

Technical Memorandum

SAR test exclusion assessment for SA3-xxx series according to FCC specifications

Performed for Allertz Exportlots Aktiebolag

Project no.: 123-27564

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Title SAR test exclusion assessment for SA3-xxx series according to FCC specifications

Assessment objects SA3-xxx series

Report no. 123-27564-2

Client Allertz Exportlots Aktiebolag
Hebbes Väg 13
644 36 Torshälla
Sweden

Manufacturer AES GmbH
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Germany

Specifications KDB 447498 D01 General RF Exposure Guidance v06

Results The test object was found to be in compliance with the specifications

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Date 11 November 2023

Project Manager

A handwritten signature in black ink, appearing to read "Jan Askov", written over a horizontal line.

Jan Askov
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1. Conclusion

Product name: (SA3-xxx series)

- SA3-I with FCC ID 2ATGK-SA3-I
- SA3-F with FCC ID 2ATGK-SA3-F
- SA3-D with FCC ID 2ATGK-SA3-D
- SA3-USB with FCC ID 2ATGK-SA3-USB

The assessment object mentioned in this report meets the requirements of the rule parts stated below in a general population/uncontrolled exposure environment - portable device.

- [KDB 447498 D01 General RF Exposure Guidance v06](#)

The results relate only to the object assessed.

1.1 Assessment objects



Photo 1.1.1 Assessment objects.

Assessment object 1.1.1

No.	Test item name	Unique identification / type / description	FW and HW versions
1	SA3-USB	SN: SA3-USD / full function version, USB interface	FW version SA3-USB: 4.10 HW version SA3-USB: 30_1
2	SA3-D	SN: SA3-D / full function version, CAN bus interface	FW version SA3-D: 4.06 HW version SA3-D: 30_1
3	SA3-I	SN: SA3-I / full function version, CAN bus interface. The flex cable on the rear is connected to the front dome buttons and isn't connected to the PCB.	FW version SA3-I: 4.06 HW version SA3-I: 30_1
4	SA3-F	SN: SA3-F / full function version, CAN bus interface	FW version SA3-F: 4.06 HW version SA3-F: 30_1
Supplementary information: -			

2. General test conditions

2.1 Description and intended use of the test object

Card reader system.

RFID devices – dual frequencies. (Not transmitting simultaneous)

2.2 Test modes during emission tests

See test report: 123-27564-1

2.3 Characteristics and parameters of the assessed object.

See test report: 123-27564-1

2.4 Exposed parts of the body

Any significant exposure will be to the body (worst case).

2.5 Pulsed / transient fields

The emissions from the assessed object are not pulse modulated.

There are no occasional or periodic transients in the emitted field.

3. Assessment of compliance with FCC requirements

Assessment method:

- KDB 447498 D01 General RF Exposure Guidance v06 clause 4.3.1
 - General population/uncontrolled exposure environment - portable device

3.1 Parameters for assessment

The requirements for determination of compliance and the preparation of an Environmental Assessment regarding human exposure to levels of radiofrequency radiation. The exposure is assessed according to KDB 447498 D01 General RF Exposure Guidance v06 clause 4.3.1

3.2 RFID radios:

The RFID radios radiated power is determined from a worst-case scenario with at constant RFID radio transmission, average DC current consumption when transmitting and at fixed voltage supply at 24 VDC. The antenna gains are very low due to antenna coil design – a very short antenna, the length of the coil wire is very short compared to a $\lambda/4$.

- Duty cycle 100 %
- G(antenna) = N/A (Very short antenna – PCB coil with a very low antenna gain)
- User separation distances > 190 mm

3.3 Measurements results: ($P = U * I$)

Product	6 min	U [V]	I [mA]	P [mW]
SA3-D + 13MHz card/tag	avg	24.001	11.447	274.74
SA3-D + 125kHz card/tag	avg	23.995	10.164	243.89
SA3-D (no card/tag)	avg	23.980	10.884	261.00
SA3-F + 13MHz card/tag	avg	23.985	8.056	193.22
SA3-F + 125kHz card/tag	avg	23.982	7.189	172.41
SA3-F (no card/tag)	avg	23.974	7.989	191.53
SA3-I + 13MHz card/tag	avg	23.964	8.684	208.10
SA3-I + 125kHz card/tag	avg	23.961	8.067	193.29
SA3-I (no card/tag)	avg	23.953	8.394	201.06
SA3-USB + 13MHz card/tag	avg	5.129	23.770	121.92
SA3-USB + 125kHz card/tag	avg	5.130	22.138	113.57
SA3-USB (no card/tag)	avg	5.129	22.923	117.57

The voltage regulator for the two transmitters has a tolerance at $\pm 1\%$ at the supply voltage.

