FCC Part 15.407

TEST REPORT

For

Tatung Technology Inc.

10F, No. 288, Sec. 6, Civic Blvd, Xinyi Dist, Taipei City 11087, Taiwan

Report Type	**Original Report**
FCC Identity:	**FCC ID: 2AATB-WAP-3518-01**
Brand Name	TTI
Product Name	**Dual Band Wireless Router**
Model Name	**WAP-3518**
Report Number	**RLK210317001-FRW02**
Report Date	**2021/05/31**
Reviewed By	**Zeus Chen** Zeus Chen
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Revision History

Revision	Report Number	Issue Date	Description
1.0	RLK210317001-FRW02	2021/05/31	Original Report

TABLE OF CONTENTS

1 General Information

1.1 Product Description for Equipment under Test (EUT)

Application	**Tatung Technology Inc.** 10F, No. 288, Sec. 6, Civic Blvd, Xinyi Dist, Taipei City 11087, Taiwan
Manufacturer	**Tatung Technology Inc.** 10F, No. 288, Sec. 6, Civic Blvd, Xinyi Dist, Taipei City 11087, Taiwan
Brand Name	TTI
Product (Equipment)	Dual Band Wireless Router
Model Name	WAP-3518
Frequency Range	UNII-1: 5150 MHz-5250 MHz UNII-3: 5725 MHz-5850 MHz
Number of Channels	**UNII-1:** IEEE 802.11a/n HT20/ac VHT20: 4 Channels IEEE 802.11n HT40/ac VHT40: 2 Channels IEEE 802.11ac VHT80: 1 Channels **UNII-3**: IEEE 802.11a/n HT20/ac VHT20: 5 Channels IEEE 802.11n HT40/ac VHT40: 2 Channels IEEE 802.11ac VHT80: 1 Channels
Output Power	**UNII-1:** IEEE 802.11a: 24.35 dBm (0.2725 W) IEEE 802.11n HT20: 24.18 dBm (0.2618 W) IEEE 802.11n HT40: 21.87 dBm (0.1537 W) IEEE 802.11ac VHT20: 24.22 dBm (0.2642 W) IEEE 802.11ac VHT40: 21.94 dBm (0.1562 W) IEEE 802.11ac VHT80: 14.16 dBm (0.0261 W) **UNII-3**: IEEE 802.11a: 24.67 dBm (0.2929 W) IEEE 802.11n HT20: 24.34 dBm (0.2714 W) IEEE 802.11n HT40: 22.80 dBm (0.1904 W) IEEE 802.11ac VHT20: 24.42 dBm (0.2766 W) IEEE 802.11ac VHT40: 22.92 dBm (0.1957 W) IEEE 802.11ac VHT80: 17.91 dBm (0.0618 W)
Modulation Type	OFDM
Related Submittal(s)/Grant(s)	**FCC Part 15.247 DTS with FCC ID: 2AATB-WAP-3518-01**
Received Date	Mar. 18, 2021
Date of Test	Apr. 09, 2021 - Apr. 22, 2021

Note: All measurement and test data in this report was gathered from production sample serial number: 210317001. Assigned by Bay Area Compliance Laboratories Corp. (Linkou Laboratory)

1.2 Operation Condition of EUT

Power Operation (Voltage Range)	☒ AC 120V/60Hz ☒ Adapter Model: MSA-C1000IC12.0-12W-US I/P: 100-240Vac, 0.5A O/P: 12Vdc, 1A ☐ By Power Cord
	☐ DC Type ☐ DC Power Supply ☐ Battery ☐ External from USB Cable ☐ External DC Adapter (Not For Sale)
	☐ Host System

1.3 Objective and Test Methodology

The Objective of this Test Report was to document the compliance of the Tatung Technology Inc. Appliance (Model(s): WAP-3518,) to the requirements of the following Standards:

-Part 2, Subpart J, Part 15 Subparts A and E of the Federal Communication Commission's rules.

-KDB 662911 D01 Multiple Transmitter Output v02r01

-KDB 789033 D02 General U-NII Test Procedures New Rules v02r01

- ANSI C63.10-2013 of t American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.4 Measurement Uncertainty

Parameter	Expanded Measurement uncertainty
RF output power with Power Meter	± 1.488 dB
Occupied Channel Bandwidth	± 453.927 Hz
RF Conducted test with Spectrum	± 2.77 dB
AC Power Line Conducted Emission	± 2.66 dB
Radiated Below 1G	± 3.57 dB
Radiated Above 1G	± 5.32 dB

The test results with statement of conformity, the decision rules are based on the specifications and standards. The test results will not take the measurement uncertainty into account.

1.5 Environmental Conditions and Test Date

Test Site	Test Date	Temperature (°C)	Relative Humidity (%)	Test Engineer
Conduction (Con-01)	Apr. 09, 2021	22.6	59	Brian Chang
Radiated (966A)	Apr. 19, 2021 – Apr. 22, 2021	17.5-18.7	60-62	Leo Cheng
Conducted (TH-02)	Apr. 15, 2021	22.8	55	Rui Jhan

1.6 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Linkou Laboratory) to collect test data is located on

☒ No.6, Wende 2Rd., Guishan Dist., Taoyuan City 33382, Taiwan (R.O.C.).

Bay Area Compliance Laboratories Corp. (Linkou Laboratory) Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3546) by Mutual Recognition Agreement (MRA). The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database. The FCC Registration No.: 0027578244. Designation No.: TW3546. The Test Firm Registration No.: 181430.

2 System Test Configuration

2.1 Test Channels and Description of Worst Test Configuration

The system was configured for testing in testing mode which was provided by manufacturer. No special accessory, No modification was made to the EUT and No special equipment used during test.

IEEE 802.11 a/n HT20/ac VHT20			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
36	**5180**	**149**	**5745**
40	**5200**	153	5765
44	5220	**157**	**5785**
48	**5240**	161	5805
-	-	**165**	**5825**

For UNII-1: Channel 36, 40 and 48 were tested. For UNII-3: Channel 149, 157 and 165 were tested.

IEEE 802.11 n HT40/ac VHT40			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
38	**5190**	**151**	**5755**
46	**5230**	**159**	**5795**

For UNII-1: Channel 38 and 46 were tested. For UNII-3: Channel 151 and 159 were tested.

IEEE 802.11 ac VHT80			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
42	**5210**	**155**	**5775**

For UNII-1: Channel 42 was tested. For UNII-3: Channel 155 was tested.

Modulation Used for Conformance Test			
Configuration	**N_{TX}**	**Data Rate**	**Worst Data Rate**
IEEE 802.11a	**2**	6-54 Mbps	6 Mbps
IEEE 802.11n HT20	**2**	MCS 0-32	MCS 0
IEEE 802.11n HT40	**2**	MCS 0-32	MCS 0
IEEE 802.11ac VHT20	**2**	MCS 0-15	MCS 0
IEEE 802.11ac VHT40	**2**	MCS 0-15	MCS 0
IEEE 802.11ac VHT80	**2**	MCS 0-15	MCS 0

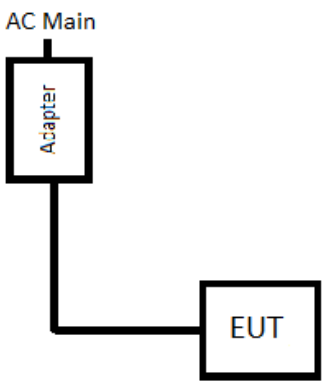
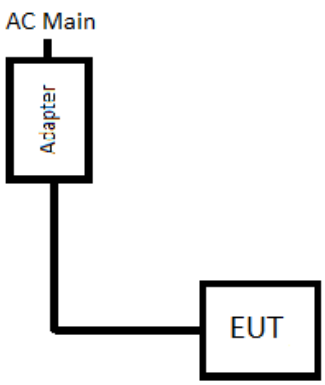
Worst Case of Power Setting					
EUT Exercise Software			RTL819x 3.6		
Configuration	N_{TX}	UNII Band	Low CH	Mid CH	High CH
IEEE 802.11a	2	UNII-1	108	127	127
		UNII-3	127	127	127
IEEE 802.11n HT20	2	UNII-1	104	124	127
		UNII-3	118	127	127
IEEE 802.11n HT40	2	UNII-1	83	-	114
		UNII-3	117	-	117
IEEE 802.11ac VHT20	2	UNII-1	104	124	127
		UNII-3	118	127	127
IEEE 802.11ac VHT40	2	UNII-1	83	-	114
		UNII-3	117	-	117
IEEE 802.11ac VHT80	2	UNII-1	-	80	-
		UNII-3	-	96	-

- The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the power and PSD across all date rates bandwidths, and modulations. Radiated below 1G were tested worst output power mode.
- Due to 802.11n HT20/T40 mode output power are less than 802.11ac VHT20/40. Therefore, 802.11ac VHT20/VHT40 cover 802.11n HT20/40 in the test, Include conducted and radiated, except duty cycle and output power test.

2.2 Support Equipment List and External Cable List

No.	Description	Manufacturer	Model Number	Serial Number
A	Notebook	DELL	Latitude E6410	PP27LA001

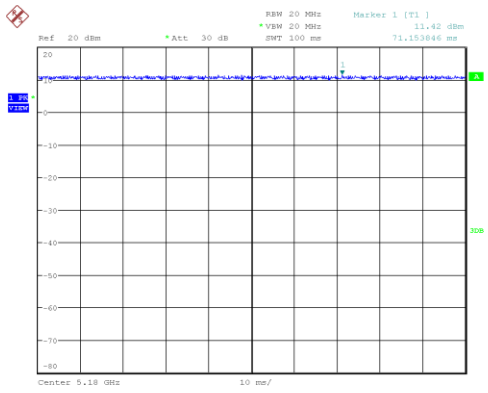
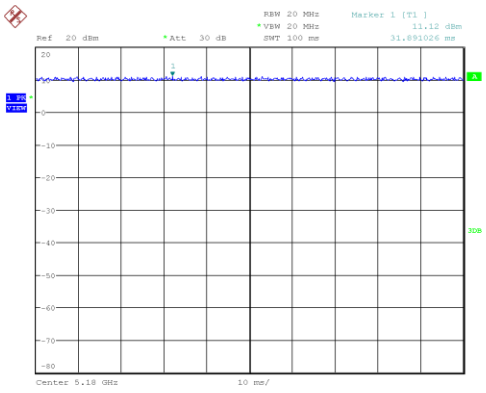
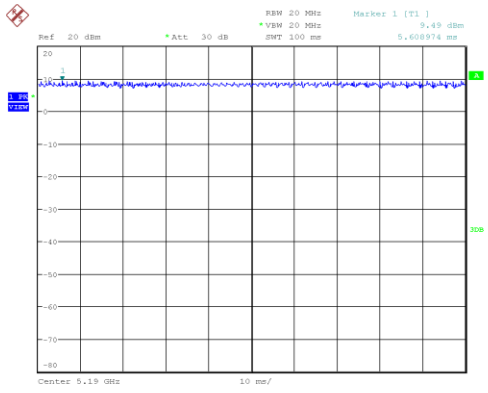
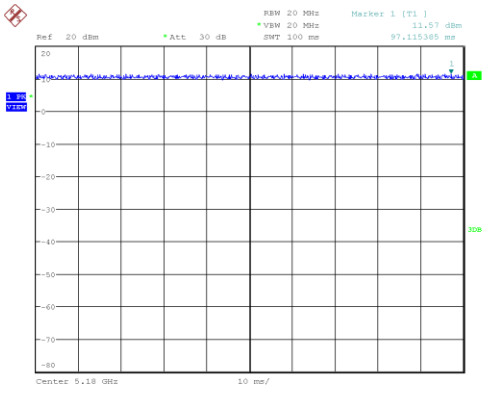
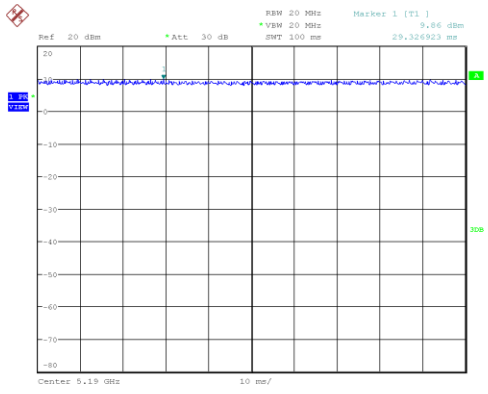
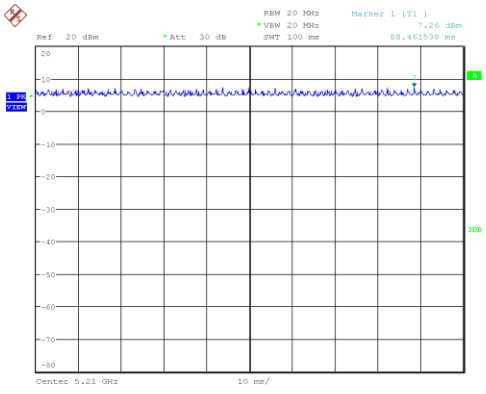
2.3 Block Diagram of Test Setup

Conduction	Radiation
	

2.4 Duty Cycle

All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum power transmission duration, T, are required for each tested mode of operation.

Configuration	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
IEEE 802.11a	100.00	100.00	100.00	0.00
IEEE 802.11n HT20	100.00	100.00	100.00	0.00
IEEE 802.11n HT40	100.00	100.00	100.00	0.00
IEEE 802.11ac VHT20	100.00	100.00	100.00	0.00
IEEE 802.11ac VHT40	100.00	100.00	100.00	0.00
IEEE 802.11ac VHT80	100.00	100.00	100.00	0.00

IEEE 802.11a	IEEE 802.11n HT20
	
IEEE 802.11n HT40	**IEEE 802.11ac VHT20**
	
IEEE 802.11ac VHT40	**IEEE 802.11ac VHT80**
	

*Note: Duty Factor = 10*log (1/Duty cycle)

3 Summary of Test Results

FCC Rules	Description of Test	Result
§1.1310, §2.1091, §15.407 (f)	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a), §15.407(b)(6)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.407(b)	Spurious Emissions	Compliance
§15.407(a)(e)	Emission Bandwidth	Compliance
§15.407(a)(1)	Maximum Peak Output Power	Compliance
§15.407(a)(1)(5)	Power Spectral Density	Compliance

4 FCC§15.407(f), §1.1307, § 2.1091 – Maximum Permissible Exposure (MPE)

4.1 Applicable Standard

According to §15.407(f), U-NII devices are subject to the radio frequency radiation exposure requirements specified in § 1.1307(b), and 2.1091 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary: Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with: $\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$

4.2 RF Exposure Evaluation Result

MPE Evaluation:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Wi-Fi 2.4G	2412-2462	3.20	2.0893	30.00	1000.0000	20	0.4159	1.0
Wi-Fi 5G UNII-1	5150-5250	3.20	2.0893	25.00	316.2278	20	0.1315	1.0
Wi-Fi 5G UNII-3	5745-5850	3.20	2.0893	25.00	316.2278	20	0.1315	1.0

Note: Wi-Fi 2.4G and Wi-Fi 5G can't simultaneously.

Result: MPE evaluation of single transmission meet the requirement of standard.

