FCC Part 15.407

TEST REPORT

For

CC&C Technologies, Inc.

8F. 150, Jian Yi Road, Zhonghe District, New Taipei City, Taiwan

Report Type	**Original Report**
FCC Identity:	**FCC ID: PANWA9563**
Product Name:	**AC1200 FE Repeater**
Model Name:	**WA-9563**
Series Model Name:	**WA-9563M; WI-4000**
Report Number :	**RXZ200804001-00C**
Report Date :	**2020/11/26**
Reviewed By :	**Zeus Chen**

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Revision History

Revision	Report Number	Issue Date	Description
1.0	RXZ200804001-00C	2020/11/26	Original Report

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	**CC&C Technologies, Inc.** 8F. 150, Jian Yi Road, Zhonghe District, New Taipei City, Taiwan
Manufacturer	**CC&C Technologies, Inc.** 8F. 150, Jian Yi Road, Zhonghe District, New Taipei City, Taiwan
Brand Name	CC&C
Product (Equipment)	AC1200 FE Repeater
Model Name	WA-9563
Serial Model Name	WA-9563M ; WI-4000
Model Discrepancy	WA-9563M: H/W same as WA-9563 and for marketing purpose. WI-4000: H/W adding Micro SD, the other same as WA-9563.
EUT Function	IEEE 802.11 an(HT20/HT40) + ac(VHT20/VHT40/VHT80)
Frequency Range	UNII-1: 5150 MHz - 5250 MHz UNII-3: 5745 MHz - 5850 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: 16.93 dBm (0.0493 W) IEEE 802.11n HT20 Mode: 17.16 dBm (0.0520 W) IEEE 802.11n HT40 Mode: 18.85 dBm (0.0767 W) IEEE 802.11ac VHT20 Mode: 17.43 dBm (0.0553 W) IEEE 802.11ac VHT40 Mode: 18.90 dBm (0.0776 W) IEEE 802.11ac VHT80 Mode: 17.73 dBm (0.0593 W) **For UNII-3**: IEEE 802.11a Mode: 14.12 dBm (0.0258 W) IEEE 802.11n HT20 Mode: 14.45 dBm (0.0279 W) IEEE 802.11n HT40 Mode: 14.61 dBm (0.0289 W) IEEE 802.11ac VHT20 Mode: 14.49 dBm (0.0281 W) IEEE 802.11ac VHT40 Mode: 14.67 dBm (0.0293 W) IEEE 802.11ac VHT80 Mode: 15.28 dBm (0.0337 W)
Modulation Type	OFDM
Received Date	Aug. 05, 2020
Date of Test	Sep. 24, 2020 - Nov. 17, 2020
Related Submittal(s)/Grant(s)	**FCC Part 15.247 DTS with FCC ID: PANWA9563**

*All measurement and test data in this report was gathered from production sample serial number: 200804001-4000.

Assigned by Bay Area Compliance Laboratories Corp. (Linkou Laboratory)

1.2 Operation Condition of EUT

Power Operation (Voltage Range)	☒ AC 120 V/60 Hz ☒ Adapter Model: DSA-10PF06-05 FUS I/P: 100-240Vac, 0.3A O/P: 5Vdc, 2A ☐ By Power Cord.
	☐ DC Type ☐ DC Power ☐ Battery ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System

1.3 Objective

The Objective of this Test Report was to document the compliance of the CC&C Technologies, Inc. Appliance (Model:WA-9563, Series Model: WA-9563M ; WI-4000) to the requirements of the following Standards:

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

-KDB 662911 D01 Multiple Transmitter Output v02r01

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

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

1.4 Measurement Uncertainty

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

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

1.5 Environmental Conditions and Test Date

Test Site	Test Date	Temperature (°C)	Relative Humidity (%)	Test Engineer
Conduction (Con-01)	Sep. 26, 2020	25.7	55	Rui Jhan
Radiated (966A)	Sep. 24, 2020 ~ Nov. 17, 2020	21.4-22.2	50-55	Leo Cheng
Conducted (TH-02)	Sep. 25, 2020 ~ Nov. 17, 2020	22.3-23.1	55-60	Ethan Shao

1.6 Test Facility

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

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

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

2 System Test Configuration

2.1 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	**1**	6-54 Mbps	6 Mbps
802.11n HT20 mode	**2**	MCS 0-15	MCS 0
802.11n HT40 mode	**2**	MCS 0-15	MCS 0
802.11ac VHT20 mode	**2**	MCS 0-15	MCS 0
802.11ac VHT40 mode	**2**	MCS 0-15	MCS 0
802.11ac VHT80 mode	**2**	MCS 0-15	MCS 0

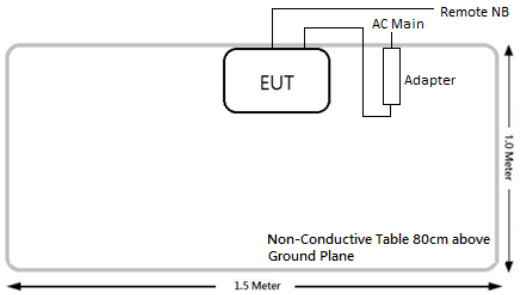
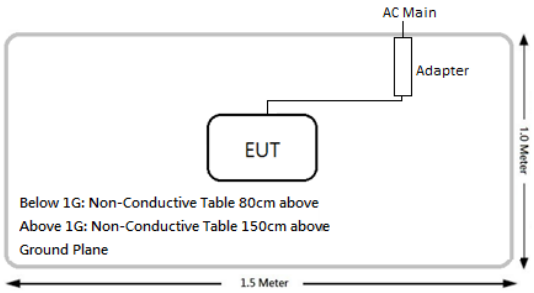
Worst Case of Power Setting					
EUT Exercise Software			MT7663 QA		
Configuration	N_{TX}	UNII Band	Low CH	Mid CH	High CH
802.11a mode	1	UNII-1	1A	1A	19
		UNII-3	11	11	15
802.11n HT20 mode	2	UNII-1	20	20	1E
		UNII-3	16	16	19
802.11n HT40 mode	2	UNII-1	22	-	22
		UNII-3	19	-	19
802.11ac VHT20 mode	2	UNII-1	20	20	1E
		UNII-3	16	16	19
802.11ac VHT40 mode	2	UNII-1	22	-	22
		UNII-3	19	-	19
802.11ac VHT80 mode	2	UNII-1	-	21	-
		UNII-3	-	1B	-

- The main test is WI-4000 and 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 for worst output power.
- 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.
- 802.11a mode is SISO mode, and the worst is ANT1, so the ANT1 result record in the report.

2.2 Support Equipment and External Cable List

No.	Description	Manufacturer	Model Number
A	Notebook	DELL	Latitude E5510
B	Notebook	DELL	Latitude E5470

2.3 Block Diagram of Test Setup

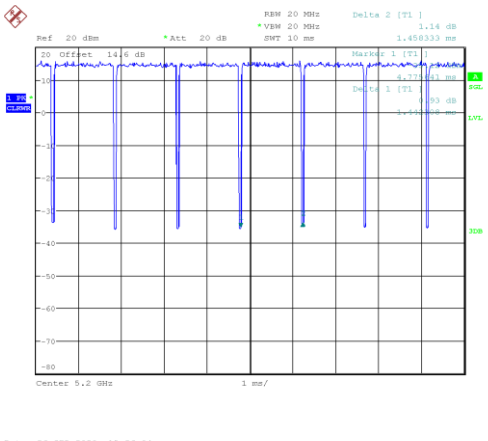
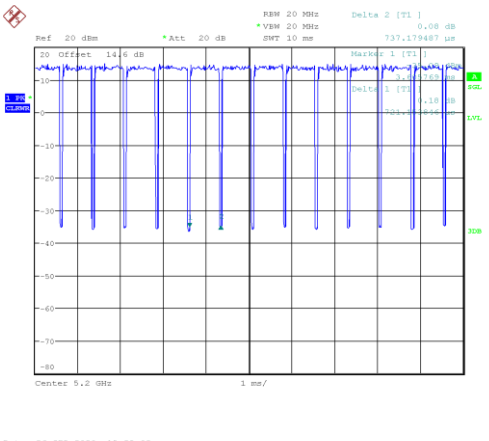
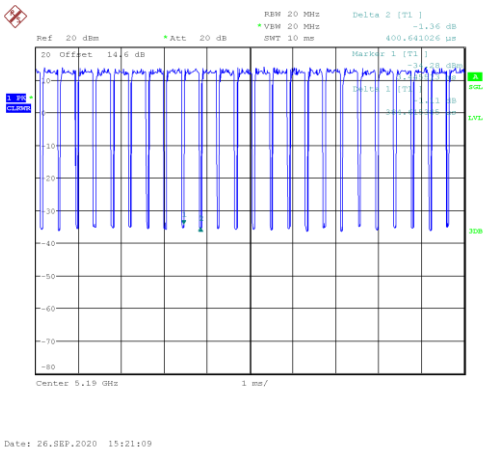
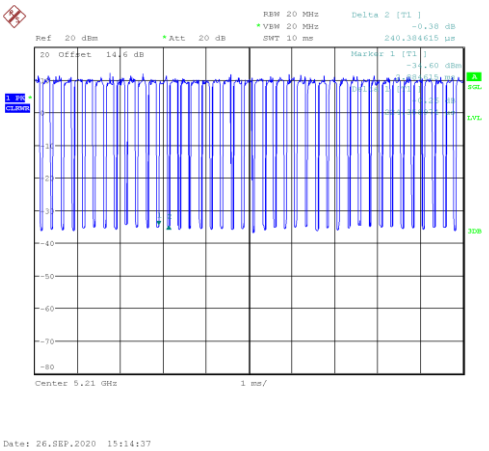
Conduction	Radiation
	

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	Duty Cycle (%)	On Time (ms)	Period (ms)	Duty Factor (dB)
802.11a mode	98.90	1.44	1.46	0.05
802.11ac VHT20 mode	97.83	0.72	0.74	0.10
802.11ac VHT40 mode	96.00	0.38	0.40	0.18
802.11ac VHT80 mode	93.33	0.22	0.24	0.30

802.11a 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/cm^2);

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

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

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

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	4.81	3.0269	28.00	630.9573	20	0.3801	1.0
UNII-1	5150-5250	4.86	3.0620	19.00	79.4328	20	0.0484	1.0
UNII-3	5745-5850	4.86	3.0620	15.50	35.4813	20	0.0216	1.0

The Wi-Fi 2.4G and 5G can transmit simultaneously:

$=S_{2.4G}/Slimit_{2.4G} + S_{5G\ UNII-1}/Slimit_{5G\ UNII-1} = 0.3801 + 0.0484 = 0.4285 < 1.0$

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	Note
PIFA	CC&C	30G000075-00	4.86 dBi	Compliance	5G Ant1
PIFA	CC&C	30G000128-00	2.00 dBi	Compliance	5G Ant2

Note1: The EUT have two internal dedicated antennas arrangement, fulfill the requirement of this section.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

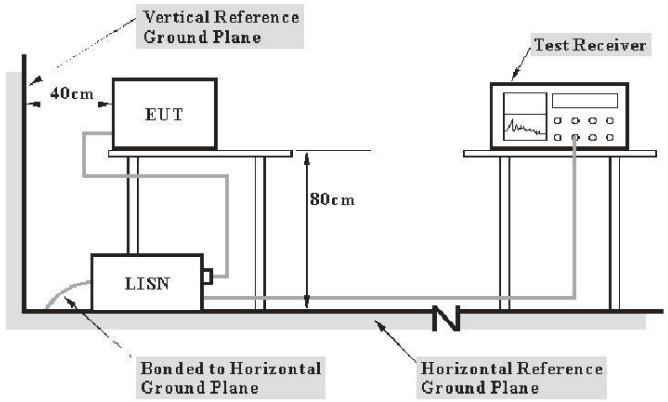
According to FCC §15.207 and §15.407(b)(6),

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.

