

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



Applicant: Chiun Mai Communication Systems, Inc
No.4, Minsheng St., Tucheng Dist., New Taipei City 23679,
Taiwan (R.O.C.)

Manufacturer: Chiun Mai Communication Systems, Inc
No.4, Minsheng St., Tucheng Dist., New Taipei City 23679,
Taiwan (R.O.C.)

Product Name: FusionAir-MRT

Brand Name: Fusion

Model No.: FURM99

Model Difference: N/A

Report Number: E2/2021/30066

FCC ID 2AZ9NBTWIM-FURM99

Issue Date: March 21, 2022

Date of Test: March 22, 2021 ~ November 9, 2021

Date of EUT Received: March 22, 2021

Approved By


Jay Lin

We hereby certify that:

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

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
E2/2021/30066	00	Original	March 21, 2022	Ariel Chang

Note:

1. Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	FusionAir-MRT
Brand Name:	Fusion
Model No.:	FURM99
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
Power Supply:	3.3Vdc

1.2 Modulation & Data Rate

Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM
Transition Rate	802.11 a: 6.5 – 54 Mbps
	802.11 n_20MHz: 6.5 – 72.2 Mbps

1.3 Antenna Designation

Antenna Type	Freq. (MHz)	Peak Antenna Gain (dBi)
PCB	5150~5250	2.49
	5250~5350	2.54
	5470~5725	3.03
	5725~5850	2.10

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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 20M	5180~5240	4	15.85 dBm	OFDM
	5260~5320	4	15.77 dBm	OFDM
	5500~5720	12	15.94 dBm	OFDM
	5745-5825	5	15.97 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 A	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.				

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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 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 Configuration of Tested System

Fig. 2-1 Conducted (Antenna Port) & Radiated Emission Configuration & Emission from AC power line



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2	Notebook	Lenovo	T420	S0012599	N/A	N/A
3	Notebook	Lenove	L420	S0012467	N/A	N/A
4	Power Supplier	DHA	DPS-3003	9411005787	N/A	N/A
5	Power Supplier	Gwinstek	SPS-3610	GEV856769	N/A	N/A
6	Notebook	Lenovo	T470	P0001293	N/A	N/A

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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	
CH	Freq (MHz)
36	5180
40	5200
44	5220
48	5240

Operated band in 5250 MHz ~5350 MHz:

20 M	
CH	Freq (MHz)
52	5260
56	5280
60	5300
64	5320

Operated band in 5470 MHz ~5725 MHz:

20 M	
CH	Freq (MHz)
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720

Operated band in 5745 MHz ~5850 MHz:

20 M	
CH	Freq (MHz)
149	5745
153	5765
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 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 type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input checked="" 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.

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4.2.1 RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	54	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	54	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	MCS7	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			

Note:

The field strength of radiation emission was measured as EUT three orthogonal plans, 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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4.2.2 ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	54	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	MCS7	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			

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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 dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

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

6.2 Measurement Equipment Used

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZ-BECK Mess-Elektronik	NSLK8127	973	03/25/2021	03/24/2022
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
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.3 EUT Setup

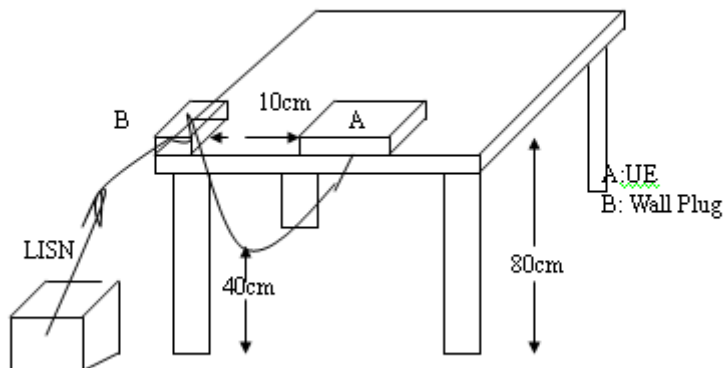
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz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

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6.4 Test SET-UP



6.5 Measurement Procedure

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

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6.6 Measurement Result

Report Number :E2/2021/30066

Test Site :Conduction C

Test Mode :5G

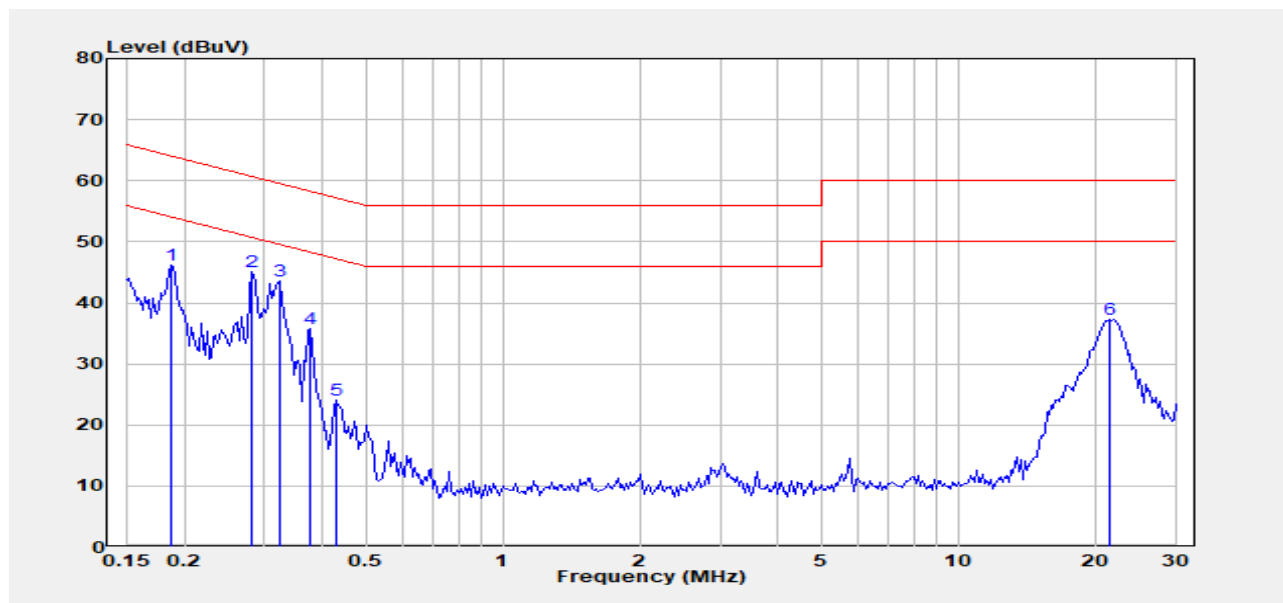
Test Date :2021-11-09

Power :120V/60Hz

Temp./Humi. :21.5/49

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
0.187	Peak	35.81	10.30	46.11	64.15	-18.04
0.280	Peak	34.77	10.30	45.07	60.81	-15.74
0.325	Peak	33.36	10.31	43.67	59.57	-15.91
0.377	Peak	25.56	10.31	35.87	58.34	-22.47
0.433	Peak	13.78	10.31	24.09	57.20	-33.11
21.600	Peak	26.37	10.92	37.29	60.00	-22.71

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Report Number :E2/2021/30066

Test Site :Conduction C

Test Mode :5G

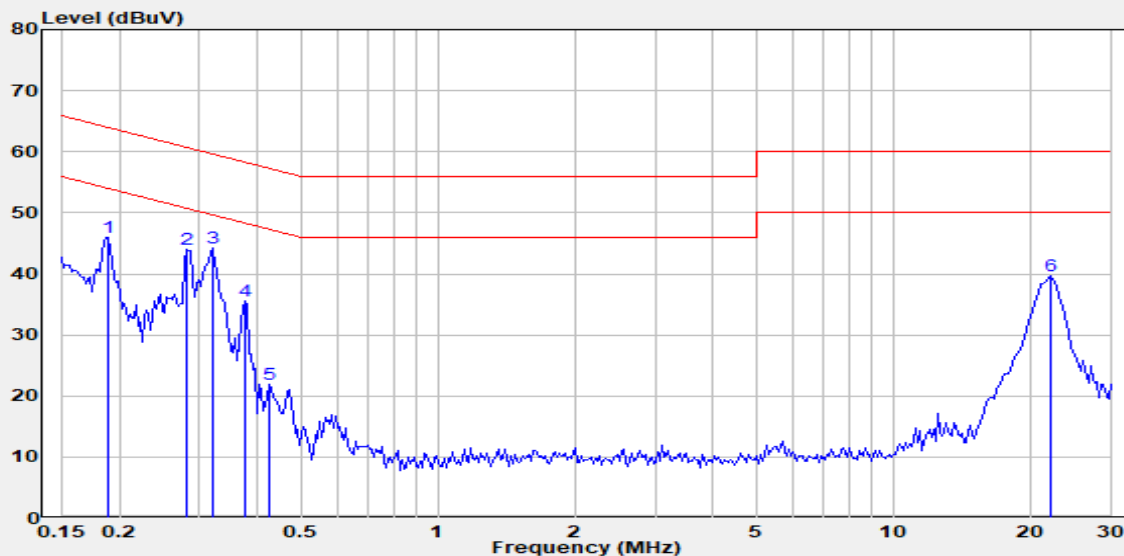
Test Date :2021-11-09

Power :120V/60Hz

Temp./Humi. :21.5/49

Probe :N

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV	Limit dBuV	Margin dB
0.189	Peak	35.67	10.30	45.97	64.06	-18.09
0.280	Peak	33.62	10.31	43.93	60.81	-16.88
0.322	Peak	33.97	10.31	44.28	59.66	-15.38
0.377	Peak	25.24	10.32	35.56	58.34	-22.79
0.428	Peak	11.67	10.32	21.99	57.29	-35.30
22.298	Peak	28.64	11.04	39.68	60.00	-20.32