5 FCC §15.203 - Antenna Requirements

5.1 Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi

5.2 Antenna List and Details

Brand	Model	Antenna Type	Antenna Gain	Note	Result
TTI	WAP-3518	PCB Antenna	3.20 dBi	2.4G Chain 0	Compliance
TTI	WAP-3518	PCB Antenna	3.20 dBi	2.4G Chain 1	Compliance
TTI	WAP-3518	PCB Antenna	3.20 dBi	5G Chain 0	Compliance
TTI	WAP-3518	PCB Antenna	3.20 dBi	5G Chain 1	Compliance

The EUT have internal antennas arrangement and fulfill the requirement of this section.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

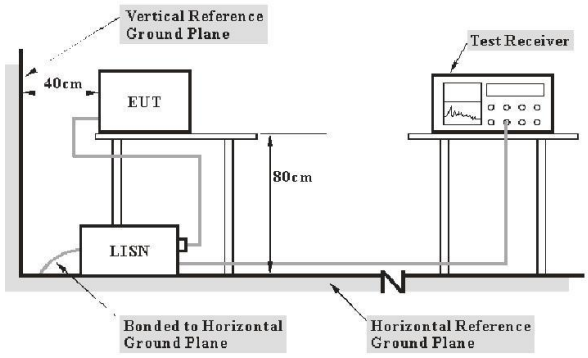
According to FCC §15.207,

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 2
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency. Note 2: A linear average detector is required

6.2 EUT Setup and Test Procedure



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits**.** The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz. During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	Receiver RBW
150 kHz - 30 MHz	9 kHz

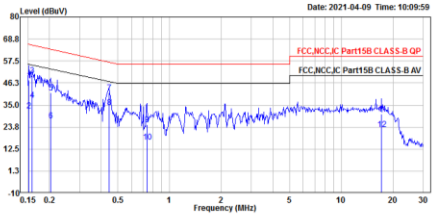
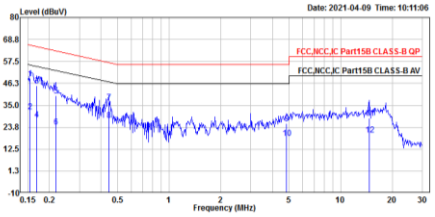
During the conducted emission test, the adapter was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

6.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
AC Line Conduction Room (Con-01)					
Two-Line V-Network	Rohde & Schwarz	ENV216	100010	2020/09/14	2021/09/13
Pulse Limiter	SCHWARZBECK	VSTD 9561-F	00432	2020/09/11	2021/09/10
ESR EMI Test Receiver	Rohde & Schwarz	ESR3	102430	2021/05/05	2022/05/04
RF Cable	EMCI	EMCCFD300-BM-BM-8000	180526	2020/08/18	2021/08/17
Software	Audix	e3 v9	E3LK-03	N.C.R	N.C.R

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

6.4 Test Result

Line	Neutral
	

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.151	27.93	47.79	19.86	65.93	-18.14	QP
2	0.151	12.40	32.26	19.86	55.93	-23.67	Average
3	0.159	30.33	50.19	19.86	65.54	-15.35	QP
4	0.159	17.79	37.65	19.86	55.54	-17.89	Average
5	0.203	21.56	41.43	19.87	63.49	-22.06	QP
6	0.203	7.26	27.13	19.87	53.49	-26.36	Average
7	0.443	21.56	41.44	19.88	57.00	-15.56	QP
8	0.443	13.92	33.80	19.88	47.00	-13.20	Average
9	0.738	4.92	24.83	19.91	56.00	-31.17	QP
10	0.738	-3.82	16.09	19.91	46.00	-29.91	Average
11	17.175	10.15	30.46	20.31	60.00	-29.54	QP
12	17.175	2.36	22.67	20.31	50.00	-27.33	Average

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.154	29.04	48.91	19.87	65.80	-16.89	QP
2	0.154	12.07	31.94	19.87	55.80	-23.86	Average
3	0.169	25.12	44.99	19.87	65.01	-20.02	QP
4	0.169	7.94	27.81	19.87	55.01	-27.20	Average
5	0.218	20.16	40.04	19.88	62.89	-22.85	QP
6	0.218	4.02	23.90	19.88	52.89	-28.99	Average
7	0.443	16.54	36.43	19.89	57.00	-20.57	QP
8	0.443	7.36	27.25	19.89	47.00	-19.75	Average
9	4.839	5.70	25.80	20.10	56.00	-30.20	QP
10	4.839	-1.75	18.35	20.10	46.00	-27.65	Average
11	14.763	8.03	28.38	20.35	60.00	-31.62	QP
12	14.763	-0.53	19.82	20.35	50.00	-30.18	Average

Note:

Level = Read Level + Factor.

Over Limit (Margin) = Level – Limit Line.

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

7 FCC §15.209, §15.205, §15.407(b) – Spurious Emissions

7.1 Applicable Standard

According to FCC §15.407(b),

Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	13.36-13.41	399.9-410	4.5-5.15
0.495-0.505	16.42-16.423	608-614	5.35-5.46
2.1735-2.1905	16.69475-16.69525	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6

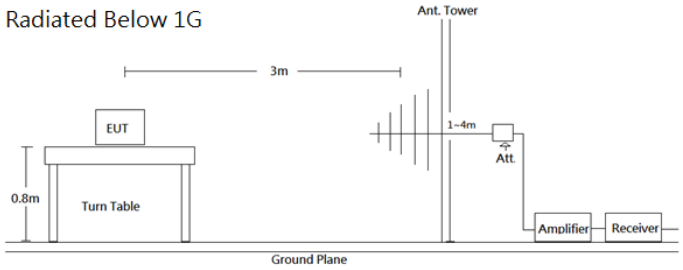
As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

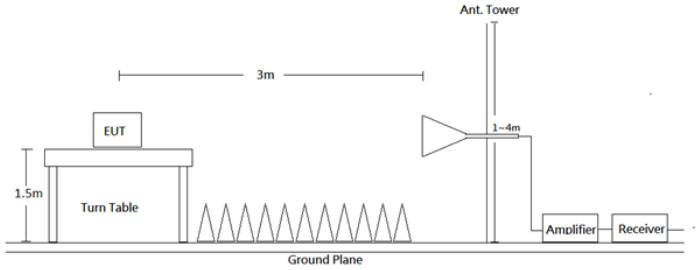
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

7.2 EUT Setup and Test Procedure

Radiated Below 1G



Radiated Above 1G



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Duty cycle	Measurement Detector method
30-1000 MHz	120 kHz	/	-	QP
Above 1 GHz	1 MHz	3 MHz	-	PK
	1 MHz	10 Hz	>98%	PK
	1 MHz	1/T	<98%	PK

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations. All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

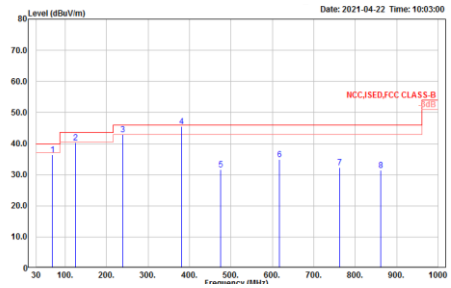
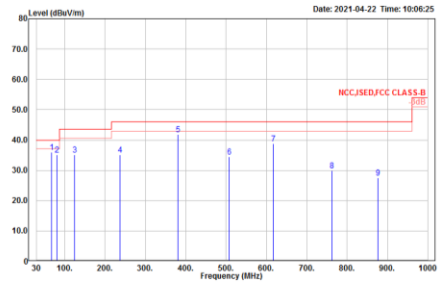
7.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Radiation 3M Room (966A)					
Active Loop	EMCO	6502	0001-3322	2021/03/16	2022/03/15
Bilog Antenna & 6 dB Attenuator	SUNOL SCIENCES & EMCI	JB3 & N-6-06	A111513 & AT-N0668	2021/03/30	2022/03/29
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Horn Antenna	ETS-Lindgren	3115	00109141	2020/07/15	2021/07/14
Horn Antenna	ETS-Lindgren	3160-09	00123852	2020/07/07	2021/07/06
Preamplifier	A.H. Systems	PAM-1840VH	174	2021/03/22	2022/03/21
Preamplifier	A.H. Systems	PAM-0118P	478	2020/05/05	2021/05/04
Microflex Cable (1m)	EMCI	EMC102-KM-KM-1000	180524	2020/08/06	2021/08/05
Microflex Cable (2m)	EMCI	EMC106-SM-SM-2000	180516	2020/08/06	2021/08/05
Microflex Cable (8m)	UTIFLEX	UFA210A-1-3149-300300	MFR 64639 232490-002	2020/08/06	2021/08/05
Turn Table	Chaintek	T-200-S-1	003501	N.C.R	N.C.R
Antenna Tower	Chaintek	MBD-400-1	003504	N.C.R	N.C.R
Controller	Chaintek	3000-1	003507	N.C.R	N.C.R
Software	Audix	e3 v9	E3LK-01	N.C.R	N.C.R
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSU 26	100406	2021/03/10	2022/03/09
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

7.4 Test Result

Below 1G (30 MHz-1 GHz) test the worst power mode. (Pre-scan with three orthogonal axis, and worse case as X axis)

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	68.800	36.38	40.00	-3.62	58.42	-22.04	QP
2	125.060	40.40	43.50	-3.10	57.39	-16.99	Peak
3	238.550	42.87	46.00	-3.13	62.26	-19.39	Peak
4 !	380.170	45.57	46.00	-0.43	61.28	-15.71	QP
5	475.230	31.57	46.00	-14.43	45.21	-13.64	Peak
6	616.850	34.84	46.00	-11.16	46.02	-11.18	Peak
7	762.350	32.31	46.00	-13.69	41.39	-9.08	Peak
8	861.290	31.40	46.00	-14.60	39.19	-7.79	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	67.830	36.00	40.00	-4.00	58.03	-22.03	QP
2	81.410	35.09	40.00	-4.91	57.88	-22.79	QP
3	125.060	35.10	43.50	-8.40	52.09	-16.99	Peak
4	237.580	35.14	46.00	-10.86	54.56	-19.42	Peak
5	380.170	41.83	46.00	-4.17	57.54	-15.71	Peak
6	508.210	34.37	46.00	-11.63	47.38	-13.01	Peak
7	616.850	38.91	46.00	-7.09	50.09	-11.18	Peak
8	762.350	29.86	46.00	-16.14	38.94	-9.08	Peak
9	875.840	27.44	46.00	-18.56	35.11	-7.67	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don’t need get average result.

Above 1G (1 GHz-40 GHz)

UNII-1:

IEEE 802.11a Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.850	53.54	54.00	-0.46	51.54	2.00	Average
5148.850	71.13	74.00	-2.87	69.13	2.00	Peak
5185.750	106.27			104.32	1.95	Average
5185.750	116.57			114.62	1.95	Peak
10360.000	53.32	68.20	-14.88	42.87	10.45	Peak
15540.000	40.13	54.00	-13.87	27.35	12.78	Average
15540.000	56.04	74.00	-17.96	43.26	12.78	Peak

IEEE 802.11a Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.700	49.48	54.00	-4.52	47.48	2.00	Average
5148.700	65.80	74.00	-8.20	63.80	2.00	Peak
5178.100	98.27			96.31	1.96	Average
5178.100	107.96			106.00	1.96	Peak
10360.000	53.19	68.20	-15.01	42.74	10.45	Peak
15540.000	41.08	54.00	-12.92	28.30	12.78	Average
15540.000	55.56	74.00	-18.44	42.78	12.78	Peak

IEEE 802.11a Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.800	52.20	54.00	-1.80	50.20	2.00	Average
5148.800	68.39	74.00	-5.61	66.39	2.00	Peak
5202.800	109.28			107.35	1.93	Average
5202.800	118.69			116.76	1.93	Peak
5447.200	49.07	54.00	-4.93	46.68	2.39	Average
5447.200	62.75	74.00	-11.25	60.36	2.39	Peak
10400.000	55.77	68.20	-12.43	45.10	10.67	Peak
15600.000	43.43	54.00	-10.57	30.48	12.95	Average
15600.000	56.39	74.00	-17.61	43.44	12.95	Peak

IEEE 802.11a Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5145.600	49.64	54.00	-4.36	47.63	2.01	Average
5145.600	63.83	74.00	-10.17	61.82	2.01	Peak
5205.600	101.82			99.88	1.94	Average
5205.600	111.39			109.45	1.94	Peak
5354.400	48.39	54.00	-5.61	46.21	2.18	Average
5354.400	62.27	74.00	-11.73	60.09	2.18	Peak
10400.000	55.43	68.20	-12.77	44.76	10.67	Peak
15600.000	42.88	54.00	-11.12	29.93	12.95	Average
15600.000	57.70	74.00	-16.30	44.75	12.95	Peak

IEEE 802.11a High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5142.400	48.54	54.00	-5.46	46.53	2.01	Average
5142.400	62.26	74.00	-11.74	60.25	2.01	Peak
5238.400	109.01			107.03	1.98	Average
5238.400	118.51			116.53	1.98	Peak
5447.600	48.69	54.00	-5.31	46.30	2.39	Average
5447.600	63.52	74.00	-10.48	61.13	2.39	Peak
10480.000	56.13	68.20	-12.07	45.33	10.80	Peak
15720.000	45.29	54.00	-8.71	32.43	12.86	Average
15720.000	56.29	74.00	-17.71	43.43	12.86	Peak

IEEE 802.11a High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5117.600	48.09	54.00	-5.91	46.09	2.00	Average
5117.600	62.18	74.00	-11.82	60.18	2.00	Peak
5238.000	100.47			98.49	1.98	Average
5238.000	110.28			108.30	1.98	Peak
5446.800	48.83	54.00	-5.17	46.44	2.39	Average
5446.800	63.02	74.00	-10.98	60.63	2.39	Peak
10480.000	54.80	68.20	-13.40	44.00	10.80	Peak
15720.000	44.27	54.00	-9.73	31.41	12.86	Average
15720.000	58.96	74.00	-15.04	46.10	12.86	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don’t need get average result.

IEEE 802.11ac VHT20 Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5146.450	53.46	54.00	-0.54	51.46	2.00	Average
5146.450	69.20	74.00	-4.80	67.20	2.00	Peak
5175.250	105.45			103.49	1.96	Average
5175.250	115.07			113.11	1.96	Peak
10360.000	52.35	68.20	-15.85	41.90	10.45	Peak
15540.000	40.13	54.00	-13.87	27.35	12.78	Average
15540.000	55.60	74.00	-18.40	42.82	12.78	Peak

IEEE 802.11ac VHT20 Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5145.850	49.92	54.00	-4.08	47.92	2.00	Average
5145.850	64.80	74.00	-9.20	62.80	2.00	Peak
5175.100	96.85			94.89	1.96	Average
5175.100	106.59			104.63	1.96	Peak
10360.000	52.36	68.20	-15.84	41.91	10.45	Peak
15540.000	40.43	54.00	-13.57	27.65	12.78	Average
15540.000	56.29	74.00	-17.71	43.51	12.78	Peak

IEEE 802.11ac VHT20 Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.800	53.44	54.00	-0.56	51.44	2.00	Average
5148.800	69.97	74.00	-4.03	67.97	2.00	Peak
5195.600	108.23			106.29	1.94	Average
5195.600	117.68			115.74	1.94	Peak
5392.000	49.24	54.00	-4.76	46.95	2.29	Average
5392.000	62.91	74.00	-11.09	60.62	2.29	Peak
10400.000	53.89	68.20	-14.31	43.22	10.67	Peak
15600.000	43.32	54.00	-10.68	30.37	12.95	Average
15600.000	58.17	74.00	-15.83	45.22	12.95	Peak

IEEE 802.11ac VHT20 Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.400	50.50	54.00	-3.50	48.50	2.00	Average
5148.400	67.46	74.00	-6.54	65.46	2.00	Peak
5198.800	100.92			98.98	1.94	Average
5198.800	110.27			108.33	1.94	Peak
5432.800	49.32	54.00	-4.68	46.95	2.37	Average
5432.800	63.01	74.00	-10.99	60.64	2.37	Peak
10400.000	57.31	68.20	-10.89	46.64	10.67	Peak
15600.000	42.93	54.00	-11.07	29.98	12.95	Average
15600.000	58.73	74.00	-15.27	45.78	12.95	Peak

IEEE 802.11ac VHT20 High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5138.000	48.85	54.00	-5.15	46.85	2.00	Average
5138.000	62.32	74.00	-11.68	60.32	2.00	Peak
5235.200	108.18			106.22	1.96	Average
5235.200	117.67			115.71	1.96	Peak
5373.200	49.33	54.00	-4.67	47.09	2.24	Average
5373.200	63.29	74.00	-10.71	61.05	2.24	Peak
10480.000	54.25	68.20	-13.95	43.45	10.80	Peak
15720.000	44.61	54.00	-9.39	31.75	12.86	Average
15720.000	59.09	74.00	-14.91	46.23	12.86	Peak

IEEE 802.11ac VHT20 High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5126.400	48.64	54.00	-5.36	46.64	2.00	Average
5126.400	61.62	74.00	-12.38	59.62	2.00	Peak
5235.200	100.57			98.61	1.96	Average
5235.200	109.88			107.92	1.96	Peak
5422.400	49.20	54.00	-4.80	46.85	2.35	Average
5422.400	62.96	74.00	-11.04	60.61	2.35	Peak
10480.000	53.89	68.20	-14.31	43.09	10.80	Peak
15720.000	44.54	54.00	-9.46	31.68	12.86	Average
15720.000	59.99	74.00	-14.01	47.13	12.86	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don't need get average result.

