ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-21375-01-00

INGENIEURBÜRO LENHARDT

Bundesnetzagentur

BNetzA-CAB-19/21-51

Assessment Report

Test report no.: 22057336-28036-0
Date of issue: 2023-11-02

Test result: The test item **- passed - and complies** with the listed standards.

Applicant

USM U.Schaerer Sons INC.

Manufacturer

BURG F.W. LÜLING KG

Test Item

Lock C

MPE Assessment according to:

FCC 47 CFR Part 15
Radio frequency devices
Parts 1.1307, 1.1310, 2.1091, 2.1093

Canada RSS-102 Issue 5
Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

Tested by (name, function, signature)	*Andreas Bender* *Deputy Managing Director*	
Approved by (name, function, signature)	*Piotr Sardyko* *Lab Manager*	

Applicant and Test item details	
Applicant	USM U.Schaerer Sons INC. 28-30 Greene Street, New York 10013, USA
Manufacturer	BURG F.W. LÜLING KG Volmarsteiner Str. 52, 58089, Hagen, Germany
Test item description	Electronic furniture lock
Model/Type reference	Lock C
Standard specific information	
Frequency	13.56 MHz, 2.4 GHz ISM band (2400 – 2483.5 MHz)
Technology	RFID, BLE
Antenna	dedicated RFID antenna, Integrated PCB antenna
Power supply	2x ½ AA 6 VDC batteries
Temperature range	5 °C to +50 °C
FCC ID	2BBFS-LOCK1C
Company number:	30925
IC (ISED CERTIFICATION NUMBER)	30925-LOCK1C
HMN (HOST MARKETING NAME)	N/V
PMN (PRODUCT MARKETING NAME)	Lock C
HVIN (HARDWARE VERSION IDENTIFICATION NO.)	1.62
FVIN (FIRMWARE VERSION IDENTIFICATION NO.)	N/V

Disclaimer and Notes

The content of this report relates to the mentioned test sample(s) only.
IBL-Lab GmbH does not take samples. The samples used for testing are provided by the applicant.
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The last valid version is available at TAMSys®.
Signatures are done electronically, if signer does not match stated signer, it is signed per order.
Information supplied by the applicant can affect the validity of results. The data is marked accordingly.

Within this test report, a ☒ point / ☐ comma is used as a decimal separator.
If otherwise, a detailed note is added adjected to its use.

Decision rule: See parent Test Report IBL-Lab GmbH.
Decision rule based on simple acceptance without guard bands, binary statement, based on mutually agreed uncertainty tolerances with expansion factor k=2.

1 TABLE OF CONTENTS

2 GENERAL INFORMATION

2.1 Administrative details

Testing laboratory	**IBL-Lab GmbH** Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany Fon: +49 6894 38938-0 Fax: +49 6894 38938-99 URL: http://ib-lenhardt.com/ E-Mail: info@ib-lenhardt.com
Accreditation / Designation	The testing laboratory is accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025:2018. Scope of testing and registration number: • Attachment to the accreditation certificate D-PL-21375-01-00 ○ Electronics ○ Electromagnetic Compatibility ○ Radio ○ Electromagnetic Compatibility and Telecommunication (FCC requirements) ○ Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian Standards ○ Automotive EMC Website DAkkS: https://www.dakks.de/ The Deutsche Akkreditierungsstelle GmbH (DAkkS) is also a signatory to the ILAC Mutual Recognition Arrangement. • Designations ○ FCC Testing Laboratory Designation Number DE0024 ○ ISED ISED Company Number 27156 Testing Laboratory CAB Identifier DE0020 ○ Kraftfahrt-Bundesamt KBA-P 00120-23
Testing location	**IBL-Lab GmbH** Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany
Date of receipt of test samples	-
Start – End of tests	- – -

2.2 Possible test case verdicts

Test sample meets the requirements	P (PASS)
Test sample does not meet the requirements	F (FAIL)
Requirement does not apply to the test sample	N/A (Not applicable)
Requirement not performed	N/P (Not performed)
Requirement not available	N/V (Not available)

2.3 Observations

No additional observations other than the reported observations within this test report have been made.

