

RF Exposure Report

23-0149RP15-004-A

Product / EUT: *RFID Reader*
Ty Type designation: *ARE i9x*
Tested type: *ARE i9x*

EUT authorization: ☒ Certification
☐ Suppliers Declaration of Conformity

Production level: *n/a*
S/N: *n/a*
FCC ID: *V7IAREI9XHF*

Manufacturer: *AEG Identifikationssysteme GmbH*
Hörvelsinger Weg 47
89081 Ulm / Germany

Test remit: FCC Rules 47 CFR Part 1 – Subpart I – Section 1.1310
FCC Rules 47 CFR Part 2 – Subpart J – Section 2.1091
KDB 447498 D04 Interim General RF Exposure Guidance v01

Test result: ☒ Pass
☐ Fail



Applicant: AEG Identifikationssysteme GmbH
Hörvelsinger Weg 47
89081 Ulm / Germany

EUT-
Date of arrival: 02/21/2024
Test ID: 23-0149PR08-003
Date(s) of test: 03/12/2024

Burgrieden, 05/26/2024

Released by:

Principal Engineer - Christian Vogelmann

Test laboratory: EMCE GmbH
Ingenieurbüro für EMV-Prüfungen und
Schaltungsentwicklung
Untere Wiesen 1 / 88483 Burgrieden / Germany

CAB-Registration No.: BnetzA-CAB-02/21-01/4
FCC-Registration No.: 239304



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1 **General information**

Project manager: Mr. S. Vogelmann
Inspector: Mr. S. Vogelmann

EMCE GmbH
Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

Contact person: Mr. Waitzinger / AEG Identifikationssysteme GmbH

Remarks: n/a

State of revision:

Source document	New Document	Date / Reviser	Modifications
23-0149RP15-004	23-0149RP15-004-A	05/23/2024 Steffen Vogelmann	Extension of RF exposure by the assessment of electric field strength.

2 EUT information

Sampling: The device was selected and provided by the customer.

Description: *RFID Reader operating in the frequency range 13.56 MHz with an external antenna.*

Voltage supply: *120 V / 60 Hz*

Frequency list: *13.56 MHz*

Max. clock frequency: *n/a*

Temperature range: *n/a*

Dimension: *(LxWxH) / mm³ - 90 x 40 x 25*

Used antennas:

Antenna designation	Manufacturer	Connector / cable length	Gain (dBi) @ f / GHz
<i>AAN Xi9F – HF Ser. 000580</i>	<i>AEG Identifikationssysteme GmbH</i>	<i>2.0 m</i>	<i>n/a</i>

Supplied / used equipment:

Designation	Type	Manufacturer	S/N
<i>Laptop</i>	<i>W25CSW</i>	<i>Terra</i>	<i>n/a</i>
<i>Power supply – Laptop</i>	<i>A12-065N2A</i>	<i>Chicony</i>	<i>F134091506009041</i>
<i>USB A Converter</i>	<i>151801</i>	<i>Manhattan</i>	<i>n/a</i>
<i>Power supply – EUT</i>	<i>SITP PSU3600</i>	<i>Siemens</i>	<i>n/a</i>

Configuration:

☒
☐

As-delivered condition
Modified
*



Cable designation	Type	Length	Remarks
<i>Antenna cable</i>	<i>n/a</i>	<i>2.0 m</i>	<i>n/a</i>
<i>Interconnection cable</i>	<i>5-core</i>	<i>1.6 m</i>	<i>n/a</i>
<i>Power cord (AC) Notebook</i>	<i>3-core</i>	<i>1.0 m</i>	<i>n/a</i>
<i>Power cord (DC) Notebook</i>	<i>2-core</i>	<i>1.8 m</i>	<i>n/a</i>
<i>Power Cord (AC) PSU</i>	<i>3-core</i>	<i>1.8 m</i>	<i>n/a</i>
<i>Data cable</i>	<i>Sub-D 9-core</i>	<i>1.4 m</i>	<i>n/a</i>
<i>USB to SUB-D converter</i>	<i>151801</i>	<i>1.6 m</i>	<i>Ferrite with 2 turns WE 742 712 21</i>

Software designation	Type	Manufacturer	Version
<i>Evaluation software</i>	<i>ARE i9 Terminal</i>	<i>AEG Identifikationssysteme GmbH</i>	<i>1.084</i>

Pictures of the EUT







Pictures of the Antenna





3 Test equipment list of EMCE GmbH

Inv.- No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
225	Electric and Magnetic Field Probe-Analyzer	EHP-200A	Narda S.T.S. / PMM	170WX70205	3 Year(s)/ 2025-07-22
237	Exposure Level Tester	ELT-400	Narda Safety Test Solutions	O-0028	3 Year(s)/ 2026-03-03



4 **Testplan provided by customer**

- ☐ Test according to the test plan provided by the customer
- ☐ Deviation from the test plan authorised by the customer
- ☒ Test according standard

