

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



Applicant: Quanta Computer Inc.
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
33377, Taiwan

Product Name: Clover Station Pro Terminal

Brand Name: clover

Model No.: C503

HVIN: C503W

Model Difference: N/A

Report Number: E2/2021/60094

FCC ID HFS-CX03W

IC: 1787B-CX03W

Issue Date: Aug. 03, 2021

Date of Test: Jul. 01, 2021 ~ Jul. 13, 2021

Date of EUT Received: Jul. 01, 2021

Approved By

Jay Lin

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.407, ISSED RSS-247.

The results of this report relate only to the sample identified in this report.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By
E2/2021/60094	Rev.00	Original.	Aug. 03, 2021	Yi-Shan Tsai

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Clover Station Pro Terminal
Brand Name:	clover
Model No.:	C503
HVIN:	C503W
Model Difference:	N/A
Hardware Version:	C503W
Firmware Version:	N/A
EUT Series No.:	PJ216216001 (Radiated) C053UQ11620145 (Conducted) C153UQ11620149 (Conduction)
Power Supply:	12V from AC/DC Adapter

1.2 Modulation & Data Rate

Modulation type:	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only
Transition Rate:	802.11 a: 6 - 54 Mbps 802.11 n_20MHz: 6.5 - 144.4 Mbps 802.11 n_40MHz: 13.5 - 300 Mbps 802.11 ac_20MHz: 6.5 - 173.4 Mbps 802.11 ac_40MHz: 13.5 - 400 Mbps 802.11 ac_80MHz: 29.3 - 866.6 Mbps

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1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Worst Antenna Gain
PIFA	SAA	GD9320-15-001-R	5150~5250	5.43	
			5250~5350	5.61	V
			5470~5725	5.86	V
			5725~5850	5.04	
	SAA	GD9321-15-001-R	5150~5250	5.88	V
			5250~5350	4.73	
			5470~5725	4.16	
			5725~5850	4.28	
	Luxshare-ICT	LA81FP017-1H	5150~5250	3.5	
			5250~5350	4.8	
			5470~5725	4.9	
			5725~5850	4.9	
	Luxshare-ICT	LA81FP018-1H	5150~5250	4.3	
			5250~5350	4.6	
			5470~5725	4.8	
			5725~5850	5.1	V

Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. Antenna information is provided by the applicant.

Freq.(MHz)	Directional Gain (dBi)
5150~5250	8.67
5250~5350	8.19
5470~5725	8.36
5725~5850	8.08

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1.4 FCC worst power

WLAN 5 GHz

Wi-Fi	Frequency Range	Channels	Rated Power(Avg) (dBm) (Worst Case)	Modulation Technology
a n_HT ac_VHT 20M	5180~5240	4	12.05 dBm	OFDM
	5260~5320	4	18.75 dBm	OFDM
	5500~5720	12	18.97 dBm	OFDM
	5745-5825	5	18.76 dBm	OFDM
n_HT ac_VHT 40M	5190~5230	2	13.52 dBm	OFDM
	5270~5310	2	17.72 dBm	OFDM
	5510~5710	6	17.81 dBm	OFDM
	5755-5795	2	17.75 dBm	OFDM
ac_VHT 80M	5210	1	13.74 dBm	OFDM
	5290	1	13.36 dBm	OFDM
	5530~5690	3	16.56 dBm	OFDM
	5775	1	16.97 dBm	OFDM

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1.5 ISED worst power

WLAN 5 GHz for ISED(Slave)

Wi-Fi	Frequency Range	Channels	EIRP/Avg	Rated Power(EIRP/Avg) (dBm) (Worst Case)	Modulation Technology
a n_HT ac_VHT 20M	5180~5240	4	EIRP	20.13 dBm	OFDM
	5260~5320	4	Avg	18.75 dBm	OFDM
	5500~5700	11	Avg	18.97 dBm	OFDM
	5720 (U-NII 2C)	1	Avg	17.23 dBm	OFDM
	5720 (U-NII 3)	1	Avg	13.10 dBm	OFDM
	5745-5825	5	Avg	18.76 dBm	OFDM
n_HT ac_VHT 40M	5190~5230	2	EIRP	22.19 dBm	OFDM
	5270~5310	2	Avg	17.75 dBm	OFDM
	5510~5670	5	Avg	13.74 dBm	OFDM
	5710 (U-NII 2C)	1	Avg	17.21 dBm	OFDM
	5710 (U-NII 3)	1	Avg	8.95 dBm	OFDM
	5755-5795	2	Avg	17.75 dBm	OFDM
ac_VHT 80M	5210	1	EIRP	22.41 dBm	OFDM
	5290	1	Avg	13.36 dBm	OFDM
	5530~5610	2	Avg	13.56 dBm	OFDM
	5690 (U-NII 2C)	1	Avg	16.51 dBm	OFDM
	5690 (U-NII 3)	1	Avg	5.78 dBm	OFDM
	5775	1	Avg	16.97 dBm	OFDM

Note: As per guidance in presentation 2018-04-10-03 IC Certification updates of April 2018 TCB workshop, Client (Slave mode) devices without active scanning function, but with the capability of operating in 5600-5650 MHz solely under the control of a certified master device meeting the requirement of RSS-247, are allowed in Canada.

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1.6 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

RSS-247 issue 2 Feb. 2017

RSS-Gen Issue 5

ANSI C63.10:2013

1.7 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction A	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		
Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.				

1.8 Special Accessories

There are no special accessories used while test was conducted.

1.9 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*9m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Configuration of Tested System

Fig. 2-1 Conduction (AC Power Line)

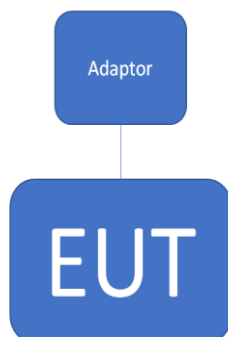


Fig. 2-2 Conducted (Antenna Port) Configuration & Radiated Emission

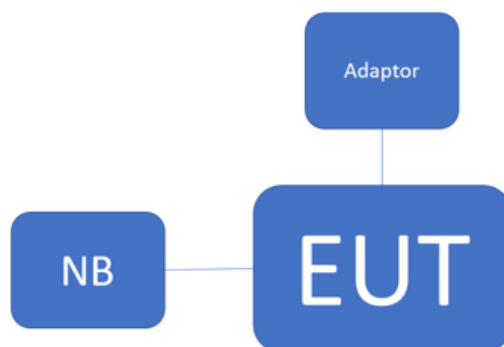


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Adapter	clover	FSP040-RHBN3	N/A	N/A	N/A
3.	Notebook	Lenovo	L440	P0000367	N/A	N/A

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3 SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.407(e)	RSS-Gen §6.7 RSS-247 §6.2.4.1	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.203 §15.407(a)	N/A	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

Operated band in 5150 MHz ~5250 MHz:

20 M	
CH	Freq (MHz)
36	5180
40	5200
44	5220
48	5240

40 M	
CH	Freq (MHz)
38	5190
46	5230

80 M	
CH	Freq (MHz)
42	5210

Operated band in 5250 MHz ~5350 MHz:

20 M	
CH	Freq (MHz)
52	5260
56	5280
60	5300
64	5320

40 M	
CH	Freq (MHz)
54	5270
62	5310

80 M	
CH	Freq (MHz)
58	5290

Operated band in 5470 MHz ~5725 MHz:

20 M	
CH	Freq (MHz)
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720

40 M	
CH	Freq (MHz)
102	5510
110	5550
118	5590
126	5630
134	5670
142	5710

80 M	
CH	Freq (MHz)
106	5530
122	5610
138	5690

Operated band in 5745 MHz ~5850 MHz:

20 M	
CH	Freq (MHz)
149	5745
153	5765
157	5785
161	5805
165	5825

40 M	
CH	Freq (MHz)
151	5755
159	5795

80 M	
CH	Freq (MHz)
155	5775

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

The gevin UE is pre-scanned among below modes.

Modulation	Transmission Chain				Single Transmission Spatial	Multiple Transmission Spatial
☒ 802.11 a	☒ Ch0	☒ Ch1	☐ Ch2	☐ Ch3	☒ 1TX	☐ 2TX
☒ 802.11 n	☒ Ch0	☒ Ch1	☐ Ch2	☐ Ch3	☐ SISO	☒ MIMO
☒ 802.11 ac	☒ Ch0	☒ Ch1	☐ Ch2	☐ Ch3	☐ SISO	☒ MIMO

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

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4.2.1 RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	Ch0
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116			
	5745~5825	149 to 165	157			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530~5610	106 to 138	106			
	5775	155	155			
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	ch0
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS8	MIMO
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
	5270~5310	54 to 62	54,62			
	5510~5670	102 to 142	102,110,134,142			
	5755~5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530~5610	106 to 138	106,122,138			
	5775	155	155			

Note:

The field strength of radiation emission was measured as EUT three orthogonal planes, E1 / E2 / H, are positioned to pre-scan the emission generating the highest one. The worst position is tested and recorded.

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4.2.2 ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	ch0
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS8	MIMO
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
	5270~5310	54 to 62	54,62			
	5510~5670	102 to 142	102,110,134,142			
	5755~5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530~5610	106 to 138	106,122,138			
	5775	155	155			

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.34 dB
Emission Bandwidth	+/- 1.53 Hz
The Maximum Output Power Measurement	+/- 1 dB
Peak Power Spectral Density Measurement	+/- 1.53 dB
Frequency Stability	+/- 1.53 Hz
Temperature	+/- 0.4 °C
Humidity	+/- 3.5 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	2.64 dB	9kHz~30MHz
	+/-	4.93 dB	30MHz - 1000MHz
	+/-	4.81 dB	1GHz - 18GHz
	+/-	4.52 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	2.64 dB	9kHz~30MHz
	+/-	4.45 dB	30MHz - 1000MHz
	+/-	4.81 dB	1GHz - 18GHz
	+/-	4.52 dB	18GHz - 40GHz

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2 Measurement Equipment Used

Radiated Emission Test Site: Conduction A					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Software	audix	e3	Ver. 6.11-20180419c	N.C.R	N.C.R
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	973	03/25/2021	03/24/2022
EMI Test Receiver	R&S	ESCI	101342	04/27/2021	04/26/2022
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2021	03/26/2022
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2021	03/26/2022

6.3 EUT Setup

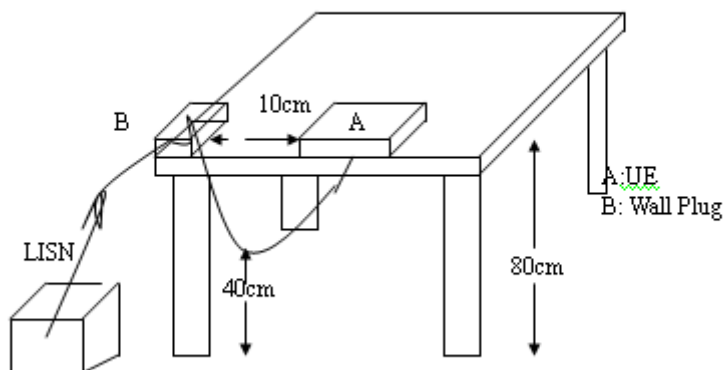
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

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6.4 Test SET-UP



6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

6.6 Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit.