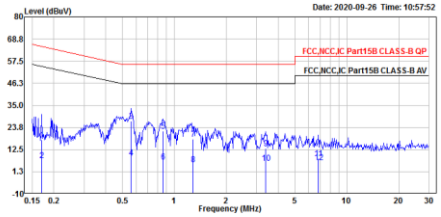
6.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conduction Room					
LISN	Rohde & Schwarz	ENV216	100010	2020/09/14	2021/09/13
EMI Test Receiver	Rohde & Schwarz	ESR3	102430	2020/05/07	2021/05/06
RF Cable	EMCI	EMCCFD300-BM-BM-8000	180526	2020/08/07	2021/08/06
Software	Audix	e3 v9	E3LK-03	N.C.R	N.C.R
LISN	Rohde & Schwarz	ENV216	100010	2020/09/14	2021/09/13

***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).

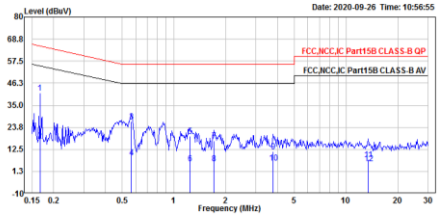
6.4 Test Data and Test Plot

Line



	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.170	-2.22	17.64	19.86	64.94	-47.30	QP
2	0.170	-12.84	7.02	19.86	54.94	-47.92	Average
3	0.563	7.26	27.15	19.89	56.00	-28.85	QP
4	0.563	-11.65	8.24	19.89	46.00	-37.76	Average
5	0.859	2.07	22.00	19.93	56.00	-34.00	QP
6	0.859	-13.73	6.20	19.93	46.00	-39.80	Average
7	1.279	-1.92	18.01	19.93	56.00	-37.99	QP
8	1.279	-14.96	4.97	19.93	46.00	-41.03	Average
9	3.381	-7.07	12.97	20.04	56.00	-43.03	QP
10	3.381	-14.53	5.51	20.04	46.00	-40.49	Average
11	6.816	-12.07	8.07	20.14	60.00	-51.93	QP
12	6.816	-14.25	5.89	20.14	50.00	-44.11	Average

Neutral



	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.166	21.54	41.41	19.87	65.14	-23.73	QP
2	0.166	-2.97	16.90	19.87	55.14	-38.24	Average
3	0.567	6.82	26.72	19.90	56.00	-29.28	QP
4	0.567	-11.67	8.23	19.90	46.00	-37.77	Average
5	1.239	-0.88	19.06	19.94	56.00	-36.94	QP
6	1.239	-14.50	5.44	19.94	46.00	-40.56	Average
7	1.704	-3.23	16.74	19.97	56.00	-39.26	QP
8	1.704	-14.77	5.20	19.97	46.00	-40.80	Average
9	3.780	-8.72	11.35	20.07	56.00	-44.65	QP
10	3.780	-14.53	5.54	20.07	46.00	-40.46	Average
11	13.417	-13.13	7.20	20.33	60.00	-52.80	QP
12	13.417	-14.93	5.40	20.33	50.00	-44.60	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:

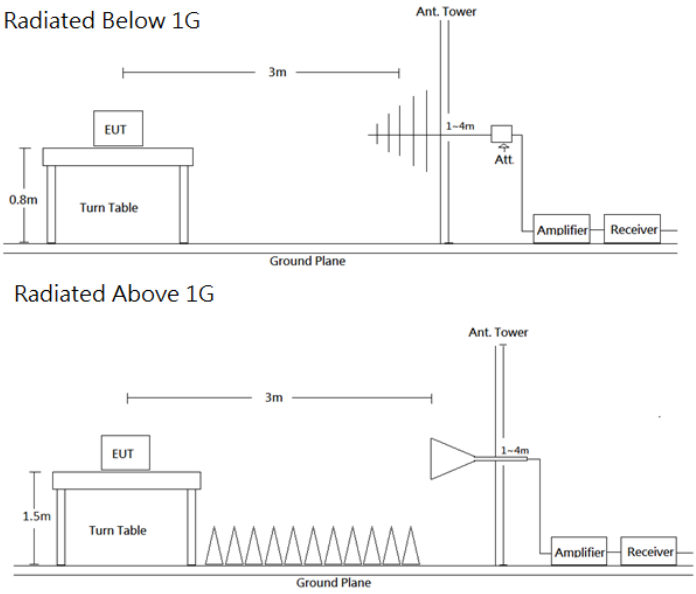
MHz	MHz	MHz	GHz
0.090-0.110	13.36-13.41	399.9-410	4.5-5.15
0.495-0.505	16.42-16.423	608-614	5.35-5.46
2.1735-2.1905	16.69475-16.69525	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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	Detector	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	QP	-	QP
Above 1 GHz	1 MHz	3 MHz	PK	-	PK
	1 MHz	3 MHz	RMS	>98%	Ave
	1 MHz	1/T	PK	<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	2058	2020/03/24	2021/03/23
Horn Antenna	ETS-Lindgren	3160-09	00123852	2020/07/07	2021/07/06
Horn Antenna	ETS-Lindgren	3160-10	00123855	2020/07/07	2021/07/06
Preamplifier	A.H. Systems	PAM-0118P	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	101456	2020/06/03	2021/06/02
Microflex Cable (1m)	EMCI	EMC102-KM-KM-1000	180524	2020/08/06	2021/08/05
Microflex Cable (2m)	EMCI	EMC106-SM-SM-2000	180516	2020/08/06	2021/08/05
Microflex Cable (8m)	UTIFLEX	UFA210A-1-3149-300300	MFR 64639 232490-002	2020/08/06	2021/08/05
Turn Table	Chaintek	T-200-S-1	003502	N.C.R	N.C.R
Antenna Tower	Chaintek	MBD-400-1	003505	N.C.R	N.C.R
Controller	Chaintek	3000-1	003508	N.C.R	N.C.R
Software	Audix	e3 v9	E3LK-02	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).

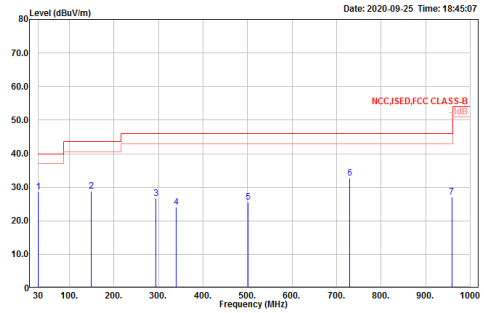
7.4 Test Data and Test Plot

Transmitting mode and the main test is WI-4000

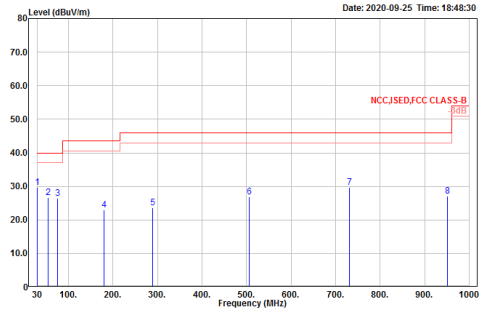
(Pre-scan with three orthogonal axis, and worse case as Y axis)

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	30.970	28.58	40.00	-11.42	38.11	-9.53	Peak
2	149.310	28.90	43.50	-14.60	49.41	-20.51	Peak
3	293.840	26.59	46.00	-19.41	46.99	-20.40	Peak
4	340.400	23.97	46.00	-22.03	43.30	-19.33	Peak
5	501.420	25.61	46.00	-20.39	41.50	-15.89	Peak
6	729.370	32.79	46.00	-13.21	45.23	-12.44	Peak
7	958.290	27.21	46.00	-18.79	37.03	-9.82	Peak



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	30.000	29.77	40.00	-10.23	38.53	-8.76	Peak
2	55.220	26.60	40.00	-13.40	50.54	-23.94	Peak
3	75.590	26.36	40.00	-13.64	50.98	-24.62	Peak
4	179.380	22.98	43.50	-20.52	45.21	-22.23	Peak
5	288.990	23.59	46.00	-22.41	44.01	-20.42	Peak
6	506.270	26.96	46.00	-19.04	42.77	-15.81	Peak
7	730.340	29.75	46.00	-16.25	42.18	-12.43	Peak
8	951.500	27.09	46.00	-18.91	36.99	-9.90	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	
5136.550	46.09	54.00	-7.91	47.11	-1.02	Average
5136.550	59.93	74.00	-14.07	60.95	-1.02	Peak
5178.250	91.07			92.10	-1.03	Average
5178.250	101.38			102.41	-1.03	Peak
10360.000	67.64	68.20	-0.56	60.13	7.51	Peak
15540.000	50.26	54.00	-3.74	40.10	10.16	Average
15540.000	64.86	74.00	-9.14	54.70	10.16	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5148.550	46.22	54.00	-7.78	47.22	-1.00	Average
5148.550	60.50	74.00	-13.50	61.50	-1.00	Peak
5179.900	94.27			95.30	-1.03	Average
5179.900	103.96			104.99	-1.03	Peak
10360.000	54.91	68.20	-13.29	47.40	7.51	Peak
15540.000	47.66	54.00	-6.34	37.50	10.16	Average
15540.000	60.93	74.00	-13.07	50.77	10.16	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5083.600	46.13	54.00	-7.87	47.22	-1.09	Average
5083.600	58.91	74.00	-15.09	60.00	-1.09	Peak
5202.000	92.29			93.33	-1.04	Average
5202.000	102.10			103.14	-1.04	Peak
5382.800	46.28	54.00	-7.72	46.90	-0.62	Average
5382.800	60.31	74.00	-13.69	60.93	-0.62	Peak
10400.000	67.95	68.20	-0.25	60.24	7.71	Peak
15600.000	58.01	74.00	-15.99	47.66	10.35	Peak
15600.000	58.01	74.00	-15.99	47.66	10.35	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5098.000	46.15	54.00	-7.85	47.19	-1.04	Average
5098.000	58.82	74.00	-15.18	59.86	-1.04	Peak
5201.600	95.46			96.50	-1.04	Average
5201.600	105.13			106.17	-1.04	Peak
5445.200	46.98	54.00	-7.02	47.45	-0.47	Average
5445.200	59.85	74.00	-14.15	60.32	-0.47	Peak
10400.000	58.55	68.20	-9.65	50.84	7.71	Peak
15600.000	51.65	54.00	-2.35	41.30	10.35	Average
15600.000	64.68	74.00	-9.32	54.33	10.35	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5133.600	45.95	54.00	-8.05	46.97	-1.02	Average
5133.600	59.84	74.00	-14.16	60.86	-1.02	Peak
5239.200	92.81			93.79	-0.98	Average
5239.200	102.78			103.76	-0.98	Peak
5428.400	46.44	54.00	-7.56	46.94	-0.50	Average
5428.400	60.06	74.00	-13.94	60.56	-0.50	Peak
10480.000	67.09	68.20	-1.11	59.28	7.81	Peak
15720.000	53.53	54.00	-0.47	43.25	10.28	Average
15720.000	67.03	74.00	-6.97	56.75	10.28	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5073.200	45.84	54.00	-8.16	46.95	-1.11	Average
5073.200	59.00	74.00	-15.00	60.11	-1.11	Peak
5238.000	95.09			96.07	-0.98	Average
5238.000	104.89			105.87	-0.98	Peak
5396.400	46.91	54.00	-7.09	47.49	-0.58	Average
5396.400	59.84	74.00	-14.16	60.42	-0.58	Peak
10480.000	59.79	68.20	-8.41	51.98	7.81	Peak
15720.000	52.09	54.00	-1.91	41.81	10.28	Average
15720.000	66.04	74.00	-7.96	55.76	10.28	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	
5103.250	46.37	54.00	-7.63	48.30	-1.93	Average
5103.250	59.76	74.00	-14.24	61.69	-1.93	Peak
5179.000	95.64			97.45	-1.81	Average
5179.000	106.75			108.56	-1.81	Peak
10360.000	67.71	68.20	-0.49	61.15	6.56	Peak
15540.000	50.04	54.00	-3.96	40.42	9.62	Average
15540.000	62.05	74.00	-11.95	52.43	9.62	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5101.000	45.83	54.00	-8.17	47.76	-1.93	Average
5101.000	59.10	74.00	-14.90	61.03	-1.93	Peak
5182.750	90.06			91.86	-1.80	Average
5182.750	101.01			102.81	-1.80	Peak
10360.000	64.40	68.20	-3.80	57.84	6.56	Peak
15540.000	52.05	54.00	-1.95	42.43	9.62	Average
15540.000	63.48	74.00	-10.52	53.86	9.62	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5115.600	45.99	54.00	-8.01	47.91	-1.92	Average
5115.600	59.95	74.00	-14.05	61.87	-1.92	Peak
5198.800	95.75			97.53	-1.78	Average
5198.800	106.66			108.44	-1.78	Peak
5441.200	46.35	54.00	-7.65	47.75	-1.40	Average
5441.200	59.69	74.00	-14.31	61.09	-1.40	Peak
10400.000	67.32	68.20	-0.88	60.71	6.61	Peak
15600.000	50.96	54.00	-3.04	41.33	9.63	Average
15600.000	64.23	74.00	-9.77	54.60	9.63	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5110.000	45.69	54.00	-8.31	47.61	-1.92	Average
5110.000	59.64	74.00	-14.36	61.56	-1.92	Peak
5200.800	88.64			90.42	-1.78	Average
5200.800	99.16			100.94	-1.78	Peak
5423.600	45.98	54.00	-8.02	47.40	-1.42	Average
5423.600	60.10	74.00	-13.90	61.52	-1.42	Peak
10400.000	64.45	68.20	-3.75	57.84	6.61	Peak
15600.000	52.17	54.00	-1.83	42.54	9.63	Average
15600.000	64.33	74.00	-9.67	54.70	9.63	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5110.800	45.85	54.00	-8.15	47.77	-1.92	Average
5110.800	58.99	74.00	-15.01	60.91	-1.92	Peak
5242.000	94.93			96.65	-1.72	Average
5242.000	106.21			107.93	-1.72	Peak
5416.000	46.68	54.00	-7.32	48.11	-1.43	Average
5416.000	59.58	74.00	-14.42	61.01	-1.43	Peak
10477.000	67.55	68.20	-0.65	60.82	6.73	Peak
15720.000	52.16	54.00	-1.84	42.58	9.58	Average
15720.000	65.35	74.00	-8.65	55.77	9.58	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5136.400	45.97	54.00	-8.03	47.85	-1.88	Average
5136.400	58.56	74.00	-15.44	60.44	-1.88	Peak
5241.600	88.93			90.65	-1.72	Average
5241.600	99.72			101.44	-1.72	Peak
5392.800	46.14	54.00	-7.86	47.62	-1.48	Average
5392.800	59.70	74.00	-14.30	61.18	-1.48	Peak
10480.000	66.44	68.20	-1.76	59.69	6.75	Peak
15720.000	53.10	54.00	-0.90	43.52	9.58	Average
15720.000	64.01	74.00	-9.99	54.43	9.58	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	
5150.000	53.92	54.00	-0.08	55.77	-1.85	Average
5150.000	67.41	74.00	-6.59	69.26	-1.85	Peak
5192.560	95.85			97.64	-1.79	Average
5192.560	107.34			109.13	-1.79	Peak
10380.000	65.46	68.20	-2.74	58.87	6.59	Peak
15570.000	49.58	54.00	-4.42	39.97	9.61	Average
15570.000	64.13	74.00	-9.87	54.52	9.61	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5150.000	48.75	54.00	-5.25	50.60	-1.85	Average
5150.000	62.19	74.00	-11.81	64.04	-1.85	Peak
5191.440	90.09			91.88	-1.79	Average
5191.440	100.95			102.74	-1.79	Peak
10380.000	63.20	68.20	-5.00	56.61	6.59	Peak
15570.000	51.18	54.00	-2.82	41.57	9.61	Average
15570.000	63.31	74.00	-10.69	53.70	9.61	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5143.600	46.98	54.00	-7.02	48.85	-1.87	Average
5143.600	58.88	74.00	-15.12	60.75	-1.87	Peak
5236.000	95.03			96.76	-1.73	Average
5236.000	105.56			107.29	-1.73	Peak
5364.400	46.33	54.00	-7.67	47.85	-1.52	Average
5364.400	59.76	74.00	-14.24	61.28	-1.52	Peak
10460.000	67.10	68.20	-1.10	60.41	6.69	Peak
15690.000	53.25	54.00	-0.75	43.67	9.58	Average
15690.000	66.01	74.00	-7.99	56.43	9.58	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5127.600	46.31	54.00	-7.69	48.21	-1.90	Average
5127.600	58.47	74.00	-15.53	60.37	-1.90	Peak
5231.600	88.49			90.23	-1.74	Average
5231.600	98.98			100.72	-1.74	Peak
5424.400	47.21	54.00	-6.79	48.62	-1.41	Average
5424.400	59.16	74.00	-14.84	60.57	-1.41	Peak
10460.000	64.56	68.20	-3.64	57.87	6.69	Peak
15690.000	53.70	54.00	-0.30	44.12	9.58	Average
15690.000	65.53	74.00	-8.47	55.95	9.58	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	
5146.600	53.63	54.00	-0.37	55.49	-1.86	Average
5146.600	65.90	74.00	-8.10	67.76	-1.86	Peak
5207.600	91.75			93.52	-1.77	Average
5207.600	102.30			104.07	-1.77	Peak
10420.000	63.52	68.20	-4.68	56.90	6.62	Peak
15630.000	49.62	54.00	-4.38	39.96	9.66	Average
15630.000	62.52	74.00	-11.48	52.86	9.66	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5149.600	49.95	54.00	-4.05	51.80	-1.85	Average
5149.600	61.86	74.00	-12.14	63.71	-1.85	Peak
5215.400	86.69			88.45	-1.76	Average
5215.400	98.15			99.91	-1.76	Peak
10420.000	62.58	68.20	-5.62	55.96	6.62	Peak
15630.000	50.18	54.00	-3.82	40.52	9.66	Average
15630.000	62.77	74.00	-11.23	53.11	9.66	Peak

