

FCC Part 15.231

TEST REPORT

For

ZHEJIANG JIECANG LINEAR MOTION TECHNOLOGY CO., LTD

No.19 XinTao Road, Provincial High Tech Park,XinChang county,ZheJiang
Province,China 312500

FCC ID: 2ANKDJCHR35W7

Report Type:
Original Report

Product Type:
Remote Control

Report Producer : Coco Lin

Report Number : RXZ231227105RF01

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ231227105	RXZ231227105RF01	2024-05-17	Original Report	Coco Lin

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	ZHEJIANG JIECANG LINEAR MOTION TECHNOLOGY CO., LTD
	No.19 XinTao Road, Provincial High Tech Park,XinChang county,ZheJiang Province,China 312500
Brand(Trade) Name	N/A
Product (Equipment)	Remote Control
Main Model Name	JCHR35W7A
Series Model Name	N/A
Frequency Range	433.9 MHz
Modulation Technique	ASK
Power Operation (Voltage Range)	<input type="checkbox"/> AC Type <input type="checkbox"/> Adapter <input type="checkbox"/> By AC Power Cord <input type="checkbox"/> PoE
	<input checked="" type="checkbox"/> DC Type <input checked="" type="checkbox"/> Battery 3V <input type="checkbox"/> DC Power Supply <input type="checkbox"/> External from USB Cable <input type="checkbox"/> External DC Adapter
	<input type="checkbox"/> Host System
Received Date	2023/12/28
Date of Test	2024/01/04 ~ 2024/05/16

*All measurement and test data in this report was gathered from production sample serial number: RXZ231227105-1 (Assigned by BACL, New Taipei Laboratory).

1.2 Objective

This report is prepared on behalf of *ZHEJIANG JIECANG LINEAR MOTION TECHNOLOGY CO., LTD* all the test measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

1.3 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.

1.4 Statement

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

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

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.

1.5 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		±2.53 dB
Occupied Bandwidth		±0.09 %
Unwanted Emissions, conducted		±1.13 dB
Emissions, radiated	9 kHz~30 MHz	±3.54 dB
	30 MHz~1 GHz	±4.99 dB
	1 GHz~18 GHz	±7.56 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

1.6 Environmental Conditions

Test Site	Test Date	Temperature (°C)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
Radiation Spurious Emissions	2024/1/4~2024/1/8	18.3~19.2	61~67	1010	Jim
Deactivation Test	2024/5/16	25.8	43	1010	Jing
Emissions Bandwidth	2024/4/19	24.4	59	1010	Jing

1.7 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) Lab 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.

2 System Test Configuration

2.1 Description of Test Configuration

Channel list:

Channel	Frequency (MHz)
1	433.9 MHz

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

No test software was used

2.4 Test Mode

Full System (model: JCHR35W7A) for all test item.

All keys were pretested, the worst data (square key) was recorded.



