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Test report No:
6077849.50

TEST REPORT

Electromagnetic Compatibility (EMC)

Identification of item tested	ELECTRIC AIRLESS SPRAYER
Trademark	AGP
Model and /or type reference	EC021; FARBMAX Airless 1900; SLP-1102; MP21; S7021; QP019; HA6; HA8; HA10; HA12; HA14; ED6; ED8; ED10; ED12; ED14; DS6; DS8, DS10; DS12, DS14; S3-110; S3-240
Ratings	110-120 V or 220-240 V;50-60 Hz; 700 W; Class I
Test Laboratory / address	DEKRA Testing and Certification (Shanghai) Ltd.
Applicant / address	LEE YEONG INDUSTRIAL CO., LTD. No.2, Kejia Rd., Douliu City, Yunlin County 64057, Taiwan
Test method requested, standard	EN 55014-1:2017; EN 55014-2:2015; EN 61000-3-2:2014; EN 61000-3-3:2013
Verdict Summary	IN COMPLIANCE
Tested by	Kaiyuan Dai (Project Engineer) 
Approved by	Zuyao Fan (Project Manager) 
Date of issue	2020-05-19
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 checked="" type="checkbox"/>	Comma (,)	<input 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
6077849.50	2020-05-19	First release

The report is issued to base on original test report Ref. No. 3158745.50 dated on 2015-08-19 including the following modifications:

- Add new types which are identical with EC021, only the models' names are different.

After review, no test is considered necessary.

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.

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item	ELECTRIC AIRLESS SPRAYER
Model / Type number	EC021; FARBMAX Airless 1900; SLP-1102; MP21; S7021; QP019; HA6; HA8; HA10; HA12; HA14; ED6; ED8; ED10; ED12; ED14; DS6; DS8, DS10; DS12, DS14; S3-110; S3-240
Trademark	AGP
Manufacturer.....	LEE YEONG INDUSTRIAL CO., LTD. No.2, Kejia Rd., Douliu City, Yunlin County 64057, Taiwan
Factory	LEE YEONG INDUSTRIAL CO., LTD. No.2, Kejia Rd., Douliu City, Yunlin County 64057, Taiwan

Rated Power	110-120 V or 220-240 V; 50-60 Hz; 700 W; Class I
Clock frequencies	Not provided
Other parameters.....	N/A
Mounting position.....	<input checked="" 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)
N/A

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:



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

Location	DEKRA Testing and Certification Co.,Ltd.
Address	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C
Date	Jun. 2013
Supervised by	Kaiyuan Dai

1.4 Classification according to EN 55014-2

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

<input type="checkbox"/>	<p>Category I: Apparatus containing no electronic control circuitry.</p> <p><u>Examples:</u> Motor operated appliances, lighting toys, track sets without electronic control units, tools, heating appliances, UV and IR radiators and apparatus containing components such as electromechanical switches and thermostats.</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: Transformer toys, dual supply toys, mains powered motor operated appliances, tools, heating appliances and similar electric apparatus (for example – UV radiators, IR radiators and microwave ovens) containing electronic control circuitry with no internal clock frequency or oscillator frequency higher than 15 MHz.</p>
<input type="checkbox"/>	<p>Category III: Battery powered apparatus (with built-in batteries or external batteries), which in normal use is not connected to the mains, containing an electronic control circuitry with no internal clock frequency or oscillator frequency higher than 15 MHz.</p>
<input type="checkbox"/>	<p>Category IV: All other apparatus covered by the scope of the EN 55014-2 standard.</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	Normal operation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>
<u>Supplemental information:</u>			

2.2 Port(s) of the EUT

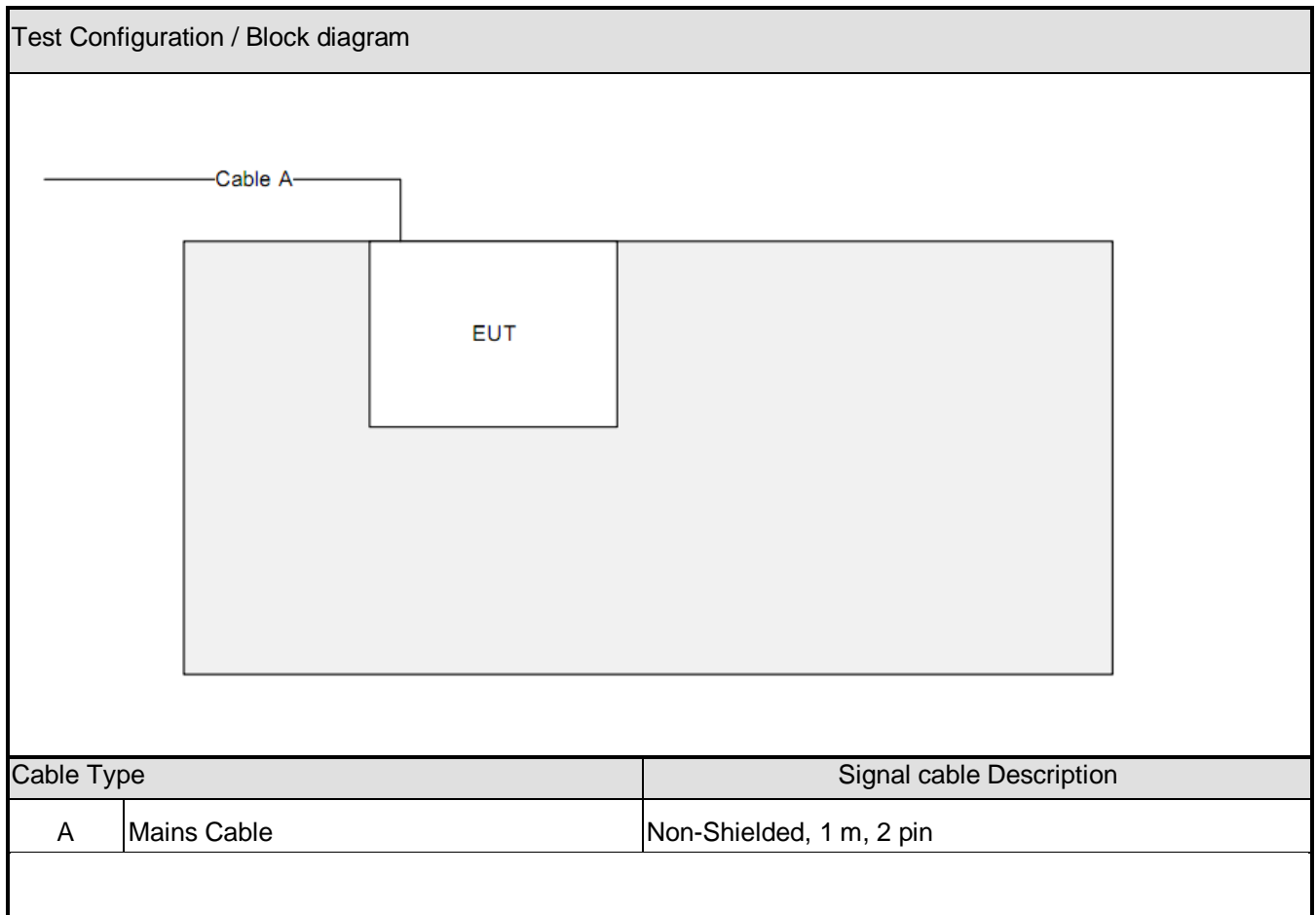
Port name and description	Connected to / Termination	Cable		
		Length used during test [m]	Attached during test	Shielded
N/A			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input 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>			

2.4 Test Configuration / Block diagram used for tests



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 55014-1	2017 ¹⁾	Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission.
EN 55016-2-1	2014	Methods of measurement of disturbances and immunity – Conducted disturbance measurements.
EN 55016-2-2	2010	Methods of measurement of disturbances and immunity – Measurement of disturbance power.
EN 55016-2-3 +A1 +A2	2010 2010 2014	Methods of measurement of disturbances and immunity – Radiated disturbance measurements.
EN 61000-3-2	2014	Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
EN 61000-3-3	2013	Limitation of voltage fluctuations and flicker
EN 55014-2	2015 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	2014	Surge immunity test.
EN 61000-4-6	2014	Immunity to conducted disturbances, induced by radio-frequency fields.
EN 61000-4-11	2004	Voltage dips, short interruptions and voltage variations immunity tests.

