PHOENIX TESTLAB

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Test Report

Report Number:

F231801E2

Equipment under Test (EUT):

GIRO RFID MIFARE

Applicant:

Martin Lehmann GmbH & Co. KG

Manufacturer:

Martin Lehmann GmbH & Co. KG

ilac-MRA

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

[1] IEEE Std C95.3™-2021 IEEE Recommended Practice for Measurements and Computations of Electric, Magnetic, and Electromagnetic Fields with Respect to Human Exposure to Such Fields, 0 Hz to 300 GHz

[2] IEEE Std C95.1™-2019, IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz. (Revision of IEEE Std C95.1-2005/ Incorporates IEEE Std C95.1-2019/Cor 1-2019)

Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.
“Passed” indicates that the equipment under test conforms with the relevant limits of the testing standard without taking any measurement uncertainty into account. However, the measurement uncertainty is calculated and shown in this test report.

Tested and written by:	 Sebastian KREHS 22.05.2024	Signature
Reviewed and approved by:	 Michael DINTER 22.05.2024	Signature

This test report is only valid in its original form.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

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1 Identification

1.1 Applicant

Name:	Martin Lehmann GmbH & Co. KG
Address:	Uphauser Weg 82, 32429 Minden
Country:	Germany
Name for contact purposes:	-
Phone:	0571-5046-0
eMail address:	info@lehmann-locks.com
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Martin Lehmann GmbH & Co. KG
Address:	Uphauser Weg 82, 32429 Minden
Country:	Germany
Name for contact purposes:	-
Phone:	0571-5046-0
eMail address:	info@lehmann-locks.com
Manufacturer represented during the test by the following person:	-

1.3 Test Laboratory

The tests were carried out by:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) according to DIN EN ISO/IEC 17025:2018. The accreditation is only valid for the scope of accreditation listed in the annex of the certificate D-PL-17186-01-00, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

Test object: *	Electronic furniture lock
Model name: *	GIRO RFID MIFARE
Model number: *	L5NF13DX
Order number: *	---
FCC ID: *	W2Y-L5NF13DX
IC certification number: *	8141A-L5NF13DX
PMN: *	GIRO RFID MIFARE
HVIN: *	L5NF13DX
FVIN: *	----

	EUT number		
	1	2	3
Serial number: *	Engineering sample	-	-
PCB identifier: *	SA020-1	-	-
Hardware version: *	SA020-11G	-	-
Software version: *	V2.0.0	-	-

* Declared by the applicant

One EUT was used for all tests.

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

General			
Power supply EUT: *	Lithium-Battey CR 123A 1600 mAh		
Supply voltage EUT: *	U_{nom} = 3.0 V	U_{min} = 2.0 V	U_{max} = 5.0 V
Temperature range: *	-5 °C to +60 °C		
Lowest / highest internal frequency: *	32.768 kHz / 32 MHz		

* Declared by the applicant

RFID part	
Operating frequency: *	13.56 MHz
Number of channels: *	1
Type of modulation: *	100% ASK
Data rate: *	106 kbit/s
Duty cycle: *	-
Antenna type: *	Integrated PCB antenna
Antenna connector: *	None

* Declared by the applicant

Equipment used for testing	

*1 Provided by the applicant
*2 Provided by the laboratory

Ancillary equipment	
NFC Card*1	MIFARE DESFIRE transponder card

*1 Provided by the applicant

1.6 Dates

Date of receipt of test sample:	18.10.2023
Start of test:	22.05.2024
End of test:	22.05.2024

2 Operational States

Description of function of the EUT:

The GIRO MIFARE electronic lock is an access control system for furniture. It provides RFID functionality. The EUT is supplied via battery. This lock opens when a transponder authorized for access is recognized by the reader.
In normal operation mode, the EUT detects when the RF field of the RFID transceiver is changed, e. g. when a TAG is placed in front of the EUT. The EUT then tries to read a TAG. When the reading is not successful, the EUT returns to sleep mode.

The EUT has an integrated antenna.

The following states were defined as the operating conditions:

The EUT was supplied by 3 V DC lithium battery CR 123 A during all tests.
The EUT was set into continuous reading mode. A green flashing LED and a Beep noise shows the correct reading of a TAG.

3 Additional Information

The EUT was not labeled as required by FCC / IC.

4 Overview

Whole-body exposure ERLs (100 kHz to 300 GHz)

