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Report No.: 2403TW5403-U1 Report Version: 1.0 Issue Date: 2024-04-11

Testing Laboratory 3261

## **MEASUREMENT REPORT**

**FCC ID** : CHQ7257TB4

**IC** : 2968A-7257TB4

**APPLICANT**: RHINE ELECTRONIC CO., LTD.

**Application Type**: Certification

**Product**: Transmitter

Model No. : UC7257TB4

Brand Name : RHINE

FCC Classification: FCC Part 15 Security/Remote Control Transmitter (DSC)

FCC Rule Part(s) : Part 15.231(b)

ISED Standard : RSS 210 Issue 10

Test Procedure(s): ANSI C63.10-2013

Received Date : March 28, 2024

Test Date: March 28~April 8, 2024

Tested By : Owen Tsai

(Owen Tsai)

Reviewed By : Paddy Chen

(Paddy Chen)

Approved By : any ker

(Chenz Ker)

The test results only relate to the tested sample.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

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# **Revision History**

Report No.	Version	Description	Issue Date	Note
2403TW5403-U1	1.0	Original Report	2024-04-11	

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## §2.1033 General Information

Applicant	RHINE ELECTRONIC CO., LTD.
Applicant Address	No. 29, Fong Li Road, Tan-Zi Dist, Taichung City 42754,Taiwan
Manufacturer	1. RHINE ELECTRONIC CO., LTD
Manufacturei	2. KAM SHING ELECTRONIC CO., LTD
	1. No.29, Fengli Rd.,Tanzi Dist.,Taichung City 427,Taiwan (R.O.C.)
Manufacturer Address	2. THE YOUTH LNDUSTRIAL ADMINISTRATION PARK, CHENJIANG
	TOWN, HUICHENG DISTRICT, HUIZHOU CITY, GUANGDONG, CHINA
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan
rest Site Address	(R.O.C)
MRT Registration No.	291082
Test Device Serial No.	#1-1 Production Pre-Production Engineering
FCC Classification	FCC Part 15 Security/Remote Control Transmitter(DSC)

## **Test Facility / Accreditations**

- **1.** MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
- 2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
- 3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Canada, EU and TELEC Rules.



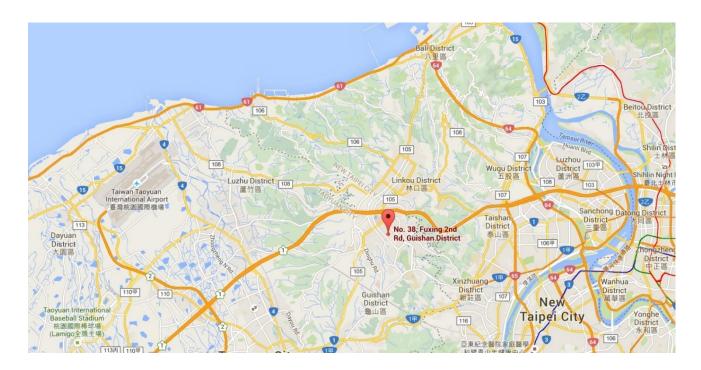
## 1. INTRODUCTION

## 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

#### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).





## 2. PRODUCT INFORMATION

## 2.1. Equipment Description

Product Name	Transmitter
Model No.	UC7257TB4
Frequency Range	433.92MHz
Type of modulation	ASK
Antenna Type	Integral Antenna

#### 2.2. Test Standards

The following report is prepared on behalf of the **RHINE ELECTRONIC CO., LTD.** in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules/ IC RSS-Gen 8.8,8.9,8.10 and RSS-210 AnnexA

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

## 2.3. Test Methodology

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013).