Source document	Date / Reviser	Modifications



5 **Test(s) according 47 CFR Part 1 Subpart I 03/08/2024 and
47 CFR Part 2 Subpart J 03/08/2024**

5.1 **Requirements and conformance test specifications**

Standard

- 47 CFR Part 1 Subpart I
 - Section 1.1310 Radiofrequency radiation exposure limits
- 47 CFR Part 2 Subpart J
 - Section 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.
- KDB 447498 D04 Interim General RF Exposure Guidance v01

Requirement		Regulation section
☒	RF Exposure Test	§ 2.1091(d) and § 1.1310(e)(1)



5.2 RF Exposure

5.2.1 Test set up





Test set up for antenna	
Side 1 Antenna position: x	
Side 2 Antenna position: y	
Side 3 Antenna position: z	

Test location

☐	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
	588	Shielded room # 2	8.3/5.8 x 5.5/2.9 x 3.4 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
	1319	Shielded room #5	5.6 x 5.0 x 3.8 m	Albatross Projects GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
☒	1320	Semi anechoic chamber # 3	6.3 x 5.6 x 3.8 m	Albatross	EMCE GmbH Untere Wiesen 1 88483 Burgrieden

Used test equipment

☐	Inv.-No.	Designation	Type	Manufacturer	S/N
☒	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
☒	225	Electric and Magnetic Field Probe-Analyzer	EHP-200A	Narda S.T.S. / PMM	170WX70205
	237	Exposure Level Tester	ELT-400	Narda Safety Test Solutions	O-0028

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements

5.2.2 Test

Requirement 47 CFR Part 1 Subpart I Section 1.1310(e)(1)

Measurement Distance 20 cm

Limits

☐ Limits for Occupational/Controlled Exposure				
Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
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			5.0	<6
f Frequency in MHz				
* Plane-wave equivalent power density				

☒ Limits for General Population/Uncontrolled Exposure				
Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3 – 3.0	614	1.63	*(100)	<30
3.0 – 30	842/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
f Frequency in MHz				
* Plane-wave equivalent power density				

☐ Compliance with RF exposure must be determined with reference to 1.1307(c)(d) of the FCC Rules. Emission for frequencies 100 kHz to 300 kHz should be within the limits defined at 300 kHz in Table 1 of 1.1310.



Rationale for selecting the EUT test set up

Equipment units:

RFID reader with an external antenna. Single intentional RF source device.

Cabling:

- ☒ Standard cables
☐ Special cables provided by the manufacturer

Port #	Designation	Remarks
# 1	Antenna cable	4-core / shielded
# 2	Interconnection cable	5-core / shielded

Operation mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
Power supply: ☒ 120 V/60 Hz ☐ 240 V/60 Hz

The EUT was operated in read mode at maximum read speed, with a read cycle being started every 80 ms. The data read was sent to a PC connected to the EUT via a USB interface. No tag was used during the measurement.

Environmental conditions

Temperature [10 – 40 °C]: 24 °C
Relative humidity [10 – 90 %]: 36 %

Environmental conditions during the test: ☒ kept
☐ not kept

Applicable Standard

According to FCC §2.1091 and §1.1307(b), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.



Test result

Limits for
General Population/Uncontrolled Exposure:

☒ kept
☐ not kept

Measurement Data – Magnetic Field Emissions

Operation frequency (MHz)	Test distance (cm)	Test position	Probe Measure Result (A/m)	Limit (A/m)	Margin (A/m)
13.56	20	Side 1	0.0012	0.161	0.1598
		Side 2	≤ 0.001		≥ 0.160
		Side 3	≤ 0.001		≥ 0.160

Measurement Data – Electric Field Emissions

Operation frequency (MHz)	Test distance (cm)	Test position	Probe Measure Result (V/m)	Limit (V/m)	Margin (V/m)
13.56	20	Side 1	0.142	62.094	61.952
		Side 2	0.136		61.958
		Side 3	0.128		61.966

Remarks: n/a



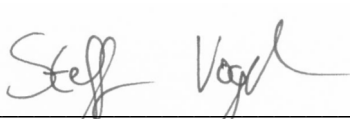
6 **Summary**

FCC Rules 47 CFR Part 1 – Subpart I – Section 1.1310
FCC Rules 47 CFR Part 2 – Subpart J – Section 2.1091

Requirement	Regulation section	Limit	Result	Remarks
RF Exposure	§ 2.1091(d) and § 1.1310(e)(1)	General Population/ Uncontrolled Exposure	Pass	n/a
- Magnetic Field Emission	n/a	0.161 A/m @13.56 MHz	Pass	n/a
- Electric Field Emission	n/a	62.094 V/m @13.56 MHz	Pass	n/a

Burgrieden, 05/26/2024

Responsible inspector:



Project manager – Steffen Vogelmann

- End of Test Report -