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Test report No:

6018740.50

TEST REPORT

Electromagnetic Compatibility (EMC)

Identification of item tested	Metal cutting Circular Saw
Trademark	AGP
Model and /or type reference	CS320; SHDC8320; MT320
Ratings	220-240 V; 50-60 Hz; 1800 W; n_0 : 1700 min ⁻¹ ; Ø 320 mm; Class II 110-120 V; 50-60 Hz; 1700 W; n_0 : 1700 min ⁻¹ ; Ø 320 mm; Class II
Test Laboratory / address	DEKRA Testing and Certification (Shanghai) Ltd. 3F #250 Jiangchangsan Road Building 16 Headquarter Economy Park Shibe Hi-Tech Park, Zhabei District Shanghai 200436 China
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	2019-01-21
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
6018740.50	2019-01-21	First release

REMARKS AND COMMENTS

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

The test results relate only to the samples tested.

According to the declaration from manufacturer, the motor of 220-240 and 110-120 V is different. The rated input of 110-120 V is 1700 W. But for 220-240 V, it's 1800 W. CS320; SHDC8320; MT320 are identical, only types are different.

Therefore, model CS320 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	Metal cutting Circular Saw
Model / Type number	CS320; SHDC8320; MT320
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 supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input checked="" type="checkbox"/>	AC: 220-240 V, 50-60 Hz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	AC: 110-120 V, 50-60 Hz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	DC: 18 V					
	<input type="checkbox"/>	Battery powered					
Rated Power	1700 W						
Clock frequencies	Not provided						
Other parameters.....	N/A						
Mounting position.....	<input type="checkbox"/>	Table top equipment					
	<input type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input checked="" type="checkbox"/>	Hand-held equipment					
	<input type="checkbox"/>	Other:					

Intended use of the Equipment Under Test (EUT)
This saw is designed exclusively for the sawing of aluminium and metal. This machine should not be used for cutting other materials. Do not use this saw to cut wood.

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:



Note: The marking label of 220-240 V version is same as the 110-120 V version except the rated input is 1800 W. Labels of SHDC8320; MT320 are same as CS320, only type is different.

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	January 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 checked="" 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 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 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

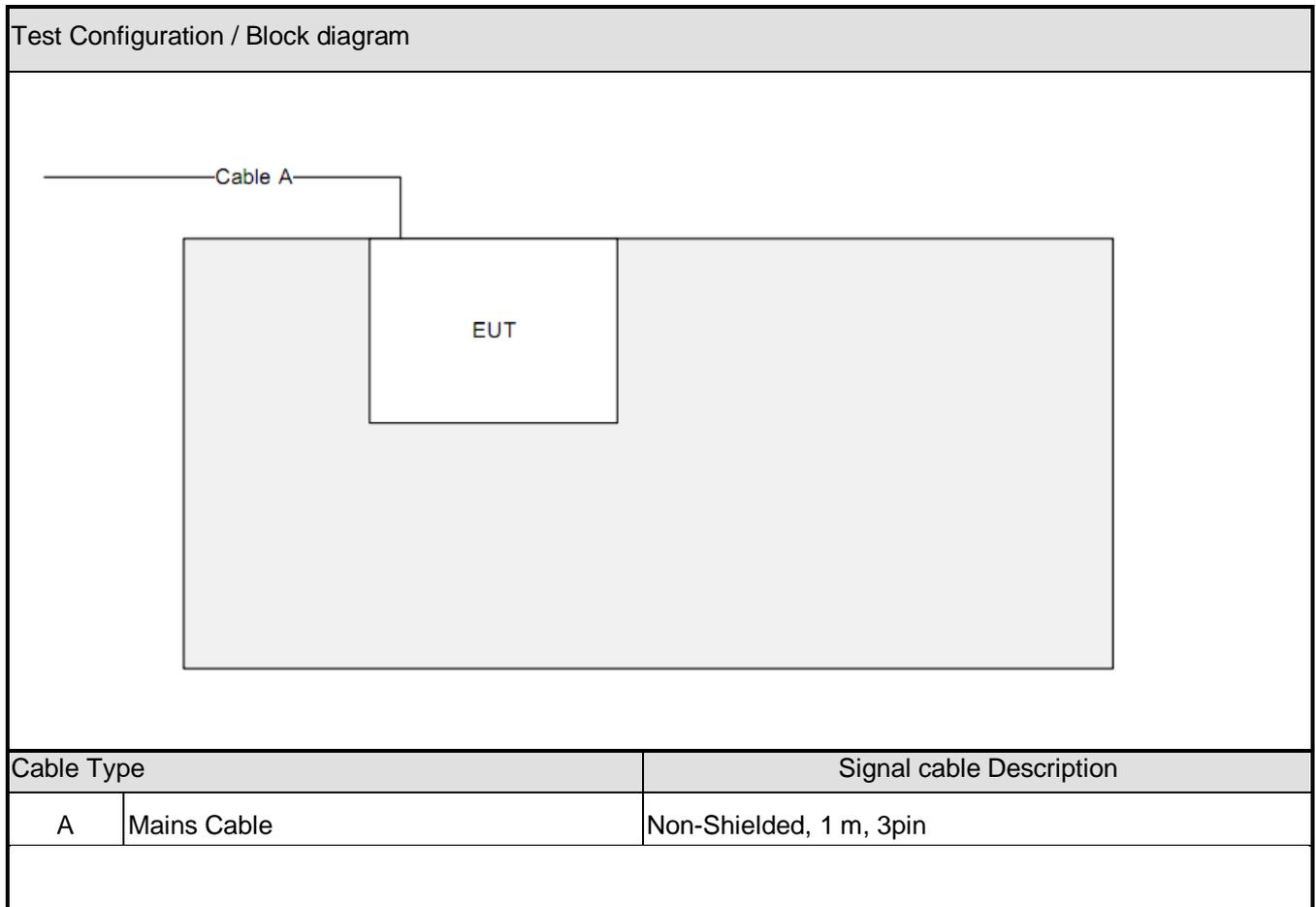
Port name and description	Connected to / Termination	Cable		
		Length used during test [m]	Attached during test	Shielded
N/A			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<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 +A1 +A2	2006 2009 2011	Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission.
EN 55014-1	2017 ¹⁾	
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.

¹⁾ Not harmonized yet.

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

No deviation.

