

FCC MPE Evaluation Report

Report No: WD-RF-R-230316-G0

Product Name : Doorbell
Model Name : DR40
FCC ID : 2AZ3JDR40
Applicant : Rhombus Systems, Inc.
Received Date : Sep. 01, 2023
Tested Date : Sep. 11, 2023 ~ Oct. 16, 2023
Applicable Standard : 47 CFR FCC Part 2.1091
47 CFR FCC Part 1.1310
KDB 447498 D01
OET Bulletin 65 Supplement C



Wendell Industrial Co., Ltd
Wendell EMC & RF Laboratory

Caution:

This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment.

Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of Wendell Industrial Co., Ltd..

Test Report

Issued Date: October 16, 2023

Project No.: 22Q090502

Product Name	Doorbell
Trade Name	rhombus
Brand Trademark	 rhombus
Model Name	DR40
FCC ID	2AZ3JDR40
Applicant	Rhombus Systems, Inc.
Manufacturer	Dynacolor Inc.
EUT Rated Voltage	DC 12V ~ 28V 、 POE 42.5V ~ 57V
EUT Test Voltage	AC 120V / 60Hz
EUT Supports Radios Application	WLAN 802.11a/b/g 、 WLAN 802.11n (HT20/HT40) WLAN 802.11ac (VHT20/VHT40/VHT80) Bluetooth BR/EDR/LE 、 NFC 13.56 MHz
Applicable Standard	47 CFR FCC Part 2.1091 47 CFR FCC Part 1.1310 KDB 447498 D01 OET Bulletin 65 Supplement C
RF Evaluation	0.08699 mW/cm ²
Test Result	Complied

Documented :



(Specialist / Emma Lu)

Technical Engineer :



(Section Manager / Jack Chang)

Approved :



(Project Manager / Gary Wu)

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Document Revision History

Report No.	Issue date	Description
WD-RF-R-230316-G0	October 16, 2023	Initial report

Reference Testing Standard

Standard	Description	Version
47 CFR FCC Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	--
47 CFR FCC Part 1.1310	Radiofrequency radiation exposure limits.	--
KDB 447498 D01	RF Exposure procedures and equipment authorization policies for mobile and portable devices.	V06
OET Bulletin 65 Supplement C	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.	Edition 01-01

1 Generation Information

1.1 Applicant

Rhombus Systems, Inc.
1920 20th St, Sacramento, CA 95811

1.2 Manufacturer

Dynacolor Inc.
NO. 116 JOU TZ STREET, NEIHU, TAIPEI 114, TAIWAN

1.3 Description of Equipment under Test

Product Name	Doorbell
Model No.	DR40
FCC ID	2AZ3JDR40
Frequency Range	802.11b/g/n-20MHz: 2412~2462MHz Bluetooth BR/EDR: 2402-2480MHz NFC: 13.56 MHz
Antenna Information	Refer to the table “Antenna List”

The above equipment was tested by Wendell EMC & RF Laboratory For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	INPAQ	RFMTA211200NNLB001	Metal Antenna	3.51 dBi for 2.4 GHz
2	INPAQ	RFNFC363006IMFB301	PCB Antenna	N/A

1.4 Test Facility

Items	Required (IEC 60068-1)
Temperature (°C)	15-35
Humidity (% RH)	25-75
Barometric pressure (mbar)	860-1060

Description: Accredited by TAF
Accredited Number: 2965

Issued by: Wendell Industrial Co., Ltd

Company Address: 6F/6F-1, No.188, Baoqiao Rd., Xindian Dist.,
New Taipei City 23145, Taiwan R.O.C

Test Lab: Wendell EMC & RF Laboratory

Lab Address: 5F-1, No.188, Baoqiao Rd., Xindian Dist.,
New Taipei City 23145, Taiwan R.O.C

Test Location: No. 119, Wugong 3rd Rd., Wugu Dist.,
New Taipei City 248, Taiwan (R.O.C.)

Designation Number: TW0025

Test Firm Registration Number: 665221

2 Mobile device Assessment Procedure

In 47 CFR § 2.1091, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location.

3 RF Exposure Assessment

Estimation of the expected exposure in power density can be made with the following equation:

$$S = \frac{P \times G}{4\pi \times R^2} = \frac{\text{EIRP}}{4\pi \times R^2}$$

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.

EIRP: Effective Isotropic Radiated Power

4 Limit Requirement

In 47 CFR § 1.1310, use of the device as based upon the user's awareness and ability to exercise control over human exposure. The two categories defined are Occupational/Controlled Exposure and General Population/Uncontrolled. These two categories are defined as follow:

Occupational/Controlled Exposure:

Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.

General Population/Uncontrolled:

General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / f	4.89 / f	(900 / f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f / 300	6
1,500-100,000	--	--	5	6

Note :

(1) f = frequency in MHz

(2) * = Plane-wave equivalent power density

Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (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 / 1,500	30
1,500-100,000	--	--	1.0	30

Note :

(1) f = frequency in MHz

(2) * = Plane-wave equivalent power density

5 Test Results

Mode	Max. Power (E.I.R.P)		Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
	dBm	mW				
BT	9.39	8.69	20	0.00173	1	Pass
LE	6.68	4.66	20	0.00093	1	Pass
WLAN 2.4G	26.32	428.55	20	0.08526	1	Pass
WLAN 5G	13.09	20.37	20	0.00405	1	Pass
NFC 13.56M	-26.51	0.002	20	0.00000	0.978933354	Pass

Note :

- * Each Function of the max power which perform MPE of any configurations.
- * The total power of BT 、WLAN 2.4G and NFC 13.56MHz transmission at the same time is the largest.
- * The BT and LE cannot be transmitted at the same time.
- * The WLAN 2.4G and WLAN 5G cannot be transmitted at the same time.
- * dBμV/m to dBm conversion formula : $\text{dBm} = \text{dB}\mu\text{V/m} + 20 \cdot \log(m) - 104.77$ ($m = 3\text{m}$ distance)
- * $\text{NFC}_{13.56\text{MHz}} \text{ Max.Power} = 68.72 \text{ dB}\mu\text{V/m} = -26.51 \text{ dBm}$
- * The frequency (range) used by the radio frequency function is 1.5GHz~100GHz, the RF field strength limits is e.i.r.p. less than or equal to 1mW/cm^2 .
- * The limit is equal to the minimum value.
- * The Max total MPE = BT + WLAN 2.4G + NFC 13.56M = $0.08699 \text{ (mW/cm}^2\text{)}$

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