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	
5623.680	60.68	68.20	-7.52	60.57	0.11	Peak
5676.600	60.93	87.92	-26.99	60.57	0.36	Peak
5719.080	62.54	110.54	-48.00	62.01	0.53	Peak
5743.560	103.32			102.73	0.59	Peak
5869.560	62.47	106.72	-44.25	61.39	1.08	Peak
5883.960	63.32	98.55	-35.23	62.18	1.14	Peak
5938.680	63.40	68.20	-4.80	62.08	1.32	Peak
11490.000	51.39	54.00	-2.61	42.84	8.55	Average
11490.000	65.85	74.00	-8.15	57.30	8.55	Peak
17235.000	67.51	68.20	-0.69	51.71	15.80	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5629.800	60.47	68.20	-7.73	60.34	0.13	Peak
5694.960	61.26	101.49	-40.23	60.80	0.46	Peak
5715.480	63.41	109.54	-46.13	62.89	0.52	Peak
5745.000	104.27			103.67	0.60	Peak
5863.080	62.31	108.54	-46.23	61.25	1.06	Peak
5902.320	63.40	84.94	-21.54	62.18	1.22	Peak
5946.600	62.80	68.20	-5.40	61.46	1.34	Peak
11490.000	43.48	54.00	-10.52	34.93	8.55	Average
11490.000	57.14	74.00	-16.86	48.59	8.55	Peak
17235.000	64.50	68.20	-3.70	48.70	15.80	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5646.360	60.42	68.20	-7.78	60.21	0.21	Peak
5682.360	61.41	92.18	-30.77	61.02	0.39	Peak
5713.680	60.76	109.03	-48.27	60.24	0.52	Peak
5786.400	105.57			104.75	0.82	Peak
5858.760	63.03	109.75	-46.72	61.99	1.04	Peak
5881.800	63.15	100.15	-37.00	62.02	1.13	Peak
5940.120	63.13	68.20	-5.07	61.80	1.33	Peak
11570.000	53.27	54.00	-0.73	44.50	8.77	Average
11570.000	67.42	74.00	-6.58	58.65	8.77	Peak
17355.000	67.53	68.20	-0.67	51.90	15.63	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5631.960	59.97	68.20	-8.23	59.82	0.15	Peak
5665.800	61.99	79.93	-17.94	61.68	0.31	Peak
5709.000	61.06	107.72	-46.66	60.56	0.50	Peak
5786.760	104.60			103.78	0.82	Peak
5859.840	62.87	109.44	-46.57	61.83	1.04	Peak
5906.280	62.58	82.02	-19.44	61.36	1.22	Peak
5954.160	62.62	68.20	-5.58	61.25	1.37	Peak
11570.000	44.74	54.00	-9.26	35.97	8.77	Average
11570.000	58.62	74.00	-15.38	49.85	8.77	Peak
17355.000	64.33	68.20	-3.87	48.70	15.63	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5639.160	60.98	68.20	-7.22	60.80	0.18	Peak
5687.400	60.19	95.91	-35.72	59.78	0.41	Peak
5715.480	61.09	109.54	-48.45	60.57	0.52	Peak
5825.640	105.72			104.78	0.94	Peak
5856.240	64.76	110.45	-45.69	63.73	1.03	Peak
5914.200	63.13	76.17	-13.04	61.87	1.26	Peak
5968.560	62.51	68.20	-5.69	61.10	1.41	Peak
11650.000	53.64	54.00	-0.36	44.25	9.39	Average
11650.000	67.49	74.00	-6.51	58.10	9.39	Peak
17475.000	65.96	68.20	-2.24	50.11	15.85	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5625.840	60.69	68.20	-7.51	60.57	0.12	Peak
5659.320	60.66	75.12	-14.46	60.38	0.28	Peak
5714.400	60.61	109.23	-48.62	60.09	0.52	Peak
5826.360	104.48			103.54	0.94	Peak
5858.400	63.31	109.85	-46.54	62.27	1.04	Peak
5921.040	62.77	71.12	-8.35	61.50	1.27	Peak
5944.080	62.59	68.20	-5.61	61.26	1.33	Peak
11650.000	44.10	54.00	-9.90	34.71	9.39	Average
11650.000	57.24	74.00	-16.76	47.85	9.39	Peak
17475.000	64.40	68.20	-3.80	48.55	15.85	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	
5613.960	59.65	68.20	-8.55	60.76	-1.11	Peak
5666.520	60.41	80.46	-20.05	61.44	-1.03	Peak
5718.360	60.27	110.34	-50.07	61.20	-0.93	Peak
5746.800	98.44			99.32	-0.88	Peak
5874.240	61.42	105.41	-43.99	62.10	-0.68	Peak
5887.920	61.14	95.61	-34.47	61.81	-0.67	Peak
5928.960	61.17	68.20	-7.03	61.78	-0.61	Peak
11490.000	53.73	54.00	-0.27	46.30	7.43	Average
11490.000	68.82	74.00	-5.18	61.39	7.43	Peak
17235.000	59.38	68.20	-8.82	44.50	14.88	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5648.520	59.98	68.20	-8.22	61.03	-1.05	Peak
5661.840	59.96	76.99	-17.03	60.99	-1.03	Peak
5714.400	59.93	109.23	-49.30	60.86	-0.93	Peak
5743.920	97.31			98.19	-0.88	Peak
5863.440	61.15	108.43	-47.28	61.85	-0.70	Peak
5903.400	61.65	84.15	-22.50	62.30	-0.65	Peak
5929.320	61.00	68.20	-7.20	61.61	-0.61	Peak
11490.000	43.39	54.00	-10.61	35.96	7.43	Average
11490.000	55.88	74.00	-18.12	48.45	7.43	Peak
17235.000	58.49	68.20	-9.71	43.61	14.88	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5616.120	60.85	68.20	-7.35	61.95	-1.10	Peak
5691.000	60.93	98.56	-37.63	61.91	-0.98	Peak
5708.640	60.99	107.62	-46.63	61.94	-0.95	Peak
5783.880	99.88			100.70	-0.82	Peak
5868.480	62.07	107.02	-44.95	62.77	-0.70	Peak
5888.640	62.21	95.08	-32.87	62.88	-0.67	Peak
5945.520	62.04	68.20	-6.16	62.62	-0.58	Peak
11570.000	53.09	54.00	-0.91	45.51	7.58	Average
11570.000	66.45	74.00	-7.55	58.87	7.58	Peak
17355.000	61.48	68.20	-6.72	45.71	15.77	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5635.560	59.86	68.20	-8.34	60.93	-1.07	Peak
5695.680	59.89	102.02	-42.13	60.86	-0.97	Peak
5717.280	59.63	110.04	-50.41	60.56	-0.93	Peak
5787.840	96.48			97.30	-0.82	Peak
5867.400	61.00	107.33	-46.33	61.70	-0.70	Peak
5898.000	62.21	88.14	-25.93	62.86	-0.65	Peak
5938.680	61.11	68.20	-7.09	61.70	-0.59	Peak
11570.000	43.19	54.00	-10.81	35.61	7.58	Average
11570.000	55.44	74.00	-18.56	47.86	7.58	Peak
17355.000	62.52	68.20	-5.68	46.75	15.77	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5612.160	59.57	68.20	-8.63	60.68	-1.11	Peak
5693.160	59.75	100.16	-40.41	60.72	-0.97	Peak
5717.280	59.93	110.04	-50.11	60.86	-0.93	Peak
5823.840	98.56			99.33	-0.77	Peak
5869.920	61.01	106.62	-45.61	61.71	-0.70	Peak
5884.320	61.02	98.28	-37.26	61.69	-0.67	Peak
5948.760	61.05	68.20	-7.15	61.62	-0.57	Peak
11650.000	53.39	54.00	-0.61	45.58	7.81	Average
11650.000	67.20	74.00	-6.80	59.39	7.81	Peak
17475.000	64.71	68.20	-3.49	47.86	16.85	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5617.920	59.75	68.20	-8.45	60.85	-1.10	Peak
5673.000	60.78	85.26	-24.48	61.79	-1.01	Peak
5716.200	59.85	109.74	-49.89	60.78	-0.93	Peak
5827.080	100.27			101.03	-0.76	Peak
5856.960	61.51	110.25	-48.74	62.22	-0.71	Peak
5890.800	62.19	93.47	-31.28	62.85	-0.66	Peak
5939.040	61.69	68.20	-6.51	62.28	-0.59	Peak
11650.000	43.56	54.00	-10.44	35.75	7.81	Average
11650.000	55.60	74.00	-18.40	47.79	7.81	Peak
17475.000	62.56	68.20	-5.64	45.71	16.85	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	
5640.240	60.44	68.20	-7.76	61.51	-1.07	Peak
5667.600	60.85	81.26	-20.41	61.87	-1.02	Peak
5715.840	61.15	109.64	-48.49	62.08	-0.93	Peak
5752.560	98.34			99.21	-0.87	Peak
5855.160	62.44	110.76	-48.32	63.15	-0.71	Peak
5877.840	62.27	103.09	-40.82	62.94	-0.67	Peak
5939.040	61.87	68.20	-6.33	62.46	-0.59	Peak
11510.000	53.45	54.00	-0.55	45.99	7.46	Average
11510.000	67.00	74.00	-7.00	59.54	7.46	Peak
17265.000	60.92	68.20	-7.28	45.80	15.12	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5640.240	60.00	68.20	-8.20	61.07	-1.07	Peak
5688.480	59.87	96.70	-36.83	60.86	-0.99	Peak
5715.120	59.72	109.44	-49.72	60.65	-0.93	Peak
5757.600	95.19			96.05	-0.86	Peak
5862.720	61.36	108.64	-47.28	62.06	-0.70	Peak
5880.720	61.45	100.95	-39.50	62.12	-0.67	Peak
5947.680	61.08	68.20	-7.12	61.66	-0.58	Peak
11510.000	42.31	54.00	-11.69	34.85	7.46	Average
11510.000	55.31	74.00	-18.69	47.85	7.46	Peak
17265.000	59.24	68.20	-8.96	44.12	15.12	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5634.480	59.03	68.20	-9.17	60.10	-1.07	Peak
5663.640	59.36	78.33	-18.97	60.39	-1.03	Peak
5709.360	59.28	107.82	-48.54	60.23	-0.95	Peak
5789.640	96.14			96.96	-0.82	Peak
5869.560	61.23	106.72	-45.49	61.93	-0.70	Peak
5896.920	60.45	88.94	-28.49	61.10	-0.65	Peak
5931.120	61.12	68.20	-7.08	61.72	-0.60	Peak
11590.000	53.22	54.00	-0.78	45.59	7.63	Average
11590.000	66.20	74.00	-7.80	58.57	7.63	Peak
17385.000	60.86	68.20	-7.34	44.83	16.03	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5623.320	60.23	68.20	-7.97	61.33	-1.10	Peak
5668.680	60.97	82.06	-21.09	61.99	-1.02	Peak
5703.600	60.80	106.21	-45.41	61.76	-0.96	Peak
5797.560	97.50			98.30	-0.80	Peak
5859.840	62.21	109.44	-47.23	62.91	-0.70	Peak
5885.760	62.59	97.21	-34.62	63.26	-0.67	Peak
5938.320	62.25	68.20	-5.95	62.84	-0.59	Peak
11590.000	42.55	54.00	-11.45	34.92	7.63	Average
11590.000	56.60	74.00	-17.40	48.97	7.63	Peak
17385.000	60.50	68.20	-7.70	44.47	16.03	Peak

