

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



FCC Applicant: Murata Manufacturing Co., Ltd.
1-10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan

FCC Manufacturer: Murata Manufacturing Co., Ltd.
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ISED Applicant: Murata Manufacturing Co., Ltd.
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ISED Manufacturer: Murata Manufacturing Co., Ltd.
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Product Name: Communication Module

Brand Name: muRata

Model No.: LBEE5ZZ1XL, LBEE5ZZ2XS

Model Difference: Refer to section 1.10

Report Number: E2/2022/10039

FCC ID VPYLBEE5ZZ1XL

IC: 772C-LBEE5ZZ1XL

Date of EUT Received: January 11, 2022

Date of Test: January 19, 2022~June 14, 2022

Issue Date: June 30, 2022

Approved By _____

Jay Lin

We hereby certify that:

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

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

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
E2/2022/10039	00	Original.	June 22, 2022	Yami Kuo	*
E2/2022/10039	01	Revised chapter 9.	June 30, 2022	Yami Kuo	*

Note:

- The remark "*" indicates modification of the report upon requests from certification body.
- Variant information of model numbers is provided by the applicant, please refer to section 1.10 of this report for details.
Test results of this report are applicable to the sample EUT(s) received and variant models are assessed as electrically identical, no further tests are required for the variant.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Communication Module
Brand Name:	muRata
Model No.:	LBEE5ZZ1XL, LBEE5ZZ2XS
Model Difference:	Refer to section 1.10
Hardware Version:	1
Firmware Version:	17.80.200.204
EUT Series No.:	1XL: Sample. No2
Power Supply:	3.3Vdc, 1.8Vdc
Test Software (Name/Version)	Tera Term V4.105 / Dut labtool v2.0.0.85

1.2 Modulation & Data Rate

Modulation type:	64QAM, 16QAM, QPSK and BPSK for OFDM in 802.11a and 802.11n
	256QAM, 64QAM, 16QAM, QPSK and BPSK for OFDM in 802.11ac
	1024QAM, 256QAM, 64QAM, 16QAM, QPSK and BPSK for OFDMA in 802.11ax only
Transition Rate:	802.11 a: 6 - 54 Mbps
	802.11 n_20MHz: 6.5 - 144.4 Mbps
	802.11 n_40MHz: 13.5 - 300 Mbps
	802.11 ac_20MHz: 6.5 - 173.3Mbps
	802.11 ac_40MHz: 13.5 - 400 Mbps
	802.11 ac_80MHz: 29.3 - 866.7Mbps
	802.11 ax_20MHz: 0.4 - 286.8Mbps
	802.11 ax_40MHz: 0.4 - 573.5Mbps
	802.11 ax_80MHz: 0.4 - 1201Mbps

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1.3 Antenna Designation

Antenna Type	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain (dBi)
Dipole	5150~5250	4.25	7.26
	5250~5350	4.25	7.26
	5475~5725	4.25	7.26
	5725~5850	4.25	7.26

Note:

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

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1.4 FCC

Wi-Fi	Frequency Range	Channels	Rated Power(Avg) (dBm) (Worst Case)	Modulation Technology
a/ n_HT/ ac_VHT/ ax_HE 20M	5180~5240	4	20.93 dBm	OFDM
	5260~5320	4	21.42 dBm	OFDM
	5500~5720	12	19.87 dBm	OFDMA
	5745-5825	5	21.84 dBm	OFDM
n_HT ac_VHT/ ax_HE 40M	5190~5230	2	20.88 dBm	OFDMA
	5270~5310	2	20.88 dBm	OFDM
	5510~5710	6	20.88 dBm	OFDM
	5755-5795	2	20.92 dBm	OFDMA
ac_VHT/ ax_HE 80M	5210	1	13.84 dBm	OFDMA
	5290	1	13.91 dBm	OFDMA
	5530~5690	3	19.91 dBm	OFDM
	5775	1	19.87 dBm	OFDMA

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1.5 ISED

Wi-Fi	Frequency Range	Channels	EIRP/Avg	Rated Power(EIRP/Avg) (dBm) (Worst Case)		Modulation Technology
a/ n_HT/ ac_VHT/ ax_HE 20M	5180~5240	4	EIRP	22.04	dBm	OFDM
	5260~5320	4	Avg	21.42	dBm	OFDM
	5500~5700	8	Avg	19.87	dBm	OFDMA
	5720 (U-NII 2C)	1	Avg	19.48	dBm	OFDM
	5720 (U-NII 3)	1	Avg	15.16	dBm	OFDMA
	5745-5825	5	Avg	21.84	dBm	OFDM
n_HT ac_VHT/ ax_HE 40M	5190~5230	2	EIRP	22.97	dBm	OFDMA
	5270~5310	2	Avg	20.94	dBm	OFDMA
	5510~5670	3	Avg	20.88	dBm	OFDM
	5710 (U-NII 2C)	1	Avg	20.17	dBm	OFDMA
	5710 (U-NII 3)	1	Avg	13.50	dBm	OFDM
	5755-5795	2	Avg	20.93	dBm	OFDMA
ac_VHT/ ax_HE 80M	5210	1	EIRP	21.10	dBm	OFDMA
	5290	1	Avg	13.91	dBm	OFDMA
	5530	1	Avg	19.91	dBm	OFDM
	5690 (U-NII 2C)	1	Avg	19.47	dBm	OFDMA
	5690 (U-NII 3)	1	Avg	10.68	dBm	OFDM
	5775	1	Avg	19.87	dBm	OFDMA

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1.6 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407
 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01
 FCC KDB 662911 D01 Multiple Transmitter Output v02r01
 FCC KDB 291074 D02 EMC Measurement v01
 RSS-247 issue 2 Feb. 2017
 RSS-Gen, Issue 5 (Amendment 2, February 2021)
 ANSI C63.10:2013

1.7 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conducted 5	TW0028	
		Conducted 6		
		Conduction C		
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
Conducted B				
Conducted C				
Conducted D				
Conducted E				
Conducted F				
Conducted G				

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

1.8 Special Accessories

There are no special accessories used while test was conducted.

1.9 Equipment Modifications

There was no modification incorporated into the EUT.

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1.10 Model difference

LBEE5ZZ1XL has a dedicated antenna port for BT.

LBEE5ZZ2XS BT shares same antenna port with WLAN.

Some passive components are different between models as below

LBEE5ZZ1XL	LBEE5ZZ2XS
C 336 No mounted	C336 mounted
C337 mounted	C337 No mounted
L310 mounted	L310 Nomounted

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Conducted Test (RF)

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

2.3.3 Radiated Emissions

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

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2.4 Measurement Results Explanation Example

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

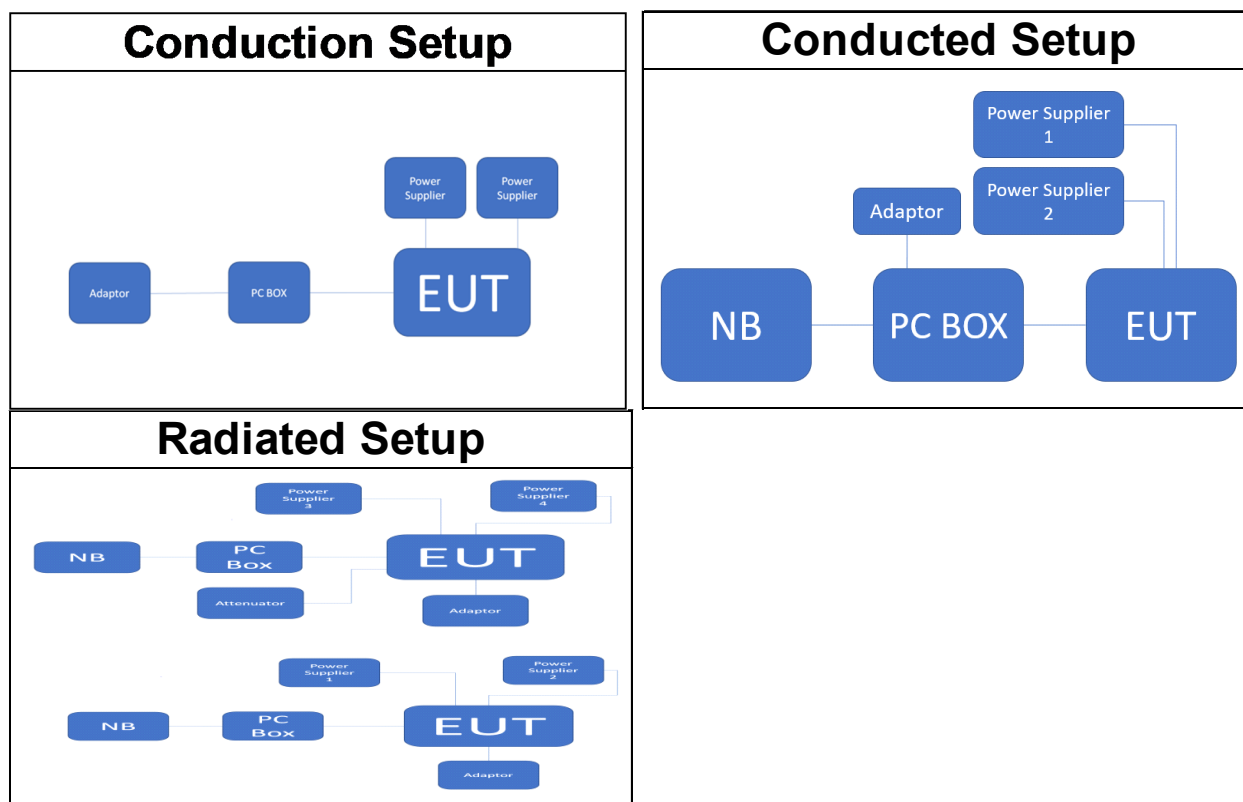
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

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.

2.5 Test Configuration



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2.6 Control Unit(s)

Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T420	S0012599	N/A	N/A
Notebook	Lenovo	L420	S0011721	N/A	N/A

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LAN Cable	向聯	VPH-02	1500021123	N.C.R	N.C.R
LAN Cable	INVAX	IVX011	N/A	N.C.R	N.C.R
Notebook	Lenovo	T470	P0001293	N/A	N/A
Notebook	Lenovo	T420	S0012599	N/A	N/A
Adapter	APD	NB-65B19	N/A	N/A	N/A
Adapter	FSP	FSP065-REBN2	H6081012364	N.C.R	N.C.R

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3 SUMMARY OF TEST RESULT

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

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

Operated band in 5150 MHz ~5250 MHz:

20 M		40 M		80 M	
CH	Freq (MHz)	CH	Freq (MHz)	CH	Freq (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

Operated band in 5250 MHz ~5350 MHz:

20 M		40 M		80 M	
CH	Freq (MHz)	CH	Freq (MHz)	CH	Freq (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

Operated band in 5470 MHz ~5725 MHz:

20 M		40 M		80 M	
CH	Freq (MHz)	CH	Freq (MHz)	CH	Freq (MHz)
100	5500	102	5510	106	5530
104	5520	110	5550	122	5610
108	5540	118	5590	138	5690
112	5560	126	5630		
116	5580	134	5670		
120	5600	142	5710		
124	5620				
128	5640				
132	5660				
136	5680				
140	5700				
144	5720				

Operated band in 5725 MHz ~5850 MHz:

20 M		40 M		80 M	
CH	Freq (MHz)	CH	Freq (MHz)	CH	Freq (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

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		
v	802.11 a	v	Ch0	v	Ch1		Ch2		Ch3	1TX	v	2TX
v	802.11 n	v	Ch0	v	Ch1		Ch2		Ch3	SISO	v	MIMO
v	802.11 ac	v	Ch0	v	Ch1		Ch2		Ch3	SISO	v	MIMO
v	802.11 ax	v	Ch0	v	Ch1		Ch2		Ch3	SISO	v	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.

