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2013-02-12

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## Prüfbericht / Test Report

Nr. / No. 11383-16916-02 (Edition 1)

Auftraggeber <i>Applicant</i>	Kontron Europe GmbH
Geräteart <i>Type of equipment</i>	Industrial PC
Typenbezeichnung <i>Type designation</i>	VRack 4U DZ77
Seriennummer / <i>Serial number</i>	N/A
Auftragsnummer / <i>Order No.</i>	45374032
Prüfgrundlage <i>Test standards</i>	EN 61000-6-4:2007 EN 61000-3-2:2006 + A1:2009 + A2:2009 EN 61000-3-3:2008 EN 61000-6-2:2005



## Summary

<b>Prüfergebnisse / Test Results</b>	Auftragsnummer / Order No. <b>45374032</b>				
Die Prüfungen wurden nach folgenden Vorschriften durchgeführt: <i>Tests were performed according to:</i> <b>EN 61000-6-4:2007</b> <b>EN 61000-3-2:2006 + A1:2009 + A2:2009</b> <b>EN 61000-3-3:2008</b> <b>EN 61000-6-2:2005</b>					
<b>Durchgeführte Prüfung Test performed</b>	<b>Prüfergebnis Test result</b>				
	Erfüllt Passed	Nicht erfüllt Not Passed	Nicht zutreffend Not applicable	Nicht durchgeführt Not performed	Kriterium Criterion
Gestrahlte Störgrößen / Radiated disturbance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Störspannung / Disturbance voltage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Störstrom / Disturbance current	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Oberschwingungen / Harmonics	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Spannungsschwankungen / Flicker	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Magnetfelder mit energietechnischer Frequenz / Power-frequency magnetic field	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A
Elektromagnetisches HF-Feld / Radio-frequency electromagnetic field	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A
Entladung statischer Elektrizität / Electrostatic discharge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Hochfrequenz, asymmetrisch / Radio-frequency common mode	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A
Schnelle Transienten / Fast transients	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Stoßspannungen / Surges	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Spannungseinbrüche und -unterbrechungen / Voltage dips and interruptions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B/C

### Bemerkungen / Remarks:

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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	<b>Prüfergebnis / Test Result</b> <input checked="" type="checkbox"/> Erfüllt / Passed <input type="checkbox"/> Nicht erfüllt / Not passed
2013-02-12	 Hannes Adelsberger Responsible for testing	 Johann Roidt Laboratory manager	



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## 1 Administrative Data

Application details	
Applicant:	Kontron Europe GmbH Oskar-von-Miller-Str. 1 GER-85386 Eching
Contact person:	Mr. Ferit Durgut
Order number:	45374032
Receipt of EUT:	2013-01-14
Return of EUT:	---
Date(s) of test:	2013-01-14 – 2013-01-18
Note(s):	---
Responsible for testing:	Mr. Hannes Adelsberger
Responsible for test report:	Mr. Hannes Adelsberger
Test report checked by:	Mr. Johann Roidt

Report details	
Report number:	11383-16916-02
Edition:	1
Issue date:	2013-02-12



## 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
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:	VRack 4U DZ77
Parts of the system:	---
Options and accessories:	INTEL LAN ADA 82574L; EXPi9301CTBLK
Type of equipment:	Industrial PC
Serial number:	N/A
Manufacturer:	Kontron Europe GmbH
Power supply:	AC supply Nominal: 230 V Nominal frequency: 50 Hz
Version of EUT:	As delivered

### 3.1 Description of the Equipment Under Test by the applicant

<i>Device / Component:</i>	<b>VRack 4U</b>
Article-Number:	
Serial-Number:	
Project-Number:	KEU-EC1210180-1-05

<b>1. Configuration:</b>				
Components	Designation	Article-Number	Serial-Nr. / Version	Remark
MB / Baseboard	Intel DZ77SL-50K			
CPU	Intel® Core™ i7-2700K			
Memory	DIMM 2GB DDR3 1333 MHz Samsung	2x		
Harddisk	SATA300 3,5" 500GB WD RE4			
Harddisk	SATA300 3,5" 500GB WD RE4			
Harddisk	SATA300 3,5" 500GB WD RE4			
CD / DVD-Drive	DVD±RW SATA Sony Opti			
Power Supply	BGNT 90-264VAC/400W,80+,PS2,FSP400-60PFB			
Other Components	3-fach SATA 3,5" HDD Rack 2x 5,25"			
Other Components	NVIDIA NVS300 PCIe x16 2x DVI-I PNY			
Other Components	INTEL LAN ADA 82574L; EXPI9301CTBLK			
Firmware:	<input type="checkbox"/>	Image: : Win7 Ultimate SP1 64 bit	<input type="checkbox"/>	
BIOS: : SL27710H.86A.0055.2012.0319.2140	<input type="checkbox"/>	Image:	<input type="checkbox"/>	

## 4 Operation Mode and Configuration of EUT

### Operation Mode(s)

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

### List of ports and cables

No.	Description	Classification <sup>1</sup>	Cable type	Cable length	
				used	maximum <sup>2</sup>
A1	Main power supply	ac power	Unshielded	2 m	---
S1- S4	USB 2.0 ports back	signal/control port	Shielded		
S5- S6	USB 3.0 ports back	signal/control port	Shielded		
S7	HDMI port (not functional, not tested)	signal/control port	Shielded		
S8	PS/2 port	signal/control port	Shielded		
S9	eSata port	signal/control port	Shielded	---	< 1 m
S10	Audio out port	signal/control port	Shielded		
S11	Audio in port	signal/control port	Shielded		
S12	Mic-in port	signal/control port	Shielded		
S13	Ethernet intern	signal/control port	Shielded		
S14	Ethernet PCI	signal/control port	Shielded		
S15	DVI port on graphic card	signal/control port	Shielded	3 m	
S16- S17	USB 2.0 ports front	signal/control port	Shielded		

<sup>1</sup> Ports shall be classified as ac power, dc power or signal/control port.

<sup>2</sup> As specified by applicant





**List of devices connected to EUT**

<i>No.</i>	<i>Description</i>	<i>Type designation</i>	<i>Serial no. or ID</i>	<i>Manufacturer</i>
1	TFT Monitor	931BW	ME19H9XQ502025 D	Samsung
2	USB mouse	M-BJ69	LZE31208544	Logitech
3	USB keyboard	KU-0316	---	HP
4	PS/2 mouse	X04-72167	---	Microsoft
---	---	---	---	---

**List of support devices**

<i>No.</i>	<i>Description</i>	<i>Type designation</i>	<i>Serial no. or ID</i>	<i>Manufacturer</i>
1	Laptop	Latitude D620	---	Dell
---	---	---	---	---

## 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.
<i>Performance criterion</i>	<i>Specification</i>
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			
<i>Function</i>	<i>Observed size</i>	<i>Permissible range</i>	<i>Observation method</i>
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 PC

## 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

<i>European publication</i>	<i>International publication</i>	<i>Title</i>
EN 55016-1-2:2004	IEC/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 55016-2-1:2004	IEC/CISPR 16-2-1:2003 Edition 1	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements
EN 55016-2-3:2010 + A1:2010	IEC/CISPR 16-2-3:2010 + A1:2010 IEC/CISPR 16-2-3:2010 Edition 3.1	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	IEC/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	IEC/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 $\leq 16$ 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 $\leq 16$ A per phase and not subject to conditional connection
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

<i>European publication</i>	<i>International publication</i>	<i>Title</i>
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 61000-4-8:2010	IEC 61000-4-8:2009	Electromagnetic compatibility (EMC) Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test
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	IEC 61000-6-4:2006	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 V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5μH NetznachbildungAMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH V-NetznachbildungAMN)	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 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 Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

<b>Immunity Testing</b>			
<i>Test</i>	<i>k<sub>p</sub></i>	<i>Expanded Uncertainty</i>	<i>Note</i>
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2.05	+21.9 / -18.0 %	3
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	2	+30.3 / -23.2 %	2
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  $k_p = 2$ , 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  $k_p = 2$ , 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  $k_p = 2.05$ , 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.



## 9 Test Results

### Emission Tests

<b>EN 61000-6-4:2007</b>			
<i>Section(s)</i>	<i>Test performed</i>	<i>Page</i>	<i>Test Result</i>
7	Radiated disturbance 30 MHz - 1 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	25	Test passed

<b>EN 61000-3-2:2006 + A1:2009 + A2:2009</b>			
<i>Section(s)</i>	<i>Test performed</i>	<i>Page</i>	<i>Test Result</i>
7	Harmonics	34	Test passed

<b>EN 61000-3-3:2008</b>			
<i>Section(s)</i>	<i>Test performed</i>	<i>Page</i>	<i>Test Result</i>
5	Flicker	40	Test passed



## Immunity Tests

<b>EN 61000-6-2:2005</b>			
<i>Section(s)</i>	<i>Test performed</i>	<i>Page</i>	<i>Test Result</i>
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	58	Test passed
8.2.2, 8.3.3, 8.4.5	Fast transients	52	Test passed
8.2.3, 8.3.2, 8.4.4	Surges	55	Test passed
8.4.2, 8.4.3	Voltage dips and interruptions	61	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
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input checked="" type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	Cabin no. 3 ESPI7	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESU40	(R&S)	100324	Rohde & Schwarz
<input type="checkbox"/> Preamplifier	CPA9231A	1651	3393	Schaffner
<input type="checkbox"/> Digital oscilloscope	WaveJet 314	1963	LCRY0101J23209	LeCroy
<input type="checkbox"/> Digital oscilloscope	Wave Surfer 452	1796	LCRY0301J11938	LeCroy
<input type="checkbox"/> Digital oscilloscope	WaveRunner 104Xi-A	2075	LCRY0617N51108	LeCroy
<input type="checkbox"/> V-network	ESH 3-Z5	1060	862770/021	Rohde & Schwarz
<input checked="" type="checkbox"/> V-network	ESH 3-Z5	1059	894785/005	Rohde & Schwarz
<input checked="" type="checkbox"/> V-network	ESH 3-Z5	1218	830952/025	Rohde & Schwarz
<input type="checkbox"/> V-network	ESH 3-Z6	1594	825993/027	Rohde & Schwarz
<input type="checkbox"/> V-network	ESH 3-Z6	1220	830722/010	Rohde & Schwarz
<input type="checkbox"/> Artificial mains network	ESH 2-Z5	1536	842966/004	Rohde & Schwarz
<input type="checkbox"/> Pulse limiter	ESH3-Z2	1144	---	Rohde & Schwarz
<input type="checkbox"/> 4-wire ISN	ENY 41	1652	836077/003	Rohde & Schwarz
<input type="checkbox"/> 2-wire ISN	ENY 22	1813	100150	Rohde & Schwarz
<input type="checkbox"/> Impedance stabization network	ISN T800	2080	28597	Teseq
<input type="checkbox"/> Current probe	EZ-17	1606	830633/010	Rohde & Schwarz
<input type="checkbox"/> High impedance probe	TK 9416	1106	---	Schwarzbeck
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input checked="" type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

## 9.1.3 Test Results

Results for interference voltage test are documented as listed below.