IEEE 802.11ac VHT40 Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5149.840	53.44	54.00	-0.56	51.44	2.00	Average
5149.840	69.18	74.00	-4.82	67.18	2.00	Peak
5182.320	99.16			97.20	1.96	Average
5182.320	108.76			106.80	1.96	Peak
10399.000	51.51	68.20	-16.69	40.84	10.67	Peak
15570.000	43.28	54.00	-10.72	30.44	12.84	Average
15570.000	57.22	74.00	-16.78	44.38	12.84	Peak

IEEE 802.11ac VHT40 Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5134.320	48.96	54.00	-5.04	46.97	1.99	Average
5134.320	62.81	74.00	-11.19	60.82	1.99	Peak
5182.320	90.76			88.80	1.96	Average
5182.320	100.20			98.24	1.96	Peak
10380.000	51.31	68.20	-16.89	40.75	10.56	Peak
15570.000	43.08	54.00	-10.92	30.24	12.84	Average
15570.000	56.84	74.00	-17.16	44.00	12.84	Peak

IEEE 802.11ac VHT40 High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.000	53.64	54.00	-0.36	51.64	2.00	Average
5148.000	69.99	74.00	-4.01	67.99	2.00	Peak
5222.400	105.17			103.21	1.96	Average
5222.400	115.04			113.08	1.96	Peak
5366.000	49.20	54.00	-4.80	46.98	2.22	Average
5366.000	63.15	74.00	-10.85	60.93	2.22	Peak
10477.000	52.19	68.20	-16.01	41.37	10.82	Peak
15690.000	44.39	54.00	-9.61	31.70	12.69	Average
15690.000	58.96	74.00	-15.04	46.27	12.69	Peak

IEEE 802.11ac VHT40 High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5086.400	49.33	54.00	-4.67	47.37	1.96	Average
5086.400	62.53	74.00	-11.47	60.57	1.96	Peak
5222.400	96.40			94.44	1.96	Average
5222.400	106.12			104.16	1.96	Peak
5401.200	48.96	54.00	-5.04	46.65	2.31	Average
5401.200	62.81	74.00	-11.19	60.50	2.31	Peak
10480.000	52.76	68.20	-15.44	41.96	10.80	Peak
15690.000	44.32	54.00	-9.68	31.63	12.69	Average
15690.000	59.19	74.00	-14.81	46.50	12.69	Peak

IEEE 802.11ac VHT80 Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5149.400	53.53	54.00	-0.47	51.53	2.00	Average
5149.400	66.90	74.00	-7.10	64.90	2.00	Peak
5189.800	94.77			92.82	1.95	Average
5189.800	105.31			103.36	1.95	Peak
10438.000	51.58	68.20	-16.62	40.73	10.85	Peak
15630.000	43.78	54.00	-10.22	30.85	12.93	Average
15630.000	57.94	74.00	-16.06	45.01	12.93	Peak

IEEE 802.11ac VHT80 Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5144.200	48.92	54.00	-5.08	46.91	2.01	Average
5144.200	61.96	74.00	-12.04	59.95	2.01	Peak
5189.800	86.10			84.15	1.95	Average
5189.800	96.67			94.72	1.95	Peak
10420.000	52.29	68.20	-15.91	41.53	10.76	Peak
15630.000	44.39	54.00	-9.61	31.46	12.93	Average
15630.000	58.55	74.00	-15.45	45.62	12.93	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don’t need get average result.

UNII-3:

IEEE 802.11a Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5641.680	64.87	68.20	-3.33	62.01	2.86	Peak
5697.480	75.68	103.34	-27.66	72.62	3.06	Peak
5718.720	86.61	110.44	-23.83	83.52	3.09	Peak
5747.880	117.08			113.95	3.13	Peak
5874.960	65.41	105.21	-39.80	61.93	3.48	Peak
5918.520	65.53	72.98	-7.45	61.94	3.59	Peak
5935.800	64.82	68.20	-3.38	61.21	3.61	Peak
11490.000	43.63	54.00	-10.37	31.10	12.53	Average
11490.000	56.13	74.00	-17.87	43.60	12.53	Peak
17235.000	65.32	68.20	-2.88	48.82	16.50	Peak

IEEE 802.11a Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5626.920	63.43	68.20	-4.77	60.62	2.81	Peak
5696.400	70.55	102.55	-32.00	67.50	3.05	Peak
5716.560	79.51	109.84	-30.33	76.42	3.09	Peak
5747.160	110.61			107.48	3.13	Peak
5868.480	65.13	107.02	-41.89	61.67	3.46	Peak
5885.760	65.26	97.21	-31.95	61.76	3.50	Peak
5959.920	65.32	68.20	-2.88	61.66	3.66	Peak
11490.000	46.28	54.00	-7.72	33.75	12.53	Average
11490.000	59.01	74.00	-14.99	46.48	12.53	Peak
17235.000	67.75	68.20	-0.45	51.25	16.50	Peak

IEEE 802.11a Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5639.880	63.91	68.20	-4.29	61.06	2.85	Peak
5698.920	65.79	104.40	-38.61	62.72	3.07	Peak
5719.800	70.05	110.74	-40.69	66.95	3.10	Peak
5779.920	115.52			112.25	3.27	Peak
5861.640	66.30	108.94	-42.64	62.86	3.44	Peak
5894.040	64.94	91.07	-26.13	61.40	3.54	Peak
5945.520	64.82	68.20	-3.38	61.19	3.63	Peak
11570.000	43.10	54.00	-10.90	30.40	12.70	Average
11570.000	57.51	74.00	-16.49	44.81	12.70	Peak
17355.000	66.79	68.20	-1.41	50.53	16.26	Peak

IEEE 802.11a Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5648.520	62.88	68.20	-5.32	60.00	2.88	Peak
5694.600	63.81	101.22	-37.41	60.77	3.04	Peak
5718.000	65.62	110.24	-44.62	62.53	3.09	Peak
5789.280	111.07			107.76	3.31	Peak
5875.320	65.03	104.96	-39.93	61.55	3.48	Peak
5910.240	64.71	79.09	-14.38	61.15	3.56	Peak
5927.520	64.65	68.20	-3.55	61.05	3.60	Peak
11570.000	46.54	54.00	-7.46	33.84	12.70	Average
11570.000	59.85	74.00	-14.15	47.15	12.70	Peak
17355.000	67.94	68.20	-0.26	51.68	16.26	Peak

IEEE 802.11a High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5642.040	62.94	68.20	-5.26	60.08	2.86	Peak
5657.520	63.54	73.79	-10.25	60.63	2.91	Peak
5719.440	63.69	110.64	-46.95	60.60	3.09	Peak
5819.880	116.08			112.71	3.37	Peak
5855.160	85.06	110.76	-25.70	81.64	3.42	Peak
5879.640	71.43	101.75	-30.32	67.94	3.49	Peak
5962.080	65.11	68.20	-3.09	61.44	3.67	Peak
11650.000	43.05	54.00	-10.95	29.81	13.24	Average
11650.000	56.94	74.00	-17.06	43.70	13.24	Peak
17475.000	66.17	68.20	-2.03	49.76	16.41	Peak

IEEE 802.11a High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5642.400	62.94	68.20	-5.26	60.08	2.86	Peak
5684.880	62.83	94.05	-31.22	59.81	3.02	Peak
5710.080	63.72	108.02	-44.30	60.64	3.08	Peak
5828.880	110.60			107.22	3.38	Peak
5854.800	80.62	111.26	-30.64	77.20	3.42	Peak
5879.640	69.10	101.75	-32.65	65.61	3.49	Peak
5962.440	65.89	68.20	-2.31	62.22	3.67	Peak
11650.000	45.35	54.00	-8.65	32.11	13.24	Average
11650.000	57.45	74.00	-16.55	44.21	13.24	Peak
17475.000	67.96	68.20	-0.24	51.55	16.41	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don’t need get average result.

IEEE 802.11ac VHT20 Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5648.880	65.65	68.20	-2.55	62.77	2.88	Peak
5697.480	79.45	103.34	-23.89	76.39	3.06	Peak
5718.720	89.56	110.44	-20.88	86.47	3.09	Peak
5743.920	116.20			113.08	3.12	Peak
5863.800	65.23	108.33	-43.10	61.78	3.45	Peak
5892.960	64.85	91.87	-27.02	61.31	3.54	Peak
5968.560	65.50	68.20	-2.70	61.83	3.67	Peak
11490.000	41.87	54.00	-12.13	29.34	12.53	Average
11490.000	55.43	74.00	-18.57	42.90	12.53	Peak
17235.000	64.48	68.20	-3.72	47.98	16.50	Peak

IEEE 802.11ac VHT20 Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5626.560	62.98	68.20	-5.22	60.18	2.80	Peak
5697.840	73.65	103.61	-29.96	70.59	3.06	Peak
5718.360	80.61	110.34	-29.73	77.52	3.09	Peak
5740.320	109.52			106.39	3.13	Peak
5869.560	64.71	106.72	-42.01	61.25	3.46	Peak
5921.760	65.04	70.59	-5.55	61.45	3.59	Peak
5948.760	64.46	68.20	-3.74	60.82	3.64	Peak
11490.000	43.94	54.00	-10.06	31.41	12.53	Average
11490.000	57.98	74.00	-16.02	45.45	12.53	Peak
17235.000	67.94	68.20	-0.26	51.44	16.50	Peak

IEEE 802.11ac VHT20 Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5643.120	64.70	68.20	-3.50	61.84	2.86	Peak
5697.480	73.20	103.34	-30.14	70.14	3.06	Peak
5713.320	77.65	108.93	-31.28	74.56	3.09	Peak
5786.400	116.83			113.53	3.30	Peak
5855.520	75.36	110.65	-35.29	71.94	3.42	Peak
5882.880	68.63	99.35	-30.72	65.13	3.50	Peak
5950.920	65.34	68.20	-2.86	61.70	3.64	Peak
11570.000	43.21	54.00	-10.79	30.51	12.70	Average
11570.000	56.81	74.00	-17.19	44.11	12.70	Peak
17355.000	65.58	68.20	-2.62	49.32	16.26	Peak

IEEE 802.11ac VHT20 Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5631.240	63.12	68.20	-5.08	60.30	2.82	Peak
5697.480	67.38	103.34	-35.96	64.32	3.06	Peak
5719.440	70.06	110.64	-40.58	66.97	3.09	Peak
5783.520	110.50			107.21	3.29	Peak
5855.880	71.35	110.55	-39.20	67.93	3.42	Peak
5903.760	65.16	83.88	-18.72	61.60	3.56	Peak
5964.600	65.30	68.20	-2.90	61.63	3.67	Peak
11570.000	45.90	54.00	-8.10	33.20	12.70	Average
11570.000	59.69	74.00	-14.31	46.99	12.70	Peak
17355.000	68.11	68.20	-0.09	51.85	16.26	Peak

IEEE 802.11ac VHT20 High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5640.600	63.29	68.20	-4.91	60.44	2.85	Peak
5697.120	65.97	103.08	-37.11	62.91	3.06	Peak
5718.000	67.49	110.24	-42.75	64.40	3.09	Peak
5823.840	116.08			112.69	3.39	Peak
5858.760	91.28	109.75	-18.47	87.85	3.43	Peak
5878.560	79.72	102.56	-22.84	76.23	3.49	Peak
5926.080	65.92	68.20	-2.28	62.33	3.59	Peak
11650.000	43.45	54.00	-10.55	30.21	13.24	Average
11650.000	57.21	74.00	-16.79	43.97	13.24	Peak
17475.000	65.06	68.20	-3.14	48.65	16.41	Peak

IEEE 802.11ac VHT20 High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5622.240	63.48	68.20	-4.72	60.70	2.78	Peak
5656.800	64.41	73.25	-8.84	61.50	2.91	Peak
5713.680	64.50	109.03	-44.53	61.41	3.09	Peak
5826.720	110.10			106.72	3.38	Peak
5855.520	85.01	110.65	-25.64	81.59	3.42	Peak
5879.640	73.52	101.75	-28.23	70.03	3.49	Peak
5960.640	64.97	68.20	-3.23	61.31	3.66	Peak
11650.000	45.01	54.00	-8.99	31.77	13.24	Average
11650.000	57.39	74.00	-16.61	44.15	13.24	Peak
17475.000	68.18	68.20	-0.02	51.77	16.41	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don’t need get average result.

IEEE 802.11ac VHT40 Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5646.000	67.32	68.20	-0.88	64.46	2.86	Peak
5698.200	79.89	103.87	-23.98	76.83	3.06	Peak
5716.560	89.30	109.84	-20.54	86.21	3.09	Peak
5747.520	107.82			104.69	3.13	Peak
5860.920	68.41	109.14	-40.73	64.98	3.43	Peak
5881.080	66.71	100.68	-33.97	63.21	3.50	Peak
5933.640	64.82	68.20	-3.38	61.21	3.61	Peak
11510.000	41.56	54.00	-12.44	28.98	12.58	Average
11510.000	54.28	74.00	-19.72	41.70	12.58	Peak
17265.000	60.76	68.20	-7.44	43.98	16.78	Peak

IEEE 802.11ac VHT40 Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5636.640	65.12	68.20	-3.08	62.29	2.83	Peak
5698.560	71.56	104.14	-32.58	68.49	3.07	Peak
5719.080	82.40	110.54	-28.14	79.31	3.09	Peak
5759.400	102.94			99.76	3.18	Peak
5860.560	65.95	109.24	-43.29	62.52	3.43	Peak
5886.480	65.32	96.68	-31.36	61.81	3.51	Peak
5938.320	65.15	68.20	-3.05	61.54	3.61	Peak
11510.000	43.98	54.00	-10.02	31.40	12.58	Average
11510.000	54.84	74.00	-19.16	42.26	12.58	Peak
17265.000	61.34	68.20	-6.86	44.56	16.78	Peak

IEEE 802.11ac VHT40 High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5639.880	67.03	68.20	-1.17	64.18	2.85	Peak
5695.320	75.73	101.75	-26.02	72.68	3.05	Peak
5719.440	81.36	110.64	-29.28	78.27	3.09	Peak
5787.480	113.54			110.24	3.30	Peak
5858.760	83.28	109.75	-26.47	79.85	3.43	Peak
5880.000	76.60	101.49	-24.89	73.10	3.50	Peak
5928.600	67.26	68.20	-0.94	63.66	3.60	Peak
11590.000	42.19	54.00	-11.81	29.45	12.74	Average
11590.000	52.74	74.00	-21.26	40.00	12.74	Peak
17385.000	58.97	68.20	-9.23	42.71	16.26	Peak

IEEE 802.11ac VHT40 High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5618.640	63.63	68.20	-4.57	60.86	2.77	Peak
5694.600	67.72	101.22	-33.50	64.68	3.04	Peak
5713.680	71.88	109.03	-37.15	68.79	3.09	Peak
5801.880	107.12			103.76	3.36	Peak
5859.120	75.88	109.64	-33.76	72.45	3.43	Peak
5878.920	70.18	102.29	-32.11	66.69	3.49	Peak
5940.120	65.33	68.20	-2.87	61.71	3.62	Peak
11590.000	43.59	54.00	-10.41	30.85	12.74	Average
11590.000	54.14	74.00	-19.86	41.40	12.74	Peak
17385.000	59.94	68.20	-8.26	43.68	16.26	Peak

IEEE 802.11ac VHT80 Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5648.880	66.52	68.20	-1.68	63.64	2.88	Peak
5695.320	80.14	101.75	-21.61	77.09	3.05	Peak
5706.840	83.12	107.12	-24.00	80.04	3.08	Peak
5754.720	107.60			104.43	3.17	Peak
5856.600	78.38	110.35	-31.97	74.96	3.42	Peak
5878.920	69.17	102.29	-33.12	65.68	3.49	Peak
5930.400	64.88	68.20	-3.32	61.27	3.61	Peak
11550.000	39.97	54.00	-14.03	27.31	12.66	Average
11550.000	52.22	74.00	-21.78	39.56	12.66	Peak
17355.000	57.24	68.20	-10.96	40.98	16.26	Peak

IEEE 802.11ac VHT80 Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5630.880	62.94	68.20	-5.26	60.12	2.82	Peak
5695.680	69.26	102.02	-32.76	66.21	3.05	Peak
5718.360	74.09	110.34	-36.25	71.00	3.09	Peak
5797.920	100.89			97.54	3.35	Peak
5856.600	74.43	110.35	-35.92	71.01	3.42	Peak
5886.120	66.08	96.94	-30.86	62.57	3.51	Peak
5938.320	65.03	68.20	-3.17	61.42	3.61	Peak
11550.000	43.18	54.00	-10.82	30.52	12.66	Average
11550.000	53.66	74.00	-20.34	41.00	12.66	Peak
17325.000	57.57	68.20	-10.63	40.84	16.73	Peak

Note:

Result = Reading + Correct Factor.

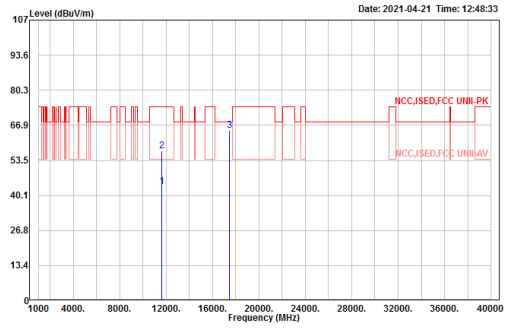
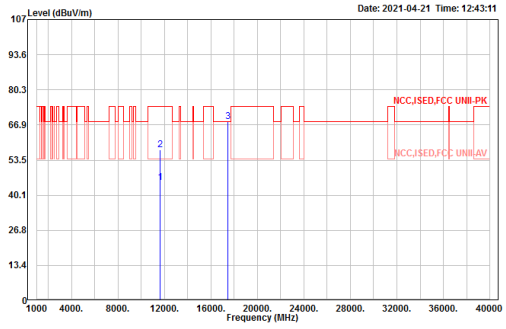
Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don’t need get average result.