802.11ax	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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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	2TX
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116			
	5745~5825	149 to 165	161			
802.11ax_HE80	5210	42	42	OFDMA	MCS0	MIMO
	5290	58	58			
	5530~5610	106 to 138	122			
	5775	155	155			

RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,161,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS8	MIMO
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,161,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
	5270~5310	54 to 62	54,62			
	5510~5670	102 to 142	102,110,134,142			
	5755~5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530~5610	106 to 138	106,122,138			
	5775	155	155			

RADIATED EMISSION TEST (ABOVE 1 GHz)							
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	RU CONFIGURATIO	DATA RATE (Mbps)	ANTENNA PORT
802.11ax_HE20	5180~5240	36 to 48	36,44,48	OFDMA	FULL RU 26/0,26/8 52/37,52/40 106/53,106/54	MCS0	MIMO
	5260~5320	52 to 64	52,60,64				
	5500~5720	100 to 144	100,116,140,144				
	5745~5825	149 to 165	149,161,165				
802.11ax_HE40	5190~5230	38 to 46	38,46	OFDMA	FULL RU 242/61,242/62	MCS0	MIMO
	5270~5310	54 to 62	54,62				
	5510~5670	102 to 142	102,110,134,142				
	5755~5795	151 to 159	151,159				
802.11ax_HE80	5210	42	42	OFDMA	FULL RU 484/65,484/66	MCS0	MIMO
	5290	58	58				
	5530~5610	106 to 138	106,122,138				
	5775	155	155				

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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	2TX
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,161,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS8	MIMO
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,161,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
	5270~5310	54 to 62	54,62			
	5510~5670	102 to 142	102,110,134,142			
	5755~5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530~5610	106 to 138	106,122,138			
	5775	155	155			

CONDUCTED TEST							
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	RU CONFIGURATIO	DATA RATE (Mbps)	ANTENNA PORT
802.11ax_HE20	5180~5240	36 to 48	36,44,48	OFDMA	FULL RU 26/0,26/8 52/37,52/40 106/53,106/54	MCS0	MIMO
	5260~5320	52 to 64	52,60,64				
	5500~5720	100 to 144	100,116,140,144				
	5745~5825	149 to 165	149,161,165				
802.11ax_HE40	5190~5230	38 to 46	38,46	OFDMA	FULL RU 242/61,242/62	MCS0	MIMO
	5270~5310	54 to 62	54,62				
	5510~5670	102 to 142	102,110,134,142				
	5755~5795	151 to 159	151,159				
802.11ax_HE80	5210	42	42	OFDMA	FULL RU 484/65,484/66	MCS0	MIMO
	5290	58	58				
	5530~5610	106 to 138	106,122,138				
	5775	155	155				

Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.34 dB
Output Power measurement	+/- 1 dB
Emission Bandwidth	+/- 1.53 Hz
Undesignable radiated emission measurement	+/- 1.68 dB
Peak Power Density	+/- 1.62 dB
Temperature	+/- 0.4 °C
Humidity	+/- 3.5 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	2.57 dB	9kHz~30MHz
	+/-	4.85 dB	30MHz - 1000MHz
	+/-	4.45 dB	1GHz - 18GHz
	+/-	4.24 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	2.57 dB	9kHz~30MHz
	+/-	4.37 dB	30MHz - 1000MHz
	+/-	4.45 dB	1GHz - 18GHz
	+/-	4.24 dB	18GHz - 40GHz

Note:

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

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6 MEASUREMENT EQUIPMENT USED

6.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZBECK Mess- Elektronik	NSLK8127	974	04/19/2021	04/18/2022
LISN	SCHWARZBECK Mess- Elektronik	NSLK8127	974	04/13/2022	04/12/2023
EMI Test Receiver	R&S	ESCI	101342	04/28/2021	04/27/2022
EMI Test Receiver	R&S	ESCI	101342	04/25/2022	04/24/2023
DC Power Supply	Gwinstek	SPS-3610	GEV856769	08/04/2021	08/03/2022
DC Power Supply	DHA	DPS-3003	9411005787	08/20/2021	08/19/2022
Coaxial Cable	EC Lab	RF-HY-CAB- 250	RF-HY-CAB- 250-01	03/27/2022	03/26/2023
Pulse Limiter	EC Lab	VTSD 9561F- N	04/29/1901	03/27/2022	03/26/2023
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

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6.2 Conducted Measurement

Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/25/2021	06/24/2022
Power Meter	Anritsu	ML2496A	1512003	07/27/2021	07/26/2022
Power Sensor	Anritsu	MA2411B	1339378	07/27/2021	07/26/2022
Power Sensor	Anritsu	MA2411B	1339379	07/27/2021	07/26/2022
DC Power Supply	Agilent	E3640A	MY53130054	09/30/2021	09/29/2022
DC Power Supply	Agilent	E3640A	MY53140006	05/28/2021	05/27/2022
DC Power Supply	Agilent	E3640A	MY53140006	05/16/2022	05/15/2023
DC Power Supply	HOLA	DP-3003	D7070035	05/28/2021	05/27/2022
DC Power Supply	HOLA	DP-3003	D7070035	06/09/2022	06/08/2023
DC Power Supply	Gwinstek	SPS-3610	GEV856767	09/29/2021	09/28/2022
Attenuator	Marvelous	MVE2213-10	RF13	11/18/2021	11/17/2022
Attenuator	Marvelous	WATT-218FS-10	RF15	11/18/2021	11/17/2022
Attenuator	KEYSIGHT	8494B	TH60075424	05/07/2021	05/06/2022
Attenuator	KEYSIGHT	8494B	TH60075424	05/06/2022	05/05/2023
Coupler	narda	MDC2044-20	RF36	11/18/2021	11/17/2022
DC Block	PASTERNAK	PE8210	RF158	11/18/2021	11/17/2022
Splitter	Marvelous Microwave	MVE8576	RF256	11/18/2021	11/17/2022
RF Switch	E-INSTRUMENT TECH LTD	ETF-1801	EC2100175	09/10/2021	09/09/2022
Coaxial Cables	Woken	00100A1F2A196C	RF62	11/18/2021	11/17/2022
Coaxial Cables	Woken	00100A1F2A196C	RF64	11/18/2021	11/17/2022
Coaxial Cables	Woken	00100A1F1A185C	RF71	11/18/2021	11/17/2022

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6.3 Radiated Measurement

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWAZBECK	VULB 9168	9168-617	11/12/2021	11/11/2022
Horn Antenna	Schwarzbeck	BBHA9170	185	08/06/2021	08/05/2022
Horn Antenna	Schwarzbeck	BBHA9120D	1341	06/04/2021	06/03/2022
Loop Antenna	ETS.LINDGREN	6502	143303	05/07/2021	05/06/2022
Loop Antenna	ETS.LINDGREN	6502	148045	09/29/2021	09/28/2022
3m Site NSA	SGS	966 chamber D	N/A	07/12/2021	07/11/2022
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/24/2021	03/23/2022
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/24/2022	03/23/2023
Attenuator	KEYSIGHT	8494B	TH60075424	05/07/2021	05/06/2022
Attenuator	KEYSIGHT	8494B	TH60075424	05/07/2022	05/06/2023
DC Power Supply	Gwinstek	SPS-3610	GEV856769	08/04/2021	08/03/2022
DC Power Supply	DHA	DPS-3003	9411005787	08/20/2021	08/19/2022
DC Power Supply	Agilent	E3640A	MY53140006	05/28/2021	05/27/2022
DC Power Supply	Agilent	E3640A	MY53140006	05/28/2022	05/27/2023
DC Power Supply	Agilent	E3640A	MY53170008	09/18/2021	09/17/2022
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2021	10/26/2022
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/18/2021	11/17/2022
Pre-Amplifier	EMC Instruments	EMC12630SE	980273	11/18/2021	11/17/2022
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	11/18/2021	11/17/2022
Coaxial Cable	Huber Suhner	EMC106-SM-SM-7200	150703	11/18/2021	11/17/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	11/18/2021	11/17/2022
Attenuator	Marvelous	WATT-218FS-10	RF17	11/18/2021	11/17/2022

NOTE: N.C.R refers to Not Calibrated Required.

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7 CONDUCTED EMISSION TEST

7.1 Standard Applicable

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

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

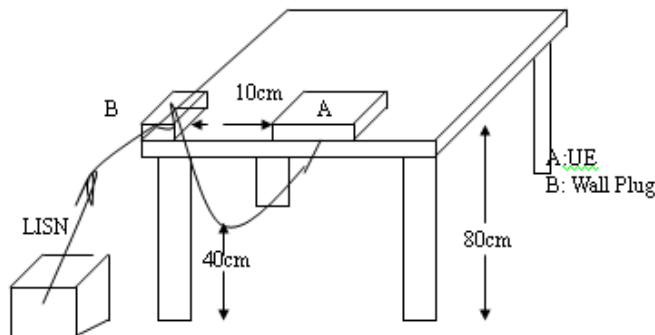
Note

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

7.2 EUT Setup

- The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 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.
- The LISN was connected with 120Vac/60Hz power source.

7.3 Test SET-UP



7.4 Measurement Procedure

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

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7.5 Measurement Result

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

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

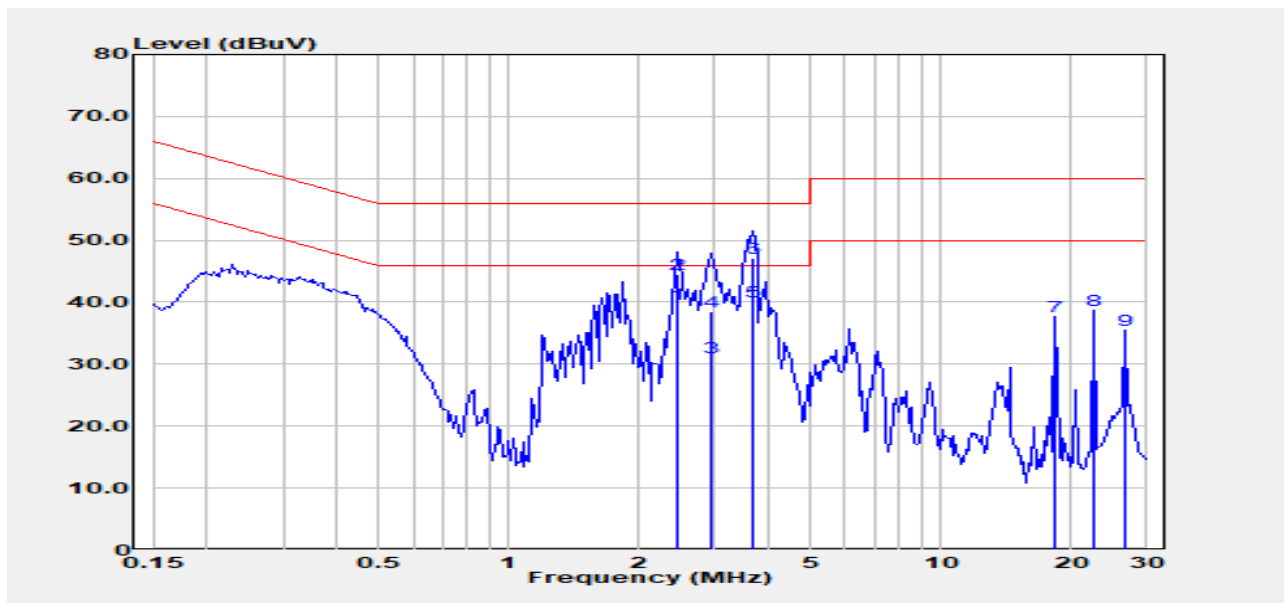
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number :E2/2022/10039 Test Site :Conduction C
 Test Mode :5G Test Date :2022-06-14
 Power :120V/60Hz Temp./Humi. :20.6/64
 Probe :L1 Engineer :Howard Huang
 Note: :Adapter:FSP0065-REBN2



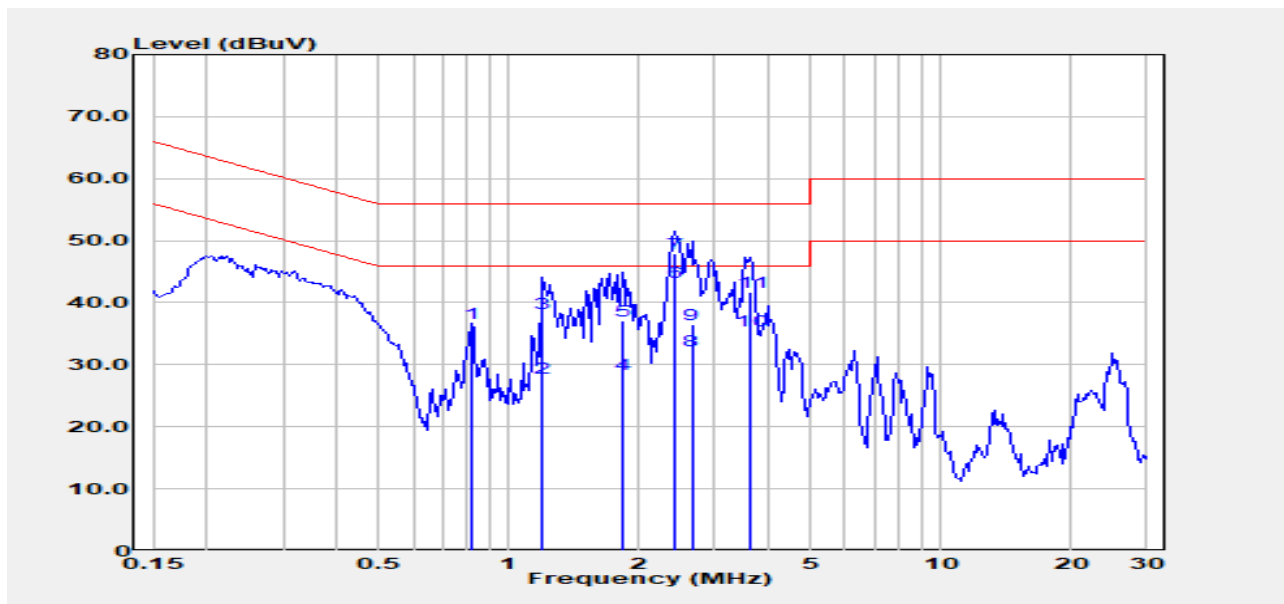
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V	Limit dB μ V	Margin dB
2.461	Average	28.70	11.03	39.73	46.00	-6.27
2.461	QP	33.40	11.03	44.43	56.00	-11.57
2.946	Average	20.10	10.90	31.00	46.00	-15.00
2.946	QP	27.60	10.90	38.50	56.00	-17.50
3.681	Average	29.40	10.74	40.14	46.00	-5.86
3.681	QP	36.40	10.74	47.14	56.00	-8.86
18.426	Peak	26.95	10.85	37.79	60.00	-22.21
22.535	Peak	27.84	10.94	38.78	60.00	-21.22
26.699	Peak	24.53	11.04	35.57	60.00	-24.43

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Report Number :E2/2022/10039 Test Site :Conduction C
 Test Mode :5G Test Date :2022-06-14
 Power :120V/60Hz Temp./Humi. :20.6/64
 Probe :N Engineer :Howard Huang
 Note: :Adapter:FSP0065-REBN2



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V	Limit dB μ V	Margin dB
0.817	Peak	26.41	10.33	36.74	56.00	-19.26
1.197	Average	17.40	10.55	27.95	46.00	-18.05
1.197	QP	27.80	10.55	38.35	56.00	-17.65
1.829	Average	17.40	11.04	28.44	46.00	-17.56
1.829	QP	26.10	11.04	37.14	56.00	-18.86
2.409	Average	32.40	11.01	43.41	46.00	-2.59
2.409	QP	36.90	11.01	47.91	56.00	-8.09
2.650	Average	21.30	10.94	32.24	46.00	-13.76
2.650	QP	25.60	10.94	36.54	56.00	-19.46
3.642	Average	24.70	10.71	35.41	46.00	-10.59
3.642	QP	31.00	10.71	41.71	56.00	-14.29

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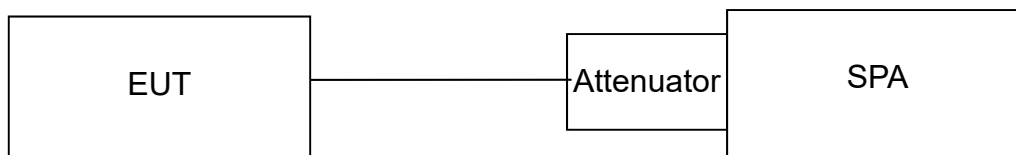
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8 EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.
The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3.

8.2 Test Setup



8.3 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 -26 dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as
RBW = 100 kHz,
VBW = 3*RBW,
Span = large enough to capture all products of the modulation process,
Detector=Peak,
Sweep=auto
 - b. Mark the peak frequency and -6 dB (upper and lower) frequency.
6. For 99% Bandwidth: Set the spectrum analyzer as
RBW = 1%,
VBW = 3*RBW,
Span = large enough to capture all products of the modulation process,
Detector=Sample,
Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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8.4 Measurement Result

8.4.1 FCC Occupied Bandwidth

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.30	12.860
5200	19.79	12.960
5240	24.77	13.940
5260	20.93	13.210
5300	20.82	13.180
5320	19.41	12.880
5500	19.46	12.890
5580	19.48	12.900
5700	26.38	14.210
5720(U-NII 2C)	14.89	11.730
5720(U-NII 3)	4.89	6.890

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.38	12.140
5805	16.37	12.140
5825	16.38	12.140

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.29	< 5250
5745	5736.76	> 5725

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802.11a_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.47	12.890
5200	19.40	12.880
5240	19.21	12.840
5260	19.35	12.870
5300	19.53	12.910
5320	19.28	12.850
5500	19.37	12.870
5580	21.14	13.250
5700	24.27	13.850
5720(U-NII 2C)	17.38	12.400
5720(U-NII 3)	7.38	8.680

802.11a_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.38	12.140
5805	16.37	12.140
5825	16.50	12.170

802.11a_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.28	< 5250
5745	5736.76	> 5725

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802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.88	12.980
5200	19.95	13.000
5240	26.80	14.280
5260	21.29	13.280
5300	20.39	13.090
5320	19.93	13.000
5500	19.95	13.000
5580	21.08	13.240
5700	25.14	14.000
5720(U-NII 2C)	14.84	11.710
5720(U-NII 3)	4.84	6.850

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.67	12.220
5805	16.92	12.280
5825	17.03	12.310

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.84	< 5250
5745	5736.21	> 5725

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802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	19.90	12.990
5200	19.86	12.980
5240	19.63	12.930
5260	19.51	12.900
5300	19.55	12.910
5320	19.48	12.900
5500	19.87	12.980
5580	22.47	13.520
5700	24.84	13.950
5720(U-NII 2C)	16.65	12.220
5720(U-NII 3)	6.65	8.230

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.54	12.440
5805	17.19	12.350
5825	17.59	12.450

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.80	< 5250
5745	5736.21	> 5725

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802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.70	16.100
5230	44.05	16.440
5270	40.44	16.070
5310	40.23	16.050
5510	40.68	16.090
5550	40.24	16.050
5670	49.99	16.990
5710(U-NII 2C)	39.76	15.990
5710(U-NII 3)	9.76	9.890

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.11	15.450
5795	35.21	15.470

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.03	< 5250
5755	5737.01	> 5725

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802.11n_HT40_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	39.65	15.980
5230	40.65	16.090
5270	39.50	15.970
5310	39.69	15.990
5510	40.01	16.020
5550	39.98	16.020
5670	49.23	16.920
5710(U-NII 2C)	37.33	15.720
5710(U-NII 3)	7.33	8.650

802.11n_HT40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.13	15.460
5795	35.37	15.490

802.11n_HT40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.06	< 5250
5755	5737.02	> 5725

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802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.72	19.120
5290	81.74	19.120
5530	81.43	19.110
5610	81.26	19.100
5690(U-NII 2C)	84.56	19.270
5690(U-NII 3)	14.56	11.630

802.11ac_VHT80_Ch0

Freq. (MHz)	49.51	10 Log (B) (dB)
5775	76.31	18.830

802.11ac_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.04	< 5250
5775	5737.16	> 5725

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802.11ac_VHT80_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.65	19.120
5290	81.68	19.120
5530	81.34	19.100
5610	81.13	19.090
5690(U-NII 2C)	78.03	18.920
5690(U-NII 3)	8.03	9.050

802.11ac_VHT80_Ch1

Freq. (MHz)	49.93	10 Log (B) (dB)
5775	76.39	18.830

802.11ac_VHT80_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.01	< 5250
5775	5737.16	> 5725

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802.11ax_HE20_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5180	full	20.27	13.070
5200	full	20.29	13.070
5240	full	20.21	13.060
5260	full	20.23	13.060
5300	full	20.41	13.100
5320	full	20.32	13.080
5500	full	20.52	13.120
5580	full	20.21	13.060
5700	full	24.60	13.910
5720 (U-NII 2C)	full	15.15	11.800
5720 (U-NII 3)	full	5.15	7.110

802.11ax_HE20_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	17.77	12.500
5805	full	17.55	12.440
5825	full	18.12	12.580

802.11ax_HE20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.38	< 5250
5745	5735.64	> 5725

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802.11ax_HE20_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5180	full	19.91	12.990
5200	full	20.36	13.090
5240	full	21.00	13.220
5260	full	20.31	13.080
5300	full	20.13	13.040
5320	full	20.16	13.040
5500	full	20.27	13.070
5580	full	20.26	13.070
5700	full	20.25	13.060
5720 (U-NII 2C)	full	17.02	12.310
5720 (U-NII 3)	full	7.02	8.470

802.11ax_HE20_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	17.51	12.430
5805	full	17.82	12.510
5825	full	17.84	12.510

802.11ax_HE20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.37	< 5250
5745	5735.64	> 5725

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802.11ax_HE40_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5190	full	40.02	16.020
5230	full	49.51	16.950
5270	full	48.03	16.820
5310	full	40.79	16.110
5510	full	39.93	16.010
5550	full	40.43	16.070
5670	full	49.35	16.930
5710 (U-NII 2C)	full	36.80	15.660
5710 (U-NII 3)	full	6.80	8.320

802.11ax_HE40_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	35.43	15.490
5795	full	35.90	15.550

802.11ax_HE40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.80	< 5250
5755	5736.31	> 5725

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802.11ax_HE40_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5190	full	40.04	16.020
5230	full	49.93	16.980
5270	full	45.07	16.540
5310	full	40.15	16.040
5510	full	40.24	16.050
5550	full	40.10	16.030
5670	full	48.53	16.860
5710 (U-NII 2C)	full	35.10	15.450
5710 (U-NII 3)	full	5.10	7.070