3.3 Overview of results

EMISSION TESTS – EN 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	N/A	See 1)
Radio-frequency electromagnetic fields	EN 61000-4-3	N/A	See 1)
Fast transients	EN 61000-4-4	N/A	See 1)
Surge transient	EN 61000-4-5	N/A	See 1)
Injected currents (radio-frequency common mode)	EN 61000-4-6	N/A	See 1)
Voltage dips and short interruptions	EN 61000-4-11	N/A	See 1)
<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
-----	--	----------------------

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

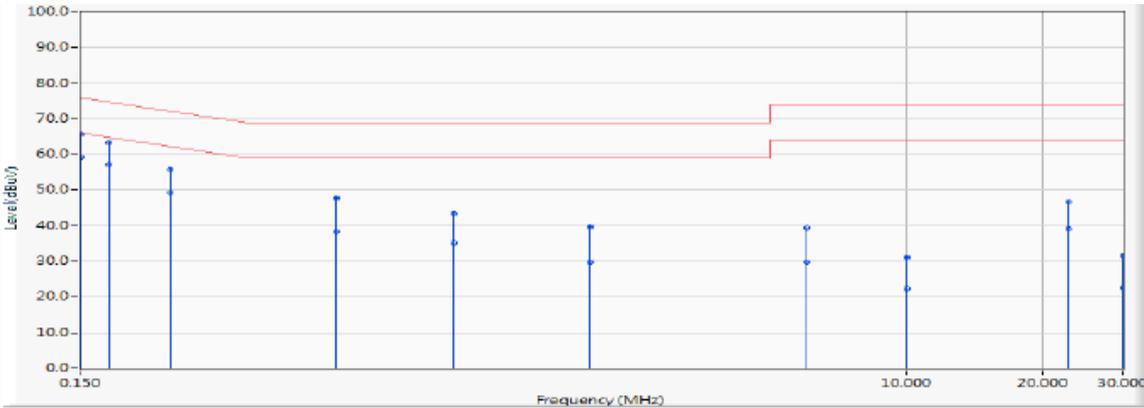
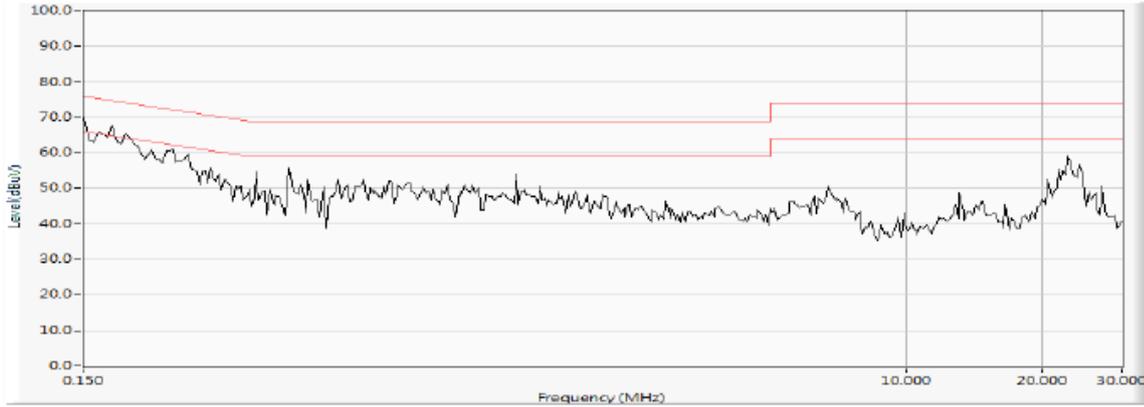
Scan range (0,9 - 1,1 U _N)	<input type="checkbox"/>	198 – 264 V _{AC}	<input type="checkbox"/>	207 – 253 V _{AC}	<input checked="" type="checkbox"/>	230 V _{AC}
Tested terminal(s) / port	<input checked="" type="checkbox"/>	AC mains input power	<input checked="" type="checkbox"/>	N	<input checked="" 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 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
---	------------------------

Results for 220-240v model

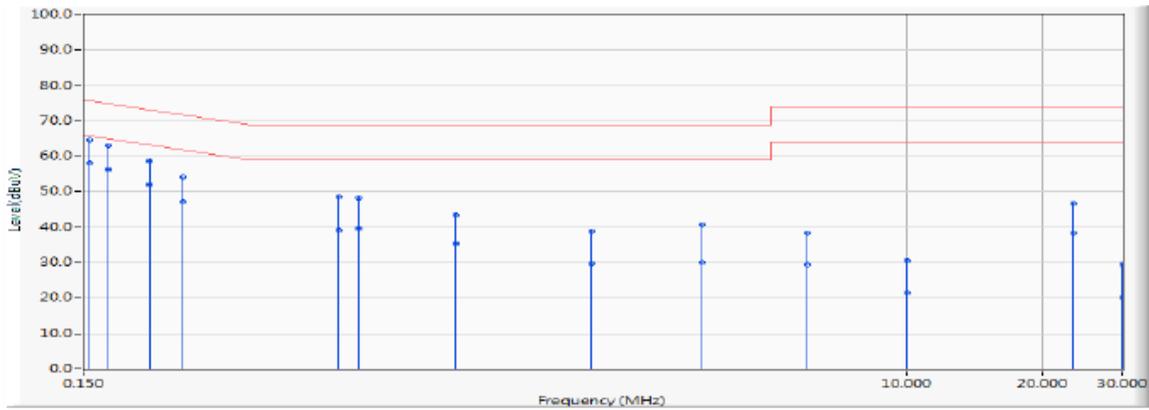
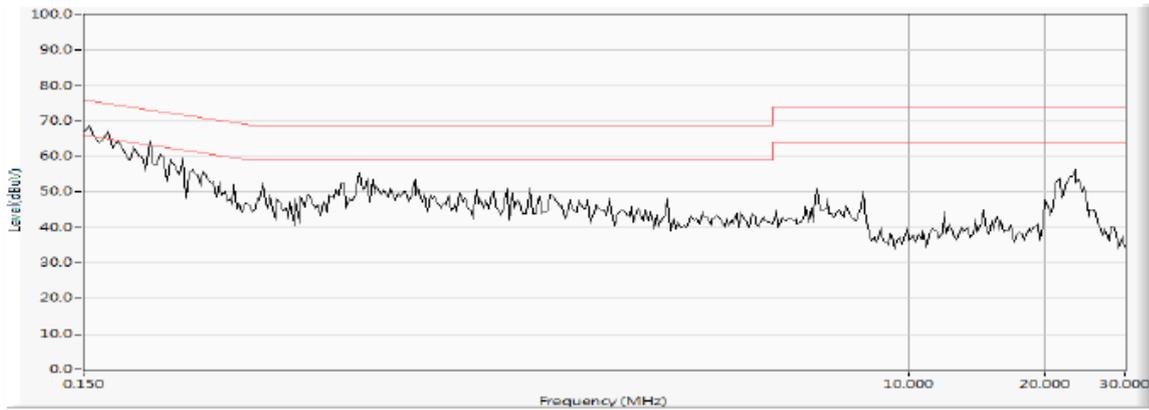
Line