2.4 Opinions and Interpretations

No additional appropriate opinions or interpretations according ISO/IEC 17025:2017 clause 7.8.7 are within this test report.

2.5 Document History

-0 Initial Version
-

3 ENVIRONMENTAL & TEST CONDITIONS

3.1 Environmental conditions of test lab

Temperature	25°C ± 5°C
Relative humidity	25-75% r.H.
Barometric Pressure	860-1060 mbar
Power supply	230/400 V AC 50Hz

4 TEST STANDARDS AND REFERENCES

Test standard (accredited)	Description
FCC 47 CFR Part 15	*RADIO FREQUENCY DEVICES*
RSS-102 Issue 5	*Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)*

Test standard (not accredited)	Description
-	-

Reference	Description
447498 D04 Interim General RF Exposure Guidance v01	*RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices*
FCC 47 CFR Part 1.1307(b)	*Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.*
FCC 47 CFR Part 1.1310	*Radiofrequency radiation exposure limits.*
FCC 47 CFR Part 2.1091	*Radiofrequency radiation exposure evaluation: mobile devices.*
FCC 47 CFR Part 2.1093	*Radiofrequency radiation exposure evaluation: portable devices.*
SPR-002 issue 1	*Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stimulation Exposure Limits*
SPR-003 Issue 1	*Supplementary Procedure for Assessing Radio Frequency Exposure Compliance of Portable Devices Operating in the 60 GHz Frequency Band (57-71 GHz)*
Notice 2021-DRS0005	*Introduction of an interim exemption limit for routine localized power density evaluations of transmitters operating in the 6 – 30 GHz frequency range*

5 Device Data

Parameters declared by the manufacturer:

The declared maximum output powers including tune-up tolerances are used with regard to the maximum antenna gains to find the maximum EIRP and ERP values.

Type	Band [GHz]	Simultaneous transmission	Max. EIRP (average) [dBm]
RFID	13.56	N/A	-42.0
Bluetooth LE	2.4	N/A	6.5

Measurements of power levels and declared antenna gains detailed in this test report and were taken from the following RF module test report(s). EUT test information such as test equipment used, date of actual test, environmental conditions, measurement uncertainty and the person who performed the original tests are referenced in the listed test report/s.

Type	Test Report	Radio Standard	Issued by	Band [xHz]	RF output Power + Antenna Gain (average) [dBm]	P.
RFID	22057336-28037-2	47 CFR Part 15 C	IBL-Lab GmbH	13.56 MHz	-43.93	9
Bluetooth LE	22057336-28038-1	47 CFR Part 15 C	IBL-Lab GmbH	2.4 GHz ISM band (2400 – 2483.5 MHz)	Conducted peak: 6 dBm, Antenna gain: 0.5 dB peak) 6.5	10
RFID	22057336-34960-0	RSS-210, Issue 10; RSS-Gen, Issue 5	IBL-Lab GmbH	13.56 MHz	-43.93	9
Bluetooth LE	22057336-34961-0	RSS-247, Issue 2; RSS-Gen, Issue 5	IBL-Lab GmbH	2.4 GHz ISM band (2400 – 2483.5 MHz)	Conducted peak: 6 dBm, Antenna gain: 0.5 dB peak) 6.5	10

6 MPE Assessment Requirements

6.1 FCC 47 CFR

6.1.1 FCC 47 CFR Part 1.1307 (b)(3) - Determine that they qualify for an exemption

(i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

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

Where

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

and

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

d = the separation distance (cm);

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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	19.2 R^2

6.1.2 FCC 47 CFR Part 1.1310 Radiofrequency radiation exposure limits.

Frequency range [MHz]	Electric field strength [V/m]	Magnetic field Strength [A/m]	Power density [mW/cm^2]	Averaging time [minutes]
(A) Limits for Occupational/Controlled Exposure				
0.3 – 3.0**	614	1.63	* 100	6
3.0 – 30	1842/f	4.89/f	* 900/f^2	6
30 – 300	61.4	0.163	1.0	6
300 – 1,500	N/A	N/A	f/300	6
1,500 – 100,000	N/A	N/A	5	6
(B) Limits for General Population/Uncontrolled Exposure				
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 – 1,500	N/A	N/A	f/1500	30
1,500 – 100,000	N/A	N/A	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