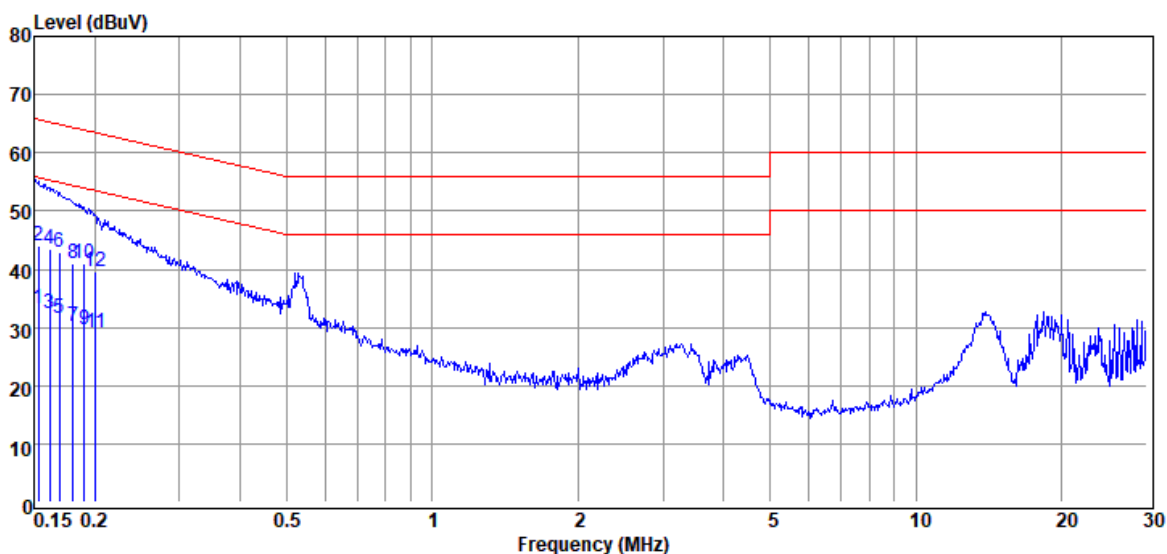
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:E2/2021/60094	Test Site	:Conduction Room C
Test Mode	:WLAN 5G	Test Date	:2021-07-09
Power	:120V/60Hz	Temp./Humi.	:25.5/52
Probe	:L1	Engineer	:Ashton Chiu
Note:	: Adapter:FSP040-RHBN3		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV	Limit dBuV	Margin dB
0.15	Average	22.91	10.22	33.13	55.82	-22.69
0.15	QP	33.87	10.22	44.09	65.82	-21.73
0.16	Average	22.15	10.22	32.37	55.38	-23.01
0.16	QP	33.18	10.22	43.40	65.38	-21.98
0.17	Average	21.36	10.22	31.58	54.99	-23.41
0.17	QP	32.79	10.22	43.01	64.99	-21.98
0.18	Average	19.96	10.22	30.18	54.46	-24.28
0.18	QP	30.81	10.22	41.03	64.46	-23.43
0.19	Average	19.37	10.22	29.59	54.02	-24.43
0.19	QP	30.71	10.22	40.93	64.02	-23.09
0.20	Average	18.76	10.22	28.98	53.58	-24.60
0.20	QP	29.25	10.22	39.47	63.58	-24.11

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Report Number :E2/2021/60094

Test Site :Conduction Room C

Test Mode :WLAN 5G

Test Date :2021-07-09

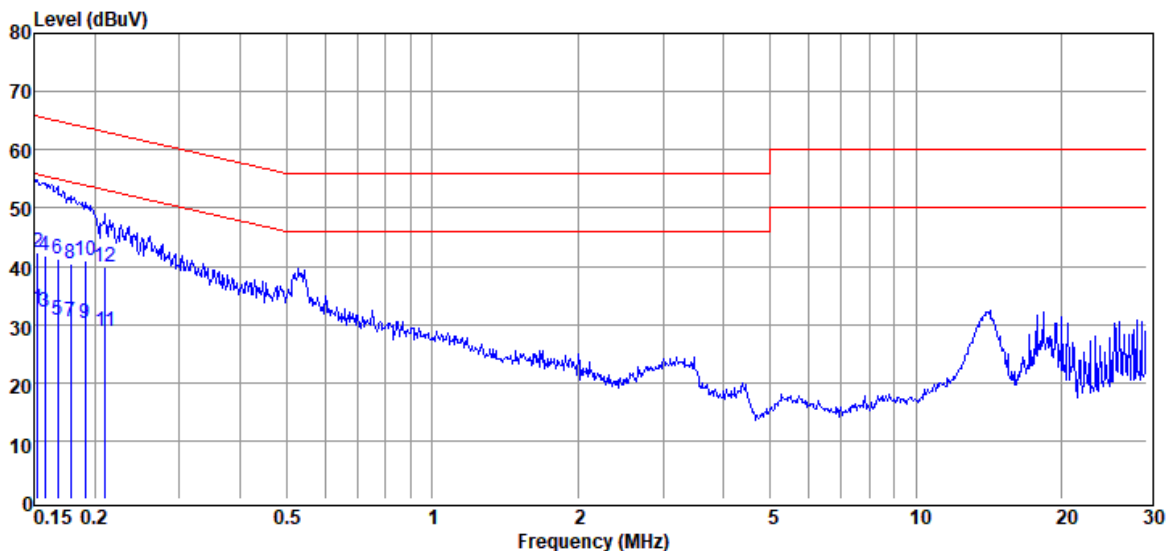
Power :120V/60Hz

Temp./Humi. :25.5/52

Probe :N

Engineer :Ashton Chiu

Note: : Adapter:FSP040-RHBN3



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.15	Average	22.33	10.20	32.53	55.87	-23.34
0.15	QP	32.23	10.20	42.43	65.87	-23.44
0.16	Average	21.86	10.20	32.06	55.56	-23.50
0.16	QP	31.73	10.20	41.93	65.56	-23.63
0.17	Average	20.65	10.20	30.85	55.08	-24.23
0.17	QP	30.96	10.20	41.16	65.08	-23.92
0.18	Average	20.16	10.20	30.36	54.55	-24.19
0.18	QP	30.26	10.20	40.46	64.55	-24.09
0.19	Average	19.96	10.20	30.16	53.98	-23.82
0.19	QP	30.69	10.20	40.89	63.98	-23.09
0.21	Average	18.55	10.20	28.75	53.18	-24.43
0.21	QP	29.69	10.20	39.89	63.18	-23.29

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7 DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

7.1 Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	97.85	0.09	0.49	1.00
802.11n_20	93.58	0.29	1.95	2.00
802.11ac_20	98.21	0.08	0.52	0.01
802.11n_40	96.03	0.18	1.06	2.00
802.11ac_40	96.35	0.16	1.05	2.00
802.11ac_80	93.00	0.32	2.15	3.00

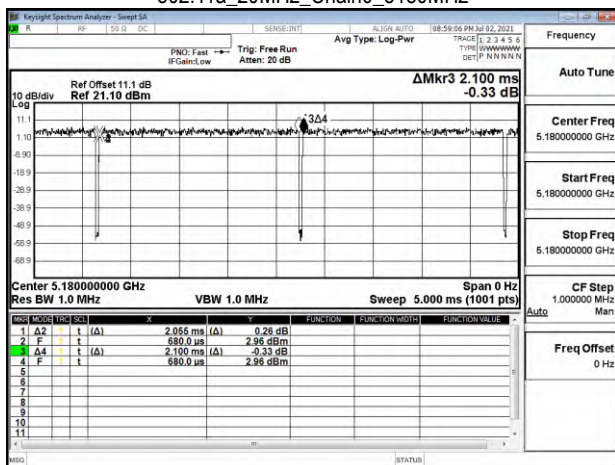
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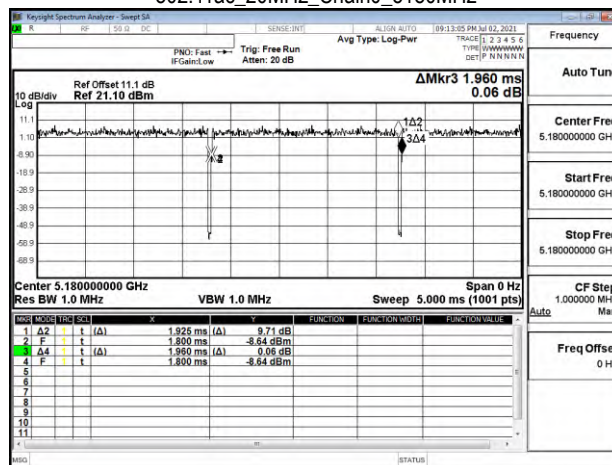
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7.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

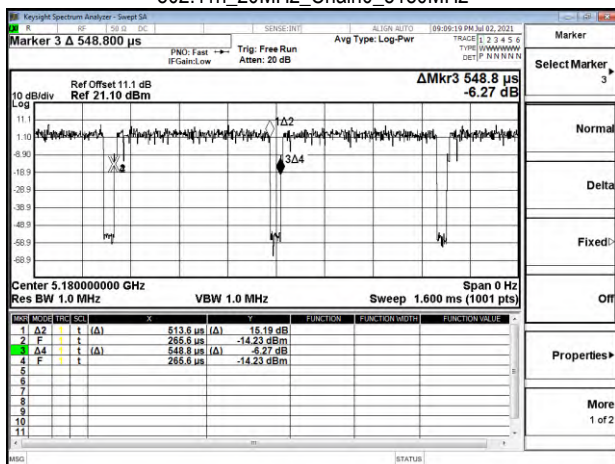
802.11a_20MHz_Chain0_5180MHz



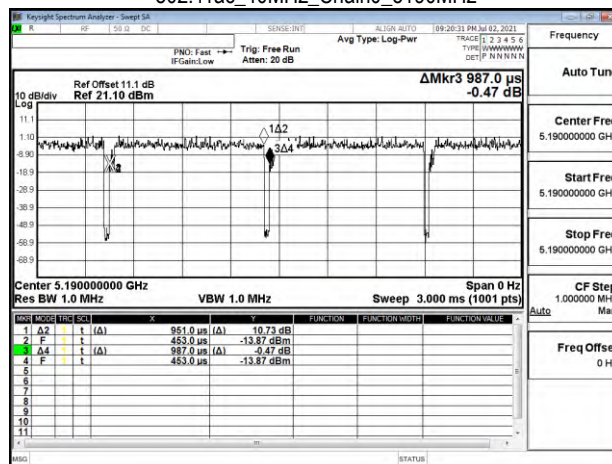
802.11ac_20MHz_Chain0_5180MHz



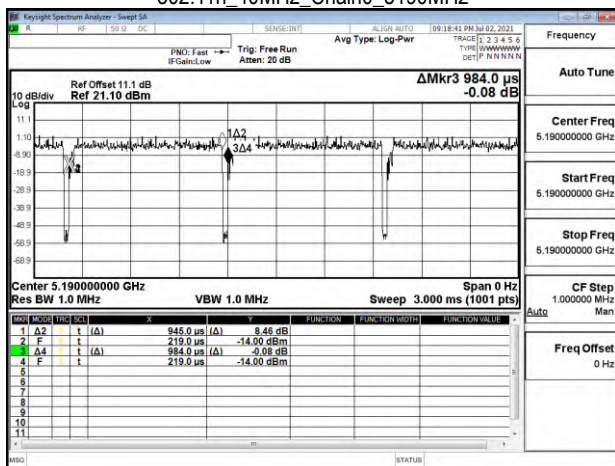
802.11n_20MHz_Chain0_5180MHz



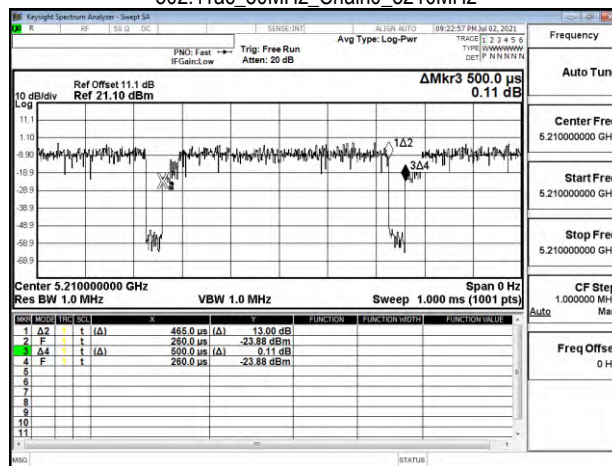
802.11ac_40MHz_Chain0_5190MHz



802.11n_40MHz_Chain0_5190MHz



802.11ac_80MHz_Chain0_5210MHz



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8 EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - 3.a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW
Sweep=auto,
Detector = Peak,
Trace Mode = Max Hold,
Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
 - 3.b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as
RBW = 100 kHz,
VBW = 3*RBW,
Span = large enough to capture all products of the modulation process,
Detector=Peak,
Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. For 99% Bandwidth: Set the spectrum analyzer as
RBW=1%,
VBW = 3*RBW,
Span = large enough to capture all products of the modulation process,
Detector=Sample,
Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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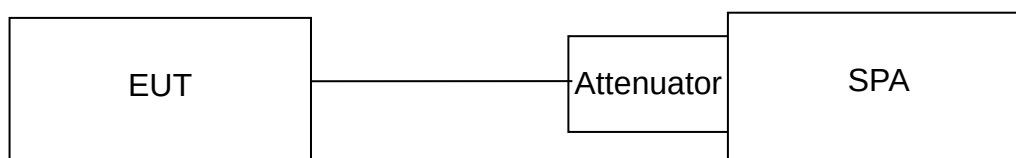
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8.3 Measurement Equipment Used

Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010B	MY60240506	06/18/2021	06/17/2022
Power Meter	Anritsu	ML2496A	1512003	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339378	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339379	07/23/2020	07/22/2021
Attenuator	Marvelous	MVE2213-10	RF12	11/19/2020	11/18/2021
Attenuator	Marvelous	WATT-218FS-10	RF16	11/19/2020	11/18/2021
DC Block	PASTER-NACK	PE8210	RF152	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F2A196C	RF62	11/19/2020	11/18/2021
Test Software	Qualcomm	QRCT	V4.0.00161.0	N.C.R	N.C.R
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R

8.4 Test Set-up



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8.5 Measurement Result

8.5.1 FCC 26dB Bandwidth and 6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.54	13.530
5220	21.49	13.320
5240	23.56	13.720
5260	23.08	13.630
5300	21.69	13.360
5320	21.62	13.350
5500	22.20	13.460
5580	22.03	13.430
5700	23.35	13.680
5720(U-NII 2C)	16.46	12.160
5720(U-NII 3)	6.46	8.100

