

Assessment Report

Test report no.: 22107893-28770-0

Date of issue: 2023-04-12

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

Applicant

Kärcher SE & Co. KG

Manufacturer

Same as applicant

Test Item

4.683-250.0

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)

Sebastian Janoschka
Lab Manager



Applicant and Test item details

Applicant	Kärcher SE & Co. KG Friedrich-List-Str. 4 71364 , Winnenden , Germany Fon: +49 7195 903-0 Fax: +49 7195 903-2805
Manufacturer	Same as applicant
Test item description	RFID-Reader
Model/Type reference	4.683-250.0
Standard specific information	
Frequency	13.56 MHz
Technology	RFID
Antenna	Integrated PCB antenna
Power supply	18 V to 42 V DC via external AC/DC adapter
Temperature range	-20 °C to +70 °C
FCC ID	ZP946832500999
Company number:	9752A
IC (ISED CERTIFICATION NUMBER)	9752A-4683500999
HMN (HOST MARKETING NAME)	HMN
PMN (PRODUCT MARKETING NAME)	46832500
HVIN (HARDWARE VERSION IDENTIFICATION NO.)	4683250000304
FVIN (FIRMWARE VERSION IDENTIFICATION NO.)	468325000000100

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.

Without a written permit of IBL-Lab GmbH, this test report shall not be reproduced, except in full.

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.

Copyright ©: All rights reserved by IBL-Lab GmbH

Within this test report, a ☒ point / ☐ comma is used as a decimal separator.

If otherwise, a detailed note is added adjoined 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

1	TABLE OF CONTENTS.....	3
2	GENERAL INFORMATION	4
2.1	Administrative details.....	4
2.2	Possible test case verdicts	5
2.3	Observations.....	5
2.4	Opinions and Interpretations	5
2.5	Document History	5
3	ENVIRONMENTAL & TEST CONDITIONS.....	6
3.1	Environmental conditions of test lab.....	6
4	TEST STANDARDS AND REFERENCES	6
5	Device Data	7
6	MPE Assessment Requirements	8
6.1	FCC 47 CFR	8
6.1.1	FCC 47 CFR Part 1.1307 (b)(3) - Determine that they qualify for an exemption	8
6.1.2	FCC 47 CFR Part 1.1310 Radiofrequency radiation exposure limits.	9
6.1.3	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.	10
6.1.4	FCC 47 CFR Part 2.1093 Radiofrequency radiation exposure evaluation: portable devices.....	10
6.2	447498 D04 Interim General RF Exposure Guidance v01	11
6.2.1	Tolerances in RF Exposure Test Methodologies.....	11
6.2.2	1-mW Test Exemption for Multiple Sources	11
6.2.3	Simultaneous Transmission with both SAR-based and MPE-Based Test Exemptions	11
6.3	ISED RSS-102 Issue 5 - Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	12
6.3.1	ISED MPE limits.....	12
6.3.2	RSS-102 Section 2.5 - Exemption Limits for Routine Evaluation	13
6.3.3	RSS-102 Section 2.5.2 - Exemption Limits for Routine Evaluation – RF Exposure Evaluation	13
6.3.4	RSS-102 Section 3.1.2 SAR Measurement of Devices Containing Multiple Transmitters	13
7	MPE Calculation Method	14
7.1	Standalone MPE Calculation Method.....	14
7.2	Simultaneous transmission MPE.....	15
8	MPE Conclusion	15
9	List of test equipment used.....	16
Annex 1	RSS-102 – Annex A - RF Technical Brief Cover Sheet.....	17
Annex 2	RSS-102 – Annex B - Declaration of RF Exposure Compliance	19
Annex 3	RSS-102 – Annex C - Declaration of RF Exposure Compliance for Exemption from Routine Evaluation Limits.....	20

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	<p>The testing laboratory is accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025:2018.</p> <p>Scope of testing and registration number:</p> <ul style="list-style-type: none"> Attachment to the accreditation certificate D-PL-21375-01-00 <ul style="list-style-type: none"> Electronics Electromagnetic Compatibility Radio Electromagnetic Compatibility and Telecommunication (FCC requirements) Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian Standards Automotive EMC <p>Website DAkkS: https://www.dakks.de/</p> <p>The Deutsche Akkreditierungsstelle GmbH (DAkkS) is also a signatory to the ILAC Mutual Recognition Arrangement.</p> <ul style="list-style-type: none"> Designations <ul style="list-style-type: none"> 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	<i>RADIO FREQUENCY DEVICES</i>
RSS-102 Issue 5	<i>Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)</i>

Test standard (not accredited)	Description
-	-

Reference	Description
447498 D04 Interim General RF Exposure Guidance v01	<i>RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices</i>
FCC 47 CFR Part 1.1307(b)	<i>Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.</i>
FCC 47 CFR Part 1.1310	<i>Radiofrequency radiation exposure limits.</i>
FCC 47 CFR Part 2.1091	<i>Radiofrequency radiation exposure evaluation: mobile devices.</i>
FCC 47 CFR Part 2.1093	<i>Radiofrequency radiation exposure evaluation: portable devices.</i>

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.

Statement	Type	Max. EIRP (average) [dBm]
that the effective isotropic radiated power (EIRP) amounts to - 28.5 dBm	RFID	-28.5

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 [GHz]	RF output Power + Antenna Gain (average) [dBm]	P.
RFID	22107893-28773-0	47 CFR Part 15 RSS-210, Issue 10; RSS-Gen, Issue 5	IBL-Lab GmbH	0.01356	65.0 dBμV/m @ 3m Calculated: -30.23	9

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:

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

Where

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

and

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

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 $\lambda/2\pi$, 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 $\lambda/4$ 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	$0.0128 R^2 f$
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

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 $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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

(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 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.

