

TEST REPORT

Electromagnetic Compatibility

Report Reference No. : **REP016000-1** (This test report replaces the one identified with number REP0016000 issued on 2023-09-05)
Date of issue : 2023-11-16
Test Report Verdict : PASS

Testing Laboratory : **Nemko S.p.A.**
Address : Via Del Carroccio, 4
City : 20853 Biassono (MB)
Country : Italy
Testing location : Described at clause 1.4

Customer name : **Nextys SA**
Customer contact information : Via Luserte Sud, 6 – 6572 Quartino – Switzerland

Reference standards : **IEC 61000-6-2:2016 – IEC 61000-6-3:2020**
EN IEC 61000-6-2:2019 – EN IEC 61000-6-3:2021
Standard application : Full application

Equipment under test : DIN rail power supply
Trademark(s) : TDK-Lambda
Manufacturer : TDK-Lambda
Model/Type reference : Described at clause 4.1

Tests performed by : G. Tepelena

Report approved by : G. Bazzi

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1. GENERAL INFORMATION

1.1 Project history

| Report number | Modification to the report / comments | Date |
|---------------|---|------------|
| REP016000 | First release | 2023-09-05 |
| REP016000-1 | Second release (Modification on par. 4.7 and par. 6.12.1) | 2023-11-16 |
| -- | -- | -- |
| -- | -- | -- |

1.2 Symbol used in the report

| | |
|---|--|
| <input checked="" type="checkbox"/> | The crossed square indicates that the listed condition, standard or equipment is applicable for this report. |
| <input type="checkbox"/> | The empty square indicates that the listed condition, standard or equipment is not applicable for this report. |
| NP (Not performed) | Test case not performed according to customer request |
| N (Not applicable) | Test case does not apply to the test object |
| P (Pass) | Test object does meet the requirement |
| F (Fail) | Test object does not meet the requirement |
| <input type="checkbox"/> Comma (,) / <input checked="" type="checkbox"/> Dot (.) | Symbol used as decimal separator throughout this report |
| Asterisk (*) | Symbol used to indicate a standard or a test not accredited by ACCREDIA |
| EUT | Equipment Under Test |
| The results contained in this report reflect the results for this particular model(s) and serial number(s) and apply to the sample(s) as received. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. | |

1.3 Date of sample(s) reception and tests

| | |
|---|------------|
| Date of receipt of test sample(s) | 2023-09-03 |
| Testing start date | 2023-09-03 |
| Testing termination date | 2023-09-05 |

1.4 Testing location

The tests have been performed in the place indicated below:

☒ Nemko premises location: Nemko S.p.A.
Via Del Carroccio, 4
20853 Biassono (MB) - Italy

☐ Other location: --
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1.5 Environmental conditions

The tests were carried out in the ranges of environmental conditions specified below:

Ambient temperature: 18-33 °C ¹

Relative Humidity: 25-70 % ²

Atmospheric pressure: 860-1060 hPa

Notes:
¹ For luminaire, temperature during tests was verified to be within 18 ÷ 30 °C
² During ESD test, humidity was verified to be within 30 ÷ 60 %

The following instruments are used to monitor the environmental conditions:

| Equipment | Trademark | Model | Serial No. |
|-------------------|-----------|----------|--------------|
| Thermo-hygrometer | Testo | 175-H2 | 20012380/305 |
| Thermo-hygrometer | Testo | 175-H2 | 38203337/703 |
| Barometer | Castle | GPB 3300 | 072015 |

1.6 Measurement uncertainty and assessment of conformity

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002. The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

| Test | Range | Measurement Uncertainty | Notes |
|--|---|-------------------------|---------|
| Radiated Disturbance | Antenna distance 1 m, 3 m, 10 m 0.009 ÷ 200 MHz | 5.0 dB | (1) |
| | Antenna distance 1 m, 3 m, 10 m 200 ÷ 1000 MHz | 5.2 dB | (1) |
| | Antenna distance 1 m, 3 m, 10 m 1 ÷ 6 GHz | 5.2 dB | (1) |
| | Antenna distance 1 m, 3 m 6 ÷ 18 GHz | 5.5 dB | (1) |
| | Antenna distance 1 m, 3 m 18 ÷ 40 GHz | 7.2 dB | (1) |
| Radiated Disturbance with large loop antenna system (LLAS) | 0.009 ÷ 30 MHz | 3.3 dB | (1) |
| Conducted Disturbance | 0.02 ÷ 150 kHz with AMN | 3.8 dB | (1) |
| | 150 kHz ÷ 30 MHz with AMN | 3.4 dB | (1) |
| | 150 kHz ÷ 30 MHz with AAN | 4.6 dB | (1) |
| | 9 kHz ÷ 30 MHz with voltage probe | 2.9 dB | (1) |
| | 150 kHz ÷ 30 MHz with current probe | 2.9 dB | (1) |
| Clicks | 9 ÷ 150 kHz | 3.8 dB | (1) |
| | 150 kHz ÷ 30 MHz | 3.4 dB | (1) |
| Disturbance Power | 30 MHz ÷ 300 MHz | 4.5 dB | (1) |
| Frequency | 10 Hz ÷ 1 kHz | 0.2 % | (1) |
| | 1 kHz ÷ 40 GHz | 10 ⁻⁶ | (1) |
| Harmonic Current Emission | 50 Hz ÷ 2 kHz | 3 % | (1) |
| Fluctuation and Flickers | Fluctuation (d%) | 0.05 % | (1) |
| | Flickers (Pst) | 5 % | (1) |
| Radiated Immunity Anechoic Chambers | 20 MHz ÷ 6 GHz | 3.4 dB | (1) (3) |
| Radiated Immunity TEM Cell | 0.01 ÷ 200 MHz | 3.0 dB | (1) (3) |
| Bulk Current | 0.1 ÷ 400 MHz | 3.0 dB | (1) |
| Immunity to conducted disturbances | 9 kHz ÷ 230 MHz | 3.0 dB | (1) |
| ESD Immunity | Voltage, Current, Rise time, Duration | (2) | (1) |
| Burst Immunity | Voltage, frequency, burst period and duration, rise time and pulse width | (2) | (1) |
| Surge Immunity | Voltage, Current, Rise time, Duration | (2) | (1) |
| DIPS, Interruption and Voltage duration Immunity | Amplitude | 5 % | (1) |
| | Duration | 5 % | |
| Impulse Magnetic Field Immunity | Peak Current | 10 % | (1) (3) |
| | Rise time, Duration | 20 % | |
| Power Frequency Magnetic Field Immunity | 16.7 Hz, 50 Hz, 60 Hz | 2.0 dB | (1) (3) |
| Damped Oscillatory Wave Immunity, Ring Wave Immunity | Voltage, front time, frequency 100 kHz, 1 MHz | (2) | (1) |
| Damped Magnetic Field | Amplitude: 100 kHz, 1 MHz | 3 dB | (1) |
| | Frequency: 100 kHz, 1 MHz | 10 % | |
| Low Frequency Immunity | 15 Hz ÷ 150 kHz | 2.2 dB | (1) |
| Automotive transients Immunity | Voltage, rise time, duration time Impulses 1, 2a, 2b, 3a, 3b and 4 | (2) | (1) |
| Automotive transients Emission | Amplitude, Time | 10 % | (1) |
| EMF for Lighting Equipment | - | 25 % | (1) |
| Electromagnetic fields (EMF) | Magnetic, Electric and Electromagnetic fields: 0 Hz ÷ 40 GHz | 25 % | (1) |
| Electrical quantities (voltage, current, resistance) | AC/DC Voltage 10 mV ÷ 1000 V 0÷100 kHz AC/DC Current 0.1 mA ÷ 400 A 0÷1 kHz Resistance 100 mΩ ÷ 10 MΩ | 2.5 % | (1) |

NOTES:

- (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %
- (2) The instruments used for this immunity test is according to the tolerances requested by the applicable standard
- (3) The reported expanded uncertainty of measurement is related to the stimulus quantity

1.7 Instruments calibration table

Instrument cited in the report and not listed in this paragraph are not subject to calibration. The calibration is valid up to the last day of the due date month.

| Description | Manufacturer | Model | Identifier | Cal Date | Due Date |
|---------------------------------|-----------------------------|---------------------------|---------------|----------|----------|
| EMI Receiver | Rohde & Schwarz | ESW44 | 101620 | 2023-08 | 2024-08 |
| EMI Receiver | Rohde & Schwarz | ESU8 | 100202 | 2023-09 | 2024-09 |
| Antenna Trilog 25MHz - 8GHz | Schwarzbeck Mess-Elektronik | VULB9162 | 9162-025 | 2021-07 | 2024-07 |
| Antenna Trilog 25-2000 MHz | Schwarzbeck Mess-Elektronik | VULB9168 | 9168-242 | 2021-06 | 2024-06 |
| Antenna 1 - 18 GHz | Schwarzbeck Mess-Elektronik | STLP9148 | STLP 9148-152 | 2021-09 | 2024-09 |
| Antenna 1 - 18 GHz | Schwarzbeck Mess-Elektronik | STLP9148 | STPL 9148-123 | 2021-06 | 2024-06 |
| Broadband Amplifier | Schwarzbeck Mess-Elektronik | BBV9718C | 00121 | 2023-03 | 2024-03 |
| Preamplifier | Schwarzbeck Mess-Elektronik | BBV9718 | BBV9718-137 | 2023-05 | 2024-05 |
| Semi-anechoic chamber | Nemko S.p.a. | 10m semi-anechoic chamber | 530 | 2023-09 | 2025-09 |
| 3m Semi anechoic chamber | Comtest | SAC-3 | 1711-150 | 2022-09 | 2024-09 |
| Common Mode Absorption Device | Schwarzbeck Mess-Elektronik | CMAD1614 | 00041 | 2022-05 | 2025-05 |
| LISN | Rohde & Schwarz | ENV432 | 101714 | 2023-08 | 2024-08 |
| LISN | Rohde & Schwarz | ESH2-Z5 | 872 460/041 | 2022-10 | 2023-10 |
| V-network | Rohde & Schwarz | ESH3-Z5 | 840 731/004 | 2023-08 | 2024-08 |
| Voltage probe | Rohrbacher | VP-1 | 2.455 | 2023-09 | 2024-09 |
| RF Current Probe | Rohde & Schwarz | ESH2-Z1 | 891 923/18 | 2023-09 | 2026-09 |
| Impedance stabilization network | Teseq | ISN T800 | 47263 | 2021-08 | 2024-08 |
| Impedance Stabilisation Network | Schwarzbeck Mess-Elektronik | NTFM8131 | 8131-153 | 2023-06 | 2024-06 |
| Absorbing clamp | Rohde & Schwarz | MDS-21 | 893 169/001 | 2022-12 | 2023-12 |
| Absorbing clamp | Rohde & Schwarz | MDS-21 | 893 169/003 | 2022-10 | 2023-10 |
| Harmonics and Flicker analyzer | Emc Partner | HARMONICS1000+HAR-EXT1000 | 016+103489 | 2023-02 | 2024-02 |
| Harmonics and Flicker analyzer | EM Test | DPA500N | P1735202736 | 2023-03 | 2024-03 |
| AC Power Source | Elettrotest | TPS/M/6000 | 358 04/18 | 2023-03 | 2024-03 |
| Attenuator | Aeroflex / Weinschel | 2 | CC8577 | 2023-08 | 2024-08 |
| Attenuator | Aeroflex / Weinschel | 2 | CC8577 | 2023-08 | 2024-08 |

