FCC Part 15.407

TEST REPORT

For

Tatung Technology Inc.

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

FCC ID: 2AATB-WAP-3518

Report Type	**Original Report**
Product Name:	**Dual Band Wireless Router**
Model Name:	**WAP-3518**
Report Number :	**RLK200203001-00C**
Report Date :	**2020/08/04**
Reviewed By :	**Zeus Chen** Zeus Chen
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Revision History

Revision	Report Number	Issue Date	Description
1.0	RLK200203001-00C	2020/08/04	Original Report

TABLE OF CONTENTS

1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	**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	Tatung Technology Inc.
Product (Equipment)	Dual Band Wireless Router
Model Name	WAP-3518
EUT Function	IEEE 802.11 an(HT20/HT40) + ac(VHT20/VHT40/VHT80)
Frequency Range	UNII-1: 5150 MHz - 5250 MHz; UNII-3: 5745 MHz - 5825 MHz
Number of Channels	**For 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 **For 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	**For UNII-1:** IEEE 802.11a Mode: 20.69 dBm (0.1172 W) IEEE 802.11n HT20 Mode: 20.69 dBm (0.1172 W) IEEE 802.11n HT40 Mode: 20.60 dBm (0.1148 W) IEEE 802.11ac VHT20 Mode: 20.86 dBm (0.1219 W) IEEE 802.11ac VHT40 Mode: 20.73 dBm (0.1183 W) IEEE 802.11ac VHT80 Mode: 15.04 dBm (0.0319 W) **For UNII-3**: IEEE 802.11a Mode: 22.70 dBm (0.1862 W) IEEE 802.11n HT20 Mode: 22.22 dBm (0.1667 W) IEEE 802.11n HT40 Mode: 21.83 dBm (0.1524 W) IEEE 802.11ac VHT20 Mode: 22.37 dBm (0.1726 W) IEEE 802.11ac VHT40 Mode: 22.02 dBm (0.1592 W) IEEE 802.11ac VHT80 Mode: 21.45 dBm (0.1396 W)
Modulation Type	OFDM
Power Operation	☒ AC 120 V/60 Hz ☒ Adapter Model: MSA-C1000IC12.0-12H-US I/P: 100-240Vac, 0.3A O/P: 12Vdc, 1A
Received Date	Feb. 10, 2020
Date of Test	Jun. 23, 2020 ~ Jul. 07, 2020
Related Submittal(s)/Grant(s)	FCC Part 15.247 DTS with FCC ID : 2AATB-WAP-3518

*All measurement and test data in this report was gathered from production sample serial number: 200203001 Assigned by BACL, Linkou Laboratory).

1.2 Objective

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 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.

1.3 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.

1.4 Environmental Conditions and Test Date

Test Site	Test Date	Temperature (°C)	Relative Humidity (%)	Test Engineer
Conduction (Con-01)	Jul. 02, 2020	22.5	55	Blake Wang
Radiated (966A)	Jun. 23, 2020 - Jul. 06, 2020	20.1~21.5	46~51	Leo Cheng
Conducted (TH-02)	Jul. 06, 2020 - Jul. 07, 2020	23.2~23.7	55~57	Ethan Shao

1.5 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.: TW1119. The Test Firm Registration No.: 311381. ISED#: 25102 and CAB identifier is TW3546.

2 System Test Configuration

2.1 Description of 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**
802.11a mode	**2**	6-54 Mbps	6 Mbps
802.11n HT20 mode	**2**	MCS 0-32	MCS 0
802.11n HT40 mode	**2**	MCS 0-32	MCS 0
802.11ac VHT20 mode	**2**	MCS 0-10 NSS4	MCS 0
802.11ac VHT40 mode	**2**	MCS 0-10 NSS4	MCS 0
802.11ac VHT80 mode	**2**	MCS 0-10 NSS4	MCS 0

Worst Case of Power Setting					
EUT Exercise Software			RTL819X		
Configuration	N_{TX}	UNII Band	Low CH	Mid CH	High CH
802.11a mode	2	UNII-1	115,105	120,110	120,108
		UNII-3	120,116	120,116	120,116
802.11n HT20 mode	2	UNII-1	115,108	120,110	120,110
		UNII-3	120,116	120,116	120,116
802.11n HT40 mode	2	UNII-1	98,88	-	120,110
		UNII-3	120,116	-	120,112
802.11ac VHT20 mode	2	UNII-1	115,108	120,110	120,110
		UNII-3	120,116	120,116	120,116
802.11ac VHT40 mode	2	UNII-1	98,88	-	120,110
		UNII-3	120,116	-	120,112
802.11ac VHT80 mode	2	UNII-1	-	96,96	-
		UNII-3	-	110,110	-

- Note1: The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the Peak power and PSD across all date rates bandwidths, and modulations. Radiated below 1G were tested worst output power mode.
- Note2: 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 power test and Duty Cycle.
- Note3: All the test result was MIMO for 802.11b/g/n HT20 and HT40, there is always 2Tx, not diversity or SISO.

2.2 Support Equipment and External Cable List

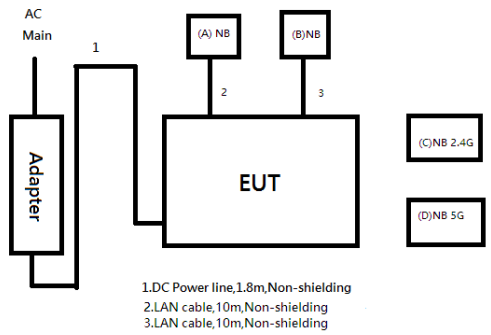
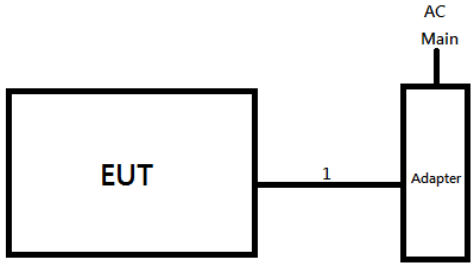
Support Equipment:

No.	Description	Manufacturer	Model Number
A	Notebook	DELL	Latitude E5510
B	Adapter	DELL	DA65NM111-00
C	Notebook	DELL	Latitude E5470
D	Notebook	DELL	E6410

External Cable List:

No.	Description	Manufacturer	Model Number
1	LAN Cable*2	BACL	10 m

2.3 Block Diagram of Test Setup

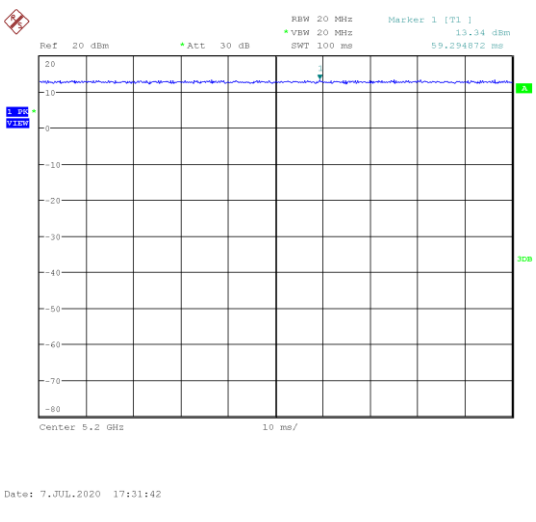
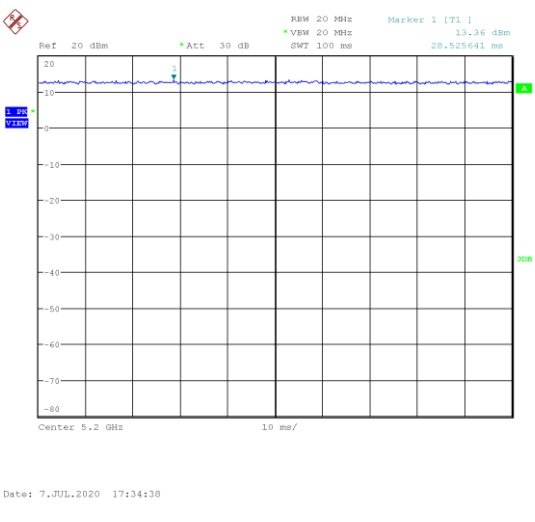
Conduction	Radiation
	

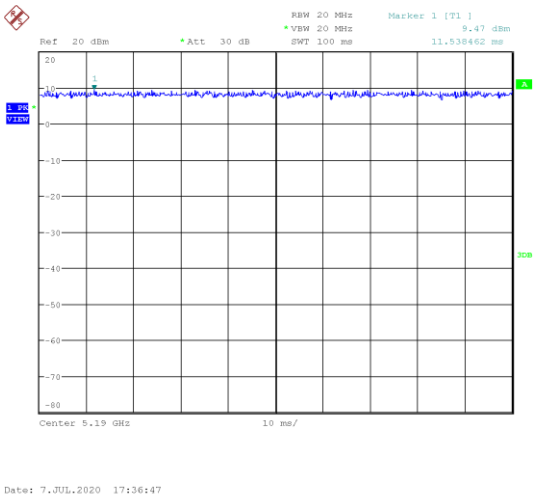
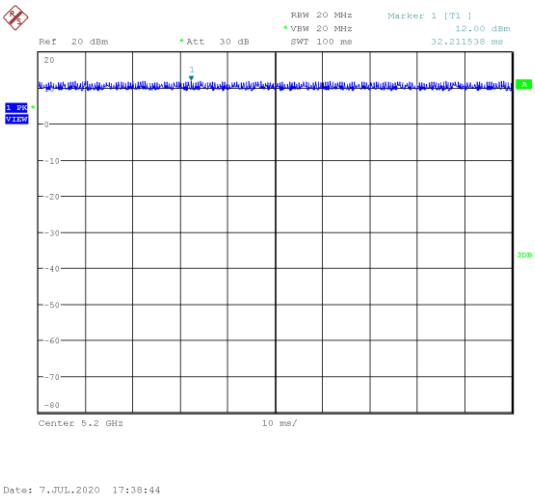
2.4 Duty Cycle

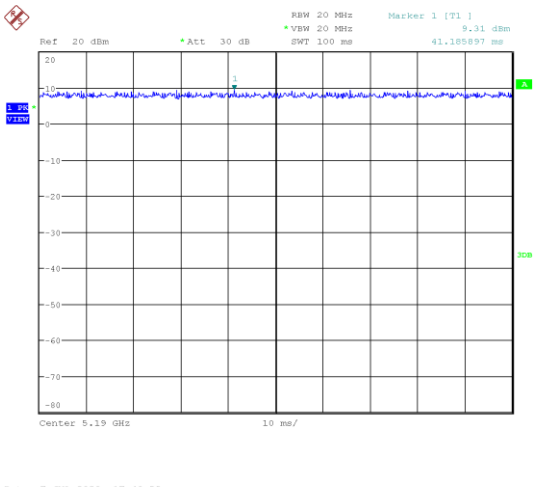
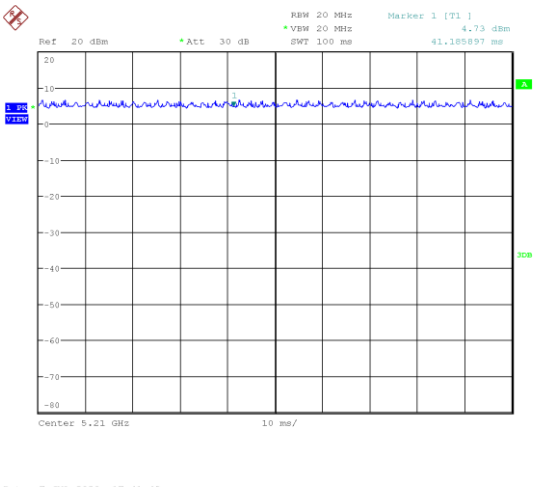
According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 section B:

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)
802.11a mode	100.00	100.00	100	0.00
802.11n HT20 mode	100.00	100.00	100	0.00
802.11n HT40 mode	100.00	100.00	100	0.00
802.11ac VHT20F mode	100.00	100.00	100	0.00
802.11ac VHT40 mode	100.00	100.00	100	0.00
802.11ac VHT80 mode	100.00	100.00	100	0.00

802.11a mode	802.11n HT20 mode
	

802.11n HT40 mode	802.11ac VHT20 mode
	

802.11ac VHT40 mode	802.11ac VHT80 mode
	

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 §1.1310, §2.1091, §15.407(f) - 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/cm2);

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: $\sum_i \frac{S_i}{S_{Limit,i}} \le 1$

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	27.00	501.1872	20	0.2084	1
Wi-Fi 5G B1	5150-5250	3.20	2.0893	21.00	125.8925	20	0.0524	1
Wi-Fi 5G B4	5725-5850	3.20	2.0893	23.00	199.5262	20	0.0830	1

Wi-Fi 2.4G and Wi-Fi 5G can transmit simultaneously，MPE evaluation is as below formula:
PD1/Limit1+PD2/Limit2+……＜1, PD (Power Density)

The worst case is as below:
Max MPE of Wi-Fi 2.4G + Max MPE of Wi-Fi 5G B4 = 0.2084/1.0+0.0830/1 =0.2914 ＜ 1.0

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

5 FCC §15.203 – Antenna Requirements

5.1 Applicable Standard

According to § 15.203 and § 15.407(a)(3),

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.

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.

5.2 Antenna List and Details

Type	Brand	Model	Gain	Result
PCB Antenna	TTI	WAP-3518	3.20 dBi	Compliance

The EUT has an internal antenna arrangement, which was permanently attached, fulfill the requirement of this section.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

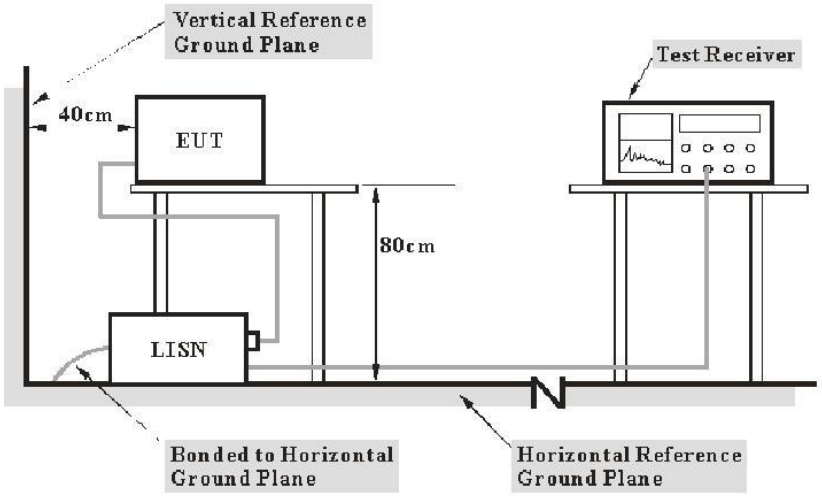
According to FCC §15.207 and §15.407(b)(6),

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.