802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.37	13.500
5220	22.27	13.480
5240	23.48	13.710
5260	23.16	13.650
5300	22.40	13.500
5320	22.06	13.440
5500	23.27	13.670
5580	23.61	13.730
5700	23.02	13.620
5720(U-NII 2C)	16.22	12.100
5720(U-NII 3)	6.22	7.940

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.37	12.140
5785	16.11	12.070
5825	16.33	12.130

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.62	12.210
5785	16.86	12.270
5825	16.94	12.290

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.27	< 5250
5745	5736.73	> 5725

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.82	< 5250
5745	5736.11	> 5725

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802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.05	13.630
5220	21.74	13.370
5240	22.48	13.520
5260	21.32	13.290
5300	21.96	13.420
5320	21.28	13.280
5500	22.59	13.540
5580	22.47	13.520
5700	23.02	13.620
5720(U-NII 2C)	16.36	12.140
5720(U-NII 3)	6.36	8.030

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.61	12.460
5785	16.93	12.290
5825	16.65	12.210

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.86	< 5250
5745	5736.13	> 5725

802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.67	16.090
5230	40.81	16.110
5270	40.84	16.110
5310	40.90	16.120
5510	40.49	16.070
5550	40.65	16.090
5670	40.74	16.100
5710(U-NII 2C)	35.30	15.480
5710(U-NII 3)	5.30	7.240

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.06	15.450
5795	35.75	15.530

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.10	< 5250
5755	5736.94	> 5725

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802.11n_HT40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.68	16.090
5230	40.58	16.080
5270	40.85	16.110
5310	40.66	16.090
5510	40.96	16.120
5550	40.20	16.040
5670	40.44	16.070
5710(U-NII 2C)	35.24	15.470
5710(U-NII 3)	5.24	7.190

802.11n_HT40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.18	15.460
5795	35.73	15.530

802.11n_HT40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.10	< 5250
5755	5736.91	> 5725

802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	82.60	19.170
5290	82.26	19.150
5530	82.85	19.180
5610	82.34	19.160
5690(U-NII 2C)	76.98	18.860
5690(U-NII 3)	6.98	8.440

802.11ac_VHT80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.40	18.770

802.11ac_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.92	< 5250
5775	5737.30	> 5725

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802.11ac_VHT80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	82.24	19.150
5290	82.81	19.180
5530	82.71	19.180
5610	82.52	19.170
5690(U-NII 2C)	76.06	18.810
5690(U-NII 3)	6.06	7.820

802.11ac_VHT80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	73.90	18.690

802.11ac_VHT80_Ch1

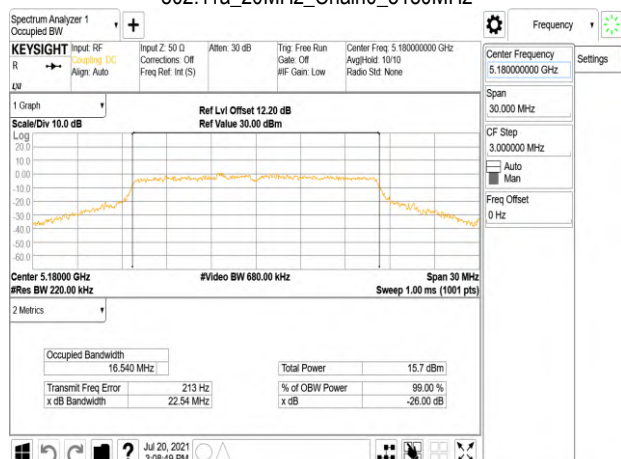
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.02	< 5250
5775	5737.24	> 5725

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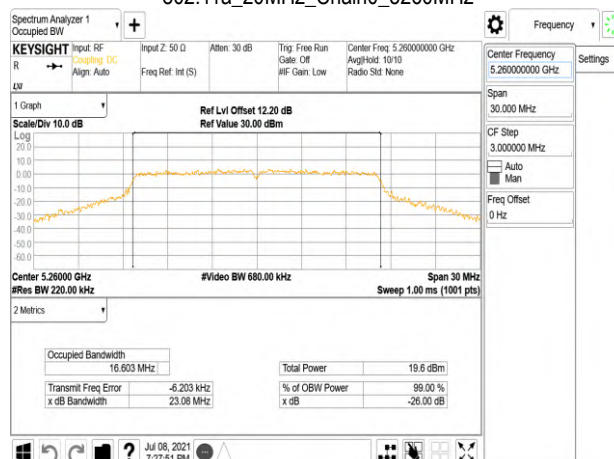
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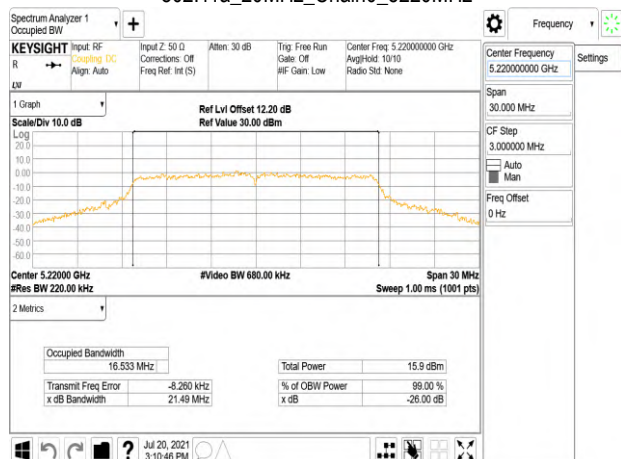
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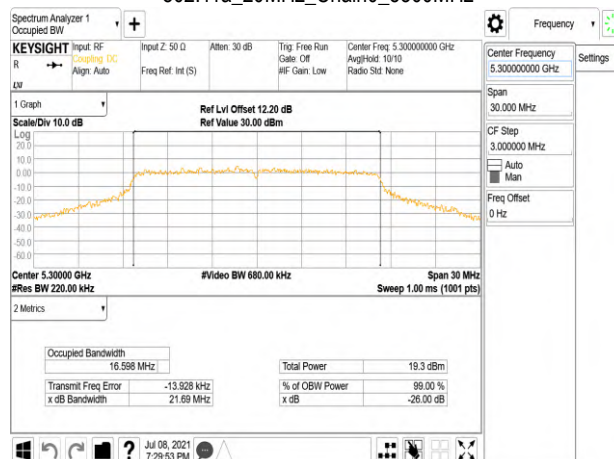
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802.11a_20MHz_Chain0_5220MHz



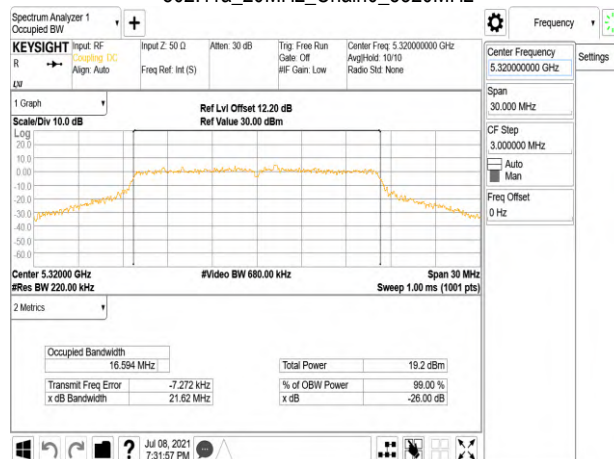
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802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

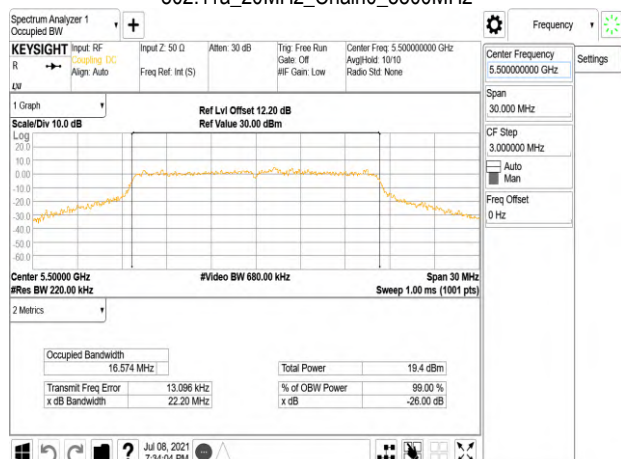


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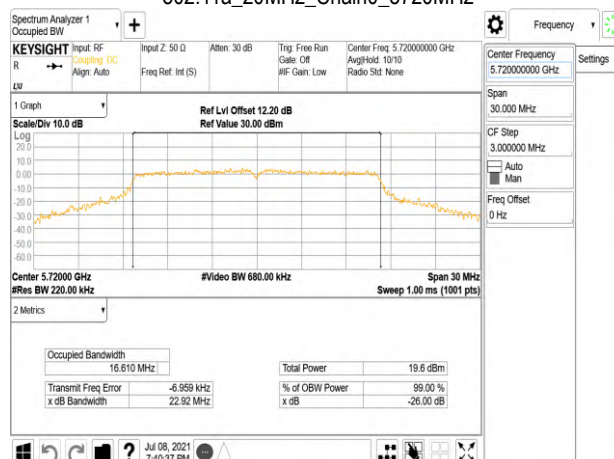
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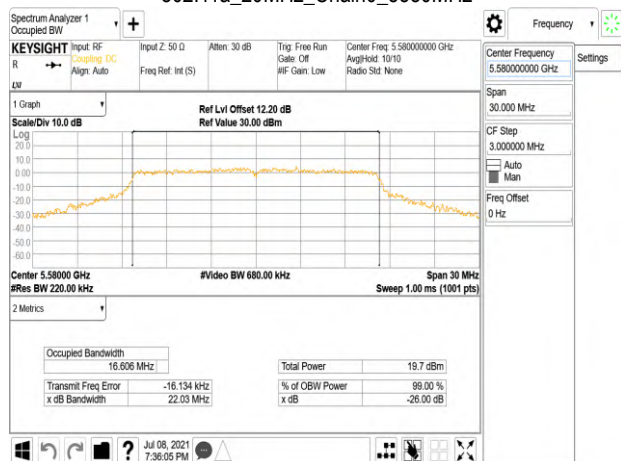
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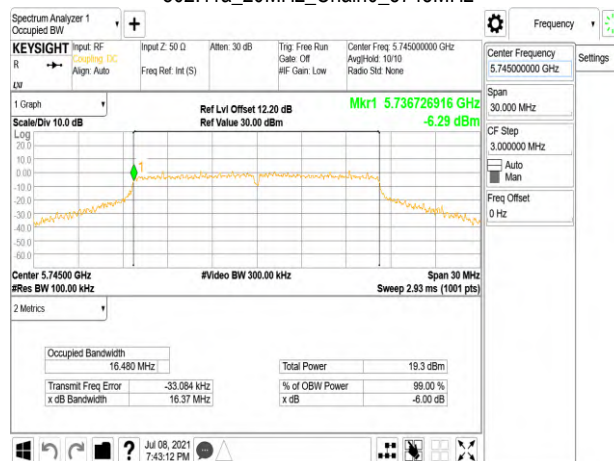
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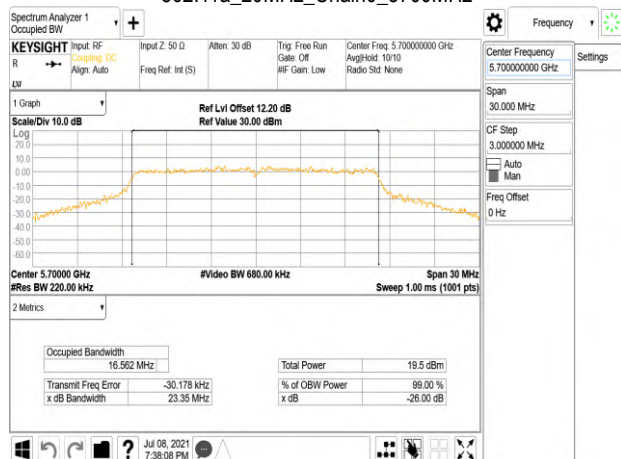
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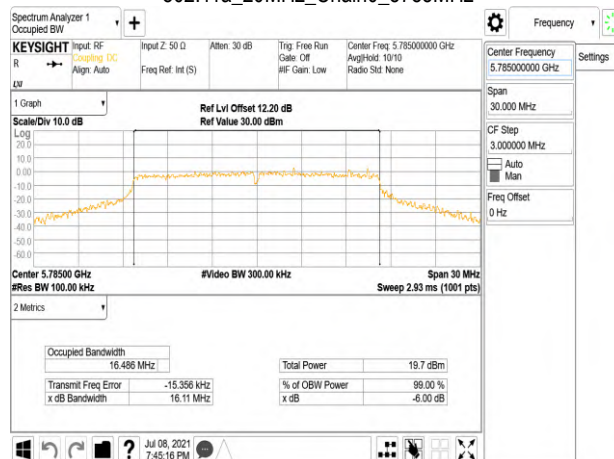
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802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5785MHz