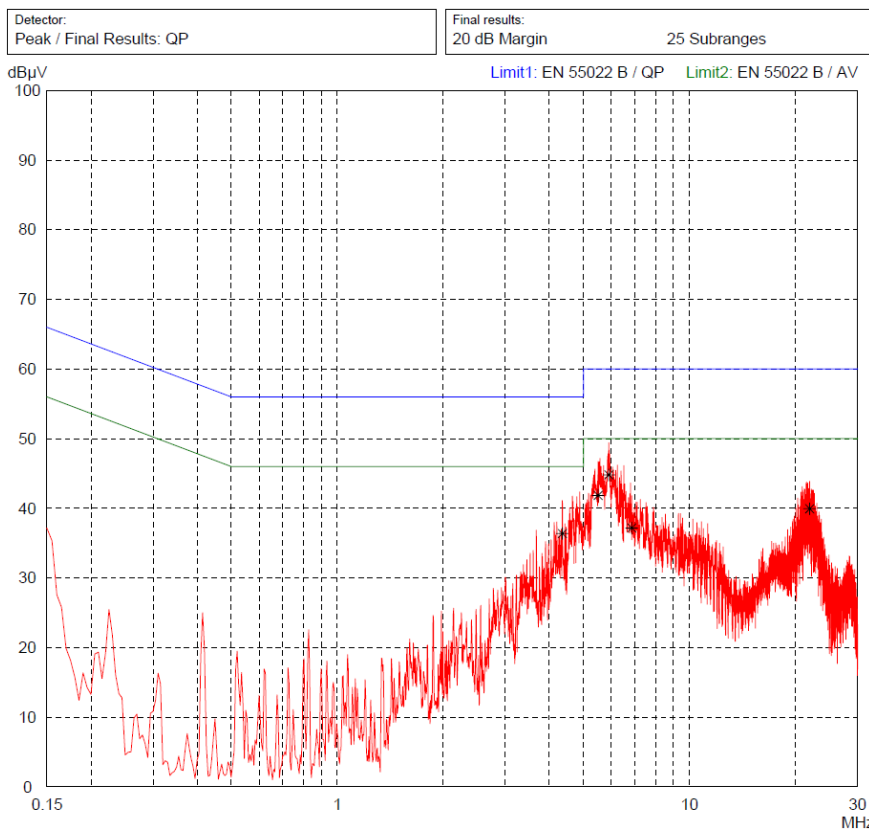
## Interference Voltage Test 150 kHz - 30 MHz

Prüfdatum / <i>Date of test:</i>	2013-01-14
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Shielded room, cabin no. 4

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-4:2007
Basisnorm / <i>Basic standard:</i>	IEC/CISPR 16-2-1:2003, Edition 1, 7.4.1 EN 55016-2-1:2004, 7.4.1 IEC/CISPR 16-1-2:2003, Edition 1, 4.3 EN 55016-1-2:2004, 4.3
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port
Kommentar / <i>Comment:</i>	EN 61000-6-3:2007 limit kept.

Messbezug / Tested on: Power line, L1

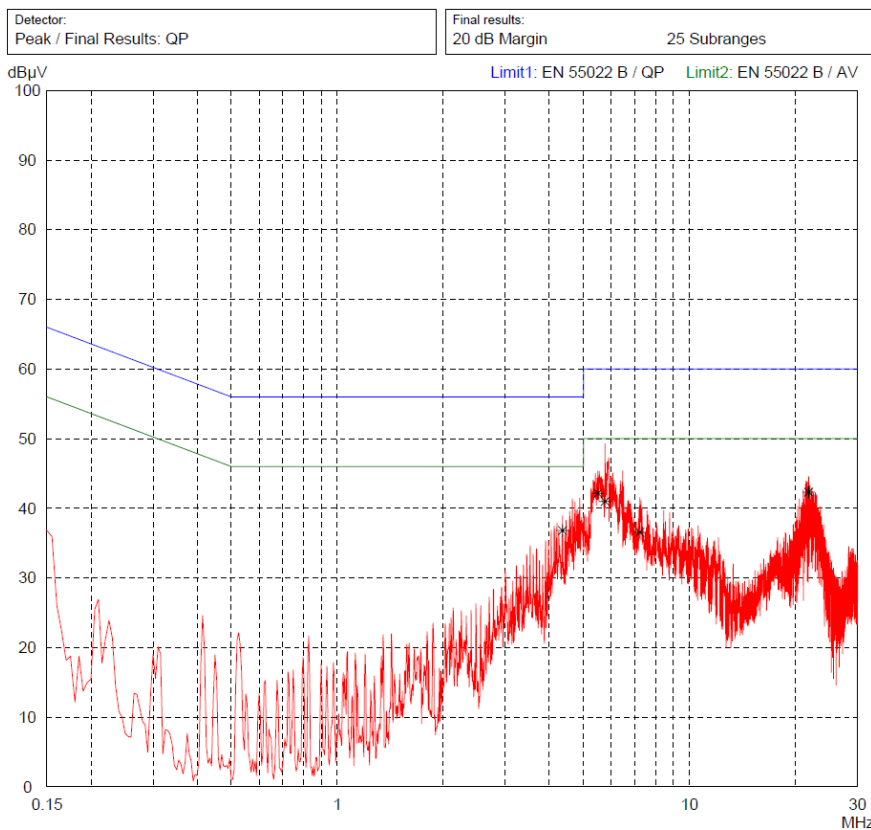


Detector: Peak / Final Results: QP  
 Final results: 20 dB Margin 25 Subranges

Frequency MHz	Reading dBµV	Correction factor dB	Value dBµV	Limit dBµV	Margin dB
4.355	36.4		36.4	56.0	19.6
5.505	41.8		41.8	60.0	18.2
5.905	44.8		44.8	60.0	15.2
6.850	37.2		37.2	60.0	22.8
21.935	39.9		39.9	60.0	20.1



Messbezug / Tested on: Power line, N



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

Frequency MHz	Reading dBµV	Correction factor dB	Value dBµV	Limit dBµV	Margin dB
4.360	36.8		36.8	56.0	19.2
5.495	42.1		42.1	60.0	17.9
5.760	41.0		41.0	60.0	19.0
7.225	36.6		36.6	60.0	23.4
21.785	42.3		42.3	60.0	17.7

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

## 9.2.3 Test Results

Results for interference current test are documented as listed below.





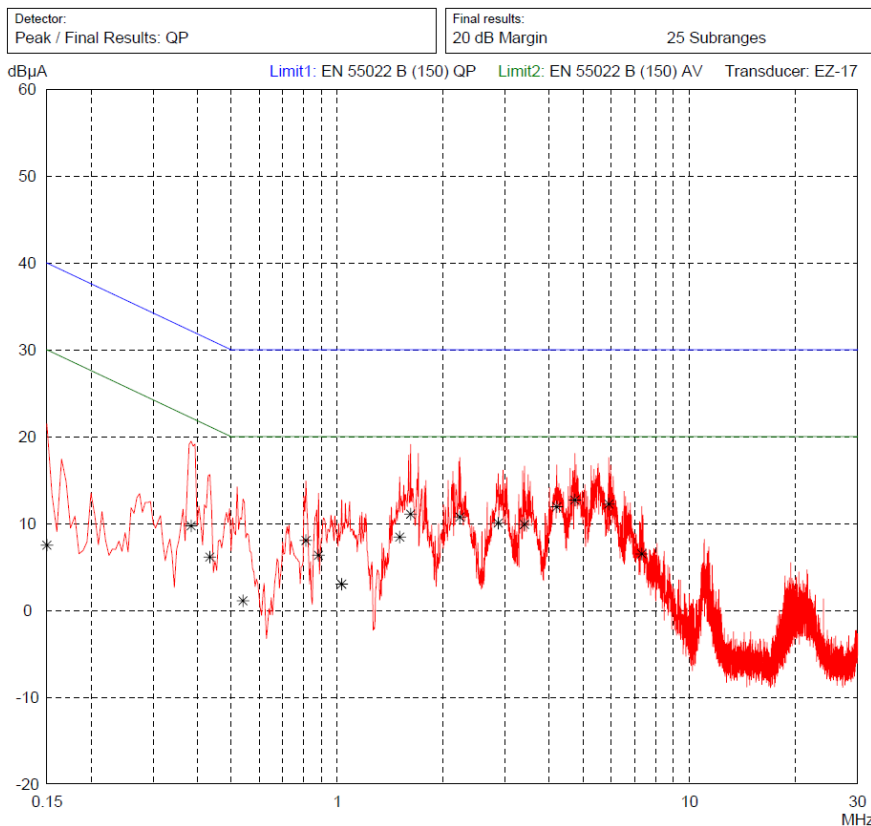
## Interference Current Test 150 kHz - 30 MHz

Prüfdatum / <i>Date of test:</i>	2013-01-14
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Shielded room, cabin no. 4

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-4:2007
Basisnorm / <i>Basic standard:</i>	IEC/CISPR 22:2008, modified EN 55022:2010
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port
Kommentar / <i>Comment:</i>	EN 61000-6-3:2007 limit kept.

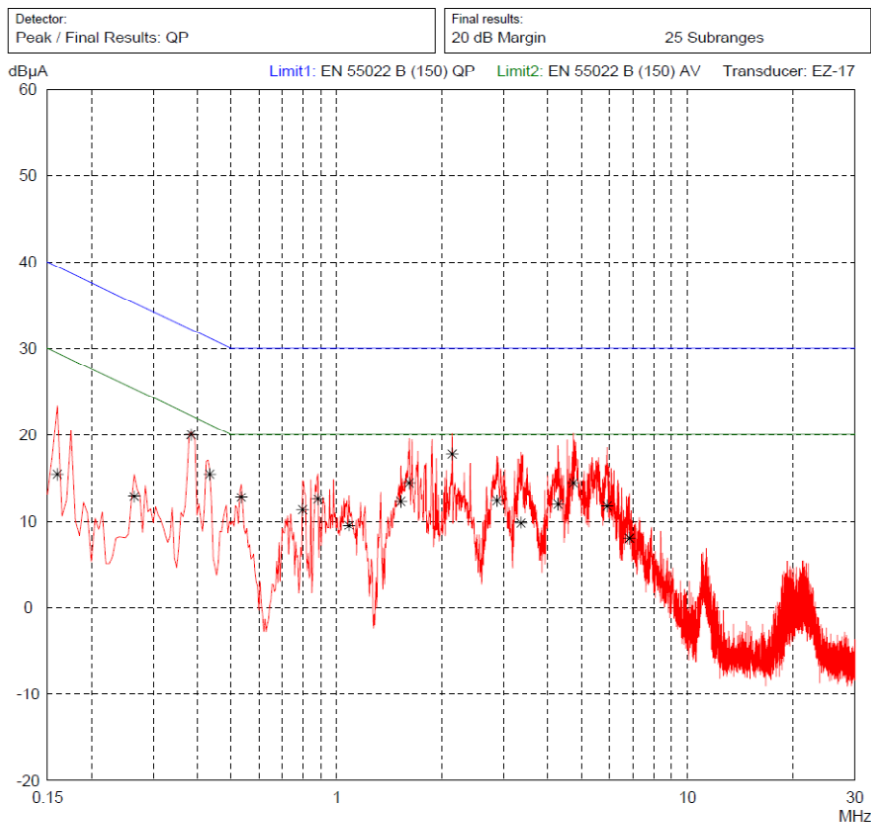
Messbezug / Tested on: Telecommunication line, Ethernet S13



