FCC Part 15.247

TEST REPORT

For

AAEON Technology Inc.

5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist, New Taipei City, 231, Taiwan, R.O.C.

Report Type	**Original Report**
FCC Identity:	**FCC ID: OHBRICO3399**
Brand Name	AAEON an ASUS assoc. co.
Product Name	**RISC Single Board Computer**
Model Name	**RICO-3399**
Series Model Name:	**RICO-3399-xxx-xxxx** **(x-Where x may be any combination of alphanumeric characters or "-" or blank.)**
Report Number	**RLK201110001-00B**
Report Date	**2021/04/22**
Reviewed By	**Zeus Chen** Zeus Chen
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Revision History

Revision	Report Number	Issue Date	Description
1.0	RLK201110001-00B	2021/04/22	Original Report

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Application	**AAEON Technology Inc.** 5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist, New Taipei City, 231, Taiwan, R**.O.C.**
Manufacturer	**AAEON Technology Inc.** 5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist, New Taipei City, 231, Taiwan, R.O.C.
Brand Name	AAEON an ASUS assoc. co.
Product (Equipment)	RISC Single Board Computer
Model Name	RICO-3399
Series Model Name	RICO-3399-xxx-xxxx (x-Where x may be any combination of alphanumeric characters or "-" or blank.)
Model Discrepancy	Marketing purpose
Frequency Range	BLE-1Mbps: 2402 - 2480 MHz IEEE 802.11b/g/n HT20: 2412 - 2462 MHz
Number of Channels	BLE-1Mbps: 40 Channels IEEE 802.11b/g/n HT20: 11 Channels
Output Power	BLE: 3.69 dBm (0.0023 W) IEEE 802.11b: 19.17 dBm (0.0826 W) IEEE 802.11g: 27.70 dBm (0.5888 W) IEEE 802.11n HT20: 27.73 dBm (0.5929 W)
Modulation Type	BLE-1Mbps: GFSK IEEE 802.11b: DSSS IEEE 802.11g/n HT 20: OFDM
Related Submittal(s)/Grant(s)	**FCC Part 15.247 DSS with FCC ID: OHBRICO3399**
Received Date	Dec. 30, 2020
Date of Test	Jan. 27, 2021 - Mar. 25, 2021

Note: All measurement and test data in this report was gathered from production sample serial number: 201110001. Assigned by Bay Area Compliance Laboratories Corp. (Linkou Laboratory)

1.2 Operation Condition of EUT

Power Operation (Voltage Range)	☐ AC 120V/60Hz ☐ Adapter ☐ 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 AAEON Technology Inc. Appliance (Model(s): RICO-3399, RICO-3399-xxx-xxxx (x-Where x may be any combination of alphanumeric characters or "-" or blank.)) 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)	Jan. 27, 2021 – Mar. 16, 2021	23.4-25.5	54-55	Brian Chang
Radiated (966A)	Feb. 08, 2021 – Mar. 25, 2021	16.2-17.9	61-68	Leo Cheng
Conducted (TH-02)	Feb. 17, 2021 – Mar. 17, 2021	23.2	55-57	Brian Chang

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.

For BLE, there are totally 40 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**2402**	20	2442
1	2404	--	--
2	2406	--	--
3	2408	37	2476
--	--	38	2478
19	**2440**	**39**	**2480**

For BLE: Channel **0**, **19** and **39** were tested.

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**	-	-

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.

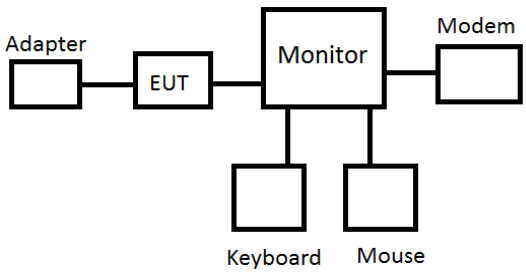
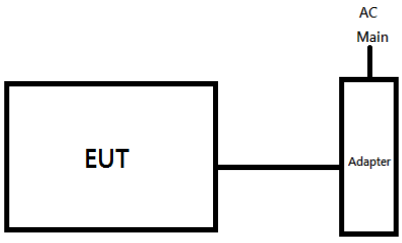
Modulation Used for Conformance Test			
Configuration	**N_{TX}**	**Data Rate**	**Worst Data Rate**
802.11b	1	1-11 Mbps	1 Mbps
802.11g	1	6-54 Mbps	6 Mbps
802.11n HT 20	1	MCS 0-7	MCS 0
BLE-1Mbps	1	125 kbps-1 Mbps	1 Mbps

Worst Case of Power Setting				
EUT Exercise Software		Ampak RFTestTool		
Configuration	N_{TX}	Low CH	Mid CH	High CH
802.11b	1	66	66	64
802.11g	1	56	78	57
802.11n HT 20	1	55	78	56
BLE-1Mbps	1	Default	Default	Default

2.2 Support Equipment List and External Cable List

No.	Description	Manufacturer	Model Number
A	Notebook	DELL	E6410
B	Monitor	DELL	U2412M
C	Keyboard	ASUS	AW211
D	Mouse	ASUS	MOBTU0A
E	Modem	iEager	TY5600

2.3 Block Diagram of Test Setup

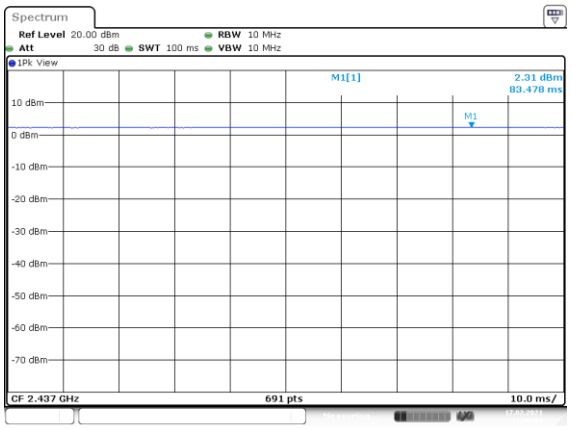
Conduction	Radiation
	

2.4 Duty Cycle

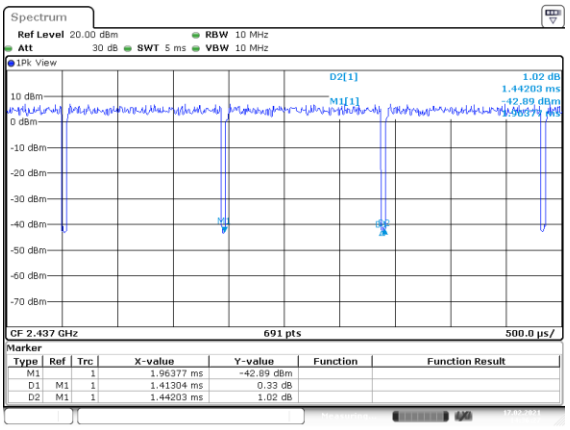
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum power transmission duration, T, are required for each tested mode of operation.

Configuration	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b	100.00	100.00	100.00	0.00
802.11g	1.41	1.44	97.99	0.09
802.11n HT20	1.33	1.36	97.86	0.09
BLE-1Mbps	0.41	0.63	65.29	1.85

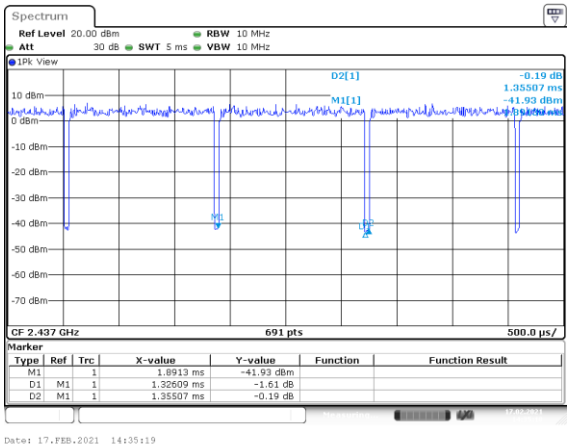
802.11b



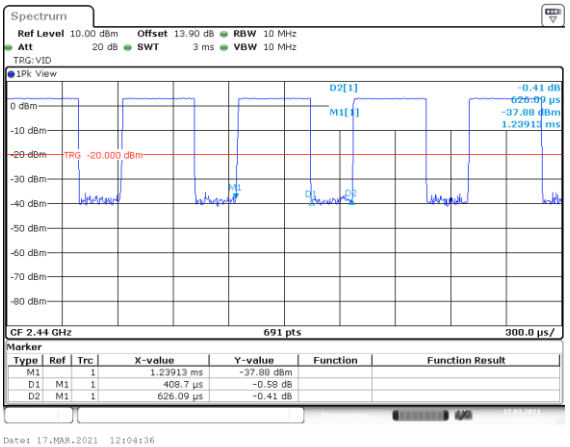
802.11g



802.11n HT20



BLE-1Mbps



*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	2.38	1.7298	28.00	630.9573	20	0.2172	1.0
BLE-1Mbps	2402-2480	2.38	1.7298	4.00	2.5119	20	0.0009	1.0
BR/EDR	2402-2480	2.38	1.7298	5.00	3.1623	20	0.0011	1.0

Note: Wi-Fi and BT can't simultaneously.

Result: MPE evaluation of 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-02-C2M2-U-M70	Dipole Antenna	2.38 dBi	Compliance

Note: The EUT has an external dedicated antennas arrangement and the connector type is RP-SMA Male, fulfill the requirement of this section.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

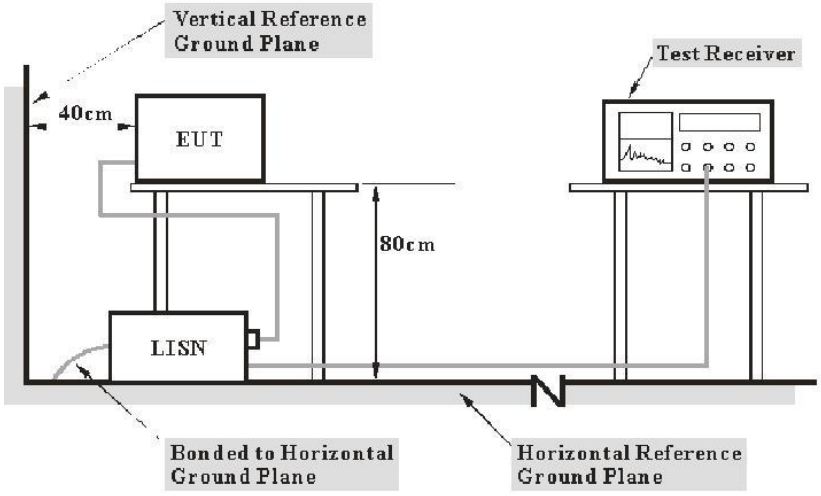
According to FCC §15.207,

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.