2.5 Support Equipment List and Details

N/A

2.6 External Cable List and Details

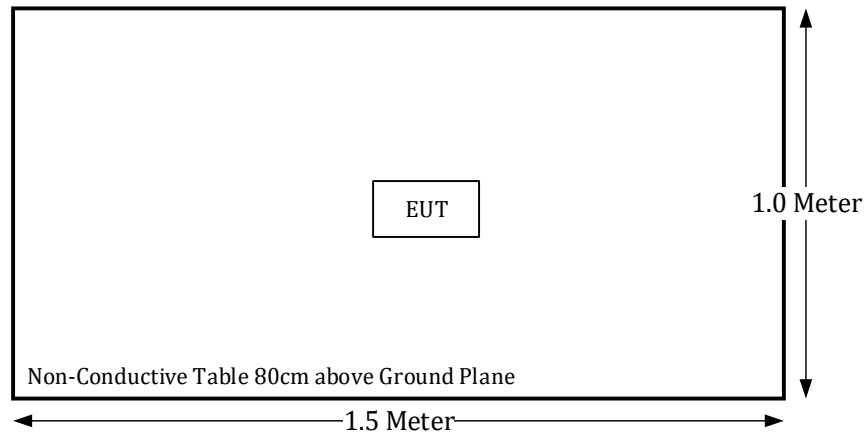
N/A

2.7 Block Diagram of Test Setup

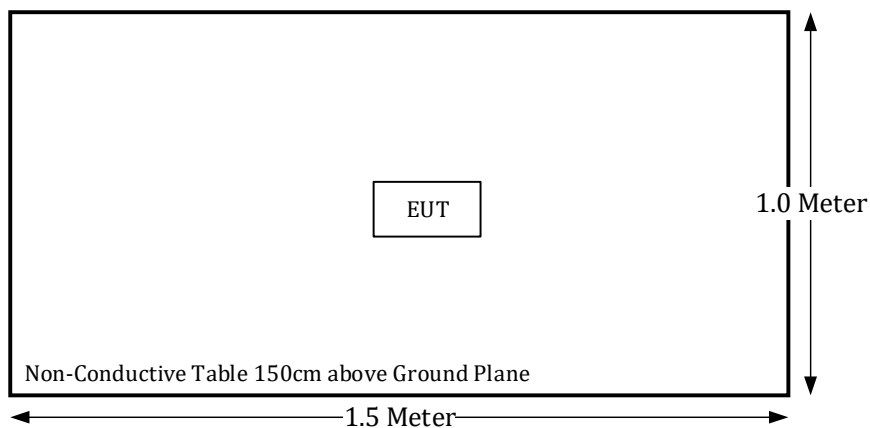
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

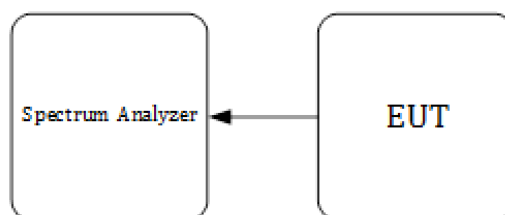
Below 1GHz:



Above 1GHz:



Conducted:



3 Summary of Test Results

FCC Rules	Description of Test	Results
§1.1307(b)(3)	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conducted Emissions	Not Applicable
§15.205, §15.209, §15.231(b)	Radiated Emissions	Compliance
§15.231(a)(1)	Deactivation Test	Compliance
§15.231(c)	20dB Emission Bandwidth	Compliance

Not Applicable: The device was powered by battery.

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	2023/3/23	2024/3/24
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
Preamplifier	Sonoma	310N	130602	2023/6/16	2024/6/15
Preamplifier	Channel	ERA-100M-18G-01D1748	EC2300051	2023/04/01	2024/03/31
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2023/1/31	2024/1/30
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
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
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
Software	AUDIX	E3	18621a	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101204	2023/5/30	2024/5/28
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

5 FCC §1.1307(b)(3) - RF Exposure

5.1 Applicable Standard

According to subpart §1.1307(b)(3), 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 P_{th} (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). P_{th} is given by

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

Where

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

and

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

(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 $\lambda/2\pi$, 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 $\lambda/4$ 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	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

5.2 RF Exposure Evaluation Result

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

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

$$\text{EIRP} = 79.90 \text{ dB}\mu\text{V/m} - 95.2 = -15.3 \text{ dBm}$$

$$\text{ERP} = \text{EIRP} - 2.15 \text{ dB}$$

Project info

Freq (MHz)	EIRP (dBm)	ERP (dBm)	ERP (mW)
433.9	-15.3	-17.45	0.02

§ 1.1307(b)(3)(i)(A)

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

Result: The device meets the exemption requirements.

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 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.

6.2 Antenna Connected Construction

Manufacturer	Model	Type	Antenna Gain
ZHEJIANG JIECANG LINEAR MOTION TECHNOLOGY CO., LTD	On-board antennas- W7A	On-board antennas	-15.2356 dBi

The antenna is permanently attached to the device.

Result: Compliant.

7 FCC §15.209, §15.205 , §15.231(b) – Radiated Emissions

7.1 Applicable Standard

FCC §15.205, §15.209, §15.231 (b)

According to FCC §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66 – 40.70	2250	225
70 – 130	1250	125
130 – 174	1250 to 3750 **	125 to 375 **
174 – 260	3750	375
160 – 470	3750 to 12500 **	375 to 1250 **
Above 470	12500	1250