| Description | Manufacturer | Model | Identifier | Cal Date | Due Date |
|---|-----------------------------|-----------------------------------|---|----------|----------|
| ESD Simulator | Emc Partner | ESD3000+DM1 | 252+192 | 2022-10 | 2023-10 |
| ESD Simulator + Coupling Network | Teseq | NSG437 | 767+437767+661+695+445 | 2023-03 | 2024-03 |
| Broadband amplifier | Rohde & Schwarz | BBA100 | 101163 | 2023-09 | 2024-09 |
| Broadband Amplifier | Rohde & Schwarz | BBA150 | 102626 | 2023-08 | 2024-08 |
| RF Amplifier 200MHz-1000MHz | IFI | CMX100010-SMCC1000 | L448A-0108 | 2023-02 | 2024-02 |
| RF Amplifier 10kHz-225MHz | Amplifier Research | 1000A225 | 0336745 | 2023-02 | 2024-02 |
| RF Amplifier 0,8-4,2 GHz | Amplifier Research | 50S1G4A | 301049 | 2023-05 | 2024-05 |
| RF Power Sensor | Rohde & Schwarz | NRP18AN | 100990 | 2023-02 | 2024-02 |
| RF Power Sensor | Rohde & Schwarz | NRP18AN | 100987 | 2022-10 | 2023-10 |
| RF Signal Generator | Rohde & Schwarz | SMB100A | 180431 | 2022-10 | 2023-10 |
| RF Signal Generator | Rohde & Schwarz | SMA100B | 104075 | 2023-08 | 2024-08 |
| Antenna | Amplifier Research | AT6026A | 0330876 | 2022-11 | 2025-11 |
| Antenna Biconilog | ETS Lindgren | 3142E | 00213197 | 2022-11 | 2025-11 |
| Broad-Band Horn Antenna | Schwarzbeck Mess-Elektronik | BBHA9120D | 01874 | 2021-02 | 2024-02 |
| EMC Multifunction Instrument+CDN Triphase 32A+CDN for I/O | Emc Partner | IMU3000+CDN2000-06-32+CDN-UTP ED3 | F5-S-D-V-1505+CDN2000-06-30-1537+CDN-UTP ED3-1526 | 2023-05 | 2024-05 |
| EMC Multifunction Instrument+CDN Triphase Burst+CDN Surge | Emc Partner+Schaffner | Transient2000+CDN300+CDN116 | 849+231+149 9318 | 2022-10 | 2023-10 |
| Coupling clamp | Schaffner | CDN125 | 245 9219 | 2023-05 | 2024-05 |
| Capacitive Coupling clamp | Emc Partner | CDN | CNEFT1000-120 | 2023-05 | 2024-05 |
| Power supply | Zenone | GVS300GL | 0000000444 | 2023-08 | 2024-08 |
| Power supply | Zenone | GVS300GL | 0000000445 | 2023-08 | 2024-08 |
| Power supply | Zenone | GVS300GL | 0000000446 | 2023-08 | 2024-08 |
| H/E Fieldmeter | Maschek | ESM-100 | 971909-G | 2023-02 | 2024-02 |
| Automotive EMC pulse generator | EM Test | UCS 200N | V1239113698 | 2022-10 | 2023-10 |
| V-network | Rohde & Schwarz | ESH3-Z6 | 843 864/025 | 2023-09 | 2024-09 |
| V-network | Rohde & Schwarz | ESH3-Z6 | 843 864/024 | 2023-09 | 2024-09 |
| V-network | Rohde & Schwarz | ESH3-Z6 | 893 046/010 | 2023-09 | 2024-09 |

| Description | Manufacturer | Model | Identifier | Cal Date | Due Date |
|---|----------------------------------|---------------------|---------------------------|----------|----------|
| V-network | Rohde & Schwarz | ESH3-Z6 | 843 864/026 | 2023-09 | 2024-09 |
| Test System for Conducted and Radiated Immunity | Teseq - Ametek | NSG4070C-80 | 540125 | 2023-10 | 2024-10 |
| Continuous wave simulator | EM Test | CWS 500 CS1 | V0710102305 | 2023-02 | 2024-02 |
| EM Injection Clamp | Fisher Custom Communications Inc | F-203I-23mm | 121239 | 2022-11 | 2023-11 |
| Bulk current injection probe | Fisher Custom Communications Inc | F-120-9A | 447 | 2022-10 | 2023-10 |
| Attenuator + Coaxial cable | EM Test + Huber+Shuner | ATT6+CS03+CS04+CS05 | 0206-18+1.662+1.663+1.664 | 2022-10 | 2023-10 |
| Coupling/Decoupling Network | Luthi | CDN AF2 | P1425135039 | 2022-12 | 2023-12 |
| Coupling/Decoupling Network | Luthi | CDN M1 | P1422134545 | 2022-12 | 2023-12 |
| Coupling/Decoupling Network | Luthi | CDN M2/M3 | P1426135614 | 2022-12 | 2023-12 |
| Coupling/Decoupling Network | Luthi | CDN M4 N-32A | P1343125190 | 2022-12 | 2023-12 |
| Coupling/Decoupling Network | Luthi | CDN M4 PE-32A | P1428136828 | 2022-12 | 2023-12 |
| Coupling/Decoupling Network | Luthi | CDN M5-32A | P1430137446 | 2022-11 | 2023-11 |
| Coupling/Decoupling Network | Luthi | CDN S1-50 BNC | P1430137436 | 2022-12 | 2023-12 |
| Coupling/Decoupling Network | Luthi | CDN T2 | P1427136163 | 2022-12 | 2023-12 |
| Coupling/Decoupling Network | EM Test | CDN M2/M3 | 0307-16 | 2022-12 | 2023-12 |
| Loop sensor | Solar Electronics | 9229-1 | 010221 | 2021-04 | 2031-04 |
| Magnetic Field Sensor | Schwarzbeck Mess-Elektronik | FESP 5134-1 | 00023 | 2021-04 | 2031-04 |
| RF Amplifier 10kHz-220MHz | Amplifier Research | 250L | 8645 | 2023-03 | 2024-03 |
| RF Vector Signal Generator | Rohde & Schwarz | SMBV100A | 263254 | 2023-05 | 2024-05 |
| Oscilloscopio | Agilent | 54846A | MY40000254 | 2023-07 | 2024-07 |
| Multimeter | Rohde & Schwarz | HMC8012 | 101577 | 2022-07 | 2023-07 |
| Barometer | Castle | GBP 3300 | 072015 | 2023-05 | 2024-05 |
| Data logger con diagnosi in campo | Testo | 175-H2 | 20012380/305 | 2022-12 | 2024-12 |
| Data logger con diagnosi in campo | Testo | 175-H2 | 38203337/703 | 2022-12 | 2024-12 |

2. STANDARDS, TEST METHODS AND TECHNICAL PROCEDURES

2.1 Standard(s) or other specifications applied

The following standard(s) or specifications, accredited by ACCREDIA, were applied:

IEC 61000-6-2:2016 / EN IEC 61000-6-2:2019

Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments

IEC 61000-6-3:2020 / EN IEC 61000-6-3:2021

Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments

2.2 Test method(s) applied

The following document(s) are referred to in the standard(s) or specifications cited at clause 2.1 in such a way that some or all of their content constitutes requirements for the standard itself:

CISPR 16-2-1 / EN 55016-2-1

Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements

CISPR 16-2-3 / EN 55016-2-3

Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements

CISPR 32 / EN 55032

Electromagnetic compatibility of multimedia equipment – Emission requirements

CISPR 22 / EN 55022

Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

IEC 61000-3-2 / EN 61000-3-2

Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

IEC 61000-3-3 / EN 61000-3-3

Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

CISPR 14-1 / EN 55014-1

Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission

IEC / EN 61000-4-2

Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

IEC / EN 61000-4-3

Electromagnetic compatibility (EMC) -- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

IEC / EN 61000-4-4

Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

IEC / EN 61000-4-5

Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test

IEC / EN 61000-4-6

Electromagnetic compatibility (EMC) -- Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields

IEC / EN 61000-4-8

Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test

IEC / EN 61000-4-11

Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

2.3 Nemko technical procedures

WM L0177: General routines for using instruments at Nemko

WM L1002: Measurement Uncertainty - Policy and Statement

WM L0077: General procedure for conducting EMC tests

3. SUMMARY OF TEST RESULTS AND VERDICTS

3.1 Measurement of electromagnetic disturbances emitted by the equipment under test

| Emission Tests | | |
|---|-------------------------------|---------|
| Requirement / test | Method Standard | Verdict |
| Radiated emissions – enclosure port | CISPR 16-2-3 EN 55016-2-3 | P |
| Conducted emissions – low voltage AC mains port | CISPR 16-2-1 EN 55016-2-1 | P |
| Conducted emissions – DC power port | CISPR 16-2-1 EN 55016-2-1 | N |
| Discontinuous disturbance – low voltage AC mains port | CISPR 14-1 EN 55014-1 | N |
| Harmonic current emissions – low voltage AC mains port | IEC 61000-3-2 EN 61000-3-2 | P |
| Voltage changes, voltage fluctuations and flicker – low voltage AC mains port | IEC 61000-3-3 EN 61000-3-3 | P |
| Conducted emissions – wired network port | CISPR 32 EN 55032 | N |
| Notes: | | |

3.2 Degree of immunity of the appliance to electromagnetic disturbances present in the intended use environment

| Immunity Tests | | |
|--|---------------------|---------|
| Requirement / test | Method Standard | Verdict |
| Enclosure ports – Electrostatic discharges | IEC / EN 61000-4-2 | P |
| Enclosure ports – Radio-frequency electromagnetic field (AM) | IEC / EN 61000-4-3 | P |
| Signal/control ports – Fast transients | IEC / EN 61000-4-4 | P |
| I/O DC power ports – Fast transients | IEC / EN 61000-4-4 | N |
| I/O AC power ports – Fast transients | IEC / EN 61000-4-4 | P |
| Signal/control ports – Surges | IEC / EN 61000-4-5 | N |
| I/O DC power ports – Surges | IEC / EN 61000-4-5 | N |
| I/O AC power ports – Surges | IEC / EN 61000-4-5 | P |
| Signal/control ports – Radio-frequency common mode | IEC / EN 61000-4-6 | P |
| I/O DC power ports – Radio-frequency common mode | IEC / EN 61000-4-6 | N |
| I/O AC power ports – Radio-frequency common mode | IEC / EN 61000-4-6 | P |
| Enclosure ports – Power-frequency magnetic field | IEC / EN 61000-4-8 | P |
| I/O AC power ports – Voltage dips and interruptions | IEC / EN 61000-4-11 | P |
| Notes: | | |

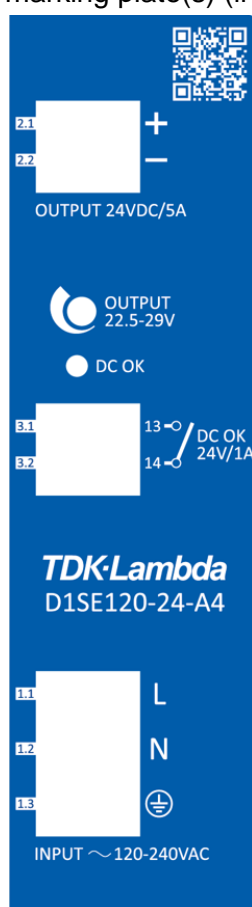
4. EQUIPMENT UNDER TEST

4.1 EUT Identification

Short description of the EUT

The EUT is a DIN rail power supply, single phase, 90-264VAC, 24V output, 120W

Copy of marking plate(s) (if present)



| | |
|---|---|
| Sample ID | PRJ00123610003 (number assigned from Nemko spa) |
| Model/Type reference | D1SE120 |
| Ratings | 230 VAC |
| Equipment installation | Rack mounted |
| Accessories and detachable parts included | None |
| Test performed..... | All tests were performed on this sample |

| | | |
|---|---|---|
| Sample ID | : | - |
| Model/Type reference | : | - |
| Ratings | : | - |
| Equipment installation | : | - |
| Accessories and detachable parts included ... | : | - |
| Test performed | : | - |
| Software and/or firmware information | : | - |
| Product variants not tested: | | |
| Opinions and interpretations - not subject to ACCREDIA accreditation: | | |

4.2 EUT Power Supply

| Used ¹ | N° ² | Type | Supply Voltage | Phases N° | Supplementary Information |
|--|-----------------|------|----------------|-----------|---------------------------|
| <input checked="" type="checkbox"/> | 1 | AC | 230 V / 50 Hz | L+N+PE | |
| Notes: ¹ The crossed square indicates that the supply voltage is used in at least one test. ² This number will be used all over the report to identify the supply voltage(s) used for each test. | | | | | |

4.3 EUT Information declared by the Customer ¹

| Information | Declaration |
|--|----------------------------|
| EUT highest frequency ² | $f_c \leq 108 \text{ MHz}$ |
| Environment intended use | Domestic / Residential |
| Equipment classification ³ | Not applicable |
| Equipment category ³ | Not applicable |
| Notes: ¹ Nemko S.p.A. declines all responsibility for the information above declared by the customer that may influence the validity of the results contained in this test report. ² Highest frequency generated or used in the device or on which the device operates or tunes. If the clock frequency is not declared by the customer, according to the product standard(s), the worst case will be considered for each test. ³ Equipment class and category definitions are specified in the standard used. | |

4.4 EUT Operation Modes

| N° | Emission | Immunity | Description |
|--------|-------------------------------------|-------------------------------------|--|
| 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | The EUT has been tested connected to an adequate load to obtain maximum output power Resistive load 4.8 Ohm |
| 2 | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3 | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4 | <input type="checkbox"/> | <input type="checkbox"/> | |
| Notes: | | | |

4.5 EUT Configuration Modes

Emission: the EUT was configured to measure its highest possible radiation level. The test modes selected are according to EUT instruction manual.