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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	66.00	1.80	4.03	5.00
802.11n_20	64.00	1.94	4.40	5.00

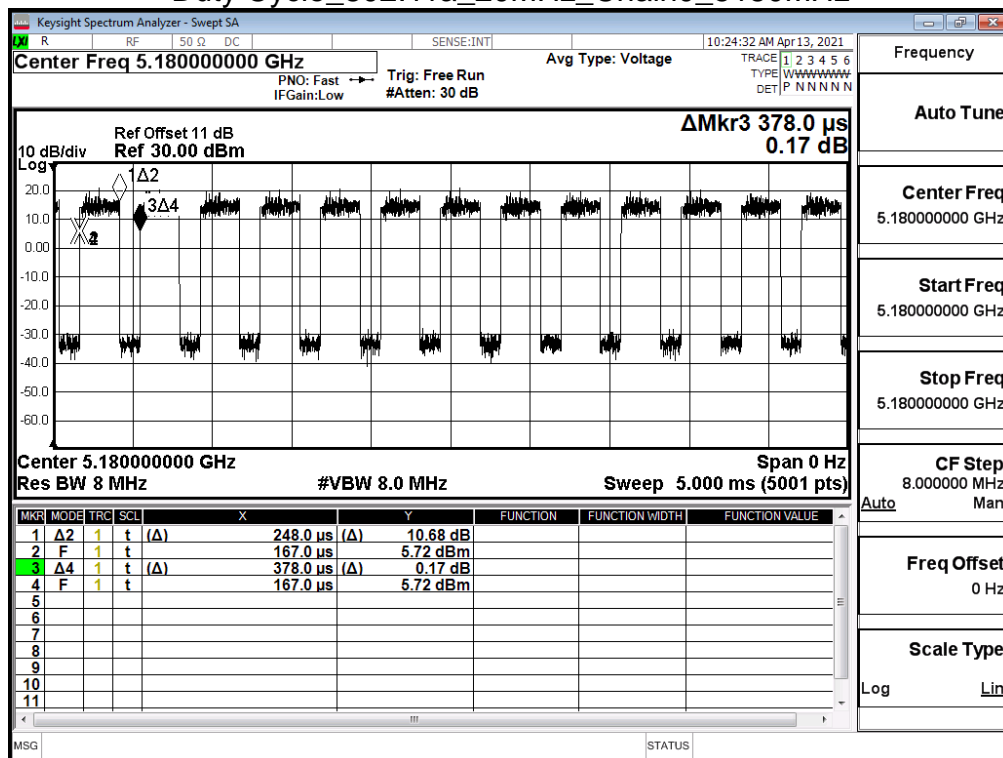
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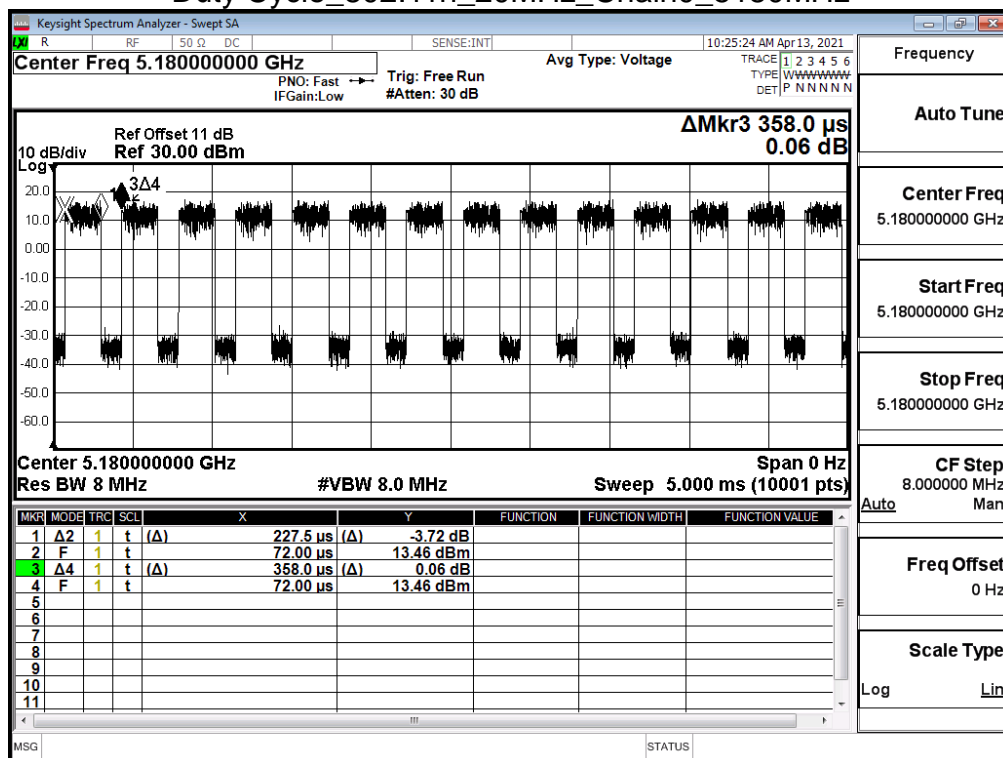
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7.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

Duty Cycle_802.11a_20MHz_Chain0_5180MHz



Duty Cycle_802.11n_20MHz_Chain0_5180MHz



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

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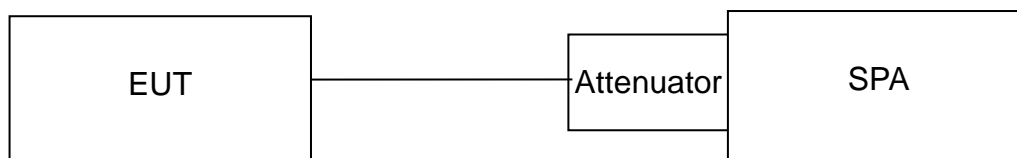
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8.3 Measurement Equipment Used

Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/22/2021	03/21/2022
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
DC Power Supply	DHA	DPS-3003	9411005787	08/19/2020	08/18/2021
Attenuator	Marvelous	WATT-218FS-10	RF15	11/19/2020	11/18/2021
DC Block	PASTER-NACK	PE8210	RF155	11/19/2020	11/18/2021

8.4 Test Set-up



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8.5 Measurement Result

8.5.1 FCC 26dB Bandwidth

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	20.27	13.070
5220	20.09	13.030
5240	19.53	12.910
5260	20.59	13.140
5300	20.75	13.170
5320	20.51	13.120
5500	20.01	13.010
5580	20.01	13.010
5700	20.08	13.030
5720(U-NII 2C)	15.36	11.860
5720(U-NII 3)	4.94	6.940

802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.42	13.310
5220	20.65	13.150
5240	20.76	13.170
5260	20.43	13.100
5300	20.86	13.190
5320	20.84	13.190
5500	21.07	13.240
5580	20.62	13.140
5700	21.24	13.270
5720(U-NII 2C)	15.36	11.860
5720(U-NII 3)	5.36	7.290

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

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.42	12.150
5785	16.38	12.140
5825	16.37	12.140

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.35	12.390
5785	17.53	12.440
5825	17.27	12.370

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8.5.3 BW Verification for DFS Function

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.22	< 5250
5745	5736.80	> 5725

802.11n_HT20_Ch0

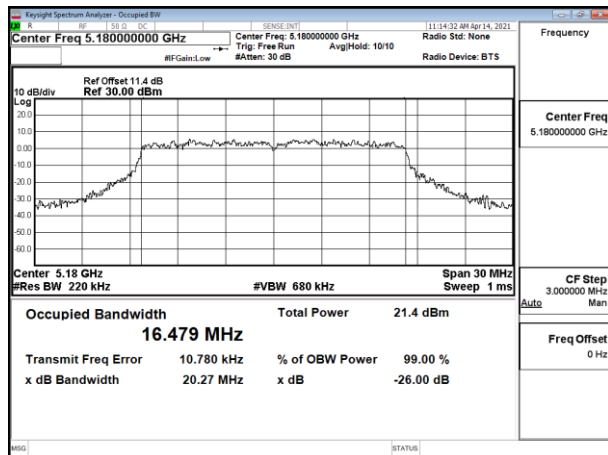
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.78	< 5250
5745	5736.20	> 5725

