FCC Part 15.249

TEST REPORT

For

PENPOWER TECHNOLOGY LTD.

7F, NO.47, Lane 2, Sec.2, Kuang-Fu Rd.,, Hsinchu City, 300 Taiwan

FCC ID: QIC-EZGOW01

Report Type:	**Product Type:**
Original Report	PenPower EZGoRF Jr.

Report Producer : Coco Lin

Report Number : RXZ231003013RF03

Report Date : 2024-04-22

Reviewed By: Andy Shih Andy. Shih

Prepared By: Bay Area Compliance Laboratories Corp.
(New Taipei Laboratory)
70, Lane 169, Sec. 2, Datong Road, Xizhi Dist.,
New Taipei City 22183, Taiwan, R.O.C.
Tel: +886 (2) 2647 6898
Fax: +886 (2) 2647 6895
www.bacl.com.tw

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(New Taipei Laboratory)

Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ231003013	RXZ231003013RF03	2024-04-22	Original Report	Coco Lin

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	PENPOWER TECHNOLOGY LTD.
	7F, NO.47, Lane 2, Sec.2, Kuang-Fu Rd.,, Hsinchu City, **300 Taiwan**
Brand(Trade) Name	PenPower
Product (Equipment)	PenPower EZGoRF Jr.
Main Model Name	EZGoW01
Frequency Range	2408~2474 MHz
Modulation Technique	GFSK
Power Operation (Voltage Range)	☐ AC ☐ Adapter ☐ By AC Power Cord ☐ PoE
	☒ DC Type 3V ☒ Battery*2 ☐ DC Power Supply ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	2023/10/04
Date of Test	2024/01/12 ~ 2024/04/20

*All measurement and test data in this report was gathered from production sample serial number: RXZ231003013-2 (Assigned by BACL, New Taipei Laboratory).

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1.2 Objective

This report is prepared on behalf of *PENPOWER TECHNOLOGY LTD.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

1.3 Related Submittal(s)/Grant(s)

N/A.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.5 Statement

Decision Rule: No, (The test results do not include MU judgment)

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Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
Emissions Bandwidth		+/- 0.09%
Emissions, radiated	9 kHz~30 MHz	+/- 3.54 dB
	30 MHz~1GHz	+/- 4.99 dB
	1 GHz~18 GHz	+/- 7.56 dB
	18 GHz~40 GHz	+/- 5.06 dB
Temperature		+/- 0.79 °C
Humidity		+/- 0.44 %

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty

1.7 Environmental Conditions

Test Site	Test Date	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
Radiation Spurious Emissions	2024/1/20~2024/4/20	23.2~23.8	66~68	1010	Jim Chen
20 dB Emission Bandwidth	2024/1/12	20.7	49	1010	Jim Chen

1.8 Test Facility

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

☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

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2 System Test Configuration

2.1 Description of Test Configuration

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2408	12	2432	24	2456
1	2410	13	2434	25	2458
2	2412	14	2436	26	2460
3	2414	15	2438	27	2462
4	2416	16	2440	28	2464
5	2418	17	2442	29	2466
6	2420	18	2444	30	2468
7	2422	19	2446	31	2470
8	2424	20	2448	32	2472
9	2426	21	2450	33	2474
10	2428	22	2452	/	/
11	2430	23	2454	/	/

Tested with channel 0, 16 and 33.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

No test software was used.

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

Test Frequency	Low	Middle	High
Power Level Setting	Default	Default	Default

2.4 Support Equipment List and Details

N/A

2.5 External Cable List and Details

N/A

2.6 Test Mode

Full System (model: EZGoW01) test item.

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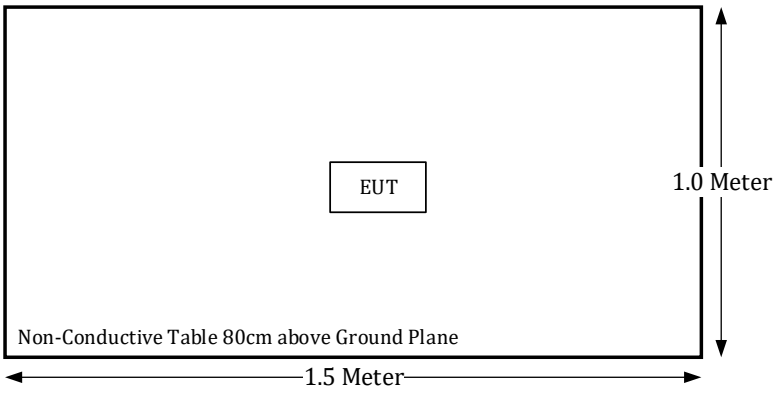
2.7 Block Diagram of Test Setup

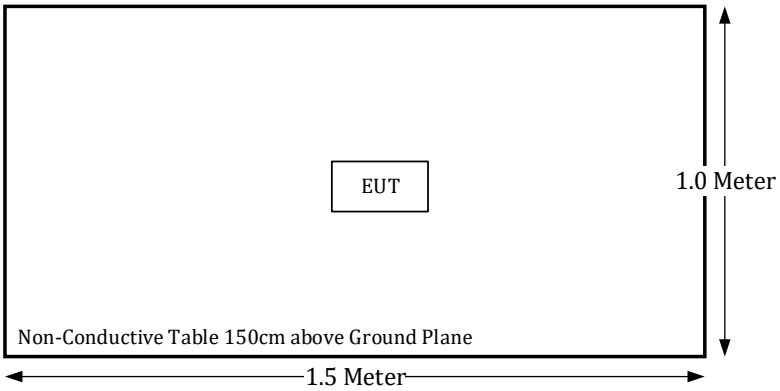
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

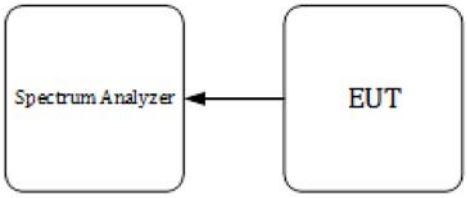
Below 1GHz:



Above 1GHz:



Conducted



3 Summary of Test Results

FCC Rules	Description of Test	Results
§1.1307(b)(3)(i)	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not applicable
§15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Emission Bandwidth	Compliance

Not Applicable: The device was powered by battery.

