

Test report No:
6138613.50

TEST REPORT

Electromagnetic Compatibility (EMC)

Identification of item tested	Straight Grinder
Trademark	AGP
Model and /or type reference	SG6; SG150; SG30; SSG; STRAIGHT-MATE (30A-606); STRAIGHT-MATE (30A-626); RISG6-1500; PT-G10601
Ratings	220-240 Vac; 50-60 Hz; 1500 W 110-120 Vac; 50-60 Hz; 1400 W
Test Laboratory / address	DEKRA Testing and Certification (Shanghai) Ltd. No.250, Jiangchangsang Road, Jing'an District, Shanghai, China
Applicant / address	LEE YEONG INDUSTRIAL CO., Ltd. No.2, Kejia Rd. Douliu City,64057 YUNLIN COUNTY TAIWAN
Test method requested, standard	EN IEC 55014-1:2021 EN IEC 55014-2:2021 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019+A2:2021
Verdict Summary	IN COMPLIANCE
Tested by	Henry Cheng Project Engineer 
Approved by	Kaiyuan Dai Project Manager 
Date of issue	2022-10-24
Report template No	TRF_EN55014-1_EN55014-2_EMC02 V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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GENERAL CONDITIONS

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.
5. The information provided by the customer in this report may affect the validity of the results, the test lab is not responsible for it.
6. The test results presented in this report relate only to the object tested.

UNCERTAINTY

For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in EN 55016-4-2 (CISPR 16-4-2), EN/IEC 61000-4 series or a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%
Atmospheric pressure	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

<input checked="" type="checkbox"/> Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.			
<input type="checkbox"/> Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.			
Decimal separator used in this report	<input type="checkbox"/>	Comma (,)	<input checked="" type="checkbox"/> Point (.)

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	:	Equipment Under Test
QP	:	Quasi-Peak
CAV	:	CISPR Average
AV	:	Average
CDN	:	Coupling Decoupling Network
SAC	:	Semi-Anechoic Chamber
OATS	:	Open Area Test Site
BW	:	Bandwidth
AM	:	Amplitude Modulation
PM	:	Pulse Modulation
HCP	:	Horizontal Coupling Plane
VCP	:	Vertical Coupling Plane
U_N	:	Nominal voltage

DOCUMENT HISTORY

Report nr.	Date	Description
6138613.50	2022-10-24	First release

REMARKS AND COMMENTS

The equipment under test (EUT) does meet the requirements of the stated standard(s)/test(s).

The test results relate only to the samples tested.

According to the declaration from manufacturer ,the eight models of SG6; SG150; SG30; SSG; STRAIGHT-MATE (30A-606); STRAIGHT-MATE (30A-626); RISG6-1500 and PT-G10601 have the same material and structure except for the different model names.

After review, all test were carried out on the following models SG6. The test results stated in this report are also representative for all models.

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item	Straight Grinder
Model / Type number	SG6; SG150; SG30; SSG; STRAIGHT-MATE (30A-606); STRAIGHT-MATE (30A-626); RISG6-1500; PT-G10601
Trademark.....	AGP
Manufacturer.....	LEE YEONG INDUSTRIAL CO., Ltd. No.2, Kejia Rd. Douliu City,64057 YUNLIN COUNTY TAIWAN
Factory 1	LEE YEONG INDUSTRIAL CO., Ltd. No.2, Kejia Rd. Douliu City,64057 YUNLIN COUNTY TAIWAN

Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input checked="" type="checkbox"/>	AC: 220-240 V, 50-60 Hz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	AC: 110-120 V, 50-60 Hz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	DC:					
<input type="checkbox"/>	Battery powered:						
Rated Power	MAX 1500W						
Clock frequencies	Not provided						
Mounting position.....	<input type="checkbox"/>	Table top equipment					
	<input type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input checked="" type="checkbox"/>	Hand-held equipment					
	<input type="checkbox"/>	Other:					

Intended use of the Equipment Under Test (EUT)
The apparatus as supplied for Straight Grinder

No	Module/parts of test item	Type	Manufacturer
	N/A		

No	Documents as provided by the applicant - Description	File name	Issue date
	N/A		

Copy of marking plate:
N/A

1.2 Environment

The requirements and standards apply to equipment intended for use in:

<input checked="" type="checkbox"/>	Residential (domestic) environment.
<input checked="" type="checkbox"/>	Commercial and light-industrial environment.
<input type="checkbox"/>	Industrial environment.

1.3 Test Location

Test Location	DEKRA Testing and Certification (Shanghai) Ltd. No.250, Jiangchangsang Road, Jing'an District, Shanghai, China
Date(receive sample)	2022-10-12 (sample(s) provided by applicant)
Date (start test)	2022-10-12
Date (finish test)	2022-10-24

1.4 Classification according to EN IEC 55014-2

The standard EN IEC 55014-2 is subdivided in five categories. For each category, specific immunity requirements are formulated.

<input type="checkbox"/>	<p>Category I: equipment containing no electronic control circuitry.</p> <p><u>Examples:</u> Appliances, tools and toys that contain no electronic control circuits and only electromechanical components such as switches, thermostats, brush motors, induction motors, heating elements, lighting toys containing only batteries and LED.</p> <p>Electric circuits consisting of passive components (such as radio interference suppression capacitors or inductors, mains transformers and mains frequency rectifiers) are not considered to be electronic control circuitry.</p>
<input checked="" type="checkbox"/>	<p>Category II: mains operated equipment containing electronic control circuitry with no clock frequency higher than 15 MHz.</p>
<input type="checkbox"/>	<p>Category III: battery operated equipment not included in Category I.</p> <p><u>Examples:</u> Appliances, tools and toys powered by batteries and that include a microprocessor to provide a selection of functions.</p> <p>NOTE The assignment to Category III is independent of the clock frequency.</p> <p>This category also includes equipment provided with rechargeable batteries, which can be charged, directly or indirectly, from the mains. Accordingly, this equipment shall also be subjected to the test requirements for mains operated equipment but only when testing the charging function.</p> <p>If the equipment can operate its intended functions when connected, directly or indirectly to the mains, then it is not battery operated. Accordingly, it shall be classified as Category II, Category IV or Category V, as applicable, and subjected to the corresponding test requirements when in mains operation.</p>
<input type="checkbox"/>	<p>Category IV: mains operated equipment containing electronic control circuitry with a highest clock frequency greater than 15 MHz but lower than or equal to 200 MHz.</p>
<input type="checkbox"/>	<p>Category V: mains operated equipment containing electronic control circuitry with a highest clock frequency greater than 200 MHz.</p>
<p>Clock frequency: Fundamental frequency of any signal used in the device, excluding those which are solely used inside integrated circuits (IC).</p>	

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Operating mode	Operating mode description	Used for testing	
		Emission	Immunity
1	The EUT is operating maximum mode.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	The EUT is operating middle mode.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
<u>Supplemental information:</u>			

2.2 Port(s) of the EUT

Port name and description	Connected to / Termination	Cable		
		Length used during test [m]	Attached during test	Shielded
AC mains input port	AC input	1.5	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<u>Supplemental information:</u>				

2.3 Support / Auxiliary equipment / unit / software for the EUT

The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
N/A			
<u>Supplemental information:</u>			

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
EN IEC 55014-1	2021 ¹⁾	Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission.
EN 55016-2-1 +A1	2014 2017	Methods of measurement of disturbances and immunity - Conducted disturbance measurements.
EN 55016-2-2	2011	Methods of measurement of disturbances and immunity – Measurement of disturbance power.
EN 55016-2-3 +A1	2017 2019	Methods of measurement of disturbances and immunity - Radiated disturbance measurements.
EN IEC 61000-3-2 A1	2019 ¹⁾ 2021 ¹⁾	Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
EN 61000-3-3 A1 A2	2013 2019 ¹⁾ 2021	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.
EN IEC 55014-2	2021 ¹⁾	Requirements for household appliances, electric tools and similar apparatus – Part 2: Immunity – Product family standard.
EN 61000-4-2	2009	Electrostatic discharge immunity test.
EN 61000-4-3 +A1 +A2	2006 2008 2010	Radiated, radio-frequency, electromagnetic field immunity test.
EN 61000-4-4	2012	Electrical fast transient/burst immunity test.
EN 61000-4-5 +A1	2014 2017	Surge immunity test.
EN 61000-4-6	2014	Immunity to conducted disturbances, induced by radio-frequency fields.
EN IEC 61000-4-11	2020	Voltage dips, short interruptions and voltage variations immunity tests.

¹⁾ Not harmonized yet.

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

No deviation.

3.3 Overview of results

EMISSION TESTS – EN IEC 55014-1			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Conducted disturbance voltage at mains terminals (150 KHz – 30 MHz)	EN 55016-2-1	N/A	See 1)
Conducted disturbance voltage at load terminals (150 KHz – 30 MHz)	EN 55016-2-1	N/A	See 2)
Conducted disturbance voltage at additional terminals (150 KHz – 30 MHz)	EN 55016-2-1	N/A	See 2)
Disturbance power (30 MHz to 300 MHz)	EN 55016-2-2	N/A	See 1)
Radiated electromagnetic disturbances (30 - 1000 MHz)	EN 55016-2-3	PASS	---
Discontinuous disturbance (clicks) on AC power leads	EN 55014-1	N/A	See 1)
<u>Supplementary information:</u>			
1) Not applicable because no test requirements have been specified for battery powered apparatus.			
2) The test is not applicable as the EUT does not have wired network ports.			

EMISSION TESTS –EN IEC 61000-3-2, EN 61000-3-3			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Harmonic current emissions	EN IEC 61000-3-2	PASS	---
Voltage changes, voltage fluctuations and flicker	EN 61000-3-3	PASS	---
<u>Supplementary information:</u>			
1) The EUT is regarded as an “Equipment with rated power of ≤ 75 W”. According to “Clause 7, Figure 1 - Flowchart for determining conformity” the EUT is deemed to comply with the requirements of the EN 61000-3-2 standard.			
2) The EUT is regarded as a professional equipment with a total rated power greater than 1 KW. The test is not applicable.			

IMMUNITY TESTS – EN IEC 55014-2			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Electrostatic discharge	EN 61000-4-2	PASS	---
Radio-frequency electromagnetic fields	EN 61000-4-3	N/A	---
Fast transients	EN 61000-4-4	PASS	See 1)
Surge transient	EN 61000-4-5	PASS	See 1)
Injected currents (radio-frequency common mode)	EN 61000-4-6	PASS	See 1)
Voltage dips and short interruptions	EN IEC 61000-4-11	PASS	See 1)
<u>Supplementary information:</u>			
1) Not applicable because no test requirements have been specified for battery powered apparatus.			

