

# Test Report

**No. 300074.010**  
**for KISS 2U 965, 2-A08C-2000**

Test Laboratory: Kontron Embedded Computers GmbH  
Oskar von Miller Straße 1  
85386 Eching  
Germany

Applicant: Kontron Embedded Computers GmbH

Purpose of Testing: To show compliance with:

CE EN 55022: 1998 + A1: 2000 + A2: 2003

CE EN 61000-3-2: 2000 + A2:2005

CE EN 61000-3-3: 1995 + A1: 2001 + A2:2005

CE EN 61000-4-2: 1995 + A1: 1998 + A2: 2001

CE EN 61000-4-4: 2004

CE EN 61000-4-5: 1995 + A1: 2001

CE EN 61000-4-6: 1996 + A1: 2001

CE EN 61000-4-8: 1993 + A1: 2001

CE EN 61000-4-11: 2004

Special Measurement: none

(see section "Reference Standards"  
for identical national standards)

Note:

The test data of this report relate only to the individual item tested.

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## 2. Administrative Data

Equipment under test: KISS 2U 965  
optional Equipment under test: none  
Options/accessories: Alteon Network ACESWITCH 180; I/O Loop back; PC Fieldworks FW8000-500  
Serial number: P001  
Version of EUT: 2-A08C-2000

Applicant (full address): Kontron Embedded Computers GmbH  
Oskar-von-Miller-Str.1  
85386 Eching, Germany

Contract identification: --  
Contact person: K. Schiege  
Manufacturer: Kontron Embedded Computers GmbH

Receipt of EUT: 7.5.2009  
Date of test: 7.5.2009 ÷ 12.5.2009  
Date of report 18.5.2009

Tested by: Vesely P., Novak H.  
Test report by: Vesely P.

### 3. Summary of Test Results

- The tested sample fulfills the requirements set forth in EN 61000-6-3:2001 EMC – Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments:

EN 61000-3-2: 2000 + A2: 2005

EN 61000-3-3: 1995 + A1: 2001 + A2: 2005

EN 55022: 1998 + A1: 2000 + A2: 2003

The tested sample fulfills the limit of class A according to EN 55022: 1998 + A1: 2000 + A2: 2003.

- The tested sample fulfills the requirements set forth in EN 61000-6-2: 2005 EMC – Part 6-2: Generic standards - Immunity for industrial environments:

EN 61000-4-2: 1995 + A1: 1998 + A2: 2001

EN 61000-4-4: 2004

EN 61000-4-5: 1995 + A1: 2001

EN 61000-4-6: 1996 + A1: 2001

EN 61000-4-8: 1993 + A1: 2001

EN 61000-4-11: 2004

No degradation of performance or loss of function is detected. The apparatus continue to operate as intended.

The tested sample fulfills all requirements for CE – Marking



Novak H.  
Technical Manager



Vesely P.  
Test Engineer

## 4. Data of Operation Mode and Configuration of EUT

### 4.1 Operation Mode

Special Susceptibility tests: none

Susceptibility tests: BitPro v5.3, BitPro v6.0

### 4.2 Configuration of Cables of EUT

Unshielded and shielded data cables connected.

### 4.3 Configuraion of EUT

Motherboard:	KT965 Flex R16, Kontron
CPU:	Core 2 Quad Q6700 (2,66 GHz), Intel
Memory:	2x1GB
Hard disk drive:	Deskstar SATA300 3.5" 250GB P7K500, HITACHI
DVD-ROM:	E616A3T, Asus
VGA:	G550DH 32MB LP PCI, Matrox
LAN3 card:	DFE-528TX PCI, D-LINK
Power supply:	FSP300-60GL, FSP Group Inc.
Operating systems:	WinXP SP3

## 4.4 Configuration of Peripherals of EUT

<u>Used Accessories:</u>	<u>Cable length:</u>
Monitor1, Acer 15" PM-EM-9590.01:	1,5m
Monitor2, Kontron 18" PM-EM-9509.01:	1,5m
PS/2 Keyboard PM-EM-9589.01; -9598.01:	1,5m
PS/2 Mouse PM-EM-9595.01; -8525.01:	1,5m
<del>USB Keyboard:</del>	<del>1,5m</del>
<del>USB Mouse Microsoft:</del>	<del>1,5m</del>
USB Floppy1 PM-EM-9594.01:	0,5m
USB CD-ROM Teac:	0,5m
USB HDD1 PM-EM-9516.01:	1,5m
<del>USB HDD2 PM-EM-9517.01:</del>	<del>1,5m</del>
USB/FireWire HDD3 PM-EM-9513.01:	1,5m
USB CD-ROM1 Amacom:	0,5m
USB CD-ROM2 Amacom:	0,5m
<b><u>Unshielded cables:</u></b>	
Power Cord	1.7 m
<b><u>Shielded cables:</u></b>	
USB3 – USB10:	1,5 m
<del>FireWire1:</del>	<del>3 m</del>
Ethernet1 – Ethernet3:	3 m
COM1 + COM2:	1,5 m
<del>LPT:</del>	<del>1,5 m</del>
<del>VGA:</del>	<del>1,5 m</del>
DVI1 + DVI2:	3 m
<del>Headset:</del>	<del>1,5 m</del>

## 5. Performed Tests and Results

Test	Classification/Result-CE	Note
EN 55022: 1998 + A1: 2000 + A2: 2003	The requirements are fulfilled for CE certification see point 6.	Conducted Emissions – <b>Class B</b> Radiated emissions – <b>Class A</b>
EN 61000-3-2: 2000 + A2: 2005	The requirements are fulfilled for CE certification see point 6.	PASS
EN 61000-3-3: 1995 + A1: 2001 + A2: 2005	The requirements are fulfilled for CE certification see point 6.	PASS
EN 61000-4-2: 1995 + A1: 1998 + A2: 2001	The requirements are fulfilled for CE certification see point 6.	Temporary degradation or loss of function or performance (criterion B according to EN 61000-6-2:2001)
EN 61000-4-4: 2004	The requirements are fulfilled for CE certification see point 6.	Temporary degradation or loss of function or performance (criterion B according to EN 61000-6-2:2001)
EN 61000-4-5: 1995 + A1: 2001	The requirements are fulfilled for CE certification see point 6.	Temporary degradation or loss of function or performance (criterion B according to EN 61000-6-2:2001)
EN 61000-4-6: 1996 + A1: 2001	The requirements are fulfilled for CE certification see point 6.	No temporary degradation or loss of function or performance (criterion A according to EN 61000-6-2:2001)
EN 61000-4-8: 1993 + A1: 2001	The requirements are fulfilled for CE certification see point 6.	No temporary degradation or loss of function or performance (criterion A according to EN 61000-6-2:2001)
EN 61000-4-11: 2004	The requirements are fulfilled for CE certification see point 6.	Temporary degradation or loss of function or performance (criterion B & C according to EN 61000-6-2: 2001)

## 6. Annotations to Performed Tests and to CE certification

### **EMC-CE Basic Standards**

EN 61000-6-3 + EN 61000-6-4 ... Generic emission standards

EN 61000-6-1 + EN 61000-6-2 ... Generic immunity standards

### **IEC 61000-3-2 (EN 61000-3-2)**

Limits for harmonic current emissions (equipment input current less than or equal to 16 A per phase;  $\leq 75W$ ) PowerFactorCorrector

### **IEC 61000 PT3-3 (EN 61000-3-3)**

Limits for voltage fluctuation and flicker for equipment with rated current  $\leq 16 A$  /  $\leq 75 W$  PowerFactorCorrector

### **IEC 61000 PT4-2, ESD (EN 61000-4-2)**

$\pm 4$  kV Contact,  $\pm 8$  kV Air, Criterion B

### **IEC 61000 PT4-4, BURST (EN 61000-4-4)**

$\pm 2$  kV DC/DC PSUs, Criterion B

$\pm 2$  kV AC/DC PSUs, Criterion B

$\pm 1$  kV data and control cables longer than 3 m (KONTRON longer than 1.5m), Criterion B

### **IEC 61000 PT4-5, SURGE (EN61000-4-5)**

With AC input/output lines, the EUT undergoes five positive as well as five negative impulses

DC In/Output  $\pm 0.5$  kV common and differential mode

AC Input port:  $\pm 1$  kV differential /  $\pm 2$  kV common mode

data cables  $\pm 1$  kV common mode, all cables longer than 30m (KONTRON longer than 3m), criterion B

(symmetrically and asymmetrically) at  $90^\circ$ , the same at  $180^\circ$  and at  $270^\circ$ .

### **IEC 61000 PT4-6, Radio-frequency common mode (EN 61000-4-6)**

Refers to the conducted immunity requirements of electrical and electronic equipment to electromagnetic disturbance from intended radio-frequency (RF) transmitters in frequency range 150 kHz to 230MHz. Does not include equipment not having at least one conducting cable (i.e. mains supply, signal line or earth connection) which can couple the equipment to the disturbing RF.

Power lines and data lines: 10 V, 0.15-230 MHz, 80% AM, Criterion A

### IEC 61000 PT4-8, Magnetic field (EN 61000-4-8)

50 Hz, 30 A/m only for system which have parts, they can be influenced by magnetic field. Criterion A (for Monitor H>3A/m Criterion A)

### IEC 61000 PT4-11, Voltage dips (EN61000-4-11)

Voltage dips, short interruptions and voltage variations immunity tests

AC Input: 30% - 10ms reduction, Criterion B

60% - 100ms and 1000ms reduction, Criterion C

>95% - 5000ms reduction, Criterion C

## EN 55022 / CISPR 22

### Conducted Emission Limit (at the mains):

Class A:	0,15 - 0,50 MHz	QP: 79	AV: 66 dB $\mu$ V
	0,50 - 30,0 MHz	QP: 73	AV: 60 dB $\mu$ V
Class B:	0,15 - 0,50 MHz	QP: 66 - 56	AV: 56 - 46 dB $\mu$ V
	0,50 - 5,0 MHz	QP: 56	AV: 46 dB $\mu$ V
	5,0 - 30,0 MHz	QP: 60	AV: 50 dB $\mu$ V

### Conducted Emission Limit (at the telecom terminal port):

Class A:	0,15 - 0,50 MHz	QP: 53 - 43	AV: 40 - 30 dB $\mu$ A
	0,50 - 30,0 MHz	QP: 43	AV: 30 dB $\mu$ A
Class B:	0,15 - 0,50 MHz	QP: 40 - 30	AV: 30 - 20 dB $\mu$ A
	0,50 - 30,0 MHz	QP: 30	AV: 20 dB $\mu$ A

### Radiated Emission (for the 1m KONTRON distance, hitch with +10 dB ( $\mu$ V/m))

Class A:	30 - 230 MHz	40 dB( $\mu$ V/m)/58,5	10m/1m
	230 - 1000 MHz	47 dB( $\mu$ V/m)/58,5	10m/1m
Class B:	30 - 230 MHz	30 dB( $\mu$ V/m)/48,5	10m/1m
	230 - 1000 MHz	37 dB( $\mu$ V/m)/48,5	10m/1m

**Measurement conditions according to CISPR 22 1997/ Amendment 1:****General measurement conditions**

A test site shall permit disturbances from the EUT to be distinguished from ambient noise. The suitability of the site in this respect can be determined by measuring the ambient noise levels with the EUT inoperative and ensuring that the noise level is at least 6 dB below the limits specified in clauses 5 and 6.

If at certain frequency bands the ambient noise is not 6 dB below the specified limit, the methods shown in 10.4 may be used to show compliance of the EUT to the specified limits.

It is not necessary that the ambient noise level be 6 dB below the specified limit where both ambient noise and source disturbance combined do not exceed the specified limit. In this case the source emanation is considered to satisfy the specified limit. Where the combined ambient noise and source disturbance exceed the specified limit, the EUT shall not be judged to fail the specified limit unless it is demonstrated that, at any measurement frequency for which the limit is exceeded, two conditions are met:

- a) the ambient noise level is at least 6 dB below the source disturbance plus ambient noise level;
- b) the ambient noise level is at least 4,8 dB below the specified limit.

**EUT configuration**

Where not specified herein, the EUT shall be configured, installed, arranged and operated in a manner consistent with typical applications. Interface cables/loads/devices shall be connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage.

Where there are multiple interface ports of the same type, additional interconnecting cables/loads/devices may have to be added to the EUT depending upon the results of preliminary tests. The number of additional cables should be limited to the condition where the addition of another cable does not decrease the margin a significant amount (for example 2 dB) with respect to the limit. The rationale for the selection of the configuration and loading of ports shall be included in the test report.

Interconnecting cables should be of the type and length specified in the individual equipment requirements. If the length can be varied, the length shall be selected to produce maximum disturbance.

If shielded or special cables are used during the tests to achieve compliance, then a note shall be included in the instruction manual advising of the need to use such cables.

Excess lengths of cables shall be bundled at the approximate centre of the cable with the bundies 30 cm to 40 cm in length. If it is impractical to do so because of cable bulk or stiffness, or because the testing is being done at a user installation, the disposition of the excess cable shall be precisely noted in the test report.

