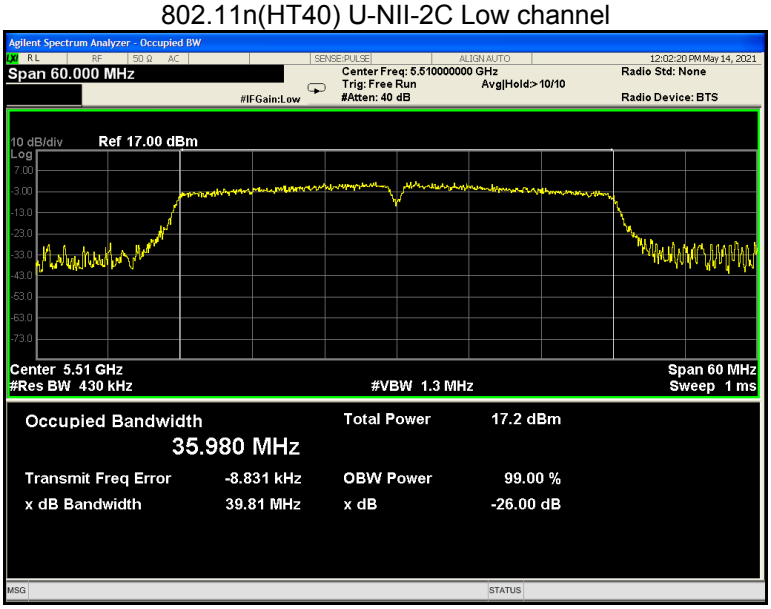
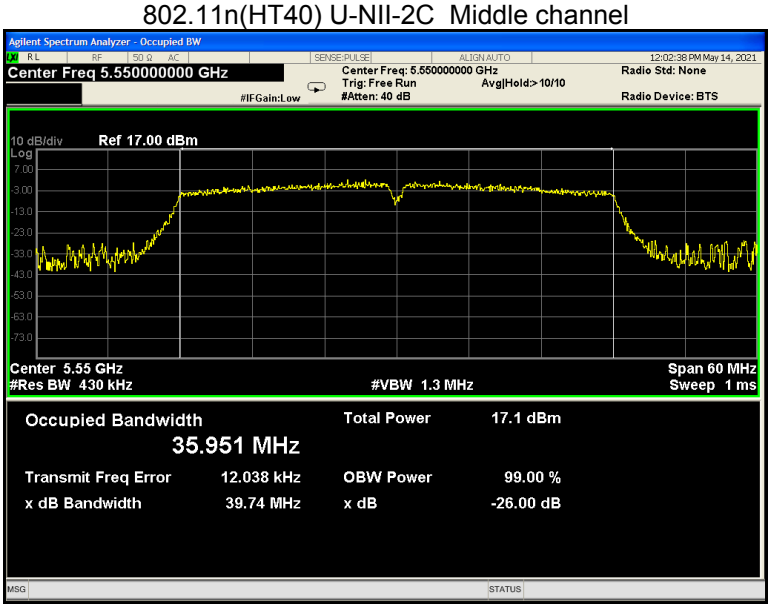
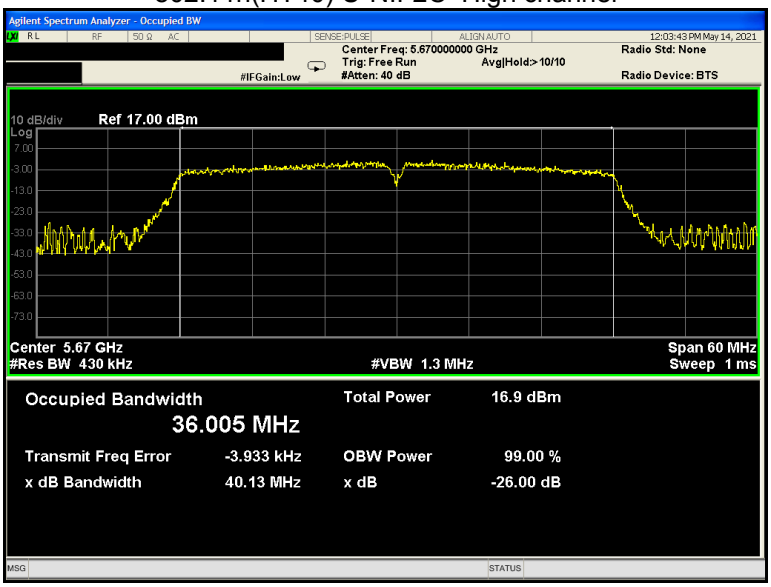
802.11n(HT40) U-NII-2C Low channel