Immunity: the EUT was configured to have its highest possible susceptibility against tested phenomena. The test modes selected are according to EUT instruction manual.

| N° | Emission | Immunity | Description |
|--------|-------------------------------------|-------------------------------------|--|
| 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | The EUT has been tested connected to the mains, the DC output is connected to a resistive load |
| 2 | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3 | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4 | <input type="checkbox"/> | <input type="checkbox"/> | |
| Notes: | | | |

4.6 EUT Input/Output Ports

| Port | Name | Type ¹ | Cable Max. >3m | Cable Shielded | Description |
|---|------------------------|-------------------|--------------------------|--------------------------|------------------|
| 0 | Enclosure | N/E | — | — | Connected to PE |
| 1 | Input ~120-240VAC | AC | <input type="checkbox"/> | <input type="checkbox"/> | 3 wires L, N, PE |
| 2 | Output 24VDC/5A | DC | <input type="checkbox"/> | <input type="checkbox"/> | 2 wires |
| 3 | Signal DC-OK 24 VDC/1A | I/O | <input type="checkbox"/> | <input type="checkbox"/> | 2 wires |
| Notes: | | | | | |
| ¹ Port type: | | | | | |
| AC = I/O AC Power Port DC = I/O DC Power Port WN = wired network port I/O = Signal/control ports | | | | | |
| N/E = Non-Electrical | | | | | |

4.7 EUT and Equipment Used During Test

| Use ¹ | Product Type | Manufacturer | Model | Comments |
|--|--------------|--------------|-------|----------------------|
| AE | Load | Nextys | // | Supplied by customer |
| AE | Multimeter | Fluke | -- | Supplied by Nemko |
| | | | | |
| Notes: ¹ Use EUT - Equipment Under Test SIM - Simulator (Not Subjected to Test) AE - Auxiliary/Associated Equipment (Not Subjected to Test) | | | | |

5 PERFORMANCE LEVELS

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test (criterion), relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product.

| Performance level definition | |
|-------------------------------------|--|
| <input type="checkbox"/> | based on the used product standard |
| <input checked="" type="checkbox"/> | based on the declaration of the manufacturer, requestor or purchaser |

The following performance criteria are defined by the product standard:

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

For each criterion, the following representative parameters and performance level were checked during immunity tests:

| Criterion | Immunity Test | Representative parameter | Performance level |
|-----------|----------------|--------------------------|-------------------------|
| A | All applicable | Output current | ± 10 % of nominal value |
| | | Output Voltage | ± 10 % of nominal value |
| B | All applicable | Output current | ± 10 % of nominal value |
| | | Output Voltage | ± 10 % of nominal value |
| C | All applicable | -- | -- |

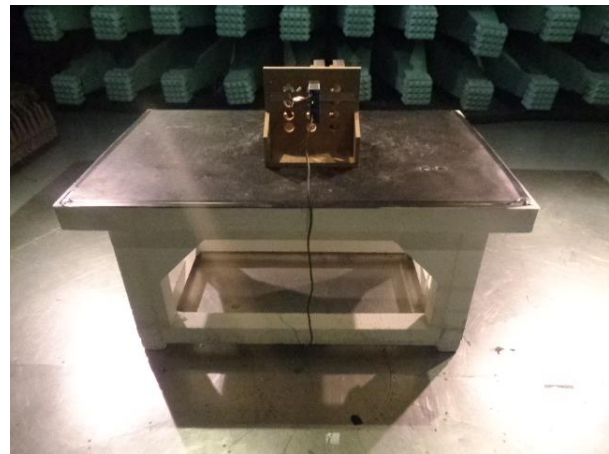
6 TEST RESULTS

6.1 Radiated emissions

6.1.1 Test result

| | |
|--|--|
| Verdict: | <input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N ¹ <input type="checkbox"/> NP |
| Frequency range: | 30 MHz – 1 000 MHz |
| Test site: | Semi anechoic chamber |
| Measurement distance: | 10 m |
| Notes: ¹ If marked, the test is not applicable for the EUT | |

6.1.2 Photo documentation of the test set-up



6.1.3 Test method

Method standard is reported at par. 3.1. Measurements were made on a semi anechoic chamber. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 meters with the receiving antenna located at a fixed height (from 1 to 4 meter) in both horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receiving antenna height from 1 to 4 meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

6.1.4 Limits for enclosure

| Radiated emissions – enclosure port | | | |
|---|---------------------------|------------------------|---------------------|
| Frequency (MHz) | Quasi-Peak limit (dBμV/m) | Average limit (dBμV/m) | Peak limit (dBμV/m) |
| 30 to 230 | 30 | - | - |
| 230 to 1000 | 37 | - | - |
| 1000 to 3000 | - | 50 | 70 |
| 3000 to 6000 | - | 54 | 74 |
| Notes: ¹ The limit decreases linearly with the logarithm of the frequency ² The limit decreases linearly with the frequency | | | |

6.1.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|---|-----------------|----------|--------------|
| <input checked="" type="checkbox"/> | SAC | Nemko Spa | 10m SAC | 530 |
| <input checked="" type="checkbox"/> | SAC | Comtest | 3m SAC | 1711-150 |
| <input checked="" type="checkbox"/> | EMI receiver | Rohde & Schwarz | ESW44 | 101620 |
| <input type="checkbox"/> | EMI receiver | R&S | ESU8 | 100202 |
| <input checked="" type="checkbox"/> | Common mode absorption device | Schwarzbeck | CMAD1614 | 00041 |
| <input checked="" type="checkbox"/> | Antenna | Schwarzbeck | VULB9162 | VULB9162-025 |
| <input type="checkbox"/> | Antenna | Schwarzbeck | VULB9168 | VULB9168-242 |
| <input checked="" type="checkbox"/> | Antenna | Schwarzbeck | STLP9148 | STLP9148-123 |
| <input type="checkbox"/> | Antenna | Schwarzbeck | STLP9148 | STLP9148-152 |
| <input type="checkbox"/> | Preamplifier | Schwarzbeck | BBV9718 | BBV9718-137 |
| <input checked="" type="checkbox"/> | Preamplifier | Schwarzbeck | BBV9718C | 00121 |
| <input checked="" type="checkbox"/> | Controller for turntable and antenna mast | Maturo | FCU3.0 | 10041 |
| <input checked="" type="checkbox"/> | Tilt antenna mast | Maturo | TAM4.0-E | 10042 |
| <input checked="" type="checkbox"/> | Turntable 4.5 t | Maturo | TT4.0-5T | 2.527 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.1.6 Test protocol

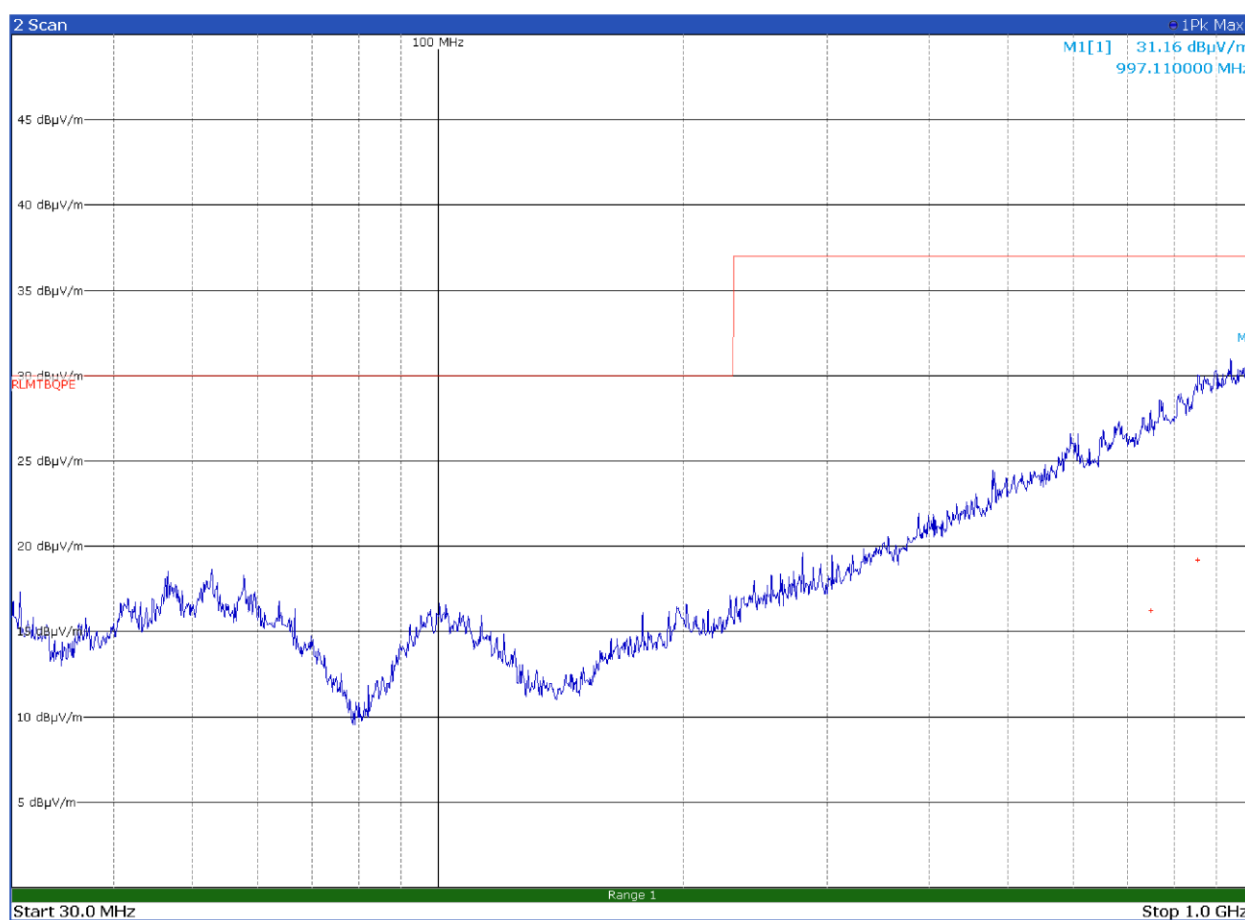
| Antenna Polarization | Supply Voltage ¹ | Test Mode | | Remarks | Verdict |
|----------------------|-----------------------------|------------------------|----------------------------|----------------|---------|
| | | Operation ² | Configuration ³ | | |
| Horizontal | 1 | 1 | 1 | 30 MHz – 1 GHz | P |

Notes:

¹ See clause 4.2 EUT Power Supply

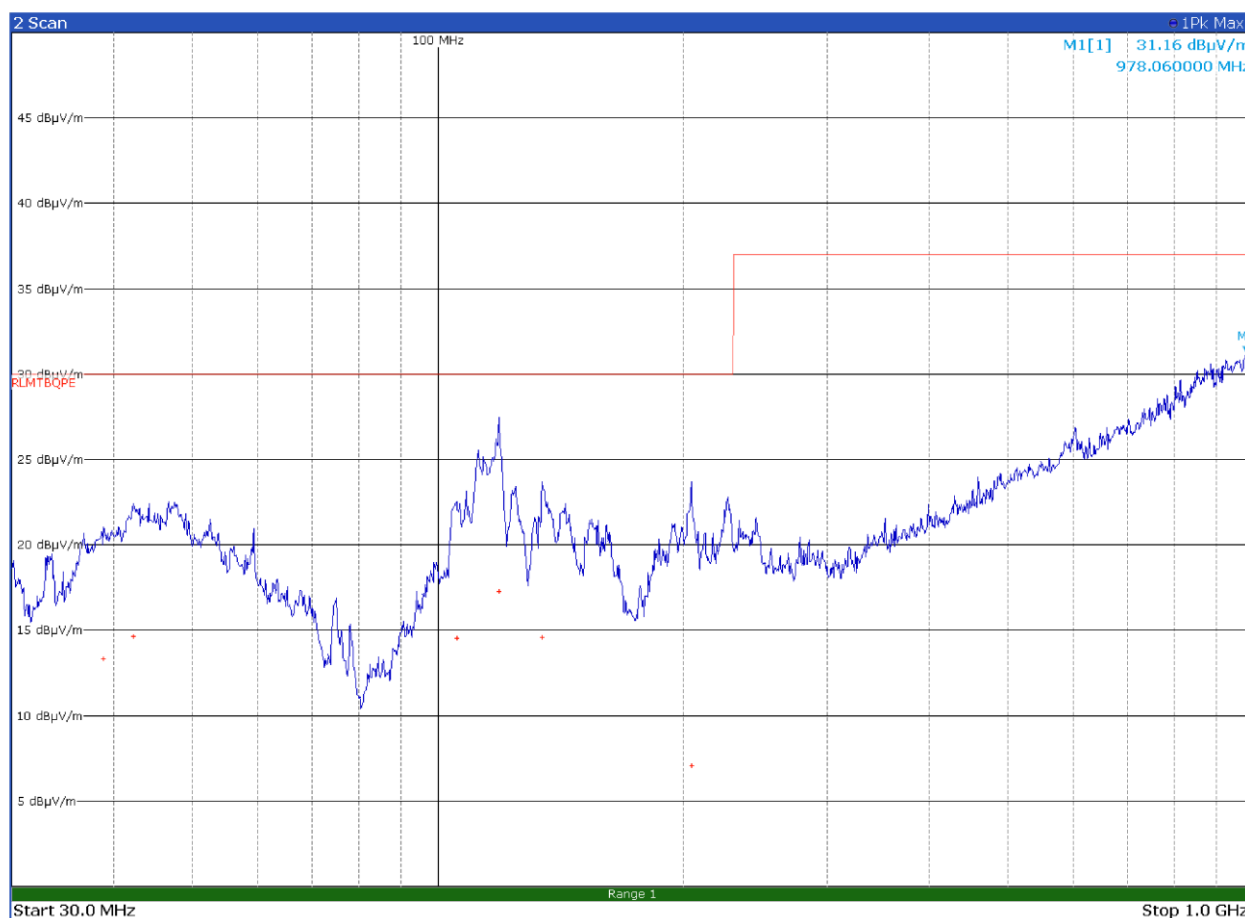
² See clause 4.4 EUT Operation Modes

³ See clause 4.5 EUT Configuration Modes



| Frequency (MHz) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Detector |
|-----------------|--------------|--------------|-------------|----------|
| 858.1500 | 19.4 | 37.0 | -17.6 | QP |
| 934.7100 | 19.4 | 37.0 | -17.6 | QP |