Where there are multiple interface ports all of the same type, connecting a cable to just one of that type of port is sufficient, provided it can be shown that the additional cables would not significantly affect the results.

Any set of results shall be accompanied by a complete description of the cable and equipment orientation so that results can be repeated. If specific conditions of use are required to meet the limits, those conditions shall be specified and documented; for example cable length, cable type, shielding and grounding. These conditions shall be included in the instructions to the user.

Equipment which is populated with multiple modules (drawer, plug-in card, board, etc.) shall be tested with a mix and number representative of that used in a typical installation. The number of additional boards or plug-in card actually used should be limited to the number for which the addition of another board or card does not decrease the margin a significant amount (for example 2 dB) with respect to the limit. The rationale used for selecting the number and type of modules should be stated in the test report.

A system that consists of a number of separate units shall be configured to form a minimum representative configuration. The number and mix of units included in the test configuration shall normally be representative of that used in a typical installation. The rationale used for selecting units should be stated in the test report.

Examples of a minimum representative configuration follow.

For a personal computer or a personal computer peripheral, the minimum configuration consists of the following device grouped and tested together:

- a) personal computer;
- b) keyboard;
- c) visual display unit;
- d) external peripheral for each of two different types of available I/O protocols, such as serial, parallel, etc.;
- e) if the EUT has a dedicated port for a special-purpose device such as a mouse or joystick, that device shall be part of the minimum configuration.

NOTE - Items a), b) and/or c) may, in some systems, be assembled in the same chassis. In no instance may items a), b), c) mouse or joystick controls, be used as a replacement for item d).

For a point of sale terminal, the minimum system consists of the following devices (to the extent applicable) grouped and tested together:

- a) active processor (till);
- b) cash drawer;
- c) keyboard(s);
- d) display units (operator and customer);
- e) typical peripheral (bar code scanner);
- f) handheld device (bar code scanner).

One module of each type shall be operative in each ITE evaluated in an EUT. For a system EUT, one of each type of ITE that can be included in the possible system configuration shall be included in the EUT.

A unit of equipment which forms part of a system distributed over a wide area (such as data processing terminals or workstations, or private branch telecommunication exchanges, etc.), and which in itself may be a subsystem, may be tested independently of the host unit or system. Distributed networks, for example a local area network, may be simulated on the test site by lengths of cable and actual peripherals or remote network communications simulators located at a distance sufficient to ensure that they do not contribute to the measured level.

The results of an evaluation of EUTs having one of each type of module or ITE can be applied to configurations having more than one of each of those modules or ITE. This is permissible because it has been found that disturbances from identical modules or ITE (see 3.5) are generally not additive in practice.

In the case of EUTs which functionally interact with other ITE, including any ITE that is dependent on a host unit for its power interface, either the actual interfacing ITE or simulators may be used to provide representative operating conditions, provided the effects of the simulator can be isolated or identified. If an ITE is designed to be a host unit to other ITE, such ITE may have to be connected in order that the host unit shall operate under normal conditions.

It is important that any simulator used instead of an actual interfacing ITE properly represents the electrical and, in some cases, the mechanical characteristics of the interfacing ITE, especially RF signals and impedances. Following this procedure will permit the results of measurements of individual ITE to remain valid for system application and integration of the ITE with other similarly tested ITE, including ITE produced and tested by different manufacturers.

In the case of printed wiring board assemblies (PWBA), separately marketed for the enhancement of diverse host units, the PWBA (such as ISDN interface, CPU, adaptor cards, etc.) shall be tested in at least one appropriate representative host unit of the PWBA manufacturer's choice so as to ensure compliance of the PWBA with the entire population of hosts in which it is intended to be installed.

The host shall be a typical compliant production sample.

PW BA intended to be class B shall not be tested in hosts which are class A.

The accompanying documentation of the PWBA shall include information regarding the host units in which the PW BA was tested and verified, and information enabling the user to identify host units in which the PW BA will achieve compliance with the classification (A or B).

## **Determination of maximum emission configuration(s)**

Initial testing shall identify the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test set-up which is representative of typical system configurations. The identification of the frequency of highest disturbance with respect to the limit shall be found by investigating disturbances at a number of significant frequencies, to give confidence that the probable frequency of maximum disturbance has been found and that the associated cable, EUT configurations and mode of operation has been identified.

For initial testing, the EUT shall be set up in accordance with figures 4 through 14. The distances between the EUT and peripherals are set according to the figures.

Final measurements shall be conducted as in clauses 9 and 10 for terminal disturbance voltage and disturbance field strength measurements, respectively.

### **Operation of the EUT**

The EUT shall be operated within the rated (nominal) operating voltage range and typical load conditions (mechanical or electrical) for which it is designed. Actual loads should be used whenever possible. If a simulator is used, it shall represent the actual load with respect to its radio frequency and functional characteristics.

The test programs or other means of exercising the equipment should ensure that various parts of a system are exercised in a manner that permits detection of all system disturbances. For example, in a computer system, tape and disk drives should be put through a read-write erase sequence; and various portions of memories should be addressed. Any mechanical activities should be performed and visual display units should be operated as in 8.2.1.

### **Operation of visual display units**

If the EUT includes a visual display or monitor, the following operating rules shall be used.

- Set the contrast control to maximum.
- Set the brightness control to maximum or at raster extinction if raster extinction occurs at less than maximum brightness.
- For color monitors, use white letters on a black background to represent all colors. - Select the worse case of positive or negative video if both alternatives are available.
- Set character size and number of characters per line so that typically the greatest number of characters per screen is displayed.
- For monitors with graphics capabilities, a pattern consisting of all scrolling Hs should be displayed. For monitors with text only capability, a pattern consisting of random text shall be displayed. If neither of the above apply, use a typical display.

The EUT shall be operated in the operating mode that generates the greatest level of emission while satisfying the above operating rules.

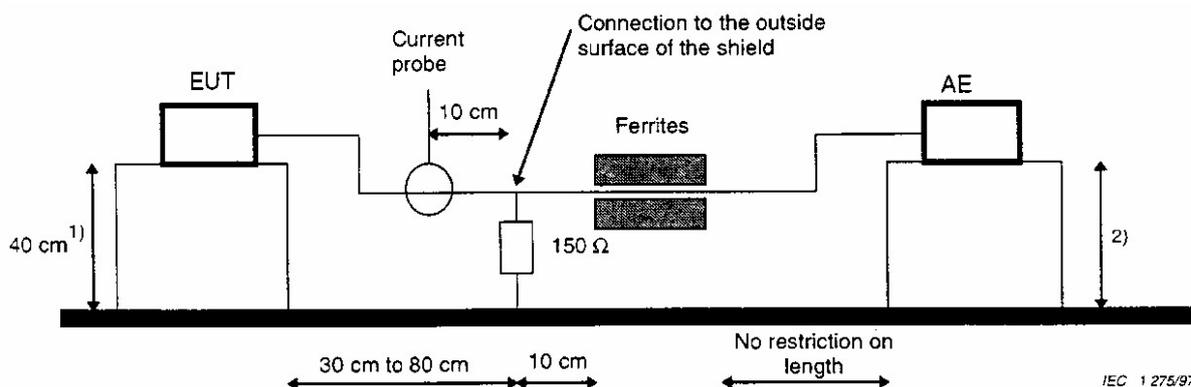
### Measurement at telecommunication ports

The EUT shall be set up in accordance with figures 4 through 9 for tabletop equipment, floorstanding equipment, and combined floor-standing equipment and tabletop equipment.

In order to make reliable emission measurements representative of high LAN utilization it is only necessary to create a condition of LAN utilization in excess of 10 % and sustain that level for a minimum of 250 ms. The content of the test traffic should consist of both periodic and pseudo-random messages in order to emulate realistic types of data transmission (e.g. random: files compressed or encrypted; periodic: uncompressed graphic files, memory dumps, screen updates, disk images). If the LAN maintains transmission during idle periods measurements shall also be made during idle periods (see clause E.3, [7]).

### Current measurements at telecommunication ports intended for connection to screened cables or to coaxial cables. Test set-up for common mode measurements C.1.2 Using a 150 Ω load to the outside surface of the shield ("in situ CDN/ISN").

- Break the insulation and connect a 150 Ω resistor from the outside surface of the shield to ground.
- Apply a ferrite tube or clamp between 150 Ω connection and AE.
- Measure current with a current probe and compare to the current limit. The common mode impedance towards the right of the 150 Ω resistor shall be sufficiently large as not to affect the measurement. Use clause C.2 to measure this impedance which should be much greater than 150 Ω so as not to affect the measurement for frequencies emitted by the EUT.



AE = Associated equipment  
 EUT = Equipment under test

1) Distance to the reference groundplane (vertical or horizontal).  
 2) Distance to the reference groundplane is not critical.

Figure C.2

## Short description of some performed tests:

### ESD EN 61000-4-2

At each test point 10 positive and 10 negative pulses are applied with a recovery time of at least 1 s.

### Burst EN 61000-4-4

Each AC/DC input/output line of the EUT undergoes with each single line and also all lines together of one port (N, L1, PE, GND) positive as well as negative impulses for 2 minutes each.

Each DATA line of the EUT undergoes positive as well as negative impulses for 2 minutes each.

The test procedure is executed for every test level up to the highest test level. Test is executed up to the highest specified test level (250 V or 500 V or 1000 V or 2000 V or 4000 V). Higher levels include all lower levels, i.e. if a 2000 V test is performed, a 250 V, a 500 V and a 1000 V test must also be performed.

### Surge EN 61000-4-5

With AC input/output lines, the EUT undergoes five positive as well as five negative impulses (symmetrically and asymmetrically) at 90°, the same at 180° and at 270°.

DC input/output lines, data lines and shielded lines undergo five positive as well as five negative impulses. DC input/output lines and data lines are tested symmetrically and asymmetrically.

The test procedure is executed for every test level up to the highest test level. Test is executed up to the highest specified test level (500 V or 1000 V or 2000 V or 4000 V). Higher levels include all lower levels, i.e. if a 2000 V test is performed, a 500 V and a 1000 V test must also be performed. Recovery time between the pulses is 60 seconds.

### Conducted disturbances induced by Radio Frequency field EN 61000-4-6

Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility. The frequency range is swept from 150 KHz to 230 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 KHz sine wave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the start and thereafter 1 % of the preceding frequency value.

## **Immunity Testing with LF Magnetic Fields EN 61000-4-8**

This test method describes immersion of the EUT by a continuous LF magnetic field, obtained by a current of power frequency flowing in an induction coil. The test equipment needed for this test includes a current source, the induction coil, and auxiliary test instrumentation. The test setup requires a nonmagnetic ground plane under the EUT of at least 1 x 1 m. The equipment is to be placed on the ground plane with an insulating support.

Depending on the size of the EUT, induction coils of different dimensions may be used. The dimensions recommended are to produce a magnetic field in the whole volume of the EUT within +3 dB. For small EUTs, like terminals and instruments, a square-shaped or circular coil of 1 m side or diameter is recommended. The double coils of the Helmholtz type could be used in order to obtain a homogeneous field better than +3 dB or to extend the volume of testable EUT.

## **Performance Criteria according to EN 61000-6-2: 2001 EMC - Generic standards - Immunity for industrial environments**

### **Performance Criterion A**

The apparatus shall continue to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation, and what the user may reasonably expect from the apparatus if used as intended.

This criterion is to be used when the apparatus is stressed with an electromagnetic phenomenon of a continuous nature such as electromagnetic fields, magnetic fields, etc.

### **Performance Criterion 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation, and what the user may reasonably expect from the apparatus if used as intended.

This criterion is to be used when the apparatus is stressed with an electromagnetic phenomenon of a transient nature such as electrostatic discharges, fast transients, and power supply voltage dips less than 10 ms in duration, etc.

### **Performance Criterion C**

Temporary loss of function is allowed, provided the loss of function is self-recoverable, or can be restored by the operation of the controls. In cases where a manufacturer's specification specifically requires external protection devices or measures which are clearly specified in the users' manual, the test requirements of this standard may be applied with the external protection devices or measures in place.

This criterion is to be used when the apparatus is stressed with short supply voltage interruptions (in excess of 100 ms).

The specification of performance criteria in a generic standard is necessarily vague, given the diversity of types of apparatus which is within the scope.