802.11ac VHT80 mode:

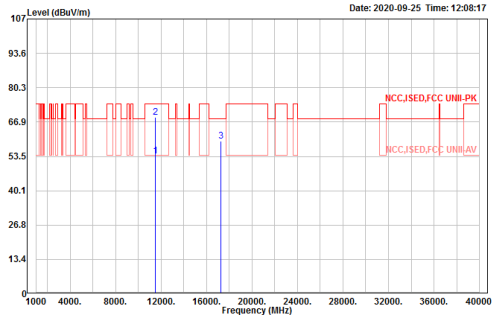
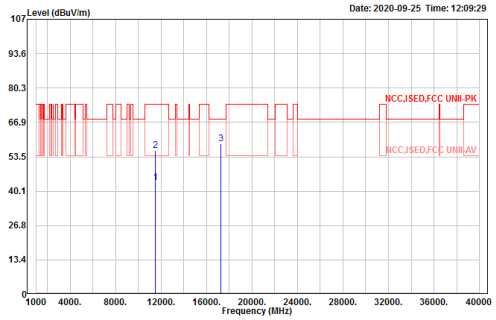
Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5636.280	59.42	68.20	-8.78	60.49	-1.07	Peak
5674.800	59.91	86.59	-26.68	60.92	-1.01	Peak
5719.080	61.60	110.54	-48.94	62.53	-0.93	Peak
5780.280	96.62			97.44	-0.82	Peak
5857.320	61.93	110.15	-48.22	62.64	-0.71	Peak
5881.080	61.75	100.68	-38.93	62.42	-0.67	Peak
5926.800	62.15	68.20	-6.05	62.76	-0.61	Peak
11550.000	53.30	54.00	-0.70	45.75	7.55	Average
11550.000	66.65	74.00	-7.35	59.10	7.55	Peak
17325.000	62.32	68.20	-5.88	46.79	15.53	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
5623.680	59.78	68.20	-8.42	60.88	-1.10	Peak
5677.680	59.80	88.72	-28.92	60.80	-1.00	Peak
5703.240	60.67	106.11	-45.44	61.63	-0.96	Peak
5782.080	94.14			94.96	-0.82	Peak
5859.120	61.48	109.64	-48.16	62.18	-0.70	Peak
5878.920	61.78	102.29	-40.51	62.45	-0.67	Peak
5958.840	61.01	68.20	-7.19	61.56	-0.55	Peak
11550.000	42.97	54.00	-11.03	35.42	7.55	Average
11550.000	55.14	74.00	-18.86	47.59	7.55	Peak
17325.000	58.91	68.20	-9.29	43.38	15.53	Peak

Above 1G (1 GHz-40 GHz): test the worst mode: IEEE 802.11ac VHT20 5745 MHz

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	!11490.000	53.73	54.00	-0.27	46.30	7.43	Average
2	!11490.000	68.82	74.00	-5.18	61.39	7.43	Peak
3	!17235.000	59.38	68.20	-8.82	44.50	14.88	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	!11490.000	43.39	54.00	-10.61	35.96	7.43	Average
2	!11490.000	55.88	74.00	-18.12	48.45	7.43	Peak
3	!17235.000	58.49	68.20	-9.71	43.61	14.88	Peak

Level = Read Level + Factor

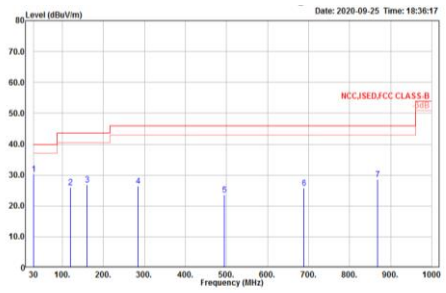
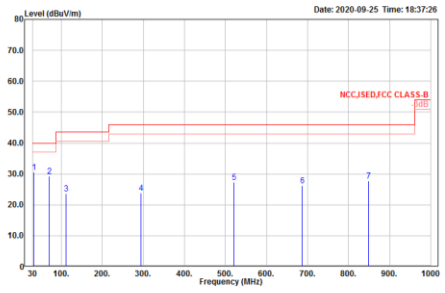
Over Limit = Level – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

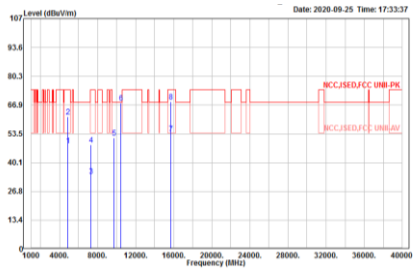
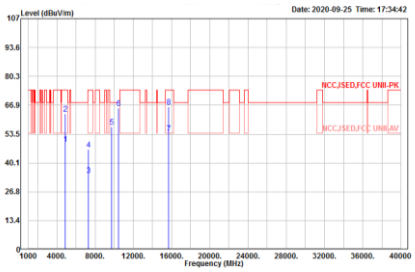
Spurious emissions more than 20 dB below the limit were not reported

Co-Location:

Below 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 30.29 40.00 -9.71 39.05 -8.76 Peak 2 119.240 25.95 43.50 -17.55 45.15 -19.20 Peak 3 159.980 26.99 43.50 -16.51 47.81 -20.82 Peak 4 284.140 26.47 46.00 -19.53 46.81 -20.34 Peak 5 494.630 23.53 46.00 -22.47 39.56 -16.03 Peak 6 688.630 25.71 46.00 -20.29 38.59 -12.88 Peak 7 867.110 28.65 46.00 -17.35 39.36 -10.71 Peak	 Freq Level Limit Line Over Limit Read Level Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m 1 32.910 30.51 40.00 -9.49 41.57 -11.06 Peak 2 70.740 29.32 40.00 -10.68 53.65 -24.33 Peak 3 111.480 23.65 43.50 -19.85 43.67 -20.02 Peak 4 294.810 23.76 46.00 -22.24 44.16 -20.40 Peak 5 520.820 27.32 46.00 -18.68 42.90 -15.58 Peak 6 687.660 26.17 46.00 -19.83 39.06 -12.89 Peak 7 847.710 27.79 46.00 -18.21 38.62 -10.83 Peak

Above 1G:

Horizontal	Vertical
 Freq Level Limit Line Over Limit Read Level Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m 1 ! 4874.000 48.17 54.00 -5.83 50.70 -2.53 Average 2 ! 4874.000 61.61 74.00 -12.39 64.14 -2.53 Peak 3 ! 7311.000 34.05 54.00 -19.95 31.34 2.71 Average 4 7311.000 48.42 74.00 -25.58 45.71 2.71 Peak 5 ! 9748.000 51.62 68.20 -16.58 45.57 6.05 Peak 6 !10460.000 67.87 68.20 -0.33 61.18 6.69 Peak 7 !15690.000 53.50 54.00 -0.50 43.92 9.58 Average 8 !15690.000 68.54 74.00 -5.46 58.96 9.58 Peak	 Freq Level Limit Line Over Limit Read Level Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m 1 ! 4874.000 48.96 54.00 -5.04 51.49 -2.53 Average 2 ! 4874.000 63.03 74.00 -10.97 65.56 -2.53 Peak 3 ! 7311.000 34.49 54.00 -19.51 31.78 2.71 Average 4 7311.000 46.46 74.00 -27.54 43.75 2.71 Peak 5 ! 9748.000 56.86 68.20 -11.34 50.81 6.05 Peak 6 !10460.000 65.68 68.20 -2.52 58.99 6.69 Peak 7 !15690.000 53.90 54.00 -0.10 44.32 9.58 Average 8 !15690.000 66.04 74.00 -7.96 56.46 9.58 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. and Set span = 1.5 times to 5.0 times the OBW.

