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TEST REPORT

Electromagnetic Compatibility

Report Reference No. ..... :	**REP124161**
Date of issue ..... :	2025-11-03
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..... :	**TDK-Lambda Switzerland 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 Switzerland SA
Model/Type reference ..... :	Described at clause 4.1
Tests performed by ..... :	Luis Anticona
Report approved by..... :	Daniele Guarnone

Firmato digitalmente da Guarnone Daniele

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1. GENERAL INFORMATION

1.1 Project history

Report number	Modification to the report / comments	Date
REP124161	First release	2025-11-03
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1.2 Symbol used in the report

☒ ..... :	The crossed square indicates that the listed condition, standard or equipment is applicable for this report.
☐ ..... :	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
☐ Comma (,) / ☒ 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) .....:	2025-10-17
Testing start date .....:	2025-10-17
Testing termination date .....:	2025-11-03

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	20013013/305
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 ÷ 2.4 kHz	(4)	(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

(4) The instrument used respect the accuracy reported in IEC/EN 61000-4-7 table 1 class I; measurement uncertainty is equal to instrument accuracy.

1.7 Instruments calibration table

Instruments 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	2025-08	2026-08
EMI Receiver	Rohde & Schwarz	ESU8	100202	2025-08	2026-08
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025	2024-08	2027-08
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242	2024-08	2027-08
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2024-10	2027-10
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STPL 9148-123	2024-08	2027-08
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2025-07	2026-07
Semi-anechoic chamber	Nemko Spa	10m semi-anechoic chamber	530	2025-10	2027-10
3m Semi anechoic chamber	Comtest	SAC-3	1711-150	2024-09	2026-09
Common Mode Absorption Device	Schwarzbeck Mess-Elektronik	CMAD1614	00041	2025-07	2028-07
LISN	Rohde & Schwarz	ENV432	101714	2025-09	2026-09
LISN	Rohde & Schwarz	ESH2-Z5	872 460/041	2025-09	2026-09
V-network	Rohde & Schwarz	ESH3-Z5	840 731/004	2025-08	2026-08
Voltage probe	Rohrbacher	VP-1	2.455	2025-09	2026-09
RF Current Probe	Rohde & Schwarz	ESH2-Z1	891 923/18	2023-08	2026-08
Impedance stabilization network	Teseq	ISN T800	47263	2024-08	2027-08
Impedance Stabilisation Network	Schwarzbeck Mess-Elektronik	NTFM8131	8131-153	2025-04	2026-04
Absorbing clamp	Rohde & Schwarz	MDS-21	893 169/001	2025-01	2026-01
Absorbing clamp	Rohde & Schwarz	MDS-21	893 169/003	2025-01	2026-01
Harmonics and Flicker analyzer	Emc Partner	HARMONICS1000+HAR-EXT1000	016+103489	2025-03	2026-03
Harmonics and Flicker analyzer	EM Test	DPA500N	P1735202736	2025-03	2026-03
AC Power Source	Elettrotest	TPS/M/6000	358 04/18	2025-03	2026-03
Attenuator	Aeroflex / Weinschel	2	CC8577	2025-01	2026-01
Attenuator	Aeroflex / Weinschel	2	CC8577	2025-01	2026-01

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Description	Manufacturer	Model	Identifier	Cal Date	Due Date
ESD Simulator	Emc Partner	ESD3000+DM1	252+192	2024-12	2025-12
ESD Simulator + Coupling Network	Teseq	NSG437	767+437767+661+695+445	2025-01	2026-01
Broadband amplifier	Rohde & Schwarz	BBA100	101163	2024-11	2025-11
Broadband Amplifier	Rohde & Schwarz	BBA150	102626	2024-11	2025-11
RF Amplifier 200MHz-1000MHz	IFI	CMX100010-SMCC1000	L448A-0108	2025-03	2026-03
RF Amplifier 10kHz-225MHz	Amplifier Research	1000A225	0336745	2025-03	2026-03
Amplificatore di potenza RF 200 W (1-6 GHz)	Bonn Elektronik	BLMA 1060-200	2415241A	2025-09	2026-09
RF Power Sensor	Rohde & Schwarz	NRP18AN	100990	2025-03	2026-03
RF Power Sensor	Rohde & Schwarz	NRP18AN	100987	2024-11	2025-11
RF Signal Generator	Rohde & Schwarz	SMB100A	180431	2025-01	2026-01
RF Signal Generator	Rohde & Schwarz	SMA100B	104075	2025-10	2026-10
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	2024-03	2027-03
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	2025-06	2026-06
EMC Multifunction Instrument+CDN Triphase Burst+CDN Surge	Emc Partner+Schaffner	Transient2000+CDN300+CDN116	849+231+149 9318	2025-01	2026-01
Coupling clamp	Schaffner	CDN125	245 9219	2025-07	2026-07
Capacitive Coupling clamp	Emc Partner	CDN	CNEFT1000-120	2025-07	2026-07
Electric and magnetic field meter	Maschek	ESM-100	971909-G	2025-04	2026-04
V-network	Rohde & Schwarz	ESH3-Z6	843 864/025	2025-08	2026-08
V-network	Rohde & Schwarz	ESH3-Z6	843 864/024	2025-08	2026-08
V-network	Rohde & Schwarz	ESH3-Z6	893 046/010	2025-08	2026-08

Description	Manufacturer	Model	Identifier	Cal Date	Due Date
V-network	Rohde & Schwarz	ESH3-Z6	843 864/026	2025-08	2026-08
Test System for Conducted and Radiated Immunity	Teseq - Ametek	NSG4070C-80	540125	2025-01	2026-01
Continuous wave simulator	EM Test	CWS 500 CS1	V0710102305	2025-03	2026-03
EM Injection Clamp	Fisher Custom Communications Inc	F-203I-23mm	121239	2024-12	2025-12
Bulk current injection probe	Fisher Custom Communications Inc	F-120-9A	447	2025-09	2026-09
Coupling/Decoupling Network	Luthi	CDN AF2	P1425135039	2024-12	2025-12
Coupling/Decoupling Network	Luthi	CDN M1	P1422134545	2024-12	2025-12
Coupling/Decoupling Network	Luthi	CDN M2/M3	P1426135614	2024-11	2025-11
Coupling/Decoupling Network	Luthi	CDN M4 N-32A	P1343125190	2024-12	2025-12
Coupling/Decoupling Network	Luthi	CDN M4 PE-32A	P1428136828	2024-12	2025-12
Coupling/Decoupling Network	Luthi	CDN M5-32A	P1430137446	2024-12	2025-12
Coupling/Decoupling Network	Luthi	CDN S1-50 BNC	P1430137436	2024-12	2025-12
Coupling/Decoupling Network	Luthi	CDN T2	P1427136163	2024-12	2025-12
Coupling/Decoupling Network	EM Test	CDN M2/M3	0307-16	2024-11	2025-11
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	2028-03
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254	2025-07	2026-07
Oscilloscopio	Agilent	54846A	MY40000254	2025-08	2026-08
Multimeter	Rohde & Schwarz	HMC8012	101577	2025-09	2026-09
Barometer	Castle	GBP 3300	072015	2025-03	2026-03
Data logger con diagnosi in campo	Testo	175-H2	20012380/305	2025-01	2027-01
Data logger	Testo	175-H2	20013013/305	2025-01	2027-01