802.11ax_HE40_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	35.73	15.530
5795	full	36.10	15.580

802.11ax_HE40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.70	< 5250
5755	5736.34	> 5725

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802.11ax_HE80_Ch0

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5210	full	80.05	19.030
5290	full	80.67	19.070
5530	full	80.14	19.040
5610	full	80.17	19.040
5690 (U-NII 2C)	full	80.08	19.040
5690 (U-NII 3)	full	10.08	10.030

802.11ax_HE80_Ch0

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5775	full	77.73	18.910

802.11ax_HE80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.69	< 5250
5775	5736.24	> 5725

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802.11ax_HE80_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5210	full	80.37	19.050
5290	full	80.26	19.040
5530	full	80.39	19.050
5610	full	80.39	19.050
5690 (U-NII 2C)	full	77.86	18.910
5690 (U-NII 3)	full	7.86	8.950

802.11ax_HE80_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5775	full	77.87	18.910

802.11ax_HE80_Ch1

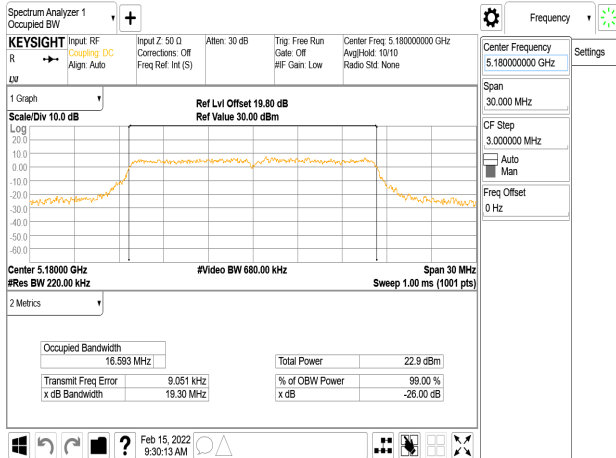
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.86	< 5250
5775	5736.27	> 5725

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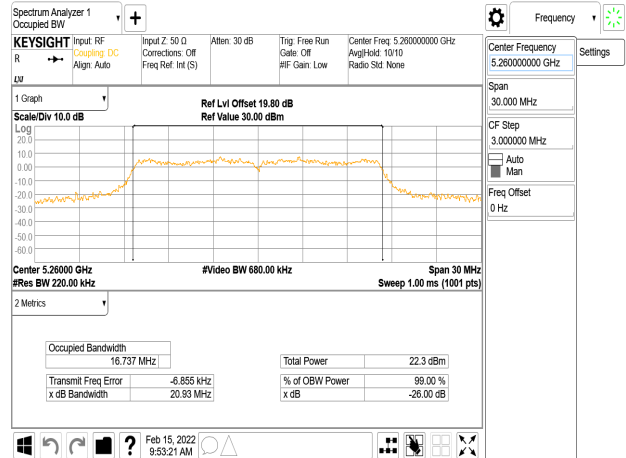
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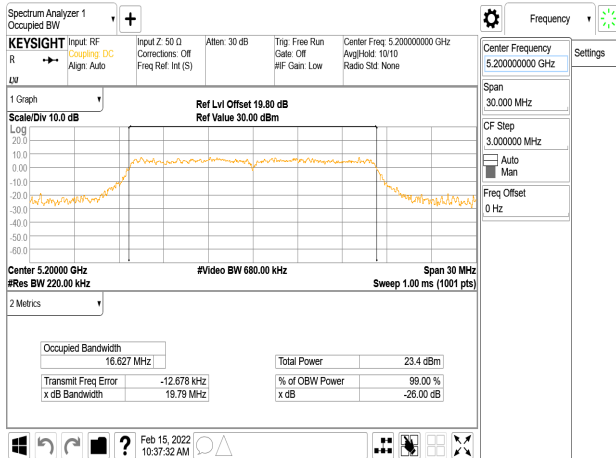
802.11a_20MHz_Chain0_5180MHz



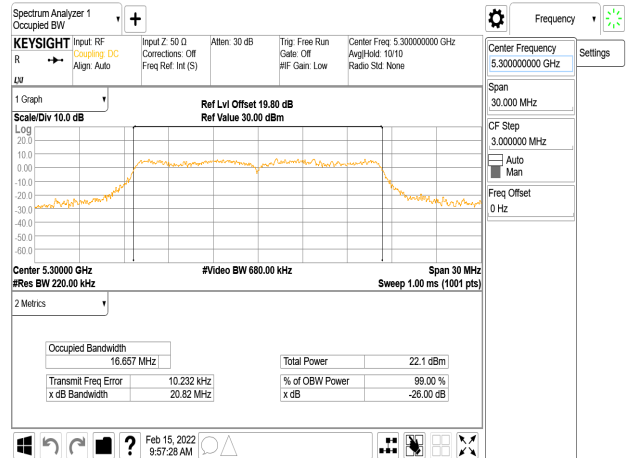
802.11a_20MHz_Chain0_5260MHz



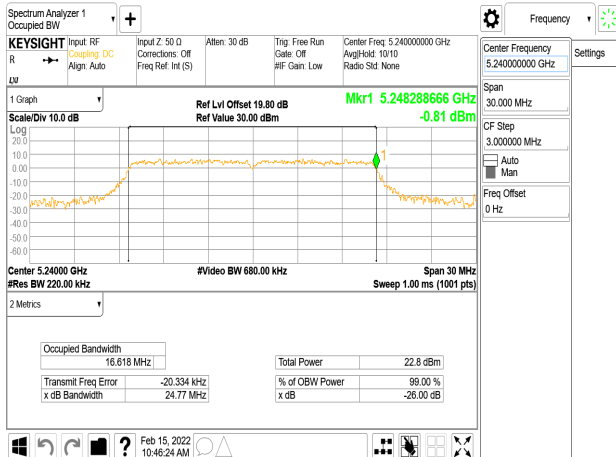
802.11a_20MHz_Chain0_5220MHz



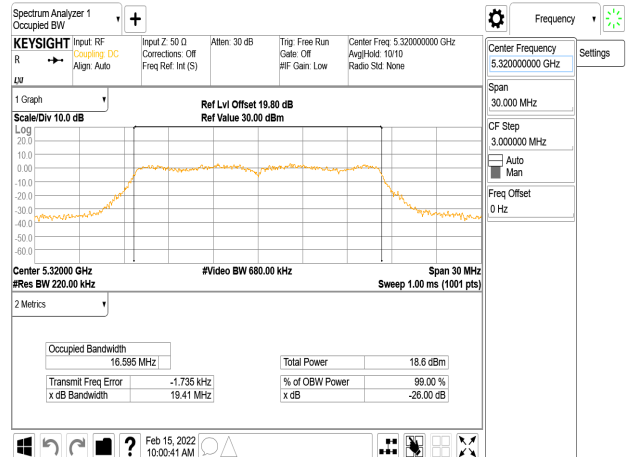
802.11a_20MHz_Chain0_5300MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

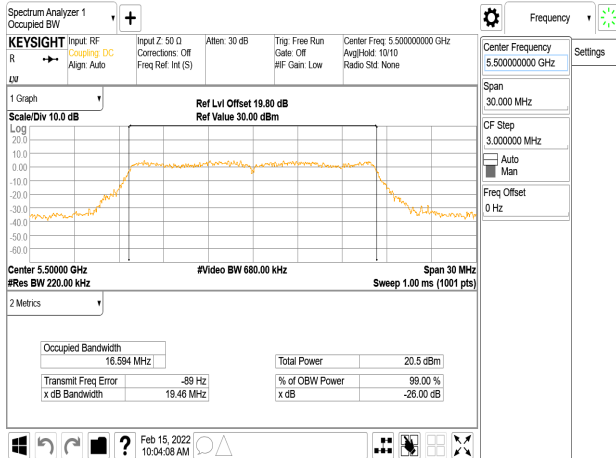


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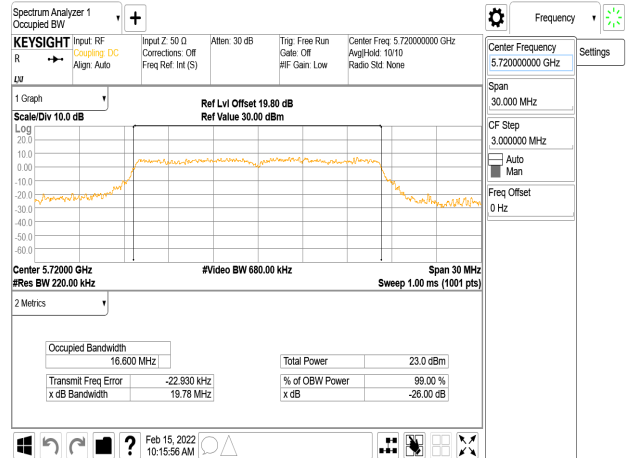
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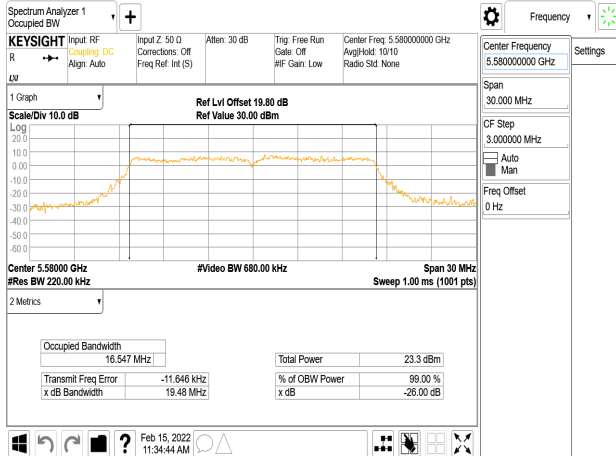
802.11a_20MHz_Chain0_5500MHz