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4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Radiation 3M Room (966-A)					
Active Loop Antenna	ETS-Lindgren	6502	35796	2024/3/27	2025/3/26
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2023/1/31	2024/1/30
Horn Antenna	EMCO	SAS-571	1020	2023/5/18	2024/5/17
Horn Antenna	ETS-Lindgren	3116	62638	2023/8/25	2024/8/24
Preamplifier	Sonoma	310N	130602	2023/6/16	2024/6/15
Preamplifier	Channel	ERA-100M-18G-01D1748	EC2300051	2023/4/1	2024/3/31
Preamplifier	A.H. Systems	PAM-1840VH	174	2023/3/24	2024/3/23
Spectrum Analyzer	Rohde & Schwarz	FSV40	101939	2024/3/23	2024/3/23
				2024/3/27	2025/3/27
EMI Test Receiver	Rohde & Schwarz	ESR3	102099	2023/6/16	2024/6/15
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2023/1/24	2024/1/23
				2024/1/23	2025/1/23
Coaxial Cable	COMMATE	PEWC	8Dr	2023/12/23	2024/12/22
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2023/1/24	2024/1/23
				2024/1/23	2025/1/23
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2023/12/23	2024/12/22
Cable	EMC	EMC105-SM-SM-10000	201003	2023/1/24	2024/1/23
				2024/1/23	2025/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2023/1/24	2024/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-50CM	15120-1	2023/2/1	2024/1/31
Software	AUDIX	E3	18621a	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2023/2/9	2024/2/8
Cable	UTIFLEX	UFA210A	9435	2023/10/2	2024/10/1

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements.

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5 FCC §1.1307(b)(3)(i) – RF EXPOSURE

5.1 Applicable Standard

According to subpart 15.249 and subpart §1.1307(b)(3)(i), 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.

For single RF sources (*i.e.,* any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold *Pth* (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). *Pth* is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^x & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

5.2 RF Exposure Evaluation Result

Calculate the ERP from the radiated field strength in the far field using Equation

EIRP= E_{Meas} + 20log(d_{Meas})-104.7

EIRP= 84.46 dBμV/m -95.2 = −10.74 dBm

ERP = EIRP – 2.15 dB

Project info

Freq (MHz)	EIRP (dBm)	ERP (dBm)	ERP (mW)
2408~2474	-10.74	-12.89	0.05

§ 1.1307(b)(3)(i)(A)

The available maximum time-averaged power is no more than 1 mW

Result: The device meets the exemption requirement.

6 FCC §15.203 – Antenna Requirements

6.1 Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by theresponsible 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.

6.2 Antenna Information

Manufacturer	Model	Type	Antenna Gain
MOSART	09-D0990-C	PCB	-1.5561 dBi

The antenna is permanently attached to the device.

Result: Compliance.

7 FCC §15.209, §15.205 , §15.249 - Radiated Emissions

7.1 Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
920-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

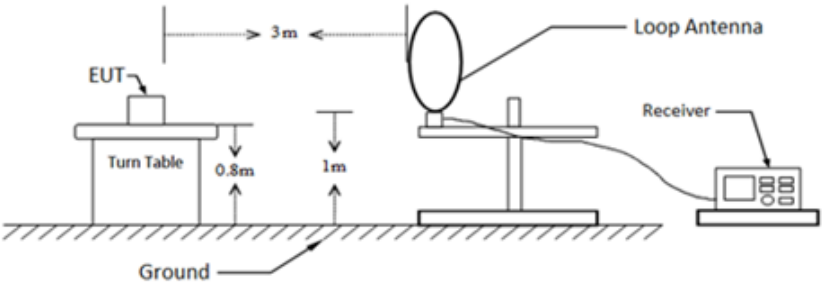
As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

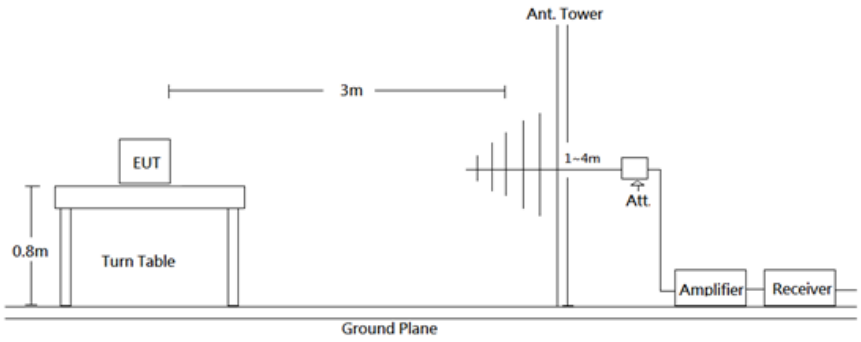
According to ANSI C63.10-2013, section 5.3.3 Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field, and the emissions to be measured can be detected by the measurement equipment (see 4.3.4). Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. Measurements from 18 GHz to 40 GHz are typically made at distances significantly less than 3 m from the EUT. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade of distance (inverse of linear distance for field-strength measurements or inverse of linear distance-squared for power-density measurements).

