TEST REPORT

Applicant:	Shenzhen Magic Vision Digital Technology Co., Ltd.
Address of Applicant:	5/F, building 2, new material port, Changyuan, Nanshan District, Shenzhen 518110, China
Manufacturer:	Sichuan Tianyi Comheart Telecom Co., Ltd.
Address of Manufacturer:	No. 198, Section 1, Xueshan Avenue, Dayi County, Chengdu, Sichuan, China

Equipment Under Test (EUT)

Product Name:	ECPN W6
Model No.:	W6
Trade Mark:	ECPN
FCC ID:	2AXSA-W6
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of sample receipt:	November 24, 2020
Date of Test:	November 24, 2020- December 05, 2020
Date of report issue:	December 05, 2020
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

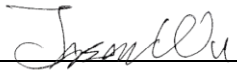
Robinson Luo

Laboratory Manager

This 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.

2 Version

Version No.	Date	Description
00	*December 05, 2020*	*Original*

Prepared By:  ***Date:*** *December 05, 2020*

Project Engineer

Check By:  ***Date:*** *December 05, 2020*

Reviewer

3 Contents

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	PASS
AC Power Line Conducted Emission	15.207	PASS
Peak Transmit Power	15.407(a)(1)	PASS
Power Spectral Density	15.407(a)(1)	PASS
Undesirable Emission	15.407(b)(6), 15.205/15.209	PASS
Radiated Emission	15.205/15.209	PASS
Band Edge	15.407(b)(1)	PASS
Frequency Stability	15.407(g)	PASS

Remark:

Pass: The EUT complies with the essential requirements in the standard.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

<table>
<tr><td>Product Name:</td><td colspan="4">ECPN W6</td></tr>
<tr><td>Model No.:</td><td colspan="4">W6</td></tr>
<tr><td>Serial No.:</td><td colspan="4">8C0E60-D3BUS8COE600255A8</td></tr>
<tr><td>Hardware Version:</td><td colspan="4">V1.0.0</td></tr>
<tr><td>Software Version:</td><td colspan="4">V1.0.1</td></tr>
<tr><td>Test sample(s) ID:</td><td colspan="4">GTS202010000093-1</td></tr>
<tr><td>Sample(s) Status:</td><td colspan="4">Engineer sample</td></tr>
<tr><td>Operation Frequency:</td><td colspan="4"><table>
<tr><th>Band</th><th>Mode</th><th>Frequency Range(MHz)</th><th>Number of channels</th></tr>
<tr><td rowspan="4">U-NII Band I</td><td>IEEE 802.11a</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac/ax 20MHz</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac/ax 40MHz</td><td>5190-5230</td><td>2</td></tr>
<tr><td>IEEE 802.11ac/ax 80MHz</td><td>5210</td><td>1</td></tr>
</table></td></tr>
<tr><td>Modulation technology:</td><td colspan="4">OFDM
MIMO: 802.11n/ac/ax
SISO: 802.11a</td></tr>
<tr><td>Antenna Type:</td><td colspan="4">Dipole</td></tr>
<tr><td>Antenna gain:</td><td colspan="4">ANT0:5dBi, ANT1:5dBi,MIMO:5dBi</td></tr>
<tr><td>Power supply:</td><td colspan="4">Adapter
MODEL: TS-A018-120015An
INPUT:AC 100-240V, 50/60Hz 0.6A
OUTPUT:DC 12V, 1.5A</td></tr>
</table>

Channel list for 802.11a/n/ac/ax(HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180MHz	40	5200MHz	44	5220MHz	48	5240MHz

Channel list for 802.11n(HT40)/ac/ax(HT40)			
Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

Channel list for 802.11ac/ax(HT80)	
Channel	Frequency
42	5210MHz

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting with modulation..

Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11a/n/ac/ax(HT20)	6/6.5 Mbps
802.11n/ac/ax(HT40)	13.5 Mbps
802.11ac/ax(HT80)	29.3 Mbps

5.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, sBaoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

5.5 Description of Support Units

None.

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

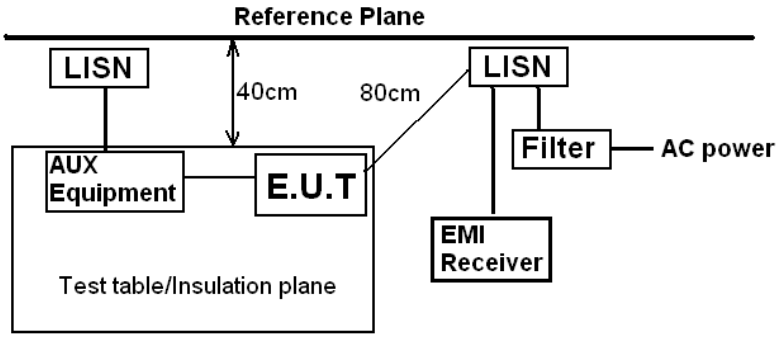
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: *An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.*	
E.U.T Antenna:	
The antennas are Dipole antenna, the best case gain of the antennas are 5dBi, reference to the appendix II for details	

7.2 Conducted Emissions

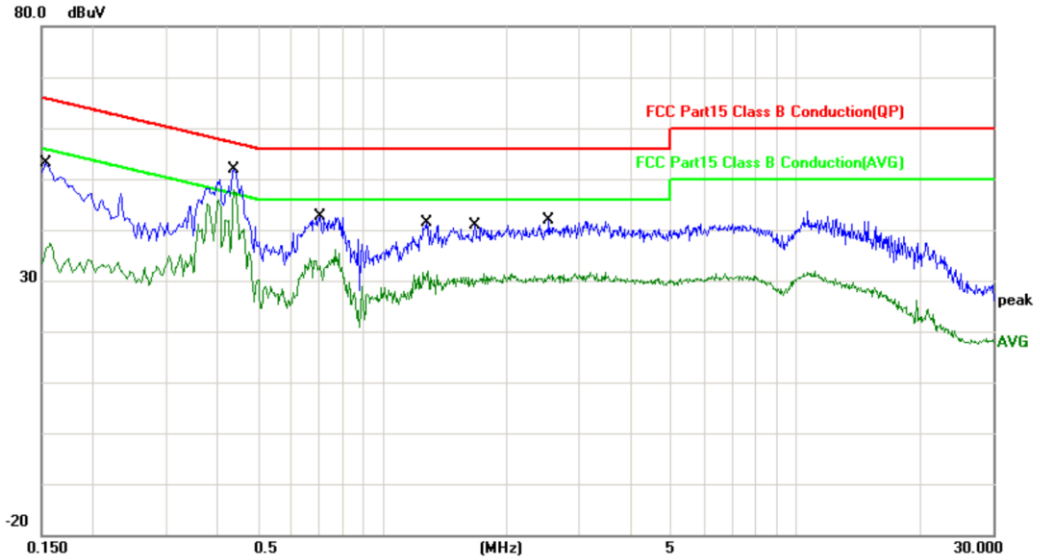
<table>
<tr><td>Test Requirement:</td><td colspan="6">FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td colspan="6">ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="6">150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td colspan="6">Class B</td></tr>
<tr><td>Receiver setup:</td><td colspan="6">RBW=9KHz, VBW=30KHz</td></tr>
<tr><td>Limit:</td><td colspan="6"><table><tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr><tr><td>Quasi-peak</td><td>Average</td></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>* Decreases with the logarithm of the frequency.</td></tr>
<tr><td>Test procedure</td><td colspan="6">The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</td></tr>
<tr><td>Test setup:</td><td colspan="6"> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 5.2 for details</td></tr>
<tr><td>Test environment:</td><td>Temp.:</td><td>25 °C</td><td>Humid.:</td><td>52%</td><td>Press.:</td><td>1012mbar</td></tr>
<tr><td>Test voltage:</td><td colspan="6">AC 120V, 60Hz</td></tr>
<tr><td>Test results:</td><td colspan="6">Pass</td></tr>
</table>

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

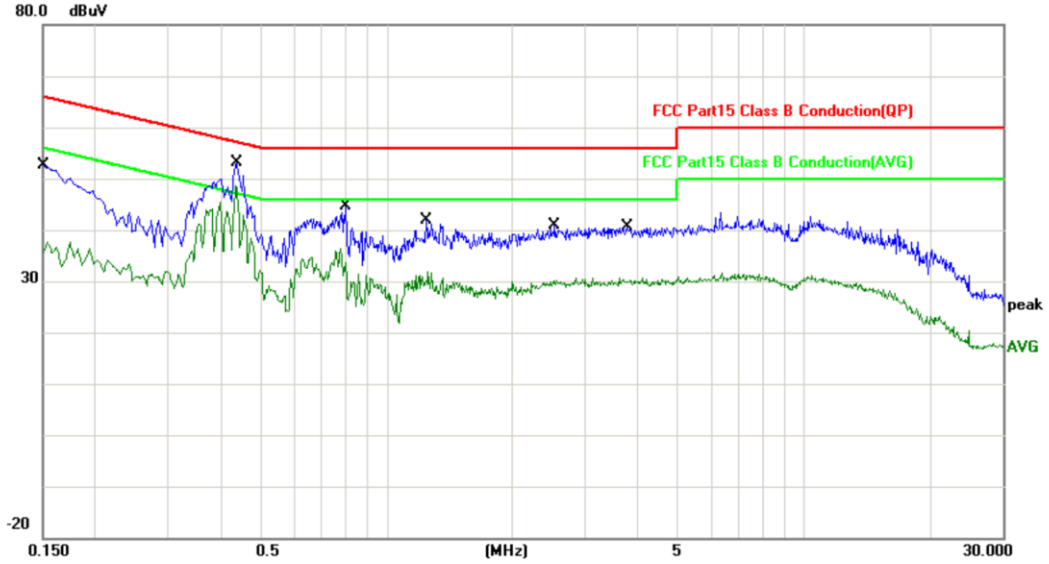
Measurement data:

Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1540	31.31	19.50	50.81	65.78	-14.97	QP	
2		0.1540	16.90	19.50	36.40	55.78	-19.38	AVG	
3		0.4380	29.82	19.53	49.35	57.10	-7.75	QP	
4	*	0.4380	23.39	19.53	42.92	47.10	-4.18	AVG	
5		0.7100	20.02	19.56	39.58	56.00	-16.42	QP	
6		0.7100	13.70	19.56	33.26	46.00	-12.74	AVG	
7		1.2820	15.94	19.73	35.67	56.00	-20.33	QP	
8		1.2820	9.26	19.73	28.99	46.00	-17.01	AVG	
9		1.6780	15.35	19.91	35.26	56.00	-20.74	QP	
10		1.6780	9.68	19.91	29.59	46.00	-16.41	AVG	
11		2.5300	15.96	20.41	36.37	56.00	-19.63	QP	
12		2.5300	10.26	20.41	30.67	46.00	-15.33	AVG	

Neutral:

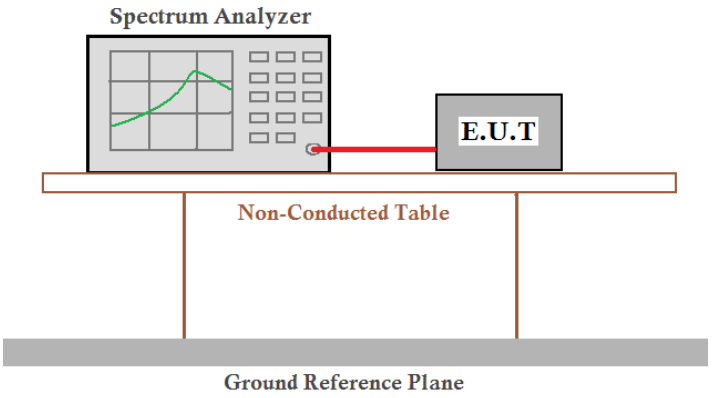


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	29.06	19.70	48.76	66.00	-17.24	QP	
2		0.1500	15.82	19.70	35.52	56.00	-20.48	AVG	
3		0.4380	30.03	19.73	49.76	57.10	-7.34	QP	
4	*	0.4380	23.68	19.73	43.41	47.10	-3.69	AVG	
5		0.7980	16.89	19.81	36.70	56.00	-19.30	QP	
6		0.7980	10.29	19.81	30.10	46.00	-15.90	AVG	
7		1.2460	13.72	19.97	33.69	56.00	-22.31	QP	
8		1.2460	8.44	19.97	28.41	46.00	-17.59	AVG	
9		2.5380	14.63	20.58	35.21	56.00	-20.79	QP	
10		2.5380	8.57	20.58	29.15	46.00	-16.85	AVG	
11		3.7620	14.96	20.27	35.23	56.00	-20.77	QP	
12		3.7620	9.37	20.27	29.64	46.00	-16.36	AVG	

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss*

7.3 Emission Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 KDB 662911 D01 Multiple Transmitter Output v02r01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)					26dB Occupied Bandwidth (MHz)				
		802.11a	802.11n(HT20)		802.11ax(HT20)		802.11a	802.11n(HT20)		802.11ax(HT20)	
		ANT 0	ANT 0	ANT 1	ANT 0	ANT 1	ANT 0	ANT 0	ANT 1	ANT 0	ANT 1
36	5180	17.361	18.231	18.148	18.351	18.136	21.160	21.360	21.280	21.320	21.360
40	5200	17.431	18.205	18.144	18.355	18.166	20.920	21.320	21.480	21.240	21.640
48	5240	17.326	18.220	18.098	19.186	19.264	21.200	21.120	21.520	21.480	24.440