802.11a_20MHz_Chain0_5720MHz



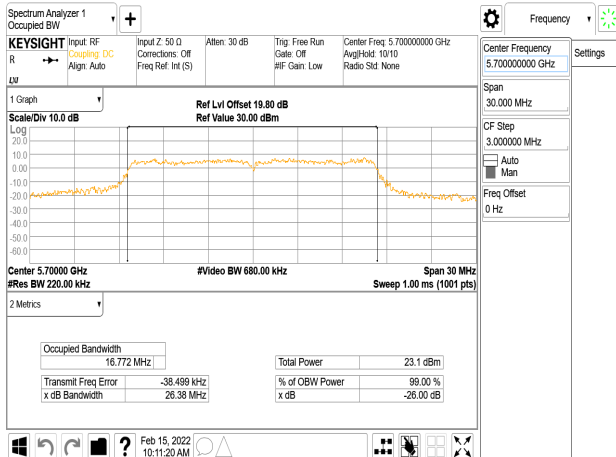
802.11a_20MHz_Chain0_5580MHz



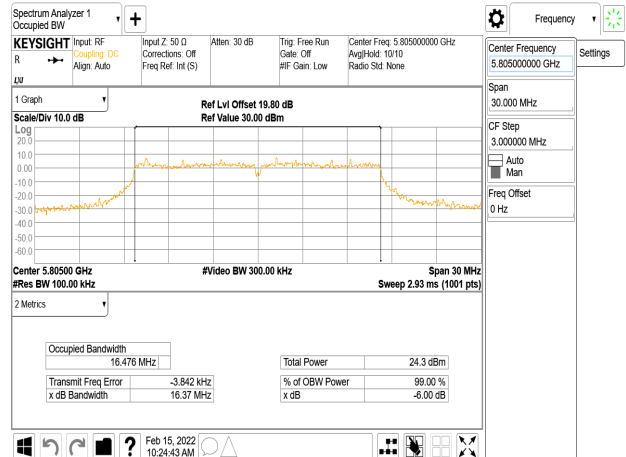
802.11a_20MHz_Chain0_5745MHz



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5805MHz

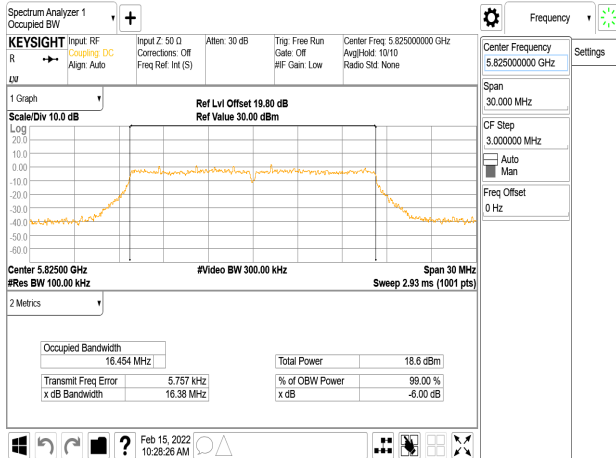


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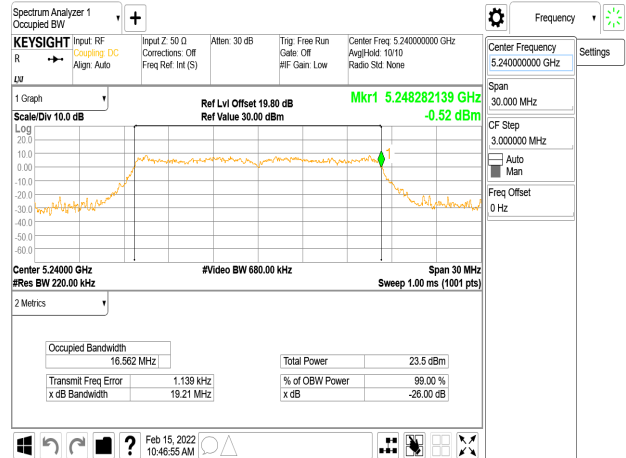
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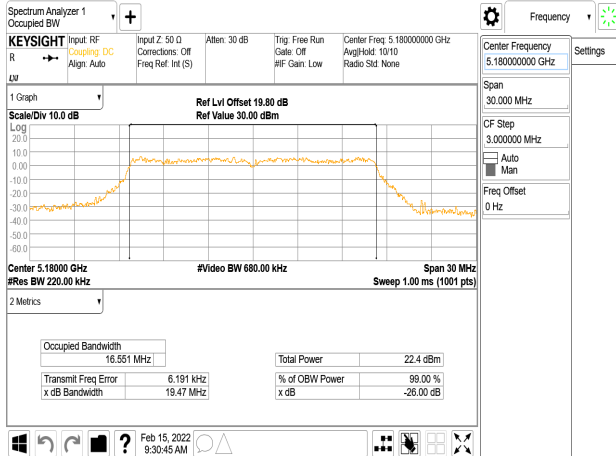
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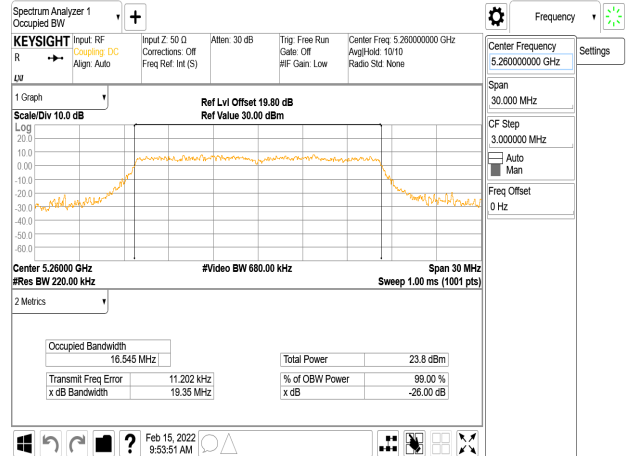
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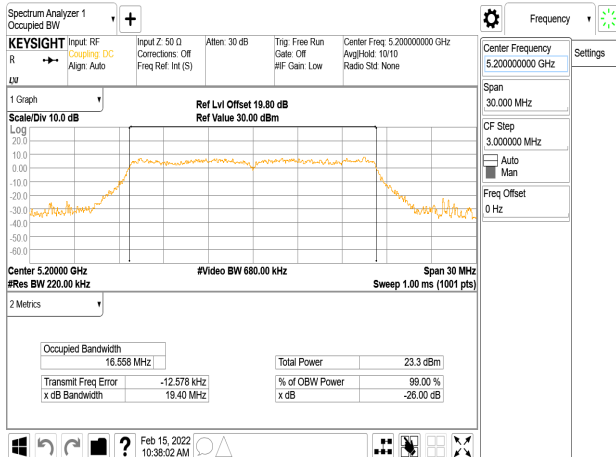
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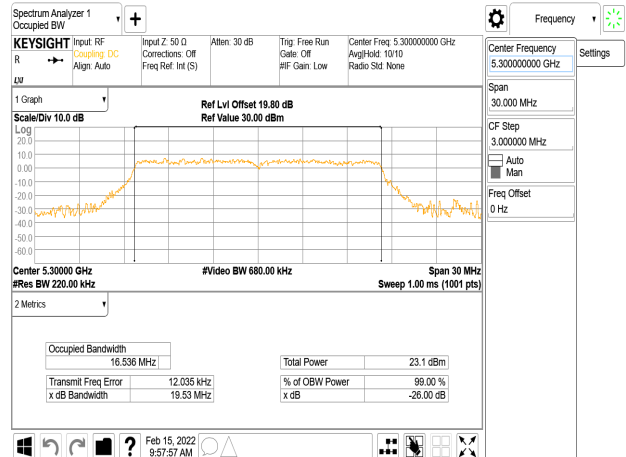
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802.11a_20MHz_Chain1_5220MHz



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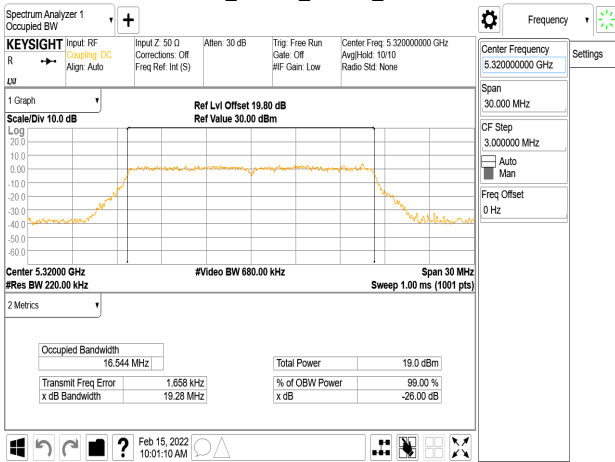


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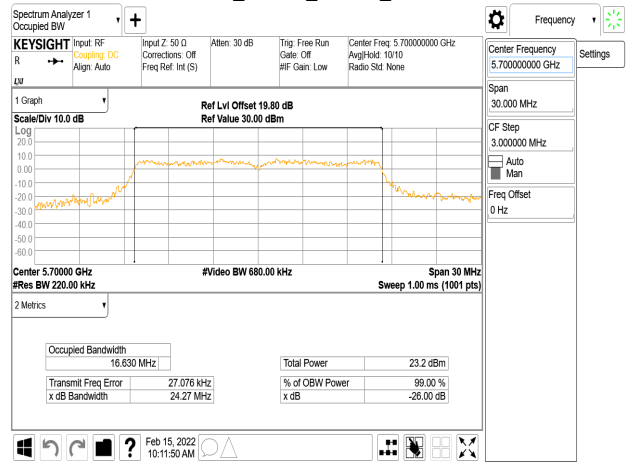
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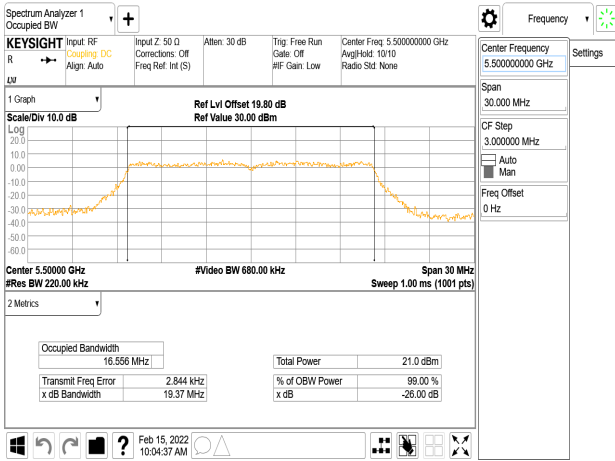
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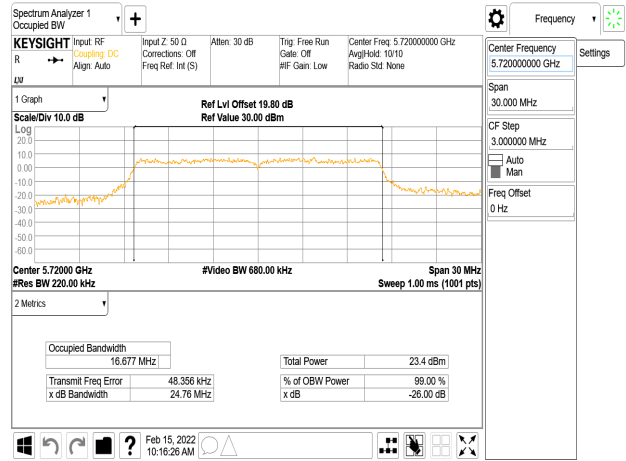
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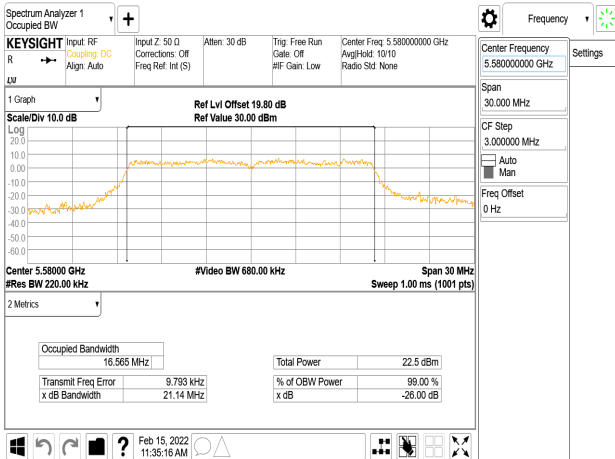
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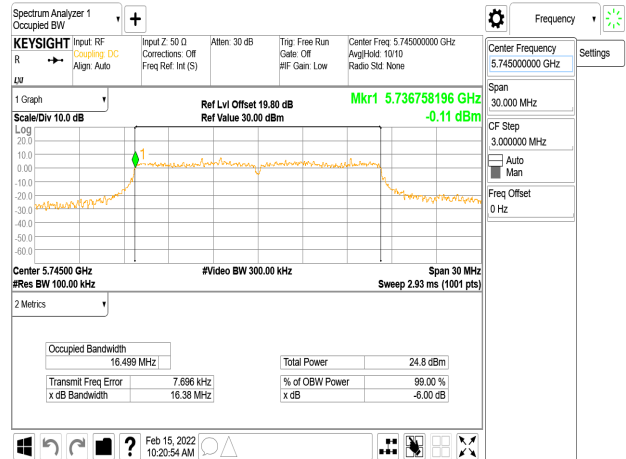
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802.11a_20MHz_Chain1_5580MHz



