

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.: 1952, 1953

Model Difference: The difference between 1952 and 1953 models is the C-Cover.
1952 - Config 1 and 1953 - Config 2

Report Number: E2/2020/70003

FCC ID: C3K1952

FCC Rule Part: §15.407, Cat: U-NII

Issue Date: Feb. 24, 2021

Date of Test: Jul. 08, 2020 ~ Nov. 06, 2020, Nov. 30, 2020 ~ Dec. 10, 2020,
Jan. 04, 2021, Feb. 22, 2021

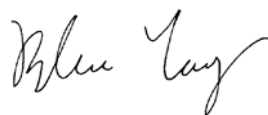
Date of EUT Received: Jul. 06, 2020

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
E2/2020/70003	Rev.00	Original.	Feb. 24, 2021	Revised By: Karen Huang

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.:	1952, 1953	
Model Difference:	The difference between 1952 and 1953 models is the C-Cover. 1952 - Config 1 and 1953 - 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 Lithium-Ion Polymer Battery or 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:	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 1 / Config 2	Chain 0 / Chain 1	Freq. (MHz)	Peak Antenna Gain (dBi)	Worst Antenna Gain
PIFA	Config 1	Chain 0	5150~5250	6.0	V
			5250~5350	6.1	V
			5470~5725	7.0	V
			5725~5850	7.0	V
		Chain 1	5150~5250	5.3	
			5250~5350	5.0	
			5470~5725	5.9	
			5725~5850	5.9	
	Config 2	Chain 0	5150~5250	5.9	
			5250~5350	5.9	
			5470~5725	6.1	
			5725~5850	6.5	
		Chain 1	5150~5250	3.0	
			5250~5350	3.0	
			5470~5725	3.5	
			5725~5850	4.1	

Note: Pre-scanned was done on the above 4 antennas, the Config 1 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	6.0	5.66
Chain 1		5.3	
Chain 0	5250~5350	6.1	5.58
Chain 1		5.0	
Chain 0	5470~5725	7.0	6.48
Chain 1		5.9	
Chain 0	5725~5850	7.0	6.48
Chain 1		5.9	

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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	18.74 (Chain 0)	OFDM
	5260~5320	4	18.48 (Chain 0)	
	5500~5720	12	18.91 (Chain 0)	
	5745~5825	5	18.98 (Chain 0)	
n_HT20M ac_VHT20M	5180~5240	4	HT: 19.35 (MIMO)	OFDM
	5260~5320	4	HT: 18.93 (MIMO)	
	5500~5720	12	HT: 18.96 (MIMO)	
	5745~5825	5	HT: 21.74 (MIMO)	
ax_HE20M	5180~5240	4	19.47(MIMO)	OFDMA
	5260~5320	4	19.61 (MIMO)	
	5500~5720	12	18.93 (Chain 0)	
	5745~5825	5	21.74 (MIMO)	
n_HT40M ac_VHT40M	5190~5230	2	HT: 20.10 (MIMO)	OFDM
	5270~5310	2	HT: 18.35 (Chain 0)	
	5510~5710	6	HT: 20.42 (MIMO)	
	5755~5795	2	HT: 21.73 (MIMO)	
ax_HE40M	5190~5230	2	20.16 (MIMO)	OFDMA
	5270~5310	2	20.64 (MIMO)	
	5510~5710	6	19.99 (MIMO)	
	5755~5795	2	21.74 (MIMO)	
ac_VHT80M	5210	1	17.82 (MIMO)	OFDM
	5290	1	17.33 (MIMO)	
	5530~5690	3	19.85 (MIMO)	
	5775	1	18.96 (MIMO)	
ax_HE80M	5210	1	15.95 (MIMO)	OFDMA
	5290	1	20.18 (MIMO)	
	5530~5690	3	18.43 (MIMO)	
	5775	1	18.89 (MIMO)	
ac_VHT160M	5250	1	13.87 (MIMO)	OFDM
	5570	1	13.41 (MIMO)	
ax_HE160M	5250	1	14.93 (MIMO)	OFDMA
	5570	1	13.41 (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 Conduction (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	21.21080.0.0-10722	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
§15.407(g)	Frequency Stability	N/A
§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

EUT	Serial Number	Note
Portable Computing Device	04529170235 (Config 2)	
Portable Computing Device	00658810245 (Config 1)	

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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
☒ 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
☒ 802.11 ax	☒ Ch0	☒ Ch1	☐ Ch2	☐ Ch3	☐ SISO	☒ 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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Note:

Models 1952 and 1953 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 1953 (FCC ID: C3K1952). Highest antenna gain across the two models in each band has been considered while doing the radiated emission measurements.

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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/Ch1
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116			
	5745~5825	149 to 165	157			
802.11n_HT20	5180~5240	36 to 48	44		HT8	MIMO
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	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			
	5500~5720	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			
	5510~5710	102 to 142	102,110,134,142			
	5755~5795	151 to 159	151,159			
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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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_ HE20	5180~5240	36 to 48	36	OFDMA	full , 26/0 52/37, 106/53	MCS0	Ch0/Ch1/ MIMO
			40,44,48		full		
	5260~5320	52 to 64	52,56,60		full		
			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		
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		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, 484/66		
802.11ax_ HE160	5250	50	50		full , 996/67 996/s67	MCS0	Ch0/Ch1/ MIMO
	5570	52 to 64	114		full , 996/67 996/s67		

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.

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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.

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
	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			
	5510~5710	102 to 142	102,110,134,142			
	5755~5795	151 to 159	151,159			
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		
			116		full		
	5500~5720	100 to 144	140		full, 26/8, 52/40 106/54		
			144		full		
	5745~5825	149 to 165	149		full, 26/0, 52/37 106/53		
			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, 484/66		
802.11ax_ HE160	5250	50	50		full , 996/67 966/s67	MCS0	Ch0/Ch1/ MIMO
	5570	114	114		full , 996/67 966/s67		

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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

6.3 EUT Setup

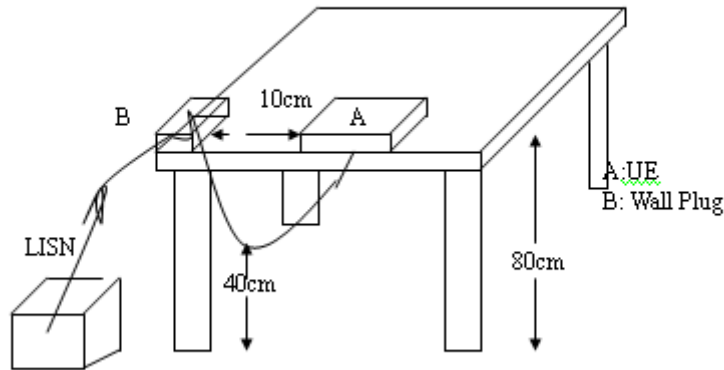
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz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

Adapter 1

Report Number :E2/2020/70003

Test Site :Conduction Room C

Test Mode :WLAN 5G

Test Date :2020-09-02

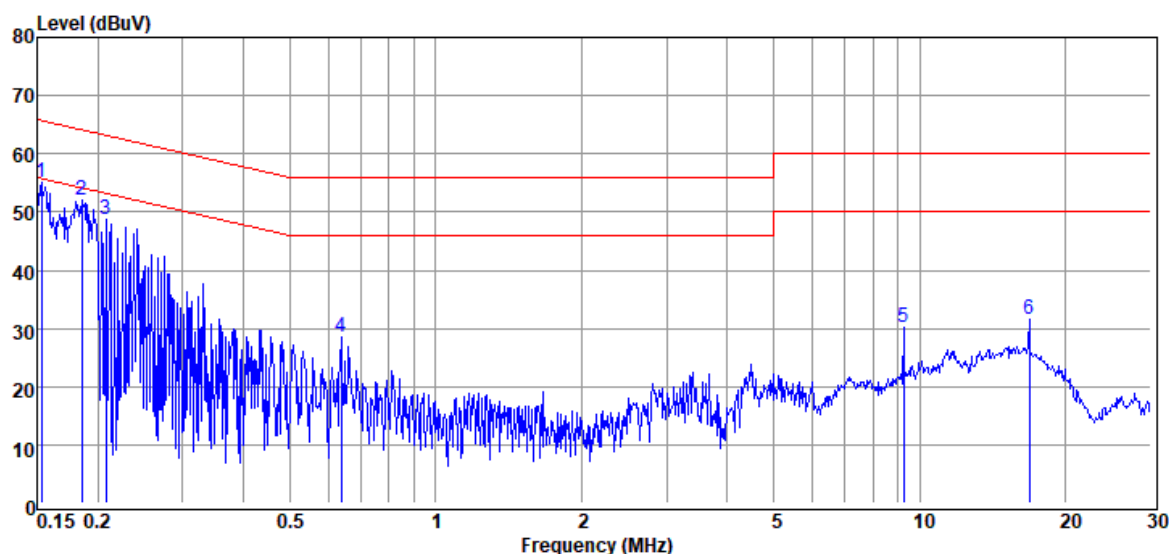
Power :120V/60Hz

Temp./Humi. :23.7/64

Probe :L1

Engineer :Ashton

Note: :EUT_ Config 1



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	44.91	10.22	55.13	65.82	-10.69
0.19	Peak	41.83	10.22	52.05	64.24	-12.19
0.21	Peak	38.46	10.22	48.68	63.27	-14.59
0.64	Peak	18.10	10.29	28.39	56.00	-27.61
9.25	Peak	19.59	10.68	30.27	60.00	-29.73
16.84	Peak	20.66	10.81	31.47	60.00	-28.53

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Report Number :E2/2020/70003

Test Site :Conduction Room C

Test Mode :WLAN 5G

Test Date :2020-09-02

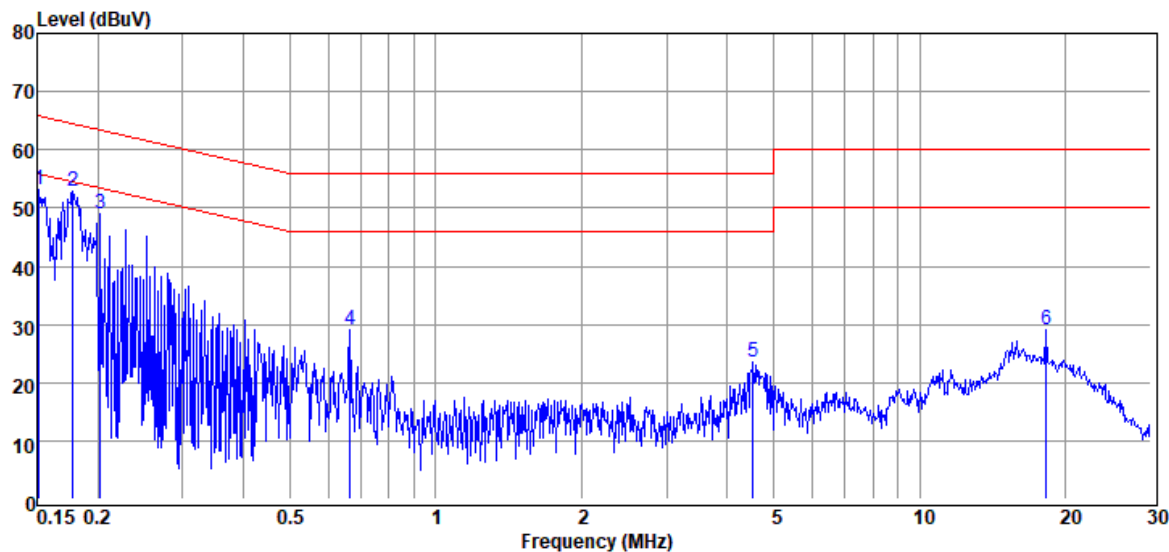
Power :120V/60Hz

Temp./Humi. :23.7/64

Probe :N

Engineer :Ashton

Note: :EUT_ Config 1



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	42.93	10.21	53.14	65.91	-12.77
0.18	Peak	42.54	10.21	52.75	64.59	-11.84
0.20	Peak	38.75	10.21	48.96	63.49	-14.53
0.66	Peak	18.67	10.31	28.98	56.00	-27.02
4.53	Peak	13.10	10.51	23.61	56.00	-32.39
18.23	Peak	18.17	10.84	29.01	60.00	-30.99

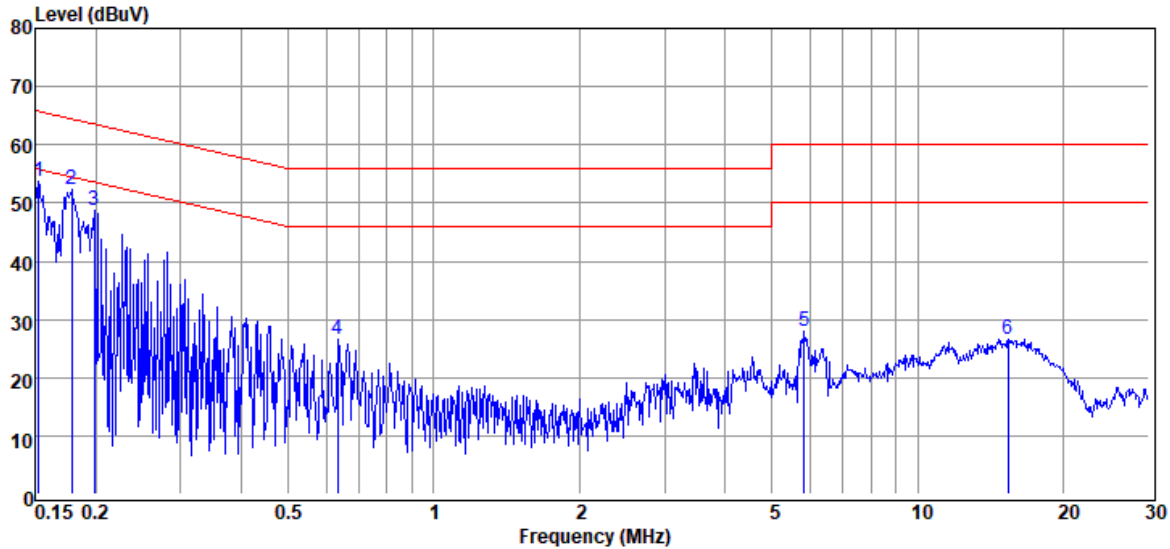
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Report Number	:E2/2020/70003	Test Site	:Conduction Room C
Test Mode	:WLAN 5G	Test Date	:2020-09-02
Power	:120V/60Hz	Temp./Humi.	:24.1/63
Probe	:L1	Engineer	:Ashton

Note: :EUT_ Config 2



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	43.38	10.22	53.60	65.87	-12.27
0.18	Peak	42.08	10.22	52.30	64.55	-12.25
0.20	Peak	38.46	10.22	48.68	63.67	-14.99
0.63	Peak	16.32	10.29	26.61	56.00	-29.39
5.84	Peak	17.36	10.55	27.91	60.00	-32.09
15.39	Peak	15.70	10.79	26.49	60.00	-33.51

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Report Number :E2/2020/70003

