Test report

Customer:

SOEKS Limited Liability Company

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Moscow,127566
Russia

EMC test report

130504-AU01+E02

CE

SOEKS Limited Liability Company

Nitrate testing device

NUC-019-1

EMV TESTHAUS

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-12155-01-01

EMV **TESTHAUS** GmbH

Gustav-Hertz-Straße 35
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Accreditation:

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-12155-01-01

Location of Testing:

EMV **TESTHAUS** GmbH
Gustav-Hertz-Straße 35
94315 Straubing

The technical accuracy is guaranteed through the quality management of the EMV **TESTHAUS** GmbH.

Table of contents

1. Test regulation

Emission

EN 55011:2009 +A1:2010	Industrial, scientific and medical (ISM) radio-frequency - Radio disturbance characteristics - Limits and methods of measurement
☑ Group 1	Group 1 contains all ISM equipment in which there is intentionally generated and/or used conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.
☐ Group 2	Group 2 contains all ISM equipment in which radio-frequency energy is intentionally generated and/or used in the form of electromagnetic radiation for the treatment of material, and spark erosion equipment.
☐ Class A	Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
☑ Class B:	Class B equipment is equipment suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Includes the following tests:

EN 55011:2009 +A1:2010	Measurement of the conducted disturbance at mains ports in a frequency range from 150 kHz to 30 MHz. Measurement of radiated disturbance in a frequency range from 30 MHz to 1 GHz.

Emission in the frequency range of ≤ 2 kHz:

EN 61000-3-2:2006	Harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3:1995 + A1:2001	Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A

Deviation of regulations and standards: No

Susceptibility

EN 61326-1:2006	Electrical equipment for measurement, control and laboratory use- EMC requirements - Part 1: General requirements.
Includes Basic EMC Publications:	
EN 61000-4-2:1995 + A1:1998 + A2:2001	Testing and measurement techniques - Electrostatic discharge immunity test.
EN 61000-4-3:2002	Testing and measurement techniques - Radiated, radio frequency, immunity test.
EN 61000-4-4:2004	Testing and measurement techniques - Electrical fast transient (EFT)/burst immunity test.
EN 61000-4-5:1995 + A1:2001	Testing and measurement techniques - Surge immunity test.
EN 61000-4-6:1996 + A1:2001	Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.
EN 61000-4-8:1993 + A1:2001	Testing and measurement techniques - Power frequency magnetic field immunity test.
EN 61000-4-11:2004	Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests.

Deviation of Regulation and Standards: No

Not applied tests:

EN 55011:2009 +A1:2010	Measurement of the conducted disturbance at mains ports in a frequency range from 150 kHz to 30 MHz.
EN 61000-3-2:2006	Harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3:1995 + A1:2001	Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A
EN 61000-4-4:2004	Testing and measurement techniques - Electrical fast transient (EFT)/burst immunity test.
EN 61000-4-5:1995 + A1:2001	Testing and measurement techniques - Surge immunity test.
EN 61000-4-6:1996 + A1:2001	Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.
EN 61000-4-11:2004	Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests.
Remark:	The EUT is battery powered.
EN 61000-4-8:1993 + A1:2001	Testing and measurement techniques - Power frequency magnetic field immunity test.
Remark:	Only for equipment containing devices susceptible to magnetic fields.

2. Equipment under test

Product type:	Nitrate testing device
Model name:	NUC-019-1
Serial number:	N/A
Manufacturer:	SOEKS Limited Liability Company

Photo documentation

Picture 1: Equipment under test

3. Test configuration and mode of operation

Test configuration

Device	Model:	S/N
Nitrate testing device	NUC-019-1	N/A

Mode of operation

The EUT was tested in the following mode of operation:

Settings: measuring

Applied Software: None

Failure criterion for test of immunity from disturbances:

It was observed whether the EUT is influenced in any form or program interruptions occurred.