## 7. Referenced Regulations

(see section "Reference Standards" for identical national standards)

Regulation	Comment
EN 55022: 1998 + A1: 2000 + A2: 2003	Limits & methods of measurement of radio disturbance characteristics of information technology equipment
EN 61000-3-2: 2000 + A2: 2005	Electromagnetic compatibility (EMC) Part 3: Limits Section 2: Limits for harmonic current emissions (Equipment input current less than or equal to 16 A per phase) PowerFactorCorrector
EN 61000-3-3: 1995 + A1: 2001 + A2: 2005	Electromagnetic compatibility (EMC) Part 3: Limits Section 3: Limits for voltage fluctuation and flicker for equipment with rated current $\leq 16$ A PowerFactorCorrector
EN 61000-4-2: 1995 + A1: 1998 + A2: 2001	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 2: Electrostatic discharge immunity test
EN 61000-4-4: 2005	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 4: Electrical fast transients/Burst immunity test
EN 61000-4-5: 1995 + A1: 2001	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 5: Surge immunity test
EN 61000-4-6: 1996 + A1: 2001	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 6: Immunity to conducted disturbances induced by radio frequency fields
EN 61000-4-8: 1993 + A1: 2001	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 8: Power frequency magnetic field immunity test
EN 61000-4-11: 2004	Electromagnetic compatibility (EMC) Part 4: Testing and measuring techniques Section 11: Voltage dips, short interruptions and voltage variations immunity tests
Special standard	

## 8. List of Test Equipment

### 8.1 Radio Interference Emission Testing

	Type	Model	Equipment No.	Manufacturer
✓	EMI test receiver	ESMI	PM-EM-3158-1	Rohde & Schwarz
✓	LISN	ESH3-Z5	PM-EM-3142-1	Rohde & Schwarz
	LISN	ESH3-Z5	PM-EM-7561-1	Rohde & Schwarz
	LISN	ESH3-Z6	PM-EM-3136-1	Rohde & Schwarz
	LISN	ESH3-Z6	PM-EM-3137-1	Rohde & Schwarz
	LISN	ENV4200	PM-EM-7562-1	Rohde & Schwarz
✓	Pulse limiter	ESH3-Z2	PM-EM-3180-1	Rohde & Schwarz
	Pulse limiter	ESH3-Z2	PM-EM-7563-1	Rohde & Schwarz
✓	Current clamp	ESH2-Z1	PM-EM-3140-1	Rohde & Schwarz
	Current clamp	ESV-Z1	PM-EM-3140-1	Rohde & Schwarz
	Current clamp	F-61	PM-EM-7554-1	FCC
	Current clamp	F-65-A	PM-EM-8543-1	FCC
	Current clamp	F-36-4	PM-EM-6173-1	FCC
	Current clamp	F-2000	PM-EM-6171-1	FCC
✓	RF relays matrix	PSU	PM-EM-6101-1	Rohde & Schwarz
✓	HF room 10 kHz to 18 GHz	Shielded room	PM-EM-6172-1	Siemens Matsushita
	Drive quali. comp.	-----	PM-EM-8500-1	Kontron Elektronik

(check mark in 1<sup>st</sup> column) = tested

## 8.2 Immunity Testing

	Type	Model	Equipment No.	Manufacturer
✓	Hybrid generator	NSG 650	PM-EM-3148-1	Schaffner
✓	Coupling/decoupling network for NSG 650	CDN 110	PM-EM-3149-1	Schaffner
✓	Coupling network for NSG 650 & CDN110	INA 202	PM-EM-4134-1	Schaffner
✓	Coupling network for NSG 650 & CDN110	INA 204	PM-EM-4136-1	Schaffner
✓	Coupling network for NSG 650 & CDN110	INA 206	PM-EM-4138-1	Schaffner
	Coupling/decoupling network for NSG 650 (data line)	CDN 115	PM-EM-4140-1	Schaffner
	40 Ω resistor for NSG 650 & CDN115	INA 110-40	PM-EM-7519-1	Schaffner
✓	HF room 10 kHz to 18 GHz	Shielded room	PM-EM-6172-1	Siemens Matsushita
✓	ESD generator	NSG 435	PM-EM-9014	Schaffner
✓	19" Rack EN61000- 3-2/3-3/4-8/4-11/4-13	PHE5000/ PAS	PM-EM-6519-1	Spitzenberger & SPIES
✓	Burst generator	NSG 2025	PM-EM-6162-1	Schaffner
✓	Capacitive coupling clamp	CDN 8014	PM-EM-3147-1	Schaffner
	Oscilloscope	HM203-7	PM-EM-3184-1	Hameg
	Digital multimeter	Fluke 83	PM-EM-7560-1	FLUKE
	Coupling/decoupling network, coaxial lines	FCC-801-C1-N-50	PM-EM-7527-1	FCC
	Coupling/decoupling network, coaxial lines	FCC-801-C1-N-50	PM-EM-7529-1	FCC
	Coupling/decoupling network, single pole	FCC-801-M1-25	PM-EM-7531-1	FCC

(check mark in 1<sup>st</sup> column) = tested

**List of Test Equipment: Immunity Testing (continued)**

	Type	Model	Equipment No.	Manufacturer
	Coupling/decoupling network, single pole	FCC-801-M2-25	PM-EM-7543-1	FCC
✓	Coupling/decoupling network, single pole	FCC-801-M3-25	PM-EM-7544-1	FCC
	EM clamp	F-203I-32mm	PM-EM-7534-1	FCC
	Decoupling clamp for EM clamp	F-203I-DCN-32mm	PM-EM-7535-1	FCC
✓	Current clamp 100 kHz to 230 MHz	F-120-9A	PM-EM-7546-1	FCC
✓	19" rack test system EN 61000-4-6	61000-4-6	PM-EM-7542-1	NeWeTec
	Current clamp	F-61	PM-EM-7554-1	FCC
	Current clamp	F-65A	PM-EM-7554-1	FCC
	Drive quali. comp.	-----	PM-EM-8500-1	Kontron Elektronik
✓	Helmholtz coil set	KEC	PM-EM-7558-1	KEC

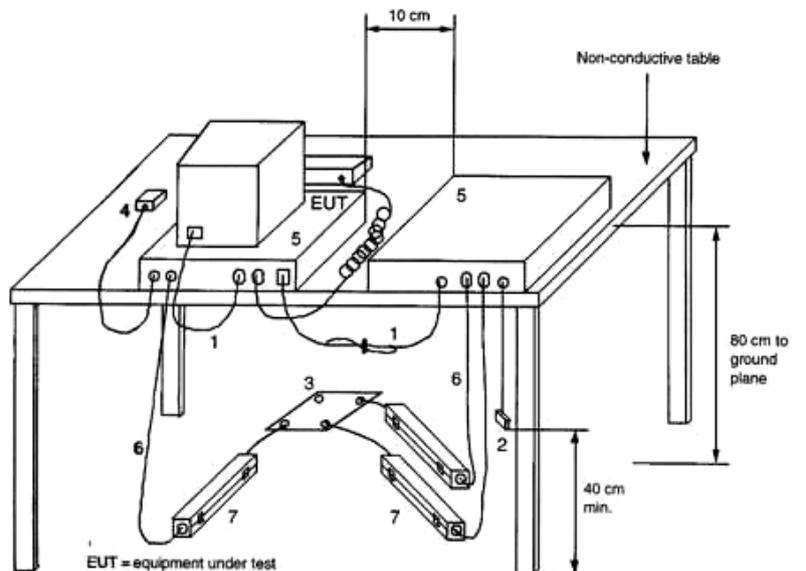
(check mark in 1<sup>st</sup> column) = tested

## 9. Photographs of EUT and Test Setup

### 9.1 Test Setup EN 55022, conducted & radiated emissions

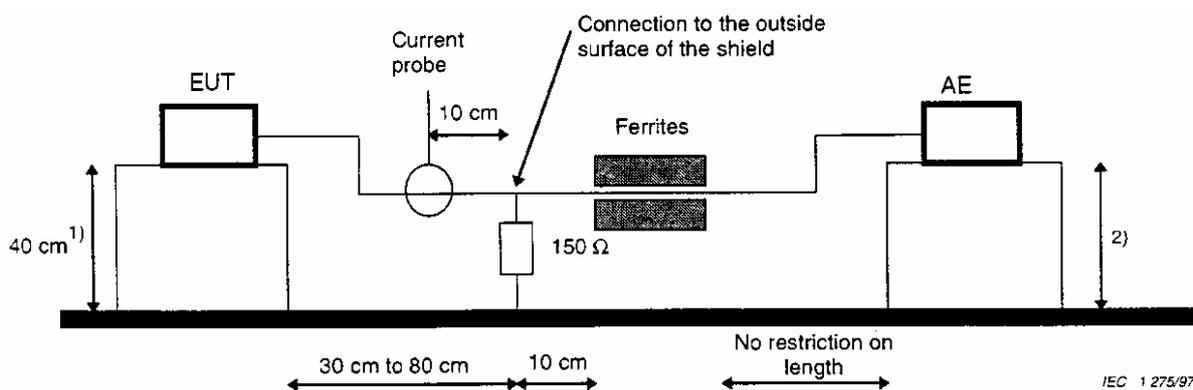
Limits & methods of measurement of radio disturbance characteristics of information technology equipment

Radiated and Conducted Emissions Test (test distance 1m)



## 9.2 Test Setup EN 55022, conducted emissions

Conducted Emissions at the telecommunication ports



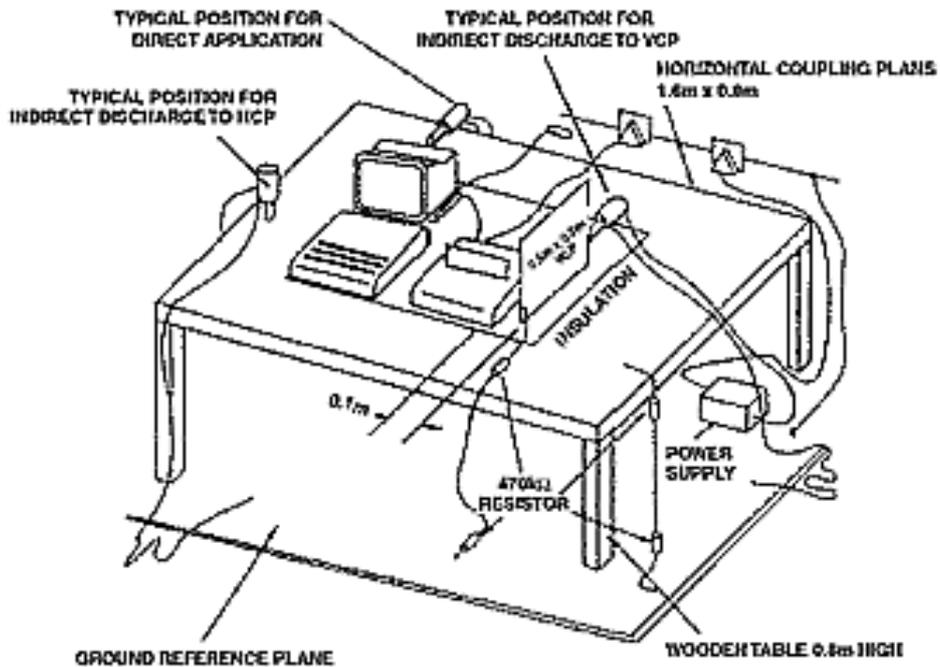
AE = Associated equipment  
 EUT = Equipment under test

- 1) Distance to the reference groundplane (vertical or horizontal).
- 2) Distance to the reference groundplane is not critical.

