

**ELECTROMAGNETIC EMISSIONS
COMPLIANCE REPORT**

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

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

Product Name: Clover Flex

Brand Name: Clover

Model No.: C405

Model Difference: N/A

Report Number: TERF2206000779E2

FCC ID HFS-C405

IC: 1787B-C405

Date of EUT Received: June 02, 2022

Date of Test: June 07, 2022 ~ June 27, 2022

Issue Date: July 18, 2022

Approved By _____

Arno Hsieh

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.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2206000779E2	00	Original	July 18, 2022	Violetta Tang	

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Clover Flex
Brand Name:	Clover
Model No.:	C405
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	C045UT20760001
Power Supply:	7.6Vdc from Rechargeable Li-ion Polymer Battery
Test Software (Name/Version)	QRCT V4.0.00163.0

1.2 Modulation & Data Rate

Modulation type:	64QAM, 16QAM, QPSK, BPSK for OFDM
	256QAM for OFDM in 802.11ac
Transition Rate:	802.11 a: 6 - 54 Mbps
	802.11 n_20MHz: up to 72.2 Mbps
	802.11 n_40MHz: up to 150 Mbps
	802.11 ac_20MHz: up to 86.7 Mbps
	802.11 ac_40MHz: up to 200 Mbps
	802.11 ac_80MHz: up to 433.3 Mbps

1.3 Antenna Designation

Antenna Type	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain (dBi)
Loop	5150~5250	2.22	2.22
	5250~5350	2.22	2.22
	5475~5725	2.10	2.10
	5725~5825	2.22	2.22

Note: 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 20M	5180~5240	4	17.46 dBm	OFDM
	5260~5320	4	17.32 dBm	OFDM
	5500~5720	12	17.31 dBm	OFDM
	5745-5825	5	17.45 dBm	OFDM
n_HT/ ac_VHT 40M	5190~5230	2	16.40 dBm	OFDM
	5270~5310	2	16.49 dBm	OFDM
	5510~5710	6	16.48 dBm	OFDM
	5755-5795	2	16.27 dBm	OFDM
ac_VHT 80M	5210	1	15.39 dBm	OFDM
	5290	1	15.47 dBm	OFDM
	5530~5690	3	15.49 dBm	OFDM
	5775	1	15.32 dBm	OFDM

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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 20M	5180~5240	4	EIRP	19.68	dBm	OFDM
	5260~5320	4	Avg	17.32	dBm	OFDM
	5500~5700	11	Avg	17.31	dBm	OFDM
	5720 (U-NII 2C)	1	Avg	15.99	dBm	OFDM
	5720 (U-NII 3)	1	Avg	11.98	dBm	OFDM
	5745-5825	5	Avg	17.45	dBm	OFDM
n_HT/ ac_VHT 40M	5190~5230	2	EIRP	18.62	dBm	OFDM
	5270~5310	2	Avg	16.49	dBm	OFDM
	5510~5670	5	Avg	16.48	dBm	OFDM
	5710 (U-NII 2C)	1	Avg	15.52	dBm	OFDM
	5710 (U-NII 3)	1	Avg	7.38	dBm	OFDM
	5755-5795	2	Avg	16.27	dBm	OFDM
ac_VHT 80M	5210	1	EIRP	17.61	dBm	OFDM
	5290	1	Avg	15.47	dBm	OFDM
	5530~5610	2	Avg	15.49	dBm	OFDM
	5690 (U-NII 2C)	1	Avg	15.11	dBm	OFDM
	5690 (U-NII 3)	1	Avg	4.30	dBm	OFDM
	5775	1	Avg	15.32	dBm	OFDM

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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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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:

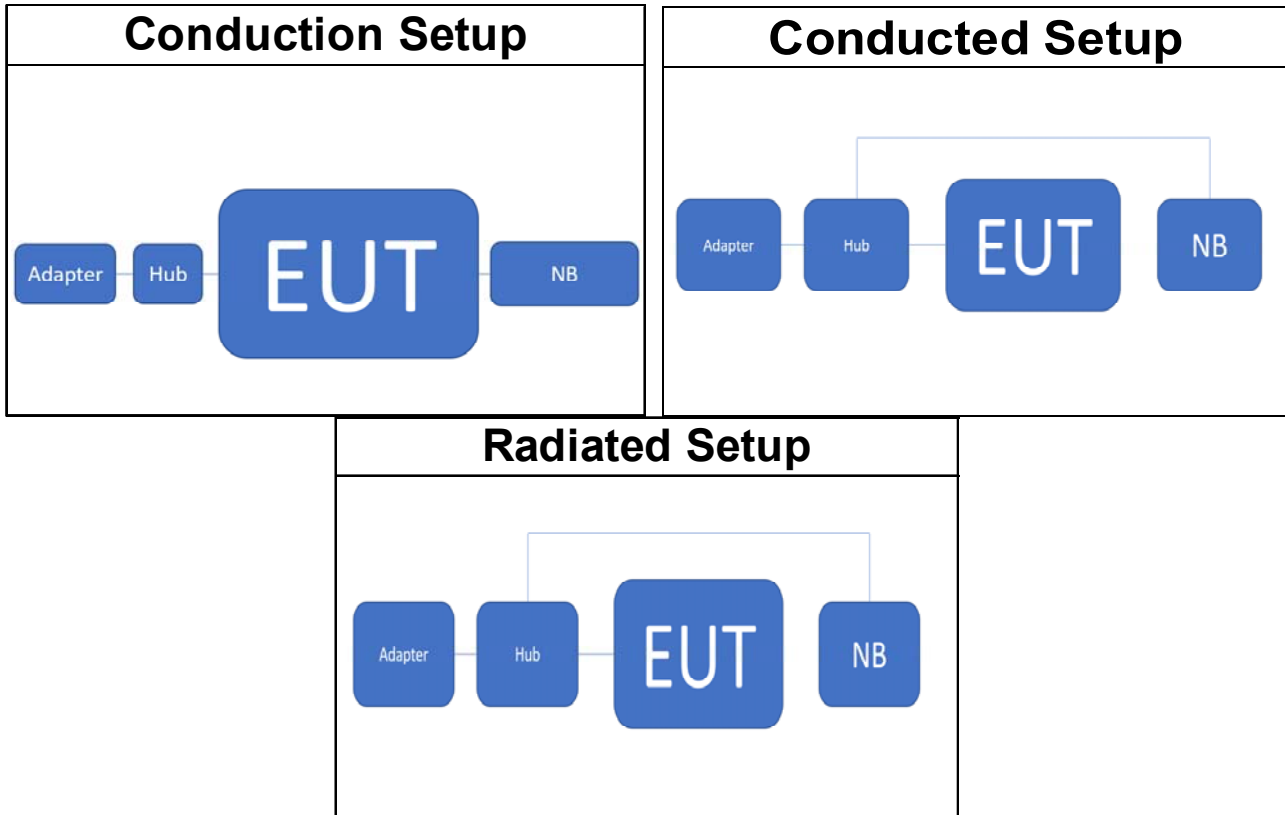
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Test Configuration



2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Adapter	Clover	FSP040-RHBN3	N/A	N/A	N/A
Notebook	HP	TP00096A	PF-1KVTP7	N/A	N/A
Hub	Clover	H305	H035WT20440103	N/A	N/A
Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Adapter	Clover	FSP040-RHBN3	N/A	N/A	N/A
Hub	Clover	H305	H035WT20440103	N/A	N/A
Notebook	Lenovo	L420	S0011721	N/A	N/A
Radiated Emission Test Site: SAC G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Adapter	Clover	FSP040-RHBN3	N/A	N/A	N/A
Notebook	HP	TP00096A	PF-1KVTP7	N/A	N/A
Hub	Clover	H305	H035WT20440103	N/A	N/A

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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				

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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			
v	802.11 a	v	Ch0		Ch1		Ch2		Ch3	v	1TX		1TX
v	802.11 n	v	Ch0		Ch1		Ch2		Ch3	v	1TX		1TX
v	802.11 ac	v	Ch0		Ch1		Ch2		Ch3	v	1TX		1TX
	802.11 ax		Ch0		Ch1		Ch2		Ch3		1TX		1TX

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

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	ch0
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116			
	5745~5825	149 to 165	157			
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	ch0
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	ch0
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	ch0
	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	ch0
	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	ch0
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	ch0
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	ch0
	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	ch0
	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	973	04/13/2022	04/12/2023
EMI Test Receiver	R&S	ESCI	101342	04/25/2022	04/24/2023
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2022	03/26/2023
Coaxial Cable	EMC Instruments Corp	EMC5D-BM-BM-3000	1401004	03/27/2022	03/26/2023
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2022	03/26/2023
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Condcuted 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
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/20/2022	06/19/2023
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
Attenuator	Marvelous	WATT-218FS-10	RF17	11/18/2021	11/17/2022
Attenuator	Marvelous	WATT-218FS-10	RF18	11/18/2021	11/17/2022
DC Block	PASTERNAK	PE8210	RF158	11/18/2021	11/17/2022

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6.3 Radiated Measurement

Radiated Emission Test Site: SAC G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWARZBECK	VULB 9168	1206	02/15/2022	02/14/2023
Horn Antenna	Schwarzbeck	BBHA9170	184	12/16/2021	12/15/2022
Horn Antenna	RF SPIN	DRH18-E	210105A18E	04/08/2022	04/07/2023
Loop Antenna	ETS.LINDGREN	6502	143303	05/06/2022	05/07/2023
3m Site NSA	SGS	966 chamber G	N/A	03/30/2022	03/29/2023
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	07/13/2021	07/12/2022
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2021	10/26/2022
Pre-Amplifier	EMC Instruments	EMC330N	980781	03/15/2022	03/14/2023
Pre-Amplifier	EMC Instruments	EMC118A45SE	980815	03/15/2022	03/14/2023
Coaxial Cable	EMC Instruments	EMCCFD400-NM-NM-8000-5000-2000	210216 、 210217 、 210218	03/15/2022	03/14/2023
Coaxial Cable	EMC Instruments	EMC104-SM-SM-8000-5000-5000	210219 、 210220 、 210221	03/15/2022	03/14/2023
Coaxial Cable	EMC Instruments	EMC105-NM-NM-5000-15000	210224 、 210306	03/15/2022	03/14/2023

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

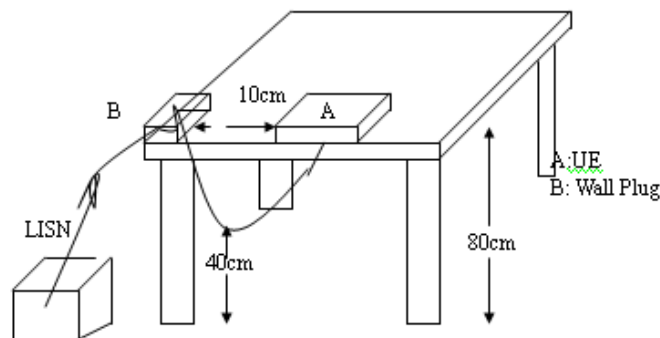
Note

- 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.

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.

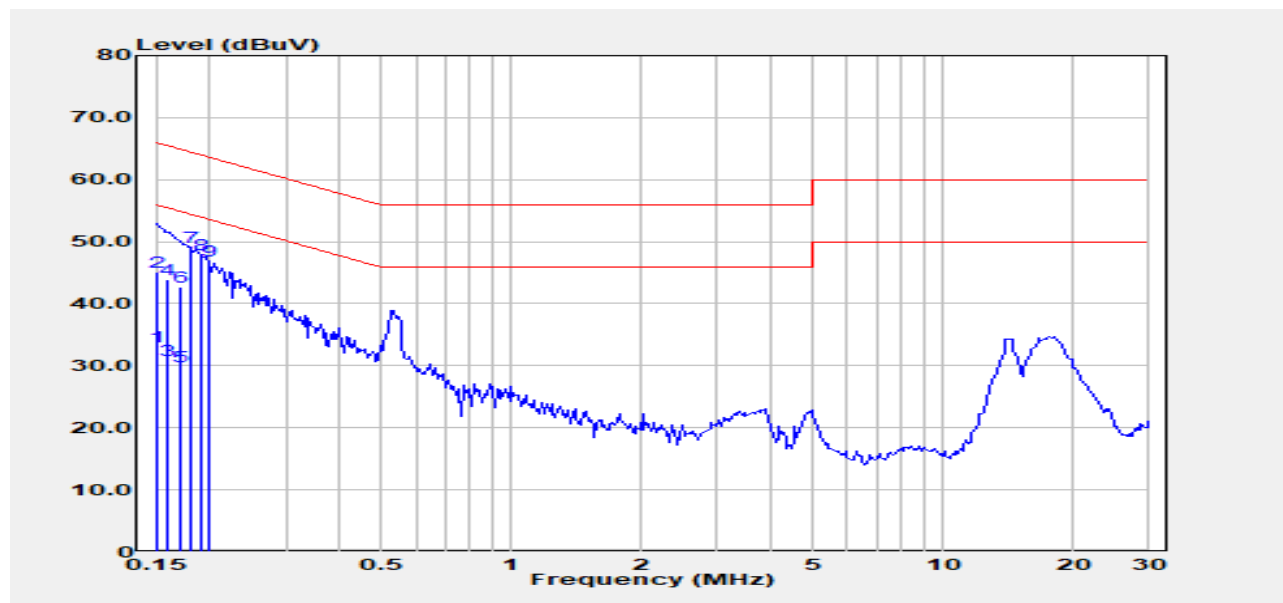
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2206000779E2	Test Site	:Conduction C
Test Mode	:5G	Test Date	:2022-06-27
Power	:120V/60Hz	Temp./Humi.	:24.5/60
Probe	:L1	Engineer	:Quentin Liu



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.152	Average	22.80	10.27	33.07	55.91	-22.84
0.152	QP	34.80	10.27	45.07	65.91	-20.84
0.160	Average	20.60	10.27	30.87	55.47	-24.60
0.160	QP	33.70	10.27	43.97	65.47	-21.50
0.170	Average	19.60	10.27	29.87	54.94	-25.07
0.170	QP	32.40	10.27	42.67	64.94	-22.27
0.182	Peak	38.83	10.27	49.10	64.42	-15.31
0.191	Peak	37.60	10.27	47.87	63.98	-16.11
0.200	Peak	36.74	10.27	47.01	63.62	-16.61