802.11a_20MHz_Chain1_5745MHz

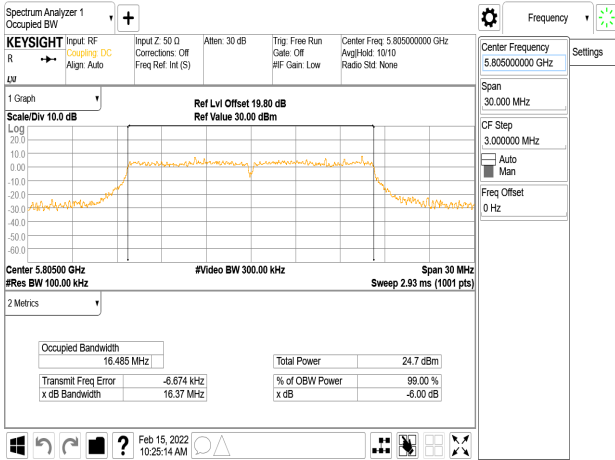


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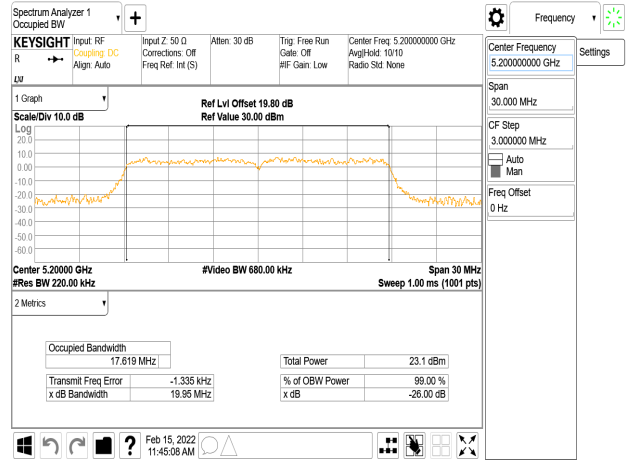
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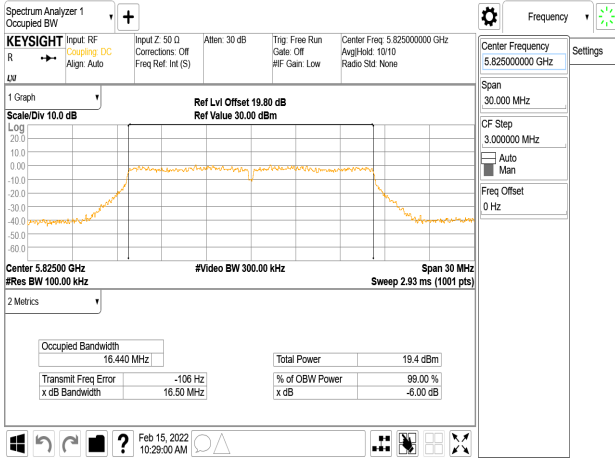
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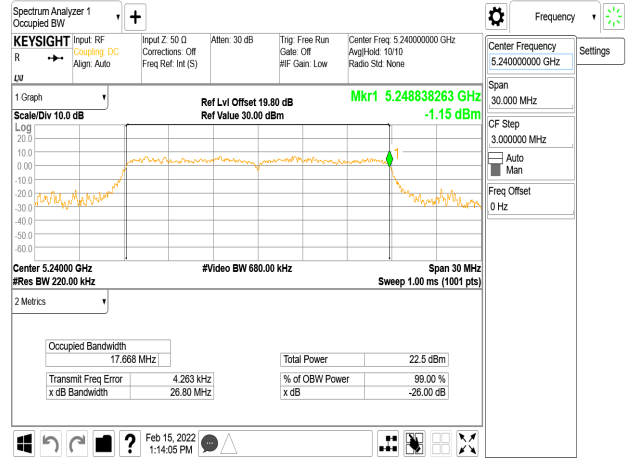
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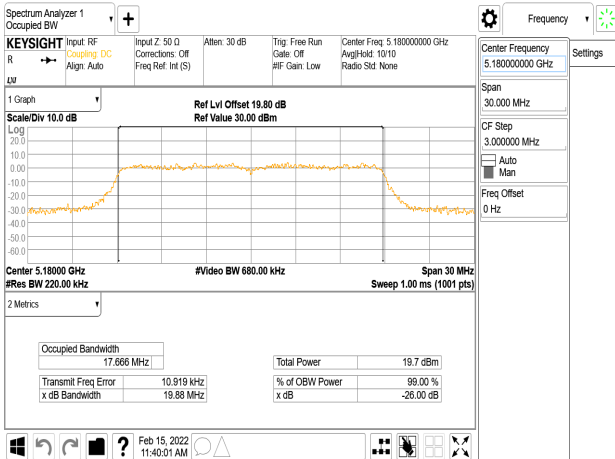
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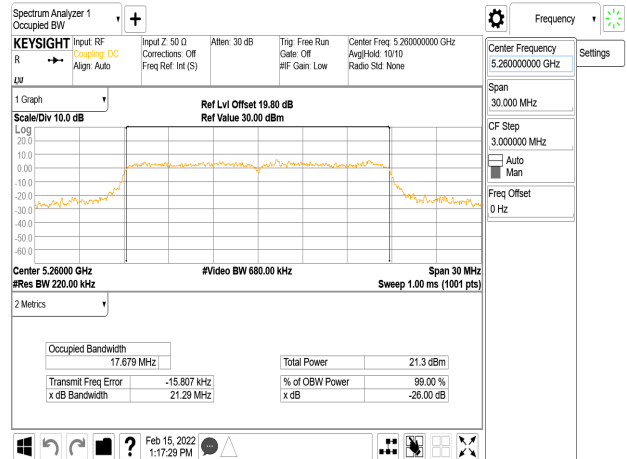
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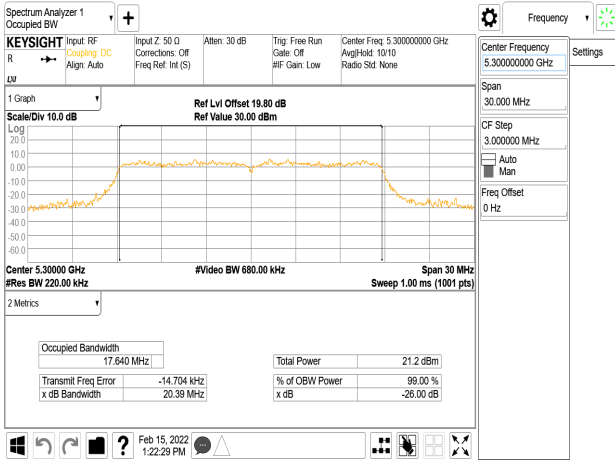


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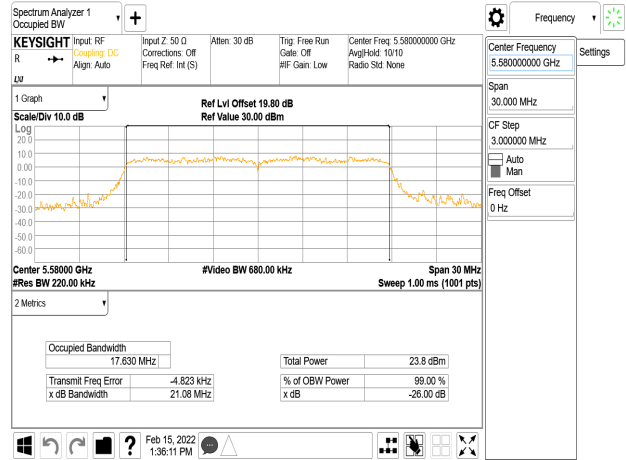
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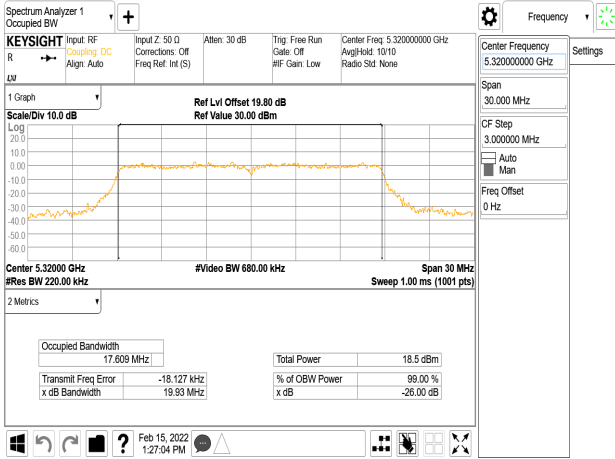
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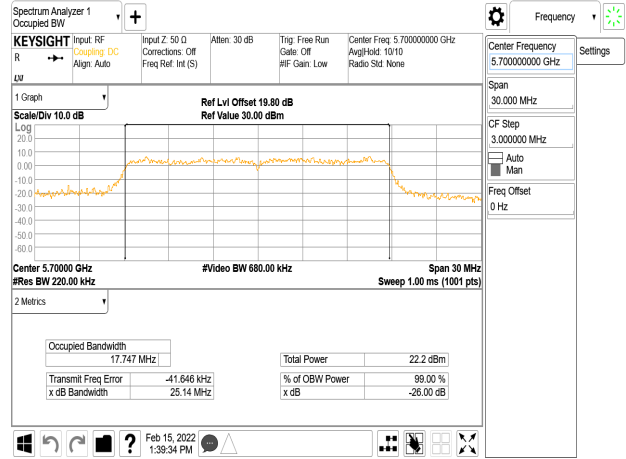
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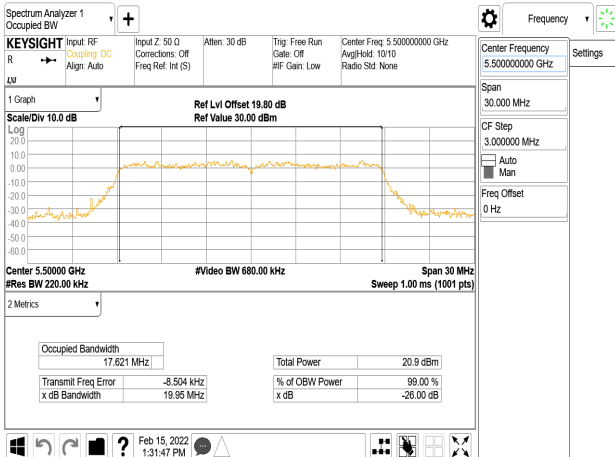
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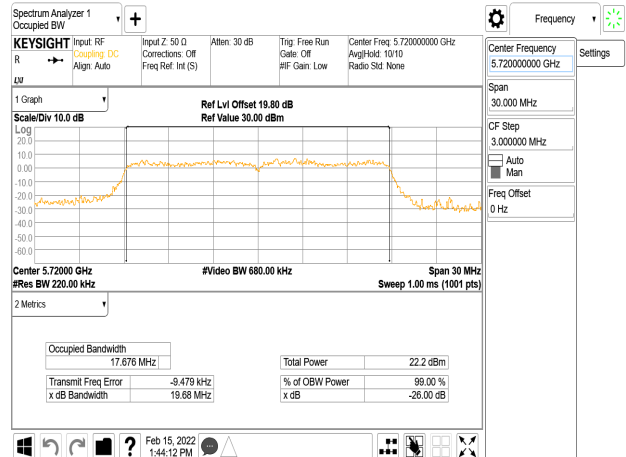
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802.11n_20MHz_Chain0_5500MHz



