

FCC EMC Test Report

Report No.: JYTSZ-R01-2400394

Applicant: Shenzhen RodinBell Technology Co., Ltd.

Address of Applicant: 905#, Block B, Xinghe WORLD, Wuhe Avenue, Longgang District, Shenzhen City, PRC

Equipment Under Test (EUT)

Product Name: 4-port UHF RFID Module

Model No.: M-702

FCC ID: 2AKQD-M-702

Applicable Standards: FCC CFR Title 47 Part 15B

Date of Sample Receipt: 30 Jul., 2024

Date of Test: 31 Jul., to 23 Aug., 2024

Date of report Issued: 23 Aug., 2024

Test Result: PASS

Project by:	<u>Logan Li</u>	Date:	<u>23 Aug., 2024</u>
			
Reviewed by:	<u>Helen Chang</u>	Date:	<u>23 Aug., 2024</u>
	Senior Engineer		
Approved by:	<u>Janet Wei</u>	Date:	<u>23 Aug., 2024</u>
	Manager		

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 above the application standard version. Test results reported herein relate only to the item(s) tested.

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1 Version

Version No.	Date	Description
00	23 Aug., 2024	Original

2 Contents

Page

Cover Page	1
1 Version	2
2 Contents.....	3
3 General Information.....	4
3.1 Client Information	4
3.2 General Description of E.U.T.	4
3.3 Test Mode	4
3.4 Description of Test Auxiliary Equipment	5
3.5 Description of Cable Used.....	5
3.6 Measurement Uncertainty	5
3.7 Additions to, Deviations, or Exclusions from the Method	5
3.8 Laboratory Facility	5
3.9 Laboratory Location.....	6
3.10 Test Instruments List.....	6
4 Measurement Setup and Procedure	7
4.1 Test Setup	7
4.2 Test Procedure	8
5 Test Results.....	9
5.1 Summary	9
5.1.1 Clause and data summary	9
5.1.2 Test Limit.....	9
5.2 Radiated Emission	10

3 General Information

3.1 Client Information

Applicant:	Shenzhen RodinBell Technology Co., Ltd.
Address:	905#, Block B, Xinghe WORLD, Wuhe Avenue, Longgang District, Shenzhen City, PRC
Manufacturer:	Shenzhen RodinBell Technology Co., Ltd.
Address:	905#, Block B, Xinghe WORLD, Wuhe Avenue, Longgang District, Shenzhen City, PRC

3.2 General Description of E.U.T.

Product Name:	4-port UHF RFID Module
Model No.:	M-702
Power Supply:	DC 4.8V
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

3.3 Test Mode

Operating Mode	Detail Description
Working mode	Keep the EUT in Working mode
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

3.4 Description of Test Auxiliary Equipment

Manufacturer	Description	Model	S/N	FCC ID/DoC
Lenovo	Laptop	ThinkPad T14 Gen 1	SL10Z47277	DoC
RUN SHENG FENG POWER	Adapter	RSF-DY103A-1204000	N/A	DoC

3.5 Description of Cable Used

Cable Type	Description	Length	From	To
N/A	N/A	N/A	N/A	N/A

3.6 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Radiated Emission (30MHz ~ 200MHz) (3m SAC)	4.6 dB
Radiated Emission (200MHz ~ 1000MHz) (3m SAC)	5.8 dB
Radiated Emission (1GHz ~ 6GHz) (3m SAC)	4.5 dB
Radiated Emission (6GHz ~ 18GHz) (3m SAC)	4.7 dB

Note: All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

3.7 Additions to, Deviations, or Exclusions from the Method

No

3.8 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

3.9 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

3.10 Test Instruments List

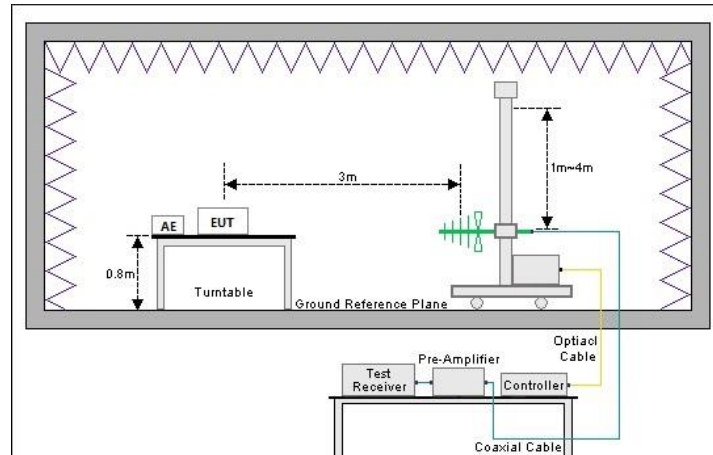
Radiated Emission(3m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2026
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	01-09-2024	01-08-2025
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	01-05-2024	01-04-2025
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	12-27-2023	12-26-2024
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	12-27-2023	12-26-2024
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	12-27-2023	12-26-2024
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	12-27-2023	12-26-2024
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-17-2024	01-16-2025
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-17-2024	01-16-2025
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