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
0.150	3.9	3.6	7.5	40.0	32.5
0.385	13.1	-3.4	9.7	32.2	22.5
0.435	10.4	-4.3	6.1	31.2	25.1
0.540	6.7	-5.6	1.1	30.0	28.9
0.815	15.4	-7.4	8.0	30.0	22.0
0.885	14.1	-7.8	6.3	30.0	23.7
1.030	11.4	-8.4	3.0	30.0	27.0
1.505	17.4	-9.0	8.4	30.0	21.6
1.615	20.2	-9.1	11.1	30.0	18.9
2.230	20.2	-9.5	10.7	30.0	19.3
2.865	19.7	-9.7	10.0	30.0	20.0
3.400	19.6	-9.7	9.9	30.0	20.1
4.200	21.7	-9.8	11.9	30.0	18.1
4.725	22.6	-9.9	12.7	30.0	17.3
5.905	22.1	-9.9	12.2	30.0	17.8
7.315	16.4	-9.9	6.5	30.0	23.5

Messbezug / Tested on: Telecommunication line, Ethernet S14



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
0.160	12.3	3.1	15.4	39.5	24.1
0.265	13.6	-0.8	12.8	35.3	22.5
0.385	23.4	-3.4	20.0	32.2	12.2
0.435	19.7	-4.3	15.4	31.2	15.8
0.535	18.3	-5.6	12.7	30.0	17.3
0.800	18.6	-7.3	11.3	30.0	18.7
0.885	20.3	-7.8	12.5	30.0	17.5
1.085	17.9	-8.4	9.5	30.0	20.5
1.525	21.2	-9.0	12.2	30.0	17.8
1.610	23.5	-9.1	14.4	30.0	15.6
2.135	27.3	-9.5	17.8	30.0	12.2
2.865	22.0	-9.7	12.3	30.0	17.7
3.355	19.5	-9.7	9.8	30.0	20.2
4.275	21.7	-9.8	11.9	30.0	18.1
4.730	24.3	-9.9	14.4	30.0	15.6
5.900	21.6	-9.9	11.7	30.0	18.3
6.835	17.9	-9.9	8.0	30.0	22.0

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

### 9.3.3 Test Results

Results for radiated emission test are documented as listed below.



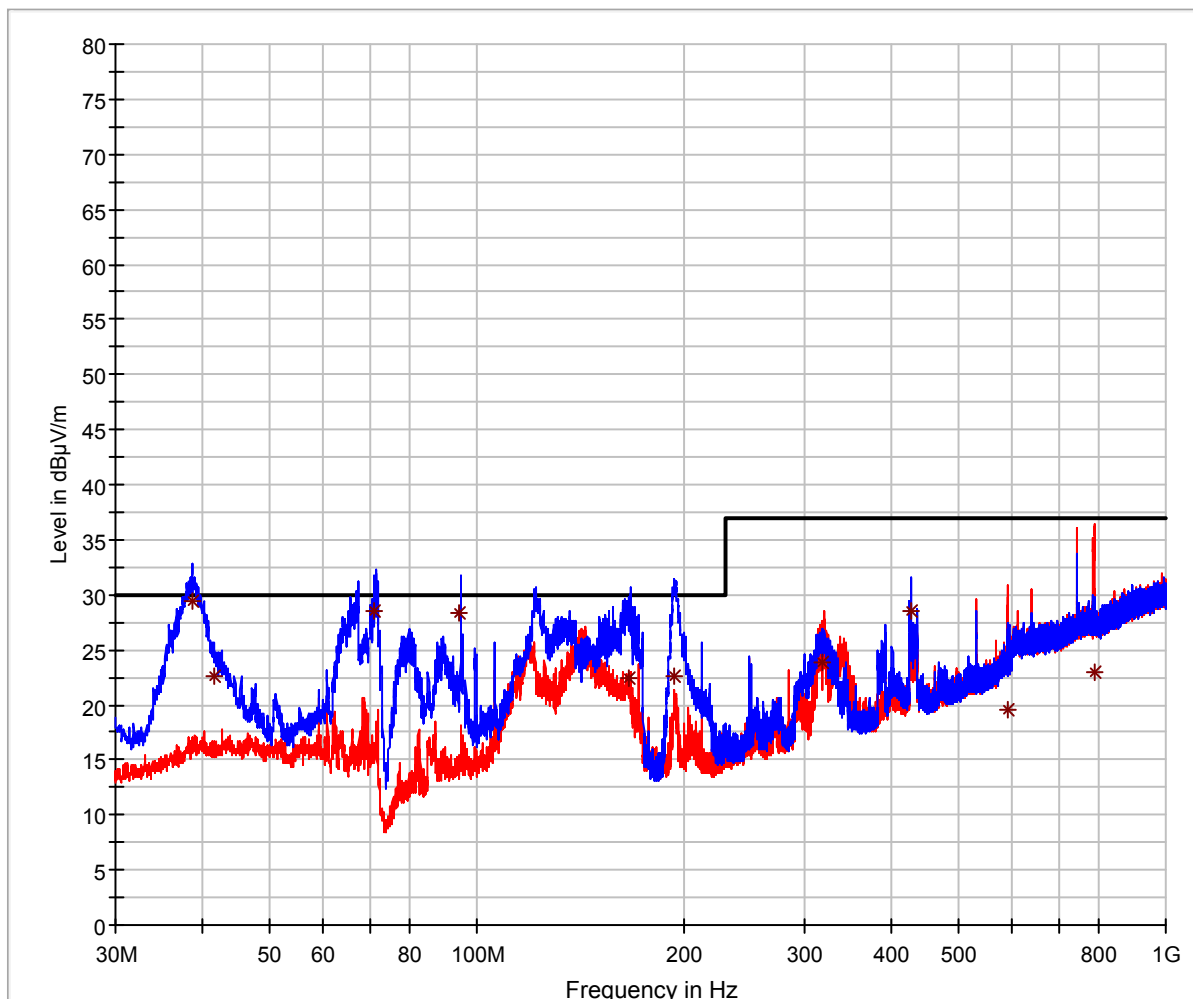
## Radiated Emission Test 30 MHz - 1 GHz

Prüfdatum / <i>Date of test:</i>	2013-01-15
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Semi anechoic room, cabin no. 8

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-4:2007
Basisnorm / <i>Basic standard:</i>	IEC/CISPR 16-2-3:2010 + A1:2010 EN 55016-2-3:2010 + A1:2010
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port
Kommentar / <i>Comment:</i>	EN 61000-6-3:2007 limit kept.

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



— EN 61000-6-3 Electric Field Strength 10 m QP  
— Preview Result 1V-PK+  
— Preview Result 1H-PK+  
\* Final Result 1-QPK

**Final Results 1:**

Frequency MHz	QuasiPeak dBµV/m	Meas. Time ms	Bandwidth kHz	Height cm	Polarization	Azimuth deg	Corr. dB	Margin dB	Limit dBµV/m
38,910000	29,4	1000,0	120,000	100,0	V	-105,0	14,5	0,6	30,0
41,760000	22,7	1000,0	120,000	100,0	V	-120,0	14,9	7,3	30,0
70,920000	28,5	1000,0	120,000	235,0	V	-90,0	8,8	1,5	30,0
94,530000	28,4	1000,0	120,000	150,0	V	136,0	12,4	1,6	30,0
166,290000	22,4	1000,0	120,000	150,0	V	-175,0	9,9	7,6	30,0
193,830000	22,6	1000,0	120,000	100,0	V	158,0	12,4	7,4	30,0
318,450000	23,9	1000,0	120,000	311,0	H	-142,0	15,6	13,1	37,0
426,000000	28,4	1000,0	120,000	100,0	V	28,0	18,2	8,6	37,0
589,800000	19,6	1000,0	120,000	110,0	H	-38,0	21,4	17,4	37,0
787,230000	22,9	1000,0	120,000	123,0	H	153,0	23,8	14,1	37,0

## 9.4 Harmonics Test

### 9.4.1 Test Setup





## 9.4.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/> Analyzer reference system (including mains impedance)	ARS 16/1	---	UO353 07/0 0907	Spitzenberger & Spies
<input checked="" type="checkbox"/> Control unit (synthesizers)	SyCore 1k1	---	UO355 12/0 1109	Spitzenberger & Spies
<input checked="" type="checkbox"/> Amplifier	PAS 5000	---	UO355 01/0 1109 UO355 02/0 1109	Spitzenberger & Spies
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

## 9.4.3 Test Results

Results for harmonics test are documented as listed below.



## Harmonics Test

Prüfdatum / <i>Date of test:</i>	2013-01-15
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Non shielded room

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Prüfgrundlage / <i>Specifications:</i>	IEC 61000-3-2:2005 + A1:2008 + A2:2009 EN 61000-3-2:2006 + A1:2009 + A2:2009
Beobachtungsdauer / <i>Observation time:</i>	150 s
Geräteklasse / <i>Equipment class:</i>	A
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port
Kommentar / <i>Comment:</i>	---



Messbezug / Tested on:

Power line

Maximum RMS current and corresponding values in timewindow 367:

Voltage: 230.91 Vrms THD=0.01 % THV=0.026 V POHV=0.011 V PWHD=0.04 %  
 Current: 0.635 Arms THD=21.75 % THC=0.135 A POHC=0.015 A PWHD=14.97 %  
 Power: 136.2 W P1=136.3 W 146.6 VA  
 Power factor: 0.930 CosPhi1: 0.952

