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Test report no.:

220365-AU01+W06

for:

Rotronic AG
QI charger for BLE probe
AwEasy-Charger

according to:

47 CFR Part 2

RSS-102



Deutsche
Akkreditierungsstelle
D-PL-12155-01-04



Deutsche
Akkreditierungsstelle
D-PL-12155-01-03

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Deutsche
Akkreditierungsstelle
D-PL-12155-01-04

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Deutsche
Akkreditierungsstelle
D-PL-12155-01-03

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Company number: 3472A

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1 Summary of test results

1.1 FCC standard

<i>FCC standard</i>	<i>Requirement</i>	<i>Page</i>	<i>Result</i>
KDB 680106 D01	Wireless power transfer	11	Passed
47 CFR Part 2, § 2.1091	Maximum permissible exposure	16	Passed
KDB 447498 D01 v06	Simultaneous transmissions – Maximum permissible exposure	18	Passed

1.2 IC standard

<i>IC standard</i>	<i>Requirement</i>	<i>Page</i>	<i>Result</i>
RSS-102 Issue 5, section 2.5.1	Frequency range 3 kHz up to 10 MHz	19	Passed
RSS-102 Issue 5, section 2.5.2	Evaluation for separation distance ≥ 20 cm	24	Passed
KDB 447498 D01 v06	Simultaneous transmissions – Evaluation for separation distance ≥ 20 cm	27	Passed

Straubing, June 22, 2023



Tested by
Konrad Graßl
Department Manager Radio



Approved by
Rainer Heller Dipl.-Ing. (FH)
Reviewer

2 Test regulations

2.1 FCC standards

<i>Standard</i>	<i>Title</i>
IEEE C95.3-2002 (R2008) Approved December 11, 2002 Reaffirmed June 12, 2008	IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz
KDB 680106 D01 v03r01 January 27, 2021	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications
Part 1, Subpart I, Section 1.1307 October 2022	Actions that may have a significant environmental effect, for which Environmental Assessment (EAs) must be prepared.
Part 1, Subpart I, Section 1.1310 October 2022	Radiofrequency radiation exposure limits
Part 2, Subpart J, Section 2.1091 October 2022	Radiofrequency radiation exposure evaluation: mobile devices.
Part 1, Subpart 2, Section 2.1093 October 2022	Radiofrequency radiation exposure evaluation: portable devices.
KDB 447498 D01 v06 October 23, 2015	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
ANSI C63.10 June, 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2.2 IC standards

<i>Standard</i>	<i>Title</i>
RSS-102 Issue 5 (March 19, 2015) Amendment 1 (February 2, 2021)	Spectrum Management and Telecommunications Radio Standards Specification Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)
SPR-002 Issue 2 (October 2022)	Supplementary Procedure for Assessing Compliance of Equipment Operating from 3 kHz to 10 MHz with RSS-10
Safety Code 6 (2020)	Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz
IEEE C95.3-2002 (R2008) Approved December 11, 2002 Reaffirmed June 12, 2008	IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz
Notice 2016-DRS001 September 20, 2016 Updated July 2020	Applicability of Latest FCC RF Exposure KDB Procedures and Other Procedures
KDB 447498 D01 v06 October 23, 2015	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices

3 Equipment under Test

3.1 General information

Product type:	QI charger for BLE probe		
Model name:	AwEasy-Charger		
Serial number:	n/a		
Manufacturer:	Rotronic AG		
Version:	Hardware:	KE_052_013_v100	
	Software:	No FW / complies with WPC 1.2 standard	
Short description:	EUT is a wireless power transmitter with additional communication capability.		
FCC ID of the charger:	2AG4J-AWEY		
IC certification number of the charger:	30048-AWEY		
FCC ID of the integrated BLE module of the BLE probe:	SQGBL653		
IC certification number of the integrated BLE module of the BLE probe:	3147A-BL653		
Technology 1 (Charger):	WPT		
Operating frequency:	139.5 kHz to 174.7 kHz		
Antenna types:	Loop antenna		
	<input type="checkbox"/> detachable	<input checked="" type="checkbox"/> not detachable	
Technology 2 (BLE probe):	Bluetooth low energy		
Application frequency band:	2400 MHz to 2483.5 MHz		
Antenna types:	PCB antenna		
	<input type="checkbox"/> detachable	<input checked="" type="checkbox"/> not detachable	
Power supply:	DC supply		
	Nominal voltage: 5.0 V		
Exposure tier:	<input type="checkbox"/>	Head	
	<input type="checkbox"/>	Body	
	<input type="checkbox"/>	Limbs	
	<input type="checkbox"/>	other	
	<input checked="" type="checkbox"/>	See appropriate results	
Separation distance:	<input type="checkbox"/>	≤ 20 cm	
	<input type="checkbox"/>	> 20 cm	
	<input checked="" type="checkbox"/>	See appropriate results	
Evaluated against exposure limits:	<input checked="" type="checkbox"/>	General public use	
	<input type="checkbox"/>	Controlled use	