4 EMISSION TEST RESULTS

4.1 Conducted disturbance voltage - Mains	VERDICT: PASS
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Standard	EN IEC 55014-1
Basic standard	EN 55016-2-1

Limits

Frequency range [MHz]	Limit: QP [dB(μ V) ¹⁾	Limit: AV [dB(μ V) ¹⁾	IF BW	Detector(s)
0,15 - 0,50	66 - 59 ²⁾	59 - 49 ²⁾	9 KHz	QP, CAV
0,50 - 5,0	59	49	9 KHz	QP, CAV
5,0 - 30	64	54	9 KHz	QP, CAV

¹⁾ At the transition frequency, the lower limit applies.

²⁾ The limit decreases linearly with the logarithm of the frequency.

<input type="checkbox"/>	Rated power below 700 W	Limits as above
<input type="checkbox"/>	Rated power between 700 and 1000 W	Limits +4 dB
<input checked="" type="checkbox"/>	Rated power above 1000 W	Limits +10 dB

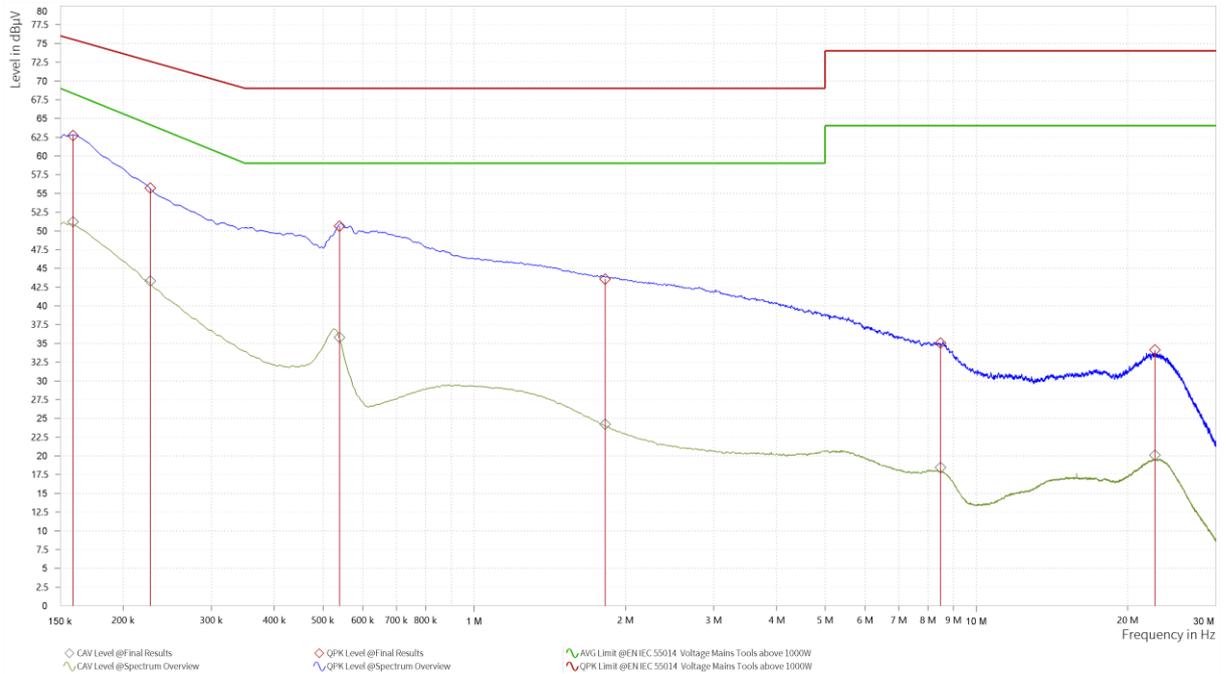
Performed measurements

Scan range (0,9 - 1,1 U_N)	<input checked="" type="checkbox"/> 220 – 240 V _{AC}	<input checked="" type="checkbox"/> 110 – 120 V _{AC}	<input type="checkbox"/> 120 V _{AC}
Tested terminal(s) / port	<input checked="" type="checkbox"/> AC mains input power	<input checked="" type="checkbox"/> N	<input checked="" type="checkbox"/> L1
	<input type="checkbox"/> DC mains input power	<input type="checkbox"/> Positive (+)	<input type="checkbox"/> L2
			<input type="checkbox"/> L3
			<input type="checkbox"/> Negative (-)
Voltage – Mains [V]	230 Vac, 120 Vac		
Frequency – Mains [Hz]	50 Hz		
Test method applied	<input checked="" type="checkbox"/>	Artificial mains network	
	<input type="checkbox"/>	Voltage probe	
Test setup	<input checked="" type="checkbox"/>	Table top	<input checked="" type="checkbox"/> Artificial hand applied
	<input type="checkbox"/>	Floor standing	<input type="checkbox"/> Other:
	Refer to the Annex 3 for test setup photo(s).		
Operating mode(s) used	Mode 1,2		
Remark	The disturbance level was investigated at all operating modes. The worst case results was reported.		

See next page.

Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 1 / 230 Vac / 50 Hz

Line:

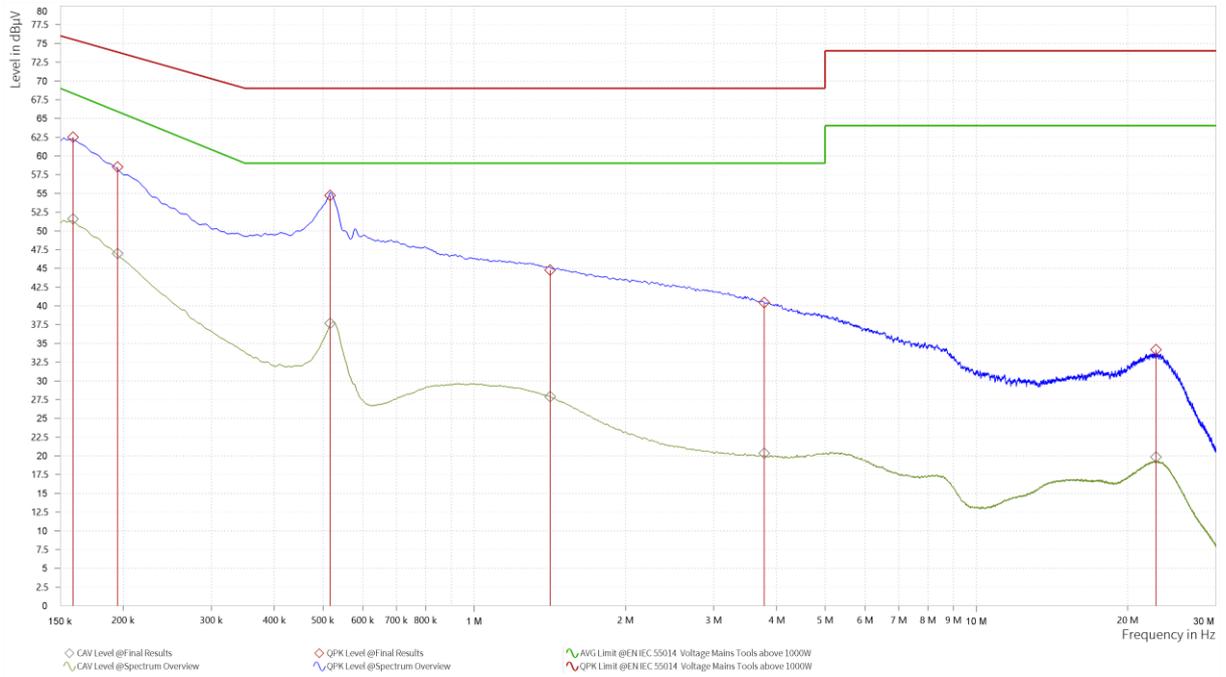


Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.159	62.72	75.52	12.80	51.18	68.31	17.13	9.84	L1
0.227	55.71	72.60	16.88	43.30	64.14	20.83	9.79	L1
0.539	50.63	69.00	18.37	35.79	59.00	23.21	9.77	L1
1.822	43.53	69.00	25.47	24.20	59.00	34.80	9.77	L1
8.484	35.03	74.00	38.97	18.43	64.00	45.57	10.05	L1
22.666	34.09	74.00	39.91	20.07	64.00	43.93	10.26	L1

Measurement data	Port under test	AC input power
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Operating mode / voltage / frequency used during the test	Mode 1 / 230 Vac / 50 Hz
---	--------------------------

Neutral:

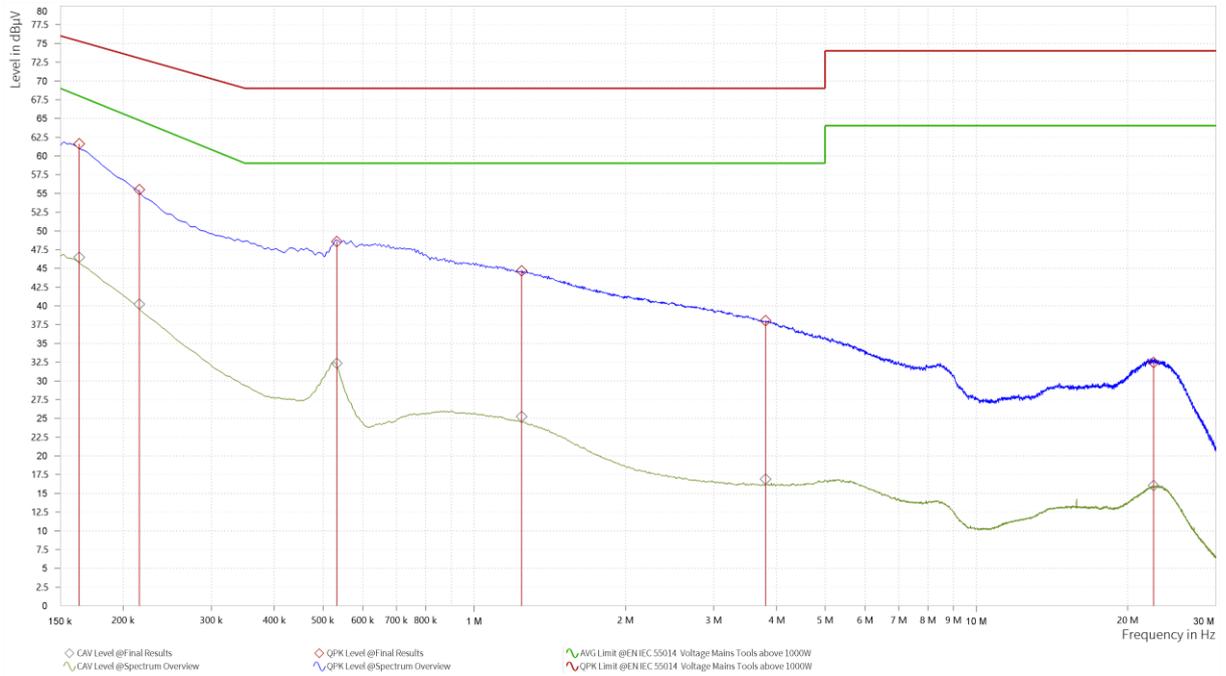


Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.159	62.48	75.52	13.03	51.59	68.31	16.73	9.92	N
0.195	58.52	73.83	15.31	46.95	65.90	18.95	9.88	N
0.517	54.71	69.00	14.29	37.67	59.00	21.33	9.87	N
1.417	44.75	69.00	24.25	27.88	59.00	31.12	9.84	N
3.782	40.43	69.00	28.57	20.33	59.00	38.67	9.91	N
22.785	34.15	74.00	39.85	19.80	64.00	44.20	10.29	N