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	55.870	65.550	-10.450	76.000	QUASIPeAK
2	*	0.150	9.680	49.700	59.380	-9.620	69.000	AVERAGE
3		0.173	9.680	53.720	63.400	-11.421	74.821	QUASIPeAK
4		0.173	9.680	47.300	56.980	-10.336	67.316	AVERAGE
5		0.236	9.680	46.010	55.690	-16.566	72.256	QUASIPeAK
6		0.236	9.680	39.550	49.230	-14.421	63.651	AVERAGE
7		0.550	9.693	37.970	47.662	-21.338	69.000	QUASIPeAK
8		0.550	9.693	28.590	38.282	-20.718	59.000	AVERAGE
9		1.000	9.790	33.600	43.390	-25.610	69.000	QUASIPeAK
10		1.000	9.790	25.270	35.060	-23.940	59.000	AVERAGE
11		2.000	9.800	29.750	39.550	-29.450	69.000	QUASIPeAK
12		2.000	9.800	20.090	29.890	-29.110	59.000	AVERAGE
13		6.000	9.877	29.550	39.427	-34.573	74.000	QUASIPeAK
14		6.000	9.877	19.960	29.837	-34.163	64.000	AVERAGE
15		10.000	10.090	20.950	31.040	-42.960	74.000	QUASIPeAK
16		10.000	10.090	12.130	22.220	-41.780	64.000	AVERAGE
17		22.783	10.429	36.200	46.629	-27.371	74.000	QUASIPeAK
18		22.783	10.429	28.580	39.009	-24.991	64.000	AVERAGE
19		30.000	10.580	20.990	31.570	-42.430	74.000	QUASIPeAK
20		30.000	10.580	12.050	22.630	-41.370	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	54.860	64.541	-11.242	75.783	QUASIPeAK
2	*	0.154	9.681	48.400	58.081	-10.609	68.689	AVERAGE
3		0.170	9.680	53.340	63.020	-11.946	74.966	QUASIPeAK
4		0.170	9.680	46.550	56.230	-11.293	67.523	AVERAGE
5		0.209	9.680	48.980	58.660	-14.600	73.260	QUASIPeAK
6		0.209	9.680	42.340	52.020	-13.065	65.085	AVERAGE
7		0.248	9.680	44.360	54.040	-17.806	71.846	QUASIPeAK
8		0.248	9.680	37.590	47.270	-15.796	63.066	AVERAGE
9		0.550	9.693	38.830	48.522	-20.478	69.000	QUASIPeAK
10		0.550	9.693	29.580	39.272	-19.728	59.000	AVERAGE
11		0.607	9.704	38.560	48.265	-20.735	69.000	QUASIPeAK
12		0.607	9.704	29.990	39.695	-19.305	59.000	AVERAGE
13		1.000	9.790	33.520	43.310	-25.690	69.000	QUASIPeAK
14		1.000	9.790	25.560	35.350	-23.650	59.000	AVERAGE
15		2.000	9.800	29.100	38.900	-30.100	69.000	QUASIPeAK
16		2.000	9.800	19.900	29.700	-29.300	59.000	AVERAGE
17		3.500	9.815	30.900	40.715	-28.285	69.000	QUASIPeAK
18		3.500	9.815	20.270	30.085	-28.915	59.000	AVERAGE
19		6.000	9.880	28.440	38.320	-35.680	74.000	QUASIPeAK
20		6.000	9.880	19.550	29.430	-34.570	64.000	AVERAGE
21		10.000	10.080	20.480	30.560	-43.440	74.000	QUASIPeAK
22		10.000	10.080	11.480	21.560	-42.440	64.000	AVERAGE
23		23.322	10.357	36.310	46.667	-27.333	74.000	QUASIPeAK
24		23.322	10.357	27.980	38.337	-25.663	64.000	AVERAGE
25		30.000	10.450	18.940	29.390	-44.610	74.000	QUASIPeAK
26		30.000	10.450	9.730	20.180	-43.820	64.000	AVERAGE
Remark								

Performed measurements

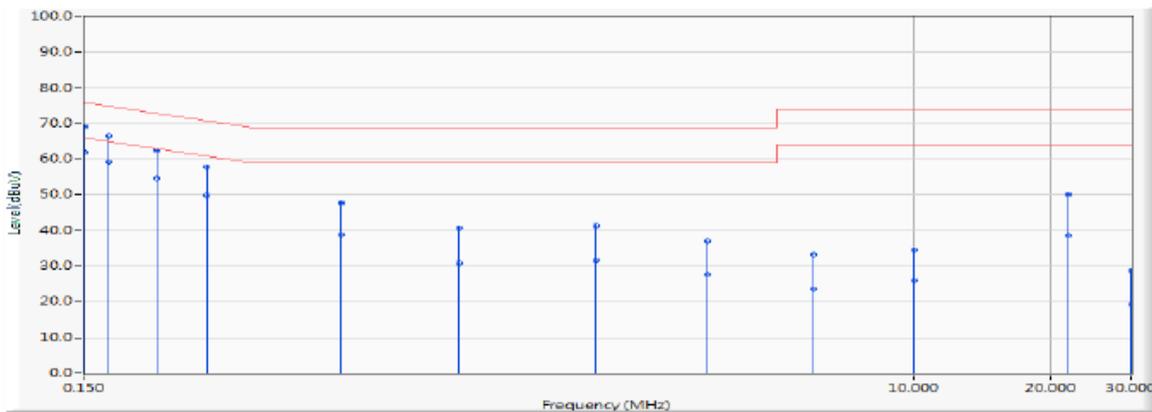
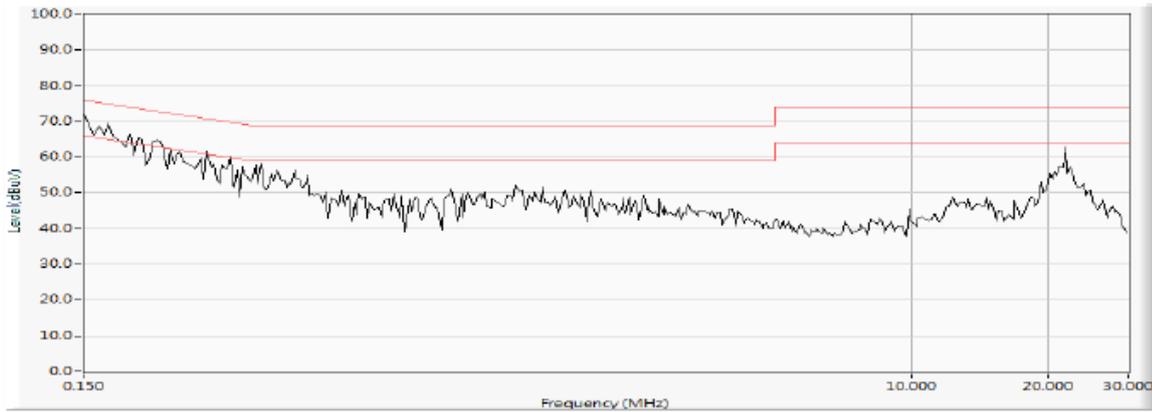
Scan range (0,9 - 1,1 U_N)	<input type="checkbox"/>	198 – 264 V_{AC}	<input type="checkbox"/>	207 – 253 V_{AC}	<input checked="" type="checkbox"/>	110 V_{AC}				
Tested terminal(s) / port	<input checked="" type="checkbox"/>	AC mains input power	<input checked="" type="checkbox"/>	N	<input checked="" 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 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
---	------------------------

