Auftrag: [Order] Untersuchung zur CE-Kennzeichnung [Test for CE Certification]

Prüfbericht-Nr.: [Test Report No.]: **2017012** **Auftrag-Nr. :** 201009636 [Order No.]:

Prüfling [Test device]: **Power supply**
Modell [Model]: DRF-960-24-1
Serien-Nr. [Serial No.]: SN 2

Auftraggeber: [Customer]:
TDK-Lambda UK Limited
Kingsley Avenue
Ilfracombe
Devon, EX34 8ES
United Kingdom

Prüflabor: [Test Laboratory]:
RS Schwarze Elektrotechnik
Moderne Industrieelektronik GmbH
Tel.: 05207/9506-80
An der Heller 33
33758 Schloß Holte-Stukenbrock

DAkkS Deutsche Akkreditierungsstelle D-PL-12075-01-00

„Durch die DAkkS nach DIN EN ISO/IEC 17025 akkreditiertes Prüflaboratorium.
Die Akkreditierung gilt nur für den in der Urkundenanlage [D-PL-12075-01-00] aufgeführten Akkreditierungsumfang."

Geprüft durch [Tested by]: Bruno Erdbories

Eingangsdatum [Date received]: 24.01.2017

Prüfzeitraum [Date of test]: 24.01. - 25.01.2017

Testergebnis: [Test result]: **Anforderungen erfüllt** requirements met

Hinweis: Die Prüfergebnisse beziehen sich ausschließlich auf die genannten Prüfgegenstände. Die Prüfgegenstände sind nach den Abnahmeprüfungen für mindestens 5 Jahre in unverändertem Zustand aufzubewahren. Das Testergebnis bezieht sich ausschließlich auf die Auswertung der im EMV-Labor angewandten Mess- / Prüfverfahren (Seite 3), weitere Anforderungen aus den Produktnormen (Prüfgrundlage Seite 2) wurden nicht berücksichtigt.

[Note]: The test results refer exclusively to the test objects. The test objects are to be stored in unchanged condition for at least 5 years after compliance tests. The test result applies only to the evaluation of applied Testing and measured techniques (page 3) in the EMC laboratory. Further requirements of the product standards (test basis page 2) were not considered.

Ort, Datum: [City, Date]

Schloß Holte, 31. Januar 2017

Unterschrift: [Signature]

B. Erdbories

Laborleiter
B. Erdbories

Ohne schriftliche Genehmigung des Prüflaboratoriums darf der Bericht nicht auszugsweise vervielfältigt werden.
[The test report shall not be reproduced except in full, without written approval of the laboratory.]

Prüfgrundlage/Datierung der Normausgabe [Applied standards/Dating of standard edition]:

German Standard (DIN EN)	European Standard	IEC/CISPR-Standard
DIN EN 61000-6-2; VDE 0839-6-2:2006-03	EN 61000-6-2:2005	IEC 61000-6-2:2005
DIN EN 61000-6-3; VDE 0839-6-3:2011-09	EN 61000-6-3:2007 + A1:2011	IEC 61000-6-3:2006 + A1:2010
DIN EN 61204-3; VDE 0557-3:2001-10	EN 61204-3:2000	

Die im vorliegenden Prüfbericht dokumentierten Prüfungen wurden jeweils nach den in der Prüfgrundlage und in den normativen Referenzen des Prüfberichtes datierten Normen durchgeführt. In den Anlagen werden für die Bestandteile der Prüfung Normangaben ohne Datierung verwendet, dann beziehen sich diese Verweise jeweils auf die Normen, wie sie in der Prüfgrundlage und in den normativen Referenzen genannt sind.
The tests documented in this test report were performed according to the dated edition of the standards as listed in the applied standards and in the normative references. All standards within the protocol that are not dated refer to the dated edition of the standard as listed in the applied standards and in the normative references.

Umgebungsbedingungen [Environmental reference conditions]**:**

Wenn durch das für die Fachgrundnorm und/oder Produktnorm zuständige Technische Komitee nichts anderes festgelegt ist, müssen die klimatischen Bedingungen während der Prüfungen innerhalb jeglicher für den Betrieb des Prüflings und die Prüfeinrichtung durch den Hersteller angegebenen Grenzen liegen.
If not defined otherwise by the Technical Committee responsible for the generic standard and/or the product standard, the climatic conditions during the tests have to be within the limits specified by the manufacturer for the operation of the EUT and the test equipment.

Die Klimabedingungen während der Prüfungen lagen innerhalb der folgenden Grenzen:
The climatic conditions during the tests were within the following limits:

Temperatur [Temperature]	Luftfeuchte [Humidity]	Luftdruck [Atmospheric pressure]
15 °C – 35 °C	30 % – 60%	860 hPa – 1060 hPa

Sofern dies in der Prüfgrundlage (Grundnorm) ausdrücklich gefordert ist, werden die Klimawerte während der jeweiligen Prüfung erfasst und gesondert ausgewiesen.
If explicitly required in the test base (basic standard), the climatic values are recorded and documented separately for the respective test.

Prüfkonfiguration [Test configuration]:

See appendix page A1, A2 and A56 to A62.

Übersicht über die EMV-Prüfergebnisse [Result of EMC Tests]:

Störfestigkeitsprüfungen [Immunity tests]		
Prüfung nach [Test according to]	**Grundnormen** [Basic standard]	**Ergebnis** [Test result]
Prüfung der Störfestigkeit gegen die Entladung statischer Elektrizität [Electrostatic discharge immunity test (ESD)]	EN 61000-4-2	Bestanden [Passed]
Prüfung der Störfestigkeit gegen hochfrequente elektromagnetische Felder [Radiated, radio-frequency, electromagnetic field immunity test]	EN 61000-4-3	Bestanden [Passed]
Prüfung der Störfestigkeit gegen schnelle transiente elektrische Störgrößen / Burst [Electrical fast transients / burst immunity test]	EN 61000-4-4	Bestanden [Passed]
Prüfung der Störfestigkeit gegen Stoßspannungen [Surge immunity test]	EN 61000-4-5	Bestanden [Passed]
Störfestigkeit gegen leitungsgeführte Störgrößen, induziert durch hochfrequente Felder [Immunity to conducted disturbances, induced by radio-frequency fields]	EN 61000-4-6	Bestanden [Passed]
Prüfung der Störfestigkeit gegen Magnetfelder mit energietechnischen Frequenzen [Power frequency magnetic field immunity test]	EN 61000-4-8	Bestanden [Passed]
Prüfung der Störfestigkeit gegen Spannungseinbrüche, Kurzzeitunterbrechungen und Spannungsschwankungen [Voltage dips, short interruptions and voltage variations immunity test]	EN 61000-4-11	Bestanden [Passed]
Störfestigkeit am Wechselstrom-Netzanschluss gegen Oberschwingungen und Zwischenharmonische einschließlich leitungsgeführter Störgrößen aus der Signalübertragung auf elektrischen Niederspannungsnetzen [Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests]	EN 61000-4-13	Nicht anzuwenden [n/a]

Störaussendungsprüfungen [Radio disturbance measurements]		
Prüfung nach [Test according to]	**Referenznormen** [Reference standard]	**Ergebnis** [Test result]
Messung der Oberschwingungsströme [Measurement of harmonic current emissions]	EN 61000-3-2	Bestanden [Passed]
Begrenzung von Spannungsänderungen, Spannungsschwankungen und Flicker [Limitation of voltage changes, voltage fluctuations and flicker]	EN 61000-3-3	Bestanden [Passed]
Leitungsgeführte Störgrößen/Störspannung/Störstrom [Conducted disturbances/disturbance voltage/disturbance current]	EN 61000-6-3 EN 55022 class B EN 55032 class B	Bestanden [Passed]
Gestrahlte Störgrößen/elektrische Feldstärke [Radiated disturbances/electric field strength]	EN 61000-6-3 EN 55022 class B EN 55032 class B	Bestanden [Passed]

Hinweis [Note]:
Die Prüfung wurde auf Wunsch des Kunden nach den aktuellsten Ausgabeständen der Grundnormen durchgeführt. Ein Vergleich zwischen den Ausgabeständen aus dem Anhang ZA der Produktnorm und den aktuellen Ausgabeständen ergab keine Abweichungen bei den Prüfungsanforderungen. Bei Änderungen/Unterschieden werden die Anforderungen aus den alten Normen durch die Anforderungen aus den aktuellen Normen mit abgedeckt.
The test was performed upon a request of the customer according to the current edition of the basic standards. A comparison between the editions from the annex ZA of the product standard and the current edition showed no deviations in the test requirements. In case of modifications/differences in the standards, the requirements of the ancient standards will be also covered by the requirements of the current standards.

Normative Referenzen [Normative references]**:**

German Standard (DIN EN)	European Standard	IEC/CISPR-Standard
DIN EN 61000-4-2; VDE 0847-4-2:2009-12	EN 61000-4-2:2009	IEC 61000-4-2:2008
DIN EN 61000-4-3; VDE 0847-4-3:2011-04	EN 61000-4-3:2006 + A1:2008 + A2:2010	IEC 61000-4-3:2006 + A1:2007 + A2:2010
DIN EN 61000-4-4; VDE 0847-4-4:2013-04	EN 61000-4-4:2012	IEC 61000-4-4:2012
DIN EN 61000-4-5; VDE 0847-4-5:2007-06	EN 61000-4-5:2006	IEC 61000-4-5:2005
DIN EN 61000-4-6; VDE 0847-4-6:2014-08	EN 61000-4-6:2014	IEC 61000-4-6:2013
DIN EN 61000-4-8; VDE 0847-4-8:2010-11	EN 61000-4-8:2010	IEC 61000-4-8:2009
DIN EN 61000-4-11; VDE 0847-4-11:2005-02	EN 61000-4-11:2004	IEC 61000-4-11:2004
DIN EN 61000-3-2; VDE 0838-2:2015-03	EN 61000-3-2:2014	IEC 61000-3-2:2014
DIN EN 61000-3-3; VDE 0838-3:2014-03	EN 61000-3-3:2013	IEC 61000-3-3:2013
DIN EN 55016-2-1:2014-01; VDE 0877-16-2-1:2014-01	EN 55016-2-1:2009 + A1:2011 + A2:2013	CISPR 16-2-1:2008 + A1:2010 + A2:2013
DIN EN 55016-2-3; VDE 0877-16-2-3:2011-03	EN 55016-2-3:2010 + A1:2010	IEC/CISPR 16-2-3:2010 + A1:2010
DIN EN 55022; VDE 0878-22:2011-12	EN 55022:2010	CISPR 22:2008, modified
DIN EN 55032:2012-12; VDE 0878-32:2012-12	EN 55032:2012	CISPR 32:2012+ Cor. 1:2012 + Cor. 2:2012
DIN EN 55032 Berichtigung 1:2013-04; VDE 0878-32 Berichtigung 1:2013-04	EN 55032:2012, Berichtigung zu DIN EN 55032 (VDE 0878-32):2012-12; Deutsche Fassung EN 55032:2012/AC:2012	CISPR 32:2012 + Cor. 1:2012 + Cor. 2:2012

Messmittel und Prüfgeräte [List of test equipment]

- **Störaussendungsmessungen** [Radio disturbance measurements]

Gerät [Device]	Seriennummer [Serial Number]	Hersteller [Manufacturer]	Used	Kalibrierung [Calibration]	
				Datum [Date]	Intervall [interval]
Gestrahlte / geleitete Störaussendung / Feldstärke / Funkstörspannung [Radiated / conducted emission]:					
Receiver ESU-8	100198	Rohde & Schwarz	☒	28.07.2016	jährlich [annual]
11966 Bilog antenna CBL 6111	1242	Hewlett Packard Chase	☒	16.08.2016	3 Jahre [3 years]
TRILOG antenna VULB 9168	9168-197	Schwarzbeck	☐	01.08.2012	5 Jahre [5 years]
Mag. loop antenna EMCO 6502	9503-2930	EMCO	☐	23.07.2014	3 Jahre [3 years]
Horn antenna HF 907	9168-197	Rohde & Schwarz	☐	22.07.2015	3 Jahre [3 years]
LISN PMM L2-16A	0100J80110	Narda S.T.S./PMM	☐	24.07.2014	5 Jahre [5 years]
LISN NSLK 8128	NSLK 8128162	Schwarzbeck	☒	27.07.2016	jährlich [annual]
Current measuring Clamp FCC F-33-2	345	FCC	☐	15.08.2016	2 Jahre [2 years]
EMC 32 Software Version 8.51.0	-----	Rhode & Schwarz	☒		
Messung der Oberschwingungsströme [Measurement of harmonic current emissions] **[EN 61000-3-2]** **Messung der Spannungsänderungen, Spannungsschwankungen und Flicker [Limitation of voltage changes, voltage fluctuations and flicker]** **[EN 61000-3-3]**					
Leistungsm. LMG640 Netzimp. NI2415-1	00631607 A0808085	ZES Zimmer Electronic Systems	☒	19.09.2016	jährlich [annual]
LMG Test Suite SW Version 1.0.34-R37312	-----	ZES Zimmer Electronic Systems	☒		

- **Störfestigkeitsprüfungen** [EMC immunity tests]

Gerät [Device]	Seriennummer [Serial Number]	Hersteller [Manufacturer]	Used	Kalibrierung [Calibration] Datum [Date]	Intervall [interval]
Prüfung der Störfestigkeit gegen die Entladung statischer Elektrizität [Electrostatic discharge immunity test (ESD)]					**[EN 61000-4-2]**
ESD Tester DITO	P1251106976	emtest	☒	22.07.2016	jährlich [annual]
Prüfung der Störfestigkeit gegen hochfrequente elektromagnetische Felder [Radiated, radio-frequency, electromagnetic field immunity test]					**[EN 61000-4-3]**
Power sensor NRP-Z91	150012	Rohde & Schwarz	☒	14.07.2015	2 Jahre [2 years]
Field probe RadiSense	05	DARE	☒	10.10.2016	jährlich [annual]
Signal generator SMB100A	101688	Rohde & Schwarz	☒	14.07.2015	3 Jahre [3 years]
Amplifier (80 MHz - 1GHz) 200W1000M2	15942	Amplifier Research	☒	05.01.2017	jährlich [annual]
Bi-dir coupler (80 MHz – 1 GHz) 440165	N598	cmc	☒	06.01.2016	2 Jahre [2 years]
Logper antenna AT 1080 M1	15261	Amplifier Research	☒	05.01.2017	jährlich [annual]
Amplifier (0,8 GHz – 4 GHz) 10S1G4AM3	307077	Amplifier Research	☒	10.01.2017	jährlich [annual]
Bi-dir coupler (0,8 GHz – 4 GHz) DC7144M1	305855	Amplifier Research	☒	06.01.2016	2 Jahre [2 years]
Horn antenna HF 907	100131	Rohde & Schwarz	☒	06.01.2017	jährlich [annual]
Horn antenna AT 4002 A	306619	Amplifier Research	☐	10.01.2017	jährlich [annual]
EMC 32 Software Version 8.50.0	-----	Rhode & Schwarz	☒		
Prüfung der Störfestigkeit gegen schnelle transiente elektrische Störgrößen/Burst [Electrical fast transient/burst immunity test]					**[EN 61000-4-4]**
Burst- generator UCS 500N5	P1520156181	EM TEST AMETEK	☒	15.01.2016	18 Monate [18 month]
Main- coupl. filter CNI 503A	P1447143683	EM TEST AMETEK	☐	15.01.2016	18 Monate [18 month]
Coupling clamp HFK	0392-26	EM- TEST	☒	05.04.2016	2 Jahre [2 years]
Prüfung der Störfestigkeit gegen Stoßspannungen [Surge immunity test]					**[EN 61000-4-5]**
Surge- generator UCS 500N5	P1520156181	EM TEST AMETEK	☒	15.01.2016	18 Monate [18 month]
Main- coupl. filter CNI 503A	P1447143683	EM TEST AMETEK	☐	15.01.2016	18 Monate [18 month]
Coupling network IP 6.2	580421-4	Haefely	☐	21.09.2015	2 Jahre [2 years]

Gerät [Device]	Seriennummer [Serial Number]	Hersteller [Manufacturer]	Used	Kalibrierung [Calibration] Datum [Date]	Intervall [interval]
Prüfung der Störfestigkeit gegen leitungsgeführte Störgrößen, induziert durch hoch-frequente Felder [Immunity to conducted disturbances, induced by radio-frequency fields]					**[EN 61000-4-6]**
Bi-dir coupler DC2600	18811	Amplifier Research	☒	22.12.2015	2 Jahre [2 years]
Power sensor NRP-Z92	100028	Rohde & Schwarz	☒	14.07.2015	2 Jahre [2 years]
Power sensor NRP-Z51	102438	Rohde & Schwarz	☐	14.07.2015	2 Jahre [2 years]
Signal generator HP 8648 D	3613A00168	Hewlett Packard	☒	16.07.2015	3 Jahre [3 years]
Amplifier AR 75A250	18112	Amplifier Research	☒	10.01.2017	jährlich [annual]
CDN FCC-801-M3-16	177	Fischer Custom Communications Inc.	☒	28.07.2016	2 Jahre [2 years]
CDN FCC 801-M2-16	92	Fischer Custom Communicatons Inc.	☒	28.07.2016	2 Jahre [2 years]
CDN FCC-801-M5-16	06	Fischer Custom Communications Inc.	☐	28.07.2016	2 Jahre [2 years]
CDN L 801-AF2	2124	Lüthi	☐	28.07.2016	2 Jahre [2 years]
CDN L 801-T4	2123	Lüthi	☐	28.07.2016	2 Jahre [2 years]
EM-Coupling Clamp FCC –801-203I-CF	213	Fischer Custom Communications Inc.	☐	28.07.2016	2 Jahre [2 years]
Decoupling Clamp FCC –203I-DCN	73	Fischer Custom Communications Inc.	☐	28.07.2016	2 Jahre [2 years]
100 Ω-Widerstand FCC –801-150-50 CDN	558	Fischer Custom Communications Inc.	☐	07.08.2015	5 Jahre [5 years]
EMC 32 Software Version 8.50.0	-----	Rhode & Schwarz	☒		
Prüfung der Störfestigkeit gegen Magnetfelder mit energietechnischen Frequenzen [Power frequency magnetic field immunity test]					**[EN 61000-4-8]**
Magnetic field frame Antenna INA 2170	200012-010SC	Schaffner	☒	10.01.2017	3 Jahre [3 years]
System PAS 5000, NT 5000, SyCore	A4555 01/0 1110 A4555 02/0 1110 A4555 12/0 1110	Spitzenberger & Spies	☒		
Leistungsm. LMG640	00631607	ZES Zimmer Electronic Systems	☒	19.09.2016	jährlich [annual]
Voltage dips, short interruptions and voltage variations immunity test [Prüfung der Störfestigkeit gegen Spannungseinbrüche, Kurzzeitunterbrechungen und Spannungsschwankungen]					**[EN 61000-4-11]**
Mains Interference Simulator UCS 500N5	P1520156181	EM TEST AMETEK	☒	15.01.2016	18 Monate [18 month]

Prüfung der Störfestigkeit am Wechselstrom-Netzanschluss gegen Oberschwingungen und Zwischenharmonische einschließlich leitungsgeführter Störgrößen aus der Signalübertragung auf elektrischen Niederspannungsnetzen **[Testing and measurement Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests]**					**[EN 61000-4-13]**
System PAS 5000, NT 5000, SyCore	A4555 01/0 1110 A4555 02/0 1110 A4555 12/0 1110	Spitzenberger & Spies	☒		
Leistungsm. LMG640	00631607	ZES Zimmer Electronic Systems	☐	19.09.2016	jährlich [annual]
SPS EMC 3.0.2	-----	Spitzenberger & Spies	☐		
Monitoring: **[Monitoring devices]**					
Oscilloscope HP 54615 B	US35420800	Hewlett Packard	☒	04.08.2016	jährlich [annual]

Anhang/[Annex]:

☒	Prüfroutine; Kriterium [Test routine, criterion]	Seite(n) A1-A2 [Page(s)]

Messprotokolle / [Test certificates]:

☒	Prüfung der Störfestigkeit gegen die Entladung statischer Elektrizität [Electrostatic discharge immunity test (ESD)]	Seite(n) A3-A6 [Page(s)]
☒	Prüfung der Störfestigkeit gegen hochfrequente elektromagnetische Felder [Radiated, radio-frequency, electromagnetic field immunity test]	Seite(n) A7-A17 [Page(s)]
☒	Prüfung der Störfestigkeit gegen schnelle transiente elektrische Störgrößen/Burst [Electrical fast transient/burst immunity test]	Seite(n) A18-A23 [Page(s)]
☒	Prüfung der Störfestigkeit gegen Stoßspannungen [Surge voltages immunity test]	Seite(n) A24-A27 [Page(s)]
☒	Prüfung der Störfestigkeit gegen leitungsgeführte Störgrößen, induziert durch hochfrequente Felder [Interference resistance to line-conducted interference variables, induced by high-frequency fields]	Seite(n) A28-A31 [Page(s)]
☒	Prüfung der Störfestigkeit gegen Magnetfelder mit energietechnischen Frequenzen [Power frequency magnetic field immunity test]	Seite(n) A32-A33 [Page(s)]
☒	Prüfung der Störfestigkeit gegen Spannungseinbrüche, Kurzzeit-unterbrechungen und Spannungsschwankungen [Voltage dips, short interruptions and voltage variations immunity test]	Seite(n) A34-A35 [Page(s)]
☐	Prüfung der Störfestigkeit am Wechselstrom-Netzanschluss gegen Oberschwingungen und Zwischenharmonische einschließlich leitungsgeführter Störgrößen aus der Signalübertragung auf elektrischen Niederspannungsnetzen [Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests]	Seite(n) [Page(s)]
☒	Gestrahlte Störgrößen/elektrische Feldstärke 30 MHz … 1 GHz [Radiated disturbances/electric field strength]	Seite(n) A36-A41 [Page(s)]
☒	Leitungsgeführte Störgrößen/Störspannung/Störstrom [Conducted disturbances/disturbance voltage/disturbance current]	Seite(n) A42-A44 [Page(s)]
☒	Messung der Oberschwingungsströme [Measurement of harmonic current emissions]	Seite(n) A45-A53 [Page(s)]
☒	Begrenzung von Spannungsänderungen, Spannungsschwankungen und Flicker [Limitation of voltage changes, voltage fluctuations and flicker]	Seite(n) A54-A55 [Page(s)]
☒	Bilder Prüfaufbau [Photographs of the test set-up]	Seite(n) A56-A62 [Page(s)]

Appendixes:

Test report- no.: 2017012

Examiner: Bruno Erdbories

Test device: DRF-960-24-1

☒ Desktop device

☐ Console device

Test device configuration:

The power supply was mounted on a DIN rail, fixed on a metal plane (see pictures on the last pages of this report). The power supply was connected to the AC-Net (230 V) over a 1,5 m long line. A resistor-load was connected to the 24 VDC-output. This load (0,6 Ω) was positioned outside the test area. During the tests in the absorber Chamber (FAR) this line was 6 m long, in all other cases the output line was 2 m long. During the tests the output voltage was measured with an oscilloscope.