3.2 Test configuration

<i>Device</i>	<i>Type designation</i>	<i>Serial or inventory no.</i>	<i>Manufacturer</i>
QI Charger for BLE probe	AwEasy-Charger	n/a	Rotronic AG

Table 1: EUT used for testing

<i>Device</i>	<i>Type designation</i>	<i>Serial or inventory no.</i>	<i>Manufacturer</i>
BLE probe	AwEasy	n/a	Rotronic AG
Power adapter for charger	PS1006-050SIB150	---	Powertron Electronics Corp.

Table 2: Support equipment used for testing

3.3 Mode of operation

RF technology 1

- Standby mode: Charger is not attached to a load
- Charging mode: Charger is attached to a load, in addition the BLE of the load is transmitting in advertising mode

RF technology 2

- BLE probe is in advertising mode
- BLE probe is in advertising mode and the charger is attached to the probe

3.4 Photographs of EUT

See Annex B of test report 220365-AU01+W09 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 5.

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

<i>Ambient temperature</i>	<i>Ambient humidity</i>	<i>Ambient pressure</i>
15°C to 35°C	30 % to 75 %	86 kPa to 106 kPa

4.1 FCC

4.1.1 Wireless power transfer

Reference: KDB 680106 D01

Basic standard: IEEE C95.3

Performed by:	Konrad Graßl	Date of test:	December 6, 2022
Result	<input checked="" type="checkbox"/> Test passed	<input type="checkbox"/> Test not passed	

4.1.1.1 Test equipment

Type	Designation	Manufacturer	Inventory no.
Exposure level tester with magnetic field probe 100 cm ²	ELT-400 with BN 2300/90.10	Narda Safety Test Solutions GmbH	E00276
Broadband field meter	NBM-550	Narda Safety Test Solutions GmbH	E00900
Electric field probe	EF0691	Narda Safety Test Solutions GmbH	E00902

