Product Service

Choose certainty.
Add value.

13 September 2013

Prüfbericht / *Test Report* Nr. / No. 11383-29860-01 (Edition 1)

Auftraggeber *Applicant*	Kontron Europe GmbH, Eching
Geräteart *Type of equipment*	Industrial PC
Typenbezeichnung *Type designation*	KISS 4U V2 PCI762-A
Seriennummer / *Serial number*	N/A
Auftragsnummer / *Order No.*	45396304
Prüfgrundlage *Test standards*	EN 61000-6-4:2007 + A1:2011 EN 61000-3-2:2006 + A1:2009 + A2:2009 EN 61000-3-3:2008 EN 61000-6-2:2005

TÜV SÜD Product Service GmbH
Äußere Frühlingstraße 45
94315 Straubing
Germany

Phone: +49 9421 5522-0
Fax: +49 9421 5522-99
Web: www.tuev-sued.de

Summary

Prüfergebnisse / *Test Results*	Auftragsnummer / *Order No.* **45396304**

Die Prüfungen wurden nach folgenden Vorschriften durchgeführt:
Tests were performed according to:

EN 61000-6-4:2007 + A1:2011
EN 61000-3-2:2006 + A1:2009 + A2:2009
EN 61000-3-3:2008
EN 61000-6-2:2005

Durchgeführte Prüfung ***Test performed***	**Prüfergebnis** ***Test result***				
	Erfüllt *Passed*	Nicht erfüllt *Not Passed*	Nicht zutreffend *Not applicable*	Nicht durchgeführt *Not performed*	Kriterium *Criterion*
Gestrahlte Störgrößen / *Radiated disturbance*	☒	☐	☐	☐	
Störspannung / *Disturbance voltage*	☒	☐	☐	☐	
Störstrom / *Disturbance current*	☒	☐	☐	☐	
Oberschwingungen / *Harmonics*	☒	☐	☐	☐	
Spannungsschwankungen / *Flicker*	☒	☐	☐	☐	
Magnetfelder mit energietechnischer Frequenz / *Power-frequency magnetic field*	☐	☐	☒	☐	A
Elektromagnetisches HF-Feld / *Radio-frequency electromagnetic field*	☒	☐	☐	☐	A
Entladung statischer Elektrizität / *Electrostatic discharge*	☒	☐	☐	☐	B
Hochfrequenz, asymmetrisch / *Radio-frequency common mode*	☒	☐	☐	☐	A
Schnelle Transienten / *Fast transients*	☒	☐	☐	☐	B
Stoßspannungen / *Surges*	☒	☐	☐	☐	B
Spannungseinbrüche und -unterbrechungen / *Voltage dips and interruptions*	☒	☐	☐	☐	B/C

Bemerkungen / *Remarks:*

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / *Date*	Geprüft von / *Tested by*	Freigabe durch / *Checked by*
2013-09-13	Markus Biberger Responsible for testing	Johann Roidt Laboratory manager

Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Table of Contents

1 Administrative Data

Application details	
Applicant:	Kontron Europe GmbH, Eching Oskar-von-Miller-Str. 1 85386 Eching
Contact person:	Mr. Ferit Durgut
Order number:	45396304
Receipt of EUT:	---
Return of EUT:	---
Date(s) of test:	2013-09-09 – 2013-09-11
Note(s):	---
Responsible for testing:	Mr. Markus Biberger
Responsible for test report:	Mr. Markus Biberger
Test report checked by:	Mr. Johann Roidt

Report details	
Report number:	11383-29860-01
Edition:	1
Issue date:	2013-09-13

2 Details about the Test Laboratory

Details about the Test Laboratory	
Company name:	TÜV SÜD Product Service GmbH
Address:	Äußere Frühlingstraße 45 D-94315 Straubing Germany
Laboratory accreditation:	DAkkS Registration No. D-PL-11321-11-01
Contact:	Mr. Johann Roidt Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

3 Description of the Equipment Under Test

Equipment characteristics	
Type designation:	KISS 4U V2 PCI762-A
Parts of the system:	---
Options and accessories:	---
Type of equipment:	Industrial PC
Serial number:	N/A
Manufacturer:	Kontron Europe GmbH, Eching
Power supply:	AC supply Nominal: 230 V Nominal frequency: 50 Hz
Highest internal frequency:	f_max < 4 GHz
Version of EUT:	As delivered

3.1 Description of the Equipment Under Test by the applicant

Gerät / Komponente:	KISS 4U V2 PCI762
Artikelnummer	2-A0EV-2xxx
Seriennummer	ohne
Projektnummer	K80-4U207-2-P

1. Konfiguration:

Komponenten	Benennung	Artikelnummer	**Seriennummer/ Version**	**Bemerkung**
Backplane	LF KISS 4U PCIE	9-1201-3688	**445980115**	**R12E**
MB / Baseboard	MBD_PCI-762-PICMG-	1054-9860	**S1348C12110E0001**	
Prozessor	Intel i7-3770	1055-0516		
Memory	8GB DDR3 1600MHz	1054-6798		**2x**
Harddisk	WDC WD2002 FYPS	1035-7855	**WCAVY6955320**	**2TB**
CD / DVD-Drive	Optiarc AD-7240S		**1009-1863**	
Power Supply	FSP400-60PFB			
Other Components				
Other Components				

Firmware:	☐	Image: WIN 7 Ultimate SP1 64bit E	☐
BIOS: SHB121.005	☐	Image:	☐

4 Operation Mode and Configuration of EUT

Operation Mode(s)
Burn-in Test running(CPU, Memory, Graphics 2D/3D, internal harddrives); EUT pinged by external laptop via Ethernet port.

List of ports and cables					
No.	*Description*	*Classification*[1]	*Cable type*	*Cable length used*	*maximum*[2]
A1	AC power supply	ac power	Unshielded	2 m	---
S1	Ethernet 1	signal/control port	Shielded	---	---
S2	Ethernet 2	signal/control port	Shielded	2 m	< 3 m
S3	VGA port	signal/control port	Shielded	1 m	2 m
S4-S5	COM1 and COM2 ports backside	signal/control port	Shielded	2 m	2 m
S6	USB 2.0 Port frontside 1	signal/control port	Shielded	1 m	2 m
S7	USB 2.0 Port frontside 2	signal/control port	Shielded	---	---
S8	USB 3.0 Port backside 1	signal/control port	Shielded	2 m	2 m
S9	USB 3.0 Port backside 2	signal/control port	Shielded	---	---

List of devices connected to EUT				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1	TFT Monitor	1704FPV	---	DELL
2	USB mouse	M-UAE55	---	Logitech
3	USB Keyboard	KU-0316	---	HP

List of support devices				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1	Laptop	D620	---	DELL

[1] Ports shall be classified as ac power, dc power or signal/control port.
[2] As specified by applicant

5 Performance Criteria and Methods of Observation

Definition of General Performance Criteria	
Referenced Standard:	EN 61000-6-2:2005
Common Requirements:	If, as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test.

Performance criterion	*Specification*
A	The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
B	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

Methods of Observation			
Function	*Observed size*	*Permissible range*	*Observation method*
No Errors in „Burn-In“ Test	Burn-In log	No errors	Visual, log entries
No change to ping latency	Ping latency	No change	Log entries external laptop

6 Annotations to Performed Tests

6.1 Conducted emission tests

In general conducted emission tests in the frequency range 150 kHz - 30 MHz are required to be performed with quasi-peak and average detector. To simplify testing the following procedure is used:
First the whole spectrum of emission caused by equipment under test (EUT) is recorded with detector set to peak. After that all emission levels having less margin than 20 dB to or exceeding the appropriate limit (in general average limit is 10 dB lower than quasi-peak limit) are retested with detector set to quasi-peak. If average limit is kept no additional scan with average detector is necessary. In cases of emission levels between quasi-peak and average limit an additional scan with detector set to average has to be recorded.

6.2 Radiated emission tests

Radiated emission tests in the frequency range 30 - 1000 MHz are performed in a semi-anechoic room with groundplane at the required test distance (maximum 10 metres):
First a peak scan is performed in four positions to get the whole spectrum of emission caused by EUT with the measuring antenna raised and lowered from 1 to 4 m to find table position, antenna height and antenna polarisation for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB to or exceeding the limit using subranges and limited number of maximums. Further maximization is following.
With detector of the test receiver set to quasi-peak final measurements are performed immediately after frequency zoom (for drifting disturbances) and maximum adjustment.

7 Referenced Regulations

European publication	*International publication*	*Title*
EN 55016-1-1:2010 + A1:2010	CISPR 16-1-1:2010 + A1:2010 CISPR 16-1-1:2010 Edition 3.1	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus
EN 55016-1-2:2004	CISPR 16-1-2:2003 Edition 1	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances
EN 55016-2-1:2009	CISPR 16-2-1:2008 Edition 2	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements
EN 55016-2-3:2006	CISPR 16-2-3:2006 Edition 2	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements
EN 55016-4-2:2004	CISPR 16-4-2:2003 Edition 1	Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Uncertainty in EMC measurements
EN 55022:2010	CISPR 22:2008, modified	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
EN 61000-3-2:2006 + A1:2009 + A2:2009	IEC 61000-3-2:2005 + A1:2008 + A2:2009	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3:2008	IEC 61000-3-3:2008 Edition 2	Electromagnetic compatibility (EMC) Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

European publication	*International publication*	*Title*
EN 61000-4-2:2009	IEC 61000-4-2:2008 Edition 2	Electromagnetic compatibility (EMC) Part 4-2: Testing and measuring techniques - Electrostatic discharge immunity test
EN 61000-4-3:2006 + A1:2008 + A2:2010	IEC 61000-4-3:2006 + A1:2007 + A2:2010	Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques - Radiated, radio-frequency electromagnetic field immunity test
EN 61000-4-4:2004 + A1:2010	IEC 61000-4-4:2004 + A1:2010	Electromagnetic compatibility (EMC) Part 4-4: Testing and measuring techniques - Electrical fast transient/burst immunity test
EN 61000-4-5:2006	IEC 61000-4-5:2005	Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6:2009	IEC 61000-4-6:2008 Edition 3	Electromagnetic compatibility (EMC) Part 4-6: Testing and measuring techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-11:2004	IEC 61000-4-11:2004	Electromagnetic compatibility (EMC) Part 4-11: Testing and measuring techniques - Voltage dips, short interruptions and voltage variations immunity tests
EN 61000-6-2:2005	IEC 61000-6-2:2005	Electromagnetic compatibility (EMC) Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007 + A1:2011	IEC 61000-6-4:2006 + A1:2010	Electromagnetic compatibility (EMC) Part 6-4 Generic standards - Emission standard for industrial environments

8 Measurement Uncertainty Values

Radio Interference Emission Testing			
Test	k_p	*Expanded Uncertainty*	*Note*
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1

Radio Interference Emission Testing (continued)			
Test	k_p	*Expanded Uncertainty*	*Note*
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Immunity Testing			
Test	k_p	*Expanded Uncertainty*	*Note*
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%

Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.

