

TEST REPORT

Reference No. : WTF21D01002802W002 V1
FCC ID..... : 2AYSN-DB21
Applicant..... : Duckieworks Ltd.
Address : Turnerstrasse 39 8006, Zurich, Switzerland
Manufacturer : The same as above
Address : The same as above
Product Name : Duckiebot Founder edition
Model No. : DB21, DB21-M, DB21-MNoJet,DB21-M-NoBat, DB21-M-NoJetNoBat
Brand..... : N/A
Standards..... : FCC CFR47 Part 15 E Section 15.407: 2018
Date of Receipt sample..... : 2021-01-15
Date of Test..... : 2021-01-18 to 2021-01-27
Date of Issue : 2021-03-08
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.
The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTF21D01002 802W002	2021-01-15	2021-01-18 to 2021-01-27	2021-01-28	original	-	Replaced
WTF21D01002 802W002 V1	2021-01-15	2021-01-18 to 2021-01-27	2021-03-08	Version 1	Updated	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Duckiebot Founder edition
Model(s):	DB21, DB21-M, DB21-MNoJet,DB21-M-NoBat, DB21-M-NoJetNoBat
Model Description:	Only different for the model names. DB21 as the main test model
Wi-Fi Specification:	2.4G-802.11b/g/n HT20/n HT40 5G-802.11a/ n(HT20/40)/ac(HT20/40/80)
Hardware Version:	A
Software Version:	V1.0
Highest frequency (Exclude Radio):	40MHz
Storage Location:	Internal Storage
Note:	N/A

4.2 Details of E.U.T.

Operation Frequency:	802.11a/ n(HT20/40)/ac(HT20/40/80): 5150MHz to 5250MHz 802.11a/ n(HT20/40)/ac(HT20/40/80): 5725MHz to 5850MHz
Max. RF output power:	U-NII-1: 12.21dBm U-NII-3: 8.81dBm
Type of Modulation:	OFDM
Antenna installation:	internal permanent antenna
Antenna Gain:	U-NII-1: 2.0dBi U-NII-3: 2.0dBi
Ratings:	DC 5V from battery

4.3 Channel List

U-NII-1 (5.15-5.25GHz)		U-NII-3 (5.725-5.85GHz)	
channel	Frequency(MHz)	channel	Frequency(MHz)
36	5180	149	5745
38	5190	151	5755
40	5200	153	5765
42	5210	155	5775
44	5220	157	5785
46	5230	159	5795
48	5240	161	5805
		165	5825

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11a/n(HT20)/ac(HT20):

channel	Frequency(MHz)	channel	Frequency(MHz)
36	5180	149	5745
40	5200	157	5785
48	5240	165	5825

For 802.11 n(HT40)/ac(HT40):

channel	Frequency(MHz)	channel	Frequency(MHz)
38	5190	151	5755
46	5230	159	5795

For 802.11 ac(HT80):

channel	Frequency(MHz)	channel	Frequency(MHz)
42	5210	155	5775

4.4 Test Mode Description:

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Transmitting duty cycle is no less 98%.

The software is installed in operation system, named "RFTestTool.apk", Version 1, date 20160518.

Test Items	Mode	Data Rate	Channel	TX/RX
Radiated Emissions	802.11a	6 Mbps	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11ac(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT80)	MCS0	U-NII-1 42 U-NII-3 155	TX
Duty Cycle	802.11a	6 Mbps	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11ac(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT80)	MCS0	U-NII-1 42 U-NII-3 155	TX
Band Edge	802.11a	6 Mbps	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11ac(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT80)	MCS0	U-NII-1 42 U-NII-3 155	TX

6dB Bandwidth	802.11a	6 Mbps	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11ac(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT80)	MCS0	U-NII-1 42 U-NII-3 155	TX
26dB Bandwidth and 99% Occupied Bandwidth	802.11a	6 Mbps	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11ac(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT80)	MCS0	U-NII-1 42 U-NII-3 155	TX
Conducted Output Power	802.11a	6 Mbps	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11ac(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT80)	MCS0	U-NII-1 42 U-NII-3 155	TX
Power Spectral Density	802.11a	6 Mbps	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX
	802.11n(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT20)	MCS0	U-NII-1 36/40/48 U-NII-3 149/155/165	TX

	802.11ac(HT40)	MCS0	U-NII-1 38/46 U-NII-3 151/159	TX
	802.11ac(HT80)	MCS0	U-NII-1 42 U-NII-3 155	TX
Frequency Stability	Un-modulation	/	U-NII-1 36/40/48 U-NII-3 149/155/165	TX

4.5 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	2020-07-30	2021-07-29
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2020-07-30	2021-07-29
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2020-07-30	2021-07-29
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2020-07-30	2021-07-29
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2020-07-30	2021-07-29
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2020-07-30	2021-07-29
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2020-07-30	2021-07-29
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	2020-07-30	2021-07-29
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2020-07-30	2021-07-29
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2020-07-30	2021-07-29
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	2020-07-30	2021-07-29
4	Cable	HUBER+SUHNER	CBL2	525178	2020-07-30	2021-07-29
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2020-07-30	2021-07-29
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2020-07-30	2021-07-29
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2020-07-30	2021-07-29

5.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

5.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207(a)	N/A
Radiated Emissions	15.407(a) 15.205(a) 15.209(a)	PASS
Duty Cycle	KDB 789033	--
6dB Bandwidth	15.407(a)	PASS
26 dB Emission Bandwidth & 99% Occupied Bandwidth	15.407(a)	PASS
Maximum Conducted Output Power	15.407(a)	PASS
Power Spectral Density	15.407(a)	PASS
Restricted bands around fundamental frequency	15.407(a)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.407

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Distance	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

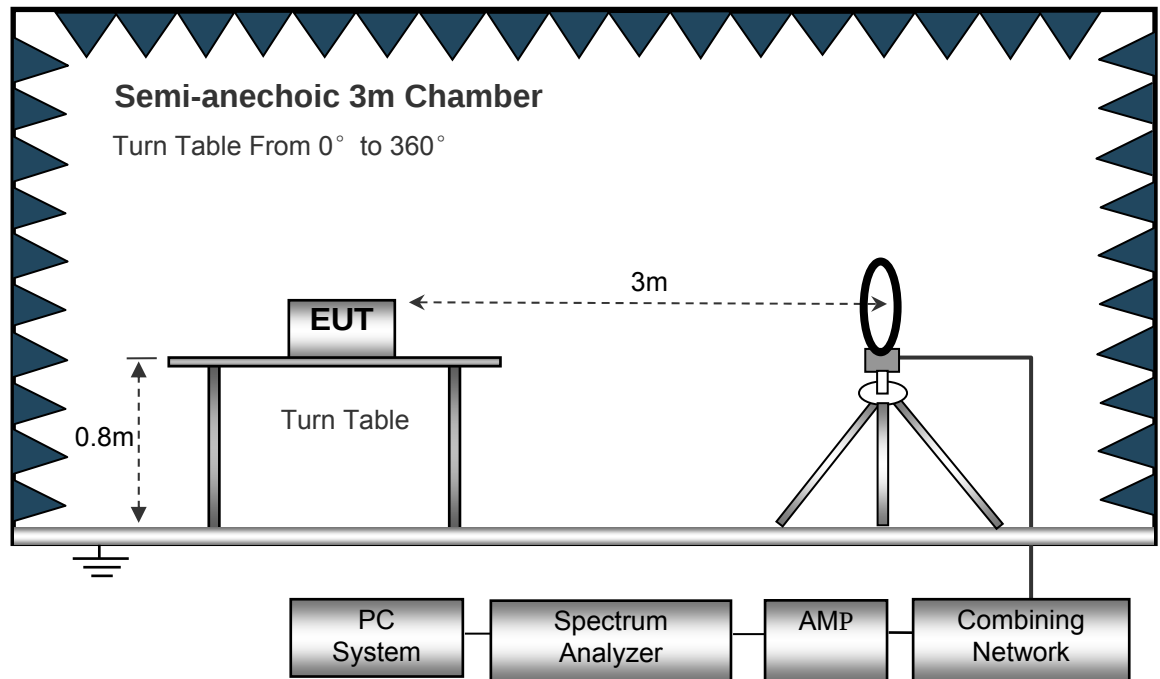
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

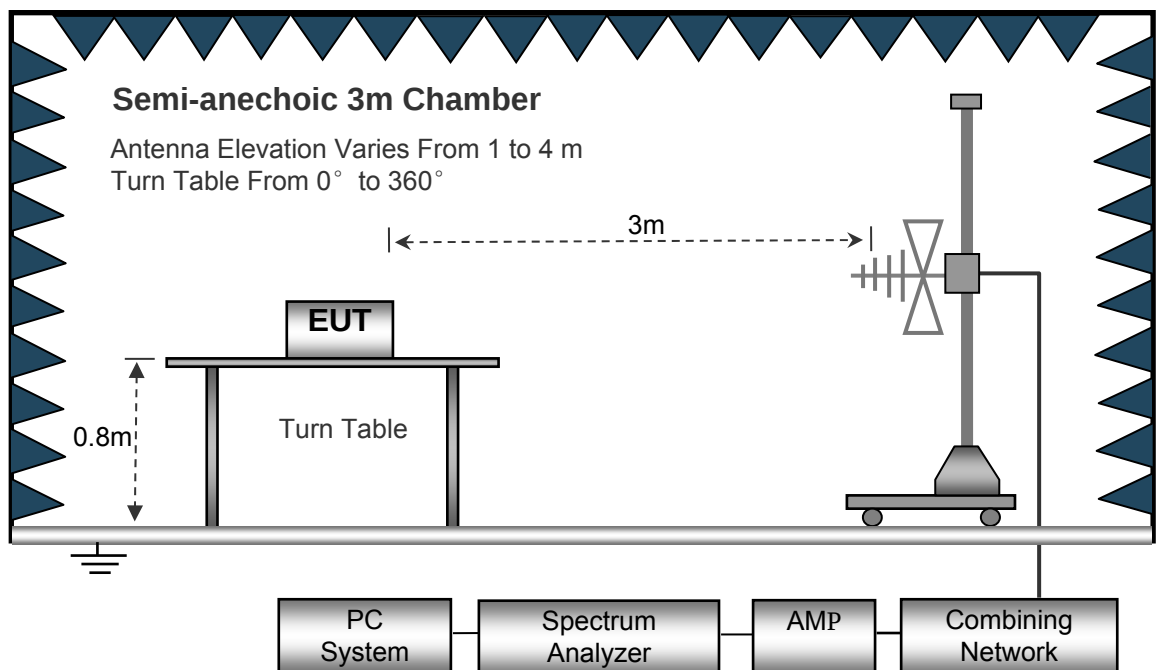
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2013.

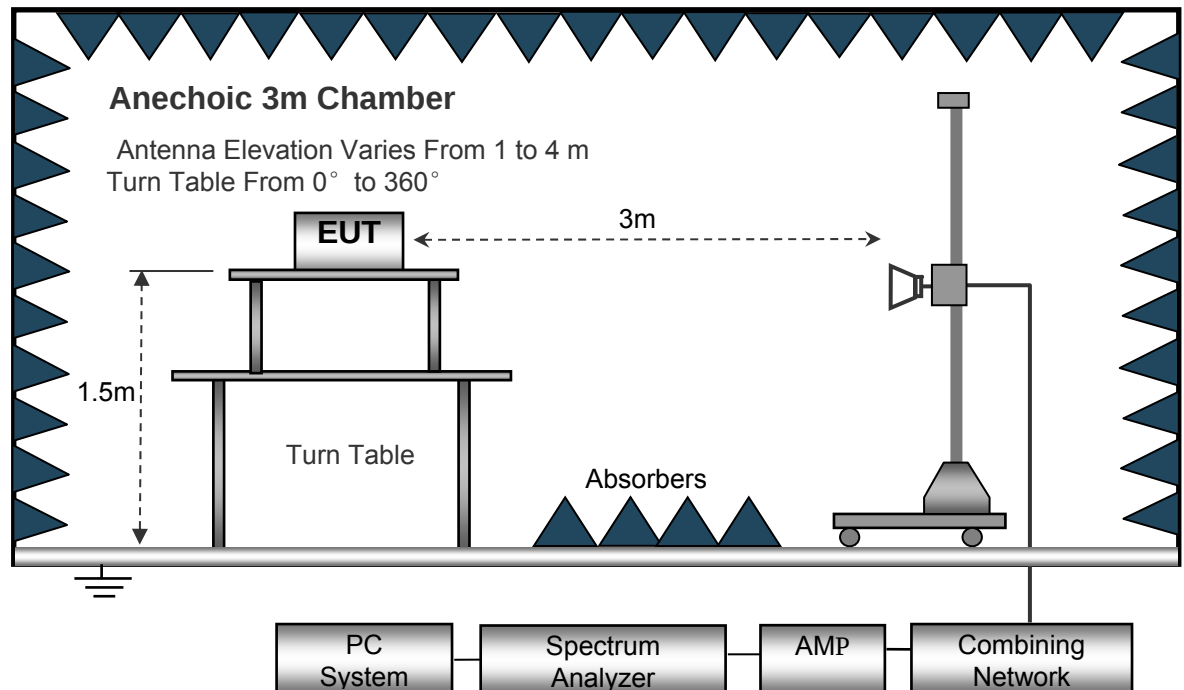
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
 IF Bandwidth.....10kHz
 Video Bandwidth.....10kHz
 Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep Speed Auto
 DetectorPK
 Resolution Bandwidth.....100kHz
 Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed Auto
 DetectorPK
 Resolution Bandwidth.....1MHz
 Video Bandwidth.....3MHz
 DetectorAve.
 Resolution Bandwidth.....1MHz
 Video Bandwidth.....10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high -pass filter is used during radiated emissions above 1GHz measurement.

7.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.6 Summary of Test Results

Test Frequency: 9KHz~30MHz

Remark: The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-1 Low Channel 5180MHz									
223.45	39.99	QP	242	1.2	H	-11.62	28.37	46.00	-17.63
223.45	35.21	QP	57	1.3	V	-11.62	23.59	46.00	-22.41
4500.37	49.00	PK	109	1.8	H	-2.03	46.97	74.00	-27.03
4500.37	45.66	Ave	109	1.8	H	-2.03	43.63	54.00	-10.37
5116.05	51.75	PK	231	1.8	H	-1.02	50.73	74.00	-23.27
5116.05	49.12	Ave	231	1.8	H	-1.02	48.10	54.00	-5.90
10360.00	41.87	PK	359	1.3	H	5.33	47.20	74.00	-26.80
10360.00	36.00	Ave	359	1.3	H	5.33	41.33	54.00	-12.67
802.11a U-NII-1 Middle channel 5200MHz									
223.45	40.79	QP	286	1.2	H	-11.62	29.17	46.00	-16.83
223.45	34.59	QP	164	1.2	V	-11.62	22.97	46.00	-23.03
4531.52	50.05	PK	246	1.8	H	-1.94	48.11	74.00	-25.89
4531.52	44.98	Ave	246	1.8	H	-1.94	43.04	54.00	-10.96
5120.05	53.58	PK	3	1.1	H	-1.06	52.52	74.00	-21.48
5120.05	50.80	Ave	3	1.1	H	-1.06	49.74	54.00	-4.26
10400.00	42.05	PK	110	1.6	H	5.21	47.26	74.00	-26.74
10400.00	36.17	Ave	110	1.6	H	5.21	41.38	54.00	-12.62

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-1 High channel 5240MHz									
223.45	39.33	QP	308	1.5	H	-11.62	27.71	46.00	-18.29
223.45	35.16	QP	48	1.8	V	-11.62	23.54	46.00	-22.46
4502.74	49.98	PK	298	1.7	H	-2.24	47.74	74.00	-26.26
4502.74	43.84	Ave	298	1.7	H	-2.24	41.60	54.00	-12.40
5148.25	54.67	PK	138	1.0	H	-1.09	53.58	74.00	-20.42
5148.25	50.36	Ave	138	1.0	H	-1.09	49.27	54.00	-4.73
10480.00	42.03	PK	118	1.4	H	5.14	47.17	74.00	-26.83
10480.00	35.42	Ave	118	1.4	H	5.14	40.56	54.00	-13.44
802.11a U-NII-3 Low Channel 5745MHz									
223.45	39.11	QP	339	1.4	H	-11.62	27.49	46.00	-18.51
223.45	33.84	QP	97	2.0	V	-11.62	22.22	46.00	-23.78
4504.10	49.22	PK	114	1.3	H	-2.06	47.16	74.00	-26.84
4504.10	44.02	Ave	114	1.3	H	-2.06	41.96	54.00	-12.04
11490.00	43.05	PK	327	1.5	H	5.93	48.98	74.00	-25.02
11490.00	37.22	Ave	327	1.5	H	5.93	43.15	54.00	-10.85
5352.43	46.70	PK	116	1.1	H	-1.25	45.45	74.00	-28.55
5352.43	37.57	Ave	116	1.1	H	-1.25	36.32	54.00	-17.68

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-3 Middle channel 5785MHz									
223.45	37.86	QP	197	1.2	H	-11.62	26.24	46.00	-19.76
223.45	33.33	QP	359	1.1	V	-11.62	21.71	46.00	-24.29
4505.68	49.64	PK	301	1.1	H	-2.03	47.61	74.00	-26.39
4505.68	44.19	Ave	301	1.1	H	-2.03	42.16	54.00	-11.84
11570.00	42.39	PK	67	1.2	H	5.81	48.20	74.00	-25.80
11570.00	37.03	Ave	67	1.2	H	5.81	42.84	54.00	-11.16
5350.34	45.93	PK	234	1.9	H	-1.22	44.71	74.00	-29.29
5350.34	39.54	Ave	234	1.9	H	-1.22	38.32	54.00	-15.68
802.11a U-NII-3 High channel 5825MHz									
223.45	36.43	QP	134	1.3	H	-11.62	24.81	46.00	-21.19
223.45	33.58	QP	238	1.1	V	-11.62	21.96	46.00	-24.04
4506.47	49.90	PK	27	1.2	H	-1.84	48.06	74.00	-25.94
4506.47	45.26	Ave	27	1.2	H	-1.84	43.42	54.00	-10.58
11650.00	40.65	PK	188	1.5	H	5.84	46.49	74.00	-27.51
11650.00	36.39	Ave	188	1.5	H	5.84	42.23	54.00	-11.77
5355.40	46.85	PK	4	1.3	H	-1.30	45.55	74.00	-28.45
5355.40	38.75	Ave	4	1.3	H	-1.30	37.45	54.00	-16.55