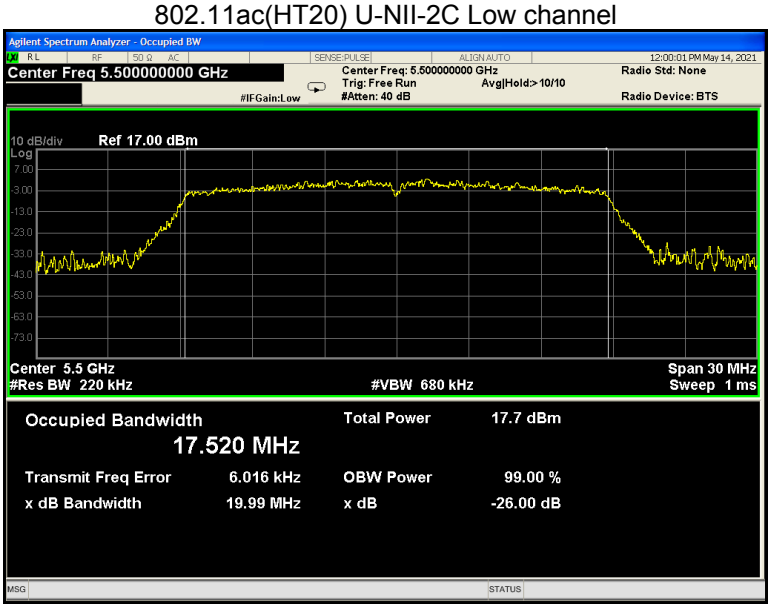
802.11n(HT40) U-NII-2C Middle channel



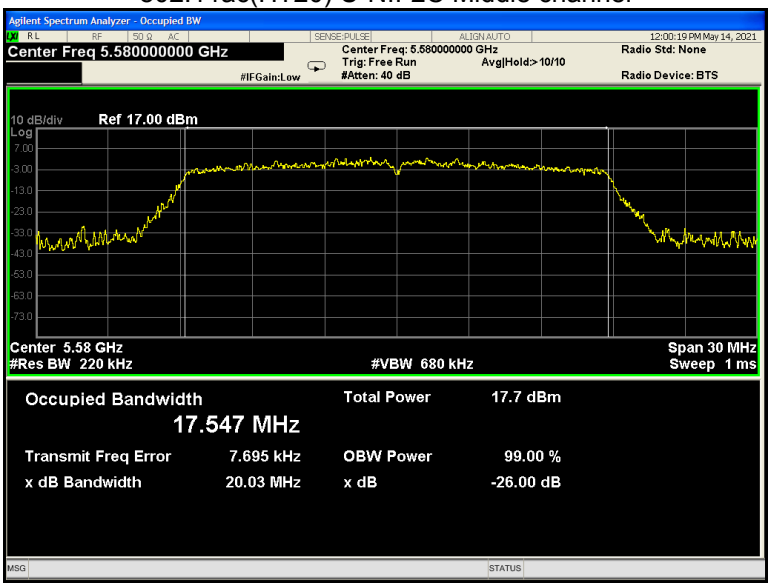
802.11n(HT40) U-NII-2C High channel



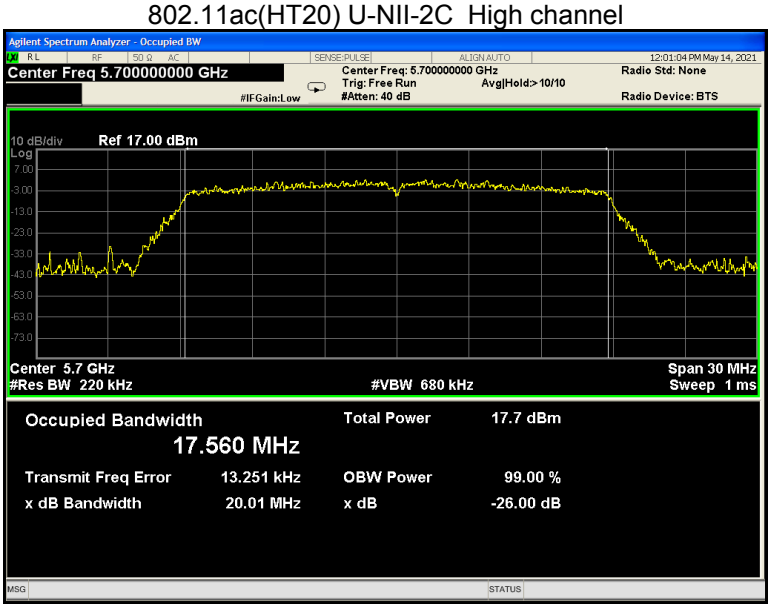
802.11ac(HT20) U-NII-2C Low channel



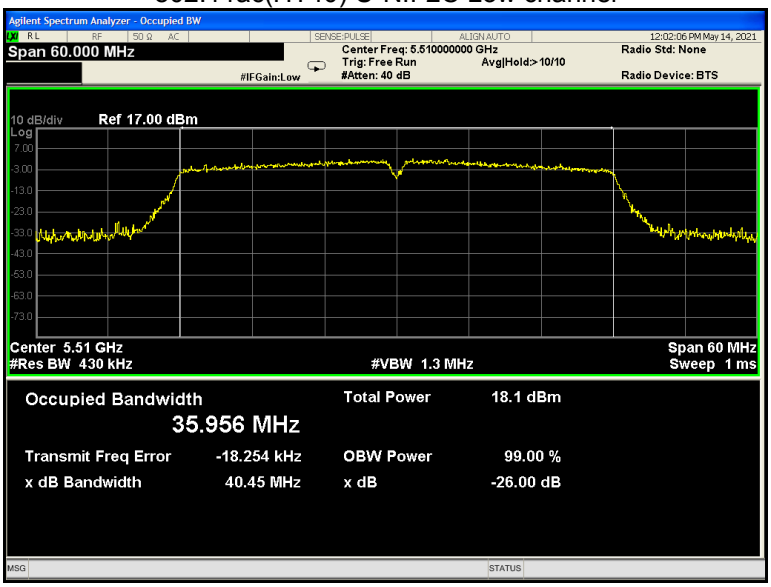
802.11ac(HT20) U-NII-2C Middle channel



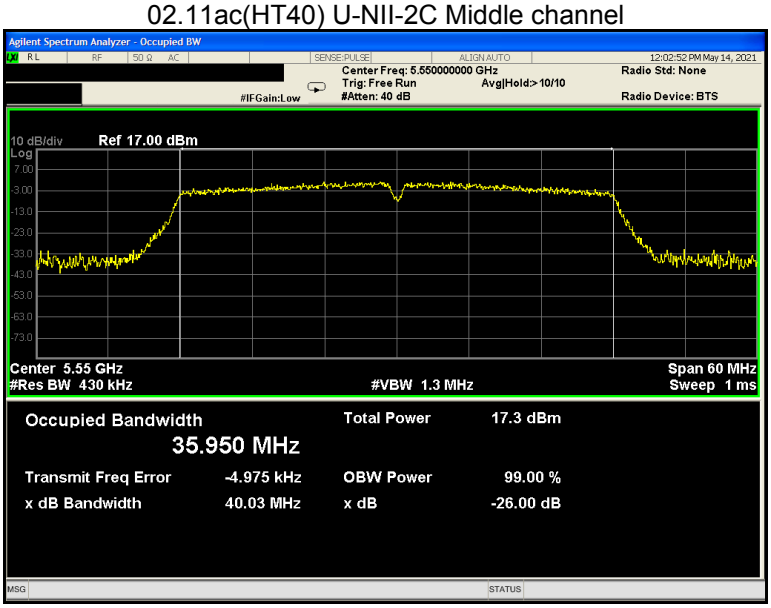
802.11ac(HT20) U-NII-2C High channel



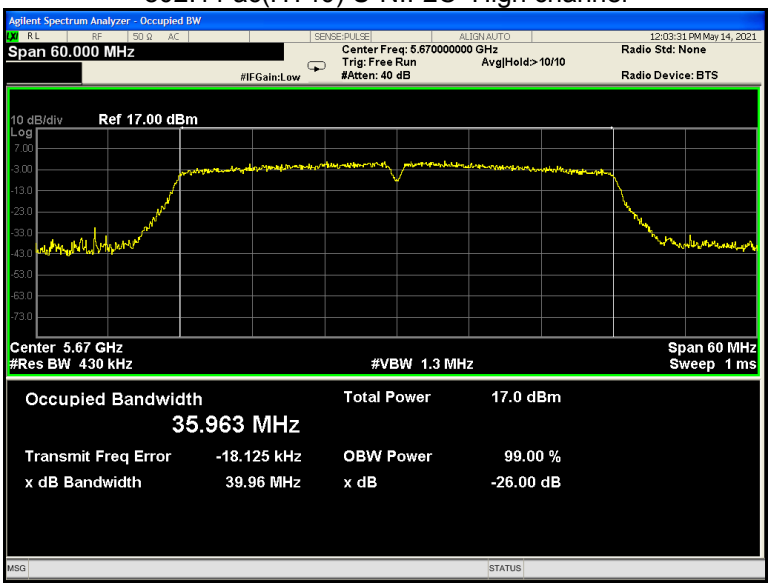
802.11ac(HT40) U-NII-2C Low channel



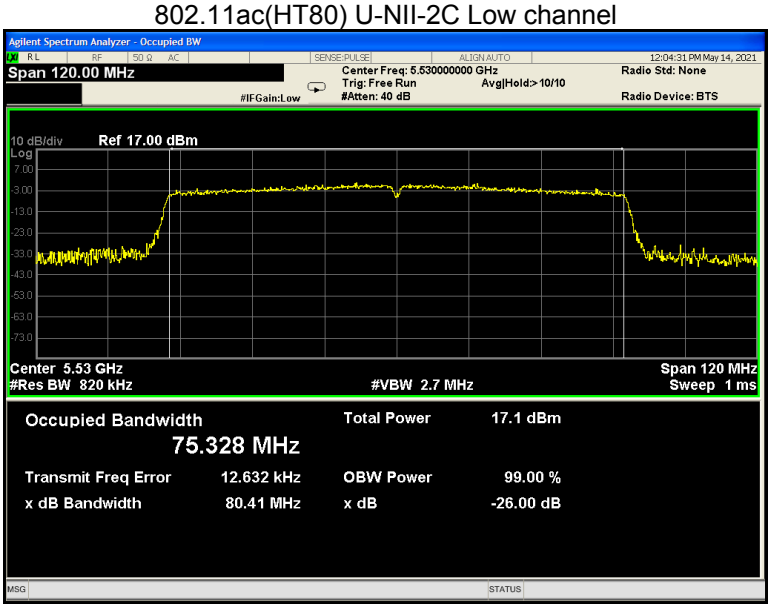
02.11ac(HT40) U-NII-2C Middle channel



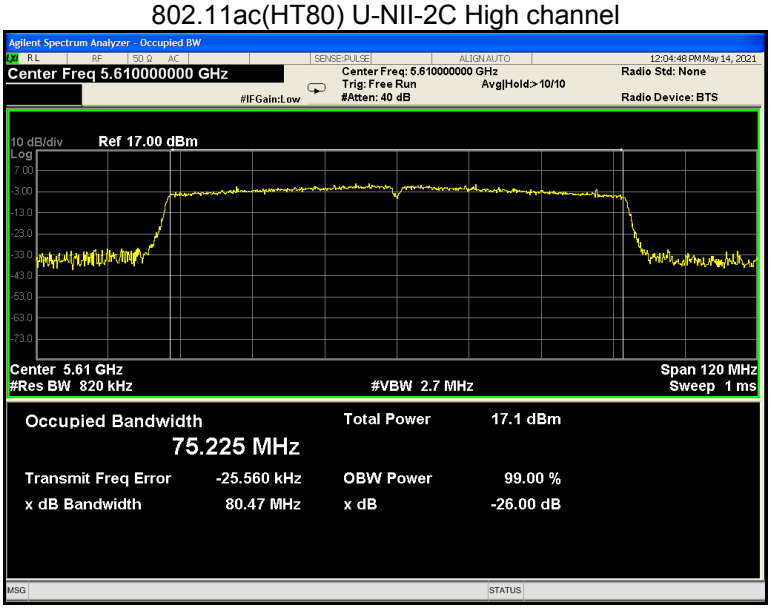
802.11 ac(HT40) U-NII-2C High channel



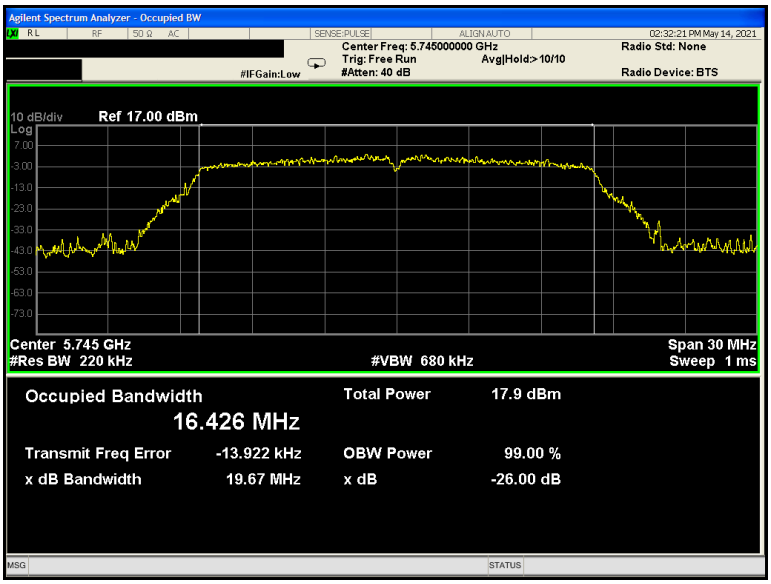
802.11ac(HT80) U-NII-2C Low channel



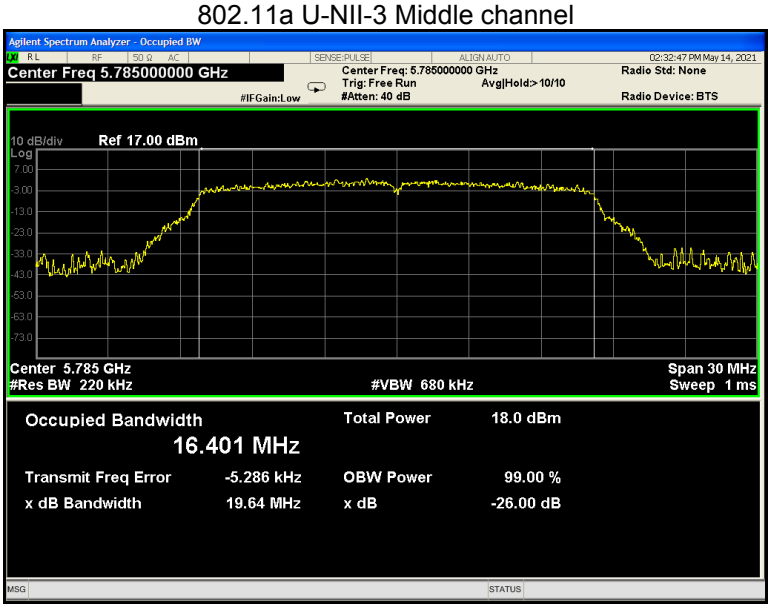
802.11ac(HT80) U-NII-2C High channel



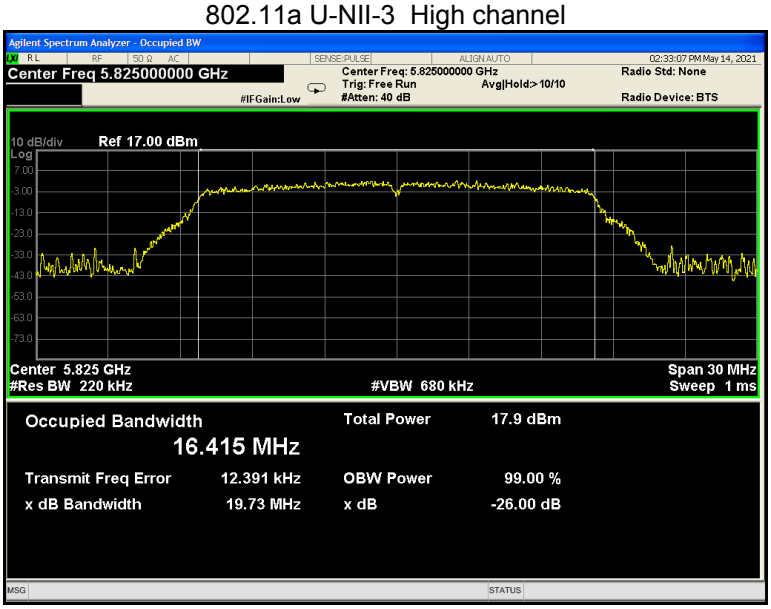
802.11a U-NII-3 Low channel



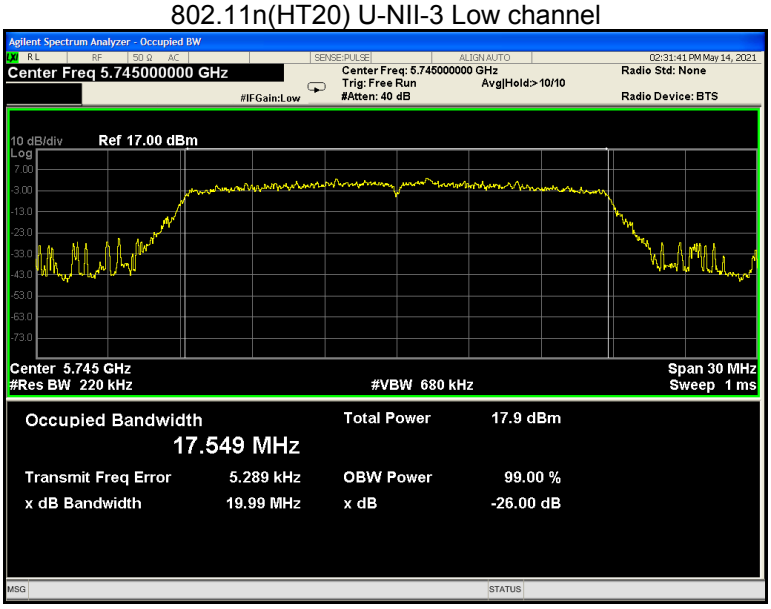
802.11a U-NII-3 Middle channel



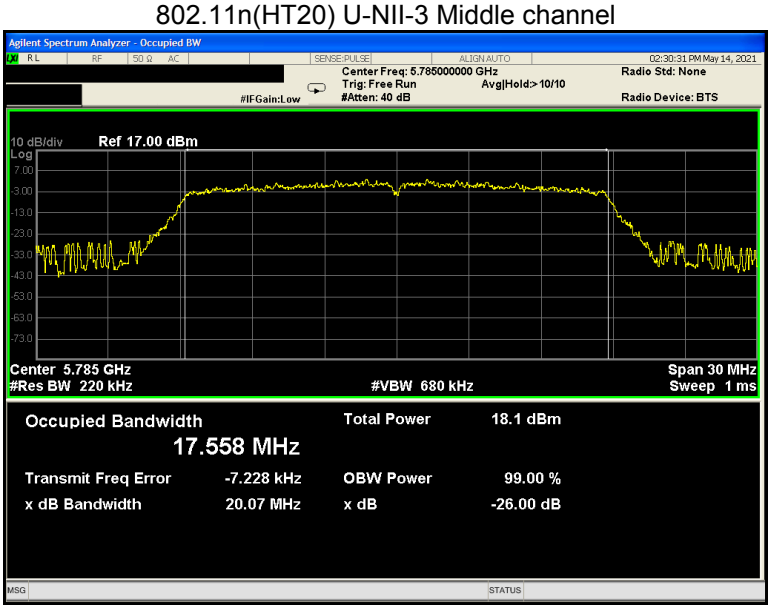
802.11a U-NII-3 High channel



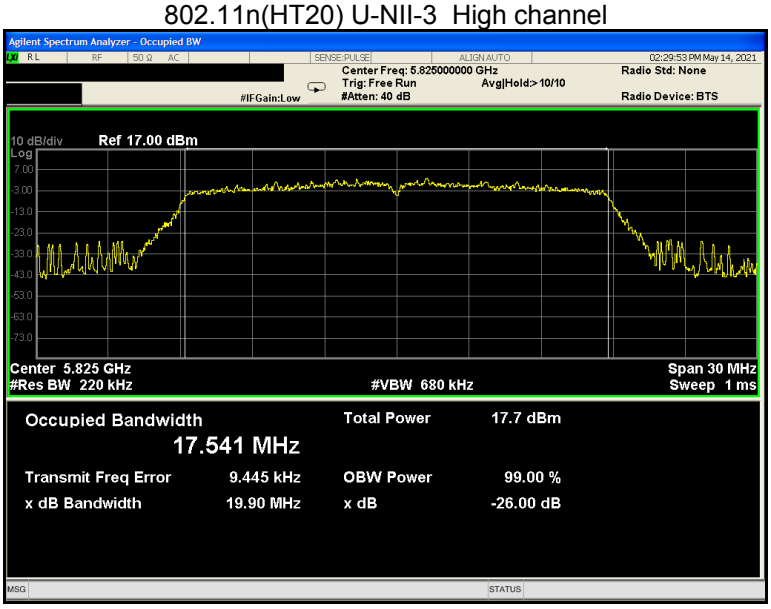
802.11n(HT20) U-NII-3 Low channel



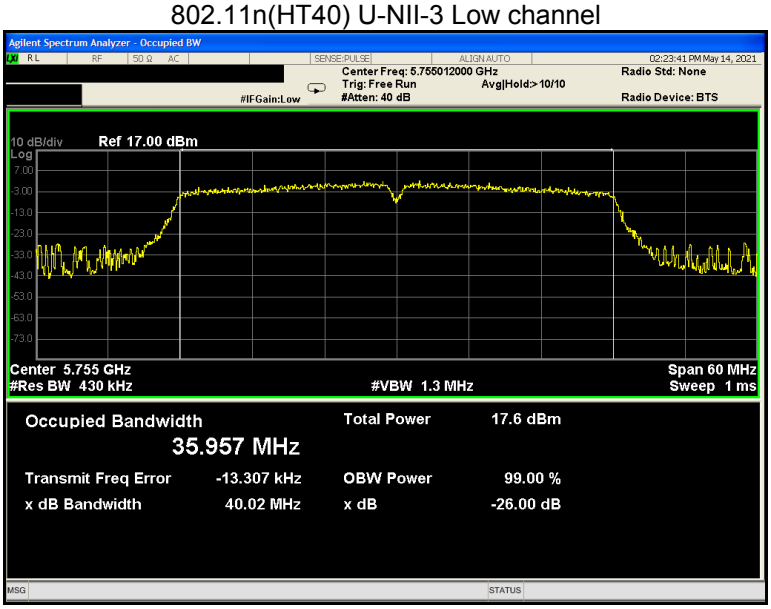
802.11n(HT20) U-NII-3 Middle channel



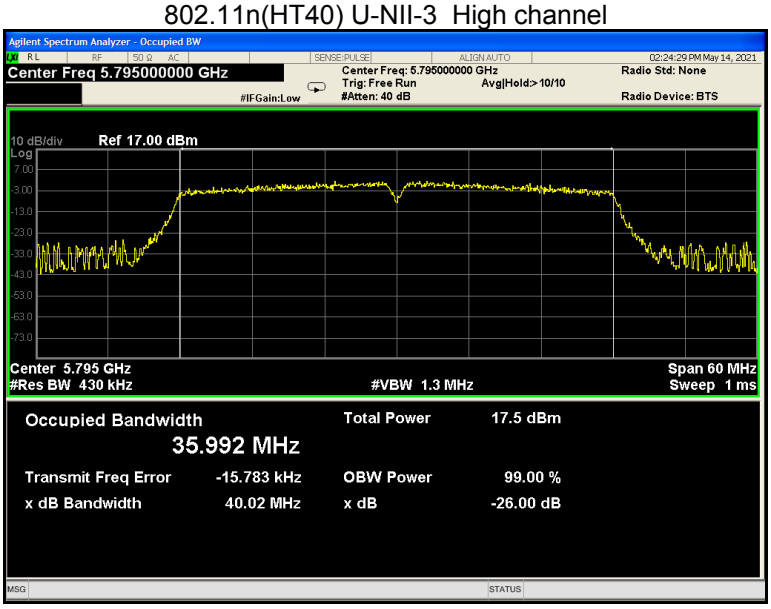
802.11n(HT20) U-NII-3 High channel



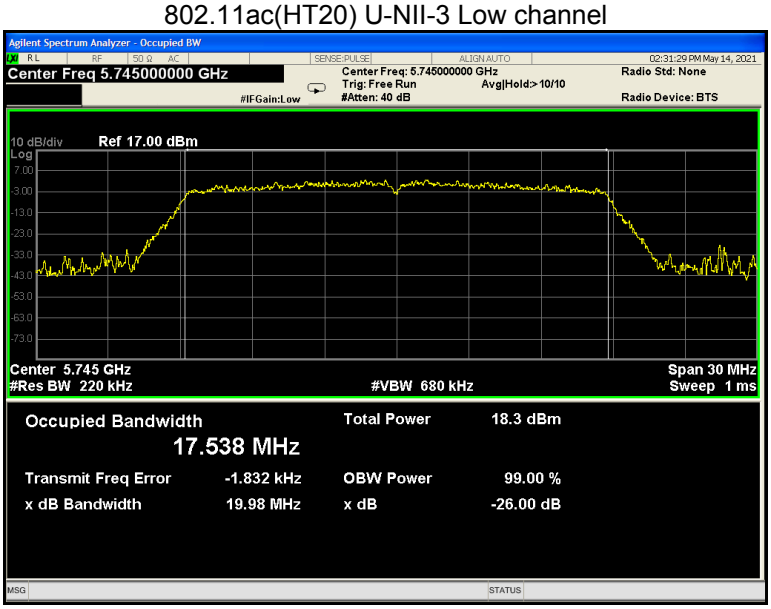
802.11n(HT40) U-NII-3 Low channel



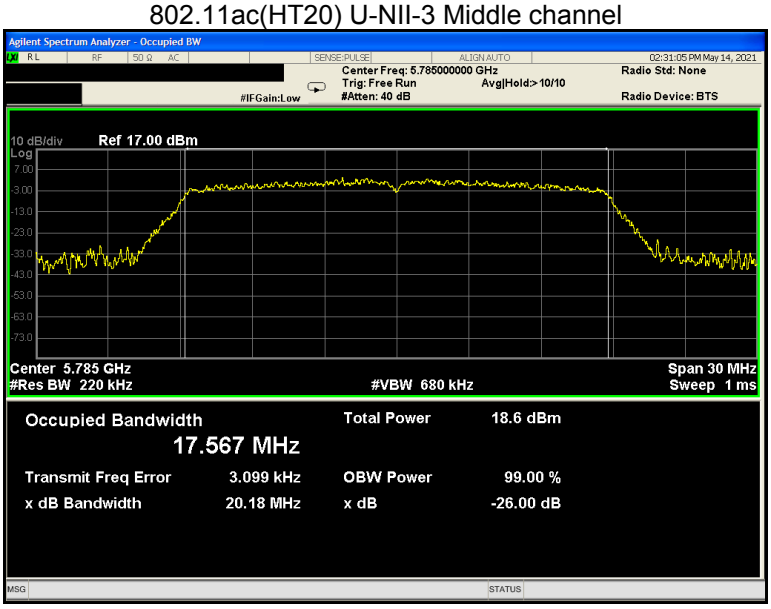
802.11n(HT40) U-NII-3 High channel



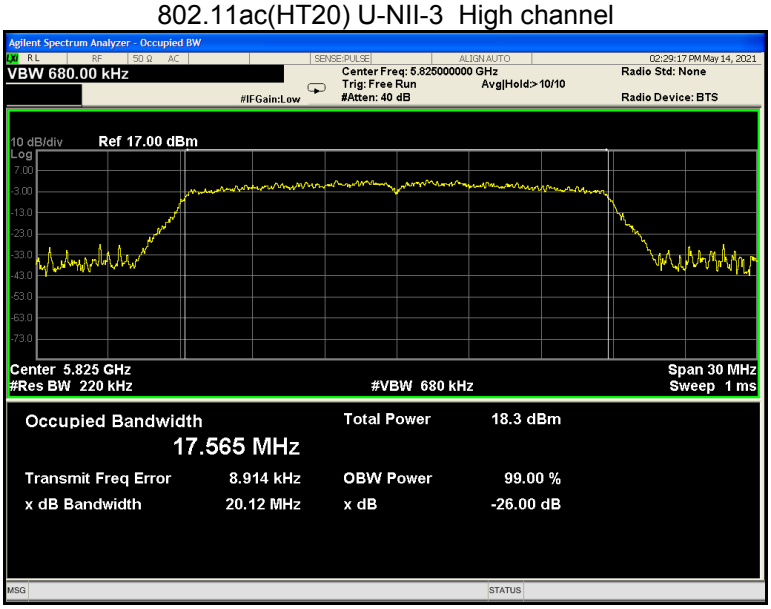
802.11ac(HT20) U-NII-3 Low channel



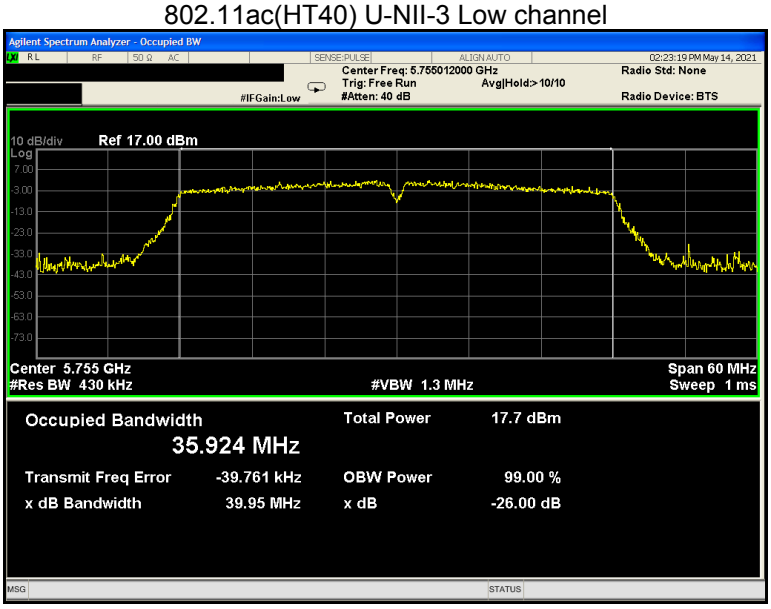
802.11ac(HT20) U-NII-3 Middle channel



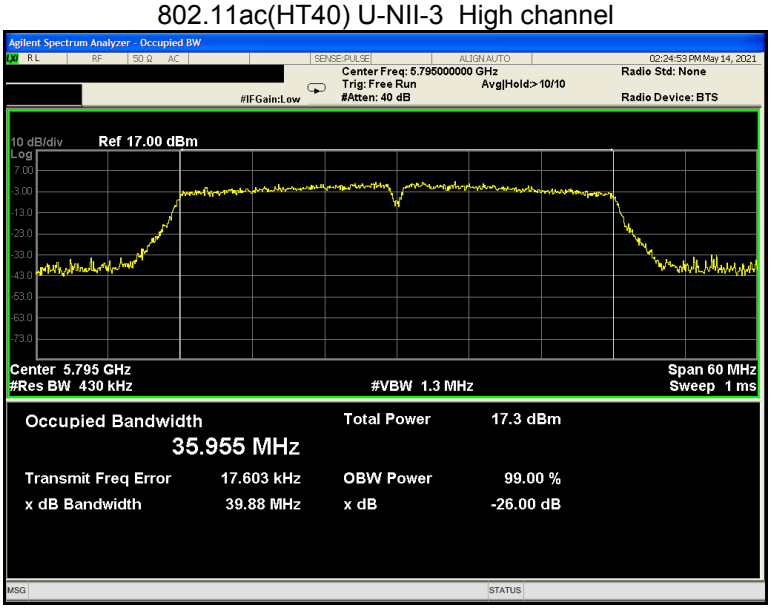
802.11ac(HT20) U-NII-3 High channel



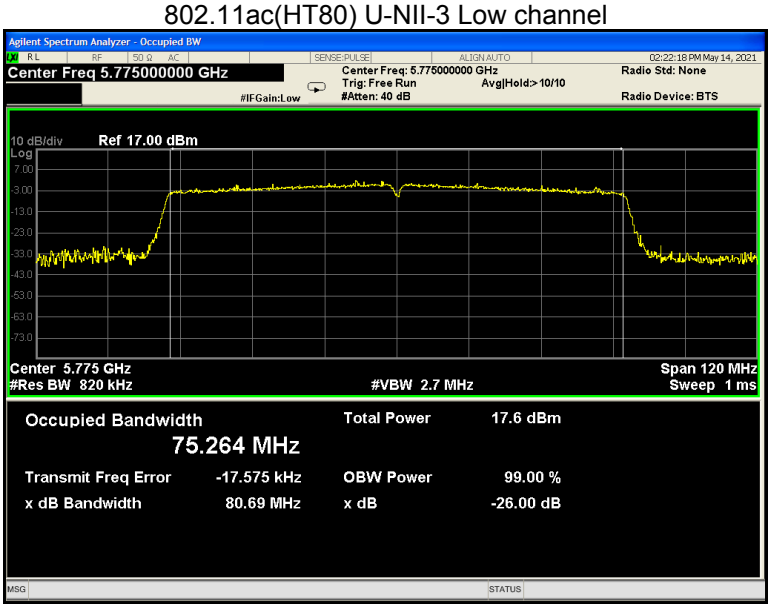
802.11ac(HT40) U-NII-3 Low channel



802.11ac(HT40) U-NII-3 High channel



802.11ac(HT80) U-NII-3 Low channel



13 Conducted Output Power

Test Requirement:	FCC CFR47 Part 15 Section 15.407(a)
Test Method:	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General U-NII Test Procedures New Rules v02r01 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

13.1 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.

13.2 Test Result :

Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-1	802.11a	13.15	13.40	13.21
	802.11n(HT20)	13.09	13.15	13.10
	802.11n(HT40)	13.34	/	13.22
	802.11ac(HT20)	13.07	13.27	13.19
	802.11ac(HT40)	13.89	/	13.27
	802.11ac(HT80)	**14.13**	/	/

Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-2A	802.11a	13.44	13.16	13.45
	802.11n(HT20)	13.31	13.18	13.40
	802.11n(HT40)	13.35	/	13.33
	802.11ac(HT20)	13.67	13.11	13.17
	802.11ac(HT40)	**13.70**	/	13.41
	802.11ac(HT80)	13.49	/	/

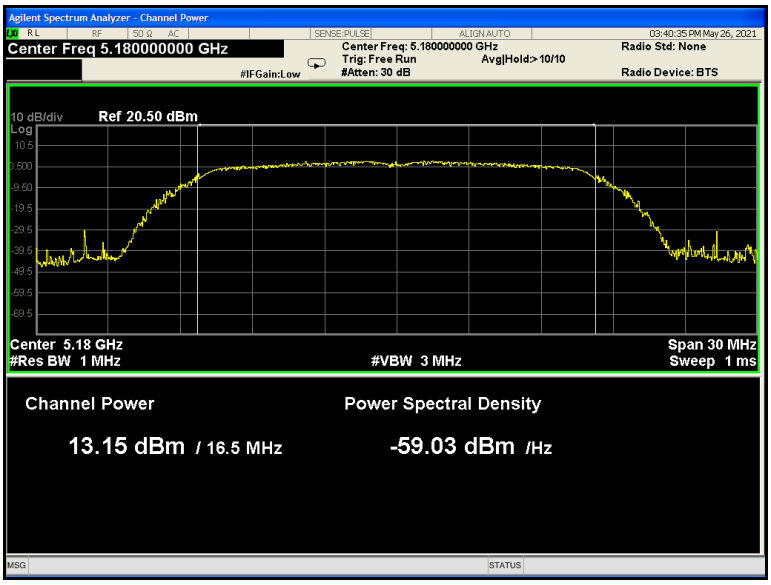
Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-2C	802.11a	13.52	14.02	**14.19**
	802.11n(HT20)	13.37	13.47	13.98
	802.11n(HT40)	13.74	13.52	13.80
	802.11ac(HT20)	13.29	13.53	13.84
	802.11ac(HT40)	13.42	13.54	13.86
	802.11ac(HT80)	13.95	13.98	/

Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-3	802.11a	14.19	13.80	13.69
	802.11n(HT20)	13.87	13.87	13.61
	802.11n(HT40)	13.94	/	13.86
	802.11ac(HT20)	14.06	13.72	13.69
	802.11ac(HT40)	**14.30**	/	13.84
	802.11ac(HT80)	14.27	/	/

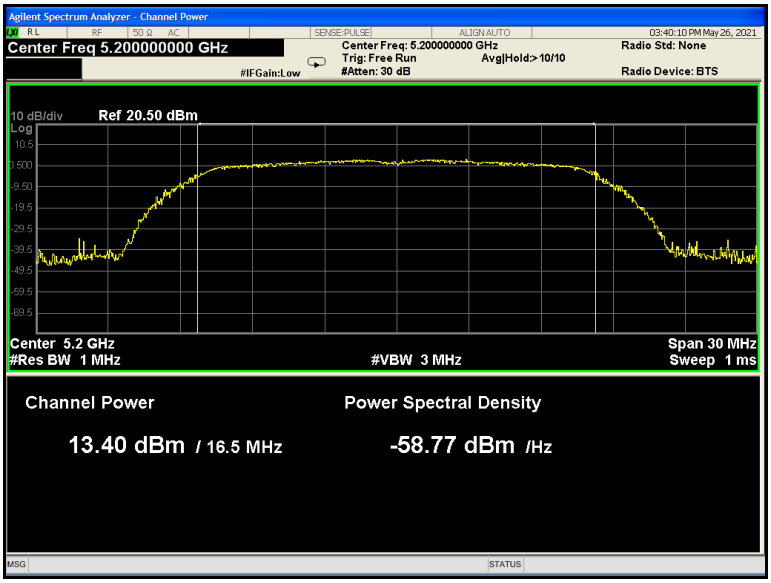
* All transmit signals are completely uncorrelated with each other, Directional gain = G_{ANT} which is less than 6dBi. So the limit does not be reduced.

Test result plots shown as follows:

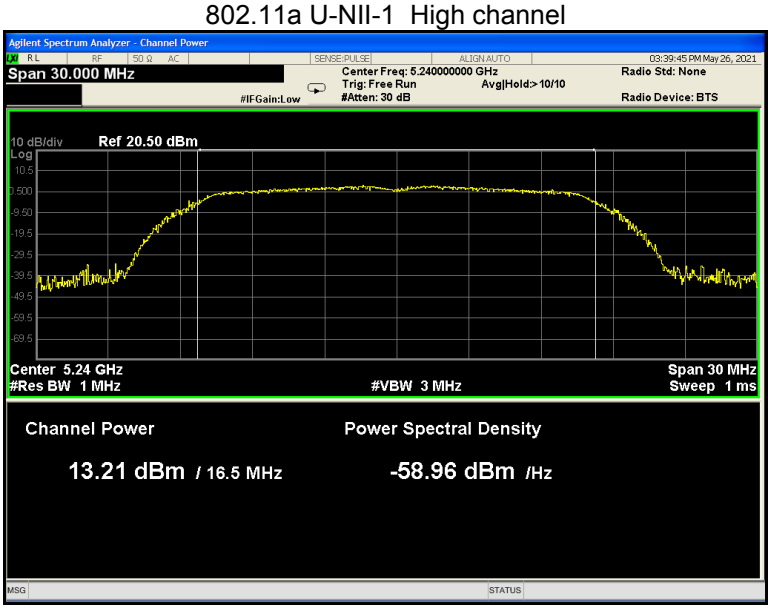
802.11a U-NII-1 Low channel



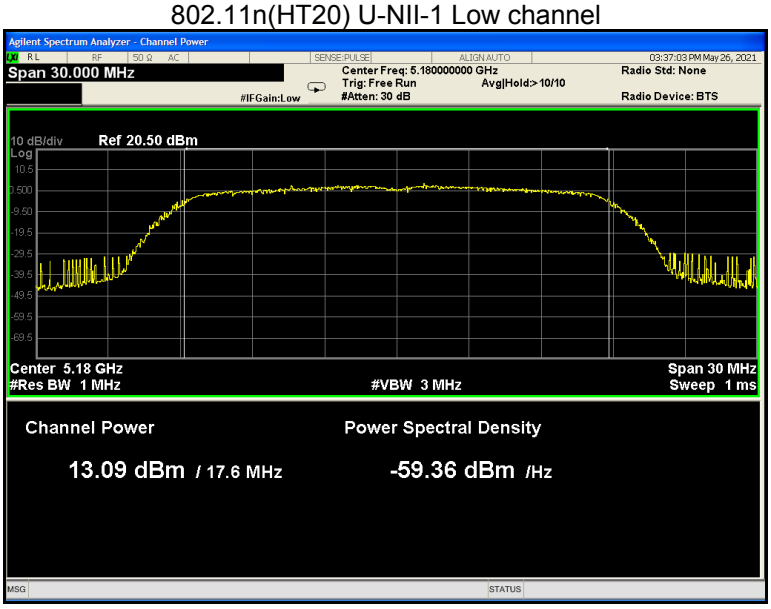
802.11a U-NII-1 Middle channel



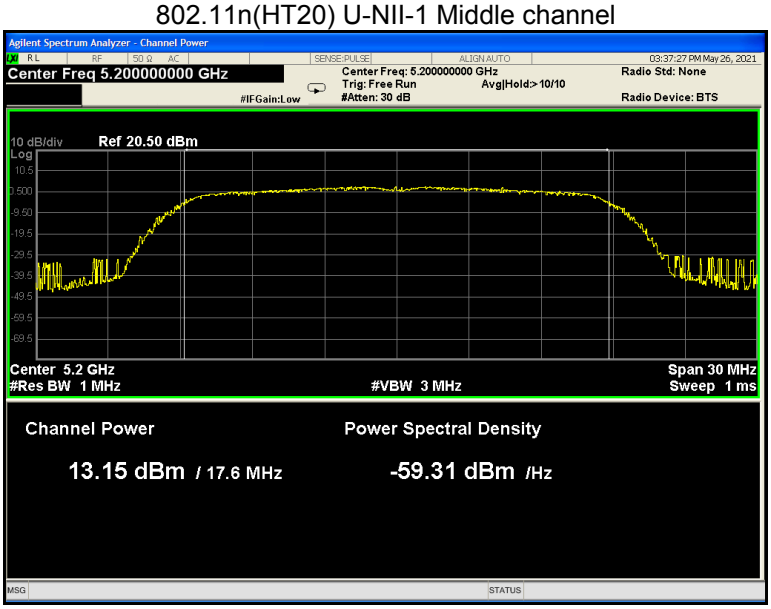
802.11a U-NII-1 High channel



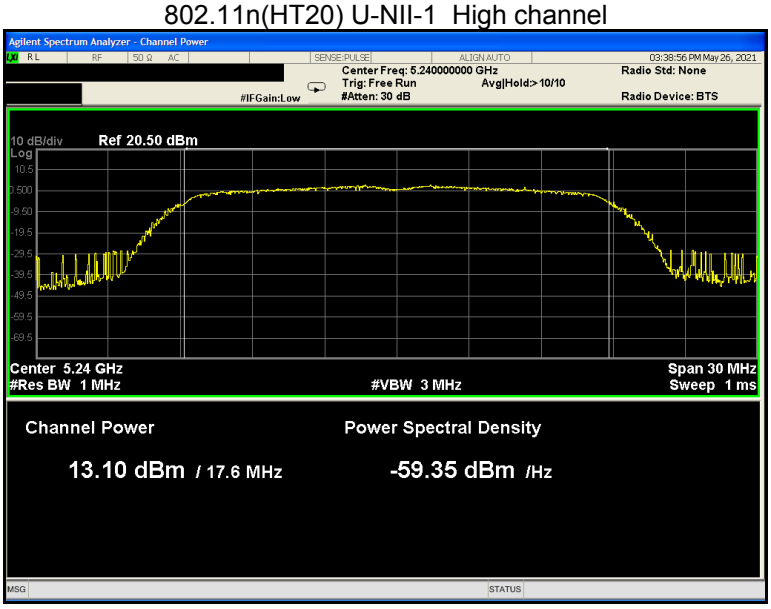
802.11n(HT20) U-NII-1 Low channel



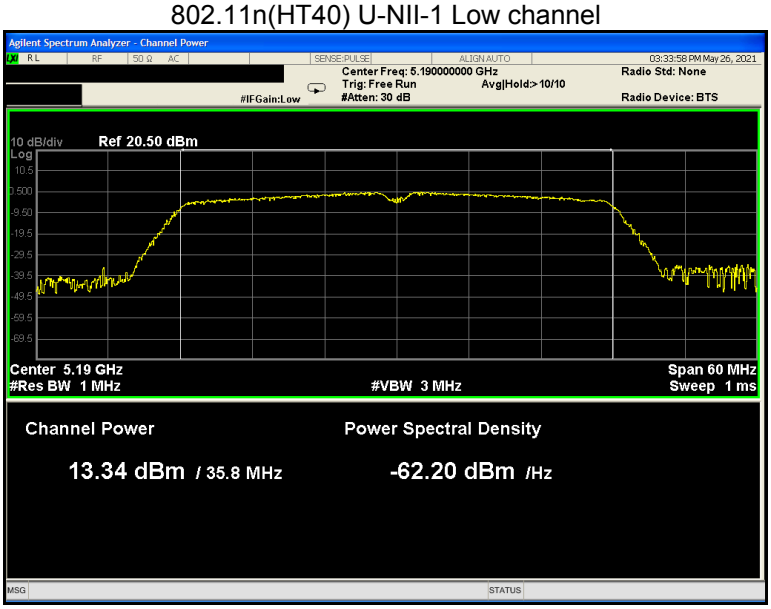
802.11n(HT20) U-NII-1 Middle channel



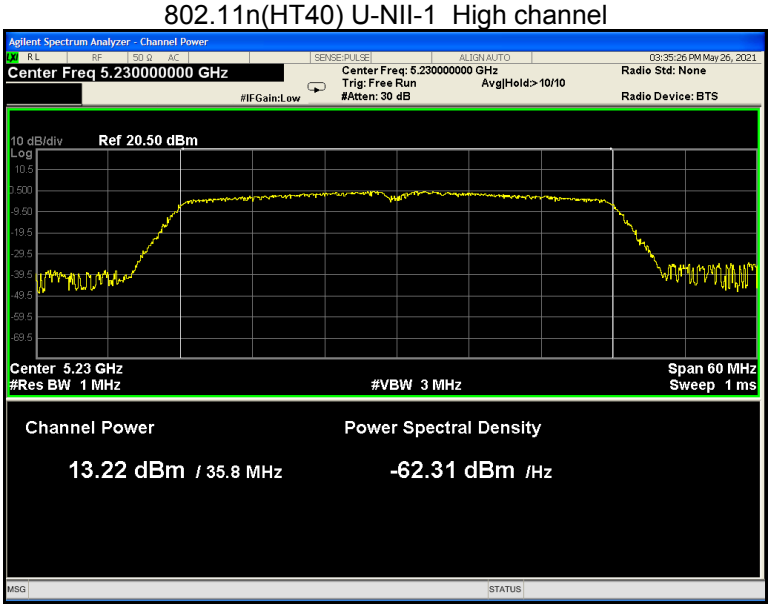
802.11n(HT20) U-NII-1 High channel



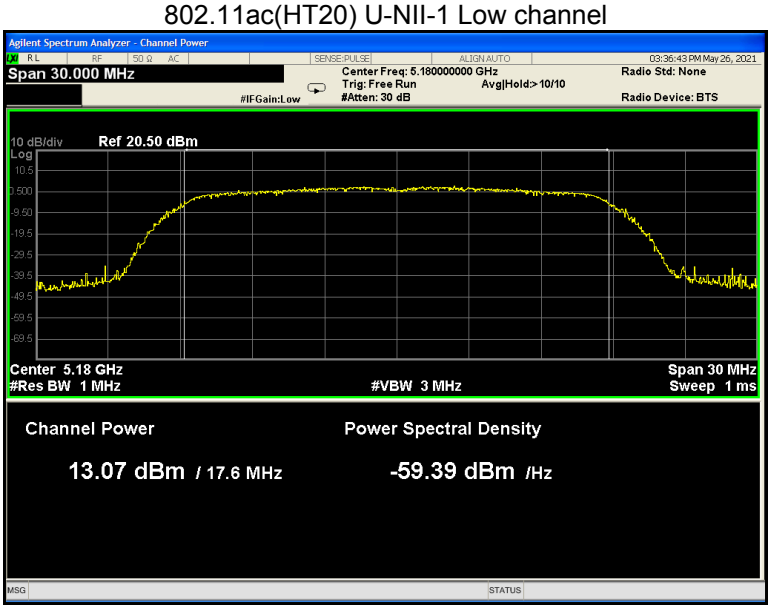
802.11n(HT40) U-NII-1 Low channel



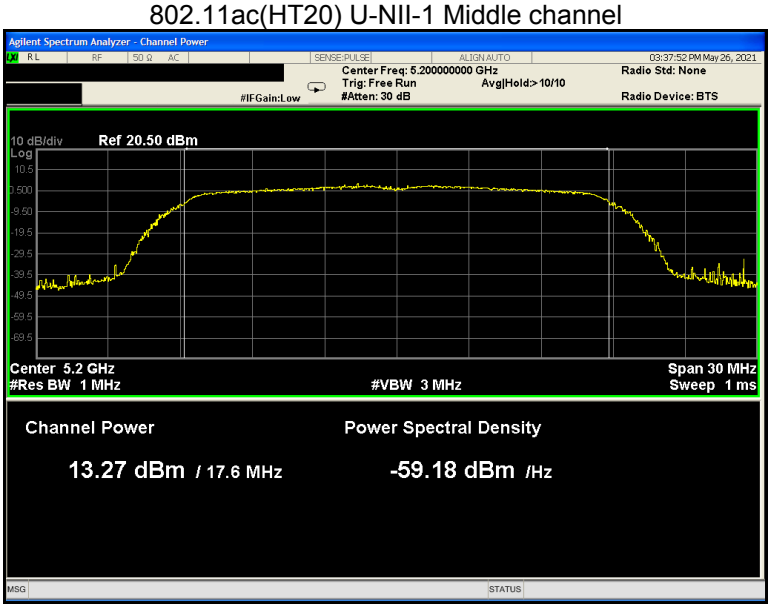
802.11n(HT40) U-NII-1 High channel



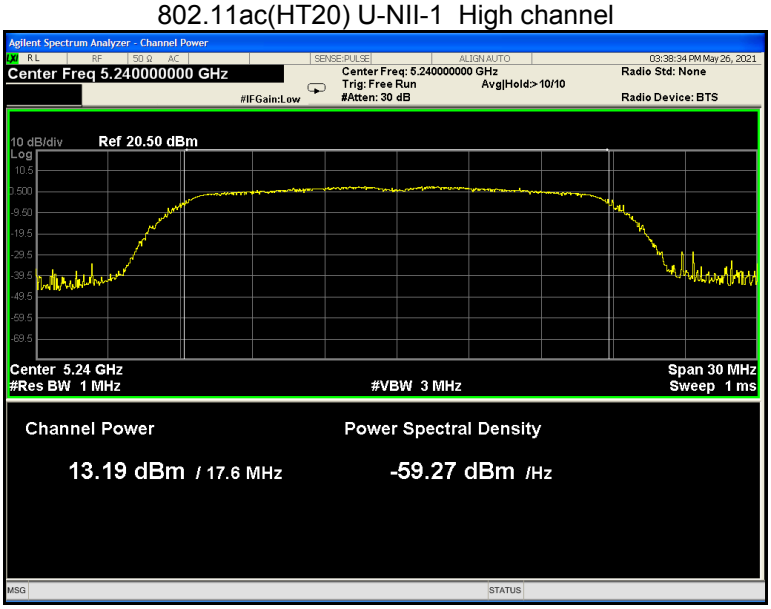
802.11ac(HT20) U-NII-1 Low channel



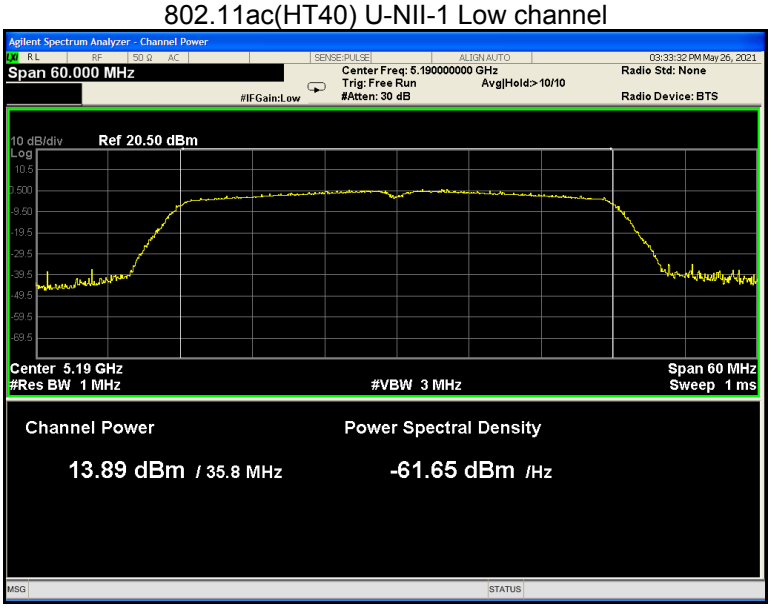
802.11ac(HT20) U-NII-1 Middle channel



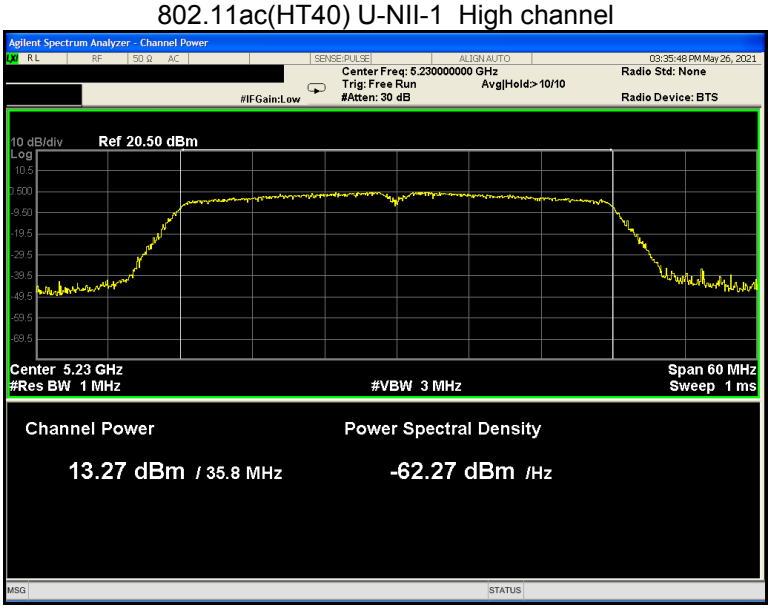
802.11ac(HT20) U-NII-1 High channel



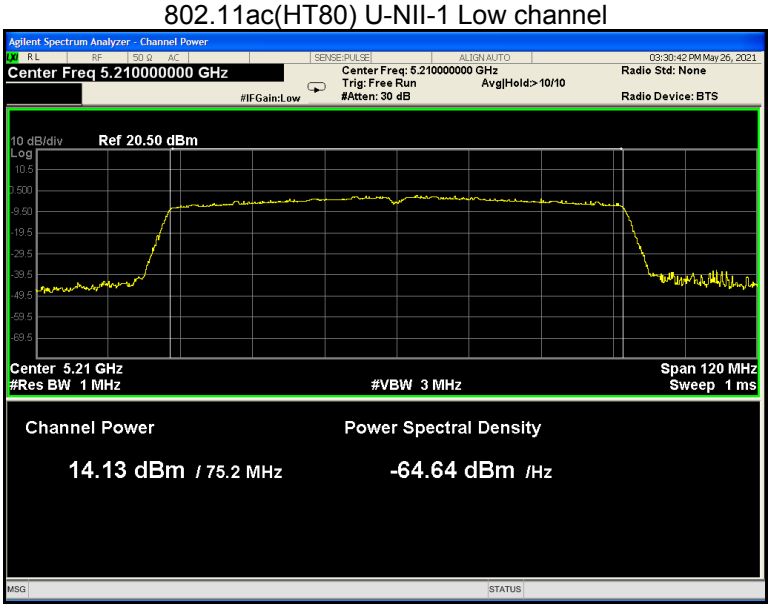
802.11ac(HT40) U-NII-1 Low channel



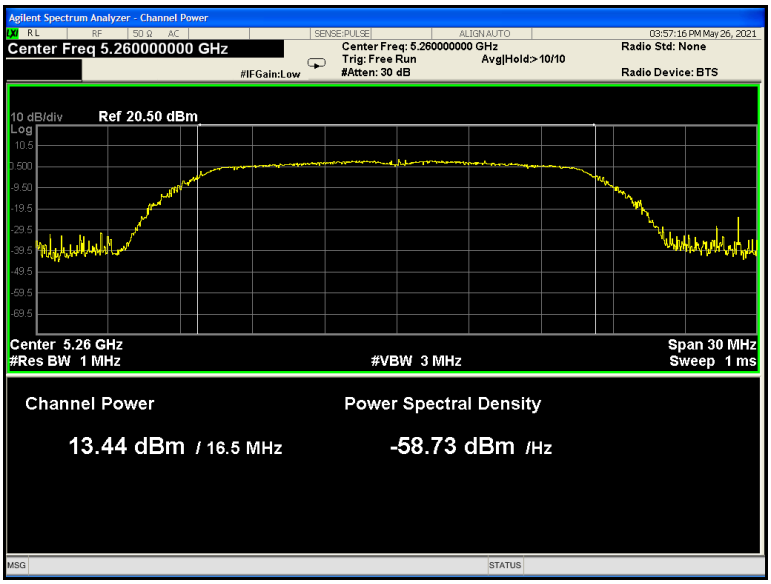
802.11ac(HT40) U-NII-1 High channel



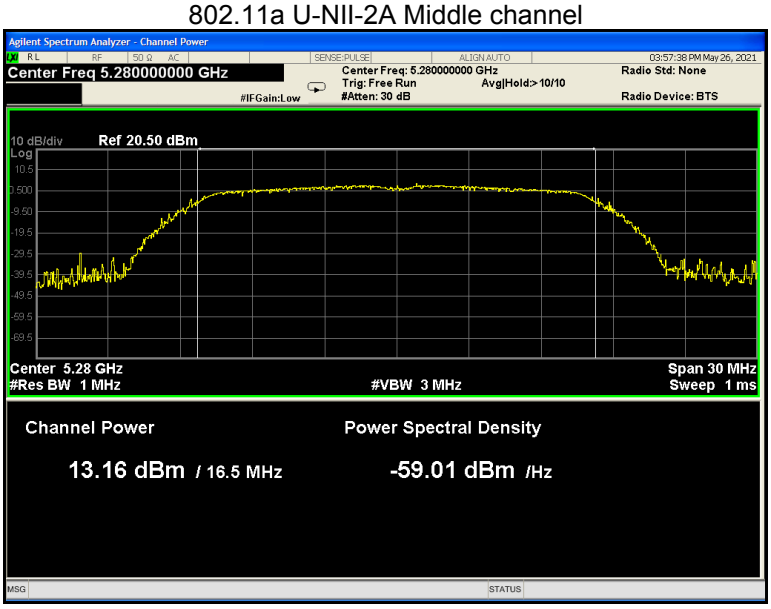
802.11ac(HT80) U-NII-1 Low channel



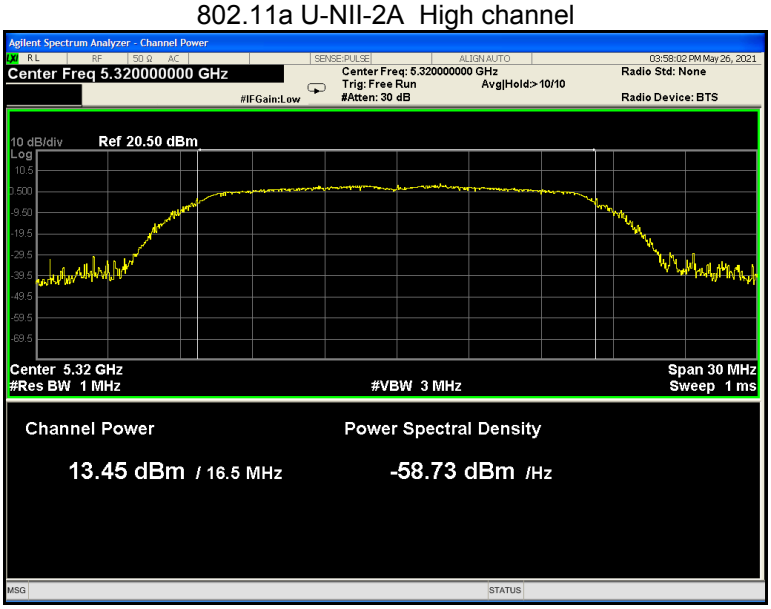
802.11a U-NII-2A Low channel



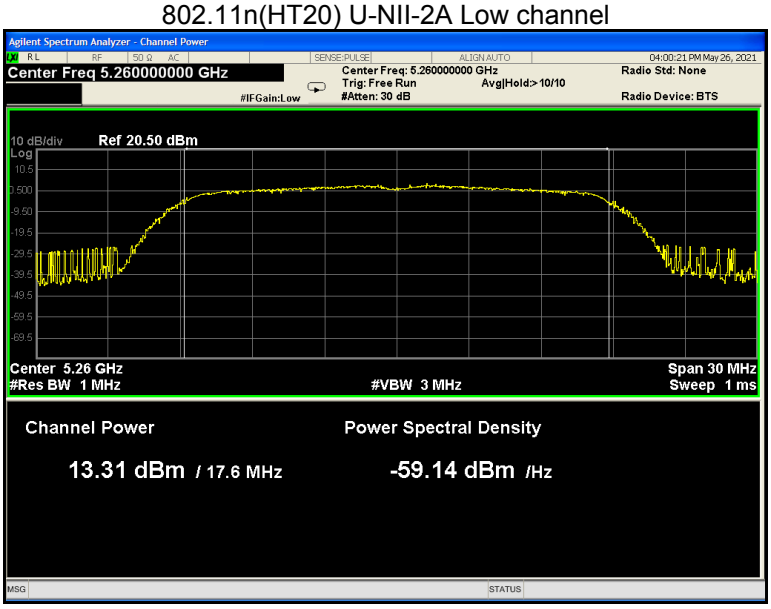
802.11a U-NII-2A Middle channel



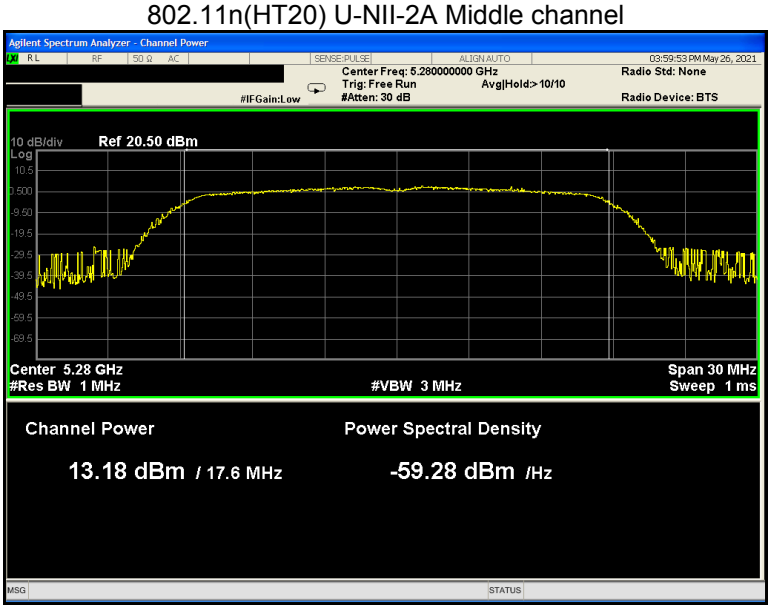
802.11a U-NII-2A High channel



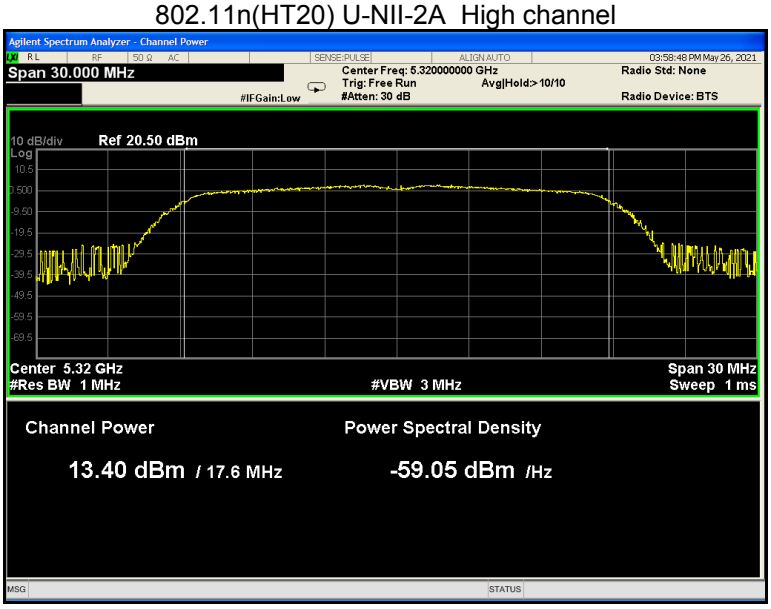
802.11n(HT20) U-NII-2A Low channel



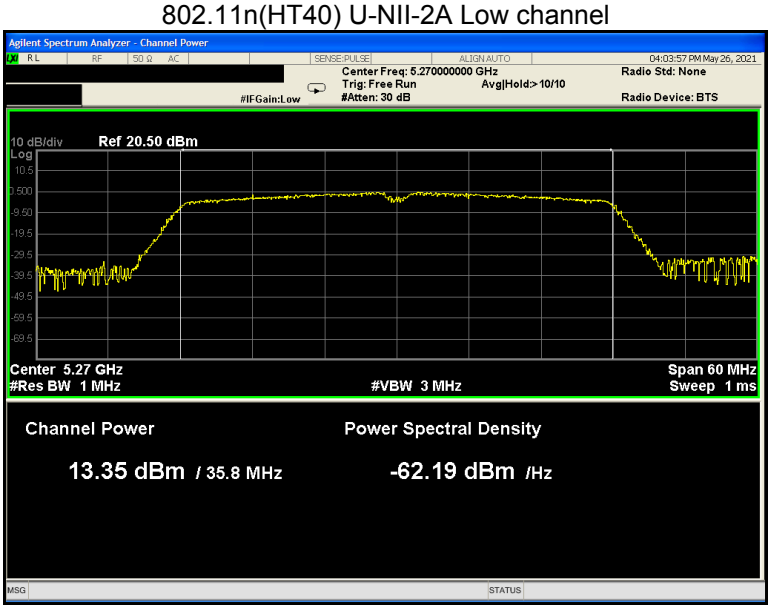
802.11n(HT20) U-NII-2A Middle channel



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



802.11n(HT40) U-NII-2A Low channel



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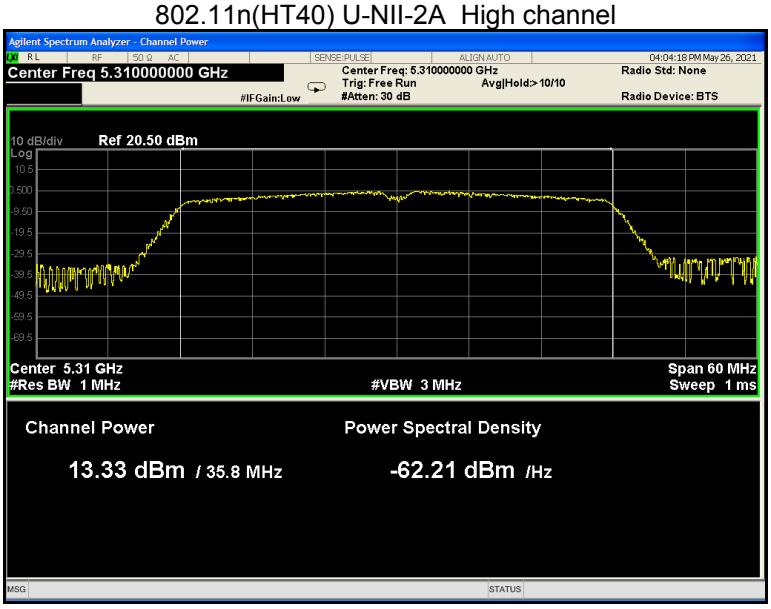
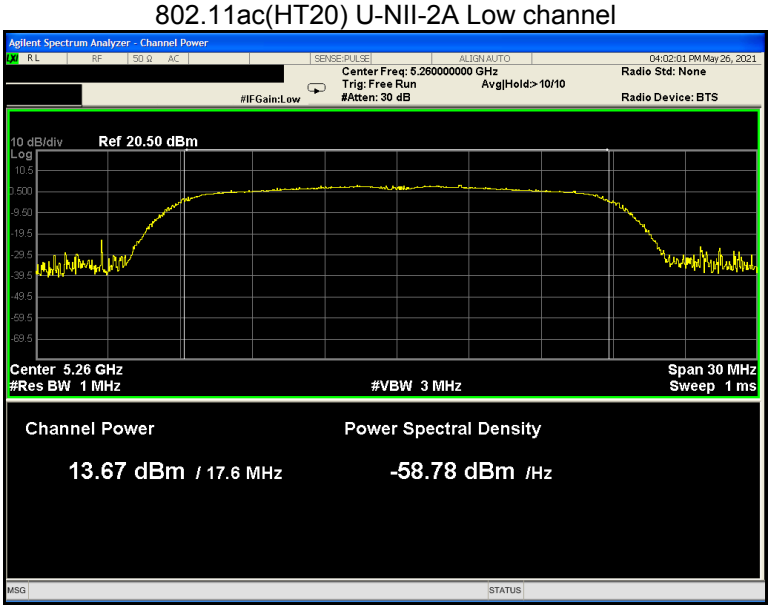
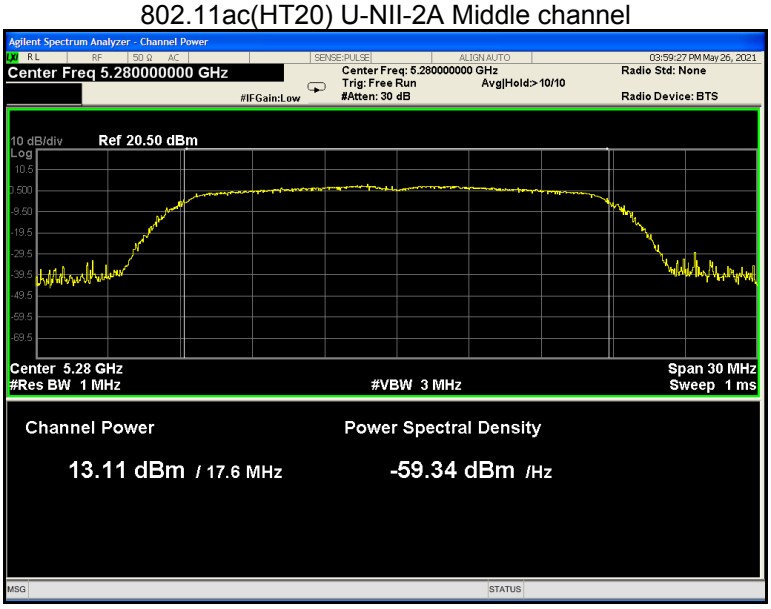


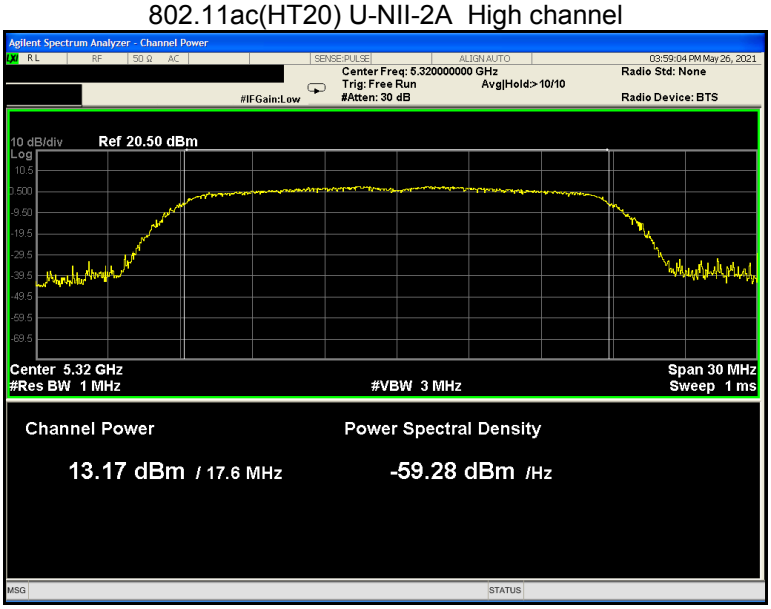
802.11ac(HT20) U-NII-2A Low channel



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



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



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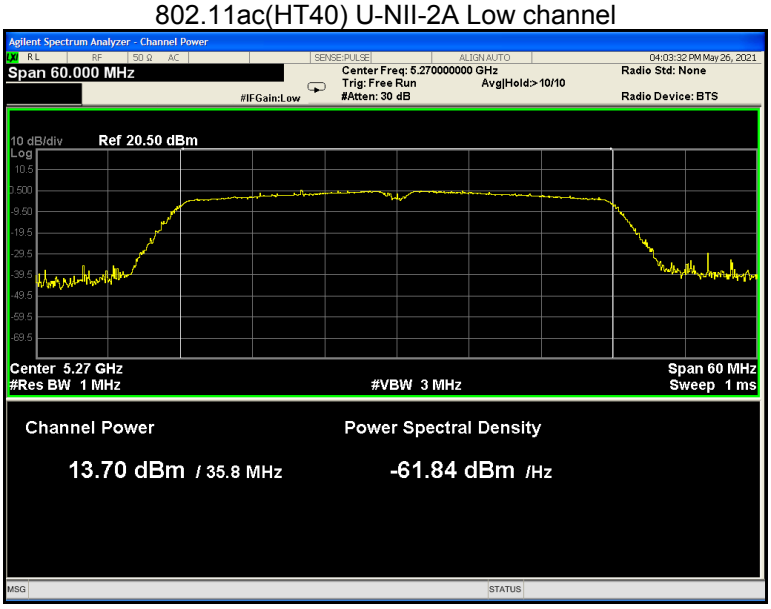

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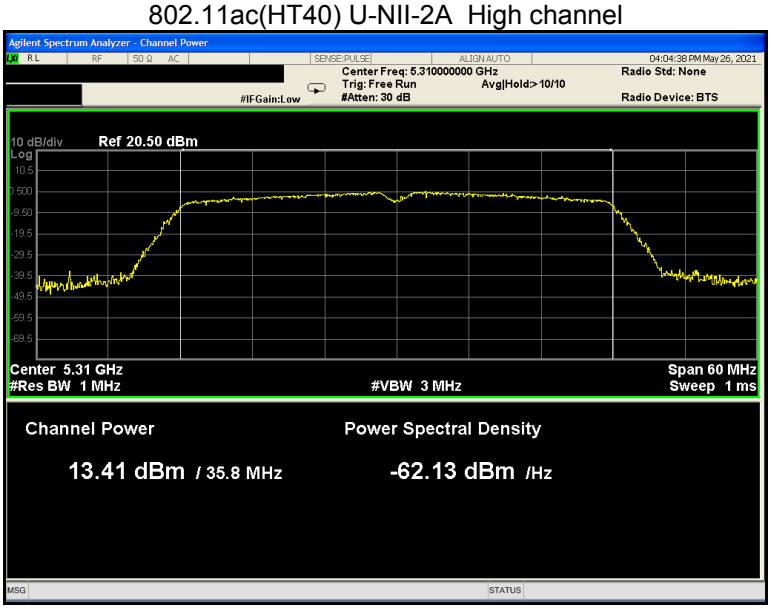
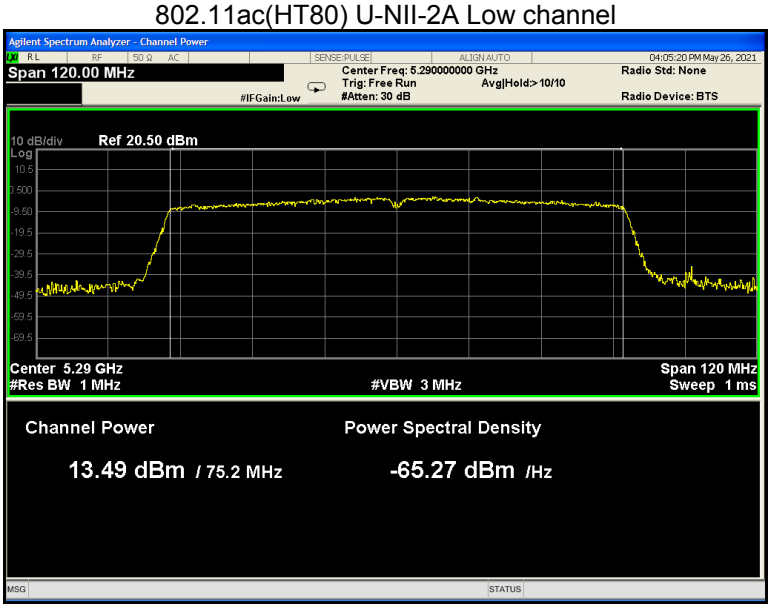
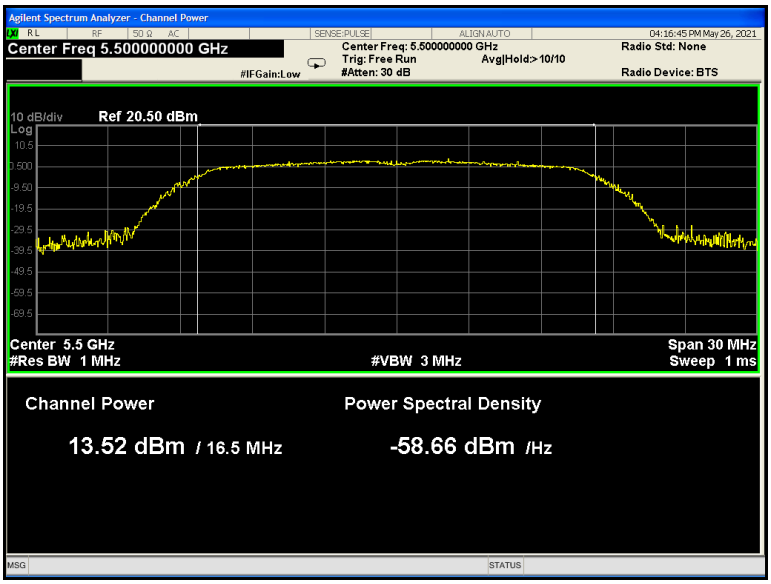