Figure C.2

### 9.3 Test Setup EN 61000-4-2

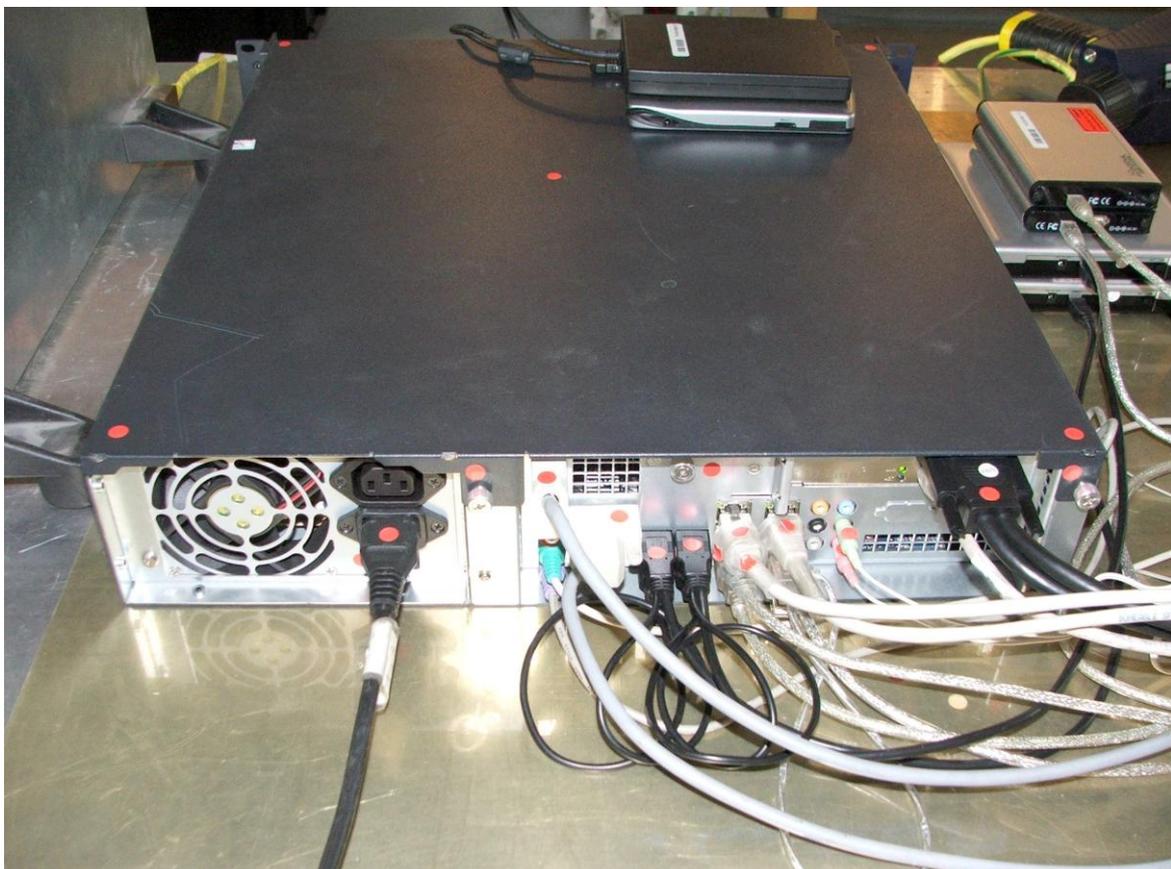
Electrostatic discharge immunity test



Electrostatic discharge immunity test – pulses location

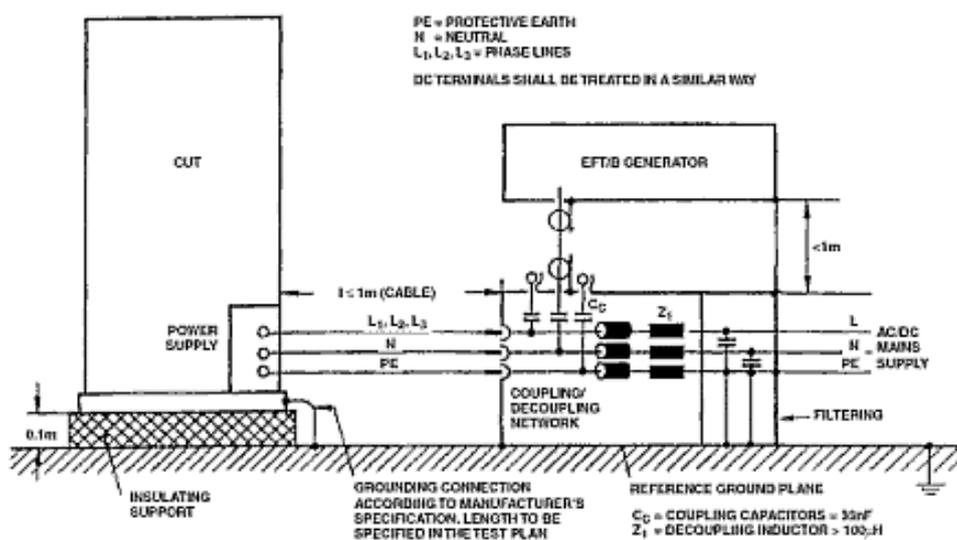


Electrostatic discharge immunity test – pulses location



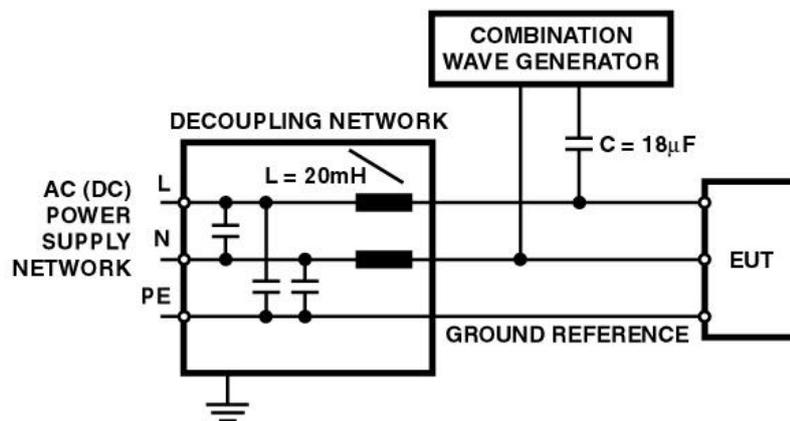
## 9.4 Test Setup EN 61000-4-4

### Burst immunity test



## 9.5 Test Setup EN 61000-4-5

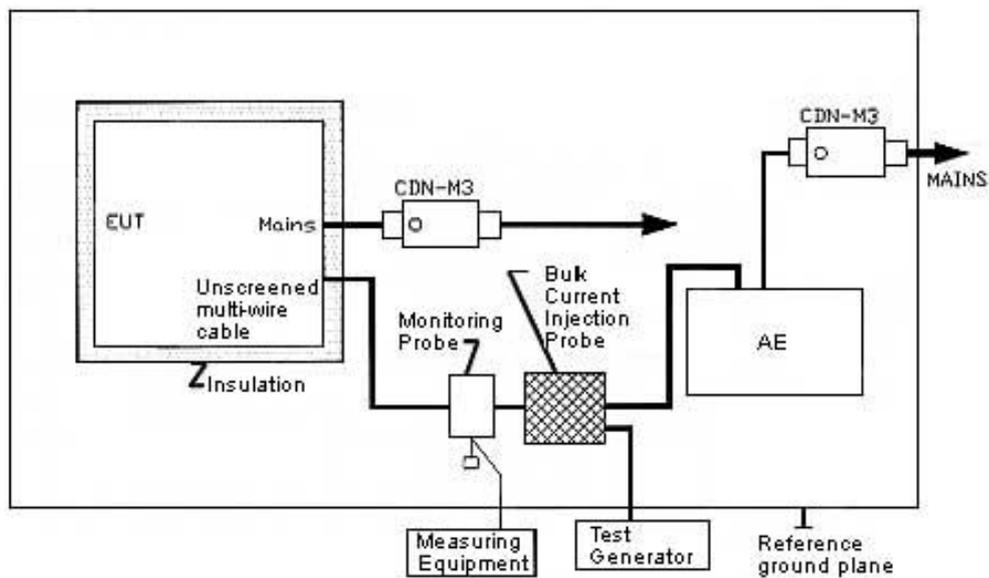
Surge immunity test



**TEST SETUP FOR CAPACITIVE COUPLING ON AC/DC LINES; LINE TO LINE COUPLING ACCORDING TO 7.2**

## 9.6 Test Setup EN 61000-4-6

Immunity to conducted disturbances induced by radio frequency fields test



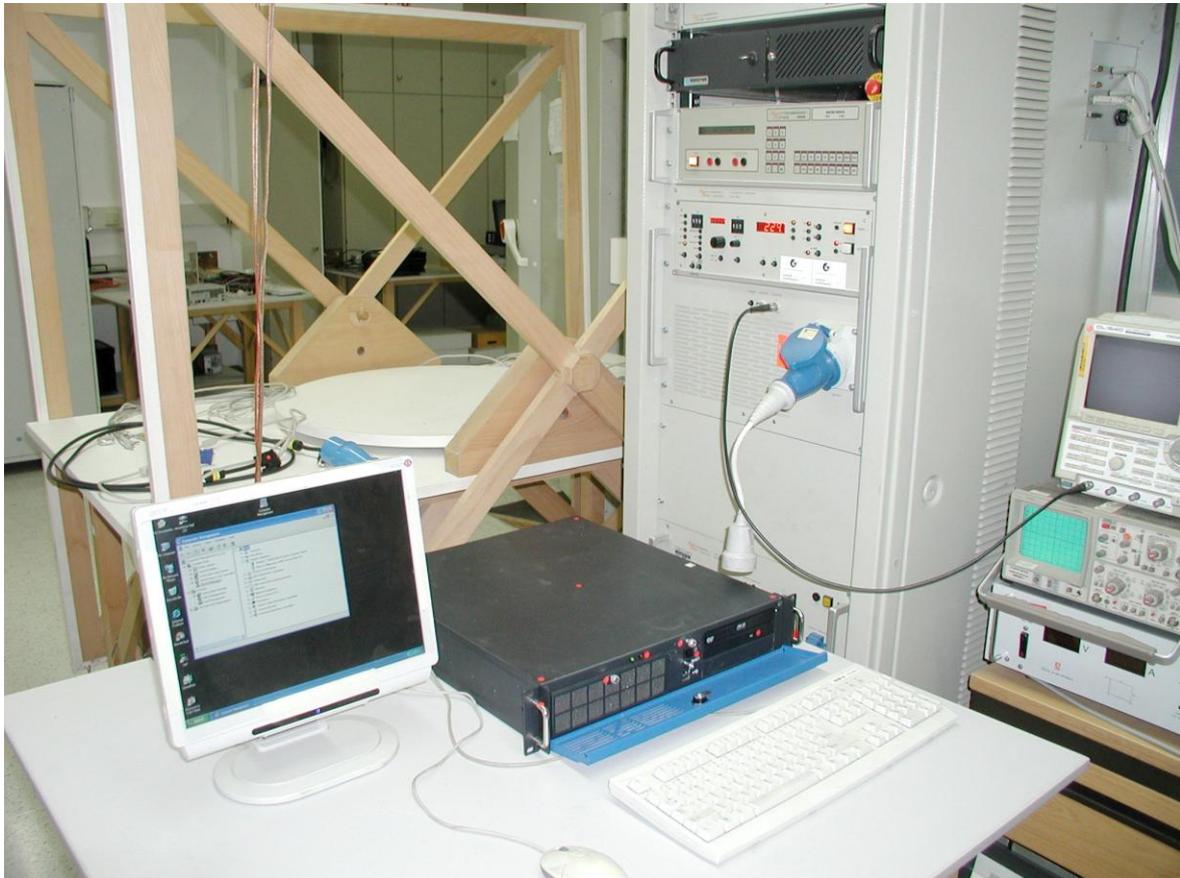
## 9.7 Test Setup EN 61000-4-8

EMC Laboratory- Kontron Embedded Computers GmbH- Helmholtz coil



## 9.8 Test Setup EN 61000-3-2; 3-3; - 4-11

Voltage dips, short interruption, and voltage variations immunity



## **10. Test Report (Forms)**

### **10.1 Test Report EN 55022**

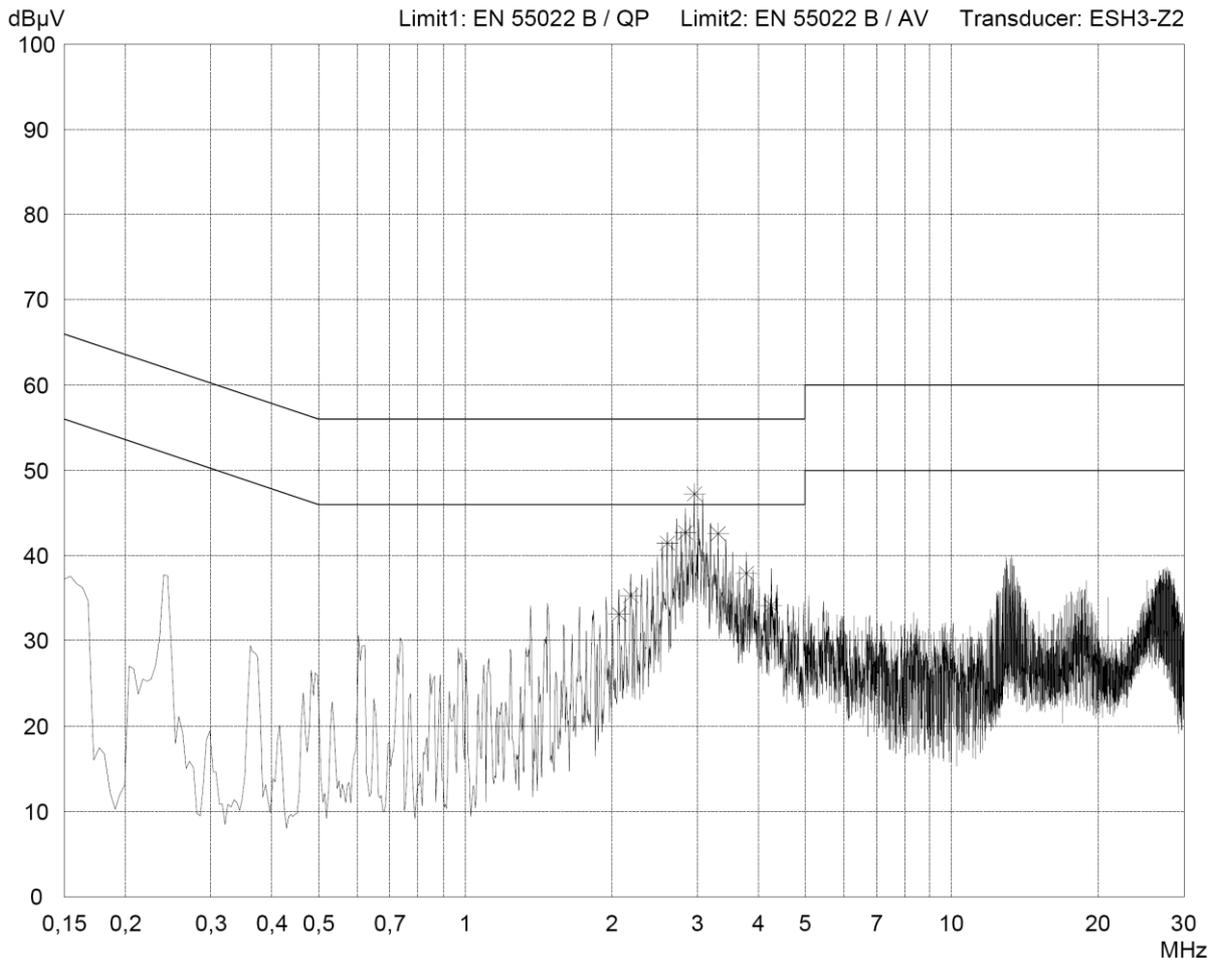
#### **Conducted and radiated emissions**