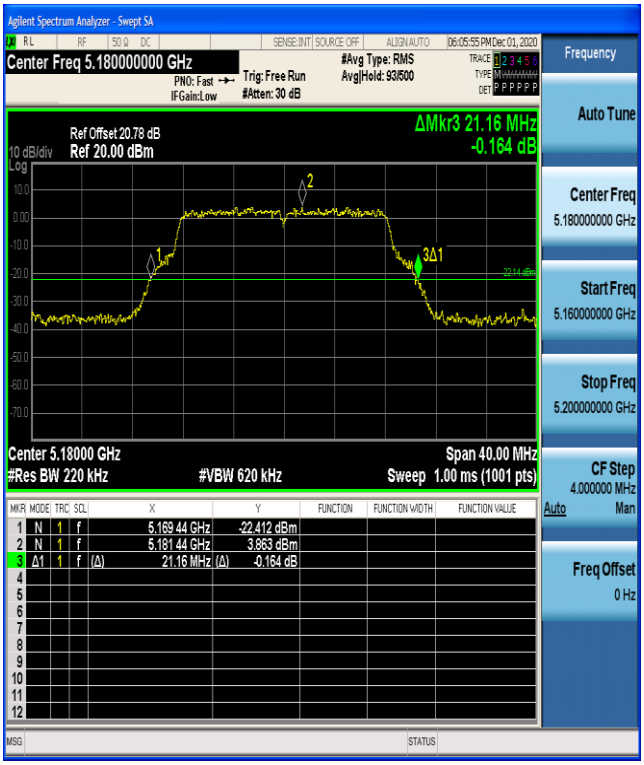
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)				26dB Occupied Bandwidth (MHz)			
		802.11n(HT40)		802.11ax(HT40)		802.11n(HT40)		802.11ax(HT40)	
		ANT 0	ANT 1	ANT 0	ANT 1	ANT 0	ANT 1	ANT 0	ANT 1
38	5190	36.537	36.755	37.733	37.623	40.080	39.520	39.920	39.680
46	5230	36.576	36.690	37.791	37.640	39.680	39.600	39.760	39.600

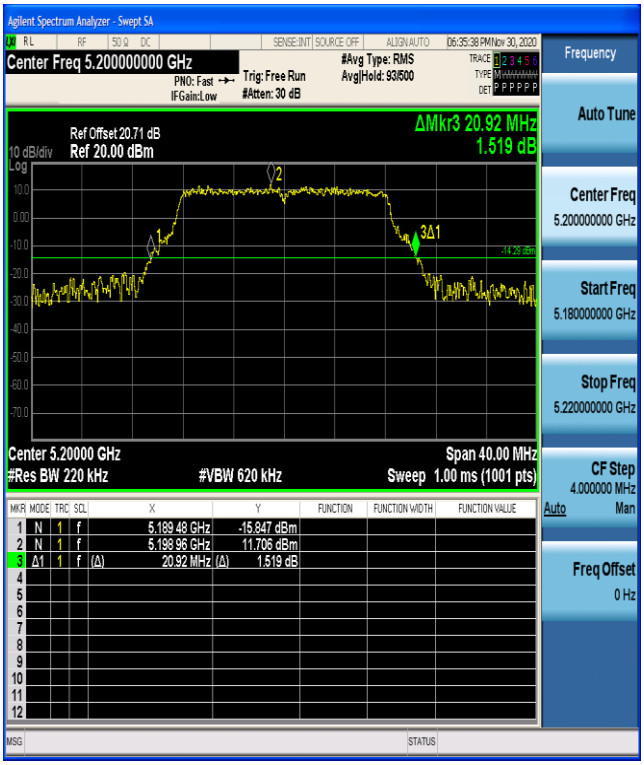
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11ax(HT80)		802.11ax(HT80)	
		ANT 0	ANT 1	ANT 0	ANT 1
42	5210	77.134	77.185	80.800	80.640

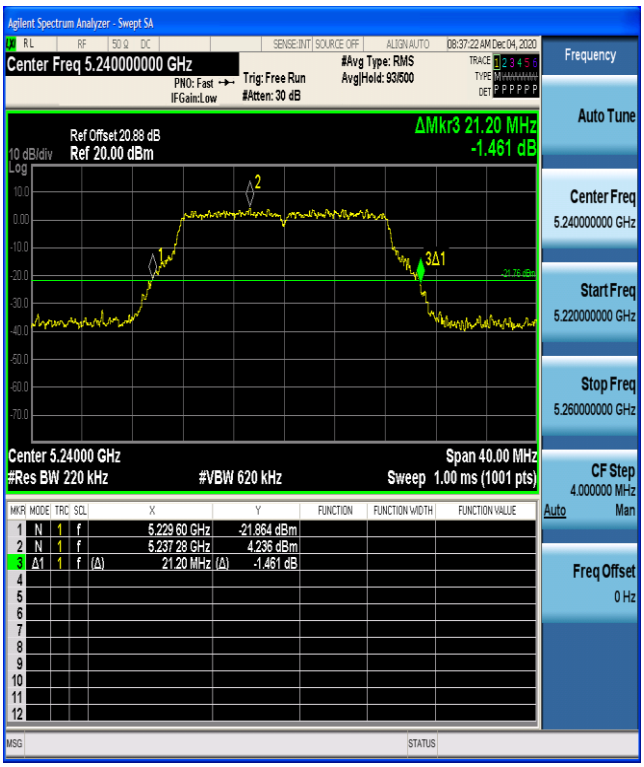
Test plot as follows:

99% Occupied Bandwidth

802.11a

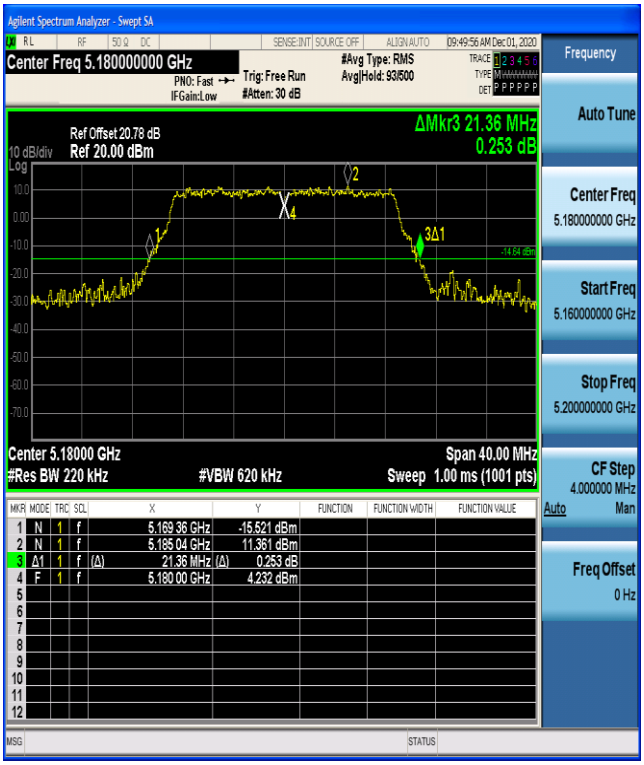




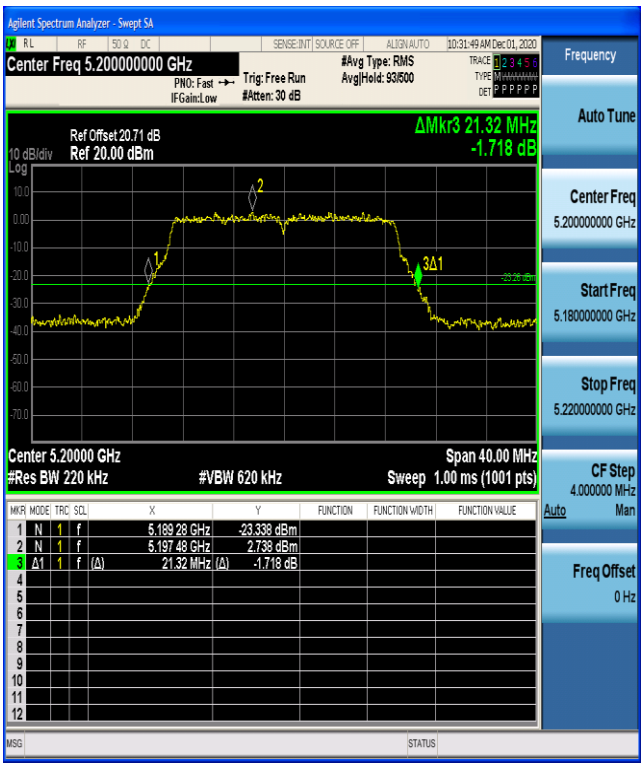


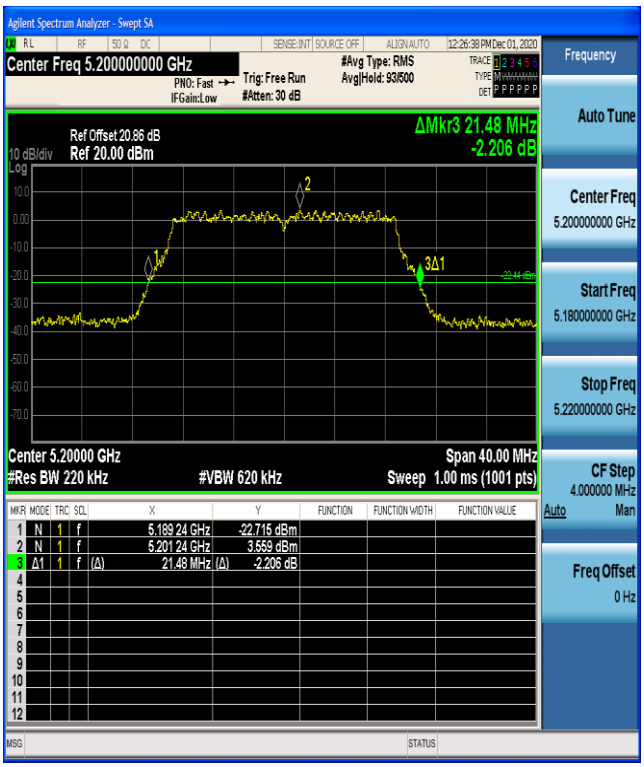
802.11n(HT20)