4. Measurement of radiated emission

according to EN 55011 Group 1 Class B

Procedure of radiated emission measurement:

☑ Scan with max-peak detector in 3 m CDC

☑ Final CISPR measurement with quasi peak detector on 10m open area test site

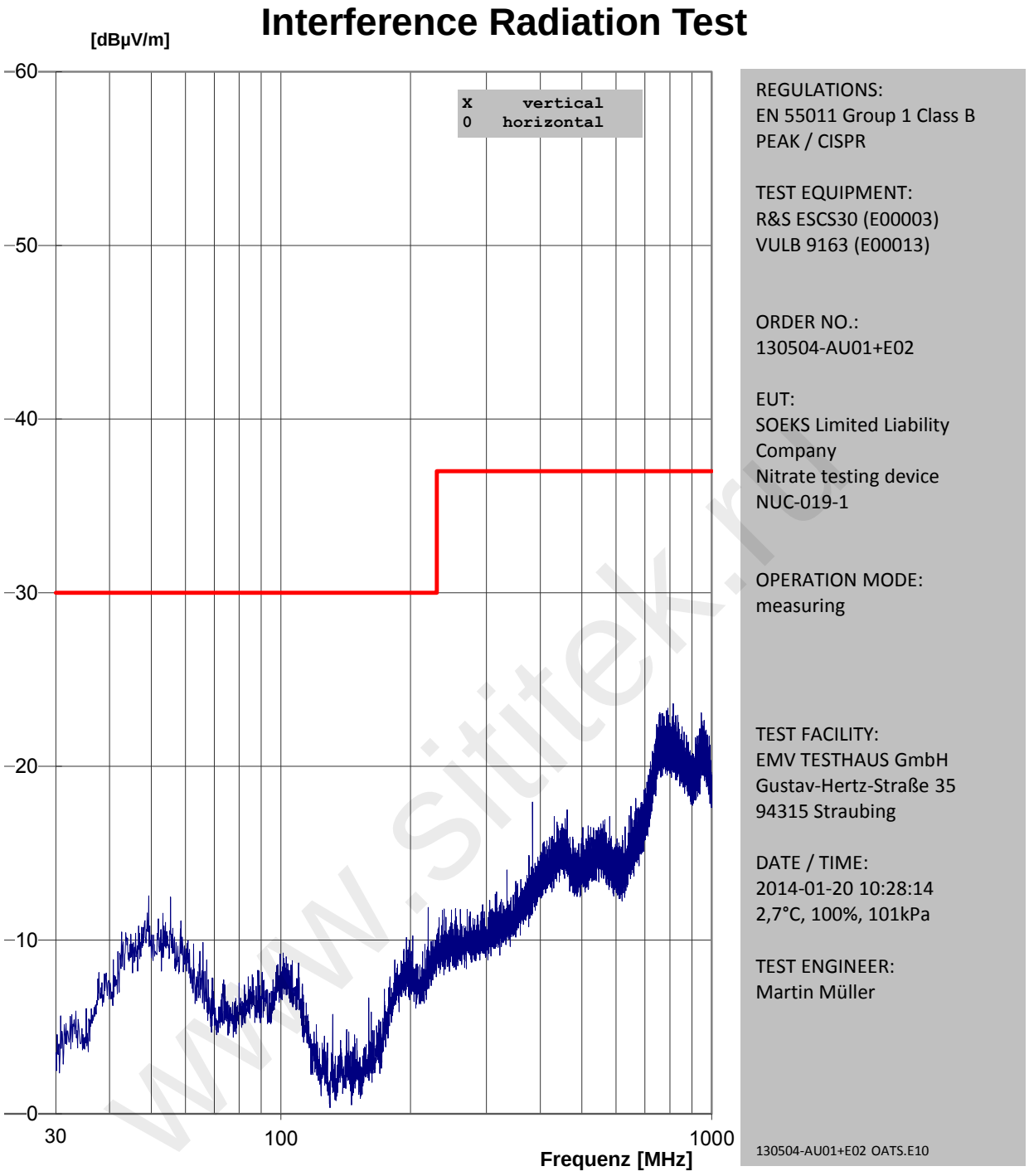
Location of measurement

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Open area test site	EMV **TESTHAUS** GmbH	E00354