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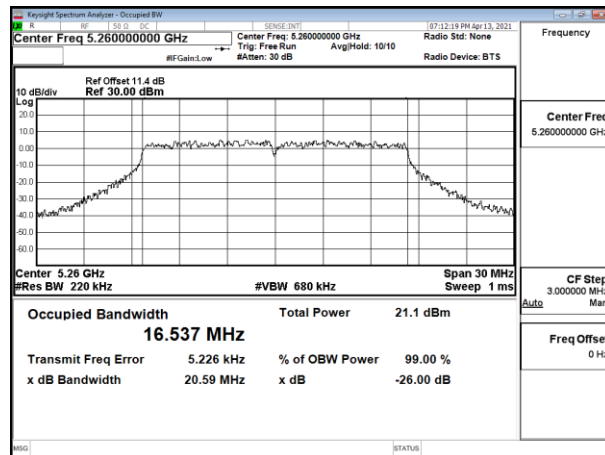
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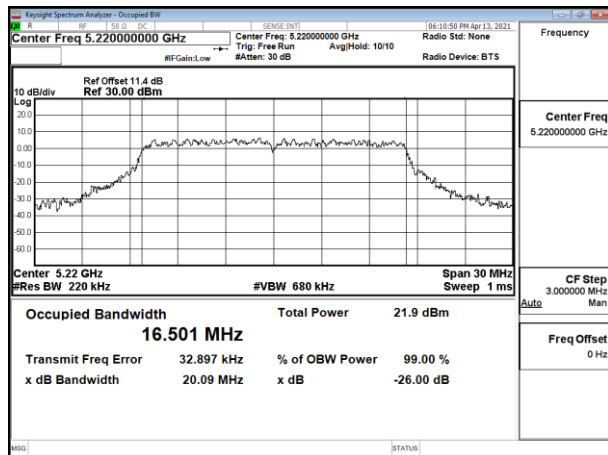
802.11a_20MHz_Chain0_5180MHz



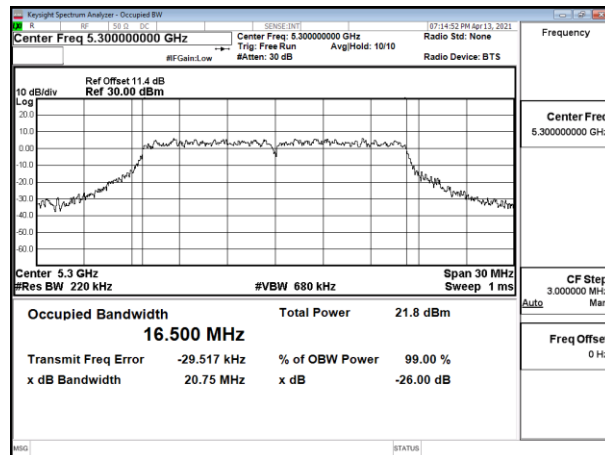
802.11a_20MHz_Chain0_5260MHz



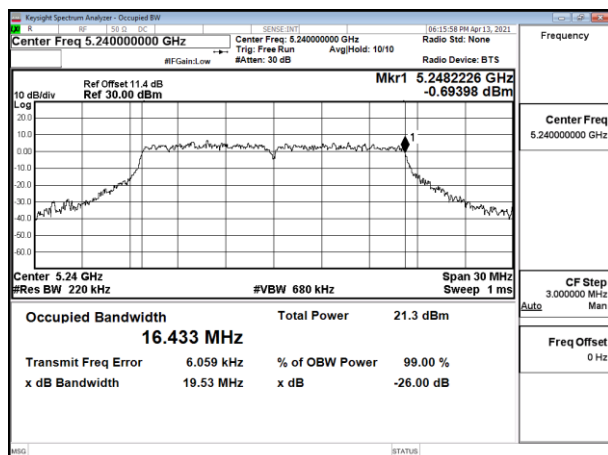
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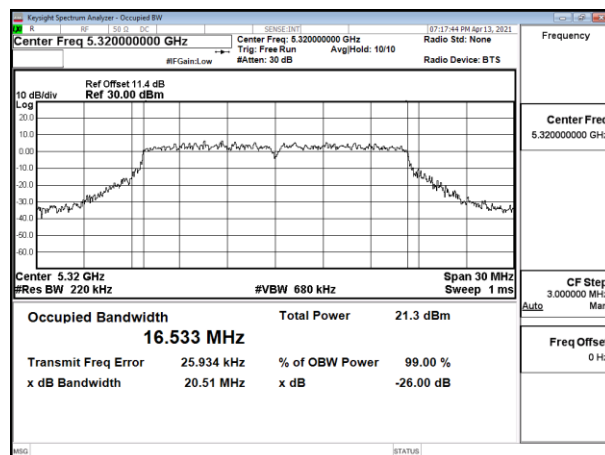
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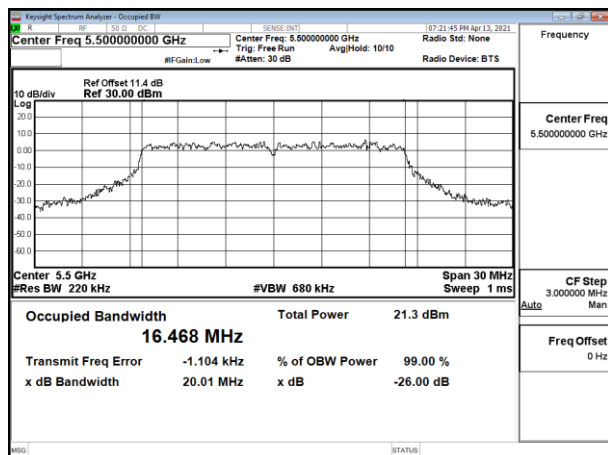


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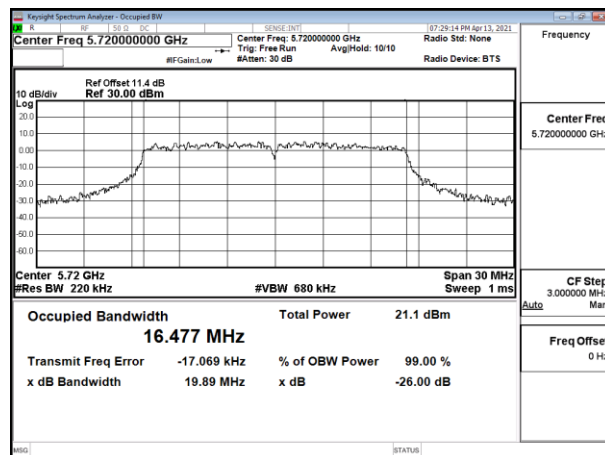
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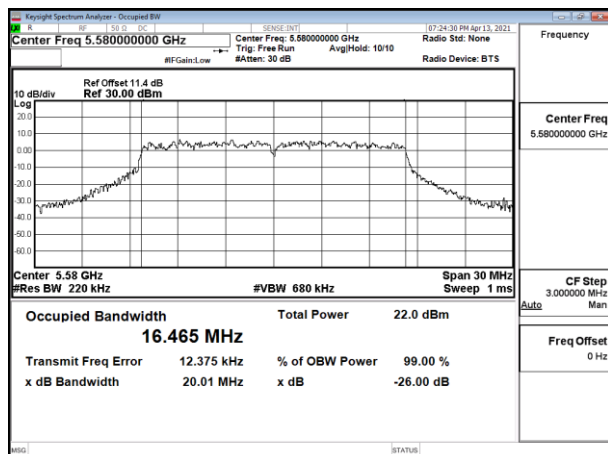
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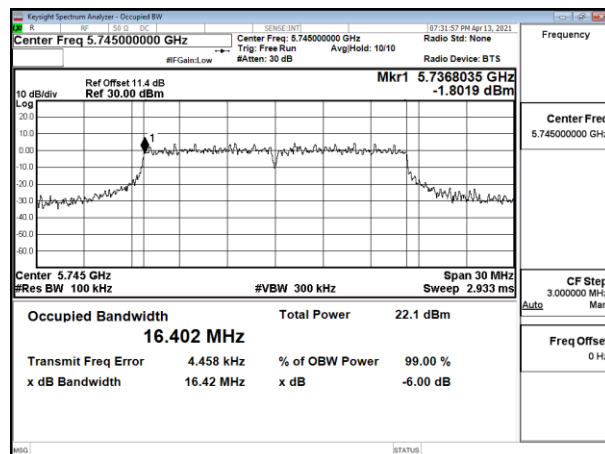
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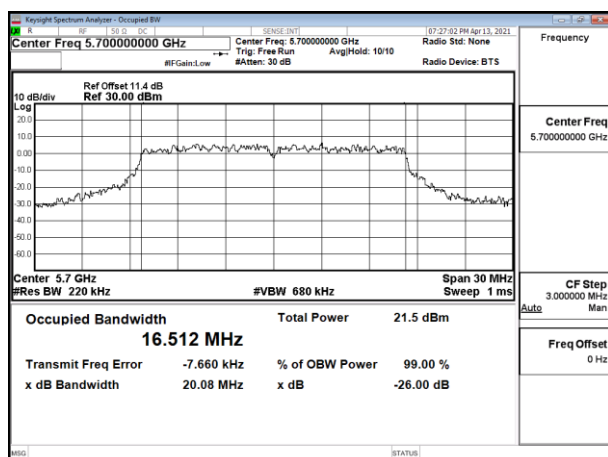
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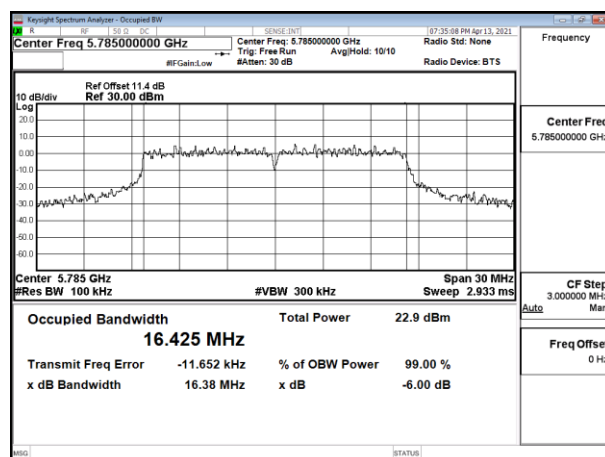
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802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5785MHz