Test Mode :WLAN 5G

Power :120V/60Hz

Probe :N

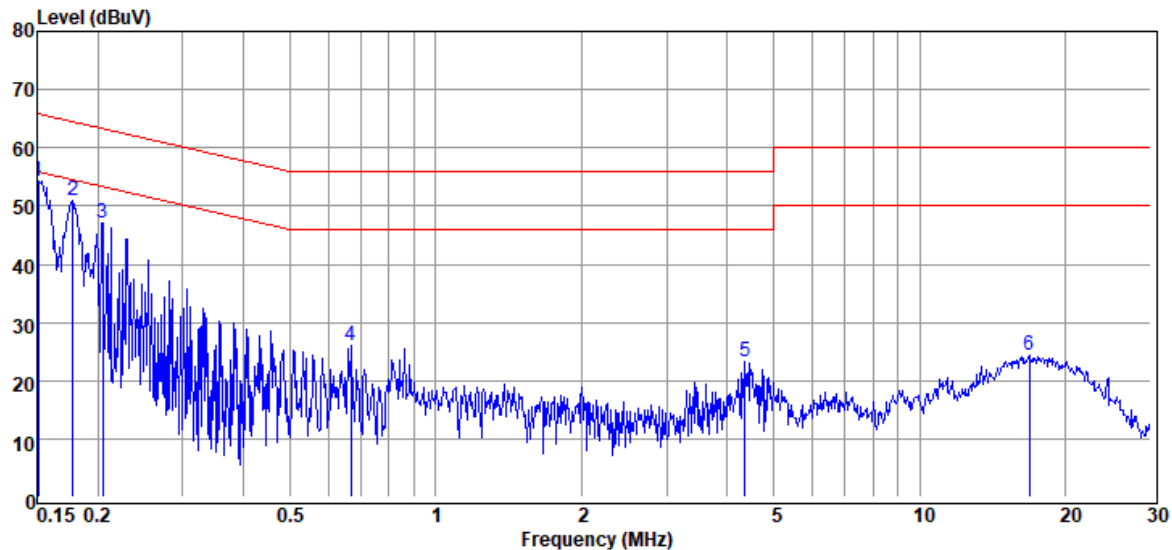
Test Site :Conduction Room C

Test Date :2020-09-02

Temp./Humi. :24.1/63

Engineer :Ashton

Note: :EUT_ Config 2



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	44.13	10.21	54.34	65.96	-11.62
0.18	Peak	40.80	10.21	51.01	64.59	-13.58
0.21	Peak	36.92	10.21	47.13	63.40	-16.27
0.67	Peak	15.75	10.31	26.06	56.00	-29.94
4.36	Peak	12.80	10.50	23.30	56.00	-32.70
16.84	Peak	13.41	10.82	24.23	60.00	-35.77

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Adapter 2

Report Number :E2/2020/70003

Test Site :Conduction Room C

Test Mode :WLAN 5G

Test Date :2020-08-14

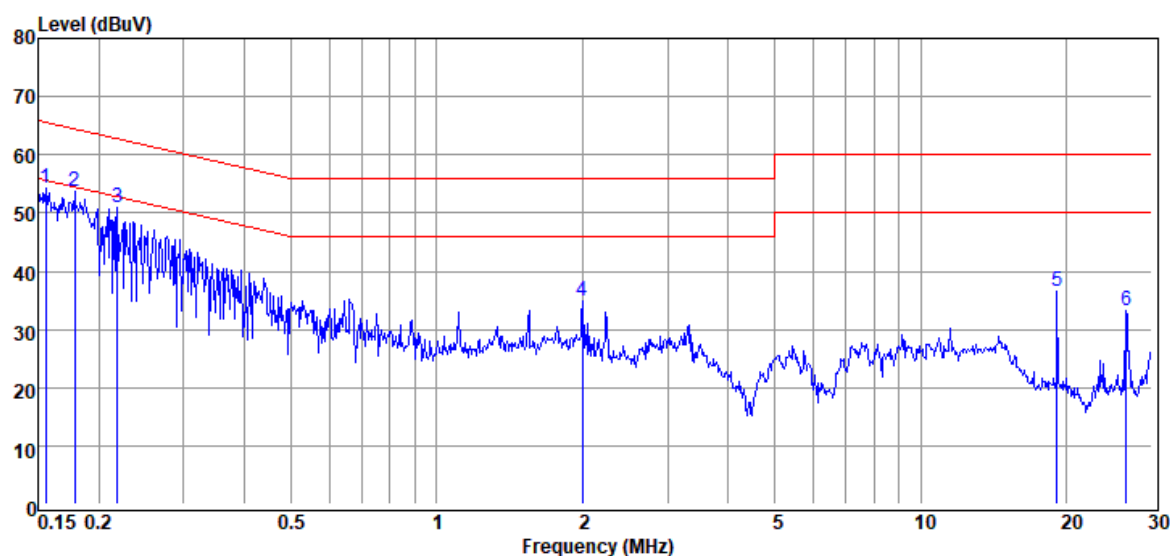
Power :120V/60Hz

Temp./Humi. :24.1/61

Probe :L1

Engineer :Ashton

Note: :EUT_ Config 1



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.16	Peak	44.05	10.22	54.27	65.69	-11.42
0.18	Peak	43.37	10.22	53.59	64.55	-10.96
0.22	Peak	40.65	10.22	50.87	62.88	-12.01
2.00	Peak	24.30	10.45	34.75	56.00	-21.25
19.12	Peak	25.79	10.84	36.63	60.00	-23.37
26.56	Peak	22.26	11.01	33.27	60.00	-26.73

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Report Number :E2/2020/70003

Test Site :Conduction Room C

Test Mode :WLAN 5G

Test Date :2020-08-14

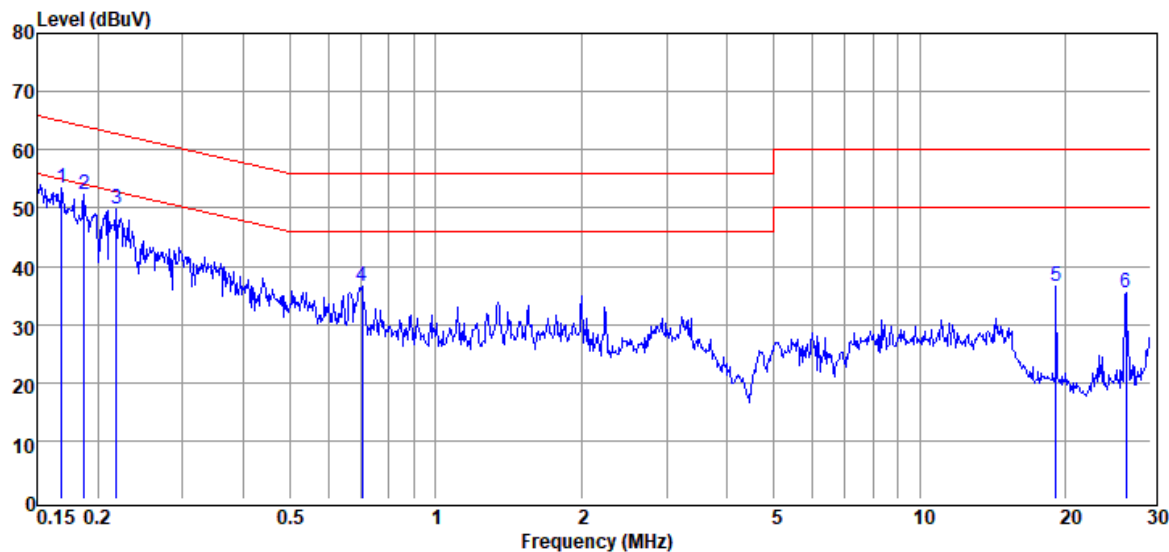
Power :120V/60Hz

Temp./Humi. :24.1/61

Probe :N

Engineer :Ashton

Note: :EUT_ Config 1



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.17	Peak	43.25	10.21	53.46	65.03	-11.57
0.19	Peak	42.00	10.21	52.21	64.15	-11.94
0.22	Peak	39.66	10.21	49.87	62.88	-13.01
0.70	Peak	26.12	10.33	36.45	56.00	-19.55
19.12	Peak	25.79	10.85	36.64	60.00	-23.36
26.70	Peak	24.45	11.02	35.47	60.00	-24.53

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Report Number :E2/2020/70003

Test Site :Conduction Room C

Test Mode :WLAN 5G

Test Date :2020-08-14

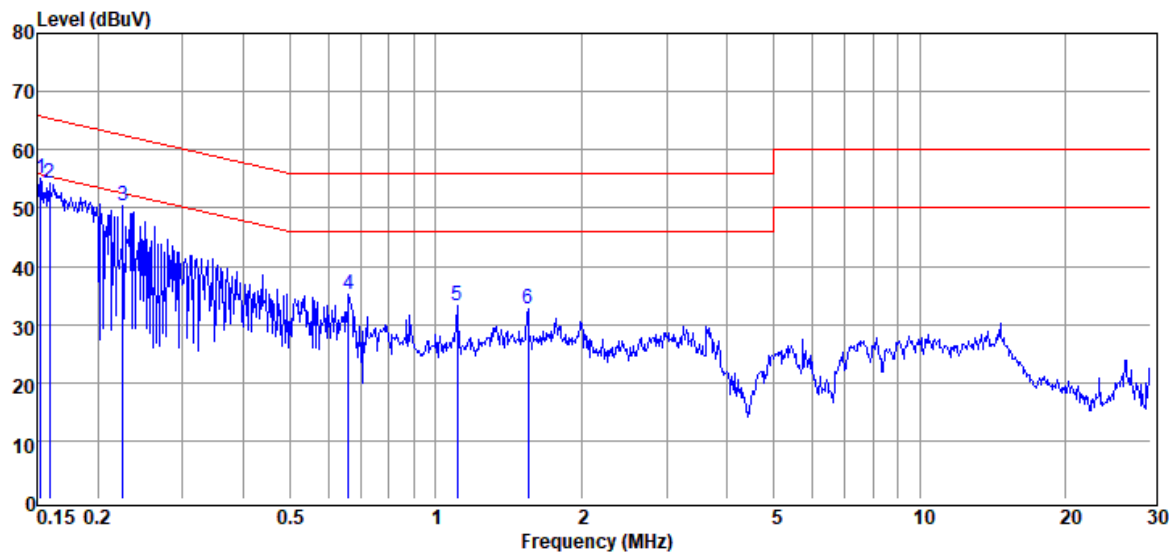
Power :120V/60Hz

Temp./Humi. :24.1/61

Probe :L1

Engineer :Ashton

Note: :EUT_ Config 2



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	44.87	10.22	55.09	65.87	-10.78
0.16	Peak	43.90	10.22	54.12	65.52	-11.40
0.23	Peak	40.18	10.22	50.40	62.61	-12.21
0.66	Peak	24.72	10.31	35.03	56.00	-20.97
1.11	Peak	22.86	10.44	33.30	56.00	-22.70
1.55	Peak	22.34	10.45	32.79	56.00	-23.21

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Report Number :E2/2020/70003

Test Mode :WLAN 5G

Power :120V/60Hz

Probe :N

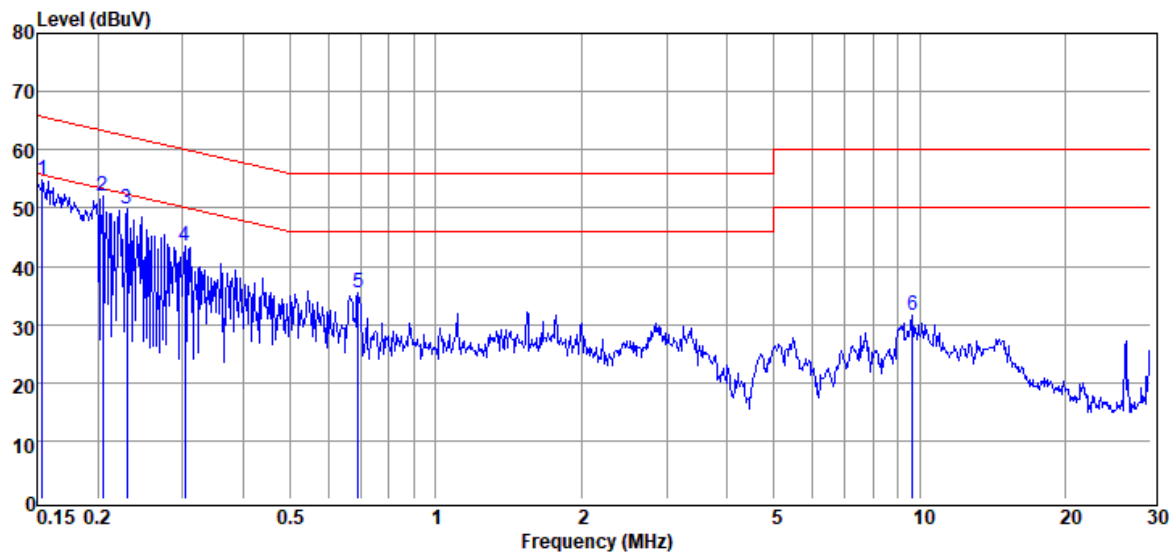
Test Site :Conduction Room C

Test Date :2020-08-14

Temp./Humi. :24.1/61

Engineer :Ashton

Note: :EUT_ Config 2



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS		
MHz	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.15	Peak	44.69	10.21	54.90	65.78	-10.88
0.21	Peak	41.81	10.21	52.02	63.40	-11.38
0.23	Peak	39.53	10.21	49.74	62.44	-12.70
0.30	Peak	33.30	10.22	43.52	60.15	-16.63
0.69	Peak	25.00	10.33	35.33	56.00	-20.67
9.65	Peak	20.83	10.70	31.53	60.00	-28.47

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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)	VBW setting (kHz)
802.11a	97.89	0.09	0.48	1.00
802.11n_20	99.75	0.01	0.04	1.00
802.11n_40	99.46	0.02	0.17	1.00
802.11ac_80	99.19	0.04	0.18	1.00
802.11ac_160	98.44	0.07	0.18	1.00
802.11ax_20	99.68	0.01	0.05	1.00
802.11ax_40	99.50	0.02	0.11	1.00
802.11ax_80	99.55	0.02	0.06	1.00
802.11ax_160	99.55	0.02	0.11	1.00