Measurement equipment

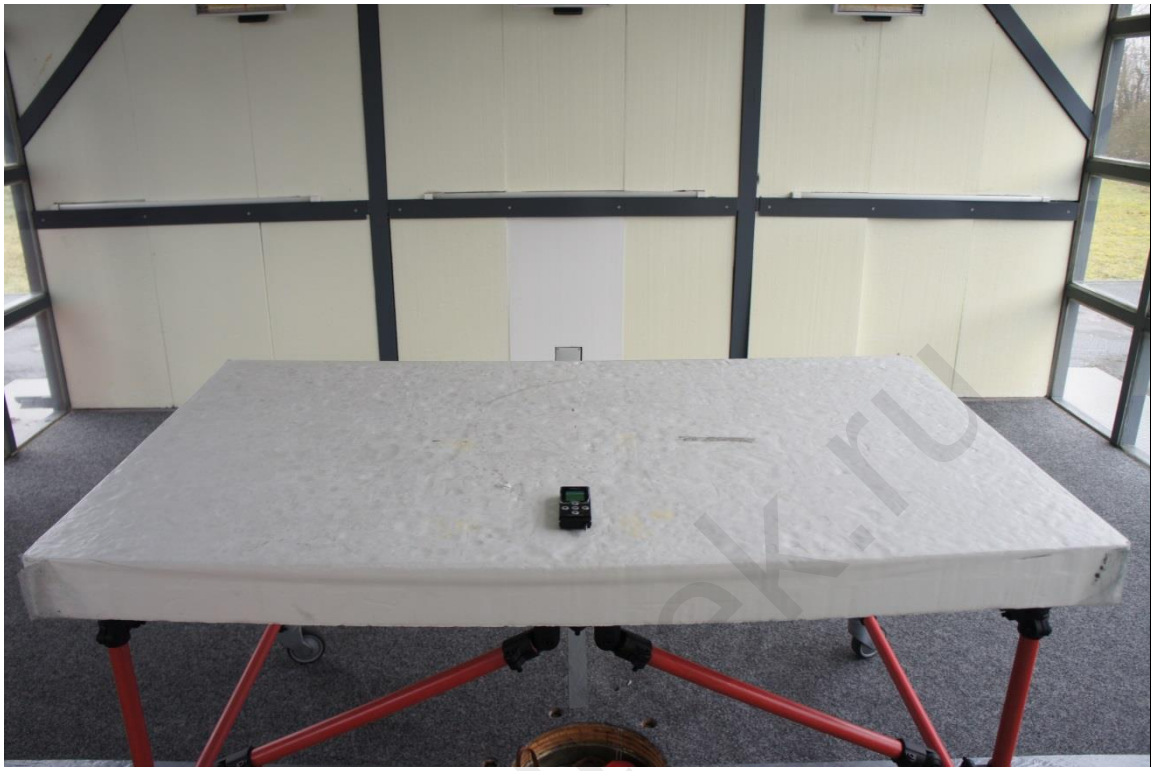
	Description	Manufacturer	Inventory No.
☑	ESCI (CDC)	Rohde & Schwarz	E00001
☐	ESU26	Rohde & Schwarz	W00002
☑	ESCS 30 (OATS)	Rohde & Schwarz	E00003
☑	VULB 9160 (CDC)	Schwarzbeck	E00011
☑	VULB 9163 (OATS)	Schwarzbeck	E00012

Test related measurement inaccuracies have to be taken into consideration when evaluating the test results.
All used test instrument as well as the test accessories are calibrated at regular intervals.



Picture 2: Measurement report of radiated emission

Photo documentation



Picture 3: Test setup radiated emission

Test result

The requirements according to EN 55011 Group 1 Class B are

☑ **Kept**

☐ **Not kept**

Information about measurement uncertainty is on page 23.

5. Electrostatic discharge immunity test

according to EN 61000-4-2

Location of measurement

Description	Manufacturer	Inventory No.
Shielded chamber	Siemens - Matsushita	E00107

Measurement equipment

	Description	Manufacturer	Inventory No.
☐	ESD 3000	EMC Partner	E00040
☑	NSG 435	Teseq	E00412
☑	VCP	EMV **TESTHAUS** GmbH	E00047
☑	HCP	EMV **TESTHAUS** GmbH	E00048

Test related measurement inaccuracies have to be taken into consideration when evaluating the test results.
All used test instrument as well as the test accessories are calibrated at regular intervals.