Above 1G (1 GHz-40 GHz): The worst mode is 802.11ac VHT20 High CH.

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	!11650.000	43.45	54.00	-10.55	30.21	13.24	Average
2	!11650.000	57.21	74.00	-16.79	43.97	13.24	Peak
3	!17475.000	65.06	68.20	-3.14	48.65	16.41	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	!11650.000	45.01	54.00	-8.99	31.77	13.24	Average
2	!11650.000	57.39	74.00	-16.61	44.15	13.24	Peak
3	!17475.000	68.18	68.20	-0.02	51.77	16.41	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Non-Restricted bands signal was less than fundamental 20 dB or more, that don’t need get average result.

8 FCC §15.407(a) and §15.407(e) –Emission Bandwidth

8.1 Applicable Standard

According to FCC §15.407(a),

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

According to FCC §15.407(e),

For equipment operating in the band 5725 – 5850 MHz, the minimum 6 dB bandwidth of U-NII devices shall be 500 kHz.

8.2 Test Procedure

a) Set RBW = approximately 1% of the emission bandwidth; b) Set the VBW > RBW; c) Detector = Peak;

d) Trace mode = max hold; e) Measure the maximum width of the emission that is n dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%;

8.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSU 26	100406	2021/03/10	2022/03/09
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

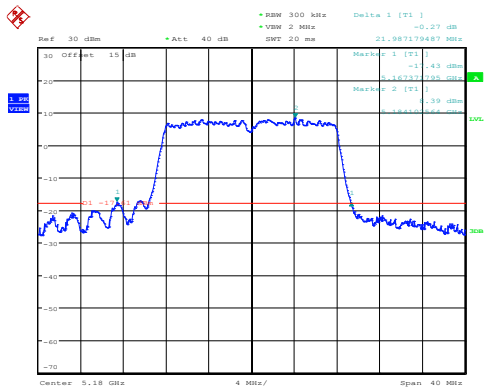
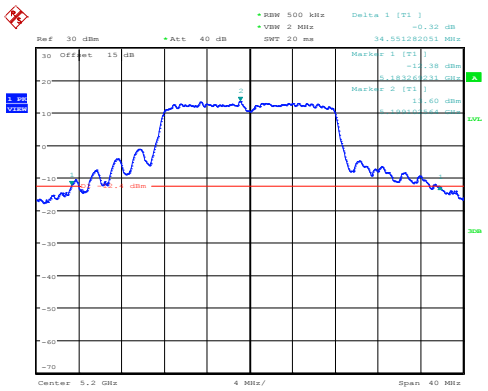
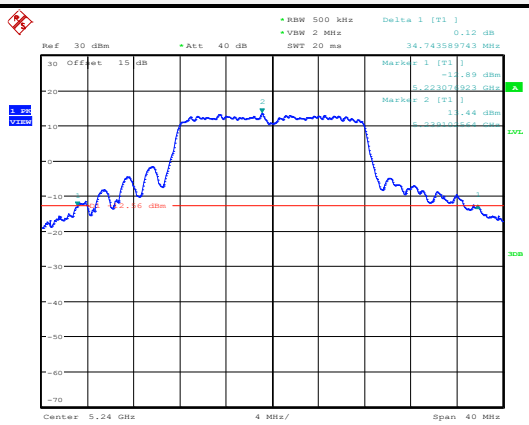
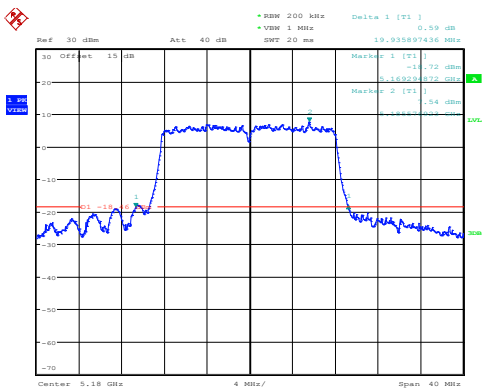
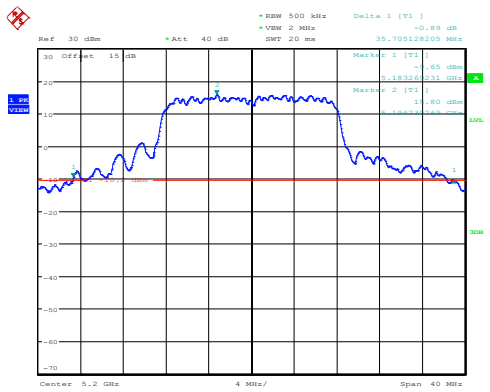
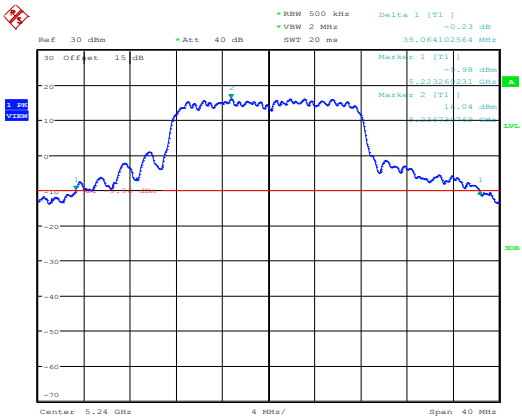
8.4 Test Results

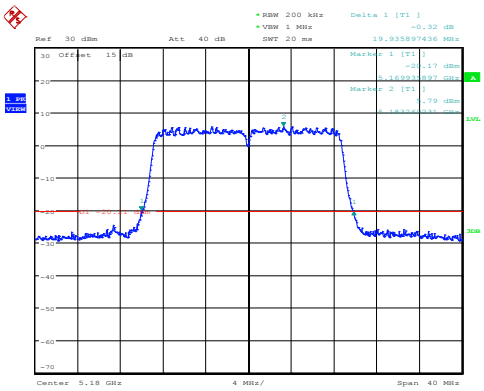
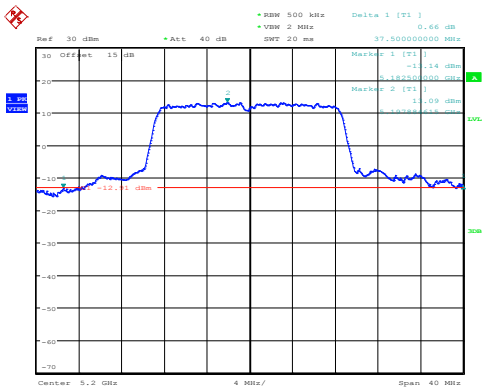
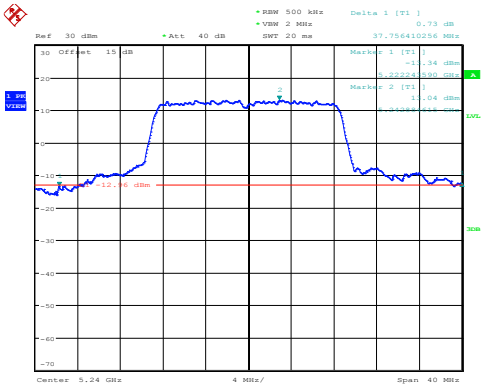
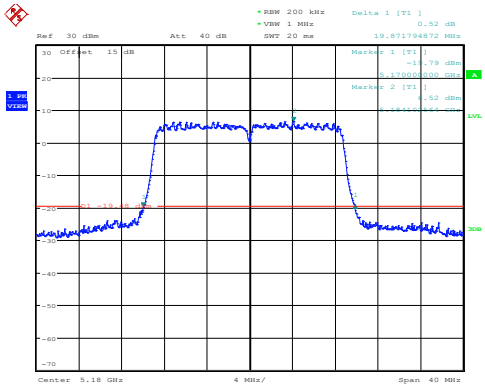
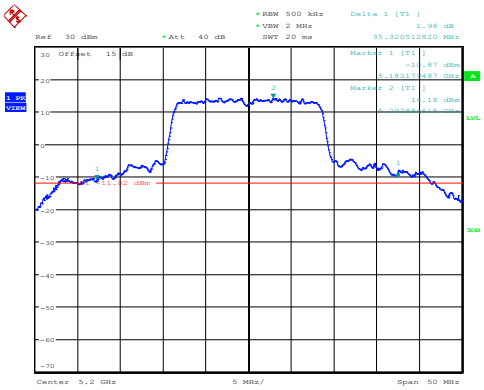
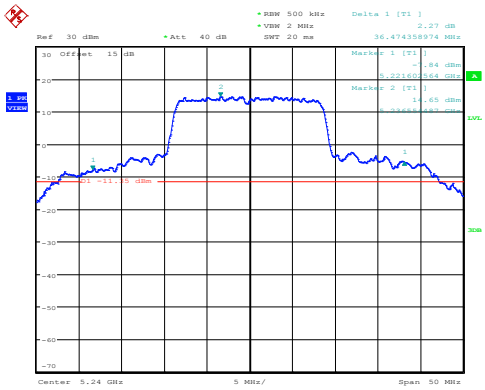
Band	Configuration	Channel	Frequency (MHz)	99% Occupied BW (MHz)		26dB Emission Bandwidth (MHz)	
				Chain0	Chain1	Chain0	Chain1
UNII-1	802.11a	36	5180	16.47	16.47	21.99	19.94
		40	5200	16.86	17.56	34.55	35.71
		48	5240	16.79	17.76	34.74	35.06
	802.11ac VHT20	36	5180	17.63	17.63	19.94	19.87
		40	5200	17.69	17.88	37.50	35.32
		48	5240	17.69	18.46	37.76	36.47
	802.11ac VHT40	38	5190	36.28	36.28	42.31	42.18
		46	5230	36.41	36.41	50.38	70.64
	802.11ac VHT80	42	5210	75.38	75.64	82.56	82.82

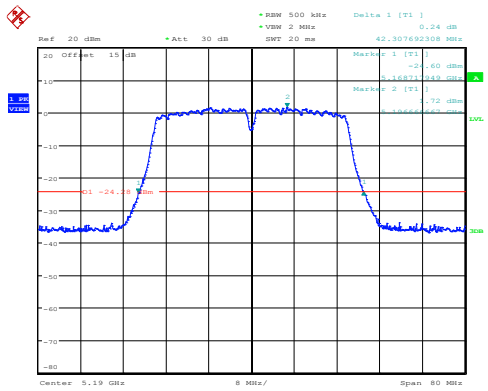
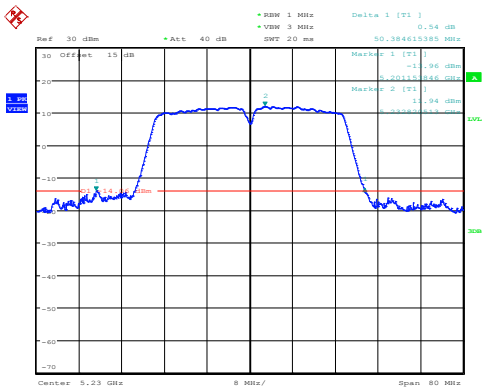
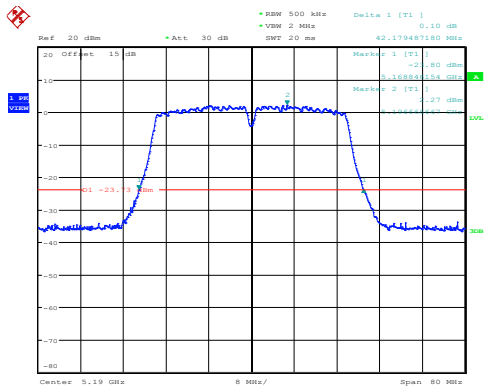
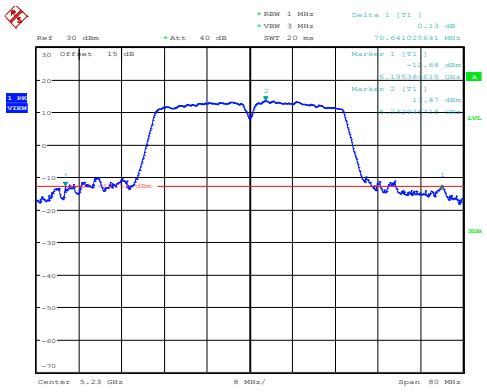
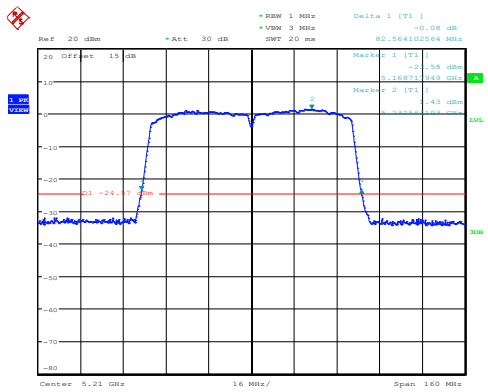
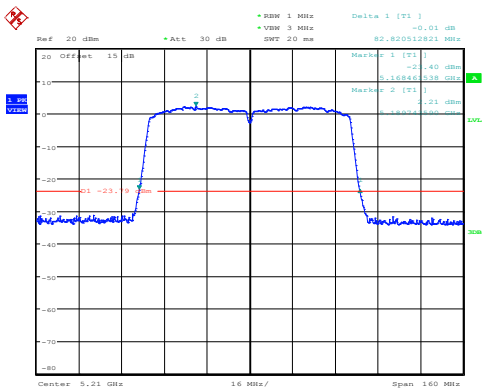
Band	Configuration	Channel	Frequency (MHz)	99% Occupied BW (MHz)		6dB Emission Bandwidth (MHz)	
				Chain0	Chain1	Chain0	Chain1
UNII-1	802.11a	149	5745	17.18	18.33	16.41	16.41
		157	5785	17.24	18.46	16.47	16.47
		165	5825	17.37	18.72	16.47	16.47
	802.11ac VHT20	149	5745	17.69	17.82	17.69	17.69
		157	5785	18.14	20.71	17.76	17.76
		165	5825	18.21	21.41	17.76	17.76
	802.11ac VHT40	151	5755	36.67	37.05	36.41	36.41
		159	5795	36.54	37.05	36.41	36.41
	802.11ac VHT80	155	5775	75.13	75.38	76.41	76.41

Note: Limit is 500 kHz or more.

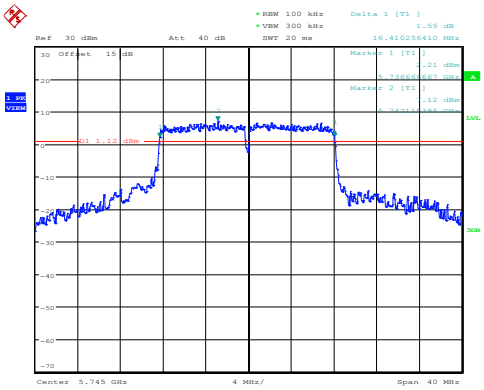
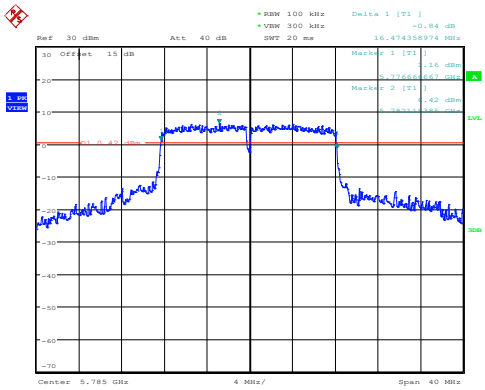
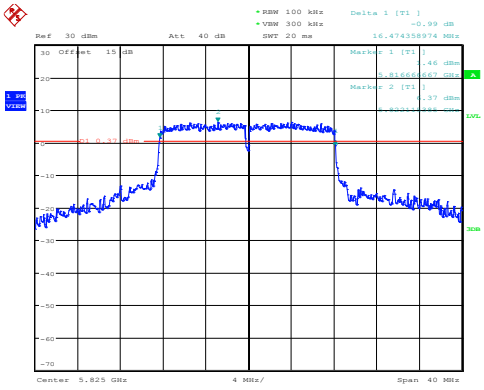
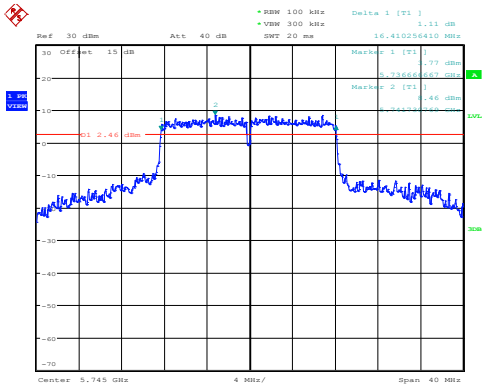
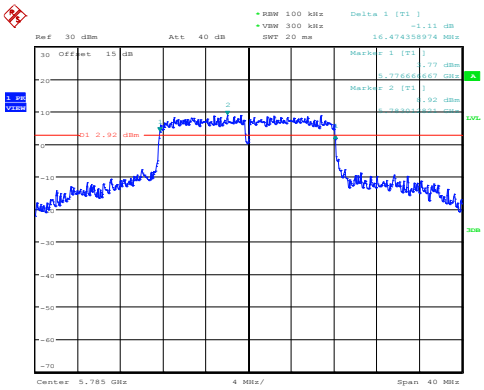
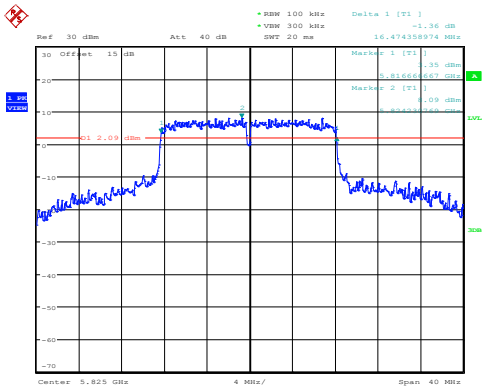
26 dB Bandwidth (UNII-1):