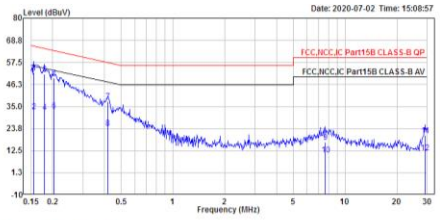
6.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conduction Room					
LISN	Rohde & Schwarz	ENV216	100010	2019/09/02	2020/09/01
EMI Test Receiver	Rohde & Schwarz	ESR3	102430	2020/05/07	2021/05/06
Pulse Limiter	SCHWARZBECK	VSTD 9561-F	00432	2019/08/28	2020/08/27
RF Cable	EMCI	EMCCFD300-BM-BM-8000	180526	2019/08/08	2020/08/07
Software	Audix	e3 v9	E3LK-03	N.C.R	N.C.R

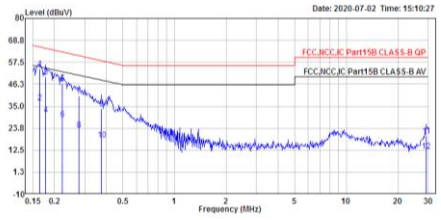
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units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

6.4 Test Data and Test Plot

Line	Neutral



	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.156	32.22	52.16	19.94	65.67	-13.51	QP
2	0.156	12.50	32.44	19.94	55.67	-23.23	Average
3	0.179	31.47	51.41	19.94	64.54	-13.13	QP
4	0.179	12.15	32.09	19.94	54.54	-22.45	Average
5	0.203	29.44	49.38	19.94	63.49	-14.11	QP
6	0.203	12.72	32.66	19.94	53.49	-20.83	Average
7	0.419	17.54	37.50	19.96	57.46	-19.96	QP
8	0.419	4.17	24.13	19.96	47.46	-23.33	Average
9	7.681	-3.40	16.67	20.07	60.00	-43.33	QP
10	7.681	-9.84	10.23	20.07	50.00	-39.77	Average
11	29.059	0.01	20.21	20.20	60.00	-39.79	QP
12	29.059	-8.96	11.24	20.20	50.00	-38.76	Average



	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.164	34.25	54.20	19.95	65.27	-11.07	QP
2	0.164	16.95	36.90	19.95	55.27	-18.37	Average
3	0.177	30.22	50.16	19.94	64.61	-14.45	QP
4	0.177	10.88	30.82	19.94	54.61	-23.79	Average
5	0.222	26.73	46.67	19.94	62.76	-16.09	QP
6	0.222	8.58	28.52	19.94	52.76	-24.24	Average
7	0.277	20.38	40.32	19.94	60.90	-20.58	QP
8	0.277	3.08	23.02	19.94	50.90	-27.88	Average
9	0.375	13.83	33.80	19.97	58.39	-24.59	QP
10	0.375	-2.13	17.84	19.97	48.39	-30.55	Average
11	29.059	-0.66	19.78	20.44	60.00	-40.22	QP
12	29.059	-8.34	12.10	20.44	50.00	-37.90	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) – Unwanted Emission

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:

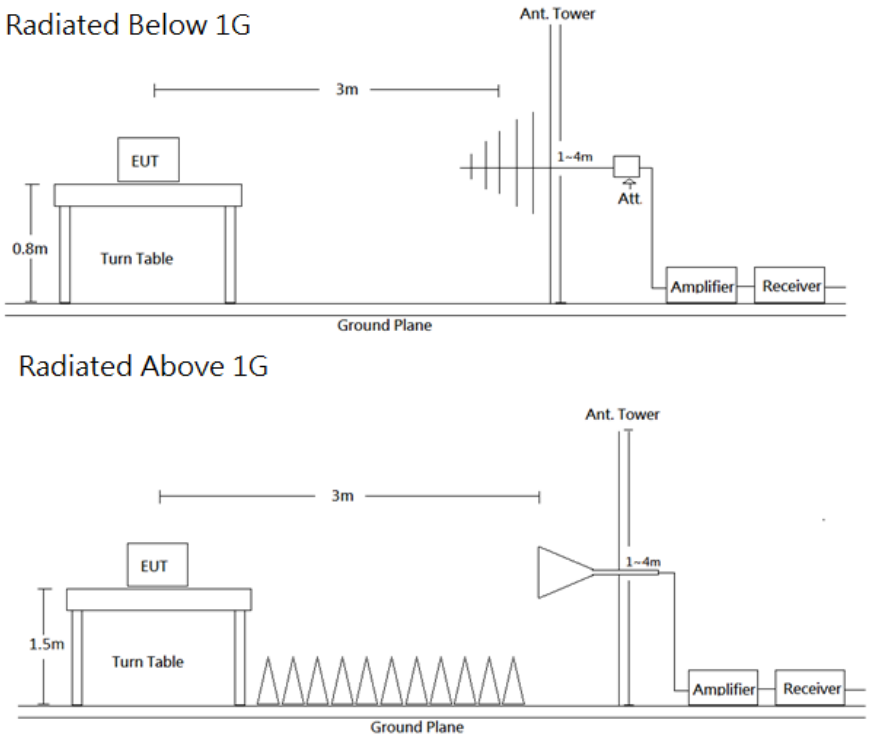
MHz	MHz	MHz	GHz
0.090-0.110	13.36-13.41	399.9-410	4.5-5.15
0.495-0.505	16.42-16.423	608-614	5.35-5.46
2.1735-2.1905	16.69475-16.69525	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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 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 15.407 Limits.

The system was investigated from 30 MHz to 40 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10-2013.

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

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

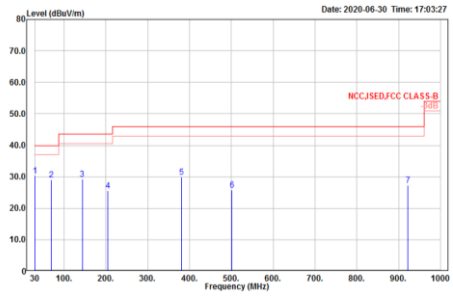
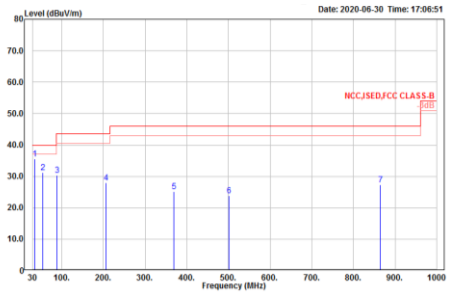
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Radiation 3M Room (966A)					
Active Loop	EMCO	6502	0001-3322	2020/03/16	2021/03/15
Bilog Antenna/6 dB Attenuator	SUNOL SCIENCES & EMEC /EMCI	JB3/N-6-06	A111513/AT-N0668	2020/03/19	2021/03/18
Horn Antenna	ETS-Lindgren	3115	00085775	2019/09/11	2020/09/10
Horn Antenna	ETS-Lindgren	3160-09	00123853	2019/09/12	2020/09/11
Preamplifier	A.H. Systems	PAM-0118	470	2020/03/16	2021/03/15
Preamplifier	A.H. Systems	PAM-1840VH	174	2020/03/25	2021/03/24
Signal Analyzer 40GHZ	Rohde & Schwarz	FSV40-N	102248	2019/09/11	2020/09/10
Microflex Cable (1m)	EMCI	EMC106-SM-SM-2000	180515	2019/08/07	2020/08/06
Microflex Cable (2m)	MTJ	H0919	00000-MT28A-100	2019/08/07	2020/08/06
Microflex Cable (8m)	UTIFLEX	UFA210A-1-3149-300300	MFR 64639 232490-001	2019/08/07	2020/08/06
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)					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
RF Cable	MTJ	MT40S	MT40S-001	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 Data and Test Plot

Transmitting mode (Pre-scan with three orthogonal axis, and worse case as X axis)

Below 1G (30 MHz-1 GHz) test the output power worst mode

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	30.000	30.32	40.00	-9.68	39.08	-8.76	Peak
2	69.770	29.11	40.00	-10.89	53.40	-24.29	Peak
3	143.490	29.25	43.50	-14.25	49.41	-20.16	Peak
4	204.600	25.57	43.50	-17.93	47.08	-21.51	Peak
5	380.170	29.92	46.00	-16.08	48.44	-18.52	Peak
6	500.450	25.88	46.00	-20.12	41.78	-15.90	Peak
7	922.400	27.27	46.00	-18.73	37.52	-10.25	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	34.850	35.49	40.00	-4.51	48.10	-12.61	QP
2	54.250	31.13	40.00	-8.87	54.97	-23.84	Peak
3	88.200	30.28	43.50	-13.22	55.39	-25.11	Peak
4	205.570	28.01	43.50	-15.49	49.73	-21.72	Peak
5	369.500	25.09	46.00	-20.91	43.81	-18.72	Peak
6	500.450	23.83	46.00	-22.17	39.73	-15.90	Peak
7	864.200	27.37	46.00	-18.63	38.10	-10.73	Peak

Level = Read Level + Factor

Over Limit = Level – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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

Above 1G (1 GHz-40 GHz) in UNII-1:

802.11a mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5146.750	53.76	54.00	-0.24	56.10	-2.34	Average
5146.750	69.26	74.00	-4.74	71.60	-2.34	Peak
5175.850	105.45			107.77	-2.32	Average
5175.850	115.43			117.75	-2.32	Peak
15540.000	53.72	74.00	-20.28	44.06	9.66	Peak
15540.000	41.69	54.00	-12.31	32.03	9.66	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5147.200	48.92	54.00	-5.08	51.26	-2.34	Average
5147.200	63.28	74.00	-10.72	65.62	-2.34	Peak
5185.600	98.15			100.47	-2.32	Average
5185.600	108.11			110.43	-2.32	Peak
!15540.000	51.75	74.00	-22.25	42.09	9.66	Peak
!15540.000	39.40	54.00	-14.60	29.74	9.66	Average

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5147.200	45.98	54.00	-8.02	48.32	-2.34	Average
5147.200	59.78	74.00	-14.22	62.12	-2.34	Peak
5196.800	106.18			108.50	-2.32	Average
5196.800	115.59			117.91	-2.32	Peak
5436.000	48.23	54.00	-5.77	49.86	-1.63	Average
5436.000	60.09	74.00	-13.91	61.72	-1.63	Peak
15600.000	56.38	74.00	-17.62	46.65	9.73	Peak
15600.000	43.40	54.00	-10.60	33.67	9.73	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5122.400	45.36	54.00	-8.64	47.71	-2.35	Average
5122.400	58.74	74.00	-15.26	61.09	-2.35	Peak
5198.000	99.54			101.86	-2.32	Average
5198.000	109.28			111.60	-2.32	Peak
5415.600	46.12	54.00	-7.88	47.82	-1.70	Average
5415.600	59.90	74.00	-14.10	61.60	-1.70	Peak
15600.000	54.42	74.00	-19.58	44.69	9.73	Peak
15600.000	41.67	54.00	-12.33	31.94	9.73	Average

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.000	46.16	54.00	-7.84	48.50	-2.34	Average
5148.000	59.31	74.00	-14.69	61.65	-2.34	Peak
5236.800	107.13			109.44	-2.31	Average
5236.800	117.21			119.52	-2.31	Peak
5398.800	47.59	54.00	-6.41	49.35	-1.76	Average
5398.800	59.98	74.00	-14.02	61.74	-1.76	Peak
15720.000	57.74	74.00	-16.26	47.93	9.81	Peak
15720.000	43.79	54.00	-10.21	33.98	9.81	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5106.800	45.16	54.00	-8.84	47.51	-2.35	Average
5106.800	58.70	74.00	-15.30	61.05	-2.35	Peak
5238.000	98.50			100.81	-2.31	Average
5238.000	108.14			110.45	-2.31	Peak
5354.000	45.50	54.00	-8.50	47.44	-1.94	Average
5354.000	59.54	74.00	-14.46	61.48	-1.94	Peak
15720.000	55.84	74.00	-18.16	46.03	9.81	Peak
15720.000	42.58	54.00	-11.42	32.77	9.81	Average

802.11ac VHT20 mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5146.600	53.61	54.00	-0.39	55.95	-2.34	Average
5146.600	69.51	74.00	-4.49	71.85	-2.34	Peak
5187.700	100.16			102.48	-2.32	Average
5187.700	109.80			112.12	-2.32	Peak
15540.000	57.32	74.00	-16.68	47.66	9.66	Peak
15540.000	42.27	54.00	-11.73	32.61	9.66	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5145.550	49.08	54.00	-4.92	51.42	-2.34	Average
5145.550	64.26	74.00	-9.74	66.60	-2.34	Peak
5175.250	97.89			100.21	-2.32	Average
5175.250	107.95			110.27	-2.32	Peak
15540.000	53.24	74.00	-20.76	43.58	9.66	Peak
15540.000	38.98	54.00	-15.02	29.32	9.66	Average

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5142.400	47.31	54.00	-6.69	49.65	-2.34	Average
5142.400	66.30	74.00	-7.70	68.64	-2.34	Peak
5195.600	104.89			107.21	-2.32	Average
5195.600	114.73			117.05	-2.32	Peak
5432.400	46.53	54.00	-7.47	48.18	-1.65	Average
5432.400	61.07	74.00	-12.93	62.72	-1.65	Peak
15600.000	58.94	74.00	-15.06	49.21	9.73	Peak
15600.000	44.12	54.00	-9.88	34.39	9.73	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.800	45.50	54.00	-8.50	47.83	-2.33	Average
5148.800	58.76	74.00	-15.24	61.09	-2.33	Peak
5195.600	98.52			100.84	-2.32	Average
5195.600	108.47			110.79	-2.32	Peak
5400.000	45.99	54.00	-8.01	47.75	-1.76	Average
5400.000	59.74	74.00	-14.26	61.50	-1.76	Peak
15600.000	55.77	74.00	-18.23	46.04	9.73	Peak
15600.000	40.58	54.00	-13.42	30.85	9.73	Average

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5140.800	45.21	54.00	-8.79	47.55	-2.34	Average
5140.800	59.02	74.00	-14.98	61.36	-2.34	Peak
5235.200	104.61			106.92	-2.31	Average
5235.200	114.45			116.76	-2.31	Peak
5405.200	46.44	54.00	-7.56	48.18	-1.74	Average
5405.200	61.29	74.00	-12.71	63.03	-1.74	Peak
!15720.000	58.32	74.00	-15.68	48.51	9.81	Peak
!15720.000	45.35	54.00	-8.65	35.54	9.81	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5128.400	44.98	54.00	-9.02	47.33	-2.35	Average
5128.400	59.01	74.00	-14.99	61.36	-2.35	Peak
5243.600	98.32			100.62	-2.30	Average
5243.600	108.26			110.56	-2.30	Peak
5448.800	46.10	54.00	-7.90	47.68	-1.58	Average
5448.800	59.50	74.00	-14.50	61.08	-1.58	Peak
15720.000	56.64	74.00	-17.36	46.83	9.81	Peak
15720.000	43.60	54.00	-10.40	33.79	9.81	Average

802.11ac VHT40 mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5141.840	48.76	54.00	-5.24	51.10	-2.34	Average
5141.840	63.07	74.00	-10.93	65.41	-2.34	Peak
5182.320	92.68			95.00	-2.32	Average
5182.320	102.92			105.24	-2.32	Peak
15570.000	56.37	74.00	-17.63	46.69	9.68	Peak
15570.000	41.66	54.00	-12.34	31.98	9.68	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5124.080	45.43	54.00	-8.57	47.78	-2.35	Average
5124.080	59.51	74.00	-14.49	61.86	-2.35	Peak
5196.880	85.43			87.75	-2.32	Average
5196.880	95.09			97.41	-2.32	Peak
15570.000	56.56	74.00	-17.44	46.88	9.68	Peak
15570.000	41.66	54.00	-12.34	31.98	9.68	Average

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5146.800	48.87	54.00	-5.13	51.21	-2.34	Average
5146.800	63.59	74.00	-10.41	65.93	-2.34	Peak
5222.400	101.78			104.10	-2.32	Average
5222.400	112.11			114.43	-2.32	Peak
5411.600	45.98	54.00	-8.02	47.69	-1.71	Average
5411.600	60.11	74.00	-13.89	61.82	-1.71	Peak
15690.000	57.54	74.00	-16.46	47.77	9.77	Peak
15690.000	43.64	54.00	-10.36	33.87	9.77	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5145.200	45.86	54.00	-8.14	48.20	-2.34	Average
5145.200	59.62	74.00	-14.38	61.96	-2.34	Peak
5222.400	95.22			97.54	-2.32	Average
5222.400	105.25			107.57	-2.32	Peak
5447.200	45.95	54.00	-8.05	47.54	-1.59	Average
5447.200	60.08	74.00	-13.92	61.67	-1.59	Peak
15690.000	57.43	74.00	-16.57	47.66	9.77	Peak
15690.000	43.42	54.00	-10.58	33.65	9.77	Average

802.11ac VHT80 mode:

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.800	53.41	54.00	-0.59	55.74	-2.33	Average
5148.800	68.85	74.00	-5.15	71.18	-2.33	Peak
5233.000	91.45			93.77	-2.32	Average
5233.000	102.05			104.37	-2.32	Peak
15630.000	56.79	74.00	-17.21	47.00	9.79	Peak
15630.000	43.74	54.00	-10.26	33.95	9.79	Average

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5145.200	47.29	54.00	-6.71	49.63	-2.34	Average
5145.200	60.97	74.00	-13.03	63.31	-2.34	Peak
5189.800	87.54			89.86	-2.32	Average
5189.800	98.30			100.62	-2.32	Peak
15630.000	56.00	74.00	-18.00	46.21	9.79	Peak
15630.000	43.48	54.00	-10.52	33.69	9.79	Average

Above 1G (1 GHz-40 GHz) in UNII-3:

802.11a mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5615.400	59.92	68.20	-8.28	61.01	-1.09	Peak
5689.920	66.00	97.77	-31.77	66.90	-0.90	Peak
5718.360	78.32	110.34	-32.02	79.13	-0.81	Peak
5739.600	116.23			116.98	-0.75	Peak
5869.920	62.64	106.62	-43.98	62.73	-0.09	Peak
5908.800	64.18	80.15	-15.97	64.06	0.12	Peak
5950.560	62.70	68.20	-5.50	62.35	0.35	Peak
11490.000	36.60	54.00	-17.40	29.17	7.43	Average
11490.000	48.66	74.00	-25.34	41.23	7.43	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5635.200	60.15	68.20	-8.05	61.18	-1.03	Peak
5685.600	60.25	94.58	-34.33	61.16	-0.91	Peak
5716.200	67.35	109.74	-42.39	68.16	-0.81	Peak
5740.320	106.13			106.88	-0.75	Peak
5868.840	62.76	106.92	-44.16	62.86	-0.10	Peak
5904.120	62.89	83.61	-20.72	62.80	0.09	Peak
5938.320	63.02	68.20	-5.18	62.74	0.28	Peak
11490.000	35.69	54.00	-18.31	28.26	7.43	Average
11490.000	48.86	74.00	-25.14	41.43	7.43	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5630.160	60.92	68.20	-7.28	61.96	-1.04	Peak
5681.640	60.59	91.65	-31.06	61.51	-0.92	Peak
5711.880	61.43	108.53	-47.10	62.25	-0.82	Peak
5781.720	116.57			117.12	-0.55	Peak
5866.680	62.57	107.53	-44.96	62.68	-0.11	Peak
5919.240	62.77	72.45	-9.68	62.60	0.17	Peak
5950.920	63.65	68.20	-4.55	63.30	0.35	Peak
11570.000	37.31	54.00	-16.69	29.84	7.47	Average
11570.000	49.96	74.00	-24.04	42.49	7.47	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5634.120	59.87	68.20	-8.33	60.91	-1.04	Peak
5694.240	60.87	100.95	-40.08	61.75	-0.88	Peak
5718.000	59.98	110.24	-50.26	60.79	-0.81	Peak
5787.120	106.81			107.34	-0.53	Peak
5870.640	61.62	106.42	-44.80	61.70	-0.08	Peak
5896.920	62.81	88.94	-26.13	62.75	0.06	Peak
5963.520	63.02	68.20	-5.18	62.60	0.42	Peak
11570.000	36.90	54.00	-17.10	29.43	7.47	Average
11570.000	50.00	74.00	-24.00	42.53	7.47	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5637.720	60.66	68.20	-7.54	61.69	-1.03	Peak
5666.520	61.06	80.46	-19.40	62.02	-0.96	Peak
5701.800	60.79	105.70	-44.91	61.65	-0.86	Peak
5822.040	117.33			117.67	-0.34	Peak
5857.320	78.00	110.15	-32.15	78.15	-0.15	Peak
5877.480	68.86	103.36	-34.50	68.90	-0.04	Peak
5957.040	62.85	68.20	-5.35	62.47	0.38	Peak
11650.000	37.42	54.00	-16.58	29.85	7.57	Average
11650.000	50.59	74.00	-23.41	43.02	7.57	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5629.800	60.09	68.20	-8.11	61.14	-1.05	Peak
5684.880	60.27	94.05	-33.78	61.18	-0.91	Peak
5711.160	60.19	108.33	-48.14	61.02	-0.83	Peak
5827.080	107.26			107.58	-0.32	Peak
5857.680	70.11	110.05	-39.94	70.26	-0.15	Peak
5914.200	63.14	76.17	-13.03	62.99	0.15	Peak
5967.120	62.76	68.20	-5.44	62.32	0.44	Peak
11650.000	37.94	54.00	-16.06	30.37	7.57	Average
11650.000	50.23	74.00	-23.77	42.66	7.57	Peak

