TEST REPORT

Reference No.	:	WTS18S04108384W
FCC ID	:	XOMEL231WL
Applicant	:	Shenzhen Qiyue Optronics Company Limited
Address	:	Flat3,Tower 3, Excellence Meilin Center Plaza, Zhongkang Road 128, Shangmeilin, Futian District, Shenzhen ,China
Manufaturer	:	SHENZHEN QIYUE OPTRONICS COMPANY LIMITED BRANCH
Address	:	SEIYU INDUSTRIAL PARK,DA SAN VILLAGE,DA SHUI KENG,GUANLAN TOWN,LONGHUA NEW DISTRICT,SHENZHEN,P.R.C
Product	:	Electronic Shelf Display
Model(s)	:	EL231WLBC0HWWW, EL231WL, XXXXXXXXXX23XXXXXXXXXXXX (Where “X” can be any alphanumeric of a-z, A-Z or 0-9 or blank or-)
Standards	:	FCC CFR47 Part 15 C Section 15.407: 2017
Date of Receipt sample	:	2018-04-13
Date of Test	:	2018-04-29 to 2018-05-03
Date of Issue	:	2018-05-05
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.

Prepared By:
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Philo Zhong / Manager

2 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation) of USA, Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CEC(California energy efficiency), IC(Industry Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek(ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.

Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

2.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note
USA	**A2LA (Certificate No.: 4243.01)**	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India	**International Services**	WPC	-
Thailand		NTC	-
Singapore		IDA	-

Note:

1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.
2. IC Canada Registration No.: 7760A

B.TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of …	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

3 Revision History

Test report #	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS18S04108384W	2018-04-13	2018-04-29 to2018-05-03	2018-05-05	Original	-	Valid

4 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207(a)	PASS
Radiated Emissions	15.407(a) 15.205(a) 15.209(a)	PASS
Duty Cycle	KDB 789033	PASS
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

5 Contents

6 General Information

6.1 General Description of E.U.T

Product:	Electronic Shelf Display
Model(s):	EL231WLBC0HWWW, EL231WL, XXXXXXXXXX23XXXXXXXXXXXX (Where “X” can be any alphanumeric of a-z, A-Z or 0-9 or blank or-)
Model Description:	Only the model names are different. The model EL231WLBC0HWWW is the test sample.
Operation Frequency:	IEEE 802.11a/ n(HT20/40)/ac(HT20/40/80): 5150MHz to 5250MHz
	IEEE 802.11a/ n(HT20/40)/ac(HT20/40/80): 5725MHz to 5850MHz
Type of modulation:	IEEE for 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM)
	IEEE for 802.11n : OFDM(BPSK/QPSK/16QAM/64QAM)
	IEEE for 802.11ac : OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)
The Lowest Oscillator:	32.768KHz
Antenna installation:	Internal Antenna
Antenna Gain:	3dBi

6.2 Details of E.U.T

Ratings	Input: 100-240V~, 50/60Hz, 0.3A
Adapter	Model: A1812_SM

6.3 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	5785
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

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%.

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

7 Equipment Used during Test

7.1 Equipments List

Conducted Emissions Test Site

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	2017-09-12	2018-09-11
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2017-09-12	2018-09-11
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2017-09-12	2018-09-11
4.	Cable	LARGE	RF300	-	2017-09-12	2018-09-11

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2018-04-29	2019-04-28
2	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2018-04-09	2019-04-08
3	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2018-04-13	2019-04-12
4	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	EW02014-7	2018-04-13	2019-04-12
5	Spectrum Analyzer	R&S	FSP40	100501	2017-10-20	2018-10-19
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2017-09-14	2018-09-13
7	Microwave Broadband Preamplifier	SCHWARZBECK	BBV 9721	100472	2017-10-25	2018-10-24
8	Cable	Top	18GHz-40GHz	-	2017-10-25	2018-10-24

3m Semi-anechoic Chamber for Radiation Emissions Test site

Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2018-04-13	2019-04-12
2	Ative Loop Antenna	Beijing Dazhi	ZN30900A	-	2017-10-17	2018-10-16
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2018-04-08	2019-04-07
4	Amplifier	ANRITSU	MH648A	M43381	2018-04-13	2019-04-12
5	Cable	HUBER+SUHNER	CBL2	525178	2018-04-13	2019-04-12
6	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2017-09-12	2018-09-11

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	2017-09-14	2018-09-13
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2017-09-12	2018-09-11

3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2017-09-12	2018-09-11
4.	Coaxial Cable (10Hz-30GHz)	/	/	/	2017-09-12	2018-09-11
5.	Antenna Connector*	/	/	/	2017-09-12	2018-09-11

"*": The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

7.2 Description of Support Units

Equipment	Manufaturer	Model No.	Series No.
/	/	/	/

7.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 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 (A mains 150KHz~30MHz)

7.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave,Tianhe District, Guangzhou, Guangdong, China.

8 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dBμV between 0.15MHz & 0.5MHz
	56 dBμV between 0.5MHz & 5MHz
	60 dBμV between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

8.1 E.U.T. Operation

Operating Environment **:**

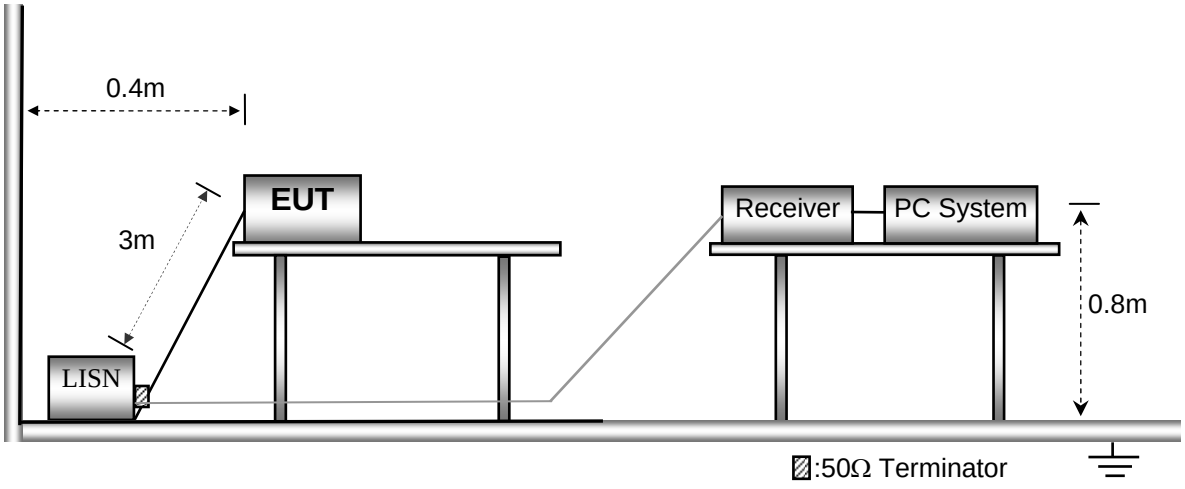
Temperature:	21.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa
EUT Operation **:**	Transmitting mode

The test was performed in Transmitting mode(For WIFI), Only the worst case 802.11a mode were record in the report.

8.2 EUT Setup

The conducted emission tests were performed using the setup acordance with the

ANSI C63.10:2013.



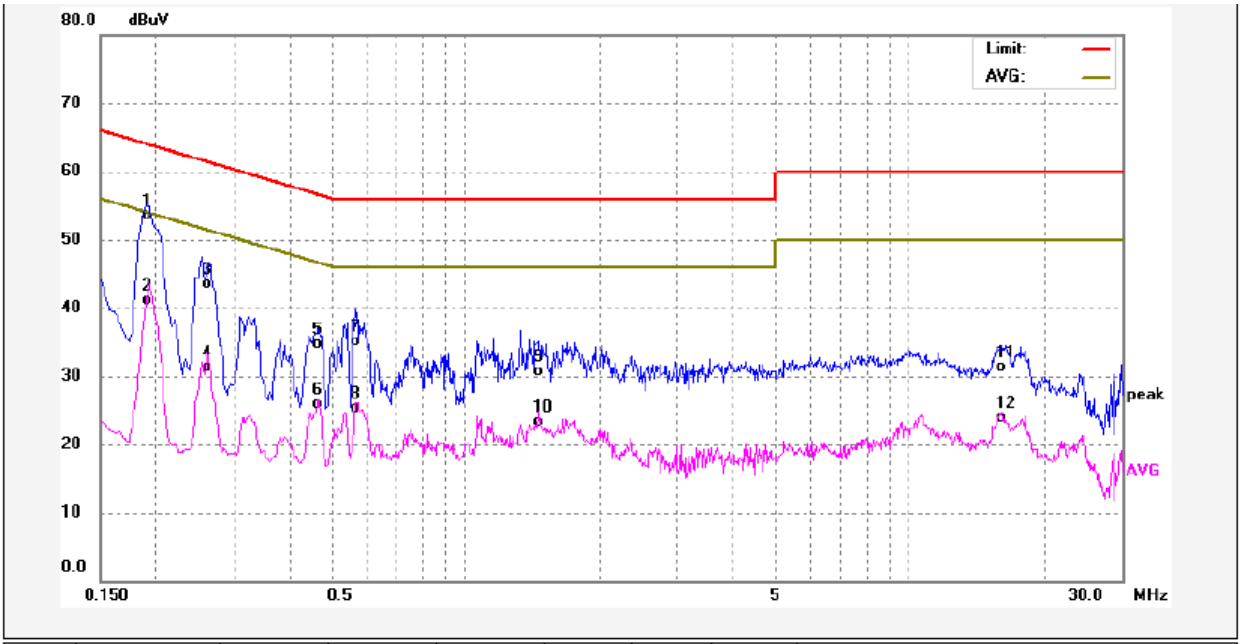
8.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

8.4 Conducted Emission Test Result

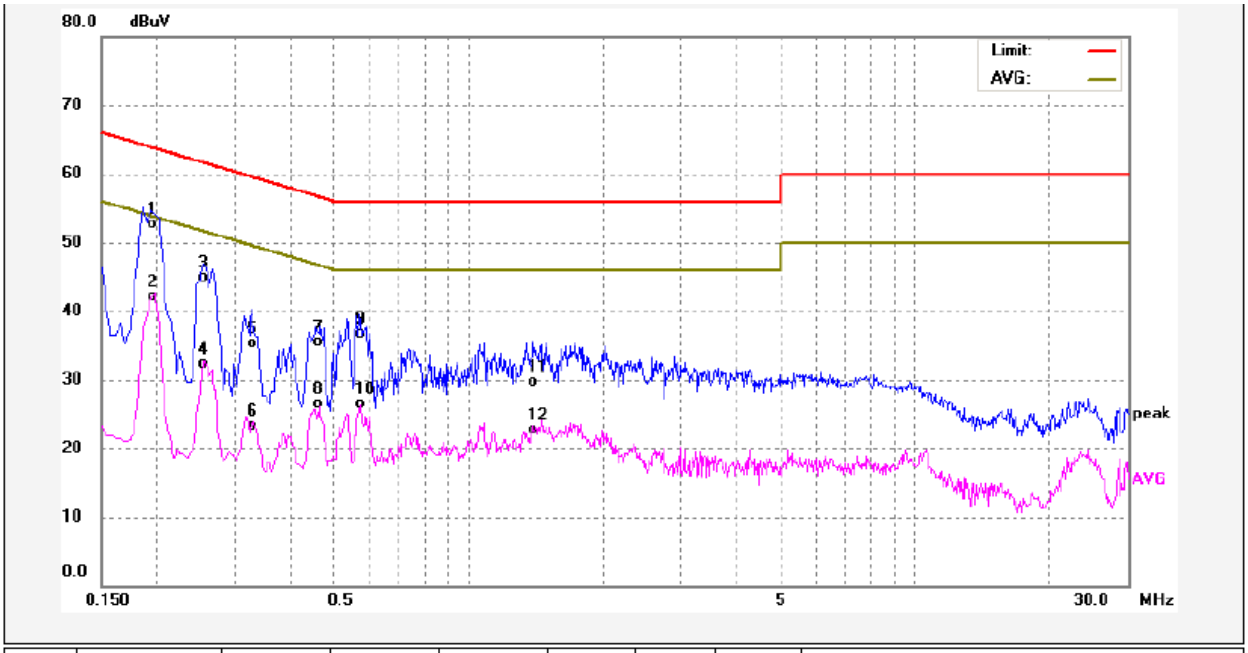
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1900	37.66	15.82	53.48	64.03	-10.55	QP	
2	0.1900	25.36	15.82	41.18	54.03	-12.85	AVG	
3	0.2620	25.53	17.92	43.45	61.36	-17.91	QP	
4	0.2620	13.43	17.92	31.35	51.36	-20.01	AVG	
5	0.4660	12.75	21.99	34.74	56.58	-21.84	QP	
6	0.4660	3.84	21.99	25.83	46.58	-20.75	AVG	
7	0.5660	12.14	23.05	35.19	56.00	-20.81	QP	
8	0.5660	2.21	23.05	25.26	46.00	-20.74	AVG	
9	1.4540	5.25	25.42	30.67	56.00	-25.33	QP	
10	1.4540	-2.09	25.42	23.33	46.00	-22.67	AVG	
11	16.1220	5.45	25.76	31.21	60.00	-28.79	QP	
12	16.1220	-1.87	25.76	23.89	50.00	-26.11	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1940	36.63	16.05	52.68	63.86	-11.18	QP	
2	0.1940	26.03	16.05	42.08	53.86	-11.78	AVG	
3	0.2540	27.28	17.72	45.00	61.62	-16.62	QP	
4	0.2540	14.66	17.72	32.38	51.62	-19.24	AVG	
5	0.3260	15.88	19.49	35.37	59.55	-24.18	QP	
6	0.3260	3.79	19.49	23.28	49.55	-26.27	AVG	
7	0.4660	13.56	21.99	35.55	56.58	-21.03	QP	
8	0.4660	4.45	21.99	26.44	46.58	-20.14	AVG	
9	0.5700	13.62	23.09	36.71	56.00	-19.29	QP	
10	0.5700	3.42	23.09	26.51	46.00	-19.49	AVG	
11	1.4020	4.25	25.38	29.63	56.00	-26.37	QP	
12	1.4020	-2.73	25.38	22.65	46.00	-23.35	AVG	

9 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(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
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	$20\log^{(500)}$

