

Applicant:
HERMOS AG
Gartenstr. 19
95490 Mistelgau
Tel.: +49 9279 991-0

Test report no.:
220194-AU01+W02
for:
HERMOS AG
134 kHz RFID Reader
LF WIP-Regal 32x RFID kit

according to:
47 CFR Part 2



Deutsche
Akkreditierungsstelle
D-PL-12155-01-04



Deutsche
Akkreditierungsstelle
D-PL-12155-01-03

Accreditation:



Deutsche
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D-PL-12155-01-04

FCC test firm accreditation expiration date: 2023-04-06
MRA US-EU, FCC designation number: DE0010
Test firm registration number: 997268
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BnetzA-CAB-02/21-02/6 Valid until 2023-11-26



Deutsche
Akkreditierungsstelle
D-PL-12155-01-03

Recognized until 2023-03-16 by the
Department of Innovation, Science and Economic Development Canada (ISED)
as a recognized testing laboratory
CAB identifier: DE0011
Company number: 3472A

Location of Testing:

Element Materials Technology Straubing GmbH

Tel.: +49 9421 56868-0

Fax: +49 9421 56868-100

Email: info.straubing@element.com

Gustav-Hertz-Straße 35

94315 Straubing, Germany

The technical accuracy is guaranteed through the quality management of
Element Materials Technology Straubing GmbH.

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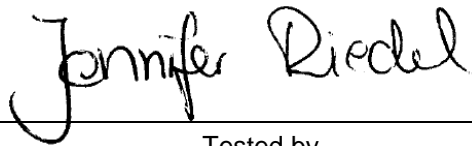
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1 Summary of test results

1.1 FCC standard

<i>FCC standard</i>	<i>Requirement</i>	<i>Page</i>	<i>Result</i>
47 CFR Part 2, § 2.1093	SAR test exclusion, except WPT	7	Passed

Straubing, October 5, 2022



Tested by
Jennifer Riedel B. Eng.
Radio Test Engineer



Approved by
Konrad Graßl
Department Manager Radio

2 Test regulations

2.1 FCC standards

<i>Standard</i>	<i>Title</i>
OET Bulletin 65, 65A, 65B Edition 97-01, August 1997	Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields
Part 1, Subpart I, Section 1.1310 October 2021	Radiofrequency radiation exposure limits
Part 1, Subpart 2, Section 2.1093 October 2021	Radiofrequency radiation exposure evaluation: portable devices.
KDB 447498 D04 v01 November 29, 2021	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
ANSI C96.1: 2005	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
ANSI C63.10 June, 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3 Equipment under Test

3.1 General information

Product type:	134 kHz RFID Reader
Model Name:	LF WIP-Regal 32x RFID kit
Serial number:	2205HAG11926
Manufacturer:	HERMOS AG
Version:	Hardware: LFM_MUX32 Rev.B Software: LFMWR32x_V2.0FV00
Short description:	The EUT is a RFID reader operating at the frequency 134.2 kHz.
FCC ID:	2AP5OLFM-32x
Technology:	RFID
Operating frequency:	134.2 kHz
Antenna types:	External antenna <input checked="" type="checkbox"/> detachable <input type="checkbox"/> not detachable
Power supply:	DC supply Nominal voltage: 24 V
Exposure tier:	<input checked="" type="checkbox"/> Head <input checked="" type="checkbox"/> Body <input type="checkbox"/> Limbs <input type="checkbox"/> other <input type="checkbox"/> See appropriate results
Separation distance:	<input checked="" type="checkbox"/> ≤ 20 cm <input type="checkbox"/> > 20 cm <input type="checkbox"/> See appropriate results
Evaluated against exposure limits:	<input checked="" type="checkbox"/> General public use <input type="checkbox"/> Controlled use

3.2 Photographs of EUT

See Annex B of test report 220194-AU01+W01 of test laboratory Element Materials Technology Straubing GmbH.