802.11ac VHT20 mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5631.240	61.12	68.20	-7.08	62.16	-1.04	Peak
5697.120	69.58	103.08	-33.50	70.45	-0.87	Peak
5718.360	78.44	110.34	-31.90	79.25	-0.81	Peak
5748.240	115.18			115.91	-0.73	Peak
5860.920	62.32	109.14	-46.82	62.45	-0.13	Peak
5909.520	64.02	79.62	-15.60	63.90	0.12	Peak
5934.360	62.91	68.20	-5.29	62.66	0.25	Peak
11490.000	37.14	54.00	-16.86	29.71	7.43	Average
11490.000	50.35	74.00	-23.65	42.92	7.43	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5633.040	60.11	68.20	-8.09	61.15	-1.04	Peak
5698.200	64.88	103.87	-38.99	65.75	-0.87	Peak
5718.720	70.22	110.44	-40.22	71.03	-0.81	Peak
5740.320	105.55			106.30	-0.75	Peak
5860.920	61.90	109.14	-47.24	62.03	-0.13	Peak
5883.960	62.99	98.55	-35.56	63.00	-0.01	Peak
5928.600	62.39	68.20	-5.81	62.17	0.22	Peak
11490.000	37.14	54.00	-16.86	29.71	7.43	Average
11490.000	50.42	74.00	-23.58	42.99	7.43	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5626.200	61.53	68.20	-6.67	62.59	-1.06	Peak
5692.800	61.15	99.89	-38.74	62.03	-0.88	Peak
5712.600	62.68	108.73	-46.05	63.50	-0.82	Peak
5788.560	115.93			116.45	-0.52	Peak
5857.320	67.66	110.15	-42.49	67.81	-0.15	Peak
5907.000	63.27	81.48	-18.21	63.16	0.11	Peak
5940.840	63.83	68.20	-4.37	63.54	0.29	Peak
11570.000	37.92	54.00	-16.08	30.45	7.47	Average
11570.000	51.17	74.00	-22.83	43.70	7.47	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5634.480	59.81	68.20	-8.39	60.84	-1.03	Peak
5675.520	60.82	87.13	-26.31	61.75	-0.93	Peak
5707.200	60.95	107.22	-46.27	61.80	-0.85	Peak
5788.560	106.88			107.40	-0.52	Peak
5860.920	62.38	109.14	-46.76	62.51	-0.13	Peak
5881.440	62.82	100.42	-37.60	62.84	-0.02	Peak
5963.520	62.82	68.20	-5.38	62.40	0.42	Peak
11570.000	37.08	54.00	-16.92	29.61	7.47	Average
11570.000	50.39	74.00	-23.61	42.92	7.47	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5629.800	59.99	68.20	-8.21	61.04	-1.05	Peak
5682.720	61.01	92.45	-31.44	61.93	-0.92	Peak
5703.240	60.51	106.11	-45.60	61.36	-0.85	Peak
5828.520	115.54			115.85	-0.31	Peak
5856.600	80.98	110.35	-29.37	81.13	-0.15	Peak
5882.520	69.05	99.62	-30.57	69.07	-0.02	Peak
5954.160	63.00	68.20	-5.20	62.63	0.37	Peak
11650.000	37.31	54.00	-16.69	29.74	7.57	Average
11650.000	50.65	74.00	-23.35	43.08	7.57	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5619.360	60.06	68.20	-8.14	61.14	-1.08	Peak
5685.600	60.47	94.58	-34.11	61.38	-0.91	Peak
5707.560	61.93	107.32	-45.39	62.78	-0.85	Peak
5828.520	101.48			101.79	-0.31	Peak
5856.960	63.67	110.25	-46.58	63.82	-0.15	Peak
5887.200	62.52	96.14	-33.62	62.52	0.00	Peak
5950.560	62.31	68.20	-5.89	61.96	0.35	Peak
11650.000	37.68	54.00	-16.32	30.11	7.57	Average
11650.000	50.57	74.00	-23.43	43.00	7.57	Peak

802.11ac VHT40 mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5646.720	60.96	68.20	-7.24	61.97	-1.01	Peak
5697.840	72.17	103.61	-31.44	73.04	-0.87	Peak
5715.120	87.10	109.44	-22.34	87.92	-0.82	Peak
5761.920	112.93			113.59	-0.66	Peak
5855.160	68.83	110.76	-41.93	68.99	-0.16	Peak
5877.120	66.15	103.62	-37.47	66.19	-0.04	Peak
5929.320	62.79	68.20	-5.41	62.57	0.22	Peak
11510.000	36.90	54.00	-17.10	29.46	7.44	Average
11510.000	50.30	74.00	-23.70	42.86	7.44	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5626.200	60.86	68.20	-7.34	61.92	-1.06	Peak
5698.560	63.55	104.14	-40.59	64.42	-0.87	Peak
5718.720	78.09	110.44	-32.35	78.90	-0.81	Peak
5747.520	102.38			103.11	-0.73	Peak
5859.840	62.02	109.44	-47.42	62.16	-0.14	Peak
5880.720	62.58	100.95	-38.37	62.60	-0.02	Peak
5960.280	62.73	68.20	-5.47	62.33	0.40	Peak
11510.000	37.29	54.00	-16.71	29.85	7.44	Average
11510.000	50.91	74.00	-23.09	43.47	7.44	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5618.640	60.79	68.20	-7.41	61.87	-1.08	Peak
5698.560	64.30	104.14	-39.84	65.17	-0.87	Peak
5719.080	68.72	110.54	-41.82	69.53	-0.81	Peak
5787.480	112.73			113.26	-0.53	Peak
5856.240	75.22	110.45	-35.23	75.37	-0.15	Peak
5884.680	65.03	98.01	-32.98	65.04	-0.01	Peak
5941.560	62.69	68.20	-5.51	62.40	0.29	Peak
11590.000	37.83	54.00	-16.17	30.34	7.49	Average
11590.000	50.72	74.00	-23.28	43.23	7.49	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5619.360	60.18	68.20	-8.02	61.26	-1.08	Peak
5675.880	60.47	87.39	-26.92	61.40	-0.93	Peak
5716.200	60.51	109.74	-49.23	61.32	-0.81	Peak
5801.880	100.15			100.60	-0.45	Peak
5861.280	63.84	109.04	-45.20	63.97	-0.13	Peak
5887.560	62.13	95.88	-33.75	62.12	0.01	Peak
5943.360	62.44	68.20	-5.76	62.14	0.30	Peak
11590.000	37.14	54.00	-16.86	29.65	7.49	Average
11590.000	50.18	74.00	-23.82	42.69	7.49	Peak

802.11ac VHT80 mode:

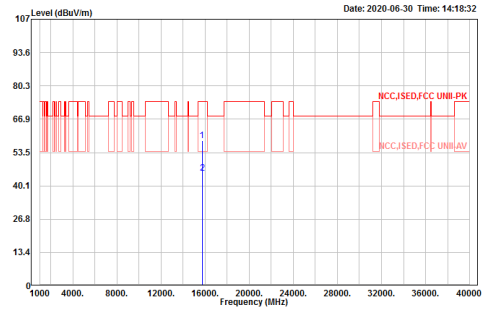
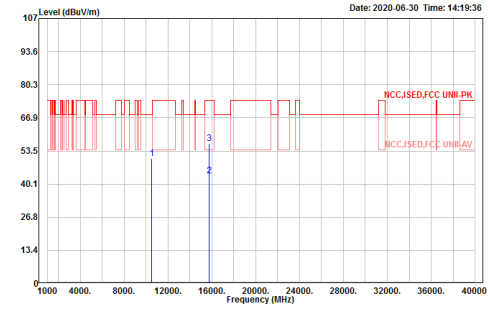
Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5636.280	64.61	68.20	-3.59	65.64	-1.03	Peak
5695.320	77.79	101.75	-23.96	78.67	-0.88	Peak
5716.200	80.64	109.74	-29.10	81.45	-0.81	Peak
5750.400	106.84			107.56	-0.72	Peak
5856.600	76.39	110.35	-33.96	76.54	-0.15	Peak
5885.040	70.65	97.75	-27.10	70.66	-0.01	Peak
5930.400	63.94	68.20	-4.26	63.71	0.23	Peak
11550.000	38.28	54.00	-15.72	30.81	7.47	Average
11550.000	50.86	74.00	-23.14	43.39	7.47	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5638.440	60.91	68.20	-7.29	61.94	-1.03	Peak
5694.240	62.73	100.95	-38.22	63.61	-0.88	Peak
5710.800	64.87	108.23	-43.36	65.70	-0.83	Peak
5755.080	94.94			95.63	-0.69	Peak
5864.880	64.19	108.03	-43.84	64.30	-0.11	Peak
5903.040	62.92	84.41	-21.49	62.84	0.08	Peak
5935.080	62.18	68.20	-6.02	61.93	0.25	Peak
11550.000	37.83	54.00	-16.17	30.36	7.47	Average
11550.000	49.87	74.00	-24.13	42.40	7.47	Peak

Above 1G (1 GHz-40 GHz): test the worst mode: 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	!15720.000	58.32	74.00	-15.68	48.51	9.81	Peak
2	!15720.000	45.35	54.00	-8.65	35.54	9.81	Average

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	!15720.000	56.64	74.00	-17.36	46.83	9.81	Peak
2	!15720.000	43.60	54.00	-10.40	33.79	9.81	Average

Level = Read Level + Factor

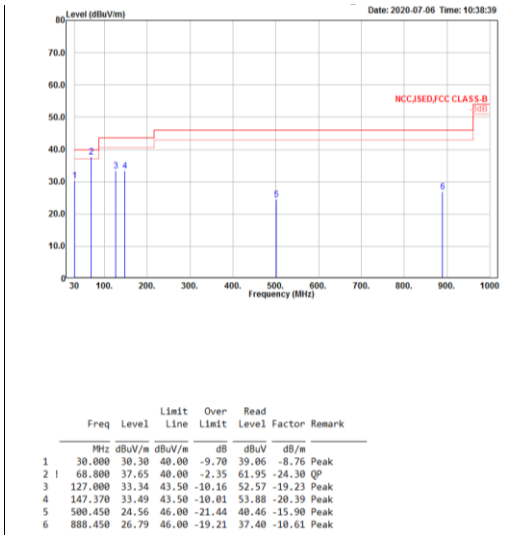
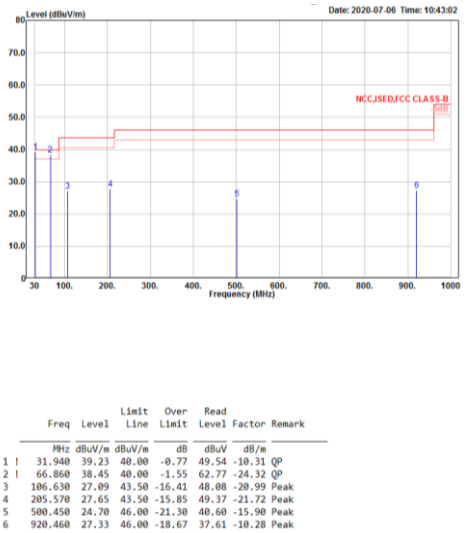
Over Limit = Level – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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

Co-Location:

30MHz -1G

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	30.000	30.30	40.00	-9.70	39.06	-8.76	Peak
2	! 68.800	37.65	40.00	-2.35	61.95	-24.30	QP
3	127.000	33.34	43.50	-10.16	52.57	-19.23	Peak
4	147.370	33.49	43.50	-10.01	53.88	-20.39	Peak
5	500.450	24.56	46.00	-21.44	40.46	-15.90	Peak
6	888.450	26.79	46.00	-19.21	37.40	-10.61	Peak

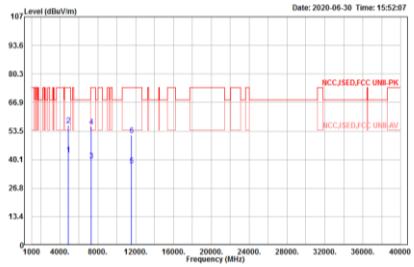
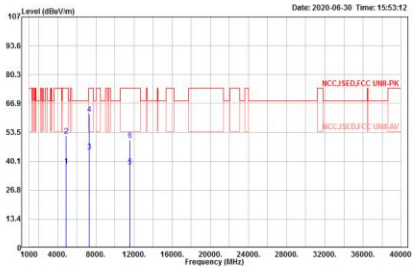
	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	! 31.940	39.23	40.00	-0.77	49.54	-10.31	QP
2	! 66.860	38.45	40.00	-1.55	62.77	-24.32	QP
3	106.630	27.09	43.50	-16.41	48.08	-20.99	Peak
4	205.570	27.65	43.50	-15.85	49.37	-21.72	Peak
5	500.450	24.70	46.00	-21.30	40.60	-15.90	Peak
6	920.460	27.33	46.00	-18.67	37.61	-10.28	Peak

Level = Read Level + Factor; Over Limit = Level – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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

1GHz -40G

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 !	4874.000	42.63	54.00	-11.37	45.51	-2.88	Average
2 !	4874.000	56.11	74.00	-17.89	58.99	-2.88	Peak
3 !	7311.000	39.59	54.00	-14.41	35.61	3.98	Average
4 !	7311.000	55.63	74.00	-18.37	51.65	3.98	Peak
5 !	11570.000	37.35	54.00	-16.65	29.88	7.47	Average
6	11570.000	51.48	74.00	-22.52	44.01	7.47	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 !	4874.000	38.09	54.00	-15.91	40.97	-2.88	Average
2	4874.000	51.98	74.00	-22.02	54.86	-2.88	Peak
3 !	7311.000	44.65	54.00	-9.35	40.67	3.98	Average
4 !	7311.000	62.15	74.00	-11.85	58.17	3.98	Peak
5 !	11570.000	37.77	54.00	-16.23	30.30	7.47	Average
6	11570.000	49.96	74.00	-24.04	42.49	7.47	Peak

Level = Read Level + Factor;

Over Limit = Level – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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

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

As per 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

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

Emission Bandwidth (EBW)

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 26 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%;

99% Occupied Bandwidth

The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99% occupied bandwidth is *required* only as a condition for using the optional band-edge measurement techniques described in II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.