Conducted Emissions – Class B

Radiated emissions – Class A

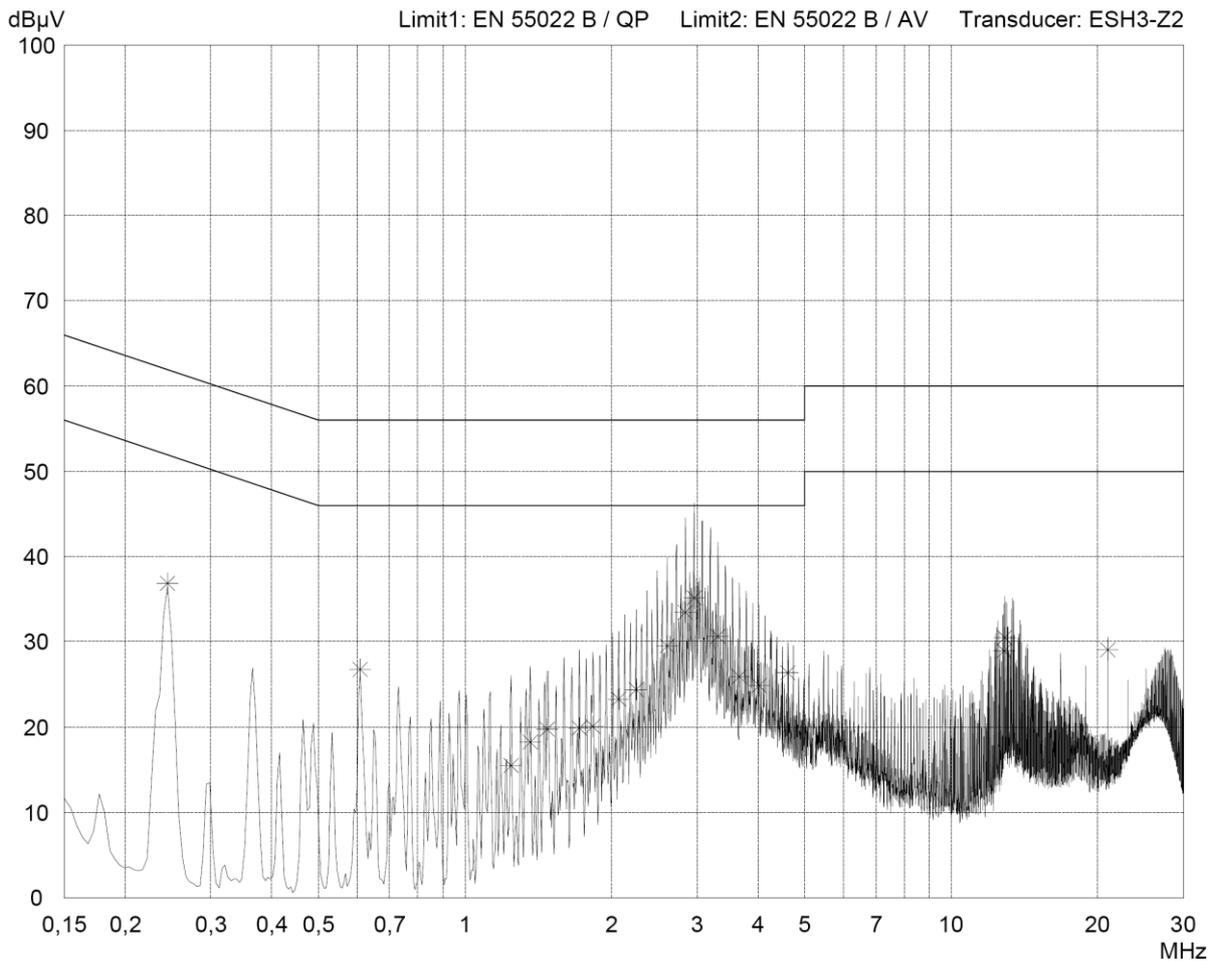
**Conducted Emission Test 150 kHz - 30 MHz  
acc. to KE\_150kHz-1gHz**

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Model: KISS 2U 965-A (2-A08C-2xxx)</td> </tr> <tr> <td colspan="2">Serial no.: 001</td> </tr> <tr> <td colspan="2">Applicant: Dumsky G.</td> </tr> <tr> <td colspan="2">Test site: Shielded room PM-EM-6172-1</td> </tr> <tr> <td colspan="2">Tested on: Linecord Phase L1</td> </tr> <tr> <td>Date of test: 05/11/2009</td> <td>Operator: H. Novak</td> </tr> <tr> <td>Test performed: automatically</td> <td>File name:</td> </tr> </table>	Model: KISS 2U 965-A (2-A08C-2xxx)		Serial no.: 001		Applicant: Dumsky G.		Test site: Shielded room PM-EM-6172-1		Tested on: Linecord Phase L1		Date of test: 05/11/2009	Operator: H. Novak	Test performed: automatically	File name:	<p>Comment:</p> <p>Power Supply: FSP300-60GL          KT965 Flex R16 (Q6700/2,66 GHz)          VGA PCI Matrox G550DH 32MB LP          PCI NET D-LINK DFE-528TX          Accessories: PS2 Keyb./Mouse, DVI Monitor</p> <p>BitPro v6.0 test SW: LAN port 50% load          LAN port on PCI D-LINK card</p>
Model: KISS 2U 965-A (2-A08C-2xxx)															
Serial no.: 001															
Applicant: Dumsky G.															
Test site: Shielded room PM-EM-6172-1															
Tested on: Linecord Phase L1															
Date of test: 05/11/2009	Operator: H. Novak														
Test performed: automatically	File name:														
<p>Detector: Peak / Final Results: QP</p>	<p>Final results: 20 dB Margin <span style="float: right;">50 Subranges</span></p>														



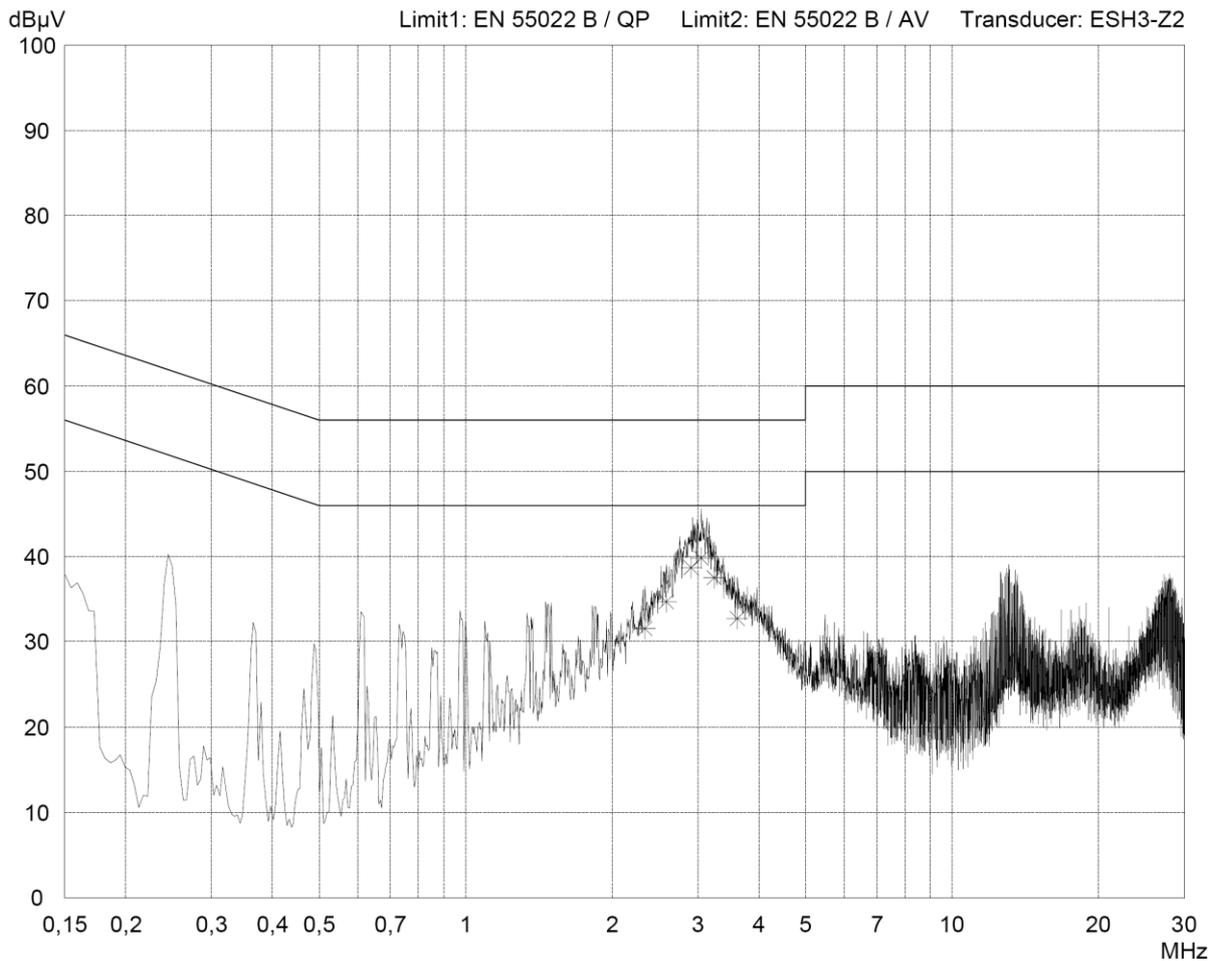
**Conducted Emission Test 150 kHz - 30 MHz**  
acc. to KE\_150kHz-1gHz

<p><b>Model:</b> KISS 2U 965-A (2-A08C-2xxx)</p> <p><b>Serial no.:</b> 001</p> <p><b>Applicant:</b> Dumsky G.</p> <p><b>Test site:</b> Shielded room PM-EM-6172-1</p> <p><b>Tested on:</b> Linecord Phase L1</p> <p><b>Date of test:</b> 05/11/2009      <b>Operator:</b> H. Novak</p> <p><b>Test performed:</b> automatically      <b>File name:</b></p>	<p><b>Comment:</b> Power Supply: FSP300-60GL KT965 Flex R16 (Q6700/2,66 GHz) VGA PCI Matrox G550DH 32MB LP PCI NET D-LINK DFE-528TX Accessories: PS2 Keyb./Mouse, DVI Monitor</p> <p>BitPro v6.0 test SW: LAN port 50% load LAN port on PCI D-LINK card</p>
<p><b>Detector:</b> Average / Final Results: AV</p>	<p><b>Final results:</b> 20 dB Margin                      50 Subranges</p>



**Conducted Emission Test 150 kHz - 30 MHz**  
acc. to KE\_150kHz-1gHz

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Model: KISS 2U 965-A (2-A08C-2xxx)</td> </tr> <tr> <td colspan="2">Serial no.: 001</td> </tr> <tr> <td colspan="2">Applicant: Dumsky G.</td> </tr> <tr> <td colspan="2">Test site: Shielded room PM-EM-6172-1</td> </tr> <tr> <td colspan="2">Tested on: Linecord Phase N</td> </tr> <tr> <td>Date of test: 05/11/2009</td> <td>Operator: H. Novak</td> </tr> <tr> <td>Test performed: automatically</td> <td>File name:</td> </tr> </table>	Model: KISS 2U 965-A (2-A08C-2xxx)		Serial no.: 001		Applicant: Dumsky G.		Test site: Shielded room PM-EM-6172-1		Tested on: Linecord Phase N		Date of test: 05/11/2009	Operator: H. Novak	Test performed: automatically	File name:	<p>Comment:</p> <p>Power Supply: FSP300-60GL          KT965 Flex R16 (Q6700/2,66 GHz)          VGA PCI Matrox G550DH 32MB LP          PCI NET D-LINK DFE-528TX          Accessories: PS2 Keyb./Mouse, DVI Monitor</p> <p>BitPro v6.0 test SW: LAN port 50% load          LAN port on PCI D-LINK card</p>
Model: KISS 2U 965-A (2-A08C-2xxx)															
Serial no.: 001															
Applicant: Dumsky G.															
Test site: Shielded room PM-EM-6172-1															
Tested on: Linecord Phase N															
Date of test: 05/11/2009	Operator: H. Novak														
Test performed: automatically	File name:														
<p>Detector: Peak / Final Results: QP</p>	<p>Final results: 20 dB Margin <span style="float: right;">50 Subranges</span></p>														