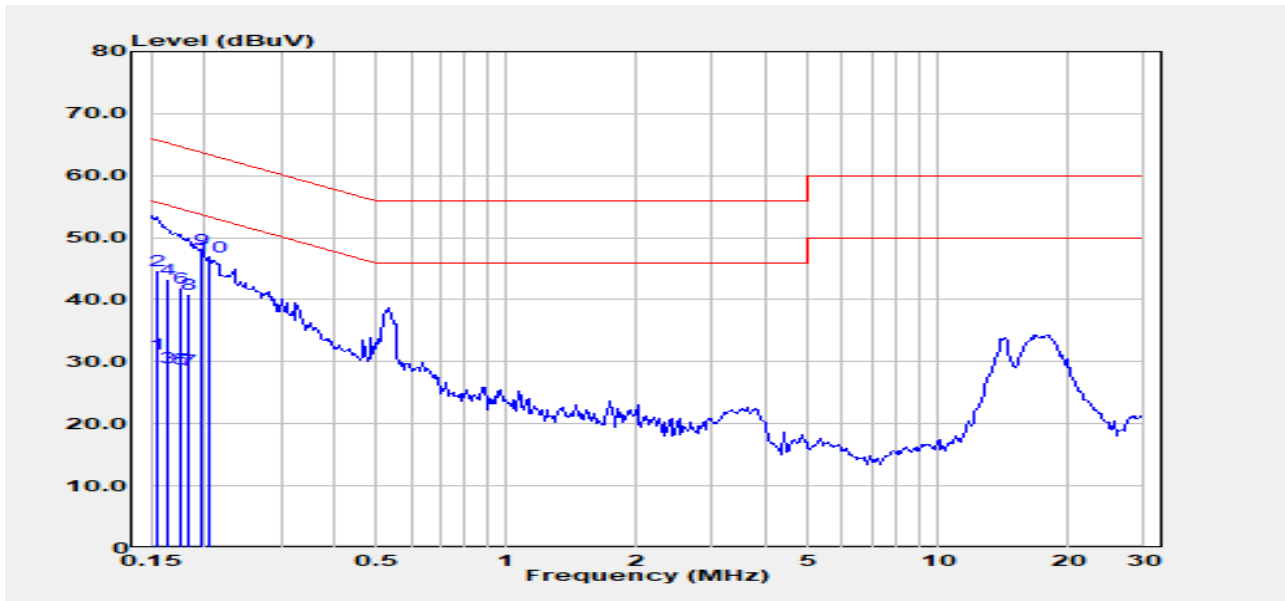
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Report Number :TERF2206000779E2
 Test Mode :5G
 Power :120V/60Hz
 Probe :N

Test Site :Conduction C
 Test Date :2022-06-27
 Temp./Humi. :24.5/60
 Engineer :Quentin Liu



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
0.155	Average	20.90	10.28	31.18	55.74	-24.56
0.155	QP	34.40	10.28	44.68	65.74	-21.06
0.163	Average	18.80	10.28	29.08	55.30	-26.22
0.163	QP	33.10	10.28	43.38	65.30	-21.92
0.176	Average	18.50	10.27	28.77	54.68	-25.91
0.176	QP	31.60	10.27	41.87	64.68	-22.81
0.183	Average	18.30	10.27	28.57	54.33	-25.75
0.183	QP	30.70	10.27	40.97	64.33	-23.35
0.195	Peak	37.82	10.27	48.09	63.80	-15.71
0.204	Peak	36.55	10.27	46.83	63.45	-16.62

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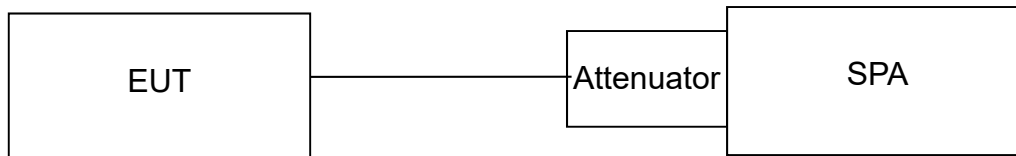
8 EMISSION BANDWIDTH MEASUREMENT

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

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8.4 Measurement Result

8.4.1 FCC Occupied Bandwidth

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.69	13.750
5220	23.29	13.670
5240	24.58	13.910
5260	22.72	13.560
5300	22.79	13.580
5320	22.93	13.600
5500	23.69	13.750
5580	23.59	13.730
5700	23.67	13.740
5720(U-NII 2C)	16.57	12.190
5720(U-NII 3)	6.57	8.180

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.89	12.280
5785	16.99	12.300
5825	17.19	12.350

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.959178	< 5250
5745	5736.232575	> 5725

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802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.57	13.720
5220	23.05	13.630
5240	24.71	13.930
5260	23.59	13.730
5300	23.03	13.620
5320	24.92	13.970
5500	21.91	13.410
5580	21.95	13.410
5700	22.51	13.520
5720(U-NII 2C)	16.58	12.200
5720(U-NII 3)	6.58	8.180

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.56	12.450
5785	16.60	12.200
5825	16.00	12.040

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.970487	< 5250
5745	5736.240279	> 5725

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802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.11	16.140
5230	40.92	16.120
5270	40.88	16.120
5310	40.99	16.130
5510	40.79	16.110
5550	40.76	16.100
5670	40.82	16.110
5710(U-NII 2C)	35.43	15.490
5710(U-NII 3)	5.43	7.350

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.13	15.460
5795	35.72	15.530

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.200693	< 5250
5755	5737.045037	> 5725

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802.11ac_VHT80_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	82.58	19.170
5290	83.78	19.230
5530	82.82	19.180
5610	82.96	19.190
5690(U-NII 2C)	76.34	18.830
5690(U-NII 3)	6.34	8.020

802.11ac_VHT80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.27	18.770

802.11ac_VHT80_Ch0

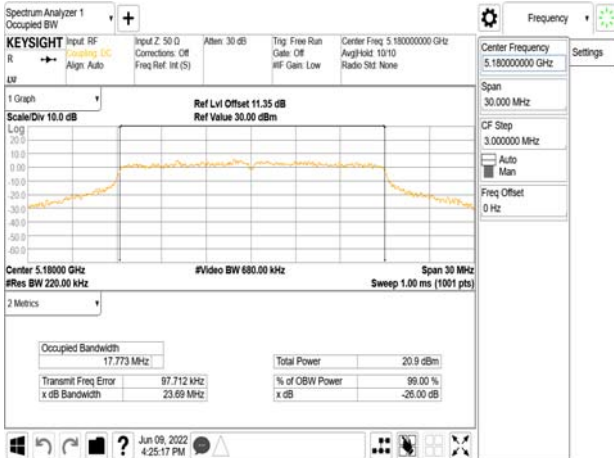
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.038650	< 5250
5775	5737.382173	> 5725

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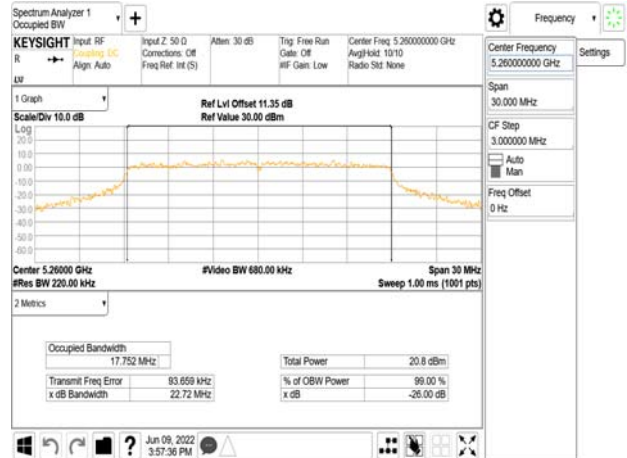
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802.11a_20MHz_Chain0_5180MHz



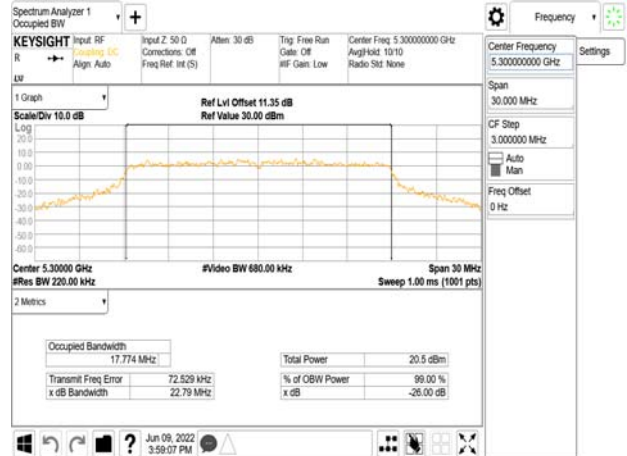
802.11a_20MHz_Chain0_5260MHz



802.11a_20MHz_Chain0_5220MHz



802.11a_20MHz_Chain0_5300MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

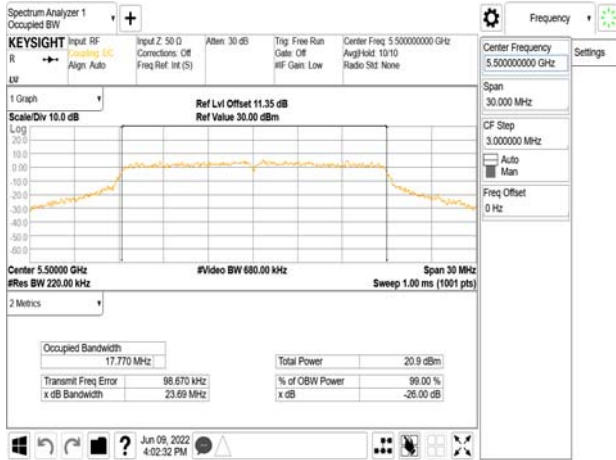


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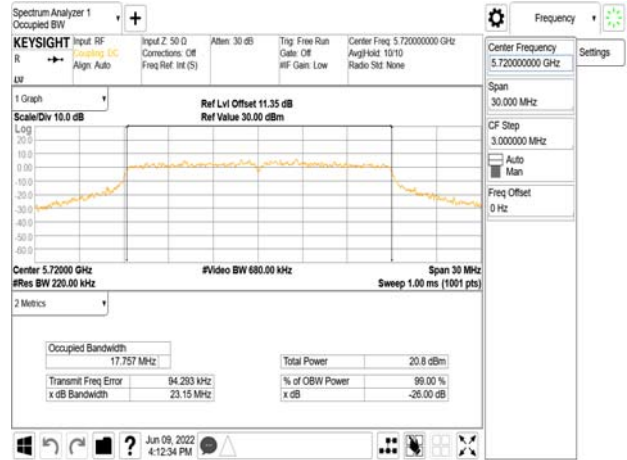
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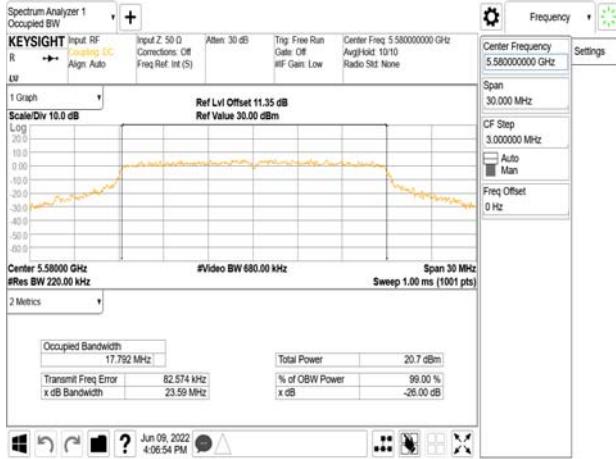
802.11a_20MHz_Chain0_5500MHz



802.11a_20MHz_Chain0_5720MHz



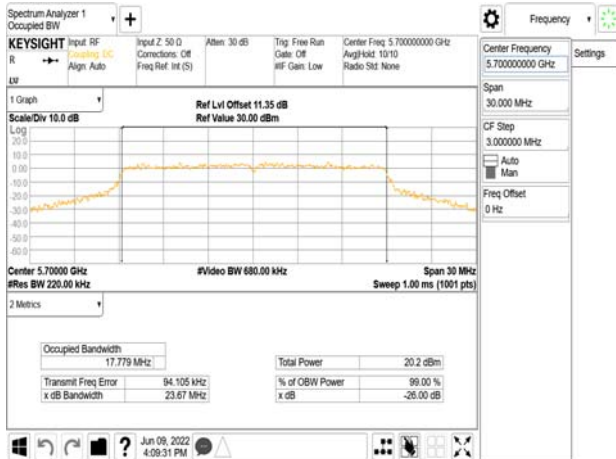
802.11a_20MHz_Chain0_5580MHz



802.11a_20MHz_Chain0_5745MHz



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5785MHz

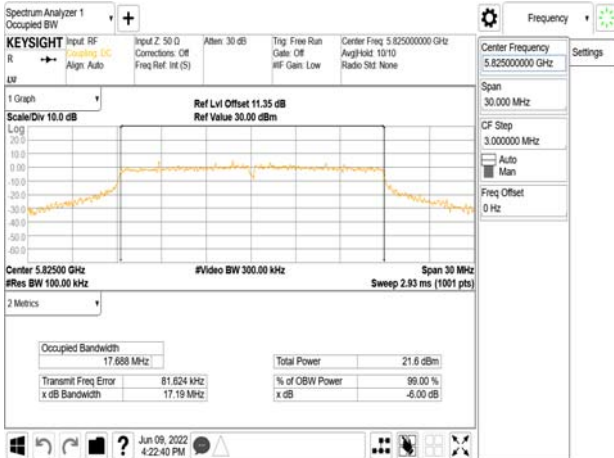


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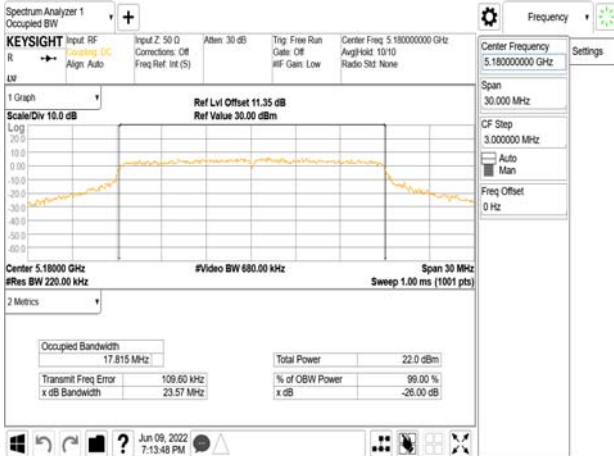
802.11a_20MHz_Chain0_5825MHz