50) Not harmonized yet.

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

No deviation.

3.3 Overview of results

EMISSION TESTS – EN 55014-1			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Conducted disturbance voltage at mains terminals (150 KHz – 30 MHz)	EN 55016-2-1	PASS	---
Conducted disturbance voltage at load terminals (150 KHz – 30 MHz)	EN 55016-2-1	N/A	---
Conducted disturbance voltage at additional terminals (150 KHz – 30 MHz)	EN 55016-2-1	N/A	---
Disturbance power (30 MHz to 300 MHz)	EN 55016-2-2	PASS	See 2)
Radiated electromagnetic disturbances (30 – 1000 MHz)	EN 55016-2-3	N/A	---
Discontinuous disturbance (clicks) on AC power leads	EN 55014-1	N/A	See 1)
<u>Supplementary information:</u>			
1) Exemptions from click measurements applicable (clause 4.2.3).			
2) According to clause 4.1.2.3.2 procedure (a) of the EN 55014-1 standard the EUT is deemed to comply in the frequency range from 300 MHz to 1000 MHz without further measurements.			

EMISSION TESTS – EN 61000-3-2, EN 61000-3-3			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Harmonic current emissions	EN 61000-3-2	PASS	---
Voltage changes, voltage fluctuations and flicker	EN 61000-3-3	PASS	---
<u>Supplementary information:</u>			

IMMUNITY TESTS – EN 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	
Surge transient	EN 61000-4-5	PASS	
Injected currents (radio-frequency common mode)	EN 61000-4-6	PASS	
Voltage dips and short interruptions	EN 61000-4-11	PASS	
<u>Supplementary information:</u>			
1) The equipment is classified as category 1 equipment according to EN 55014-2; no immunity tests are applicable.			

4 EMISSION TEST RESULTS

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

Limits – Tools

Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾	Limit: AV [dB(μV) ¹⁾	IF BW	Detector(s)
0,15 - 0,35	66 – 56 ²⁾	59 - 46 ²⁾	9 KHz	QP, CAV
0,35 - 5,0	56	46	9 KHz	QP, CAV
5,0 - 30	60	50	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 checked="" type="checkbox"/>	Rated power below 700 W	Limits as above
<input type="checkbox"/>	Rated power between 700 and 1000 W	Limits +4 dB
<input type="checkbox"/>	Rated power above 1000 W	Limits +10 dB

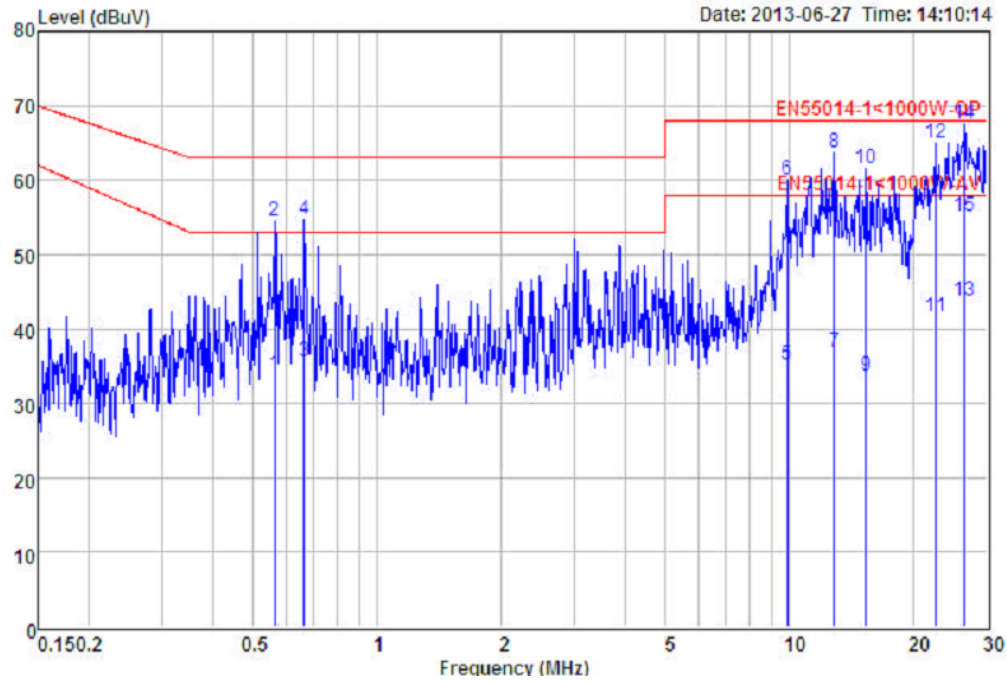
Performed measurements

Scan range (0,9 – 1,1 U _N)	<input type="checkbox"/> 198 – 264 V _{AC}	<input type="checkbox"/> 207 – 253 V _{AC}	<input checked="" type="checkbox"/> 120/230 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"/> Negative (-)
Voltage – Mains [V]	120/230 Vac		
Frequency – Mains [Hz]	60/50 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		
Remark	---		

Measurement data	Port under test	AC mains power input
------------------	-----------------	----------------------

Operating mode / voltage / frequency used during the test	Mode 1/ 120 Vac/ 60 Hz
---	------------------------

Line



	Freq	Read Level	Level Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV	dB	dBuV	
1	0.56	33.62	33.80	0.18	-19.20	53.00 Average
2	0.56	54.27	54.45	0.18	-8.55	63.00 Peak
3	0.66	35.42	35.60	0.18	-17.40	53.00 Average
4	0.66	54.49	54.67	0.18	-8.33	63.00 Peak
5	9.86	34.52	35.16	0.64	-22.84	58.00 Average
6	9.86	59.51	60.15	0.64	-7.85	68.00 Peak
7	12.78	36.06	36.82	0.76	-21.18	58.00 Average
8	12.78	62.86	63.62	0.76	-4.38	68.00 Peak
9	15.31	32.83	33.67	0.84	-24.33	58.00 Average
10	15.31	60.71	61.55	0.84	-6.45	68.00 Peak
11	22.54	40.54	41.60	1.06	-16.40	58.00 Average
12	22.54	63.96	65.02	1.06	-2.98	68.00 Peak
13	26.56	42.47	43.68	1.21	-14.32	58.00 Average
14	26.56	66.31	67.52	1.21	-0.48	68.00 Peak
15	26.56	53.89	55.10	1.21	-12.90	68.00 QP

