

**ELECTROMAGNETIC EMISSIONS  
COMPLIANCE REPORT**

**Applicant:** HTC Corporation  
No. 88, Sec. 3, Zhongxing Rd. Xindian Dist., New Taipei City  
231, Taiwan

**Product Name:** VIVE Headset

**Brand Name:** VIVE

**Model No.:** 2Q7Y100

**Model Difference:** N/A

**Report Number:** E2/2021/60091

**FCC ID** NM82Q7Y100

**Issue Date:** August 27, 2021

**Date of Test:** July 12, 2021 ~ August 19, 2021

**Date of EUT Received:** July 01, 2021

**Approved By** \_\_\_\_\_

**Vito Pei**

**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.

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

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## Revision History

Report Number	Revision	Description	Issue Date	Revised By
E2/2021/60091	00	Original.	Aug. 27, 2021	Tiffany Kao

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## 1 GENERAL INFORMATION

### 1.1 Product Description

Product Name:	VIVE Headset
Brand Name:	VIVE
Model No.:	2Q7Y100
Model Difference:	N/A
Hardware Version:	XG
Firmware Version:	0.50.8888.01
EUT Series No.:	5A11X2S00133
Power Supply:	3.85Vdc from Rechargeable Li-polymer Battery or or 5 Vdc from USB cable

### 1.2 Modulation & Data Rate

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

### 1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain (dBi)
Dipole	Amphenol	2Q7Y100	5GHz	-2	1.01
	Amphenol	2Q7Y100	5GHz	-2	1.01

**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

WLAN 5 GHz

Wi-Fi	Frequency Range	Channels	Rated Power(Avg) (dBm) (Worst Case)	Modulation Technology
a n_HT ac_VHT 20M	5180~5240	4	18.53 dBm	OFDM
	5260~5320	4	20.93 dBm	OFDM
	5500~5700	11	20.97 dBm	OFDM
	5745-5825	5	20.98 dBm	OFDM
n_HT ac_VHT 40M	5190~5230	2	20.94 dBm	OFDM
	5270~5310	2	20.83 dBm	OFDM
	5510~5670	5	20.93 dBm	OFDM
	5755-5795	2	20.97 dBm	OFDM
ac_VHT 80M	5210	1	20.83 dBm	OFDM
	5290	1	20.78 dBm	OFDM
	5530~5610	2	20.86 dBm	OFDM
	5775	1	15.78 dBm	OFDM

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### 1.5 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407  
 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01  
 FCC KDB 662911 D01 Multiple Transmitter Output v02r01  
 ANSI C63.10:2013

### 1.6 Test Facility

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

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

### 1.7 Special Accessories

There are no special accessories used while test was conducted.

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

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## 2.4 Measurement Results Explanation Example

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

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

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

### 2.4.2 For all conducted test items:

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

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## 2.5 Test Configuration

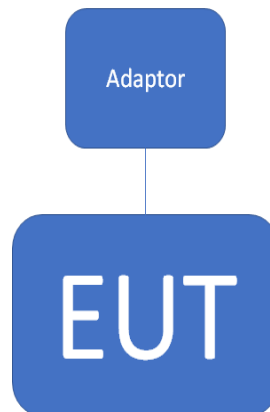
Fig. 2-1 Conducted (Antenna Port) Emission Configuration



Fig. 2-2 Radiated Emission



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



## 2.6 Control Unit(s)

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
1.	WLAN Test Softwear	N/A	N/A	N/A
2.	Notebook	Lenovo	L420	S0011721
3.	Notebook	Lenovo	T470	P0001293
4.	Adapter	Sony	AC-0400-TW	3504600

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### 3 SUMMARY OF TEST RESULT

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

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## 4 DESCRIPTION OF TEST MODES

### 4.1 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		
112	5560	126	5630		
116	5580	134	5670		
120	5600				
124	5620				
128	5640				
132	5660				
136	5680				
140	5700				

#### Operated band in 5745 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
<input checked="" type="checkbox"/> 802.11 a	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input checked="" type="checkbox"/> 1TX	<input type="checkbox"/> 2TX
<input checked="" type="checkbox"/> 802.11 n	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> SISO	<input checked="" type="checkbox"/> MIMO
<input checked="" type="checkbox"/> 802.11 ac	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> SISO	<input checked="" type="checkbox"/> MIMO
<input type="checkbox"/> 802.11 ax	<input type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> SISO	<input type="checkbox"/> MIMO

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

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			
	5500~5700	100 to 140	116			
	5745~5825	149 to 165	157			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530~5610	106 to 122	106			
	5775	155	155			

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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			
	5500-5700	100 to 140	100,116,140			
	5745-5825	149 to 165	149,157,165			
802.11n_HT20	5180-5240	36 to 48	36,44,48	OFDM	MCS8	MIMO
	5260-5320	52 to 64	52,60,64			
	5500-5700	100 to 140	100,116,140			
	5745-5825	149 to 165	149,157,165			
802.11n_HT40	5190-5230	38 to 46	38,46	OFDM	MCS8	MIMO
	5270-5310	54 to 62	54,62			
	5510-5670	102 to 134	102,110,134			
	5755-5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530-5610	106 to 122	106,122			
	5775	155	155			

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			
	5500-5700	100 to 140	100,116,140			
	5745-5825	149 to 165	149,157,165			
802.11n_HT20	5180-5240	36 to 48	36,44,48	OFDM	MCS8	MIMO
	5260-5320	52 to 64	52,60,64			
	5500-5700	100 to 140	100,116,140			
	5745-5825	149 to 165	149,157,165			
802.11n_HT40	5190-5230	38 to 46	38,46	OFDM	MCS8	MIMO
	5270-5310	54 to 62	54,62			
	5510-5670	102 to 134	102,110,134			
	5755-5795	151 to 159	151,159			
802.11ac_VHT20	5180-5240	36 to 48	36,44,48	OFDM	MCS0	MIMO
	5260-5320	52 to 64	52,60,64			
	5500-5700	100 to 140	100,116,140			
	5745-5825	149 to 165	149,157,165			
802.11ac_VHT40	5190-5230	38 to 46	38,46	OFDM	MCS0	MIMO
	5270-5310	54 to 62	54,62			
	5510-5670	102 to 134	102,110,134			
	5755-5795	151 to 159	151,159			
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
	5290	58	58			
	5530-5610	106 to 122	106,122			
	5775	155	155			

**Note:**

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

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## 5 MEASUREMENT UNCERTAINTY

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

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

### Note:

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

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable

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

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

Note

- 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.

### 6.2 Measurement Equipment Used

Radiated Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Software	audix	e3	Ver. 6.11-20180419c	N.C.R	N.C.R
LISN	SCHWARZBEC K Mess- Elektronik	NSLK8127	974	04/19/2021	04/18/2022
EMI Test Receiver	R&S	ESCI	101342	04/28/2021	04/27/2022
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2021	03/26/2022
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2021	03/26/2022
Adapter	Sony	AC-0400-TW	3504600	N.C.R	N.C.R
USB Cable	COXOC	C807M3A03 E1E2	N/A	N.C.R	N.C.R
USB to Type-c	A-GOOD	USB to Type-c	N/A	N.C.R	N.C.R

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

### 6.3 EUT Setup

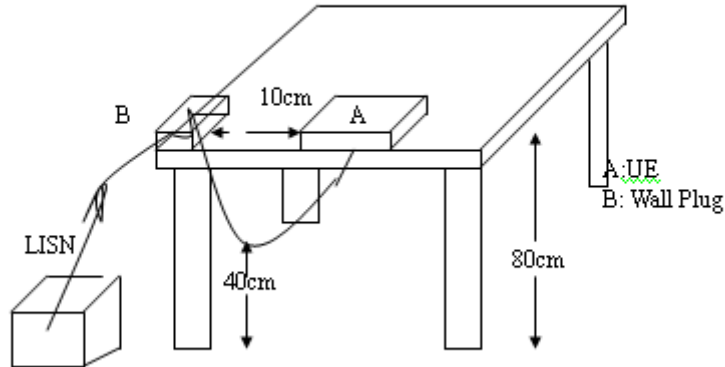
- The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- The LISN was connected with 120Vac/60Hz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

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## 6.4 Test SET-UP



## 6.5 Measurement Procedure

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

## 6.6 Measurement Result

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

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

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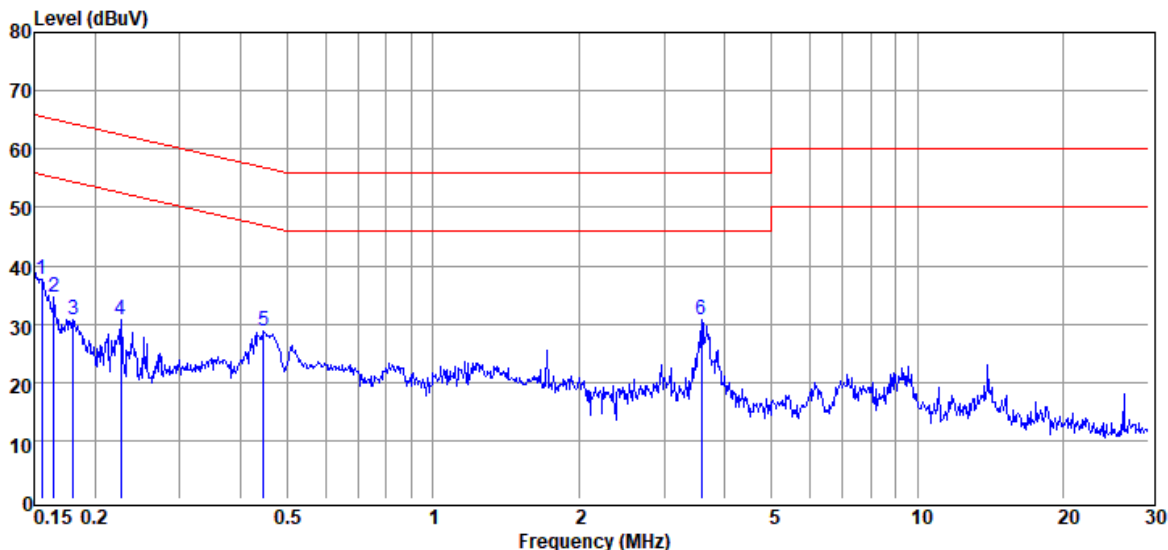
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### AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:E2/2021/60091	Test Site	:Conduction Room C
Test Mode	:5G	Test Date	:2021-07-22
Power	:120V/60Hz	Temp./Humi.	:24.0/64
Probe	:L1	Engineer	:Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.16	Peak	27.37	10.30	37.67	65.69	-28.02
0.17	Peak	24.25	10.30	34.55	65.21	-30.66
0.18	Peak	20.56	10.30	30.86	64.46	-33.60
0.23	Peak	20.30	10.30	30.60	62.57	-31.97
0.45	Peak	18.38	10.31	28.69	56.93	-28.24
3.58	Peak	19.84	10.77	30.61	56.00	-25.39

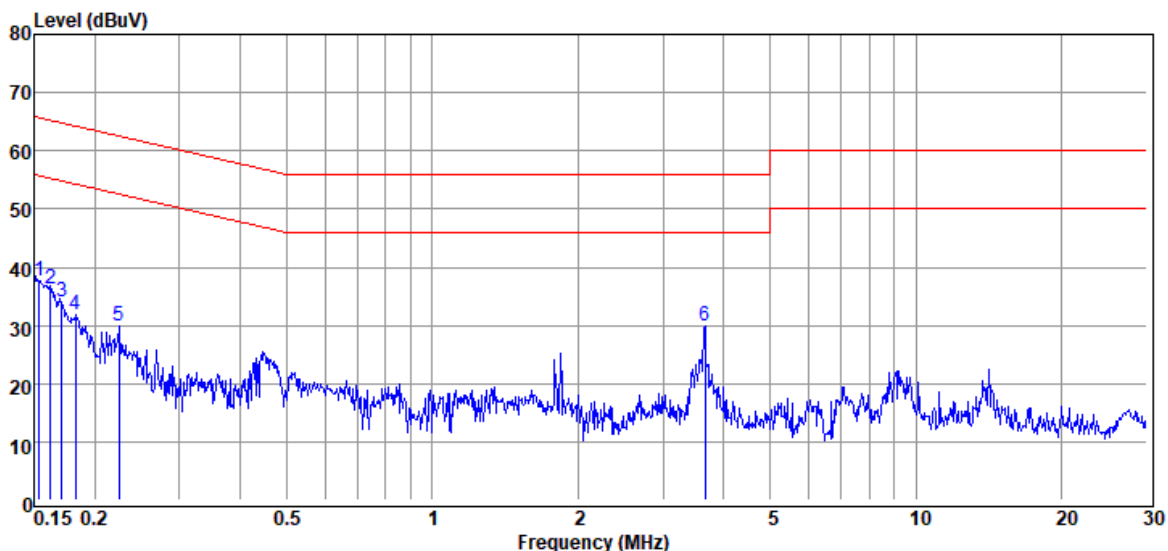
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Report Number :E2/2021/60091  
 Test Mode :5G  
 Power :120V/60Hz  
 Probe :N

Test Site :Conduction Room C  
 Test Date :2021-07-22  
 Temp./Humi. :24.0/64  
 Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.15	Peak	27.43	10.31	37.74	65.78	-28.04
0.16	Peak	26.00	10.31	36.31	65.34	-29.03
0.17	Peak	23.60	10.31	33.91	64.90	-30.99
0.18	Peak	21.56	10.30	31.86	64.37	-32.51
0.22	Peak	19.47	10.30	29.77	62.66	-32.89
3.66	Peak	19.45	10.48	29.93	56.00	-26.07

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## 7 DUTY CYCLE TEST SIGNAL

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

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

### 7.1 Measurement Procedure:

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

Duty Cycle:

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
802.11a	98.28	0.08	0.48	0.01
802.11n_20	98.16	0.08	0.52	0.01
802.11ac_20	98.17	0.08	0.52	0.01
802.11n_40	96.34	0.16	1.05	2.00
802.11ac_40	96.35	0.16	1.05	2.00
802.11ac_80	92.80	0.32	2.16	3.00

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## 7.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

802.11a\_20MHz\_Chain0\_5180MHz



802.11ac\_20MHz\_Chain0\_5180MHz



802.11n\_20MHz\_Chain0\_5180MHz



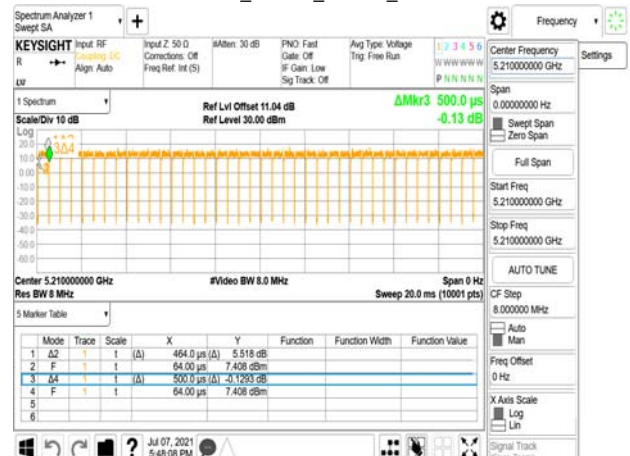
802.11ac\_40MHz\_Chain0\_5190MHz



802.11n\_40MHz\_Chain0\_5190MHz



802.11ac\_80MHz\_Chain0\_5210MHz



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## 8 EMISSION BANDWIDTH MEASUREMENT

### 8.1 Standard Applicable

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

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

### 8.2 Measurement Procedure

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

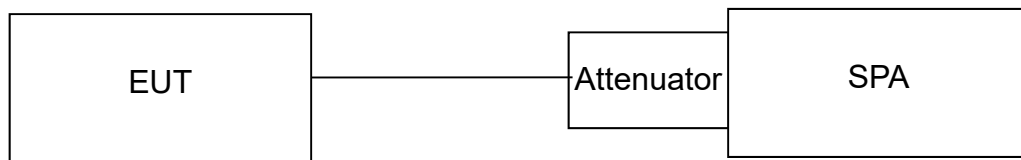
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### 8.3 Measurement Equipment Used

Conducted Emission Test Site: Conducted G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010B	MY60240506	06/18/2021	06/17/2022
Attenuator	Marvelous	WATT-218FS-10	RF23	11/19/2020	11/18/2021
DC Block	PASTERNAK	PE8210	RF151	11/19/2020	11/18/2021
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N/A	N/A

### 8.4 Test Set-up



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## 8.5 Measurement Result

### 8.5.1 FCC Occupied Bandwidth

#### 802.11a\_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	28.04	14.480
5220	24.81	13.950
5240	25.58	14.080
5260	26.69	14.260
5300	27.15	14.340
5320	26.58	14.250
5500	24.70	13.930
5580	25.52	14.070
5700	26.88	14.290

#### 802.11a\_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.35	12.140
5785	16.33	12.130
5825	16.35	12.140

#### 802.11a\_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.38	< 5250
5745	5736.75	> 5725

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802.11n\_HT20\_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	29.62	14.720
5220	29.92	14.760
5240	29.95	14.760
5260	27.58	14.410
5300	29.76	14.740
5320	27.37	14.370
5500	28.53	14.550
5580	27.46	14.390
5700	28.02	14.470

802.11n\_HT20\_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	30.00	14.770
5220	29.72	14.730
5240	29.48	14.700
5260	29.11	14.640
5300	27.56	14.400
5320	28.48	14.550
5500	24.94	13.970
5580	26.97	14.310
5700	28.99	14.620

802.11n\_HT20\_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.59	12.450
5785	17.67	12.470
5825	17.61	12.460

802.11n\_HT20\_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.34	12.390
5785	17.36	12.400
5825	17.34	12.390

802.11n\_HT20\_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.05	< 5250
5745	5736.21	> 5725

802.11n\_HT20\_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.07	< 5250
5745	5736.20	> 5725

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802.11n\_HT40\_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	49.61	16.960
5230	49.67	16.960
5270	49.63	16.960
5310	49.57	16.950
5510	48.00	16.810
5550	47.43	16.760
5670	49.48	16.940

802.11n\_HT40\_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	49.72	16.970
5230	49.70	16.960
5270	49.97	16.990
5310	49.97	16.990
5510	49.51	16.950
5550	48.88	16.890
5670	49.16	16.920

802.11n\_HT40\_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.20	15.590
5795	36.33	15.600

802.11n\_HT40\_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.09	15.570
5795	36.17	15.580

802.11n\_HT40\_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.31	< 5250
5755	5736.95	> 5725

802.11n\_HT40\_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.35	< 5250
5755	5736.96	> 5725

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802.11ac\_VHT80\_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	101.50	20.060
5290	100.90	20.040
5530	91.42	19.610
5610	92.26	19.650

802.11ac\_VHT80\_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	107.40	20.310
5290	106.60	20.280
5530	98.27	19.920
5610	99.99	20.000

802.11ac\_VHT80\_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.82	18.800

802.11ac\_VHT80\_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.78	18.800

802.11ac\_VHT80\_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.28	< 5250
5775	5737.23	> 5725

802.11ac\_VHT80\_Ch1

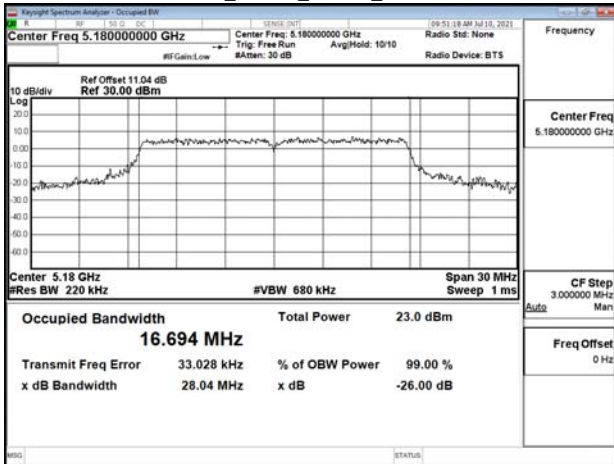
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5248.28	< 5250
5775	5737.22	> 5725