2. Set span = 1.5 times to 5.0 times the OBW.

3. Set RBW = 1 % to 5 % of the OBW

4. Set VBW ≥ 3 · RBW

5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

6. Use the 99 % power bandwidth function of the instrument (if available).

7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

8.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
RF Cable	MTJ	MT40S	MT40S-001	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 Data and Test Plot

UNII-1

Mode	Channel	Frequency (MHz)	26dB Emission Bandwidth (MHz)	
			Chain 0	Chain 1
802.11a	36	5180	18.52	18.44
	40	5200	18.48	18.60
	48	5240	18.44	18.48
802.11ac20	36	5180	19.68	19.80
	40	5200	19.68	19.72
	48	5240	19.68	19.68
802.11ac 40	38	5190	42.00	42.08
	46	5230	41.92	42.00
802.11ac 80	42	5210	82.56	82.24

UNII-3

Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)		Limit (MHz)
			Chain 0	Chain 1	
802.11a	149	5745	16.48	16.44	>0.5
	157	5785	16.44	16.48	>0.5
	165	5825	16.48	16.44	>0.5
802.11ac20	149	5745	17.64	17.64	>0.5
	157	5785	17.64	17.64	>0.5
	165	5825	17.64	17.64	>0.5
802.11ac 40	151	5755	36.40	36.40	>0.5
	159	5795	36.40	36.40	>0.5
802.11ac 80	155	5775	76.32	76.48	>0.5

UNII-1

Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
			Chain 0	Chain 1
802.11a	36	5180	16.40	16.36
	40	5200	16.36	16.40
	48	5240	16.36	16.40
802.11ac20	36	5180	17.60	17.60
	40	5200	17.56	17.60
	48	5240	17.56	17.60
802.11ac 40	38	5190	36.24	36.32
	46	5230	36.24	36.24
802.11ac 80	42	5210	75.36	75.36

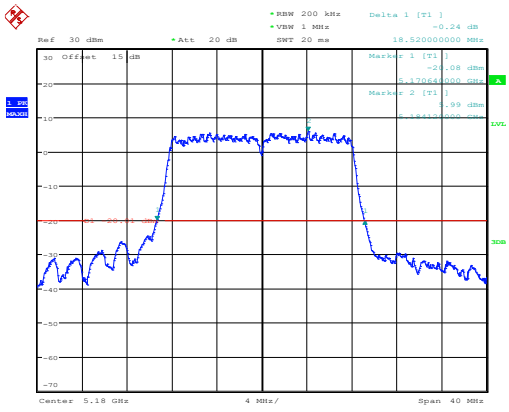
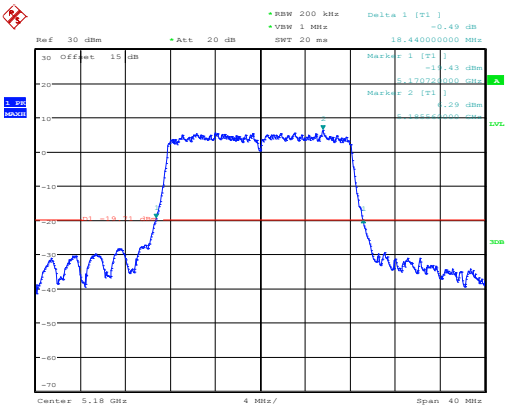
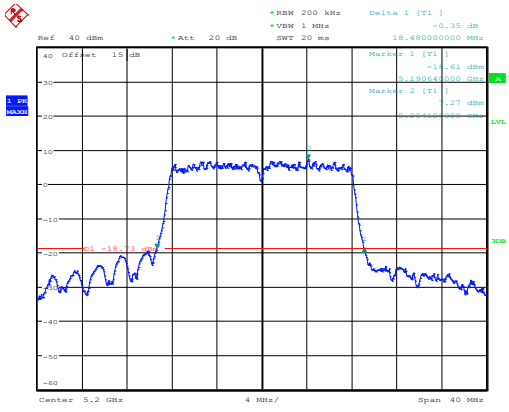
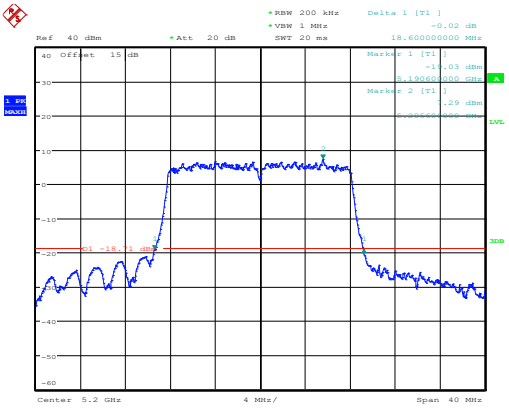
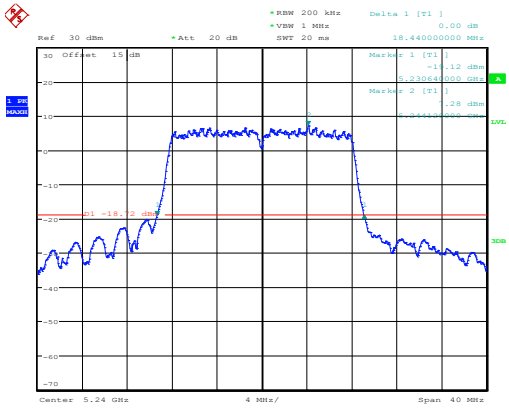
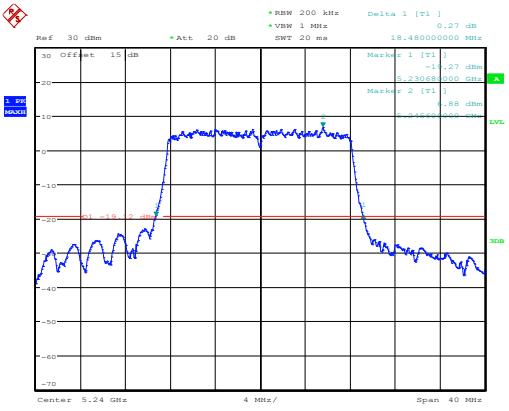
UNII-3

Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
			Chain 0	Chain 1
802.11a	149	5745	16.56	16.52
	157	5785	16.60	16.52
	165	5825	16.60	16.52
802.11ac20	149	5745	17.64	17.64
	157	5785	17.72	17.68
	165	5825	17.72	17.68
802.11ac 40	151	5755	36.56	36.56
	159	5795	36.72	36.40
802.11ac 80	155	5775	76.96	75.68

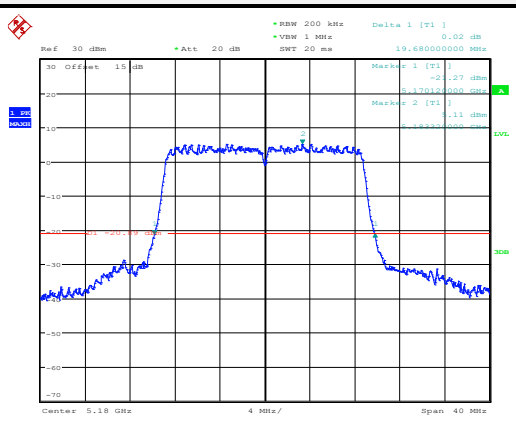
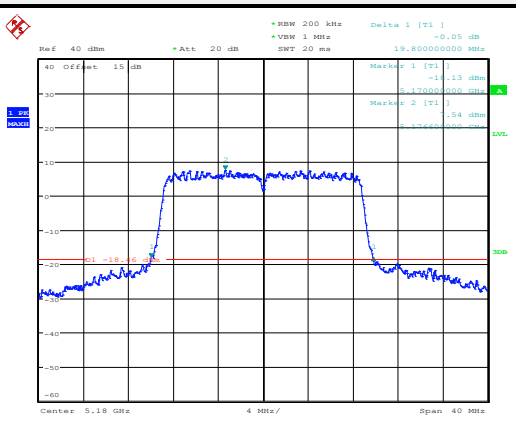
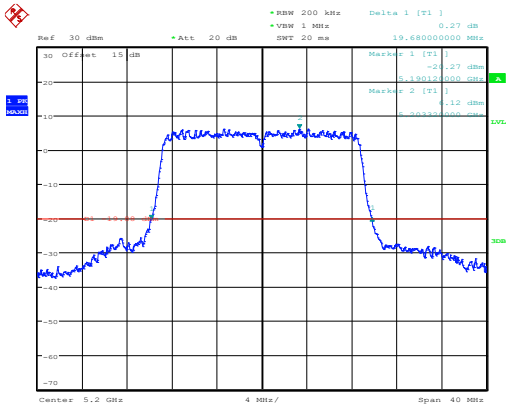
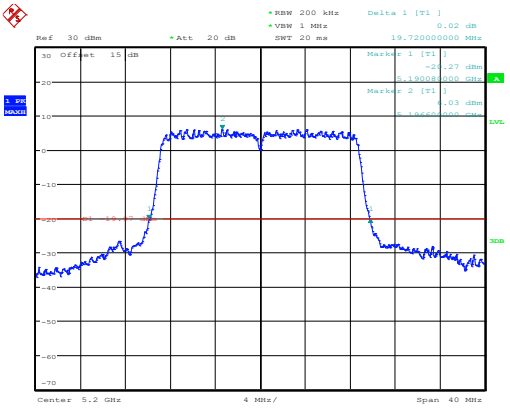
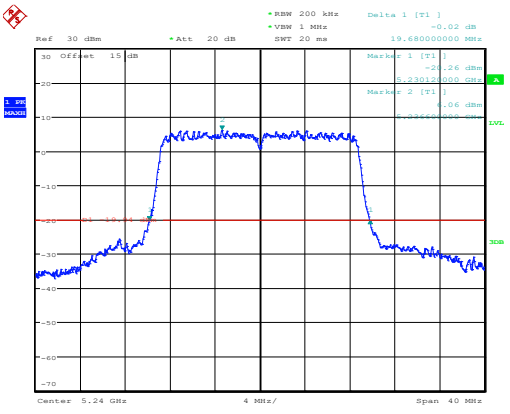
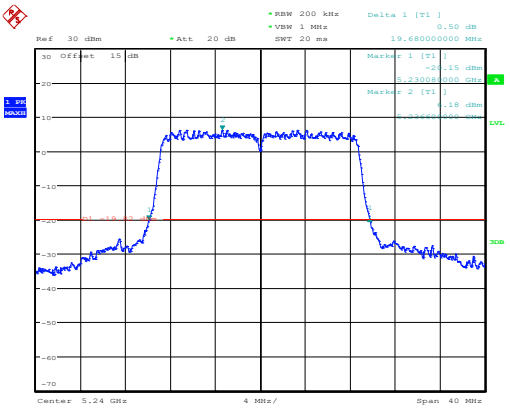
26 dB Bandwidth and 6 dB Bandwidth

For UNII-1

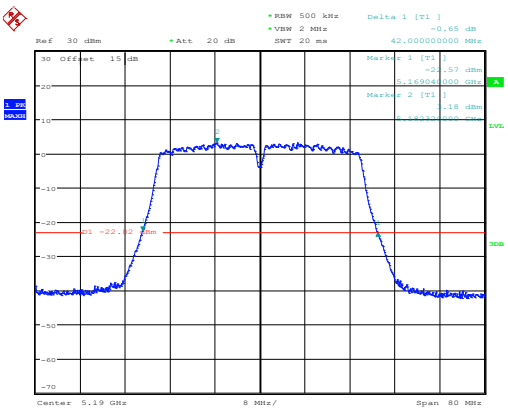
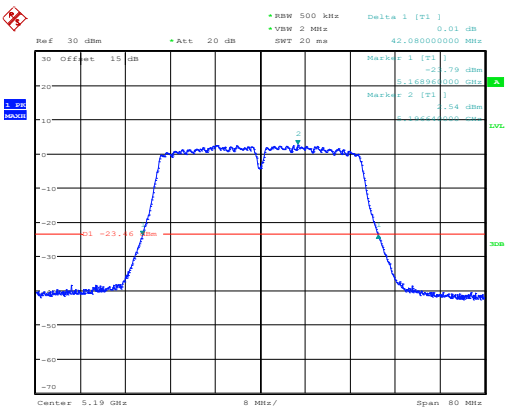
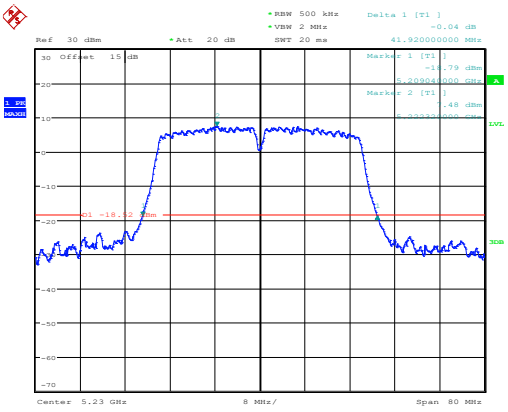
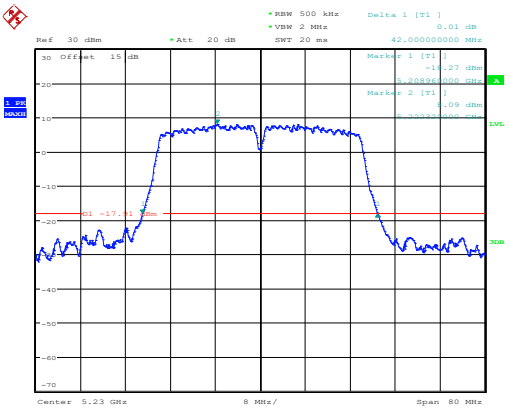
802.11a mode

Chain 0	Chain 1
Low CH	**Low CH**
	
Date: 7.JUL.2020 11:59:52	Date: 7.JUL.2020 12:27:41
Middle CH	**Middle CH**
	
Date: 7.JUL.2020 11:55:47	Date: 7.JUL.2020 12:29:28
High CH	**High CH**
	
Date: 7.JUL.2020 11:57:56	Date: 7.JUL.2020 12:31:17

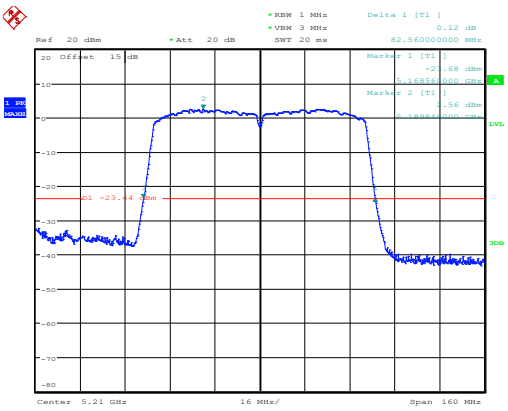
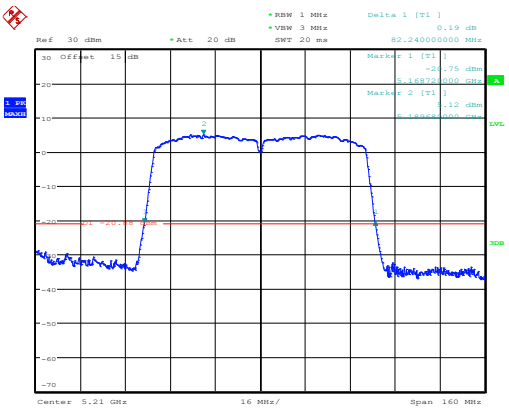
802.11ac VHT20 mode:

Chain 0	Chain 1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

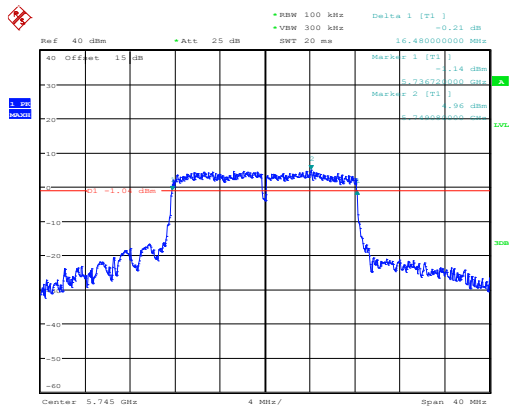
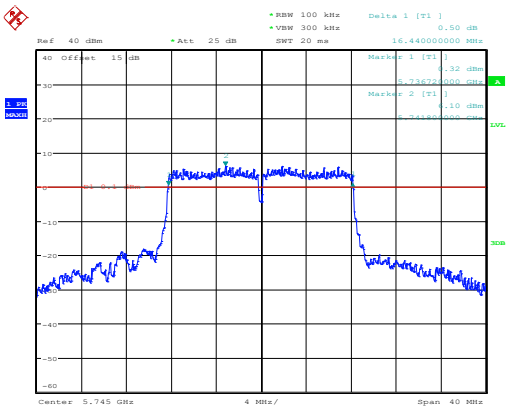
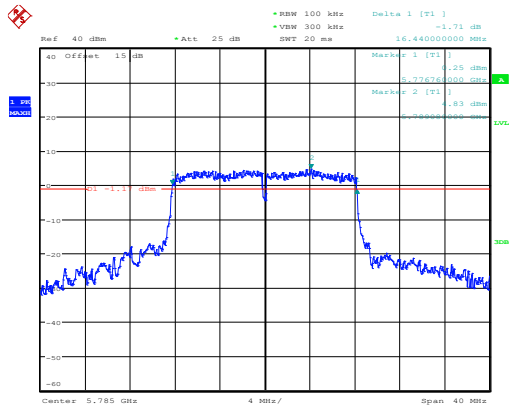
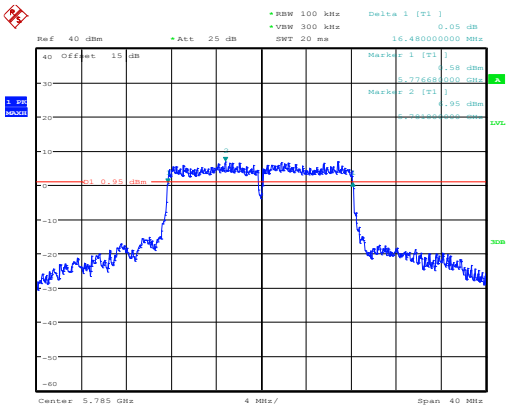
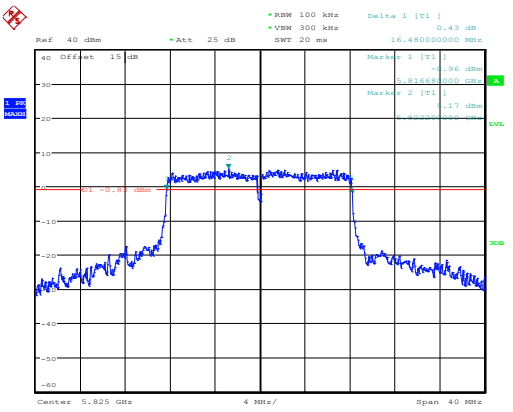
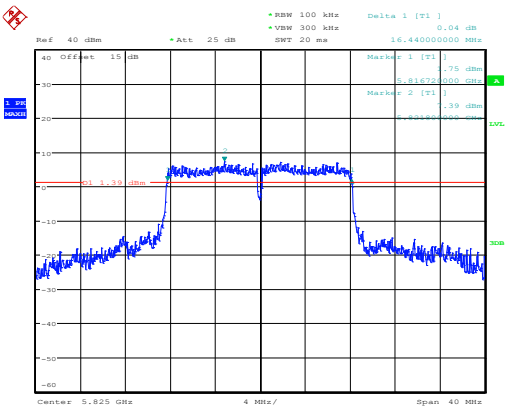
Chain 0	Chain 1
Low CH	Low CH
	
