FCC Part 15.247

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 :	**RLK200203001-00B**
Report Date :	**2020/08/04**
Reviewed By :	**Zeus Chen**

Prepared By:

Bay Area Compliance Laboratories Corp.(Linkou Laboratory)

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

Tel: +886 (3)3961072; Fax: +886 (3) 3961027

www.bacl.com.tw

Revision History

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

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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	TTI Tatung Technology Inc.
Product (Equipment)	Dual Band Wireless Router
Model Name	WAP-3518
Frequency Range	IEEE 802.11b/g/n HT20/HT40: 2412 - 2462 MHz IEEE 802.11n HT40: 2422 - 2452 MHz
Number of Channels	IEEE 802.11b/g/n HT20: 11 Channels; IEEE 802.11n HT40: 9 Channels
Output Power	IEEE 802.11b: 20.92 dBm (0.1236 W) IEEE 802.11g: 26.65 dBm (0.4624 W) IEEE 802.11n HT20: 26.60 dBm (0.4571 W) IEEE 802.11n HT40: 26.13 dBm (0.4102 W)
Modulation Type	IEEE 802.11b: DSSS; IEEE 802.11g/n HT 20/HT40: OFDM
Related Submittal(s)/Grant(s)	**FCC Part 15.407 NII with FCC ID: 2AATB-WAP-3518**
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

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

1.2 Objective and Test Methodology

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

- Part 2, Subpart J, Part 15, Subparts A and C, section 15.247 of the Federal Communication Commission's rules.
- 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 Test Channels and Description of Worst Test Configuration

The system was configured for testing in testing mode which was provided by manufacturer.

No special accessory, No modification was made to the EUT and No special equipment used during test.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2412**	7	2442
2	2417	8	2447
3	**2422**	**9**	**2452**
4	2427	10	2457
5	2432	**11**	**2462**
6	**2437**	-	-

For 802.11b/g/n HT20: Channel **1**, **6** and **11** were tested. For 802.11n HT40: Channel **3**, **6** and 9 were tested.

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.

Note2: All the test result was MIMO for 802.11b/g/n HT20 and HT40, there is always 2Tx, not diversity or SISO.

Modulation Used for Conformance Test			
Configuration	**NTX**	**Data Rate**	**Worst Data Rate**
802.11b	2	1-11 Mbps	1 Mbps
802.11g	2	6-54 Mbps	6 Mbps
802.11n HT 20	2	MCS 0-7	MCS 0
802.11n HT 40	2	MCS 0-7	MCS 0

Worst Case of Power Setting				
EUT Exercise Software		Command		
Configuration	**NTX**	**Low CH**	**Mid CH**	**High CH**
802.11b	2	94,90	94,90	94,90
802.11g	2	98,94	120,116	103,99
802.11n HT 20	2	101,97	120,116	101,97
802.11n HT 40	2	89,85	114,109	90,86

2.2 Support Equipment List and External Cable List

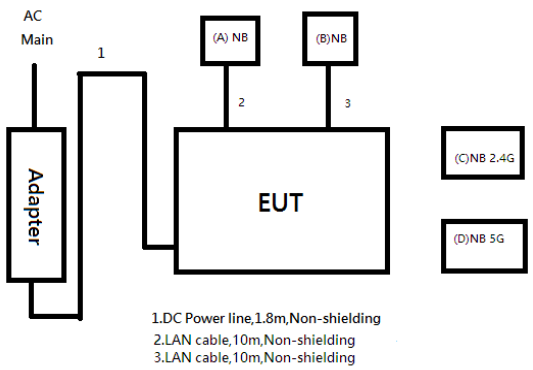
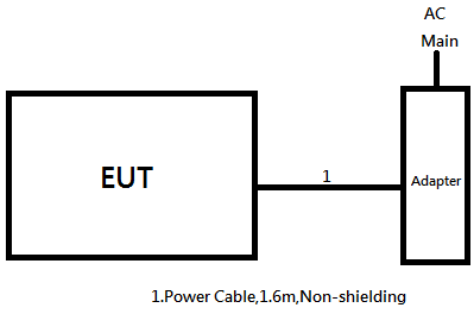
Support Equipment:

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

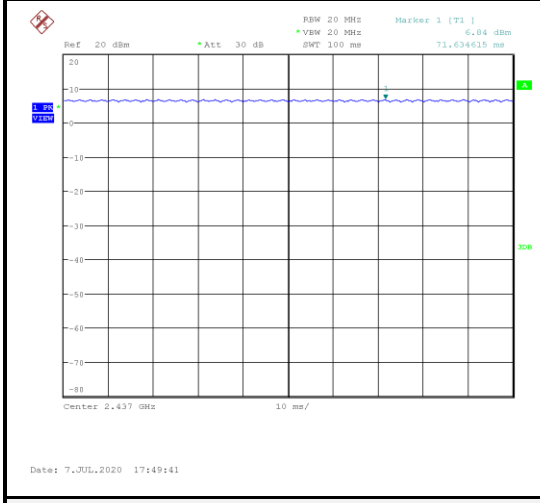
Conduction	Radiation
	

2.4 Duty Cycle

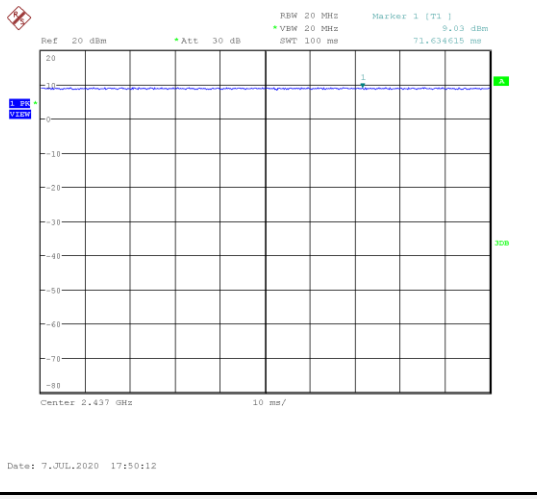
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum power transmission duration, T, are required for each tested mode of operation.

Configuration	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b	100	100	100	0.00
802.11g	100	100	100	0.00
802.11n HT20	100	100	100	0.00
802.11n HT40	100	100	100	0.00

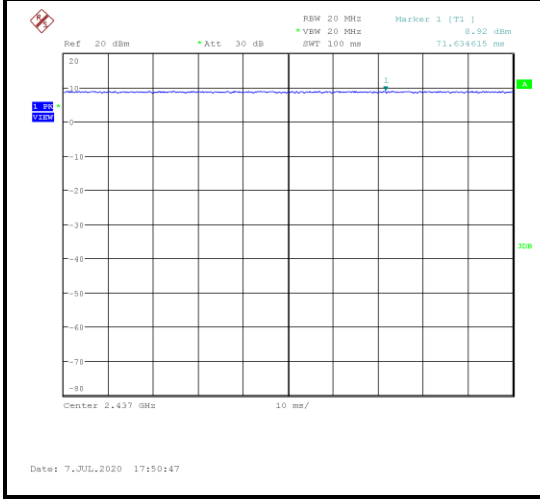
802.11b



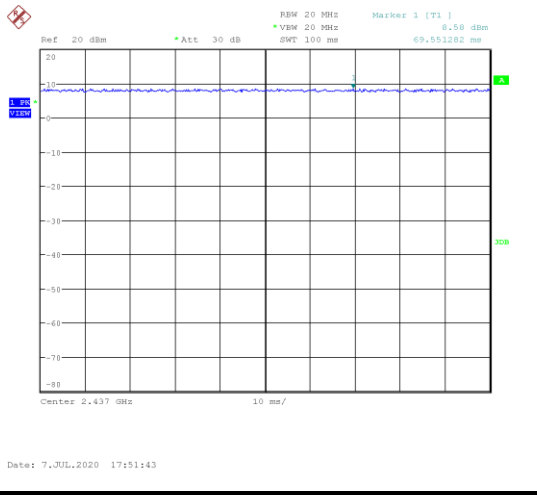
802.11g



802.11n HT20



802.11n HT40



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

3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.247(i), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth and Occupied Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 FCC§15.247(i), §1.1307, § 2.1091 – Maximum Permissible Exposure (MPE)

4.1 Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

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

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

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

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

Calculated Formulary: Predication of MPE limit at a given distance

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

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

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

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

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

4.2 RF Exposure Evaluation Result

MPE Evaluation

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Wi-Fi 2.4G	2412-2462	3.20	2.0893	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, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

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

5.2 Antenna List and Details

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

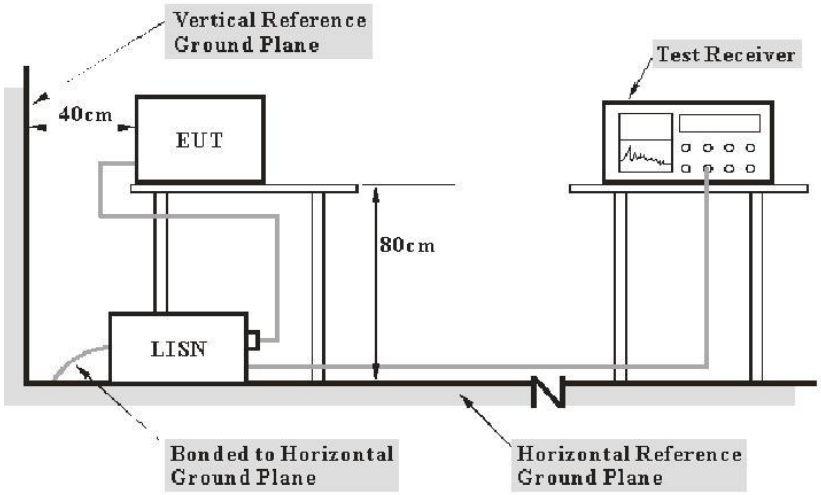
According to FCC §15.207,

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

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

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

6.2 EUT Setup and Test Procedure



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

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz. During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	Receiver RBW
150 kHz - 30 MHz	9 kHz

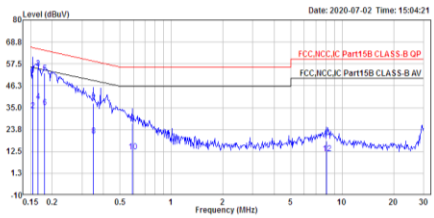
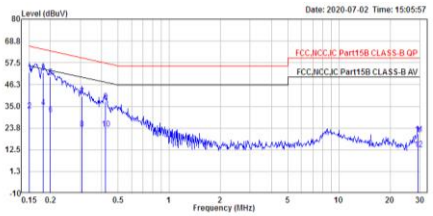
During the conducted emission test, the adapter was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

6.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
AC Line Conduction Room (CON-01)					
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 Result

Line	Neutral
	

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.154	32.33	52.27	19.94	65.80	-13.53	QP
2	0.154	13.42	33.36	19.94	55.80	-22.44	Average
3	0.165	35.34	55.28	19.94	65.21	-9.93	QP
4	0.165	18.26	38.20	19.94	55.21	-17.01	Average
5	0.182	32.83	52.77	19.94	64.41	-11.64	QP
6	0.182	15.11	35.05	19.94	54.41	-19.36	Average
7	0.349	17.37	37.32	19.95	58.99	-21.67	QP
8	0.349	0.77	20.72	19.95	48.99	-28.27	Average
9	0.591	7.01	26.97	19.96	56.00	-29.03	QP
10	0.591	-7.65	12.31	19.96	46.00	-33.69	Average
11	8.122	-2.30	17.77	20.07	60.00	-42.23	QP
12	8.122	-8.72	11.35	20.07	50.00	-38.65	Average

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.150	32.66	52.61	19.95	66.00	-13.39	QP
2	0.150	12.94	32.89	19.95	56.00	-23.11	Average
3	0.182	32.50	52.44	19.94	64.41	-11.97	QP
4	0.182	14.63	34.57	19.94	54.41	-19.84	Average
5	0.200	30.09	50.03	19.94	63.62	-13.59	QP
6	0.200	10.98	30.92	19.94	53.62	-22.70	Average
7	0.307	20.34	40.28	19.94	60.04	-19.76	QP
8	0.307	3.18	23.12	19.94	50.04	-26.92	Average
9	0.423	17.53	37.50	19.97	57.40	-19.90	QP
10	0.423	3.20	23.17	19.97	47.40	-24.23	Average
11	29.291	0.25	20.69	20.44	60.00	-39.31	QP
12	29.291	-7.59	12.85	20.44	50.00	-37.15	Average

Note1: Transmit mode

Note2: 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, §15.247(d) – Spurious Emissions

7.1 Applicable Standard

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

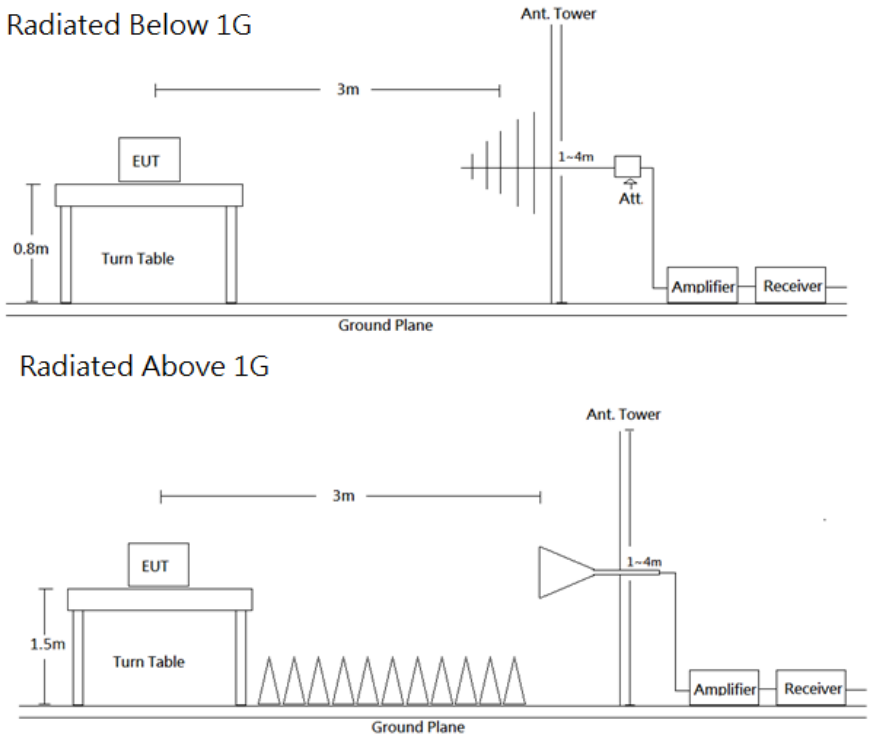
As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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.

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

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 15.247 Limits.

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

Frequency Range	RBW	VBW	Duty cycle	Measurement 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

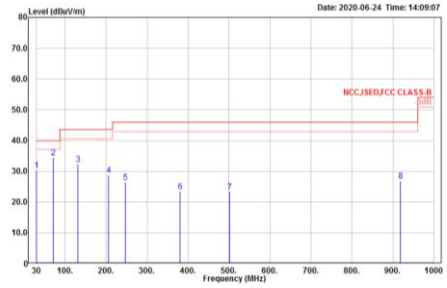
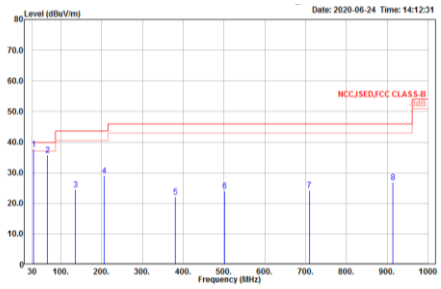
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Radiation 3M Room (966A)					
Active Loop	EMCO	6502	0001-3322	2020/03/16	2021/03/15
Bilog Antenna/6 dB Attenuator	SUNOL SCIENCES & EMEC /EMCI	JB3/N-6-06	A111513/AT-N0668	2020/03/19	2021/03/18
Horn Antenna	ETS-Lindgren	3115	00085775	2019/09/11	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 Result

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	30.28	40.00	-9.72	39.04	-8.76	Peak
2	70.740	34.54	40.00	-5.46	58.87	-24.33	Peak
3	130.880	32.20	43.50	-11.30	51.54	-19.34	Peak
4	205.570	28.92	43.50	-14.58	50.64	-21.72	Peak
5	246.310	26.45	46.00	-19.55	48.28	-21.83	Peak
6	380.170	23.31	46.00	-22.69	41.83	-18.52	Peak
7	500.450	23.49	46.00	-22.51	39.39	-15.90	Peak
8	918.520	26.95	46.00	-19.05	37.26	-10.31	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 !	32.910	37.68	40.00	-2.32	48.74	-11.06	QP
2	67.830	35.83	40.00	-4.17	60.15	-24.32	Peak
3	136.700	24.41	43.50	-19.09	44.15	-19.74	Peak
4	205.570	29.06	43.50	-14.44	50.78	-21.72	Peak
5	380.170	22.05	46.00	-23.95	40.57	-18.52	Peak
6	500.450	24.05	46.00	-21.95	39.95	-15.90	Peak
7	709.000	24.30	46.00	-21.70	36.93	-12.63	Peak
8	913.670	26.81	46.00	-19.19	37.18	-10.37	Peak

Note1: Transmit mode

Note2:

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-26.5 GHz)

802.11b mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2386.944	42.22	54.00	-11.78	51.94	-9.72	Average
2386.944	54.94	74.00	-19.06	64.66	-9.72	Peak
2412.144	105.27			114.92	-9.65	Average
2412.144	108.09			117.74	-9.65	Peak
4824.000	53.68	54.00	-0.32	56.72	-3.04	Average
4824.000	55.50	74.00	-18.50	58.54	-3.04	Peak
7236.000	44.07	54.00	-9.93	40.25	3.82	Average
7236.000	51.63	74.00	-22.37	47.81	3.82	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2379.328	40.23	54.00	-13.77	49.97	-9.74	Average
2379.328	52.76	74.00	-21.24	62.50	-9.74	Peak
2411.920	102.74			112.39	-9.65	Average
2411.920	105.65			115.30	-9.65	Peak
4824.000	48.86	54.00	-5.14	51.90	-3.04	Average
4824.000	50.92	74.00	-23.08	53.96	-3.04	Peak
7236.000	50.48	54.00	-3.52	46.66	3.82	Average
7236.000	55.02	74.00	-18.98	51.20	3.82	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2354.044	40.37	54.00	-13.63	50.19	-9.82	Average
2354.044	53.88	74.00	-20.12	63.70	-9.82	Peak
2439.954	104.54			114.10	-9.56	Average
2439.954	107.16			116.72	-9.56	Peak
2496.582	40.31	54.00	-13.69	49.70	-9.39	Average
2496.582	52.94	74.00	-21.06	62.33	-9.39	Peak
4874.000	53.87	54.00	-0.13	56.75	-2.88	Average
4874.000	55.92	74.00	-18.08	58.80	-2.88	Peak
7311.000	44.29	54.00	-9.71	40.31	3.98	Average
7311.000	51.65	74.00	-22.35	47.67	3.98	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2385.988	39.42	54.00	-14.58	49.15	-9.73	Average
2385.988	52.67	74.00	-21.33	62.40	-9.73	Peak
2439.954	102.37			111.93	-9.56	Average
2439.954	105.28			114.84	-9.56	Peak
2490.048	40.12	54.00	-13.88	49.52	-9.40	Average
2490.048	52.64	74.00	-21.36	62.04	-9.40	Peak
4874.000	48.55	54.00	-5.45	51.43	-2.88	Average
4874.000	51.31	74.00	-22.69	54.19	-2.88	Peak
7311.000	49.59	54.00	-4.41	45.61	3.98	Average
7311.000	54.65	74.00	-19.35	50.67	3.98	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2462.900	105.51			115.00	-9.49	Average
2462.900	108.14			117.63	-9.49	Peak
2487.100	44.25	54.00	-9.75	53.66	-9.41	Average
2487.100	56.06	74.00	-17.94	65.47	-9.41	Peak
4924.000	48.22	54.00	-5.78	50.88	-2.66	Average
4924.000	51.82	74.00	-22.18	54.48	-2.66	Peak
7386.000	46.51	54.00	-7.49	42.39	4.12	Average
7386.000	53.50	74.00	-20.50	49.38	4.12	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2464.700	102.87			112.36	-9.49	Average
2464.700	105.54			115.03	-9.49	Peak
2487.500	41.09	54.00	-12.91	50.49	-9.40	Average
2487.500	53.31	74.00	-20.69	62.71	-9.40	Peak
4924.000	53.72	54.00	-0.28	56.38	-2.66	Average
4924.000	55.69	74.00	-18.31	58.35	-2.66	Peak
7386.000	43.93	54.00	-10.07	39.81	4.12	Average
7386.000	51.78	74.00	-22.22	47.66	4.12	Peak

802.11g mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.744	53.28	54.00	-0.72	62.99	-9.71	Average
2389.744	71.14	74.00	-2.86	80.85	-9.71	Peak
2410.240	100.78			110.44	-9.66	Average
2410.240	110.67			120.33	-9.66	Peak
4824.000	40.70	54.00	-13.30	43.74	-3.04	Average
4824.000	52.73	74.00	-21.27	55.77	-3.04	Peak
7236.000	41.80	54.00	-12.20	37.98	3.82	Average
7236.000	60.36	74.00	-13.64	56.54	3.82	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.968	43.64	54.00	-10.36	53.35	-9.71	Average
2389.968	59.65	74.00	-14.35	69.36	-9.71	Peak
2410.016	97.83			107.49	-9.66	Average
2410.016	108.10			117.76	-9.66	Peak
4824.000	36.56	54.00	-17.44	39.60	-3.04	Average
4824.000	49.66	74.00	-24.34	52.70	-3.04	Peak
7236.000	46.38	54.00	-7.62	42.56	3.82	Average
7236.000	63.81	74.00	-10.19	59.99	3.82	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.376	42.79	54.00	-11.21	52.50	-9.71	Average
2389.376	59.86	74.00	-14.14	69.57	-9.71	Peak
2435.598	103.71			113.28	-9.57	Average
2435.598	113.14			122.71	-9.57	Peak
2483.998	42.53	54.00	-11.47	51.95	-9.42	Average
2483.998	57.82	74.00	-16.18	67.24	-9.42	Peak
4874.000	44.02	54.00	-9.98	46.90	-2.88	Average
4874.000	57.82	74.00	-16.18	60.70	-2.88	Peak
7311.000	51.83	54.00	-2.17	47.85	3.98	Average
7311.000	66.74	74.00	-7.26	62.76	3.98	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2387.924	39.82	54.00	-14.18	49.53	-9.71	Average
2387.924	55.23	74.00	-18.77	64.94	-9.71	Peak
2435.598	102.35			111.92	-9.57	Average
2435.598	112.00			121.57	-9.57	Peak
2483.756	39.78	54.00	-14.22	49.20	-9.42	Average
2483.756	55.25	74.00	-18.75	64.67	-9.42	Peak
4874.000	40.72	54.00	-13.28	43.60	-2.88	Average
4874.000	52.92	74.00	-21.08	55.80	-2.88	Peak
7311.000	53.79	54.00	-0.21	49.81	3.98	Average
7311.000	69.86	74.00	-4.14	65.88	3.98	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2461.300	101.71			111.21	-9.50	Average
2461.300	111.12			120.62	-9.50	Peak
2483.600	53.08	54.00	-0.92	62.50	-9.42	Average
2483.600	69.88	74.00	-4.12	79.30	-9.42	Peak
4924.000	41.88	54.00	-12.12	44.54	-2.66	Average
4924.000	53.58	74.00	-20.42	56.24	-2.66	Peak
7386.000	44.98	54.00	-9.02	40.86	4.12	Average
7386.000	60.86	74.00	-13.14	56.74	4.12	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2460.800	99.47			108.97	-9.50	Average
2460.800	109.14			118.64	-9.50	Peak
2483.800	46.73	54.00	-7.27	56.15	-9.42	Average
2483.800	66.16	74.00	-7.84	75.58	-9.42	Peak
4924.000	36.84	54.00	-17.16	39.50	-2.66	Average
4924.000	49.07	74.00	-24.93	51.73	-2.66	Peak
7386.000	47.92	54.00	-6.08	43.80	4.12	Average
7386.000	64.75	74.00	-9.25	60.63	4.12	Peak

802.11n HT20 mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2390.000	53.15	54.00	-0.85	62.86	-9.71	Average
2390.000	73.72	74.00	-0.28	83.43	-9.71	Peak
2411.024	100.27			109.93	-9.66	Average
2411.024	109.81			119.47	-9.66	Peak
4824.000	39.88	54.00	-14.12	42.92	-3.04	Average
4824.000	54.56	74.00	-19.44	57.60	-3.04	Peak
7236.000	41.62	54.00	-12.38	37.80	3.82	Average
7236.000	58.79	74.00	-15.21	54.97	3.82	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.968	44.27	54.00	-9.73	53.98	-9.71	Average
2389.968	62.68	74.00	-11.32	72.39	-9.71	Peak
2412.928	97.29			106.93	-9.64	Average
2412.928	106.66			116.30	-9.64	Peak
4824.000	34.81	54.00	-19.19	37.85	-3.04	Average
4824.000	49.46	74.00	-24.54	52.50	-3.04	Peak
7236.000	45.54	54.00	-8.46	41.72	3.82	Average
7236.000	62.34	74.00	-11.66	58.52	3.82	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.618	43.25	54.00	-10.75	52.96	-9.71	Average
2389.618	60.81	74.00	-13.19	70.52	-9.71	Peak
2438.502	103.13			112.69	-9.56	Average
2438.502	113.19			122.75	-9.56	Peak
2487.628	43.34	54.00	-10.66	52.74	-9.40	Average
2487.628	60.25	74.00	-13.75	69.65	-9.40	Peak
4874.000	44.02	54.00	-9.98	46.90	-2.88	Average
4874.000	57.32	74.00	-16.68	60.20	-2.88	Peak
7311.000	50.59	54.00	-3.41	46.61	3.98	Average
7311.000	67.90	74.00	-6.10	63.92	3.98	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2388.892	41.06	54.00	-12.94	50.77	-9.71	Average
2388.892	57.52	74.00	-16.48	67.23	-9.71	Peak
2436.082	101.85			111.42	-9.57	Average
2436.082	111.61			121.18	-9.57	Peak
2483.514	41.22	54.00	-12.78	50.64	-9.42	Average
2483.514	59.05	74.00	-14.95	68.47	-9.42	Peak
4874.000	39.80	54.00	-14.20	42.68	-2.88	Average
4874.000	52.68	74.00	-21.32	55.56	-2.88	Peak
7311.000	53.23	54.00	-0.77	49.25	3.98	Average
7311.000	71.63	74.00	-2.37	67.65	3.98	Peak

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2460.900	100.10			109.60	-9.50	Average
2460.900	109.62			119.12	-9.50	Peak
2483.500	53.41	54.00	-0.59	62.83	-9.42	Average
2483.500	73.34	74.00	-0.66	82.76	-9.42	Peak
4924.000	40.24	54.00	-13.76	42.90	-2.66	Average
4924.000	54.21	74.00	-19.79	56.87	-2.66	Peak
7386.000	41.73	54.00	-12.27	37.61	4.12	Average
7386.000	59.32	74.00	-14.68	55.20	4.12	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2460.900	97.41			106.91	-9.50	Average
2460.900	106.72			116.22	-9.50	Peak
2483.600	45.02	54.00	-8.98	54.44	-9.42	Average
2483.600	63.16	74.00	-10.84	72.58	-9.42	Peak
4924.000	34.90	54.00	-19.10	37.56	-2.66	Average
4924.000	47.86	74.00	-26.14	50.52	-2.66	Peak
7386.000	44.57	54.00	-9.43	40.45	4.12	Average
7386.000	62.74	74.00	-11.26	58.62	4.12	Peak

802.11n HT40 mode:

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.068	49.09	54.00	-4.91	58.80	-9.71	Average
2389.068	67.23	74.00	-6.77	76.94	-9.71	Peak
2420.748	94.26			103.88	-9.62	Average
2420.748	103.63			113.25	-9.62	Peak
4844.000	34.42	54.00	-19.58	37.39	-2.97	Average
4844.000	47.84	74.00	-26.16	50.81	-2.97	Peak
7266.000	35.75	54.00	-18.25	31.85	3.90	Average
7266.000	47.90	74.00	-26.10	44.00	3.90	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2388.672	42.88	54.00	-11.12	52.59	-9.71	Average
2388.672	59.93	74.00	-14.07	69.64	-9.71	Peak
2419.956	92.48			102.10	-9.62	Average
2419.956	101.73			111.35	-9.62	Peak
4844.000	31.53	54.00	-22.47	34.50	-2.97	Average
4844.000	43.38	74.00	-30.62	46.35	-2.97	Peak
7266.000	37.41	54.00	-16.59	33.51	3.90	Average
7266.000	51.50	74.00	-22.50	47.60	3.90	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.376	53.45	54.00	-0.55	63.16	-9.71	Average
2389.376	71.59	74.00	-2.41	81.30	-9.71	Peak
2438.502	99.96			109.52	-9.56	Average
2438.502	109.78			119.34	-9.56	Peak
2485.450	53.46	54.00	-0.54	62.88	-9.42	Average
2485.450	69.90	74.00	-4.10	79.32	-9.42	Peak
4874.000	40.62	54.00	-13.38	43.50	-2.88	Average
4874.000	53.10	74.00	-20.90	55.98	-2.88	Peak
7311.000	44.95	54.00	-9.05	40.97	3.98	Average
7311.000	59.83	74.00	-14.17	55.85	3.98	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.860	47.86	54.00	-6.14	57.57	-9.71	Average
2389.860	67.35	74.00	-6.65	77.06	-9.71	Peak
2438.744	97.55			107.11	-9.56	Average
2438.744	106.97			116.53	-9.56	Peak
2488.112	47.94	54.00	-6.06	57.34	-9.40	Average
2488.112	64.07	74.00	-9.93	73.47	-9.40	Peak
4874.000	36.52	54.00	-17.48	39.40	-2.88	Average
4874.000	49.66	74.00	-24.34	52.54	-2.88	Peak
7311.000	48.96	54.00	-5.04	44.98	3.98	Average
7311.000	64.58	74.00	-9.42	60.60	3.98	Peak

High CH

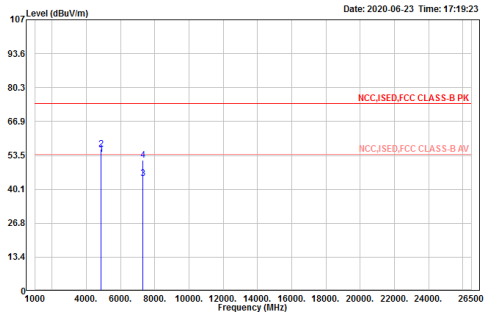
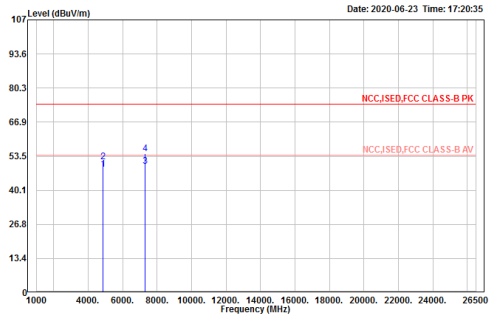
Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2453.480	95.98			105.50	-9.52	Average
2453.480	105.25			114.77	-9.52	Peak
2484.080	53.85	54.00	-0.15	63.27	-9.42	Average
2484.080	69.87	74.00	-4.13	79.29	-9.42	Peak
4904.000	32.00	54.00	-22.00	34.76	-2.76	Average
4904.000	44.03	74.00	-29.97	46.79	-2.76	Peak
7356.000	37.03	54.00	-16.97	32.97	4.06	Average
7356.000	51.61	74.00	-22.39	47.55	4.06	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2450.600	92.82			102.35	-9.53	Average
2450.600	102.10			111.63	-9.53	Peak
2485.760	45.68	54.00	-8.32	55.10	-9.42	Average
2485.760	62.06	74.00	-11.94	71.48	-9.42	Peak
4904.000	35.59	54.00	-18.41	38.35	-2.76	Average
4904.000	47.89	74.00	-26.11	50.65	-2.76	Peak
7356.000	34.51	54.00	-19.49	30.45	4.06	Average
7356.000	48.33	74.00	-25.67	44.27	4.06	Peak

Above 1G (1 GHz-26.5 GHz): The worst mode: 802.11b Middle CH

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 !	4874.000	53.87	54.00	-0.13	56.75	-2.88	Average
2 !	4874.000	55.92	74.00	-18.08	58.80	-2.88	Peak
3 !	7311.000	44.29	54.00	-9.71	40.31	3.98	Average
4	7311.000	51.65	74.00	-22.35	47.67	3.98	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 !	4874.000	48.55	54.00	-5.45	51.43	-2.88	Average
2	4874.000	51.31	74.00	-22.69	54.19	-2.88	Peak
3 !	7311.000	49.59	54.00	-4.41	45.61	3.98	Average
4 !	7311.000	54.65	74.00	-19.35	50.67	3.98	Peak

Note1: Transmit with MIMO mode

Note2:

Level = Read Level + Factor

Over Limit = Level – Limit

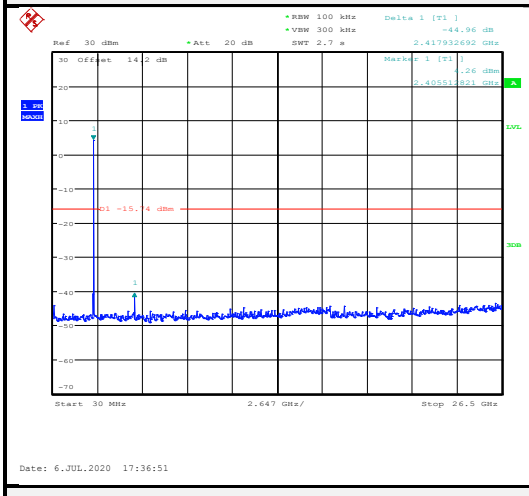
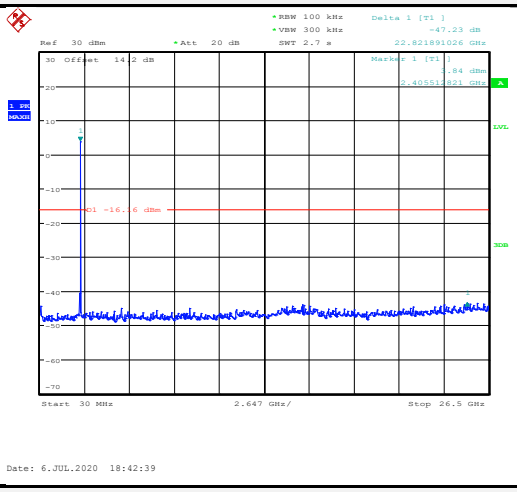
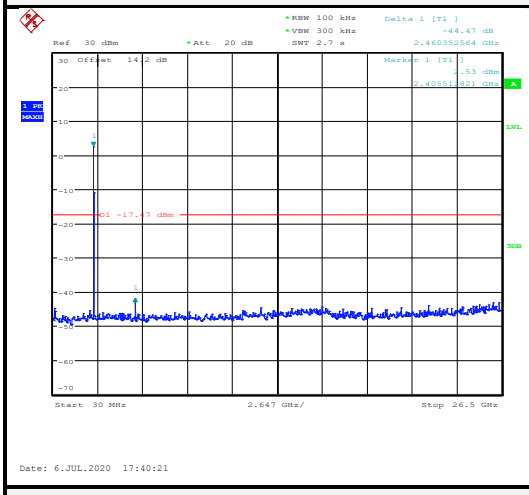
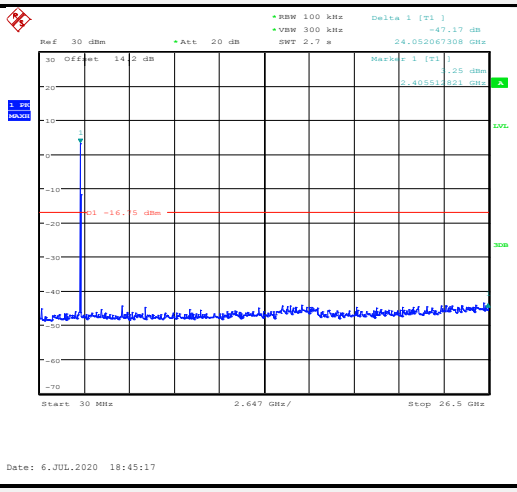
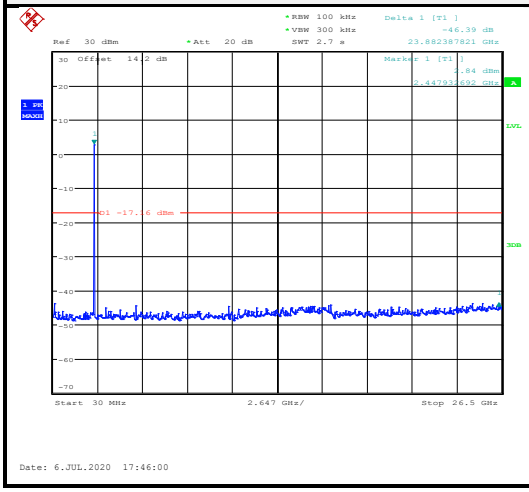
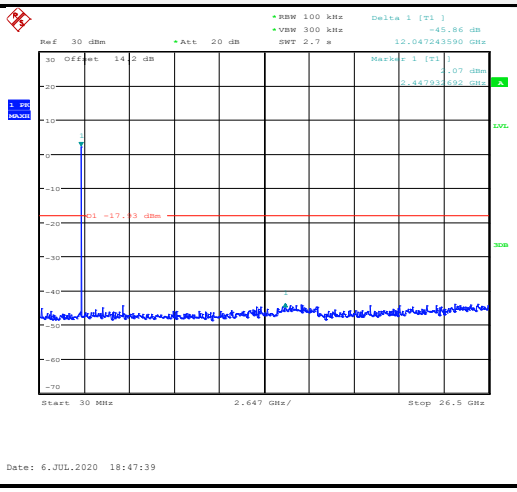
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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

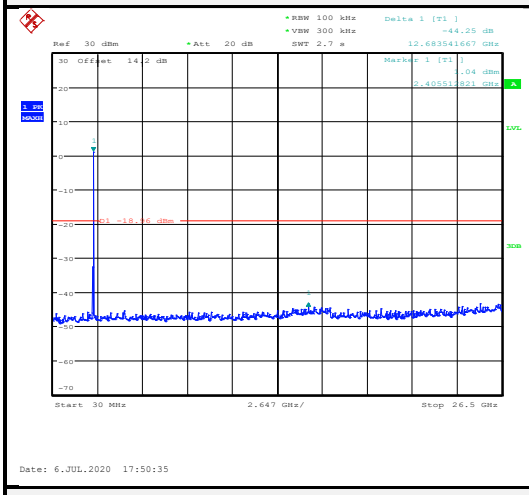
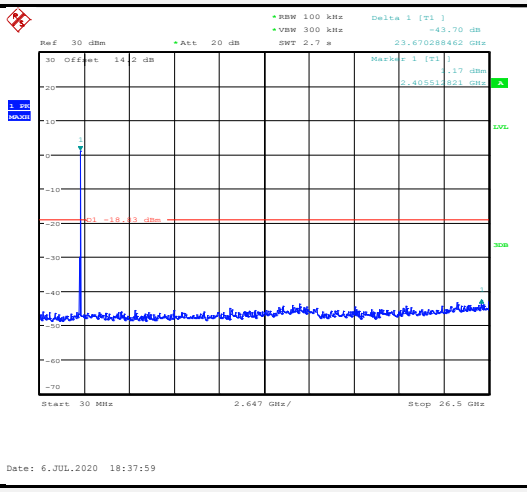
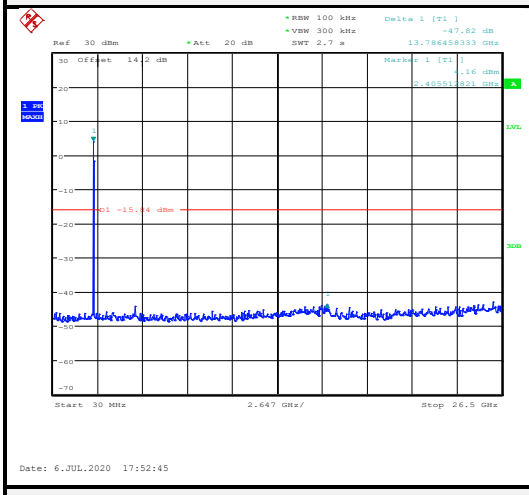
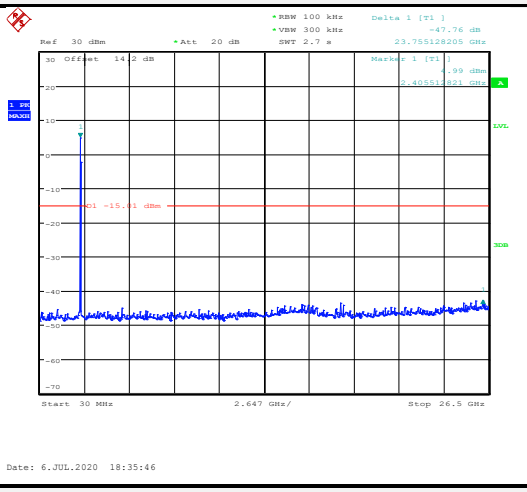
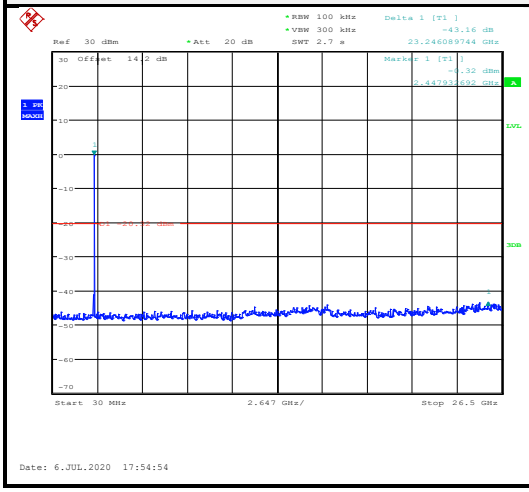
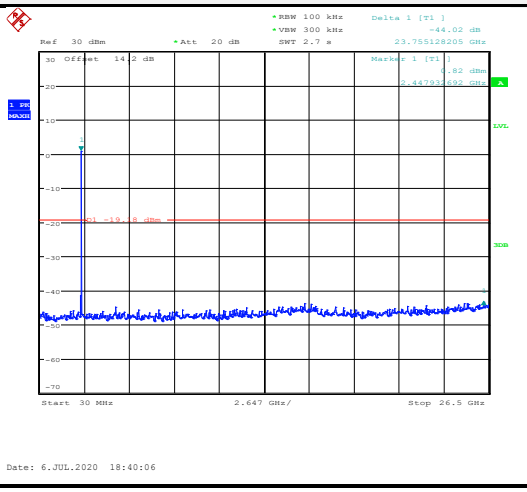
Conducted Spurious Emissions:

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)		Limit (dBc)	Result
			Chain0	Chain1		
802.11b	Low	2412	44.96	47.23	≥ 20	Compliance
	Mid	2437	44.47	47.17	≥ 20	Compliance
	High	2462	46.39	45.86	≥ 20	Compliance
802.11g	Low	2412	44.25	43.70	≥ 20	Compliance
	Mid	2437	47.82	47.76	≥ 20	Compliance
	High	2462	43.16	44.02	≥ 20	Compliance
802.11n HT20	Low	2412	44.06	44.15	≥ 20	Compliance
	Mid	2437	48.12	47.93	≥ 20	Compliance
	High	2462	42.18	43.29	≥ 20	Compliance
802.11n HT40	Low	2422	38.28	38.89	≥ 20	Compliance
	Mid	2437	42.84	44.01	≥ 20	Compliance
	High	2452	37.17	39.31	≥ 20	Compliance

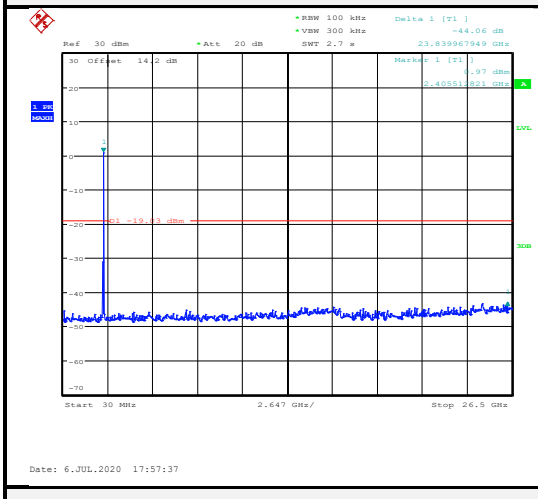
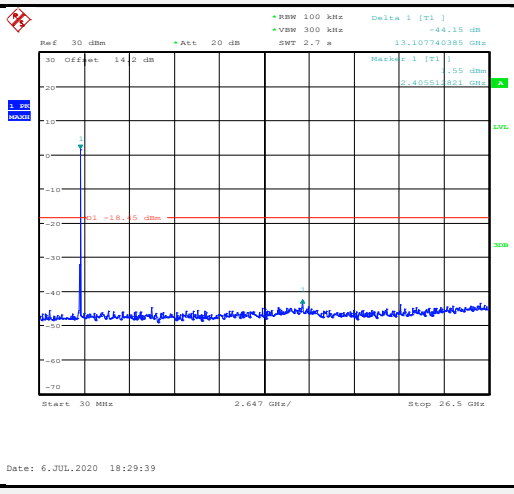
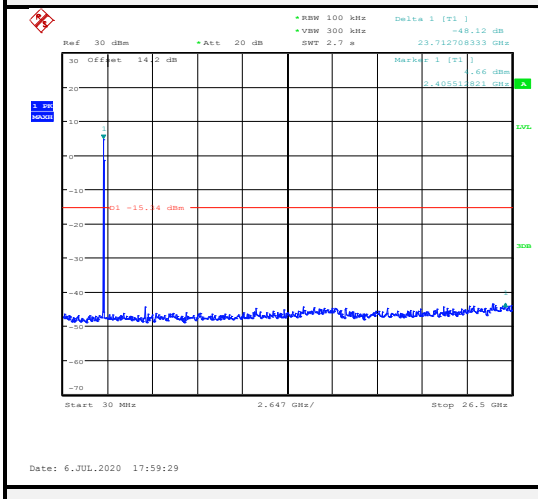
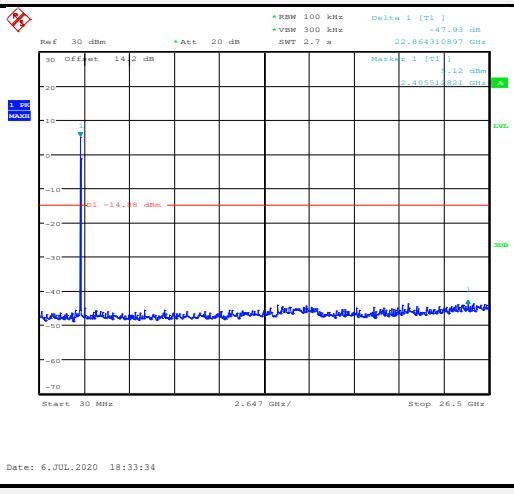
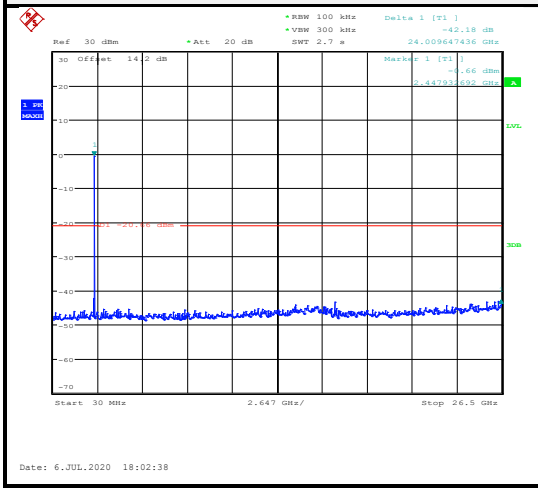
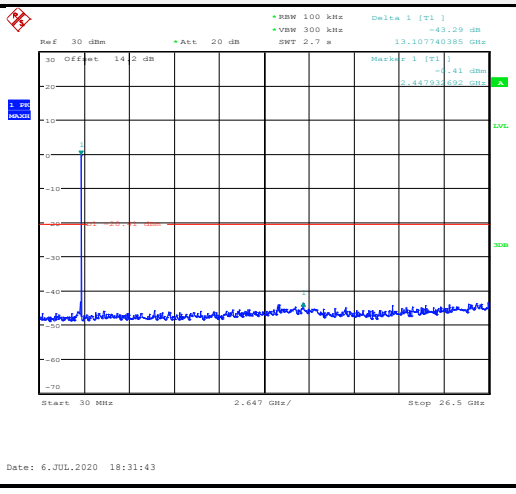
802.11b mode

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

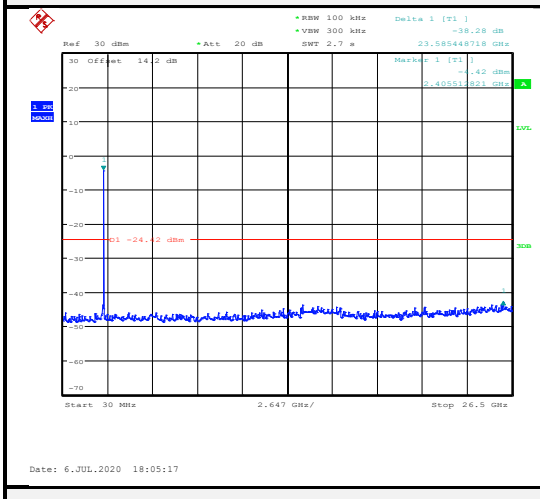
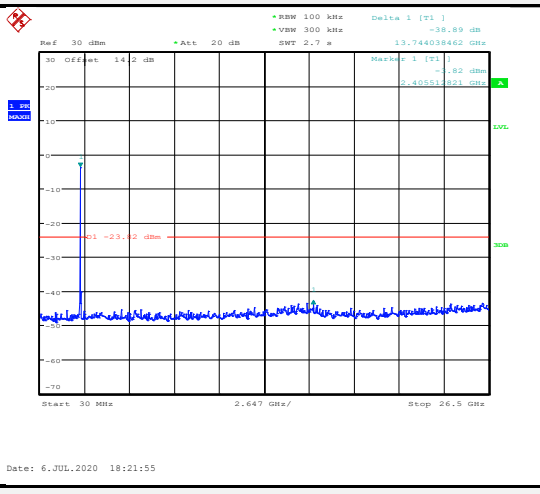
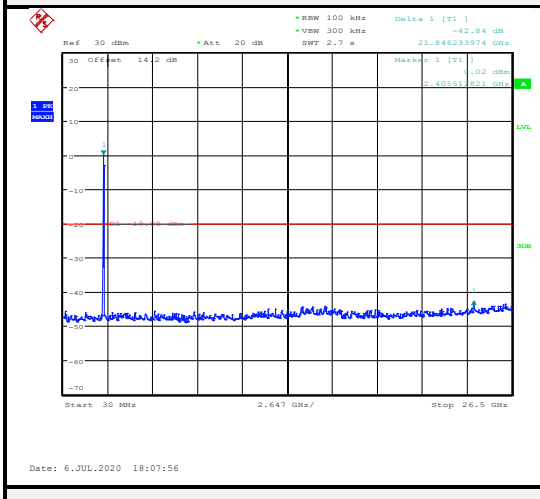
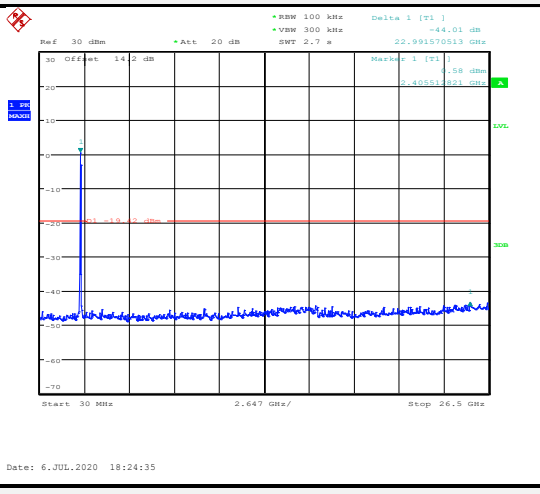
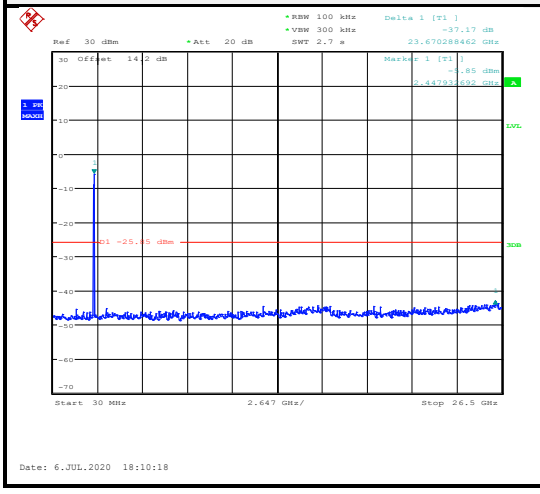
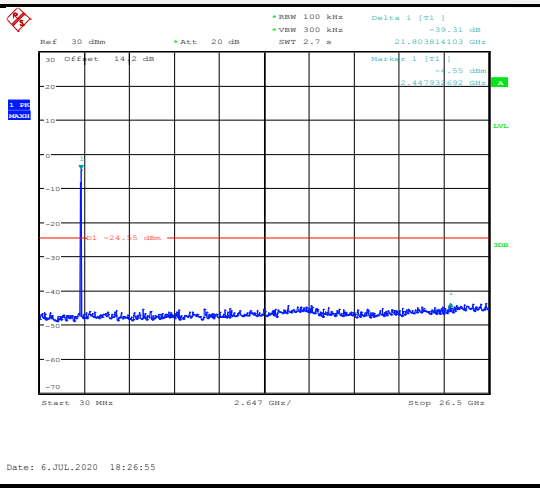
802.11g mode

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

802.11n HT20 mode:

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

802.11n HT40 Mode

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

8 FCC §15.247(a)(2) – 6 dB Emission Bandwidth and Occupied Bandwidth

8.1 Applicable Standard

According to FCC §15.247(a) (2),

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.2 Test Procedure

According to ANSI C63.10-2013, the steps for the first option are as follows:

(1) Set RBW = 100 kHz. (2) Set the VBW ≥ [3 × RBW]. (3) Detector = peak. (4) Trace mode = max hold.

(5) Sweep = auto couple. (6) Allow the trace to stabilize. (7) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.3 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).*

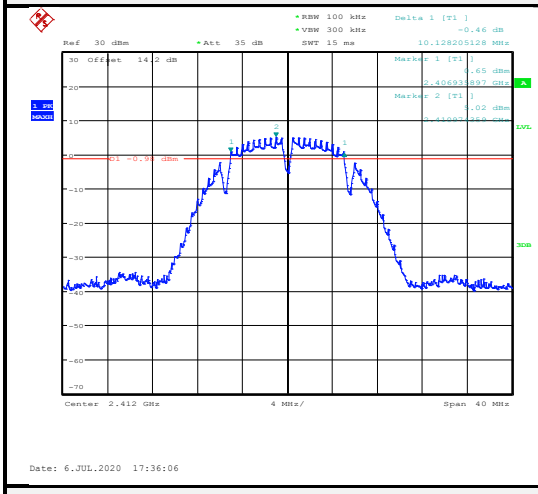
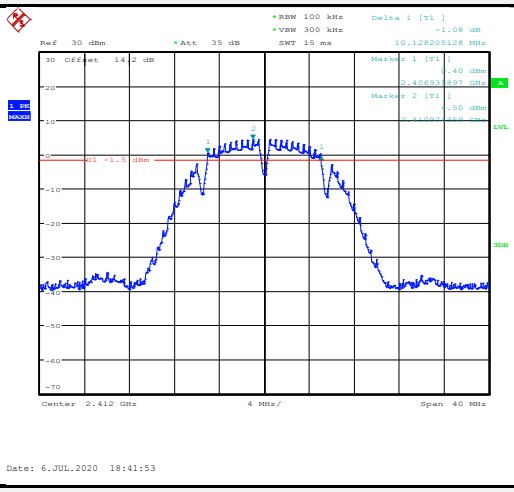
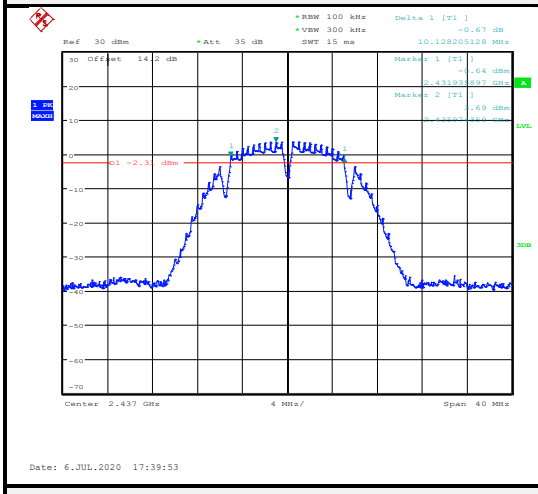
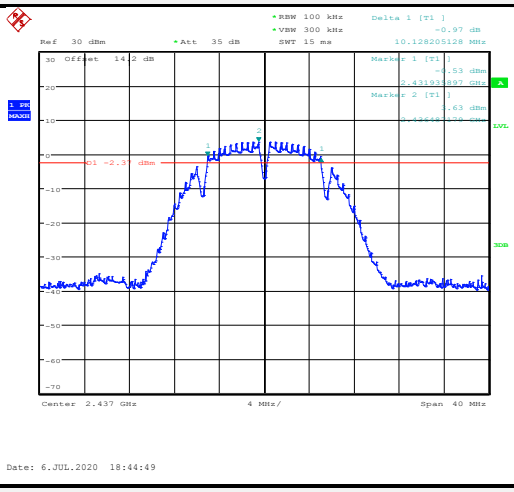
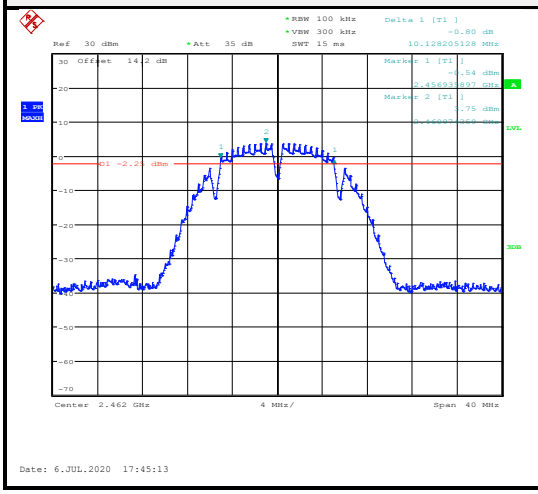
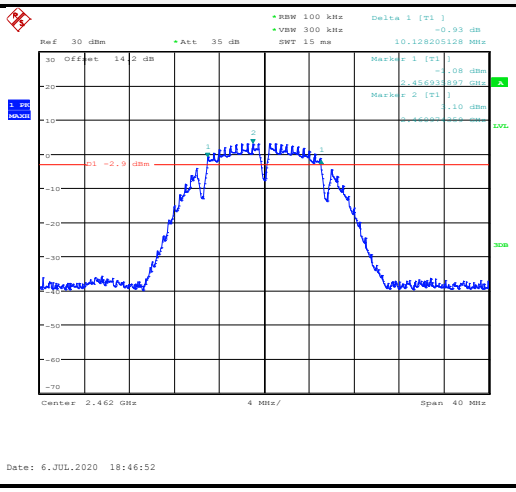
8.4 Test Results

Configuration	Channel	Frequency (MHz)	6 dB BW (MHz)		6dB Limit (MHz)	Result
			Chain0	Chain1		
802.11b	Low	2412	10.13	10.13	> 0.5	Compliance
	Mid	2437	10.13	10.13	> 0.5	Compliance
	High	2462	10.13	10.13	> 0.5	Compliance
802.11g	Low	2412	15.26	13.85	> 0.5	Compliance
	Mid	2437	14.81	14.17	> 0.5	Compliance
	High	2462	15.26	13.85	> 0.5	Compliance
802.11n HT20	Low	2412	14.55	13.59	> 0.5	Compliance
	Mid	2437	14.74	14.36	> 0.5	Compliance
	High	2462	13.59	13.91	> 0.5	Compliance
802.11n HT40	Low	2422	26.54	26.54	> 0.5	Compliance
	Mid	2437	26.28	26.28	> 0.5	Compliance
	High	2452	26.79	26.54	> 0.5	Compliance

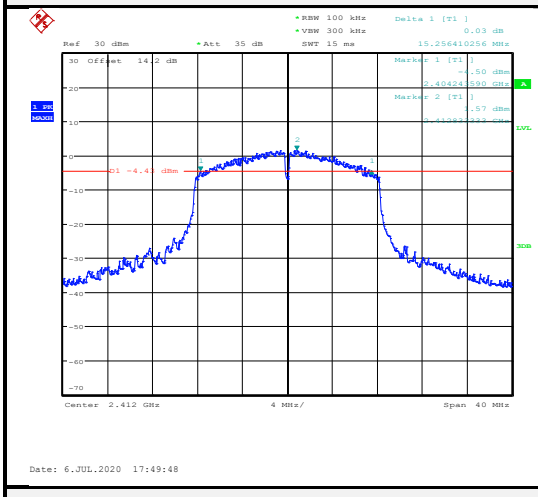
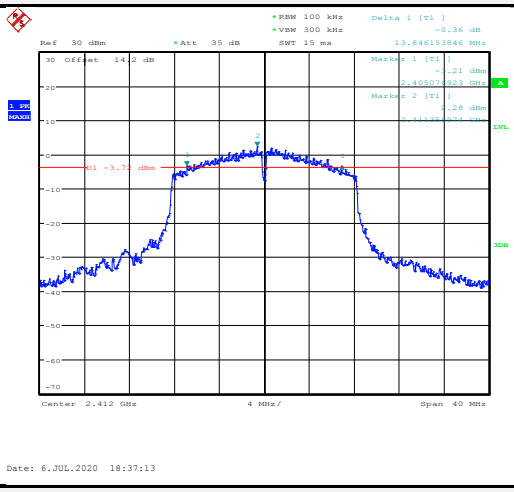
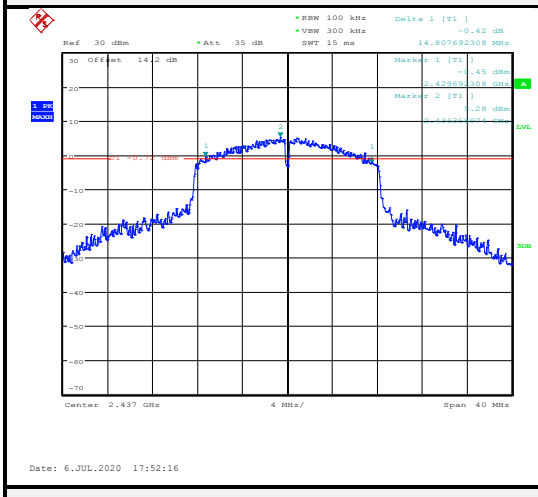
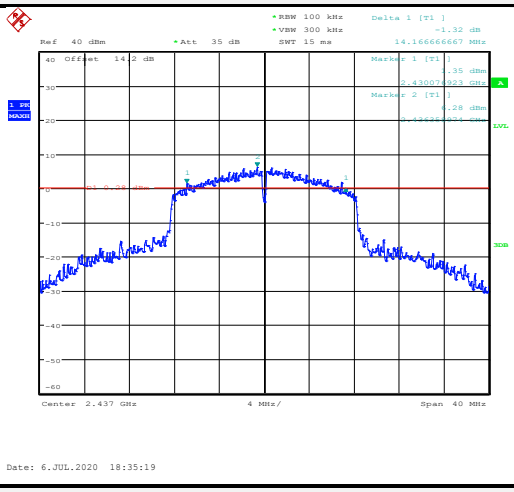
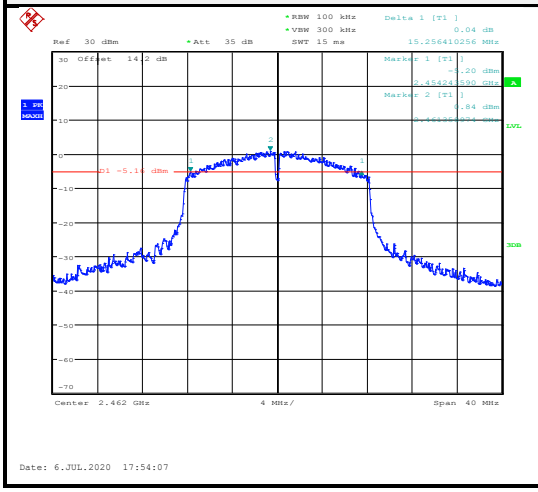
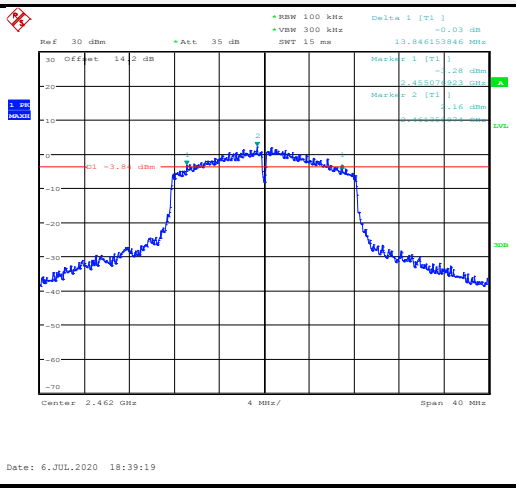
Configuration	Channel	Frequency (MHz)	Occupied BW (MHz)		Result
			Chain0	Chain1	
802.11b	Low	2412	14.10	13.97	Compliance
	Mid	2437	13.97	13.97	Compliance
	High	2462	14.04	13.97	Compliance
802.11g	Low	2412	16.09	16.15	Compliance
	Mid	2437	16.54	16.73	Compliance
	High	2462	16.22	16.22	Compliance
802.11n HT20	Low	2412	17.24	17.24	Compliance
	Mid	2437	17.63	17.69	Compliance
	High	2462	17.24	17.24	Compliance
802.11n HT40	Low	2422	34.62	34.49	Compliance
	Mid	2437	35.00	35.13	Compliance
	High	2452	34.49	34.49	Compliance

