



Test report No:
6018737.50

TEST REPORT

Electromagnetic Compatibility (EMC)

Identification of item tested	Reciprocating saw
Trademark	AGP
Model and /or type reference	RS26, 50306, 50305, 200SP, PS202SP, PS201SP, 203SP, 201SP
Ratings	110-120 Vac; 50~60 Hz; 1500 W; Class II 220-240 Vac; 50~60 Hz; 1500 W; Class II
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	2020-07-22
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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
6018737.50	2020-07-22	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, all models are identical except model name.

Therefore, model RS26 was selected for the full test and the result is also representative for all models as well.

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item	Reciprocating saw
Model / Type number	RS26, 50306, 50305, 200SP, PS202SP, PS201SP, 203SP, 201SP
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

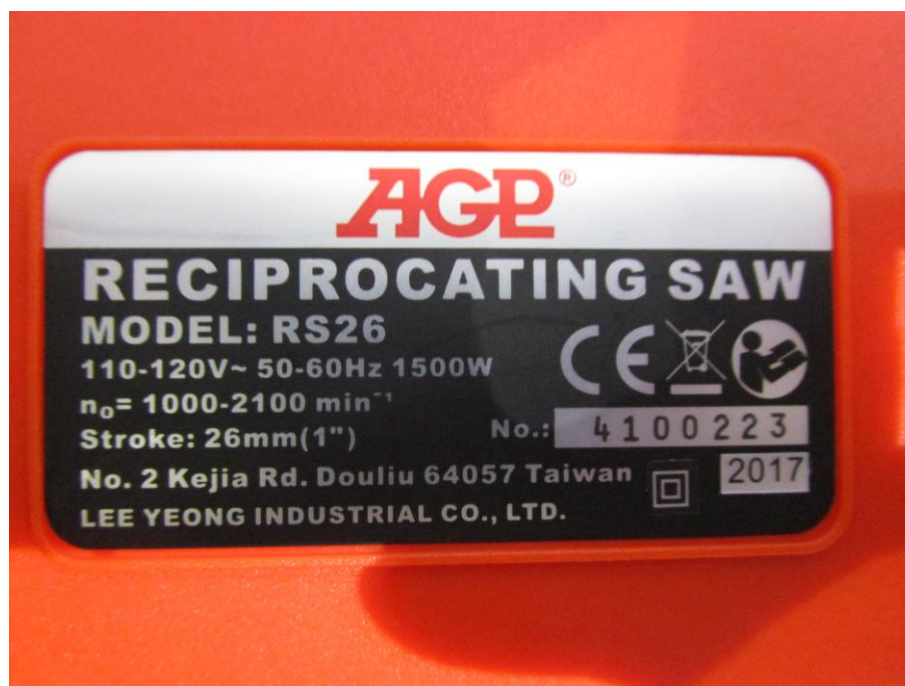
Rated Power	220-240 Vac; 50~60 Hz; 1500 W; Class II 110-120 Vac; 50~60 Hz; 1500 W; Class II
Clock frequencies	Not provided
Other parameters.....	N/A
Mounting position.....	<input checked="" type="checkbox"/> Table top equipment <input type="checkbox"/> Wall/Ceiling mounted equipment <input type="checkbox"/> Floor standing equipment <input 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	April 2019
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

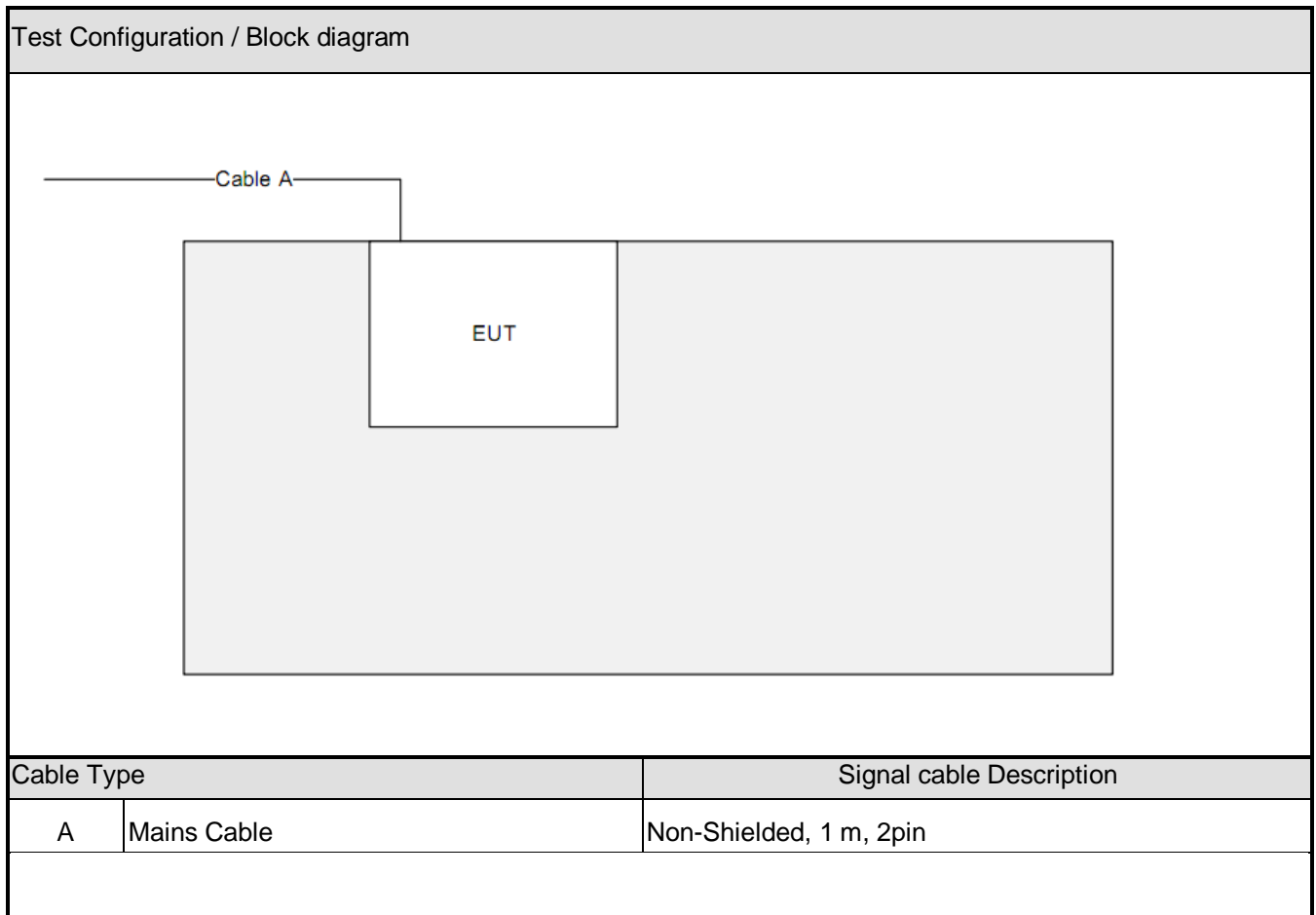
Port name and description	Connected to / Termination	Cable		
		Length used during test [m]	Attached during test	Shielded
N/A			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>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