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-1 Low Channel 5180MHz									
223.45	37.91	QP	161	1.6	H	-11.62	26.29	46.00	-19.71
223.45	34.78	QP	354	1.5	V	-11.62	23.16	46.00	-22.84
4501.82	48.54	PK	162	1.4	H	-2.14	46.40	74.00	-27.60
4501.82	45.07	Ave	162	1.4	H	-2.14	42.93	54.00	-11.07
5112.78	46.91	PK	258	1.3	H	-1.06	45.85	74.00	-28.15
5112.78	38.62	Ave	258	1.3	H	-1.06	37.56	54.00	-16.44
10360.00	42.12	PK	37	1.6	H	5.33	47.45	74.00	-26.55
10360.00	34.80	Ave	37	1.6	H	5.33	40.13	54.00	-13.87
802.11n(HT20) U-NII-1 Middle channel 5200MHz									
223.45	39.01	QP	173	1.6	H	-11.62	27.39	46.00	-18.61
223.45	33.92	QP	233	1.9	V	-11.62	22.30	46.00	-23.70
4536.90	49.22	PK	143	1.5	H	-2.12	47.10	74.00	-26.90
4536.90	46.16	Ave	143	1.5	H	-2.12	44.04	54.00	-9.96
5140.65	46.27	PK	228	1.6	H	-1.06	45.21	74.00	-28.79
5140.65	38.03	Ave	228	1.6	H	-1.06	36.97	54.00	-17.03
10400.00	42.80	PK	21	1.9	H	5.21	48.01	74.00	-25.99
10400.00	36.07	Ave	21	1.9	H	5.21	41.28	54.00	-12.72

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-1 High channel 5240MHz									
223.45	39.96	QP	68	1.7	H	-11.62	28.34	46.00	-17.66
223.45	33.13	QP	22	1.1	V	-11.62	21.51	46.00	-24.49
4512.97	48.22	PK	257	1.6	H	-1.96	46.26	74.00	-27.74
4512.97	45.88	Ave	257	1.6	H	-1.96	43.92	54.00	-10.08
5117.00	46.13	PK	30	1.8	H	-1.06	45.07	74.00	-28.93
5117.00	37.05	Ave	30	1.8	H	-1.06	35.99	54.00	-18.01
10480.00	41.17	PK	162	1.4	H	5.14	46.31	74.00	-27.69
10480.00	36.78	Ave	162	1.4	H	5.14	41.92	54.00	-12.08
802.11n(HT20) U-NII-3 Low Channel 5745MHz									
223.45	38.74	QP	114	1.0	H	-11.62	27.12	46.00	-18.88
223.45	32.93	QP	1	1.7	V	-11.62	21.31	46.00	-24.69
4528.18	46.98	PK	330	2.0	H	-1.85	45.13	74.00	-28.87
4528.18	44.16	Ave	330	2.0	H	-1.85	42.31	54.00	-11.69
11490.00	40.72	PK	328	1.9	H	5.93	46.65	74.00	-27.35
11490.00	34.03	Ave	328	1.9	H	5.93	39.96	54.00	-14.04
5365.50	45.76	PK	114	1.5	H	-1.01	44.75	74.00	-29.25
5365.50	37.06	Ave	114	1.5	H	-1.01	36.05	54.00	-17.95

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-3 Middle channel 5785MHz									
223.45	38.19	QP	295	1.9	H	-11.62	26.57	46.00	-19.43
223.45	33.03	QP	303	1.2	V	-11.62	21.41	46.00	-24.59
4507.05	46.06	PK	219	1.9	H	-1.89	44.17	74.00	-29.83
4507.05	44.49	Ave	219	1.9	H	-1.89	42.60	54.00	-11.40
11570.00	42.16	PK	90	2.0	H	5.81	47.97	74.00	-26.03
11570.00	35.03	Ave	90	2.0	H	5.81	40.84	54.00	-13.16
5378.03	46.83	PK	189	1.6	H	-1.04	45.79	74.00	-28.21
5378.03	39.99	Ave	189	1.6	H	-1.04	38.95	54.00	-15.05
802.11n(HT20) U-NII-3 High channel 5825MHz									
223.45	37.19	QP	266	1.2	H	-11.62	25.57	46.00	-20.43
223.45	32.94	QP	238	1.6	V	-11.62	21.32	46.00	-24.68
4505.36	45.70	PK	182	1.4	H	-1.97	43.73	74.00	-30.27
4505.36	43.93	Ave	182	1.4	H	-1.97	41.96	54.00	-12.04
11650.00	42.30	PK	89	1.9	H	5.84	48.14	74.00	-25.86
11650.00	35.48	Ave	89	1.9	H	5.84	41.32	54.00	-12.68
5352.16	46.88	PK	109	1.3	H	-1.12	45.76	74.00	-28.24
5352.16	39.77	Ave	109	1.3	H	-1.12	38.65	54.00	-15.35

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT40) U-NII-1 Low Channel 5190MHz									
223.45	39.25	QP	313	1.4	H	-11.62	27.63	46.00	-18.37
223.45	32.75	QP	244	1.6	V	-11.62	21.13	46.00	-24.87
4506.90	39.13	PK	6	1.8	H	-1.89	37.24	74.00	-36.76
4506.90	39.39	Ave	6	1.8	H	-1.89	37.50	54.00	-16.50
5127.16	45.66	PK	189	1.5	H	-1.06	44.60	74.00	-29.40
5127.16	39.80	Ave	189	1.5	H	-1.06	38.74	54.00	-15.26
10380.00	39.66	PK	122	1.1	H	5.26	44.92	74.00	-29.08
10380.00	34.53	Ave	122	1.1	H	5.26	39.79	54.00	-14.21
802.11n(HT40) U-NII-1 High channel 5230MHz									
223.45	40.38	QP	173	1.0	H	-11.62	28.76	46.00	-17.24
223.45	33.60	QP	197	2.0	V	-11.62	21.98	46.00	-24.02
4507.99	38.61	PK	64	1.3	H	-1.94	36.67	74.00	-37.33
4507.99	34.99	Ave	64	1.3	H	-1.94	33.05	54.00	-20.95
5148.79	47.24	PK	175	1.6	H	-1.06	46.18	74.00	-27.82
5148.79	38.33	Ave	175	1.6	H	-1.06	37.27	54.00	-16.73
10480.00	42.10	PK	98	1.2	H	5.28	47.38	74.00	-26.62
10480.00	36.23	Ave	98	1.2	H	5.28	41.51	54.00	-12.49

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT40) U-NII-3 Low Channel 5755MHz									
223.45	41.46	QP	239	1.8	H	-11.62	29.84	74.00	-44.16
223.45	34.05	QP	233	1.7	V	-11.62	22.43	74.00	-51.57
4536.61	37.23	PK	154	1.3	H	-1.96	35.27	74.00	-38.73
4536.61	33.12	Ave	154	1.3	H	-1.96	31.16	54.00	-22.84
11510.00	39.07	PK	95	2.0	H	5.88	44.95	74.00	-29.05
11510.00	33.93	Ave	95	2.0	H	5.88	39.81	54.00	-14.19
5361.29	46.35	PK	336	1.2	H	-1.01	45.34	74.00	-28.66
5361.29	37.09	Ave	336	1.2	H	-1.01	36.08	54.00	-17.92
802.11n(HT40) U-NII-3 High channel 5795MHz									
223.45	42.24	QP	250	1.4	H	-11.62	30.62	74.00	-43.38
223.45	35.00	QP	265	1.2	V	-11.62	23.38	74.00	-50.62
4538.78	37.27	PK	98	1.1	H	-1.92	35.35	74.00	-38.65
4538.78	33.15	Ave	98	1.1	H	-1.92	31.23	54.00	-22.77
11590.00	42.07	PK	182	1.5	H	5.63	47.70	74.00	-26.30
11590.00	35.50	Ave	182	1.5	H	5.63	41.13	54.00	-12.87
5379.25	46.45	PK	256	1.7	H	-1.04	45.41	74.00	-28.59
5379.25	39.44	Ave	256	1.7	H	-1.04	38.40	54.00	-15.60

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(HT20) U-NII-1 Low Channel 5180MHz									
223.45	38.32	QP	273	1.2	H	-11.62	26.70	46.00	-19.30
223.45	33.86	QP	43	1.4	V	-11.62	22.24	46.00	-23.76
4538.56	43.02	PK	185	1.9	H	-1.86	41.16	74.00	-32.84
4538.56	42.55	Ave	185	1.9	H	-1.86	40.69	54.00	-13.31
5121.90	45.20	PK	106	1.2	H	-1.06	44.14	74.00	-29.86
5121.90	39.37	Ave	106	1.2	H	-1.06	38.31	54.00	-15.69
10360.00	40.79	PK	180	1.6	H	5.33	46.12	74.00	-27.88
10360.00	34.62	Ave	180	1.6	H	5.33	39.95	54.00	-14.05
802.11ac(HT20) U-NII-1 Middle channel 5200MHz									
223.45	39.29	QP	246	1.2	H	-11.62	27.67	46.00	-18.33
223.45	33.82	QP	37	2.0	V	-11.62	22.20	46.00	-23.80
4526.69	43.22	PK	27	1.8	H	-1.82	41.40	74.00	-32.60
4526.69	42.56	Ave	27	1.8	H	-1.82	40.74	54.00	-13.26
5115.13	46.03	PK	195	1.5	H	-1.06	44.97	74.00	-29.03
5115.13	40.87	Ave	195	1.5	H	-1.06	39.81	54.00	-14.19
10400.00	42.18	PK	338	1.9	H	5.21	47.39	74.00	-26.61
10400.00	36.67	Ave	338	1.9	H	5.21	41.88	54.00	-12.12

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(HT20) U-NII-1 High channel 5240MHz									
223.45	39.24	QP	346	1.5	H	-11.62	27.62	46.00	-18.38
223.45	34.80	QP	134	1.4	V	-11.62	23.18	46.00	-22.82
4519.50	43.03	PK	167	1.4	H	-1.81	41.22	74.00	-32.78
4519.50	43.01	Ave	167	1.4	H	-1.81	41.20	54.00	-12.80
5122.32	47.31	PK	303	1.3	H	-1.06	46.25	74.00	-27.75
5122.32	40.75	Ave	303	1.3	H	-1.06	39.69	54.00	-14.31
10480.00	41.80	PK	52	1.5	H	5.14	46.94	74.00	-27.06
10480.00	35.40	Ave	52	1.5	H	5.14	40.54	54.00	-13.46
802.11ac(HT20) U-NII-3 Low Channel 5745MHz									
223.45	38.92	QP	49	1.3	H	-11.62	27.30	46.00	-18.70
223.45	34.49	QP	221	1.2	V	-11.62	22.87	46.00	-23.13
4503.04	41.31	PK	106	2.0	H	-1.92	39.39	74.00	-34.61
4503.04	41.82	Ave	106	2.0	H	-1.92	39.90	54.00	-14.10
11490.00	40.05	PK	252	1.9	H	5.93	45.98	74.00	-28.02
11490.00	33.97	Ave	252	1.9	H	5.93	39.90	54.00	-14.10
5384.27	46.11	PK	267	2.0	H	-1.03	45.08	74.00	-28.92
5384.27	38.78	Ave	267	2.0	H	-1.03	37.75	54.00	-16.25

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(HT20) U-NII-3 Middle channel 5785MHz									
223.45	39.73	QP	326	1.5	H	-11.62	28.11	46.00	-17.89
223.45	34.07	QP	60	1.5	V	-11.62	22.45	46.00	-23.55
4525.33	41.40	PK	25	1.5	H	-1.97	39.43	74.00	-34.57
4525.33	42.19	Ave	25	1.5	H	-1.97	40.22	54.00	-13.78
11570.00	41.71	PK	322	1.0	H	5.81	47.52	74.00	-26.48
11570.00	36.95	Ave	322	1.0	H	5.81	42.76	54.00	-11.24
5357.26	46.04	PK	211	1.2	H	-1.05	44.99	74.00	-29.01
5357.26	38.79	Ave	211	1.2	H	-1.05	37.74	54.00	-16.26
802.11ac(HT20) U-NII-3 High channel 5825MHz									
223.45	40.27	QP	300	1.3	H	-11.62	28.65	46.00	-17.35
223.45	33.48	QP	239	1.1	V	-11.62	21.86	46.00	-24.14
4535.36	41.97	PK	149	1.2	H	-1.88	40.09	74.00	-33.91
4535.36	41.84	Ave	149	1.2	H	-1.88	39.96	54.00	-14.04
11650.00	41.30	PK	332	1.8	H	5.84	47.14	74.00	-26.86
11650.00	35.69	Ave	332	1.8	H	5.84	41.53	54.00	-12.47
5360.82	46.78	PK	261	1.0	H	-1.06	45.72	74.00	-28.28
5360.82	39.90	Ave	261	1.0	H	-1.06	38.84	54.00	-15.16

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(HT40) U-NII-1 Low Channel 5190MHz									
223.45	42.47	QP	145	1.7	H	-11.62	30.85	74.00	-43.15
223.45	34.72	QP	22	1.7	V	-11.62	23.10	74.00	-50.90
4500.14	35.59	PK	141	1.2	H	-1.91	33.68	74.00	-40.32
4500.14	30.29	Ave	141	1.2	H	-1.91	28.38	54.00	-25.62
5126.98	46.05	PK	108	1.5	H	-1.06	44.99	74.00	-29.01
5126.98	41.09	Ave	108	1.5	H	-1.06	40.03	54.00	-13.97
10380.00	39.59	PK	151	1.9	H	5.26	44.85	74.00	-29.15
10380.00	34.79	Ave	151	1.9	H	5.26	40.05	54.00	-13.95
802.11ac(HT40) U-NII-1 High channel 5230MHz									
223.45	42.93	QP	199	1.7	H	-11.62	31.31	74.00	-42.69
223.45	34.22	QP	185	1.5	V	-11.62	22.60	74.00	-51.40
4503.44	36.59	PK	293	1.4	H	-1.93	34.66	74.00	-39.34
4503.44	31.09	Ave	293	1.4	H	-1.93	29.16	54.00	-24.84
5146.22	46.91	PK	119	1.4	H	-1.06	45.85	74.00	-28.15
5146.22	42.33	Ave	119	1.4	H	-1.06	41.27	54.00	-12.73
10460.00	40.89	PK	87	2.0	H	5.28	46.17	74.00	-27.83
10480.00	36.20	Ave	87	2.0	H	5.28	41.48	54.00	-12.52

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(HT40) U-NII-3 Low Channel 5755MHz									
223.45	42.52	QP	159	1.9	H	-11.62	30.90	74.00	-43.10
223.45	35.33	QP	292	1.9	V	-11.62	23.71	74.00	-50.29
4536.79	35.47	PK	244	1.4	H	-1.92	33.55	74.00	-40.45
4536.79	29.88	Ave	244	1.4	H	-1.92	27.96	54.00	-26.04
11510.00	40.00	PK	208	2.0	H	5.88	45.88	74.00	-28.12
11510.00	33.47	Ave	208	2.0	H	5.88	39.35	54.00	-14.65
5360.66	45.48	PK	317	1.4	H	-1.07	44.41	74.00	-29.59
5360.66	38.82	Ave	317	1.4	H	-1.07	37.75	54.00	-16.25
802.11ac(HT40) U-NII-3 High channel 5795MHz									
223.45	42.13	QP	24	1.6	H	-11.62	30.51	74.00	-43.49
223.45	34.98	QP	110	1.6	V	-11.62	23.36	74.00	-50.64
4524.10	34.49	PK	256	1.1	H	-1.86	32.63	74.00	-41.37
4524.10	29.45	Ave	256	1.1	H	-1.86	27.59	54.00	-26.41
11590.00	42.63	PK	347	1.1	H	5.63	48.26	74.00	-25.74
11590.00	36.04	Ave	347	1.1	H	5.63	41.67	54.00	-12.33
5386.14	45.10	PK	180	1.6	H	-1.03	44.07	74.00	-29.93
5386.14	39.76	Ave	180	1.6	H	-1.03	38.73	54.00	-15.27

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(HT80) U-NII-1 Low Channel 5210MHz									
223.45	35.80	QP	14	1.1	H	-11.62	24.18	54.00	-29.82
223.45	33.98	QP	200	1.2	V	-11.62	22.36	54.00	-31.64
4534.47	28.57	PK	298	1.9	H	-1.88	26.69	74.00	-47.31
4534.47	42.75	Ave	298	1.9	H	-1.88	40.87	54.00	-13.13
5110.53	37.86	PK	332	1.9	H	-1.06	36.80	74.00	-37.20
5110.53	45.69	Ave	332	1.9	H	-1.06	44.63	54.00	-9.37
10420.00	41.85	PK	82	1.3	H	4.65	46.50	74.00	-27.50
10420.00	35.78	Ave	82	1.3	H	4.65	40.43	54.00	-13.57
802.11ac(HT80) U-NII-3 Low Channel 5775MHz									
223.45	34.12	QP	355	1.2	H	-11.62	22.50	74.00	-51.50
223.45	29.23	QP	84	1.4	V	-11.62	17.61	74.00	-56.39
4535.74	43.22	PK	192	1.6	H	-1.85	41.37	74.00	-32.63
4535.74	42.71	Ave	192	1.6	H	-1.85	40.86	54.00	-13.14
5364.28	42.71	PK	149	1.8	H	4.83	47.54	74.00	-26.46
5364.28	35.86	Ave	149	1.8	H	4.83	40.69	54.00	-13.31
11550.00	45.50	PK	82	1.1	H	-1.14	44.36	74.00	-29.64
11550.00	37.31	Ave	82	1.1	H	-1.14	36.17	54.00	-17.83

Test Frequency: 18GHz~40GHz

The measurements were more than 20 dB below the limit and not reported.

