



RF - TEST REPORT

- Human Exposure -

Type / Model Name : AX500 SMG NG

Product Description : Ticket reader

Applicant : Axess AG

Address : Sonystraße 18

5081 Anif/Salzburg, Austria

Manufacturer : Axess AG

Address : Sonystraße 18

5081 Anif/Salzburg, Austria

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : 80219256-08 Rev_3

26. November 2025

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-00

Contents

1	<u>TEST STANDARDS</u>	3
2	<u>EQUIPMENT UNDER TEST</u>	4
2.1	Information provided by the Client	4
2.2	Sampling	4
2.3	Photo documentation of the EUT	4
2.4	Equipment type	4
2.5	Short description of the equipment under test (EUT)	4
2.6	Operation frequency and channel plan	5
2.7	Transmit operating modes	5
2.8	Antennas	5
2.9	EUT configuration	6
2.10	Power supply system utilised	6
3	<u>TEST RESULT SUMMARY</u>	7
3.1	Revision history of test report	7
3.2	Final assessment	7
4	<u>TEST ENVIRONMENT</u>	8
4.1	Address of the test laboratory	8
4.2	Environmental conditions	8
4.3	Statement of the measurement uncertainty	8
5	<u>HUMAN EXPOSURE</u>	9
5.1	Maximum permissible exposure (MPE)	9
5.2	Co-location and Co-transmission	14
5.3	SAR test exclusion considerations	15
5.4	Exemption limits for routine evaluation - SAR evaluation	16
6	<u>USED TEST EQUIPMENT AND ACCESSORIES</u>	17

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Part 1, Subpart I, Section 1.1310 Radiofrequency radiation exposure limits

Part 1, Subpart 2, Section 2.1091 Radiofrequency radiation exposure evaluation: **mobile devices**.

Part 1, Subpart 2, Section 2.1093 Radiofrequency radiation exposure evaluation: **portable devices**.

KDB 447498 D01 V06 RF Exposure procedures and equipment authorisation policies for mobile and portable devices, April 20, 2021.

ANSI C95.1: 2005 IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

ETSI TR 100 028 V1.3.1: 2001-03, Electromagnetic Compatibility and Radio Spectrum Matters (ERM);
Uncertainties in the Measurement of Mobile Radio Equipment
Characteristics—Part 1 and Part 2

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

2.3 Photo documentation of the EUT

Detailed photos see ATTACHMENT A and ATTACHMENT B

ATTACHMENT A: External views

ATTACHMENT B: Internal views

2.4 Equipment type

BLE / RFID device, fixed equipment (fixed installed floor standing device)

2.5 Short description of the equipment under test (EUT)

The EUT is a Ticket reader.

Number of tested samples:	1
Serial number:	1 7000000 0100 24 0230
Firmware version:	FW BLE00.33 and NRF01.20

2.6 Operation frequency and channel plan

The operating frequency of the BLE is 2402 MHz to 2480 MHz.

Channel plan:

Channel	Frequency	Channel	Frequency
37	2402	18	2442
0	2404	19	2444
1	2406	20	2446
2	2408	21	2448
3	2410	22	2450
4	2412	23	2452
5	2414	24	2454
6	2416	25	2456
7	2418	26	2458
8	2420	27	2460
9	2422	28	2462
10	2424	29	2464
38	2426	30	2466
11	2428	31	2468
12	2430	32	2470
13	2432	33	2472
14	2434	34	2474
15	2436	35	2476
16	2438	36	2478
17	2440	39	2480

Note: the marked frequencies are determined for final testing.

The operating frequency of the RFID is 13.553 MHz to 13.567 MHz on 1 channel.

2.7 Transmit operating modes

BLE:

The EUT uses GFSK modulation and may provide following data rates:

- 1000 kbps

(kbps = kilobits per second)

RFID:

Continuous reading mode (13.56 MHz)

The EUT is tested together with a TAG.

2.8 Antennas

The following antennas shall be used with the EUT:

Axess BLE-Antenna Kathrein 52010559-A01

Dual Band WIFI/Bluetooth Antenna APAMBJ-135

Antenna Loop, Resonance Circuit for 13.56 MHz carrier frequency (TA108)

(The antennas cannot be unattached by user.)

2.9 EUT configuration

The following peripheral devices and interface cables were connected during the measurements:

- | | |
|----------------|-------------------------------------|
| - Power supply | Model: AX500 POWER SUPPLY, Axess AG |
| - RFID - card | Model: Axess AG |

*) SN.: 115002500100240113

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 24 V DC

All tests were carried out with a supply voltage of 24 V DC unless otherwise stated. Exceptions are described in the detailed test conditions.