9.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

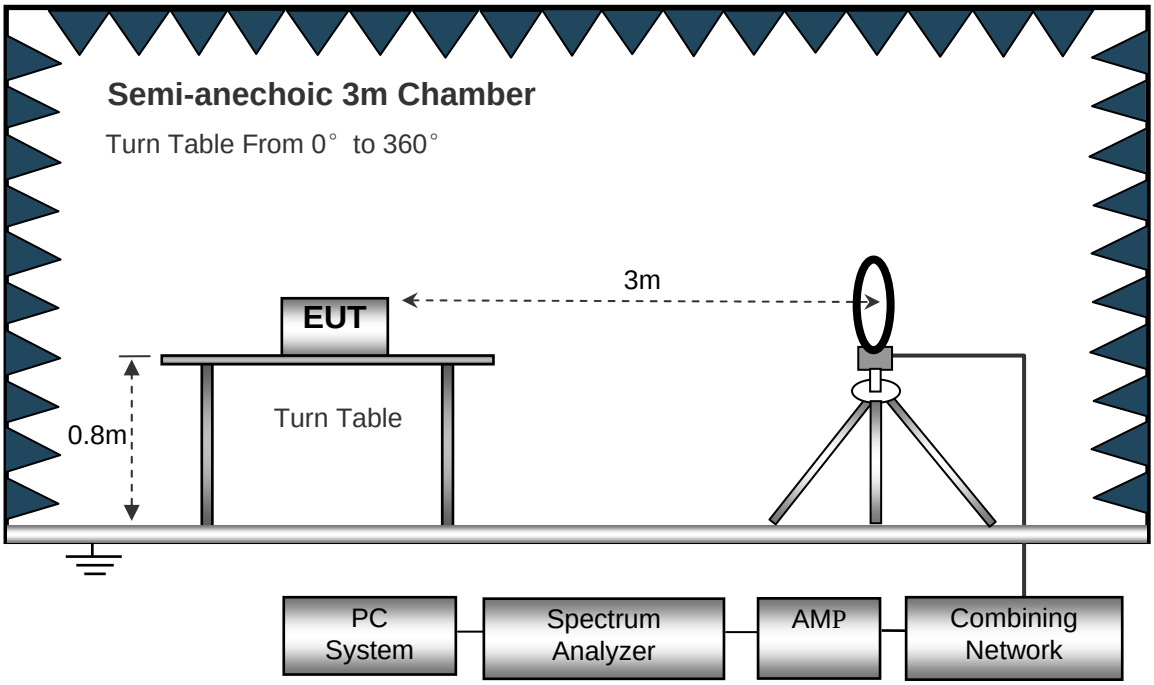
EUT Operation **:**

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

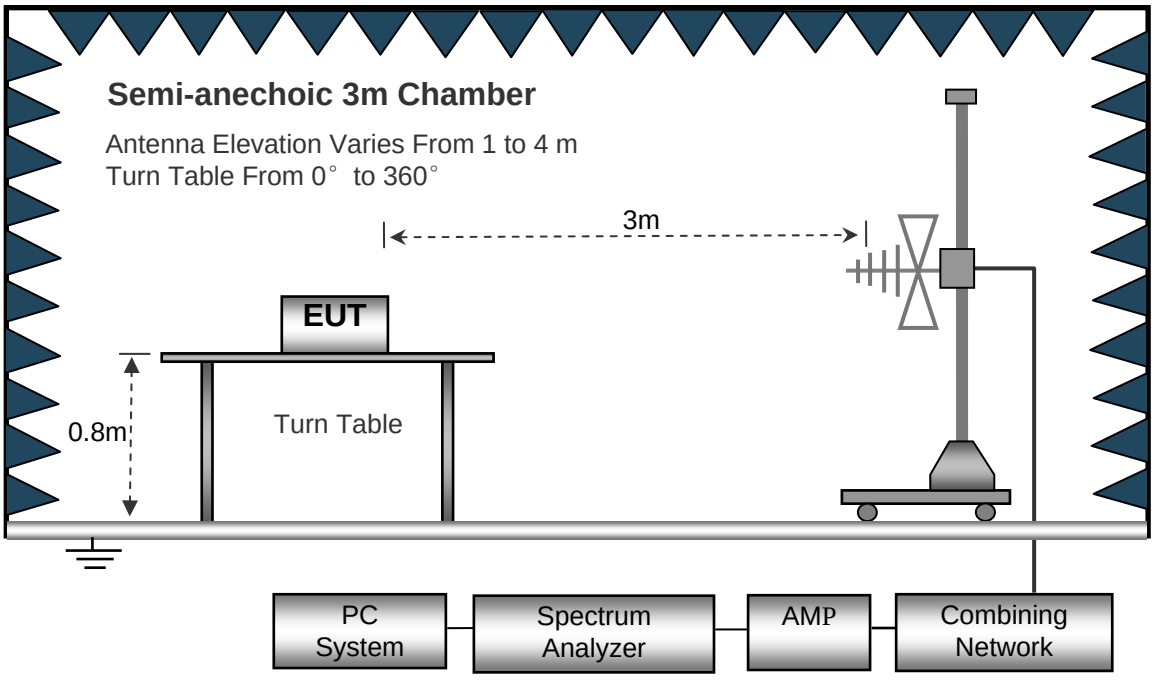
9.2 Test Setup

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

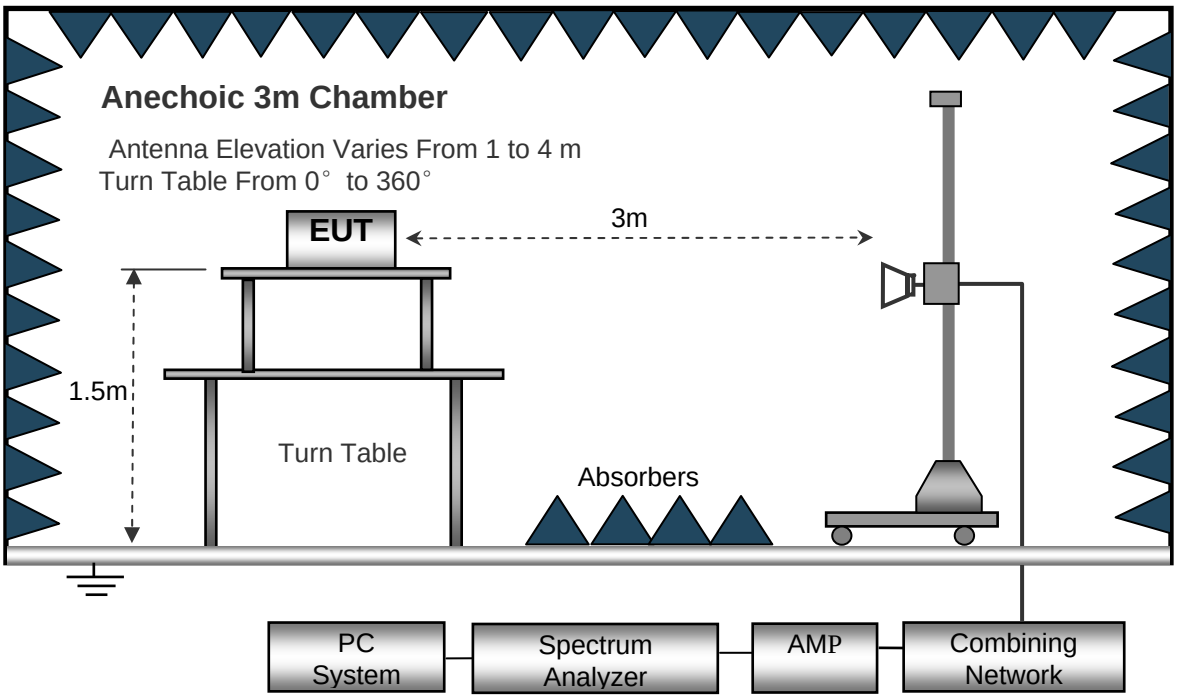
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

Below 30MHz

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

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

9.4 Test Procedure

1. The EUT is plaed 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, eah 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 druing radiated emissions above 1GHz measurement.

9.5 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Antenna Fator + Cable Fator - 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:

Margin = Corr. Ampl. – Limit

9.6 Summary of Test Results

FCC Part15.33: For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph: If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Fator	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									
226.32	46.17	QP	174	1.3	H	-11.25	34.92	46.00	-11.08
226.32	45.94	QP	235	1.4	V	-11.25	34.69	46.00	-11.31
4503.85	45.07	PK	345	1.5	H	-1.54	43.53	74.00	-30.47
4503.85	39.77	Ave	345	1.5	H	-1.54	38.23	54.00	-15.77
5135.47	43.61	PK	55	1.0	H	-0.75	42.86	74.00	-31.14
5135.47	45.39	Ave	55	1.0	H	-0.75	44.64	54.00	-9.36
10360.00	38.96	PK	303	1.1	H	5.33	44.29	74.00	-29.71
10360.00	24.06	Ave	303	1.1	H	5.33	29.39	54.00	-24.61
15540.00	44.83	PK	18	1.0	H	5.29	50.12	74.00	-23.88
15540.00	37.27	Ave	18	1.0	H	5.29	42.56	54.00	-11.44
802.11n(HT20) U-NII-1 middle channel 5200MHz									
226.94	43.04	QP	267	1.7	H	-10.96	32.08	46.00	-13.92
226.94	46.74	QP	204	1.6	V	-10.96	35.78	46.00	-10.22
4509.36	46.33	PK	311	1.1	H	-1.64	44.69	74.00	-29.31
4509.36	42.96	Ave	311	1.1	H	-1.64	41.32	54.00	-12.68
5133.87	43.96	PK	106	1.9	H	-0.91	43.05	74.00	-30.95
5133.87	43.45	Ave	106	1.9	H	-0.91	42.54	54.00	-11.46
10400.00	39.09	PK	16	1.5	H	5.21	44.30	74.00	-29.70
10400.00	23.02	Ave	16	1.5	H	5.21	28.23	54.00	-25.77
15600.00	45.31	PK	147	1.6	H	5.30	50.61	74.00	-23.39
15600.00	39.57	Ave	147	1.6	H	5.30	44.87	54.00	-9.13

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Fator	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									
226.68	44.08	QP	239	1.8	H	-10.97	33.11	46.00	-12.89
226.68	44.10	QP	328	1.7	V	-10.97	33.13	46.00	-12.87
4510.78	42.80	PK	18	1.9	H	-1.56	41.24	74.00	-32.76
4510.78	43.58	Ave	18	1.9	H	-1.56	42.02	54.00	-11.98
5128.12	43.05	PK	278	1.6	H	-0.81	42.24	74.00	-31.76
5128.12	44.73	Ave	278	1.6	H	-0.81	43.92	54.00	-10.08
10480.00	41.15	PK	189	1.9	H	5.14	46.29	74.00	-27.71
10480.00	22.34	Ave	189	1.9	H	5.14	27.48	54.00	-26.52
15720.00	45.44	PK	184	1.3	H	5.10	50.54	74.00	-23.46
15720.00	38.11	Ave	184	1.3	H	5.10	43.21	54.00	-10.79
802.11n(HT20) U-NII-3 low Channel 5745MHz									
227.25	46.46	QP	63	1.8	H	-10.99	35.47	46.00	-10.53
227.25	44.74	QP	355	1.3	V	-10.99	33.75	46.00	-12.25
4529.59	44.01	PK	89	1.7	H	-1.80	42.21	74.00	-31.79
4529.59	40.13	Ave	89	1.7	H	-1.80	38.33	54.00	-15.67
5141.43	40.20	PK	326	2.0	H	-0.96	39.24	74.00	-34.76
5141.43	24.12	Ave	326	2.0	H	-0.96	23.16	54.00	-30.84
11490.00	46.47	PK	195	1.5	H	5.93	52.40	74.00	-21.60
11490.00	37.94	Ave	195	1.5	H	5.93	43.87	54.00	-10.13
17235.00	46.61	PK	39	1.8	H	10.35	56.96	74.00	-17.04
17235.00	37.25	Ave	39	1.8	H	10.35	47.60	54.00	-6.40

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Fator	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									
227.26	46.98	QP	156	1.1	H	-11.13	35.85	46.00	-10.15
227.26	46.00	QP	127	1.6	V	-11.13	34.87	46.00	-11.13
4510.69	42.91	PK	180	1.2	H	-1.59	41.32	74.00	-32.68
4510.69	41.20	Ave	180	1.2	H	-1.59	39.61	54.00	-14.39
5111.62	39.82	PK	8	1.5	H	-0.95	38.87	74.00	-35.13
5111.62	23.36	Ave	8	1.5	H	-0.95	22.41	54.00	-31.59
11570.00	46.25	PK	332	1.0	H	5.81	52.06	74.00	-21.94
11570.00	39.54	Ave	332	1.0	H	5.81	45.35	54.00	-8.65
17355.00	46.33	PK	84	1.2	H	10.37	56.70	74.00	-17.30
17355.00	38.92	Ave	84	1.2	H	10.37	49.29	54.00	-4.71
802.11n(HT20) U-NII-3 High channel 5825MHz									
227.37	46.03	QP	309	2.0	H	-11.03	35.00	46.00	-11.00
227.37	45.54	QP	261	1.4	V	-11.03	34.51	46.00	-11.49
4527.42	43.24	PK	339	1.5	H	-1.68	41.56	74.00	-32.44
4527.42	43.16	Ave	339	1.5	H	-1.68	41.48	54.00	-12.52
5127.21	41.36	PK	69	1.8	H	-0.96	40.40	74.00	-33.60
5127.21	23.98	Ave	69	1.8	H	-0.96	23.02	54.00	-30.98
11650.00	45.93	PK	129	1.1	H	5.84	51.77	74.00	-22.23
11650.00	38.55	Ave	129	1.1	H	5.84	44.39	54.00	-9.61
17475.00	45.96	PK	56	1.8	H	10.41	56.37	74.00	-17.63
17475.00	37.64	Ave	56	1.8	H	10.41	48.05	54.00	-5.95

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Fator	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(HT20) U-NII-1 low Channel 5180MHz									
227.11	46.12	QP	88	1.5	H	-11.20	34.92	46.00	-11.08
227.11	43.45	QP	334	1.5	V	-11.20	32.25	46.00	-13.75
4501.75	43.57	PK	9	1.3	H	-1.80	41.77	74.00	-32.23
4501.75	43.80	Ave	9	1.3	H	-1.80	42.00	54.00	-12.00
5115.89	41.86	PK	259	1.5	H	-0.94	40.92	74.00	-33.08
5115.89	33.54	Ave	259	1.5	H	-0.94	32.60	54.00	-21.40
10360.00	42.26	PK	243	1.5	H	5.33	47.59	74.00	-26.41
10360.00	23.89	Ave	243	1.5	H	5.33	29.22	54.00	-24.78
15540.00	43.77	PK	313	1.6	H	5.29	49.06	74.00	-24.94
15540.00	37.86	Ave	313	1.6	H	5.29	43.15	54.00	-10.85
802.11a(HT20) U-NII-1 middle channel 5200MHz									
226.86	47.22	QP	323	1.3	H	-11.15	36.07	46.00	-9.93
226.86	42.65	QP	11	1.5	V	-11.15	31.50	46.00	-14.50
4513.24	42.98	PK	216	1.3	H	-1.69	41.29	74.00	-32.71
4513.24	42.36	Ave	216	1.3	H	-1.69	40.67	54.00	-13.33
5138.48	41.67	PK	190	1.7	H	-0.91	40.76	74.00	-33.24
5138.48	44.43	Ave	190	1.7	H	-0.91	43.52	54.00	-10.48
10400.00	40.98	PK	113	1.8	H	5.21	46.19	74.00	-27.81
10400.00	22.22	Ave	113	1.8	H	5.21	27.43	54.00	-26.57
15600.00	45.60	PK	359	1.8	H	5.30	50.90	74.00	-23.10
15600.00	38.34	Ave	359	1.8	H	5.30	43.64	54.00	-10.36

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Fator	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(HT20) U-NII-1 High channel 5240MHz									
226.87	47.51	QP	69	1.0	H	-11.18	36.33	46.00	-9.67
226.87	44.27	QP	94	1.7	V	-11.18	33.09	46.00	-12.91
4501.21	43.19	PK	142	1.5	H	-1.77	41.42	74.00	-32.58
4501.21	42.93	Ave	142	1.5	H	-1.77	41.16	54.00	-12.84
5119.46	45.28	PK	211	1.7	H	-0.79	44.49	74.00	-29.51
5119.46	44.08	Ave	211	1.7	H	-0.79	43.29	54.00	-10.71
10480.00	40.59	PK	105	1.2	H	5.14	45.73	74.00	-28.27
10480.00	22.64	Ave	105	1.2	H	5.14	27.78	54.00	-26.22
15720.00	46.51	PK	77	1.3	H	5.10	51.61	74.00	-22.39
15720.00	39.34	Ave	77	1.3	H	5.10	44.44	54.00	-9.56
802.11a(HT20) U-NII-3 low Channel 5745MHz									
226.68	47.26	QP	33	1.7	H	-11.15	36.11	46.00	-9.89
226.68	45.98	QP	94	1.2	V	-11.15	34.83	46.00	-11.17
4520.90	40.81	PK	122	1.9	H	-1.64	39.17	74.00	-34.83
4520.90	40.13	Ave	122	1.9	H	-1.64	38.49	54.00	-15.51
5111.76	41.09	PK	258	2.0	H	-0.84	40.25	74.00	-33.75
5111.76	24.97	Ave	258	2.0	H	-0.84	24.13	54.00	-29.87
11490.00	45.85	PK	112	1.2	H	5.93	51.78	74.00	-22.22
11490.00	37.86	Ave	112	1.2	H	5.93	43.79	54.00	-10.21
17235.00	46.24	PK	252	1.7	H	10.35	56.59	74.00	-17.41
17235.00	37.26	Ave	252	1.7	H	10.35	47.61	54.00	-6.39

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Fator	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(HT20) U-NII-3 middle channel 5785MHz									
226.80	44.95	QP	186	1.4	H	-11.02	33.93	46.00	-12.07
226.80	44.55	QP	141	1.0	V	-11.02	33.53	46.00	-12.47
4500.54	42.92	PK	187	1.7	H	-1.63	41.29	74.00	-32.71
4500.54	43.12	Ave	187	1.7	H	-1.63	41.49	54.00	-12.51
5113.75	40.86	PK	44	1.1	H	-0.73	40.13	74.00	-33.87
5113.75	24.39	Ave	44	1.1	H	-0.73	23.66	54.00	-30.34
11570.00	46.79	PK	44	1.7	H	5.81	52.60	74.00	-21.40
11570.00	39.00	Ave	44	1.7	H	5.81	44.81	54.00	-9.19
17355.00	45.03	PK	335	1.0	H	10.37	55.40	74.00	-18.60
17355.00	37.03	Ave	335	1.0	H	10.37	47.40	54.00	-6.60
802.11a(HT20) U-NII-3 High channel 5825MHz									
227.16	46.21	QP	28	1.6	H	-11.25	34.96	46.00	-11.04
227.16	44.24	QP	186	1.7	V	-11.25	32.99	46.00	-13.01
4520.74	43.76	PK	174	1.6	H	-1.67	42.09	74.00	-31.91
4520.74	44.34	Ave	174	1.6	H	-1.67	42.67	54.00	-11.33
5111.35	41.23	PK	55	1.6	H	-0.83	40.40	74.00	-33.60
5111.35	23.54	Ave	55	1.6	H	-0.83	22.71	54.00	-31.29
11650.00	45.63	PK	33	1.4	H	5.84	51.47	74.00	-22.53
11650.00	37.62	Ave	33	1.4	H	5.84	43.46	54.00	-10.54
17475.00	45.34	PK	136	1.2	H	10.41	55.75	74.00	-18.25
17475.00	38.54	Ave	136	1.2	H	10.41	48.95	54.00	-5.05

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									
227.27	44.38	QP	18	1.9	H	-11.20	33.18	46.00	-12.82
227.27	44.29	QP	147	1.1	V	-11.20	33.09	46.00	-12.91
4510.10	40.59	PK	102	1.7	H	-1.50	39.09	74.00	-34.91
4510.10	39.31	Ave	102	1.7	H	-1.50	37.81	54.00	-16.19
5122.62	46.54	PK	306	2.0	H	-0.86	45.68	74.00	-28.32
5122.62	37.54	Ave	306	2.0	H	-0.86	36.68	54.00	-17.32
10380.00	38.21	PK	157	1.7	H	5.26	43.47	74.00	-30.53
10380.00	34.36	Ave	157	1.7	H	5.26	39.62	54.00	-14.38
15570.00	46.60	PK	179	1.9	H	5.13	51.73	74.00	-22.27
15570.00	38.07	Ave	179	1.9	H	5.13	43.20	54.00	-10.80
802.11n(HT40) U-NII-1 High channel 5230MHz									
227.13	46.05	QP	289	1.8	H	-11.12	34.93	46.00	-11.07
227.13	43.27	QP	107	1.9	V	-11.12	32.15	46.00	-13.85
4511.33	43.94	PK	299	1.1	H	-1.63	42.31	74.00	-31.69
4511.33	42.28	Ave	299	1.1	H	-1.63	40.65	54.00	-13.35
5134.64	43.52	PK	67	1.4	H	-0.90	42.62	74.00	-31.38
5134.64	42.90	Ave	67	1.4	H	-0.90	42.00	54.00	-12.00
10460.00	40.54	PK	100	1.7	H	5.28	45.82	74.00	-28.18
10460.00	36.77	Ave	100	1.7	H	5.28	42.05	54.00	-11.95
15690.00	46.45	PK	306	1.9	H	5.02	51.47	74.00	-22.53
15690.00	39.85	Ave	306	1.9	H	5.02	44.87	54.00	-9.13

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									
227.05	46.52	QP	99	1.6	H	-10.98	35.54	46.00	-10.46
227.05	46.37	QP	140	2.0	V	-10.98	35.39	46.00	-10.61
4501.62	39.32	PK	174	1.2	H	-1.69	37.63	74.00	-36.37
4501.62	39.19	Ave	174	1.2	H	-1.69	37.50	54.00	-16.50
5117.93	38.47	PK	219	1.0	H	-0.74	37.73	74.00	-36.27
5117.93	34.15	Ave	219	1.0	H	-0.74	33.41	54.00	-20.59
11510.00	45.51	PK	257	1.5	H	5.88	51.39	74.00	-22.61
11510.00	38.18	Ave	257	1.5	H	5.88	44.06	54.00	-9.94
17265.00	46.67	PK	269	1.8	H	10.42	57.09	74.00	-16.91
17265.00	38.75	Ave	269	1.8	H	10.42	49.17	54.00	-4.83
802.11n(HT40) U-NII-3 High channel 5795MHz									
227.01	44.56	QP	44	1.2	H	-11.19	33.37	46.00	-12.63
227.01	44.26	QP	50	1.3	V	-11.19	33.07	46.00	-12.93
4520.20	44.85	PK	310	1.7	H	-1.69	43.16	74.00	-30.84
4520.20	41.87	Ave	310	1.7	H	-1.69	40.18	54.00	-13.82
5111.73	41.35	PK	35	1.1	H	-0.89	40.46	74.00	-33.54
5111.73	36.21	Ave	35	1.1	H	-0.89	35.32	54.00	-18.68
11590.00	45.55	PK	22	1.1	H	5.63	51.18	74.00	-22.82
11590.00	37.35	Ave	22	1.1	H	5.63	42.98	54.00	-11.02
17385.00	46.60	PK	28	1.6	H	10.63	57.23	74.00	-16.77
17385.00	38.93	Ave	28	1.6	H	10.63	49.56	54.00	-4.44