High CH	High CH
	

802.11ac VHT80 mode:

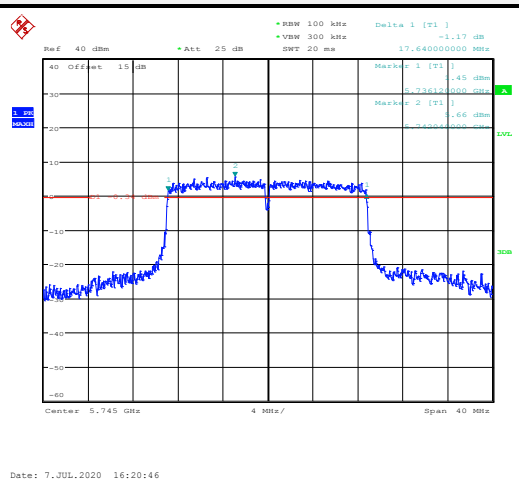
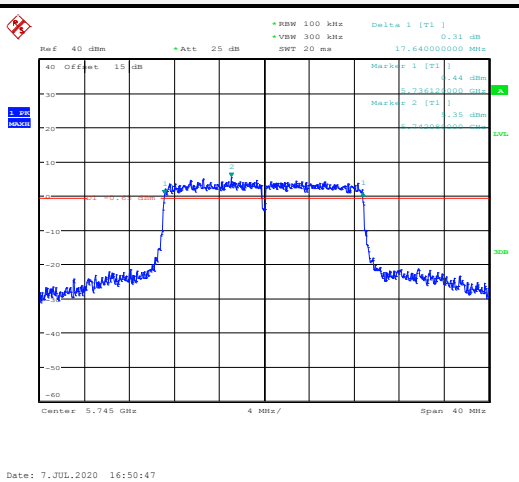
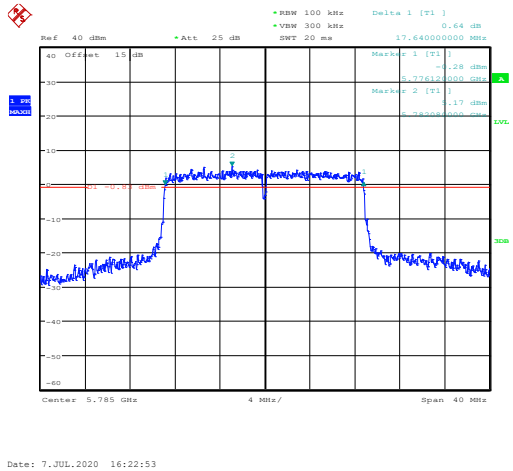
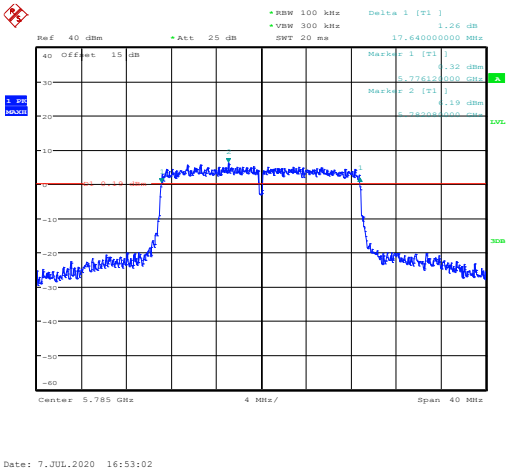
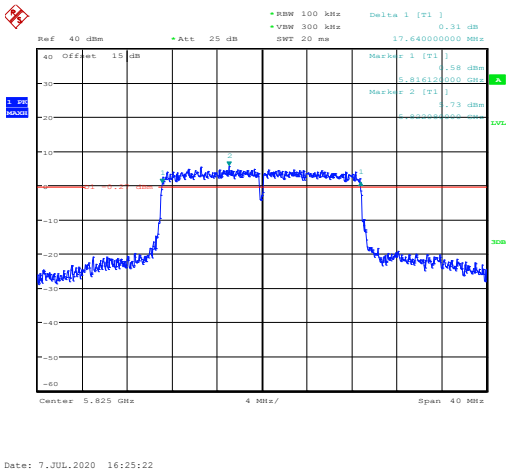
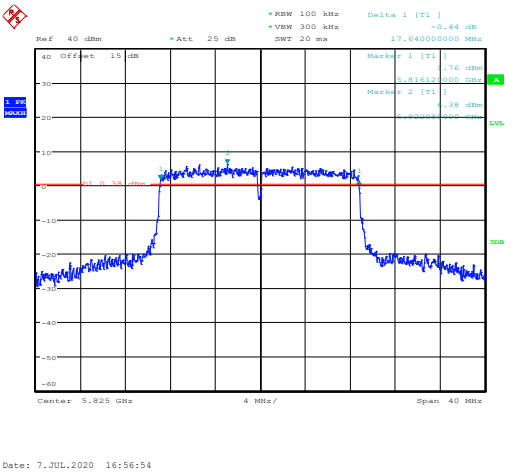
Chain 0	Chain 1
	

For UNII-3

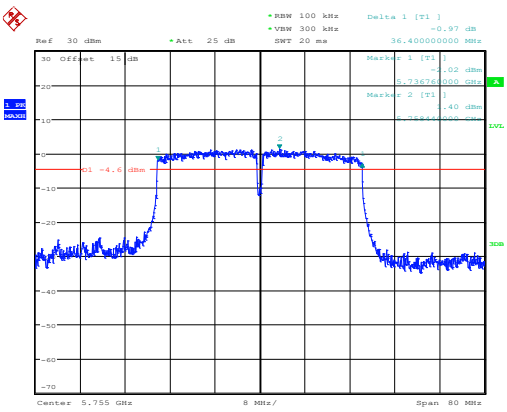
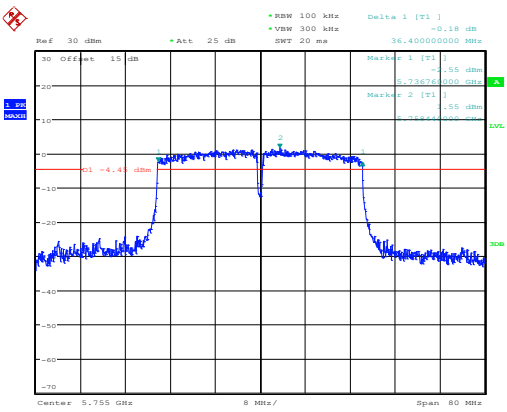
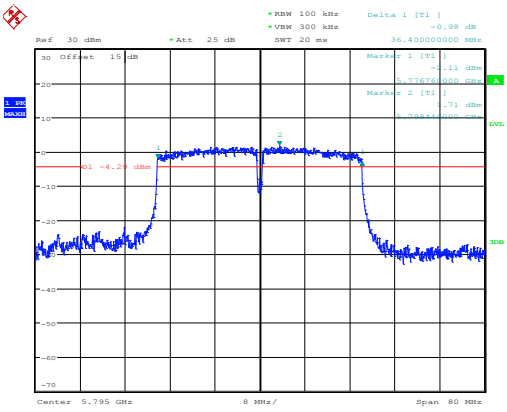
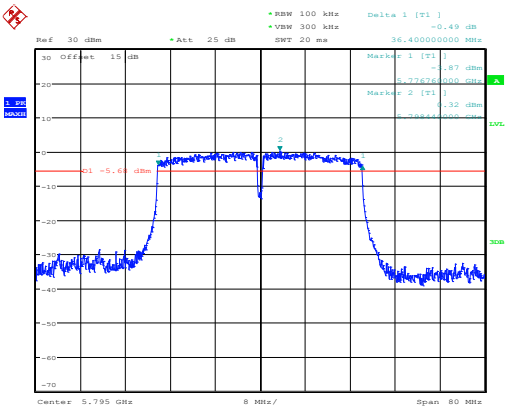
802.11a mode

Chain 0	Chain 1
Low CH	**Low CH**
	
Date: 7.JUL.2020 16:10:36	Date: 7.JUL.2020 16:36:48
Middle CH	**Middle CH**
	
Date: 7.JUL.2020 16:13:28	Date: 7.JUL.2020 16:44:20
High CH	**High CH**
	
Date: 7.JUL.2020 16:16:04	Date: 7.JUL.2020 16:46:34

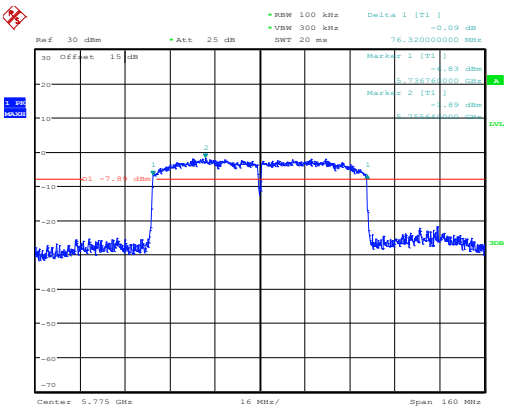
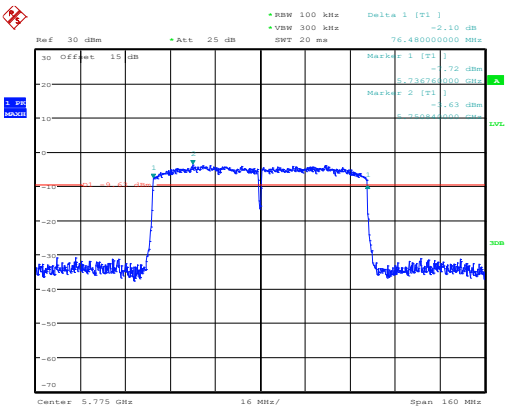
802.11ac VHT20 mode:

Chain 0	Chain 1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

Chain 0	Chain 1
Low CH	Low CH
	
High CH	High CH
	

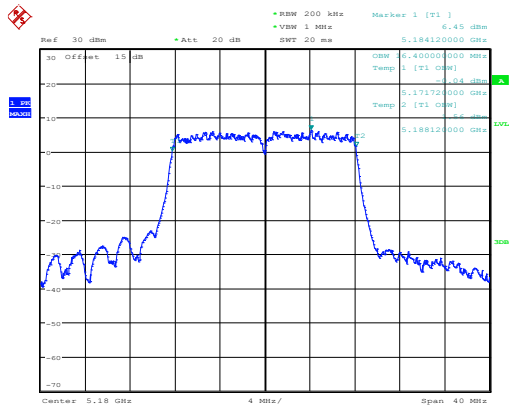
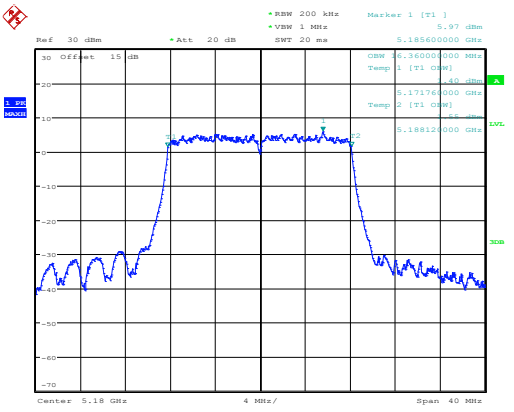
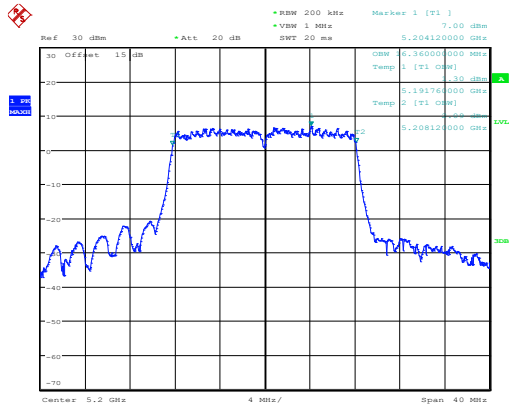
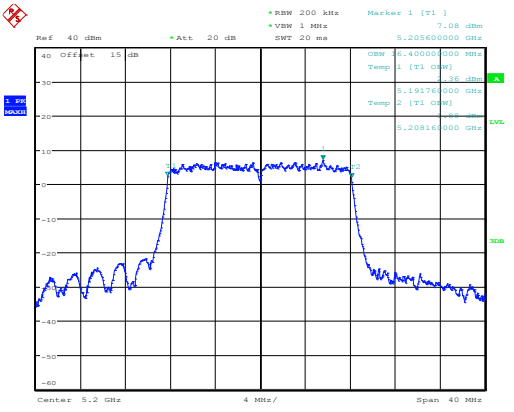
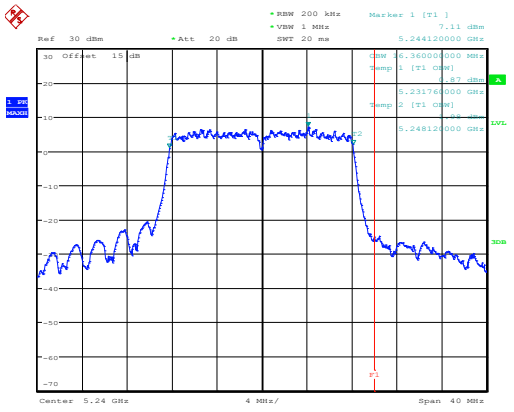
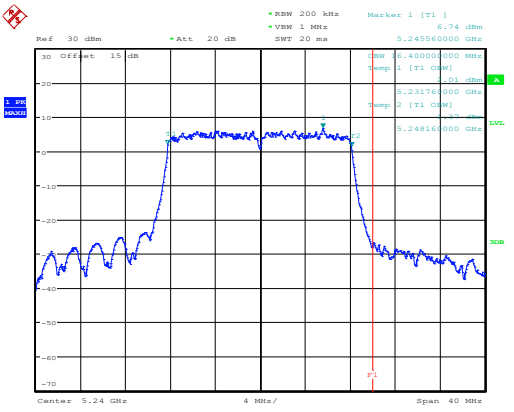
802.11ac VHT80 mode:

Chain 0	Chain 1
	

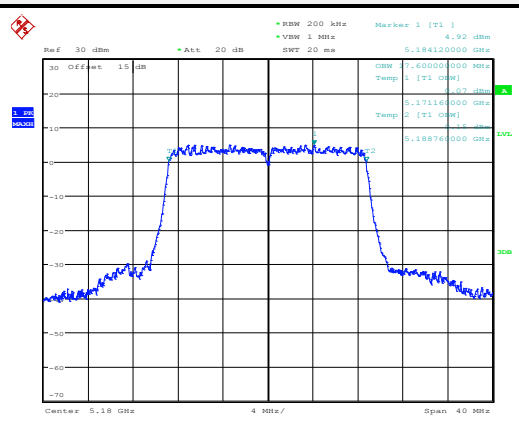
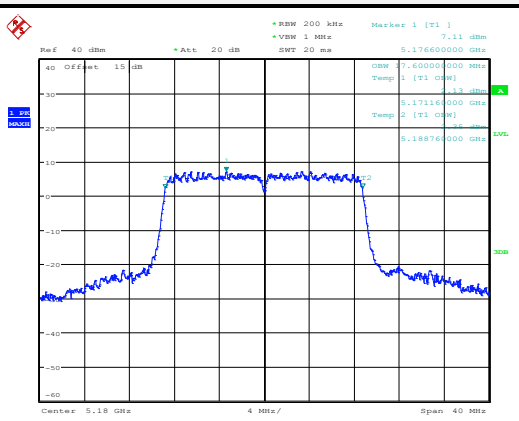
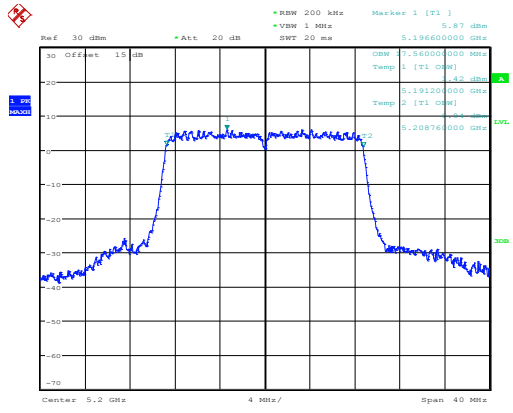
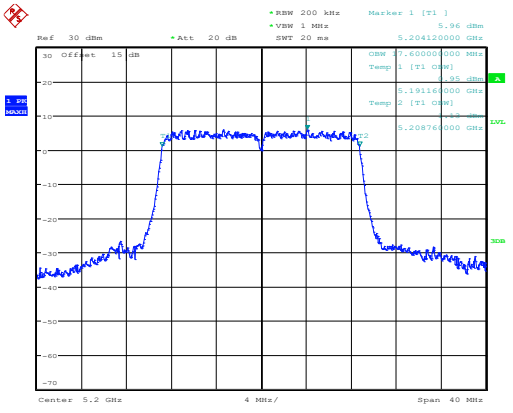
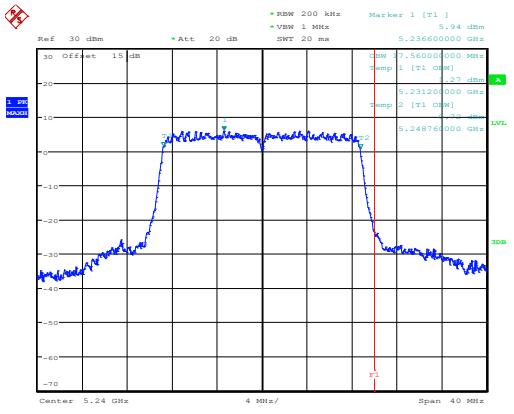
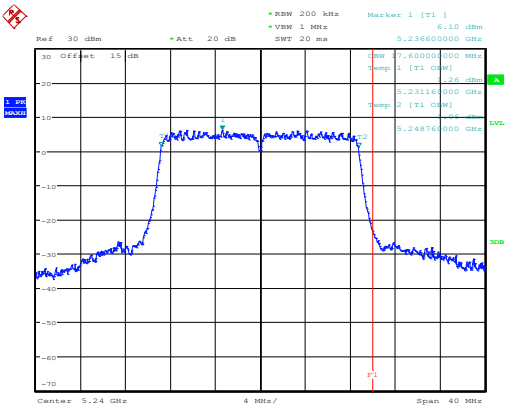
Occupied Bandwidth