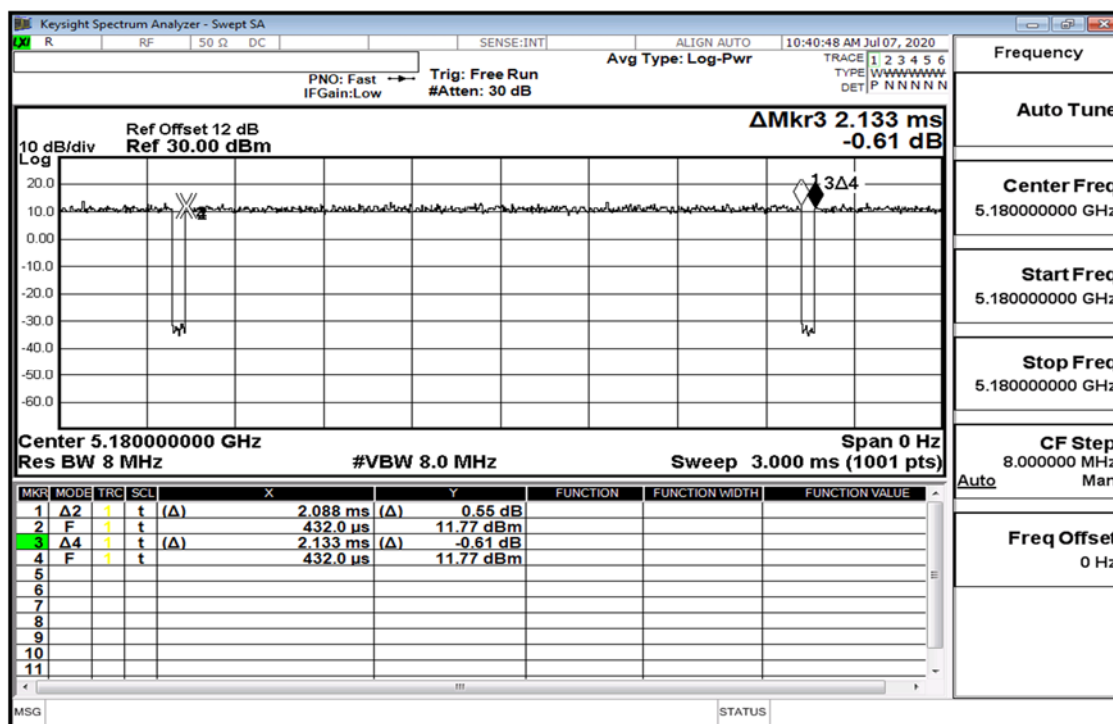
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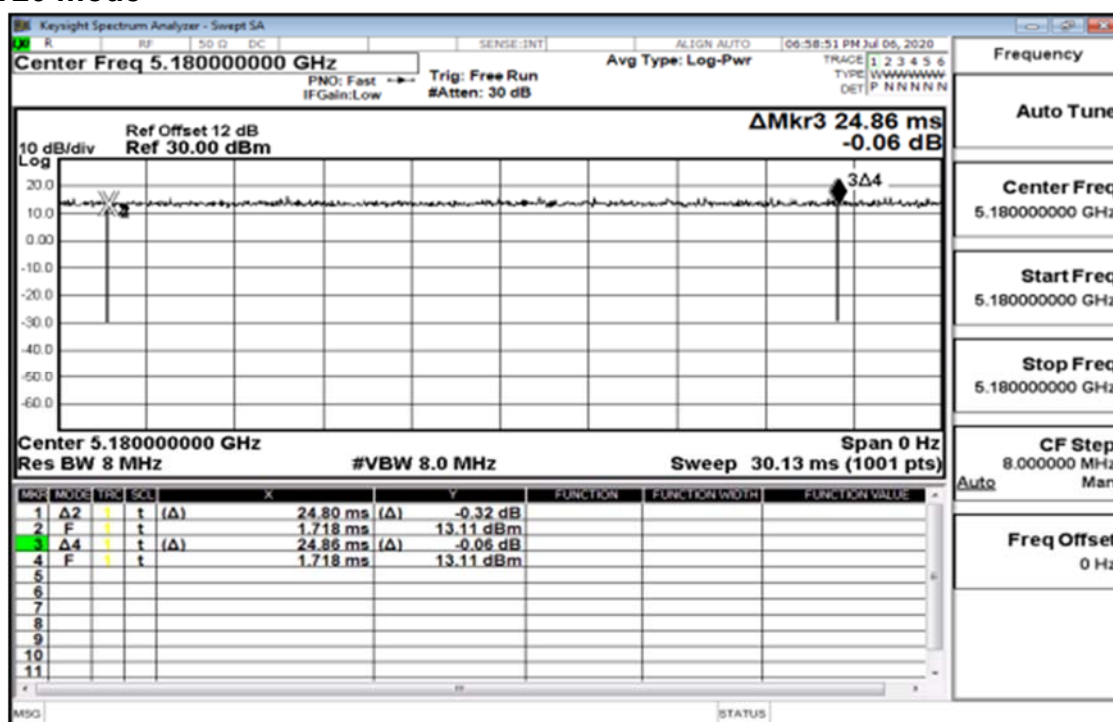
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7.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

802.11 a mode



802.11n HT20 mode

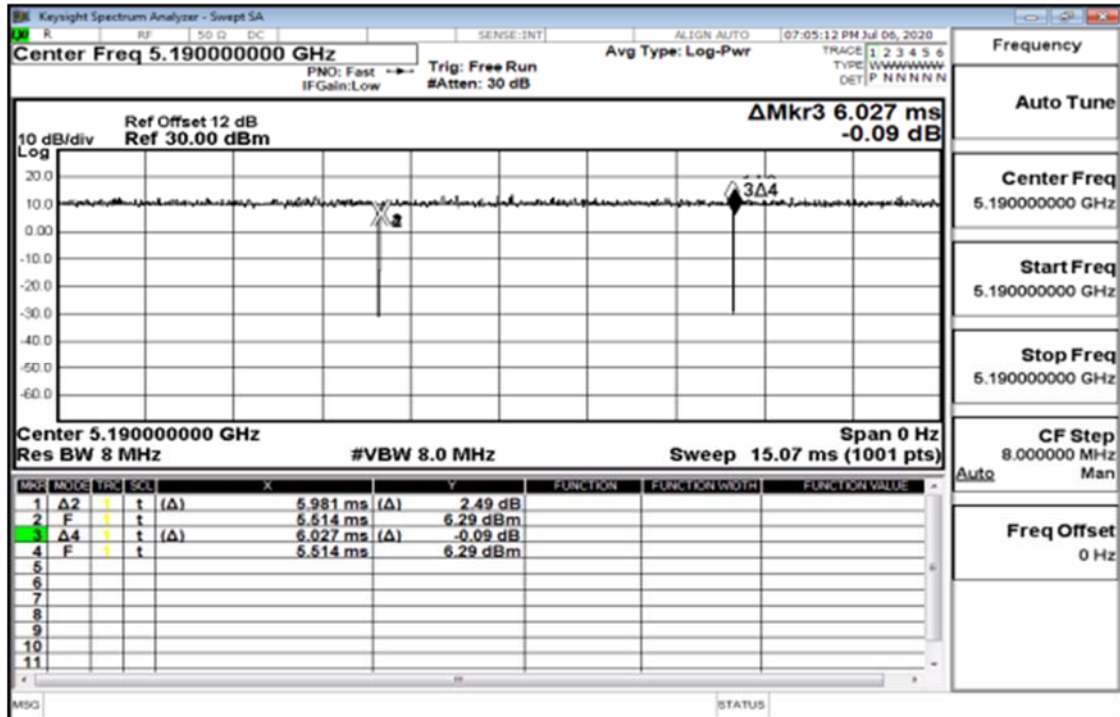


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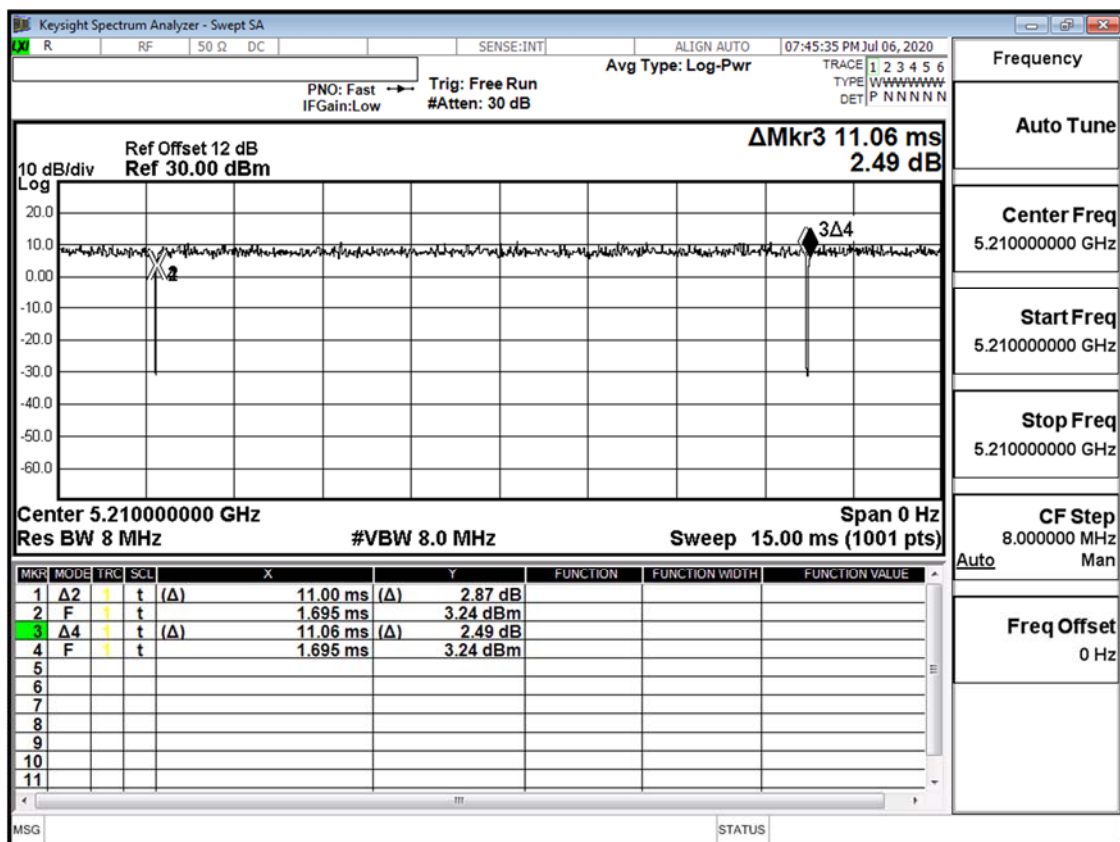
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802.11n HT40 mode



802.11ac VHT80 mode

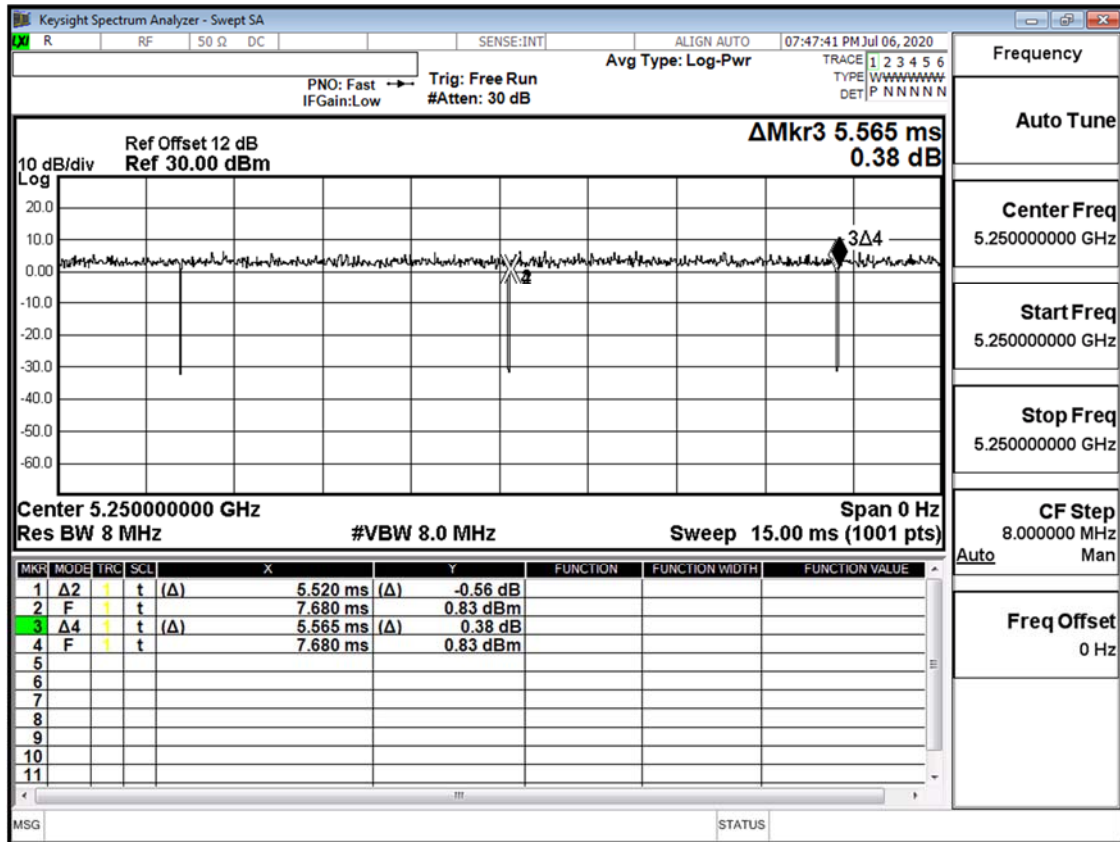


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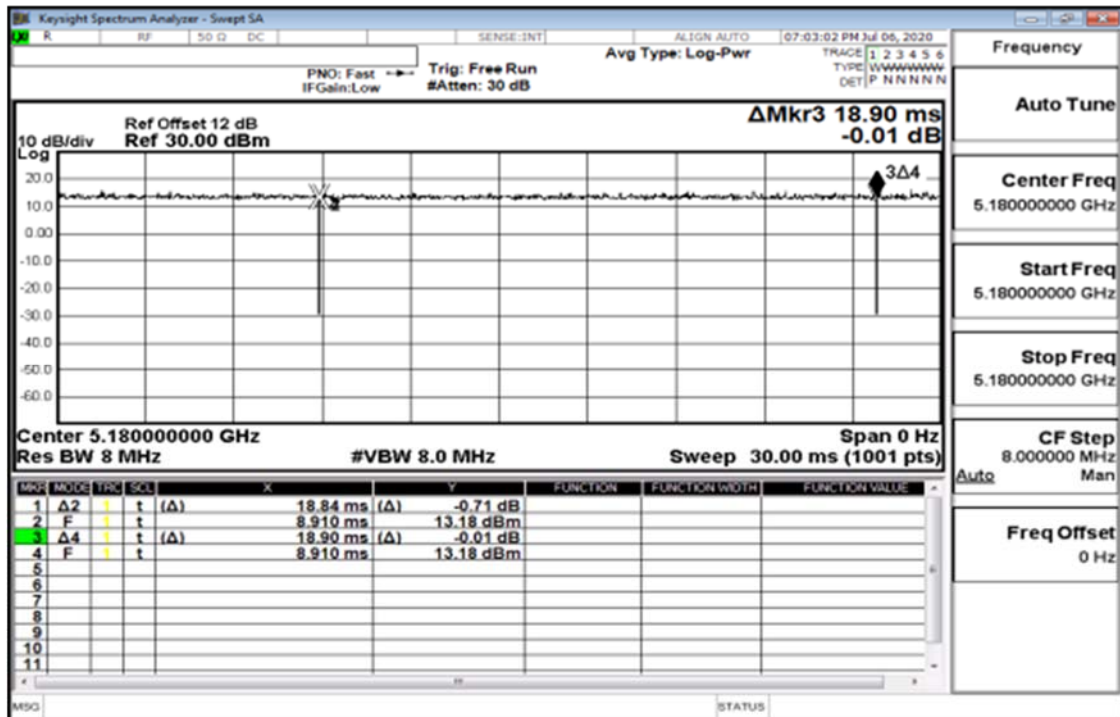
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802.11ac VHT160 mode