7.2 EUT Setup

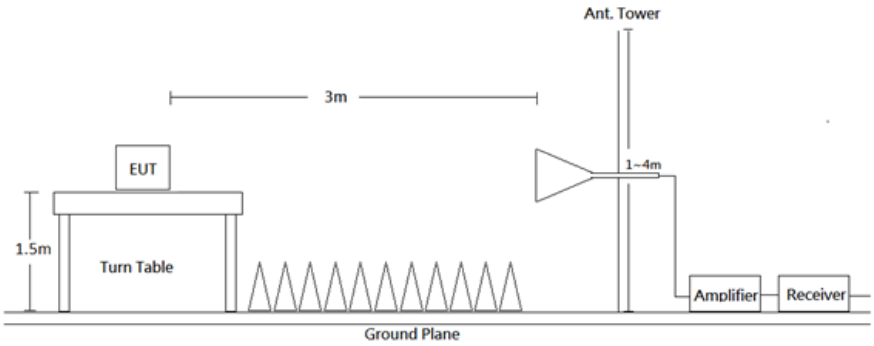
9kHz-30MHz:



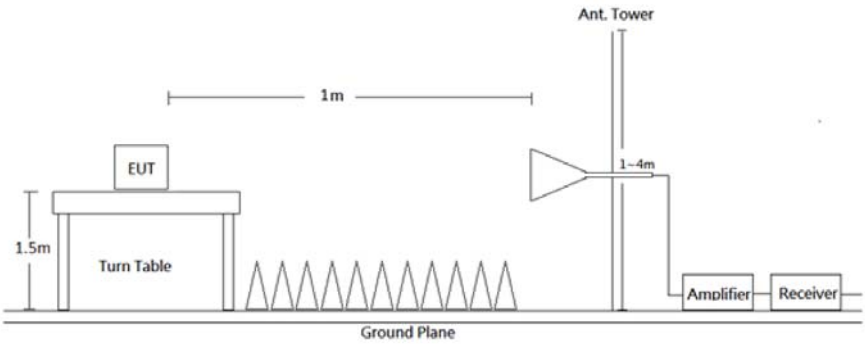
30MHz-1GHz:



1-18 GHz:



18-26.5 GHz:



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 15.209 and FCC 15.249 limits.

7.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	VBW	Measurement method
9 kHz - 150 kHz	300 Hz	1 kHz	QP/AV
150 kHz - 30 MHz	10 kHz	30 kHz	QP/AV
30-1000 MHz	120 kHz	300 kHz	QP
Above 1 GHz	1 MHz	3 MHz	PK
Above 1 GHz	1 MHz	10 Hz	AVG

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

7.4 Test Procedure

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.

Prescan using three directional polarities. (parallel, vertical and ground parallel)

7.5 Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and Amplifier Gain from the Meter Reading. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss + Amplifier Gain

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit line. For example, The Over Limit of -7 dB means the emission is 7 dB below the limit line. The equation for margin calculation is as follows:

Margin = Level – Limit

7.6 Test Results

Test Mode: Transmitting

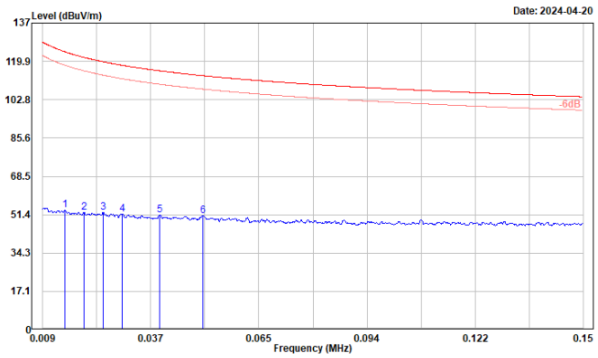
(worse case as Z axis.)

9kHz-30MHz:

(worst case is low channel)

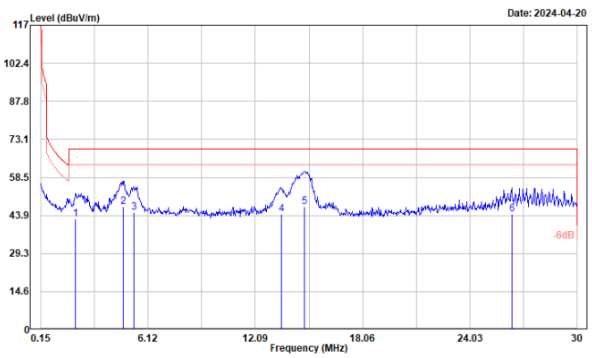
(Prescan using three directional polarities, worst case parallel.)

9kHz-150kHz



Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
0.015	37.42	15.88	53.30	124.13	-70.83	100	157	Average
0.020	37.42	14.94	52.36	121.65	-69.29	100	119	Average
0.025	37.94	14.34	52.28	119.72	-67.44	100	206	Average
0.030	37.96	13.73	51.69	118.10	-66.41	100	107	Average
0.040	38.63	12.76	51.39	115.65	-64.26	100	206	Average
0.051	38.35	12.54	50.89	113.50	-62.61	100	33	Average

150kHz-30MHz

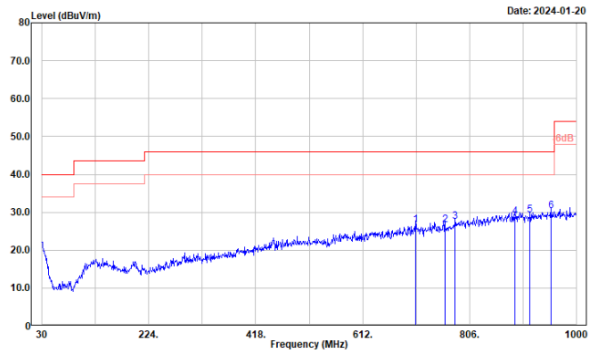


Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
2.090	31.74	10.71	42.45	69.54	-27.09	100	85	QP
4.717	36.49	10.66	47.15	69.54	-22.39	100	104	QP
5.314	33.90	11.05	44.95	69.54	-24.59	100	118	QP
13.523	32.98	11.47	44.45	69.54	-25.09	100	315	QP
14.806	35.61	11.51	47.12	69.54	-22.42	100	252	QP
26.358	32.74	11.72	44.46	69.54	-25.08	100	110	QP

