

of the accredited test laboratory

TÜV Nr.:INE-AT/FG-17/110

Applicant:

PS GmbH

Melisau 1255

6863 Egg

Austria

**Tested Product:** 

Electronic Lock

FCC-ID:

2ALMH1

IC-ID:

N/A

Manufacturer:

See Applicant

Output power /

74,2 dBµV/m @

power supply:

3V DC

internal battery

field strength:

3m distance

A I / A

Frequency range:

125 kHz

Channel separation:

N/A

Standard:

FCC: 47 CFR Part 15 (October 1, 2016 edition)

RSS-210 Issue 9, August 2016

TUV Austria Services GmbH
Test laboratory for EMC

Supervisor of EMC-laboratory:

ing. Wilhelm Seier

Rundsiegel G AUSTRIA 19.05.2017

Ing. Michael Emminger

checked by

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The results of this test report only refer to the provided equipment.



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Technik



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IBAN AT1531000001040932 BIC RZBAATWW

VAT ATU63240488 DVR 3002476 Ambient temperature: 22°C

Relative humidity: 43%



#### LIST OF MEASUREMENTS

The complete list of measurements called for in 47 CFR 15 and RSS-210 is given below.

SUBCLAUSE	PARAMETER TO BE MEASURED	PAGE
	Intentional Radiators	
4	Test object data	3
15.209 RSS-Gen	General emissions limit	4

Ambient temperature: 22°C

Relative humidity: 43%



#### **TEST OBJECT DATA**

#### General EUT Description

This Electronic Lock uses RFID at 125 kHz to read keycards or other forms of RFID-Tags.

- 2.1033 (c) Technical description
- 2.1033 (4) Type of emission: pulsed transmission
- 2.1033 (5) Frequency range: only one operating frequency 125 kHz.
- 2.1033 (6) Power range and Controls: Fixed output power resulting in 74,2 dBµV/m field strength in 3m distance.
- 2.1033 (7) Maximum output power rating: 74,2 dBµV/m @ 3m distance.
- 2.1033 (8) DC Voltage and Current: 3 V DC powered by internal battery maximum current consumption: 280 mA

Ambient temperature: 22°C

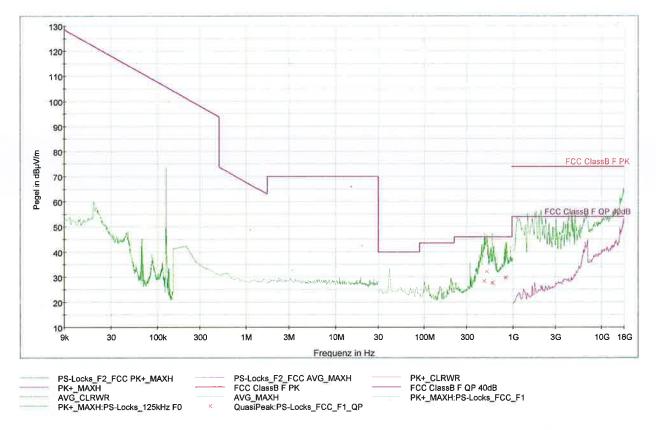
Relative humidity: 43%



#### General emissions limit

§ 15.209 RSS-Gen

Green line: Peak measurement; Magenta line: Average measurement



Field strength at 125 kHz:  $74.2~dB\mu V/m = 5129~\mu V/m$  at 3 m distance. Converted with 40dB per decade for the 300m Limit this would be a Level of -5,8 dB $\mu$ V/m or 0,513  $\mu$ V/m. The Limit at 125 kHz is 19,2  $\mu$ V/m at a distance of 300m.

Highest Quasipeak value at 3m distance: 500,00 MHz: 32,0 dBµV/m

LIMIT

15.209 (RSS-Gen)

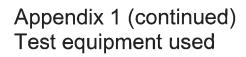
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-112; EMV-200