Test routine:

During the tests the power supply operated in nominal mode (I = 40 A).

Performance criterion

Criterion A: No loss of function or performance during the test.
Operating as intended within specified tolerance:
Uout = 24 V ± 0,24 V

Criterion B: Temporary loss of function or performance during the test.
Self-recoverable
Degradation of performance shall be specified by the manufacturer.
PSU shall continue to operate as intended after the test.
Voltage dips are allowed, voltage interruptions are not allowed.

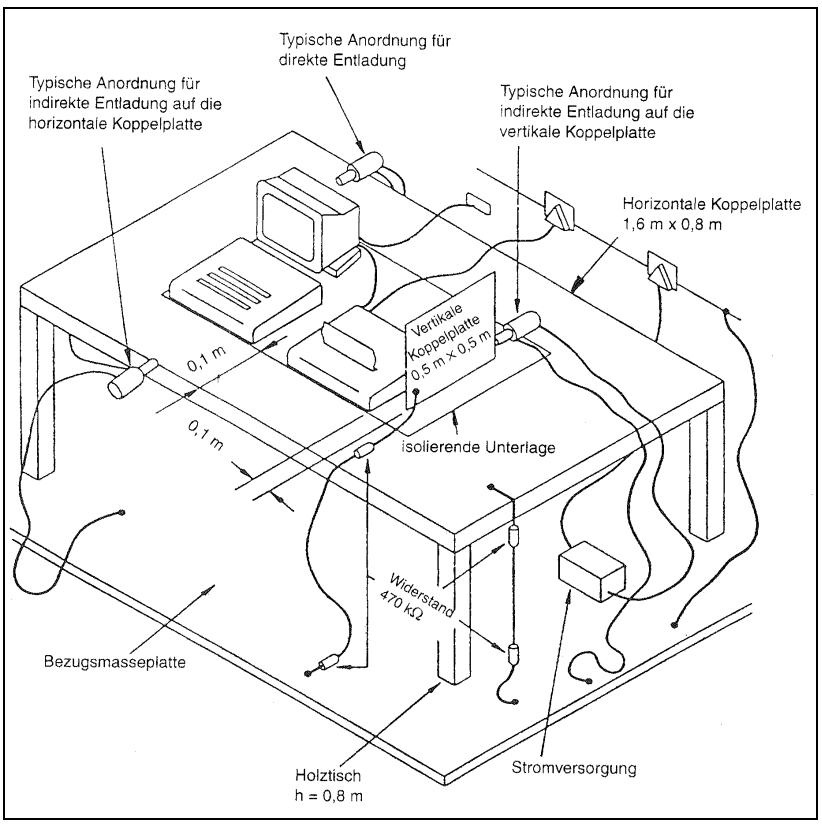
Criterion C: Loss of function or performance. Not self-recoverable. Not damaged.
Any resettable condition allowed including shut-down and replacement of fuses.

Test certificate of interference resistance measurement according to EN 61000-4-2
Interference resistance to static electrical discharges

Test set-up:

Testing desk-top devices

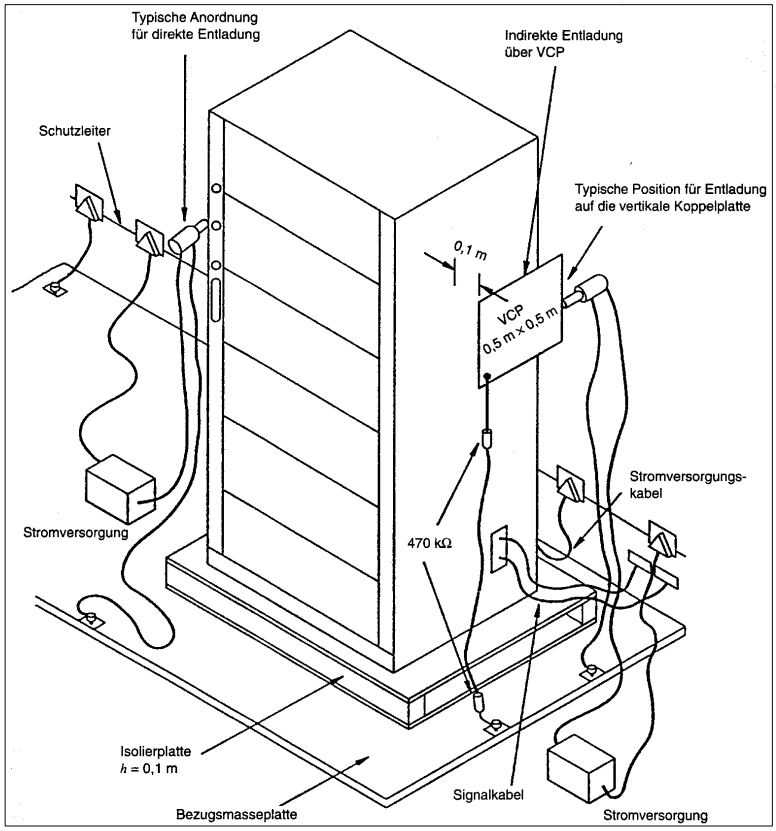
The test was performed in a shielded enclosure. The test device was placed on a wooden table, which is 0.8 m high. The table has been set up on a reference ground surface (of aluminium). A horizontal coupling plate (1.6 m * 0.8 m), which was connected to the reference ground surface via two 470 kΩ resistors, is on the table. An insulating pad, which is 0.5 mm thick, is located between the test device and the coupling plate. The coupling plate extends beyond the test device on all sides by at least 0.1 m. For vertical, indirect linking a couple plate (0.5 m * 0.5 m) is used, it is connected over two 470 the kΩ Resistances to the ground plane. Unloadings are accomplished in each case on the centre of the front sides of the couple plates. Depending on the test device, the direct or indirect coupling method must be used.
Contact discharges are executed directly on all metallic, tangible points. Air discharges are executed directly on all no conducting, tangible points. The testing level is (everyone applicable testing level) the reach up to at first the level for the lowest level 1 (2 kV) prepared. The level is gradually increased (everyone applicable testing level) up to reaching the maximum testing level to be used after that.
All the examination becomes after each other with positive and negative discharges (number see product standard). All applied testing levels are documented.



Picture 1: Test setup desktop devices:

Testing console devices

The test was performed in a shielded enclosure. The test device was placed on a wooden pallet, which is 0.1 m high, above a reference ground surface (of aluminium). This surface extends for at least 0.1 m beyond the test device on all sides. For an indirect coupling-in, a coupling plate (0.5 m * 0.5 m), which is connected to the reference ground surface via two 470 kΩ resistors, is used. Unloadings are accomplished in each case on the centre of the front sides of the couple plates.



Picture 2: Test set-up for console devices:

Test characteristics:

Contact discharge: 0 to 6 kV

Air discharge: 0 to 8 kV

The number of discharges: 10 at each point

Ambient conditions:

- Ambient temperature: 15 °C to 35 °C
- Relative humidity: 30 % to 60 %
- Air pressure: 86 kPa (860 mbar) to 106 kPa (1060 mbar)

Testing the device:

Test device: DRF-960-24-1

Comment:

Test report no.: 2017012 Examiner: Bruno Erdbories

Test date: 25.01.2017

Surroundings:

Relative humidity: 34 %

Ambient temperature: 23,2 °C

Air pressure: 1019 hPa

Tests:

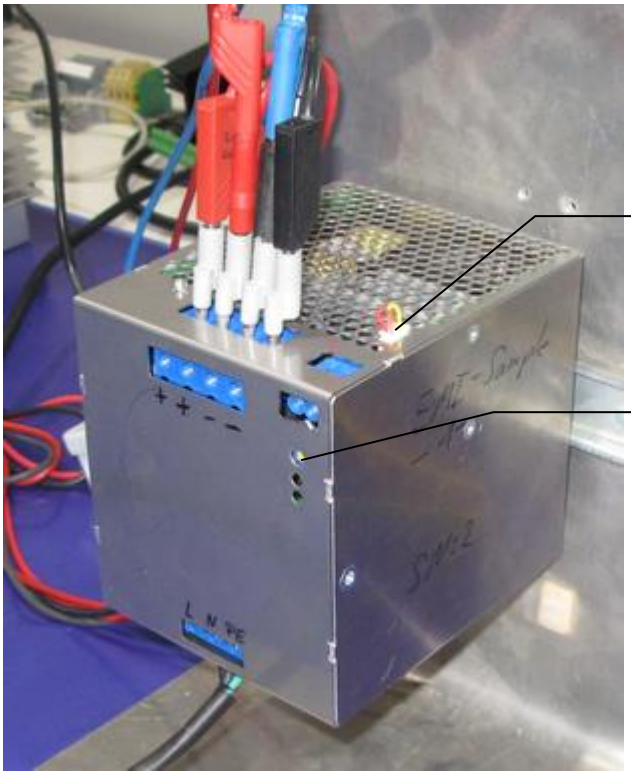
Direct discharges:

Test Points	Max. level for air discharge	Max. level for contact discharge
1.) Case		± 6 kV
2.) Screws		± 6 kV
3.) LED's	± 2 kV; ± 4 kV; ± 8 kV	
4.) Terminals	± 2 kV; ± 4 kV; ± 8 kV	
5.) Enable-Plug	± 2 kV; ± 4 kV; ± 8 kV	
6.)		
7.)		
8.)		
9.)		
10.)		

Indirect discharges:

Position of the coupling plate and the discharge points	Max. level for contact discharge
Horizontal:	
- front	± 6 kV
- back	± 6 kV
- left	± 6 kV
- right	± 6 kV
vertical	
- front	± 6 kV
- back	± 6 kV
- left	± 6 kV
- right	± 6 kV

Testing points:



Result: **No interrupts of the output voltage were detected.**

Test certificate of interference resistance measurement according to EN 61000-4-3
Radiated interference resistance in a range of 80 MHz to 2.7 GHz

Test set-up:

The test was performed in an absorber chamber. The test device exposed to a uniform electromagnetic field, which is located 80 cm above the floor.
The size of the field is 1.5 x 1.5 m. The permissible tolerance for deviation from the test field strength within this area is 0 to 6 dB for 75 % of the measurement points. The calibration of the field was done without the test device. The generator output level determined subsequently used throughout the entire interference resistance test without readjustment.

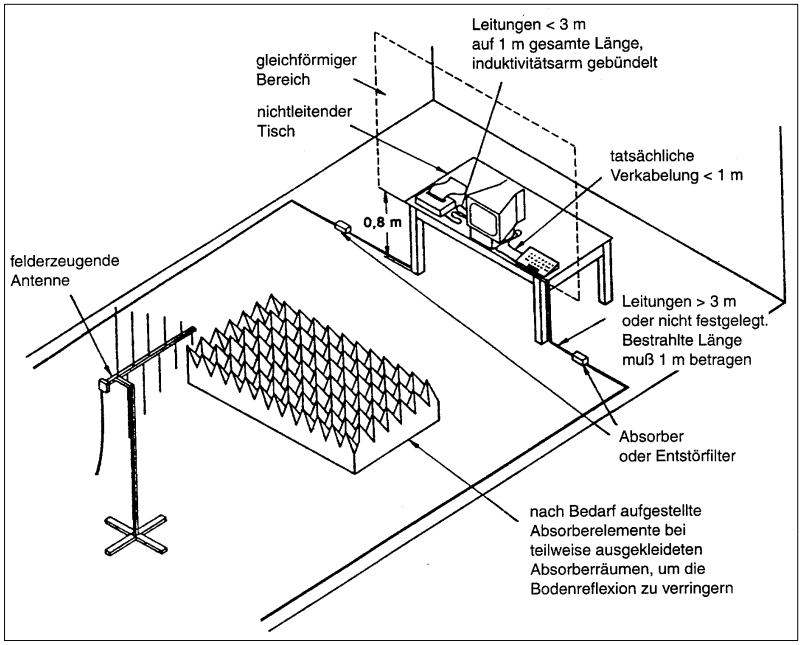
The distance between antenna top and the examinee are:

- **Frequency range 80 MHz – 1 GHz (test level 3V/m and 10 V/m) - 3 m.**
- **Frequency range 80 MHz – 1 GHz (20 V/m) limited max. 1 m x 1 m - 3 m.**
- **Frequency range 1 GHz – 2.7 GHz (test level 3V/m) - 3 m.**
- **Frequency range 1 MHz – 2.7 GHz (10 V/m) window method (1 m x 1 m) –2.3 m**

Depending on the standard used, the interference resistance test is performed with a field strength of 3 or 10 V/m and an amplitude modulation of 80% and a modulation frequency of f = 1 kHz. Equipment which is designed for the control, supervision or measuring of physiological data, will be measured with f = 2 Hz modulating frequency. The test is started at 80 MHz and subsequently increased progressively up to 2.7 GHz with a step width of 1 % of the total measuring region added to the previous value. In addition, a further test was performed. This test takes place at 900 MHz ± 5 MHz at 100 % modulation with 200 Hz impulses with the same pulse/pause ratio.

Testing desk-top devices

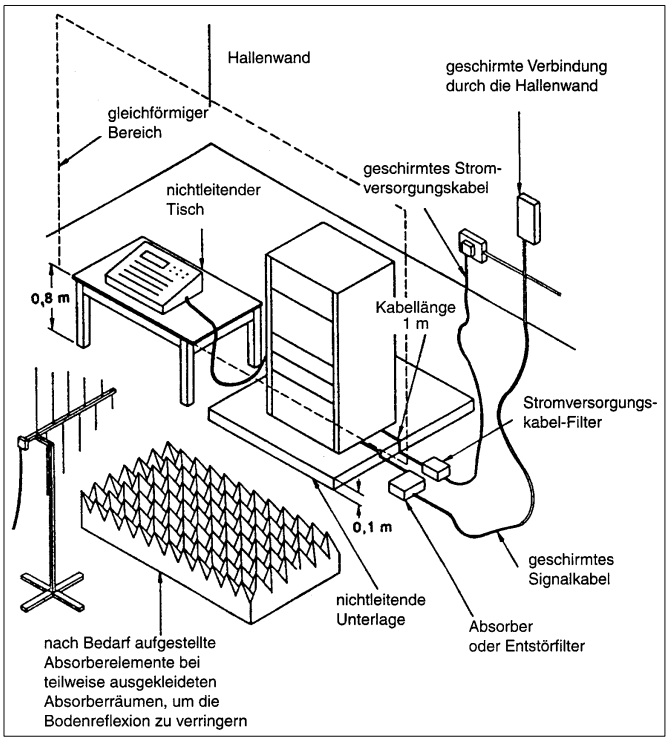
The test device was placed on a non-conducting table (styrodur table) with a height of 0.8 m within the testing facility. The device was connected to the power supply and signal lines according to the installation instructions.



Picture 4: Test set-up for desktop devices

Testing console devices

The test device was placed on a non-conducting support (wooden pallet) with a height of 0.1 m within the testing facility. The device was connected to the power supply and signal lines according to the instillation instructions.



Picture 5: Test set-up for console devices

Test level

Frequency range:	Test-Level				
	1V/m	3 V/m	6 V/m	10 V/m	20 V/m
80 MHz to87 MHz	☐	☐	☐	☒	☐
87 MHz to108 MHz (ITU)	☐	☐	☐	☒	☐
108 MHz to174 MHz	☐	☐	☐	☒	☐
174 MHz to230 MHz (ITU)	☐	☐	☐	☒	☐
230 MHz to470 MHz	☐	☐	☐	☒	☐
470 MHz to790 MHz (ITU)	☐	☐	☐	☒	☐
790 MHz to1.0 GHz	☐	☐	☐	☒	☐
1.0 GHz to 1.4 GHz	☐	☒	☐	☐	☐
1.4 GHz to 2.0 GHz	☐	☒	☐	☐	☐
2.0 GHz to 2.7 GHz	☐	☒	☐	☐	☐

Test parameters

Frequency range: 80 MHz to 2700 MHz

Step size: 1 %

Duration: 1 s

Testing the device:

Test device: DRF-960-24-1

Comment:

Test report no.: 2017012 Examiner: Bruno Erdbories

Test date: 24.01.2017

Tests: Passed:

	AM	PM

Horizontally polarized antenna:

Position of Test device:

0°:	**yes**
90°:	**yes**
180°:	**yes**
270°:	**yes**

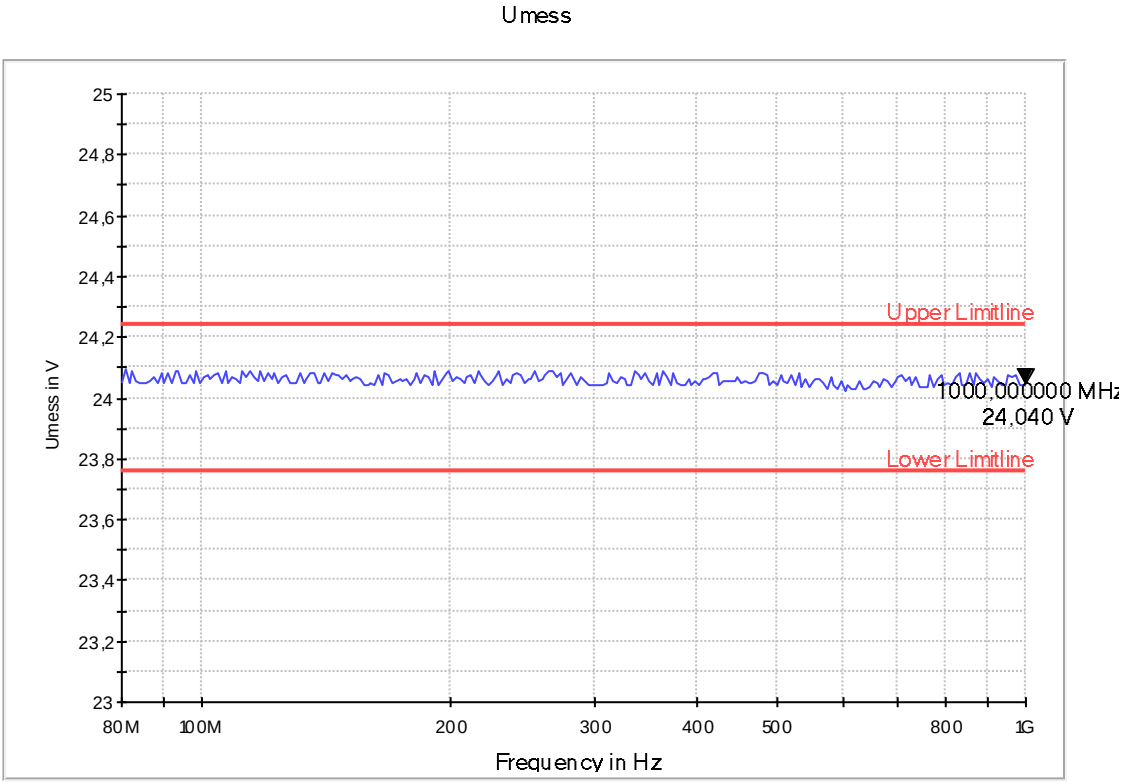
Vertically polarized antenna:

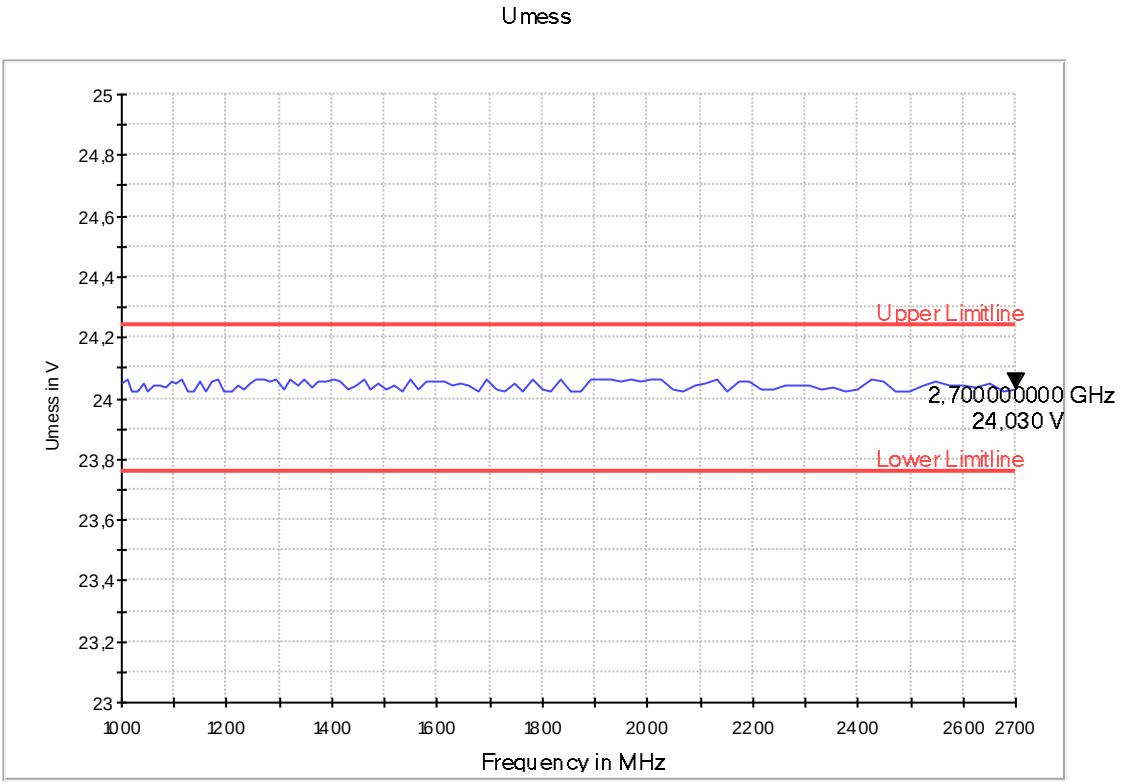
Position of Test device:

0°:	**yes**
90°:	**yes**
180°:	**yes**
270°:	**yes**

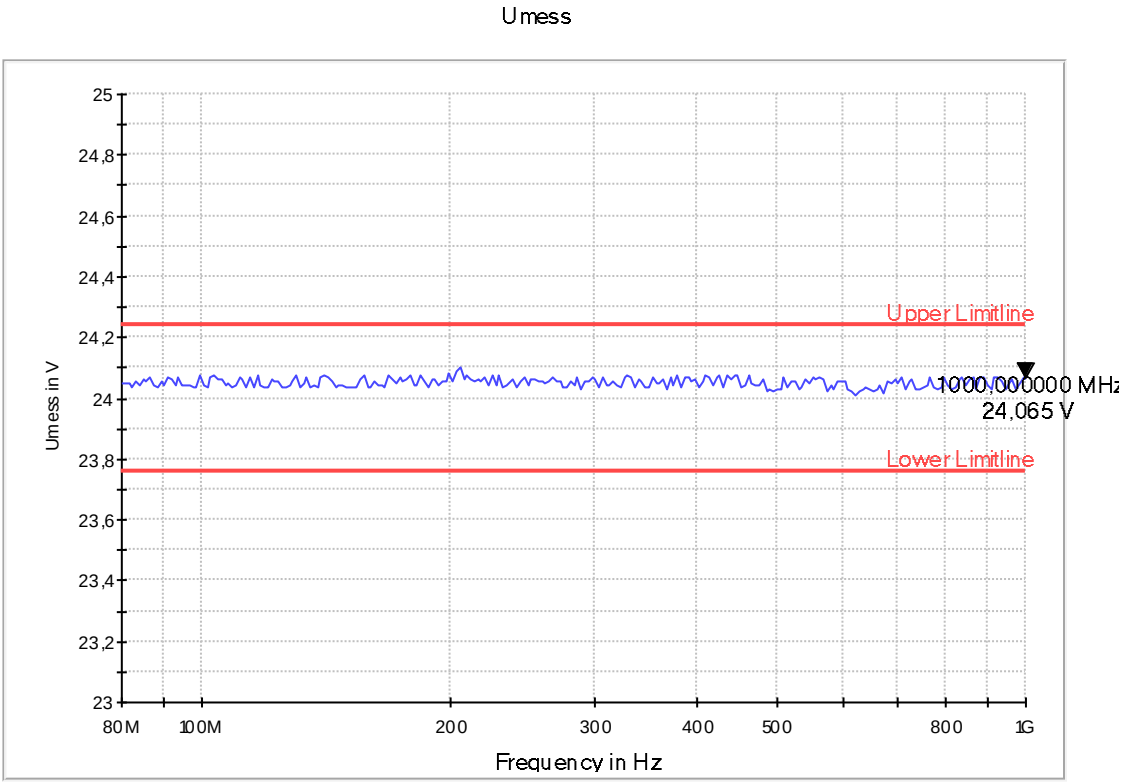
Graphical presentation of the measured voltage output:

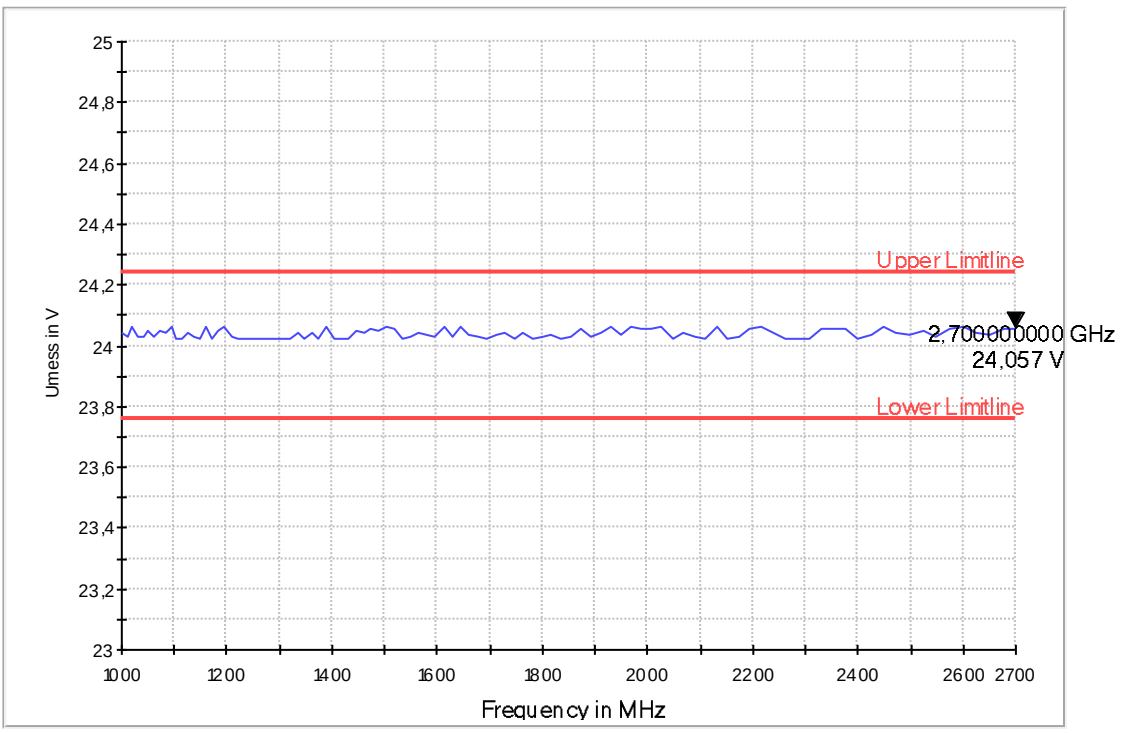
Horizontal 0 °:



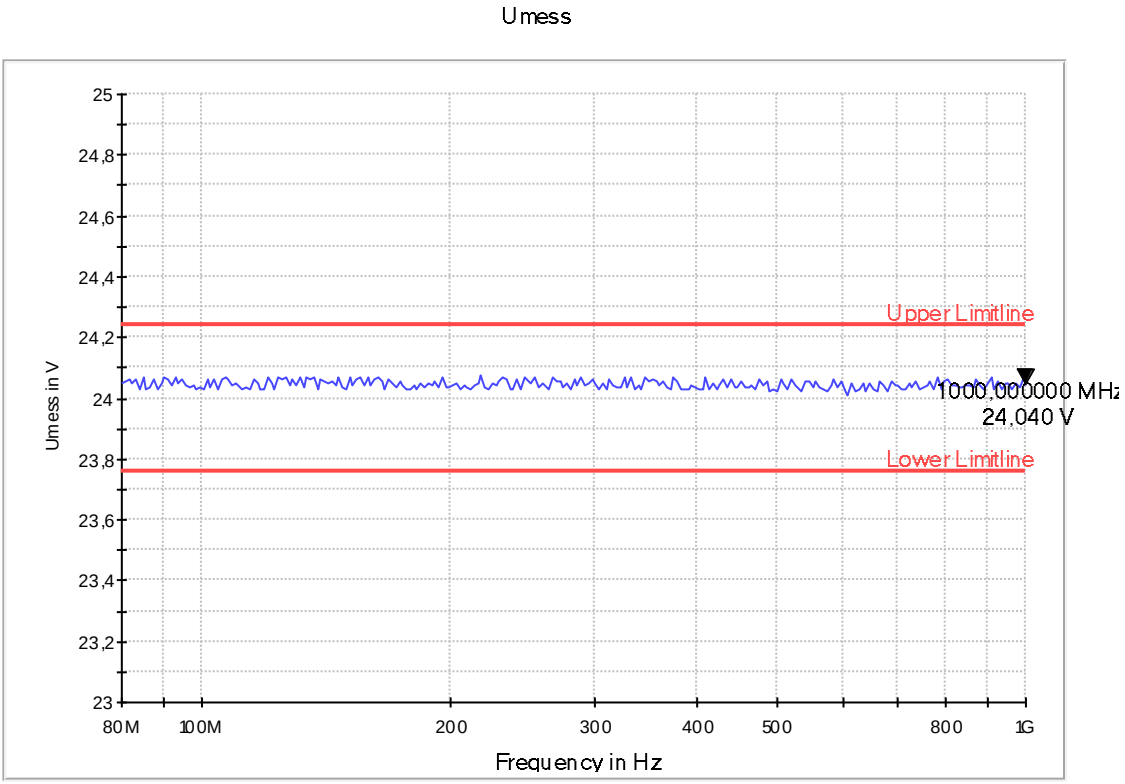


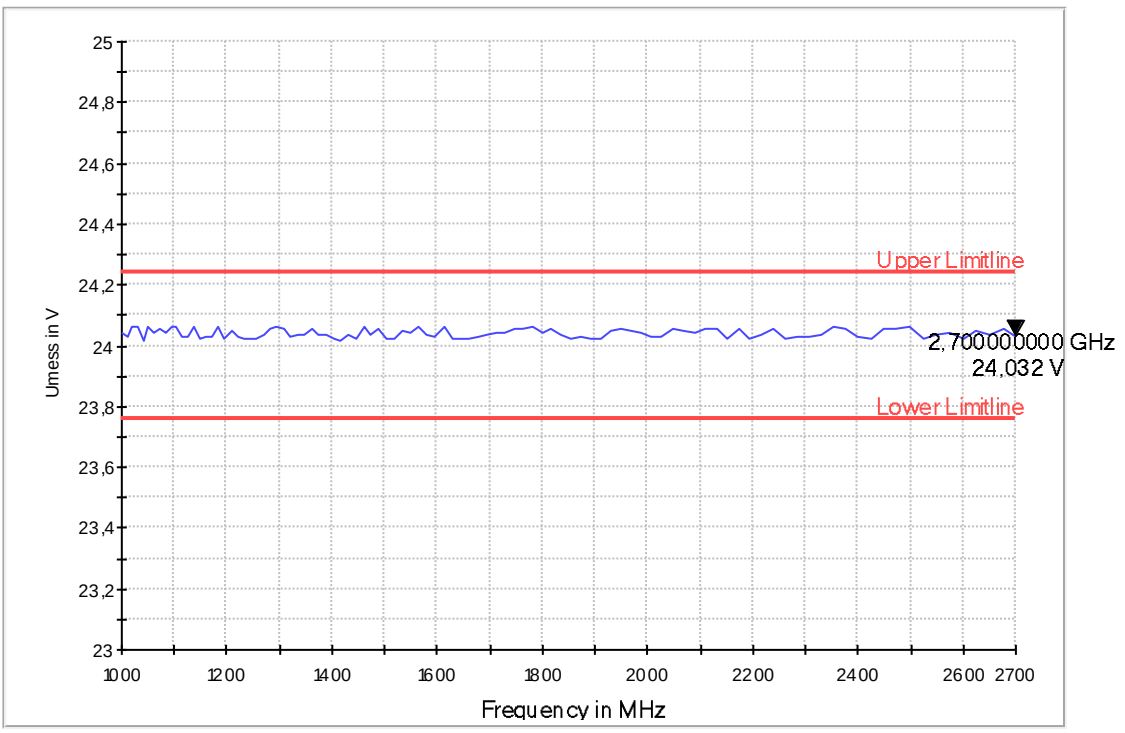
Horizontal 90 °:



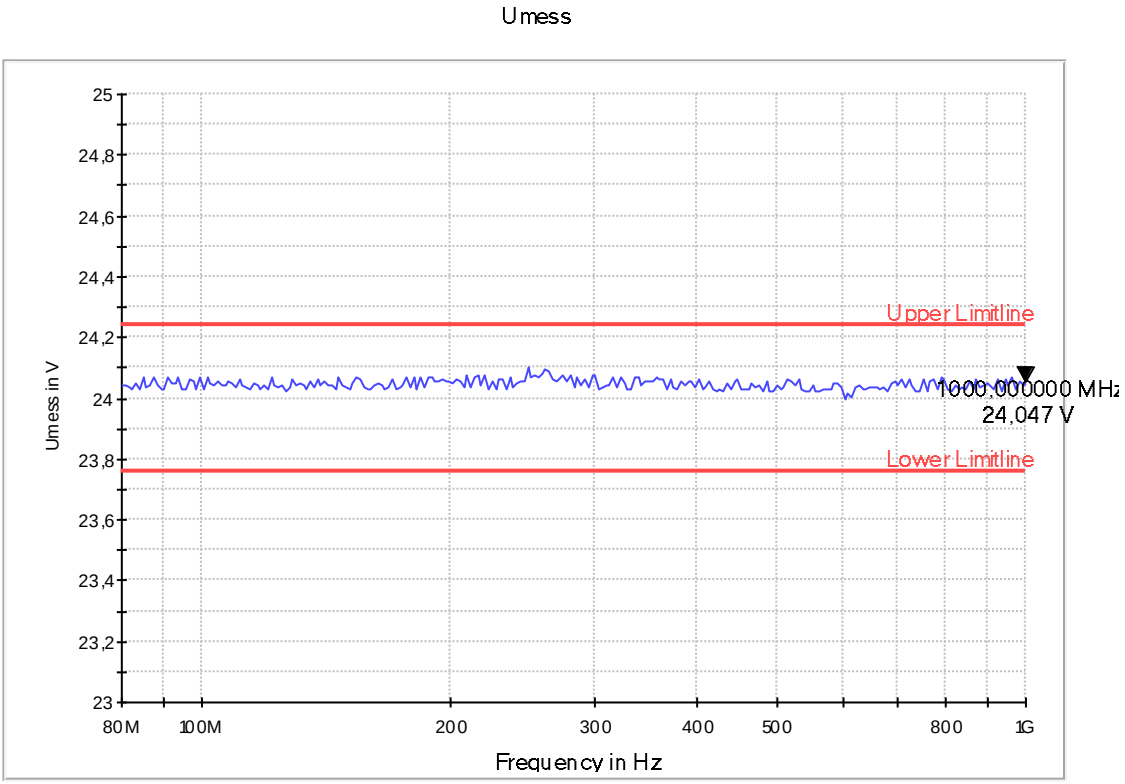


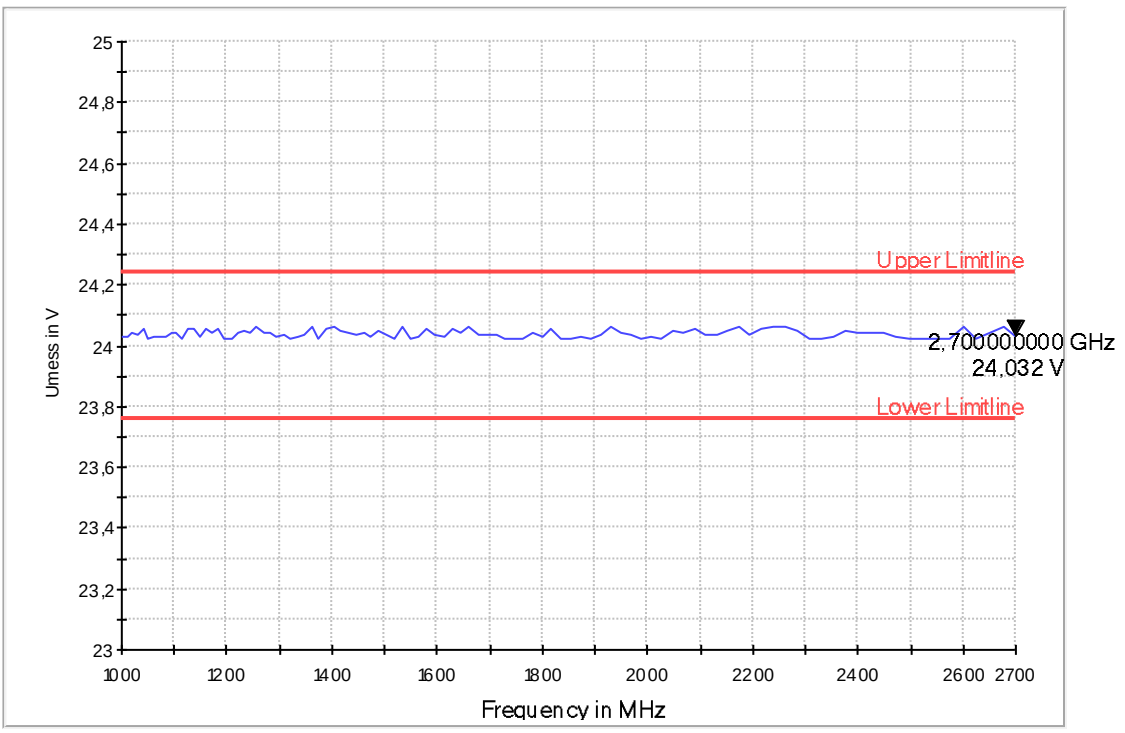
Horizontal 180 °:



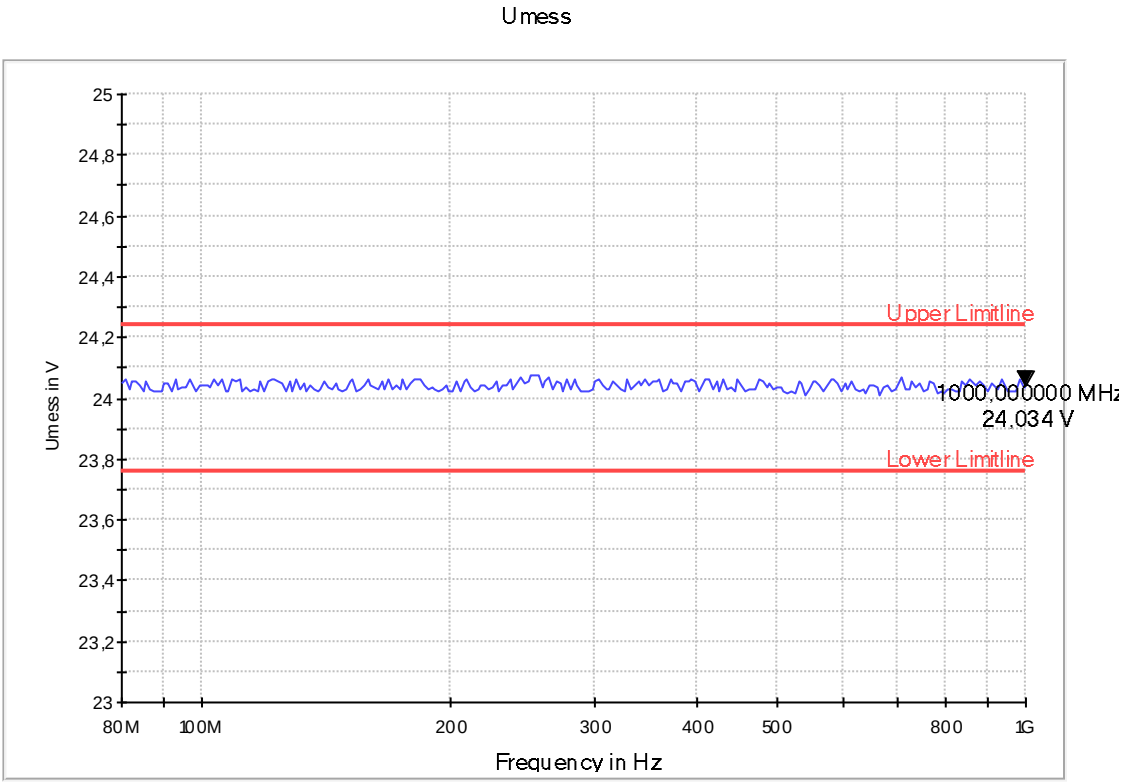


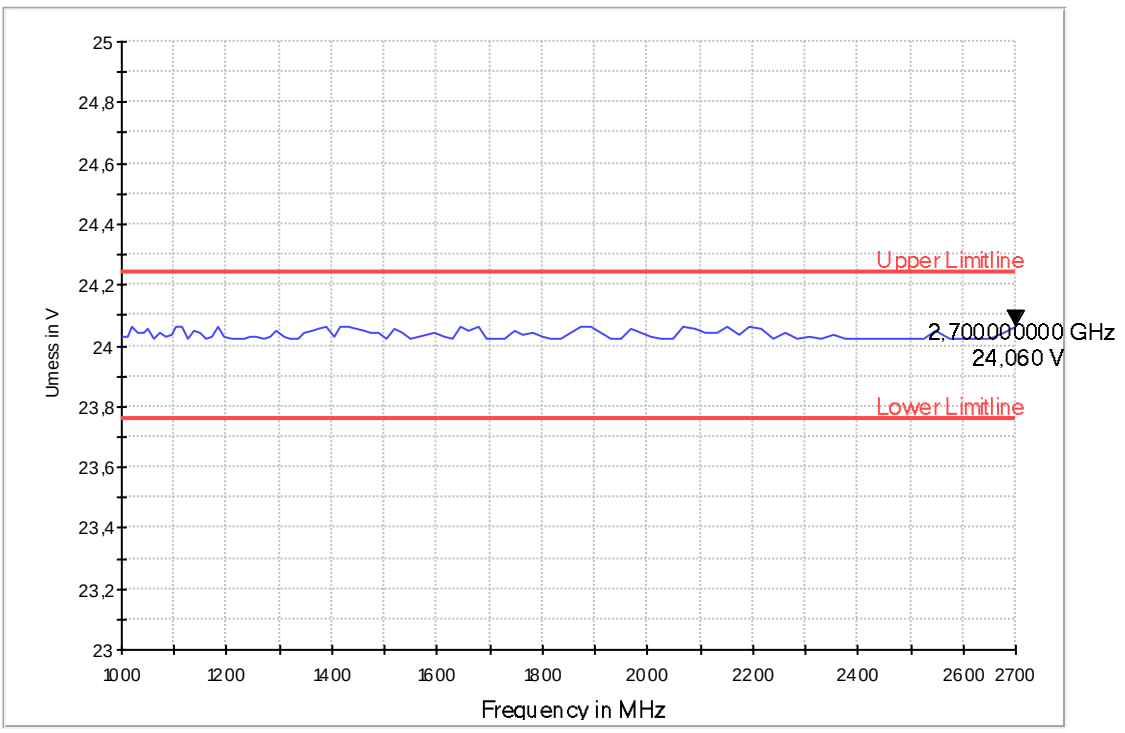
Horizontal 270 °:



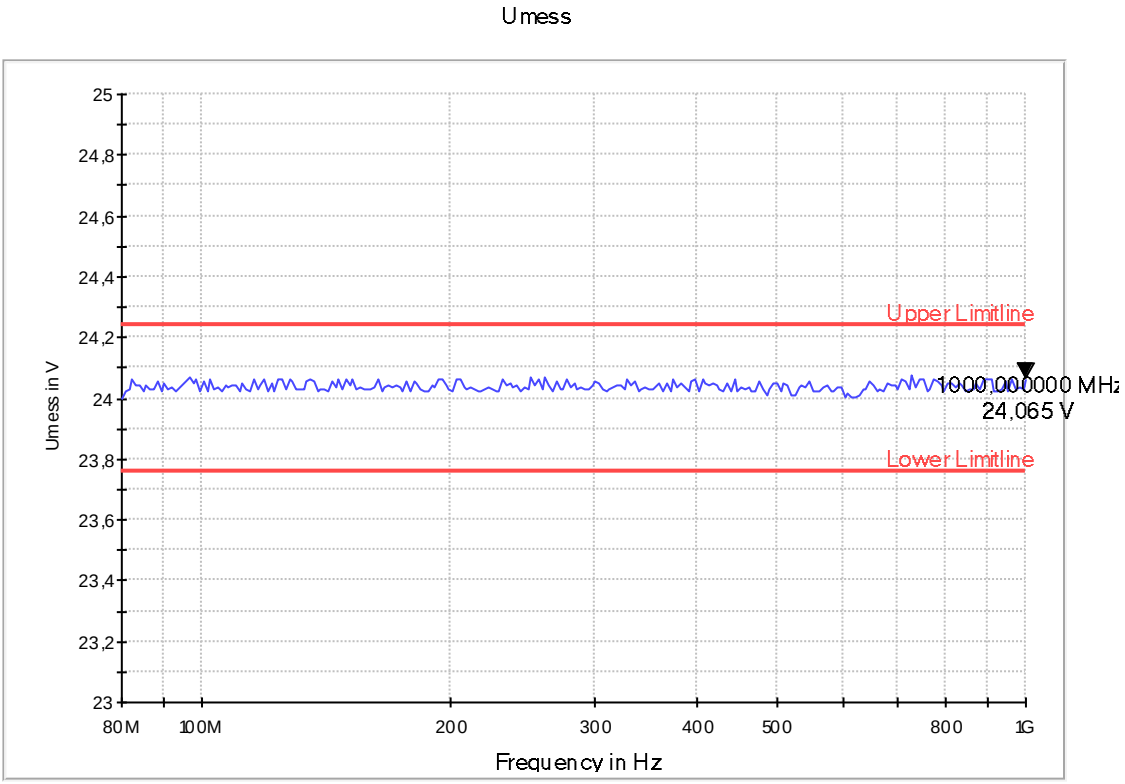


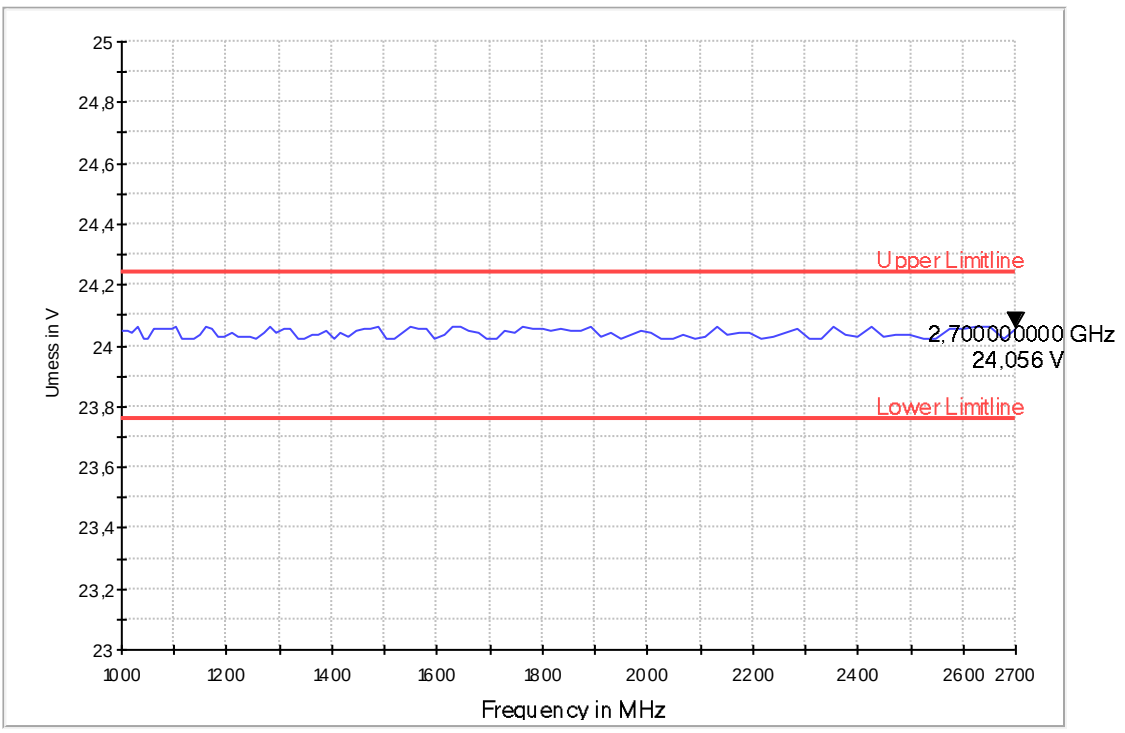
Vertical 0 °:


Umess
25
24,8
24,6
24,4
24,2
24
23,8
23,6
23,4
23,2
23
Umess in V
Upper Limitline
1000,000000 MHz
24,034 V
Lower Limitline
80M
100M
200
300
400
500
800
1G
Frequency in Hz

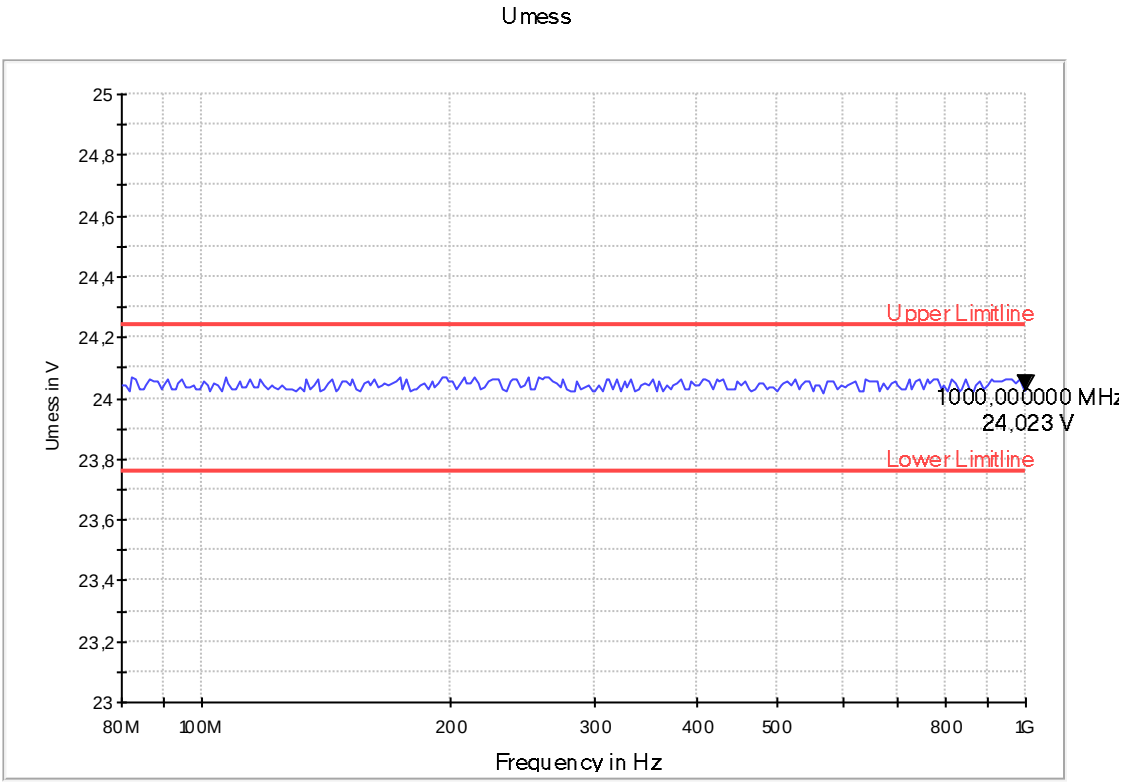

Umess
25
24,8
24,6
24,4
24,2
24
23,8
23,6
23,4
23,2
23
Umess in V
Upper Limitline
2,700000000 GHz
24,060 V
Lower Limitline
1000
1200
1400
1600
1800
2000
2200
2400
2600
2700
Frequency in MHz

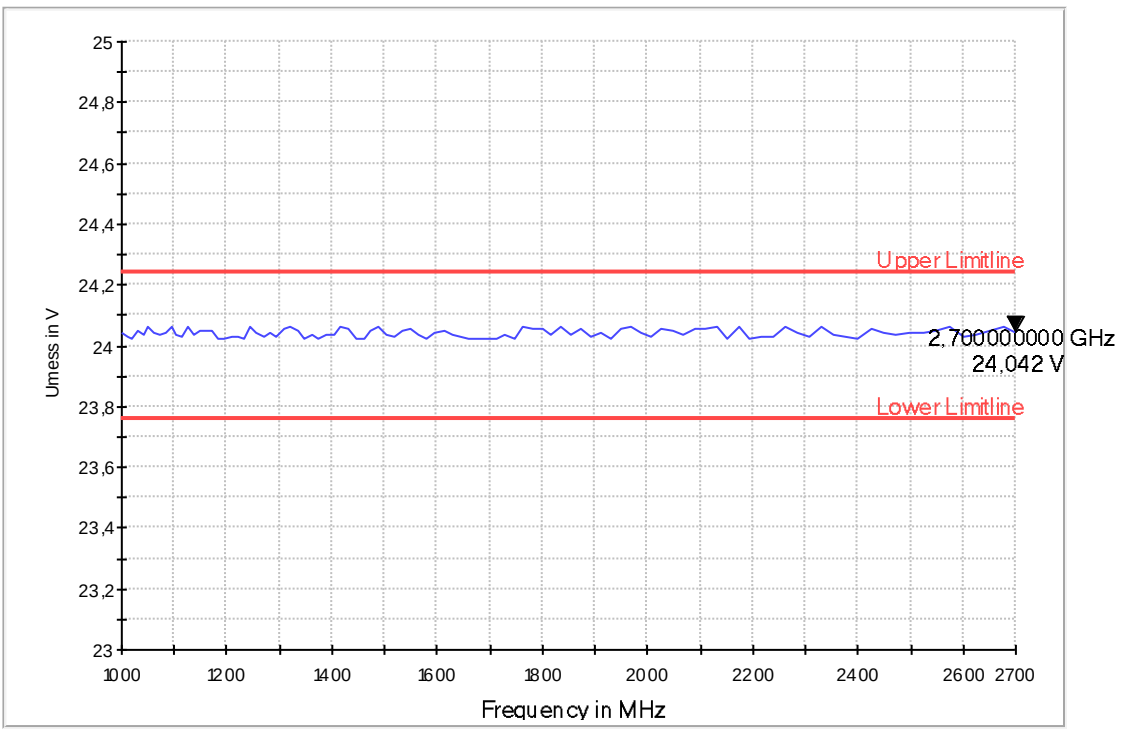
Vertical 90 °:


Umess
25
24,8
24,6
24,4
24,2
24
23,8
23,6
23,4
23,2
23
Umess in V
Upper Limitline
1000,000000 MHz
24,065 V
Lower Limitline
80M
100M
200
300
400
500
800
1G
Frequency in Hz

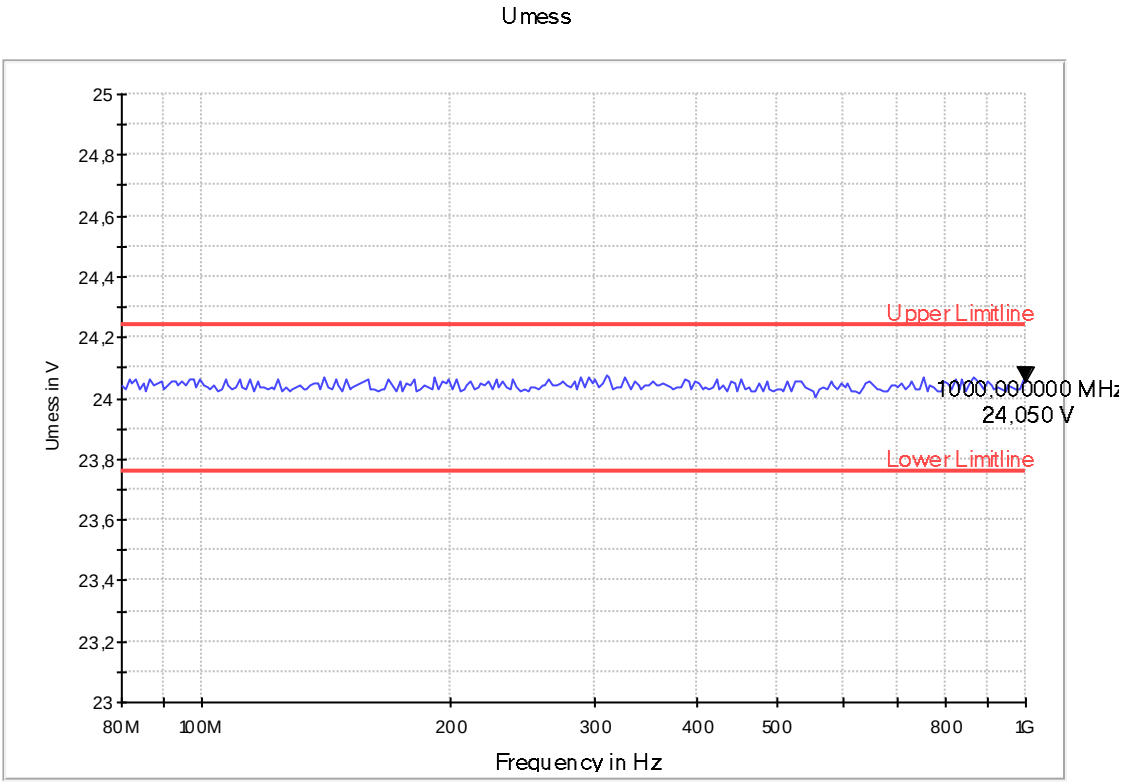

Umess
25
24,8
24,6
24,4
24,2
24
23,8
23,6
23,4
23,2
23
Umess in V
Upper Limitline
2,700000000 GHz
24,056 V
Lower Limitline
1000
1200
1400
1600
1800
2000
2200
2400
2600
2700
Frequency in MHz

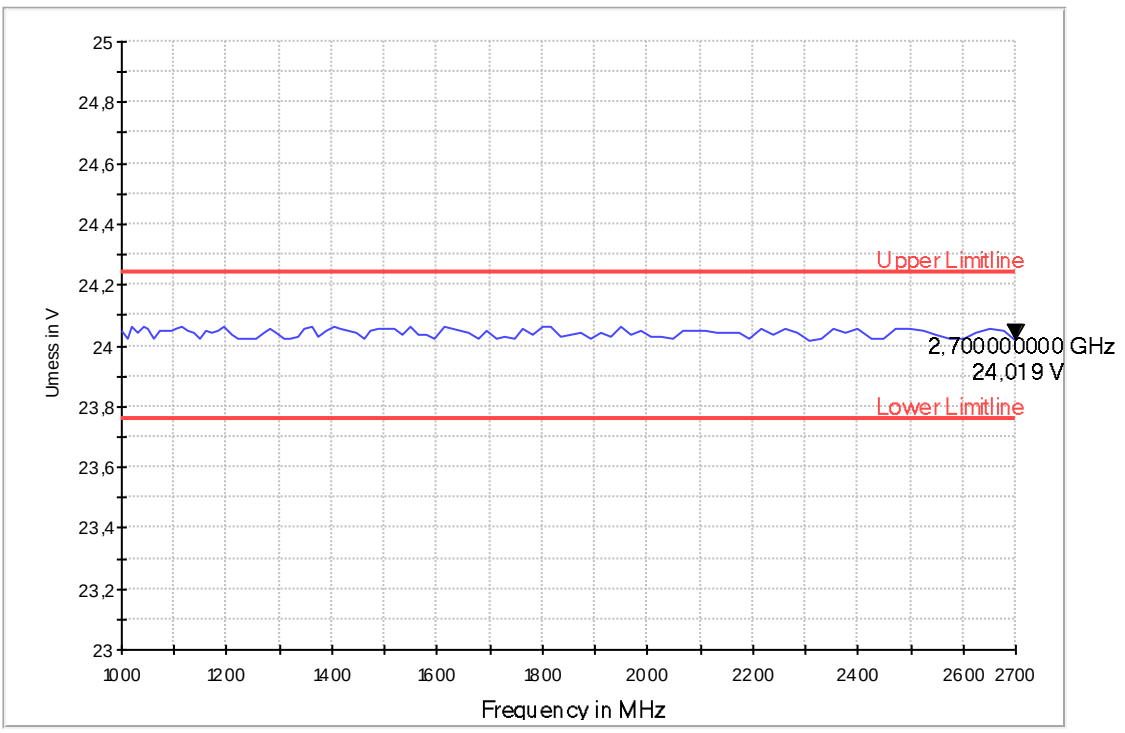
Vertical 180 °:





Vertical 270 °:

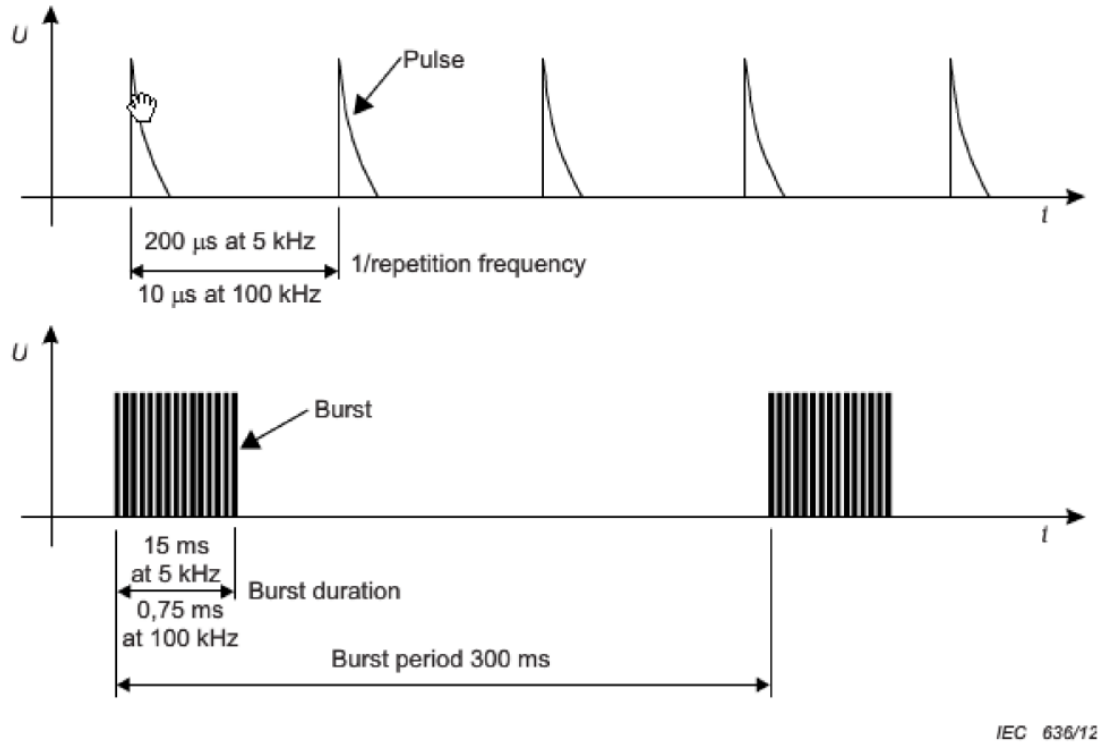




Test certificate of interference-resistance measurement according to EN 61000-4-4
Radiated interference resistance to rapid transient electrical interference variables (bursts)

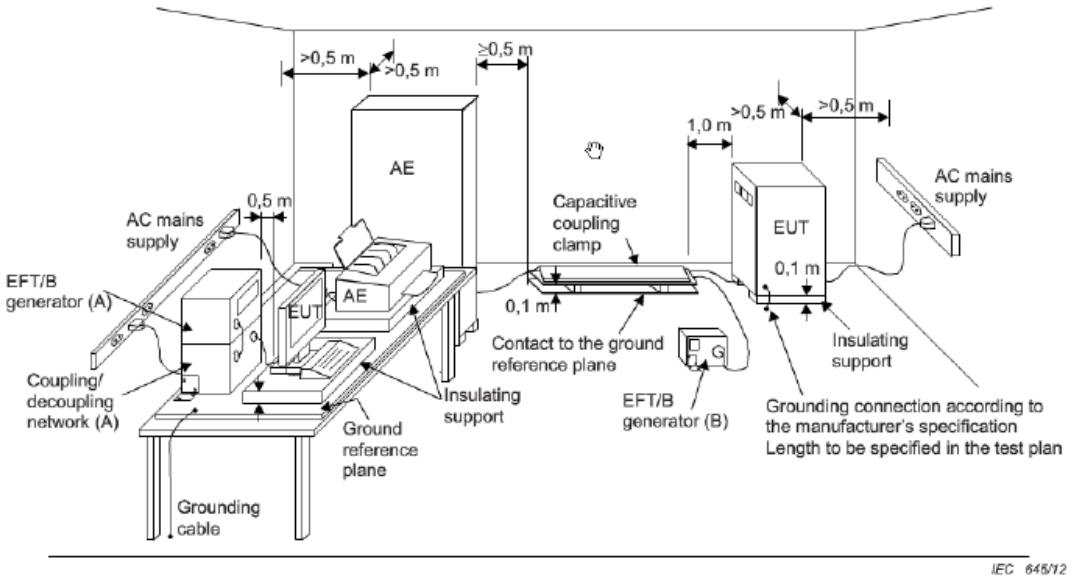
Test method and test pulse

Rapid transients are caused, e.g., when switching on a switch or a contactor. On opening an electric circuit in which energy is stored (e.g., due to inductance), the air gap in the switch fires repeatedly. This process repeats itself as long as the voltage across the contacts is larger than the electric strength between the electrodes of the switch. In these processes, very high switching frequencies and a very high voltage level can result. This chatter (bursting) of the switch is to be simulated by a standardised generator.
This burst generator must generate a standardised pulse with a rise time of 5 ns ± 30 % and a wave-tail half-time of 50 ns ± 30 %. These pulses are then coupled into the test device with a spike frequency of 5 kHz and burst packets, which are 15 ms long. The total period duration of a burst interval is 300 ms.



