FCC Part 15.247

TEST REPORT

For

iKeyless, LLC dba Car Keys Express

12101 Sycamore Station Place Suite 140 Louisville, KY 40299

Report Type	**Original Report**
FCC Identity:	**FCC ID: X32-ROKSBX1XX**
Brand Name	**ROKS Box**
Product Name	**ROKS Box v3**
Model Name	**ROKSBX-1XX**
Report Number	**RLK210305003-FRW01**
Report Date	**2021/06/22**
Reviewed By	**Zeus Chen** Zeus Chen

Prepared By:

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Revision History

Revision	Report Number	Issue Date	Description
1.0	RLK210305003-FRW01	2021/06/22	Original Report

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Application	**iKeyless, LLC dba Car Keys Express** 12101 Sycamore Station Place Suite 140 Louisville, KY 40299
Manufacturer	**AAEON TECHNOLOGY INC.** 5F, No.135, Lane 235, Pao Chiao Rd Hsin-Tien Dist, New Taipei City, 231 Taiwan
Brand Name	ROKS Box
Product (Equipment)	ROKS Box v3
Model Name	ROKSBX-1XX
Frequency Range	IEEE 802.11bgn HT20: 2412 - 2462 MHz
Number of Channels	IEEE 802.11bgn HT20: 11 Channels
Output Power	IEEE 802.11b: 23.51 dBm (0.2244 W) IEEE 802.11g: 23.75 dBm (0.2371 W) IEEE 802.11n HT20: 23.81 dBm (0.2404 W)
Modulation Type	IEEE 802.11b: DSSS; IEEE 802.11gn HT 20: OFDM
Related Submittal(s)/Grant(s)	**FCC Part 15.407 NII with FCC ID: X32-ROKSBX1XX** **FCC Part 15.209 DXX with FCC ID: X32-ROKSBX1XX**
Received Date	Mar. 29, 2021
Date of Test	Apr. 07, 2021 - May 29, 2021

Note: All measurement and test data in this report was gathered from production sample serial number: 210305003. Assigned by Bay Area Compliance Laboratories Corp. (Linkou Laboratory)

1.2 Operation Condition of EUT

Power Operation (Voltage Range)	☒ AC 120V/60Hz ☒ Adapter Model: FSP060-DHAN3 I/P: 100-240Vac, 1.8A O/P: 12Vdc, 5A ☐ By Power Cord
	☐ DC Type ☐ DC Power Supply ☐ Battery ☐ External from USB Cable ☐ External DC Adapter (Not For Sale)
	☐ Host System

1.3 Objective and Test Methodology

The Objective of this Test Report was to document the compliance of the iKeyless, LLC dba Car Keys Express Appliance (Model(s): ROKSBX-1XX,) 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.

1.4 Measurement Uncertainty

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

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

1.5 Environmental Conditions and Test Date

Test Site	Test Date	Temperature (°C)	Relative Humidity (%)	Test Engineer
Conduction (Con-01)	Apr. 07, 2021	25.5	55	Brian Chang
Radiated (966A)	May 19, 2021 – May 28, 2021	17.2-20.1	57-61	Kevin Tsou
Conducted (TH-02)	May 29, 2021	22.5	60	Blake Wang

1.6 Test Facility

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

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

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

2 System Test Configuration

2.1 Test Channels and Description of Worst Test Configuration

The system was configured for testing in testing mode which was provided by manufacturer. No special accessory, No modification was made to the EUT and No special equipment used during test. And this device is the AP/STA and working in non-DFS Band.

For Wi-Fi 2.4G mode, there are totally 11 channels.

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**	-	-

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

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 data rates bandwidths, and modulations. Radiated below 1G were tested worst output power.

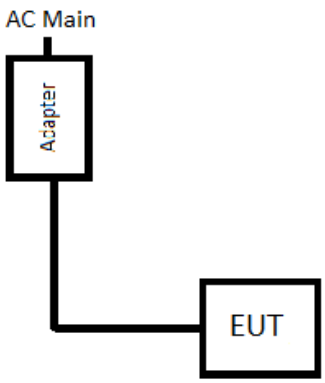
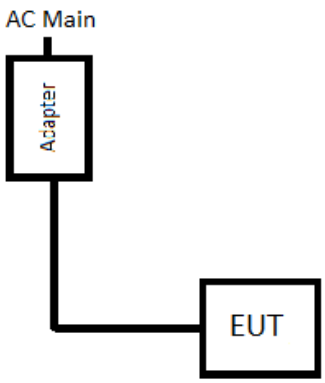
Modulation Used for Conformance Test			
Configuration	**N_{TX}**	**Data Rate**	**Worst Data Rate**
IEEE 802.11b	1	1-11 Mbps	1 Mbps
IEEE 802.11g	1	6-54 Mbps	6 Mbps
IEEE 802.11n HT 20	1	MCS 0-7	MCS 0

Worst Case of Power Setting				
EUT Exercise Software		RFTestTool v5.8		
Configuration	**N_{TX}**	**Low CH**	**Mid CH**	**High CH**
IEEE 802.11b	1	68	80	66
IEEE 802.11g	1	58	78	63
IEEE 802.11n HT 20	1	62	79	57

2.2 Support Equipment List and External Cable List

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

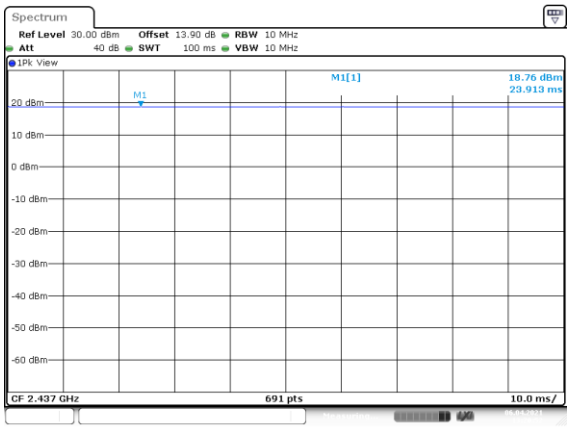
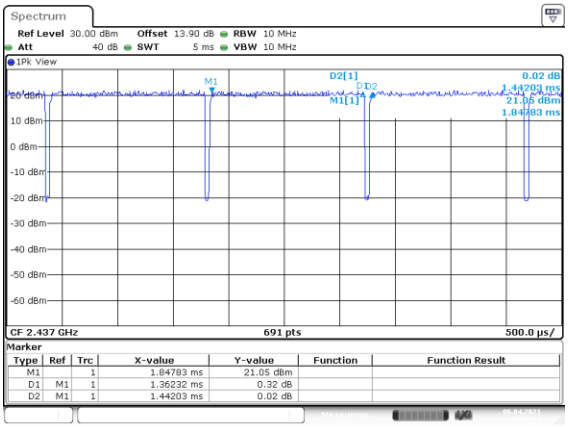
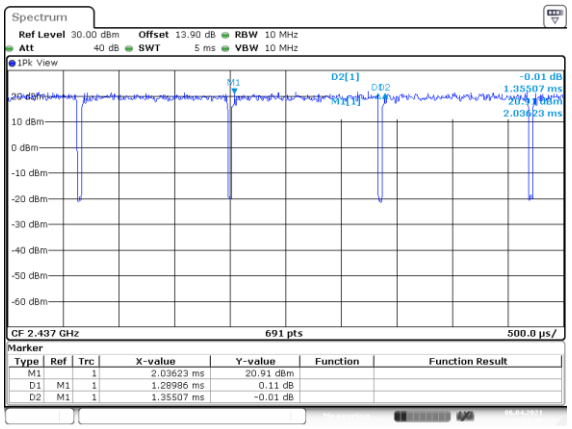
2.3 Block Diagram of Test Setup

Conduction	Radiation
	

2.4 Duty Cycle

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

Configuration	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
IEEE 802.11b	100.00	100.00	100.00	0.00
IEEE 802.11g	1.36	1.44	94.47	0.25
IEEE 802.11n HT 20	1.29	1.36	95.19	0.21