# Appendix 1 Test equipment used



Anechoic Chamber with 3m measurement distance	NT-100	Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200	<b>Division:</b> Industry & Energy
Stripline according to ISO 11452-5	NT-108	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1	December 50
MA4000 - Antenna mast 1 - 4 m height	NT-110/1	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207	Department: FG  Test report number:
DS - Turntable 0 - 400 ° Azimuth	NT-111/1	Digital Radio Tester CTS55	NT-208	INE-AT/FG-17/110
CO3000 Controller Mast+Turntable	NT-112/1	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209	Page: 1 of 4  Date: 19.05.2017
HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	CMTA - Radiocommunication analyzer; 0,1 - 1000 MHz	NT-210	Checked by:
HFH-Z2 - Loop Antenna 9 kHz - 30 MHz	NT-122	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211	10
HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	Digital Radio Tester Aeroflex 3920	NT-212/1	
3121C - Dipole Antenna 28 - 1000 MHz	NT-124	Mixer M28HW 26,5 GHz - 40 GHz	NT-214	
3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	RubiSource T&M Timing reference	NT-216	
3116 - Horn Antenna 18 - 40 GHz	NT-126	Radiocommunicationanalyzer SWR 1180 MD	NT-217	
SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	Mixer M19HWD 40 GHz – 60 GHz	NT-218	
AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	Mixer M12HWD 60 GHz – 90 GHz	NT-219	
HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	DSO9104 Digital scope	NT-220/1	
HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	TPS 2014 Digital scope	NT-222	
3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	Artificial Ear according to IEC 60318	NT-224	
VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1	1 kHz Sound calibrator	NT-225	
 Loop Antenna H-Field	NT-132	B10 - Harmonics and flicker analyzer	NT-232	
Horn Antenna 500 MHz - 2900 MHz	NT-133	SRM-3000 Spectrumanalyzer	NT-233	
Horn Antenna 500 MHz - 6000 MHz	NT-133/1	SRM-3006 Spectrumanalyzer	NT-233/1a	
Log. per. Antenna 800 MHz - 2500 MHz	NT-134	E-field probe SRM 75 MHz – 3 GHz	NT-234	
Log. per. Antenna 800 MHz - 2500 MHz	NT-135	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-d	
BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	Hall-Teslameter ETM-1	NT-241	
Conical Dipol Antenna PCD8250	NT-138	EFA-3 H-field- / E-field probe	NT-243	
HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	EHP-50F H-field- / E-field probe	NT-243/1	
HZ-1 Antenna tripod	NT-150	Field Meter EMR-200 100 kHz – 3 GHz	NT-244	
BN 1500 Antenna tripod	NT-151	E-field probe 100 kHz – 3 GHz	NT-245	
Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	H-field probe 300 kHz – 30 MHz	NT-246	
Power quality analyzer	NT-160 -			
Fluke 1760 (complete set)	NT-173			





E-field probe 3 MHz – 18 GHz	NT-247	Oscillatory Wave Simulator incl. Coupling networks	NT- 328a+b+c
H-field probe 27 MHz – 1 GHz	NT-248	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
ELT-400 1 Hz – 400 kHz	NT-249	T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
FCC-203I EM Injection clamp	NT-251	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
FCC-203I-DCN Ferrite decoupling network	NT-252	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
PR50 Current Probe	NT-253	Preamplifier 1 GHz - 4 GHz	NT-335
i310s Current Probe	NT-254/1	Preamplifier for GPS MKU 152 A	NT-336
Fluke 87 V True RMS Multimeter	NT-260	Preamplifier 100 MHz – 23 GHz	NT-337
Model 2000 Digital Multimeter	NT-261	DC Block 10 MHz – 18 GHz Model 8048	NT-338
Fluke 87 V Digital Multimeter	NT-262/1	2-97201 Electronic load	NT-341
ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	VDS 200 Mobil-impuls-generator	NT-350
ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a	LD 200 Mobil-impuls-generator	NT-351
PHE 4500/B Power amplifier	NT-304	MPG 200 Mobil-Impuls-Generators	NT-352
EZ10 T-Artificial Network	NT-305	EFT 200 Mobil-impuls-generator	NT-353
SMG - Signal generator 0,1 - 1000 MHz	NT-310	AN 200 S1 Artificial Network	NT-354
SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
RefRad Reference generator	NT-312	PHE 4500 - Mains impedance network	NT-401
SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	IP 6.2 Coupling filter for data lines (Surge)	NT-403
40 MHz Arbitrary Generator TGA1241	NT-315	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
Artificial mains network NSLK 8127-PLC	NT-316	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
PEFT - Burst generator up to 4 kV	NT-320	IP 4 - Capacitive clamp (Burst)	NT-411
ESD 30 System up to 25 kV	NT-321	Highpass-Filter 100 MHz – 3 GHz	NT-412
PSURGE 4.1 Surge generator	NT-324	Highpass-Filter 600 MHz – 4 GHz	NT-413
IMU4000 Immunity test system	NT-325/1	Highpass-Filter 1250 MHz – 4 GHz	NT-414
VCS 500-M6 Surge-Generator	NT-326	Highpass-Filter 1800 MHz – 16 GHz	NT-415