Note 5:
The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 6:
The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

9 Test Results

Emission Tests

EN 61000-6-4:2007 + A1:2011			
Section(s)	*Test performed*	*Page*	*Test Result*
7	Radiated disturbance (SAC) 30 MHz - 1 GHz	28	Test passed
7	Radiated disturbance (SAC) 1 GHz - 6 GHz	30	Test passed
7	Conducted disturbance at low voltage AC mains port 150 kHz - 30 MHz	20	Test passed
7	Discontinuous disturbance 150 kHz - 30 MHz	---	Not applicable
7	Conducted disturbance at telecommunications / network port 150 kHz - 30 MHz	24	Test passed

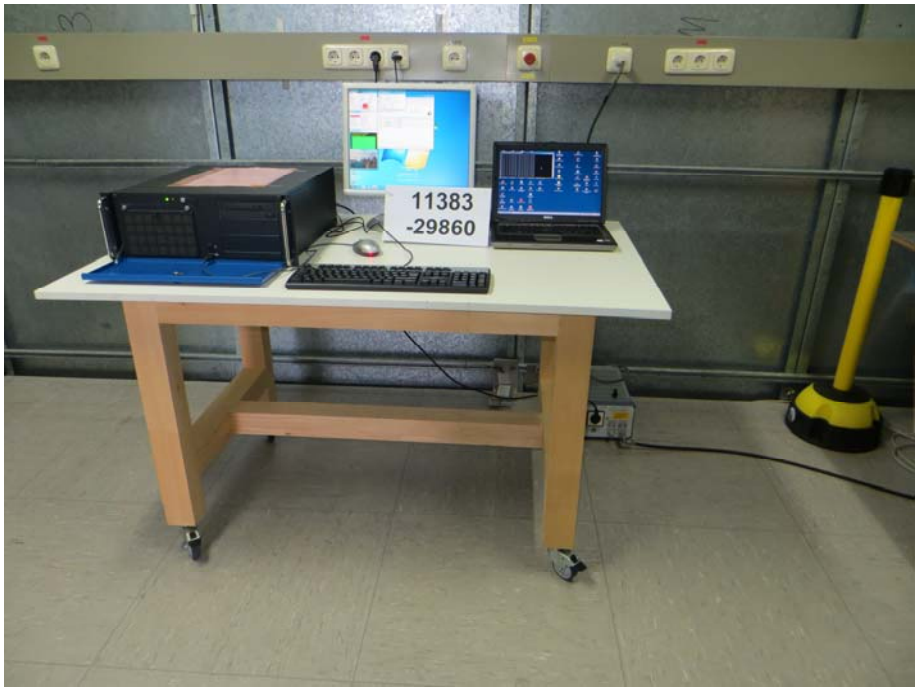
EN 61000-3-2:2006 + A1:2009 + A2:2009			
Section(s)	*Test performed*	*Page*	*Test Result*
7	Harmonics	34	Test passed
EN 61000-3-3:2008			
Section(s)	*Test performed*	*Page*	*Test Result*
5	Flicker	40	Test passed

Immunity Tests

EN 61000-6-2:2005			
Section(s)	*Test performed*	*Page*	*Test Result*
8.1.1	Power-frequency magnetic field	---	Not applicable
8.1.2, 8.1.3, 8.1.4	Radio-frequency electromagnetic field	49	Test passed
8.1.5	Electrostatic discharge	43	Test passed
8.2.1, 8.3.1, 8.4.1	Radio-frequency common mode	60	Test passed
8.2.2, 8.3.3, 8.4.5	Fast transients	53	Test passed
8.2.3, 8.3.2, 8.4.4	Surges	56	Test passed
8.4.2, 8.4.3	Voltage dips and interruptions	63	Test passed

9.1 Interference Voltage Test

9.1.1 Test Setup



9.1.2 Test Equipment List

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☒	Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
☐	Test receiver	ESHS 10	(R&S)	862970/001	Rohde & Schwarz
☐	EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
☐	EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐	EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
☐	EMI test receiver	ESR7	(R&S)	101108	Rohde & Schwarz
☐	EMI test receiver	ESU8	2044	100232	Rohde & Schwarz
☐	EMI test receiver	ESU40	(R&S)	100324	Rohde & Schwarz
☐	Preamplifier	CPA9231A	1651	3393	Schaffner
☐	Digital oscilloscope	WaveJet 314	1963	LCRY0101J23209	LeCroy
☐	Digital oscilloscope	Wave Surfer 452	1796	LCRY0301J11938	LeCroy
☐	Digital oscilloscope	WaveRunner 104Xi-A	2075	LCRY0617N51108	LeCroy
☒	V-network	ESH 3-Z5	1060	862770/021	Rohde & Schwarz
☐	V-network	ESH 3-Z5	1059	894785/005	Rohde & Schwarz
☐	V-network	ESH 3-Z5	1218	830952/025	Rohde & Schwarz
☐	V-network	ESH 3-Z6	1594	825993/027	Rohde & Schwarz
☐	V-network	ESH 3-Z6	1220	830722/010	Rohde & Schwarz
☐	Artificial mains network	ESH 2-Z5	1536	842966/004	Rohde & Schwarz
☐	Pulse limiter	ESH3-Z2	1144	---	Rohde & Schwarz
☐	4-wire ISN	ENY 41	1652	836077/003	Rohde & Schwarz
☐	2-wire ISN	ENY 22	1813	100150	Rohde & Schwarz
☐	Impedance stabization network	ISN T800	2080	28597	Teseq
☒	Current probe	EZ-17	1606	830633/010	Rohde & Schwarz
☐	High impedance probe	TK 9416	1106	---	Schwarzbeck
☐	Shielded room	No. 1	1451	---	Albatross
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☒	Shielded room	No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room	No. 6	1865	---	Albatross
☐	Shielded room	No. 7	1866	---	Albatross

9.1.3 Test Results

Results for interference voltage test are documented as listed below.

TÜV SÜD Product Service GmbH
Äußere Frühlingstraße 45
94315 Straubing
Germany

Phone: +49 9421 5522-0
Fax: +49 9421 5522-99
Web: www.tuev-sued.de

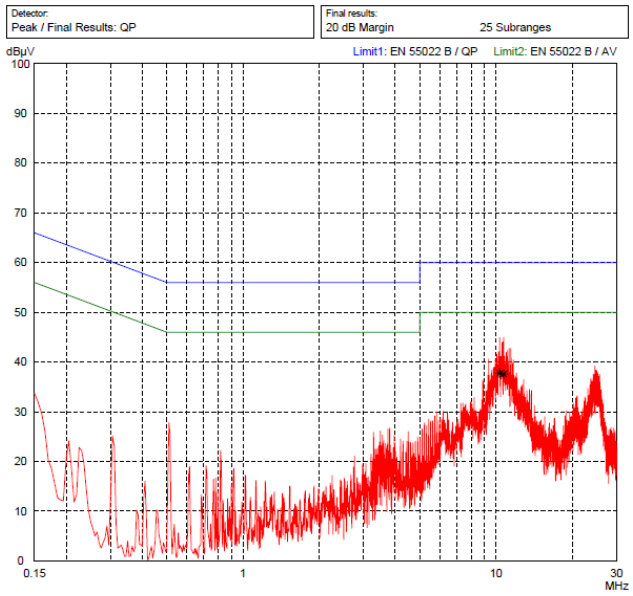
Interference Voltage Test 150 kHz - 30 MHz

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Shielded room, cabin no. 4

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

Prüfgrundlage / *Specifications:*	EN 61000-6-4:2007 + A1:2011
Basisnorm / *Basic standard:*	IEC/CISPR 16-2-1:2008, 7.4.1 EN 55016-2-1:2009, 7.4.1 IEC/CISPR 16-1-2:2003, 4.3 EN 55016-1-2:2004, 4.3
Betriebsart / *Operation mode:*	According to chapter 4
Kommentar / *Comment:*	---

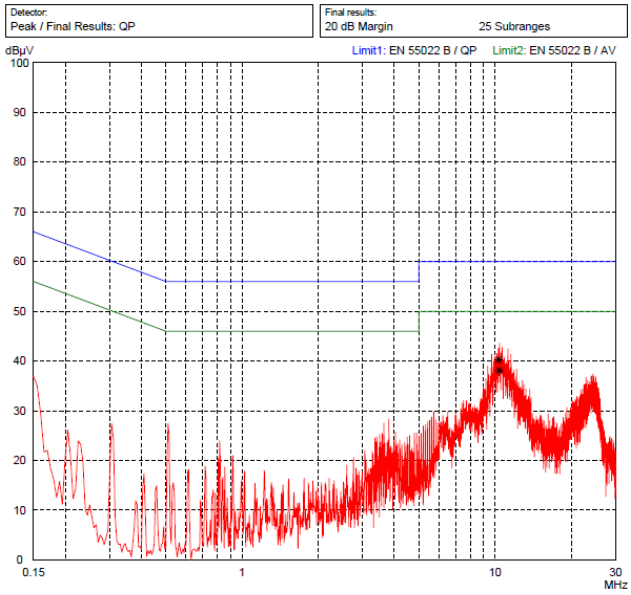
Messbezug / *Tested on:*	Power line, L1



Detector:	Final results:	
Peak / Final Results: QP	20 dB Margin	25 Subranges

Frequency MHz	*Reading dBµV*	*Correction factor dB*	*Value dBµV*	*Limit dBµV*	*Margin dB*
10.345	37.7		37.7	60.0	22.3
10.730	37.6		37.6	60.0	22.4

Messbezug / *Tested on:*	Power line, N

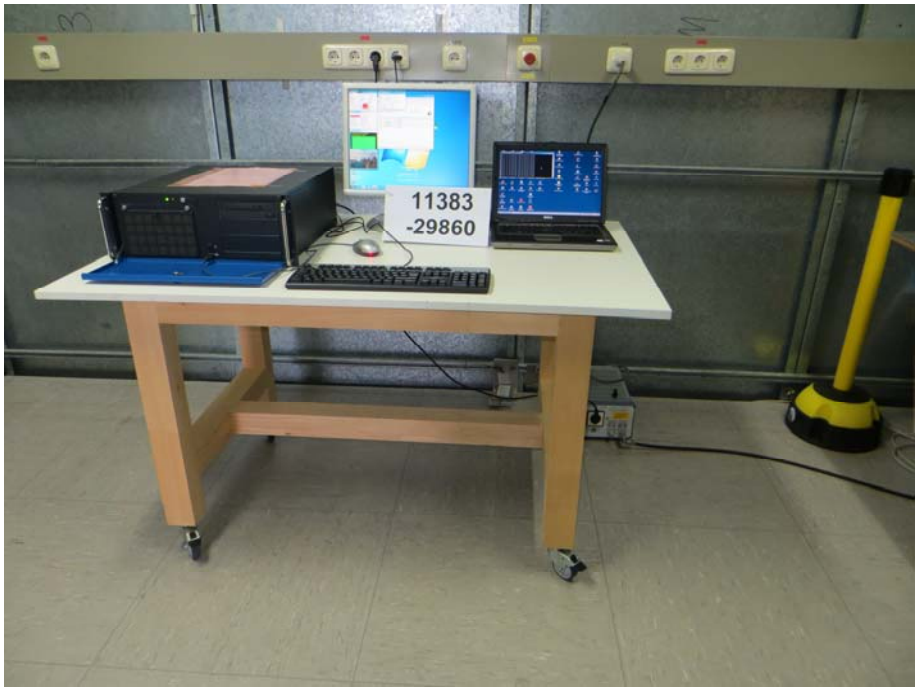


Detector:	Final results:	
Peak / Final Results: QP	20 dB Margin	25 Subranges

Frequency MHz	*Reading dBµV*	*Correction factor dB*	*Value dBµV*	*Limit dBµV*	*Margin dB*
10.355	40.2		40.2	60.0	19.8
10.415	38.1		38.1	60.0	21.9

9.2 Interference Current Test

9.2.1 Test Setup



9.2.2 Test Equipment List

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☒	Test receiver		ESHS 10	1028	860043/016	Rohde & Schwarz
☐	Test receiver		ESHS 10	(R&S)	862970/001	Rohde & Schwarz
☐	EMI test receiver		ESPI7	1711	836914/0002	Rohde & Schwarz
☐	EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐	EMI test receiver		ESCI3	1863	100008	Rohde & Schwarz
☐	EMI test receiver		ESR7	(R&S)	101108	Rohde & Schwarz
☐	EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐	EMI test receiver		ESU40	(R&S)	100324	Rohde & Schwarz
☐	Preamplifier		CPA9231A	1651	3393	Schaffner
☐	Digital oscilloscope		WaveJet 314	1963	LCRY0101J23209	LeCroy
☐	Digital oscilloscope		Wave Surfer 452	1796	LCRY0301J11938	LeCroy
☐	Digital oscilloscope		WaveRunner 104Xi-A	2075	LCRY0617N51108	LeCroy
☒	V-network		ESH 3-Z5	1060	862770/021	Rohde & Schwarz
☐	V-network		ESH 3-Z5	1059	894785/005	Rohde & Schwarz
☐	V-network		ESH 3-Z5	1218	830952/025	Rohde & Schwarz
☐	V-network		ESH 3-Z6	1594	825993/027	Rohde & Schwarz
☐	V-network		ESH 3-Z6	1220	830722/010	Rohde & Schwarz
☐	Artificial mains network		ESH 2-Z5	1536	842966/004	Rohde & Schwarz
☐	Pulse limiter		ESH3-Z2	1144	---	Rohde & Schwarz
☐	4-wire ISN		ENY 41	1652	836077/003	Rohde & Schwarz
☐	2-wire ISN		ENY 22	1813	100150	Rohde & Schwarz
☐	Impedance stabization network		ISN T800	2080	28597	Teseq
☒	Current probe		EZ-17	1606	830633/010	Rohde & Schwarz
☐	High impedance probe		TK 9416	1106	---	Schwarzbeck
☐	Shielded room		No. 1	1451	---	Albatross
☐	Fully anechoic room		No. 2	1452	---	Albatross
☐	Semi anechoic room		No. 3	1453	---	Siemens
☒	Shielded room		No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room		No. 6	1865	---	Albatross
☐	Shielded room		No. 7	1866	---	Albatross

9.2.3 Test Results

Results for interference current test are documented as listed below.