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

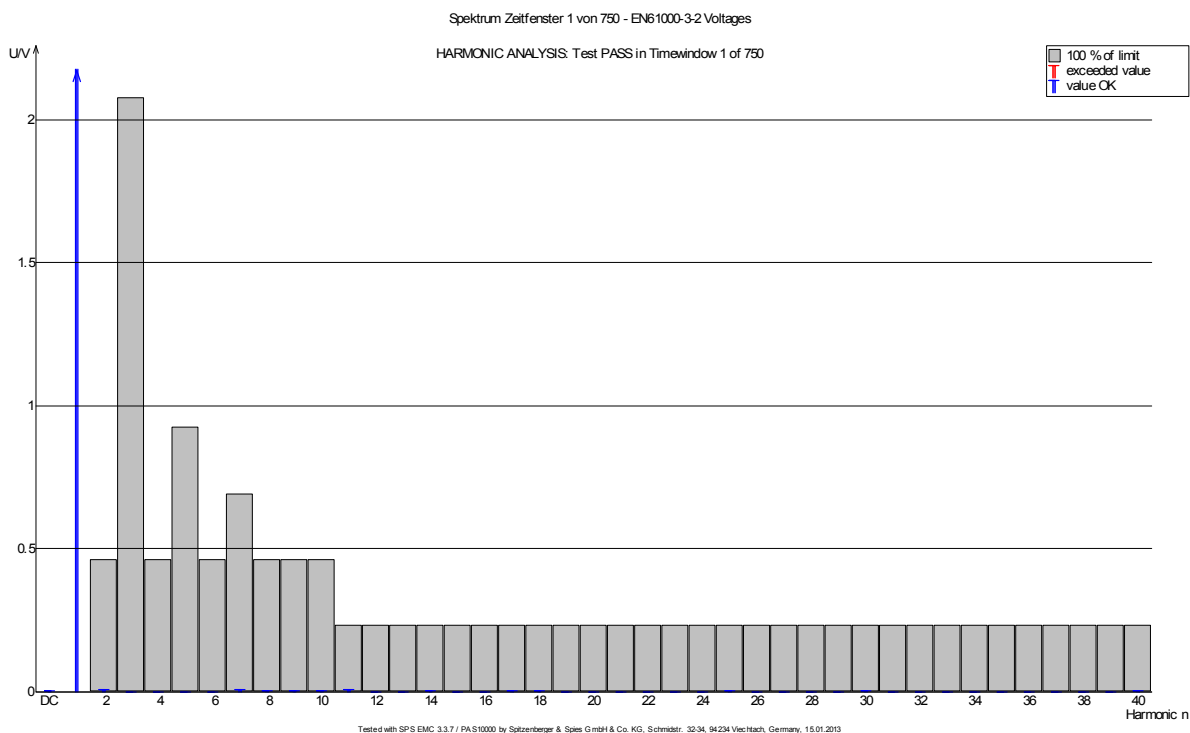
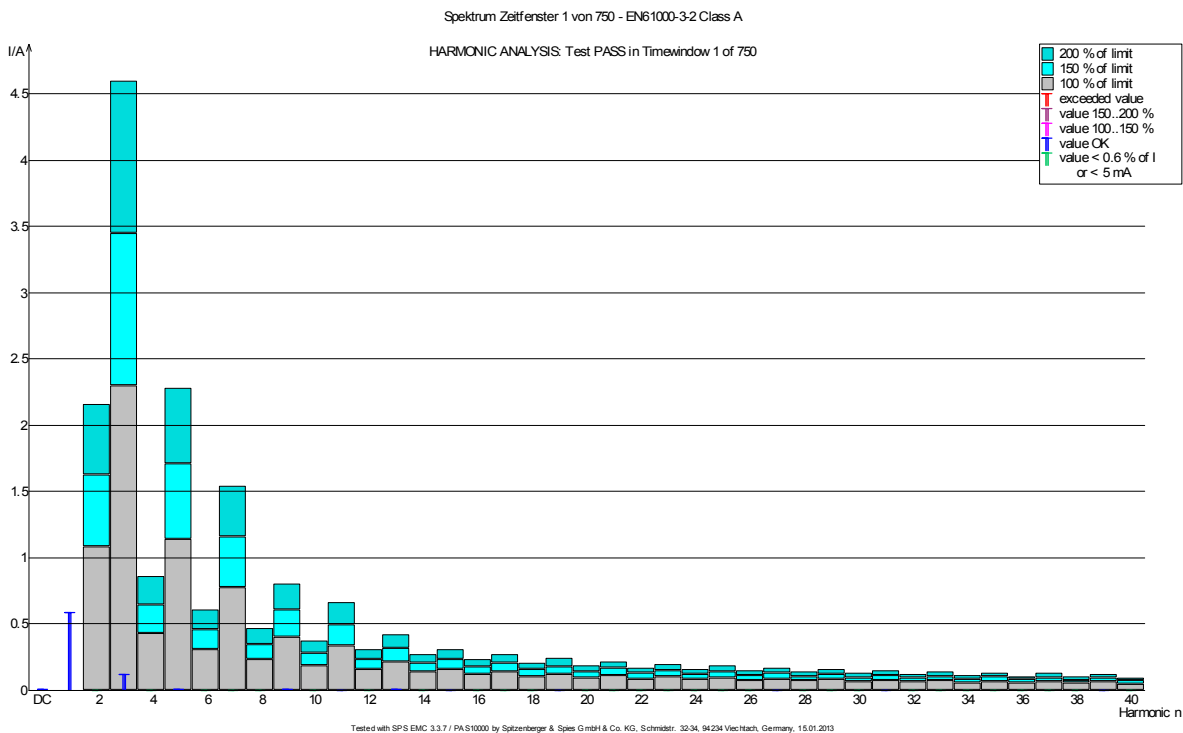
HARMONIC ANALYSIS: Test PASS

Tobs = entire measurement; POHC: avg=0.01 A, limits=0.25 A  
 Iavg=0.604 Arms

Ha	Entire measurement (2.5 min = 750 time windows)							Worst 2.5 min		Average		P A S S	F A I L
	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	0.0156 A	364	----	---	0	0	0	n.e.	n.e.	0.0132 A	0	-	
1	0.6199 A	367	----	---	0	0	0	n.e.	n.e.	0.5893 A	0	X	
2	0.0038 A	2	1.0800 A	-99.7 %	0	0	0	n.e.	n.e.	0.0028 A	0	X	
3	0.1314 A	365	2.3000 A	-94.3 %	0	0	0	n.e.	n.e.	0.1275 A	0	X	
4	0.0014 A	163	0.4300 A	-99.7 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
5	0.0161 A	115	1.1400 A	-98.6 %	0	0	0	n.e.	n.e.	0.0146 A	0	X	
6	0.0009 A	365	0.3000 A	-99.7 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
7	0.0042 A	382	0.7700 A	-99.5 %	0	0	0	n.e.	n.e.	0.0036 A	0	X	
8	0.0008 A	365	0.2300 A	-99.7 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
9	0.0144 A	468	0.4000 A	-96.4 %	0	0	0	n.e.	n.e.	0.0137 A	0	X	
10	0.0007 A	365	0.1840 A	-99.6 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
11	0.0091 A	474	0.3300 A	-97.2 %	0	0	0	n.e.	n.e.	0.0083 A	0	X	
12	0.0009 A	1	0.1533 A	-99.4 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
13	0.0103 A	468	0.2100 A	-95.1 %	0	0	0	n.e.	n.e.	0.0093 A	0	X	
14	0.0011 A	1	0.1314 A	-99.2 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
15	0.0064 A	116	0.1500 A	-95.7 %	0	0	0	n.e.	n.e.	0.0059 A	0	X	
16	0.0006 A	2	0.1150 A	-99.4 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
17	0.0039 A	365	0.1324 A	-97.0 %	0	0	0	n.e.	n.e.	0.0024 A	0	X	
18	0.0010 A	1	0.1022 A	-99.1 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
19	0.0093 A	115	0.1184 A	-92.1 %	0	0	0	n.e.	n.e.	0.0081 A	0	X	
20	0.0009 A	1	0.0920 A	-99.0 %	0	0	0	n.e.	n.e.	0.0006 A	0	X	
21	0.0048 A	116	0.1071 A	-95.5 %	0	0	0	n.e.	n.e.	0.0042 A	0	X	
22	0.0006 A	2	0.0836 A	-99.3 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
23	0.0038 A	367	0.0978 A	-96.1 %	0	0	0	n.e.	n.e.	0.0024 A	0	X	
24	0.0010 A	1	0.0767 A	-98.7 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
25	0.0073 A	628	0.0900 A	-91.9 %	0	0	0	n.e.	n.e.	0.0045 A	0	X	
26	0.0010 A	2	0.0708 A	-98.5 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
27	0.0075 A	382	0.0833 A	-91.1 %	0	0	0	n.e.	n.e.	0.0070 A	0	X	
28	0.0011 A	1	0.0657 A	-98.3 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
29	0.0053 A	367	0.0776 A	-93.1 %	0	0	0	n.e.	n.e.	0.0043 A	0	X	
30	0.0012 A	2	0.0613 A	-98.0 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
31	0.0055 A	354	0.0726 A	-92.4 %	0	0	0	n.e.	n.e.	0.0051 A	0	X	
32	0.0010 A	2	0.0575 A	-98.2 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
33	0.0040 A	367	0.0682 A	-94.1 %	0	0	0	n.e.	n.e.	0.0030 A	0	X	
34	0.0010 A	2	0.0541 A	-98.1 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
35	0.0050 A	504	0.0643 A	-92.2 %	0	0	0	n.e.	n.e.	0.0046 A	0	X	
36	0.0011 A	2	0.0511 A	-97.8 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
37	0.0057 A	367	0.0608 A	-90.6 %	0	0	0	n.e.	n.e.	0.0044 A	0	X	
38	0.0012 A	369	0.0484 A	-97.4 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	
39	0.0059 A	474	0.0577 A	-89.7 %	0	0	0	n.e.	n.e.	0.0054 A	0	X	
40	0.0013 A	365	0.0460 A	-97.2 %	0	0	0	n.e.	n.e.	0.0009 A	0	X	

average value < 0.6 % of Iavg or < 5 mA n.e. = not evaluated

Tested with SPS EMC 3.3.7 / PAS10000 by Spitzenberger & Spies GmbH & Co. KG, Schmidstr. 32-34, 94234 Viechtach, Germany, 15.01.2013





Maximum RMS current and corresponding values in timewindow 367:

Voltage: 230.91 Vrms THD=0.01 % THV=0.026 V POHV=0.011 V PWHD=0.04 %  
 Current: 0.635 Arms THD=21.75 % THC=0.135 A POHC=0.015 A PWHD=14.97 %  
 Power: 136.2 W P1=136.3 W 146.6 VA  
 Power factor: 0.930 CosPhi1: 0.952