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# Appendix 1 (continued) Test equipment used



Highpass-Filter 3500 MHz – 18 GHz		NT-416	FCC-801-S25 Coupling decoupling network	NT-462	<b>Division:</b> Industry & Energy
	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417	FCC-801-T4 Coupling decoupling network	NT-463	Department: FG
	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	FCC-801-C1 Coupling decoupling network	NT-464	Test report number:
	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	SW 9605 - Current probe 150 kHz – 30 MHz	NT-465/1	INE-AT/FG-17/110
	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	95242-1 – Current probe 1 MHz – 400 MHz	NT-468	Page: 3 of 4  Date: 19.05.2017
	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471	Checked by:
	RF-Attenuator 30 dB	NT-424	GA 1240 Power amplifier according to EN 61000-4-16	NT-480	
	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	Coupling networks according to EN 61000-4-16	NT-481 - NT-483	
	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	Van der Hoofden Test Head	NT-484	
	RF-Attenuator 6 dB	NT-428	PC P4 3 GHz Test computer	NT-500	
	RF-Attenuator 0 dB - 81 dB	NT-429	PC P4 1700 MHz Notebook	NT-505	
	WRU 27 - Band blocking 27 MHz	NT-430	Monitoring camera with Monitor	NT-511	
	WHJ450C9 AA - High pass 450 MHz	NT-431	ES-K1 Version 1.71 SP2 Test software	NT-520	
	WHJ250C9 AA - High pass 250 MHz	NT-432	EMC32 Version 10.20.01 Test software	NT-520/1	
	RF-Load 150 W	NT-433	SRM-TS Version 1.3 software for SRM-3000	NT-522	
	Impedance transducer 1:4; 1:9; 1:16	NT-435	SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1	
	RF-Attenuator DC – 18 GHz 6 dB	NT-436	Spitzenberger und Spies Test software V4.1	NT-525	
	RF-Attenuator DC – 18 GHz 6 dB	NT-437	Noise power test apparatus according to EN 55014	NT-530	
	RF-Attenuator DC – 18 GHz 10 dB	NT-438	Vertical coupling plane (ESD)	NT-531	
	RF-Attenuator DC – 18 GHz 20 dB	NT-439	Test cable #4 for EN 61000-4-6	NT-553	291
	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	Test cable #3 for conducted emission	NT-554	
	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556	
	Power Divider 6 dB/1 W/50 Ohm	NT-443	Test cable #8 Sucoflex 104EA	NT-559	
	Directional coupler 0,1 MHz – 70 MHz	NT-444	Test cable #9 (for outdoor measurements)	NT-580	
	Directional coupler 0,1 MHz – 70 MHz	NT-445	Test cable #10 (for outdoor measurements)	NT-581	
	Tube imitations according to EN 55015	NT-450	Test cable #13 Sucoflex 104PE	NT-584	
	FCC-801-M3-16A Coupling decoupling network	NT-458	Test cable #21 for SRM-3000	NT-592	
	FCC-801-M2-50A Coupling decoupling network	NT-459	Shield chamber	NT-600	
	FCC-801-M5-25 Coupling decoupling network	NT-460	Climatic chamber	M-1200	
	FCC-801-AF10 Coupling decoupling network	NT-461			