This tolerance must be in consideration to the total DC power consumption – in a worst-case scenario ($P_{w.c}$), it will give a $P_{w.c}$ at $1.02 \times$ “total DC power consumption”.

Worst-Case device: $P_{w.c} = 1.02 * 274.74 = 280$ [mW] for the “SA3-D” + 13MHz card/tag

3.4 Limit

$P(125\text{ kHz_Limit}@190\text{ mm}) = 2214\text{ mW}$ or $P(13.56\text{ MHz_Limit}@190\text{ mm}) = 1060\text{ mW W.C.}$

- According to KDB 447498 D01 General RF Exposure Guidance v06 Clause 4.3.1.c.1
 - General population/uncontrolled exposure environment - portable device

3.5 Result

Therefore, all products are considered compliant with the FCC rule parts for a user separation distances $> 190\text{ mm}$ for portable device in a general population/uncontrolled exposure environment.

4. Annex

4.1 Measurements results for the DC power consumption

$$P(\text{RFID_DC input power}) = V(\text{CC_RFID}) * I(\text{RFID_Tx})$$

		Volt [V]	Amp [mA]	Pwr[mW]	Pwr[mW]
SA3-D + 13MHz card	min	23.970	8.119	194.61	
	max	24.020	14.222	341.61	
	avg	24.001	11.447	274.74	275
SA3-D + 125kHz card	min	23.980	8.162	195.72	
	max	24.010	12.261	294.39	
	avg	23.995	10.164	243.89	
SA3-D (no card)	min	23.970	10.419	249.74	
	max	23.992	11.905	285.62	
	avg	23.980	10.884	261.00	

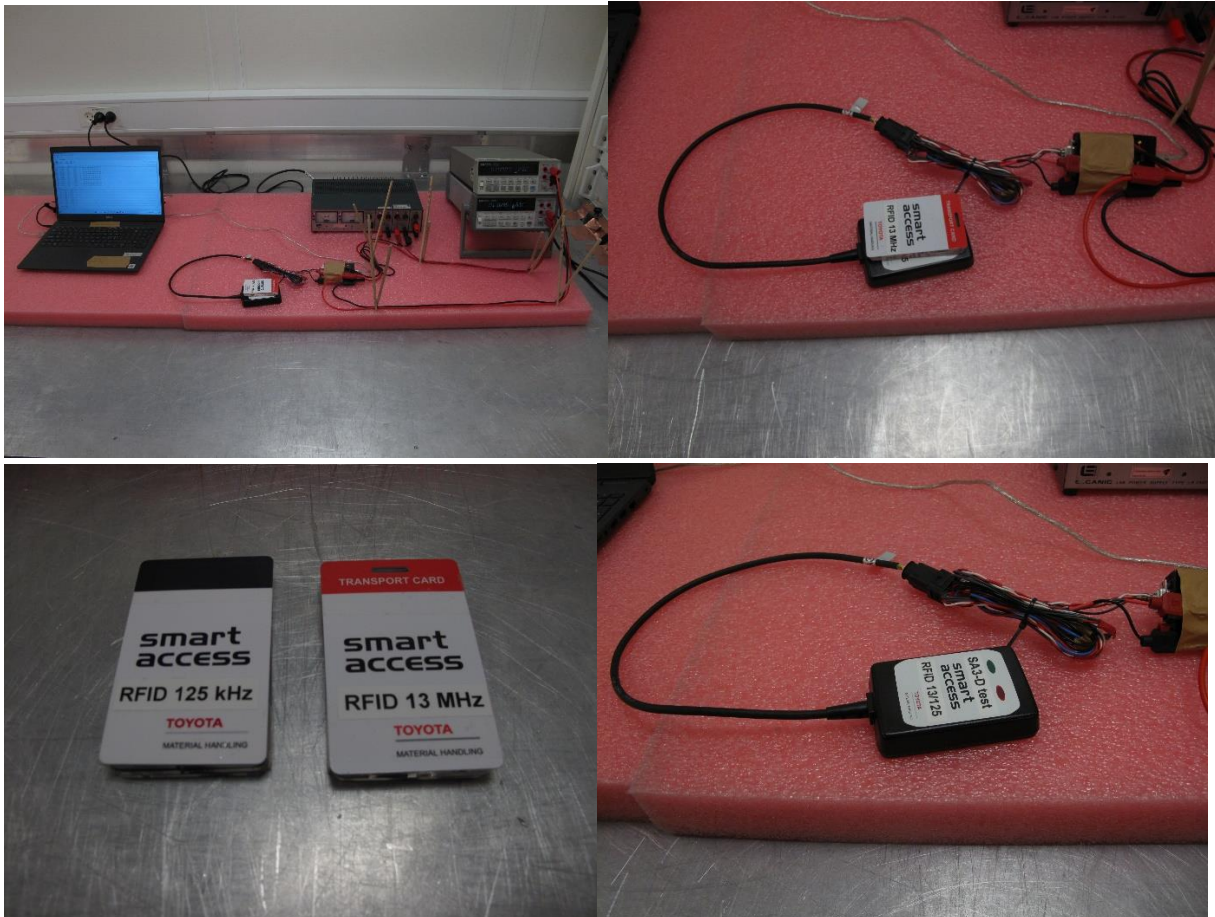
		Volt [V]	Amp [mA]	Pwr[mW]	Pwr[mW]
SA3-F + 13MHz card	min	23.976	6.578	157.71	
	max	23.997	9.312	223.46	
	avg	23.985	8.056	193.22	193
SA3-F + 125kHz card	min	23.974	6.635	159.07	
	max	23.990	8.070	193.60	
	avg	23.982	7.189	172.41	
SA3-F (no card)	min	23.969	7.879	188.85	
	max	23.978	8.170	195.90	
	avg	23.974	7.989	191.53	