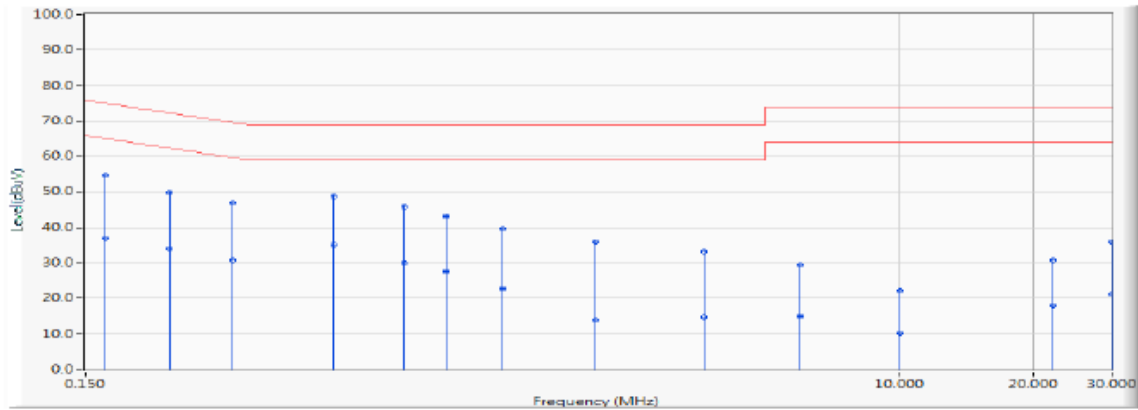
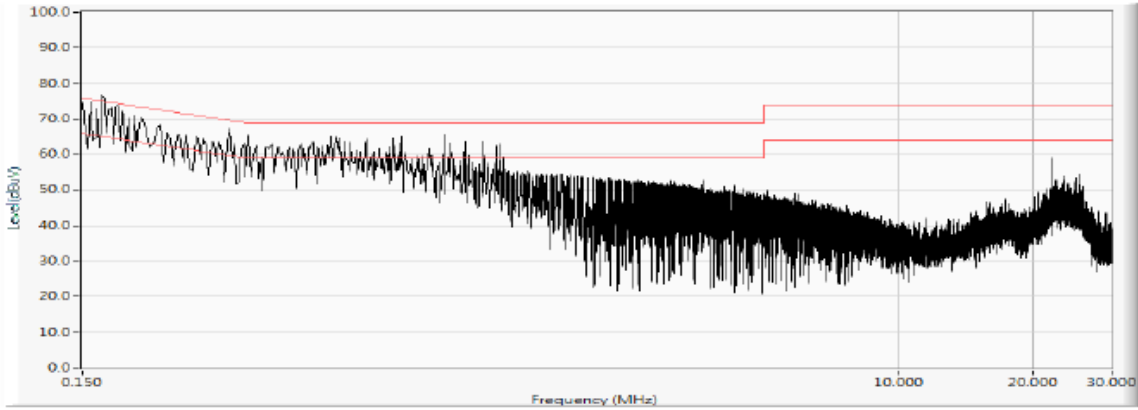
Performed measurements

Scan range (0,9 – 1,1 U _N)	<input type="checkbox"/> 198 – 264 V _{AC}	<input type="checkbox"/> 207 – 253 V _{AC}	<input checked="" type="checkbox"/> 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]	230 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		
Remark	---		

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

For 220-240 V model

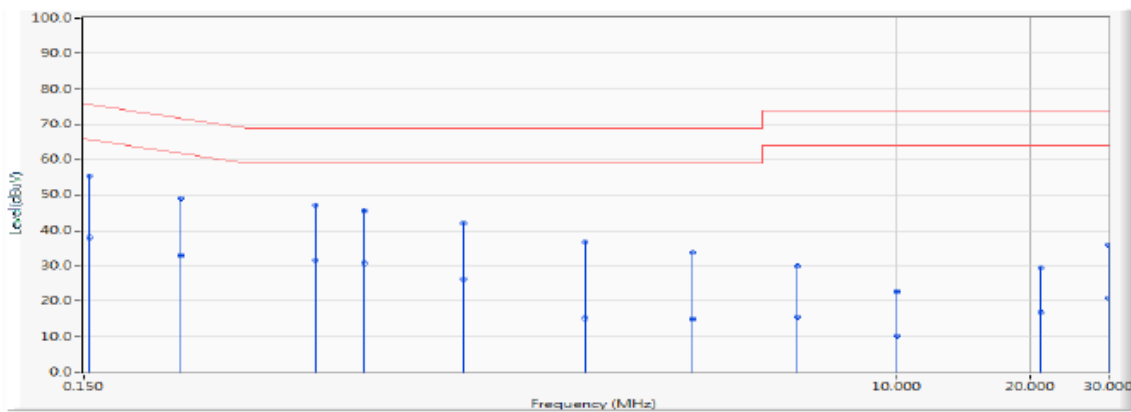
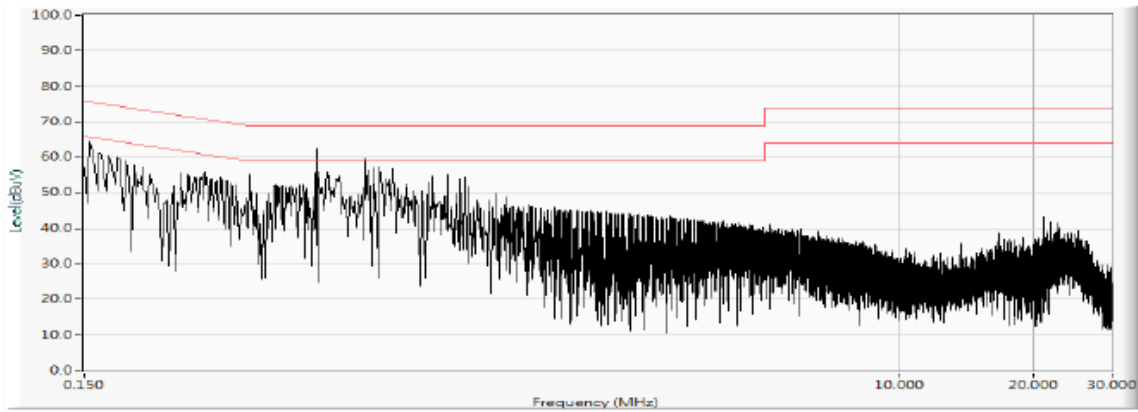
Line