6dB Bandwidth

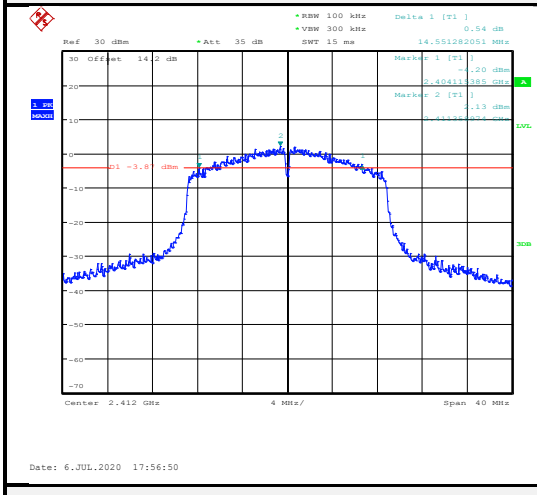
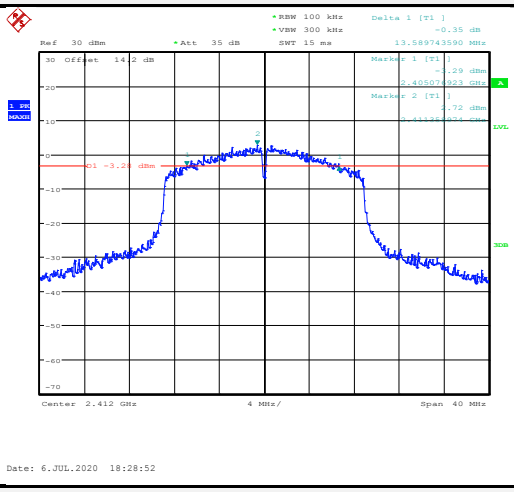
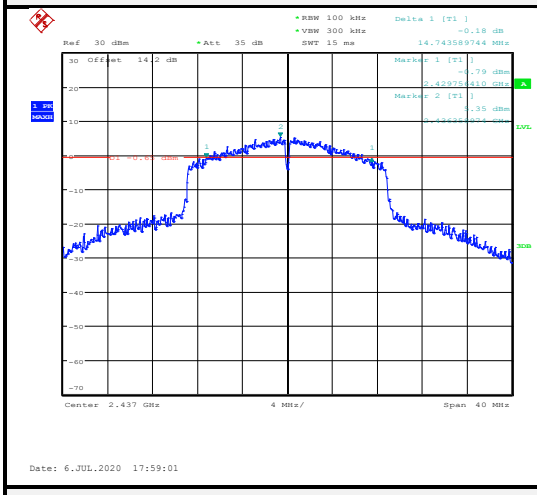
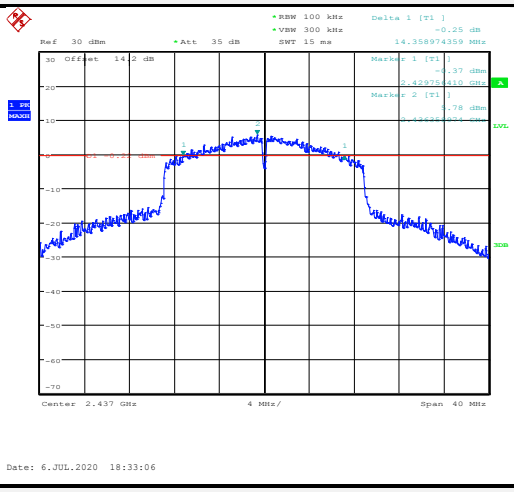
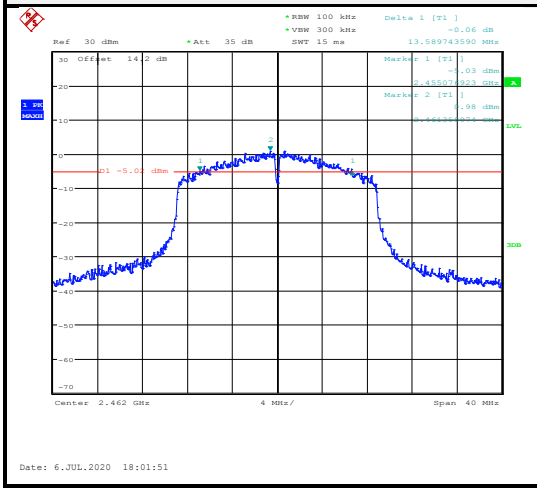
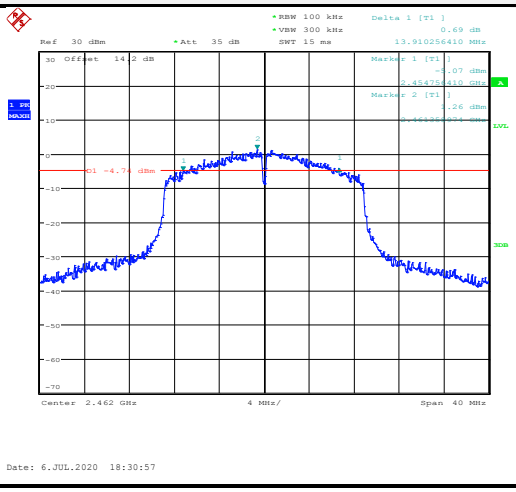
802.11b mode:

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

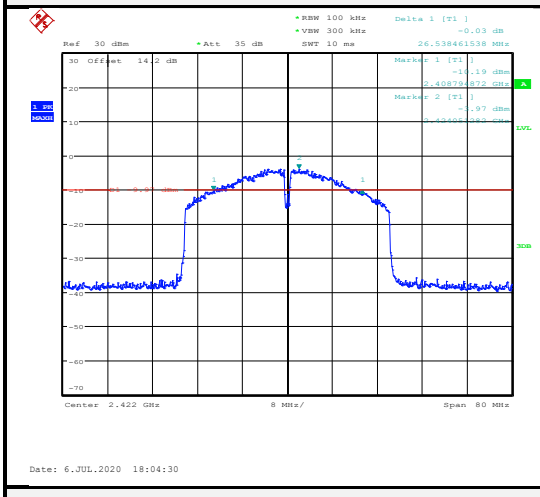
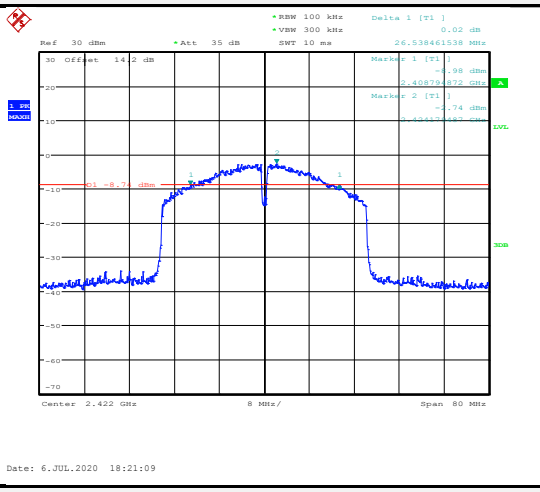
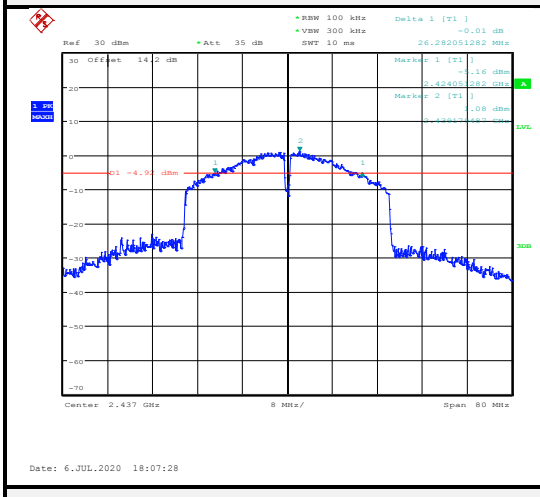
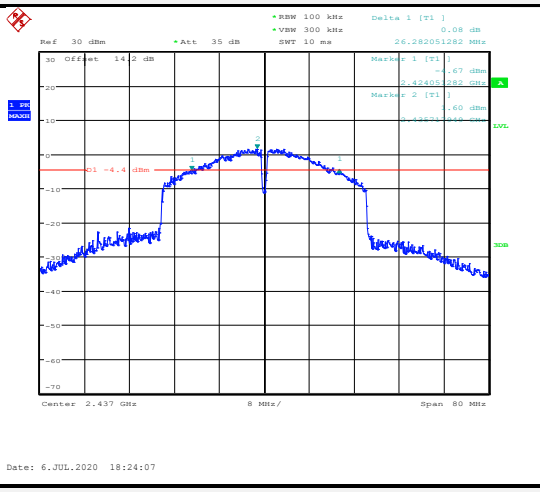
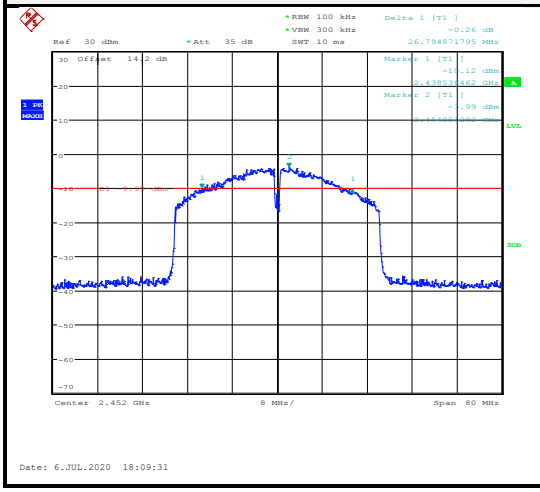
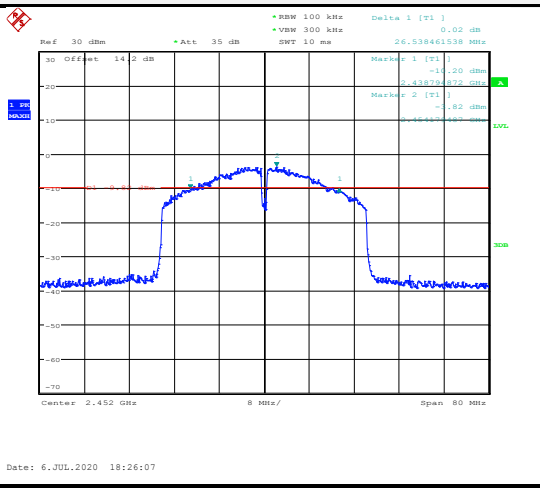
802.11g mode:

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

802.11n HT20 mode:

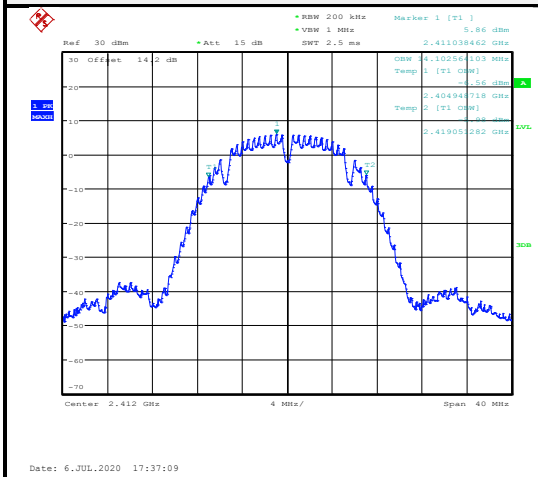
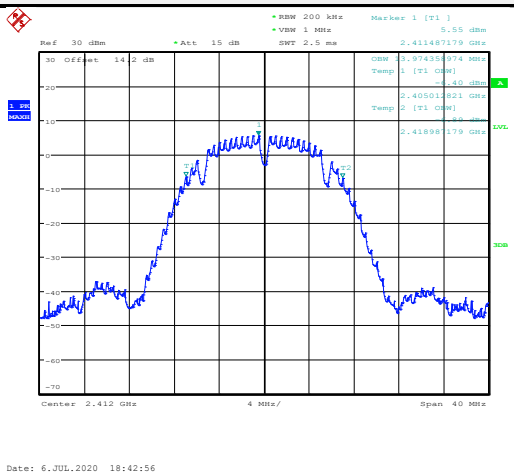
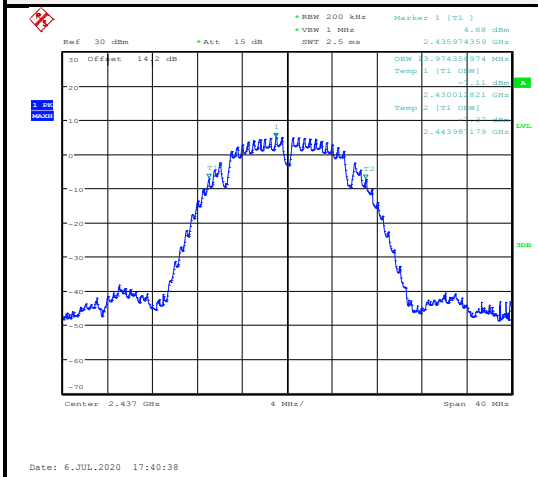
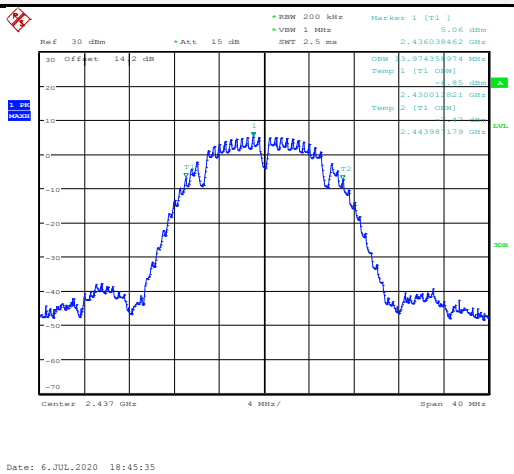
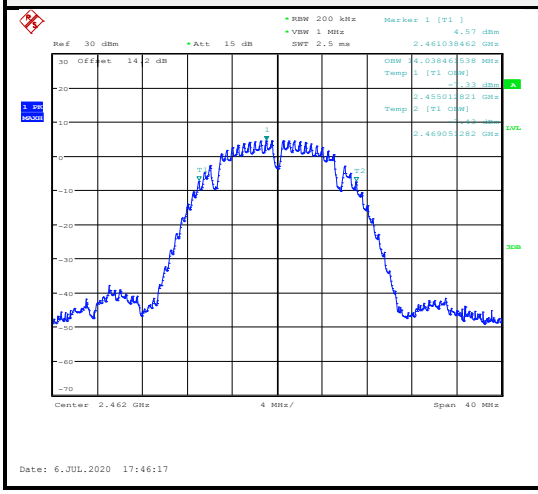
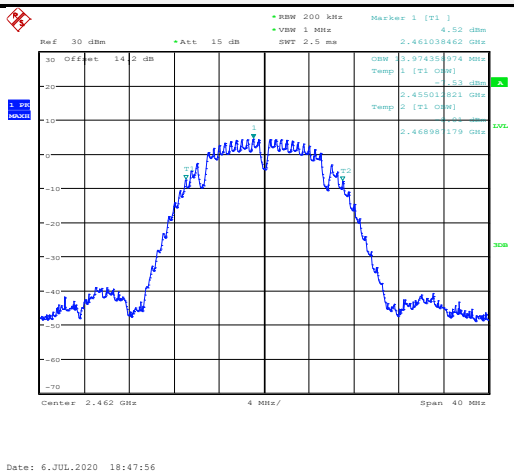
Chain 0	Chain 1
Low CH	**Low CH**
	
Middle CH	**Middle CH**
	
High CH	**High CH**
	

802.11n HT40 mode:

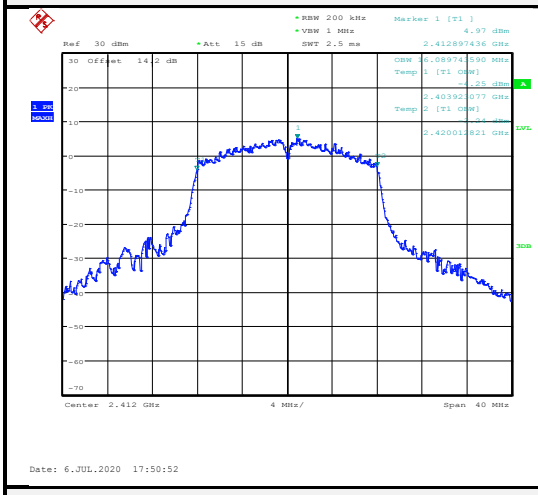
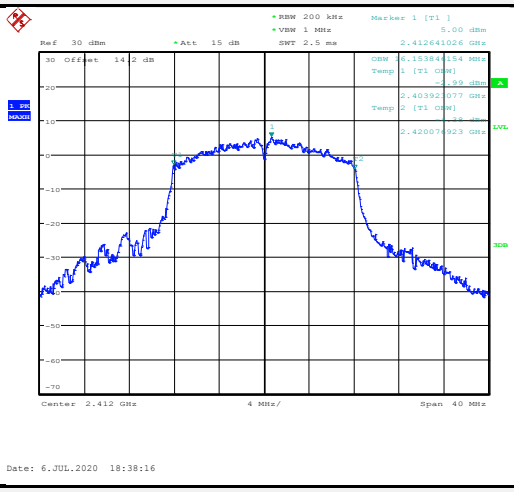
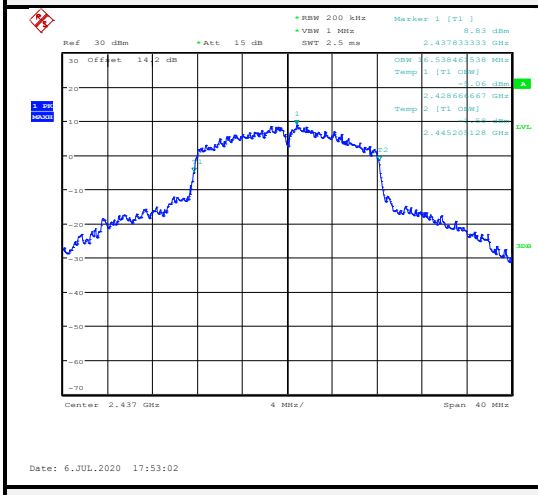
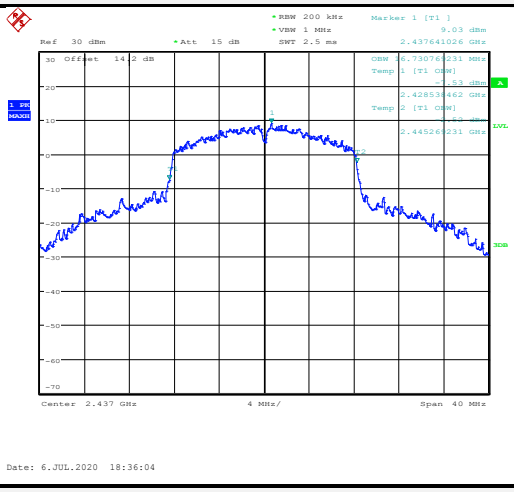
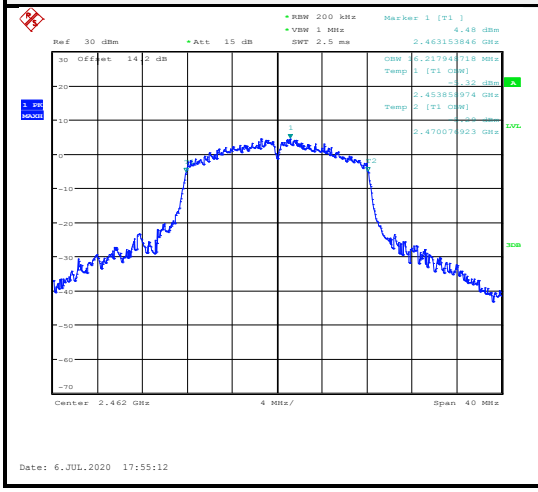
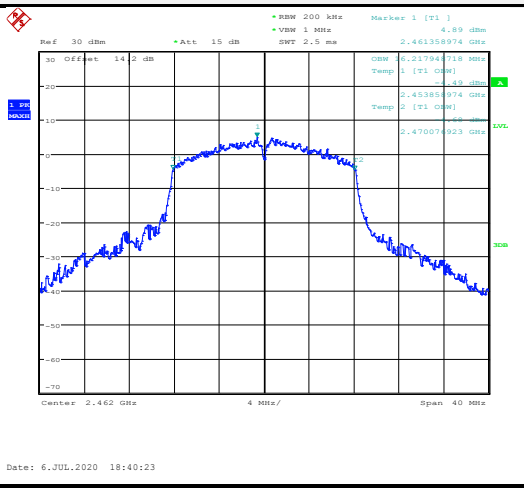
Chain 0	Chain 1
Low CH	Low CH
	
Middle CH	Middle CH
	
High CH	High CH
	

Occupied Bandwidth

802.11b mode:

Chain 0	Chain 1
Low CH	**Low CH**
	
Date: 6.JUL.2020 17:37:09	Date: 6.JUL.2020 18:42:56
Middle CH	**Middle CH**
	
Date: 6.JUL.2020 17:40:38	Date: 6.JUL.2020 18:45:35
High CH	**High CH**
	
Date: 6.JUL.2020 17:46:17	Date: 6.JUL.2020 18:47:56

802.11g mode:

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

802.11n HT20 mode:

Chain 0	Chain 1
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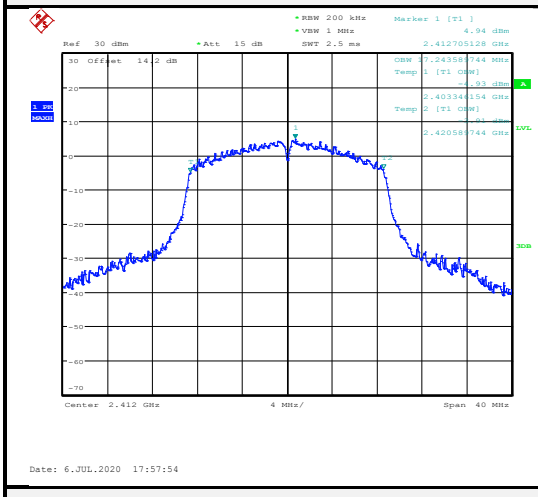
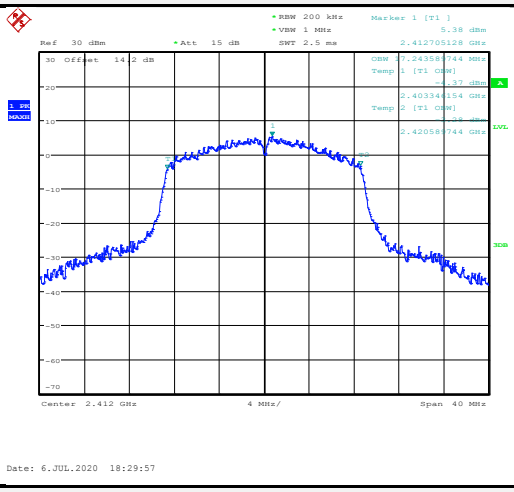
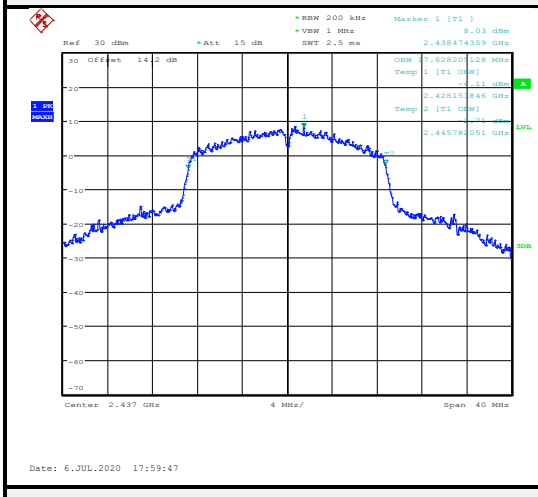
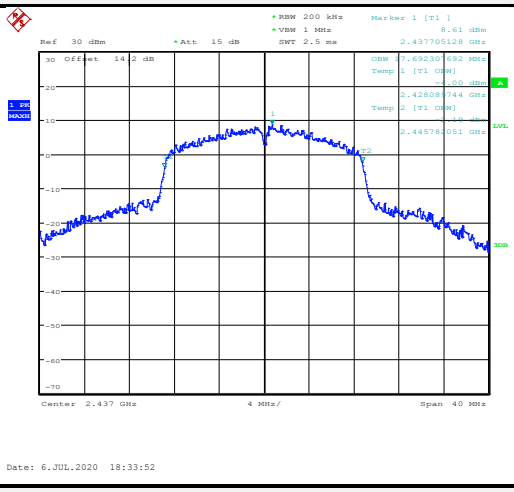
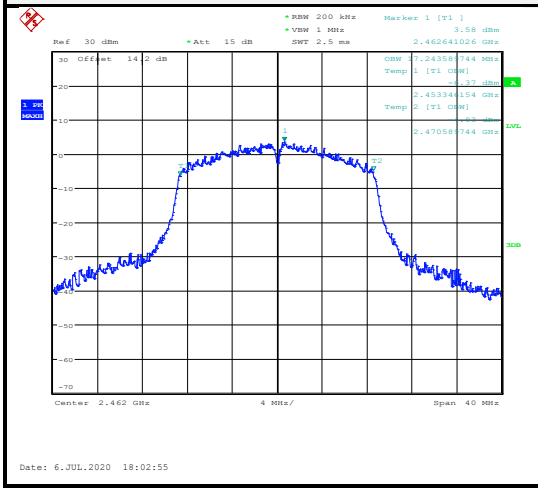
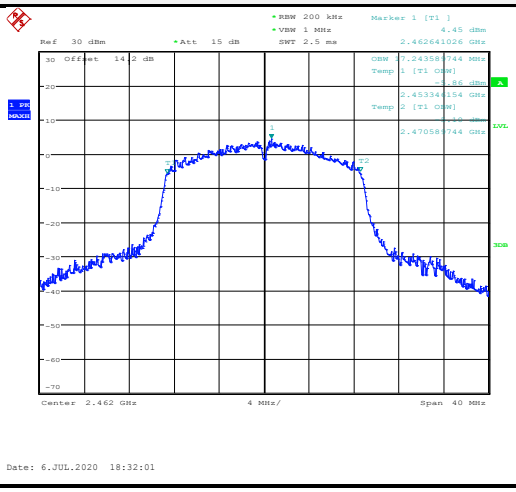
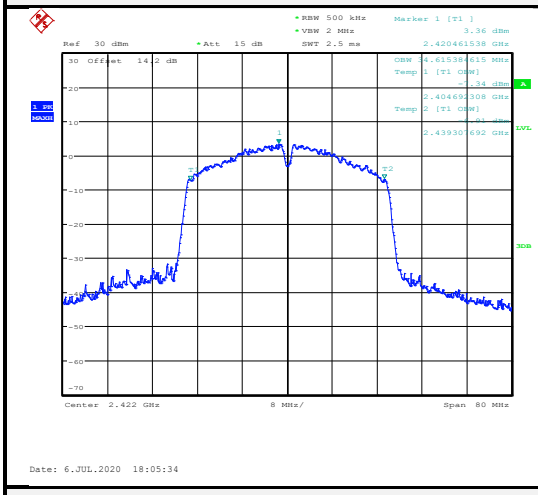
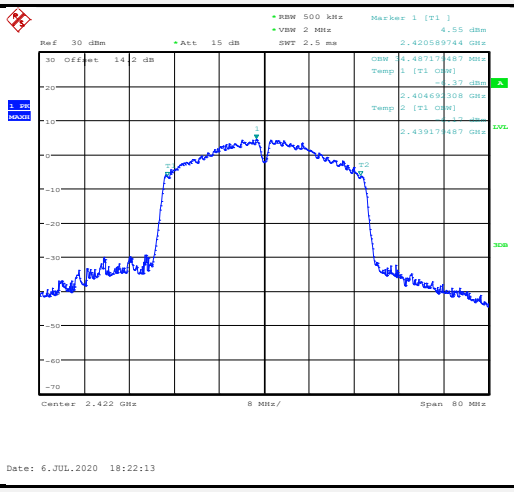
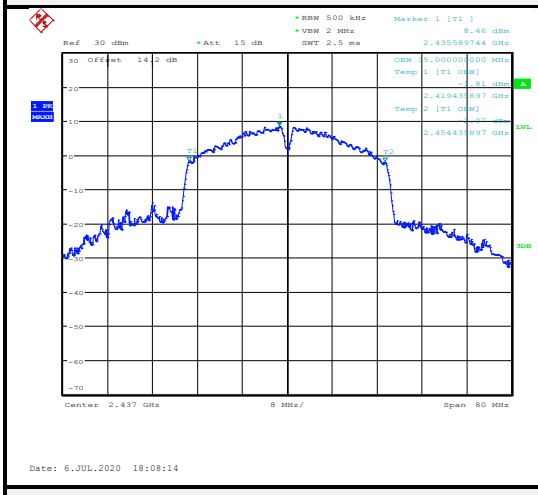
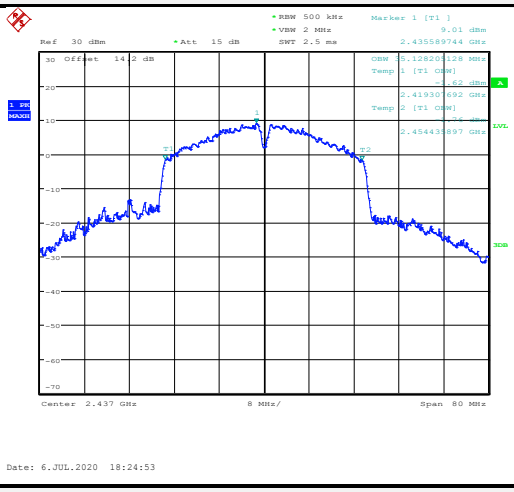
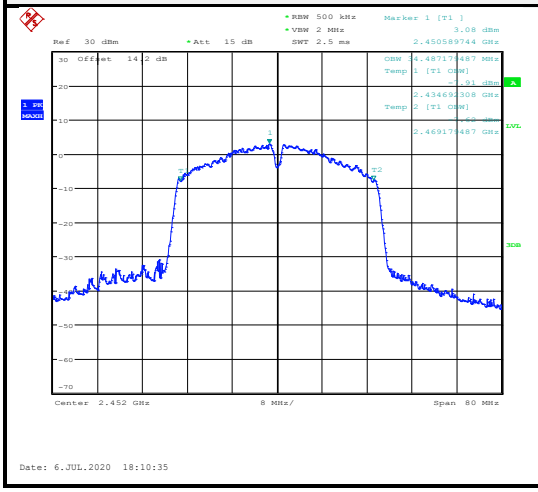
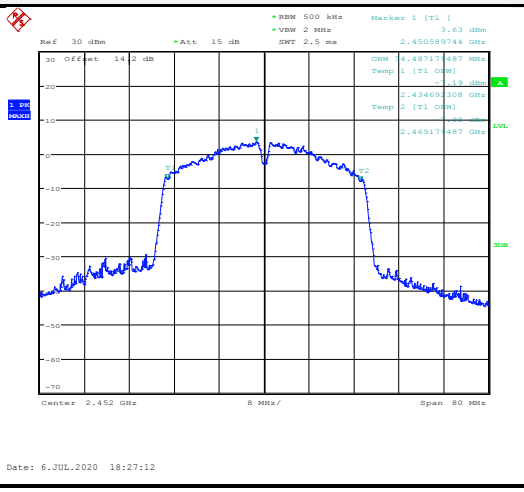
	
Middle CH	**Middle CH**
	
High CH	**High CH**
	

802.11n HT40 mode:

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

9 FCC §15.247(b) (3) – Maximum Output Power

9.1 Applicable Standard

According to FCC §15.247(b) (3),

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

9.2 Test Procedure

(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 measuring equipment.

(3). Add a correction factor to the display.

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 Results

Configuration	Channel	Frequency (MHz)	Maximum Peak Output Power (dBm)			Maximum Peak Output Power (W)	Limit (dBm)	Result
			Chain0	Chain1	SUM Chain	SUM Chain		
802.11b	Low	2412	17.85	17.97	20.92	0.1236	30	Compliance
	Mid	2437	17.25	17.77	20.53	0.1130	30	Compliance
	High	2462	16.75	16.98	19.88	0.0973	30	Compliance
802.11g	Low	2412	23.18	23.32	26.26	0.4227	30	Compliance
	Mid	2437	23.52	23.75	26.65	0.4624	30	Compliance
	High	2462	22.70	22.76	25.74	0.3750	30	Compliance
802.11n HT20	Low	2412	23.18	23.26	26.23	0.4198	30	Compliance
	Mid	2437	23.58	23.59	26.60	0.4571	30	Compliance
	High	2462	22.32	22.51	25.43	0.3491	30	Compliance
802.11n HT40	Low	2422	20.05	20.21	23.14	0.2061	30	Compliance
	Mid	2437	23.04	23.19	26.13	0.4102	30	Compliance
	High	2452	20.14	20.24	23.20	0.2089	30	Compliance

10 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

10.1 Applicable Standard

According to FCC §15.247(d),

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

10.2 Test Procedure

(1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

(2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

(3) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.

(4) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

10.3 Test Equipment List and Details

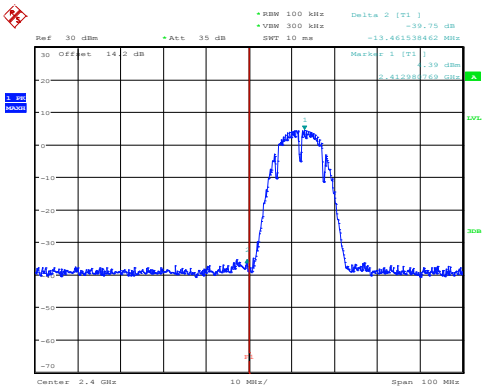
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
RF Cable	MTJ	MT40S	MT40S-001	Each Use	/

***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).*

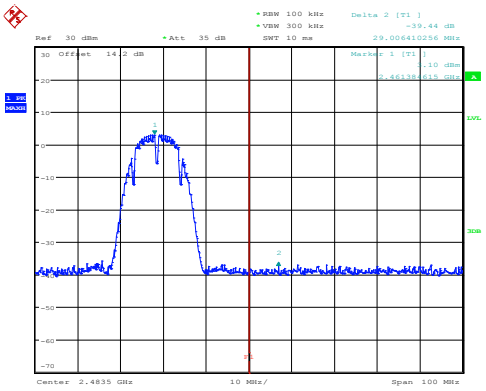
10.4 Test Results

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)		Limit (dBc)	Result
			Chain0	Chain1		
802.11b	Low	2412	39.75	39.44	≥ 20	Compliance
	High	2462	39.26	38.61	≥ 20	Compliance
802.11g	Low	2412	30.67	37.70	≥ 20	Compliance
	High	2462	31.30	38.55	≥ 20	Compliance
802.11n HT20	Low	2412	32.88	36.96	≥ 20	Compliance
	High	2462	31.75	37.60	≥ 20	Compliance
802.11n HT40	Low	2422	32.20	31.64	≥ 20	Compliance
	High	2452	32.68	32.48	≥ 20	Compliance

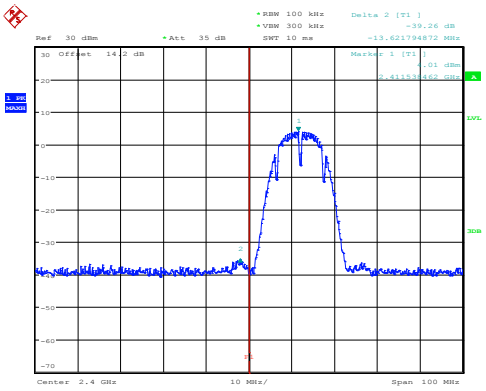
802.11b Left Side Chain 0



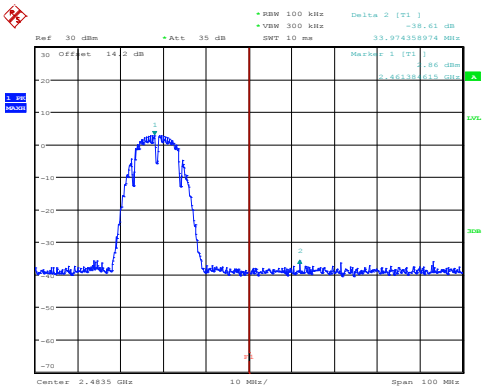
802.11b Right Side Chain 0

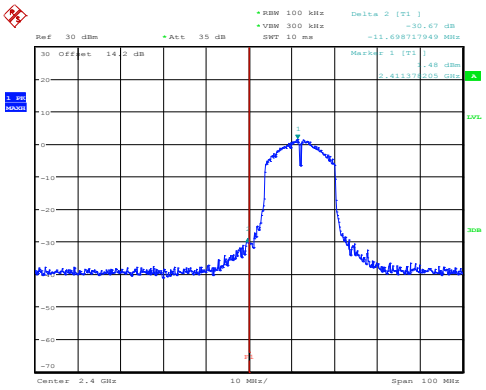
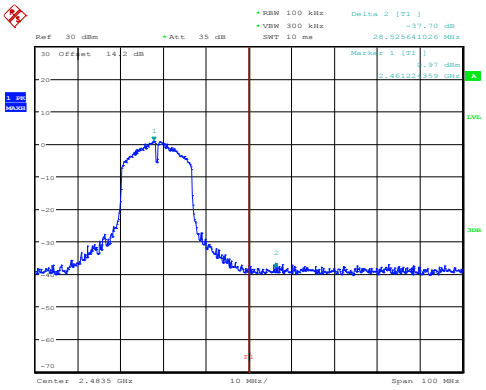
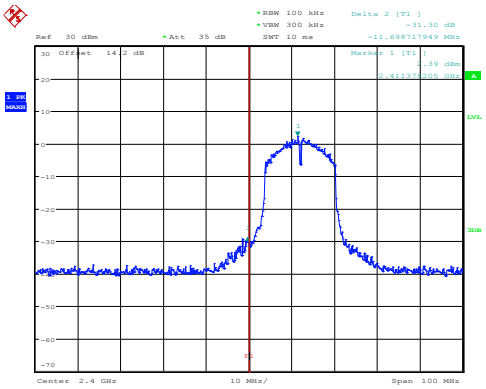
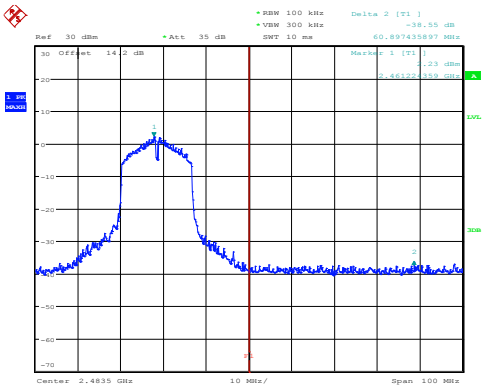
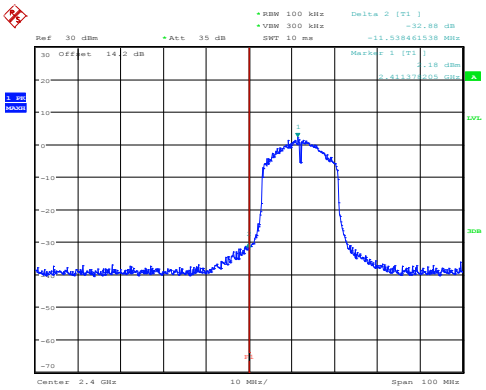
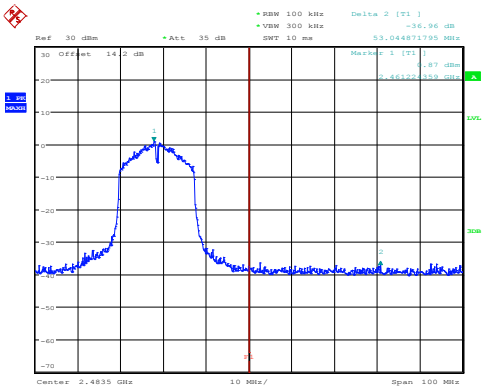


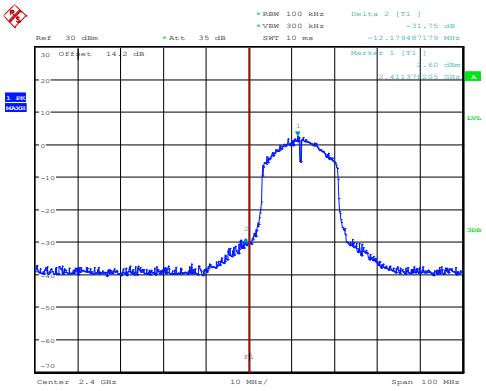
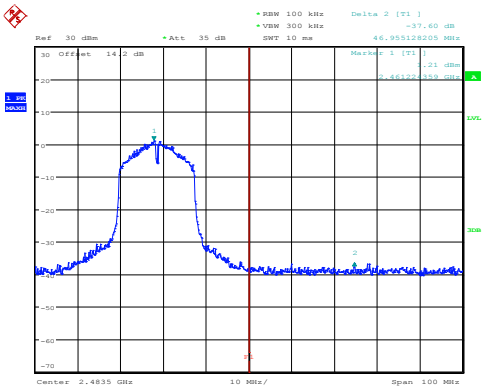
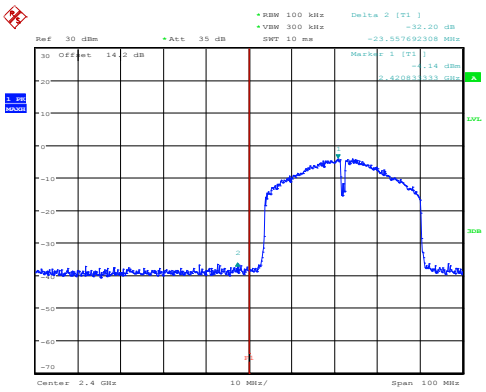
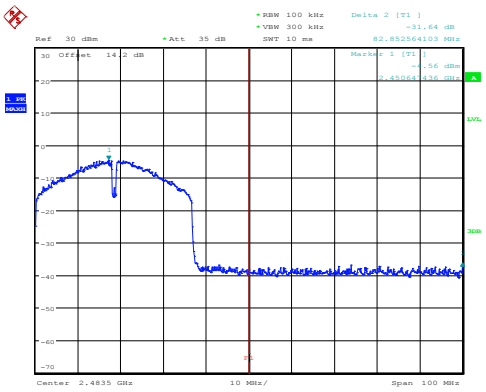
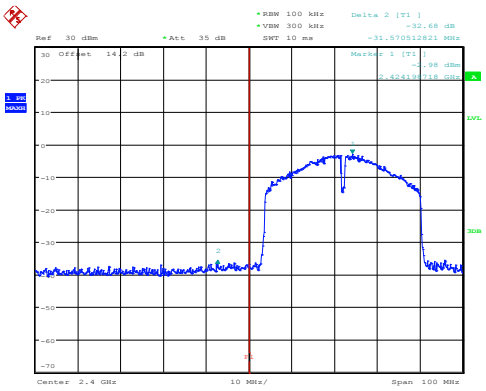
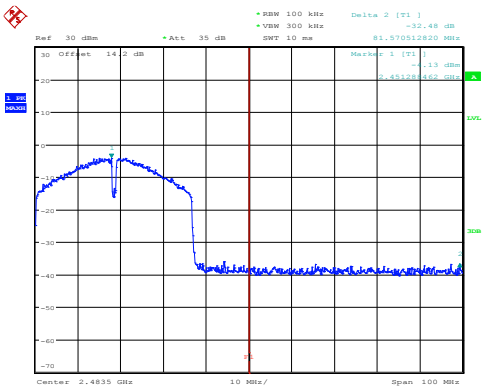
802.11b Left Side Chain 1



802.11b Right Side Chain 1



802.11g Left Side Chain 0	802.11g Right Side Chain 0
	
Date: 6.JUL.2020 17:50:17	Date: 6.JUL.2020 17:54:36
802.11g Left Side Chain 1	**802.11g Right Side Chain 1**
	
Date: 6.JUL.2020 18:37:41	Date: 6.JUL.2020 18:39:48
802.11n HT20 Left Side Chain 0	**802.11n HT20 Right Side Chain 0**
	
Date: 6.JUL.2020 17:57:19	Date: 6.JUL.2020 18:02:20

802.11n HT20 Left Side Chain 1	802.11n HT20 Right Side Chain 1
	
Date: 6.JUL.2020 18:29:21	Date: 6.JUL.2020 18:31:25
802.11n HT40 Left Side Chain 0	**802.11n HT40 Right Side Chain 0**
	
Date: 6.JUL.2020 18:04:58	Date: 6.JUL.2020 18:10:00
802.11n HT40 Left Side Chain 1	**802.11n HT40 Right Side Chain 1**
	
Date: 6.JUL.2020 18:21:37	Date: 6.JUL.2020 18:26:37

11 CC §15.247(e) – Power Spectral Density

11.1 Applicable Standard

According to FCC §15.247(e),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

11.2 Test Procedure

According to ANSI C63.10-2013,

(1) Set analyzer center frequency to DTS channel center frequency.

(2) Set the span to 1.5 times the DTS bandwidth. (3) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.

(4) Set the VBW ≥ [3 × RBW]. (5) Detector = peak. (6) Sweep time = auto couple.

(7) Trace mode = max hold. (8) Allow trace to fully stabilize.

(9) Use the peak marker function to determine the maximum amplitude level within the RBW.

(10) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

11.3 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	/

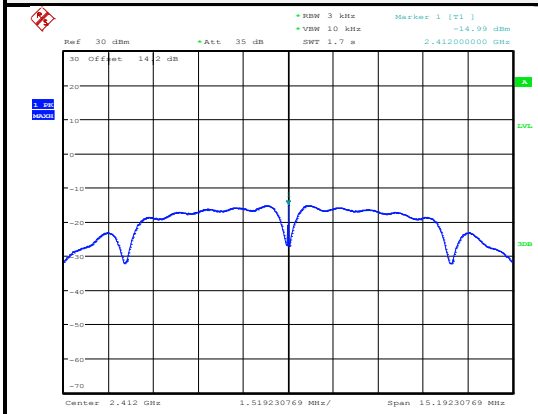
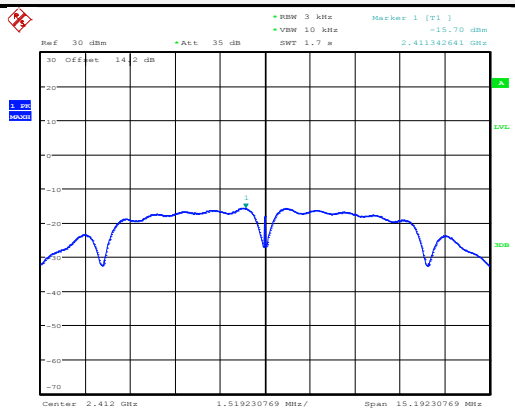
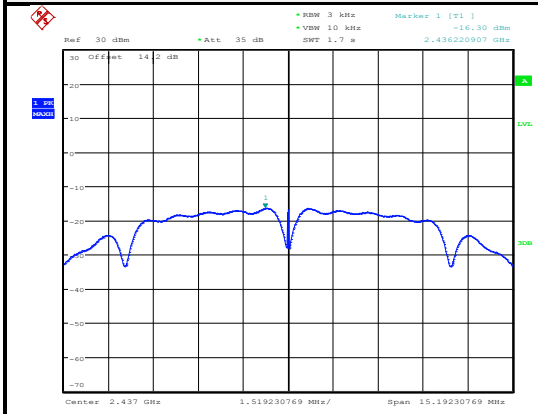
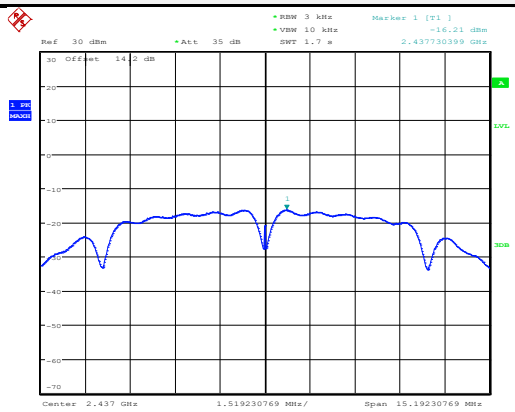
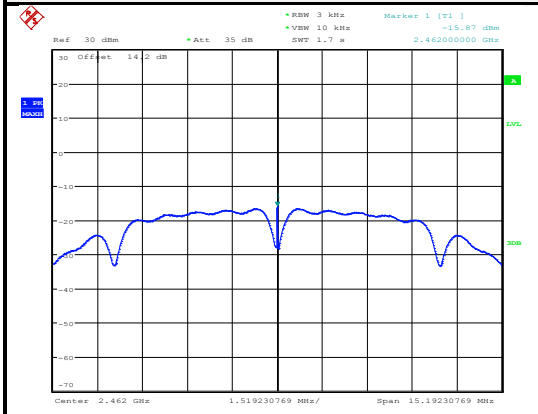
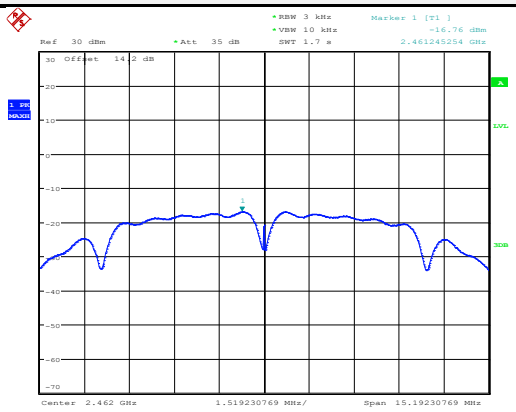
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units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