Telecommunication Certification Body (TCB) Presentations – Workshop Oct. 2022

Frequency range [a]	FCC Rules	OET Equipment Authorization Policies
≤ 100 kHz	N/A (under consideration) [c]	All devices assessed case-by-case, with field strength limits of E = 83 V/m and H = 90 A/m, in all body exposure relevant positions
100 kHz < f ≤ 300 kHz [b]	SAR limits in § 1.1310 (b), (c)	MPE limits at 300 kHz in Table 1 to § 1.1310(e)(1): E = 614 V/m and H = 1.63 A/m
300 kHz < f ≤ 4 MHz [b]	§ 2.1091 Mobile Devices: MPE limits in Table 1 to § 1.1310(e)(1)	MPE limits in Table 1 to § 1.1310(e)(1)
	§ 2.1093 Portable Devices: SAR limits in § 1.1310 (b), (c)	

[a] = For all f ≤ 6 GHz, SAR limits in §§ 1.1310 (b), (c) can always be applied where available, in place of MPE limits

[b] = Policies for 100 kHz < f ≤ 4 MHz reflect capabilities of available SAR measurement equipment. Numerical simulations may be also acceptable, under PAG

[c] = NPRM, ET Docket No. 19-226; FCC 19-126, 34 FCC Rcd 11743

6.1.3 FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.

(a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular §1.1307(b), chapter (6.1.2).

(b) For purposes of this section, the definitions in § 1.1307(b)(2) of this chapter shall apply. 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 RF source'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 while transmitting. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal desktop computer, are considered to be **mobile devices** if they meet the **20-centimeter** separation requirement.

(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 mobile devices with single RF sources having either more than an available maximum time-averaged power of **1 mW** or more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), whichever is greater. For mobile devices not exempt by § 1.1307(b)(3)(i)(C) at distances from **20 centimeters** to **40 centimeters** and frequencies from **0.3 GHz to 6 GHz**, evaluation of compliance with the exposure limits in § 1.1310 of this chapter is necessary if the ERP of the device is greater than ERP_{20cm} in the formula below. If the ERP of a single RF source at distances from **20 centimeters** to **40 centimeters** and frequencies from **0.3 GHz to 6 GHz** is not easily obtained, then the available maximum time-averaged power may be used (*i.e.,* without consideration of ERP) in comparison with the following formula only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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

(c)(2) For multiple mobile or portable RF sources within a device operating in the same time averaging period, routine environmental evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

(c)(3) Unless otherwise specified in this chapter, any other single mobile or multiple mobile and portable RF source(s) associated with a device is exempt from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in § 1.1307(c) and (d) of this chapter.

6.1.4 FCC 47 CFR Part 2.1093 Radiofrequency radiation exposure evaluation: portable devices.

(a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular § 1.1307(b).

(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.

(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 Pth 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.

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

Where

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

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

(2) For multiple mobile or portable RF sources within a device operating in the same time averaging period, evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

(3) Unless otherwise specified in this chapter, any other single portable or multiple mobile and portable RF source(s) associated with a device is exempt from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in § 1.1307(c) and (d) of this chapter.

6.2 447498 D04 Interim General RF Exposure Guidance v01

6.2.1 Tolerances in RF Exposure Test Methodologies

Device samples used for compliance testing must have the same physical, mechanical, and thermal characteristics, and operational tolerances as for production units.

All devices must be tested within the tune-up tolerance specification range. More specifically, each device must be evaluated for SAR or MPE compliance in the required operating modes and test configurations, at the maximum rated output power, and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance.

6.2.2 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.

This exemption may not be combined with any other exemption.

6.2.3 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.

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

Appendix C of KDB provides additional details.

For these test exemptions to apply, the maximum output power, duty factor, and other applicable parameters used in the standalone ERP determination tests, must be the same, or corresponding to a more conservative choice, than those required for simultaneous transmission.

The power level of the standalone SAR used to qualify for SAR test exemption, or additional test exemption, must be clearly explained in the SAR report. When simultaneous transmission SAR- based test exemptions, or when the SPLSR test exemption [Section 2.2.3] cannot be applied, enlarged zoom scan [Glossary] SAR measurements must be performed at the maximum output power required for the applicable simultaneous transmission scenarios. This power level shall account for the tune-up tolerance [Glossary] requirements of all transmitters, but not more than **2 dB lower than the maximum tune-up tolerance limit**.