** : Linear interpolations.

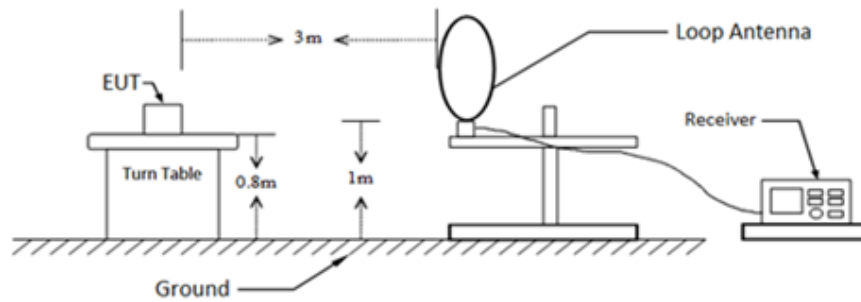
(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

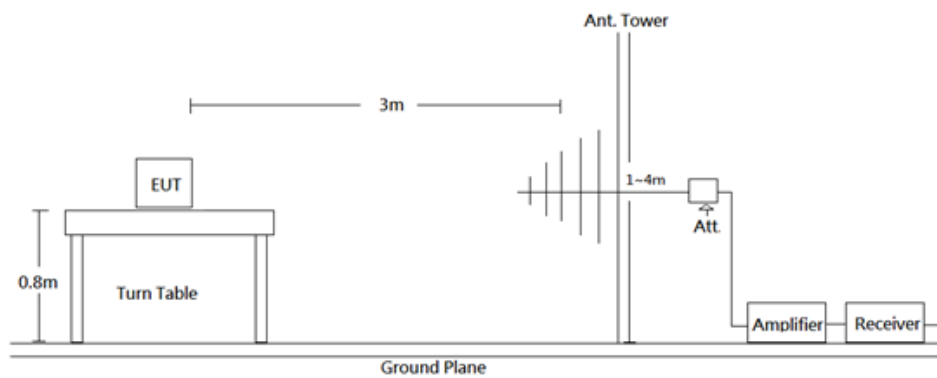
(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

7.2 EUT Setup

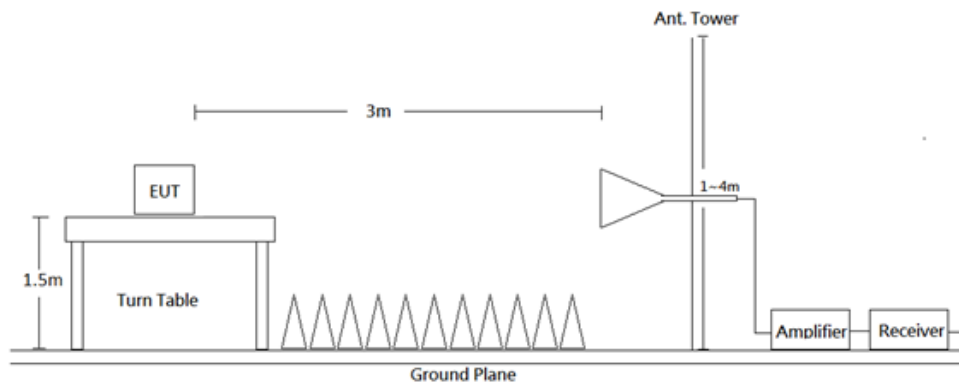
9kHz-30MHz:



30MHz-1GHz:



Above 1 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 Part 15.209 and FCC 15.231 Limits.

7.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 10 GHz. During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	RBW	VBW	Detector
9 kHz - 150 kHz	200Hz/300Hz	1 kHz	QP/AV
150 kHz - 30 MHz	9kHz/10kHz	30 kHz	QP/AV
30-1000 MHz	120 kHz	300 kHz	QP
Above 1 GHz	1 MHz	3 MHz	PK