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									
226.93	45.05	QP	216	1.8	H	-11.09	33.96	46.00	-12.04
226.93	43.57	QP	155	1.5	V	-11.09	32.48	46.00	-13.52
4518.04	39.79	PK	252	1.7	H	-1.70	38.09	74.00	-35.91
4518.04	39.49	Ave	252	1.7	H	-1.70	37.79	54.00	-16.21
5110.75	47.26	PK	359	1.6	H	-0.78	46.48	74.00	-27.52
5110.75	39.27	Ave	359	1.6	H	-0.78	38.49	54.00	-15.51
10380.00	39.30	PK	77	1.3	H	5.26	44.56	74.00	-29.44
10380.00	35.50	Ave	77	1.3	H	5.26	40.76	54.00	-13.24
15570.00	45.46	PK	41	1.0	H	5.13	50.59	74.00	-23.41
15570.00	38.09	Ave	41	1.0	H	5.13	43.22	54.00	-10.78
802.11ac(HT40) U-NII-1 High channel 5230MHz									
226.86	45.40	QP	199	1.5	H	-11.25	34.15	46.00	-11.85
226.86	44.16	QP	266	1.5	V	-11.25	32.91	46.00	-13.09
4538.42	41.14	PK	70	1.1	H	-1.50	39.64	74.00	-34.36
4538.42	39.98	Ave	70	1.1	H	-1.50	38.48	54.00	-15.52
5132.58	39.55	PK	240	1.1	H	-0.85	38.70	74.00	-35.30
5132.58	34.82	Ave	240	1.1	H	-0.85	33.97	54.00	-20.03
10460.00	45.10	PK	137	1.5	H	5.28	50.38	74.00	-23.62
10460.00	38.96	Ave	137	1.5	H	5.28	44.24	54.00	-9.76
15690.00	45.39	PK	211	1.1	H	5.02	50.41	74.00	-23.59
15690.00	39.16	Ave	211	1.1	H	5.02	44.18	54.00	-9.82

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									
227.25	47.38	QP	64	1.3	H	-10.99	36.39	46.00	-9.61
227.25	45.80	QP	27	1.0	V	-10.99	34.81	46.00	-11.19
4531.13	40.94	PK	82	1.8	H	-1.79	39.15	74.00	-34.85
4531.16	42.36	Ave	82	1.8	H	-1.79	40.57	54.00	-13.43
5147.17	40.24	PK	12	1.9	H	-0.81	39.43	74.00	-34.57
5147.17	36.00	Ave	12	1.9	H	-0.81	35.19	54.00	-18.81
11510.00	46.60	PK	327	1.2	H	5.88	52.48	74.00	-21.52
11510.00	37.10	Ave	327	1.2	H	5.88	42.98	54.00	-11.02
17265.00	46.52	PK	11	1.4	H	10.42	56.94	74.00	-17.06
17265.00	38.29	Ave	11	1.4	H	10.42	48.71	54.00	-5.29
802.11ac(HT40) U-NII-3 High channel 5795MHz									
227.24	45.27	QP	27	1.2	H	-10.99	34.28	46.00	-11.72
227.24	45.35	QP	235	1.2	V	-10.99	34.36	46.00	-11.64
4503.46	43.69	PK	124	1.4	H	-1.54	42.15	74.00	-31.85
4503.46	41.72	Ave	124	1.4	H	-1.54	40.18	54.00	-13.82
5111.18	41.92	PK	77	1.3	H	-0.89	41.03	74.00	-32.97
5111.18	37.13	Ave	77	1.3	H	-0.89	36.24	54.00	-17.76
11590.00	46.49	PK	219	1.9	H	5.63	52.12	74.00	-21.88
11590.00	37.65	Ave	219	1.9	H	5.63	43.28	54.00	-10.72
17385.00	46.26	PK	175	1.1	H	10.63	56.89	74.00	-17.11
17385.00	39.35	Ave	175	1.1	H	10.63	49.98	54.00	-4.02

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									
226.77	45.07	QP	300	1.0	H	-11.18	33.89	46.00	-12.11
226.77	45.33	QP	102	1.9	V	-11.18	34.15	46.00	-11.85
4530.84	43.38	PK	30	1.2	H	-1.77	41.61	74.00	-32.39
4530.84	43.09	Ave	30	1.2	H	-1.77	41.32	54.00	-12.68
5135.27	42.70	PK	219	1.9	H	-0.82	41.88	74.00	-32.12
5135.27	48.53	Ave	219	1.9	H	-0.82	47.71	54.00	-6.29
10420.00	41.34	PK	228	1.2	H	4.65	45.99	74.00	-28.01
10420.00	37.14	Ave	228	1.2	H	4.65	41.79	54.00	-12.21
15630.00	46.61	PK	66	1.1	H	5.10	51.71	74.00	-22.29
15630.00	37.80	Ave	66	1.1	H	5.10	42.90	54.00	-11.10
802.11ac(HT80) U-NII-3 low Channel 5775MHz									
226.69	46.74	QP	163	2.0	H	-11.13	35.61	46.00	-10.39
226.69	44.67	QP	28	1.2	V	-11.13	33.54	46.00	-12.46
4514.54	43.09	PK	228	1.7	H	-1.75	41.34	74.00	-32.66
4514.54	43.09	Ave	228	1.7	H	-1.75	41.34	54.00	-12.66
5119.20	43.09	PK	300	1.6	H	-0.95	42.14	74.00	-31.86
5119.20	43.85	Ave	300	1.6	H	-0.95	42.90	54.00	-11.10
11550.00	45.14	PK	198	1.7	H	4.83	49.97	74.00	-24.03
11550.00	38.15	Ave	198	1.7	H	4.83	42.98	54.00	-11.02
17325.00	46.56	PK	163	2.0	H	10.55	57.11	74.00	-16.89
17325.00	39.53	Ave	163	2.0	H	10.55	50.08	54.00	-3.92

Test Frequency: 18GHz~40GHz

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

10 Duty cycle

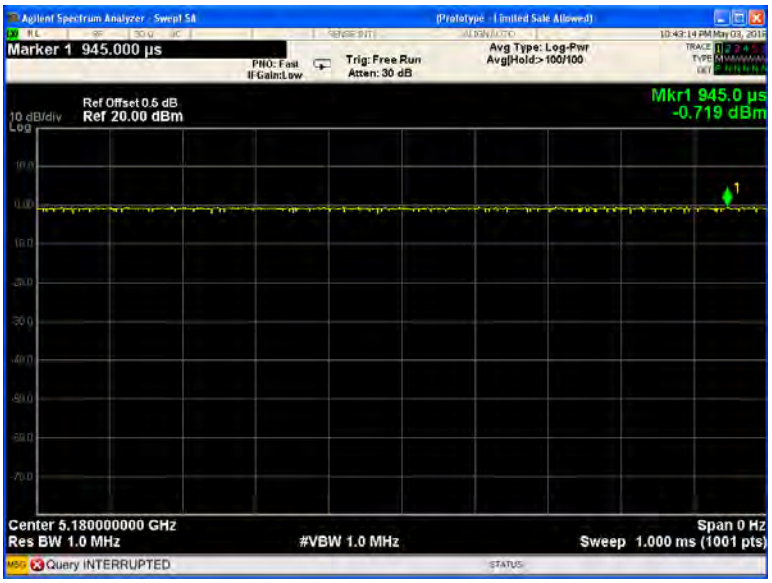
Test Requirement:	47 CFR Part 15C 15.407 and 789033 D02 General UNII Test Procedures New Rules v02r01 , Section (B)
Test Method:	ANSI C63.10: 2013
Test Limit:	N/A
Test Result:	PASS
Remark:	Only the worst case is recorded in the report.

10.1 Summary of Test Results

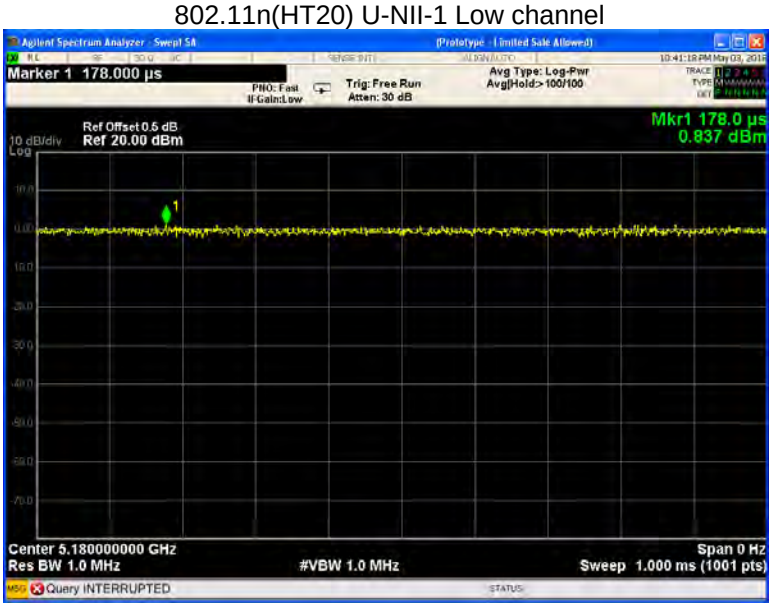
802.11a mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
149	100	100	100
802.11n(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
149	100	100	100
802.11n(HT40) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	100	100	100
151	100	100	100
802.11ac(HT20)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

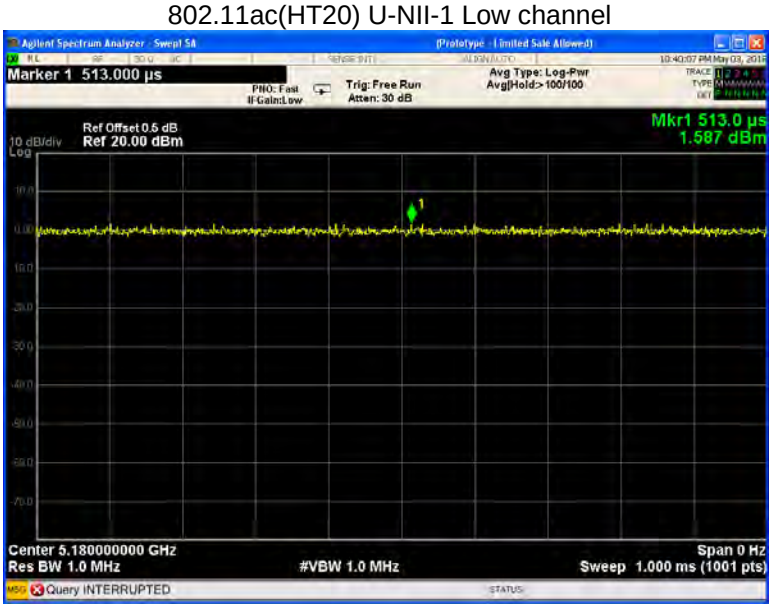


802.11n(HT20) U-NII-1 Low channel

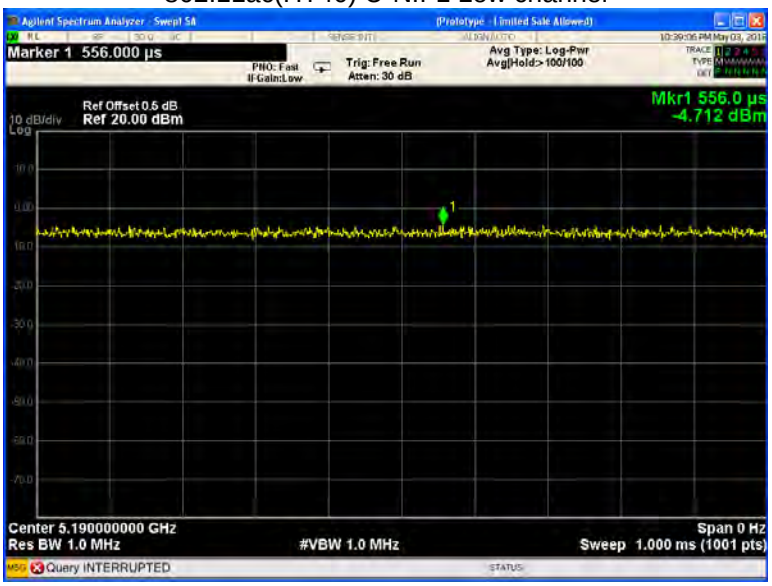


802.11n(HT40) U-NII-1 Low channel

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

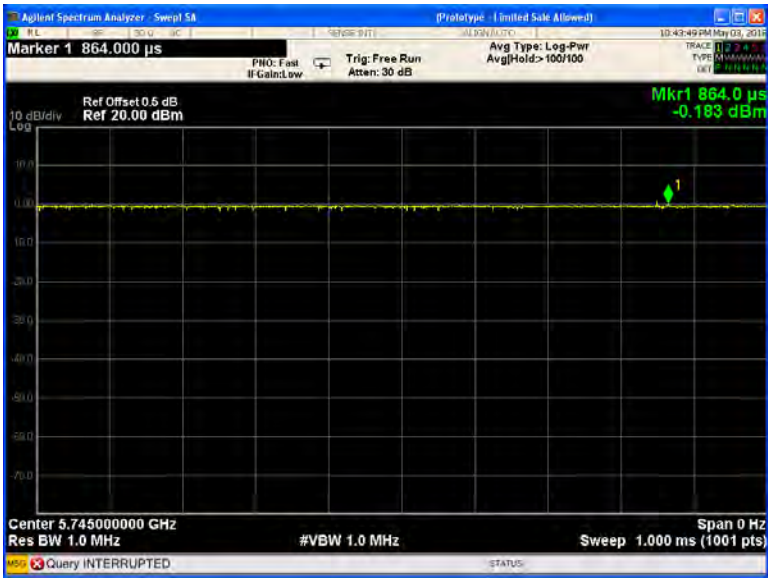


802.11ac(HT40) U-NII-1 Low channel

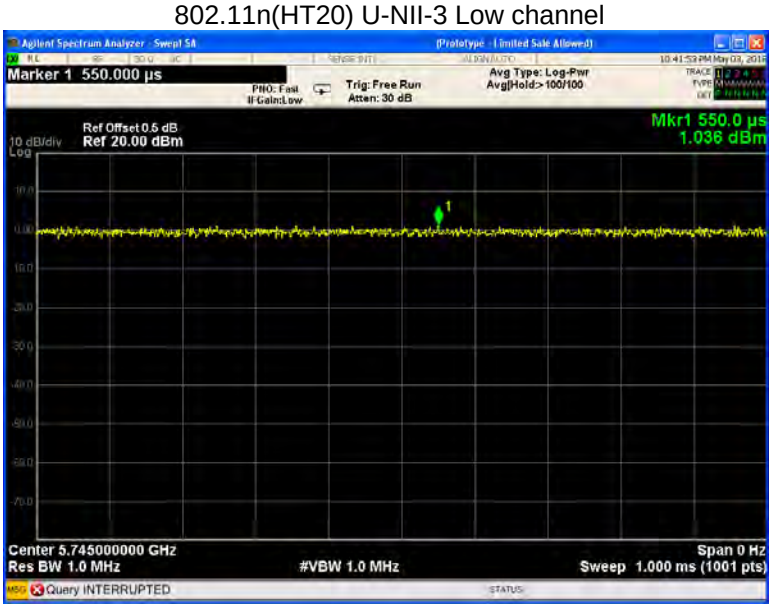


802.11ac(HT80) U-NII-1 Low channel

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

11 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 shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
Test Result:	PASS

11.1 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.