Interference Current Test 150 kHz - 30 MHz

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Shielded room, cabin no. 4

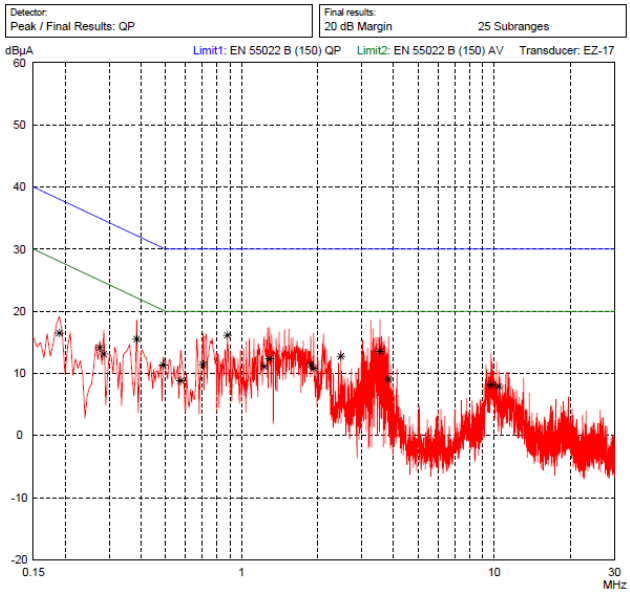
Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Prüfgrundlage / *Specifications:*	EN 61000-6-4:2007 + A1:2011
Basisnorm / *Basic standard:*	IEC/CISPR 22:2008 EN 55022:2010
Betriebsart / *Operation mode:*	According to chapter 4
Kommentar / *Comment:*	---

Messbezug / *Tested on:*	Telecommunication line, Ethernet S2

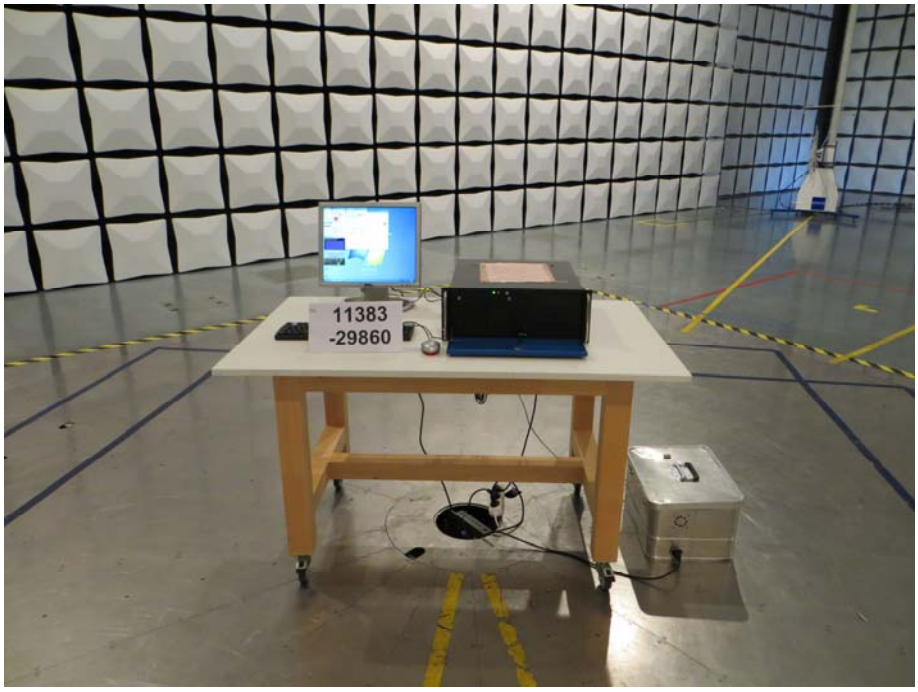


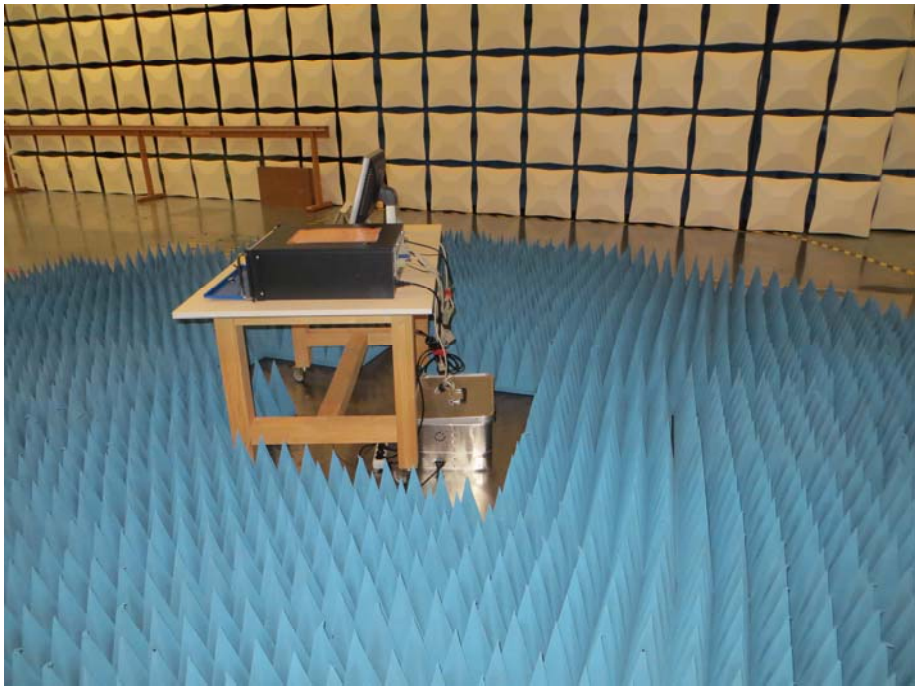
Detector: Peak / Final Results: QP	Final results: 20 dB Margin	25 Subranges

Frequency MHz	*Reading dBµA*	*Correction factor dB*	*Value dBµA*	*Limit dBµA*	*Margin dB*
0.190	14.9	1.6	16.5	38.0	21.5
0.275	15.3	-1.1	14.2	35.0	20.8
0.285	14.4	-1.3	13.1	34.7	21.6
0.385	18.9	-3.4	15.5	32.2	16.7
0.490	16.5	-5.2	11.3	30.2	18.9
0.575	14.7	-5.9	8.8	30.0	21.2
0.705	18.2	-6.8	11.4	30.0	18.6
0.880	23.8	-7.7	16.1	30.0	13.9
1.230	19.8	-8.7	11.1	30.0	18.9
1.290	21.1	-8.7	12.4	30.0	17.6
1.880	20.8	-9.4	11.4	30.0	18.6
1.930	20.2	-9.4	10.8	30.0	19.2
2.475	22.3	-9.6	12.7	30.0	17.3
3.535	23.3	-9.7	13.6	30.0	16.4
3.820	18.9	-9.8	9.1	30.0	20.9
9.735	18.1	-9.9	8.2	30.0	21.8
10.445	17.8	-9.9	7.9	30.0	22.1

9.3 Radiated Emission Test

9.3.1 Test Setup





9.3.2 Test Equipment List

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐	EMI test receiver		ESPI7	1711	836914/0002	Rohde & Schwarz
☐	EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐	EMI test receiver		ESCI3	1863	100008	Rohde & Schwarz
☐	EMI test receiver		ESR7	(R&S)	101108	Rohde & Schwarz
☒	EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐	EMI test receiver		ESU40	(R&S)	100324	Rohde & Schwarz
☐	Spectrum analyzer		FSP30	1666	100063	Rohde & Schwarz
☐	Spectrum analyzer		FSP30	(R&S)	100062	Rohde & Schwarz
☐	Preamplifier	Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐	Preamplifier	Cabin no. 2	AFS3-00100800-32-LN	1684	847743	Miteq
☐	Preamplifier	Cabin no. 2	AFS3-00100800-32-LN	2076	1344017	Miteq
☐	Preamplifier	Cabin no. 2	ACO/180-3530	1484	32641	CTT
☐	Preamplifier		CPA9231A	1651	3393	Schaffner
☐	Preamplifier		R14601	1142	13120026	Advantest
☐	Preamplifier		AMF-4D-005080-25-13P	1685	860149	Miteq
☐	Magnetic Field Pickup Coil		HZ-10	1605	827129/013	Rohde & Schwarz
☐	Loop antenna		HFH2-Z2	1016	882964/1	Rohde & Schwarz
☐	Rod antenna		HFH2-Z6	1017	893053/001	Rohde & Schwarz
☐	Trilog antenna	Cabin no. 2	VULB 9163	1802	9163-214	Schwarzbeck
☐	Trilog antenna	Cabin no. 3	VULB 9163	1722	9163-188	Schwarzbeck
☒	Trilog antenna	Cabin no. 8	VULB 9163	2058	9163-408	Schwarzbeck
☒	Horn antenna		HF907	2073	100154	Rohde & Schwarz
☐	Shielded room		No. 1	1451	---	Albatross
☐	Fully anechoic room		No. 2	1452	---	Albatross
☐	Semi anechoic room		No. 3	1453	---	Siemens
☐	Shielded room		No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room		No. 6	1865	---	Albatross
☐	Shielded room		No. 7	1866	---	Albatross
☒	Semi anechoic room		No. 8	2057	---	Albatross

9.3.3 Test Results

Results for radiated emission test are documented as listed below.

Radiated Emission Test 30 MHz - 1 GHz

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Semi anechoic room, cabin no. 8

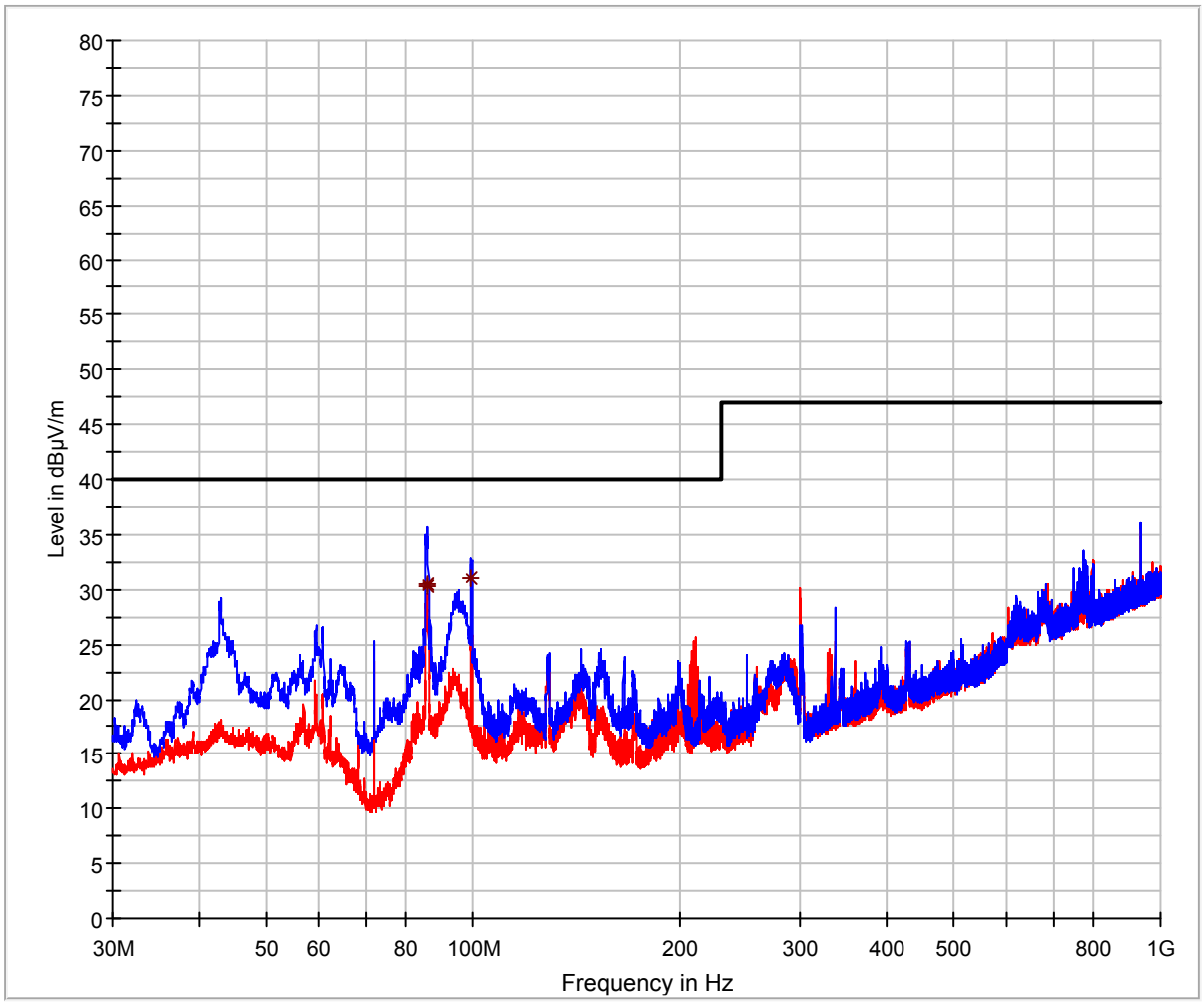
Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Prüfgrundlage / *Specifications:* Basisnorm / *Basic standard:*	EN 61000-6-4:2007 + A1:2011 IEC/CISPR 16-2-3:2006 EN 55016-2-3:2006
Messumgebung / *Test environment:*	Semi anechoic room
Betriebsart / *Operation mode:*	According to chapter 4
Kommentar / *Comment:*	---