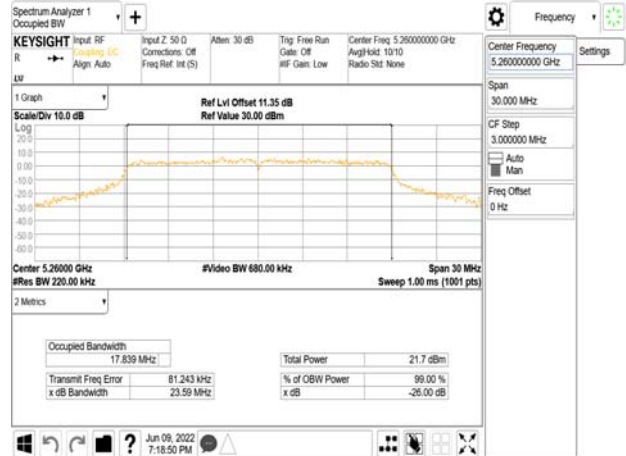
802.11n_20MHz_Chain0_5240MHz



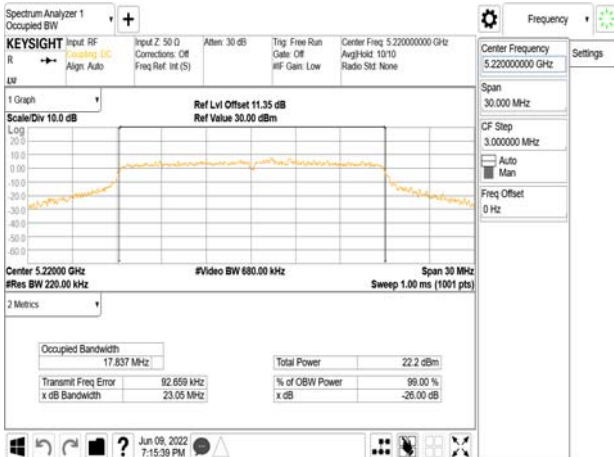
802.11n_20MHz_Chain0_5180MHz



802.11n_20MHz_Chain0_5260MHz



802.11n_20MHz_Chain0_5220MHz



802.11n_20MHz_Chain0_5300MHz

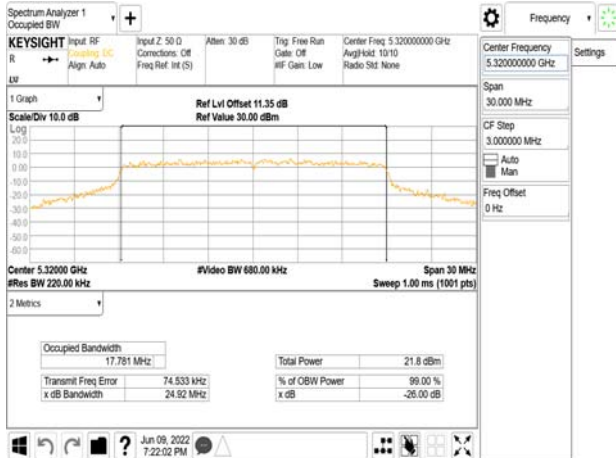


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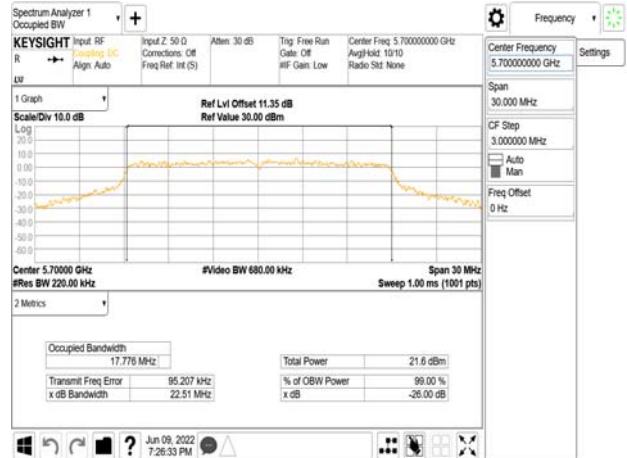
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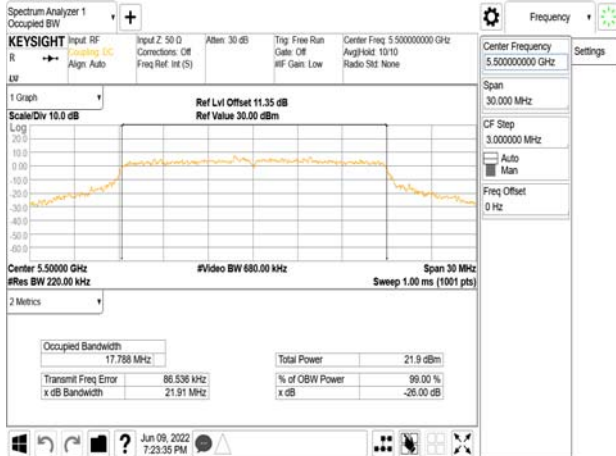
802.11n_20MHz_Chain0_5320MHz



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

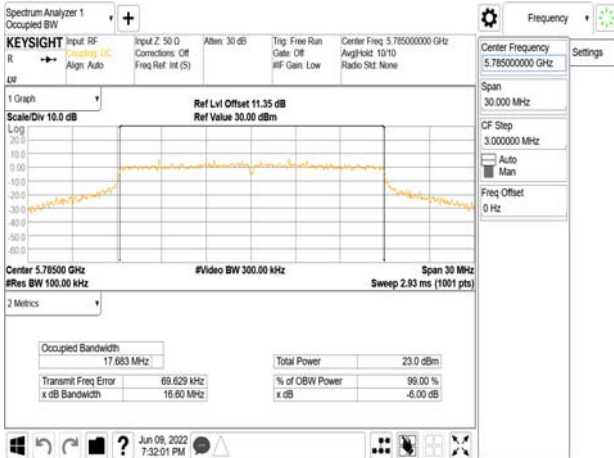


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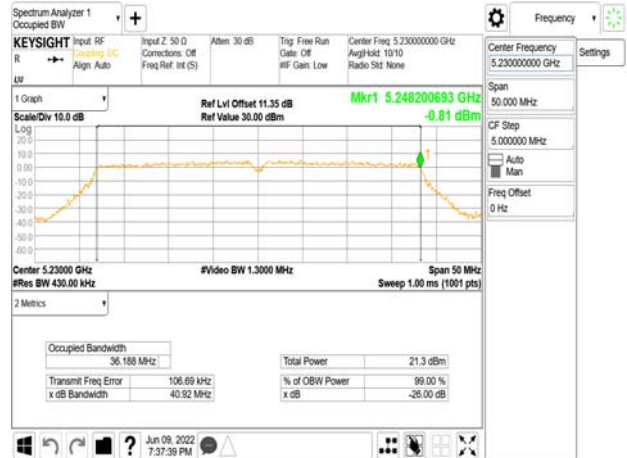
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802.11n_20MHz_Chain0_5785MHz



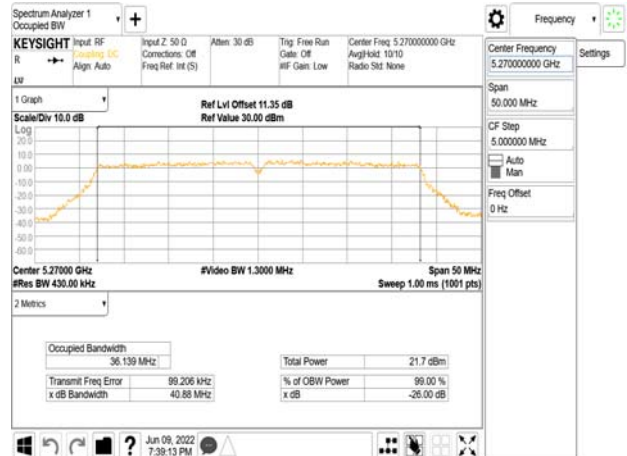
802.11n_40MHz_Chain0_5230MHz



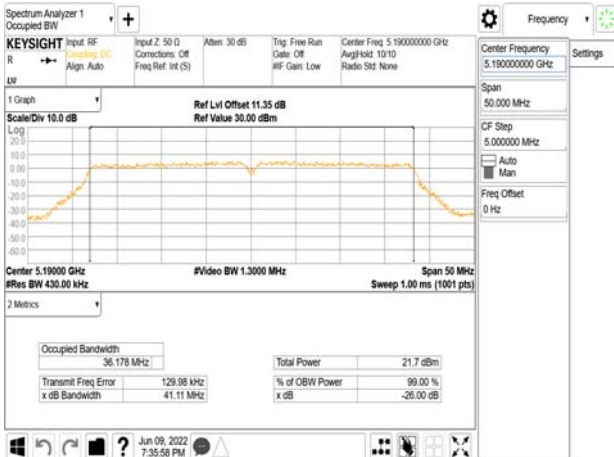
802.11n_20MHz_Chain0_5825MHz



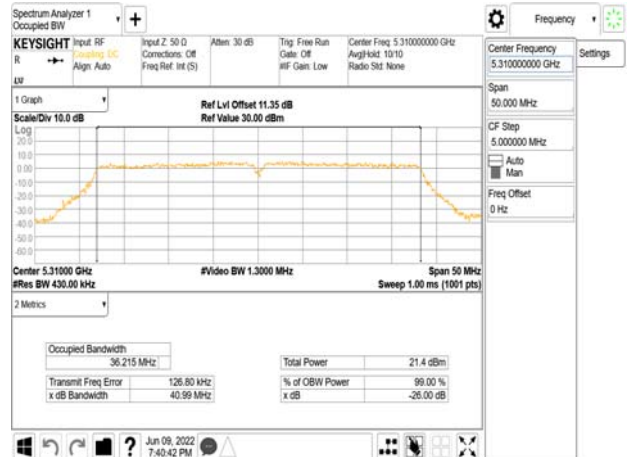
802.11n_40MHz_Chain0_5270MHz



802.11n_40MHz_Chain0_5190MHz



802.11n_40MHz_Chain0_5310MHz

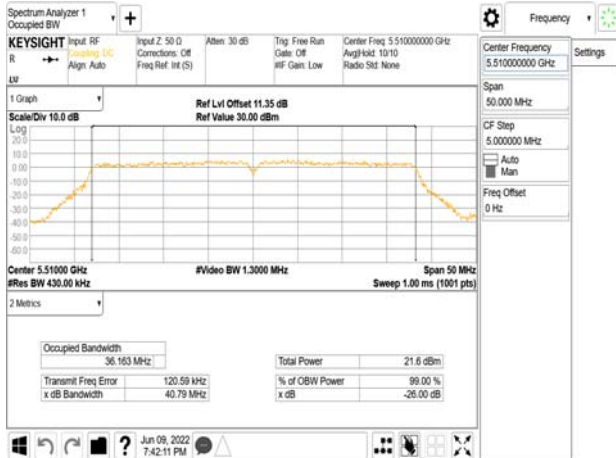


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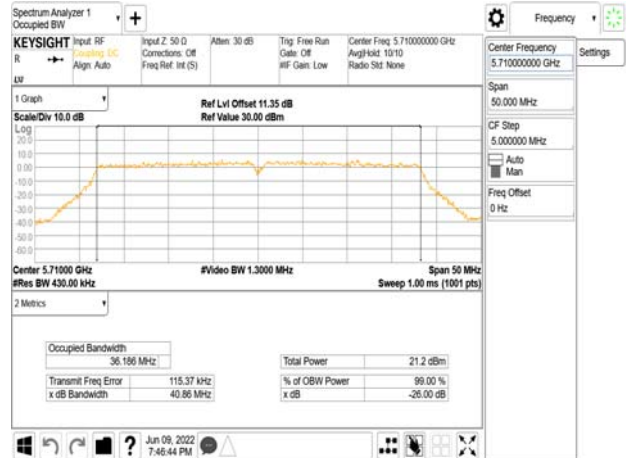
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802.11n_40MHz_Chain0_5510MHz



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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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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8.4.2 ISED Occupied Bandwidth

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.778	12.500
5220	17.741	12.490
5240	17.728	12.490
5260	17.771	12.500
5300	17.682	12.480
5320	17.753	12.490
5500	17.744	12.490
5580	17.745	12.490
5700	17.747	12.490
5720(U-NII 2C)	13.878	11.420
5720(U-NII 3)	3.878	5.890

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.713	16.880
5785	17.786	16.960
5825	17.757	17.260

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802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.805	12.510
5220	17.768	12.500
5240	17.757	12.490
5260	17.821	12.510
5300	17.749	12.490
5320	17.764	12.500
5500	17.751	12.490
5580	17.750	12.490
5700	17.776	12.500
5720(U-NII 2C)	13.880	11.420
5720(U-NII 3)	3.880	5.890

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.725	17.180
5785	17.829	17.590
5825	17.774	17.230

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802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.205	15.590
5230	36.163	15.580
5270	36.141	15.580
5310	36.143	15.580
5510	36.154	15.580
5550	36.160	15.580
5670	36.180	15.580
5710(U-NII 2C)	33.075	15.190
5710(U-NII 3)	3.075	4.880

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.165	36.190
5795	36.185	36.140

802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.613	18.790
5290	75.705	18.790
5530	75.513	18.780
5610	75.586	18.780
5690(U-NII 2C)	72.894	18.630
5690(U-NII 3)	2.894	4.610

802.11ac_VHT80_Ch0

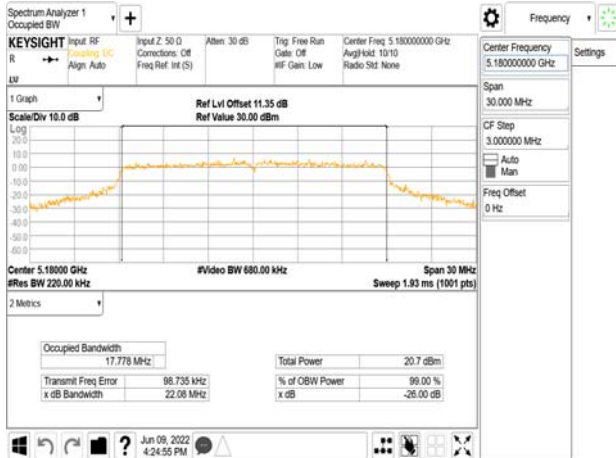
Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5775	75.691	76.230

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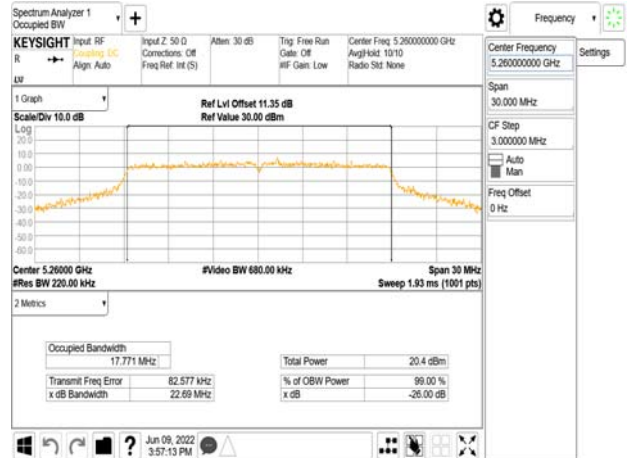
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802.11a_20MHz_Chain0_5180MHz



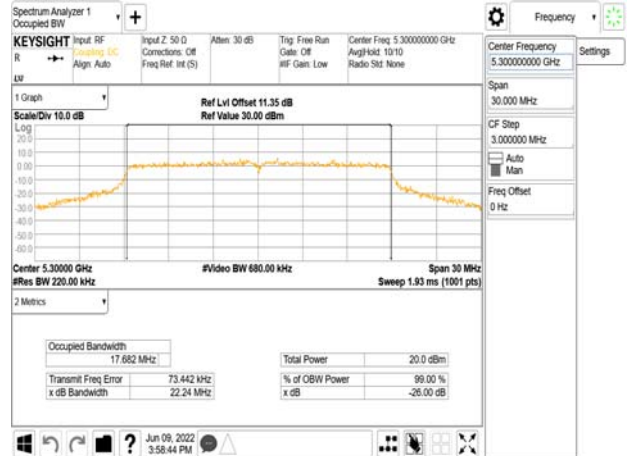
802.11a_20MHz_Chain0_5260MHz



802.11a_20MHz_Chain0_5220MHz



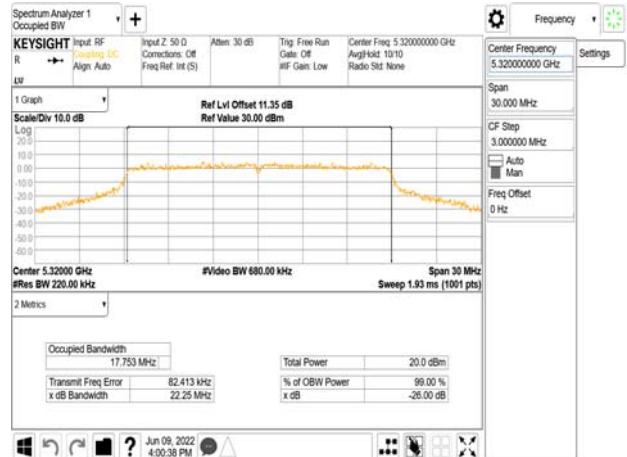
802.11a_20MHz_Chain0_5300MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