IEEE 802.11b	IEEE 802.11g
	
IEEE 802.11n HT20	**-**
	-

*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	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	2.80	1.9054	24.00	251.1886	20	0.0953	1.00
Wi-Fi 5G UNII-1	5150-5250	3.10	2.0417	17.00	50.1187	20	0.0204	1.00
Wi-Fi 5G UNII-3	5745-5850	3.10	2.0417	21.00	125.8925	20	0.0512	1.00
WCDMA II	1852.4-1907.6	3.00	1.9953	25.00	316.2278	20	0.1256	1.00
WCDMA IV	1712.4-1752.6	3.00	1.9953	25.00	316.2278	20	0.1256	1.00
WCDMA V	826.4-846.6	2.00	1.5849	25.00	316.2278	20	0.0998	0.55
LTE Band 2	1850.7-1909.3	3.00	1.9953	25.00	316.2278	20	0.1256	1.00
LTE Band 4	1710.7-1754.3	3.00	1.9953	25.00	316.2278	20	0.1256	1.00
LTE Band 5	824.7-848.3	2.00	1.5849	25.00	316.2278	20	0.0998	0.55
LTE Band 12	699.7-715.3	2.00	1.5849	25.00	316.2278	20	0.0998	0.47
LTE Band 13	779.5-784.5	2.00	1.5849	25.00	316.2278	20	0.0998	0.52
LTE Band 14	790.5-795.5	2.00	1.5849	25.00	316.2278	20	0.0998	0.53
LTE Band 66	1710.7-1779.3	3.00	1.9953	25.00	316.2278	20	0.1256	1.00
LTE Band 71	665.5-695.5	2.00	1.5849	25.00	316.2278	20	0.0998	0.45

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

Wi-Fi and WWAN 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 + Max MPE of LTE
= 0.0953/1.0+0.0998/0.45 =0.3171 ＜ 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

Brand	Model	Antenna Type	Antenna Gain	Result
ARistotle	RFA-25-JP189-16W-500	PIFA	2.80 dBi	Compliance

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

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

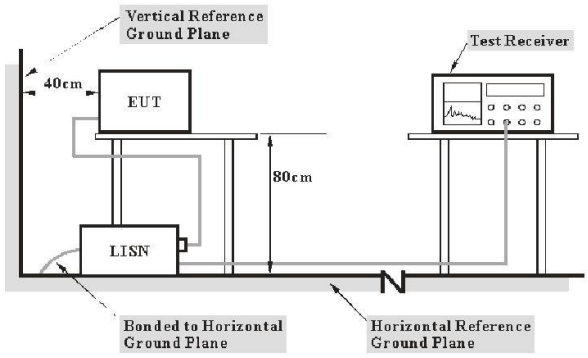
According to FCC §15.207,

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

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

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

6.2 EUT Setup and Test Procedure



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

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

Frequency Range	Receiver RBW
150 kHz - 30 MHz	9 kHz

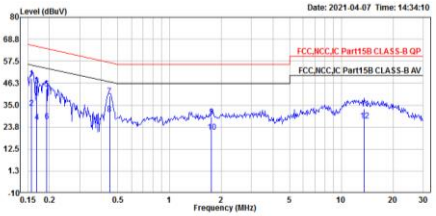
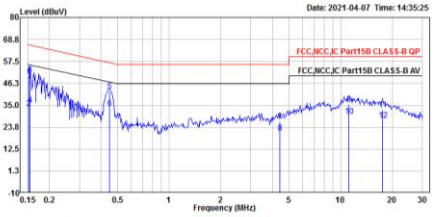
During the conducted emission test, the adapter was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

6.3 Test Equipment List and Details

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

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

6.4 Test Result

Line	Neutral
	

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.157	28.93	48.79	19.86	65.60	-16.81	QP
2	0.157	13.77	33.63	19.86	55.60	-21.97	Average
3	0.169	25.25	45.11	19.86	65.01	-19.90	QP
4	0.169	6.51	26.37	19.86	55.01	-28.64	Average
5	0.192	23.56	43.43	19.87	63.95	-20.52	QP
6	0.192	6.81	26.68	19.87	53.95	-27.27	Average
7	0.447	19.60	39.48	19.88	56.93	-17.45	QP
8	0.447	10.53	30.41	19.88	46.93	-16.52	Average
9	1.759	9.15	29.10	19.95	56.00	-26.90	QP
10	1.759	1.29	21.24	19.95	46.00	-24.76	Average
11	13.632	13.00	33.26	20.26	60.00	-26.74	QP
12	13.632	6.85	27.11	20.26	50.00	-22.89	Average

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.151	29.89	49.76	19.87	65.93	-16.17	QP
2	0.151	13.63	33.50	19.87	55.93	-22.43	Average
3	0.155	30.78	50.65	19.87	65.74	-15.09	QP
4	0.155	15.21	35.08	19.87	55.74	-20.66	Average
5	0.450	22.38	42.27	19.89	56.87	-14.60	QP
6	0.450	13.58	33.47	19.89	46.87	-13.40	Average
7	4.433	6.74	26.84	20.10	56.00	-29.16	QP
8	4.433	0.94	21.04	20.10	46.00	-24.96	Average
9	11.170	15.41	35.67	20.26	60.00	-24.33	QP
10	11.170	9.12	29.38	20.26	50.00	-20.62	Average
11	17.591	12.53	32.94	20.41	60.00	-27.06	QP
12	17.591	6.79	27.20	20.41	50.00	-22.80	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, §15.247(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:

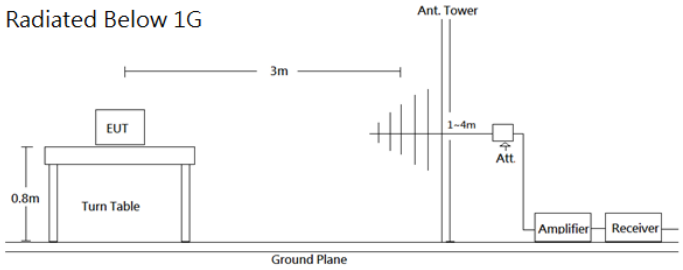
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** 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.

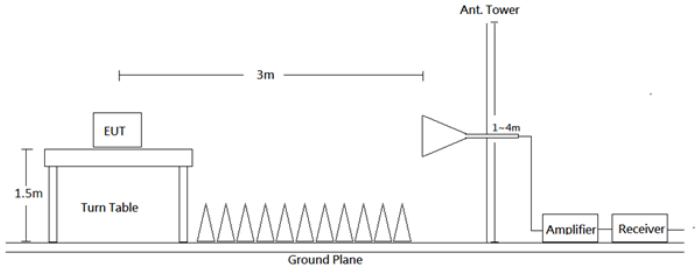
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the 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 Below 1G



Radiated Above 1G



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

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

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

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

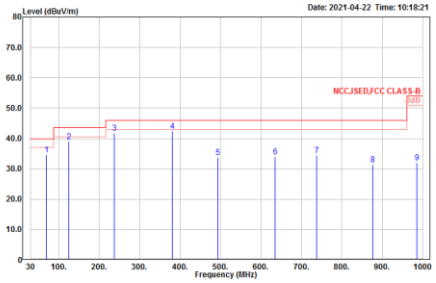
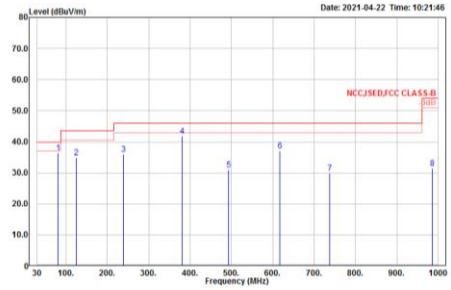
7.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Radiation 3M Room (966A)					
Active Loop	EMCO	6502	0001-3322	2021/03/16	2022/03/15
Bilog Antenna & 6 dB Attenuator	SUNOL SCIENCES & EMCI	JB3 & N-6-06	A111513 & AT-N0668	2021/03/30	2022/03/29
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2021/05/12	2022/05/11
Horn Antenna	ETS-Lindgren	3115	00109141	2020/07/15	2021/07/14
Horn Antenna	ETS-Lindgren	3160-09	00123852	2020/07/07	2021/07/06
Preamplifier	A.H. Systems	PAM-1840VH	174	2021/03/22	2022/03/21
Preamplifier	A.H. Systems	PAM-0118P	478	2021/05/12	2022/05/11
Microflex Cable (1m)	EMCI	EMC102-KM-KM-1000	180524	2020/08/06	2021/08/05
Microflex Cable (2m)	EMCI	EMC106-SM-SM-2000	180516	2020/08/06	2021/08/05
Microflex Cable (8m)	UTIFLEX	UFA210A-1-3149-300300	MFR 64639 232490-002	2020/08/06	2021/08/05
Turn Table	Chaintek	T-200-S-1	003501	N.C.R	N.C.R
Antenna Tower	Chaintek	MBD-400-1	003504	N.C.R	N.C.R
Controller	Chaintek	3000-1	003507	N.C.R	N.C.R
Software	Audix	e3 v9	E3LK-01	N.C.R	N.C.R
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2021/05/12	2022/05/11
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

