

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant: Microsoft Corporation
One Microsoft Way Redmond, WA 98052-6399, U.S.A

Product Name: Portable Computing Device

Brand Name: Microsoft

Model No.: 1958, 1959

Model Difference: The difference between 1958 and 1959 models is the C-Cover.
1958 - Config 1 and 1959 - Config 2

Report Number: E2/2020/70034

FCC ID: C3K1958

FCC Rule Part: §15.407, Cat: UNII

Issue Date: Feb. 24, 2021

Date of Test: Jul. 08, 2020 ~ Feb. 22, 2021

Date of EUT Received: Jul. 06, 2020

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 tested as described in this report is in compliance with conducted and radiated emission limits.

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

Approved By: _____

Blue Yang / Asst. Manager



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Revision History

Report Number	Revision	Description	Issue Date	Remark
E2/2020/70034	Rev.00	Original.	Feb. 24, 2021	Revised By: Tiffany Kao

Note:

1、Multiple Model numbers or Trademarks

The variant model numbers are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.

2、Disclaimer

Antenna information and Variant information between model numbers are provided by the applicant, test results of this report are applicable to the sample EUT received.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Portable Computing Device	
Brand Name:	Microsoft	
Model No.:	1958, 1959	
Model Difference:	The difference between 1958 and 1959 models is the C-Cover. 1958 - Config 1 and 1959 - Config 2	
HW Version (Product):	EV2	
SW Version (Product):	MTEOS.1.311.0	
HW Version (Radio):	N/A	
SW Version (Radio):	21.80.2.1	
Radio Test Tool & Version:	DRTU: 21.21080.0.0-10722	
Power Supply:	From Rechargeable Li-Ion Polymer Battery or from AC/DC Adapter	
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only 1024QAM for OFDMA in 802.11ax only	
Transition Rate (2TX):	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300.0Mbps	802.11 ac_20MHz: 6.5 – 173.3Mbps 802.11 ac_40MHz: 13.5 – 400.0Mbps 802.11 ac_80MHz: 29.3 – 866.7Mbps 802.11 ac_160MHz: 58.5 – 1733.4Mbps 802.11 ax_20MHz: 8.6 – 286.8 Mbps 802.11 ax_40MHz: 17.2 -573.5 Mbps 802.11 ax_80MHz: 36.0 – 1201 Mbps 802.11 ax_160MHz: 68 – 2402 Mbps

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1.2 Antenna Designation

Antenna Type	Config	Chain 0 / Chain 1	Freq. (MHz)	Peak Antenna Gain (dBi)	Worst Antenna Gain
PIFA	Config 1	Chain 0	5150~5250	5.5	V
			5250~5350	5.5	V
			5470~5725	6.1	V
			5725~5850	6.7	V
		Chain 1	5150~5250	4.9	
			5250~5350	5.5	
			5470~5725	4.6	
			5725~5850	4.7	
	Config 2	Chain 0	5150~5250	3.8	
			5250~5350	3.9	
			5470~5725	4.8	
			5725~5850	4.8	
		Chain 1	5150~5250	1.7	
			5250~5350	1.9	
			5470~5725	1.5	
			5725~5850	1.7	

Note: Pre-scanned was done on the above 4 antennas, the Config 1 cover type results higher emission at 5GHz. Therefore, the completed set of measurement was done on the antenna to be presented on this test report.

Below directional gain is used in measurement due to the worse case scenario determined in section 4 of this report designate below antennas for transmissions.

Transmission Chain	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain in the worst case senario (dBi)
Chain 0	5150~5250	5.5	5.21
Chain 1	5150~5250	4.9	
Chain 0	5250~5350	5.5	5.50
Chain 1	5250~5350	5.5	
Chain 0	5470~5725	6.1	5.41
Chain 1	5470~5725	4.6	
Chain 0	5725~5850	6.7	5.81
Chain 1	5725~5850	4.7	

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1.3 FCC worst power

Wi-Fi 802.11	Frequency Range	Channels	Avg. Power (dBm)	Modulation Technology
a	5180~5240	4	16.98 (Chain 0)	OFDM
	5260~5320	4	16.96 (Chain 0)	
	5500~5720	12	16.96 (Chain 0)	
	5745~5820	5	16.92 (Chain 1)	
n_HT20M	5180~5240	4	HT: 18.94 (MIMO)	OFDM
	5260~5320	4	HT: 17.94 (MIMO)	
	5500~5720	12	HT: 18.96 (MIMO)	
	5745~5820	5	HT: 19.28 (MIMO)	
ax_HE20M	5180~5240	4	18.94 (MIMO)	OFDMA
	5260~5320	4	17.94 (MIMO)	
	5500~5720	12	18.96 (MIMO)	
	5745~5820	5	19.42 (MIMO)	
n_HT40M	5190~5230	2	HT: 18.90 (MIMO)	OFDM
	5270~5310	2	HT: 17.96 (MIMO)	
	5510~5710	6	HT: 18.93 (MIMO)	
	5755~5795	2	HT: 19.31 (MIMO)	
ax_HE40M	5190~5230	2	18.94 (MIMO)	OFDMA
	5270~5310	2	17.95 (MIMO)	
	5510~5710	6	18.97 (MIMO)	
	5755~5795	2	18.98 (MIMO)	
ac_VHT80M	5210~5210	1	17.45 (MIMO)	OFDM
	5290~5290	1	15.96 (MIMO)	
	5530~5690	3	18.96 (MIMO)	
	5775~5775	1	18.97 (MIMO)	
ax_HE80M	5210~5210	1	15.96 (MIMO)	OFDMA
	5290~5290	1	17.95 (MIMO)	
	5530~5690	3	18.62 (MIMO)	
	5775~5775	1	18.96 (MIMO)	
ac_VHT160M	5250~5250	1	12.47 (MIMO)	OFDM
	5570~5570	1	13.21 (MIMO)	
ax_HE160M	5250~5250	1	13.96 (MIMO)	OFDMA
	5570~5570	1	12.48 (MIMO)	

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1.4 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
ANSI C63.10:2013

1.5 Test Facility

SGS Taiwan Ltd. Central RF Lab (TAF code 3702)
No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Designation number: TW0028

1.6 Special Accessories

There are no special accessories used while test was conducted.

1.7 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.

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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.

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 Radiated Emission Configuration



Fig. 2-3 Conducted (AC powerline) Emission Configuration



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



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	DRTU	INTEL	21.80.2.1	N/A	N/A	N/A

Note: The EUT is tested with all external accessory ports populated.

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3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 802.11a/n/ac/ax operated in U-NII Bands

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

160 M	
CH	Freq (MHz)
50	5250

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

160 M	
CH	Freq (MHz)
114	5570

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 given UE is pre-scanned among below modes.

Modulation	Transmission Chain				Single Transmission Spatial	Multiple Transmission Spatial
<input checked="" type="checkbox"/> 802.11 a	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input checked="" type="checkbox"/> 1TX	<input type="checkbox"/> 2TX
<input checked="" type="checkbox"/> 802.11 n	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> SISO	<input checked="" type="checkbox"/> MIMO
<input checked="" type="checkbox"/> 802.11 ac	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> SISO	<input checked="" type="checkbox"/> MIMO
<input checked="" type="checkbox"/> 802.11 ax	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> SISO	<input checked="" type="checkbox"/> MIMO

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4. Observations have been done for 802.11 ax available RU configurations below and found that the lowest, highest and Full RU results higher emissions.

Only one RU can be enabled at any given time. (802.11 ax)

802.11ax	20MHz				802.11ax	40MHz			
RU type	26-tone RU		52-tone RU		RU type	26-tone RU		52-tone RU	
RU index and subcarrier range	RU0	[-121: -96]	RU37	[-121: -70]	RU index and subcarrier range	RU0	[-243: -218]	RU37	[-243: -192]
	RU1	[-95: -70]	RU38	[-68: -17]		RU1	[-217: -192]	RU38	[-189: -138]
	RU2	[-68: -43]	RU39	[17: 68]		RU2	[-189: -164]	RU39	[-109: -58]
	RU3	[-42: -17]	RU40	[70: 121]		RU3	[-163: -138]	RU40	[-55: -4]
	RU4	[-16: -4, 4: 16]	RU41	N/A		RU4	[-136: -111]	RU41	[4: 55]
	RU5	[17: 42]	RU42	N/A		RU5	[-109: -84]	RU42	[58: 109]
	RU6	[43: 68]	RU43	N/A		RU6	[-83: -58]	RU43	[138: 189]
	RU7	[70: 95]	RU44	N/A		RU7	[-55: -30]	RU44	[192: 243]
	RU8	[96: 121]	RU45	N/A		RU8	[-29: -4]	RU45	N/A
	RU9	N/A	RU46	N/A		RU9	[4: 29]	RU46	N/A
	RU10	N/A	RU47	N/A		RU10	[30: 55]	RU47	N/A
	RU11	N/A	RU48	N/A		RU11	[58: 83]	RU48	N/A
	RU12	N/A	RU49	N/A		RU12	[84: 109]	RU49	N/A
	RU13	N/A	RU50	N/A		RU13	[111: 136]	RU50	N/A
	RU14	N/A	RU51	N/A		RU14	[138: 163]	RU51	N/A
	RU15	N/A	RU52	N/A		RU15	[164: 189]	RU52	N/A
	RU16	N/A				RU16	[192: 217]		
	RU17	N/A	106-tone RU			RU17	[218: 243]	106-tone RU	
	RU18	N/A	RU53	[-122: -17]		RU18	N/A	RU53	[-243: -138]
	RU19	N/A	RU54	[17: 122]		RU19	N/A	RU54	[-109: -4]
	RU20	N/A	RU55	N/A		RU20	N/A	RU55	[4: 109]
	RU21	N/A	RU56	N/A		RU21	N/A	RU56	[138: 243]
	RU22	N/A	RU57	N/A		RU22	N/A	RU57	N/A
	RU23	N/A	RU58	N/A		RU23	N/A	RU58	N/A
	RU24	N/A	RU59	N/A		RU24	N/A	RU59	N/A
	RU25	N/A	RU60	N/A		RU25	N/A	RU60	N/A
	RU26	N/A				RU26	N/A		
	RU27	N/A	242-tone RU			RU27	N/A	242-tone RU	
	RU28	N/A	RU61	[-122: -2, 2: 122]		RU28	N/A	RU61	[-244: -3]
	RU29	N/A	RU62	N/A		RU29	N/A	RU62	[3: 244]
	RU30	N/A	RU63	N/A		RU30	N/A	RU63	N/A
	RU31	N/A	RU64	N/A		RU31	N/A	RU64	N/A
	RU32	N/A				RU32	N/A		
	RU33	N/A				RU33	N/A	484-tone RU	
	RU34	N/A				RU34	N/A	RU65	[-244: -3, 3: 244]
	RU35	N/A				RU35	N/A	RU66	N/A
RU36	N/A			RU36	N/A				

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802.11ax	80MHz			
RU type	26-tone RU		52-tone RU	
RU index and subcarrier range	RU0	[-499: -474]	RU37	[-499: -448]
	RU1	[-473: -448]	RU38	[-445: -394]
	RU2	[-445: -420]	RU39	[-365: -314]
	RU3	[-419: -394]	RU40	[-311: -260]
	RU4	[-392: -367]	RU41	[-257: -206]
	RU5	[-365: -340]	RU42	[-203: -152]
	RU6	[-339: -314]	RU43	[-123: -72]
	RU7	[-311: -286]	RU44	[-69: -18]
	RU8	[-285: -260]	RU45	[18: 69]
	RU9	[-257: -232]	RU46	[72: 123]
	RU10	[-231: -206]	RU47	[152: 203]
	RU11	[-203: -178]	RU48	[206: 257]
	RU12	[-177: -152]	RU49	[260: 311]
	RU13	[-150: -125]	RU50	[314: 365]
	RU14	[-123: -98]	RU51	[394: 445]
	RU15	[-97: -72]	RU52	[448: 499]
	RU16	[-69: -44]	106-tone RU	
	RU17	[-43: -18]	RU53	[-499: -394]
	RU18	[-16: -4, 4: 16]	RU54	[-365: -260]
	RU19	[18: 43]	RU55	[-257: -152]
	RU20	[44: 69]	RU56	[-123: -18]
	RU21	[72: 97]	RU57	[18: 123]
	RU22	[98: 123]	RU58	[152: 257]
	RU23	[125: 150]	RU59	[260: 365]
	RU24	[152: 177]	RU60	[394: 499]
	RU25	[178: 203]	242-tone RU	
	RU26	[206: 231]	RU61	[-500: -259]
	RU27	[232: 257]	RU62	[-258: -17]
	RU28	[260: 285]	RU63	[17: 258]
	RU29	[286: 311]	RU64	[259: 500]
	RU30	[314: 339]	484-tone RU	
	RU31	[340: 365]	RU65	[-500: -17]
	RU32	[367: 392]	RU66	[17: 500]
	RU33	[394: 419]	996-tone RU	
	RU34	[420: 445]	RU67	[-500: -3, 3: 500]
	RU35	[448: 473]		
	RU36	[474: 499]		

5. 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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Models 1958 and 1959 are electrically and RF equivalent as they use the same motherboard, radio module and on board RF components. Both models share a common WiFi and BT power table. The radio-related firmware and driver versions are the same for the two models. The peak antenna gains are in the antenna gain section of the report. Antenna port conducted emissions measurements are done on model 1959 (FCC ID: C3K1958). Highest antenna gain across the two models in each band has been considered while doing the radiated emission measurements.

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	40,	OFDM	6	Ch0/Ch1
	5260~5320	52 to 64	60			
	5500~5700	100 to 140	116			
	5745~5825	149 to 165	157			
802.11ac_VHT160	5250	50	50		VHT0	Ch0/Ch1/ MIMO
	5570	114	114			

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/Ch1
	5260~5320	52 to 64	52,56,64			
	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		HT0/HT8	Ch0/Ch1/ MIMO
	5260~5320	52 to 64	52,56,64			
	5500~5700	100 to 140	100,116,140			
	5500~5720	100 to 144	144			
802.11n_HT40	5745~5825	149 to 165	149,157,165		HT0/HT8	Ch0/Ch1/ MIMO
	5190~5230	38 to 46	38,46			
	5270~5310	54 to 62	54,62			
	5510~5670	102 to 134	102,110,134,14			
802.11ac_VHT80	5510~5710	102 to 142	2		VHT0	Ch0/Ch1/ MIMO
	5755~5795	151 to 159	151,159			
	5210	42	42			
	5290	58	58			
802.11ac_VHT160	5530~5690	106 to 138	106,122,138		VHT0	Ch0/Ch1/ MIMO
	5775	155	155			
	5250	50	50			
	5570	114	114			

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RADIATED EMISSION TEST (ABOVE 1 GHz)

MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODU- LATION	RU CONFIGU- RATION	DATA RATE (Mbps)	AN- TENNA PORT
802.11ax_HE2 0	5180~5240	36 to 48	36	OFDMA	full , 26/0 52/37, 106/53	MCS0	Ch0/Ch1 / MIMO
			40,48		full		
			52,60		full		
	5260~5320	52 to 64	64		full, 26/8, 52/40 106/54		
			100		full, 26/0, 52/37 106/53		
			116		full		
	5500~5720	100 to 144	140		full, 26/8, 52/40 106/54		
			144		full		
			149		full, 26/0, 52/37 106/53		
			157,165		full		
	5745~5825	149 to 165	38		full , 242/61		
			46		full		
			54		full		
802.11ax_HE4 0	5190~5230	38 to 46	62		full , 242/62	MCS0	Ch0/Ch1 / MIMO
			102		full, 242/61		
			110		full		
	5270~5310	54 to 62	134		full, 242/62		
			142		full		
			151		full, 242/61		
			159		full		
	5510~5710	102 to 142	42		full, 484/65		
			58		full, 484/66		
			106		full, 484/65		
	5755~5795	151 to 159	122		full		
			138		full		
			155		full, 484/65		
802.11ax_HE8 0	5210	42	42		full , 996/67	MCS0	Ch0/Ch1 / MIMO
	5290	58	58		full , 996/67		
	5530~5690	106 to 138	114		full , 996/67		
	5775	155	155				
802.11ax_HE160	5250	50	50				
	5570	52 to 64	114				

Note: Observation has been done on all RU configurations, the Full RU configuration yields higher emissions and average output power, and hence the radiated emission results are demonstrated in full RU configuration in this report.

Note:

The field strength of radiation emission was measured for 802.11a/n/ac/ax WLAN Transmitter for above tested channel, the worst case NB position was reported.