Because of the difficulty in determining whether an exposure complies with the DRLs, ERLs were derived. The ERLs, which protect against adverse health effects associated with heating, are provided in this subclause for convenience in exposure assessments. For human exposure to electromagnetic energy at radio frequencies from 100 kHz to 300 GHz, the ERLs, in terms of rms electric (E) and magnetic (H) field strengths, the power density (S) and plane-wave-equivalent power densities (SE, SH) are presented as a function of frequency in Table 7 and Table 8. For uncorrelated (in time) fields, such as multiple field exposure situations (e.g., different frequency field sources), compliance is determined by summing the percentages of the applicable ERLs in terms of E^2, H^2, or power density that each frequency field represents and ensuring that this sum does not exceed 100 % (IEC/TR 62630 [B659]). If exposure levels are determined via theoretical analysis, consideration of possible reflections of fields shall be included. For frequencies between 100 kHz and 6 GHz, compliance with Table 7 and Table 8 implies compliance with the DRLs for WBA SAR. However, lack of compliance with Table 7 and Table 8 does not necessarily imply lack of compliance with the DRLs, but rather to demonstrate compliance, it shall then be necessary to perform additional evaluations to determine whether the DRLs have been met. If the DRLs given earlier are not exceeded, the ERLs in Table 7 and Table 8 may be exceeded. Consequently, it is sufficient to demonstrate compliance with either the whole-body DRLs in Table 5 (see 4.3.1) or the whole-body ERLs in Table 7 or Table 8. Note that between 6 GHz and 300 GHz, the ERLs in Table 7 and Table 8 are in terms of field strength and power density, and whole-body average SAR does not apply.

Glossary:
ERLs (**E**xposure **R**eference **L**evel)
DRLs (**D**osimetric **R**eference **L**evel)
WBA (**W**hole-**B**ody **A**verage)
SAR (**S**pecific **A**bsorption **R**ate)

Limits according to [2]

Table 7—ERLs for whole-body exposure of persons in unrestricted environments (100 kHz to 300 GHz) [see Figure 3 for graphical representation]

Frequency range (MHz)	Electric field strength (E)[a,b,c] (V/m)	Magnetic field strength (H)[a,b,c] (A/m)	Power density (S)[a,b,c] (W/m^2)		Averaging time (min)
			S_E	S_H	
0.1 to 1.34	614	16.3 / f_M	1000	100 000 / f_M^2	30
1.34 to 30	823.8 / f_M	16.3 / f_M	1800 / f_M^2	100 000 / f_M^2	30
30 to 100	27.5	158.3 / $f_M^{1.668}$	2	9 400 000 / $f_M^{3.336}$	30
100 to 400	27.5	0.0729	2		30
400 to 2000	—	—	f_M / 200		30
2000 to 300 000	—	—	10		30

NOTE—S_E and S_H are plane-wave-equivalent power density values, based on electric or magnetic field strength respectively, and are commonly used as a convenient comparison with ERLs at higher frequencies and are sometimes displayed on commonly used instruments.

[a] For exposures that are uniform over the dimensions of the body, such as certain far-field plane-wave exposures, the exposure field strengths and power densities are compared with the ERLs in Table 7. For more typical nonuniform exposures, the mean values of the exposure fields, as obtained by spatially averaging the plane-wave-equivalent power densities or the squares of the field strengths, are compared with the ERLs in Table 7. (See notes to Table 7 through Table 11 in 4.3.5.)

[b] f_M is the frequency in MHz.

[c] The E, H, and S values are those rms values unperturbed by the presence of the body.

Table 8—ERLs for whole-body exposure of persons permitted in restricted environments (100 kHz to 300 GHz) [see Figure 4 for graphical representation]

Frequency range (MHz)	Electric field strength (E)[a,b,c] (V/m)	Magnetic field strength (H)[a,b,c] (A/m)	Power density (S)[a,b,c] (W/m^2)		Averaging time (min)
			S_E	S_H	
0.1 to 1.0	1842	16.3 / f_M	9000	100 000 / f_M^2	30
1.0 to 30	1842 / f_M	16.3 / f_M	9000 / f_M^2	100 000 / f_M^2	30
30 to 100	61.4	16.3 / f_M	10	100 000 / f_M^2	30
100 to 400	61.4	0.163	10		30
400 to 2000	—	—	f_M / 40		30
2000 to 300 000	—	—	50		30

NOTE—S_E and S_H are plane-wave-equivalent power density values, based on electric or magnetic field strength respectively, and are commonly used as a convenient comparison with ERLs at higher frequencies and are sometimes displayed on commonly used instruments.

[a] For exposures that are uniform over the dimensions of the body, such as certain far-field plane-wave exposures, the exposure field strengths and power densities are compared with the ERLs in Table 8. For more typical nonuniform exposures, the mean values of the exposure fields, as obtained by spatially averaging the plane-wave-equivalent power densities or the squares of the field strengths, are compared with the ERLs in Table 8. (See notes to Table 7 through Table 11 in 4.3.5.)

[b] f_M is the frequency in MHz.

[c] The E, H, and S values are those rms values unperturbed by the presence of the body.