Results for 110-120v model

Line

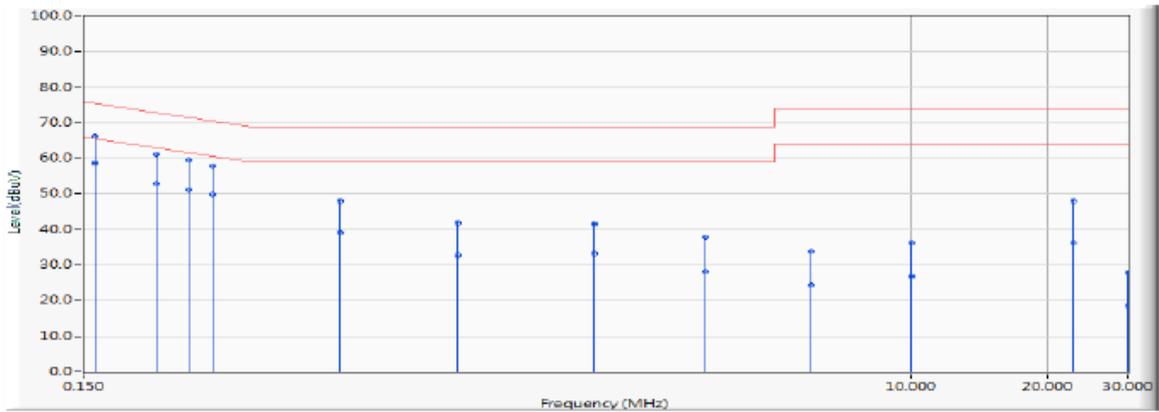
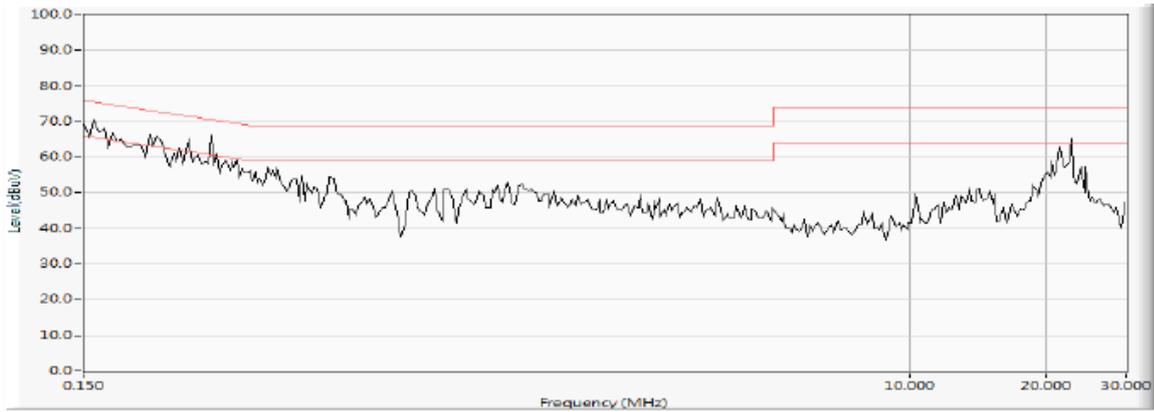




Measurement data				Port under test		AC mains power input		
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.150	9.680	59.560	69.240	-6.760	76.000	QUASIPeAK
2		0.150	9.680	52.140	61.820	-7.180	69.000	AVERAGE
3		0.170	9.680	56.750	66.430	-8.536	74.966	QUASIPeAK
4		0.170	9.680	49.580	59.260	-8.263	67.523	AVERAGE
5		0.216	9.680	52.720	62.400	-10.587	72.987	QUASIPeAK
6		0.216	9.680	45.070	54.750	-9.946	64.696	AVERAGE
7		0.279	9.680	48.240	57.920	-12.953	70.873	QUASIPeAK
8		0.279	9.680	40.060	49.740	-11.936	61.676	AVERAGE
9		0.550	9.693	38.120	47.812	-21.188	69.000	QUASIPeAK
10		0.550	9.693	29.070	38.762	-20.238	59.000	AVERAGE
11		1.000	9.790	30.900	40.690	-28.310	69.000	QUASIPeAK
12		1.000	9.790	20.980	30.770	-28.230	59.000	AVERAGE
13		2.000	9.800	31.360	41.160	-27.840	69.000	QUASIPeAK
14		2.000	9.800	21.960	31.760	-27.240	59.000	AVERAGE
15		3.500	9.807	27.320	37.127	-31.873	69.000	QUASIPeAK
16		3.500	9.807	17.870	27.677	-31.323	59.000	AVERAGE
17		6.000	9.877	23.420	33.297	-40.703	74.000	QUASIPeAK
18		6.000	9.877	13.690	23.567	-40.433	64.000	AVERAGE
19		10.000	10.090	24.620	34.710	-39.290	74.000	QUASIPeAK
20		10.000	10.090	15.860	25.950	-38.050	64.000	AVERAGE
21		21.759	10.422	39.720	50.142	-23.858	74.000	QUASIPeAK
22		21.759	10.422	28.270	38.692	-25.308	64.000	AVERAGE
23		30.000	10.580	18.240	28.820	-45.180	74.000	QUASIPeAK
24		30.000	10.580	8.750	19.330	-44.670	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	*	0.158	9.680	56.660	66.340	-9.230	75.571	QUASIPeAK
2		0.158	9.680	48.980	58.660	-9.726	68.387	AVERAGE
3		0.216	9.680	51.580	61.260	-11.727	72.987	QUASIPeAK
4		0.216	9.680	43.060	52.740	-11.956	64.696	AVERAGE
5		0.255	9.680	49.740	59.420	-12.196	71.616	QUASIPeAK
6		0.255	9.680	41.560	51.240	-11.497	62.737	AVERAGE
7		0.287	9.680	48.320	58.000	-12.640	70.640	QUASIPeAK
8		0.287	9.680	40.270	49.950	-11.392	61.342	AVERAGE
9		0.550	9.693	38.170	47.862	-21.138	69.000	QUASIPeAK
10		0.550	9.693	29.580	39.272	-19.728	59.000	AVERAGE
11		1.000	9.790	32.030	41.820	-27.180	69.000	QUASIPeAK
12		1.000	9.790	22.960	32.750	-26.250	59.000	AVERAGE
13		2.000	9.800	31.870	41.670	-27.330	69.000	QUASIPeAK
14		2.000	9.800	23.430	33.230	-25.770	59.000	AVERAGE
15		3.500	9.815	27.880	37.695	-31.305	69.000	QUASIPeAK
16		3.500	9.815	18.420	28.235	-30.765	59.000	AVERAGE
17		6.000	9.880	24.010	33.890	-40.110	74.000	QUASIPeAK
18		6.000	9.880	14.420	24.300	-39.700	64.000	AVERAGE
19		10.000	10.080	26.130	36.210	-37.790	74.000	QUASIPeAK
20		10.000	10.080	16.790	26.870	-37.130	64.000	AVERAGE
21		22.634	10.357	37.760	48.117	-25.883	74.000	QUASIPeAK
22		22.634	10.357	25.810	36.167	-27.833	64.000	AVERAGE
23		30.000	10.450	17.310	27.760	-46.240	74.000	QUASIPeAK
24		30.000	10.450	8.060	18.510	-45.490	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"/>	CDN 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"/>	CDN 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