For UNII-1

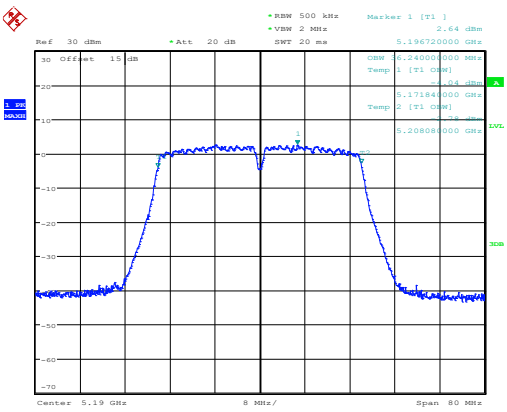
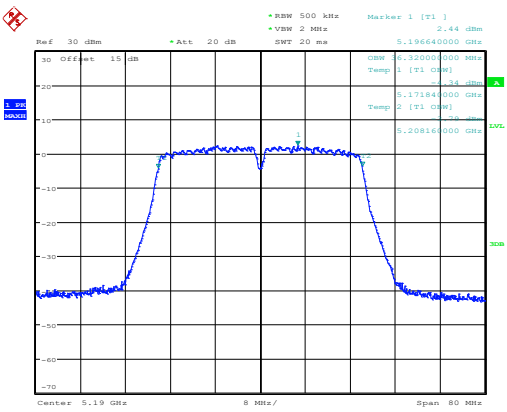
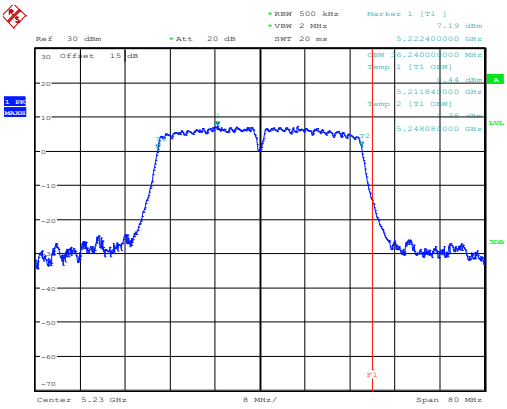
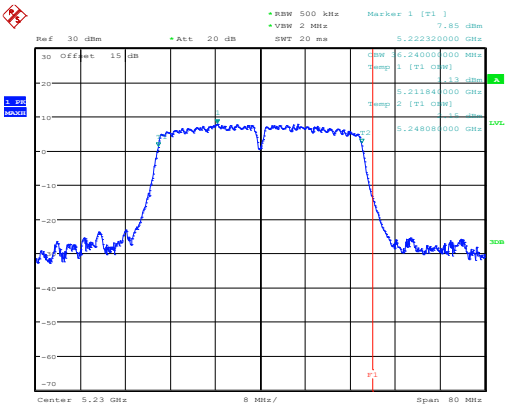
802.11a mode

Chain 0	Chain 1
Low CH	Low CH
	
Date: 7.JUL.2020 11:54:13	Date: 7.JUL.2020 12:28:29
Middle CH	Middle CH
	
Date: 7.JUL.2020 11:56:35	Date: 7.JUL.2020 12:30:16
High CH	High CH
	
Date: 7.JUL.2020 11:58:45	Date: 7.JUL.2020 12:32:06

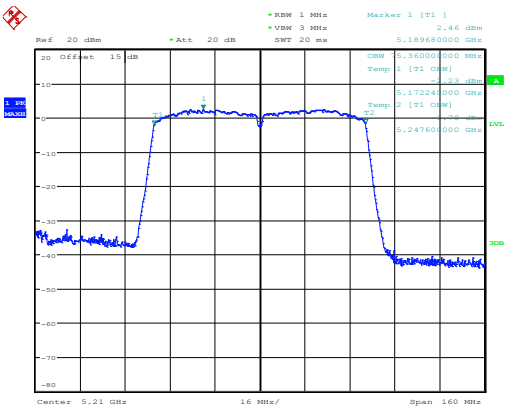
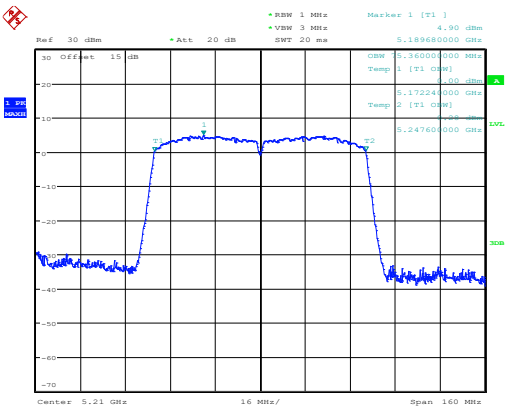
802.11ac VHT20 mode:

Chain 0	Chain 1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

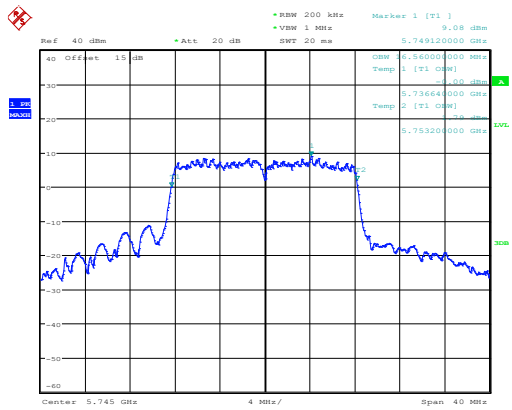
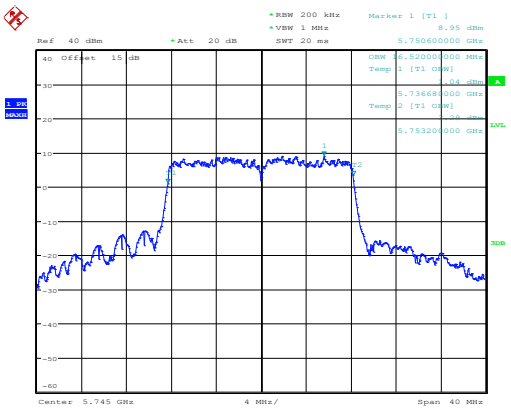
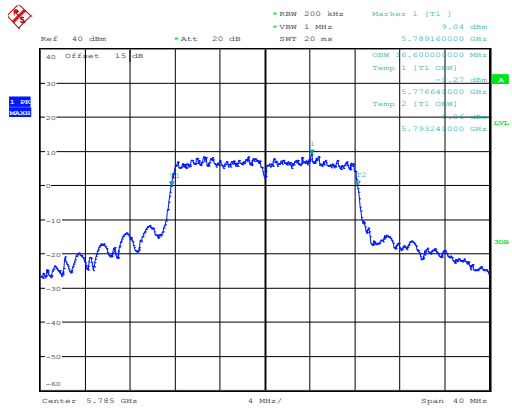
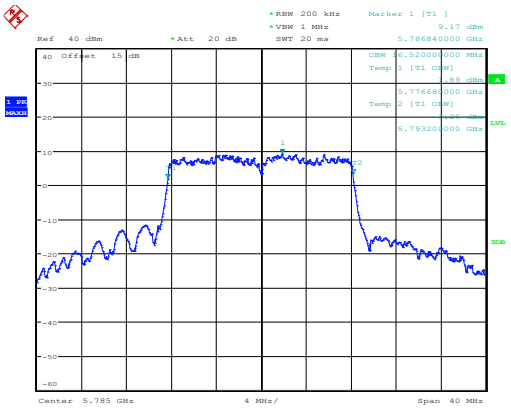
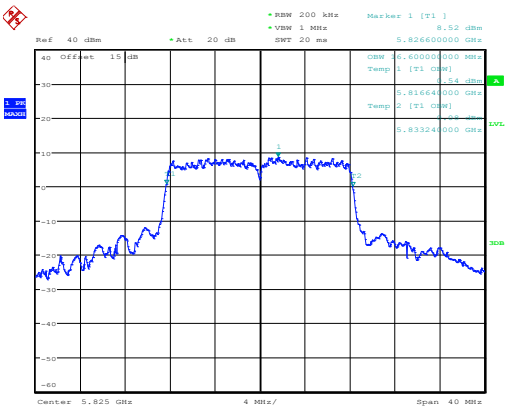
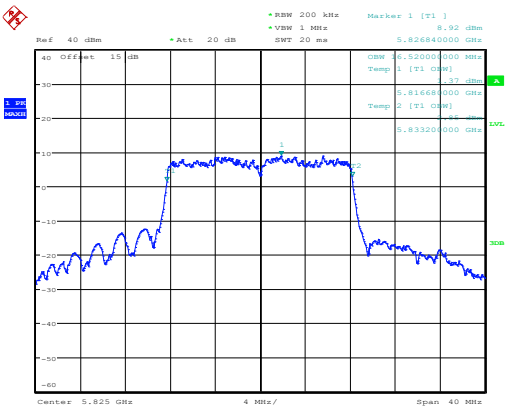
Chain 0	Chain 1
Low CH	Low CH
	
High CH	High CH
	

802.11ac VHT80 mode:

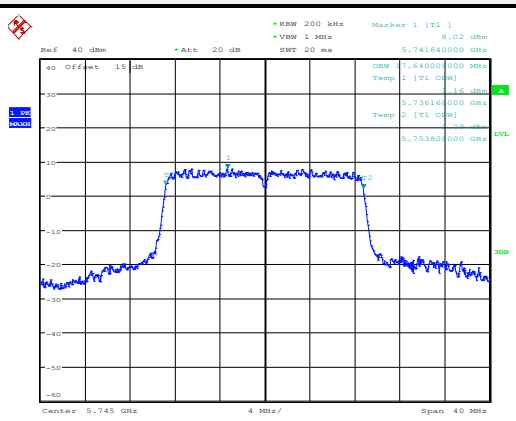
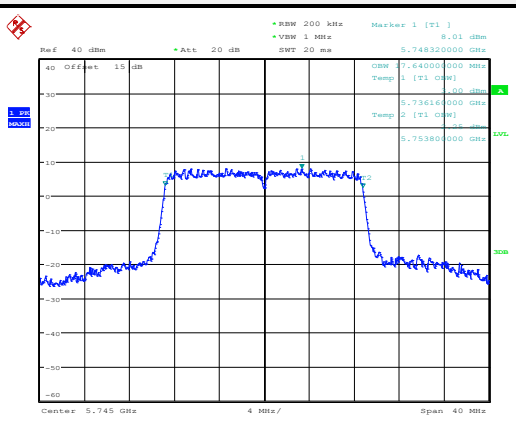
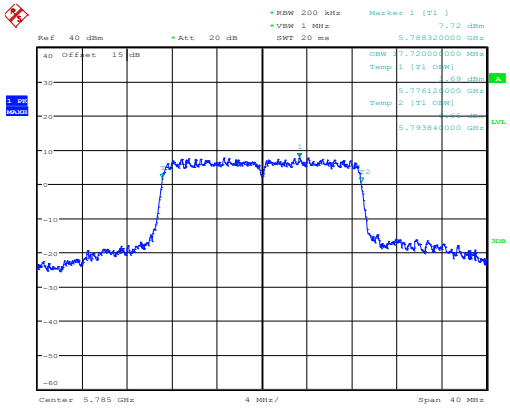
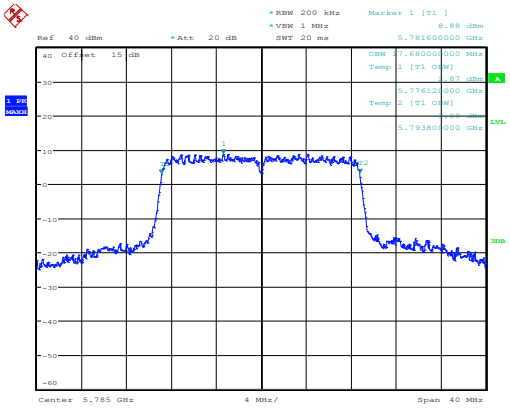
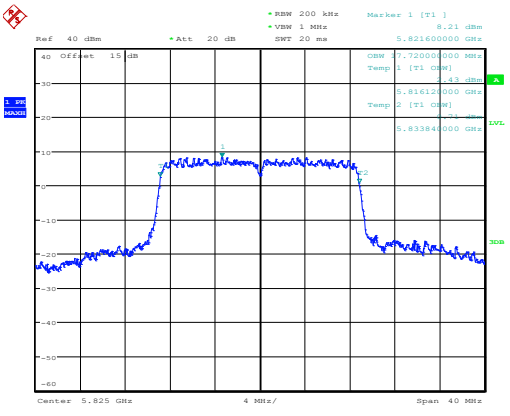
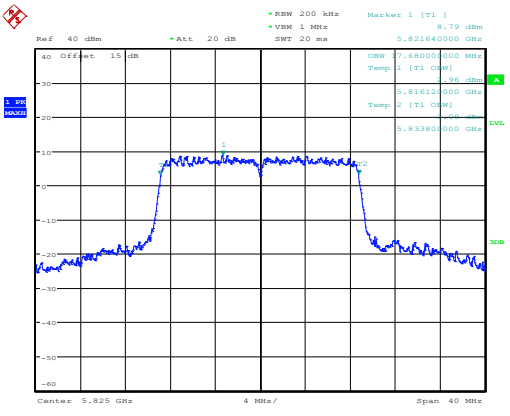
Chain 0	Chain 1
	

For UNII-3

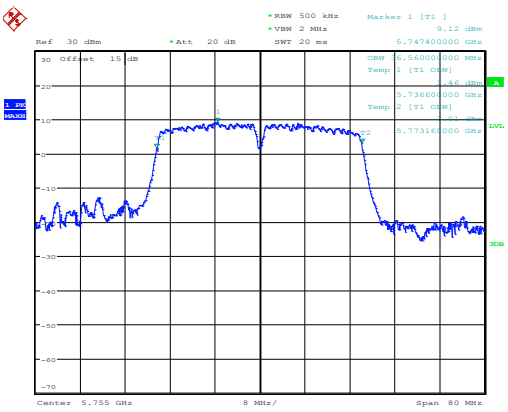
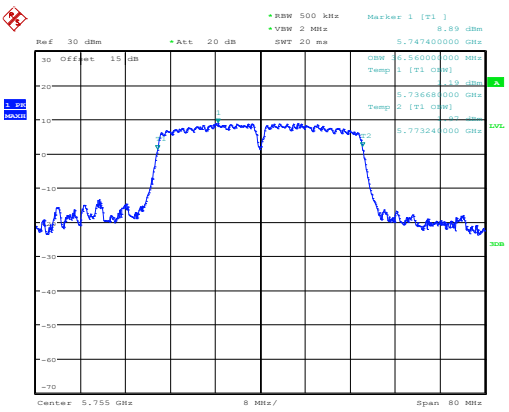
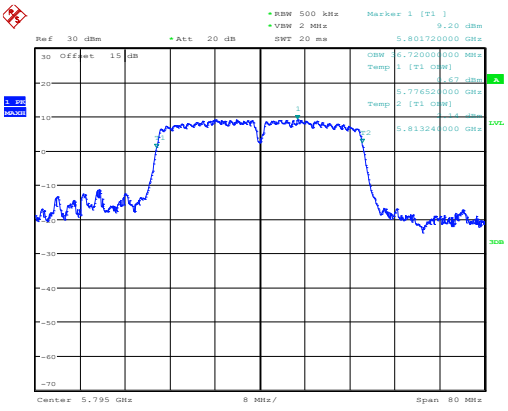
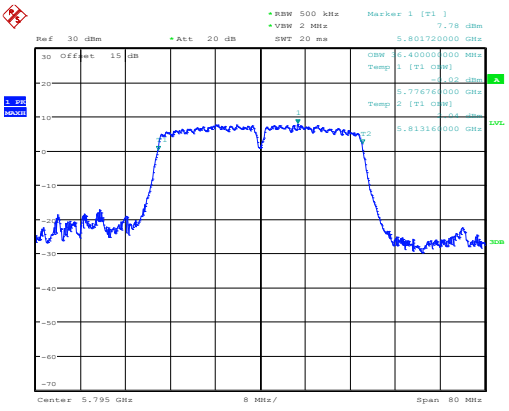
802.11a mode