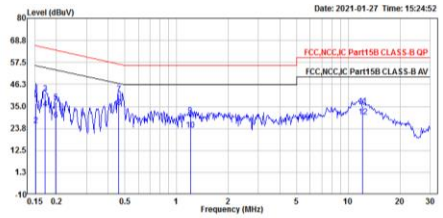
6.3 Test Equipment List and Details

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	2020/05/07	2021/05/06
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

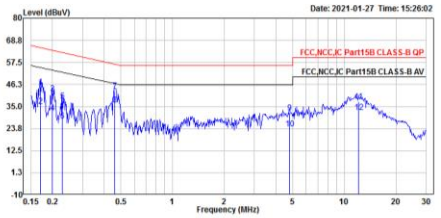
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units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

6.4 Test Result

Wi-Fi 2.4G Line	Wi-Fi 2.4G Neutral

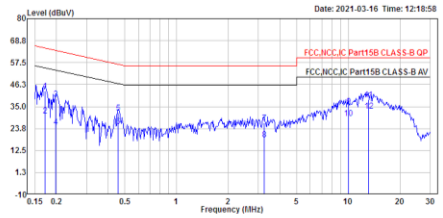


	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.151	16.69	36.55	19.86	65.93	-29.38	QP
2	0.151	5.63	25.49	19.86	55.93	-30.44	Average
3	0.172	21.70	41.56	19.86	64.88	-23.32	QP
4	0.172	14.06	33.92	19.86	54.88	-20.96	Average
5	0.198	17.31	37.18	19.87	63.68	-26.50	QP
6	0.198	8.04	27.91	19.87	53.68	-25.77	Average
7	0.461	21.56	41.44	19.88	56.67	-15.23	QP
8	0.461	14.44	34.32	19.88	46.67	-12.35	Average
9	1.200	10.51	30.43	19.92	56.00	-25.57	QP
10	1.200	3.14	23.06	19.92	46.00	-22.94	Average
11	12.096	14.86	35.09	20.23	60.00	-24.91	QP
12	12.096	9.49	29.72	20.23	50.00	-20.28	Average

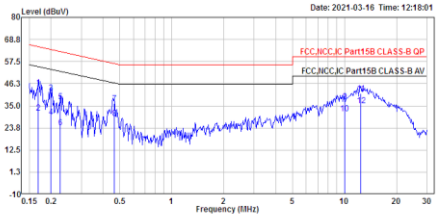


	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.170	25.25	45.12	19.87	64.94	-19.82	QP
2	0.170	15.16	35.03	19.87	54.94	-19.91	Average
3	0.200	21.90	41.78	19.88	63.62	-21.84	QP
4	0.200	11.77	31.65	19.88	53.62	-21.97	Average
5	0.229	18.01	37.89	19.88	62.49	-24.60	QP
6	0.229	7.73	27.61	19.88	52.49	-24.88	Average
7	0.461	23.22	43.11	19.89	56.67	-13.56	QP
8	0.461	15.99	35.88	19.89	46.67	-10.79	Average
9	4.800	11.51	31.61	20.10	56.00	-24.39	QP
10	4.800	3.43	23.53	20.10	46.00	-22.47	Average
11	12.096	17.25	37.54	20.29	60.00	-22.46	QP
12	12.096	11.72	32.01	20.29	50.00	-17.99	Average

BLE Line	BLE Neutral



	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.172	23.25	43.11	19.86	64.88	-21.77	QP
2	0.172	10.52	30.38	19.86	54.88	-24.50	Average
3	0.198	19.02	38.89	19.87	63.68	-24.79	QP
4	0.198	4.76	24.63	19.87	53.68	-29.05	Average
5	0.458	11.84	31.72	19.88	56.74	-25.02	QP
6	0.458	4.93	24.81	19.88	46.74	-21.93	Average
7	3.249	6.61	26.64	20.03	56.00	-29.36	QP
8	3.249	-1.70	18.33	20.03	46.00	-27.67	Average
9	9.991	14.95	35.16	20.21	60.00	-24.84	QP
10	9.991	8.85	29.06	20.21	50.00	-20.94	Average
11	13.100	18.22	38.47	20.25	60.00	-21.53	QP
12	13.100	12.56	32.81	20.25	50.00	-17.19	Average



	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.169	24.30	44.17	19.87	65.01	-20.84	QP
2	0.169	11.44	31.31	19.87	55.01	-23.70	Average
3	0.200	21.67	41.55	19.88	63.62	-22.07	QP
4	0.200	9.42	29.30	19.88	53.62	-24.32	Average
5	0.227	17.19	37.07	19.88	62.56	-25.49	QP
6	0.227	4.17	24.05	19.88	52.56	-28.51	Average
7	0.465	16.23	36.12	19.89	56.60	-20.48	QP
8	0.465	8.89	28.78	19.89	46.60	-17.82	Average
9	9.991	16.88	37.12	20.24	60.00	-22.88	QP
10	9.991	10.75	30.99	20.24	50.00	-19.01	Average
11	12.389	20.95	41.24	20.29	60.00	-18.76	QP
12	12.389	14.94	35.23	20.29	50.00	-14.77	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:

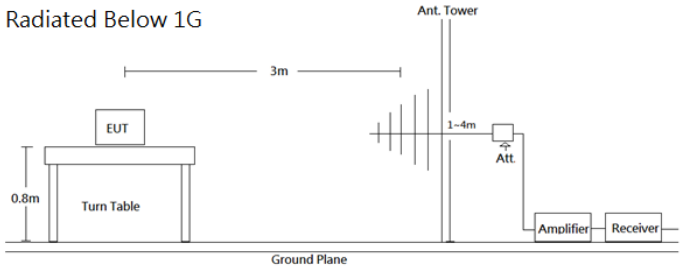
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** 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.

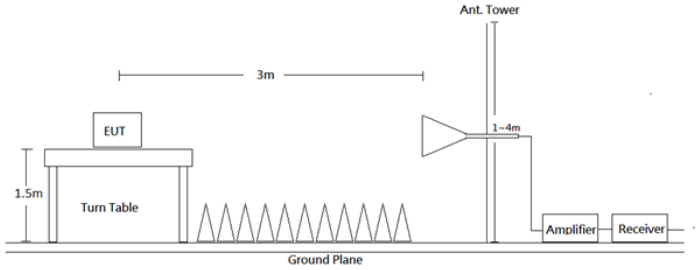
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the 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 method
30-1000 MHz	120 kHz	/	-	QP
Above 1 GHz	1 MHz	3 MHz	-	PK
	1 MHz	10 Hz	>98%	PK
	1 MHz	1/T	<98%	PK

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

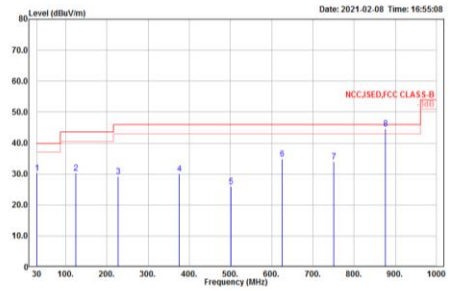
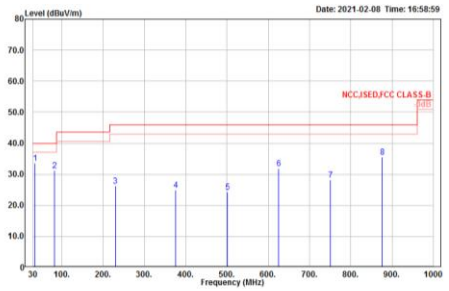
7.3 Test Equipment List and Details

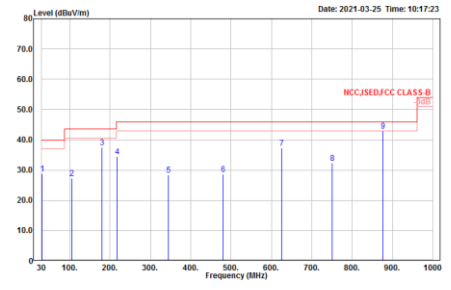
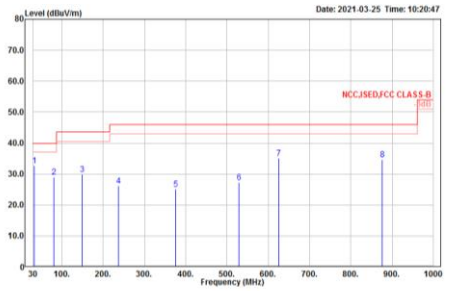
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Radiation 3M Room (966B)					
Active Loop	EMCO	6502	0001-3322	2020/03/16	2021/03/15
Active Loop	EMCO	6502	0001-3322	2021/03/16	2022/03/15
Bilog Antenna/6 dB Attenuator	SUNOL SCIENCES & EMEC /EMCI	JB3/N-6-06	A111513/AT-N0668	2020/03/19	2021/03/18
Bilog Antenna/6 dB Attenuator	SUNOL SCIENCES & EMEC /EMCI	JB3/N-6-06	A111513/AT-N0668	2021/03/30	2022/03/29
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Horn Antenna	ETS-Lindgren	3115	00109141	2020/07/15	2021/07/14
Horn Antenna	ETS-Lindgren	3160-09	00123852	2020/07/07	2021/07/06
Preamplifier	A.H. Systems	PAM-1840VH	174	2020/03/25	2021/03/24
Preamplifier	A.H. Systems	PAM-1840VH	174	2021/03/22	2022/03/21
Preamplifier	A.H. Systems	PAM-0118	478	2020/05/05	2021/05/04
Microflex Cable (1m)	EMCI	EMC102-KM-KM-1000	180524	2020/08/06	2021/08/05
Microflex Cable (2m)	EMCI	EMC106-SM-SM-2000	180516	2020/08/06	2021/08/05
Microflex Cable (8m)	UTIFLEX	UFA210A-1-3149-300300	MFR 64639 232490-002	2020/08/06	2021/08/05
Turn Table	Chaintek	T-200-S-1	003501	N.C.R	N.C.R
Antenna Tower	Chaintek	MBD-400-1	003504	N.C.R	N.C.R
Controller	Chaintek	3000-1	003507	N.C.R	N.C.R
Software	Audix	e3 v9	E3LK-01	N.C.R	N.C.R
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
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)