8 Duty cycle

Test Requirement:	47 CFR Part 15C 15.407 KDB789033 D02 General U-NII Test Procedures New Rules v02r01, Section (B)
Test Method:	ANSI C63.10: 2013
Test Limit:	N/A
Test Result:	PASS
Remark:	Through Pre-scan, and found 802.11a at lowest channel is the worst case. Only the worst case is recorded in the report.

8.1 Summary of Test Results

802.11a mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
149	100	100	100
802.11n(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
149	100	100	100
802.11n(HT40) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	100	100	100
151	100	100	100
802.11ac(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
149	100	100	100
802.11ac(HT40) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	100	100	100
151	100	100	100
802.11ac(HT80) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
42	100	100	100
155	100	100	100

Test result plots shown as follows:

802.11a U-NII-1 Low channel



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



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



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



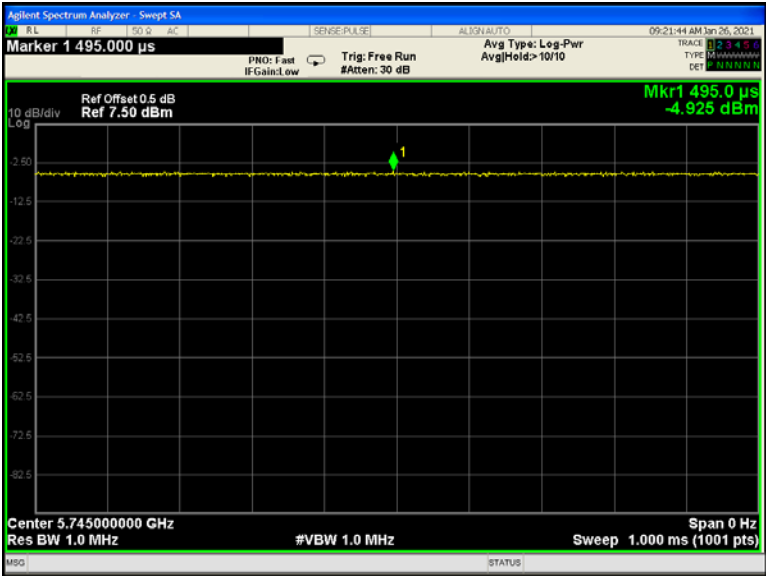
802.11ac(HT40) U-NII-1 Low channel



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



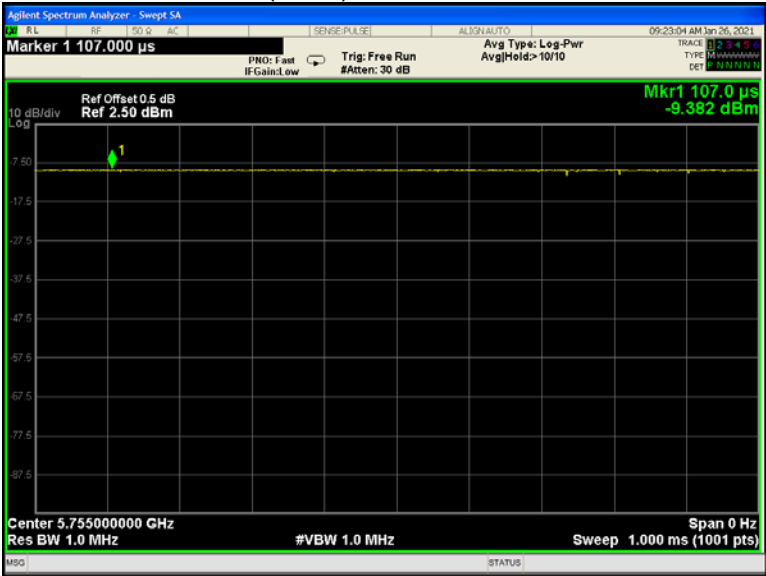
802.11a U-NII-3 Low channel



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



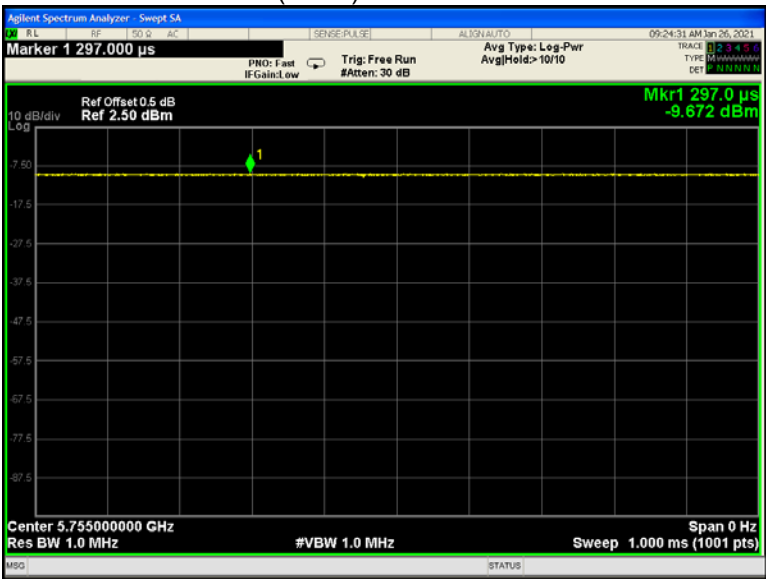
802.11n(HT40) U-NII-3 Low channel



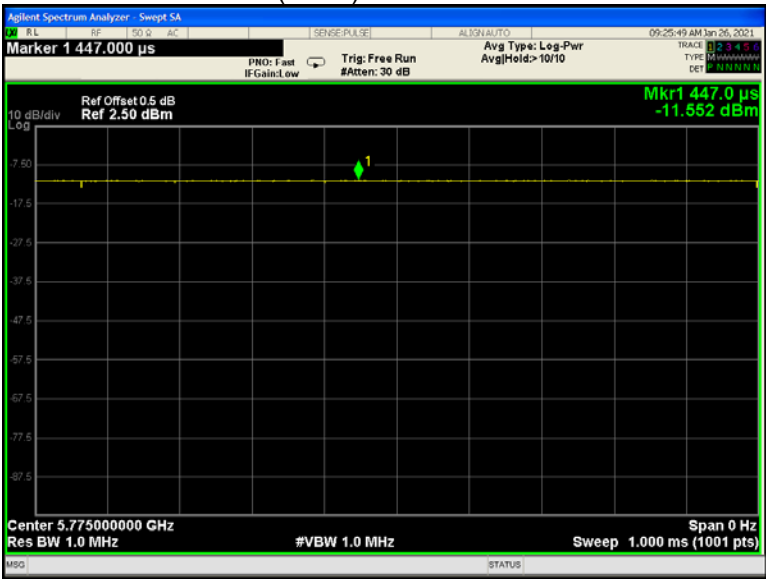
802.11ac(HT20) U-NII-3 Low channel



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



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



9 Band Edge

Test Requirement:	FCC CFR47 Part 15 Section 15.407
Test Method:	ANSI C63.10 2013
Test Limit:	(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27dBm/MHz. (2) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.
Test Result:	PASS

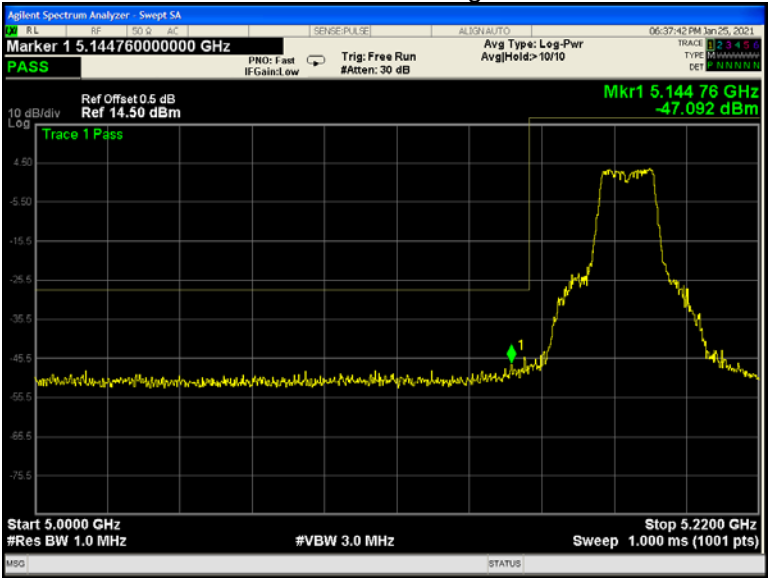
9.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

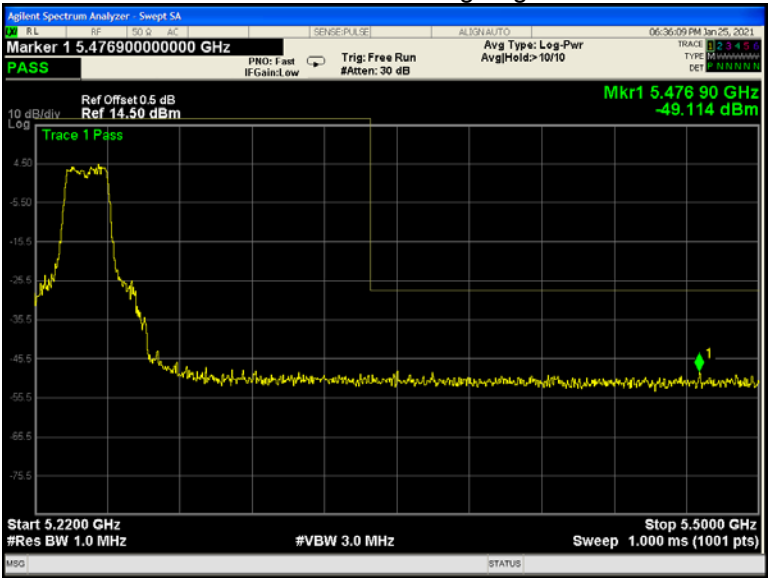
9.2 Test Result

Test result plots shown as follows:

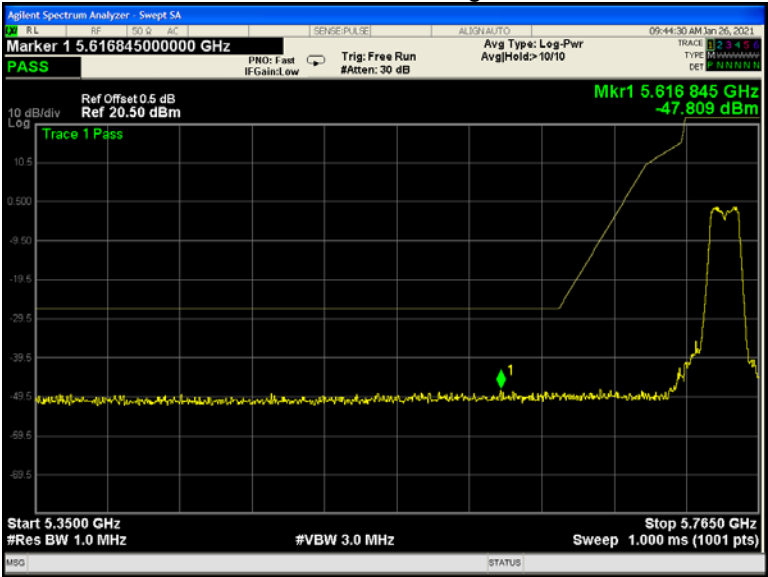
802.11a U-NII-1 Band edge-left side



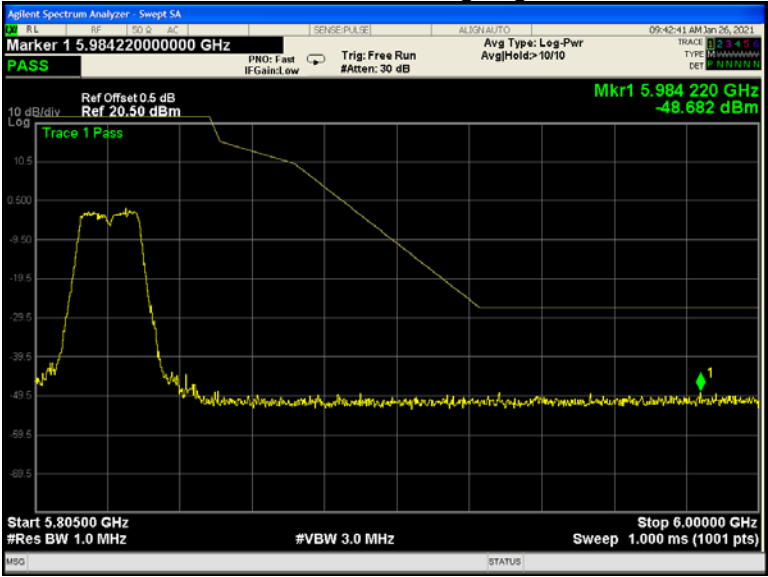
802.11a U-NII-1 Band edge-right side



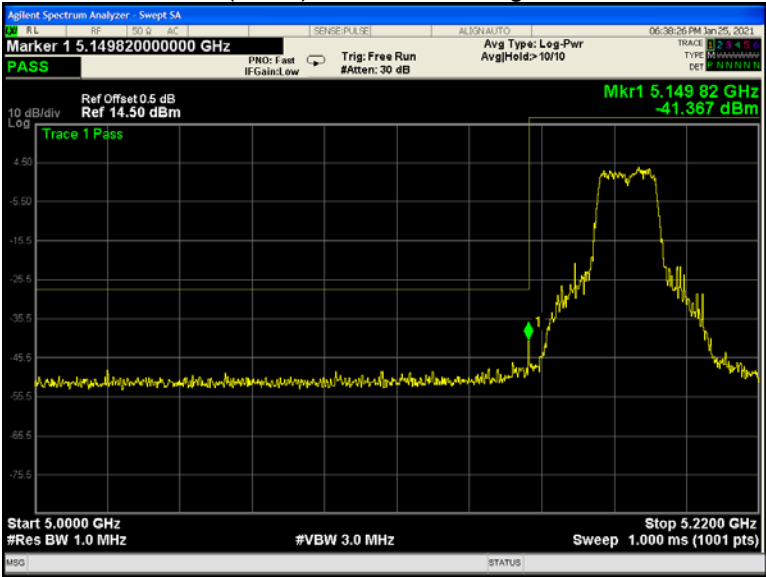
802.11a U-NII-3 Band edge-left side



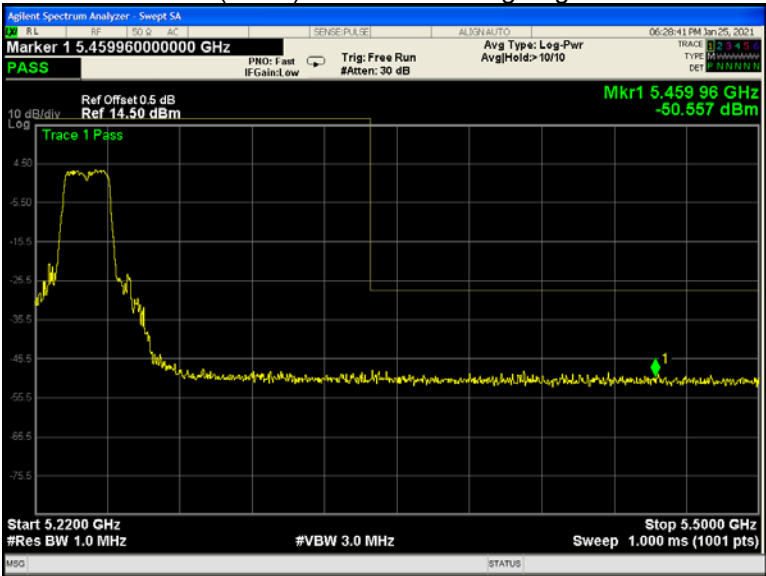
802.11a U-NII-3 Band edge-right side



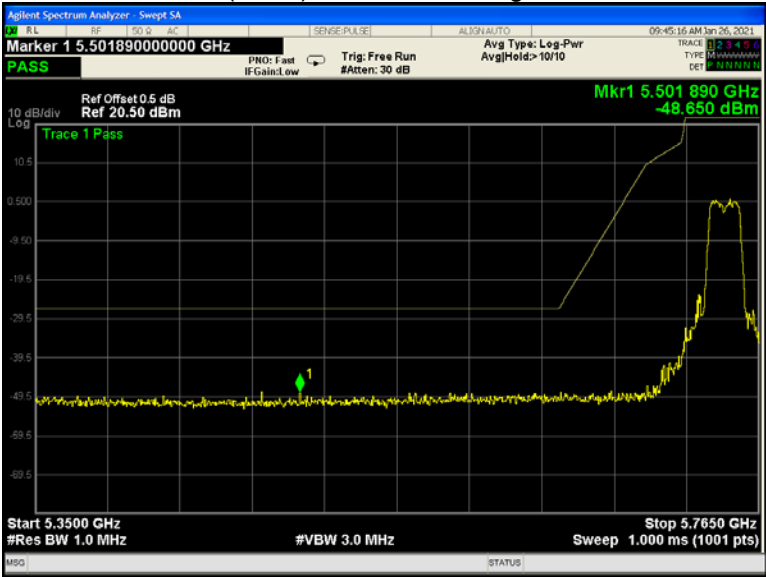
802.11n(HT20) U-NII-1 Band edge-left side