Picture 6: Definition of the test pulse according to EN 61000-4-4

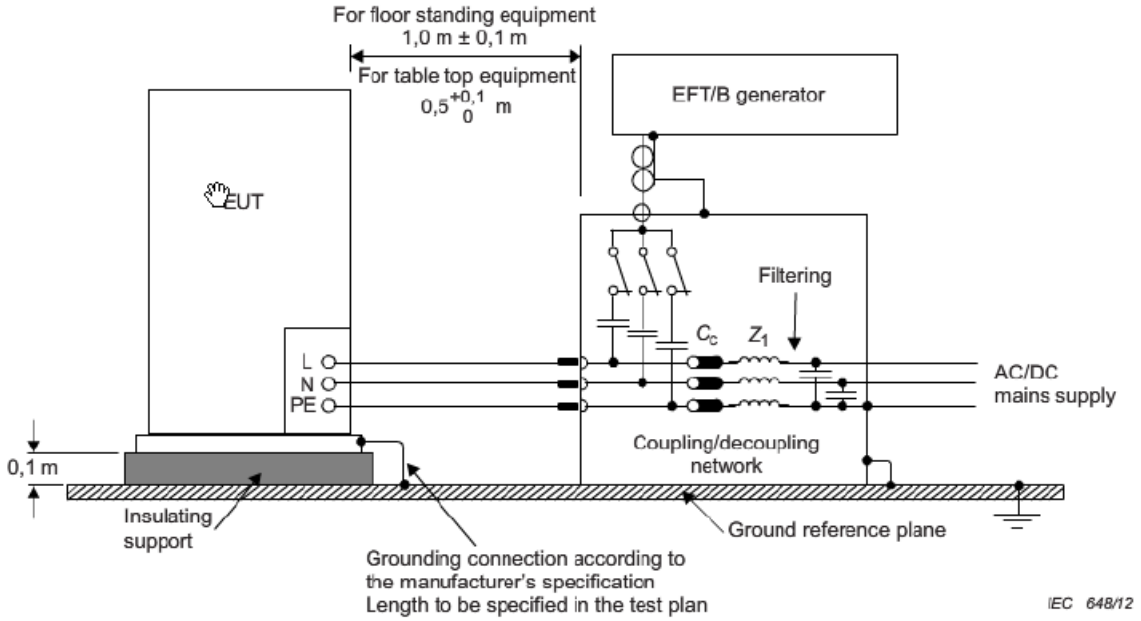
Test set-up for laboratory type approval



(A) location for supply line coupling

(B) location for signal lines coupling

Picture 7: Example of a test setup for type approval



Components

PE protective earth

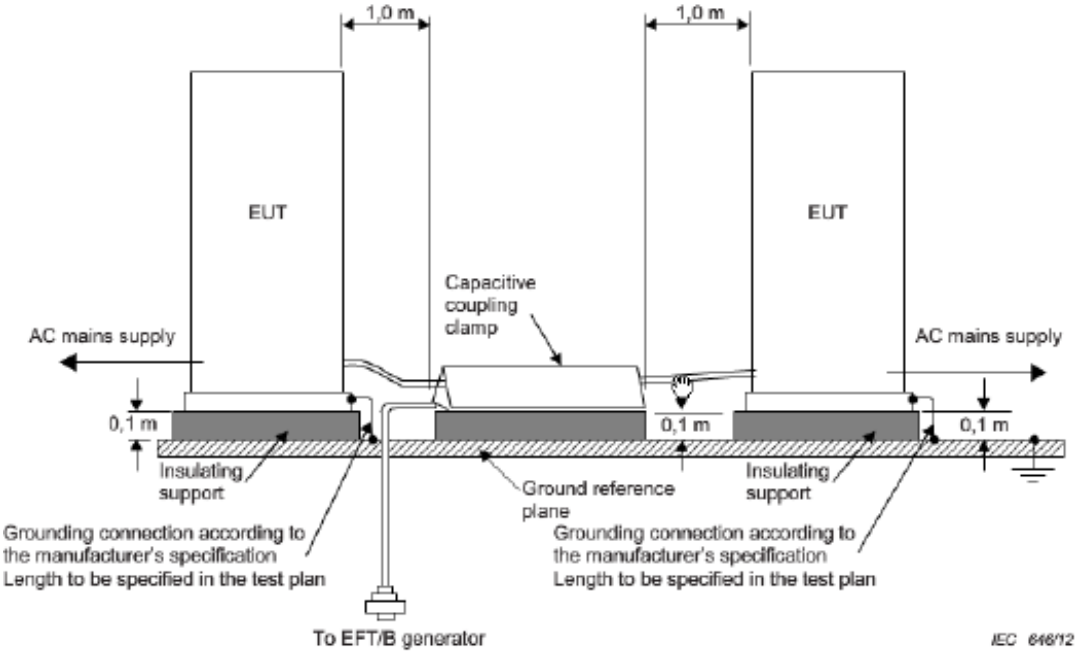
N neutral

L phase

Z_1 decoupling inductive

C_c coupling capacitor

Picture 8: Example of a test setup for direct coupling to a.c. / d.c. voltages power ports



Equipment without cables provided should be tested according to the operating/installation instruction or with a worst case scenario.

Picture 9: Example of a test setup floor standing system of two ETU's

Test set-up

Coupling-into mains- /signal lines

The test device was placed on a reference ground plate and insulated from it by a 0.1 m (± 0.01 m) thick insulating support. The ground plate extends beyond all sides of the test device by at least 0.1 m.

A direct coupling network or a capacitive clamp was used for the application of the test voltages.

The distance between EUT and any coupling devices was 0.5 m (-0 / + 0.1 m) for table top devices and 1.0 m (± 0.1 m) for floor standing equipment.

The cable between EUT and the coupling device was as short as possible.

If the manufacturer provides a cable exceeding the distance between the coupling device and the point of entry of the EUT, the excess length of this cable was bundled and situated at a distance of 0.1 above the ground reference plane.

All cables to the EUT were placed on the isolated support above 0.1 m over the ground reverence plane (the excess cable length were bundled).

Test level

Ports	Test-Level			
	0.5 kV	1 kV	2 kV	4 kV
On power port, PE direct voltage	☐	☐	☐	☐
On power ports, PE a.c. power port	☐	☐	☒	☐
I/O (Input/Output-) signal-, data- and control ports	☐	☒	☐	☐

Duration of the test ever coupling line and polarity: 120 s

Testing the device:

Test device: DRF-960-24-1

Comment:

Test report no.: 2017012 Examiner: Bruno Erdbories

Test date: 24.01.2017

Burst test on mains lines:

TEST1: Burst positive on L / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L

TEST2: Burst negative on L / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L

TEST3: Burst positive on N / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; N

TEST4: Burst negative on N / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; N

TEST5: Burst positive on PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; PE

TEST6: Burst negative on PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; PE

TEST7: Burst positive on L and N / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L+N

TEST8: Burst negative on L and N / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L+N

TEST9: Burst positive on L and PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L+PE

TEST10: Burst negative on L and PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L+PE

TEST11: Burst positive on N and PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; N+PE

TEST12: Burst negative on N and PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; N+PE

TEST13: Burst positive on L, N and PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L+N+PE

TEST14: Burst negative on L, N and PE / standard: 2 kV

Level: 2.00 kV / 5.00 kHz; L+N+PE

Burst test on output line

TEST1: Burst positive on signal lines / standard: 1 kV

Level: 1.00 kV / 5.00 kHz; HV-OUT

TEST2: Burst negative on signal lines / standard: 1kV

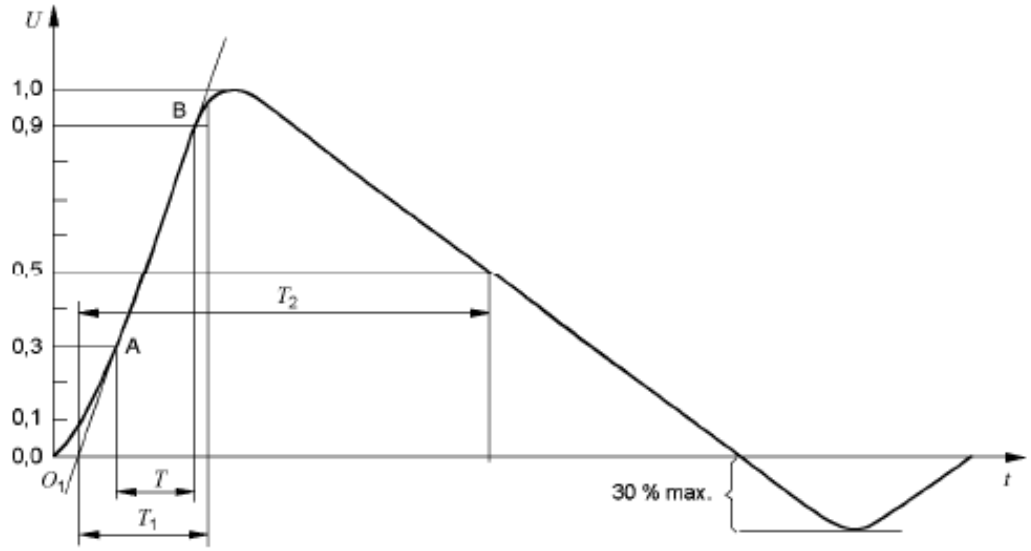
Level: 1.00 kV / 5.00 kHz; HV-OUT

Result: **No interrupts of the output voltage were detected.**

Test certificate of interference resistance measurement according to EN 61000-4-5
Interference resistance to surge voltages

Test procedure and test pulse

The test pulse has the following pulse shapes: in no-load, 1.2/50 and in short-circuit, 8/20. This means that the rise time of the pulse lasts 1.2 µs or 8 µs and the wave-tail half-time is 50 µs or 20 µs, respectively. The pulse is coupled-in over a coupling filter in a manner similar to the burst test. In this case, one differentiates between a symmetrical and an asymmetrical coupling-in. For each coupling path 5 pulses with positive voltage and 5 with negative amplitude are coupled-in. In alternating current lines the pulses will be coupled on the phase-line during the voltage zero-transit and on the peak values of the sinus-curve (positive and negative).



Picture 9: Pulse shape of the surge pulses after EN 61000-4-5

No-load pulse (1.2/50 µs):

Front time:	$T_1 = 1.67 \times T = 1.2\ \mu s \pm 30\ \%$
Time to half-value:	$T_2 = 50\ \mu s \pm 20\ \%$

Short-circuit pulse (8/20 µs):

Front time:	$T_1 = 1.25 \times T = 8\ \mu s \pm 20\ \%$
Time to half-value:	$T_2 = 20\ \mu s \pm 20\ \%$

Test level:

Input and output AC power ports		☒
- Asymmetrical (line to earth)	2 kV (4 kV special)	
- Symmetrical (line to line)	1 kV (2 kV special)	
Input and output DC power ports		☐
- Asymmetrical (line to earth)	0.5 kV	
- Symmetrical (line to line)	0.5 kV	
Signal ports		☐
- Asymmetrical (line to earth)	1 kV	

Testing the device:

Test device: DRF-960-24-1

Test date: 25.01.2017

Supply voltage: 230 V, 50 Hz

Primary protection: No detail by the manufacturer
[Breakdown voltage]

Equipment safety class system:

Class I equipment (protective earth conductor) ☒
Class II equipment (without protective conductor and with double or extra insulation): ☐
Class III equipment (protective Extra Low Voltage, with reliable disconnection): ☐

Electric power system:

TN-S power system ☒, no synchronization between N-PE
IT- power system ☐

Comment:

☒ Verification of the test equipment before the beginning of the examinations carried out.

☒ The examinations carried out (see table) with the standard-testing levels of the standard. Nearer examinations to the primary-/ secondary protection topic not examined in the context of this examination.

Test Report No.: 2017012 Examiner: Bruno Erdbories

Coupling into the power ports

AC power ports:

Repeating rate of the pulses: 60 seconds
Valuation criterion: B

☐ Double or extra isolated product (I. e. product without protective conductor), no asymmetrical tests between line and earth.
(EN 61000-4-5:2015-03), see exceptions of the product standards.

Comment:

The beginning testing level is 500 V. Then the next unloading is carried out with the next, being higher immunity test level. If the demanded examining immunity test level is reached, the unloading is carried out with the full test voltage. Per adjustment (level, coupling, angle, polarity) five pulses applied in each case.

1.) Symmetrical coupling (between lines)
Coupling (2 Ω / 18 µF)

Coupling path	Test-Level 2 (0.5 kV)	Test-Level 3 (1 kV)	Test-Level 4 (2 kV)	Test-Level x (4 kV)	Comment
L - N					
Positive/0°	☒	☒	☒	☐	passed
Negative/0°	☒	☒	☒	☐	passed
Positive/90°	☒	☒	☒	☐	passed
Negative/90°	☒	☒	☒	☐	passed
Positive/180°	☒	☒	☒	☐	passed
Negative/180°	☒	☒	☒	☐	passed
Positive/270°	☒	☒	☒	☐	passed
Negative/270°	☒	☒	☒	☐	passed

2.) Asymmetrical coupling (between lines and earth)
Coupling (12 Ω / 9 µF)

Coupling path	Test-Level 1 (0.5 kV)	Test-Level 2 (1 kV)	Test-Level 3 (2 kV)	Test-Level 4 (4 kV)	Comment
L - PE					
Positive/0°	☒	☒	☒	☒	passed
Negative/0°	☒	☒	☒	☒	passed
Positive/90°	☒	☒	☒	☒	passed
Negative/90°	☒	☒	☒	☒	passed
Positive/180°	☒	☒	☒	☒	passed
Negative/180°	☒	☒	☒	☒	passed
Positive/270°	☒	☒	☒	☒	passed
Negative/270°	☒	☒	☒	☒	passed
N - PE					
Positive	☒	☒	☒	☒	passed
Negative	☒	☒	☒	☒	passed

Result: **No interrupts of the output voltage were detected**

Test certificate of interference measurement according to EN 61000-4-6

Immunity to conducted disturbances, induced by radio frequency in a range of 150 kHz to 80 MHz

Test method:

The objective of this test is to simulate disturbance variables that are coupled in via the connected lines.

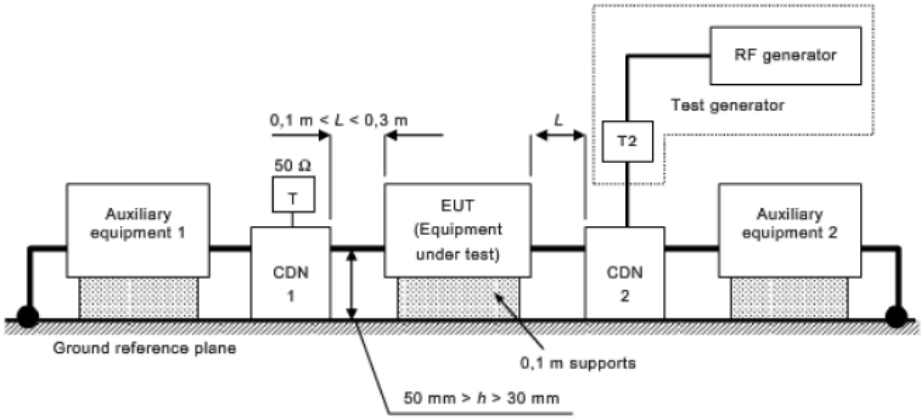
The equipment to be tested is placed on an insulating support of 0.1 m height above the ground reference plane. All cables exiting EUT shall be supported at a height of a least 30 mm above the ground reference plane.

To generate the signals, a test generator includes all equipment and components for supplying input port of each coupling device with the disturbing signal at the required signal level at the required point is used. The frequency range is swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with disturbance signal 80 % amplitude modulated with 1 kHz sinus wave. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.

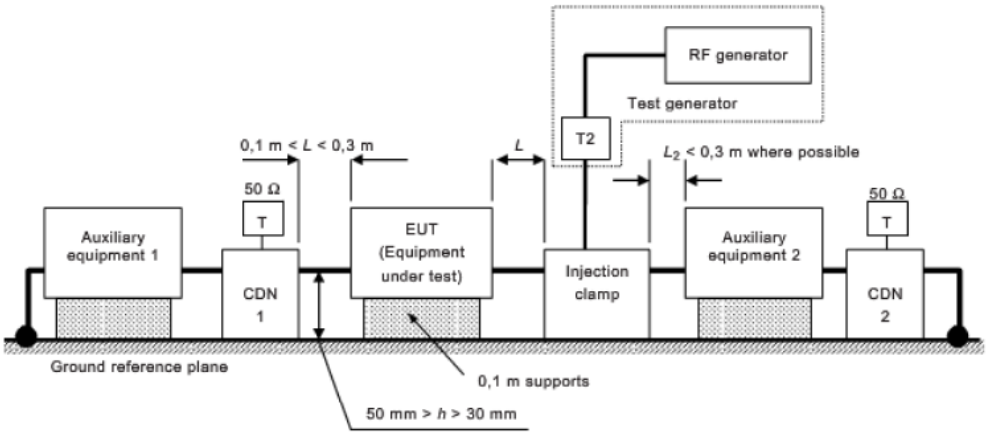
The test shall be performed with the test generator connected to each of the coupling devices (CDN, Injection clamp, current injection probe) in turn. All other cables not under test, shall be disconnected (when functionally allowed) or provided with decoupling networks or unterminated CDN's only.

For the coupling in mains lines occurs mandatorily via CDN's of type M2 (two conductors), M3 (three conductors, e.g. L1, N &. PE), and M5 (5 conductors, three-phase connection). By coupling into all other connected control and data lines, the coupling procedure is selected under the rules from chapter 7.4.2 of EN 61000-4-6.

Test configuration:



Picture 1: Schematic set-up for immunity test to RF conducted disturbance (main line)



Picture 2: Schematic set-up for immunity test to RF conducted disturbance (signal line)

Test parameter

Frequency range:	150 kHz to 80 MHz
Modulation frequency:	1 kHz [AM]
Dwell time:	1 s
Frequency step:	1 %
Test level:	10 V, (+/- 0.2 dB)
Mains voltage:	230 V / 50 Hz,

Testing the device

Test device: DRF-960-24-1

Comment:

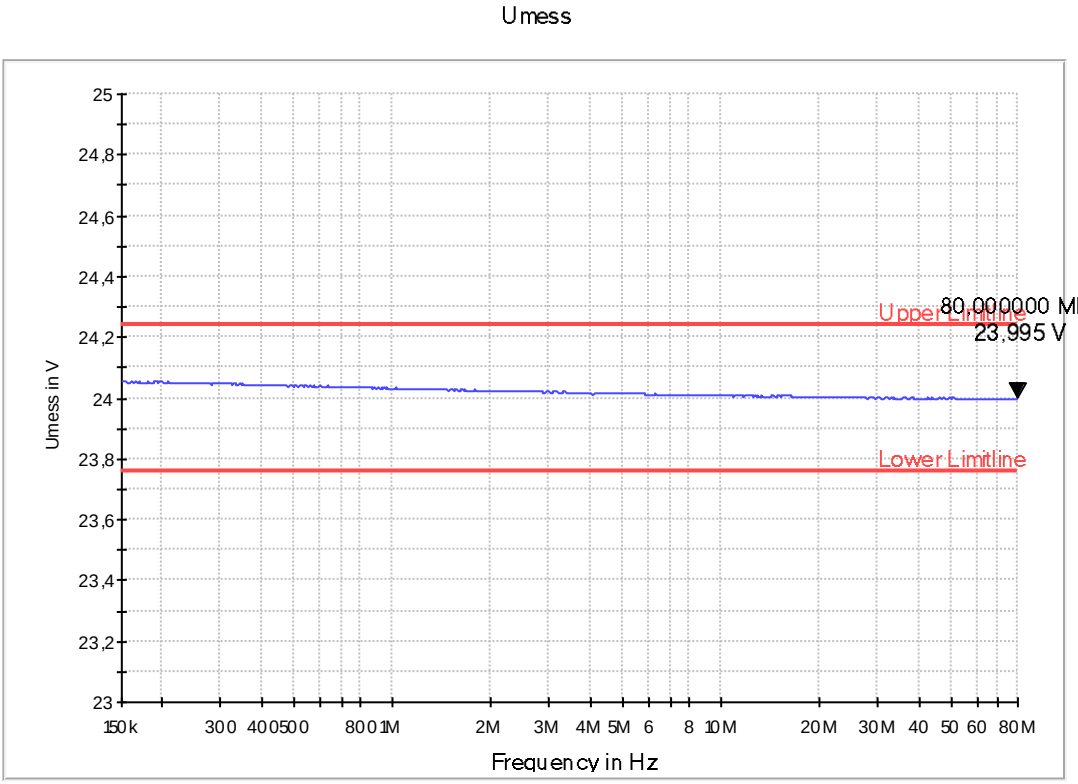
Test report no.: 2017012 Examiner: Bruno Erdbories

Test date: 24.01.2017

Tests:

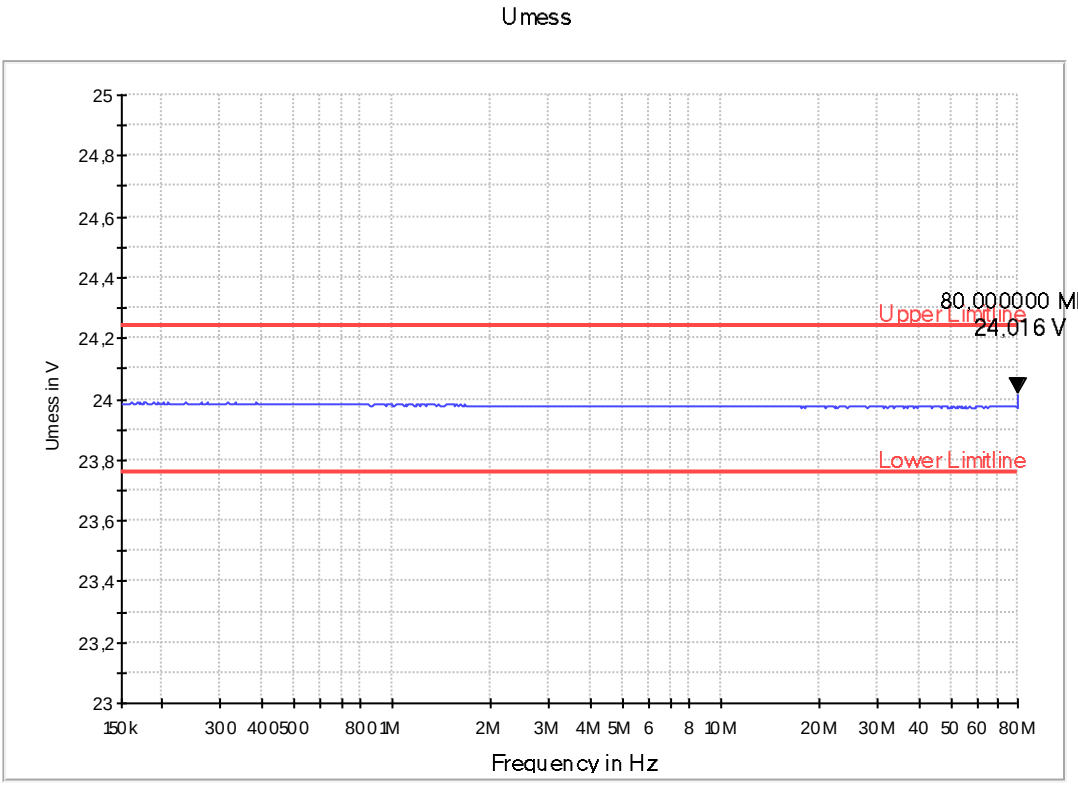
Lines	Coupling network	Passed:
Mains supply:	☐ **M5:**	
	☒ **M3:**	**yes**
	☐ **M2:**	