30MHz-1GHz:

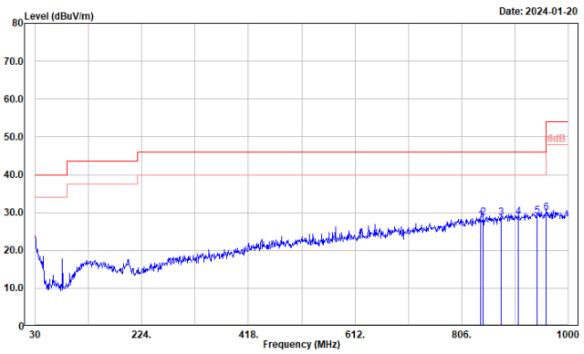
Low channel

Horizontal



Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
708.030	28.25	-1.61	26.64	46.00	-19.36	100	116	QP
761.380	27.72	-0.98	26.74	46.00	-19.26	100	187	QP
779.810	27.96	-0.45	27.51	46.00	-18.49	100	290	QP
888.450	27.29	1.64	28.93	46.00	-17.07	100	140	QP
915.610	27.19	1.99	29.18	46.00	-16.82	100	213	QP
953.440	27.50	2.79	30.29	46.00	-15.71	100	55	QP

Vertical



Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
839.950	27.04	0.87	27.91	46.00	-18.09	100	133	QP
845.770	27.65	0.96	28.61	46.00	-17.39	100	354	QP
877.780	27.33	1.39	28.72	46.00	-17.28	100	25	QP
909.790	26.86	1.97	28.83	46.00	-17.17	100	161	QP
943.740	26.34	2.63	28.97	46.00	-17.03	100	290	QP
960.230	27.11	2.80	29.91	54.00	-24.09	100	53	QP

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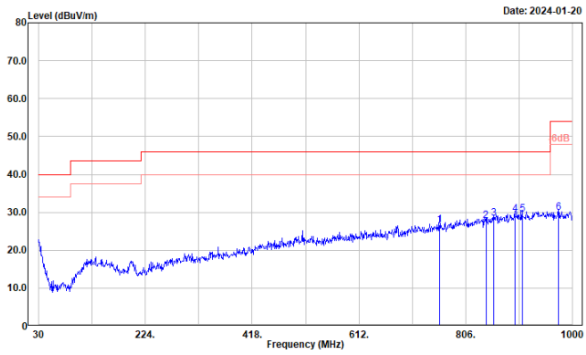
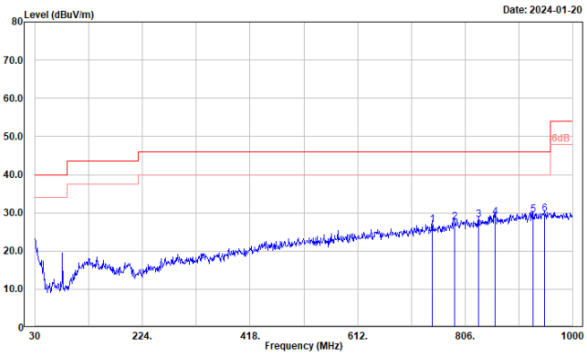
Middle channel

Horizontal



Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
758.470	27.73	-1.00	26.73	46.00	-19.27	100	124	QP
842.860	26.76	0.91	27.67	46.00	-18.33	100	240	QP
857.410	26.98	1.32	28.30	46.00	-17.70	100	197	QP
895.240	27.58	1.88	29.46	46.00	-16.54	100	360	QP
908.820	27.53	1.95	29.48	46.00	-16.52	100	323	QP
974.780	27.37	2.46	29.83	54.00	-24.17	100	313	QP

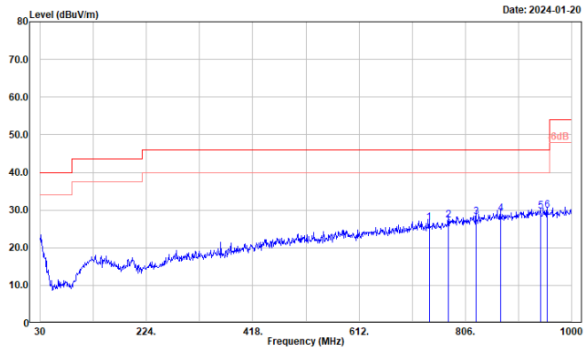
Vertical



Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
746.830	27.95	-1.08	26.87	46.00	-19.13	100	97	QP
786.600	27.73	-0.13	27.60	46.00	-18.40	100	44	QP
830.250	27.49	0.66	28.15	46.00	-17.85	100	226	QP
860.320	27.50	1.40	28.90	46.00	-17.10	100	254	QP
928.220	27.01	2.38	29.39	46.00	-16.61	100	246	QP
949.560	27.03	2.76	29.79	46.00	-16.21	100	85	QP

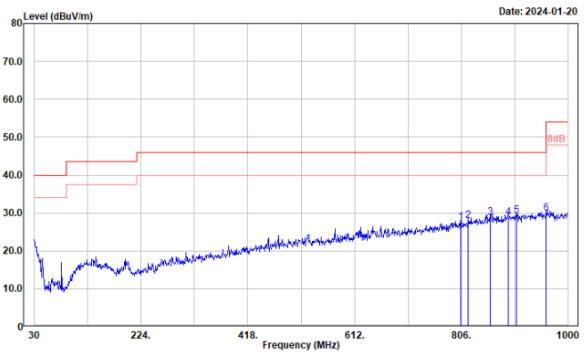
High channel

Horizontal



Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
740.040	27.83	-1.23	26.60	46.00	-19.40	100	169	QP
774.960	27.99	-0.68	27.31	46.00	-18.69	100	208	QP
825.400	27.58	0.51	28.09	46.00	-17.91	100	266	QP
870.020	27.78	1.31	29.09	46.00	-16.91	100	354	QP
942.770	27.11	2.62	29.73	46.00	-16.27	100	135	QP
955.380	27.04	2.79	29.83	46.00	-16.17	100	360	QP