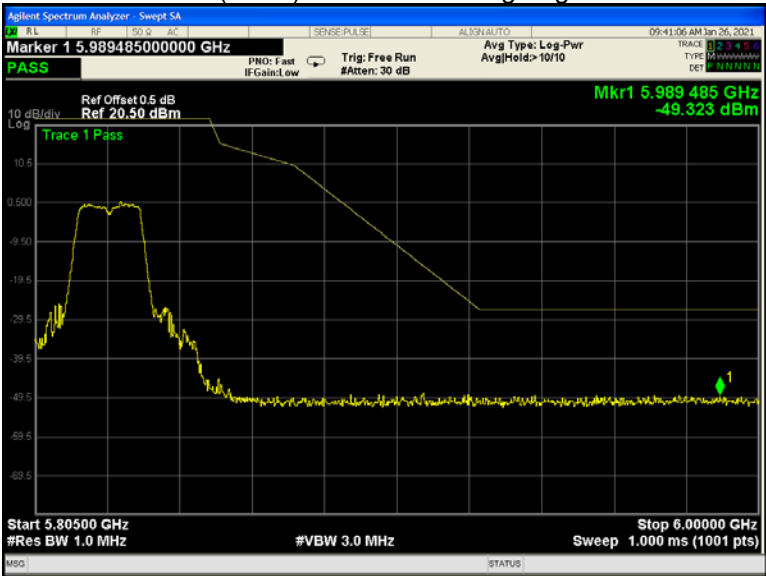
802.11n(HT20) U-NII-1 Band edge-right side



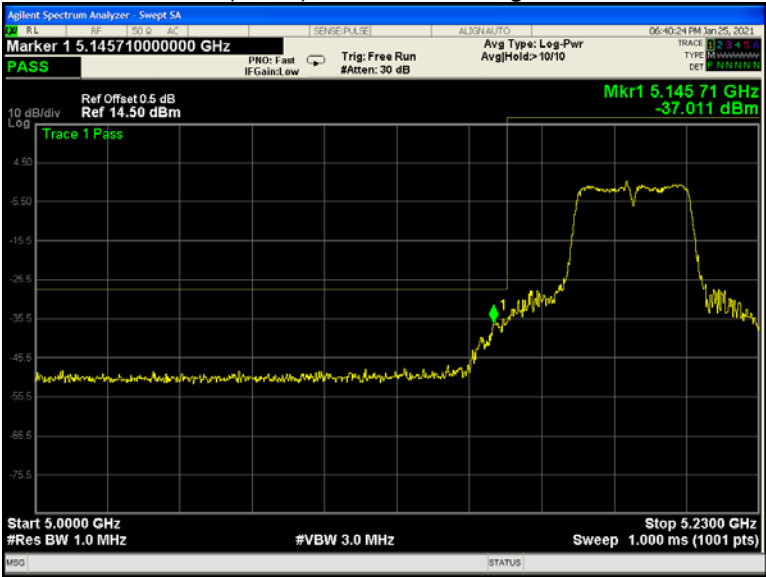
802.11n(HT20) U-NII-3 Band edge-left side



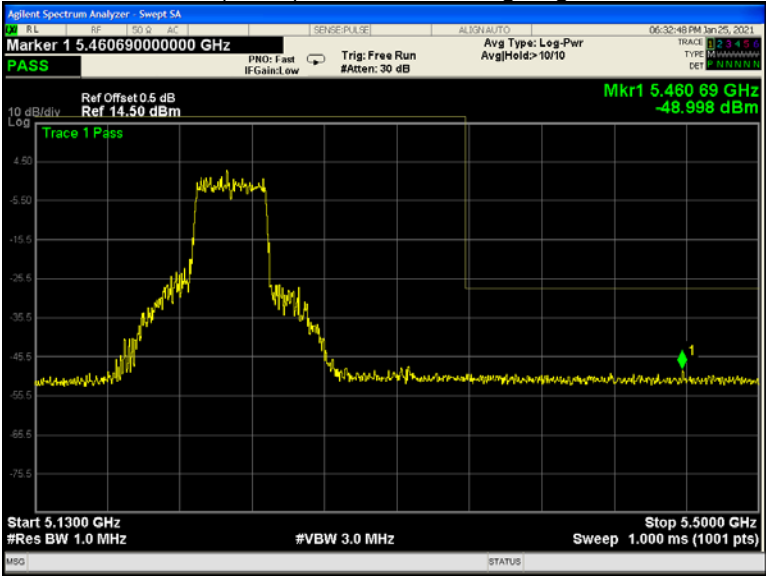
802.11n(HT20) U-NII-3 Band edge-right side



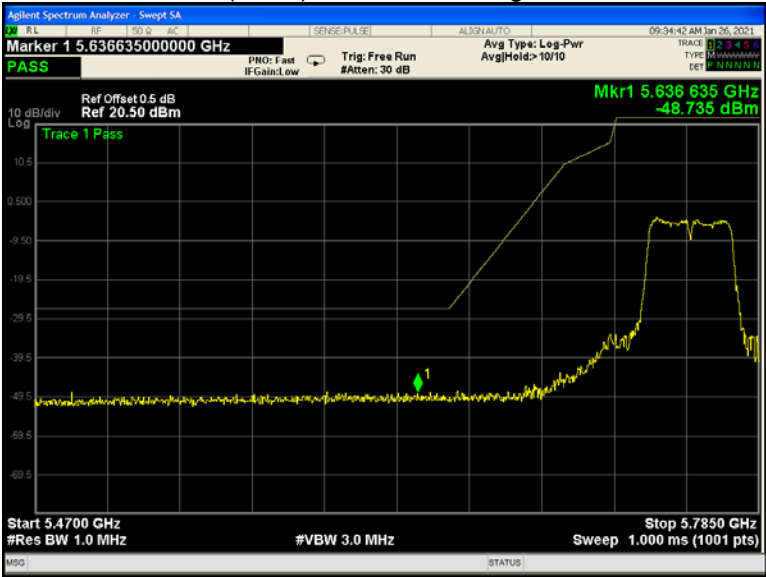
802.11n(HT40) U-NII-1 Band edge-left side



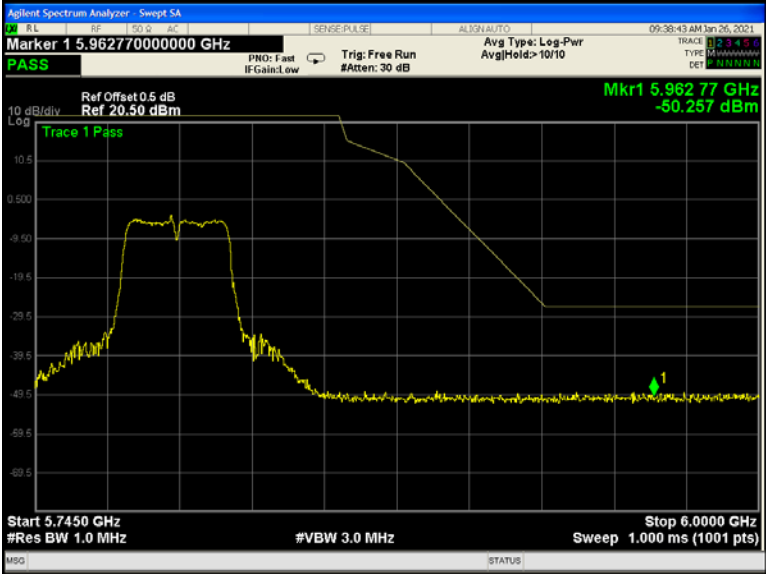
802.11n(HT40) U-NII-1 Band edge-right side



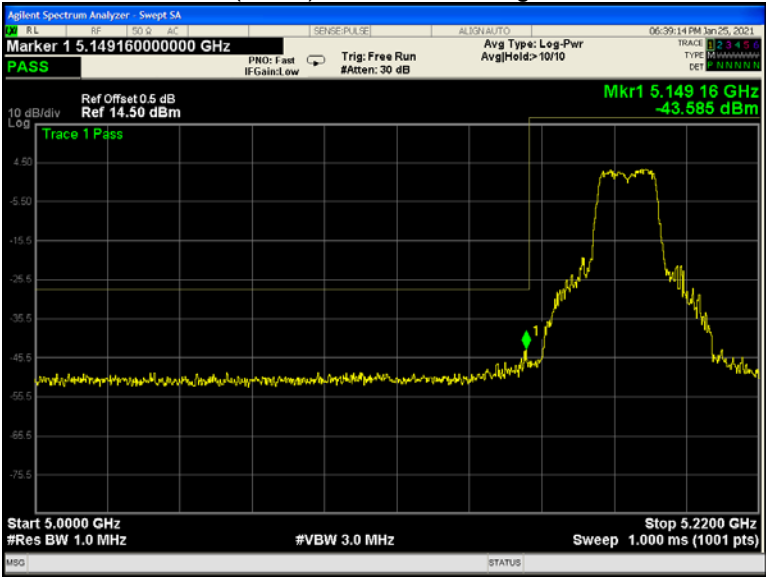
802.11n(HT40) U-NII-3 Band edge-left side



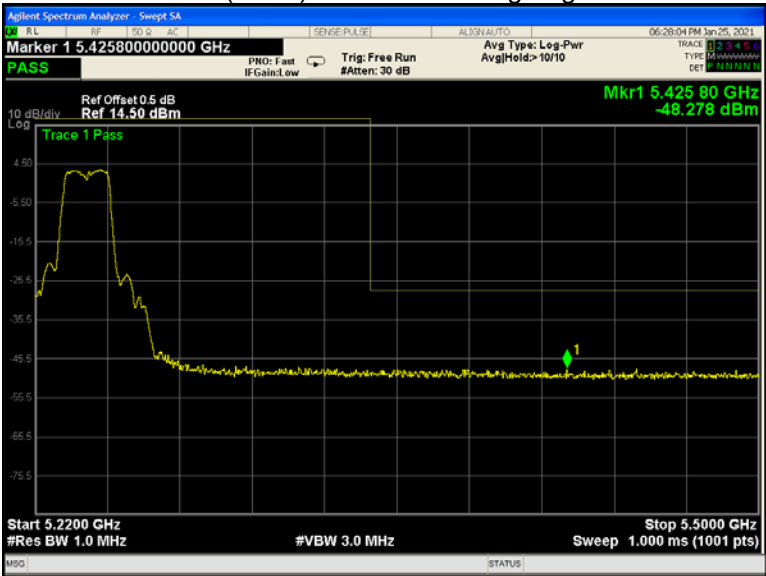
802.11n(HT40) U-NII-3 Band edge-right side



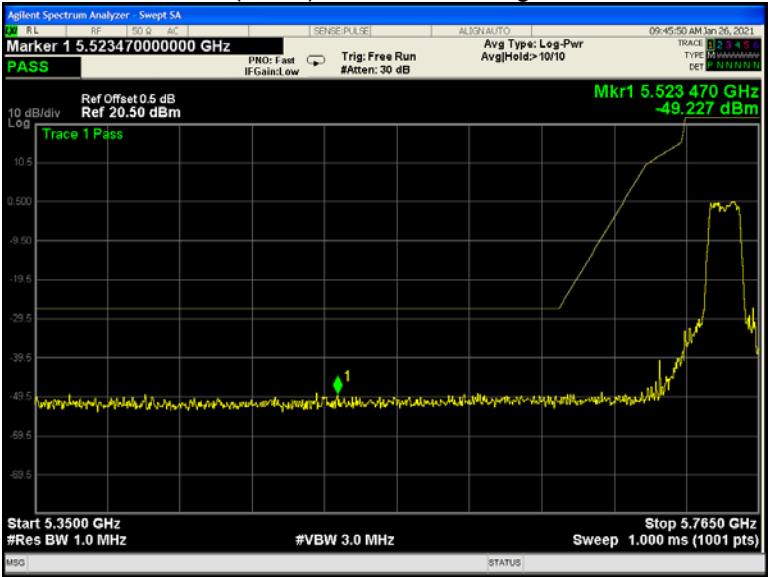
802.11ac(HT20) U-NII-1 Band edge-left side



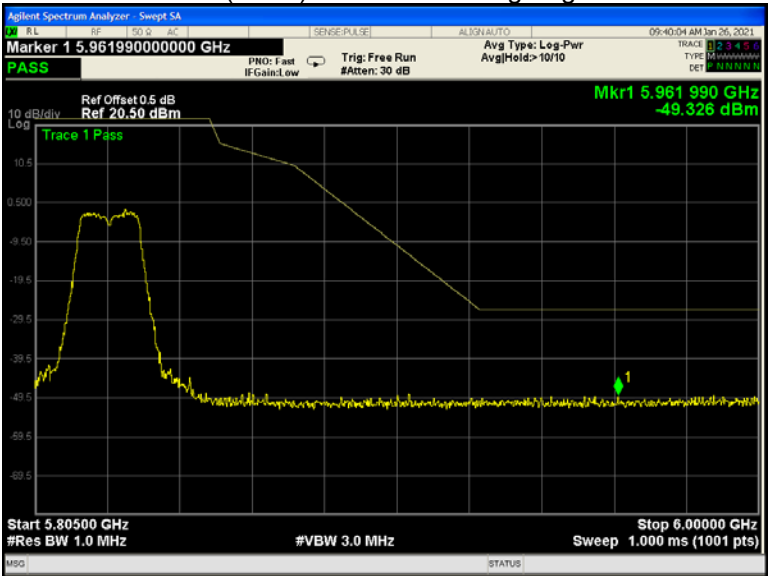
802.11ac(HT20) U-NII-1 Band edge-right side



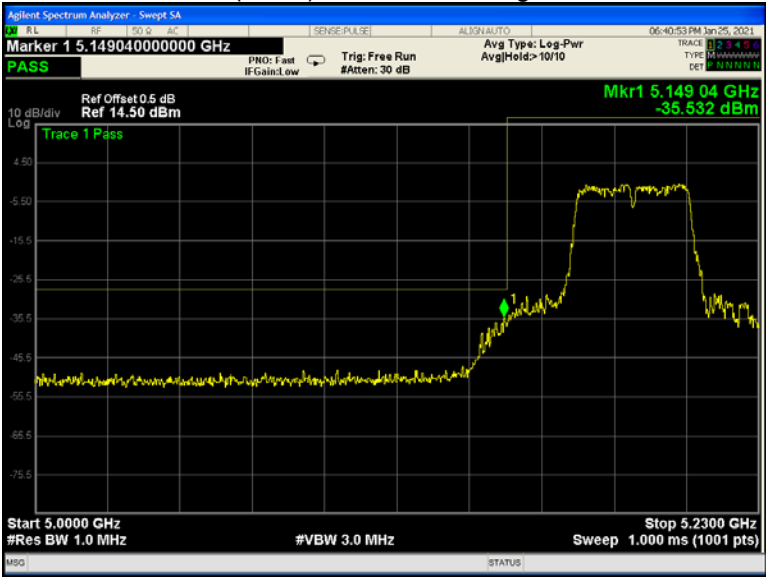
802.11ac(HT20) U-NII-3 Band edge-left side



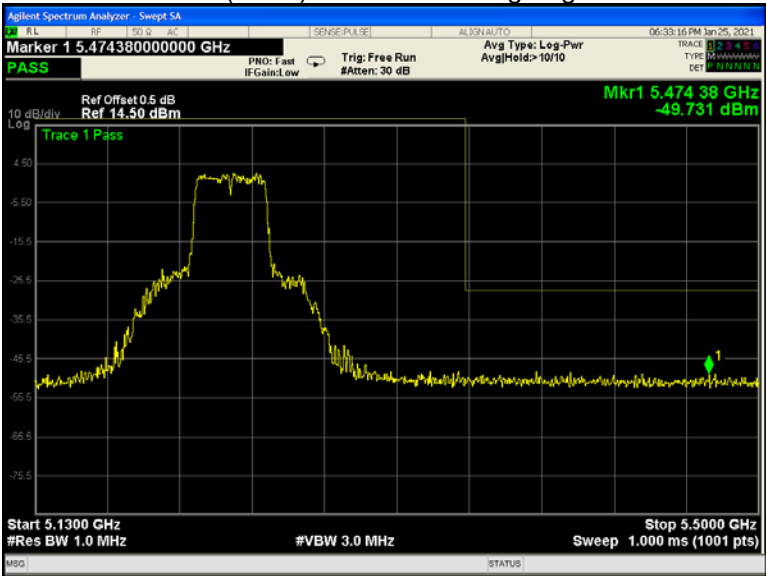
802.11ac(HT20) U-NII-3 Band edge-right side



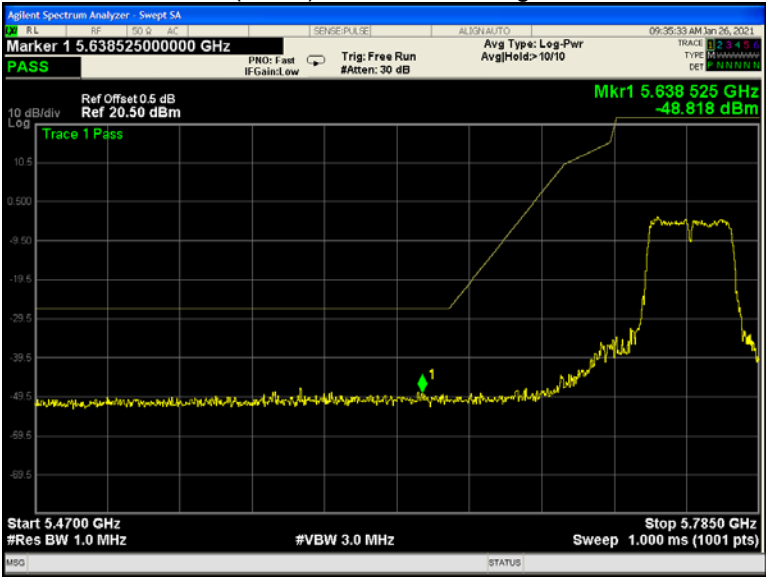
802.11ac(HT40) U-NII-1 Band edge-left side