7.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

7.5 Corrected Factor & Margin Calculation

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

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Level} - \text{Limit}$$

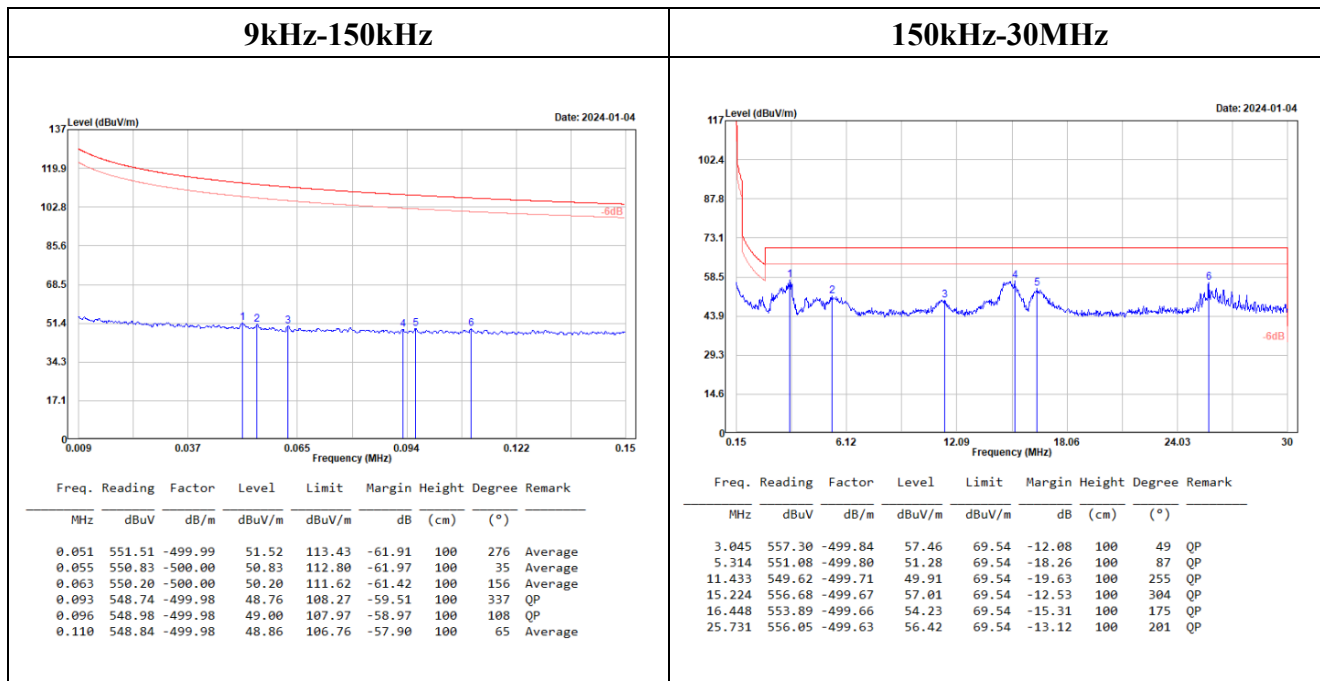
7.6 Test Results

Test Mode: Transmitting

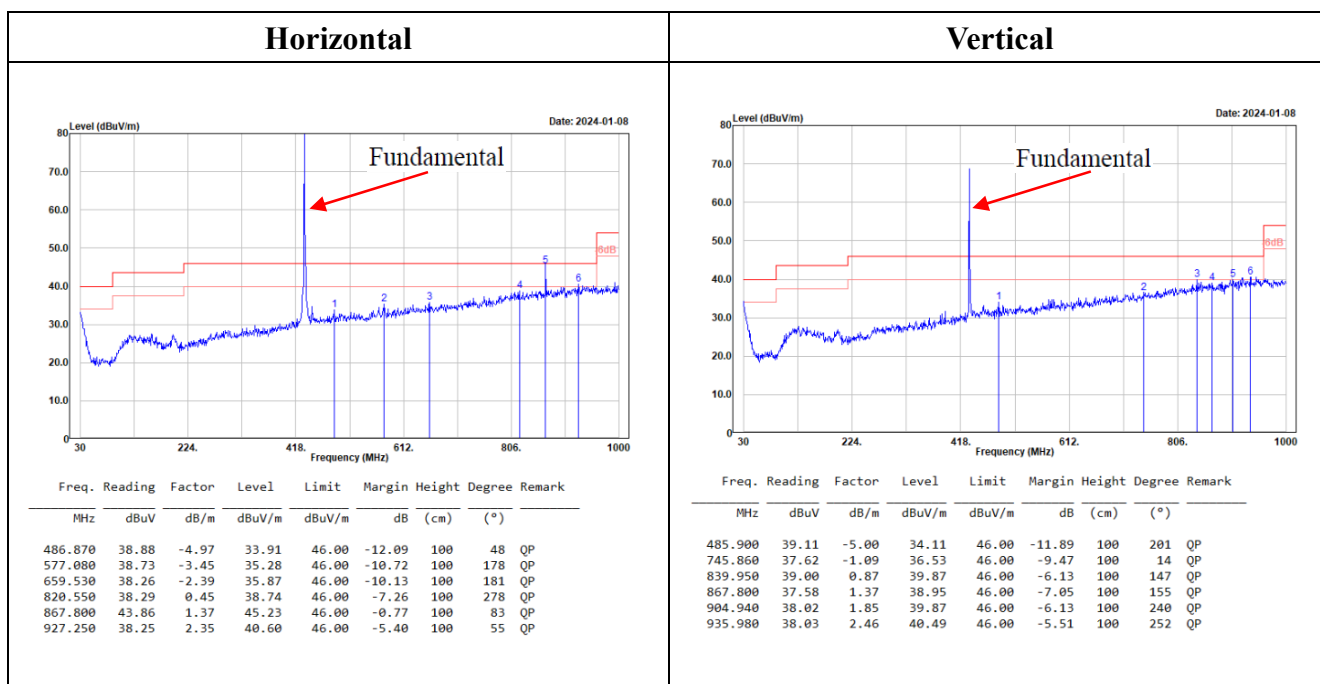
(Pre-scan with three orthogonal axis, and worse case as Z axis.)