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

7.4 Test Result

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

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	68.800	34.62	40.00	-5.38	56.66	-22.04	QP
2	125.060	39.08	43.50	-4.42	56.07	-16.99	Peak
3	236.610	41.84	46.00	-4.16	61.30	-19.46	Peak
4	380.170	42.59	46.00	-3.41	58.30	-15.71	QP
5	492.690	33.76	46.00	-12.24	47.07	-13.31	Peak
6	635.280	34.02	46.00	-11.98	44.80	-10.78	Peak
7	738.100	34.38	46.00	-11.62	43.84	-9.46	Peak
8	875.840	31.43	46.00	-14.57	39.10	-7.67	Peak
9	984.480	32.07	54.00	-21.93	38.21	-6.14	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	81.410	36.47	40.00	-3.53	59.26	-22.79	QP
2	125.060	34.98	43.50	-8.52	51.97	-16.99	Peak
3	239.520	36.02	46.00	-9.98	55.37	-19.35	Peak
4	380.170	41.77	46.00	-4.23	57.48	-15.71	Peak
5	492.690	30.94	46.00	-15.06	44.25	-13.31	Peak
6	616.850	37.13	46.00	-8.87	48.31	-11.18	Peak
7	738.100	30.01	46.00	-15.99	39.47	-9.46	Peak
8	984.480	31.52	54.00	-22.48	37.66	-6.14	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

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

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

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

Above 1G (1 GHz-26.5 GHz)

IEEE 802.11b Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.520	52.78	54.00	-1.22	60.23	-7.45	Average
2389.520	58.39	74.00	-15.61	65.84	-7.45	Peak
2413.040	102.54			109.94	-7.40	Average
2413.040	105.18			112.58	-7.40	Peak
4824.000	35.62	54.00	-18.38	36.90	-1.28	Average
4824.000	45.85	74.00	-28.15	47.13	-1.28	Peak
7236.000	47.43	54.00	-6.57	41.52	5.91	Average
7236.000	55.81	74.00	-18.19	49.90	5.91	Peak

IEEE 802.11b Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.856	50.64	54.00	-3.36	58.09	-7.45	Average
2389.856	57.28	74.00	-16.72	64.73	-7.45	Peak
2413.040	101.68			109.08	-7.40	Average
2413.040	104.31			111.71	-7.40	Peak
4824.000	39.06	54.00	-14.94	40.34	-1.28	Average
4824.000	47.65	74.00	-26.35	48.93	-1.28	Peak
7236.000	44.74	54.00	-9.26	38.83	5.91	Average
7236.000	53.84	74.00	-20.16	47.93	5.91	Peak

IEEE 802.11b Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.860	46.63	54.00	-7.37	54.08	-7.45	Average
2389.860	55.40	74.00	-18.60	62.85	-7.45	Peak
2435.598	105.18			112.52	-7.34	Average
2435.598	107.69			115.03	-7.34	Peak
2483.998	45.40	54.00	-8.60	52.68	-7.28	Average
2483.998	55.28	74.00	-18.72	62.56	-7.28	Peak
4874.000	44.22	54.00	-9.78	45.39	-1.17	Average
4874.000	49.57	74.00	-24.43	50.74	-1.17	Peak
7311.000	47.37	54.00	-6.63	41.70	5.67	Average
7311.000	55.40	74.00	-18.60	49.73	5.67	Peak

IEEE 802.11b Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.860	44.08	54.00	-9.92	51.53	-7.45	Average
2389.860	53.81	74.00	-20.19	61.26	-7.45	Peak
2435.598	106.57			113.91	-7.34	Average
2435.598	109.09			116.43	-7.34	Peak
2484.724	46.48	54.00	-7.52	53.76	-7.28	Average
2484.724	55.27	74.00	-18.73	62.55	-7.28	Peak
4874.000	46.65	54.00	-7.35	47.82	-1.17	Average
4874.000	51.27	74.00	-22.73	52.44	-1.17	Peak
7311.000	48.43	54.00	-5.57	42.76	5.67	Average
7311.000	56.06	74.00	-17.94	50.39	5.67	Peak

IEEE 802.11b High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2461.100	100.95			108.26	-7.31	Average
2461.100	103.59			110.90	-7.31	Peak
2483.600	51.49	54.00	-2.51	58.77	-7.28	Average
2483.600	58.63	74.00	-15.37	65.91	-7.28	Peak
4924.000	34.45	54.00	-19.55	35.50	-1.05	Average
4924.000	46.03	74.00	-27.97	47.08	-1.05	Peak
7386.000	40.97	54.00	-13.03	35.18	5.79	Average
7386.000	52.23	74.00	-21.77	46.44	5.79	Peak

IEEE 802.11b High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2461.100	102.69			110.00	-7.31	Average
2461.100	105.34			112.65	-7.31	Peak
2483.500	52.75	54.00	-1.25	60.03	-7.28	Average
2483.500	59.42	74.00	-14.58	66.70	-7.28	Peak
4924.000	33.24	54.00	-20.76	34.29	-1.05	Average
4924.000	45.51	74.00	-28.49	46.56	-1.05	Peak
7386.000	41.84	54.00	-12.16	36.05	5.79	Average
7386.000	51.96	74.00	-22.04	46.17	5.79	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

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

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

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

IEEE 802.11g Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.744	52.35	54.00	-1.65	59.80	-7.45	Average
2389.744	72.59	74.00	-1.41	80.04	-7.45	Peak
2412.704	95.99			103.39	-7.40	Average
2412.704	105.50			112.90	-7.40	Peak
4824.000	31.63	54.00	-22.37	32.91	-1.28	Average
4824.000	43.69	74.00	-30.31	44.97	-1.28	Peak
7236.000	37.19	54.00	-16.81	31.28	5.91	Average
7236.000	49.99	74.00	-24.01	44.08	5.91	Peak

IEEE 802.11g Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.856	50.77	54.00	-3.23	58.22	-7.45	Average
2389.856	71.00	74.00	-3.00	78.45	-7.45	Peak
2412.592	95.29			102.69	-7.40	Average
2412.592	104.98			112.38	-7.40	Peak
4824.000	32.21	54.00	-21.79	33.49	-1.28	Average
4824.000	45.82	74.00	-28.18	47.10	-1.28	Peak
7236.000	37.53	54.00	-16.47	31.62	5.91	Average
7236.000	50.31	74.00	-23.69	44.40	5.91	Peak

IEEE 802.11g Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.376	47.14	54.00	-6.86	54.59	-7.45	Average
2389.376	63.40	74.00	-10.60	70.85	-7.45	Peak
2435.356	102.40			109.74	-7.34	Average
2435.356	111.67			119.01	-7.34	Peak
2486.418	48.16	54.00	-5.84	55.44	-7.28	Average
2486.418	67.19	74.00	-6.81	74.47	-7.28	Peak
4874.000	33.44	54.00	-20.56	34.61	-1.17	Average
4874.000	47.09	74.00	-26.91	48.26	-1.17	Peak
7311.000	41.72	54.00	-12.28	36.05	5.67	Average
7311.000	55.91	74.00	-18.09	50.24	5.67	Peak

IEEE 802.11g Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2387.440	46.39	54.00	-7.61	53.85	-7.46	Average
2387.440	62.77	74.00	-11.23	70.23	-7.46	Peak
2436.324	102.35			109.69	-7.34	Average
2436.324	111.49			118.83	-7.34	Peak
2486.660	47.58	54.00	-6.42	54.86	-7.28	Average
2486.660	66.46	74.00	-7.54	73.74	-7.28	Peak
4874.000	34.64	54.00	-19.36	35.81	-1.17	Average
4874.000	48.40	74.00	-25.60	49.57	-1.17	Peak
7311.000	42.34	54.00	-11.66	36.67	5.67	Average
7311.000	56.32	74.00	-17.68	50.65	5.67	Peak