802.11ax HE20 mode

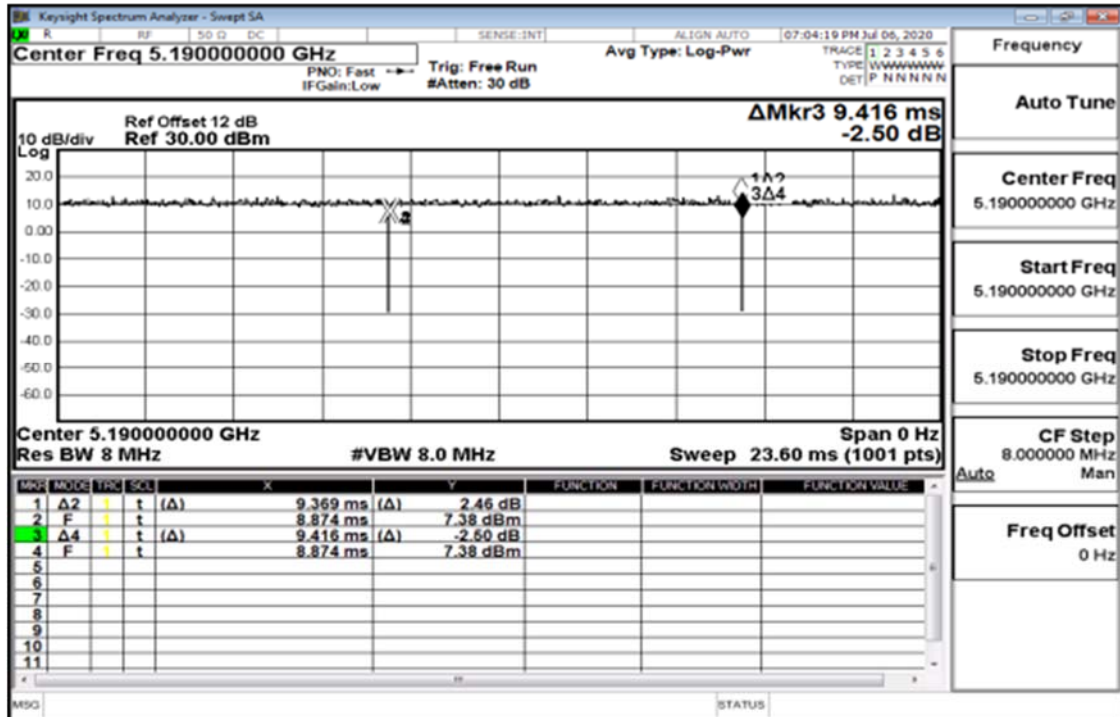


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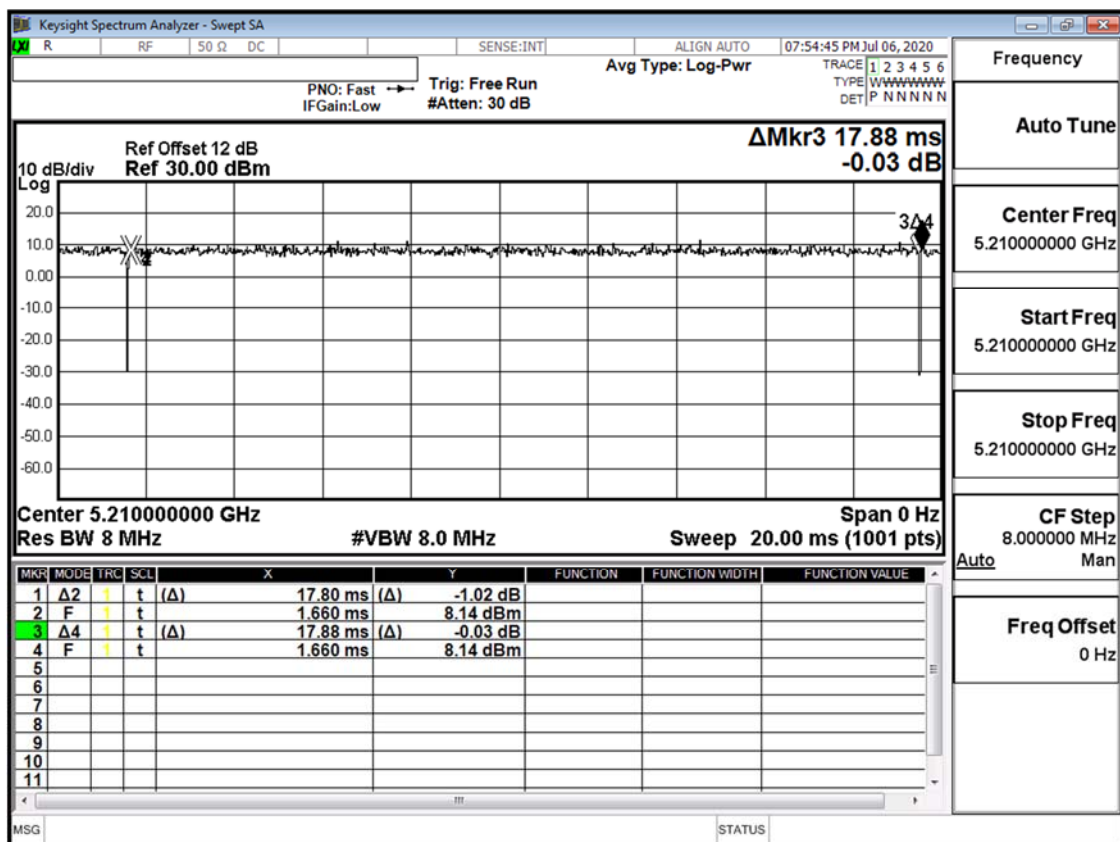
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802.11ax HE40 mode



802.11ax HE80 mode

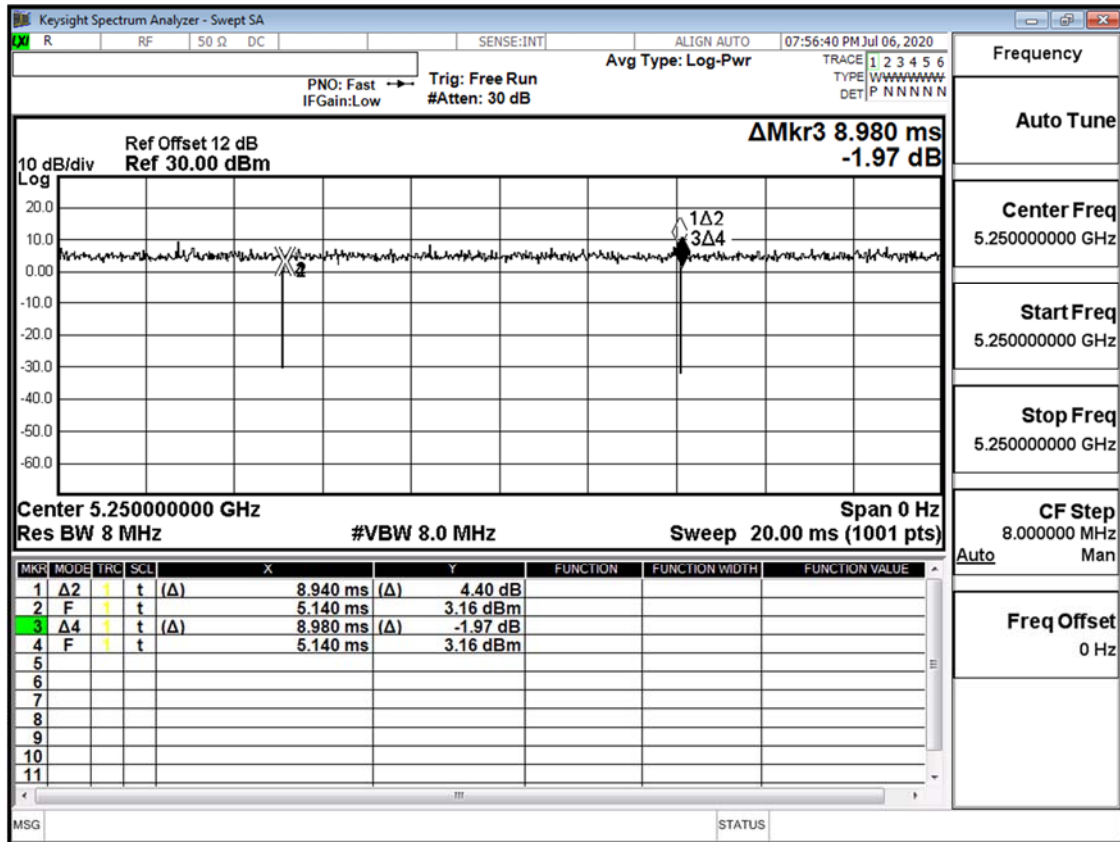


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802.11ax HE160 mode



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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,
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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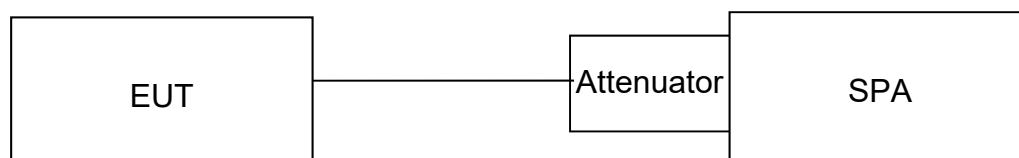
8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	07/08/2020	07/07/2021
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF80	11/20/2019	11/19/2020
IPEX-4 Cable	Woken	00100A1H646027	N/A	N/A	N/A

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 inter-mediate period of time of the measurement.

Name of Equip-ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
DC Block	PASTERNAK	PE8210	RF256	11/19/2020	11/18/2021
Attenuator	Marvelous	MVE2213-10	RF80	11/19/2020	11/18/2021

8.4 Test Set-up



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8.5 Measurement Result

8.5.1 FCC 26dB Bandwidth

Mode: Chain 0

802.11a_Ch0			802.11n_HT20_Ch0			802.11n_HT40_Ch0		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.46	13.703	5180	23.79	13.764	5190	41.43	16.173
5220	23.45	13.701	5220	24.46	13.885	5230	41.77	16.209
5240	22.87	13.593	5240	25.2	14.014	5270	42.15	16.248
5260	22.27	13.477	5260	22.86	13.591	5310	42.04	16.237
5300	21.76	13.377	5300	22.99	13.615	5510	42	16.232
5320	22.18	13.460	5320	22.98	13.614	5550	42.6	16.294
5500	22.46	13.514	5500	23.26	13.666	5670	41.65	16.196
5580	22.83	13.585	5580	23.52	13.714	5710	41.59	16.190
5700	22.43	13.508	5700	23.5	13.711			
5720	22.99	13.615	5720	22.76	13.572			
802.11ac_VHT80_Ch0			802.11ac_VHT160_Ch0			802.11ax_20_Ch0		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	83.79	19.232	5250	163	22.122	5180	22.83	13.585
5290	82.98	19.190	5570	163	22.122	5220	25.02	13.983
5530	83.43	19.213				5240	23.53	13.716
5610	82.29	19.153				5260	22.15	13.454
5690	82.86	19.183				5300	22.41	13.504
						5320	22.28	13.479
						5500	23.26	13.666
						5580	22.53	13.528
						5700	21.92	13.408
						5720	22.09	13.442

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802.11ax _40_Ch0			802.11ax _80_Ch0			802.11ax _160_Ch0		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.05	16.133						
5230	40.82	16.109						
5270	41.24	16.153						
5310	42.04	16.237	5210	83.33	19.208			
5510	40.97	16.125	5290	81.63	19.118			
5550	40.62	16.087	5530	81.89	19.132			
5670	40.63	36.088	5610	81.05	19.088	5250	164	22.148
5710	41.14	16.143	5690	82.08	19.142	5570	164	22.148

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Mode: Chain 1

802.11a_Ch1			802.11n_HT20_Ch1			802.11n_HT40_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.71	13.562	5180	23.85	13.775	5190	42.58	16.292
5220	22.55	13.531	5220	23	13.617	5230	41.79	16.211
5240	22.59	13.539	5240	23.49	13.709	5270	41.43	16.173
5260	22.11	13.446	5260	22.95	13.608	5310	42.24	16.257
5300	22.59	13.539	5300	23.12	13.640	5510	42.44	16.278
5320	22.03	13.430	5320	22.47	13.516	5550	41.93	16.225
5500	22.87	13.593	5500	23.03	13.623	5670	41.93	16.225
5580	22.37	13.497	5580	22.81	13.581	5710	41.64	16.195
5700	22.15	13.454	5700	22.91	13.600			
5720	22.65	13.551	5720	23.11	13.638			

802.11ac_VHT80_Ch1			802.11ac_VHT160_Ch1			802.11ax_20_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	83.7	19.227	5250	163.4	22.133	5180	23.35	13.683
5290	83.33	19.208	5570	162.7	22.114	5220	23.29	13.672
5530	83.75	19.230				5240	21.72	13.369
5610	82.43	19.161				5260	22.03	13.430
5690	82.75	19.178				5300	22.25	13.473
						5320	22.56	13.533
						5500	22.51	13.524
						5580	21.68	13.361
						5700	22.37	13.497
						5720	21.73	13.371

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802.11ax _40_Ch1			802.11ax _80_Ch1			802.11ax _160_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.47	16.177						
5230	40.82	16.109						
5270	41.39	16.169						
5310	41.64	16.195	5210	83.08	19.195			
5510	40.75	16.101	5290	82.35	19.157			
5550	41.09	16.137	5530	81.46	19.109			
5670	40.55	16.080	5610	81.74	19.124	5250	163.3	22.130
5710	40.79	16.106	5690	81.93	19.134	5570	165.3	22.183

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Mode: MIMO

802.11n_HT20_Ch0			802.11n_HT20_Ch1			802.11n_HT40_Ch0			802.11n_HT40_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.18	13.651	5180	22.98	13.614						
5220	23.39	13.690	5220	22.02	13.428						
5240	22.75	13.570	5240	22.69	13.558	5190	41.63	16.194	5190	42.52	16.286
5260	23.52	13.714	5260	23.51	13.713	5230	41.08	16.136	5230	41.59	16.190
5300	23.11	13.638	5300	22.58	13.537	5270	41.56	16.187	5270	42.72	16.306
5320	23.26	13.666	5320	22.76	13.572	5310	42.04	16.237	5310	42.89	16.324
5500	22.97	13.612	5500	23.66	13.740	5510	41.66	16.197	5510	40.85	16.112
5580	23.72	13.751	5580	22.82	13.583	5550	41.22	16.151	5550	41.51	16.182
5700	23.51	13.713	5700	23.46	13.703	5670	41.8	16.212	5670	41.39	16.169
5720	23.7	13.747	5720	22.94	13.606	5710	40.91	16.118	5710	41.58	16.189

802.11ac_VHT80_Ch0			802.11ac_VHT80_Ch1			802.11ac_VHT160_Ch0			802.11ac_VHT160_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	84.93	19.291	5210	83.09	19.195						
5290	84.03	19.244	5290	84.49	19.268						
5530	85.22	19.305	5530	83.04	19.193						
5610	84	19.243	5610	83.12	19.197	5250	162.8	22.117	5250	163.5	22.135
5690	83.7	19.227	5690	85.69	19.329	5570	163.4	22.133	5570	162.6	22.111

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802.11ax_20_Ch0			802.11ax_20_Ch1			802.11ax_40_Ch0			802.11ax_40_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.39	13.690	5180	24.83	13.950	5190	43.66	16.401	5190	43.37	16.372
5220	23.79	13.764	5220	24.26	13.849	5230	43.65	16.400	5230	43.16	16.351
5240	24.23	13.844	5240	24.36	13.867	5270	44.01	16.436	5270	44.19	16.453
5260	23.9	13.784	5260	24.56	13.902	5310	44.29	16.463	5310	43.73	16.408
5300	23.6	13.729	5300	24.77	13.939	5510	44.35	16.469	5510	43.18	16.353
5320	23.21	13.657	5320	24.74	13.934	5550	44.57	16.490	5550	43.04	16.339
5500	25.42	14.052	5500	24.27	13.851	5670	43.49	16.384	5670	42.94	16.329
5580	24.64	13.916	5580	23.87	13.779	5710	43.29	16.364	5710	44.08	16.442
5700	25.24	14.021	5700	24.15	13.829						
5720	25	13.979	5720	23.81	13.768						

802.11ax_80_Ch0			802.11ax_80_Ch1			802.11ax_160_Ch0			802.11ax_160_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.8	19.128	5210	85.7	19.330	5250	164.8	22.170	5250	163.5	22.135
5290	83.71	19.228	5290	84.09	19.247	5570	164.1	22.151	5570	163.9	22.146
5530	85.82	19.336	5530	83.98	19.242						
5610	84.74	19.281	5610	86.18	19.354						
5690	82.49	19.164	5690	82.8	19.180						

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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			802.11n_HT20_Ch0			802.11n_HT40_Ch0		
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	12.81	11.075	5745	17.64	12.465			
5785	13.16	11.193	5785	17.64	12.465	5755	35.71	15.528
5825	13.43	11.281	5825	17.62	12.460	5795	35.78	15.536