Wi-Fi 2.4G Horizontal	Wi-Fi 2.4G Vertical
	
Freq Level Limit Line Over Limit Read Level Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m 1 30.000 30.37 40.00 -9.63 39.02 -8.65 Peak 2 125.060 30.33 43.50 -13.17 49.43 -19.10 Peak 3 227.880 29.36 46.00 -16.64 51.34 -21.98 Peak 4 375.320 30.22 46.00 -15.78 48.60 -18.38 Peak 5 500.450 26.02 46.00 -19.98 41.57 -15.55 Peak 6 625.580 35.00 46.00 -11.00 48.45 -13.45 Peak 7 750.710 34.10 46.00 -11.90 45.80 -11.70 Peak 8 ! 875.840 44.72 46.00 -1.28 54.87 -10.15 QP	Freq Level Limit Line Over Limit Read Level Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m 1 34.850 33.52 40.00 -6.48 46.02 -12.50 Peak 2 82.380 31.16 40.00 -8.84 56.01 -24.85 Peak 3 229.820 26.33 46.00 -19.67 48.25 -21.92 Peak 4 375.320 24.99 46.00 -21.01 43.37 -18.38 Peak 5 500.450 24.21 46.00 -21.79 39.76 -15.55 Peak 6 625.580 31.95 46.00 -14.05 45.40 -13.45 Peak 7 750.710 28.22 46.00 -17.78 39.92 -11.70 Peak 8 875.840 35.53 46.00 -10.47 45.68 -10.15 Peak

BLE-1Mbps Horizontal	BLE-1MBps Vertical
	
Freq Level Limit Line Over Limit Read Level Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m 1 31.940 28.77 40.00 -11.23 36.87 -8.10 Peak 2 104.690 27.35 43.50 -16.15 46.37 -19.02 Peak 3 180.350 37.51 43.50 -5.99 57.23 -19.72 Peak 4 218.180 34.57 46.00 -11.43 54.52 -19.95 Peak 5 345.250 28.34 46.00 -17.66 45.18 -16.84 Peak 6 480.080 28.55 46.00 -17.45 41.85 -13.30 Peak 7 625.580 37.19 46.00 -8.81 48.02 -10.83 Peak 8 750.710 32.27 46.00 -13.73 41.37 -9.10 Peak 9 875.840 42.84 46.00 -3.16 50.52 -7.68 Peak	Freq Level Limit Line Over Limit Read Level Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m 1 32.910 32.80 40.00 -7.20 41.80 -9.00 Peak 2 81.410 29.10 40.00 -10.90 51.79 -22.69 Peak 3 149.310 30.01 43.50 -13.49 48.17 -18.16 Peak 4 237.580 26.17 46.00 -19.83 45.44 -19.27 Peak 5 375.320 25.13 46.00 -20.87 41.06 -15.93 Peak 6 529.550 27.35 46.00 -18.65 39.95 -12.60 Peak 7 625.580 35.06 46.00 -10.94 45.89 -10.83 Peak 8 875.840 34.79 46.00 -11.21 42.47 -7.68 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.

Above 1G (1 GHz-26.5 GHz)

802.11b Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.296	41.69	54.00	-12.31	49.45	-7.76	Average
2389.296	52.68	74.00	-21.32	60.44	-7.76	Peak
2411.248	94.59			102.30	-7.71	Average
2411.248	97.27			104.98	-7.71	Peak
4824.000	30.80	54.00	-23.20	32.45	-1.65	Average
4824.000	41.98	74.00	-32.02	43.63	-1.65	Peak
7236.000	44.77	54.00	-9.23	39.20	5.57	Average
7236.000	52.38	74.00	-21.62	46.81	5.57	Peak

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	52.09	54.00	-1.91	59.85	-7.76	Average
2389.856	59.29	74.00	-14.71	67.05	-7.76	Peak
2411.248	104.27			111.98	-7.71	Average
2411.248	106.93			114.64	-7.71	Peak
4824.000	35.88	54.00	-18.12	37.53	-1.65	Average
4824.000	44.26	74.00	-29.74	45.91	-1.65	Peak
7236.000	53.22	54.00	-0.78	47.65	5.57	Average
7236.000	56.82	74.00	-17.18	51.25	5.57	Peak

802.11b Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2363.482	37.37	54.00	-16.63	45.21	-7.84	Average
2363.482	51.14	74.00	-22.86	58.98	-7.84	Peak
2436.324	93.27			100.92	-7.65	Average
2436.324	95.98			103.63	-7.65	Peak
2543.530	37.70	54.00	-16.30	45.11	-7.41	Average
2543.530	51.99	74.00	-22.01	59.40	-7.41	Peak
4874.000	30.76	54.00	-23.24	32.31	-1.55	Average
4874.000	43.00	74.00	-31.00	44.55	-1.55	Peak
7311.000	47.25	54.00	-6.75	41.93	5.32	Average
7311.000	53.30	74.00	-20.70	47.98	5.32	Peak

802.11b Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2387.198	39.43	54.00	-14.57	47.20	-7.77	Average
2387.198	52.76	74.00	-21.24	60.53	-7.77	Peak
2436.324	105.10			112.75	-7.65	Average
2436.324	107.79			115.44	-7.65	Peak
2514.006	39.43	54.00	-14.57	46.96	-7.53	Average
2514.006	53.04	74.00	-20.96	60.57	-7.53	Peak
4874.000	36.71	54.00	-17.29	38.26	-1.55	Average
4874.000	45.06	74.00	-28.94	46.61	-1.55	Peak
7311.000	53.08	54.00	-0.92	47.76	5.32	Average
7311.000	56.84	74.00	-17.16	51.52	5.32	Peak

802.11b High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2462.900	92.25			99.87	-7.62	Average
2462.900	94.83			102.45	-7.62	Peak
2483.300	41.40	54.00	-12.60	48.99	-7.59	Average
2483.300	52.72	74.00	-21.28	60.31	-7.59	Peak
4924.000	32.12	54.00	-21.88	33.55	-1.43	Average
4924.000	42.98	74.00	-31.02	44.41	-1.43	Peak
7386.000	46.44	54.00	-7.56	41.00	5.44	Average
7386.000	53.25	74.00	-20.75	47.81	5.44	Peak

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	102.92			110.54	-7.62	Average
2461.100	105.65			113.27	-7.62	Peak
2483.600	53.61	54.00	-0.39	61.20	-7.59	Average
2483.600	60.49	74.00	-13.51	68.08	-7.59	Peak
4924.000	39.54	54.00	-14.46	40.97	-1.43	Average
4924.000	45.77	74.00	-28.23	47.20	-1.43	Peak
7386.000	52.45	54.00	-1.55	47.01	5.44	Average
7386.000	57.42	74.00	-16.58	51.98	5.44	Peak

802.11g Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.856	43.64	54.00	-10.36	51.40	-7.76	Average
2389.856	60.60	74.00	-13.40	68.36	-7.76	Peak
2412.592	87.90			95.61	-7.71	Average
2412.592	97.98			105.69	-7.71	Peak
4824.000	29.02	54.00	-24.98	30.67	-1.65	Average
4824.000	43.06	74.00	-30.94	44.71	-1.65	Peak
7236.000	38.08	54.00	-15.92	32.51	5.57	Average
7236.000	52.79	74.00	-21.21	47.22	5.57	Peak

802.11g Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.968	52.86	54.00	-1.14	60.62	-7.76	Average
2389.968	72.14	74.00	-1.86	79.90	-7.76	Peak
2412.592	96.84			104.55	-7.71	Average
2412.592	106.96			114.67	-7.71	Peak
4824.000	29.30	54.00	-24.70	30.95	-1.65	Average
4824.000	42.83	74.00	-31.17	44.48	-1.65	Peak
7236.000	41.97	54.00	-12.03	36.40	5.57	Average
7236.000	57.10	74.00	-16.90	51.53	5.57	Peak

802.11g Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.134	43.76	54.00	-10.24	51.52	-7.76	Average
2389.134	61.64	74.00	-12.36	69.40	-7.76	Peak
2435.356	92.05			99.70	-7.65	Average
2435.356	102.09			109.74	-7.65	Peak
2486.902	39.81	54.00	-14.19	47.40	-7.59	Average
2486.902	56.23	74.00	-17.77	63.82	-7.59	Peak
4874.000	30.17	54.00	-23.83	31.72	-1.55	Average
4874.000	43.09	74.00	-30.91	44.64	-1.55	Peak
7311.000	45.48	54.00	-8.52	40.16	5.32	Average
7311.000	58.31	74.00	-15.69	52.99	5.32	Peak

802.11g Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.376	52.99	54.00	-1.01	60.75	-7.76	Average
2389.376	71.93	74.00	-2.07	79.69	-7.76	Peak
2435.356	103.40			111.05	-7.65	Average
2435.356	113.42			121.07	-7.65	Peak
2487.144	48.27	54.00	-5.73	55.86	-7.59	Average
2487.144	69.66	74.00	-4.34	77.25	-7.59	Peak
4874.000	31.41	54.00	-22.59	32.96	-1.55	Average
4874.000	43.76	74.00	-30.24	45.31	-1.55	Peak
7311.000	49.97	54.00	-4.03	44.65	5.32	Average
7311.000	63.30	74.00	-10.70	57.98	5.32	Peak

802.11g High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2462.600	86.70			94.32	-7.62	Average
2462.600	96.77			104.39	-7.62	Peak
2483.500	42.60	54.00	-11.40	50.19	-7.59	Average
2483.500	62.43	74.00	-11.57	70.02	-7.59	Peak
4924.000	30.05	54.00	-23.95	31.48	-1.43	Average
4924.000	44.14	74.00	-29.86	45.57	-1.43	Peak
7386.000	38.09	54.00	-15.91	32.65	5.44	Average
7386.000	52.09	74.00	-21.91	46.65	5.44	Peak