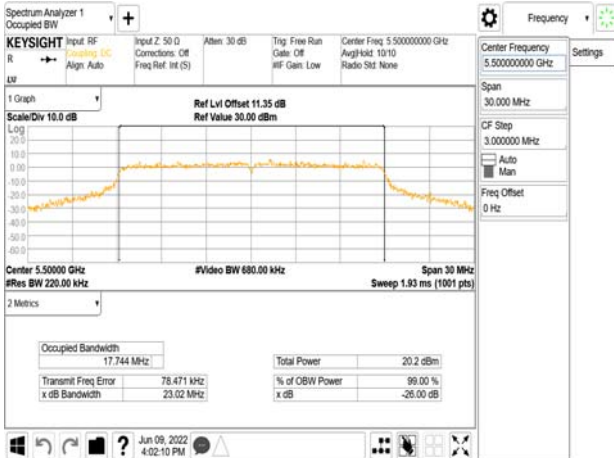


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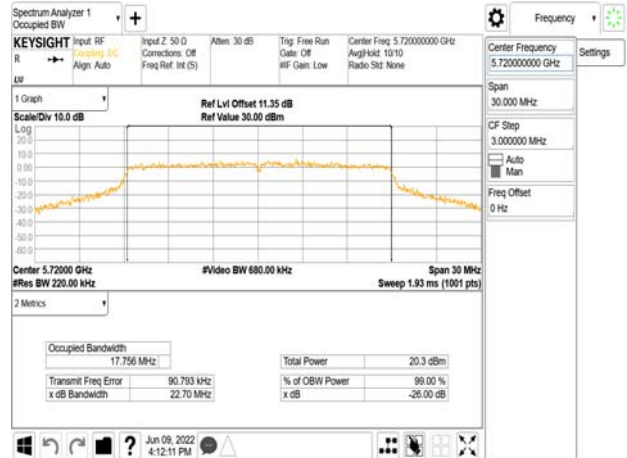
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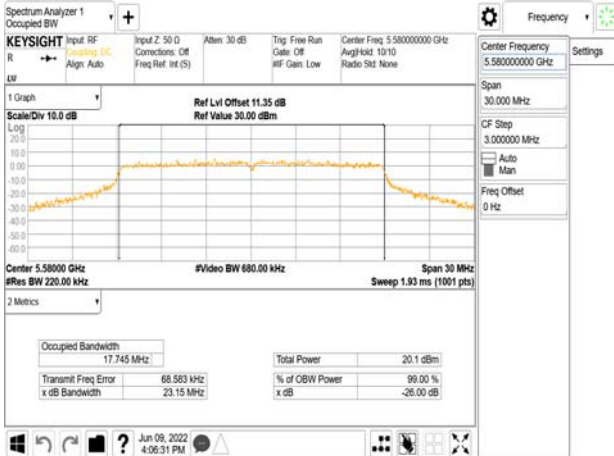
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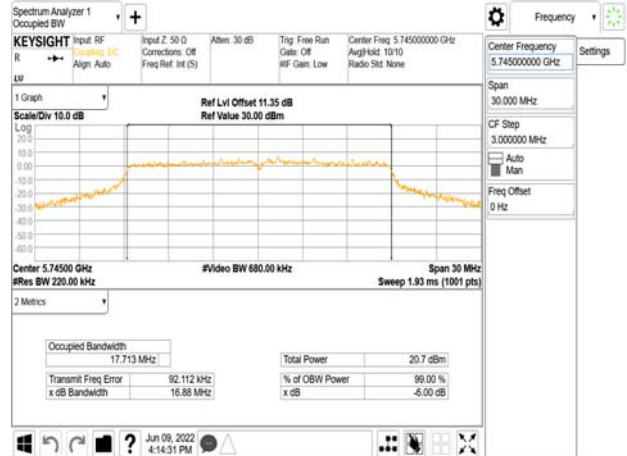
802.11a_20MHz_Chain0_5720MHz



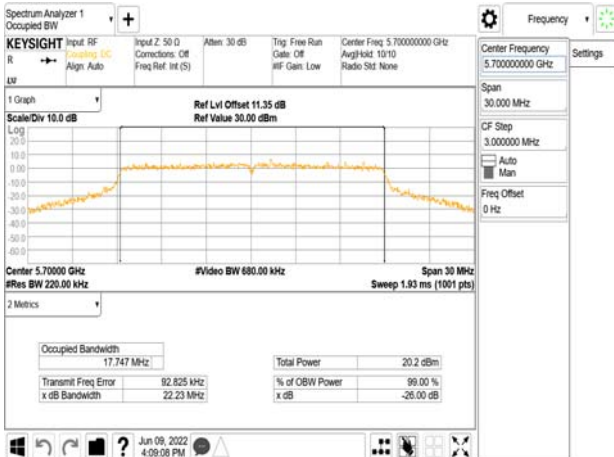
802.11a_20MHz_Chain0_5580MHz



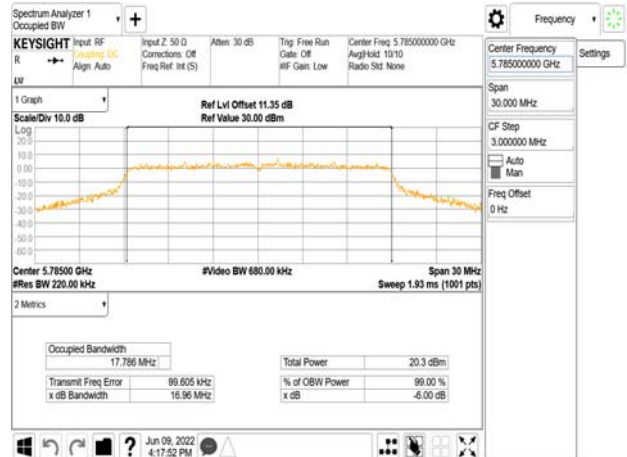
802.11a_20MHz_Chain0_5745MHz



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5785MHz

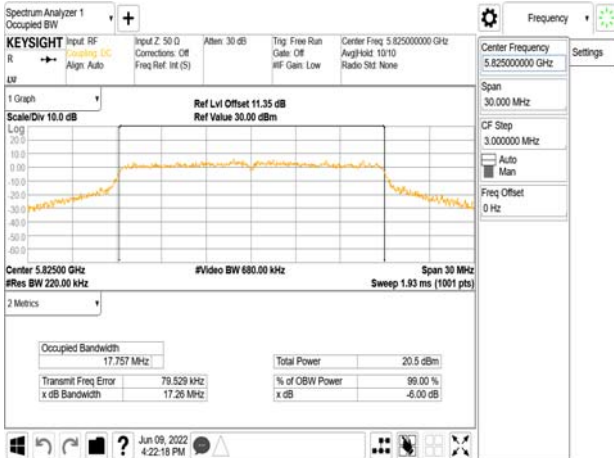


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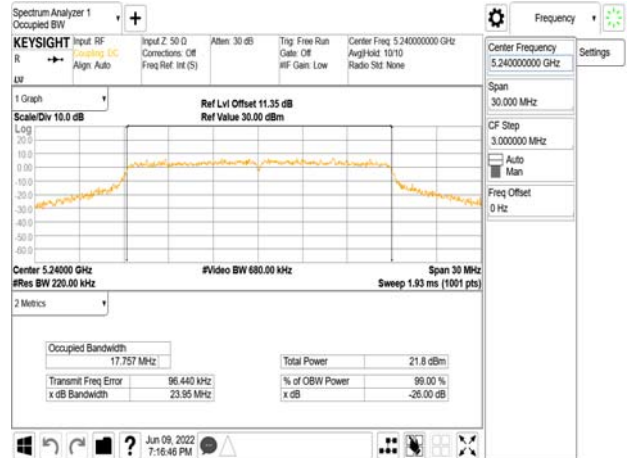
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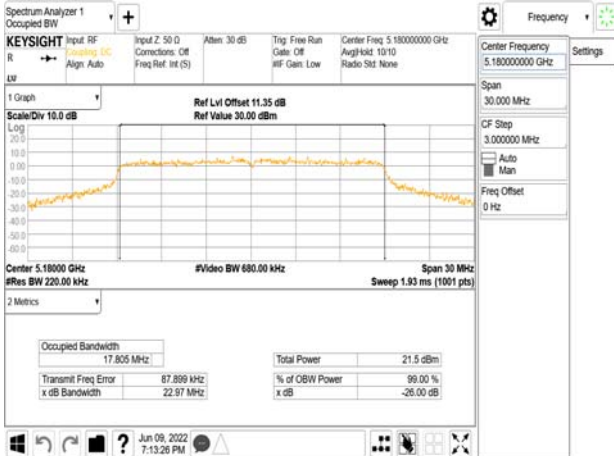
802.11a_20MHz_Chain0_5825MHz



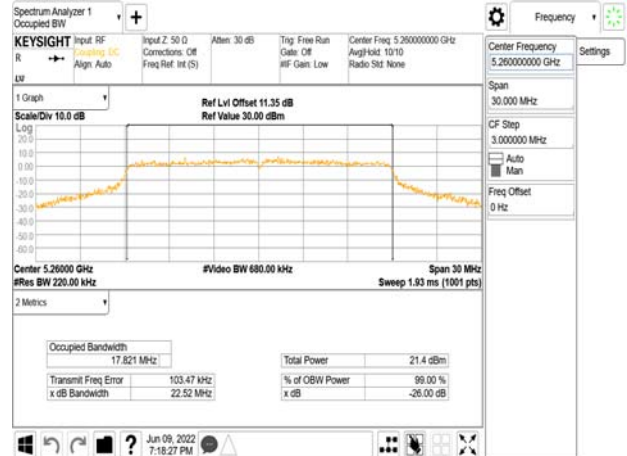
802.11n_20MHz_Chain0_5240MHz



802.11n_20MHz_Chain0_5180MHz



802.11n_20MHz_Chain0_5260MHz



802.11n_20MHz_Chain0_5220MHz



802.11n_20MHz_Chain0_5300MHz

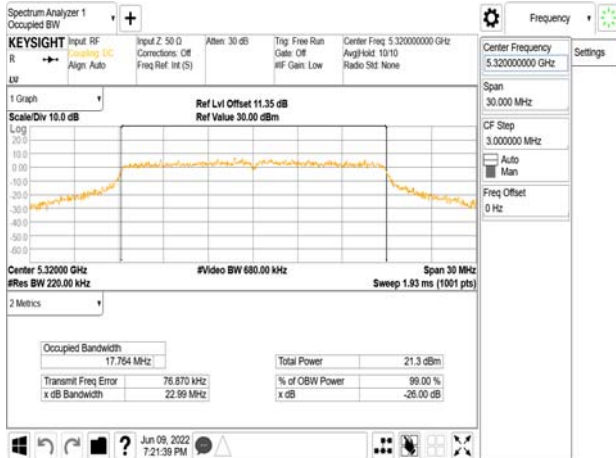


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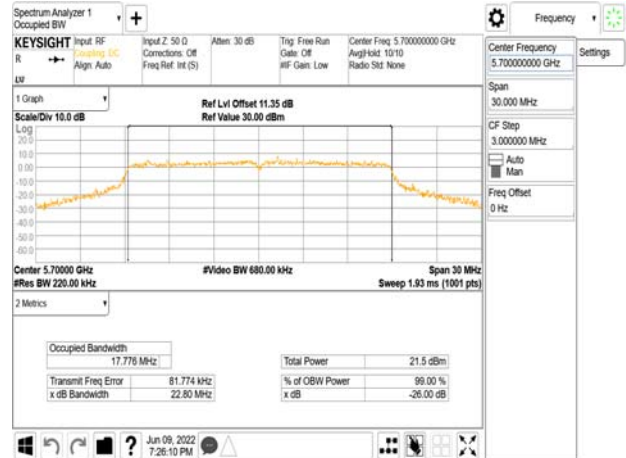
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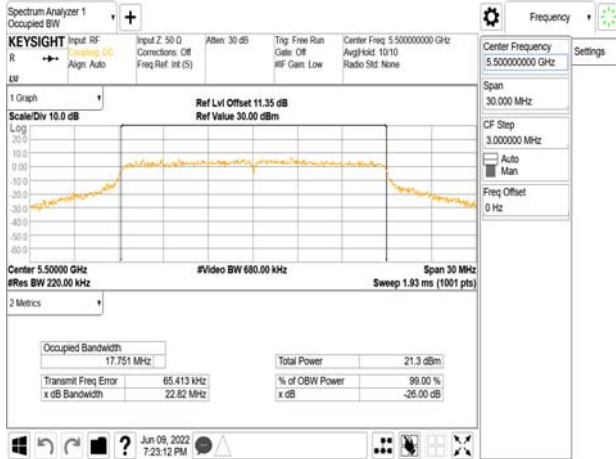
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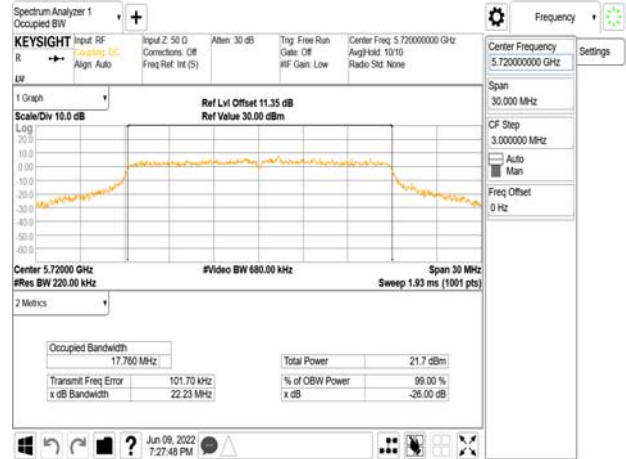
802.11n_20MHz_Chain0_5700MHz



802.11n_20MHz_Chain0_5500MHz



802.11n_20MHz_Chain0_5720MHz



802.11n_20MHz_Chain0_5580MHz



802.11n_20MHz_Chain0_5745MHz



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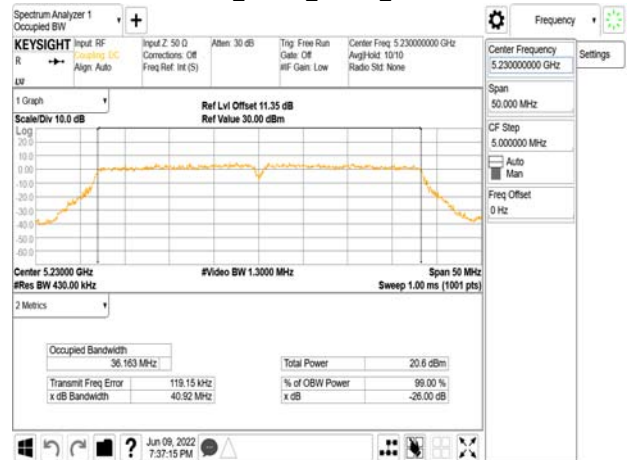
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802.11n_20MHz_Chain0_5785MHz