| Antenna Polarization | Supply Voltage ¹ | Test Mode | | Remarks | Verdict |
|--|-----------------------------|------------------------|----------------------------|----------------|---------|
| | | Operation ² | Configuration ³ | | |
| Vertical | 1 | 1 | 1 | 30 MHz – 1 GHz | P |
| Notes: ¹ See clause 4.2 EUT Power Supply ² See clause 4.4 EUT Operation Modes ³ See clause 4.5 EUT Configuration Modes | | | | | |



| Frequency (MHz) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Detector |
|-----------------|--------------|--------------|-------------|----------|
| 30.0000 | 9.0 | 30.0 | -21.0 | QP |
| 45.3000 | 13.3 | 30.0 | -16.7 | QP |
| 105.5100 | 12.2 | 30.0 | -17.8 | QP |
| 117.9900 | 13.9 | 30.0 | -16.1 | QP |
| 124.4100 | 15.6 | 30.0 | -14.4 | QP |
| 142.4100 | 11.8 | 30.0 | -18.2 | QP |
| 221.3400 | 9.3 | 30.0 | -20.7 | QP |

6.2 Conducted emissions

6.2.1 Test result

| | | | | |
|--|---------------------------------------|----------------------------|--|-----------------------------|
| Verdict for low voltage AC mains port: | <input type="checkbox"/> P | <input type="checkbox"/> F | <input checked="" type="checkbox"/> N ¹ | <input type="checkbox"/> NP |
| Verdict for DC power port: | <input checked="" type="checkbox"/> P | <input type="checkbox"/> F | <input type="checkbox"/> N ¹ | <input type="checkbox"/> NP |
| Verdict for wired network port: | <input type="checkbox"/> P | <input type="checkbox"/> F | <input checked="" type="checkbox"/> N ¹ | <input type="checkbox"/> NP |
| Frequency range: | 0.15 MHz – 30 MHz | | | |
| Kind of test site: | Shielded room | | | |
| Notes: | | | | |
| ¹ If marked, the test is not applicable for the EUT | | | | |

6.2.2 Photo documentation of the test set-up



6.2.3 Test method

Method standard is reported at par. 3.1. Measurements were made on a ground plane that extends one meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN. All tested telecommunications lines were connected to an Impedance Stabilization Network (ISN) and conducted voltage measurements on telecommunications lines were made at the output of the ISN. Where an ISN was not appropriate or available measurements were made using a Capacitive Voltage Probe and Current probe.

6.2.4 Limits

| Conducted emissions – low voltage AC mains port | | |
|---|-------------------------------|----------------------------|
| Frequency (MHz) | Quasi-Peak limit (dB μ V) | Average limit (dB μ V) |
| 0.15 to 0.50 | 66 to 56 ¹ | 56 to 46 ¹ |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |
| Notes: | | |
| ¹ The limits decrease linearly with the logarithm of the frequency | | |

| Conducted emissions – DC power port | | |
|-------------------------------------|-------------------------------|----------------------------|
| Frequency (MHz) | Quasi-Peak limit (dB μ V) | Average limit (dB μ V) |
| 0.15 to 0.50 | 79 | 66 |
| 0.50 to 30 | 73 | 60 |
| Notes: | | |

| Conducted emissions – wired network port ¹ | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| Frequency (MHz) | Quasi-Peak limit | | Average limit | |
| | dB(μ V) | dB(μ A) | dB(μ V) | dB(μ A) |
| 0.15 to 0.50 | 84 to 74 ² | 40 to 30 ² | 74 to 64 ² | 30 to 20 ² |
| 0.50 to 30 | 74 | 30 | 64 | 20 |
| Notes: | | | | |
| ¹ Applicable to wired network, optical fiber (with metallic shield or tension member) and antenna ports | | | | |
| ² The limits decrease linearly with the logarithm of the frequency | | | | |

6.2.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|---------------------|----------------------|------------------------------|-------------|
| <input checked="" type="checkbox"/> | EMI receiver | R&S | ESU8 | 100202 |
| <input type="checkbox"/> | EMI receiver | Rohde & Schwarz | ESW44 | 101620 |
| <input checked="" type="checkbox"/> | Attenuator | Aeroflex / Weinschel | 2 | CC8577 |
| <input type="checkbox"/> | LISN 9 kHz ÷ 30 MHz | R&S | ESH2-Z5 | 872 460/041 |
| <input checked="" type="checkbox"/> | LISN 9 kHz ÷ 30 MHz | R&S | ENV432 | 101714 |
| <input type="checkbox"/> | LISN 9 kHz ÷ 30 MHz | R&S | ESH3-Z5 | 840 731/004 |
| <input checked="" type="checkbox"/> | Current clamp probe | R&S | ESH2-Z1 | 891 923/18 |
| <input checked="" type="checkbox"/> | Voltage Probe | Rorhbacher | VP-1 | 2.455 |
| <input type="checkbox"/> | ISN | Schwarzbeck | NTFM8131 | 8131-153 |
| <input type="checkbox"/> | ISN | Teseq | ISN T800 | 47263 |
| <input checked="" type="checkbox"/> | Shielded room | Siemens | Conducted emission test room | 1862 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.2.6 Test protocol

| Test Port | | Supply Voltage ² | Test Mode | | Remarks | Verdict |
|------------------|------|-----------------------------|------------------------|----------------------------|---------|---------|
| EUT ¹ | Line | | Operation ³ | Configuration ⁴ | | |
| 1 | L | 1 | 1 | 1 | | P |

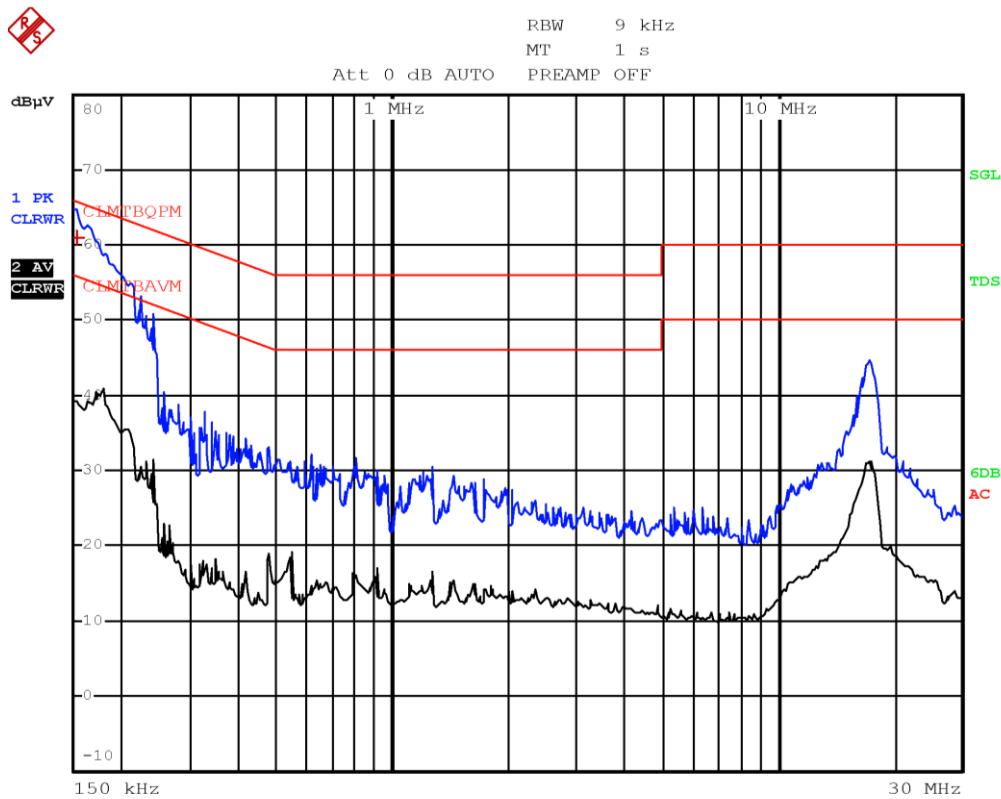
Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See clause 4.2 EUT Power Supply

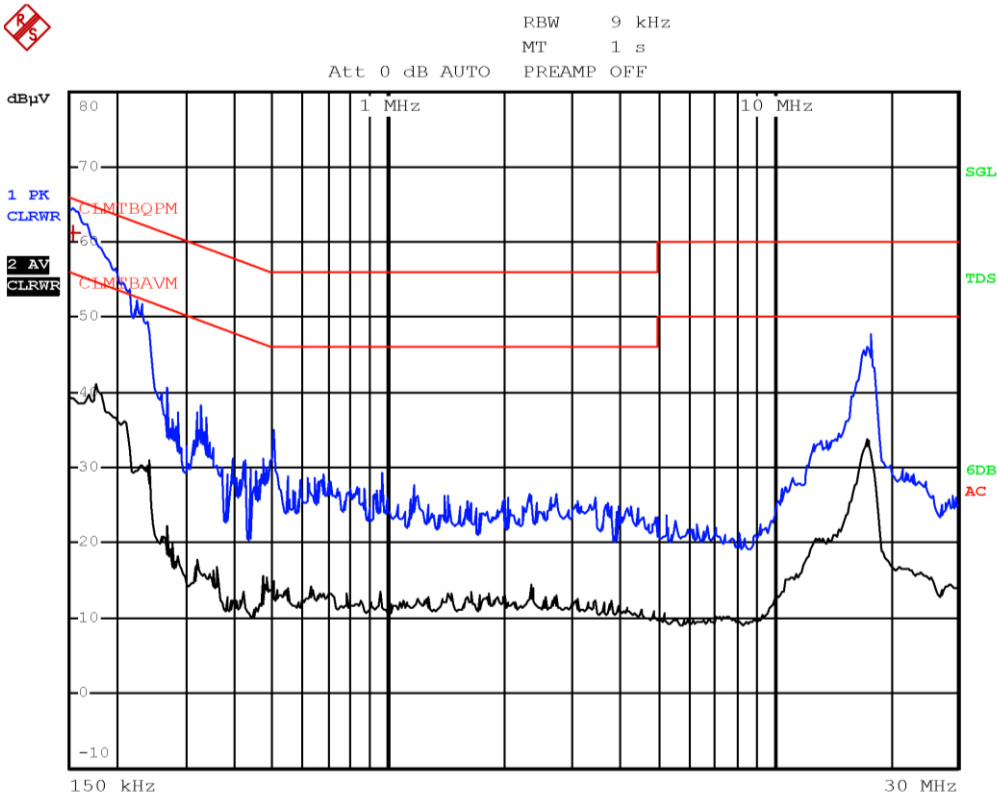
³ See clause 4.4 EUT Operation Modes

⁴ See clause 4.5 EUT Configuration Modes



| EDIT PEAK LIST (Final Measurement Results) | | | |
|--|-----------|------------|----------------|
| Trace1: | CLMTRBQPM | | |
| Trace2: | CLMTRBQPM | | |
| Trace3: | --- | | |
| TRACE | FREQUENCY | LEVEL dBμV | DELTA LIMIT dB |
| 1 Quasi Peak | 154 kHz | 61.08 | -4.69 |

| Test Port | | Supply Voltage ² | Test Mode | | Remarks | Verdict |
|---|------|-----------------------------|------------------------|----------------------------|---------|---------|
| EUT ¹ | Line | | Operation ³ | Configuration ⁴ | | |
| 1 | N | 1 | 1 | 1 | | P |
| <div>Notes:</div> <div><div>¹ See clause 4.6 EUT Input/Output Ports</div><div>² See clause 4.2 EUT Power Supply</div><div>³ See clause 4.4 EUT Operation Modes</div><div>⁴ See clause 4.5 EUT Configuration Modes</div></div> | | | | | | |



| EDIT PEAK LIST (Final Measurement Results) | | | |
|--|-----------|------------|----------------|
| Trace1: | CLMTRBQPM | | |
| Trace2: | CLMTRBAVM | | |
| Trace3: | --- | | |
| TRACE | FREQUENCY | LEVEL dBμV | DELTA LIMIT dB |
| 1 Quasi Peak | 154 kHz | 61.24 | -4.53 |

| Test Port | | Supply Voltage ² | Test Mode | | Remarks | Verdict |
|------------------|---------|-----------------------------|------------------------|----------------------------|---------|---------|
| EUT ¹ | Line | | Operation ³ | Configuration ⁴ | | |
| 1 | +24 Out | 1 | 1 | 1 | | P |