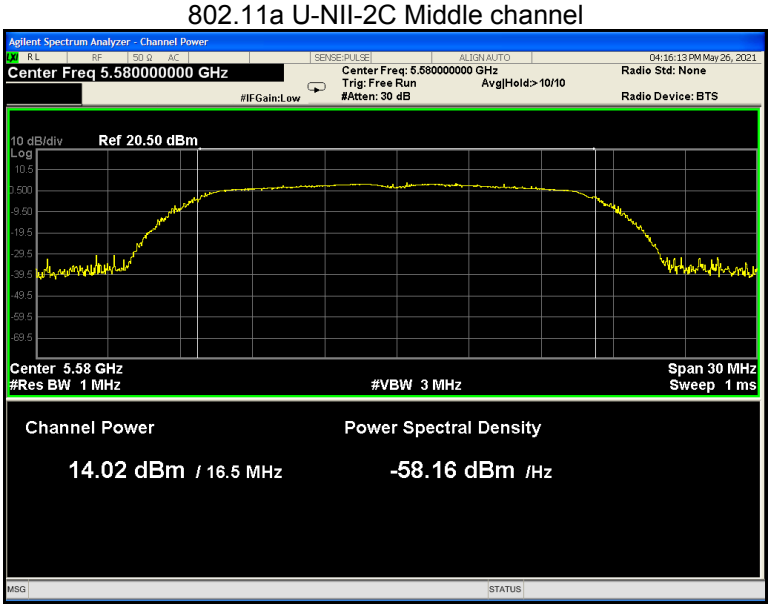
802.11ac(HT80) U-NII-2A Low channel



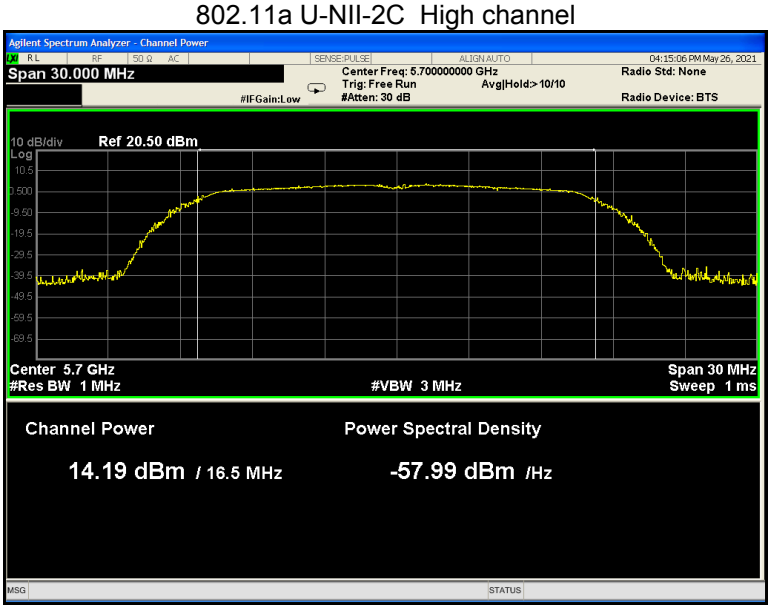
802.11a U-NII-2C Low channel



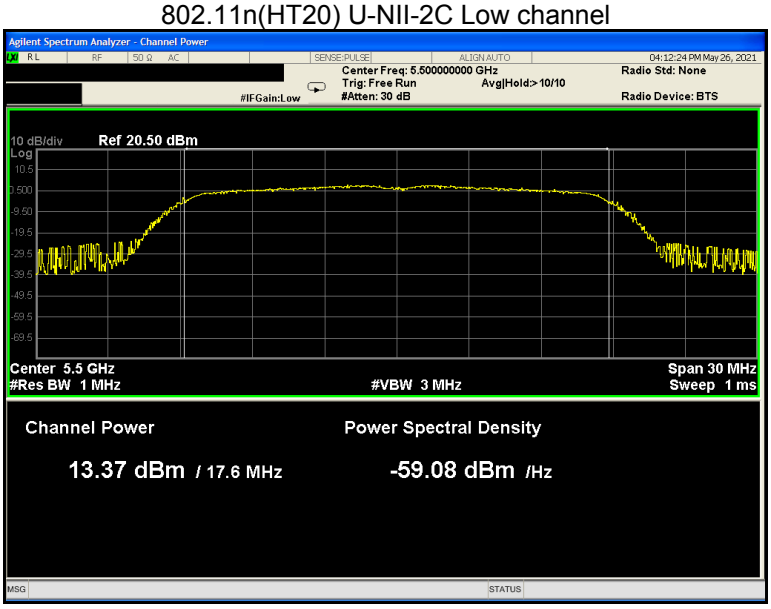
802.11a U-NII-2C Middle channel



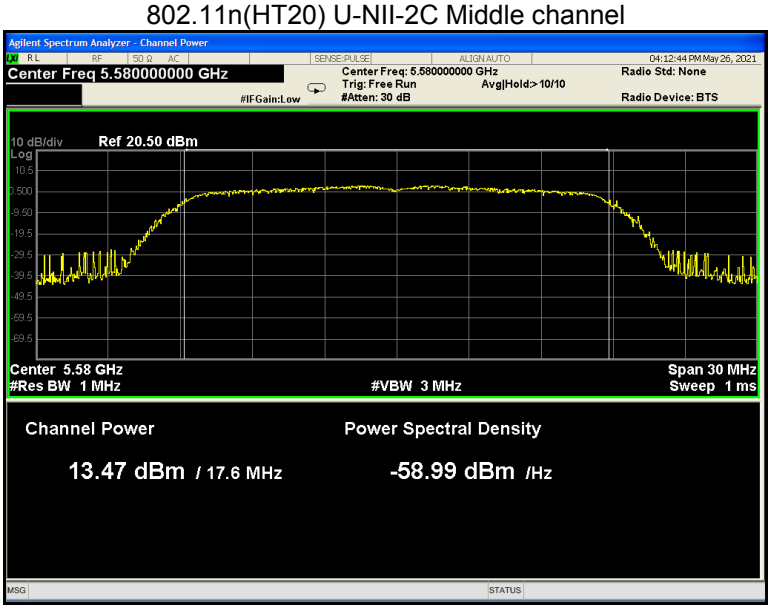
802.11a U-NII-2C High channel



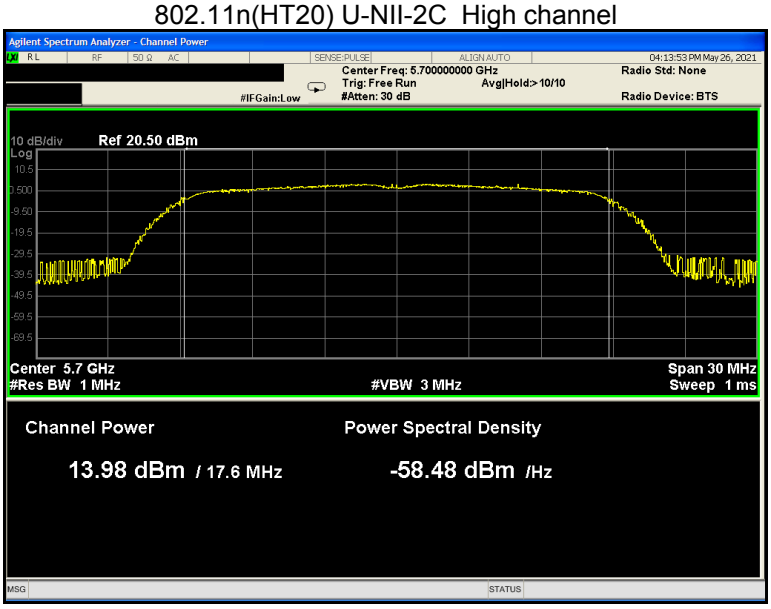
802.11n(HT20) U-NII-2C Low channel



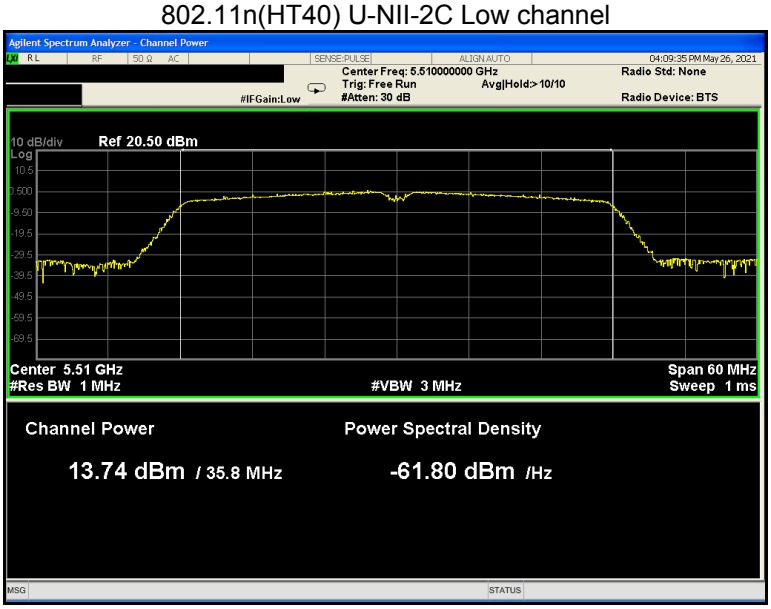
802.11n(HT20) U-NII-2C Middle channel



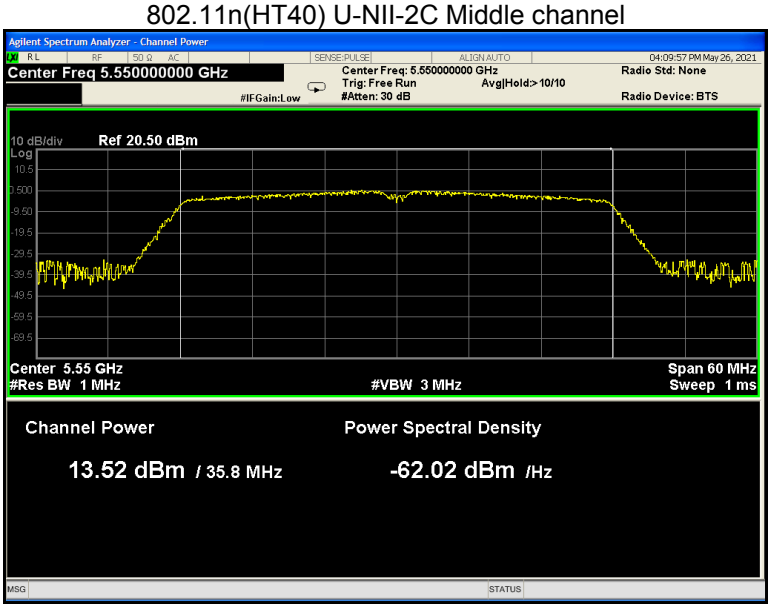
802.11n(HT20) U-NII-2C High channel



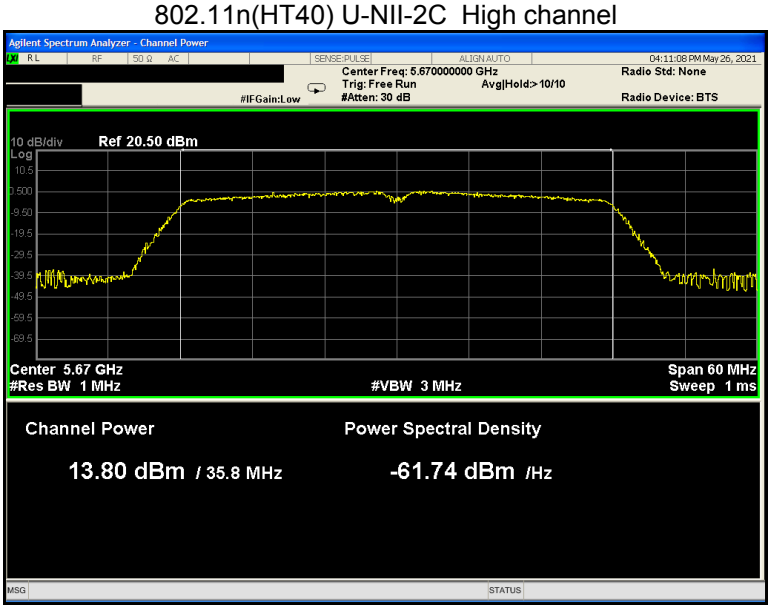
802.11n(HT40) U-NII-2C Low channel



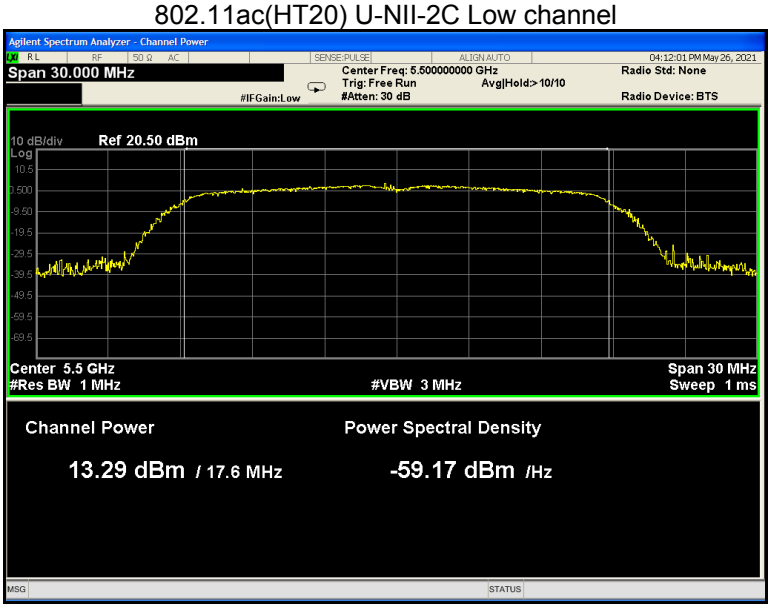
802.11n(HT40) U-NII-2C Middle channel



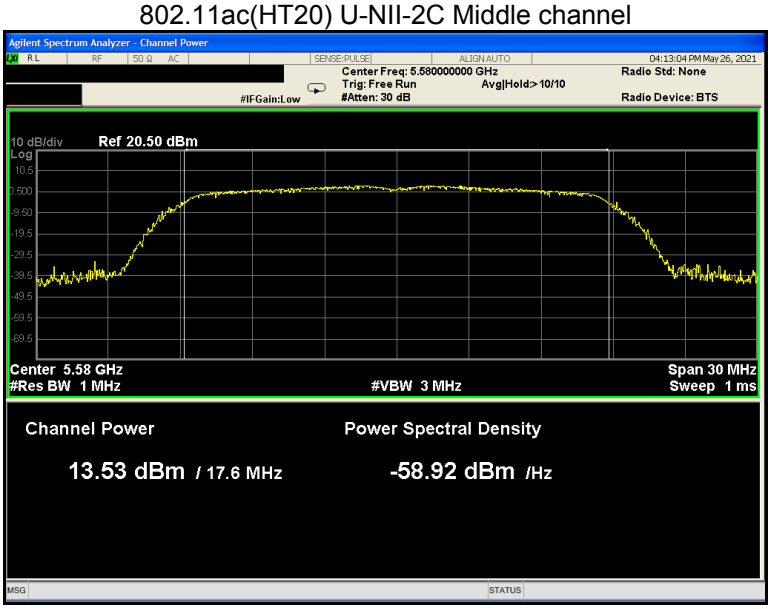
802.11n(HT40) U-NII-2C High channel



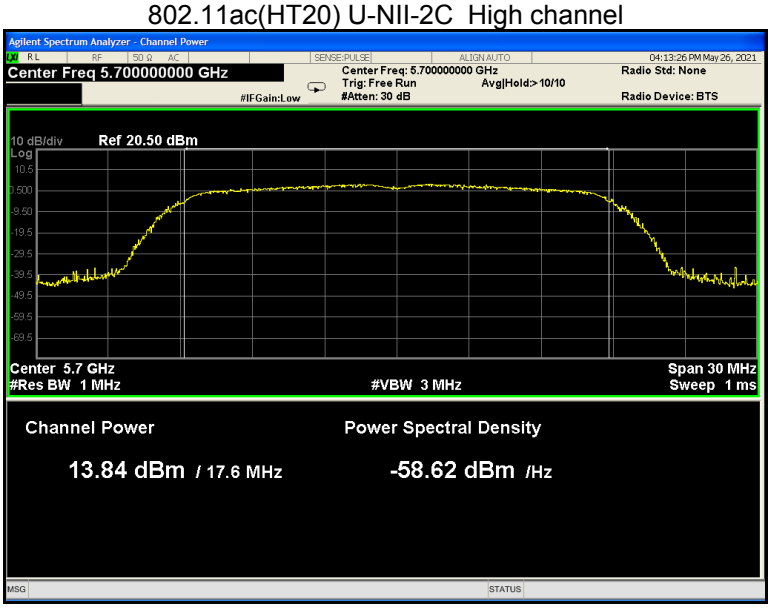
802.11ac(HT20) U-NII-2C Low channel



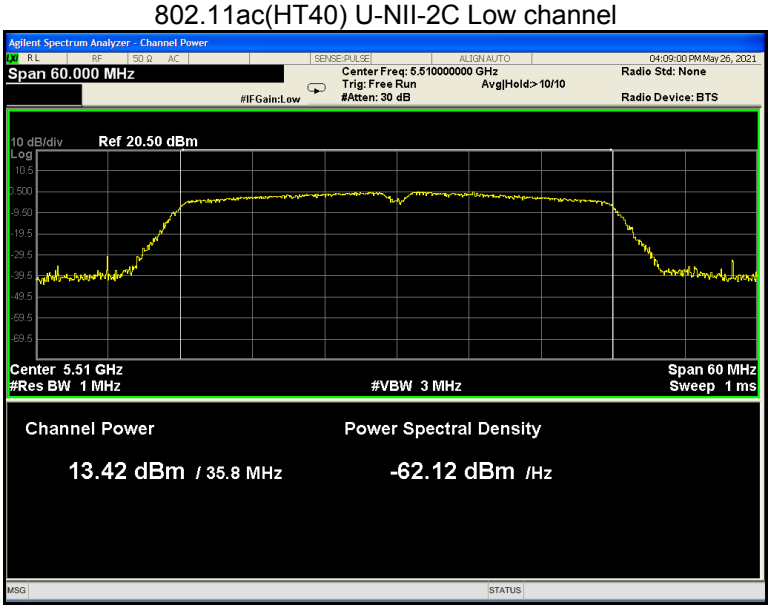
802.11ac(HT20) U-NII-2C Middle channel



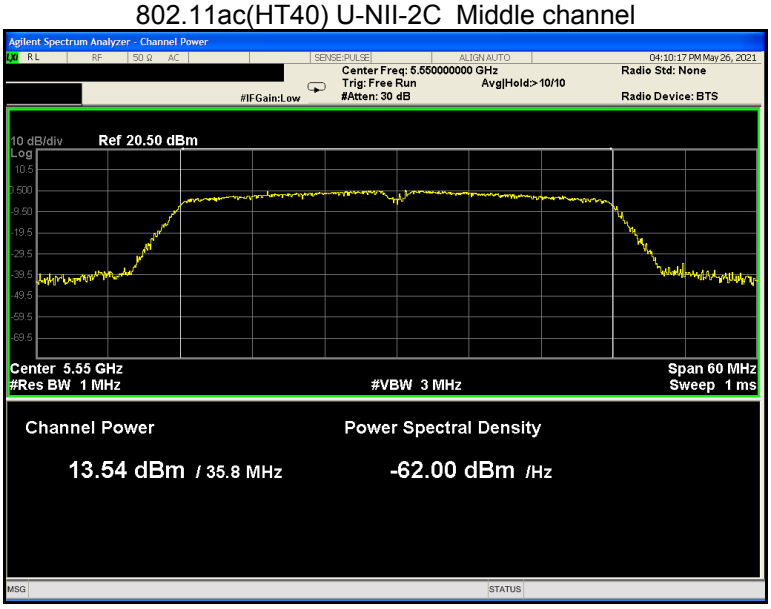
802.11ac(HT20) U-NII-2C High channel



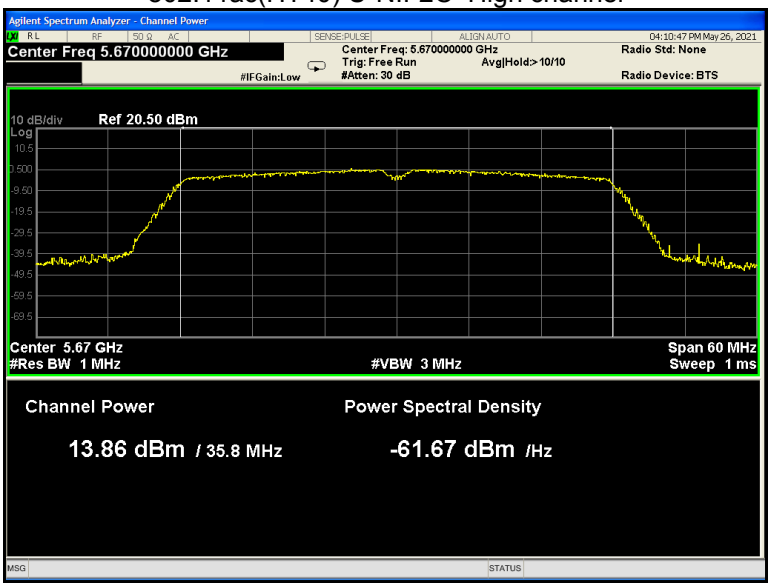
802.11ac(HT40) U-NII-2C Low channel



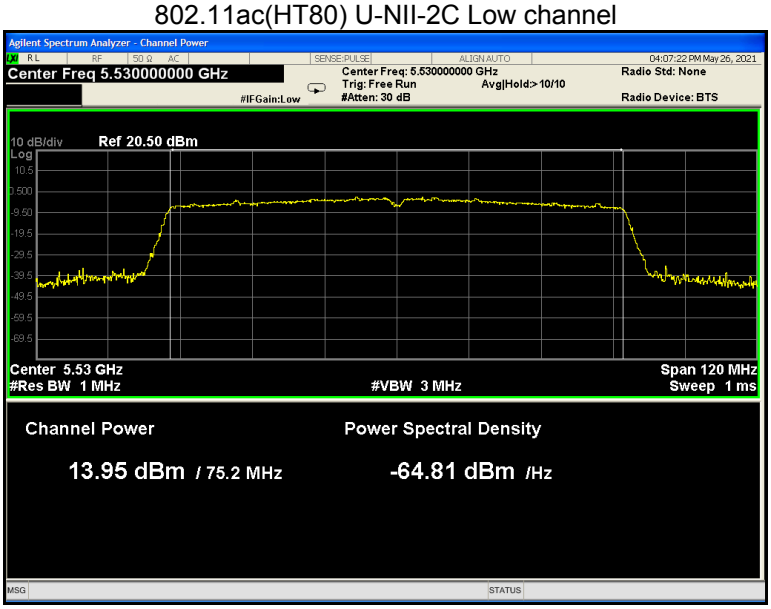
802.11ac(HT40) U-NII-2C Middle channel



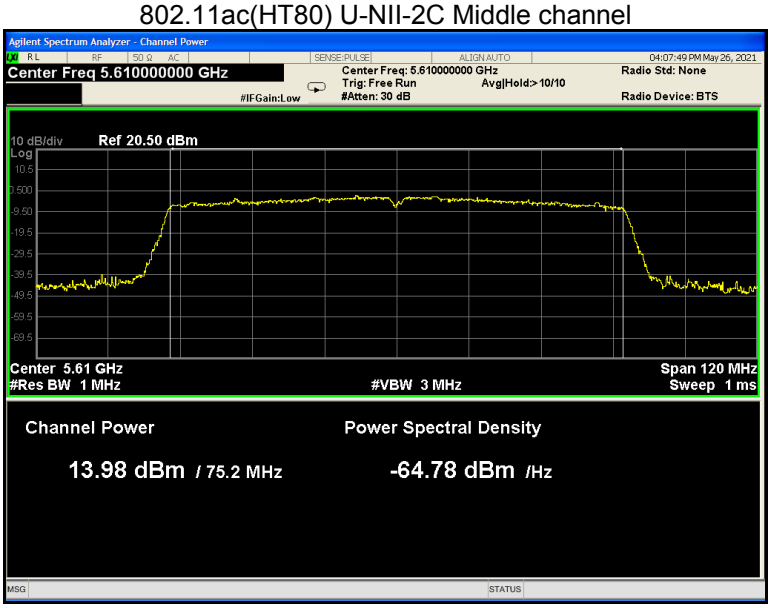
802.11ac(HT40) U-NII-2C High channel



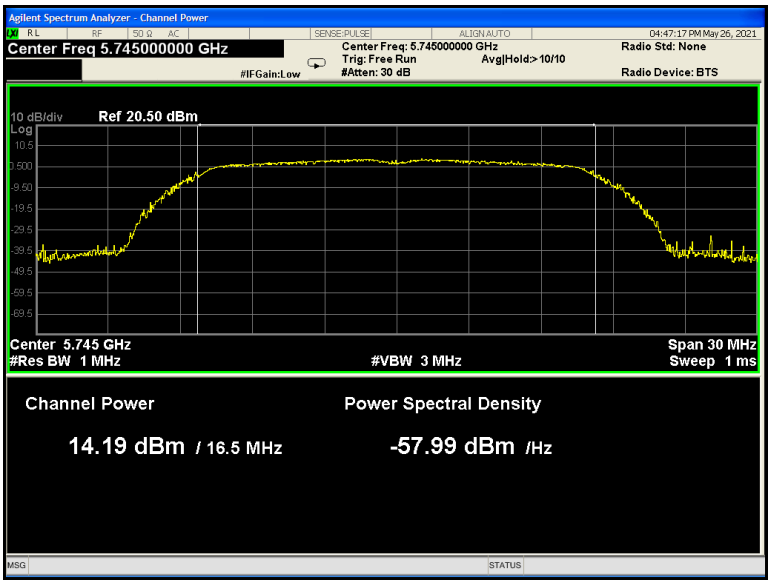
802.11ac(HT80) U-NII-2C Low channel



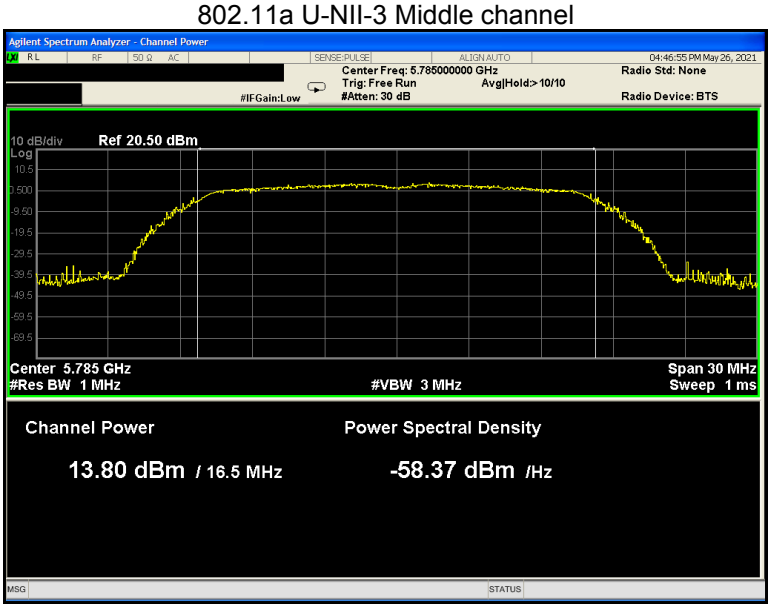
802.11ac(HT80) U-NII-2C Middle channel



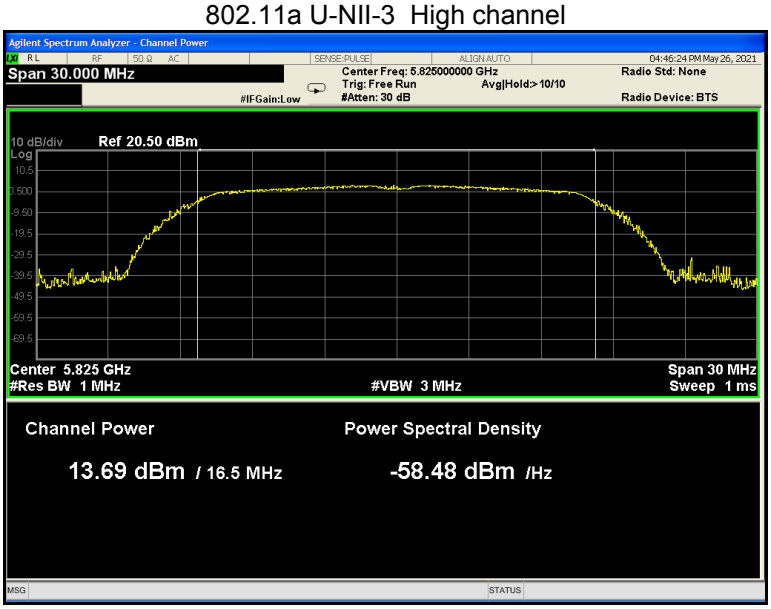
802.11a U-NII-3 Low channel



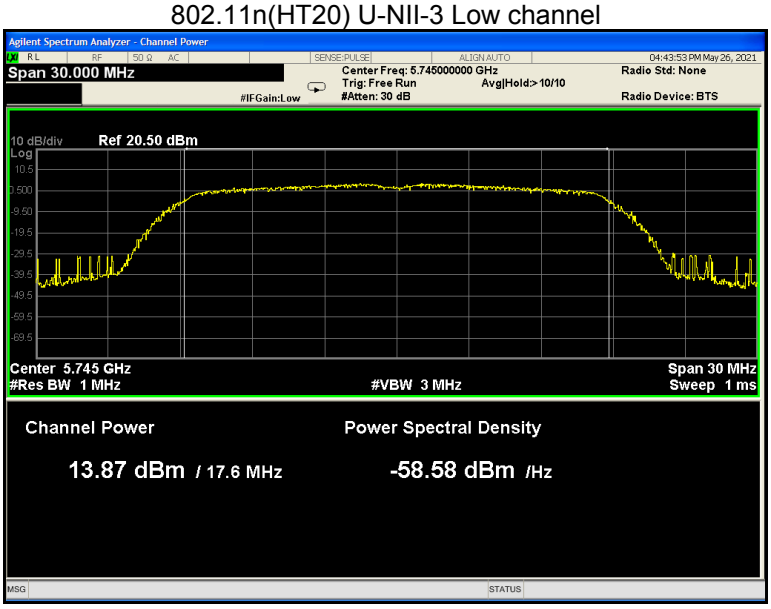
802.11a U-NII-3 Middle channel



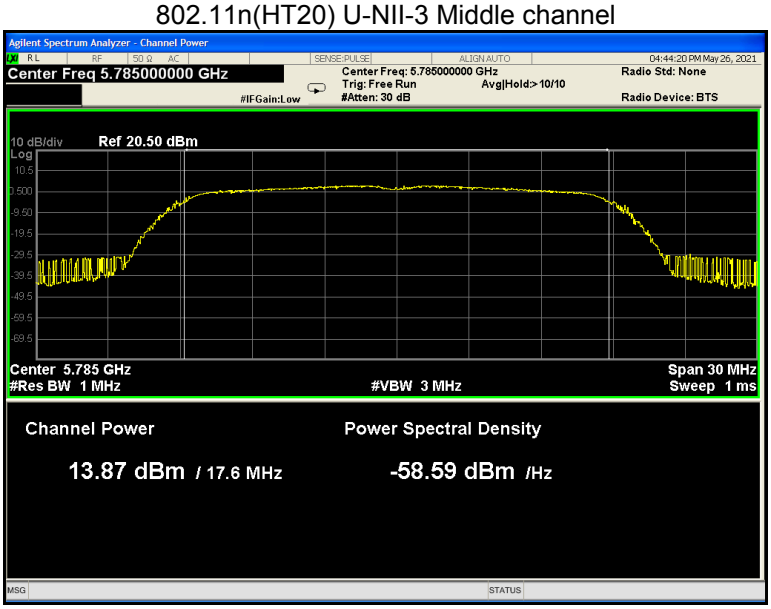
802.11a U-NII-3 High channel



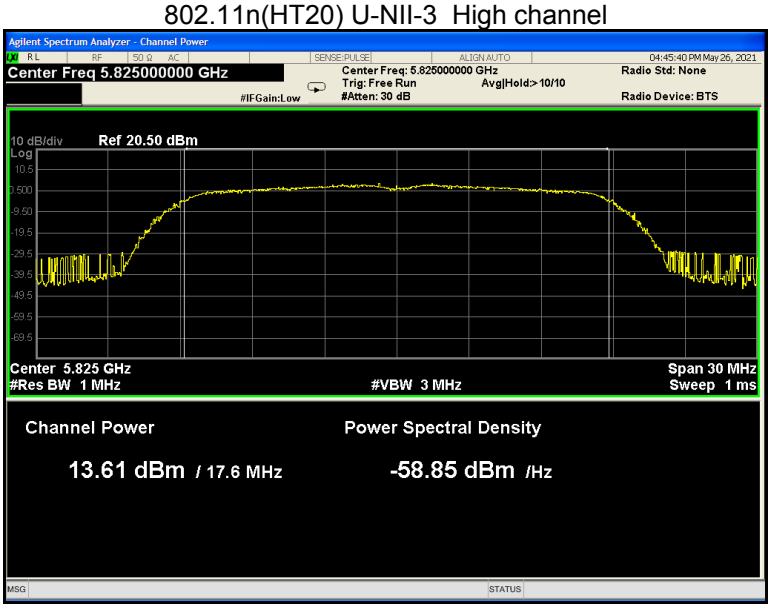
802.11n(HT20) U-NII-3 Low channel



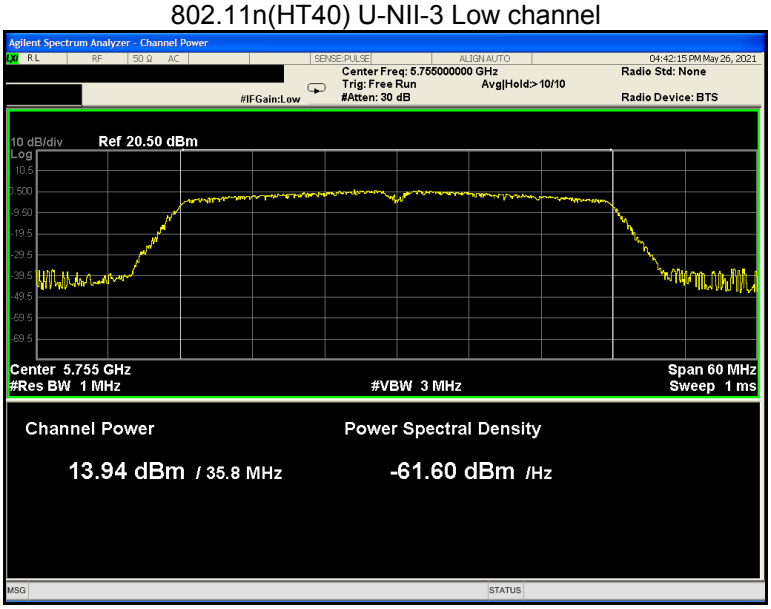
802.11n(HT20) U-NII-3 Middle channel



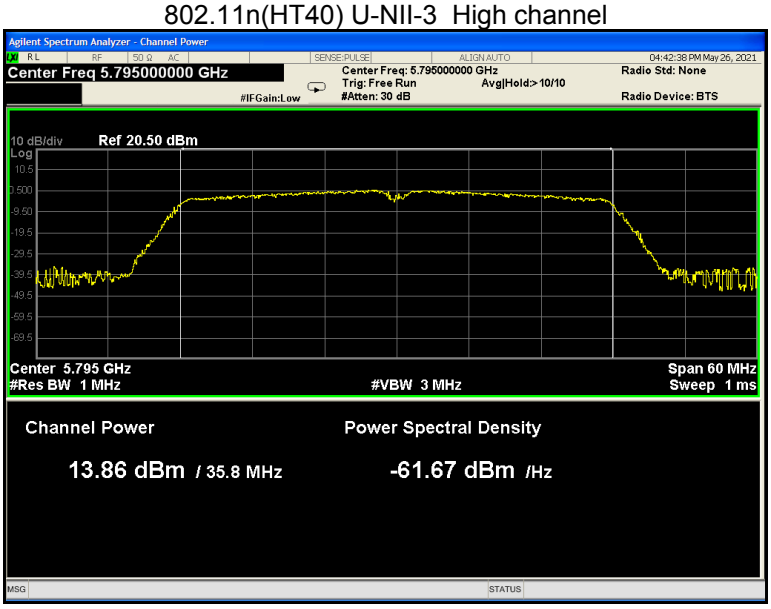
802.11n(HT20) U-NII-3 High channel



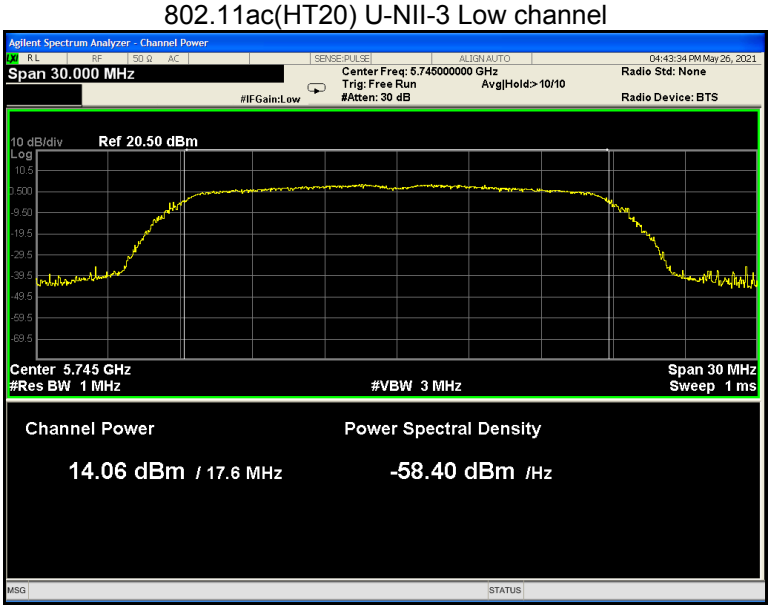
802.11n(HT40) U-NII-3 Low channel



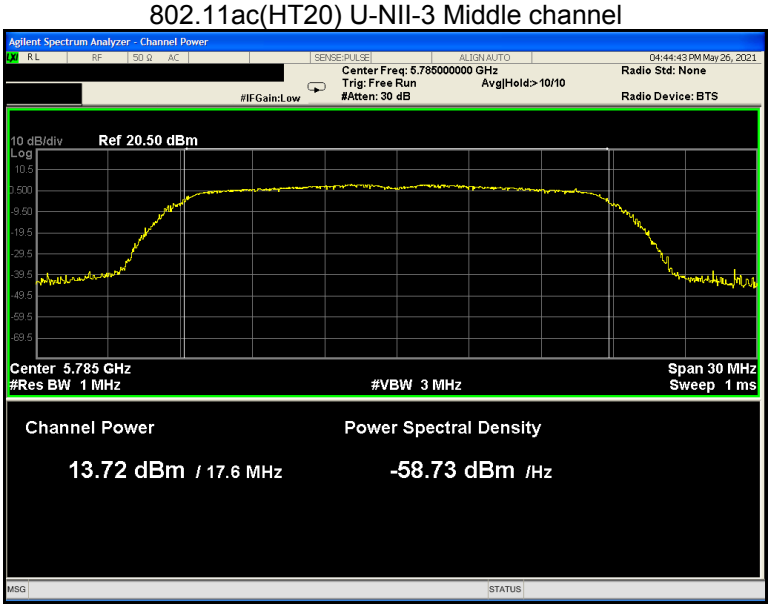
802.11n(HT40) U-NII-3 High channel



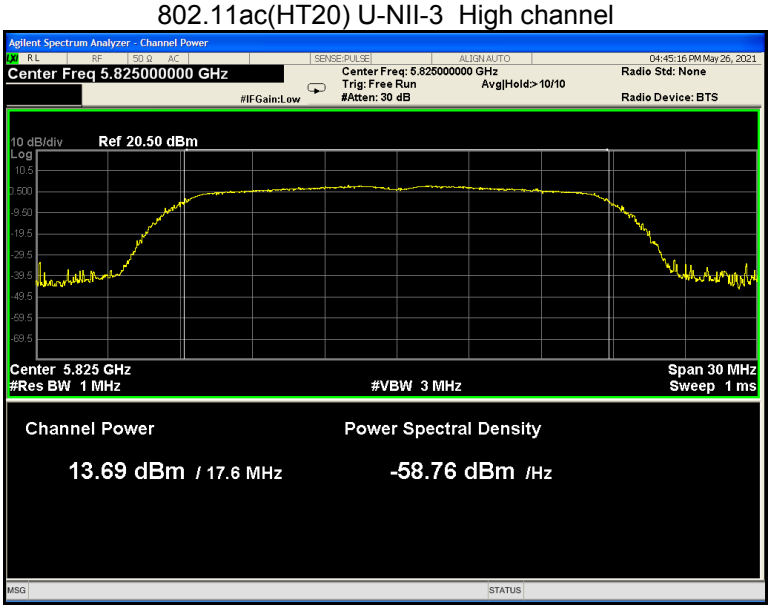
802.11ac(HT20) U-NII-3 Low channel