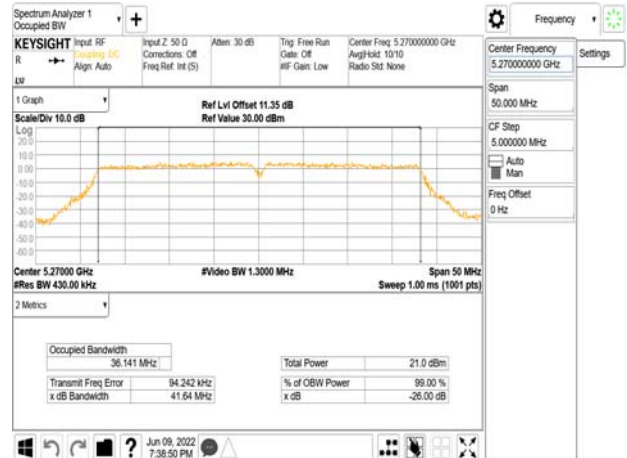
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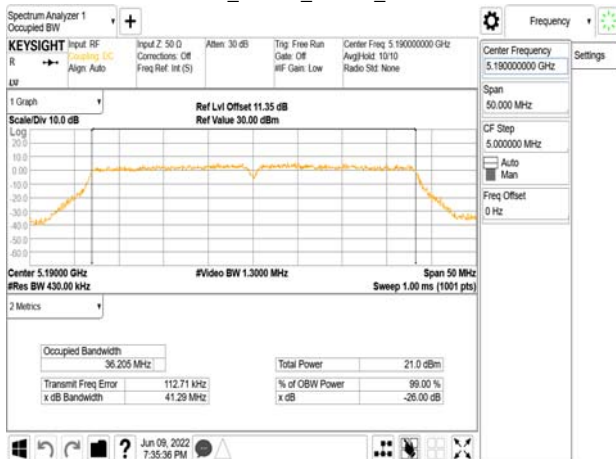
802.11n_20MHz_Chain0_5825MHz



802.11n_40MHz_Chain0_5270MHz



802.11n_40MHz_Chain0_5190MHz



802.11n_40MHz_Chain0_5310MHz

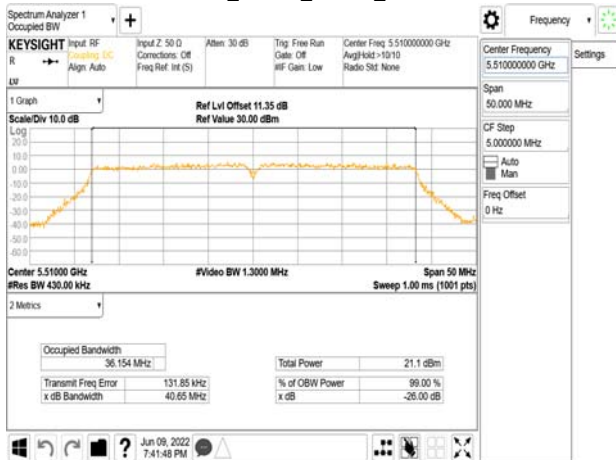


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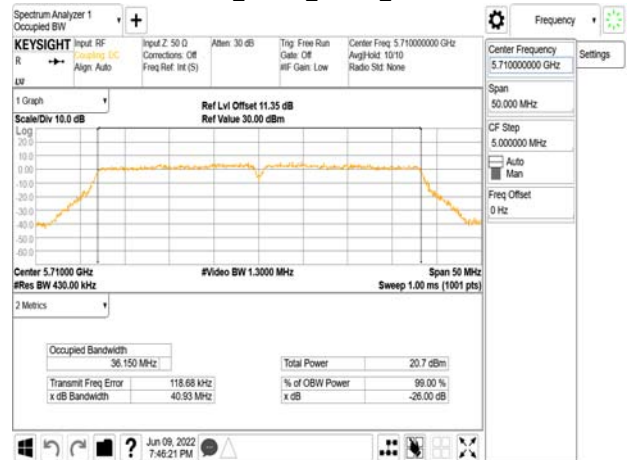
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802.11n_40MHz_Chain0_5510MHz



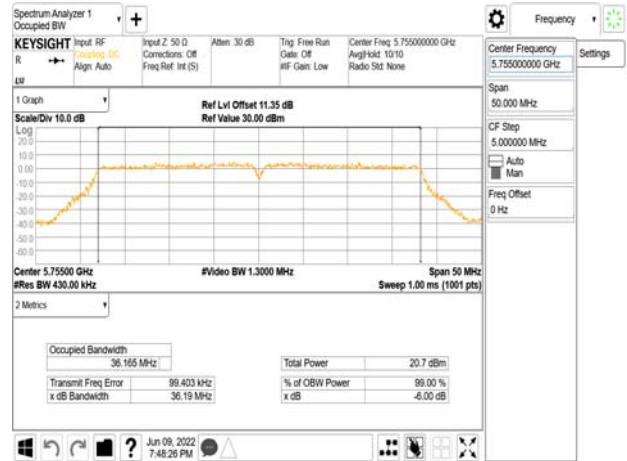
802.11n_40MHz_Chain0_5710MHz



802.11n_40MHz_Chain0_5550MHz



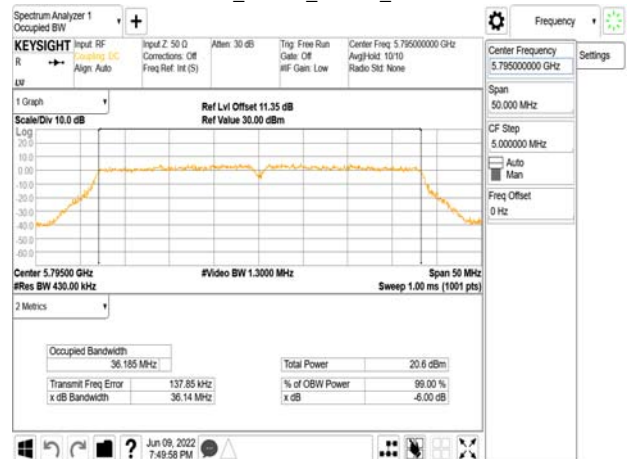
802.11n_40MHz_Chain0_5755MHz



802.11n_40MHz_Chain0_5670MHz



802.11n_40MHz_Chain0_5795MHz



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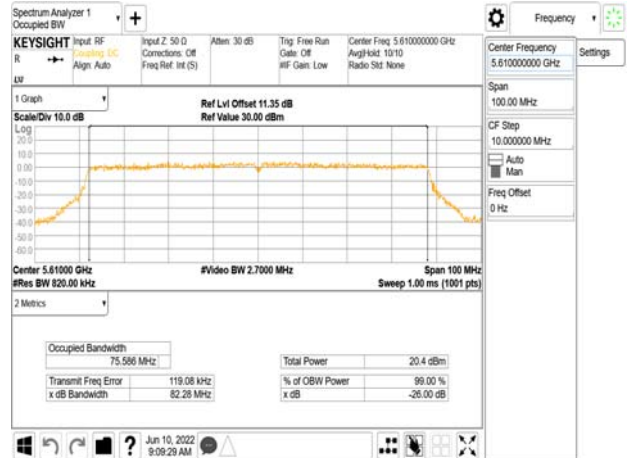
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802.11ac_80MHz_Chain0_5210MHz



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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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

9.1.1 Duty Cycle

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.

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9.1.2 Output Power

Band	EUT CATEGORY		e-CRF Title 47 §15.407			
			Conducted Output Power	EIRP	TPC	Antenna Directional Gain Requirements
U-NII-1		Fixed point-to-point	1 Watt(30dBm)	Not required	Not required	23dBi
		Out door AP	1 Watt(30dBm)	Elevation angle above 30 degrees 125mW (21dBm)	Not required	6dBi
		Indoor AP	1 Watt(30dBm)	Not required	Not required	6dBi
	✓	Other	250mW(23.98dBm)	Not required	Not required	6dBi
U-NII-2A	✓	Other	250mW(23.98dBm) or 11dBm+10 log B	Not required	When EIRP >500mW At least 6dB below EIRP 1W (30dBm)	6dBi
U-NII-2C	✓	Other	250mW(23.98dBm) or 11dBm+10 log B	Not required		6dBi
U-NII-3	✓	Other	1 Watt(30dBm)	Not required	Not required	6dBi
		Fixed point-to-point	1 Watt(30dBm)	Not required	Not required	Not required
U-NII-4		Indoor AP (a channel spans 5725~5850 and 5850~5895MHz)	Not required	36dBm	Not required	Not required
		indoor client (a channel spans 5725~5850 and 5850~5895MHz)	Not required	30dBm	Not required	Not required
		subordinate device	Not required	36dBm	Not required	Not required

1. If transmitting antennas of directional gain greater than the antenna requirements column, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna.

2. For the 10 log B, B is the 26 dB emission bandwidth.

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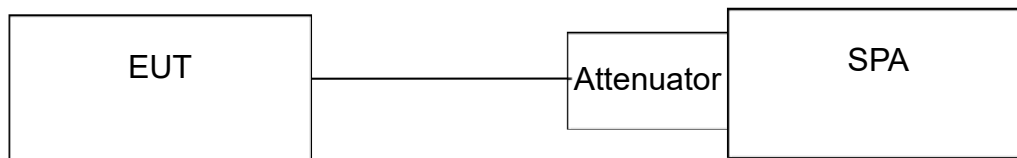
FREQUENCY BAND (MHz)	EUT CATEGORY		RSS-247 §6.2.1~6.2.4		
			EIRP	Conducted Output Power	TPC
5150~5250		OEM devices installed in vehicles	30 mW or $1.76 + 10 \log_{10} B$	N/A	At least 3dB below 30mW EIRP
	V	Other device	200 mW or $10 + 10 \log_{10} B$ dBm	N/A	N/A
5250~5350		OEM devices installed in vehicles	30 mW or $1.76 + 10 \log_{10} B$	N/A	At least 3dB below 30mW EIRP
	V	Other device	1.0 W or $17 + 10 \log_{10} B$ dBm	250 mW or $11 + 10 \log_{10} B$	EIRP >500mW, at least 6dB below 1W EIRP
		Outdoor Fixed with EIRP>200mW	-13 dBW/MHz for $0^\circ \leq \theta < 8^\circ$ $-13 - 0.716 (\theta - 8)$ dBW/MHz for $8^\circ \leq \theta < 40^\circ$ $-35.9 - 1.22 (\theta - 40)$ dBW/MHz for $40^\circ \leq \theta \leq 45^\circ$ -42 dBW/MHz for $\theta > 45^\circ$	N/A	EIRP >500mW, at least 6dB below 1W EIRP
5470-5600 and 5650-5725	V	All	1.0 W or $17 + 10 \log_{10} B$ dBm	250 mW or $11 + 10 \log_{10} B$	EIRP >500mW, at least 6dB below 1W EIRP
5725~5850	V	All	N/A	1 W	N/A

1 For equipment operating in the band 5725-5850 MHz, If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

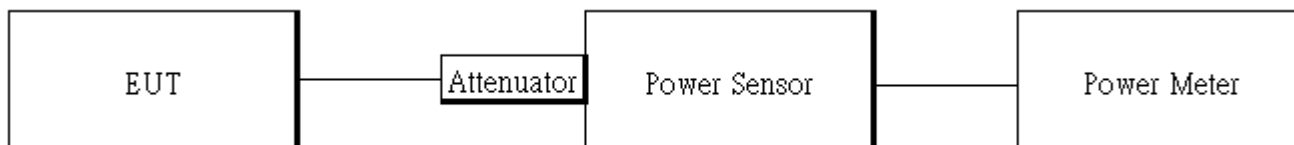
2. For the $10 \log B$, B is the 99% emission bandwidth.

9.2 Test Setup

9.2.1 Duty Cycle



9.2.2 Output Power



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9.3 Measurement Procedure

9.3.1 Duty Cycle Measurements

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

9.3.2 Output Power Measurements

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 power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add 10 log(1/duty cycle).
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

9.4 Duty Cycle Measurement Result

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	98.19	0.08	0.48	0.01
802.11n_20	98.16	0.08	0.52	0.01
802.11ac_20	98.07	0.08	0.52	0.01
802.11n_40	96.34	0.16	1.05	2.00
802.11ac_40	96.36	0.16	1.05	2.00
802.11ac_80	92.80	0.32	2.16	3.00

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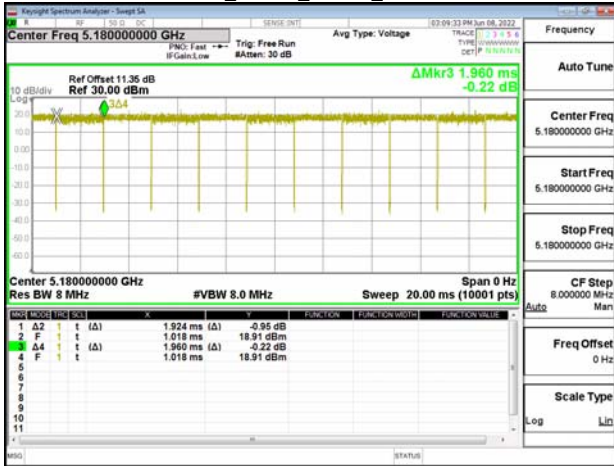
802.11a_20MHz_Chain0_5180MHz



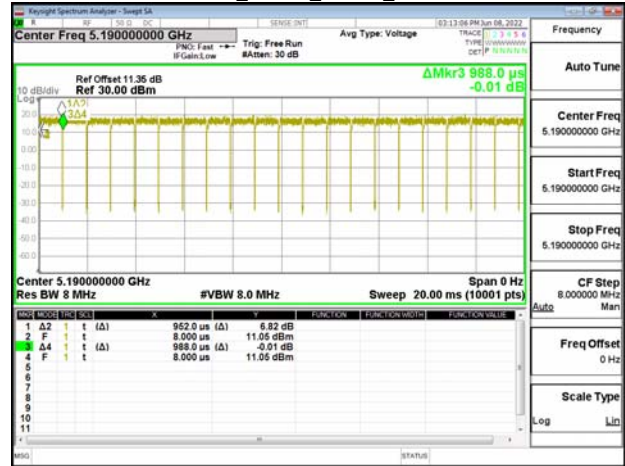
802.11ac_20MHz_Chain0_5180MHz



802.11n_20MHz_Chain0_5180MHz



802.11ac_40MHz_Chain0_5190MHz



802.11n_40MHz_Chain0_5190MHz



802.11ac_80MHz_Chain0_5210MHz



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9.5 Output Power Measurement Result

9.5.1 FCC Output power

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	15	16.45	44.150	23.98	PASS
44	5220	6	14.5	16.30	42.651	23.98	PASS
48	5240	6	14.5	16.16	41.298	23.98	PASS
52	5260	6	14.5	16.23	41.969	23.98	PASS
60	5300	6	14.5	16.12	40.920	23.98	PASS
64	5320	6	14.5	16.18	41.489	23.98	PASS
100	5500	6	14.5	16.49	44.559	23.98	PASS
116	5580	6	14.5	16.34	43.046	23.98	PASS
140	5700	6	14.5	16.24	42.066	23.98	PASS
144	5720(U-NII 2C)	6	14.5	14.95	31.25	23.19	PASS
144	5720 (U-NII 3)	6	14.5	10.93	12.40	30	PASS
149	5745	6	14.5	16.43	43.947	30	PASS
157	5785	6	14	16.20	41.680	30	PASS
165	5825	6	14	16.33	42.947	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	16	17.34	54.208	23.98	PASS
44	5220	MCS0	16	17.46	55.727	23.98	PASS
48	5240	MCS0	16	17.42	55.216	23.98	PASS
52	5260	MCS0	16	17.14	51.768	23.98	PASS
60	5300	MCS0	16	17.32	53.959	23.98	PASS
64	5320	MCS0	16	17.25	53.096	23.98	PASS
100	5500	MCS0	15.5	17.31	53.835	23.98	PASS
116	5580	MCS0	15.5	17.19	52.368	23.98	PASS
140	5700	MCS0	16	17.29	53.588	23.98	PASS
144	5720(U-NII 2C)	MCS0	16	15.99	39.71	23.98	PASS
144	5720 (U-NII 3)	MCS0	16	11.98	15.76	30	PASS
149	5745	MCS0	15.5	17.35	54.333	30	PASS
157	5785	MCS0	15.5	17.45	55.599	30	PASS
165	5825	MCS0	15	17.15	51.888	30	PASS