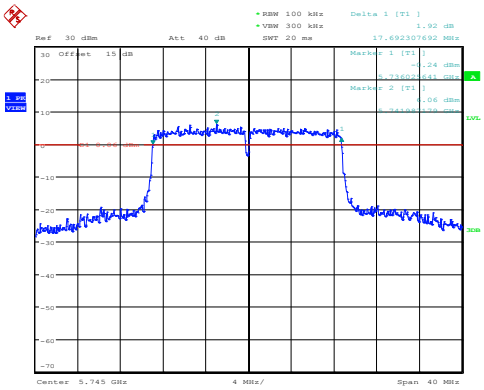
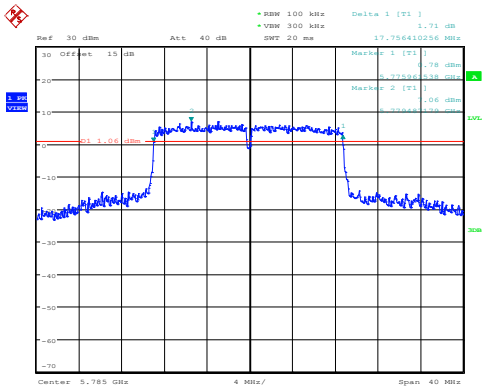
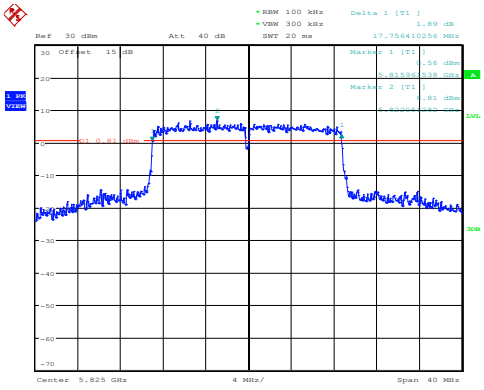
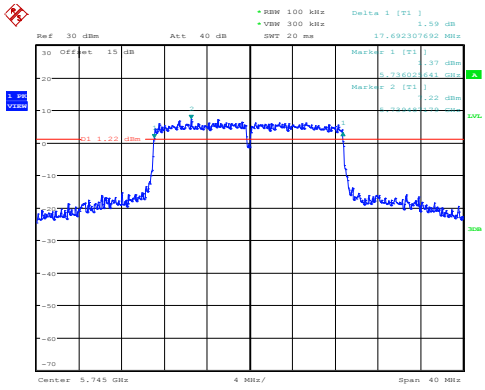
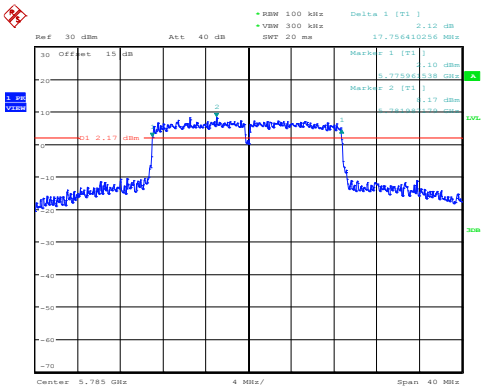
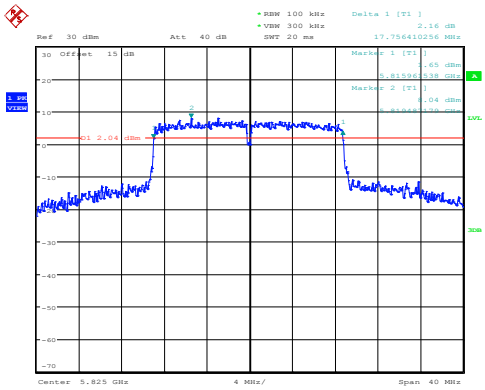
IEEE 802.11a Low CH Chain0	IEEE 802.11a Middle CH Chain0
	
Date: 14.APR.2021 12:36:50	Date: 14.APR.2021 13:35:49
IEEE 802.11a High CH Chain0	**IEEE 802.11a Low CH Chain1**
	
Date: 14.APR.2021 14:29:10	Date: 14.APR.2021 14:41:09
IEEE 802.11a Middle CH Chain1	**IEEE 802.11a High CH Chain1**
	
Date: 14.APR.2021 14:35:03	Date: 14.APR.2021 14:32:29

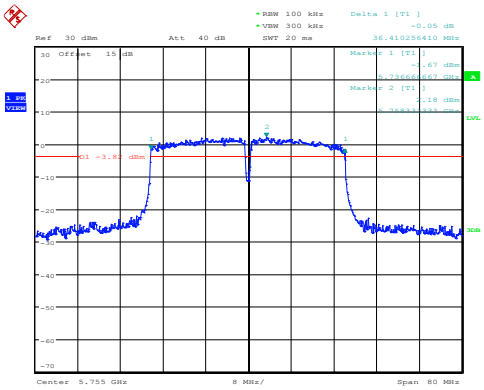
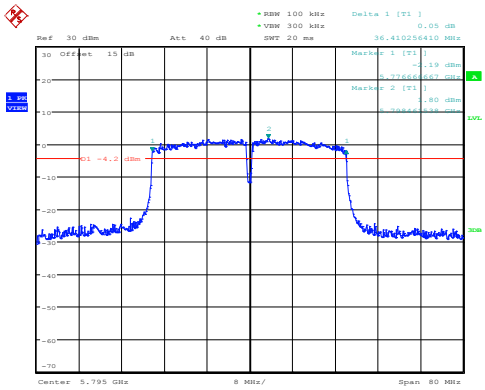
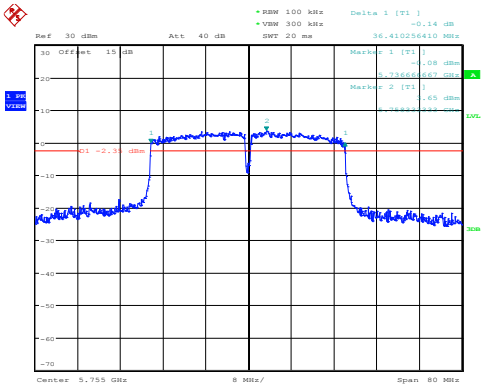
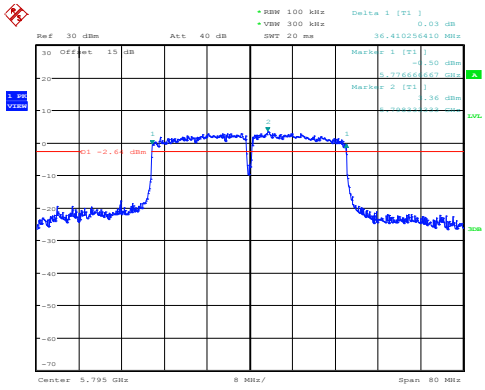
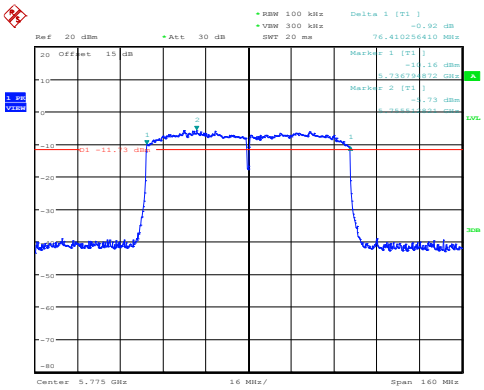
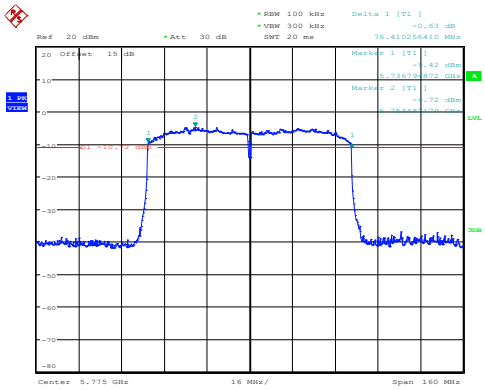
IEEE 802.11ac VHT20 Low CH Chain0	IEEE 802.11ac VHT20 Middle CH Chain0
	
Date: 14.APR.2021 14:52:01	Date: 14.APR.2021 14:54:54
IEEE 802.11ac VHT20 High CH Chain0	**IEEE 802.11ac VHT20 Low CH Chain1**
	
Date: 14.APR.2021 15:02:40	Date: 14.APR.2021 15:12:40
IEEE 802.11ac VHT20 Middle CH Chain1	**IEEE 802.11ac VHT20 High CH Chain1**
	
Date: 14.APR.2021 15:14:51	Date: 14.APR.2021 15:17:19

IEEE 802.11ac VHT40 Low CH Chain0	IEEE 802.11ac VHT40 High CH Chain0
	
Date: 14.APR.2021 15:23:12	Date: 14.APR.2021 15:33:10
IEEE 802.11ac VHT40 Low CH Chain1	**IEEE 802.11ac VHT40 High CH Chain1**
	
Date: 14.APR.2021 15:35:11	Date: 14.APR.2021 15:38:02
IEEE 802.11ac VHT80 Chain0	**IEEE 802.11ac VHT80 Chain1**
	
Date: 14.APR.2021 15:42:03	Date: 14.APR.2021 15:45:38

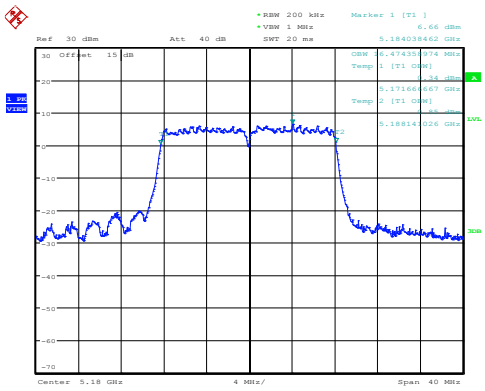
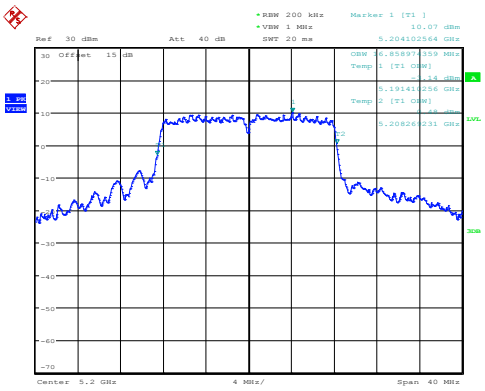
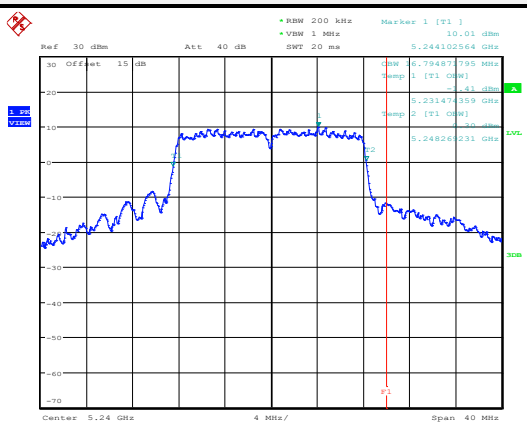
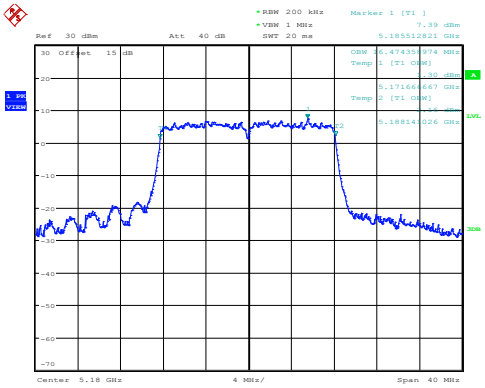
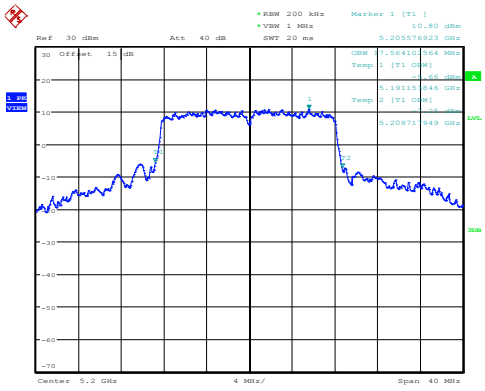
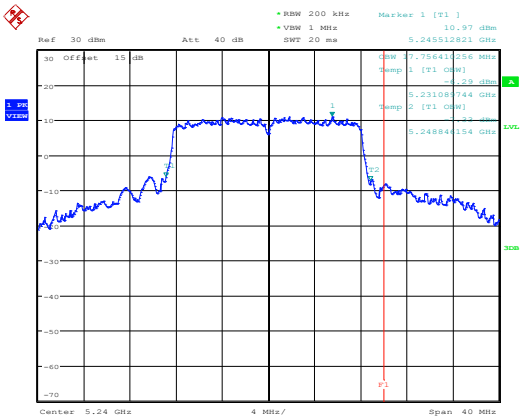
6 dB Bandwidth (UNII-3):

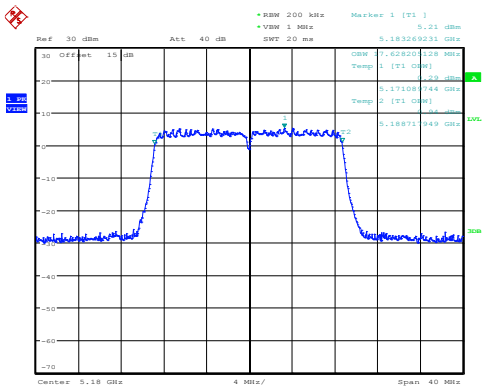
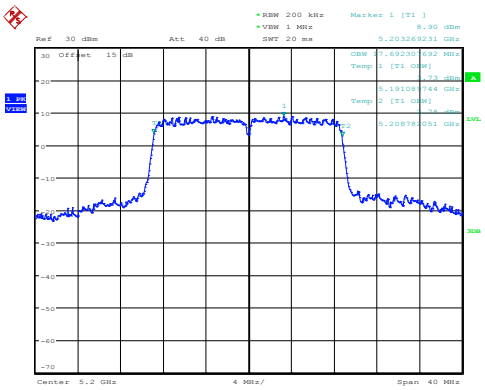
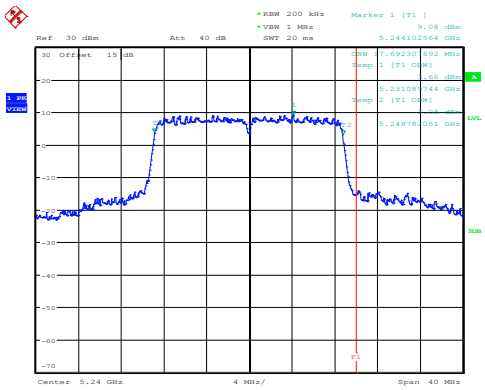
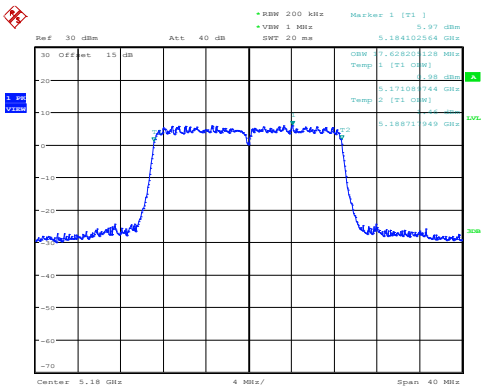
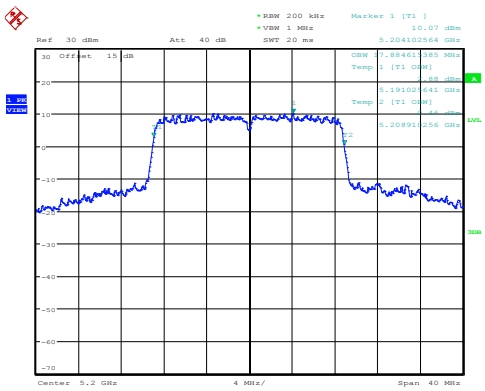
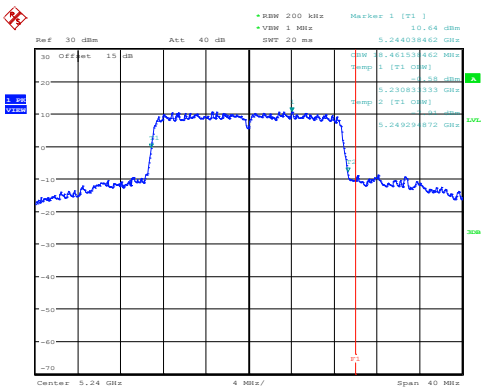
IEEE 802.11a Low CH Chain0	IEEE 802.11a Middle CH Chain0
	