Deviation from measurement procedure......None



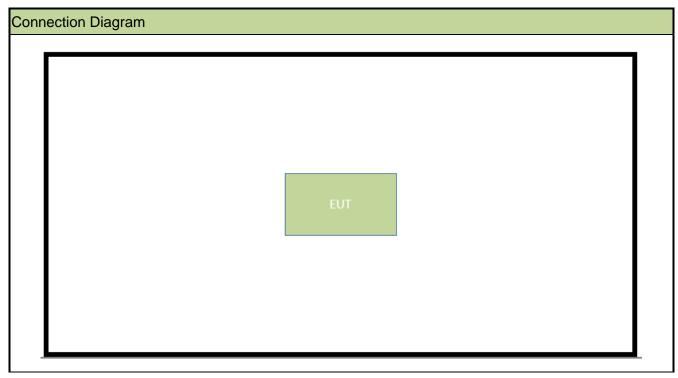
## 2.4. EUT Setup and Test Mode

The EUT was operated at continuous transmitting mode that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode

Mode 1: Transmitting by 433.92MHz

## 2.5. Test Configuration



## 2.6. Test System Details

The types for all equipment, and descriptions of all cables used in the tested system (including inserted cards) are:

N/A



## 3. ANTENNA REQUIREMENTS

## Excerpt from §15.203 of the FCC and RSS-Gen 6.8 of the ISED Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the Transmitter is permanently attached.
- There are no provisions for connection to an external antenna.

#### Conclusion:

The Transmitter unit complies with the requirement of §15.203 and RSS-Gen 6.8.



## 4. TEST EQUIPMENT CALIBRATION DATE

## Radiated Emissions – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Acitve Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2024/5/22
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2024/10/31
Broadband Hornantenna	RFSPIN	DRH18-E	MRTTWA00087	1 year	2024/5/17
Broadband Preamplifier	EMC Instruments corporation	EMC118A45SE	MRTTWA00088	1 year	2024/5/17
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2025/3/26
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2025/3/21
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2025/3/5
Signal Analyzer	R&S	FSVA3044	MRTTWA00092	1 year	2024/6/29
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00034	1 year	2024/6/26
Cable	HUBERSUHNER	EMC105-NM-N M-3000	MRTTWE00035	1 year	2024/6/26
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2024/6/4

## Test Software

Software	Version	Function
e3	9.160520a	EMI Test Software
EMI	V3	EMI Test Software

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## 5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

#### AC Conducted Emission Measurement – SR2

Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):

150kHz~30MHz: ± 2.42dB

#### Conducted Measurement-SR1

Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 1.3dB

#### Occupied Bandwidth

Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 3.3%

#### Radiated Emission Measurement – AC1

Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):

Horizontal: 9K~30MHz: ± 4.14dB

30MHz~1GHz: ± 4.22dB

1GHz~40GHz: ± 4.05dB

Vertical: 9K~30MHz: ± 4.14dB

30MHz~1GHz: ± 3.37dB 1GHz~40GHz: ± 4.08dB



## 6. TEST RESULT

## 6.1. Summary

Company Name: RHINE ELECTRONIC CO., LTD.

FCC/IC Part Section(s)	Test Description	Test Condition	Test Result
15.203	ANTENNA		Pass
RSS-Gen 6.8	REQUIREMENTS		Pd55
15.205,15.209,15.231(b)/	Radiated Spurious		Door
RSS Gen 8.9,8.10 RSS-210 Annex A	Emissions		Pass
15.231(c)/	20dB Bandwidth /		Door
RSS-210 Annex A.1.3	ex A.1.3 99% Bandwidth		Pass
15.231(a)/	Transmission Time	Radiated	Door
RSS-210 Annex A.1.1(a)	Transmission Time		Pass
15.231(a)/	Duty Cyala		Dana
RSS-210 Annex A.1.1(a)	Duty Cycle		Pass
45 207 /	AC Conducted	Lina	
15.207 /	Emissions	Line	N/A
RSS Gen 8.8	150kHz - 30MHz	Conducted	

- Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.
- 2) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 3) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 4) The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
- 5) The EUT Power by Battery, so do not need to test Conducted Emissions.