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802.11n_HT40_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	13.5	16.40	43.671	23.98	PASS
46	5230	MCS0	14	16.29	42.579	23.98	PASS
54	5270	MCS0	15.5	16.49	44.585	23.98	PASS
62	5310	MCS0	14	16.42	43.873	23.98	PASS
102	5510	MCS0	14	16.34	43.072	23.98	PASS
110	5550	MCS0	14	16.18	41.514	23.98	PASS
134	5670	MCS0	14	16.48	44.483	23.98	PASS
142	5710(U-NII 2C)	MCS0	14	15.52	35.67	23.98	PASS
142	5710 (U-NII 3)	MCS0	14	7.38	5.47	30	PASS
151	5755	MCS0	14	16.21	41.802	30	PASS
159	5795	MCS0	13.5	16.27	42.383	30	PASS

802.11ac_VHT20_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	16	17.25	53.145	23.98	PASS
44	5220	MCS0	16	17.40	55.013	23.98	PASS
48	5240	MCS0	16	17.35	54.383	23.98	PASS
52	5260	MCS0	16	17.12	51.578	23.98	PASS
60	5300	MCS0	16	17.26	53.268	23.98	PASS
64	5320	MCS0	16	17.23	52.901	23.98	PASS
100	5500	MCS0	15.5	17.30	53.761	23.98	PASS
116	5580	MCS0	15.5	17.17	52.175	23.98	PASS
140	5700	MCS0	16	17.21	52.658	23.98	PASS
144	5720(U-NII 2C)	MCS0	16	15.98	39.66	23.98	PASS
144	5720 (U-NII 3)	MCS0	16	11.97	15.74	30	PASS
149	5745	MCS0	15.5	17.28	53.514	30	PASS
157	5785	MCS0	15.5	17.43	55.394	30	PASS
165	5825	MCS0	15	17.11	51.459	30	PASS

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802.11ac_VHT40_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	13.5	16.38	43.461	23.98	PASS
46	5230	MCS0	14	16.26	42.277	23.98	PASS
54	5270	MCS0	15.5	16.46	44.269	23.98	PASS
62	5310	MCS0	14	16.37	43.361	23.98	PASS
102	5510	MCS0	14	16.27	42.374	23.98	PASS
110	5550	MCS0	14	16.10	40.748	23.98	PASS
134	5670	MCS0	14	16.42	43.863	23.98	PASS
142	5710(U-NII 2C)	MCS0	14	15.43	34.93	23.98	PASS
142	5710 (U-NII 3)	MCS0	14	7.29	5.35	30	PASS
151	5755	MCS0	14	16.19	41.601	30	PASS
159	5795	MCS0	13.5	16.16	41.315	30	PASS

802.11ac_VHT80_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
42	5210	MCS0	13.5	15.39	34.630	23.98	PASS
58	5290	MCS0	13.5	15.47	35.274	23.98	PASS
106	5530	MCS0	13.5	15.49	35.437	23.98	PASS
122	5610	MCS0	13	15.08	32.244	23.98	PASS
138	5690(U-NII 2C)	MCS0	13.5	15.11	32.42	23.98	PASS
138	5690 (U-NII 3)	MCS0	13.5	4.30	2.69	30	PASS
155	5775	MCS0	12.5	15.32	34.076	30	PASS

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9.5.2 ISED Conducted output power and EIRP

802.11a_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	16.23	41.969	23.50	PASS
60	5300	16.12	40.920	23.48	PASS
64	5320	16.18	41.489	23.49	PASS
100	5500	16.49	44.559	23.49	PASS
116	5580	16.34	43.046	23.49	PASS
140	5700	16.24	42.066	23.49	PASS
144	5720(U-NII 2C)	14.95	31.249	22.42	PASS
144	5720 (U-NII 3)	10.93	12.396	30	PASS
149	5745	16.43	43.947	30	PASS
157	5785	16.20	41.680	30	PASS
165	5825	16.33	42.947	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	17.14	51.768	23.51	PASS
60	5300	17.32	53.959	23.49	PASS
64	5320	17.25	53.096	23.5	PASS
100	5500	17.31	53.835	23.49	PASS
116	5580	17.19	52.368	23.49	PASS
140	5700	17.29	53.588	23.5	PASS
144	5720(U-NII 2C)	15.99	39.711	22.42	PASS
144	5720 (U-NII 3)	11.98	15.760	30	PASS
149	5745	17.35	54.333	30	PASS
157	5785	17.45	55.599	30	PASS
165	5825	17.15	51.888	30	PASS

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802.11n_HT40_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	16.49	44.585	23.98	PASS
62	5310	16.42	43.873	23.98	PASS
102	5510	16.34	43.072	23.98	PASS
110	5550	16.18	41.514	23.98	PASS
134	5670	16.48	44.483	23.98	PASS
142	5710(U-NII 2C)	15.52	35.667	23.98	PASS
142	5710 (U-NII 3)	7.38	5.466	30	PASS
151	5755	16.21	41.802	30	PASS
159	5795	16.27	42.383	30	PASS

802.11ac_VHT20_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	17.12	51.578	23.51	PASS
60	5300	17.26	53.268	23.49	PASS
64	5320	17.23	52.901	23.5	PASS
100	5500	17.30	53.761	23.49	PASS
116	5580	17.17	52.175	23.49	PASS
140	5700	17.21	52.658	23.5	PASS
144	5720(U-NII 2C)	15.98	39.656	22.42	PASS
144	5720 (U-NII 3)	11.97	15.738	30	PASS
149	5745	17.28	53.514	30	PASS
157	5785	17.43	55.394	30	PASS
165	5825	17.11	51.459	30	PASS

802.11ac_VHT40_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	16.46	44.269	23.98	PASS
62	5310	16.37	43.361	23.98	PASS
102	5510	16.27	42.374	23.98	PASS
110	5550	16.10	40.748	23.98	PASS
134	5670	16.42	43.863	23.98	PASS
142	5710(U-NII 2C)	15.43	34.928	23.98	PASS
142	5710 (U-NII 3)	7.29	5.353	30	#REF!
151	5755	16.19	41.601	30	PASS
159	5795	16.16	41.315	30	PASS

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802.11ac_VHT80_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
58	5290	15.47	35.274	23.98	PASS
106	5530	15.49	35.437	23.98	PASS
122	5610	15.08	32.244	23.98	PASS
138	5690(U-NII 2C)	15.11	32.421	23.98	PASS
138	5690 (U-NII 3)	4.30	2.691	30	PASS
155	5775	15.32	34.076	30	PASS

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802.11a_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	16.45	2.22	18.67	73.621	22.5	PASS
44	5220	16.30	2.22	18.52	71.121	22.49	PASS
48	5240	16.16	2.22	18.38	68.865	22.49	PASS
52	5260	16.23	2.22	18.45	69.984	29.5	PASS
60	5300	16.12	2.22	18.34	68.234	29.48	PASS
64	5320	16.18	2.22	18.40	69.183	29.49	PASS
100	5500	16.49	2.10	18.59	72.277	29.49	PASS
116	5580	16.34	2.10	18.44	69.823	29.49	PASS
140	5700	16.24	2.10	18.34	68.234	29.49	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	17.34	2.22	19.56	90.365	22.51	PASS
44	5220	17.46	2.22	19.68	92.897	22.5	PASS
48	5240	17.42	2.22	19.64	92.045	22.49	PASS
52	5260	17.14	2.22	19.36	86.298	29.51	PASS
60	5300	17.32	2.22	19.54	89.950	29.49	PASS
64	5320	17.25	2.22	19.47	88.512	29.5	PASS
100	5500	17.31	2.10	19.41	87.297	29.49	PASS
116	5580	17.19	2.10	19.29	84.918	29.49	PASS
140	5700	17.29	2.10	19.39	86.896	29.5	PASS

802.11n_HT40_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	16.40	2.22	18.62	72.778	23.01	PASS
46	5230	16.29	2.22	18.51	70.958	23.01	PASS
54	5270	16.49	2.22	18.71	74.302	30	PASS
62	5310	16.42	2.22	18.64	73.114	30	PASS
102	5510	16.34	2.10	18.44	69.823	30	PASS
110	5550	16.18	2.10	18.28	67.298	30	PASS
134	5670	16.48	2.10	18.58	72.111	30	PASS

802.11ac_VHT20_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	17.25	2.22	19.47	88.512	22.51	PASS
44	5220	17.40	2.22	19.62	91.622	22.5	PASS
48	5240	17.35	2.22	19.57	90.573	22.49	PASS
52	5260	17.12	2.22	19.34	85.901	29.51	PASS
60	5300	17.26	2.22	19.48	88.716	29.49	PASS
64	5320	17.23	2.22	19.45	88.105	29.5	PASS
100	5500	17.30	2.10	19.40	87.096	29.49	PASS
116	5580	17.17	2.10	19.27	84.528	29.49	PASS
140	5700	17.21	2.10	19.31	85.310	29.5	PASS

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802.11ac_VHT40_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	16.38	2.22	18.60	72.444	23.01	PASS
46	5230	16.26	2.22	18.48	70.469	23.01	PASS
54	5270	16.46	2.22	18.68	73.790	30	PASS
62	5310	16.37	2.22	18.59	72.277	30	PASS
102	5510	16.27	2.10	18.37	68.707	30	PASS
110	5550	16.10	2.10	18.20	66.069	30	PASS
134	5670	16.42	2.10	18.52	71.121	30	PASS

802.11ac_VHT80_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)	RESULT
42	5210	15.39	2.22	17.61	57.677	23.01	PASS
58	5290	15.47	2.22	17.69	58.749	30	PASS
106	5530	15.49	2.10	17.59	57.412	30	PASS

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10 MAXIMUM POWER SPECTRAL DENSITY

10.1 Standard Applicable

Operation Bands	EUT CATEGORY		e-CRF Title 47 §15.407 Power Spectral Density	Antenna Directional Gain Requirements
U-NII-1		Outdoor Access Point (Master)	1. 17dBm/ MHz 2. EIRP<=125mW(21dBm) at any elevation angle > 30°	6dBi
		Indoor Access Point (Master)	17dBm / MHz	6dBi
		Fixed point-to-point Access Point	17dBm / MHz	23dBi
	✓	Client device	11dBm / MHz	6dBi
U-NII-2A	✓	All	11dBm / MHz	6dBi
U-NII-2C	✓	All	11dBm / MHz	6dBi
U-NII-3	✓	All	30dBm / 500kHz	6dBi
U-NII-4		Indoor AP	20dBm / MHz e.i.r.p.	Not required
		indoor client	14dBm / MHz e.i.r.p.	Not required
		subordinate device	20dBm / MHz e.i.r.p.	Not required
If transmitting antennas of directional gain greater than the antenna requirements column, the Maximum transmit power shall be reduced by the amount in dB that the directional gain of the antenna.				

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FREQUENCY BAND (MHz)	EUT CATEGORY		RSS-247 §6.2.1~6.2.4	
			EIRP Density	Power Density
5150~5250		OEM devices installed in vehicles	N/A	N/A
	V	Other device	10 dBm/MHz	N/A
5250~5350		OEM devices installed in vehicles	N/A	N/A
	V	Other device	N/A	11 dBm/MHz
5725~5850	V	All	N/A	30 dBm/500kHz

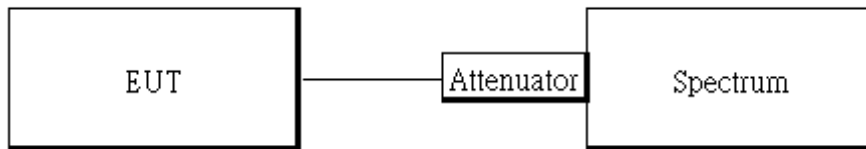
For equipment operating in the band 5725-5850 MHz, If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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10.2 Test Setup



10.3 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 Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (1001 pts), Detector = power averaging (rms), if available. Otherwise, use sample detector mode, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set RBW=300kHz, VBW=1MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto, detector = RMS or sample, traces 100 sweeps of video averaging. In addition, measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log(500 \text{ kHz}/\text{RBW})$ to the measured result.
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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10.4 Measurement Result

POWER DENSITY 802.11a MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	5.686	0.00	5.69		11.00 dBm/MHz	-5.31
5220	5.357	0.00	5.36		11.00 dBm/MHz	-5.64
5240	4.724	0.00	4.72		11.00 dBm/MHz	-6.28
5260	4.755	0.00	4.76		11.00 dBm/MHz	-6.25
5300	4.232	0.00	4.23		11.00 dBm/MHz	-6.77
5320	4.271	0.00	4.27		11.00 dBm/MHz	-6.73
5500	5.077	0.00	5.08		11.00 dBm/MHz	-5.92
5580	5.109	0.00	5.11		11.00 dBm/MHz	-5.89
5700	4.487	0.00	4.49		11.00 dBm/MHz	-6.51
5720 (U-NII 2C)	5.180	0.00	5.18		11.00 dBm/MHz	-5.82
Frequency (MHz)	Ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5720 (U-NII 3)	-1.640	0.00	2.22	0.58	30.00 dBm/500kHz	-29.42
5745	0.224	0.00	2.22	2.44	30.00 dBm/500kHz	-27.56
5785	-0.611	0.00	2.22	1.61	30.00 dBm/500kHz	-28.39
5825	-0.281	0.00	2.22	1.94	30.00 dBm/500kHz	-28.06
POWER DENSITY 802.11n HT20 MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	6.134	0.00	6.13		11.00 dBm/MHz	-4.87
5220	6.468	0.00	6.47		11.00 dBm/MHz	-4.53
5240	6.377	0.00	6.38		11.00 dBm/MHz	-4.62
5260	5.744	0.00	5.74		11.00 dBm/MHz	-5.26
5300	5.631	0.00	5.63		11.00 dBm/MHz	-5.37
5320	5.645	0.00	5.65		11.00 dBm/MHz	-5.36
5500	6.295	0.00	6.30		11.00 dBm/MHz	-4.71
5580	6.146	0.00	6.15		11.00 dBm/MHz	-4.85
5700	6.174	0.00	6.17		11.00 dBm/MHz	-4.83
5720 (U-NII 2C)	6.200	0.00	6.20		11.00 dBm/MHz	-4.80
Frequency (MHz)	Ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5720 (U-NII 3)	-0.350	0.00	2.22	1.87	30.00 dBm/500kHz	-28.13
5745	1.007	0.00	2.22	3.23	30.00 dBm/500kHz	-26.77
5785	1.100	0.00	2.22	3.32	30.00 dBm/500kHz	-26.68
5825	0.662	0.00	2.22	2.88	30.00 dBm/500kHz	-27.12