4 Measurement Setup and Procedure

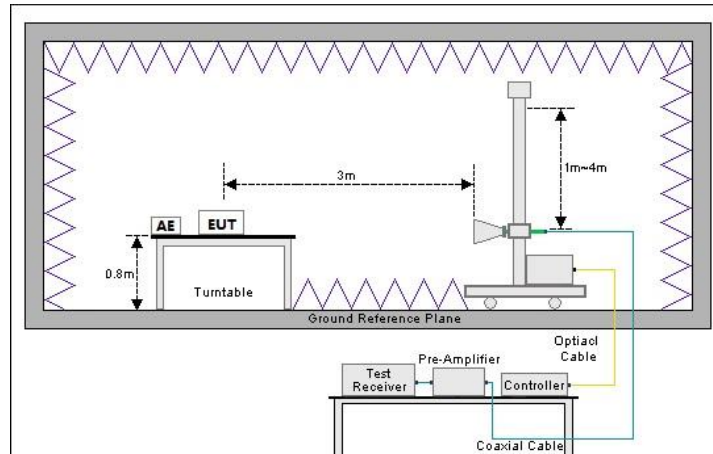
4.1 Test Setup

1) Radiated emission measurement:

Below 1GHz (3m SAC)



Above 1GHz (3m SAC)



4.2 Test Procedure

Test method	Test step
Radiated emission	For below 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m . 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. For above 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

5 Test Results

5.1 Summary

5.1.1 Clause and data summary

Test items	Standard clause	Test data	Result
Conducted Emission	Part 15.107	N/A	N/A
Radiated Emission	Part 15.109	See Section 5.2	Pass
Remark: 1. The EUT is a Class B digital device. 2. Pass: The EUT complies with the essential requirements in the standard. 3. N/A: Not Applicable.			
Test Method:	ANSI C63.4:2014		

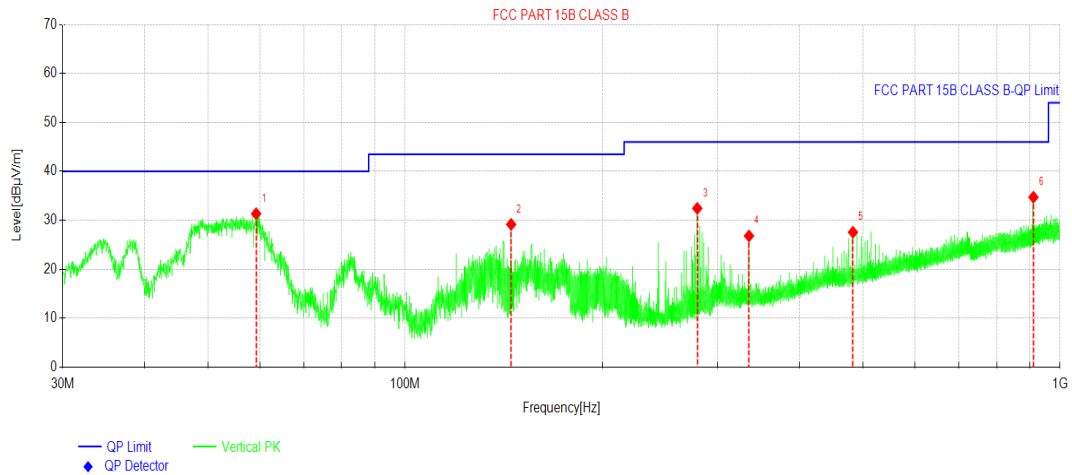
5.1.2 Test Limit

Test items	Limit				
Radiated Emission	Frequency (MHz)	Class A Limit (dBµV/m)		Class B Limit (dBµV/m)	
		Quasi-Peak @ 3m	Quasi-Peak @ 10m	Quasi-Peak @ 3m	Quasi-Peak @ 10m
	30 – 88	49.0	39.0	40.0	30.0
	88 – 216	53.5	43.5	43.5	33.5
	216 – 960	56.0	46.0	46.0	36.0
	960 – 1000	60.0	50.0	54.0	44.0
	Note: The more stringent limit applies at transition frequencies.				
	Frequency	Class A Limit (dBµV/m) @ 3m		Class B Limit (dBµV/m) @ 3m	
		Average	Peake	Average	Peake
	Above 1 GHz	60.0	80.0	54.0	74.0
	Note: The measurement bandwidth shall be 1 MHz or greater.				