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	97.60			105.22	-7.62	Average
2462.600	107.82			115.44	-7.62	Peak
2483.500	53.11	54.00	-0.89	60.70	-7.59	Average
2483.500	72.85	74.00	-1.15	80.44	-7.59	Peak
4924.000	29.96	54.00	-24.04	31.39	-1.43	Average
4924.000	43.74	74.00	-30.26	45.17	-1.43	Peak
7386.000	42.85	54.00	-11.15	37.41	5.44	Average
7386.000	56.05	74.00	-17.95	50.61	5.44	Peak

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	
2389.968	43.22	54.00	-10.78	50.98	-7.76	Average
2389.968	63.80	74.00	-10.20	71.56	-7.76	Peak
2410.240	87.65			95.36	-7.71	Average
2410.240	98.34			106.05	-7.71	Peak
4824.000	29.32	54.00	-24.68	30.97	-1.65	Average
4824.000	43.40	74.00	-30.60	45.05	-1.65	Peak
7236.000	38.08	54.00	-15.92	32.51	5.57	Average
7236.000	52.36	74.00	-21.64	46.79	5.57	Peak

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	
2389.632	53.35	54.00	-0.65	61.11	-7.76	Average
2389.632	73.25	74.00	-0.75	81.01	-7.76	Peak
2411.024	97.51			105.22	-7.71	Average
2411.024	108.17			115.88	-7.71	Peak
4824.000	29.95	54.00	-24.05	31.60	-1.65	Average
4824.000	42.87	74.00	-31.13	44.52	-1.65	Peak
7236.000	41.03	54.00	-12.97	35.46	5.57	Average
7236.000	56.20	74.00	-17.80	50.63	5.57	Peak

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	
2389.618	45.00	54.00	-9.00	52.76	-7.76	Average
2389.618	62.70	74.00	-11.30	70.46	-7.76	Peak
2434.872	92.21			99.87	-7.66	Average
2434.872	102.56			110.22	-7.66	Peak
2483.998	40.15	54.00	-13.85	47.74	-7.59	Average
2483.998	57.33	74.00	-16.67	64.92	-7.59	Peak
4874.000	30.00	54.00	-24.00	31.55	-1.55	Average
4874.000	43.31	74.00	-30.69	44.86	-1.55	Peak
7311.000	45.28	54.00	-8.72	39.96	5.32	Average
7311.000	59.26	74.00	-14.74	53.94	5.32	Peak

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	
2384.778	51.76	54.00	-2.24	59.53	-7.77	Average
2384.778	73.19	74.00	-0.81	80.96	-7.77	Peak
2436.082	102.94			110.59	-7.65	Average
2436.082	113.00			120.65	-7.65	Peak
2485.450	49.17	54.00	-4.83	56.76	-7.59	Average
2485.450	71.85	74.00	-2.15	79.44	-7.59	Peak
4874.000	31.31	54.00	-22.69	32.86	-1.55	Average
4874.000	43.90	74.00	-30.10	45.45	-1.55	Peak
7311.000	49.76	54.00	-4.24	44.44	5.32	Average
7311.000	63.02	74.00	-10.98	57.70	5.32	Peak

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	
2459.700	86.58			94.20	-7.62	Average
2459.700	96.97			104.59	-7.62	Peak
2483.700	41.25	54.00	-12.75	48.84	-7.59	Average
2483.700	61.88	74.00	-12.12	69.47	-7.59	Peak
4924.000	29.94	54.00	-24.06	31.37	-1.43	Average
4924.000	42.31	74.00	-31.69	43.74	-1.43	Peak
7386.000	37.31	54.00	-16.69	31.87	5.44	Average
7386.000	50.99	74.00	-23.01	45.55	5.44	Peak

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	
2459.700	97.13			104.75	-7.62	Average
2459.700	107.78			115.40	-7.62	Peak
2483.600	52.35	54.00	-1.65	59.94	-7.59	Average
2483.600	73.76	74.00	-0.24	81.35	-7.59	Peak
4924.000	30.12	54.00	-23.88	31.55	-1.43	Average
4924.000	43.62	74.00	-30.38	45.05	-1.43	Peak
7386.000	41.97	54.00	-12.03	36.53	5.44	Average
7386.000	57.09	74.00	-16.91	51.65	5.44	Peak

BLE-1Mbps Low CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2320.300	40.12	54.00	-13.88	45.68	-5.56	Average
2320.300	53.30	74.00	-20.70	58.86	-5.56	Peak
2401.800	89.17			94.60	-5.43	Average
2401.800	90.21			95.64	-5.43	Peak
4804.000	32.29	54.00	-21.71	30.75	1.54	Average
4804.000	45.19	74.00	-28.81	43.65	1.54	Peak
7206.000	36.68	54.00	-17.32	28.73	7.95	Average
7206.000	49.31	74.00	-24.69	41.36	7.95	Peak

BLE-1Mbps Low CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2335.200	39.69	54.00	-14.31	45.25	-5.56	Average
2335.200	52.99	74.00	-21.01	58.55	-5.56	Peak
2402.300	101.49			106.92	-5.43	Average
2402.300	102.51			107.94	-5.43	Peak
4804.000	33.39	54.00	-20.61	31.85	1.54	Average
4804.000	46.91	74.00	-27.09	45.37	1.54	Peak
7206.000	40.72	54.00	-13.28	32.77	7.95	Average
7206.000	51.70	74.00	-22.30	43.75	7.95	Peak

BLE-1Mbps Middle CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2329.118	40.00	54.00	-14.00	45.56	-5.56	Average
2329.118	52.41	74.00	-21.59	57.97	-5.56	Peak
2439.954	88.58			93.96	-5.38	Average
2439.954	89.68			95.06	-5.38	Peak
2545.224	40.44	54.00	-13.56	45.64	-5.20	Average
2545.224	53.56	74.00	-20.44	58.76	-5.20	Peak
4880.000	33.10	54.00	-20.90	31.46	1.64	Average
4880.000	45.60	74.00	-28.40	43.96	1.64	Peak
7320.000	36.19	54.00	-17.81	28.82	7.37	Average
7320.000	48.64	74.00	-25.36	41.27	7.37	Peak

BLE-1Mbps Middle CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2373.888	39.78	54.00	-14.22	45.27	-5.49	Average
2373.888	52.44	74.00	-21.56	57.93	-5.49	Peak
2439.954	100.24			105.62	-5.38	Average
2439.954	101.29			106.67	-5.38	Peak
2529.736	41.00	54.00	-13.00	46.25	-5.25	Average
2529.736	53.75	74.00	-20.25	59.00	-5.25	Peak
4880.000	34.60	54.00	-19.40	32.96	1.64	Average
4880.000	46.04	74.00	-27.96	44.40	1.64	Peak
7320.000	37.69	54.00	-16.31	30.32	7.37	Average
7320.000	50.58	74.00	-23.42	43.21	7.37	Peak

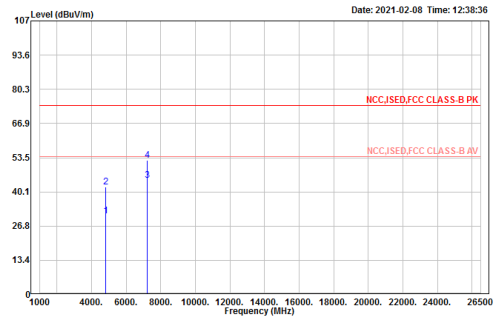
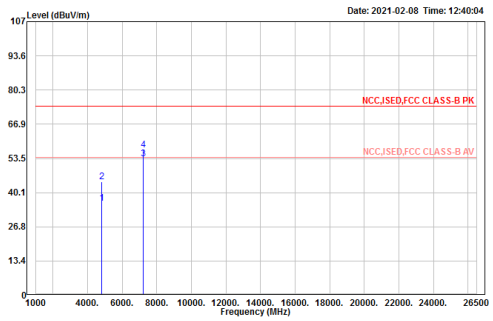
BLE-1Mbps High CH Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2479.676	86.58			91.95	-5.37	Average
2479.676	87.63			93.00	-5.37	Peak
2516.412	40.91	54.00	-13.09	46.21	-5.30	Average
2516.412	53.50	74.00	-20.50	58.80	-5.30	Peak
4960.000	34.62	54.00	-19.38	32.85	1.77	Average
4960.000	45.77	74.00	-28.23	44.00	1.77	Peak
7440.000	36.71	54.00	-17.29	29.05	7.66	Average
7440.000	49.23	74.00	-24.77	41.57	7.66	Peak

BLE-1Mbps High CH Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2480.250	100.04			105.41	-5.37	Average
2480.250	101.05			106.42	-5.37	Peak
2547.162	41.69	54.00	-12.31	46.88	-5.19	Average
2547.162	54.19	74.00	-19.81	59.38	-5.19	Peak
4960.000	36.77	54.00	-17.23	35.00	1.77	Average
4960.000	47.27	74.00	-26.73	45.50	1.77	Peak
7440.000	37.51	54.00	-16.49	29.85	7.66	Average
7440.000	50.36	74.00	-23.64	42.70	7.66	Peak

Above 1G (1 GHz-26.5 GHz): The worst mode is 802.11b Low CH.

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	4824.000	30.80	54.00	-23.20	32.45	-1.65	Average
2	4824.000	41.98	74.00	-32.02	43.63	-1.65	Peak
3 !	7236.000	44.77	54.00	-9.23	39.20	5.57	Average
4	7236.000	52.38	74.00	-21.62	46.81	5.57	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 !	4824.000	35.88	54.00	-18.12	37.53	-1.65	Average
2	4824.000	44.26	74.00	-29.74	45.91	-1.65	Peak
3 !	7236.000	53.22	54.00	-0.78	47.65	5.57	Average
4 !	7236.000	56.82	74.00	-17.18	51.25	5.57	Peak

Note:

Result = Reading + Correct Factor.