9kHz-30MHz:

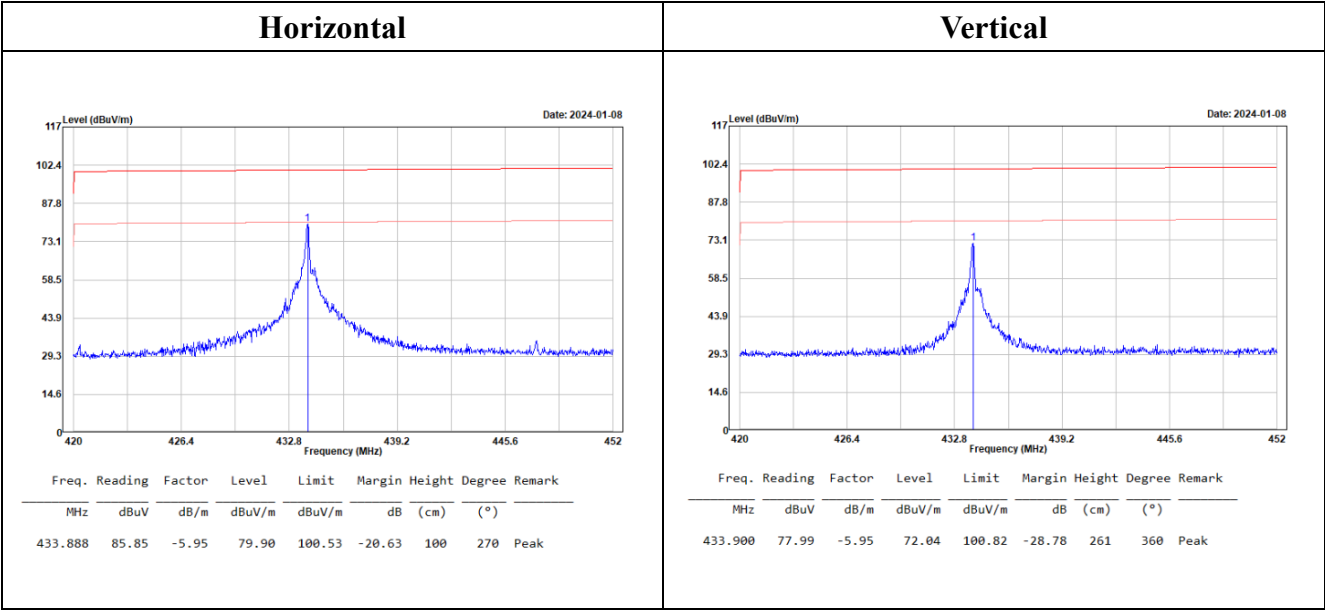
(Pre-scan using three directional polarities, worst case as parallel.)



