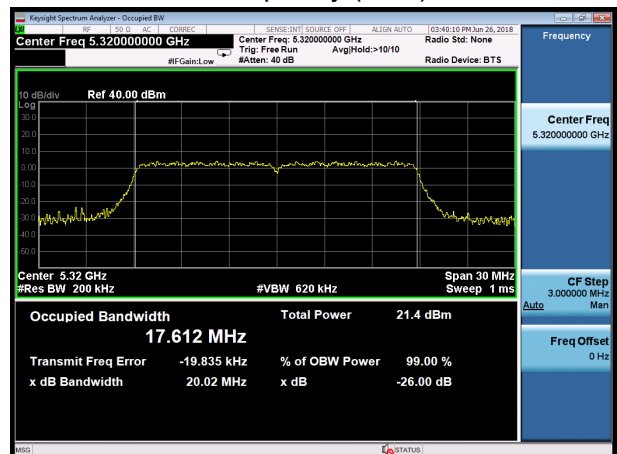
U-NII-2A, 802.11n HT40
Carrier frequency (MHz): 5310



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

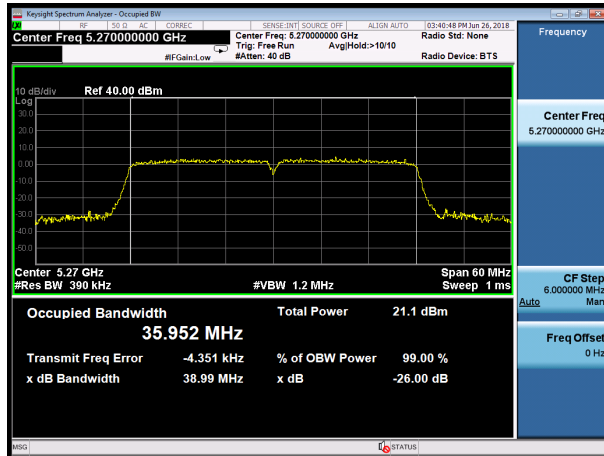


U-NII-2A, 802.11ac VHT20
Carrier frequency (MHz): 5320

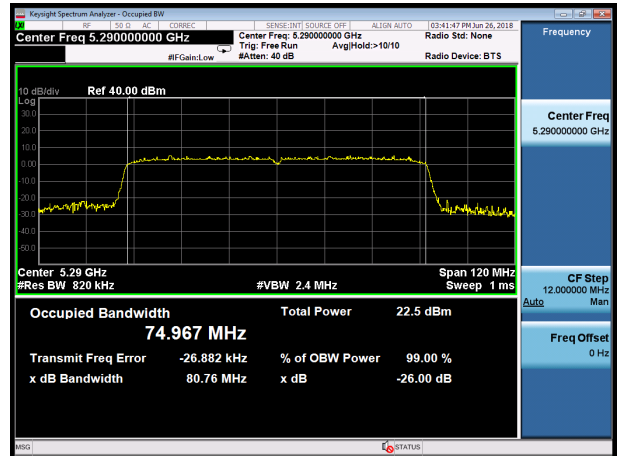




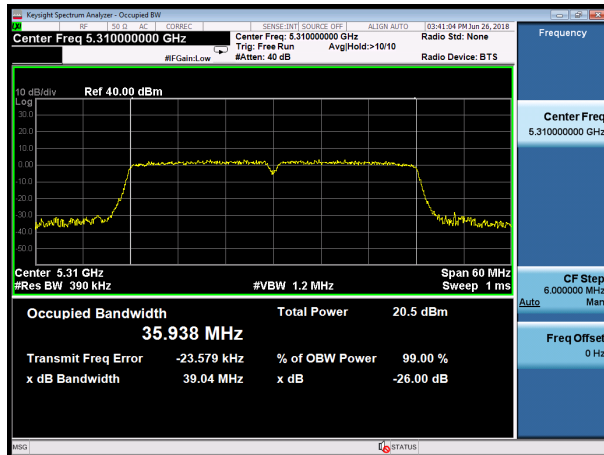
U-NII-2A, 802.11ac VHT40
Carrier frequency (MHz): 5270



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

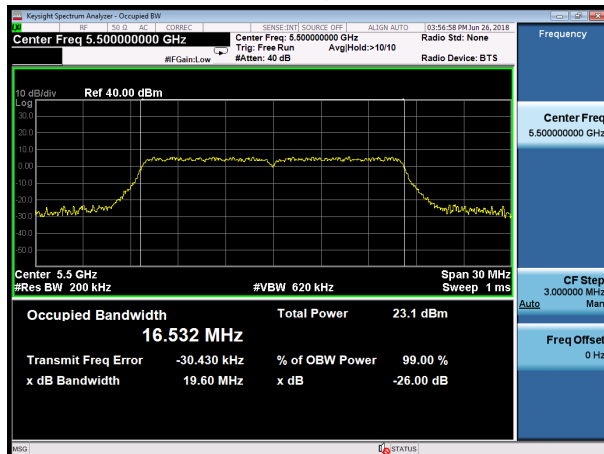


U-NII-2A, 802.11ac VHT40
Carrier frequency (MHz): 5310

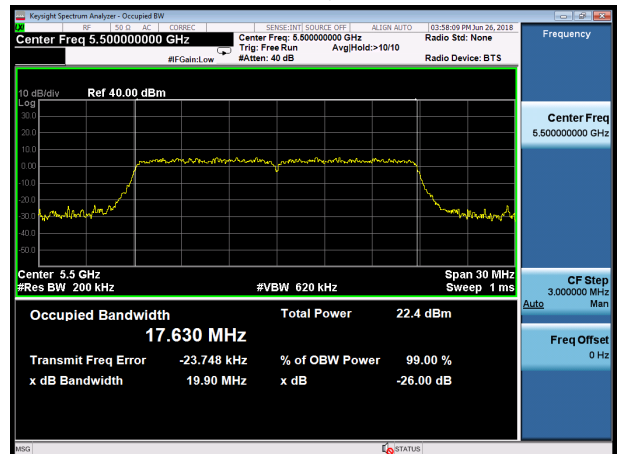




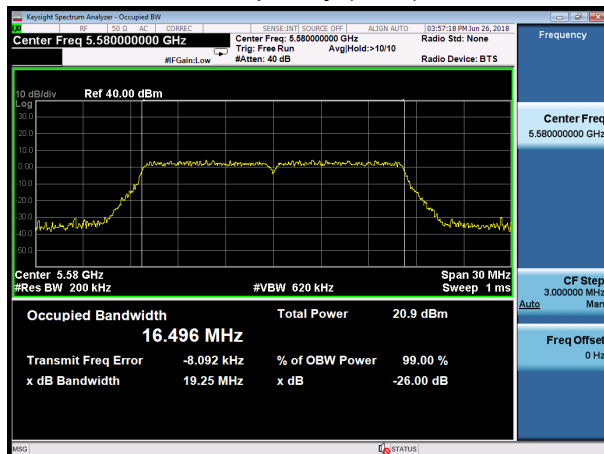
U-NII-2C, 802.11a
Carrier frequency (MHz): 5500



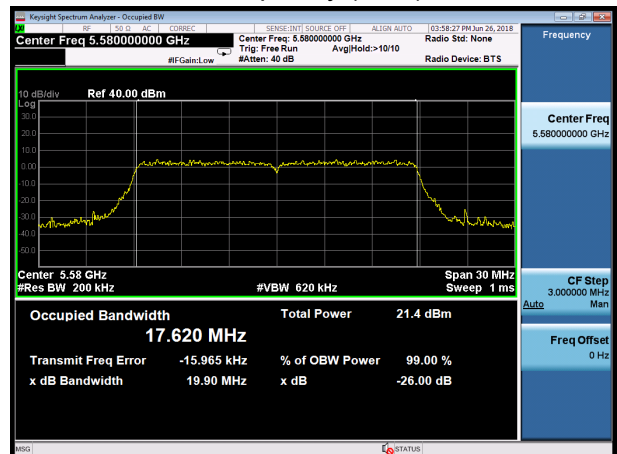
U-NII-2C, 802.11n HT20
Carrier frequency (MHz): 5500



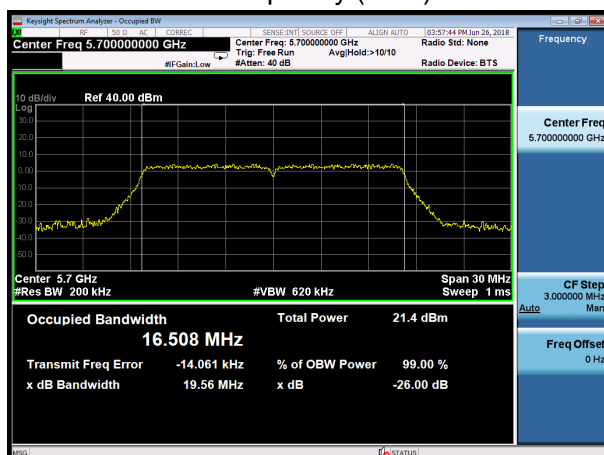
U-NII-2C, 802.11a
Carrier frequency (MHz): 5580



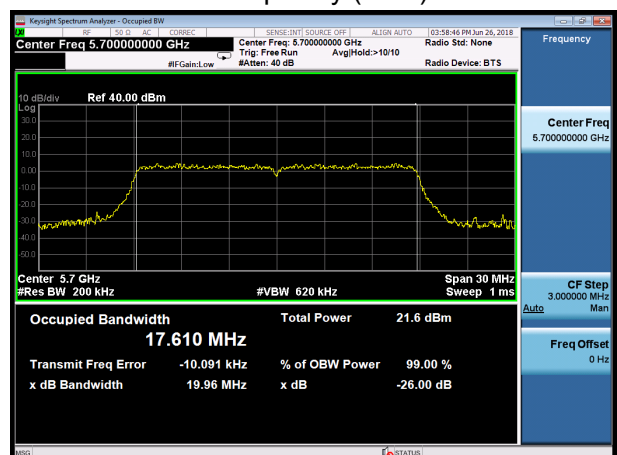
U-NII-2C, 802.11n HT20
Carrier frequency (MHz): 5580



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

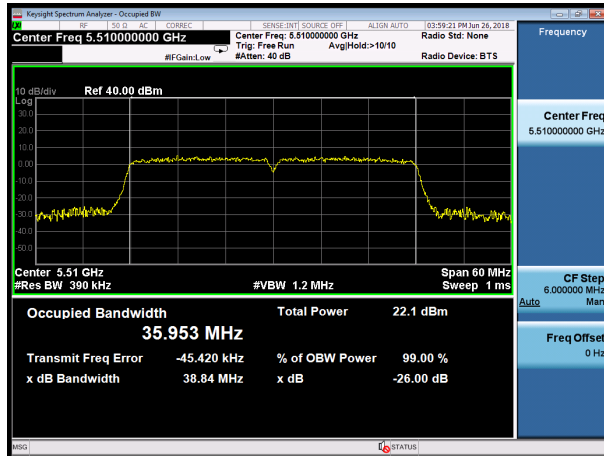


U-NII-2C, 802.11n HT20
Carrier frequency (MHz): 5700

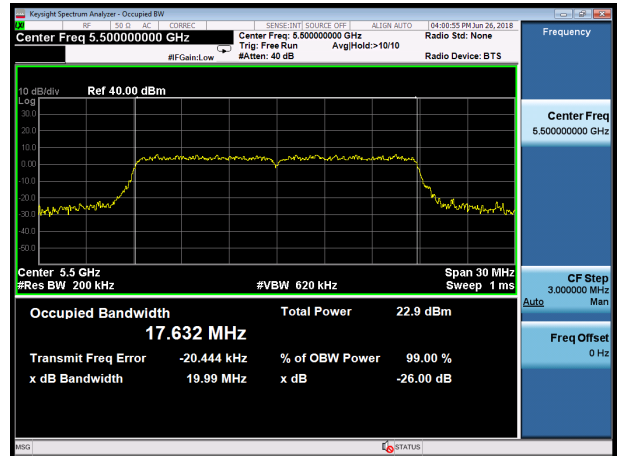




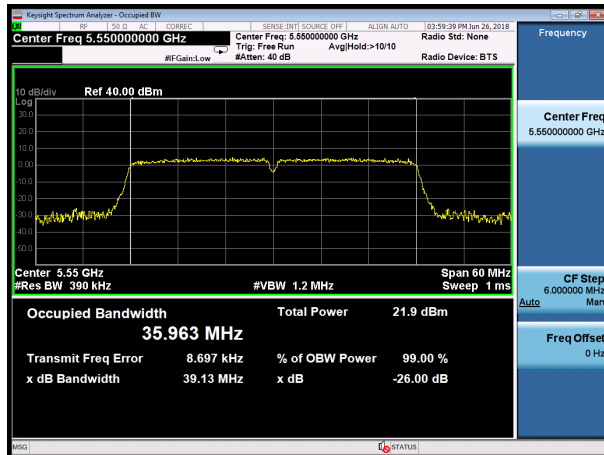
U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5510