Date: 14.APR.2021 15:56:49	Date: 14.APR.2021 15:59:57
IEEE 802.11a High CH Chain0	**IEEE 802.11a Low CH Chain1**
	
Date: 14.APR.2021 16:02:23	Date: 14.APR.2021 16:07:17
IEEE 802.11a Middle CH Chain1	**IEEE 802.11a High CH Chain1**
	
Date: 14.APR.2021 17:10:28	Date: 14.APR.2021 17:12:50

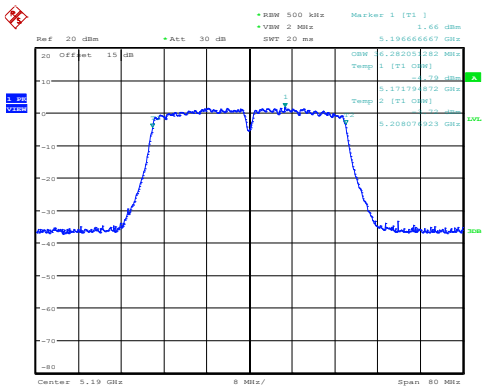
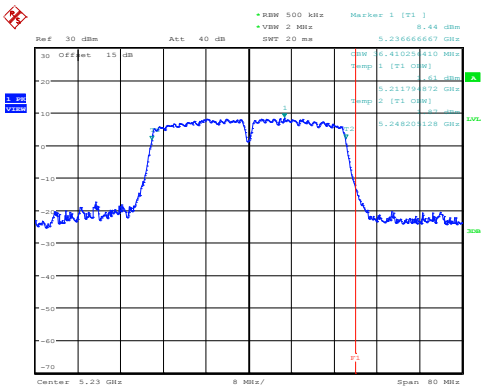
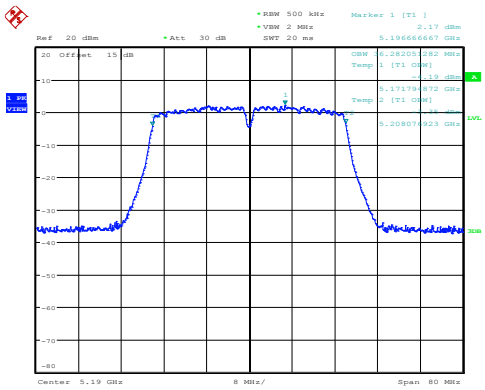
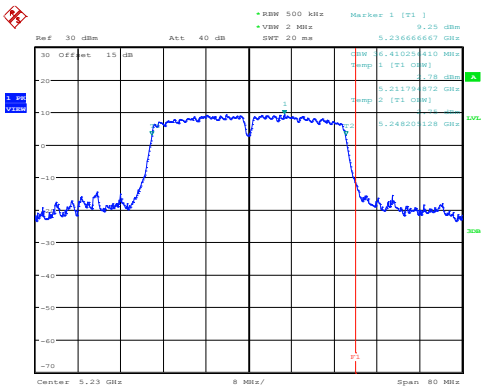
IEEE 802.11ac VHT20 Low CH Chain0	IEEE 802.11ac VHT20 Middle CH Chain0
	
Date: 14.APR.2021 17:21:16	Date: 14.APR.2021 17:23:37
IEEE 802.11ac VHT20 High CH Chain0	**IEEE 802.11ac VHT20 Low CH Chain1**
	
Date: 14.APR.2021 17:25:57	Date: 14.APR.2021 17:28:59
IEEE 802.11ac VHT20 Middle CH Chain1	**IEEE 802.11ac VHT20 High CH Chain1**
	
Date: 14.APR.2021 17:31:18	Date: 14.APR.2021 17:33:39

IEEE 802.11ac VHT40 Low CH Chain0	IEEE 802.11ac VHT40 High CH Chain0
	
Date: 14.APR.2021 17:38:51	Date: 14.APR.2021 17:42:59
IEEE 802.11ac VHT40 Low CH Chain1	**IEEE 802.11ac VHT40 High CH Chain1**
	
Date: 14.APR.2021 17:46:45	Date: 14.APR.2021 17:48:55
IEEE 802.11ac VHT80 Chain0	**IEEE 802.11ac VHT80 Chain1**
	
Date: 14.APR.2021 17:55:31	Date: 14.APR.2021 17:52:19

99% Occupied Bandwidth (UNII-1):

IEEE 802.11a Low CH Chain0	IEEE 802.11a Middle CH Chain0
	
Date: 14.APR.2021 12:37:37	Date: 14.APR.2021 13:36:36
IEEE 802.11a High CH Chain0	**IEEE 802.11a Low CH Chain1**
	
Date: 14.APR.2021 14:29:57	Date: 14.APR.2021 14:41:56
IEEE 802.11a Middle CH Chain1	**IEEE 802.11a High CH Chain1**
	
Date: 14.APR.2021 14:35:50	Date: 14.APR.2021 14:33:16

IEEE 802.11ac VHT20 Low CH Chain0	IEEE 802.11ac VHT20 Middle CH Chain0
	
Date: 14.APR.2021 14:52:49	Date: 14.APR.2021 14:55:41
IEEE 802.11ac VHT20 High CH Chain0	**IEEE 802.11ac VHT20 Low CH Chain1**
	
Date: 14.APR.2021 14:59:44	Date: 14.APR.2021 15:13:28
IEEE 802.11ac VHT20 Middle CH Chain1	**IEEE 802.11ac VHT20 High CH Chain1**
	
Date: 14.APR.2021 15:15:38	Date: 14.APR.2021 15:18:06

IEEE 802.11ac VHT40 Low CH Chain0	IEEE 802.11ac VHT40 High CH Chain0
	
Date: 14.APR.2021 15:23:59	Date: 14.APR.2021 15:31:46
IEEE 802.11ac VHT40 Low CH Chain1	**IEEE 802.11ac VHT40 High CH Chain1**
	
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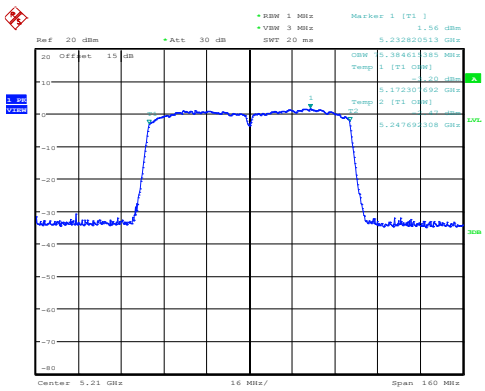	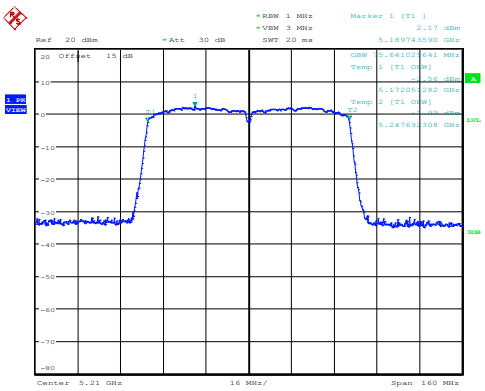
Date: 14.APR.2021 15:42:54	Date: 14.APR.2021 15:46:28

99% Occupied Bandwidth (UNII-3):

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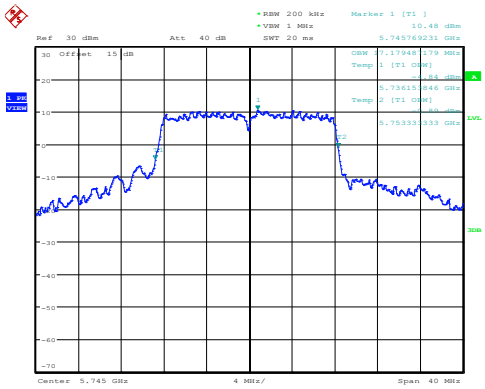	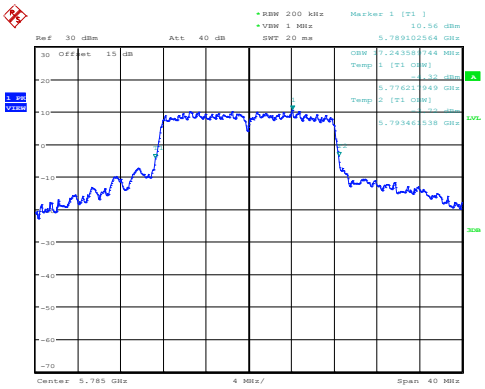
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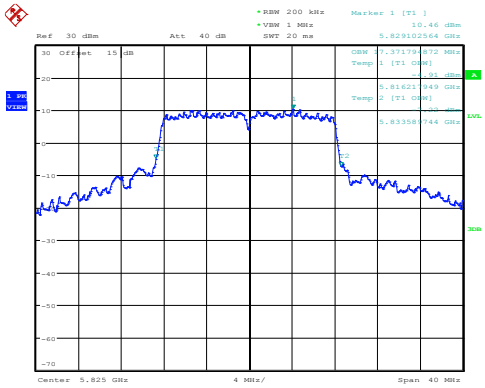	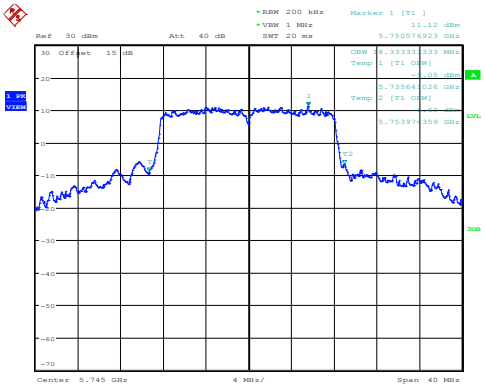
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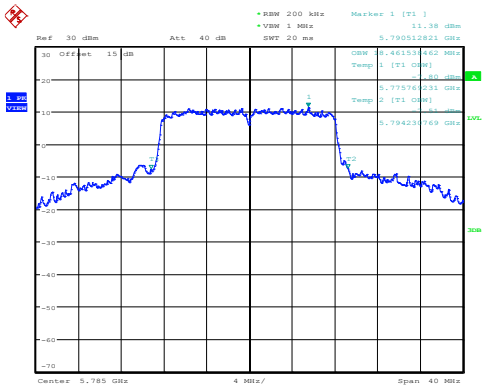	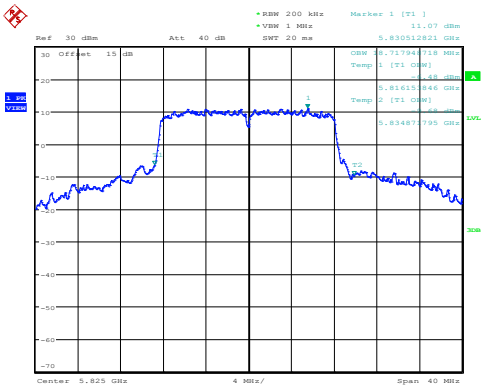
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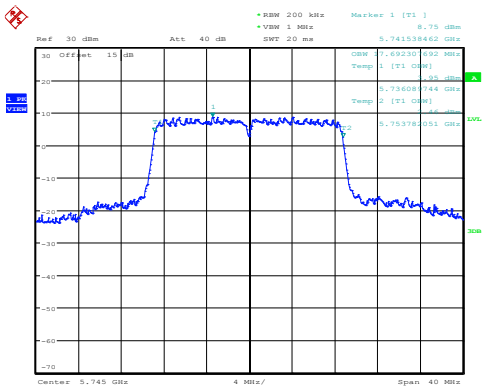	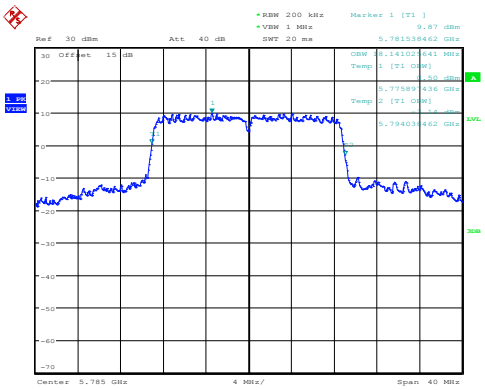
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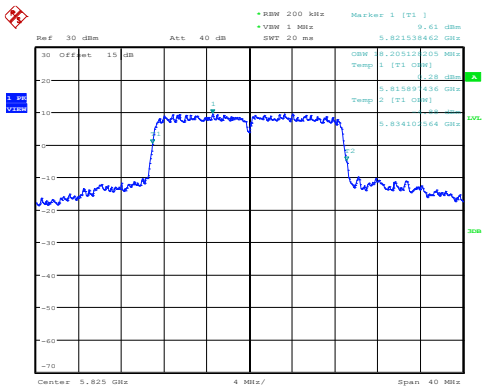	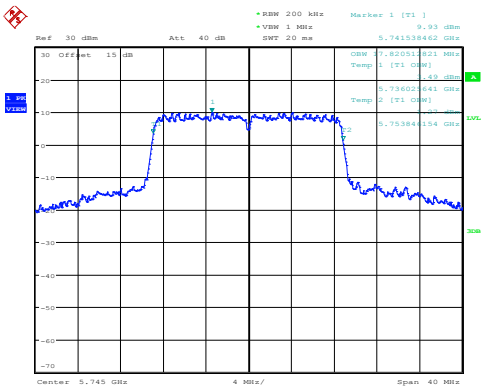
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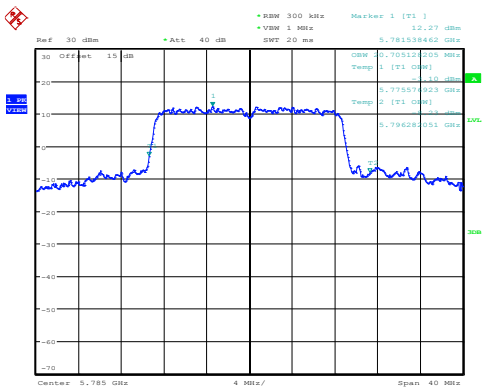
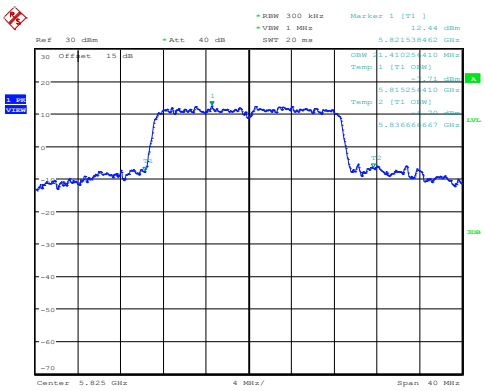
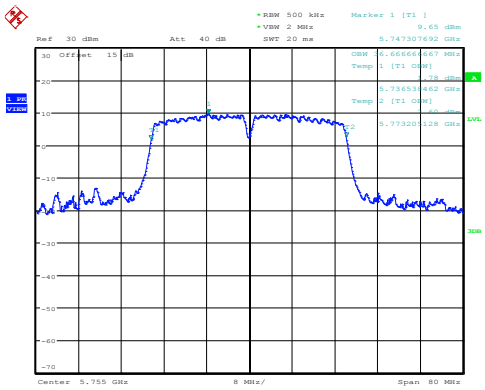
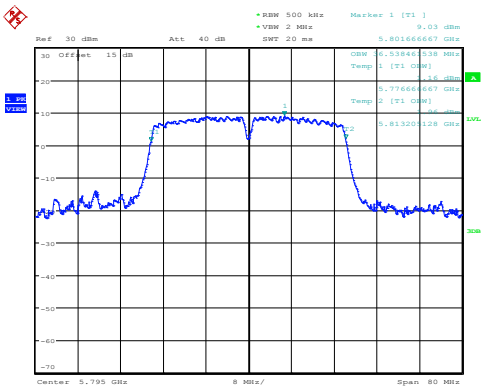
	