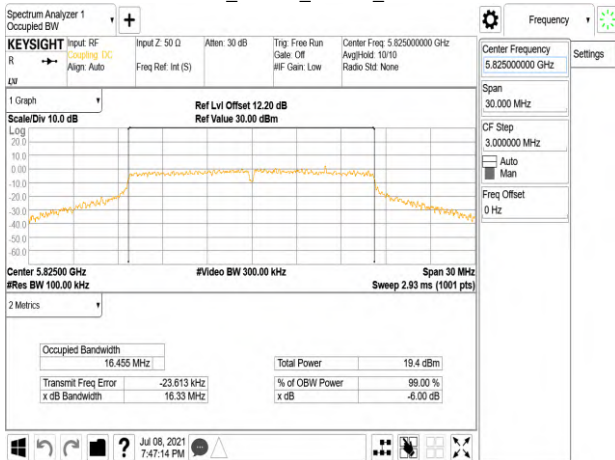


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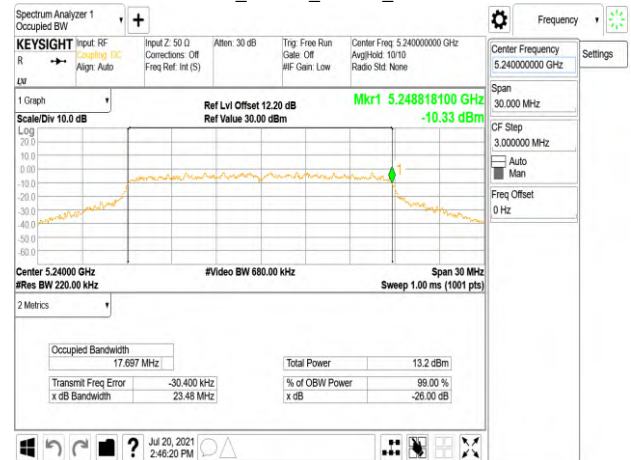
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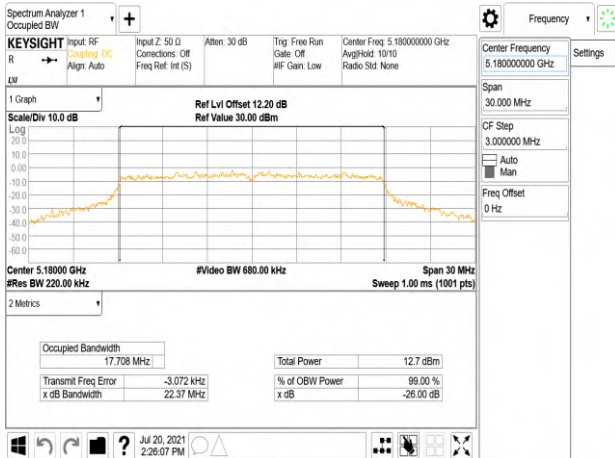
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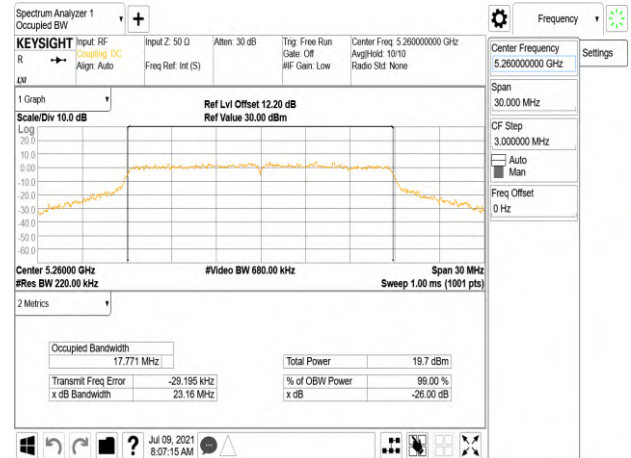
802.11n_20MHz_Chain0_5240MHz



802.11n_20MHz_Chain0_5180MHz



802.11n_20MHz_Chain0_5260MHz



802.11n_20MHz_Chain0_5220MHz



802.11n_20MHz_Chain0_5300MHz

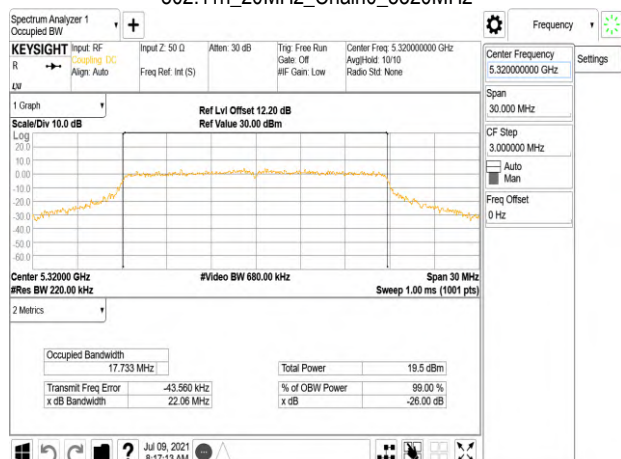


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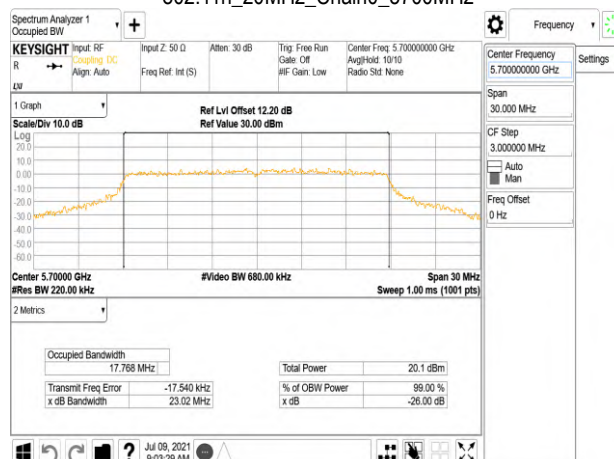
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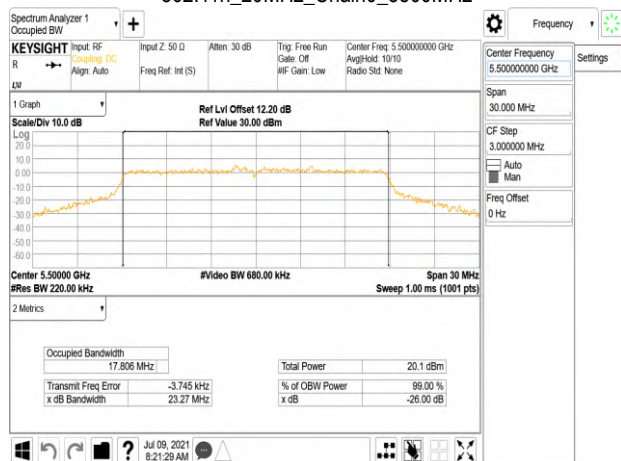
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802.11n_20MHz_Chain0_5700MHz



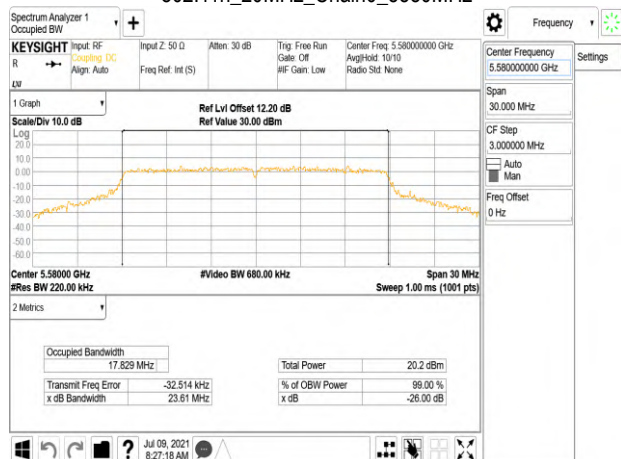
802.11n_20MHz_Chain0_5500MHz



802.11n_20MHz_Chain0_5720MHz



802.11n_20MHz_Chain0_5580MHz



802.11n_20MHz_Chain0_5745MHz

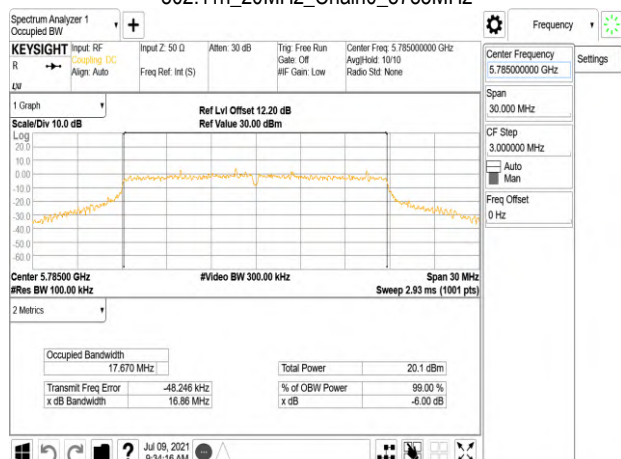


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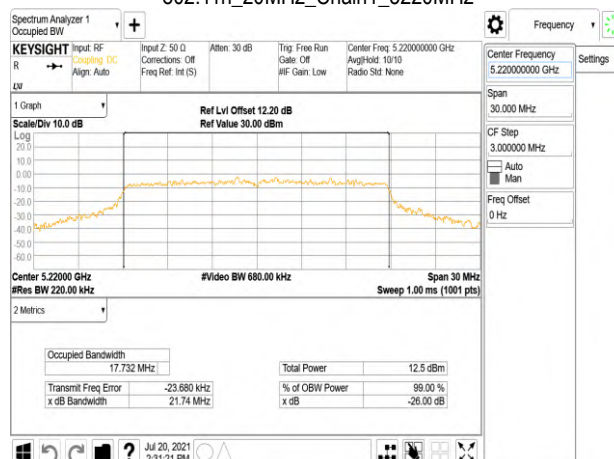
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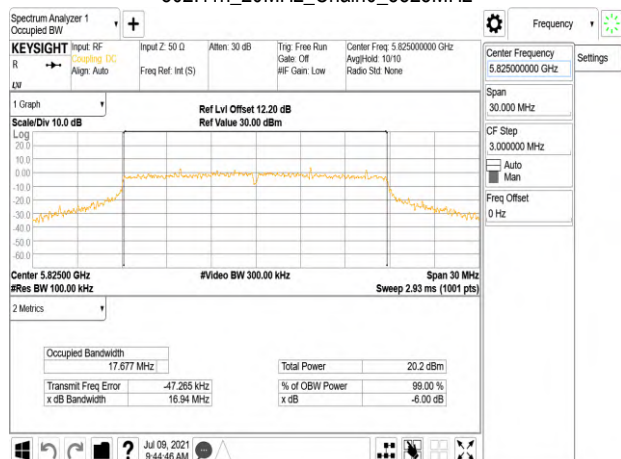
802.11n_20MHz_Chain0_5785MHz