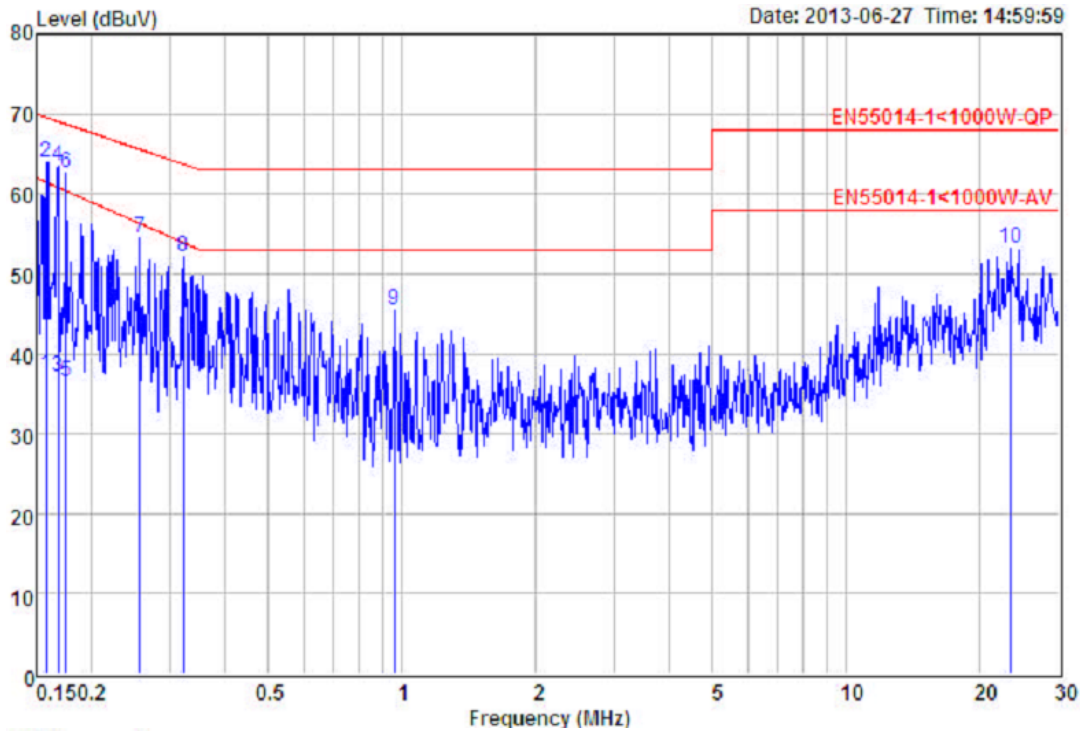
Remark

Measurement data	Port under test	AC mains power input																																																																																																																																																								
Operating mode / voltage / frequency used during the test		Mode 1/ 120 Vac/ 60 Hz																																																																																																																																																								
Neutral																																																																																																																																																										
<p>Date: 2013-06-27 Time: 14:17:05</p>																																																																																																																																																										
<table border="1"> <thead> <tr> <th></th> <th>Freq</th> <th>Read Level</th> <th>Level</th> <th>Factor</th> <th>Over Limit</th> <th>Limit Line</th> <th>Remark</th> </tr> <tr> <th></th> <th>MHz</th> <th>dBuV</th> <th>dBuV</th> <th>dB</th> <th>dB</th> <th>dBuV</th> <th></th> </tr> </thead> <tbody> <tr><td>1</td><td>0.51</td><td>33.75</td><td>33.90</td><td>0.15</td><td>-19.10</td><td>53.00</td><td>Average</td></tr> <tr><td>2</td><td>0.51</td><td>59.81</td><td>59.96</td><td>0.15</td><td>-3.04</td><td>63.00</td><td>Peak</td></tr> <tr><td>3</td><td>0.59</td><td>35.44</td><td>35.60</td><td>0.16</td><td>-17.40</td><td>53.00</td><td>Average</td></tr> <tr><td>4</td><td>0.59</td><td>59.78</td><td>59.94</td><td>0.16</td><td>-3.06</td><td>63.00</td><td>Peak</td></tr> <tr><td>5</td><td>14.44</td><td>41.04</td><td>41.80</td><td>0.76</td><td>-16.20</td><td>58.00</td><td>Average</td></tr> <tr><td>6</td><td>14.44</td><td>64.74</td><td>65.50</td><td>0.76</td><td>-2.50</td><td>68.00</td><td>Peak</td></tr> <tr><td>7</td><td>16.75</td><td>37.52</td><td>38.33</td><td>0.81</td><td>-19.67</td><td>58.00</td><td>Average</td></tr> <tr><td>8</td><td>16.75</td><td>65.41</td><td>66.22</td><td>0.81</td><td>-1.78</td><td>68.00</td><td>Peak</td></tr> <tr><td>9</td><td>22.42</td><td>42.72</td><td>43.65</td><td>0.93</td><td>-14.35</td><td>58.00</td><td>Average</td></tr> <tr><td>10</td><td>22.42</td><td>67.05</td><td>67.98</td><td>0.93</td><td>-0.02</td><td>68.00</td><td>Peak</td></tr> <tr><td>11</td><td>22.42</td><td>49.09</td><td>50.02</td><td>0.93</td><td>-17.98</td><td>68.00</td><td>QP</td></tr> <tr><td>12</td><td>25.05</td><td>42.83</td><td>43.82</td><td>0.99</td><td>-14.18</td><td>58.00</td><td>Average</td></tr> <tr><td>13 *</td><td>25.05</td><td>72.03</td><td>73.02</td><td>0.99</td><td>5.02</td><td>68.00</td><td>Peak</td></tr> <tr><td>14</td><td>25.05</td><td>54.53</td><td>55.52</td><td>0.99</td><td>-12.48</td><td>68.00</td><td>QP</td></tr> <tr><td>15</td><td>29.53</td><td>41.07</td><td>42.16</td><td>1.09</td><td>-15.84</td><td>58.00</td><td>Average</td></tr> <tr><td>16 *</td><td>29.53</td><td>67.18</td><td>68.27</td><td>1.09</td><td>0.27</td><td>68.00</td><td>Peak</td></tr> <tr><td>17</td><td>29.53</td><td>55.57</td><td>56.66</td><td>1.09</td><td>-11.34</td><td>68.00</td><td>QP</td></tr> </tbody> </table>				Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark		MHz	dBuV	dBuV	dB	dB	dBuV		1	0.51	33.75	33.90	0.15	-19.10	53.00	Average	2	0.51	59.81	59.96	0.15	-3.04	63.00	Peak	3	0.59	35.44	35.60	0.16	-17.40	53.00	Average	4	0.59	59.78	59.94	0.16	-3.06	63.00	Peak	5	14.44	41.04	41.80	0.76	-16.20	58.00	Average	6	14.44	64.74	65.50	0.76	-2.50	68.00	Peak	7	16.75	37.52	38.33	0.81	-19.67	58.00	Average	8	16.75	65.41	66.22	0.81	-1.78	68.00	Peak	9	22.42	42.72	43.65	0.93	-14.35	58.00	Average	10	22.42	67.05	67.98	0.93	-0.02	68.00	Peak	11	22.42	49.09	50.02	0.93	-17.98	68.00	QP	12	25.05	42.83	43.82	0.99	-14.18	58.00	Average	13 *	25.05	72.03	73.02	0.99	5.02	68.00	Peak	14	25.05	54.53	55.52	0.99	-12.48	68.00	QP	15	29.53	41.07	42.16	1.09	-15.84	58.00	Average	16 *	29.53	67.18	68.27	1.09	0.27	68.00	Peak	17	29.53	55.57	56.66	1.09	-11.34	68.00	QP
	Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark																																																																																																																																																			
	MHz	dBuV	dBuV	dB	dB	dBuV																																																																																																																																																				
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2	0.51	59.81	59.96	0.15	-3.04	63.00	Peak																																																																																																																																																			
3	0.59	35.44	35.60	0.16	-17.40	53.00	Average																																																																																																																																																			
4	0.59	59.78	59.94	0.16	-3.06	63.00	Peak																																																																																																																																																			
5	14.44	41.04	41.80	0.76	-16.20	58.00	Average																																																																																																																																																			
6	14.44	64.74	65.50	0.76	-2.50	68.00	Peak																																																																																																																																																			
7	16.75	37.52	38.33	0.81	-19.67	58.00	Average																																																																																																																																																			
8	16.75	65.41	66.22	0.81	-1.78	68.00	Peak																																																																																																																																																			
9	22.42	42.72	43.65	0.93	-14.35	58.00	Average																																																																																																																																																			
10	22.42	67.05	67.98	0.93	-0.02	68.00	Peak																																																																																																																																																			
11	22.42	49.09	50.02	0.93	-17.98	68.00	QP																																																																																																																																																			
12	25.05	42.83	43.82	0.99	-14.18	58.00	Average																																																																																																																																																			
13 *	25.05	72.03	73.02	0.99	5.02	68.00	Peak																																																																																																																																																			
14	25.05	54.53	55.52	0.99	-12.48	68.00	QP																																																																																																																																																			
15	29.53	41.07	42.16	1.09	-15.84	58.00	Average																																																																																																																																																			
16 *	29.53	67.18	68.27	1.09	0.27	68.00	Peak																																																																																																																																																			
17	29.53	55.57	56.66	1.09	-11.34	68.00	QP																																																																																																																																																			
Remark																																																																																																																																																										