3. Set RBW = 1 % to 5 % of the OBW and 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(TH-02)					
Signal Analyzer 40GHZ	Rohde & Schwarz	FSV40	101456	2020/06/03	2021/06/02
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

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

8.4 Test Data and Test Plot

UNII-1

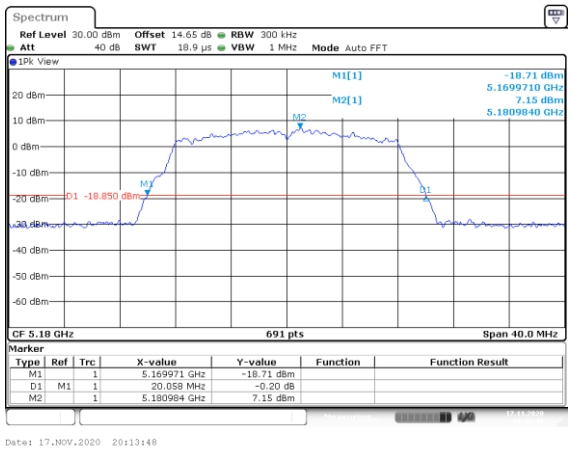
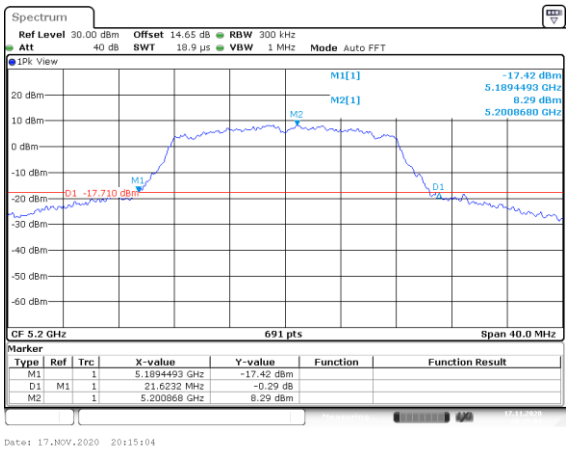
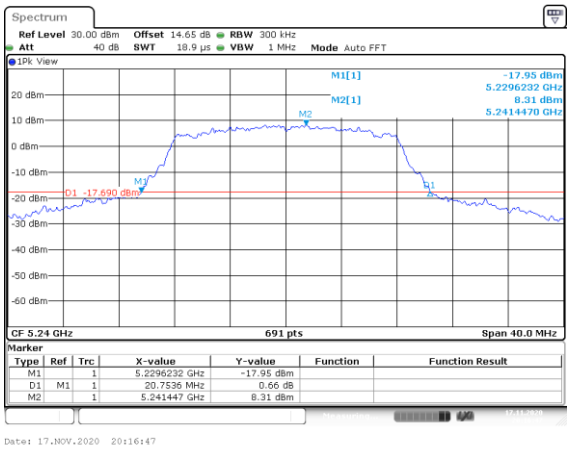
Mode	Channel	Frequency (MHz)	26dB Emission Bandwidth (MHz)	
			Ant. 1	Ant. 2
802.11a	36	5180	20.06	-
	40	5200	21.62	-
	48	5240	20.75	-
802.11ac20	36	5180	20.71	20.45
	40	5200	21.03	20.58
	48	5240	20.96	20.51
802.11ac 40	38	5190	41.54	40.51
	46	5230	68.46	41.03
802.11ac 80	42	5210	81.79	81.03

UNII-3

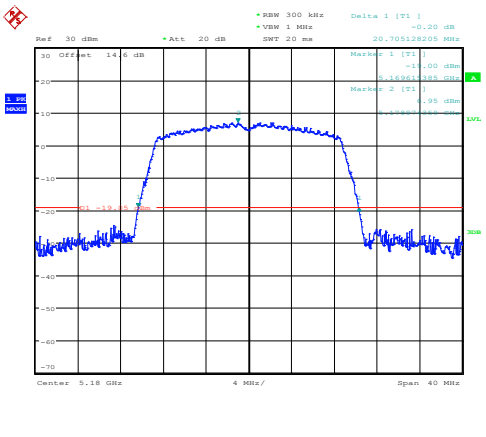
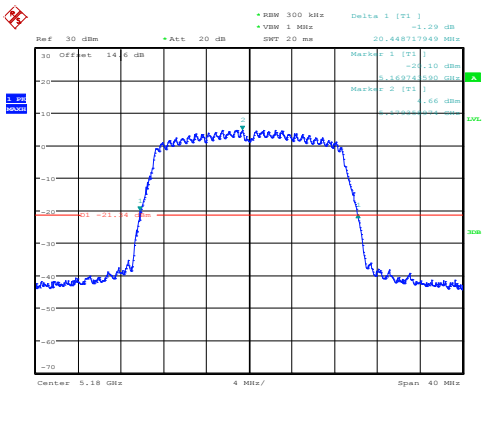
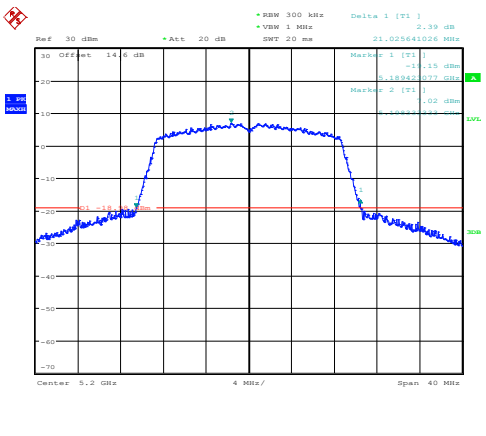
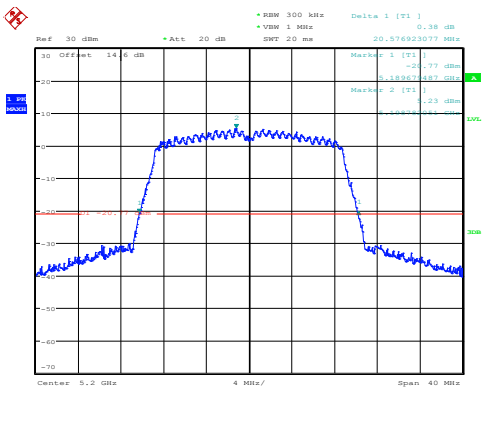
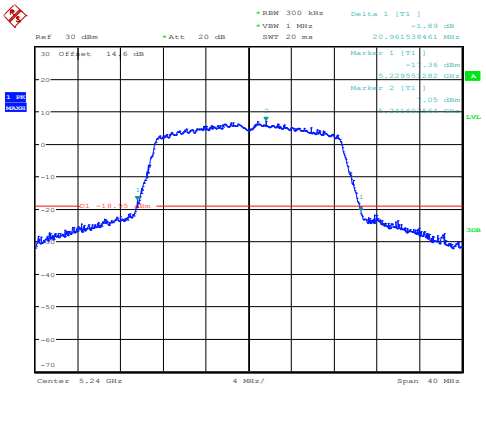
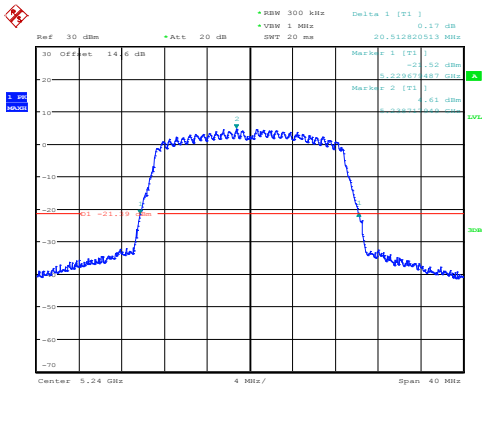
Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)		Limit (MHz)
			Ant. 1	Ant. 2	
802.11a	149	5745	15.19	-	>0.5
	157	5785	15.19	-	>0.5
	165	5825	15.54	-	>0.5
802.11ac20	149	5745	15.77	16.35	>0.5
	157	5785	15.13	16.35	>0.5
	165	5825	15.13	16.54	>0.5
802.11ac 40	151	5755	35.13	35.13	>0.5
	159	5795	35.13	35.13	>0.5
802.11ac 80	155	5775	75.38	75.38	>0.5

For UNII-1

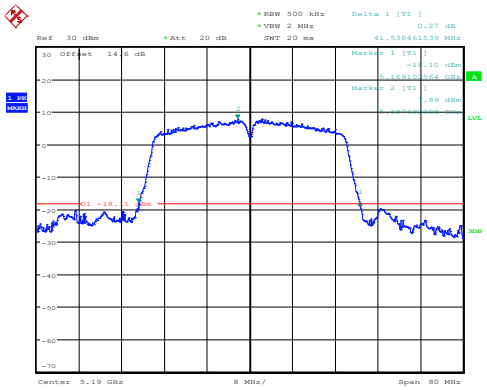
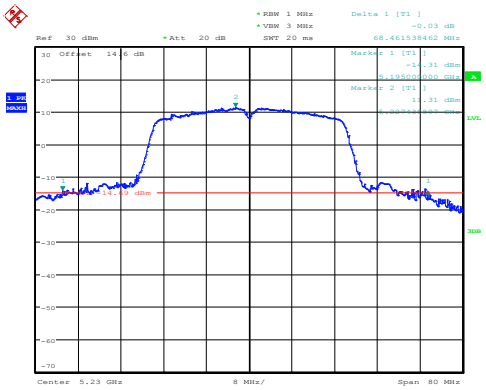
802.11a mode

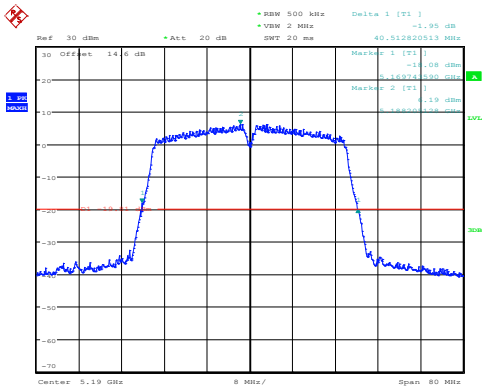
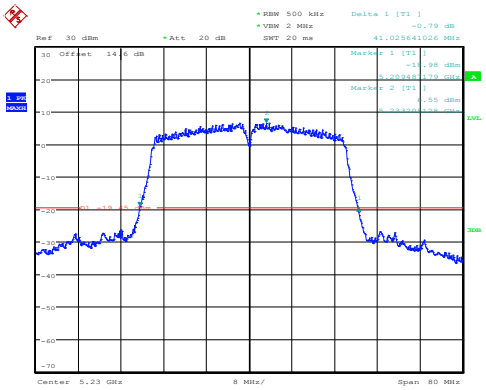
Low CH	Middle CH
	
High CH	**-**
	-

802.11ac VHT20 mode:

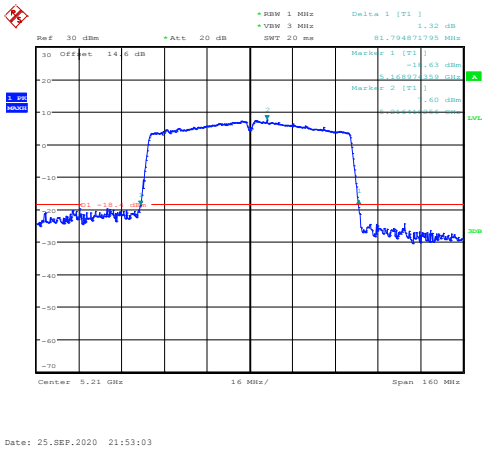
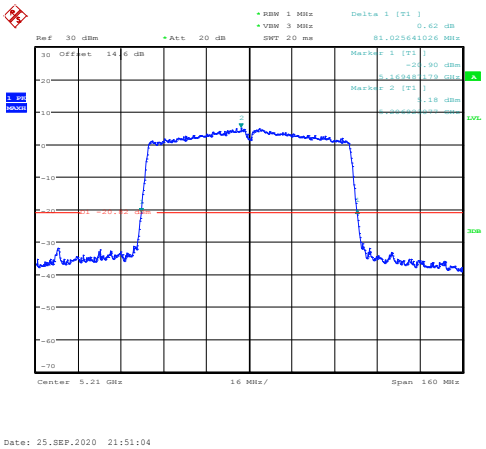
Ant. 1	Ant. 2
Low CH	**Low CH**
	
Middle CH	**Middle CH**
	
High CH	**High CH**
	

802.11ac VHT40 mode:

Ant. 1	
Low CH	**High CH**
	

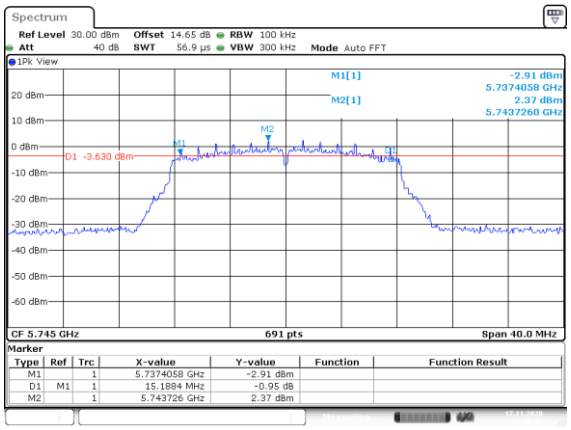
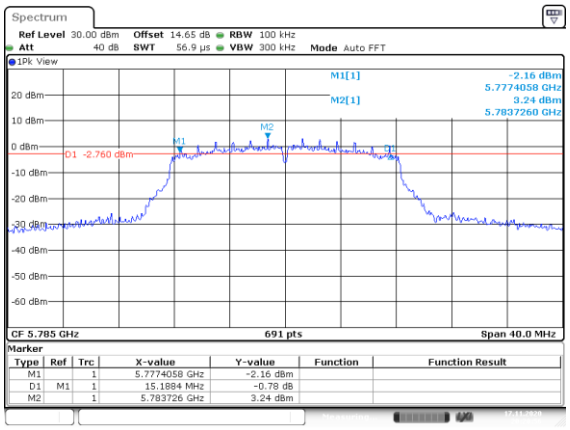
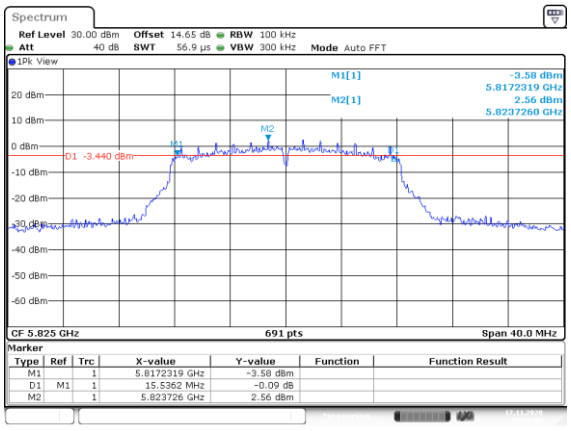
Ant. 2	
Low CH	**High CH**
	