Date: 14.APR.2021 19:32:23	Date: 14.APR.2021 19:33:33

IEEE 802.11ac VHT40 Low CH Chain0	IEEE 802.11ac VHT40 High CH Chain0
	
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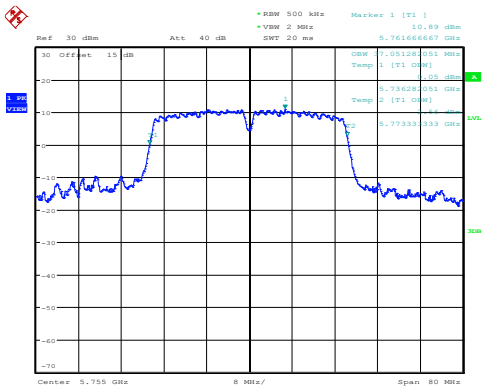	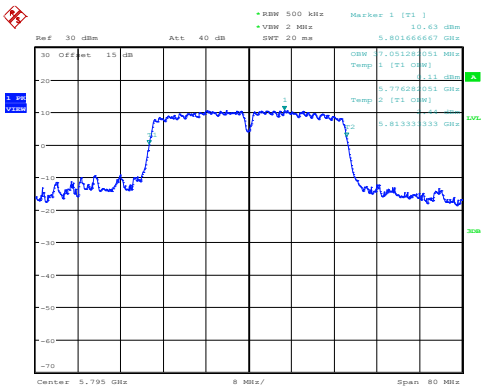
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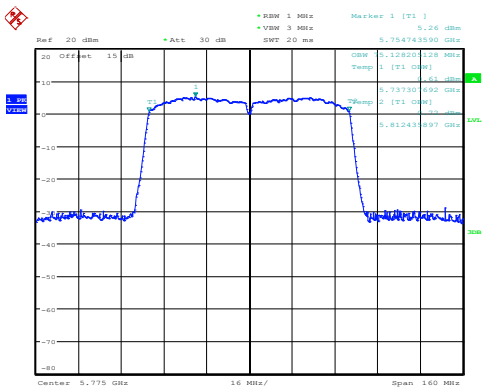
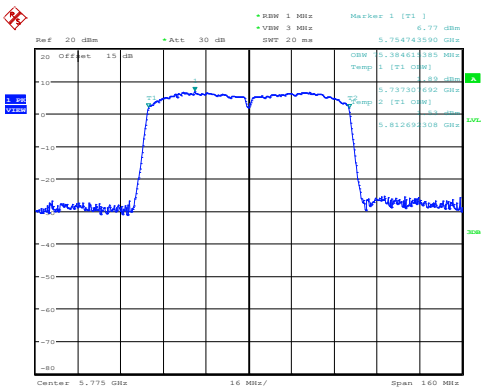
	
Date: 14.APR.2021 17:56:50	Date: 14.APR.2021 17:53:38

9 FCC §15.407(a)(1) – Maximum Output Power

9.1 Applicable Standard

According to FCC §15.407(a),

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

9.2 Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01,

1) Place the EUT on a bench and set it in transmitting mode.

2) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a Power sensor.

9.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
USB Wideband Power Sensor	Agilent	U2021XA	MY56120026	2020/09/14	2021/09/13
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

9.4 Test Results

Configuration	Channel	Frequency (MHz)	Maximum Peak Output Power (dBm)				Limit (dBm)
			Chain0	Chain1	SUM	W	
IEEE 802.11a	36	5180	17.14	18.18	20.70	0.1175	30.00
	40	5200	20.65	21.94	24.35	0.2723	30.00
	48	5240	20.41	22.02	24.30	0.2692	30.00
	149	5745	21.05	22.19	24.67	0.2931	30.00
	157	5785	20.87	22.24	24.62	0.2897	30.00
	165	5825	20.78	22.10	24.50	0.2818	30.00
IEEE 802.11n HT20	36	5180	16.52	17.30	19.94	0.0986	30.00
	40	5200	20.16	21.29	23.77	0.2382	30.00
	48	5240	20.32	21.88	24.18	0.2618	30.00
	149	5745	19.52	20.82	23.23	0.2104	30.00
	157	5785	20.83	21.77	24.34	0.2716	30.00
	165	5825	20.44	21.82	24.19	0.2624	30.00
IEEE 802.11n HT40	38	5190	11.77	12.22	15.01	0.0317	30.00
	46	5230	18.31	19.34	21.87	0.1538	30.00
	151	5755	19.23	20.28	22.80	0.1905	30.00
	159	5795	18.90	20.21	22.61	0.1824	30.00
IEEE 802.11ac VHT20	36	5180	16.78	17.37	20.10	0.1023	30.00
	40	5200	20.38	21.36	23.91	0.2460	30.00
	48	5240	20.36	21.92	24.22	0.2642	30.00
	149	5745	19.55	20.89	23.28	0.2128	30.00
	157	5785	20.89	21.87	24.42	0.2767	30.00
	165	5825	20.56	21.89	24.29	0.2685	30.00
IEEE 802.11ac VHT40	38	5190	11.86	12.43	15.16	0.0328	30.00
	46	5230	18.37	19.42	21.94	0.1563	30.00
	151	5755	19.32	20.42	22.92	0.1959	30.00
	159	5795	18.93	20.38	22.73	0.1875	30.00
IEEE 802.11ac VHT80	42	5210	10.61	11.63	14.16	0.0261	30.00
	155	5775	14.16	15.53	17.91	0.0618	30.00

10 FCC §15.407(a) – Power Spectral Density

10.1 Applicable Standard

According to FCC §15.407(a),

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

10.2 Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 and ANSI 63.10: 2013 Sec 10.3.7.

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set the RBW to 1 MHz.

b) Set the VBW to be at least 1 MHz (a VBW of 3 MHz is desirable).

c) Set the frequency span to examine the spectrum across a convenient frequency segment (e.g., 600 MHz).

d) Select the power averaging (rms) detector.

e) Set the sweep time so that there is no more than a 1 ms integration period over each measurement bin.

f) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

10.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSU 26	100406	2021/03/10	2022/03/09
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

10.4 Test Results

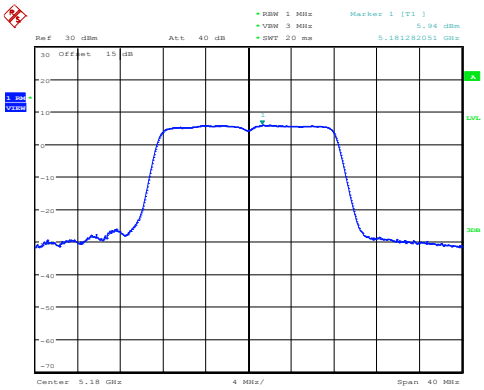
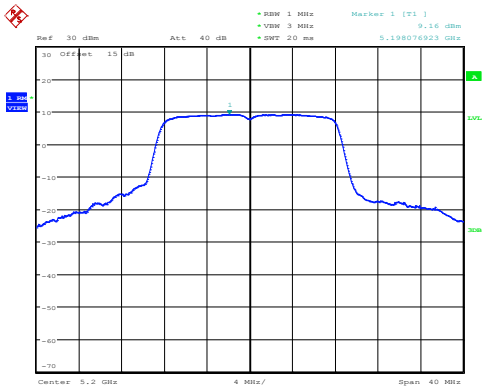
Band	Configuration	Channel	Frequency (MHz)	PSD (dBm/MHz)			Limit (dBm/MHz)	Result
				Chain0	Chain1	SUM		
UNII-1	802.11a	36	5180	5.94	7.04	9.54	16.79	Compliance
		40	5200	9.16	11.09	13.24	16.79	Compliance
		48	5240	9.06	11.19	13.26	16.79	Compliance
	802.11ac VHT20	36	5180	5.25	5.99	8.65	16.79	Compliance
		40	5200	8.99	10.06	12.57	16.79	Compliance
		48	5240	8.92	10.71	12.92	16.79	Compliance
	802.11ac VHT40	38	5190	-2.60	-2.03	0.70	16.79	Compliance
		46	5230	4.43	5.22	7.85	16.79	Compliance
	802.11ac VHT80	42	5210	-6.42	-5.78	-3.08	16.79	Compliance

Note: Limit = 17 - (Direction Gain-6) = 17 – 0.21 = 16.79 dBm/MHz

Band	Configuration	Channel	Frequency (MHz)	PSD (dBm/500 kHz)			Limit (dBm/500 kHz)	Result
				Chain0	Chain1	SUM		
UNII-1	802.11a	149	5745	7.70	8.93	11.37	29.79	Compliance
		157	5785	7.27	8.97	11.21	29.79	Compliance
		165	5825	7.38	8.67	11.08	16.79	Compliance
	802.11ac VHT20	149	5745	6.08	7.36	9.78	16.79	Compliance
		157	5785	7.17	8.20	10.73	16.79	Compliance
		165	5825	6.98	8.45	10.79	16.79	Compliance
	802.11ac VHT40	151	5755	3.13	4.16	6.69	16.79	Compliance
		159	5795	2.36	4.01	6.27	16.79	Compliance
	802.11ac VHT80	155	5775	-5.24	-3.78	-1.44	16.79	Compliance

Note: Limit = 30 - (Direction Gain-6) = 30 – 0.21 = 29.79 dBm/MHz

UNII-1:

IEEE 802.11a Low CH Chain0	IEEE 802.11a Middle CH Chain0
	
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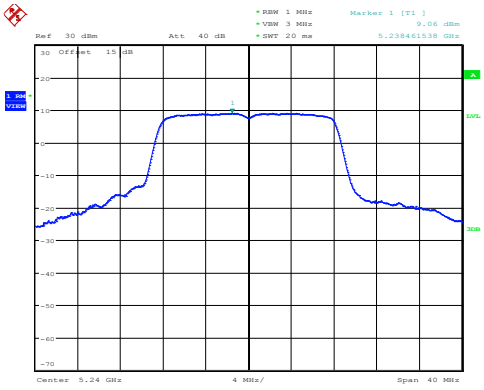
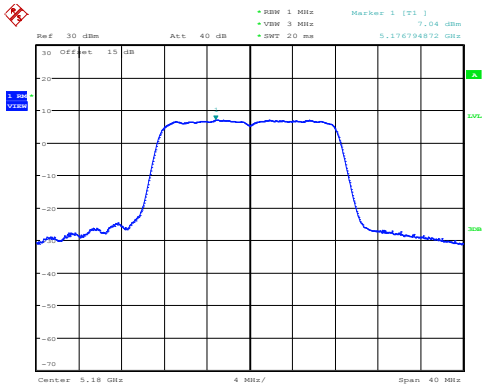
IEEE 802.11a High CH Chain0	**IEEE 802.11a Low CH Chain1**
	
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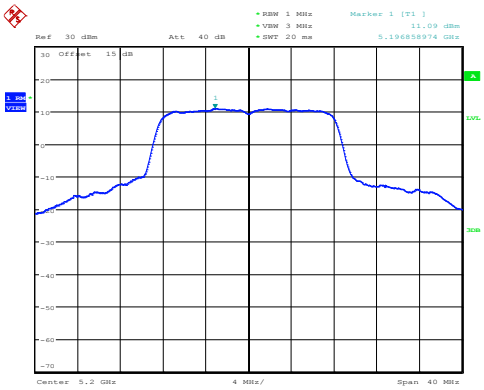	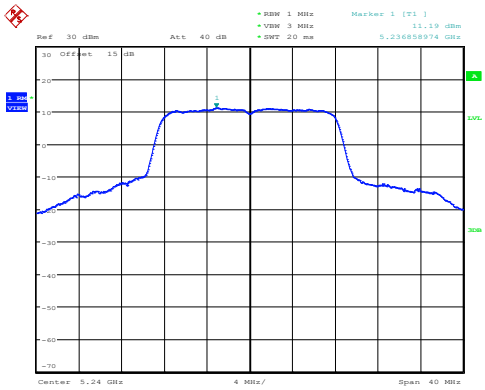
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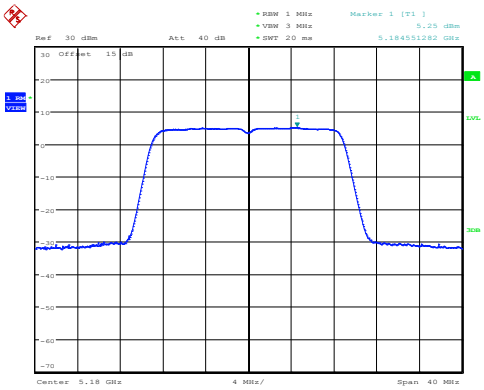
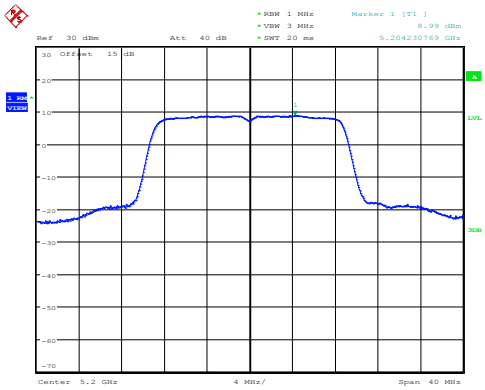
IEEE 802.11ac VHT20 Low CH Chain0	IEEE 802.11ac VHT20 Middle CH Chain0
	