Graphical presentation of the measured voltage output:



Lines	Coupling network	Passed:
DC-output:	☐ **M5:**	
	☐ **M3:**	
	☒ **M2:**	**yes**

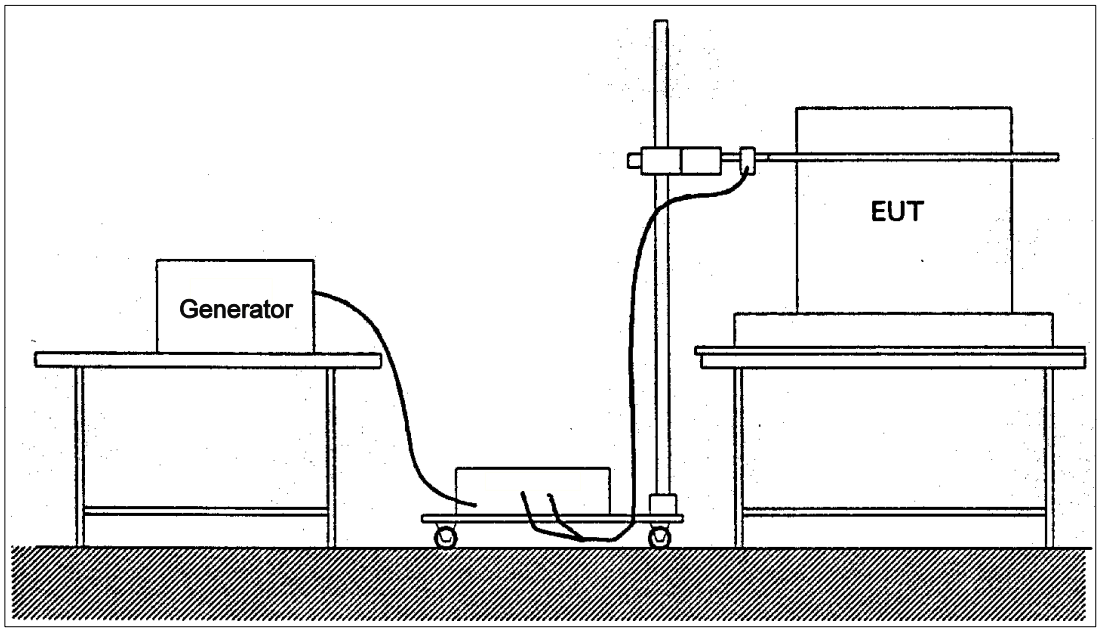
Graphical presentation of the measured voltage output:



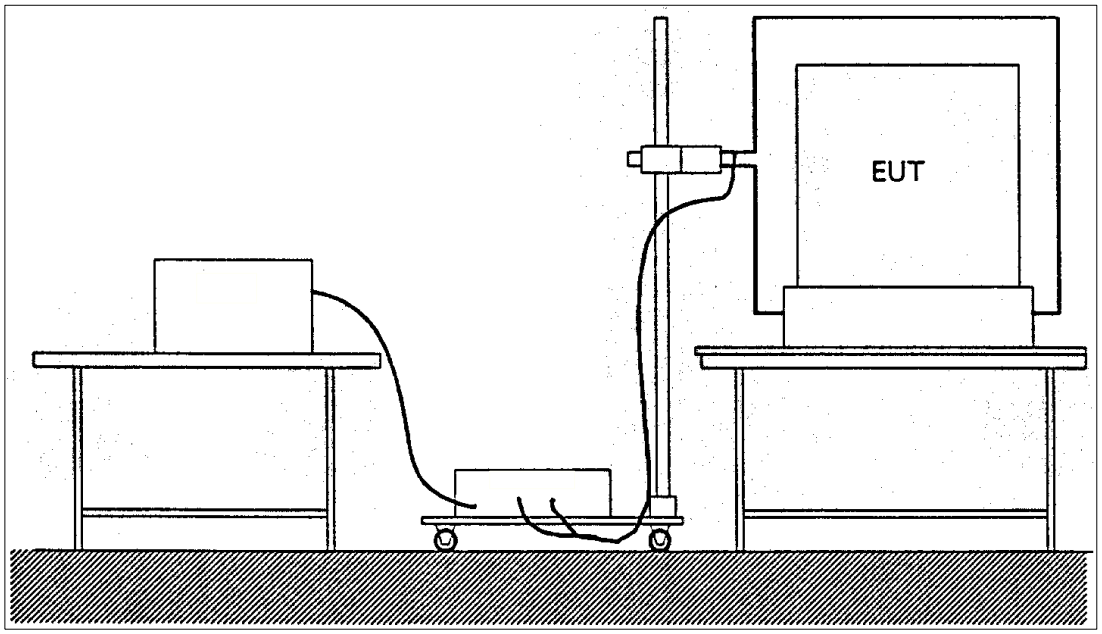
Test certificate of interference resistance measurement according to EN 61000-4-8
Interference resistance to magnetic fields with technical frequencies

Test procedure

The EUT will be tested against magnetic fields inside a loop antenna 1 m × 1 m in horizontal and vertical position with the required test-level.



Picture 1: test with horizontal antenna (vertical magnetic field)



Picture 2: test with vertical antenna (horizontal magnetic field)

Test level:

☐ 1 A/m

☐ 3 A/m

☐ 10 A/m

☒ 30 A/m

☐ 100 A/m

Testing the device:

Test device: DRF-960-24-1

Test date: 25.01.2017

Test report no.: 2017012 Examiner: Bruno Erdbories

Testparameter:

Level: 30 A/m

Frequencies: 50 Hz

Dwell time: 30 s

Test result: **requirments met**

Test certificate of interference resistance measurement according to EN 61000-4-11
Interference resistance to voltage dips, short interruptions and voltage fluctuations.

General

Electrical and electronic equipment may be affected by voltage dips, short interruptions or voltage variations of power supply.

Voltage dips and short interruptions are caused by faults in the a.c. network, primarily short circuits, in installations or by sudden large changes of load. In certain cases, two or more consecutive voltage dips or interruptions may occur. Voltage variations are caused by continuously varying loads connected to the network.

Test method

The test shall be performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer. If no cable length is specified, it shall be the shortest possible length suitable to the application of the EUT.

Performance of the tests:

Voltage dips and short interruptions
The test device must be tested for each selected combination of test levels and durations with a sequence of three dips or interruptions with intervals of 10 s minimum (between each test events). Voltage dips, changes in supply voltages shall occur at zero crossings of the voltage, and at additional angles (observe the product standards) on each phase.

Voltage variations
The device is tested to each of the specified voltage variations, three times at 10 s interval for the most representative modes of operation.

Preferred test level:

☒ - Voltage interruptions for 0,5 cycle.
☒ - Voltage interruptions for 1 cycle.
☒ - Voltage dips of 30% for 25 (30) cycles at 50/60 Hz.
☒ - Voltage dips of 60% for 10 (12) cycles at 50/60 Hz.
☒ - Voltage interruptions for 250 (300) cycles at 50/60 Hz.
Additional in EN 61204-3:
☒ - Voltage dips of 30% for 0,5 cycles at 50 Hz.
☒ - Voltage dips of 60% for 5 cycles at 50 Hz.

Testing the device:

Test device: DRF-960-24-1

Test date: 24.01.2017

Comment:

Test report no.: 2017012 Examiner: Bruno Erdbories

Tests:

Supply voltage: 230 V/ 50 Hz

	Test levels				**Operation conditions**			**Results**	
x % from U_{Nenn}	Duration	Phase-Angle	Break [s]	Test-Time [s]	Stand-by	Operation	Safety	Criteria	Comment
0 % from Un for 0,5 cycles		0^0	10	60	☐	☒	☐	A	
0 % from Un for 0,5 cycles		180^0	10	60	☐	☒	☐	A	
0 % from Un for 1 cycle		0^0	10	60	☐	☒	☐	A	
40 % from Un for 10 cycles		0^0	10	60	☐	☒	☐	B	50 ms Interruption of Uout
70 % from Un for 25 cycles		0^0	10	60	☐	☒	☐	A	
0 % from Un for 250 cycles		0^0	10	60	☐	☒	☐	B	5 s Interruption Of Uout
40 % from Un for 5 cycles		0^0	10	60	☐	☒	☐	B	50 ms Interruption of Uout
70 % from Un for 0,5 cycles		0^0	10	60	☐	☒	☐	A	
80 % from Un for 250 cycles		0^0	10	60	☐	☐	☐		

Test certificate of radiated emission measurements

Measurements in the range of 30 MHz to 1 GHz

Test report no.: 2017012 Test date: 24.01.2017

Explanatory notes

In the frequency range 30 MHz to 1 GHz for radiated field strength measurements a quasi-peak limit value is defined to CISPR. For the measurement, a test receiver is stipulated with quasi-peak detector. However, this quasi-peak measurement would take many times. To carry out an examination of the measurement completely with the quasi-peak detector, a measuring time of more than 5 hours would arise for the complete range. This is the reason why a pre-measurement (prescan) with the peak detector is preferred.

First a scan with a relative small dwell time 1 ms (step 50 kHz, BW 120 kHz) carried out per frequency step. However, it is known that the emissions are pulsed slowly (<1 kHz), the dwell time must be increased so. The EUT is measured from different directions; therefore, the table will be turned in 30 ° steps. The antenna is mounted in a fixed height in the middle of the testing volume.

After the prescan, a data reduction is carried out. All greater interference levels than the limit value – 10 dB listed in a data reduction table. The 20 biggest values used for the further measurements (however, here can be intervened manually still by hand). Now with the frequency's a finer scan carried out with a greater dwell time and a smaller step size (15°) of the turntable.
On the determined maximum value positions, a maximisation carried out afterwards once again with turning the table slowly during the measurement 30° around the maximum position.
The final measuring then carried out with the quasi-peak detector at the maximum.

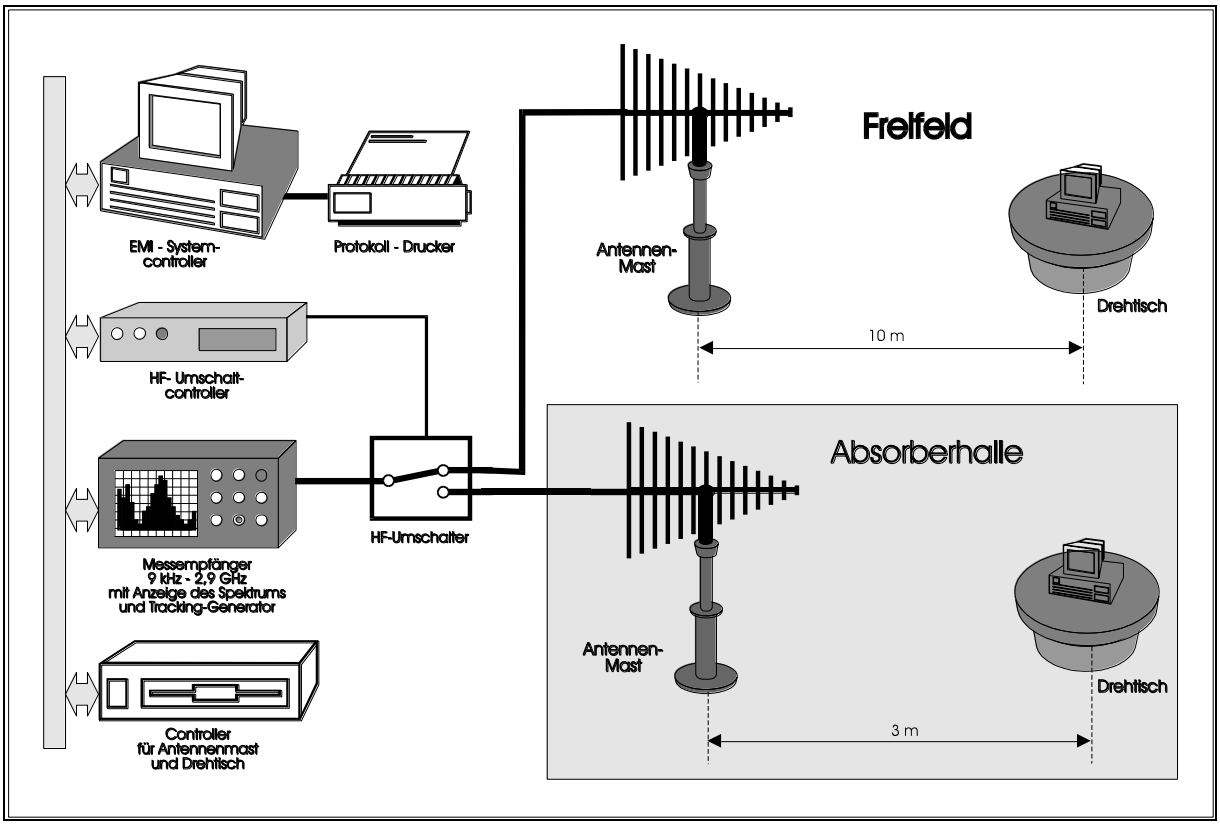
The first measurement is always accomplished in the absorber-chamber (standardize-compliant FAR according to EN 55016-1-4, section 5.8, max. diameters of the test volume d = 1.2 m, height of h = 2.0 m).
The measuring distance is 3.0 m in the absorber chamber (measured from the front of the EUT volume up to the phase centre of the antenna).
With bigger EUT'S or with devices arranged under product standards, which do not accept this alternative measuring field (3 m - FAR), a optional measurement on the open area test side (according to EN 55016-1-4, section 5.1, 10 m measuring position) is carried out finally.
Therefor, a frequency list will generated from the results of the measurements in the absorber chamber. At this frequency's the EUT will measured once more, by stepping the turntable again in 15 ° steps. The antenna will be scanned in the height between 1 m and 4 m. On the maximum position, the quasi-peak measurement carried out after the maximisation routine.

Uncertainty:

The uncertainty amounts to ± 5,2 dB (specification with an extension factor of k = 2) during the radiated field strength measurements. This value lies within the measuring uncertainty agreed from CISPR A, therefore the limit lines are absolute limits. The test passed if the measuring value lies below the limit line.

Test set-up:

Console devices placed directly on the turntable. Desktop devices placed on non-conductive table, which is 0.8 m in height. The distance between the antenna phase centre and the centre of the turntable is 3 m in the bay and 10 m on the free field. In the bay, the antenna not runs up. On the open area test site, the antenna runs up to a height between 1 and 4 m depending on the standard. The turntable rotated between 0° and 360°. The power supply and additional interface connections for the test device are located in the middle of the turntable.



Picture 11: Measuring set-up for field strength measurements

Radiated emission report

Common Information

Test Description:	EMC32 Standard Report Setup
Operating Conditions:	Test Laboratory RS Schwarze Elektrotechnik GmbH
Operator Name:	B. Erdbories

EUT Information

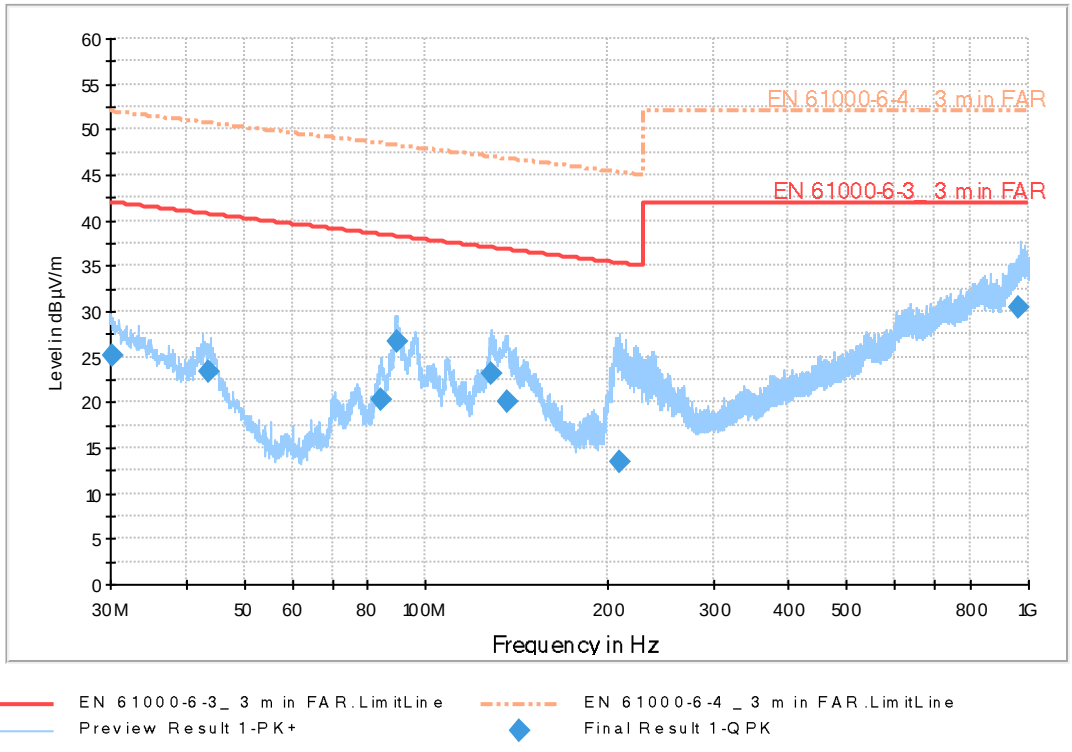
EUT Name:	DRF 960-24-1
Manufacturer:	TDK-Lambda UK Limited
Serial Number:	
Hardware Rev.:	
Software Rev.:	
Comment:	24 V, 40 A

Scan Setup: EN 55016-2-3 FAR max [EMI radiated]

Hardware Setup:	FAR_30MHz - 1 GHz
Receiver:	[ESU 8]
Level Unit:	dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 1 GHz	50 kHz	PK+	120 kHz	0,02 s	20 dB

FAR EN 55016-2-3



Final Result 1:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (s)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.150000	25.2	1.0	120.0	100.0	V	182.0	26.2	16.8	42.0
43.700000	23.4	1.0	120.0	100.0	V	248.0	19.3	17.3	40.7
84.450000	20.3	1.0	120.0	100.0	V	23.0	13.8	18.1	38.4
89.500000	26.7	1.0	120.0	100.0	V	8.0	14.3	11.6	38.2
128.850000	23.2	1.0	120.0	100.0	H	8.0	16.9	13.8	37.0
137.100000	20.0	1.0	120.0	100.0	V	120.0	16.3	16.8	36.8
209.100000	13.4	1.0	120.0	100.0	V	91.0	11.5	21.9	35.3
965.700000	30.4	1.0	120.0	100.0	V	105.0	30.6	11.6	42.0

Radiated emission report

Common Information

Test Description:	EMC32 Standard Report Setup
Operating Conditions:	Test Laboratory RS Schwarze Elektrotechnik GmbH
Operator Name:	B. Erdbories

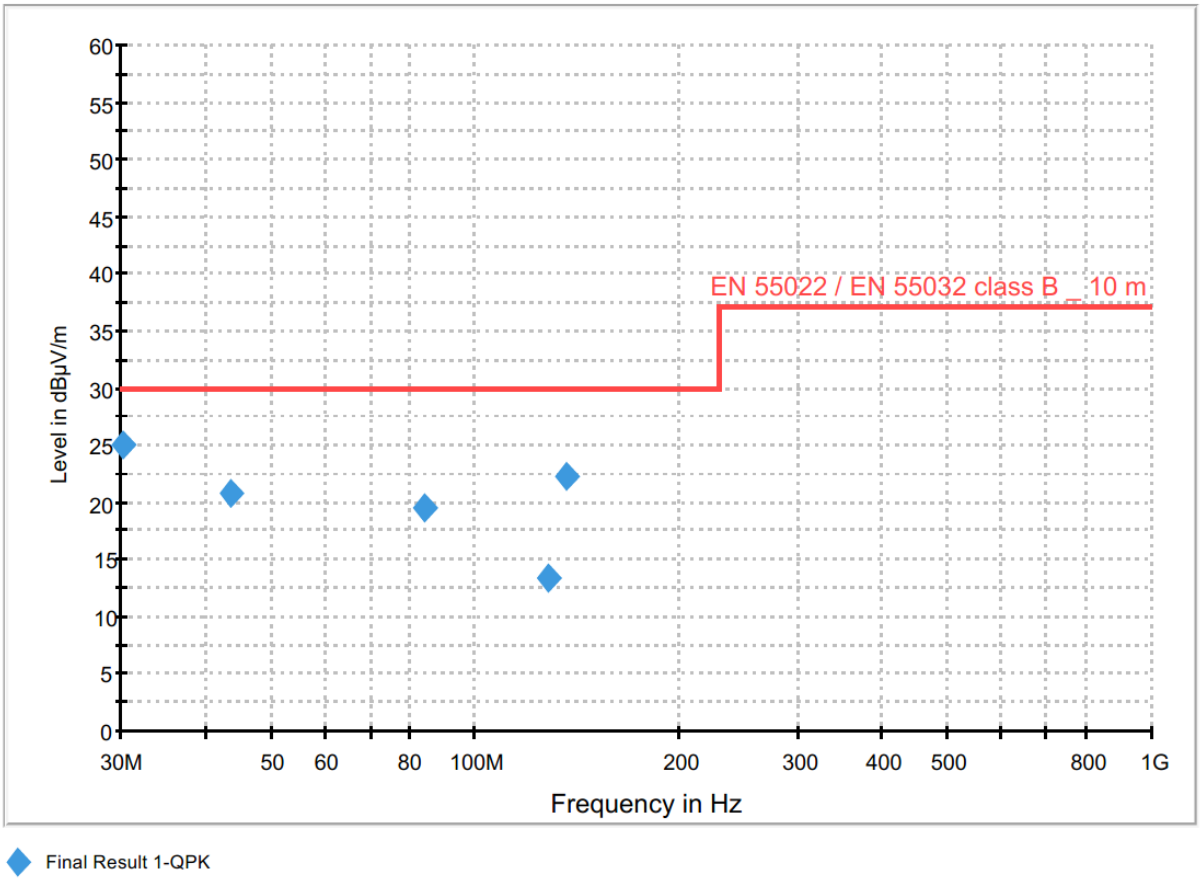
EUT Information

EUT Name:	DRF 960-24-1
Manufacturer:	TDK-Lambda UK Limited
Serial Number:	
Hardware Rev.:	
Software Rev.:	
Comment:	24 V, 40 A

Scan Setup: EN 55022 / EN 55032 OATS fin [EMI radiated]

Hardware Setup:	OATS_30 MHz - 1 GHz
Receiver:	[ESU 8]
Level Unit:	dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 1 GHz	50 kHz	QPK	120 kHz	15 s	20 dB



Final Result 1:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (s)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.150000	25.0	15.0	120.0	369.0	V	15.0	19.2	5.0	30.0
43.700000	20.8	15.0	120.0	266.0	V	9.0	12.8	9.2	30.0
84.450000	19.4	15.0	120.0	123.0	V	9.0	8.8	10.6	30.0
128.850000	13.3	15.0	120.0	357.0	H	75.0	13.5	16.7	30.0
137.100000	22.2	15.0	120.0	283.0	V	15.0	13.2	7.8	30.0

Test certificate of the conducted emission measurements
Measurement of the radio interference voltages/ currents in a range of (10) 150 kHz to 30 MHz

Test report no.: 2017012 Test date: 24.01.2017

Explanatory notes

For conducted emission measurements a “quasi-peak- and an average limit “was defined by CISPR. However, this measurement would take a great deal of time. Therefore, the measurements are performed in the “Peak- and Average (wide BW)” detector function mode. On exceeding the limit curves, these signals are deliberately checked in the “Quasi-peak”- and Average-mode. The thus determined measurements are plotted in the diagrams as crosses crosses and as horizontal lines.