6.3 ISED RSS-102 Issue 5 - Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

6.3.1 RSS-102 Section 2.5 - Exemption Limits for Routine Evaluation

All transmitters are exempt from routine SAR and RF exposure evaluations provided that they comply with the requirements of sections 2.5.1 or 2.5.2. **If the equipment under test (EUT) meets the requirements of sections 2.5.1 or 2.5.2, applicants are only required to submit a properly signed declaration of compliance (see Annex C).** The information contained in the RF exposure technical brief may be limited to the value(s) of the maximum output power, the information that demonstrates how the maximum output power of the transmitter was derived and the rationale for the separation distances applied (see Table 1), which must be based on the most conservative exposure condition for the applicable module or host platform test procedure requirements.

6.3.2 RSS-102 Section 2.5.1 - Exemption Limits for Routine Evaluation – SAR Evaluation

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.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance

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

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.
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.
Transmitters operating between **0.003-10 MHz**, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4 of RSS-102.

6.3.3 RSS-102 Section 2.5.2 - Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element **is greater than 20 cm**, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

6.3.4 RSS-102 Section 3.1.2 SAR Measurement of Devices Containing Multiple Transmitters

Compliance of devices with multiple transmitters capable of simultaneous transmission shall be assessed in accordance with the latest version of IEEE 1528. However, other recognized methods — such as the procedures published by the FCC proven to provide a conservative estimate of the SAR value (KDB 447498 D01) — can also be used. Applicants shall include in the RF exposure technical brief all information relevant to the exact test methodology used.

6.3.5 RSS-102 Section 4 Exposure Limits

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 2: Internal Electric Field Strength Basic Restrictions (3 kHz-10 MHz)

Condition*	**Internal Electric Field Strength** (V/m) (any part of the body)**
Controlled Environment	$2.7 \times 10^{-4}\ f$
Uncontrolled Environment	$1.35 \times 10^{-4}\ f$
Note: f is frequency in Hz. **Instantaneous, RMS values apply.	

*: For provisions related to instantaneous nerve stimulation measurements see Notice 2015-DRS001.

Table 3: SAR Limits for Devices Used by the **General Public** (Uncontrolled Environment)

Body Region	**Average SAR (W/kg)**	**Averaging Time (minutes)**	**Mass Average (g)**
Whole Body	0.08	6	Whole Body
Localized Head, Neck and Trunk	1.6	6	1
Localized Limbs	4	6	10

Table 4: RF Field Strength Limits for Devices Used by the **General Public** (Uncontrolled Environment)

Frequency Range [MHz]	**Electric Field [V/m rms]**	**Magnetic Field [A/m rms]**	**Power Density [W/m^2]**	**Reference Period [minutes]**
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142\ f^{0.3417}$	$0.008335\ f^{0.3417}$	$0.02619\ f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158\ f^{0.5}$	$4.21 \times 10^{-4}\ f^{0.5}$	6.67×10^{-5} f	$616000/f^{1.2}$

Note: f is in frequency in MHz

* Based on nerve stimulation (NS)

** Based on specific absorption rate (SAR)

Table 5: SAR Limits for **Controlled Use Devices** (Controlled Environment)

Body Region	Average SAR (W/kg)	Averaging Time (minutes)	Mass Average (g)
Whole Body	0.4	6	Whole Body
Localized Head, Neck and Trunk	8	6	1
Localized Limbs	20	6	10

Table 6: RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range [MHz]	Electric Field [V/m rms]	Magnetic Field [A/m rms]	Power Density [W/m^2]	Reference Period [minutes]
0.003-10	170	180	-	Instantaneous*
1-10	-	1.6/*f*	-	6**
1.29-10	193/*f* $^{0.5}$	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/*f* $^{0.25}$	0.3444/*f* $^{0.25}$	44.72/*f* $^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 *f* $^{0.25}$	0.04138 *f* $^{0.25}$	0.6455 *f* $^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/*f* $^{1.2}$
150000-300000	0.354 *f* $^{0.5}$	9.40 x 10^{-4} *f* $^{0.5}$	3.33 x 10^{-5} f	616000/*f* $^{1.2}$

Note: *f* is in frequency in MHz

* Based on nerve stimulation (NS)

** Based on specific absorption rate (SAR)

General public use is the type of approval given to a device that can be used by the general public.