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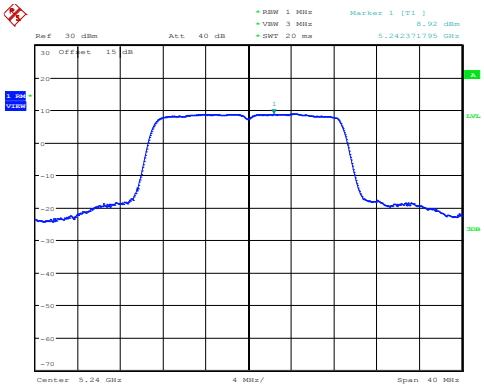
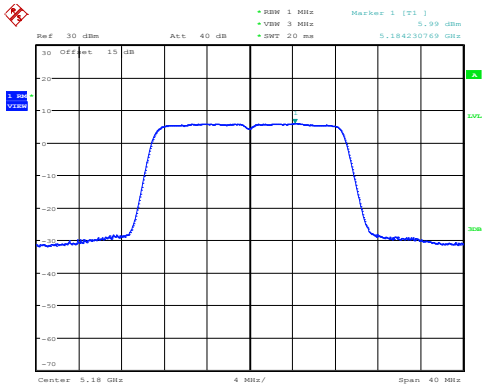
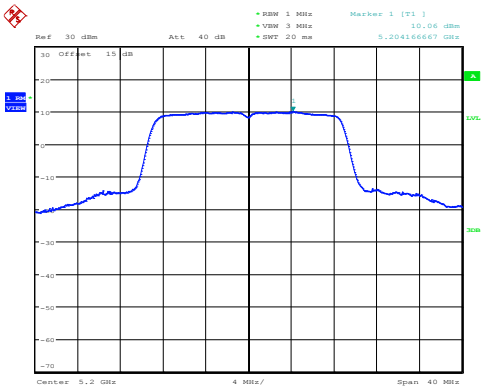
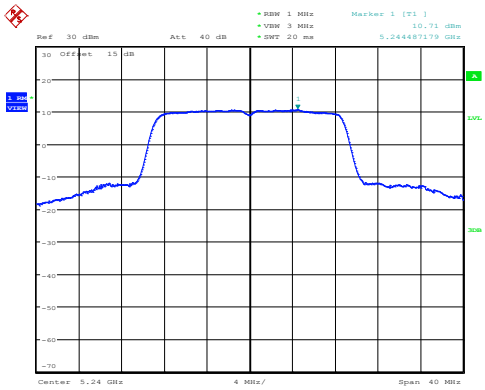
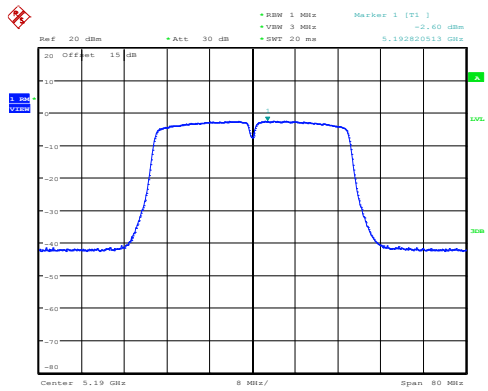
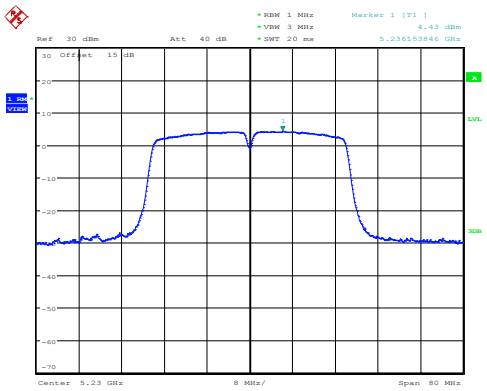
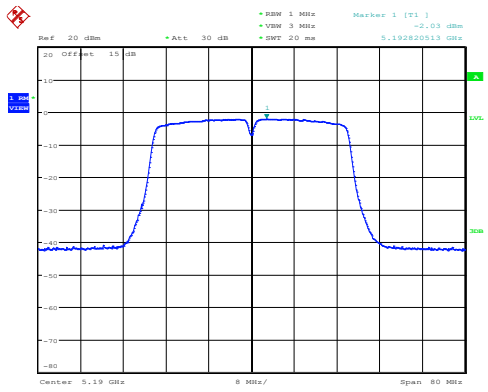
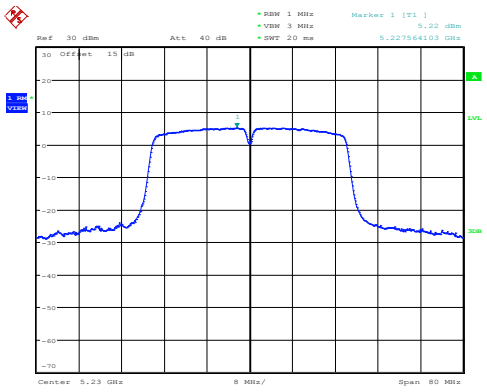
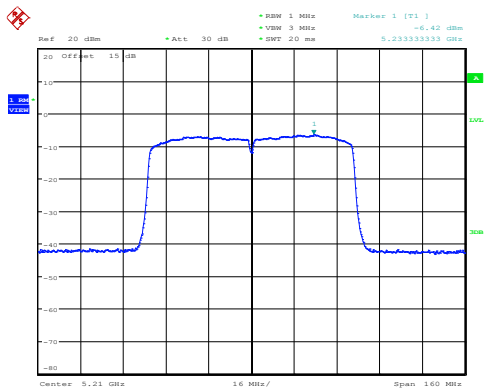
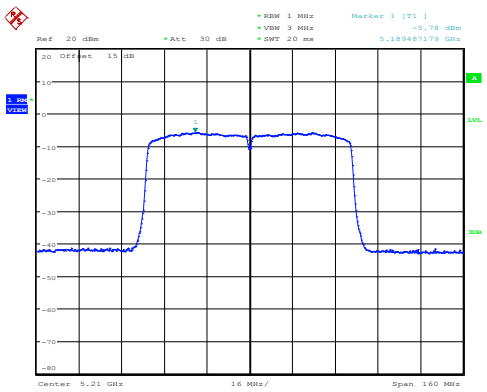
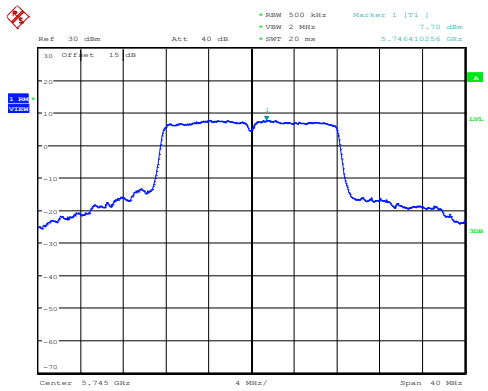
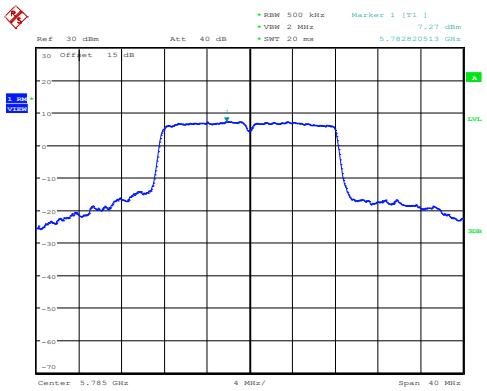
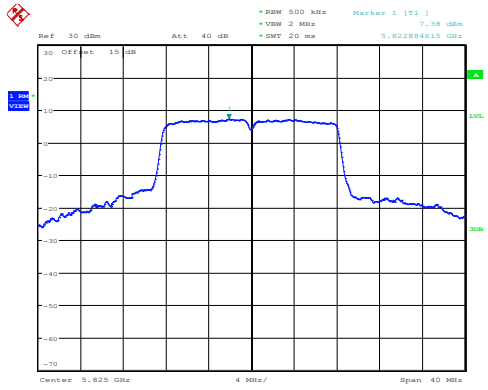
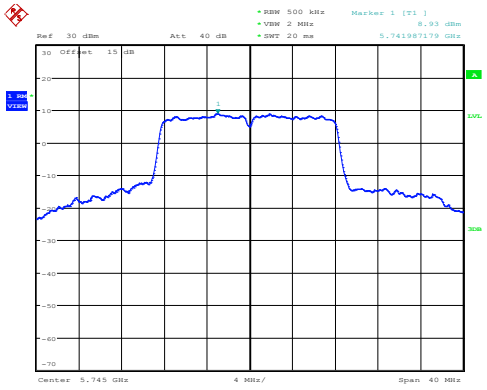
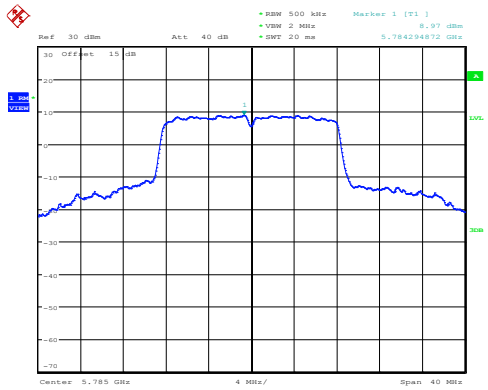
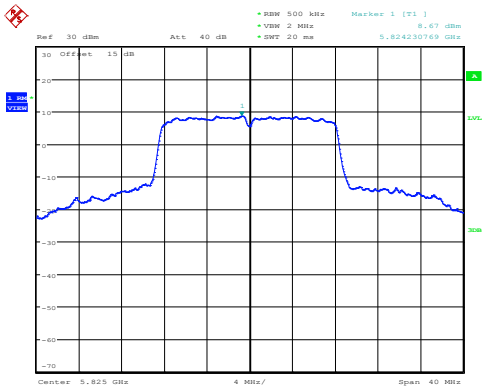
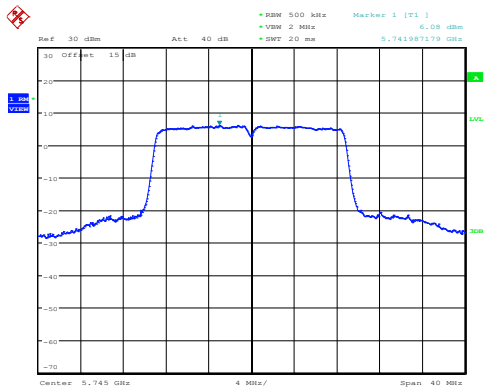
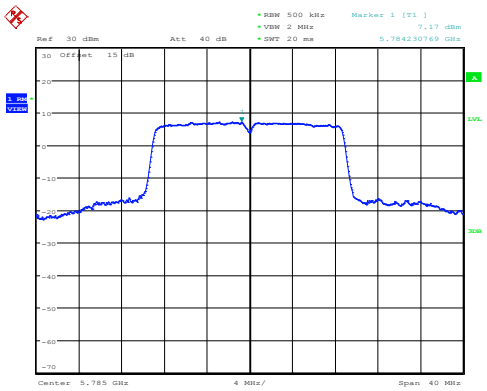
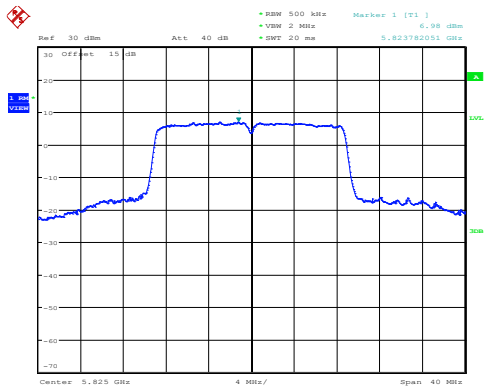
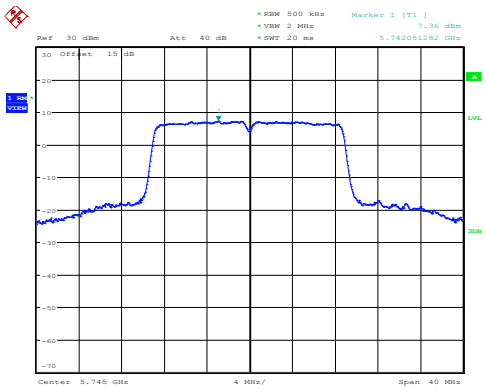
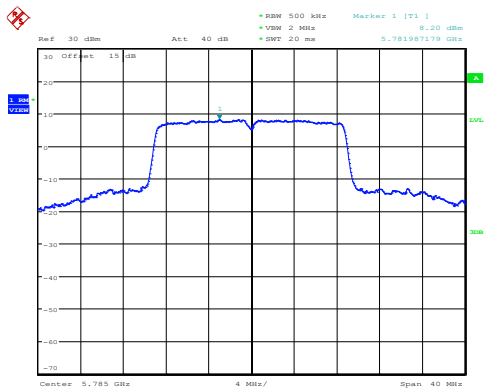
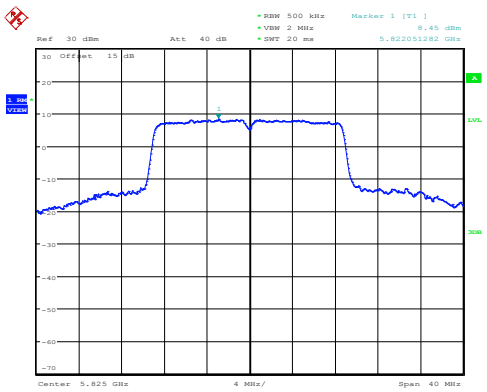
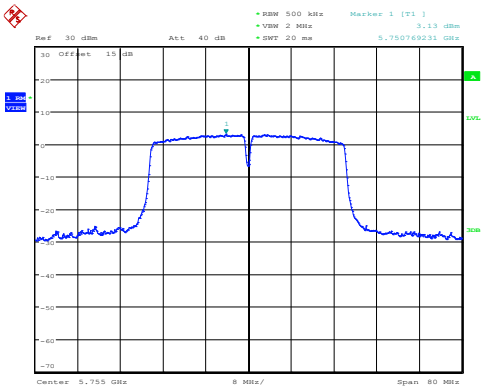
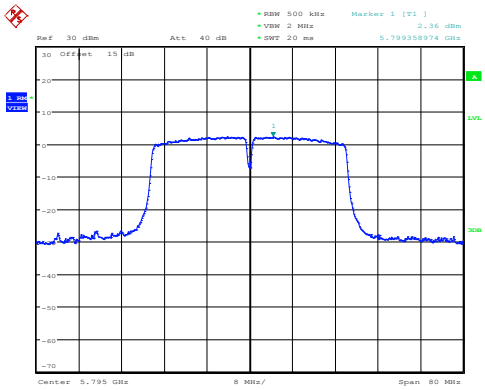
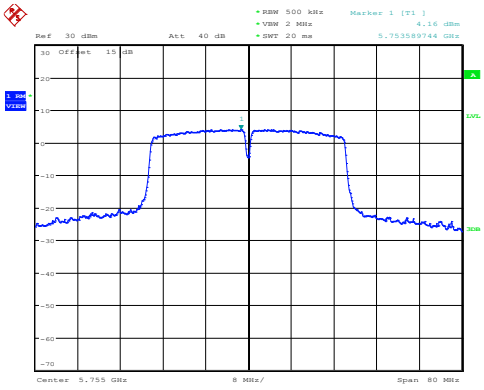
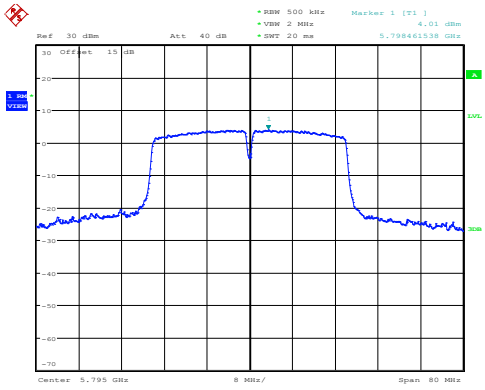
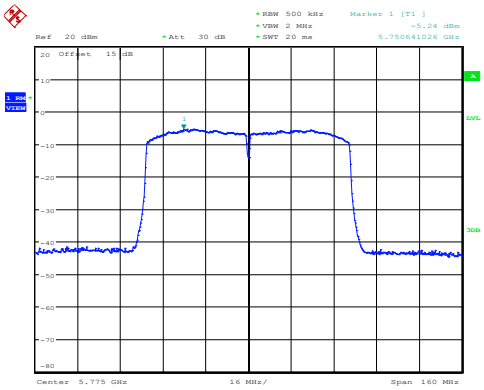
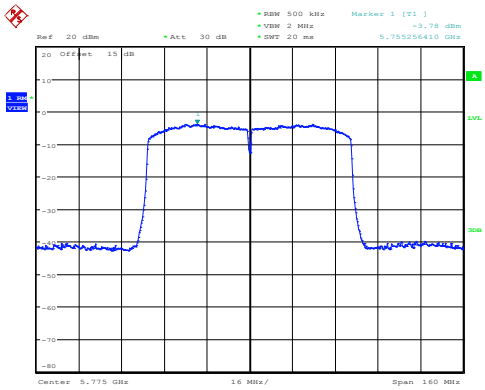
	
Date: 14.APR.2021 14:59:12	Date: 14.APR.2021 15:12:56
IEEE 802.11ac VHT20 Middle CH Chain1	**IEEE 802.11ac VHT20 High CH Chain1**
	
Date: 14.APR.2021 15:15:07	Date: 14.APR.2021 15:17:35

IEEE 802.11ac VHT40 Low CH Chain0	IEEE 802.11ac VHT40 High CH Chain0
	
Date: 14.APR.2021 15:23:28	Date: 14.APR.2021 15:31:15
IEEE 802.11ac VHT40 Low CH Chain1	**IEEE 802.11ac VHT40 High CH Chain1**
	
Date: 14.APR.2021 15:35:27	Date: 14.APR.2021 15:38:18
IEEE 802.11ac VHT80 Chain0	**IEEE 802.11ac VHT80 Chain1**
	
Date: 14.APR.2021 15:42:20	Date: 14.APR.2021 15:45:55

UNII-3:

IEEE 802.11a Low CH Chain0	IEEE 802.11a Middle CH Chain0
	
Date: 14.APR.2021 15:57:34	Date: 14.APR.2021 16:00:42
IEEE 802.11a High CH Chain0	**IEEE 802.11a Low CH Chain1**
	
Date: 14.APR.2021 16:03:08	Date: 14.APR.2021 16:08:02
IEEE 802.11a Middle CH Chain1	**IEEE 802.11a High CH Chain1**
	
Date: 14.APR.2021 17:11:13	Date: 14.APR.2021 17:13:35

IEEE 802.11ac VHT20 Low CH Chain0	IEEE 802.11ac VHT20 Middle CH Chain0
	
Date: 14.APR.2021 17:22:02	Date: 14.APR.2021 17:24:22
IEEE 802.11ac VHT20 High CH Chain0	**IEEE 802.11ac VHT20 Low CH Chain1**
	
Date: 14.APR.2021 17:26:42	Date: 14.APR.2021 17:29:44
IEEE 802.11ac VHT20 Middle CH Chain1	**IEEE 802.11ac VHT20 High CH Chain1**
	
Date: 14.APR.2021 17:32:03	Date: 14.APR.2021 17:34:24

IEEE 802.11ac VHT40 Low CH Chain0	IEEE 802.11ac VHT40 High CH Chain0
	
Date: 14.APR.2021 17:39:36	Date: 14.APR.2021 17:43:45
IEEE 802.11ac VHT40 Low CH Chain1	**IEEE 802.11ac VHT40 High CH Chain1**
	
Date: 14.APR.2021 17:47:31	Date: 14.APR.2021 17:49:40
IEEE 802.11ac VHT80 Chain0	**IEEE 802.11ac VHT80 Chain1**
	
Date: 14.APR.2021 17:56:17	Date: 14.APR.2021 17:53:05

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