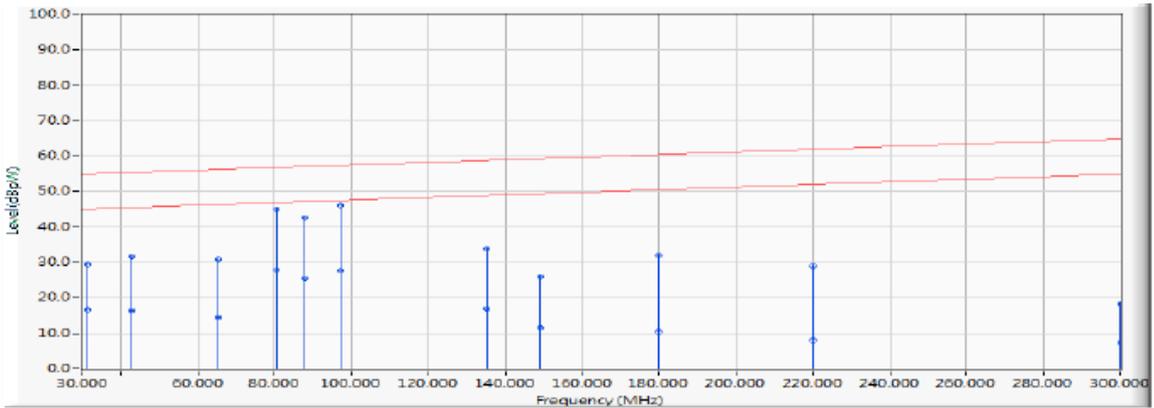
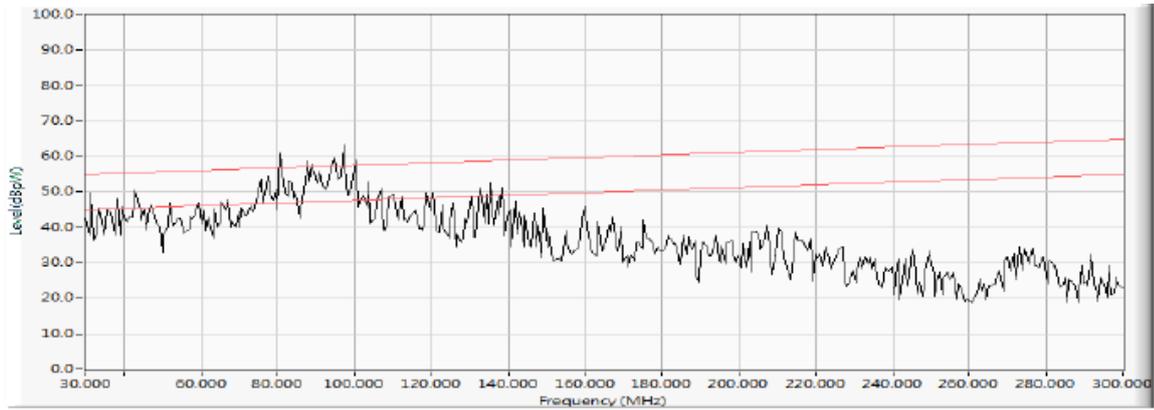
Frequency range [MHz]	Limit: QP [dB(pW)]	Limit: AV [dB(pW)]	IF BW	Detector(s)
30 - 300	45 – 55 ¹⁾	35 – 45 ¹⁾	120 KHz	QP, CAV
Margin				
200 - 300	0 – 10 ¹⁾	---	120 KHz	QP, CAV
¹⁾ The limit increases linearly with the frequency.				
<input type="checkbox"/>	Rated power below 700 W		Limits as above	
<input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