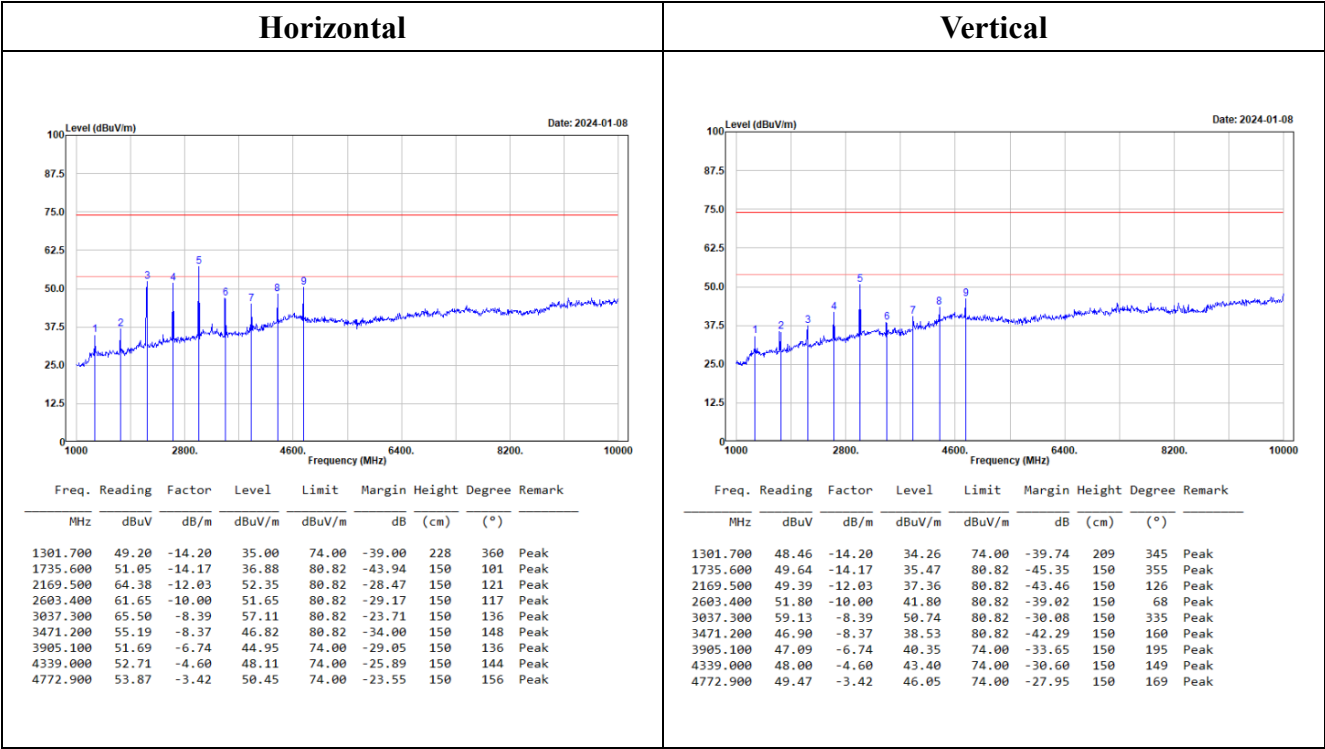
30MHz-1GHz:



Fundamental:



1GHz-10GHz:



Note :

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

All the peak emissions are under the peak limit more than 20dB, therefore average detector is unnecessary.