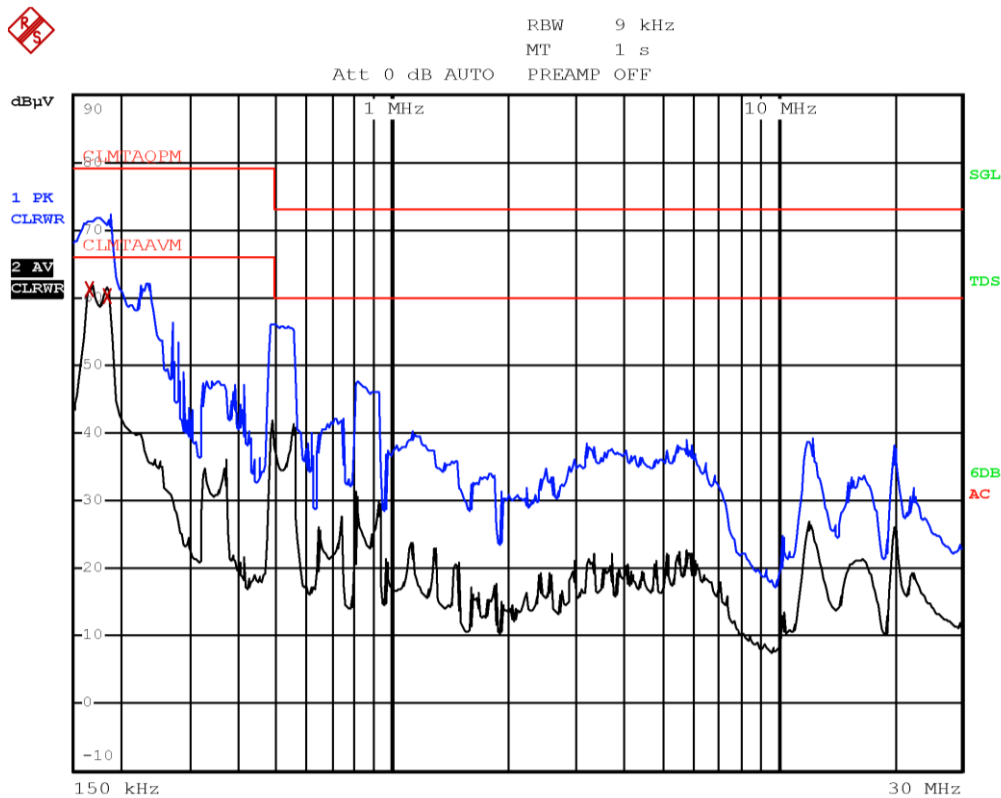
Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See clause 4.2 EUT Power Supply

³ See clause 4.4 EUT Operation Modes

⁴ See clause 4.5 EUT Configuration Modes



| EDIT PEAK LIST (Final Measurement Results) | | | |
|--|-----------|------------|----------------|
| Trace1: | CLMTAQPM | | |
| Trace2: | CLMTAAVM | | |
| Trace3: | --- | | |
| TRACE | FREQUENCY | LEVEL dBμV | DELTA LIMIT dB |
| 2 Average | 166 kHz | 61.39 | -4.61 |
| 2 Average | 186 kHz | 60.32 | -5.67 |

| Test Port | | Supply Voltage ² | Test Mode | | Remarks | Verdict |
|------------------|---------|-----------------------------|------------------------|----------------------------|---------|---------|
| EUT ¹ | Line | | Operation ³ | Configuration ⁴ | | |
| 1 | -24 Out | 1 | 1 | 1 | | P |

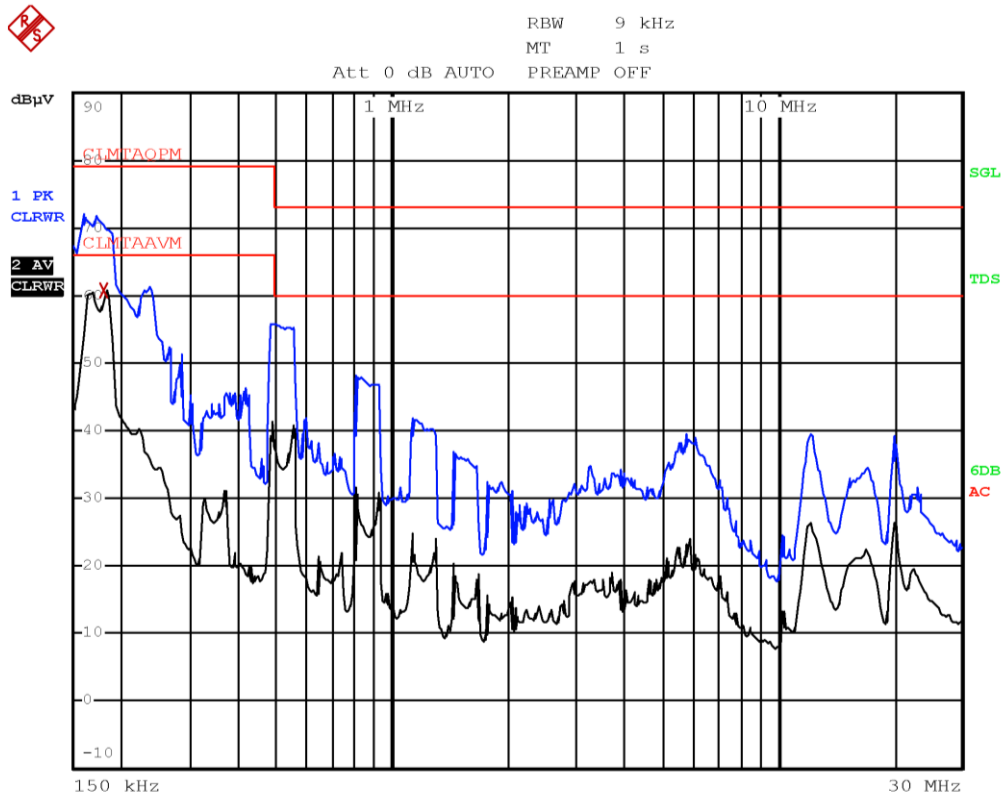
Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See clause 4.2 EUT Power Supply

³ See clause 4.4 EUT Operation Modes

⁴ See clause 4.5 EUT Configuration Modes



| EDIT PEAK LIST (Final Measurement Results) | | | |
|--|-----------|------------|----------------|
| Trace1: | CLMTAQPM | | |
| Trace2: | CLMTAAVM | | |
| Trace3: | --- | | |
| TRACE | FREQUENCY | LEVEL dBμV | DELTA LIMIT dB |
| 2 Average | 182 kHz | 60.65 | -5.34 |

6.3 Discontinuous disturbance

6.3.1 Test result

| | |
|--|--|
| Verdict: | <input type="checkbox"/> P <input type="checkbox"/> F <input checked="" type="checkbox"/> N ¹ <input type="checkbox"/> NP |
| Frequency range: | 0.15 MHz – 30 MHz |
| Kind of test site: | Shielded room |
| Notes: ¹ If marked, the test is not applicable for the EUT | |

6.3.2 Photo documentation of the test set-up

6.3.3 Test method

Method standard is reported at par. 3.1. Measurement of a disturbance, the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms which is separated from a subsequent disturbance by at least 200 ms.

6.3.4 Limits

The limits for discontinuous disturbance depend mainly on the character of the disturbance and on the click rate N. For the first measurement with the limit L and a time of measurement equal to T or 120 minutes, the click rate is obtained with $N = (\text{Number of clicks or switching operation} / \text{Time of measurement})$.

Appliance which has a click rate N less than 5 clicks per minute, and which has instantaneous switching (90% clicks shorter than 10 ms and none longer than 20ms) shall be deemed to comply with the limits, regardless of the click's amplitude. Otherwise a second measurement is needed.

For the second measurement, the click limit L_q is obtained by increasing the relevant limit L with 44 dB for $N < 0.2$, or $20\log(30 / N)$ for $0.2 \leq N < 30$. With the limit L_q during the same time T or 120 minutes, the number of authorized clicks is equal to $N_2 \leq N_1/4$

6.3.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|---------------------|----------------------|------------------------------|-------------|
| <input type="checkbox"/> | EMI receiver | R&S | ESU8 | 100202 |
| <input type="checkbox"/> | EMI receiver | Rohde & Schwarz | ESW44 | 101620 |
| <input type="checkbox"/> | Attenuator | Aeroflex / Weinschel | 2 | CC8577 |
| <input type="checkbox"/> | LISN 9 kHz ÷ 30 MHz | R&S | ESH2-Z5 | 872 460/041 |
| <input type="checkbox"/> | LISN 9 kHz ÷ 30 MHz | R&S | ENV432 | 101714 |
| <input type="checkbox"/> | LISN 9 kHz ÷ 30 MHz | R&S | ESH3-Z5 | 840 731/004 |
| <input type="checkbox"/> | Shielded room | Siemens | Conducted emission test room | 1862 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.3.6 Test protocol

| Test Port | | Supply Voltage ² | Test Mode | | Remarks | Verdict |
|--|------|-----------------------------|------------------------|----------------------------|---------|---------|
| EUT ¹ | Line | | Operation ³ | Configuration ⁴ | | |
| | | | | | | N |
| Notes: ¹ See clause 4.6 EUT Input/Output Ports ² See clause 4.2 EUT Power Supply ³ See clause 4.4 EUT Operation Modes ⁴ See clause 4.5 EUT Configuration Modes | | | | | | |

| FIRST RUN | | | | | | | |
|-----------------|--------------|------------------|--------------|---------|----------------------|------------|--------------|
| Frequency (MHz) | Limit (dBµV) | Number of clicks | | | Switching operations | Time (min) | Click rate N |
| | | < 10 ms | 10ms to 20ms | > 20 ms | | | |
| 0.15 | 66 | | | | | | |
| 0.5 | 56 | | | | | | |
| 1.4 | 56 | | | | | | |
| 30 | 60 | | | | | | |

| SECOND RUN | | | | | | |
|-----------------|--------------|------------------|--------------|---------|------------|---------|
| Frequency (MHz) | Limit (dBµV) | Number of clicks | | | Time (min) | Limit N |
| | | < 10 ms | 10ms to 20ms | > 20 ms | | |
| 0.15 | | | | | | |
| 0.5 | | | | | | |
| 1.4 | | | | | | |
| 30 | | | | | | |

6.4 Harmonics of current

6.4.1 Test result

| | |
|--|--|
| Verdict: | <input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N ¹ <input type="checkbox"/> NP |
| Frequency range: | 0 kHz – 2 kHz |
| Class: | <input checked="" type="checkbox"/> A |
| Notes: ¹ If marked, the test is not applicable for the EUT | |

6.4.2 Photo documentation of the test set-up



6.4.3 Test method

Method standard is reported at par. 3.1. This test consists on the measurement of harmonics components of the input current which may be produced by equipment having an input current up to and including 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.