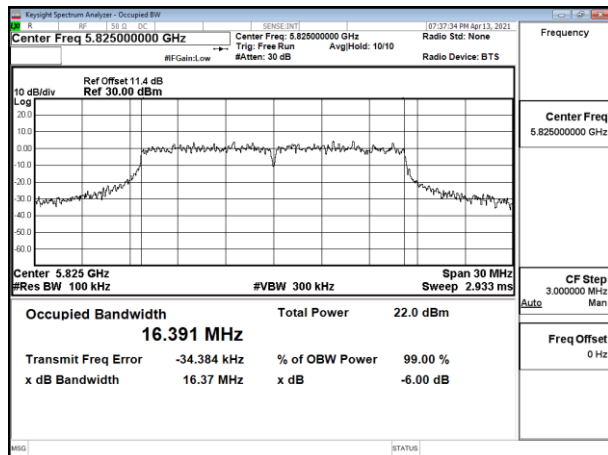


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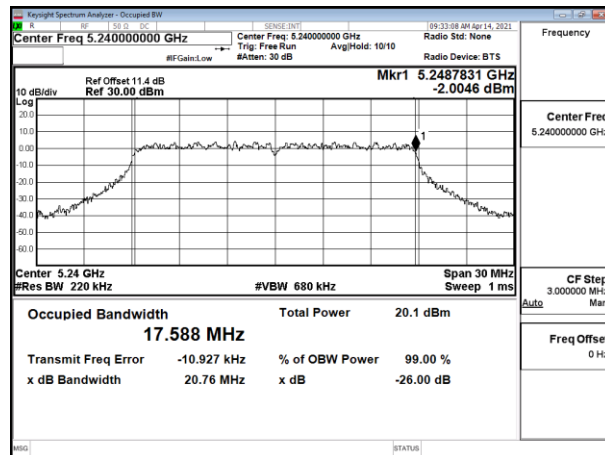
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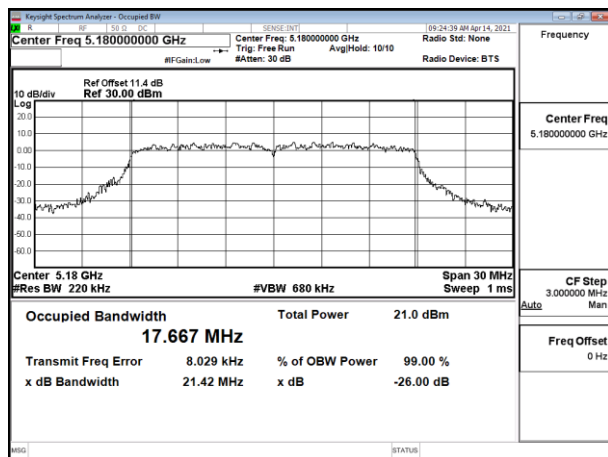
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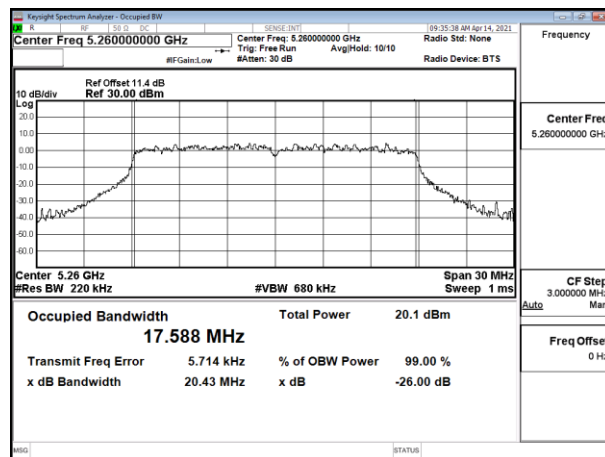
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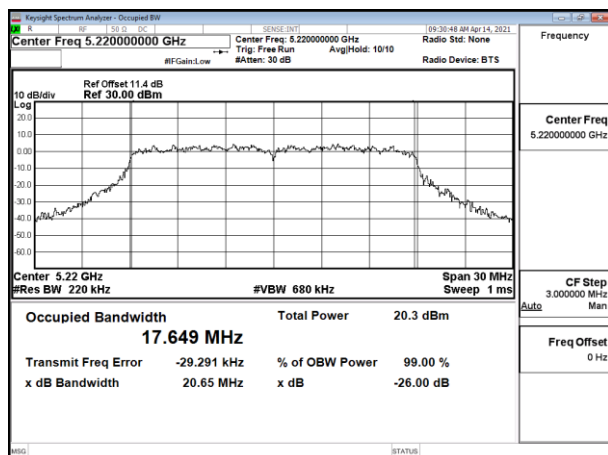
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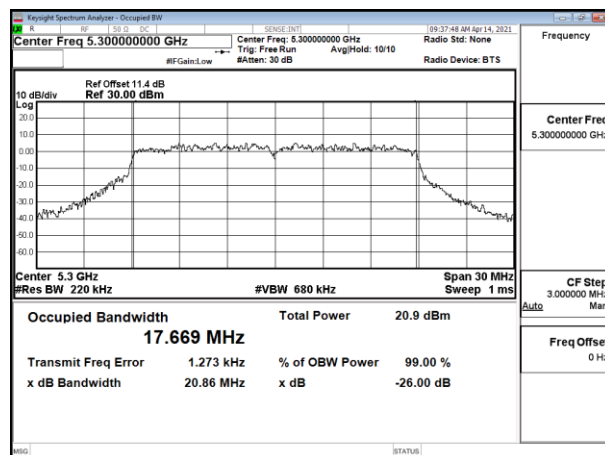
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802.11n_20MHz_Chain0_5220MHz