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

Line

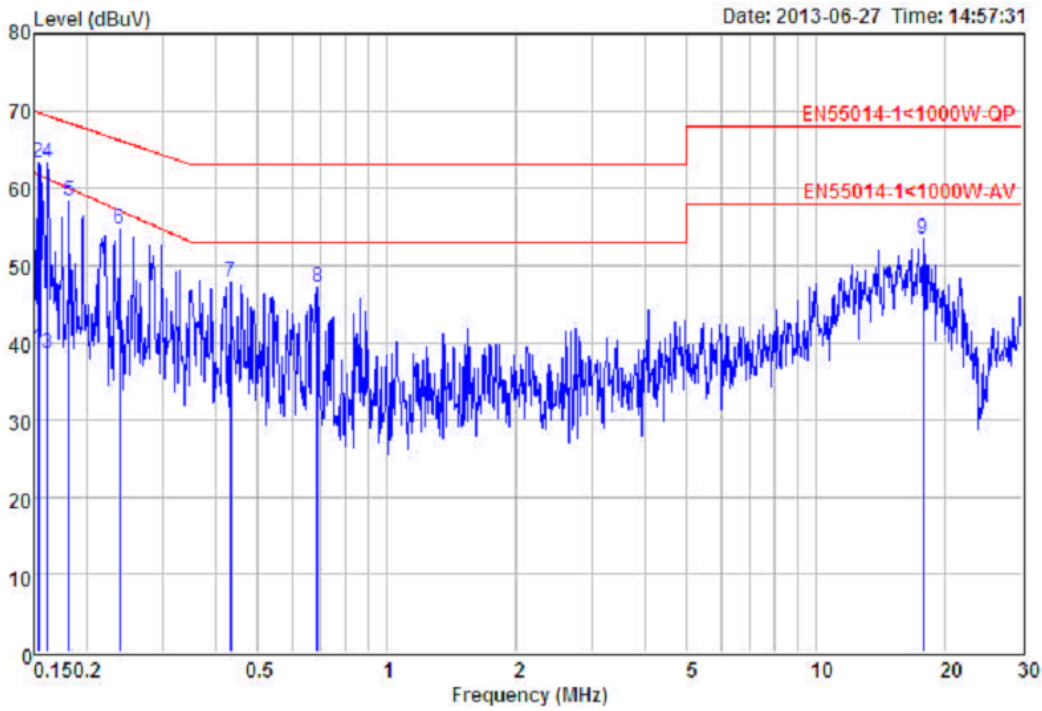


	Freq	Read Level	Level Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV	dB	dBuV	
1	0.16	37.21	37.35	0.14	-24.09	Average
2	0.16	63.82	63.96	0.14	-5.60	Peak
3	0.17	36.99	37.13	0.14	-23.69	Average
4	0.17	63.27	63.41	0.14	-5.67	Peak
5	0.17	36.36	36.50	0.14	-23.87	Average
6	0.17	62.48	62.62	0.14	-6.11	Peak
7	0.26	54.37	54.51	0.14	-11.07	Peak
8	0.32	52.02	52.18	0.16	-11.52	Peak
9	0.96	45.26	45.47	0.21	-17.53	Peak
10	23.39	52.14	53.23	1.09	-14.77	Peak

Remark

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

Neutral



	Read Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	
1	0.15	39.06	39.20	0.14	-22.52	61.72	Average
2	0.15	63.10	63.24	0.14	-6.54	69.78	Peak
3	0.16	38.47	38.61	0.14	-22.60	61.21	Average
4	0.16	63.13	63.27	0.14	-6.12	69.39	Peak
5	0.18	58.30	58.43	0.13	-9.99	68.42	Peak
6	0.24	54.67	54.80	0.13	-11.39	66.19	Peak
7	0.43	47.63	47.77	0.14	-15.23	63.00	Peak
8	0.69	46.92	47.08	0.16	-15.92	63.00	Peak
9	17.75	52.54	53.37	0.83	-14.63	68.00	Peak

Remark

4.2 Conducted disturbance voltage– Load terminals	VERDICT: N/A
--	---------------------

Standard	EN 55014-1
Basic standard	EN 55016-2-1

Limits

Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾	Limit: AV [dB(μV) ¹⁾	IF BW	Detector(s)
0,15 - 0,50	80	70	9 KHz	QP, CAV
5,0 - 30	74	64	9 KHz	QP, CAV

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

Performed measurements

Port(s) / Terminal(s) under test	
<input type="checkbox"/> (please write the name of the port under test)	<input type="checkbox"/> Other:
<input type="checkbox"/> Other:	<input type="checkbox"/> Other:
Voltage—Mains [V]	(Please write the voltage/voltages used for testing)
Frequency—Mains [Hz]	(Please write the frequency/frequencies used for testing)
Test method applied	<input type="checkbox"/> Voltage probe
	<input type="checkbox"/> ISN—Impedance Stabilisation Network
	<input type="checkbox"/> GDN according to EN / IEC 61000-4-6
	<input type="checkbox"/> Current probe
	<input type="checkbox"/> Artificial mains network
Test setup	<input type="checkbox"/> Table top <input 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	Please write the operating mode(s) used during testing
Remark	---

4.3 Conducted disturbance voltage– Additional terminals	VERDICT: N/A
--	---------------------

Standard	EN 55014-1
Basic standard	EN 55016-2-1

Limits

Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾	Limit: AV [dB(μV) ¹⁾	IF BW	Detector(s)
0,15 - 0,50	80	70	9 KHz	QP, CAV
5,0 - 30	74	64	9 KHz	QP, CAV

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

Performed measurements

Port(s) / Terminal(s) under test			
<input type="checkbox"/>	(please write the name of the port under test)		<input type="checkbox"/> Other:
<input type="checkbox"/>	Other:		<input type="checkbox"/> Other:
Voltage—Mains [V]		(Please write the voltage/voltages used for testing)	
Frequency—Mains [Hz]		(Please write the frequency/frequencies used for testing)	
Test method applied	<input type="checkbox"/>	GDN according to EN / IEC 61000-4-6	
	<input type="checkbox"/>	ISN—Impedance Stabilisation Network	
	<input type="checkbox"/>	Voltage probe	
	<input type="checkbox"/>	Current probe	
	<input type="checkbox"/>	Artificial mains network	
	<input type="checkbox"/>	Other:	
Test setup	<input type="checkbox"/>	Table top	<input 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		Please write the operating mode(s) used during testing	
Remark		---	

