Report on the FCC and IC Testing of the Agrident GmbH

Model: ASR650 (RFID Long Range Reader) APA203, APA204, APA206, APA160, LGA149, ARA120 (Antennas for ASR650)

Partly in accordance with FCC 47 CFR and ISED RSS-GEN and ISED RSS-102

Product Service

Add value.
Inspire trust.

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COMMERCIAL-IN-CONFIDENCE

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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
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Authorised Signatory	Alex Fink	2024-11-11	SIGN-ID 984144

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

Engineering Statement:
This measurement shown in this report was made in accordance with the procedures described on test pages.
All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR and ISED RSS-102 and RSS-GEN.
The sample tested was found to comply with the requirements in the tested parts

Laboratory Accreditation	Laboratory recognition	Industry Canada test site registration
DAkkS Reg. No. D-PL-11321-11-03 DAkkS Reg. No. D-PL-11321-11-04	Registration No. BNetzA-CAB-16/21-15	3050A-2

Executive Statement:
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 1:2022 and ISED RSS-102, Issue 6: 2023 and ISED RSS-Gen:2018 + A1:2019 + A2:2021 in the tested parts

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Product Service

Content

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1 Report Summary

1.1 Modification Report

Alternations and additions of this report will be issued to the holders of each copy in the form of a complete document.

Revision	*Description of changes*	*Date of Issue*
0	First Issue	2024-10-01
1	Evaluation according to RSS-102, section 5.3.1 added.	2024-11-06
2	Separate chapter for Nerve Stimulation added.	2024-11-11

Table 1: Report of Modifications

1.2 Introduction

Applicant	Agrident GmbH
Manufacturer	Agrident GmbH
Model Number(s)	ASR650 (RFID Long Range Reader) APA203, APA204, APA206, APA160, LGA149, ARA120 (Antennas for ASR650)
Serial Number(s)	ASR650 SN: 2128005957, 2128005958 APA203 SN: 5615006429, 5615006430 APA204 SN: 5616000532, 5616000533 APA206 SN: 5614004275, 5614004276 APA160 SN: 5618000851, 5618000852 ARA120 SN: 5707000260, 5707000261 LGA149 SN: 5629001015
Hardware Version(s)	---
Software Version(s)	---
Number of Samples Tested	1
Test Specification(s) / Issue / Date	FCC 47 CFR, Part 1, § 1.1307: 2022 and ISED RSS-102, Issue 6: 2023
Test Plan/Issue/Date	---
Order Number	---
Date	---
Date of Receipt of EUT	2024-02-15
Start of Test	2024-03-07
Finish of Test	2024-04-25
Name of Engineer(s)	Alexander Deese
Related Document(s)	ANSI C63.10:2013 KDB 447498 D04 v01 RSS-102.NS.MEAS

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1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR, Part 1, § 1.1307 and ISED RSS-102 is shown below.

Section	*Specification Clause*	*Test Description*	*Result*
2.1	(b)(3)	RF Exposure Exemption	Pass

Table 2: Results according to FCC 47 CFR, Part 1, § 1.1307(b)(3)

Section	*Specification Clause*	*Test Description*	*Result*
2.1	6.3	RF Exposure Exemption	Pass
2.2	7.3	Nerve Stimulation	Pass

Table 3: Results according to ISED RSS-102

Product Service

1.4 Product Information

1.4.1 Technical Description

RFID Long Range Reader used for electronic animal identification.

Supply Voltage:	12 V
Supply Frequency:	DC
Highest clock frequency:	62.2688 MHz

If the EUT contains intentional radiating modules:

(Highest) Clock Frequencies of modules:	134.2 kHz
FCC IDs of modules:	QG2ASR650
IC IDs of modules:	6252A-ASR650

1.5 Test Configuration

The EUT was 12 V DC power supplied. RFID worked.

1.6 Modes of Operation

Test Case 1:
ASR650 (RFID Long Range Reader) with APA203 (Antenna for ASR650)

Test Case 2:
ASR650 (RFID Long Range Reader) with APA204 (Antenna for ASR650)

Test Case 3:
ASR650 (RFID Long Range Reader) with APA206 (Antenna for ASR650)

Test Case 4:
ASR650 (RFID Long Range Reader) with APA160 (Antenna for ASR650)

Test Case 5:
ASR650 (RFID Long Range Reader) with ARA120 (Antenna for ASR650)

Test Case 6:
ASR650 (RFID Long Range Reader) with LGA149 (Antenna for ASR650)

Product Service

1.7 Deviations from Standard

1.8 EUT Modifications Record

The table below details modifications made to the EUT during the test program.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 4

1.9 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing test laboratory:

Test Name	Name of Engineer(s)
RF Exposure	Alexander Deese

Office Address:
Äußere Frühlingstraße 45
94315 Straubing
Germany

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2 Test Details

2.1 RF Exposure Exemption

2.1.1 Specification Reference

47 CFR, Part 1, § 1.1307(b)(3)
RSS-102, Issue 6 (2023-12-15)

2.1.2 Equipment under Test and Modification State

ASR650; S/N 2128005957; Modification state 0
APA203; S/N 2128005957; Modification state 0
APA204; S/N 2128005957; Modification state 0
APA206; S/N 2128005957; Modification state 0
APA160; S/N 2128005957; Modification state 0
ARA120; S/N 2128005957; Modification state 0
LGA149; S/N 2128005957; Modification state 0

2.1.3 Date of Test

2024-03-07 to 2024-06-12

2.1.4 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	34 %

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2.1.5 Specification Limits

47 CFR, Part 1, § 1.1307(b)(3)

(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 radiate 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 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by

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

where

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

and

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

d = the test separation distance (cm);

(C) Or using the table below 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 described for that frequency. For the exemption in the table 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	1920 R^2
1.34 – 30	3450 R^2 / f^2
30 – 300	3.83 R^2
300 – 1500	0.0128 R^2 f^2
1500 – 100000	19.2 R^2

(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 2 cm 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 case of fixed RF sources operating in the same time-averaging period, or of multiple or portable RF sources within a device 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:

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

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RSS-102, section 6.3

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 the table below:

f (MHz)	*Exemption Limits (mW) at separation distance of*									
	≤ 5 mm	*10 mm*	*15 mm*	*20 mm*	*25 mm*	*30 mm*	*35 mm*	*40 mm*	*45 mm*	*≥ 50 mm*
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

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 route evaluation are multiplied by a factor of 5. For limb-worn devices where the 10 grams value applies, the exemption limits for routine evaluation are multiplied by a factor of 2.5.
If the operating frequency of the device is between two frequencies located, 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 implant 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.

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2.1.6 Test Method

Field strength values at 300 m were taken from TR-713319609-02, section 2.2.7. Original measurements were conducted at a 5 m and 10 m distance. The values at 300 m were calculated through interpolation. Maximum output power was calculated through following equation:

$$P = \frac{(E * d)^2}{30 * G}$$

P: Maximum output power [W]
E: Electric field strength [V/m]
d: Distance to antenna [m]
G: Antenna gain = 1

2.1.7 Test Results

47 CFR

Evaluation according to 47 CFR Part 1, §1.1307(b)(3)(i)(A).

Evaluation of RFID:

Test Case	*Frequency [MHz]*	*Field Strength at 300m [dBµV/m]*	*Maximum Output Power [mW]*	*Exemption Limit [mW]*	*Margin [mW]*
1	0.1342	14.38	0.00008225	1	0.9999
2	0.1342	11.83	0.00004572	1	0.9999
3	0.1342	22.46	0.0005286	1	0.9995
4	0.1342	21.90	0.0004646	1	0.9996
5	0.1342	-10.00	0.0000003000	1	1
6	0.1342	15.08	0.00009663	1	0.9999

Product Service

RSS-102, section 6.3

Evaluation according to RSS-102, section 6.3, at a test separation distance of 0 mm.

Evaluation of RFID:

Test Case	*Frequency [MHz]*	*Field Strength at 300m [dBµV/m]*	*Maximum Output Power [mW]*	*Exemption Limit [mW]*	*Margin [mW]*
1	0.1342	14.38	0.00008225	45	45.00
2	0.1342	11.83	0.00004572	45	45.00
3	0.1342	22.46	0.0005286	45	45.00
4	0.1342	21.90	0.0004646	45	45.00
5	0.1342	-10.00	0.0000003000	45	45.00
6	0.1342	15.08	0.00009663	45	45.00

2.1.8 Test Location and Test Equipment

The test was carried out in semi anechoic chamber no. 3 and 8:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
EMI test receiver	Rohde & Schwarz	ESR7	61814	12	2024-06-30
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2026-06-30
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	20116	36	2025-01-31
Semi anechoic room	Frankonia	Cabin no. 3	56331	36	2025-07-31
Semi anechoic room	Albatross	Cabin no. 8	19917	36	2025-07-31

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2.2 Nerve Stimulation

2.2.1 Specification Reference

RSS-102, Issue 6 (2023-12-15), section 7.3

2.2.2 Equipment under Test and Modification State

ASR650; S/N 2128005957; Modification state 0
APA203; S/N 2128005957; Modification state 0
APA204; S/N 2128005957; Modification state 0
APA206; S/N 2128005957; Modification state 0
APA160; S/N 2128005957; Modification state 0
ARA120; S/N 2128005957; Modification state 0
LGA149; S/N 2128005957; Modification state 0