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

Where

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

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

(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.

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

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 ISED MPE limits

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	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is in frequency in MHz

* Based on nerve stimulation (NS)

** Based on specific absorption rate (SAR)

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	$0.354 f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-5} f$	$616000/f^{1.2}$

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.

6.3.2 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.

6.3.3 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.

7 MPE Calculation Method

7.1 Standalone MPE Calculation Method

Conversion of output power

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

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/m ²]
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 [MHz]	Max. EIRP [dBm]	Max. EIRP [W]	Power Density [W/m ²]	Power Density [mW/cm ²]	FCC Limit [mW/cm ²]	FCC Verdict	FCC Exemp. [W]	FCC Exemp. fulfilled	ISED Limit [W/m ²]	ISED Verdict	ISED Exemp. [W]	ISED Exemp. fulfilled
Manufacturer declared values													
RFID	13.56	-28.5	0.00000142	0.0000028	0.00000028	N/A	N/A	0.001	yes	N/A	N/A	1	yes
--	--	--	--	--	--	--	--	--	--	--	--	--	--
Measured values for reference													
RFID	13.56	-30.23	0.00000095	0.0000019	0.00000019	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: Pass

7.2 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 in 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.

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

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 $\lambda/2\pi$ 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.

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 A - RF Technical Brief Cover Sheet

Note: To obtain approval under this standard, the above-mentioned application for certification shall be accompanied by the duly completed RF technical brief cover sheet (see Annex 1) and a properly signed declaration of compliance (see Annex 2). However, if the device in question meets the exemption from routine evaluation limits, only a signed declaration of compliance needs to be submitted (see Annex 3).

All fields must be completed with the requested information or the following codes:

N/A for Not Applicable, N/P for Not Performed or N/V for Not Available.

Where applicable, check appropriate box.

Applicant/Product Information	
1. Company Number:	--
2. Product Marketing Name (PMN):	--
3. Hardware Version ID. (HVIN):	--
4. Firmware version identification number (FIN):	--
5. Host Marketing Name (HMN):	--
6. IC Certification Number:	--
7. Applicant	--
SAR/RF Test Lab Information	
8. SAR/RF Exposure Test Laboratory	IBL-Lab GmbH Heinrich-Hertz-Allee 7 66386 Sankt Ingbert / Germany Fon: +49 6894 38938-0 Fax: +49 6894 38938-99 URL: www.ib-lenhardt.de E-Mail: info@ib-lenhardt.de ISED Company Number 27156 Testing Laboratory CAB Identifier DE0020
Type of Evaluation Information	
9. Type of Evaluation:	<input type="checkbox"/> (a) Vicinity Of The Human Head. <input type="checkbox"/> (b) Body Worn or Body Supported Device <input type="checkbox"/> (c) Limb-Worn Device <input type="checkbox"/> (d) Exposure Evaluation Information
(a) Vicinity Of The Human Head.	
Multiple Transmitter:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Evaluated against exposure limits:	<input type="checkbox"/> General public use <input type="checkbox"/> Controlled use
Duty Cycle:	%
Standard(s)/Procedure(s) used for evaluation (e.g. IEEE 1528, KDB 447498):	-
SAR Value:	W/kg <input type="checkbox"/> measured <input type="checkbox"/> computed <input type="checkbox"/> calculated
(b) Body Worn or Body Supported Device.	
Multiple Transmitter:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Evaluated against exposure limits:	<input type="checkbox"/> General public use <input type="checkbox"/> Controlled use
Duty Cycle:	%

Standard(s)/Procedure(s) used for evaluation (e.g. IEC62209-2):	-	
SAR Value:	W/kg <input type="checkbox"/> measured <input type="checkbox"/> computed <input type="checkbox"/> calculated	
(c) Limb-Worn Device.		
Multiple Transmitter:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Evaluated against exposure limits:	<input type="checkbox"/> General public use <input type="checkbox"/> Controlled use	
Duty Cycle:	%	
Standard(s)/Procedure(s) used for evaluation (e.g. IEC62209-2):	-	
SAR Value:	W/kg <input type="checkbox"/> measured <input type="checkbox"/> computed <input type="checkbox"/> calculated	
(d) Exposure Evaluation Information.		
Evaluated against exposure limits:	<input type="checkbox"/> General public use <input type="checkbox"/> Controlled use	
Duty Cycle:	%	
Standard(s)/Procedure(s) used for evaluation (e.g. IEEE C95.3):	RSS 102	
Measurement distance:	0.2 m	
RF field strength value:		<input type="checkbox"/> V/m
		<input type="checkbox"/> A/m
		<input type="checkbox"/> W/m ²
	<input type="checkbox"/> measured <input type="checkbox"/> computed <input type="checkbox"/> calculated	

Annex 2 RSS-102 – Annex B - Declaration of RF Exposure Compliance

(NOTE: Annex 1 & 2 are required when SAR or RF Evaluation Measurements are applicable)

ATTESTATION:	
I attest: a) that the information provided in Annex 1 – RSS102 - Annex A is correct; 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	-
Name:	-
Title:	-
Product Marketing Name (PMN):	-
Hardware Version ID. (HVIN):	-
Firmware version identification number (FIN):	-
Host Marketing Name (HMN):	-
IC Certification Number:	-

Note: In cases of exemption according to RSS-102, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. or output power was derived (Annex 3 – RSS102 - Annex C).


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	2023-04-12
Name:	Andreas Bender
Title:	Head of Laboratory
Company:	9752A
Product Marketing Name (PMN):	46832500
Hardware Version ID. (HVIN):	468325000304
Firmware version identification number (FIN):	46832500000100
Host Marketing Name (HMN):	HMN
IC Certification Number:	9752A-4683500999

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