6.4.4 Limits

| Harmonic type | Harmonic order | Maximum permissible harmonic current (A) | |
|---------------|---------------------|--|---------------------|
| | | Class A Equipment | Class B Equipment |
| Odd | 3 | 2.30 | 3.45 |
| | 5 | 1.14 | 1.71 |
| | 7 | 0.77 | 1.155 |
| | 9 | 0.40 | 0.60 |
| | 11 | 0.33 | 0.495 |
| | 13 | 0.21 | 0.315 |
| | $15 \leq n \leq 40$ | $0.15 \times 15/n$ | $0.225 \times 15/n$ |
| Even | 2 | 1.08 | 1.62 |
| | 4 | 0.43 | 0.645 |
| | 6 | 0.30 | 0.45 |
| | $8 \leq n \leq 40$ | $0.23 \times 8/n$ | $0.345 \times 8/n$ |
| Notes: | | | |

6.4.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|--------------------------------|--------------|----------------|-------------|
| <input type="checkbox"/> | Harmonics and Flicker analyser | Emc Partner | Harmonics 1000 | 016+103489 |
| <input checked="" type="checkbox"/> | Harmonics and Flicker analyser | EM Test | DPA500N | P1735202736 |
| <input checked="" type="checkbox"/> | Power source | Elettrotest | TPS/M/6000 | 358 04/18 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.4.6 Test protocol

| Test Port | | Supply Voltage ² | Test Mode | | Remarks | Verdict |
|------------------|------|-----------------------------|------------------------|----------------------------|---------|---------|
| EUT ¹ | Line | | Operation ³ | Configuration ⁴ | | |
| 1 | L, N | 1 | 1 | 1 | | P |

Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See clause 4.2 EUT Power Supply

³ See clause 4.4 EUT Operation Modes

⁴ See clause 4.5 EUT Configuration Modes

Measured values

Fundamental Current

Line 1: 0.576 A

Active input Power

Line 1: 125.114 W *

Circuit power factor

Line 1: 0.931 *

* Absolute value.

Current Test Result

| Average and Maximum harmonic current results | | | | | | | | | |
|--|----------------------|--------------|-----------|--------|----------------------|--------------|-----------|--------|-----------------|
| Hn | Average | | | | Maximum | | | | Harmonic Result |
| | I _{eff} [A] | of Limit [%] | Limit [A] | Result | I _{eff} [A] | of Limit [%] | Limit [A] | Result | |
| 1 | 0.575 | | | | 0.576 | | | | |
| 2 | 0.001 | 0.072 | 1.080 | n/a | 0.001 | 0.052 | 1.620 | n/a | PASS |
| 3 | 0.086 | 3.753 | 2.300 | PASS | 0.087 | 2.512 | 3.450 | PASS | PASS |
| 4 | 0.001 | 0.231 | 0.430 | n/a | 0.001 | 0.164 | 0.645 | n/a | PASS |
| 5 | 0.020 | 1.739 | 1.140 | PASS | 0.020 | 1.178 | 1.710 | PASS | PASS |
| 6 | 0.001 | 0.288 | 0.300 | n/a | 0.001 | 0.223 | 0.450 | n/a | PASS |
| 7 | 0.017 | 2.155 | 0.770 | PASS | 0.017 | 1.449 | 1.155 | PASS | PASS |
| 8 | 0.001 | 0.359 | 0.230 | n/a | 0.001 | 0.256 | 0.345 | n/a | PASS |
| 9 | 0.011 | 2.762 | 0.400 | PASS | 0.011 | 1.870 | 0.600 | PASS | PASS |
| 10 | 0.001 | 0.439 | 0.184 | n/a | 0.001 | 0.340 | 0.276 | n/a | PASS |
| 11 | 0.007 | 2.137 | 0.330 | PASS | 0.007 | 1.438 | 0.495 | PASS | PASS |
| 12 | 0.001 | 0.542 | 0.153 | n/a | 0.001 | 0.394 | 0.230 | n/a | PASS |
| 13 | 0.005 | 2.221 | 0.210 | n/a | 0.005 | 1.509 | 0.315 | n/a | PASS |
| 14 | 0.001 | 0.641 | 0.131 | n/a | 0.001 | 0.466 | 0.197 | n/a | PASS |
| 15 | 0.004 | 2.377 | 0.150 | n/a | 0.004 | 1.615 | 0.225 | n/a | PASS |
| 16 | 0.001 | 0.747 | 0.115 | n/a | 0.001 | 0.526 | 0.173 | n/a | PASS |
| 17 | 0.002 | 1.811 | 0.132 | n/a | 0.003 | 1.294 | 0.199 | n/a | PASS |
| 18 | 0.001 | 0.908 | 0.102 | n/a | 0.001 | 0.638 | 0.153 | n/a | PASS |
| 19 | 0.002 | 1.846 | 0.118 | n/a | 0.002 | 1.282 | 0.178 | n/a | PASS |
| 20 | 0.001 | 0.920 | 0.092 | n/a | 0.001 | 0.637 | 0.138 | n/a | PASS |
| 21 | 0.003 | 2.388 | 0.107 | n/a | 0.003 | 1.738 | 0.161 | n/a | PASS |

| | | | | | | | | | |
|----|-------|-------|-------|-----|-------|-------|-------|-----|------|
| 22 | 0.001 | 1.063 | 0.084 | n/a | 0.001 | 0.764 | 0.125 | n/a | PASS |
| 23 | 0.003 | 3.377 | 0.098 | n/a | 0.003 | 2.349 | 0.147 | n/a | PASS |
| 24 | 0.001 | 1.107 | 0.077 | n/a | 0.001 | 0.820 | 0.115 | n/a | PASS |
| 25 | 0.003 | 3.273 | 0.090 | n/a | 0.003 | 2.247 | 0.135 | n/a | PASS |
| 26 | 0.001 | 1.266 | 0.071 | n/a | 0.001 | 0.926 | 0.106 | n/a | PASS |
| 27 | 0.002 | 2.924 | 0.083 | n/a | 0.003 | 2.013 | 0.125 | n/a | PASS |
| 28 | 0.001 | 1.267 | 0.066 | n/a | 0.001 | 0.896 | 0.099 | n/a | PASS |
| 29 | 0.003 | 3.341 | 0.078 | n/a | 0.003 | 2.337 | 0.116 | n/a | PASS |
| 30 | 0.001 | 1.403 | 0.061 | n/a | 0.001 | 0.996 | 0.092 | n/a | PASS |
| 31 | 0.001 | 1.877 | 0.073 | n/a | 0.001 | 1.339 | 0.109 | n/a | PASS |
| 32 | 0.001 | 1.528 | 0.058 | n/a | 0.001 | 1.072 | 0.086 | n/a | PASS |
| 33 | 0.002 | 2.238 | 0.068 | n/a | 0.002 | 1.556 | 0.102 | n/a | PASS |
| 34 | 0.001 | 1.884 | 0.054 | n/a | 0.001 | 1.353 | 0.081 | n/a | PASS |
| 35 | 0.002 | 2.367 | 0.064 | n/a | 0.002 | 1.671 | 0.096 | n/a | PASS |
| 36 | 0.001 | 1.631 | 0.051 | n/a | 0.001 | 1.143 | 0.077 | n/a | PASS |
| 37 | 0.003 | 4.413 | 0.061 | n/a | 0.003 | 3.021 | 0.091 | n/a | PASS |
| 38 | 0.001 | 1.934 | 0.048 | n/a | 0.001 | 1.406 | 0.073 | n/a | PASS |
| 39 | 0.002 | 3.014 | 0.058 | n/a | 0.002 | 2.195 | 0.087 | n/a | PASS |
| 40 | 0.001 | 1.881 | 0.046 | n/a | 0.001 | 1.307 | 0.069 | n/a | PASS |

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

6.5 Voltage changes, voltage fluctuations and flicker

6.5.1 Test result

| | | | | |
|--|---------------------------------------|----------------------------|---|-----------------------------|
| Verdict: | <input checked="" type="checkbox"/> P | <input type="checkbox"/> F | <input type="checkbox"/> N ¹ | <input type="checkbox"/> NP |
| Notes: | | | | |
| ¹ If marked, the test is not applicable for the EUT | | | | |

6.5.2 Photo documentation of the test set-up



6.5.3 Test method

Method standard is reported at par. 3.1. This test consists in the measurement of voltage changes, voltage fluctuations and flicker which may be produced by equipment having an input current ≤ 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.

6.5.4 Limits

The value of Pst shall be not greater than 1.0.

The value of Plt shall be not greater than 0.65.

The value of d(t) during a voltage change shall not exceed 3.3 % for more than 500 ms.

The relative steady-state voltage change, dc shall not exceed 3.3 %.

The maximum relative voltage change dmax shall not exceed:

- 4 % without additional conditions
- 6 % for equipment which is switched manually, or switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption
- 7 % for equipment which is attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as mowers, portable tools such as electric drills), or switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

6.5.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|-------------------------------------|--------------------------------|--------------|----------------|-------------|
| <input type="checkbox"/> | Harmonics and Flicker analyser | Emc Partner | Harmonics 1000 | 016+103489 |
| <input checked="" type="checkbox"/> | Harmonics and Flicker analyser | EM Test | DPA500N | P1735202736 |
| <input checked="" type="checkbox"/> | Power source | Elettrotest | TPS/M/6000 | 358 04/18 |

Notes:
¹ See clause 1.7 for calibration information.
² If crossed, the instrument was used during tests.

6.5.6 Test protocol

| Test Port | | Supply Voltage ² | Test Mode | | Remarks | Verdict |
|------------------|------|-----------------------------|------------------------|----------------------------|---------|---------|
| EUT ¹ | Line | | Operation ³ | Configuration ⁴ | | |
| 1 | L,N | 1 | 1 | 1 | | P |

Notes:
¹ See clause 4.6 EUT Input/Output Ports
² See clause 4.2 EUT Power Supply
³ See clause 4.4 EUT Operation Modes
⁴ See clause 4.5 EUT Configuration Modes

Analysis Status: **PASS**

Flicker Measurements Settings

Main Line: 230V, 50Hz
Flicker Meter: 230V / 50Hz
Flicker Impedance: Zref
Observation Time: 1 × 10 min
Measurements: **1**

Flicker Measurements

| | P _{It} | Max P _{st} | Max d _c | Max d _{max} | Max T _{max} |
|----------|-----------------|---------------------|--------------------|----------------------|----------------------|
| Line 1: | 0.012 | 0.028 | 0 | 0.21 | 0 |
| Limits: | 0.65 | 1 | 3.3 | 4 | 0.5 |
| Results: | PASS | PASS | PASS | PASS | PASS |

Flicker Individual Measurements

| Measurement P _{st} [] | | | d _c [%] | | | d _{max} [%] | | | T _{max} [s] | | | |
|---------------------------------|-------------|--------|--------------------|-------------|--------|----------------------|-------------|--------|----------------------|-------------|--------|-------------|
| Value | Limit | Result | Value | Limit | Result | Value | Limit | Result | Value | Limit | Result | |
| #1 | 0.03 | 1.00 | PASS | 0.00 | 3.30 | PASS | 0.21 | 4.00 | PASS | 0.00 | 0.50 | PASS |

6.6 Electrostatic discharges

6.6.1 Test result

| EUT port ¹ | Test n° ² | Supply Voltage ³ | Criterion ⁴ | | Mode | | Verdict |
|-----------------------|----------------------|-----------------------------|------------------------|----------|-----------|---------------|---------|
| | | | Required | Achieved | Operation | Configuration | |
| 0 | 1 | 1 | A | A | 1 | 1 | P |
| 0 | 2 | 1 | A | A | 1 | 1 | P |

Notes:

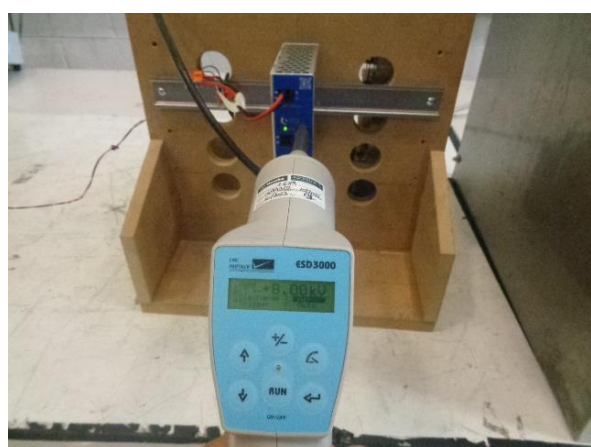
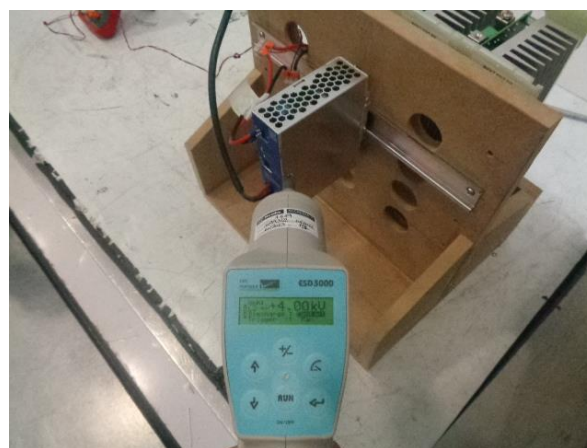
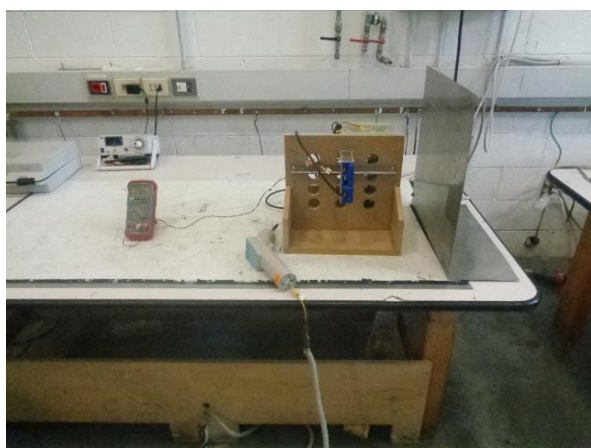
¹ See clause 4.6 EUT Input/Output Ports