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POWER DENSITY 802.11n HT40 MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5190	2.212	0.16	2.37		11.00 dBm/MHz	-8.63
5230	1.682	0.16	1.84		11.00 dBm/MHz	-9.16
5270	2.084	0.16	2.24		11.00 dBm/MHz	-8.76
5310	1.719	0.16	1.88		11.00 dBm/MHz	-9.12
5510	2.155	0.16	2.32		11.00 dBm/MHz	-8.69
5550	2.091	0.16	2.25		11.00 dBm/MHz	-8.75
5670	2.252	0.16	2.41		11.00 dBm/MHz	-8.59
5710 (U-NII 2C)	1.620	0.16	1.78		11.00 dBm/MHz	-9.22
Frequency (MHz)	Ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5710 (U-NII 3)	-5.550	0.16	2.22	-3.17	30.00 dBm/500kHz	-33.17
5755	-3.334	0.16	2.22	-0.95	30.00 dBm/500kHz	-30.95
5795	-3.543	0.16	2.22	-1.16	30.00 dBm/500kHz	-31.16
POWER DENSITY 802.11ac VHT80 MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5210	-2.418	0.32	-2.10		11.00 dBm/MHz	-13.10
5290	-2.219	0.32	-1.90		11.00 dBm/MHz	-12.90
5530	-1.774	0.32	-1.45		11.00 dBm/MHz	-12.45
5610	-1.965	0.32	-1.65		11.00 dBm/MHz	-12.65
5690 (U-NII 2C)	-1.980	0.32	-1.66		11.00 dBm/MHz	-12.66
Frequency (MHz)	Ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5690 (U-NII 3)	-8.650	0.32	2.22	-6.11	30.00 dBm/500kHz	-36.11
5775	-7.068	0.32	2.22	-4.53	30.00 dBm/500kHz	-34.53

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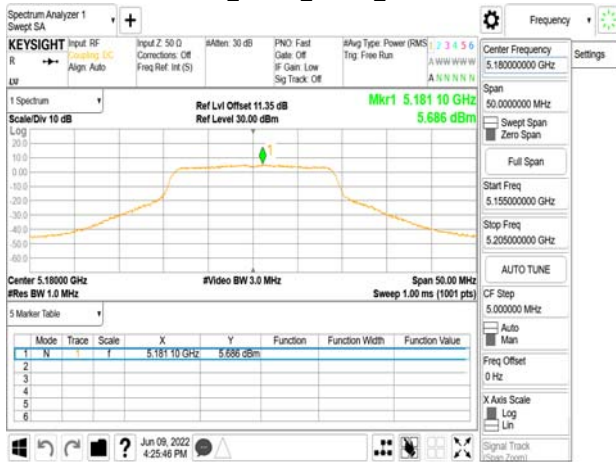
EIRP spectral density 802.11a MODE					
Freq. (MHz)	PSD (dBm)	Ant. Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Margin (dB)
5180	5.69	2.22	7.91	10	-2.09
5220	5.36	2.22	7.58	10	-2.42
5240	4.72	2.22	6.94	10	-3.06
EIRP spectral density 802.11n HT20 MODE					
Freq. (MHz)	PSD (dBm)	Ant. Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Margin (dB)
5180	6.13	2.22	8.35	10	-1.65
5220	6.47	2.22	8.69	10	-1.31
5240	6.38	2.22	8.60	10	-1.40
EIRP spectral density 802.11n HT40 MODE					
Freq. (MHz)	PSD (dBm)	Ant. Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Margin (dB)
5190	2.37	2.22	4.59	10	-5.41
5230	1.84	2.22	4.06	10	-5.94
EIRP spectral density 802.11ac VHT80 MODE					
Freq. (MHz)	PSD (dBm)	Ant. Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Margin (dB)
5210	-2.10	2.22	0.12	10	-9.88

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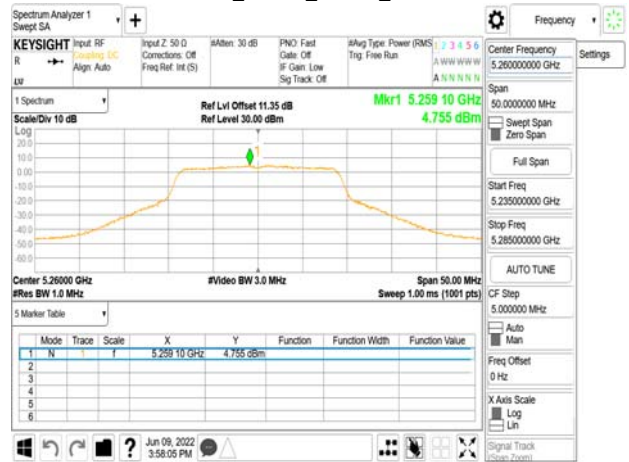
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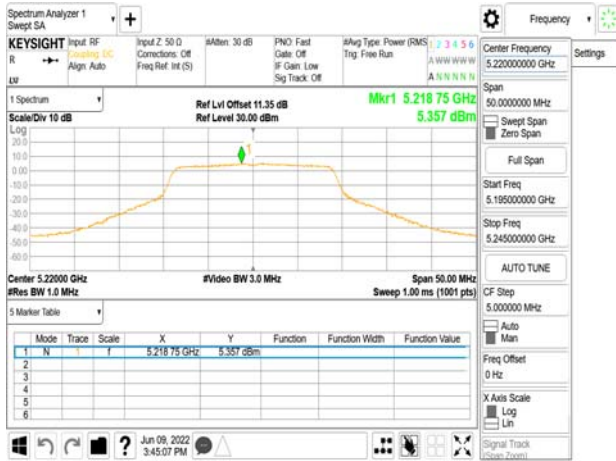
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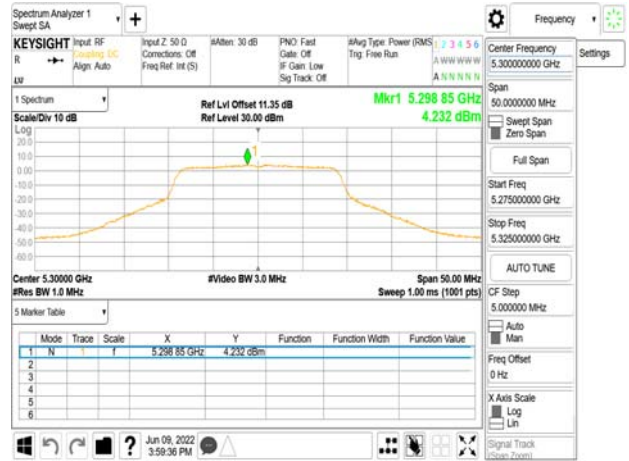
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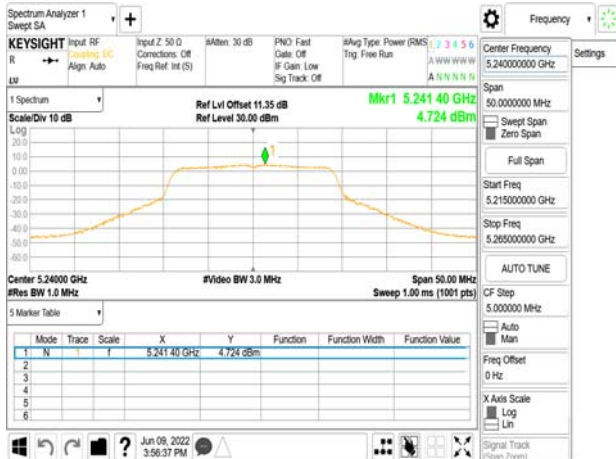
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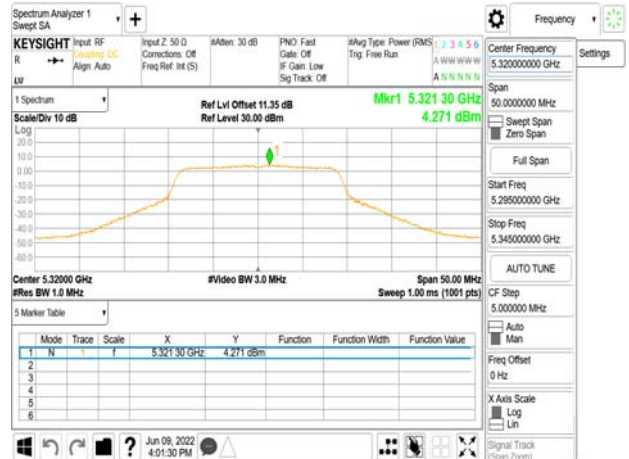
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802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

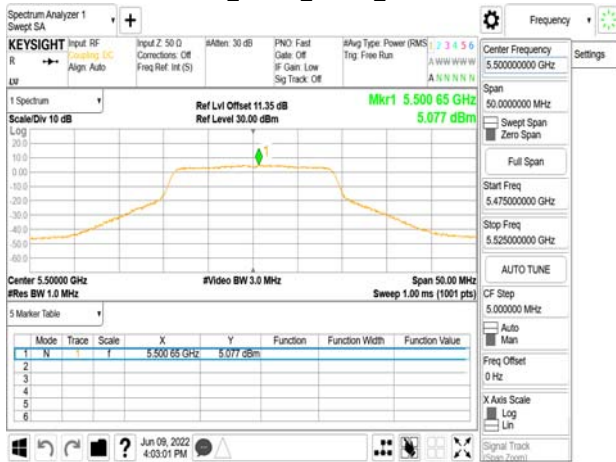


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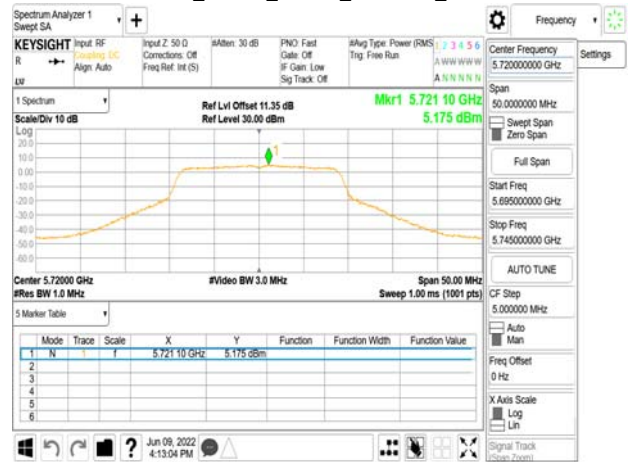
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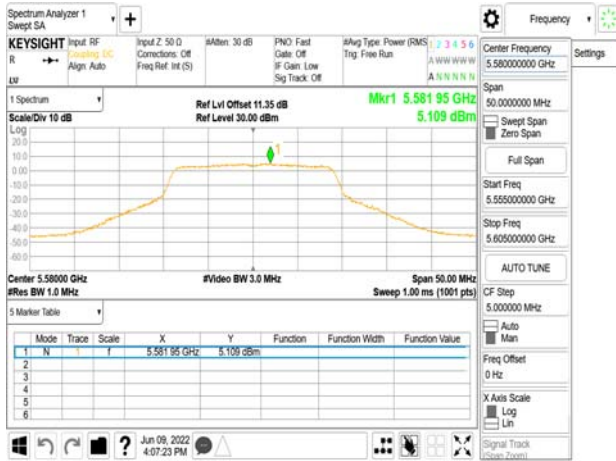
802.11a_20MHz_Chain0_5500MHz



802.11a_20MHz_Chain0_5720MHz_UNII 2C



802.11a_20MHz_Chain0_5580MHz



802.11a_20MHz_Chain0_5720MHz_UNII 3



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5745MHz

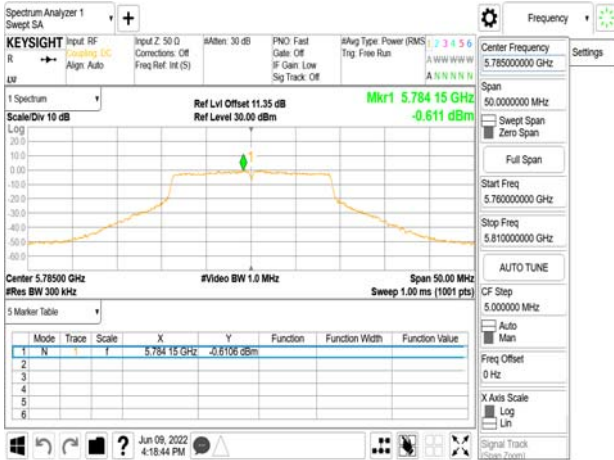


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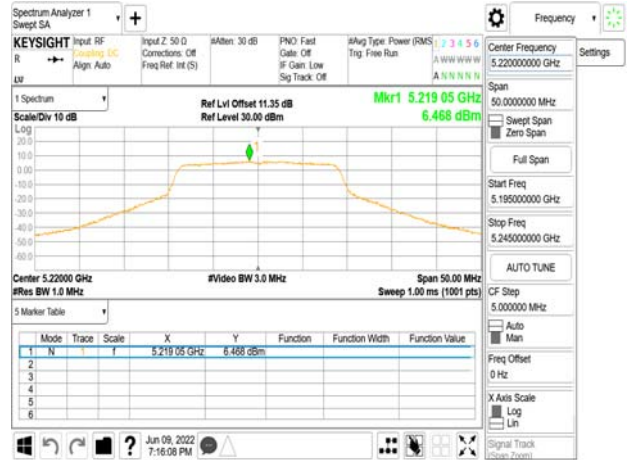
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802.11a_20MHz_Chain0_5785MHz



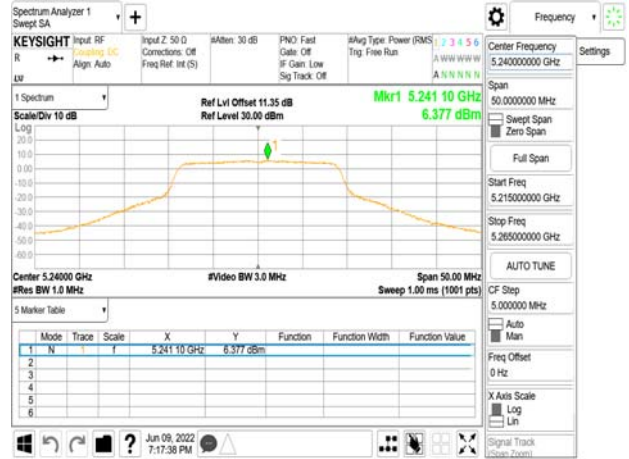
802.11n_20MHz_Chain0_5220MHz



802.11a_20MHz_Chain0_5825MHz



802.11n_20MHz_Chain0_5240MHz



802.11n_20MHz_Chain0_5180MHz



802.11n_20MHz_Chain0_5260MHz

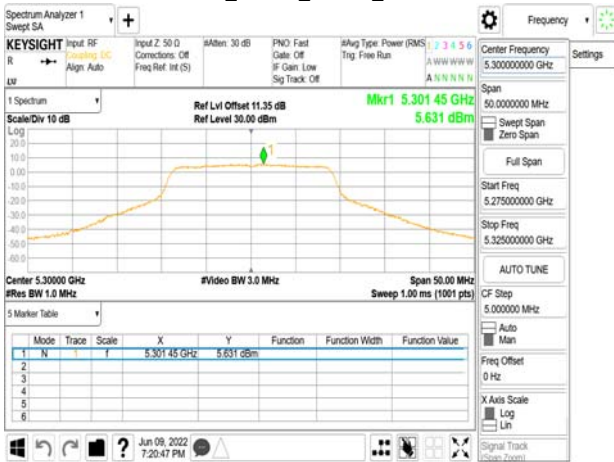


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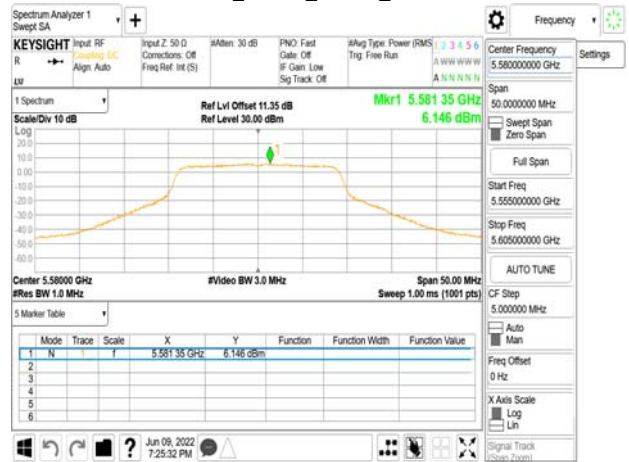
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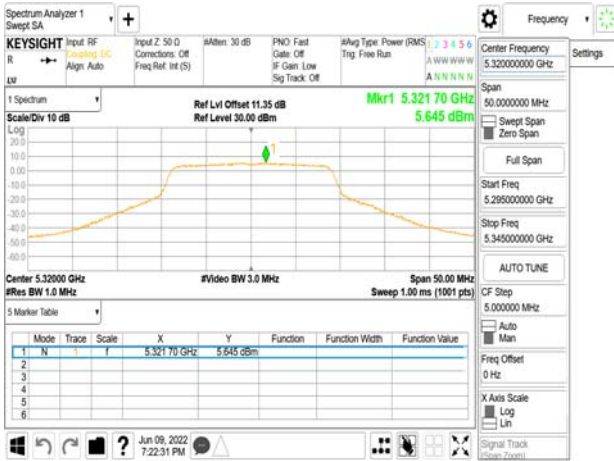
802.11n_20MHz_Chain0_5300MHz