Controlled use is the type of approval given to a device that is intended to be used by persons who are fully aware of, and can exercise control over, their exposure. **Controlled use devices** are typically installed in non-public areas and are not intended for use by members of the general public.

For provisions related to instantaneous nerve stimulation measurements see **Notice 2015-DRS001**. Please note, that the notice has been replaced by **SPR-002.**

7 MPE Calculation Method

7.1 Standalone MPE Calculation Method

Conversion of output power

$$\boldsymbol{P(mW) = 10^{(\frac{Lp(dBm)}{10})} \times 1mW}$$

E:	E-field strength [V/m]
P:	Power input to antenna [W]
G:	Gain of the antenna in the direction of interest relative to an isotropic radiator [dBi]
PG:	EIRP (effective isotropic radiated power) [W]
r:	Distance [m]

$$E = \frac{\sqrt{30PG}}{r}$$

S:	Power density [W/m2]
P:	Power input to antenna [W]
G:	Gain of the antenna in the direction of interest relative to an isotropic radiator [dBi]
PG:	EIRP (effective isotropic radiated power) [W]
r:	Distance [m]

$$S = \frac{PG}{4\pi r^2}$$

The EUT is a wireless device with a distance of at least 0.2m from any body part of nearby persons.

Type	Band [GHz]	Max. EIRP [dBm]	Max. EIRP [mW]	Power Density [W/m²]	Power Density [mW/cm²]	FCC Limit [mW/cm²]	FCC Verdict	FCC Exemp. [W]	FCC Exemp. fulfilled	ISED Limit [W/m²]	ISED Verdict	ISED Exemp. [W]	ISED Exemp. fulfilled
Manufacturer declared values													
RFID	0.01356	-42.0	0.0000631	0.00000013	0.000000013	N/A	N/A	0.001	yes	N/A	N/A	1	yes
BLE	2400	6.5	4.4669	0.008891	0.0008891	N/A	N/A	3.06	yes	N/A	N/A	0.290	yes
Measured values for reference													
RFID	0.01356	-42.0	0.0000405	0.00000009	0.000000009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE	2400	6.5	4.4669	0.008891	0.0008891	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

447498 D04 Interim General RF Exposure Guidance v01 - Tolerances in RF Exposure Test Methodologies

Requirement: Values for MPE compliance in the required operating modes and test configurations, at the maximum rated output power, are not within 2 dB lower than the maximum *tune-up tolerance limit.*

Verdict: Passed.

7.2 ISED – SPR-002 – Nerve Stimulation

RSS-102 – SPR-002 – Nerve Stimulation
Direct Measurement Against the RSS-102 Nerve Stimulation RLs

Direct measurement at a defined separation distance for comparison to the nerve stimulation RLs is the simplest of all measurements. The maximum measured field strength is located and compared to the RLs outlined in RSS-102.

Frequency (kHz)	Location						Max	Limit	Verdict
	Upper	Back	Left	Right	Top	Bottom			
	H-Field measurements [A/m]						[A/m]	[A/m]	
									N/A
	E-Field measurements [V/m]						[V/m]	[V/m]	--
									N/A

7.3 ISED – Notice 2021-DRS0005 - LPD (localized power density) 6 – 30 GHz

Notice 2021-DRS0005 - Introduction of an interim exemption limit for routine localized power density evaluations of transmitters operating in the 6 – 30 GHz frequency range

Radio Standards Specification (RSS)-102, entitled Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), outlines exemption limits for routine SAR evaluations. Following the publication of Health Canada's Notice: Localized human exposure limits for radiofrequency fields in the range of **6 GHz to 300 GHz**, Innovation, Science and Economic Development Canada (ISED) is in the process of developing **exemption limits** for **routine localized power density (LPD)** evaluations, which are to be included in the upcoming Issue 6 of RSS-102. However, the need for an interim exemption limit in the 6 – 30 GHz frequency range has been identified due to the emission characteristics of certain transmitter implementations, e.g. ultra-wideband (UWB) devices. As a result, ISED has established the following **interim exemption limit:**

A transmitter producing emissions in the **6 – 30 GHz** frequency range, i.e. where the occupied bandwidth **(99% emission bandwidth)** is fully contained within this range, is exempt from routine LPD evaluation if the higher of the **maximum six-minute time-averaged conducted power or equivalent isotropic radiated power (EIRP)**, adjusted for **tune-up tolerance**, is **1 mW (0 dBm) or lower**.