IEEE Std C95.1-2019
IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

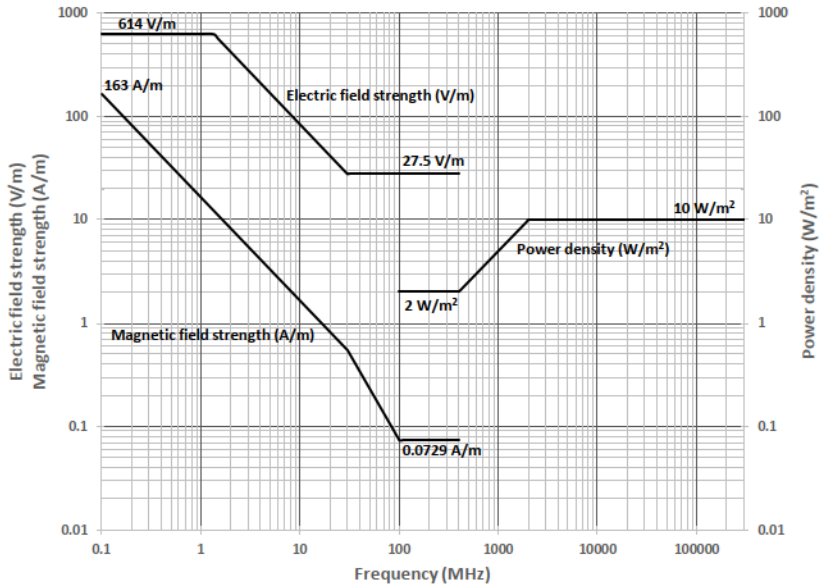

Figure 3—Graphical representations of the ERLs in Table 7 for electric and magnetic fields and plane-wave-equivalent power density—Persons in unrestricted environments

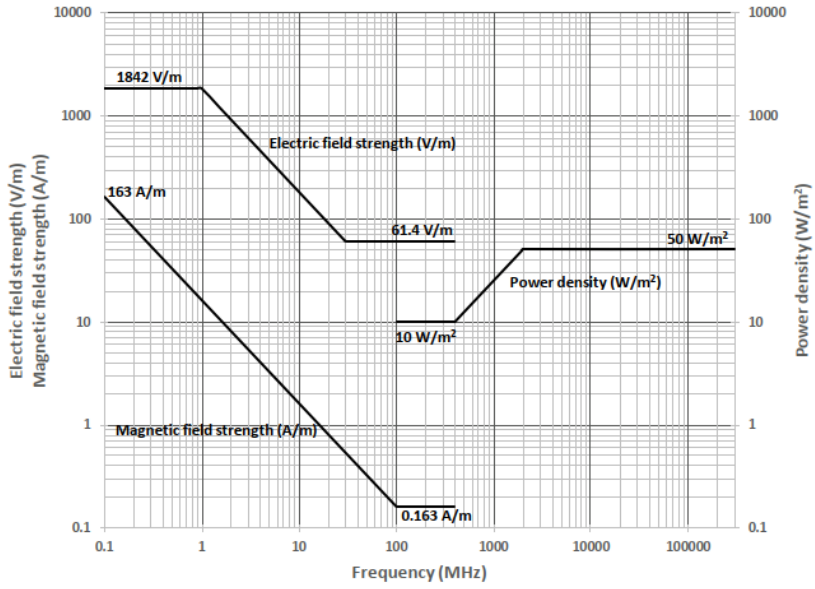

Figure 4—Graphical representations of the ERLs in Table 8 for electric and magnetic fields and plane-wave-equivalent power density—Persons permitted in restricted environments

5 Results

5.1 Measurement of E and H field strength

Ambient temperature:	22 °C
Relative humidity:	59 %

Date:	22.05.2024
Tested by:	S. KREHS

The EUT operates in the frequency range 100 kHz to 300 GHz (operating frequency = 13.56 MHz).

Because the EUT can be touched by the user's hands during normal operation the field probe was placed directly in front of the EUT (measurement with continuous reading a TAG), which means a measuring distance of 0 cm. The position of the maximum field strength and the test setup are shown in the photograph below.

Parameter	Result	Limit	Test result
Electric field strength	27.86 V/m at 0 cm distance (max hold)*2	60.75 V/m	Passed *
Measurement uncertainty		20.62 %	

* The GIRO RFID MIFARE generates an electric field strength, which is below the level for ERLs for whole-body exposure of persons in unrestricted environments [2].

Remark*2: The measurement was carried out in max hold function. A measurement with RMS over 30 minutes will generate less field strength than noted here.

Test equipment (please refer to chapter 7 for details)
1

Ambient temperature:	22 °C
Relative humidity:	59 %

Date:	22.05.2024
Tested by:	S. KREHS

The EUT operates in the frequency range 100 kHz to 300 GHz (operating frequency = 13.56 MHz).

Because the EUT can be touched by the user's hands during normal operation the field probe was placed directly in front of the EUT (measurement with continuous reading TAG), which means a measuring distance of 0 cm. The position of the maximum field strength and the test setup are shown in the photograph below.

Parameter	Result	Limit	Test result
Electric field strength	1.008 A/m at 0 cm distance (max hold)*2	1.202 A/m	Passed *
Measurement uncertainty		20.62 %	

* The GIRO RFID MIFARE generates a magnetic field strength, which is below the level for ERLs for whole-body exposure of persons in unrestricted environments [2].

Remark*2: The measurement was carried out in max hold function. A measurement with RMS over 30 minutes will generate less field strength than noted here.

Test equipment (please refer to chapter 7 for details)
1

6 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. Due
1	Isotropical E- and H-fieldanalyser	EHP-200A	Narda	170WX80314	482643	31.08.2023	08.2025

7 Report History

Report Number	Date	Comment
F231801E2	22.05.2024	Initial Test Report
-	-	-
-	-	-