4.4 Disturbance power (30 MHz – 300 MHz)	VERDICT: PASS
---	----------------------

Standard	EN 55014-1
Basic standard	EN 55016-2-2

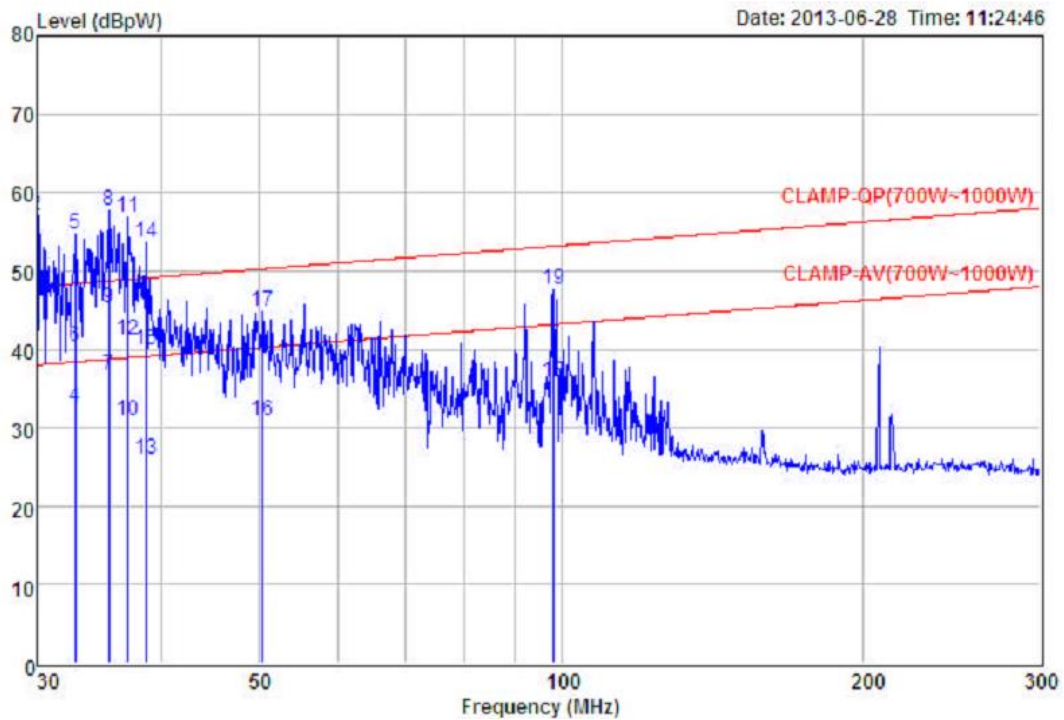
Limits – Tools

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 checked="" type="checkbox"/>	Rated power below 700 W		Limits as above	
<input type="checkbox"/>	Rated power between 700 and 1000 W		Limits +4 dB	
<input 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 type="checkbox"/>	198 – 264 V _{AC}	<input type="checkbox"/>	207 – 253 V _{AC}	<input checked="" type="checkbox"/>	120/230 V _{AC}
Voltage – Mains [V]	120/230 Vac					
Frequency – Mains [Hz]	60/50 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 type="checkbox"/>	Maximum clock frequency < 30 MHz				
Operating mode(s) used	Mode 1					
Remark	---					

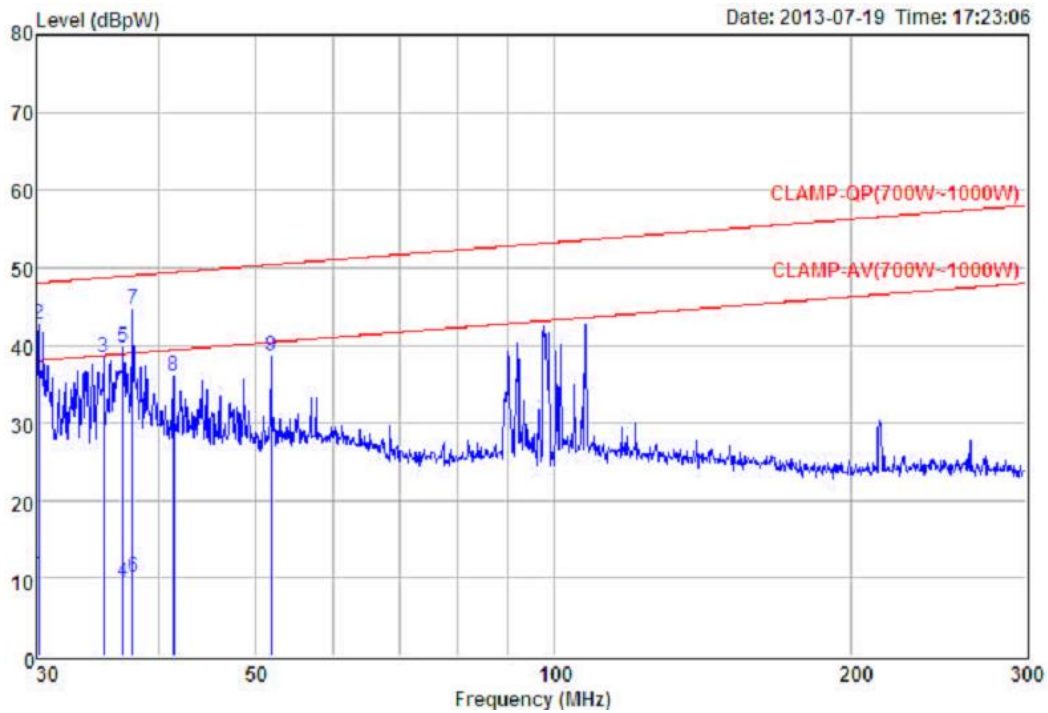
Measurement data	Port under test	AC mains power input
Operating mode / voltage / frequency used during the test		Mode 1/ 230 Vac/ 50 Hz



	Freq	Read Level	Level Factor	Over Limit	Limit Line	Remark
	MHz	dBpW	dBpW	dB	dBpW	
1	30.00	14.40	32.64	18.24	-5.37	38.01 Average
2 *	30.00	38.90	57.14	18.24	9.13	48.01 Peak
3	30.00	24.06	42.30	18.24	-5.71	48.01 QP
4	32.74	14.45	32.67	18.22	-5.72	38.39 Average
5 *	32.74	36.52	54.74	18.22	6.35	48.39 Peak
6	32.74	22.00	40.22	18.22	-8.17	48.39 QP
7	35.41	18.50	36.70	18.20	-2.03	38.73 Average
8 *	35.41	39.47	57.67	18.20	8.94	48.73 Peak
9	35.41	27.11	45.31	18.20	-3.42	48.73 QP
10	36.99	12.63	30.82	18.19	-8.10	38.92 Average
11 *	36.99	38.59	56.78	18.19	7.86	48.92 Peak
12	36.99	23.07	41.26	18.19	-7.66	48.92 QP
13	38.56	7.72	25.90	18.18	-13.20	39.10 Average
14 *	38.56	35.43	53.61	18.18	4.51	49.10 Peak
15	38.56	21.80	39.98	18.18	-9.12	49.10 QP
16	50.36	13.84	30.97	17.13	-9.29	40.26 Average
17	50.36	27.60	44.73	17.13	-5.53	50.26 Peak
18	98.20	19.65	35.88	16.23	-7.28	43.16 Average

Remark	
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Measurement data	Port under test	AC mains power input
Operating mode / voltage / frequency used during the test		Mode 1/ 120 Vac/ 60 Hz



	Freq	Read Level	Level Factor	Over Limit	Limit Line	Remark
	MHz	dBpW	dBpW	dB	dBpW	
1	30.21	-7.84	10.40	18.24	-27.64	Average
2	30.21	24.47	42.71	18.24	-5.33	Peak
3	35.08	20.25	38.45	18.20	-10.24	Peak
4	36.74	-8.69	9.50	18.19	-29.39	Average
5	36.74	21.56	39.75	18.19	-9.14	Peak
6	37.59	-8.19	10.00	18.19	-28.99	Average
7	37.59	26.48	44.67	18.19	-4.32	Peak
8	41.32	18.03	36.06	18.03	-13.34	Peak
9	51.89	21.37	38.63	17.26	-11.76	Peak

Remark	
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4.5	Radiated electromagnetic disturbances (30 – 1000 MHz)	VERDICT:	N/A
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Standard	EN 55014-1
Basic standard	EN 55016-2-3
Test method	Antenna method according to EN 55016-2-3 standard.

