FCC MPE Evaluation Report

Report No: WD-RF-R-230178-C0

Product Name	:	RFID Reader
Model No	:	DF700A
Multi-listing Model No.	:	DF700A-00, DF710A-00, DF710A-U2, ACC-D5280
FCC ID	:	WXADF700A
Applicant	:	GIGA-TMS INC
Received Date	:	Jun. 06, 2023
Tested Date	:	Jun. 09, 2023 ~ Jun. 20, 2023
Applicable Standard	:	47 CFR FCC Part 2.1091 47 CFR FCC Part 1.1310 KDB 447498 D01 OET Bulletin 65 Supplement C

Testing Laboratory
2965

Wendell Industrial Co., Ltd
Wendell EMC & RF Laboratory

Test Report

Issued Date: June 21, 2023

Project No.: 23Q050802

Product Name	RFID Reader
Trade Name	PROMAG, GIGATEK, ProxData
Model No	DF700A
Multi-listing Model No.	DF700A-00, DF710A-00, DF710A-U2, ACC-D5280
FCC ID	WXADF700A
Applicant	GIGA-TMS INC
Manufacturer	GIGA-TMS INC
EUT Rated Voltage	DC 9 ~ 24V
EUT Test Voltage	DC 12V
EUT Supports Radios Application	RFID 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	0.0008 mW
Test Result	Complied

Documented : Emma Lu

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(Project Manager / Gary Wu)

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Document Revision History

Report No.	Issue date	Description
WD-RF-R-230178-C0	June 21, 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

GIGA-TMS INC
8F. NO31, Lane 169, Kang-Ning St., His-Chih, New Taipei City 22180, Taiwan

1.2 Manufacturer

GIGA-TMS INC
8F. NO31, Lane 169, Kang-Ning St., His-Chih, New Taipei City 22180, Taiwan

1.3 Description of Equipment under Test

Product Name	RFID Reader
Model No	DF700A
Multi-listing Model No.	DF700A-00, DF710A-00, DF710A-U2, ACC-D5280
Model Difference	Refer to the table "Series Difference List"
FCC ID	WXADF700A
Frequency Range	13.56 MHz

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

Series Difference List

Model / Differences	Model No.	Multi-listing Model No.			
	DF700A	DF700A-00	DF710A-00	DF710A-U2	ACC-D5280
RS 232	The model name of this project is collectively called as DF700A.	V	--	--	--
RS 485		--	V	V	V
8 pins		V	V	--	--
10 pins		--	--	V	V

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	N/A	PCB-T2889A	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

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

Test Lab: Wendell EMC & RF Laboratory

Test Location: 1F., 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:

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

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/ cm²)**	**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/ cm²)**	**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

RF Exposure Test Exemptions for Single Source

1-mW Test Exemption：Per § 1.1307(b)(3)(i)(A), a single RF source is *exempt RF device* (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

SAR-Based Exemption：A more comprehensive exemption, considering a variable power threshold that depends on both the *separation distance* and power, is provided in § 1.1307(b)(3)(i)(B). This exemption is applicable to the frequency range between 300 MHz and 6 GHz, with *test separation distances* between 0.5 cm and 40 cm, and for all RF sources in fixed, mobile, and portable device exposure conditions.

MPE-Based Exemption：An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power.[10] For this case, a RF source is an *RF exempt device* if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

RF Exposure Test Exemptions for Simultaneous Transmission Sources

1-mW Test Exemption for Multiple Sources：As discussed in § 1.1307(b)(3)(ii)(A), the 1-mW exemption intended for single transmitters may be also applied to simultaneous transmission conditions, within the same host device, according one of the following criteria:

a) When maximum available power each individual transmitting antenna within the same time averaging period is ≤ 1 mW, and the nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm.

b) When the aggregate maximum available power of all transmitting antennas is ≤ 1 mW in the same time-averaging period.

Simultaneous Transmission with both SAR-based and MPE-Based Test Exemptions：This case is described in detail in § 1.1307(b)(3)(ii)(B) and covers the situations where both SAR-based and MPE-based exemption may be considered for test exemption in fixed, mobile, or portable device exposure conditions. For these cases, a device with multiple RF sources transmitting simultaneously will be considered an *RF exempt device* if the condition of Formula (1) is satisfied.

$$\sum_{t=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evakyated_k}{Exposure\ Limit_k}\le 1 \qquad (1)$$

Test Exemption Based on the SAR to Peak Location Separation Ratio：When the ERP-based condition in the previous section does not apply, a test exemption may be still applicable based on the SAR to peak location separation ratio (SPLSR) [Glossary] procedure, discussed in more detail in Appendix E of KDB 447498.

5 Test Results

Mode	Max. Power (E.I.R.P)		Limit (mW)	Result
	dBm	mW		
RFID 13.56M	-31.10	0.0008	1mW	Pass

Note：The total power is less than 1mW. Compliance RF Exposure Test Exemption.

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