5.2 Radiated Emission

Below 1GHz:

Product Name:	4-port UHF RFID Module	Product Model:	M-702
Test By:	Kiran Zeng	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



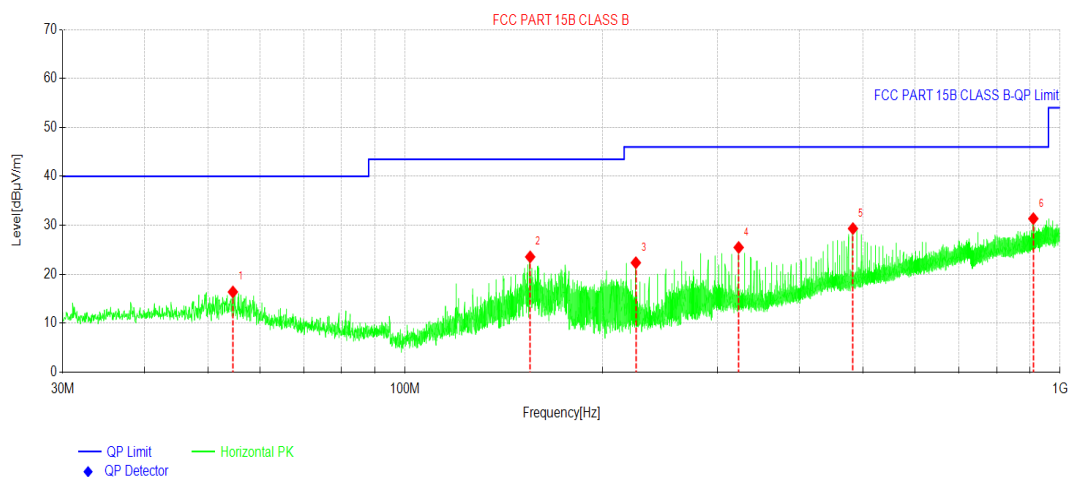
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	59.2470	46.23	-14.88	31.35	40.00	8.65	PK	Vertical
2	145.193	43.50	-14.33	29.17	43.50	14.33	PK	Vertical
3	279.351	46.77	-14.33	32.44	46.00	13.56	PK	Vertical
4	335.031	39.56	-12.75	26.81	46.00	19.19	PK	Vertical
5	482.867	35.99	-8.42	27.57	46.00	18.43	PK	Vertical
6	910.610	34.78	-0.06	34.72	46.00	11.28	PK	Vertical

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	4-port UHF RFID Module	Product Model:	M-702
Test By:	Kiran Zeng	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



Suspected Data List

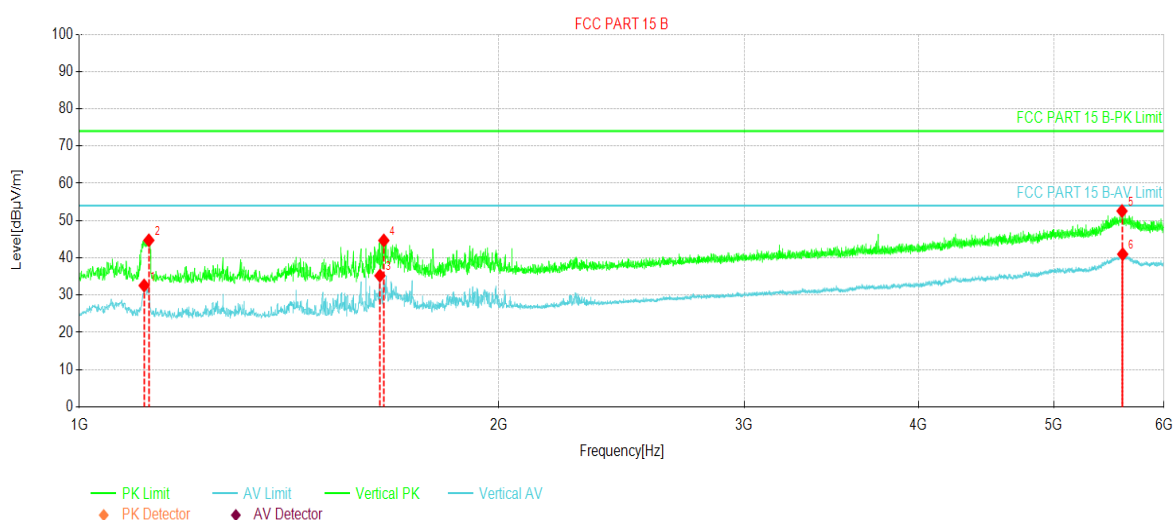
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	54.5907	30.51	-14.12	16.39	40.00	23.61	PK	Horizontal
2	155.233	37.46	-13.91	23.55	43.50	19.95	PK	Horizontal
3	225.076	38.66	-16.30	22.36	46.00	23.64	PK	Horizontal
4	323.100	38.52	-13.05	25.47	46.00	20.53	PK	Horizontal
5	482.818	37.75	-8.42	29.33	46.00	16.67	PK	Horizontal
6	910.222	31.44	-0.08	31.36	46.00	14.64	PK	Horizontal

