

RF Exposure Report

23-0147RP06-007

Product / EUT: *RFID reader with an external antenna*
Type designation: *ARE i2.0x SEMI*
Tested type: *ARE i2.0x SEMI*

EUT authorization: Certification
 Suppliers Declaration of Conformity

Production level: *n/a*
S/N: *000577*
FCC ID: *V7IAREI20XLF-S*

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: 10/23/2023
Test ID: 23-0147PR43-003
Date(s) of test: 02/06/2024

Burgrieden, 02/06/2024

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



Responsible inspector: Mr. S. Vogelmann
 EMCE GmbH
 Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

Contact person: Mr. H. Leuthe / AEG Identifikationssysteme GmbH

EUT

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

Description: *RFID Reader operating at 134.2 kHz*

Voltage supply: *120 V / 60 Hz*

Frequency list: *RFID 134.2 kHz*

Max. clock frequency: *84 MHz*

Temperature range: *n/a*

Dimension: *(LxWxH) / mm³ - 125 x 73 x 38*

**Supplied /
used equipment:**

Designation	Type	Manufacturer	S/N
<i>Antenna</i>	<i>AAN Xi9F - SEMI</i>	<i>AEG ID</i>	<i>n/a</i>
<i>DC Power Supply EUT</i>	<i>LIF120-10B12R2S-EX</i>	<i>RS Pro</i>	<i>220822-727220855585000J</i>
<i>Laptop</i>	<i>W25CSW-W</i>	<i>Terra</i>	<i>NKW25CSWW004K00230</i>
<i>Power Supply Laptop</i>	<i>A12-065N2A</i>	<i>Chicony</i>	<i>F134091506009041</i>



Configuration:

As-delivered condition

Modified

* _____

Cable designation	Type	Length	Remarks
<i>Interconnection cable</i>	<i>5-core + shielded</i>	<i>1.5 + 0.5 m</i>	<i>M12 connector</i>
<i>Antenna cable</i>	<i>3-core</i>	<i>2 m</i>	
<i>RS32 data cable</i>	<i>3-core + shielded</i>	<i>1.4 m</i>	
<i>USB to RS32</i>	<i>n/a</i>	<i>0.3 m</i>	<i>Ferrite WE 742 712 21 with 2 turns</i>
<i>EUT mains cord</i>	<i>3-core</i>	<i>1.8 m</i>	
<i>Laptop mains cord</i>	<i>3-core</i>	<i>1 m</i>	



Pictures of the EUT with external antenna:



Remarks: n/a

State of revision:

Source document	New Document	Date / Reviser	Modifications



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



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1 RF Exposure Test

1.1 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.

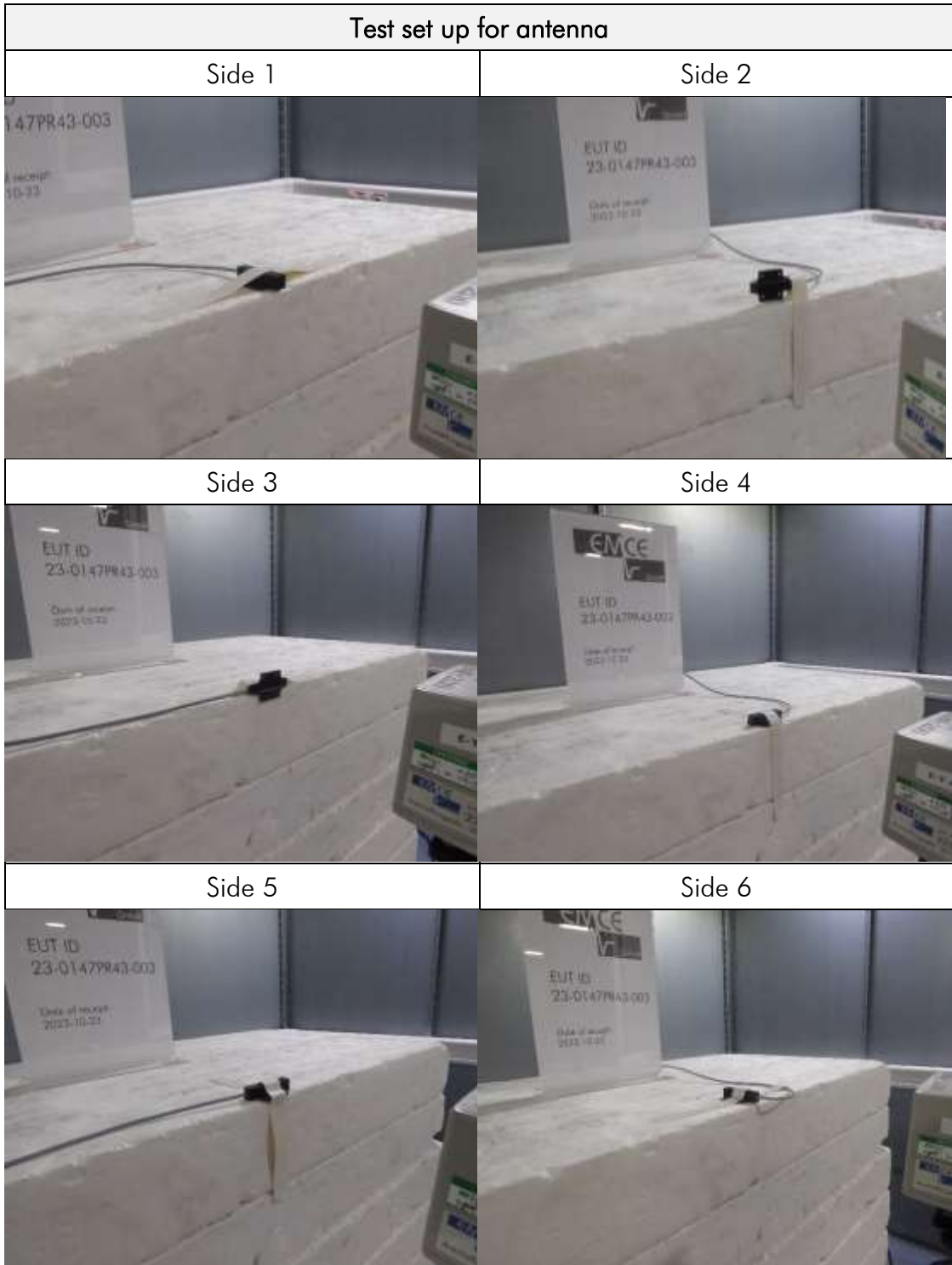
KDB 447498 D04 Interim General RF Exposure Guidance v01