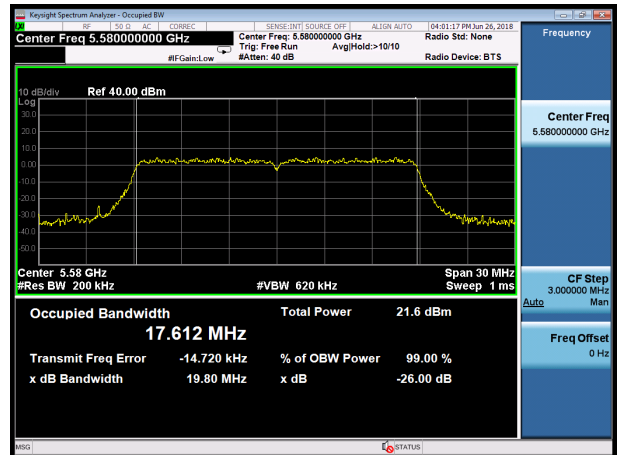
U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz): 5500



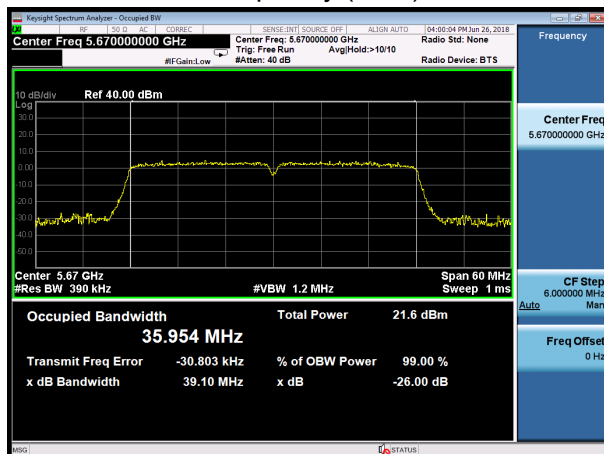
U-NII-2C, 802.11n HT40
Carrier frequency (MHz): 5550



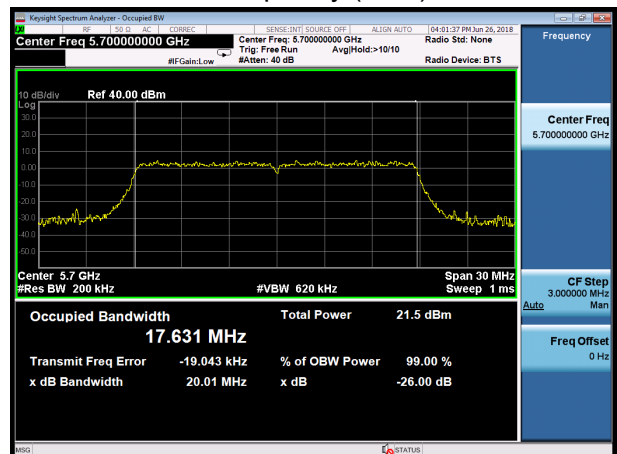
U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz): 5580



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

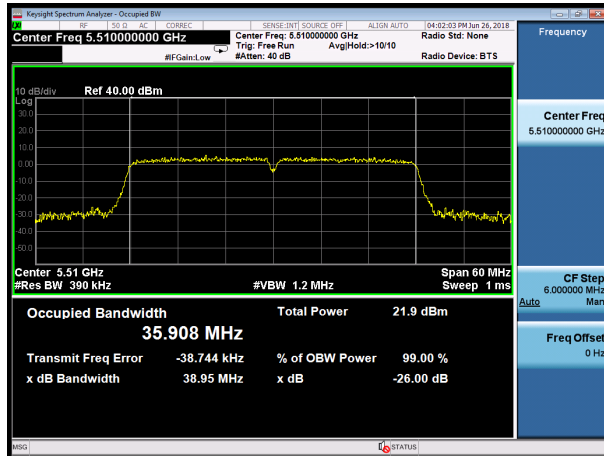


U-NII-2C, 802.11ac VHT20
Carrier frequency (MHz): 5700

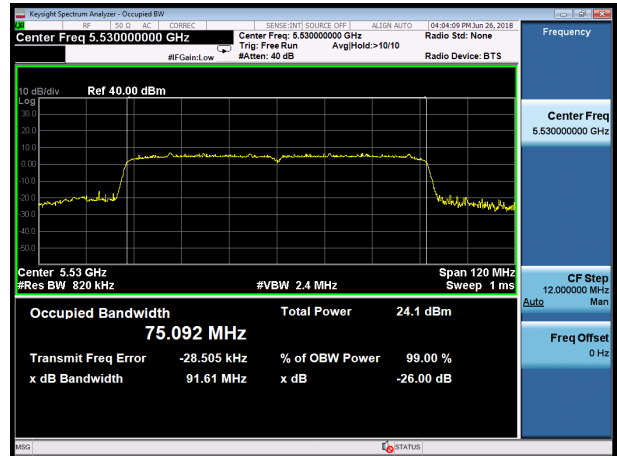




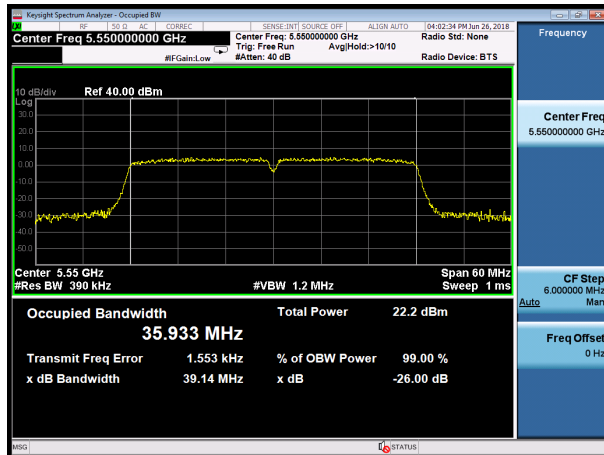
U-NII-2C, 802.11ac VHT40
Carrier frequency (MHz): 5510



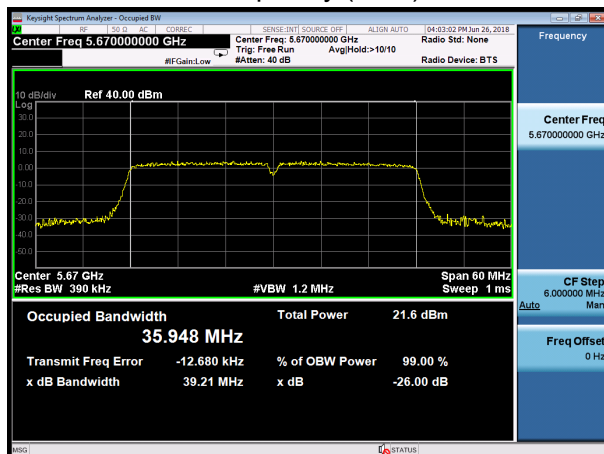
U-NII-2C, 802.11ac VHT80
Carrier frequency (MHz): 5530



U-NII-2C, 802.11ac VHT40
Carrier frequency (MHz): 5550



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

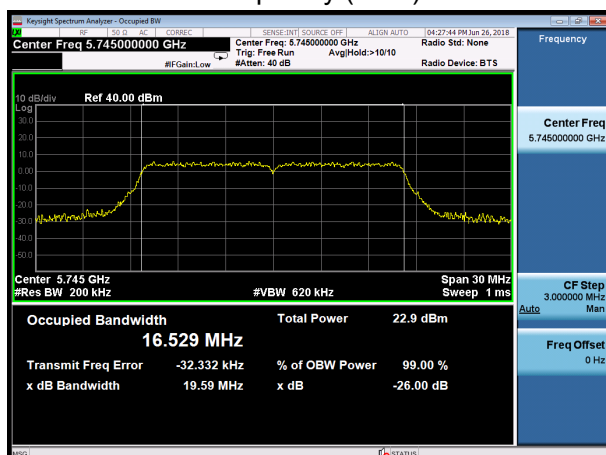




99% bandwidth

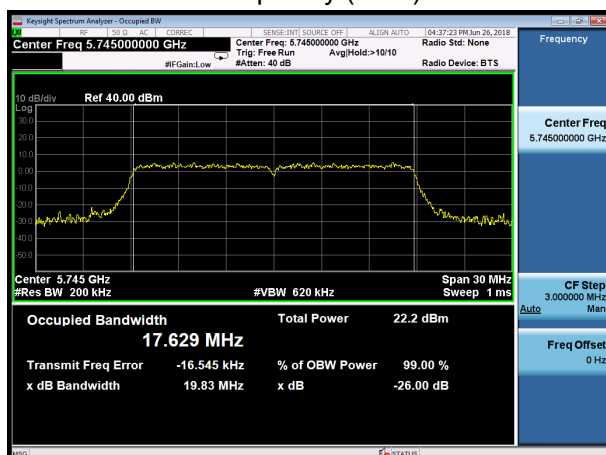
U-NII-3, 802.11a

Carrier frequency (MHz): 5745



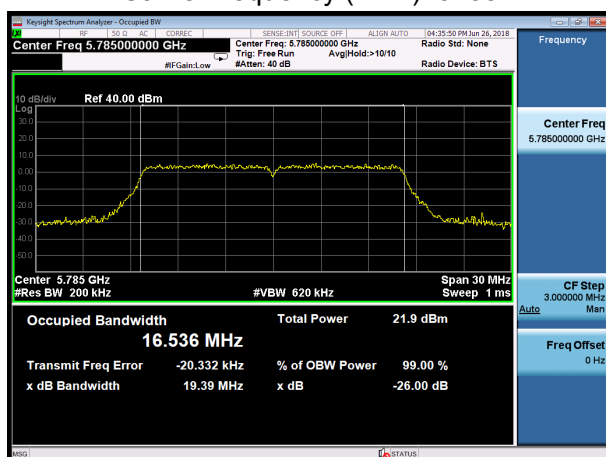
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5745



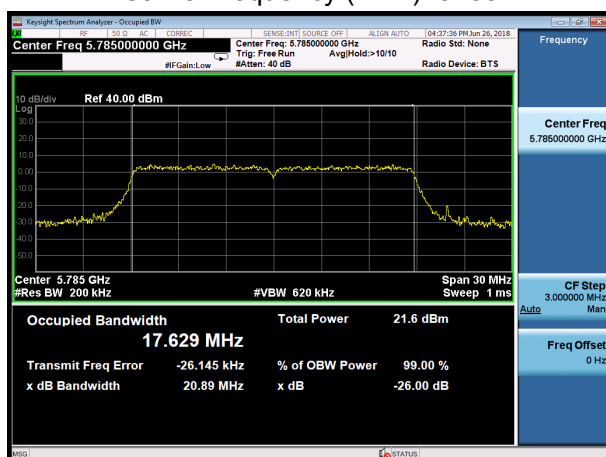
U-NII-3, 802.11a

Carrier frequency (MHz): 5785



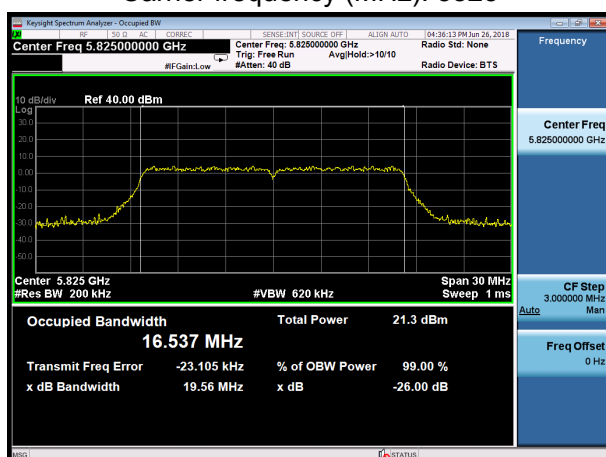
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5785