		Volt [V]	Amp [mA]	Pwr[mW]	Pwr[mW]
SA3-I + 13MHz card	min	23.954	6.664	159.63	
	max	23.977	10.278	246.44	
	avg	23.964	8.684	208.10	208
SA3-I + 125kHz card	min	23.950	6.701	160.49	
	max	23.972	9.418	225.77	
	avg	23.961	8.067	193.29	
SA3-I (no card)	min	23.950	8.154	195.29	
	max	23.958	8.877	212.68	
	avg	23.953	8.394	201.06	

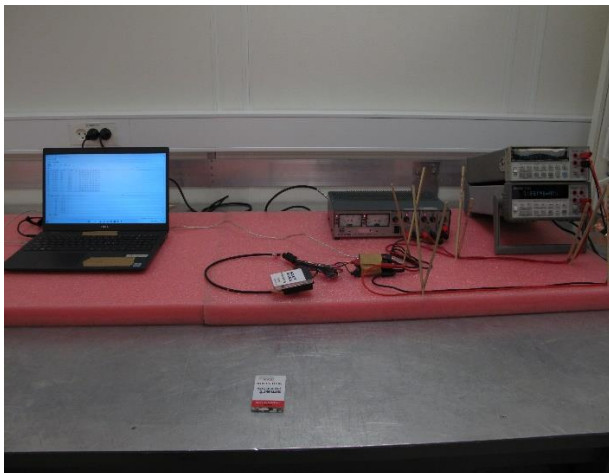
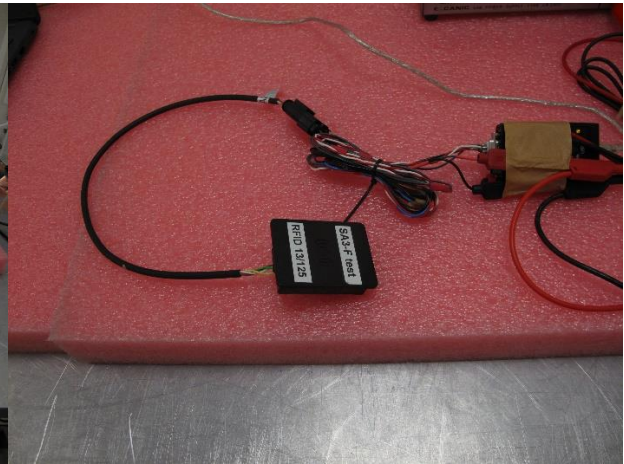
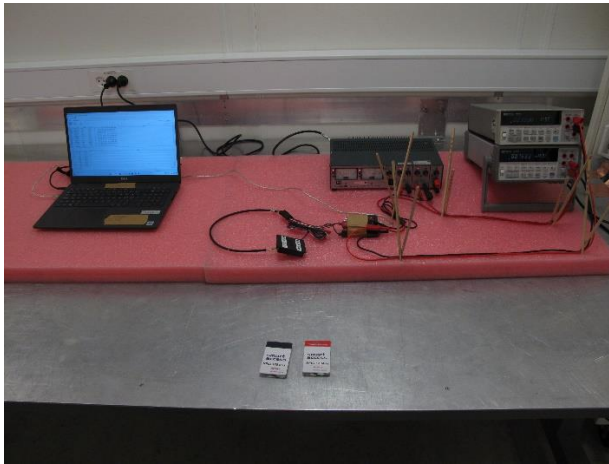
		Volt [V]	Amp [mA]	Pwr[mW]	Pwr[mW]
SA3-USB + 13MHz card	min	5.127	20.113	103.12	
	max	5.130	26.945	138.23	
	avg	5.129	23.770	121.92	122
SA3-USB + 125kHz card	min	5.128	19.794	101.50	
	max	5.130	24.644	126.42	
	avg	5.130	22.138	113.57	
SA3-USB (no card)	min	5.128	20.696	106.13	
	max	5.130	24.714	126.78	
	avg	5.129	22.923	117.57	