Messentfernung / *Test distance:*	10 m
Polarisation / *Polarization:*	horizontal / vertical



Frequency MHz	*QuasiPeak dBµV/m*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Polarization*	*Azimuth deg*	*Corr. dB*	*Margin dB*	*Limit dBµV/m*
86,220000	30,5	1000,0	120,000	141,0	V	-60,0	10,8	9,5	40,0
86,250000	30,2	1000,0	120,000	260,0	V	-27,0	10,8	9,8	40,0
99,600000	31,0	1000,0	120,000	122,0	V	109,0	13,0	9,0	40,0

Radiated Emission Test 1 GHz - 6 GHz

Prüfdatum / *Date of test:*	2013-09-10
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Semi anechoic room, cabin no. 8

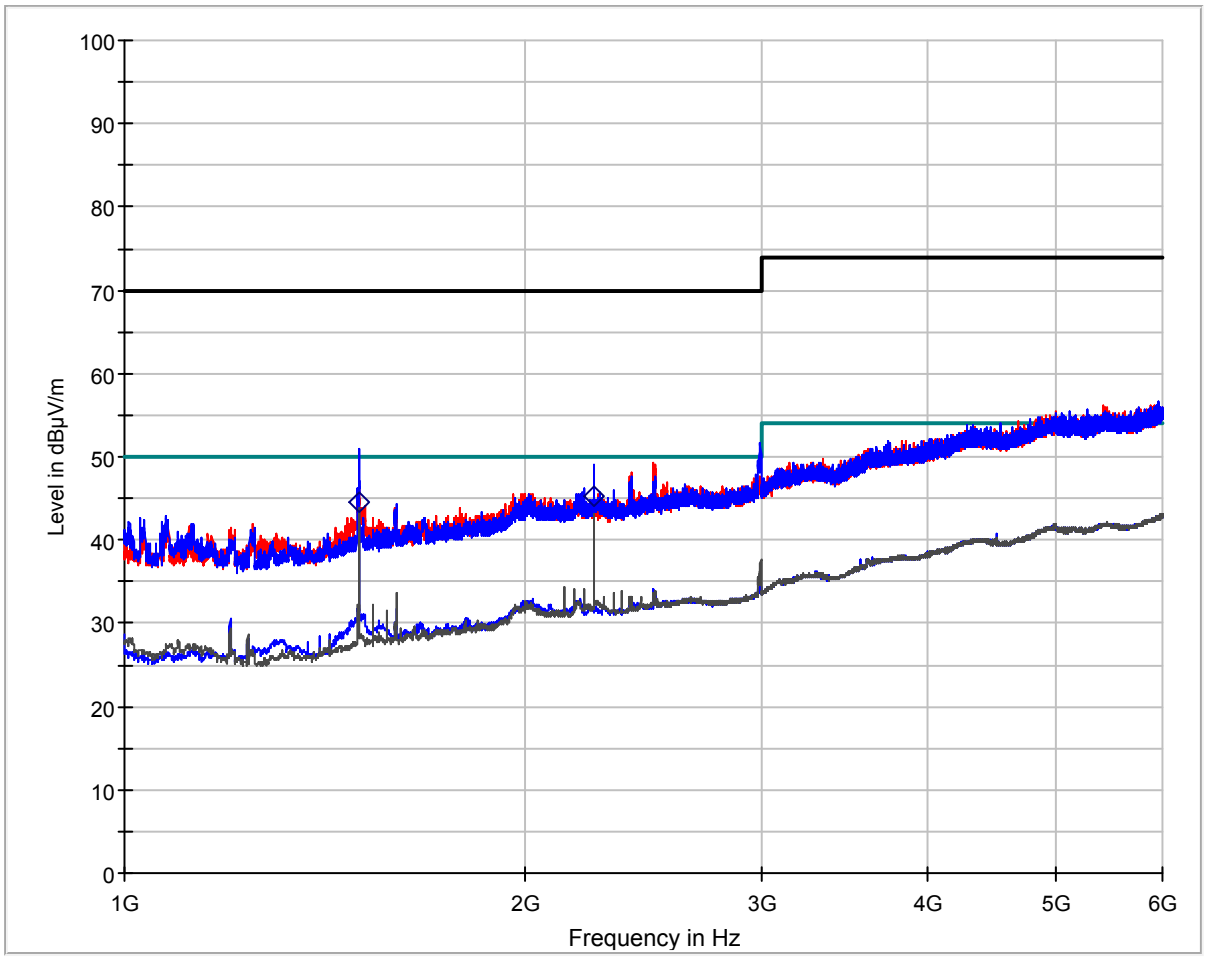
Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Prüfgrundlage / *Specifications:* Basisnorm / *Basic standard:*	EN 61000-6-4:2007 + A1:2011 IEC/CISPR 16-2-3:2006 EN 55016-2-3:2006
Messumgebung / *Test environment:*	Semi anechoic room with partial arrangement of floor absorbers
Betriebsart / *Operation mode:*	According to chapter 4
Kommentar / *Comment:*	---

Messentfernung / *Test distance:*	3 m
Polarisation / *Polarization:*	horizontal / vertical



EN 55022 Class B Radiated disturbance 3 m PK
Preview Result 1H-PK+
Preview Result 1V-PK+
Final Result 2-AVG
EN 55022 Class B Radiated disturbance 3 m AV
Preview Result 2H-AVG
Preview Result 2V-AVG

Frequency MHz	*Average dBµV/m*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Polarization*	*Azimuth deg*	*Corr. dB*	*Margin dB*	*Limit dBµV/m*
1500.000000	44.5	1000.0	1000.000	154.0	V	-21.0	29.5	5.5	50.0
2250.000000	45.2	1000.0	1000.000	175.0	V	-9.0	33.1	4.8	50.0

9.4 Harmonics Test

9.4.1 Test Setup

9.4.2 Test Equipment List

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Analyzer reference system (including mains impedance)	ARS 16/3/TPM	2197	A4990 07/1 1112	Spitzenberger & Spies
☐	Additional mains impedance	AIP 75/3/P/TPM	2198	A4990 07/2 1112	Spitzenberger & Spies
☐	Control unit (synthesizers)	SyCore 1k4	2196	A4235 12/0 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-1	A4235 01/1 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-2	A4235 01/2 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-3	A4235 01/3 0209	Spitzenberger & Spies
☐	Additional transformer	UT 5000/400/B	2090	A4609 03/0 1110	Spitzenberger & Spies
☐	RLC load	RLC 37500/2.5/SM	2199	A4991	Spitzenberger & Spies
☐	Photovoltaic simulator	PVS 25000	2200	A4989 01/0 1112	Spitzenberger & Spies
☐	Oscilloscope	TDS2014B	2039	C041606	Tektronix
☒	Analyzer reference system (including mains impedance)	ARS 16/1	(SpS)	UO353 07/0 0907	Spitzenberger & Spies
☒	Control unit (synthesizers)	SyCore 1k1	(SpS)	UO355 12/0 1109	Spitzenberger & Spies
☒	Amplifier	PAS 5000	(SpS)	UO355 01/0 1109 UO355 02/0 1109	Spitzenberger & Spies
☐	Shielded room	No. 1	1451	---	Albatross
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☐	Shielded room	No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room	No. 6	1865	---	Albatross
☐	Shielded room	No. 7	1866	---	Albatross

9.4.3 Test Results

Results for harmonics test are documented as listed below.

Harmonics Test

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Non shielded room

Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Prüfgrundlage / *Specifications:*	IEC 61000-3-2:2005 + A1:2008 + A2:2009 EN 61000-3-2:2006 + A1:2009 + A2:2009
Beobachtungsdauer / *Observation time:*	150 s
Geräteklasse / *Equipment class:*	A
Betriebsart / *Operation mode:*	According to chapter 4
Kommentar / *Comment:*	---

Messbezug / *Tested on:*	Power line

Maximum RMS current and corresponding values in timewindow 590:

Voltage:	230.74 Vrms		THD=0.01 %	THV=0.013 V	POHV=0.003 V	PWHD=0.01 %
Current:	0.462 Arms		THD=12.70 %	THC=0.058 A	POHC=0.009 A	PWHD=16.18 %
Power:	94.8 W	P1=95.1 W	106.7 VA			
Power factor:	0.889	CosPhi1: 0.899				

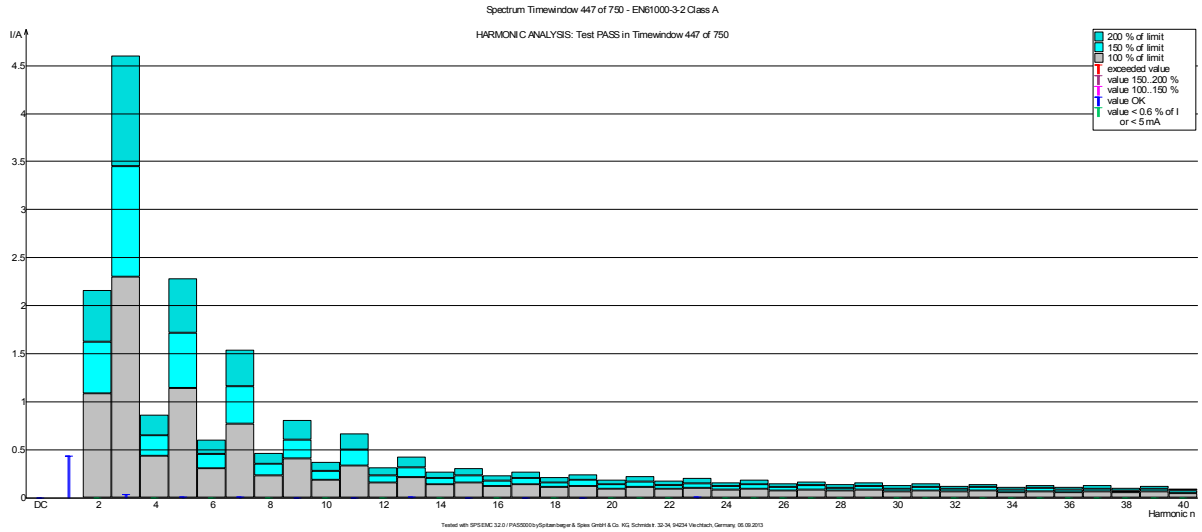
Test conditions: EN 61000-3-2:2006 + A1:2009 + A2:2009, f=50 Hz, Phase=L1, Range=0.80 A
Time window=10/12 (200ms), Grouping (>2nd harm.)=on
No Ztest selected
harmonic currents < 0.6 % of I or < 5 mA are disregard for calc. of THD, THC, POHC, PWHD

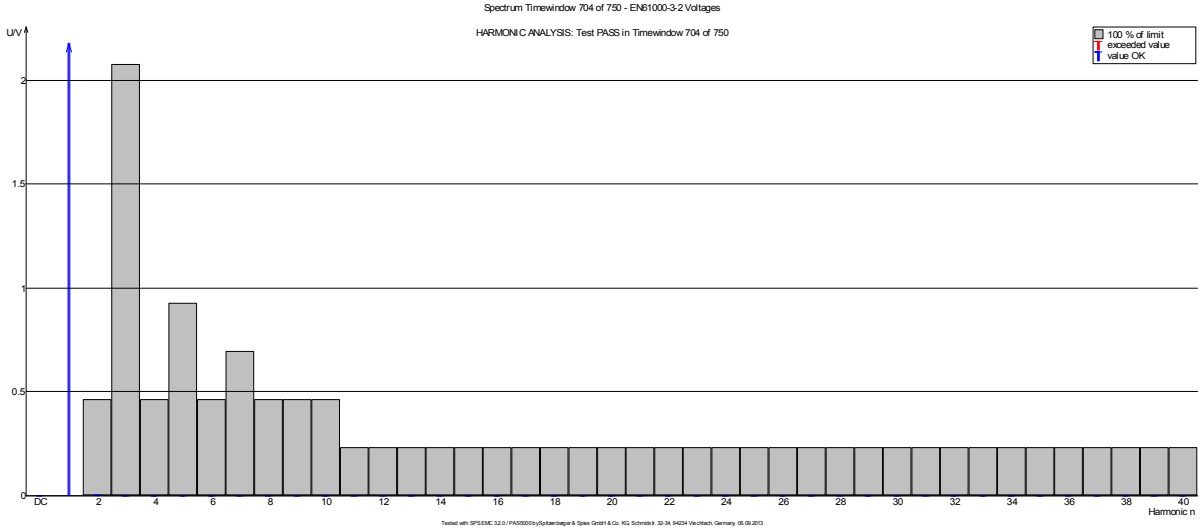
HARMONIC ANALYSIS: Test PASS
Tobs = entire measurement; POHC: avg=0.01 A, limits=0.25 A
Iavg=0.440 Arms