Vertical



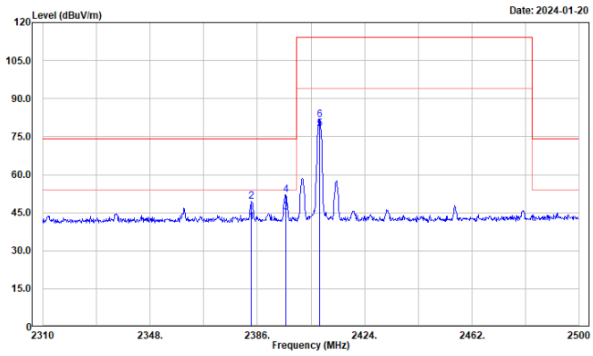
Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
805.030	27.19	0.27	27.46	46.00	-18.54	100	2	QP
818.610	27.44	0.43	27.87	46.00	-18.13	100	135	QP
858.380	27.39	1.34	28.73	46.00	-17.27	100	329	QP
891.360	27.13	1.70	28.83	46.00	-17.17	100	294	QP
905.910	27.34	1.87	29.21	46.00	-16.79	100	18	QP
960.230	27.02	2.80	29.82	54.00	-24.18	100	250	QP

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

Band-Edge:

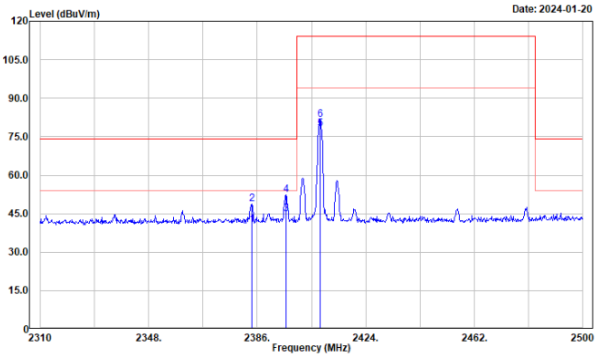
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2383.720	52.51	-11.19	41.32	54.00	-12.68	144	227	Average
2383.720	60.63	-11.19	49.44	74.00	-24.56	144	227	Peak
2396.070	56.19	-11.14	45.05	54.00	-8.95	144	227	Average
2396.070	63.32	-11.14	52.18	74.00	-21.82	144	227	Peak
2408.000	89.13	-11.10	78.03	94.00	-15.97	144	227	Average
2408.000	92.76	-11.10	81.66	114.00	-32.34	144	227	Peak

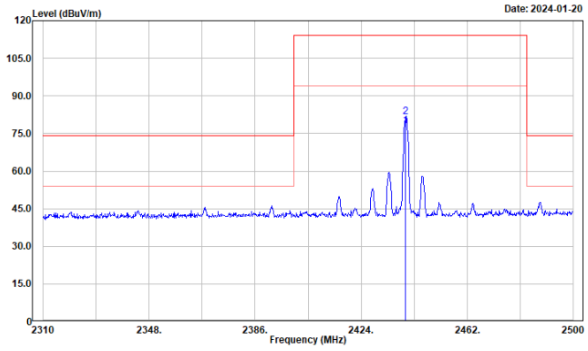
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2384.100	51.96	-11.18	40.78	54.00	-13.22	102	281	Average
2384.100	59.86	-11.18	48.68	74.00	-25.32	102	281	Peak
2396.070	55.92	-11.14	44.78	54.00	-9.22	102	281	Average
2396.070	63.41	-11.14	52.27	74.00	-21.73	102	281	Peak
2408.000	89.14	-11.10	78.04	94.00	-15.96	102	281	Average
2408.000	92.78	-11.10	81.68	114.00	-32.32	102	281	Peak

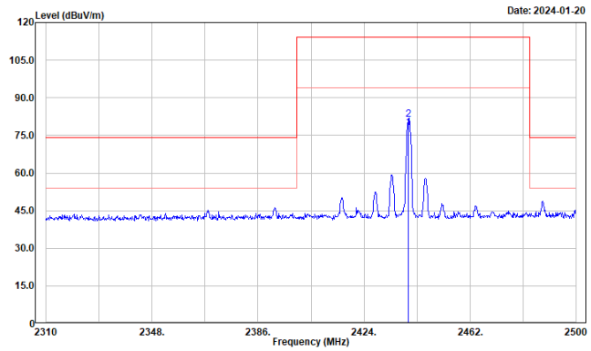
Middle channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2440.000	88.97	-11.06	77.91	94.00	-16.09	117	228	Average
2440.000	92.61	-11.06	81.55	114.00	-32.45	117	228	Peak

Vertical

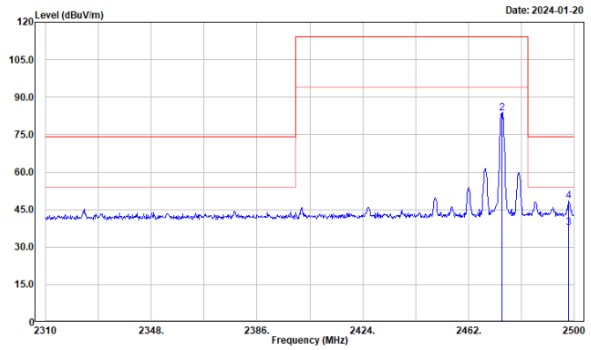


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2440.000	88.98	-11.06	77.92	94.00	-16.08	103	282	Average
2440.000	92.48	-11.06	81.42	114.00	-32.58	103	282	Peak