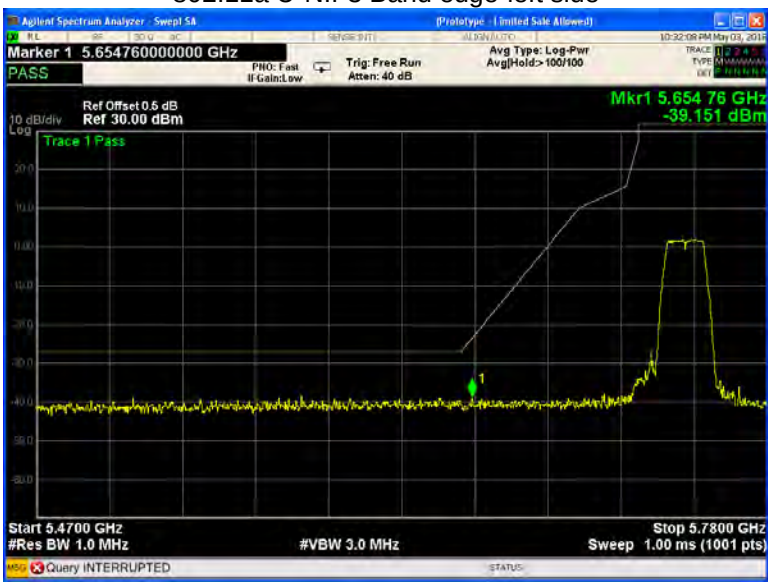
11.2 Test Result

Test result plots shown as follows:

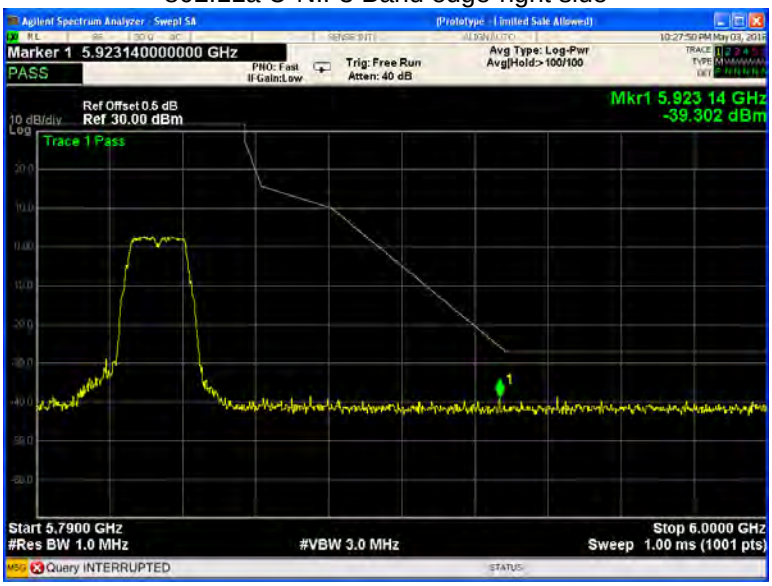
802.11a U-NII-1 Band edge-left side

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

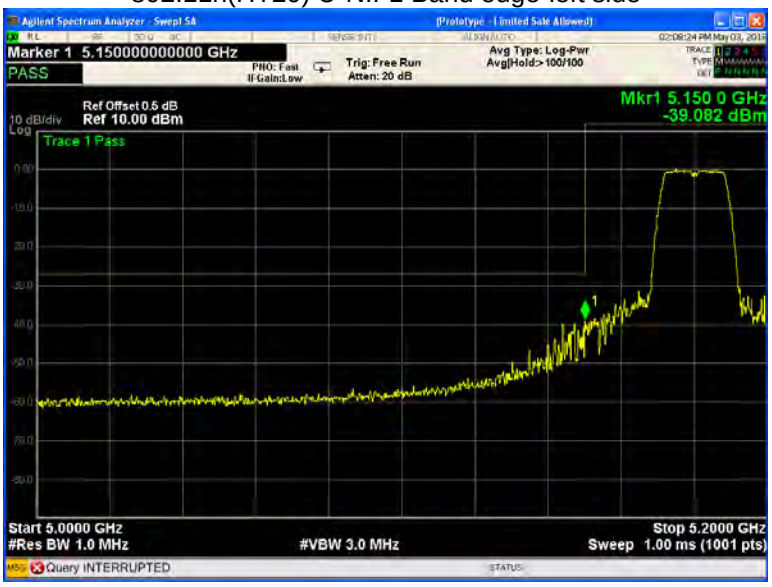
802.11a U-NII-3 Band edge-left side



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

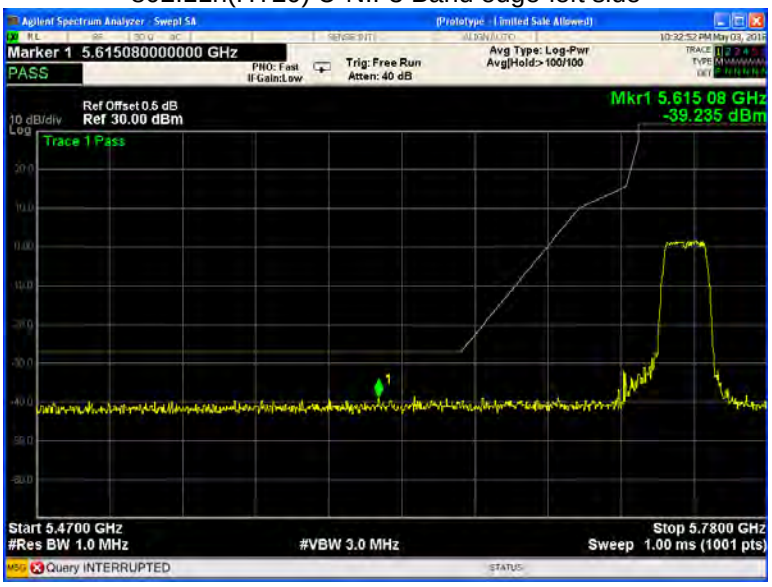


802.11n(HT20) U-NII-1 Band edge-left side

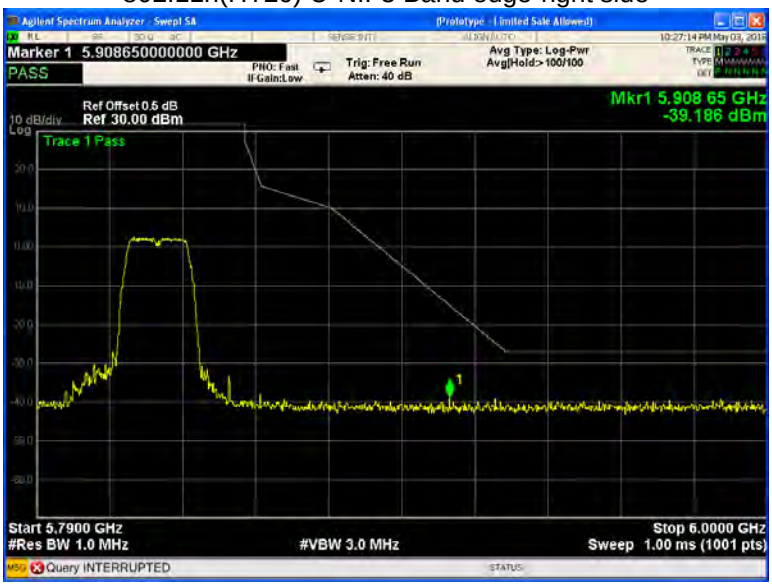


802.11n(HT20) U-NII-1 Band edge-right side

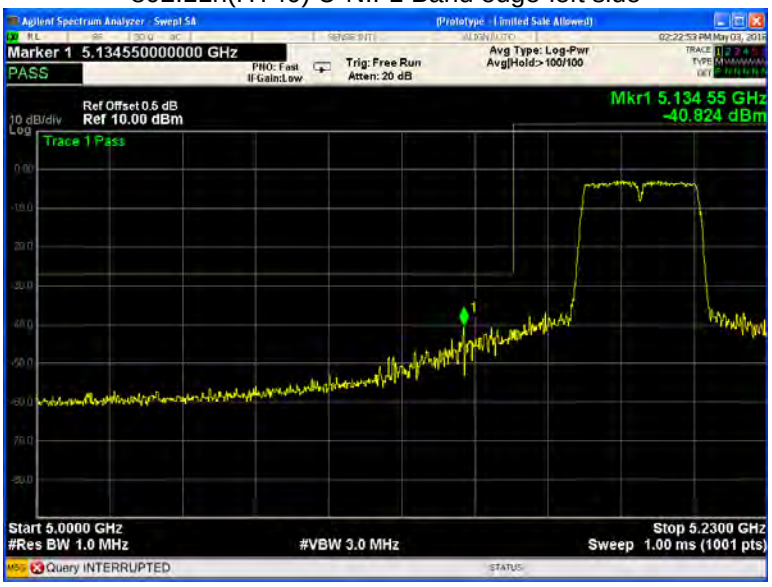
802.11n(HT20) U-NII-3 Band edge-left side



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

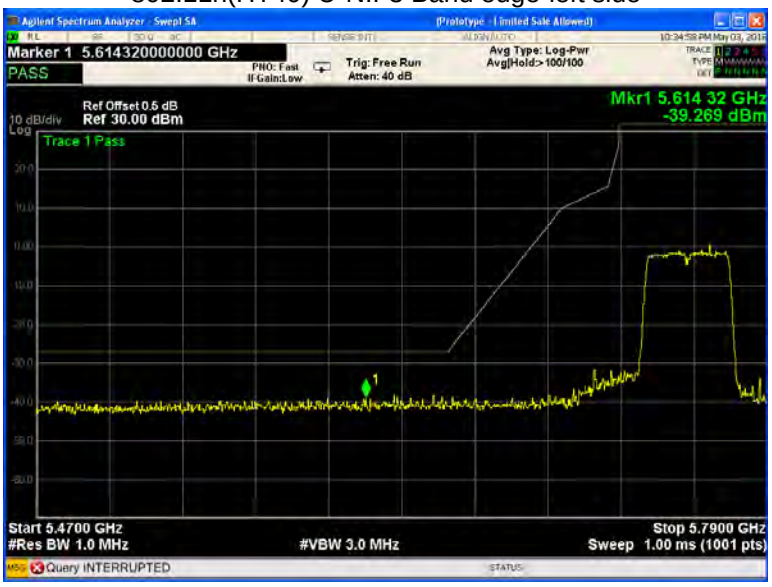


802.11n(HT40) U-NII-1 Band edge-left side

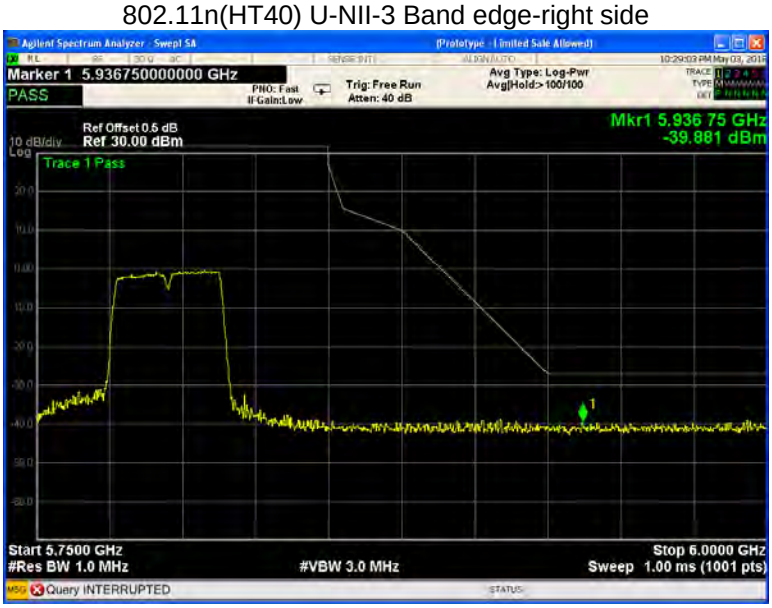


802.11n(HT40) U-NII-1 Band edge-right side

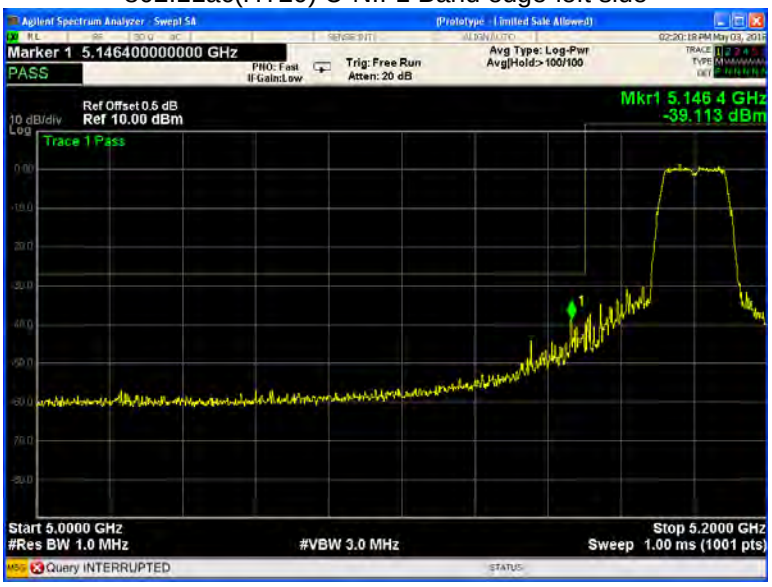
802.11n(HT40) U-NII-3 Band edge-left side



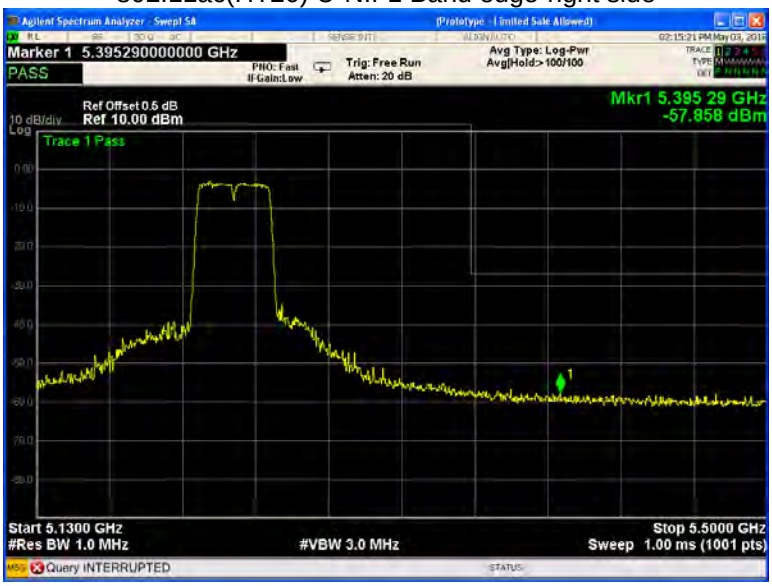
802.11n(HT40) U-NII-3 Band edge-right side



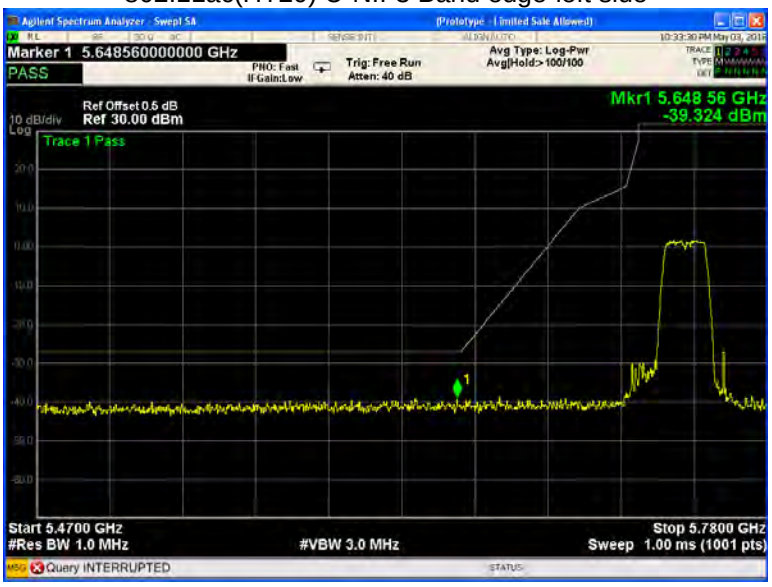
802.11ac(HT20) U-NII-1 Band edge-left side



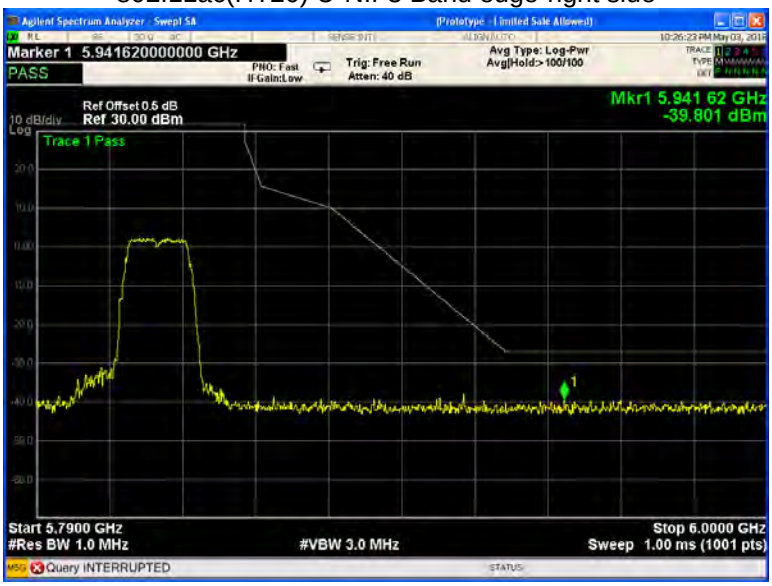
802.11ac(HT20) U-NII-1 Band edge-right side



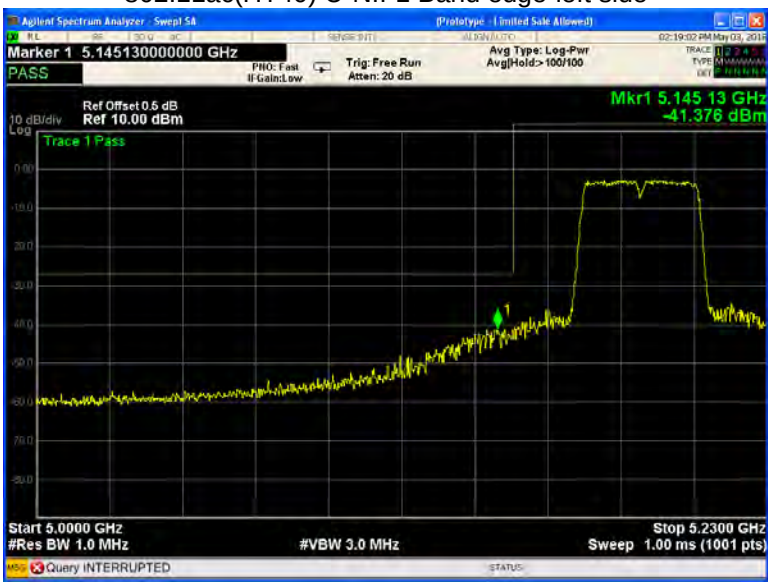
802.11ac(HT20) U-NII-3 Band edge-left side