Remark ---

Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 2 / 230 Vac / 50 Hz

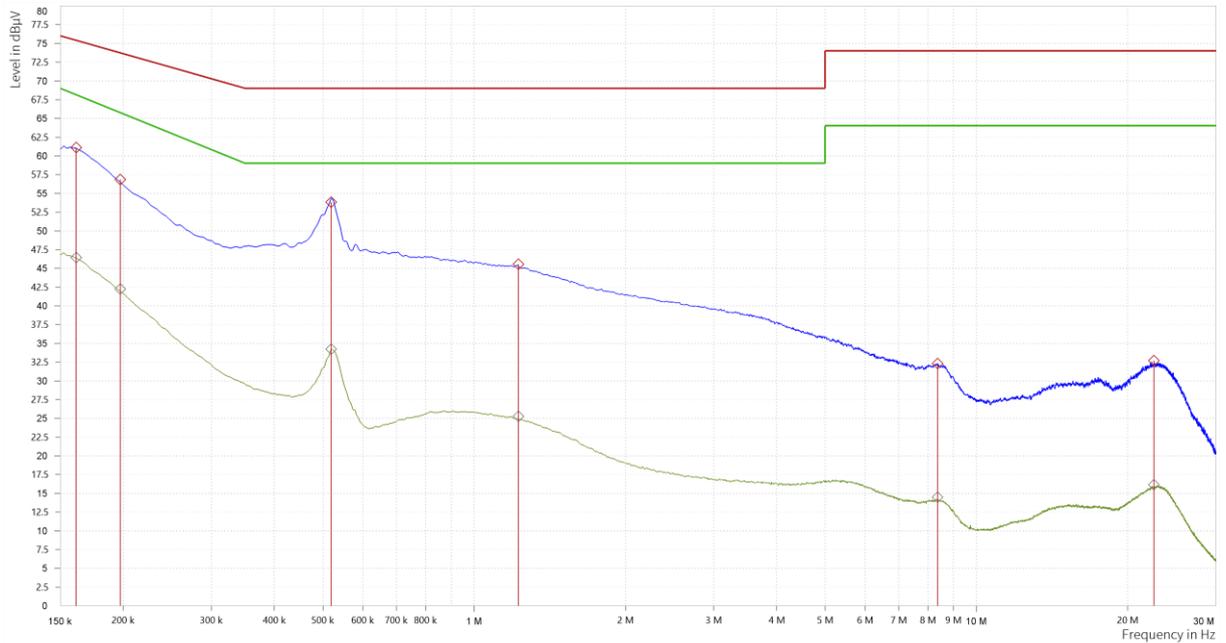
Line:



Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.164	61.61	75.29	13.67	46.45	67.98	21.53	9.83	L1
0.215	55.50	73.02	17.52	40.21	64.74	24.53	9.79	L1
0.533	48.55	69.00	20.45	32.34	59.00	26.66	9.77	L1
1.244	44.67	69.00	24.33	25.23	59.00	33.77	9.71	L1
3.804	38.02	69.00	30.98	16.86	59.00	42.14	9.95	L1
22.538	32.42	74.00	41.58	16.03	64.00	47.97	10.26	L1

Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 2 / 230 Vac / 50 Hz

Neutral:



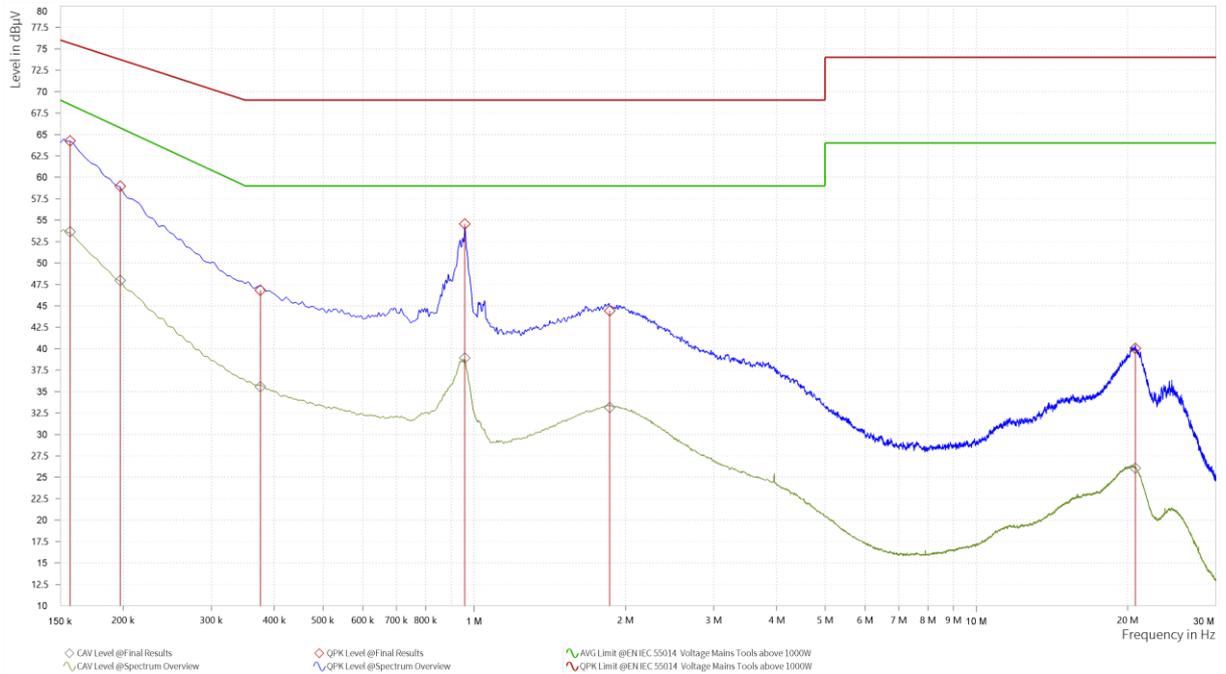
◇ CAV Level @Final Results
 ◇ QPK Level @Final Results
 ~ AVG Limit @EN IEC 55014 Voltage Mains Tools above 1000W
~ QPK Limit @EN IEC 55014 Voltage Mains Tools above 1000W
^ CAV Level @Spectrum Overview
 ^ QPK Level @Spectrum Overview

Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.161	61.11	75.40	14.29	46.42	68.15	21.73	9.92	N
0.197	56.85	73.74	16.89	42.24	65.77	23.53	9.87	N
0.519	53.82	69.00	15.18	34.20	59.00	24.80	9.87	N
1.226	45.55	69.00	23.45	25.25	59.00	33.75	9.83	N
8.372	32.29	74.00	41.71	14.47	64.00	49.53	9.97	N
22.562	32.68	74.00	41.32	16.13	64.00	47.87	10.29	N

Remark ---

Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 1 / 120 Vac / 50 Hz

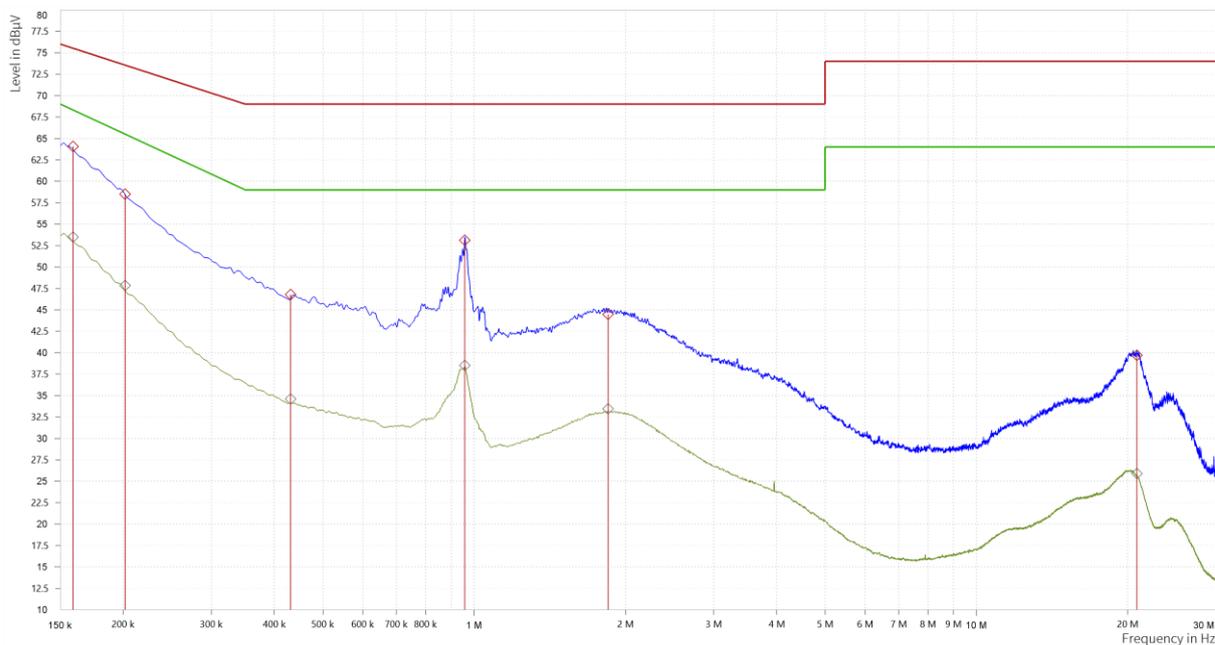
Line:



Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.157	64.24	75.64	11.39	53.63	68.48	14.85	9.84	L1
0.197	58.96	73.74	14.78	47.96	65.77	17.81	9.79	L1
0.375	46.82	69.00	22.18	35.56	59.00	23.44	9.78	L1
0.958	54.53	69.00	14.47	38.92	59.00	20.08	9.70	L1
1.860	44.40	69.00	24.60	33.13	59.00	25.87	9.77	L1
20.713	40.02	74.00	33.98	26.02	64.00	37.98	10.23	L1

Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 1 / 120 Vac / 50 Hz

Neutral:



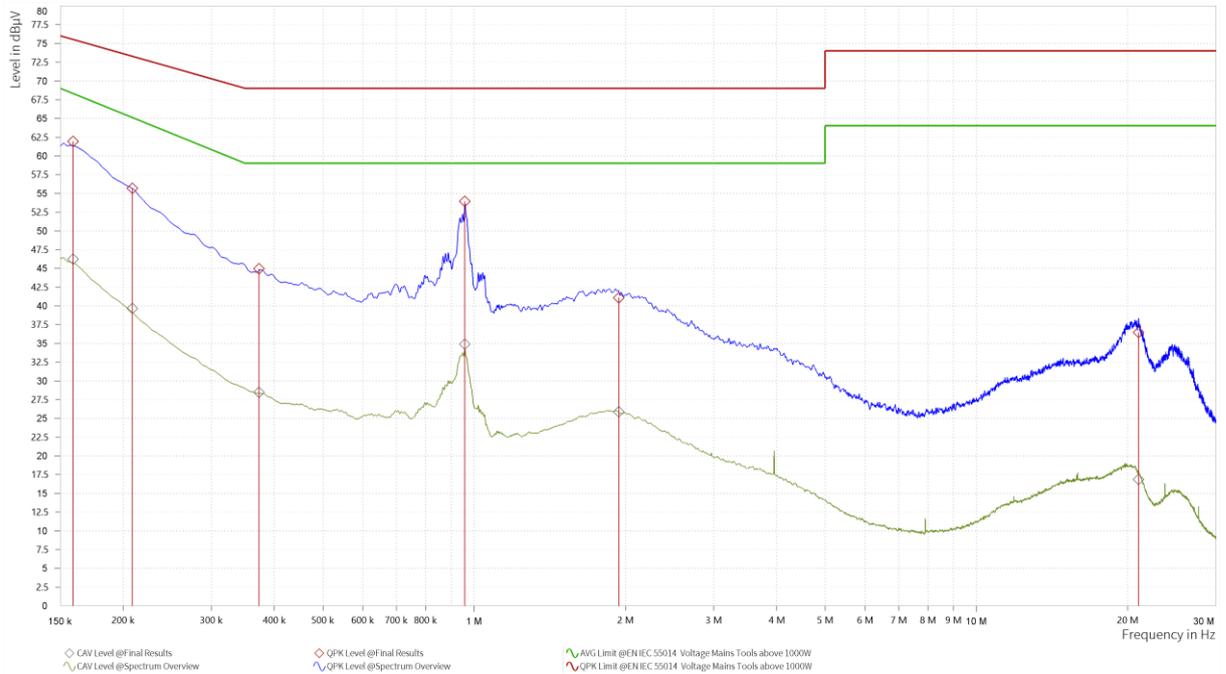
◇ CAV Level @Final Results
 ◇ QPK Level @Final Results
 ~ AVG Limit @EN IEC 55014 Voltage Mains Tools above 1000W
~ CAV Level @Spectrum Overview
 ~ QPK Level @Spectrum Overview
 ~ QPK Limit @EN IEC 55014 Voltage Mains Tools above 1000W

Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.159	64.04	75.52	11.48	53.50	68.31	14.82	9.92	N
0.202	58.48	73.55	15.07	47.82	65.50	17.68	9.87	N
0.431	46.78	69.00	22.22	34.58	59.00	24.42	9.87	N
0.958	53.12	69.00	15.88	38.50	59.00	20.50	9.82	N
1.847	44.46	69.00	24.54	33.43	59.00	25.57	9.87	N
20.877	39.68	74.00	34.32	25.90	64.00	38.10	10.25	N

Remark	---
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Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 2 / 120 Vac / 50 Hz

Line:

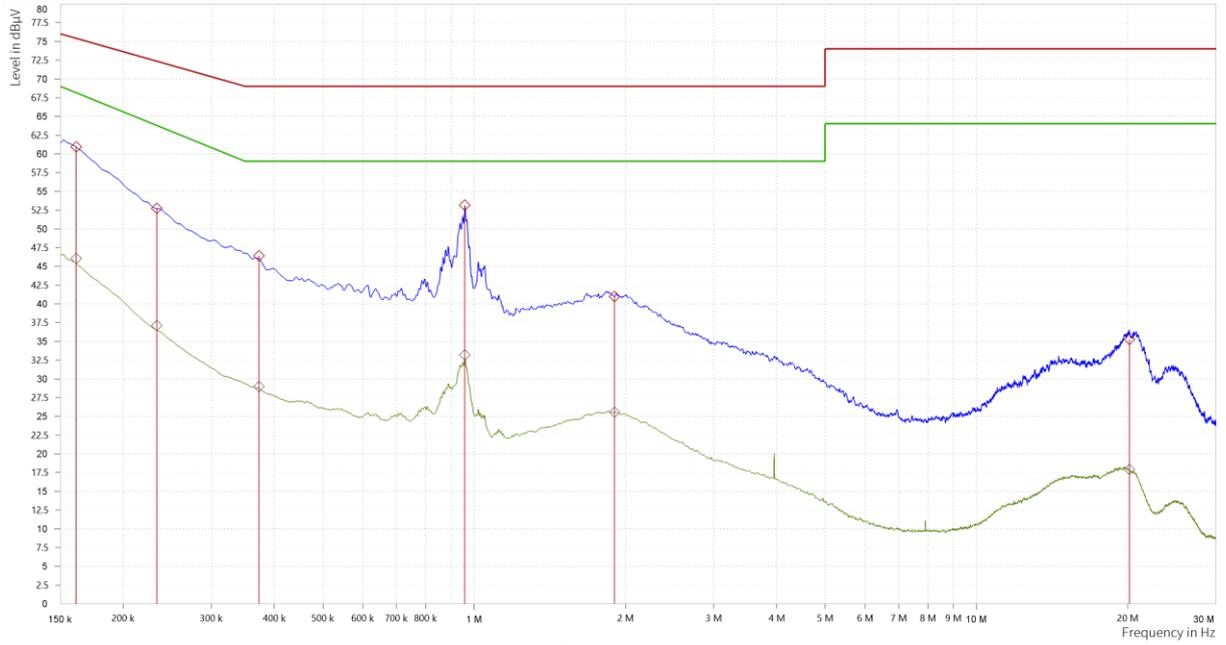


Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.159	61.91	75.52	13.61	46.21	68.31	22.10	9.84	L1
0.209	55.67	73.28	17.61	39.64	65.11	25.47	9.79	L1
0.373	44.93	69.00	24.07	28.47	59.00	30.53	9.78	L1
0.958	53.91	69.00	15.09	34.89	59.00	24.11	9.70	L1
1.941	41.06	69.00	27.94	25.85	59.00	33.15	9.78	L1
21.017	36.46	74.00	37.54	16.85	64.00	47.15	10.23	L1

Measurement data	Port under test	AC input power
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Operating mode / voltage / frequency used during the test	Mode 2 / 120 Vac / 50 Hz
---	--------------------------

Neutral:



◇ CAV Level @Final Results
 ◇ QPK Level @Final Results
 ◇ AVG Limit @EN IEC 55014 Voltage Mains Tools above 1000W
◇ QPK Limit @Spectrum Overview
 ◇ QPK Limit @EN IEC 55014 Voltage Mains Tools above 1000W

Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line
0.161	60.93	75.40	14.47	46.04	68.15	22.11	9.92	N
0.233	52.70	72.35	19.65	37.10	63.79	26.69	9.87	N
0.373	46.40	69.00	22.60	28.97	59.00	30.03	9.87	N
0.958	53.13	69.00	15.87	33.17	59.00	25.83	9.82	N
1.903	40.95	69.00	28.05	25.53	59.00	33.47	9.87	N
20.153	35.24	74.00	38.76	17.91	64.00	46.09	10.22	N

Remark	---
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4.2 Disturbance power (30 MHz – 300 MHz)	VERDICT: PASS
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Standard	EN IEC 55014-1
Basic standard	EN 55016-2-2

Limits

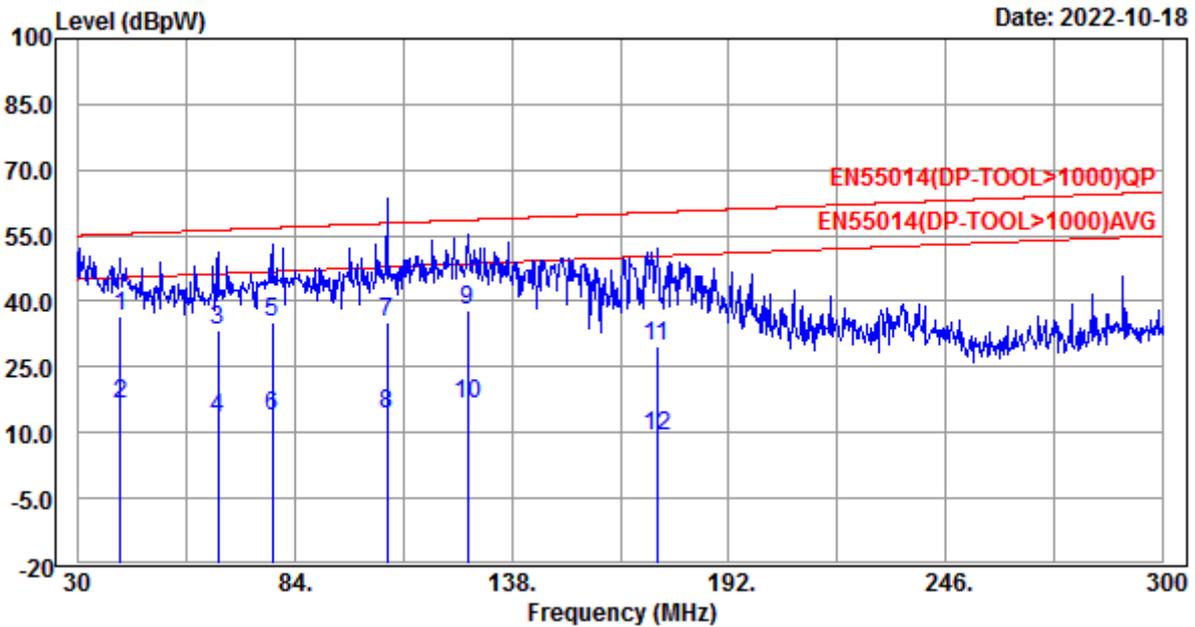
Frequency range [MHz]	Limit: QP [dB(pW)]	Limit: AV [dB(pW)]	IF BW	Detector(s)
30 - 300	45 – 55 ¹⁾	35 – 45 ¹⁾	120 KHz	QP, CAV
Margin				
200 - 300	0 – 10 ¹⁾	---	120 KHz	QP, CAV
¹⁾ The limit increases linearly with the frequency.				
<input type="checkbox"/>	Rated power below 700 W	Limits as above		
<input type="checkbox"/>	Rated power between 700 and 1000 W	Limits +4 dB		
<input checked="" type="checkbox"/>	Rated power above 1000 W	Limits +10 dB		