IEEE 802.11g High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2460.300	99.17			106.48	-7.31	Average
2460.300	108.42			115.73	-7.31	Peak
2484.400	53.87	54.00	-0.13	61.15	-7.28	Average
2484.400	70.92	74.00	-3.08	78.20	-7.28	Peak
4924.000	31.74	54.00	-22.26	32.79	-1.05	Average
4924.000	44.10	74.00	-29.90	45.15	-1.05	Peak
7386.000	38.27	54.00	-15.73	32.48	5.79	Average
7386.000	51.90	74.00	-22.10	46.11	5.79	Peak

IEEE 802.11g High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2462.600	98.10			105.41	-7.31	Average
2462.600	107.43			114.74	-7.31	Peak
2484.300	53.49	54.00	-0.51	60.77	-7.28	Average
2484.300	70.65	74.00	-3.35	77.93	-7.28	Peak
4924.000	31.96	54.00	-22.04	33.01	-1.05	Average
4924.000	45.14	74.00	-28.86	46.19	-1.05	Peak
7386.000	38.54	54.00	-15.46	32.75	5.79	Average
7386.000	52.05	74.00	-21.95	46.26	5.79	Peak

Note:

Result = Reading + Correct Factor.

Margin = Result – Limit.

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

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

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

IEEE 802.11n HT20 Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.744	53.12	54.00	-0.88	58.57	-5.45	Average
2389.744	73.75	74.00	-0.25	79.20	-5.45	Peak
2411.136	100.70			106.11	-5.41	Average
2411.136	110.21			115.62	-5.41	Peak
4824.000	34.17	54.00	-19.83	32.61	1.56	Average
4824.000	48.31	74.00	-25.69	46.75	1.56	Peak
7236.000	35.42	54.00	-18.58	27.73	7.69	Average
7236.000	49.97	74.00	-24.03	42.28	7.69	Peak
9648.000	59.29	74.00	-14.71	49.43	9.86	Peak

IEEE 802.11n HT20 Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.744	45.02	54.00	-8.98	50.47	-5.45	Average
2389.744	63.30	74.00	-10.70	68.75	-5.45	Peak
2413.040	97.22			102.64	-5.42	Average
2413.040	106.54			111.96	-5.42	Peak
4824.000	34.48	54.00	-19.52	32.92	1.56	Average
4824.000	47.18	74.00	-26.82	45.62	1.56	Peak
7236.000	35.44	54.00	-18.56	27.75	7.69	Average
7236.000	52.28	74.00	-21.72	44.59	7.69	Peak
9648.000	58.70	74.00	-15.30	48.84	9.86	Peak

IEEE 802.11n HT20 Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.860	47.87	54.00	-6.13	53.32	-5.45	Average
2389.860	71.43	74.00	-2.57	76.88	-5.45	Peak
2438.744	103.82			109.20	-5.38	Average
2438.744	114.60			119.98	-5.38	Peak
2483.514	45.41	54.00	-8.59	50.77	-5.36	Average
2483.514	67.82	74.00	-6.18	73.18	-5.36	Peak
4874.000	44.83	54.00	-9.17	43.20	1.63	Average
4874.000	58.73	74.00	-15.27	57.10	1.63	Peak
7311.000	45.00	54.00	-9.00	37.60	7.40	Average
7311.000	59.94	74.00	-14.06	52.54	7.40	Peak
9748.000	60.80	74.00	-13.20	50.86	9.94	Peak
12185.000	42.88	54.00	-11.12	29.46	13.42	Average
12185.000	57.02	74.00	-16.98	43.60	13.42	Peak

IEEE 802.11n HT20 Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.618	45.97	54.00	-8.03	51.42	-5.45	Average
2389.618	67.24	74.00	-6.76	72.69	-5.45	Peak
2438.744	102.93			108.31	-5.38	Average
2438.744	113.46			118.84	-5.38	Peak
2483.514	42.80	54.00	-11.20	48.16	-5.36	Average
2483.514	63.70	74.00	-10.30	69.06	-5.36	Peak
4874.000	47.15	54.00	-6.85	45.52	1.63	Average
4874.000	60.84	74.00	-13.16	59.21	1.63	Peak
7311.000	49.17	54.00	-4.83	41.77	7.40	Average
7311.000	64.27	74.00	-9.73	56.87	7.40	Peak
9748.000	68.27	74.00	-5.73	58.33	9.94	Peak
12185.000	44.95	54.00	-9.05	31.53	13.42	Average
12185.000	59.40	74.00	-14.60	45.98	13.42	Peak

IEEE 802.11n HT20 High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2461.000	100.20			105.57	-5.37	Average
2461.000	109.82			115.19	-5.37	Peak
2483.600	53.30	54.00	-0.70	58.66	-5.36	Average
2483.600	72.63	74.00	-1.37	77.99	-5.36	Peak
4924.000	36.00	54.00	-18.00	34.30	1.70	Average
4924.000	50.65	74.00	-23.35	48.95	1.70	Peak
7386.000	35.70	54.00	-18.30	28.21	7.49	Average
7386.000	53.95	74.00	-20.05	46.46	7.49	Peak
9848.000	57.81	74.00	-16.19	47.49	10.32	Peak

IEEE 802.11n HT20 High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2461.000	95.33			100.70	-5.37	Average
2461.000	104.77			110.14	-5.37	Peak
2483.600	44.24	54.00	-9.76	49.60	-5.36	Average
2483.600	61.41	74.00	-12.59	66.77	-5.36	Peak
4924.000	35.64	54.00	-18.36	33.94	1.70	Average
4924.000	49.69	74.00	-24.31	47.99	1.70	Peak
7386.000	36.02	54.00	-17.98	28.53	7.49	Average
7386.000	52.35	74.00	-21.65	44.86	7.49	Peak
9848.000	59.42	74.00	-14.58	49.10	10.32	Peak

Note:

Result = Reading + Correct Factor.

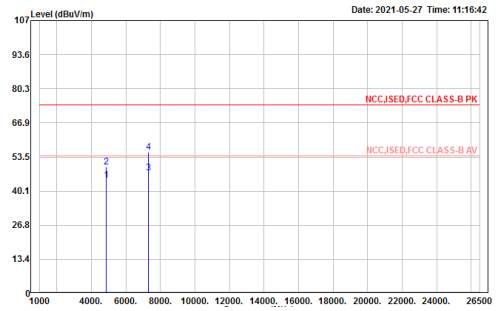
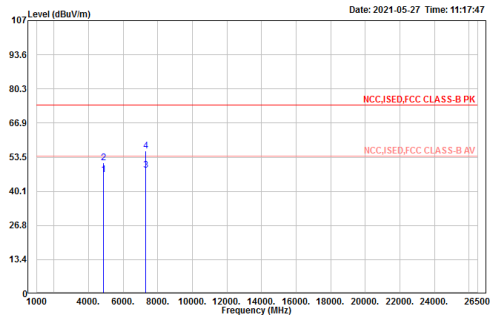
Margin = Result – Limit.

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

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

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

Above 1G (1 GHz-26.5 GHz): The worst mode is 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	44.22	54.00	-9.78	45.39	-1.17	Average
2	4874.000	49.57	74.00	-24.43	50.74	-1.17	Peak
3 !	7311.000	47.37	54.00	-6.63	41.70	5.67	Average
4 !	7311.000	55.40	74.00	-18.60	49.73	5.67	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 !	4874.000	46.65	54.00	-7.35	47.82	-1.17	Average
2	4874.000	51.27	74.00	-22.73	52.44	-1.17	Peak
3 !	7311.000	48.43	54.00	-5.57	42.76	5.67	Average
4 !	7311.000	56.06	74.00	-17.94	50.39	5.67	Peak

Note:

Result = Reading + Correct Factor. Margin = Result – Limit.

