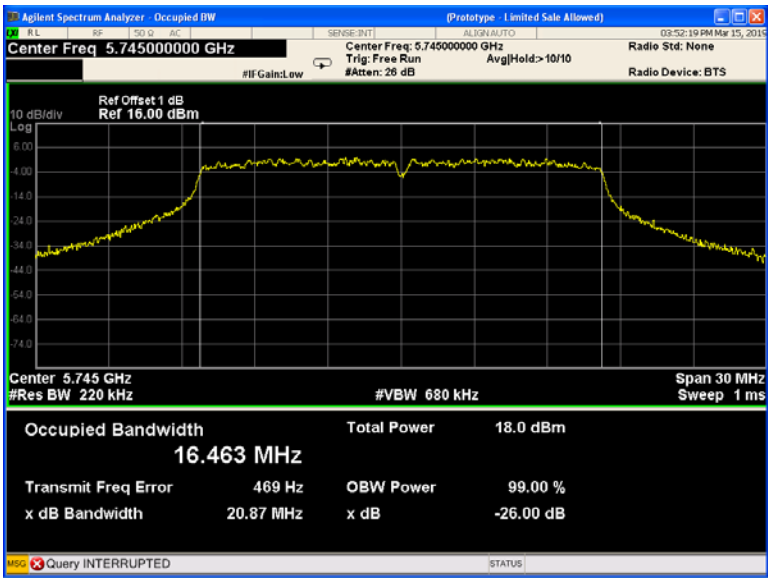
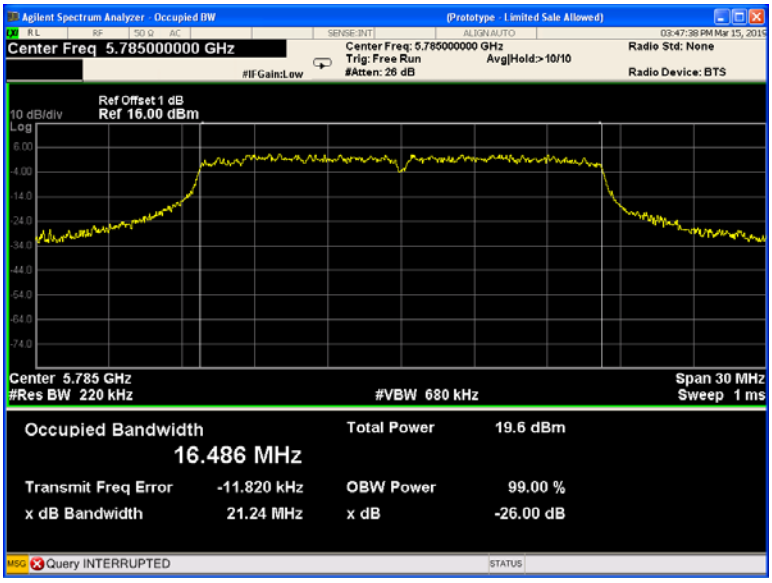
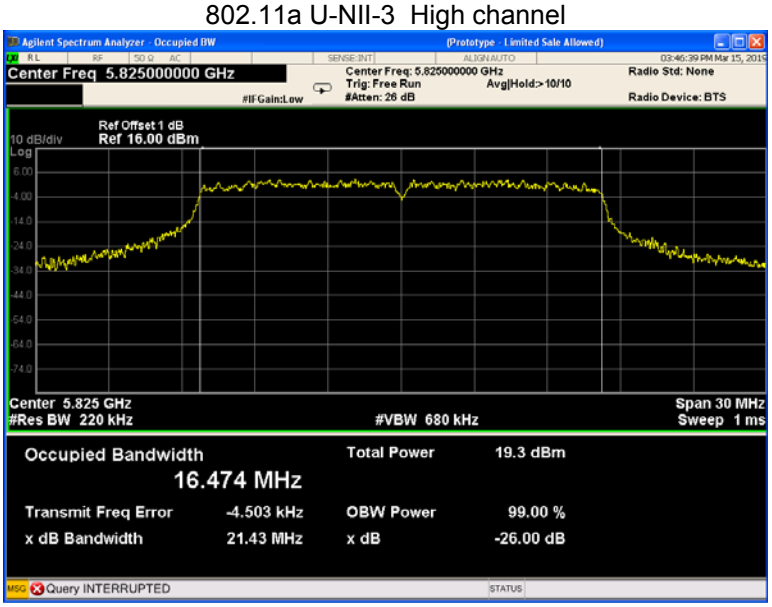
802.11a U-NII-3 Low channel



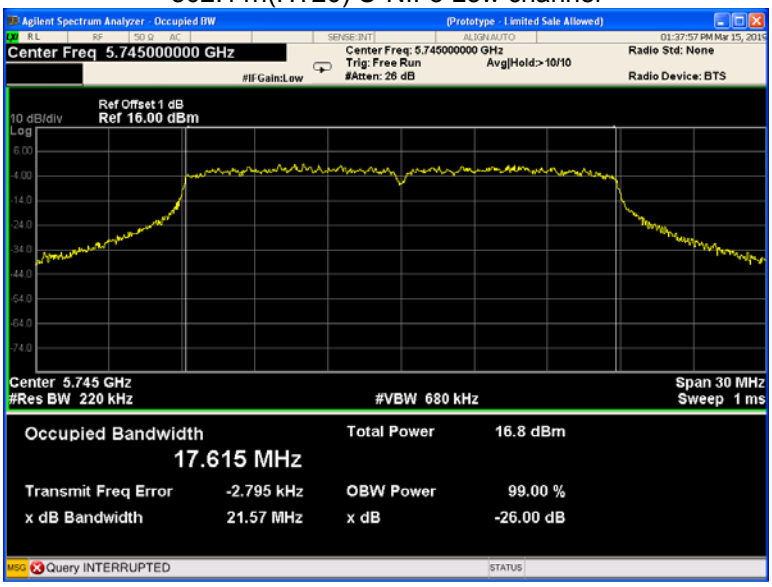
802.11a U-NII-3 Middle channel



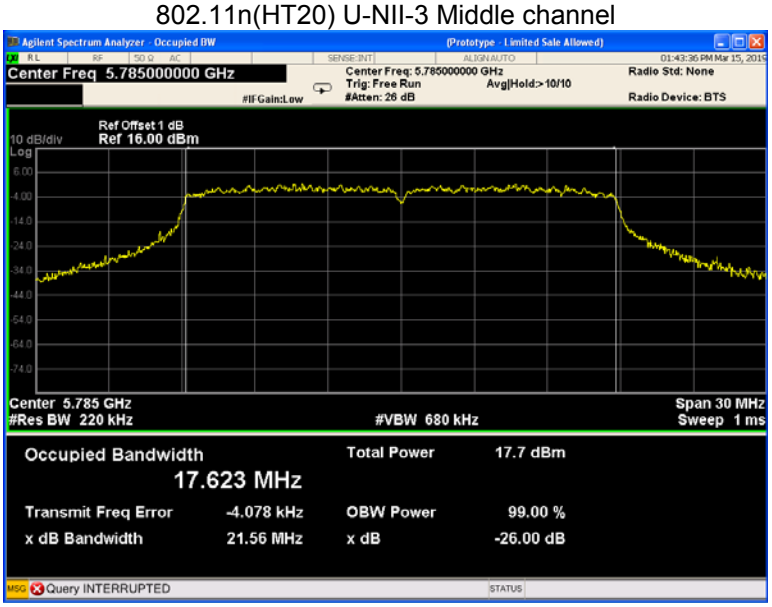
802.11a U-NII-3 High channel



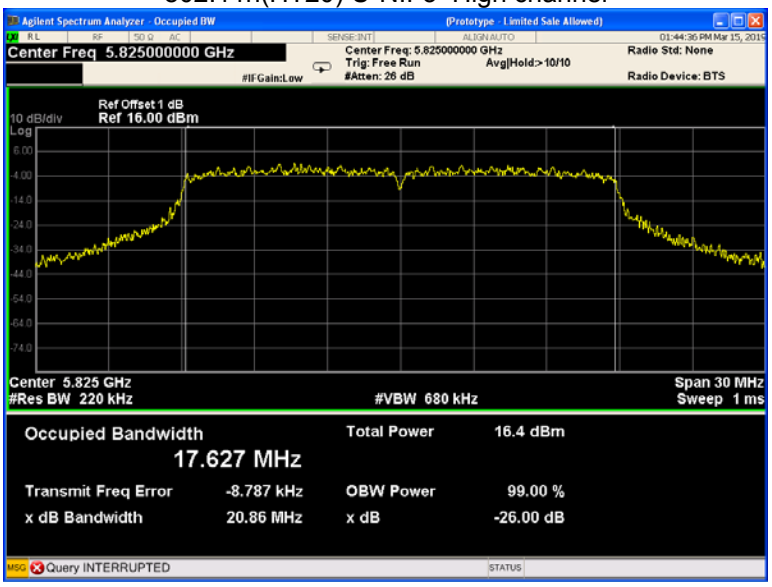
802.11n(HT20) U-NII-3 Low channel



802.11n(HT20) U-NII-3 Middle channel



802.11n(HT20) U-NII-3 High channel



14 Conducted Output Power

Test Requirement:	FCC CFR47 Part 15 Section 15.407(a)
Test Method:	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02r01 (December 14, 2017)Section E
Test Limit:	U-NII-1 250mW(24dBm) U-NII-2A 250mW(24dBm) U-NII-2C 250mW(24dBm) U-NII-3 1W(30dBm)
Test Result:	PASS
Remark:	Conducted output power= measurement power+10log(1/x) X is duty cycle=1, so 10log(1/1)=0 Conducted output power= measurement power

14.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

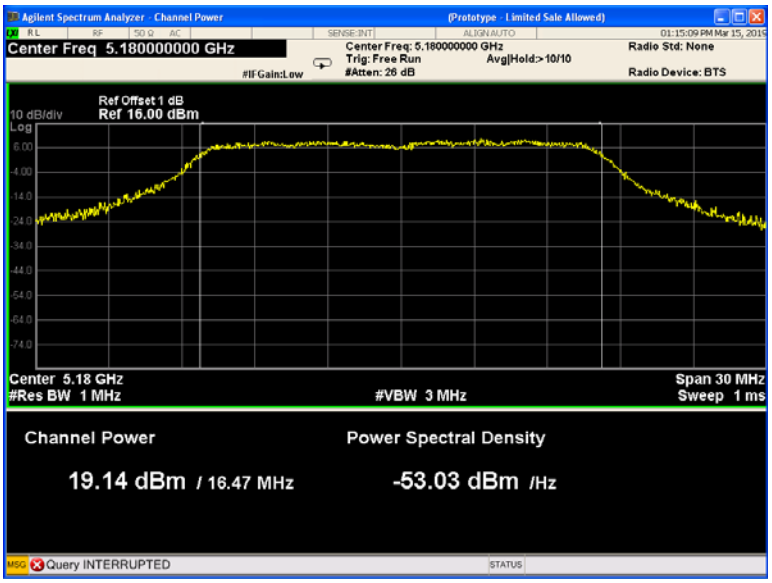
14.2 Test Result :

Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-1	802.11a	**19.14**	18.65	18.72
	802.11n(HT20)	15.47	15.98	16.77
U-NII-2A	802.11a	18.53	**18.56**	18.24
	802.11n(HT20)	16.23	16.89	16.05
U-NII-2C	802.11a	16.13	17.54	17.38
	802.11n(HT20)	17.24	**17.78**	17.30
U-NII-3	802.11a	18.96	**19.78**	19.78
	802.11n(HT20)	17.10	17.90	16.67

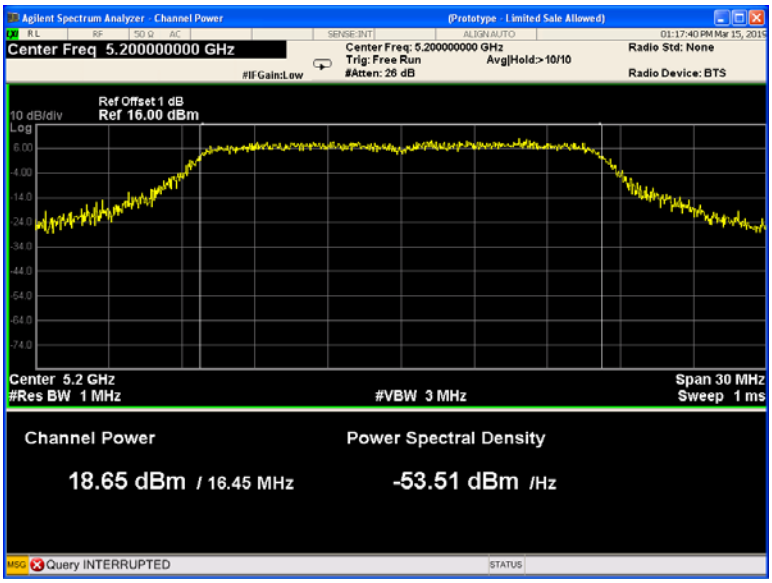
* All transmit signals are completely uncorrelated with each other, Directional gain = G_{ANT} which is less than 6dBi. So the limit does not be reduced.

Test result plots shown as follows:

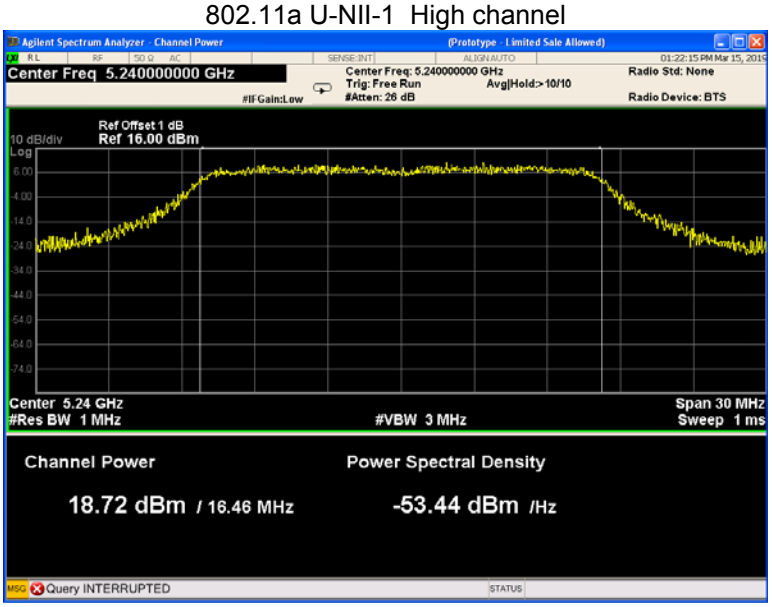
802.11a U-NII-1 Low channel



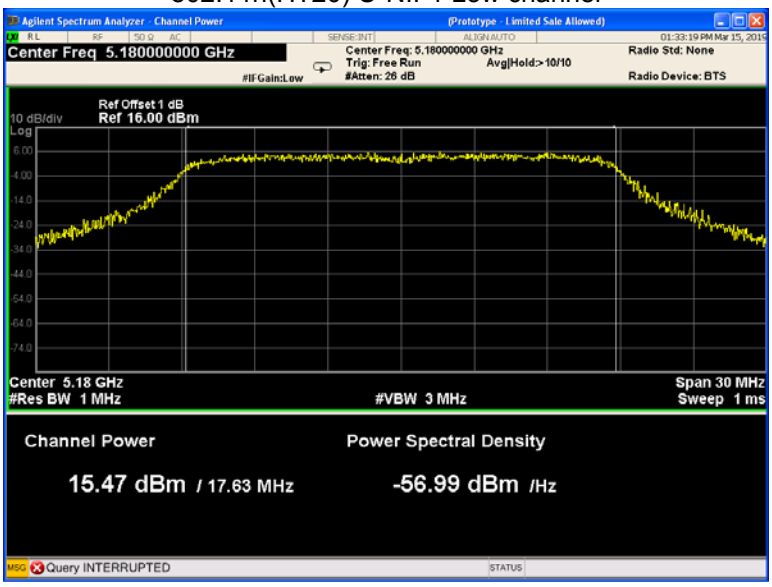
802.11a U-NII-1 Middle channel



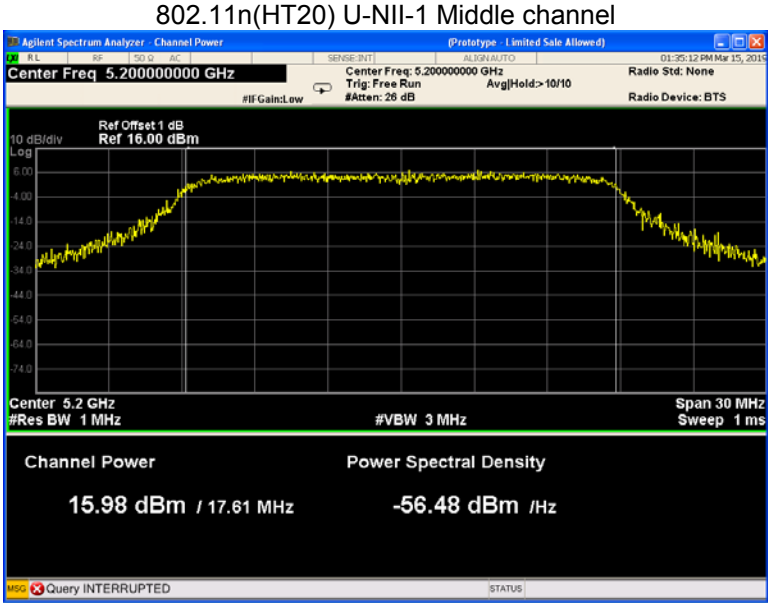
802.11a U-NII-1 High channel



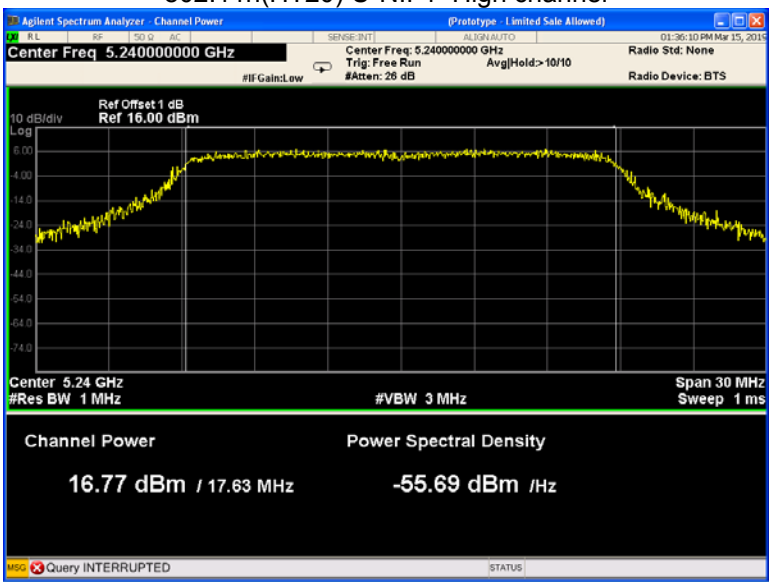
802.11n(HT20) U-NII-1 Low channel



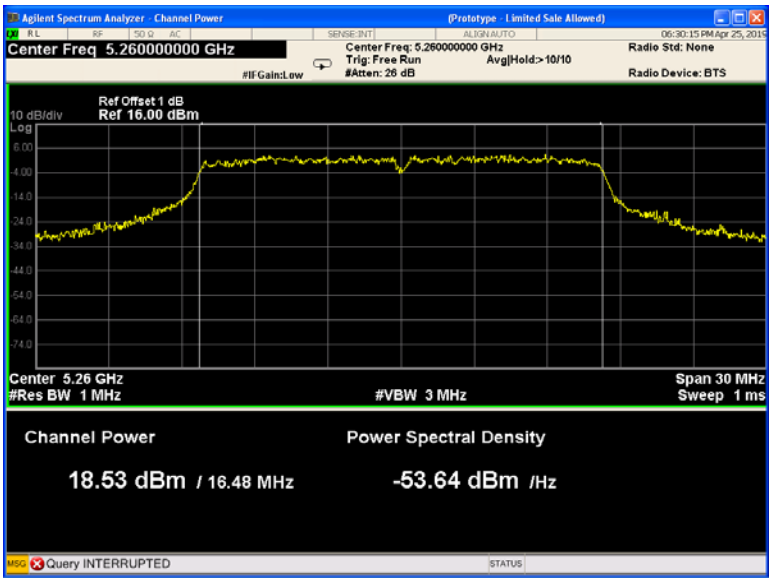
802.11n(HT20) U-NII-1 Middle channel



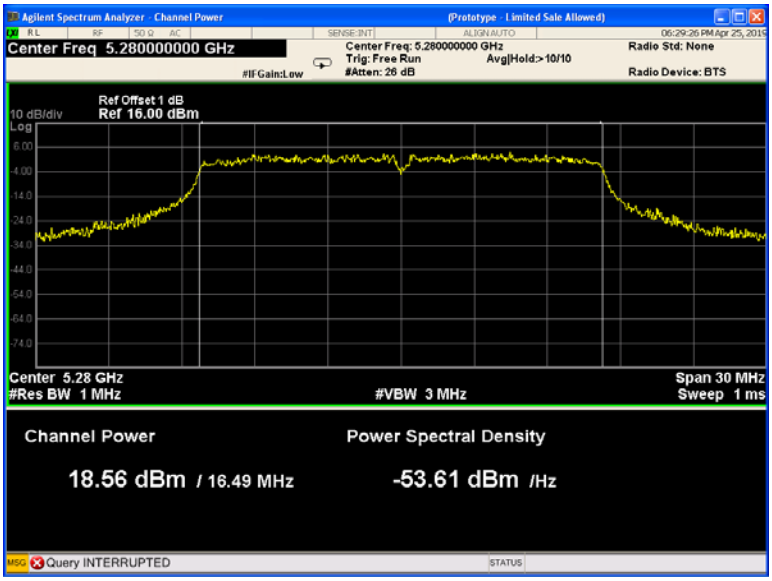
802.11n(HT20) U-NII-1 High channel



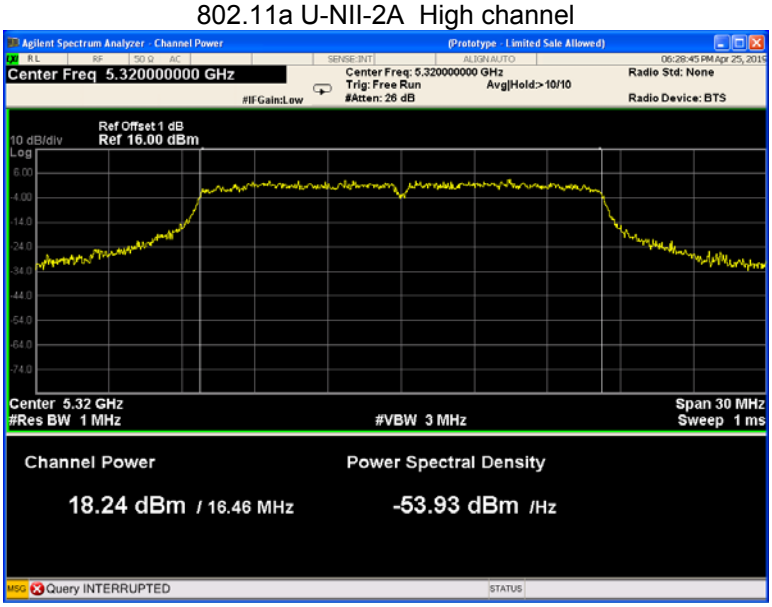
802.11a U-NII-2A Low channel



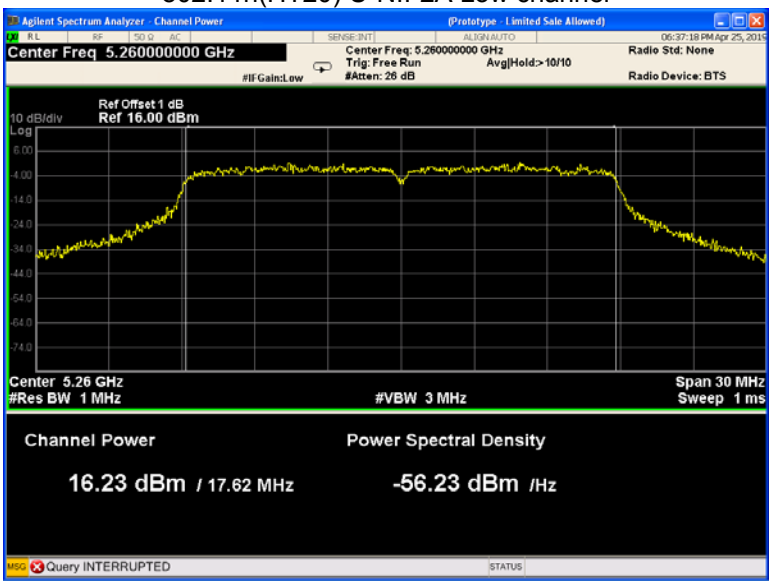
802.11a U-NII-2A Middle channel



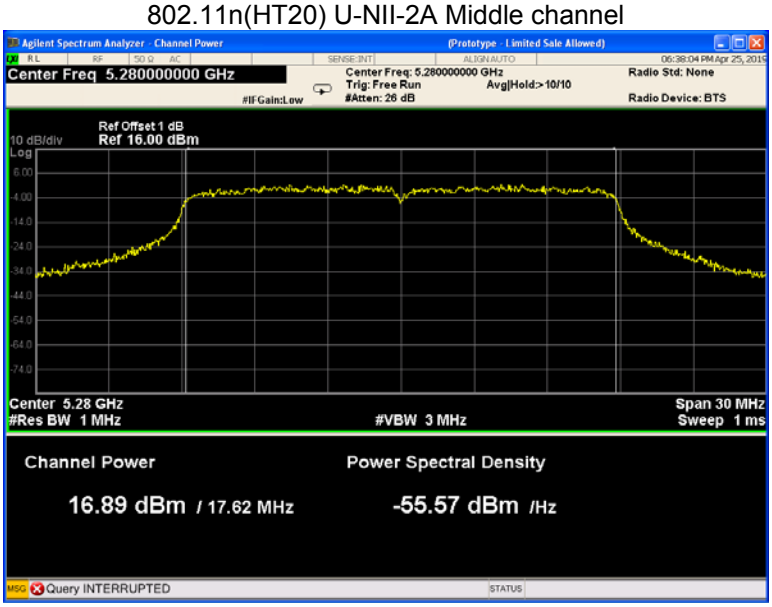
802.11a U-NII-2A High channel



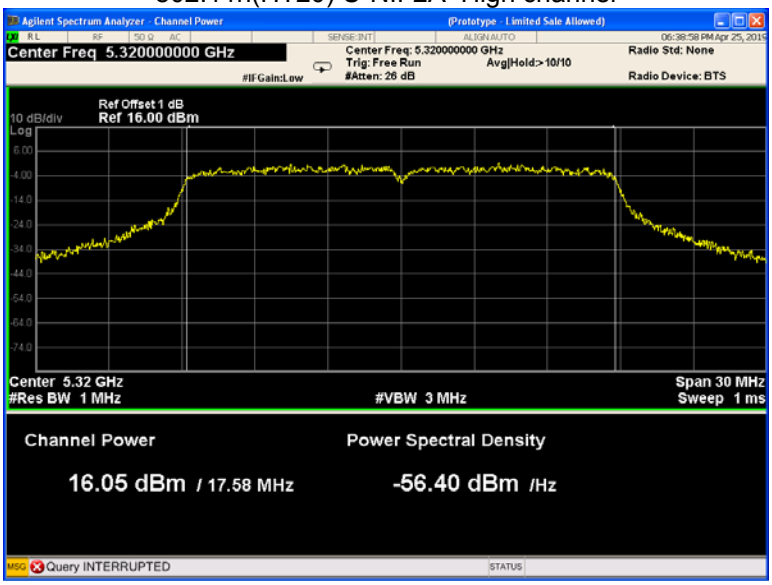
802.11n(HT20) U-NII-2A Low channel



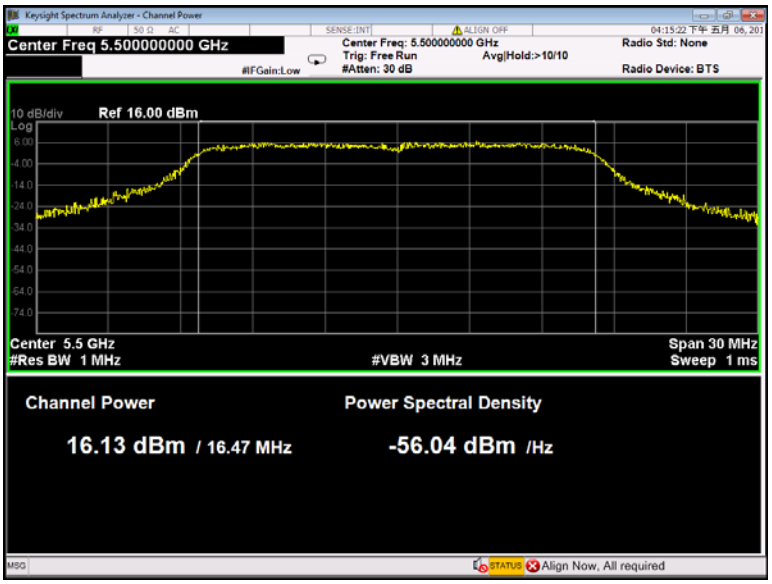
802.11n(HT20) U-NII-2A Middle channel



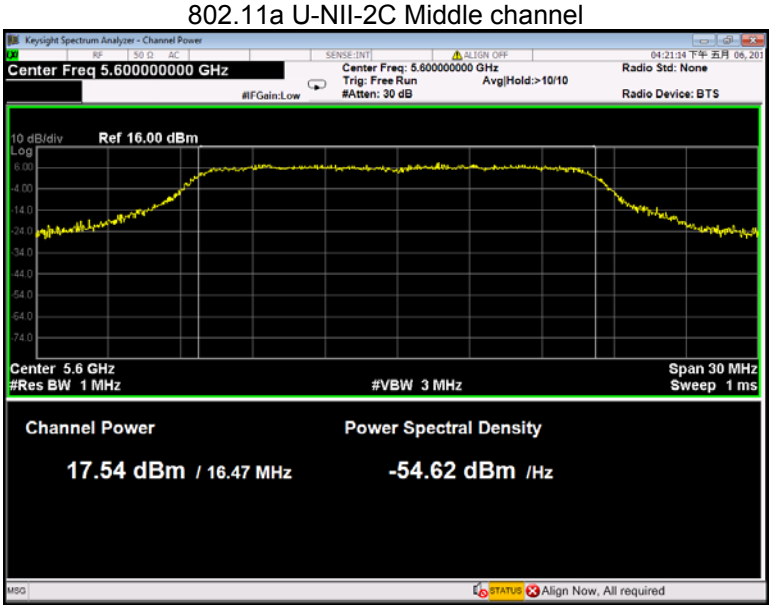
802.11n(HT20) U-NII-2A High channel



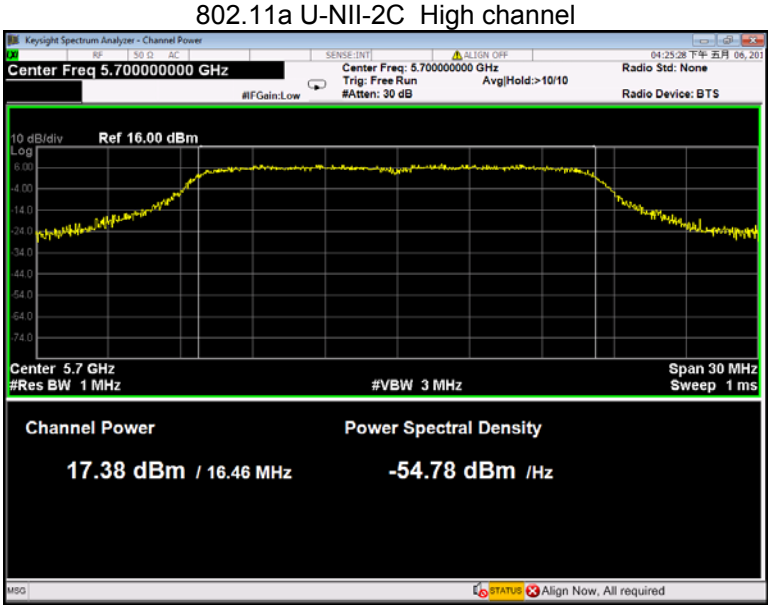
802.11a U-NII-2C Low channel



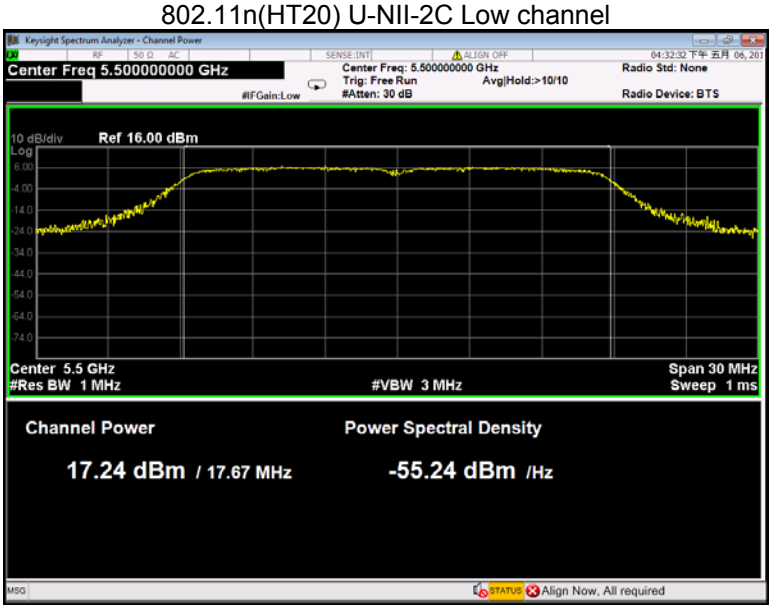
802.11a U-NII-2C Middle channel



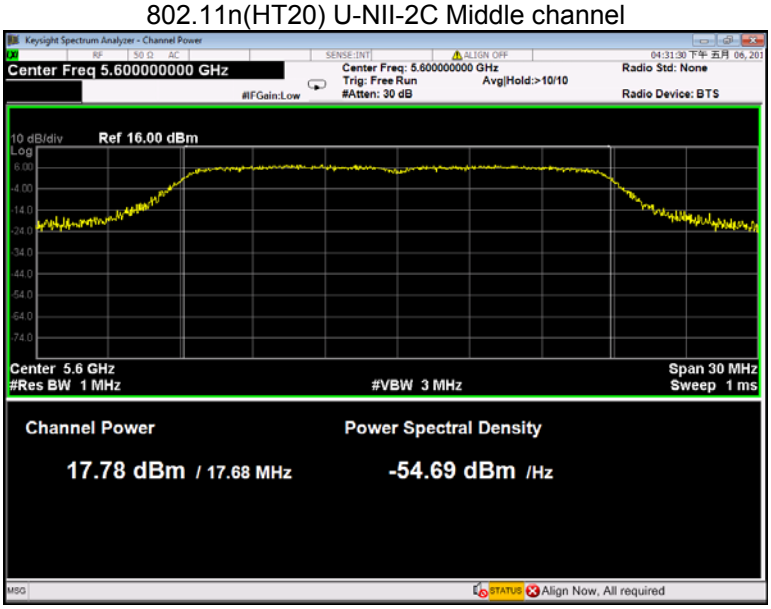
802.11a U-NII-2C High channel



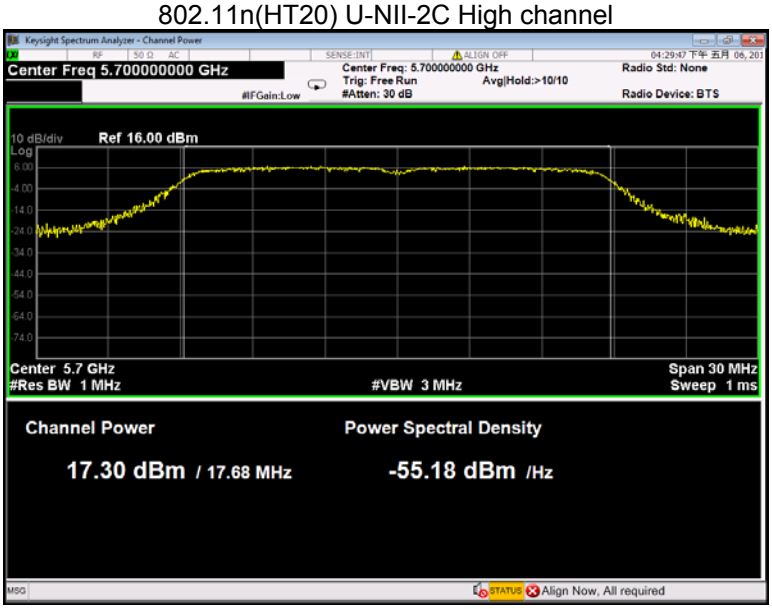
802.11n(HT20) U-NII-2C Low channel



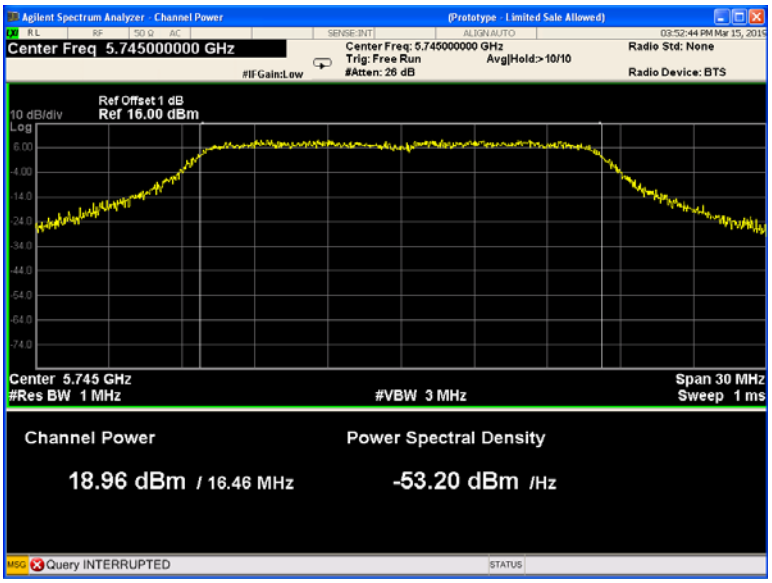
802.11n(HT20) U-NII-2C Middle channel



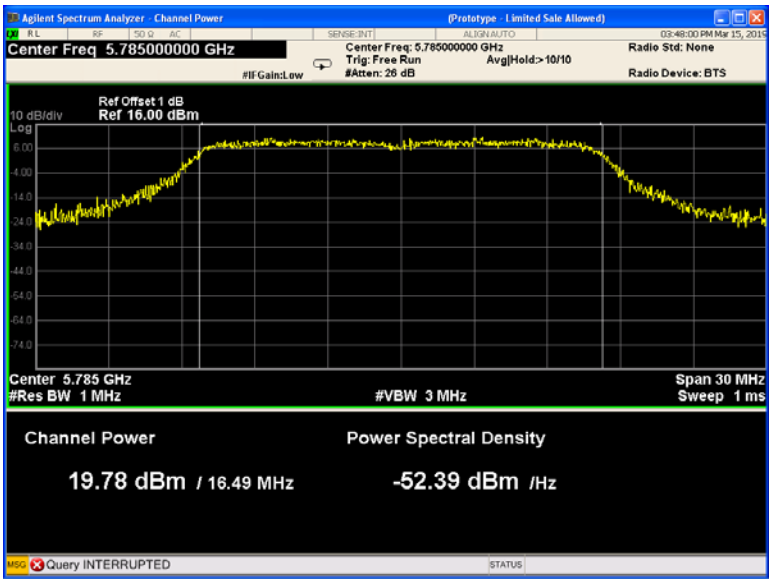
802.11n(HT20) U-NII-2C High channel



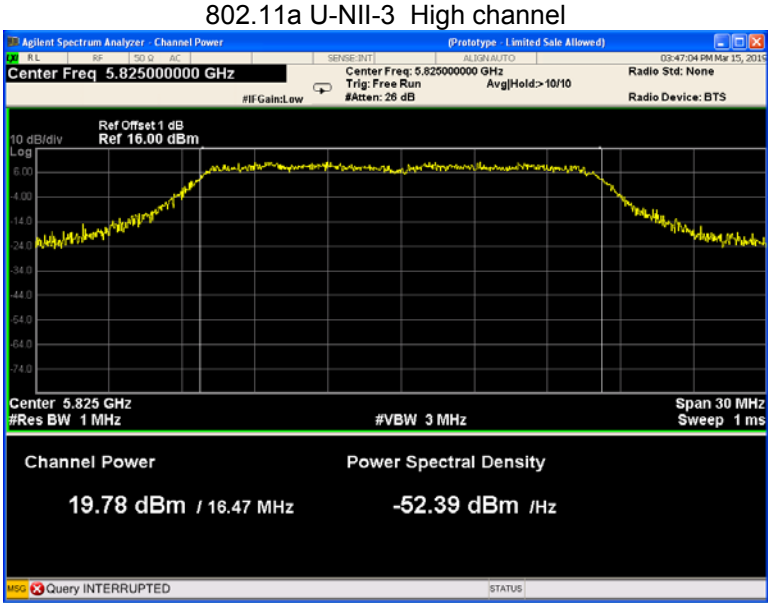
802.11a U-NII-3 Low channel



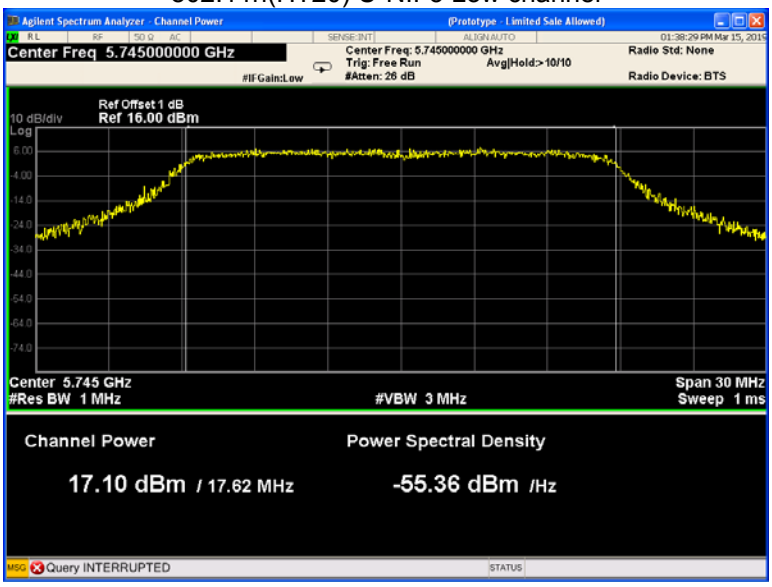
802.11a U-NII-3 Middle channel



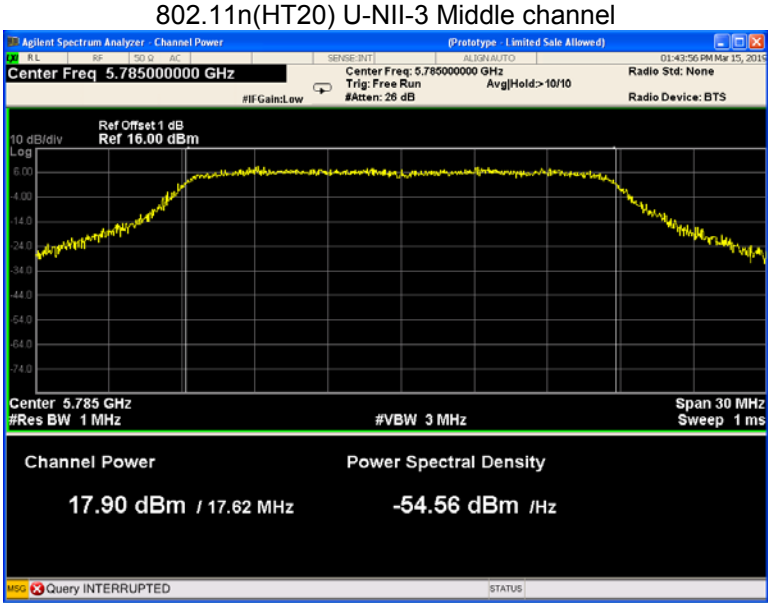
802.11a U-NII-3 High channel



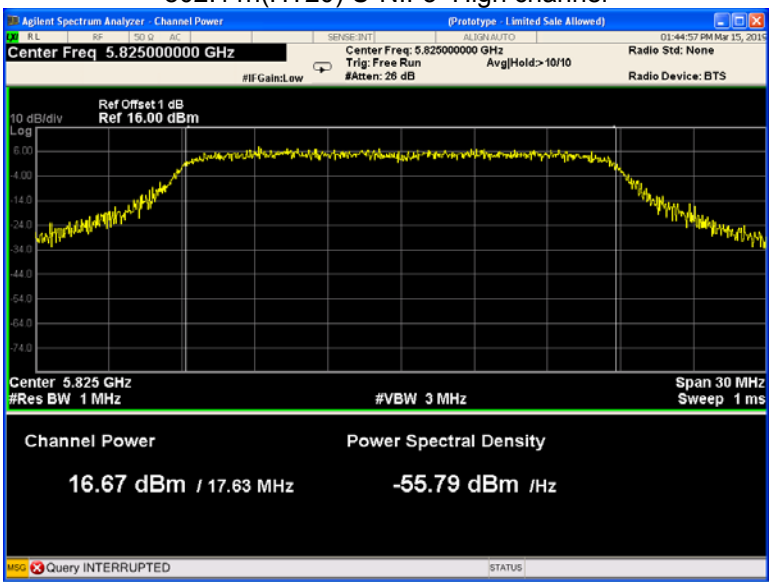
802.11n(HT20) U-NII-3 Low channel



802.11n(HT20) U-NII-3 Middle channel



802.11n(HT20) U-NII-3 High channel



15 Power Spectral density

Test Requirement:	FCC CFR47 Part 15 Section 15.407(a)
Test Method:	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02r01 (December 14, 2017)Section F
Test Limit:	≤11.00dBm/MHz for Operation in the U-NII-1(5150MHz-5250MHz)of device ≤11.00dBm/MHz for Operation in the U-NII-2A(5250MHz-5350MHz)of device ≤11.00dBm/MHz for Operation in the U-NII-2C(5470MHz-5725MHz)of device ≤30.00dBm/500KHz for Operation in the U-NII-3(5725MHz-5850MHz)of device
Test Result:	PASS

15.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer:

U-NII-1

RBW = 1MHz, VBW ⩾3* RBW Sweep = auto; Detector Function = Peak. Trace = Max hold.

U-NII-3

RBW = 510KHz, VBW ⩾3* RBW Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

15.2 Test Result:

Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-1	802.11a	9.596	10.071	9.824
	802.11n(HT20)	6.009	6.925	7.499
	Limit	≤11.00dBm/MHz		

Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-2A	802.11a	10.495	10.164	9.909
	802.11n(HT20)	8.132	7.510	7.065
	Limit	≤11.00dBm/MHz		

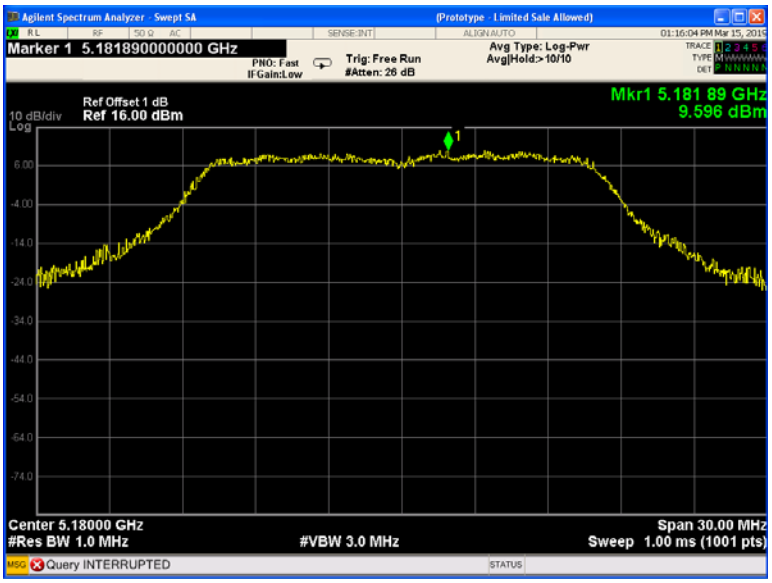
Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-2C	802.11a	9.788	10.106	9.744
	802.11n(HT20)	9.079	9.409	9.051
	Limit	≤11.00dBm/MHz		

Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-3	802.11a	9.977	10.845	10.789
	802.11n(HT20)	7.814	8.142	7.755
	Limit	≤30.00dBm/MHz		

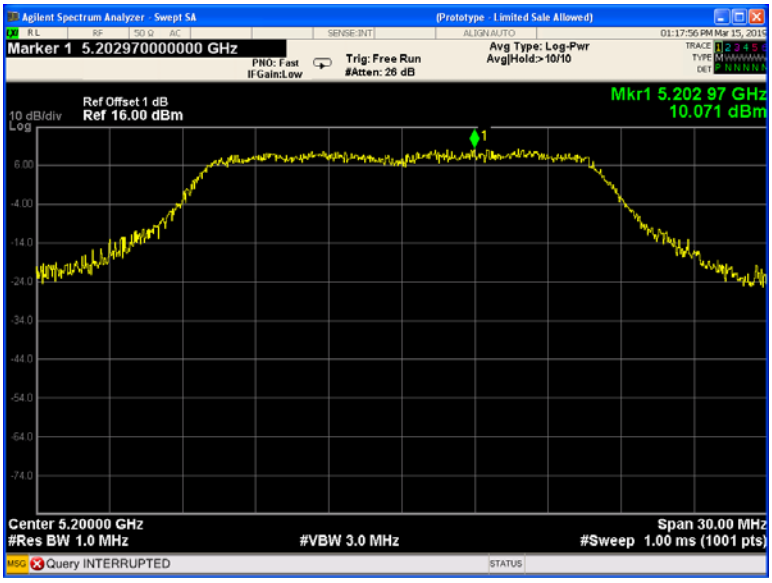
* All transmit signals are completely uncorrelated with each other, Directional gain = G_{ANT} which is less than 6dBi. So the limit does not be reduced.

Test result plots shown as follows:

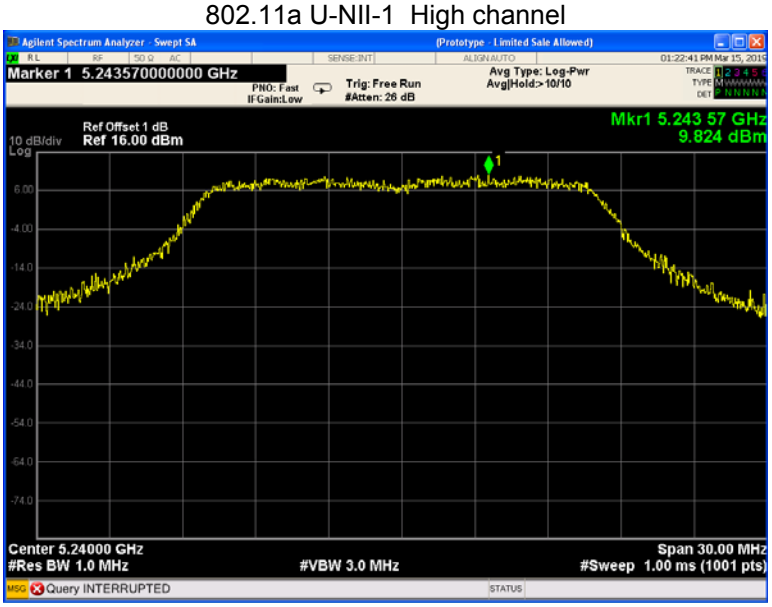
802.11a U-NII-1 Low channel



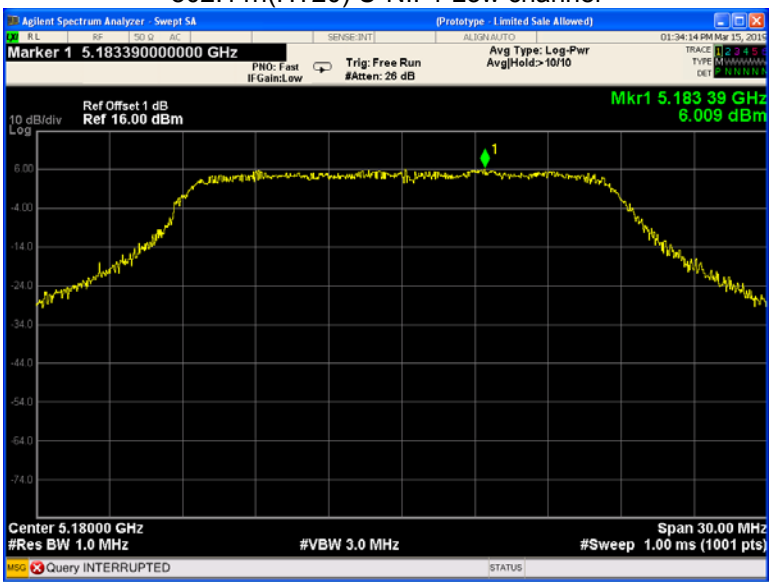
802.11a U-NII-1 Middle channel



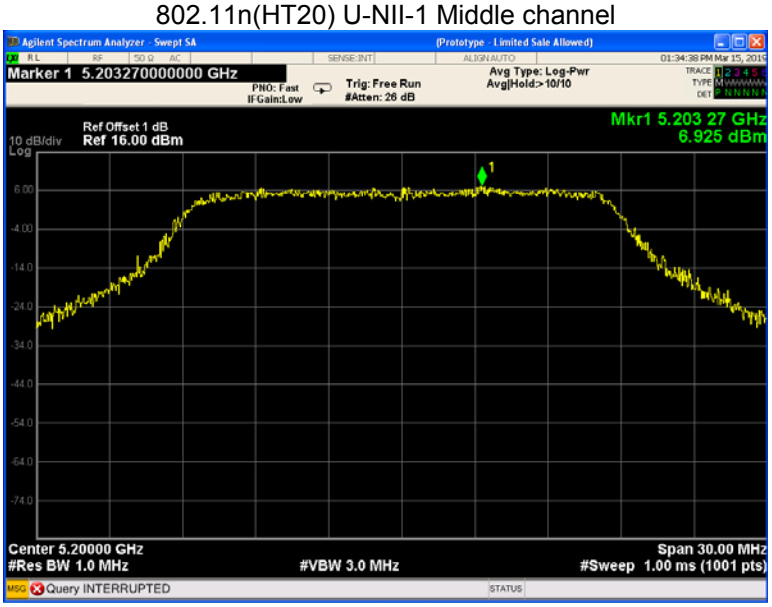
802.11a U-NII-1 High channel



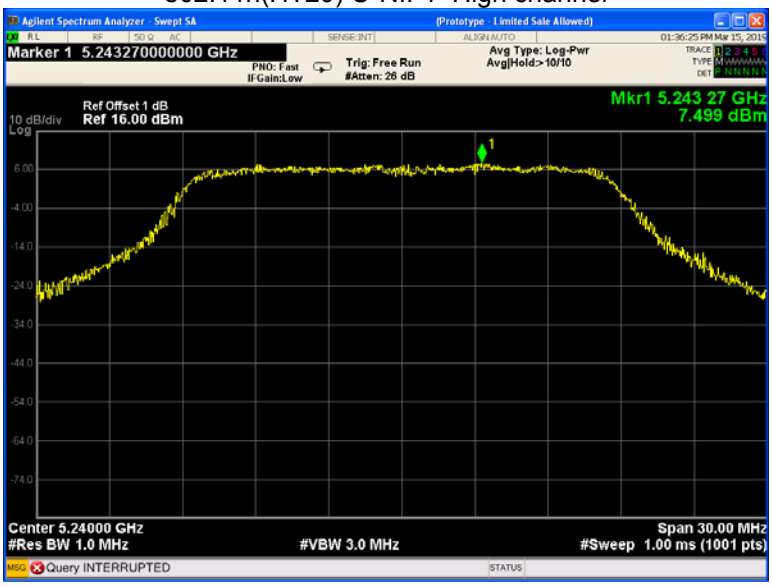
802.11n(HT20) U-NII-1 Low channel



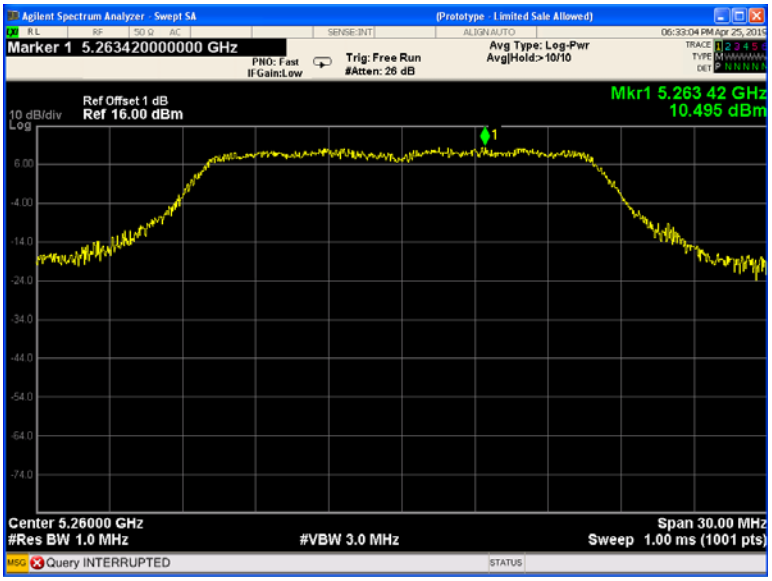
802.11n(HT20) U-NII-1 Middle channel



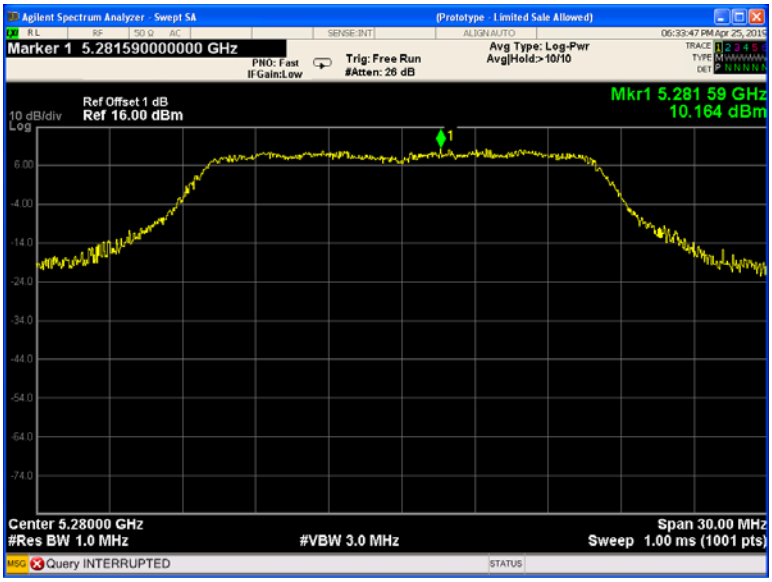
802.11n(HT20) U-NII-1 High channel



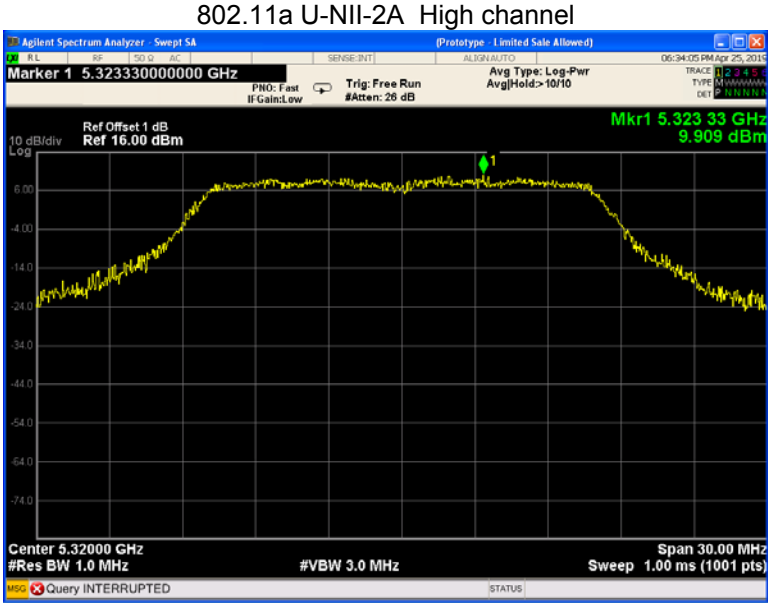
802.11a U-NII-2A Low channel



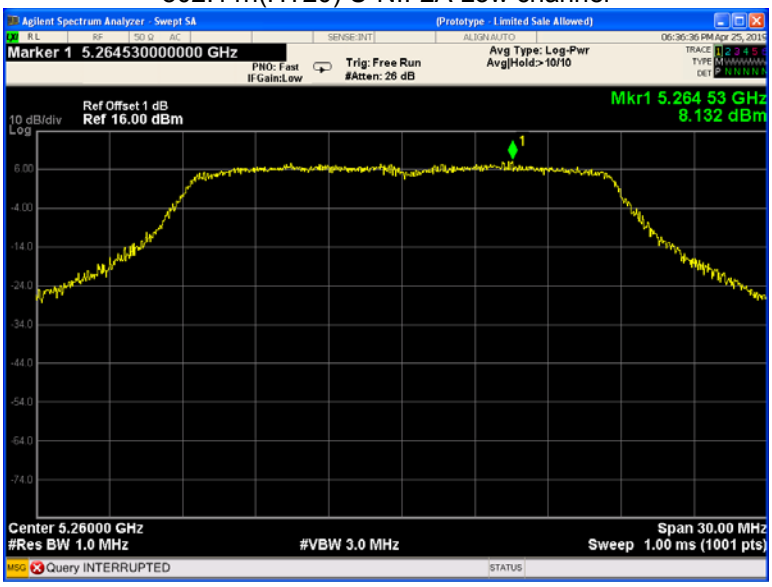
802.11a U-NII-2A Middle channel



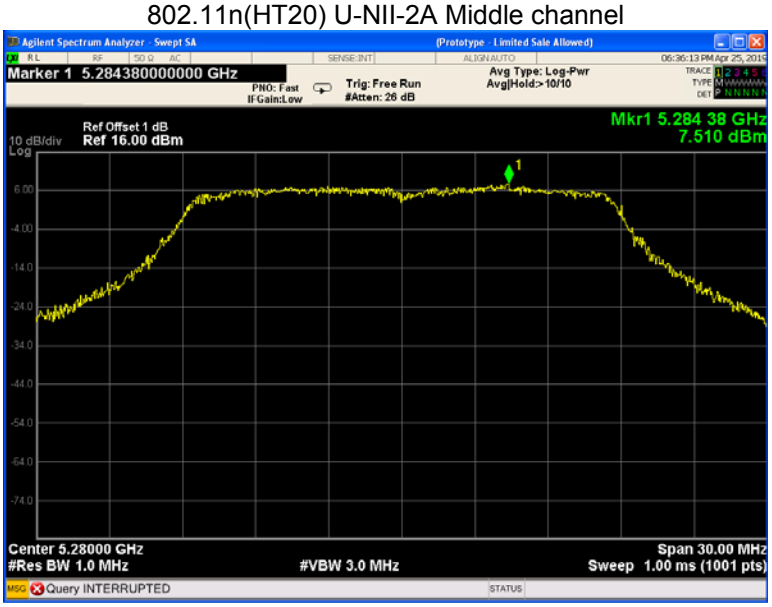
802.11a U-NII-2A High channel



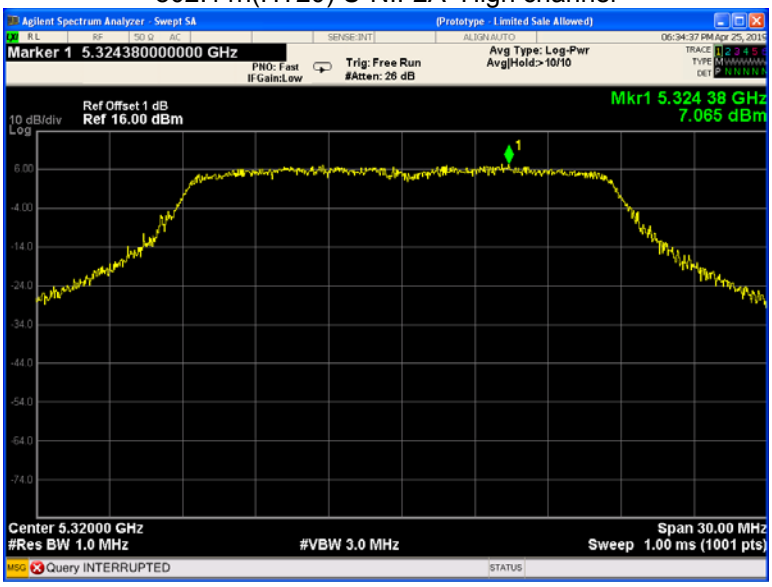
802.11n(HT20) U-NII-2A Low channel



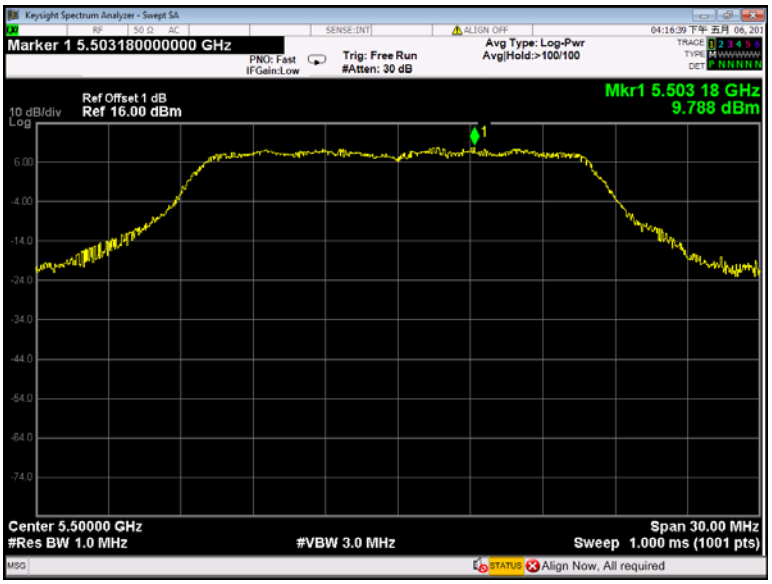
802.11n(HT20) U-NII-2A Middle channel



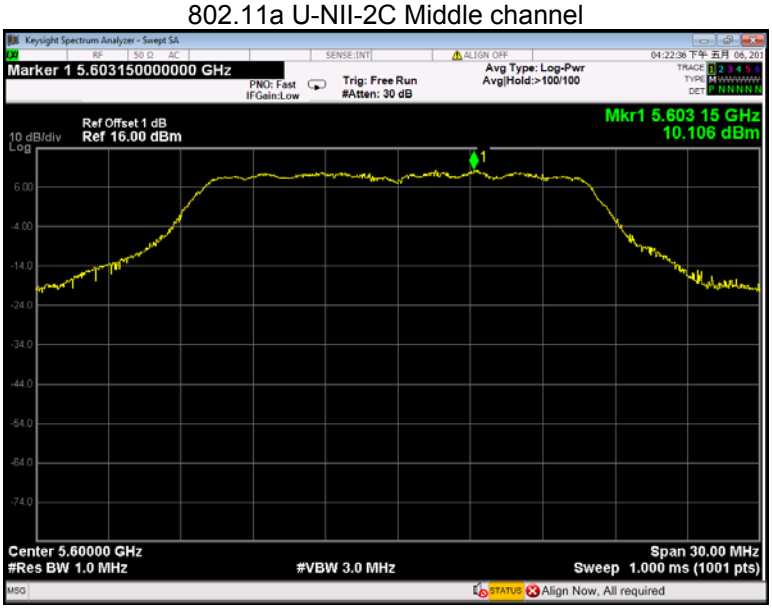
802.11n(HT20) U-NII-2A High channel



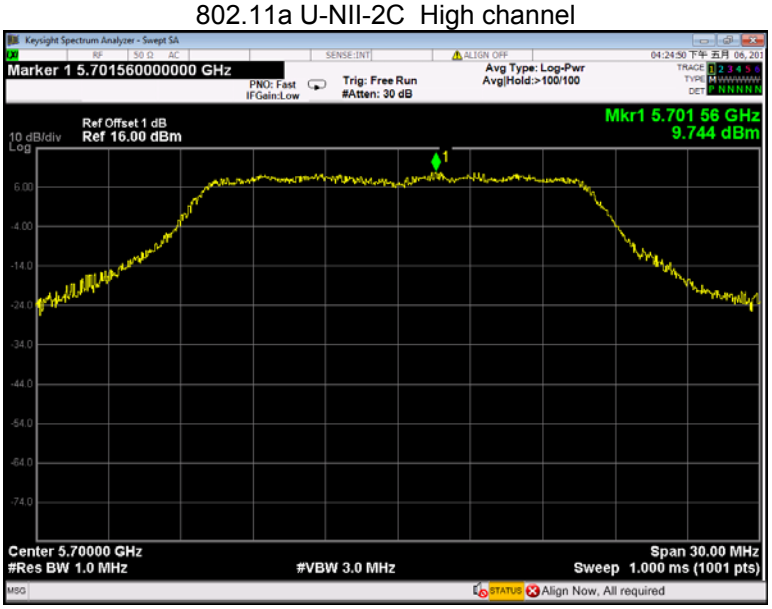
802.11a U-NII-2C Low channel



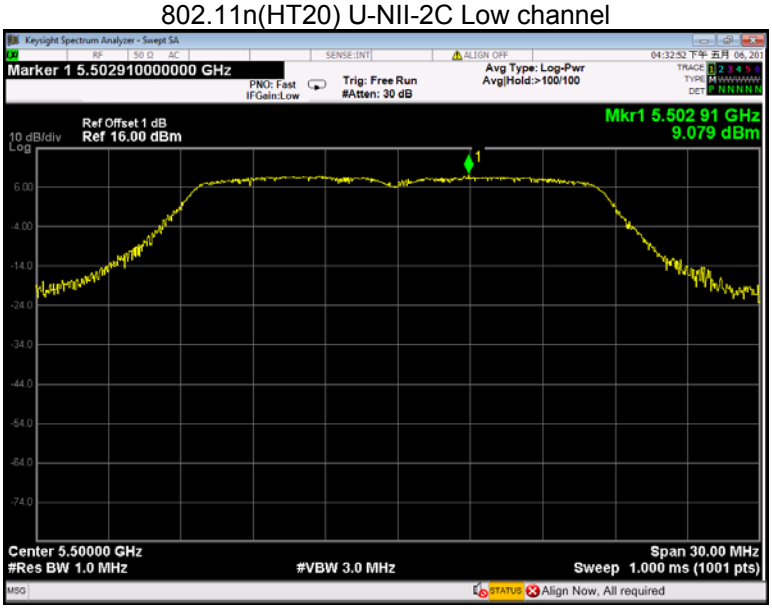
802.11a U-NII-2C Middle channel



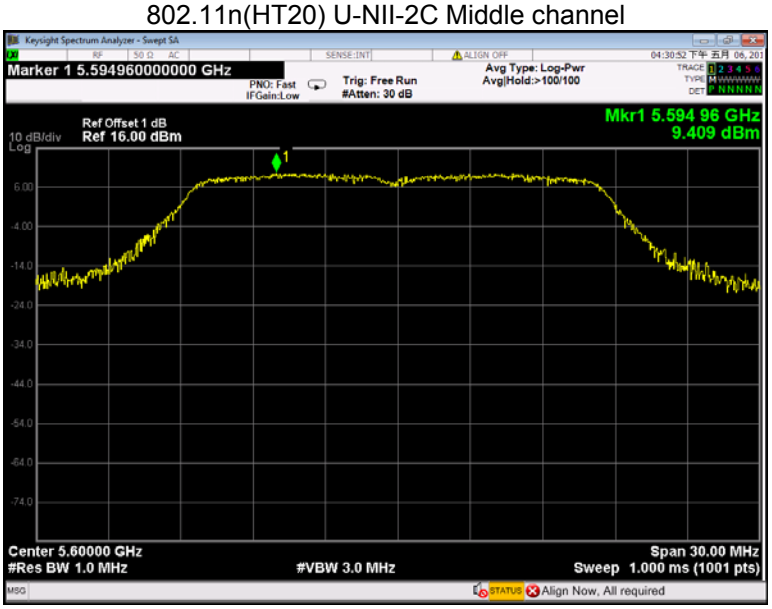
802.11a U-NII-2C High channel



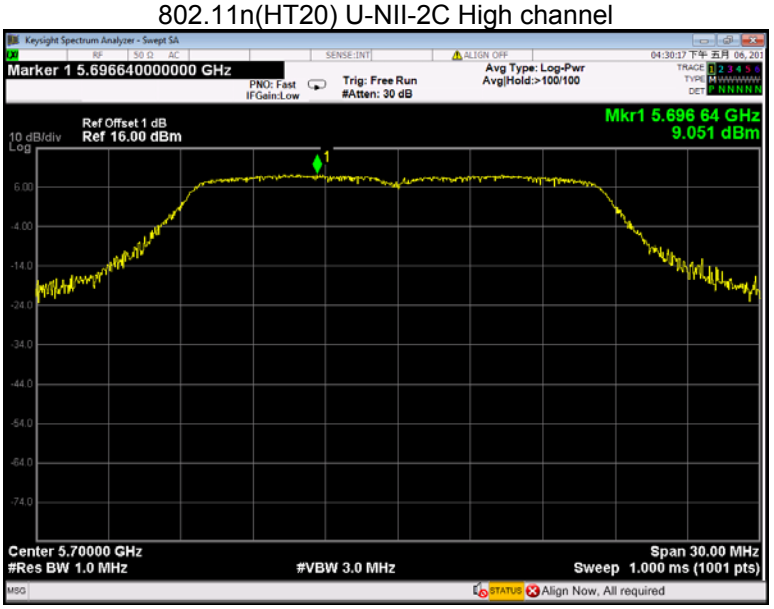
802.11n(HT20) U-NII-2C Low channel



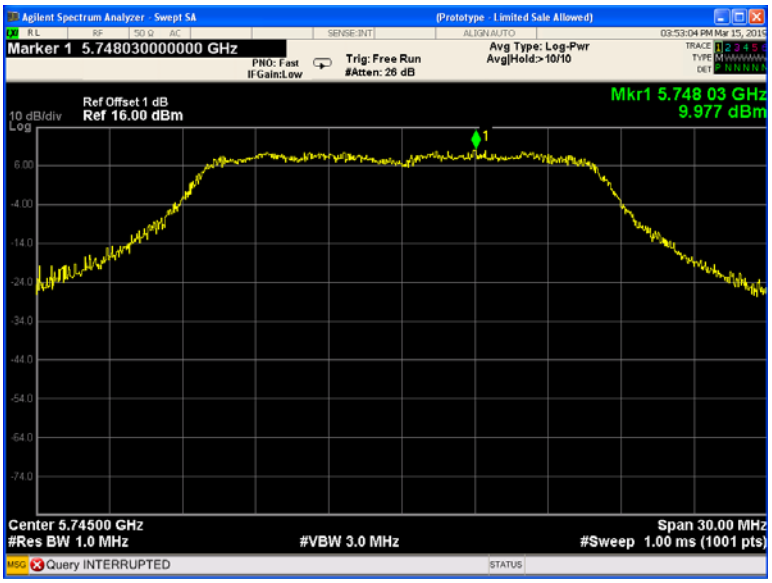
802.11n(HT20) U-NII-2C Middle channel



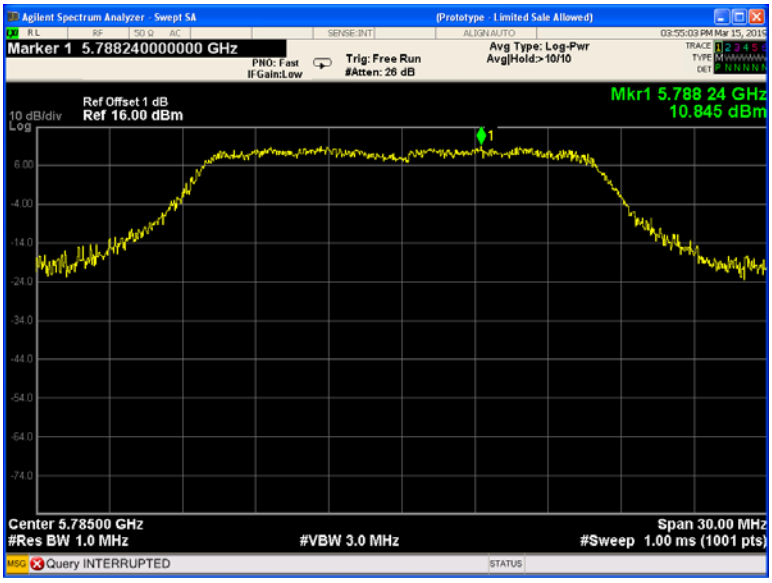
802.11n(HT20) U-NII-2C High channel



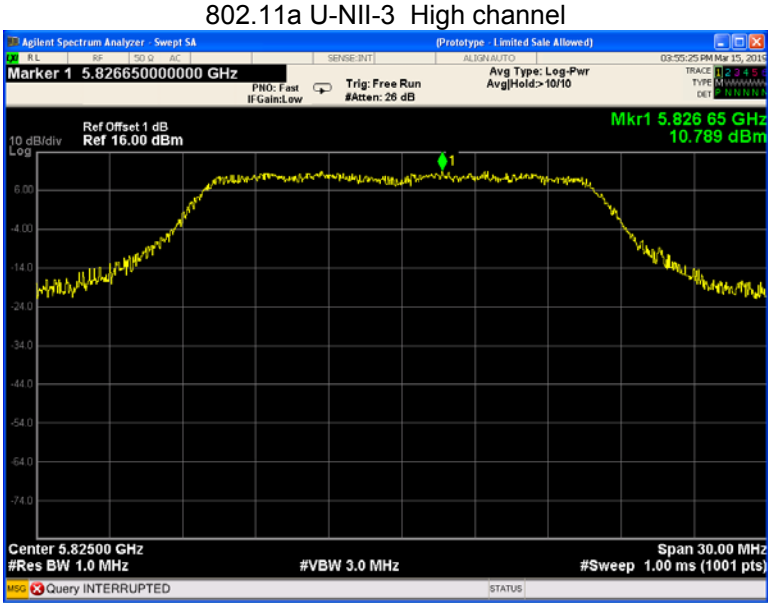
802.11a U-NII-3 Low channel



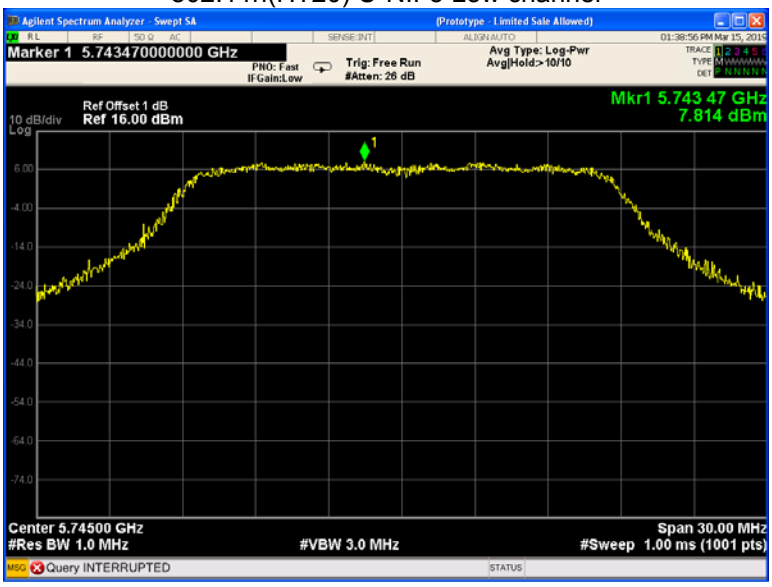
802.11a U-NII-3 Middle channel



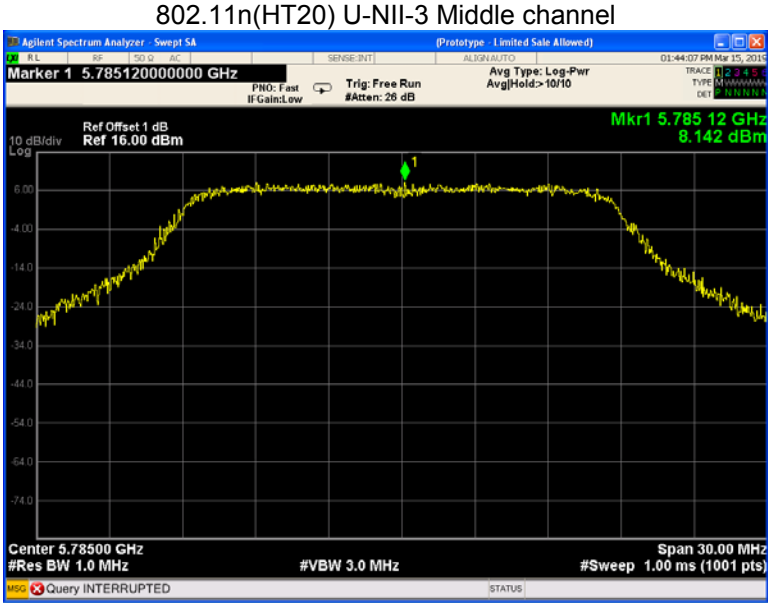
802.11a U-NII-3 High channel



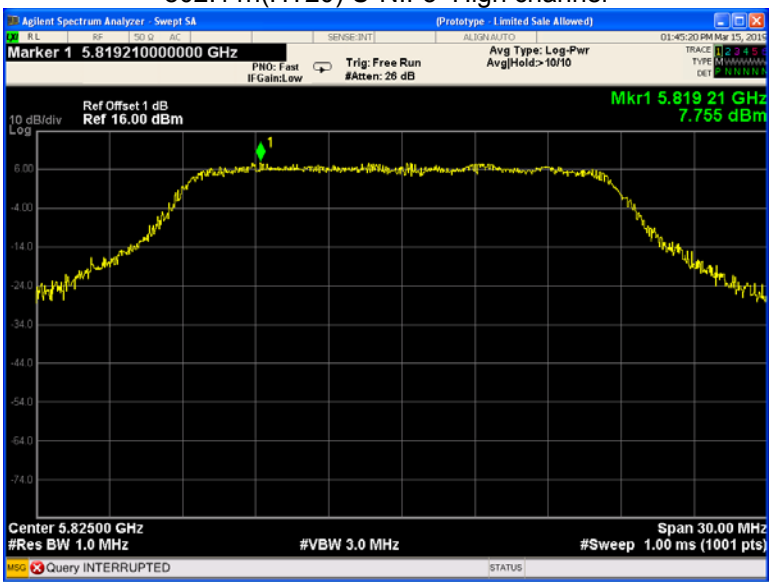
802.11n(HT20) U-NII-3 Low channel



802.11n(HT20) U-NII-3 Middle channel



802.11n(HT20) U-NII-3 High channel



16 Frequency Stability

Test Requirement:	FCC CFR47 Part 15 Section 15.407(g)
Test Method:	ANSI C63.10:2013
Test 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 or 20ppm.
Test Result:	PASS

16.1 Test Procedure:

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
   EUT have transmitted absence of unmodulation signal and fixed channelise. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

2. Extreme temperature rule is -20°C~ 40°C.

16.2 Test Result:

U-NII-1 Test Frequency:5180MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	120	/	/	/
45		1807	2.1598	20
30		1800	2.1513	20
20		1806	2.1582	20
10		1800	2.1525	20
0		1803	2.1559	20
-10		1800	2.1518	20
-15		1809	2.1624	20
-30		/	/	/
20	108	1810	2.1636	20
20	132	1798	2.1493	20

U-NII-2A Test Frequency:5260MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	120	/	/	/
45		1807	2.1596	20
30		1800	2.1512	20
20		1806	2.1513	20
10		1800	2.1550	20
0		1803	2.1563	20
-10		1800	2.1514	20
-15		1809	2.1650	20
-30		/	/	/
20	108	1810	2.1540	20
20	132	1798	2.1339	20

U-NII-2C Test Frequency:5500MHz				
Temperature (℃)	**Power Supply (VAC)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
50	120	/	/	/
45		1807	2.1598	20
30		1800	2.1510	20
20		1806	2.1526	20
10		1800	2.1541	20
0		1803	2.1554	20
-10		1800	2.1538	20
-15		1809	2.1659	20
-30		/	/	/
20	108	1810	2.1544	20
20	132	1798	2.1321	20

U-NII-3 Test Frequency:5785MHz				
Temperature (℃)	**Power Supply (VAC)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
50	120	/	/	/
45		1919	2.2936	20
30		1911	2.2845	20
20		1915	2.2893	20
10		1923	2.2984	20
0		1907	2.2799	20
-10		1908	2.2804	20
-15		1914	2.2872	20
-30		/	/	/
20	108	1918	2.2920	20
20	132	1906	2.2782	20

17 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

This device uses of two antennas that uses a specified coupling to the intentional radiator. Antenna connectors complied with the requirement.

18 Photographs of test setup and EUT.

Note: Please refer to appendix: WTS19S02008374W_Photo.

======End of Report======