Test conditions

Air discharge

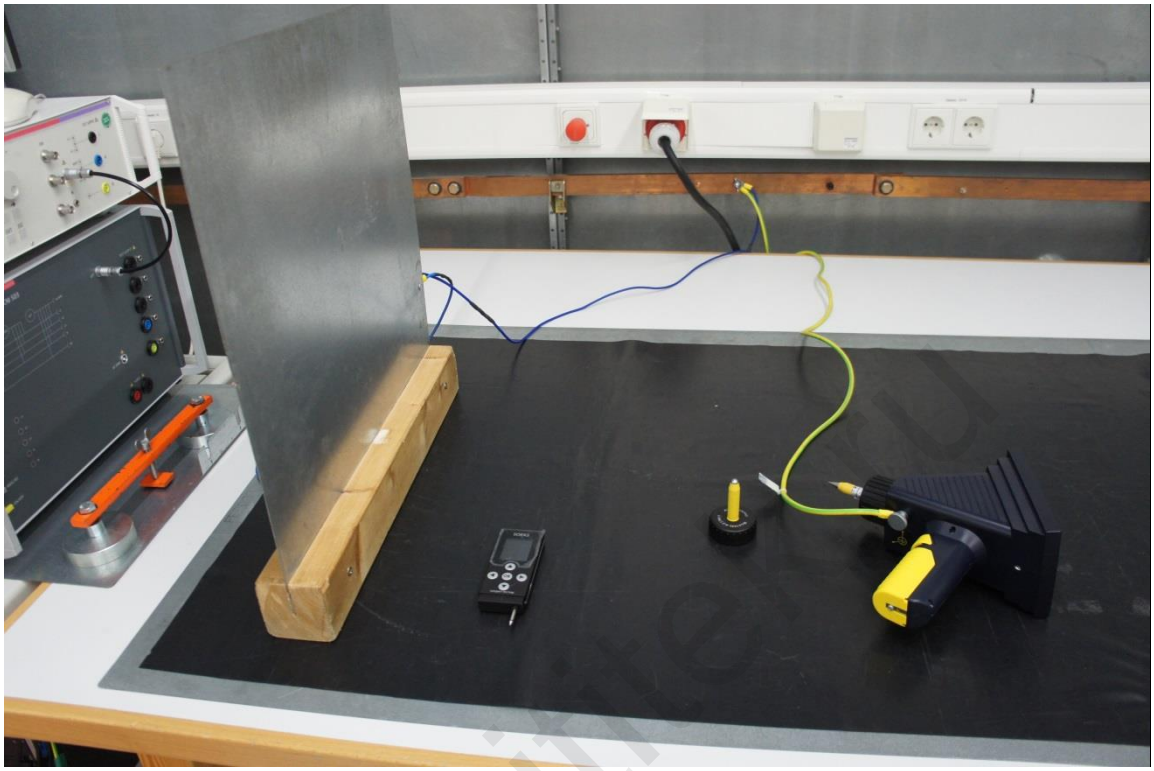
Test voltage:	☑ 2 kV	test level 1
	☑ 4 kV	test level 2
	☑ 8 kV	test level 3
	☐ 15 kV	test level 4
	☐ kV	test level x
Polarity:	☑ positive	
	☑ negative	
Discharges:	≥ 10 discharges per polarity	
Discharging points:	screws, housing slots	
	no discharges	

Contact discharge

Test voltage:	☑ 2 kV	test level 1
	☑ 4 kV	test level 2
	☐ 6 kV	test level 3
	☐ 8 kV	test level 4
	☐ kV	test level x
Polarity:	☑ positive	
	☑ negative	
Discharges:	≥ 10 discharges per polarity	
Discharging points:	direct:	USB shield, measuring probe
		no discharges
	indirect:	HCP, VCP

Climatic conditions:	Ambient temp.:	21,9	°C
	Relative humidity.:	32,2	%
	Barometric pressure:	97	kPa

Photo documentation



Picture 4: Test setup ESD

Test result

The requirements according to EN 61000-4-2 are

☑ **Kept**

☐ **Not kept**

Information about measurement uncertainty is on page 23.