802.11ac_VHT80_Ch0			802.11ax_20_Ch0				802.11ax_40_Ch0			
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5775	75.61	18.786	5745	full	17.91	12.531	5755	full	35.24	15.470
				26/0	2.04	3.096				
			5785	full	14.56	11.632				
				26/0	2.059	3.137				
5825	75.61	18.786	5825	full	18.85	12.753	5795	full	37.89	15.785
				26/0	2.027	3.069				

802.11ax_80_Ch0		
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	70.11	18.458

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Mode: Chain 1

802.11a_Ch1			802.11n_HT20_Ch1			802.11n_HT40_Ch1		
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.11	11.793	5745	17.63	12.463	5755	36.36	15.606
5785	10.33	10.141	5785	11.76	10.704	5795	31.68	15.008
5825	11.73	10.693	5825	17.6	12.455			

802.11ax_20_Ch1				802.11ax_40_Ch1			
Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.75	12.730	5755	full	36.56	15.630
	26/0	2.054	3.126		full	31.8	15.024
5785	full	18.85	12.753				
	26/0	2.086	3.193				
5825	full	16.28	12.117				
	26/0	2.058	3.134				

802.11ac_VHT80_Ch1			802.11ax_80_Ch1		
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	55.52	17.444	5775	70.21	18.464

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Mode: MIMO

802.11n_HT20_Ch0			802.11n_HT20_Ch1			802.11n_HT40_Ch0			802.11n_HT40_Ch1		
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.63	12.463	5745	17.6	12.455	5755	36.34	15.604	5755	36.34	15.604
5785	17.36	12.395	5785	17.6	12.455	5795	35.72	15.529	5795	33.46	15.245
5825	17.59	12.453	5825	17.64	12.465						

802.11ac_VHT80_Ch0			802.11ac_VHT80_Ch1		
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	57.04	17.562	5775	62.98	17.992

802.11ax_20_Ch0				802.11ax_20_Ch1			
Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	18.5	12.672	5745	full	17.63	12.463
	26/0	2.075	3.170		26/0	2.069	3.158
5785	full	18.02	12.558	5785	full	16.96	12.294
	26/0	2.06	3.139		26/0	2.017	3.047
5825	full	18.64	12.704	5825	full	12.24	10.878
	26/0	2.056	3.130		26/0	2.071	3.162

802.11ax_40_Ch0				802.11ax_40_Ch1			
Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU Config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	31.11	14.929	5755	full	30.98	14.911
5795	full	30.09	14.784	5795	full	35.66	15.522

802.11ax_80_Ch0			802.11ax_80_Ch1		
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	60.23	17.798	5775	70.12	18.458

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8.5.3 BW Verification for DFS Function

Mode: Chain 0

802.11a_Ch0			802.11n_HT20_Ch0			802.11n_HT40_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.33	< 5250	5240	5248.91	< 5250	5230	5248.01	< 5250
5745	5736.78	> 5725	5745	5736.81	> 5725	5755	5737.00	> 5725

802.11ac_VHT80_Ch0			802.11ax_20_Ch0			802.11ax_40_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.43	< 5250	5240	5249.49	< 5250	5230	5248.74	< 5250
5775	5737.53	> 5725	5745	5735.01	> 5725	5755	5736.19	> 5725

802.11ax_VHT80_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.25	< 5250
5775	5736.83	> 5725

Mode: Chain 1

802.11a_Ch1			802.11n_HT20_Ch1			802.11n_HT40_Ch1		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.27	< 5250	5240	5248.88	< 5250	5230	5248.02	< 5250
5745	5736.77	> 5725	5745	5736.20	> 5725	5755	5737.04	> 5725

802.11ac_VHT80_Ch1			802.11ax_20_Ch1			802.11ax_40_Ch1		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.56	< 5250	5240	5249.42	< 5250	5230	5248.78	< 5250
5775	5737.49	> 5725	5745	5735.57	> 5725	5755	5736.28	> 5725

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802.11ax _VHT80_Ch1		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.24	< 5250
5775	5736.76	> 5725

Mode: MIMO

802.11n_HT20_Ch0			802.11n_HT20_Ch1			802.11n_HT40_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.87	< 5250	5240	5248.89	< 5250	5230	5248.00	< 5250
5745	5736.19	> 5725	5745	5736.18	> 5725	5755	5737.02	> 5725

802.11n_HT40_Ch1			802.11ac_VHT80_Ch0			802.11ac_VHT80_Ch1		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.02	< 5250	5210	5247.95	< 5250	5210	5247.72	< 5250
5755	5737.03	> 5725	5775	5737.49	> 5725	5775	5737.46	> 5725

802.11ax_20_Ch0			802.11ax_20_Ch1			802.11ax_40_Ch0		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.50	< 5250	5240	5249.47	< 5250	5230	5248.72	< 5250
5745	5735.56	> 5725	5745	5735.55	> 5725	5755	5736.19	> 5725

802.11ax_40_Ch1			802.11ax_VHT80_Ch0			802.11ax_VHT80_Ch1		
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.83	< 5250	5210	5248.18	< 5250	5210	5248.24	< 5250
5755	5736.33	> 5725	5775	5736.88	> 5725	5775	5736.92	> 5725

Please see next page for test plots.

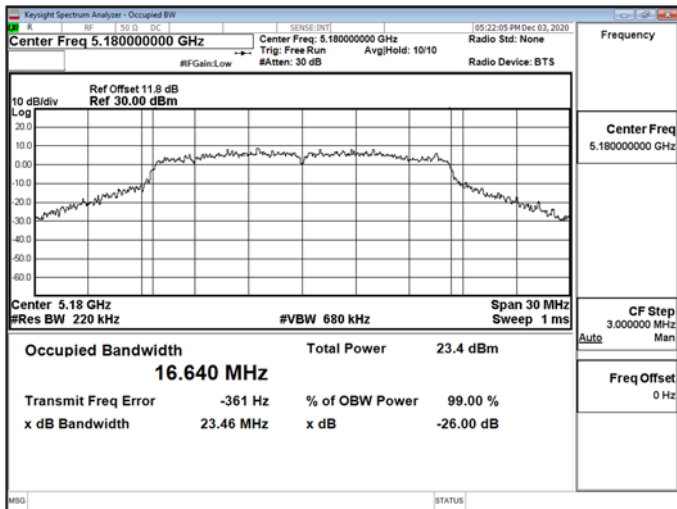
Note: For the test plots, Detector: PEAK, Trace: MAX Hold

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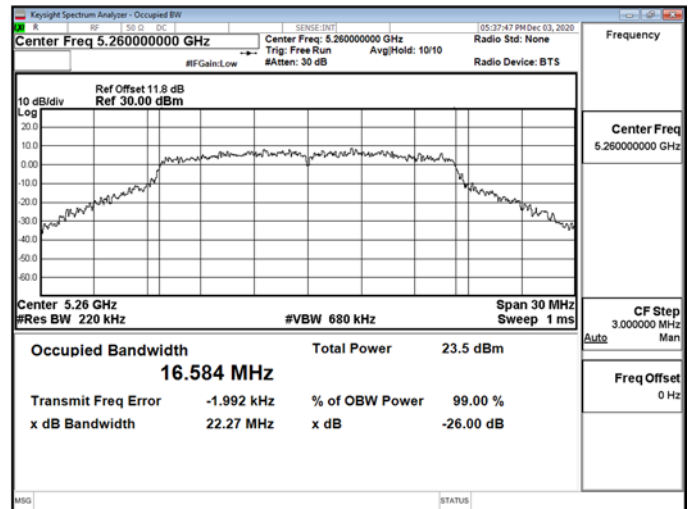
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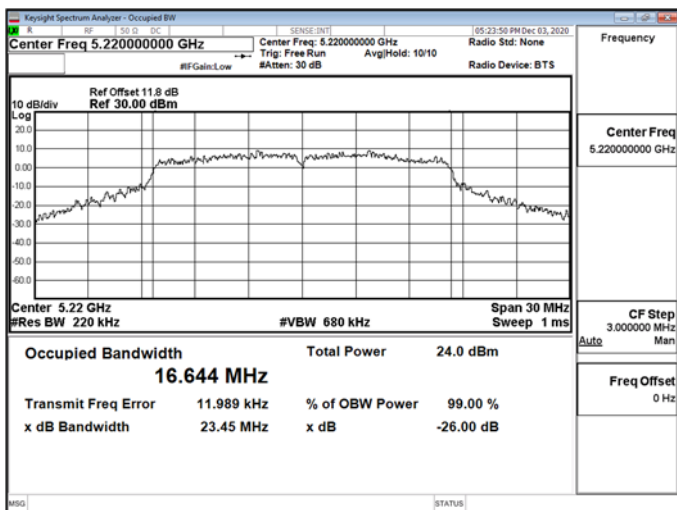
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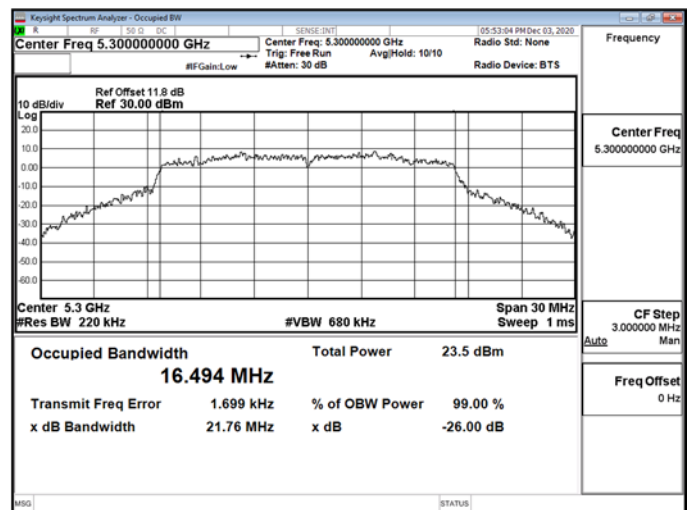
802.11a_20MHz_Chain0_5260MHz



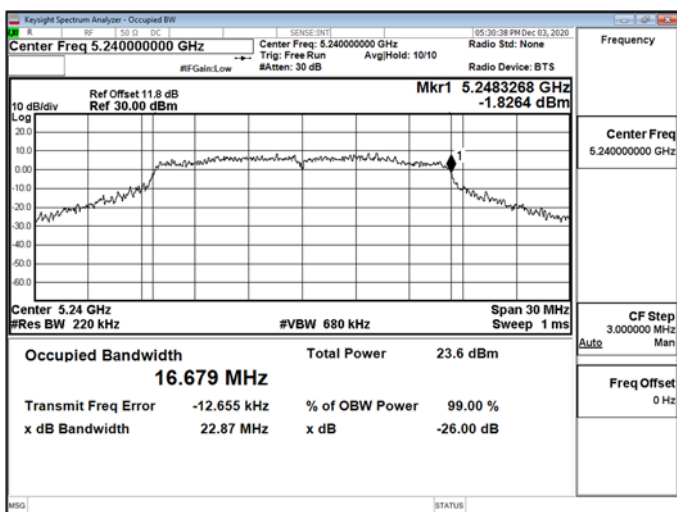
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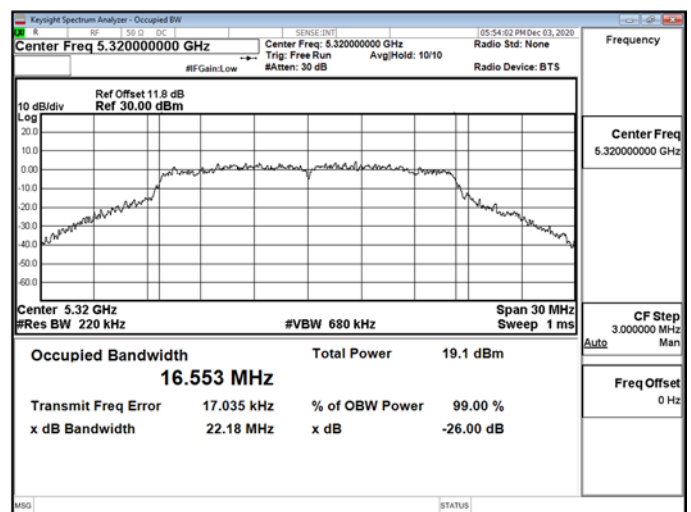
802.11a_20MHz_Chain0_5300MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

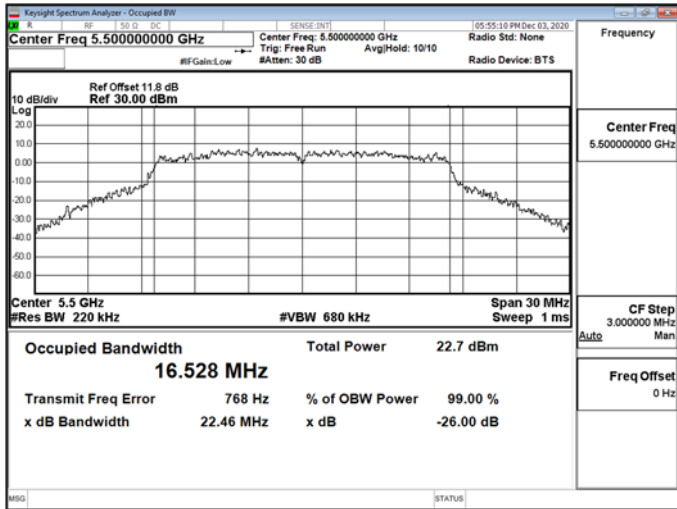


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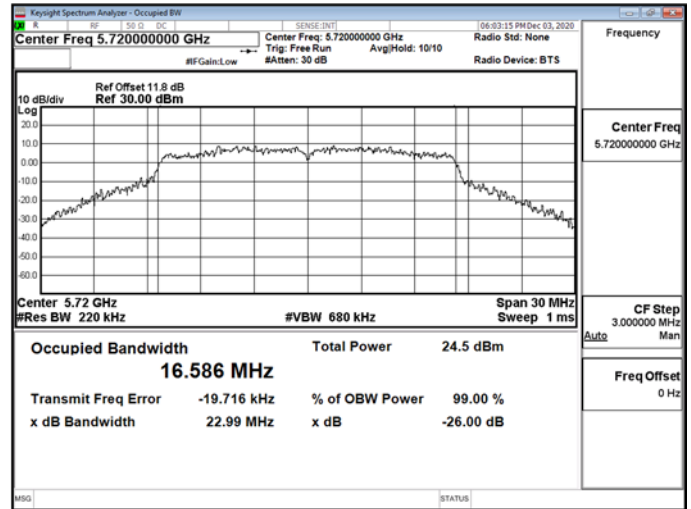
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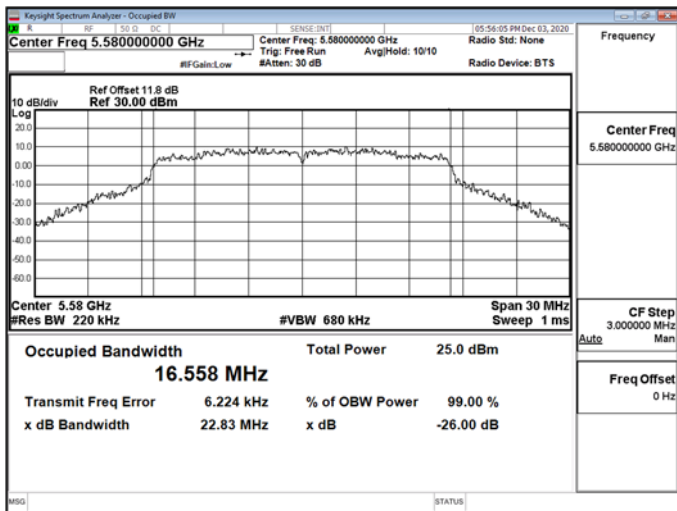
802.11a_20MHz_Chain0_5500MHz