Ha	Entire measurement (2.5 min = 750 time windows)							Worst 2.5 min		Average		PASS	FAIL
	Maximum	Window	EN61000-3-2 Class A	Margin in MaxWin	100 to 150%	150 to 200%	Ex-ceeded	100 to 150%	Ex-ceeded	Value	Ex-ceeded		
DC	0.0060 A	27	-.- - - -	- - - . -	0	0	0	n.e.	n.e.	0.0035 A	0	X	
1	0.4584 A	590	-.- - - -	- - - . -	0	0	0	n.e.	n.e.	0.4359 A	0	X	
2	0.0029 A	64	1.0800 A	-99.7 %	0	0	0	n.e.	n.e.	0.0025 A	0	X	
3	0.0460 A	590	2.3000 A	-98.0 %	0	0	0	n.e.	n.e.	0.0442 A	0	X	
4	0.0009 A	117	0.4300 A	-99.8 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
5	0.0134 A	174	1.1400 A	-98.8 %	0	0	0	n.e.	n.e.	0.0127 A	0	X	
6	0.0004 A	398	0.3000 A	-99.9 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
7	0.0173 A	589	0.7700 A	-97.7 %	0	0	0	n.e.	n.e.	0.0169 A	0	X	
8	0.0005 A	398	0.2300 A	-99.8 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
9	0.0112 A	590	0.4000 A	-97.2 %	0	0	0	n.e.	n.e.	0.0084 A	0	X	
10	0.0008 A	398	0.1840 A	-99.6 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
11	0.0100 A	590	0.3300 A	-97.0 %	0	0	0	n.e.	n.e.	0.0091 A	0	X	
12	0.0007 A	398	0.1533 A	-99.6 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
13	0.0169 A	67	0.2100 A	-92.0 %	0	0	0	n.e.	n.e.	0.0148 A	0	X	
14	0.0005 A	400	0.1314 A	-99.6 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
15	0.0093 A	590	0.1500 A	-93.8 %	0	0	0	n.e.	n.e.	0.0084 A	0	X	
16	0.0009 A	28	0.1150 A	-99.2 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
17	0.0101 A	175	0.1324 A	-92.4 %	0	0	0	n.e.	n.e.	0.0094 A	0	X	
18	0.0009 A	400	0.1022 A	-99.1 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
19	0.0096 A	700	0.1184 A	-91.9 %	0	0	0	n.e.	n.e.	0.0089 A	0	X	
20	0.0009 A	398	0.0920 A	-99.0 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
21	0.0065 A	178	0.1071 A	-94.0 %	0	0	0	n.e.	n.e.	0.0049 A	0	X	
22	0.0006 A	474	0.0836 A	-99.3 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
23	0.0095 A	447	0.0978 A	-90.3 %	0	0	0	n.e.	n.e.	0.0091 A	0	X	
24	0.0006 A	59	0.0767 A	-99.3 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
25	0.0042 A	59	0.0900 A	-95.3 %	0	0	0	n.e.	n.e.	0.0038 A	0	X	
26	0.0007 A	214	0.0708 A	-99.0 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
27	0.0060 A	178	0.0833 A	-92.8 %	0	0	0	n.e.	n.e.	0.0038 A	0	X	
28	0.0008 A	398	0.0657 A	-98.8 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
29	0.0051 A	689	0.0776 A	-93.5 %	0	0	0	n.e.	n.e.	0.0046 A	0	X	
30	0.0007 A	398	0.0613 A	-98.9 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
31	0.0019 A	590	0.0726 A	-97.4 %	0	0	0	n.e.	n.e.	0.0014 A	0	X	
32	0.0007 A	398	0.0575 A	-98.8 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
33	0.0034 A	67	0.0682 A	-95.1 %	0	0	0	n.e.	n.e.	0.0025 A	0	X	
34	0.0007 A	109	0.0541 A	-98.8 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
35	0.0023 A	364	0.0643 A	-96.5 %	0	0	0	n.e.	n.e.	0.0019 A	0	X	
36	0.0007 A	393	0.0511 A	-98.7 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
37	0.0031 A	57	0.0608 A	-94.9 %	0	0	0	n.e.	n.e.	0.0018 A	0	X	
38	0.0007 A	395	0.0484 A	-98.5 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
39	0.0024 A	590	0.0577 A	-95.8 %	0	0	0	n.e.	n.e.	0.0021 A	0	X	
40	0.0007 A	397	0.0460 A	-98.4 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	

average value < 0.6 % of Iavg or < 5 mA

Tested with SPS EMC 3.2.0 / PAS5000 by Spitzenberger & Spies GmbH & Co. KG, Schmidstr. 32-34, 94234 Viechtach, Germany, 06.09.2013


Spectrum Timewindow 447 of 750 - EN61000-3-2 Class A
HARMONIC ANALYSIS: Test PASS in Timewindow 447 of 750
I/A
200 % of limit
150 % of limit
100 % of limit
exceeded value
value 150...200 %
value 100...150 %
value OK
value < 0.6 % of I or < 5 mA
DC
Harmonic n


Spectrum Timewindow 704 of 750 - EN61000-3-2 Voltages
HARMONIC ANALYSIS: Test PASS in Timewindow 704 of 750
U/V
100 % of limit
exceeded value
value OK
DC
Harmonic n

Maximum RMS current and corresponding values in timewindow 590:

Voltage:	230.74 Vrms		THD=0.01 %	THV=0.013 V	POHV=0.003 V	PWHD=0.01 %
Current:	0.462 Arms		THD=12.70 %	THC=0.058 A	POHC=0.009 A	PWHD=16.18 %
Power:	94.8 W	P1=95.1 W	106.7 VA			
Power factor:	0.889	CosPhi1: 0.899				

Test conditions: EN 61000-3-2:2006 + A1:2009 + A2:2009, f=50 Hz, Phase=L1, Range=0.80 A
Time window=10/12 (200ms), Grouping (>2nd harm.)=on
No Ztest selected
harmonic currents < 0.6 % of I or < 5 mA are disregard for calc. of THD, THC, POHC, PWHD

HARMONIC ANALYSIS: Test PASS
Tobs = entire measurement; POHC: avg=0.00 V, limits=0.73 V
Vavg=230.74 Vrms

Ha	Entire measurement (2.5 min = 750 time windows)						Worst 2.5 min		Average		PASS	FAIL
	Maximum	Window	EN61000-3-2 Voltages	Margin in MaxWin	100 to 150%	Ex-ceeded	100 to 150%	Ex-ceeded	Value	Ex-ceeded		
DC	-0.0071 V	13	-.- - - -	- - - . -	- - -	0	n.e.	n.e.	-0.0015 V	0	X	
1	230.7477 V	704	-.- - - -	- - - . -	- - -	0	n.e.	n.e.	230.7422 V	0	X	
2	0.0102 V	642	fluctuating	-97.8 %	- - -	0	n.e.	n.e.	0.0049 V	0	X	
3	0.0076 V	570	fluctuating	-99.6 %	- - -	0	n.e.	n.e.	0.0052 V	0	X	
4	0.0036 V	701	fluctuating	-99.2 %	- - -	0	n.e.	n.e.	0.0017 V	0	X	
5	0.0030 V	26	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0018 V	0	X	
6	0.0015 V	392	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0006 V	0	X	
7	0.0045 V	253	fluctuating	-99.4 %	- - -	0	n.e.	n.e.	0.0036 V	0	X	
8	0.0012 V	398	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0006 V	0	X	
9	0.0036 V	119	fluctuating	-99.2 %	- - -	0	n.e.	n.e.	0.0029 V	0	X	
10	0.0009 V	252	fluctuating	-99.8 %	- - -	0	n.e.	n.e.	0.0004 V	0	X	
11	0.0032 V	76	fluctuating	-98.6 %	- - -	0	n.e.	n.e.	0.0027 V	0	X	
12	0.0012 V	35	fluctuating	-99.5 %	- - -	0	n.e.	n.e.	0.0006 V	0	X	
13	0.0041 V	56	fluctuating	-98.2 %	- - -	0	n.e.	n.e.	0.0034 V	0	X	
14	0.0009 V	392	fluctuating	-99.6 %	- - -	0	n.e.	n.e.	0.0005 V	0	X	
15	0.0033 V	397	fluctuating	-98.6 %	- - -	0	n.e.	n.e.	0.0026 V	0	X	
16	0.0009 V	28	fluctuating	-99.6 %	- - -	0	n.e.	n.e.	0.0005 V	0	X	
17	0.0029 V	553	fluctuating	-98.7 %	- - -	0	n.e.	n.e.	0.0022 V	0	X	
18	0.0007 V	67	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0004 V	0	X	
19	0.0027 V	293	fluctuating	-98.8 %	- - -	0	n.e.	n.e.	0.0022 V	0	X	
20	0.0007 V	351	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0003 V	0	X	
21	0.0018 V	161	fluctuating	-99.2 %	- - -	0	n.e.	n.e.	0.0012 V	0	X	
22	0.0006 V	310	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0003 V	0	X	
23	0.0025 V	69	fluctuating	-98.9 %	- - -	0	n.e.	n.e.	0.0021 V	0	X	
24	0.0008 V	224	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0004 V	0	X	
25	0.0017 V	553	fluctuating	-99.3 %	- - -	0	n.e.	n.e.	0.0010 V	0	X	
26	0.0005 V	676	fluctuating	-99.8 %	- - -	0	n.e.	n.e.	0.0003 V	0	X	
27	0.0021 V	704	fluctuating	-99.1 %	- - -	0	n.e.	n.e.	0.0011 V	0	X	
28	0.0007 V	139	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0003 V	0	X	
29	0.0014 V	492	fluctuating	-99.4 %	- - -	0	n.e.	n.e.	0.0010 V	0	X	
30	0.0005 V	392	fluctuating	-99.8 %	- - -	0	n.e.	n.e.	0.0002 V	0	X	
31	0.0011 V	589	fluctuating	-99.5 %	- - -	0	n.e.	n.e.	0.0005 V	0	X	
32	0.0006 V	625	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0003 V	0	X	
33	0.0014 V	553	fluctuating	-99.4 %	- - -	0	n.e.	n.e.	0.0007 V	0	X	
34	0.0005 V	537	fluctuating	-99.8 %	- - -	0	n.e.	n.e.	0.0002 V	0	X	
35	0.0012 V	576	fluctuating	-99.5 %	- - -	0	n.e.	n.e.	0.0006 V	0	X	
36	0.0006 V	589	fluctuating	-99.7 %	- - -	0	n.e.	n.e.	0.0003 V	0	X	
37	0.0017 V	587	fluctuating	-99.2 %	- - -	0	n.e.	n.e.	0.0006 V	0	X	
38	0.0005 V	699	fluctuating	-99.8 %	- - -	0	n.e.	n.e.	0.0002 V	0	X	
39	0.0016 V	244	fluctuating	-99.3 %	- - -	0	n.e.	n.e.	0.0012 V	0	X	
40	0.0005 V	330	fluctuating	-99.8 %	- - -	0	n.e.	n.e.	0.0002 V	0	X	

9.5 Flicker Test

9.5.1 Test Setup

9.5.2 Test Equipment List

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Analyzer reference system (including mains impedance)	ARS 16/3/TPM	2197	A4990 07/1 1112	Spitzenberger & Spies
☐	Additional mains impedance	AIP 75/3/P/TPM	2198	A4990 07/2 1112	Spitzenberger & Spies
☐	Control unit (synthesizers)	SyCore 1k4	2196	A4235 12/0 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-1	A4235 01/1 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-2	A4235 01/2 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-3	A4235 01/3 0209	Spitzenberger & Spies
☐	Additional transformer	UT 5000/400/B	2090	A4609 03/0 1110	Spitzenberger & Spies
☐	RLC load	RLC 37500/2.5/SM	2199	A4991	Spitzenberger & Spies
☐	Photovoltaic simulator	PVS 25000	2200	A4989 01/0 1112	Spitzenberger & Spies
☐	Oscilloscope	TDS2014B	2039	C041606	Tektronix
☒	Analyzer reference system (including mains impedance)	ARS 16/1	(SpS)	UO353 07/0 0907	Spitzenberger & Spies
☒	Control unit (synthesizers)	SyCore 1k1	(SpS)	UO355 12/0 1109	Spitzenberger & Spies
☒	Amplifier	PAS 5000	(SpS)	UO355 01/0 1109 UO355 02/0 1109	Spitzenberger & Spies
☐	Shielded room	No. 1	1451	---	Albatross
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☐	Shielded room	No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room	No. 6	1865	---	Albatross
☐	Shielded room	No. 7	1866	---	Albatross

9.5.3 Test Results

Results for flicker test are documented as listed below.