Measurement data				Port under test		AC mains power input		
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.166	9.680	44.912	54.592	-20.570	75.163	QUASIPeAK
2		0.166	9.680	27.427	37.107	-30.697	67.804	AVERAGE
3		0.232	9.680	40.293	49.973	-22.424	72.397	QUASIPeAK
4		0.232	9.680	24.377	34.057	-29.796	63.853	AVERAGE
5		0.320	9.680	37.204	46.884	-22.856	69.740	QUASIPeAK
6		0.320	9.680	21.248	30.928	-29.129	60.058	AVERAGE
7	*	0.540	9.690	39.131	48.821	-20.179	69.000	QUASIPeAK
8		0.540	9.690	25.516	35.207	-23.793	59.000	AVERAGE
9		0.776	9.741	36.050	45.791	-23.209	69.000	QUASIPeAK
10		0.776	9.741	20.386	30.128	-28.872	59.000	AVERAGE
11		0.964	9.782	33.273	43.055	-25.945	69.000	QUASIPeAK
12		0.964	9.782	17.831	27.613	-31.387	59.000	AVERAGE
13		1.288	9.793	30.007	39.800	-29.200	69.000	QUASIPeAK
14		1.288	9.793	12.908	22.701	-36.299	59.000	AVERAGE
15		2.088	9.800	26.066	35.866	-33.134	69.000	QUASIPeAK
16		2.088	9.800	4.265	14.065	-44.935	59.000	AVERAGE
17		3.648	9.808	23.307	33.115	-35.885	69.000	QUASIPeAK
18		3.648	9.808	4.946	14.755	-44.245	59.000	AVERAGE
19		6.000	9.877	19.627	29.504	-44.496	74.000	QUASIPeAK
20		6.000	9.877	5.218	15.094	-48.906	64.000	AVERAGE
21		10.000	10.090	12.223	22.313	-51.687	74.000	QUASIPeAK
22		10.000	10.090	0.000	10.090	-53.910	64.000	AVERAGE
23		22.172	10.425	20.360	30.785	-43.215	74.000	QUASIPeAK
24		22.172	10.425	7.603	18.028	-45.972	64.000	AVERAGE
25		30.000	10.580	25.247	35.827	-38.173	74.000	QUASIPeAK
26		30.000	10.580	10.499	21.079	-42.921	64.000	AVERAGE
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



Measurement data			Port under test		AC mains power input			
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.154	9.681	45.801	55.482	-20.301	75.783	QUASIPeAK
2		0.154	9.681	28.263	37.944	-30.745	68.689	AVERAGE
3		0.248	9.680	39.465	49.145	-22.701	71.846	QUASIPeAK
4		0.248	9.680	23.171	32.851	-30.215	63.066	AVERAGE
5		0.496	9.683	37.489	47.172	-21.828	69.000	QUASIPeAK
6		0.496	9.683	21.921	31.604	-27.396	59.000	AVERAGE
7		0.640	9.712	35.985	45.697	-23.303	69.000	QUASIPeAK
8		0.640	9.712	21.103	30.815	-28.185	59.000	AVERAGE
9		1.064	9.791	32.323	42.113	-26.887	69.000	QUASIPeAK
10		1.064	9.791	16.510	26.301	-32.699	59.000	AVERAGE
11		2.000	9.800	26.830	36.630	-32.370	69.000	QUASIPeAK
12		2.000	9.800	5.371	15.171	-43.829	59.000	AVERAGE
13		3.500	9.815	24.091	33.907	-35.093	69.000	QUASIPeAK
14		3.500	9.815	5.146	14.961	-44.039	59.000	AVERAGE
15		6.000	9.880	20.195	30.075	-43.925	74.000	QUASIPeAK
16		6.000	9.880	5.661	15.541	-48.459	64.000	AVERAGE
17		10.000	10.080	12.774	22.854	-51.146	74.000	QUASIPeAK
18		10.000	10.080	0.146	10.226	-53.774	64.000	AVERAGE
19		21.116	10.359	19.143	29.502	-44.498	74.000	QUASIPeAK
20		21.116	10.359	6.657	17.016	-46.984	64.000	AVERAGE
21		30.000	10.450	25.423	35.873	-38.127	74.000	QUASIPeAK
22		30.000	10.450	10.444	20.894	-43.106	64.000	AVERAGE
Remark								

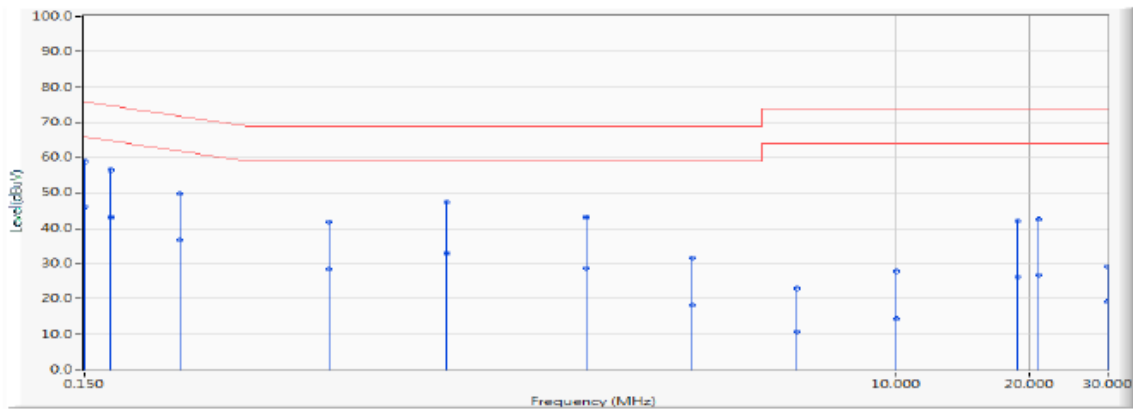
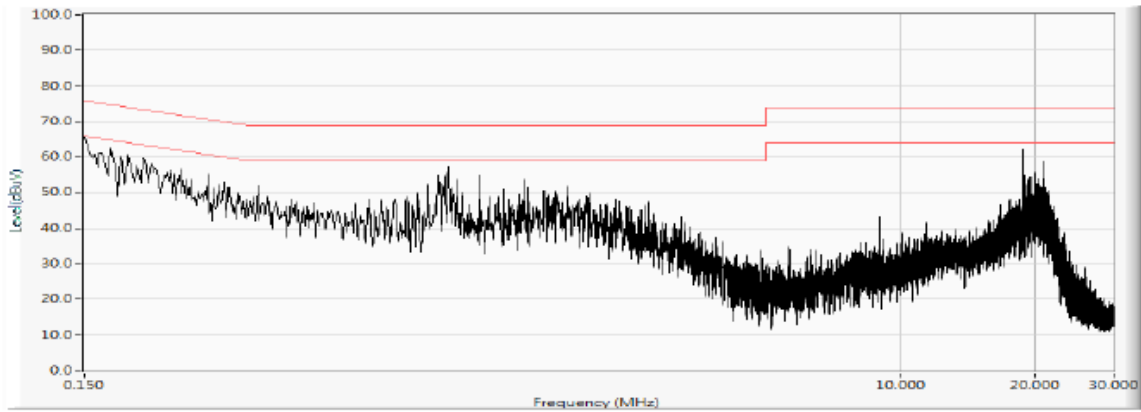
Performed measurements