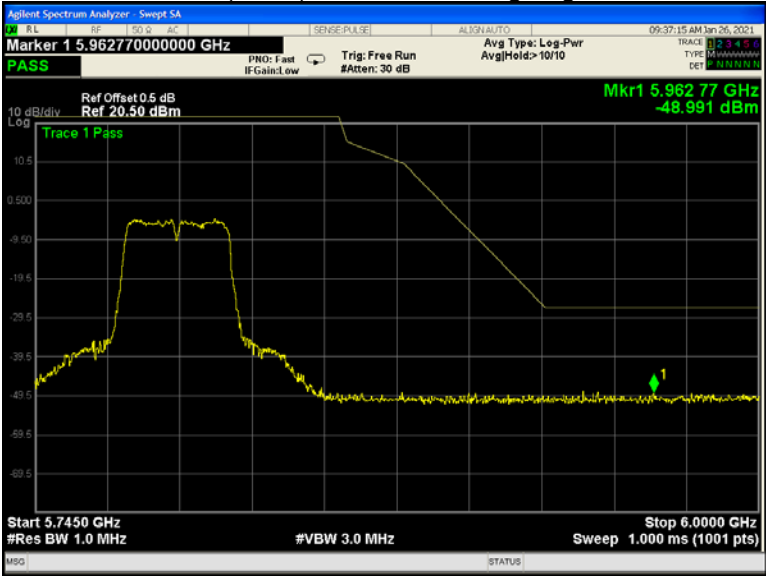
802.11ac(HT40) U-NII-1 Band edge-right side



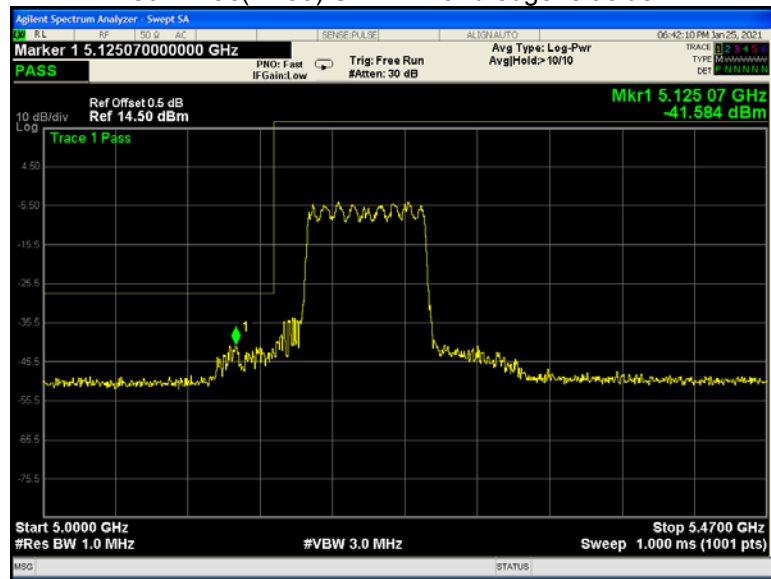
802.11ac(HT40) U-NII-3 Band edge-left side



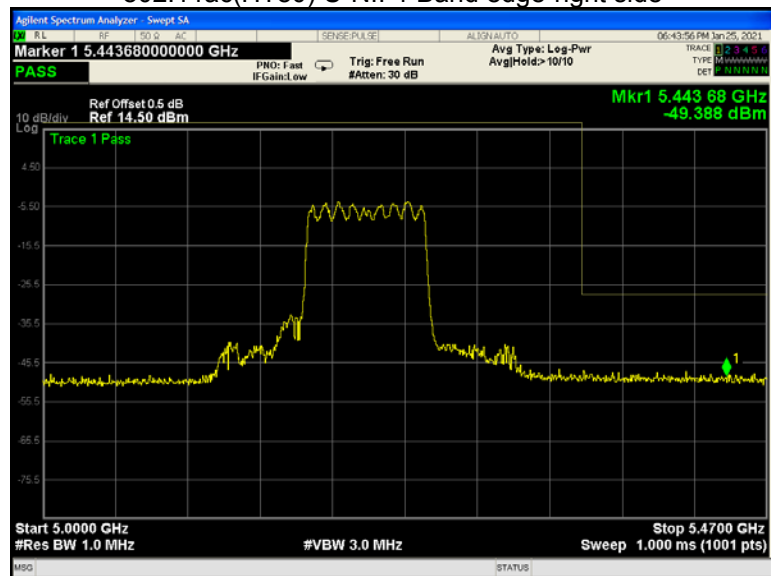
802.11ac(HT40) U-NII-3 Band edge-right side



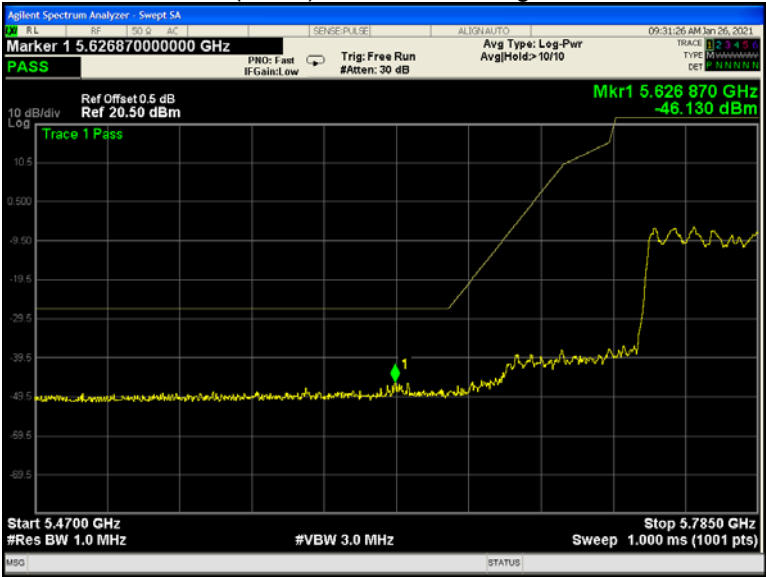
802.11ac(HT80) U-NII-1 Band edge-left side



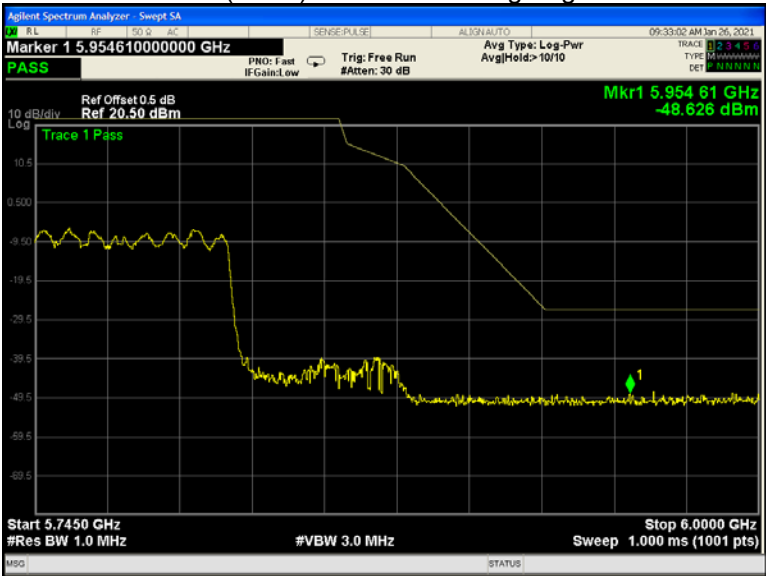
802.11ac(HT80) U-NII-1 Band edge-right side



802.11ac(HT80) U-NII-3 Band edge-left side



802.11ac(HT80) U-NII-3 Band edge-right side



10 6 dB Bandwidth

Test Requirement: FCC CFR47 Part 15 Section 15.407(e)
 KDB662911 D01 Multiple Transmitter Output v02r01
 Test Method: KDB789033 D02 General U-NII Test Procedures New Rules v02r01
 Section C
 Test Limit: ≥ 500 kHz
 Test Result: PASS

10.1 Test Procedure:

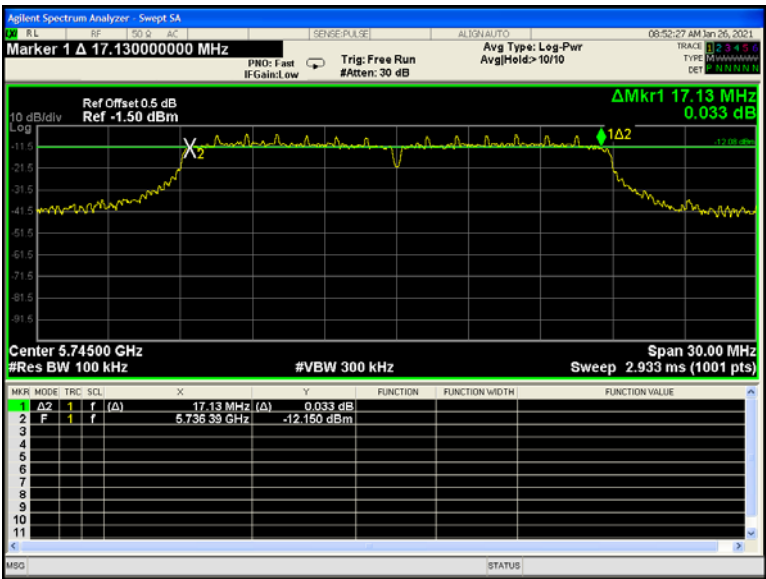
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

10.2 Test Result:

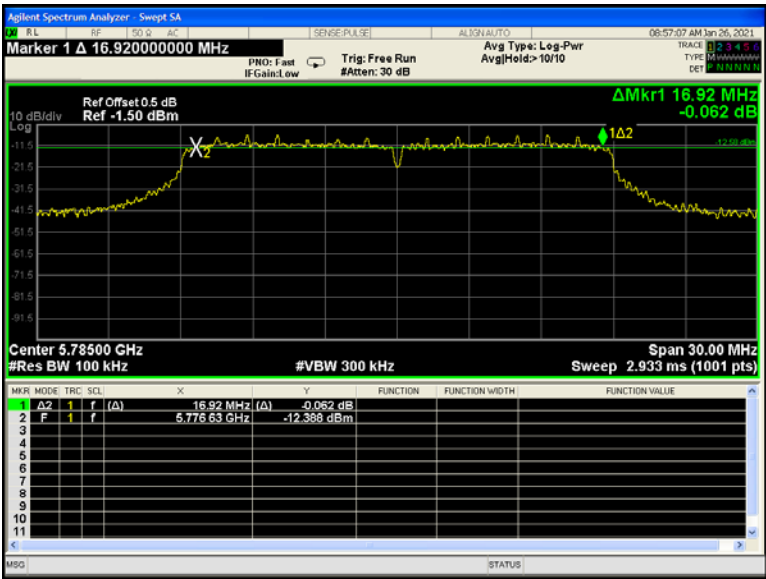
Band	Operation mode	6 dB Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	17.13	16.92	17.04
	802.11n(HT20)	16.95	16.92	17.22
	802.11n(HT40)	35.58	/	35.76
	802.11ac(HT20)	16.80	16.83	17.04
	802.11ac(HT40)	35.94	/	35.64
	802.11ac(HT80)	75.48	/	/

Test result plots shown as follows:

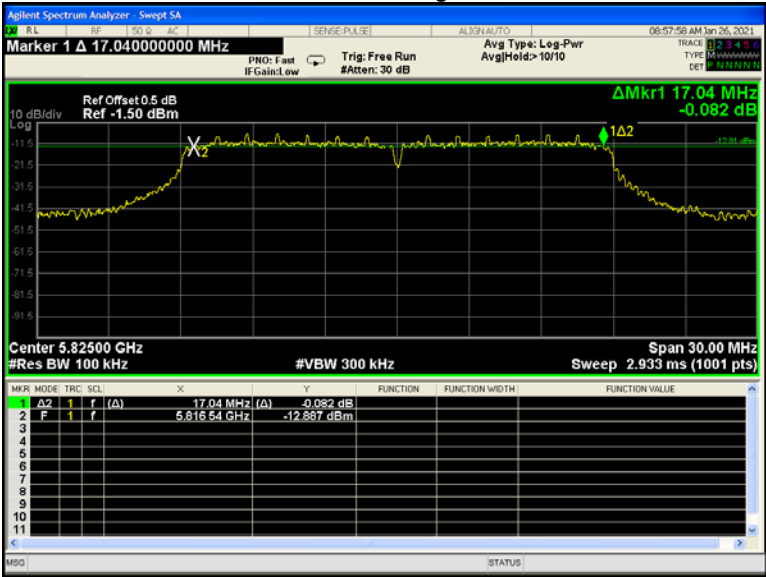
802.11a U-NII-3 Low channel



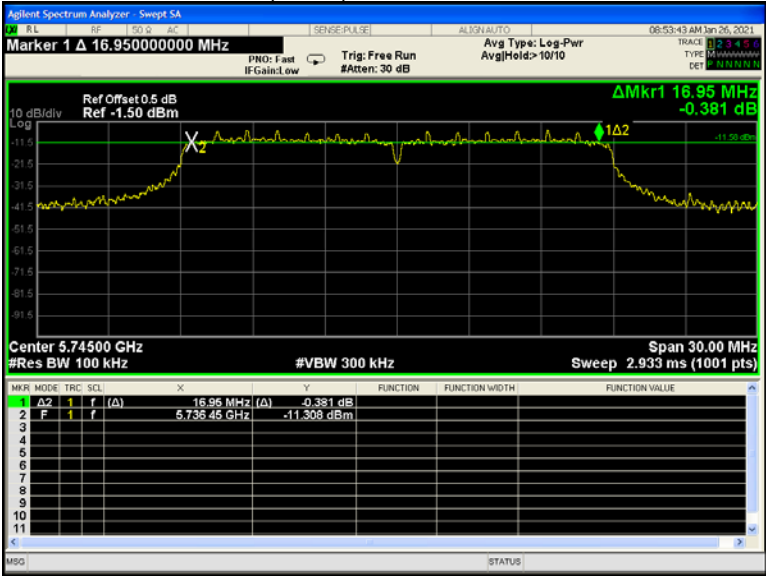
802.11a U-NII-3 Middle channel



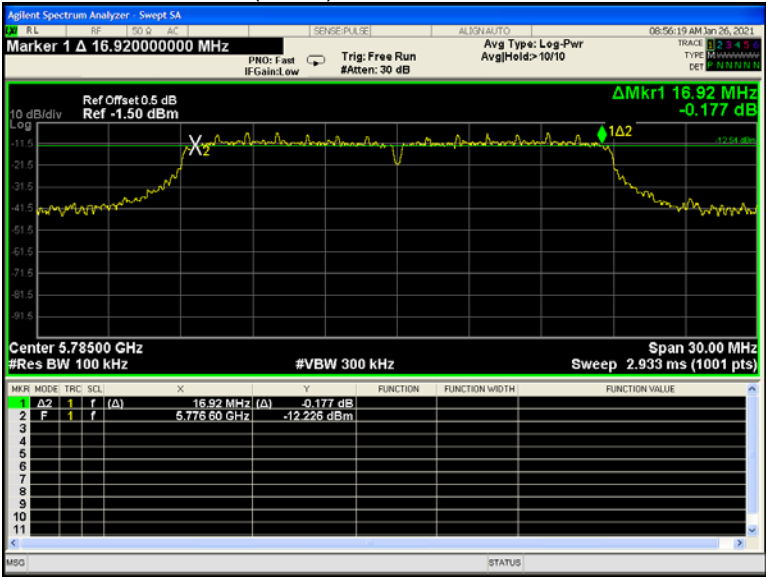
802.11a U-NII-3 High channel



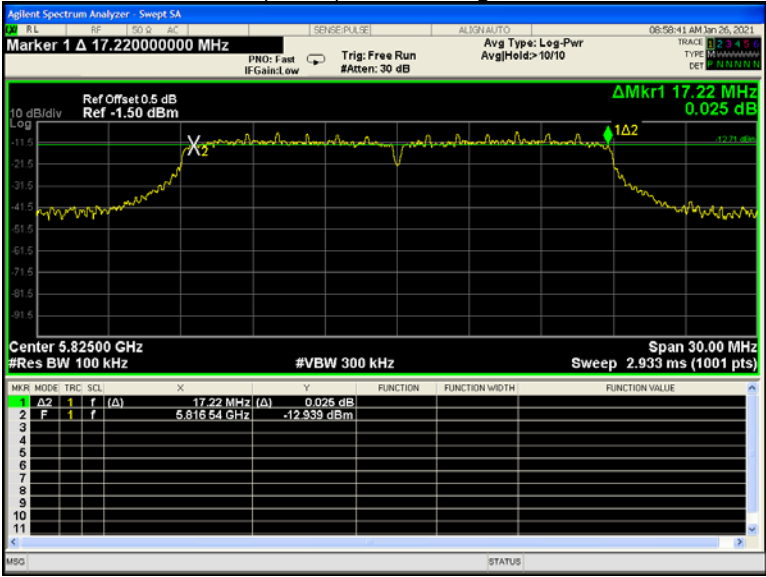
802.11n(HT20) U-NII-3 Low channel



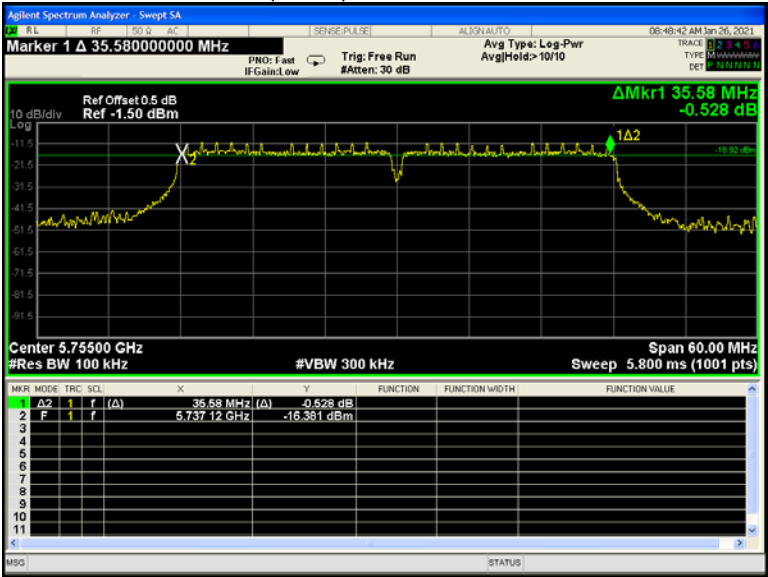
802.11n(HT20) U-NII-3 Middle channel



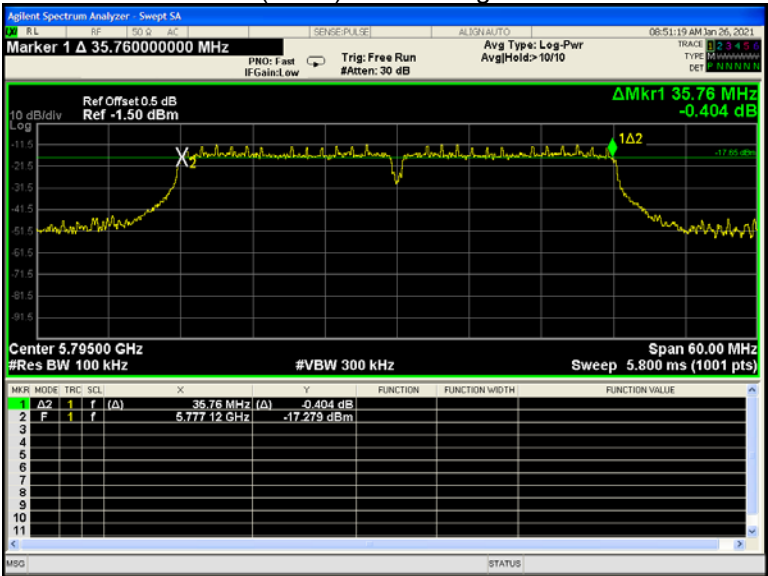
802.11n(HT20) U-NII-3 High channel



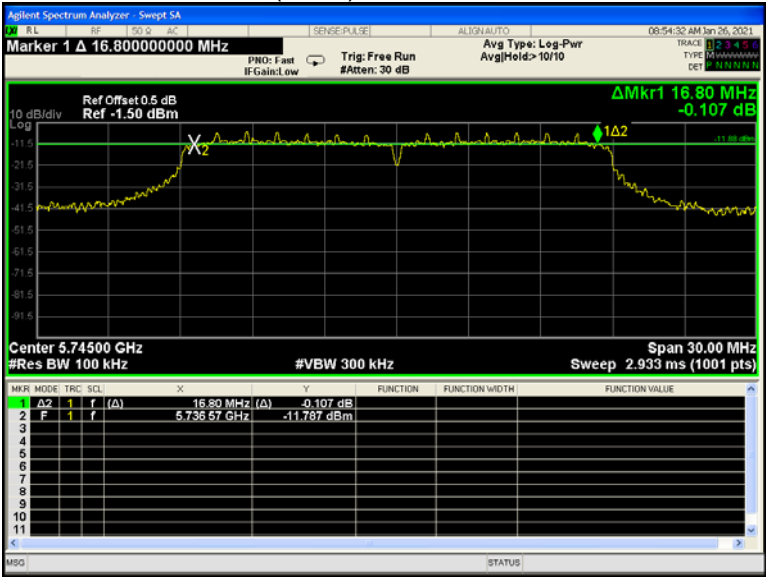
802.11n(HT40) U-NII-3 Low channel



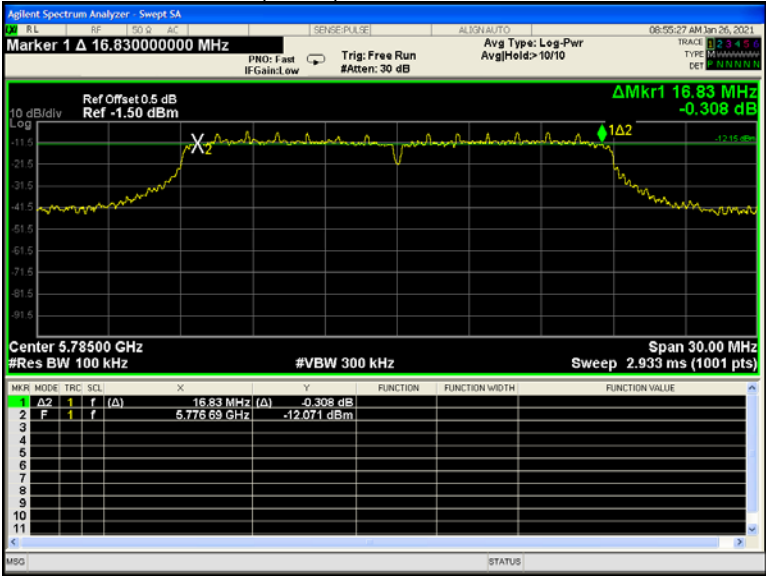
802.11n(HT40) U-NII-3 High channel



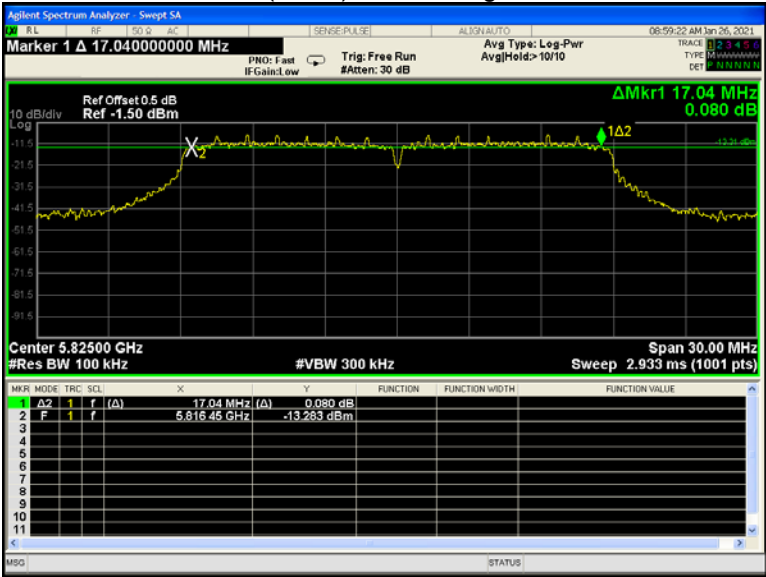
802.11ac(HT20) U-NII-3 Low channel



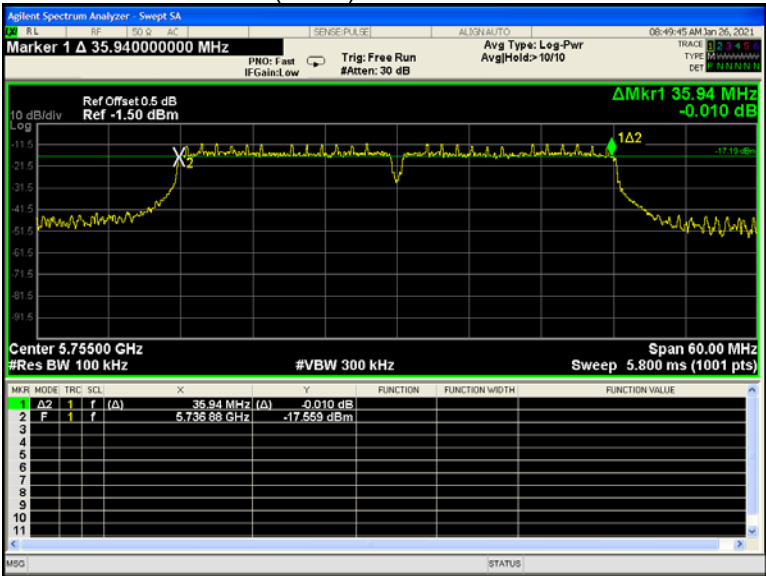
802.11ac(HT20) U-NII-3 Middle channel



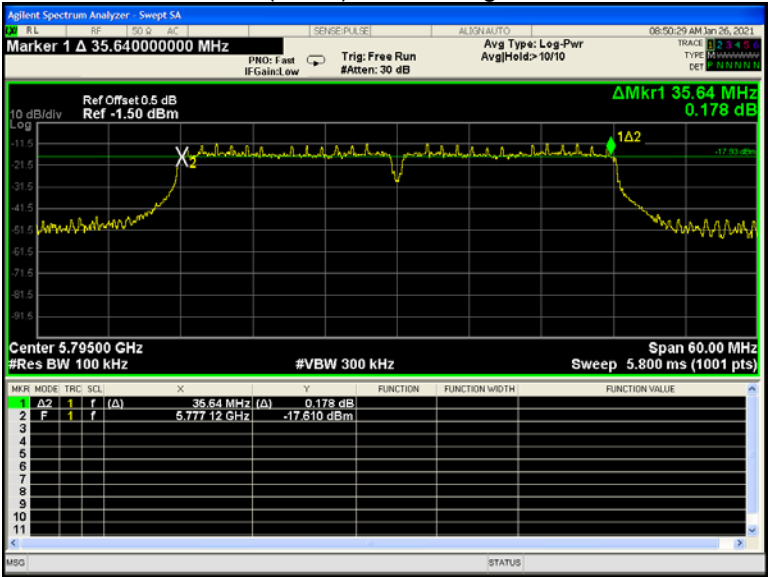
802.11ac(HT20) U-NII-3 High channel



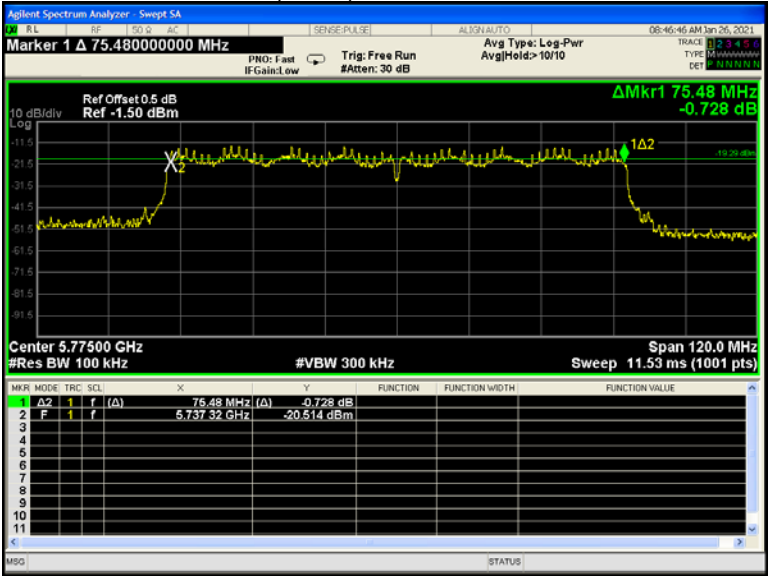
802.11ac(HT40) U-NII-3 Low channel



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



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



11 26 dB Bandwidth and 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.407 (a) KDB662911 D01 Multiple Transmitter Output v02r01
Test Method:	KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Section D
Test Limit:	No restriction limits
Test Result:	PASS

11.1 Test Procedure:

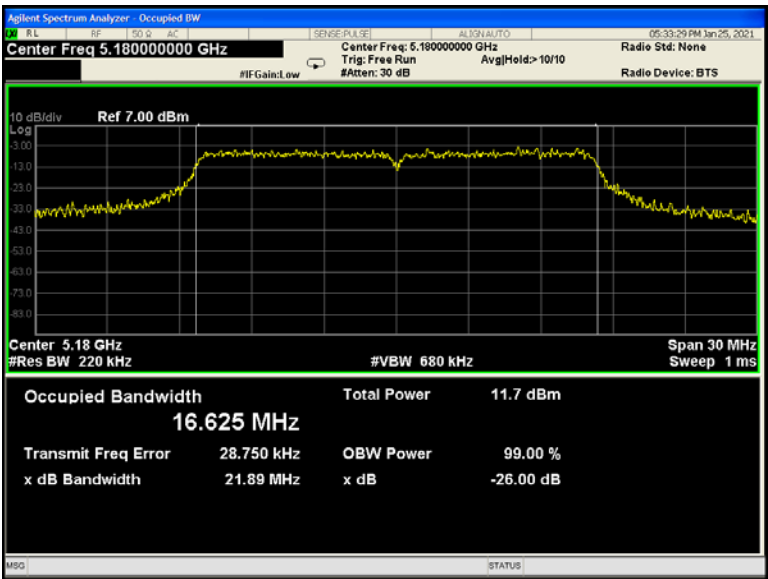
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 1% to 5% of the OBW, VBW = 3x RBW

11.2 Test Result:

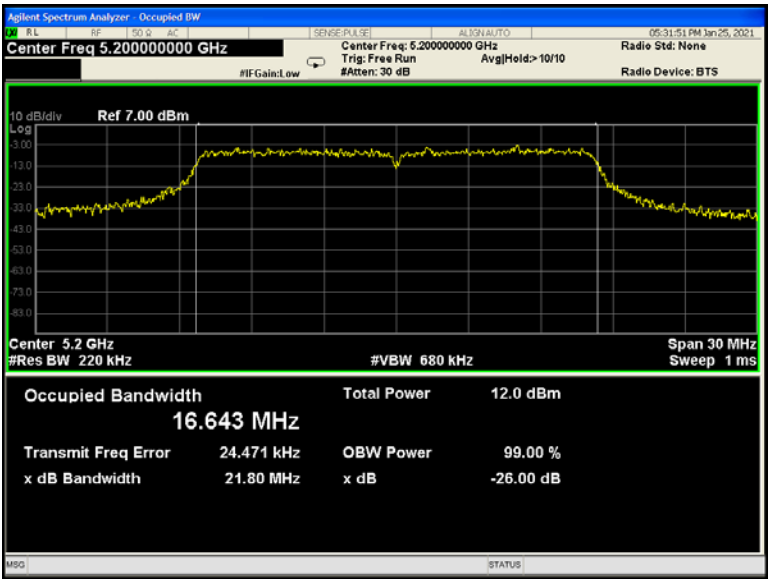
Band	Operation mode	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
		Low	Middle	High	Low	Middle	High
U-NII-1	802.11a	21.89	21.80	22.25	16.625	16.643	16.626
	802.11n(HT20)	23.71	25.95	21.20	17.710	17.717	17.678
	802.11n(HT40)	41.60	/	58.32	36.246	/	36.294
	802.11ac(HT20)	22.28	26.16	21.09	17.711	17.760	17.678
	802.11ac(HT40)	41.70	/	54.68	36.230	/	36.362
	802.11ac(HT80)	80.91	/	/	75.487	/	/
U-NII-3	802.11a	20.54	20.47	20.26	16.567	16.574	16.579
	802.11n(HT20)	21.82	20.99	20.89	17.670	17.675	17.646
	802.11n(HT40)	40.18	/	40.54	36.034	/	36.037
	802.11ac(HT20)	21.50	21.20	20.95	17.659	17.668	17.651
	802.11ac(HT40)	40.44	/	40.19	36.052	/	36.045
	802.11ac(HT80)	79.01	/	/	75.369	/	/

Test result plots shown as follows:

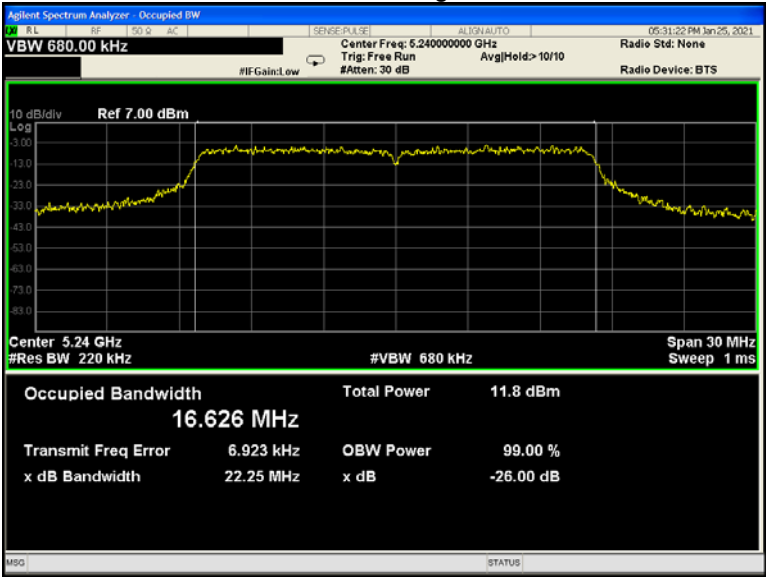
802.11a U-NII-1 Low channel



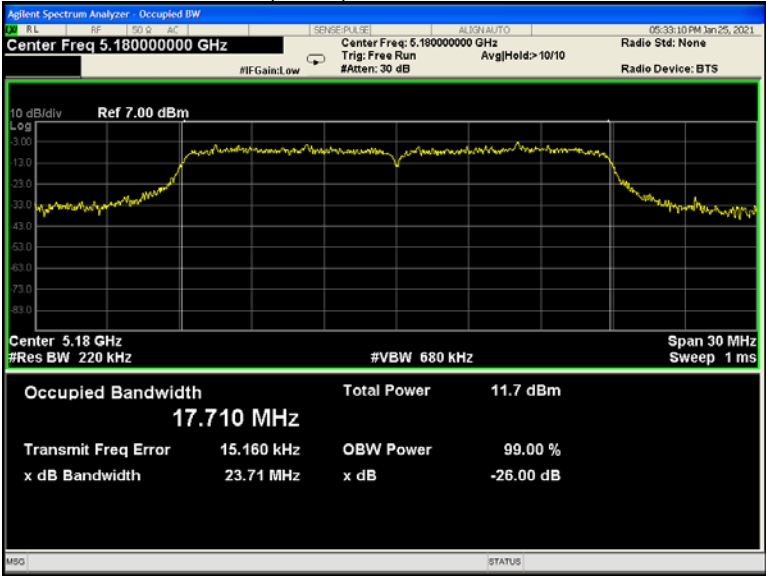
802.11a U-NII-1 Middle channel



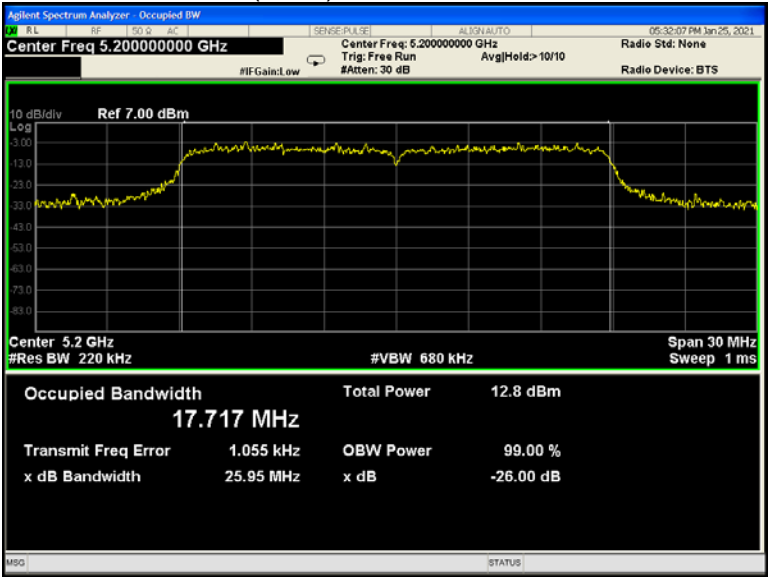
802.11a U-NII-1 High channel



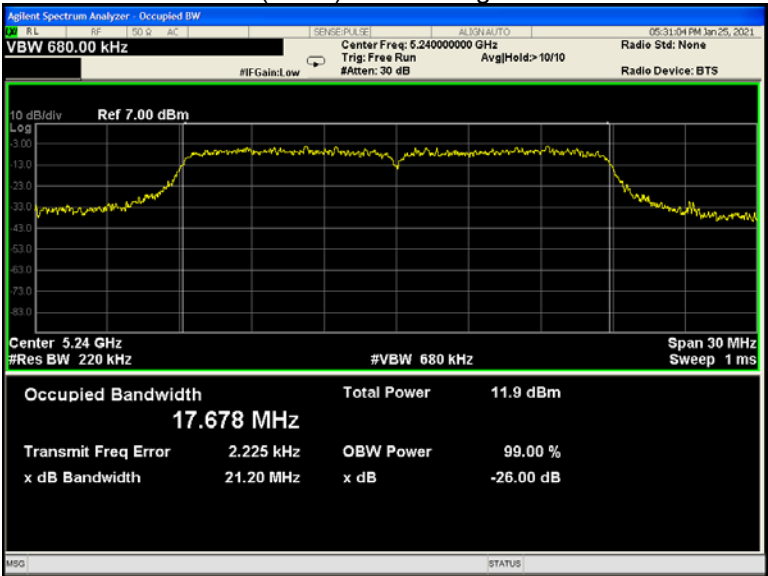
802.11n(HT20) U-NII-1 Low channel



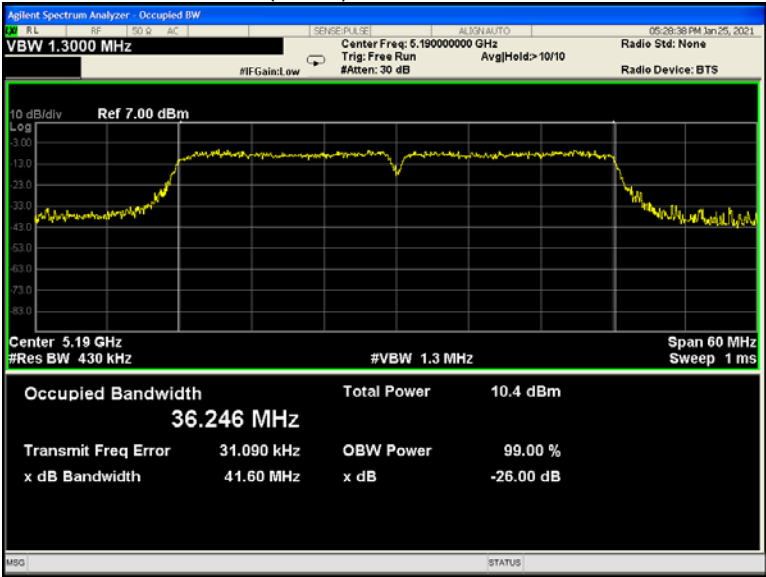
802.11n(HT20) U-NII-1 Middle channel



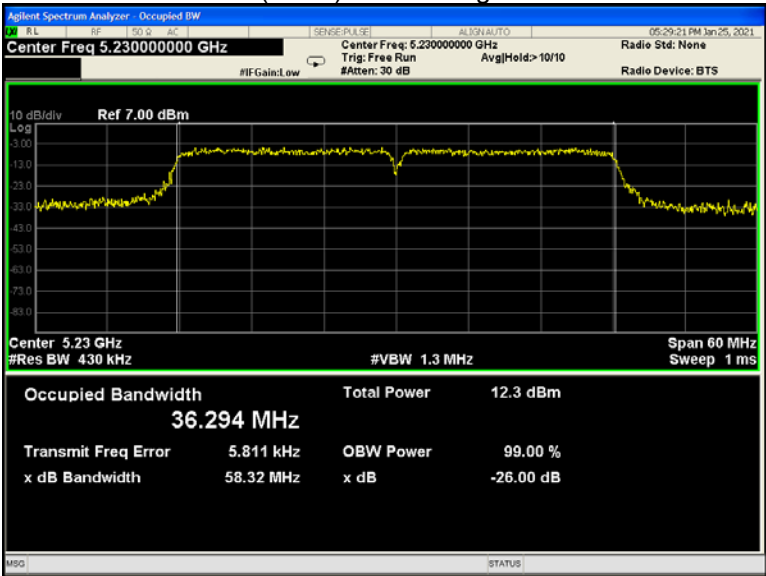
802.11n(HT20) U-NII-1 High channel



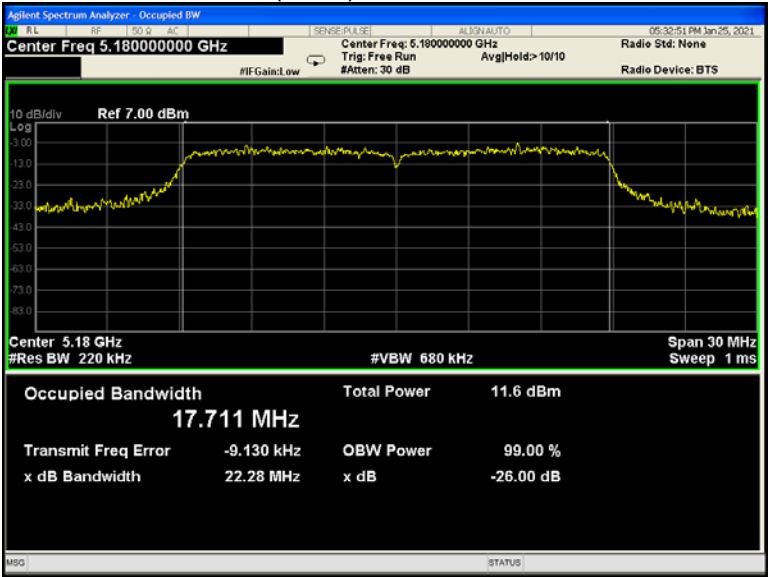
802.11n(HT40) U-NII-1 Low channel



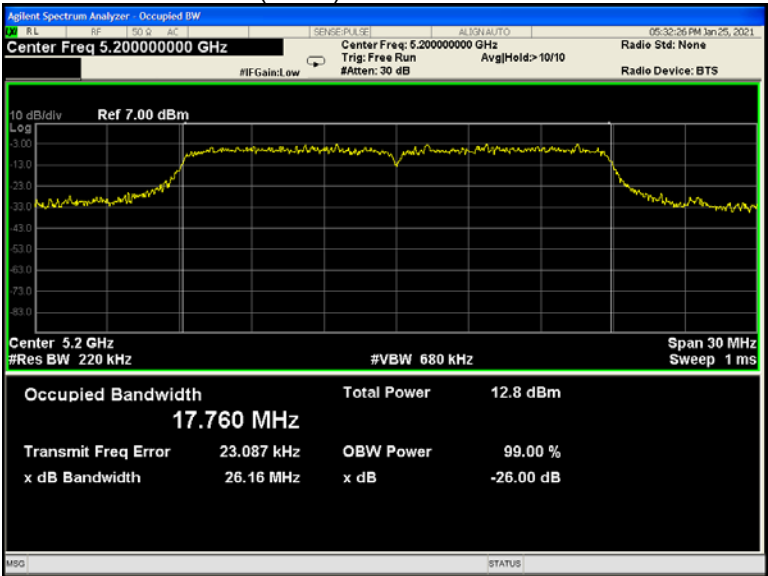
802.11n(HT40) U-NII-1 High channel



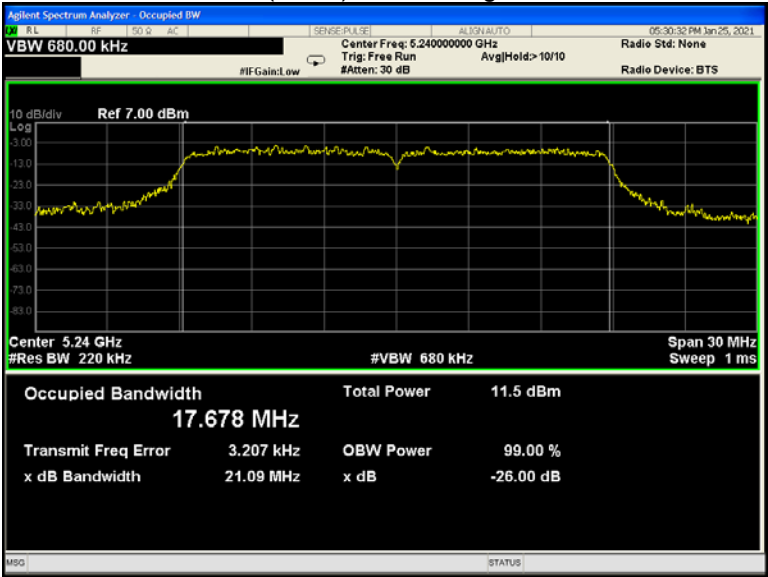
802.11ac(HT20) U-NII-1 Low channel



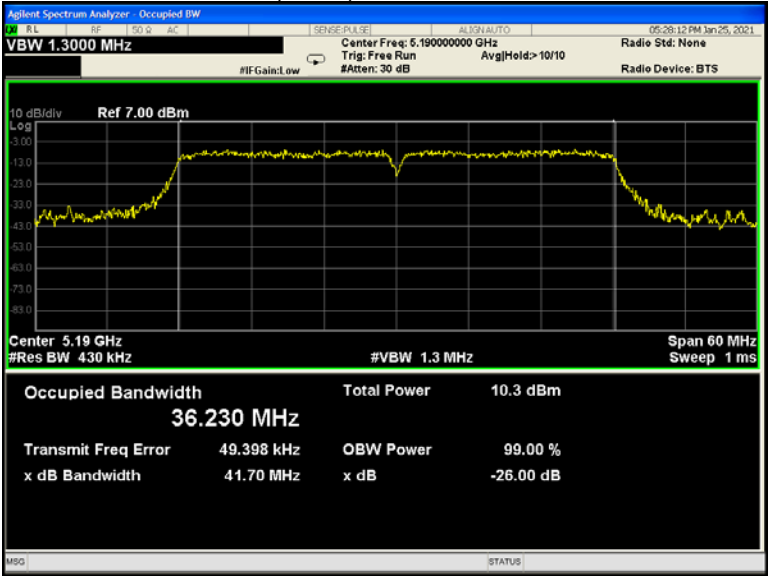
802.11ac(HT20) U-NII-1 Middle channel



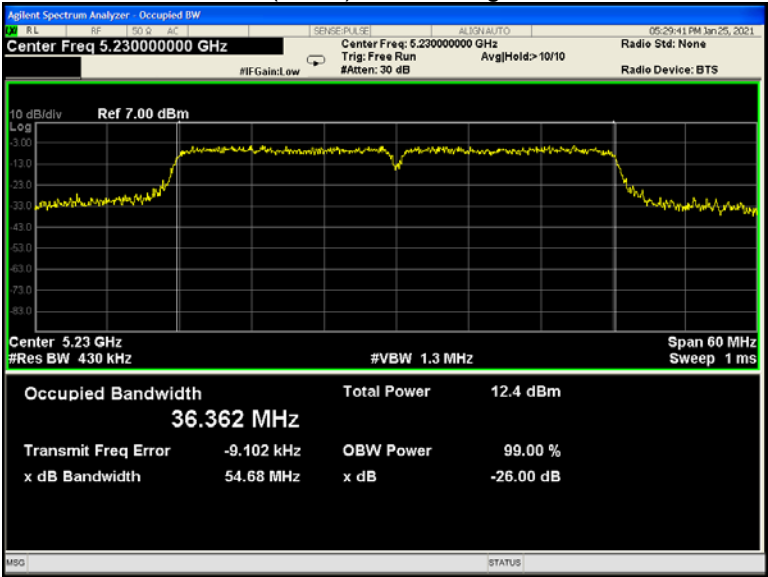
802.11ac(HT20) U-NII-1 High channel



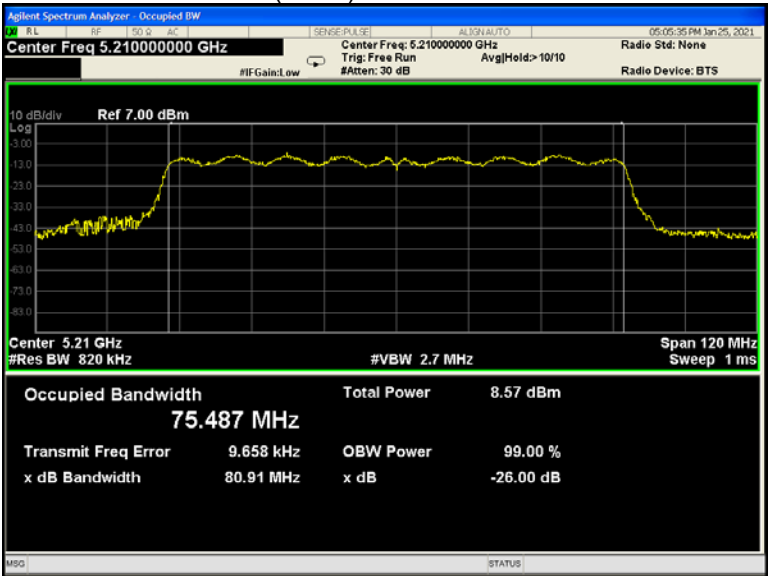
802.11ac(HT40) U-NII-1 Low channel



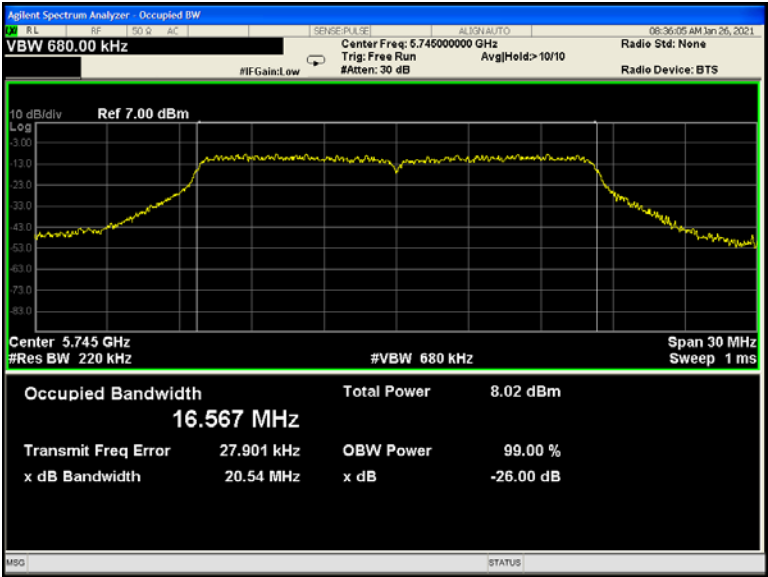
802.11 ac(HT40) U-NII-1 High channel



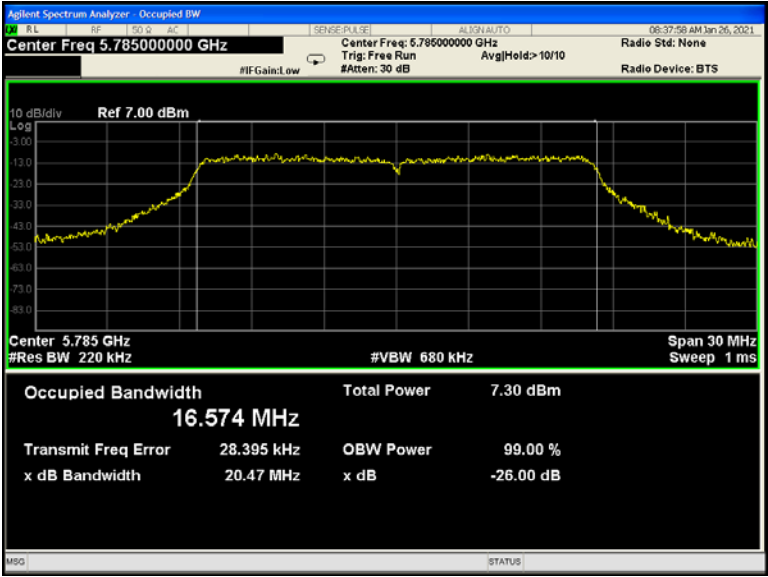
802.11ac(HT80) U-NII-1 Low channel



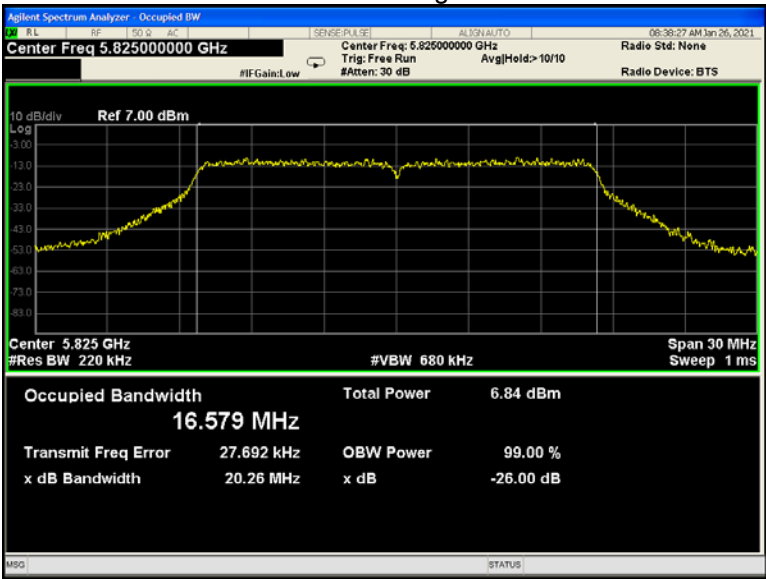
802.11a U-NII-3 Low channel



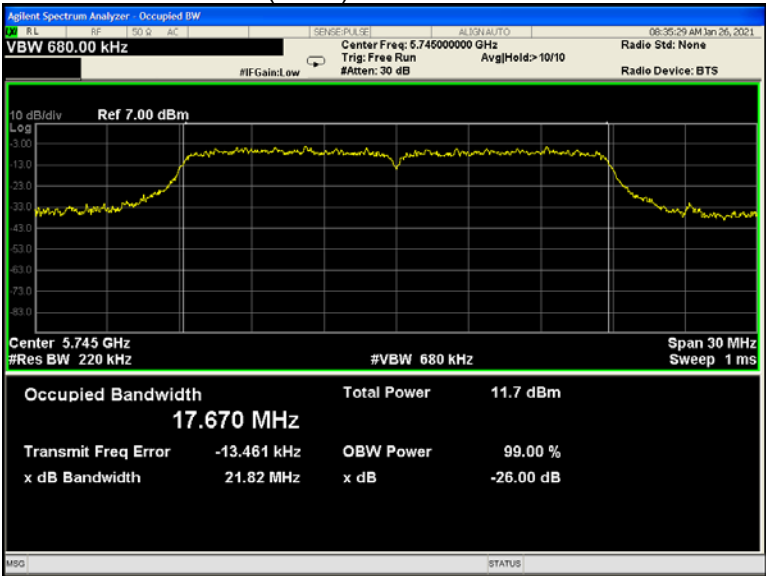
802.11a U-NII-3 Middle channel



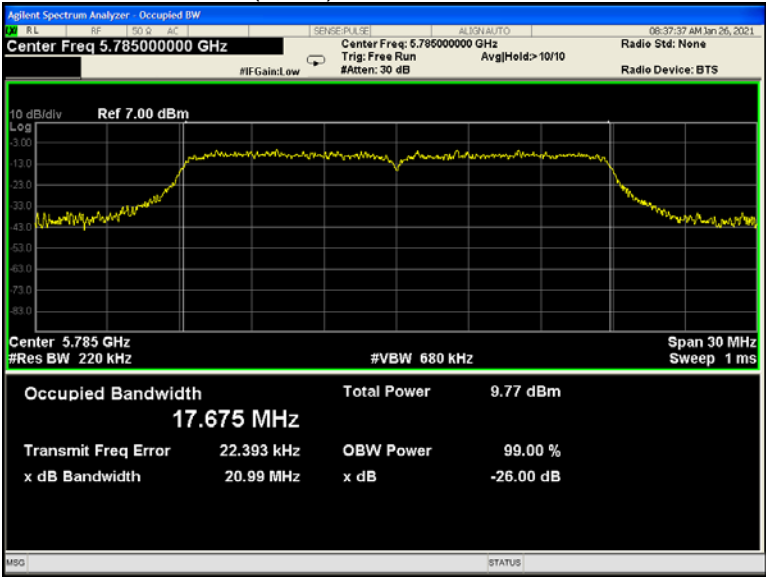
802.11a U-NII-3 High channel



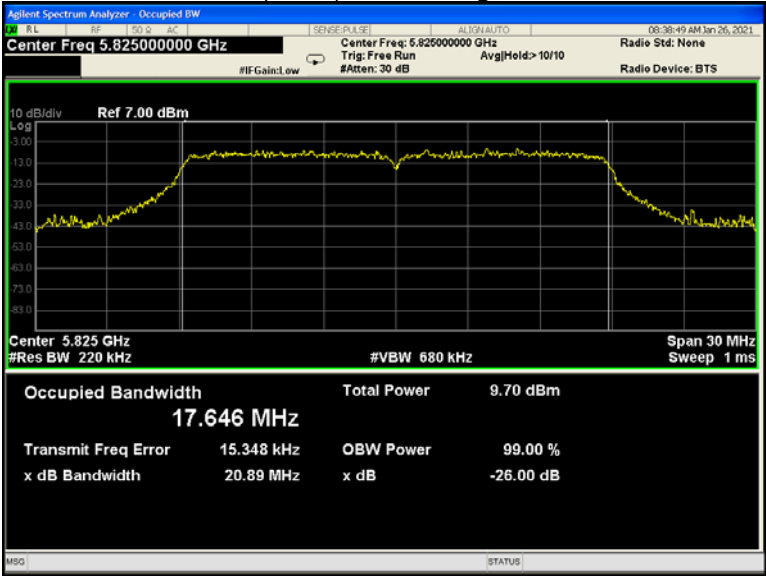
802.11n(HT20) U-NII-3 Low channel