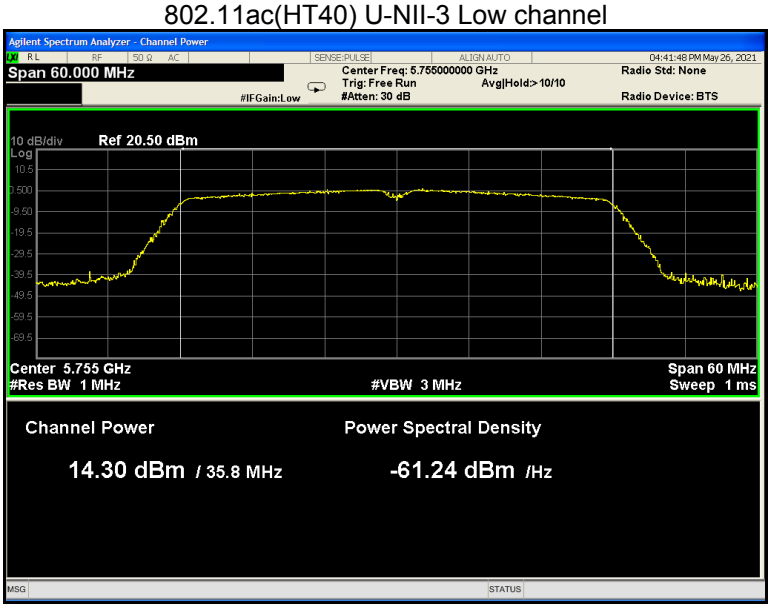
802.11ac(HT20) U-NII-3 Middle channel



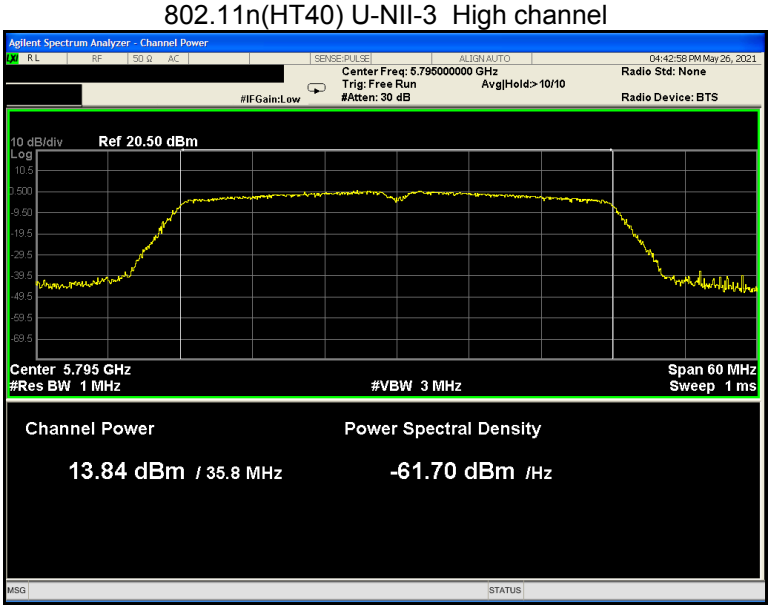
802.11ac(HT20) U-NII-3 High channel



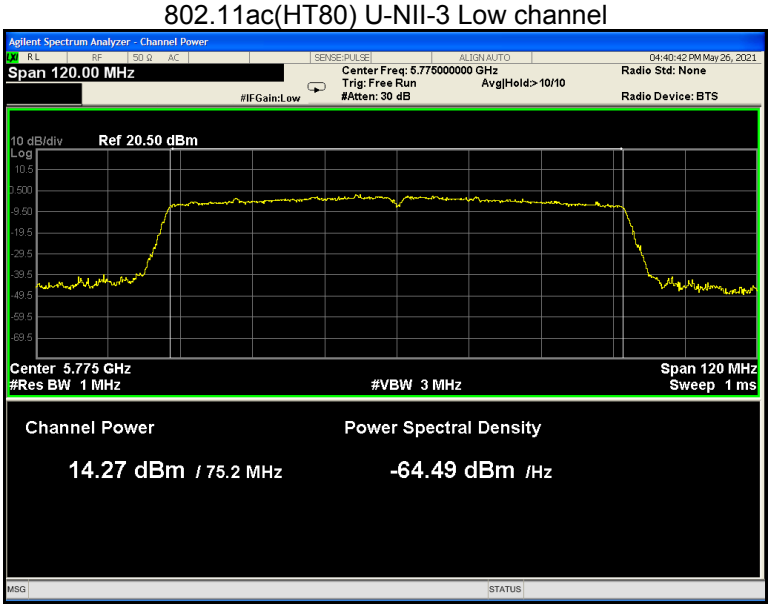
802.11ac(HT40) U-NII-3 Low channel



802.11n(HT40) U-NII-3 High channel



802.11ac(HT80) U-NII-3 Low channel



14 Power Spectral density

Test Requirement:	FCC CFR47 Part 15 Section 15.407(a)
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Test Limit:	≤11dBm/MHz for Operation in the U-NII-1(5150MHz-5250MHz,5250-5350MHz and 5470-5725MHz)of device; ≤30dBm/500kHz for Operation in the U-NII-3(5725MHz-5850MHz)of device
Test Result:	PASS

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:

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.

14.2 Test Result:

Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-1	802.11a	3.883	3.292	3.646
	802.11n(HT20)	3.361	3.035	2.954
	802.11n(HT40)	0.767	/	0.580
	802.11ac(HT20)	3.318	2.942	3.117
	802.11ac(HT40)	0.131	/	0.841
	802.11ac(HT80)	-2.151	/	/
	Limit	≤11.00dBm/MHz		

Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-2A	802.11a	3.329	3.085	3.768
	802.11n(HT20)	2.947	2.764	3.065
	802.11n(HT40)	0.009	/	0.921
	802.11ac(HT20)	3.160	3.298	3.285
	802.11ac(HT40)	0.016	/	0.140
	802.11ac(HT80)	-2.536	/	/
	Limit	≤11.00dBm/MHz		

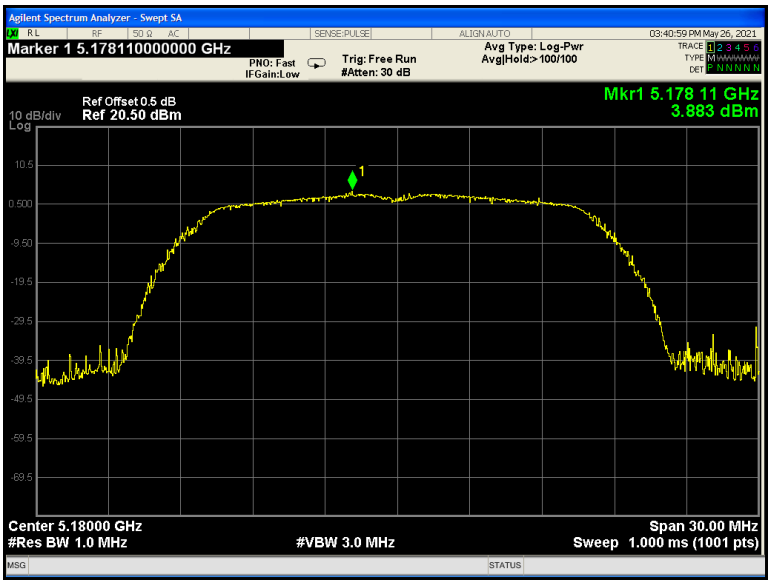
Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-2C	802.11a	4.278	4.734	4.675
	802.11n(HT20)	3.192	3.272	3.546
	802.11n(HT40)	1.460	0.729	0.832
	802.11ac(HT20)	3.182	3.487	3.973
	802.11ac(HT40)	0.521	0.977	1.353
	802.11ac(HT80)	-2.139	-1.782	/
	Limit	≤11.00dBm/MHz		

Band	Operation mode	Power Spectral Density (dBm/MHz)		
		Low	Middle	High
U-NII-3	802.11a	1.100	0.411	0.727
	802.11n(HT20)	0.776	0.145	-0.341
	802.11n(HT40)	-2.343	/	-1.953
	802.11ac(HT20)	0.219	0.155	-0.107
	802.11ac(HT40)	-1.601	/	-2.367
	802.11ac(HT80)	-4.569	/	/
	Limit	≤30.00dBm/500kHz		

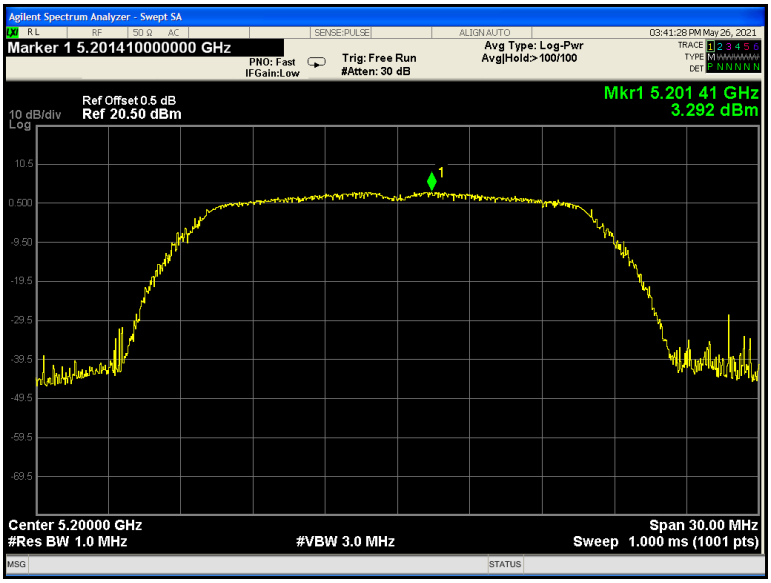
* All transmit signals are completely uncorrelated with each other, Directional gain = G_{ANT} which is less than 6dBi. So the limit does not be reduced.

Test result plots shown as follows:

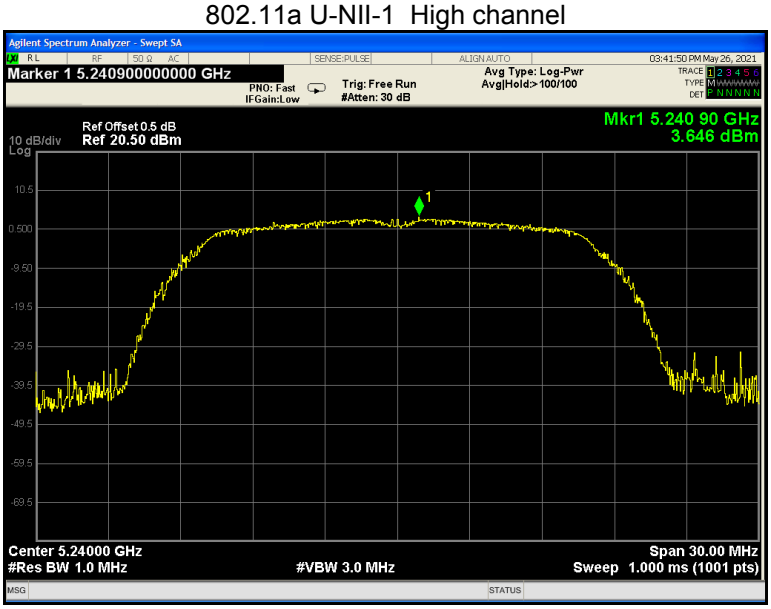
802.11a U-NII-1 Low channel



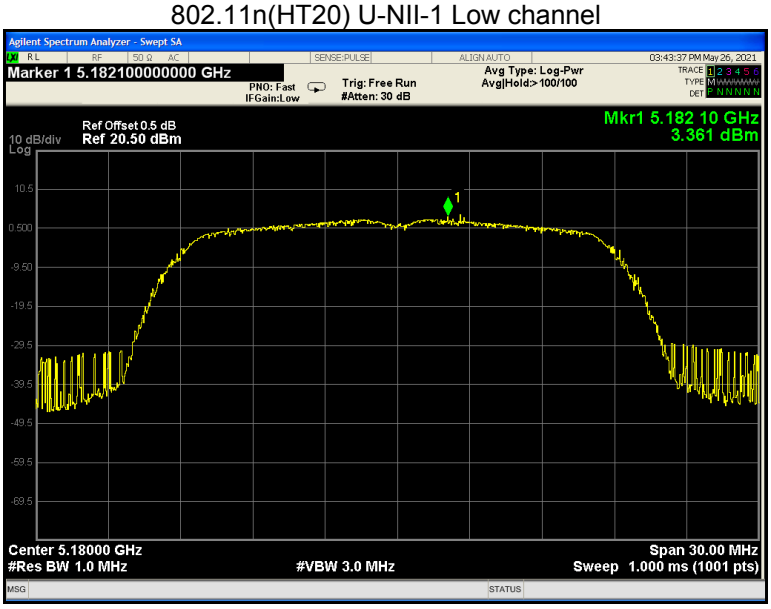
802.11a U-NII-1 Middle channel



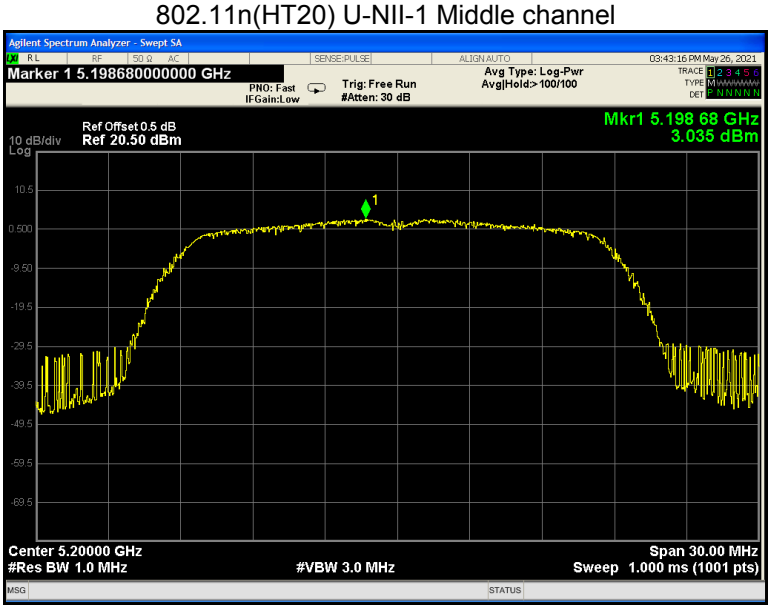
802.11a U-NII-1 High channel



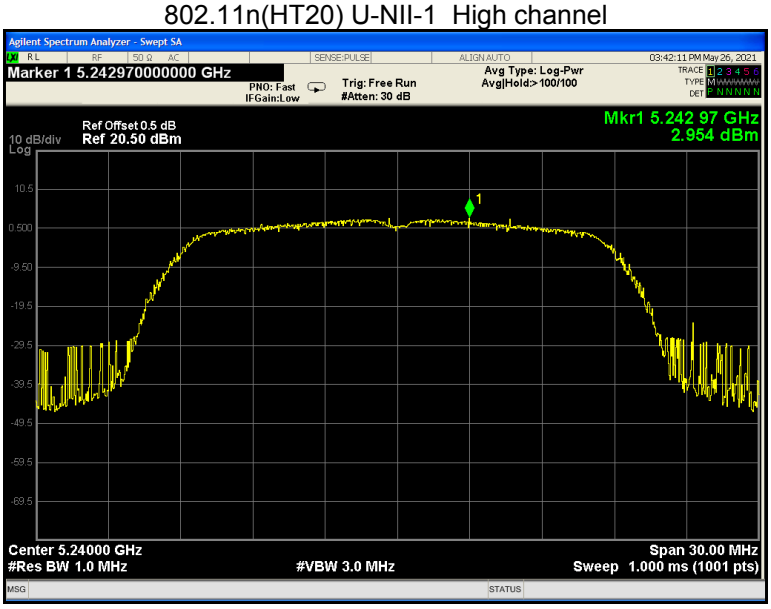
802.11n(HT20) U-NII-1 Low channel



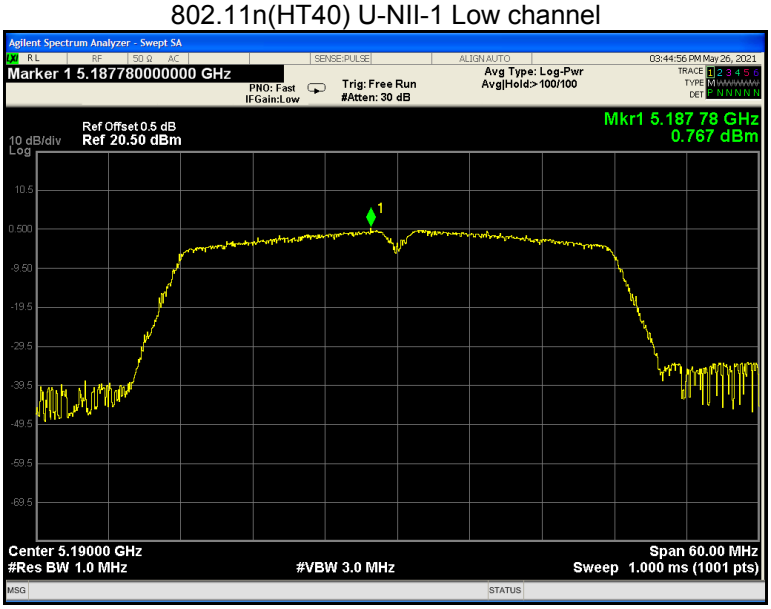
802.11n(HT20) U-NII-1 Middle channel



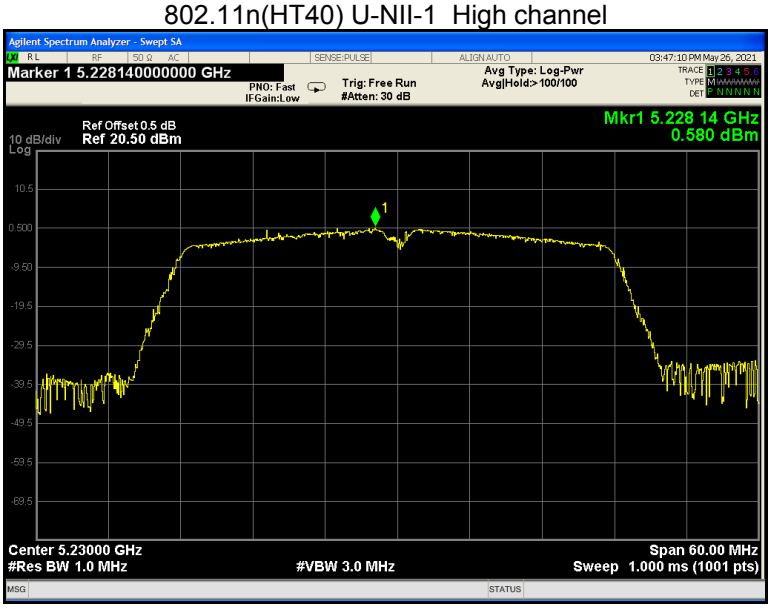
802.11n(HT20) U-NII-1 High channel



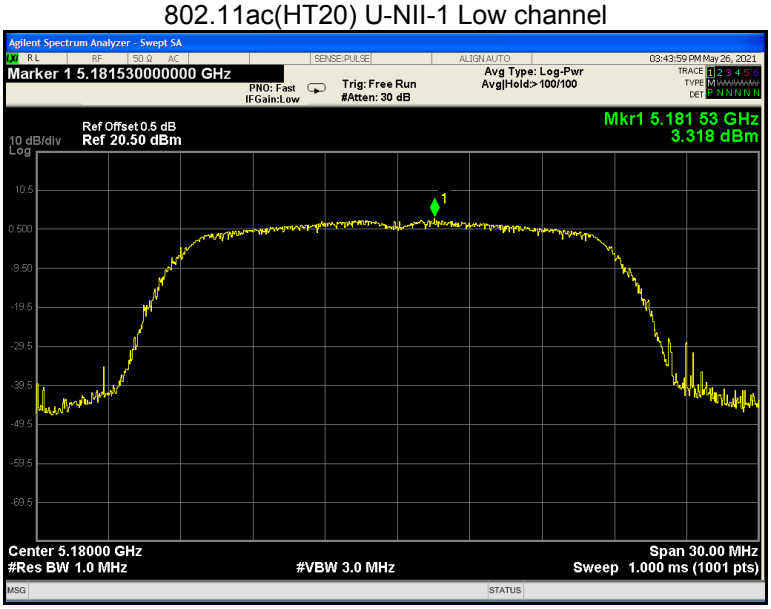
802.11n(HT40) U-NII-1 Low channel



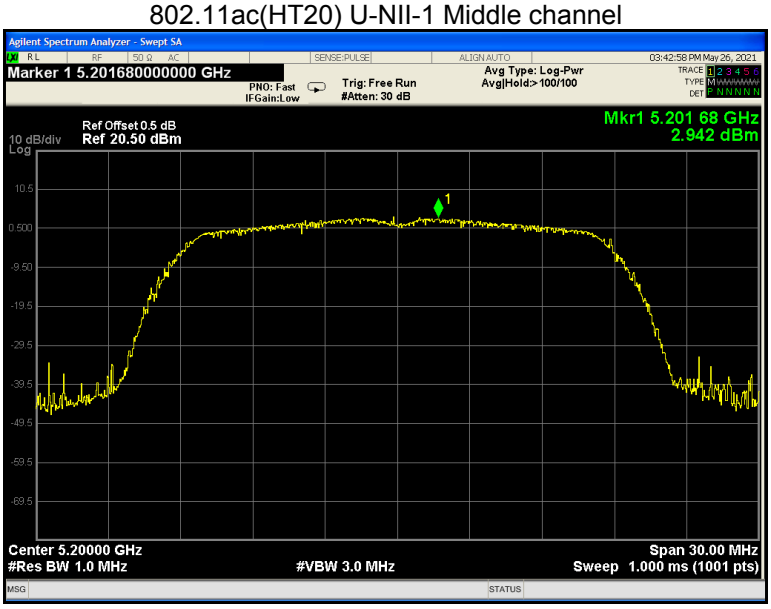
802.11n(HT40) U-NII-1 High channel



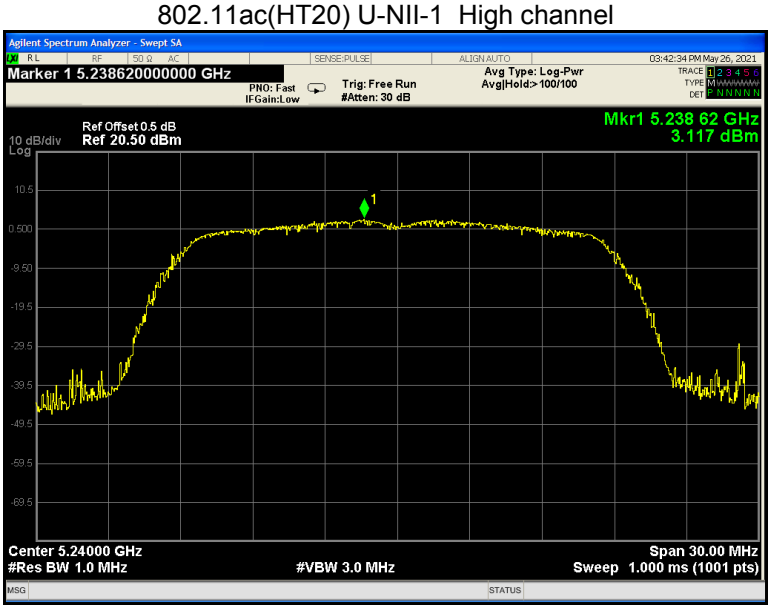
802.11ac(HT20) U-NII-1 Low channel



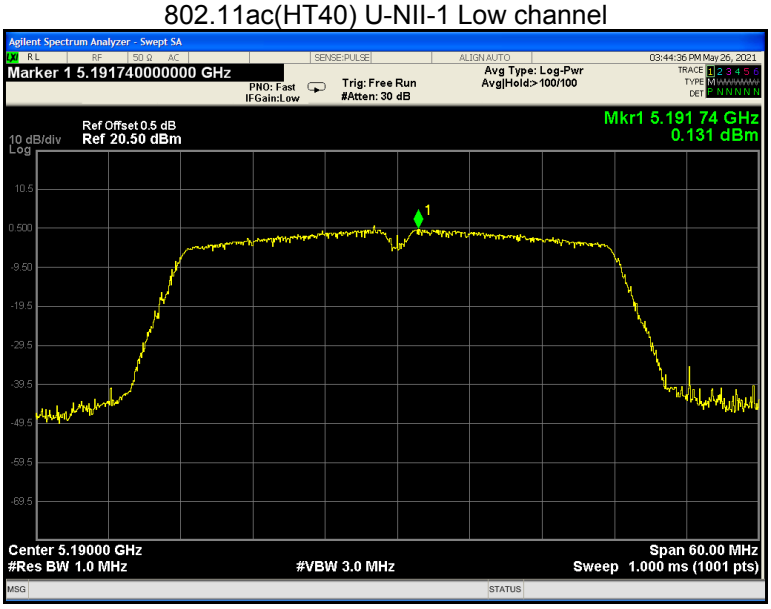
802.11ac(HT20) U-NII-1 Middle channel



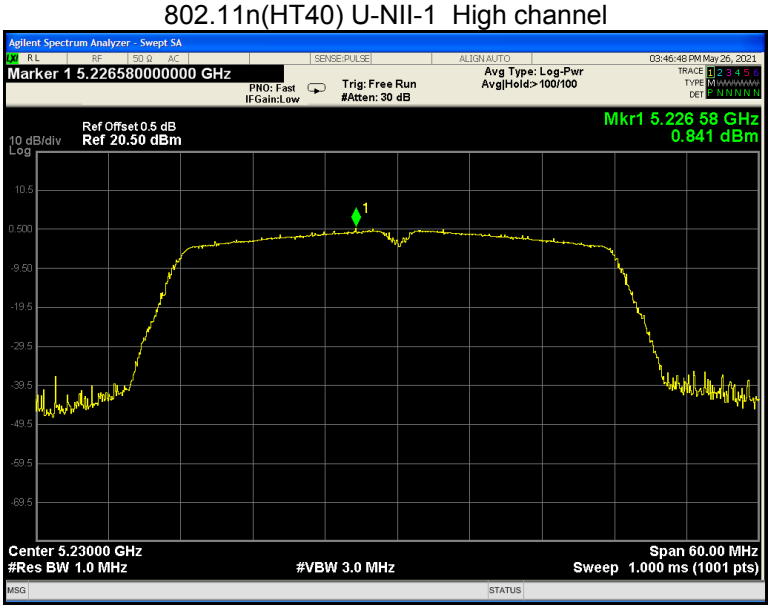
802.11ac(HT20) U-NII-1 High channel



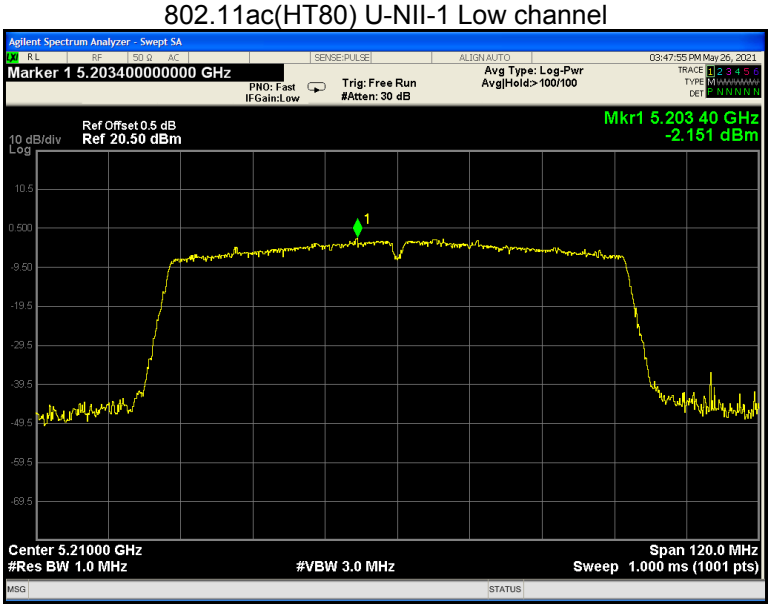
802.11ac(HT40) U-NII-1 Low channel



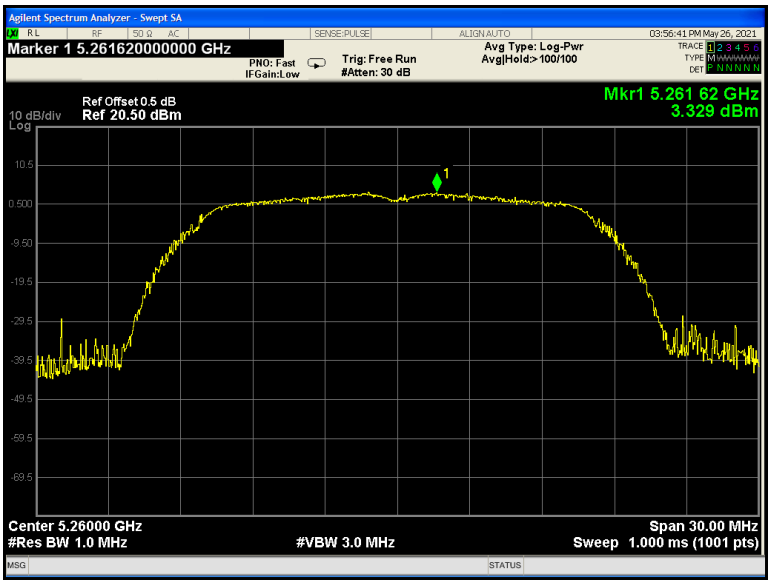
802.11n(HT40) U-NII-1 High channel



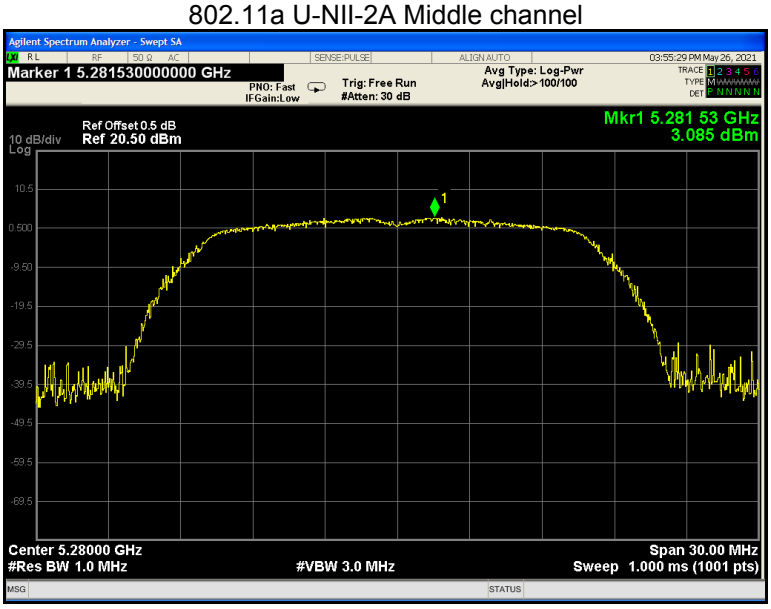
802.11ac(HT80) U-NII-1 Low channel



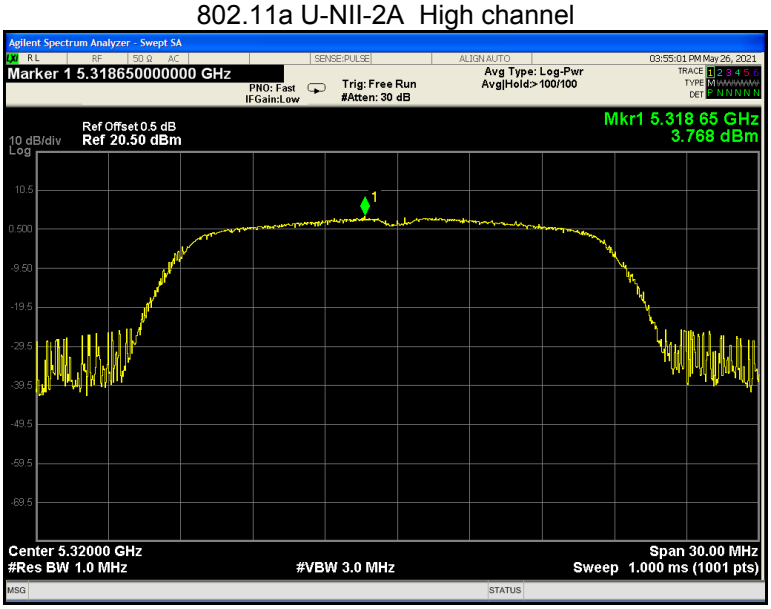
802.11a U-NII-2A Low channel



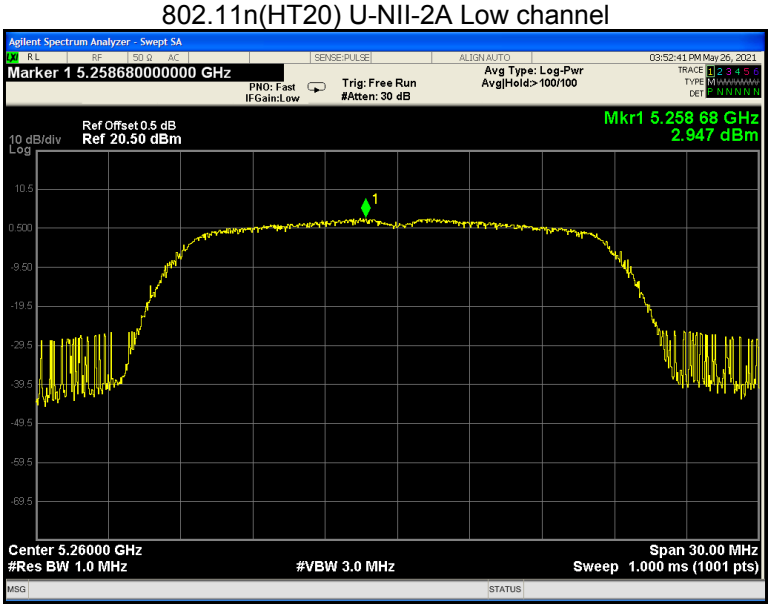
802.11a U-NII-2A Middle channel



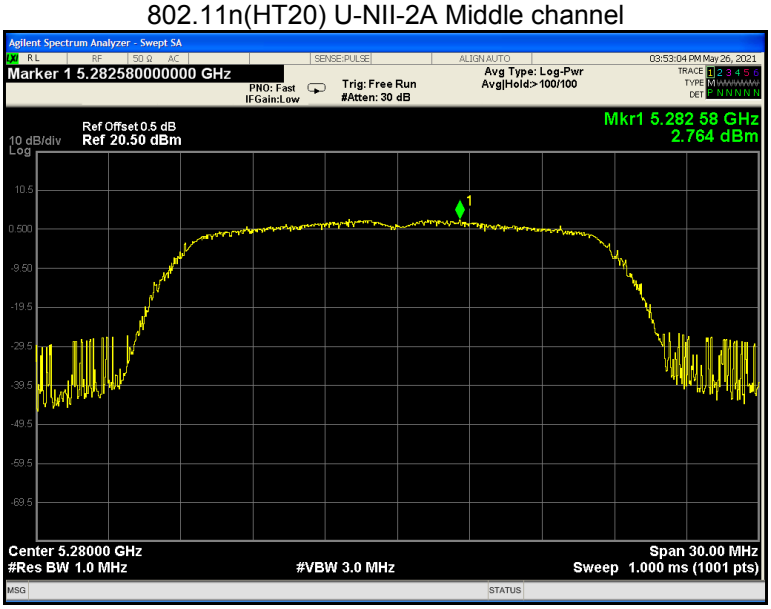
802.11a U-NII-2A High channel



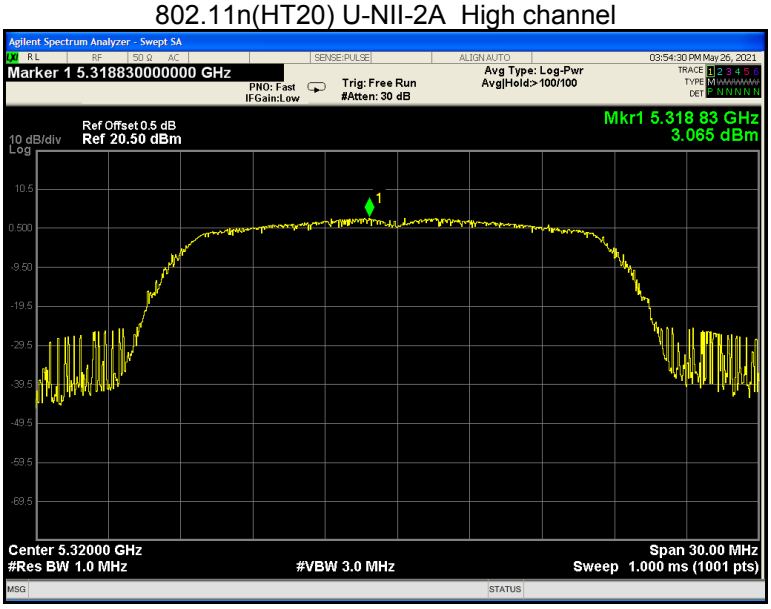
802.11n(HT20) U-NII-2A Low channel



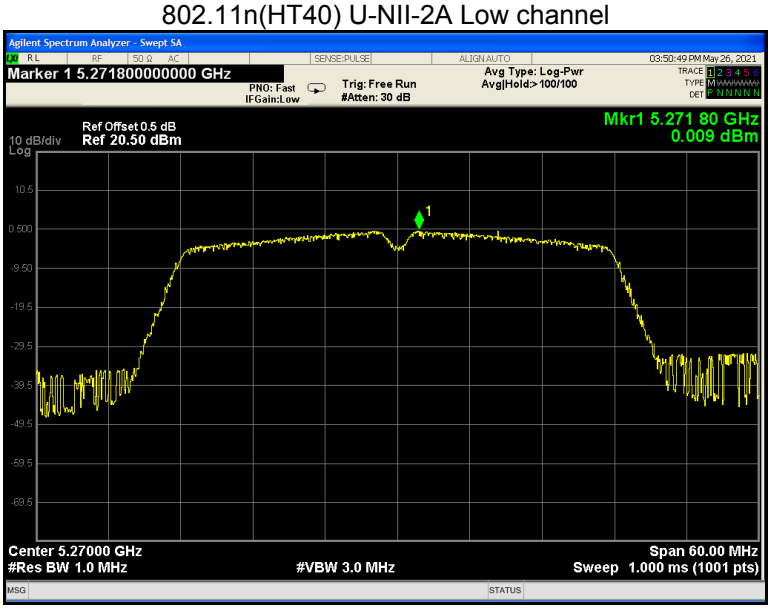
802.11n(HT20) U-NII-2A Middle channel



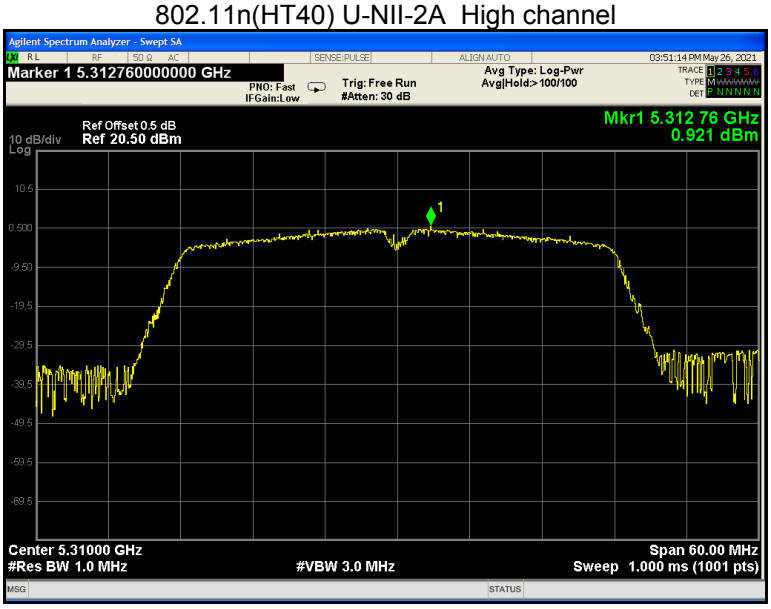
802.11n(HT20) U-NII-2A High channel



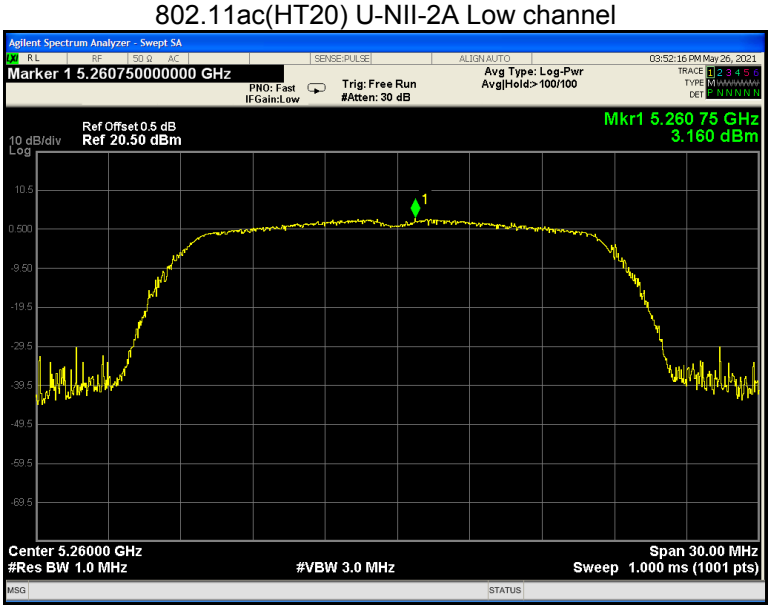
802.11n(HT40) U-NII-2A Low channel



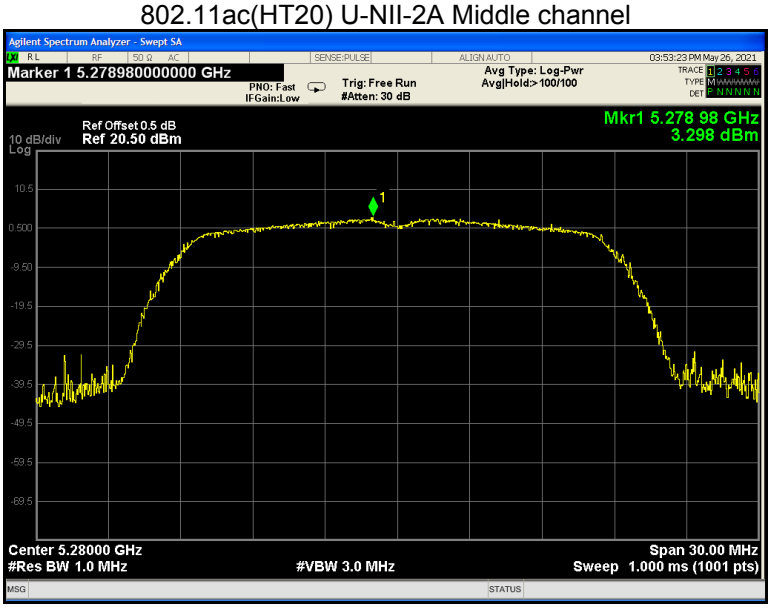
802.11n(HT40) U-NII-2A High channel



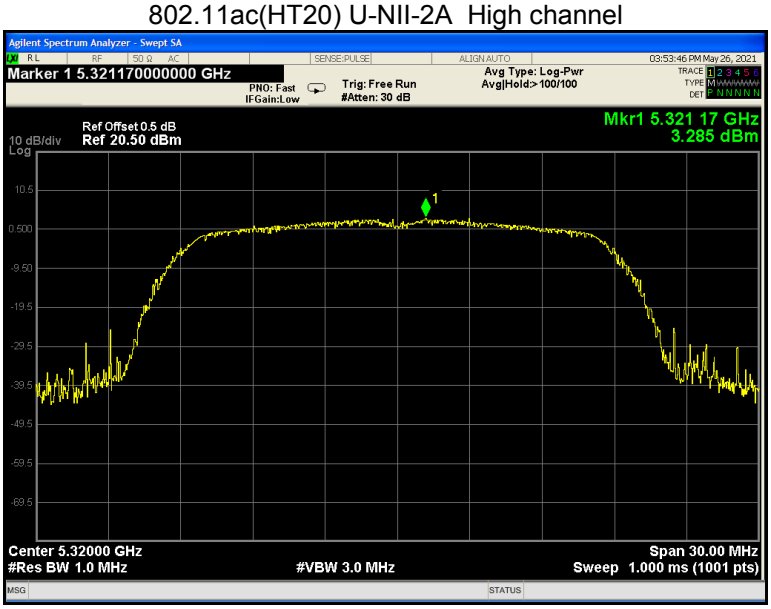
802.11ac(HT20) U-NII-2A Low channel



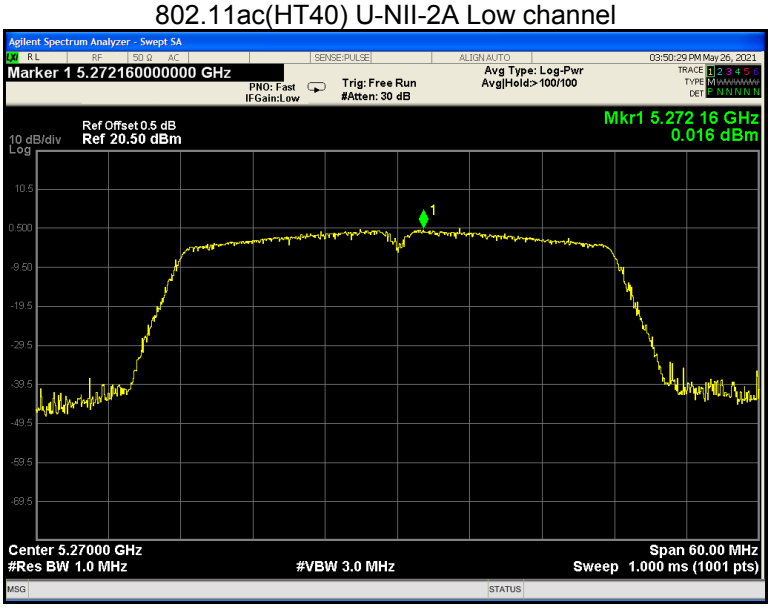
802.11ac(HT20) U-NII-2A Middle channel



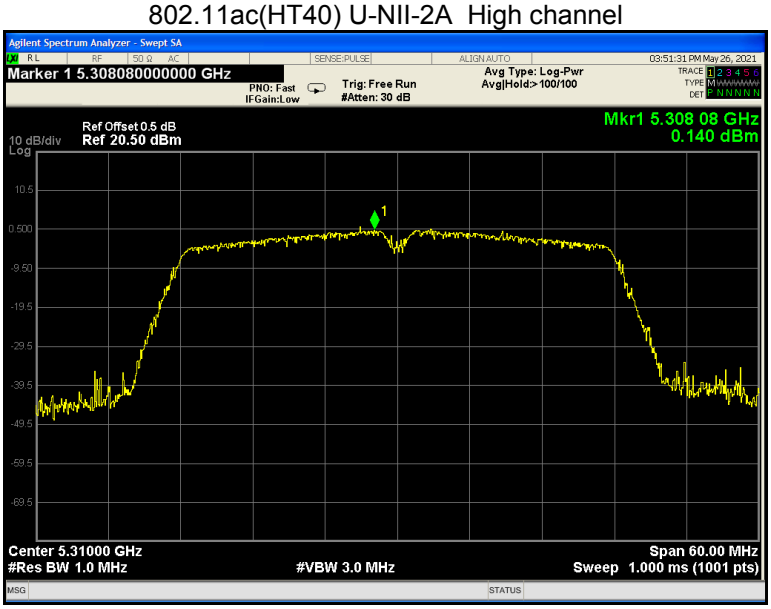
802.11ac(HT20) U-NII-2A High channel



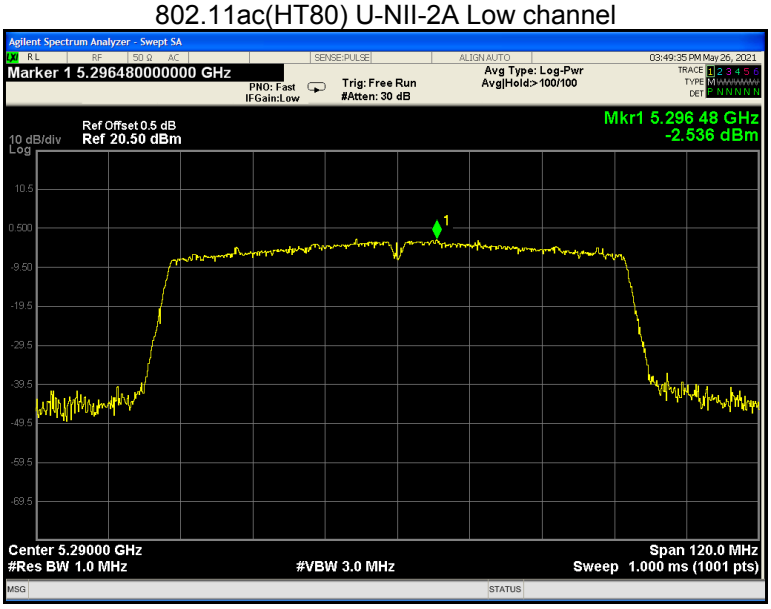
802.11ac(HT40) U-NII-2A Low channel