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

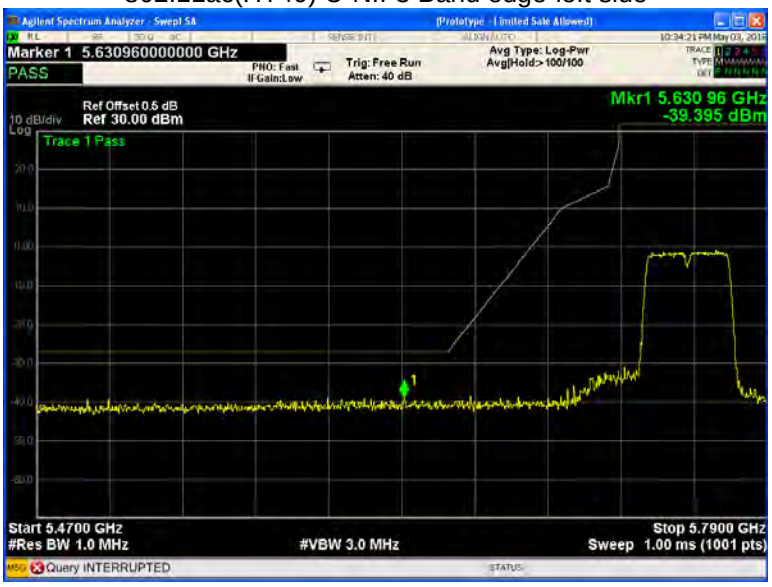


802.11ac(HT40) U-NII-1 Band edge-left side

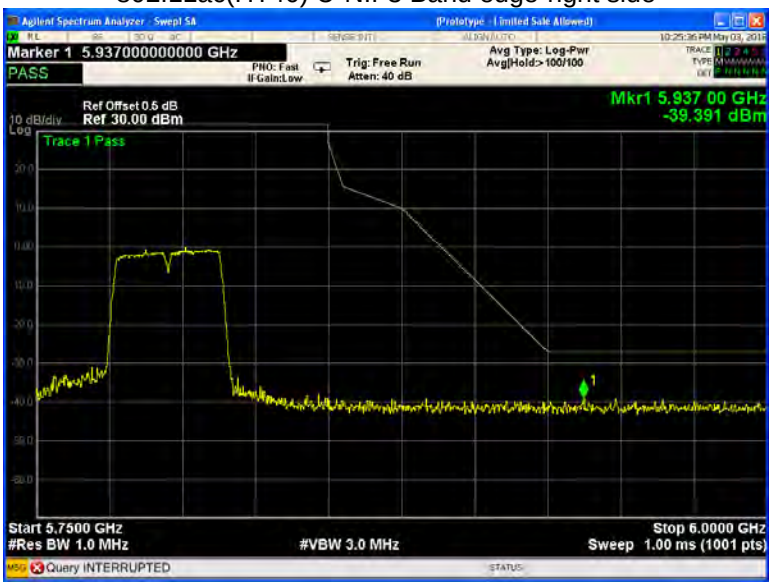


802.11ac(HT40) U-NII-1 Band edge-right side

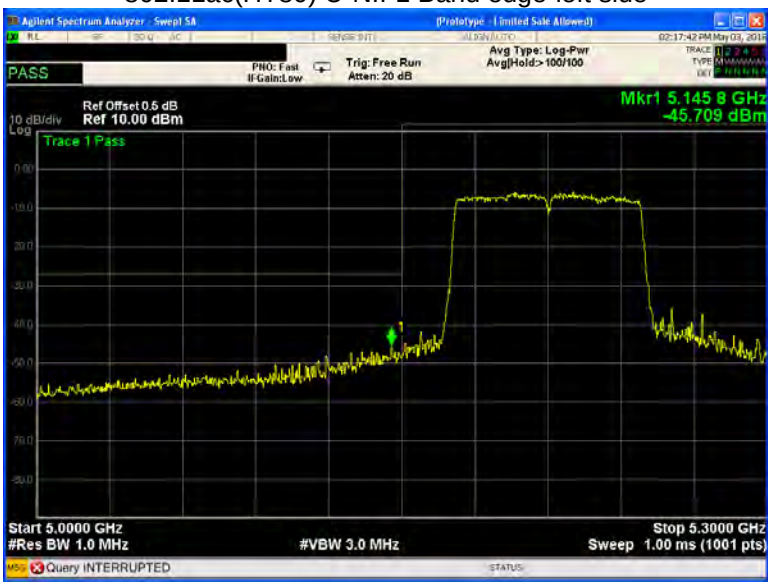
802.11ac(HT40) U-NII-3 Band edge-left side



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

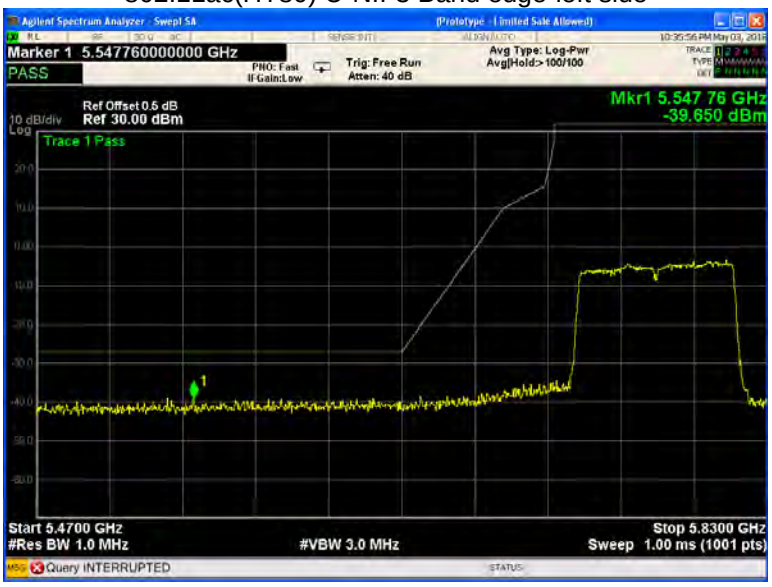


802.11ac(HT80) U-NII-1 Band edge-left side

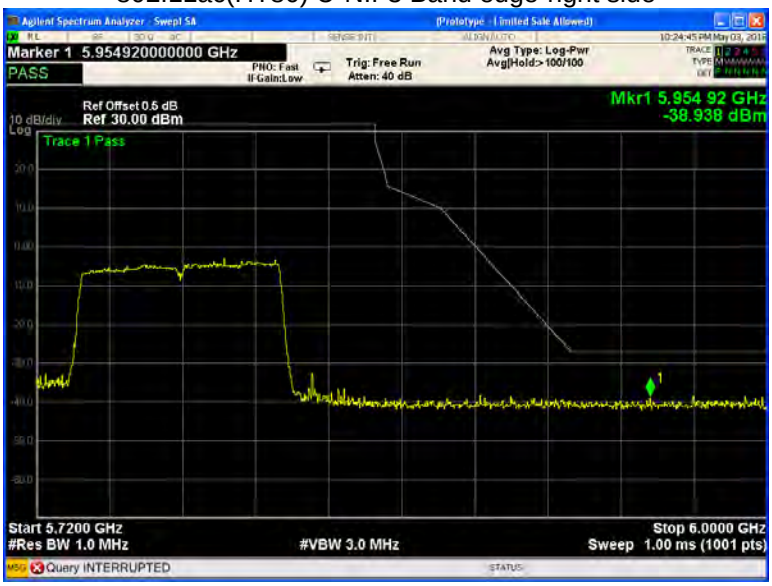


802.11ac(HT80) U-NII-1 Band edge-right side

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



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



12 6 dB Bandwidth

Test Requirement:	FCC CFR47 Part 15 Section 15.407(e)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
Test Limit:	≥ 500 kHz
Test Result:	PASS

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 = 100kHz, VBW = 300kHz

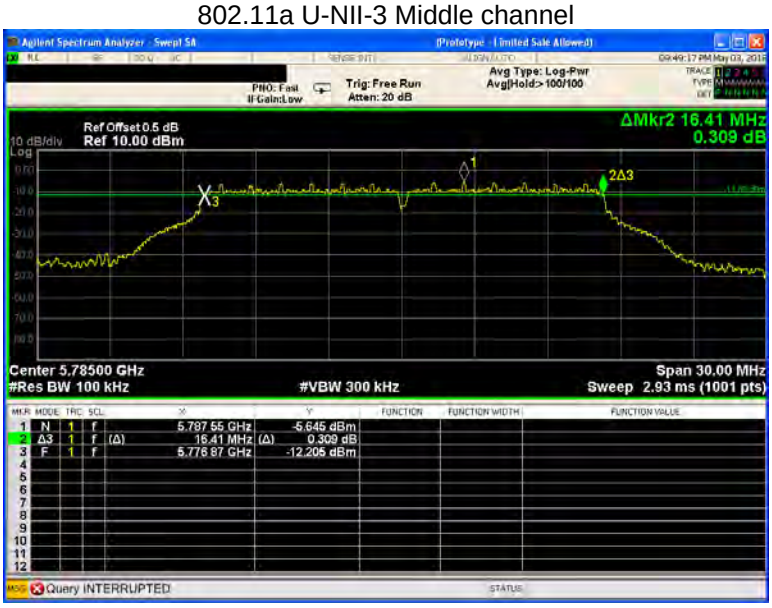
12.2 Test Result:

Band	Operation mode	6 dB Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	16.44	16.41	16.44
	802.11n(HT20)	17.73	17.67	16.41
	802.11n(HT40)	36.48	/	36.42
	802.11ac(HT20)	17.70	17.67	17.70
	802.11ac(HT40)	36.48	/	36.36
	802.11ac(HT80)	76.08	/	/

Test result plots shown as follows:

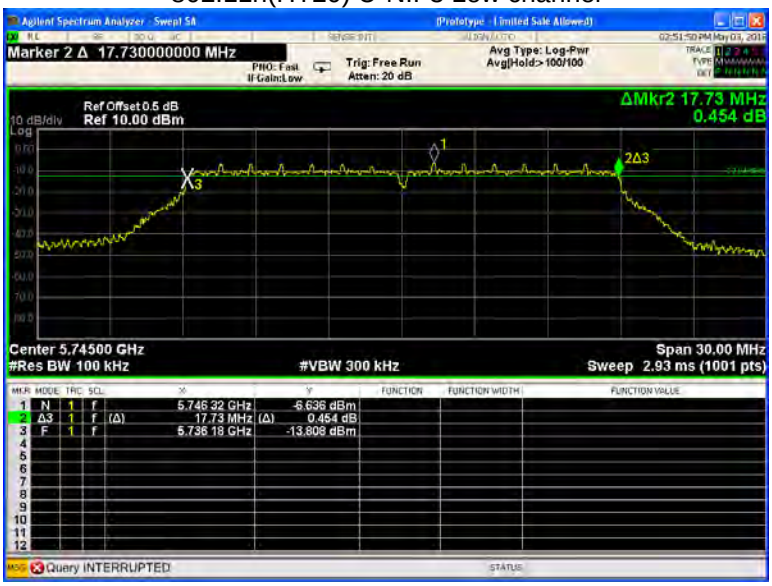
802.11a U-NII-3 Low channel

802.11a U-NII-3 Middle channel



802.11a U-NII-3 High channel

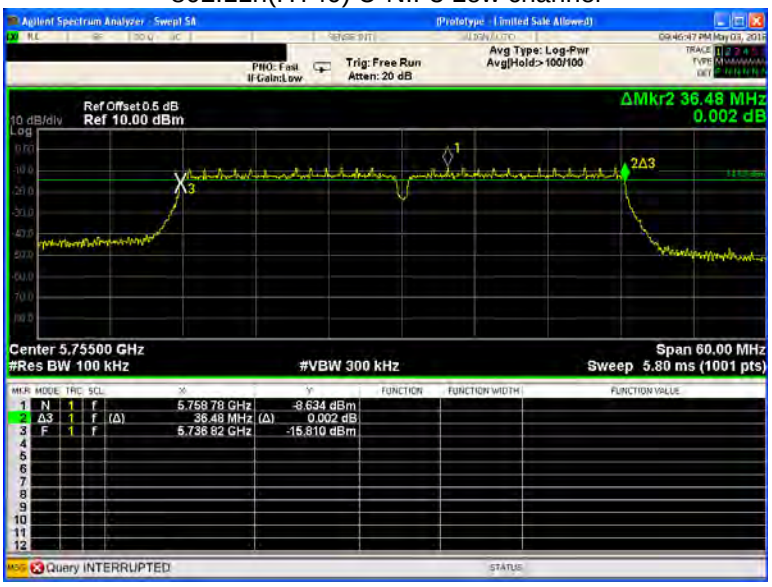
802.11n(HT20) U-NII-3 Low channel



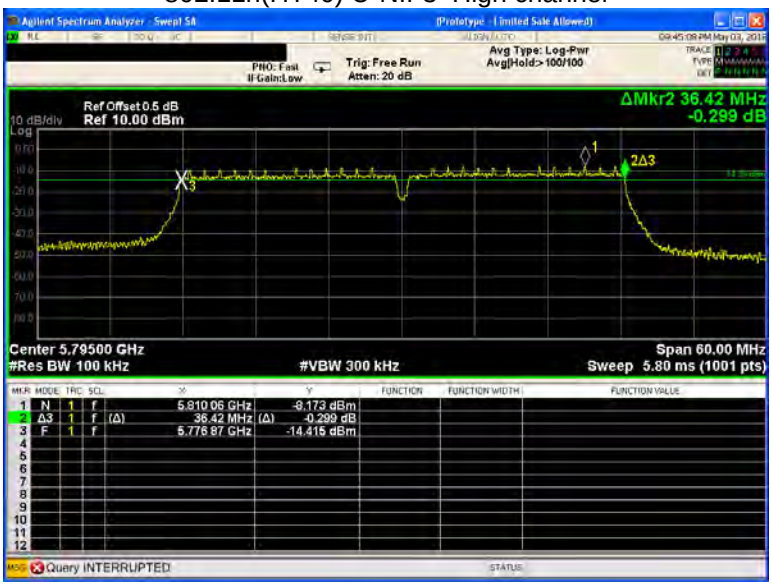
802.11n(HT20) U-NII-3 Middle channel

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

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

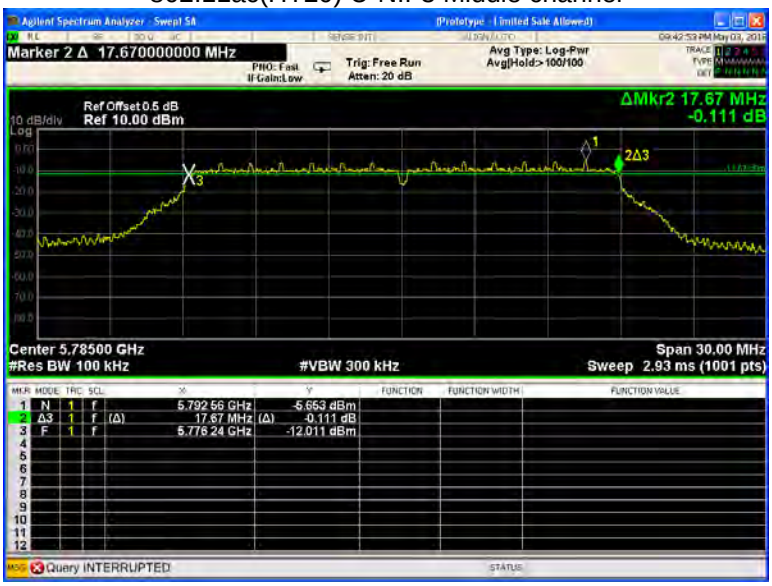


802.11n(HT40) U-NII-3 High channel



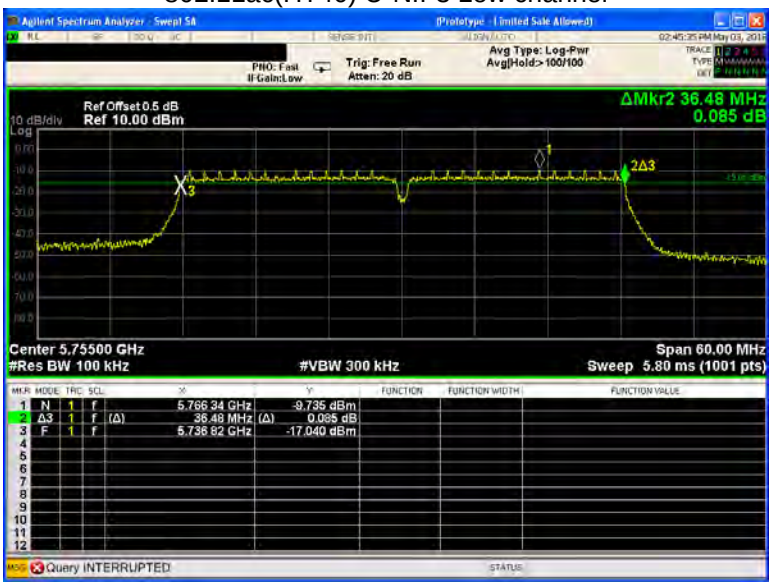
802.11ac(HT20) U-NII-3 Low channel

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



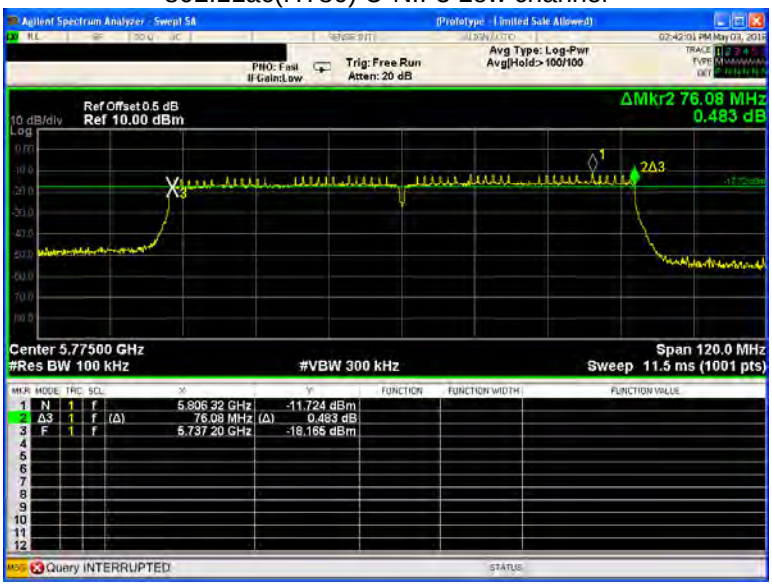
802.11ac(HT20) U-NII-3 High channel

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



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

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



13 26 dB Bandwidth and 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section D
Test Limit:	No restriction limits
Test Result:	PASS

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 = approximately 1% of the emission bandwidth,

VBW ≥ 3 × RBW

13.2 Test Result:

Band	Operation mode	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
		Low	Middle	High	Low	Middle	High
U-NII-1	802.11a	21.65	21.41	21.55	16.811	16.787	16.791
	802.11n(HT20)	21.64	21.60	21.61	17.941	17.913	17.964
	802.11n(HT40)	40.21	/	40.00	36.367	/	36.366
	802.11ac(HT20)	21.64	21.40	21.57	17.977	17.858	17.910
	802.11ac(HT40)	40.11	/	40.12	36.370	/	36.347
	802.11ac(HT80)	81.52	/	/	75.761	/	/
U-NII-3	802.11a	21.52	21.41	21.52	16.800	16.807	16.778
	802.11n(HT20)	19.45	19.15	19.35	17.490	17.500	17.510
	802.11n(HT40)	39.58	/	39.40	36.180	/	36.121
	802.11ac(HT20)	21.69	21.56	21.61	17.972	17.988	17.899
	802.11ac(HT40)	40.15	/	39.79	36.370	/	36.366
	802.11ac(HT80)	81.97	/	/	75.856	/	/

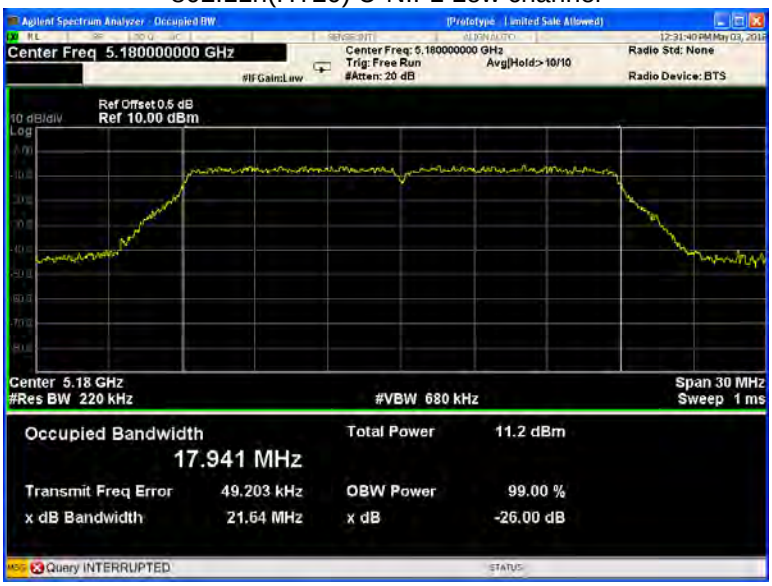
Test result plots shown as follows:

802.11a U-NII-1 Low channel

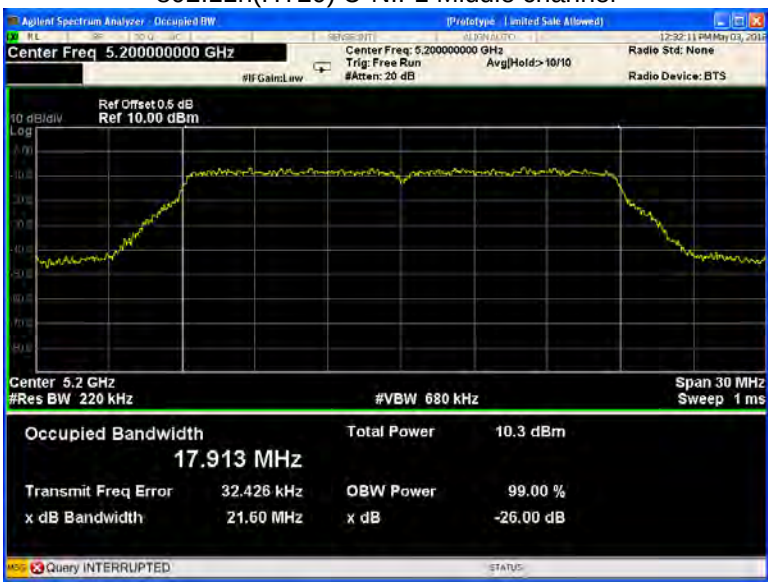
802.11a U-NII-1 Middle channel

802.11a U-NII-1 High channel

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

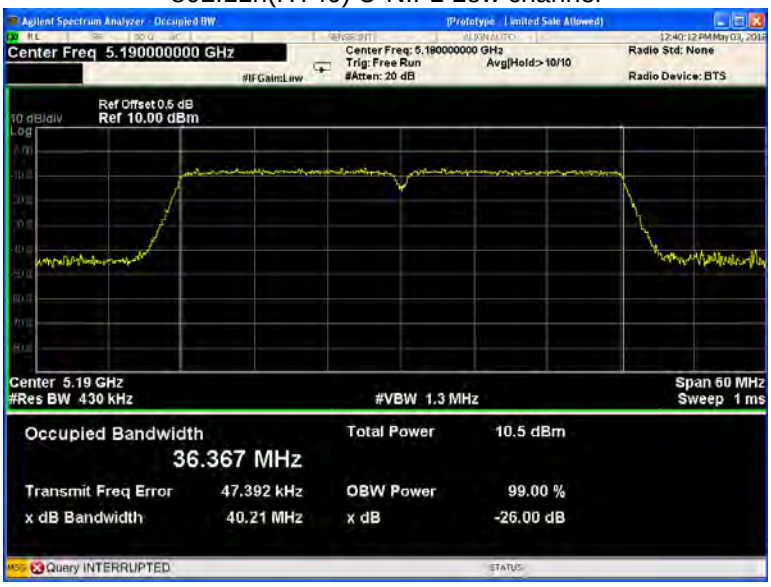


802.11n(HT20) U-NII-1 Middle channel



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

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



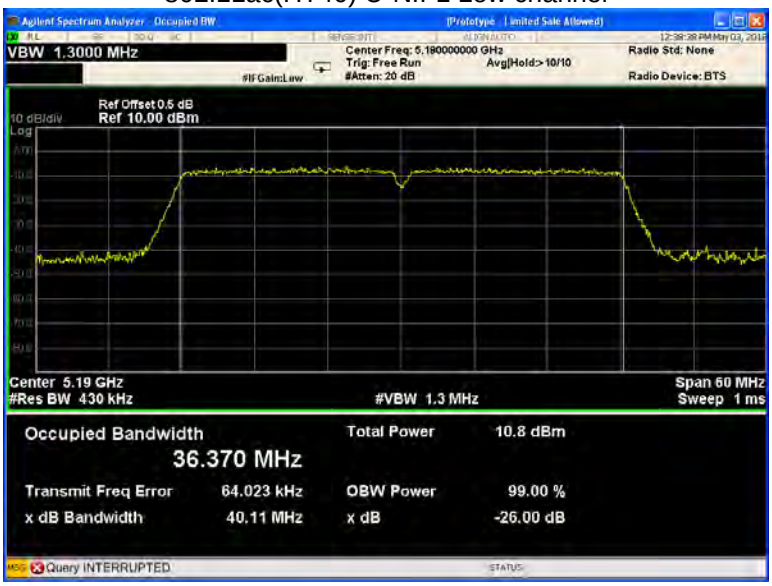
802.11n(HT40) U-NII-1 High channel

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

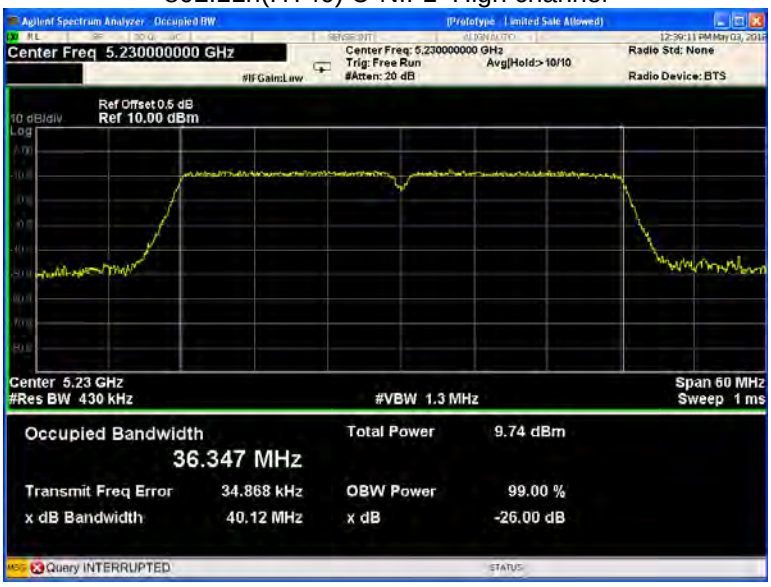
802.11ac(HT20) U-NII-1 Middle channel

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

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



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



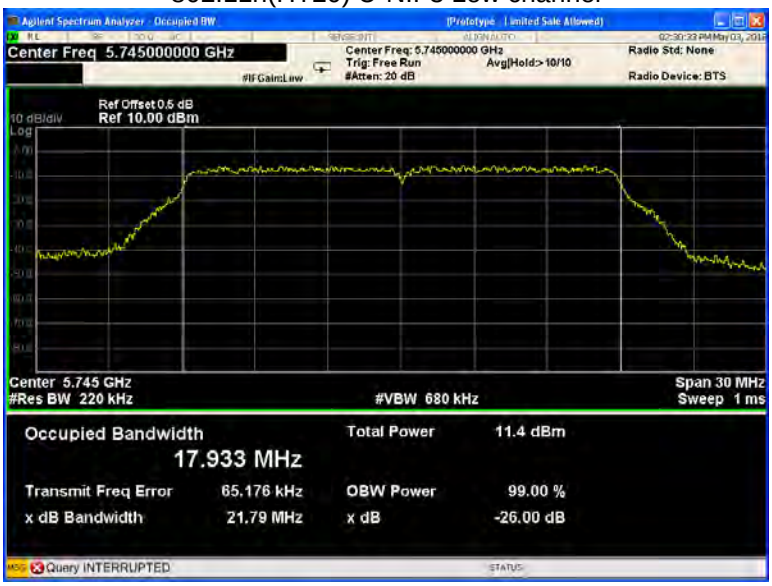
802.11ac(HT80) U-NII-1 Low channel

802.11a U-NII-3 Low channel

802.11a U-NII-3 Middle channel

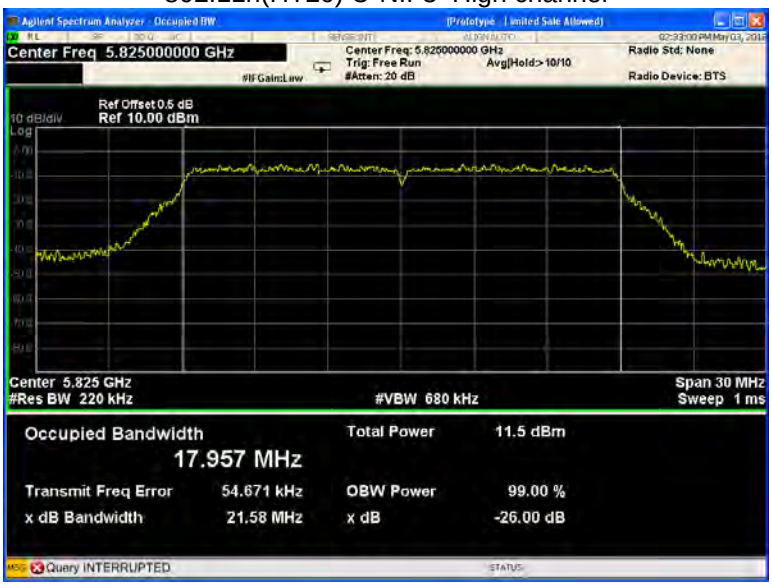
802.11a U-NII-3 High channel

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

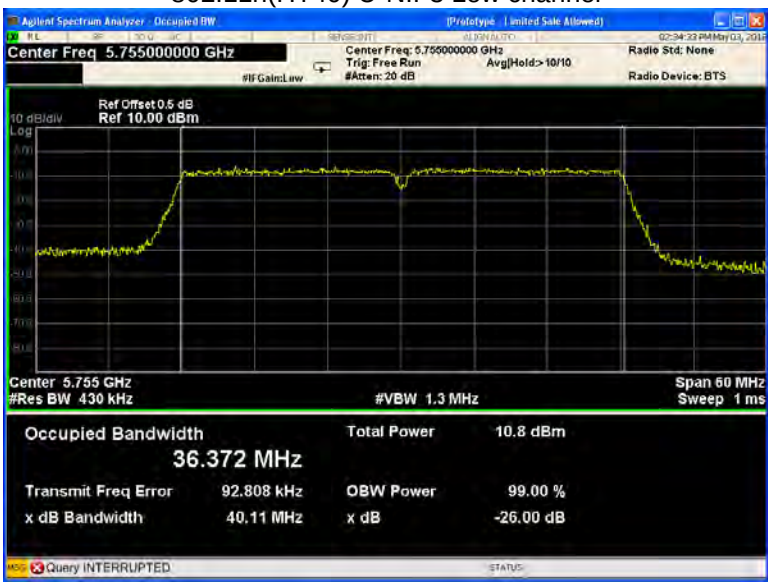


802.11n(HT20) U-NII-3 Middle channel

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

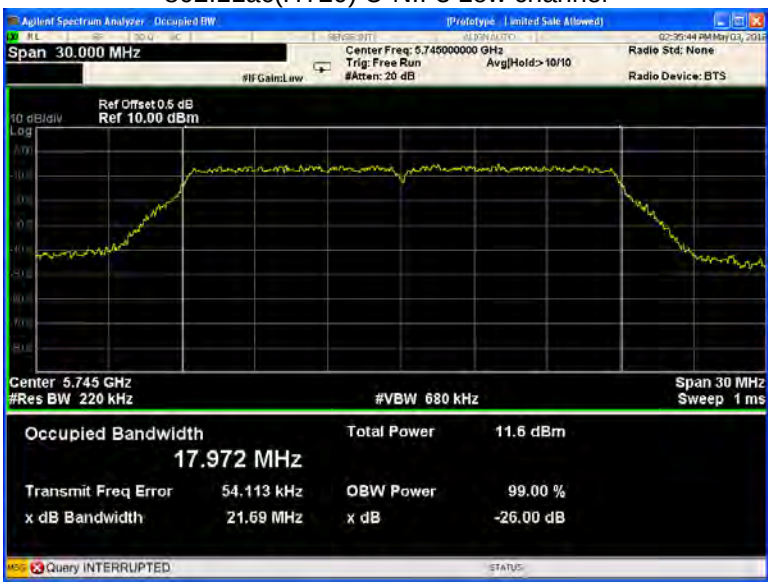


802.11n(HT40) U-NII-3 Low channel

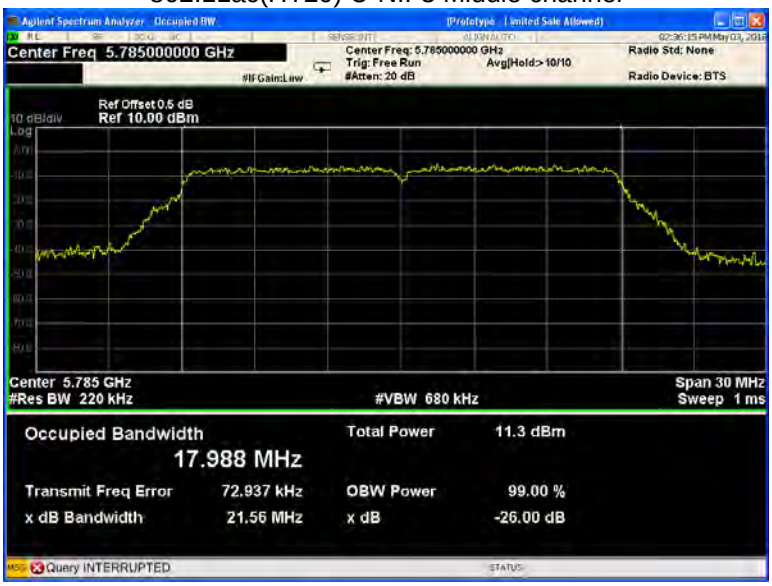


802.11n(HT40) U-NII-3 High channel

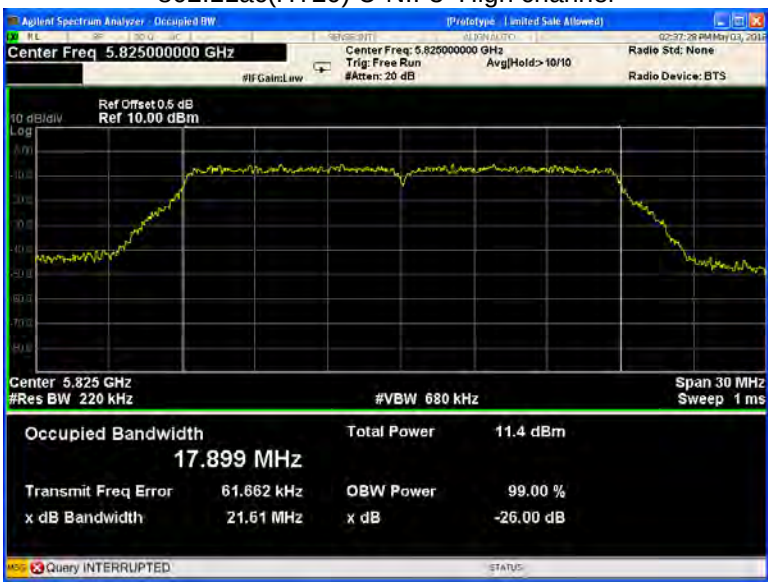
802.11ac(HT20) U-NII-3 Low channel



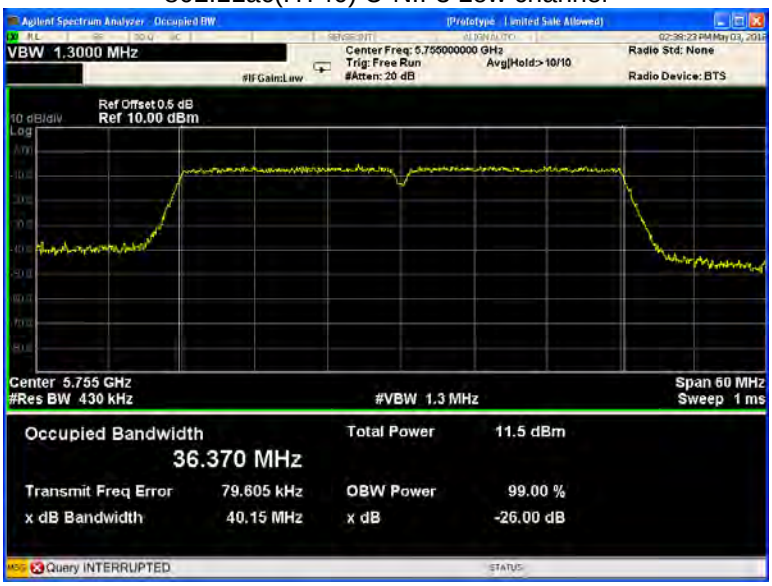
802.11ac(HT20) U-NII-3 Middle channel



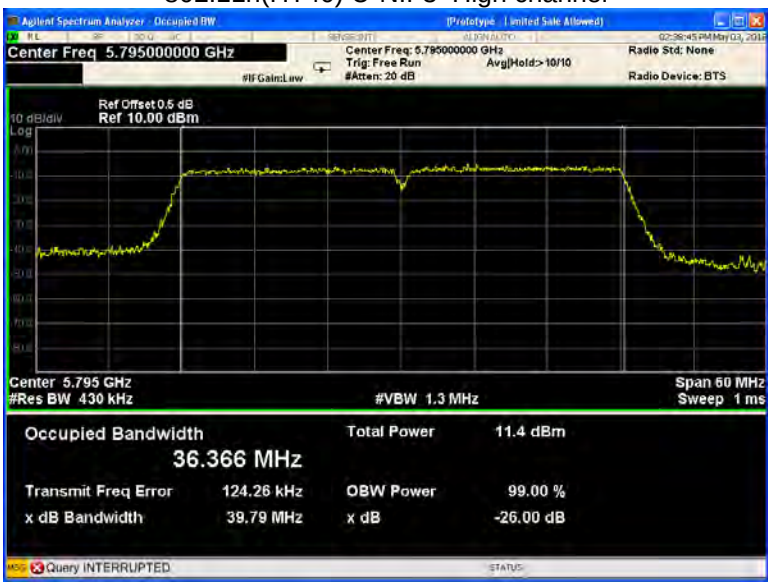
802.11ac(HT20) U-NII-3 High channel



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 Conducted Output Power

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

14.1 Test Procedure:

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

14.2 Test Result :

Band	Operation mode	CH	Conducted Output Power (dBm)
U-NII-1	802.11a	Low	11.79
		Middle	11.96
		High	10.87
	802.11n(HT20)	Low	11.64
		Middle	11.86
		High	11.08
	802.11n(HT40)	Low	11.63
		Middle	/
		High	11.63
	802.11ac(HT20)	Low	11.83
		Middle	11.86
		High	11.02
	802.11ac(HT40)	Low	12.28
		Middle	/
		High	11.53
	802.11ac(HT80)	Low	11.34
		Middle	/
		High	/
U-NII-3	802.11a	Low	9.37
		Middle	9.38
		High	9.57
	802.11n(HT20)	Low	9.48
		Middle	9.82
		High	9.84
	802.11n(HT40)	Low	9.75
		Middle	/
		High	9.72
	802.11ac(HT20)	Low	9.50
		Middle	9.52
		High	9.50
	802.11ac(HT40)	Low	9.38
		Middle	/
		High	9.51
	802.11ac(HT80)	Low	9.75
		Middle	/
		High	/

.