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"/>	110 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"/>	L2	<input type="checkbox"/>	L3
	<input type="checkbox"/>	DC mains input power	<input type="checkbox"/>	Positive (+)		<input type="checkbox"/>	Negative (-)			
Voltage – Mains [V]	110 Vac									
Frequency – Mains [Hz]	60 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/ 110 Vac/ 60 Hz

For 110-120 V model

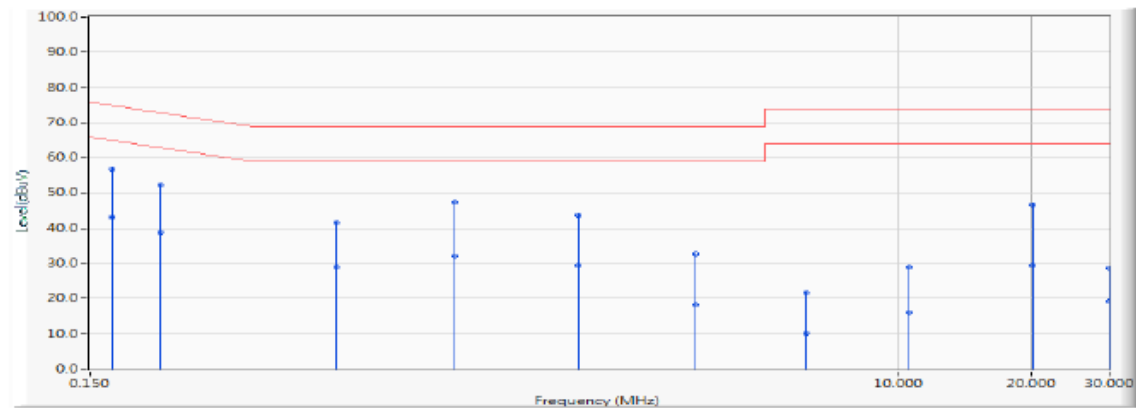
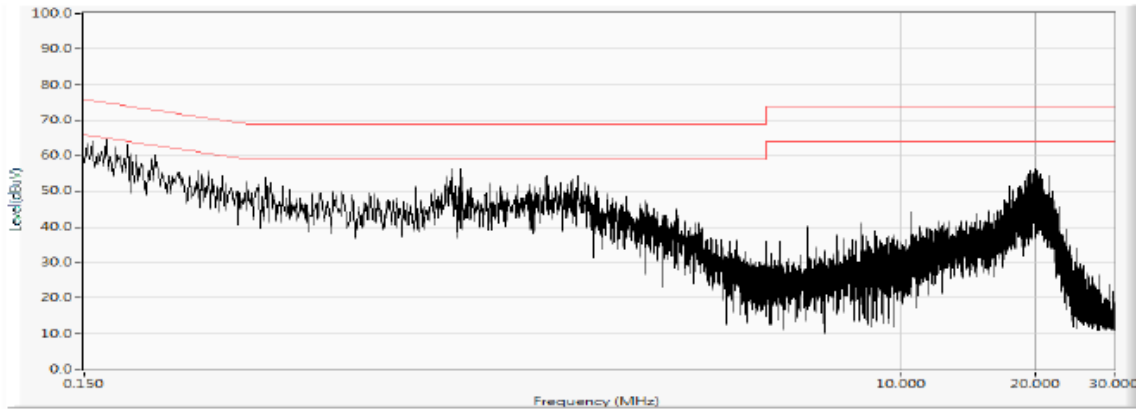
Line



Measurement data			Port under test		AC mains power input			
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.150	9.680	49.430	59.110	-16.890	76.000	QUASIPeAK
2		0.150	9.680	36.326	46.006	-22.994	69.000	AVERAGE
3		0.172	9.680	46.790	56.470	-18.400	74.869	QUASIPeAK
4		0.172	9.680	33.586	43.266	-24.119	67.385	AVERAGE
5		0.246	9.680	40.214	49.894	-22.019	71.913	QUASIPeAK
6		0.246	9.680	27.175	36.855	-26.306	63.161	AVERAGE
7		0.532	9.688	32.117	41.806	-27.194	69.000	QUASIPeAK
8		0.532	9.688	18.839	28.527	-30.473	59.000	AVERAGE
9		0.980	9.786	37.556	47.341	-21.659	69.000	QUASIPeAK
10		0.980	9.786	23.181	32.967	-26.033	59.000	AVERAGE
11		2.020	9.800	33.471	43.271	-25.729	69.000	QUASIPeAK
12		2.020	9.800	18.906	28.706	-30.294	59.000	AVERAGE
13		3.500	9.807	21.708	31.516	-37.484	69.000	QUASIPeAK
14		3.500	9.807	8.306	18.114	-40.886	59.000	AVERAGE
15		6.000	9.877	13.242	23.119	-50.881	74.000	QUASIPeAK
16		6.000	9.877	0.739	10.616	-53.384	64.000	AVERAGE
17		10.000	10.090	17.892	27.982	-46.018	74.000	QUASIPeAK
18		10.000	10.090	4.415	14.505	-49.495	64.000	AVERAGE
19		18.812	10.396	31.582	41.978	-32.022	74.000	QUASIPeAK
20		18.812	10.396	15.798	26.194	-37.806	64.000	AVERAGE
21		21.008	10.417	32.325	42.742	-31.258	74.000	QUASIPeAK
22		21.008	10.417	16.318	26.735	-37.265	64.000	AVERAGE
23		30.000	10.580	18.511	29.091	-44.909	74.000	QUASIPeAK
24		30.000	10.580	8.754	19.334	-44.666	64.000	AVERAGE
Remark								

Measurement data	Port under test	AC mains power input
Operating mode / voltage / frequency used during the test		Mode 1/ 110 Vac/ 60 Hz

Neutral



Measurement data				Port under test		AC mains power input		
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.168	9.680	47.123	56.803	-18.261	75.064	QUASIPeAK
2		0.168	9.680	33.404	43.084	-24.579	67.662	AVERAGE
3		0.216	9.680	42.560	52.240	-20.748	72.987	QUASIPeAK
4		0.216	9.680	29.267	38.947	-25.749	64.696	AVERAGE
5		0.540	9.690	31.911	41.601	-27.399	69.000	QUASIPeAK
6		0.540	9.690	19.315	29.005	-29.995	59.000	AVERAGE
7		1.000	9.790	37.762	47.552	-21.448	69.000	QUASIPeAK
8		1.000	9.790	22.354	32.144	-26.856	59.000	AVERAGE
9		1.892	9.799	33.833	43.632	-25.368	69.000	QUASIPeAK
10		1.892	9.799	19.658	29.457	-29.543	59.000	AVERAGE
11		3.500	9.815	22.968	32.783	-36.217	69.000	QUASIPeAK
12		3.500	9.815	8.545	18.360	-40.640	59.000	AVERAGE
13		6.212	9.890	11.761	21.652	-52.348	74.000	QUASIPeAK
14		6.212	9.890	0.221	10.112	-53.888	64.000	AVERAGE
15		10.548	10.106	18.827	28.933	-45.067	74.000	QUASIPeAK
16		10.548	10.106	5.914	16.020	-47.980	64.000	AVERAGE
17		20.172	10.360	36.200	46.560	-27.440	74.000	QUASIPeAK
18		20.172	10.360	19.173	29.533	-34.467	64.000	AVERAGE
19		30.000	10.450	18.118	28.568	-45.432	74.000	QUASIPeAK
20		30.000	10.450	8.724	19.174	-44.826	64.000	AVERAGE
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
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Standard	EN 55014-1
Basic standard	EN 55016-2-2