TÜV SÜD Product Service GmbH
Äußere Frühlingstraße 45
94315 Straubing
Germany

Phone: +49 9421 5522-0
Fax: +49 9421 5522-99
Web: www.tuev-sued.de

Flicker Test

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Non shielded room

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

Prüfgrundlage / *Specifications:*	IEC 61000-3-3:2008 EN 61000-3-3:2008
Beobachtungsdauer für P_{st} / *Observation time for P_{st}:* Gesamtdauer / *Total time:* Flickerimpedanz / *Flicker impedance:* Spezielle Prüfbedingungen / *Special test conditions:* Spezielle Bedingungen für d_{max} / *Special conditions for d_{max}:*	10 min 10 min (1 Flicker measurement) Zref (IEC 60725) --- ---
Betriebsart / *Operation mode:* Kommentar / *Comment:*	According to chapter 4 ---

Messbezug / *Tested on:*	Power line

Test conditions: EN 61000-3-3:2008 / 230 V / 50 Hz / Phase L1 /
Obs 1 x 10 min / Ztest (0.400+j0.250) Ohm

FLICKER: Test PASS!

Time	Pmax	Pst	Sliding Plt	d(t)>3.30% [s]	dmax [%]	dc [%]	PASS	FAIL
11:54:55	0.001	0.0210	0.0210	0.000	0.032	- . - - -	X	
Limits:		1.000	0.650	0.500	4.000	3.300		
Plt: 0.021000							X	
Evaluated: PST, PLT, Sliding PLT, dc, dmax, d(t)								

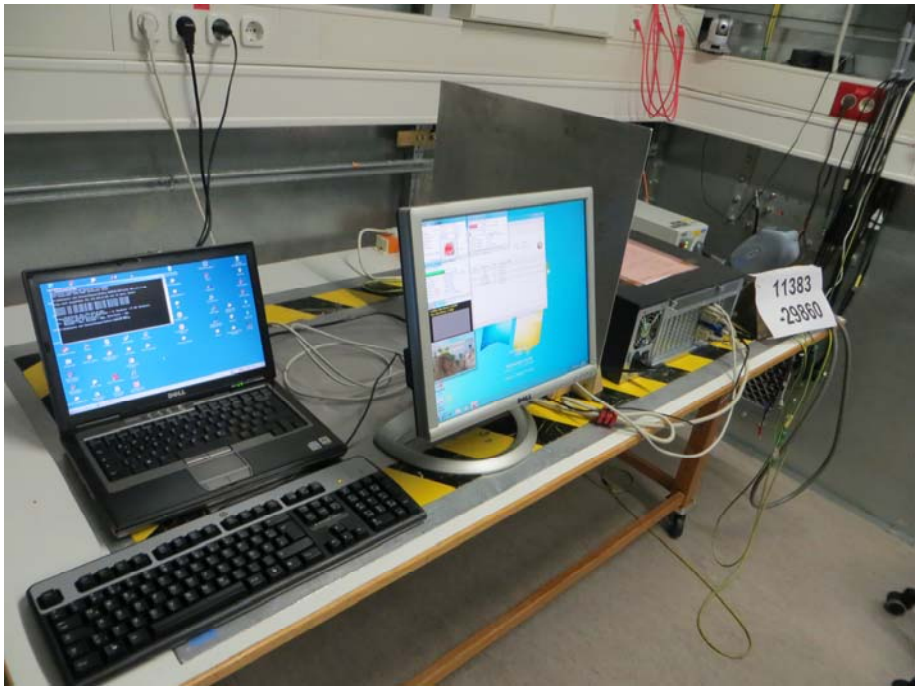
FLICKER: Source test PASS!

Time	Pmax	Pst	Sliding Plt	d(t)>3.30% [s]	dmax [%]	dc [%]	PASS	FAIL
11:54:55	0.000	0.0070	- . - - - -	0.000	0.013	- . - - -	X	
Plt: 0.007000								
Evaluated: PST <= 0.4 dmax < 20 % dmax1								

Tested with SPS EMC 3.2.0 / PAS5000 by Spitzenberger & Spies GmbH & Co. KG, Schmidstr. 32-34, 94234 Viechtach, Germany, 06.09.2013

9.6 Electrostatic Discharge

9.6.1 Test Setup



9.6.2 Test Equipment List

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☒	ESD simulator	NSG 438A	2117	101	Teseq
☒	RC network 150 pF / 330 Ω	INA 4380	2117-1	101	Teseq
☐	RC network 150 pF / 2 kΩ	INA 4381	2117-2	485	Teseq
☐	RC network 330 pF / 2 kΩ	INA 4382	2117-3	512	Teseq
☐	RC network 330 pF / 330 Ω	INA 4553	2117-4	264	Teseq
☐	ESD simulator	NSG 435	1223	000290	Schaffner
☒	Shielded room	No. 1	1451	---	Albatross
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☐	Shielded room	No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room	No. 6	1865	---	Albatross
☐	Shielded room	No. 7	1866	---	Albatross

9.6.3 Test Results

Results for electrostatic discharge test are documented as listed below.

Electrostatic Discharge

Prüfdatum / *Date of test:*	2013-09-10
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Shielded room, cabin no. 1

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

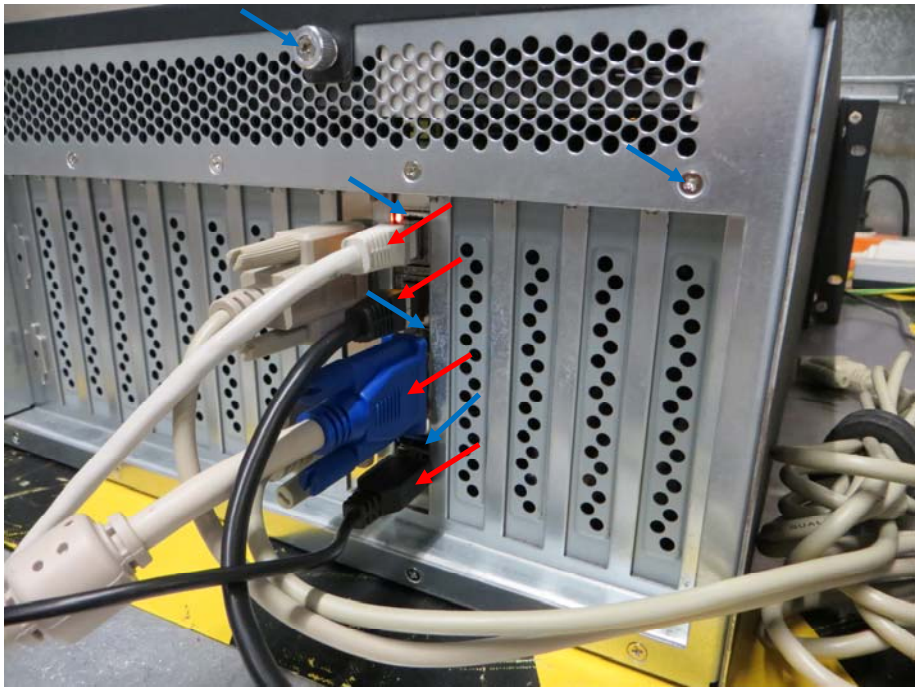
Luftdruck / *Barometric pressure:*	975.6 hPa
Relative Luftfeuchtigkeit / *Relative humidity:*	41.5 %
Temperatur / *Ambient temperature:*	27.0 °C

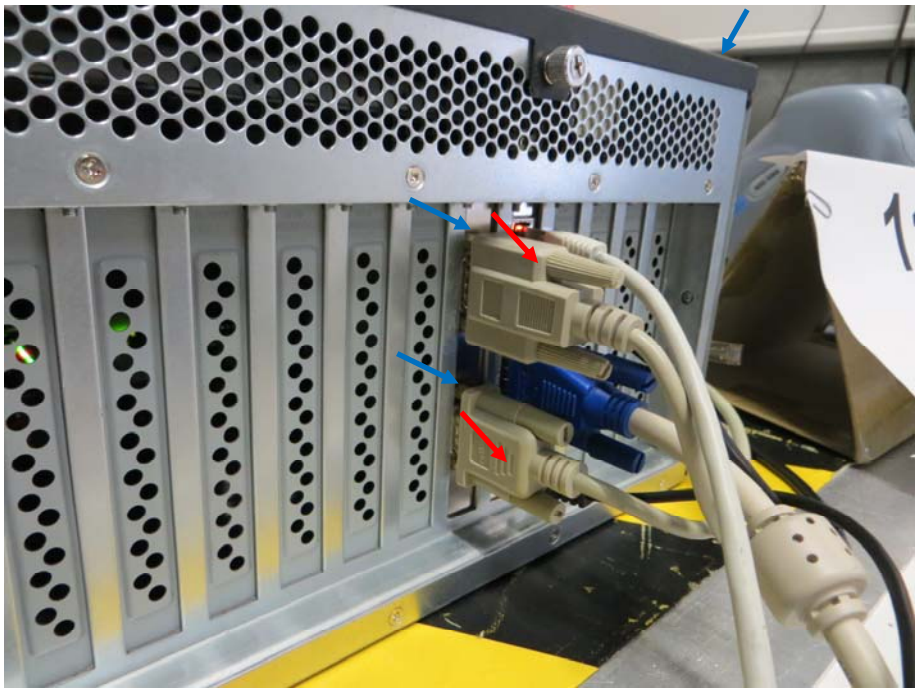
Prüfgrundlage / *Specifications:*	EN 61000-6-2:2005	
Bewertungskriterium / *Performance criterion:*	B	
Anforderung / *Requirement:*	Contact discharge: Air discharge:	± 4 kV ± 8 kV
Anzahl der Entladungen / *Number of discharges:*	Contact discharge: Air discharge:	≥ 10 per polarity and test point ≥ 10 per polarity and test point
Basisnorm / *Basic standard:*	IEC 61000-4-2:2008 EN 61000-4-2:1995 EN 61000-4-2:2009	
Betriebsart / *Operation mode:*	According to chapter 4	
Kommentar / *Comment:*	---	

Discharge method	*Discharge voltage*	*Test points*	*Result*	*Note*
Via contact to horizontal coupling plane	± 2 kV, ± 4 kV	Several points on horizontal coupling plane (around EUT)	Passed	
Via contact to vertical coupling plane	± 2 kV, ± 4 kV	On vertical coupling plane placed in the vicinity of EUT	Passed	
Via direct contact to EUT	± 2 kV, ± 4 kV	All conductive parts of EUT accessible to normal user	Passed	
Via air gap to EUT	± 2 kV, ± 4 kV, ± 8 kV	All non conductive parts of EUT accessible to normal user	Passed	

Note(s):

Electrostatic Discharge - Test points

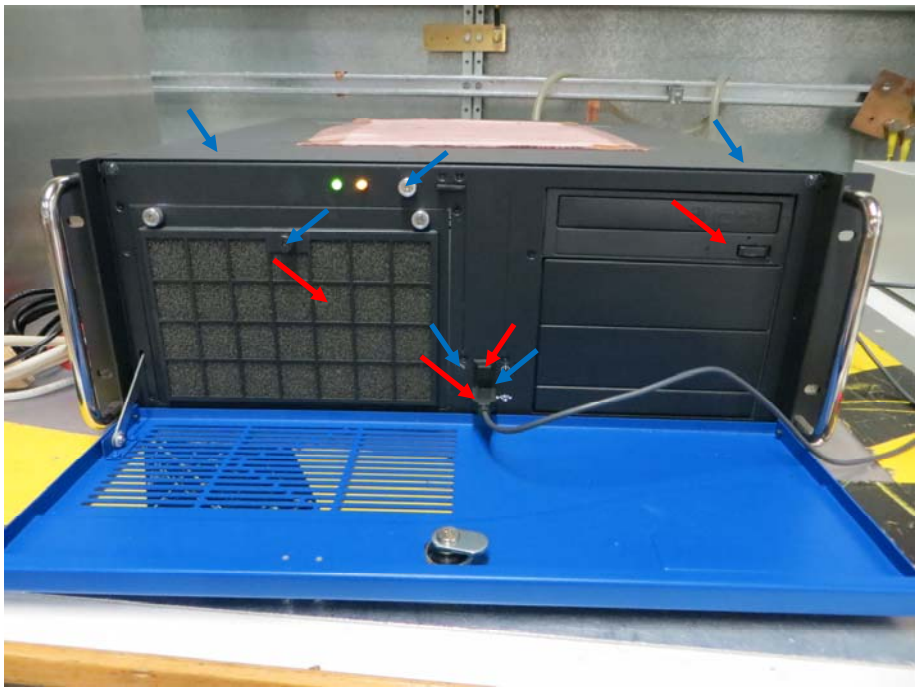




Contact discharge: →

Air discharge: →

Electrostatic Discharge - Test points (continued)