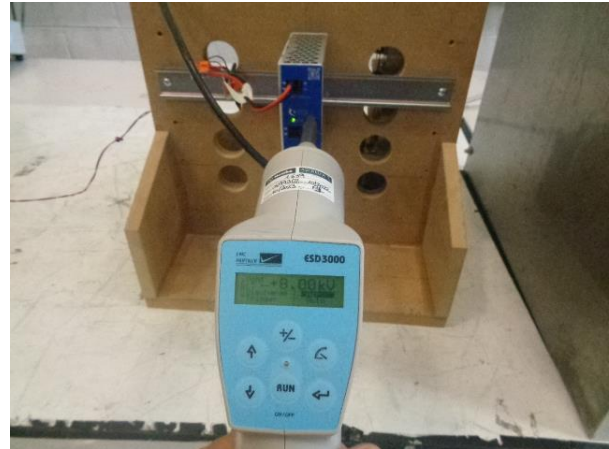
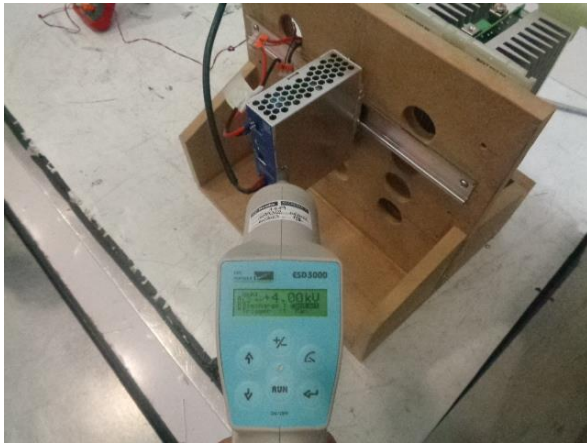
² See test specification clause reported below for this test

³ See clause 4.2 EUT Power Supply

⁴ For criterion definition and requirement see clause 5 Performance Levels

6.6.2 Photo documentation of the test set-up





6.6.3 Test method

Method standard is reported at par. 3.2. The test is intended to demonstrate the immunity of equipment subjected to static electricity discharges from operators directly and to adjacent objects. The table-top equipment under test is placed on a wooden table, 0.8 m high, standing on the ground reference plane. A horizontal coupling plane (HCP) is placed on the table. The EUT and the cables are isolated from the coupling plane by an insulating support 0.5 mm thick. The floor standing equipment is isolated from the ground reference plane by an insulating support about 0.1 m thick. The vertical coupling plane (VCP) of dimensions 0.5 m x 0.5 m is placed parallel to, and positioned at a distance of 0.1 m from, the EUT. Air discharges are applied to non-metallic parts of the system. Contact discharges are applied to all accessible metallic parts. Discharges are also applied to the Horizontal and Vertical Coupling Planes.

6.6.4 Test specification

| Test n° | Discharge type | Discharge impedance | Discharge repetition | Discharge polarity | Test level |
|---------|----------------|-----------------------|-------------------------------|-----------------------|------------|
| 1 | contact | 330 Ω / 150 pF | 10 discharges, one per second | positive and negative | 4 kV |
| 2 | air | 330 Ω / 150 pF | 10 discharges, one per second | positive and negative | 8 kV |
| Notes: | | | | | |

6.6.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|-----------------|--------------|---------|------------|
| <input checked="" type="checkbox"/> | ESD Test system | EMC Partner | ESD3000 | 252 + 192 |
| <input type="checkbox"/> | ESD Test system | Teseq | NSG437 | 767+437767 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.7 Radio-frequency electromagnetic field. Amplitude modulated

6.7.1 Test result

| EUT port ¹ | Test n° ² | Supply voltage ³ | Criterion ⁴ | | Mode | | Verdict |
|-----------------------|----------------------|-----------------------------|------------------------|----------|-----------|---------------|---------|
| | | | Required | Achieved | Operation | Configuration | |
| 0 | 1 | 1 | A | A | 1 | 1 | P |
| 0 | 2 | 1 | A | A | 1 | 1 | P |
| - | - | - | - | - | - | - | |

Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See test specification clause reported below for this test

³ See clause 4.2 EUT Power Supply

⁴ For criterion definition and requirement see clause 5 Performance Levels

6.7.2 Photo documentation of the test set-up



6.7.3 Test method

Method standard is reported at par. 3.2. The test allows estimating of the radiated immunity of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range indicated in the product standard. The interference is applied on the enclosure of the equipment by using transmitting antennas. Measurements are made in a fully anechoic chamber and the indicated field strength is pre-calibrated prior to placement of the system under test.

6.7.4 Test specification

| Test n° | EUT - Antenna separation | Frequency step | Modulation | Frequency range | Test level |
|---|--------------------------|-------------------------|--|--------------------|------------|
| 1 ¹ | 2.5 m ± 0.3 m | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 80 MHz to 1000 MHz | 10 V/m |
| 2 ¹ | 2.5 m ± 0.3 m | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 1.4 GHz to 6 GHz | 3 V/m |
| Notes: ¹ Test was performed with antenna in both horizontal and vertical polarization, positioning each EUT face in front of generating antenna. Top and bottom faces are not exposed to EM field for table-top and floor standing equipment. | | | | | |

6.7.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|-------------------------------|-----------------------------|--------------------|---------------------------|
| <input checked="" type="checkbox"/> | RF Amplifier | Amplifier Research | 1000A225 | 336745 |
| | RF amplifier | Amplifier Research | 50S1G4A | 301049 |
| | Log periodic antenna | Amplifier Research | AT6026A | 330878 |
| | Bidirectional coaxial coupler | Amplifier Research | DC7144 | 301249 |
| | RF Amplifier | IFI | CMX100010-SMCC1000 | L448A-0108 |
| | SAC | Nemko Spa | 10m SAC | 530 |
| | Power sensor | Rohde & Schwarz | NRP18AN | 100987 |
| | RF generator | Rohde & Schwarz | SMB100A | 180431 |
| | Shielded room | Siemens | 10m control room | 1947 |
| <input type="checkbox"/> | Biconilog antenna | ETS Lindgren | 3142E | 00213197 |
| | Turntable | Inn.co | CT1000-150kg | CT1000/115/40 530517/P |
| | SAC | Comtest | 3m SAC | 1711-150 |
| | RF amplifier | Rohde & Schwarz | BBA100 | 101163 |
| | RF amplifier | Rohde & Schwarz | BBA150 | 102626 |
| | Power sensor | Rohde & Schwarz | NRP18AN | 100987 |
| | RF generator | Rohde & Schwarz | SMA100B | 104075 |
| | Shielded room | Siemens | 3 m control room | 3 |
| <input checked="" type="checkbox"/> | Broad-Band Horn Antenna | Schwarzbeck Mess-Elektronik | BBHA9120D | 01874 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.8 Fast transients

6.8.1 Test result

| EUT port ¹ | Test n° ² | Supply voltage ³ | Criterion ⁴ | | Mode | | Verdict |
|-----------------------|----------------------|-----------------------------|------------------------|----------|-----------|---------------|---------|
| | | | Required | Achieved | Operation | Configuration | |
| 1 | 1 | 1 | B | A | 1 | 1 | P |
| 2 | 3 | 1 | B | A | 1 | 1 | P |
| 3 | 3 | 1 | B | A | 1 | 1 | P |

Notes:

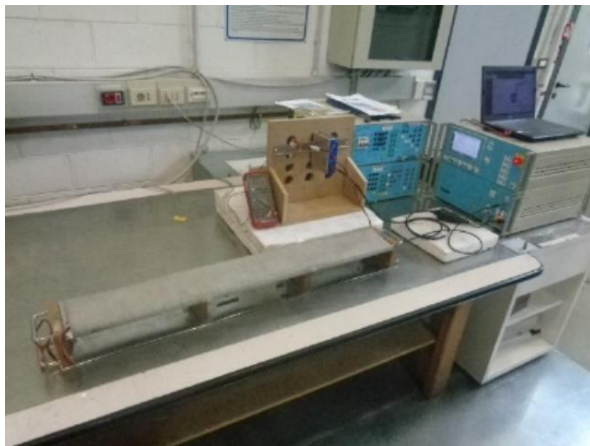
¹ See clause 4.6 EUT Input/Output Ports

² See test specification clause reported below for this test

³ See clause 4.2 EUT Power Supply

⁴ For criterion definition and requirement see clause 5 Performance Levels

6.8.2 Photo documentation of the test set-up



6.8.3 Test method

Method standard is reported at par. 3.2. The test is intended to demonstrate the immunity of equipment subjected to types of transient disturbances such as those originating from switching transients (interruption of inductive loads, relay contact bounce....). The bursts are applied on the mains supply port by using a coupling decoupling network and on signal and control lines ports by using a capacitive clamp. Measurements are made on a ground plane.

6.8.4 Test specification

| Test n° | Port type | Coupling device | Burst repetition frequency | Burst polarity | Test duration | Test level |
|----------------|----------------------|-----------------|-------------------------------|-----------------------|---------------|------------|
| 1 | I/O AC power ports | network | 5 kHz or 100 kHz ¹ | positive and negative | 60 s | 2 kV |
| 2 ² | I/O DC power ports | network | 5 kHz or 100 kHz ¹ | positive and negative | 60 s | 1 kV |
| 3 ² | Signal/control ports | clamp | 5 kHz or 100 kHz ¹ | positive and negative | 60 s | 1 kV |

Notes:

¹ The test may be performed at one or at both repetition frequencies. The use of 5 kHz repetition frequency is traditional; however, 100 kHz is closer to reality.

² Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 3 m. Not applicable to input ports intended for connection to a battery or a rechargeable battery which shall be removed or disconnected from the equipment for recharging.

6.8.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|-------------------------------------|------------------|--------------|----------------|---------------|
| <input checked="" type="checkbox"/> | Pulse generator | EMC partner | IMU3000 | F5-S-D-V-1505 |
| | Coupling network | EMC partner | CDN2000-06-32 | 1537 |
| <input type="checkbox"/> | Pulse generator | EMC partner | Transient 2000 | 849 |
| | Coupling network | Schaffner | CDN 300 | 231 |
| <input checked="" type="checkbox"/> | Coupling clamp | EMC partner | CN-EFT1000 | 120 |
| <input type="checkbox"/> | Coupling clamp | Schaffner | CDN 125 | 245 9219 |

Notes:

¹ See clause 1.7 for calibration information.

² If crossed, the instrument was used during tests.

6.9 Surges

6.9.1 Test result

| EUT port ¹ | Test n° ² | Supply voltage ³ | Criterion ⁴ | | Mode | | Verdict |
|-----------------------|----------------------|-----------------------------|------------------------|----------|-----------|---------------|---------|
| | | | Required | Achieved | Operation | Configuration | |
| 1 | 1 | 1 | B | A | 1 | 1 | P |
| 1 | 2 | 1 | B | A | 1 | 1 | P |

Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See test specification clause reported below for this test

³ See clause 4.2 EUT Power Supply

⁴ For criterion definition and requirement see clause 5 Performance Levels

6.9.2 Photo documentation of the test set-up



6.9.3 Test method

Method standard is reported at par. 3.2. The test allows estimating of the conducted immunity of electrical and electronic equipment to unidirectional surges caused by over voltages from switching and lighting transients. The interference is applied on symmetrical and unsymmetrical modes on mains supply port by using coupling decoupling network. Five positive surges and five negative surges are applied at each of phases of the a.c. waveform: 0°, 90°, 180° and 270°. Each surge was applied 60 seconds after the previous surge. Signal and Telecommunications ports were subject to five positive and five negative surges applied through the appropriate Coupling/Decoupling Network (CDN).