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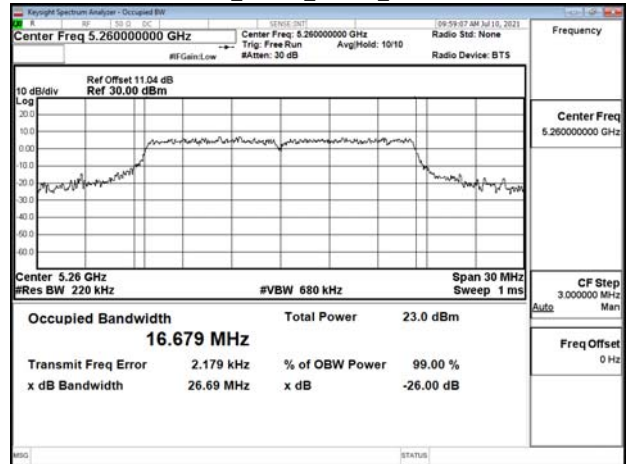
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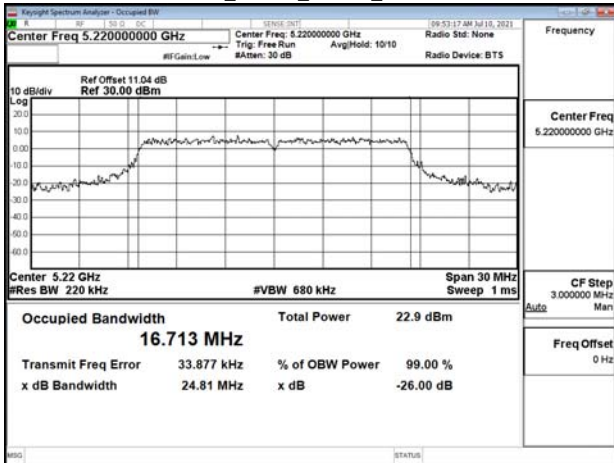
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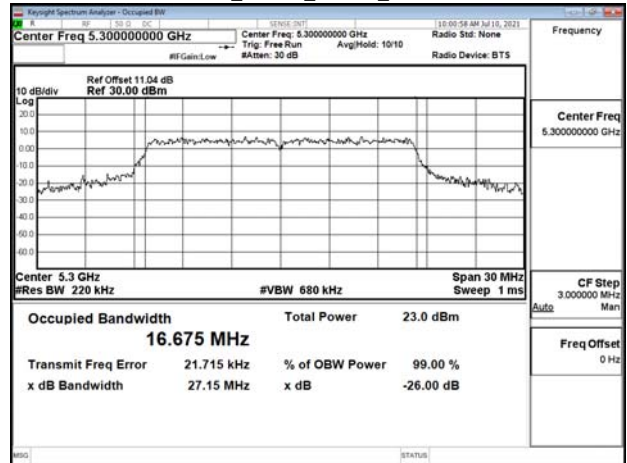
802.11a\_20MHz\_Chain0\_5260MHz



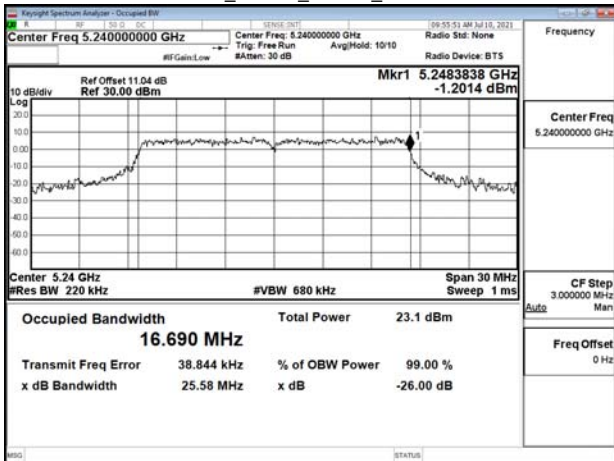
802.11a\_20MHz\_Chain0\_5220MHz



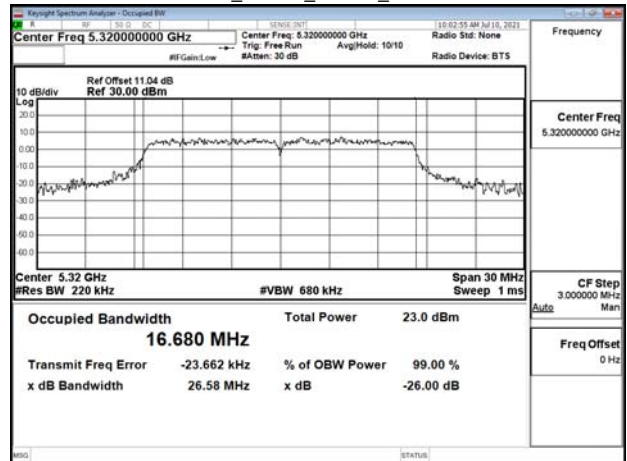
802.11a\_20MHz\_Chain0\_5300MHz



802.11a\_20MHz\_Chain0\_5240MHz



802.11a\_20MHz\_Chain0\_5320MHz

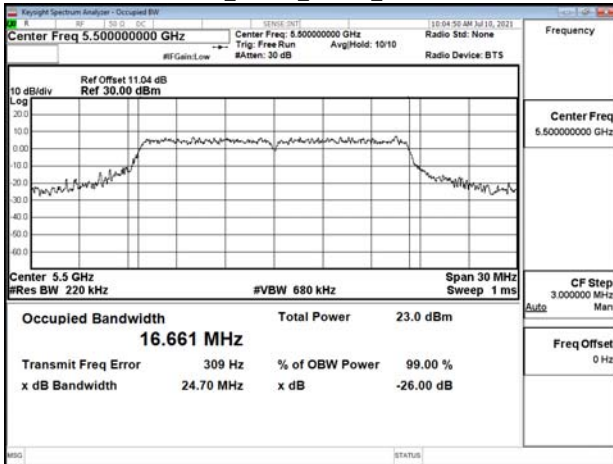


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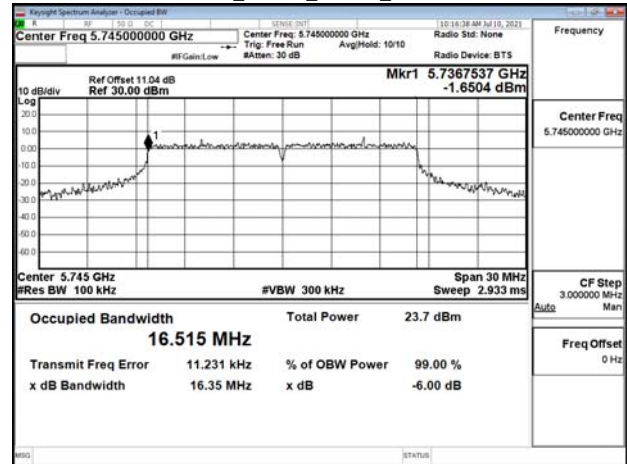
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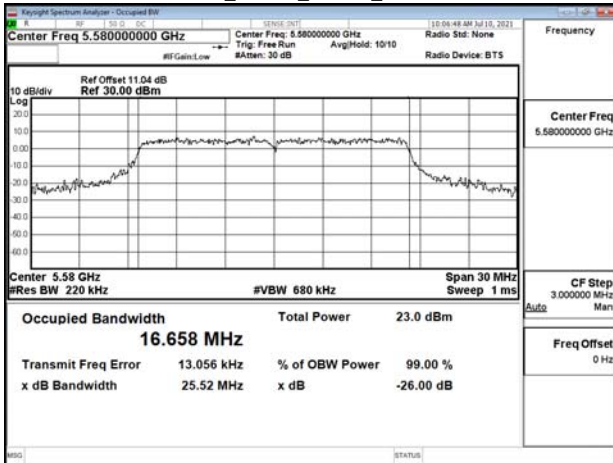
802.11a\_20MHz\_Chain0\_5500MHz



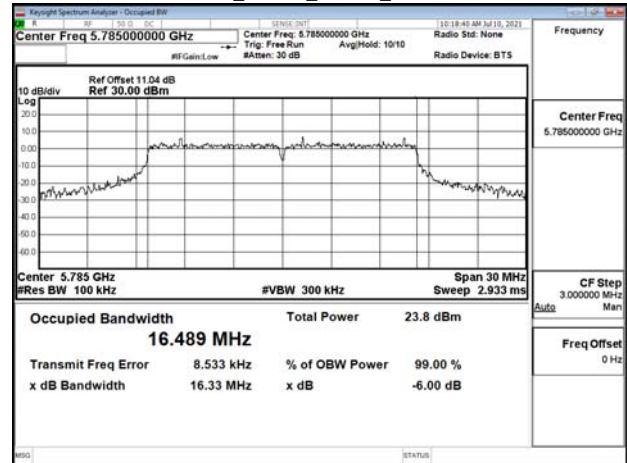
802.11a\_20MHz\_Chain0\_5745MHz



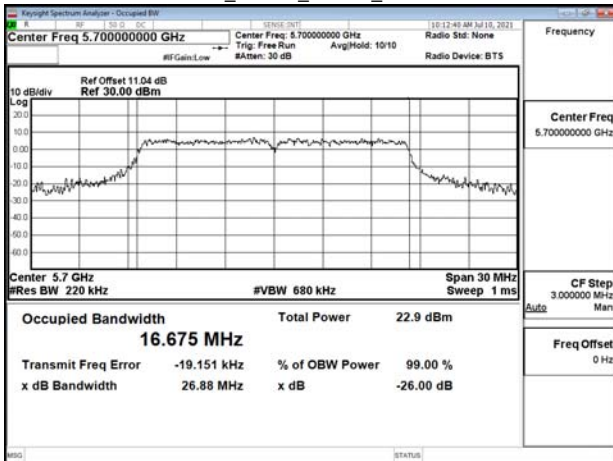
802.11a\_20MHz\_Chain0\_5580MHz



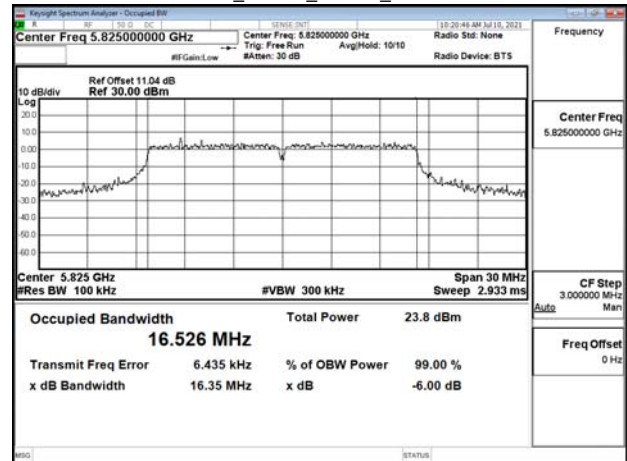
802.11a\_20MHz\_Chain0\_5785MHz



802.11a\_20MHz\_Chain0\_5700MHz



802.11a\_20MHz\_Chain0\_5825MHz

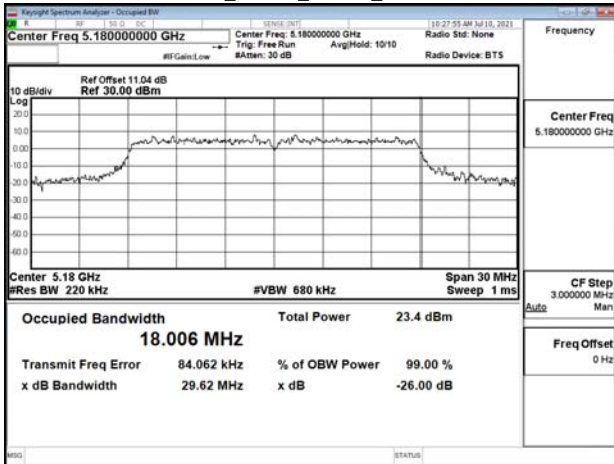


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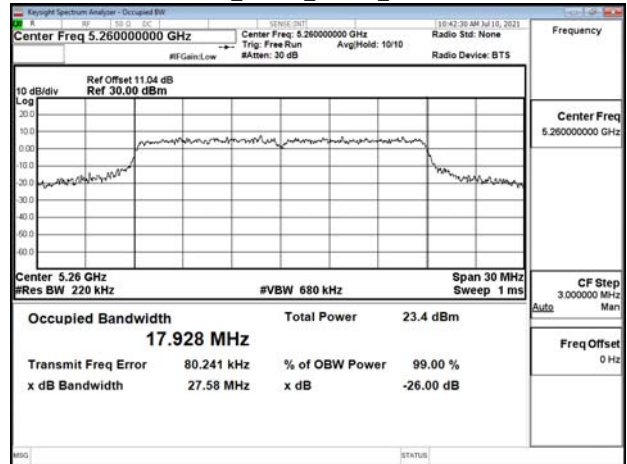
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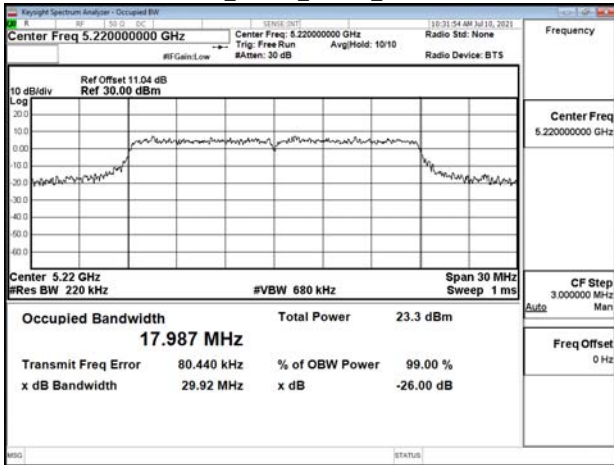
802.11n\_20MHz\_Chain0\_5180MHz



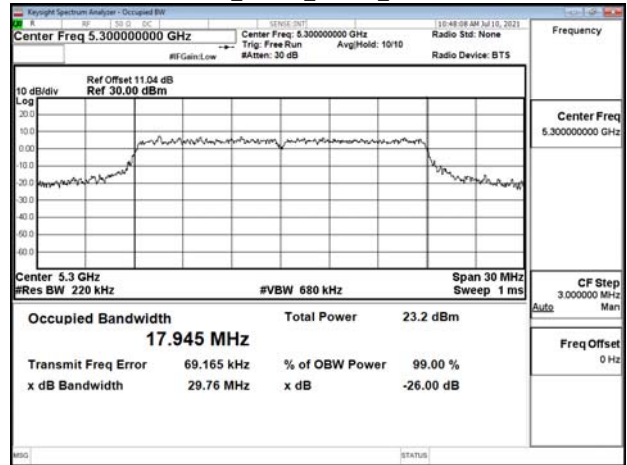
802.11n\_20MHz\_Chain0\_5260MHz



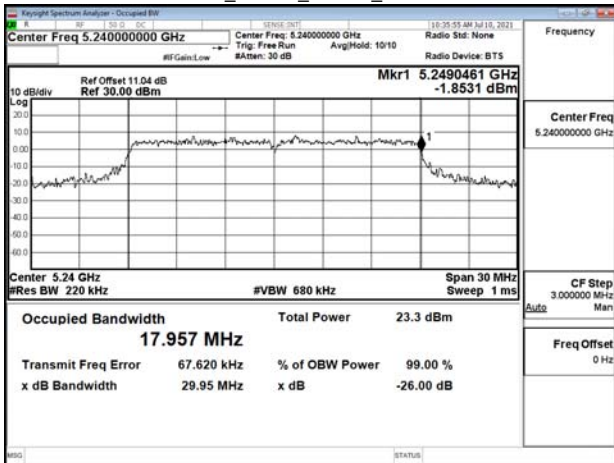
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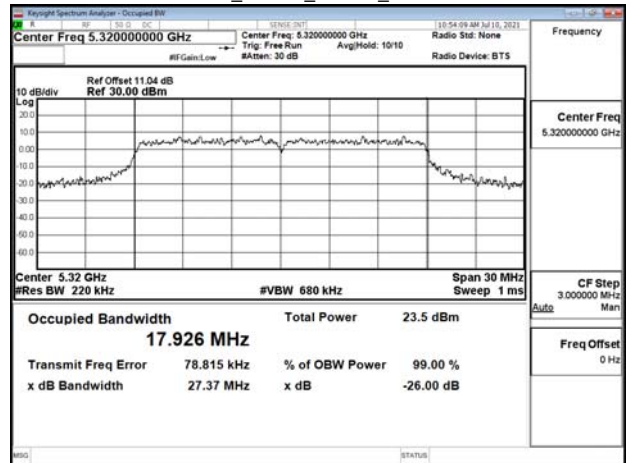
802.11n\_20MHz\_Chain0\_5300MHz



802.11n\_20MHz\_Chain0\_5240MHz



802.11n\_20MHz\_Chain0\_5320MHz

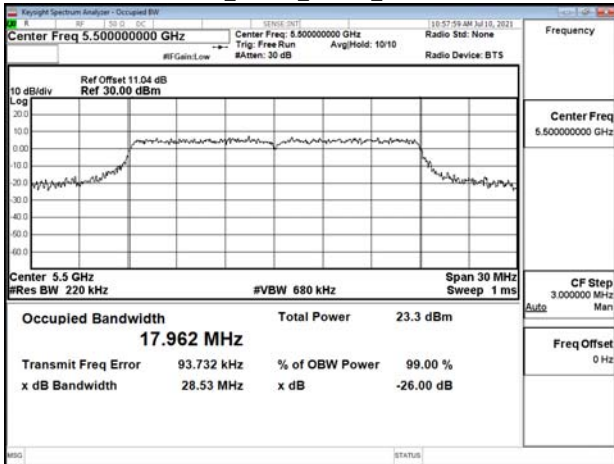


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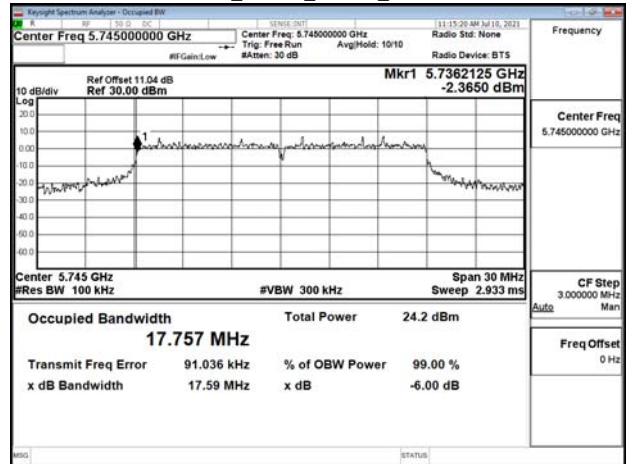
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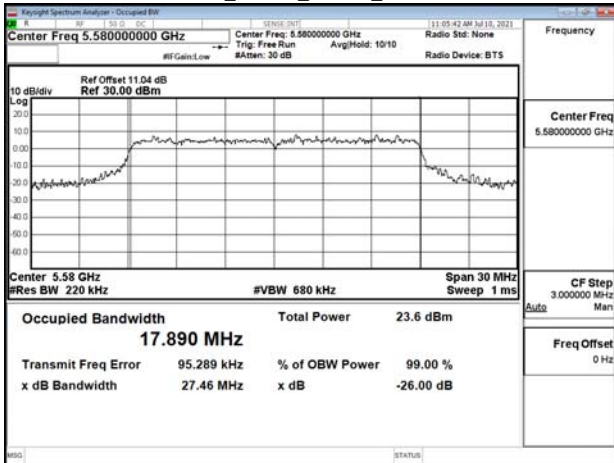
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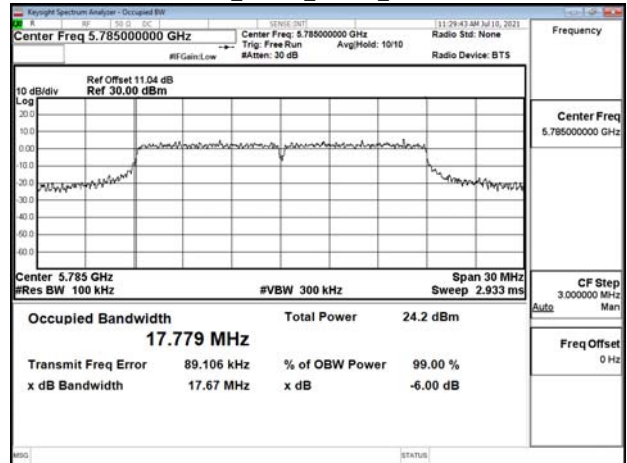
802.11n\_20MHz\_Chain0\_5745MHz