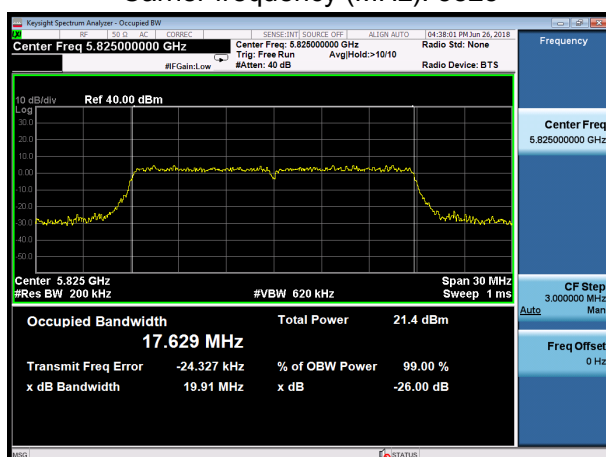
U-NII-3, 802.11a

Carrier frequency (MHz): 5825



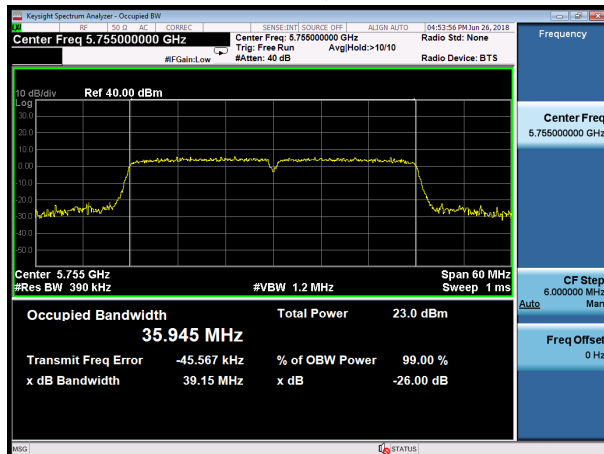
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825

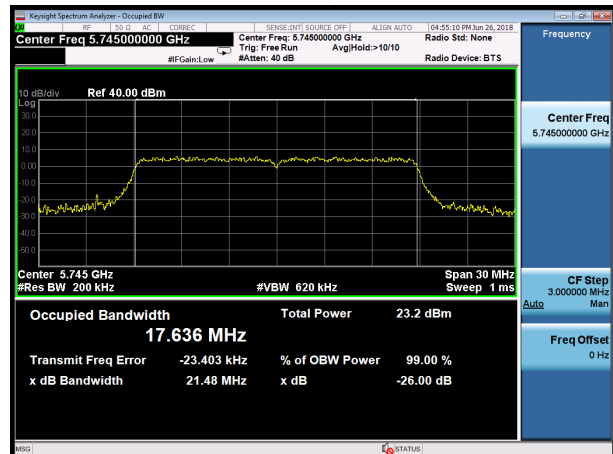




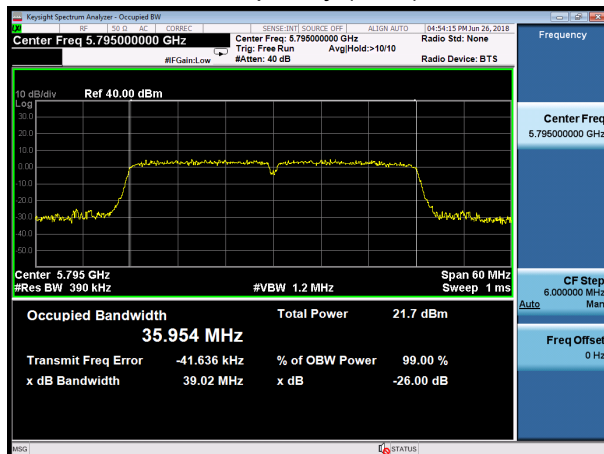
U-NII-3, 802.11n HT40
Carrier frequency (MHz): 5755



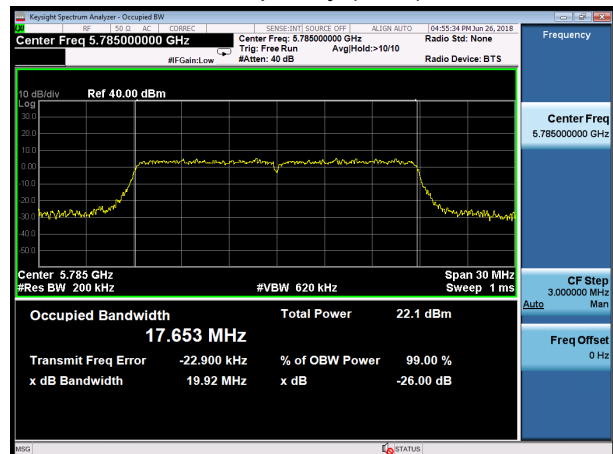
U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5745



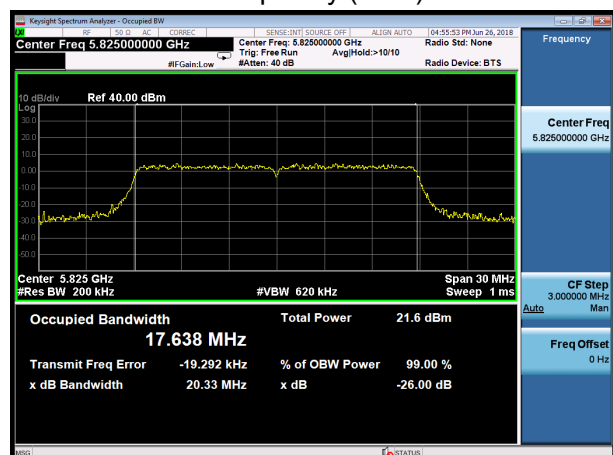
U-NII-3, 802.11n HT40
Carrier frequency (MHz): 5795



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



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

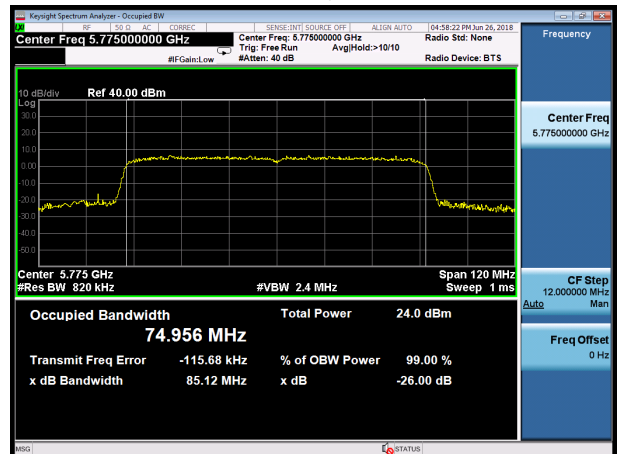




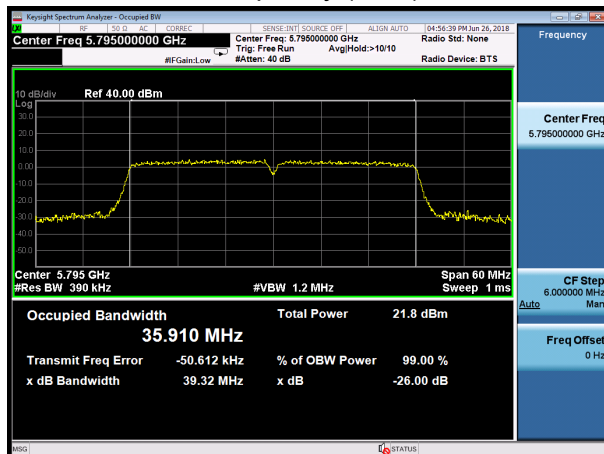
U-NII-3, 802.11ac VHT40
Carrier frequency (MHz): 5755



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



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

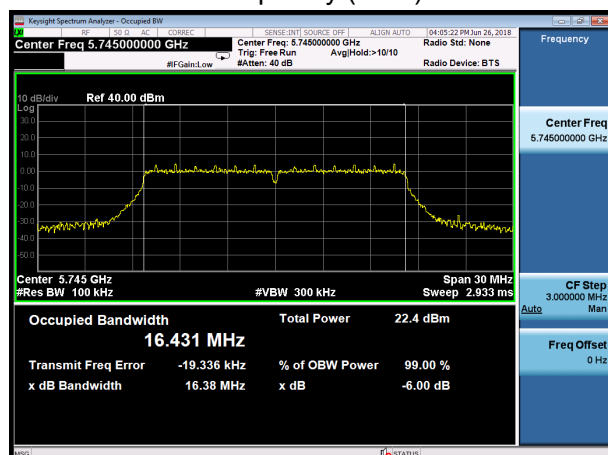




Minimum 6 dB bandwidth

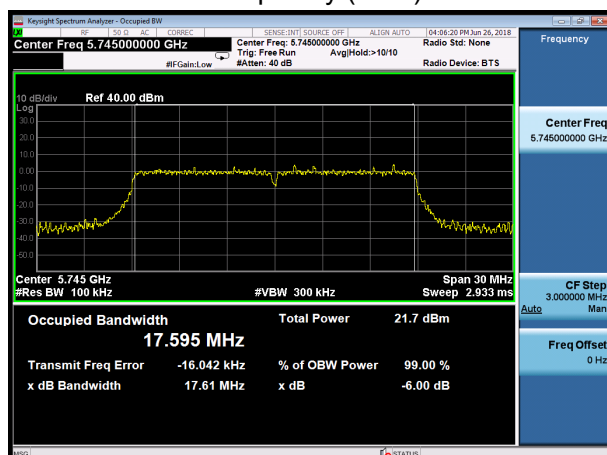
U-NII-3, 802.11a

Carrier frequency (MHz): 5745



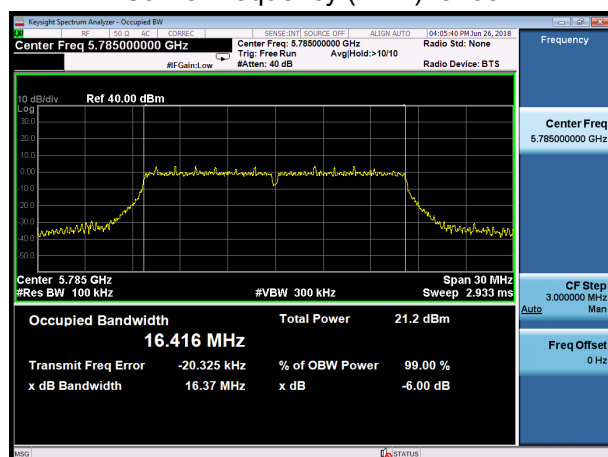
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5745