6.9.4 Test specification

| Test N° | Port type | Coupling type | Coupling network | Pulse type | Pulse polarity | Pulse repetition | Test level |
|--|----------------------|---------------|---------------------------|------------------|-----------------------|--------------------------|------------|
| 1 ¹ | I/O AC power ports | line to line | 2 Ω + 18 μ F | 1.2 / 50 μ s | positive and negative | 5 surges, one per minute | 2 kV |
| 2 ¹ | I/O AC power ports | line to earth | 12 Ω + 9 μ F | 1.2 / 50 μ s | positive and negative | 5 surges, one per minute | 4 kV |
| 3 ² | I/O DC power ports | line to line | 2 Ω + 18 μ F | 1.2 / 50 μ s | positive and negative | 5 surges, one per minute | 0.5 kV |
| 4 ² | I/O DC power ports | line to earth | 12 Ω + 9 μ F | 1.2 / 50 μ s | positive and negative | 5 surges, one per minute | 1 kV |
| 5 ² | Signal/control ports | line to earth | 42 Ω + 0.5 μ F | 1.2 / 50 μ s | positive and negative | 5 surges, one per minute | 1 kV |
| Notes: ¹ Test repeated at phase angle 0°, 90°, 180° and 270°. Level 2kV, 4kV required by manufacturer. ² Applicable only to ports interfacing with long distance lines; not applicable to input ports intended for connection to a battery or a rechargeable battery which shall be removed or disconnected from the equipment for recharging. | | | | | | | |

6.9.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|------------------|--------------|----------------|---------------|
| <input checked="" type="checkbox"/> | Pulse generator | EMC partner | IMU3000 | F5-S-D-V-1505 |
| | Coupling network | EMC partner | CDN2000-06-32 | 1537 |
| | Coupling network | EMC partner | CDN-UTP ED3 | 1526 |
| <input type="checkbox"/> | Pulse generator | EMC partner | Transient 2000 | 849 |
| | Coupling network | Schaffner | CDN 116 | 149 9318 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.10 Radio-frequency common mode

6.10.1 Test result

| EUT port ¹ | Test n° ² | Supply voltage ³ | Criterion ⁴ | | Mode | | Verdict |
|-----------------------|----------------------|-----------------------------|------------------------|----------|-----------|---------------|---------|
| | | | Required | Achieved | Operation | Configuration | |
| 1 | 1 | 1 | A | A | 1 | 1 | P |
| 2 | 5 | 1 | A | A | 1 | 1 | P |
| 3 | 7 | 1 | A | A | 1 | 1 | P |

Notes:

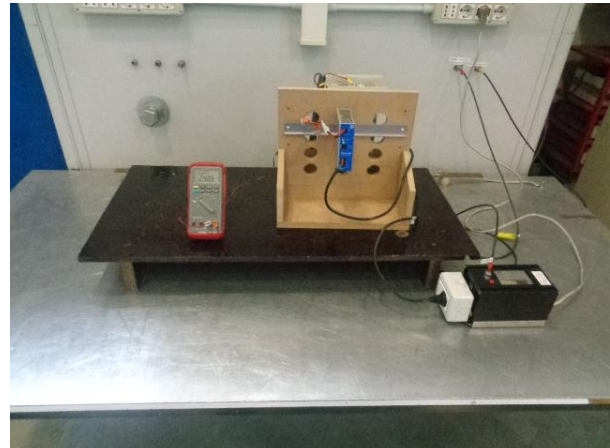
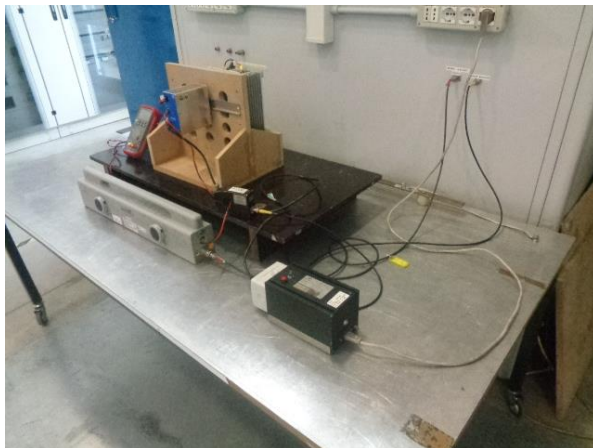
¹ See clause 4.6 EUT Input/Output Ports

² See test specification clause reported below for this test

³ See clause 4.2 EUT Power Supply

⁴ For criterion definition and requirement see clause 5 Performance Levels

6.10.2 Photo documentation of the test set-up



6.10.3 Test method

Method standard is reported at par. 3.2. The test allows estimating of the conducted immunity of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 150 kHz to 80 MHz. The interference is applied on mains supply, signal line and earth connection ports by using coupling decoupling networks or a clamp. Measurements are made on a ground plane. The EUT was located 10cm above the reference ground plane and any associated I/O cables attached to the EUT are located between 30mm and 50mm above the ground plane. The indicated field is pre-calibrated prior to placement of the system under test.

6.10.4 Test specification

| Test n° | Port type | Coupling Device | Frequency step | Modulation | Frequency range | Test level |
|-----------------|----------------------|-----------------|-------------------------|--|-----------------|------------|
| 1 | I/O AC power ports | CDN M2 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 2 | I/O AC power ports | CDN M3 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 3 | I/O AC power ports | CDN M4 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 4 | I/O AC power ports | CDN M5 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 5 ¹ | I/O DC power ports | CDN M2 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 6 ¹ | I/O DC power ports | CDN M3 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 7 ¹ | Signal/control ports | CLAMP | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 8 ¹ | Signal/control ports | AF2 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 9 ¹ | Signal/control ports | T2 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |
| 10 ¹ | Signal/control ports | S1 | 1 % with 3 s dwell time | 80 % AM modulated with a 1 kHz sine wave | 0.15 to 80 MHz | 10 V |

Notes:

¹ Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 3 m.

6.10.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|--|--------------------------------------|--------------|---------------|-------------|
| <input checked="" type="checkbox"/> | RF Conducted immunity test equipment | Teseq-Ametek | NSG4070C-80 | 540125 |
| <input type="checkbox"/> | RF Conducted immunity test equipment | EM Test | CWS500 CSI | V0710102305 |
| <input checked="" type="checkbox"/> | Attenuator 6dB | EM Test | ATT6/75 | 0206-18 |
| <input checked="" type="checkbox"/> | EM injection clamp | FCC | F-203I-23mm | 121239 |
| <input type="checkbox"/> | Bulk current injection probe | FCC | F-120-9A | 447 |
| <input checked="" type="checkbox"/> | CDN | EM Test | CDN M2 / M3 | 0307-16 |
| <input type="checkbox"/> | CDN | Luthi | CDN M2/M3 | P1426135614 |
| <input type="checkbox"/> | CDN | Luthi | CDN M4 N-32A | P1343125190 |
| <input type="checkbox"/> | CDN | Luthi | CDN M4 PE-32A | P1428136828 |
| <input type="checkbox"/> | CDN | Luthi | CDN M5-32A | P1430137446 |
| <input type="checkbox"/> | CDN | Luthi | CDN S1-50 BNC | P1430137436 |
| <input type="checkbox"/> | CDN | Luthi | CDN T2 | P1427136163 |
| <input type="checkbox"/> | CDN | Luthi | CDN AF2 | P1425135039 |
| Notes: ¹ See clause 1.7 for calibration information. ² If crossed, the instrument was used during tests. | | | | |

6.11 Power frequency magnetic field

6.11.1 Test result

| EUT port ¹ | Test n° 2 | Supply voltage ³ | Criterion ⁴ | | Mode | | Verdict |
|-----------------------|-----------|-----------------------------|------------------------|----------|-----------|---------------|---------|
| | | | Required | Achieved | Operation | Configuration | |
| 0 | 1 | 1 | A | A | 1 | 1 | P |
| - | - | - | - | - | - | - | |
| - | - | - | - | - | - | - | |

Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See test specification clause reported below for this test

³ See clause 4.2 EUT Power Supply

⁴ For criterion definition and requirement see clause 5 Performance Levels

6.11.2 Photo documentation of the test set-up



6.11.3 Test method

Method standard is reported at par. 3.2. This test is intended to demonstrate the immunity of equipment when subjected to power frequency magnetic fields. The test magnetic field is obtained by a current flowing in an induction coil; the application of the test field to the EUT is by the immersion method.

6.11.4 Test specification

| Test n° | Magnetic field type | Magnetic field orientation ¹ | Test duration | Test frequency | Test level |
|----------------|-----------------------------|---|---------------|----------------|------------|
| 1 ² | sinusoidal continuous field | x-axis, y-axis, z-axis | 60 s | 50 Hz | 30 A/m |
| 2 ² | sinusoidal continuous field | x-axis, y-axis, z-axis | 60 s | 60 Hz | 30 A/m |

Notes:
¹ Respect to EUT
² Applicable only to equipment containing devices susceptible to magnetic fields. The test shall be carried out at the frequencies appropriate to the power supply frequency. Equipment intended for use in areas supplied only at one of these frequencies need only be tested at that frequency.

6.11.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|-------------------------------------|------------------------|--------------|-------------|------------|
| <input checked="" type="checkbox"/> | Magnetic field meter | Maschek | ESM-100 | 971909-G |
| <input checked="" type="checkbox"/> | Helmutz induction coil | G.I.E. | IEC1000-4-8 | 111962 |

Notes:
¹ See clause 1.7 for calibration information.
² If crossed, the instrument was used during tests.

6.12 Voltage dips and interruptions

6.12.1 Test result

| EUT port ¹ | Test n° ² | Supply voltage ³ | Criterion ⁴ | | Mode | | Verdict |
|-----------------------|----------------------|-----------------------------|------------------------|----------|-----------|---------------|---------|
| | | | Required | Achieved | Operation | Configuration | |
| 1 | 1 | 1 | B | A | 1 | 1 | P |
| 1 | 3 | 1 | B | A | 1 | 1 | P |
| 1 | 5 | 1 | B | A | 1 | 1 | P |
| 1 | 7 | 1 | C | C | 1 | 1 | P |

Notes:

¹ See clause 4.6 EUT Input/Output Ports

² See test specification clause reported below for this test

³ See clause 4.2 EUT Power Supply

⁴ For criterion definition and requirement see clause 5 Performance Levels

⁵ If this note is present near the verdict P, it means that the EUT does not demonstrate compliance when tested with 0 degree switching; the test was repeated with the switching occurring at both 90 degrees and 270 degrees and EUT fulfilled the requirements.

6.12.2 Photo documentation of the test set-up



6.12.3 Test method

Method standard is reported at par. 3.2. The test allows estimating of the conducted immunity of electrical and electronic equipment connected to low-voltage power supply networks for voltage dips and short interruptions. Testing is performed with the product connected directly to a generator capable of simulating the voltage drops and interrupts as described.

6.12.4 Test specification

| Test n° | Change type | Frequency | Cycles | Test level ³ |
|---------|-----------------------|-----------|--------|-------------------------|
| 1 | Voltage dips | 50 Hz | 1 | 0 % |
| 2 | Voltage dips | 60 Hz | 1 | 0 % |
| 3 | Voltage dips | 50 Hz | 10 | 40 % |
| 4 | Voltage dips | 60 Hz | 12 | 40 % |
| 5 | Voltage dips | 50 Hz | 25 | 70 % |
| 6 | Voltage dips | 60 Hz | 30 | 70 % |
| 7 | Voltage interruptions | 50 Hz | 250 | 0 % |
| 8 | Voltage interruptions | 60 Hz | 300 | 0 % |

Notes:

¹ Changes to occur at 0 degree crossover point of the voltage waveform.

² The test shall be carried out at the frequencies appropriate to the power supply frequency. Equipment intended to be used in regions where only one of these frequencies is applied needs to be tested at this specific frequency only.

³ % residual voltage

6.12.5 Test equipment used¹

| Used ² | Description | Manufacturer | Model | Identifier |
|-------------------------------------|-----------------|--------------|----------------|---------------|
| <input checked="" type="checkbox"/> | Pulse generator | EMC partner | IMU3000 | F5-S-D-V-1505 |
| <input type="checkbox"/> | Pulse generator | EMC partner | Transient 2000 | 849 |
| <input type="checkbox"/> | Power supply | Zenone | GVS300GL | 0000000446 |
| <input type="checkbox"/> | Power supply | Zenone | GVS300GL | 0000000445 |
| <input type="checkbox"/> | Power supply | Zenone | GVS300GL | 0000000444 |

Notes:

¹ See clause 1.7 for calibration information.

² If crossed, the instrument was used during tests.

7 EUT PHOTOS



End of report