802.11n_20MHz_Chain0_5300MHz

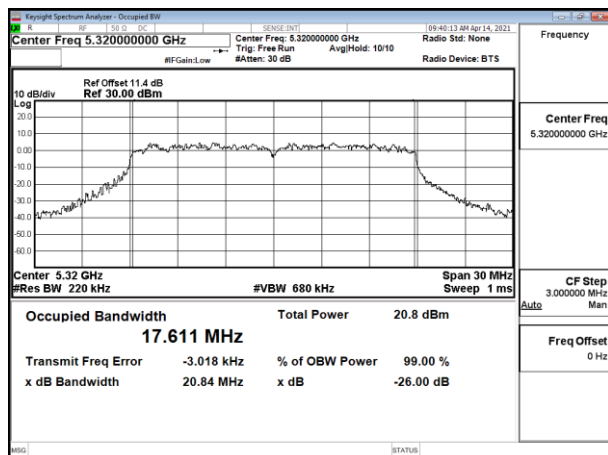


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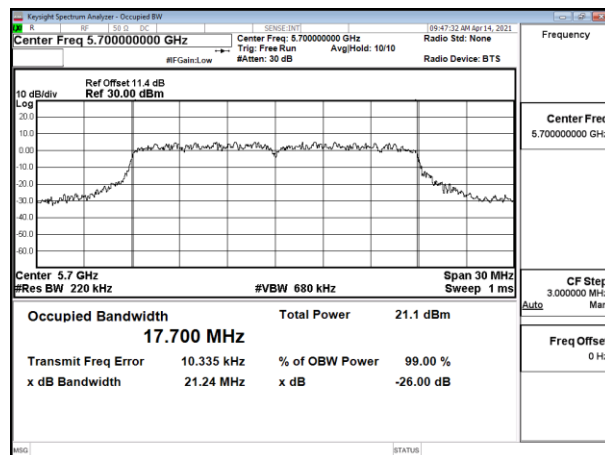
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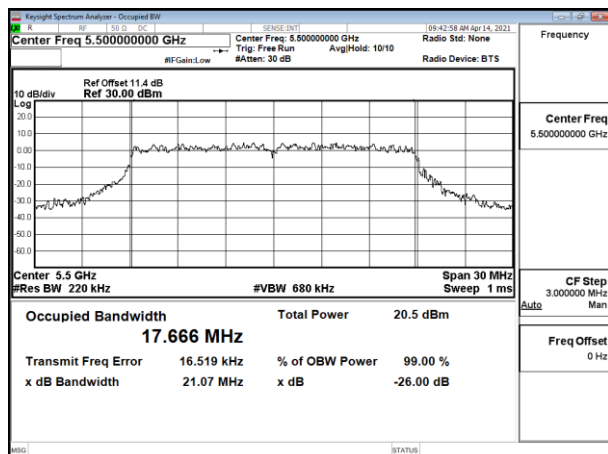
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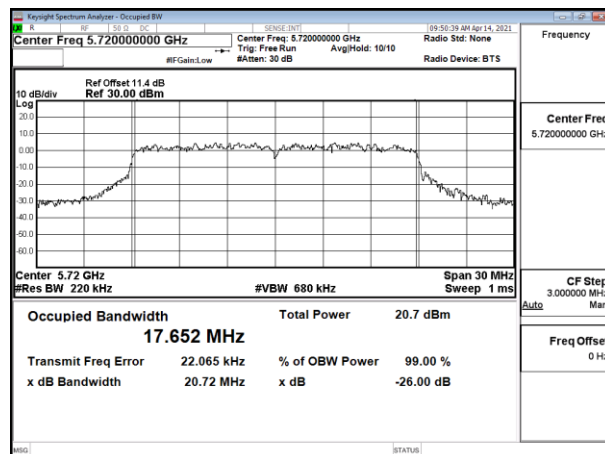
802.11n_20MHz_Chain0_5700MHz



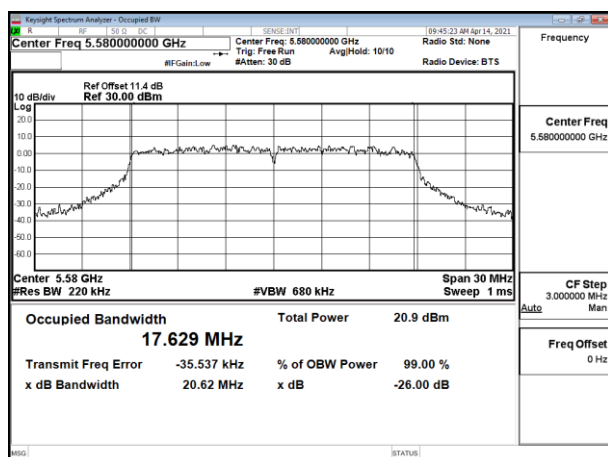
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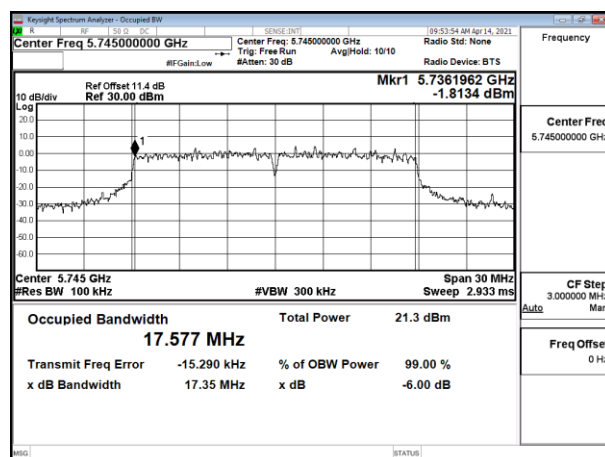
802.11n_20MHz_Chain0_5720MHz



802.11n_20MHz_Chain0_5580MHz



802.11n_20MHz_Chain0_5745MHz

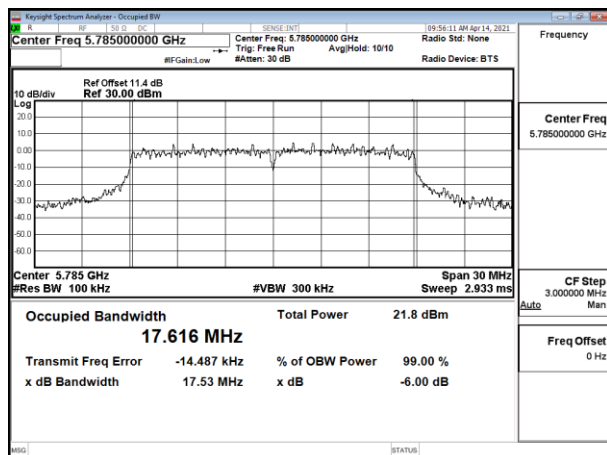


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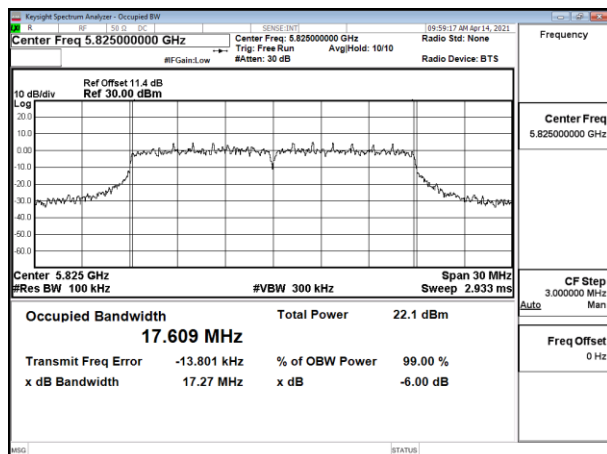
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802.11n_20MHz_Chain0_5785MHz



802.11n_20MHz_Chain0_5825MHz



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable FCC

Band	EUT CATEGORY		LIMIT			
			Conducted Out-put 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 requirements column, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna.

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.

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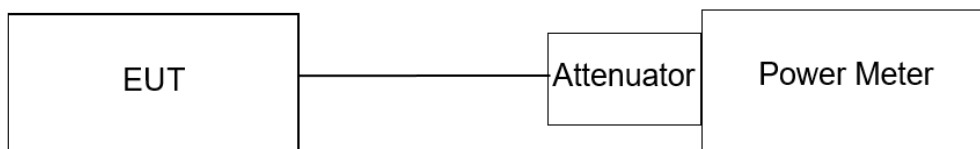
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9.3 Measurement Equipment Used

Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/22/2021	03/21/2022
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
DC Power Supply	DHA	DPS-3003	9411005787	08/19/2020	08/18/2021
Attenuator	Marvelous	WATT-218FS-10	RF15	11/19/2020	11/18/2021
DC Block	PASTER-NACK	PE8210	RF155	11/19/2020	11/18/2021

9.4 Test Set-up



Note:

Cable Loss= 11.4dB

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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.