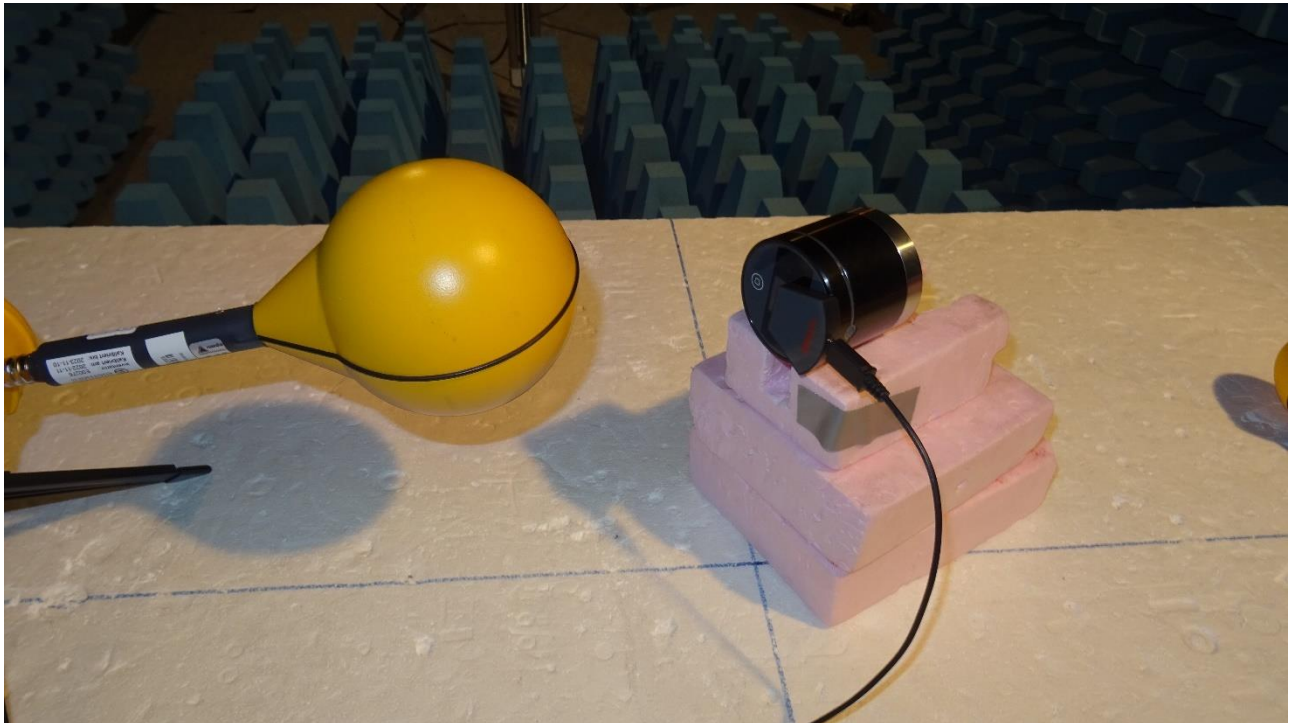
4.1.1.2 Test setup



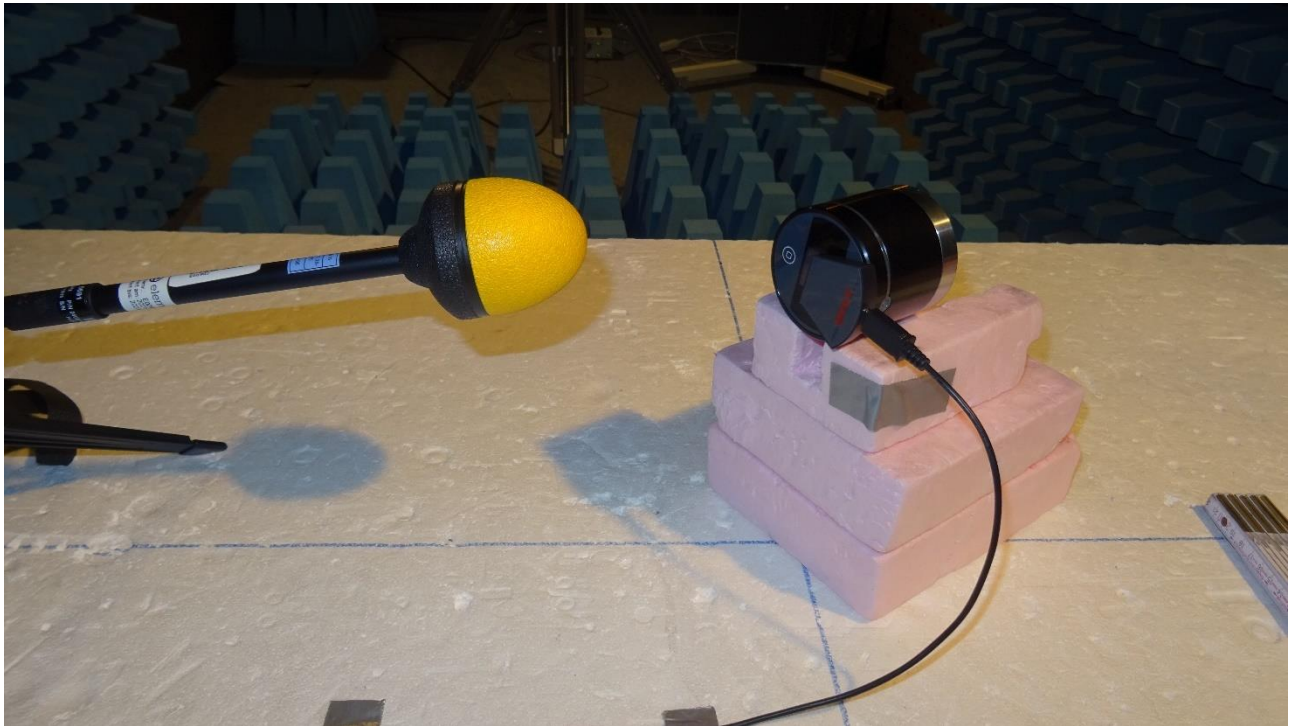
Picture 1: Setup of magnetic field test at a measurement distance of 15 cm in standby mode



Picture 2: Setup of electric field test at a measurement distance of 15 cm in standby mode



Picture 3: Setup of magnetic field test at a measurement distance of 15 cm in charging mode



Picture 4: Setup of electric field test at a measurement distance of 15 cm in charging mode

4.1.1.3 Limits

According to section c) of paragraph 3) of KDB 680106 D01:

For devices designed for typical desktop applications, such as wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m. Below 100 kHz, applicable reference levels for maximum instantaneous exposure field strengths are defined in clause 3.a).(2) of KDB 680106 D01.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
<i>(A) Limits for Occupational/Controlled Exposure</i>				
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			f/300	6
1,500-100,000			5	6
<i>(B) Limits for General Population/Uncontrolled Exposure</i>				
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			f/1500	30
1,500 - 100,000			1.0	30
f = frequency in MHz * = Plane-wave equivalent power density				

Table 3: Limits for Maximum Permissible Exposure (MPE) to RF electromagnetic fields

4.1.1.4 Test procedure

The RF exposure test is performed by the direct measurement method using a Broadband probe.