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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/Ch1/ 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_HT20	5180~5240	36 to 48	36,44,48		HT0/HT8	Ch0/Ch1/ 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		HT0/HT8	Ch0/Ch1/ MIMO
	5270~5310	54 to 62	54,62			
	5510~5670	102 to 134	102,110,134,142			
	5510~5710	102 to 142				
	5755~5795	151 to 159				
802.11ac_VHT80	5210	42	42		VHT0	Ch0/Ch1/ MIMO
	5290	58	58			
	5530~5690	106 to 138	106,122,138			
	5775	155	155			
802.11ac_VHT160	5250	50	50	VHT0	Ch0/Ch1/ MIMO	
	5570	114	114			

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CONDUCTED TEST							
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	RU CONFIGURATION	DATA RATE (Mbps)	ANTENNA PORT
802.11ax_ HE20	5180~5240	36 to 48	36	OFDMA	full , 26/0 52/37, 106/53	MCS0	Ch0/Ch1/ MIMO
			40,48		full		
	5260~5320	52 to 64	52,60		full		
			64		full, 26/8, 52/40 106/54		
			100		full , 26/0 52/37, 106/53		
	5500~5720	100 to 144	116		full		
			140		full, 26/8, 52/40 106/54		
			144		full		
			149		full, 26/0, 52/37 106/53		
	5745~5825	149 to 165	157,165		full		
802.11ax_ HE40	5190~5230	38 to 46	38	OFDMA	full , 242/61	MCS0	Ch0/Ch1/ MIMO
			46		full		
	5270~5310	54 to 62	54		full		
			62		full , 242/62		
	5510~5710	102 to 142	102		full, 242/61		
			110		full		
			134		full, 242/62		
			142		full		
	5755~5795	151 to 159	151		full, 242/61		
			159		full		
802.11ax_ HE80	5210	42	42	OFDMA	full, 484/65	MCS0	Ch0/Ch1/ MIMO
	5290	58	58		full, 484/66		
	5530~5690	106 to 138	106		full, 484/65		
			122		full		
			138		full		
	5775	155	155		full, 484/65		
802.11ax_ HE160	5250	50	50		full , 996/67	MCS0	Ch0/Ch1/ MIMO
	5570	52 to 64	114		full , 996/67		

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission Measurement Uncertainty	
Polarization: Vertical	9kHz~30MHz: +2.3dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
Polarization: Horizontal	9kHz~30MHz: +2.3dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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 dB(μV)	
	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

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	974	03/25/2020	03/24/2021
EMI Test Receiver	R&S	ESCI	101342	04/28/2020	04/27/2021
Test Software	audix	e3	Ver. 6.11- 20180419c	N.C.R	N.C.R

6.3 EUT Setup

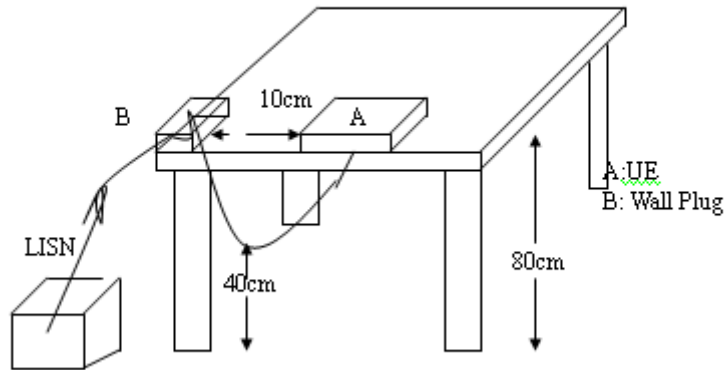
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz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

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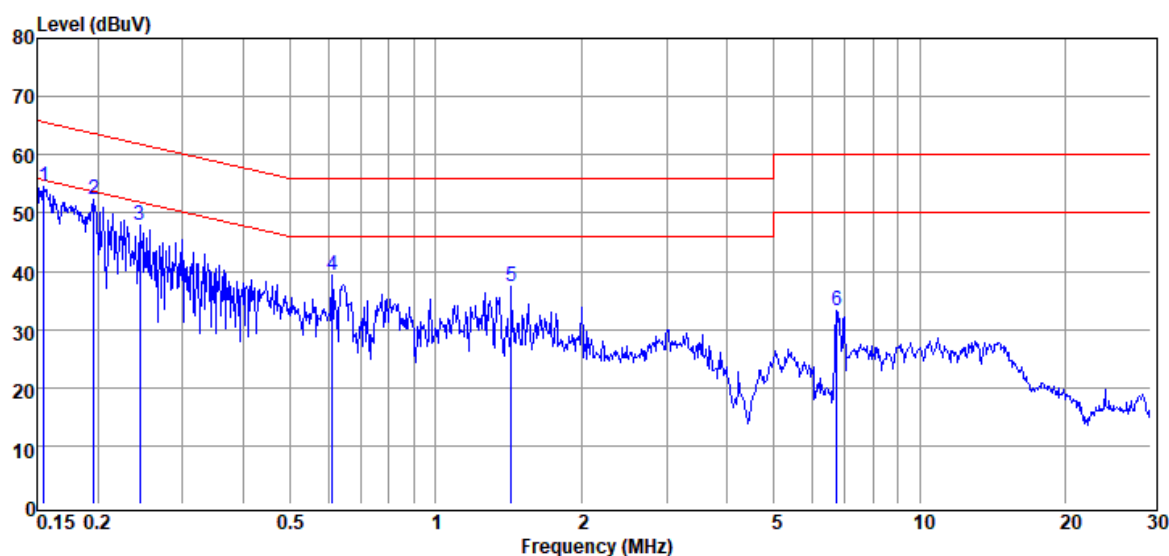
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Adapter 1

Report Number :E2/2020/70034
 Test Mode :WLAN 5G
 Power :120V/60Hz
 Probe :L1
 Note: :EUT_Config 1

Test Site :Conduction Room C
 Test Date :2020-08-14
 Temp./Humi. :24.3/62
 Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	44.33	10.22	54.55	65.74	-11.19
0.20	Peak	41.98	10.22	52.20	63.76	-11.56
0.24	Peak	37.66	10.22	47.88	61.95	-14.07
0.61	Peak	29.14	10.29	39.43	56.00	-16.57
1.43	Peak	26.85	10.45	37.30	56.00	-18.70
6.73	Peak	22.73	10.59	33.32	60.00	-26.68

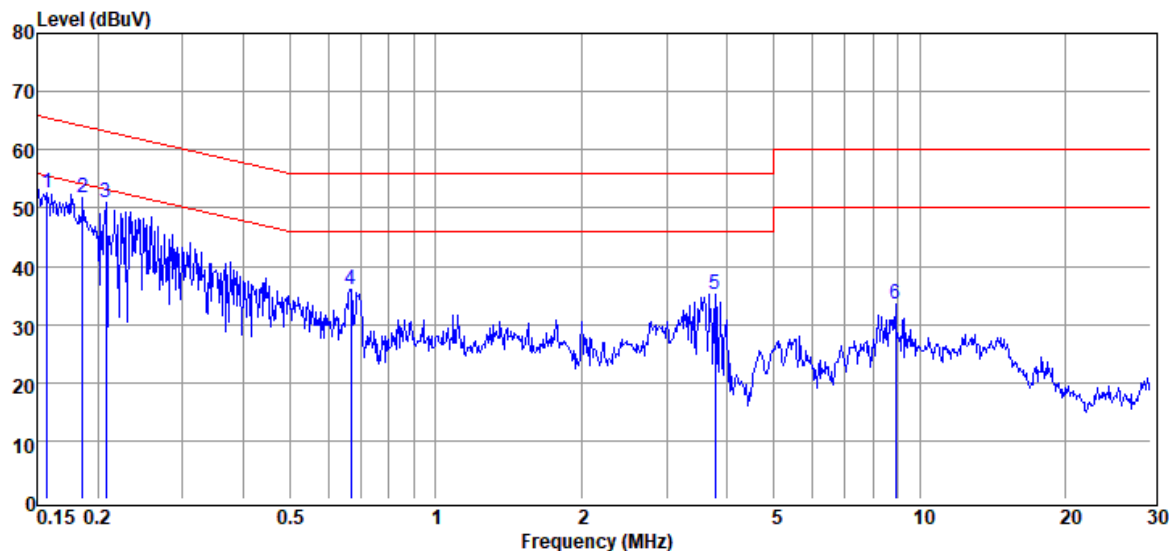
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Report Number :E2/2020/70034
Test Mode :WLAN 5G
Power :120V/60Hz
Probe :N
Note: :EUT_Config 1

Test Site :Conduction Room C
Test Date :2020-08-14
Temp./Humi. :24.3/62
Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.16	Peak	42.42	10.21	52.63	65.60	-12.97
0.19	Peak	41.62	10.21	51.83	64.20	-12.37
0.21	Peak	40.75	10.21	50.96	63.27	-12.31
0.67	Peak	25.79	10.31	36.10	56.00	-19.90
3.78	Peak	24.67	10.49	35.16	56.00	-20.84
8.92	Peak	22.87	10.67	33.54	60.00	-26.46

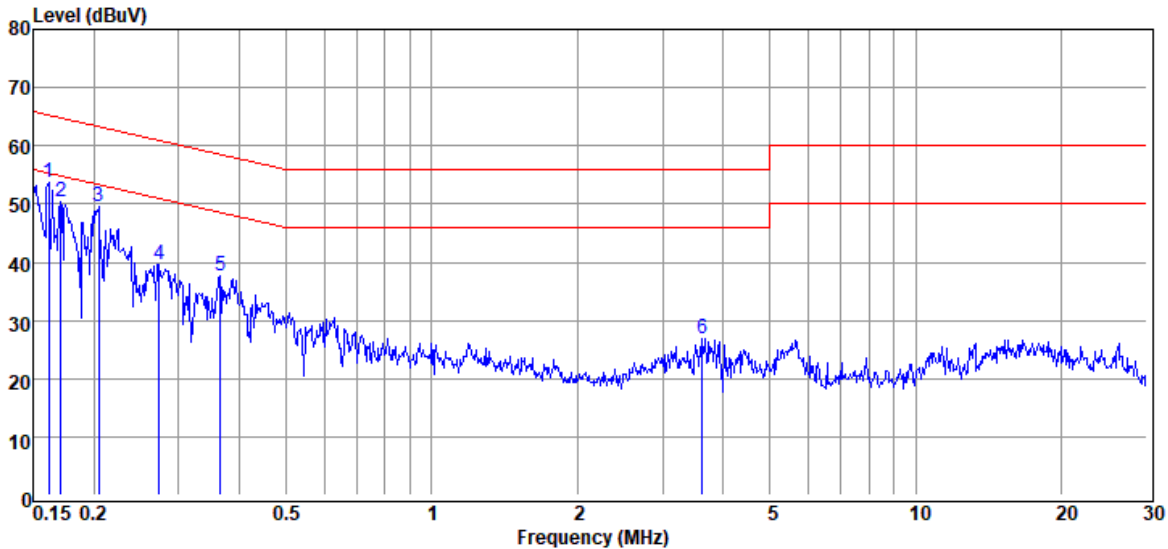
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Report Number :E2/2020/70034
Test Mode :WLAN 5G
Power :120V/60Hz
Probe :L1
Note: : EUT_Config 2

Test Site :Conduction Room C
Test Date :2020-08-14
Temp./Humi. :24.1/61
Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.16	Peak	43.46	10.22	53.68	65.38	-11.70
0.17	Peak	40.18	10.22	50.40	64.90	-14.50
0.21	Peak	39.23	10.22	49.45	63.40	-13.95
0.27	Peak	29.42	10.22	39.64	61.03	-21.39
0.37	Peak	27.31	10.22	37.53	58.61	-21.08
3.62	Peak	16.38	10.48	26.86	56.00	-29.14

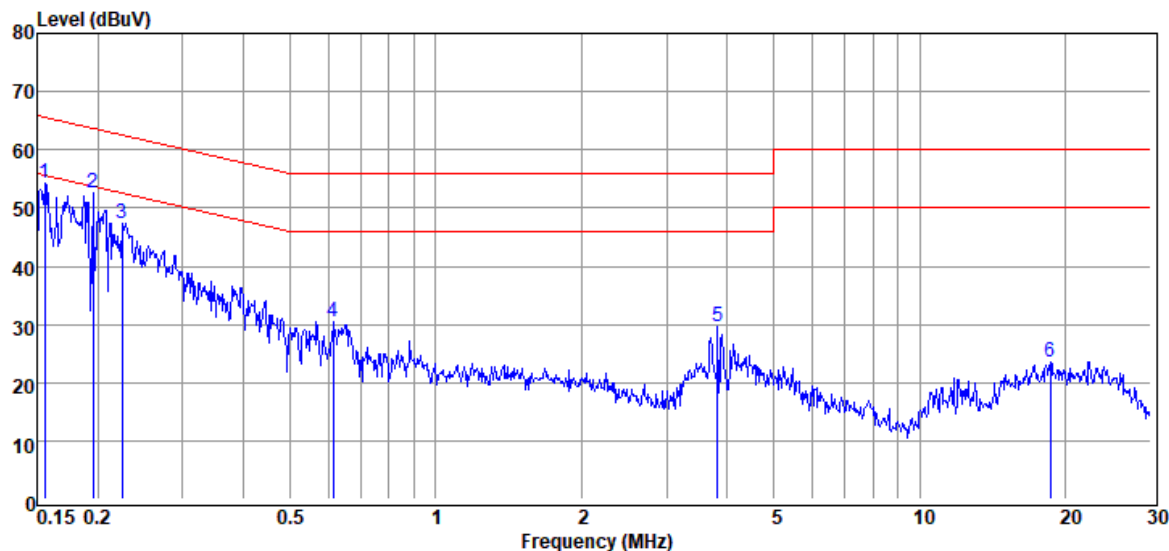
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Report Number :E2/2020/70034
Test Mode :WLAN 5G
Power :120V/60Hz
Probe :N
Note: : EUT_Config 2

Test Site :Conduction Room C
Test Date :2020-08-14
Temp./Humi. :24.1/61
Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.16	Peak	43.92	10.21	54.13	65.69	-11.56
0.20	Peak	42.44	10.21	52.65	63.80	-11.15
0.22	Peak	37.26	10.21	47.47	62.66	-15.19
0.61	Peak	20.15	10.28	30.43	56.00	-25.57
3.82	Peak	19.21	10.49	29.70	56.00	-26.30
18.62	Peak	12.69	10.84	23.53	60.00	-36.47

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Adapter 2

Report Number :E2/2020/70034

Test Mode :WLAN 5G

Power :120V/60Hz

Probe :L1

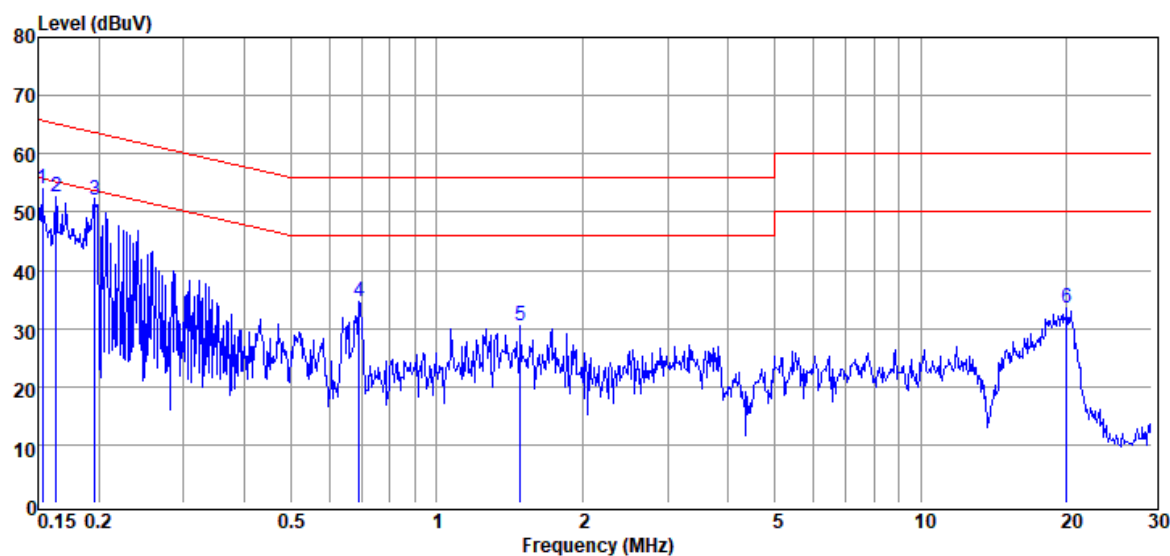
Note: :EUT_Config 1

Test Site :Conduction Room C

Test Date :2020-09-02

Temp./Humi. :23.4/65

Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level	FS				
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	43.90	10.22	54.12	65.82	-11.70
0.16	Peak	42.41	10.22	52.63	65.30	-12.67
0.20	Peak	41.91	10.22	52.13	63.76	-11.63
0.69	Peak	24.40	10.33	34.73	56.00	-21.27
1.49	Peak	19.93	10.45	30.38	56.00	-25.62
20.06	Peak	22.66	10.85	33.51	60.00	-26.49

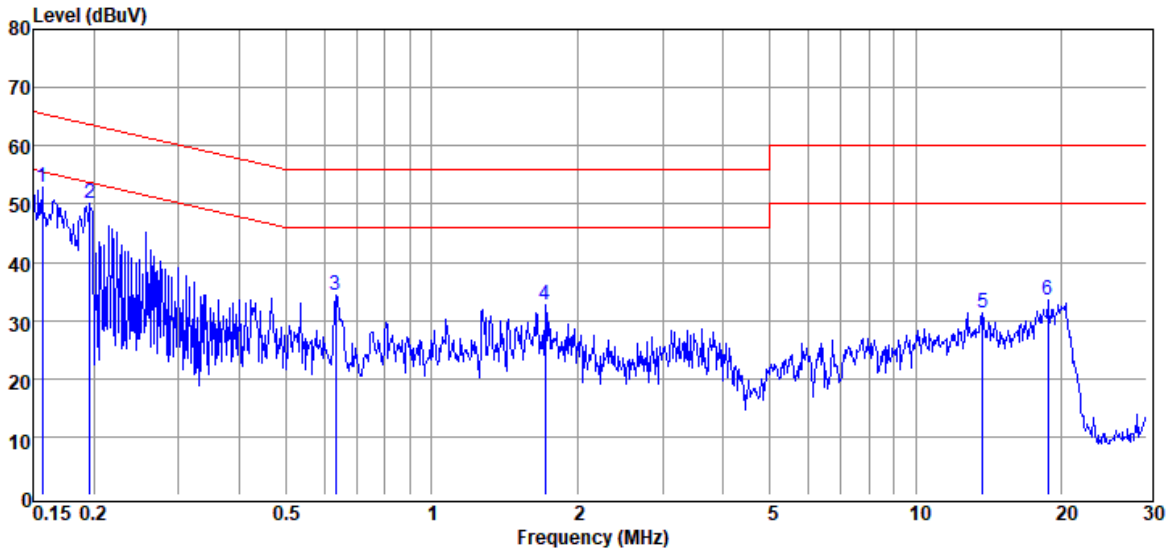
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Report Number :E2/2020/70034
Test Mode :WLAN 5G
Power :120V/60Hz
Probe :N
Note: :EUT_Config 1