4.2 Measurements setup for:

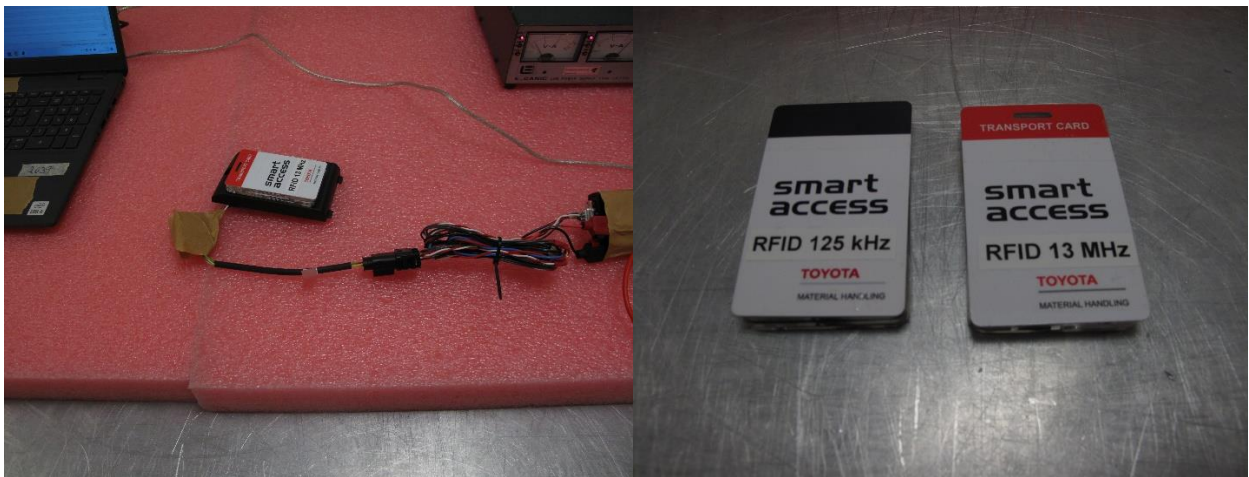
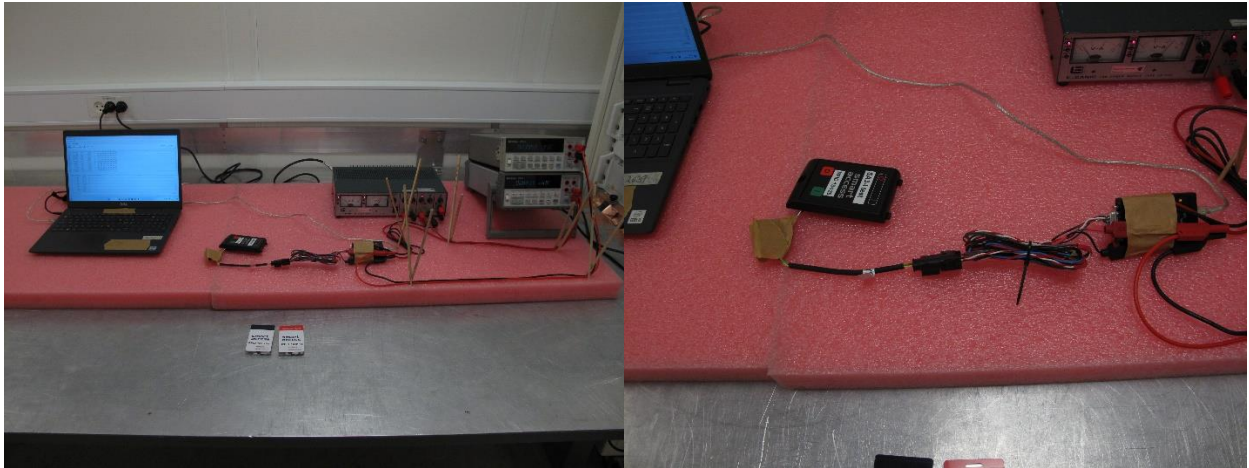
4.2.1 SA3-D + 13MHz card/tag / SA3-D + 125kHz card/tag / SA3-D (no card/tag)