4 Test results

This clause gives details about the test results as collected in the summary of test results on page 4.

4.1 FCC

4.1.1 SAR test exclusion, except WPT

Requirement: Part 2, §2.1093
Reference: KDB 447498 D04 v01

Performed by:	Jennifer Riedel B. Eng.	Date of test:	September 22, 2022
Result:	<input checked="" type="checkbox"/> Limits kept	<input type="checkbox"/> Limits not kept	

4.1.1.1 Requirements and limits for separation distance ≤ 20 cm

According to §2.1093(b):

For purposes of this section, the definitions in §1.1307(b)(2) of this chapter shall apply. A portable 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 the RF source's radiating structure(s) is/are within 20 centimeters of the body of the user.

According to §2.1093(c)(1):

Evaluation of compliance with the exposure limits in §1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for portable devices having single RF sources with more than an available maximum time-averaged power of 1 mW, more than the ERP listed in Table 1 to §1.1307(b)(3)(i)(C), or more than the P_{th} in the following formula, whichever is greater. The following formula shall only be used in conjunction with portable devices not exempt by §1.1307(b)(3)(i)(C) at distances from 0.5 centimeters to 20 centimeters and frequencies from 0.3 GHz to 6 GHz.

Note:

1. According to the TCB Workshop on April 27, 2022 P_{th} can be calculated to the extended frequency range 100 kHz to 6 GHz. The formulas in the presentation of the TCB workshop beginning at slide 17 were used in addition to the KDB 447498 D04 v01.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

Table 1: Formula for calculation P_{th}

d = the minimum separation distance (cm) in any direction from any part of the device antenna(s) or radiating structure(s) to the body of the device user.

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R ² .
1.34-30	3,450 R ² /f ² .
30-300	3.83 R ² .
300-1,500	0.0128 R ² f.
1,500-100,000	19.2R ² .

Table 2: Table 1 to §1.1307(b)(3)(i)(C)—Single RF Sources Subject to Routine Environmental Evaluation

4.1.1.2 Process to determine RF Exposure Compliance

According to Appendix A of KDB 447498 D04 Interim General RF Exposure Guidance V01: Generally, the sequence to apply for single portable RF sources includes the following steps:

- 1) Determination of 1 mW exemption
- 2) Determination of exemption according to Table 2
- 3) Determination of exemption according to formula in Table 1

4.1.1.3 Results

The following data are based on applicants document: Test report 220194-AU01+W01 of the test laboratory Element Materials Technology Straubing GmbH

Application: RFID
 Operation frequency: 134.2 kHz
 Maximum field strength: 0.25 dB μ V/m at 300 m

Information related to Exposure:

Tune-up tolerance (according to the manufacturer): 2 dB
 Separation distance: < 5 mm
 Exposure tier: general public
 Power averaging over time: not applied
 Applied determination process: Step 3 of clause 4.1.1.2

Separation distance (mm)	Channel frequency (kHz)	ERP + tolerance (dBm)	ERP + tolerance (mW)	Limit (mW)	Ratio of limit	Result
< 5	134.2	-55.06	$3.12 \cdot 10^{-6}$	1778.89	$1.75 \cdot 10^{-9}$	Passed

Table 3: Result of SAR test exclusion, exposure to the head and body

EIRP is calculated using the formula of ANSI C63.10-2013 clause 9.5:

$$\text{EIRP} = E + 20\log(d) - 104.7$$

Where: EIRP = equivalent isotropically radiated power in dBm
 E = electric field strength in dB μ V/m
 d = measurement distance in meters (m)

$$\text{ERP} = \text{EIRP} - 2.15 \text{ dB}$$

5 Revision history

<i>Revision</i>	<i>Date</i>	<i>Issued by</i>	<i>Description of modifications</i>
0	2022-10-05	Jennifer Riedel B. Eng.	First edition

Template: RF_FCC_IC_Human Exposure_V1.6