8 FCC §15.231(a)(1) –Deactivation Testing

8.1 Applicable Standard

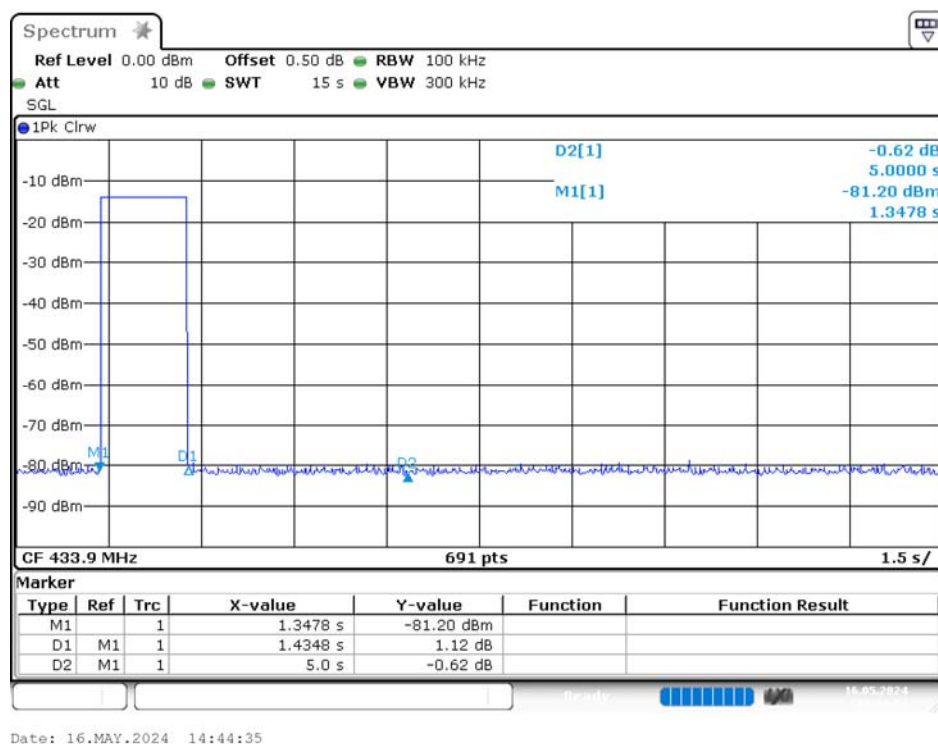
Per FCC §15.231(a) (1), A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released

8.2 Test Procedure

1. With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=100k VBW=300k Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

8.3 Test Results

Test Frequency (MHz)	Maximum Deactivate Time (s)	Limit (s)
433.9 MHz	1.4348	< 5



9 FCC §15.231(c) – 20 dB Emission Bandwidth Testing

9.1 Applicable Standard

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

9.2 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

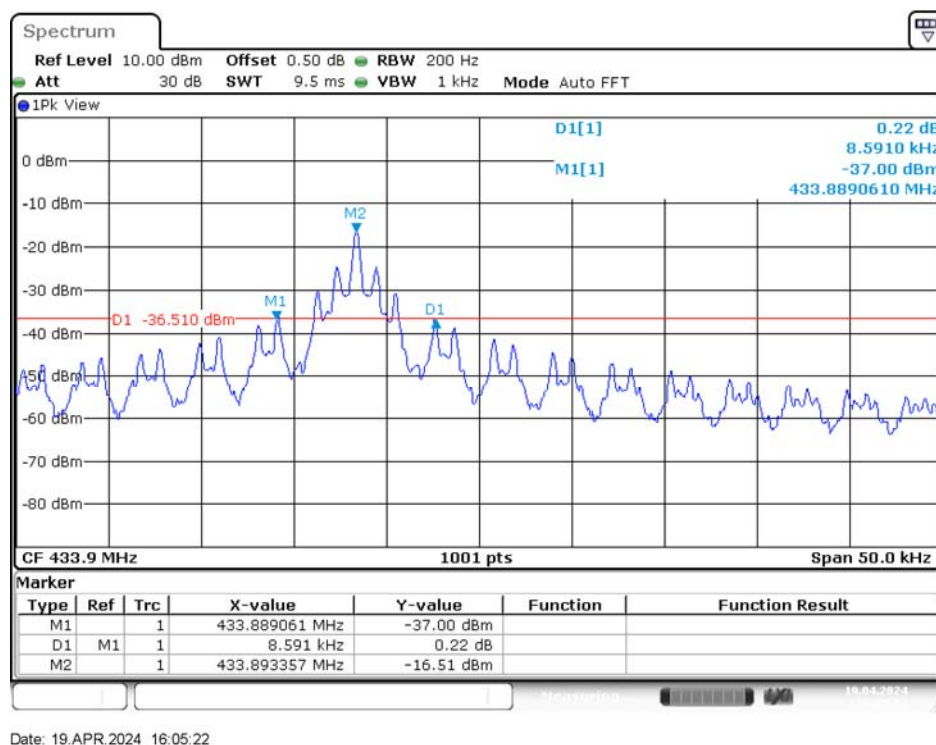
With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

9.3 Test Results

Frequency (MHz)	20 dB Emission Bandwidth (kHz)	Limit (kHz)	Result
433.9	8.591	1084.75	Compliance

Note: Limit = 0.25% * Center Frequency = 0.25% * 433.9 MHz = 1084.75 kHz

20 dB Emission Bandwidth



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