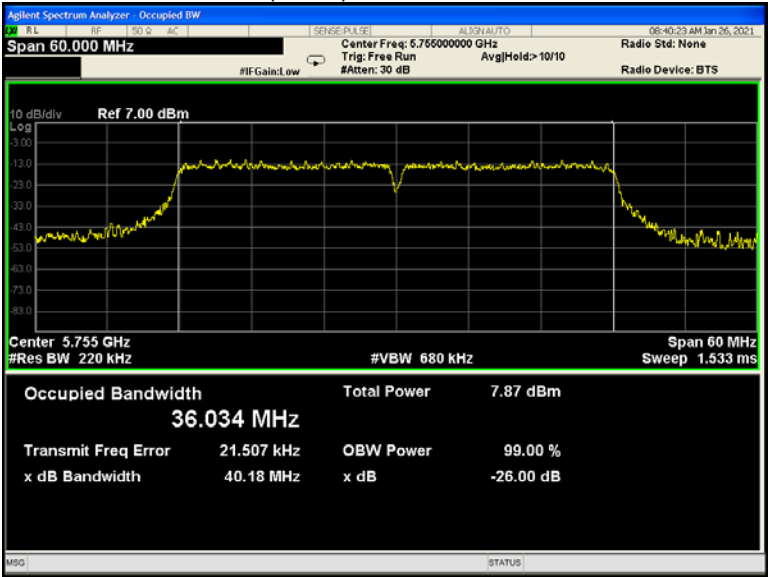
802.11n(HT20) U-NII-3 Middle channel



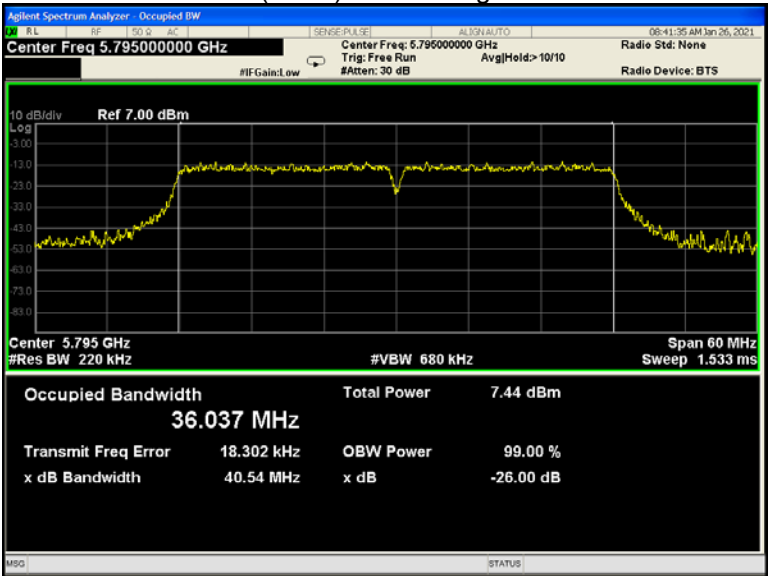
802.11n(HT20) U-NII-3 High channel



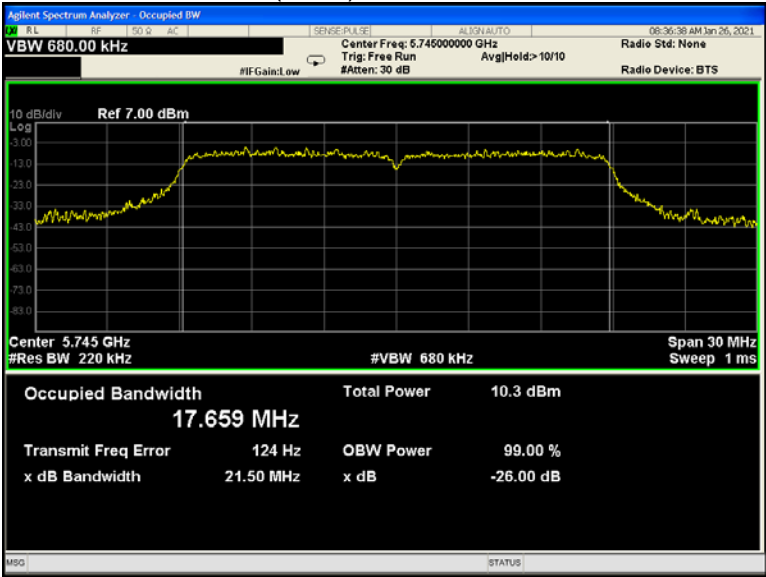
802.11n(HT40) U-NII-3 Low channel



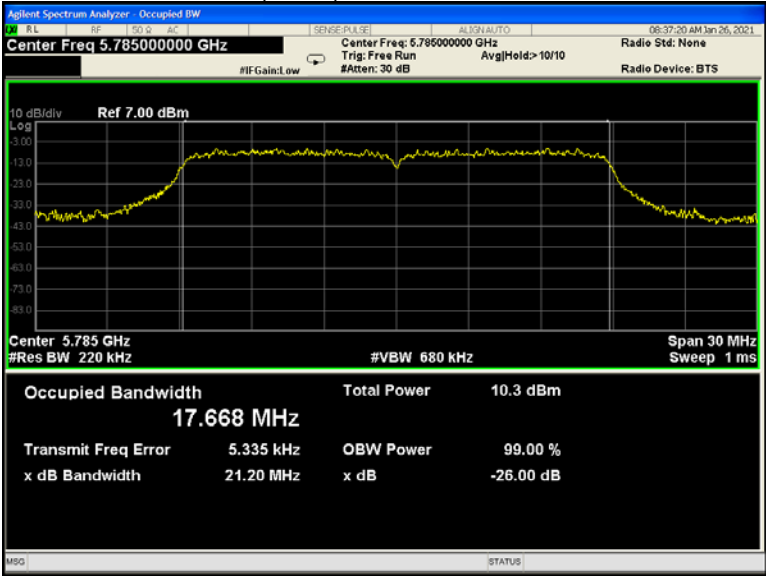
802.11n(HT40) U-NII-3 High channel



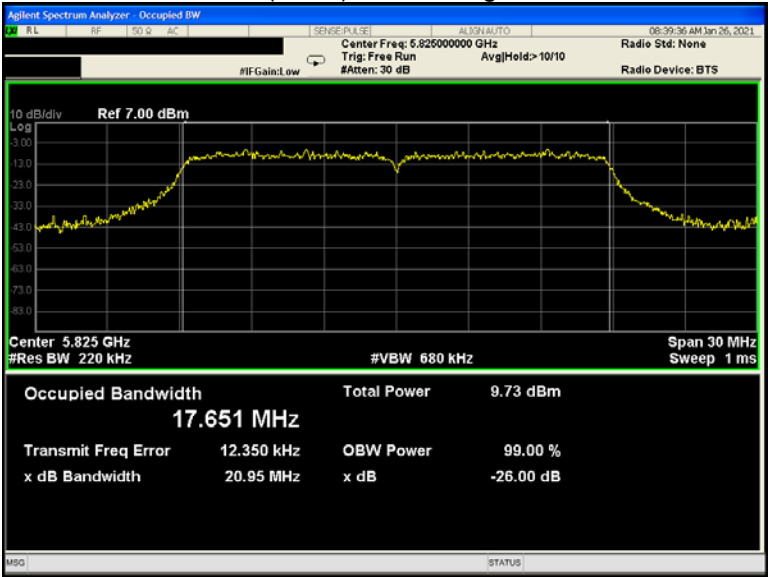
802.11ac(HT20) U-NII-3 Low channel



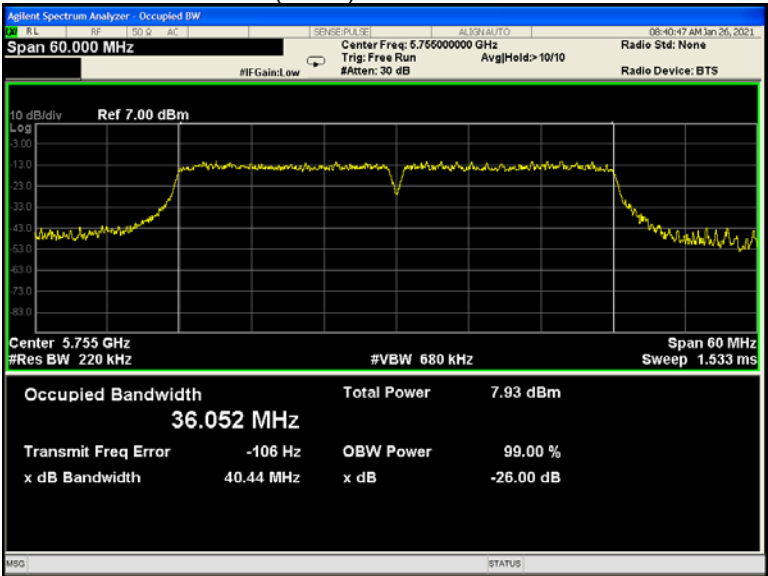
802.11ac(HT20) U-NII-3 Middle channel



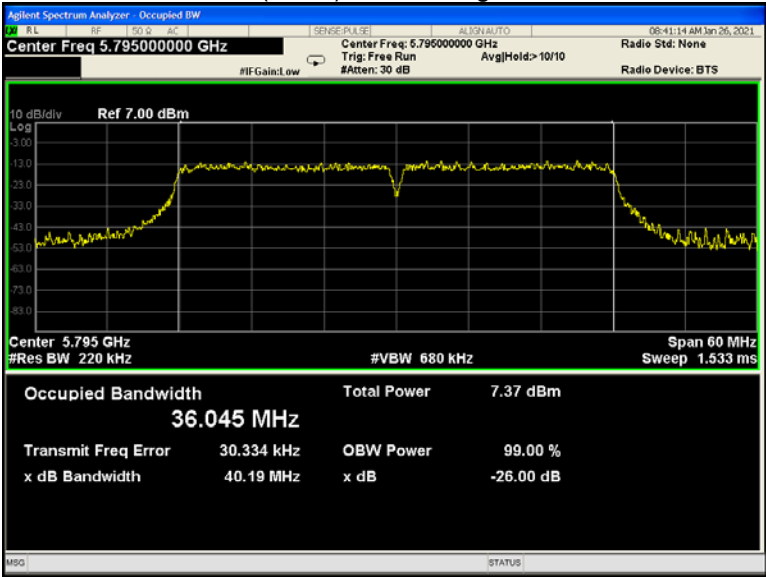
802.11ac(HT20) U-NII-3 High channel



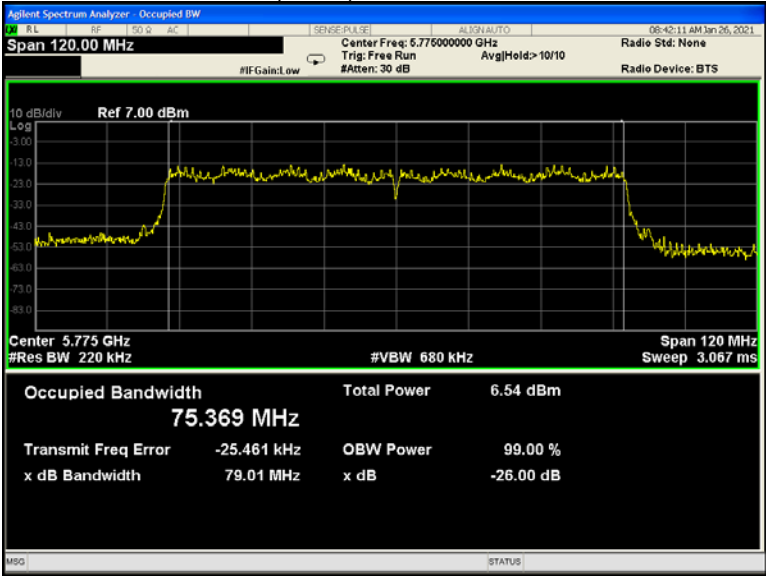
802.11ac(HT40) U-NII-3 Low channel



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



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



12 Conducted Output Power

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

12.1 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.

12.2 Test Result :

Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-1	802.11a	11.52	11.50	11.00
	802.11n(HT20)	11.47	11.84	10.48
	802.11n(HT40)	10.52	/	10.36
	802.11ac(HT20)	11.54	12.21	10.70
	802.11ac(HT40)	10.21	/	10.15
	802.11ac(HT80)	8.35	/	/
U-NII-3	802.11a	6.71	5.97	5.61
	802.11n(HT20)	8.80	8.65	8.57
	802.11n(HT40)	7.14	/	6.27
	802.11ac(HT20)	8.81	8.34	8.27
	802.11ac(HT40)	7.37	/	6.58
	802.11ac(HT80)	5.78	/	/

* 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.