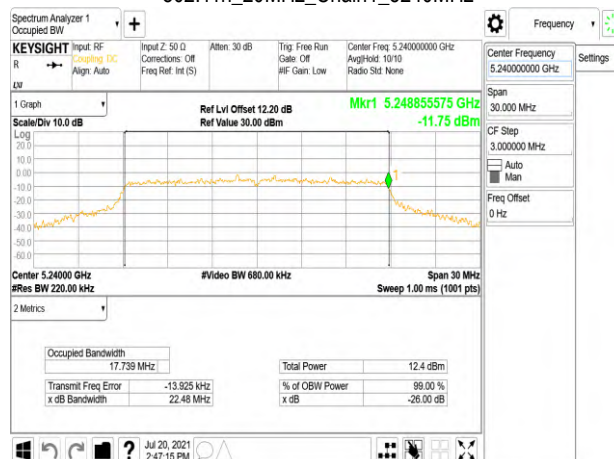
802.11n_20MHz_Chain1_5220MHz



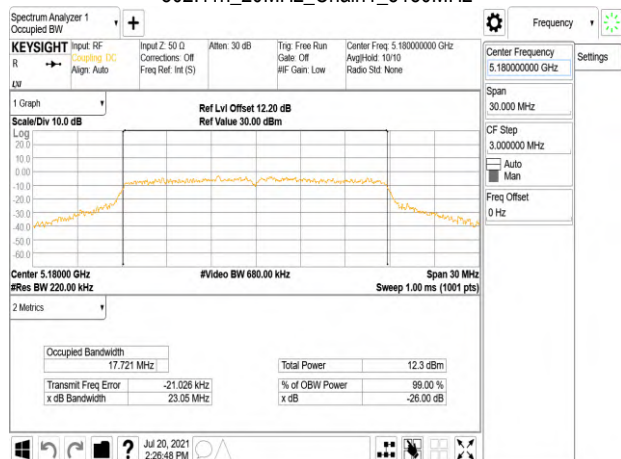
802.11n_20MHz_Chain0_5825MHz



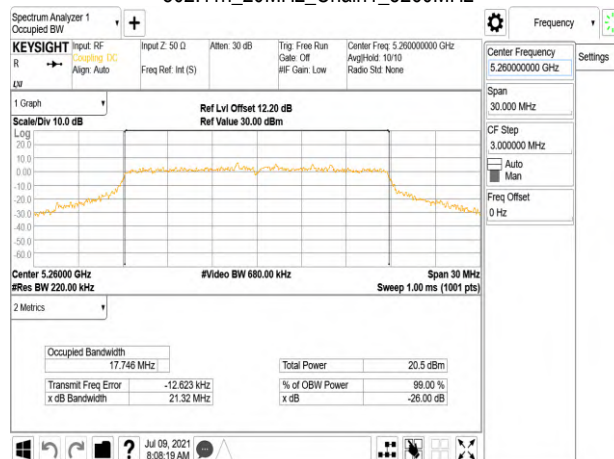
802.11n_20MHz_Chain1_5240MHz



802.11n_20MHz_Chain1_5180MHz



802.11n_20MHz_Chain1_5260MHz

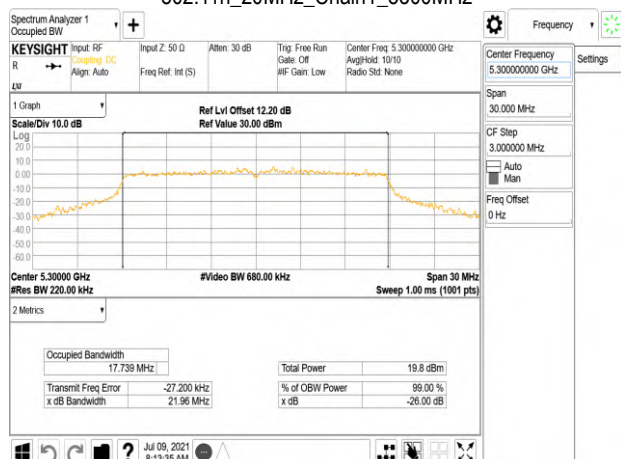


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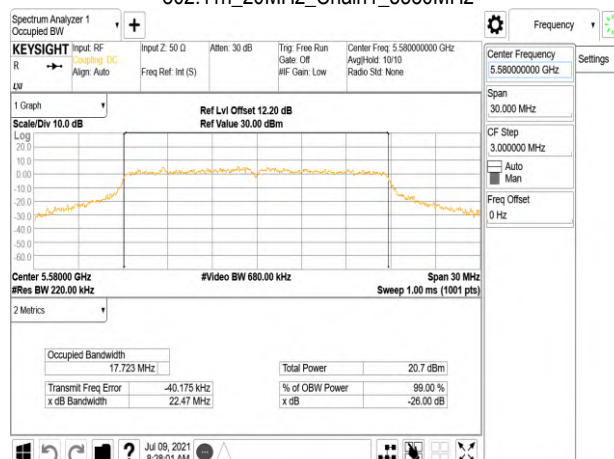
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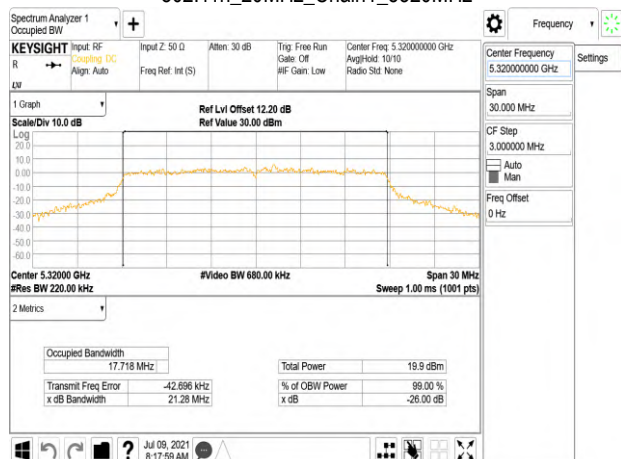
802.11n_20MHz_Chain1_5300MHz



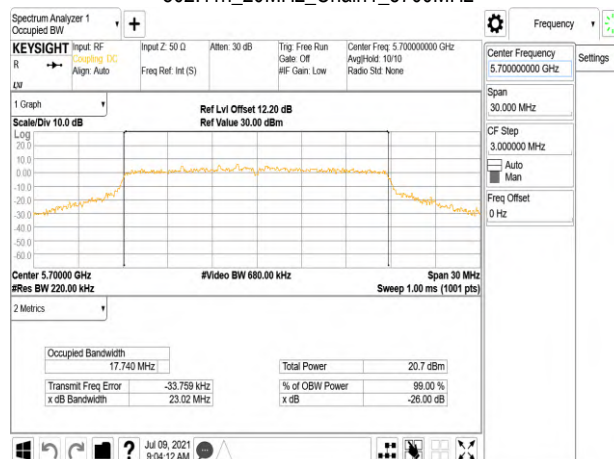
802.11n_20MHz_Chain1_5580MHz



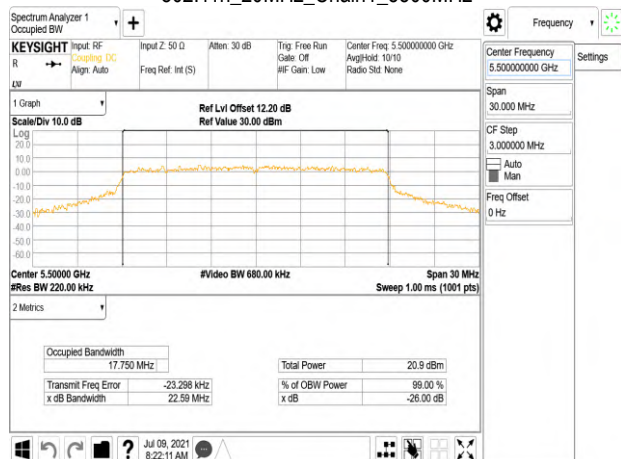
802.11n_20MHz_Chain1_5320MHz



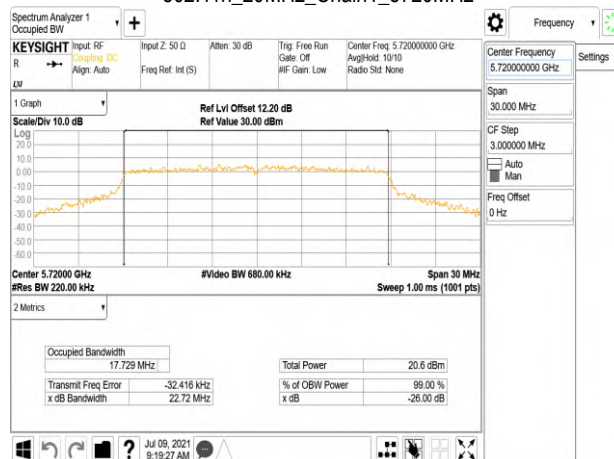
802.11n_20MHz_Chain1_5700MHz



802.11n_20MHz_Chain1_5500MHz



802.11n_20MHz_Chain1_5720MHz



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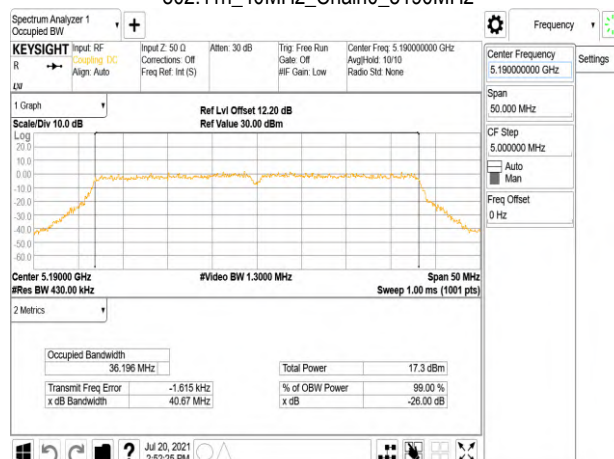
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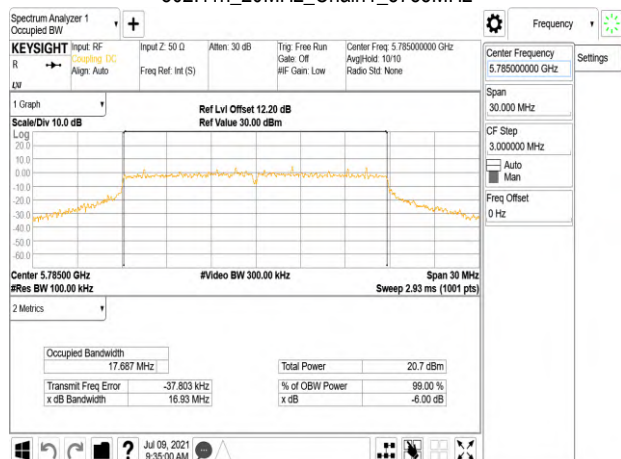
802.11n_20MHz_Chain1_5745MHz



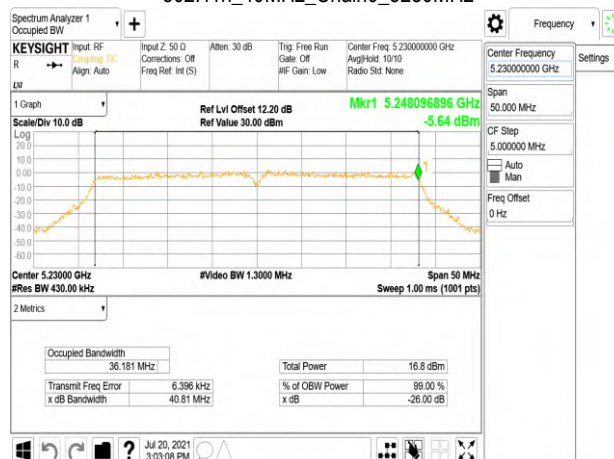
802.11n_40MHz_Chain0_5190MHz



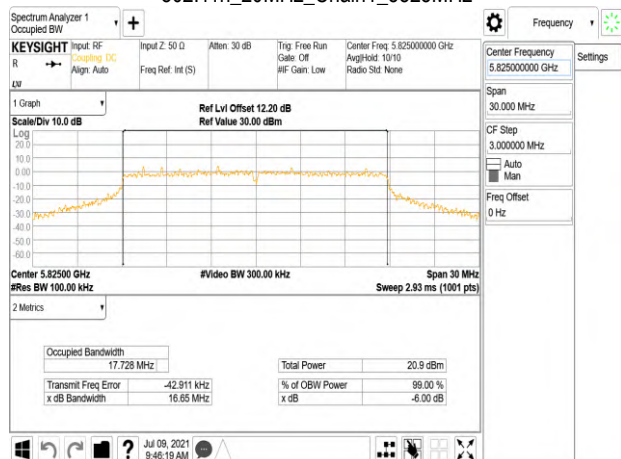
802.11n_20MHz_Chain1_5785MHz



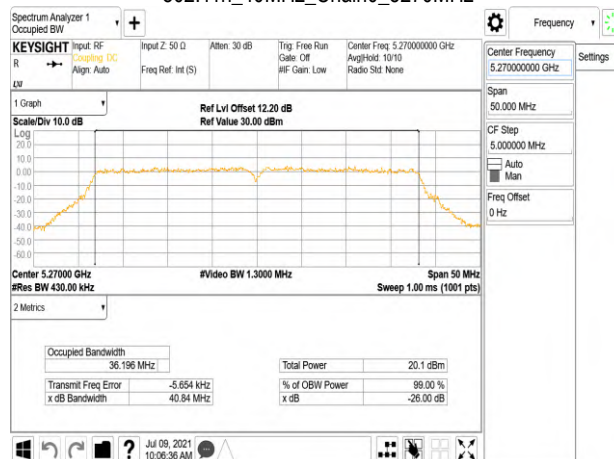
802.11n_40MHz_Chain0_5230MHz



802.11n_20MHz_Chain1_5825MHz



802.11n_40MHz_Chain0_5270MHz



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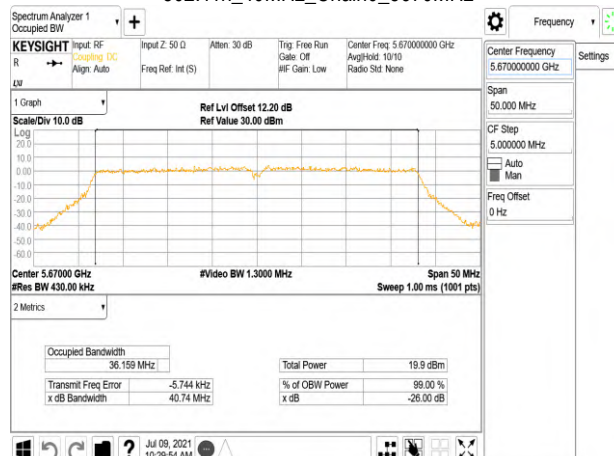
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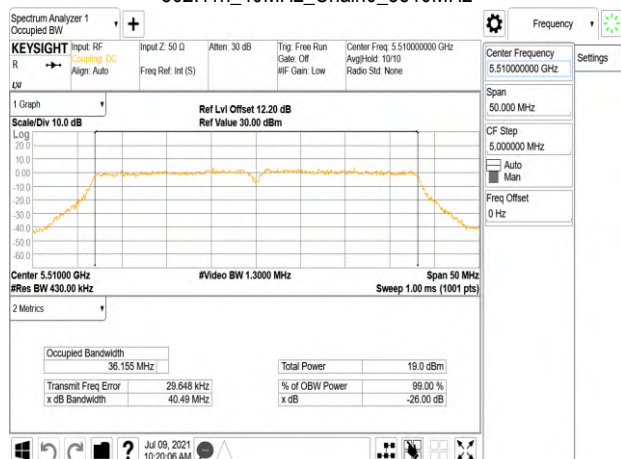
802.11n_40MHz_Chain0_5310MHz