11.4 Test Results

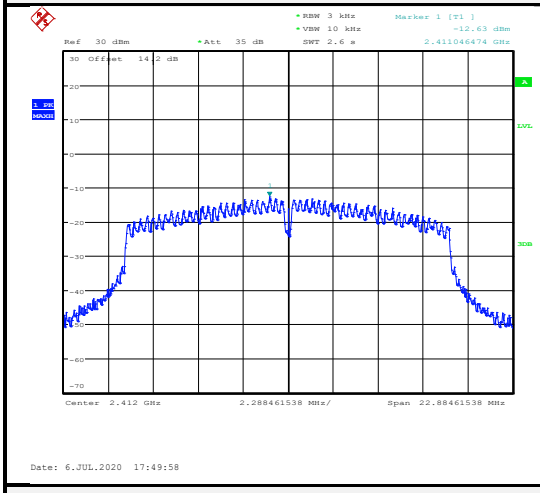
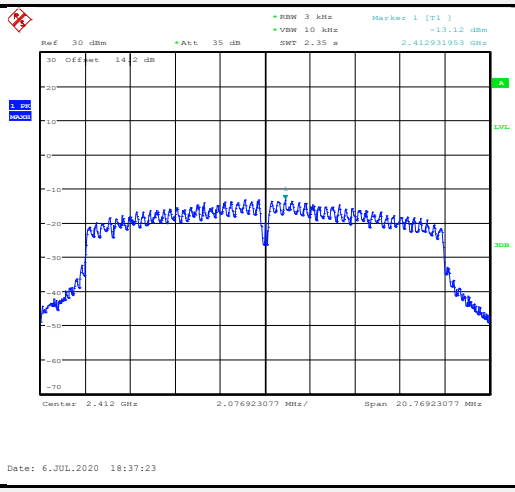
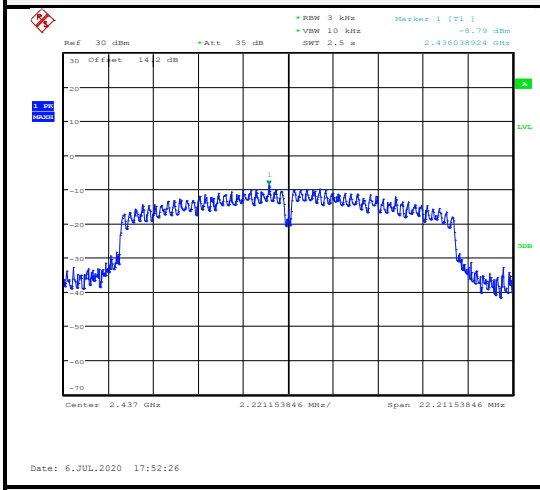
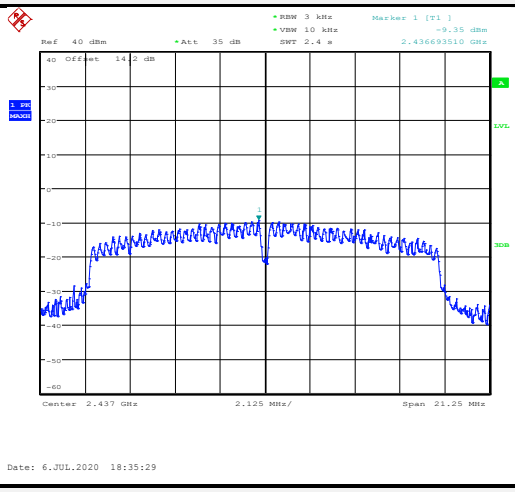
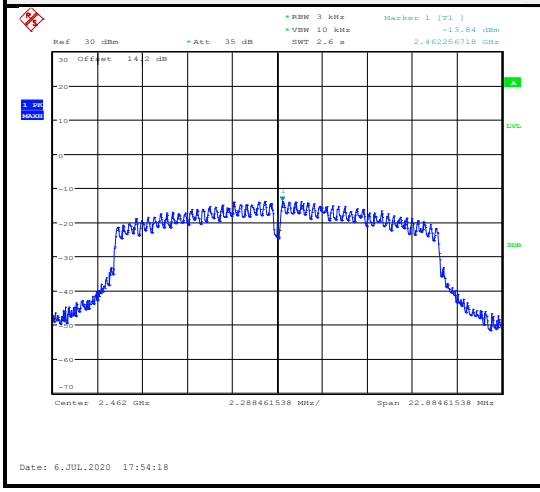
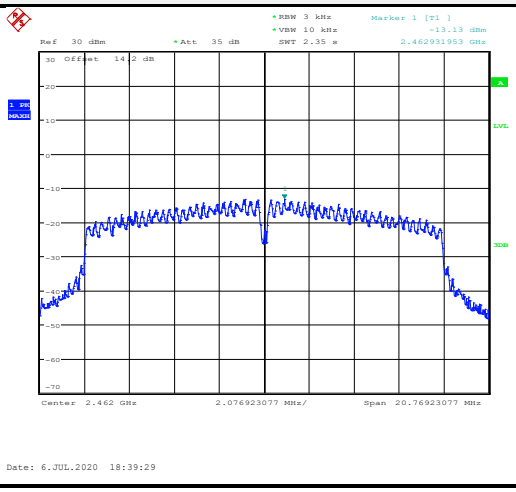
Configuration	Channel	Frequency (MHz)	PSD (dBm/3 kHz)			Limit (dBm/3 kHz)	Result
			Chain0	Chain1	SUM Chain		
802.11b	Low	2412	-14.99	-15.70	-12.32	7.79	Compliance
	Mid	2437	-16.30	-16.21	-13.24	7.79	Compliance
	High	2462	-15.87	-16.76	-13.28	7.79	Compliance
802.11g	Low	2412	-12.63	-13.12	-9.86	7.79	Compliance
	Mid	2437	-8.79	-9.35	-6.05	7.79	Compliance
	High	2462	-13.84	-13.13	-10.46	7.79	Compliance
802.11n HT20	Low	2412	-11.64	-11.63	-8.62	7.79	Compliance
	Mid	2437	-8.82	-7.91	-5.33	7.79	Compliance
	High	2462	-12.85	-12.46	-9.64	7.79	Compliance
802.11n HT40	Low	2422	-14.67	-14.10	-11.37	7.79	Compliance
	Mid	2437	-11.53	-9.62	-7.46	7.79	Compliance
	High	2452	-15.91	-16.30	-13.09	7.79	Compliance

Note: Limit = 8 - (Direction Gain-6) = 8 – 0.21 = 7.79 dBm/3 kHz

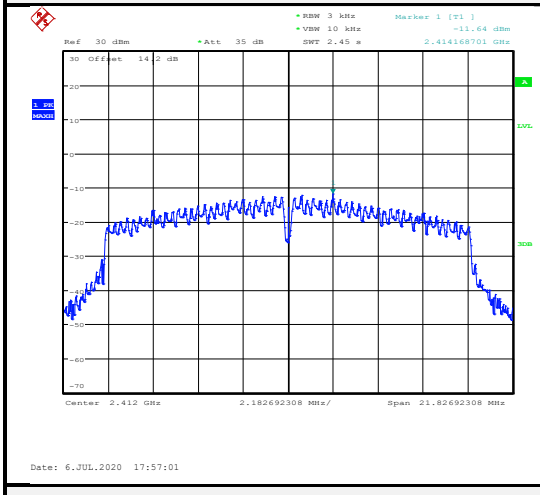
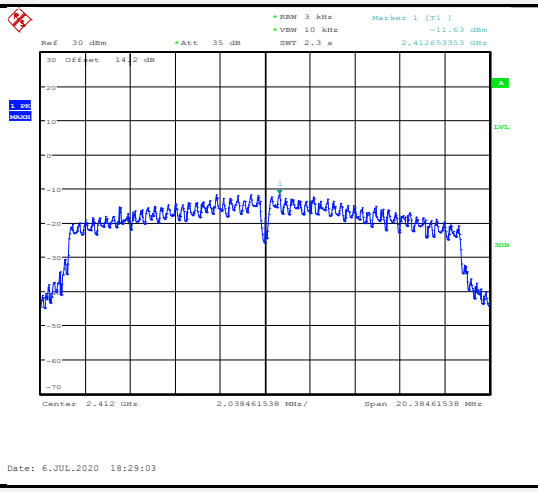
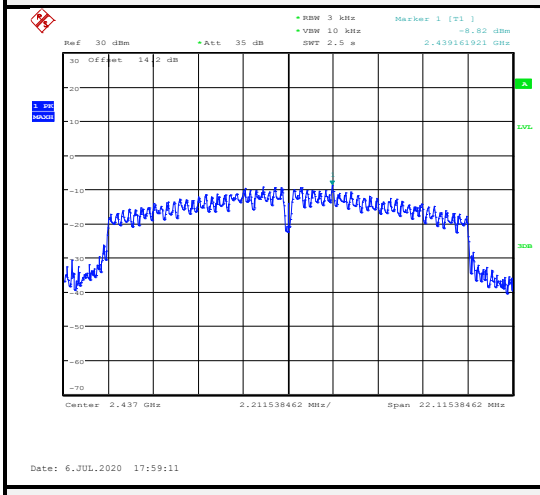
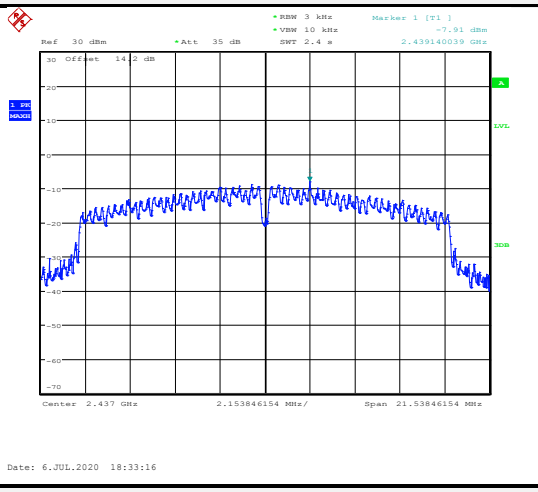
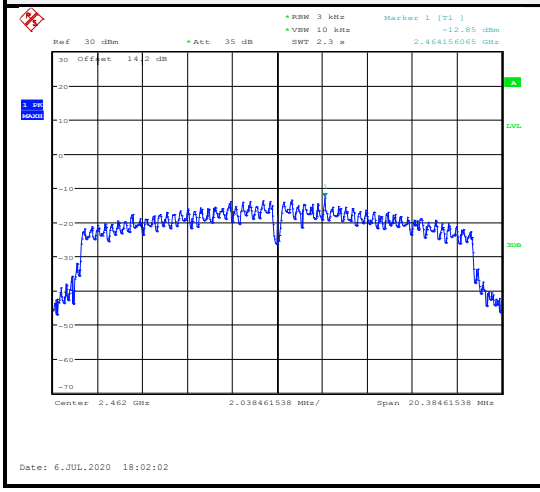
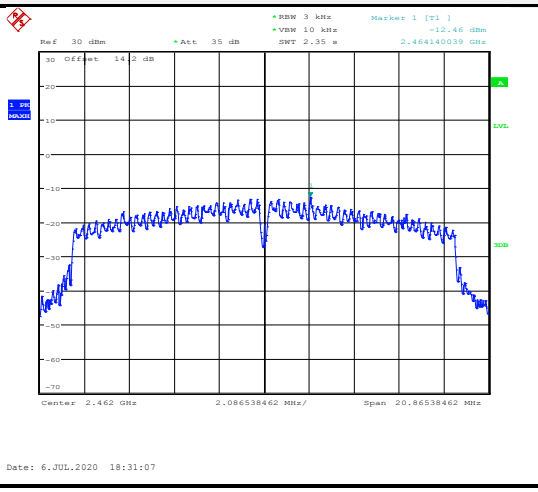
802.11b mode:

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

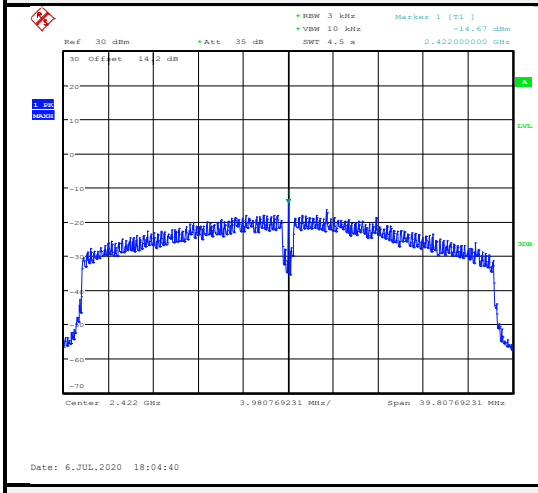
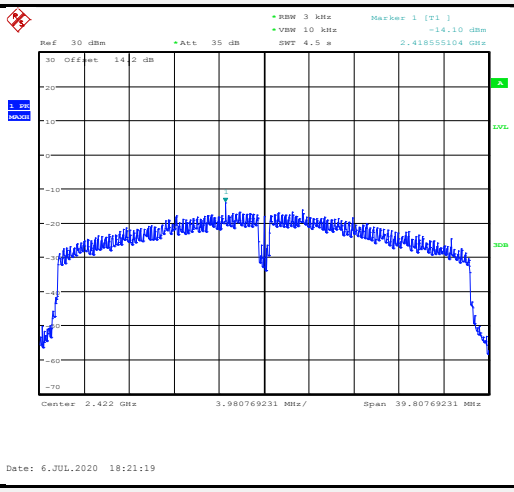
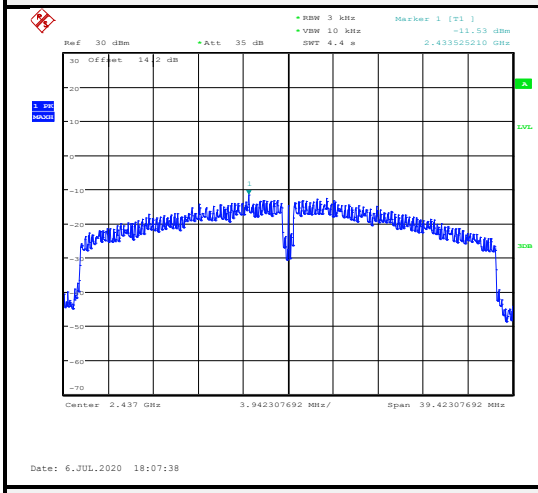
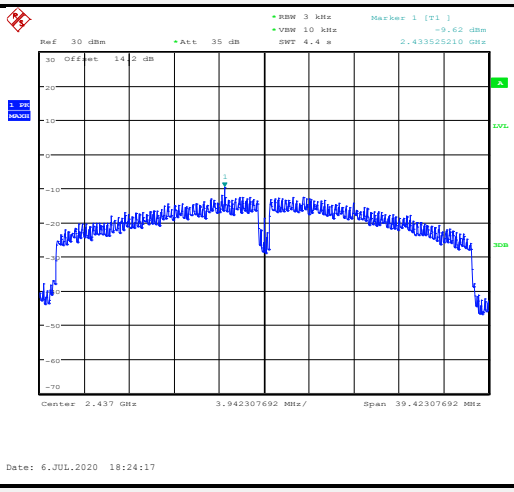
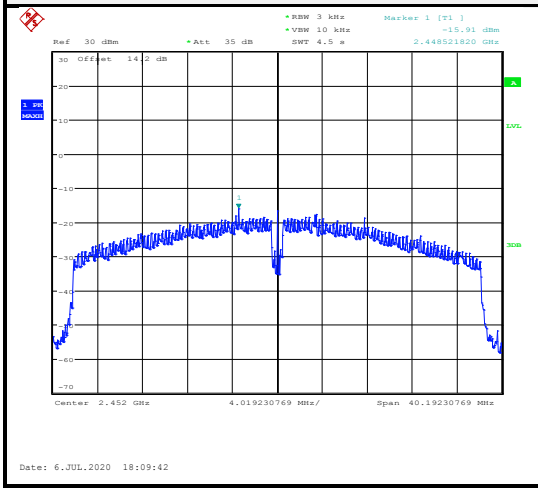
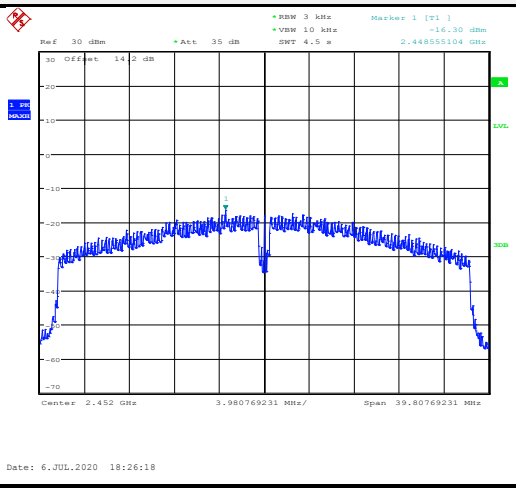
802.11g mode:

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

802.11n HT20 mode:

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

802.11n HT40 mode:

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

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