Chain 0	Chain 1
Low CH	**Low CH**
	
Date: 7.JUL.2020 16:11:54	Date: 7.JUL.2020 16:38:06
Middle CH	**Middle CH**
	
Date: 7.JUL.2020 16:14:46	Date: 7.JUL.2020 16:45:38
High CH	**High CH**
	
Date: 7.JUL.2020 16:17:22	Date: 7.JUL.2020 16:47:52

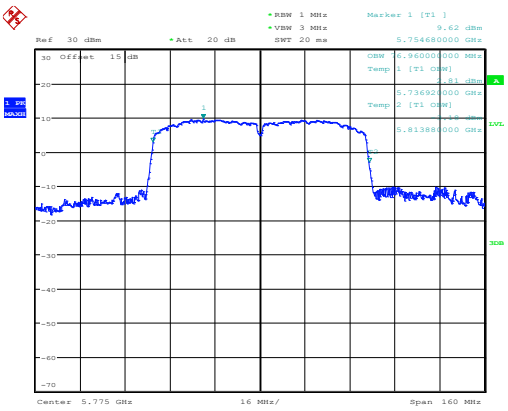
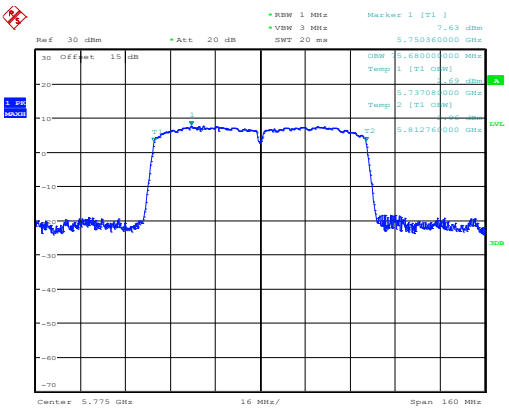
802.11ac VHT20 mode:

Chain 0	Chain 1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

Chain 0	Chain 1
Low CH	Low CH
	
High CH	High CH
	

802.11ac VHT80 mode:

Chain 0	Chain 1
	

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,

The use Power Meter

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)					
RF Cable	MTJ	MT40S	MT40S-001	Each Use	/
USB Wideband Power Sensor	Agilent	U2021XA	MY56120026	2019/09/06	2020/09/05

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 Data

Channel	Frequency (MHz)	Average Output Power (dBm)			Limit (dBm)
		Ant. 1	Ant. 2	Sum	
IEEE 802.11a mode					
36	**5180**	16.74	16.53	19.65	30.00
40	**5200**	17.58	17.77	20.69	30.00
48	**5240**	17.57	17.43	20.51	30.00
149	**5745**	19.37	19.42	22.41	30.00
157	**5785**	19.48	19.75	22.63	30.00
165	**5825**	19.46	19.91	22.70	30.00
IEEE 802.11n HT20 mode					
36	**5180**	16.87	16.94	19.92	30.00
40	**5200**	17.46	17.58	20.53	30.00
48	**5240**	17.62	17.73	20.69	30.00
149	**5745**	18.84	19.11	21.99	30.00
157	**5785**	19.25	19.17	22.22	30.00
165	**5825**	19.05	19.15	22.11	30.00
IEEE 802.11n HT40 mode					
38	**5190**	12.58	12.18	15.39	30.00
46	**5230**	17.66	17.52	20.60	30.00
151	**5755**	18.79	18.84	21.83	30.00
159	**5795**	18.65	18.77	21.72	30.00

Channel	Frequency (MHz)	Average Output Power (dBm)			Limit (dBm)
		Ant. 1	Ant. 2	Sum	
IEEE 802.11ac VHT20 mode					
36	**5180**	16.95	17.07	20.02	30.00
40	**5200**	17.68	17.79	20.75	30.00
48	**5240**	17.77	17.92	20.86	30.00
149	**5745**	19.03	19.29	22.17	30.00
157	**5785**	19.37	19.35	22.37	30.00
165	**5825**	19.19	19.21	22.21	30.00
IEEE 802.11ac VHT40 mode					
38	**5190**	12.61	12.43	15.53	30.00
46	**5230**	17.78	17.65	20.73	30.00
151	**5755**	18.97	19.05	22.02	30.00
159	**5795**	18.79	18.82	21.82	30.00
IEEE 802.11ac VHT80 mode					
42	**5210**	12.14	11.91	15.04	30.00
155	**5775**	18.45	18.43	21.45	30.00

10 FCC §15.407(a) – Power Spectral Density

10.1 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.

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)					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
RF Cable	MTJ	MT40S	MT40S-001	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 Data and Test Plot

UNII-1

Mode	Channel	Frequency (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Duty Factor (dB)	Limit (dBm/MHz)
			Chain0	Chain1			
802.11a	36	5180	6.66	6.02	9.36	0.00	16.79
	40	5200	7.05	7.19	10.13	0.00	16.79
	48	5240	6.71	6.76	9.75	0.00	16.79
802.11ac VHT20	36	5180	5.15	7.57	9.54	0.00	16.79
	40	5200	6.23	6.20	9.23	0.00	16.79
	48	5240	6.17	6.28	9.24	0.00	16.79
802.11ac VHT40	38	5190	-1.17	-1.37	1.74	0.00	16.79
	46	5230	3.51	4.06	6.80	0.00	16.79
802.11ac VHT80	42	5210	-5.06	-2.72	-0.72	0.00	16.79

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

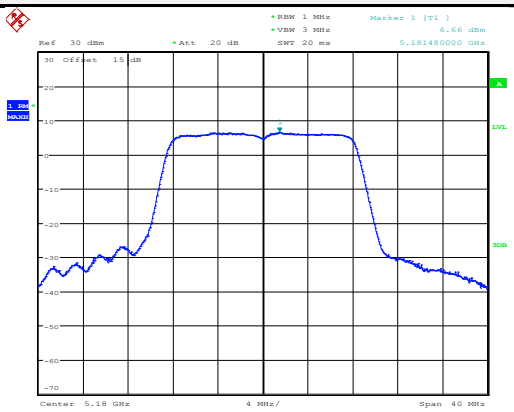
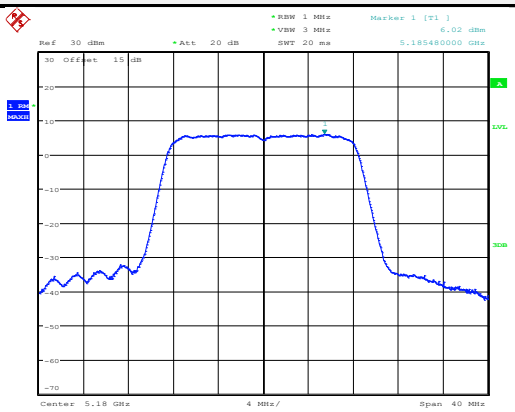
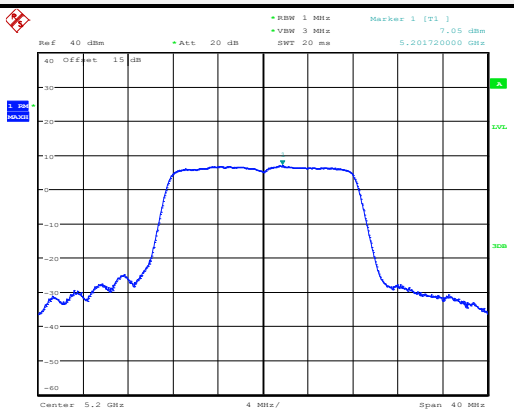
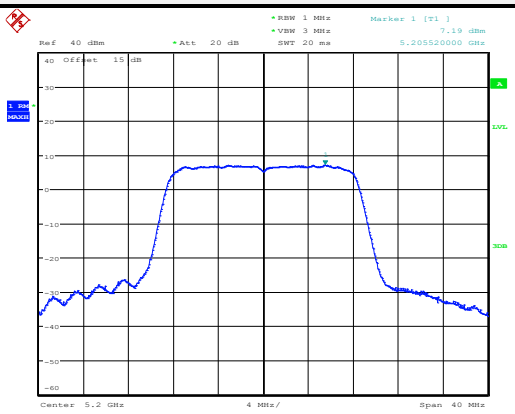
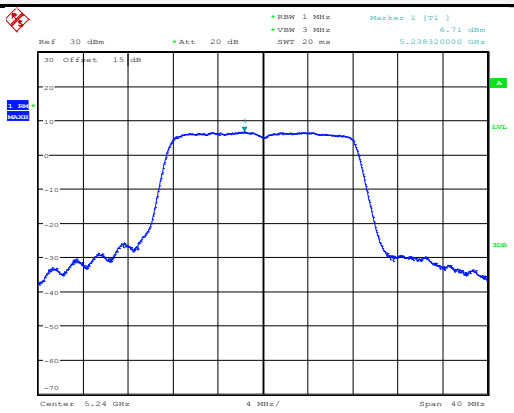
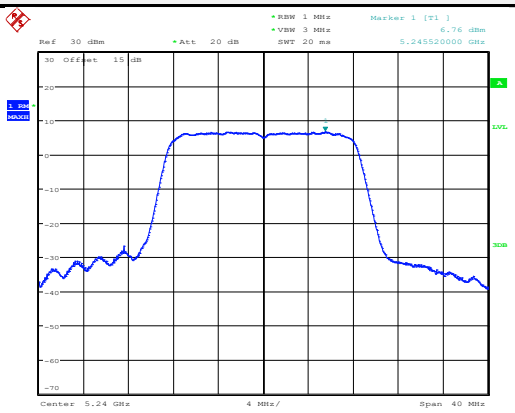
UNII-3

Mode	Channel	Frequency (MHz)	PSD (dBm/500 kHz)		Total PSD (dBm/500 kHz)	Duty Factor (dB)	Limit (dBm/500 kHz)
			Chain0	Chain1			
802.11a	149	5745	6.32	7.63	10.03	0.00	29.79
	157	5785	6.15	7.92	10.13	0.00	29.79
	165	5825	6.65	7.37	10.04	0.00	29.79
802.11ac VHT20	149	5745	6.23	6.18	9.22	0.00	29.79
	157	5785	5.97	6.98	9.51	0.00	29.79
	165	5825	6.25	7.02	9.66	0.00	29.79
802.11ac VHT40	151	5755	2.84	3.05	5.96	0.00	29.79
	159	5795	3.03	1.47	5.33	0.00	29.79
802.11ac VHT80	155	5775	-0.53	-2.43	1.63	0.00	29.79

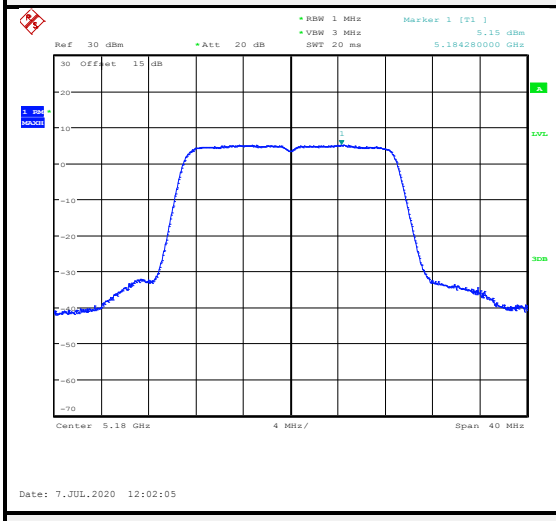
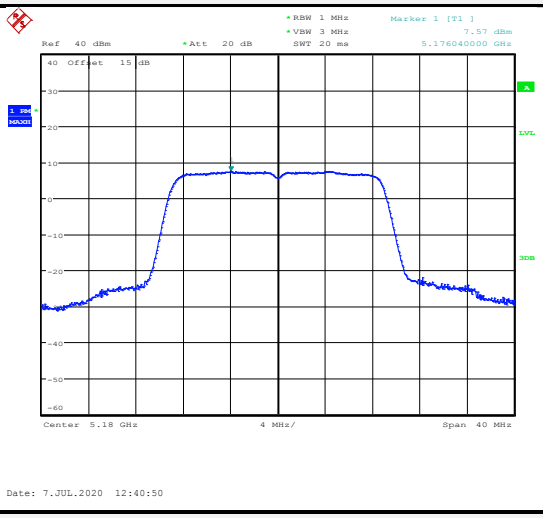
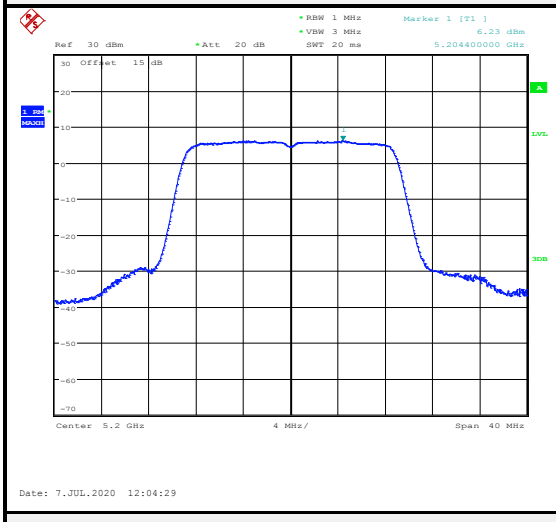
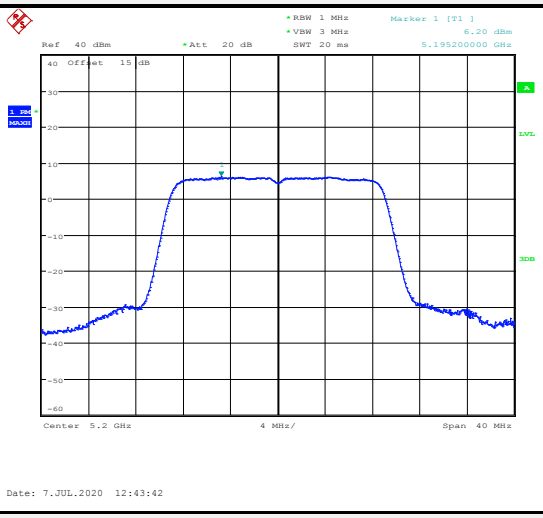
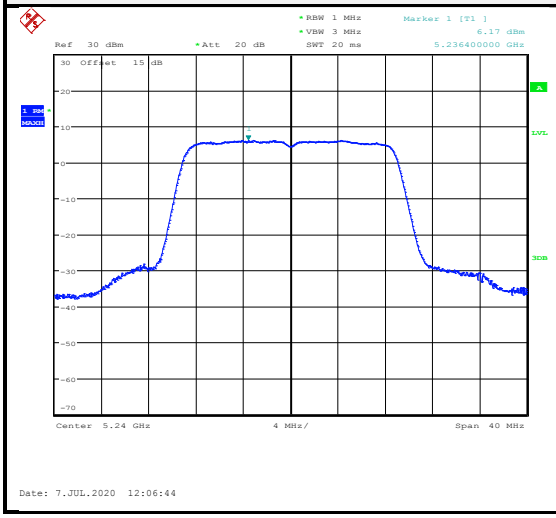
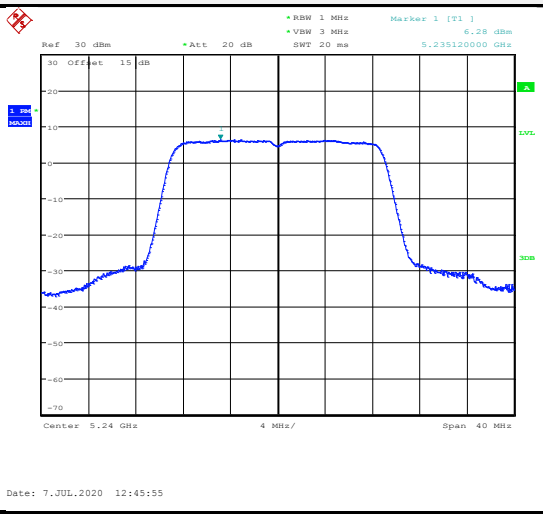
Note: Limit = 30 - (Direction Gain-6) = 30 – 0.21 = 29.79 dBm/MHz

For UNII-1:

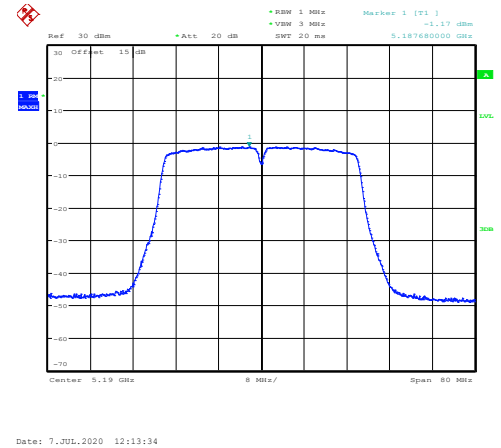
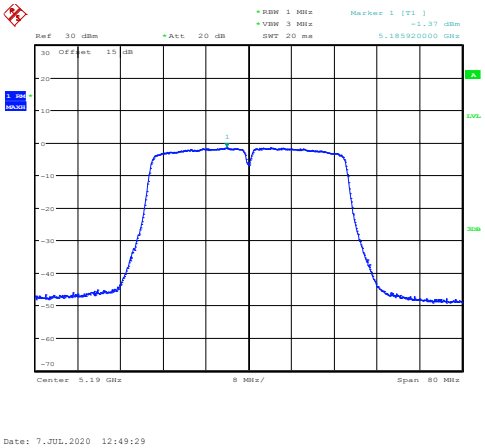
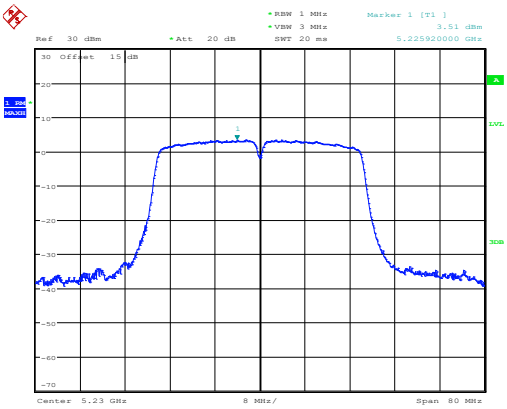
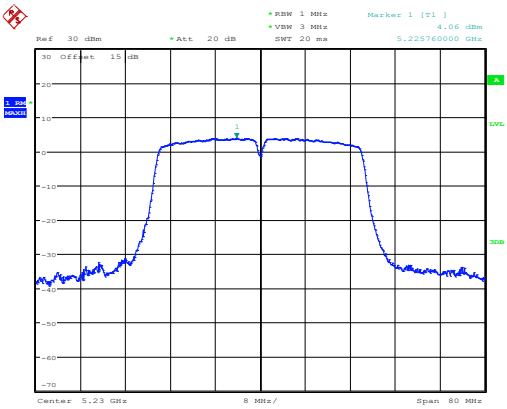
802.11a mode

Chain0	Chain1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

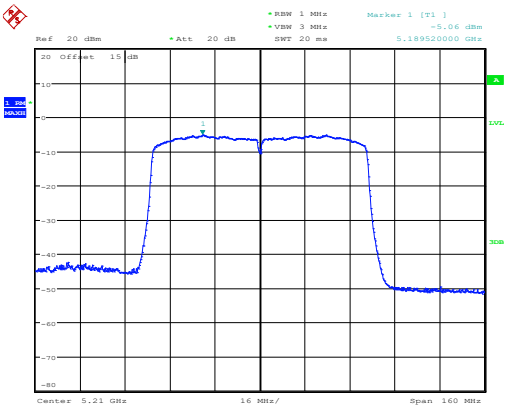
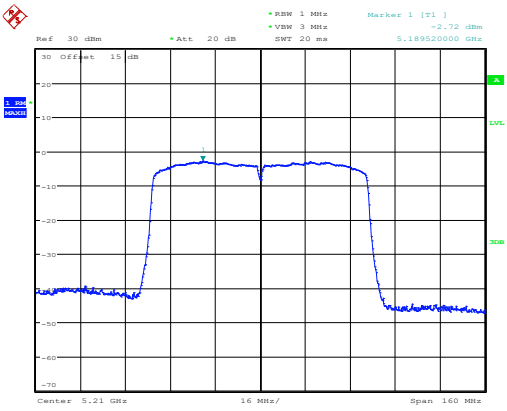
802.11ac VHT20 mode:

Chain0	Chain1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

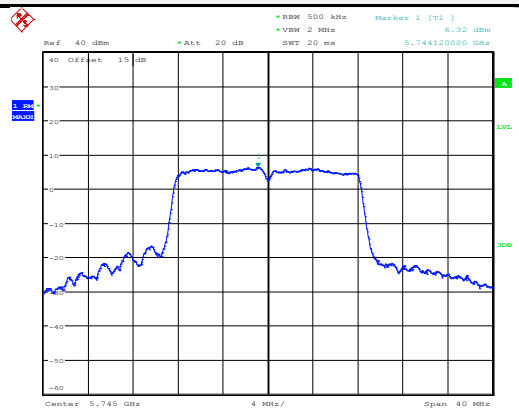
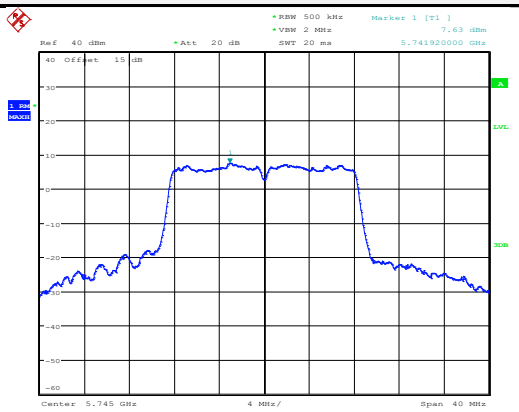
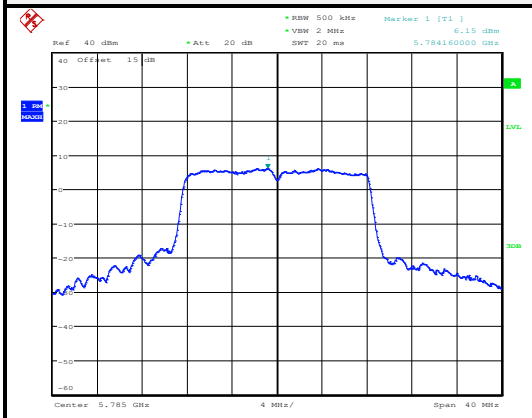
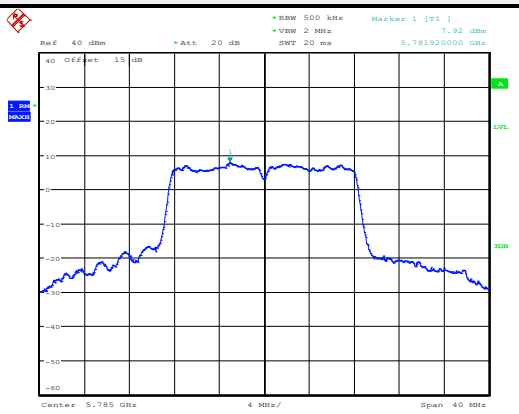
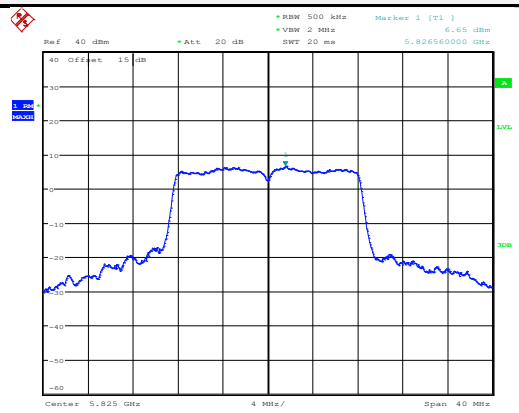
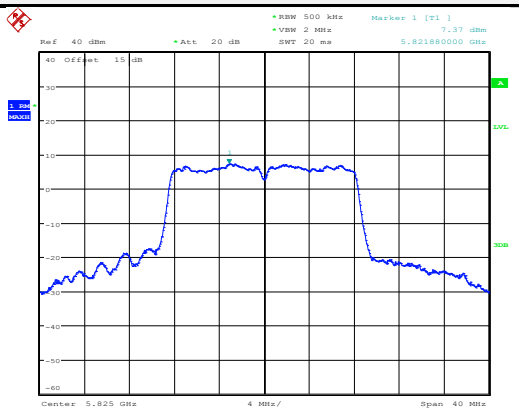
Chain0	Chain1
Low CH	Low CH
	
High CH	High CH
	

802.11ac VHT80 mode

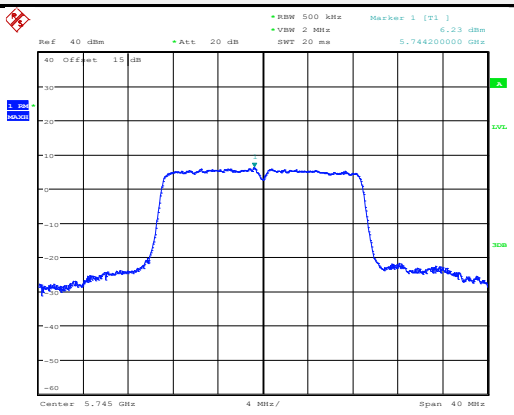
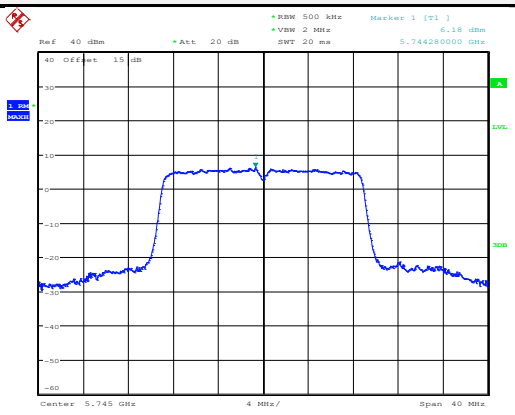
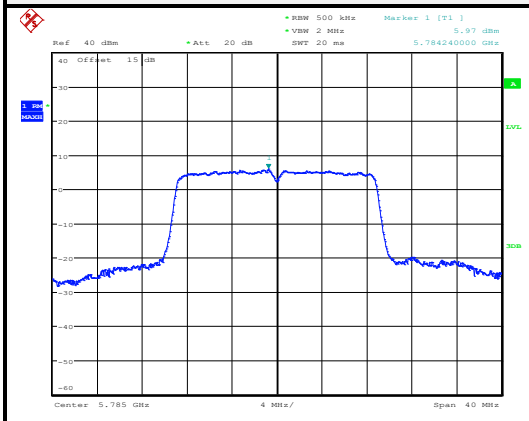
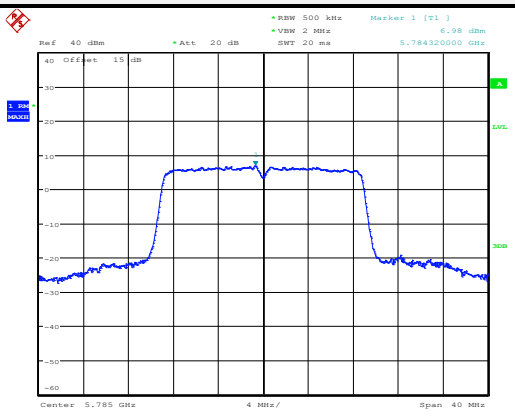
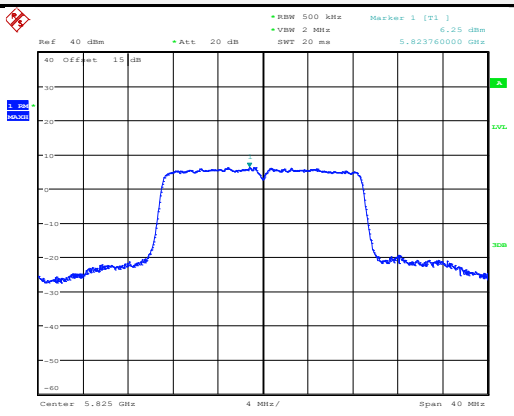
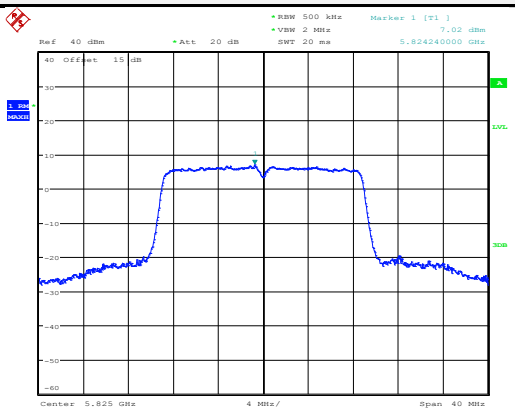
Chain0	Chain1
	

For UNII-3:

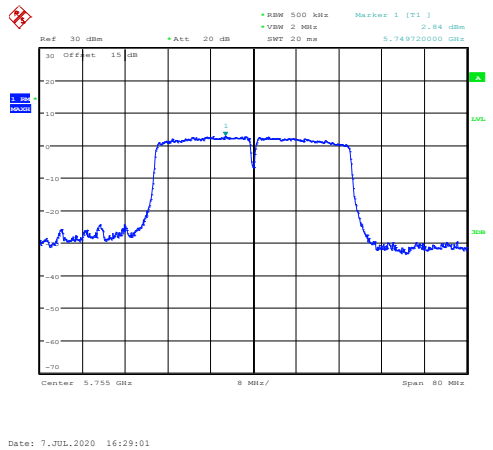
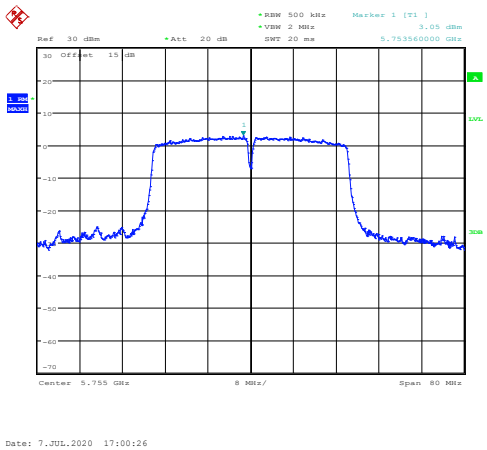
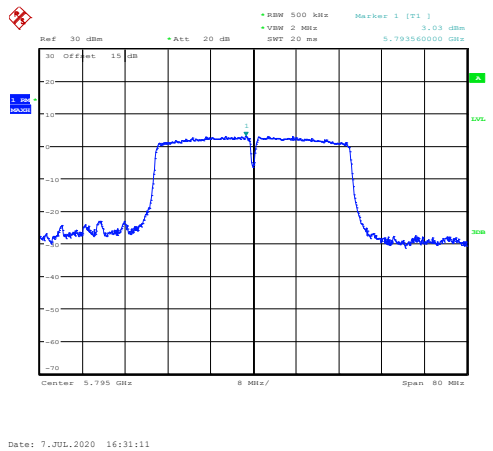
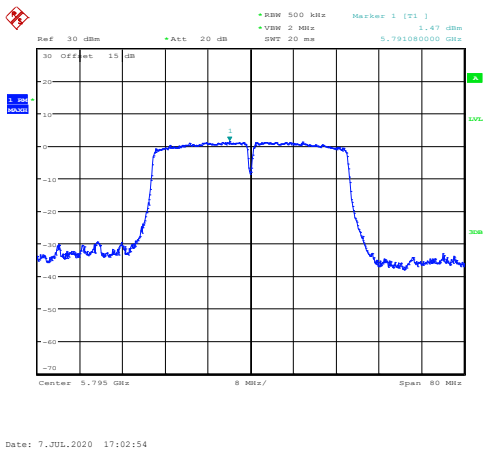
802.11a mode:

Chain0	Chain1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

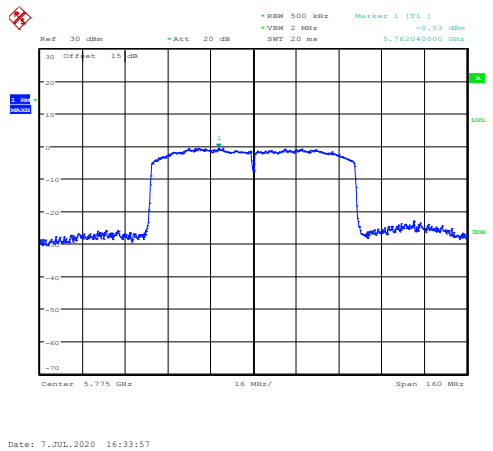
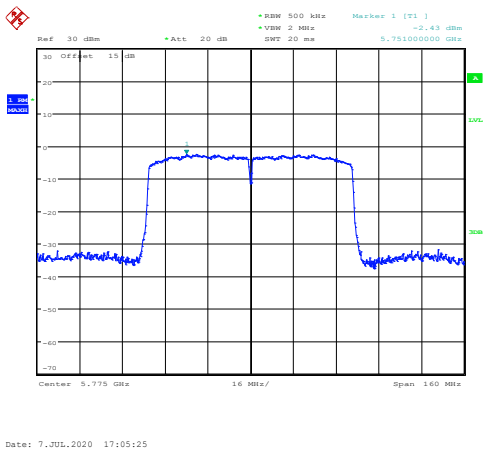
802.11ac VHT20 mode:

Chain0	Chain1
Low CH	**Low CH**
	
Middle CH	**Middle CH**
	
High CH	**High CH**
	

802.11ac VHT40 mode:

Chain0	Chain1
Low CH	Low CH
	
High CH	High CH
	

802.11ac VHT80 mode

Chain0	Chain1
	

******* END OF REPORT *******