Operating conditions during test:

Criterion

☑ A The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

☐ B After the test, the equipment shall continue to operate as intended without operator invention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

☐ C Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Comments: During the test the function of the EUT was observed. Influences in any form or program interruptions did not occur.

6. Radiated, radio-frequency, electromagnetic field immunity test

according to EN 61000-4-3

Location of measurement

Description	Manufacturer	Inventory No.
Anechoic chamber	EMV **TESTHAUS** GmbH	E00100

Measurement equipment

	Model	Description	Manufacturer	Inventory
☑	VULB 9163	Antenna 30 – 3000 MHz	Schwarzbeck	E00013
☑	BBHA 9120E	Antenne 1000 – 2700 MHz	Schwarzbeck	E00018
☑	SMT06	Signal Generator	Rohde & Schwarz	E00036
☑	COSF 3312	Power Switching Unit	Conformitas	E00037
☑	NRVD	Power Meter	Rohde & Schwarz	E00038
☑	AS0104-55/30	Amplifier 1 - 4GHz	Milmega	E00070
☑	BTA 0122-150W	Amplifier 9 kHz-220 MHz	Bonn	E00071
☑	BLWA 2010-100W	Amplifier 200-1000 MHz	Bonn	E00072
☑	NRV-Z51	Power Measuring Head	Rohde & Schwarz	E00075
☑	NRV-Z51	Power Measuring Head	Rohde & Schwarz	E00076

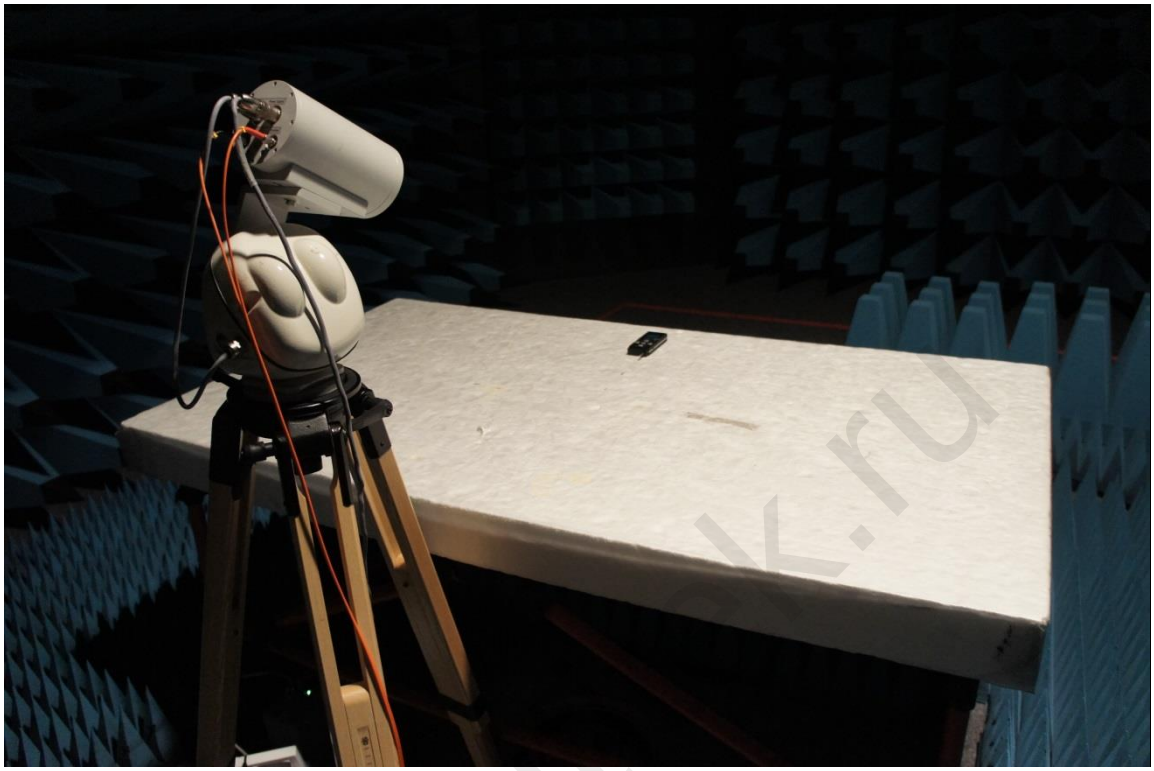
Test related measurement inaccuracies have to be taken into consideration when evaluating the test results.
All used test instrument as well as the test accessories are calibrated at regular intervals.