Performed measurements

Port(s) under test						
<input checked="" type="checkbox"/>	AC mains input power	<input type="checkbox"/>	Load	<input type="checkbox"/>	Control	
<input type="checkbox"/>	Other:	<input type="checkbox"/>	Other:	<input type="checkbox"/>	Other:	
Scan range (0,9 - 1,1 U _N)	<input checked="" type="checkbox"/>	220 – 240 V _{AC}	<input checked="" type="checkbox"/>	110-120 V _{AC}	<input type="checkbox"/>	120 V _{AC}
Voltage – Mains [V]	230 Vac, 120 Vac					
Frequency – Mains [Hz]	50 Hz					
Test setup	<input checked="" type="checkbox"/>	Table top	<input type="checkbox"/>	Floor standing		
	<input type="checkbox"/>	Other:				
Refer to the Annex 3 for test setup photo(s).						
Conditions for exemption from measurements above 300 MHz	<input checked="" type="checkbox"/>	“Limits” reduced by “Margin” applied and passed				
	<input checked="" type="checkbox"/>	Maximum clock frequency < 30 MHz				
Operating mode(s) used	Mode 1,2					
Remark	The disturbance level was investigated at all operating modes. The worst case results was reported.					

See next page.

Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 1 / 230 Vac / 50 Hz

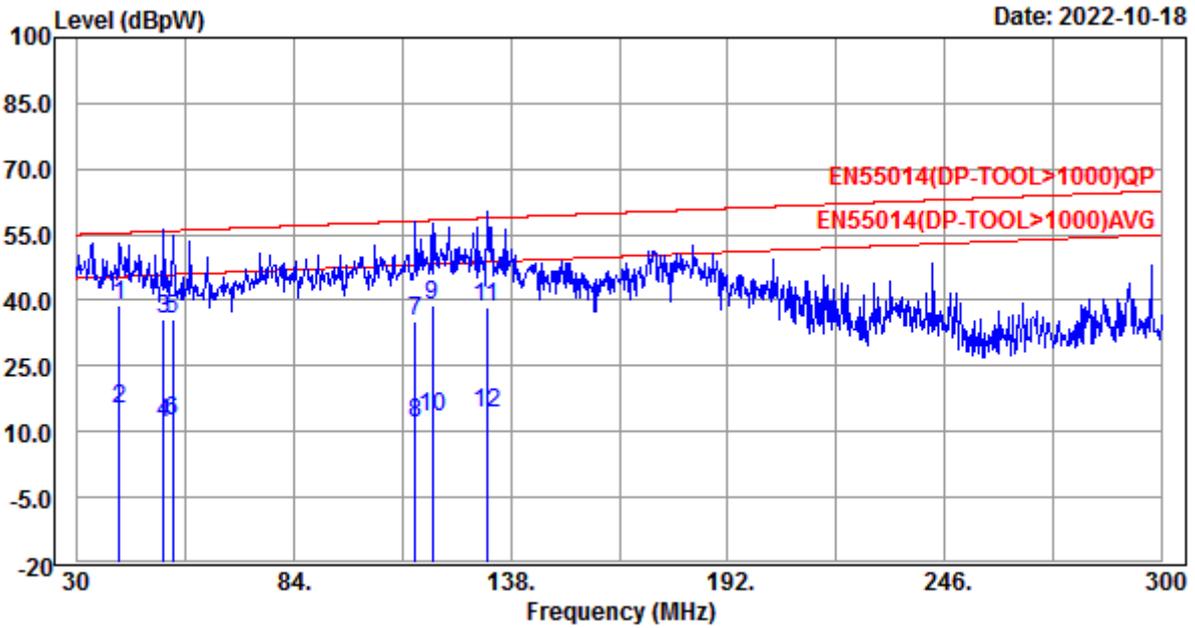


Item	Freq. MHz	Reading Level dBpW	C.F dB	Emission Level dBpW	Limit dBpW	Over Limit dB	Detector
1	40.80	9.41	27.28	36.69	55.41	-18.72	QP
2	40.80	-10.59	27.28	16.69	45.41	-28.72	Average
3	65.10	10.01	23.58	33.59	56.31	-22.72	QP
4	65.10	-10.19	23.58	13.39	46.31	-32.92	Average
5	78.60	10.01	25.00	35.01	56.81	-21.80	QP
6	78.60	-11.19	25.00	13.81	46.81	-33.00	Average
7	106.95	11.61	23.62	35.23	57.86	-22.63	QP
8	106.95	-9.39	23.62	14.23	47.86	-33.63	Average
9	127.20	14.30	23.62	37.92	58.61	-20.69	QP
10	127.20	-7.30	23.62	16.32	48.61	-32.29	Average
11	174.18	6.01	23.74	29.75	60.35	-30.60	QP
12	174.18	-14.49	23.74	9.25	50.35	-41.10	Average

Remarks: 1. C.F (Correction Factor) = Clamp factor + Cable loss+ATT..
 2. Emission Level = Reading Level + C.F (Correction Factor).

Remark	
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Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 2 / 230 Vac / 50 Hz

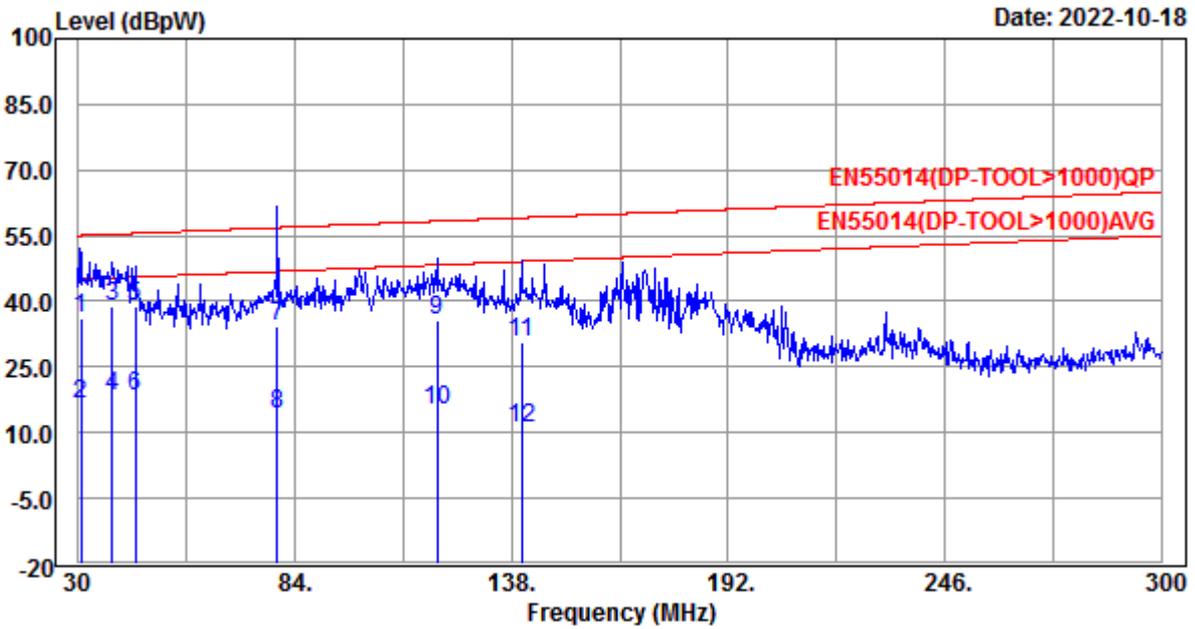


Item	Freq. MHz	Reading Level dBpW	C.F dB	Emission Level dBpW	Limit dBpW	Over Limit dB	Detector
1	40.80	11.41	27.28	38.69	55.41	-16.72	QP
2	40.80	-12.09	27.28	15.19	45.41	-30.22	Average
3	51.87	11.21	24.40	35.61	55.82	-20.21	QP
4	51.87	-12.59	24.40	11.81	45.82	-34.01	Average
5	54.03	11.21	24.28	35.49	55.90	-20.41	QP
6	54.03	-11.89	24.28	12.39	45.90	-33.51	Average
7	114.24	12.21	23.08	35.29	58.13	-22.84	QP
8	114.24	-11.29	23.08	11.79	48.13	-36.34	Average
9	118.56	15.11	23.63	38.74	58.29	-19.55	QP
10	118.56	-10.49	23.63	13.14	48.29	-35.15	Average
11	132.06	14.71	23.66	38.37	58.79	-20.42	QP
12	132.06	-9.39	23.66	14.27	48.79	-34.52	Average

Remarks:1. C.F (Correction Factor) = Clamp factor + Cable loss+ATT..
 2. Emission Level = Reading Level + C.F (Correction Factor).