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Above 1GHz:

Product Name:	4-port UHF RFID Module	Product Model:	M-702
Test By:	Alan Chen	Test mode:	Working mode
Test Frequency:	1000 MHz ~ 6000 MHz	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



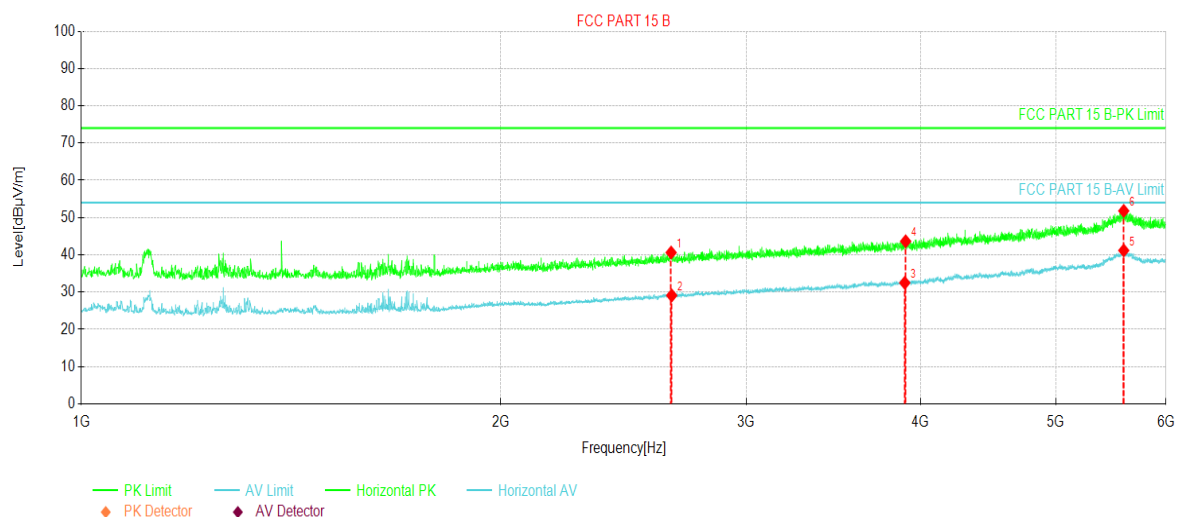
Suspected Data List

NO.	Freq. [MHz]	Reading[dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1113.1391	55.38	-22.81	32.57	54.00	21.43	PK	Vertical
2	1121.8902	67.55	-22.85	44.70	74.00	29.30	PK	Vertical
3	1643.2054	57.88	-22.67	35.21	54.00	18.79	PK	Vertical
4	1653.8317	67.29	-22.64	44.65	74.00	29.35	PK	Vertical
5	5598.0748	56.94	-4.38	52.56	74.00	21.44	PK	Vertical
6	5604.3255	45.36	-4.39	40.97	54.00	13.03	PK	Vertical

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	4-port UHF RFID Module	Product Model:	M-702
Test By:	Alan Chen	Test mode:	Working mode
Test Frequency:	1000 MHz ~ 6000 MHz	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



Suspected Data List

NO.	Freq. [MHz]	Reading[dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	2649.58	59.23	-18.62	40.61	74.00	33.39	PK	Horizontal
2	2652.08	47.70	-18.61	29.09	54.00	24.91	PK	Horizontal
3	3897.23	46.78	-14.29	32.49	54.00	21.51	PK	Horizontal
4	3902.86	57.89	-14.27	43.62	74.00	30.38	PK	Horizontal
5	5595.57	45.60	-4.43	41.17	54.00	12.83	PK	Horizontal
6	5595.57	56.22	-4.43	51.79	74.00	22.21	PK	Horizontal

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

-----End of report-----