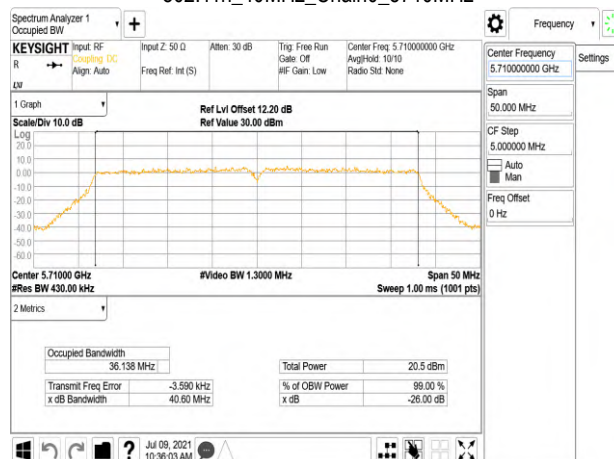
802.11n_40MHz_Chain0_5670MHz



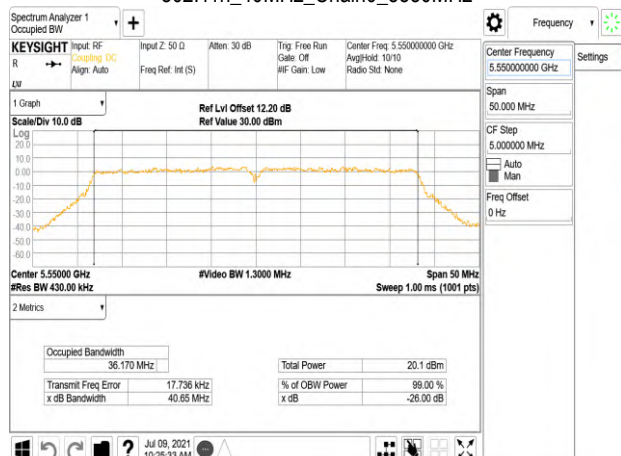
802.11n_40MHz_Chain0_5510MHz



802.11n_40MHz_Chain0_5710MHz



802.11n_40MHz_Chain0_5550MHz



802.11n_40MHz_Chain0_5755MHz

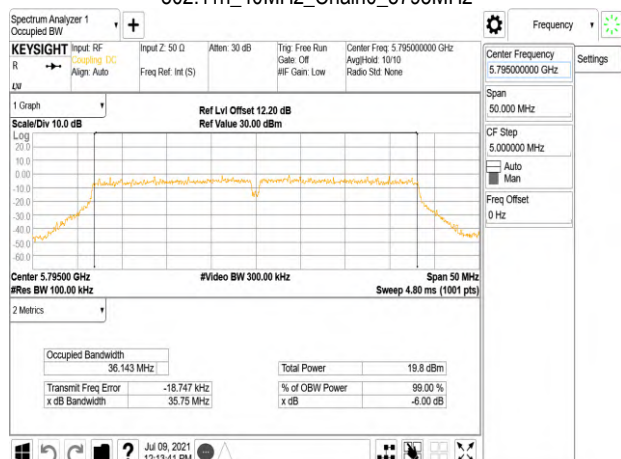


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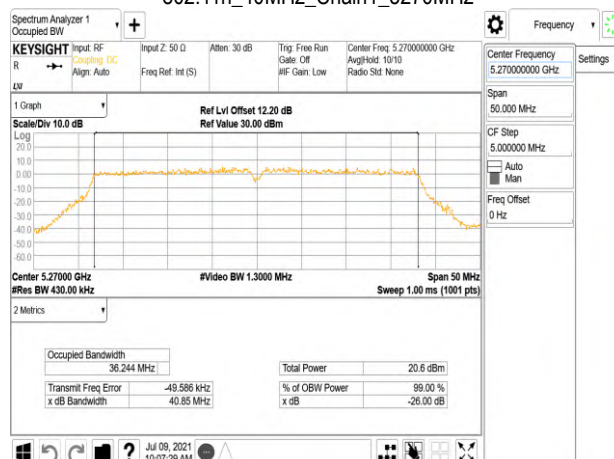
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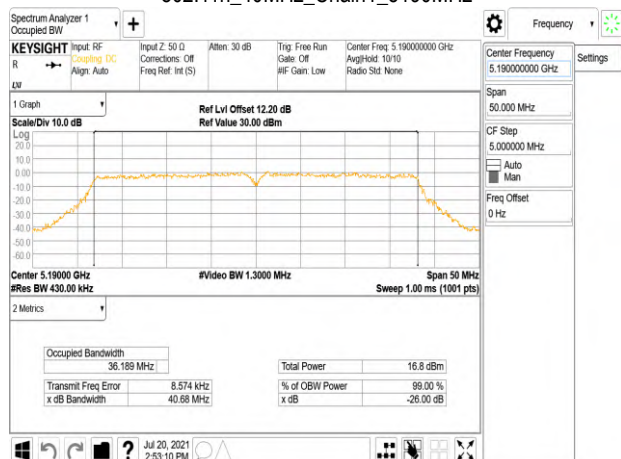
802.11n_40MHz_Chain0_5795MHz



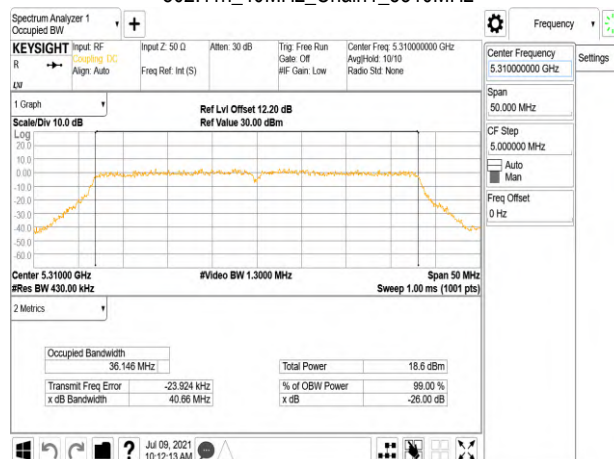
802.11n_40MHz_Chain1_5270MHz



802.11n_40MHz_Chain1_5190MHz



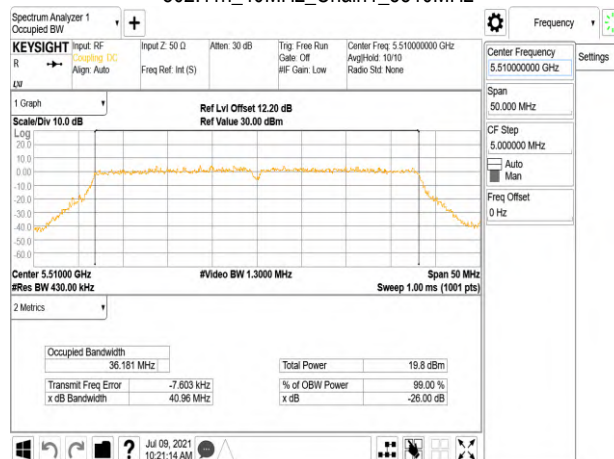
802.11n_40MHz_Chain1_5310MHz



802.11n_40MHz_Chain1_5230MHz



802.11n_40MHz_Chain1_5510MHz

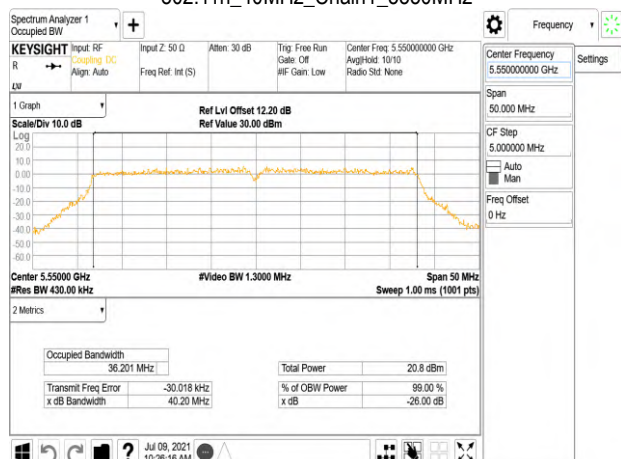


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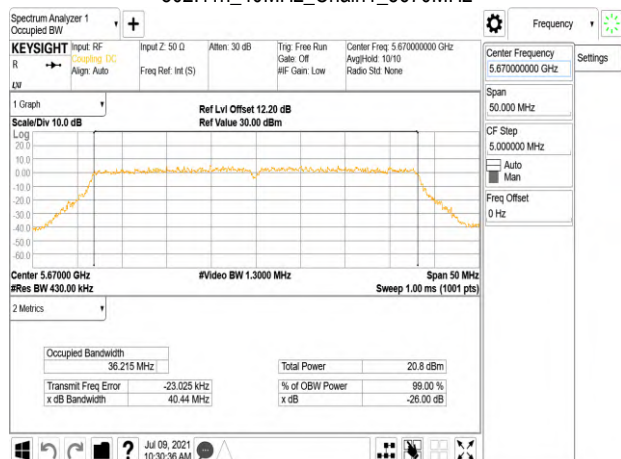
802.11n_40MHz_Chain1_5550MHz