Test Conditions

Frequency range:	☑ 80 MHz - 1000 MHz with test level 3 ☑ 1400 MHz - 2000 MHz with test level 2 ☑ 2000 MHz - 2700 MHz with test level 1
Step size:	☑ 1 % of output frequency ☐ 4 % of output frequency
Field strength:	☑ 1 V/m test level 1 ☑ 3 V/m test level 2 ☑ 10 V/m test level 3 ☐ V/m test level x
Modulation:	Kind of Modulation: AM Modulation factor: 80 % Modulation frequency: 1 kHz
Dwell time:	☑ 3 seconds ☐ X seconds
Antenna polarization:	☑ vertical ☑ horizontal
Test distance:	☐ 1 m ☑ 3 m
EUT position:	☑ front side ☑ rear side ☑ left side ☑ right side ☐ top ☐ bottom
Observation of EUT:	Via video camera

Climatic conditions:	Ambient temp.:	21,9	° C
	Relative humidity.:	32,2	%
	Barometric pressure:	97	kPa

Photo documentation



Picture 5: Test setup radiated immunity test

Test result

The requirements according to EN 61000-4-3 are

☑ **Kept**

☐ **Not kept**

Information about measurement uncertainty is on page 23.

Operating conditions during test:

Criterion

☑ A The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

☐ B After the test, the equipment shall continue to operate as intended without operator invention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

☐ C Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Comments: During the test the function of the EUT was observed. Influences in any form or program interruptions did not occur.

7. Measurement uncertainty

Standard	Description	Max. deviation	k=
EN 55011	Conducted emission AMN (150kHz to 30 MHz)	+/- 4,1 dB	2
EN 55011	Radiated emission open field (30 MHz to 300 MHz) (300MHz to 1 GHz)	+/- 5,4 dB +/- 4,7 dB	2
EN 61000-4-2	ESD	inside specification *	
EN 61000-4-3	Radiated immunity	+/- 1,8 dB a.)	1,64
EN 61000-4-4	Burst	inside specification *	
EN 61000-4-5	Surge	inside specification *	
EN 61000-4-6	Conducted immunity with CDN (150 kHz to 230 MHz)	+/- 2,4 dB b.)	1,64
EN 61000-4-6	Conducted immunity with BCI (150 kHz to 230 MHz)	+/- 2,4 dB c.)	1,64
EN 61000-4-8	Magnetic field	+/- 0,9 dB	2
EN 61000-4-11	Dips	inside specification *	2
EN 61000-3-2	Harmonic currents	+/- 0,2 % d.)	1
EN 61000-3-3	Flicker	annotation e.)	

Comment: The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k. If k=2 the value of the measurands lies within the assigned range of values with a probability of 95 %.

* The specific requirements regarding to the standard was kept

a.) To maintain the claimed test level with a probability of 90 % an additional test level of 38 % percent must be added.

b.) To maintain the claimed test level with a probability of 90 % an additional test level of 35 % percent must be added.

c.) To maintain the claimed test level with a probability of 90 % an additional test level of 39 % percent must be added.

d.) Measuring uncertainty (current): +/- 0,2% (fundamental oscillation), +/- 0,2% (rated current), voltage metering +/- 0,2% of the reading. Impacts on the measuring system by the EUT are not included.

e.) Measuring uncertainty (flicker): dc and dmax +/- 5%, Pst +/- 8%. Impacts on the measuring system by the EUT are not included.

8. Summary

The EMC regulations according to the marked specifications are

☑ Kept

The Equipment under Test fulfills the general approval requirements mentioned.

☐ Not kept

The Equipment under Test does not fulfill the general approval requirements mentioned.

Straubing, January 21st, 2014

Martin Müller	Christian Kiermeier
Test engineer	Technical executive
EMV **TESTHAUS** GmbH	EMV **TESTHAUS** GmbH