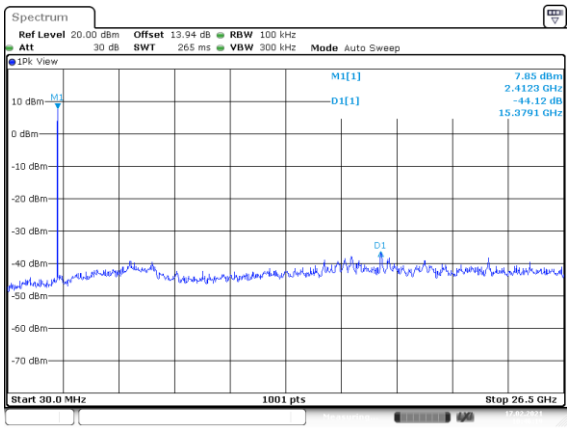
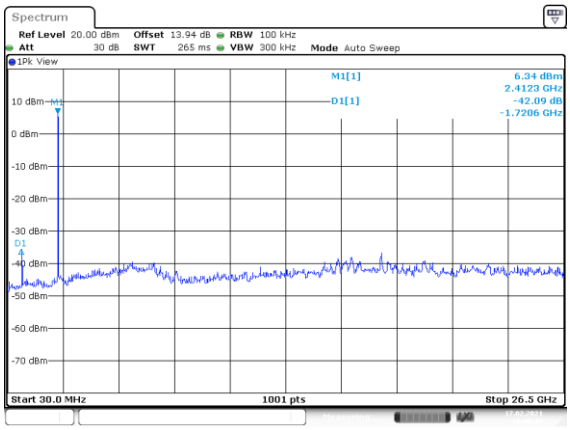
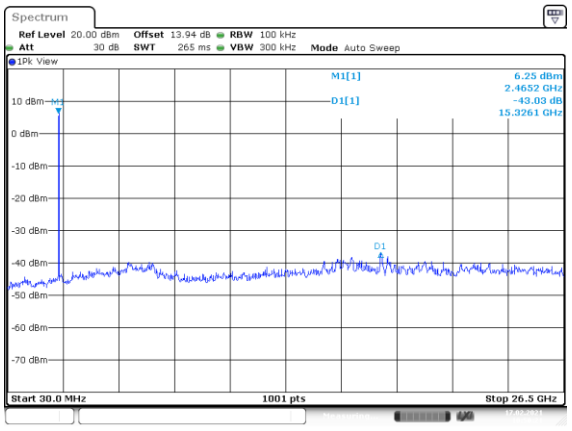
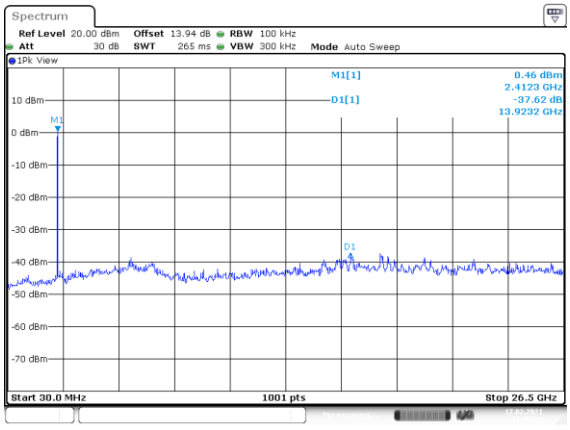
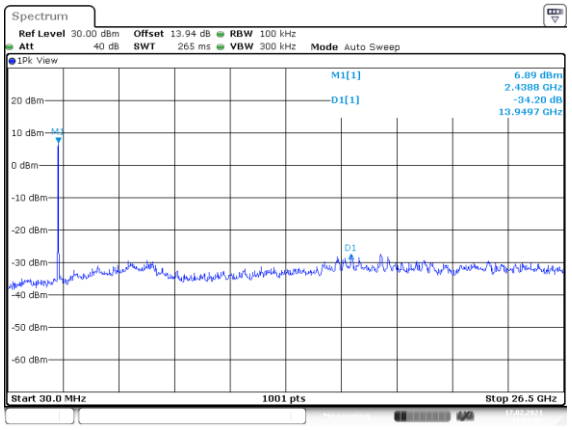
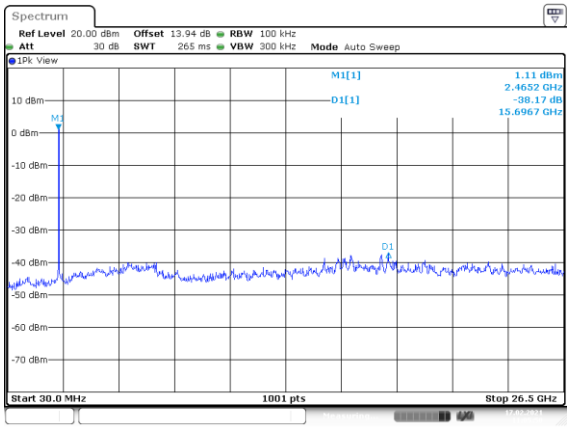
Margin = Result – Limit.

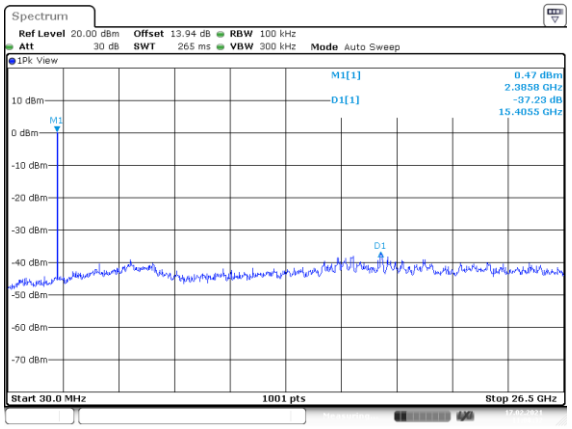
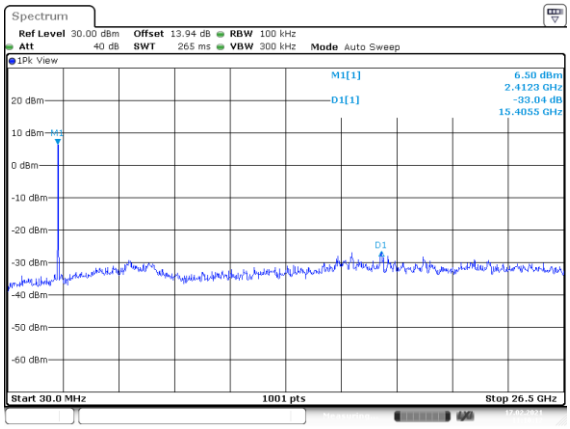
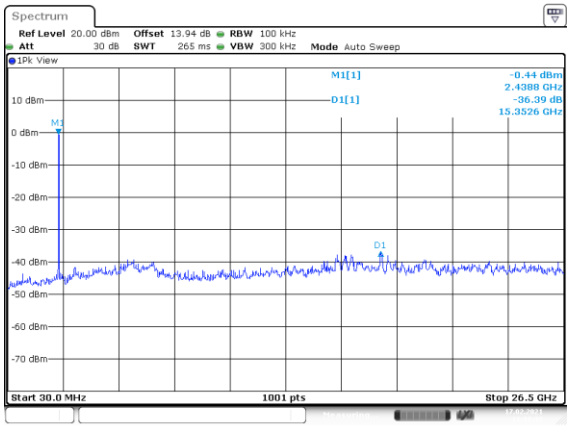
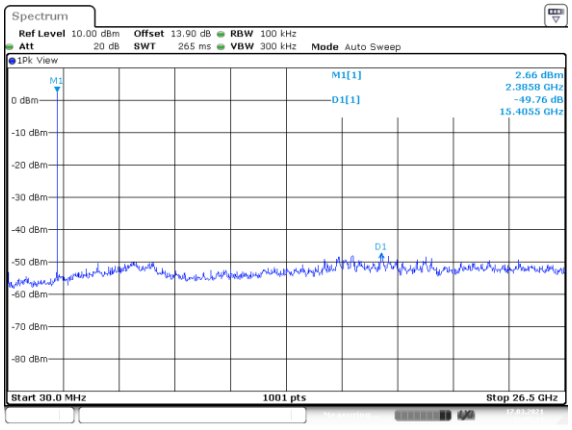
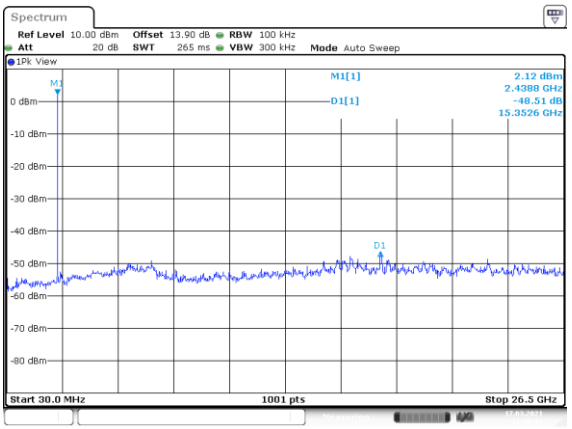
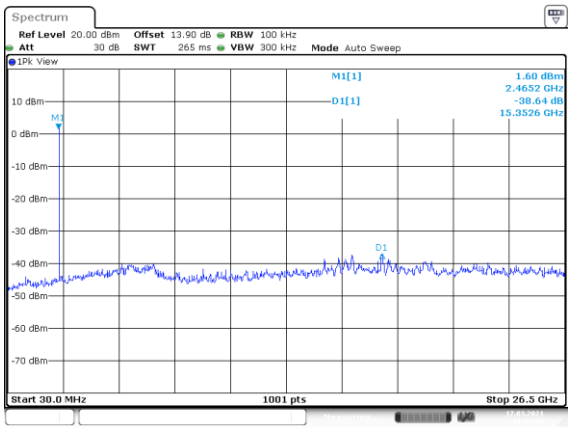
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

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

Conducted Spurious Emissions:

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
IEEE 802.11b	Low	2412	44.12	≥ 20	Compliance
	Middle	2437	42.09	≥ 20	Compliance
	High	2462	43.03	≥ 20	Compliance
IEEE 802.11g	Low	2412	37.62	≥ 20	Compliance
	Middle	2437	34.20	≥ 20	Compliance
	High	2462	38.17	≥ 20	Compliance
IEEE 802.11n HT20	Low	2412	37.23	≥ 20	Compliance
	Middle	2437	33.04	≥ 20	Compliance
	High	2462	36.39	≥ 20	Compliance
BLE-1Mbps	Low	2402	49.76	≥ 20	Compliance
	Middle	2440	48.51	≥ 20	Compliance
	High	2480	38.64	≥ 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	**BLE-1Mbps Low CH**
	
BLE-1Mbps Middle CH	**BLE-1Mbps 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.