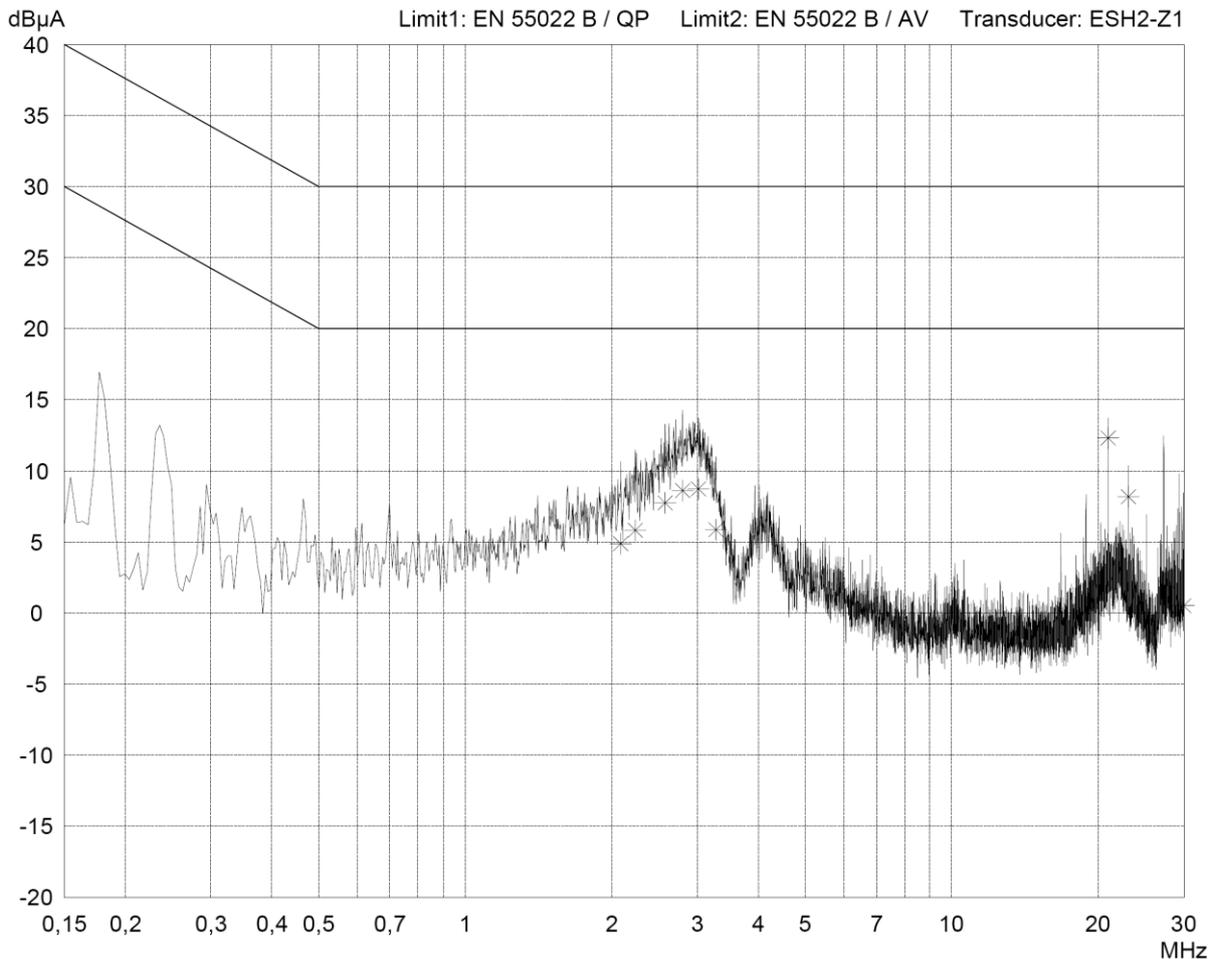






**Conducted Emission Test 150 kHz - 30 MHz  
acc. to HF Current measurement 9kHz-1GHz class B**

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Model: KISS 2U 965-A (2-A08C-2xxx)</td> <td rowspan="7" style="vertical-align: top; padding: 2px;"> <b>Comment:</b>                      Power Supply: FSP300-60GL                      KT965 Flex R16 (Q6700/2,66 GHz)                      VGA PCI Matrox G550DH 32MB LP                      PCI NET D-LINK DFE-528TX                      Accessories: PS2 Keyb./Mouse, DVI Monitor                       BitPro v6.0 test SW: LAN port 50% load                      LAN port on PCI D-LINK card                 </td> </tr> <tr> <td style="padding: 2px;">Serial no.: 001</td> </tr> <tr> <td style="padding: 2px;">Applicant: Dumsky G.</td> </tr> <tr> <td style="padding: 2px;">Test site: Shielded room PM-EM-6172-1</td> </tr> <tr> <td style="padding: 2px;">Tested on: Signal and data lines LAN D-Link</td> </tr> <tr> <td style="padding: 2px;">Date of test: 05/08/2009</td> <td style="padding: 2px;">Operator: H. Novak</td> </tr> <tr> <td style="padding: 2px;">Test performed: automatically</td> <td style="padding: 2px;">File name:</td> </tr> </table>	Model: KISS 2U 965-A (2-A08C-2xxx)	<b>Comment:</b> Power Supply: FSP300-60GL KT965 Flex R16 (Q6700/2,66 GHz) VGA PCI Matrox G550DH 32MB LP PCI NET D-LINK DFE-528TX Accessories: PS2 Keyb./Mouse, DVI Monitor  BitPro v6.0 test SW: LAN port 50% load LAN port on PCI D-LINK card	Serial no.: 001	Applicant: Dumsky G.	Test site: Shielded room PM-EM-6172-1	Tested on: Signal and data lines LAN D-Link	Date of test: 05/08/2009	Operator: H. Novak	Test performed: automatically	File name:	
Model: KISS 2U 965-A (2-A08C-2xxx)	<b>Comment:</b> Power Supply: FSP300-60GL KT965 Flex R16 (Q6700/2,66 GHz) VGA PCI Matrox G550DH 32MB LP PCI NET D-LINK DFE-528TX Accessories: PS2 Keyb./Mouse, DVI Monitor  BitPro v6.0 test SW: LAN port 50% load LAN port on PCI D-LINK card										
Serial no.: 001											
Applicant: Dumsky G.											
Test site: Shielded room PM-EM-6172-1											
Tested on: Signal and data lines LAN D-Link											
Date of test: 05/08/2009			Operator: H. Novak								
Test performed: automatically		File name:									
Detector: Peak / Final Results: QP	Final results: 20 dB Margin <span style="float: right;">50 Subranges</span>										









## 10.2 Test Report EN 61000-3-2

### Limits for harmonic current emissions

(Equipment input current less than or equal to 16 A per phase)

PowerFactorCorrector

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-3-2: 2000 + A2: 2005
<b>Requirements:</b>	Harmonic n = 40; Unit: _Arms
<b>Test result:</b>	PASS
<b>Classification:</b>	The requirements are fulfilled
<b>Date of test:</b>	month: 05      day: 12      year: 2009
<b>Tested by:</b>	P. Vesely

Spitzenberger + Spies  
Viechtach

Name:	Vesely P.	Serial no:	P001
Department:	RD-V	Operating modes:	230 VAC / 50 Hz
Company:	Kontron EC GmbH	Comment1:	
Test report no:		Comment2:	
Device:	KISS 2U 965	Comment3:	
Specimen:		Comment4:	
Manufacturer:	KEC	Date:	12.05.2009
Type:	2-A08C-2000	Test date:	12.05.2009

Maximum RMS current and corresponding values in timewindow 1:

Voltage:	229.72 Vrms		THD=0.05 %	THV=0.118 V	POH1
Current:	0.402 Arms	-0.721 Apk	THD=36.05 %	THC=0.138 A	POH2
Power:	83.9 W	P1=83.9 W	92.4 VA		
Powerfactor:	0.908	CosPhi1: 0.967			

Testconditions: EN 61000-3-2 / A14, f=50 Hz, Phase=1, Range=0.80 A, Rated power: 100.0 W

HARMONIC ANALYSIS: Test PASS

Tobs = entire measurement POHC: avg=0.014 A, limits=0.036 A Rated power exceeded and changed to 83.89 W

Ha	Entire measurement (0.320 s = 1 time window(s))					Worst 2.5 min		Average		P A S S	F A I L
	Maximum	Window	EN61000-3-2 Class D 75W	Margin in MaxWin	100 to 150%	Ex- ceeded	100 to 150%	Ex- ceeded	Value		
DC	0.0003 A	1	----	----	0	0	n.e.	n.e.	0.0003 A	0	X
1	0.3776 A	1	----	----	0	0	n.e.	n.e.	0.3776 A	0	X
2	0.0005 A	1	----	----	0	0	n.e.	n.e.	0.0005 A	0	X
3	0.1362 A	1	0.2852 A	-52.2 %	0	0	n.e.	n.e.	0.1362 A	0	X
4	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
5	0.0121 A	1	0.1594 A	-92.4 %	0	0	n.e.	n.e.	0.0121 A	0	X
6	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
7	0.0046 A	1	0.0839 A	-94.5 %	0	0	n.e.	n.e.	0.0046 A	0	X
8	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
9	0.0058 A	1	0.0419 A	-86.2 %	0	0	n.e.	n.e.	0.0058 A	0	X
10	0.0000 A	1	----	----	0	0	n.e.	n.e.	0.0000 A	0	X
11	0.0021 A	1	0.0294 A	-92.8 %	0	0	n.e.	n.e.	0.0021 A	0	X
12	0.0000 A	1	----	----	0	0	n.e.	n.e.	0.0000 A	0	X
13	0.0033 A	1	0.0248 A	-86.6 %	0	0	n.e.	n.e.	0.0033 A	0	X
14	0.0000 A	1	----	----	0	0	n.e.	n.e.	0.0000 A	0	X
15	0.0035 A	1	0.0215 A	-83.6 %	0	0	n.e.	n.e.	0.0035 A	0	X
16	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
17	0.0042 A	1	0.0190 A	-77.7 %	0	0	n.e.	n.e.	0.0042 A	0	X
18	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
19	0.0007 A	1	0.0170 A	-95.7 %	0	0	n.e.	n.e.	0.0007 A	0	X
20	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
21	0.0068 A	1	0.0154 A	-56.0 %	0	0	n.e.	n.e.	0.0068 A	0	X
22	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
23	0.0014 A	1	0.0140 A	-90.2 %	0	0	n.e.	n.e.	0.0014 A	0	X
24	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
25	0.0063 A	1	0.0129 A	-51.4 %	0	0	n.e.	n.e.	0.0063 A	0	X
26	0.0000 A	1	----	----	0	0	n.e.	n.e.	0.0000 A	0	X
27	0.0027 A	1	0.0120 A	-77.1 %	0	0	n.e.	n.e.	0.0027 A	0	X
28	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
29	0.0017 A	1	0.0111 A	-84.6 %	0	0	n.e.	n.e.	0.0017 A	0	X
30	0.0002 A	1	----	----	0	0	n.e.	n.e.	0.0002 A	0	X
31	0.0064 A	1	0.0104 A	-38.1 %	0	0	n.e.	n.e.	0.0064 A	0	X
32	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
33	0.0062 A	1	0.0098 A	-37.0 %	0	0	n.e.	n.e.	0.0062 A	0	X
34	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
35	0.0048 A	1	0.0092 A	-48.1 %	0	0	n.e.	n.e.	0.0048 A	0	X
36	0.0001 A	1	----	----	0	0	n.e.	n.e.	0.0001 A	0	X
37	0.0029 A	1	0.0087 A	-66.7 %	0	0	n.e.	n.e.	0.0029 A	0	X
38	0.0000 A	1	----	----	0	0	n.e.	n.e.	0.0000 A	0	X
39	0.0012 A	1	0.0083 A	-85.1 %	0	0	n.e.	n.e.	0.0012 A	0	X
40	0.0000 A	1	----	----	0	0	n.e.	n.e.	0.0000 A	0	X