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=230.91 Vrms

Ha	Entire measurement (2.5 min = 750 time windows)						Worst 2.5 min		Average		P A S S	F A I L
	Maximum	Window	EN61000-3-2 Voltages	Margin in MaxWin	100 to 150%	Ex- ceeded	100 to 150%	Ex- ceeded	Value	Ex- ceeded		
DC	0.0118 V	642	----	----	---	0	n.e.	n.e.	0.0060 V	0	—	
1	230.9124 V	413	----	----	---	0	n.e.	n.e.	230.9075 V	0	X	
2	0.0116 V	364	fluctuating	-97.5 %	---	0	n.e.	n.e.	0.0070 V	0	X	
3	0.0045 V	295	fluctuating	-99.8 %	---	0	n.e.	n.e.	0.0024 V	0	X	
4	0.0024 V	163	fluctuating	-99.5 %	---	0	n.e.	n.e.	0.0016 V	0	X	
5	0.0048 V	320	fluctuating	-99.5 %	---	0	n.e.	n.e.	0.0031 V	0	X	
6	0.0028 V	164	fluctuating	-99.4 %	---	0	n.e.	n.e.	0.0023 V	0	X	
7	0.0131 V	542	fluctuating	-98.1 %	---	0	n.e.	n.e.	0.0105 V	0	X	
8	0.0066 V	46	fluctuating	-98.6 %	---	0	n.e.	n.e.	0.0056 V	0	X	
9	0.0058 V	22	fluctuating	-98.7 %	---	0	n.e.	n.e.	0.0041 V	0	X	
10	0.0074 V	81	fluctuating	-98.4 %	---	0	n.e.	n.e.	0.0065 V	0	X	
11	0.0116 V	85	fluctuating	-95.0 %	---	0	n.e.	n.e.	0.0097 V	0	X	
12	0.0020 V	124	fluctuating	-99.1 %	---	0	n.e.	n.e.	0.0014 V	0	X	
13	0.0027 V	18	fluctuating	-98.8 %	---	0	n.e.	n.e.	0.0021 V	0	X	
14	0.0066 V	670	fluctuating	-97.2 %	---	0	n.e.	n.e.	0.0054 V	0	X	
15	0.0023 V	105	fluctuating	-99.0 %	---	0	n.e.	n.e.	0.0017 V	0	X	
16	0.0013 V	425	fluctuating	-99.4 %	---	0	n.e.	n.e.	0.0007 V	0	X	
17	0.0074 V	678	fluctuating	-96.8 %	---	0	n.e.	n.e.	0.0060 V	0	X	
18	0.0062 V	3	fluctuating	-97.3 %	---	0	n.e.	n.e.	0.0054 V	0	X	
19	0.0022 V	276	fluctuating	-99.1 %	---	0	n.e.	n.e.	0.0012 V	0	X	
20	0.0044 V	235	fluctuating	-98.1 %	---	0	n.e.	n.e.	0.0032 V	0	X	
21	0.0047 V	362	fluctuating	-97.9 %	---	0	n.e.	n.e.	0.0040 V	0	X	
22	0.0019 V	184	fluctuating	-99.2 %	---	0	n.e.	n.e.	0.0011 V	0	X	
23	0.0036 V	618	fluctuating	-98.5 %	---	0	n.e.	n.e.	0.0027 V	0	X	
24	0.0018 V	297	fluctuating	-99.2 %	---	0	n.e.	n.e.	0.0011 V	0	X	
25	0.0072 V	628	fluctuating	-96.9 %	---	0	n.e.	n.e.	0.0061 V	0	X	
26	0.0030 V	320	fluctuating	-98.7 %	---	0	n.e.	n.e.	0.0018 V	0	X	
27	0.0027 V	132	fluctuating	-98.9 %	---	0	n.e.	n.e.	0.0022 V	0	X	
28	0.0018 V	661	fluctuating	-99.2 %	---	0	n.e.	n.e.	0.0011 V	0	X	
29	0.0044 V	444	fluctuating	-98.1 %	---	0	n.e.	n.e.	0.0031 V	0	X	
30	0.0061 V	277	fluctuating	-97.4 %	---	0	n.e.	n.e.	0.0048 V	0	X	
31	0.0024 V	538	fluctuating	-99.0 %	---	0	n.e.	n.e.	0.0018 V	0	X	
32	0.0017 V	672	fluctuating	-99.2 %	---	0	n.e.	n.e.	0.0012 V	0	X	
33	0.0047 V	106	fluctuating	-97.9 %	---	0	n.e.	n.e.	0.0039 V	0	X	
34	0.0034 V	544	fluctuating	-98.5 %	---	0	n.e.	n.e.	0.0024 V	0	X	
35	0.0036 V	419	fluctuating	-98.4 %	---	0	n.e.	n.e.	0.0031 V	0	X	
36	0.0022 V	364	fluctuating	-99.1 %	---	0	n.e.	n.e.	0.0014 V	0	X	
37	0.0057 V	106	fluctuating	-97.5 %	---	0	n.e.	n.e.	0.0043 V	0	X	
38	0.0021 V	235	fluctuating	-99.1 %	---	0	n.e.	n.e.	0.0011 V	0	X	
39	0.0040 V	553	fluctuating	-98.3 %	---	0	n.e.	n.e.	0.0034 V	0	X	
40	0.0054 V	44	fluctuating	-97.7 %	---	0	n.e.	n.e.	0.0040 V	0	X	

n.e. = not evaluated

Tested with SPS EMC 3.3.7 / PAS10000 by Spitzenberger & Spies GmbH & Co. KG, Schmidstr. 32-34, 94234 Viechtach, Germany, 15.01.2013

## 9.5 Flicker Test

### 9.5.1 Test Setup





## 9.5.2 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/> Analyzer reference system (including mains impedance)	ARS 16/1	---	UO353 07/0 0907	Spitzenberger & Spies
<input checked="" type="checkbox"/> Control unit (synthesizers)	SyCore 1k1	---	UO355 12/0 1109	Spitzenberger & Spies
<input checked="" type="checkbox"/> Amplifier	PAS 5000	---	UO355 01/0 1109 UO355 02/0 1109	Spitzenberger & Spies
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

## 9.5.3 Test Results

Results for flicker test are documented as listed below.

## Flicker Test

Prüfdatum / <i>Date of test:</i>	2013-01-15
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Non shielded room

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Prüfgrundlage / <i>Specifications:</i>	IEC 61000-3-3:2008, Edition 2 EN 61000-3-3:2008
Beobachtungsdauer für $P_{st}$ / <i>Observation time for <math>P_{st}</math>:</i>	10 min
Gesamtdauer / <i>Total time:</i>	10 min (1 Flicker measurement)
Flickerimpedanz / <i>Flicker impedance:</i>	Zref (IEC 60725)
Spezielle Prüfbedingungen / <i>Special test conditions:</i>	---
Spezielle Bedingungen für $d_{max}$ / <i>Special conditions for <math>d_{max}</math>:</i>	---
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port
Kommentar / <i>Comment:</i>	---

Messbezug / <i>Tested on:</i>	Power line
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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
09:24:05	0.001	0.0210	0.0210	0.000	0.031	- . - - -	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!

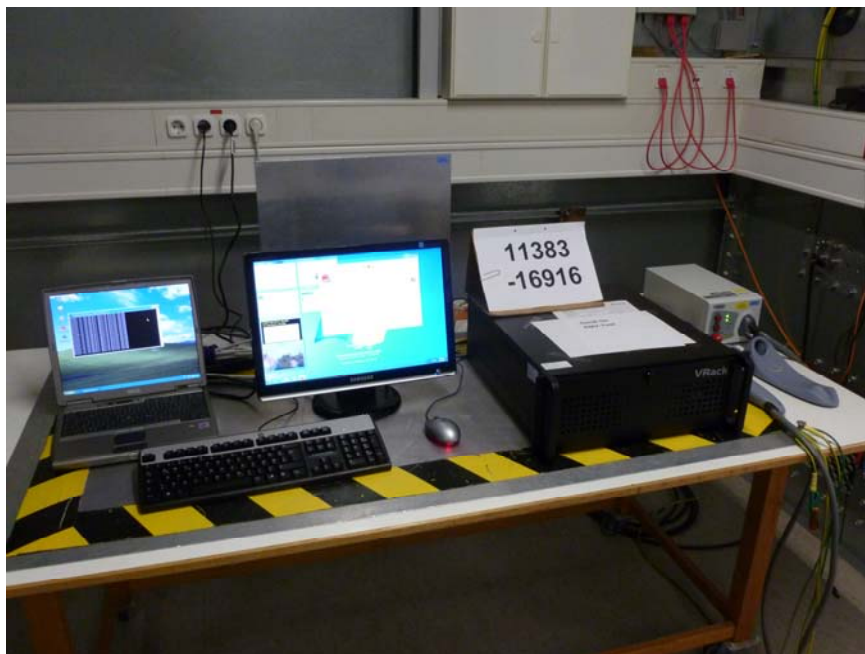
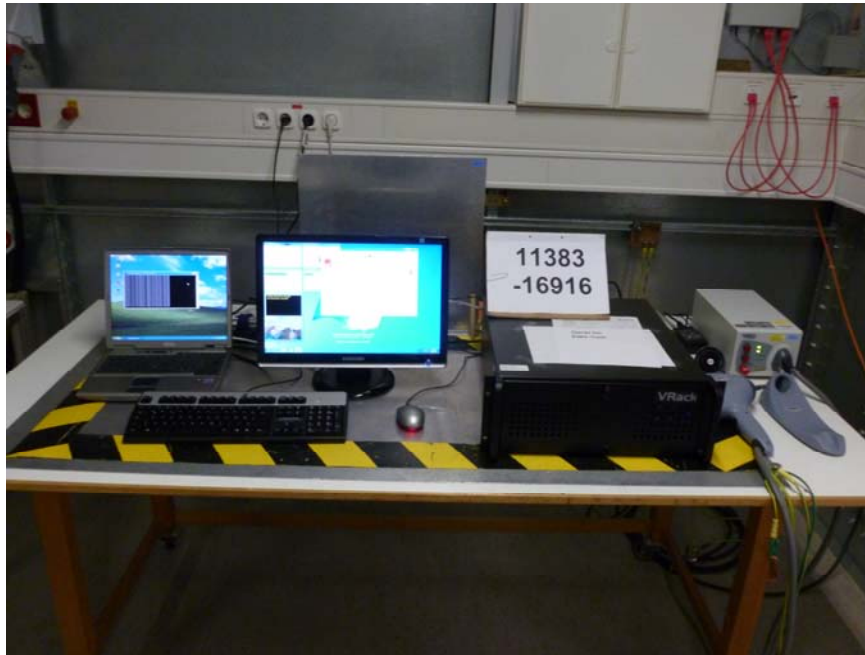
Time	Pmax	Pst	Sliding Plt	d(t)>3.30% [s]	dmax [%]	dc [%]	PASS	FAIL
09:24:05	0.000	0.0020	- . - - - -	0.000	0.016	- . - - -	X	
Plt: 0.002000								
Evaluated: PST <= 0.4 dmax < 20 % dmax1								

Test ed with SPS EMC 3.3.7 / PAS10000 by Spitzenberger & Spies GmbH & Co. KG, Schmidstr. 32-34, 94234 Viechtach, Germany, 15.01.2013



## 9.6 Electrostatic Discharge

### 9.6.1 Test Setup



## 9.6.2 Test Equipment List

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

## 9.6.3 Test Results

Results for electrostatic discharge test are documented as listed below.