3 TEST RESULT SUMMARY

FCC Rule Part	Description	Result
KDB 447498, 7.1	MPE	passed
KDB 447498, 4.3.1	SAR exclusion consideration	not applicable
KDB 447498, 7.2	Co-location, Co-transmission	passed

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80219256-08	0	02 June 2025	Initial test report
80219256-08	1	25 June 2025	Change of minimum separation distance from R = 0.3 m to R = 0.02 m for the calculation according to Table 1 to § 1.1307(b)(3)(i)(C) – Single RF Sources Subject to Routine Environmental Evaluation
80219256-08	2	19 September 2025	Cancel chapter: KDB 447498, 2.1.4 MBE-Based Exemption, KDB 447498, 2.2.2 RF Exposure Test Exemptions for Simultaneous Transmission Sources New chapter: Appendix B.2 Blanket 1 mW Blanket Exemption
80219256-08	3	26 November 2025	Cancel chapter: Appendix B.2 Blanket 1 mW Blanket Exemption New chapter: MPE and Co-location, Co-transmission according FCC Rules and KDB 447498 D01 V06, Inserting the measurement results: BLE antenna ports 2 and 3.

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

The equipment under test fulfills the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 10 October 2024

Testing concluded on : 24 November 2025

Checked by:

 Jürgen Pessinger
2025.11.26 12:48:58
+01'00'

Jürgen Pessinger
Team Lead Radio

Tested by:

 Markus Friedl
I am the author of
this document.
2025.11.26 11:15:05
+01'00'

Markus Friedl
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Straubinger Straße 100
94447 Plattling
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15 - 35 °C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

5 HUMAN EXPOSURE

5.1 Maximum permissible exposure (MPE)

For test instruments and accessories used see section 6 Part RF.

5.1.1 Photo documentation of the test set-up

See ATTACHMENT C to this test report. (Location of measurement points, RFID)

5.1.2 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

5.1.3 Description of Determination

The maximum rated output power conducted included the tune up tolerance is used to calculate the EIRP. Through the Friis transmission formula, the known maximum gain of the antenna and the maximum power, can be calculated the MPE in a defined distance away from the product.

Friis transmission formula:

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

Where:

P_d = power density (mW/cm²)

P_{out} = output power to antenna (mW)

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

According to FCC Rules 47CFR 2.1093(b) the EUT is not a portable device. The EUT is designed to be used that radiating structures are 20 cm outside of the body of the user. ($r = 20$ cm)



AX500 SMG NG Ticket reader, Place the card about 20 cm right and 20 cm in front of the antenna coil, position approximately in the middle of the antenna height.

5.1.4 Determination of MPE according FCC
Evaluation of the RFID (radiated) of the EUT:

(Location of measurement points see ATTACHMENT C to this test report.)

Frequency [MHz]	Distance	≤ 5 cm EIRP [dBm]	Calculated EIRP [mw]	RF Exposure Limit [mW]	Result
	Position				
13.56	1	-24.38	0.0036	1	passed
13.56	2	-27.11	0.0019	1	passed
13.56	3	-26.44	0.0023	1	passed
13.56	4	-25.33	0.0029	1	passed

Maximum at 13.56 MHz, 0.004 mW

$$\text{EIRP} = P_{\text{out}} * G = 0.004 \text{ mW}$$

Minimum distance r: 20 cm

EIRP	EIRP	S	Limit S _{eq}	Margin	Exposure ratio
(mW)	(W)	(mW/cm ²)	(mW/cm ²)	(mW/cm ²)	(%)
0.004	0.000004	0.0000032	0.98	-0.9799968	0.00032

Evaluation of RF Output Power BLE of the EUT:

The RF output power (conducted) is taken from the test report 80219256-05 Rev_0 issued by CSA Group Bayern GmbH (Adress: Straubinger Straße 100, 94447 Plattling, Germany). CSA Group Bayern is an accredited testing laboratory.

BLE Port 1:

1 Mbps:

FCC §15.247 (b)(3) RSS-247 6.2.2.2 (b):					
Modulation	Channel	Frequency	Measured Conducted TX Power	Conducted Tx-Power Limit	Margin
		MHz	dBm	dBm	dB
1 Mbps	CH37	2402	-2.24	23.98	26.22
	CH18	2442	-2.75	23.98	26.73
	CH39	2480	-2.98	23.98	26.96

Note: As worst-case power the peak power is not averaged over time

Maximum at 2402 MHz, -2.2 dBm

FCC ID: 2AC3W-AX500SMGNG
IC: 12296A-AX500SMGNG

Rated output power: -2.2 dBm 0.6 mW
Tune-up tolerance: 1.00 dB
Maximum output power: -1.2 dBm 0.8 mW
Antenna gain max: 1.17 dBi