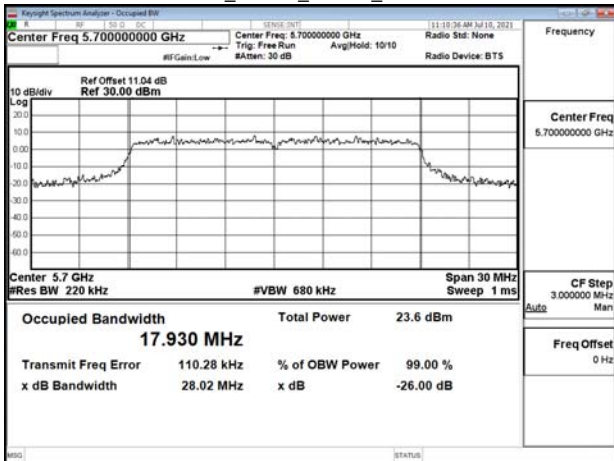
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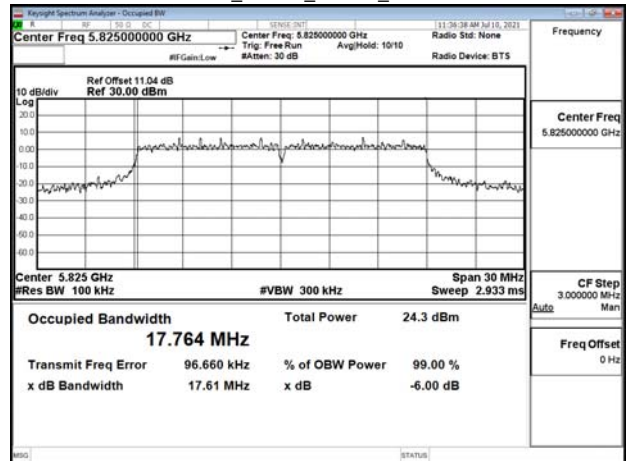
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802.11n\_20MHz\_Chain0\_5700MHz



802.11n\_20MHz\_Chain0\_5825MHz

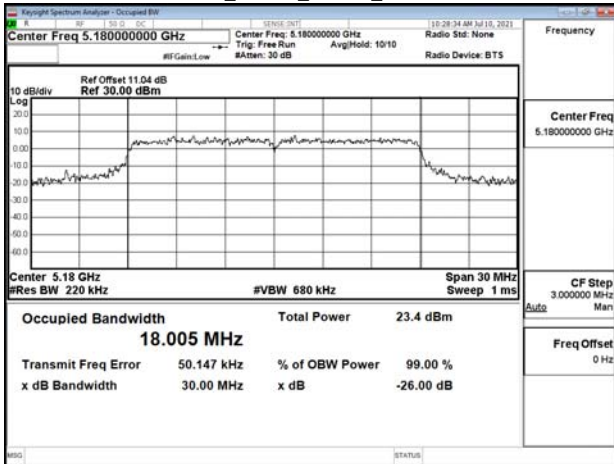


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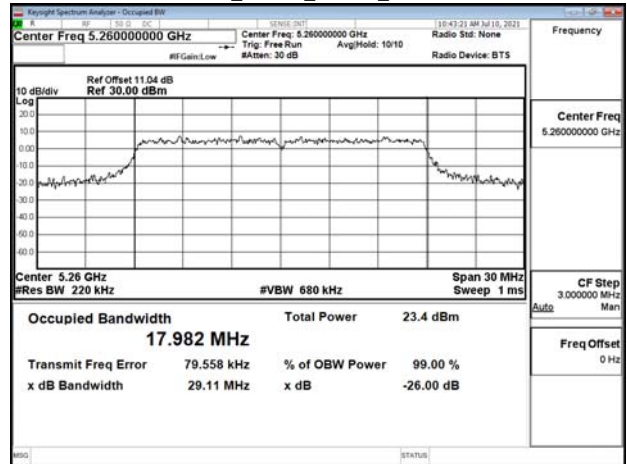
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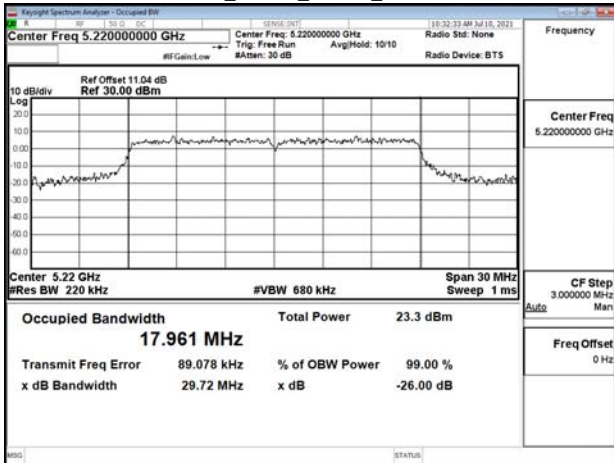
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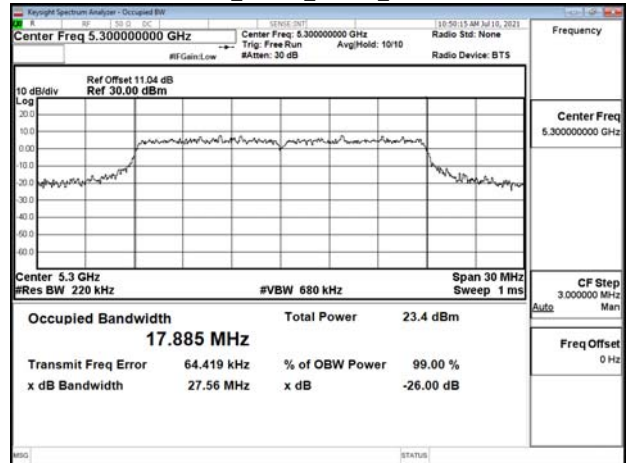
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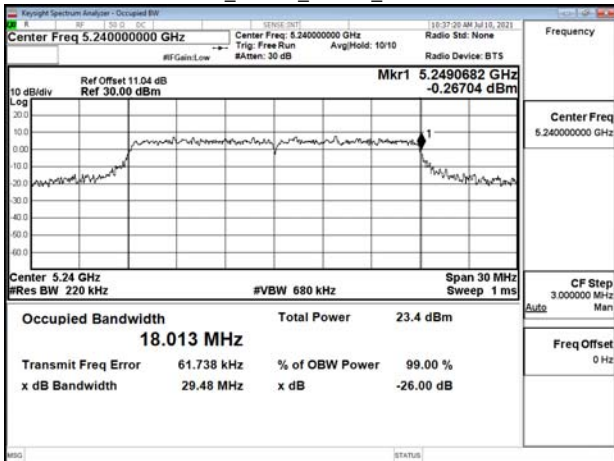
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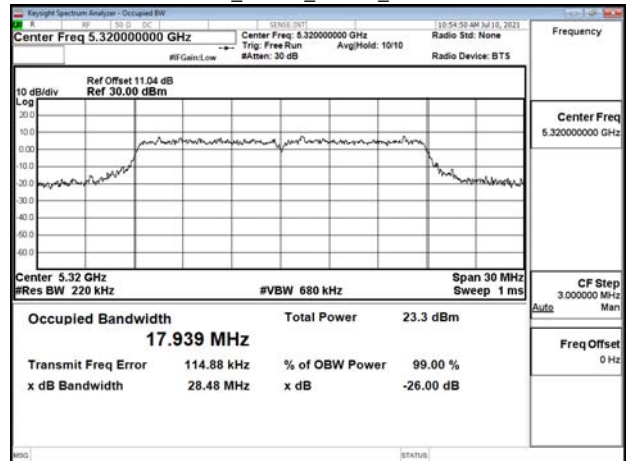
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802.11n\_20MHz\_Chain1\_5240MHz



802.11n\_20MHz\_Chain1\_5320MHz

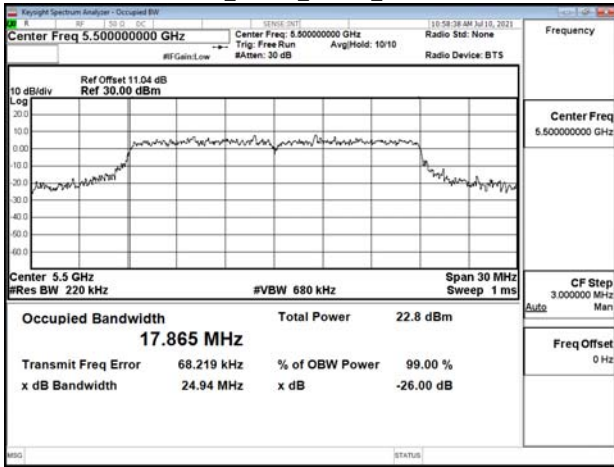


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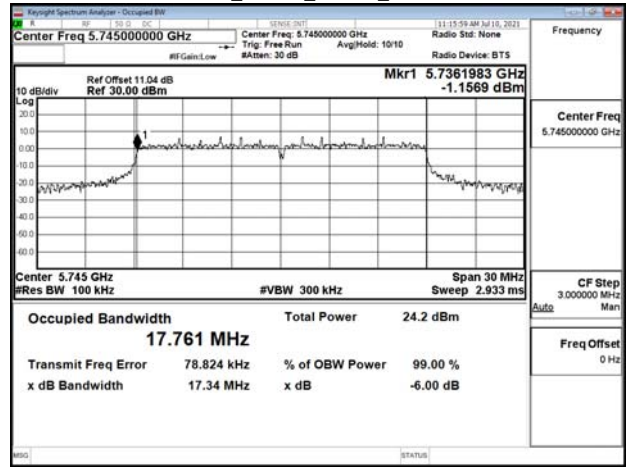
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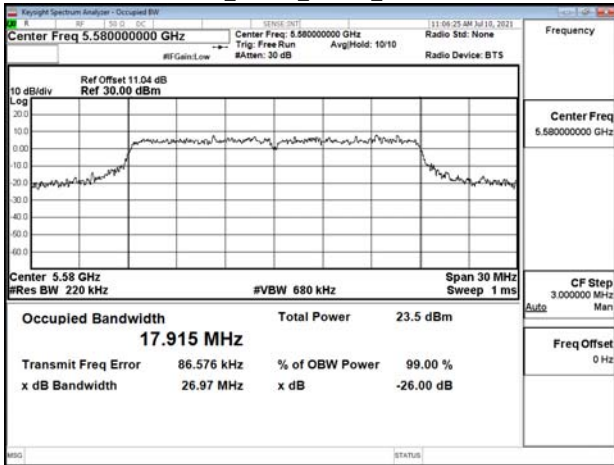
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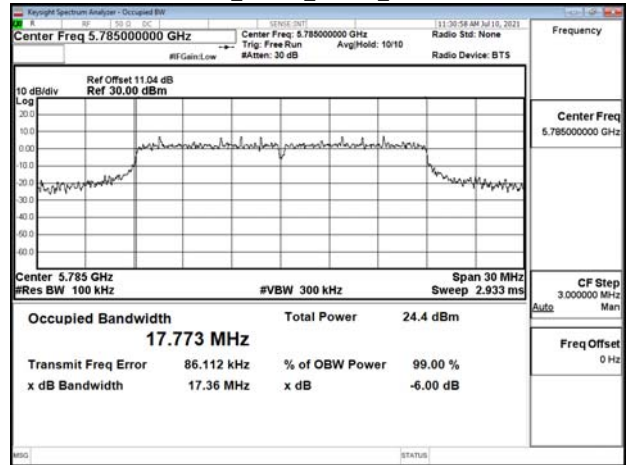
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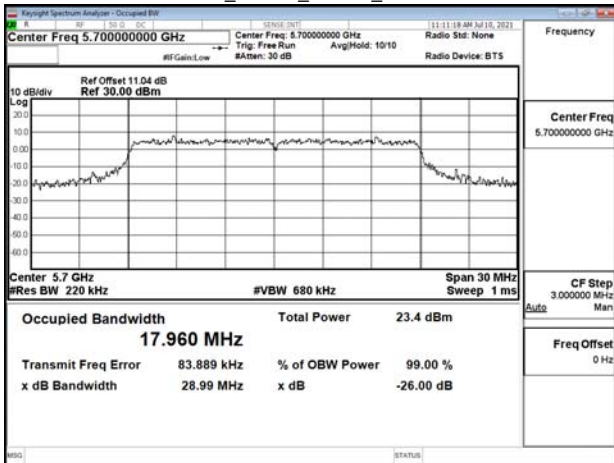
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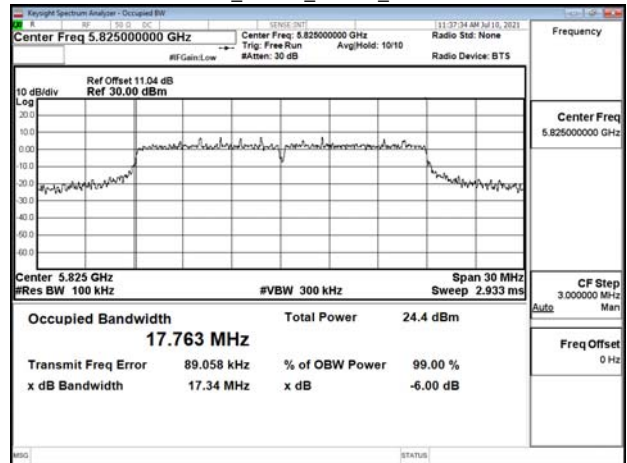
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802.11n\_20MHz\_Chain1\_5700MHz



802.11n\_20MHz\_Chain1\_5825MHz



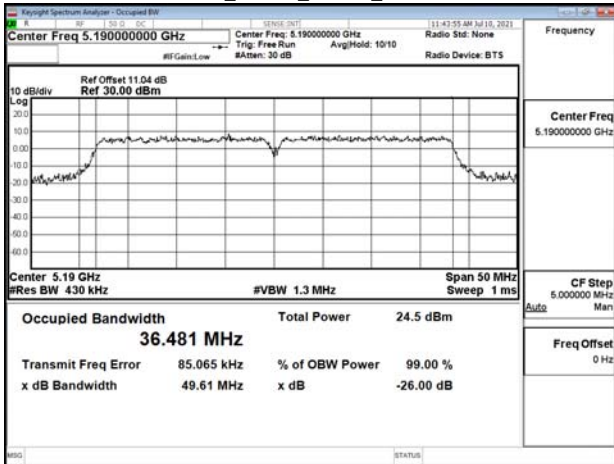
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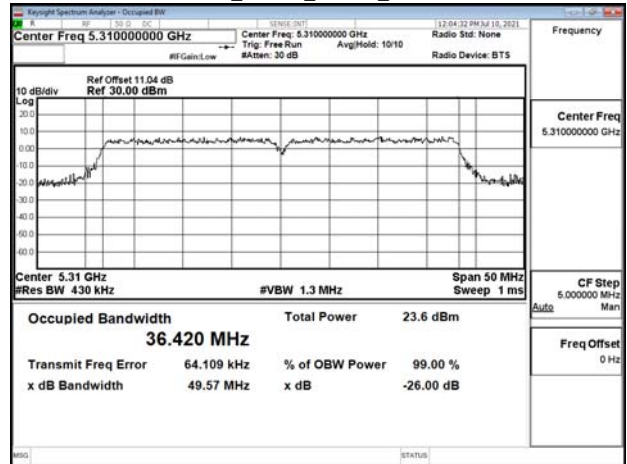
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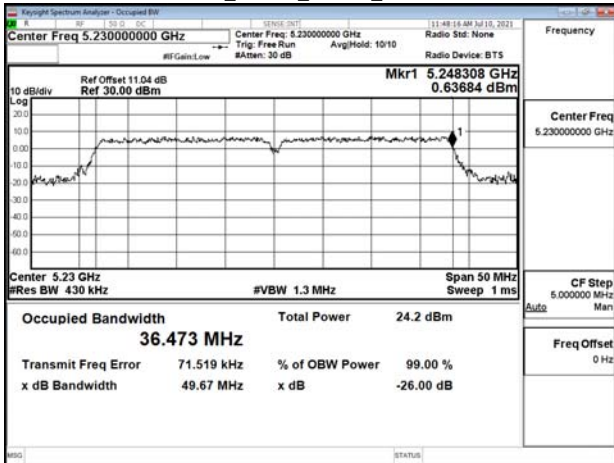
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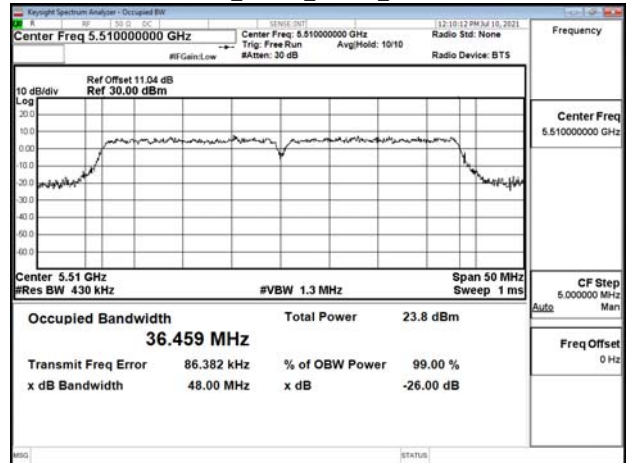
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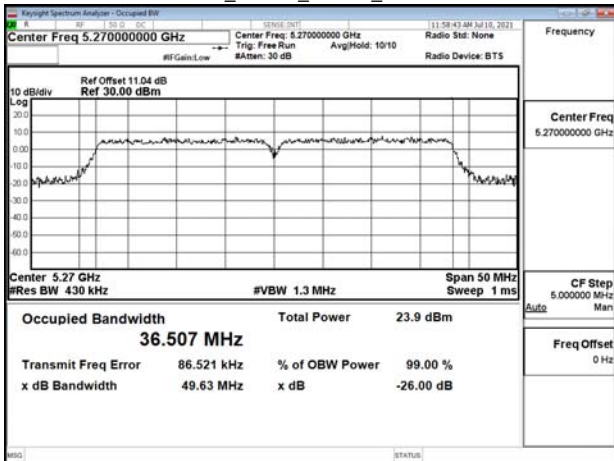
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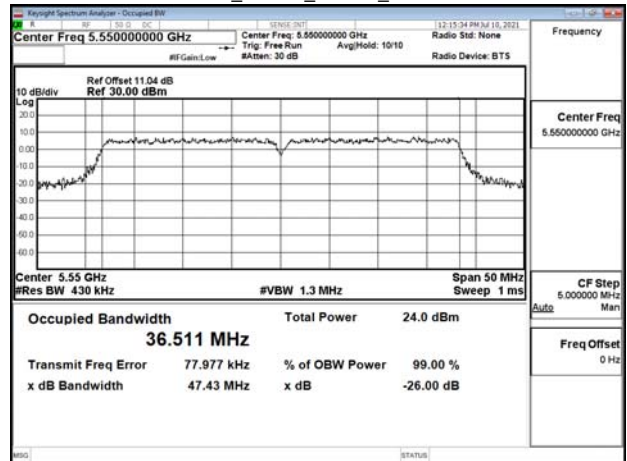
802.11n\_40MHz\_Chain0\_5510MHz