9.5.1 Conducted output power (FCC)

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	Power set	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	54	100	15.67	36.937	23.98	PASS
44	5220	54	100	15.72	37.364	23.98	PASS
48	5240	54	99	15.85	38.500	23.98	PASS
52	5260	54	99	15.73	37.450	23.98 or 11+10log(B) = 24.14	PASS
60	5300	54	103	15.77	37.797	23.98 or 11+10log(B) = 24.17	PASS
64	5320	54	103	15.61	36.430	23.98 or 11+10log(B) = 24.12	PASS
100	5500	54	100	15.94	39.306	23.98 or 11+10log(B) = 24.01	PASS
116	5580	54	102	15.87	38.677	23.98 or 11+10log(B) = 24.01	PASS
140	5700	54	102	15.93	39.215	23.98 or 11+10log(B) = 24.03	PASS
144	5720(U-NII 2C)	54	102	14.47	28.01	23.98 or 11+10log(B) = 22.86	PASS
144	5720 (U-NII 3)	54	102	9.67	9.27	30	PASS
149	5745	54	95	15.92	39.125	30	PASS
157	5785	54	99	15.68	37.022	30	PASS
165	5825	54	96	15.97	39.578	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	MCS7	97	14.93	31.104	23.98	PASS
44	5220	MCS7	95	14.95	31.248	23.98	PASS
48	5240	MCS7	95	14.87	30.678	23.98	PASS
52	5260	MCS7	95	14.66	29.229	23.98 or 11+10log(B) = 24.10	PASS
60	5300	MCS7	100	14.96	31.320	23.98 or 11+10log(B) = 24.19	PASS
64	5320	MCS7	100	14.86	30.607	23.98 or 11+10log(B) = 24.19	PASS
100	5500	MCS7	89	12.99	19.898	23.98 or 11+10log(B) = 24.24	PASS
116	5580	MCS7	99	14.68	29.364	23.98 or 11+10log(B) = 24.14	PASS
140	5700	MCS7	97	14.81	30.257	23.98 or 11+10log(B) = 24.27	PASS
144	5720(U-NII 2C)	MCS7	100	13.27	21.22	23.98 or 11+10log(B) = 22.86	PASS
144	5720 (U-NII 3)	MCS7	100	8.70	7.41	30	PASS
149	5745	MCS7	91	14.91	30.961	30	PASS
157	5785	MCS7	95	14.90	30.890	30	PASS
165	5825	MCS7	95	14.91	30.961	30	PASS

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10 MAXIMUM POWER SPECTRAL DENSITY

10.1 Standard Applicable

FCC

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1	<input type="checkbox"/>	Access Point (Master device)	17dBm/ MHz
	<input type="checkbox"/>	Fixed point-to-point Access Ponit	
	<input checked="" type="checkbox"/>	Mobile and portable client device	11dBm/ MHz
U-NII-2A	<input checked="" type="checkbox"/>		11dBm/ MHz
U-NII-2C	<input checked="" type="checkbox"/>		11dBm/ MHz
U-NII-3	<input checked="" type="checkbox"/>		30dBm/ 500kHz

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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 (601 pts), detector = sample, 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= approximately 1% of EBW, VBW≥ 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto, detector = RMS or sample, traces 100 sweeps of video averaging.
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.

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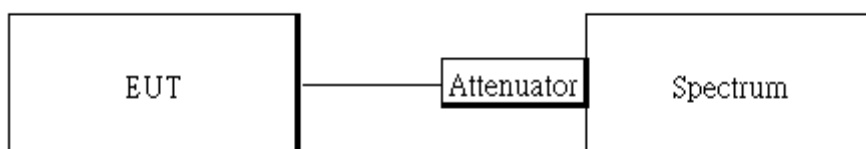
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Power Meter	Anritsu	ML2496A	1512003	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339378	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339379	07/23/2020	07/22/2021
DC Power Supply	DHA	DPS-3003	9.411E+09	08/19/2020	08/18/2021
Attenuator	Marvelous	WATT-218FS-10	RF15	11/19/2020	11/18/2021
DC Block	PASTERNAK	PE8210	RF155	11/19/2020	11/18/2021

10.4 Test Set-up



Note:

Cable Loss= 11.4dB

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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)
5180.00	4.22	1.80	6.02		11.00 dBm/MHz	-4.98
5220.00	4.23	1.80	6.03		11.00 dBm/MHz	-4.97
5240.00	3.82	1.80	5.62		11.00 dBm/MHz	-5.38
5260.00	3.40	1.80	5.20		11.00 dBm/MHz	-5.80
5300.00	4.57	1.80	6.37		11.00 dBm/MHz	-4.63
5320.00	3.75	1.80	5.55		11.00 dBm/MHz	-5.45
5500.00	3.34	1.80	5.14		11.00 dBm/MHz	-5.86
5580.00	4.85	1.80	6.65		11.00 dBm/MHz	-4.35
5700.00	4.05	1.80	5.85		11.00 dBm/MHz	-5.15
5720 (U-NII 2C)	3.78	1.80	5.58		11.00 dBm/MHz	-5.42
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)	-2.06	1.80	2.22	1.96	30.00 dBm/500kHz	-28.04
5745.00	-0.45	1.80	2.22	3.57	30.00 dBm/500kHz	-26.43
5785.00	-0.25	1.80	2.22	3.77	30.00 dBm/500kHz	-26.23
5825.00	-1.36	1.80	2.22	2.66	30.00 dBm/500kHz	-27.34

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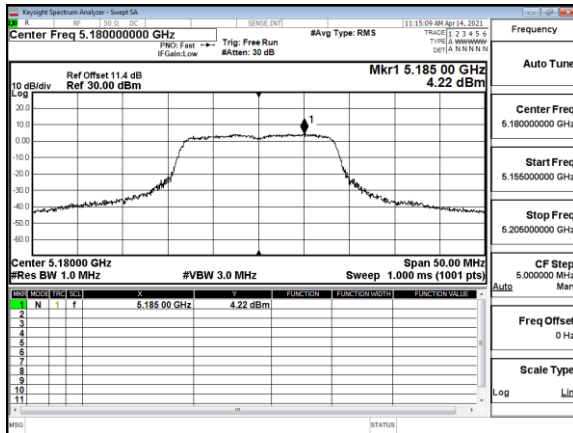
POWER DENSITY 802.11n HT20 MODE						
Frequency (MHz)	ch0 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180.00	3.03	1.94	4.97		11.00 dBm/MHz	-6.03
5220.00	2.64	1.94	4.58		11.00 dBm/MHz	-6.42
5240.00	2.70	1.94	4.64		11.00 dBm/MHz	-6.36
5260.00	2.90	1.94	4.84		11.00 dBm/MHz	-6.16
5300.00	3.80	1.94	5.74		11.00 dBm/MHz	-5.26
5320.00	3.15	1.94	5.09		11.00 dBm/MHz	-5.91
5500.00	3.03	1.94	4.97		11.00 dBm/MHz	-6.03
5580.00	2.82	1.94	4.76		11.00 dBm/MHz	-6.24
5700.00	3.39	1.94	5.33		11.00 dBm/MHz	-5.67
5720 (U-NII 2C)	2.98	1.94	4.92		11.00 dBm/MHz	-6.08
Frequency (MHz)	ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD(dBm/500k Hz)	Limit	Margin (dB)
5720 (U-NII 3)	-2.64	1.94	2.22	1.52	30.00 dBm/500kHz	-28.48
5745.00	-1.93	1.94	2.22	2.23	30.00 dBm/500kHz	-27.77
5785.00	-1.23	1.94	2.22	2.93	30.00 dBm/500kHz	-27.07
5825.00	-1.31	1.94	2.22	2.85	30.00 dBm/500kHz	-27.15

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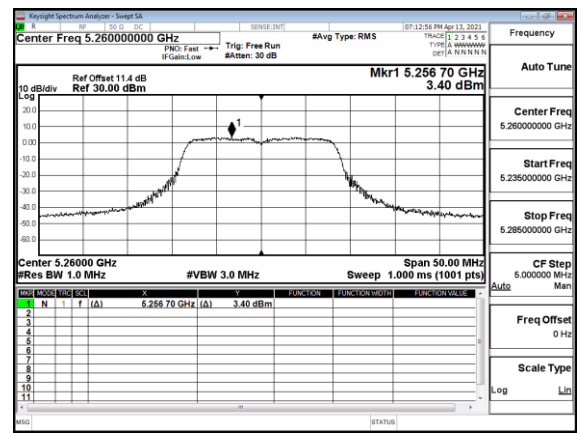
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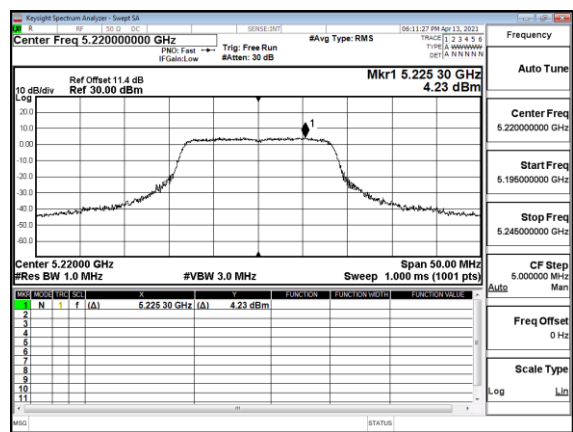
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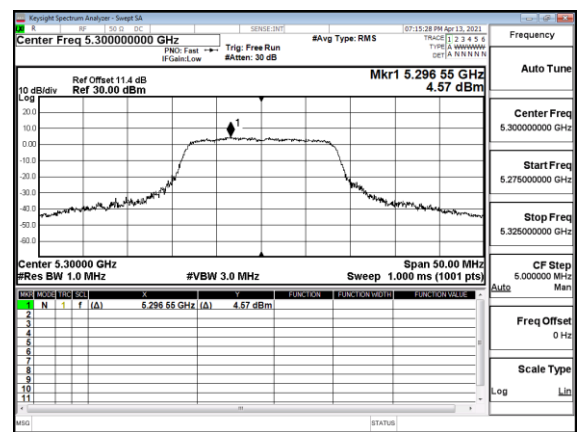
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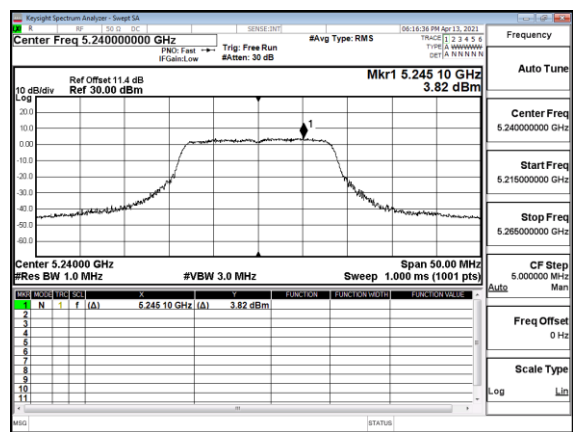
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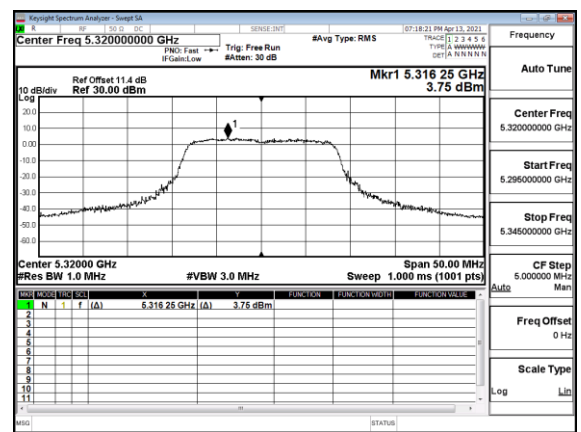
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802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