# Appendix 1 (continued) Test equipment used



П	Anechoic Chamber	EMV-100		Log.per Antenna 80-2700 MHz	EMV-304	Division:
ш	3 m / 5 m measuring distance	EIVIV-100		STLP 9128 E special Log.per Antenna 0,7 – 9 GHz	EMV-305	Industry & Energy
	Turntabel 6 m diameter	EMV-101	П	STLP9149	EIVIV-303	Department: FG
	Antenna mast 1 – 4 m	EMV-102		Load Dump Generator LD 200N	EMV-350	Test report number:
	Mast and Turntable controller FC-06	EMV-103		Ultra Compact Symulator UCS 200N100	EMV-351	INE-AT/FG-17/110 Page: 4 of 4
	EMC Video/Audiosystem	EMV-104		Automotive Power fail module PFM 200N100.1	EMV-352	Date: 19.05.2017
	EMC Software EMC32 Version 10.20.01	EMV-105		Voltage Drop Symulator VDS 200Q100	EMV-353	Checked by:
	Hornantenna 1 – 18 GHz HF 907	EMV-110		Arb. Generator AutoWave	EMV-354	C
	Antennapre.amp. 1 – 18 GHz ERZ-LNA0200-1800-30-2	EMV-111		Ultra Compact Symulator UCS 500N7	EMV-355	
	Trilog Antenna 30-3000 MHz VULB9163	EMV-112		Coupling decoupling network CNI 503B7 / 32 A	EMV-356	
	Monopol 9 kHz – 30 MHz VAMP 9243	EMV-113		Coupling decoupling network CNI 503B7 / 63 A	EMV-357	
	Antennapre.amp 18 – 40 GHz BBV 9721	EMV-114		Telecom Surge Generator TSurge 7	EMV-358	
	DC Artificial Network PVDC 8300	EMV-150		Coupling decoupling network CNI 508N2	EMV-359	
	AC Artificial Network NNLK 8121 RC	EMV-151		Coupling decoupling network CNV 504N2.2	EMV-360	
	EMI Receiver ESR26	EMV-200		Immunity generator NSG4060/NSG4060-1	EMV-361	
	Signalgenerator 9 kHz – 40 GHz N5173B	EMV-201		Coupling network CDND M316-2	EMV-362	
	GPS Frequency normal B-88	EMV-202		Coupling network CT419-5	EMV-363	
	DC Power supply N5745A	EMV-203		ESD Generator NSG 437	EMV-364	
	DC Power supply N5745A	EMV-204		Pulse Limiter VTSD 9561-F BNC	EMV-405	
	Spektrum Analyzator FSV40	EMV-205		Transient emission BSM200N40+BS200N100	EMV- 450+451	
	Thd Multimeter Model 2015	EMV-206		Cap. Coupling Clamp HFK	EMV-455	
	Poweramplifier PAS15000	EMV- 207/abc		Mag. Field System MS100N+MC26100+MC2630	EMV- 456-458	
	Inrush Current Source	EMV- 208/abc		Coupling network CDN M2-100A	EMV-459	
	Arbgenerator Sycore	EMV-209		Coupling network CDN M3-32A	EMV-460	
	Harmonics/Flicker analyzer ARS 16/3	EMV-210		Coupling network CDN M5-100A	EMV-461	
	HF- Ampflifier 9 kHz-250 MHz BBA150	EMV-300		Current Clamp CIP 9136A	EMV-462	
	HF- Amplifier 80 -1000 MHz BBA150	EMV-301		DC Artificial Network HV-AN 150	EMV- 464+465	
	HF- Amplifier 0,8 - 6 GHz BBA150	EMV-302		Coupling Clamp EM 101	EMV-466	
	High Power Ant. 20-200 MHz VHBD 9134	EMV-303		Decoupling Clamp FTC 101	EMV-467	
	VIID GIOT			Power attenuator DG 250 W 6 GHz 6 dB	EMV-469	



Description: General view

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Description: Front view

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Description: Backside view

**Division:** Industry & Energy

Department: FG

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Description: Case opened view #1

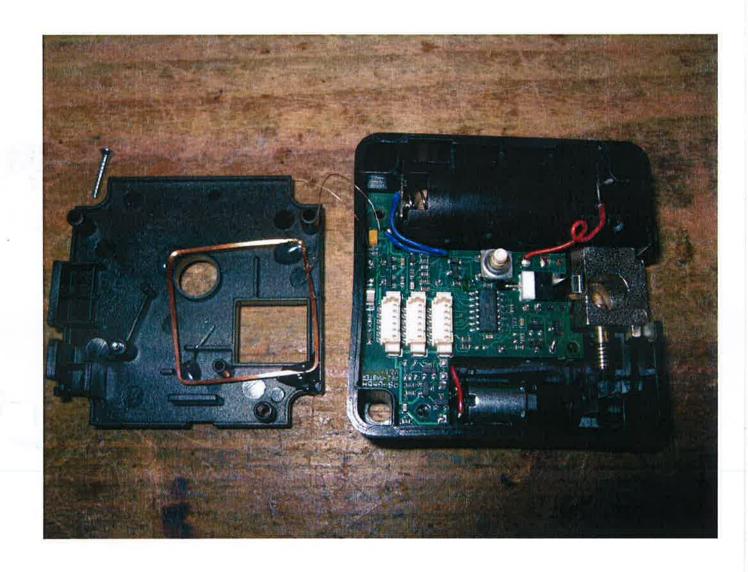
**Division:** Industry & Energy

Department: FG

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Description: Case opened view #2