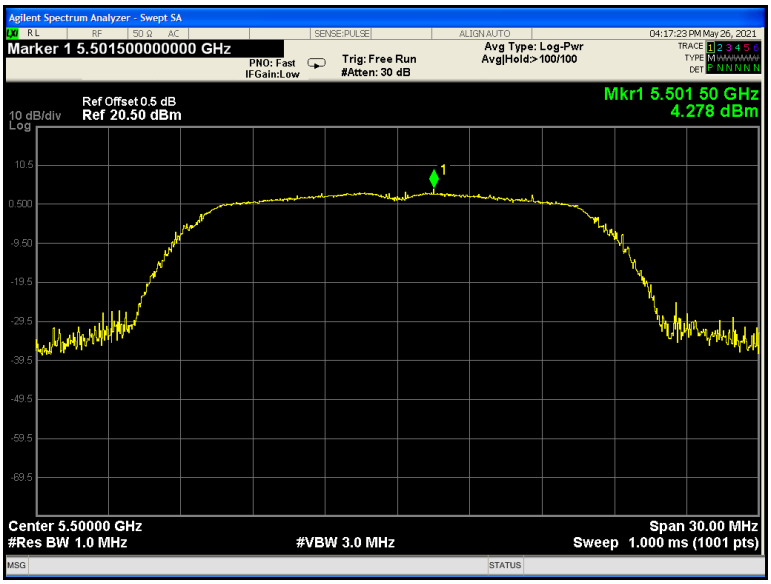
802.11ac(HT40) U-NII-2A High channel



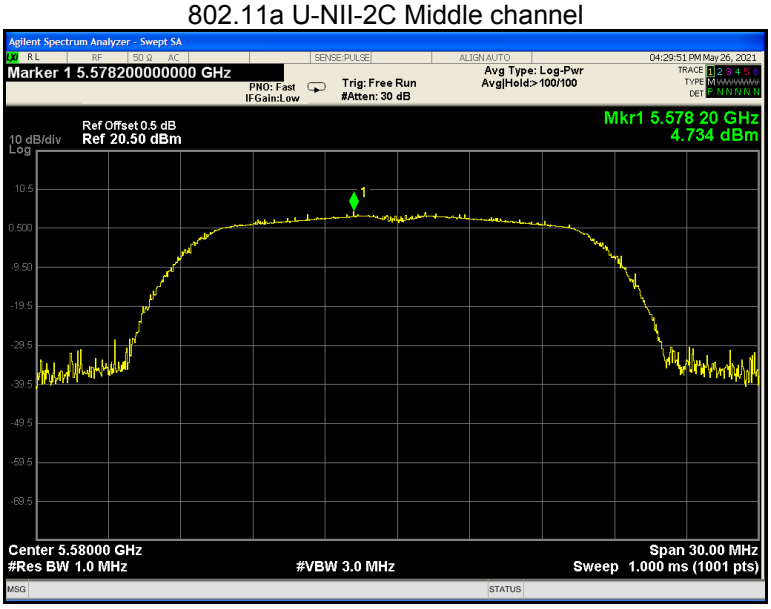
802.11ac(HT80) U-NII-2A Low channel



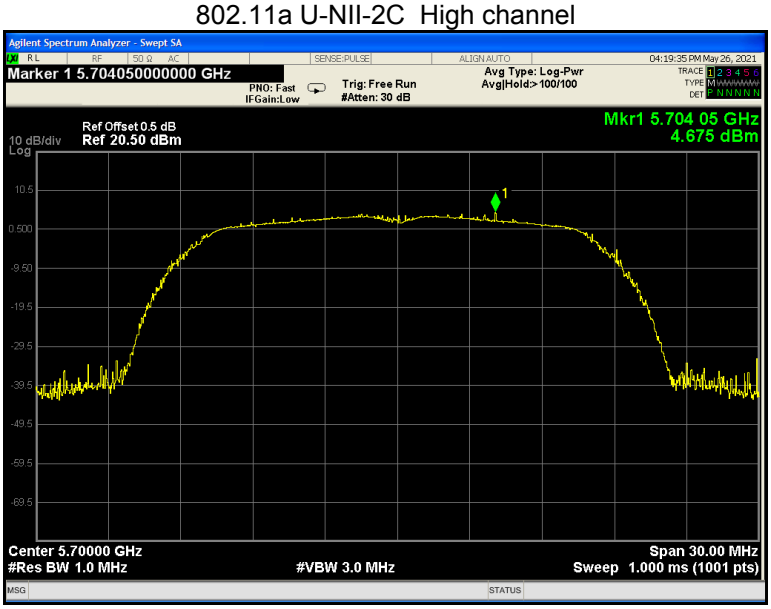
802.11a U-NII-2C Low channel



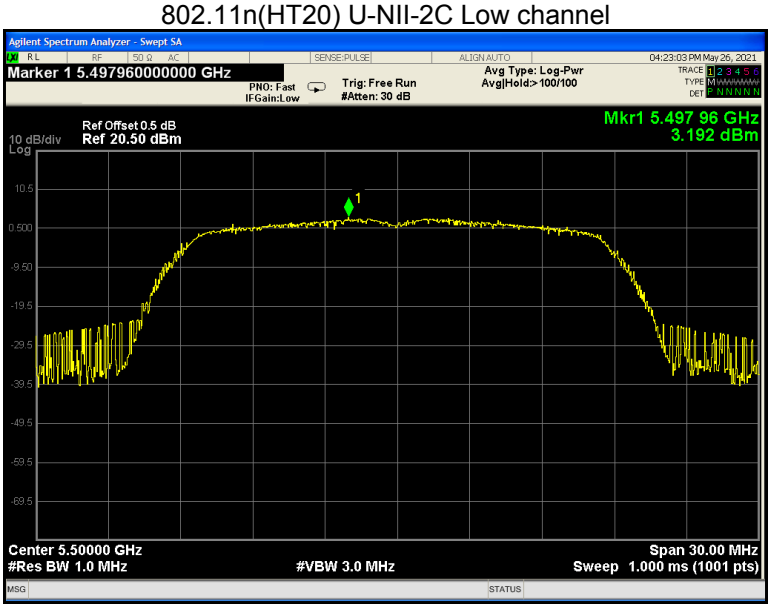
802.11a U-NII-2C Middle channel



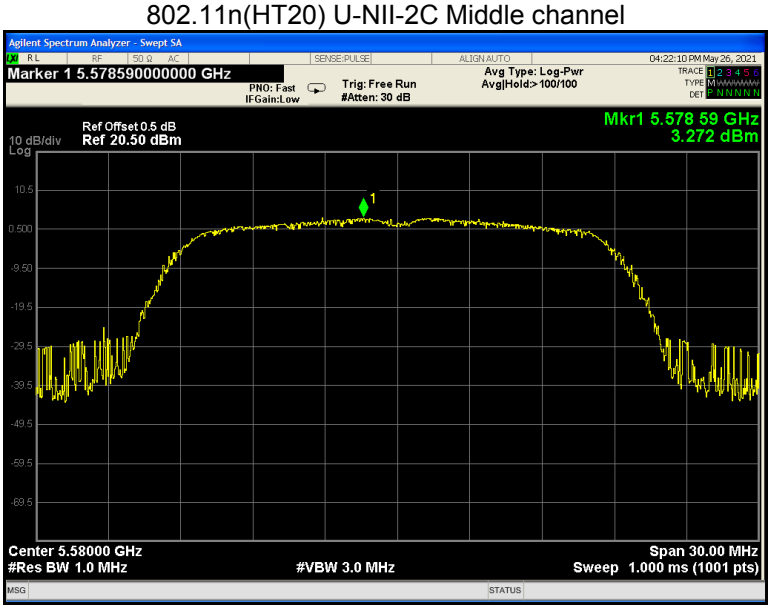
802.11a U-NII-2C High channel



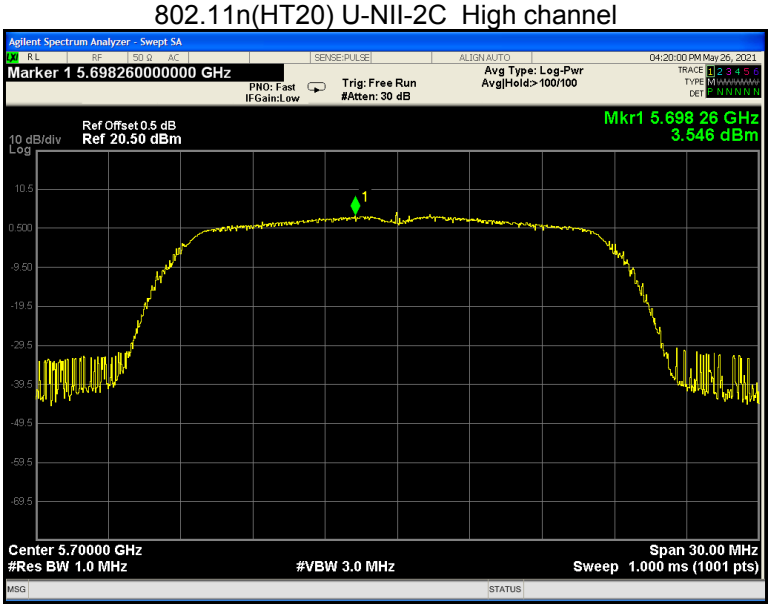
802.11n(HT20) U-NII-2C Low channel



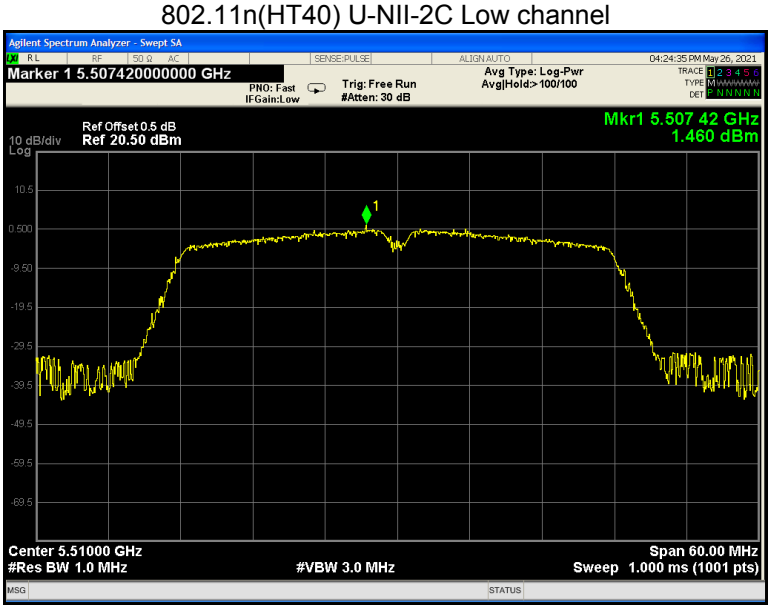
802.11n(HT20) U-NII-2C Middle channel



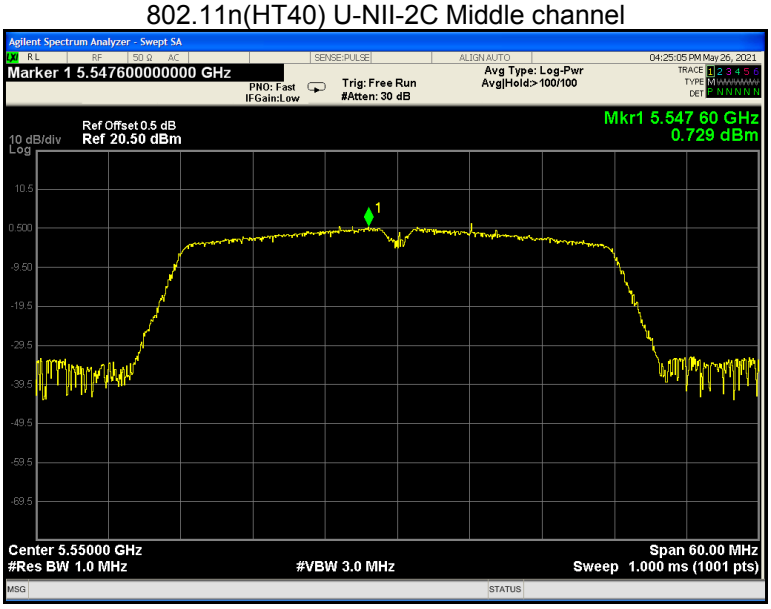
802.11n(HT20) U-NII-2C High channel



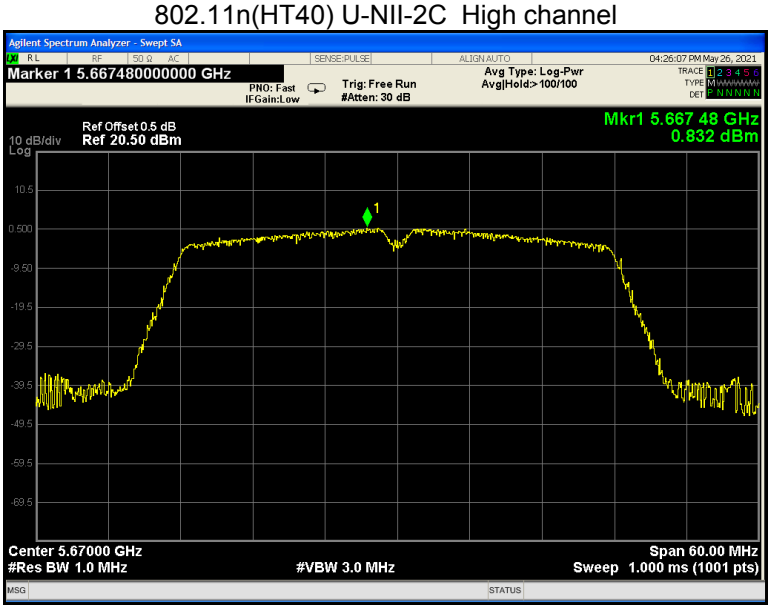
802.11n(HT40) U-NII-2C Low channel



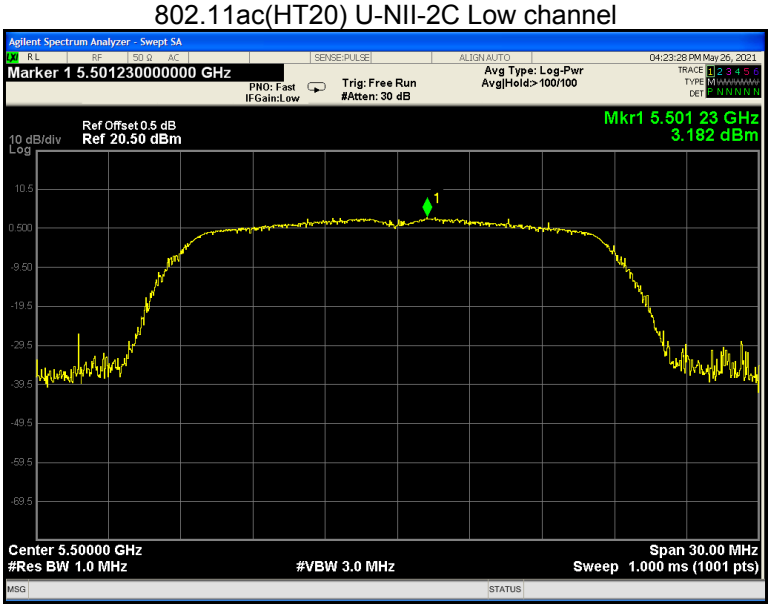
802.11n(HT40) U-NII-2C Middle channel



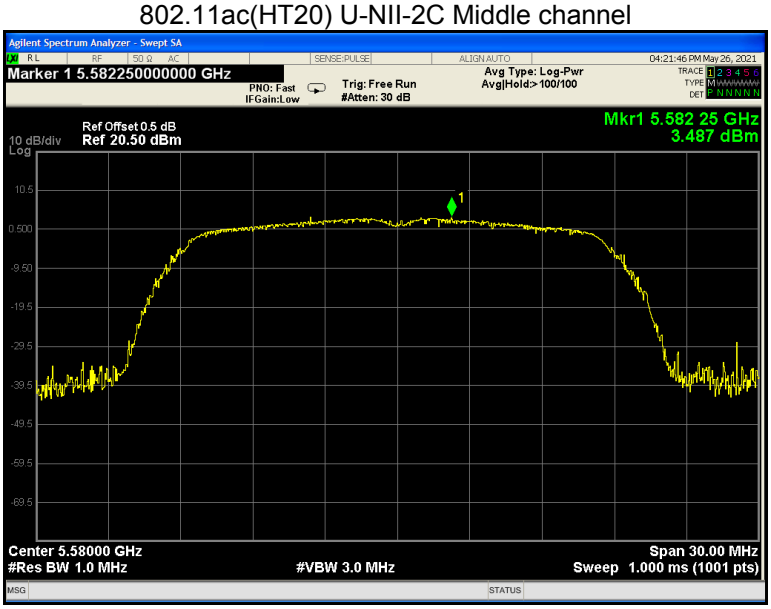
802.11n(HT40) U-NII-2C High channel



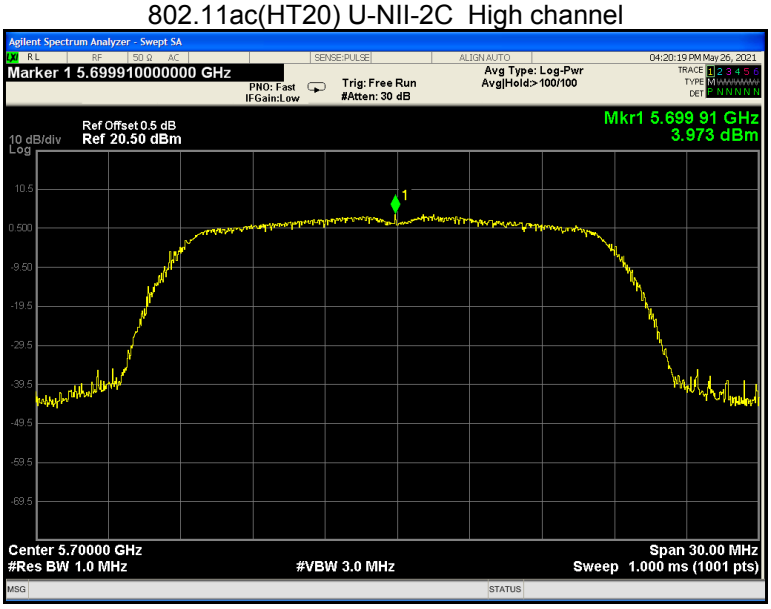
802.11ac(HT20) U-NII-2C Low channel



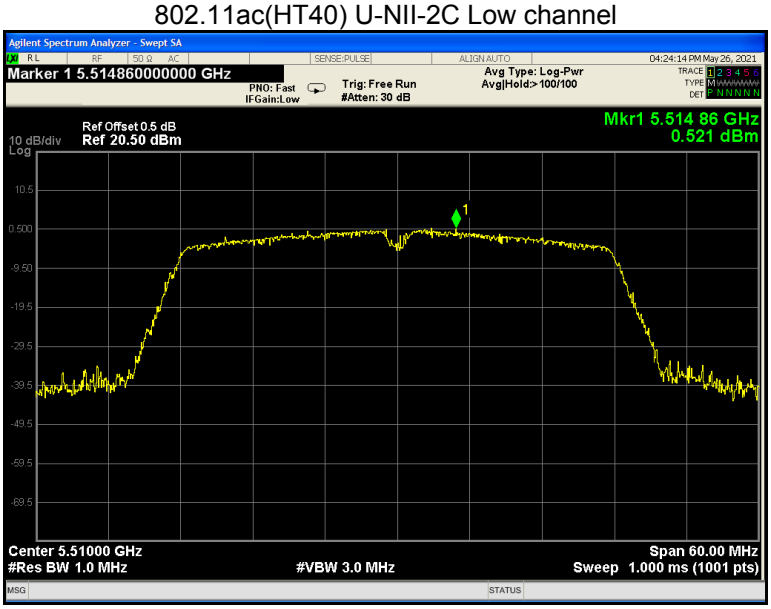
802.11ac(HT20) U-NII-2C Middle channel



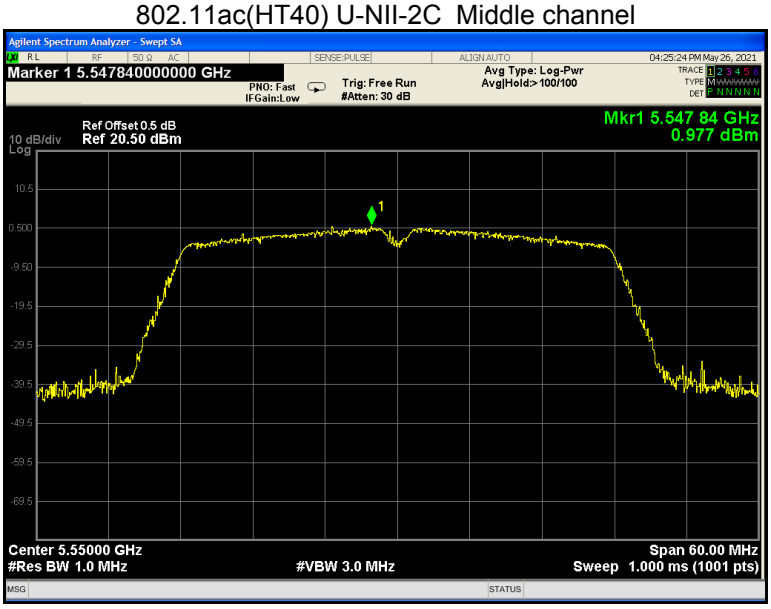
802.11ac(HT20) U-NII-2C High channel



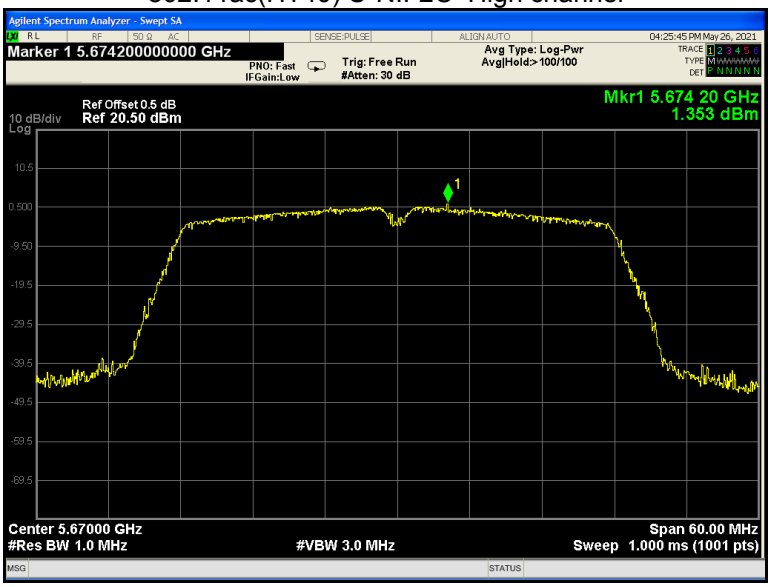
802.11ac(HT40) U-NII-2C Low channel



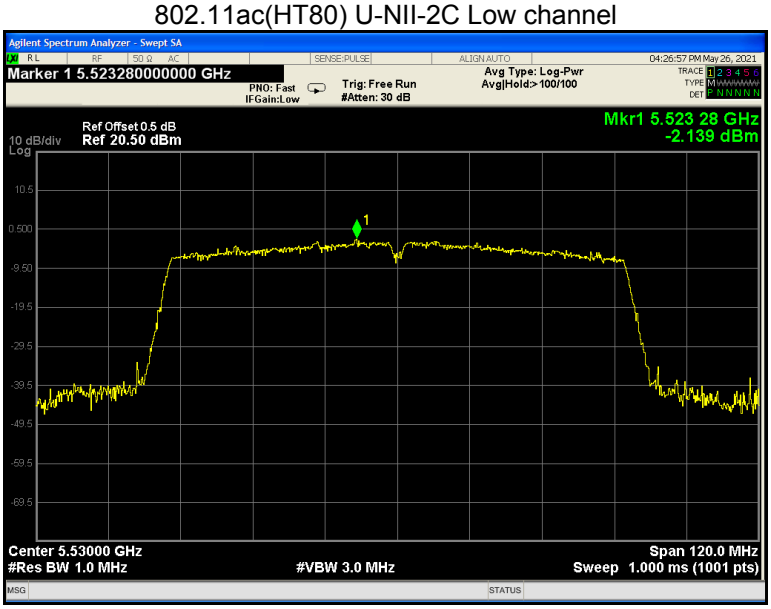
802.11ac(HT40) U-NII-2C Middle channel



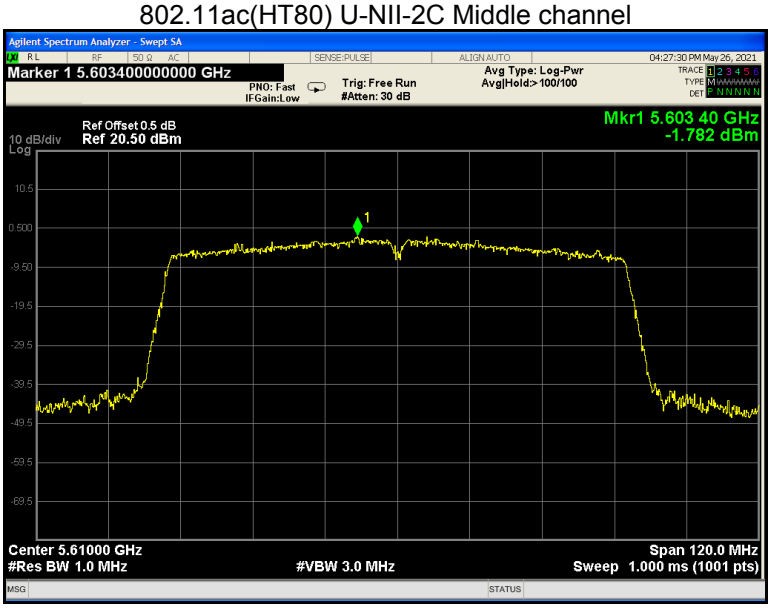
802.11ac(HT40) U-NII-2C High channel



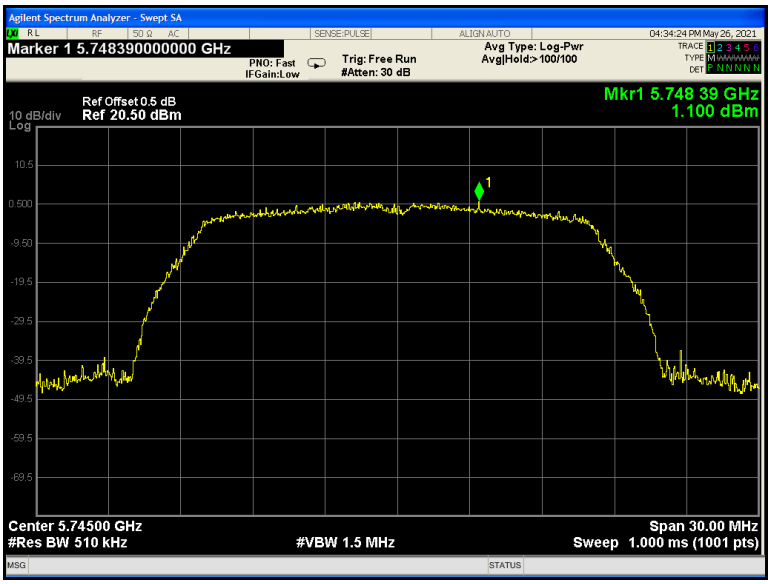
802.11ac(HT80) U-NII-2C Low channel



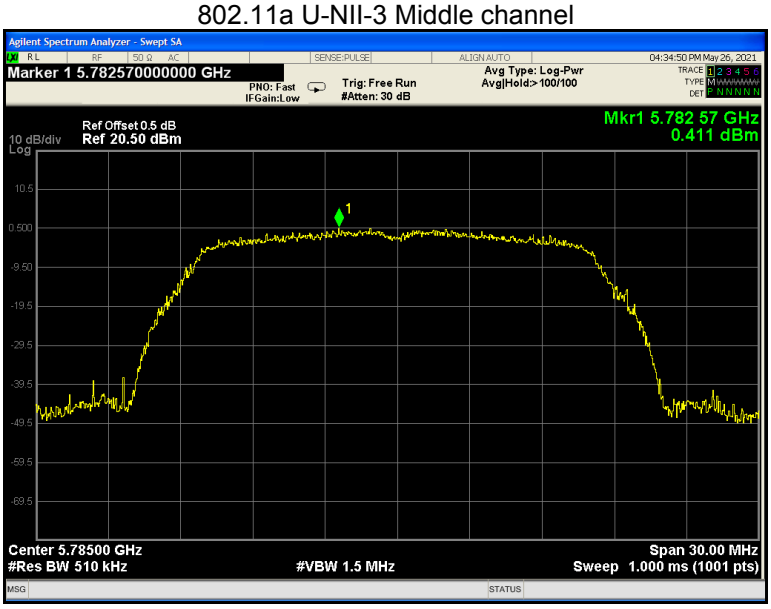
802.11ac(HT80) U-NII-2C Middle channel



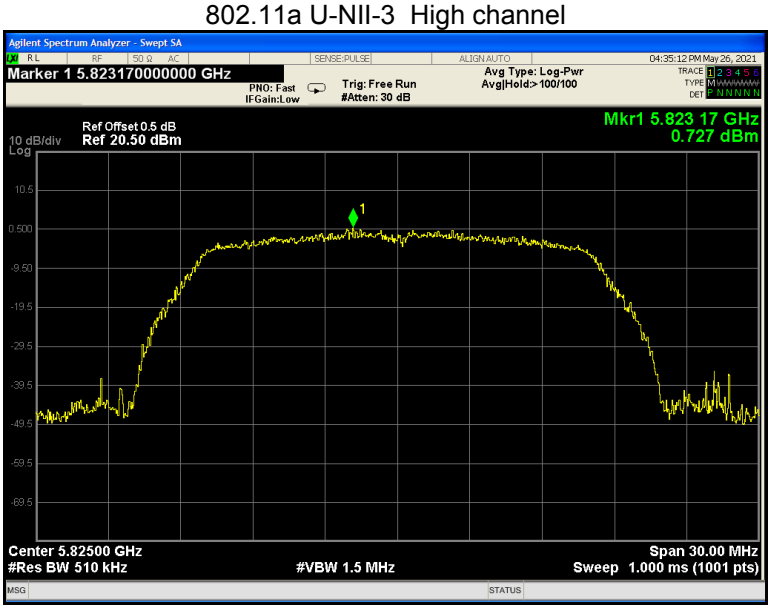
802.11a U-NII-3 Low channel



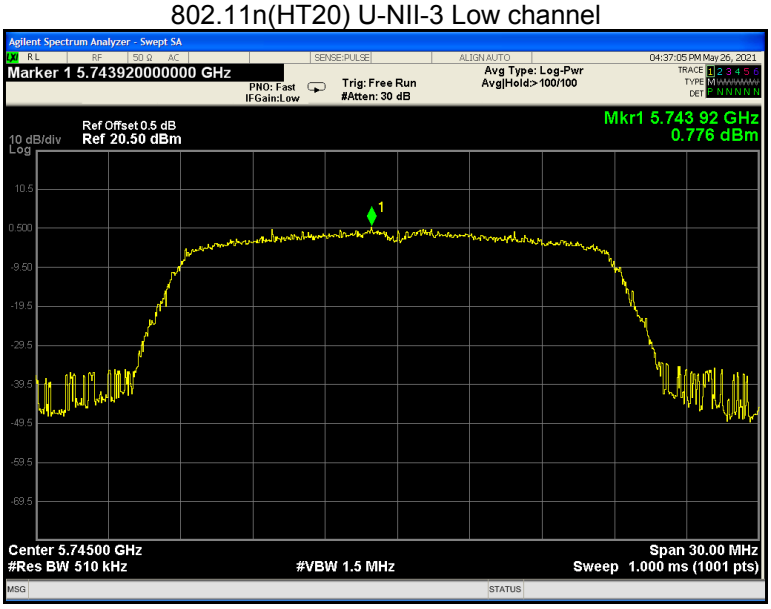
802.11a U-NII-3 Middle channel



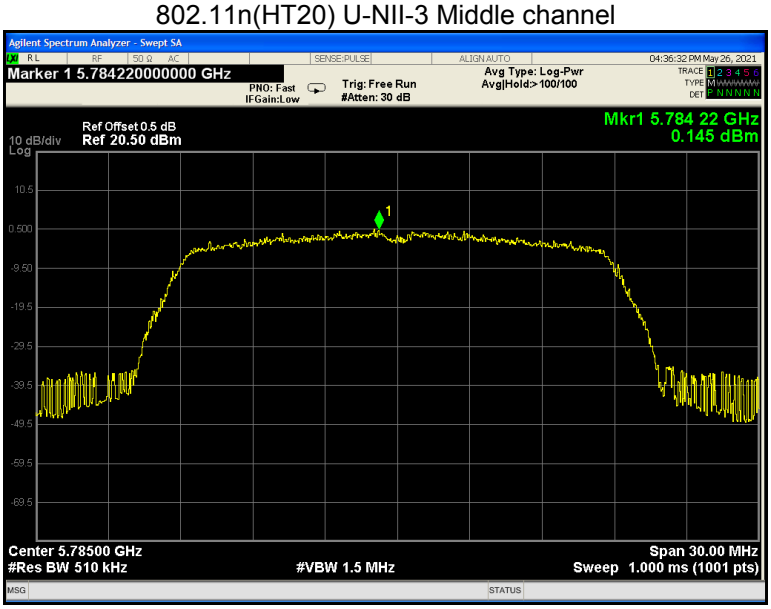
802.11a U-NII-3 High channel



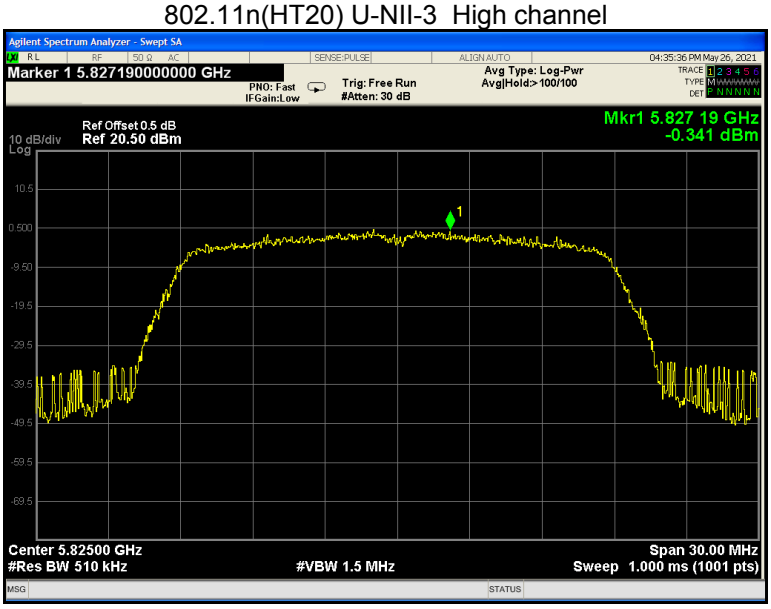
802.11n(HT20) U-NII-3 Low channel



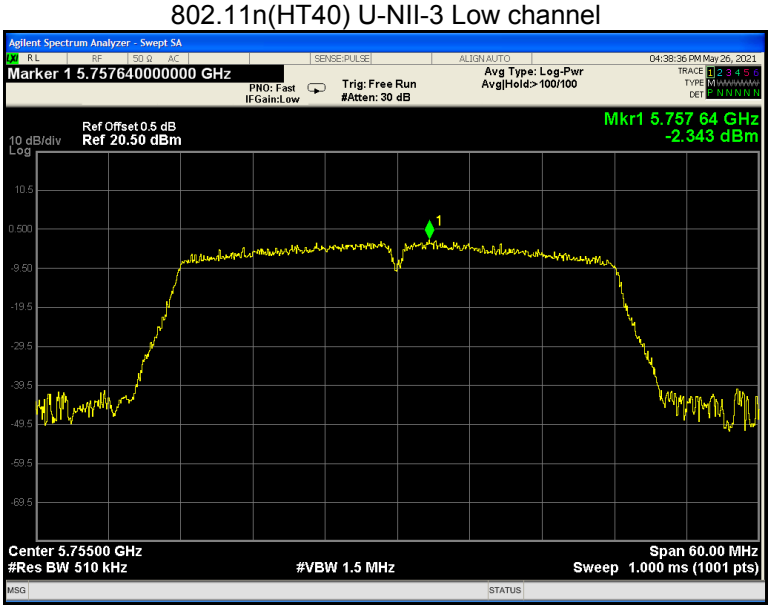
802.11n(HT20) U-NII-3 Middle channel



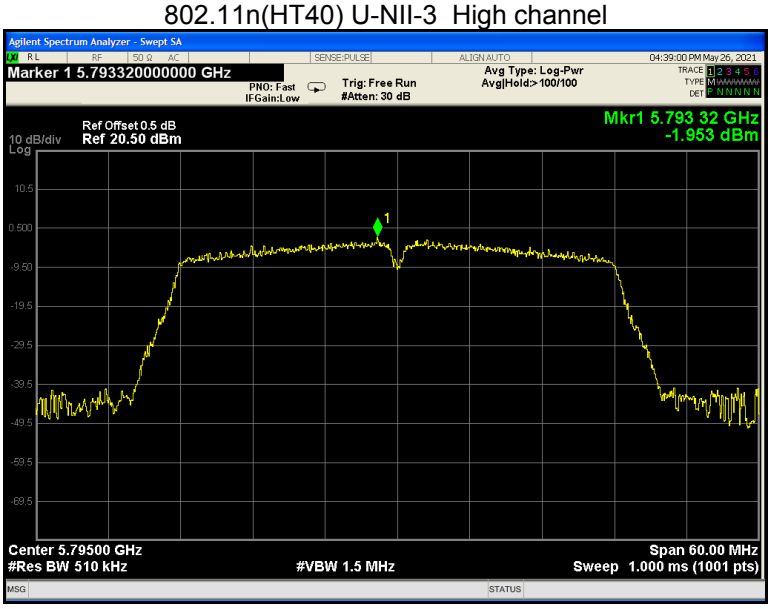
802.11n(HT20) U-NII-3 High channel



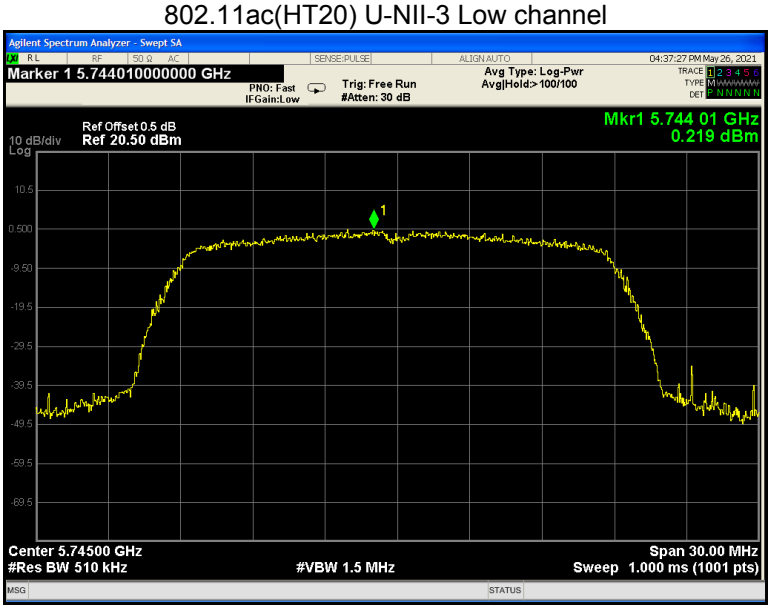