When evaluating the total exposure ratio (TER) under simultaneous transmission scenarios, the contribution from a transmitter satisfying the above condition shall be accounted for as follows:

$$\boldsymbol{ER = 0.1 * \left(max \frac{P_{cond} \vee P_{EIRP}}{1mW} \right)}$$

- *ER* is the exposure ratio associated with the exempted transmitter (-)
- P_{cond} is the maximum source based, time-averaged conducted power produced by the transmitter (mW), i.e. delivered to a perfectly matched load/antenna, adjusted for tune-up tolerance
- P_{eirp} is the maximum source based, time-averaged EIRP produced by the transmitter (mW), adjusted for tune-up tolerance

Type	P_{cond} [dBm]	P_{eirp} [dBm]	Limit [dBm]	Verdict
			0	N/A

7.4 Simultaneous transmission MPE

FCC 1.1307 / (3) Determination of exemption / (ii) For multiple RF sources:
Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k k} \leq 1$$

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source *i* at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source *i.*

ERP_j = the ERP of fixed, mobile, or portable RF source *j.*

$ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source *j,* at a distance of at least λ/2π according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

$Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure\ Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source *k,* as applicable from §1.1310 of this chapter.

Type	Band [GHz]	Max. EIRP [dBm]	Max. EIRP [W]	Power Density [W/m²]	Power Density [mW/cm²]	FCC Limit [mW/cm²]	FCC Verdict	FCC Exemp. [W]	FCC Exemp. fulfilled	ISED Limit [W/m²]	ISED Verdict	ISED Exemp. [W]	ISED Exemp. fulfilled
						N/A	-	N/A	-	N/A	-	N/A	
						N/A	-	N/A	-	N/A	-	N/A	
						N/A	-	N/A	-	N/A	-	N/A	
						N/A	-	N/A	-	N/A	-	N/A	
Σ(f_x)	-	-	-			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8 MPE Conclusion

FCC: The results do comply with the requirements.

ISED: The results do comply with the requirements.

9 List of test equipment used

#	Equipment Class	ID	Calibration due date
	N/A		

Annex 1 - RSS-102 Annex A1 – SAR and LPD technical brief cover sheet

The worst-case values of specific absorption rate (SAR), absorbed power density (APD) [only for SPR-APD] and incident power density (IPD) [only for SPR-003] shall be reported in the sections below.

Must report values or enter the following codes: N/A for not applicable, N/P for not performed or N/V for not available. Check appropriate box where applicable.

Applicant/Product Information			
Company Number:	--	ISED Certification #:	--
PMN:	--	HMN:	--
HVIN:	--	FVIN:	--
Applicant:	--		

SAR: Vicinity of Human Head Device		**Test Lab:**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
SAR Value:	W/kg	☐ Measured	☐ Computed	--
SAR: Body Worn or Body Supported Device		**--**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
SAR Value:	W/kg	☐ Measured	☐ Computed	--
SAR: Limb-Worn Device		**--**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
SAR Value:	W/kg	☐ Measured	☐ Computed	--

APD: Vicinity of Human Head Device		**Test Lab:**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
PD Value:	W/m^2	☐ Measured	☐ Computed	--
APD: Body Worn or Body Supported Device		**--**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
SAR Value:	W/m^2	☐ Measured	☐ Computed	--
APD: Limb-Worn Device		**--**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
PD Value:	W/m^2	☐ Measured	☐ Computed	--