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

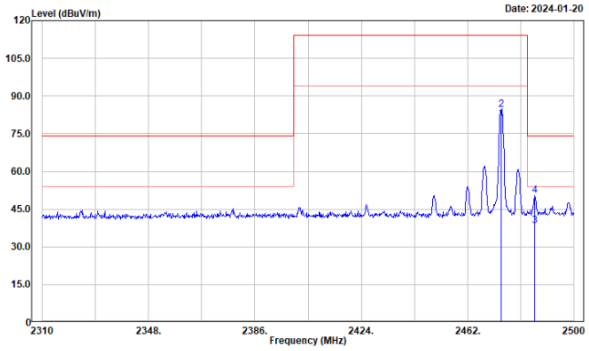
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2474.000	90.77	-10.72	80.05	94.00	-13.95	132	225	Average
2474.000	94.23	-10.72	83.51	114.00	-30.49	132	225	Peak
2498.100	48.28	-10.40	37.88	54.00	-16.12	132	225	Average
2498.100	58.92	-10.40	48.52	74.00	-25.48	132	225	Peak

Vertical

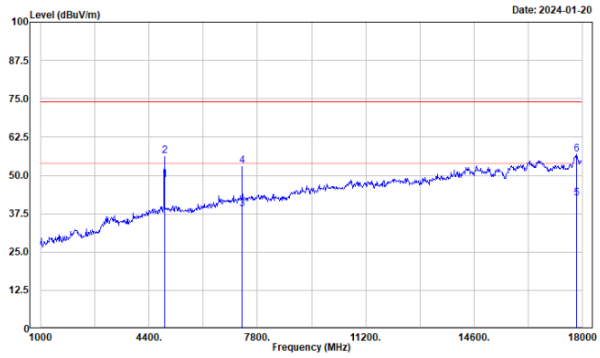


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2474.000	91.80	-10.72	81.08	94.00	-12.92	103	273	Average
2474.000	95.18	-10.72	84.46	114.00	-29.54	103	273	Peak
2486.130	49.08	-10.56	38.52	54.00	-15.48	103	273	Average
2486.130	60.93	-10.56	50.37	74.00	-23.63	103	273	Peak

(worst case is middle channel)

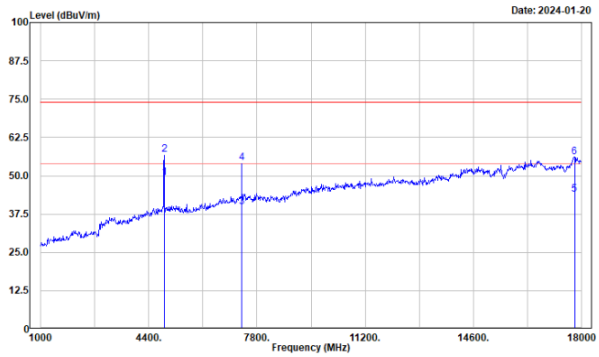
1GHz-18GHz:

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4880.000	53.51	-4.89	48.62	54.00	-5.38	106	10	Average
4880.000	61.21	-4.89	56.32	74.00	-17.68	106	10	Peak
7320.000	39.12	0.02	39.14	54.00	-14.86	135	170	Average
7320.000	53.20	0.02	53.22	74.00	-20.78	135	170	Peak
17830.000	29.55	13.09	42.64	54.00	-11.36	150	155	Average
17830.000	43.77	13.09	56.86	74.00	-17.14	150	155	Peak

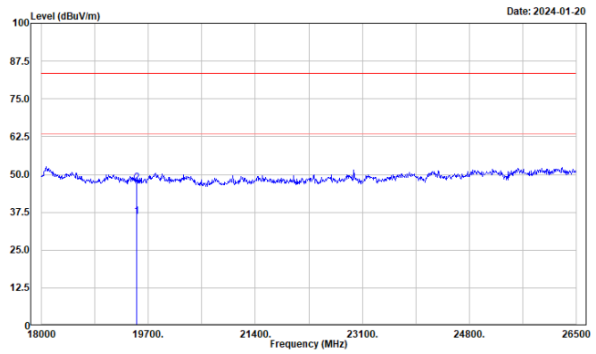
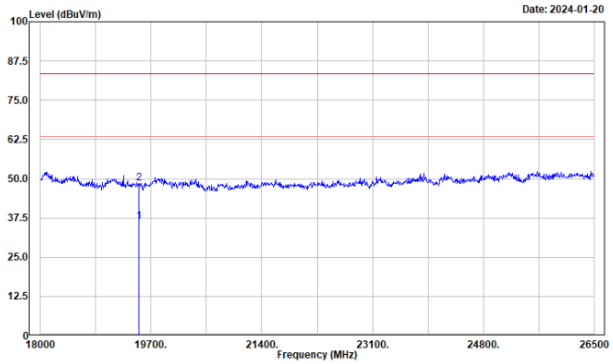
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4880.000	54.12	-4.89	49.23	54.00	-4.77	110	284	Average
4880.000	61.87	-4.89	56.98	74.00	-17.02	110	284	Peak
7320.000	39.71	0.02	39.73	54.00	-14.27	133	30	Average
7320.000	54.11	0.02	54.13	74.00	-19.87	133	30	Peak
17779.000	31.00	12.86	43.86	54.00	-10.14	150	155	Average
17779.000	43.33	12.86	56.19	74.00	-17.81	150	155	Peak

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

18GHz-26.5GHz:

Horizontal	Vertical
	

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
19520.000	19.44	16.69	36.13	63.50	-27.37	155	121	Average
19520.000	30.47	16.69	47.16	83.50	-36.34	155	121	Peak

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
19520.000	19.58	16.69	36.27	63.50	-27.23	153	339	Average
19520.000	31.88	16.69	48.57	83.50	-34.93	153	339	Peak

Note:

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

For 18-26.5GHz Convert the test distance limit of 3 meters to a limit of 1 meter:

Conversion factor = 20 log (1m/3m) = 9.5 dB , Limit = 54+9.5 = 63.50 dBuV/m @ 1m

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

Above 1GHz

Low channel

Horizontal

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
2383.720	52.51	-11.19	41.32	54.00	-12.68	144	227	Average
2383.720	60.63	-11.19	49.44	74.00	-24.56	144	227	Peak
2396.070	56.19	-11.14	45.05	54.00	-8.95	144	227	Average
2396.070	63.32	-11.14	52.18	74.00	-21.82	144	227	Peak
2408.000	89.13	-11.10	78.03	94.00	-15.97	144	227	Average
2408.000	92.76	-11.10	81.66	114.00	-32.34	144	227	Peak

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
4816.000	53.25	-4.97	48.28	54.00	-5.72	106	23	Average
4816.000	62.15	-4.97	57.18	74.00	-16.82	106	23	Peak
7224.000	40.74	0.04	40.78	54.00	-13.22	128	186	Average
7224.000	52.24	0.04	52.28	74.00	-21.72	128	186	Peak

Vertical

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
2384.100	51.96	-11.18	40.78	54.00	-13.22	102	281	Average
2384.100	59.86	-11.18	48.68	74.00	-25.32	102	281	Peak
2396.070	55.92	-11.14	44.78	54.00	-9.22	102	281	Average
2396.070	63.41	-11.14	52.27	74.00	-21.73	102	281	Peak
2408.000	89.14	-11.10	78.04	94.00	-15.96	102	281	Average
2408.000	92.78	-11.10	81.68	114.00	-32.32	102	281	Peak

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
4816.000	54.11	-4.97	49.14	54.00	-4.86	121	275	Average
4816.000	63.17	-4.97	58.20	74.00	-15.80	121	275	Peak
7224.000	41.14	0.04	41.18	54.00	-12.82	118	62	Average
7224.000	53.27	0.04	53.31	74.00	-20.69	118	62	Peak

Middle channel

Horizontal

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
2440.000	88.97	-11.06	77.91	94.00	-16.09	117	228	Average
2440.000	92.61	-11.06	81.55	114.00	-32.45	117	228	Peak

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
4880.000	53.51	-4.89	48.62	54.00	-5.38	106	10	Average
4880.000	61.21	-4.89	56.32	74.00	-17.68	106	10	Peak
7320.000	39.12	0.02	39.14	54.00	-14.86	135	170	Average
7320.000	53.20	0.02	53.22	74.00	-20.78	135	170	Peak
17830.000	29.55	13.09	42.64	54.00	-11.36	150	155	Average
17830.000	43.77	13.09	56.86	74.00	-17.14	150	155	Peak

Vertical

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
2440.000	88.98	-11.06	77.92	94.00	-16.08	103	282	Average
2440.000	92.48	-11.06	81.42	114.00	-32.58	103	282	Peak

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
4880.000	54.12	-4.89	49.23	54.00	-4.77	110	284	Average
4880.000	61.87	-4.89	56.98	74.00	-17.02	110	284	Peak
7320.000	39.71	0.02	39.73	54.00	-14.27	133	30	Average
7320.000	54.11	0.02	54.13	74.00	-19.87	133	30	Peak
17779.000	31.00	12.86	43.86	54.00	-10.14	150	155	Average
17779.000	43.33	12.86	56.19	74.00	-17.81	150	155	Peak

High channel

Horizontal

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
2474.000	90.77	-10.72	80.05	94.00	-13.95	132	225	Average
2474.000	94.23	-10.72	83.51	114.00	-30.49	132	225	Peak
2498.100	48.28	-10.40	37.88	54.00	-16.12	132	225	Average
2498.100	58.92	-10.40	48.52	74.00	-25.48	132	225	Peak

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
4948.000	45.50	-4.63	40.87	54.00	-13.13	105	355	Average
4948.000	57.10	-4.63	52.47	74.00	-21.53	105	355	Peak
7422.000	40.31	0.37	40.68	54.00	-13.32	123	19	Average
7422.000	51.95	0.37	52.32	74.00	-21.68	123	19	Peak

Vertical

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
2474.000	91.80	-10.72	81.08	94.00	-12.92	103	273	Average
2474.000	95.18	-10.72	84.46	114.00	-29.54	103	273	Peak
2486.130	49.08	-10.56	38.52	54.00	-15.48	103	273	Average
2486.130	60.93	-10.56	50.37	74.00	-23.63	103	273	Peak

Freq. MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Height (cm)	Degree (°)	Remark
4948.000	46.20	-4.63	41.57	54.00	-12.43	106	264	Average
4948.000	57.85	-4.63	53.22	74.00	-20.78	106	264	Peak
7422.000	41.09	0.37	41.46	54.00	-12.54	134	48	Average
7422.000	52.36	0.37	52.73	74.00	-21.27	134	48	Peak

Note:

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

8 FCC §15.215(c) –20 dB Bandwidth Testing

8.1 Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

8.2 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Results

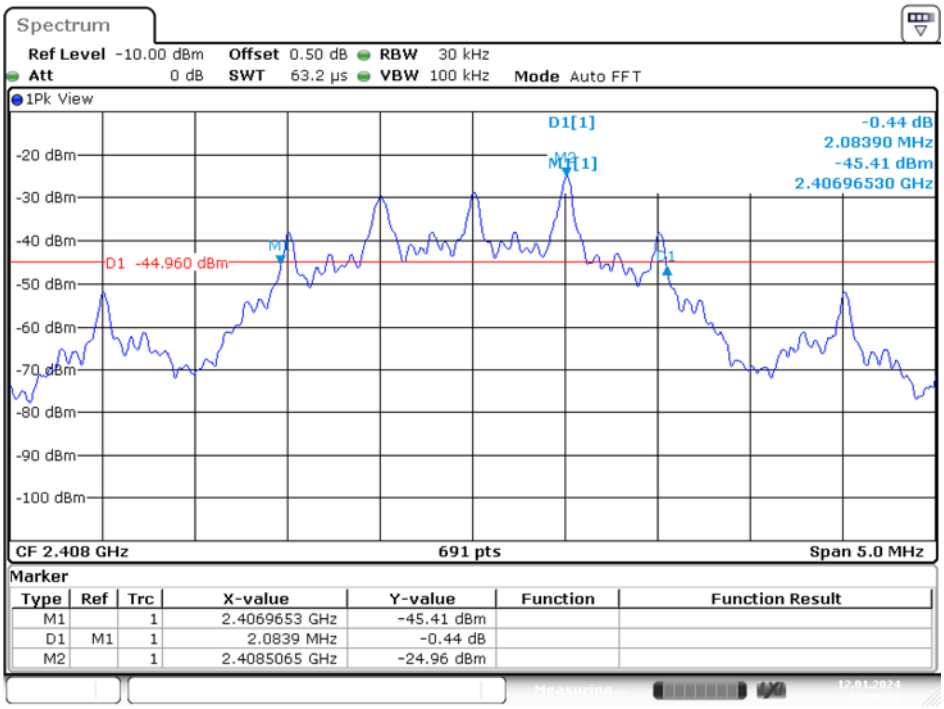
Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
Low	2408	2.08
Middle	2440	2.08
High	2474	2.08

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

Please refer to the following plots

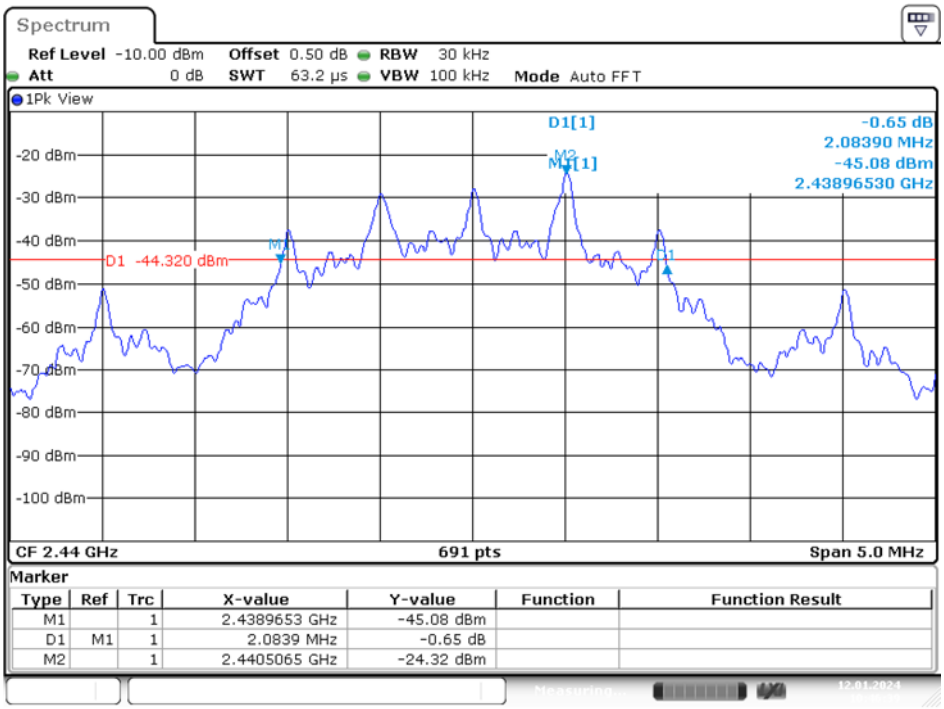
20 dB Emission Bandwidth

Low Channel



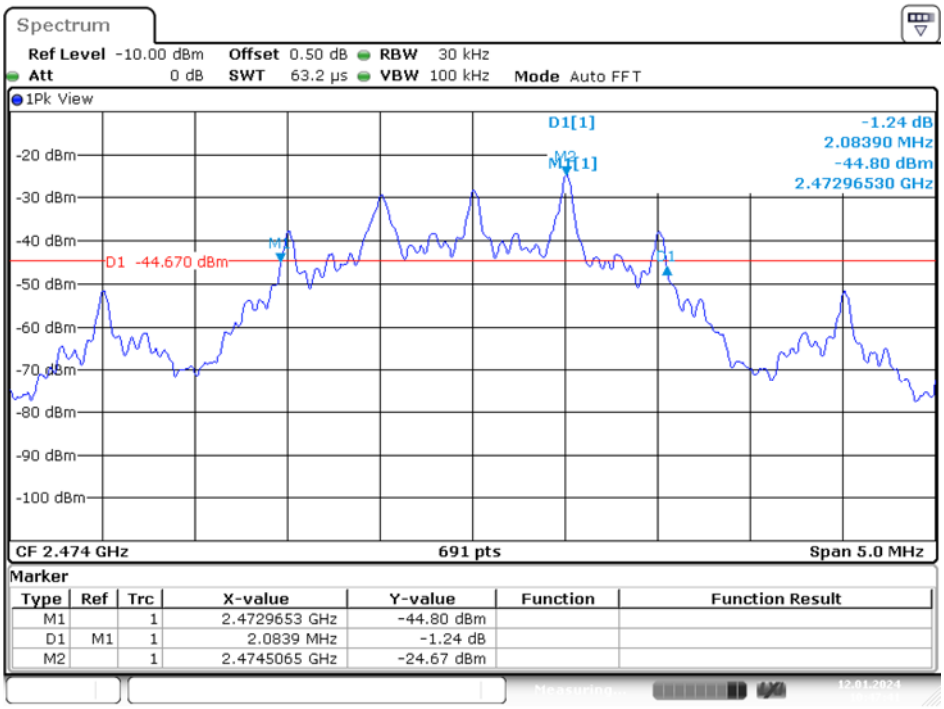
Date: 12.JAN.2024 10:40:09

Middle Channel



Date: 12.JAN.2024 10:46:39

High Channel



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