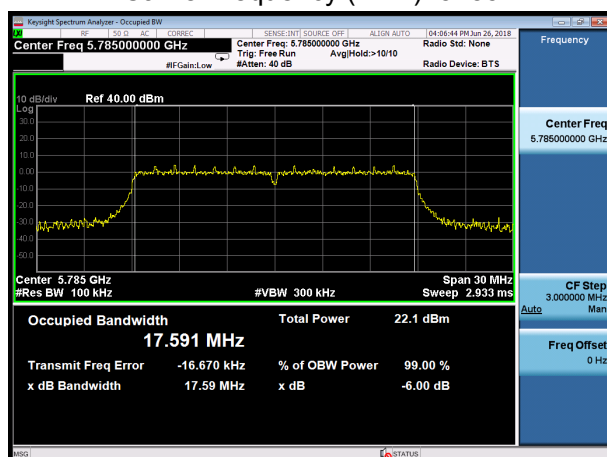
U-NII-3, 802.11a

Carrier frequency (MHz): 5785



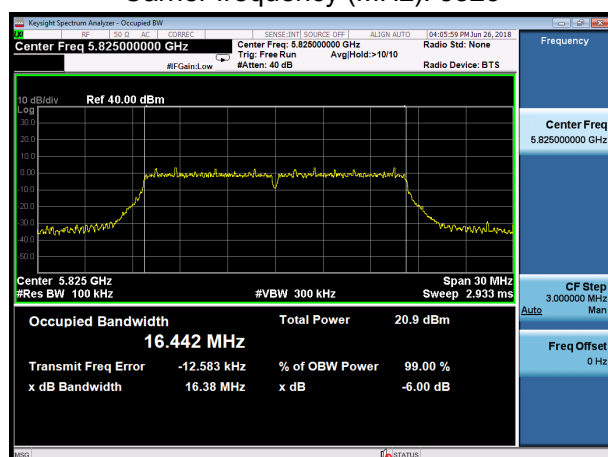
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5785



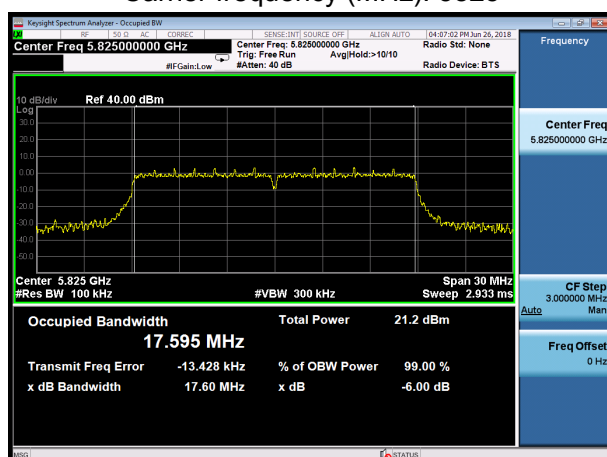
U-NII-3, 802.11a

Carrier frequency (MHz): 5825



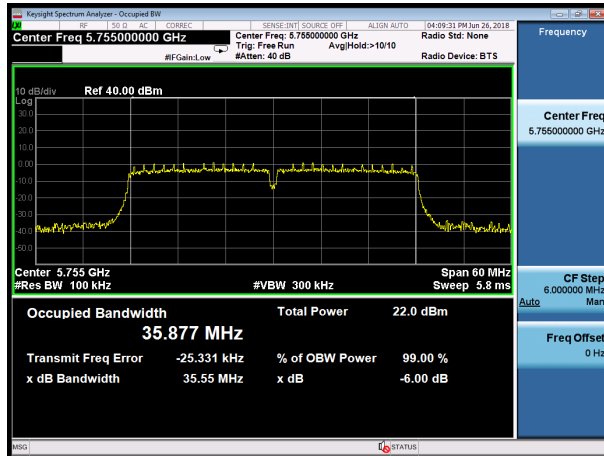
U-NII-3, 802.11n HT20

Carrier frequency (MHz): 5825

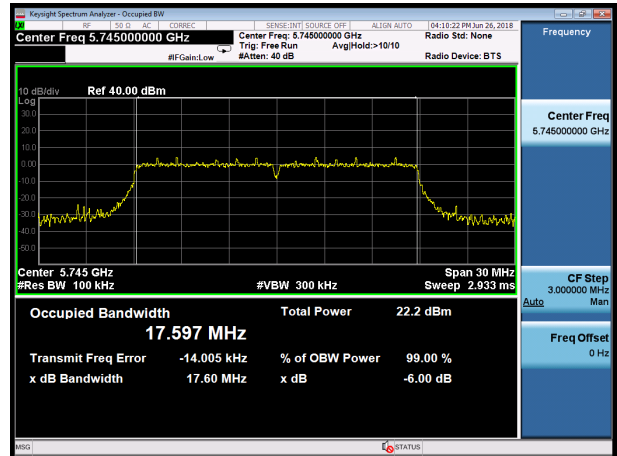




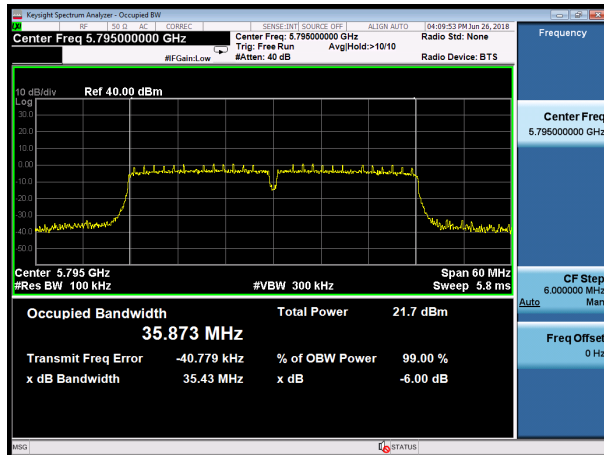
U-NII-3, 802.11n HT40
Carrier frequency (MHz): 5755



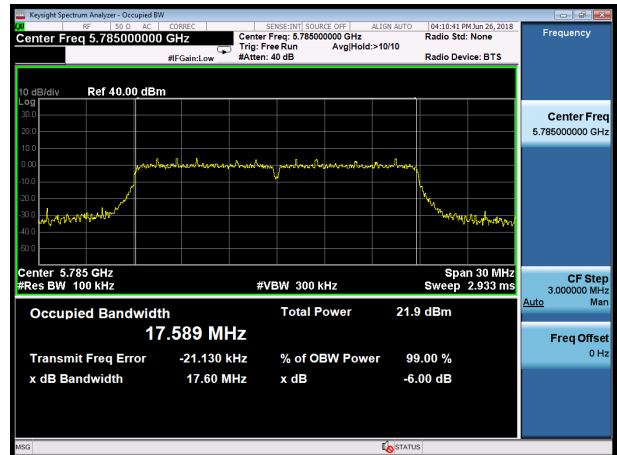
U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5745



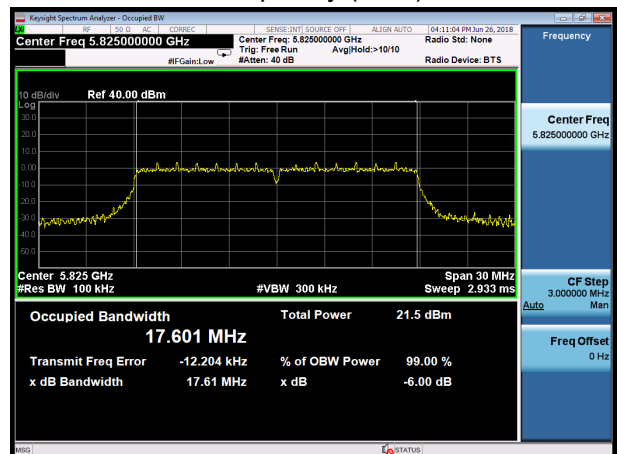
U-NII-3, 802.11n HT40
Carrier frequency (MHz): 5795



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

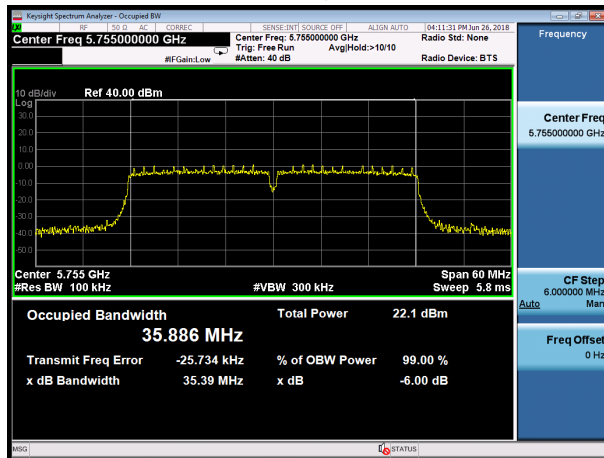


U-NII-3, 802.11ac VHT20
Carrier frequency (MHz): 5825

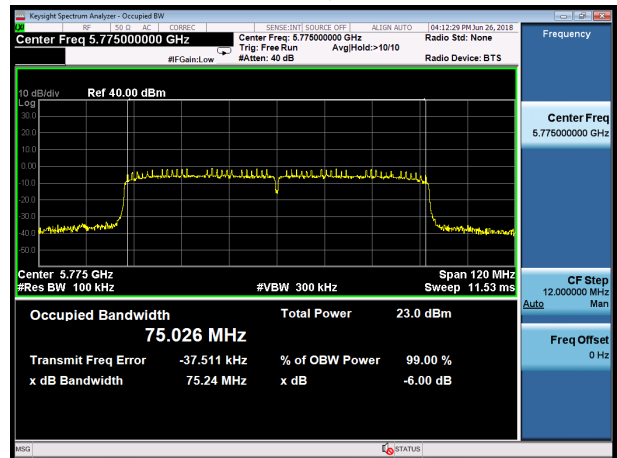




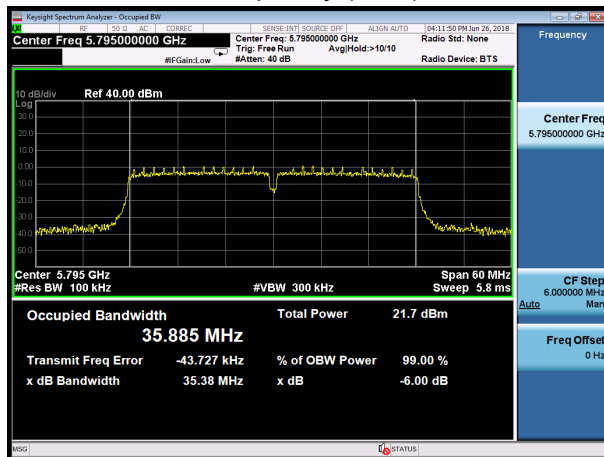
U-NII-3, 802.11ac VHT40
Carrier frequency (MHz): 5755



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



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



5.2. Average Power Output –Conducted

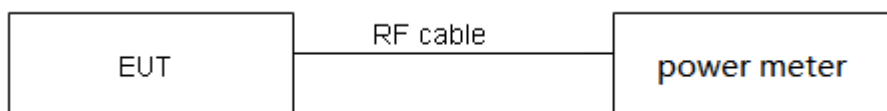
Ambient condition

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

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

Band	T _{on} (ms)	T _(on+off) (ms)	Duty cycle	Duty cycle correction Factor(dB)
802.11a	2.06	2.11	0.98	NA
802.11n HT20	1.92	1.96	0.98	NA
802.11n HT40	0.94	0.99	0.95	0.22
802.11ac VHT20	1.93	1.98	0.98	NA
802.11ac VHT40	0.95	1.00	0.95	0.21
802.11ac VHT80	0.46	0.48	0.96	0.17
Note: when Duty cycle>0.98, Duty cycle correction Factor not required.				