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 / EN55016-2-3
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

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

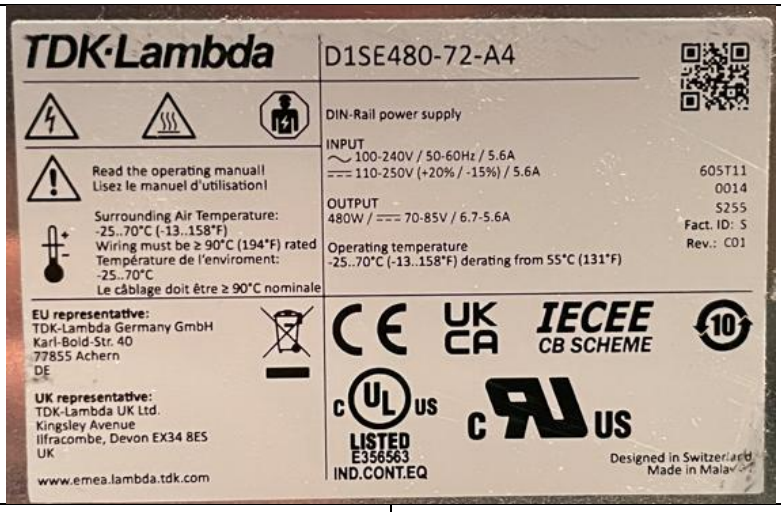
Emission Tests		
Requirement / test	**Method Standard**	**Verdict**
Radiated emissions – enclosure port	CISPR 16-2-3 EN 55016-2-3	P
Conducted emissions – low voltage AC mains port	CISPR 16-2-1 EN 55016-2-1	P
Conducted emissions – DC power port	CISPR 16-2-1 EN 55016-2-1	P
Discontinuous disturbance – low 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	P
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	P
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
DIN-Rail Power supply
Copy of marking plate(s) (if present)


Sample ID ..... :	605T110014
Model/Type reference ..... :	D1SE480-72-A4
Ratings ..... :	Input:100-240Vac, 50-60Hz, 5.6A Output: 70-85Vdc, 6.7-5.6A, 480W
Equipment installation ..... :	Table-top
Accessories and detachable parts included .... :	None
Test performed..... :	All tests were performed on this sample

4.2 EUT Power Supply

Used [1]	N° [2]	Type	Supply Voltage	Phases N°	Supplementary Information
☒	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] .....:	fc ≤ 108 MHz
Environment intended use.....:	Domestic / Residential
Equipment classification[3] .....:	Not applicable
Equipment category[3].....:	Not applicable
Other information .....:	Cables (see par. 4.6), performance level (see par. 5)

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	☒	☒	Normal mode

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	☒	☒	EUT connected to power supply and DC output connected to nominal load
Notes:			

4.6 EUT Input/Output Ports

Port	Name	Type [1]	Cable Max. >3m	Cable Shielded	Description
0	Enclosure	N/E	—	—	—
1	AC power supply	AC	☐	☐	Input: 3 wires L+N+PE
2	DC Power supply	DC	☐	☐	Output: 2 wires
3	Control port	I/O	☐	☐	-

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	Resistive Load 2x21.60 Ohm	/	/	Connection in parallel (10.8Ohm)

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	
☒	based on the used product standard
☐	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	Led status	No change status
B	All applicable	Led status	No change status
C	All applicable	Led status	Change status is permitted

6 TEST RESULTS

6.1 Radiated emissions

6.1.1 Test result

Verdict:	☒ P ☐ F ☐ N[1] ☐ NP
Frequency range:	30 MHz to 1 000 MHz
Test site:	Semi anechoic chamber
Measurement distance:	10 m

Notes:

[1] If marked, the test is not applicable for the EUT

[2] for radiated emissions measurements, Table 2 shows the highest frequency up to which measurements shall be performed based upon the value of F_x

Table 2 – Required highest frequency for radiated measurement

Highest internal frequency F_x	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz < $F_x \leq 500$ MHz	2 GHz
500 MHz < $F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	5 × F_x up to a maximum of 6 GHz
Where the highest internal frequency is not known, tests shall be performed up to 6 GHz. NOTE F_x is defined in 3.1.9.	

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[3]	-	-
230 to 1000	37[3]	-	-
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

[3] Limits reported in table for frequency below 1 GHz, refer to measurements performed at the distance of 10 m; for measurements performed at the distance of 3 m limits shall be increased by 10 dB

6.1.5 Test equipment used[1]

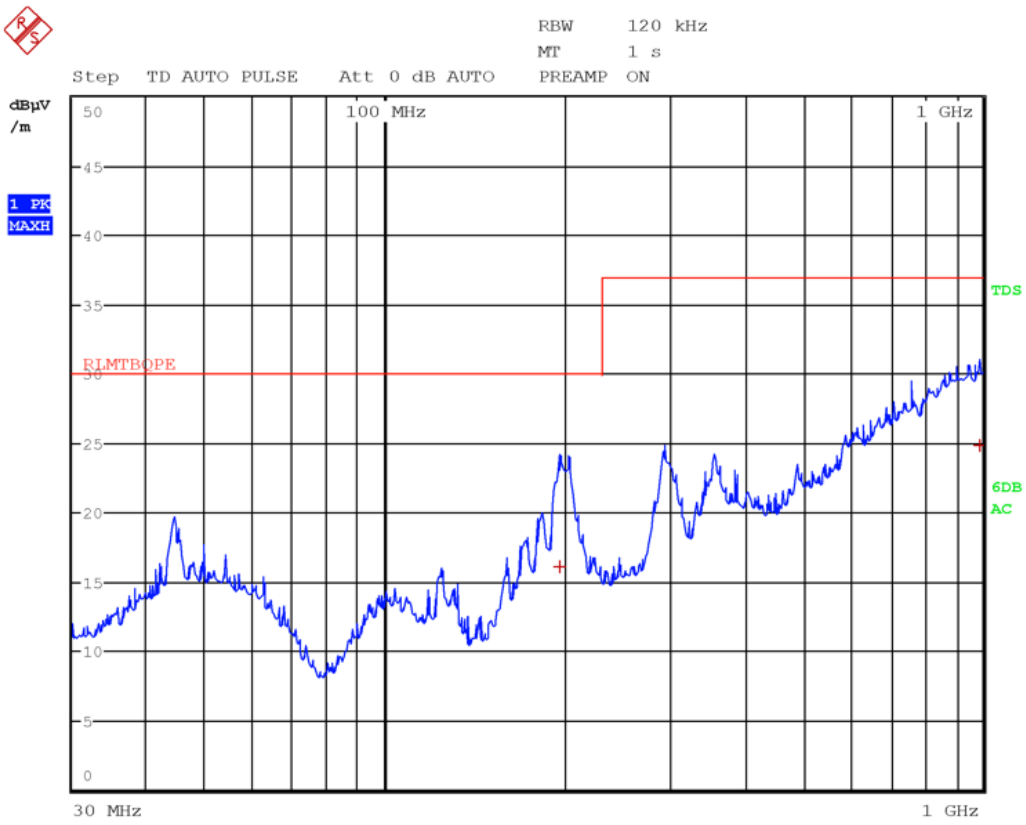
Used [2]	Description	Manufacturer	Model	Identifier
☒	SAC	Nemko Spa	10m SAC	530
	Controller for turntable and antenna mast	Maturo	FCU3.0	10041
	Tilt antenna mast	Maturo	TAM4.0-E	2.526
	Turntable 4 m / 5 t	Maturo	TT4.0-5T	2.527
☐	SAC	Comtest	3m SAC	1711-150
	Controller for turntable and antenna mast	Maturo	FCU3.0	10237
	Tilt antenna mast	Maturo	TAM4.0-E	2.578B
	Turntable 1.5 m / 1 t	Maturo	TT1.5-SI	2.578C
☐	EMI receiver	Rohde & Schwarz	ESW44	101620
☒	EMI receiver	R&S	ESU8	100202
☐	Common mode absorption device	Schwarzbeck	CMAD1614	00041
☒	Antenna	Schwarzbeck	VULB9162	VULB9162-025
☐	Antenna	Schwarzbeck	VULB9168	VULB9168-242
☐	Antenna	Schwarzbeck	STLP9148	STLP9148-123
☐	Antenna	Schwarzbeck	STLP9148	STLP9148-152
☐	Preamplifier	Schwarzbeck	BBV9718	BBV9718-137
☐	Preamplifier	Schwarzbeck	BBV9718C	00121