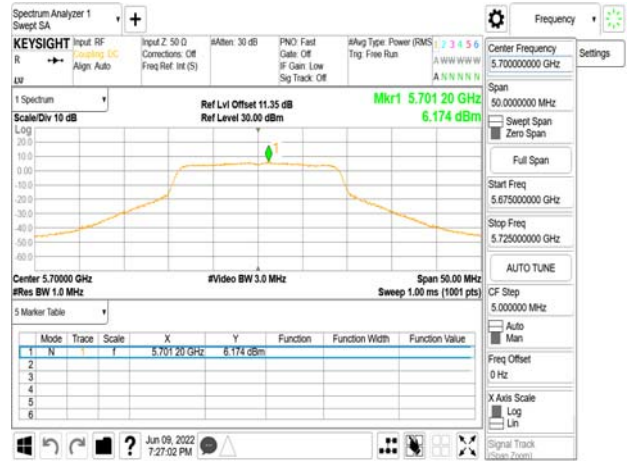
802.11n_20MHz_Chain0_5580MHz



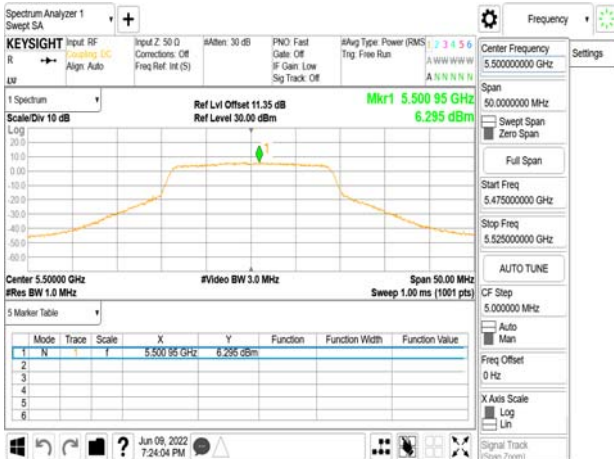
802.11n_20MHz_Chain0_5320MHz



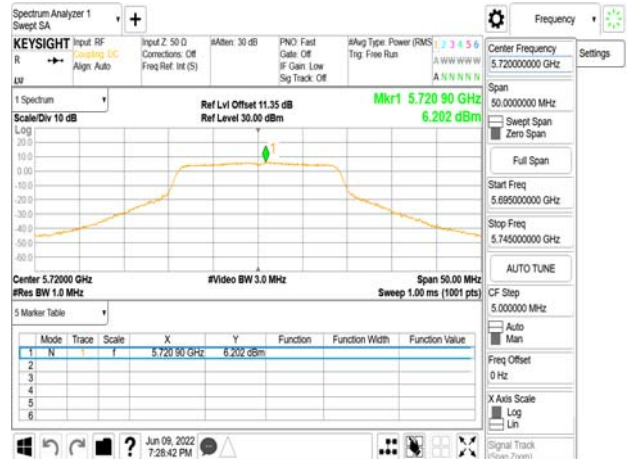
802.11n_20MHz_Chain0_5700MHz



802.11n_20MHz_Chain0_5500MHz



802.11n_20MHz_Chain0_5720MHz_UNII 2C

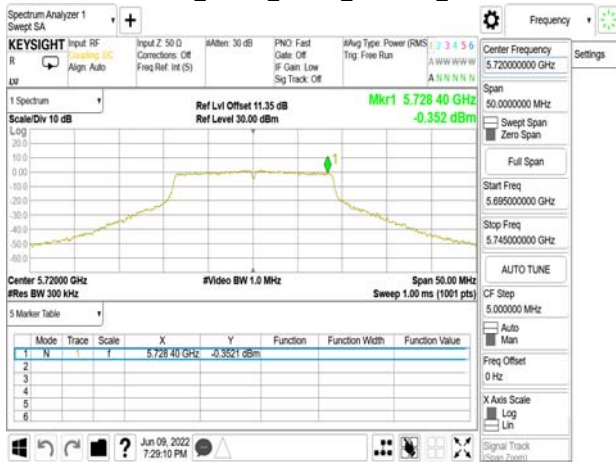


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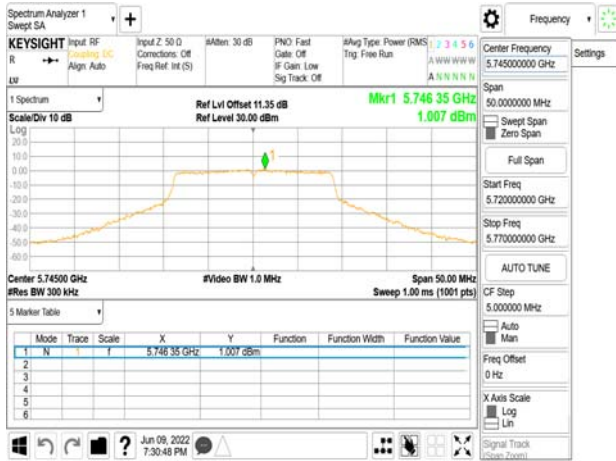
802.11n_20MHz_Chain0_5720MHz_UNI13



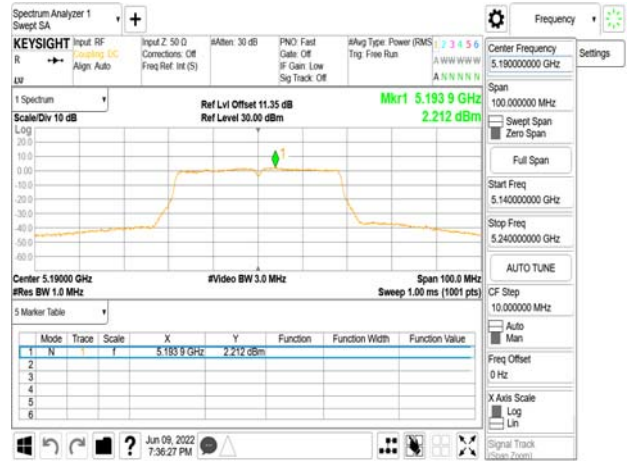
802.11n_20MHz_Chain0_5825MHz



802.11n_20MHz_Chain0_5745MHz



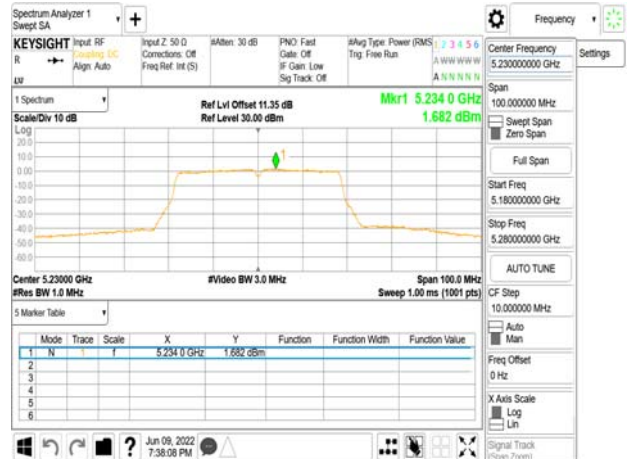
802.11n_40MHz_Chain0_5190MHz



802.11n_20MHz_Chain0_5785MHz



802.11n_40MHz_Chain0_5230MHz

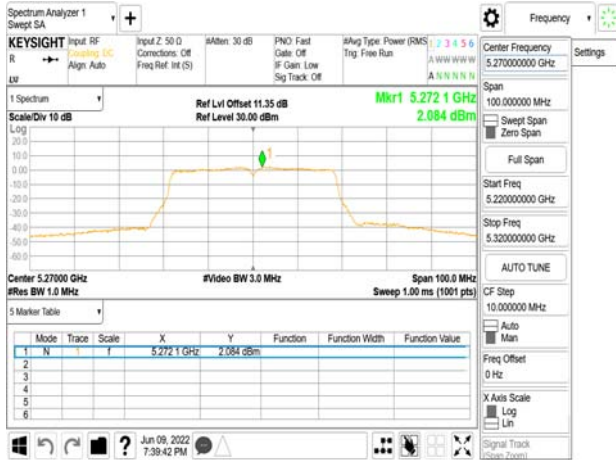


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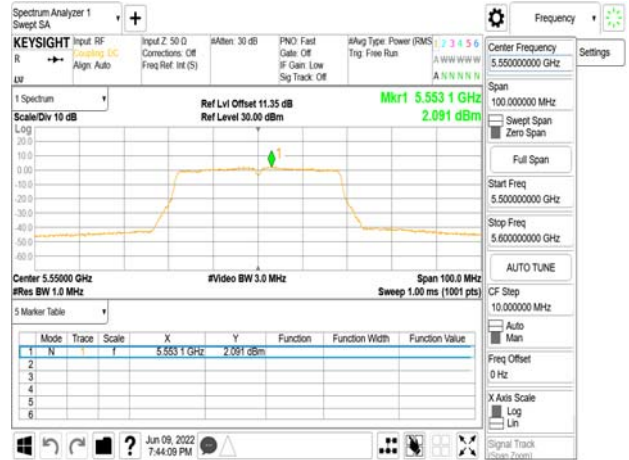
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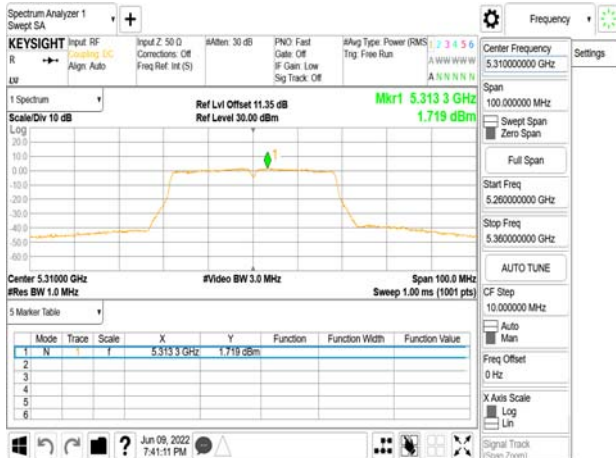
802.11n_40MHz_Chain0_5270MHz



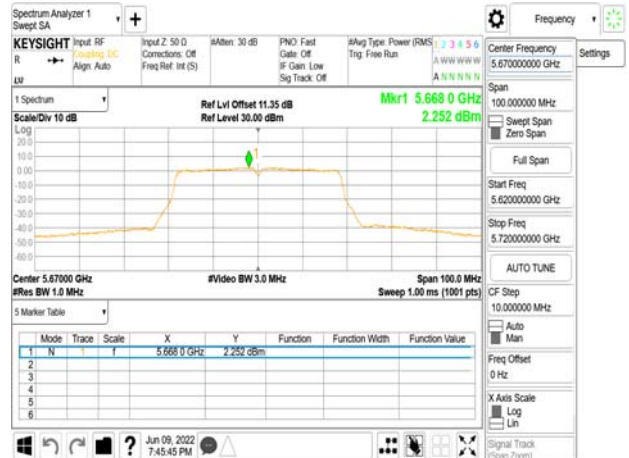
802.11n_40MHz_Chain0_5550MHz



802.11n_40MHz_Chain0_5310MHz



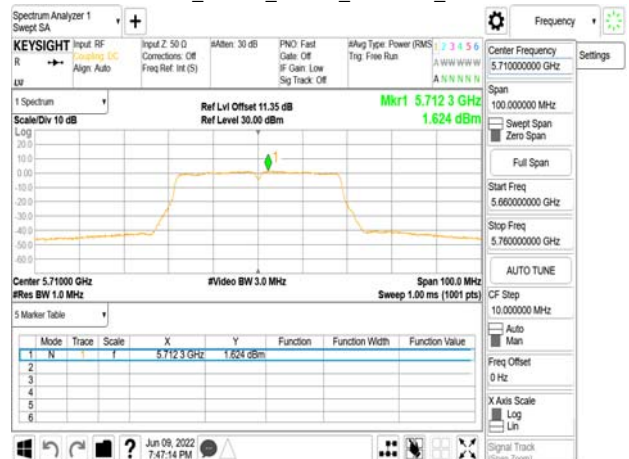
802.11n_40MHz_Chain0_5670MHz



802.11n_40MHz_Chain0_5510MHz



802.11n_40MHz_Chain0_5710MHz_UNII 2C



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802.11n_40MHz_Chain0_5710MHz_UNI13



802.11ac_80MHz_Chain0_5210MHz



802.11n_40MHz_Chain0_5755MHz



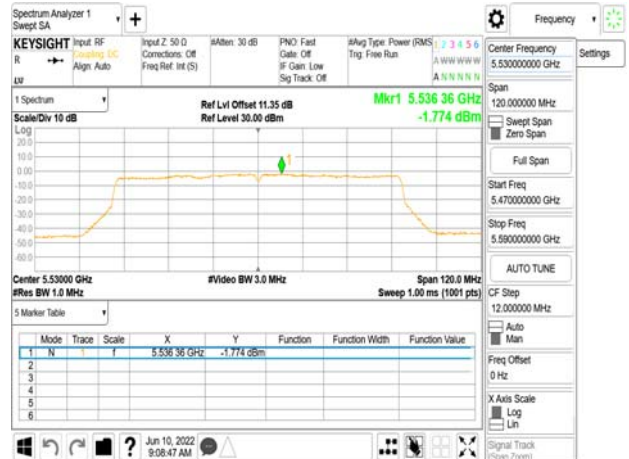
802.11ac_80MHz_Chain0_5290MHz



802.11n_40MHz_Chain0_5795MHz



802.11ac_80MHz_Chain0_5530MHz



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