To find the worst case emissions, the field probe is moved over all sides of the EUT at the separation distance of 15 cm, while observing the display of the field meter. At the worst case position, the final value is measured and recorded.

According to section c) of paragraph 3) of KDB 680106 D01:

The test distance is measured from the center of the probe(s) to the edge of the device.

4.1.1.5 Test results

RF technology 1 in standby mode and charging mode

<i>Electric field strength at a test distance of 15 cm</i>					
<i>Reference level frequency range</i>	<i>Frequency</i>	<i>Operation mode</i>	<i>Measured value V/m</i>	<i>Limit V/m</i>	<i>Result</i>
100 kHz - 300 kHz	174.7 kHz	Standby	0.31	614	Passed
100 kHz - 300 kHz	139.5 kHz – 152.2 kHz	Charging	1.16	614	Passed
<i>Magnetic field strength at a test distance of 15 cm</i>					
<i>Reference level frequency range</i>	<i>Frequency</i>	<i>Operation mode</i>	<i>Measured value A/m</i>	<i>Limit A/m</i>	<i>Result</i>
100 kHz - 300 kHz	174.7 kHz	Standby	0.45	1.63	Passed
100 kHz - 300 kHz	139.5 kHz – 152.2 kHz	Charging	0.45	1.63	Passed

Table 4: RF exposure test results according to KDB 680106 D01

4.1.2 Maximum permissible exposure

Requirement: Part 2, §2.1091
Reference: KDB 447498 D01 v01

Performed by:	Konrad Graßl	Date of test:	June 22, 2023
Result:	<input checked="" type="checkbox"/> Limits kept <input type="checkbox"/> Limits not kept		

4.1.2.1 Requirements and limits for maximum permissible exposure

According to §2.1091(b):

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 transmitter's radiating structure(s) and the body of the user or nearby persons.”

According to §2.1091(c):

The limits to be used for evaluation are defined in §1.1310.

According to §1.1310(d)(2):

At operating frequencies less than or equal to 6 GHz, the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in Table 1 of §1.1310(e) may be used.

Frequency range	Electric field strength	Magnetic field strength	Power density	Averaging time
(MHz)	(V/m)	(A/m)	(mW/cm ²)	(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 - 1500			f/300	6
1500 - 100000			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 - 1500			f/1500	30
1500 - 100000			1.0	30

Table 5: Limits for maximum permissible exposure (MPE) according to table 1 of §1.1310(e)

Note(s):

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

4.1.2.2 Results

Technology 2:

The following data are based on applicants document: Test report 220365-AU01+W03 of the test laboratory Element Materials Technology Straubing GmbH

Application:	Bluetooth low energy
Operation frequency band:	2400 MHz to 2483.5 MHz
Maximum conducted output power:	-0.2 dBm at 2426 MHz
Antenna gain:	-0.94 dBi (maximum)
Maximum EIRP:	-1.14 dBm at 2426 MHz

Information related to Exposure:

Tune-up tolerance (according to the manufacturer):	0 dB
Separation distance:	20 cm
Maximum power used for calculation:	Maximum EIRP
Exposure tier:	general public
Power averaging over time:	not applied

<i>Channel Frequency (MHz)</i>	<i>EIRP (mW)</i>	<i>Power density (mW/cm²)</i>	<i>Limit Power density (mW/cm²)</i>	<i>Ratio of limit</i>	<i>Result</i>
2426	0.77	0.00015	1.0	0.00015	Passed

Table 6: Result of evaluation of compliance

Power density is calculated according to the formula:

$$S = \frac{P}{4 \cdot \pi \cdot d^2}$$

with

- S = power density in mW/cm²
- P = maximum power in mW
- D = separation distance in cm

4.1.3 Simultaneous transmissions - Maximum permissible exposure

Requirement: KDB 447498 D01 v06

Performed by: Konrad Graßl Date of test: June 22, 2023

Result: ☒ Limits kept ☐ Limits not kept

4.1.3.1 Requirements and limits

According to KDB 447498 D01 v06, section 7.2:
simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modeled, or measured field strengths or power density.

4.1.3.2 Results

Note(s):

1. The ratios are taken from clause 4.1.1.5 for technology 1 and from clause 4.1.1.2 for technology 2.
2. Technology 1 and 2 can transmit simultaneously.