## 6.2. Radiated Emissions

#### 6.2.1. Standard Applicable

According to §15.231(b) and RSS-210 Annex A.1.2, 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 emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	11,250 to 3,750	1125 to 375
174-260	3,750	375
260-470	13,750 to 12,500	1375 to 1,250
Above 470	12.500	1,250

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.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements start below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

#### 6.2.2. Test Procedure

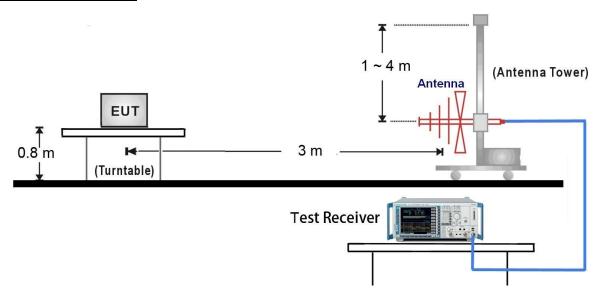
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit / RSS-Gen 8.9 and RSS-210 Annex A.1.2.



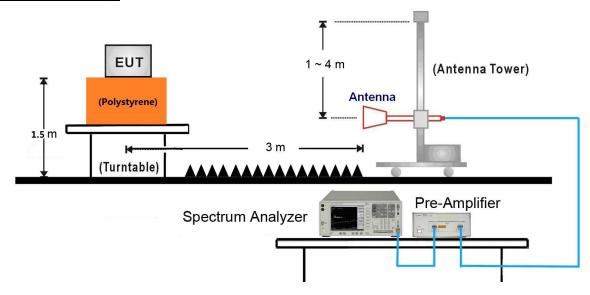
## 6.2.3. Test Setup

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit/ RSS-Gen 8.9 and RSS-210 Annex A.1.2.

## 30MHz ~ 1GHz Test Setup:



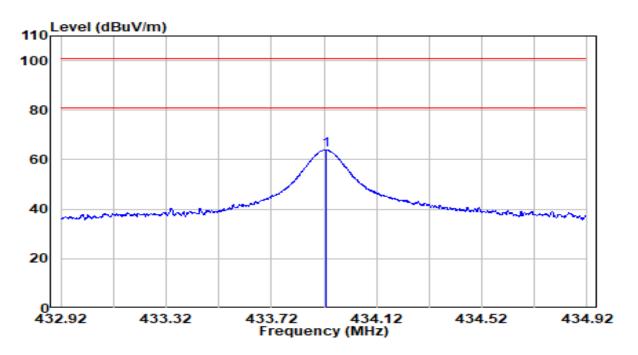
## 1GHz ~ 5GHz Test Setup:





#### 6.2.4. Test Results

EUT	Transmitter	Date of Test	2024-04-08
Factor	VULB 9162	Temp. / Humidity	23°C /60%
Polarity	Horizontal	Site / Test Engineer	AC2 / You
Test Mode	TX_433.92MHz	Test Voltage	By Battery

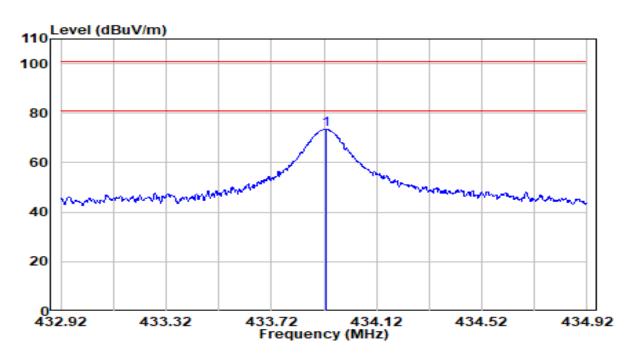


	No	Frequency	Reading	C.F	Measurement	Margin	Limit	Height	Angle	Remark
•	NO	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dB)	(dBuV/m)	(cm)	(deg)	(QP/PK/AV)
	1	* 433.926	40.26	23.66	63.91	-36.92	100.83	160	170	Peak

- 1. " \*", means this data is the worst emission level.
- 2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
- 3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.