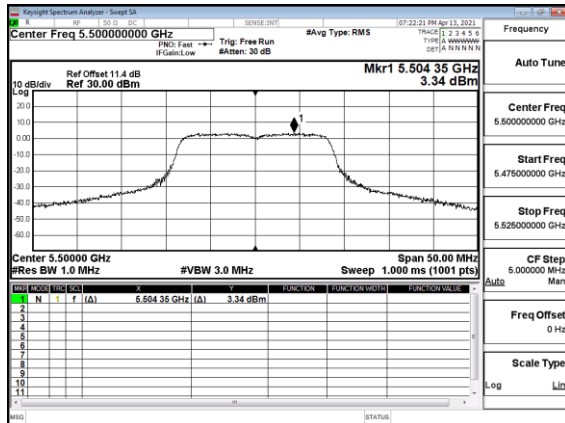


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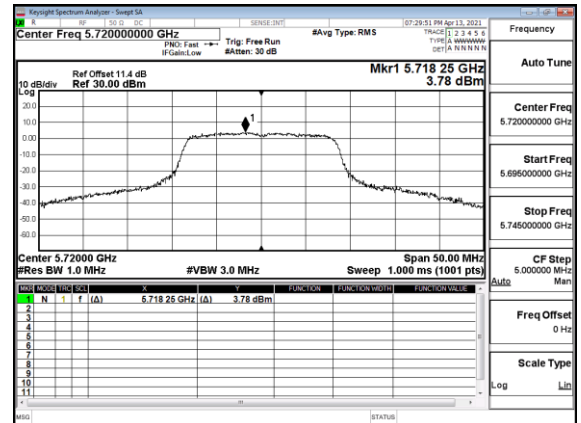
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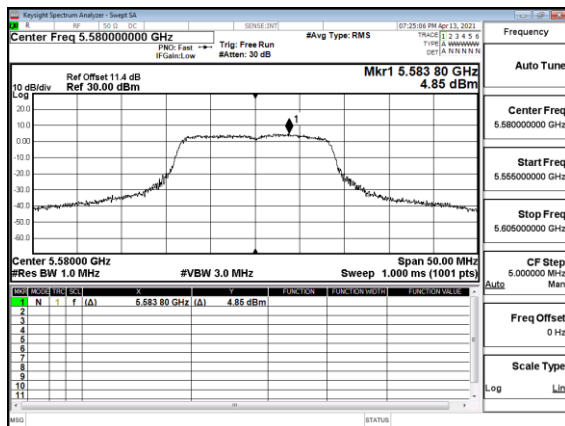
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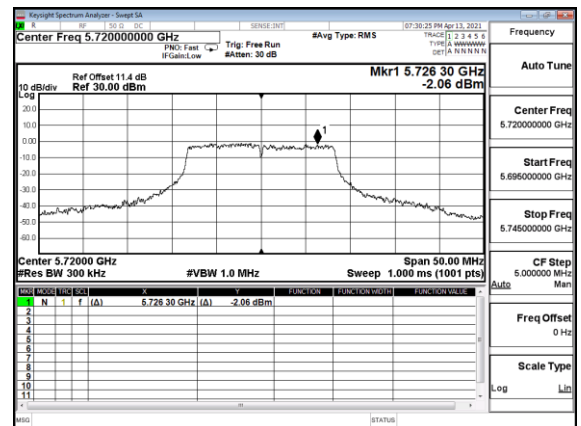
802.11a_20MHz_Chain0_5720MHz_UNII 2C



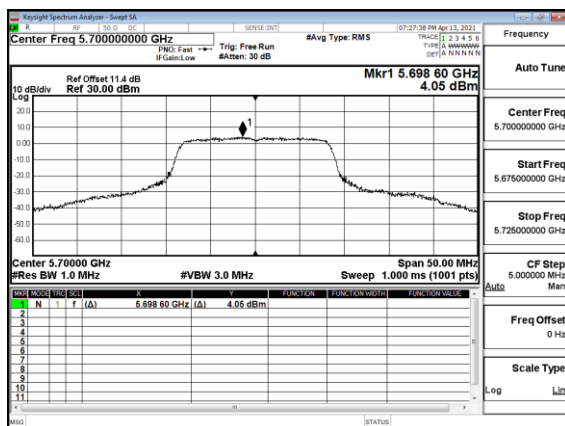
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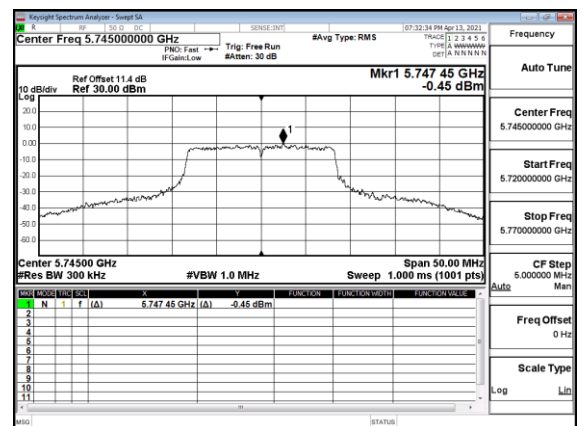
802.11a_20MHz_Chain0_5720MHz_UNII 3