Test mode application		
<input checked="" type="checkbox"/>	47 CFR Part 1 Subpart I Section 1.1310	§ 1.1310(e)(1) Table 1 - Limits for Maximum Permissible Exposure (MPE)
<input checked="" type="checkbox"/>	47 CFR Part 2 Subpart J Section 2.1091	§ 2.1091 (c)(1)



1.1.1 Test set up







Test set up for transceiver	
Side 1	Side 2
Side 3	Side 4
Side 5	Side 6

Test location

<input checked="" type="checkbox"/>	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
<input checked="" type="checkbox"/>	1319	Shielded room #5	5.6 x 5.0 x 3.8 m	Albatross Projects GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden

Used test equipment

<input checked="" type="checkbox"/>	Inv.-No.	Designation	Type	Manufacturer	S/N
<input checked="" type="checkbox"/>	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

Test-/Measurement uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the terminal voltage with an extended coverage factor of $k = 2$:

Frequency	Measurement uncertainty
9 kHz – 150 kHz	4.0 dB
150 kHz – 30 MHz	3.6 dB

1.1.2 Test

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

Measurement Distance 20 cm

Limits

<input type="checkbox"/> 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

<input checked="" type="checkbox"/> 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 (transceiver) with an external antenna. Single intentional RF source device.

Cabling:

- Standard cables
- Special cables provided by the manufacturer

Port #	Designation	Remarks
# 1	Antenna cable	2-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

Continuous reading of a transponder with the highest repetition rate for the reading process. The transponder was placed in the field at the maximum reading distance.

Environmental conditions

Temperature [10 – 40 °C]: 23.6 °C
Relative humidity [10 – 90 %]: 38 %

- 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 (Antenna)

Operation frequency (kHz)	Test distance (cm)	Test position	Probe Measure Result (A/m)	Limit (A/m)	Margin (A/m)
134.244	20	Side 1	0.087	1.63	1.543
		Side 2	0.035		1.595
		Side 3	0.039		1.591
		Side 4	0.034		1.596
		Side 5	0.034		1.596
		Side 6	0.082		1.548

Measurement Data – Electric Field Emissions (Antenna)

Operation frequency (kHz)	Test distance (cm)	Test position	Probe Measure Result (V/m)	Limit (V/m)	Margin (V/m)
134.244	20	Side 1	1.016	614	612.984
		Side 2	1.118		612.882
		Side 3	1.125		612.875
		Side 4	1.030		612.970
		Side 5	1.113		612.887
		Side 6	0.747		613.253

Measurement Data – Magnetic Field Emissions (Transceiver)

Operation frequency (kHz)	Test distance (cm)	Test position	Probe Measure Result (A/m)	Limit (A/m)	Margin (A/m)
134.244	20	Side 1	< 0.016	1.63	≥ 1.614
		Side 2	< 0.016		≥ 1.614
		Side 3	< 0.016		≥ 1.614
		Side 4	< 0.016		≥ 1.614
		Side 5	< 0.016		≥ 1.614
		Side 6	< 0.016		≥ 1.614



Measurement Data – Electric Field Emissions (Transceiver)

Operation frequency (kHz)	Test distance (cm)	Test position	Probe Measure Result (V/m)	Limit (V/m)	Margin (V/m)
134.244	20	Side 1	< 0.061	614	≥ 613.939
		Side 2	< 0.061		≥ 613.939
		Side 3	< 0.061		≥ 613.939
		Side 4	< 0.061		≥ 613.939
		Side 5	< 0.061		≥ 613.939
		Side 6	< 0.061		≥ 613.939

Remarks: n/a



2 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	Result	Remarks
47 CFR Part 1 Subpart I Section 1.1310	General Population/ Uncontrolled Exposure		
- Magnetic Field Emission	1.63 A/m @300 kHz	Pass	n/a
- Electric Field Emission	614 V/m @300 kHz	Pass	n/a

Burgrieden, 02/06/2024

Responsible inspector:

Project manager – Steffen Vogelmann

- End of Test Report –