Spitzenberger + Spies  
Viechtach

Name: Vesely P. Serial no: P001  
 Department: RD-V Operating modes: 230 VAC / 50 Hz  
 Company: Kontron EC GmbH Comment1:  
 Test report no: Comment2:  
 Device: KISS 2U 965 Comment3:  
 Specimen: Comment4:  
 Manufacturer: KEC Date: 12.05.2009  
 Type: 2-A08C-2000 Test date: 12.05.2009

Voltage: 229.72 Vrms THD=0.05 % THV=0.118 V POHV=0.025 V  
 Current: 0.402 Arms -0.721 Apk THD=36.05 % THC=0.138 A POHC=0.014 A  
 Power: 83.9 W P1=83.9 W 92.4 VA  
 Powerfactor: 0.908 CosPhi1: 0.967

Testconditions: EN 61000-3-2 / A14, f=50 Hz, Phase=1, Range=0.80 A, Rated power: 100.0 W

HARMONIC ANALYSIS: Test PASS in Timewindow 1 of 1  
 Rated power exceeded and changed to 83.89 W

Ha	Value	Percent	Angle	EN61000-3-2 Class D 75W	Margin	PASS	FAIL
DC	0.0003 A	0.07 %	--- - Deg	---	---	X	
1	0.3776 A	100.00 %	14.8 Deg	---	---	X	
2	0.0005 A	0.12 %	111.9 Deg	---	---	X	
3	0.1362 A	36.08 %	-150.4 Deg	0.2852 A	-52.2 %	X	
4	0.0001 A	0.03 %	54.0 Deg	---	---	X	
5	0.0121 A	3.21 %	-177.1 Deg	0.1594 A	-92.4 %	X	
6	0.0001 A	0.01 %	-13.8 Deg	---	---	X	
7	0.0046 A	1.21 %	10.7 Deg	0.0839 A	-94.5 %	X	
8	0.0001 A	0.02 %	-54.4 Deg	---	---	X	
9	0.0058 A	1.53 %	83.0 Deg	0.0419 A	-86.2 %	X	
10	0.0000 A	0.00 %	-81.5 Deg	---	---	X	
11	0.0021 A	0.56 %	163.9 Deg	0.0294 A	-92.8 %	X	
12	0.0000 A	0.01 %	140.4 Deg	---	---	X	
13	0.0033 A	0.88 %	133.8 Deg	0.0248 A	-86.6 %	X	
14	0.0000 A	0.01 %	44.7 Deg	---	---	X	
15	0.0035 A	0.93 %	47.9 Deg	0.0215 A	-83.6 %	X	
16	0.0001 A	0.01 %	-46.8 Deg	---	---	X	
17	0.0042 A	1.12 %	9.0 Deg	0.0190 A	-77.7 %	X	
18	0.0001 A	0.02 %	20.6 Deg	---	---	X	
19	0.0007 A	0.19 %	-119.3 Deg	0.0170 A	-95.7 %	X	
20	0.0001 A	0.02 %	-105.6 Deg	---	---	X	
21	0.0068 A	1.79 %	-69.0 Deg	0.0154 A	-56.0 %	X	
22	0.0001 A	0.03 %	-124.4 Deg	---	---	X	
23	0.0014 A	0.36 %	-128.0 Deg	0.0140 A	-90.2 %	X	
24	0.0001 A	0.02 %	60.3 Deg	---	---	X	
25	0.0063 A	1.66 %	142.5 Deg	0.0129 A	-51.4 %	X	
26	0.0000 A	0.01 %	-174.5 Deg	---	---	X	
27	0.0027 A	0.73 %	-78.4 Deg	0.0120 A	-77.1 %	X	
28	0.0001 A	0.03 %	-170.2 Deg	---	---	X	
29	0.0017 A	0.45 %	155.7 Deg	0.0111 A	-84.6 %	X	
30	0.0002 A	0.04 %	52.4 Deg	---	---	X	
31	0.0064 A	1.71 %	99.4 Deg	0.0104 A	-38.1 %	X	
32	0.0001 A	0.03 %	-12.4 Deg	---	---	X	
33	0.0062 A	1.63 %	-3.8 Deg	0.0098 A	-37.0 %	X	
34	0.0001 A	0.04 %	-109.6 Deg	---	---	X	
35	0.0048 A	1.27 %	-68.1 Deg	0.0092 A	-48.1 %	X	
36	0.0001 A	0.02 %	135.2 Deg	---	---	X	
37	0.0029 A	0.77 %	-149.0 Deg	0.0087 A	-66.7 %	X	
38	0.0000 A	0.01 %	35.6 Deg	---	---	X	
39	0.0012 A	0.33 %	159.1 Deg	0.0083 A	-85.1 %	X	
40	0.0000 A	0.01 %	-31.4 Deg	---	---	X	

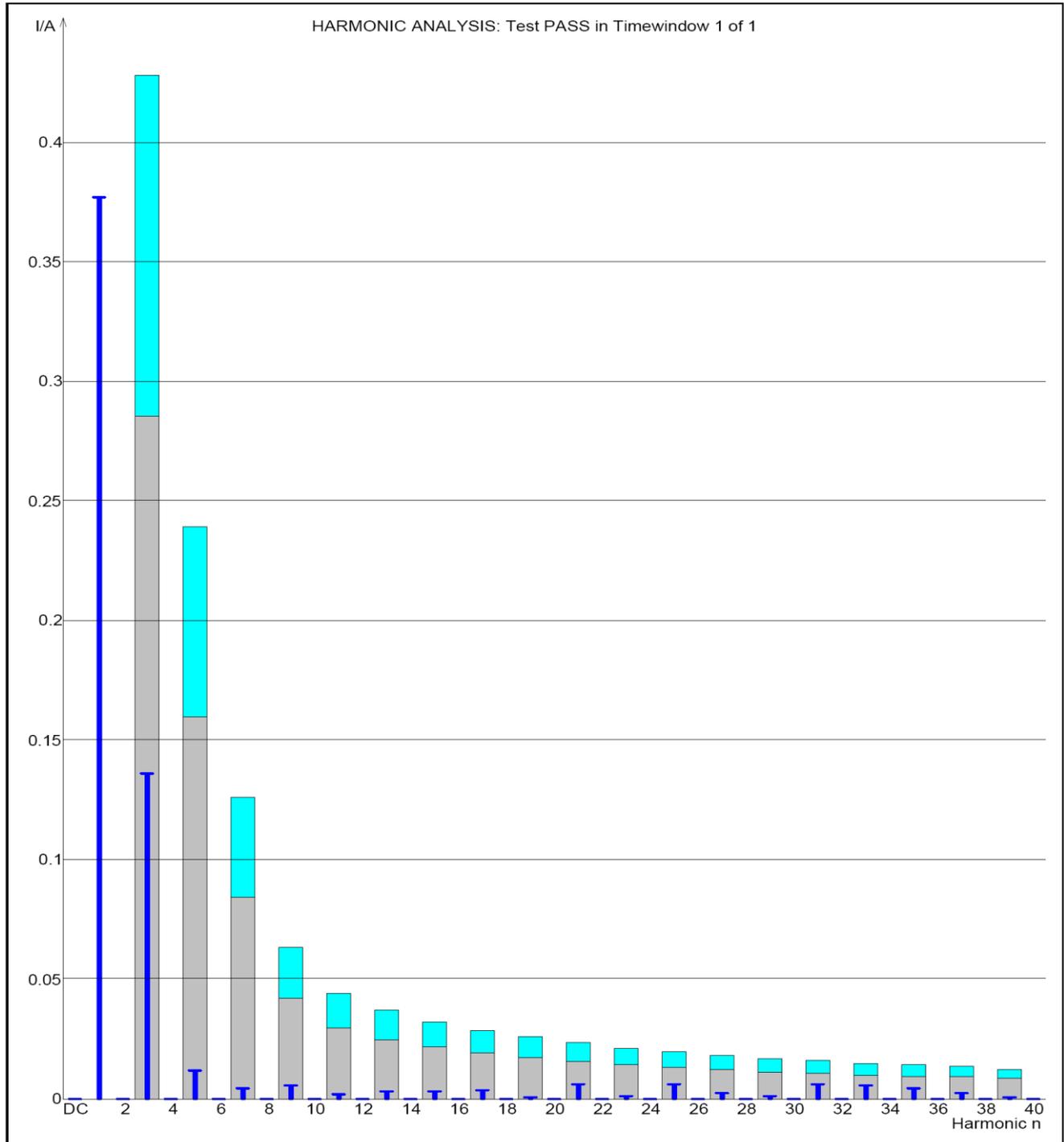
Spitzenberger + Spies  
Viechtach

Name: Vesely P.  
Department: RD-V  
Company: Kontron EC GmbH  
Test report no:  
Device: KISS 2U 965  
Specimen:  
Manufacturer: KEC  
Type: 2-A08C-2000

Serial no: P001  
Operating modes: 230 VAC / 50 Hz  
Comment1:  
Comment2:  
Comment3:  
Comment4:  
Date: 12.05.2009  
Test date: 12.05.2009

Voltage:	229.72 Vrms		THD=0.05 %	THV=0.118 V	POHV=0.025 V
Current:	0.402 Arms	-0.721 Apk	THD=36.05 %	THC=0.138 A	POHC=0.014 A
Power:	83.9 W	P1=83.9 W	92.4 VA		
Powerfactor:	0.908	CosPhi1: 0.967			
Testconditions:	EN 61000-3-2 / A14, f=50 Hz, Phase=1, Range=0.80 A				

Spektrum Zeitfenster 1 von 1 - EN61000-3-2 Class D 75W



## 10.3 Test Report EN 61000-3-3

### Limits for Voltage Fluctuation and Flicker

(Equipment input current less than or equal to 16 A per phase)

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-3-3: 1995 + A1: 2001 + A2: 2005
<b>Requirements:</b>	Short-time flicker $P_{st} \leq 1$ (Observations 1x10 min) sliding $Plt \leq 0,65$ ; $dC \leq 3,3$ (%); $d_{max} \leq 4$ (%); $d(t) > 3,3\%$ (Sec)
<b>Test result:</b>	PASS
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05      day: 12      year: 2009
<b>Tested by:</b>	P. Vesely

Spitzenberger + Spies  
Viechtach

Name:	Vesely P.	Serial no:	P001
Department:	RD-V	Operating modes:	230 VAC / 50 Hz
Company:	Kontron EC GmbH	Comment1:	
Test report no:		Comment2:	
Device:	KISS 2U 965	Comment3:	
Specimen:		Comment4:	
Manufacturer:	KEC	Date:	12.05.2009
Type:	2-A08C-2000	Test date:	12.05.2009

Testconditions: 230 V / 50 Hz / Phase: 1 / Observations: 1 x 10 min

FLICKER: Test PASS!

Time	Pmax	Pst	Sliding Plt	d(t)>3.30% [s]	dmax [%]	dc [%]	PASS	FAIL	
13:22:48	0.001	0.0280	- . - - - -	0.000	0.081	- . - - - -	X		
Limits:		1.000	0.650	0.500	4.000	3.300			
Plt: 0.028000									
Evaluated: PST									

FLICKER: Source test PASS!