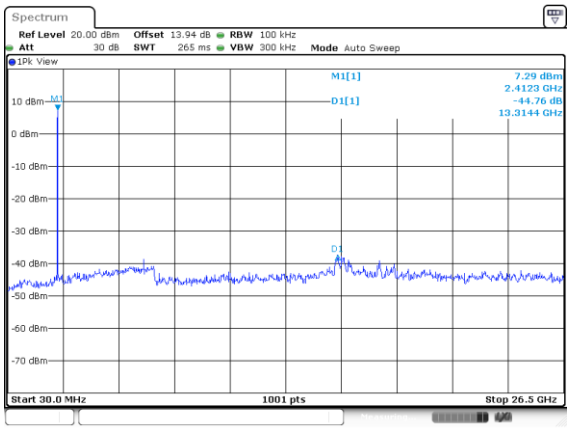
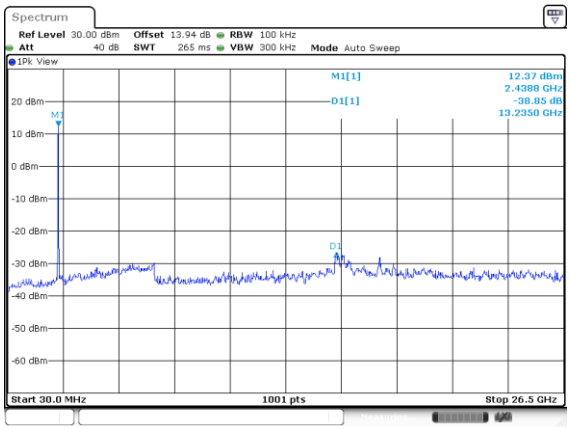
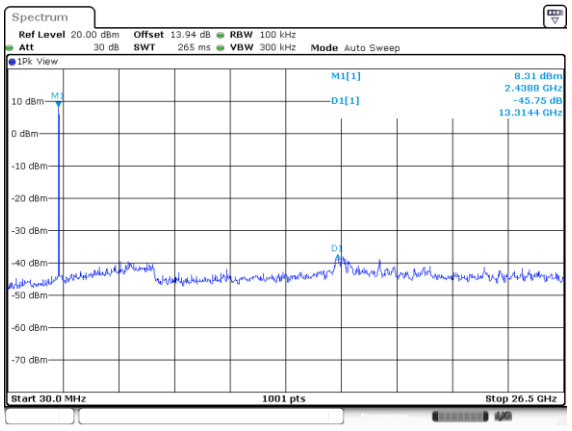
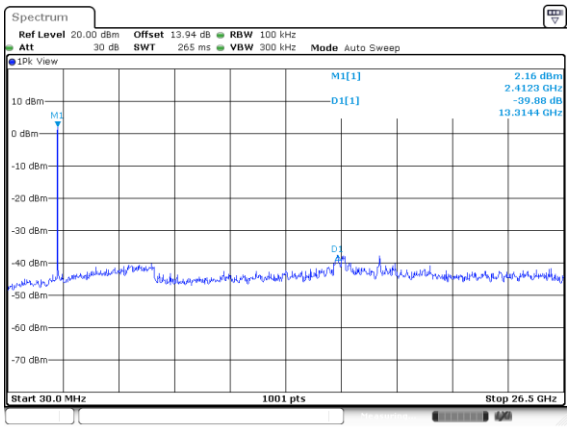
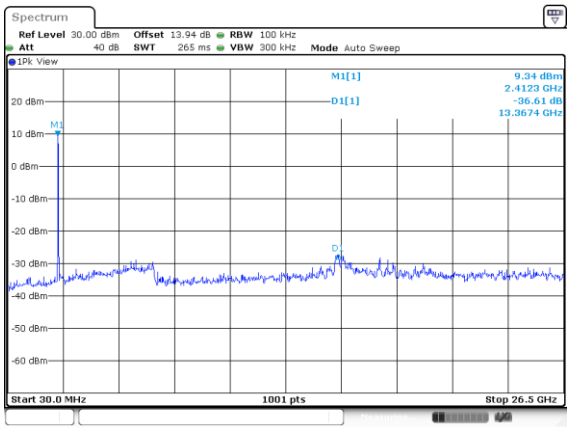
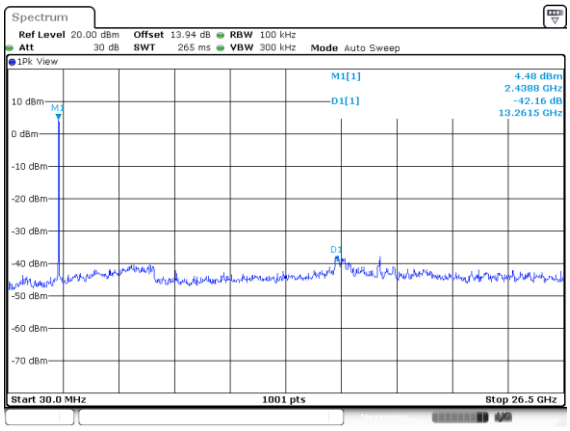
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

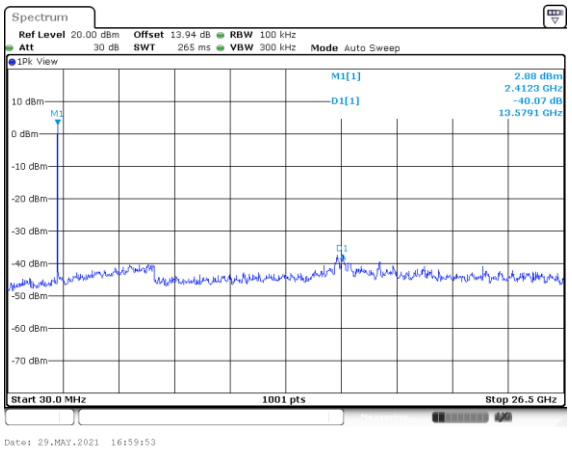
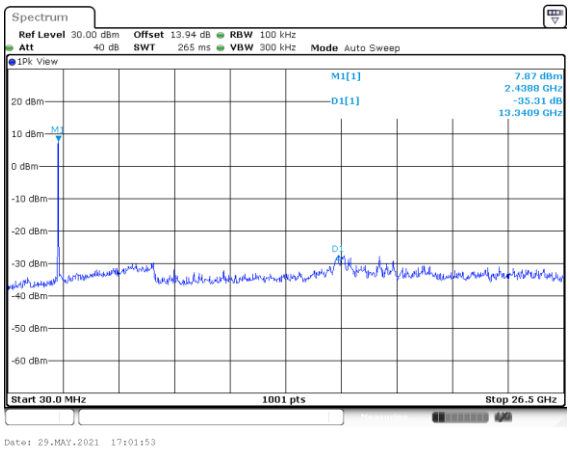
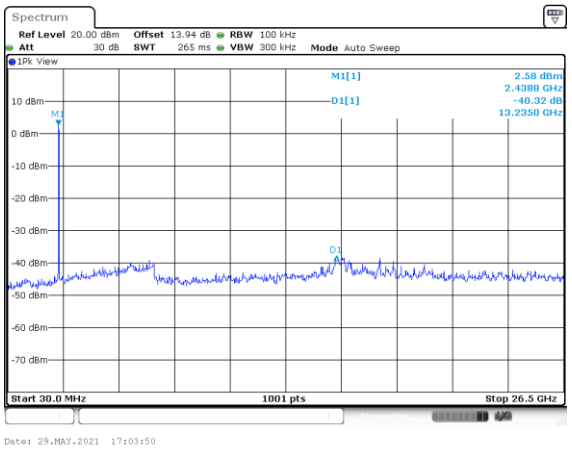
Spurious emissions more than 20 dB below the limit were not reported.