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	D1SE480-72-A4	P

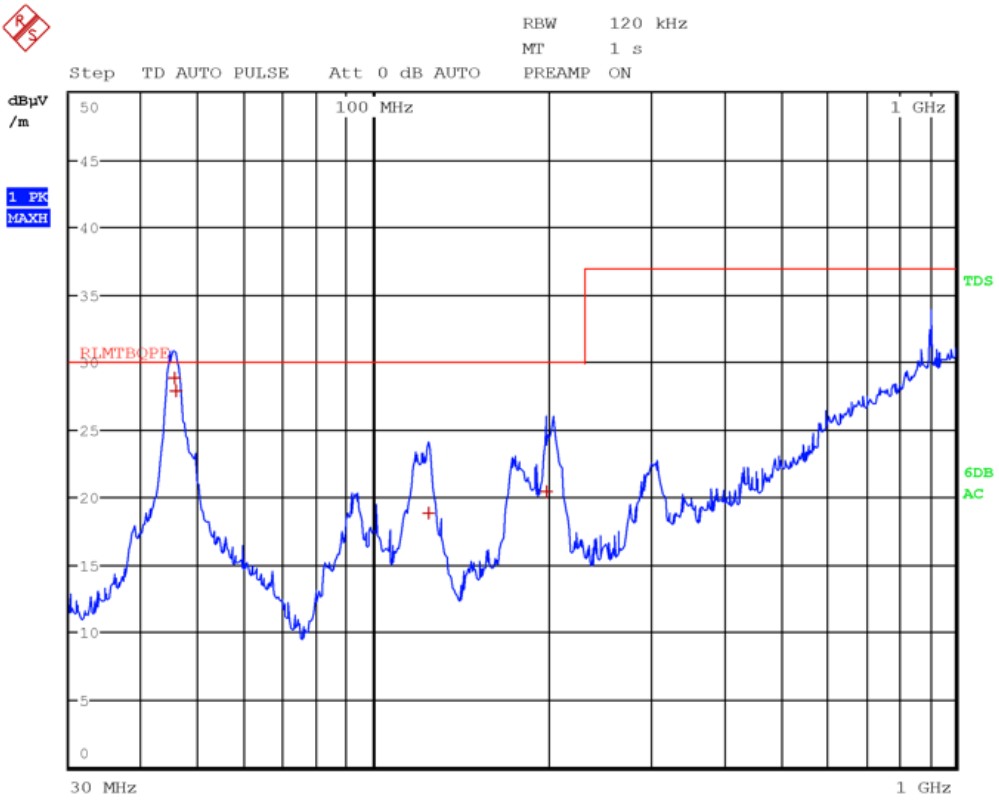
Notes:
[1] See clause 4.2 EUT Power Supply
[2] See clause 4.4 EUT Operation Modes
[3] See clause 4.5 EUT Configuration Modes



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
196.4700	16.2	30.0	-13.8	QP
988.8000	24.9	37.0	-12.1	QP

Antenna Polarization	Supply Voltage[1]	Test Mode		Remarks	Verdict
		Operation[2]	Configuration[3]		
Vertical	1	1	1	D1SE480-72-A4	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



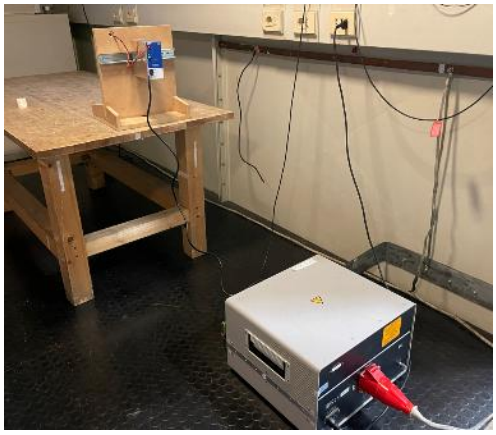
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
45.3900	28.8	30.0	-1.2	QP
45.7500	28.0	30.0	-2.0	QP
124.2900	18.9	30.0	-11.1	QP
198.5100	20.5	30.0	-9.5	QP

6.2 Conducted emissions

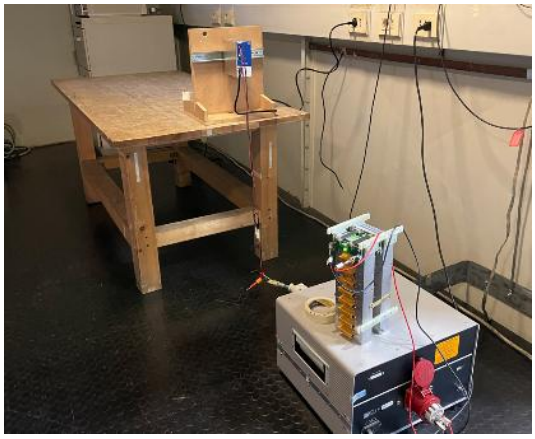
6.2.1 Test result

Verdict for low voltage AC mains port:	☒ P	☐ F	☐ N[1]	☐ NP
Verdict for DC power port:	☒ P	☐ F	☐ N[1]	☐ NP
Verdict for wired network port:	☐ P	☐ F	☒ N[1]	☐ 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