Single Antenna Power Index												
Packet Type	CH36	CH40	CH48	CH52	CH60	CH64	CH100	CH116	CH140	CH149	CH157	CH165
802.11a	16	16	16	16	16	16	16	16	16	16	16	16
802.11n HT20	16	16	16	16	16	16	16	16	16	16	16	16
802.11ac VHT20	16	16	16	16	16	16	16	16	16	16	16	16
Packet Type	CH38	CH46	CH54	CH62	CH102	CH110	CH134	CH151	CH159	/	/	/
802.11n HT40	16	16	16	16	16	16	16	16	16	/	/	/
802.11ac VHT40	16	16	16	16	16	16	16	16	16	/	/	/
Packet Type	CH42	CH58	CH106	CH122	CH155	/	/	/	/	/	/	/
802.11ac VHT80	16	16	16	16	16	/	/	/	/	/	/	/



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	19.380	23.87<24	23.87
		60/5300	19.250	23.84<24	23.84
		64/5320	19.380	23.87<24	23.87
	802.11n HT20	52/5260	19.890	23.99<24	23.99
		60/5300	19.860	23.98<24	23.98
		64/5320	20.160	24.04>24	24.00
	802.11n HT40	54/5270	39.160	26.93>24	24.00
		62/5310	39.110	26.92>24	24.00
	802.11ac VHT20	52/5260	20.430	24.10>24	24.00
		60/5300	20.070	24.03>24	24.00
		64/5320	20.020	24.01>24	24.00
	802.11ac VHT40	54/5270	38.990	26.91>24	24.00
		62/5310	39.040	26.92>24	24.00
	802.11ac VHT80	58/5290	80.760	30.07>24	24.00
U-NII-2C	802.11a	100/5500	19.600	23.92<24	23.92
		116/5580	19.250	23.84<24	23.84
		140/5700	19.560	23.91<24	23.91
	802.11n HT20	100/5500	19.900	23.99<24	23.99
		116/5580	19.900	23.99<24	23.99
		140/5700	19.960	24.00>24	24.00
	802.11n HT40	102/5510	38.840	26.89>24	24.00
		110/5550	39.130	26.93>24	24.00
		134/5670	39.100	26.92>24	24.00
	802.11ac VHT20	100/5500	19.990	24.01>24	24.00
		116/5580	19.800	23.97<24	23.97
		140/5700	20.010	24.01>24	24.00
	802.11ac VHT40	102/5510	38.950	26.91>24	24.00
		110/5550	39.140	26.93>24	24.00
		134/5670	39.210	26.93>24	24.00
	802.11ac VHT80	106/5530	91.610	30.62>24	24.00
Note: 250mW=24dBm					



U-NII-1

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	36/5180	15.77	15.77	24.00	PASS
	40/5200	15.62	15.62	24.00	PASS
	48/5240	15.44	15.44	24.00	PASS
802.11n HT20	36/5180	15.99	15.99	24.00	PASS
	40/5200	15.88	15.88	24.00	PASS
	48/5240	15.67	15.67	24.00	PASS
802.11n HT40	38/5190	15.42	15.64	24.00	PASS
	46/5230	15.26	15.48	24.00	PASS
802.11ac VHT20	36/5180	15.94	15.94	24.00	PASS
	40/5200	15.88	15.88	24.00	PASS
	48/5240	15.69	15.69	24.00	PASS
802.11ac VHT40	38/5190	15.33	15.54	24.00	PASS
	46/5230	15.21	15.42	24.00	PASS
802.11ac VHT80	42/5210	15.69	15.86	24.00	PASS

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

U-NII-2A

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	52/5260	15.15	15.15	23.87	PASS
	60/5300	15.35	15.35	23.84	PASS
	64/5320	15.31	15.31	23.87	PASS
802.11n HT20	52/5260	15.48	15.48	23.99	PASS
	60/5300	15.67	15.67	23.98	PASS
	64/5320	15.64	15.64	24.00	PASS
802.11n HT40	54/5270	15.03	15.25	24.00	PASS
	62/5310	15.18	15.40	24.00	PASS
802.11ac VHT20	52/5260	15.42	15.42	24.00	PASS
	60/5300	15.74	15.74	24.00	PASS
	64/5320	15.66	15.66	24.00	PASS
802.11ac VHT40	54/5270	14.92	15.13	24.00	PASS
	62/5310	14.99	15.20	24.00	PASS
802.11ac VHT80	58/5290	15.22	15.39	24.00	PASS

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



U-NII-2C

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	100/5500	16.22	16.22	23.92	PASS
	116/5580	15.45	15.45	23.84	PASS
	140/5700	15.49	15.49	23.91	PASS
802.11n HT20	100/5500	16.53	16.53	23.99	PASS
	116/5580	15.77	15.77	23.99	PASS
	140/5700	15.81	15.81	24.00	PASS
802.11n HT40	102/5510	15.95	16.17	24.00	PASS
	110/5550	15.89	16.11	24.00	PASS
	134/5670	15.43	15.65	24.00	PASS
802.11ac VHT20	100/5500	16.45	16.45	24.00	PASS
	116/5580	15.76	15.76	23.97	PASS
	140/5700	15.63	15.63	24.00	PASS
802.11ac VHT40	102/5510	15.88	16.09	24.00	PASS
	110/5550	15.84	16.05	24.00	PASS
	134/5670	15.33	15.54	24.00	PASS
802.11ac VHT80	106/5530	16.22	16.39	24.00	PASS

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

U-NII-3

Network Standards	Channel/ Frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11a	149/5745	15.94	15.94	30.00	PASS
	157/5785	15.77	15.77	30.00	PASS
	165/5825	15.33	15.33	30.00	PASS
802.11n HT20	149/5745	16.28	16.28	30.00	PASS
	157/5785	16.03	16.03	30.00	PASS
	165/5825	15.65	15.65	30.00	PASS
802.11n HT40	151/5755	15.64	15.86	30.00	PASS
	159/5795	15.48	15.70	30.00	PASS
802.11ac VHT20	149/5745	16.22	16.22	30.00	PASS
	157/5785	16.15	16.15	30.00	PASS
	165/5825	15.55	15.55	30.00	PASS
802.11ac VHT40	151/5755	15.69	15.90	30.00	PASS
	159/5795	15.48	15.69	30.00	PASS
802.11ac VHT80	155/5775	15.78	15.95	30.00	PASS

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

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

- 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.
- 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.
- 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).
- Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.
- 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.
- 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.
- Measure the frequency at each of frequencies specified in 5.6.
- Switch OFF the EUT but do not switch OFF the oscillator heater.
- Lower the chamber temperature by not more than 10 C, and allow the temperature inside the chamber to stabilize.
- 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.

- 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 $k = 2$, $U = 936\text{Hz}$

**Test Results**

Voltage (V)	Temperature (°C)	U-NII-1 Test Results			
		5200MHz			
		1min	2min	5min	10min
3.82	0	5200.007853	5200.000232	5199.998792	5199.997971
3.82	5	5200.008835	5199.996528	5199.989141	5199.992074
3.82	10	5200.006219	5199.994509	5199.981611	5199.985383
3.82	15	5199.999192	5199.989386	5199.979792	5199.980115
3.82	20	5199.993905	5199.985970	5199.976745	5199.978381
3.82	25	5199.987703	5199.982616	5199.968986	5199.970794
3.82	30	5199.980278	5199.980925	5199.963390	5199.967808
3.82	35	5199.976866	5199.979513	5199.956284	5199.965853
3.6	25	5199.975724	5199.978832	5199.946575	5199.961230
4.4	25	5199.975663	5199.978104	5199.937482	5199.959183
MHz		-0.024337	-0.021896	-0.062518	-0.040817
PPM		-4.680184	-4.210761	-12.022613	-7.849421

Voltage (V)	Temperature (°C)	U-NII-2A Test Results			
		5300MHz			
		1min	2min	5min	10min
3.82	0	5299.993525	5299.991704	5299.982524	5299.980685
3.82	5	5299.984527	5299.986202	5299.979463	5299.974063
3.82	10	5299.983173	5299.981499	5299.971181	5299.972840
3.82	15	5299.979831	5299.977360	5299.966631	5299.972413
3.82	20	5299.974666	5299.971534	5299.958513	5299.970054
3.82	25	5299.970272	5299.967612	5299.954976	5299.964496
3.82	30	5299.961646	5299.959874	5299.952779	5299.956829
3.82	35	5299.957107	5299.952286	5299.950807	5299.950969
3.6	25	5299.953149	5299.950667	5299.943210	5299.946505
4.4	25	5299.949822	5299.946679	5299.938231	5299.944703
MHz		-0.050178	-0.053321	-0.061769	-0.055297
PPM		-9.467637	-10.060481	-11.654457	-10.433354



Voltage (V)	Temperature (°C)	U-NII-2C Test Results			
		5580MHz			
		1min	2min	5min	10min
3.82	0	5580.006357	5579.998407	5579.998362	5579.993226
3.82	5	5580.004407	5579.992938	5579.995336	5579.991732
3.82	10	5580.002972	5579.991866	5579.987345	5579.982838
3.82	15	5579.994330	5579.986457	5579.982692	5579.973582
3.82	20	5579.985163	5579.981564	5579.973210	5579.967347
3.82	25	5579.984013	5579.973799	5579.965115	5579.959097
3.82	30	5579.982353	5579.966756	5579.961114	5579.953734
3.82	35	5579.975089	5579.963615	5579.957633	5579.949855
3.6	25	5579.967652	5579.960819	5579.956887	5579.942471
4.4	25	5579.965288	5579.956904	5579.949596	5579.934618
MHz		-0.034712	-0.043096	-0.050404	-0.065382
PPM		-6.220780	-7.723325	-9.032974	-11.717266

Voltage (V)	Temperature (°C)	U-NII-3 Test Results			
		5785MHz			
		1min	2min	5min	10min
3.82	0	5784.994231	5784.990119	5784.984037	5784.982145
3.82	5	5784.987636	5784.989762	5784.981010	5784.979463
3.82	10	5784.978224	5784.984007	5784.972623	5784.974147
3.82	15	5784.974760	5784.975204	5784.967681	5784.972904
3.82	20	5784.972281	5784.970623	5784.960996	5784.965293
3.82	25	5784.965360	5784.969585	5784.959403	5784.957953
3.82	30	5784.959187	5784.962096	5784.949708	5784.955812
3.82	35	5784.958129	5784.957094	5784.948488	5784.952239
3.6	25	5784.949965	5784.947298	5784.947304	5784.951166
4.4	25	5784.948954	5784.946496	5784.940666	5784.948262
MHz		-0.051046	-0.053504	-0.059334	-0.051738
PPM		-8.823810	-9.248735	-10.256543	-8.943419

5.4. Power Spectral Density

Ambient condition

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

Method of Measurement

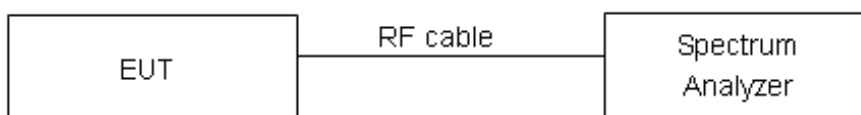
The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable.

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.

(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.