Test Site :Conduction Room C
Test Date :2020-09-02
Temp./Humi. :23.4/65
Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.16	Peak	42.74	10.21	52.95	65.65	-12.70
0.20	Peak	39.77	10.21	49.98	63.76	-13.78
0.63	Peak	23.96	10.29	34.25	56.00	-21.75
1.72	Peak	22.27	10.45	32.72	56.00	-23.28
13.77	Peak	20.53	10.78	31.31	60.00	-28.69
18.72	Peak	22.56	10.85	33.41	60.00	-26.59

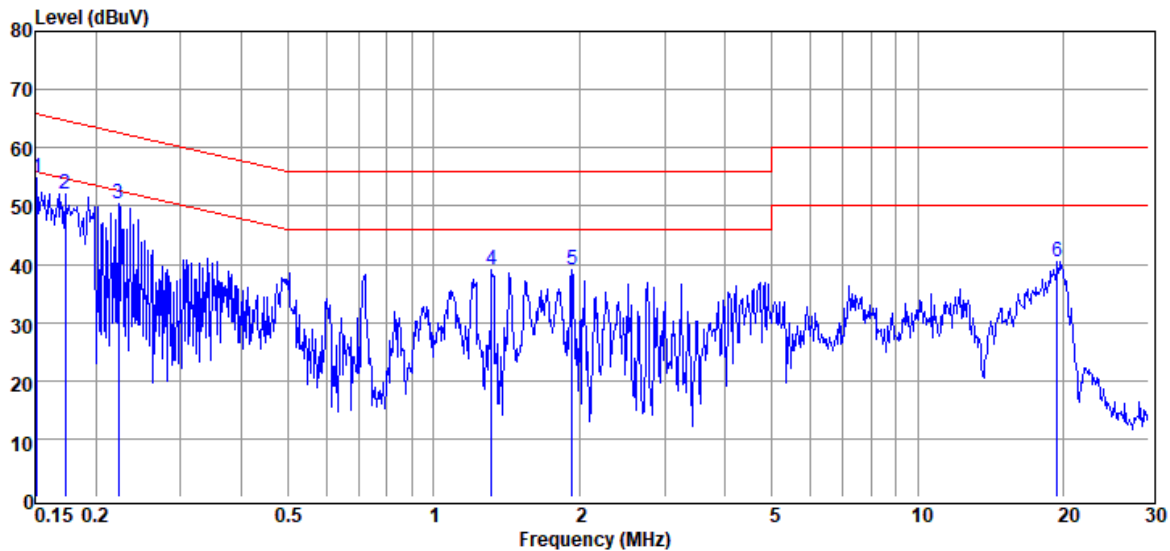
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Report Number :E2/2020/70034
Test Mode :WLAN 5G
Power :120V/60Hz
Probe :L1
Note: : EUT_Config 2

Test Site :Conduction Room C
Test Date :2020-09-02
Temp./Humi. :23.6/65
Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	44.49	10.22	54.71	65.91	-11.20
0.17	Peak	41.88	10.22	52.10	64.81	-12.71
0.22	Peak	40.08	10.22	50.30	62.70	-12.40
1.32	Peak	28.64	10.44	39.08	56.00	-16.92
1.93	Peak	28.46	10.45	38.91	56.00	-17.09
19.43	Peak	29.53	10.84	40.37	60.00	-19.63

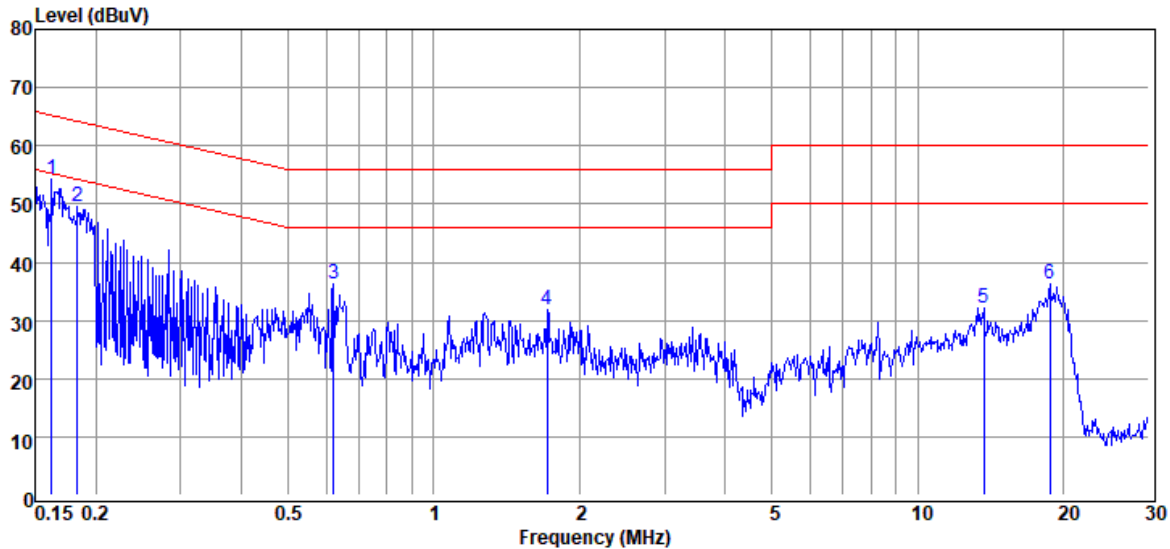
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Report Number :E2/2020/70034
Test Mode :WLAN 5G
Power :120V/60Hz
Probe :N
Note: : EUT_Config 2

Test Site :Conduction Room C
Test Date :2020-09-02
Temp./Humi. :23.6/65
Engineer :Kailin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.16	Peak	44.09	10.21	54.30	65.34	-11.04
0.18	Peak	39.38	10.21	49.59	64.33	-14.74
0.62	Peak	25.86	10.28	36.14	56.00	-19.86
1.72	Peak	21.29	10.45	31.74	56.00	-24.26
13.70	Peak	21.30	10.78	32.08	60.00	-27.92
18.72	Peak	25.37	10.85	36.22	60.00	-23.78

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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: Chain 1

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)
802.11a	97.89	0.09	0.48
802.11n_20	99.73	0.01	0.05
802.11n_40	99.47	0.02	0.11
802.11ac_80	99.19	0.04	0.18
802.11ac_160	98.44	0.07	0.36
802.11ax_20	99.49	0.02	0.11
802.11ax_40	99.04	0.04	0.21
802.11ax_80	99.05	0.04	0.20
802.11ax_160	98.99	0.04	0.22

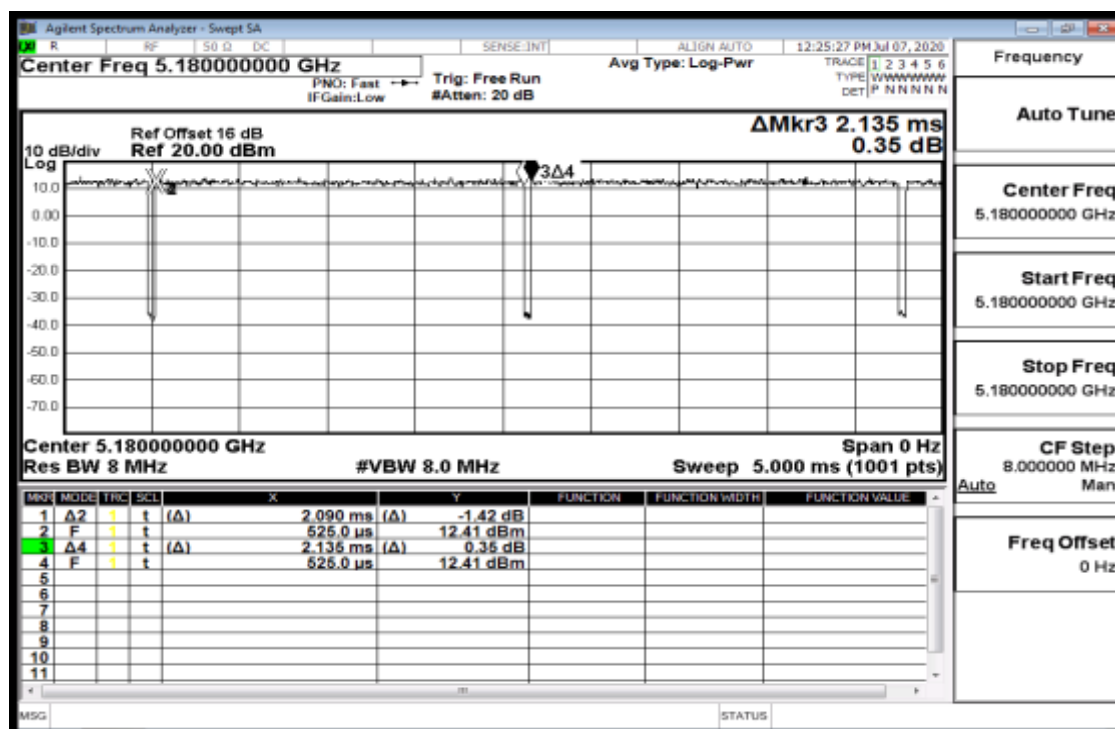
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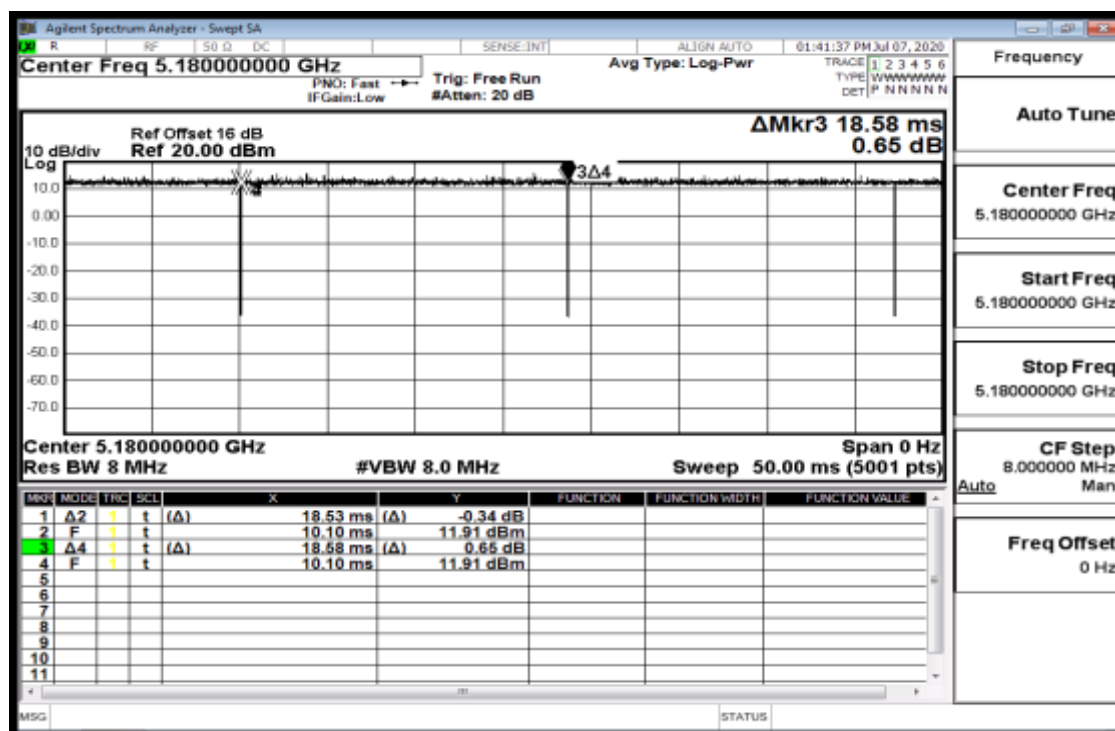
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7.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

802.11 a mode



802.11n HT20 mode

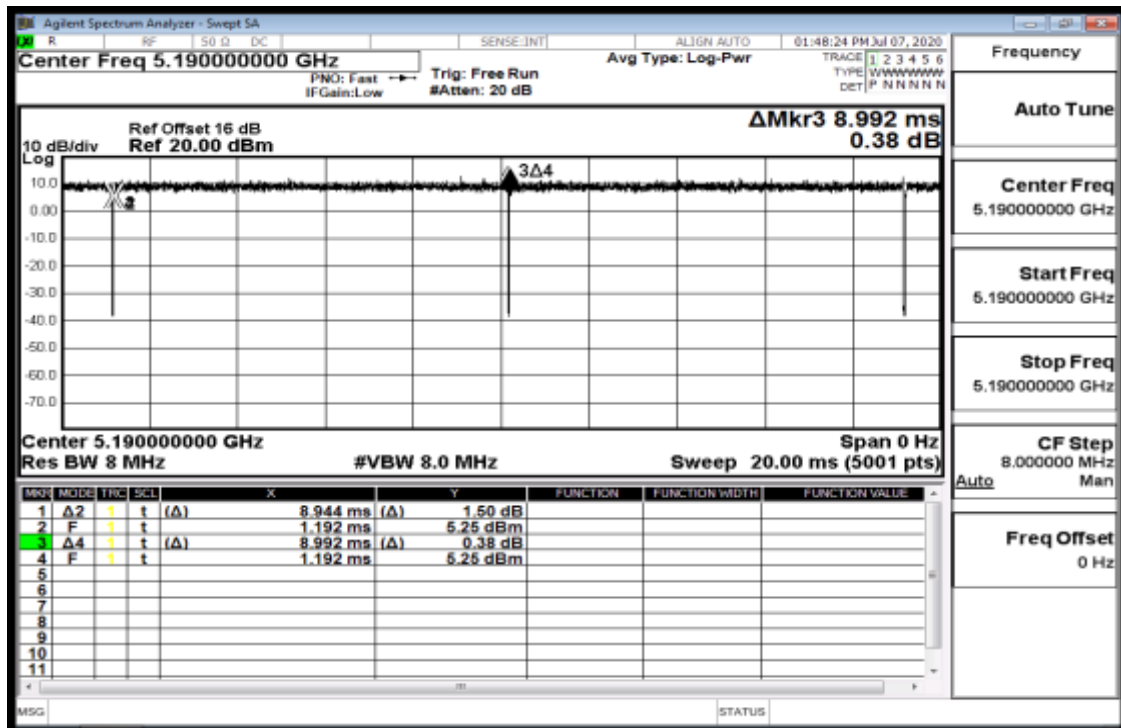


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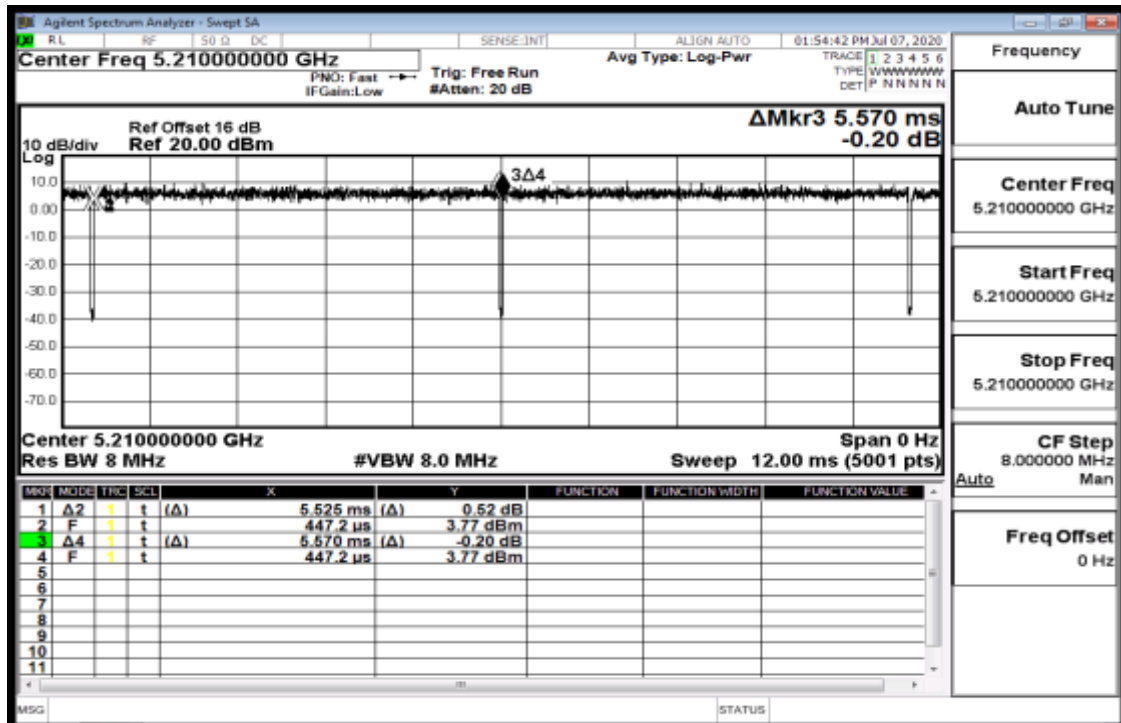
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802.11n HT40 mode



802.11ac VHT80 mode



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Agilent Spectrum Analyzer - Swept SA

R RF 50 Ω DC SENSE:INT ALIGN AUTO 08:00:57 PM Jul 07, 2020

Center Freq 5.250000000 GHz Avg Type: Log-Pwr

PNO: Fast IF Gain: Low Trig: Free Run #Atten: 20 dB

TRACE 1 2 3 4 5 6
TYPE WWWWWW
DET P N N N N N

Ref Offset 16 dB Δ Mkr3 2.829 ms
Ref 20.00 dBm 0.43 dB

10 dB/div Log

Center 5.250000000 GHz Span 0 Hz
Res BW 8 MHz #VBW 8.0 MHz Sweep 7.667 ms (5001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ 2	1	t	(Δ)	2.785 ms	(Δ)	-2.42 dB	
2	F	1	t		426.5 μ s		2.49 dBm	
3	Δ 4	1	t	(Δ)	2.829 ms	(Δ)	0.43 dB	
4	F	1	t		426.5 μ s		2.49 dBm	
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency Auto Tune

Center Freq 5.250000000 GHz

Start Freq 5.250000000 GHz

Stop Freq 5.250000000 GHz

CF Step 8.000000 MHz

Auto Man

Freq Offset 0 Hz

The screenshot displays an Agilent Spectrum Analyzer interface. The main plot shows a frequency spectrum with a center frequency of 5.180000000 GHz. The plot has a vertical scale of 10 dB/div and a horizontal scale of 8 MHz. A peak is labeled with a value of 3.44. The plot also shows a reference level of 20.00 dBm and a span of 0 Hz. The plot is titled 'Center Freq 5.180000000 GHz' and 'Avg Type: Log-Pwr'.