Maximum EIRP: -0.03 dBm 1.0 mW
Minimum distance r: 20.0 cm

max. EIRP	Antgain	EIRP	G	EIRP	S	Limit S_{eq}	Margin	Exposure ratio
(dBm)	(dBi)	(mW)	linear	(W)	(mW/cm ²)	(mW/cm ²)	(mW/cm ²)	(%)
-0.03	1.2	0.99	1.31	0.00099	0.000198	1.0	-0.9998	0.02

BLE Port 2:
1 Mbps:

FCC §15.247 (b)(3) RSS-247 6.2.2.2 (b):					
Modulation	Channel	Frequency	Measured Conducted TX Power	Conducted Tx-Power Limit	Margin
		MHz	dBm	dBm	dB
1 Mbps	CH37	2402	-2.02	23.98	26.00
	CH18	2442	-1.94	23.98	25.92
	CH39	2480	-2.13	23.98	26.11

Note: As worst-case power the peak power is not averaged over time

Maximum at 2480 MHz, -2.1 dBm

Rated output power: -2.1 dBm 0.6 mW
Tune-up tolerance: 1.00 dB
Maximum output power: -1.1 dBm 0.8 mW
Antenna gain max: 1.17 dBi

Maximum EIRP: 0.07 dBm 1.0 mW
Minimum distance r: 20.0 cm

max. EIRP	Antgain	EIRP	G	EIRP	S	Limit S_{eq}	Margin	Exposure ratio
(dBm)	(dBi)	(mW)	linear	(W)	(mW/cm ²)	(mW/cm ²)	(mW/cm ²)	(%)
0.07	1.2	1.02	1.31	0.00102	0.000202	1.0	-0.9998	0.02

BLE Port 3:
1 Mbps:

FCC §15.247 (b)(3) RSS-247 6.2.2.2 (b):					
Modulation	Channel	Frequency	Measured Conducted TX Power	Conducted Tx-Power Limit	Margin
		MHz	dBm	dBm	dB
1 Mbps	CH37	2402	-1.48	23.98	25.46
	CH18	2442	-1.30	23.98	25.28
	CH39	2480	-1.28	23.98	25.26

Note: As worst-case power the peak power is not averaged over time

Maximum at 2480 MHz, -1.3 dBm

Rated output power:	-1.3 dBm	0.7 mW
Tune-up tolerance:	1.00 dB	
Maximum output power:	-0.3 dBm	0.9 mW
Antenna gain max:	4.50 dBi	
Maximum EIRP:	4.20 dBm	2.6 mW
Minimum distance r:	20.0 cm	

max. EIRP	Antgain	EIRP	G	EIRP	S	Limit S_{eq}	Margin	Exposure ratio
(dBm)	(dBi)	(mW)	linear	(W)	(mW/cm ²)	(mW/cm ²)	(mW/cm ²)	(%)
4.20	4.5	2.63	2.82	0.00263	0.000523	1.0	-0.9995	0.05

Σ BLE Port 1 – BLE Port 3 Exposure ratio (%) : 0.09%

Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(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

f = Frequency in MHz

13.56 MHz = 0.98 mW/cm²

2402 MHz, 2442 MHz and 2480 MHz = 1.0 mW/cm²

Exemption limits for routine Evaluations – Field reference level exposure exemption limits according RSS102, 6.6:

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 $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ (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)

The requirements are **FULFILLED**.

Remarks: None

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

5.2 Co-location and Co-transmission

Applicable standard:

OET Bulletin 65, Edition 97-01, Section 2: Multiple-transmitter sites and Complex Environments

The FCC's MPE limits vary with frequency. Therefore, in mixed or broadband RF fields where several sources and frequencies are involved, the fraction of the recommended limit (in terms of power density or square of the electric or magnetic field strength) incurred within each frequency interval should be determined, and the sum of all fractional contributions should not exceed 1.0, or 100 % in terms of percentage.

Both transmitters (Co- Transmission):**RFID**

Maximum at 13.56 MHz; Exposure ratio 0.00032 %

BLE

Maximum output power at 2402 MHz, 2442 MHz and 2480 MHz; Exposure ratio 0.09 %

$$0.00032 \% + 0.09 \% = 0.09032 < 1\%$$

The requirements are **FULFILLED**.

Remarks: None

5.3 SAR test exclusion considerations

5.3.1 Applicable standard

According to RF exposure guidance:

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Remarks: Not applicable, EUT is not portable.

5.4 Exemption limits for routine evaluation - SAR evaluation

5.4.1 Applicable standard

According to RSS-102, item 6.3:

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

Remarks: Not applicable, EUT is not portable.

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
RF (Test date: 10.10.2024)						
	FSW43	02-02/11-15-001	19/08/2025	19/08/2024		
	HFRAE 5161	02-02/24-11-004				