802.11n\_40MHz\_Chain0\_5270MHz



802.11n\_40MHz\_Chain0\_5550MHz

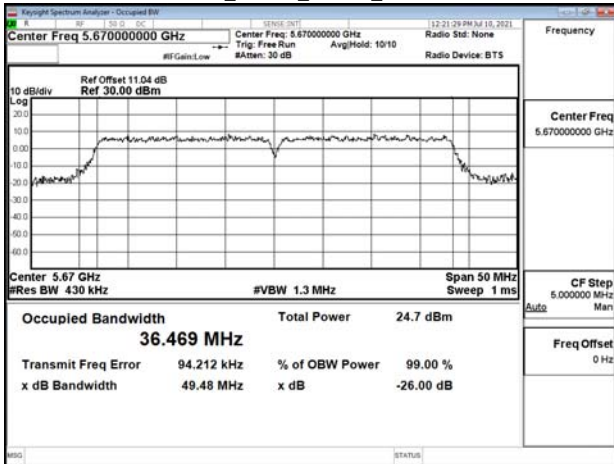


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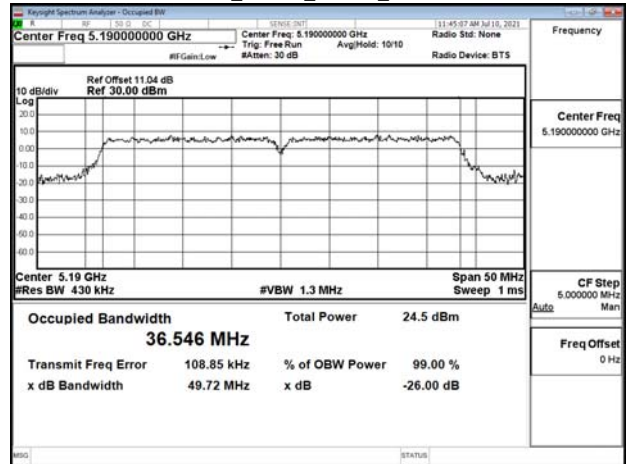
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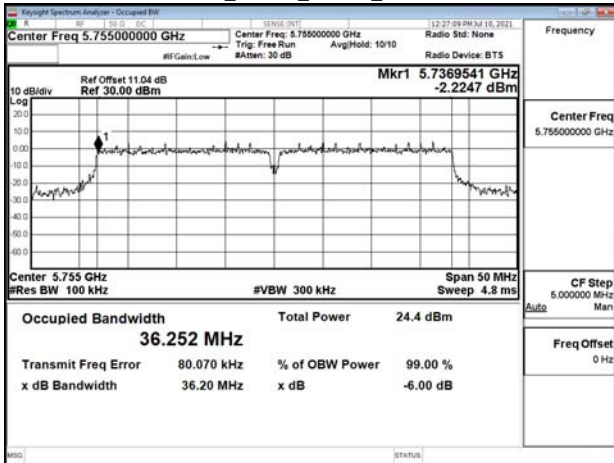
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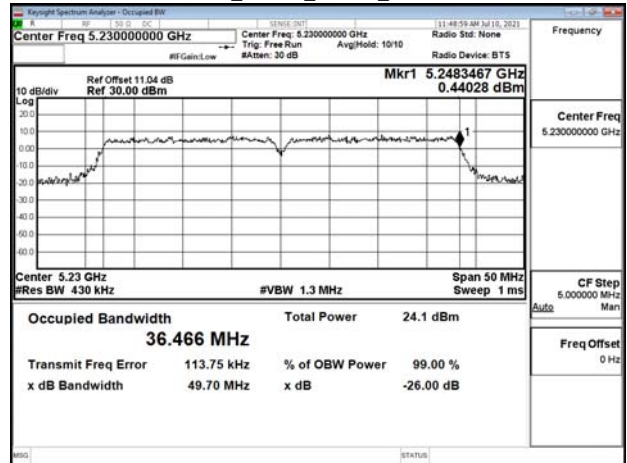
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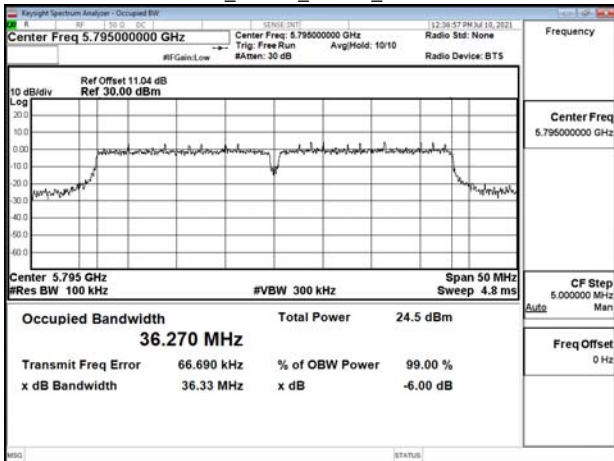
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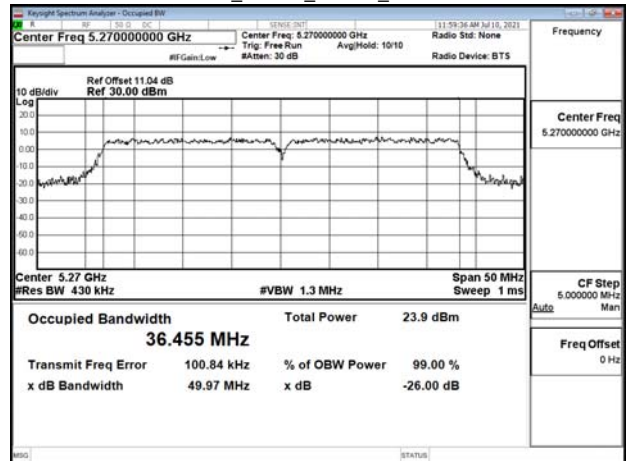
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802.11n\_40MHz\_Chain0\_5795MHz



802.11n\_40MHz\_Chain1\_5270MHz

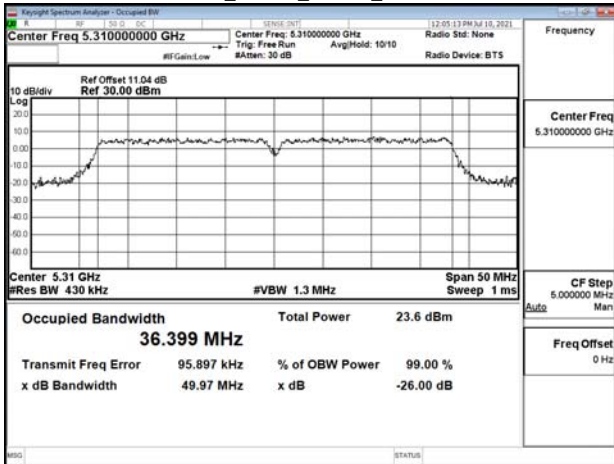


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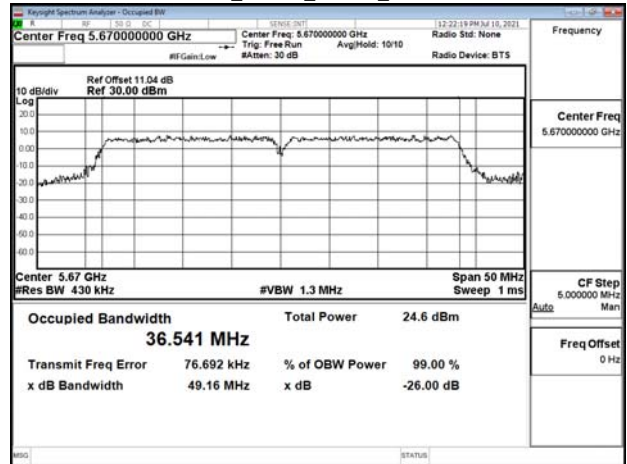
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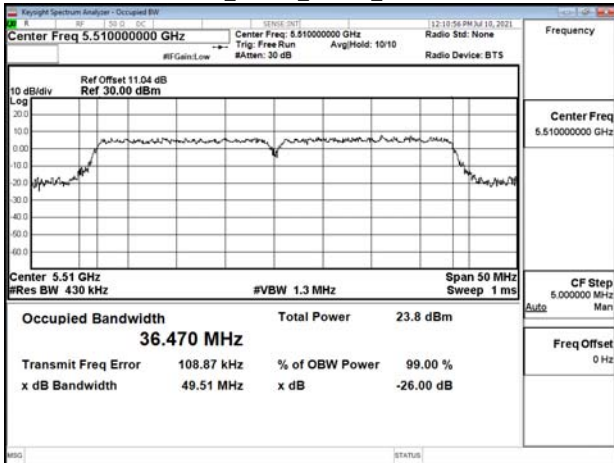
802.11n\_40MHz\_Chain1\_5310MHz



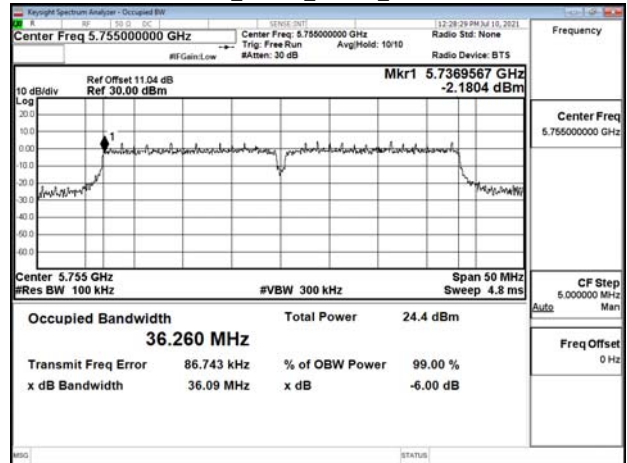
802.11n\_40MHz\_Chain1\_5670MHz



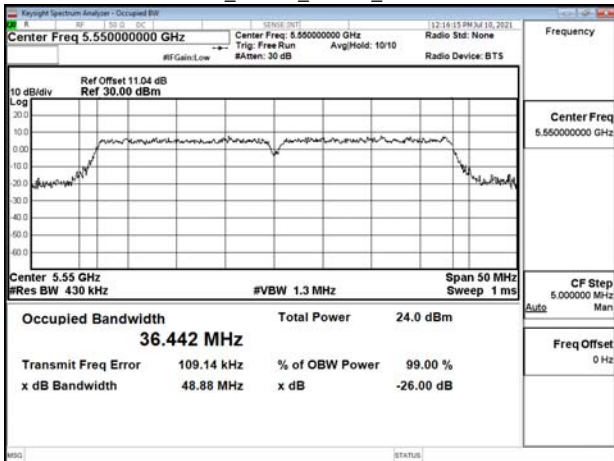
802.11n\_40MHz\_Chain1\_5510MHz



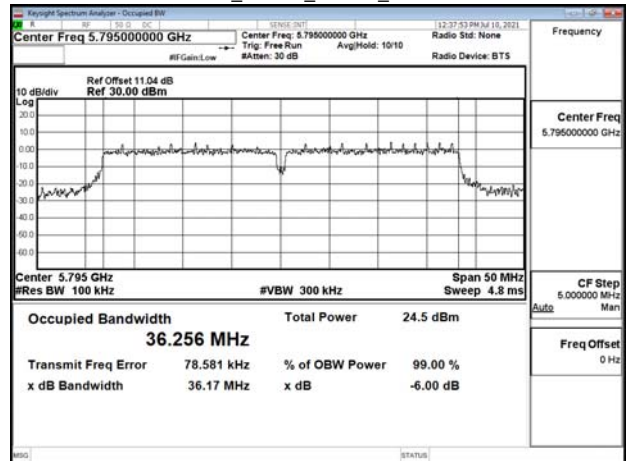
802.11n\_40MHz\_Chain1\_5755MHz



802.11n\_40MHz\_Chain1\_5550MHz



802.11n\_40MHz\_Chain1\_5795MHz

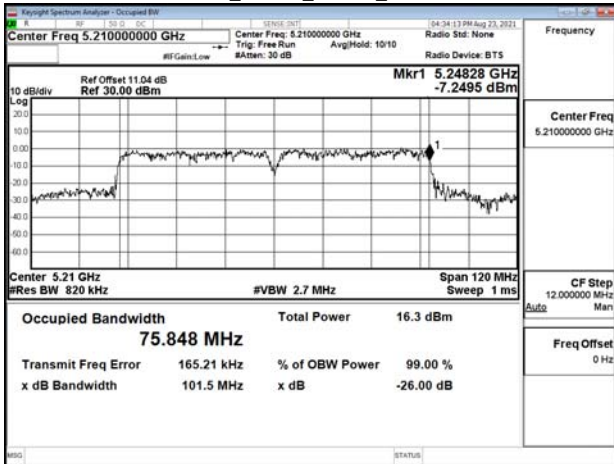


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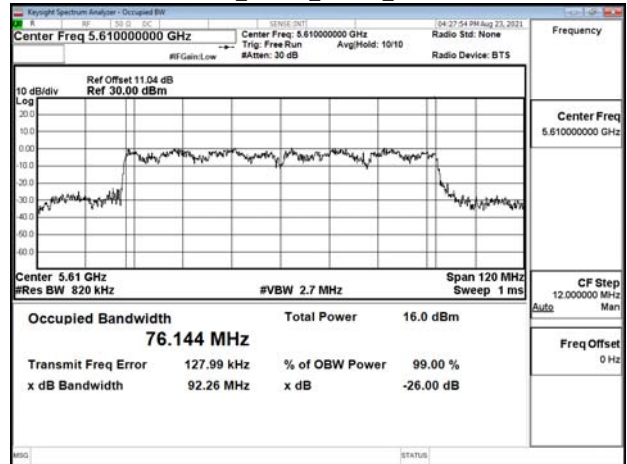
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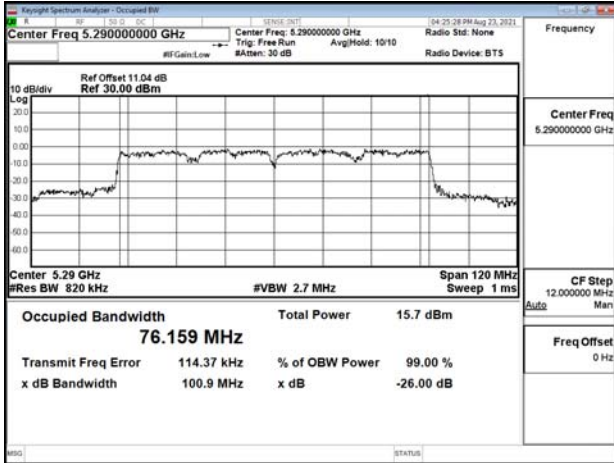
802.11ac\_80MHz\_Chain0\_5210MHz



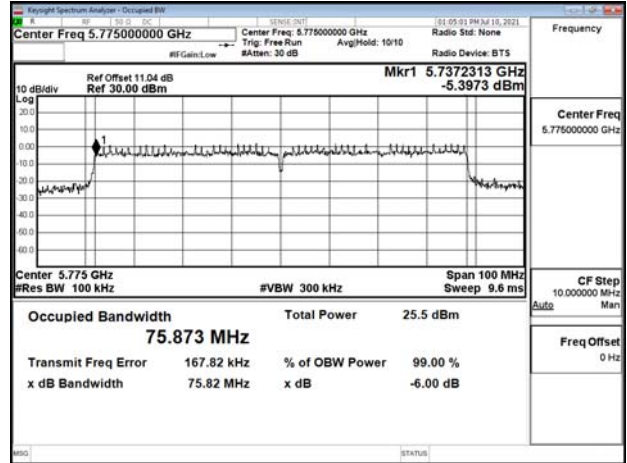
802.11ac\_80MHz\_Chain0\_5610MHz



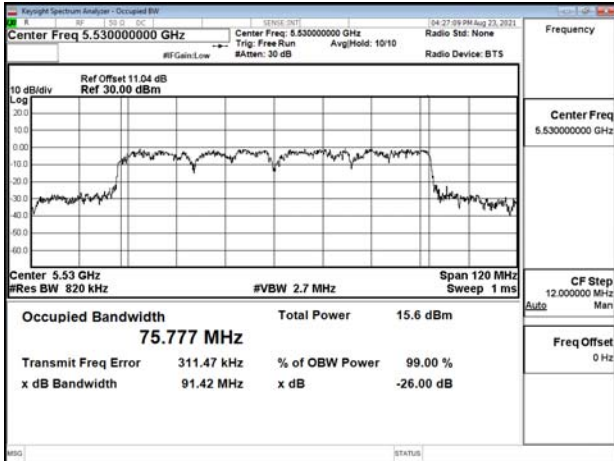
802.11ac\_80MHz\_Chain0\_5290MHz



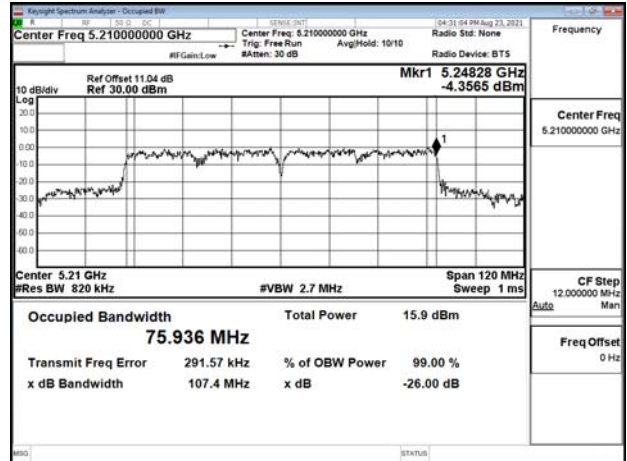
802.11ac\_80MHz\_Chain0\_5775MHz



802.11ac\_80MHz\_Chain0\_5530MHz



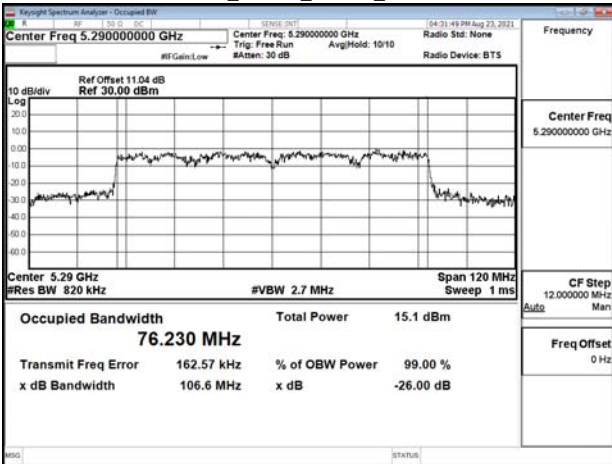
802.11ac\_80MHz\_Chain1\_5210MHz



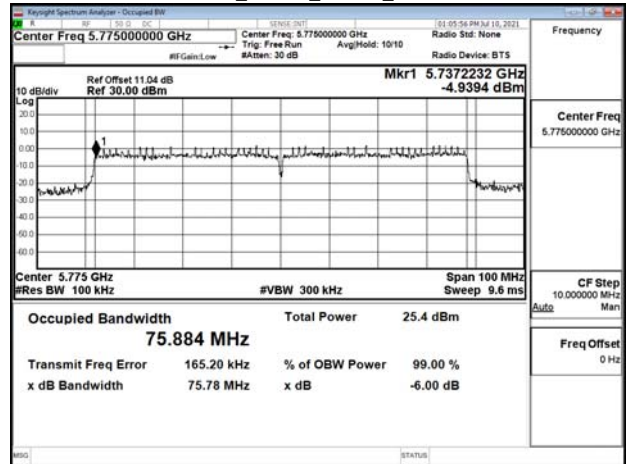
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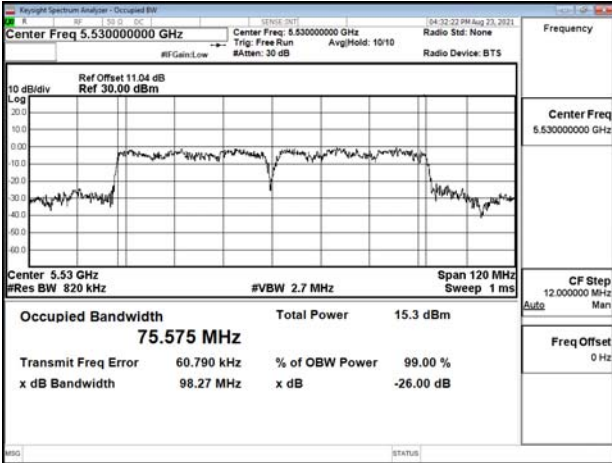
802.11ac\_80MHz\_Chain1\_5290MHz



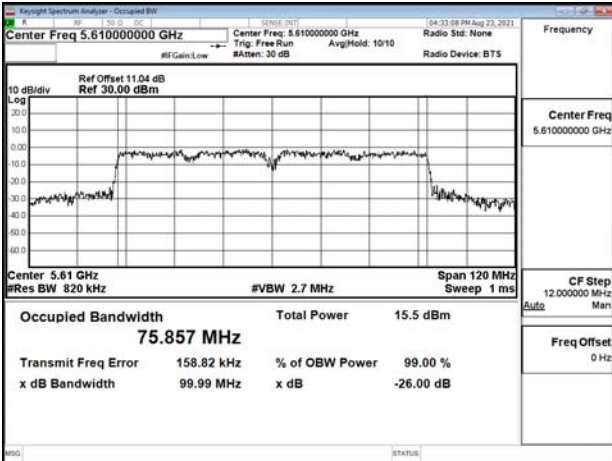
802.11ac\_80MHz\_Chain1\_5775MHz



802.11ac\_80MHz\_Chain1\_5530MHz



802.11ac\_80MHz\_Chain1\_5610MHz



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## 9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### 9.1 Standard Applicable

Band	EUT CATEGORY		LIMIT			
			Conducted Output Power	EIRP	TPC	Antenna Directional Gain Requirements
U-NII-1	<input type="checkbox"/>	Fixed point-to-point	1 Watt(30dBm)	Not required	Not required	23dBi
	<input type="checkbox"/>	Out door AP	1 Watt(30dBm)	Elevation angle above 30 degrees 125mW (21dBm)	Not required	6dBi
	<input checked="" type="checkbox"/>	Other	250mW(23.98dBm)	Not required	Not required	6dBi
U-NII-2A	<input checked="" type="checkbox"/>	Other	250mW(23.98dBm) or 11dBm+10 log B	Not required	When EIRP >500mW	6dBi
U-NII-2C	<input checked="" type="checkbox"/>	Other	250mW(23.98dBm) or 11dBm+10 log B	Not required	At least 6dB below EIRP 1W (30dBm)	6dBi
U-NII-3	<input checked="" type="checkbox"/>	Other	1 Watt(30dBm)	Not required	Not required	6dBi
	<input type="checkbox"/>	Fixed point-to-point	1 Watt(30dBm)	Not required	Not required	Not required

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

**Note:**

As per section F. 2). e). (ii) of FCC KDB 662911 D01

If antenna gains are not equal and each transmit antenna is driven by only one spatial stream, directional gain may be calculated by either of the following formulas.