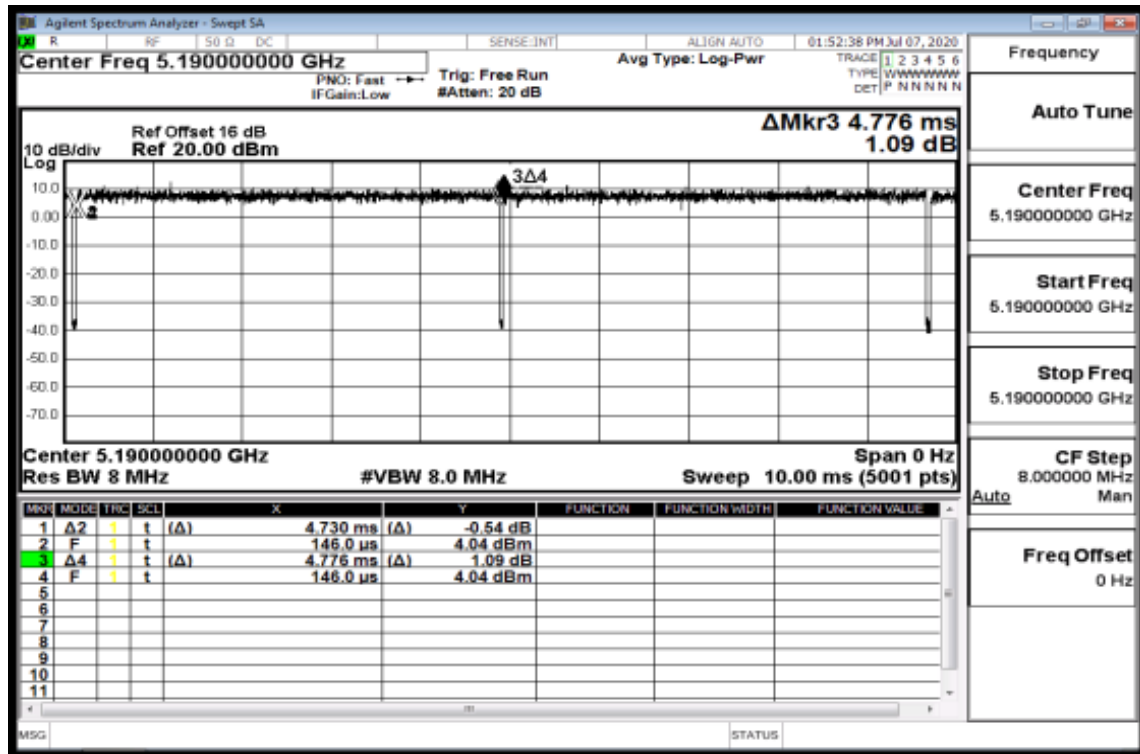
Below the plot, there is a table of measurement results. The table has columns for 'MNR', 'MODE', 'TRIG', 'SCL', 'X', 'Y', 'FUNCTION', 'FUNCTION WIDTH', and 'FUNCTION VALUE'. The table contains 11 rows of data, with the first three rows highlighted in green.

MNR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	1	t	(Δ)	9.396 ms	(Δ)	2.09 dB	
2	F	1	t	(Δ)	288.0 μs		9.23 dBm	
3	Δ4	1	t	(Δ)	9.444 ms	(Δ)	2.91 dB	
4	F	1	t		288.0 μs		9.23 dBm	
5								
6								
7								
8								
9								
10								
11								

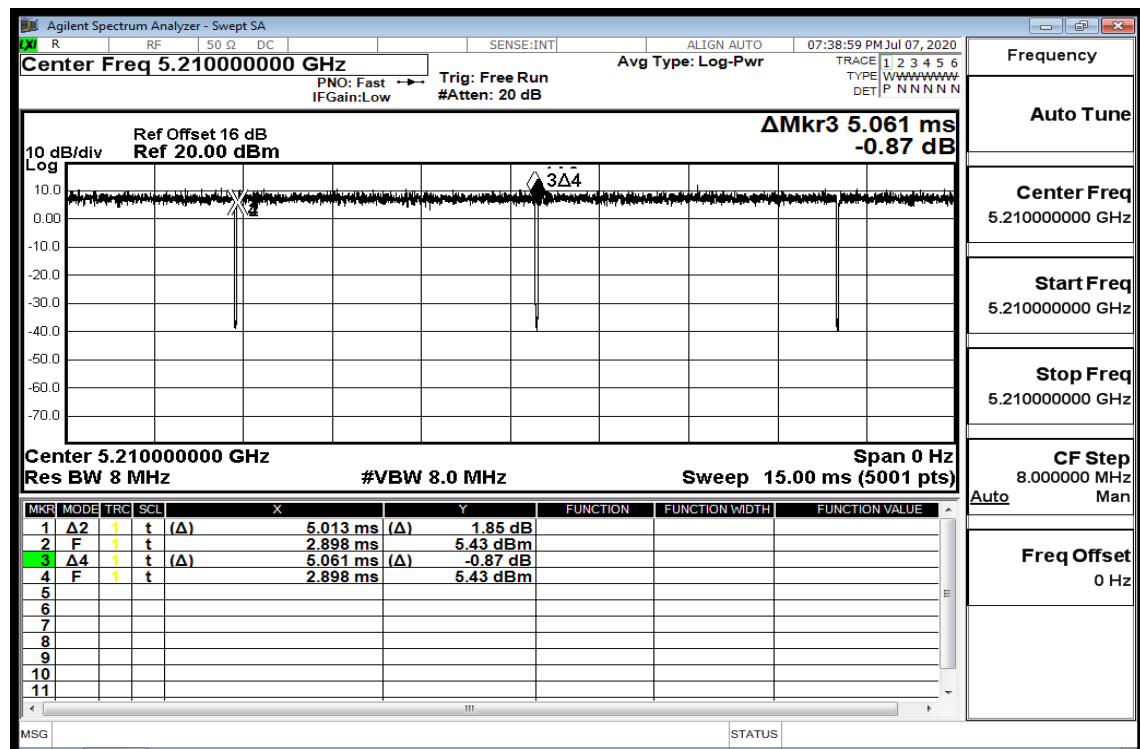
On the right side of the screen, there is a sidebar with several controls and readouts. The 'Frequency' section shows 'Auto Tune'. The 'Center Freq' section shows '5.180000000 GHz'. The 'Start Freq' section shows '5.180000000 GHz'. The 'Stop Freq' section shows '5.180000000 GHz'. The 'CF Step' section shows '8.000000 MHz'. The 'Freq Offset' section shows '0 Hz'.

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802.11ax HE40 mode



802.11ax HE80 mode

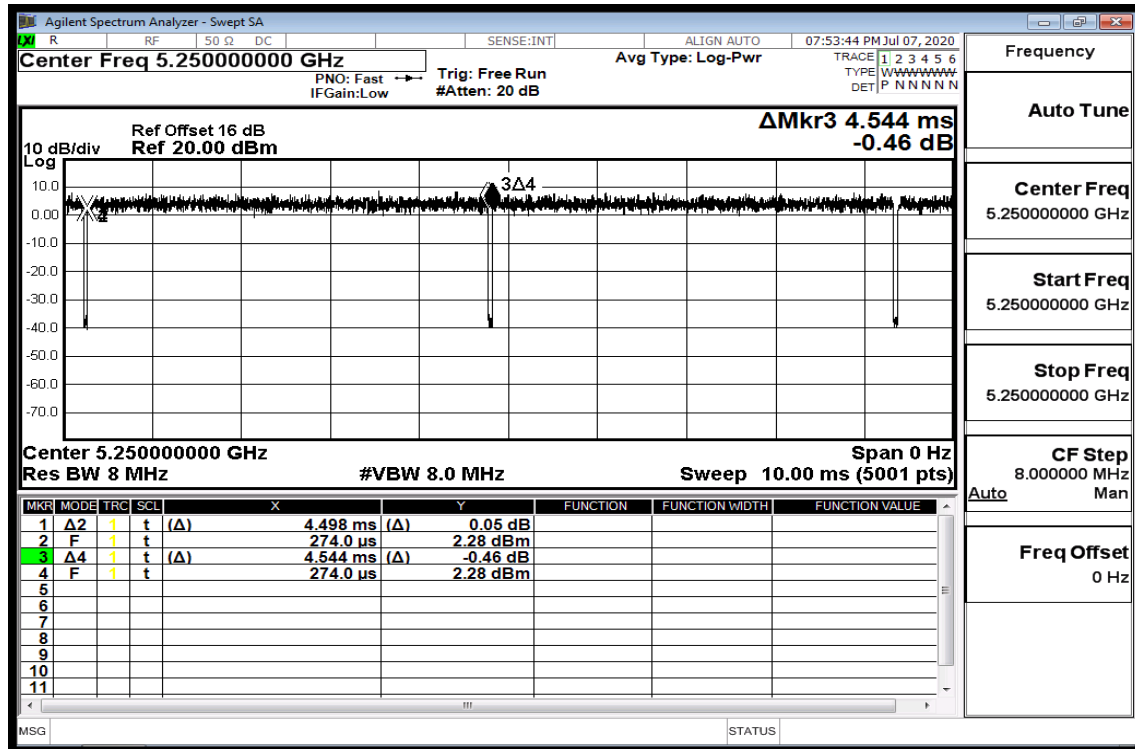


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802.11ax HE160 mode



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8 26DB & 6DB 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 = 30M/50MHz,
Detector=Peak,
Trace Mode = Max Hold
Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all frequency of interest measured was complete.

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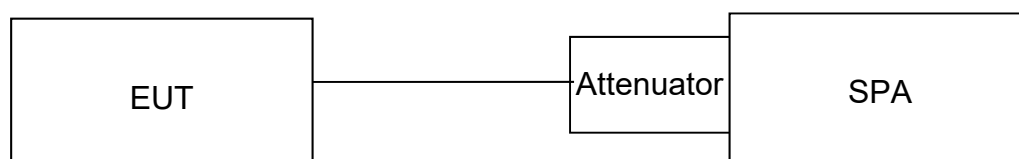
8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY53400256	11/21/2019	11/20/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	WATT-218FS-10	RF268	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF219	11/20/2019	11/19/2020
DC Power Supply	Agilent	E3640A	MY53130054	09/07/2020	09/06/2021
I Pex4 Cables	Woken	00100A1H646027	RF508	06/01/2020	05/31/2021

Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown blow indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY53400256	11/20/2020	11/19/2021
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071573	06/26/2020	06/25/2021
DC Block	PASTERNAK	PE8210	RF152	11/19/2020	11/18/2021
Attenuator	Marvelous	WATT-218FS-10	RF19	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF219	11/19/2020	11/18/2021

8.4 Test Set-up



8.5 Measurement Result

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8.5.1 FCC 26dB Bandwidth

Mode: Chain 0

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.7	13.560
5220	23.18	13.651
5240	22.7	13.560
5260	22.41	13.504
5300	22.84	13.587
5320	23.07	13.630
5500	23.08	13.632
5580	22.61	13.543
5700	22.45	13.512
5720	23.48	13.707

802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.76	13.572
5220	22.84	13.587
5240	23.63	13.735
5260	22.42	13.506
5300	22.74	13.568
5320	23.09	13.634
5500	23.45	13.701
5580	24.71	13.929
5700	22.15	13.454
5720	22.52	13.526

802.11ax_20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.13	13.450
5220	23.22	13.659
5240	21.98	13.420
5260	23.36	13.685
5300	21.67	13.359
5320	23.11	13.638
5500	22.37	13.497
5580	22.46	13.514
5700	21.79	13.383
5720	22.49	13.520

802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	42.32	16.265
5230	41.64	16.195
5270	41.22	16.151
5310	43.31	16.366
5510	41.66	16.197
5550	42.19	16.252
5670	42.28	16.261
5710	42.03	16.236

802.11ax_40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.95	16.123
5230	41.38	16.168
5270	41.67	16.198
5310	41.17	16.146
5510	41.47	16.177
5550	41.12	16.141
5670	40.71	16.097
5710	40.64	16.090

802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.74	19.071
5290	81.52	19.113
5530	81.1	19.090
5610	80.26	19.045
5690	82.73	19.177

802.11ax_80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.7	19.069
5290	80.85	19.077
5530	80.13	19.038
5610	80.78	19.073
5690	81.63	19.118

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802.11ac_VHT160_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	163.1	22.125
5570	162.1	22.098

802.11ax_160_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	163.1	22.125
5570	164.8	22.170

Note: detector (peak) and trace settings (max hold) for test plots.

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Mode: Chain 1

802.11a_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.04	13.625
5220	23.27	13.668
5240	22.89	13.596
5260	22.4	13.502
5300	22.87	13.593
5320	22.77	13.574
5500	22.56	13.533
5580	22.83	13.585
5700	22.69	13.558
5720	21.61	13.347

802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.72	13.751
5220	23.65	13.738
5240	22.28	13.479
5260	23.76	13.758
5300	23.22	13.659
5320	22.79	13.577
5500	22.28	13.479
5580	23.04	13.625
5700	23.07	13.630
5720	22.63	13.547

802.11ax_20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.79	13.577
5220	21.62	13.349
5240	22.37	13.497
5260	21.68	13.361
5300	21.69	13.363
5320	22.14	13.452
5500	21.68	13.361
5580	22.17	13.458
5700	21.51	13.326
5720	22.29	13.481

802.11n_HT40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.83	16.215
5230	41.5	16.180
5270	41.52	16.183
5310	41.72	16.203
5510	40.73	16.099
5550	42.98	16.333
5670	41.91	16.223
5710	41.9	16.222

802.11ax_40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.5	16.180
5230	42.25	16.258
5270	40.78	16.104
5310	41.25	16.154
5510	40.89	16.116
5550	41.87	16.219
5670	41.54	16.185
5710	40.84	16.111

802.11ac_VHT80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.47	19.110
5290	81.23	19.097
5530	81.17	19.094
5610	80.67	19.067
5690	81.48	19.111

802.11ax_80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.16	19.040
5290	80.42	19.054
5530	79.45	19.001
5610	79.86	19.023
5690	82.25	19.151

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802.11ac_VHT160_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	162.7	22.114
5570	163.6	22.138

802.11ax_160_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	163.2	22.127
5570	162.1	22.098

Note: detector (peak) and trace settings (max hold) for test plots.

Mode: MIMO

802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.3	13.674
5220	22.41	13.504
5240	23.21	13.657
5260	23.61	13.731
5300	23.05	13.627
5320	22.89	13.596
5500	23.22	13.659
5580	23.14	13.644
5700	23.15	13.646
5720	22.68	13.556

802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.5	13.522
5220	23.23	13.660
5240	22.4	13.502
5260	23.11	13.638
5300	22.97	13.612
5320	24.37	13.869
5500	23.09	13.634
5580	23.03	13.623
5700	22.75	13.570
5720	22.58	13.537

802.11ax_20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	24.55	13.901
5220	25.66	14.093
5240	22.7	13.560
5260	23.84	13.773
5300	25.03	13.985
5320	23.96	13.795
5500	24.55	13.901
5580	24.02	13.806
5700	24.44	13.881
5720	23.34	13.681

802.11ax_20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	24.62	13.913
5220	23.77	13.760
5240	25.21	14.016
5260	24.28	13.852
5300	25.58	14.079
5320	24.79	13.943
5500	24.36	13.867
5580	24.86	13.955
5700	24.62	13.913
5720	22.99	13.615

802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.9	16.222
5230	41.48	16.178
5270	41.24	16.153
5310	42.29	16.262
5510	42.86	16.321
5550	42.16	16.249
5670	41.72	16.203
5710	39.79	15.998

802.11n_HT40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	42.46	16.280
5230	40.67	16.093
5270	40.8	16.107
5310	41.71	16.202
5510	42.03	16.236
5550	41.66	16.197
5670	41.49	16.179
5710	39.88	16.008

802.11ax_40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	44.37	16.471
5230	43.48	16.383
5270	43.31	16.366
5310	43.71	16.406
5510	43.82	16.417
5550	43.53	16.388
5670	43.38	16.373
5710	43.76	16.411

802.11ax_40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	43.37	16.372
5230	43.24	16.359
5270	43.32	16.367
5310	43.35	16.370
5510	42.74	16.308
5550	43.68	16.403
5670	44.9	16.522
5710	42.97	16.332

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802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.29	19.100
5290	80.66	19.067
5530	82.16	19.147
5610	80.97	19.083
5690	82.08	19.142

802.11ac_VHT80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.42	19.107
5290	81.46	19.109
5530	81.36	19.104
5610	81.33	19.103
5690	80.96	19.083

802.11ax_80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	80.47	19.056
5290	81.21	19.096
5530	80.38	19.051
5610	80.44	19.055
5690	80.76	19.072

802.11ax_80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	82.13	19.145
5290	81.89	19.132
5530	80.07	19.035
5610	80.55	19.061
5690	81.96	19.136

802.11ac_VHT160_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	163.7	22.140
5570	164.6	22.164

802.11ac_VHT160_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	164.1	22.151
5570	162.8	22.117

802.11ax_160_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	164	22.148
5570	162.8	22.117

802.11ax_160_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5250	163.6	22.138
5570	162.6	22.111

Note: detector (peak) and trace settings (max hold) for test plots.

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8.5.2 6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

Mode: Chain 0

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.1	11.790
5785	12.29	10.896
5825	14.23	11.532

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.58	12.450
5785	10.94	10.390
5825	17.6	12.455

802.11ax_20_Ch0

Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.42	12.653
	26/0	2.042	3.101
5785	full	18.87	12.758
	26/0	2.072	3.164
5825	full	16.28	12.117
	26/0	2.067	3.153

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	32.91	15.173
5795	27.61	14.411

802.11ax_40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	34.92	15.431
5795	37.3	15.717

802.11ac_VHT80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	52.69	17.217

802.11ax_80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	68.95	18.385

Note: detector (peak) and trace settings (max hold) for test plots.