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 transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the



amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

Measurement Uncertainty

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

Test Results:

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

U-NII-1

Network Standards	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	36	3.93	3.93	11	PASS
	40	3.63	3.63	11	PASS
	48	3.56	3.56	11	PASS
802.11n HT20	36	3.70	3.70	11	PASS
	40	3.65	3.65	11	PASS
	48	3.41	3.41	11	PASS
802.11n HT40	38	0.37	0.59	11	PASS
	46	0.31	0.53	11	PASS
802.11ac VHT20	36	3.40	3.40	11	PASS
	40	3.66	3.66	11	PASS
	48	3.40	3.40	11	PASS
802.11ac VHT40	38	0.50	0.71	11	PASS
	46	0.20	0.42	11	PASS
802.11ac VHT80	42	-2.62	-2.45	11	PASS



U-NII-2A

Network Standards	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	52	3.76	3.76	11	PASS
	60	3.73	3.73	11	PASS
	64	3.81	3.81	11	PASS
802.11n HT20	52	3.70	3.70	11	PASS
	60	4.01	4.01	11	PASS
	64	3.83	3.83	11	PASS
802.11n HT40	54	0.01	0.23	11	PASS
	62	0.41	0.63	11	PASS
802.11ac VHT20	52	3.81	3.81	11	PASS
	60	3.61	3.61	11	PASS
	64	3.82	3.82	11	PASS
802.11ac VHT40	54	0.14	0.35	11	PASS
	62	0.51	0.73	11	PASS
802.11ac VHT80	58	-3.16	-2.99	11	PASS



U-NII-2C

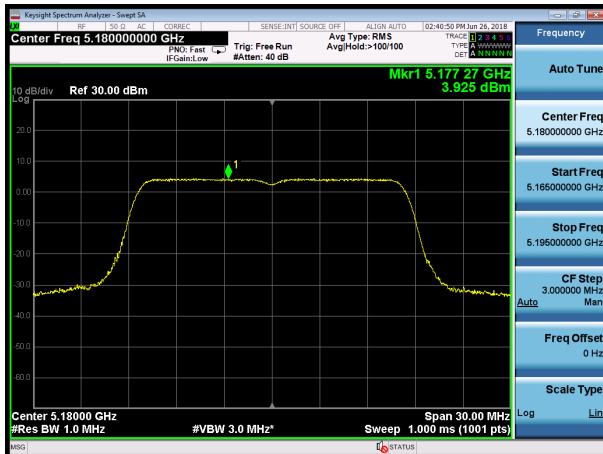
Network Standards	Channel Number	Read Value (dBm /MHz)	Power Spectral Density (dBm /MHz)	Limit (dBm /MHz)	Conclusion
802.11a	100	4.62	4.62	11	PASS
	116	3.87	3.87	11	PASS
	140	3.96	3.96	11	PASS
802.11n HT20	100	4.76	4.76	11	PASS
	116	3.98	3.98	11	PASS
	140	3.78	3.78	11	PASS
802.11n HT40	102	1.24	1.45	11	PASS
	110	1.47	1.69	11	PASS
	134	0.50	0.71	11	PASS
802.11ac VHT20	100	4.54	4.54	11	PASS
	116	3.87	3.87	11	PASS
	140	3.88	3.88	11	PASS
802.11ac VHT40	102	1.10	1.32	11	PASS
	110	1.24	1.45	11	PASS
	134	0.76	0.97	11	PASS
802.11ac VHT80	106	-1.81	-1.64	11	PASS

U-NII-3

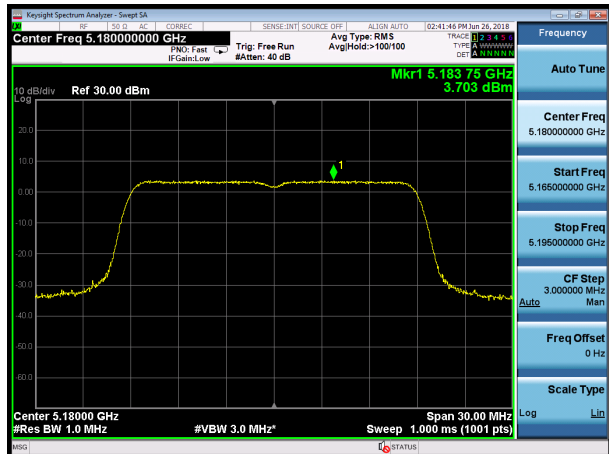
Network Standards	Channel Number	Read Value (dBm/500kHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Conclusion
802.11a	149	1.80	1.80	30	PASS
	157	0.88	0.88	30	PASS
	165	0.45	0.45	30	PASS
802.11n HT20	149	1.29	1.29	30	PASS
	157	1.21	1.21	30	PASS
	165	0.53	0.53	30	PASS
802.11n HT40	151	-2.18	-1.96	30	PASS
	159	-1.84	-1.62	30	PASS
802.11ac VHT20	149	1.77	1.77	30	PASS
	157	1.10	1.10	30	PASS
	165	0.47	0.47	30	PASS
802.11ac VHT40	151	-2.15	-1.93	30	PASS
	159	-2.55	-2.34	30	PASS
802.11ac VHT80	155	-4.81	-4.64	30	PASS



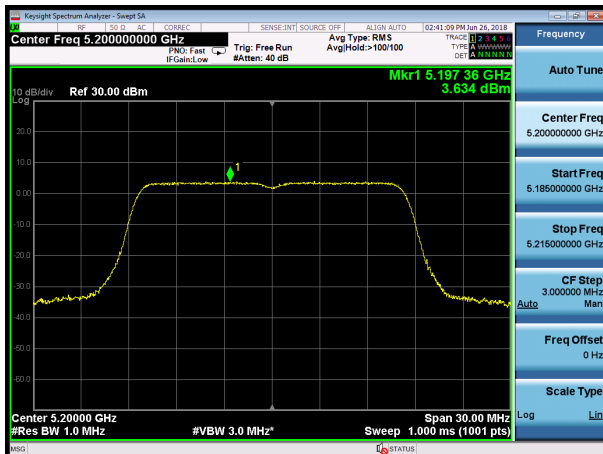
U-NII-1, 802.11a, Channel No.: 36



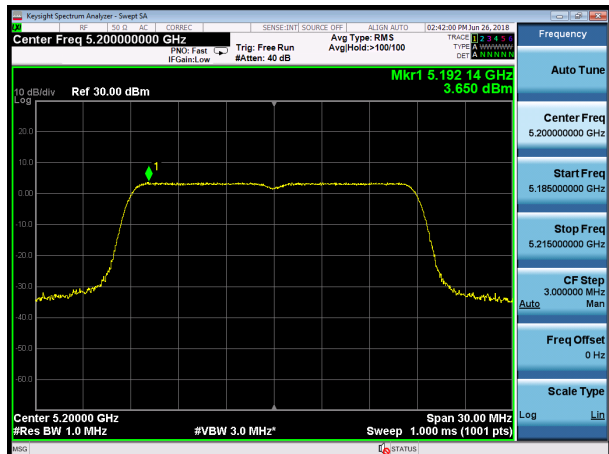
U-NII-1, 802.11n HT20, Channel No.: 36



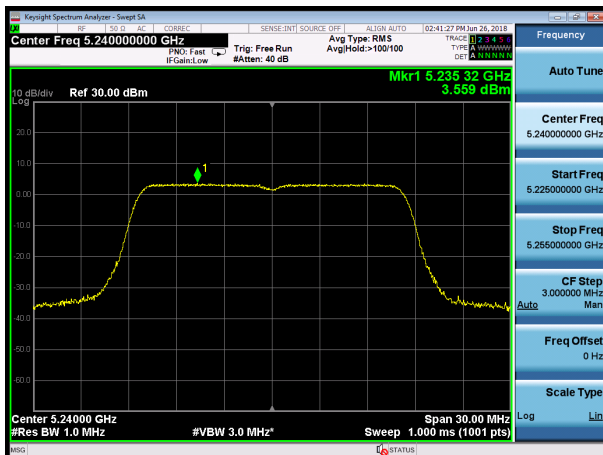
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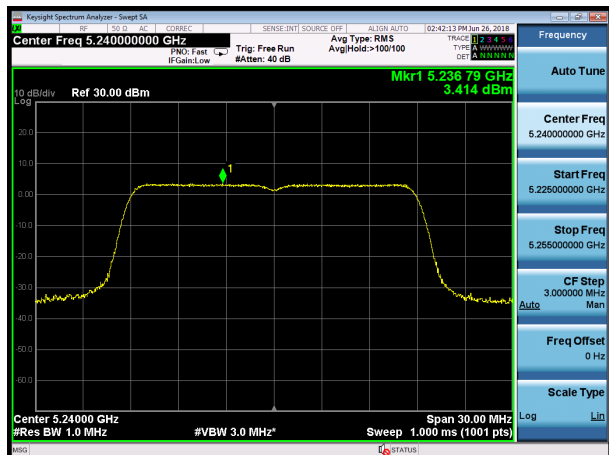
U-NII-1, 802.11n HT20, Channel No.: 40



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



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

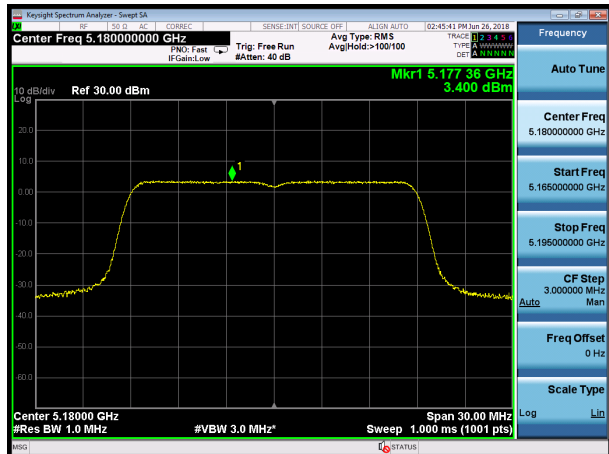




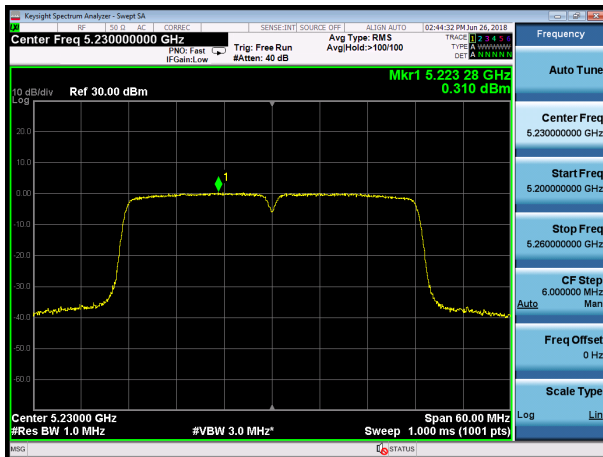
U-NII-1, 802.11n HT40, Channel No.: 38



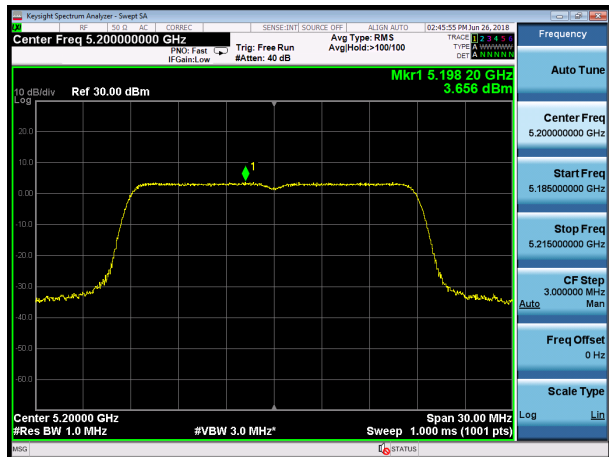
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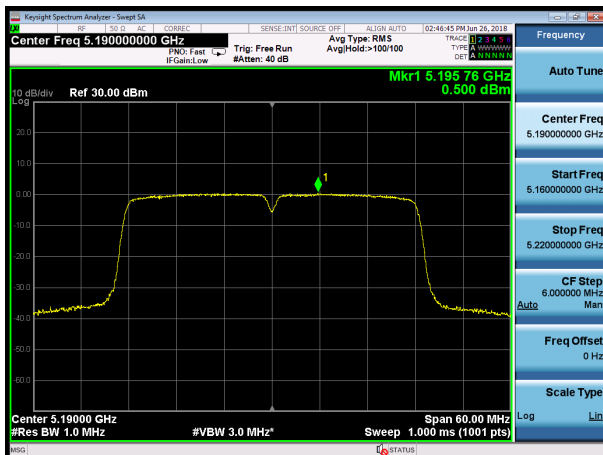
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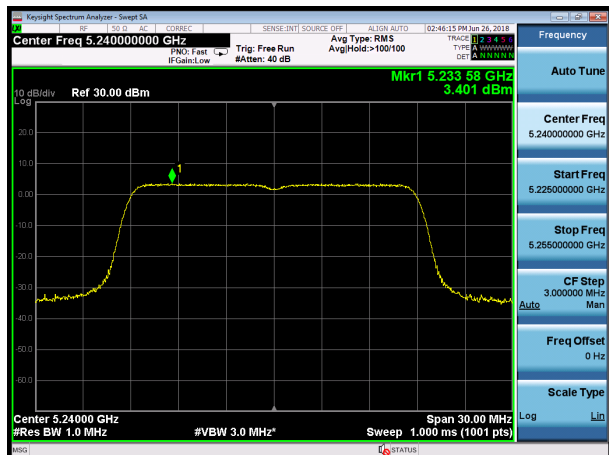
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U-NII-1, 802.11ac VHT40, Channel No.: 38