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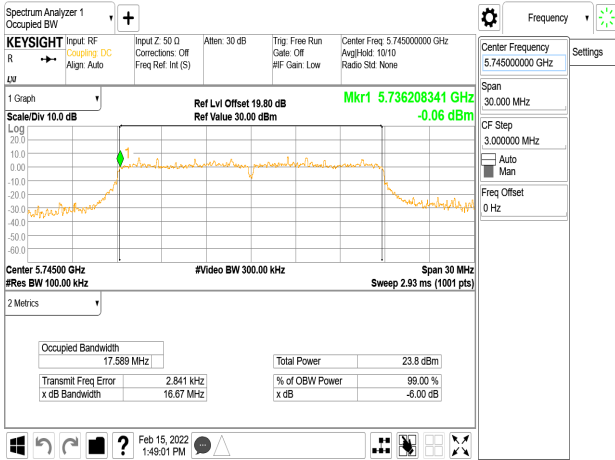


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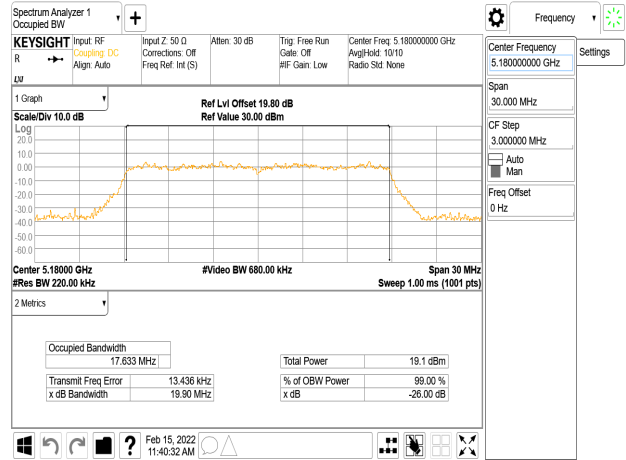
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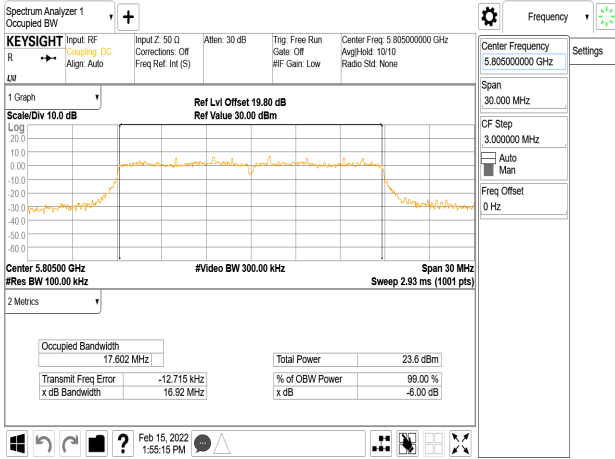
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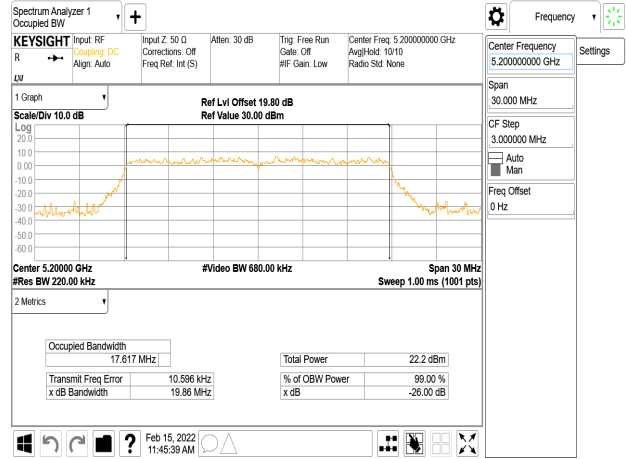
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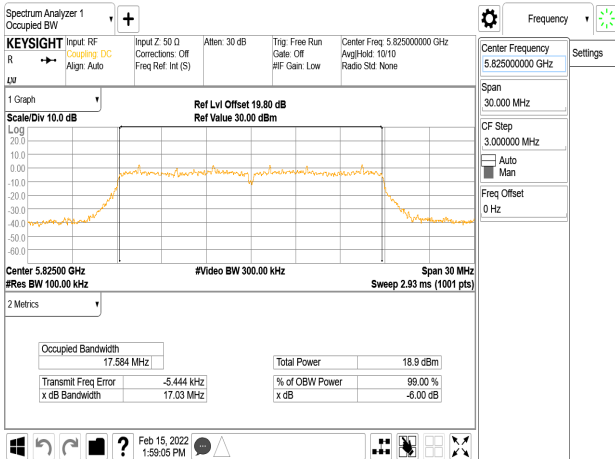
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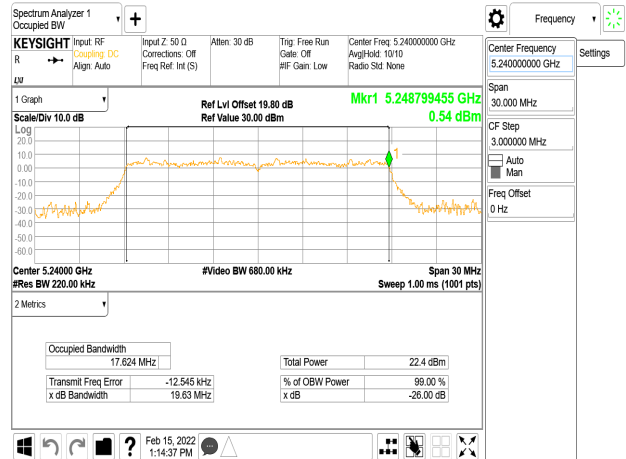
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802.11n_20MHz_Chain0_5825MHz



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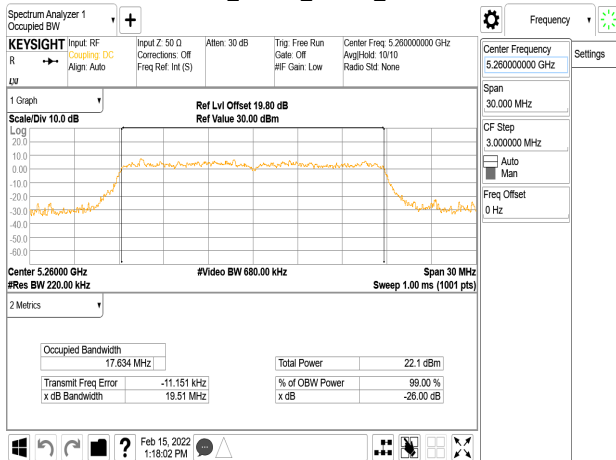


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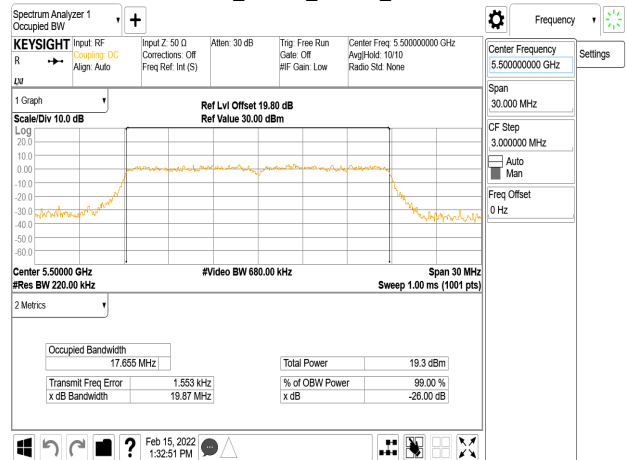
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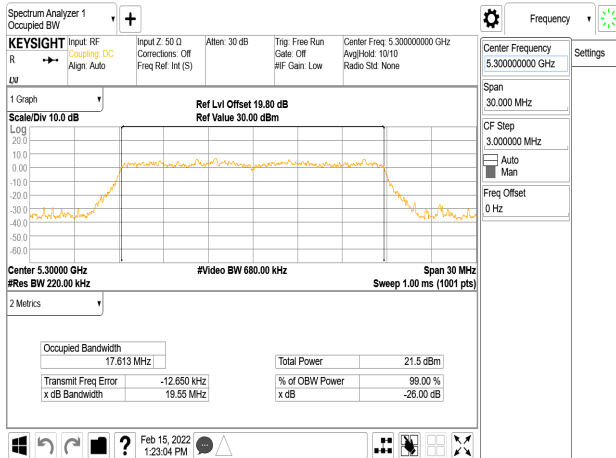
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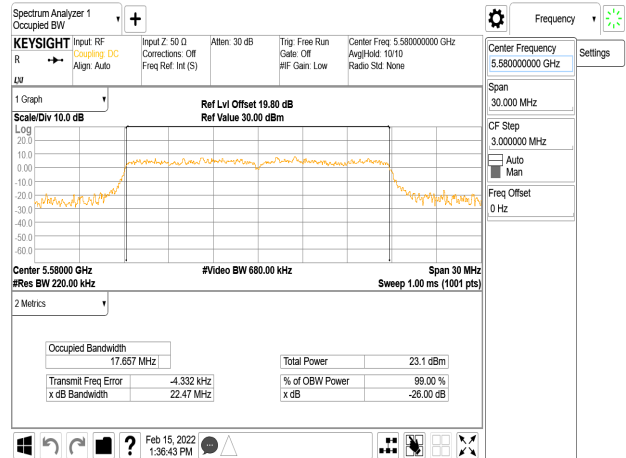
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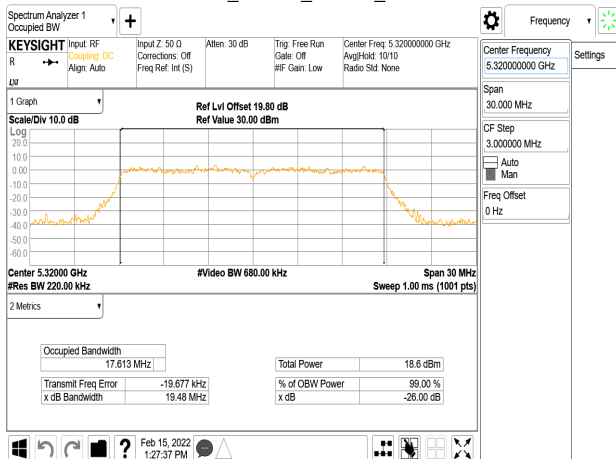
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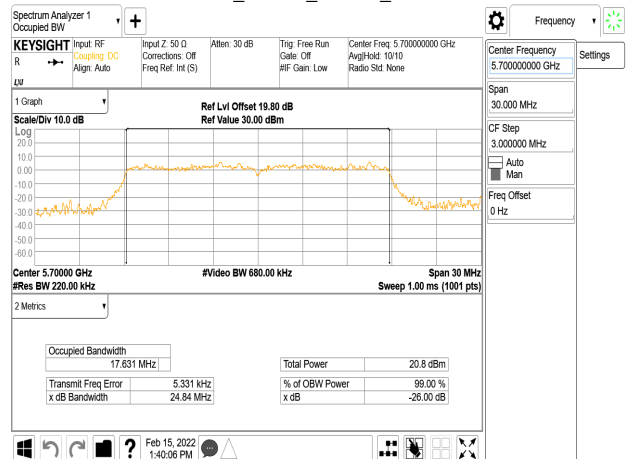
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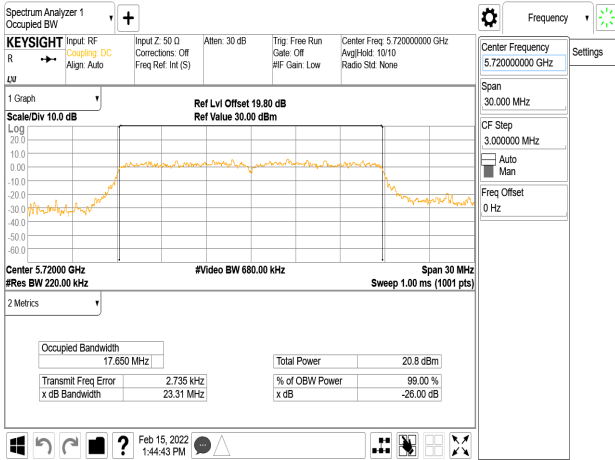