Remark	
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Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 1 / 120 Vac / 50 Hz

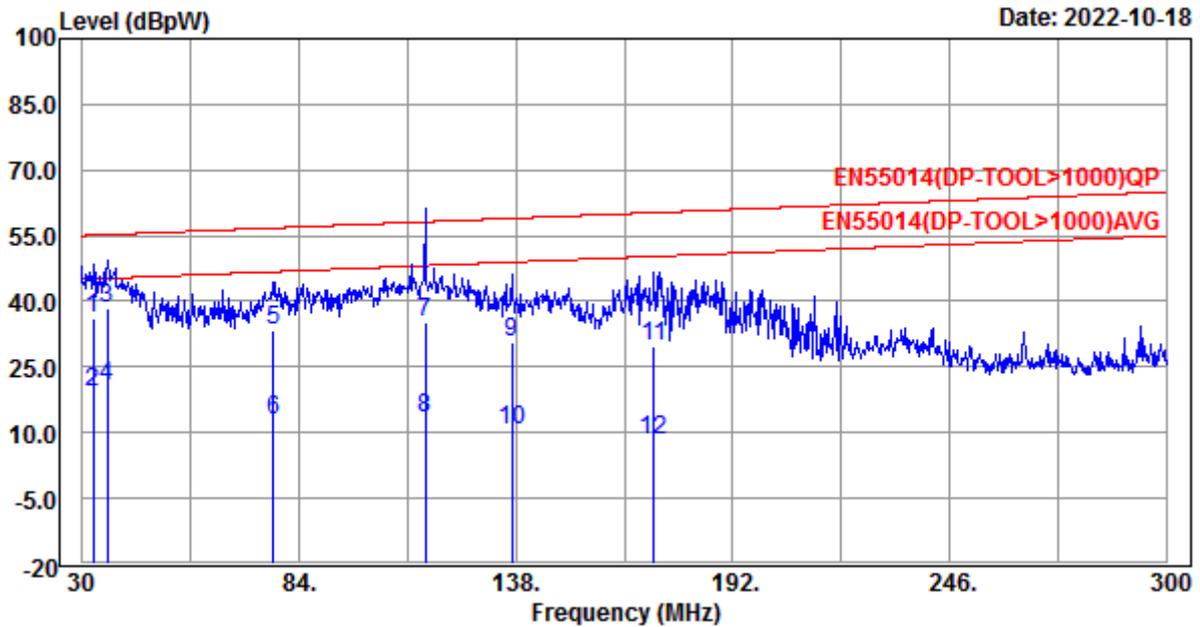


Item	Freq. MHz	Reading Level dBpW	C.F dB	Emission Level dBpW	Limit dBpW	Over Limit dB	Detector
1	31.08	8.60	27.54	36.14	55.05	-18.91	QP
2	31.08	-11.00	27.54	16.54	45.05	-28.51	Average
3	38.64	11.31	27.36	38.67	55.33	-16.66	QP
4	38.64	-9.09	27.36	18.27	45.33	-27.06	Average
5	44.58	11.81	27.00	38.81	55.55	-16.74	QP
6	44.58	-8.89	27.00	18.11	45.55	-27.44	Average
7	79.68	9.11	25.20	34.31	56.85	-22.54	QP
8	79.68	-10.89	25.20	14.31	46.85	-32.54	Average
9	119.64	11.71	23.78	35.49	58.33	-22.84	QP
10	119.64	-8.59	23.78	15.19	48.33	-33.14	Average
11	140.70	6.81	23.82	30.63	59.11	-28.48	QP
12	140.70	-12.69	23.82	11.13	49.11	-37.98	Average

Remarks: 1. C.F (Correction Factor) = Clamp factor + Cable loss+ATT..
 2. Emission Level = Reading Level + C.F (Correction Factor).

Remark	
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Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 2 / 120 Vac / 50 Hz



Item	Freq. MHz	Reading Level dBpW	C.F dB	Emission Level dBpW	Limit dBpW	Over Limit dB	Detector
1	32.97	8.61	27.47	36.08	55.12	-19.04	QP
2	32.97	-8.29	27.47	19.18	45.12	-25.94	Average
3	36.48	11.21	27.39	38.60	55.25	-16.65	QP
4	36.48	-6.79	27.39	20.60	45.25	-24.65	Average
5	77.79	8.51	24.85	33.36	56.78	-23.42	QP
6	77.79	-11.89	24.85	12.96	46.78	-33.82	Average
7	115.59	11.91	23.20	35.11	58.18	-23.07	QP
8	115.59	-9.69	23.20	13.51	48.18	-34.67	Average
9	137.19	6.81	23.79	30.60	58.98	-28.38	QP
10	137.19	-13.39	23.79	10.40	48.98	-38.58	Average
11	172.29	6.22	23.31	29.53	60.28	-30.75	QP
12	172.29	-15.18	23.31	8.13	50.28	-42.15	Average

Remarks: 1. C.F (Correction Factor) = Clamp factor + Cable loss+ATT..
 2. Emission Level = Reading Level + C.F (Correction Factor).

Remark	
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4.3 Harmonic current emissions	VERDICT: PASS
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Standard	EN IEC 61000-3-2	
Exclusions (For these categories of equipment, limits are not specified in the EN 61000-3-2 standard)	<input type="checkbox"/>	Arc welding equipment intended for professional use.
	<input type="checkbox"/>	System(s) with nominal voltage(s) less than 220 V _{AC} (line-to-neutral).
	<input type="checkbox"/>	Equipment with rated power of ≤ 75 W (other than lighting equipment).
	<input type="checkbox"/>	Professional equipment with total rated power > 1 kW.
	<input type="checkbox"/>	Symmetrically controlled heating elements with a rated power ≤ 200 W.
	<input type="checkbox"/>	Independent phase control dimmers for incandescent lamps with rated power ≤ 1 kW..

Classification			
<input type="checkbox"/>	Class A	All apparatus not classified as Class B, C or D	
<input checked="" type="checkbox"/>	Class B	Portable tools, arc welding equipment which is not professional equipment.	
<input type="checkbox"/>	Class C	<input type="checkbox"/>	Lighting equipment with active input power > 25 W
		<input type="checkbox"/>	Lighting equipment with active input power ≥ 5W, and ≤ 25 W (First requirement, Table 3 column 2)
		<input type="checkbox"/>	Lighting equipment with active input power ≤ 25 W (Second requirement)
<input type="checkbox"/>	Class D	Personal computers, television receivers, refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).	

Performed measurements

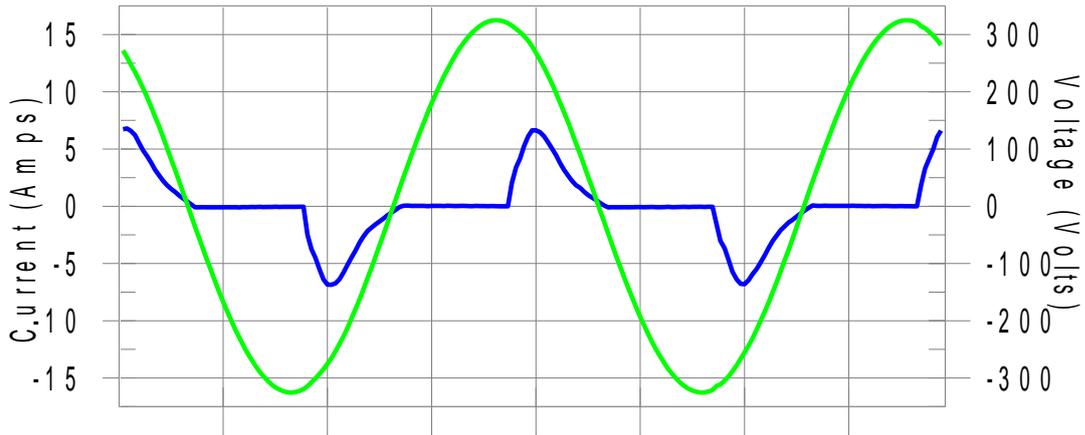
Port under test	AC mains power input					
Voltage – Mains [V]	230 Vac					
Frequency – Mains [Hz]	50Hz					
Observation period	<input type="checkbox"/>	6.5 min.	<input checked="" type="checkbox"/>	2.5 min.	<input type="checkbox"/>	Other:
Version of measurement instrument standard used EN / IEC61000-4-7 (Cl. 7)	<input checked="" type="checkbox"/>	EN 61000-4-7:2002 + AM1:2009 (IEC 61000-4-7:2002+AM1:2008)				
	<input type="checkbox"/>	EN 61000-4-7:1991				
Control principle used in the EUT	<input checked="" type="checkbox"/>	Comply with the requirements of the Clause 6.1 (EN / IEC 61000-3-2).				
	<input type="checkbox"/>	Not comply with the requirements of the Clause 6.1 (EN / IEC 61000-3-2).				
Operating mode(s) used	Mode 1					
Remark	---					

See next page.

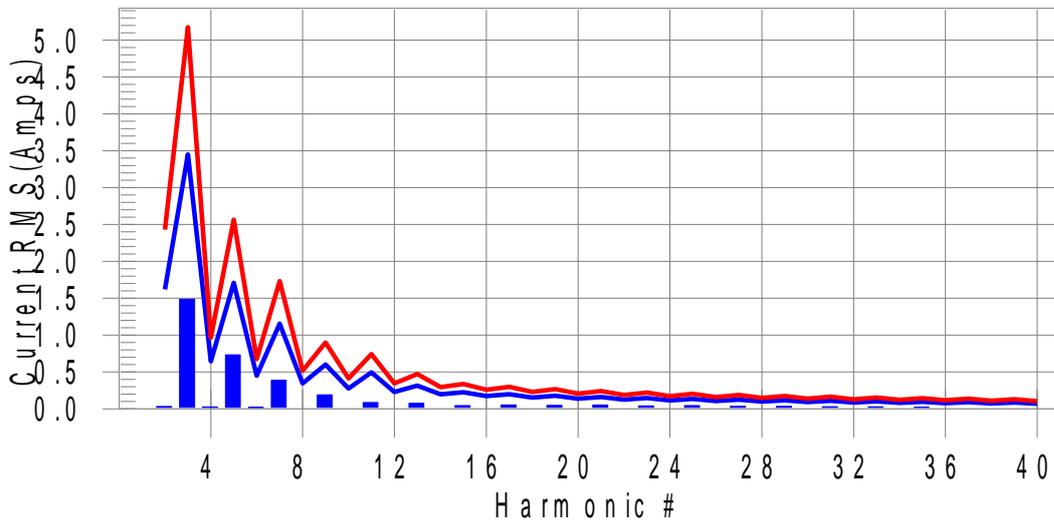
Measurement data	Port under test	AC input power
Operating mode / voltage / frequency used during the test		Mode 1 / 230 Vac / 50 Hz

Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class B limit line **European Limits**