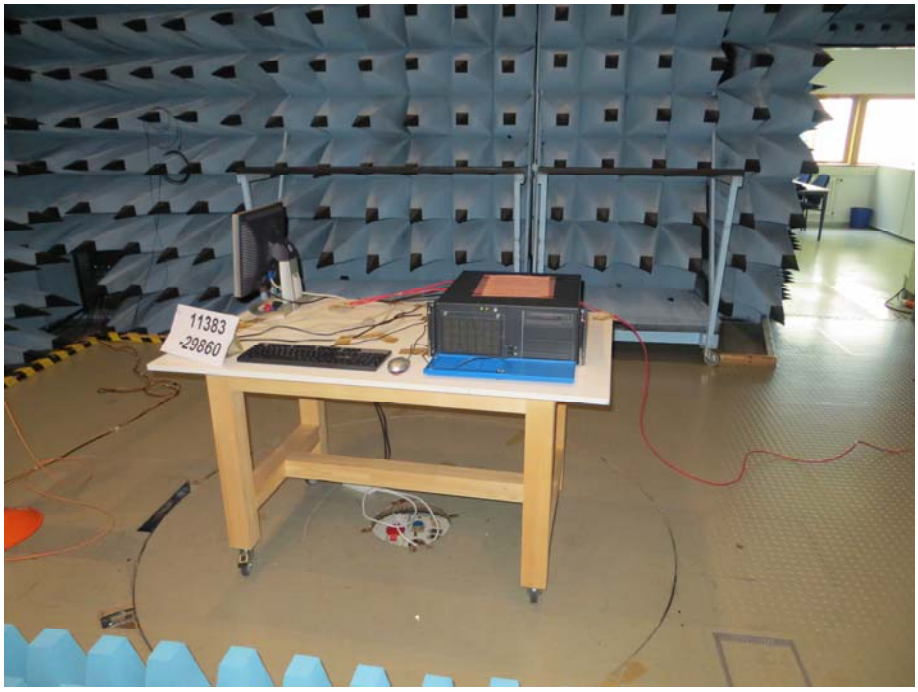


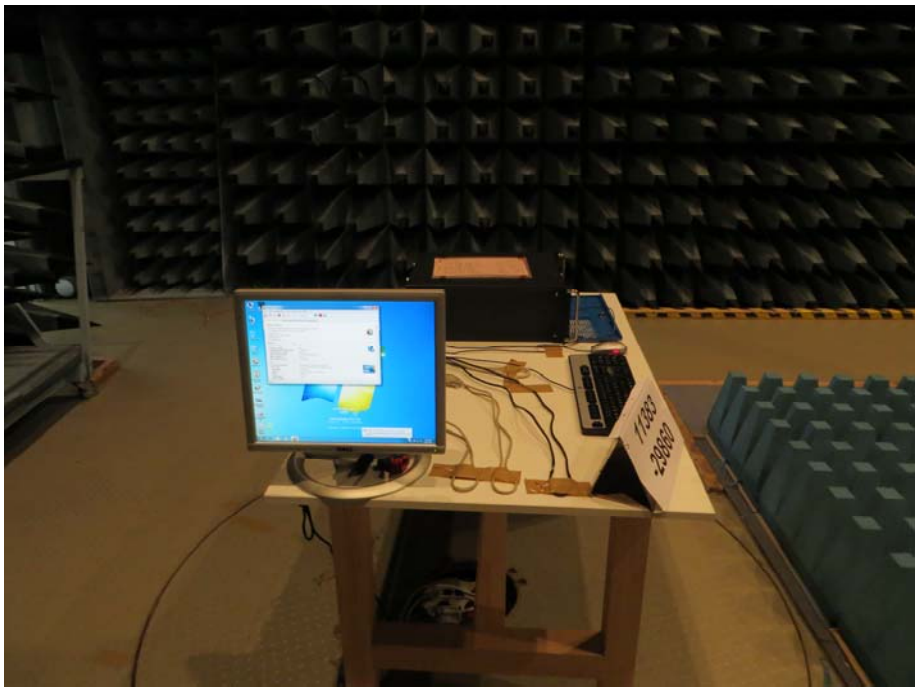
Contact discharge: →

Air discharge: →

9.7 RF-Electromagnetic Fields

9.7.1 Test Setup





9.7.2 Test Equipment List

	Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
☐	Signal generator	Cabin no. 2	SML 02	1759	836926/016	Rohde & Schwarz
☐	Signal generator	Cabin no. 3	SML 03	1729	101495	Rohde & Schwarz
☐	Signal generator	Cabin no. 6	SML 03	1867	102131	Rohde & Schwarz
☐	Signal generator		SMB100A	2027	100112	Rohde & Schwarz
☐	Power amplifier	Cabin no. 6	HVV 250	1508	836956/004	Rohde & Schwarz
☐	Power amplifier	Cabin no. 3	1000L	1704	8923	Amplifier Research
☐	Power amplifier	Cabin no. 2	10W1000	1119	5239	Amplifier Research
☒	Power amplifier	Cabin no. 3	200W1000	1225	12904	Amplifier Research
☐	Power amplifier	Cabin no. 6	1000W1000B	1827	307669	Amplifier Research
☐	Power amplifier		25S1G4	1587	23171	Amplifier Research
☐	Power amplifier		BLMA 1040-450D	2074	097733	Bonn
☒	Power amplifier	Cabin no. 6	TD81-250	1829	H040-0204	IFI
☐	Power amplifier	Cabin no. 6	T188-20	1864	G119-0703	IFI
☐	Power meter	Cabin no. 2	NRVS	1726	100808	Rohde & Schwarz
☒	Power meter	Cabin no. 3	NRVD	1985	837333/029	Rohde & Schwarz
☐	Power meter	Cabin no. 6	NRP	1818	100006	Rohde & Schwarz
☐	Power sensor	Cabin no. 2	NRV-Z4	1727	100179	Rohde & Schwarz
☒	Power sensor	Cabin no. 3	NRV-Z4	1798	100238	Rohde & Schwarz
☒	Power sensor	Cabin no. 3	NRV-Z4	1799	100236	Rohde & Schwarz
☐	Power sensor	Cabin no. 6	NRP-Z91	1819	100064	Rohde & Schwarz
☐	Power sensor	Cabin no. 6	NRP-Z91	1820	100065	Rohde & Schwarz
☐	Directional coupler	Cabin no. 3	DC2000	1226	12502	Amplifier Research
☒	Directional coupler	Cabin no. 3	DC6100	1227	12643	Amplifier Research
☒	Directional coupler	Cabin no. 3	BDC 2080-40/500	2012	076951	Bonn
☐	Directional coupler	Cabin no. 6	DC6280M6	1828	306877	Amplifier Research
☐	Directional coupler	Cabin no. 6	DC7144M1	1808	310890	Amplifier Research
☐	E-field generator		3107 B	1019	2302	Emco
☐	High power broadband balun		VHBD 9134	2098	9134-050	Schwarzbeck
☐	Antenna elements		BBFA 9146	2099	---	Schwarzbeck
☐	Trilog antenna	Cabin no. 6	VULB 9163	1824	9163-233	Schwarzbeck
☒	Hybrid log. periodic antenna		HLP-2603	1655	120500	EMC Automation
☐	Stacked log. per. antenna		STLP 9128 E special	1854	019	Schwarzbeck
☐	Horn antenna		3115	1516	9508-4553	Emco
☐	Horn antenna		HF907	2073	100154	Rohde & Schwarz
☐	Horn antenna		ATH1G4	2078	0330665	Amplifier Research
☐	Horn antenna		3160-03	1010	9112-1003	Emco
☐	Horn antenna		3160-04	1011	9112-1001	Emco
☐	Horn antenna		3160-05	1012	9112-1001	Emco
☐	Horn antenna		3160-06	1013	9112-1001	Emco
☐	Horn antenna		3160-07	1014	9112-1008	Emco
☐	Horn antenna		3160-08	1015	9112-1002	Emco
☐	Horn antenna		3161-01	1749	1091	Emco
☐	Stripline 90 Ohms (3.2 m)		SL 090	1811	---	Stimpfl
☒	Isotropic field probe		FP 2000	1228	12847	Amplifier Research
☒	Isotropic field monitor		FM 2004	1229	12632	Amplifier Research
☐	Electromagnetic radiation meter		EMR-200	1723	AT-0023	Narda
☐	Electric field probe		Type 8.3	1724	AU-0008	Narda
☐	Electric field probe		Type 9.2	1876	AG-0010	Narda

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Fully anechoic room	No. 2	1452	---	Albatross
☒	Semi anechoic room	No. 3	1453	---	Siemens
☐	Fully anechoic room	No. 6	1865	---	Albatross
☐	Semi anechoic room	No. 8	2057	---	Albatross
☐	Shielded room	No. 8b	2057-2	---	Albatross

9.7.3 Test Results

Results for RF-electromagnetic fields test are documented as listed below.

RF-Electromagnetic Fields

Prüfdatum / *Date of test:*	2013-09-11
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Semi anechoic room, cabin no. 3

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

Luftdruck / *Barometric pressure:*	976. hPa
Relative Luftfeuchtigkeit / *Relative humidity:*	39.5 %
Temperatur / *Ambient temperature:*	26.7 °C

Prüfgrundlage / *Specifications:*	EN 61000-6-2:2005	
Bewertungskriterium / *Performance criterion:*	A	
Anforderung / *Requirement:*	80 MHz - 1 GHz: 1.4 GHz - 2 GHz: 2 GHz - 2.7 GHz:	10 V/m 3 V/m 1 V/m
Störsignal / *Interfering signal:*	Modulation: Modulation depth: Modulation frequency:	AM 80 % 1 kHz
Schrittweite / *Step size:*	1 %	
Verweildauer / *Dwell time:*	3 s	
Antennenpolarisation / *Antenna polarization:*	☒ horizontal	☒ vertical
Basisnorm / *Basic standard:*	IEC 61000-4-3:2006 + A1:2007+ A2:2010 EN 61000-4-3:2002 EN 61000-4-3:2006 + A1:2008+ A2:2010	
Betriebsart / *Operation mode:*	According to chapter 4	
Kommentar / *Comment:*	---	

Position of EUT	*Field strength level*	*Result*	*Note*
Front to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2 GHz: 3 V/m f > 2 GHz: 1 V/m	Passed	
Rear side to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2 GHz: 3 V/m f > 2 GHz: 1 V/m	Passed	
Left side to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2 GHz: 3 V/m f > 2 GHz: 1 V/m	Passed	
Right side to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2 GHz: 3 V/m f > 2 GHz: 1 V/m	Passed	

Note(s):

9.8 Electrical fast Transients (Bursts)

9.8.1 Test Setup

9.8.2 Test Equipment List

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	High energy pulse generator		NSG 2050	1680	200104-005AR	Schaffner
☐	Pulse network module		PNW 2225	1806	200448-527LU	Schaffner
☒	Ultra compact simulator		UCS500M4	1898	V0602101058	EM Test
☒	Coupling network		CNI 503A3	2151	V1150111228	EM Test
☐	Coupling clamp	Cabin no. 1	CDN 8014	1221	131	Schaffner
☐	Coupling clamp	Cabin no. 4	SL 400-071D	1076	007	Schaffner
☒	Shielded room		No. 1	1451	---	Albatross
☐	Fully anechoic room		No. 2	1452	---	Albatross
☐	Semi anechoic room		No. 3	1453	---	Siemens
☐	Shielded room		No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room		No. 6	1865	---	Albatross
☐	Shielded room		No. 7	1866	---	Albatross

9.8.3 Test Results

Results for electrical fast transients test are documented as listed below.