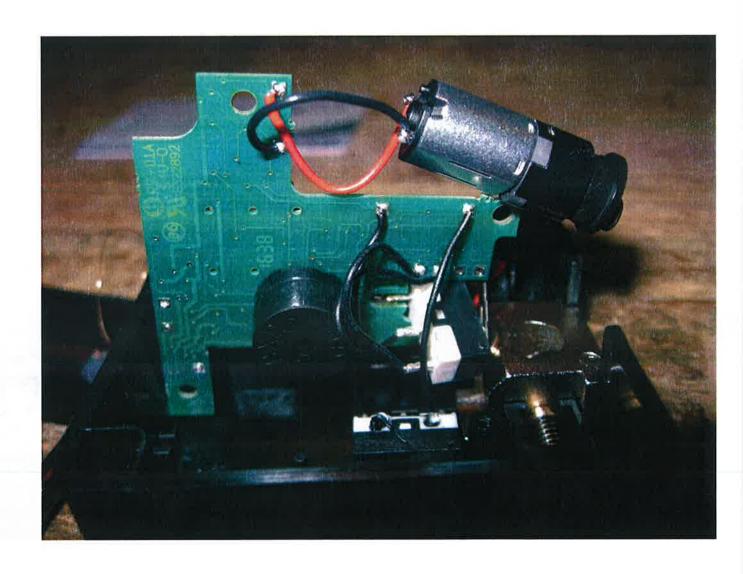
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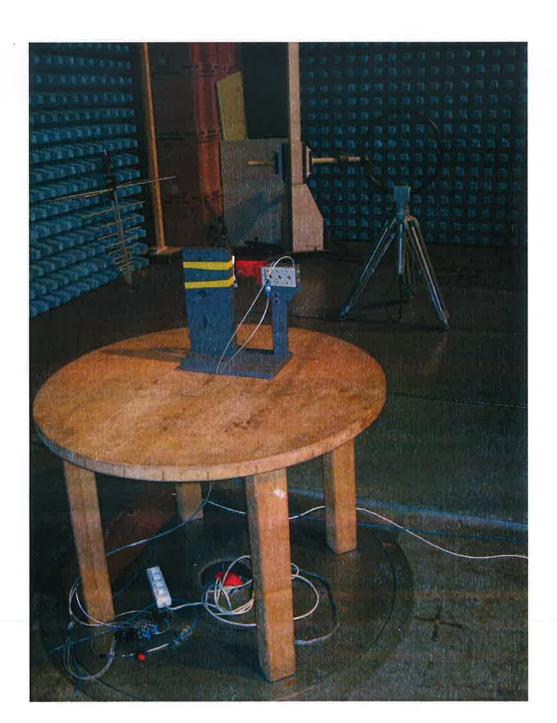
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Description: Test setup view #1



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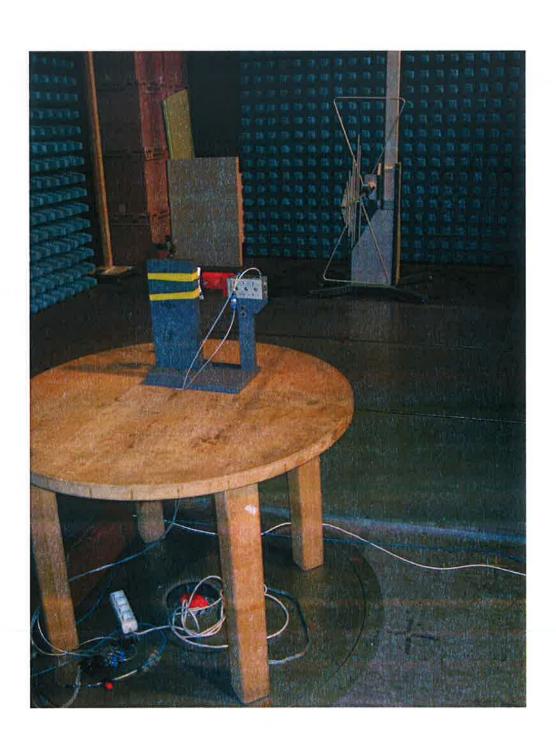
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Description: Test setup view #2



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