EUT	Transmitter	Date of Test	2024-04-08
Factor	VULB 9162	Temp. / Humidity	23°C /60%
Polarity	Vertical	Site / Test Engineer	AC2 / You
Test Mode	TX_433.92MHz	Test Voltage	By Battery

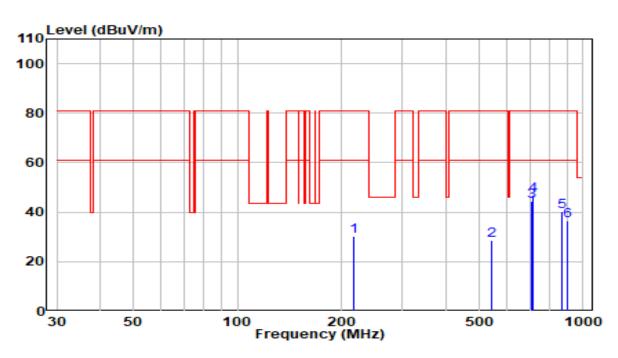


No	Frequency	Reading	C.F	Measurement	Margin	Limit	Height	Angle	Remark
INO	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dB)	(dBuV/m)	(cm)	(deg)	(QP/PK/AV)
1	* 433.930	49.78	23.66	73.43	-27.40	100.83	100	360	Peak

- 1. " \*", means this data is the worst emission level.
- 2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
- 3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.



EUT	Transmitter	Date of Test	2024-04-03		
Factor	VULB 9162	Temp. / Humidity	21°C /64%		
Polarity	Horizontal	Site / Test Engineer	AC2 / You		
Test Mode	TX_433.92MHz	Test Voltage	By Battery		

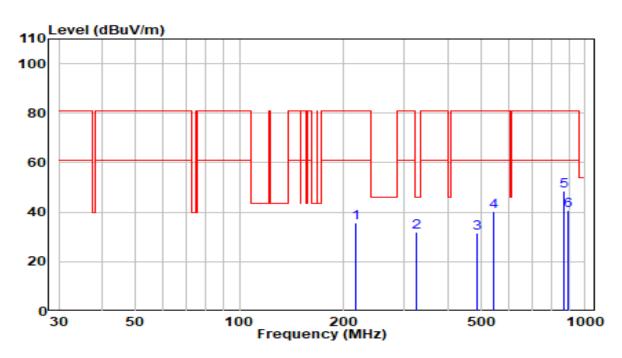


No	Frequency	Reading	C.F	Measurement	Margin	Limit	Height	Angle	Remark
INO	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dB)	(dBuV/m)	(cm)	(deg)	(QP/PK/AV)
1	216.240	12.21	18.10	30.31	-50.51	80.82	300	0	Peak
2	542.160	3.07	25.64	28.71	-52.11	80.82	300	0	Peak
3	709.970	16.30	28.27	44.56	-36.26	80.82	300	71	Peak
4	* 716.760	18.48	28.40	46.88	-33.94	80.82	300	71	Peak
5	868.080	9.49	30.62	40.11	-40.71	80.82	300	359	Peak
6	903.970	5.65	30.72	36.37	-44.45	80.82	300	29	Peak

- 1. " \*", means this data is the worst emission level.
- 2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
- 3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.



EUT	Transmitter	Date of Test	2024-04-03
Factor	VULB 9162	Temp. / Humidity	21°C /64%
Polarity	Vertical	Site / Test Engineer	AC2 / You
Test Mode	TX_433.92MHz	Test Voltage	By Battery