Results for 220-240v model



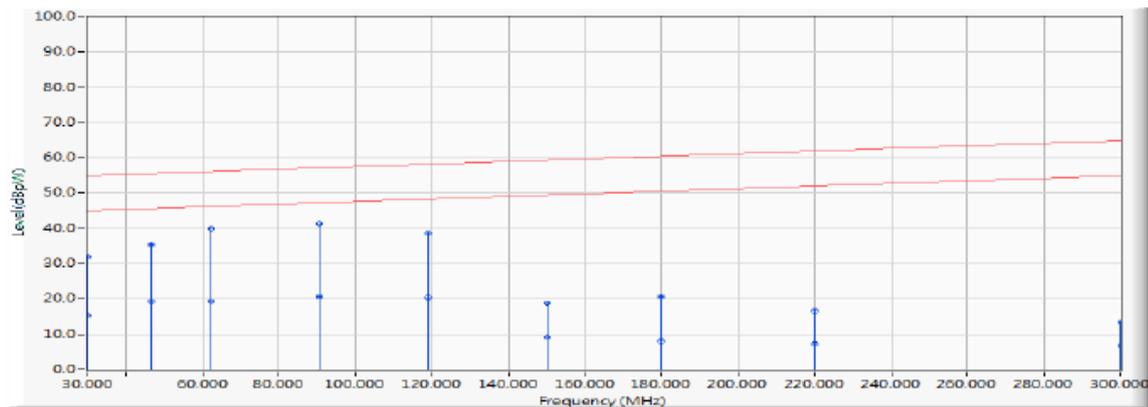
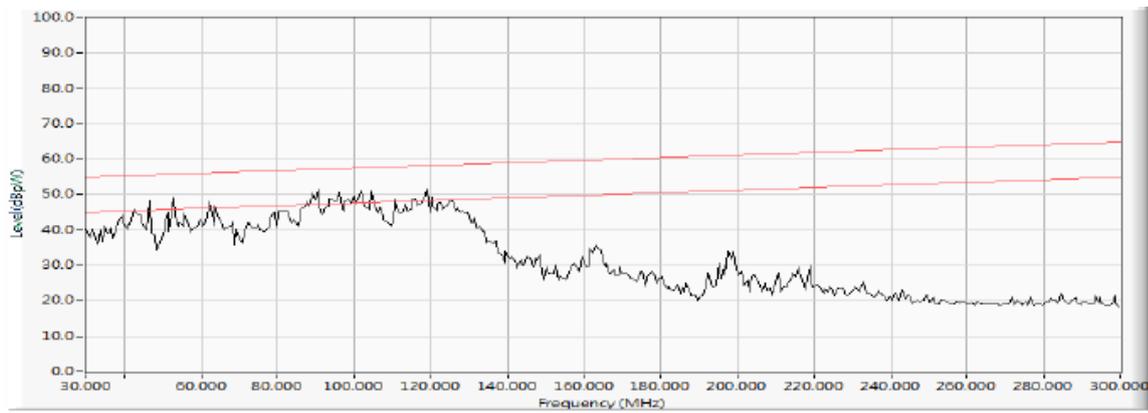
Measurement data				Port under test		AC mains power input		
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBpW)	Measure Level (dBpW)	Margin (dB)	Limit (dBpW)	Detector Type
1		31.500	2.820	26.800	29.620	-25.592	55.212	QUASIPeAK
2		31.500	2.820	13.840	16.660	-28.552	45.212	AVERAGE
3		42.937	1.712	29.870	31.582	-24.975	56.557	QUASIPeAK
4		42.937	1.712	14.730	16.442	-30.115	46.557	AVERAGE
5		65.312	0.691	30.170	30.861	-27.518	58.379	QUASIPeAK
6		65.312	0.691	13.900	14.591	-33.788	48.379	AVERAGE
7		80.437	0.413	44.740	45.153	-14.130	59.283	QUASIPeAK
8		80.437	0.413	27.340	27.753	-21.530	49.283	AVERAGE
9		87.687	0.631	41.890	42.521	-17.138	59.658	QUASIPeAK
10		87.687	0.631	24.840	25.471	-24.188	49.658	AVERAGE
11	*	97.125	0.629	45.350	45.979	-14.123	60.102	QUASIPeAK
12		97.125	0.629	26.950	27.579	-22.523	50.102	AVERAGE
13		135.375	-0.015	33.690	33.675	-27.869	61.544	QUASIPeAK
14		135.375	-0.015	16.780	16.765	-34.779	51.544	AVERAGE
15		149.187	-0.476	26.580	26.104	-35.862	61.966	QUASIPeAK
16		149.187	-0.476	11.890	11.414	-40.552	51.966	AVERAGE
17		180.000	-1.199	33.010	31.811	-30.970	62.782	QUASIPeAK
18		180.000	-1.199	11.720	10.521	-42.260	52.782	AVERAGE
19		220.000	-1.298	30.230	28.932	-34.721	63.653	QUASIPeAK
20		220.000	-1.298	9.230	7.932	-45.721	53.653	AVERAGE
21		300.000	-1.095	19.250	18.155	-46.845	65.000	QUASIPeAK
22		300.000	-1.095	8.210	7.115	-47.885	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

Results 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	30.000	3.000	28.840	31.840	-23.160	55.000	QUASPEAK	
2	30.000	3.000	12.220	15.220	-29.780	45.000	AVERAGE	
3	46.500	1.605	33.670	35.275	-21.628	56.903	QUASPEAK	
4	46.500	1.605	17.720	19.325	-27.578	46.903	AVERAGE	
5	*	62.187	1.284	38.760	40.044	-18.121	58.166	QUASPEAK
6	62.187	1.284	17.950	19.234	-28.931	48.166	AVERAGE	
7	90.687	0.693	40.510	41.203	-18.601	59.804	QUASPEAK	
8	90.687	0.693	19.940	20.633	-29.171	49.804	AVERAGE	
9	119.062	0.600	37.960	38.560	-22.427	60.987	QUASPEAK	
10	119.062	0.600	19.860	20.460	-30.527	50.987	AVERAGE	
11	150.000	-0.500	19.320	18.820	-43.170	61.990	QUASPEAK	
12	150.000	-0.500	9.600	9.100	-42.890	51.990	AVERAGE	
13	180.000	-1.199	21.920	20.721	-42.060	62.782	QUASPEAK	
14	180.000	-1.199	9.190	7.991	-44.790	52.782	AVERAGE	
15	220.000	-1.298	17.850	16.552	-47.101	63.653	QUASPEAK	
16	220.000	-1.298	8.450	7.152	-46.501	53.653	AVERAGE	
17	300.000	-1.095	14.480	13.385	-51.615	65.000	QUASPEAK	
18	300.000	-1.095	7.870	6.775	-48.225	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
---	---------------------

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 _q – 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