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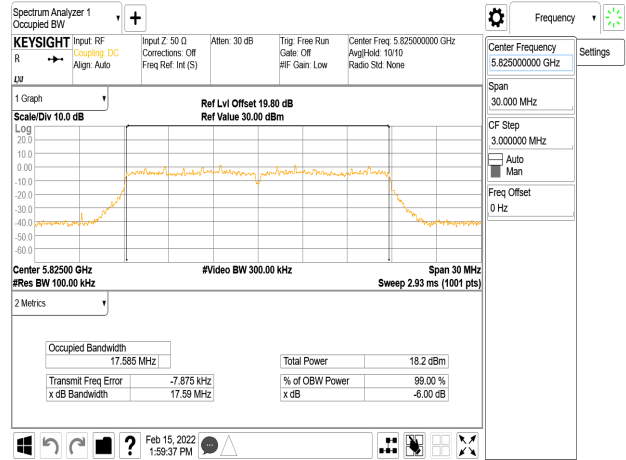
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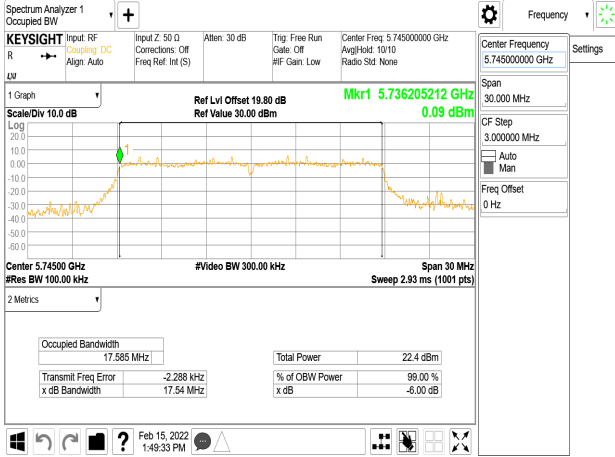
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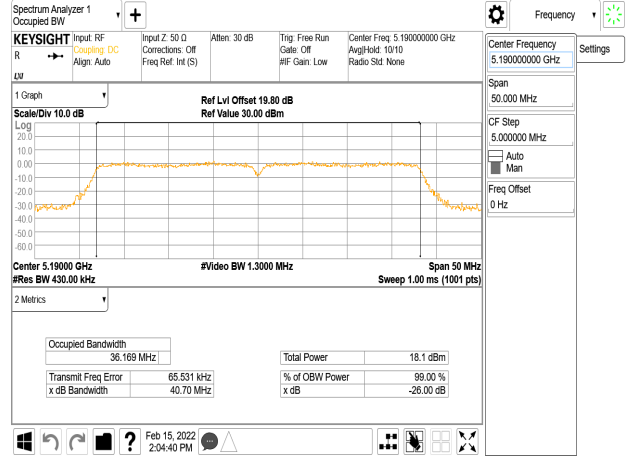
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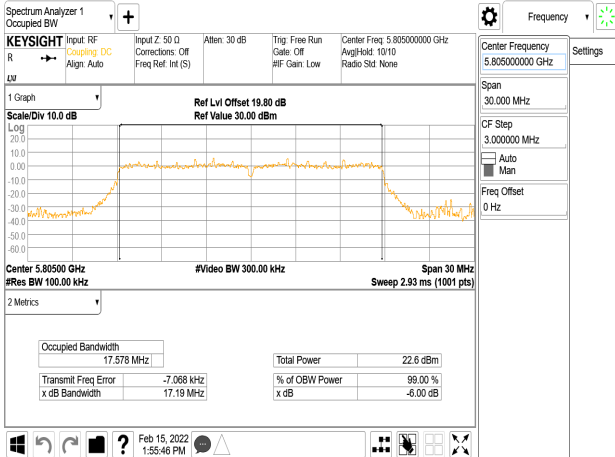
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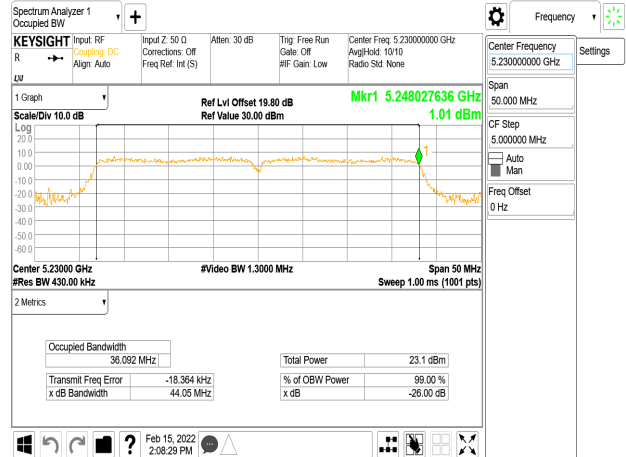
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802.11n_20MHz_Chain1_5805MHz



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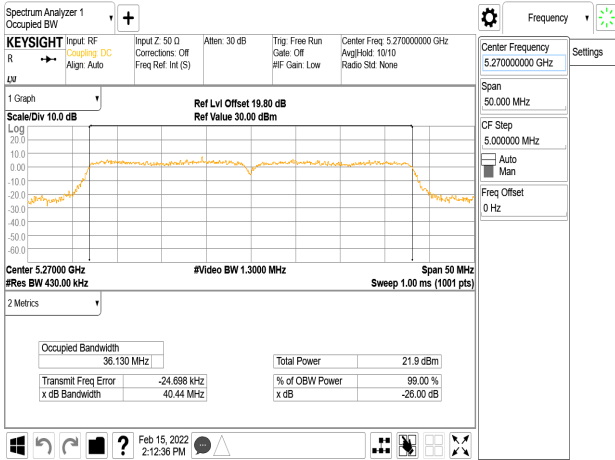


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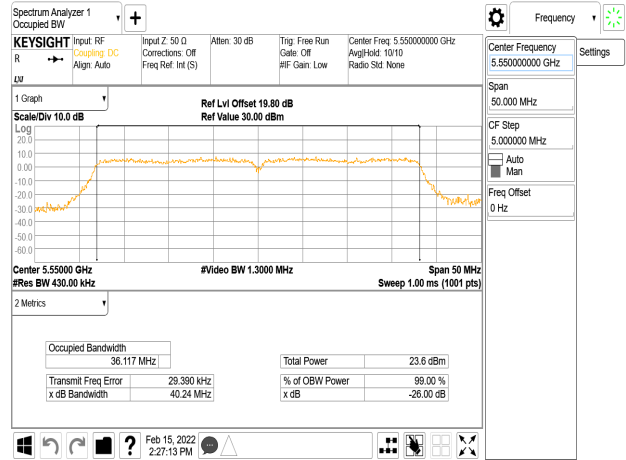
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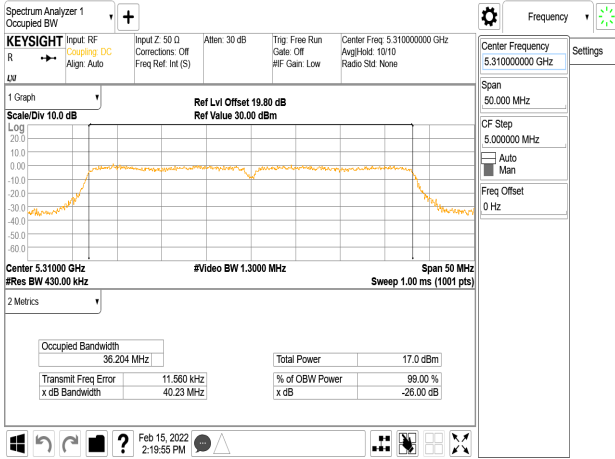
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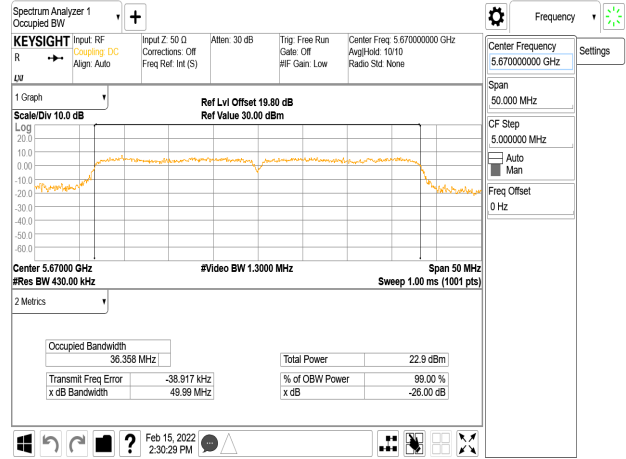
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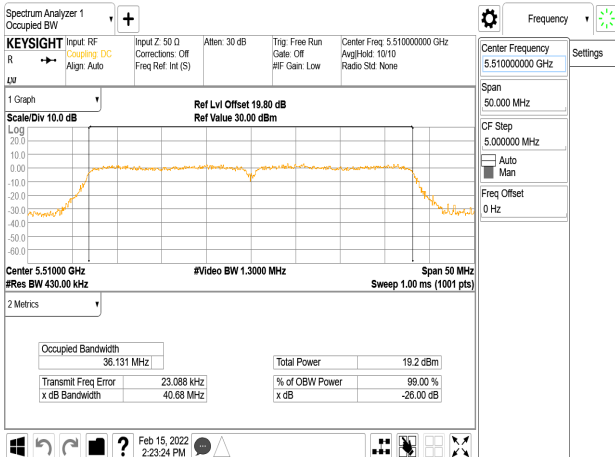
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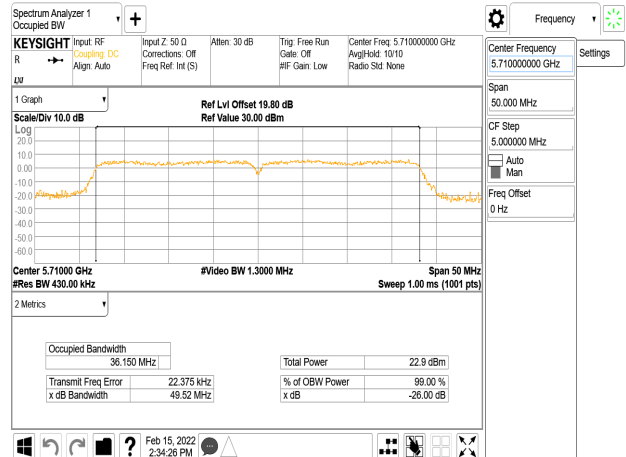
802.11n_40MHz_Chain0_5670MHz



802.11n_40MHz_Chain0_5510MHz



802.11n_40MHz_Chain0_5710MHz



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