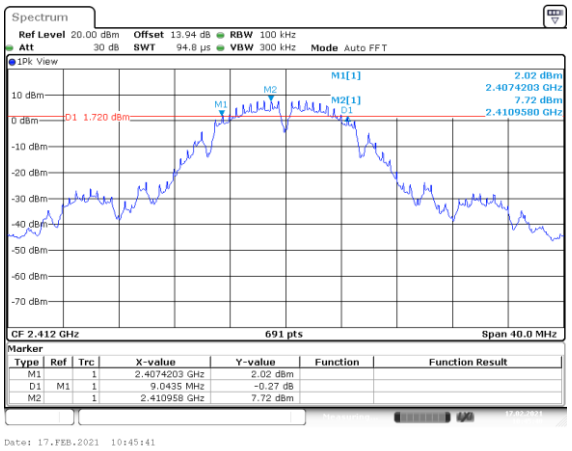
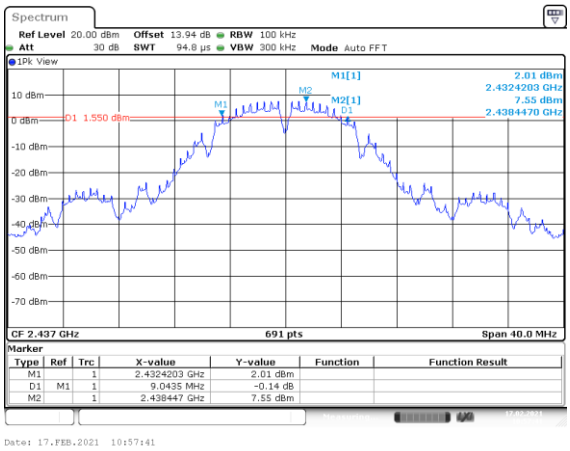
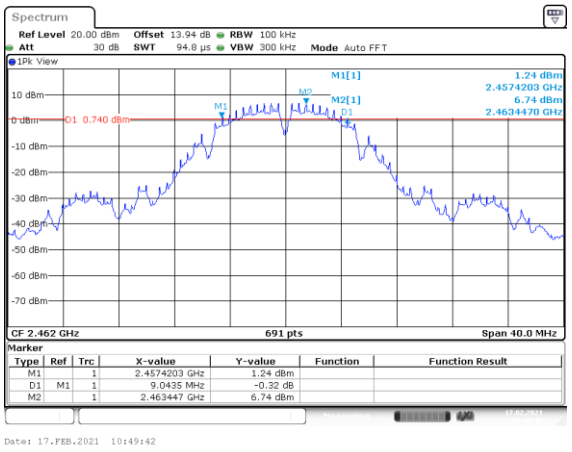
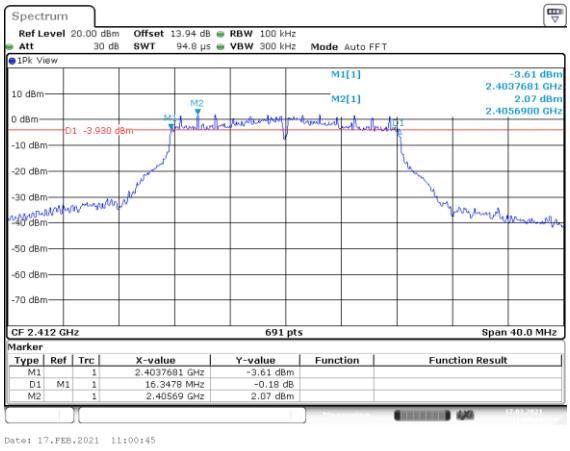
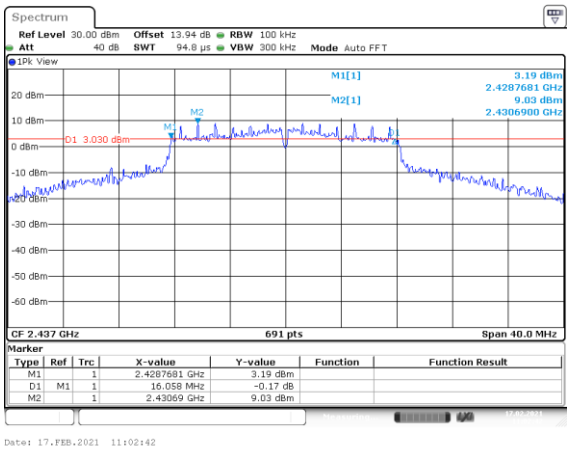
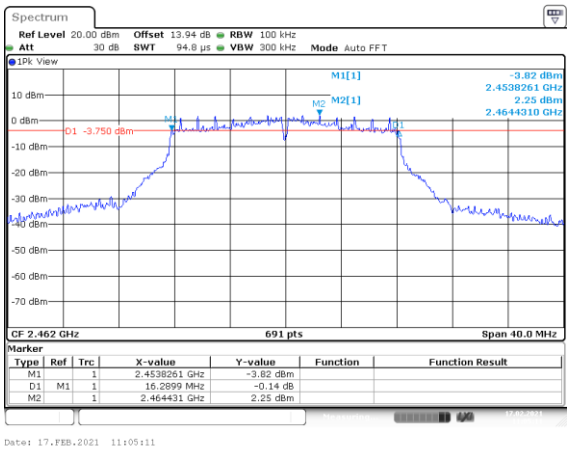
8.3 Test Equipment List and Details

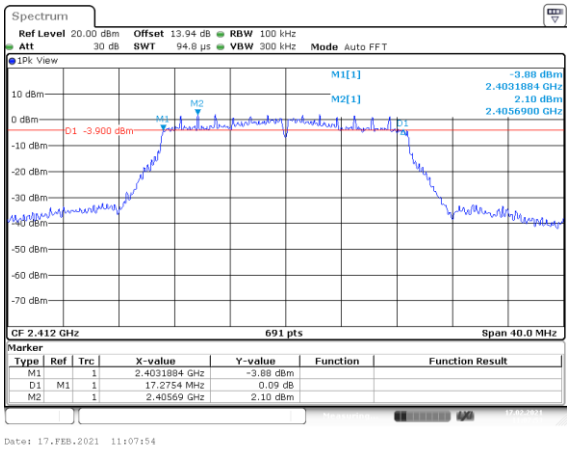
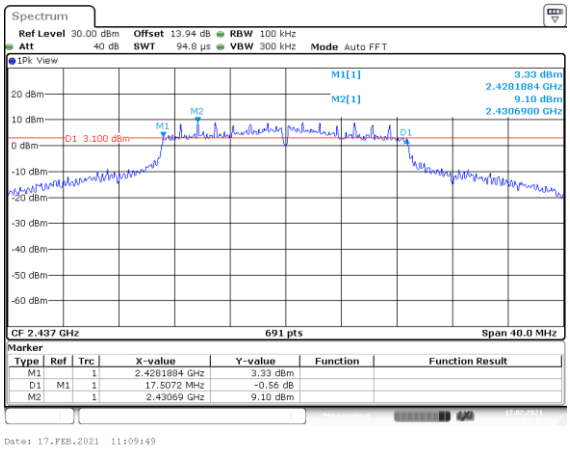
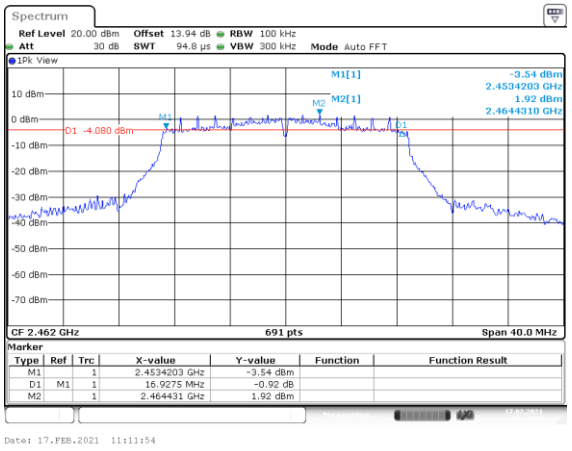
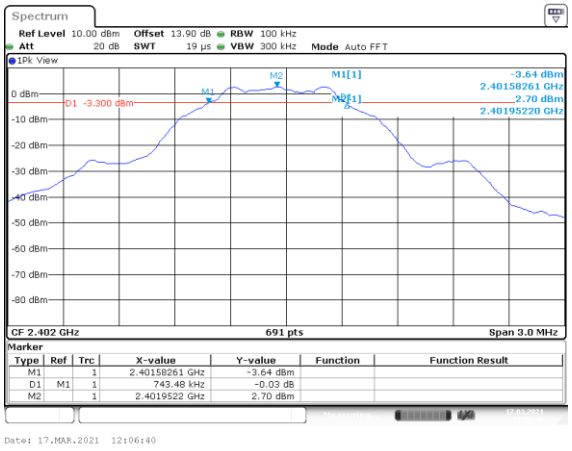
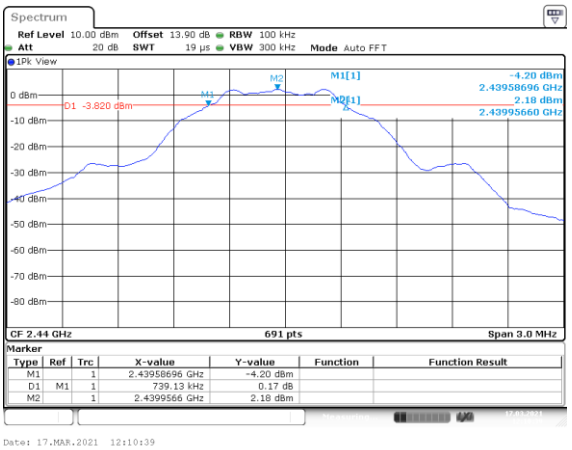
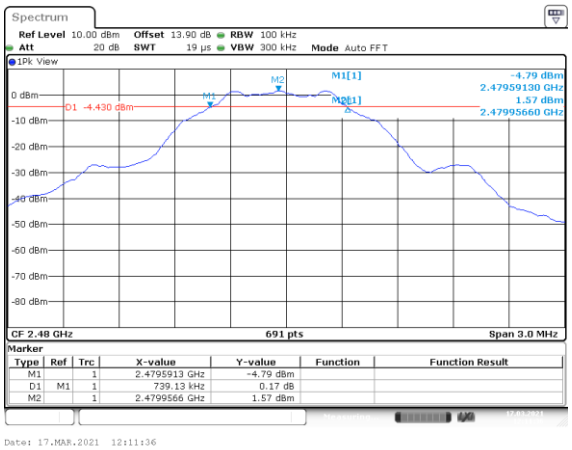
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***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	9.04	> 0.5	Compliance
	Middle	2437	9.04	> 0.5	Compliance
	High	2462	9.04	> 0.5	Compliance
IEEE 802.11g	Low	2412	16.35	> 0.5	Compliance
	Middle	2437	16.06	> 0.5	Compliance
	High	2462	16.29	> 0.5	Compliance
IEEE 802.11n HT20	Low	2412	17.28	> 0.5	Compliance
	Middle	2437	17.51	> 0.5	Compliance
	High	2462	16.93	> 0.5	Compliance
BLE-1Mbps	Low	2402	0.74	> 0.5	Compliance
	Middle	2440	0.74	> 0.5	Compliance
	High	2480	0.74	> 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	**BLE-1Mbps Low CH**
	
