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Applicant:

Ambient Recording GmbH
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80797 München
Tel.: +49 89 360 55 10-0

Test report no.:

200503-AU01+W06

for:

Ambient Recording GmbH
Modular card
LockitModule

according to:

Part 2

RSS 102

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

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

Note:
Element Materials Technology Straubing GmbH is the legal successor of EMV Testhaus GmbH. Therefore, until the ongoing procedure for renaming the conformity assessment body applied for at German Accreditation Body DAkkS is completed, the certificates and appropriate annexes of EMV Testhaus GmbH are referred to.

Accreditation:

Deutsche Akkreditierungsstelle D-PL-12155-01-04

FCC test firm accreditation expiration date: 2021-05-30
MRA US-EU, FCC designation number: DE0010
FCC registration number: 97268
BnetzA-CAB-02/21-02/5 Valid until 2023-11-26

Deutsche Akkreditierungsstelle D-PL-12155-01-03

Recognized on March 14th, 2019 by the
Department of Innovation, Science and Economic Development (ISED) Canada
as a wireless testing laboratory
CAB identifier: DE0011
ISED#: 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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List of tables

1 Test regulations

Standard	*Title*
RSS-102 Issue 5 March 2015	Spectrum Management and Telecommunications Radio Standards Specification Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)
SPR-002 Issue 1 September 2016	Spectrum Management and Telecommunications Supplementary Procedure Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stimulation Exposure Limits
Safety Code 6 (2015)	Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz
KDB 680106 D01 May 31, 2013 (published by the Federal Communications Commission FCC)	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications
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	Radiofrequency radiation exposure limits
Part 1, Subpart 2, Section 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.
Part 1, Subpart 2, Section 2.1093	Radiofrequency radiation exposure evaluation: portable device
KDB 447498 D01 v06	Mobile and portable devices RF Exposure procedures and equipment authorisation policies, October 23, 2015.
KDB 865664 D01	SAR Measurement Requirements for 100 MHz to 6 GHz, August 7, 2015.
ANSI C95.1: 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

2 Summary of test results

Standard	*Evaluation*	*Page*	*Result*
Part 2, § 2.1093	SAR test exclusion, except WPT	9	Passed
RSS-102 Issue 5, section 2.5.1	SAR test exclusion, except 3 kHz - 10 MHz	11	Passed

Straubing, January 25, 2021

Jennifer Riedel B. Eng.
Radio Test Engineer

Konrad Graßl
Department Manager Radio

3 Equipment under test (EUT)

Product type:	Modular card	
Model Name:	LockitModule	
Manufacturer:	Ambient Recording GmbH	
Serial number:	NLa01289	
Version:	Hardware:	Rev B
	Software:	6.20
Short description:	EUT is a modular card that transmits its data to devices using the same core technology on a single selectable frequency on ISM 2.45 GHz, Ch. 11 (2405 MHz) through 26 (2480MHz) according to IEEE 802.15.4.	
FCC ID:	PDZ-LM	
IC certification number:	27202-LM	
Application frequency band:	2400 MHz to 2483.5 MHz	
Frequency range:	2405 MHz to 2480 MHz	
Number of RF channels:	15	
Modulation:	QPSK	
Antenna types:	2.4G & 2db RP SMA male antenna ☒ detachable ☐ not detachable	
Power supply:	DC supply nominal voltage: 3.3 V	
Exposure to:	☒	Head
	☒	Body
	☐	Limbs
	☐	other
Separation distance:	☒	≤ 20 cm
	☐	> 20 cm
Evaluated against exposure limits:	☒	General public use
	☐	Controlled use

4 Photographs of EUT

See Annex C of test report 200503-AU01+W05 Test report of test laboratory Element Materials Technology Straubing GmbH.

5 Test results

This clause gives details about the test results as collected on page 6.