Limits

Frequency [MHz]	Limit: QP [dB(μV/m) ¹⁾			IF BW	Detector
	@3 m.	@5 m.	@10 m.		
30 - 230	40	36	30	120 KHz	QP
230 - 1000	47	43	37	120 KHz	QP

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

Performed measurements

Port under test	Enclosure	
Voltage — Mains [V]	(Please write the voltage/voltages used for testing)	
Frequency — Mains [Hz]	(Please write the frequency/frequencies used for testing)	
Test method applied	<input checked="" type="checkbox"/>	OATS or SAC with measurement distance [m]: 3 m.
	<input type="checkbox"/>	OATS or SAC with measurement distance [m]: 5 m.
	<input type="checkbox"/>	OATS or SAC with measurement distance [m]: 10 m.
Test setup	<input checked="" type="checkbox"/>	Equipment on a table of 80 cm height
	<input type="checkbox"/>	Equipment on the floor (insulated from ground plane)
	<input type="checkbox"/>	Other:
		Refer to the Annex 3 for test setup photo(s).
Operating mode(s) used	Please write the operating mode(s) used during testing	
Remark	---	

4.6 Discontinuous disturbance (clicks) on AC power leads	VERDICT: N/A
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Standard	EN 55014-1		
Frequency [MHz]	Limit: QP [dB(μV)]	IF BW	Detector
0,15	66	9 KHz	Quasi-Peak (QP)
0,50	56	9 KHz	Quasi-Peak (QP)
1,40	56	9 KHz	Quasi-Peak (QP)
30,0	60	9 KHz	Quasi-Peak (QP)

Performed measurements

Scan range (0,9 – 1,1 U_N)	<input checked="" type="checkbox"/> 198 – 264 V _{AC}	<input type="checkbox"/> 207 – 253 V _{AC}	<input type="checkbox"/> \sim V _{AC}
Voltage – Mains [V]	264 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 type="checkbox"/> Floor standing	
	<input type="checkbox"/> Other:		
Operating mode(s) used	Mode 1		
Remark	---		

Reason for not performing the test	<input checked="" type="checkbox"/> The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.
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Measurement results	<input checked="" type="checkbox"/> Neutral	<input checked="" type="checkbox"/> Line 1	<input type="checkbox"/> Line 2	<input type="checkbox"/> Line 3
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Frequency (MHz)	First Measurement: Determination of the limit L_{qp} – Quasi-peak							
	Limit L (dBμV)	Number of short clicks	Number of long clicks	Number of clicks – N_1	Time of meas. (min.)	Click rate N	Increased limit (dB)	Increased Limit L_q
0,15	66	0	0	0	2			
0,5	56	0	0	0	2			
1,4	56	0	0	0	2			
30	60	0	0	0	2			

The calculated click rate N is not more than 5 times per minute and all the clicks are classified as short ($t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.

Frequency (MHz)	Second measurement with Limit = L_q (Upper quartile method):			
	Limit L_q (dBμV)	Number of clicks – N_2	Number of authorized clicks $N_2 \leq N_1/4$	Verdict
0,15				
0,5				
1,4				
30				

Supplementary information: ---

4.7 Harmonic current emissions	VERDICT: PASS
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Standard	EN 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 dimmers for incandescent lamps with rated power ≤ 1 kW.

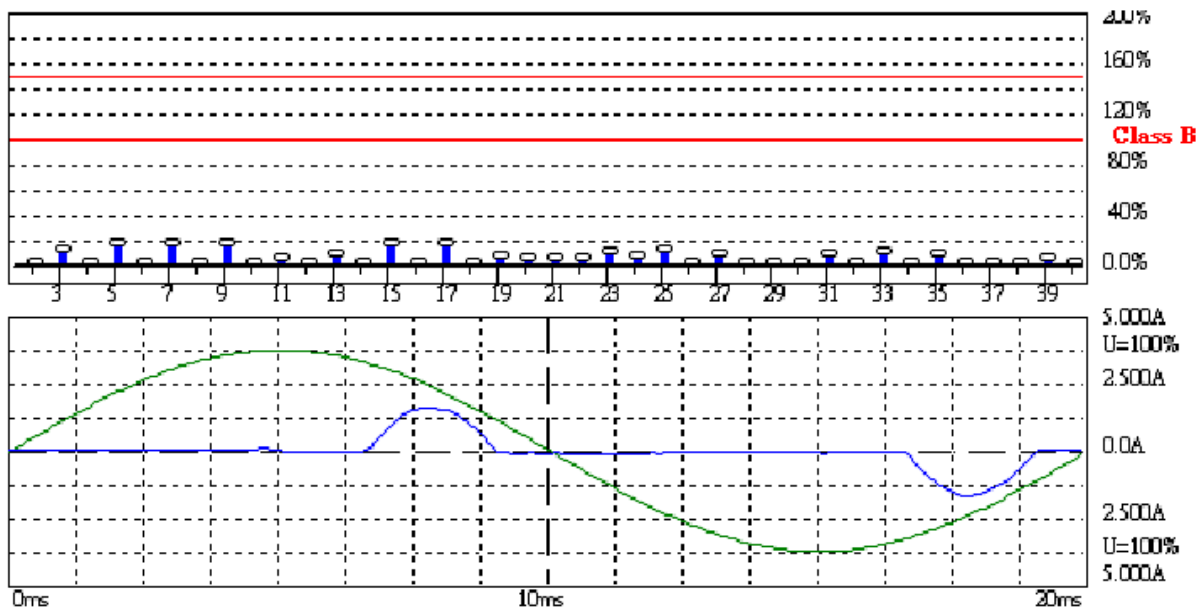
Classification		
<input type="checkbox"/>	Class A	All apparatus not classified as Class B, C or D
<input checked="" type="checkbox"/>	Class B	Portable tools
<input type="checkbox"/>	Class C	<input type="checkbox"/> Lighting equipment with active input power > 25 W
		<input type="checkbox"/> Lighting equipment with active input power ≤ 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

Performed measurements

Port under test	AC mains power input					
Voltage – Mains [V]	230 Vac					
Frequency – Mains [Hz]	50 Hz					
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						

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

Voltage on EUT **Urms = 230.7 V** **P = 57.55 W**
Current into EUT **Irms = 0.583 A** **pf = 0.428** **THC = 0.473 A**



Test Result: Pass **Source qualification: Normal**
 Urms = 230.7V Freq = 50.000 Range: 5 A
 Irms = 0.583A Ipk = 1.753A cf = 3.004
 P = 57.55W S = 134.6VA pf = 0.428
 THDi = 80.3 % THDu = 0.20 % Class B

Measurement data					Port under test	AC mains power input
Order	Freq. [Hz]	Iavg [A]	Irms [A]	I _{max} [A]	Limit [A]	Status Pass/Fail
1	50	0.3561	0.3510	0.3696		Pass
2	100	0.0059	0.0064	0.0064	1.6200	Pass
3	150	0.3391	0.3342	0.3497	3.4500	Pass
4	200	0.0032	0.0052	0.0055	0.6450	Pass
5	250	0.2667	0.2637	0.2734	1.7100	Pass
6	300	0.0000	0.0031	0.0034	0.4500	Pass
7	350	0.1781	0.1770	0.1804	1.1550	Pass
8	400	0.0000	0.0027	0.0031	0.3450	Pass
9	450	0.0879	0.0885	0.0885	0.6000	Pass
10	500	0.0000	0.0024	0.0027	0.2760	Pass
11	550	0.0194	0.0208	0.0211	0.4950	Pass
12	600	0.0000	0.0027	0.0027	0.2300	Pass
13	650	0.0198	0.0186	0.0223	0.3150	Pass
14	700	0.0000	0.0027	0.0027	0.1971	Pass
15	750	0.0344	0.0339	0.0360	0.2250	Pass
16	800	0.0000	0.0037	0.0037	0.1725	Pass
17	850	0.0285	0.0287	0.0287	0.1985	Pass
18	900	0.0001	0.0046	0.0049	0.1533	Pass
19	950	0.0099	0.0107	0.0110	0.1776	Pass
20	1000	0.0054	0.0055	0.0055	0.1380	Pass
21	1050	0.0063	0.0055	0.0079	0.1607	Pass
22	1100	0.0053	0.0055	0.0055	0.1255	Pass
23	1150	0.0133	0.0131	0.0140	0.1467	Pass
24	1200	0.0049	0.0052	0.0052	0.1150	Pass
25	1250	0.0141	0.0143	0.0143	0.1350	Pass
26	1300	0.0000	0.0043	0.0043	0.1062	Pass
27	1350	0.0080	0.0085	0.0085	0.1250	Pass
28	1400	0.0000	0.0034	0.0034	0.0986	Pass
29	1450	0.0000	0.0021	0.0040	0.1164	Pass
30	1500	0.0000	0.0024	0.0027	0.0920	Pass
31	1550	0.0073	0.0070	0.0079	0.1089	Pass
32	1600	0.0000	0.0024	0.0024	0.0862	Pass
33	1650	0.0081	0.0082	0.0082	0.1023	Pass
34	1700	0.0000	0.0018	0.0018	0.0812	Pass
35	1750	0.0059	0.0061	0.0064	0.0964	Pass
36	1800	0.0000	0.0018	0.0018	0.0767	Pass
37	1850	0.0000	0.0021	0.0027	0.0912	Pass
38	1900	0.0000	0.0018	0.0018	0.0726	Pass
39	1950	0.0031	0.0043	0.0061	0.0865	Pass
40	2000	0.0000	0.0018	0.0018	0.0690	Pass
Remark						