BLE-1Mbps Middle CH	**BLE-1Mbps 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)					
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		Limit (dBm)	Result
			(dBm)	(W)		
IEEE 802.11b	Low	2412	19.17	0.0826	30	Compliance
	Middle	2437	19.08	0.0809	30	Compliance
	High	2462	18.27	0.0671	30	Compliance
IEEE 802.11g	Low	2412	22.34	0.1714	30	Compliance
	Middle	2437	27.70	0.5888	30	Compliance
	High	2462	21.74	0.1493	30	Compliance
IEEE 802.11n HT20	Low	2412	21.88	0.1542	30	Compliance
	Middle	2437	27.73	0.5929	30	Compliance
	High	2462	20.93	0.1239	30	Compliance
BLE-1Mbps	Low	2402	3.69	0.0023	30	Compliance
	Middle	2440	3.33	0.0022	30	Compliance
	High	2480	2.70	0.0019	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.

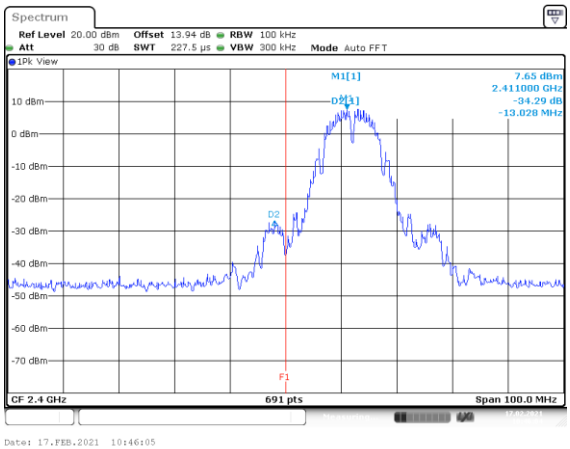
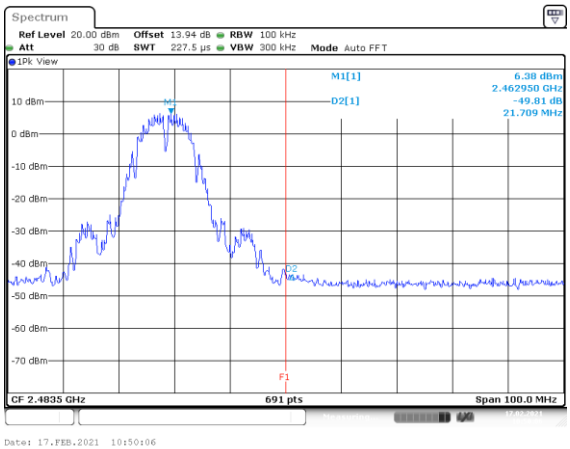
10.3 Test Equipment List and Details

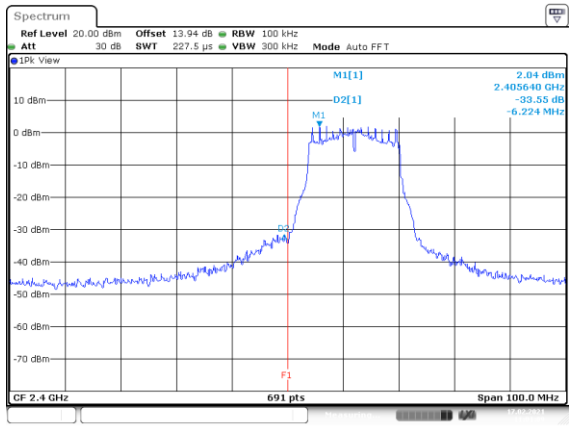
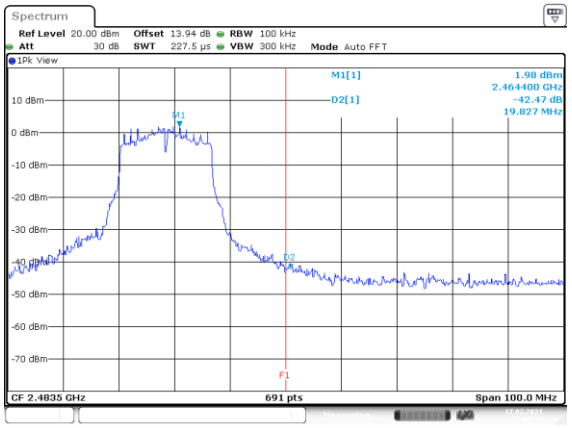
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***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	34.29	≥ 20	Compliance
	High	2462	49.81	≥ 20	Compliance
IEEE 802.11g	Low	2412	33.55	≥ 20	Compliance
	High	2462	42.47	≥ 20	Compliance
IEEE 802.11n HT20	Low	2412	34.97	≥ 20	Compliance
	High	2462	41.26	≥ 20	Compliance
BLE-1Mbps	Low	2402	56.21	≥ 20	Compliance
	High	2480	45.69	≥ 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)
	
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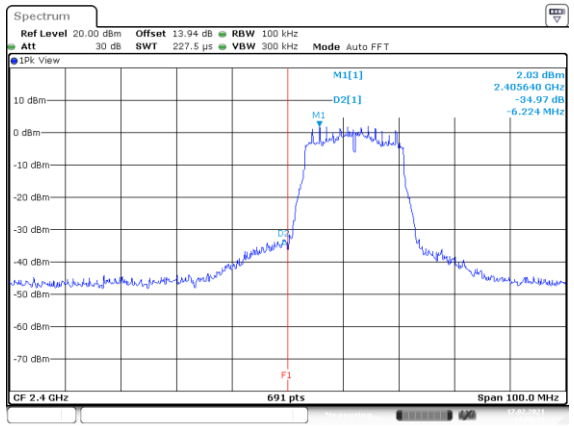
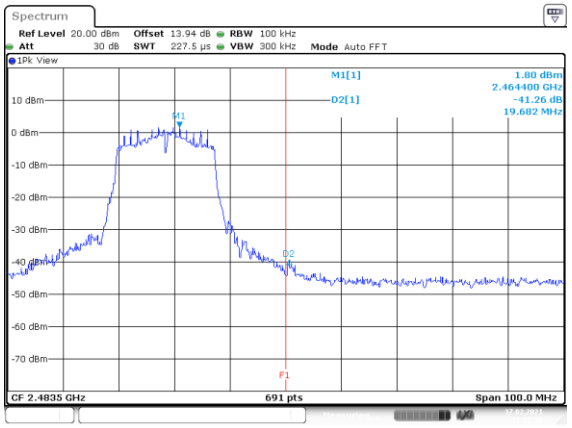
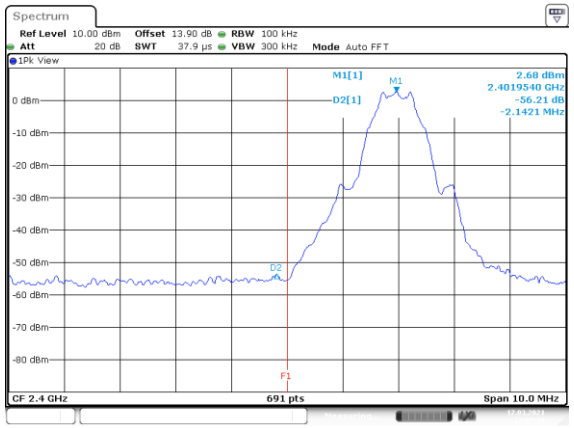
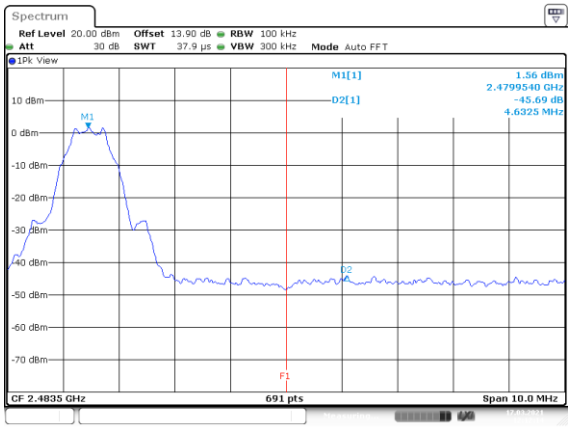
	
BLE-1Mbps Low CH (Left Side)	**BLE-1Mbps High CH (Right Side)**
	

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,

(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.