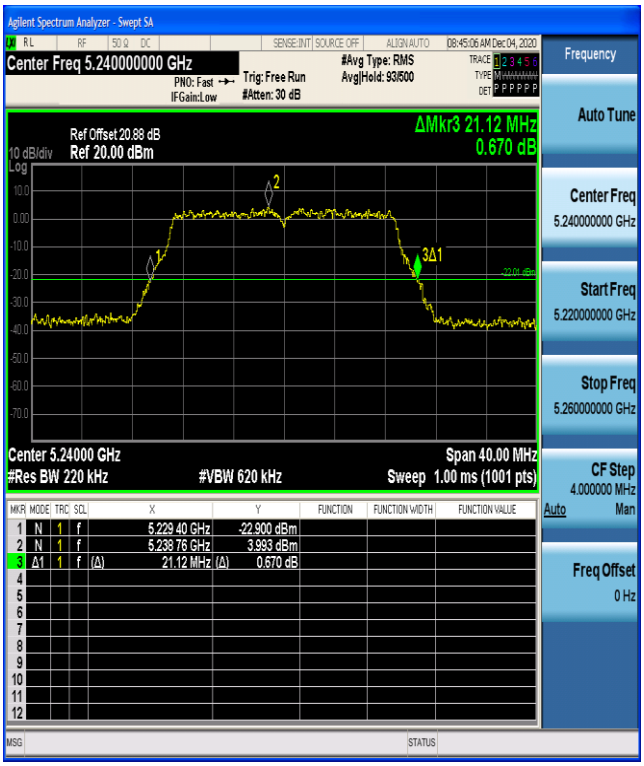
ANT0

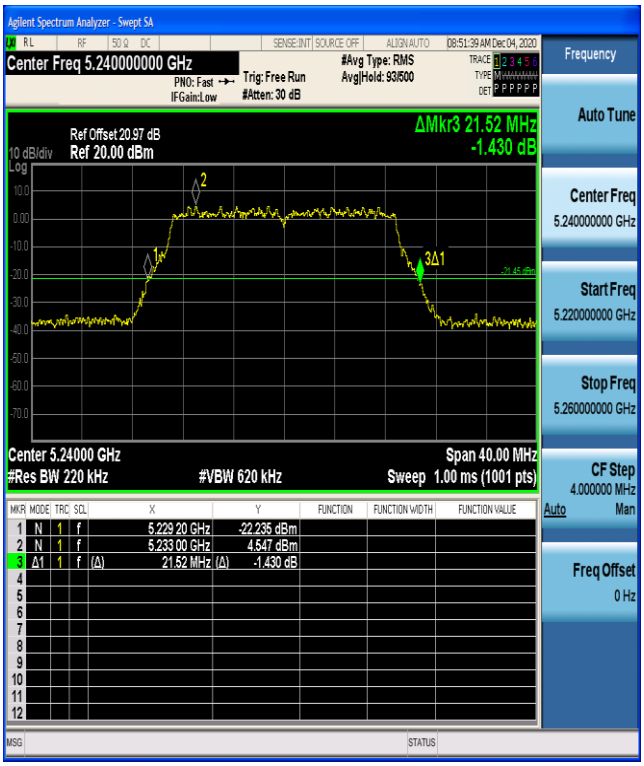


ANT1



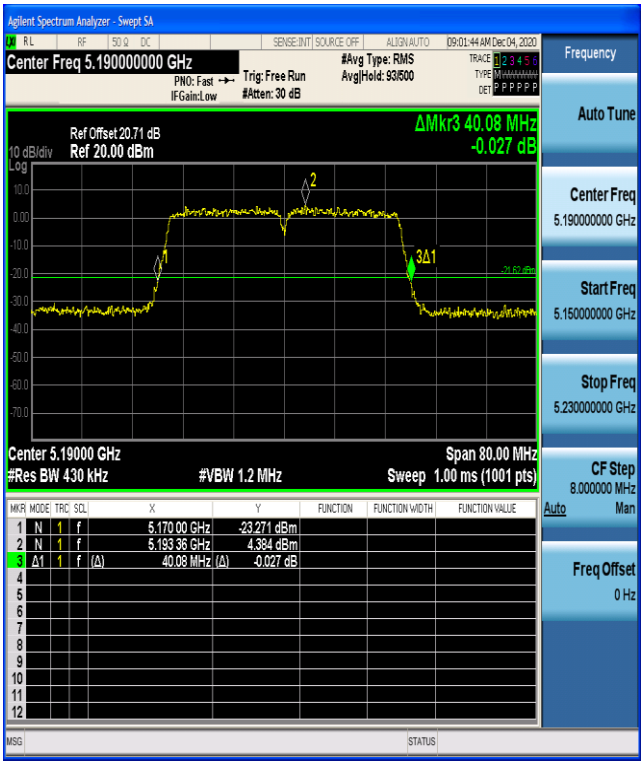






802.11n(HT40)

ANT0



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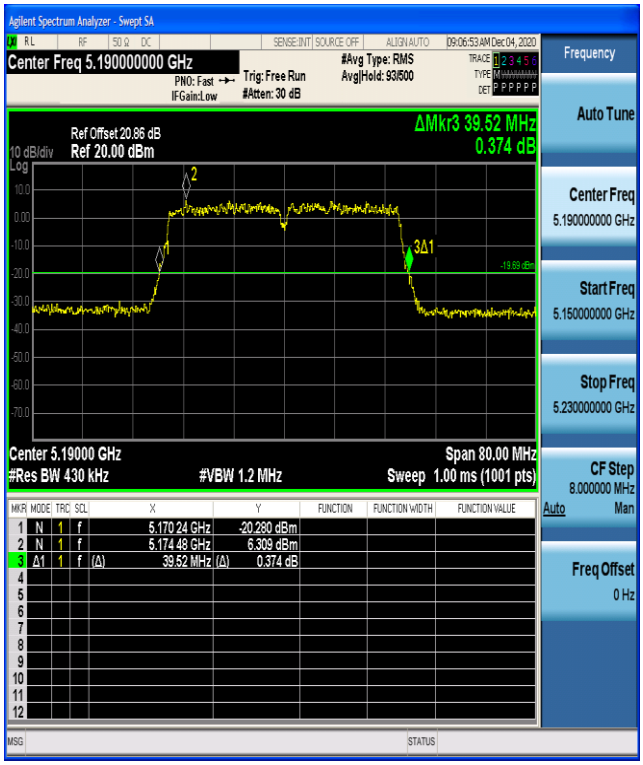

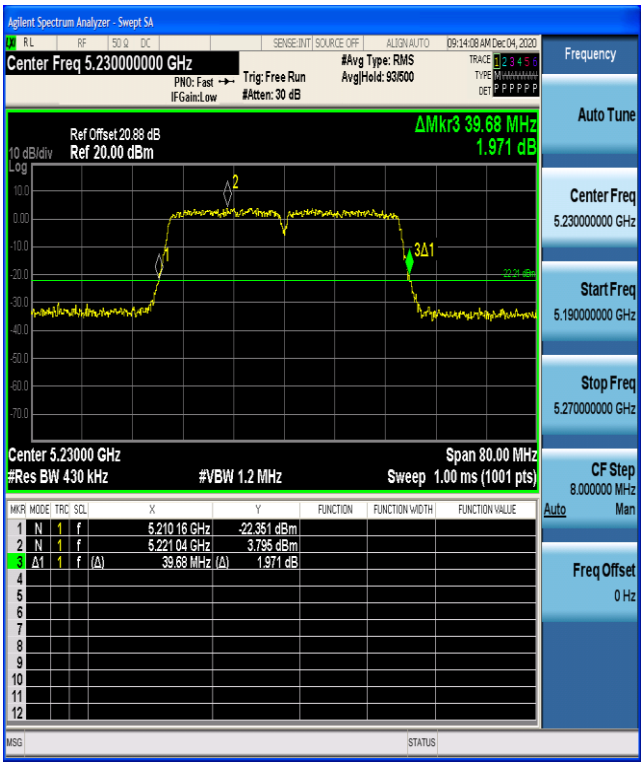

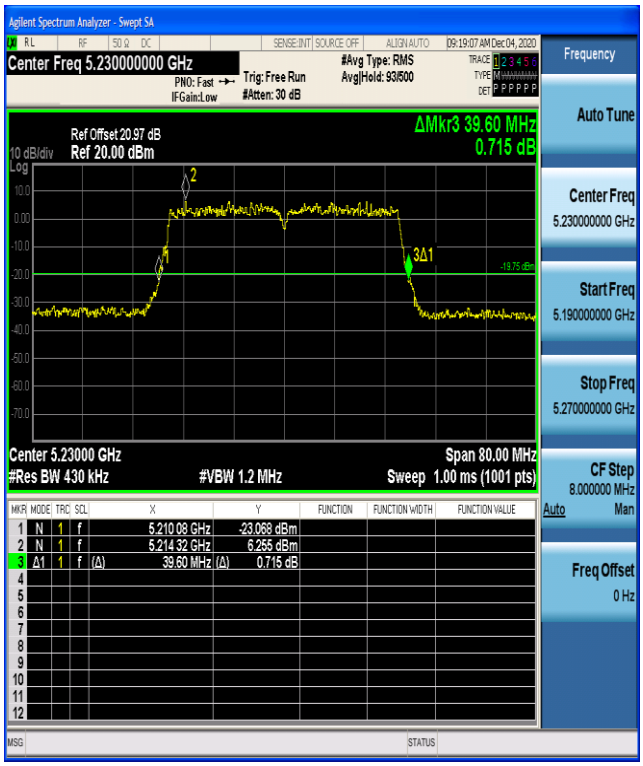

802.11ax(HT20)

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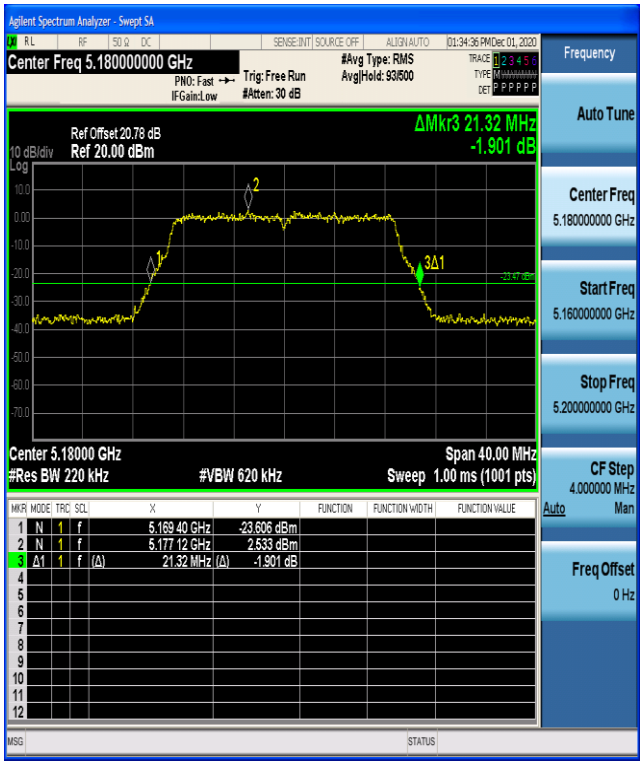

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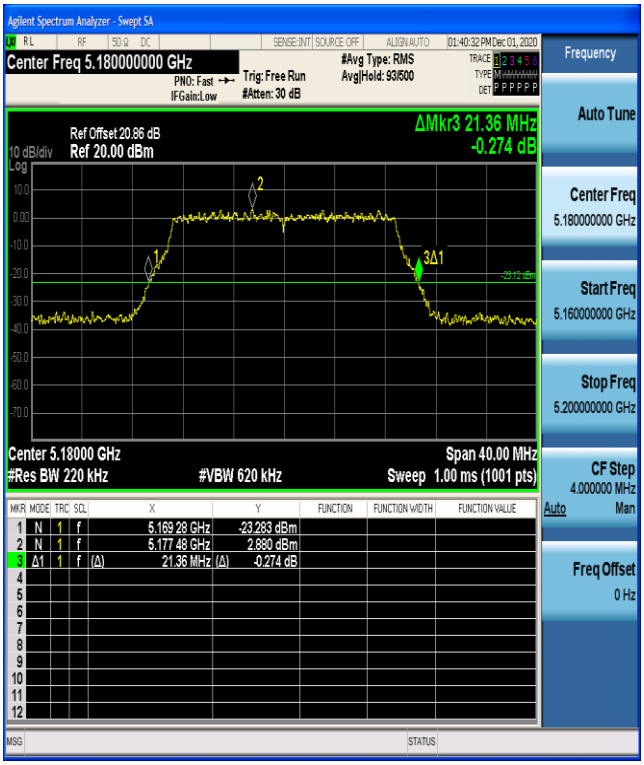