4.8 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 type="checkbox"/>	≤ 1	<input checked="" 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
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]	50 Hz					
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 type="checkbox"/>	10 min.	<input type="checkbox"/>	120 min.	<input type="checkbox"/>	Other:
	<input checked="" type="checkbox"/>	24 times switching according to Annex B				
Operating mode(s) used	Mode 1					
Remark	---					

See next page.

Measurement data	Port under test	AC mains power input										
Operating mode used during the test	Mode1/ 230 Vac/ 50 Hz											
<table border="1" data-bbox="193 472 1337 685"> <tbody> <tr> <td data-bbox="193 472 999 517">Relative voltage change characteristic dt</td> <td data-bbox="999 472 1337 517">0,0</td> </tr> <tr> <td data-bbox="193 517 999 562">Maximum voltage change d_{MAX}</td> <td data-bbox="999 517 1337 562">3,53%</td> </tr> <tr> <td data-bbox="193 562 999 607">Relative Voltage change d_c</td> <td data-bbox="999 562 1337 607">0,42%</td> </tr> <tr> <td data-bbox="193 607 999 651">Short term flicker P_{ST}</td> <td data-bbox="999 607 1337 651">N/A</td> </tr> <tr> <td data-bbox="193 651 999 685">Long term flicker P_{LT}</td> <td data-bbox="999 651 1337 685">N/A</td> </tr> </tbody> </table>			Relative voltage change characteristic dt	0,0	Maximum voltage change d _{MAX}	3,53%	Relative Voltage change d _c	0,42%	Short term flicker P _{ST}	N/A	Long term flicker P _{LT}	N/A
Relative voltage change characteristic dt	0,0											
Maximum voltage change d _{MAX}	3,53%											
Relative Voltage change d _c	0,42%											
Short term flicker P _{ST}	N/A											
Long term flicker P _{LT}	N/A											
Remark												

5 IMMUNITY TEST RESULTS

5.1 Performance (Compliance) criteria

[According to EN 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
Fast transients	B
Surge transient	B
Injected currents (radio-frequency common mode)	A
Voltage dips and short interruptions	C

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 checked="" 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 type="checkbox"/>	Others : LED's
<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	PASS	---
Radio-frequency electromagnetic fields	N/A	---
Fast transients	PASS	---
Surge transient	PASS	---
Injected currents (radio-frequency common mode)	PASS	---
Voltage dips and short interruptions	PASS	---
<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 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 °C		Relative Humidity air [%]	46.1%
Voltage – Mains [V]	120/230 Vac			
Frequency – Mains [Hz]	60/50 Hz			
Operating mode(s) used	Mode 1			

Test Point	Test Voltage [kV] & Polarity	Coupling type	# of applied discharges / polarity	Discharge interval [s]
<input checked="" type="checkbox"/> Points on conductive surface as indicated in the picture below.	±4	Contact	10	1
<input checked="" type="checkbox"/> Points on non-conductive surface as indicated in the picture below.	±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	Radio-frequency electromagnetic fields immunity	VERDICT: N/A
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During the test it is verified if the equipment under test (EUT) has sufficient immunity against radiated electromagnetic fields. Industrial electromagnetic sources, walkie-talkies, radio transmitters, television transmitters and telecommunication equipment including cellular telephones and other emitting devices can generate these fields.

Requirements

Standard	EN 55014-2			
Basic standard	EN 61000-4-3			
Port under test	Enclosure			
Frequency range	Test level	Modulation	Dwell time	Step size
80 – 1000 MHz	3 V/m	80% AM (1kHz)	≥ 0,5 s	≤ 1%
<u>Supplementary information:</u>				

Performed tests

Test method	<input checked="" type="checkbox"/>	EN 61000-4-3	<input type="checkbox"/>	EN 61000-4-20		
Test set-up	<input checked="" type="checkbox"/>	Equipment on the table (0,8 m height)				
	<input type="checkbox"/>	Equipment standing on floor (0,05—0,15 m height)				
Voltage—Mains [V]	230 Vac					
Frequency—Mains [Hz]	50 Hz					
Operating mode(s) used	Mode 1					
Frequency range (applied)	Antenna Polarization	Test level (applied)	Modulation (applied)	Dwell time (applied)	Remark	
80—1000 MHz (step size 1%)	H	3 V/m	80% AM (1kHz)	3 s		
	V	3 V/m	80% AM (1kHz)	3 s		
Exposed side of the EUT	<input checked="" type="checkbox"/>	Front (0°)	<input checked="" type="checkbox"/>	Right (90°)	<input type="checkbox"/>	Top
	<input checked="" type="checkbox"/>	Rear (180°)	<input checked="" type="checkbox"/>	Left (270°)	<input type="checkbox"/>	Bottom
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.					
<u>Supplementary information:</u>						

5.5	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 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	2 min. / polarity	
<input type="checkbox"/> DC input-output power ²⁾	± 500 V	5 KHz	2 min. / polarity	
<input type="checkbox"/> Signal and Control lines ³⁾	± 500 V	5 KHz	2 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]	120/230 Vac		
Frequency – Mains [Hz]	60/50 Hz		
Operating mode(s) used	Mode 1		
Test Set-up	<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 type="checkbox"/>	Artificial hand applied.	
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		
				<input checked="" type="checkbox"/> CDN	<input type="checkbox"/> Clamp	<input type="checkbox"/> Clamp
AC / DC mains power input	1 kV	5 KHz	2 min	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC / DC power output		5 KHz		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethernet / LAN		5 KHz		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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.					

5.6	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 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	N/A	90
AC input power ¹⁾	- 1 kV	N/A	270
¹⁾ Tests with lower voltages are not required.			

Performed tests

Voltage – Mains [V]	120/230 Vac
Frequency – Mains [Hz]	60/50 Hz
Operating mode(s) used	Mode 1
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 checked="" type="checkbox"/> AC mains input power	Line to Earth	+2 kV	90	
<input checked="" type="checkbox"/> AC mains input power	Line to Earth	-2 kV	270	
<input checked="" type="checkbox"/> AC mains input power	Neutral to Earth	+2 kV	90	
<input checked="" 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 or data was observed.			
<u>Supplementary information:</u>				

5.7 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 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 ₀		
<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		
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 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. ⁴⁾ Applicable only to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.			

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]	120/230 Vac	Frequency – Mains [Hz] 60/50 Hz
Operating mode(s) used	Mode 1	
Test set-up	<input 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.	