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

Conducted Spurious Emissions

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
IEEE 802.11b	Low	2412	44.76	≥ 20	Compliance
	Middle	2437	38.85	≥ 20	Compliance
	High	2462	45.75	≥ 20	Compliance
IEEE 802.11g	Low	2412	39.88	≥ 20	Compliance
	Middle	2437	36.61	≥ 20	Compliance
	High	2462	42.16	≥ 20	Compliance
IEEE 802.11n HT20	Low	2412	40.07	≥ 20	Compliance
	Middle	2437	35.31	≥ 20	Compliance
	High	2462	40.32	≥ 20	Compliance

IEEE 802.11b Low CH	IEEE 802.11b Middle CH
	
IEEE 802.11b High CH	**IEEE 802.11g Low CH**
	
IEEE 802.11g Middle CH	**IEEE 802.11g High CH**
	

IEEE 802.11n HT20 Low CH	IEEE 802.11n HT20 Middle CH
	
IEEE 802.11n HT20 High CH	**-**
	-

8 FCC §15.247(a)(2) – 6 dB Emission 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.

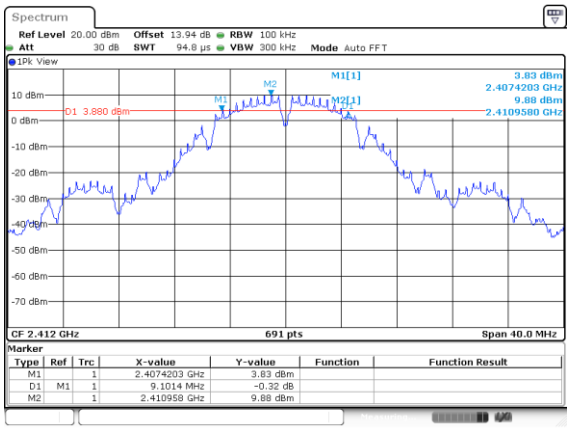
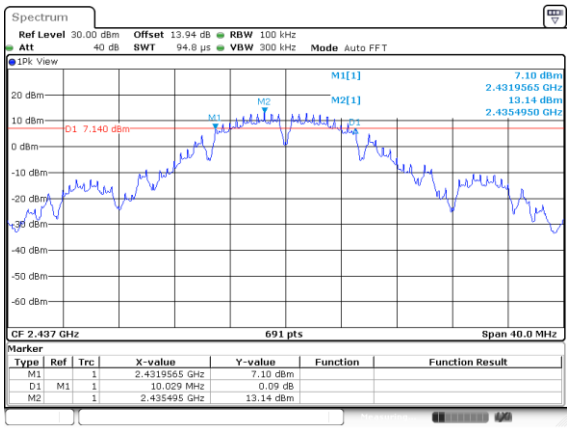
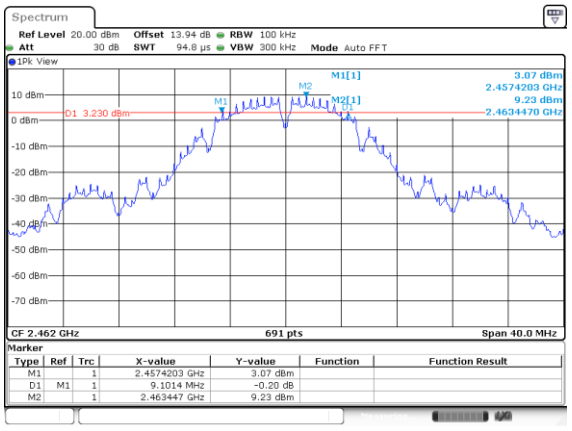
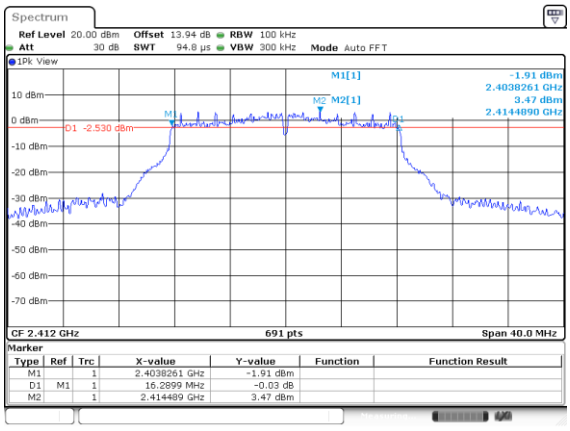
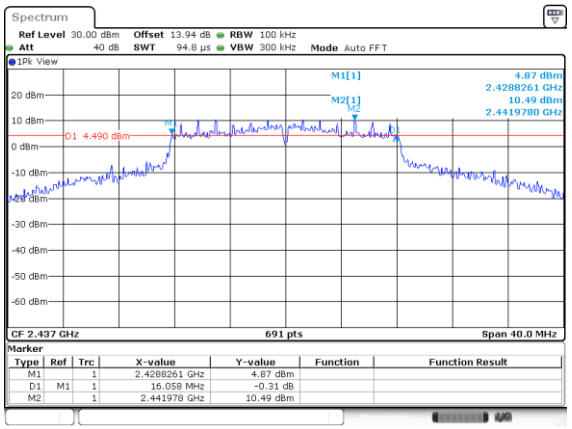
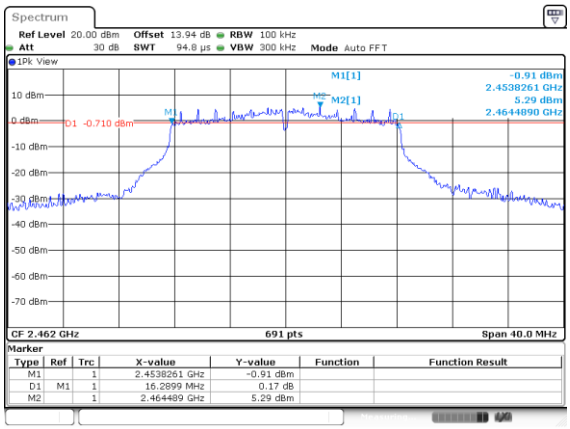
8.3 Test Equipment List and Details

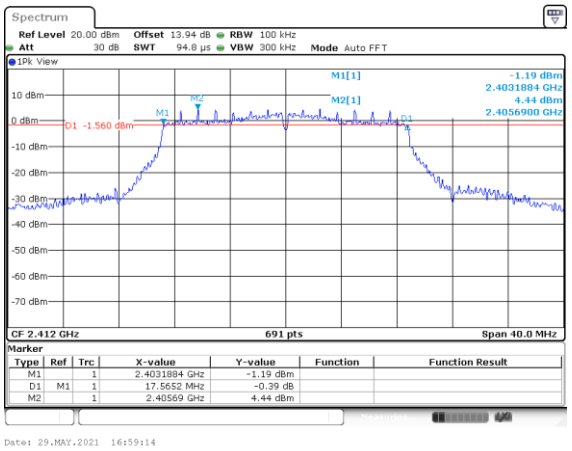
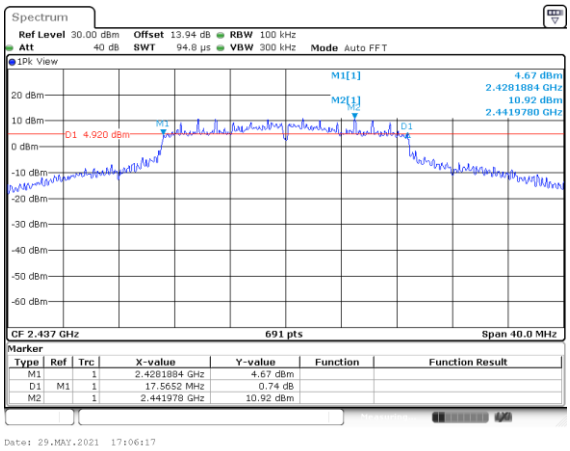
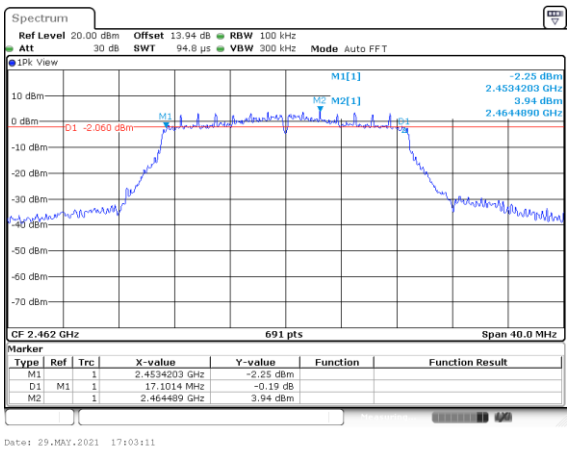
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2021/05/12	2022/05/11
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

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

8.4 Test Results

Configuration	Channel	Frequency (MHz)	6 dB BW (MHz)	6dB Limit (MHz)	Result
IEEE 802.11b	Low	2412	9.10	> 0.5	Compliance
	Middle	2437	10.03	> 0.5	Compliance
	High	2462	9.10	> 0.5	Compliance
IEEE 802.11g	Low	2412	16.29	> 0.5	Compliance
	Middle	2437	16.06	> 0.5	Compliance
	High	2462	16.29	> 0.5	Compliance
IEEE 802.11n HT20	Low	2412	17.57	> 0.5	Compliance
	Middle	2437	17.57	> 0.5	Compliance
	High	2462	17.10	> 0.5	Compliance