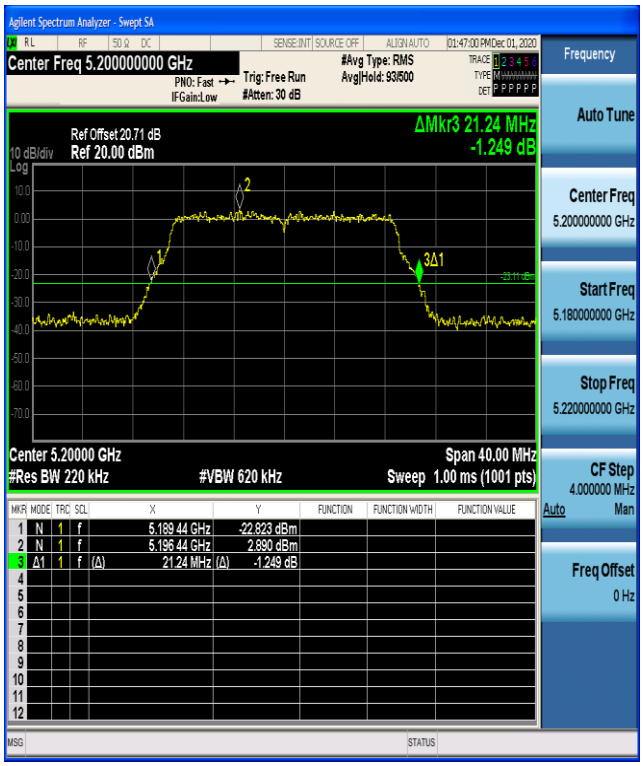
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Trig: Free Run
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#Avg Type: RMS
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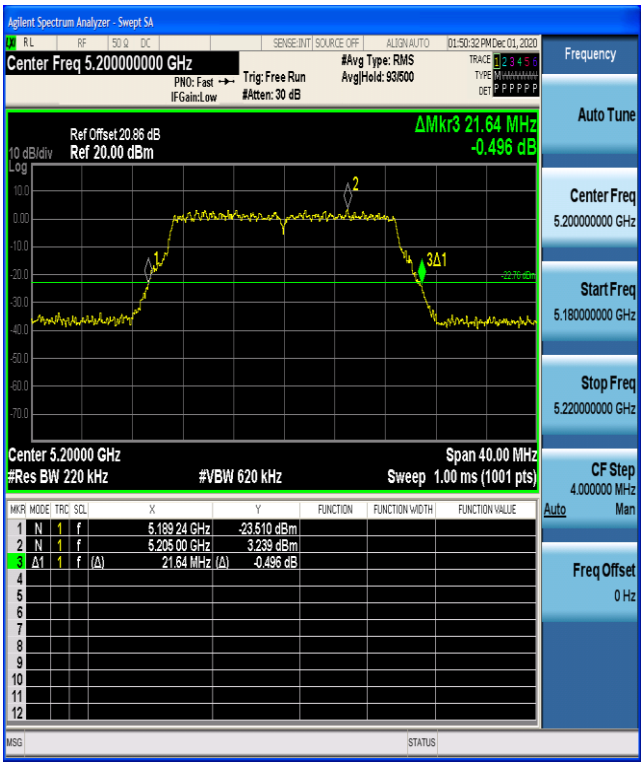
Ref Offset 20.71 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.24 MHz
-1.249 dB
Center 5.20000 GHz
#Res BW 220 kHz
#VBW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)
1 N 1 f 5.189 44 GHz -22.823 dBm
2 N 1 f 5.196 44 GHz 2.890 dBm
3 Δ1 1 f (Δ) 21.24 MHz (Δ) -1.249 dB
Frequency
Auto Tune
Center Freq
5.200000000 GHz
Start Freq
5.180000000 GHz
Stop Freq
5.220000000 GHz
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS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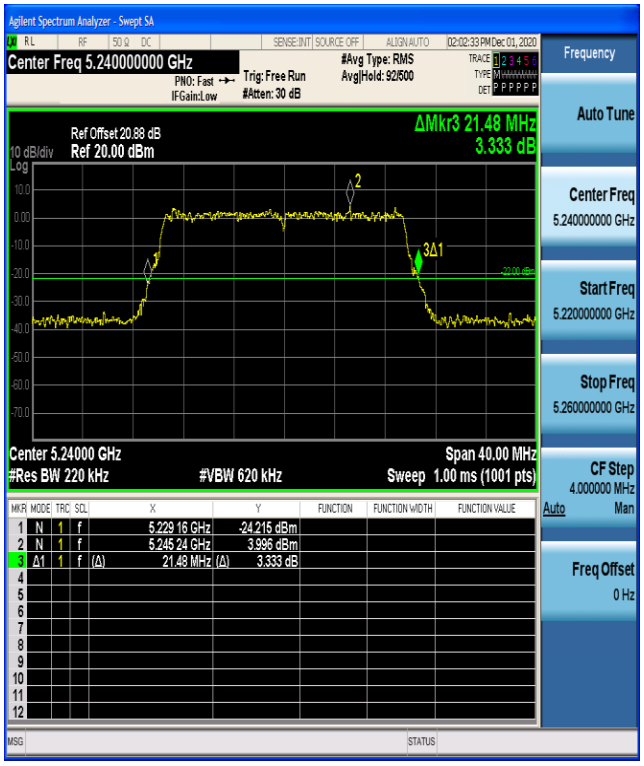
Avg|Hold: 93/500
01:50:32 PM Dec 01, 2020
Ref Offset 20.86 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.64 MHz
-0.496 dB
Center 5.20000 GHz
#Res BW 220 kHz
#VBW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)
1 N 1 f 5.189 24 GHz -23.510 dBm
2 N 1 f 5.205 00 GHz 3.239 dBm
3 Δ1 1 f (Δ) 21.64 MHz (Δ) -0.496 dB
Frequency
Auto Tune
Center Freq
5.200000000 GHz
Start Freq
5.180000000 GHz
Stop Freq
5.220000000 GHz
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS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Trig: Free Run
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Avg|Hold: 92/500
02:02:33 PM Dec 01, 2020
Ref Offset 20.88 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.48 MHz
3.333 dB
Center 5.24000 GHz
#Res BW 220 kHz
#VBW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)
1 N 1 f 5.229 16 GHz -24.215 dBm
2 N 1 f 5.245 24 GHz 3.996 dBm
3 Δ1 1 f (Δ) 21.48 MHz (Δ) 3.333 dB
Frequency
Auto Tune
Center Freq
5.240000000 GHz
Start Freq
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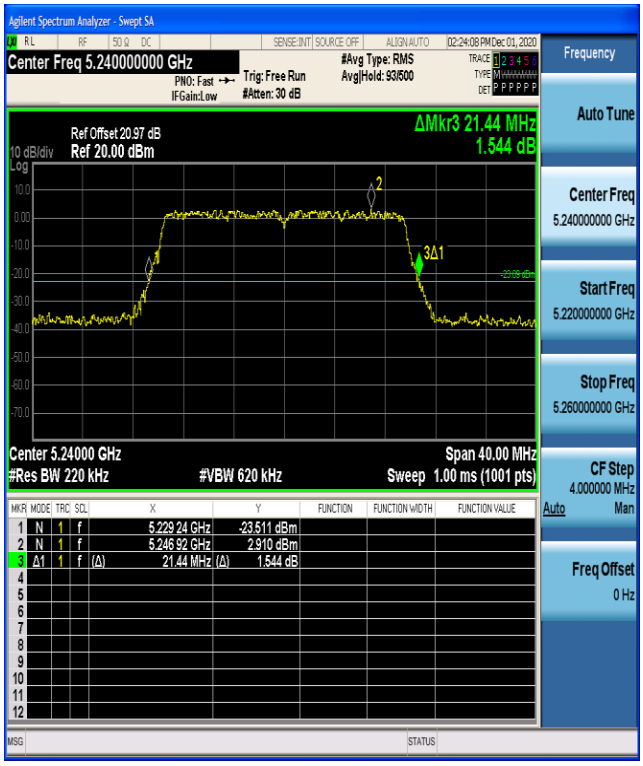
Stop Freq
5.260000000 GHz
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS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IFGain:Low
Trig: Free Run
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Avg|Hold: 93/500
02:24:08 PM Dec 01, 2020
Ref Offset 20.97 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.44 MHz
1.544 dB
Center 5.24000 GHz
#Res BW 220 kHz
#VBW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)
1 N 1 f 5.229 24 GHz -23.511 dBm
2 N 1 f 5.246 92 GHz 2.910 dBm
3 Δ1 1 f (Δ) 21.44 MHz (Δ) 1.544 dB
Frequency
Auto Tune
Center Freq
5.240000000 GHz
Start Freq
5.220000000 GHz
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CF Step
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Auto
Man
Freq Offset
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MSG
STATUS

802.11ax(HT40)

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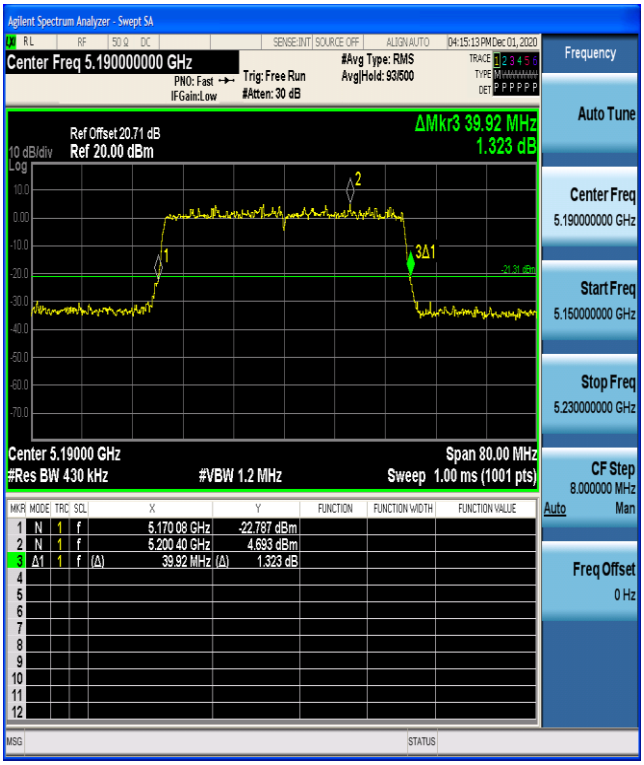

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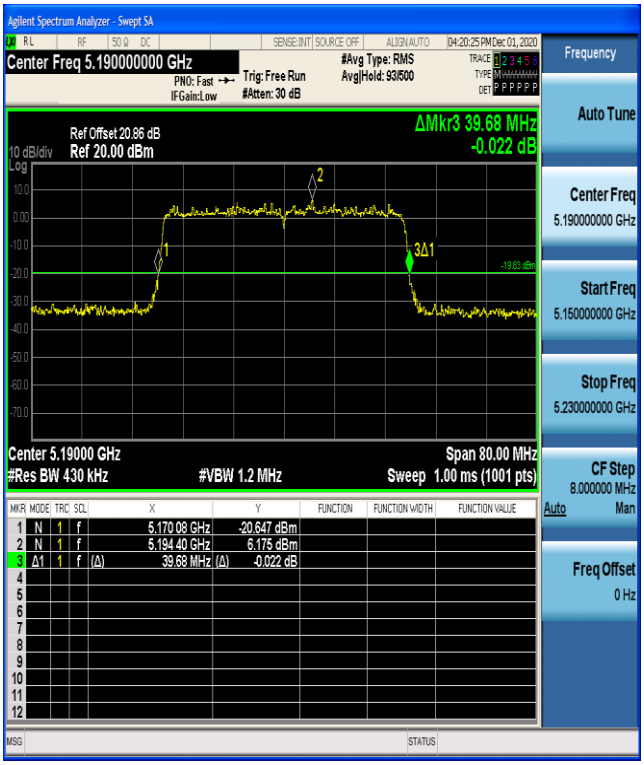

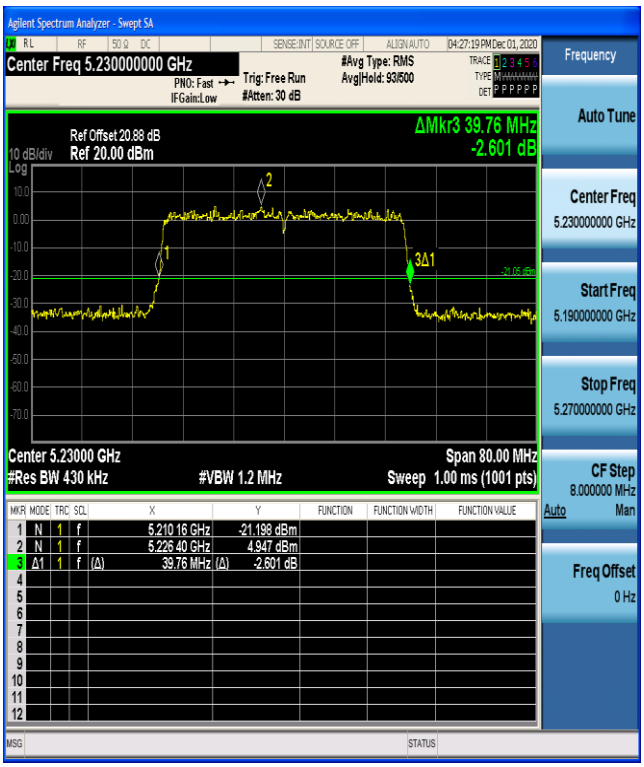

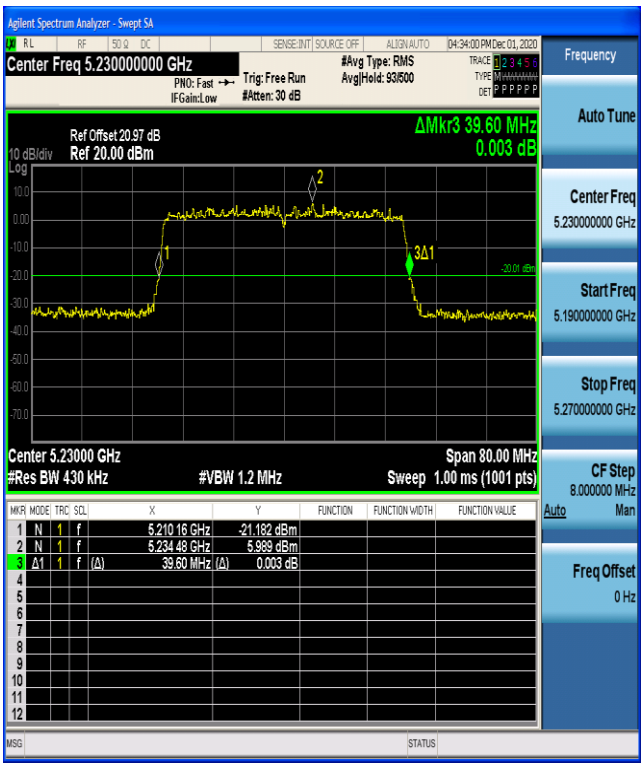

802.11ax(HT80)