Test result: Pass **Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit**

Measurement data		Port under test		AC input power			
Test Result: Pass Source qualification: Normal THC(A): 1.723 I-THD(%): 78.3 POHC(A): 0.108 POHC Limit(A): 0.377							
Highest parameter values during test:							
V_RMS (Volts): 230.01		Frequency(Hz): 50.00		I_RMS (Amps): 2.848		Crest Factor: 2.600	
I_Peak (Amps): 7.259		Power (Watts): 379.9		Power Factor: 0.587			
I_Fund (Amps): 2.202							
Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.032	1.620	2.0	0.035	2.430	1.4	Pass
3	1.486	3.450	43.1	1.520	5.175	29.4	Pass
4	0.026	0.645	4.1	0.029	0.968	3.0	Pass
5	0.733	1.710	42.9	0.745	2.565	29.1	Pass
6	0.021	0.450	4.7	0.023	0.675	3.4	Pass
7	0.388	1.155	33.6	0.395	1.733	22.8	Pass
8	0.018	0.345	5.4	0.020	0.518	3.9	Pass
9	0.191	0.600	31.9	0.195	0.900	21.7	Pass
10	0.015	0.276	N/A	0.017	0.414	N/A	Pass
11	0.086	0.495	17.4	0.091	0.743	12.3	Pass
12	0.011	0.230	N/A	0.014	0.345	N/A	Pass
13	0.076	0.315	24.0	0.081	0.473	17.2	Pass
14	0.009	0.197	N/A	0.011	0.295	N/A	Pass
15	0.045	0.225	19.8	0.049	0.338	14.6	Pass
16	0.008	0.173	N/A	0.010	0.260	N/A	Pass
17	0.054	0.199	27.2	0.059	0.299	19.8	Pass
18	0.008	0.153	N/A	0.010	0.230	N/A	Pass
19	0.047	0.178	26.4	0.050	0.267	18.8	Pass
20	0.008	0.138	N/A	0.011	0.207	N/A	Pass
21	0.051	0.161	32.1	0.055	0.241	22.8	Pass
22	0.008	0.125	N/A	0.009	0.188	N/A	Pass
23	0.041	0.147	27.7	0.043	0.221	19.5	Pass
24	0.008	0.115	N/A	0.009	0.173	N/A	Pass
25	0.045	0.135	33.4	0.047	0.203	23.0	Pass
26	0.008	0.106	N/A	0.009	0.159	N/A	Pass
27	0.035	0.125	28.1	0.037	0.188	19.5	Pass
28	0.007	0.099	N/A	0.009	0.149	N/A	Pass
29	0.035	0.116	30.5	0.036	0.174	20.7	Pass
30	0.007	0.092	N/A	0.009	0.138	N/A	Pass
31	0.028	0.110	26.0	0.030	0.164	18.0	Pass
32	0.007	0.086	N/A	0.010	0.129	N/A	Pass
33	0.027	0.102	26.4	0.028	0.153	18.3	Pass
34	0.007	0.081	N/A	0.010	0.122	N/A	Pass
35	0.022	0.096	23.1	0.023	0.144	16.1	Pass
36	0.006	0.077	N/A	0.009	0.116	N/A	Pass
37	0.020	0.092	21.7	0.022	0.137	16.1	Pass
38	0.005	0.073	N/A	0.009	0.110	N/A	Pass
39	0.018	0.087	20.2	0.018	0.131	14.0	Pass
40	0.005	0.069	N/A	0.006	0.104	N/A	Pass
Remark	---						

4.4 Voltage changes, voltage fluctuations and flicker	VERDICT: PASS
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Standard	EN 61000-3-3
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Limits

P _{ST} (Short term flicker)	<input checked="" type="checkbox"/>	≤ 1	<input type="checkbox"/>	Not Applicable
P _{LT} (Long term flicker)	<input type="checkbox"/>	≤ 0,65	<input checked="" type="checkbox"/>	Not Applicable
d _c (Relative Voltage change)	<input checked="" type="checkbox"/>	≤ 3,3%	<input type="checkbox"/>	Not Applicable
T _{MAX} (Maximum time duration)	<input checked="" type="checkbox"/>	500ms	<input type="checkbox"/>	Not Applicable
d _{MAX} (Max. voltage change)	<input type="checkbox"/>	≤ 4%	<input type="checkbox"/>	6%
	<input checked="" type="checkbox"/>	7%	<input type="checkbox"/>	Not Applicable
<u>Supplemental information:</u>				

Performed measurements

Reason for not performing the measurement(s)	<input type="checkbox"/>	Tests are not necessary because the EUT is unlikely to produce significant voltage fluctuations or flicker (clause 6.1).				
Port under test	AC Mains power input					
Voltage – Mains [V]	230 Vac					
Frequency – Mains [Hz]	50Hz					
Test method	<input checked="" type="checkbox"/>	Flickermeter according EN / IEC 61000-4-15:2011				
	<input type="checkbox"/>	Simulation (Clause 4.2.3 of EN / IEC 61000-3-3)				
	<input type="checkbox"/>	Analytical method (Clause 4.2.4 of EN / IEC 61000-3-3)				
	<input type="checkbox"/>	Use of P _{st} = 1 curve (Clause 4.2.5 of EN / IEC 61000-3-3)				
Observation period	<input checked="" type="checkbox"/>	10 min.	<input type="checkbox"/>	120 min.	<input type="checkbox"/>	Other:
	<input checked="" type="checkbox"/>	24 times switching for d _{max} according to Annex B				
Operating mode(s) used	Mode 1					
Remark	---					

See next page.

Measurement data	Port under test	AC input power
Operating mode used during the test	Mode 1 / 230 Vac / 50 Hz	
Results		
Tmax (dt > 3,3%)	0 ms	
Maximum relative voltage change d_{MAX}	0.83%	
Relative Voltage change d_c	0.75%	
Short term flicker P_{ST}	0.288	
Long term flicker P_{LT}	Not applicable	
Remark	---	

5 IMMUNITY TEST RESULTS

5.1 Performance (Compliance) criteria

[According to EN IEC 55014-2 (CISPR 14-2)]

Performance criteria A : The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and from what the user may reasonably expect from the apparatus if used as intended.

Performance criteria B : The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer when the apparatus is used as intended. During the test, degradation of performance is allowed however 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 then either of these may be derived from the product description and documentation and from what the user may reasonable expect from the apparatus if used as intended.

Performance criteria C : Temporary loss of function is allowed provided the function is self- recoverable or can be restored by the operation of the controls or by any operation specified in the instruction for use.

5.1.1 Performance criteria related to immunity tests

Immunity test	Performance criteria
Electrostatic discharge	B
Radio-frequency electromagnetic fields	A

5.1.2 Manufacturer defined performance criteria

Not provided.

5.2 Monitored – Checked Functions / Parameters

During the immunity tests the following functions of the EUT has/have been monitored/checked.

<input type="checkbox"/>	Motor speed	<input type="checkbox"/>	Display data
<input type="checkbox"/>	Switching	<input type="checkbox"/>	Data storage
<input type="checkbox"/>	Standby mode	<input type="checkbox"/>	Sensor functions
<input type="checkbox"/>	Temperature	<input type="checkbox"/>	Audible signals
<input type="checkbox"/>	Power consumption	<input checked="" type="checkbox"/>	Others : Functional status
<input type="checkbox"/>	AC mains input current	<input type="checkbox"/>	Others :
<input type="checkbox"/>	Timing	<input type="checkbox"/>	Others :
<input type="checkbox"/>	Illumination	<input type="checkbox"/>	Others :
<u>Supplementary information :</u>			

Immunity test	Monitored - Checked function(s)/parameter(s) during / after the test	Method
Electrostatic discharge	Functional status	Visual
Radio-frequency electromagnetic fields	N/A	N/A
Fast transients	Functional status	Visual
Surge transient	Functional status	Visual
Injected currents (radio-frequency common mode)	Functional status	Visual
Voltage dips and short interruptions	Functional status	Visual
<u>Supplementary information :</u>		

5.3 Electrostatic discharge immunity	VERDICT: PASS
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Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

Requirements

Standard	EN IEC 55014-2							
Basic standard	EN 61000-4-2							
Port under test	Enclosure							
Air discharges ¹⁾	<input type="checkbox"/>	±2 kV	<input type="checkbox"/>	±4 kV	<input checked="" type="checkbox"/>	±8 kV	<input type="checkbox"/>	kV
Contact discharges ¹⁾	<input type="checkbox"/>	±2 kV	<input checked="" type="checkbox"/>	±4 kV	<input type="checkbox"/>	±8 kV	<input type="checkbox"/>	kV
Number of discharges	≥ 10 per polarity with ≥ 1 sec interval.							
¹⁾ Tests with lower voltages are not required.								

Performed tests

Set-up	<input checked="" type="checkbox"/>	Table-top	<input type="checkbox"/>	Floor standing
Ambient temperature [°C]	23		Relative Humidity air [%]	49
Voltage – Mains [V]	230 Vac, 120 Vac			
Frequency – Mains [Hz]	50 Hz			
Operating mode(s) used	Mode 1,2			

	Test Point (Location of discharge, see also photo)	Test Voltage [kV] & Polarity	Coupling type	# of applied discharges / polarity	Discharge interval [s]
<input checked="" type="checkbox"/>	Points on conductive surface touchable by hand	±4	Contact	10	1
<input checked="" type="checkbox"/>	Points on non-conductive surface touchable by hand	±8	Air	10	1
<input checked="" type="checkbox"/>	HCP top side.	±4	Contact	10	1
<input checked="" type="checkbox"/>	HCP bottom side.	±4	Contact	10	1
<input checked="" type="checkbox"/>	VCP right side.	±4	Contact	10	1
<input checked="" type="checkbox"/>	VCP left side.	±4	Contact	10	1
<input checked="" type="checkbox"/>	VCP front side.	±4	Contact	10	1
<input checked="" type="checkbox"/>	VCP rear side.	±4	Contact	10	1
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.				
Supplementary information:					

5.4	Electrical Fast Transients immunity	VERDICT: PASS
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The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts. The transients are likely to disturb electronics but less likely to cause damage.

Requirements

Standard		EN IEC 55014-2		
Basic standard		EN 61000-4-4		
Pulse characteristics		5/50 ns		
Port		Test level	Repetition frequency	Duration
<input checked="" type="checkbox"/>	AC input-output power ¹⁾	± 1000 V	5 KHz	1 min. / polarity
<input type="checkbox"/>	DC input-output power ²⁾	± 500 V	5 KHz	1 min. / polarity
<input type="checkbox"/>	Signal and Control lines ³⁾	± 500 V	5 KHz	1 min. / polarity
¹⁾ For extra low voltage a.c ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification. ²⁾ Not applicable to battery operated appliances that cannot be connected to the mains while in use. ³⁾ Applicable only to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.				

Performed tests

Voltage – Mains [V]		230 Vac, 120 Vac	
Frequency – Mains [Hz]		50 Hz	
Operating mode(s) used		Mode 1,2	
Test Set-up (see Annex 3 for photo)	<input type="checkbox"/>	Equipment standing on floor at (0,1 ± 0,01) m above ground plane	
	<input checked="" type="checkbox"/>	Equipment on the table (0,1 ± 0,01) m above ground plane	
	<input type="checkbox"/>	Artificial hand applied. Location refer to Annex 3.	
Coupling	<input checked="" type="checkbox"/>	Common mode	<input type="checkbox"/> Other:

Port(s) under test	Test Voltage & Polarity	Repetition Frequency	Test duration / polarity	Injection method		
AC power input	± 1 kV	5 KHz	60 s	<input checked="" type="checkbox"/>	CDN	<input type="checkbox"/> Clamp
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.					
Supplementary information: ---						

5.5 Surge transient immunity	VERDICT: PASS
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The surge transient immunity test simulates the surges that are caused by over-voltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

Requirements

Standard	EN IEC 55014-2		
Basic standard	EN 61000-4-5		
Pulse characteristics	1,2/50µs Voltage; 8/20µs Current		
Repetition rate	≤ 60 secs. (for each test level and phase angle)		
Number of pulses	5 pulses (at each polarity and phase angle)		
Port	Test level & Polarity & Coupling		Phase angle [°]
	Line to Line	Line to Earth	
AC input power ¹⁾	+ 1 kV	+ 2 kV	90
AC input power ¹⁾	- 1 kV	- 2 kV	270
¹⁾ Tests with lower voltages are not required.			