Limits – Tools

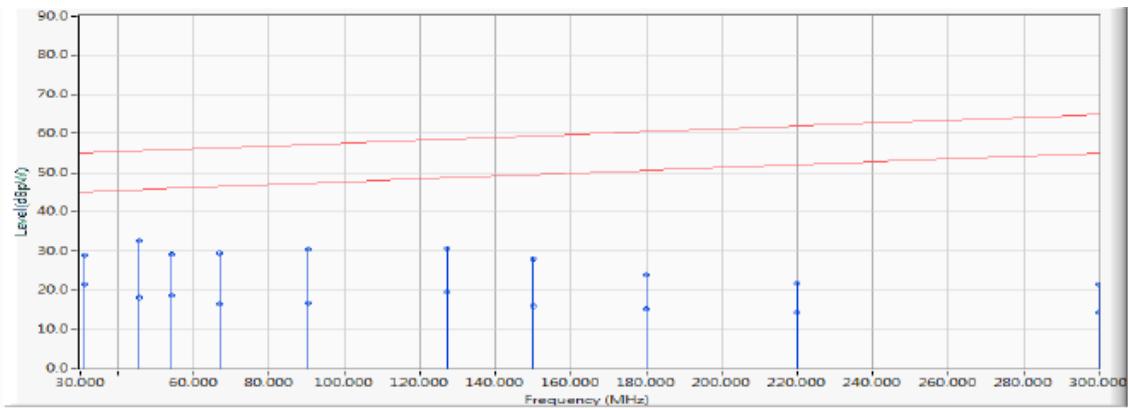
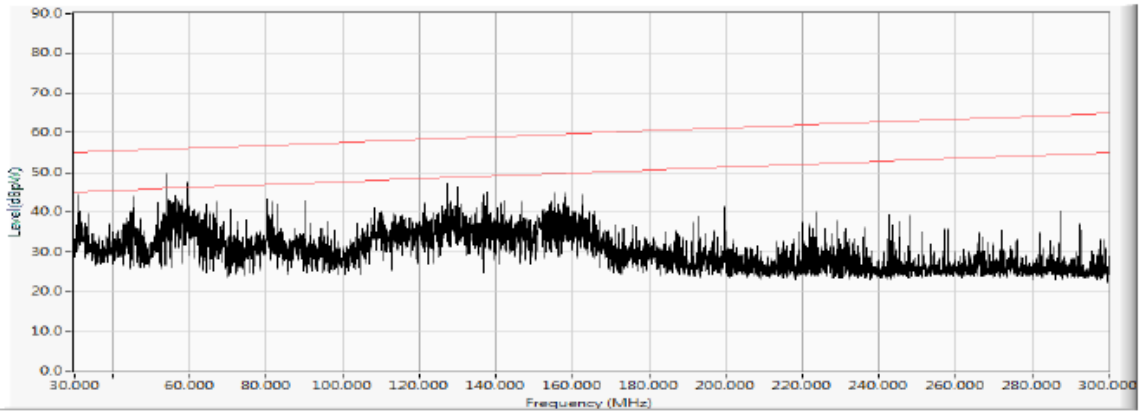
Frequency range [MHz]	Limit: QP [dB(pW)]	Limit: AV [dB(pW)]	IF BW	Detector(s)
30 - 300	45 – 55 ¹⁾	35 – 45 ¹⁾	120 KHz	QP, CAV
Margin				
200 - 300	0 – 10 ¹⁾	---	120 KHz	QP, CAV
¹⁾ The limit increases linearly with the frequency.				
<input type="checkbox"/>	Rated power below 700 W			Limits as above
<input 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 type="checkbox"/>	198 – 264 V _{AC}	<input type="checkbox"/>	207 – 253 V _{AC}	<input checked="" type="checkbox"/>	230 V _{AC}
Voltage – Mains [V]	230 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 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

For 220-240V model



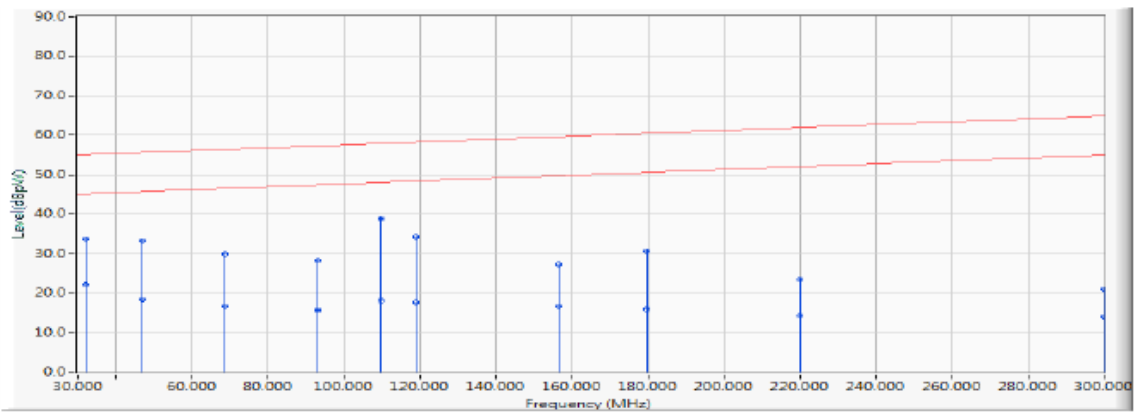
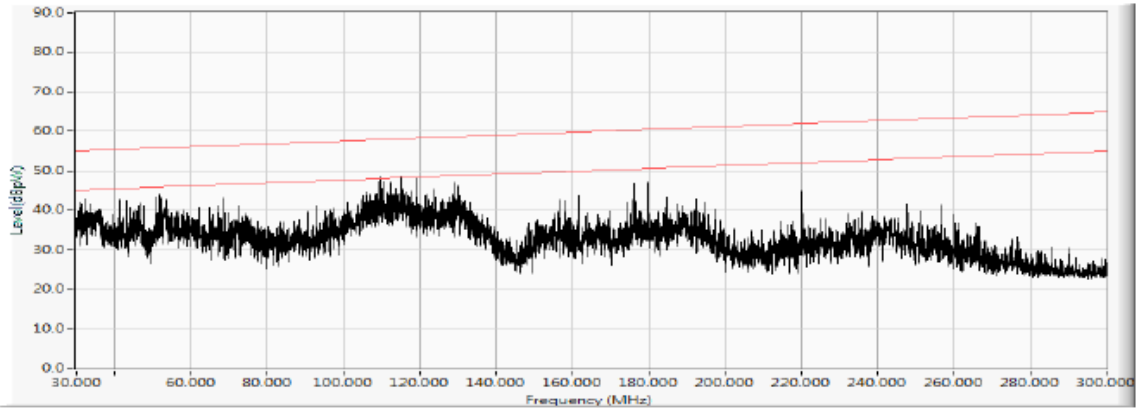
Measurement data				Port under test		AC mains power input		
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBpW)	Measure Level (dBpW)	Margin (dB)	Limit (dBpW)	Detector Type
1		30.900	8.601	20.416	29.017	-26.112	55.128	QUASIPeAK
2	*	30.900	8.601	12.818	21.419	-23.710	45.128	AVERAGE
3		45.360	7.452	25.114	32.566	-24.230	56.796	QUASIPeAK
4		45.360	7.452	10.741	18.193	-28.603	46.796	AVERAGE
5		54.060	7.451	21.841	29.293	-28.265	57.558	QUASIPeAK
6		54.060	7.451	11.134	18.585	-28.972	47.558	AVERAGE
7		67.020	6.294	23.235	29.529	-28.962	58.491	QUASIPeAK
8		67.020	6.294	10.067	16.361	-32.130	48.491	AVERAGE
9		90.420	6.719	23.803	30.522	-29.270	59.791	QUASIPeAK
10		90.420	6.719	9.990	16.709	-33.083	49.791	AVERAGE
11		127.200	6.491	24.216	30.707	-30.567	61.274	QUASIPeAK
12		127.200	6.491	12.949	19.440	-31.834	51.274	AVERAGE
13		150.000	5.755	22.225	27.980	-34.009	61.990	QUASIPeAK
14		150.000	5.755	10.247	16.002	-35.988	51.990	AVERAGE
15		180.000	5.171	18.701	23.872	-38.910	62.782	QUASIPeAK
16		180.000	5.171	10.109	15.280	-37.501	52.782	AVERAGE
17		220.000	5.174	16.540	21.713	-41.940	63.653	QUASIPeAK
18		220.000	5.174	9.100	14.274	-39.379	53.653	AVERAGE
19		300.000	5.585	15.998	21.583	-43.417	65.000	QUASIPeAK
20		300.000	5.585	8.595	14.180	-40.820	55.000	AVERAGE
Remark								