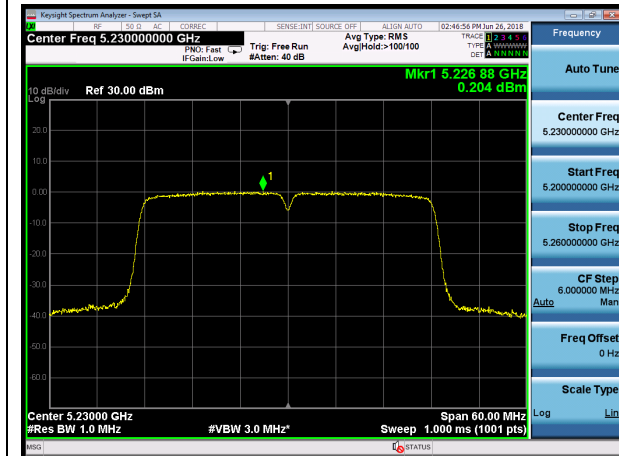


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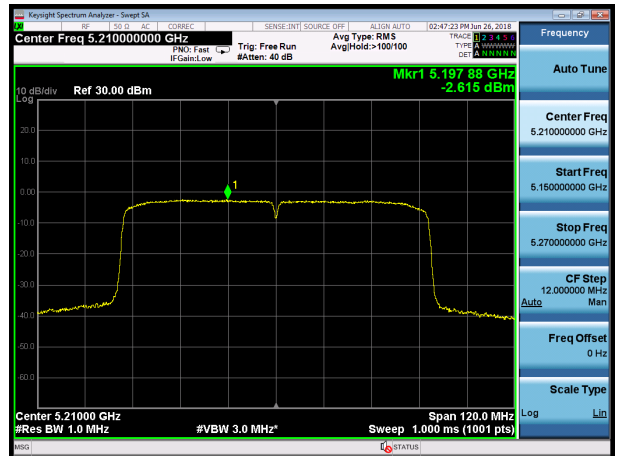




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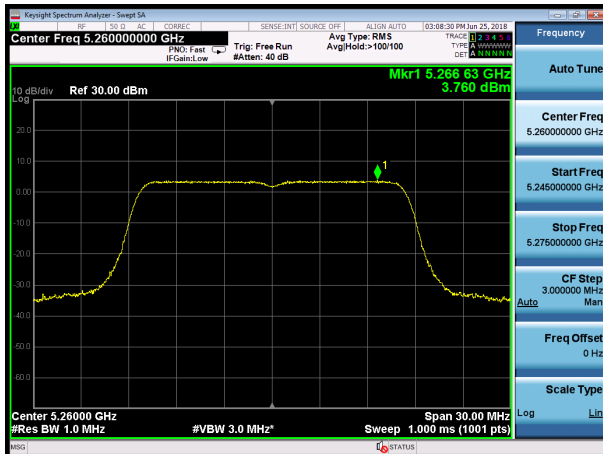


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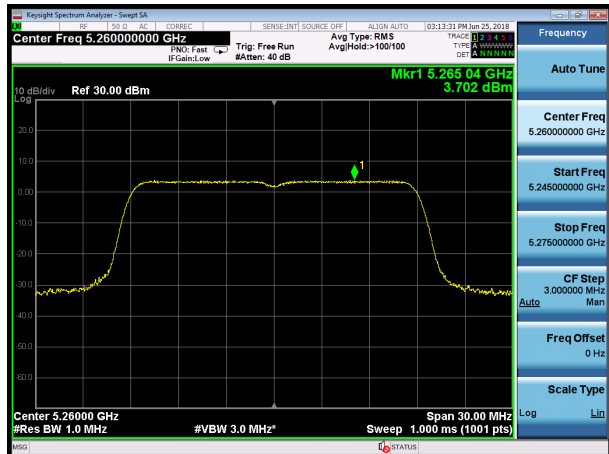




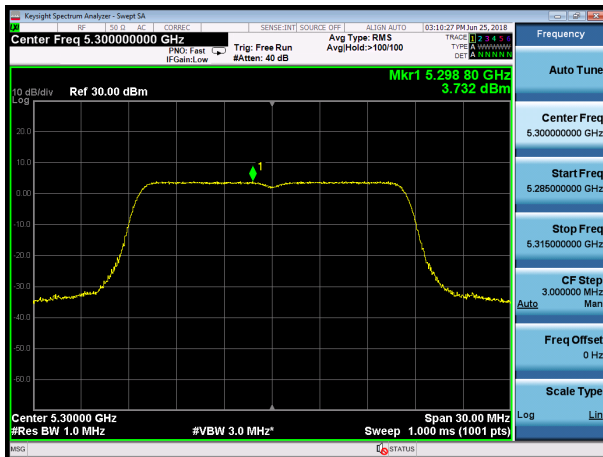
U-NII-2A, 802.11a, Channel No.: 52



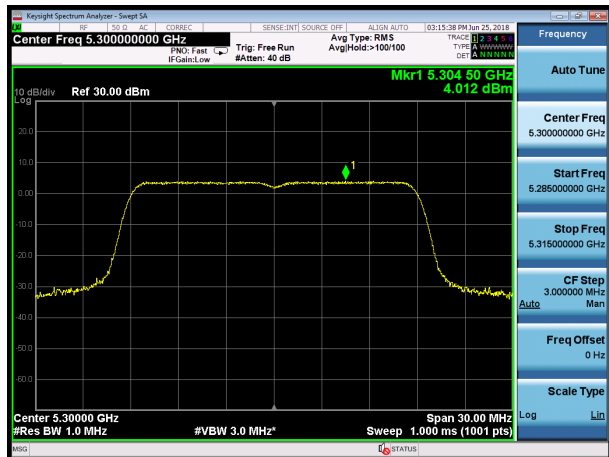
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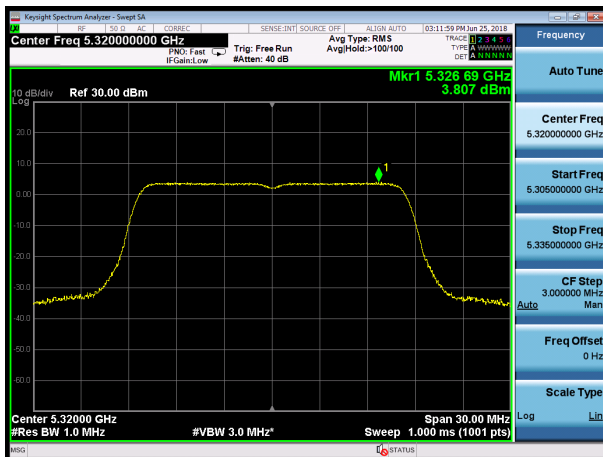
U-NII-2A, 802.11a, Channel No.: 60



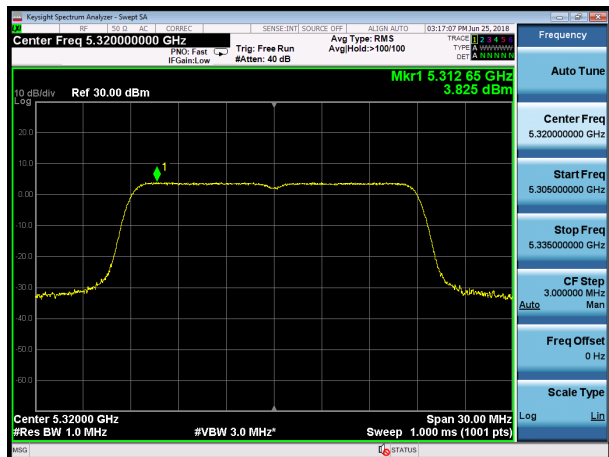
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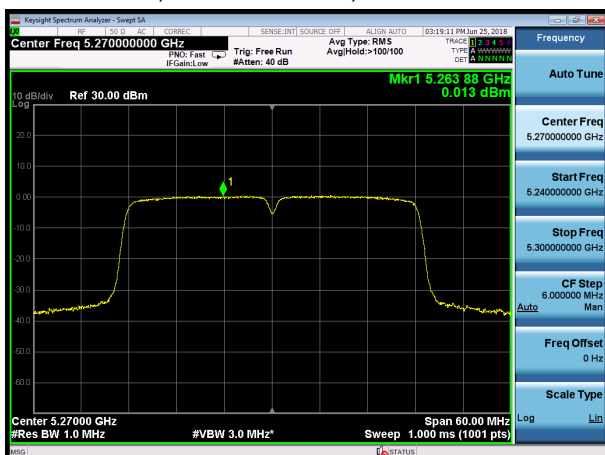
U-NII-2A, 802.11a, Channel No.: 64



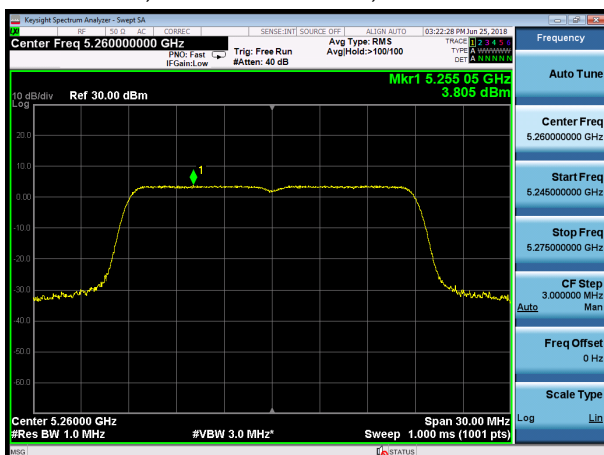
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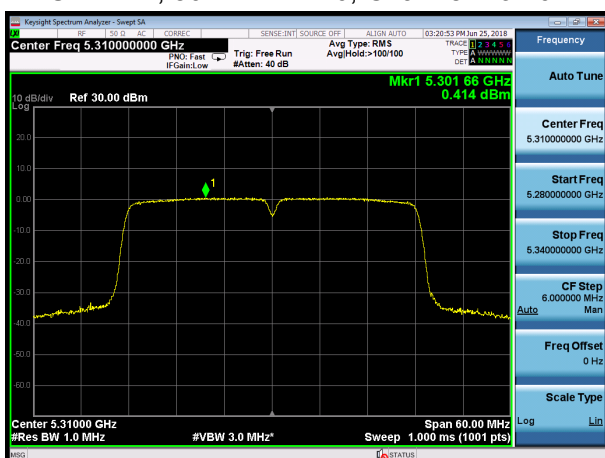
U-NII-2A, 802.11n HT40, Channel No.: 54



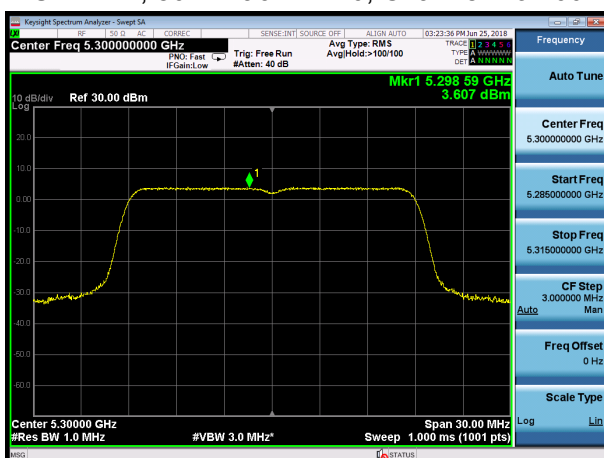
U-NII-2A, 802.11ac VHT20, Channel No.:52