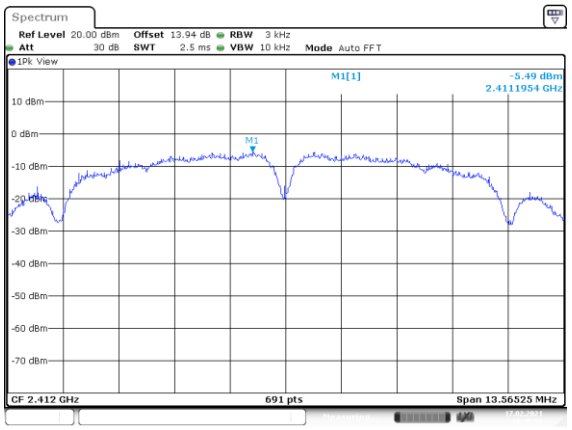
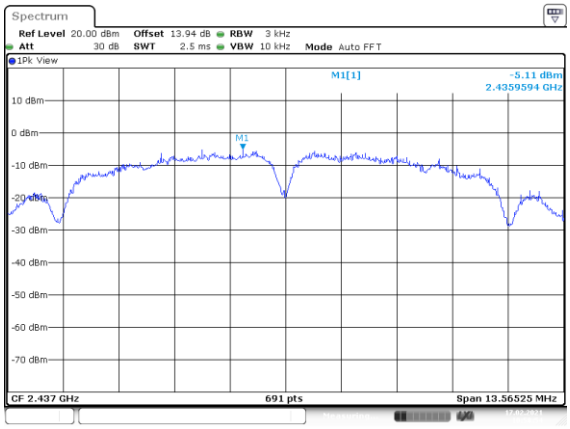
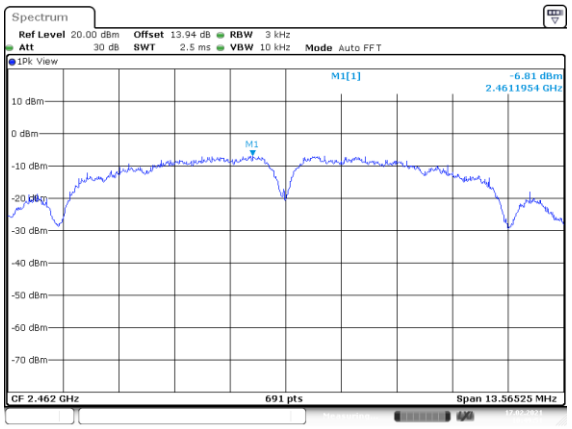
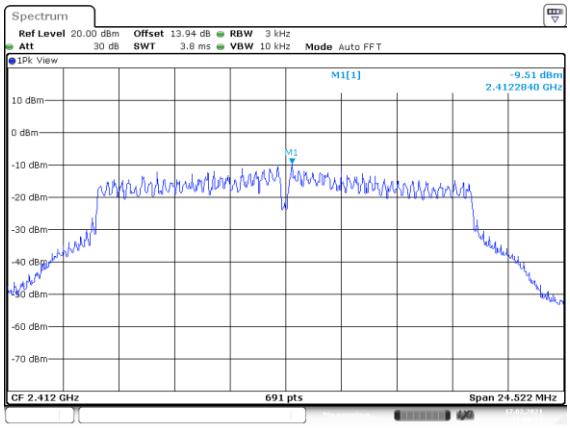
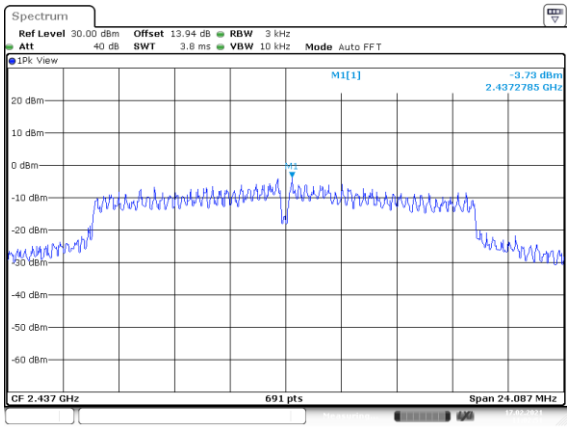
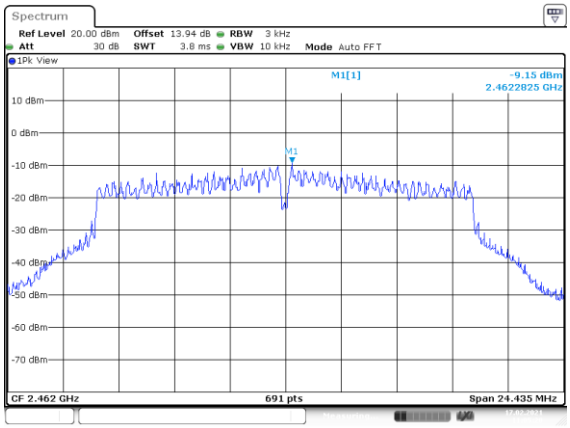
11.3 Test Equipment List and Details

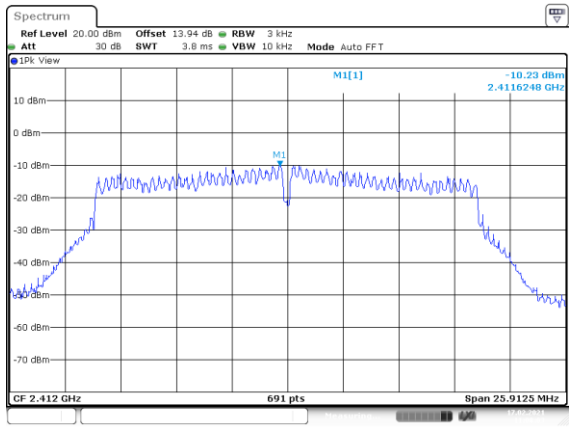
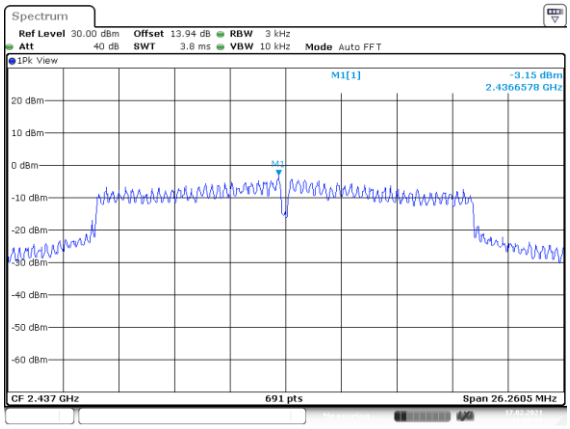
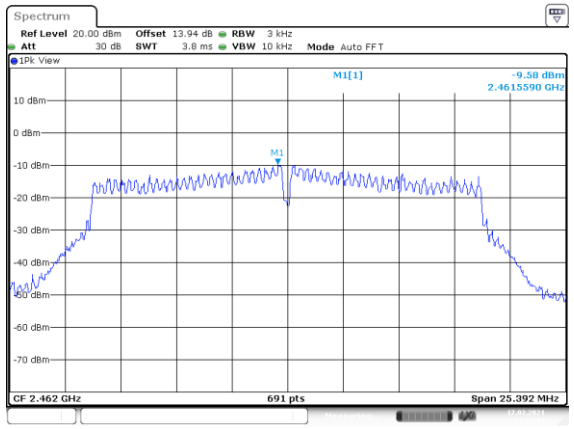
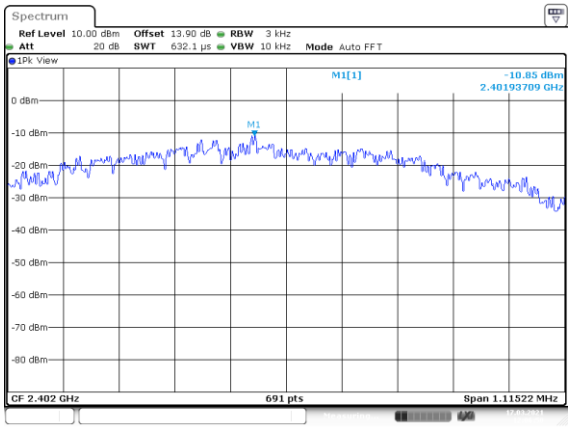
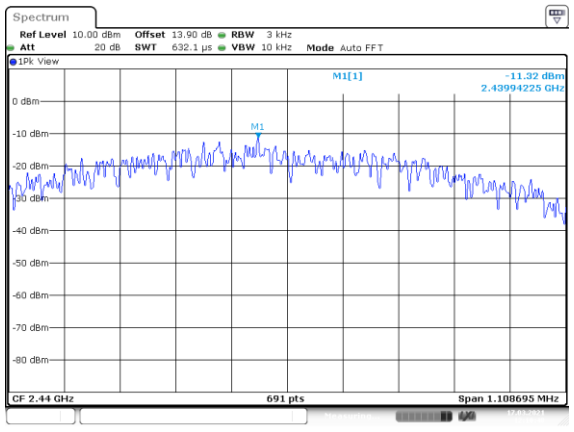
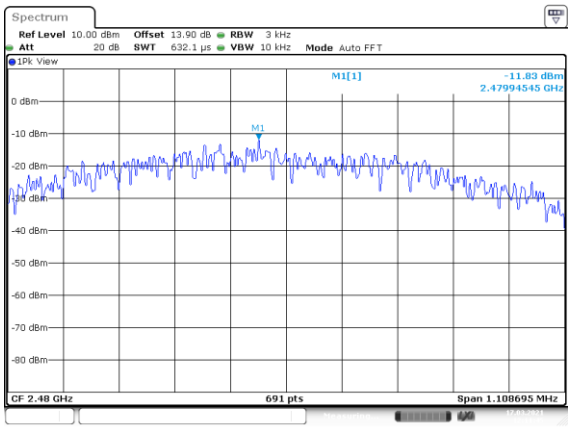
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***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	-5.49	8	Compliance
	Middle	2437	-5.11	8	Compliance
	High	2462	-6.81	8	Compliance
IEEE 802.11g	Low	2412	-9.51	8	Compliance
	Middle	2437	-3.73	8	Compliance
	High	2462	-9.15	8	Compliance
IEEE 802.11n HT20	Low	2412	-10.23	8	Compliance
	Middle	2437	-3.15	8	Compliance
	High	2462	-9.58	8	Compliance
BLE-1Mbps	Low	2402	-10.85	8	Compliance
	Middle	2440	-11.32	8	Compliance
	High	2480	-11.83	8	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	**BLE-1Mbps Low CH**
	
BLE-1Mbps Middle CH	**BLE-1Mbps High CH**
	

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