Ratio of technology 1: 0.28 (H field during charging mode)

Ratio of technology 2: 0.00019

<i>Technologies</i>	<i>Ratios</i>	<i>Sum of MPE ratios</i>	<i>MPE exemption limit</i>	<i>Result</i>
1 + 2	0.28 + 0.00015	0.28015	≤ 1	Passed

Table 7: Result of MPE exemption, simultaneous transmissions

4.2 ISED Canada

4.2.1 Frequency range 3 kHz up to 10 MHz

Requirement: RSS-102 Issue 5, section 2.5.1
 Basic standard: SPR-002
 IEEE C95.3

Performed by:	Konrad Graßl	Date of test:	December 7, 2022
Result:	<input checked="" type="checkbox"/> Test passed	<input type="checkbox"/> Test not passed	

4.2.1.1 Test equipment

Type	Designation	Manufacturer	Inventory no.
Exposure level tester with magnetic field probe 100 cm ²	ELT-400 with BN 2300/90.10	Narda Safety Test Solutions GmbH	E00276
Broadband field meter	NBM-550	Narda Safety Test Solutions GmbH	E00900
Electric field probe	EF0691	Narda Safety Test Solutions GmbH	E00902

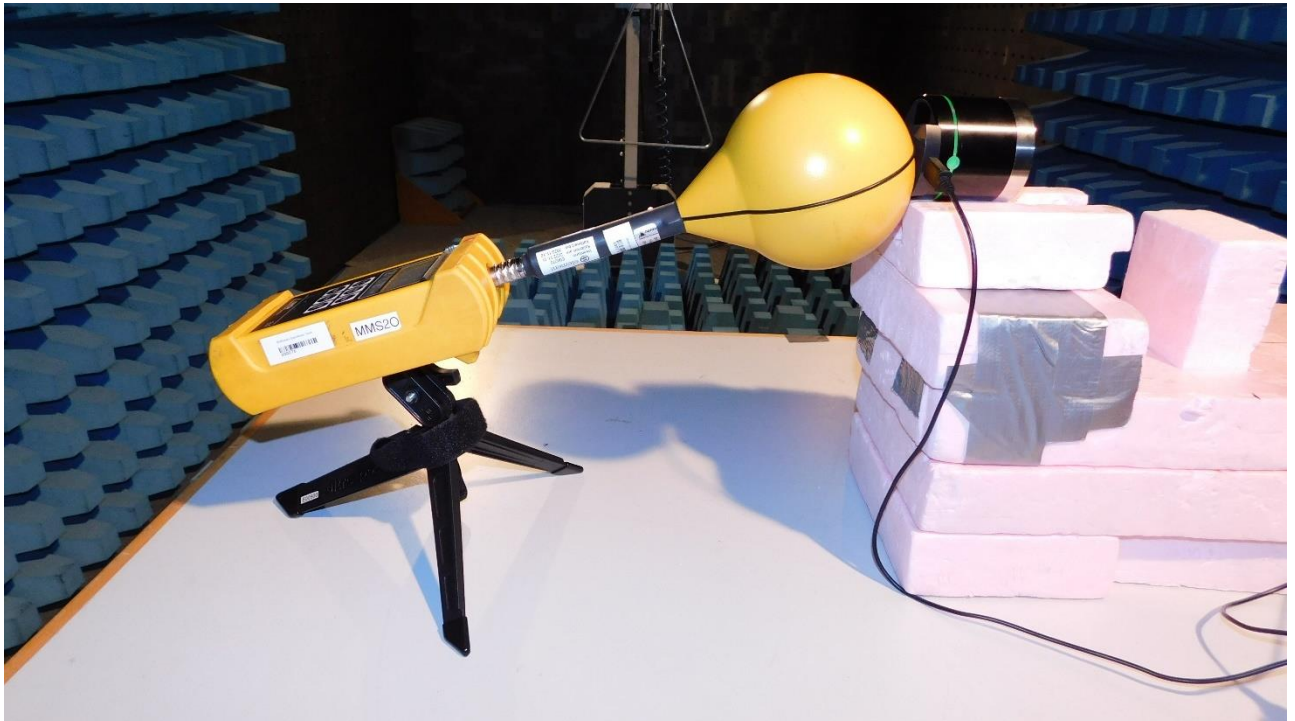
4.2.1.2 Test setup



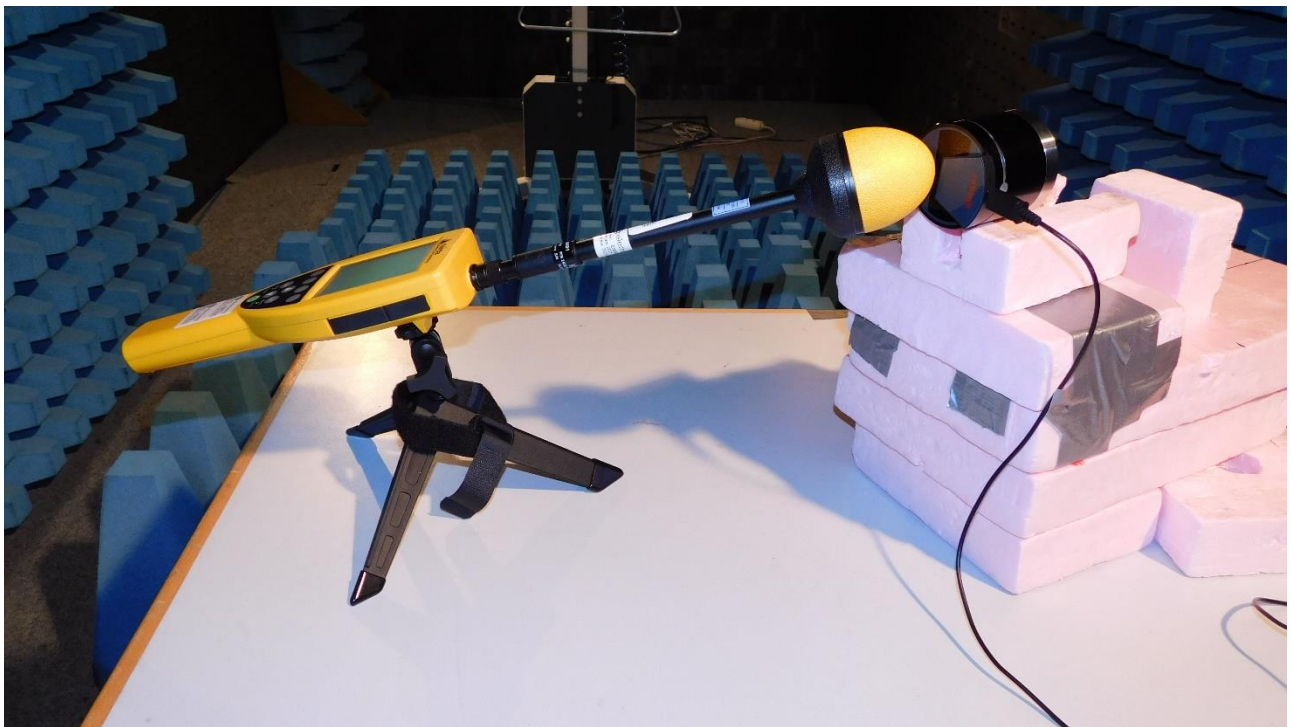
Picture 5: Position of maximum H-field emission measurement in standby mode



Picture 6: Position of maximum E-field emission measurement in standby mode



Picture 7: Position of maximum H-field emission measurement in charging mode



Picture 8: Position of maximum E-field emission measurement in charging mode

4.2.1.3 Limits

According to note 5 in section 2.5.1 of RSS-102:

Transmitters operating between 3 kHz and 10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in section 4 of RSS-102. Therefore, these limits apply irrespective of the separation distance between the user or bystanders and the device.

According to section 4 of RSS-102:

The exposure limits in section 4 of RSS-102 are adopted from Health Canada's Safety Code 6.

According to section 2.1.1 of Safety Code 6:

Limits for internal electric field strength are intended to prevent the occurrence of nerve stimulation (NS). At frequencies between 3 kHz and 10 MHz, basic restrictions for internal electric field strength in excitable tissues as shown in table 1 of Safety Code 6 (i.e. table 2 of RSS-102) shall not be exceeded. For conditions where the determination of internal electric field strength is not possible or practical (e.g. by measurement or modelling), external unperturbed field strength assessment shall be carried out and the reference levels outlined in section 2.2 of Safety Code 6 shall be respected.

For transmitters operating between 3 kHz and 10 MHz, the requirements of table 4 and table 6 in section 4 of RSS-102 apply which are adopted from table 3 and table 4 of Safety Code 6, section 2.2:

<i>Electric Field Strength Reference Levels</i>				
<i>Frequency Range (MHz)</i>	<i>Reference Level Basis</i>	<i>Reference Level (E_{RL}), (V/m, RMS)</i>		<i>Reference Period</i>
		<i>Uncontrolled Environment</i>	<i>Controlled Environment</i>	
0.003 – 10	NS	83	170	Instantaneous (Note 1)

Table 8: Electric field strength reference levels

<i>Magnetic Field Strength Reference Levels</i>				
<i>Frequency Range (MHz)</i>	<i>Reference Level Basis</i>	<i>Reference Level (H_{RL}), (A/m, RMS)</i>		<i>Reference Period (minutes)</i>
		<i>Uncontrolled Environment</i>	<i>Controlled Environment</i>	
0.003 – 10	NS	90	180	Instantaneous (Note 1)

Table 9: Magnetic field strength reference levels

Notes:

- 1 According to note 1 of table 3 of Safety Code 6: At no point in time shall the RMS values for electric- and magnetic-fields exceed the reference levels with an instantaneous reference period in table 8 and table 9. In the case of RF fields with amplitude modulation, the RMS value during the maximum of the modulation envelope shall be compared to the reference level.