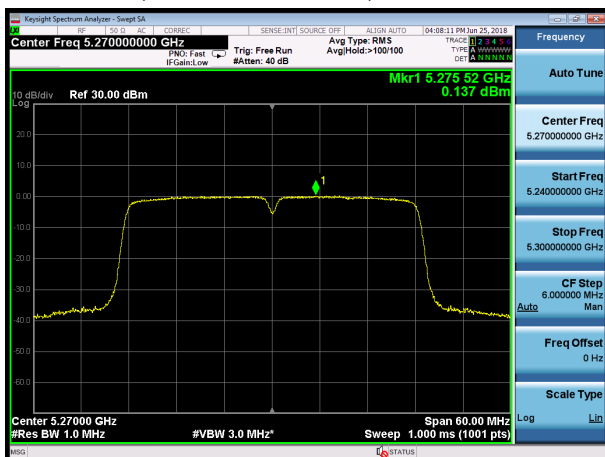
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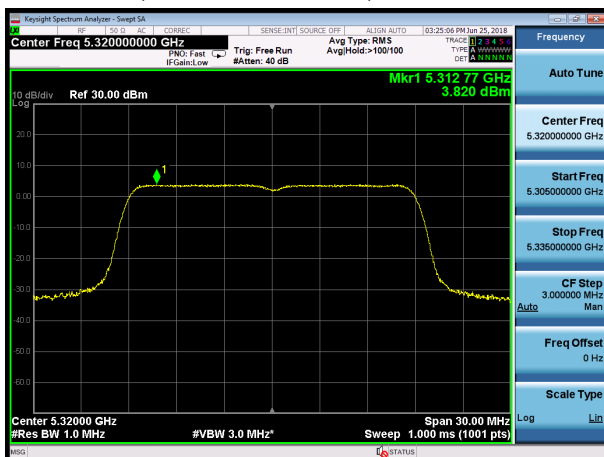
U-NII-2A, 802.11ac VHT20, Channel No.: 60



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

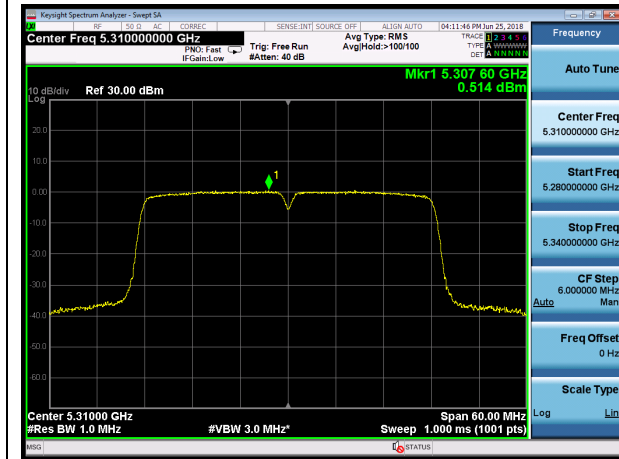


U-NII-2A, 802.11ac VHT20, Channel No.: 64





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

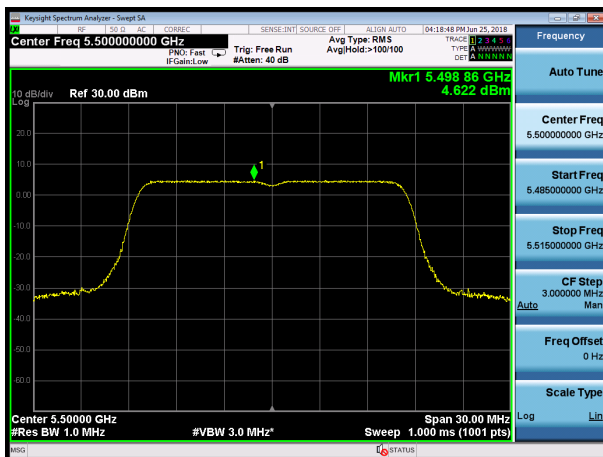


U-NII-2A, 802.11ac VHT80, Channel No.: 58

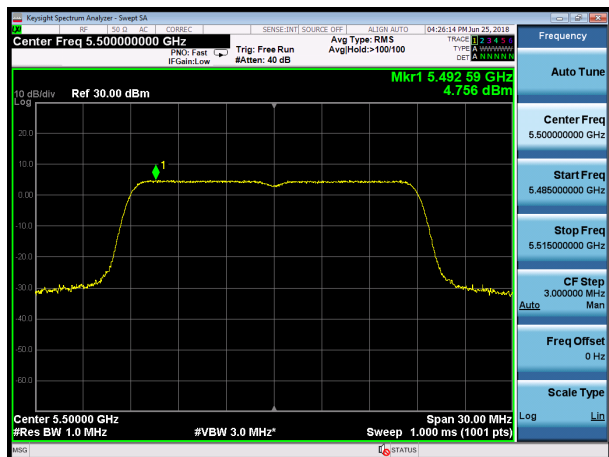




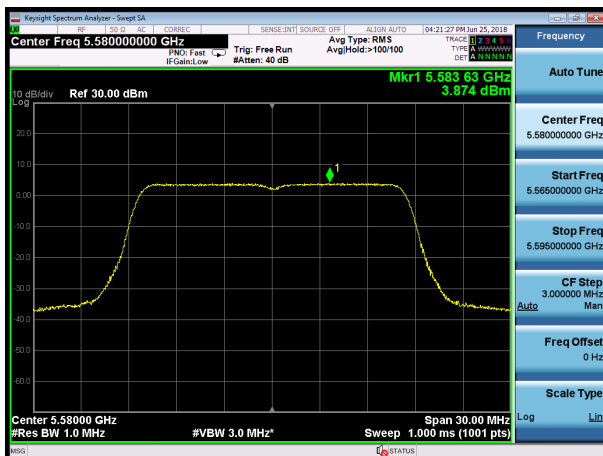
U-NII-2C, 802.11a, Channel No.: 100



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



U-NII-2C, 802.11a, Channel No.: 116



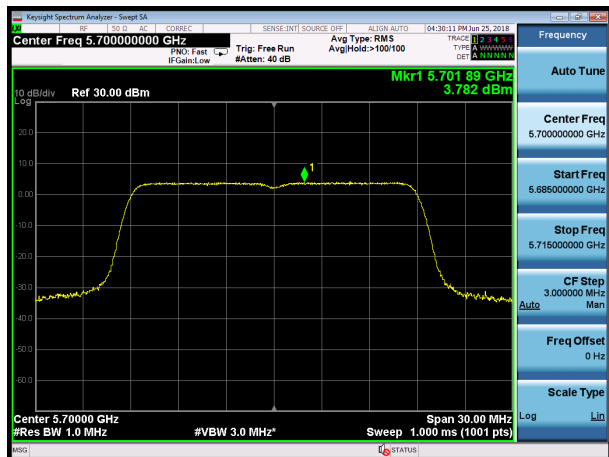
U-NII-2C, 802.11n HT20, Channel No.: 116



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

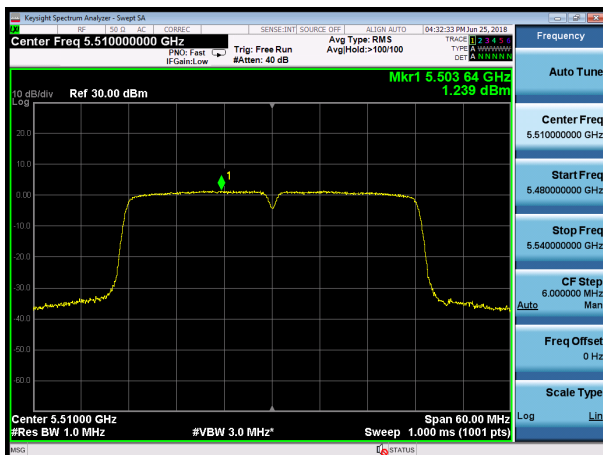


U-NII-2C, 802.11n HT20, Channel No.: 140

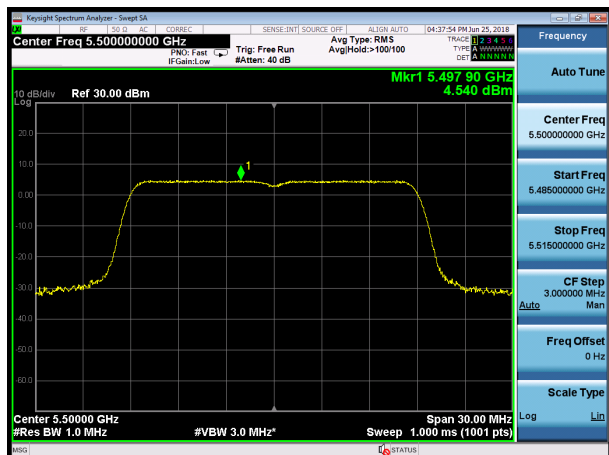




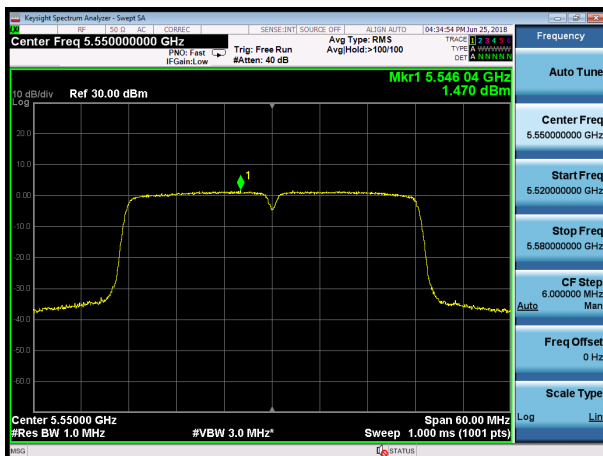
U-NII-2C, 802.11n HT40, Channel No.: 102



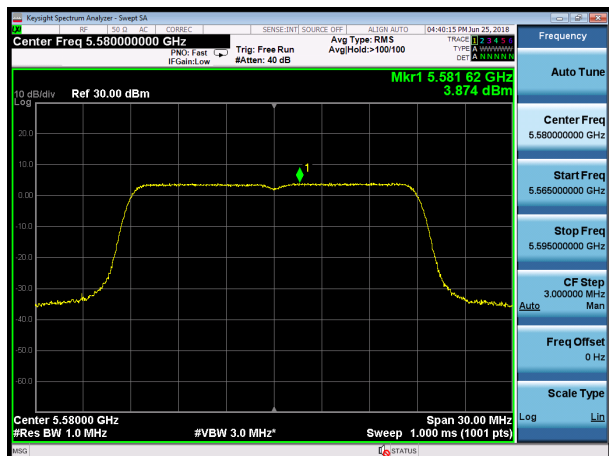
U-NII-2C, 802.11ac VHT20, Channel No.: 100



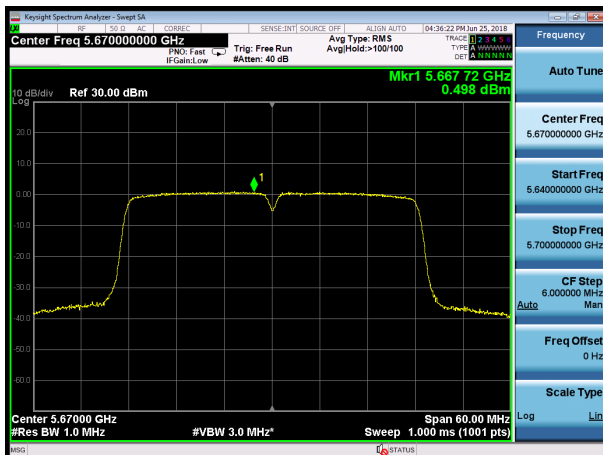
U-NII-2C, 802.11n HT40, Channel No.: 110



U-NII-2C, 802.11ac VHT20, Channel No.: 116



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



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