Measuring time in the first Prescan was 10 ms per step (4 kHz, BW is 9 kHz).
For test devices with a normal mains connection (230/400 V) the mains supply was diverted through a V-LISN. In this case, the asymmetrical radio noise voltage of each individual line was measured against the reference ground with the receiver. The measuring software switched the measuring path automatically. Only the maximum was notified in the diagrams.

Test set-up:

The test device was placed on a table, which was 80 cm high at a distance of 40 cm from a grounded, conductive surface (metal wall of the screened enclosure). The shortest distance between the test devices’s housing and its connection to the balanced network must be 80 cm. Test devices, which are not equipped with fixed connection leads are connected to the balanced network with an unshielded lead, which was 1 m long. For test devices equipped with non-removable power leads, which are longer than 1 meter, the lead was to be folded in the middle to form a meander-like bundle, which is 30 to 40 cm long and as tight as possible. It was fixed to the table such that the total length does not exceed 1m.

Uncertainty:

The uncertainty amounts to± 4,1 dB (specification with an extension factor of k = 2) during the conducted emission measurements. This value lies within the measuring uncertainty agreed from CISPR A, therefore the limit lines are absolute limits. The test was passed if the measuring value lies below the limit line.

conducted emission report

Common Information

Test Description:	EMC32 Standard Report Setup
Operating Conditions:	Test laboratory RS Schwarze Elektrotechnik GmbH
Operator Name:	B. Erdbories

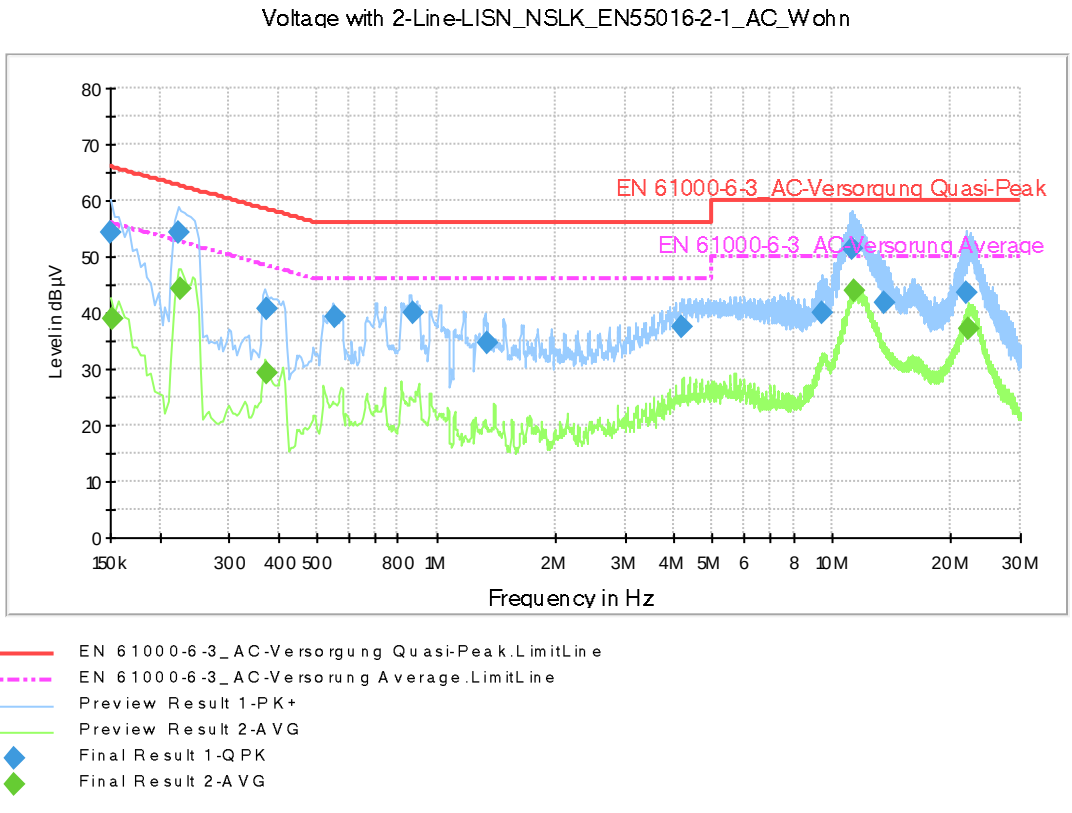
EUT Information

EUT Name:	DRF 960-24-1
Manufacturer:	TDK-Lambda UK Limited
Serial Number:	
Hardware Rev.:	
Software Rev.:	
Comment:	24 V, 40 A

Scan Setup: Voltage with 2-Line_NSLK_EN55016-2-1 pre [EMI conducted]

Hardware Setup:	Störspannung_NSLK_1-phasig
Receiver:	[ESU 8]
Level Unit:	dBµV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4 kHz	PK+; AVG	9 kHz	0,01 s	0 dB



Final Result 1:

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (s)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150800	54.3	15.0	9.0	FLO	N	10.1	11.6	66.0
0.223600	54.3	15.0	9.0	FLO	N	10.1	8.4	62.7
0.373600	40.7	15.0	9.0	GN	N	10.1	17.7	58.4
0.555600	39.3	15.0	9.0	GN	L1	10.1	16.7	56.0
0.869600	40.0	15.0	9.0	GN	N	10.2	16.0	56.0
1.340800	34.8	15.0	9.0	GN	N	10.3	21.2	56.0
4.196800	37.6	15.0	9.0	GN	N	10.5	18.4	56.0
9.499600	40.1	15.0	9.0	FLO	N	11.0	19.9	60.0
11.242000	51.4	15.0	9.0	FLO	N	11.2	8.6	60.0
13.622400	41.6	15.0	9.0	FLO	L1	11.3	18.4	60.0
21.903200	43.7	15.0	9.0	FLO	N	12.1	16.3	60.0

Final Result 2:

Frequency (MHz)	Average (dBµV)	Meas. Time (s)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.152400	38.9	15.0	9.0	GN	L1	10.0	16.9	55.9
0.224400	44.3	15.0	9.0	GN	N	10.1	8.4	52.7
0.374000	29.4	15.0	9.0	GN	N	10.1	19.0	48.4
11.332400	44.0	15.0	9.0	FLO	L1	11.1	6.0	50.0
22.079200	37.3	15.0	9.0	FLO	N	12.1	12.7	50.0

Test certificate of spurious radiation measurement according to EN 61000-3-2
Measurement of current harmonics for devices with an input current ≤ 16A for each line

Test report-no.: 2017012 Test date: 24.01.2017

Test device: DRF-960-24-1

Examiner: Bruno Erdbories

Explanations

The test device is classified for the measurement of current harmonics. One differentiates thereby the following classes:

Class A:
- Symmetrical three-phase devices;
- Household appliances excluded devices, which fall into the class D;
- Electric power tools excluded portable electric power tools;
- Dimmer (dimmer) for lamps;
- Audio mechanisms

Devices, which do not fall into one the other class, must be regarded as devices of the class A.

Class B: Portable ele4ctric power tools

Class C: Lighting mechanisms

Class D: Devices with maximum power of 600 W:
- Personal computers and displays (monitors)
- Television broadcast receiver

Note: The limit values of the class D are reserved devices, for which it can be shown that they have an expressed influence on the public electricity supply network by applying factors, which are specified in the note under class ` A`.

Result: Class A

Test result was

OK

Test Settings

Test	
Measuring Standard	EN 61000-4-7:2002 + A1:2009
Limits	EN 61000-3-2:2014 (Table 1)
Test Date	24.01.2017
Test Time	14:40:50
Measurement Duration	00:02:30
EUT Classification	Class A
EUT / Measurement Setup	
Power Supply	
Nominal Voltage	230V
Nominal Frequency	50Hz

EUT Details

Brand	
Model	
Type	DRF 960-24-1
Serial number	2
Manufacturer details	TDK-Lambda UK Limited

Product Mode Details

Name of product mode	
Description of configuration	Uout= 24 V, I = 40 A

Test Equipment

Power Meter	
Manufacturer	ZES ZIMMER Electronic Systems GmbH
Model	LMG640
Serial Number	00631607
Software Version	1.034-R37312
NI controlled by LMG, SN:	A0808085
Analysis Software	ZES ZIMMER LMG Test Suite 1.034-R37312

Additional Measurands - Informative

Additional Measurands					
$U_{trms,\ L1}$	230.841 V	$U_{pp,\ L1}$	653.268 V	$U_{dc,\ L1}$	9.90391 mV
$U_{cf,\ L1}$	1.41534	$I_{trms,\ L1}$	4.35843 A	$I_{pp,\ L1}$	13.626 A
$I_{dc,\ L1}$	2.09947 mA	$I_{cf,\ L1}$	1.56645	P_{L1}	987.708 W
Q_{L1}	191.535 var	S_{L1}	1.00611 kVA	PF_{L1}	0.98171
$f_{cycle,\ L1}$	49.9918 Hz				

Result Overview

Test Name	Test Result	Limit Usage	Info
Supply Voltage Frequency Test (61000-4-7) [L1]	OK		49.99 Hz (50.00 Hz ± 0.5%)
Supply peak voltage test (61000-4-7) [L1]	OK		
Positive peak test	OK		All positive peak values within the allowed range
Negative peak test	OK		All negative peak values within the allowed range
Supply peak position test (61000-4-7) [L1]	OK		All peak values within the allowed range
Supply Voltage Harmonic Distortion Test (61000-4-7) [L1]	OK		
Voltage Distortion H2	OK	2.4%	0.00% < 0.20%
Voltage Distortion H3	OK	2.4%	0.02% < 0.90%
Voltage Distortion H4	OK	0.8%	0.00% < 0.20%
Voltage Distortion H5	OK	2.8%	0.01% < 0.40%
Voltage Distortion H6	OK	0.6%	0.00% < 0.20%
Voltage Distortion H7	OK	2.3%	0.01% < 0.30%
Voltage Distortion H8	OK	0.5%	0.00% < 0.20%
Voltage Distortion H9	OK	2.5%	0.00% < 0.20%
Voltage Distortion H10	OK	0.4%	0.00% < 0.20%
Voltage Distortion H11	OK	4.4%	0.00% < 0.10%
Voltage Distortion H12	OK	0.6%	0.00% < 0.10%
Voltage Distortion H13	OK	4.0%	0.00% < 0.10%
Voltage Distortion H14	OK	1.2%	0.00% < 0.10%
Voltage Distortion H15	OK	2.8%	0.00% < 0.10%
Voltage Distortion H16	OK	0.7%	0.00% < 0.10%
Voltage Distortion H17	OK	3.4%	0.00% < 0.10%
Voltage Distortion H18	OK	0.7%	0.00% < 0.10%
Voltage Distortion H19	OK	1.1%	0.00% < 0.10%
Voltage Distortion H20	OK	0.6%	0.00% < 0.10%
Voltage Distortion H21	OK	1.6%	0.00% < 0.10%
Voltage Distortion H22	OK	0.5%	0.00% < 0.10%
Voltage Distortion H23	OK	2.3%	0.00% < 0.10%
Voltage Distortion H24	OK	0.4%	0.00% < 0.10%
Voltage Distortion H25	OK	1.4%	0.00% < 0.10%
Voltage Distortion H26	OK	0.4%	0.00% < 0.10%
Voltage Distortion H27	OK	1.1%	0.00% < 0.10%
Voltage Distortion H28	OK	0.6%	0.00% < 0.10%
Voltage Distortion H29	OK	0.9%	0.00% < 0.10%
Voltage Distortion H30	OK	0.4%	0.00% < 0.10%
Voltage Distortion H31	OK	0.6%	0.00% < 0.10%
Voltage Distortion H32	OK	0.4%	0.00% < 0.10%
Voltage Distortion H33	OK	1.7%	0.00% < 0.10%
Voltage Distortion H34	OK	0.4%	0.00% < 0.10%
Voltage Distortion H35	OK	2.0%	0.00% < 0.10%
Voltage Distortion H36	OK	0.4%	0.00% < 0.10%
Voltage Distortion H37	OK	1.3%	0.00% < 0.10%
Voltage Distortion H38	OK	0.3%	0.00% < 0.10%
Voltage Distortion H39	OK	1.4%	0.00% < 0.10%
Voltage Distortion H40	OK	0.4%	0.00% < 0.10%
Table 1 Harmonic Current Test (61000-3-2) [L1]	OK		
Harmonic Current Test	OK		

100%			
100% Test H2	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H3	OK	18.7%	Limit met (0.429 A ≤ 2.300 A)
100% Test H4	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H5	OK	14.3%	Limit met (0.163 A ≤ 1.140 A)
100% Test H6	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H7	OK	12.0%	Limit met (0.092 A ≤ 0.770 A)
100% Test H8	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H9	OK	14.2%	Limit met (0.057 A ≤ 0.400 A)
100% Test H10	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H11	OK	12.9%	Limit met (0.043 A ≤ 0.330 A)
100% Test H12	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H13	OK	14.8%	Limit met (0.031 A ≤ 0.210 A)
100% Test H14	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H15	OK		No test required (0.018 A ≤ 0.026 A)
100% Test H16	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H17	OK		No test required (0.010 A ≤ 0.026 A)
100% Test H18	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H19	OK		No test required (0.007 A ≤ 0.026 A)
100% Test H20	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H21	OK		No test required (0.005 A ≤ 0.026 A)
100% Test H22	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H23	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H24	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H25	OK		No test required (0.002 A ≤ 0.026 A)
100% Test H26	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H27	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H28	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H29	OK		No test required (0.002 A ≤ 0.026 A)
100% Test H30	OK		No test required (0.001 A ≤ 0.026 A)

100% Test H31	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H32	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H33	OK		No test required (0.002 A ≤ 0.026 A)
100% Test H34	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H35	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H36	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H37	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H38	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H39	OK		No test required (0.002 A ≤ 0.026 A)
100% Test H40	OK		No test required (0.001 A ≤ 0.026 A)
Harmonic Current Test 150%	OK		
150% Test H2	OK		No test required (0.003 A ≤ 0.026 A)
150% Test H3	OK	12.6%	Limit met (0.435 A ≤ 3.450 A)
150% Test H4	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H5	OK	9.7%	Limit met (0.165 A ≤ 1.710 A)
150% Test H6	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H7	OK	8.1%	Limit met (0.093 A ≤ 1.155 A)
150% Test H8	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H9	OK	9.5%	Limit met (0.057 A ≤ 0.600 A)
150% Test H10	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H11	OK	8.7%	Limit met (0.043 A ≤ 0.495 A)
150% Test H12	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H13	OK	10.1%	Limit met (0.031 A ≤ 0.315 A)
150% Test H14	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H15	OK		No test required (0.018 A ≤ 0.026 A)
150% Test H16	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H17	OK		No test required (0.010 A ≤ 0.026 A)
150% Test H18	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H19	OK		No test required (0.007 A ≤ 0.026 A)
150% Test H20	OK		No test required (0.001 A

			≤ 0.026 A)
150% Test H21	OK		No test required (0.004 A ≤ 0.026 A)
150% Test H22	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H23	OK		No test required (0.003 A ≤ 0.026 A)
150% Test H24	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H25	OK		No test required (0.002 A ≤ 0.026 A)
150% Test H26	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H27	OK		No test required (0.003 A ≤ 0.026 A)
150% Test H28	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H29	OK		No test required (0.002 A ≤ 0.026 A)
150% Test H30	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H31	OK		No test required (0.003 A ≤ 0.026 A)
150% Test H32	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H33	OK		No test required (0.002 A ≤ 0.026 A)
150% Test H34	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H35	OK		No test required (0.003 A ≤ 0.026 A)
150% Test H36	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H37	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H38	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H39	OK		No test required (0.002 A ≤ 0.026 A)
150% Test H40	OK		No test required (0.001 A ≤ 0.026 A)
Harmonic Current Test 200%	OK		
200% Test H2	OK		No test required (0.003 A ≤ 0.026 A)
200% Test H3	OK	9.5%	Limit met (0.435 A ≤ 4.600 A)
200% Test H4	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H5	OK	7.2%	Limit met (0.165 A ≤ 2.280 A)
200% Test H6	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H7	OK	6.1%	Limit met (0.093 A ≤ 1.540 A)
200% Test H8	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H9	OK	7.2%	Limit met (0.057 A ≤ 0.800 A)

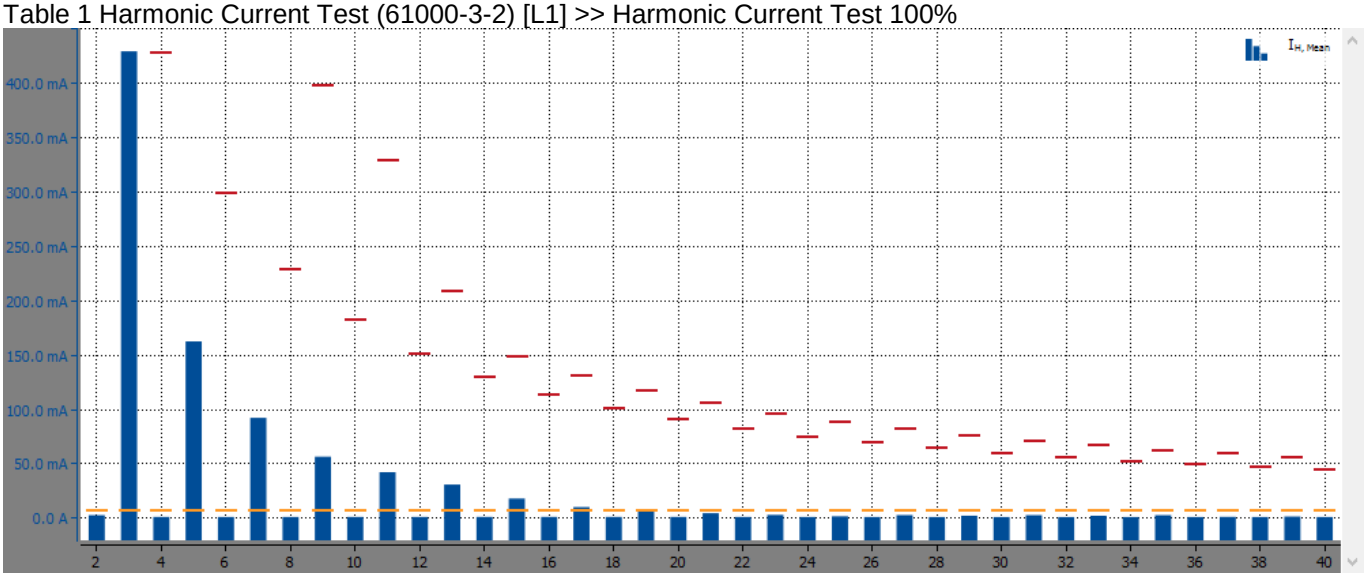
200% Test H10	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H11	OK	6.5%	Limit met (0.043 A ≤ 0.660 A)
200% Test H12	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H13	OK	7.6%	Limit met (0.031 A ≤ 0.420 A)
200% Test H14	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H15	OK		No test required (0.018 A ≤ 0.026 A)
200% Test H16	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H17	OK		No test required (0.010 A ≤ 0.026 A)
200% Test H18	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H19	OK		No test required (0.007 A ≤ 0.026 A)
200% Test H20	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H21	OK		No test required (0.004 A ≤ 0.026 A)
200% Test H22	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H23	OK		No test required (0.003 A ≤ 0.026 A)
200% Test H24	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H25	OK		No test required (0.002 A ≤ 0.026 A)
200% Test H26	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H27	OK		No test required (0.003 A ≤ 0.026 A)
200% Test H28	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H29	OK		No test required (0.002 A ≤ 0.026 A)
200% Test H30	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H31	OK		No test required (0.003 A ≤ 0.026 A)
200% Test H32	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H33	OK		No test required (0.002 A ≤ 0.026 A)
200% Test H34	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H35	OK		No test required (0.003 A ≤ 0.026 A)
200% Test H36	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H37	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H38	OK		No test required (0.001 A ≤ 0.026 A)
200% Test H39	OK		No test required (0.002 A

			≤ 0.026 A)
200% Test H40	OK		No test required (0.001 A ≤ 0.026 A)
POHC Test	OK		POHC Limit met (0.009 A ≤ 0.251 A)
100% Test H2	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H3	OK	18.7%	Limit met (0.429 A ≤ 2.300 A)
100% Test H4	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H5	OK	14.3%	Limit met (0.163 A ≤ 1.140 A)
100% Test H6	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H7	OK	12.0%	Limit met (0.092 A ≤ 0.770 A)
100% Test H8	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H9	OK	14.2%	Limit met (0.057 A ≤ 0.400 A)
100% Test H10	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H11	OK	12.9%	Limit met (0.043 A ≤ 0.330 A)
100% Test H12	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H13	OK	14.8%	Limit met (0.031 A ≤ 0.210 A)
100% Test H14	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H15	OK		No test required (0.018 A ≤ 0.026 A)
100% Test H16	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H17	OK		No test required (0.010 A ≤ 0.026 A)
100% Test H18	OK		No test required (0.001 A ≤ 0.026 A)
100% Test H19	OK		No test required (0.007 A ≤ 0.026 A)
100% Test H20	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H21	OK		No test required (0.005 A ≤ 0.026 A)
100% Test H22	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H23	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H24	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H25	OK		No test required (0.002 A ≤ 0.026 A)
100% Test H26	OK		No test required (0.001 A ≤ 0.026 A)
150% Test H27	OK		No test required (0.003 A ≤ 0.026 A)
100% Test H28	OK		No test required (0.001 A ≤ 0.026 A)