802.11ac VHT80 mode:

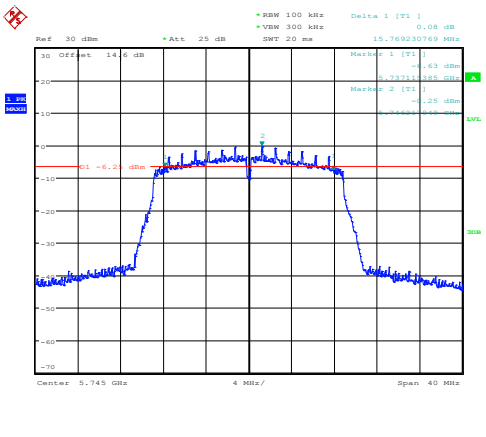
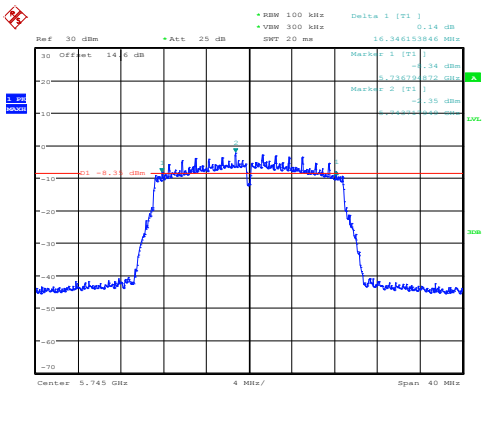
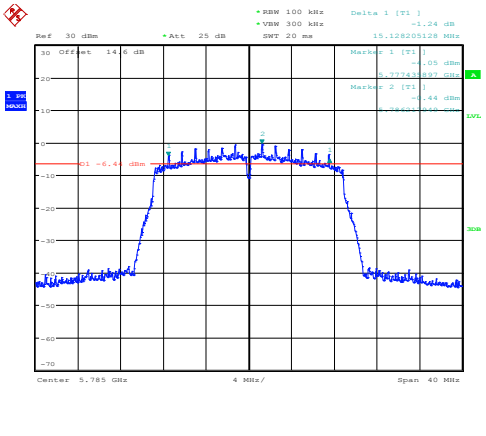
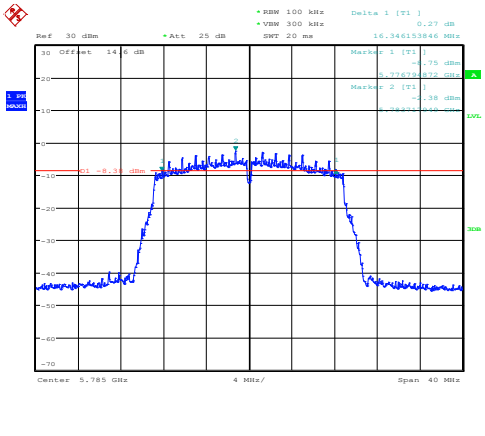
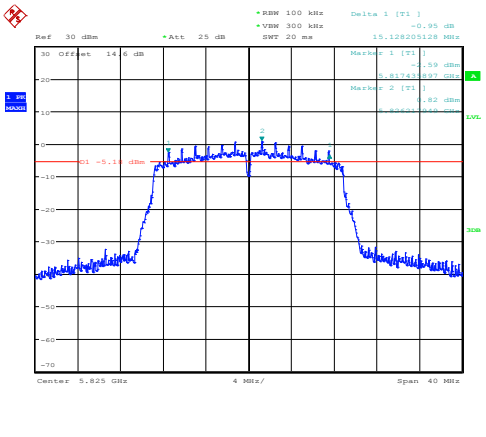
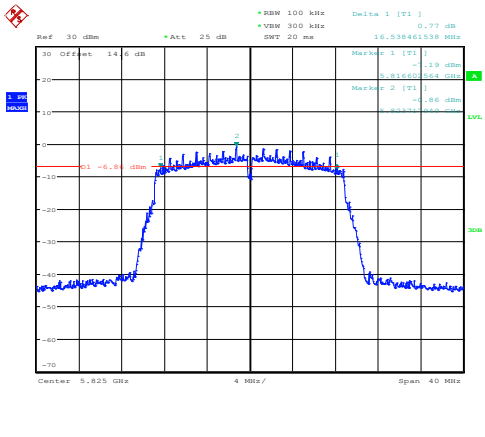
Ant. 1	Ant. 2
Middle CH	**Middle CH**
	

For UNII-3

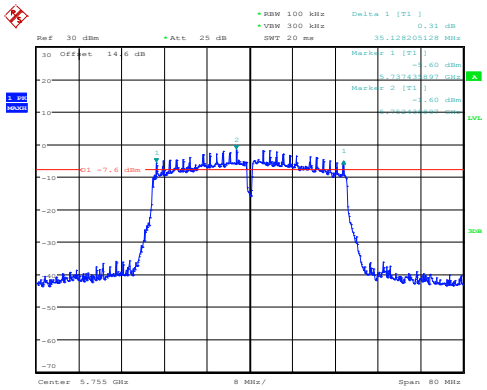
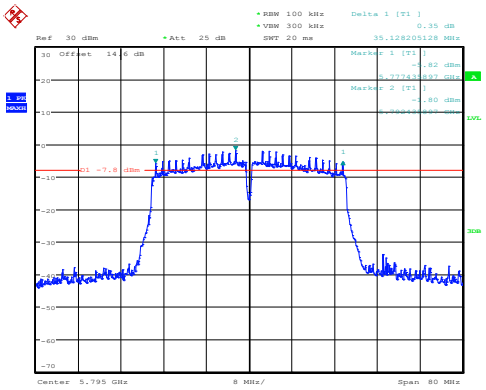
802.11a mode

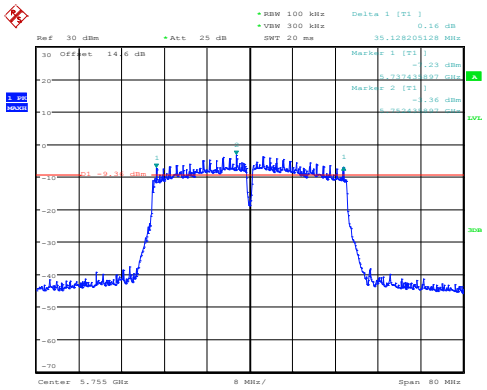
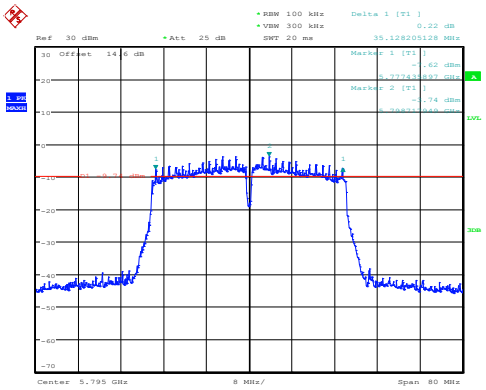
Low CH	Middle CH
	
High CH	**-**
	-

802.11ac VHT20 mode:

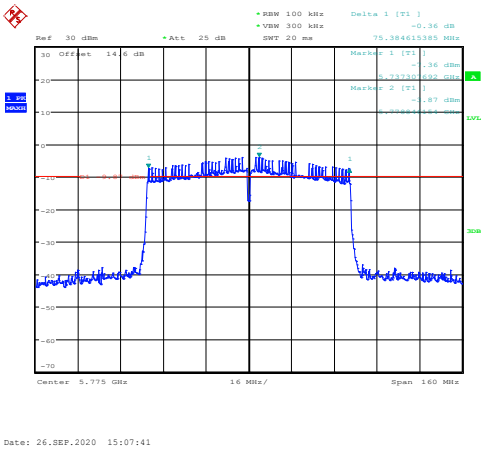
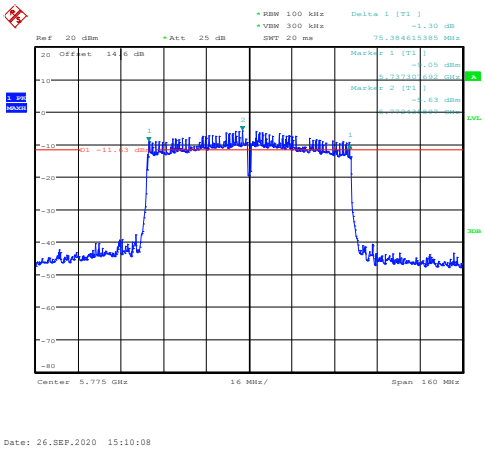
Ant. 1	Ant. 2
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

Ant. 1	
Low CH	**High CH**
	
Date: 26.SEP.2020 15:04:47	Date: 26.SEP.2020 15:02:36

Ant. 2	
Low CH	**High CH**
	
Date: 26.SEP.2020 14:58:06	Date: 26.SEP.2020 15:00:18

802.11ac VHT80 mode:

Ant. 1	Ant. 2
Middle CH	**Middle CH**
	

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)					
Signal Analyzer 40GHZ	Rohde & Schwarz	FSV40	101456	2020/06/03	2021/06/02
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

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

9.4 Test Data

Channel	Frequency (MHz)	Average Output Power (dBm)			Limit (dBm)
		Ant. 1	Ant. 2	Sum	
IEEE 802.11a mode					
36	**5180**	14.97	-	14.97	30.00
40	**5200**	16.83	-	16.83	30.00
48	**5240**	16.93	-	16.93	30.00
149	**5745**	13.07	-	13.07	30.00
157	**5785**	14.12	-	14.12	30.00
165	**5825**	13.31	-	13.31	30.00
IEEE 802.11n HT20 mode					
36	**5180**	15.44	12.32	17.16	30.00
40	**5200**	15.38	12.39	17.15	30.00
48	**5240**	14.93	12.02	16.72	30.00
149	**5745**	11.01	9.04	13.15	30.00
157	**5785**	10.89	8.84	13.00	30.00
165	**5825**	12.31	10.34	14.45	30.00
IEEE 802.11n HT40 mode					
38	**5190**	16.51	13.45	18.25	30.00
46	**5230**	17.14	13.99	18.85	30.00
151	**5755**	12.47	10.50	14.61	30.00
159	**5795**	12.32	10.48	14.51	30.00

Note: 802.11n/ac mode Power DG Gain is 4.86 dBi. Due to the Power DG Gain not over 6 dBi. Therefore, not need adjustment the power limit.

Channel	Frequency (MHz)	Average Output Power (dBm)			Limit (dBm)
		Ant. 1	Ant. 2	Sum	
IEEE 802.11ac VHT20 mode					
36	**5180**	15.82	12.34	17.43	30.00
40	**5200**	15.44	12.68	17.29	30.00
48	**5240**	14.96	11.78	16.67	30.00
149	**5745**	11.18	9.05	13.25	30.00
157	**5785**	10.91	8.91	13.03	30.00
165	**5825**	12.34	10.40	14.49	30.00
IEEE 802.11ac VHT40 mode					
38	**5190**	16.61	13.46	18.32	30.00
46	**5230**	17.17	14.06	18.90	30.00
151	**5755**	12.47	10.66	14.67	30.00
159	**5795**	12.35	10.52	14.54	30.00
IEEE 802.11ac VHT80 mode					
42	**5210**	16.02	12.86	17.73	30.00
155	**5775**	13.13	11.20	15.28	30.00

Note: 802.11n/ac mode Power DG Gain is 4.86 dBi. Due to the Power DG Gain not over 6 dBi. Therefore, not need adjustment the power limit.