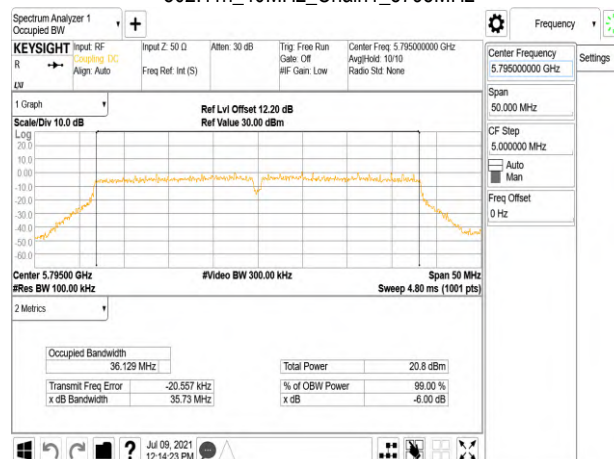
802.11n_40MHz_Chain1_5755MHz



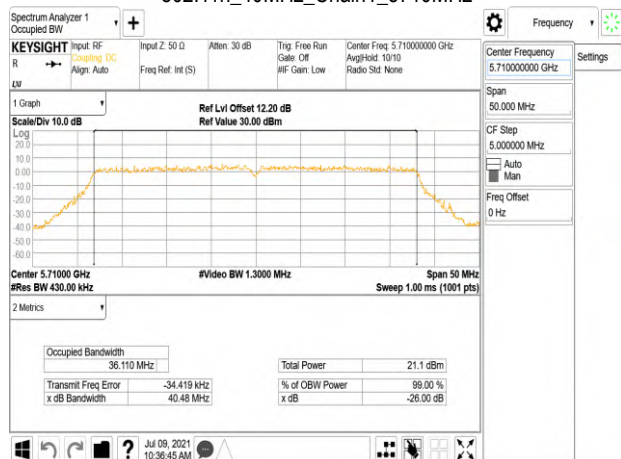
802.11n_40MHz_Chain1_5670MHz



802.11n_40MHz_Chain1_5795MHz



802.11n_40MHz_Chain1_5710MHz



802.11ac_80MHz_Chain0_5210MHz

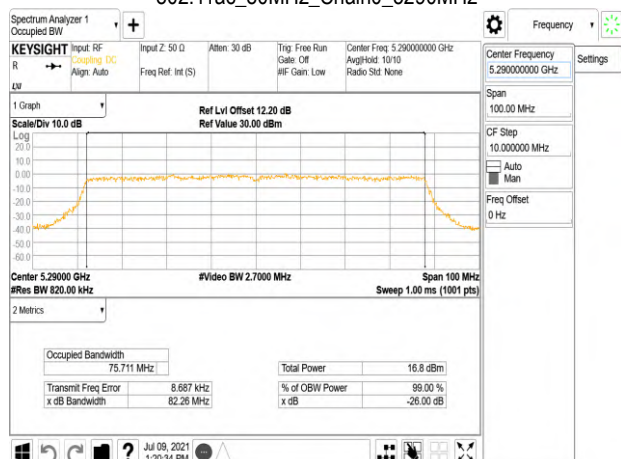


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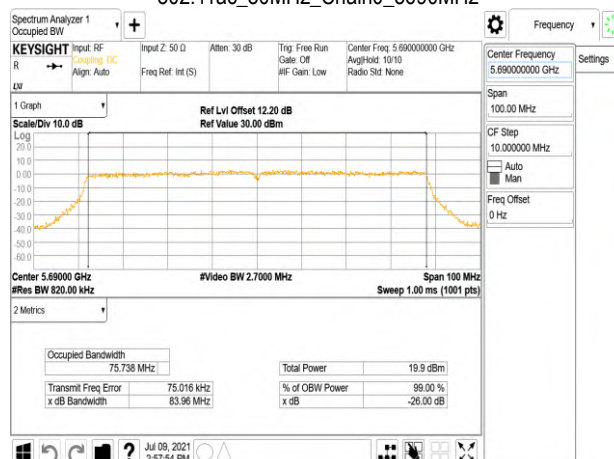
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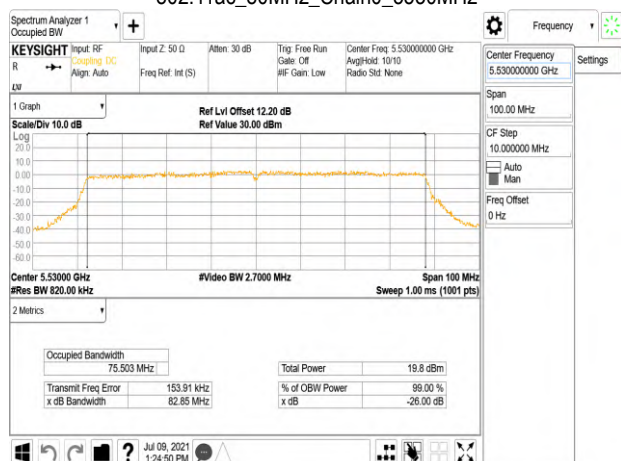
802.11ac_80MHz_Chain0_5290MHz



802.11ac_80MHz_Chain0_5690MHz



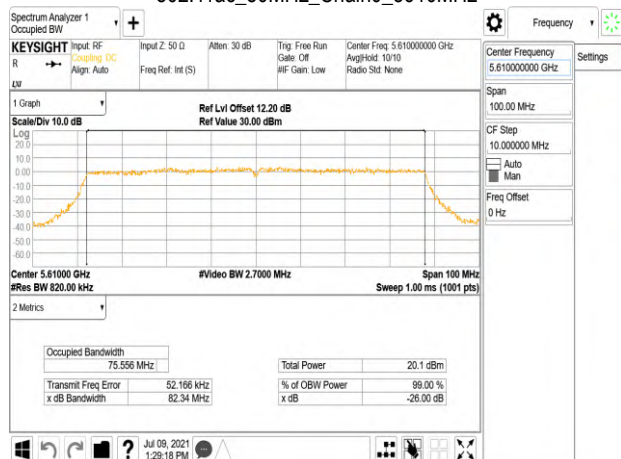
802.11ac_80MHz_Chain0_5530MHz



802.11ac_80MHz_Chain0_5775MHz



802.11ac_80MHz_Chain0_5610MHz



802.11ac_80MHz_Chain1_5210MHz



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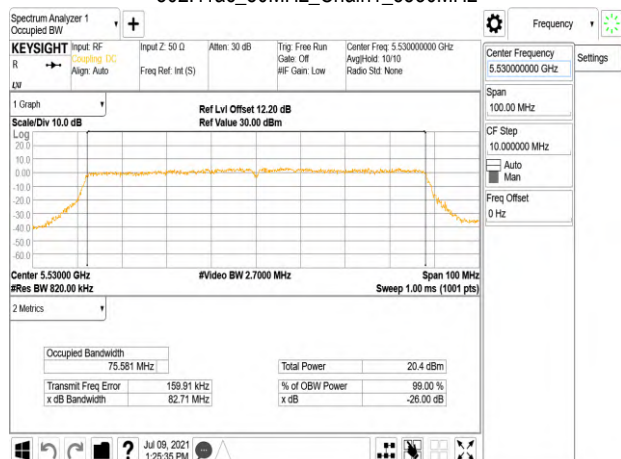
802.11ac_80MHz_Chain1_5290MHz



802.11ac_80MHz_Chain1_5690MHz



802.11ac_80MHz_Chain1_5530MHz



802.11ac_80MHz_Chain1_5775MHz



802.11ac_80MHz_Chain1_5610MHz



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8.5.2 ISED 99% Bandwidth and 6dB Bandwidth (5725 MHz~ 5850 MHz) measure with sample detector for ISED

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.511	12.180
5220	16.517	12.180
5240	16.525	12.180
5260	16.579	12.200
5300	16.531	12.180
5320	16.580	12.200
5500	16.542	12.190
5580	16.589	12.200
5700	16.589	12.200
5720(U-NII 2C)	13.297	11.240
5720(U-NII 3)	3.297	5.180

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.688	12.480
5220	17.684	12.480
5240	17.690	12.480
5260	17.753	12.490
5300	17.715	12.480
5320	17.722	12.490
5500	17.802	12.500
5580	17.790	12.500
5700	17.749	12.490
5720(U-NII 2C)	13.865	11.420
5720(U-NII 3)	3.865	5.870

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	16.557	16.250
5785	16.558	16.400
5825	16.574	12.200

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.774	17.320
5785	17.792	17.620
5825	17.747	12.200

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802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.714	12.480
5220	17.695	12.480
5240	17.708	12.480
5260	17.725	12.490
5300	17.719	12.480
5320	17.688	12.480
5500	17.706	12.480
5580	17.721	12.480
5700	17.688	12.480
5720(U-NII 2C)	13.856	11.420
5720(U-NII 3)	3.856	5.860

802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.698	17.530
5785	17.796	17.580
5825	17.701	12.200

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.133	15.580
5230	36.201	15.590
5270	36.170	15.580
5310	36.144	15.580
5510	36.104	15.580
5550	36.156	15.580
5670	36.155	15.580
5710(U-NII 2C)	33.071	15.190
5710(U-NII 3)	3.071	4.870

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.164	36.120
5795	36.145	36.080

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.137	15.580
5230	36.135	15.580
5270	36.103	15.580
5310	36.253	15.590
5510	36.153	15.580
5550	36.178	15.580
5670	36.202	15.590
5710(U-NII 2C)	33.095	15.200
5710(U-NII 3)	3.095	4.910

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.186	35.880
5795	36.201	36.300

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802.11ac _VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.594	18.780
5290	75.665	18.790
5530	75.538	18.780
5610	75.638	18.790
5690(U-NII 2C)	72.860	18.620
5690(U-NII 3)	2.860	4.560

802.11ac _VHT80_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.584	18.780
5290	75.485	18.780
5530	75.606	18.790
5610	75.616	18.790
5690(U-NII 2C)	72.836	18.620
5690(U-NII 3)	2.836	4.530

802.11ac _VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5775	75.612	76.140

802.11ac _VHT80_Ch1

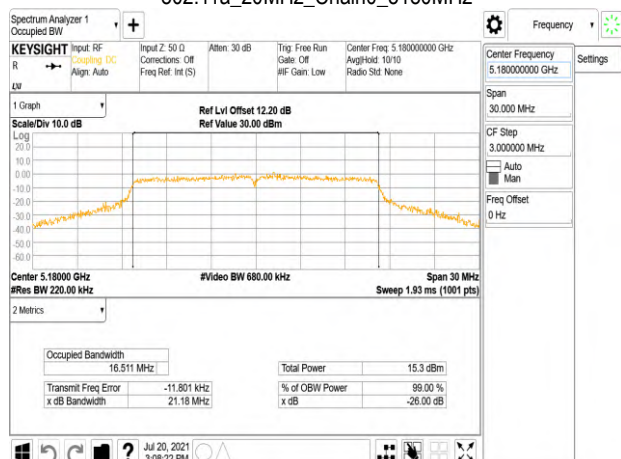
Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5775	75.692	76.020

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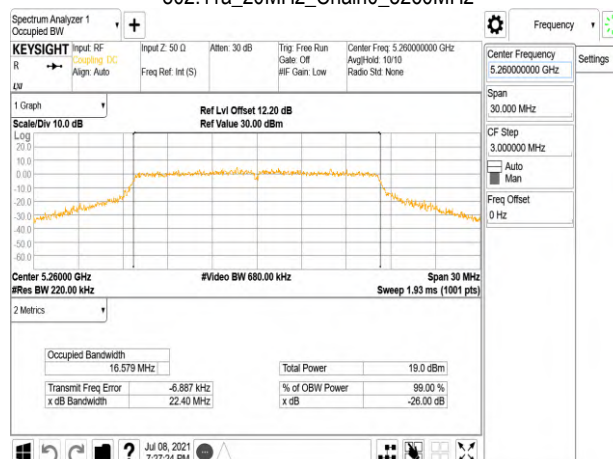
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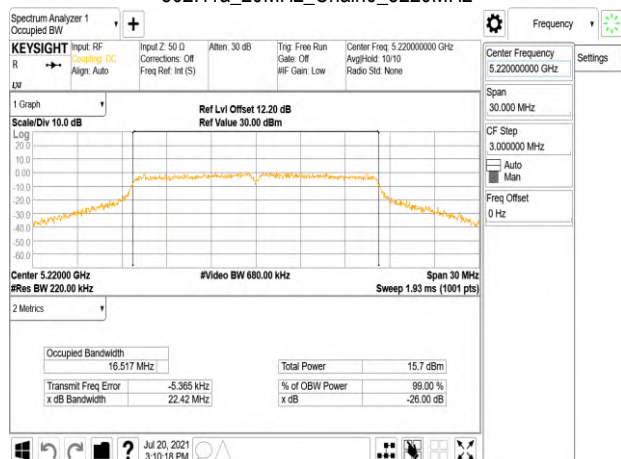
802.11a_20MHz_Chain0_5180MHz



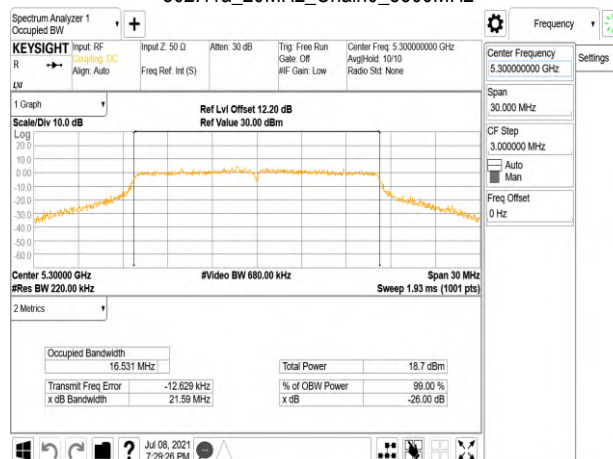
802.11a_20MHz_Chain0_5260MHz



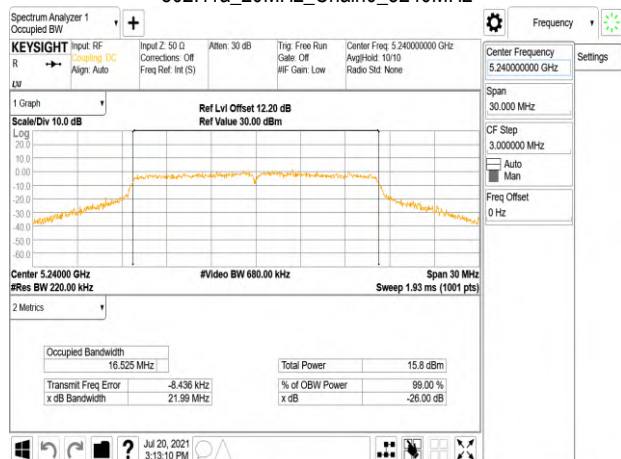
802.11a_20MHz_Chain0_5220MHz



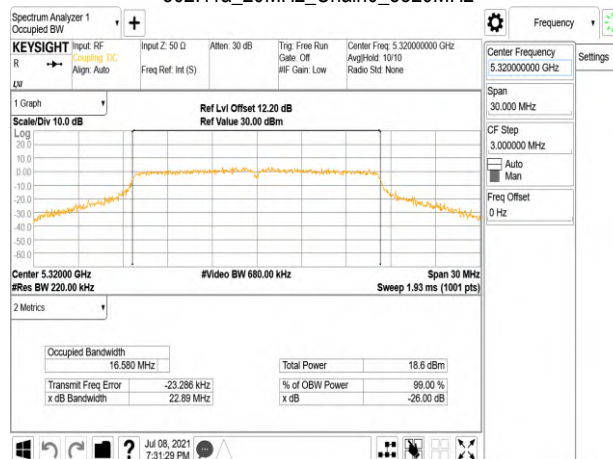
802.11a_20MHz_Chain0_5300MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