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

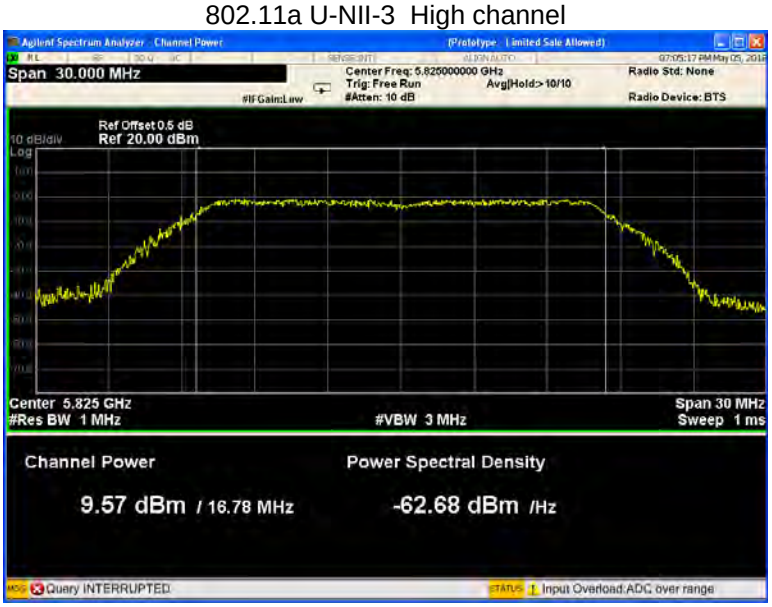
802.11n(HT40) U-NII-1 High channel

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

802.11a U-NII-3 Low channel

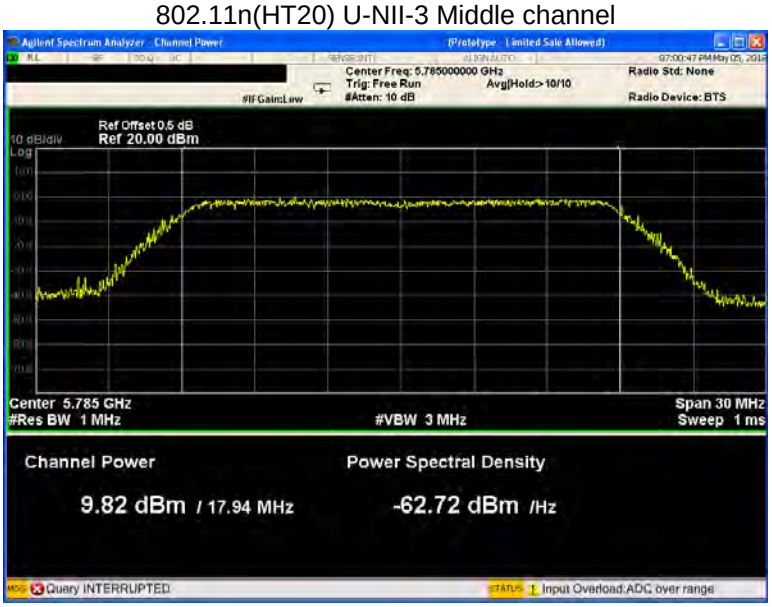
802.11a U-NII-3 Middle channel

802.11a U-NII-3 High channel



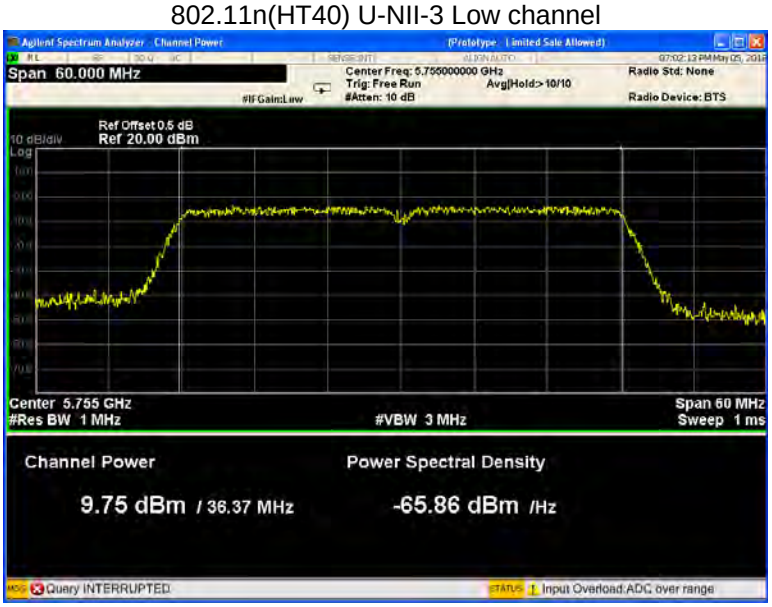
802.11n(HT20) U-NII-3 Low channel

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

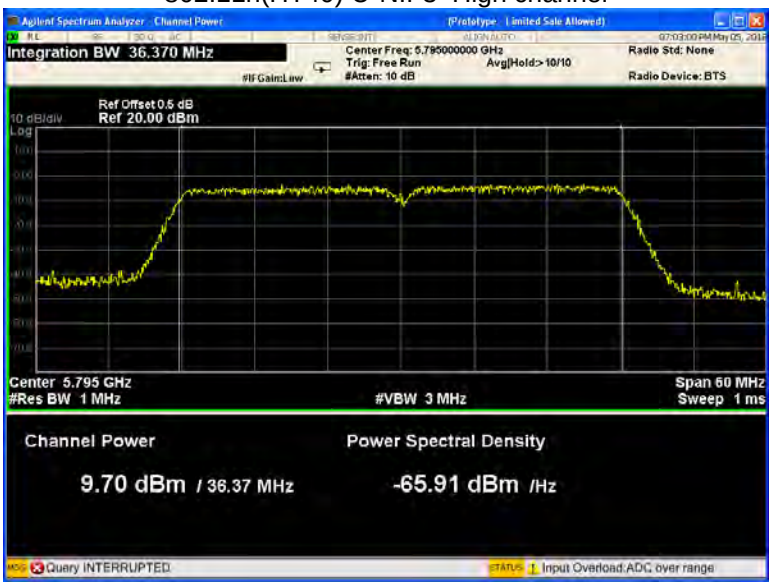


802.11n(HT20) U-NII-3 High channel

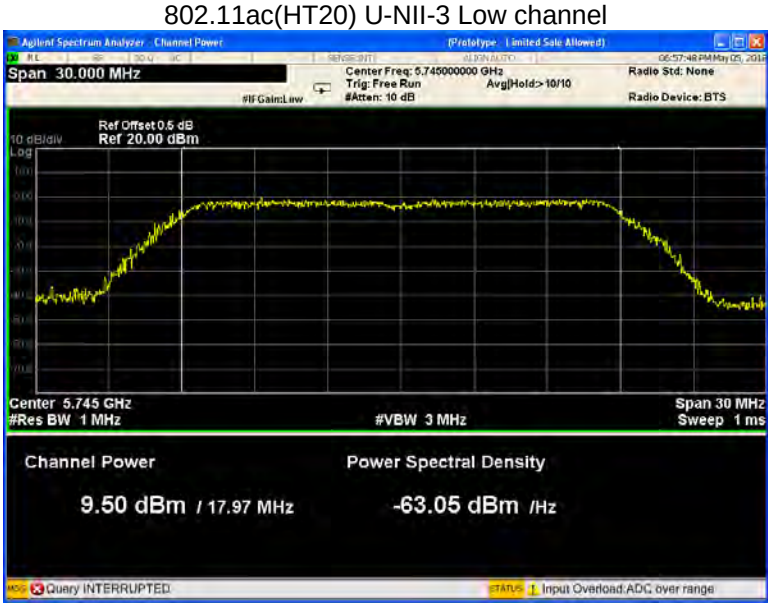
802.11n(HT40) U-NII-3 Low channel



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

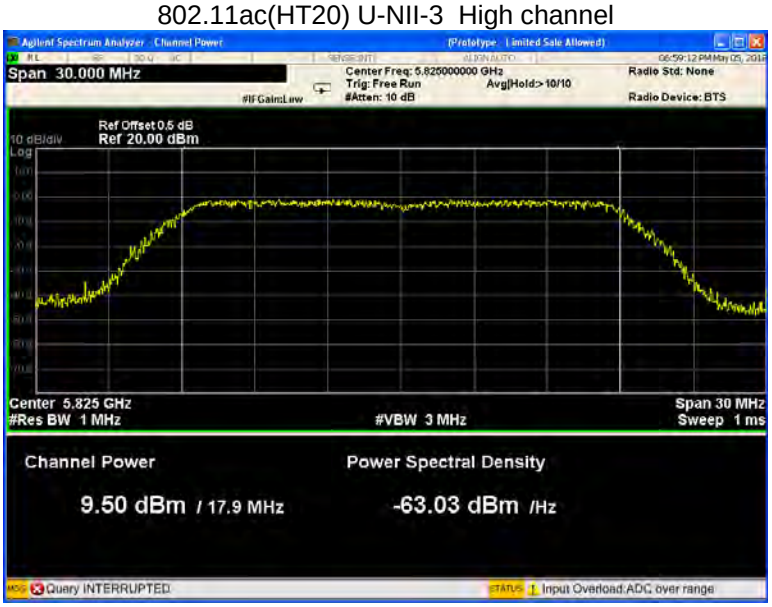


802.11ac(HT20) U-NII-3 Low channel



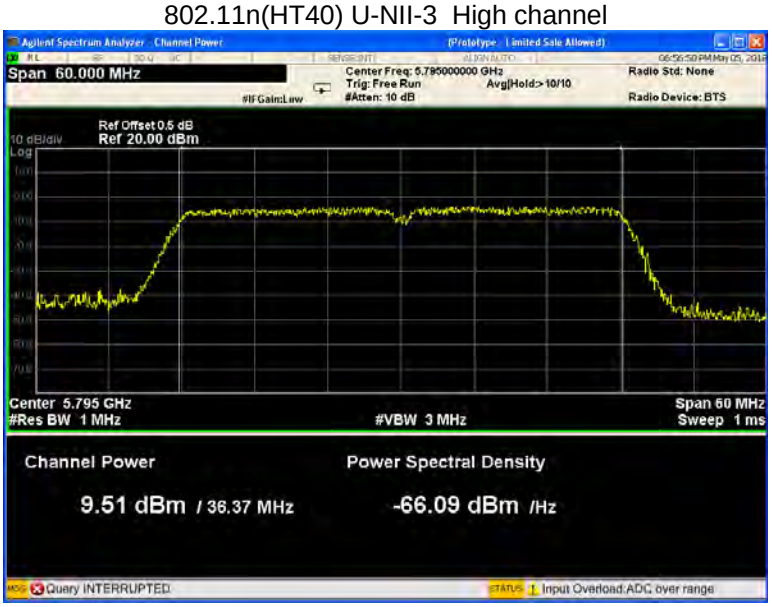
802.11ac(HT20) U-NII-3 Middle channel

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

15 Power Spectral density

Test Requirement:	FCC CFR47 Part 15 Section 15.407(a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 , Section F
Test Limit:	≤11.00dBm/MHz for Operation in the U-NII-1(5150MHz-5250MHz)of mobile device ≤30.00dBm/500KHz for Operation in the U-NII-3(5725MHz-5850MHz)of device
Test Result:	PASS

15.1 Test Procedure:

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

2. Set the spectrum analyzer:

U-NII-1

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

U-NII-3

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

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

15.2 Test Result:

Band	Operation mode	CH	Power Spectral Density (dBm/MHz)
U-NII-1	802.11a	Low	0.320
		Middle	-0.122
		High	-0.369
	802.11n(HT20)	Low	2.913
		Middle	0.323
		High	0.622
	802.11n(HT40)	Low	-1.638
		Middle	/
		High	-3.078
	802.11ac(HT20)	Low	1.300
		Middle	1.101
		High	0.568
	802.11ac(HT40)	Low	-1.921
		Middle	/
		High	-2.905
	802.11ac(HT80)	Low	-5.345
		Middle	/
		High	/
	Limit	≤11.00dBm/MHz	

Band	Operation mode	CH	Power Spectral Density (dBm/MHz)
U-NII-3	802.11a	Low	-1.584
		Middle	-1.129
		High	-1.102
	802.11n(HT20)	Low	-0.730
		Middle	-1.261
		High	0.181
	802.11n(HT40)	Low	-4.120
		Middle	/
		High	-4.066
	802.11ac(HT20)	Low	-1.390
		Middle	-1.495
		High	-0.765
	802.11ac(HT40)	Low	-3.988
		Middle	/
		High	-4.009
	802.11ac(HT80)	Low	-7.299
		Middle	/
		High	/
	Limit	≤30.00dBm/500KHz	