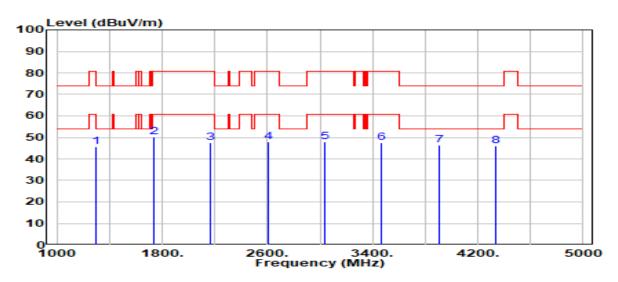


No		Frequency	Reading	C.F	Measurement	Margin	Limit	Height	Angle	Remark
INO		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dB)	(dBuV/m)	(cm)	(deg)	(QP/PK/AV)
1		216.240	17.79	18.10	35.89	-44.93	80.82	300	81	Peak
2	*	324.880	10.32	21.53	31.86	-14.14	46.00	152	360	Peak
3		487.840	6.74	24.72	31.46	-49.36	80.82	100	360	Peak
4		542.160	14.77	25.64	40.41	-40.41	80.82	100	360	Peak
5		868.080	17.74	30.62	48.36	-32.46	80.82	108	360	Peak
6		896.210	10.06	30.69	40.75	-40.07	80.82	244	360	Peak

- 1. " \*", means this data is the worst emission level.
- 2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
- 3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.



EUT	Transmitter	Date of Test	2024-04-02		
Factor	DRH18-E	Temp. / Humidity	23°C /60%		
Polarity	Horizontal	Site / Test Engineer	AC2 / You		
Test Mode	433.92MHz_TX	Test Voltage	By Battery		

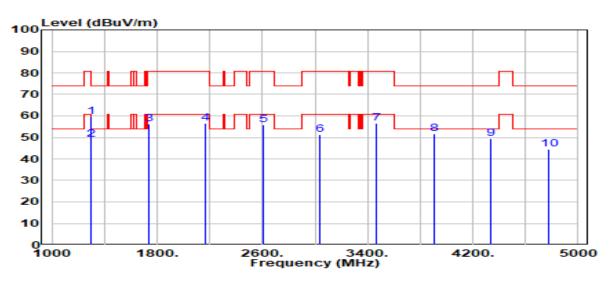


No	Frequency	Reading	C.F	Measurement	Margin	Limit	Height	Angle	Remark
No	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dB)	(dBuV/m)	(cm)	(deg)	(QP/PK/AV)
1	1301.760	53.47	-7.71	45.77	-28.23	74.00	300	36	Peak
2	1735.680	57.62	-7.27	50.36	-30.46	80.82	282	0	Peak
3	2169.600	53.22	-5.57	47.65	-33.17	80.82	246	0	Peak
4	2603.520	52.78	-4.97	47.81	-33.01	80.82	100	358	Peak
5	3037.440	51.80	-3.69	48.11	-32.71	80.82	100	342	Peak
6	3471.360	50.43	-2.84	47.60	-33.22	80.82	100	0	Peak
7	* 3905.280	47.79	-1.40	46.39	-27.61	74.00	100	25	Peak
8	4339.200	47.26	-1.19	46.07	-27.93	74.00	100	35	Peak

- 1. " \*", means this data is the worst emission level.
- 2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
- 3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 5. Average factor (20Log(1/Duty Cycle)) is 10.70dB.
- 6. Average Measurement = Peak Measurement Average factor.



EUT	Transmitter	Date of Test	2024-04-02		
Factor	DRH18-E	Temp. / Humidity	23°C /60%		
Polarity	Vertical	Site / Test Engineer	AC2 / You		
Test Mode	433.92MHz_TX	Test Voltage	By Battery		



No		Frequency	Reading	C.F	Measurement	Margin	Limit	Height	Angle	Remark
INO		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dB)	(dBuV/m)	(cm)	(deg)	(QP/PK/AV)
1	*	1301.760	67.39	-7.71	59.69	-14.31	74.00	165	360	Peak
2	*	1301.760	N/A	N/A	48.99	-5.01	54.00	165	360	Average
3		1735.680	63.43	-7.27	56.16	-24.66	80.82	100	289	Peak
4		2169.600	62.05	-5.57	56.48	-24.34	80.82	100	293	Peak
5		2603.520	60.79	-4.97	55.82	-25.00	80.82	200	183	Peak
6		3037.440	54.87	-3.69	51.19	-29.63	80.82	300	47	Peak
7		3471.360	59.58	-2.84	56.74	-24.08	80.82	200	86	Peak
8		3905.280	53.11	-1.40	51.71	-22.29	74.00	300	47	Peak
9		4339.200	50.55	-1.19	49.35	-24.65	74.00	200	125	Peak
10		4773.120	44.57	0.14	44.71	-29.29	74.00	300	109	Peak

- 1. " \*", means this data is the worst emission level.
- 2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
- 3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 5. Average factor (20Log(1/Duty Cycle)) is 10.70dB.
- 6. Average Measurement = Peak Measurement Average factor.