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

NSS = the number of independent spatial streams of data;

NANT = the total number of antennas

$g_{j,k} = 10^{G_k/20}$  if the kth antenna is being fed by spatial stream j, or zero if it is not;

$G_k$  is the gain in dBi of the kth antenna.

The antenna gain is not greater than 6 dBi. Therefore, reduction of power is not required.

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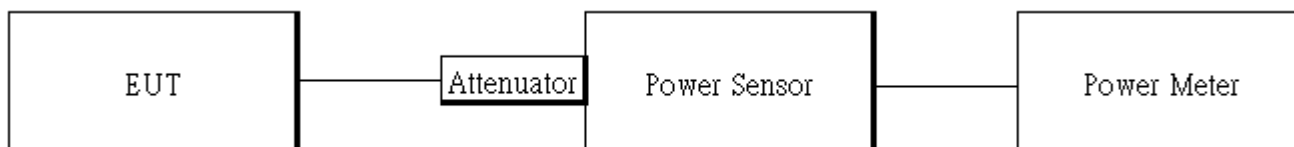
### 9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the 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.

### 9.3 Measurement Equipment Used

Conducted Emission Test Site: Conducted G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1512003	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339378	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339379	07/23/2020	07/22/2021
Attenuator	Marvelous	WATT-218FS-10	RF22	11/19/2020	11/18/2021
Attenuator	Marvelous	WATT-218FS-10	RF23	11/19/2020	11/18/2021
Power Meter	Anritsu	ML2496A	1804002	04/14/2021	04/13/2022
Power Sensor	Anritsu	MA2411B	1726105	04/14/2021	04/13/2022
Power Sensor	Anritsu	MA2411B	1726106	04/14/2021	04/13/2022

### 9.4 Test Set-up



### 9.5 Measurement Result

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power limits are the lesser of 250 mW (23.98dBm) or 11 dBm + 10 log B.

1. Where B is the 26 dB emission bandwidth in megahertz for FCC compliance.

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### 9.5.1 Conducted 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	17.5	17.95	62.307	23.98	PASS
44	5220	6	17.5	<b>17.96</b>	62.450	23.98	PASS
48	5240	6	17.5	17.93	62.020	23.98	PASS
52	5260	6	17.5	17.92	61.878	23.98	PASS
60	5300	6	17.5	17.88	61.310	23.98	PASS
64	5320	6	17.5	<b>17.96</b>	62.450	23.98	PASS
100	5500	6	17.5	<b>17.94</b>	62.163	23.98	PASS
116	5580	6	17.5	17.93	62.020	23.98	PASS
140	5700	6	17.5	17.90	61.593	23.98	PASS
149	5745	6	17.5	<b>17.98</b>	62.739	30	PASS
157	5785	6	17.5	17.97	62.594	30	PASS
165	5825	6	17.5	17.94	62.163	30	PASS

#### 802.11a\_Ch1

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	18.5	17.93	62.020	23.98	PASS
44	5220	6	18.5	17.90	61.593	23.98	PASS
48	5240	6	18.5	17.85	60.888	23.98	PASS
52	5260	6	18.5	17.87	61.169	23.98	PASS
60	5300	6	18.5	17.82	60.469	23.98	PASS
64	5320	6	18.5	17.93	62.020	23.98	PASS
100	5500	6	18.5	17.89	61.452	23.98	PASS
116	5580	6	18.5	17.88	61.310	23.98	PASS
140	5700	6	18.5	17.86	61.029	23.98	PASS
149	5745	6	18.5	17.96	62.450	30	PASS
157	5785	6	18.5	17.91	61.735	30	PASS
165	5825	6	18.5	17.85	60.888	30	PASS

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802.11n\_HT20\_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	15	15.39	34.599	23.98	PASS
44	5220	MCS0	15	15.32	34.046	23.98	PASS
48	5240	MCS0	15	15.37	34.440	23.98	PASS
52	5260	MCS0	17.5	17.93	62.096	23.98	PASS
60	5300	MCS0	17.5	17.90	61.669	23.98	PASS
64	5320	MCS0	17.5	17.94	62.239	23.98	PASS
100	5500	MCS0	17.5	17.97	62.671	23.98	PASS
116	5580	MCS0	17.5	17.92	61.953	23.98	PASS
140	5700	MCS0	16	15.98	39.634	23.98	PASS
149	5745	MCS0	17.5	17.95	62.383	30	PASS
157	5785	MCS0	17.5	17.96	62.527	30	PASS
165	5825	MCS0	17.5	17.94	62.239	30	PASS

802.11n\_HT20\_Ch1

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	15	15.25	33.502	23.98	PASS
44	5220	MCS0	15	15.12	32.514	23.98	PASS
48	5240	MCS0	15	15.17	32.890	23.98	PASS
52	5260	MCS0	18.5	17.88	61.385	23.98	PASS
60	5300	MCS0	18.5	17.87	61.244	23.98	PASS
64	5320	MCS0	18.5	17.92	61.953	23.98	PASS
100	5500	MCS0	18.5	17.93	62.096	23.98	PASS
116	5580	MCS0	18.5	17.88	61.385	23.98	PASS
140	5700	MCS0	16.5	15.74	37.503	23.98	PASS
149	5745	MCS0	18.5	17.94	62.239	30	PASS
157	5785	MCS0	18.5	17.91	61.811	30	PASS
165	5825	MCS0	18.5	17.89	61.527	30	PASS

802.11n\_HT20\_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
				CH 0	CH 1				
36	5180	MCS8	15	15.64	15.23	18.53	71.298	23.98	PASS
44	5220	MCS8	15	15.51	15.08	18.39	69.044	23.98	PASS
48	5240	MCS8	15	15.57	15.11	18.44	69.776	23.98	PASS
52	5260	MCS8	18	18.29	17.33	20.93	123.806	23.98	PASS
60	5300	MCS8	18	18.27	17.25	20.88	122.485	23.98	PASS
64	5320	MCS8	18	18.41	17.18	20.93	123.861	23.98	PASS
100	5500	MCS8	18	18.36	17.33	20.97	124.923	23.98	PASS
116	5580	MCS8	18	18.38	17.29	20.96	124.740	23.98	PASS
140	5700	MCS8	16.5	16.49	15.59	19.15	82.304	23.98	PASS
149	5745	MCS8	18	18.38	17.34	20.98	125.372	30	PASS
157	5785	MCS8	18	18.27	17.4	20.95	124.386	30	PASS
165	5825	MCS8	18	18.35	17.38	20.98	125.400	30	PASS

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802.11ac\_VHT20\_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	15	15.46	35.158	23.98	PASS
44	5220	MCS0	15	15.27	33.653	23.98	PASS
48	5240	MCS0	15	15.29	33.808	23.98	PASS
52	5260	MCS0	17	17.85	60.957	23.98	PASS
60	5300	MCS0	17	17.82	60.537	23.98	PASS
64	5320	MCS0	17	17.83	60.677	23.98	PASS
100	5500	MCS0	17	17.80	60.259	23.98	PASS
116	5580	MCS0	17	17.88	61.379	23.98	PASS
140	5700	MCS0	16	15.86	38.550	23.98	PASS
149	5745	MCS0	17	17.84	60.816	30	PASS
157	5785	MCS0	17	17.85	60.957	30	PASS
165	5825	MCS0	17	17.91	61.805	30	PASS

802.11ac\_VHT20\_Ch1

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	15	16.12	40.928	23.98	PASS
44	5220	MCS0	15	15.08	32.212	23.98	PASS
48	5240	MCS0	15	15.11	32.436	23.98	PASS
52	5260	MCS0	18	17.80	60.259	23.98	PASS
60	5300	MCS0	18	17.76	59.706	23.98	PASS
64	5320	MCS0	18	17.78	59.982	23.98	PASS
100	5500	MCS0	18	17.73	59.295	23.98	PASS
116	5580	MCS0	18	17.85	60.957	23.98	PASS
140	5700	MCS0	16.5	15.62	36.477	23.98	PASS
149	5745	MCS0	18	17.78	59.982	30	PASS
157	5785	MCS0	18	17.81	60.398	30	PASS
165	5825	MCS0	18	17.88	61.379	30	PASS

802.11ac\_VHT20\_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
				CH 0	CH 1				
36	5180	MCS0	15	15.57	15.17	18.47	70.228	23.98	PASS
44	5220	MCS0	15	15.43	15.01	18.32	67.851	23.98	PASS
48	5240	MCS0	15	15.41	15.06	18.33	68.062	23.98	PASS
52	5260	MCS0	17.5	18.08	17.05	20.69	117.111	23.98	PASS
60	5300	MCS0	17.5	17.96	16.97	20.58	114.384	23.98	PASS
64	5320	MCS0	17.5	18.03	17.15	20.70	117.565	23.98	PASS
100	5500	MCS0	17.5	18.07	17.09	20.70	117.438	23.98	PASS
116	5580	MCS0	17.5	17.99	17.19	20.70	117.460	23.98	PASS
140	5700	MCS0	16.5	16.35	15.47	19.02	79.850	23.98	PASS
149	5745	MCS0	17.5	18.04	17.18	20.72	118.080	30	PASS
157	5785	MCS0	17.5	18.07	17.15	20.72	118.163	30	PASS
165	5825	MCS0	17.5	18.12	17.1	20.73	118.315	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	17.5	17.94	62.258	23.98	PASS
46	5230	MCS0	17.5	17.89	61.545	23.98	PASS
54	5270	MCS0	17.5	17.96	62.545	23.98	PASS
62	5310	MCS0	15	15.48	35.334	23.98	PASS
102	5510	MCS0	13	13.89	24.502	23.98	PASS
110	5550	MCS0	17.5	17.94	62.258	23.98	PASS
134	5670	MCS0	17.5	17.97	62.689	23.98	PASS
151	5755	MCS0	17.5	17.94	62.258	30	PASS
159	5795	MCS0	17.5	17.92	61.972	30	PASS

802.11n\_HT40\_Ch1

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	18	17.86	61.121	23.98	PASS
46	5230	MCS0	18	17.85	60.981	23.98	PASS
54	5270	MCS0	18	17.92	61.972	23.98	PASS
62	5310	MCS0	15	15.16	32.824	23.98	PASS
102	5510	MCS0	14	13.86	24.333	23.98	PASS
110	5550	MCS0	18	17.90	61.687	23.98	PASS
134	5670	MCS0	18	17.86	61.121	23.98	PASS
151	5755	MCS0	18	17.84	60.841	30	PASS
159	5795	MCS0	18	17.81	60.422	30	PASS

802.11n\_HT40\_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
				CH 0	CH 1				
38	5190	MCS8	17.5	18.01	17.52	<b>20.94</b>	124.284	23.98	PASS
46	5230	MCS8	17.5	17.92	17.5	20.89	122.668	23.98	PASS
54	5270	MCS8	17.5	17.97	17.33	<b>20.83</b>	121.172	23.98	PASS
62	5310	MCS8	15	15.54	14.94	18.42	69.544	23.98	PASS
102	5510	MCS8	13.5	14.2	13.29	16.94	49.443	23.98	PASS
110	5550	MCS8	18	18.06	17.43	<b>20.93</b>	123.841	23.98	PASS
134	5670	MCS8	18	18.1	17.32	20.90	123.019	23.98	PASS
151	5755	MCS8	18	18.3	17.22	<b>20.97</b>	124.903	30	PASS
159	5795	MCS8	18	18.27	17.25	20.96	124.799	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	17	17.77	59.862	23.98	PASS
46	5230	MCS0	17	17.72	59.176	23.98	PASS
54	5270	MCS0	17	17.62	57.829	23.98	PASS
62	5310	MCS0	15	15.43	34.926	23.98	PASS
102	5510	MCS0	13	13.84	24.219	23.98	PASS
110	5550	MCS0	17	17.65	58.230	23.98	PASS
134	5670	MCS0	17	17.66	58.364	23.98	PASS
151	5755	MCS0	17	17.59	57.431	30	PASS
159	5795	MCS0	17	17.58	57.299	30	PASS

802.11ac\_VHT40\_Ch1

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	17.5	17.74	59.450	23.98	PASS
46	5230	MCS0	17.5	17.58	57.299	23.98	PASS
54	5270	MCS0	17.5	17.58	57.299	23.98	PASS
62	5310	MCS0	15	15.05	32.000	23.98	PASS
102	5510	MCS0	14	13.81	24.052	23.98	PASS
110	5550	MCS0	17.5	17.58	57.299	23.98	PASS
134	5670	MCS0	17.5	17.64	58.096	23.98	PASS
151	5755	MCS0	17.5	17.51	56.383	30	PASS
159	5795	MCS0	17.5	17.55	56.905	30	PASS

802.11ac\_VHT40\_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
				CH 0	CH 1				
38	5190	MCS0	17.5	18	17.37	20.87	122.129	23.98	PASS
46	5230	MCS0	17.5	17.92	17.29	20.79	119.900	23.98	PASS
54	5270	MCS0	17.5	17.94	17.1	20.71	117.816	23.98	PASS
62	5310	MCS0	15	15.41	14.79	18.28	67.342	23.98	PASS
102	5510	MCS0	13.5	14.12	13.16	16.84	48.286	23.98	PASS
110	5550	MCS0	17.5	17.86	16.87	20.56	113.892	23.98	PASS
134	5670	MCS0	17.5	18	17.08	20.74	118.470	23.98	PASS
151	5755	MCS0	17.5	18.02	17.04	20.73	118.287	30	PASS
159	5795	MCS0	17.5	17.99	17.16	20.77	119.305	30	PASS

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## 802.11ac\_VHT80\_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
42	5210	MCS0	18	17.86	61.158	23.98	PASS
58	5290	MCS0	18	17.82	60.597	23.98	PASS
106	5530	MCS0	18	17.97	62.727	23.98	PASS
122	5610	MCS0	18	17.96	62.582	23.98	PASS
155	5775	MCS0	12	12.46	17.638	30	PASS

## 802.11ac\_VHT80\_Ch1

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
42	5210	MCS0	18.5	17.82	60.597	23.98	PASS
58	5290	MCS0	18.5	17.51	56.422	23.98	PASS
106	5530	MCS0	18.5	17.70	58.946	23.98	PASS
122	5610	MCS0	18.5	17.73	59.354	23.98	PASS
155	5775	MCS0	13	12.38	17.316	30	PASS

## 802.11ac\_VHT80\_MIMO

CH	Frequency (MHz)	Data Rate	Power set	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
				CH 0	CH 1				
42	5210	MCS0	18	17.75	17.23	<b>20.83</b>	121.132	23.98	PASS
58	5290	MCS0	18	17.67	17.2	<b>20.78</b>	119.569	23.98	PASS
106	5530	MCS0	18	17.78	17.26	<b>20.86</b>	121.972	23.98	PASS
122	5610	MCS0	18	17.72	17.19	20.80	120.168	23.98	PASS
155	5775	MCS0	13	13	11.8	<b>15.78</b>	37.811	30	PASS

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## 10 MAXIMUM POWER SPECTRAL DENSITY

### 10.1 Standard Applicable

Operation Band	EUT CATEGORY		LIMIT	Antenna Directional Gain Requirements
U-NII-1	<input type="checkbox"/>	Outdoor Access Point (Master)	1. 17dBm/ MHz 2. EIRP<=125mW(21dBm) at any elevation angle > 30°	6dBi
	<input type="checkbox"/>	Indoor Access Point (Master)	17dBm/ MHz	6dBi
	<input type="checkbox"/>	Fixed point-to-point Access Point	17dBm/ MHz	23dBi
	<input checked="" type="checkbox"/>	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

If transmitting antennas of directional gain greater than the Antenna Directional Gain Requirements column, the Maximum transmit power shall be reduced by the amount in dB that the directional gain of the antenna.

**Note:**

As per section F. 2). e). (ii) of FCC KDB 662911 D01

If antenna gains are not equal and each transmit antenna is driven by only one spatial stream, directional gain may be calculated by either of the following formulas.

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

NSS = the number of independent spatial streams of data;

NANT = the total number of antennas

$g_{j,k} = / 20 \log G_k$  if the kth antenna is being fed by spatial stream j, or zero if it is not;

$G_k$  is the gain in dBi of the kth antenna.

The antenna gain is not greater than 6 dBi. Therefore, reduction of power is not required.

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## 10.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to 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 kHz/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/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.
8. MIMO mode: offset is set following "measure and add 10 Log (N)" on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna.

*Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome.*

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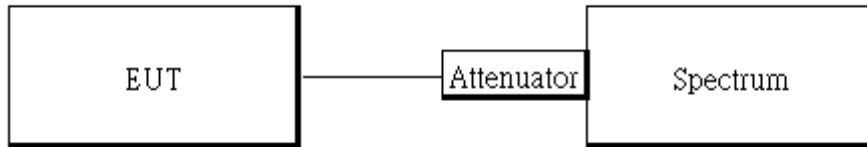
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### 10.3 Measurement Equipment Used

Conducted Emission Test Site: Conducted G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010B	MY60240506	06/18/2021	06/17/2022
Attenuator	Marvelous	WATT-218FS-10	RF23	11/19/2020	11/18/2021
DC Block	PASTERNAK	PE8210	RF151	11/19/2020	11/18/2021
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N/A	N/A

### 10.4 Test Set-up



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## 10.5 Measurement Result

### 10.5.1 Power spectral density

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	7.41	0.00	7.41		11.00 dBm/MHz	-3.59	
5220	7.37	0.00	7.37		11.00 dBm/MHz	-3.63	
5240	7.00	0.00	7.00		11.00 dBm/MHz	-4.00	
5260	7.08	0.00	7.08		11.00 dBm/MHz	-3.92	
5300	6.80	0.00	6.80		11.00 dBm/MHz	-4.20	
5320	6.98	0.00	6.98		11.00 dBm/MHz	-4.02	
5500	6.86	0.00	6.86		11.00 dBm/MHz	-4.14	
5580	7.30	0.00	7.30		11.00 dBm/MHz	-3.70	
5700	7.46	0.00	7.46		11.00 dBm/MHz	-3.54	
Frequency (MHz)	ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)	
5745	2.41	0.00	2.22	4.63	30.00 dBm/500kHz	-25.37	
5785	2.50	0.00	2.22	4.72	30.00 dBm/500kHz	-25.28	
5825	2.17	0.00	2.22	4.39	30.00 dBm/500kHz	-25.61	
POWER DENSITY 802.11n HT20 MODE							
Frequency (MHz)	ch0 meas PSD (dBm/MHz)	ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	4.91	4.97	0.00	7.95		11.00 dBm/MHz	-3.05
5220	4.71	4.64	0.00	7.69		11.00 dBm/MHz	-3.31
5240	4.71	4.63	0.00	7.68		11.00 dBm/MHz	-3.32
5260	7.15	6.95	0.00	10.06		11.00 dBm/MHz	-0.94
5300	6.79	6.71	0.00	9.76		11.00 dBm/MHz	-1.24
5320	6.89	6.77	0.00	9.84		11.00 dBm/MHz	-1.16
5500	6.75	6.81	0.00	9.79		11.00 dBm/MHz	-1.21
5580	7.26	7.32	0.00	10.30		11.00 dBm/MHz	-0.70
5700	4.88	4.75	0.00	7.83		11.00 dBm/MHz	-3.17
Frequency (MHz)	ch0 meas PSD (dBm/300kHz)	ch1 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD(dBm/500kHz)	Limit	Margin (dB)
5745	2.63	2.57	0.00	2.22	7.83	30.00 dBm/500kHz	-22.17
5785	2.22	2.81	0.00	2.22	7.76	30.00 dBm/500kHz	-22.24
5825	2.10	2.35	0.00	2.22	7.46	30.00 dBm/500kHz	-22.54

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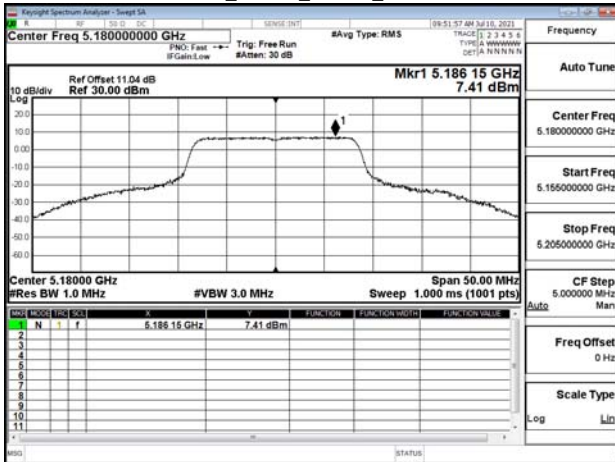
POWER DENSITY 802.11n HT40 MODE							
Frequency (MHz)	ch0 meas PSD (dBm/MHz)	ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5190	3.79	4.07	0.16	7.10		11.00 dBm/MHz	-3.90
5230	3.72	3.80	0.16	6.93		11.00 dBm/MHz	-4.07
5270	3.59	3.47	0.16	6.70		11.00 dBm/MHz	-4.30
5310	3.28	3.31	0.16	6.47		11.00 dBm/MHz	-4.53
5510	3.45	3.75	0.16	6.77		11.00 dBm/MHz	-4.23
5550	3.97	3.78	0.16	7.05		11.00 dBm/MHz	-3.95
5670	4.22	4.20	0.16	7.38		11.00 dBm/MHz	-3.62
Frequency (MHz)	ch0 meas PSD (dBm/300kHz)	ch1 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD(dBm/500k Hz)	Limit	Margin (dB)
5755	-0.63	-0.70	0.16	2.22	4.73	30.00 dBm/500kHz	-25.27
5795	-0.98	-0.90	0.16	2.22	4.45	30.00 dBm/500kHz	-25.55
POWER DENSITY 802.11ac VHT80 MODE							
Frequency (MHz)	ch0 meas PSD (dBm/MHz)	ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5210	1.61	1.16	0.32	4.72		11.00 dBm/MHz	-6.28
5290	0.85	0.86	0.32	4.19		11.00 dBm/MHz	-6.81
5530	0.95	1.03	0.32	4.32		11.00 dBm/MHz	-6.68
5610	1.57	1.67	0.32	4.95		11.00 dBm/MHz	-6.05
Frequency (MHz)	ch0 meas PSD (dBm/300kHz)	ch1 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD(dBm/500k Hz)	Limit	Margin (dB)
5775	-3.74	-3.88	0.32	2.22	1.74	30.00 dBm/500kHz	-28.26

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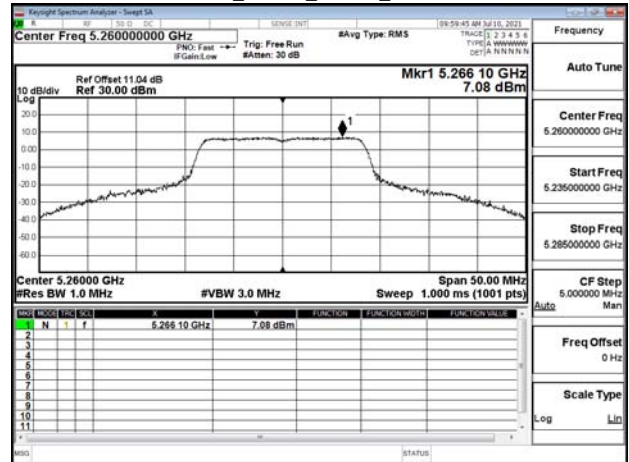
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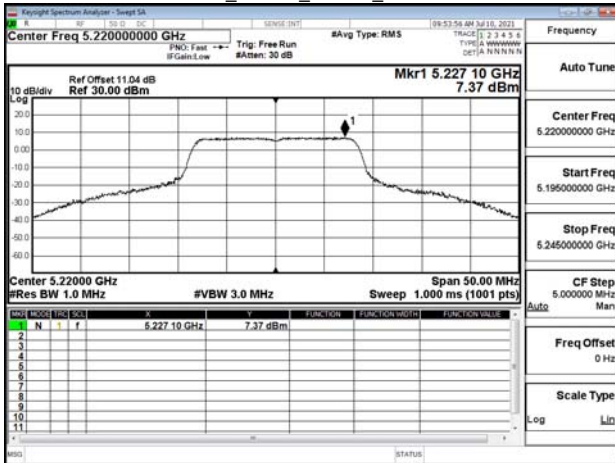
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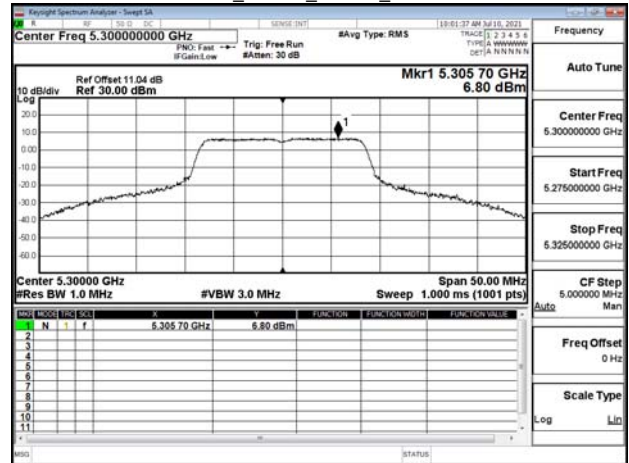
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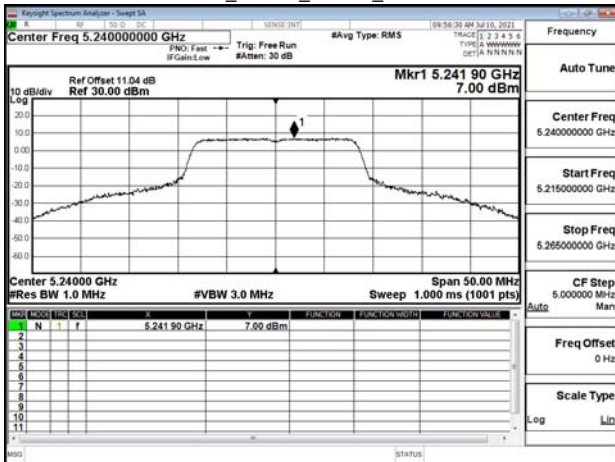
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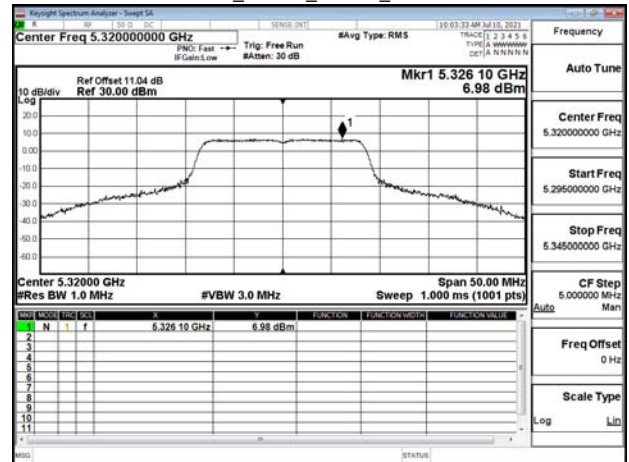
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802.11a\_20MHz\_Chain0\_5320MHz

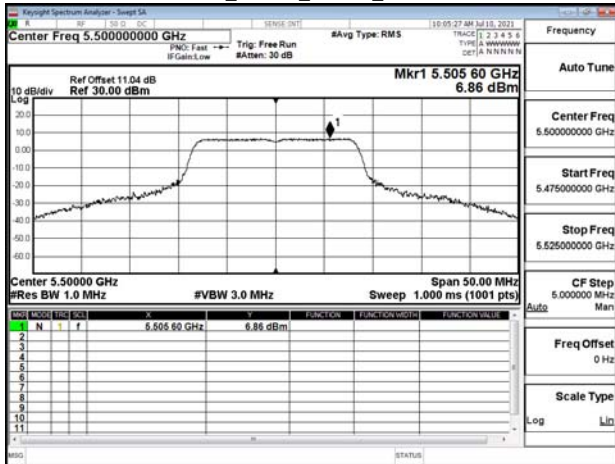


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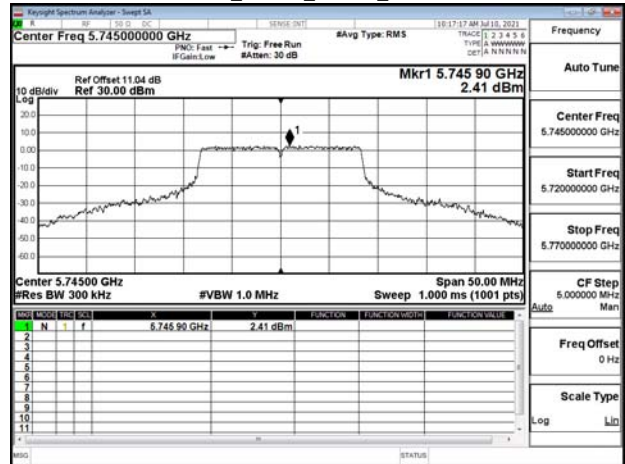
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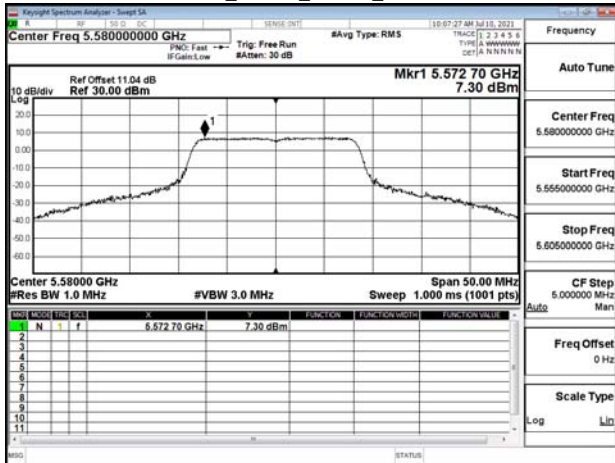
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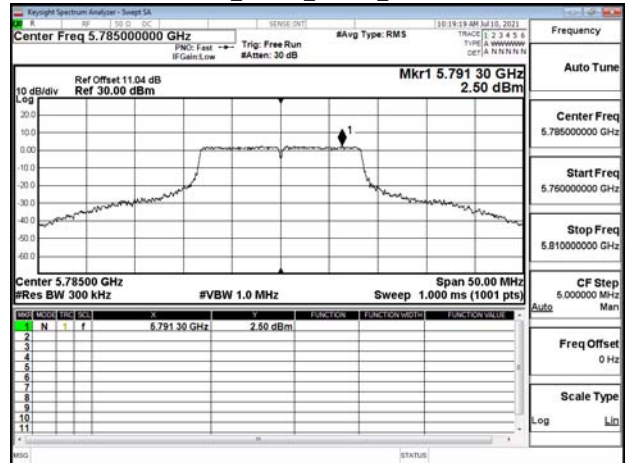
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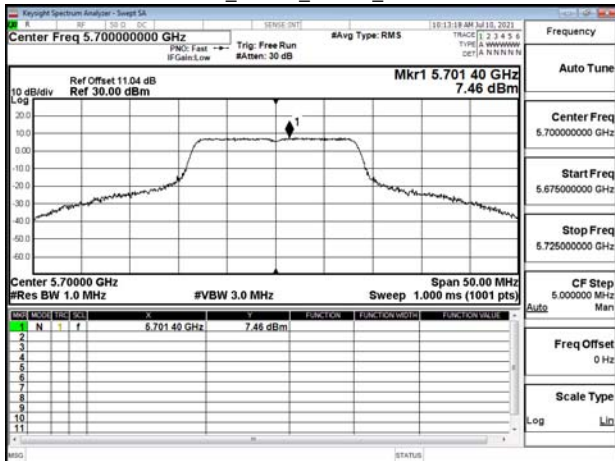
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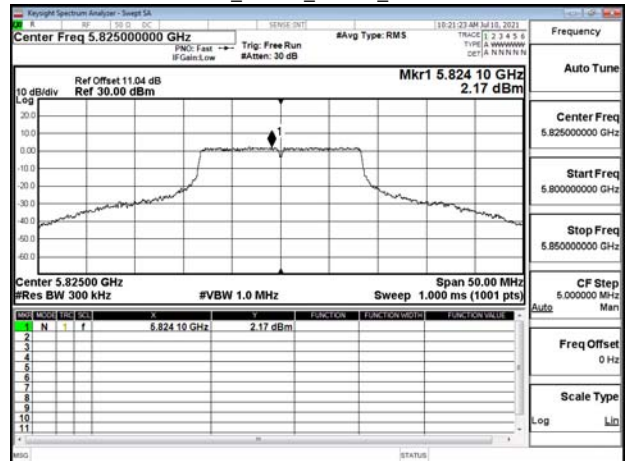
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802.11a\_20MHz\_Chain0\_5700MHz



802.11a\_20MHz\_Chain0\_5825MHz

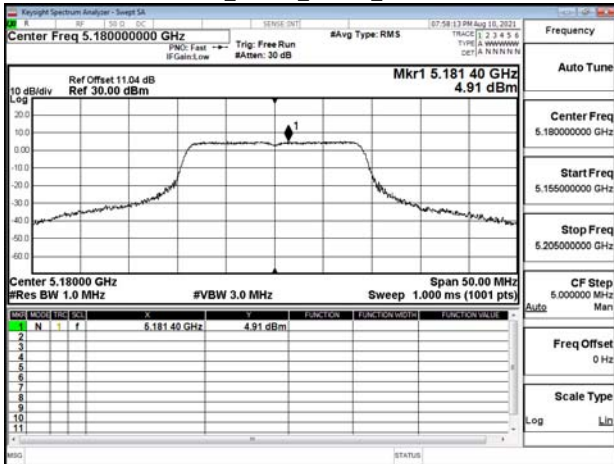


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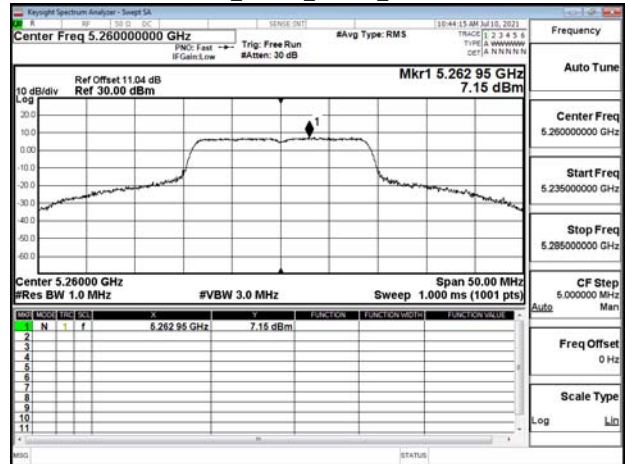
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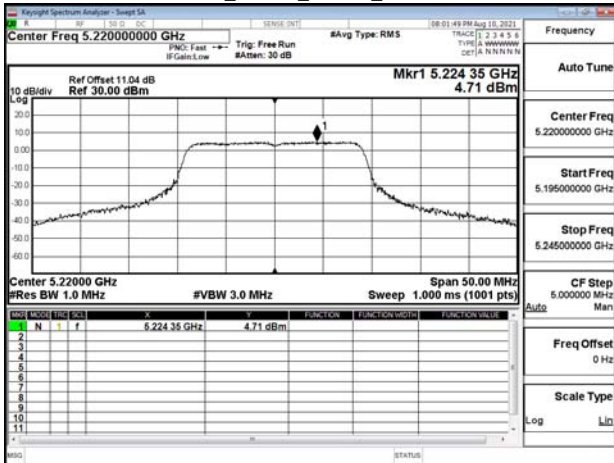
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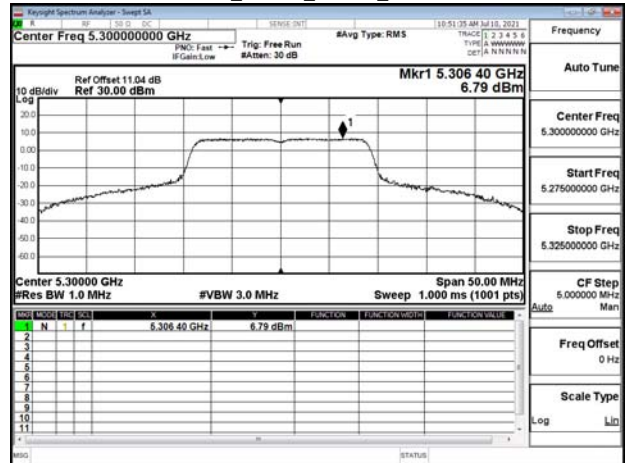
802.11n\_20MHz\_Chain0\_5260MHz



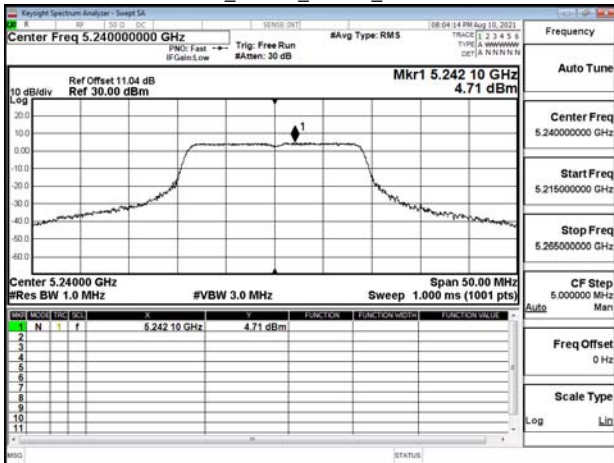
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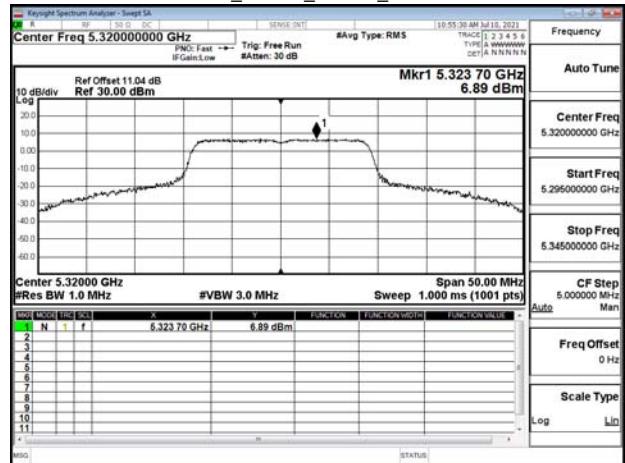
802.11n\_20MHz\_Chain0\_5300MHz