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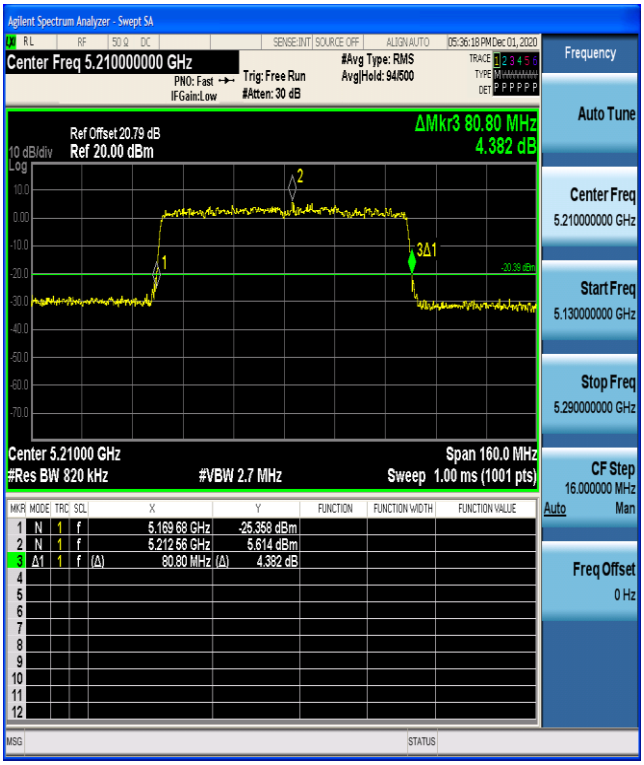

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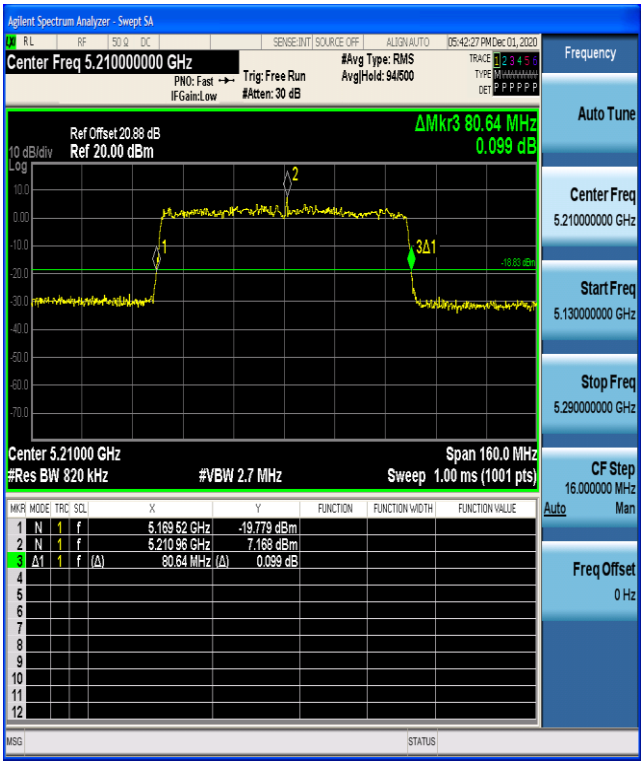
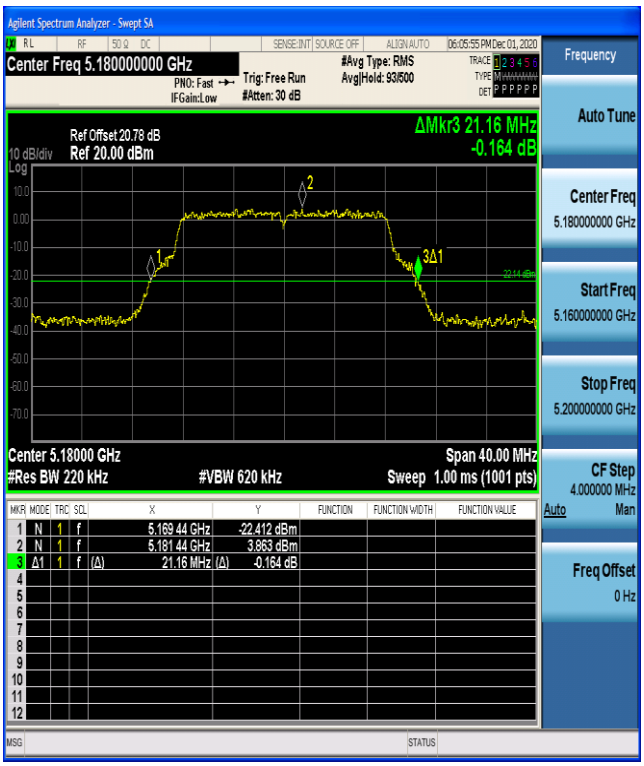
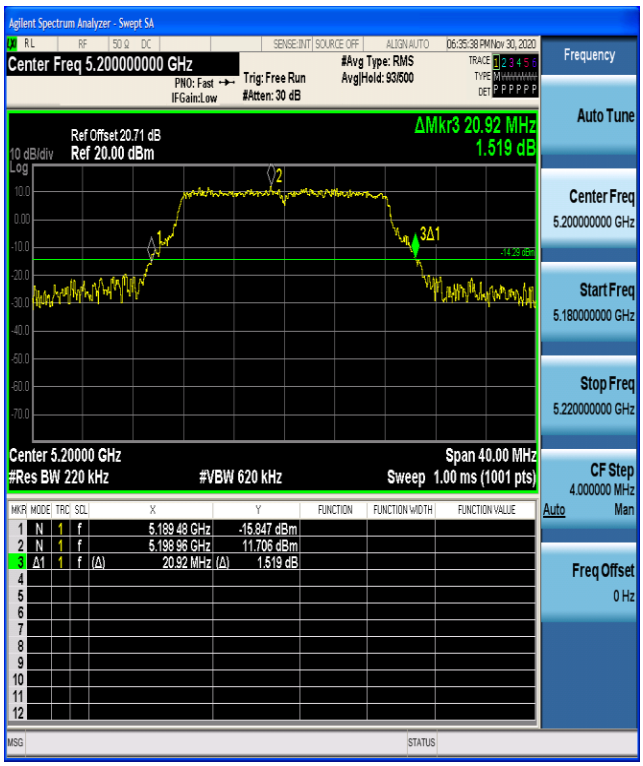
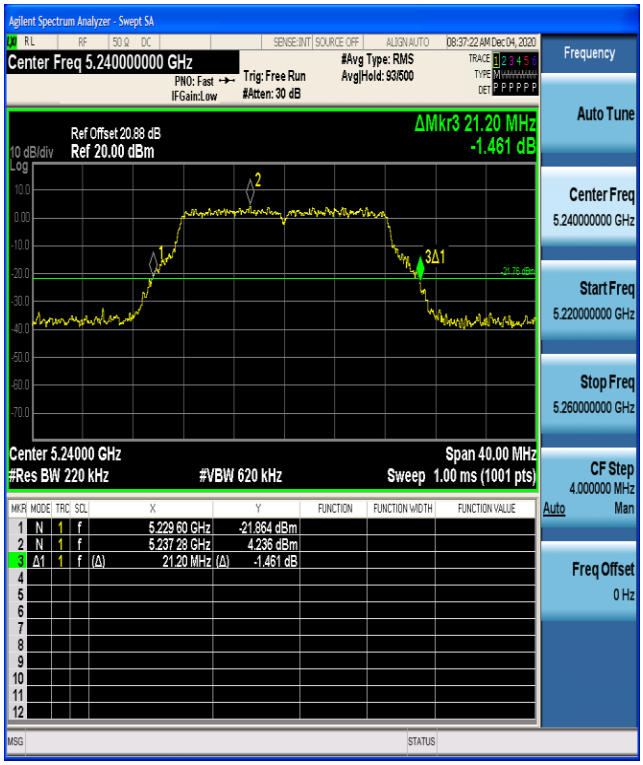


26dB Occupied Bandwidth

802.11a







802.11n(HT20)

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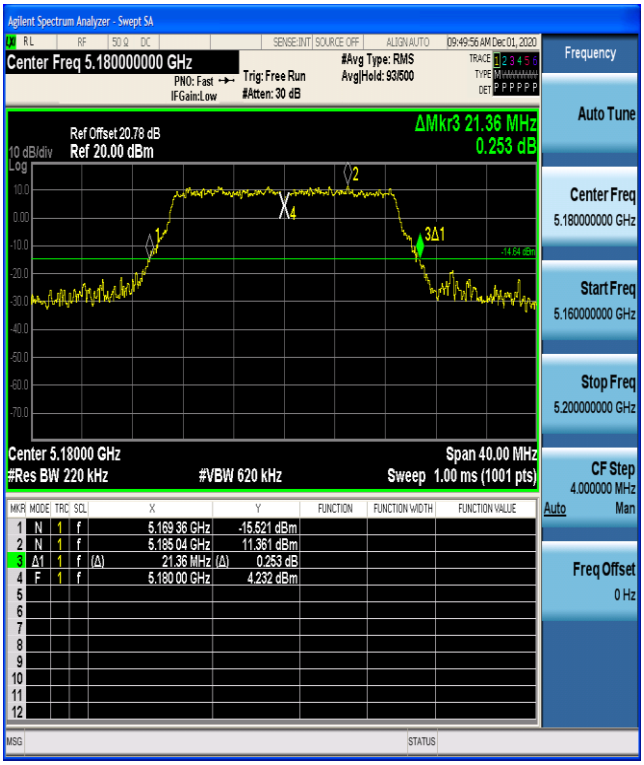

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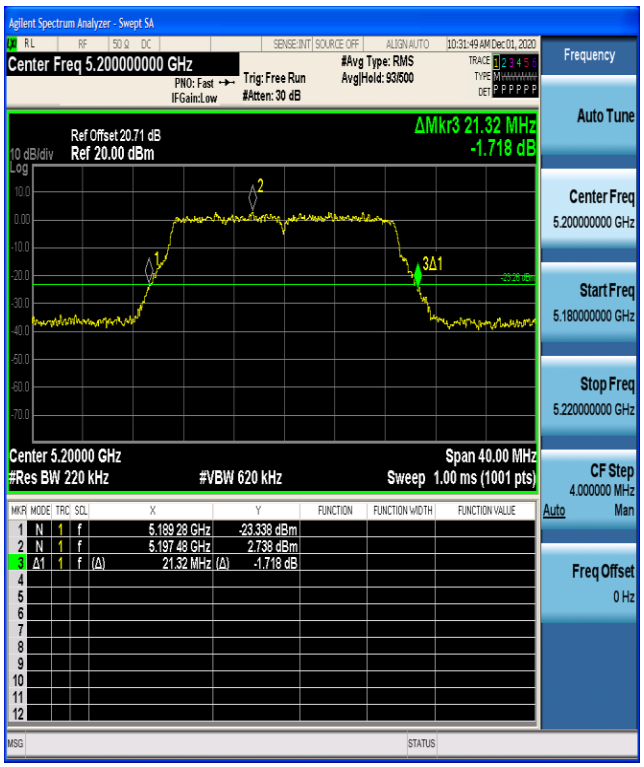