2.2.3 Date of Test

2024-03-11

2.2.4 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	38 %

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2.2.5 Specification Limits

RSS-102, Issue 6, section 5.3.1, table 5 and table 6

Frequency range (MHz)	*Reference level basis*	*Reference level for uncontrolled environment (V/m)*	*Reference level for controlled environment (V/m)*	*Reference period*
0.003 – 10	NS	83	170	Instantaneous
1.10 – 10	SAR	$87 / f^{0,5}$	N/A	6 minutes
1.29 - 10	SAR	N/A	$193 / f^{0,5}$	6 minutes

Frequency range (MHz)	*Reference level basis*	*Reference level for uncontrolled environment (A/m)*	*Reference level for controlled environment (A/m)*	*Reference period*
0.003 – 10	NS	90	180	Instantaneous
1.10 – 10	SAR	0.73 / f	1.6 / f	6 minutes

Product Service

2.2.6 Test Method

According to RSS-102.NS.MEAS, at a test separation distance of 20 cm.

2.2.7 Test Results

Evaluation of RFID:

Test Case	*Frequency [MHz]*	*Reference level basis*	*Reference period*	*Electric Field Strength at 20 cm [V/m]*	*Limit [V/m]*	*Margin [V/m]*
1	0.1342	NS	Instantaneous	4.53	83	78.5
2	0.1342	NS	Instantaneous	6.44	83	76.6
3	0.1342	NS	Instantaneous	4.45	83	78.6
4	0.1342	NS	Instantaneous	7.85	83	75.2
5	0.1342	NS	Instantaneous	0.86	83	82.1
6	0.1342	NS	Instantaneous	1.32	83	81.7

Test Case	*Frequency [MHz]*	*Reference level basis*	*Reference period*	*Magnetic Field Strength at 20 cm [µT]*	*Magnetic Field Strength at 20 cm [A/m]*	*Limit [A/m]*	*Margin [A/m]*
1	0.1342	NS	Instantaneous	8.345	6.641	90	83.36
2	0.1342	NS	Instantaneous	7.413	5.899	90	84.10
3	0.1342	NS	Instantaneous	8.453	6.727	90	83.27
4	0.1342	NS	Instantaneous	7.984	6.353	90	83.65
5	0.1342	NS	Instantaneous	7.984	6.353	90	83.65
6	0.1342	NS	Instantaneous	3.485	2.773	90	87.23

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2.2.8 Test Location and Test Equipment

The test was carried out in shielded room no. 4:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Electromagnetic radiation meter	Narda	EMR-200	19590	36	2025-12-31
Electric field probe	Narda	Type 8.3	19591	36	2025-12-13
Exposure level tester	Narda	ELT-400	19725	12	2025-04-30
Shielded room	Euroshield	No. 4	19314	---	---

Product Service

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to IEC/IEEE 62209-1528 and CISPR16-4-2: 2011 + A1 + A2 + Cor1 (U_{CISPR}). This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Conducted Voltage Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB
Discontinuous Conducted Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
Conducted Current Emission		
9 kHz to 200 MHz	2	± 3.5 dB
Magnetic Field strength		
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB
Radiated Emission		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 5.0 dB
1 GHz to 6 GHz	2	± 4.6 dB
Test distance 10 m		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 4.9 dB
The expanded uncertainty reported according to to CISPR16-4-2: 2011 + A1 + A2 + Cor1 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 5 Measurement uncertainty based on CISPR 16-4-2

Product Service

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Occupied Bandwidth	2	± 5 %
Conducted Power		
9 kHz ≤ f < 30 MHz	2	± 1.0 dB
30 MHz ≤ f < 1 GHz	2	± 1.5 dB
1 GHz ≤ f ≤ 40 GHz	2	± 2.5 dB
1 MS/s power sensor (TS8997)	2	± 1.5 dB
Occupied Bandwidth	2	± 5 %
Power Spectral Density	2	± 3.0 dB
Radiated Power		
9 kHz ≤ f < 26.5 GHz	2	± 5.6 dB
26.5 GHz ≤ f < 60 GHz	2	± 8.0 dB
60 GHz ≤ f < 325 GHz	2	± 10 dB
Conducted Spurious Emissions	2	± 3.0 dB
Radiated Spurious Emissions	2	± 6.0 dB
Voltage		
DC	2	± 1.0 %
AC	2	± 2.0 %
Time (automatic)	2	± 5 %
Frequency	2	± 10^{-7}
The expanded uncertainty reported according to to ETSI TR 100 028:2001 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 6 Measurement uncertainty based on ETSI TR 100 028