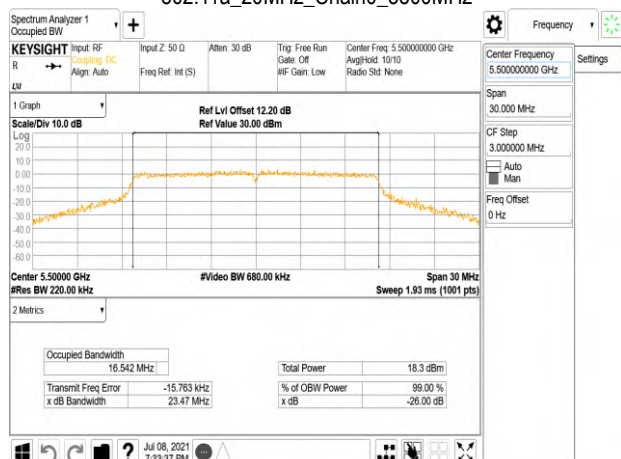


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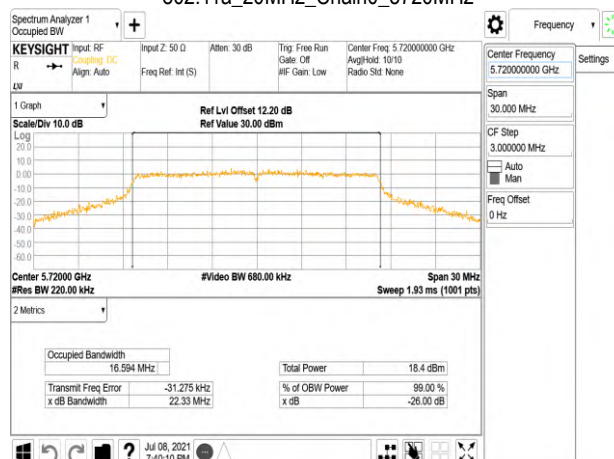
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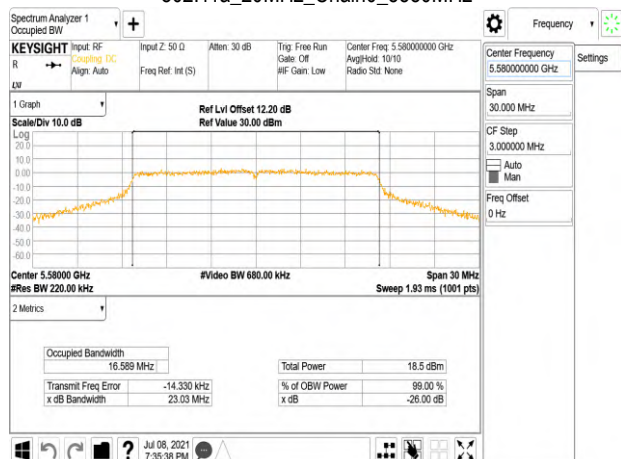
802.11a_20MHz_Chain0_5500MHz



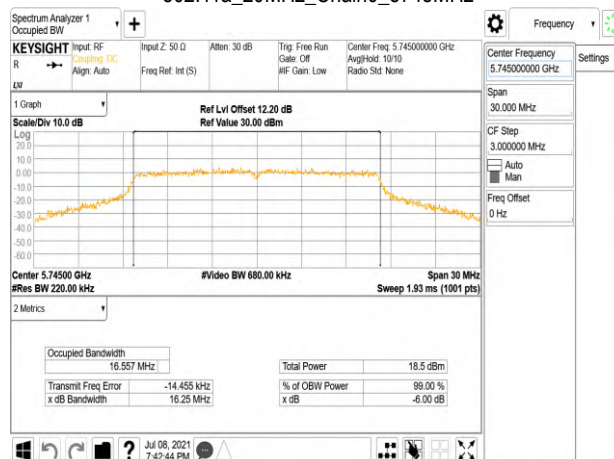
802.11a_20MHz_Chain0_5720MHz



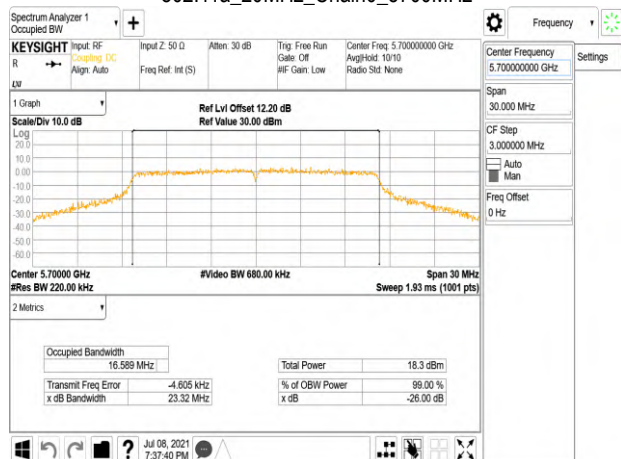
802.11a_20MHz_Chain0_5580MHz



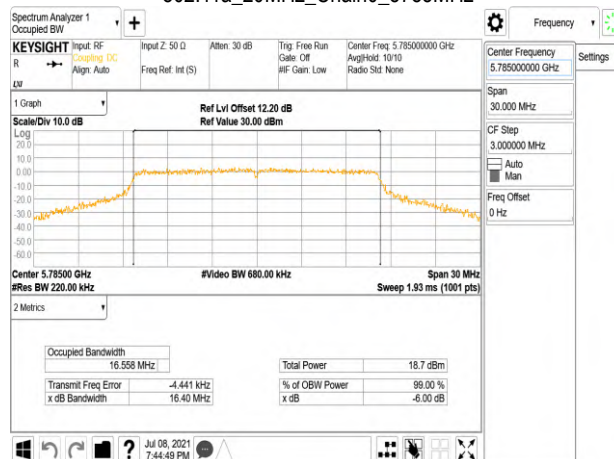
802.11a_20MHz_Chain0_5745MHz



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5785MHz

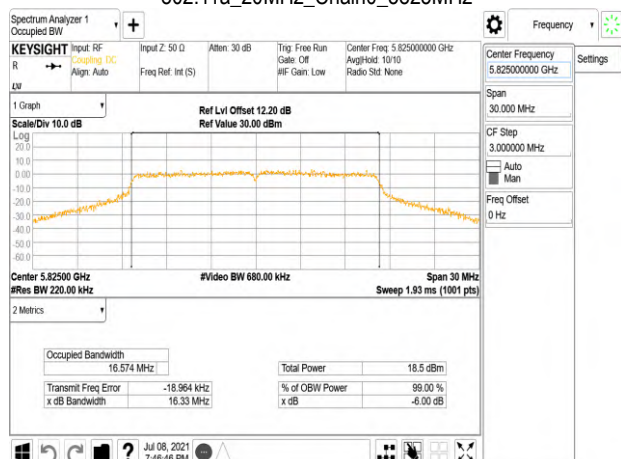


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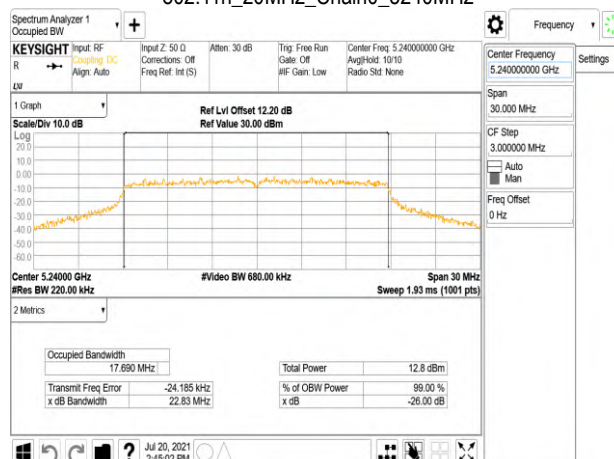
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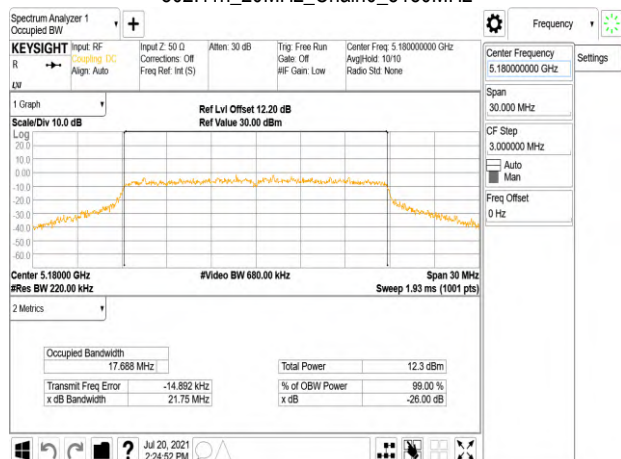
802.11a_20MHz_Chain0_5825MHz



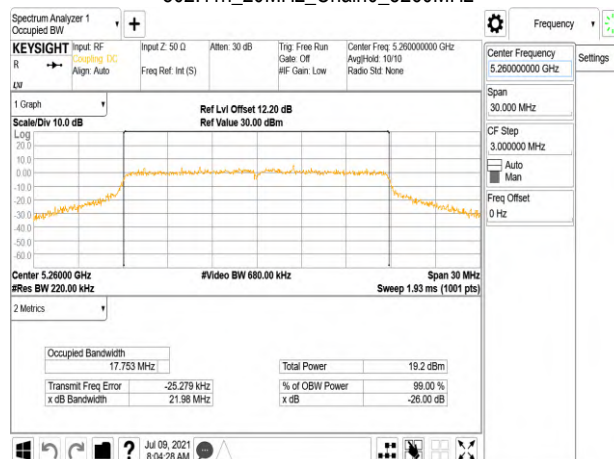
802.11n_20MHz_Chain0_5240MHz



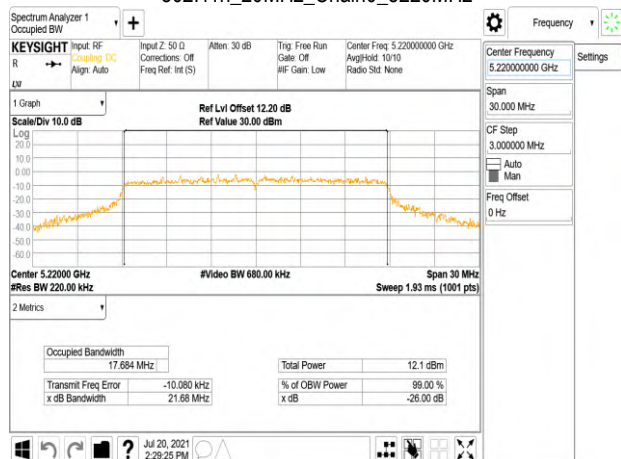
802.11n_20MHz_Chain0_5180MHz



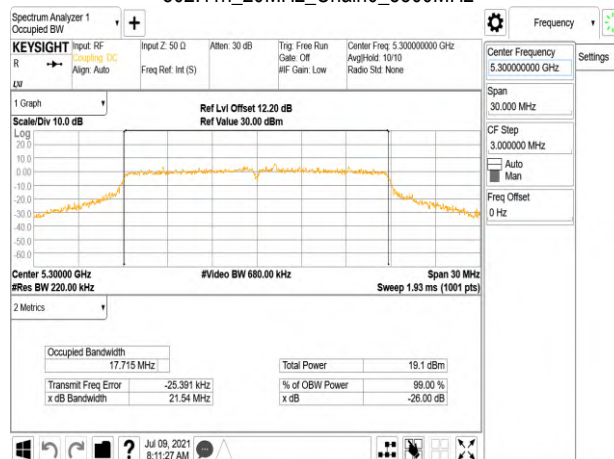
802.11n_20MHz_Chain0_5260MHz



802.11n_20MHz_Chain0_5220MHz



802.11n_20MHz_Chain0_5300MHz



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