D1SE480-72-A4



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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 (dBµV)**	**Average limit (dBµV)**
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 (dBµV)	Average limit (dBµV)
0.15 to 0.50	79	66
0.50 to 30	73	60
Notes:		

Conducted emissions – wired network port				
Frequency (MHz)	Quasi-Peak limit		Average limit	
	dB(µV)	dB(µA)	dB(µV)	dB(µA)
0.15 to 0.50	84 to 74 [1]	40 to 30 [1]	74 to 64 [1]	30 to 20 [1]
0.50 to 30	74	30	64	20
Notes: [1] The limits decrease linearly with the logarithm of the frequency				

6.2.5 Test equipment used[1]

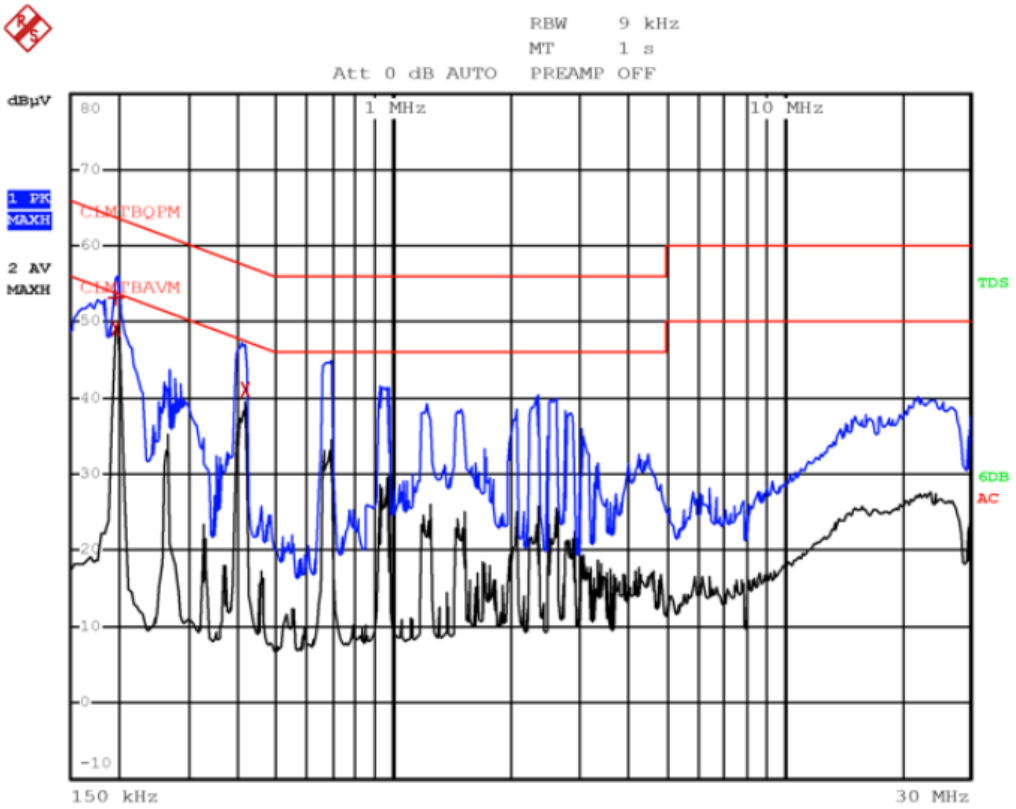
Used [2]	Description	Manufacturer	Model	Identifier
☒	EMI receiver	R&S	ESU8	100202
☐	EMI receiver	Rohde & Schwarz	ESW44	101620
☒	Attenuator	Aeroflex / Weinschel	2	CC8577
☐	LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	872 460/041
☒	LISN 9 kHz ÷ 30 MHz	R&S	ENV432	101714
☐	LISN 9 kHz ÷ 30 MHz	R&S	ESH3-Z5	840 731/004
☐	Current clamp probe	R&S	ESH2-Z1	891 923/18
☐	Voltage Probe	Rorhbacher	VP-1	2.455
☐	ISN	Schwarzbeck	NTFM8131	8131-153
☐	ISN	Teseq	ISN T800	47263
☒	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	D1SE480-72-A4	P

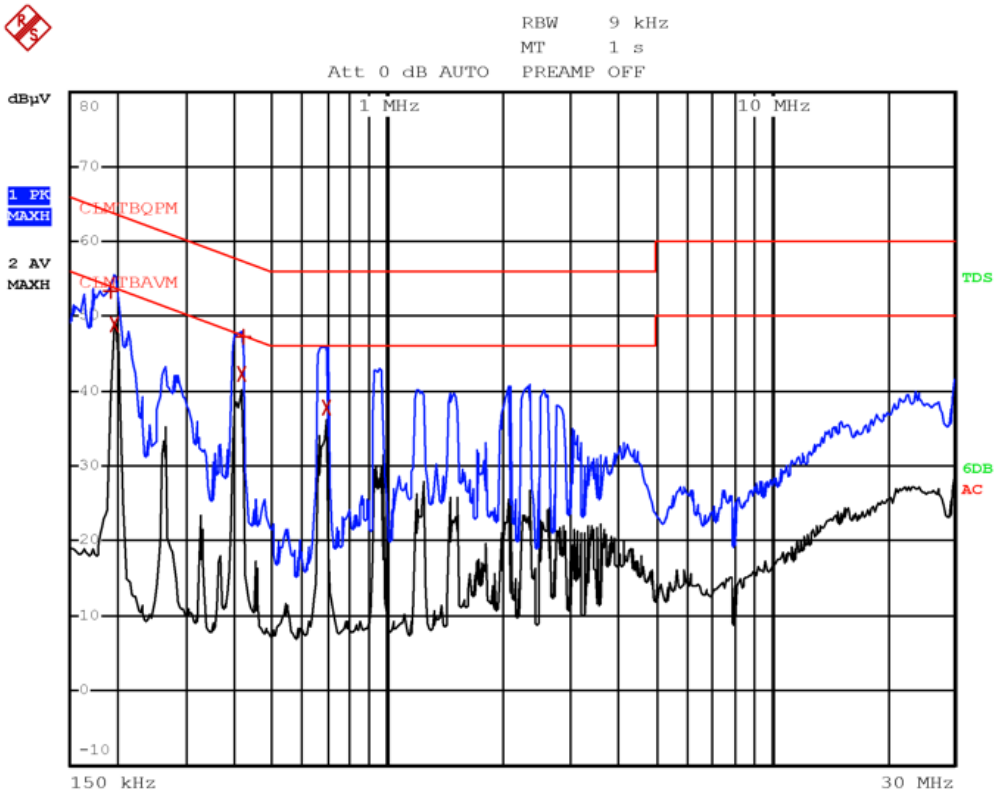
Notes:
[1] See clause 4.6 EUT Input/Output Ports
[2] See clause 4.2 EUT Power Supply
[3] See clause 4.4 EUT Operation Modes
[4] See clause 4.5 EUT Configuration Modes



Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.1980	53.2	63.7	-10.5	QP
0.1980	49.2	53.7	-4.5	Av
0.4140	41.1	47.6	-6.5	Av

Test Port		Supply Voltage[2]	Test Mode		Remarks	Verdict
EUT[1]	Line		Operation[3]	Configuration[4]		
1	N	1	1	1	D1SE480-72-A4	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

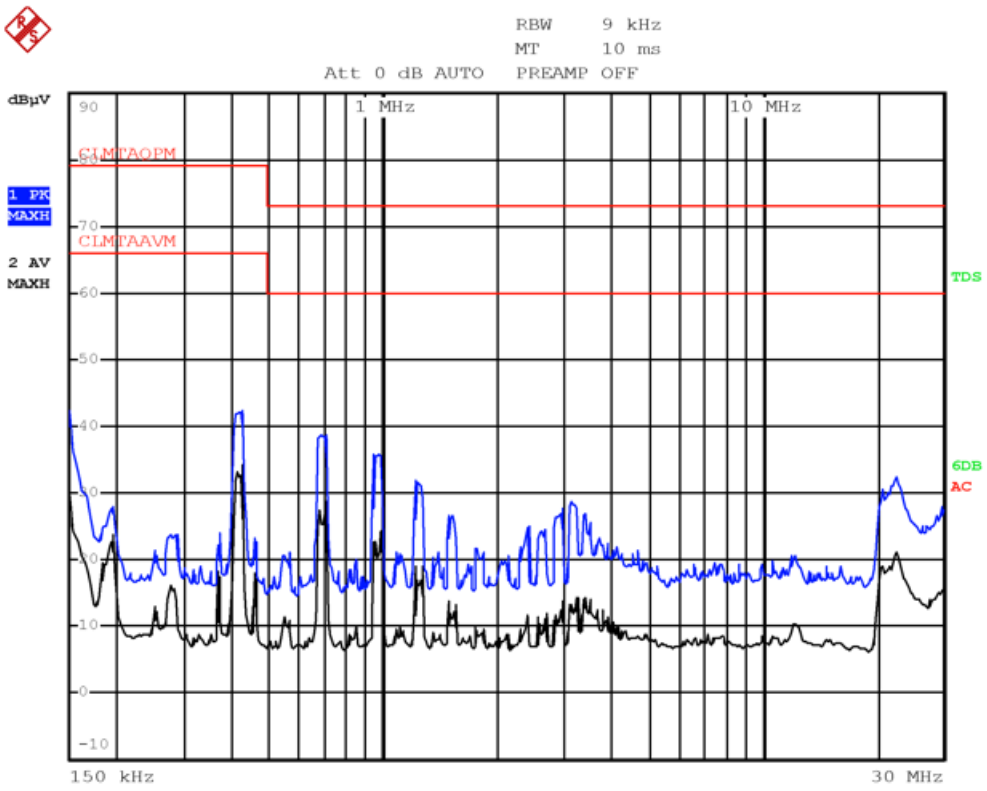


Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.1940	53.5	63.9	-10.4	QP
0.1980	49.0	53.7	-4.7	Av
0.4140	42.3	47.6	-5.3	Av
0.4180	47.3	57.5	-10.2	QP
0.6940	38.0	46.0	-8.0	Av

00036

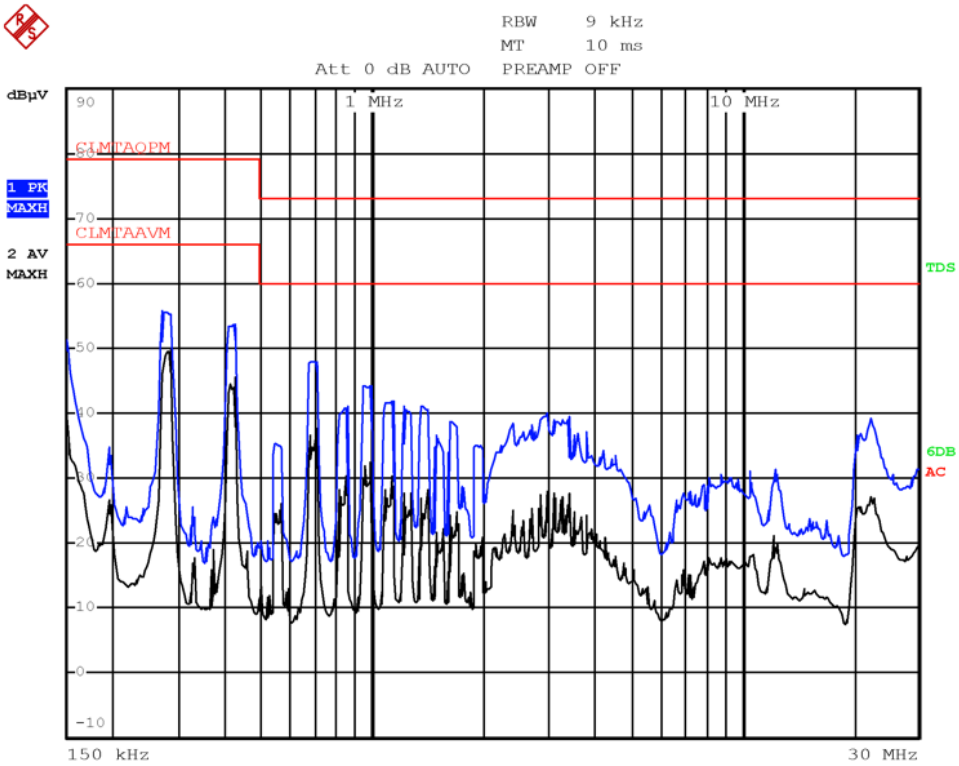
Test Port		Supply Voltage[2]	Test Mode		Remarks	Verdict
EUT[1]	Line		Operation[3]	Configuration[4]		
2	neg	1	1	1	D1SE480-72-A4	P

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



Test Port		Supply Voltage[2]	Test Mode		Remarks	Verdict
EUT[1]	Line		Operation[3]	Configuration[4]		
2	pos	1	1	1	D1SE480-72-A4	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



6.3 Discontinuous disturbance

6.3.1 Test result

Verdict:	☐ P ☐ F ☒ N[1] ☐ 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	

6.4 Harmonics of current

6.4.1 Test result

Verdict:	☒ P ☐ F ☐ N[1] ☐ NP
Frequency range:	0 kHz – 2 kHz
Class:	☒ A
Total harmonic current (THC) measurement:	☐ no need for THC check Annex B applied ☐ THC measurement performed on all operating modes[2]

Notes:

[1] If marked, the test is not applicable for the EUT

[2] Emission tests reported below are conducted with the operating mode that produces the maximum total harmonic current (THC)

6.4.2 Photo documentation of the test set-up

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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 ≤ n ≤ 40	0.15 x 15/n	0.225 x 15/n
Even	2	1.08	1.62
	4	0.43	0.645
	6	0.30	0.45
	8 ≤ n ≤ 40	0.23 x 8/n	0.345 x 8/n
Notes:			

6.4.5 Test equipment used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☐	Harmonics and Flicker analyser	Emc Partner	Harmonics 1000	016+103489
☒	Harmonics and Flicker analyser	EM Test	DPA500N	P1735202736
☒	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[5]

Test Port		Supply Voltage[2]	Test Mode		Remarks	Verdict
EUT[1]	Line		Operation[3]	Configuration[4]		
1	L+N	1	1	1	D1SE480-72-A4	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
[5] For equipment not mentioned in Annex B of 61000-3-2, emission tests is conducted with the operation mode set to the mode expected to produce the maximum total harmonic current (THC) under normal operating conditions.

Evaluation of Partial Odd Harmonics Enhancement			
Partial Odd Harmonic Currents	*measured value*	*limit*	*result*
Line 1:	0,047 A (2,11 %)	0,251 A	PASS
Evaluation for current limits	*without enhancement*	*with enhancement*	*need enhancement*
Line 1:	PASS	PASS	No
Enhancement is not applied			

Check Harmonics 2..40			
First detected harmonic order > 150 %			
Line 1:	None		
Harmonics orders > 150 %			
Line 1:	None		
Harmonics orders with average > 100 %			
Line 1:	None		

Measured values			
	Fundamental Current	*Active input Power*	*Circuit power factor*
Line 1:	2,181 A	489,333 W [1]	0,962 [1]

[1] *Absolute value.*

Hn	Average				Maximum				Harmonic Result
	Ieff [A]	of Limit [%]	Limit [A]	Result	Ieff [A]	of Limit [%]	Limit [A]	Result	
1	2,178				2,180				
2	0,001	0,103	1,080	n/a	0,001	0,090	1,620	n/a	PASS
3	0,331	14,376	2,300	PASS	0,331	9,598	3,450	PASS	PASS
4	0,001	0,218	0,430	n/a	0,001	0,170	0,645	n/a	PASS
5	0,051	4,438	1,140	PASS	0,051	2,978	1,710	PASS	PASS
6	0,001	0,250	0,300	n/a	0,001	0,196	0,450	n/a	PASS
7	0,040	5,249	0,770	PASS	0,041	3,522	1,155	PASS	PASS
8	0,001	0,287	0,230	n/a	0,001	0,227	0,345	n/a	PASS
9	0,033	8,351	0,400	PASS	0,034	5,622	0,600	PASS	PASS
10	0,001	0,354	0,184	n/a	0,001	0,262	0,276	n/a	PASS
11	0,025	7,475	0,330	PASS	0,025	5,031	0,495	PASS	PASS
12	0,001	0,411	0,153	n/a	0,001	0,298	0,230	n/a	PASS
13	0,021	9,913	0,210	PASS	0,021	6,689	0,315	PASS	PASS
14	0,001	0,598	0,131	n/a	0,001	0,487	0,197	n/a	PASS
15	0,027	18,082	0,150	PASS	0,027	12,181	0,225	PASS	PASS
16	0,001	0,741	0,115	n/a	0,001	0,571	0,173	n/a	PASS
17	0,031	23,105	0,132	PASS	0,031	15,553	0,199	PASS	PASS
18	0,001	0,678	0,102	n/a	0,001	0,539	0,153	n/a	PASS
19	0,027	22,905	0,118	PASS	0,027	15,393	0,178	PASS	PASS
20	0,001	1,041	0,092	n/a	0,001	0,866	0,138	n/a	PASS
21	0,027	25,143	0,107	PASS	0,027	16,960	0,161	PASS	PASS
22	0,001	1,021	0,084	n/a	0,001	0,799	0,125	n/a	PASS
23	0,026	26,460	0,098	PASS	0,026	17,889	0,147	PASS	PASS
24	0,001	1,064	0,077	n/a	0,001	0,807	0,115	n/a	PASS
25	0,020	22,352	0,090	PASS	0,020	15,137	0,135	PASS	PASS
26	0,001	1,085	0,071	n/a	0,001	0,839	0,106	n/a	PASS
27	0,008	9,619	0,083	n/a	0,008	6,547	0,125	n/a	PASS
28	0,001	0,980	0,066	n/a	0,001	0,738	0,099	n/a	PASS
29	0,009	12,008	0,078	n/a	0,010	8,283	0,116	n/a	PASS
30	0,001	1,525	0,061	n/a	0,001	1,193	0,092	n/a	PASS
31	0,006	7,816	0,073	n/a	0,006	5,755	0,109	n/a	PASS
32	0,001	1,153	0,058	n/a	0,001	0,931	0,086	n/a	PASS
33	0,002	2,390	0,068	n/a	0,002	1,917	0,102	n/a	PASS
34	0,001	1,265	0,054	n/a	0,001	1,028	0,081	n/a	PASS
35	0,011	16,855	0,064	n/a	0,011	11,515	0,096	n/a	PASS
36	0,001	1,507	0,051	n/a	0,001	1,153	0,077	n/a	PASS
37	0,003	4,546	0,061	n/a	0,003	3,352	0,091	n/a	PASS
38	0,001	1,510	0,048	n/a	0,001	1,149	0,073	n/a	PASS
39	0,007	12,867	0,058	n/a	0,008	9,396	0,087	n/a	PASS
40	0,001	1,493	0,046	n/a	0,001	1,210	0,069	n/a	PASS

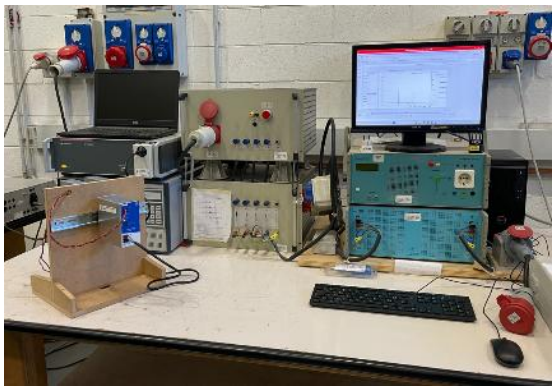
Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

6.5 Voltage changes, voltage fluctuations and flicker

6.5.1 Test result

Verdict:	☒ P ☐ F ☐ N[1] ☐ NP
Notes: [1] If marked, the test is not applicable for the EUT	

6.5.2 Photo documentation of the test set-up



D1SE480-72-A4

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:

a) 4 % without additional conditions
b) 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
c) 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 used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☐	Harmonics and Flicker analyser	Emc Partner	Harmonics 1000	016+103489
☒	Harmonics and Flicker analyser	EM Test	DPA500N	P1735202736
☒	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	D1SE480-72-A4	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

Flicker Measurements					
	P_{lt}	Max P_{st}	Max d_c	Max d_{max}	Max T_{max}
Line 1:	0,012	0,028	0	< 0,2	0
Limits:	0,65	1	3,3	4	0,5
Results:	PASS	PASS	PASS	PASS	PASS

6.6 Electrostatic discharges

6.6.1 Climatic condition check

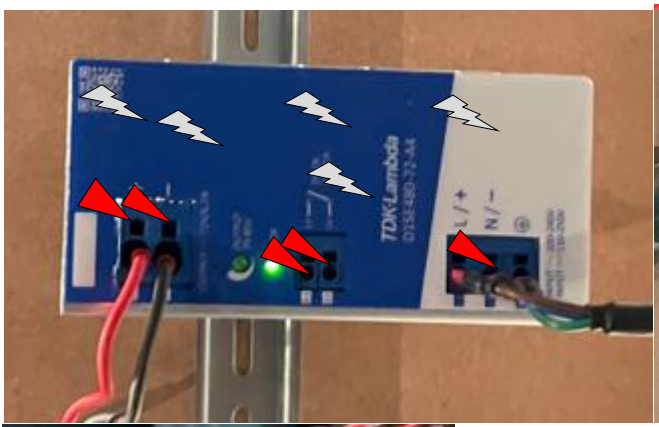
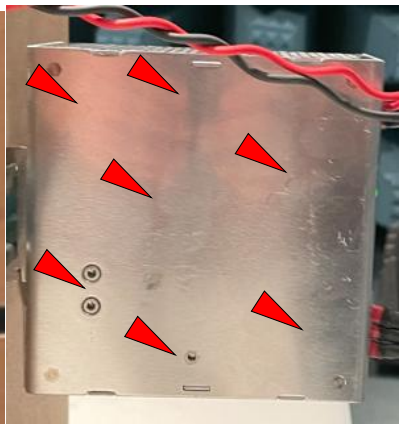
Requirement	Verdict
Ambient temperature during air discharge testing shall be within 15 °C to 35 °C	P
Relative humidity during air discharge testing shall be within 30 % to 60 %	P
Atmospheric pressure during air discharge testing shall be within 86 kPa (860 mbar) to 106 kPa (1060 mbar)	P

6.6.2 Test result

EUT port[1]	Test n° [2]	Supply Voltage[3]	Criterion[4]		Mode		Verdict
			Required	Achieved	Operation	Configuration	
0	1, 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

6.6.3 Photo documentation of the test set-up


6.6.4 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.

6.6.5 Test specification

Test n°	Discharge type	Discharge impedance	Discharge repetition	Discharge polarity	Test level
1[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:
[1] Additional points have been requested by the customer even if they are not accessible

6.6.6 Test equipment used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☒	ESD Test system	EMC Partner	ESD3000	252 + 192
☐	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, 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

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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 used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☐	RF Amplifier	Amplifier Research	1000A225	336745
	RF amplifier	Bonn Elektronik	BLMA 1060-200	2415241A
	Log periodic antenna	Amplifier Research	AT6026A	330878
	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
☒	Biconilog antenna	ETS Lindgren	3142E	00213197
	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
☒	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.

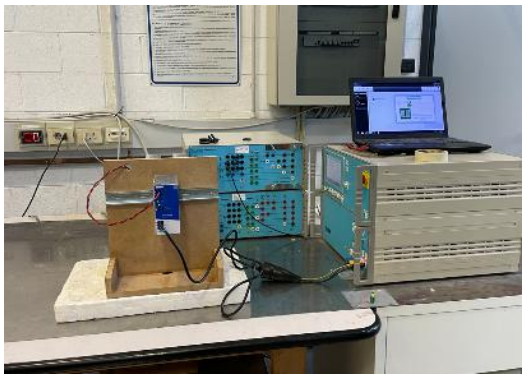
6.8 Fast transients

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	2	2	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



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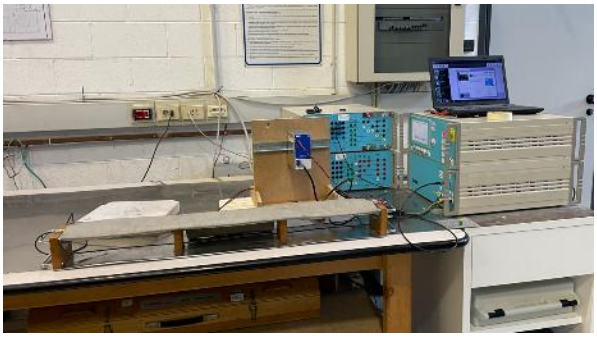

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6.8.3 Test method

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	4 kV[3]
2[2]	I/O DC power ports	clamp	5 kHz or 100 kHz [1]	positive and negative	60 s	2 kV[3]
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.

[3] Level requested by customer.

6.8.5 Test equipment used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☒	Pulse generator	EMC partner	IMU3000	F5-S-D-V-1505
	Coupling network	EMC partner	CDN2000-06-32	1537
☐	Pulse generator	EMC partner	Transient 2000	849
	Coupling network	Schaffner	CDN 300	231
☒	Coupling clamp	EMC partner	CN-EFT1000	120
☐	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.

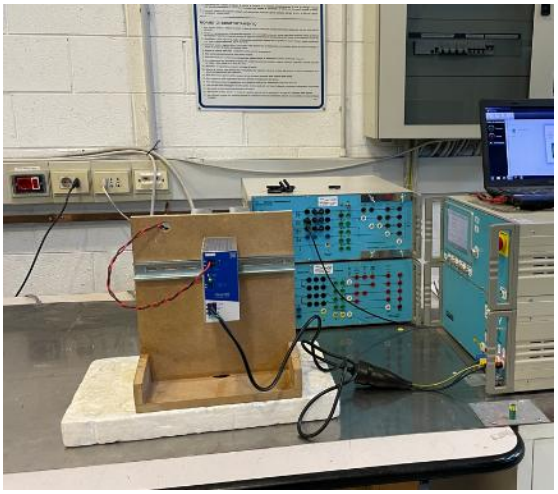
6.9 Surges

6.9.1 Test result

EUT port[1]	Test n° [2]	Supply voltage[3]	Criterion[4]		Mode		Verdict
			Required	Achieved	Operation	Configuration	
1	1, 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



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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[3]
1[1]	I/O AC power ports	line to line	2 Ω + 18 µF	1.2 / 50 µs	positive and negative	5 surges, one per minute	2 kV[4]
2[1]	I/O AC power ports	line to earth	12 Ω + 9 µF	1.2 / 50 µs	positive and negative	5 surges, one per minute	4 kV[4]
3[2]	I/O DC power ports	line to line	2 Ω + 18 µF	1.2 /50 µs	positive and negative	5 surges, one per minute	0.5 kV
4[2]	I/O DC power ports	line to earth	12 Ω + 9 µF	1.2 /50 µs	positive and negative	5 surges, one per minute	1 kV
5[2]	Signal/control ports	line to earth	42 Ω + 0.5 µF	1.2 /50 µs	positive and negative	5 surges, one per minute	1 kV

Notes:

[1] Test repeated at phase angle 0°, 90°, 180° and 270°

[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.

[3] The test was applied at all test levels in Table 1 of 61000-4-5 up to and including the specified test level

[4] Level requested by customer.

6.9.5 Test equipment used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☒	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
☐	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.

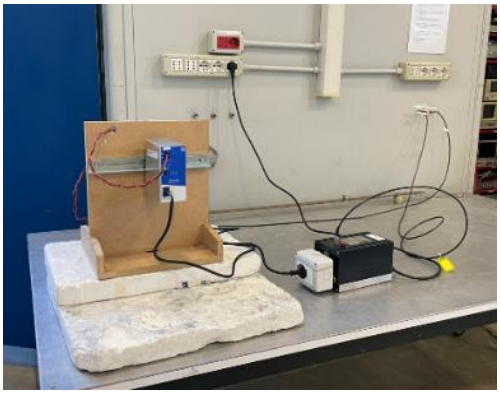
6.10 Radio-frequency common mode

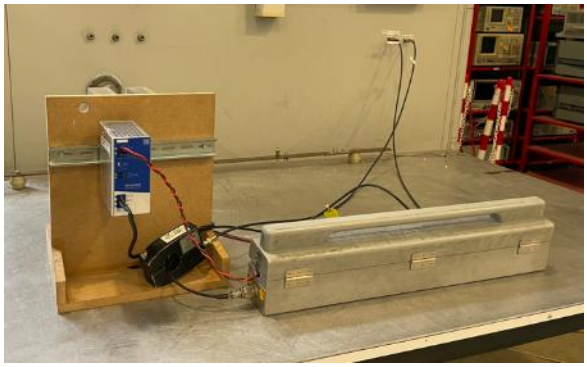
6.10.1 Test result

EUT port[1]	Test n° [2]	Supply voltage[3]	Criterion[4]		Mode		Verdict
			Required	Achieved	Operation	Configuration	
1	2	1	A	A	1	1	P
2	6	2	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 used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☒	RF Conducted immunity test equipment	Teseq-Ametek	NSG4070C-80	540125
☐	RF Conducted immunity test equipment	EM Test	CWS500 CSI	V0710102305
☒	Attenuator 6dB	EM Test	ATT6/75	0206-18
☒	EM injection clamp	FCC	F-203I-23mm	121239
☐	Bulk current injection probe	FCC	F-120-9A	447
☒	CDN	EM Test	CDN M2 / M3	0307-16
☐	CDN	Luthi	CDN M2/M3	P1426135614
☐	CDN	Luthi	CDN M4 N-32A	P1343125190
☐	CDN	Luthi	CDN M4 PE-32A	P1428136828
☐	CDN	Luthi	CDN M5-32A	P1430137446
☐	CDN	Luthi	CDN S1-50 BNC	P1430137436
☐	CDN	Luthi	CDN T2	P1427136163
☐	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

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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 used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☒	Magnetic field meter	Narda	EHP-50G	510ZY00109
☐	Magnetic field meter	Maschek	ESM-100	971909-G
☒	Helmotz induction coil	G.I.E.	IEC1000-4-8	111962
☐	Inductive standard coil 1 m x 1 m	Schwarzbeck Mess-Elektronik	FESP 5410-1	00026
☐	Oscilloscope + clamp	Rohde & Schwarz	RTH1002 + M1.UB	103815
☐	Clamp meter	Fluke	323	51160462WS

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 Peak inrush current requirement

Requirement	Verdict
According to clause A.3 of IEC/EN 61000-4-11: a. generator peak inrush current drive capability meets the specified requirement, or b. EUT's measured inrush current is less than 70 % of the measured inrush current drive capability of the generator	P

6.12.2 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	C	A	1	1	P
1	5	1	C	A	1	1	P
1	7	1	C	C	1	1	P

Notes:

[1] See clause 4.6 EUT Input/Output Ports

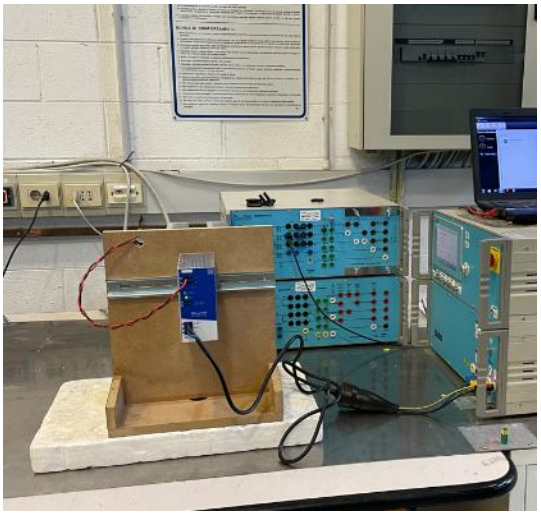
[2] See test specification clause reported below for this test

[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 he 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.

6.12.3 Photo documentation of the test set-up



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6.12.4 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.

6.12.5 Test specification[4, 5]

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

[4] The EUT is tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals between 10 s and 20 s (between each test event).

[5] For the voltage dips test of single-phase systems, the voltage phase-to-neutral is tested; this implies one series of tests. For the voltage dips test of three-phase systems with neutral, each individual voltage (phase-to-neutral and phase-to-phase) is tested, one at a time; this implies six different series of tests. For the voltage dips test of three-phase systems without neutral, each phase-to-phase voltage is tested, one at a time; this implies three different series of tests.

6.12.6 Test equipment used[1]

Used [2]	Description	Manufacturer	Model	Identifier
☒	Pulse generator	EMC partner	IMU3000	F5-S-D-V-1505
☐	Pulse generator	EMC partner	Transient 2000	849
☐	Power supply	Zenone	GVS300GL	0000000446
☐	Power supply	Zenone	GVS300GL	0000000445
☐	Power supply	Zenone	GVS300GL	0000000444
☐	Programmable AC+DC power supply	Pacific Power Source	390AFX-4AGE	173224315
☐	Programmable AC+DC power supply	Pacific Power Source	390AFX-4AGE	173224316
☐	Interruption Generator	Emc Partner	SRC32+PFS32	21

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

7 EUT PHOTOS

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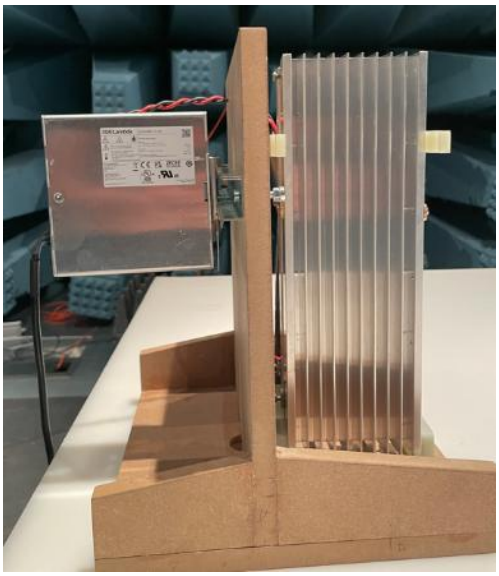

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End of report