Port(s) under test	Test Level (applied)	Injection method	Dwell time (applied)	Remark
AC mains power input	3 V	CDN-M3	3 s	

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.
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Supplementary information:

5.8	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

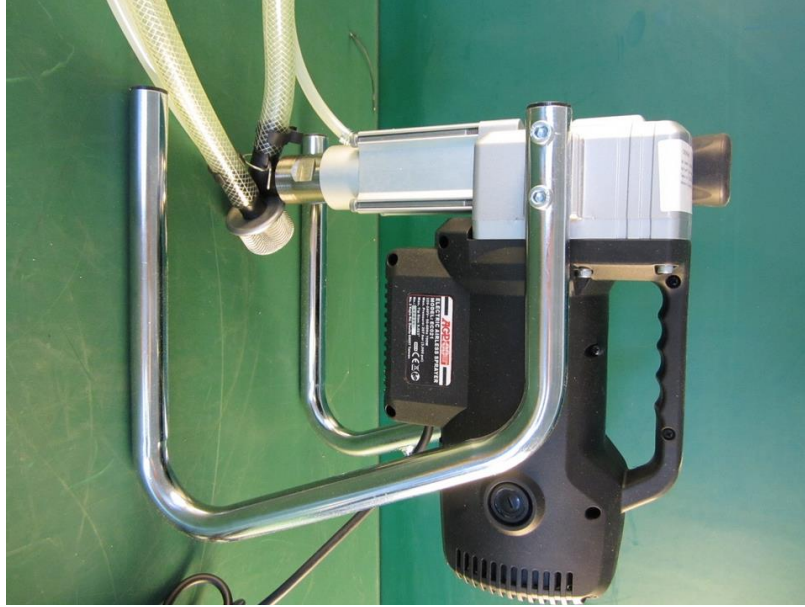
Standard	EN 55014-2			
Basic standard	EN 61000-4-11			
# of dips & interruptions	3 dips / interruptions for each test level and phase angle			
Interval between events	≥ 10 seconds			
Port	Test level ¹⁾	Period (Cycles)		Performance Criteria
		50 Hz	60 Hz	
AC input power port	$U_{NOM} - 100\%$	0,5	0,5	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	/	10	3	0, 180
230	L-N	40	10	/	10	3	0, 180
230	L-N	70	25	/	10	3	0, 180
120	L-N	0	/	0,5	10	3	0, 180
120	L-N	40	/	12	10	3	0, 180
120	L-N	70	/	30	10	3	0, 180
Operating mode(s) used		Mode 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 was observed.					
<u>Supplementary information:</u>							

6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

EUT PHOTOS



7 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%.

Conducted Emissions

The measurement uncertainty is evaluated as ± 2.26 dB.

Disturbance Power Emission

The measurement uncertainty is evaluated as ± 3.34 dB.

Harmonic Current Emission

The measurement uncertainty is evaluated as 0.1%.

Voltage Fluctuation and Flicker

The measurement uncertainty is evaluated as $\pm 4\%$.

8 USED EQUIPMENT

Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Test Receiver	R&S	ESR3	102608	2019/07/03	2020/07/02
Artificial Mains Network	R&S	ENV4200	848411/010	2020/01/08	2021/01/07
LISN	R&S	ENV216	100092	2019/07/09	2020/07/08
Coaxial Cable(9m)	Belden	8129	SR2-H	2019/08/15	2020/08/14
DEKRA-EMI system	DEKRA	Version 1.0	SR2-H	N/A	N/A

Disturbance Power Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Test Receiver	R&S	ESC17	100879	2019/07/03	2020/07/02
Absorbing Clamp	Luthi	MDS 21B	P1602169770	2020/01/16	2021/01/15
Coaxial Cable(5m)	Schwarzbeck	RG-223U	SR2-H-PT	2019/08/15	2020/08/14
DEKRA-EMI system	DEKRA	Version 1.0	SR2-H	N/A	N/A

Power Harmonics / SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Emission Tester	EMC-Partner	HAR-1000-1P	109	2019/12/17	2020/12/16

Voltage Fluctuation and Flicker / SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Emission Tester	EMC-Partner	HAR-1000-1P	109	2019/12/17	2020/12/16

Electrostatic Discharge / SR8-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Electrostatic Simulator Discharge	NoiseKen	ESS-2002	ESS04Z3759	2019/06/11	2020/06/09
Horizontal Coupling Plane (HCP)	QuieTek	HCP AL50	N/A	N/A	N/A
Vertical Coupling Plane (VCP)	QuieTek	HCP AL50	N/A	N/A	N/A

Electrical fast transient/ Brust / SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Immunity Tester	Teseq	NSG 3060	1424	2019/07/09	2020/07/08
Clamper	Haefely	093 506.1	083 593-23	2020/01/02	2021/01/01

Surge / SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Immunity Tester	Teseq	NSG 3060	1424	2019/07/09	2020/07/08
CDN	Teseq	CDN 118	47916	2020/01/02	2021/01/01
CDN	Teseq	CDN 118	47917	2020/01/02	2021/01/01

Conducted susceptibility / SR7-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Compact Immunity Test System	Teseq	NSG 4070b-80	41145	2019/12/17	2020/12/16
CDN	Schafner	CDN M016	16337	2019/10/07	2020/10/06
CDN	Schafner	CDN T400	16905	2019/10/07	2020/10/06
CDN	Teseq	CDN T800	52751	2019/10/24	2020/10/24
CDN	Teseq	CDN T8-10	38994	2019/10/07	2020/10/06
Immunity Injection Clamp	Schafner	KENZ801	15928	2019/10/14	2020/10/13
6Db PAD	JFW	50FHAO-06-100	N/A	N/A	N/A

Voltage dips and interruptions / SR7-H

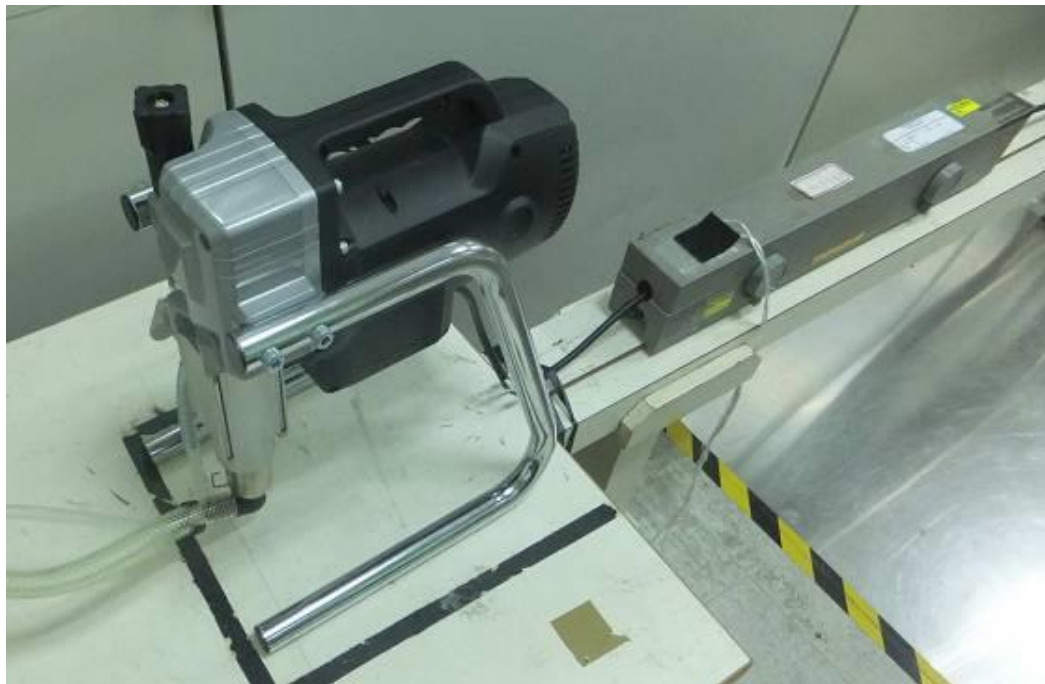
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Immunity Tester	Teseq	NSG 3060	1424	2019/07/09	2020/07/08

9 TEST PHOTOS

Conducted disturbance voltage at mains terminals



Disturbance power



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