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)					
Signal Analyzer 40GHZ	Rohde & Schwarz	FSV40	101456	2020/06/03	2021/06/02
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

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

10.4 Test Data and Test Plot

UNII-1

Mode	Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD (dBm/MHz)	Limit (dBm/MHz)
			Ant. 1	Ant. 2			
802.11a	36	5180	5.03	-	0.05	5.08	17.00
	40	5200	6.80	-	0.05	6.85	17.00
	48	5240	6.95	-	0.05	7.00	17.00
802.11ac VHT20	36	5180	4.73	1.89	0.10	6.64	15.13
	40	5200	4.59	2.10	0.10	6.63	15.13
	48	5240	4.15	1.45	0.10	6.11	15.13
802.11ac VHT40	38	5190	2.94	0.14	0.18	4.95	15.13
	46	5230	3.24	0.88	0.18	5.41	15.13
802.11ac VHT80	42	5210	-0.42	-3.56	0.30	1.60	15.13

Note: Power DG Gain is 4.86 dBi, and PSD DG Gain = Power DG Gain + Array Gain = 4.86 + 3.01 = 7.87 dBi. Due to above, the PSD limit is 17 – (7.87-6) = 15.13 dBm/MHz

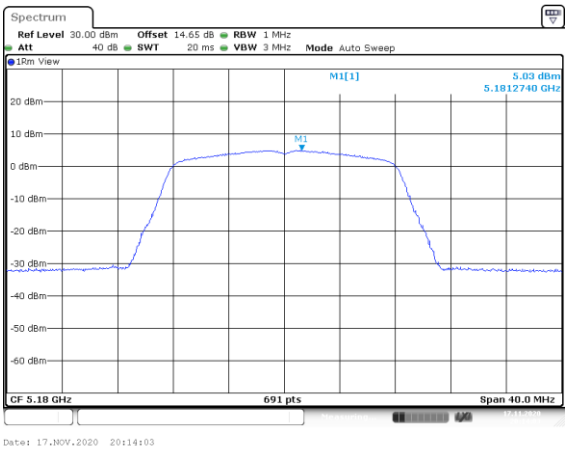
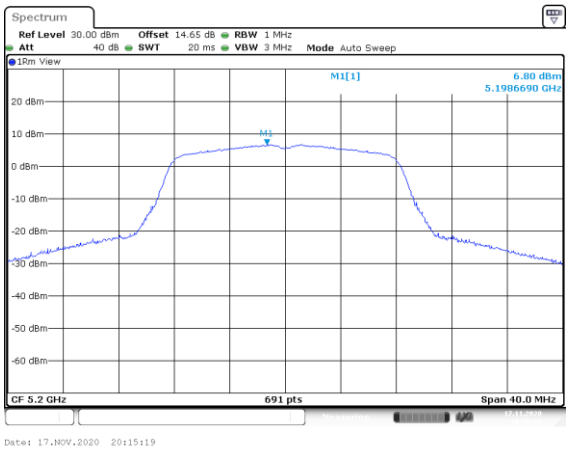
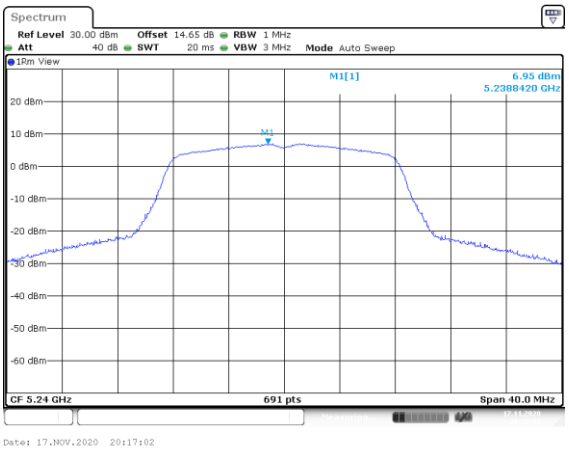
UNII-3

Mode	Channel	Frequency (MHz)	PSD (dBm/500 kHz)		Duty Factor (dB)	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)
			Ant. 1	Ant. 2			
802.11a	149	5745	0.63	-	0.05	0.68	30.00
	157	5785	1.73	-	0.05	1.78	30.00
	165	5825	1.28	-	0.05	1.33	30.00
802.11ac VHT20	149	5745	-1.39	-3.69	0.10	0.72	28.13
	157	5785	-1.84	-3.76	0.10	0.41	28.13
	165	5825	-0.31	-2.33	0.10	1.90	28.13
802.11ac VHT40	151	5755	-3.13	-4.51	0.18	-0.58	28.13
	159	5795	-3.22	-4.97	0.18	-0.82	28.13
802.11ac VHT80	155	5775	-5.36	-6.86	0.30	-2.74	28.13

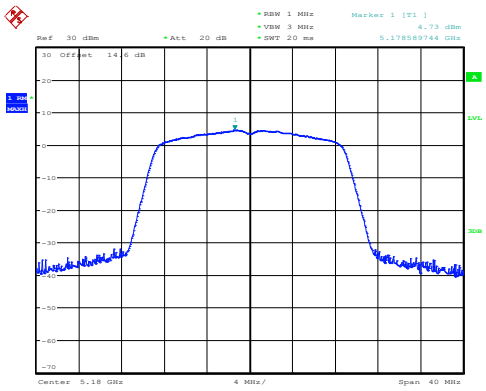
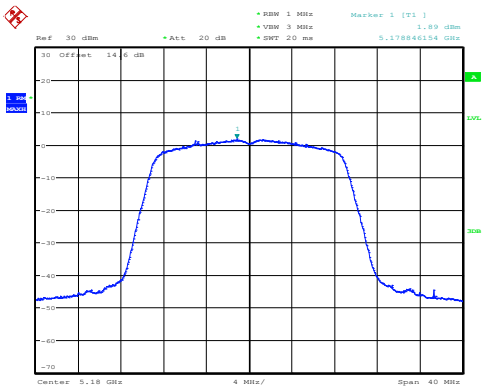
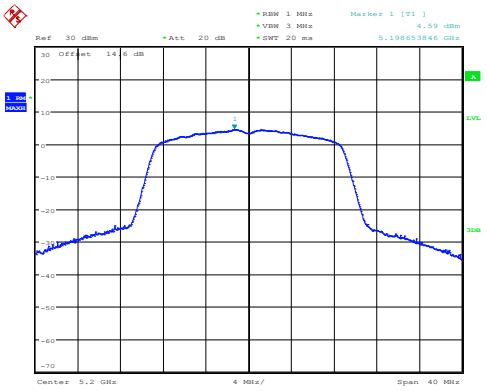
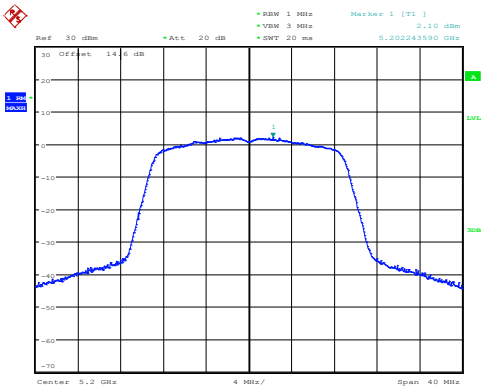
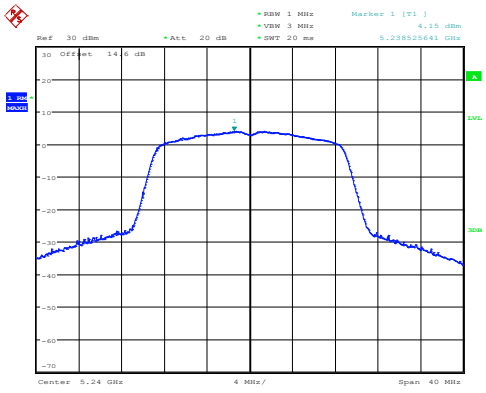
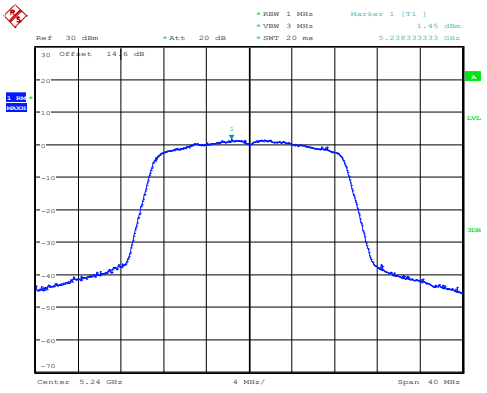
Note: Power DG Gain is 4.86 dBi, and PSD DG Gain = Power DG Gain + Array Gain = 4.86 + 3.01 = 7.87 dBi. Due to above, the PSD limit is 30 – (7.87-6) = 28.13 dBm/500 kHz

For UNII-1:

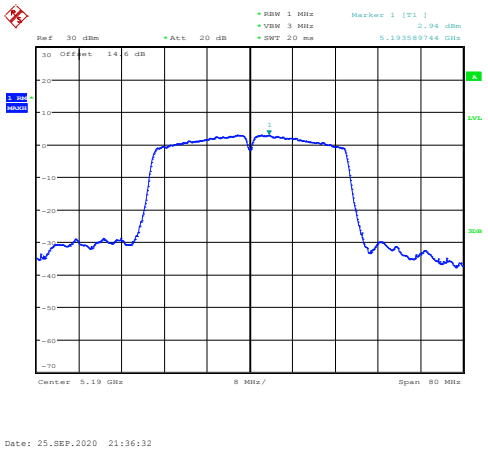
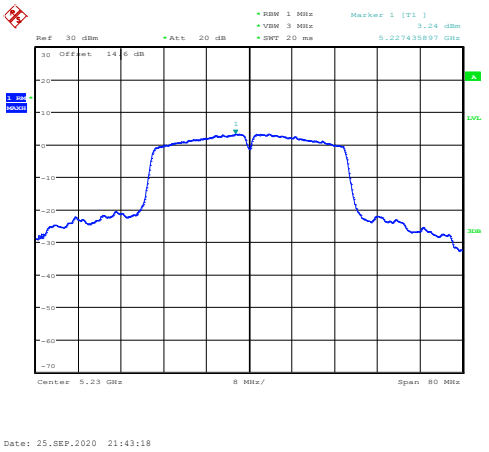
802.11a mode

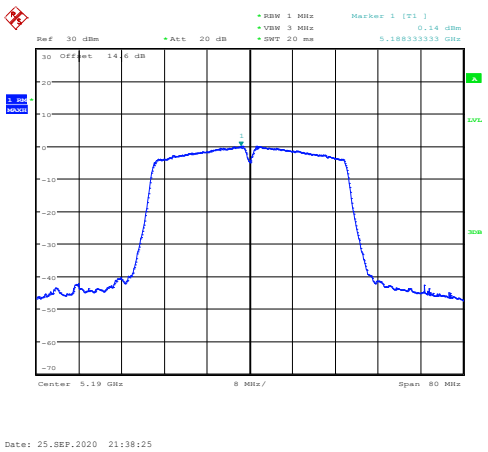
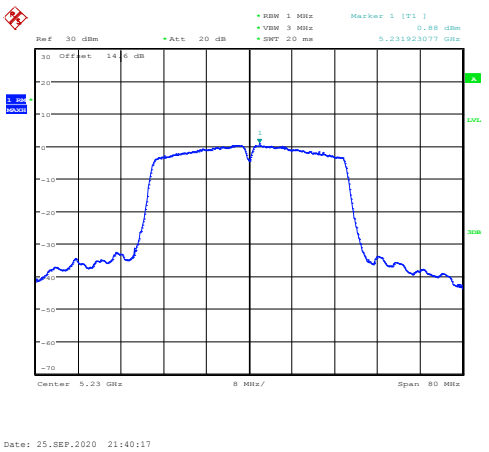
Low CH	Middle CH
	
High CH	**-**
	-

802.11ac VHT20 mode:

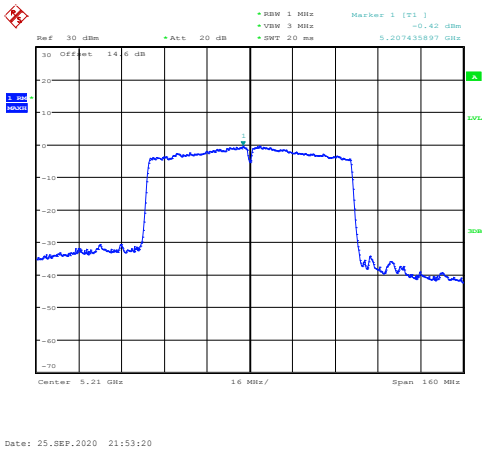
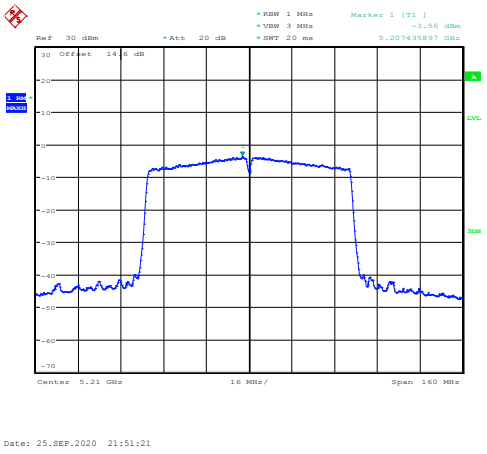
Ant. 1	Ant. 2
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