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Mode: Chain 1

802.11a_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	14.08	11.486
5785	15.15	11.804
5825	13.16	11.193

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	14.67	11.664
5785	16.67	12.219
5825	17.61	12.458

802.11ax_20_Ch1

Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	17.02	12.310
	26/0	2.05	3.118
5785	full	18.26	12.615
	26/0	2.042	3.101
5825	full	15.44	11.886
	26/0	1.985	2.978

802.11n_HT40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.36	15.606
5795	28.5	14.548

802.11ax_40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	34.85	15.422
5795	36.86	15.666

802.11ac_VHT80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	71.42	18.538

802.11ax_80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	70.18	18.462

Note: detector (peak) and trace settings (max hold) for test plots.

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Mode: MIMO

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.59	12.453
5785	17.58	12.450
5825	12.56	10.990

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.55	12.443
5785	16.36	12.138
5825	17.61	12.458

802.11ax_20_Ch0

Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.23	12.608
	26/0	2.042	3.101
5785	full	18.71	12.721
	26/0	2.027	3.069
5825	full	12.62	11.011
	26/0	2.086	3.193

802.11ax_20_Ch1

Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.6	12.695
	26/0	2.042	3.101
5785	full	17.16	12.345
	26/0	1.967	2.938
5825	full	15.67	11.951
	26/0	2.049	3.115

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.72	15.529
5795	29.88	14.754

802.11n_HT40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.08	15.451
5795	26.09	14.165

802.11ax_40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	26.46	14.226
5795	26.1	14.166

802.11ax_40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.15	15.459
5795	25.67	14.094

802.11ac_VHT80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	58.01	17.635

802.11ac_VHT80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	61.29	17.874

802.11ax_80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	57.91	17.628

802.11ax_80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	66.23	18.211

Note: detector (peak) and trace settings (max hold) for test plots.

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8.5.3 BW Verification for DFS Function

Mode: Chain 0

802.11a_Ch0			802.11n_HT20_Ch0			802.11ax_20_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.28	< 5250	5240	5248.86	< 5250	5240	5249.47	< 5250
5745	5736.76	> 5725	5745	5736.19	> 5725	5745	5735.59	> 5725

802.11n_HT40_Ch0			802.11ax_40_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.00	< 5250	5230	5248.72	< 5250
5755	5737.02	> 5725	5755	5736.25	> 5725

802.11ac_VHT80_Ch0			802.11ax_VHT80_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.50	< 5250	5210	5248.30	< 5250
5775	5737.52	> 5725	5775	5736.80	> 5725

Mode: Chain 1

802.11a_Ch1			802.11n_HT20_Ch1			802.11ax_20_Ch1		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.31	< 5250	5240	5248.85	< 5250	5240	5249.47	< 5250
5745	5736.78	> 5725	5745	5736.19	> 5725	5745	5735.57	> 5725

802.11n_HT40_Ch1			802.11ax_40_Ch1		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.01	< 5250	5230	5248.73	< 5250
5755	5737.01	> 5725	5755	5736.28	> 5725

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802.11ac_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.50	< 5250
5775	5737.47	> 5725

802.11ax_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.50	< 5250
5775	5736.77	> 5725

Mode: MIMO

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.84	< 5250
5745	5736.19	> 5725

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.87	< 5250
5745	5736.19	> 5725

802.11ax_20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.49	< 5250
5745	5735.53	> 5725

802.11ax_20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.49	< 5250
5745	5735.54	> 5725

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.01	< 5250
5755	5737.02	> 5725

802.11n_HT40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5247.98	< 5250
5755	5737.03	> 5725

802.11ax_40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.76	< 5250
5755	5736.28	> 5725

802.11ax_40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.74	< 5250
5755	5736.23	> 5725

802.11ac_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.60	< 5250
5775	5737.48	> 5725

802.11ac_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.70	< 5250
5775	5737.50	> 5725

802.11ax_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.70	< 5250
5775	5736.78	> 5725

802.11ax_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.60	< 5250
5775	5736.74	> 5725

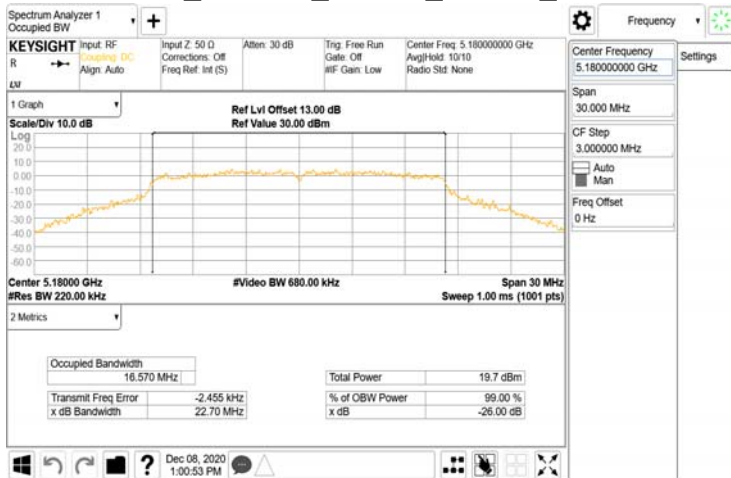
Please see next page for test plots.

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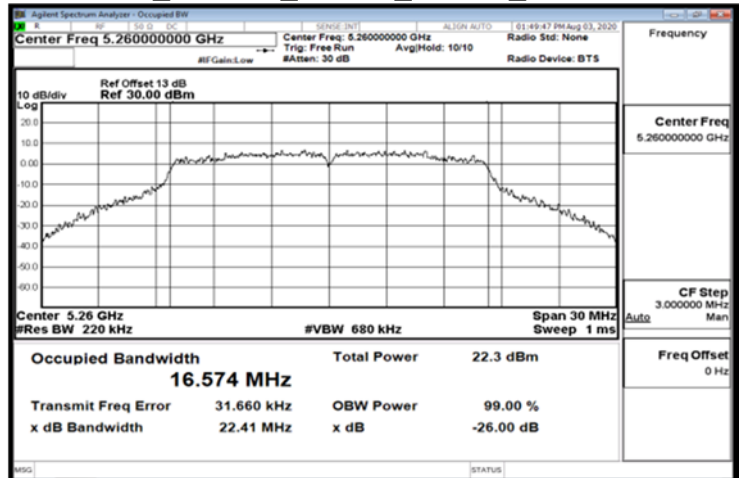
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Ch0 FCC_802.11a_20MHz_Chain0_5180MHz



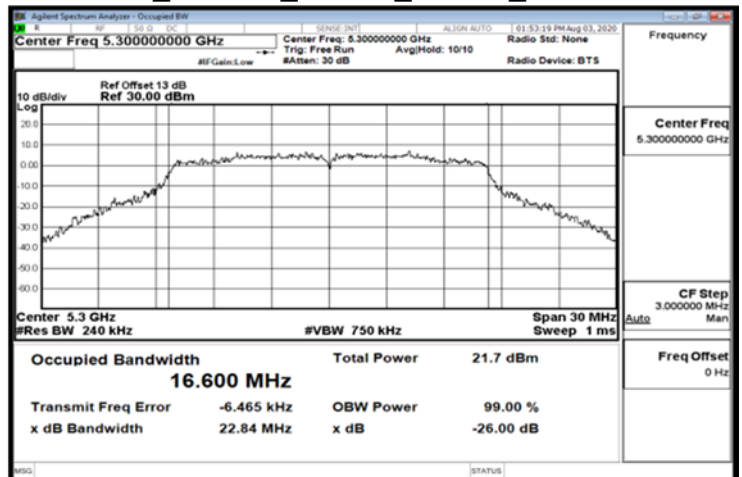
FCC_802.11a_20MHz_Chain0_5260MHz



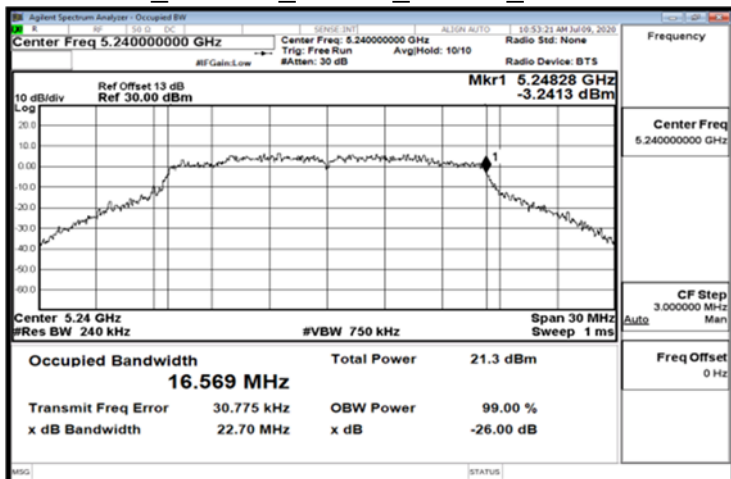
FCC_802.11a_20MHz_Chain0_5220MHz



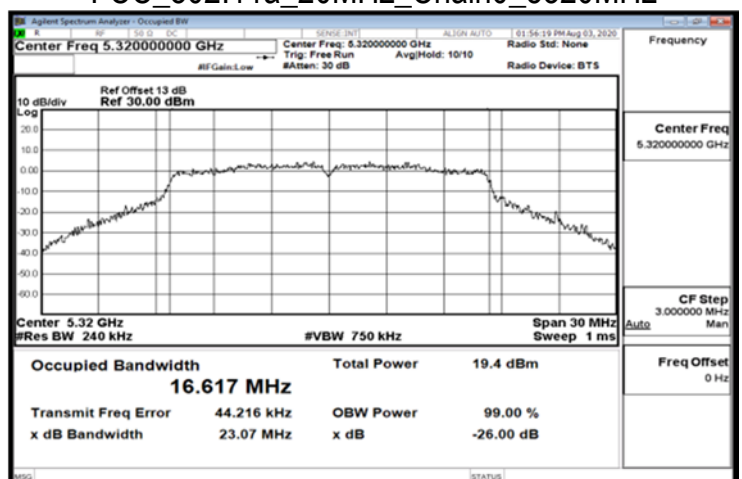
FCC_802.11a_20MHz_Chain0_5300MHz



FCC_802.11a_20MHz_Chain0_5240MHz



FCC_802.11a_20MHz_Chain0_5320MHz

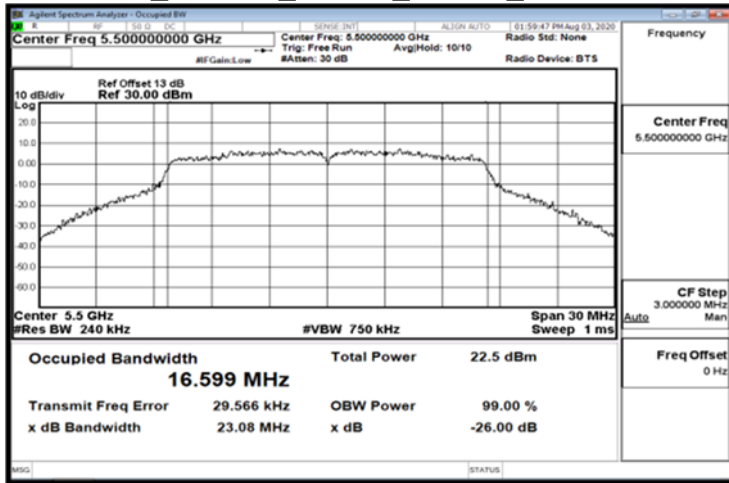


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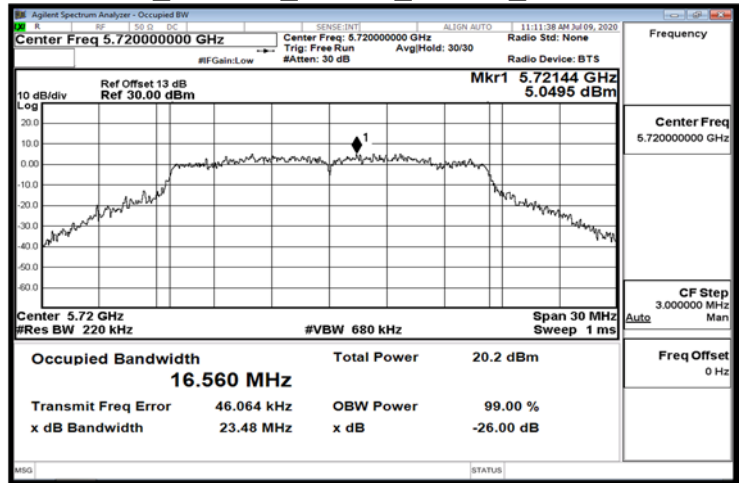
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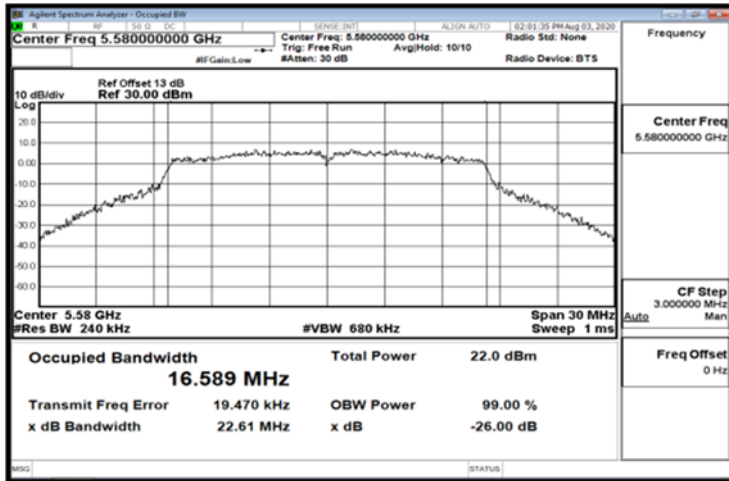
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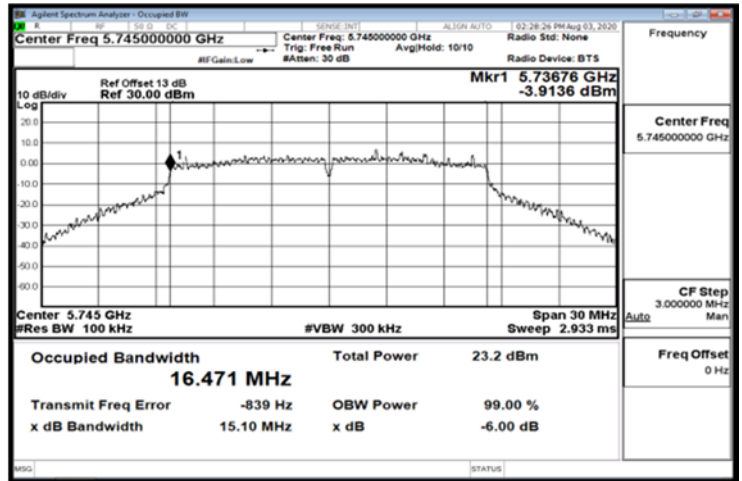
FCC_802.11a_20MHz_Chain0_5720MHz



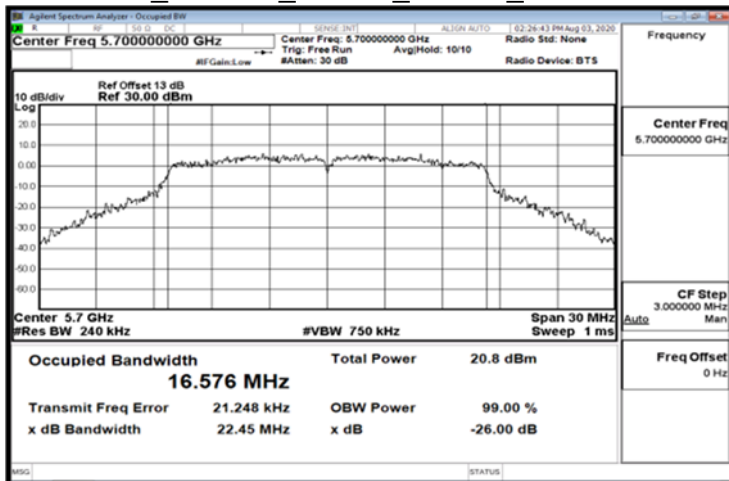
FCC_802.11a_20MHz_Chain0_5580MHz



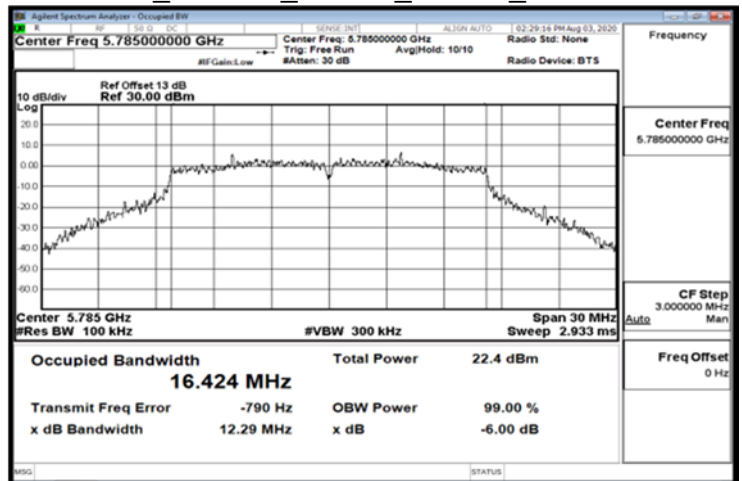
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FCC_802.11a_20MHz_Chain0_5700MHz



FCC_802.11a_20MHz_Chain0_5785MHz

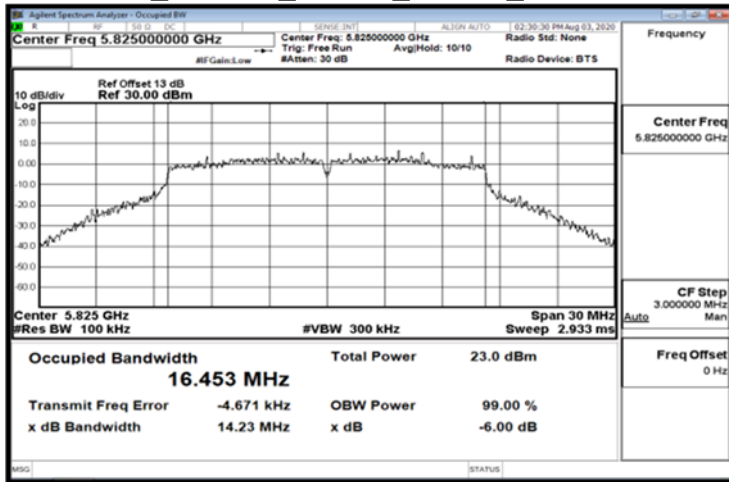


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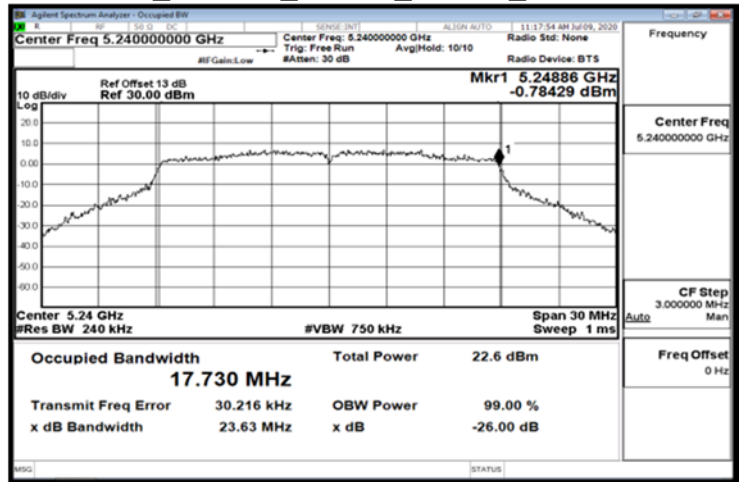
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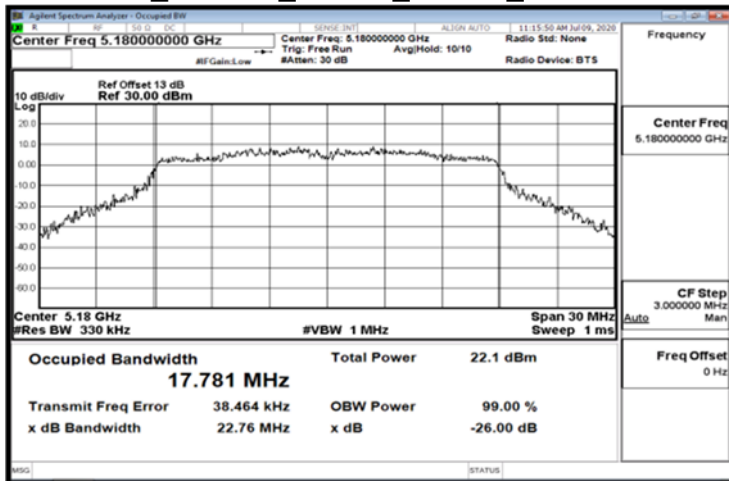
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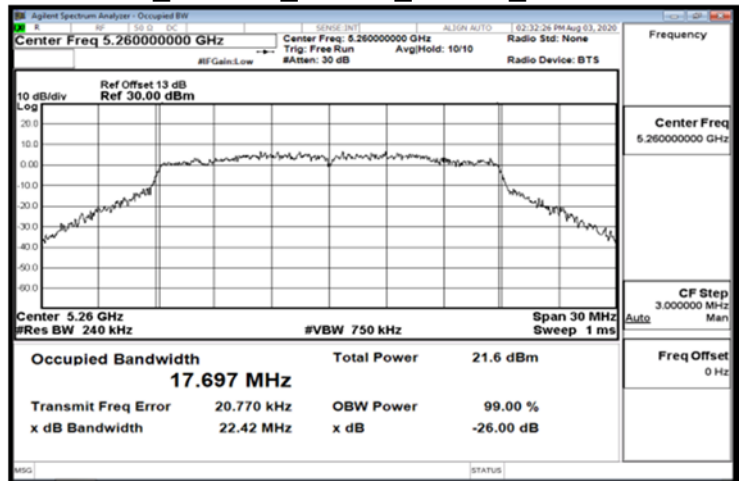
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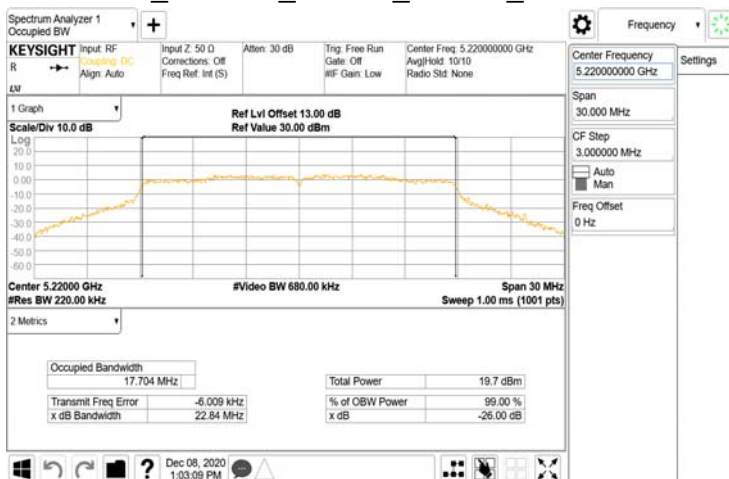
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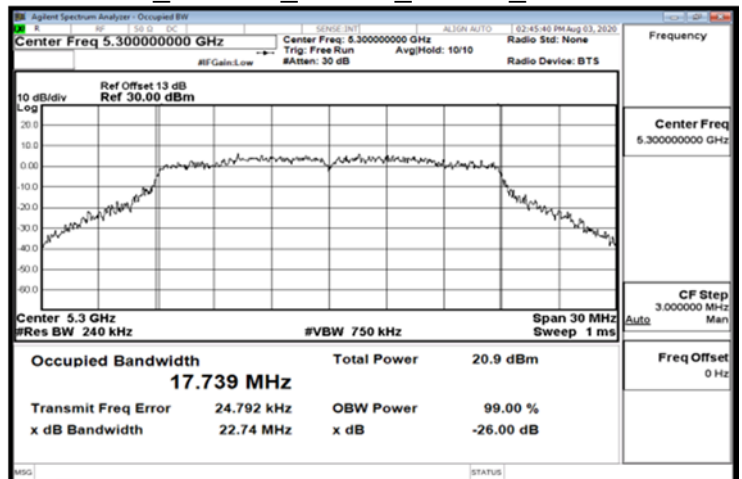
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FCC_802.11n_20MHz_Chain0_5220MHz



FCC_802.11n_20MHz_Chain0_5300MHz

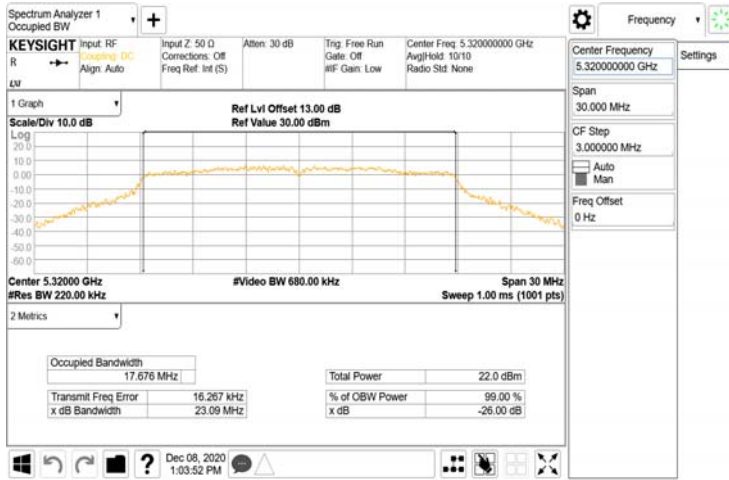


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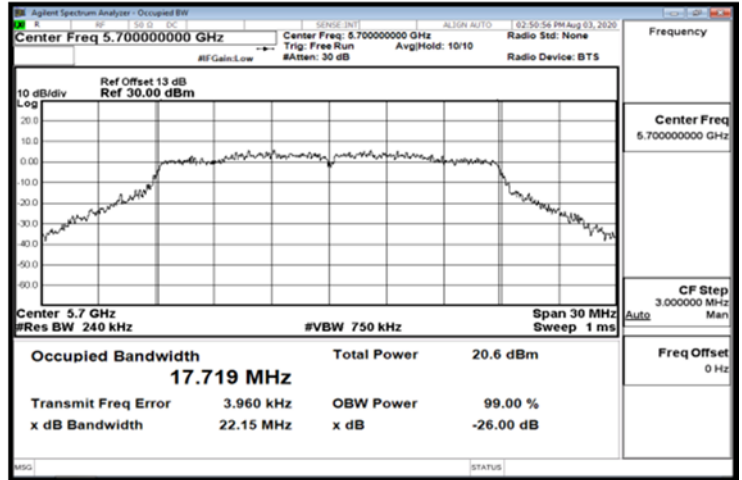
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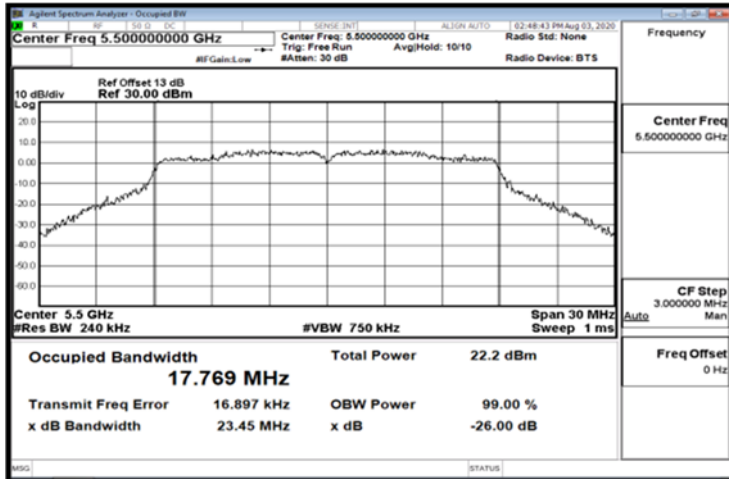
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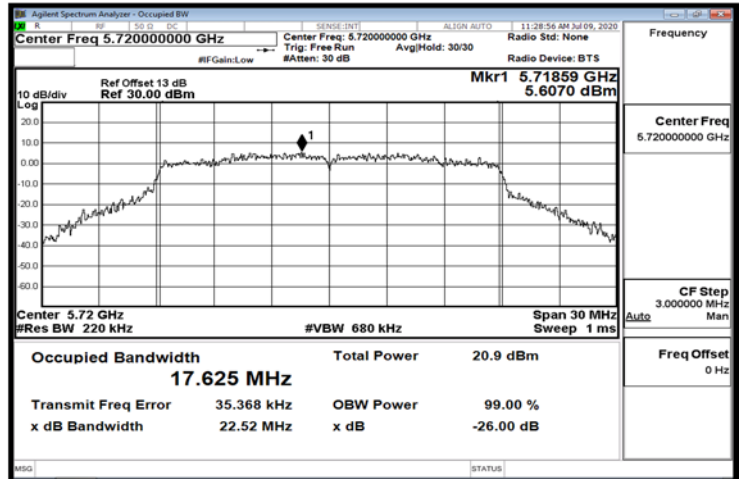
FCC_802.11n_20MHz_Chain0_5700MHz



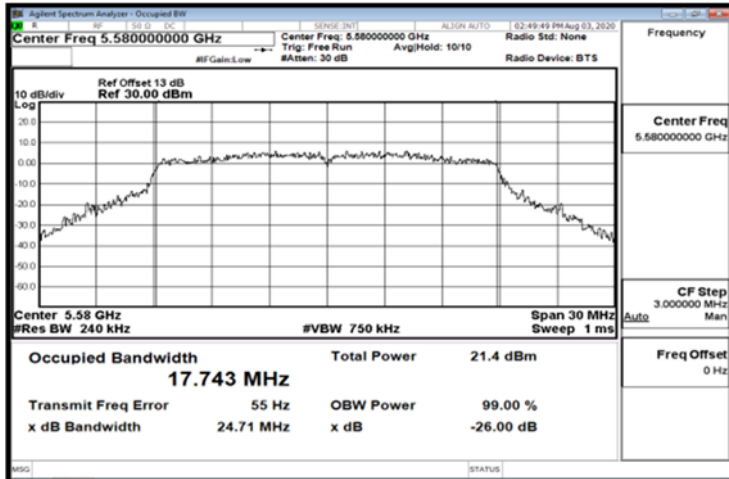
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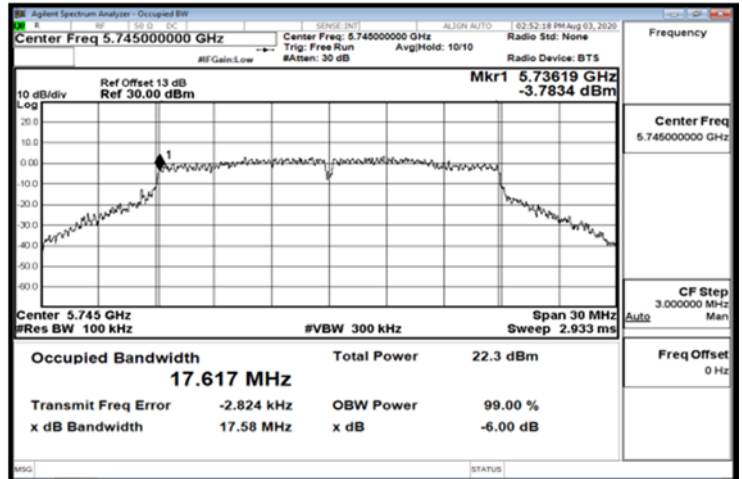
FCC_802.11n_20MHz_Chain0_5720MHz



FCC_802.11n_20MHz_Chain0_5580MHz



FCC_802.11n_20MHz_Chain0_5745MHz

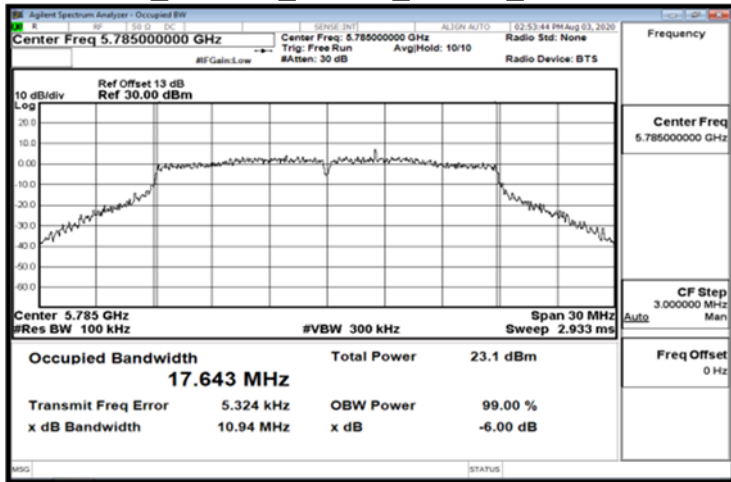


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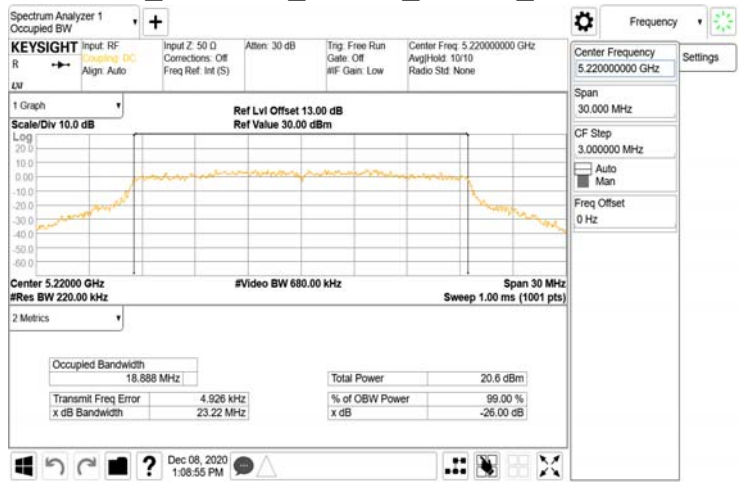
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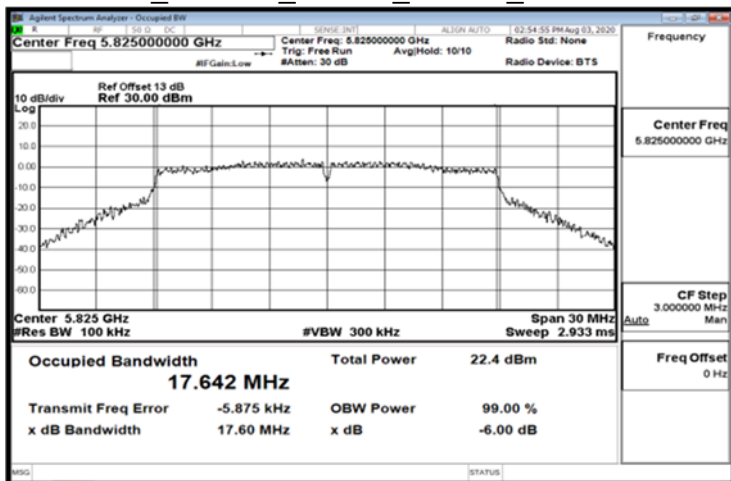
FCC_802.11n_20MHz_Chain0_5785MHz



FCC_802.11ax_20MHz_Chain0_5220MHz



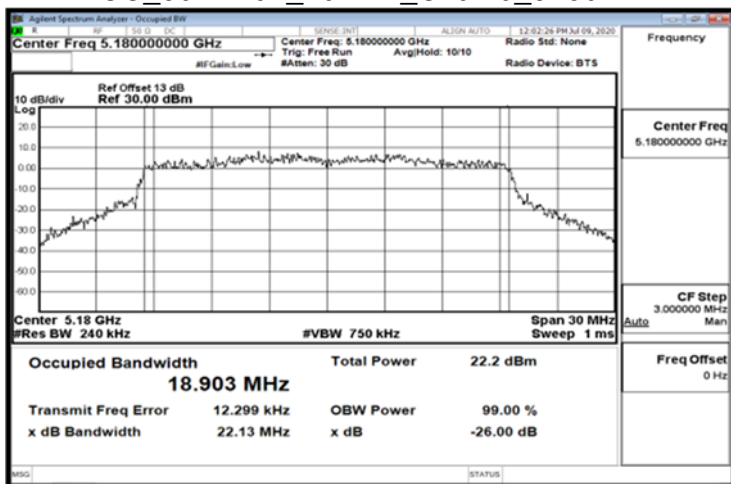
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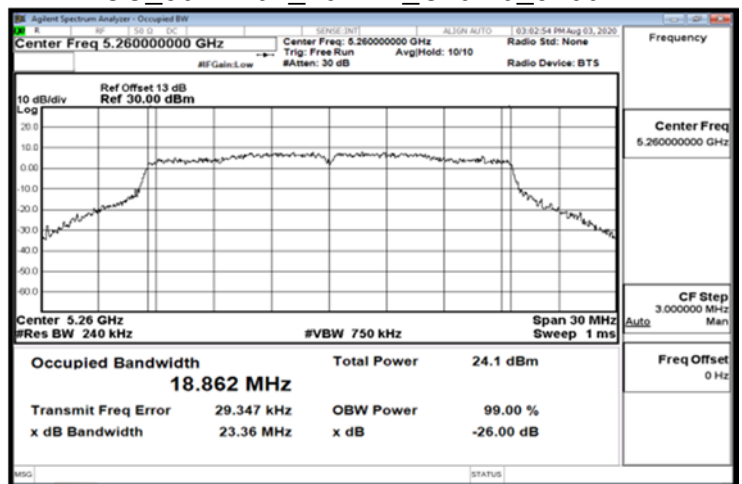
FCC_802.11ax_20MHz_Chain0_5240MHz



FCC_802.11ax_20MHz_Chain0_5180MHz



FCC_802.11ax_20MHz_Chain0_5260MHz



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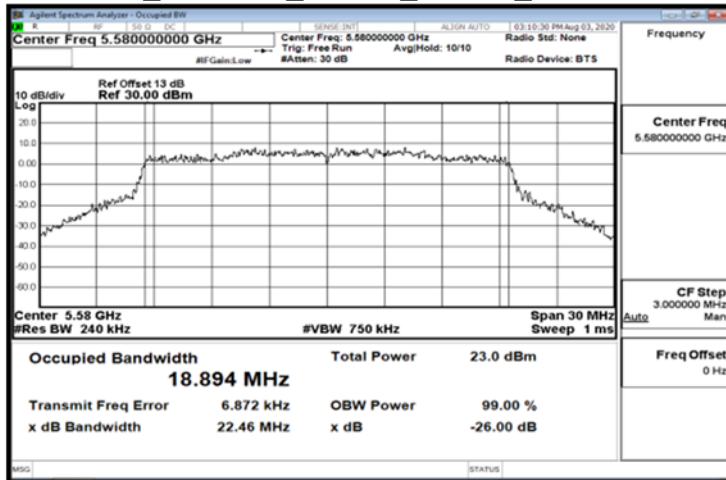
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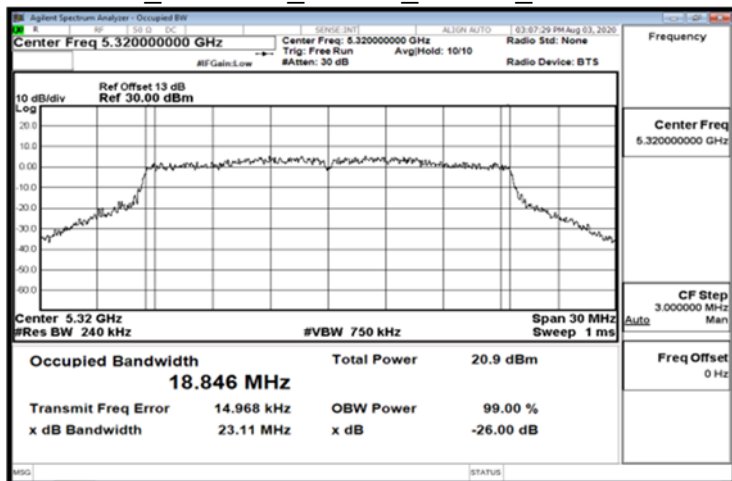
FCC_802.11ax_20MHz_Chain0_5300MHz



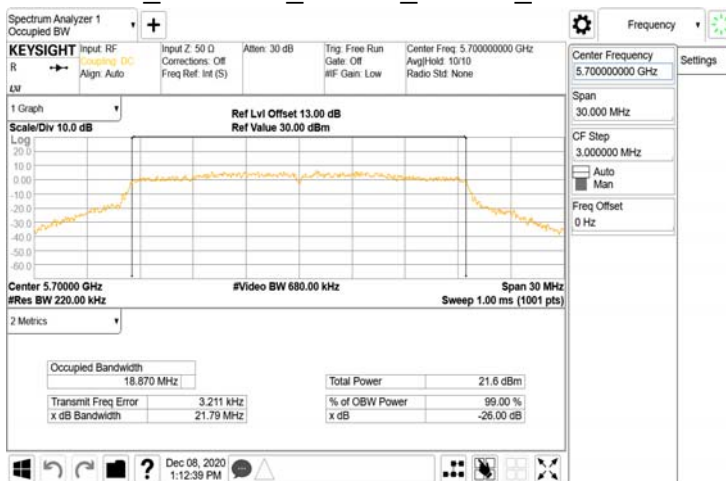
FCC_802.11ax_20MHz_Chain0_5580MHz



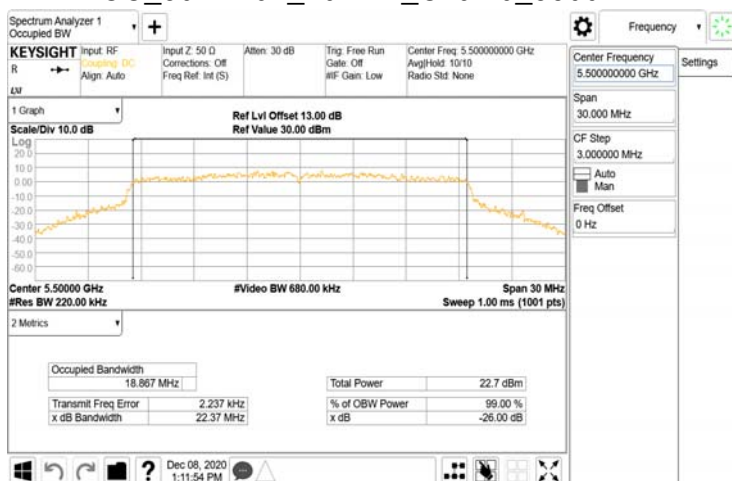
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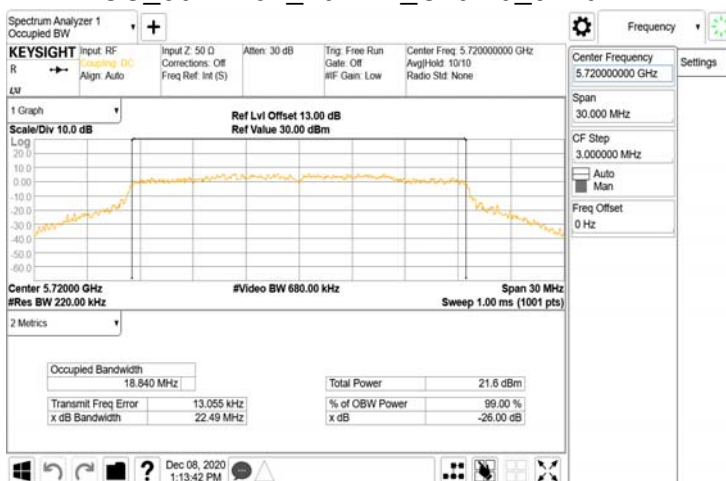
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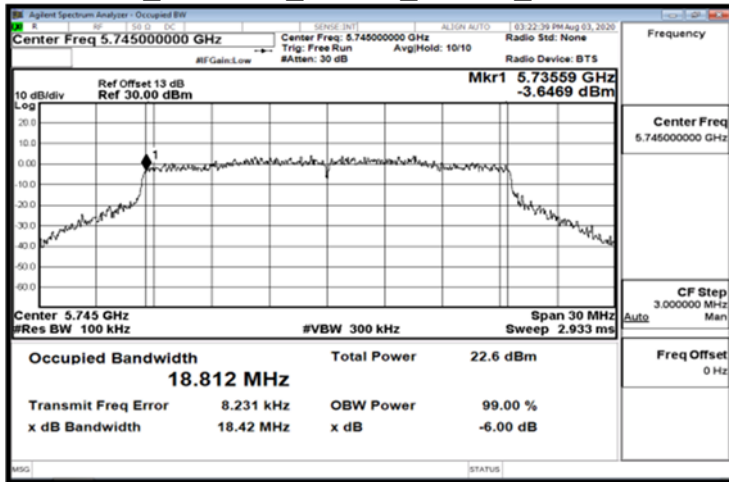


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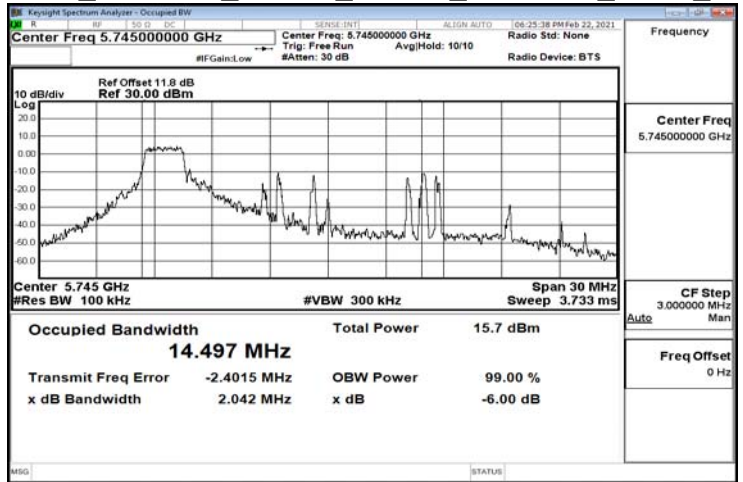
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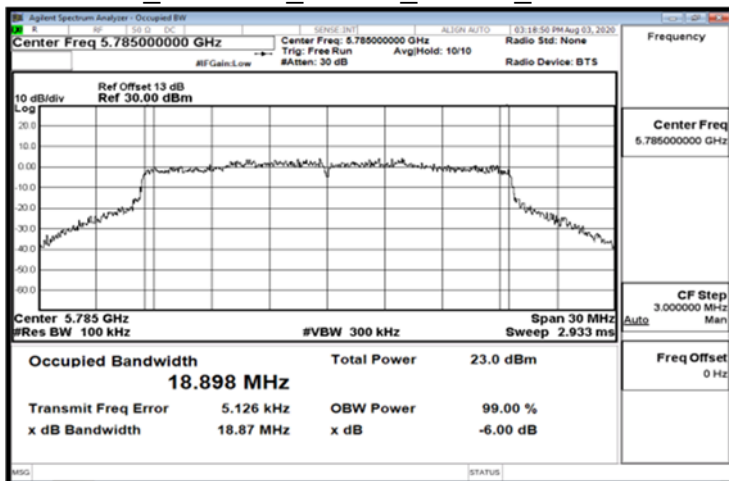
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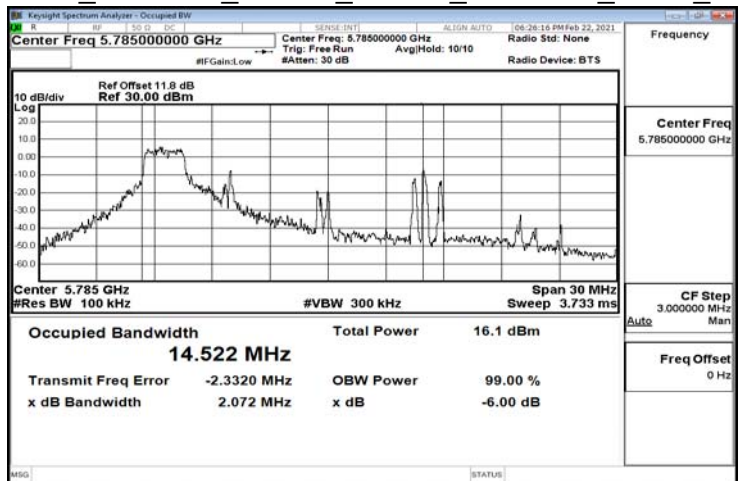
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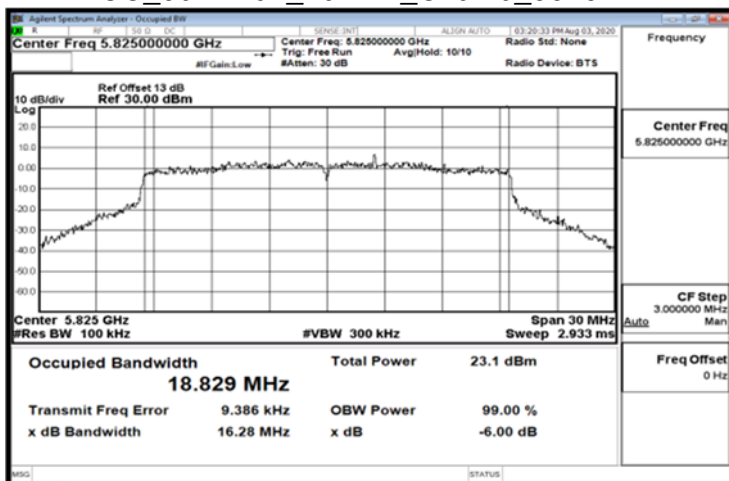
FCC_802.11ax_20MHz_Chain0_5785MHz



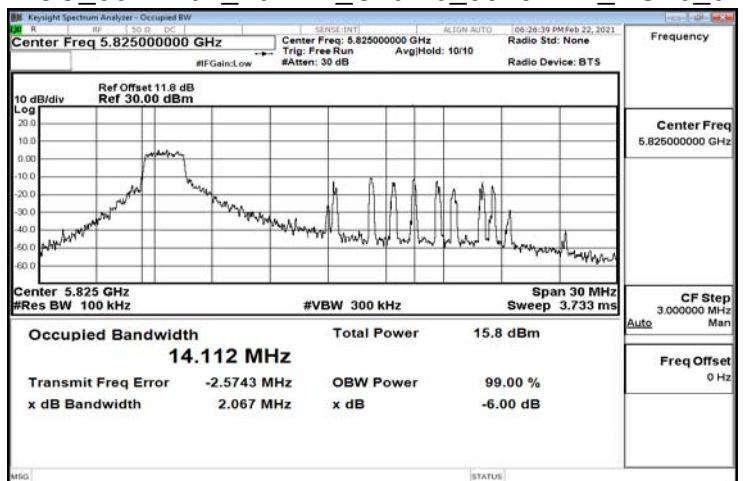
FCC_802.11ax_20MHz_Chain0_5785MHz_RU26_0



FCC_802.11ax_20MHz_Chain0_5825MHz



FCC_802.11ax_20MHz_Chain0_5825MHz_RU26_0

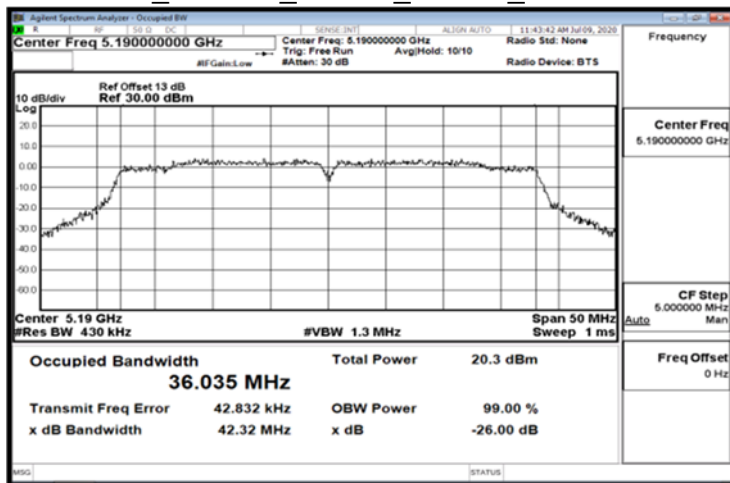


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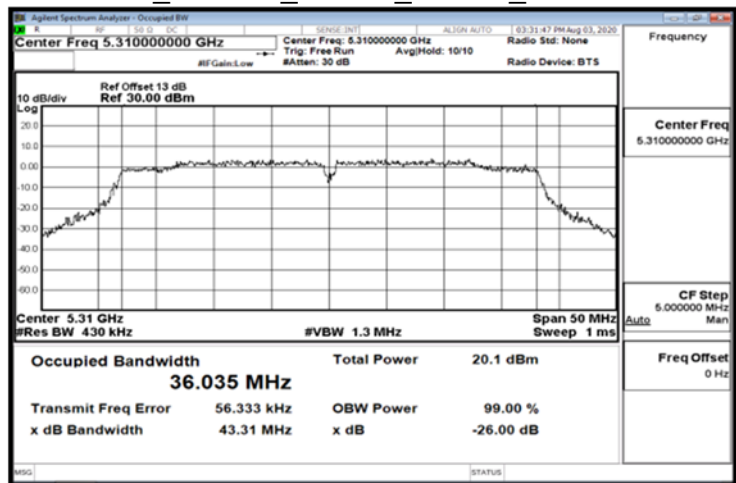
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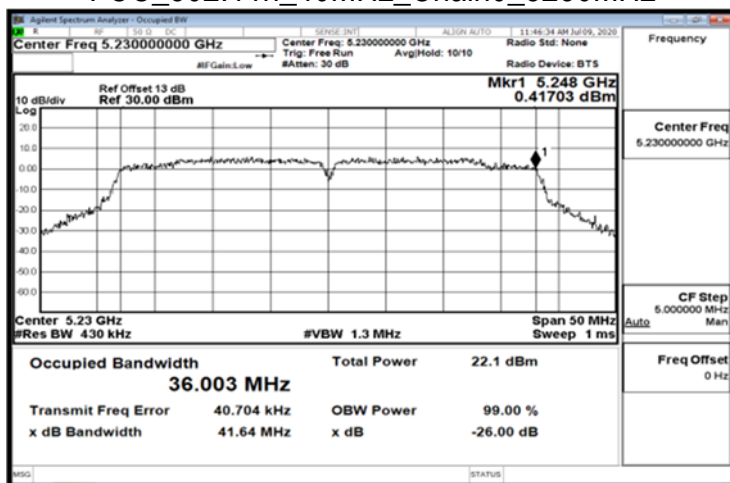
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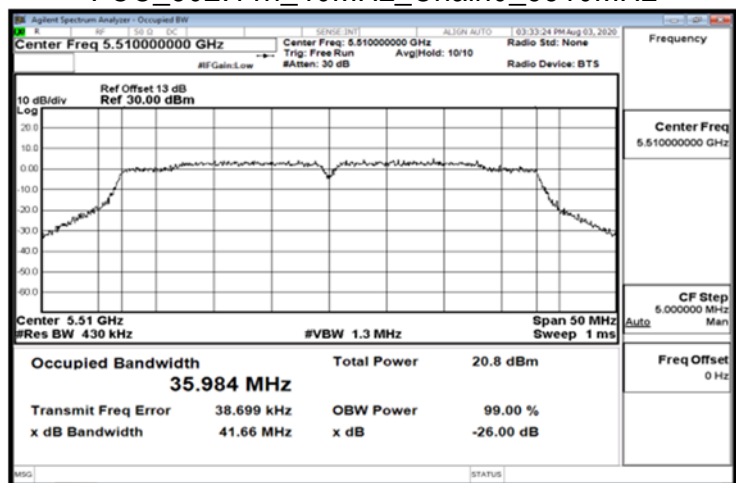
FCC_802.11n_40MHz_Chain0_5310MHz



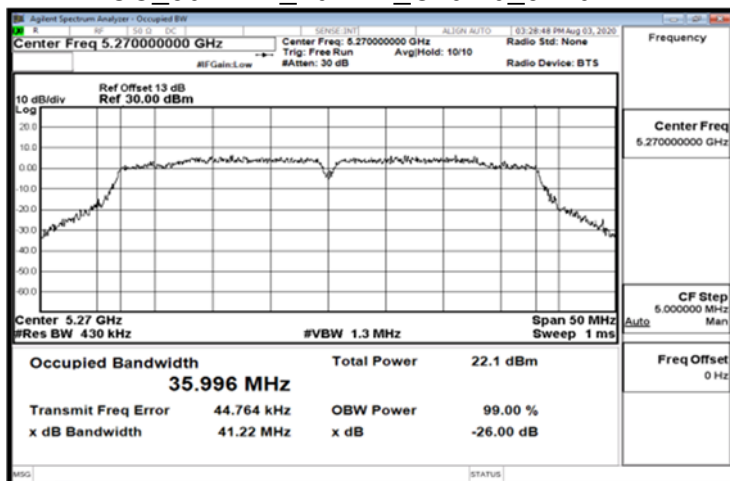
FCC_802.11n_40MHz_Chain0_5230MHz



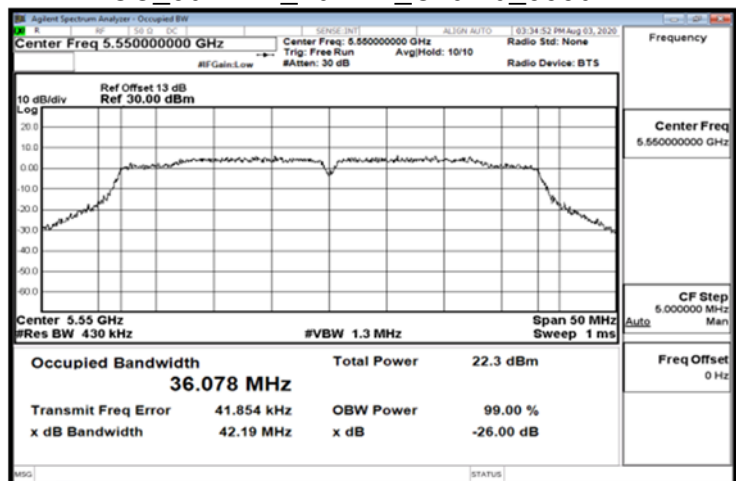
FCC_802.11n_40MHz_Chain0_5510MHz



FCC_802.11n_40MHz_Chain0_5270MHz



FCC_802.11n_40MHz_Chain0_5550MHz



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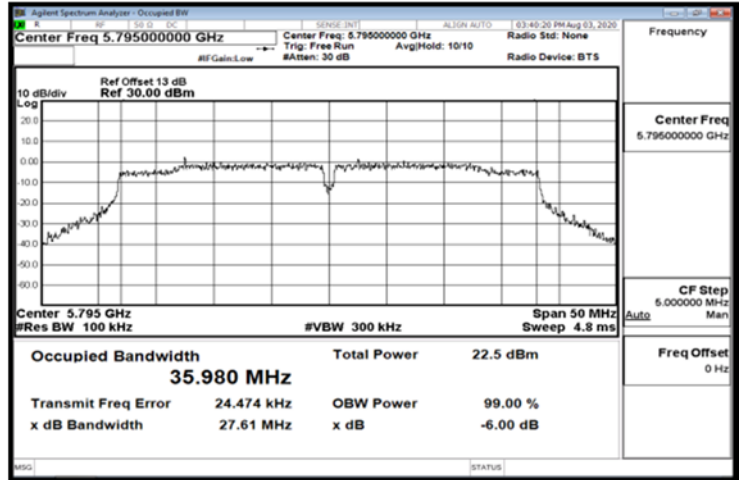
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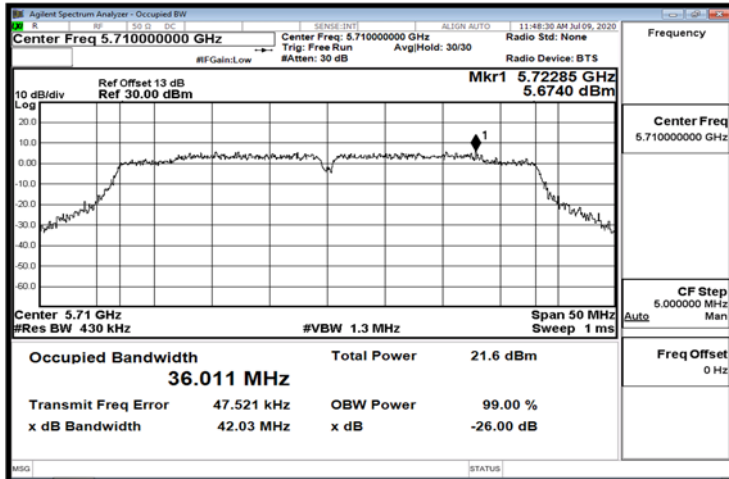
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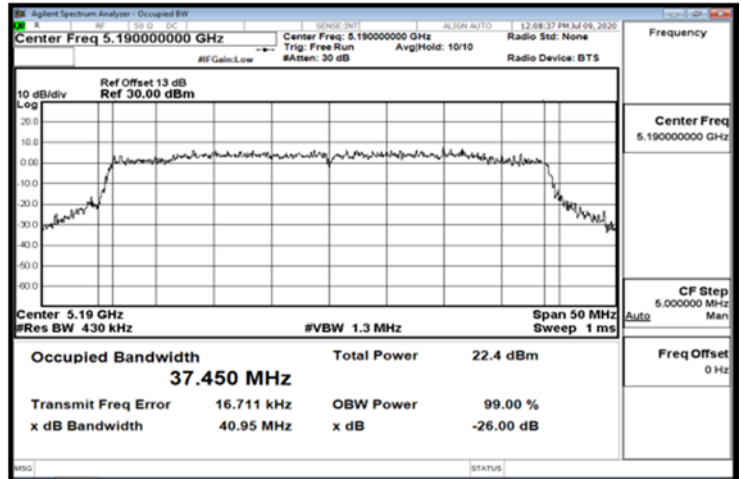
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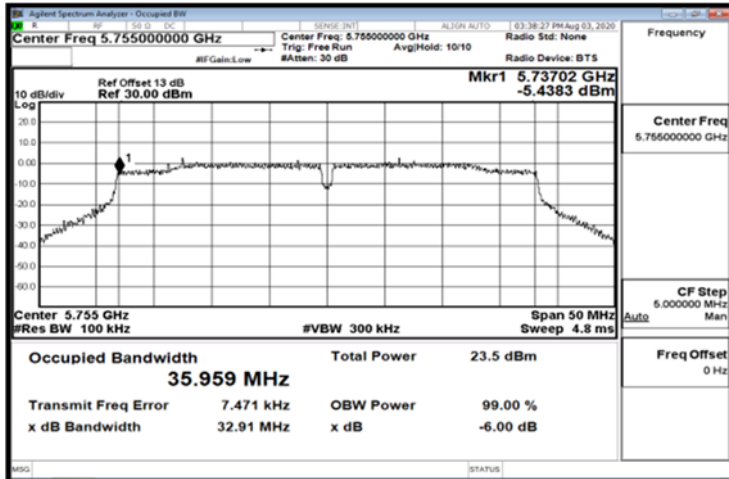
FCC_802.11n_40MHz_Chain0_5710MHz



FCC_802.11ax_40MHz_Chain0_5190MHz



FCC_802.11n_40MHz_Chain0_5755MHz



FCC_802.11ax_40MHz_Chain0_5230MHz

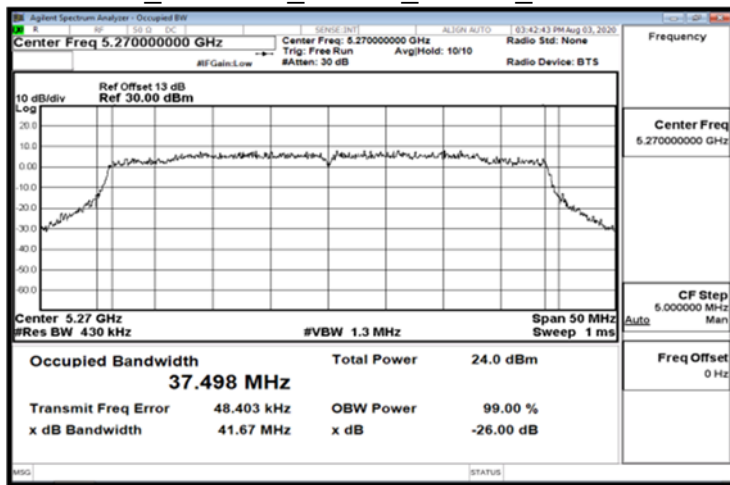


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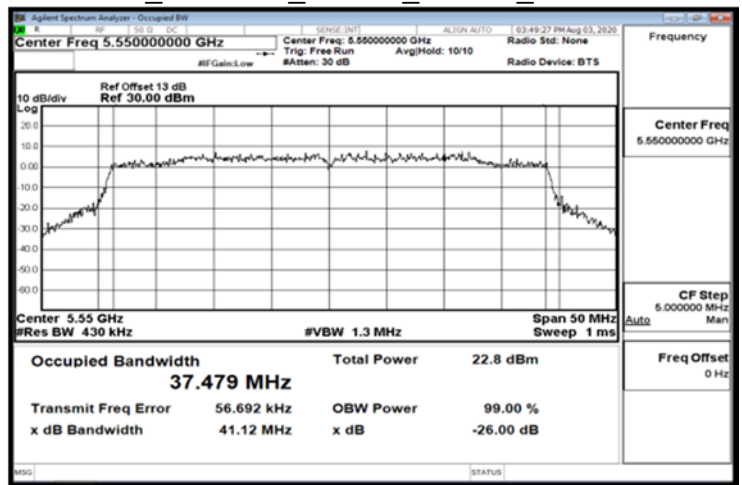
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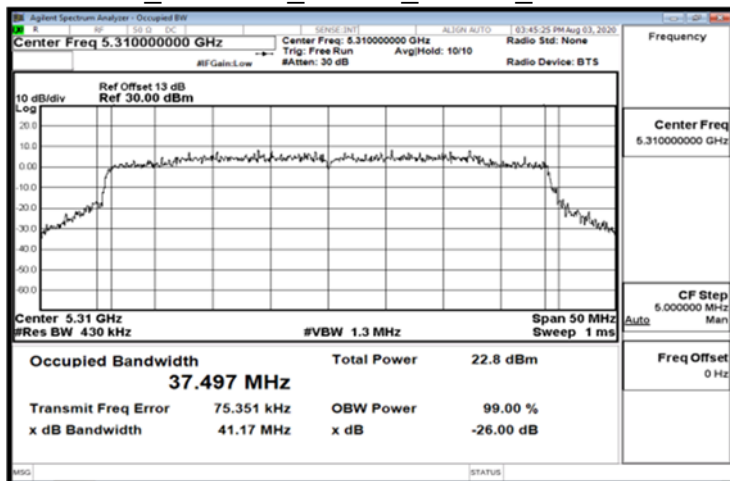
FCC_802.11ax_40MHz_Chain0_5270MHz



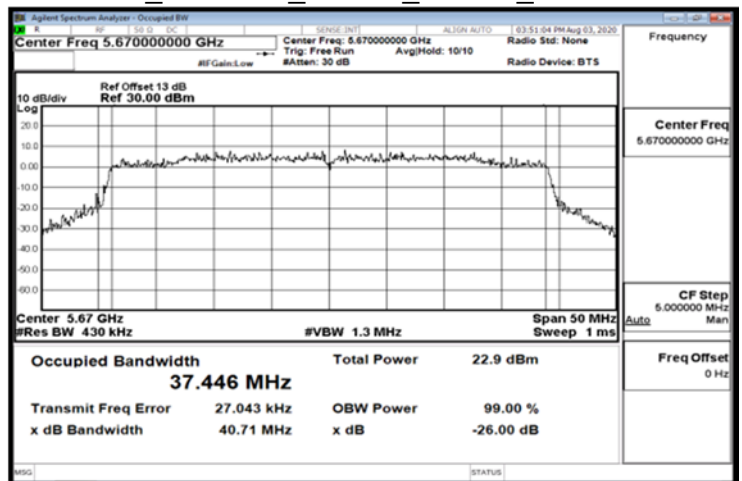
FCC_802.11ax_40MHz_Chain0_5550MHz



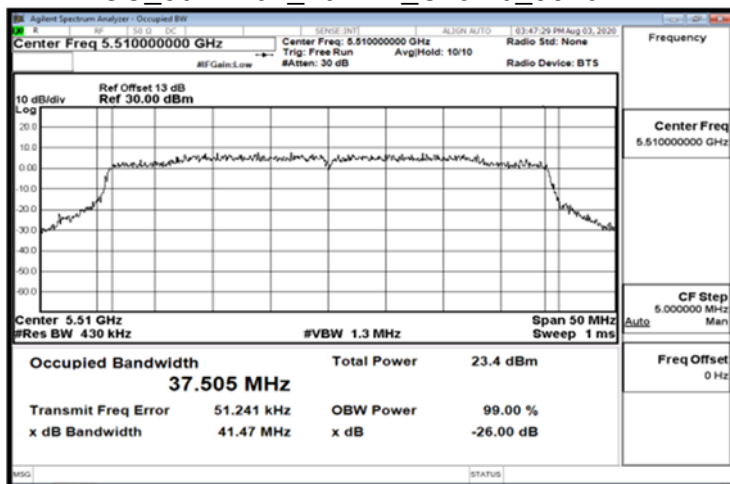
FCC_802.11ax_40MHz_Chain0_5310MHz



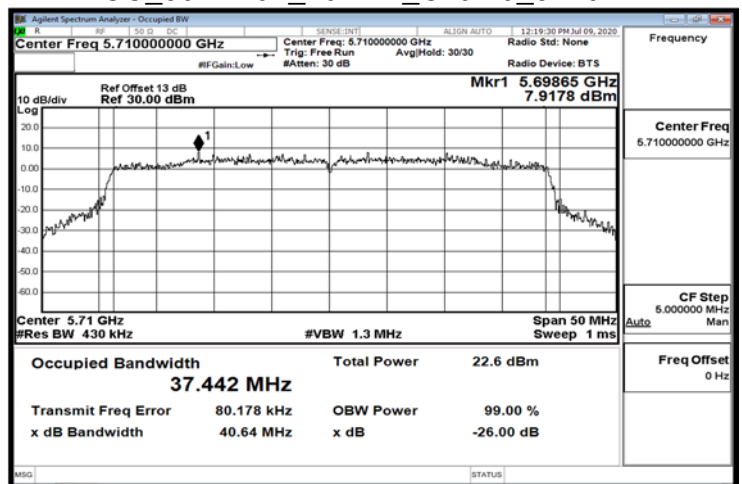
FCC_802.11ax_40MHz_Chain0_5670MHz



FCC_802.11ax_40MHz_Chain0_5510MHz



FCC_802.11ax_40MHz_Chain0_5710MHz



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