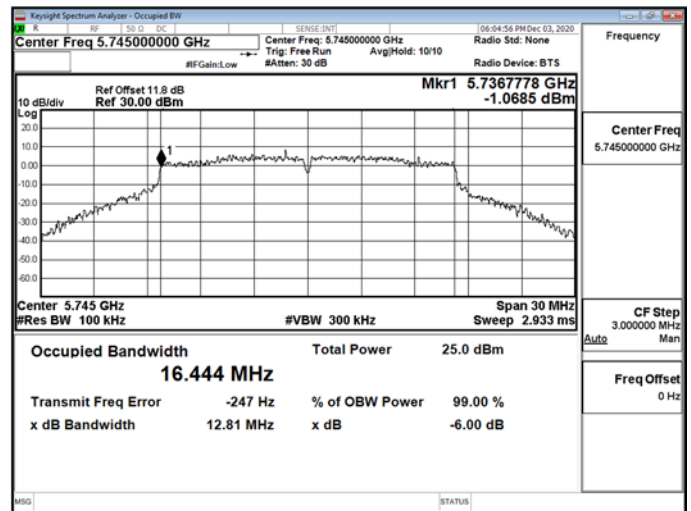
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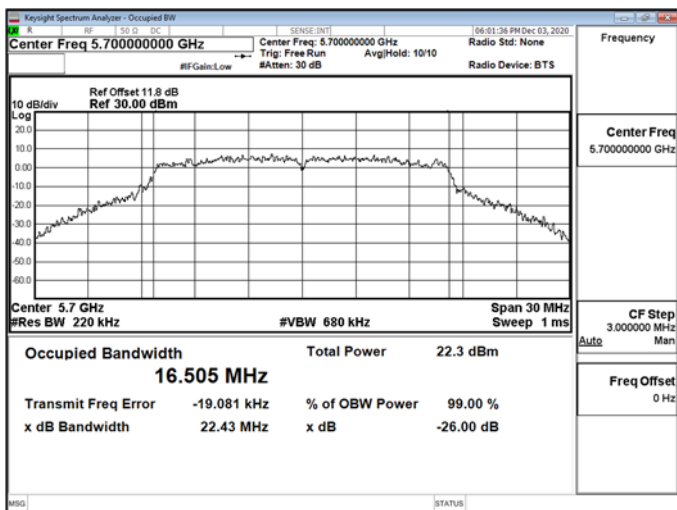
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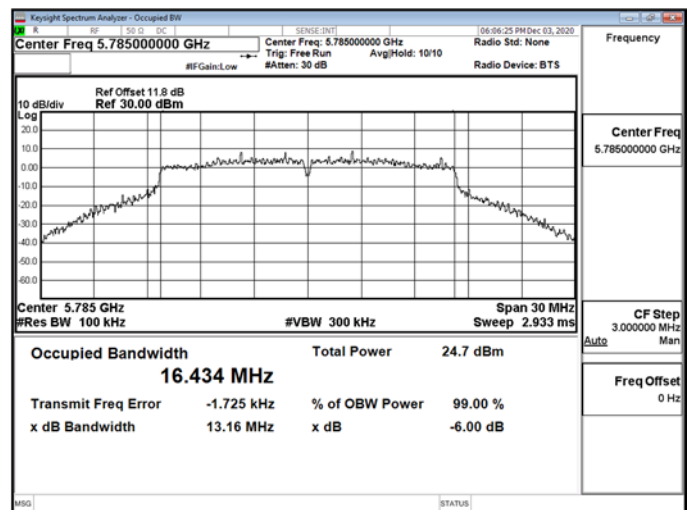
802.11a_20MHz_Chain0_5745MHz



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5785MHz

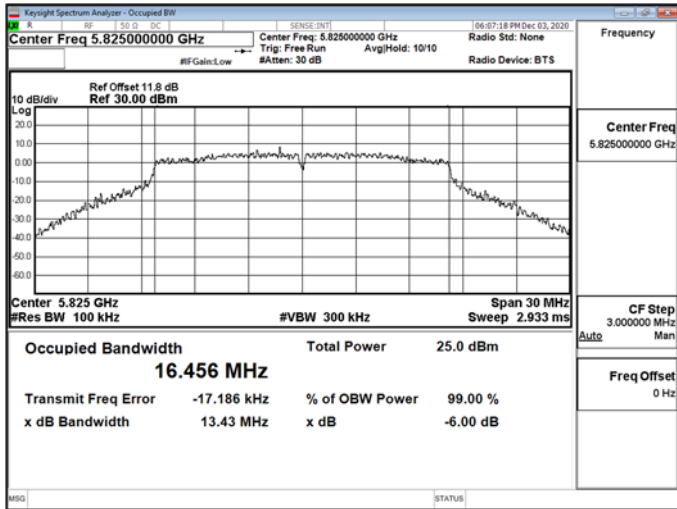


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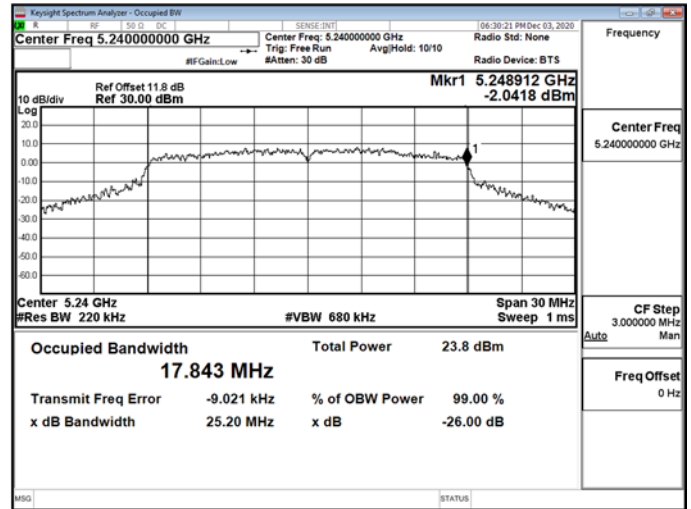
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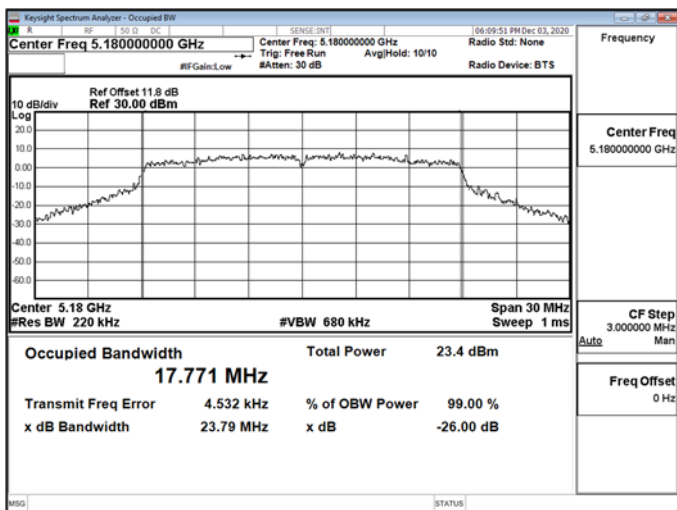
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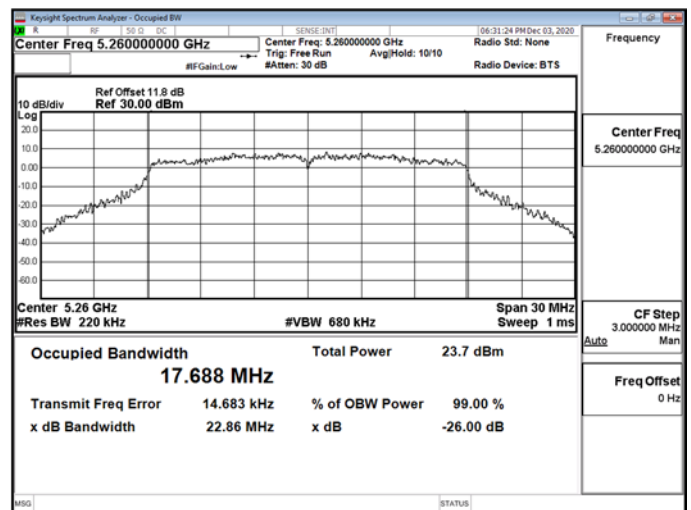
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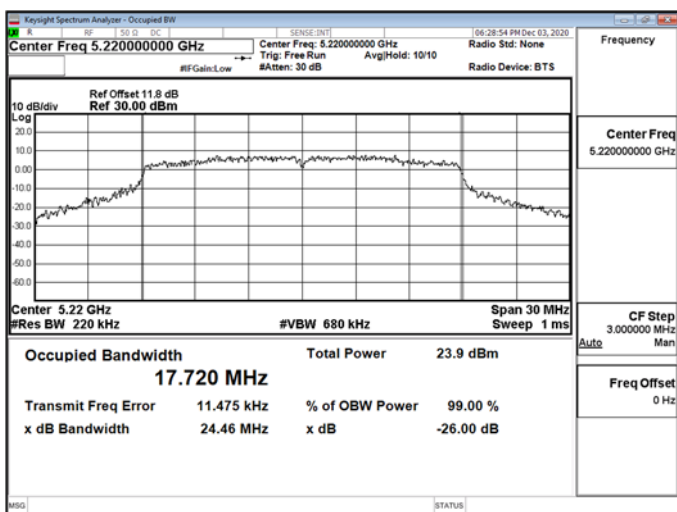
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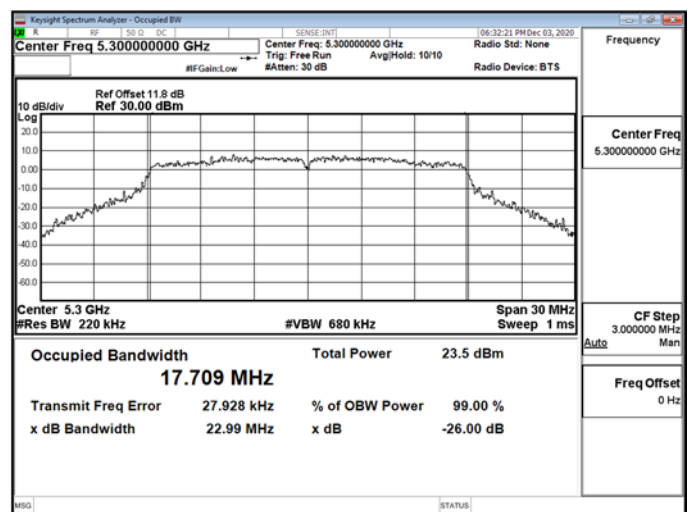
802.11n_20MHz_Chain0_5260MHz



802.11n_20MHz_Chain0_5220MHz



802.11n_20MHz_Chain0_5300MHz

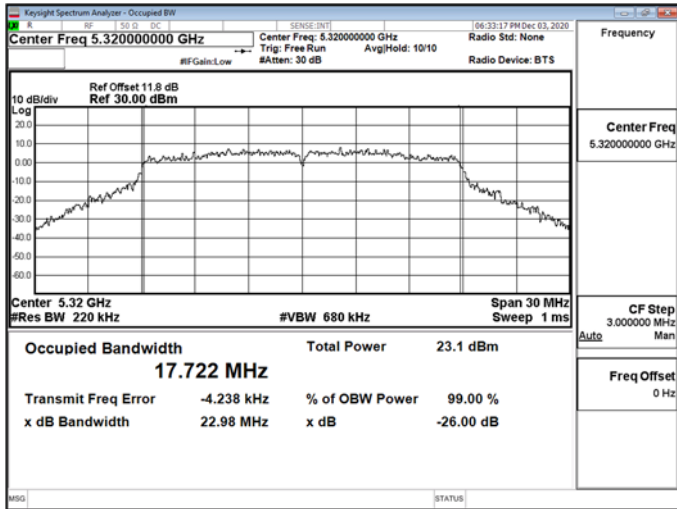


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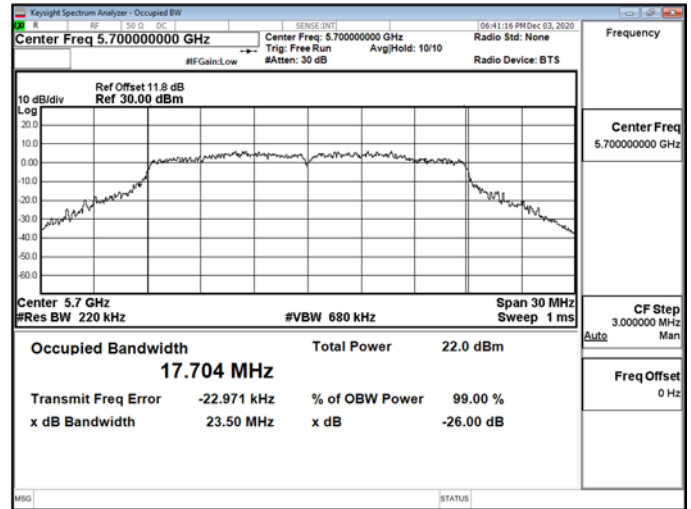
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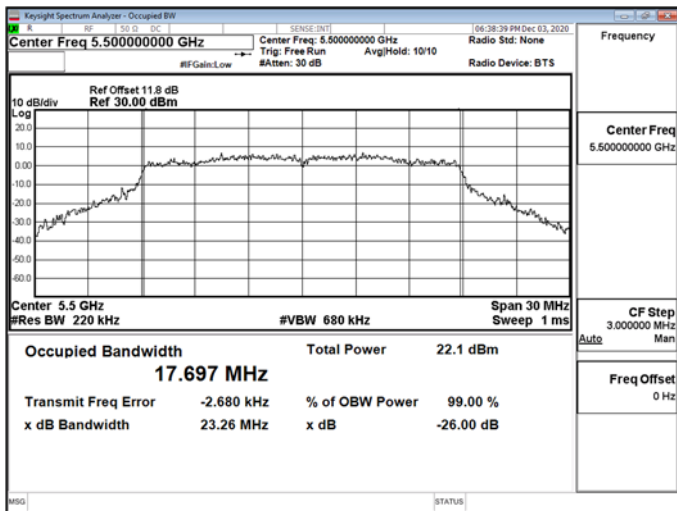
802.11n_20MHz_Chain0_5320MHz



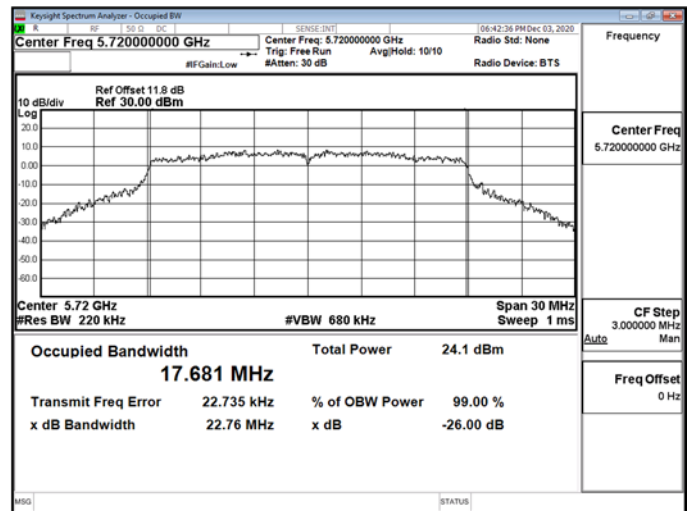
802.11n_20MHz_Chain0_5700MHz



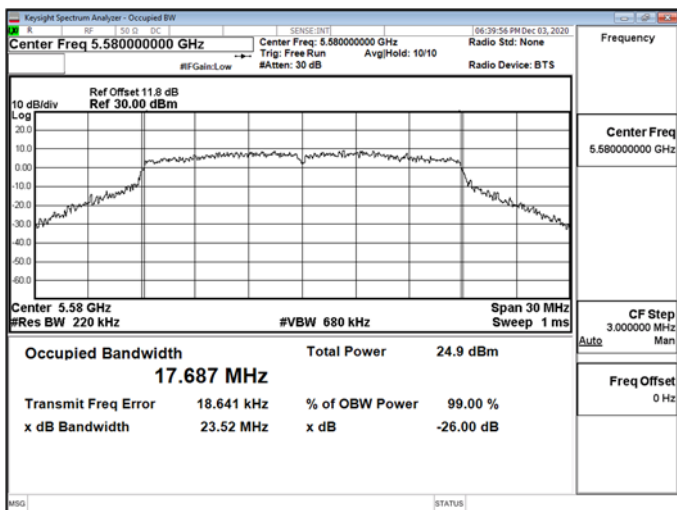
802.11n_20MHz_Chain0_5500MHz



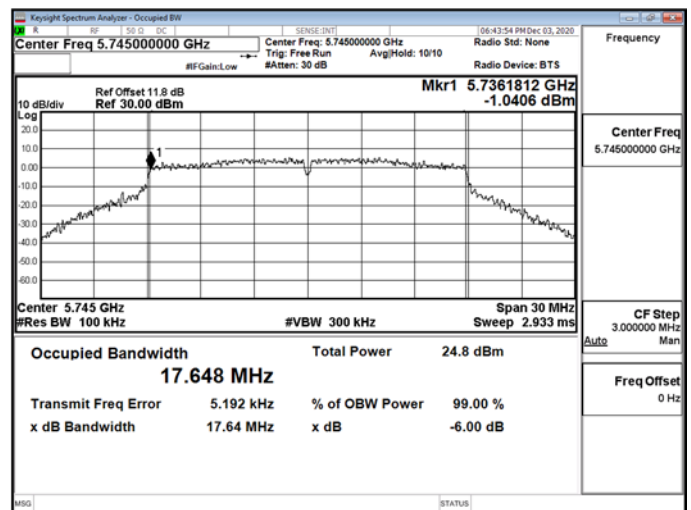
802.11n_20MHz_Chain0_5720MHz



802.11n_20MHz_Chain0_5580MHz



802.11n_20MHz_Chain0_5745MHz

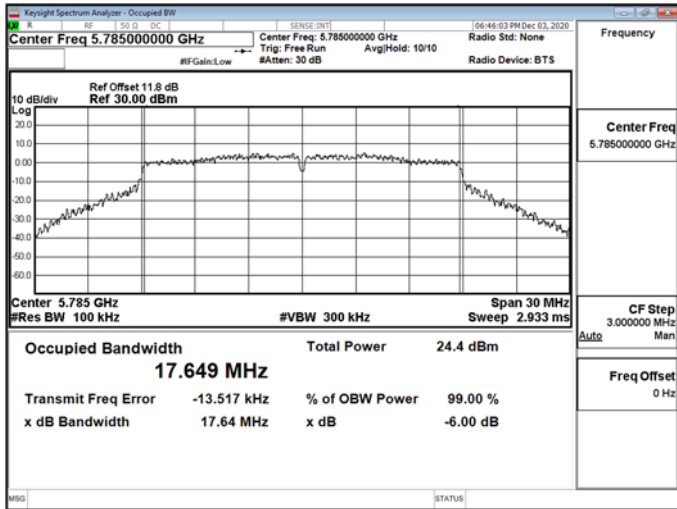


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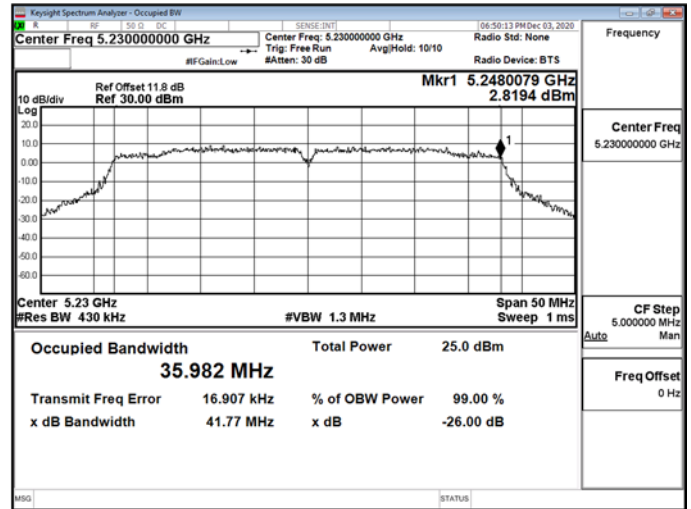
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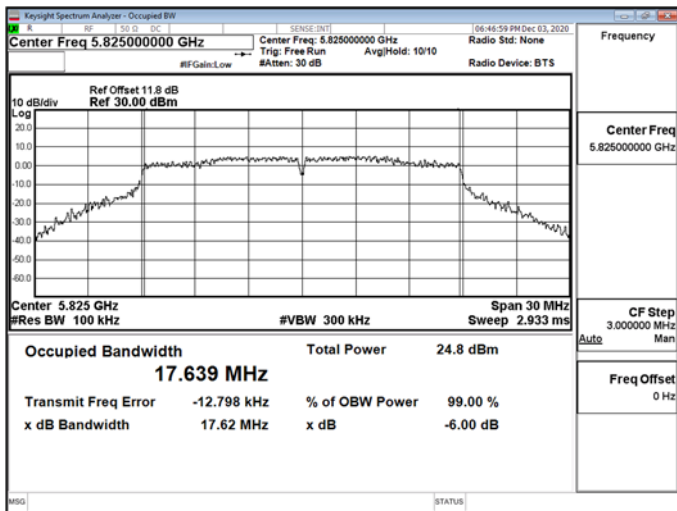
802.11n_20MHz_Chain0_5785MHz



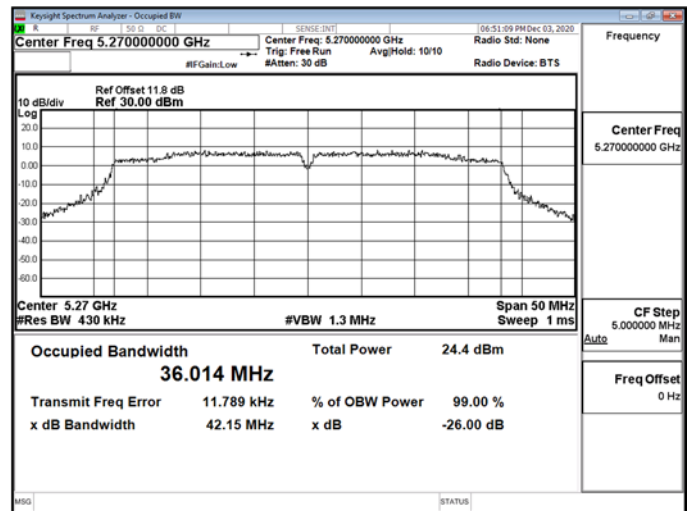
802.11n_40MHz_Chain0_5230MHz



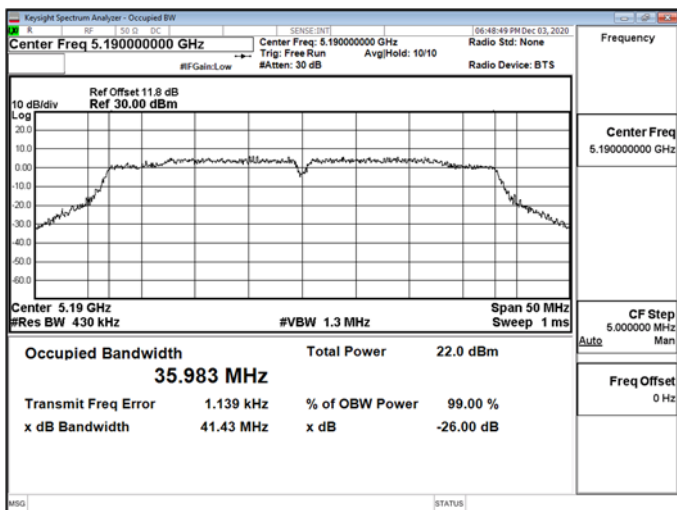
802.11n_20MHz_Chain0_5825MHz



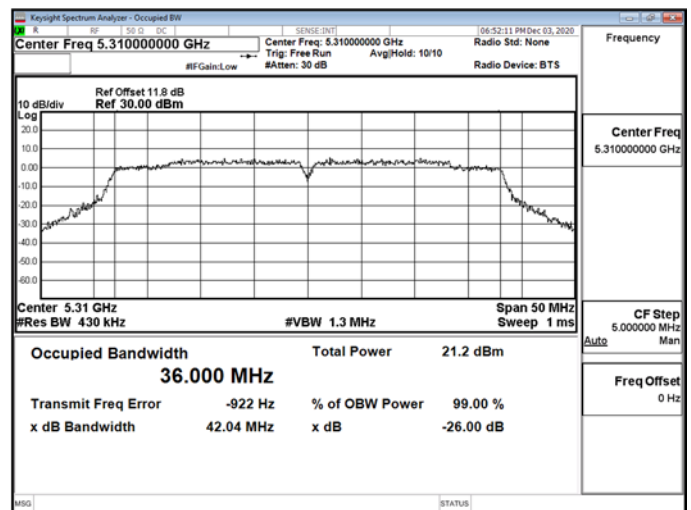
802.11n_40MHz_Chain0_5270MHz



802.11n_40MHz_Chain0_5190MHz



802.11n_40MHz_Chain0_5310MHz

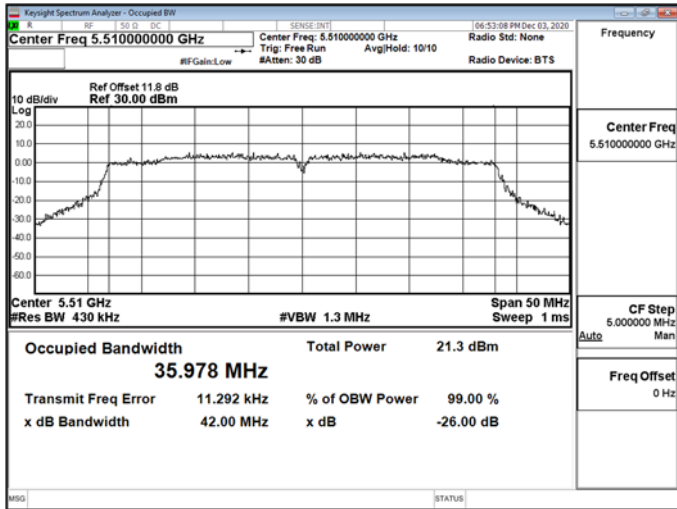


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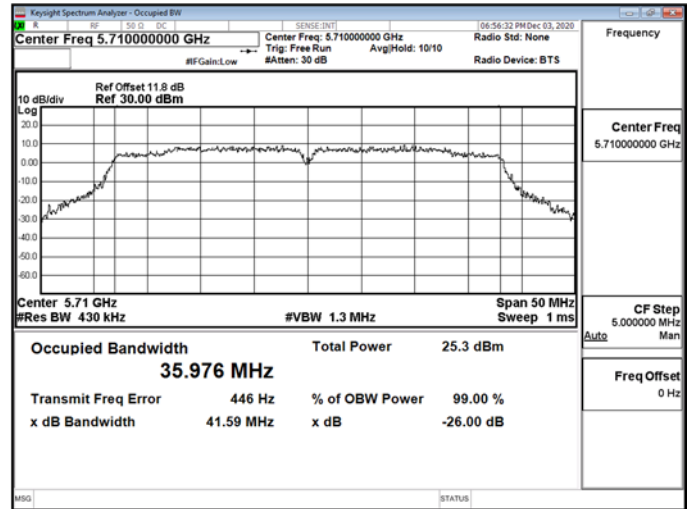
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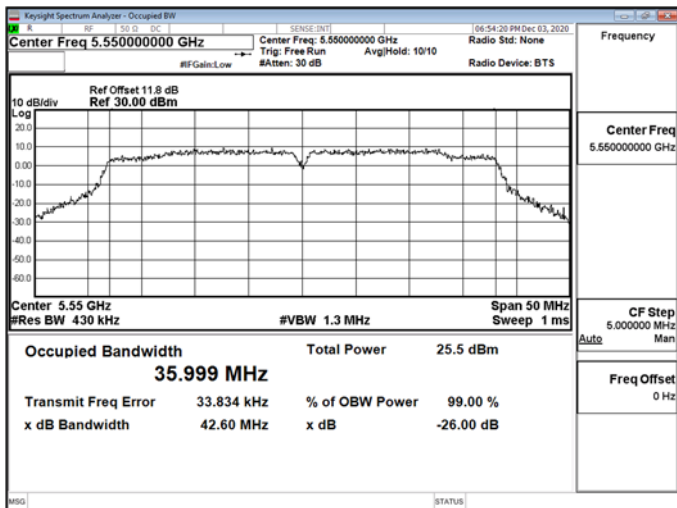
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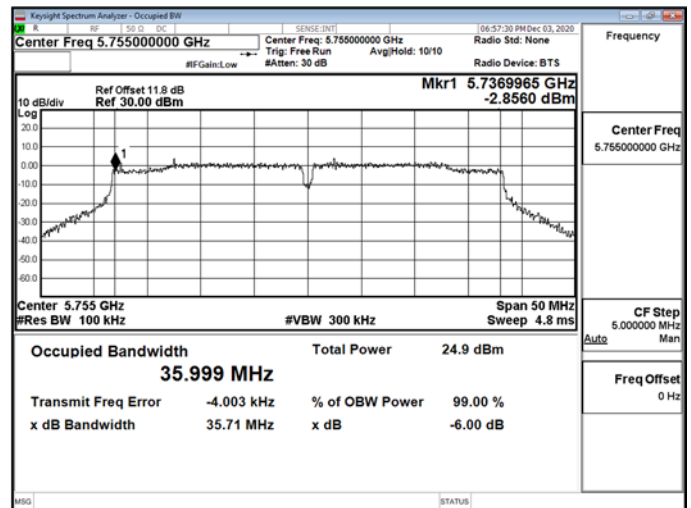
802.11n_40MHz_Chain0_5710MHz