Time	Pmax	Pst	Sliding Plt	d(t)>3.30% [s]	dmax [%]	dc [%]	PASS	FAIL	
13:22:48	0.000	0.0120	- . - - - -	0.000	0.082	- . - - - -	X		
Plt: 0.012000									
Evaluated: PST <= 0.4 dmax < 20% dmax1									

## 10.4 Test Report EN 61000-4-2

### Electrostatic Discharge Immunity test – Indirect action

<b>Model:</b>	KISS 2U 965																	
<b>Applicant:</b>	Kontron Embedded Computers GmbH																	
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)																	
<b>Regulation(s):</b>	EN 61000-4-2: 1995 + A1: 1998 + A2: 2001																	
<b>Performed test:</b>	Contact discharge									Air discharge								
<b>Locations of discharge:</b>	Several points close to EUT at horizontal coupling plate																	
<b>Tested severity level/ voltage:</b>	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	kV
	+	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	kV
<b>Locations of discharge:</b>	Several points close to EUT at vertical coupling plate																	
<b>Tested severity level/ voltage:</b>	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	kV
	+	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	kV
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion B)																	
<b>Test result:</b>	No errors detected.																	
<b>Classification:</b>	The requirements are fulfilled.																	
<b>Date of test:</b>	month: 05					day: 07					year: 2009							
<b>Tested by:</b>	P. Vesely																	

1 tested

1 not tested

## 10.5 Test Report EN 61000-4-2

### Electrostatic Discharge Immunity test – Direct action

<b>Model:</b>	KISS 2U 965										
<b>Applicant:</b>	Kontron Embedded Computers GmbH										
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)										
<b>Regulation(s):</b>	EN 61000-4-2: 1995 + A1: 1998 + A2: 2001										
<b>Performed test:</b>	Contact discharge					Air discharge					
<b>Locations of discharge:</b>	Whole surface of the EUT										
<b>Tested severity level/ voltage:</b>	-	1	2	3	4	5	6	7	8		kV
	+	1	2	3	4	5	6	7	8		kV
<b>Locations of discharge:</b>	All conductive parts of EUT accessible to normal user										
<b>Tested severity level/ voltage:</b>	-	1	2	3	4	5	6	7	8		kV
	+	1	2	3	4	5	6	7	8		kV
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion B)										
<b>Test result:</b>	No errors detected.										
<b>Classification:</b>	The requirements are fulfilled.										
<b>Date of test:</b>	month:	05	day:	07	year:	2009					
<b>Tested by:</b>	P. Vesely										

1 tested

1 not tested

## 10.6 Test Report EN 61000-4-4 Electrical Fast Transients

### Burst Immunity test - Power Lines (Coupling Filter)

<b>Model:</b>	KISS 2U 965								
<b>Applicant:</b>	Kontron Embedded Computers GmbH								
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)								
<b>Regulation(s):</b>	EN 61000-4-4: 2004								
<b>Performed test:</b>	Capacitive coupling with coupling/decoupling network								
<b>Coupling via:</b>	Coupling filter								
<b>Coupling to:</b>	Power Line: L								
<b>Tested severity level/ pulse amplitude:</b>	+		0.5	1.0	2.0	4.0		kV	
	-		0.5	1.0	2.0	4.0		kV	
<b>Coupling to:</b>	Power Line: N								
<b>Tested severity level/ pulse amplitude:</b>	+		0.5	1.0	2.0	4.0		kV	
	-		0.5	1.0	2.0	4.0		kV	
<b>Coupling to:</b>	Power Line: PE								
<b>Tested severity level/ pulse amplitude:</b>	+		0.5	1.0	2.0	4.0		kV	
	-		0.5	1.0	2.0	4.0		kV	
<b>Coupling to:</b>	Power Line: L, N, PE								
<b>Tested severity level/ pulse amplitude:</b>	+		0.5	1.0	2.0	4.0		kV	
	-		0.5	1.0	2.0	4.0		kV	
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion B)								
<b>Test result:</b>	No inadmissible errors detected.								
<b>Classification:</b>	The requirements are fulfilled.								
<b>Date of test:</b>	month:	05	day:	07	year:	2009			
<b>Tested by:</b>	P. Vesely								
1	tested	1	not tested						

## 10.7 Test Report EN 61000-4-4

### Electrical Fast Transients/Burst Immunity test - Data Lines (Coupling Clamp)

<b>Model:</b>	KISS 2U 965							
<b>Applicant:</b>	Kontron Embedded Computers GmbH							
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)							
<b>Regulation(s):</b>	EN 61000-4-4: 2004							
<b>Performed test:</b>	Capacitive coupling with capacitive coupling clamp							
<b>Coupling via:</b>	Capacitive coupling clamp							
<b>Coupling to:</b>	Data Lines: COM1÷2, USB3÷10, LAN1÷3 and DVI1÷2 Test Cables							
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV
<b>Coupling to:</b>								
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV
<b>Coupling to:</b>								
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV
<b>Coupling to:</b>								
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion B)							
<b>Test result:</b>	No errors detected.							
<b>Classification:</b>	The requirements are fulfilled.							
<b>Date of test:</b>	month:	05	day:	07	year:	2009		
<b>Tested by:</b>	P. Vesely							
<b>1</b> tested								<b>1</b> not tested

## 10.8 Test Report EN 61000-4-5

### Surge Immunity test - Power Lines

<b>Model:</b>	KISS 2U 965							
<b>Applicant:</b>	Kontron Embedded Computers GmbH							
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)							
<b>Regulation(s):</b>	EN 61000-4-5: 1995 + A1: 2001							
<b>Performed test:</b>	Capacitive coupling with coupling/decoupling network							
<b>Coupling to:</b>	Symmetrical coupling between L1 and L2							
<b>Tested severity level/ pulse amplitude:</b>	+		0.5	1.0	2.0	4.0		kV
	-		0.5	1.0	2.0	4.0		kV
<b>Coupling to:</b>	Asymmetrical coupling onto L1							
<b>Tested severity level/ pulse amplitude:</b>	+		0.5	1.0	2.0	4.0		kV
	-		0.5	1.0	2.0	4.0		kV
<b>Coupling to:</b>	Asymmetrical coupling onto L2							
<b>Tested severity level/ pulse amplitude:</b>	+		0.5	1.0	2.0	4.0		kV
	-		0.5	1.0	2.0	4.0		kV
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion B)							
<b>Test result:</b>	No inadmissible errors detected.							
<b>Classification:</b>	The requirements are fulfilled.							
<b>Date of test:</b>	month: 05		day: 11		year: 2009			
<b>Tested by:</b>	H. Novak							

1 tested

1 not tested

## 10.9 Test Report EN 61000-4-5

### Surge Immunity test - Shielded Data Lines

<b>Model:</b>	KISS 2U 965								
<b>Applicant:</b>	Kontron Embedded Computers GmbH								
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)								
<b>Regulation(s):</b>	EN 61000-4-5: 1995 + A1: 2001								
<b>Performed test:</b>	Coupling direct onto shield								
<b>Coupling to:</b>	Data Line: Coupling onto LAN1 ÷ 3 Test Cables								
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV	
	-	0.25	0.5	1.0	2.0	4.0		kV	
<b>Coupling to:</b>	Data Line: Coupling onto COM1 ÷ 2 Test Cables								
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV	
	-	0.25	0.5	1.0	2.0	4.0		kV	
<b>Coupling to:</b>	Data Line:								
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV	
	-	0.25	0.5	1.0	2.0	4.0		kV	
<b>Coupling to:</b>	Data Line:								
<b>Tested severity level/ pulse amplitude:</b>	+	0.25	0.5	1.0	2.0	4.0		kV	
	-	0.25	0.5	1.0	2.0	4.0		kV	
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion B).								
<b>Test result:</b>	No inadmissible errors detected.								
<b>Classification:</b>	The requirements are fulfilled.								
<b>Date of test:</b>	month: 05		day: 11		year: 2009				
<b>Tested by:</b>	H. Novak								

tested

not tested

## 10.10 Test Report EN 61000-4-6

### Immunity to Conducted Disturbances Induced by RF Fields – Power Lines

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-6: 1996 + A1: 2001
<b>Requirements:</b>	150 kHz to 230 MHz : 10 V <sub>eff</sub>
<b>Interfering signal:</b>	Modulation: AM Modulation depth: 80 % Modulation frequency: 1 kHz Step size: 1 % Dwell time: 1 s
<b>Coupling to:</b>	Power cables
<b>Coupling with:</b>	CDN: FCC-M3; S/N: 9720; PM-EM-7544-1
<b>Performance criteria:</b>	No temporary degradation or loss of function or performance (criterion A)
<b>Test result:</b>	No errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05      day: 11      year: 2009
<b>Tested by:</b>	H. Novak

## 10.11 Test Report EN 61000-4-6

### Immunity to Conducted Disturbances Induced by RF Fields – Data Lines

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-6: 1996 + A1: 2001
<b>Requirements:</b>	150 kHz to 230 MHz : 10 V <sub>eff</sub>
<b>Interfering signal:</b>	Modulation: AM Modulation depth: 80 % Modulation frequency: 1 kHz Step size: 1 % Dwell time: 1 s
<b>Coupling to:</b>	COM1÷2, USB3÷10, LAN1÷3 and DVI1÷2 Test Cables
<b>Coupling with:</b>	F 120-9A; S/N: 20; PM-EM-7546-1
<b>Performance criteria:</b>	No temporary degradation or loss of function or performance (criterion A)
<b>Test result:</b>	No errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05      day: 11      year: 2009
<b>Tested by:</b>	H. Novak

## 10.12 Test Report EN 61000-4-8

### Power Frequency Magnetic Field Immunity Test

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-8: 1993 + A1: 2001
<b>Requirements:</b>	50 Hz; 30 A/m
<b>Performance criteria:</b>	No temporary degradation or loss of function or performance (criterion A)
<b>Test result:</b>	No errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05      day: 11      year: 2009
<b>Tested by:</b>	H. Novak

## 10.13 Test Report EN 61000-4-11

### Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-11: 2004
<b>Requirements:</b>	AC input: 100 % - 10ms reduction
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion C).
<b>Test result:</b>	No errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05      day: 12      year: 2009
<b>Tested by:</b>	H. Novak

## 10.14 Test Report EN 61000-4-11

### Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-11: 2004
<b>Requirements:</b>	AC input: 100 % - 20ms reduction
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion C).
<b>Test result:</b>	No errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05          day: 12          year: 2009
<b>Tested by:</b>	H. Novak

## 10.15 Test Report EN 61000-4-11

### Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-11: 2004
<b>Requirements:</b>	AC input: 60 % - 0,2s reduction
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion C).
<b>Test result:</b>	No inadmissible errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05          day: 12          year: 2009
<b>Tested by:</b>	H. Novak

## 10.16 Test Report EN 61000-4-11

### Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-11: 2004
<b>Requirements:</b>	AC input: 30 % - 0,5s reduction
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion C).
<b>Test result:</b>	No errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05            day: 12            year: 2009
<b>Tested by:</b>	H. Novak

## 10.17 Test Report EN 61000-4-11

### Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-11: 2004
<b>Requirements:</b>	AC input: 20 % - 5s reduction
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion C).
<b>Test result:</b>	No errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05          day: 12          year: 2009
<b>Tested by:</b>	H. Novak

## 10.18 Test Report EN 61000-4-11

### Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

<b>Model:</b>	KISS 2U 965
<b>Applicant:</b>	Kontron Embedded Computers GmbH
<b>Operation mode:</b>	Test software: see Point 4.1 (Operation Mode)
<b>Regulation(s):</b>	EN 61000-4-11: 2004
<b>Requirements:</b>	AC input: 100 % - 5000ms reduction
<b>Performance criteria:</b>	Temporary degradation or loss of function or performance (criterion C).
<b>Test result:</b>	No inadmissible errors detected.
<b>Classification:</b>	The requirements are fulfilled.
<b>Date of test:</b>	month: 05          day: 12          year: 2009
<b>Tested by:</b>	H. Novak

## 11. Measurement Uncertainty Values:

### 11.1 Emission Testing

Used measuring instrument	Unit	Tolerance
Test Receiver ESMI		< 1,5dB
LISN ESH3-Z5		$\leq \pm 20\%$
LISN ESH3-Z6		$\leq \pm 20\%$
LISN ENV4200		$\leq \pm 20\%$
Pulse Limiter ESH3-Z3		$\leq \pm 0,2\text{dB}$
Cable attenuation incl. PSU 10kHz - 30MHz 30MHz - 200MHz 200MHz - 1GHz		$\leq \pm 0,5\text{dB}$ $\leq \pm 1,5\text{dB}$ $\leq \pm 2,7\text{dB}$
Pre Amplifier ESMI-Z7		max. + 2dB/-1dB
Current Clamp -ESH2-Z1	uA	$\leq \pm 1\text{dB}$
Current Clamp -ESV-Z1	uA	$\leq \pm 0,5\text{dB}$
Current Clamp -F61	uA	$\leq \pm 1,8\text{dB}$
Current Clamp F-65A	uA	$\leq \pm 1,8\text{dB}$
Current Clamp F-36-4	uA	$\leq \pm 1,8\text{dB}$
Current Clamp F-2000	uA	$\leq \pm 1,8\text{dB}$

## 11.2 Immunity Testing

Used measuring instrument	Unit	Tolerance
Harmonics current PHE5000/PAS	Measured current	$\pm 1 \%$
Flicker PHE5000/PAS	Higher than specified by IEC868 + AMD 1	
PHE5000/PAS	Adjusted voltage	$\pm 1 \%$
ESD generator NSG 435	Air discharge	$\pm 5 \%$
	Contact discharge	$\pm 5 \%$
Burst generator NSG 2025	Test level voltage	$\pm 10 \%$
	Frequency	$\pm 2 \%$
	Phase angle	$\pm 2^\circ$
	Pulse rise time:	
	BNC output below 1500V	$\pm 30 \%$
	BNC output above 1500V	$\pm 20 \%$
	Mains output	$\pm 30 \%$
Pulse width:	$\pm 30 \%$	
Generator impedance:	$\pm 10 \%$	
Surge generator NSG 650	Test level voltage	$\pm 10 \%$
	Phase angle	$V \leq 4 \text{ kV} \pm 15^\circ$ $V > 4 \text{ kV} \pm 25^\circ$
Current Clamp -F61	uA	$\leq \pm 1,8\text{dB}$
Current Clamp F-65A	uA	$\leq \pm 1,8\text{dB}$
Current Clamp F-120-9A	uA	$\leq \pm 1,8\text{dB}$
EM-Clamp	uA	$\leq \pm 1,8\text{dB}$
19" Rack EN61000-4-6	Frequency	$\leq \pm 0,1\text{Hz}$
	Output Level	$\leq \pm 2\text{dB}$