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"/>	110 V _{AC}
Voltage – Mains [V]	110 Vac					
Frequency – Mains [Hz]	60 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/ 110 Vac/ 60 Hz

For 110-120V model



Measurement data				Port under test		AC mains power input		
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBpW)	Measure Level (dBpW)	Margin (dB)	Limit (dBpW)	Detector Type
1	*	32.040	8.475	25.308	33.783	-21.503	55.286	QUASIPeAK
2		32.040	8.475	13.714	22.189	-23.096	45.286	AVERAGE
3		46.860	7.419	25.931	33.350	-23.586	56.937	QUASIPeAK
4		46.860	7.419	10.965	18.384	-28.553	46.937	AVERAGE
5		68.640	5.993	23.903	29.895	-28.699	58.595	QUASIPeAK
6		68.640	5.993	10.630	16.623	-31.972	48.595	AVERAGE
7		93.120	6.708	21.415	28.122	-31.797	59.919	QUASIPeAK
8		93.120	6.708	8.996	15.703	-34.216	49.919	AVERAGE
9		109.560	6.713	32.132	38.846	-21.780	60.625	QUASIPeAK
10		109.560	6.713	11.422	18.135	-32.490	50.625	AVERAGE
11		118.920	6.746	27.401	34.147	-26.834	60.981	QUASIPeAK
12		118.920	6.746	10.757	17.503	-33.478	50.981	AVERAGE
13		156.720	5.570	21.612	27.183	-34.997	62.180	QUASIPeAK
14		156.720	5.570	11.168	16.739	-35.441	52.180	AVERAGE
15		179.760	5.175	25.391	30.565	-32.210	62.776	QUASIPeAK
16		179.760	5.175	10.655	15.830	-36.946	52.776	AVERAGE
17		219.900	5.172	18.191	23.363	-40.288	63.651	QUASIPeAK
18		219.900	5.172	9.164	14.336	-39.315	53.651	AVERAGE
19		300.000	5.585	15.306	20.891	-44.109	65.000	QUASIPeAK
20		300.000	5.585	8.464	14.049	-40.951	55.000	AVERAGE
Remark								

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"/> – 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 ≤ 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 ≤ N ₁ /4	Verdict
0,15				
0,5				
1,4				
30				

Supplementary information: ---

4.7 Harmonic current emissions	VERDICT: PASS
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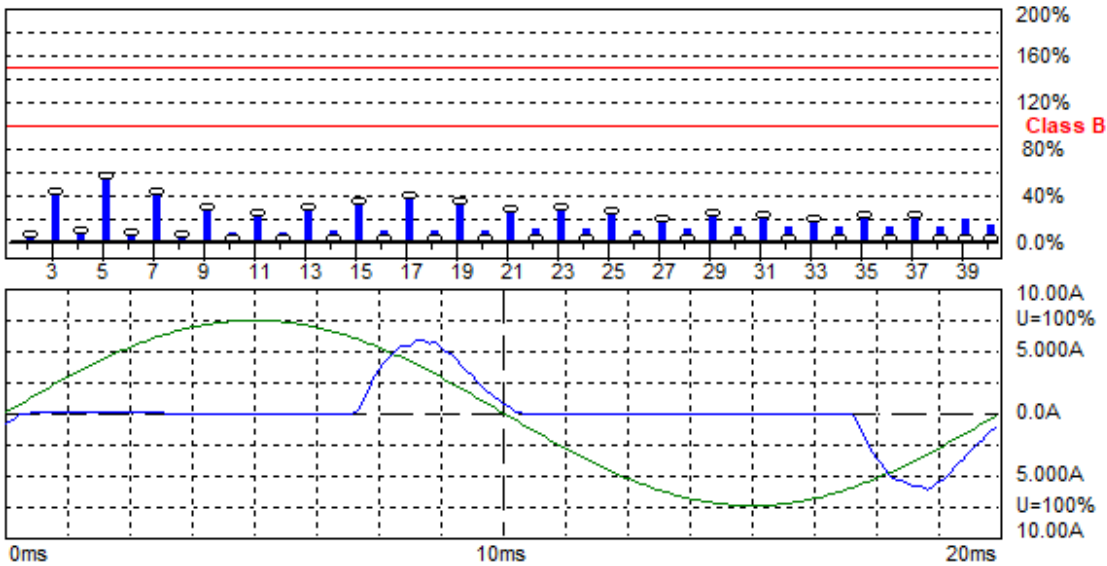
Standard	EN 61000-3-2	
Exclusions (For these categories of equipment, limits are not specified in the EN 61000-3-2 standard)	<input type="checkbox"/>	Arc welding equipment intended for professional use.
	<input type="checkbox"/>	System(s) with nominal voltage(s) less than 220 V _{AC} (line-to-neutral).
	<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



Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)

2019/4/16 上午 11:49:01

Urms = 230.1 V P = 169.6 W THC = 1.694 A
 Irms = 2.271 A pf = 0.325

Range: 10 A
 V-nom: 230 V
 TestTime: 5 min (100%)

Test completed, Result: PASSED

Measurement data				Port under test		AC mains power input				
Urms =	230.1V	Freq =	49.987	Range:	10 A					
Irms =	2.271A	Ipk =	6.343A	cf =	2.794					
P =	169.6W	S =	522.5VA	pf =	0.325					
THDi =	106 %	THDu =	0.10 %	Class B						
Test - Time :		5min		(100 %)						
Test completed, Result: PASSED										
Order	Freq. [Hz]	Iavg [A]	Irms [A]	Irms% [%]	Irms%L [%]	Imax [A]	Imax% [%]	Imax%L [%]	Limit [A]	Status
1	50	1.6360	1.5942	70.215		1.7456	76.882			0.00
2	100	0.0511	0.0482	2.1237	2.9764	0.0549	2.4194	3.3908	1.6200	0.00
3	150	1.3819	1.3422	59.113	38.903	1.4594	64.274	42.300	3.4500	0.00
4	200	0.0402	0.0378	1.6667	5.8669	0.0433	1.9086	6.7186	0.6450	0.00
5	250	0.9158	0.8923	39.301	52.183	0.9589	42.231	56.074	1.7100	0.00
6	300	0.0260	0.0250	1.1022	5.5610	0.0281	1.2366	6.2391	0.4500	0.00
7	350	0.4544	0.4456	19.624	38.576	0.4688	20.645	40.584	1.1550	0.00
8	400	0.0123	0.0146	0.6452	4.2459	0.0159	0.6989	4.5998	0.3450	0.00
9	450	0.1589	0.1575	6.9355	26.245	0.1611	7.0968	26.855	0.6000	0.00
10	500	0.0000	0.0098	0.4301	3.5383	0.0122	0.5376	4.4228	0.2760	0.00
11	550	0.1035	0.1038	4.5699	20.962	0.1056	4.6505	21.331	0.4950	0.00
12	600	0.0000	0.0116	0.5108	5.0420	0.0134	0.5914	5.8381	0.2300	0.00
13	650	0.0850	0.0861	3.7903	27.320	0.0873	3.8441	27.708	0.3150	0.00
14	700	0.0009	0.0134	0.5914	6.8112	0.0146	0.6452	7.4304	0.1971	0.00
15	750	0.0700	0.0690	3.0376	30.653	0.0714	3.1452	31.738	0.2250	0.00
16	800	0.0000	0.0116	0.5108	6.7227	0.0128	0.5645	7.4304	0.1725	0.00
17	850	0.0746	0.0732	3.2258	36.892	0.0763	3.3602	38.430	0.1985	0.00
18	900	0.0000	0.0098	0.4301	6.3689	0.0110	0.4839	7.1650	0.1533	0.00
19	950	0.0575	0.0574	2.5269	32.299	0.0586	2.5806	32.986	0.1776	0.00
20	1000	0.0000	0.0098	0.4301	7.0765	0.0104	0.4570	7.5188	0.1380	0.00
21	1050	0.0392	0.0385	1.6935	23.926	0.0415	1.8280	25.825	0.1607	0.00
22	1100	0.0000	0.0098	0.4301	7.7842	0.0104	0.4570	8.2707	0.1255	0.00
23	1150	0.0400	0.0391	1.7204	26.620	0.0415	1.8280	28.284	0.1467	0.00
24	1200	0.0000	0.0079	0.3495	6.8996	0.0092	0.4032	7.9611	0.1150	0.00
25	1250	0.0309	0.0317	1.3978	23.510	0.0323	1.4247	23.962	0.1350	0.00
26	1300	0.0000	0.0067	0.2957	6.3247	0.0079	0.3495	7.4746	0.1062	0.00
27	1350	0.0201	0.0195	0.8602	15.625	0.0208	0.9140	16.602	0.1250	0.00
28	1400	0.0000	0.0067	0.2957	6.8112	0.0079	0.3495	8.0496	0.0986	0.00
29	1450	0.0251	0.0244	1.0753	20.978	0.0262	1.1559	22.551	0.1164	0.00
30	1500	0.0000	0.0073	0.3226	7.9611	0.0085	0.3763	9.2880	0.0920	0.00
31	1550	0.0229	0.0238	1.0484	21.864	0.0238	1.0484	21.864	0.1089	0.00
32	1600	0.0000	0.0079	0.3495	9.1995	0.0085	0.3763	9.9072	0.0862	0.00
33	1650	0.0166	0.0165	0.7258	16.113	0.0177	0.7796	17.307	0.1023	0.00
34	1700	0.0000	0.0073	0.3226	9.0226	0.0079	0.3495	9.7745	0.0812	0.00
35	1750	0.0187	0.0183	0.8065	18.989	0.0201	0.8871	20.888	0.0964	0.00
36	1800	0.0000	0.0061	0.2688	7.9611	0.0073	0.3226	9.5533	0.0767	0.00
37	1850	0.0175	0.0177	0.7796	19.405	0.0183	0.8065	20.074	0.0912	0.00
38	1900	0.0000	0.0061	0.2688	8.4034	0.0073	0.3226	10.084	0.0726	0.00
39	1950	0.0004	0.0128	0.5645	14.811	0.0140	0.6183	16.222	0.0865	0.00
40	2000	0.0000	0.0067	0.2957	9.7302	0.0079	0.3495	11.499	0.0690	0.00
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"> <tbody> <tr> <td data-bbox="193 477 999 521">Relative voltage change characteristic dt</td> <td data-bbox="999 477 1337 521">0,0</td> </tr> <tr> <td data-bbox="193 521 999 566">Maximum voltage change d_{MAX}</td> <td data-bbox="999 521 1337 566">0,97%</td> </tr> <tr> <td data-bbox="193 566 999 611">Relative Voltage change d_C</td> <td data-bbox="999 566 1337 611">1,08%</td> </tr> <tr> <td data-bbox="193 611 999 656">Short term flicker P_{ST}</td> <td data-bbox="999 611 1337 656">0,09</td> </tr> <tr> <td data-bbox="193 656 999 701">Long term flicker P_{LT}</td> <td data-bbox="999 656 1337 701">0,12</td> </tr> </tbody> </table>			Relative voltage change characteristic dt	0,0	Maximum voltage change d _{MAX}	0,97%	Relative Voltage change d _C	1,08%	Short term flicker P _{ST}	0,09	Long term flicker P _{LT}	0,12
Relative voltage change characteristic dt	0,0											
Maximum voltage change d _{MAX}	0,97%											
Relative Voltage change d _C	1,08%											
Short term flicker P _{ST}	0,09											
Long term flicker P _{LT}	0,12											
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	Visual
Radio-frequency electromagnetic fields	N/A	---
Fast transients	PASS	Visual
Surge transient	PASS	Visual
Injected currents (radio-frequency common mode)	PASS	Visual
Voltage dips and short interruptions	PASS	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 55014-2							
Basic standard	EN 61000-4-2							
Port under test	Enclosure							
Air discharges ¹⁾	<input checked="" type="checkbox"/>	±2 kV	<input checked="" 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]	230 Vac			
Frequency – Mains [Hz]	50 Hz			
Operating mode(s) used	Mode 1			

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 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]	230 Vac		
Frequency – Mains [Hz]	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]	230 Vac
Frequency – Mains [Hz]	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 type="checkbox"/> AC mains input power	Line to Earth	+2 kV	90	1
<input type="checkbox"/> AC mains input power	Line to Earth	-2 kV	270	1
<input type="checkbox"/> AC mains input power	Neutral to Earth	+2 kV	90	1
<input type="checkbox"/> AC mains input power	Neutral to Earth	-2 kV	270	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.			
<u>Supplementary information:</u>				
1. The EUT does not include an earth port.				