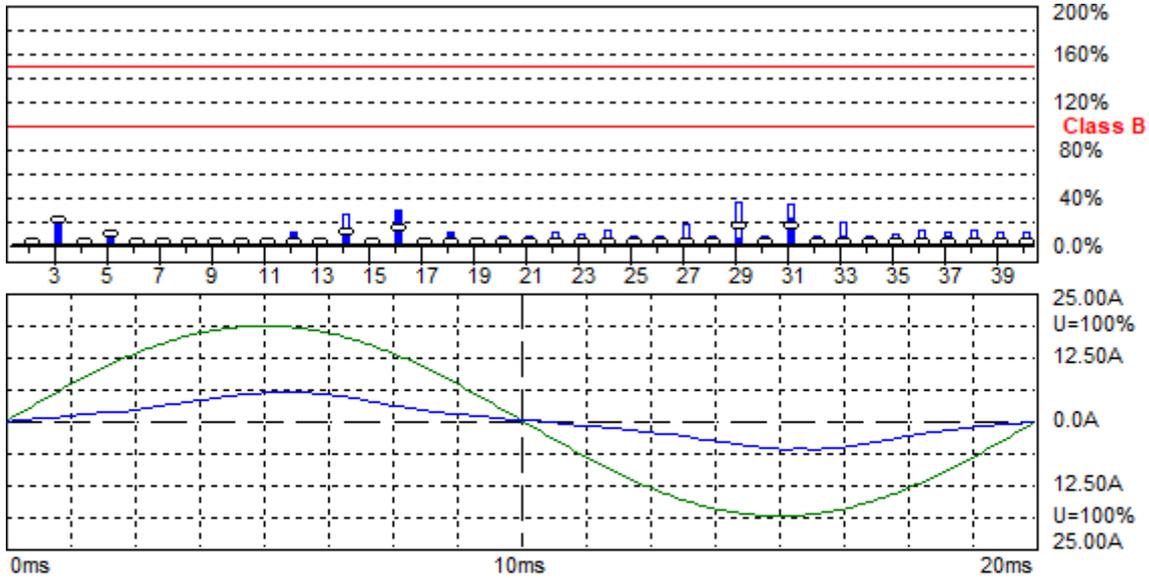
Performed measurements

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						

See next page.

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

Results for 220-240v model



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

2019/1/18 上午 10:09:29

Urms = 230.1 V	P = 749.2 W	THC = 0.626 A	Range: 25 A
Irms = 3.320 A	pf = 0.981		V-nom: 230 V
			TestTime: 5 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

Remark	
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Measurement data				Port under test		AC mains power input				
Operating mode / voltage / frequency used during the test						Mode 1/ 230 Vac/ 50 Hz				
Urms =	230.1V	Freq =	50.000	Range:	25 A					
Irms =	3.320A	Ipk =	5.798A	cf =	1.746					
P =	749.2W	S =	764.0VA	pf =	0.981					
THDi =	19.1 %	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	3.2744	3.2669	98.392		3.4073	102.62			0.00
2	100	0.0000	0.0061	0.1838	0.3768	0.0092	0.2757	0.5651	1.6200	0.00
3	150	0.6320	0.6119	18.428	17.736	0.6744	20.313	19.549	3.4500	0.00
4	200	0.0000	0.0046	0.1379	0.7097	0.0107	0.3217	1.6560	0.6450	0.00
5	250	0.1213	0.1160	3.4926	6.7817	0.1297	3.9063	7.5848	1.7100	0.00
6	300	0.0000	0.0046	0.1379	1.0173	0.0153	0.4596	3.3908	0.4500	0.00
7	350	0.0007	0.0092	0.2757	0.7927	0.0229	0.6893	1.9817	1.1550	0.00
8	400	0.0000	0.0046	0.1379	1.3269	0.0107	0.3217	3.0960	0.3450	0.00
9	450	0.0000	0.0137	0.4136	2.2888	0.0168	0.5055	2.7974	0.6000	0.00
10	500	0.0000	0.0076	0.2298	2.7643	0.0092	0.2757	3.3171	0.2760	0.00
11	550	0.0000	0.0107	0.3217	2.1578	0.0107	0.3217	2.1578	0.4950	0.00
12	600	0.0002	0.0137	0.4136	5.9708	0.0198	0.5974	8.6245	0.2300	0.00
13	650	0.0000	0.0076	0.2298	2.4220	0.0092	0.2757	2.9064	0.3150	0.00
14	700	0.0175	0.0153	0.4596	7.7400	0.0458	1.3787	23.220	0.1971	0.00
15	750	0.0000	0.0061	0.1838	2.7127	0.0061	0.1838	2.7127	0.2250	0.00
16	800	0.0195	0.0443	1.3327	25.652	0.0458	1.3787	26.537	0.1725	0.00
17	850	0.0000	0.0061	0.1838	3.0744	0.0076	0.2298	3.8430	0.1985	0.00
18	900	0.0000	0.0137	0.4136	8.9562	0.0137	0.4136	8.9562	0.1533	0.00
19	950	0.0000	0.0046	0.1379	2.5770	0.0061	0.1838	3.4361	0.1776	0.00
20	1000	0.0000	0.0031	0.0919	2.2114	0.0076	0.2298	5.5285	0.1380	0.00
21	1050	0.0000	0.0046	0.1379	2.8483	0.0076	0.2298	4.7472	0.1607	0.00
22	1100	0.0000	0.0031	0.0919	2.4326	0.0107	0.3217	8.5140	0.1255	0.00
23	1150	0.0000	0.0046	0.1379	3.1196	0.0092	0.2757	6.2391	0.1467	0.00
24	1200	0.0000	0.0046	0.1379	3.9806	0.0107	0.3217	9.2880	0.1150	0.00
25	1250	0.0000	0.0046	0.1379	3.3908	0.0076	0.2298	5.6514	0.1350	0.00
26	1300	0.0000	0.0031	0.0919	2.8748	0.0061	0.1838	5.7497	0.1062	0.00
27	1350	0.0000	0.0046	0.1379	3.6621	0.0183	0.5515	14.648	0.1250	0.00
28	1400	0.0000	0.0031	0.0919	3.0960	0.0046	0.1379	4.6440	0.0986	0.00
29	1450	0.0147	0.0031	0.0919	2.6223	0.0397	1.1949	34.089	0.1164	0.00
30	1500	0.0000	0.0031	0.0919	3.3171	0.0046	0.1379	4.9757	0.0920	0.00
31	1550	0.0136	0.0214	0.6434	19.622	0.0336	1.0110	30.834	0.1089	0.00
32	1600	0.0000	0.0031	0.0919	3.5383	0.0046	0.1379	5.3074	0.0862	0.00
33	1650	0.0000	0.0046	0.1379	4.4759	0.0168	0.5055	16.412	0.1023	0.00
34	1700	0.0000	0.0031	0.0919	3.7594	0.0046	0.1379	5.6391	0.0812	0.00
35	1750	0.0000	0.0031	0.0919	3.1648	0.0061	0.1838	6.3296	0.0964	0.00
36	1800	0.0000	0.0031	0.0919	3.9806	0.0076	0.2298	9.9514	0.0767	0.00
37	1850	0.0000	0.0046	0.1379	5.0184	0.0076	0.2298	8.3641	0.0912	0.00
38	1900	0.0000	0.0015	0.0460	2.1008	0.0076	0.2298	10.504	0.0726	0.00
39	1950	0.0000	0.0031	0.0919	3.5265	0.0076	0.2298	8.8162	0.0865	0.00
40	2000	0.0000	0.0015	0.0460	2.2114	0.0061	0.1838	8.8457	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 checked="" type="checkbox"/>	24 times switching according to Annex B		
Other:	<input type="checkbox"/>			
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	
Results for 220-240v model		
Relative voltage change characteristic dt	0,0	
Maximum voltage change d_{MAX}	1,61%	
Relative Voltage change d_c	0,76%	
Short term flicker P_{ST}	0,13	
Long term flicker P_{LT}	Not applicable	
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	N/A	---
Radio-frequency electromagnetic fields	N/A	---
Fast transients	N/A	---
Surge transient	N/A	---
Injected currents (radio-frequency common mode)	N/A	---
Voltage dips and short interruptions	N/A	---
<u>Supplementary information :</u>		