Performed tests

Voltage – Mains [V]	230 Vac, 120 Vac
Frequency – Mains [Hz]	50 Hz
Operating mode(s) used	Mode 1,2
Repetition rate	60 secs. (for each test level and phase angle)
Number of pulses	5 pulses (at each polarity and phase angle)

Port(s) under test	Coupling	Test level & Polarity	Phase angle [°]	Remark
<input checked="" type="checkbox"/> AC mains input power	Line to Neutral	+1 kV	90	---
<input checked="" type="checkbox"/> AC mains input power	Line to Neutral	-1 kV	270	---
<input type="checkbox"/> AC mains input power	Line to Earth	+2 kV	90	---
<input type="checkbox"/> AC mains input power	Line to Earth	-2 kV	270	---
<input type="checkbox"/> AC mains input power	Neutral to Earth	+2 kV	90	---
<input type="checkbox"/> AC mains input power	Neutral to Earth	-2 kV	270	---

Observation(s) During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Supplementary information:---

5.6	Injected currents (RF common mode) immunity	VERDICT: PASS
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During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

Requirements

Standard		EN IEC 55014-2		
Basic standard		EN 61000-4-6		
Frequency range		Modulation	Step size	Dwell time
<input type="checkbox"/>	0,15 – 80 MHz	80% AM (1kHz)	≤ 1%	≥ 0,5 s
<input checked="" type="checkbox"/>	0,15 – 230 MHz	80% AM (1kHz)	≤ 1%	≥ 0,5 s
Port			Test level, U _o	
<input checked="" type="checkbox"/>	AC input-output power ¹⁾	3 V		
<input type="checkbox"/>	DC input-output power ^{2) 3)}	1 V		
<input type="checkbox"/>	Signal and Control lines ⁴⁾	1 V		
<p>¹⁾ For extra low voltage a.c ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.</p> <p>²⁾ Not applicable to battery operated appliances that cannot be connected to the mains while in use.</p> <p>³⁾ Applicable to battery operated appliances that can be connected to the mains while in use, or to appliances for which the length of d.c. cables may exceed 3 m according to the manufacturer's functional specification.</p> <p>⁴⁾ Applicable only to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.</p>				

Performed tests

Frequency range (applied)		Modulation (applied)		Step size (applied)
<input type="checkbox"/>	0,15 – 80 MHz	<input checked="" type="checkbox"/>	0,15 – 230 MHz	80% AM (1kHz) 1%
Voltage – Mains [V]		230 Vac, 120 Vac		Frequency – Mains [Hz] 50 Hz
Operating mode(s) used		Mode 1,2		
Test set-up (see Annex 3 for photo)		<input checked="" type="checkbox"/>	Equipment standing on floor at (0,1 ± 0,01) m above ground plane.	
		<input type="checkbox"/>	Equipment on the table (0,1 ± 0,01) m above ground plane.	
		<input checked="" type="checkbox"/>	Artificial hand applied. Location refer to Annex 3.	

Port(s) under test	Test Level (applied)	Injection method	Dwell time (applied)	Remark
AC input power	3V	CDN-M2	3s	---
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.			
Supplementary information: ---				

5.7	Power supply interruptions and dips immunity	VERDICT: PASS
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The purpose of the test is to verify the immunity of the equipment against voltage dips and voltage interruptions. It helps to ensure that the equipment functions properly (as expected and safely) with power supply fluctuations. Voltage dips and interruptions are caused by faults in the LV, MV, HV networks (short-circuit or ground faults).

Requirements

Standard	EN IEC 55014-2			
Basic standard	EN 61000-4-11			
# of dips & interruptions	3 dips / interruptions for each test level and phase angle			
Interval between events	≥ 10 seconds			
Port	Test level ¹⁾	Period (Cycles)		Performance Criterion
		50 Hz	60 Hz	
AC input power port	$U_{NOM} - 100\%$	0,5	0,5	C; Refer to the chapter 5.1 for details.
AC input power port	$U_{NOM} - 60\%$	10	12	C; Refer to the chapter 5.1 for details.
AC input power port	$U_{NOM} - 30\%$	25	30	C; Refer to the chapter 5.1 for details.
¹⁾ Changes to the voltage level shall occur at a zero crossing point in the a.c. voltage waveform. NOTE: Where the equipment has a rated voltage range the following shall apply: <ul style="list-style-type: none"> - If the voltage range does not exceed 20% of the lower voltage specified for the rated voltage range. A single voltage within that range may be selected for testing. - In all other cases, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range. 				

Performed tests

U_{NOM} [V _{AC}]	Terminal	Voltage dip [% U_{NOM}]	Duration [cycles]		Repetition rate [s]	Number of dips per test	Phase angle [°]
			50 Hz	60 Hz			
230	L-N	0	0,5	0,5	10	3	0, 180
230	L-N	40	10	12	10	3	0, 180
230	L-N	70	25	30	10	3	0, 180
Operating mode(s) used		Mode 1,2					
Observation(s)		During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.					
Supplementary information: ---							

6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

EUT PHOTOS



7 ANNEX 1 - MEASUREMENT UNCERTAINTIES

The table(s) below show(s) measurement uncertainties of the EMC test set-ups. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Emission tests		Uncertainty	U_{CISPR}
RF Conducted disturbance (mains port) 9 kHz – 150 kHz	AMN: R&S ENV216	3.3 dB	3.8 dB
RF Conducted disturbance (mains port) 150 kHz – 30 MHz		2.9 dB	3.4 dB
RF Conducted disturbance (mains port) 9 kHz – 150 kHz	AMN: R&S ENV432	3.5 dB	3.8 dB
RF Conducted disturbance (mains port) 150 kHz – 30 MHz		3.1 dB	3.4 dB
Conducted disturbance using a CP 150 kHz – 30 MHz		2.6 dB	2.9 dB
Radiated disturbance using CDNE 30 MHz – 300 MHz	CDNE M2	3.3 dB	3.8 dB
Radiated disturbance using CDNE 30 MHz – 300 MHz	CDNE M3	3.4 dB	3.8 dB
Radiated disturbance 9 kHz – 30 MHz	LLAS	3.6 dB	3.3 dB
Disturbance Power 30 MHz – 300 MHz	clamp	4.0 dB	2.0 dB
Radiated disturbance 30 MHz – 1000 MHz	Horizontal	4.9 dB	6.3 dB
Radiated disturbance 30 MHz – 1000 MHz	Vertical	6.1 dB	
Radiated disturbance 1000 MHz – 6000 MHz		4.8 dB	5.2 dB
LF harmonic current emissions		0.6 %	N/A
LF voltage fluctuations		2.6 %	N/A

Immunity tests		Uncertainty
Electrostatic discharge		$U_{peak}=5.6\%$, $U_{30ns}=5.7\%$ $U_{60ns}=5.7\%$, $U_{rt}=14.3\%$
Radio-frequency electromagnetic fields 80 MHz – 1000 MHz		2.0 dB
Radio-frequency electromagnetic fields, 1000 MHz – 6000 MHz		1.9 dB
Fast transients		$U_{tr}=7.2\%$, $U_{vp}=6.8\%$, $U_{tw}=5.4\%$
Surges		$U_{vp}=4.3\%$, $U_{TV}=6.7\%$, $U_{td}=1.3\%$
Injected currents (radio-frequency common mode)	CDN	1.5 dB
Injected currents (radio-frequency common mode)	EM Clamp	2.6 dB
Voltage dips, Short interruptions and voltage variations		$U_{out}=0.4\%$, $U_i=3\%$, $U_{r-d}=3\%$

8 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

Conducted disturbance -Shielded Room No.1

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
EMI test receiver	R&S	ESCI	101351	2023/06/20
Artificial Mains Network	R&S	ENV216	101620	2023/06/20
Asymmetric artificial network	SCHWARZBECK	NTFM8131	8131-151	2023/06/20
Attenuator 26dB	SHANGHAI ESE	20dB+6dB	01	2023/06/20
High power voltage probe	SCHWARZBECK	TK9421	#308	2023/06/16
Current probe	ETS.LINDGREN	91550-1L	218473	2023/06/20

Disturbance power

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
EMI test receiver	R&S	ESCI	101351	2023/06/20
EMI absorbing clamp	SCHWARZBECK	MDS 21B	4183	2023/06/28

Harmonic current emissions & Voltage changes, voltage fluctuations and flicker

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
Harmonic currents and flicker tester	California Instruments	CTS	1306A00135	2023/06/20
AC power source	California Instruments	5001iX-CTS-400	1306A00135	2023/06/20
Harmonic currents and flicker tester	EMTEST	DPA 500N	P2114250803	2023/01/24
AC power source	EMTEST	Netwave7-400	P2136256253	2023/01/24

Electrostatic discharge immunity

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
ESD generator	TESEQ	NSG 437	6716	2023/09/26

Fast transient immunity

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
Compact immunity test system	TESEQ	NSG-3040-MF	2006/EFT:0535	2023/06/20
EFT/Burst capacitive coupling clamp	TESEQ	CDN 3425	1786	NCR

Surge immunity

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
Compact immunity test system	TESEQ	NSG-3040-MF	2006 /SURGE:1234	2023/06/20
Coupling/Decoupling Network (CDN)	TESEQ	CDN 117-M	35452	NCR

Injected currents immunity

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
Compact immunity test system	TESEQ	NSG 4070-30	35895	2023/06/20
Coupling/Decoupling Network (CDN)	TESEQ	CDN M016S	34640	2023/06/20
Attenuator	TESEQ	ANT 6050	34847	2023/06/20
EM clamp	TESEQ	KEMZ 801A	35475	2023/06/20

Voltage dips and short interruptions immunity

Equipment	Manufacturer	Model No.	Serial No.	Cal. due date
Compact immunity test system	TESEQ	NSG-3040-MF	2006/DIPS:2062	2023/06/20
Automatic step transformer with circuit breaker	TESEQ	INA 6502-CIB	217	NCR

9 ANNEX 2 - TEST PHOTOS

Conducted disturbance at mains terminals



Disturbance power



Harmonic current emissions & Voltage changes, voltage fluctuations and flicker



Electrostatic discharge immunity



Fast transients, Surges & Voltage dips and short interruptions immunity



Injected currents (radio-frequency common mode) immunity



End of the report