## Electrostatic Discharge

Prüfdatum / <i>Date of test:</i>	2013-01-18
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Shielded room, cabin no. 1

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

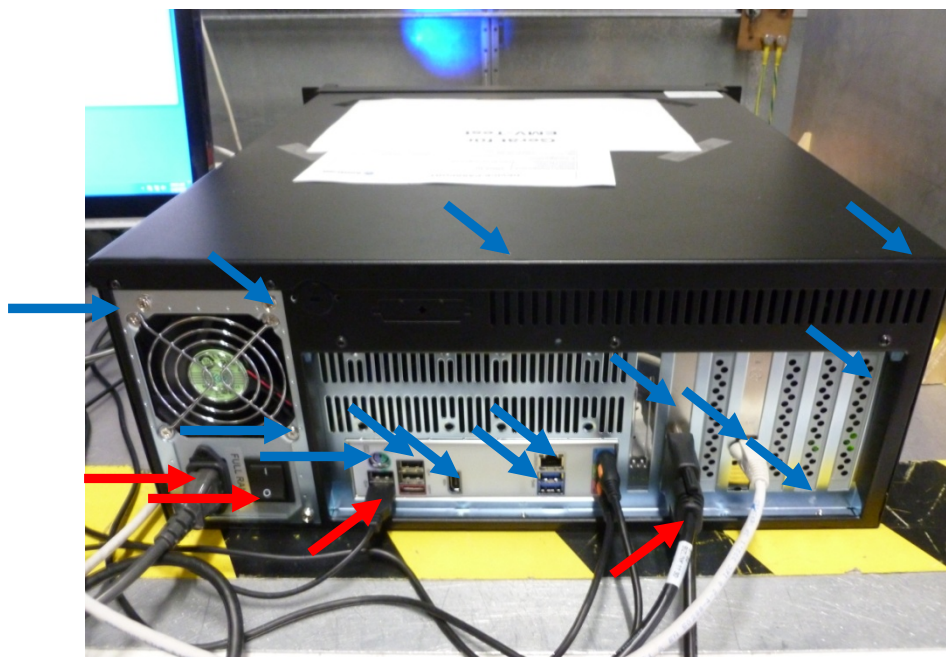
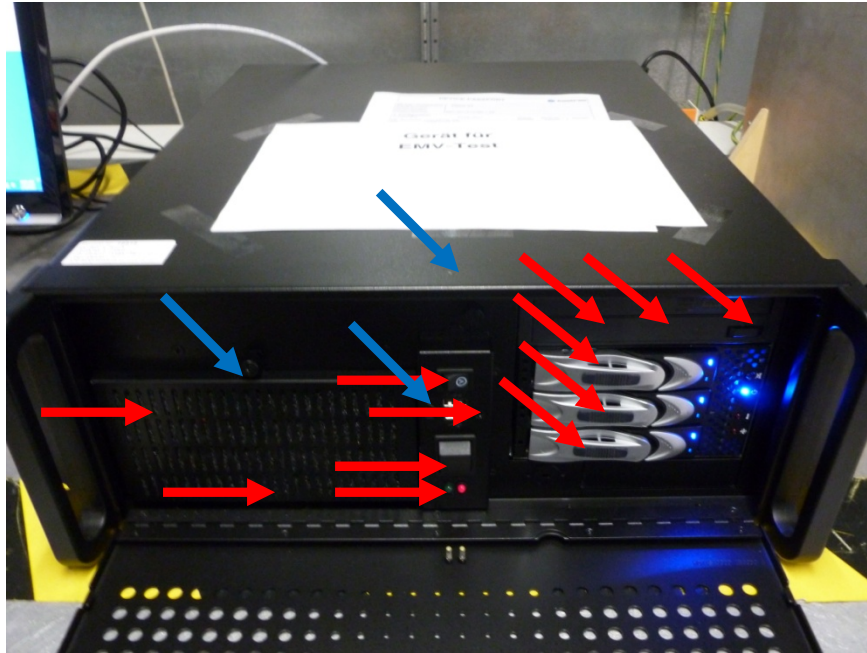
Luftdruck / <i>Barometric pressure:</i>	966.3 hPa
Relative Luftfeuchtigkeit / <i>Relative humidity:</i>	38 %
Temperatur / <i>Ambient temperature:</i>	19.4 °C

Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-2:2005
Bewertungskriterium / <i>Performance criterion:</i>	B
Anforderung / <i>Requirement:</i>	Contact discharge: ± 4 kV Air discharge: ± 8 kV
Anzahl der Entladungen / <i>Number of discharges:</i>	Contact discharge: ≥ 10 per polarity and test point Air discharge: ≥ 10 per polarity and test point
Basisnorm / <i>Basic standard:</i>	IEC 61000-4-2:2008, Edition 2 EN 61000-4-2:2009
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port
Kommentar / <i>Comment:</i>	---

<i>Discharge method</i>	<i>Discharge voltage</i>	<i>Test points</i>	<i>Result</i>	<i>Note</i>
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):

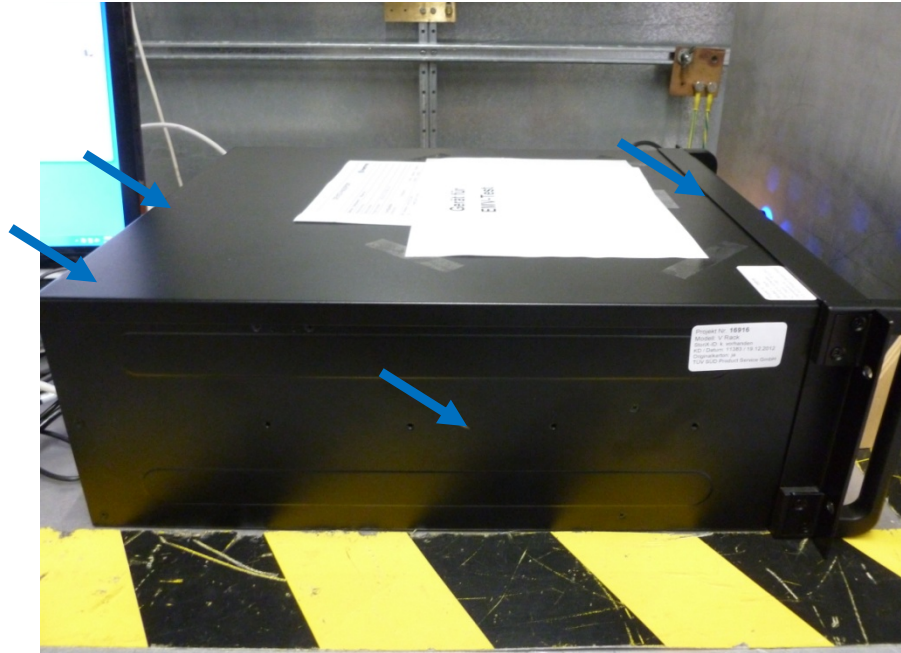
## Electrostatic Discharge - Test points



Contact discharge 

Air discharge 

## Electrostatic Discharge - Test points (continued)

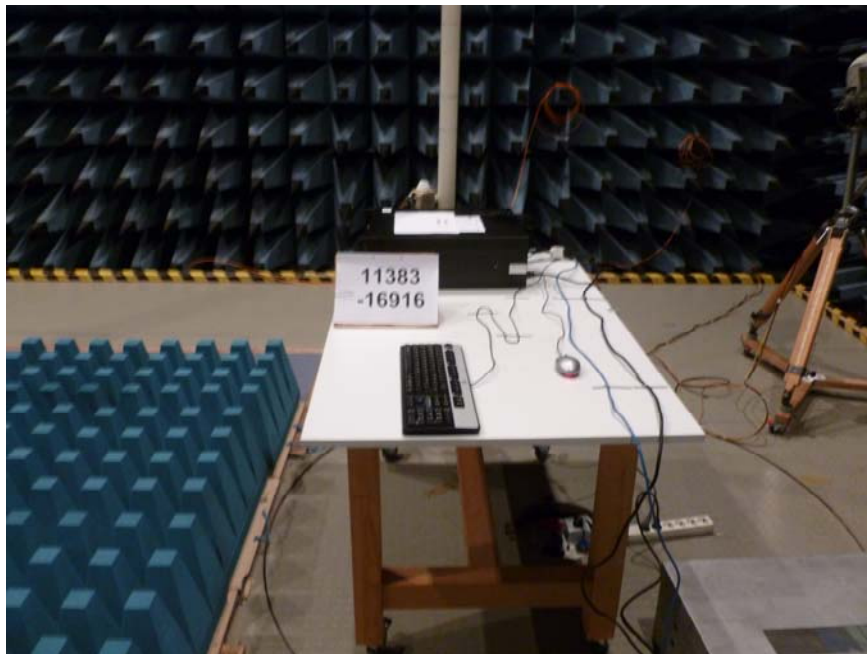


Contact discharge →

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	
<input type="checkbox"/>	Signal generator	Cabin no. 2	SML 02	1759	836926/016	Rohde & Schwarz
<input checked="" type="checkbox"/>	Signal generator	Cabin no. 3	SML 03	1729	101495	Rohde & Schwarz
<input type="checkbox"/>	Signal generator	Cabin no. 6	SML 03	1867	102131	Rohde & Schwarz
<input type="checkbox"/>	Signal generator		SMB100A	2027	100112	Rohde & Schwarz
<input type="checkbox"/>	Power amplifier	Cabin no. 6	HVV 250	1508	836956/004	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power amplifier	Cabin no. 3	1000L	1704	8923	Amplifier Research
<input type="checkbox"/>	Power amplifier	Cabin no. 2	10W1000	1119	5239	Amplifier Research
<input checked="" type="checkbox"/>	Power amplifier	Cabin no. 3	200W1000	1225	12904	Amplifier Research
<input type="checkbox"/>	Power amplifier	Cabin no. 6	1000W1000B	1827	307669	Amplifier Research
<input type="checkbox"/>	Power amplifier		25S1G4	1587	23171	Amplifier Research
<input type="checkbox"/>	Power amplifier		BLMA 1040-450D	2074	097733	Bonn
<input checked="" type="checkbox"/>	Power amplifier	Cabin no. 6	TD81-250	1829	H040-0204	IFI
<input type="checkbox"/>	Power amplifier	Cabin no. 6	T188-20	1864	G119-0703	IFI
<input type="checkbox"/>	Power meter	Cabin no. 2	NRVS	1726	100808	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power meter	Cabin no. 3	NRVD	1797	101092	Rohde & Schwarz
<input type="checkbox"/>	Power meter	Cabin no. 6	NRP	1818	100006	Rohde & Schwarz
<input type="checkbox"/>	Power sensor	Cabin no. 2	NRV-Z4	1727	100179	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power sensor	Cabin no. 3	NRV-Z4	1798	100238	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power sensor	Cabin no. 3	NRV-Z4	1799	100236	Rohde & Schwarz
<input type="checkbox"/>	Power sensor	Cabin no. 6	NRP-Z91	1819	100064	Rohde & Schwarz
<input type="checkbox"/>	Power sensor	Cabin no. 6	NRP-Z91	1820	100065	Rohde & Schwarz
<input type="checkbox"/>	E-field generator		3107 B	1019	2302	Emco
<input type="checkbox"/>	High power broadband balun		VHBD 9134	2098	9134-050	Schwarzbeck
<input type="checkbox"/>	Antenna elements		BBFA 9146	2099	---	Schwarzbeck
<input type="checkbox"/>	Trilog antenna	Cabin no. 6	VULB 9163	1824	9163-233	Schwarzbeck
<input checked="" type="checkbox"/>	Hybrid log. periodic antenna		HLP-2603	1655	120500	EMC Automation
<input type="checkbox"/>	Stacked log. per. antenna		STLP 9128 E special	1854	019	Schwarzbeck
<input type="checkbox"/>	Horn antenna		3115	1516	9508-4553	Emco
<input type="checkbox"/>	Horn antenna		HF907	2073	100154	Rohde & Schwarz
<input type="checkbox"/>	Horn antenna		ATH1G4	2078	0330665	Amplifier Research
<input type="checkbox"/>	Horn antenna		3160-03	1010	9112-1003	Emco
<input type="checkbox"/>	Horn antenna		3160-04	1011	9112-1001	Emco
<input type="checkbox"/>	Horn antenna		3160-05	1012	9112-1001	Emco
<input type="checkbox"/>	Horn antenna		3160-06	1013	9112-1001	Emco
<input type="checkbox"/>	Horn antenna		3160-07	1014	9112-1008	Emco
<input type="checkbox"/>	Horn antenna		3160-08	1015	9112-1002	Emco
<input type="checkbox"/>	Horn antenna		3161-01	1749	1091	Emco
<input type="checkbox"/>	Stripline 90 Ohms (3.2 m)		SL 090	1811	---	Stimpfl
<input checked="" type="checkbox"/>	Isotropic field probe		FP 2000	1228	12847	Amplifier Research
<input checked="" type="checkbox"/>	Isotropic field monitor		FM 2004	1229	12632	Amplifier Research
<input type="checkbox"/>	Electromagnetic radiation meter		EMR-200	1723	AT-0023	Narda
<input type="checkbox"/>	Electric field probe		Type 8.3	1724	AU-0008	Narda
<input type="checkbox"/>	Fully anechoic room		No. 2	1452	---	Albatross
<input checked="" type="checkbox"/>	Semi anechoic room		No. 3	1453	---	Siemens
<input type="checkbox"/>	Fully anechoic room		No. 6	1865	---	Albatross
<input type="checkbox"/>	Shielded room		No. 8b	2057-2	---	Albatross



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### 9.7.3 Test Results

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



## RF-Electromagnetic Fields

Prüfdatum / <i>Date of test:</i>	2013-01-16 – 2013-01-17
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Semi anechoic room, cabin no. 3

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Luftdruck / <i>Barometric pressure:</i>	968.8 hPa
Relative Luftfeuchtigkeit / <i>Relative humidity:</i>	39 %
Temperatur / <i>Ambient temperature:</i>	20.7 °C

Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-2:2005		
Bewertungskriterium / <i>Performance criterion:</i>	A		
Anforderung / <i>Requirement:</i>	80 MHz - 1 GHz:	10 V/m	
	1.4 GHz - 2 GHz:	3 V/m	
	2 GHz - 2.7 GHz:	1 V/m	
Störsignal / <i>Interfering signal:</i>	Modulation:	AM	
	Modulation depth:	80 %	
	Modulation frequency:	1 kHz	
Schrittweite / <i>Step size:</i>	1 %		
Verweildauer / <i>Dwell time:</i>	3 s		
Antennenpolarisation / <i>Antenna polarization:</i>	<input checked="" type="checkbox"/> horizontal	<input checked="" type="checkbox"/> vertical	
Basisnorm / <i>Basic standard:</i>	EN 61000-4-3:2006 + A1:2008+ A2:2010 IEC 61000-4-3:2006 + A1:2007+ A2:2010		
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port		
Kommentar / <i>Comment:</i>	---		

<i>Position of EUT</i>	<i>Field strength level</i>	<i>Result</i>	<i>Note</i>
Front to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2.7 GHz: 3 V/m	Passed	
Rear side to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2.7 GHz: 3 V/m	Passed	
Left side to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2.7 GHz: 3 V/m	Passed	
Right side to antenna	f <= 1 GHz: 10 V/m 1 GHz < f <= 2.7 GHz: 3 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
<input type="checkbox"/> High energy pulse generator	NSG 2050	1680	200104-005AR	Schaffner
<input type="checkbox"/> Pulse network module	PNW 2225	1806	200448-527LU	Schaffner
<input checked="" type="checkbox"/> Ultra compact simulator	UCS500M4	1898	V0602101058	EM Test
<input checked="" type="checkbox"/> Coupling network	CNI 503A3	2151	V1150111228	EM Test
<input checked="" type="checkbox"/> Coupling clamp Cabin no. 1	CDN 8014	1221	131	Schaffner
<input type="checkbox"/> Coupling clamp Cabin no. 4	SL 400-071D	1076	007	Schaffner
<input checked="" type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> 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 / <i>Date of test:</i>	2013-01-16
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Shielded room, cabin no. 1

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Luftdruck / <i>Barometric pressure:</i>	964.8 hPa
Relative Luftfeuchtigkeit / <i>Relative humidity:</i>	38.5 %
Temperatur / <i>Ambient temperature:</i>	23.8 °C

Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-2:2005		
Bewertungskriterium / <i>Performance criterion:</i>	B		
Anforderung / <i>Requirement:</i>	Signal and control lines:	± 1 kV	
	DC mains inputs and outputs:	± 2 kV	
	AC mains inputs and outputs:	± 2 kV	
Störsignal / <i>Interfering signal:</i>	Test pulse:	5 ns / 50 ns	
	Pulse frequency:	5 kHz	
	Burst duration:	15 ms	
	Repetition period:	300 ms	
Prüfdauer / <i>Test time:</i>	1 min per polarity		
Basisnorm / <i>Basic standard:</i>	IEC 61000-4-4:2004 + A1:2010 EN 61000-4-4:2004 + A1:2010		
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port		
Kommentar / <i>Comment:</i>	---		

Port	Voltage level	Coupling	Coupling mode	Result	Note
A1	± 2 kV	L1 + N + PE → GND	Coupling filter	Passed	
S1	± 1 kV	(50 Ω)	Coupling clamp	Passed	
S5	± 1 kV	(50 Ω)	Coupling clamp	Passed	
S8	± 1 kV	(50 Ω)	Coupling clamp	Passed	
S13	± 1 kV	(50 Ω)	Coupling clamp	Passed	
S14	± 1 kV	(50 Ω)	Coupling clamp	Passed	
S15	± 1 kV	(50 Ω)	Coupling clamp	Passed	
S17	± 1 kV	(50 Ω)	Coupling clamp	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
<input type="checkbox"/> High energy pulse generator	NSG 2050	1680	200104-005AR	Schaffner
<input type="checkbox"/> Pulse network module	PNW 2050	1677	200117-009SC	Schaffner
<input checked="" type="checkbox"/> Ultra compact simulator	UCS500M4	1898	V0602101058	EM Test
<input type="checkbox"/> Coupling network	CDN 131	1752	34320	Schaffner
<input type="checkbox"/> Coupling network	CDN 115	1071	132	Schaffner
<input type="checkbox"/> Coupling network	CNV 508S5	2066	V0951105647	EM Test
<input checked="" type="checkbox"/> Coupling network	CNI 503A3	2151	V1150111228	EM Test
<input type="checkbox"/> Dropping resistor	INA 110-40	1072	121	Schaffner
<input type="checkbox"/> Dropping resistor	R40	1897	---	TÜV SÜD PS
<input type="checkbox"/> Dropping resistor	R100	1801	---	TÜV SÜD PS
<input type="checkbox"/> Digital oscilloscope	WaveJet 314	1963	LCRY0101J23209	LeCroy
<input type="checkbox"/> Digital oscilloscope	Wave Surfer 452	1796	LCRY0301J11938	LeCroy
<input type="checkbox"/> Digital oscilloscope	WaveRunner 104Xi-A	2075	LCRY0617N51108	LeCroy
<input checked="" type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> Shielded room	No. 7	1866	---	Albatross

## 9.9.3 Test Results

Results for surge test are documented as listed below.



## Surges

Prüfdatum / <i>Date of test:</i>	2013-01-15 – 2013-01-16
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Shielded room, cabin no. 1

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Luftdruck / <i>Barometric pressure:</i>	964.8 hPa
Relative Luftfeuchtigkeit / <i>Relative humidity:</i>	38.5 %
Temperatur / <i>Ambient temperature:</i>	23.8 °C

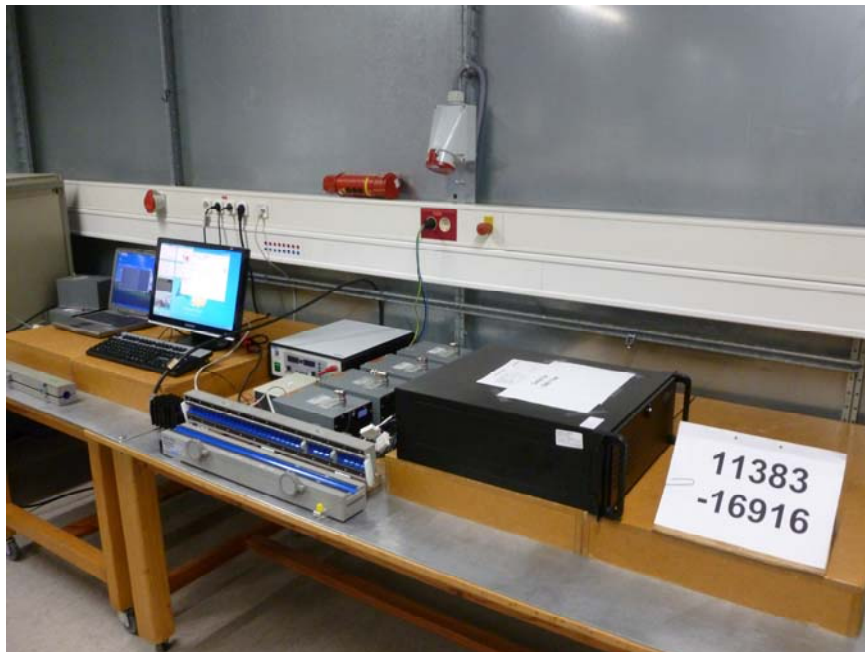
Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-2:2005		
Bewertungskriterium / <i>Performance criterion:</i>	B		
Anforderung / <i>Requirement:</i>		Line to line	Line(s) to ground
	Signal and control lines:	---	± 1 kV
	DC mains inputs	± 0.5 kV	± 0.5 kV
	AC mains inputs:	± 1 kV	± 2 kV
Störsignal / <i>Interfering signal:</i>	Test pulse:	1.2 µs / 50 µs	
	Repetition:	60 s	
	Angle (AC):	0°, 90°, 180°, 270°	
	Count:	≥ 5 per voltage level	
Basisnorm / <i>Basic standard:</i>	IEC 61000-4-5:2005 EN 61000-4-5:2006		
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port		
Kommentar / <i>Comment:</i>	---		