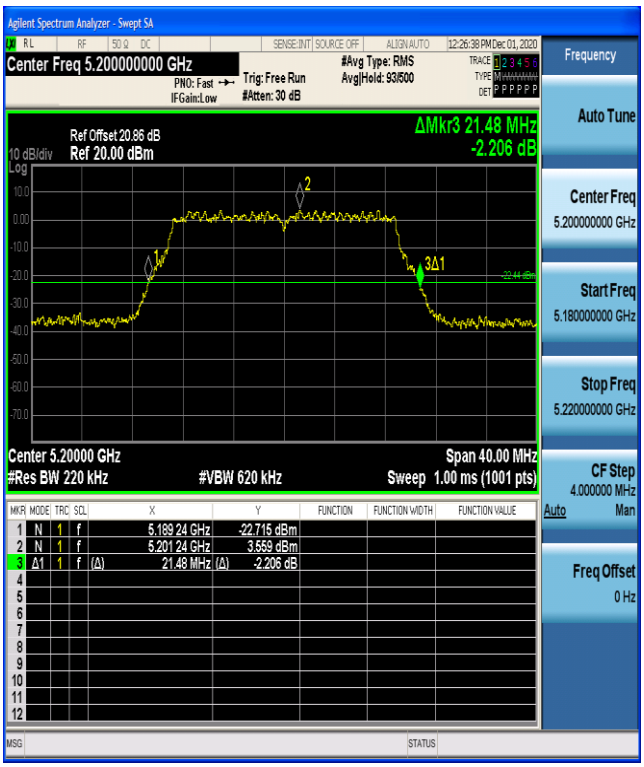

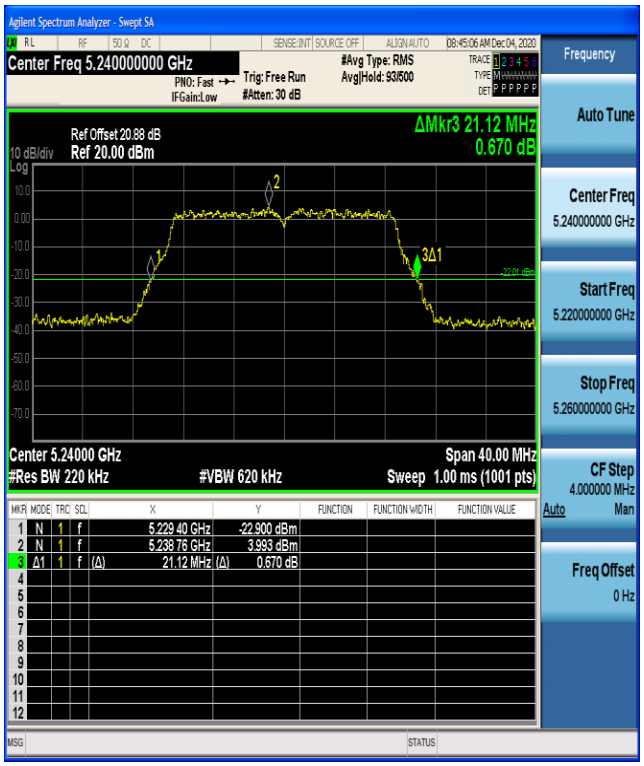

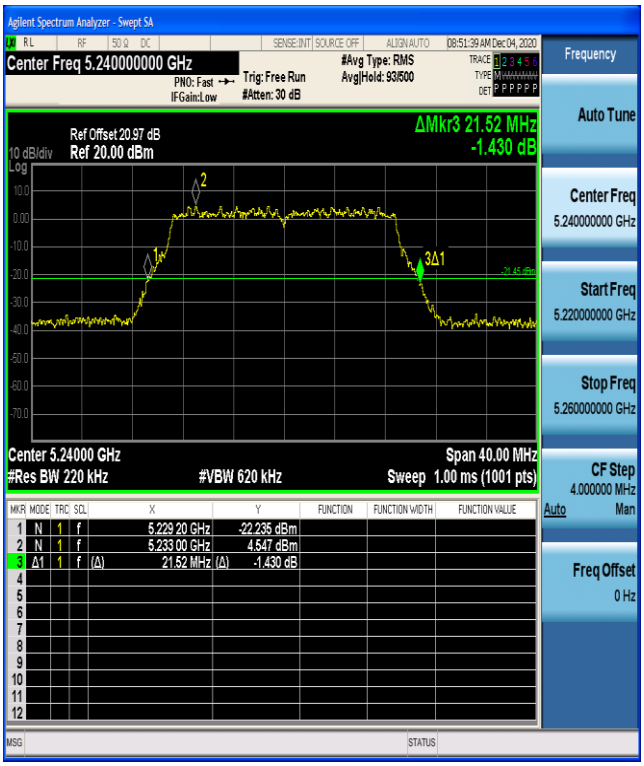

802.11n(HT40)

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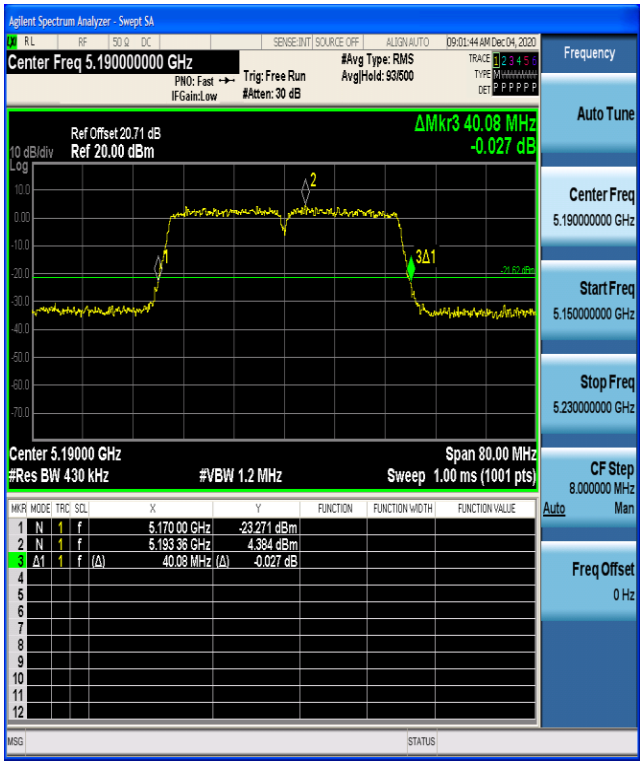

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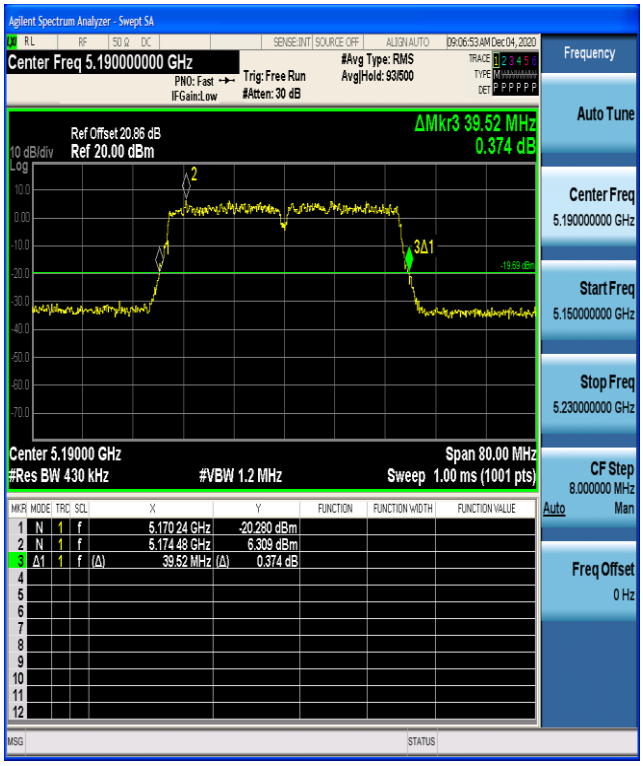

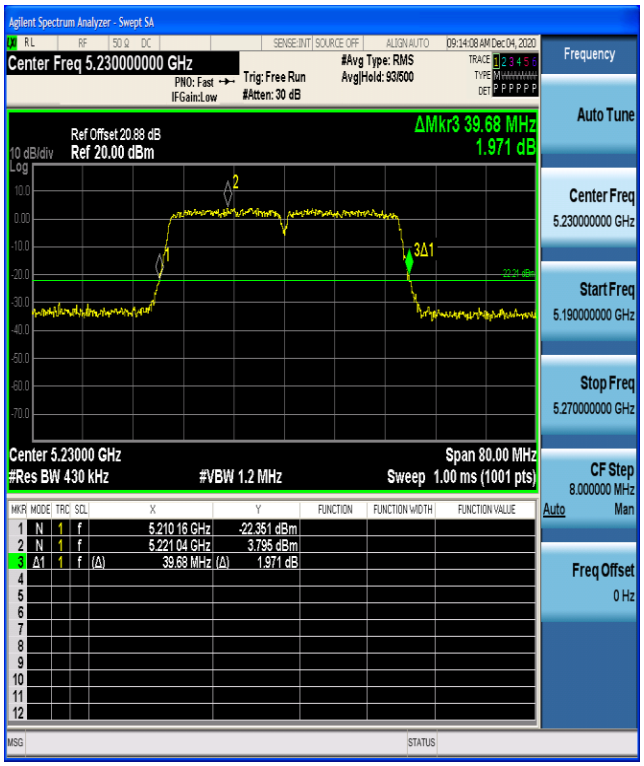

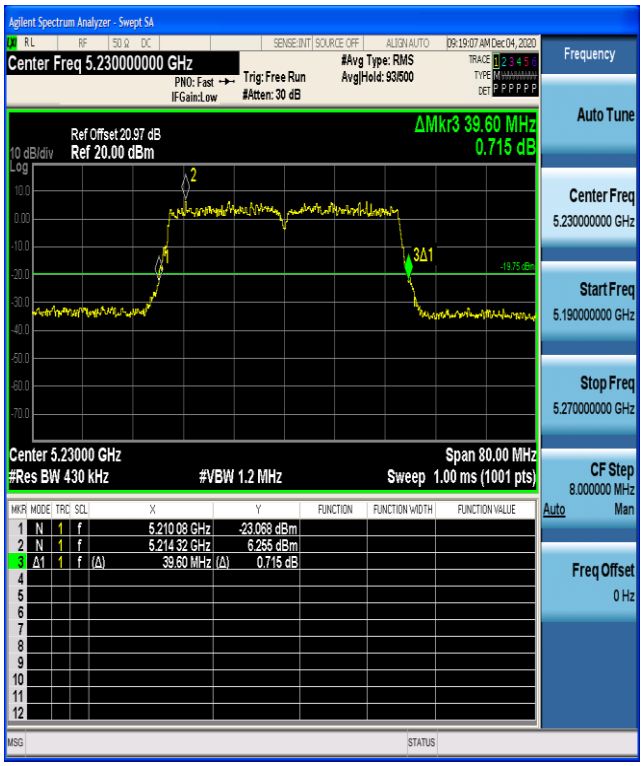

802.11ax(HT20)

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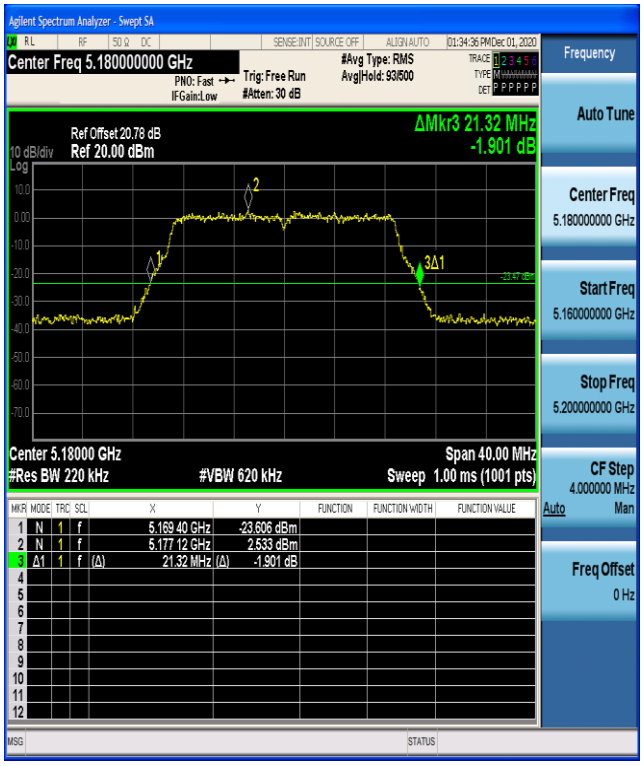

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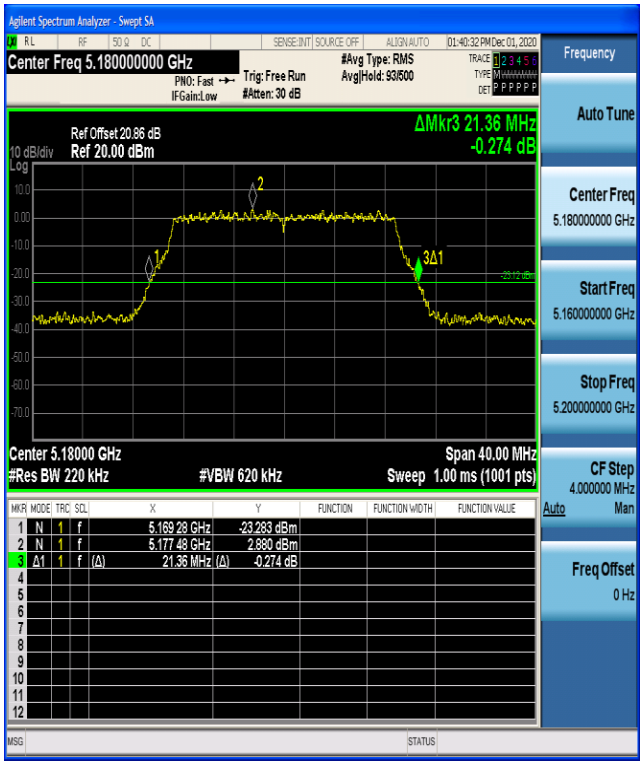

