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Applicant:

HERMOS AG

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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

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12155-01-04

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12155-01-03

Accreditation:

FCC test firm accreditation expiration date: 2023-04-06
MRA US-EU, FCC designation number: DE0010
Test firm registration number: 997268
FCC Registration Number (FRN): 0032245045
BnetzA-CAB-02/21-02/6 Valid until 2023-11-26

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:

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

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1.1 FCC standard

FCC standard	*Requirement*	*Page*	*Result*
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Straubing, December 20, 2022

Tested by
Jennifer Riedel B. Eng.
Radio Test Engineer

Approved by
Konrad Graßl
Department Manager Radio

2 Test regulations

2.1 FCC standards

Standard	*Title*
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	
	☒ detachable	☐ not detachable
Power supply:	DC supply Nominal voltage: 24 V	
Exposure tier:	☒	Head
	☒	Body
	☐	Limbs
	☐	other
	☐	See appropriate results
Separation distance:	☒	≤ 20 cm
	☐	> 20 cm
	☐	See appropriate results
Evaluated against exposure limits:	☒	General public use
	☐	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:	☒ Limits kept	☐ 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.

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

Where

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

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

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^2f.
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 dBµV/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	$3.12 * 10^{-6}$	1778.89	$1.75 * 10^{-9}$	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:

EIRP = E + 20log(d) - 104.7

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

ERP = EIRP – 2.15 dB

5 Revision history

Revision	*Date*	*Issued by*	*Description of modifications*
0	2022-12-20	Jennifer Riedel B. Eng.	First edition

Template: RF_FCC_IC_Human Exposure_V1.6