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	
S13	± 0.5 kV, ± 1 kV	Shield	Direct coupling	Passed	
S14	± 0.5 kV, ± 1 kV	Shield	Direct coupling	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	
<input checked="" type="checkbox"/>	Signal generator	Cabin no. 1	SMX	1036	883184/018	Rohde & Schwarz
<input type="checkbox"/>	Signal generator	Cabin no. 8b	SML 02	1759	836926/016	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power amplifier	Cabin no. 1	M-100	1896	J164-1105	ifi
<input type="checkbox"/>	Power amplifier	Cabin no. 8b	411 LA	1122	299	ENI
<input type="checkbox"/>	Power amplifier		HVV250	1508	836956/004	Rohde & Schwarz
<input type="checkbox"/>	Power amplifier		10W1000	1119	5239	Amplifier Research
<input type="checkbox"/>	Power amplifier		200W1000	1225	12904	Amplifier Research
<input checked="" type="checkbox"/>	Power meter	Cabin no. 1	NRVS	1726	100808	Rohde & Schwarz
<input type="checkbox"/>	Power meter	Cabin no. 7	NRVS	1502	838624/016	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power sensor	Cabin no. 1	NRV-Z4	1727	100179	Rohde & Schwarz
<input type="checkbox"/>	Power sensor	Cabin no. 8b	URV5-Z4	1116	826775/010	Rohde & Schwarz
<input type="checkbox"/>	Coupling network		FCC-801-AF4	1550	47	FCC
<input type="checkbox"/>	Coupling network		FCC-801-M5-25	1551	16	FCC
<input type="checkbox"/>	Coupling network		FCC-801-C1	1552	64	FCC
<input type="checkbox"/>	Coupling network		FCC-801-AF4	1553	48	FCC
<input checked="" type="checkbox"/>	Coupling network		FCC-801-M3-25	1554	117	FCC
<input type="checkbox"/>	Coupling network		FCC-801-M4-25	1555	17	FCC
<input type="checkbox"/>	Coupling network		CDN 801-M3	1572	---	TÜV SÜD PS
<input type="checkbox"/>	Coupling network		CDN 801-S37	1573	---	TÜV SÜD PS
<input type="checkbox"/>	Coupling network		CDN L-801 M2/M3	1862	2443	Lüthi
<input type="checkbox"/>	EM injection clamp	Cabin no. 1	EM 101	1568	35354	Lüthi
<input checked="" type="checkbox"/>	EM injection clamp	Cabin no. 8b	EM 101	1917	35785	Lüthi
<input type="checkbox"/>	Ferrite tube clamp		FTC 101	1564	4413	Lüthi
<input type="checkbox"/>	Current clamp		F-120-9B	1514	15	FCC
<input type="checkbox"/>	Current clamp		F-55	1700	51	FCC
<input checked="" type="checkbox"/>	Shielded room		No. 1	1451	---	Albatross
<input type="checkbox"/>	Fully anechoic room		No. 2	1452	---	Albatross
<input type="checkbox"/>	Semi anechoic room		No. 3	1453	---	Siemens
<input type="checkbox"/>	Shielded room		No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/>	Fully anechoic room		No. 6	1865	---	Albatross
<input type="checkbox"/>	Shielded room		No. 7	1866	---	Albatross
<input type="checkbox"/>	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 / <i>Date of test:</i>	2013-01-17
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Shielded room, cabin no. 1

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Luftdruck / <i>Barometric pressure:</i>	968.8 hPa
Relative Luftfeuchtigkeit / <i>Relative humidity:</i>	39 %
Temperatur / <i>Ambient temperature:</i>	20.7 °C

Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-2:2005		
Bewertungskriterium / <i>Performance criterion:</i>	A		
Anforderung / <i>Requirement:</i>	Frequency range:	0.15 - 80 MHz	
	Signal and control lines:	10 V <sub>rms</sub>	
	DC mains inputs and outputs:	10 V <sub>rms</sub>	
	AC mains inputs and outputs:	10 V <sub>rms</sub>	
Störsignal / <i>Interfering signal:</i>	Modulation:	AM	
	Modulation depth:	80 %	
	Modulation frequency:	1 kHz	
Schrittweite / <i>Step size:</i>	1 %		
Verweildauer / <i>Dwell time:</i>	3 s		
Basisnorm / <i>Basic standard:</i>	IEC 61000-4-6:2008, Edition 3 EN 61000-4-6:2009		
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port		
Kommentar / <i>Comment:</i>	---		

Port	Voltage level	Coupling via	Result	Note
A1	10 V <sub>rms</sub>	CDN FCC-801-M3-25	Passed	
S1	10 V <sub>rms</sub>	EM-Clamp EM 101	Passed	
S5	10 V <sub>rms</sub>	EM-Clamp EM 101	Passed	
S8	10 V <sub>rms</sub>	EM-Clamp EM 101	Passed	
S13	10 V <sub>rms</sub>	EM-Clamp EM 101	Passed	
S14	10 V <sub>rms</sub>	EM-Clamp EM 101	Passed	
S15	10 V <sub>rms</sub>	EM-Clamp EM 101	Passed	
S17	10 V <sub>rms</sub>	EM-Clamp EM 101	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
<input checked="" type="checkbox"/> Analyzer reference system (including mains impedance)	ARS 16/1	---	UO353 07/0 0907	Spitzenberger & Spies
<input checked="" type="checkbox"/> Control unit (synthesizers)	SyCore 1k1	---	UO355 12/0 1109	Spitzenberger & Spies
<input checked="" type="checkbox"/> Amplifier	PAS 5000	---	UO355 01/0 1109 UO355 02/0 1109	Spitzenberger & Spies
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/> 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 / <i>Date of test:</i>	2013-01-15
Prüfer / <i>Operator:</i>	Hannes Adelsberger
Messplatz / <i>Test site:</i>	Non shielded room

<b>Prüfergebnis / <i>Test Result</i></b>	
<input checked="" type="checkbox"/>	<b>Erfüllt / <i>Passed</i></b>
<input type="checkbox"/>	<b>Nicht erfüllt / <i>Not passed</i></b>

Luftdruck / <i>Barometric pressure:</i>	966.0 hPa
Relative Luftfeuchtigkeit / <i>Relative humidity:</i>	38 %
Temperatur / <i>Ambient temperature:</i>	24.2 °C

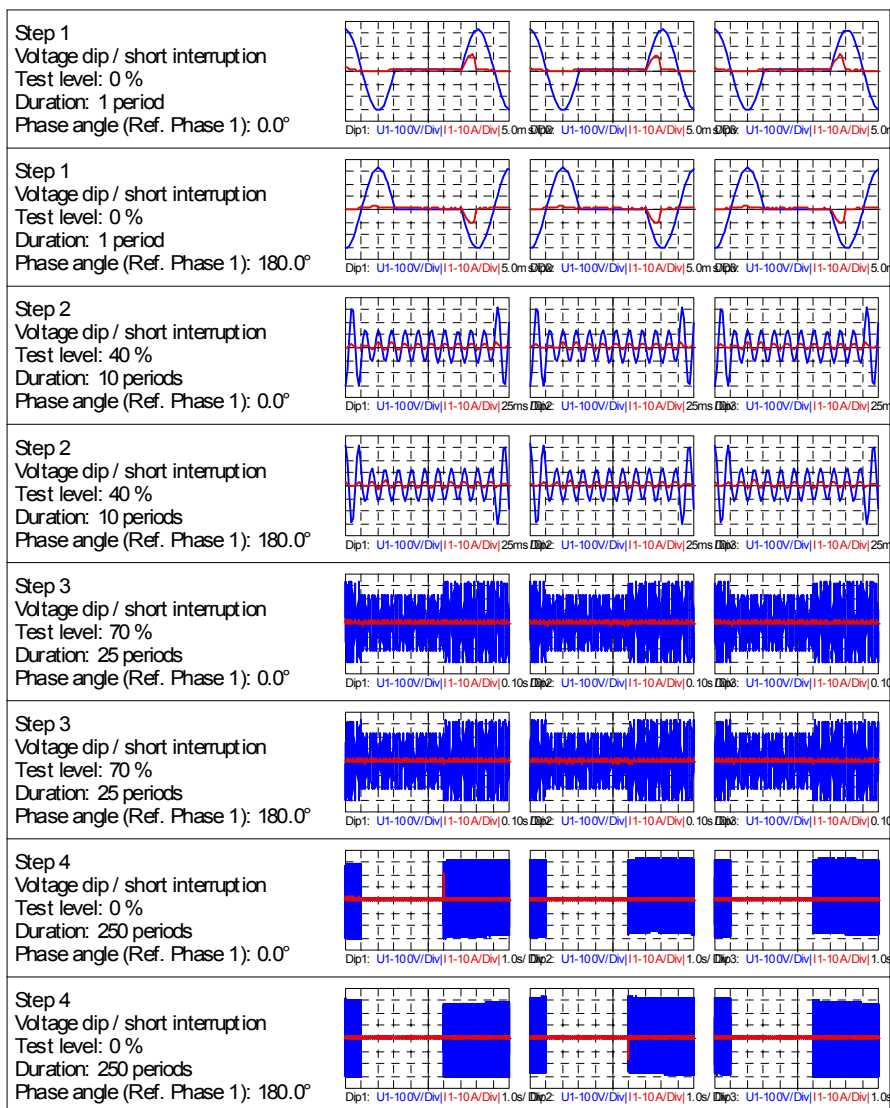
Prüfgrundlage / <i>Specifications:</i>	EN 61000-6-2:2005			
Kopplung auf / <i>Coupling to:</i>	AC mains inputs			
Nennspannung / <i>Nominal voltage:</i>	$U_N = 230 \text{ V AC}$			
Nennfrequenz / <i>Nominal frequency:</i>	$f_N = 50 \text{ Hz}$			
Anforderung / <i>Requirement:</i>	Voltage reduction in % of $U_N$	Duration in periods of $f_N$	ms	Performance criterion
	100	1	20	B
	60	10	200	C
	30	25	500	C
	100	250	5000	C
Prüfparameter / <i>Test paramters:</i>	Count:	$\geq 3$ per angle		
	Repetition:	10 s		
	Angle:	$0^\circ, 180^\circ$		
Basisnorm / <i>Basic standard:</i>	IEC 61000-4-11:2004 EN 61000-4-11:2004			
Betriebsart / <i>Operation mode:</i>	Burn-in Test running(CPU, Memory, Graphics 2D/3D, three internal harddrives); EUT pinged by external laptop via Ethernet port			
Kommentar / <i>Comment:</i>	---			

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):

Test conditions: EN 61000-4-11 voltage dips, short interruptions and variations test

Voltage / frequency: 230.0 V / 50.0 Hz  
 Test phase: Single phase / L1-N  
 Executed test: EN 61000-6-2:2005  
 Test description: -  
 Disturbances per step: 3 (per phase angle) / 10.5 sec delay between



Test results:

- Normal performance within limits specified by manufacturer, request or purchaser
  - Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention
  - Temporary loss of function or degradation of performance, the correction of which requires operator intervention
  - Loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data

Comments:



## 10 Revision History

Revision History			
<i>Edition</i>	<i>Date</i>	<i>Issued by</i>	<i>Modifications</i>
1	2013-02-12	H. Adelsberger (gz)	First Edition
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