802.11n(HT40) U-NII-3 Low channel



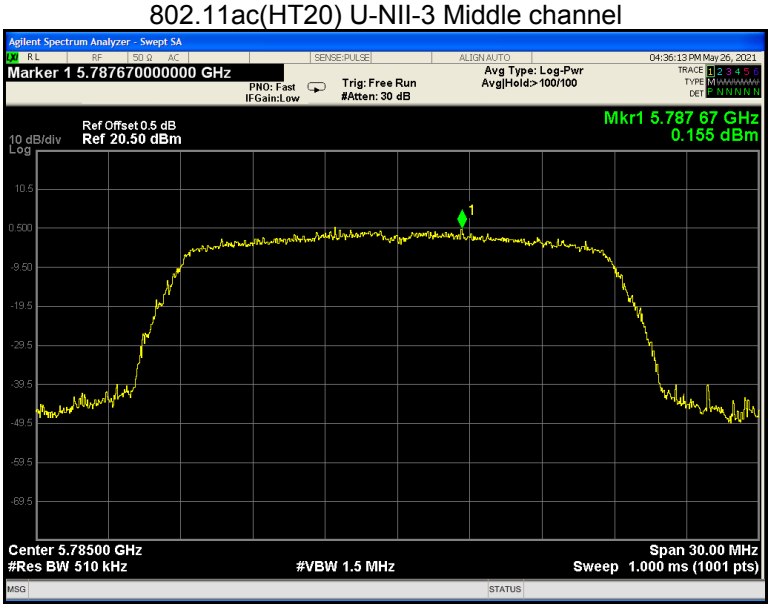
802.11n(HT40) U-NII-3 High channel



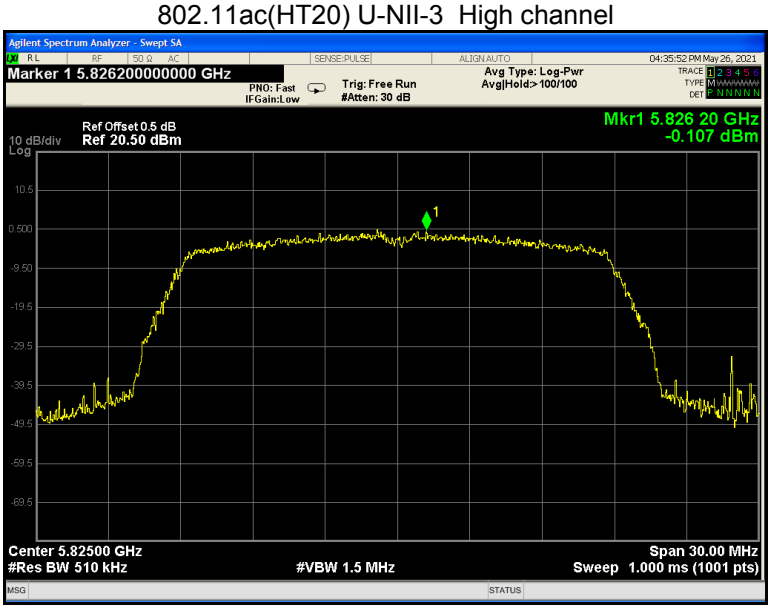
802.11ac(HT20) U-NII-3 Low channel



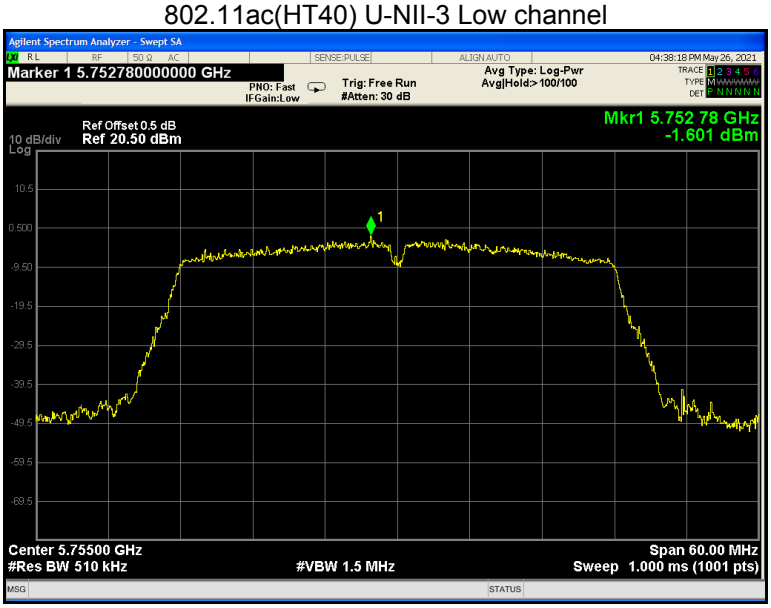
802.11ac(HT20) U-NII-3 Middle channel



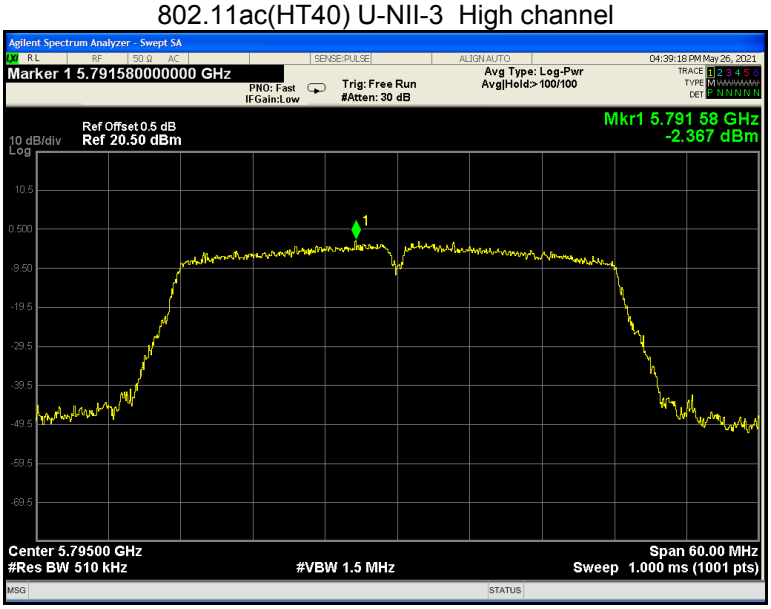
802.11ac(HT20) U-NII-3 High channel



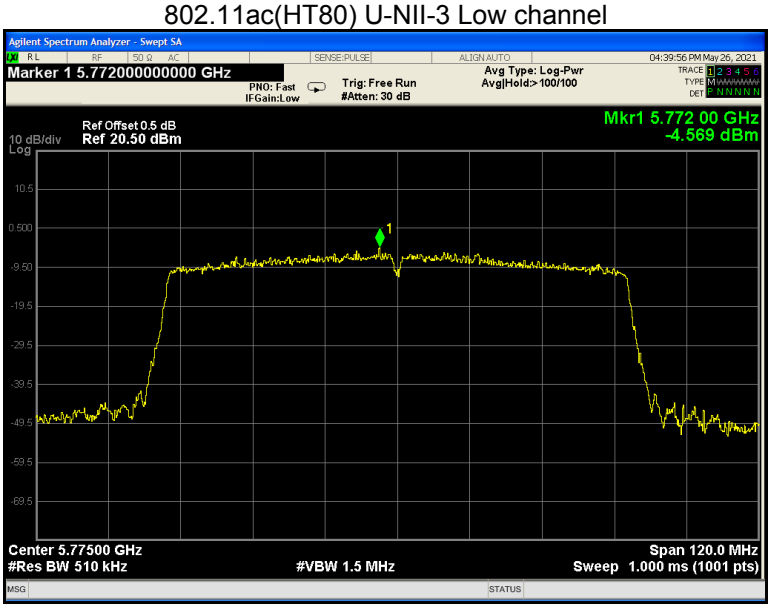
802.11ac(HT40) U-NII-3 Low channel



802.11ac(HT40) U-NII-3 High channel



802.11ac(HT80) U-NII-3 Low channel



15 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

15.1 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 -15°C~ 45°C.

15.2 Test Result:

U-NII-1 Test Frequency:5180MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	120	/	/	/
45		1807	2.1595	20
30		1800	2.1518	20
20		1806	2.1584	20
10		1800	2.1510	20
0		1803	2.1553	20
-10		1800	2.1516	20
-15		1809	2.1625	20
-30		/	/	/
20	108	1810	2.1637	20
20	132	1798	2.1490	20

U-NII-2A Test Frequency:5260MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	120	/	/	/
45		1807	2.1591	20
30		1800	2.1514	20
20		1806	2.1588	20
10		1800	2.1513	20
0		1803	2.1555	20
-10		1800	2.1517	20
-15		1809	2.1628	20
-30		/	/	/
20	108	1810	2.1639	20
20	132	1798	2.1493	20

U-NII-2C Test Frequency:5500MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	120	/	/	/
45		1807	2.1592	20
30		1800	2.1513	20
20		1806	2.1587	20
10		1800	2.1515	20
0		1803	2.1558	20
-10		1800	2.1519	20
-15		1809	2.1624	20
-30		/	/	/
20	108	1810	2.1638	20
20	132	1798	2.1492	20

U-NII-3 Test Frequency:5785MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	120	/	/	/
45		1919	2.2938	20
30		1911	2.2840	20
20		1915	2.2890	20
10		1923	2.2987	20
0		1907	2.2795	20
-10		1908	2.2806	20
-15		1914	2.2878	20
-30		/	/	/
20	108	1918	2.2925	20
20	132	1906	2.2783	20

16 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.

17 RF Exposure

Remark: refer to MPE test report: WTD21D04040628W001.

18 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-Black G-Photos.

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