Ant. 1	
Low CH	**High CH**
	

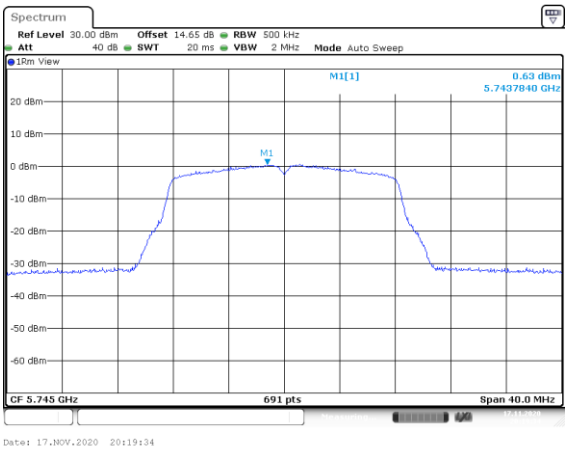
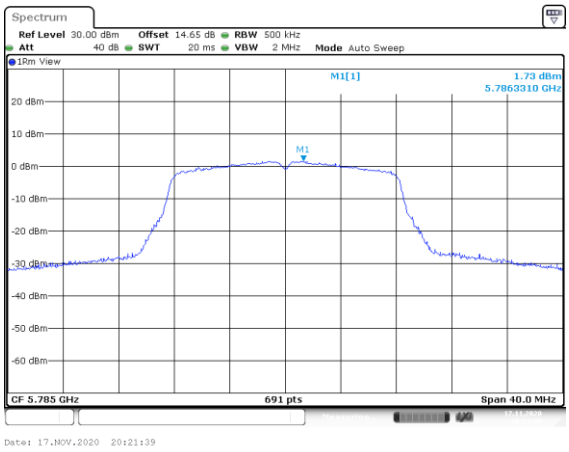
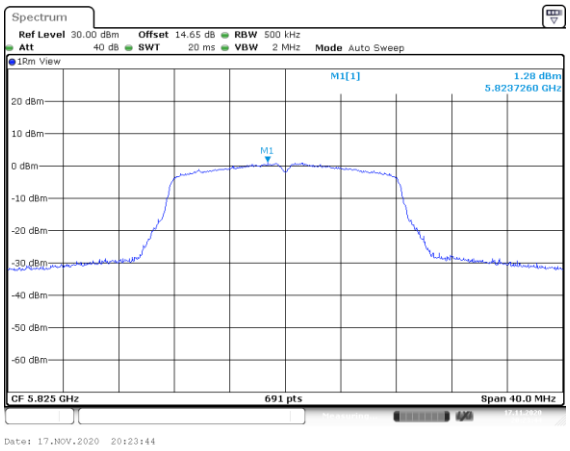
Ant. 2	
Low CH	**High CH**
	

802.11ac VHT80 mode

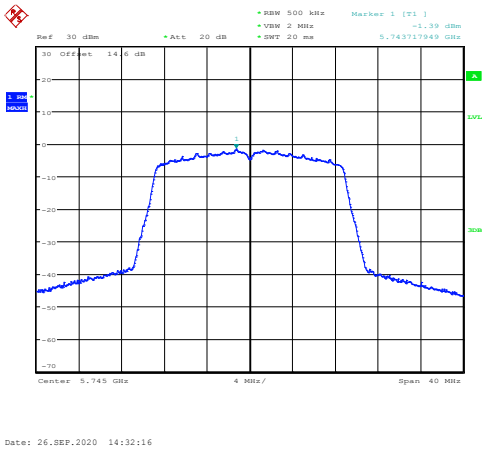
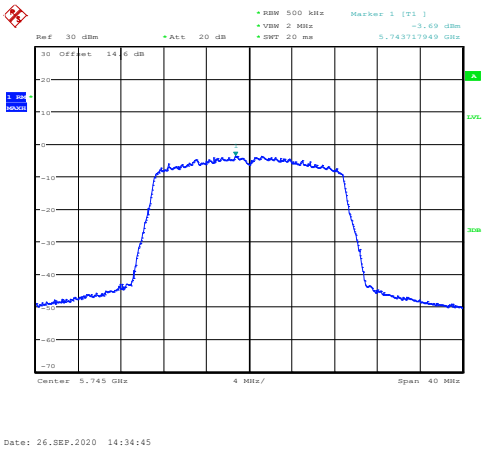
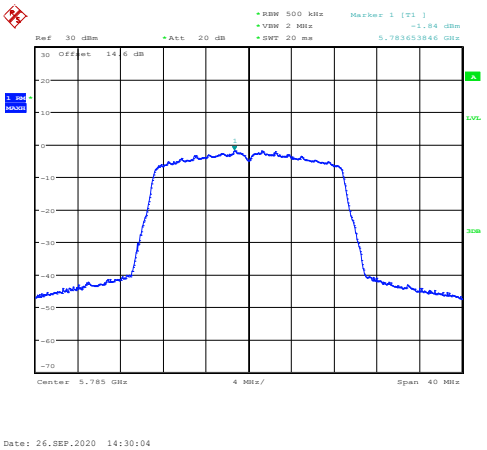
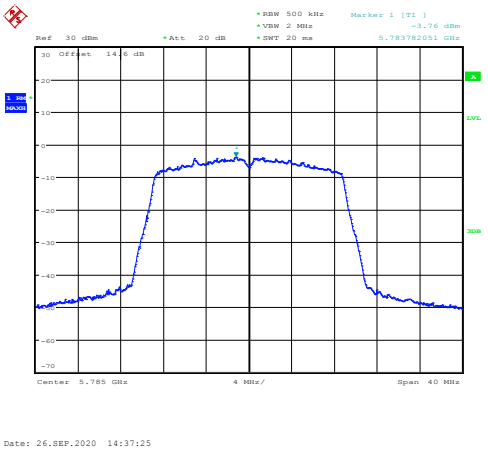
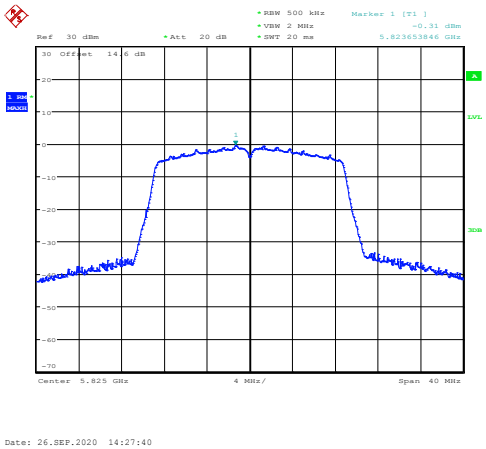
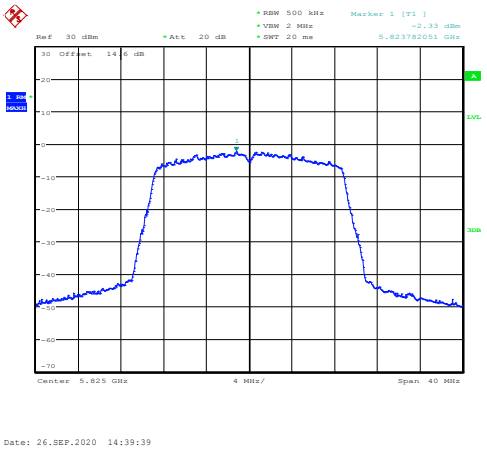
Ant. 1	Ant. 2
Middle	Middle
	

For UNII-3:

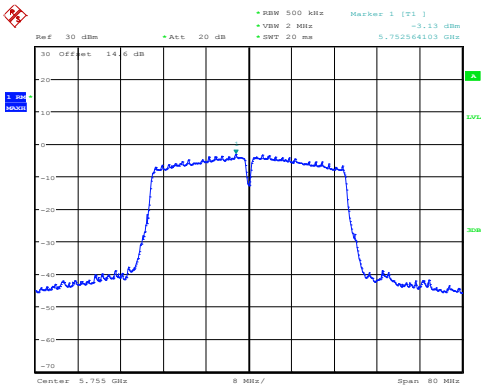
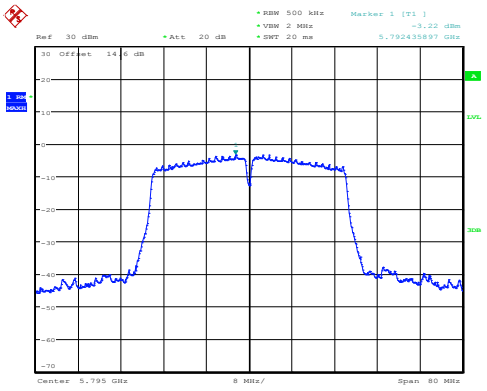
802.11a mode:

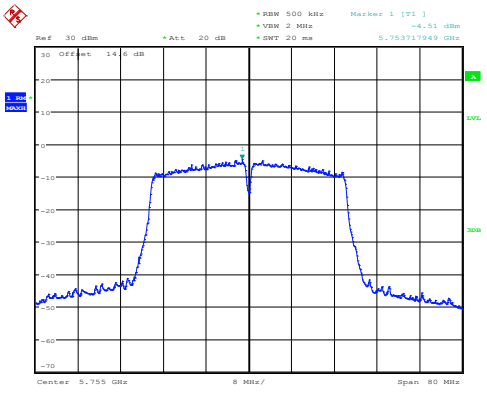
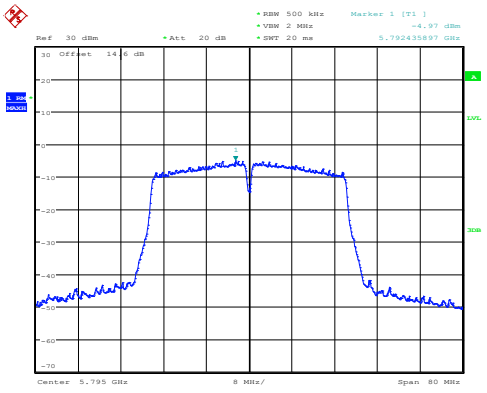
Low CH	Middle CH
	
High CH	**-**
	-

802.11ac VHT20 mode:

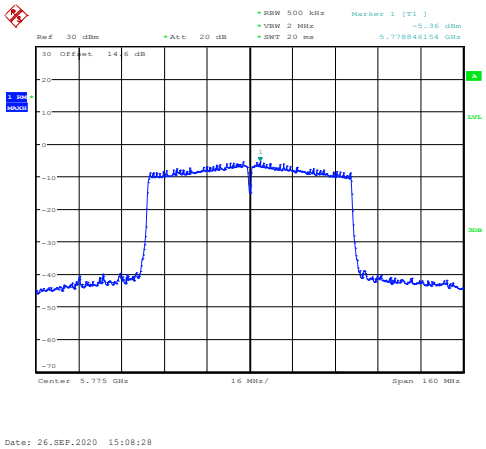
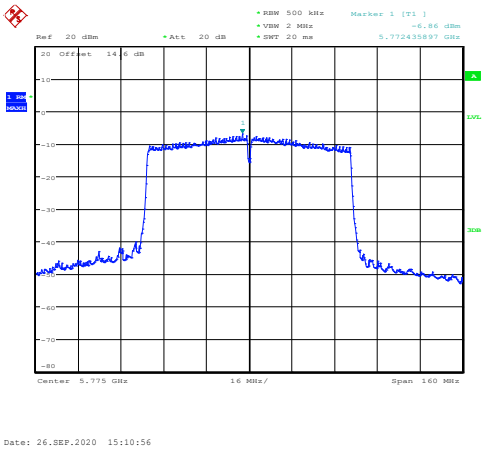
Ant. 1	Ant. 2
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

802.11ac VHT40 mode:

Ant. 1	
Low CH	**High CH**
	

Ant. 2	
Low CH	**High CH**
	

802.11ac VHT80 mode

Ant. 1	Ant. 2
Middle	Middle
	

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