IEEE 802.11b Low CH	IEEE 802.11b Middle CH
	
IEEE 802.11b High CH	**IEEE 802.11g Low CH**
	
IEEE 802.11g Middle CH	**IEEE 802.11g High CH**
	

IEEE 802.11n HT20 Low CH	IEEE 802.11n HT20 Middle CH
	
IEEE 802.11n HT20 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, and 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)					
USB Wideband Power Sensor	Agilent	U2021XA	MY56120026	2020/09/14	2021/09/13
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

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

9.4 Test Results

Configuration	Channel	Frequency (MHz)	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (W)	Limit (dBm)	Result
IEEE 802.11b	Low	2412	20.78	0.1197	30	Compliance
	Middle	2437	23.51	0.2244	30	Compliance
	High	2462	20.34	0.1081	30	Compliance
IEEE 802.11g	Low	2412	22.77	0.1892	30	Compliance
	Middle	2437	23.75	0.2371	30	Compliance
	High	2462	23.59	0.2286	30	Compliance
IEEE 802.11n HT20	Low	2412	22.86	0.1932	30	Compliance
	Middle	2437	23.81	0.2404	30	Compliance
	High	2462	23.37	0.2173	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

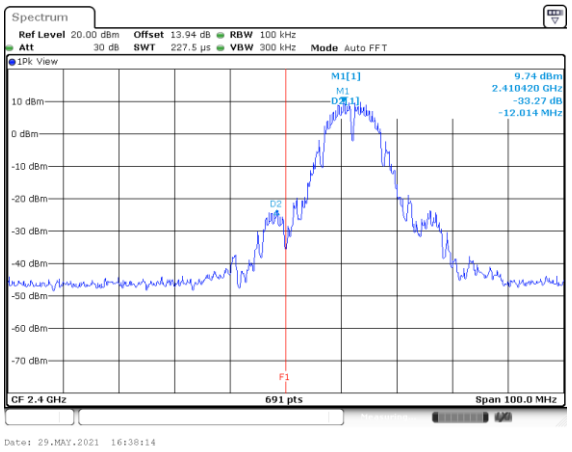
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2021/05/12	2022/05/11
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

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

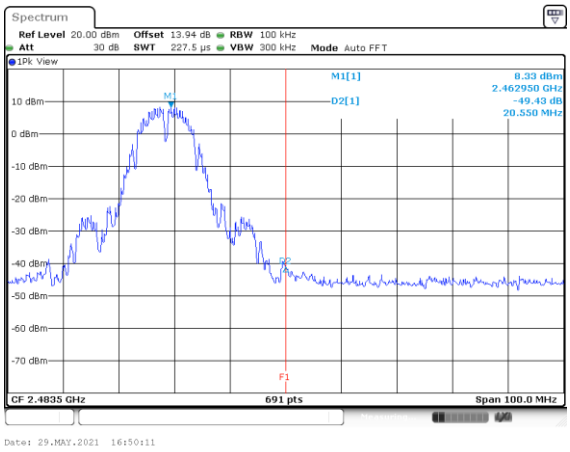
10.4 Test Results

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
IEEE 802.11b	Low	2412	33.27	≥ 20	Compliance
	High	2462	49.43	≥ 20	Compliance
IEEE 802.11g	Low	2412	33.77	≥ 20	Compliance
	High	2462	38.39	≥ 20	Compliance
IEEE 802.11n HT20	Low	2412	30.32	≥ 20	Compliance
	High	2462	42.40	≥ 20	Compliance

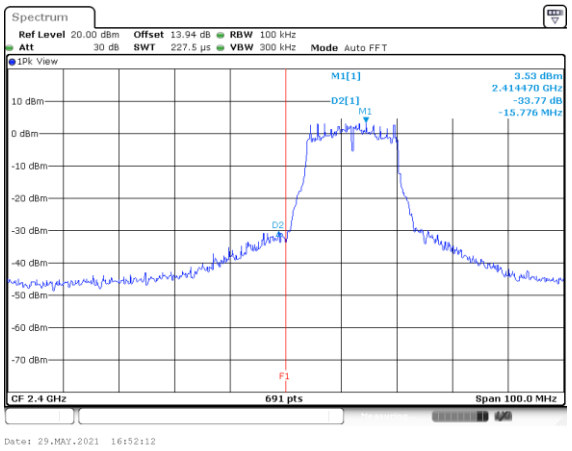
IEEE 802.11b Low CH (Left Side)



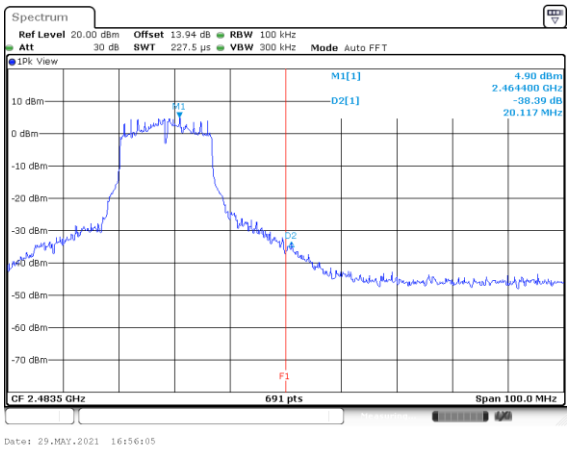
IEEE 802.11b High CH (Right Side)

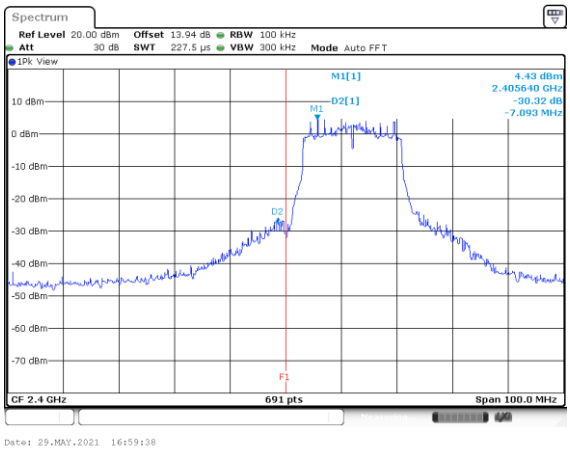
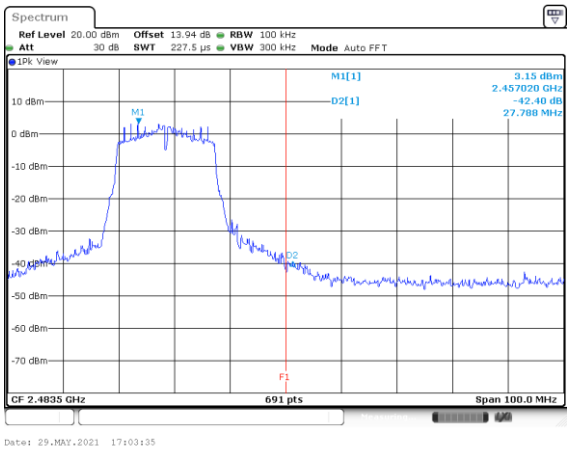


IEEE 802.11g Low CH (Left Side)



IEEE 802.11g High CH (Right Side)



IEEE 802.11n HT20 Low CH (Left Side)	IEEE 802.11n HT20 High CH (Right Side)
	

11 FCC §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, Set analyzer center frequency to DTS channel center frequency, And Set the span to 1.5 times the DTS bandwidth. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz. Set the VBW ≥ [3 × RBW]. Detector = peak. Sweep time = auto couple. Trace mode = max hold. (8) Allow trace to fully stabilize. Use the peak marker function to determine the maximum amplitude level within the RBW. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