5.3 Electrostatic discharge immunity	VERDICT: N/A
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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: N/A
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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"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC / DC mains power input	1 kV	5 KHz	2 min	<input checked="" type="checkbox"/>	CDN	<input type="checkbox"/> Clamp
AC / DC power output		5 KHz		<input type="checkbox"/>	CDN	<input type="checkbox"/> Clamp
Ethernet / LAN		5 KHz		<input type="checkbox"/>	CDN	<input type="checkbox"/> Clamp
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.					

5.6 Surge transient immunity	VERDICT: N/A
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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.
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Supplementary information:
 1. The EUT does not include an earth port.

5.7	Injected currents (RF common mode) immunity	VERDICT: N/A
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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: N/A
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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 $\pm 4\%$.

8 USED EQUIPMENT

Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Test Receiver	R&S	ESCS 30	825442/014	2018/03/13	2019/03/12
Artificial Mains Network	R&S	ENV4200	848411/010	2018/01/22	2019/01/21
LISN	R&S	ENV216	100092	2018/07/23	2019/07/22
Coaxial Cable	Harbour	RG-400	SR2-H	2018/08/15	2019/08/14
Quietek EMI system	Quietek	Version 2.2	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	ESCS 30	825442/014	2018/03/13	2019/03/12
Absorbing Clamp	Luthi	MDS 21B	P1602169770	2018/02/05	2019/02/04
QuieTek EMI	Dekra	Version 2	SR2-H	N/A	N/A

Power Harmonics / SR3-H

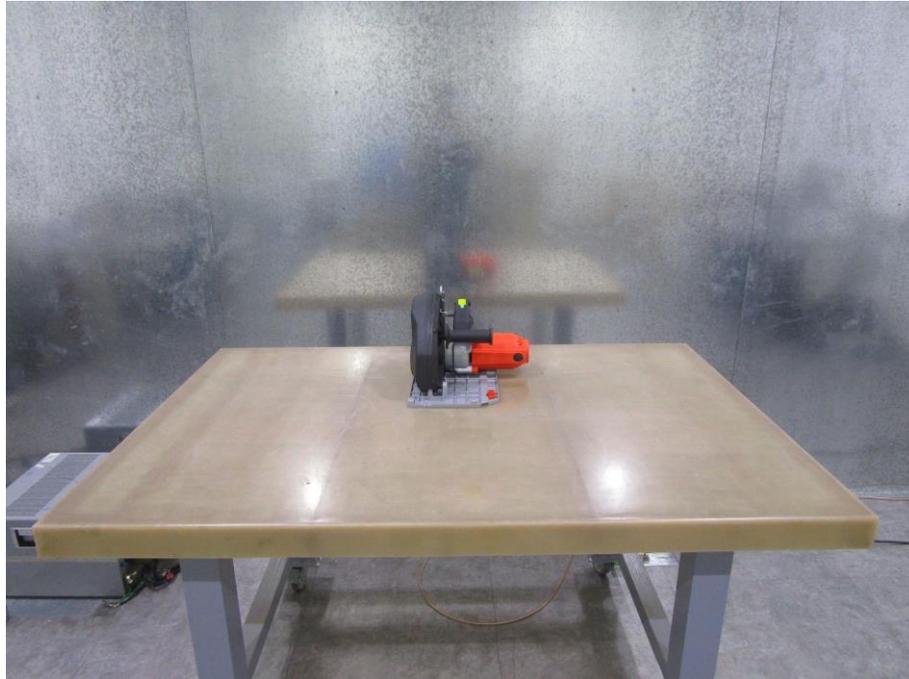
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Emission Tester	EMC-Partner	HAR-1000-1P	109	2018/01/15	2019/01/14

Voltage Fluctuation and Flicker / SR3-H

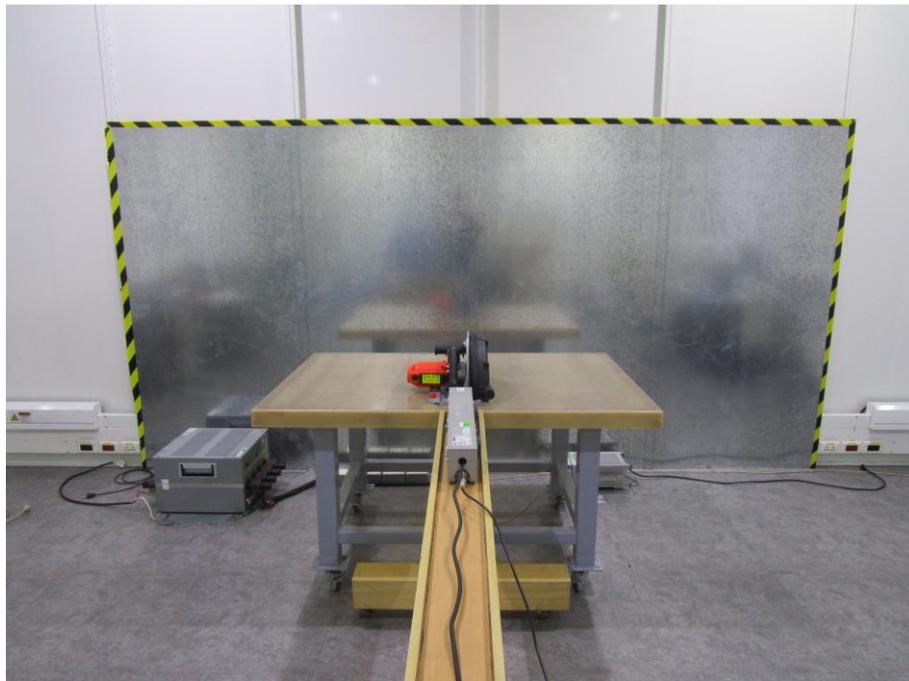
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Emission Tester	EMC-Partner	HAR-1000-1P	109	2018/01/15	2019/01/14

9 TEST PHOTOS

Conducted disturbance voltage at mains terminals



Disturbance power



-----END-----