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5745MHz

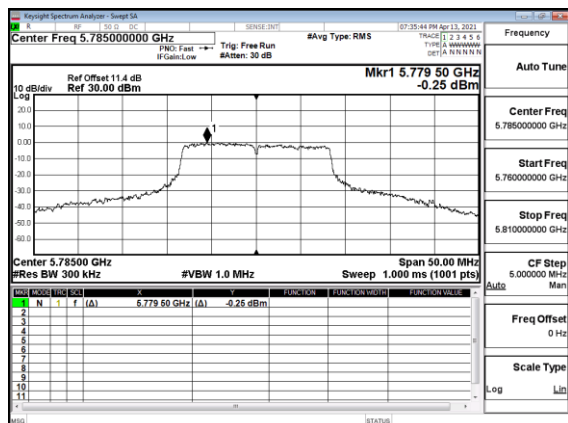


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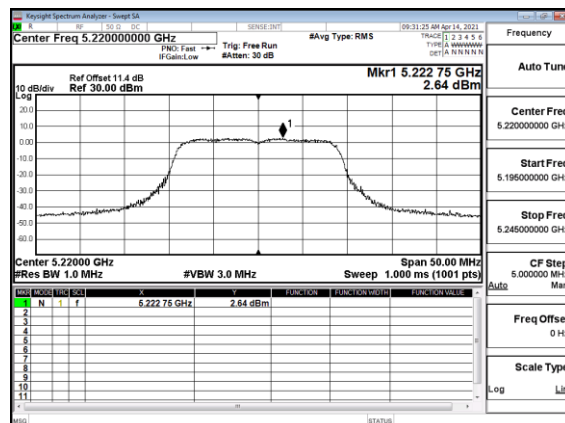
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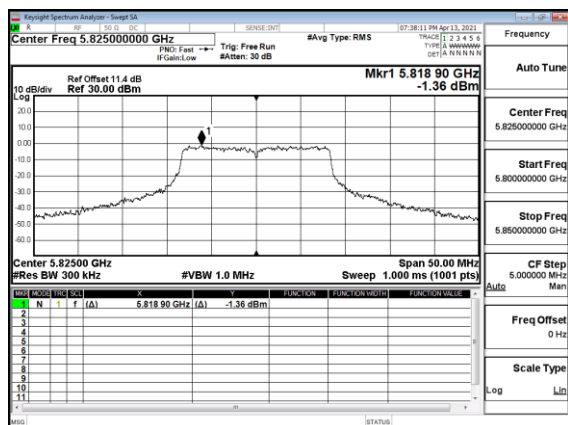
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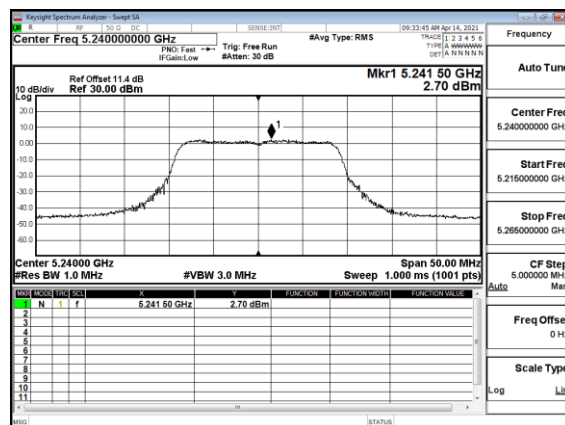
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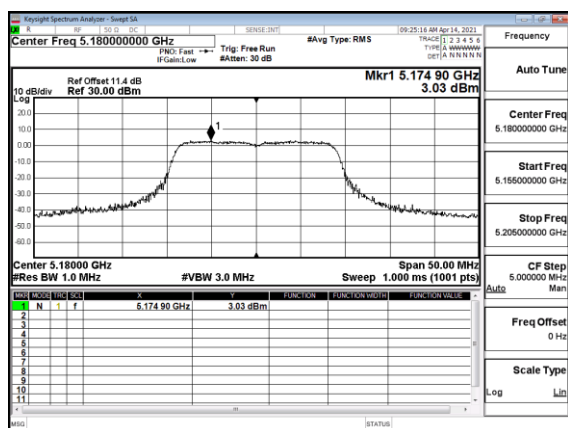
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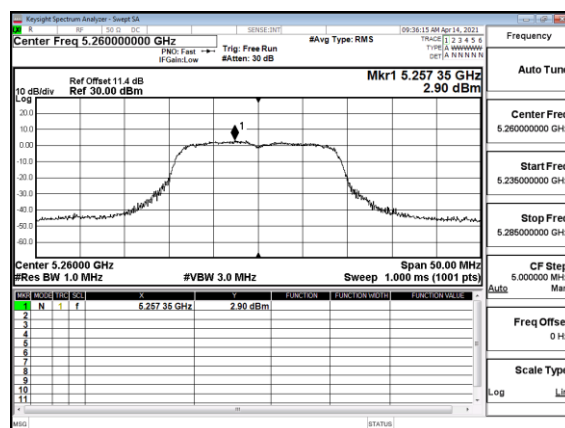
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802.11n_20MHz_Chain0_5180MHz



802.11n_20MHz_Chain0_5260MHz

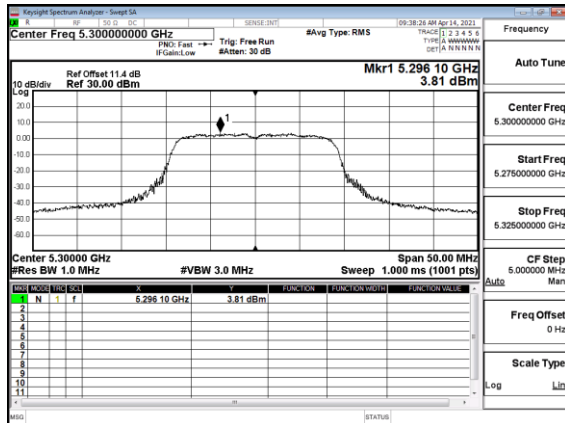


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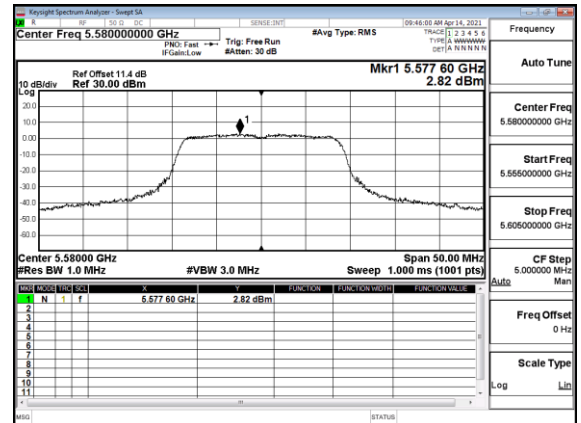
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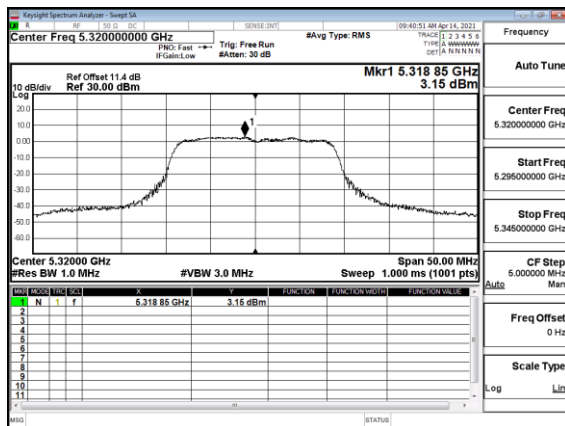
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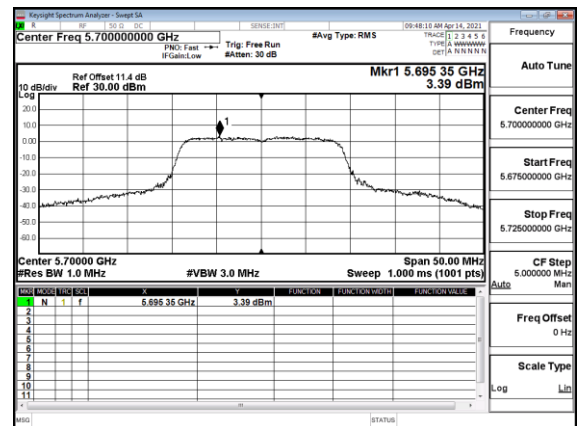
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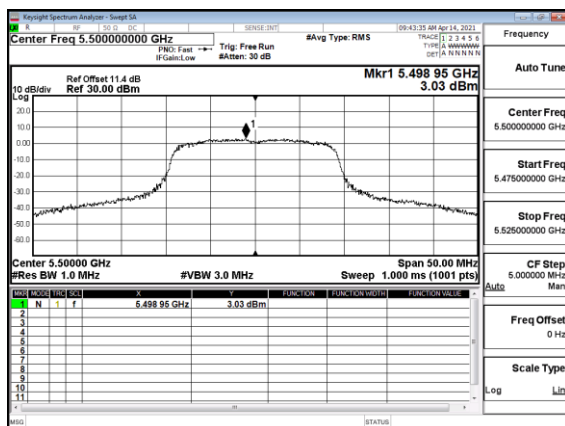
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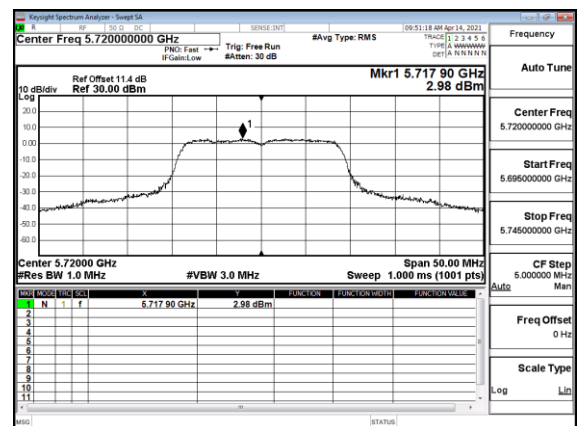
802.11n_20MHz_Chain0_5700MHz



802.11n_20MHz_Chain0_5500MHz



802.11n_20MHz_Chain0_5720MHz_UNII 2C



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