802.11n\_20MHz\_Chain0\_5240MHz



802.11n\_20MHz\_Chain0\_5320MHz

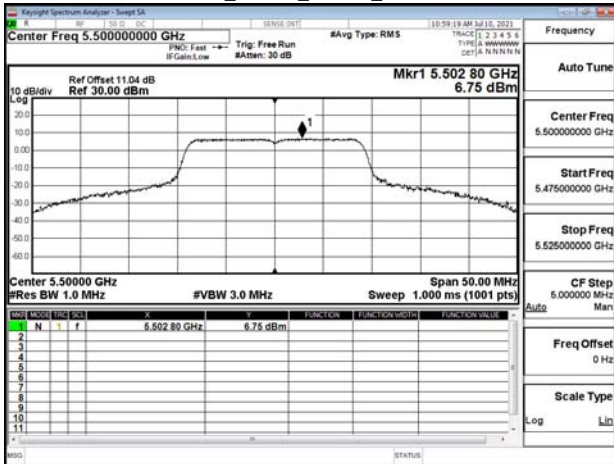


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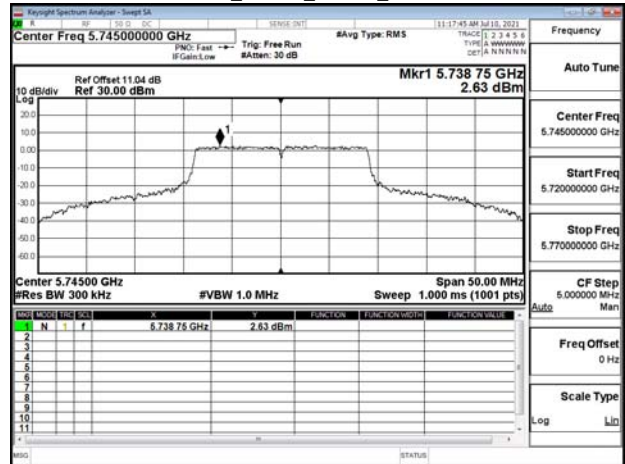
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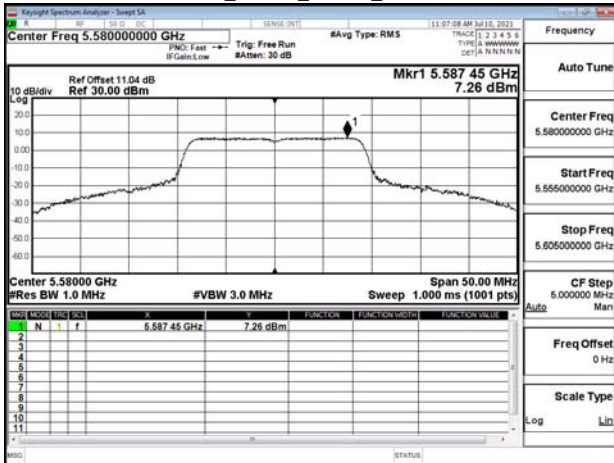
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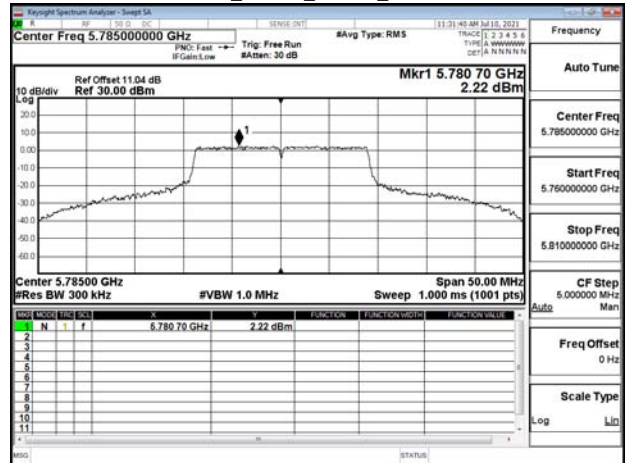
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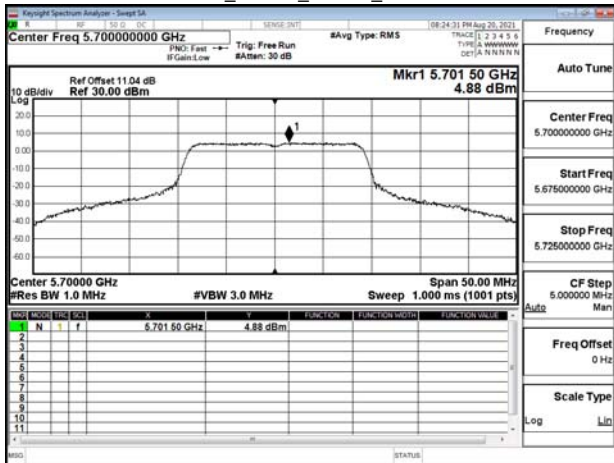
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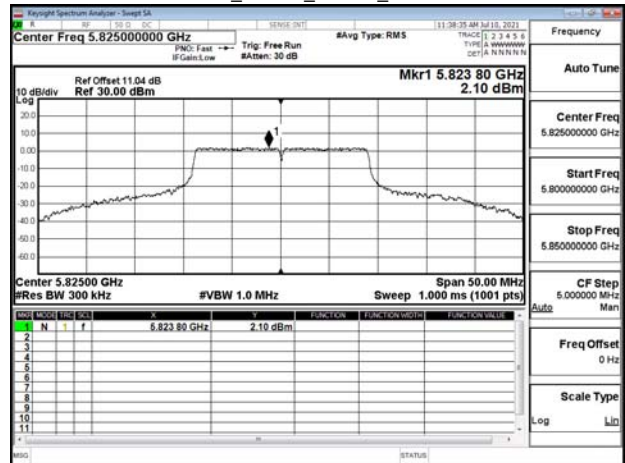
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802.11n\_20MHz\_Chain0\_5700MHz



802.11n\_20MHz\_Chain0\_5825MHz

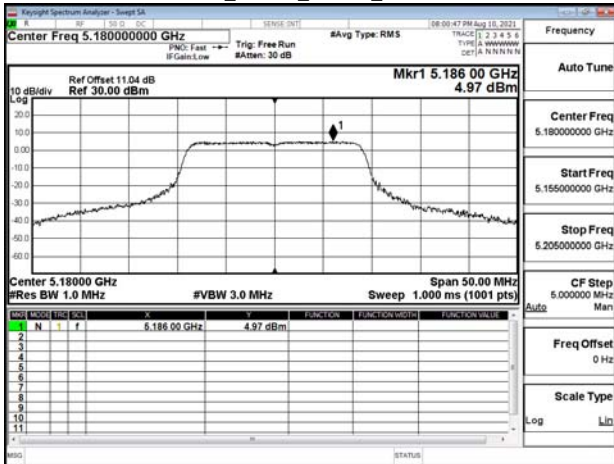


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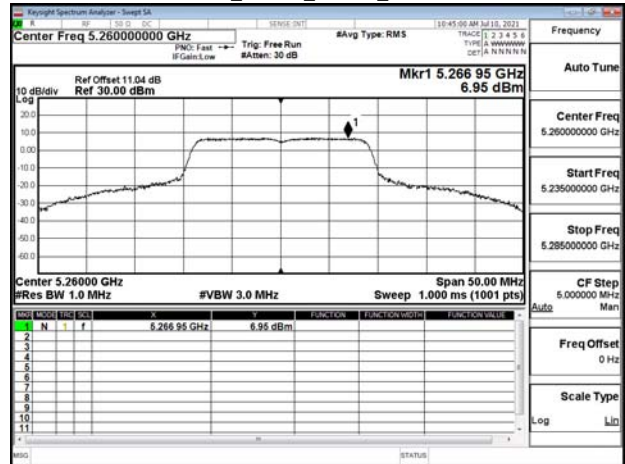
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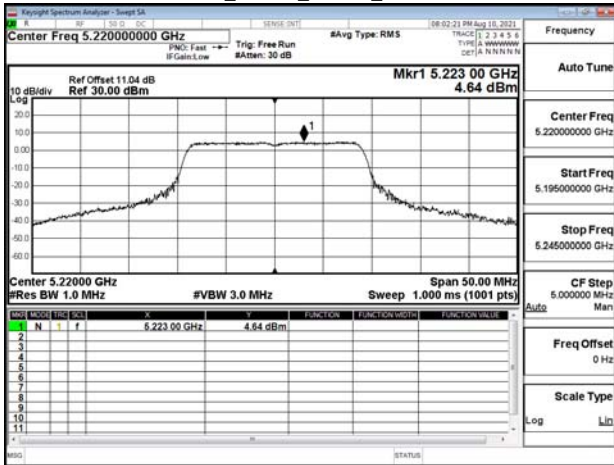
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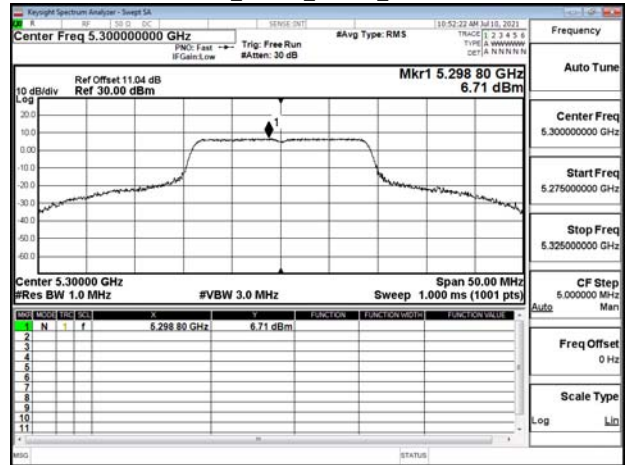
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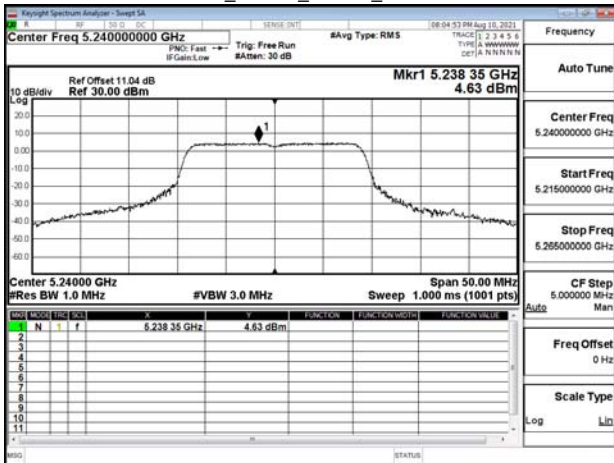
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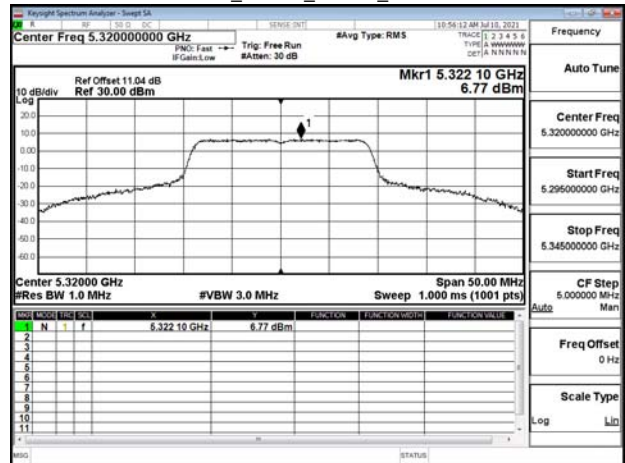
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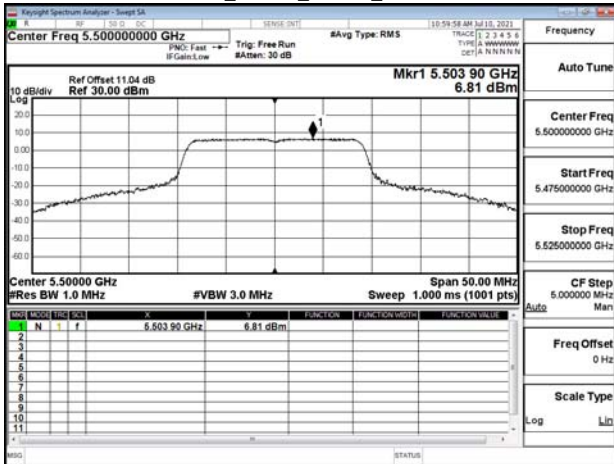


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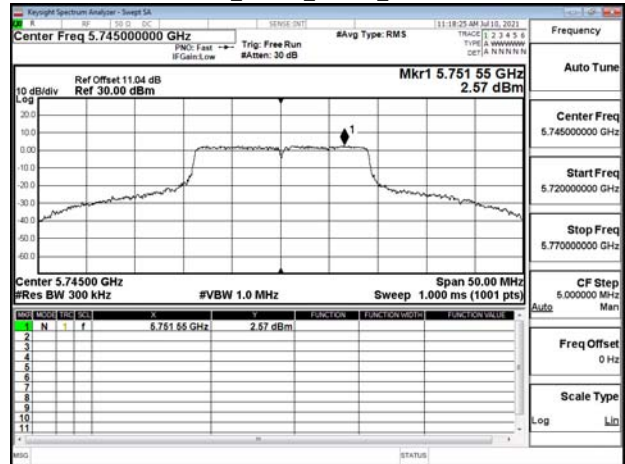
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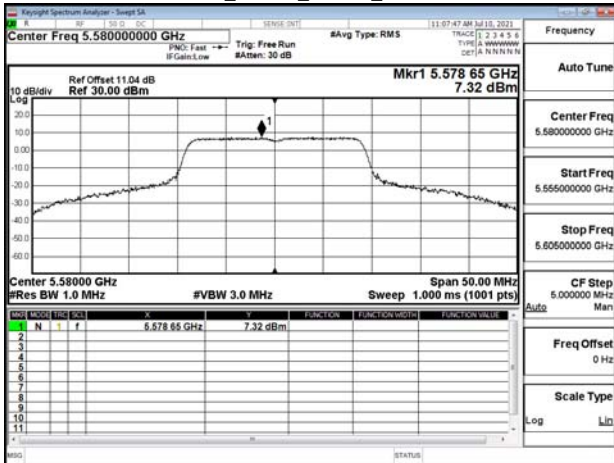
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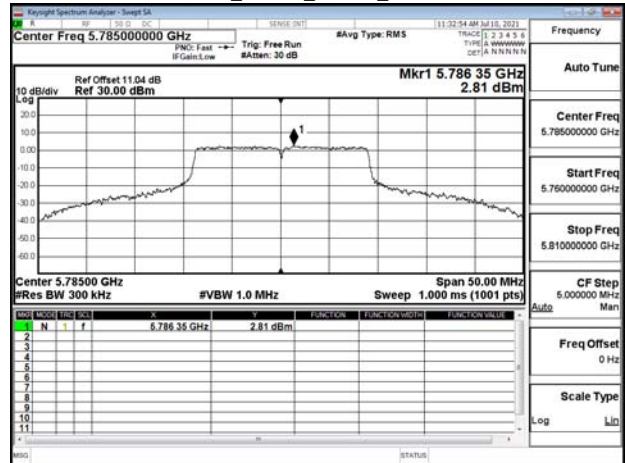
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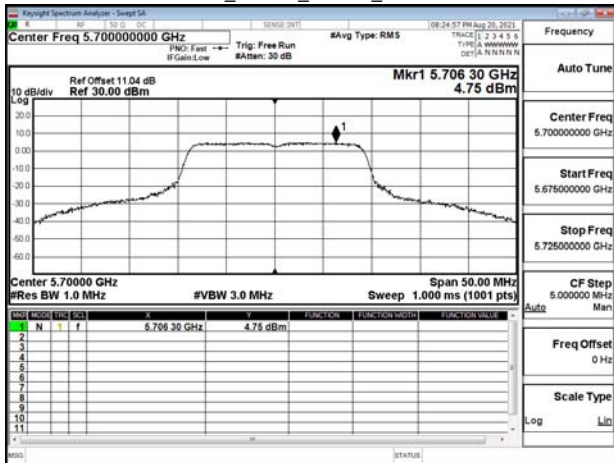
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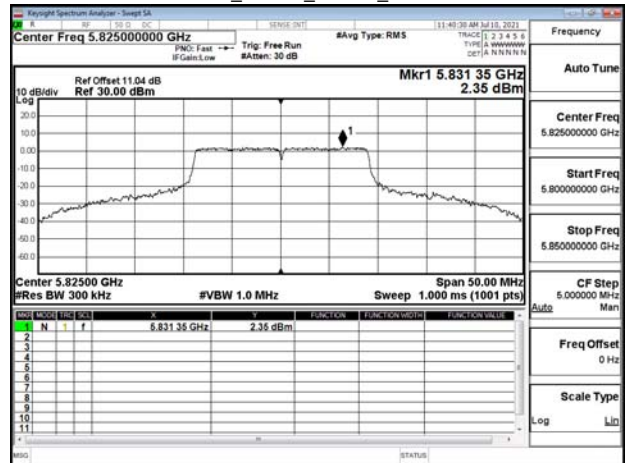
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802.11n\_20MHz\_Chain1\_5700MHz