#### 6.3. 20dB Bandwidth / 99% Bandwidth

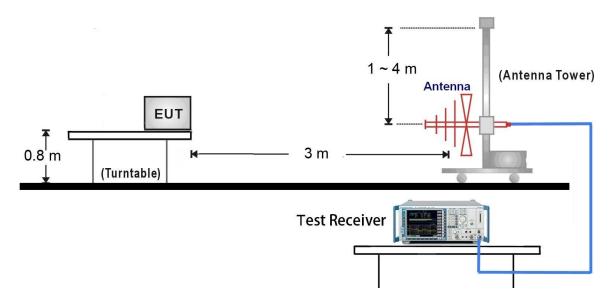
## 6.3.1. Standard Applicable

According to FCC Part 15.231(c) and RSS-210 Annex A.1.3, the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### 6.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

#### 6.3.3. Test Setup





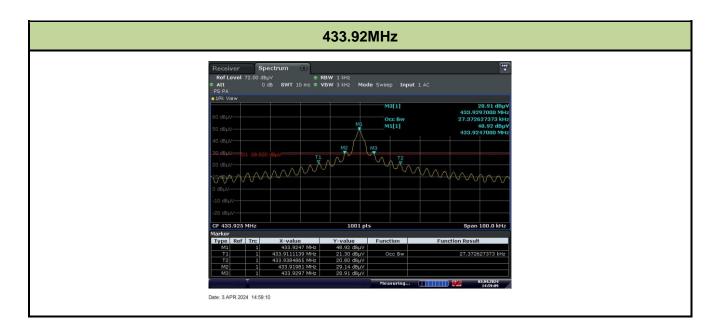
## 6.3.4. Test Result

Test Frequency (MHz)			Limit (kHz)	Result
433.92	9.890	27.373	≤ 1084.80	Pass

## Note:

Limit = Fundamental Frequency \* 0.25%, 433.92 MHz \* 0.25% = 1.0848MHz;

1.0848MHz \* 1000= 1084.80kHz.





#### 6.4. Transmission Time

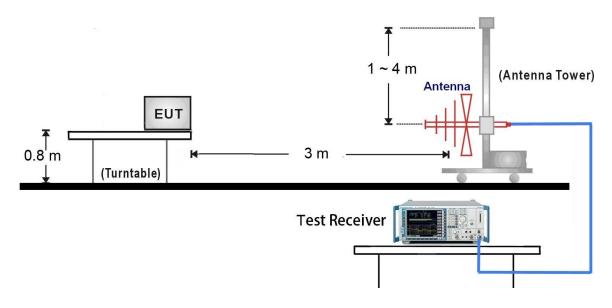
## 6.4.1. Standard Applicable

According to FCC 15.231(a)(1) and RSS-210 Annex A.1.1, A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

#### 6.4.2. Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 434MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

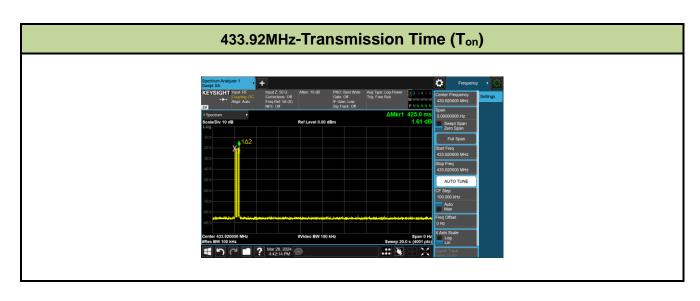
#### 6.4.3. Test Setup





## 6.4.4. Test Result

Test Item	Frequency (MHz)	Measurement (s)	Limit (s)	Result
Transmission Time (Ton)	433.92	0.425	< 5	Pass