IPD: Vicinity of Human Head Device	**Test Lab:**

Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
psPD Value*:	W/m²	☐ Measured	☐ Computed	--
pPD Value:	W/m²	☐ Measured	☐ Computed	--
IPD: Body Worn or Body Supported Device		**--**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
psPD Value*:	W/m²	☐ Measured	☐ Computed	--
pPD Value:	W/m²	☐ Measured	☐ Computed	--
IPD: Limb-Worn Device		**--**		
Multiple Transmitters:	☐ Yes ☐ No	--	Duty Cycle:	%
Exposure Limits Used:	☐ General public use	☐ Controlled use	Compliance Dist.:	mm
psPD Value*:	W/m²	☐ Measured	☐ Computed	--
pPD Value:	W/m²	☐ Measured	☐ Computed	--

*Both psPD and pPD are defined in section 4 of SPR-003.

Declaration of RF Exposure Compliance	
ATTESTATION: I attest that, Annex A1 and the Technical Brief information was prepared by me and is correct; that the device evaluation was performed or supervised by me; that applicable measurement and evaluation methodologies have been followed; and that the device meets the SAR and/or LPD limits of RSS-102.	
Signature:	--
Date:	--
Name:	--
Title:	--

Annex 2 RSS-102 – Annex A2 – RF Exposure Evaluation and NS Technical Brief Cover Sheet

The worst case values of RF Exposure and/or Nerve Stimulation shall be reported in the sections below.

Must report values or enter the following codes: N/A for not applicable, N/P for not performed or N/V for not available. Check appropriate box where applicable.

Applicant/Product Information			
Company Number:	--	ISED Certification #:	--
PMN:	--	HMN:	--
HVIN:	--	FVIN:	--
Applicant:	--		

RF Exposure Evaluation Information		**RF Exposure Evaluation Test Lab:**		
Exposure Limits Used:	☐ General Public Use	☐ Controlled Use	--	--
Duty Cycle:	%	Compliance Dist.:	mm	--
RF Field Strength Value:		☐ V/m	☐ Measured	--
		☐ A/m	☐ Calculated	--
		☐ W/m^2	☐ Computed	--

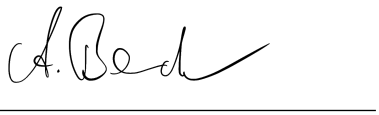
Nerve Stimulation Exposure Information		**NS Test Lab:**		
Exposure Limits Used:	☐ General Public Use	☐ Controlled Use	--	--
--	☐ Body/Torso/Head	☐ Leg	☐ Arm	☐ Hand/Foot
Compliance Dist.:	mm	--	--	--
Electric FS:	V/m (r.m.s)	☐ Measured	☐ Calculated	☐ Computed
Magnetic FS:	A/m (r.m.s)	☐ Measured	☐ Calculated	☐ Computed

Declaration of RF Exposure Compliance	
ATTESTATION: I attest that the information provided in Annex A2 is correct; that the Technical Brief was prepared and the information contained therein is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed; and that the device meets the RF Exposure Evaluation and/or Nerve Stimulation limits of RSS-102.	
Signature:	--
Date:	--
Name:	--
Title:	--

This form may be provided with the online application submission in lieu of Annex A & B in RSS-102.

Annex 3 RSS-102 – Annex C - Declaration of RF Exposure Compliance for Exemption from Routine Evaluation Limits

(NOTE: The submission of Annex C is only required if the device meets the exemption limits for the routine evaluation)

ATTESTATION:	
I attest: a) that the radiocommunication apparatus meets the exemption from the routine evaluation limits in Section 2.5 of RSS-102; b) that the Technical Brief was prepared, and the information contained therein is correct; c) that the device evaluation was performed or supervised by me; d) that applicable measurement methods and evaluation methodologies have been followed; e) and that the device meets the SAR and/or RF field strength limits of RSS-102.	
Signature	
Date	2023-11-02
Name:	Andreas Bender
Title:	Head of Laboratory
Company:	30925
Product Marketing Name (PMN):	Lock C
Hardware-Version ID. (HVIN):	1.62
Firmware version identification number (FIN):	N/V
Host Marketing Name (HMN):	N/V
IC Certification Number:	30925-LOCK1C

Note: The submission of Annex C is only required if the device meets the exemption limits for the routine evaluation in Section 2.5 of RSS-102.

End of Assessment Report