The climatic conditions are recorded during the tests. It is ensured that the climatic conditions are within the following ranges:

Ambient temperature	*Ambient humidity*	*Ambient pressure*
15°C to 35°C	30 % to 75 %	86 kPa to 106 kPa

5.1 FCC

5.1.1 SAR test exclusion, except WPT

Reference: Part 2, Section 2.1093

Basic standard: n/a

Performed by:	Jennifer Riedel B. Eng.	Date of test:	January 25, 2021
Result:	☒ Limits kept	☐ Limits not kept	

5.1.1.1 Requirements and limits for separation distance ≤ 20 cm

This estimation follows the general guidelines for RF Exposure according to KDB 447498.

As noted in §2.103(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

According §2.1093 (d)(i)(2): The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

5.1.1.2 Results

The following data are based on applicants document: Test report 200503-AU01+W05 Test report of the test laboratory Elements Materials Technology Straubing GmbH

RF technology:

Application:	IEEE 802.15.4
Operation frequency range:	2405 MHz – 2480 MHz
Antenna model	2.4G & 2db RP SMA male antenna
Antenna connector:	permanent
Antenna type:	external
	detachable
Antenna gain:	2 dBi
Maximum conducted output power:	7.79 dBm at 2405 MHz 7.11 dBm at 2440 MHz 6.85 dBm at 2480 MHz

Information related to Exposure:

Tune-up tolerance (according to the manufacturer):	± 0.8 dB
Separation distance:	15 mm
Exposure tier:	general public
Power averaging over time:	not applied

Separation distance (mm)	*Channel Frequency (MHz)*	*rated power + tolerance (dBm)*	*Rounded rated power + tolerance (mW)*	*Rounded 1-g SAR*	*Limit 1-g SAR*	*Fraction of limit (%)*	*Result*
15	2405	8.59	7.3	0.8	3.0	26.7	Passed
15	2440	7.91	6.2	0.7	3.0	21.5	Passed
15	2480	7.65	5.8	0.6	3.0	20.4	Passed

Table 1: Result of SAR test exclusion, exposure to the head and body

5.2 Canada

5.2.1 SAR test exclusion, except 3 kHz -.10 MHz

Reference: RSS 102 clause 2.5.1

Basic standard: n/a

Performed by:	Jennifer Riedel B. Eng.	Date of test:	January 25, 2021
Result:	☒ Limits kept	☐ Limits not kept	

5.2.1.1 Exemption Limits for Routine Evaluation – SAR Evaluation

According RSS 102 clause 2.5.1:
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

4 The exemption limits in Table 1 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

5 Transmitters operating between 0.003-10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4.

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.
For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

5.2.1.2 Results

The following data are based on applicants document: Test report 200503-AU01+W05 Test report of the test laboratory Elements Materials Technology Straubing GmbH

RF technology:

Application:	IEEE 802.15.4
Operation frequency range:	2405 MHz – 2480 MHz
Antenna model	2.4G & 2db RP SMA male antenna
Antenna connector:	permanent
Antenna type:	external
	detachable
Antenna gain:	2 dBi
Maximum conducted output power:	7.79 dBm at 2405 MHz 7.11 dBm at 2440 MHz 6.85 dBm at 2480 MHz

Information related to Exposure:

Tune-up tolerance (according to the manufacturer):	± 0.8 dB
Separation distance:	15 mm
Exposure tier:	general public
Power averaging over time:	not applied

Separation distance (mm)	*Channel Frequency (MHz)*	*EIRP + tolerance (dBm)*	*EIRP + tolerance (mW)*	*Limit 1-g SAR (mW)*	*Fraction of limit (%)*	*Result*
15	2405	10.6	11.5	15.0	77.0	Passed
15	2440	9.9	9.8	15.0	65.0	Passed
15	2480	9.7	9.3	15.0	62.0	Passed

Table 2: Result of SAR test exclusion, exposure to the head and body

6 Revision history

Revision	*Date*	*Issued by*	*Description of modifications*
0	2021-01-25	Jennifer Riedel B. Eng.	First edition

Template: RF_FCC_IC_Human Exposure_V1.1