4.2.1.4 Test procedure

The RF exposure test is performed by the direct measurement method using a Broadband probe as described in clause 7.1.6 of the supplementary procedure SPR-002.

To find the worst case emissions, the field probe is moved over all sides of the EUT while observing the display of the field meter. At the worst case position, the final value is measured and recorded.

According to the clauses D.2.2 and D.2.3 the measurements on the WPT system are performed at touch position (0 cm).

4.2.1.5 Test results

RF technology 1:

Application:	RFID
Operation frequency range:	139.3 kHz to 174.7 kHz
Antenna model	Loop antenna
Antenna connector:	permanent
Antenna type:	internal not detachable
Environment:	Uncontrolled
Primary exposure condition:	Whole Body

Note(s):

1. Premeasurements were performed to determine the worst case which is documented below.

<i>Frequency (kHz)</i>	<i>Measured value (V/m)</i>	<i>Relaxation factor</i>	<i>Limit (V/m)</i>	<i>Ratio of limit</i>	<i>Result</i>
139.3 to 174.7	2.21	1.0	83	0.03	Passed

Table 10: Electrical field strength at a distance of 0 cm in standby mode

<i>Frequency (kHz)</i>	<i>Measured value (A/m)</i>	<i>Relaxation factor</i>	<i>Limit (A/m)</i>	<i>Ratio of limit</i>	<i>Result</i>
139.3 to 174.7	4.84	1.0	90	0.05	Passed

Table 11: Magnetic field strength at a distance of 0 cm in standby mode

<i>Frequency (kHz)</i>	<i>Measured value (V/m)</i>	<i>Relaxation factor</i>	<i>Limit (V/m)</i>	<i>Ratio of limit</i>	<i>Result</i>
139.3 to 174.7	9.92	1.0	83	0.12	Passed

Table 12: Electrical field strength at a distance of 0 cm in charging mode

<i>Frequency (kHz)</i>	<i>Measured value (A/m)</i>	<i>Relaxation factor</i>	<i>Limit (A/m)</i>	<i>Ratio of limit</i>	<i>Result</i>
139.3 to 174.7	1.97	1.0	90	0.02	Passed

Table 13: Magnetic field strength at a distance of 0 cm in charging mode

4.2.2 Evaluation for separation distance ≥ 20 cm

Requirement: RSS-102 Issue 5, section 2.5.2

Reference: n/a

Performed by:	Konrad Graßl	Date of test:	June 22, 2023
Result:	<input checked="" type="checkbox"/> Limits kept <input type="checkbox"/> Limits not kept		

4.2.2.1 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

According to RSS 102 Clause 2.5.2:

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.

4.2.2.2 Results

RF technology 1:

The following data are based on applicants document: Test report 220365-AU01+W10 of the test laboratory Element Materials Technology Straubing GmbH

Application:	WPT
Operation frequency range:	139.5 kHz to 174.7 kHz
Antenna model	Loop antenna
Antenna type:	external
	not detachable
Maximum field strength:	8.1 dBμA/m at 3 m at 0.1395 MHz

Information related to Exposure:

Tune-up tolerance (according to the manufacturer):	1 dB
Separation distance:	20 cm
Exposure tier:	general public
Power averaging over time:	not applied

<i>Channel frequency (MHz)</i>	<i>EIRP + tolerance (dBm)</i>	<i>EIRP + tolerance (W)</i>	<i>EIRP Limit (W)</i>	<i>Ratio of limit</i>	<i>Result</i>
0.1395	-34.6	$3.5 \cdot 10^{-7}$	1.0	$2.8 \cdot 10^{-7}$	passed

Table 14: Result of exemption for routine evaluation of RF exposure

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

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

With: $E = H + 51.5 \text{ dB}$

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

RF technology 2:

The following data are based on applicants document: Test report 220365-AU01+W03 of the test laboratory Element Materials Technology Straubing GmbH

Application:	Bluetooth low energy
Operation frequency range:	2400 MHz – 2483.5 MHz
Antenna model	PCB antenna
Antenna type:	internal
	not detachable
Antenna gain:	-0.94 dBi
Maximum conducted output power:	-0.2 dBm at 2426 MHz

Information related to Exposure:

Tune-up tolerance (according to the manufacturer):	0 dB
Separation distance:	20 cm
Exposure tier:	general public
Power averaging over time:	not applied

<i>Channel frequency (MHz)</i>	<i>EIRP + tolerance (dBm)</i>	<i>EIRP + tolerance (W)</i>	<i>EIRP Limit (W)</i>	<i>Ratio of limit</i>	<i>Result</i>
2426	-1.14	0.00077	2.69	0.0003	passed

Table 15: Result of exemption for routine evaluation of RF exposure

4.2.3 Simultaneous transmissions - Evaluation for separation distance ≥ 20 cm

Requirement: RSS-102 Issue 5, section 3.3

Reference: Notice 2016-DRS001
KDB 447498 D01 v06

Performed by:	Konrad Graßl	Date of test:	June 22, 2023
Result:	<input checked="" type="checkbox"/> Limits kept	<input type="checkbox"/> Limits not kept	

4.2.3.1 Requirements and limit

According to Notice 2016-DRS001:

It is permitted to apply the FCC KDB 447498.

The exemption limits for routine evaluation defined in RSS-102 are to be applied when determining if a routine evaluation is required.

4.2.3.2 Results

Note(s):

- 1 The fractions are taken from clause 4.2.2.2.
- 2 Technology 1 and 2 can transmit simultaneously.

<i>Technologies</i>	<i>Ratios</i>	<i>Sum of ratios</i>	<i>Limit</i>	<i>Result</i>
1 + 2	$3.5 \cdot 10^{-7} + 0.0003$	0.00030035	≤ 1.0	Passed

Table 16: Result of routine evaluation of simultaneous transmissions

5 Equipment calibration status

Description	Modell number(s)	Serial number(s)	Inventory number(s)	Last calibration	Next calibration
Exposure level tester with magnetic field probe 100 cm ²	ELT-400 with BN 2300/90.10	B-0087 B-0102	E00276	2022-11	2024-11
Broadband field meter with magnetic field probe	NBM-550 with HF3061	H-0015 D-0595	E00900 E00901	2021-06	2023-06
Broadband field meter with electric field probe	NBM-550 with EF0691	H-0015 H-0318	E00900 E00902	2021-06	2023-06

6 Measurement uncertainty

Test	Frequency range	Equipment used	Expanded uncertainty	U_{Limit}	k=
Magnetic field	1 Hz – 10 kHz	ELT 400 + probe	$\pm 28.147 \%$	+58.% / -37 %	2
Magnetic field	10 kHz – 400 kHz	ELT 400 + probe	$\pm 28.147 \%$	+41.% / -30 %	2
H-field	300 kHz – 800 kHz	NBM 550 + HF3061	$\pm 25.602 \%$	+41.% / -30 %	2
H-field	800 kHz – 1 MHz	NBM 550 + HF3061	$\pm 25.245 \%$	+41.% / -30 %	2
H-field	1 MHz – 30 MHz	NBM 550 + HF3061	$\pm 25.245 \%$	+41.% / -30 %	2
E-field	100 kHz – 1 MHz	NBM 550 + EF0691	$\pm 28.467 \%$	+41.% / -30 %	2
E-field	1 MHz – 30 MHz	NBM 550 + EF0691	$\pm 27.324 \%$	+41.% / -30 %	2
E-field	30 MHz – 1 GHz	NBM 550 + EF0691	$\pm 27.324 \%$	+100.% / -50 %	2
E-field	1 GHz – 4 GHz	NBM 550 + EF0691	$\pm 30.244 \%$	+100.% / -50 %	2
E-field	4 GHz – 6 GHz	NBM 550 + EF0691	$\pm 32.150 \%$	+100.% / -50 %	2
Contact current	0 Hz – 110 MHz	EZ 17	+41.25 % / -29.21.%	+100.% / -50 %	2

Note(s):

1. The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k. For a confidence level of 95 % the coverage factor k is 2.
2. The values of the measurement uncertainty as listed above are equal to or lower than the required ones stated in table 3 of EN 62369-1 2009 and listed as (U_{Limit}) in the table above.
3. Simple acceptance is applied as the decision rule while keeping the specified limits (U_{ETSI}) for the expanded measurement uncertainty (i.e. Test Uncertainty Ratio $TUR \geq 1:1$). That means, compliance is based on the recorded level by the lab irrespective of the expanded measurement uncertainty value but with a limitation to it.
4. All used test instrument as well as the test accessories are calibrated at regular intervals.

7 Revision history

<i>Revision</i>	<i>Date</i>	<i>Issued by</i>	<i>Description of modifications</i>
0	2023-06-22	Konrad Graßl	First edition

Template: RF_FCC_IC_Human Exposure_V1.6