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]		230 Vac	Frequency – Mains [Hz]	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-M2	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.
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
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 $\pm 4\%$.

Electrostatic Discharge

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025:1999[2], the requirements for measurement uncertainty in ESD testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant ESD standards. The immunity test signal from the ESD system meet the required specifications in

IEC 61000-4-2 through the calibration report with the calibrated uncertainty for the waveform of voltage and timing as being $1.63 \% \cdot 10^{-10}$ and 2.76%.

Radiated susceptibility

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025:1999[2], the requirements for measurement uncertainty in RS testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant RS

Conducted susceptibility

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in CS testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant CS standards. The immunity test signal from the CS system meet the required specifications in IEC 61000-4-6 through the calibration for unmodulated signal and monitoring for the test level with the uncertainty evaluation report for the injected modulated signal level through CDN and EM Clamp/Direct Injection as being 3.72 dB and 2.78 dB.

Voltage dips and interruptions

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in DIP testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant DIP standards. The immunity test signal from the DIP system meet the required specifications in IEC 61000-4-11 through the calibration report with the calibrated uncertainty for the waveform of voltage and timing as being 1.63 % and 2.76%.

standards. The immunity test signal from the RS system meet the required specifications in

IEC 61000-4-3 through the calibration for the uniform field strength and monitoring for the test level with the uncertainty evaluation report for the electrical filed strength as being 2.72 dB.

Electrical fast transient/burst

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in EFT/Burst testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant EFT/Burst standards. The immunity test signal from the EFT/Burst system meet the required specifications in IEC 61000-4-4 through the calibration report with the calibrated uncertainty for the waveform of voltage, frequency and timing as being

1.63 %, 2.8×10^{-10} and 2.76%.

Surge

As what is concluded in the document from Note2 of clause 5.4.6.2 of ISO/IEC 17025: 1999[2], the requirements for measurement uncertainty in Surge testing are deemed to have been satisfied, and the testing is reported in accordance with the relevant Surge standards. The immunity test signal from the Surge system meet the required specifications in IEC 61000-4-5 through the calibration report with the calibrated uncertainty for the waveform of voltage and timing as being 1.63 % and 2.76%.

8 USED EQUIPMENT

Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESR3	102608	2020/06/17	2021/06/16
Artificial Mains Network	R&S	ENV4200	848411/010	2020/01/08	2021/01/07
LISN	R&S	ENV216	100092	2020/06/22	2021/06/21
Coaxial Cable(9m)	Belden	8129	SR2-H	2019/08/15	2020/08/14
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
EMI Test Receiver	R&S	ESC17	100879	2020/06/17	2021/06/16
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
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	2020/05/26	2021/05/25
Horizontal Coupling Plane (HCP)	QuieTek	HCP AL50	N/A	N/A	N/A
Vertical Coupling Plane (VCP)	QuieTek	VCP AL50	N/A	N/A	N/A

Electrical fast transient / Burst / SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Immunity Tester	Teseq	NSG 3060	1424	2020/06/12	2021/06/11
Clamper	Haefely	093 506.1	083 593-23	2019/12/16	2020/12/15

Surge / SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Immunity Tester	Teseq	NSG 3060	1424	2020/06/12	2021/06/11
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	2019/10/05	2020/10/04
CDN	Schaffner	CDN M016	16337	2020/02/27	2021/02/26
CDN	Schaffner	CDN T400	16905	2019/10/07	2020/10/06
CDN	Teseq	CDN T800	52751	2019/10/25	2020/10/24
CDN	Teseq	CDN T8-10	38994	2019/10/07	2020/10/06
Immunity Injection Clamp	Schaffner	KEMZ801	15928	2019/10/14	2020/10/13
6dB PAD	JFW	50FHAO-06-100	N/A	N/A	N/A

Voltage dips and interruptions / SR3-H

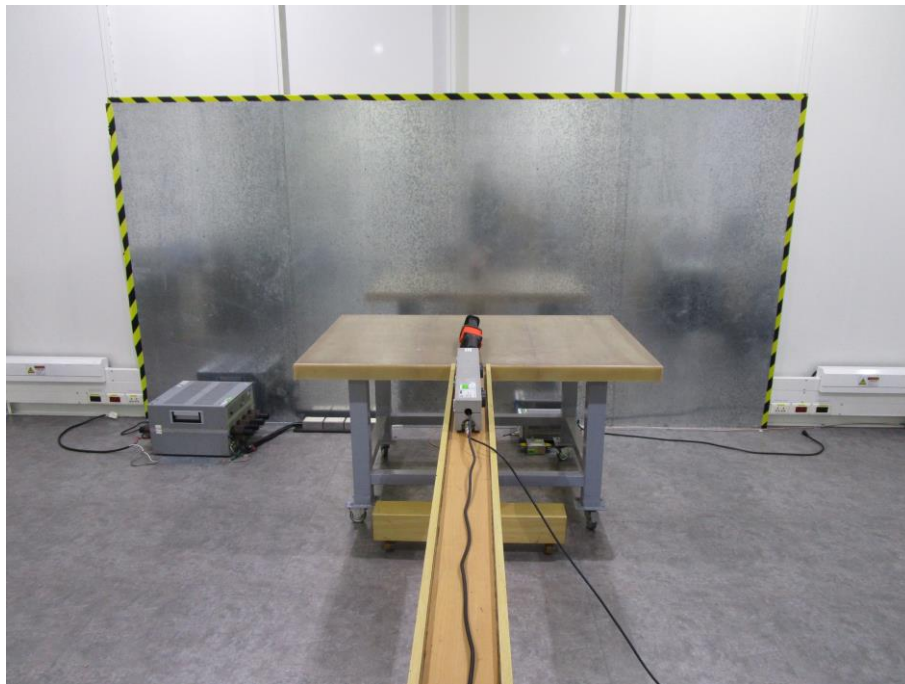
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Immunity Tester	Teseq	NSG 3060	1424	2019/10/22	2020/10/21

9 TEST PHOTOS

Conducted disturbance voltage at mains terminals



Disturbance power



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