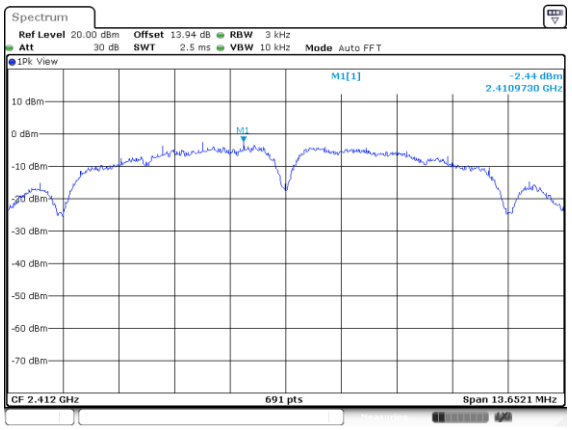
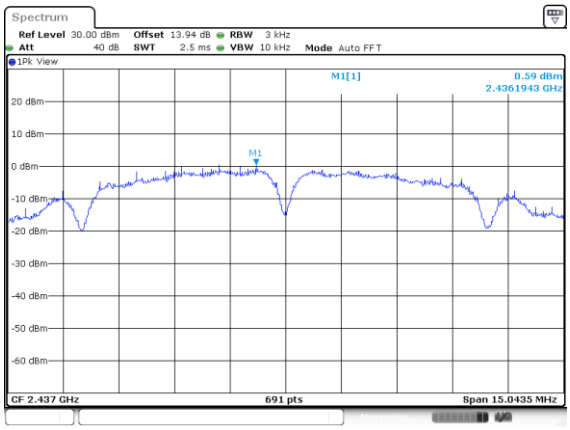
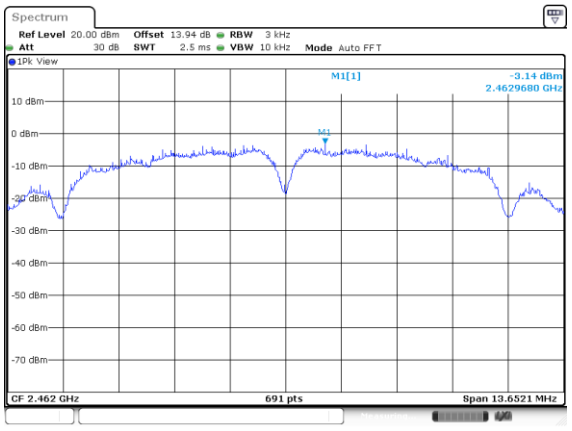
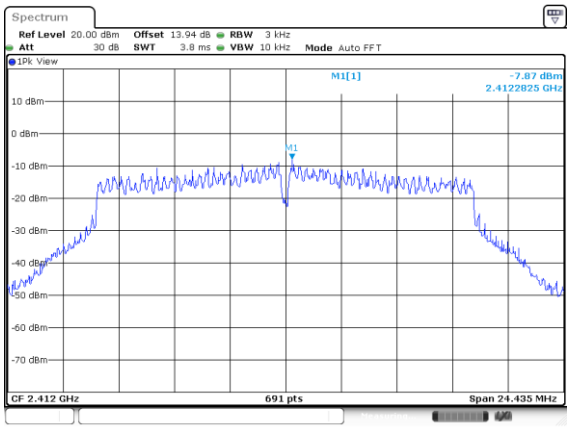
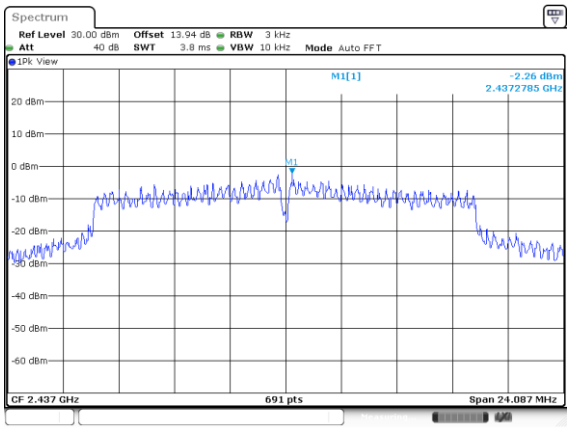
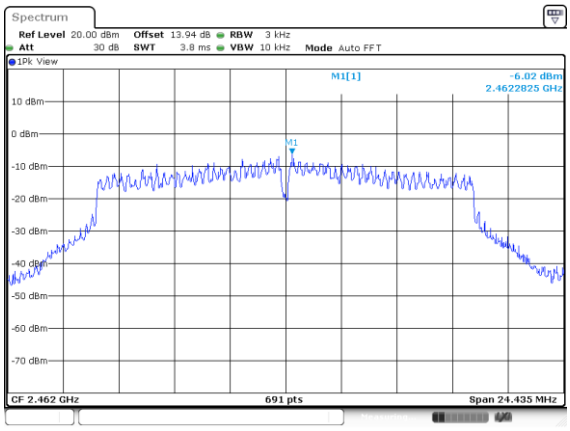
11.3 Test Equipment List and Details

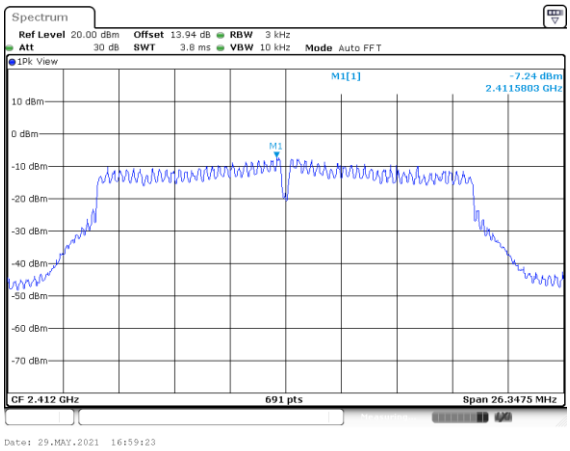
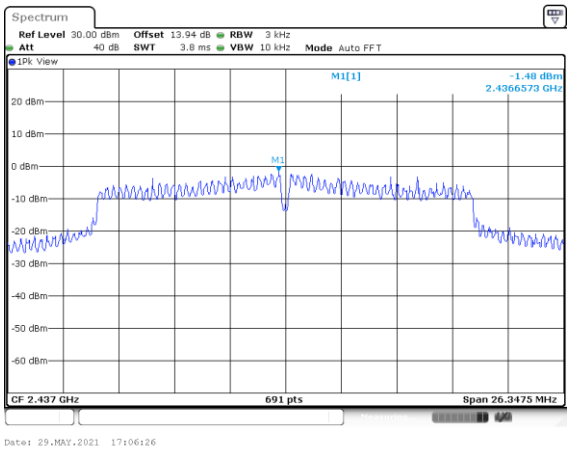
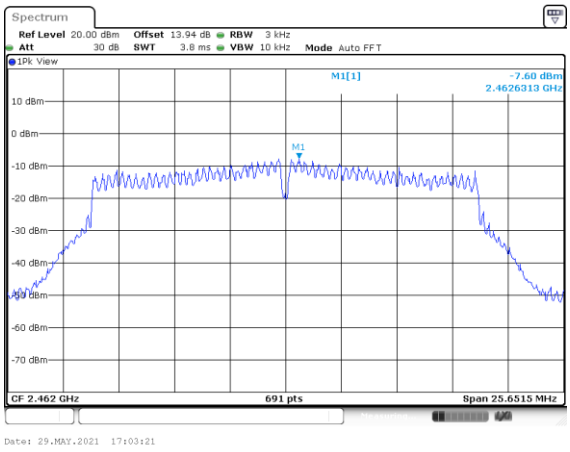
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2021/05/12	2022/05/11
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***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).

11.4 Test Results

Configuration	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
IEEE 802.11b	Low	2412	-2.44	8.00	Compliance
	Middle	2437	0.59	8.00	Compliance
	High	2462	-3.14	8.00	Compliance
IEEE 802.11g	Low	2412	-7.87	8.00	Compliance
	Middle	2437	-2.26	8.00	Compliance
	High	2462	-6.02	8.00	Compliance
IEEE 802.11n HT20	Low	2412	-7.24	8.00	Compliance
	Middle	2437	-1.48	8.00	Compliance
	High	2462	-7.60	8.00	Compliance

IEEE 802.11b Low CH	IEEE 802.11b Middle CH
	
IEEE 802.11b High CH	**IEEE 802.11g Low CH**
	
IEEE 802.11g Middle CH	**IEEE 802.11g High CH**
	

IEEE 802.11n HT20 Low CH	IEEE 802.11 n HT20 Middle CH
	
IEEE 802.11n HT20 High CH	-
	-

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