## 6.5. Duty Cycle

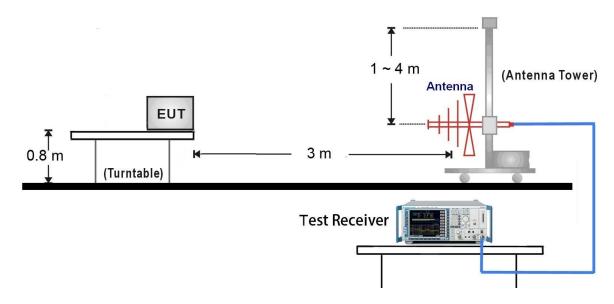
## 6.5.1. Standard Applicable

According to FCC Part 15.231(b) and 15.35(c), for pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

#### 6.5.2. Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 434MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

## 6.5.3. Test Setup





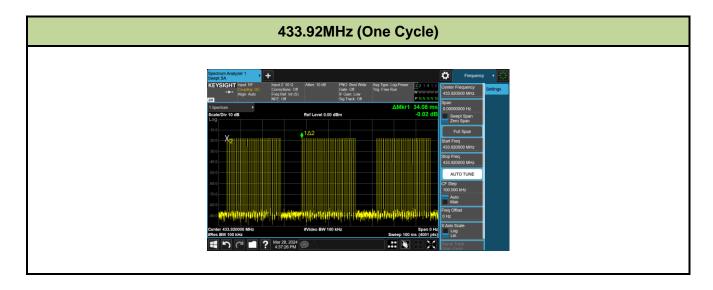
## 6.5.4. Test Result

Frequency (MHz)	Total Time (T <sub>on</sub> ) (ms)	The duration of one cycle (ms)	Duty Cycle (ms)	Average Factor (dB)
433.92	9.94	34.08	0.29	10.70

Note 1: Duty Cycle = Total Time  $(T_{on}) / (T_{on} + \overline{T_{off}})$ .

433.92MHz: (Long 664.3us\*6)+(Short 313.3us\*19) = 9938.5us, 9938.5us / 1000 = 9.94.

Note 2: Average Factor = 20\*Log\*(1/Duty Cycle).





## **433.92MHz** (T<sub>on</sub>-Long)



## 433.92MHz (Ton-Short)





## **6.6. AC Conducted Emissions Measurement**

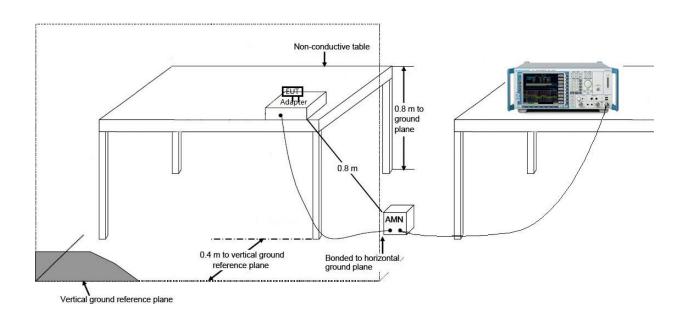
## 6.6.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 / RSS-Gen Limits				
Frequency (MHz)	QP (dBµV)	Average (dBμV)		
0.15 - 0.50	66 - 56	56 - 46		
0.50 - 5.0	56	46		
5.0 - 30	60	50		

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

## 6.6.2. Test Setup





## 6.6.3. Test Result

Note: The EUT Power by Battery, so do not need to test Conducted Emissions.



## 7. CONCLUSION

The data collected relate only the item(s) tested and show that the **Transmitter** is in compliance with FCC Rules/ IC RSS 210 Annex A1.1.

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# Appendix A : Test Photograph

Refer to "2403TW5403-UT" file.

# **Appendix B : External Photograph**

Refer to "2403TW5403-UE" file.

<b>Appendix</b>	C	: Internal	<b>Photograp</b>	h
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Refer to "2403TW5403-UI" file.		
	The End	