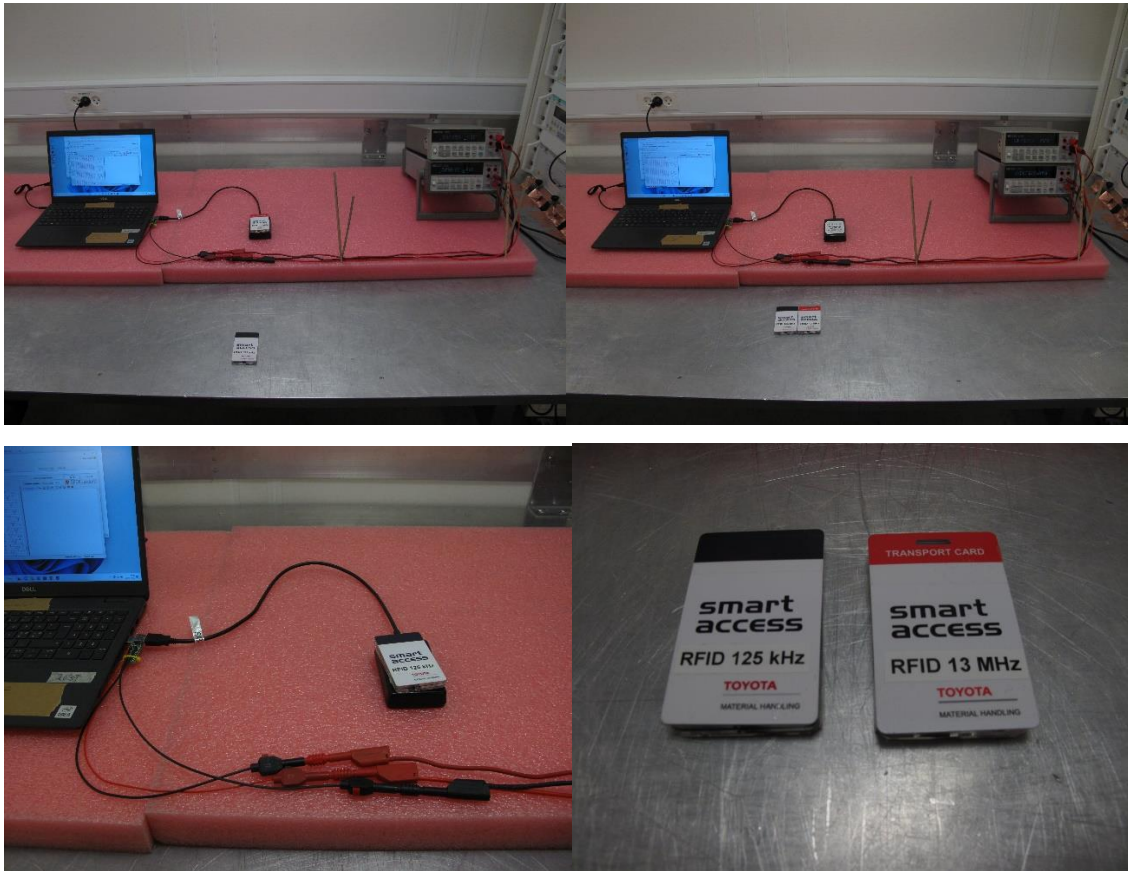
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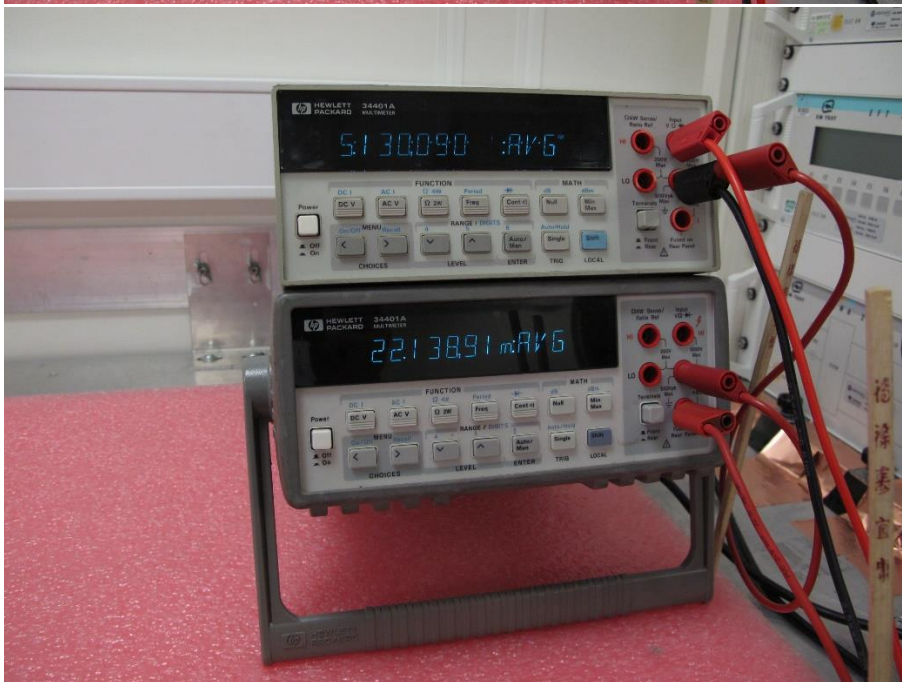
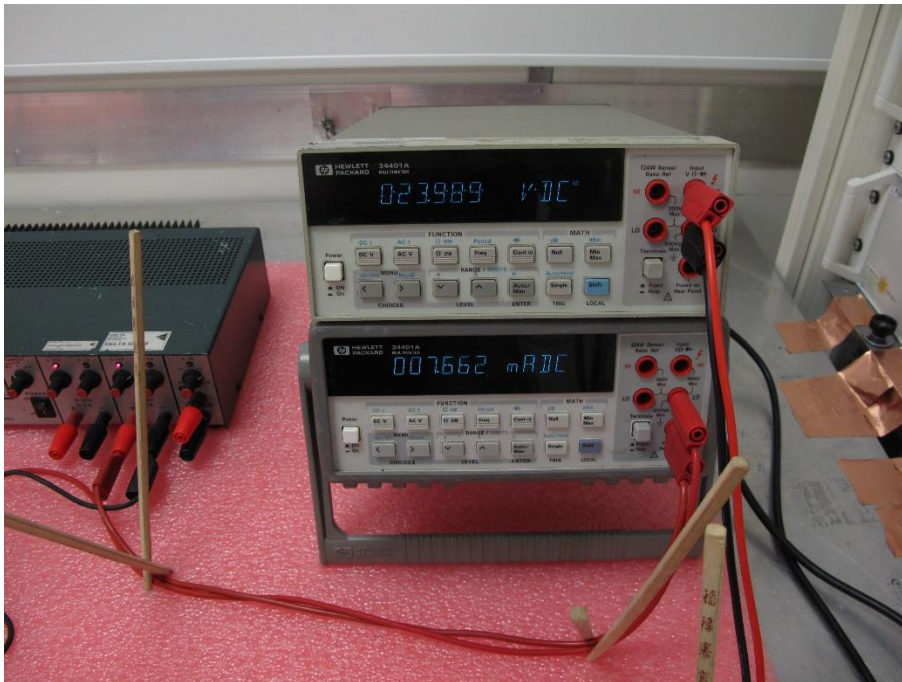
4.2.3 SA3-I + 13MHz card/tag / SA3-I + 125kHz card/tag / SA3-I (no card/tag)



4.2.4 SA3-USB + 13MHz card/tag / SA3-USB + 125kHz card/tag / SA3-USB (no card/tag)



4.3 Test equipment



5. List of test equipment

ID no.	Description	Manufacturer	Type no.	Last Calibration date	Calibration due date
415	Multimeter	HP	34401A	2023-02-28	2024-02-28
610	Multimeter	HP	34401A	2022-11-30	2023-11-30
605	PSU	Elcanic	LR2302	N/A	N/A