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

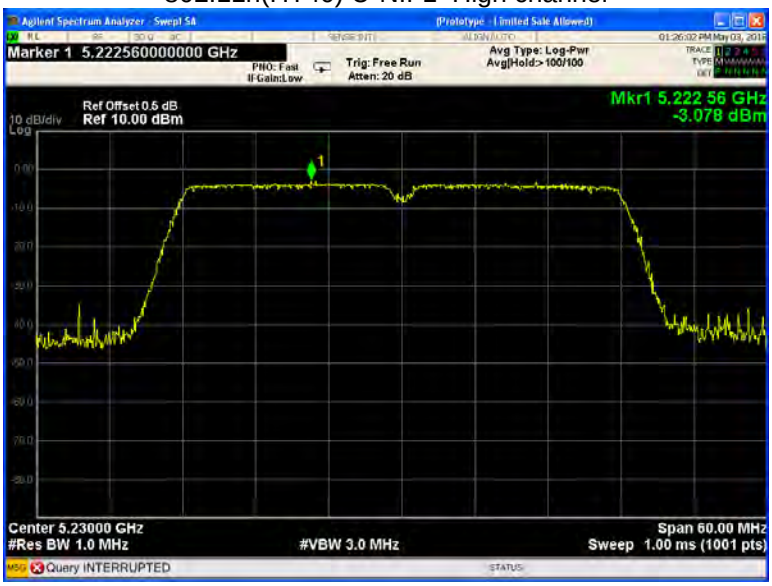
802.11n(HT20) U-NII-1 Low channel

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

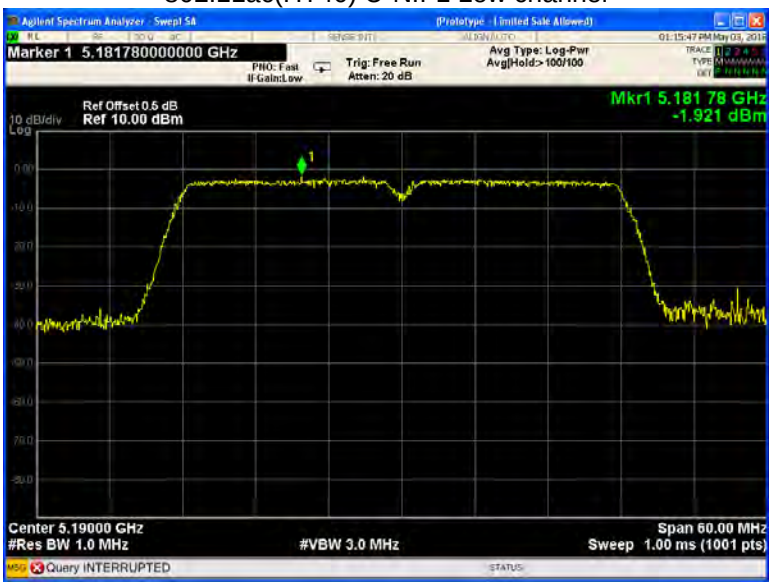


802.11ac(HT20) U-NII-1 Low channel

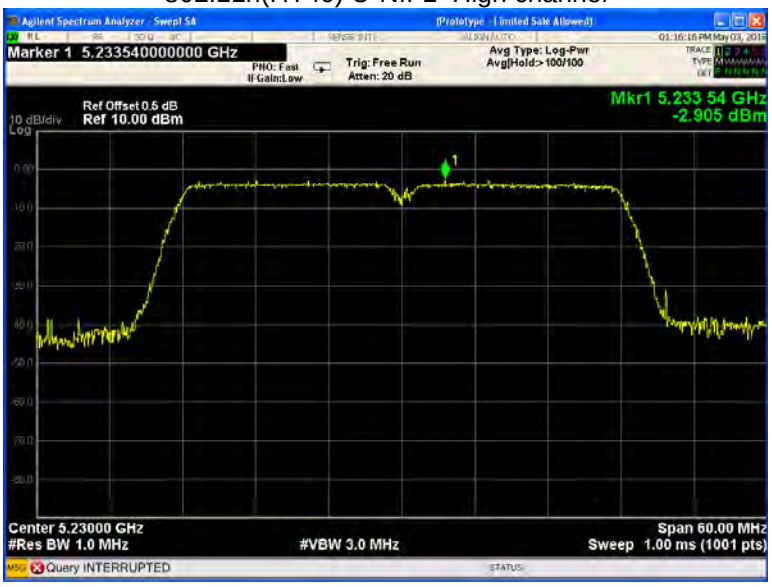
802.11ac(HT20) U-NII-1 Middle channel

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

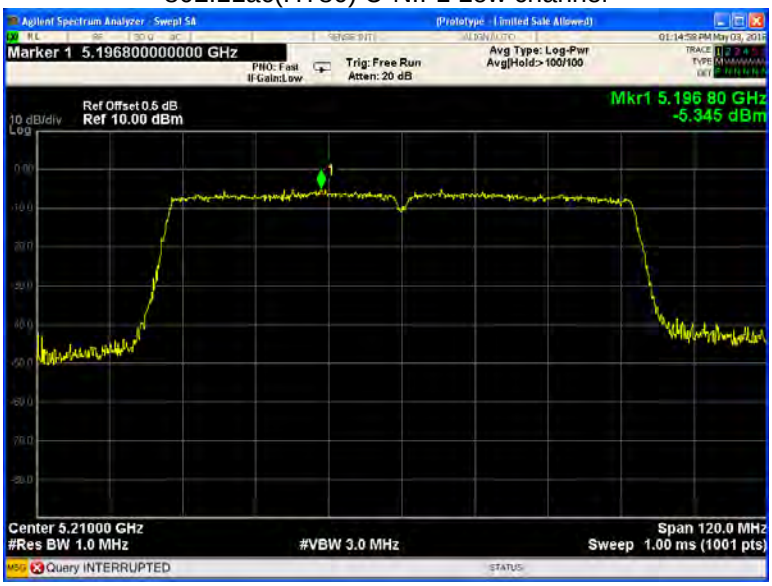
802.11ac(HT40) U-NII-1 Low channel



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



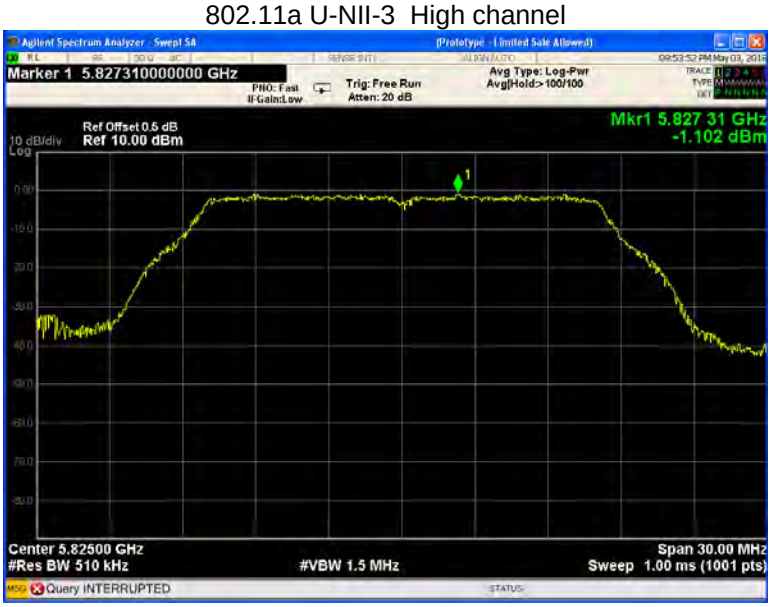
802.11ac(HT80) U-NII-1 Low channel



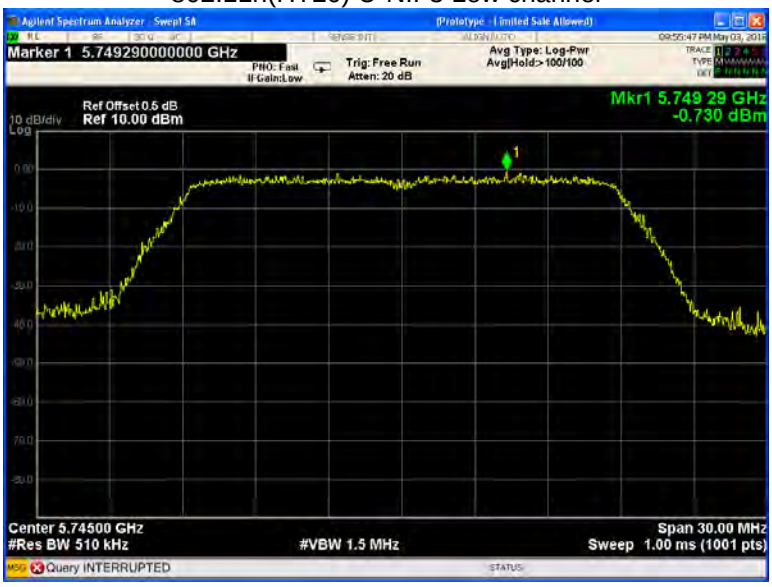
802.11a U-NII-3 Low channel

802.11a U-NII-3 Middle channel

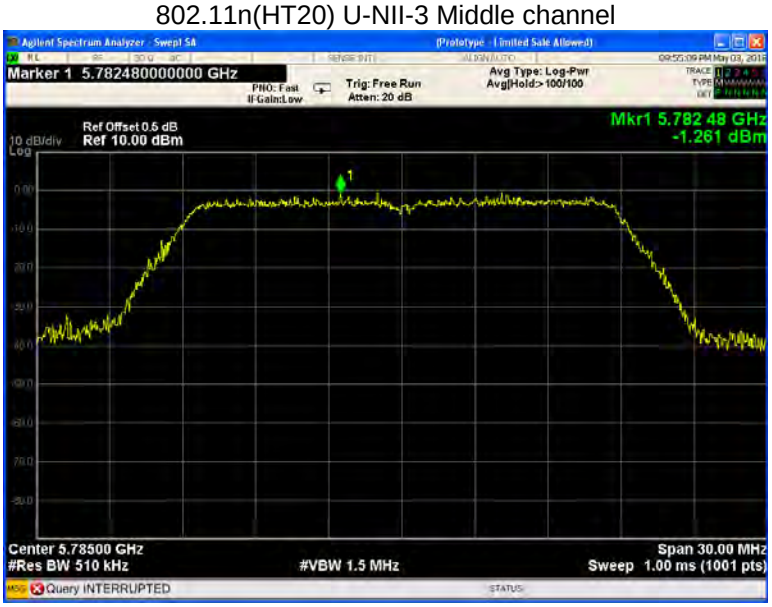
802.11a U-NII-3 High channel



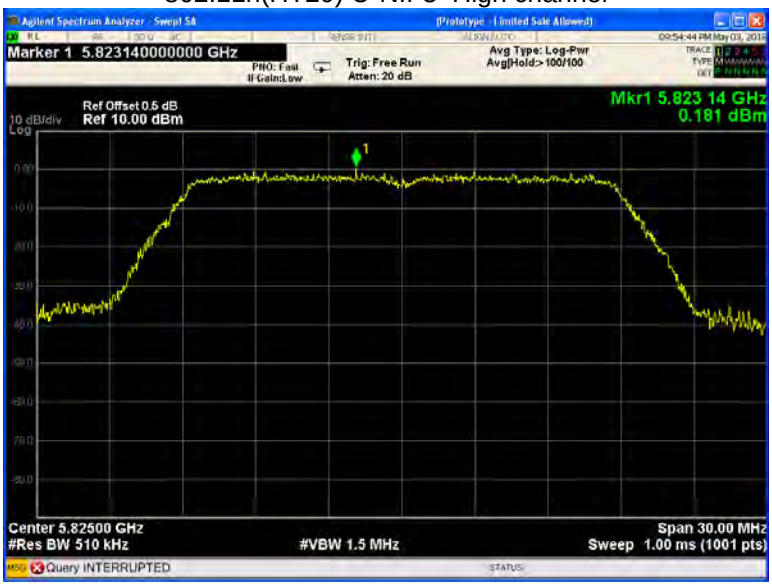
802.11n(HT20) U-NII-3 Low channel



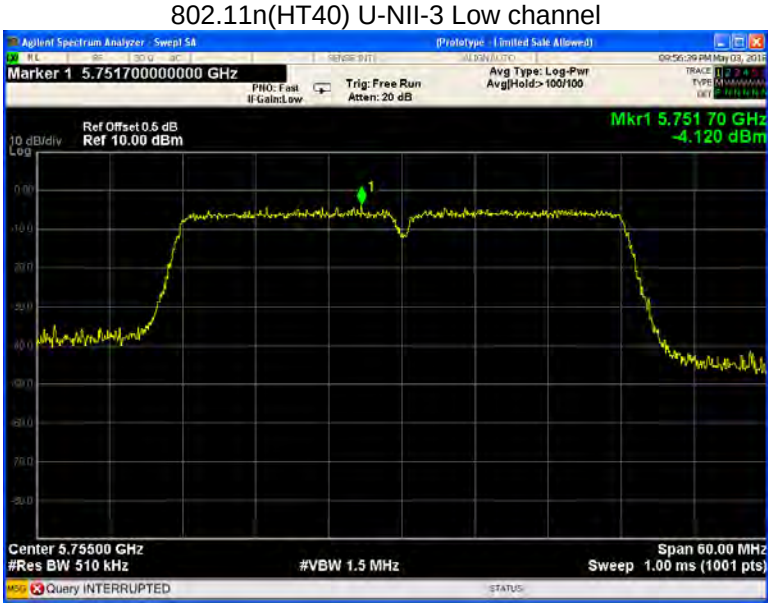
802.11n(HT20) U-NII-3 Middle channel



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

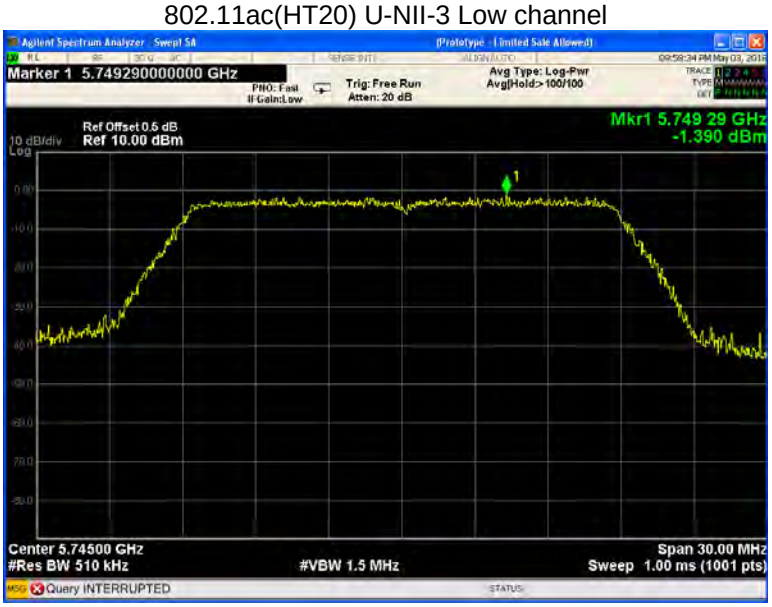


802.11n(HT40) U-NII-3 Low channel



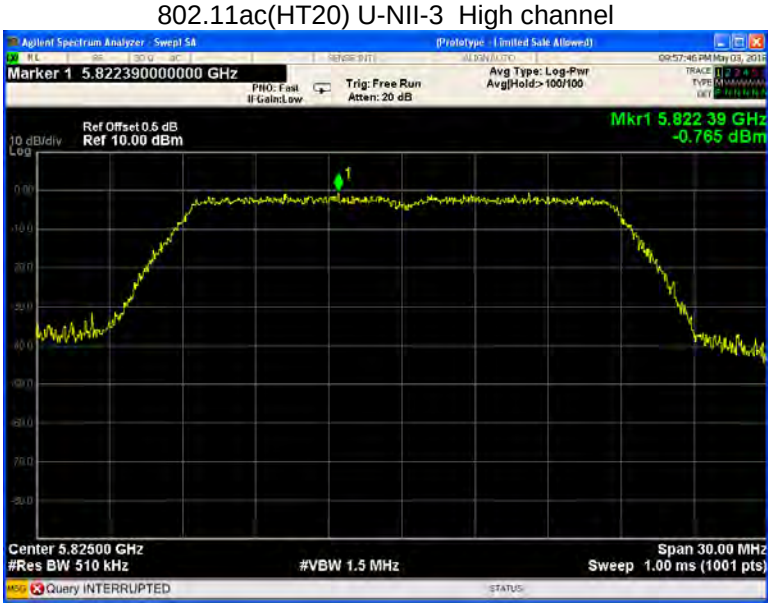
802.11n(HT40) U-NII-3 High channel

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



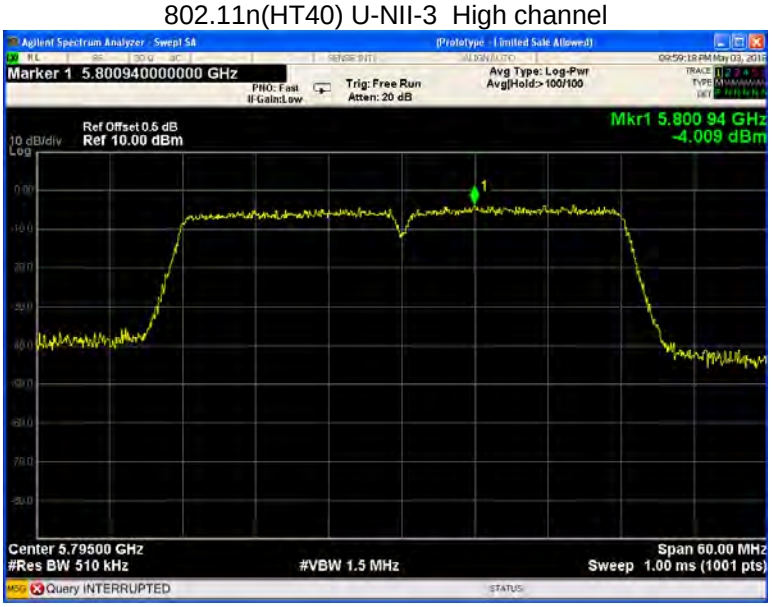
802.11ac(HT20) U-NII-3 Middle channel

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

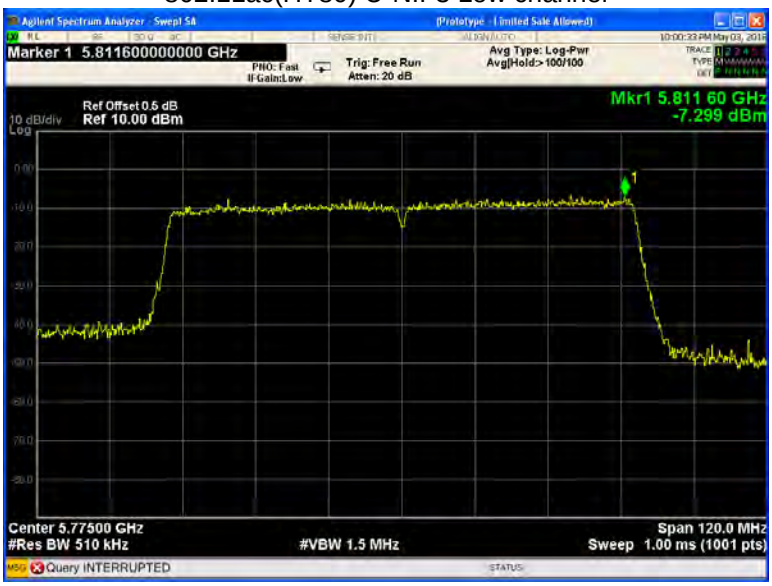


802.11ac(HT40) U-NII-3 Low channel

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



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



16 Frequency Stability

Test Requirement:	FCC CFR47 Part 15 Section 15.407(g)
Test Method:	ANSI C63.10:2013
Test Limit:	Manufaturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual or 20ppm.
Test Result:	PASS

16.1 Test Procedure:

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
   EUT have transmitted absence of unmodulation signal and fixed channelise. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. fc is declaring of channel frequency. Then the frequency error formula is $(fc-f)/fc \times 10^6$ 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 5°C~ 35°C.

16.2 Test Result:

U-NII-1 Test Frequency:5180MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
35	120	1752	0.3382	20
30		1789	0.3454	20
25		1778	0.3432	20
20		1732	0.3344	20
15		1764	0.3405	20
10		1766	0.3409	20
5		1744	0.3367	20
20	108	1774	0.3425	20
20	132	1780	0.3436	20

U-NII-3 Test Frequency:5785MHz				
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
35		1854	0.3156	20
30		1862	0.3169	20
25		1853	0.3154	20
20		1836	0.3125	20
15		1842	0.3135	20
10		1846	0.3142	20
5		1852	0.3152	20
20	108	1903	0.3239	20
20	132	1902	0.3237	20

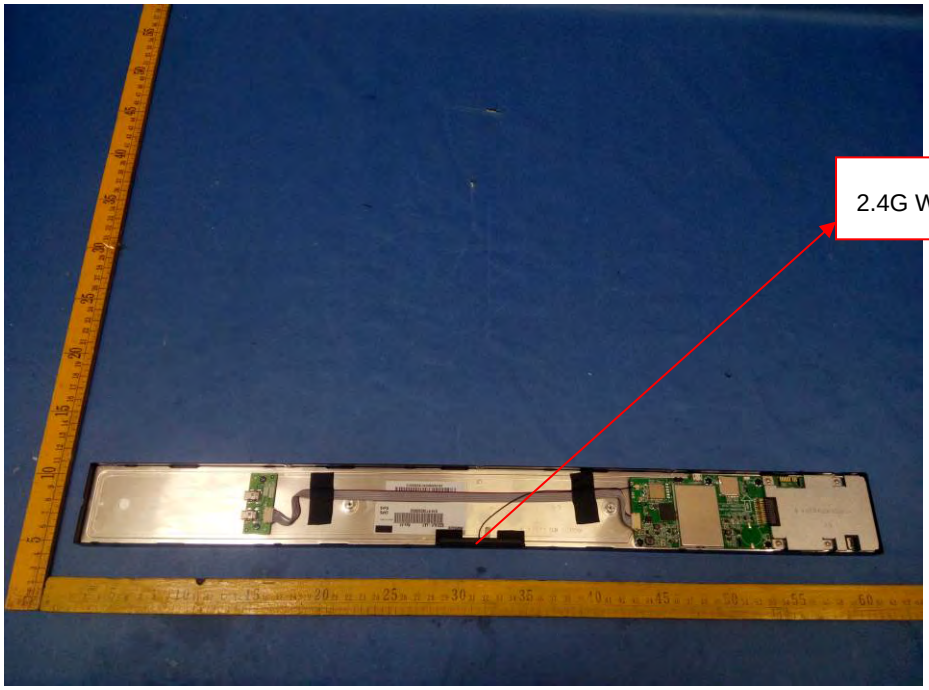
17 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attahed 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 manufaturer may design the unit so that a broken antenna can be replaed by the user, but the use of a standard antenna jak 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 acordance 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.

Result:

The EUT have one Integrated Antenna, meets the requirements of FCC 15.203.



18 SAR Evaluation

Please refer to SAR report.

19 Photographs - Test Setup and EUT Photos

Refer to the file EL231WLBC0HWWW _Ext Photos, EL231WLBC0HWWW _Int Photos and EL231WLBC0HWWW _Tsup Photos.

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