Electrical fast Transients (Bursts)

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Shielded room, cabin no. 1

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

Luftdruck / *Barometric pressure:*	979.6 hPa
Relative Luftfeuchtigkeit / *Relative humidity:*	35.3 %
Temperatur / *Ambient temperature:*	26.8 °C

Prüfgrundlage / *Specifications:*	EN 61000-6-2:2005	
Bewertungskriterium / *Performance criterion:*	B	
Anforderung / *Requirement:*	Signal and control lines: DC mains inputs and outputs: AC mains inputs and outputs:	± 1 kV ± 2 kV ± 2 kV
Störsignal / *Interfering signal:*	Test pulse: Pulse frequency: Burst duration: Repetition period:	5 ns / 50 ns 5 kHz 15 ms 300 ms
Prüfdauer / *Test time:*	1 min per polarity	
Basisnorm / *Basic standard:*	IEC 61000-4-4:2004 + A1:2010 EN 61000-4-4:2004 EN 61000-4-4:2004 + A1:2010	
Betriebsart / *Operation mode:*	According to chapter 4	
Kommentar / *Comment:*	---	

Port	*Voltage level*	*Coupling*	*Coupling mode*	*Result*	*Note*
A1	± 2 kV	L1 + N + PE → GND	Coupling filter	Passed	

Note(s):

9.9 Surges

9.9.1 Test Setup

9.9.2 Test Equipment List

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	High energy pulse generator	NSG 2050	1680	200104-005AR	Schaffner
☐	Pulse network module	PNW 2050	1677	200117-009SC	Schaffner
☒	Ultra compact simulator	UCS500M4	1898	V0602101058	EM Test
☐	Coupling network	CDN 131	1752	34320	Schaffner
☐	Coupling network	CDN 115	1071	132	Schaffner
☐	Coupling network	CNV 508S5	2066	V0951105647	EM Test
☒	Coupling network	CNI 503A3	2151	V1150111228	EM Test
☐	Dropping resistor	INA 110-40	1072	121	Schaffner
☐	Dropping resistor	R40	1897	---	TÜV SÜD PS
☐	Dropping resistor	R100	1801	---	TÜV SÜD PS
☐	Digital oscilloscope	WaveJet 314	1963	LCRY0101J23209	LeCroy
☐	Digital oscilloscope	Wave Surfer 452	1796	LCRY0301J11938	LeCroy
☐	Digital oscilloscope	WaveRunner 104Xi-A	2075	LCRY0617N51108	LeCroy
☒	Shielded room	No. 1	1451	---	Albatross
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☐	Shielded room	No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room	No. 6	1865	---	Albatross
☐	Shielded room	No. 7	1866	---	Albatross

9.9.3 Test Results

Results for surge test are documented as listed below.

Surges

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Shielded room, cabin no. 1

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

Luftdruck / *Barometric pressure:*	979.6 hPa
Relative Luftfeuchtigkeit / *Relative humidity:*	35.6 %
Temperatur / *Ambient temperature:*	26.9 °C

Prüfgrundlage / *Specifications:*	EN 61000-6-2:2005		
Bewertungskriterium / *Performance criterion:*	B		
Anforderung / *Requirement:*		Line to line	Line(s) to ground
	Signal and control lines:	---	± 1 kV
	DC mains inputs	± 0.5 kV	± 0.5 kV
	AC mains inputs:	± 1 kV	± 2 kV
Störsignal / *Interfering signal:*	Test pulse:	1.2 µs / 50 µs	
	Repetition:	60 s	
	Angle (AC):	0°, 90°, 180°, 270°	
	Count:	≥ 5 per voltage level	
Basisnorm / *Basic standard:*	IEC 61000-4-5:2005 EN 61000-4-5:1995 EN 61000-4-5:2006		
Betriebsart / *Operation mode:*	According to chapter 4		
Kommentar / *Comment:*	---		

Port	*Voltage level*	*Coupling*	*Coupling mode*	*Result*	*Note*
A1	± 0.5 kV, ± 1 kV	L1 → N	Coupling filter	Passed	
A1	± 0.5 kV, ± 1 kV, ± 2 kV	L1 → GND, N → GND	Coupling filter	Passed	

Note(s):

9.10 Induced conducted disturbances

9.10.1 Test Setup

9.10.2 Test Equipment List

	Type		*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Signal generator	Cabin no. 1	SMX	1036	883184/018	Rohde & Schwarz
☒	Signal generator	Cabin no. 8b	SML 02	1772	101023	Rohde & Schwarz
☐	Power amplifier	Cabin no. 1	M-100	1896	J164-1105	ifi
☐	Power amplifier	Cabin no. 8b	411 LA	1122	299	ENI
☒	Power amplifier	Cabin no. 8b	BSA 0125-125	2136	118535	Bonn
☐	Power amplifier		HVV250	1508	836956/004	Rohde & Schwarz
☐	Power amplifier		10W1000	1119	5239	Amplifier Research
☐	Power amplifier		200W1000	1225	12904	Amplifier Research
☐	Power meter	Cabin no. 1	NRVS	1726	100808	Rohde & Schwarz
☐	Power meter	Cabin no. 8b	NRVS	1502	838624/016	Rohde & Schwarz
☒	Power meter	Cabin no. 8b	NRVD	1797	101092	Rohde & Schwarz
☐	Sensor hub	Cabin no. 8b	NRP-Z5	2133	101511	Rohde & Schwarz
☐	Power sensor	Cabin no. 1	NRV-Z4	1727	100179	Rohde & Schwarz
☒	Power sensor	Cabin no. 8b	NRV-Z4	2043	100496	Rohde & Schwarz
☒	Power sensor	Cabin no. 8b	NRV-Z4	1034	863828/015	Rohde & Schwarz
☐	Power sensor	Cabin no. 8b	URV5-Z4	1116	826775/010	Rohde & Schwarz
☐	Power sensor	Cabin no. 8b	NRP-Z91	2134	101493	Rohde & Schwarz
☐	Power sensor	Cabin no. 8b	NRP-Z91	2135	101494	Rohde & Schwarz
☐	Directional coupler	Cabin no. 1	BDC 0110-40/100	1916	066248	Bonn
☒	Directional coupler	Cabin no. 8b	BDC 0125-40/250	2137	118535	Bonn
☐	Coupling network		FCC-801-AF4	1550	47	FCC
☐	Coupling network		FCC-801-M5-25	1551	16	FCC
☐	Coupling network		FCC-801-C1	1552	64	FCC
☐	Coupling network		FCC-801-AF4	1553	48	FCC
☐	Coupling network		FCC-801-M3-25	1554	117	FCC
☐	Coupling network		FCC-801-M4-25	1555	17	FCC
☐	Coupling network		CDN 801-M3	1572	---	TÜV SÜD PS
☐	Coupling network		CDN 801-S37	1573	---	TÜV SÜD PS
☐	Coupling network		CDN L-801 M2/M3	1862	2443	Lüthi
☐	Coupling network		CDN M1-10	2171	32253	Teseq
☐	Coupling network		CDN M216-10	2172	31986	Teseq
☒	Coupling network		CDN M316-10	2173	30386	Teseq
☐	Coupling network		CDN M4/80A-HV	2174	A2490001/2012	Schlöder
☐	EM injection clamp	Cabin no. 1	EM 101	1917	35785	Lüthi
☒	EM injection clamp	Cabin no. 8b	EM 101	1568	35354	Lüthi
☐	Ferrite tube clamp		FTC 101	1564	4413	Lüthi
☐	Current clamp		F-120-9B	1514	15	FCC
☐	Current clamp		F-55	1700	51	FCC
☐	Audio analyzer		UPP 200	2187	120194	Rohde & Schwarz
☐	Shielded room		No. 1	1451	---	Albatross
☐	Fully anechoic room		No. 2	1452	---	Albatross
☐	Semi anechoic room		No. 3	1453	---	Siemens
☐	Shielded room		No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room		No. 6	1865	---	Albatross
☐	Shielded room		No. 7	1866	---	Albatross
☒	Shielded room		No. 8b	2057-2	---	Albatross

9.10.3 Test Results

Results for induced conducted disturbance test are documented as listed below.

Induced conducted disturbances

Prüfdatum / *Date of test:*	2013-09-10
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Shielded room, cabin no. 8b

Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Luftdruck / *Barometric pressure:*	983.7 hPa
Relative Luftfeuchtigkeit / *Relative humidity:*	45.3 %
Temperatur / *Ambient temperature:*	23.2 °C

Prüfgrundlage / *Specifications:*	EN 61000-6-2:2005	
Bewertungskriterium / *Performance criterion:*	A	
Anforderung / *Requirement:*	Frequency range:	0.15 - 80 MHz
	Signal and control lines:	10 V_{rms}
	DC mains inputs and outputs:	10 V_{rms}
	AC mains inputs and outputs:	10 V_{rms}
Störsignal / *Interfering signal:*	Modulation:	AM
	Modulation depth:	80 %
	Modulation frequency:	1 kHz
Schrittweite / *Step size:*	1 %	
Verweildauer / *Dwell time:*	3 s	
Basisnorm / *Basic standard:*	IEC 61000-4-6:2008 EN 61000-4-6:2009	
Betriebsart / *Operation mode:*	According to chapter 4	
Kommentar / *Comment:*	---	

Port	*Voltage level*	*Coupling via*	*Result*	*Note*
A1	10 V_{rms}	CDN M316-10	Passed	

Note(s):

9.11 Voltage Dips and Interruptions

9.11.1 Test Setup

9.11.2 Test Equipment List

	Type	*Designation*	*Inv.-no.*	*Serial No. or ID*	*Manufacturer*
☐	Ultra compact simulator	UCS500M4	1898	V0602101058	EM Test
☐	Transformer	EAC/MT27016/ATE/PCG1	1590	96.24.934	ET System Electronic
☐	Oscilloscope	54602B	1535	US35060304	Hewlett Packard
☐	Analyzer reference system (including mains impedance)	ARS 16/3/TPM	2197	A4990 07/1 1112	Spitzenberger & Spies
☐	Additional mains impedance	AIP 75/3/P/TPM	2198	A4990 07/2 1112	Spitzenberger & Spies
☐	Control unit (synthesizers)	SyCore 1k4	2196	A4235 12/0 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-1	A4235 01/1 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-2	A4235 01/2 0209	Spitzenberger & Spies
☐	Amplifier	PAS 10000	2038-3	A4235 01/3 0209	Spitzenberger & Spies
☐	Additional transformer	UT 5000/400/B	2090	A4609 03/0 1110	Spitzenberger & Spies
☐	RLC load	RLC 37500/2.5/SM	2199	A4991	Spitzenberger & Spies
☐	Photovoltaic simulator	PVS 25000	2200	A4989 01/0 1112	Spitzenberger & Spies
☐	Oscilloscope	TDS2014B	2039	C041606	Tektronix
☒	Analyzer reference system (including mains impedance)	ARS 16/1	(SpS)	UO353 07/0 0907	Spitzenberger & Spies
☒	Control unit (synthesizers)	SyCore 1k1	(SpS)	UO355 12/0 1109	Spitzenberger & Spies
☒	Amplifier	PAS 5000	(SpS)	UO355 01/0 1109 UO355 02/0 1109	Spitzenberger & Spies
☐	Shielded room	No. 1	1451	---	Albatross
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☐	Shielded room	No. 4	1454	3FD 100 544	Euroshield
☐	Fully anechoic room	No. 6	1865	---	Albatross
☐	Shielded room	No. 7	1866	---	Albatross

9.11.3 Test Results

Results for voltage dips and interruptions test are documented as listed below.

Voltage Dips and Interruptions

Prüfdatum / *Date of test:*	2013-09-09
Prüfer / *Operator:*	Markus Biberger
Messplatz / *Test site:*	Non shielded room

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

Luftdruck / *Barometric pressure:*	979.8 hPa
Relative Luftfeuchtigkeit / *Relative humidity:*	42.0 %
Temperatur / *Ambient temperature:*	27.0 °C

Prüfgrundlage / *Specifications:*	EN 61000-6-2:2005
Kopplung auf / *Coupling to:*	AC mains inputs
Nennspannung / *Nominal voltage:*	U_N = 230 V AC
Nennfrequenz / *Nominal frequency:*	f_N = 50 Hz
Anforderung / *Requirement:*	Voltage reduction in % of U_N / Duration in periods of f_N / Duration in ms / Performance criterion 100 / 1 / 20 / B 60 / 10 / 200 / C 30 / 25 / 500 / C 100 / 250 / 5000 / C
Prüfparameter / *Test paramters:*	Count: ≥ 3 per angle Repetition: 10 s Angle: 0°, 180°
Basisnorm / *Basic standard:*	IEC 61000-4-11:2004 EN 61000-4-11:2004
Betriebsart / *Operation mode:*	According to chapter 4
Kommentar / *Comment:*	---

Port	*Voltage reduction in % of U_N*	*Duration in periods of f_N*	*Duration in ms*	*Result*	*Note*
A1	100	1	20	Passed	
A1	60	10	200	Passed	
A1	30	25	500	Passed	
A1	100	250	5000	Passed	

Note(s):

10 Revision History

Revision History			
Edition	*Date*	*Issued by*	*Modifications*
1	2013-09-13	M. Biberger (gz)	First Edition