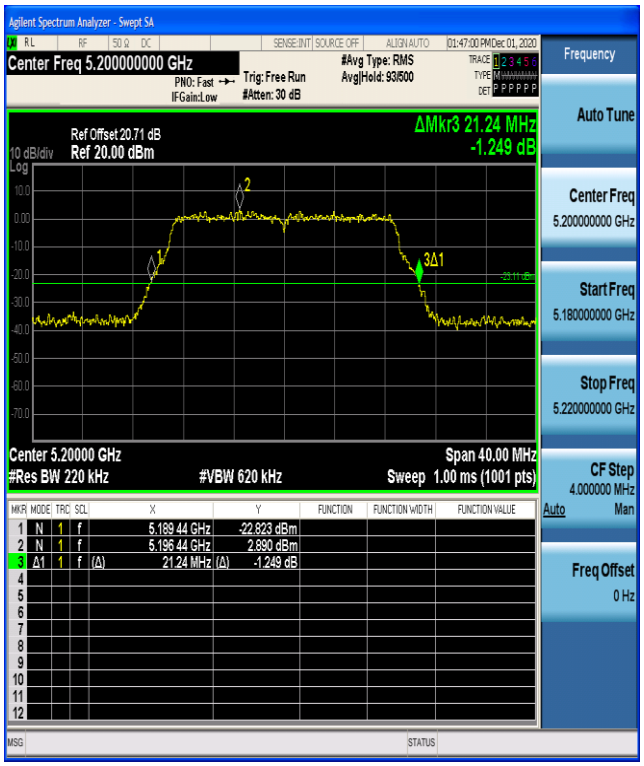
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IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 93/500
01:47:00 PM Dec 01, 2020
Ref Offset 20.71 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.24 MHz
-1.249 dB
Center 5.20000 GHz
#Res BW 220 kHz
#VBW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)
1 N 1 f 5.189 44 GHz -22.823 dBm
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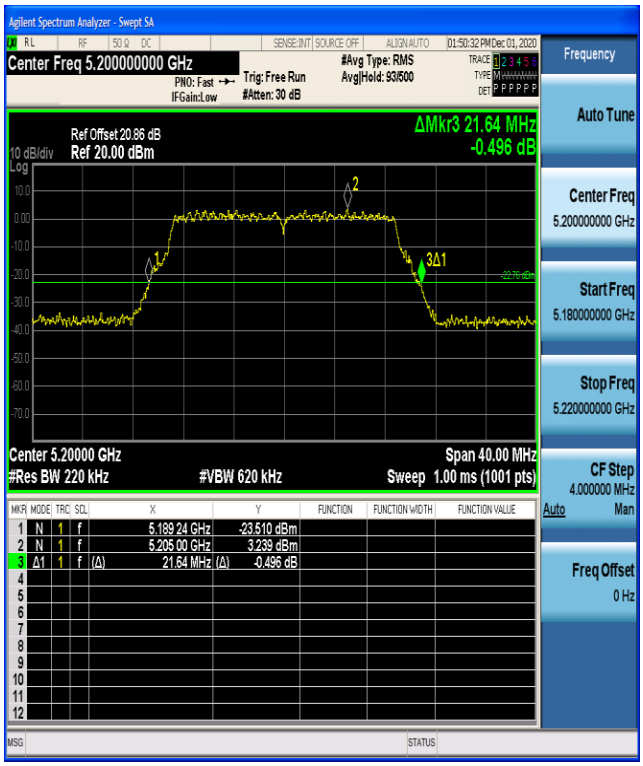
3 Δ1 1 f (Δ) 21.24 MHz (Δ) -1.249 dB
Frequency
Auto Tune
Center Freq
5.200000000 GHz
Start Freq
5.180000000 GHz
Stop Freq
5.220000000 GHz
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz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IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 93/500
01:50:32 PM Dec 01, 2020
Ref Offset 20.86 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.64 MHz
-0.496 dB
Center 5.20000 GHz
#Res BW 220 kHz
#VBW 620 kHz
Span 40.00 MHz
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1 N 1 f 5.189 24 GHz -23.510 dBm
2 N 1 f 5.205 00 GHz 3.239 dBm
3 Δ1 1 f (Δ) 21.64 MHz (Δ) -0.496 dB
Frequency
Auto Tune
Center Freq
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Start Freq
5.180000000 GHz
Stop Freq
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CF Step
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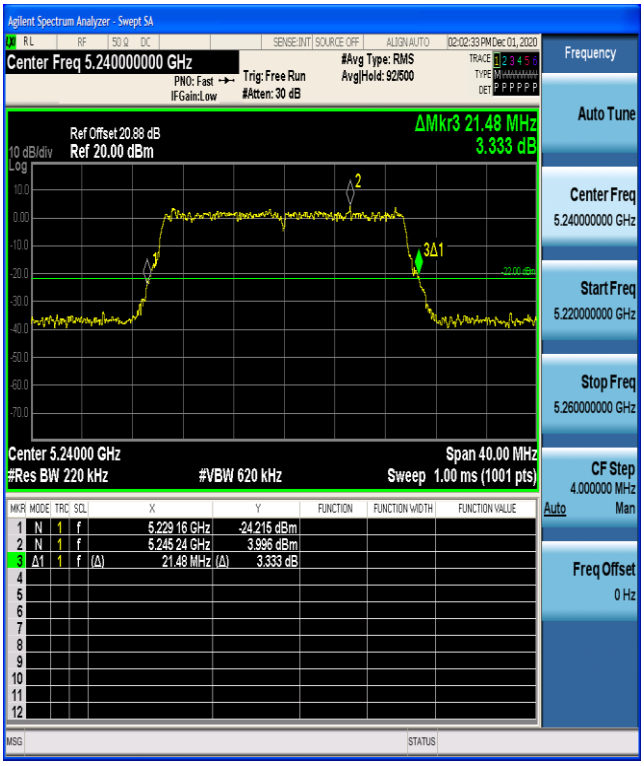
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.240000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 92/500
02:02:33 PM Dec 01, 2020
Ref Offset 20.88 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.48 MHz
3.333 dB
Center 5.24000 GHz
#Res BW 220 kHz
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5.240000000 GHz
Start Freq
5.220000000 GHz
Stop Freq
5.260000000 GHz
CF Step
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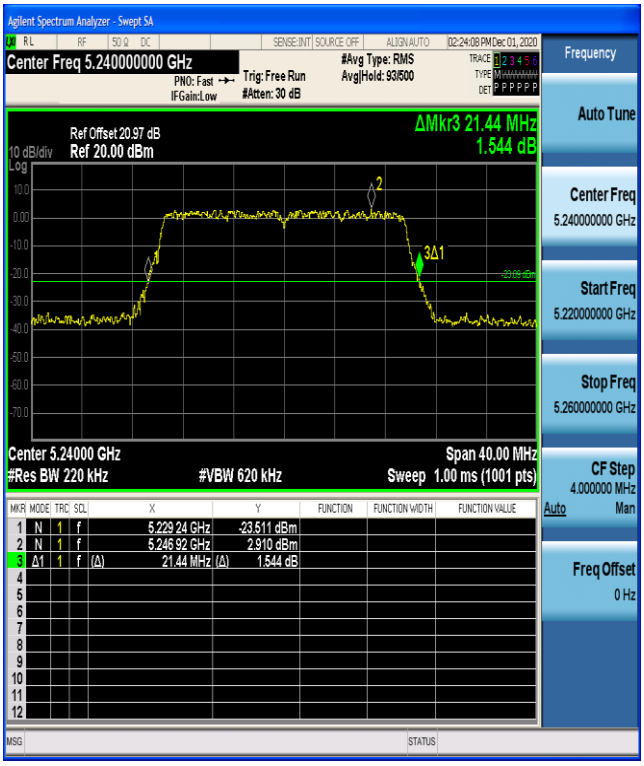
Auto
Man
Freq Offset
0 Hz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IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 93/500
02:24:08 PM Dec 01, 2020
Ref Offset 20.97 dB
10 dB/div
Ref 20.00 dBm
ΔMkr3 21.44 MHz
1.544 dB
Center 5.24000 GHz
#Res BW 220 kHz
#VBW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)
1 N 1 f 5.229 24 GHz -23.511 dBm
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Frequency
Auto Tune
Center Freq
5.240000000 GHz
Start Freq
5.220000000 GHz
Stop Freq
5.260000000 GHz
CF Step
4.000000 MHz
Auto
Man
Freq Offset
0 Hz

802.11ax(HT40)

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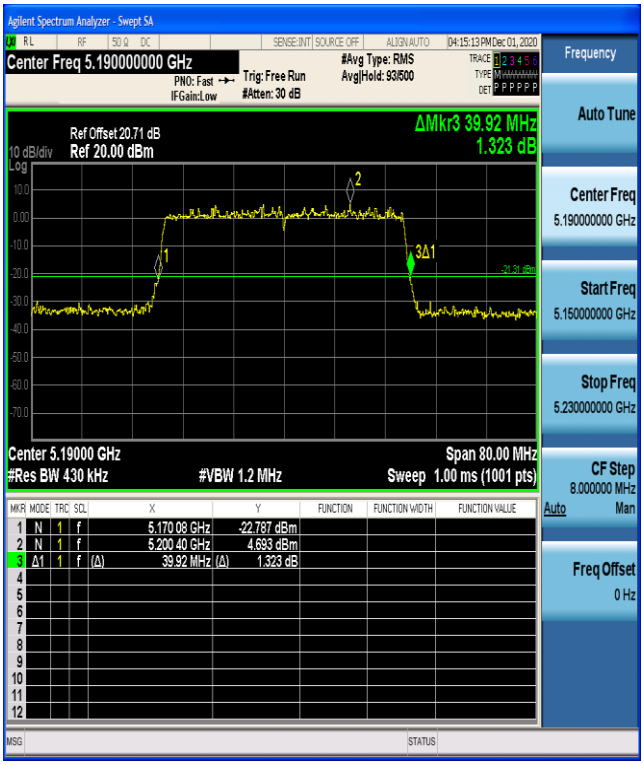

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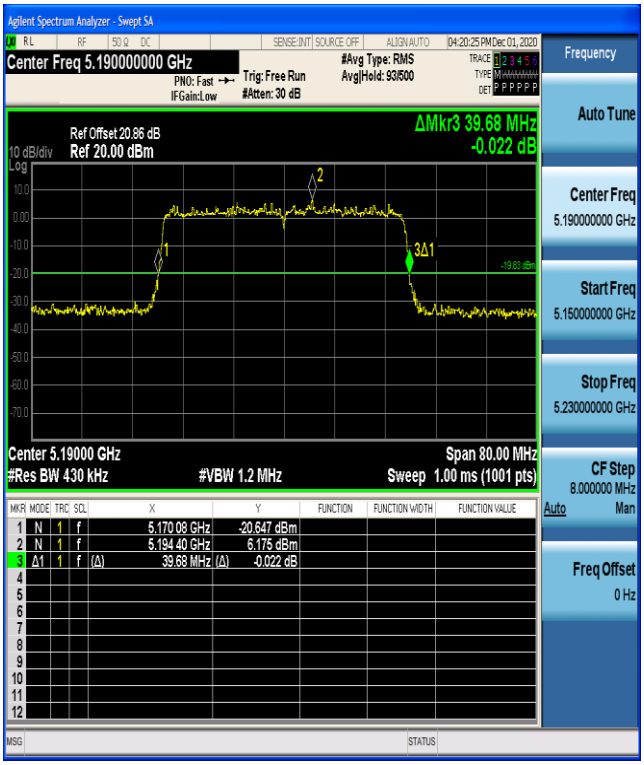

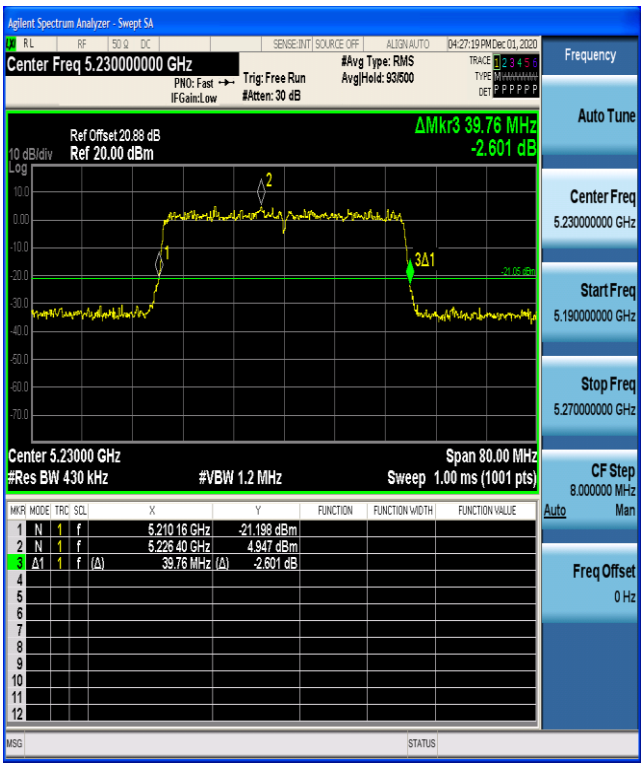

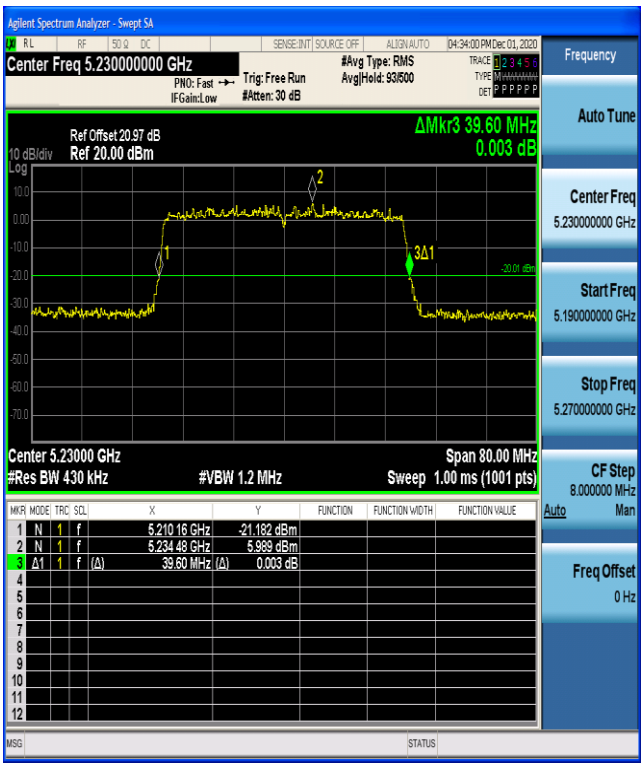

802.11ax(HT80)