802.11n\_20MHz\_Chain1\_5825MHz



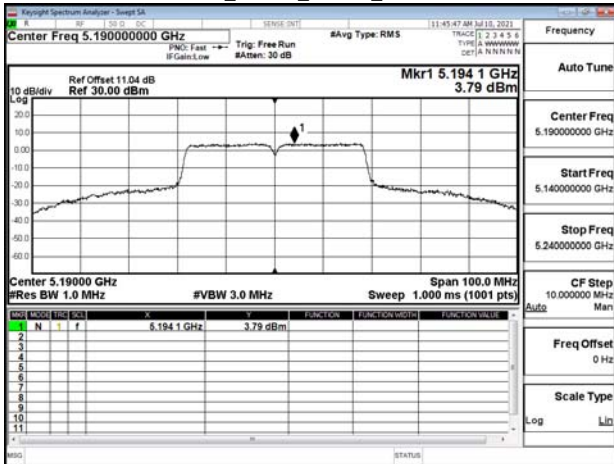
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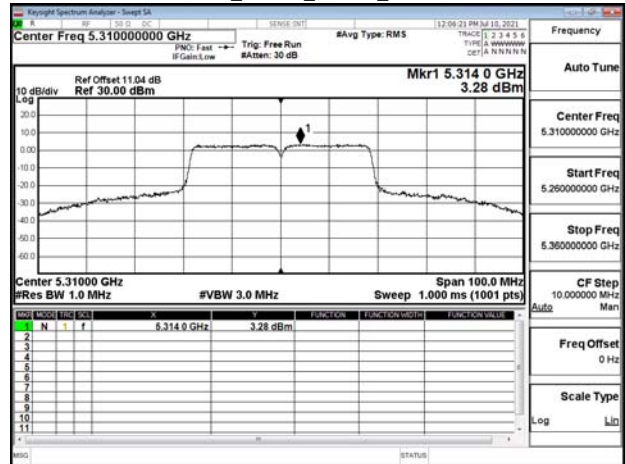
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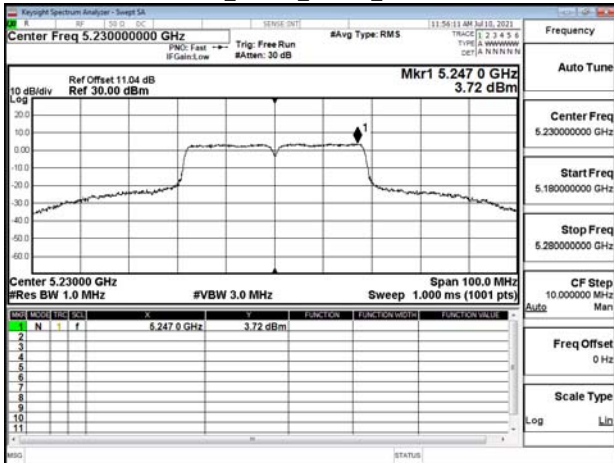
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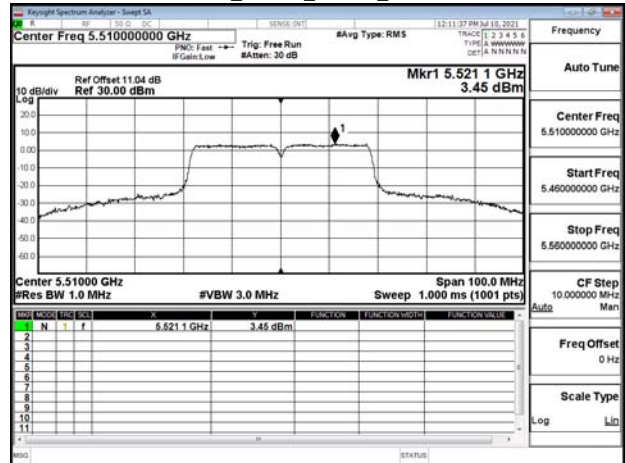
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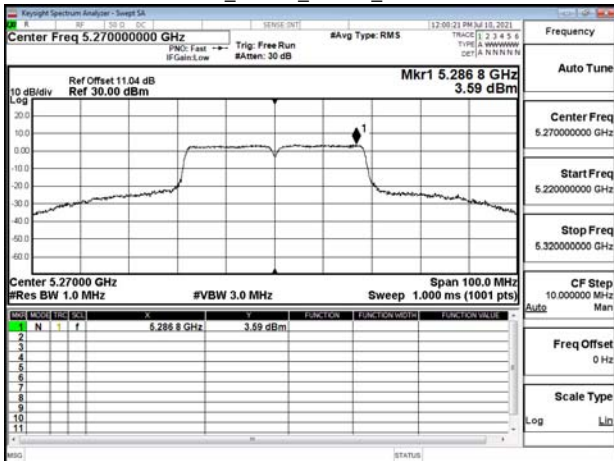
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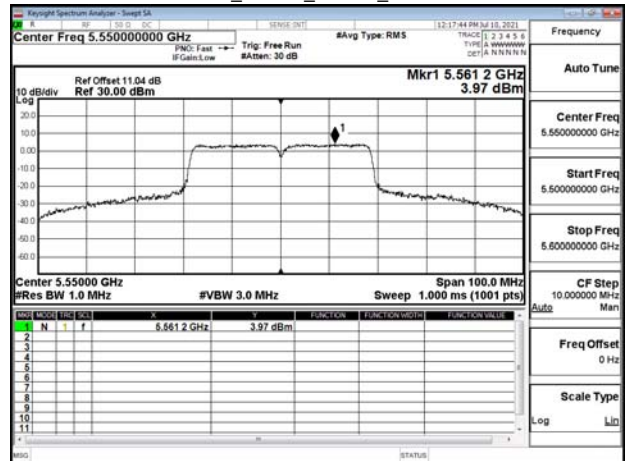
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802.11n\_40MHz\_Chain0\_5270MHz



802.11n\_40MHz\_Chain0\_5550MHz

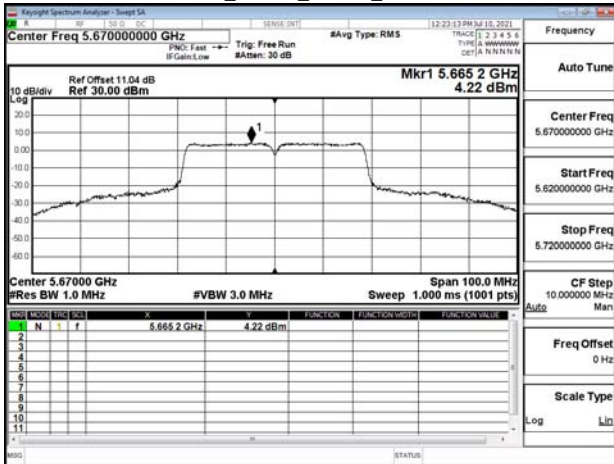


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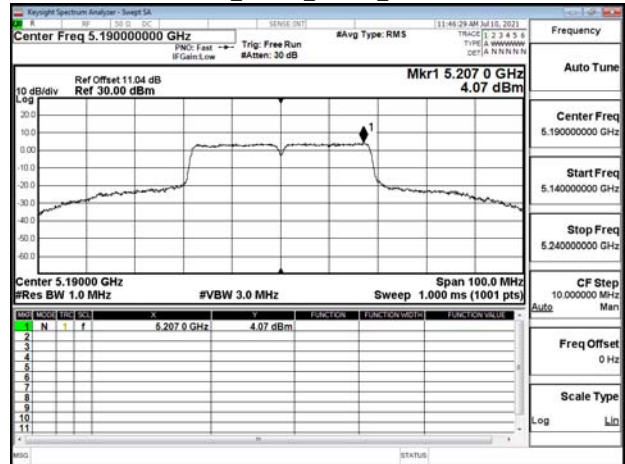
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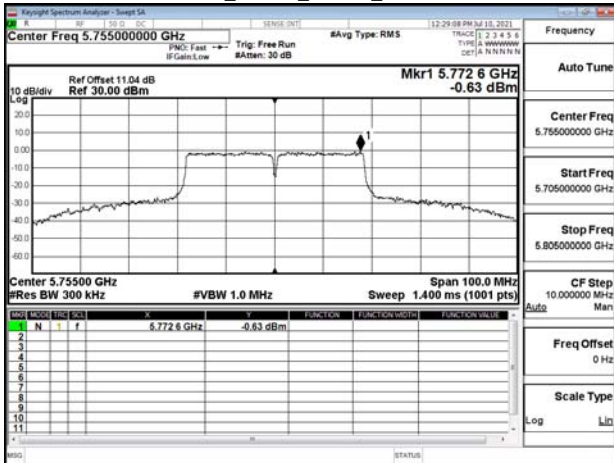
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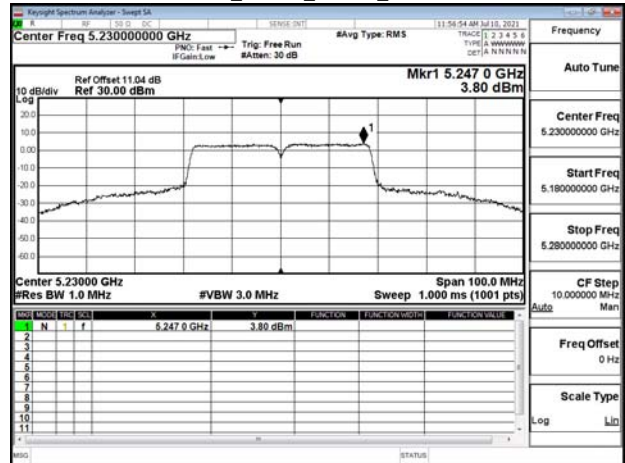
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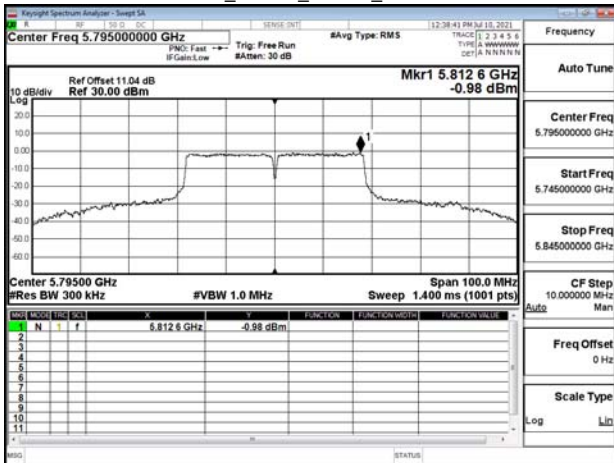
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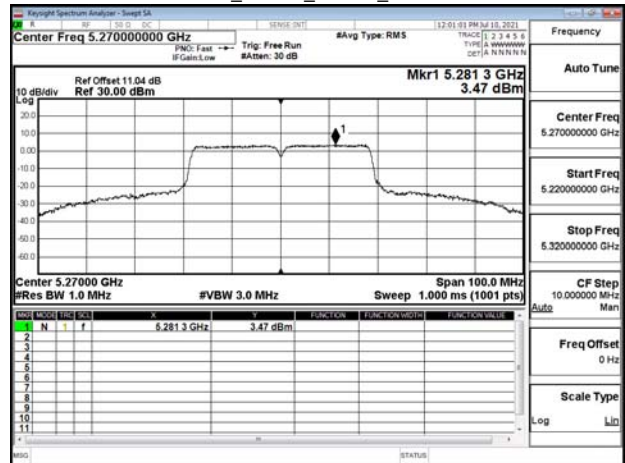
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802.11n\_40MHz\_Chain0\_5795MHz



802.11n\_40MHz\_Chain1\_5270MHz

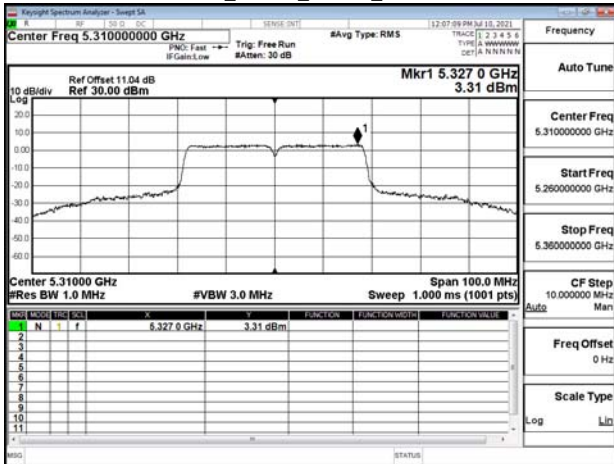


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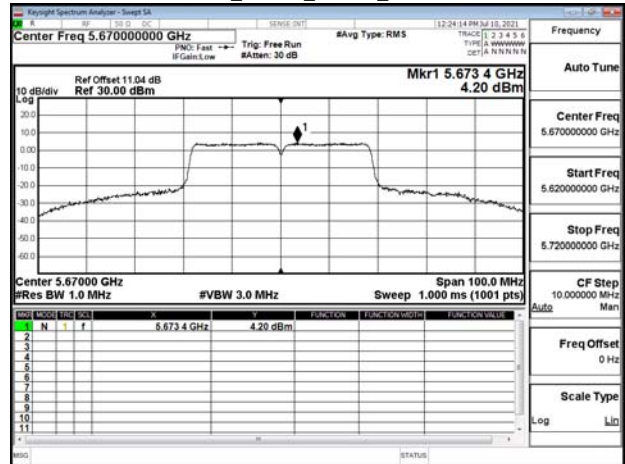
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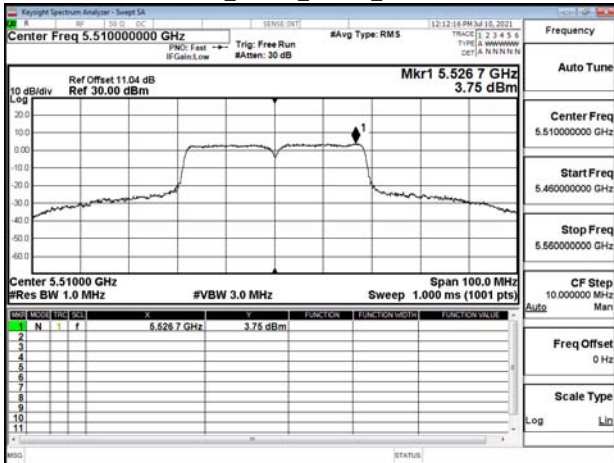
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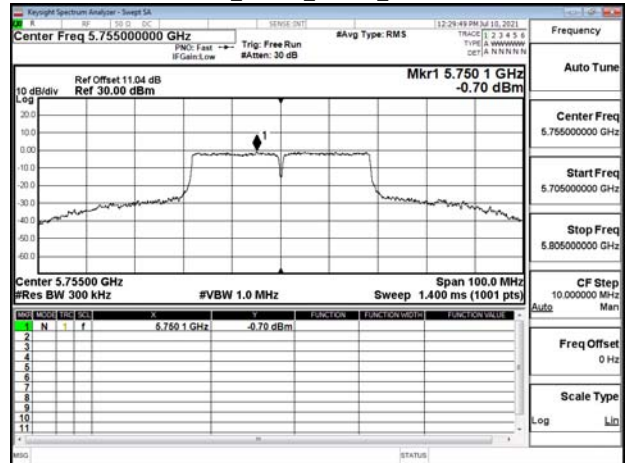
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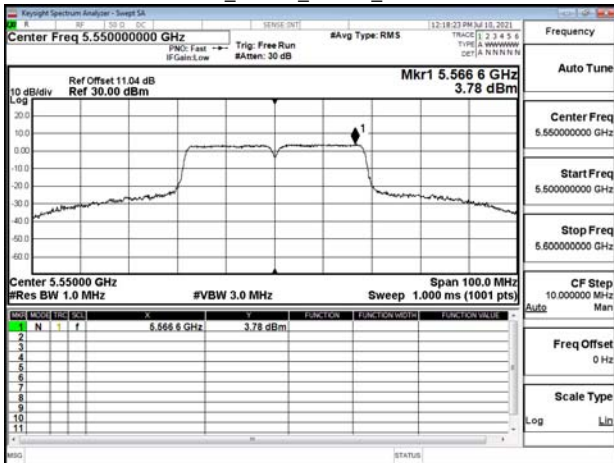
802.11n\_40MHz\_Chain1\_5510MHz



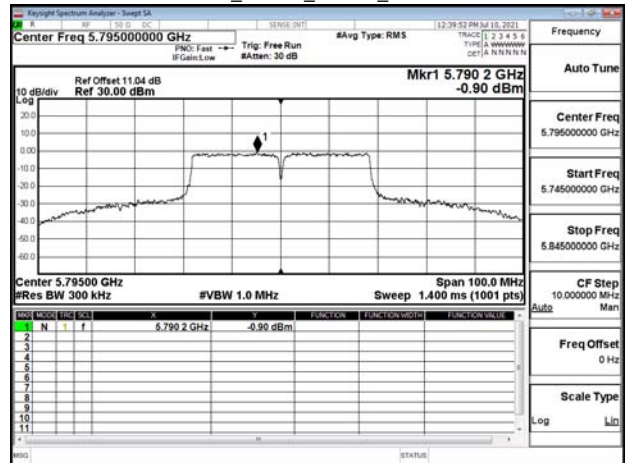
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802.11n\_40MHz\_Chain1\_5550MHz



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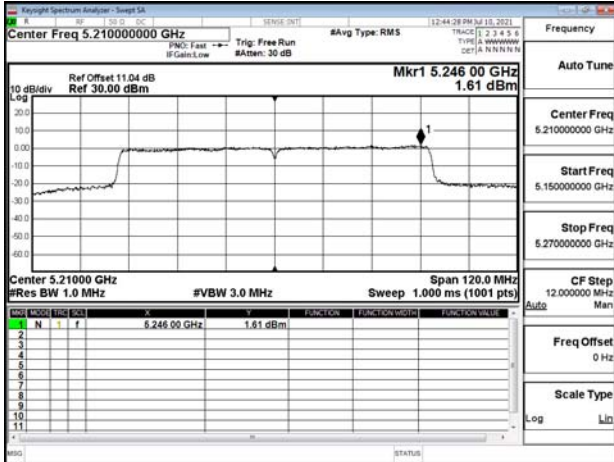


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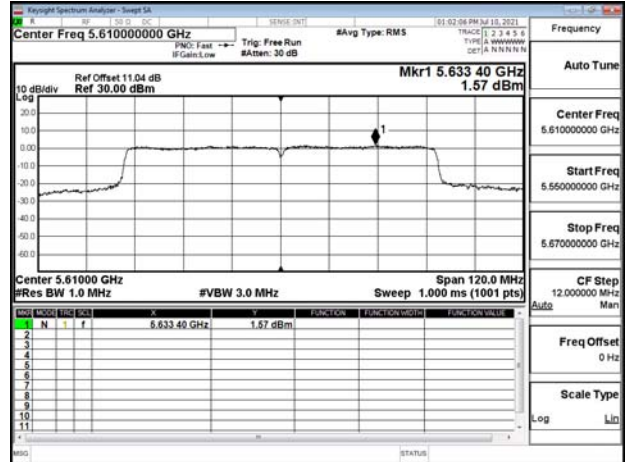
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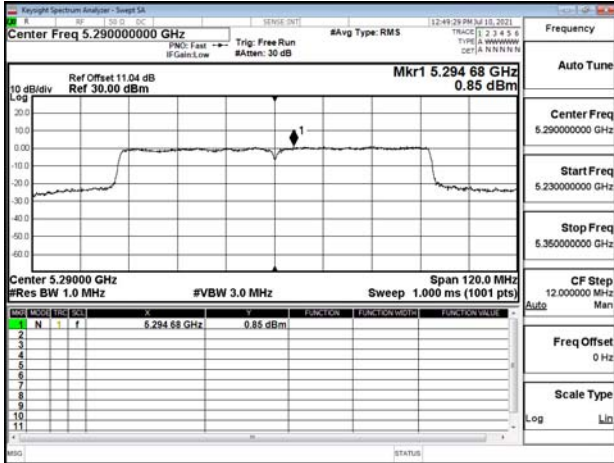
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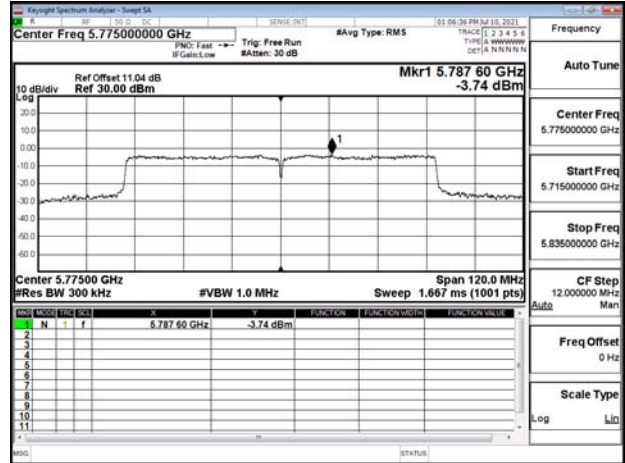
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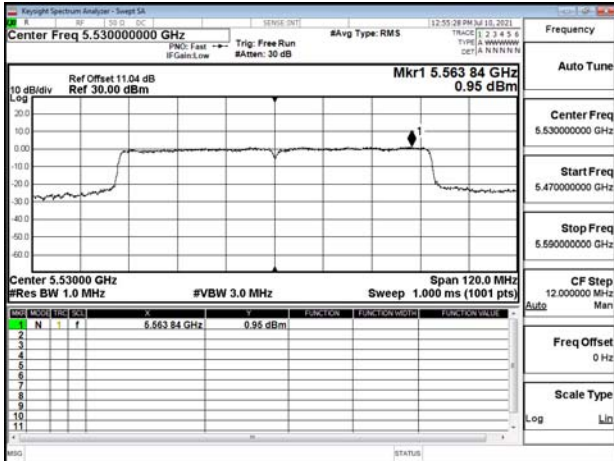
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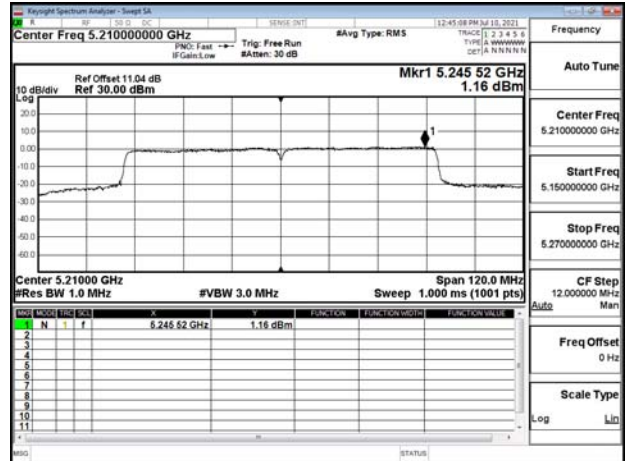
802.11ac\_80MHz\_Chain0\_5775MHz



802.11ac\_80MHz\_Chain0\_5530MHz



802.11ac\_80MHz\_Chain1\_5210MHz



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