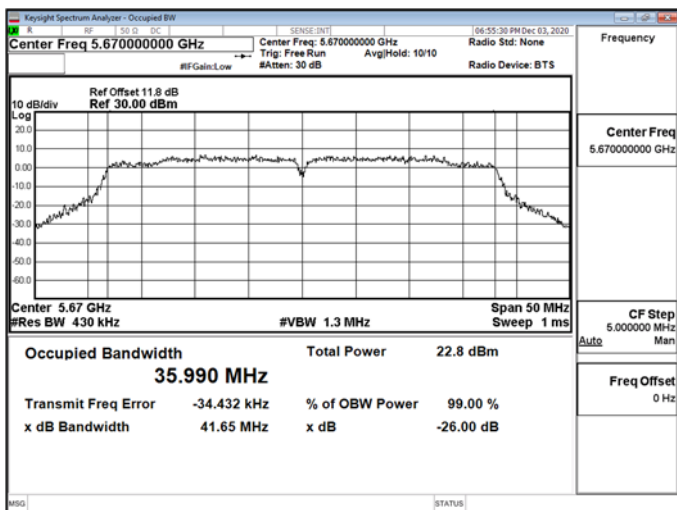
802.11n_40MHz_Chain0_5550MHz



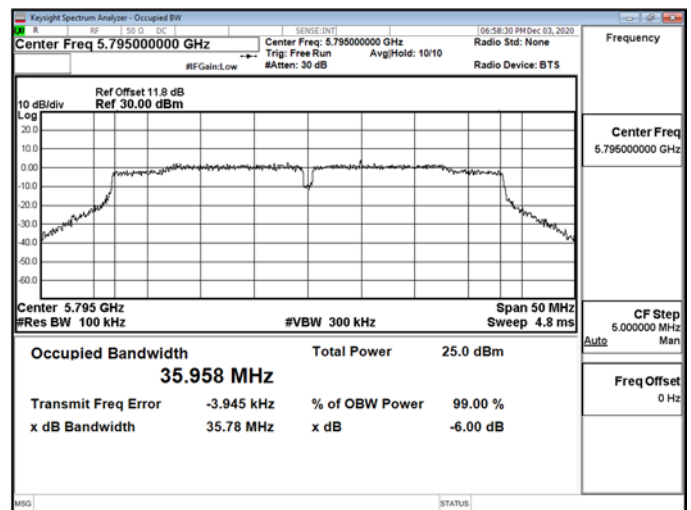
802.11n_40MHz_Chain0_5755MHz



802.11n_40MHz_Chain0_5670MHz



802.11n_40MHz_Chain0_5795MHz

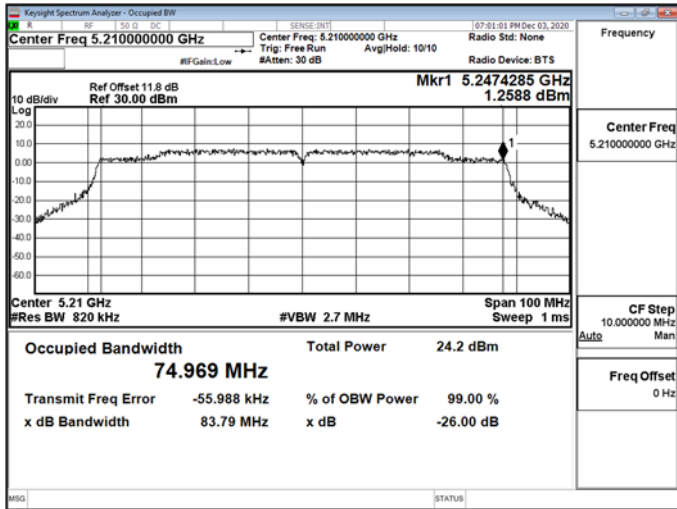


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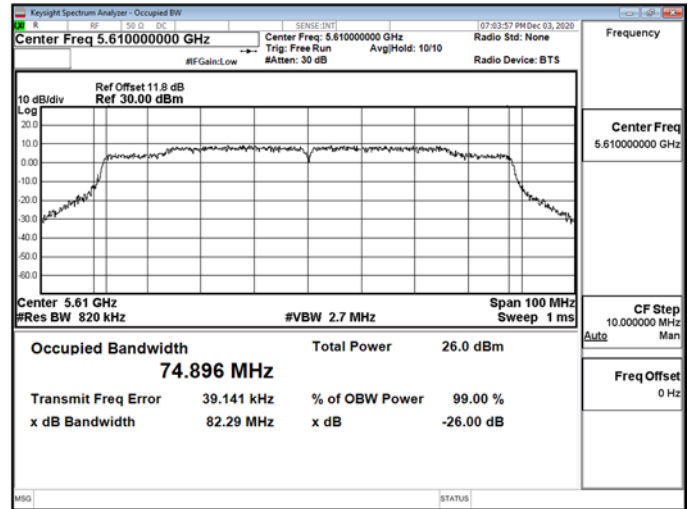
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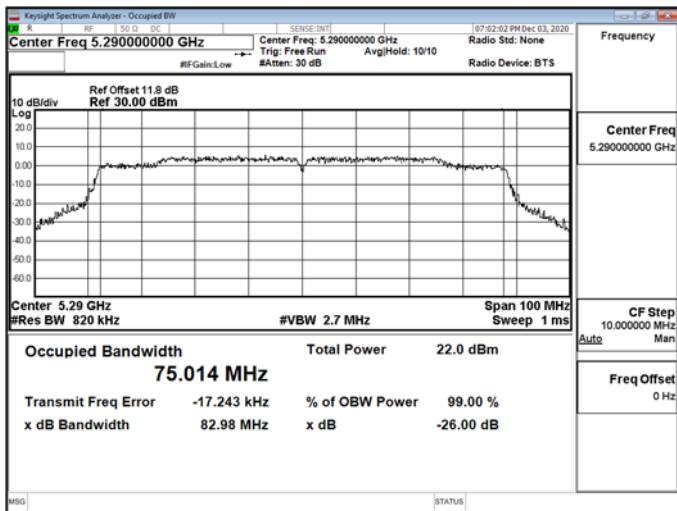
802.11ac_80MHz_Chain0_5210MHz



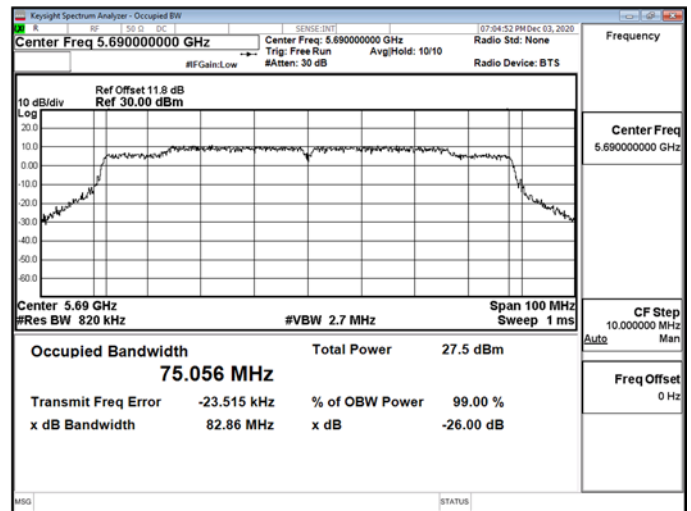
802.11ac_80MHz_Chain0_5610MHz



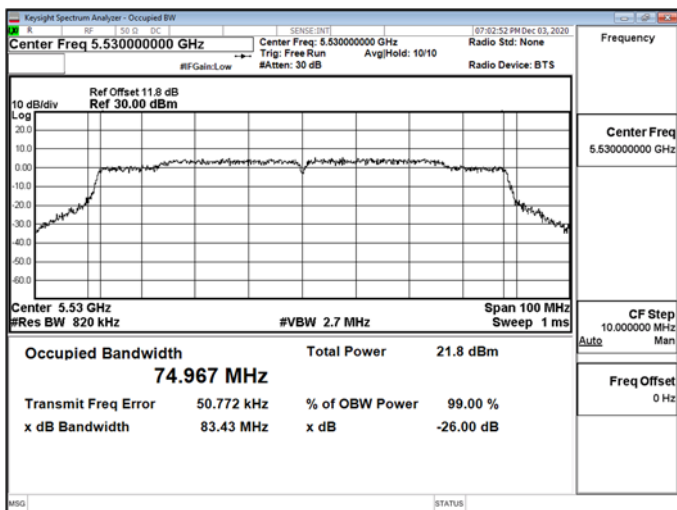
802.11ac_80MHz_Chain0_5290MHz



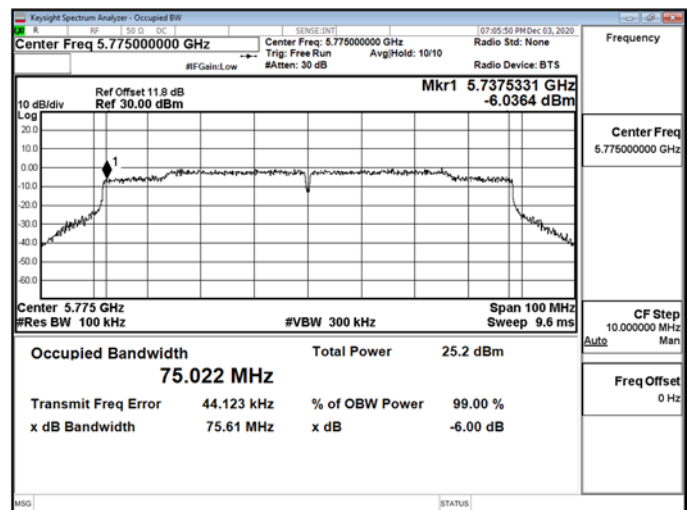
802.11ac_80MHz_Chain0_5690MHz



802.11ac_80MHz_Chain0_5530MHz



802.11ac_80MHz_Chain0_5775MHz

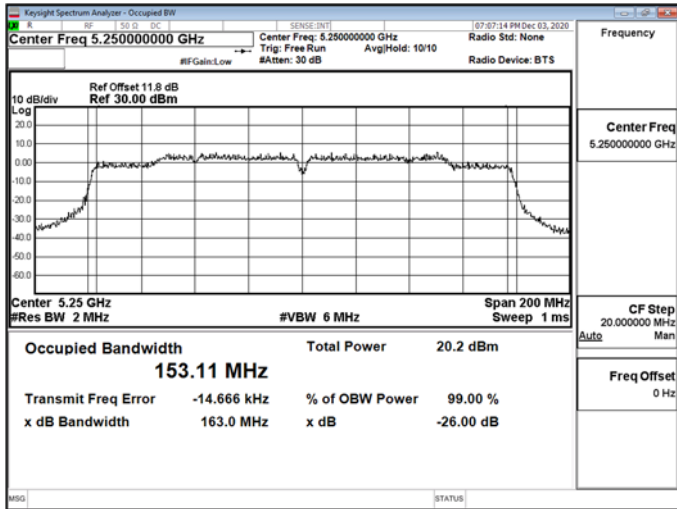


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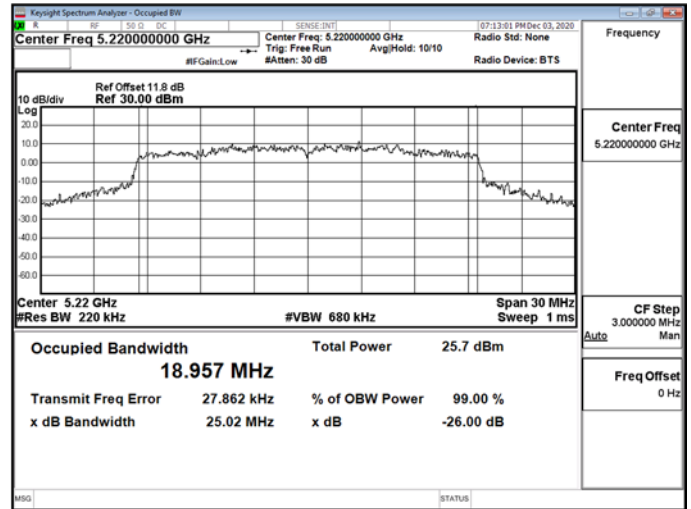
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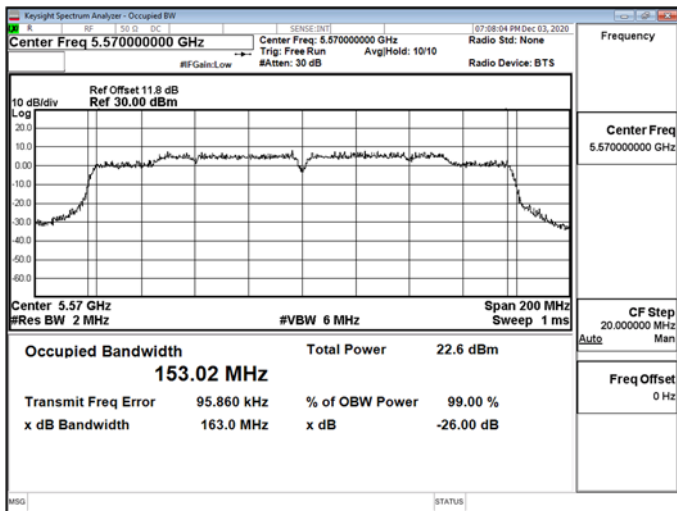
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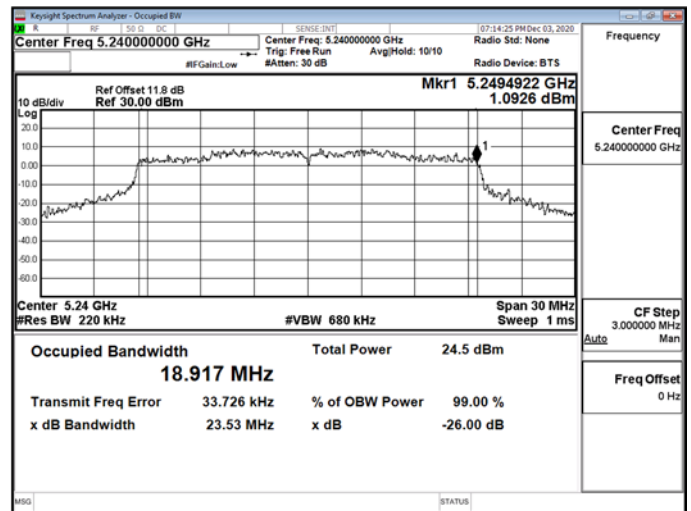
802.11ax_20MHz_Chain0_5220MHz



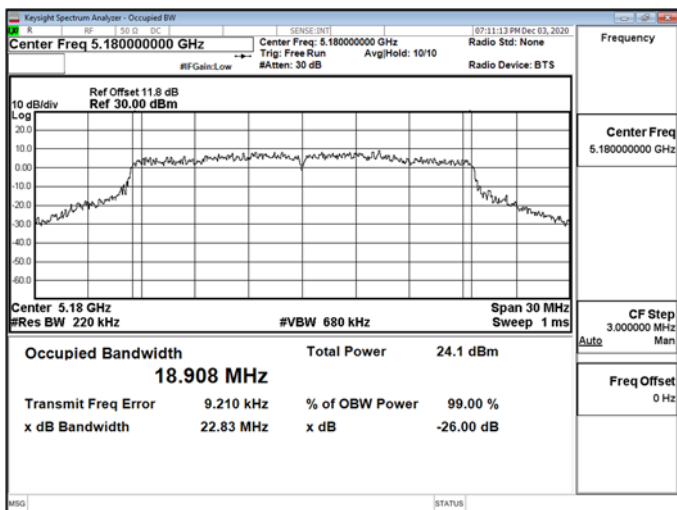
802.11ac_160MHz_Chain0_5570MHz



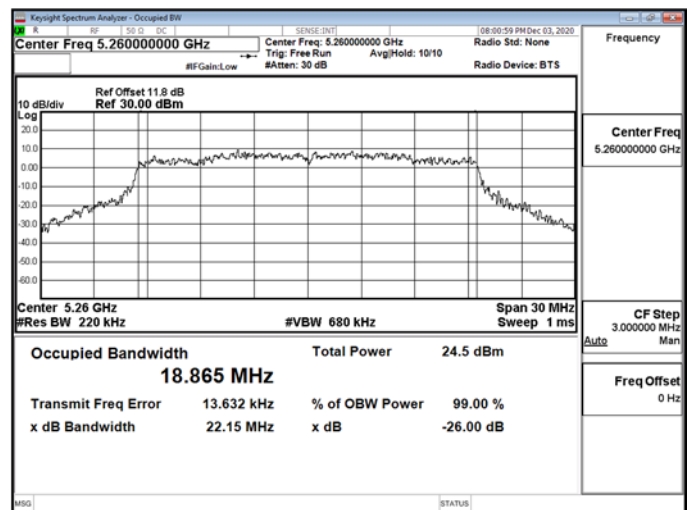
802.11ax_20MHz_Chain0_5240MHz



802.11ax_20MHz_Chain0_5180MHz



802.11ax_20MHz_Chain0_5260MHz



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