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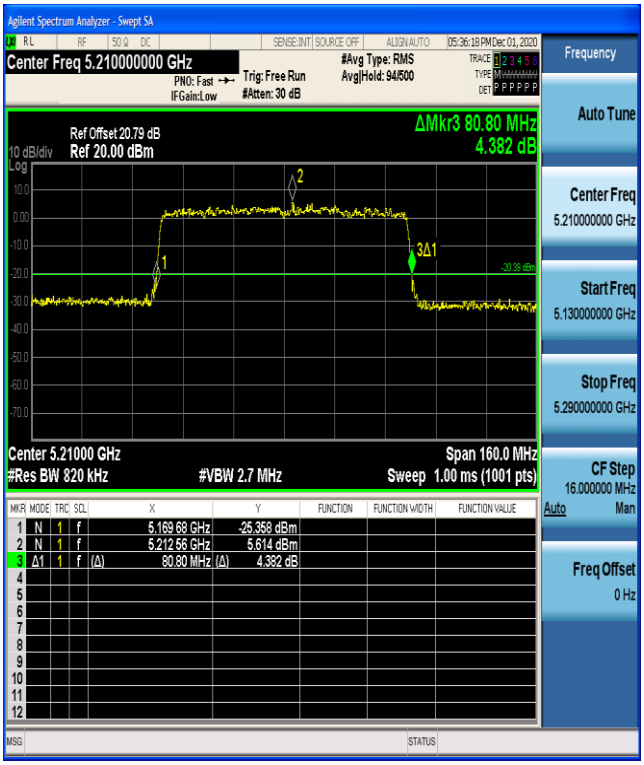

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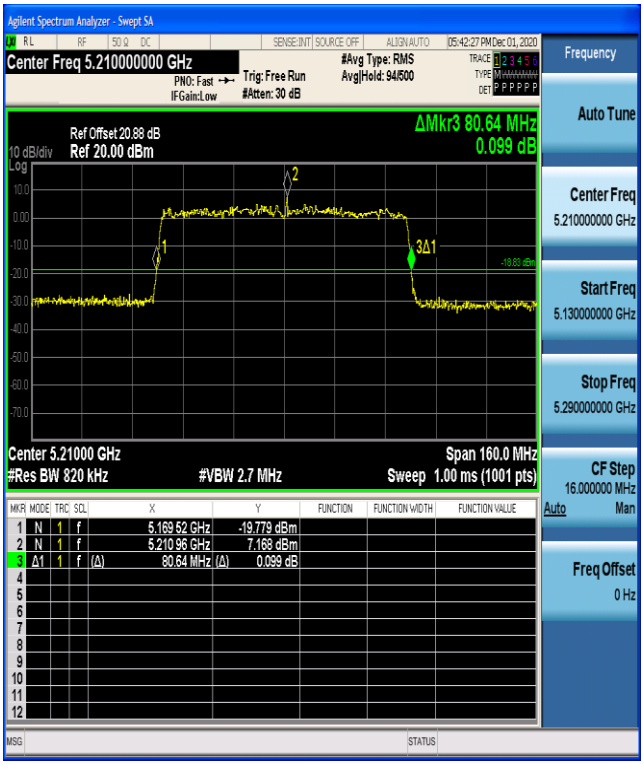
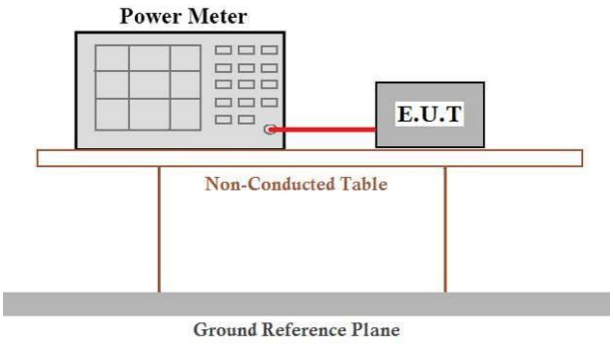


7.4 Peak Transmit Power

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407</td></tr>
<tr><td>Test Method:</td><td>KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency band (MHz)</th><th>Limit</th></tr>
<tr><td rowspan="2">5150-5250</td><td>≤1W(30dBm) for master device</td></tr>
<tr><td>≤250mW(23.98dBm) for client device</td></tr>
<tr><td>5250-5350</td><td>≤250mW(23.98dBm) for client device or 11dBm+10logB*</td></tr>
<tr><td>5470-5725</td><td>≤250mW(23.98dBm) for client device or 11dBm+10logB*</td></tr>
<tr><td colspan="2">Remark: *Where B is the 26dB emission bandwidth in MHz.
The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test procedure:</td><td>Measurement using an RF average power meter
(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied
a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B).
(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
(iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10log(1/0.25) if the duty cycle is 25 percent).</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.2 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

Measurement Data

Modulation	Duty cycle	Duty Factor
802.11a	94.98%	0.22
802.11n(HT20)	90.54%	0.43
802.11n(HT40)	82.94%	0.81
802.11ax(HT20)	98.39%	0.07
802.11ax(HT40)	92.39%	0.34
802.11ax(HT80)	87.96%	0.56

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180	22.16	0.22	22.38	23.98	Pass
40	5200	21.55	0.22	21.77	23.98	Pass
48	5240	21.50	0.22	21.72	23.98	Pass

802.11n(HT20) mode								
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Output Power (dBm)		Limit (dBm)	Result
		ANT0	ANT1		ANT0	ANT1		
36	5180	19.46	19.58	0.43	19.89	20.01	23.98	Pass
40	5200	19.81	19.28	0.43	20.24	19.71	23.98	Pass
48	5240	19.38	19.85	0.43	19.81	20.28	23.98	Pass

802.11n(HT40) mode								
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Output Power (dBm)		Limit (dBm)	Result
		ANT0	ANT1		ANT0	ANT1		
38	5180	19.16	20.32	0.81	19.97	21.13	23.98	Pass
46	5200	19.38	20.42	0.81	20.19	21.23	23.98	Pass

802.11ax(HT20) mode								
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Output Power (dBm)		Limit (dBm)	Result
		ANT0	ANT1		ANT0	ANT1		
36	5180	20.46	19.82	0.07	20.53	19.89	23.98	Pass
40	5200	19.76	20.19	0.07	19.83	20.26	23.98	Pass
48	5240	20.34	19.79	0.07	20.41	19.86	23.98	Pass

802.11ax(HT40) mode								
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Output Power (dBm)		Limit (dBm)	Result
		ANT0	ANT1		ANT0	ANT1		
38	5190	19.84	20.27	0.34	20.18	20.61	23.98	Pass
46	5230	19.36	20.16	0.34	19.70	20.50	23.98	Pass

802.11 ax(HT80) mode								
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Output Power (dBm)		Limit (dBm)	Result
		ANT0	ANT1		ANT0	ANT1		
42	5210	19.86	20.24	0.56	20.42	20.80	23.98	Pass

Note: Output Power = Measured Power + Duty Factor
Duty Factor = 10 log (1/Duty Cycle)

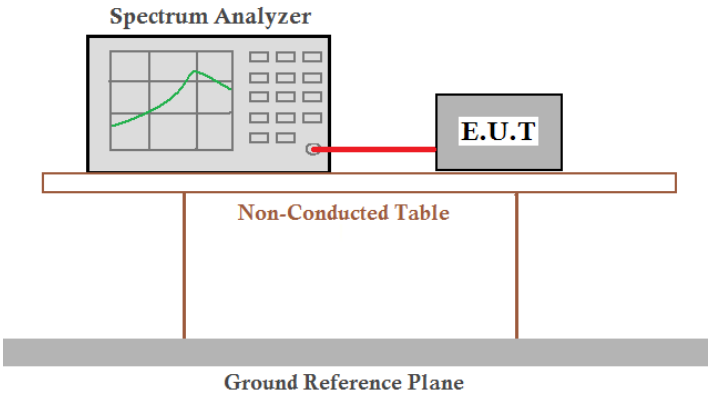
MIMO without beam forming:

Test mode	Frequency (MHz)	ANT 0 power (dBm)	ANT 1 power (dBm)	MIMO power (dBm)	Limit (dBm)	Result
802.11n(HT20)	5180	19.89	19.58	22.96	23.98	Pass
	5200	20.24	19.71	22.99		
	5240	19.81	20.28	23.06		
802.11ax(HT20)	5180	19.97	21.13	23.60		
	5200	20.19	21.23	23.75		
	5240	20.53	19.89	23.23		
802.11n(HT40)	5190	19.83	20.26	23.06		
	5230	20.41	19.86	23.15		
802.11ax(HT40)	5190	20.18	20.61	23.41		
	5230	19.70	20.50	23.13		
802.11ax(HT80)	5210	20.42	20.80	23.62		

Note: transmit signals are completely un*correlated*,

Directional gain=10 x log [($10^{5/10}$ + $10^{5/10}$)/2]=5dBi

7.5 Power Spectral Density

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407</td></tr>
<tr><td>Test Method:</td><td>KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency band (MHz)</th><th>Limit</th></tr>
<tr><td rowspan="2">5150-5250</td><td>≤17dBm in 1MHz for master device</td></tr>
<tr><td>≤11dBm in 1MHz for client device</td></tr>
<tr><td>5250-5350</td><td>≤11dBm in 1MHz for client device</td></tr>
<tr><td>5470-5725</td><td>≤11dBm in 1MHz for client device</td></tr>
<tr><td colspan="2">Remark: The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test procedure:</td><td>1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”.
2) Use the peak search function on the instrument to find the peak of the spectrum.
3) Make the following adjustments to the peak value of the spectrum, if applicable:
a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.
b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4) The result is the PSD.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.2 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

Measurement Data

Modulation	Duty cycle	Duty Factor
802.11a	94.98%	0.22
802.11n(HT20)	90.54%	0.43
802.11n(HT40)	82.94%	0.81
802.11ax(HT20)	98.39%	0.07
802.11ax(HT40)	92.39%	0.34
802.11ax(HT80)	87.96%	0.56

802.11a mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	7.80	0.22	8.02	11	Pass
40	5200	9.79	0.22	10.01	11	Pass
48	5240	8.16	0.22	8.38	11	Pass

802.11n(HT20) mode								
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)		Duty Factor	Total PSD Power(dBm/MHz)		Limit (dBm/MHz)	Result
		ANT0	ANT1		ANT0	ANT1		
36	5180	6.12	8.06	0.43	6.55	8.49	11	Pass
40	5200	4.66	7.46	0.43	5.09	7.89	11	Pass
48	5240	6.20	8.03	0.43	6.63	8.46	11	Pass

802.11n(HT40) mode								
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)		Duty Factor	Total PSD Power(dBm/MHz)		Limit (dBm/MHz)	Result
		ANT0	ANT1		ANT0	ANT1		
38	5190	4.47	6.82	0.81	5.28	7.63	11	Pass
46	5230	4.32	6.73	0.81	5.13	7.54	11	Pass

802.11ax(HT20) mode								
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)		Duty Factor	Total PSD Power(dBm/MHz)		Limit (dBm/MHz)	Result
		ANT0	ANT1		ANT0	ANT1		
36	5180	6.78	8.32	0.07	6.85	8.39	11	Pass
40	5200	6.41	7.77	0.07	6.48	7.84	11	Pass
48	5240	6.97	8.41	0.07	7.04	8.48	11	Pass

802.11ax(HT40) mode								
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)		Duty Factor	Total PSD Power(dBm/MHz)		Limit (dBm/MHz)	Result
		ANT0	ANT1		ANT0	ANT1		
38	5190	6.52	7.68	0.34	6.86	8.02	11	Pass
46	5230	7.95	6.61	0.34	8.29	6.95	11	Pass
802.11 ax(HT80) mode								
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)		Duty Factor	Total PSD Power(dBm/MHz)		Limit (dBm/MHz)	Result
		ANT0	ANT1		ANT0	ANT1		
42	5210	4.68	5.08	0.56	5.24	5.64	11	Pass

Note: Output Power = Measured Power + Duty Factor
Duty Factor = 10 log (1/Duty Cycle)

MIMO without beam forming:

Test mode	Frequency (MHz)	ANT 0 PSD (dBm/MHz)	ANT 1 PSD (dBm/MHz)	MIMO (dBm/MHz)	Limit	Result
802.11n(HT20)	5180	6.55	8.49	10.64	11 dBm/MHz	Pass
	5200	5.09	7.89	9.72		
	5240	6.63	8.46	10.65		
802.11ax(HT20)	5180	6.85	8.39	10.70		
	5200	6.48	7.84	10.22		
	5240	7.04	8.48	10.83		
802.11n(HT40)	5190	5.28	7.63	9.62		
	5230	5.13	7.54	9.51		
802.11ax(HT40)	5190	6.86	8.02	10.49		
	5230	8.29	6.95	10.68		
802.11ax(HT80)	5210	5.24	5.64	8.45		

Test plot as follows:

802.11a