150% Test H29	OK	No test required (0.002 A ≤ 0.026 A)
100% Test H30	OK	No test required (0.001 A ≤ 0.026 A)
150% Test H31	OK	No test required (0.003 A ≤ 0.026 A)
100% Test H32	OK	No test required (0.001 A ≤ 0.026 A)
150% Test H33	OK	No test required (0.002 A ≤ 0.026 A)
100% Test H34	OK	No test required (0.001 A ≤ 0.026 A)
150% Test H35	OK	No test required (0.003 A ≤ 0.026 A)
100% Test H36	OK	No test required (0.001 A ≤ 0.026 A)
150% Test H37	OK	No test required (0.001 A ≤ 0.026 A)
100% Test H38	OK	No test required (0.001 A ≤ 0.026 A)
150% Test H39	OK	No test required (0.002 A ≤ 0.026 A)
100% Test H40	OK	No test required (0.001 A ≤ 0.026 A)

Result Plots

Table 1 Harmonic Current Test (61000-3-2) [L1] >> Harmonic Current Test 100%



Test certificate of spurious radiation measurement according to EN 61000-3-3
Measurement of voltage fluctuations and Flicker

Test report-no.: 2017012 Test date: 24.01.2017

Test device: DRF-960-24-1

Test result was

OK

Test Settings

Test	
Measuring Standard	EN 61000-4-15:2011
Limits	EN 61000-3-3:2013
Test Date	24.01.2017
Test Time	14:56:53
Measurement Duration	00:10:00
EUT Classification	Class A
EUT / Measurement Setup	
Dmax limit	4%
Number of Pst intervals	1
Pst interval	00:10:00
Cooldown time after interval	00:00:00
Plt evaluation disabled by user	
Power Supply	
Nominal Voltage	230V
Nominal Frequency	50Hz

EUT Details

Brand	
Model	
Type	DRF 960-24-1
Serial number	2
Manufacturer details	TDK-Lambda UK Limited

Product Mode Details

Name of product mode	
Description of configuration	Uout= 24 V, I = 40 A

Test Equipment

Power Meter

Manufacturer	ZES ZIMMER Electronic Systems GmbH
Model	LMG640
Serial Number	00631607
Software Version	1.034-R37312
NI controlled by LMG, SN:	A0808085
Analysis Software	ZES ZIMMER LMG Test Suite 1.034-R37312

Additional Measurands - Informative

Additional Measurands

$U_{trms, L1}$	229.184 V	$U_{pp, L1}$	650.642 V	$U_{dc, L1}$	109.475 mV
$U_{cf, L1}$	1.42024	$I_{trms, L1}$	4.38949 A	$I_{pp, L1}$	13.4759 A
$I_{dc, L1}$	-3.03801 mA	$I_{cf, L1}$	1.53781	P_{L1}	987.308 W
Q_{L1}	193.029 var	S_{L1}	1.006 kVA	PF_{L1}	0.98142
$f_{cycle, L1}$	49.9918 Hz	$P_{st, L1}(1)$	0.18539	$P_{lt, L1}$	0.18539

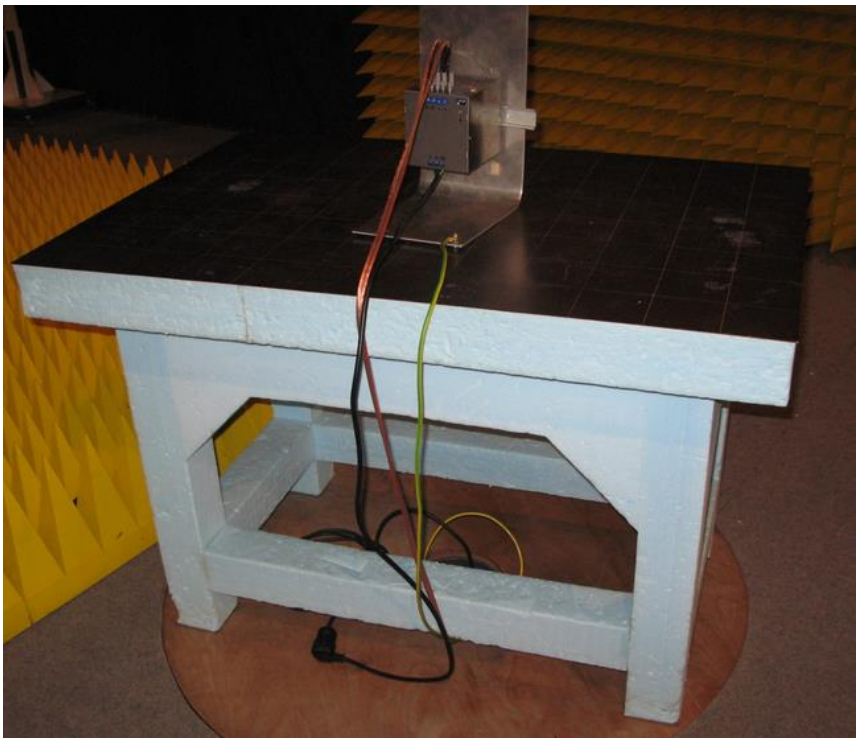
Result Overview

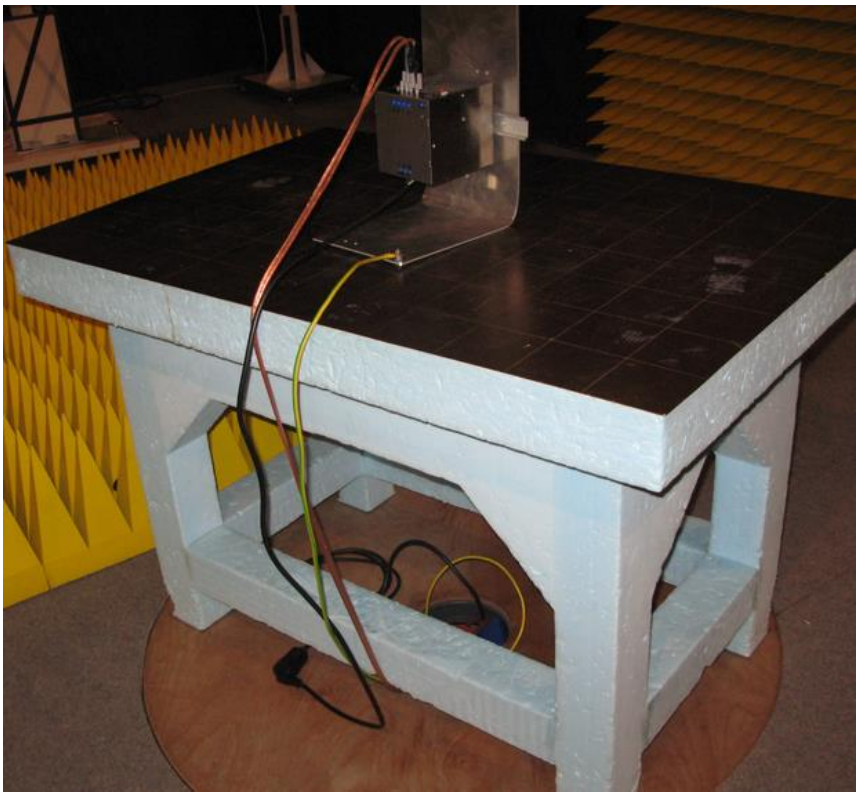
Test Name	Test Result	Limit Usage	Info
Dc Test [L1]	OK	28.7%	0.9% ≤ 3.3%
Dmax Test [L1]	OK	29.0%	1.2% ≤ 4.0%
Pst Test [L1]	OK	18.5%	0.185 ≤ 1.000
Tmax Test [L1]	OK		

Test Report No.: 2017012 Examiner: Bruno Erdbories

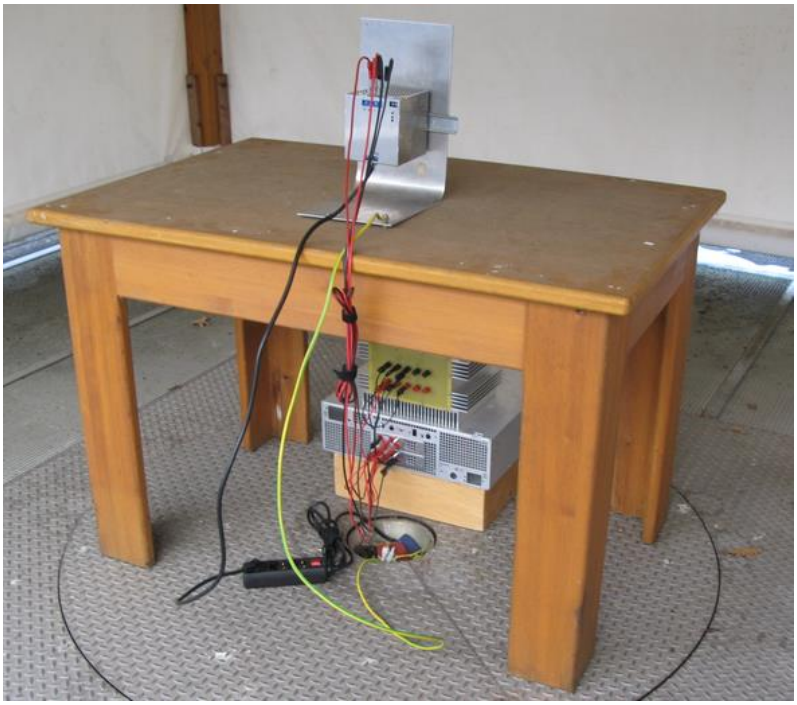
Test setup:

Measurement of radiated emissions in the absorber chamber (FAR):

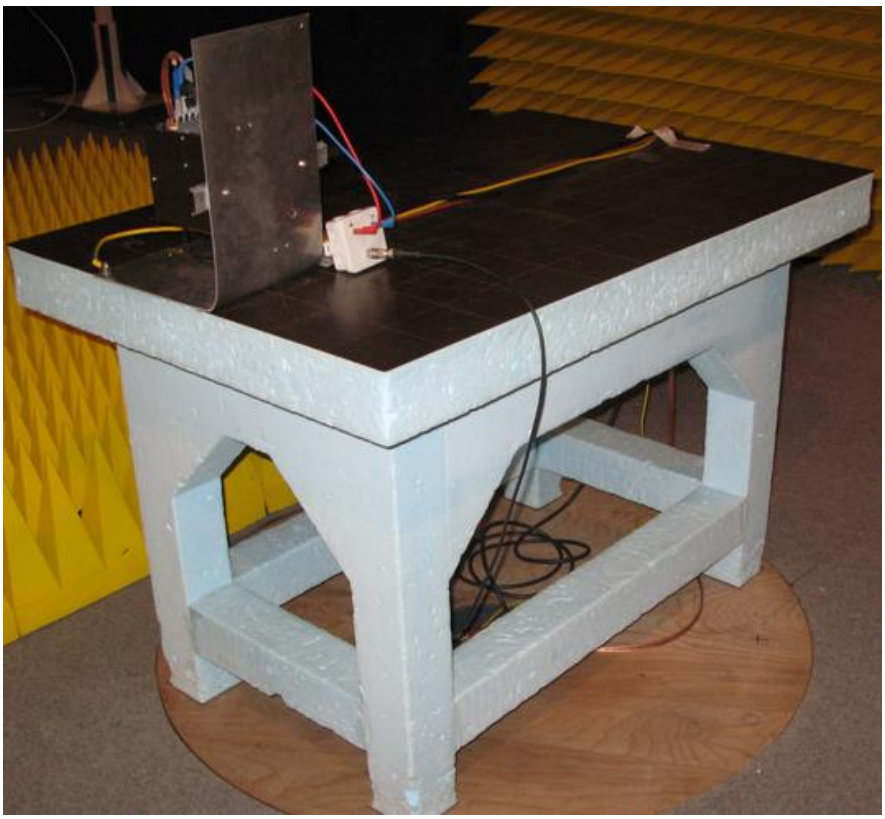




Measurement of radiated emissions at the open area test site (OATS):

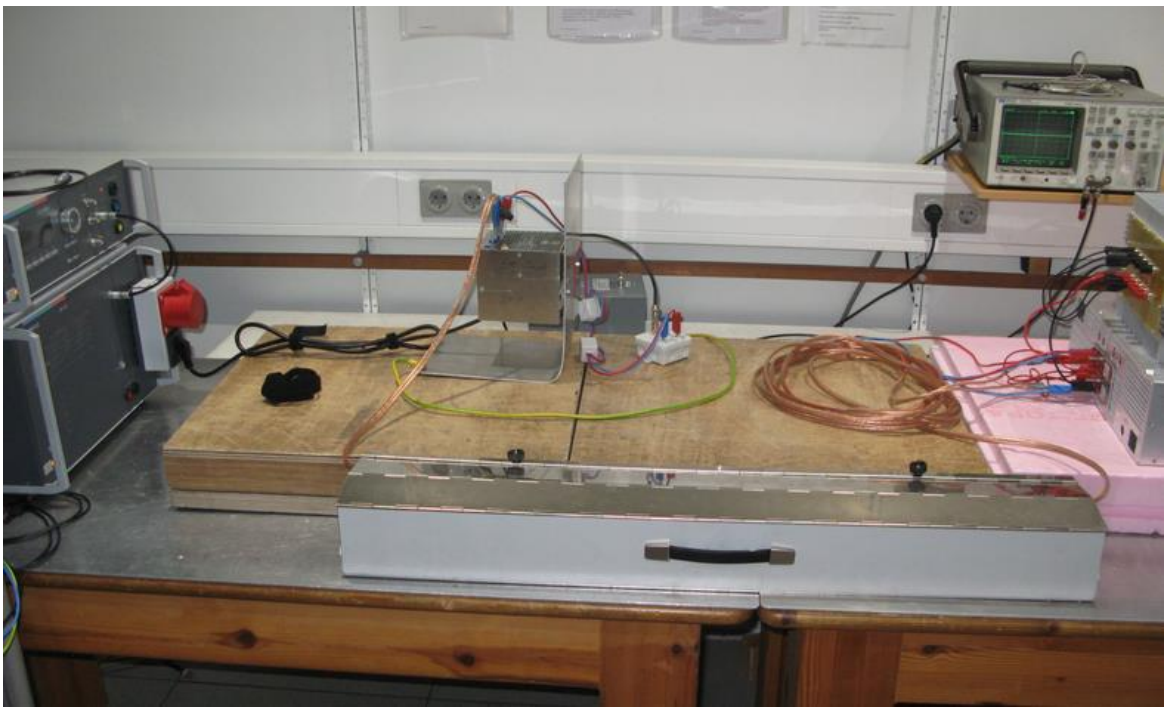


Test against HF-fields according to EN 61000-4-3 in the absorber chamber:

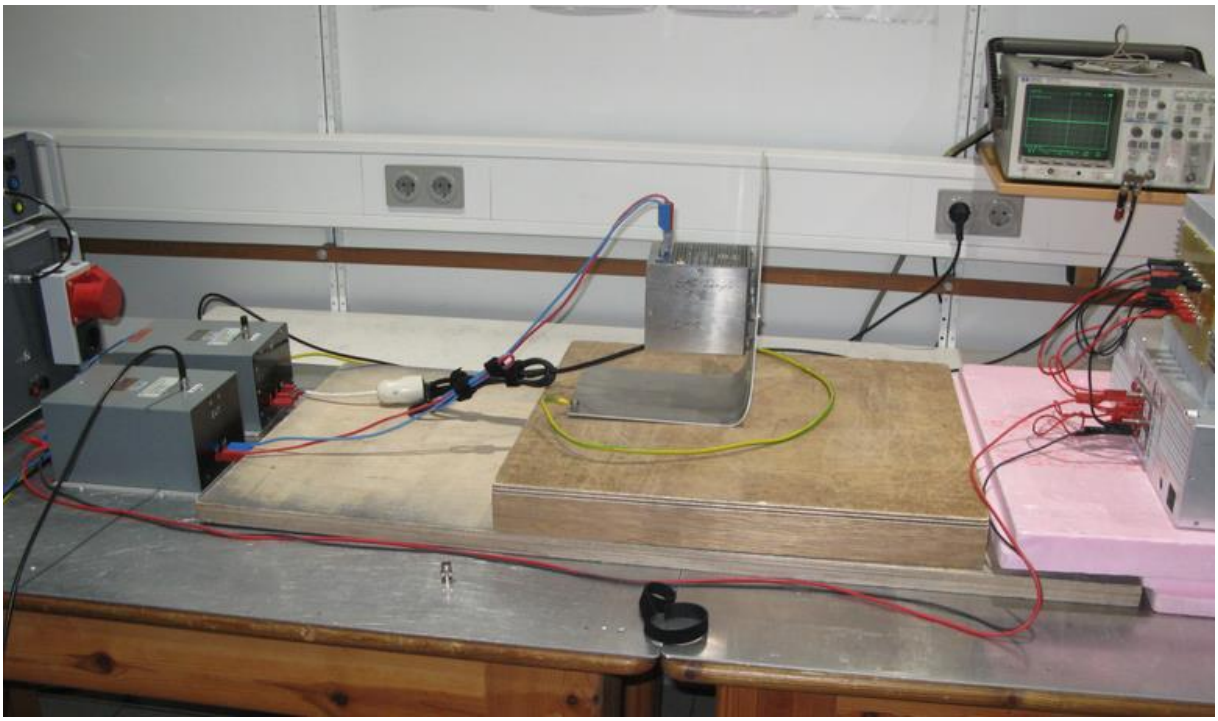


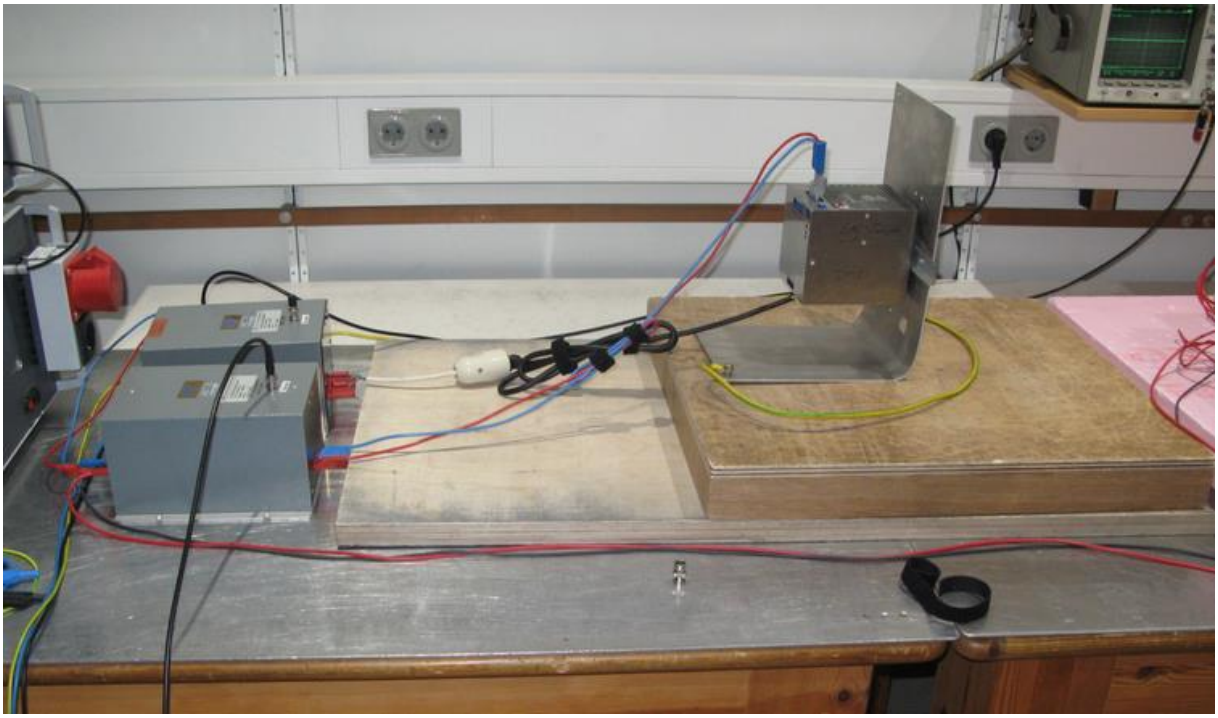
Measurement of radio interference voltage:

Test against bursts according to EN 61000-4-4:

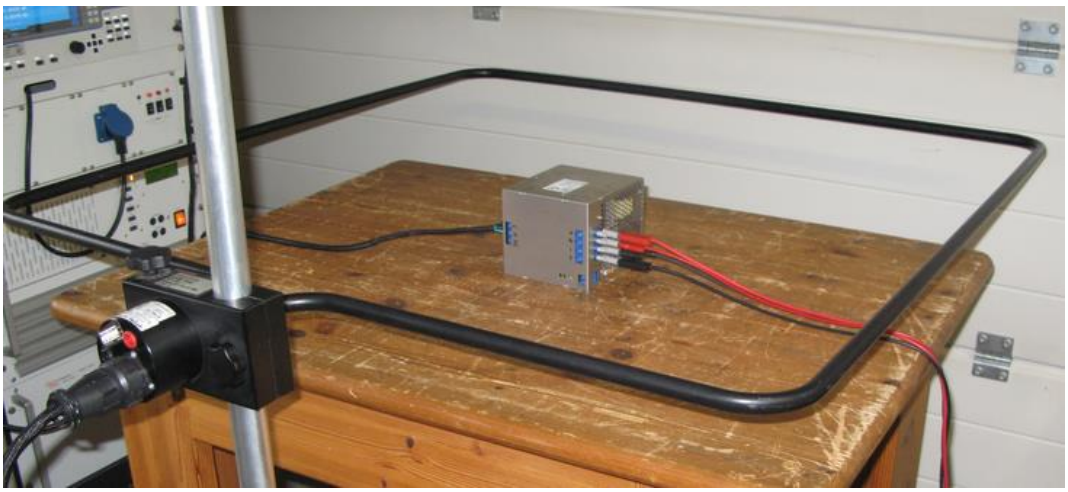


Test against HF-current according to EN 61000-4-6:





Test against magnetic fields according to EN 61000-4-8:



Identifikation labeling: