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Test report No:  
6018733.50

## TEST REPORT

### Electromagnetic Compatibility (EMC)

Identification of item tested	Metal Cutting Circular Saw
Trademark	AGP
Model and /or type reference	CS200; HDC 8200; CS230N; CM230; CM230K; HDC 8230N; HKS230
Ratings	CS200; HDC 8200: 220-240 V; 50-60 Hz; 1700 W; no: 3700 min <sup>-1</sup> ; Ø200 mm; Class II CS230N; CM230; CM230K; HDC 8230N; HKS230: 220-240 V; 50-60 Hz; 1700 W; no: 2200 min <sup>-1</sup> ; Ø230 mm; 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	2020-04-23
Report template No	TRF_EN55014-1_EN55014-2_EMCC02 V1.0

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## COMPETENCES AND GUARANTEES

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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

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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

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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

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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

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Report nr.	Date	Description
6018733.50	2020-04-23	First release

## REMARKS AND COMMENTS

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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,  
CS230N and CS200 share the same construction and components except that the size of the guarding system and gear of them are different.

CS230N and CS200 can be only used for cutting metal or similar materials.

CS200 and HDC 8200 are identical. CS230N; CM230; CM230K; HDC 8230N and HKS230 are identical.

Therefore, model CS230N 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 .....	CS230N
Representative Types .....	CS200; HDC 8200; CM230; CM230K; HDC 8230N; HKS230
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 .....	CS200; HDC 8200: 220-240 V; 50-60 Hz; 1700 W; n <sub>0</sub> : 3700 min <sup>-1</sup> ; Ø200 mm; Class II CS230N; CM230; CM230K; HDC 8230N; HKS230: 220-240 V; 50-60 Hz; 1700 W; n <sub>0</sub> : 2200 min <sup>-1</sup> ; Ø230 mm; 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:

**AGP®**

**Metal Cutting Circular Saw**  
**Model : CS230N**  
220-240V~50-60Hz 1700W  
 **$n_o=2200 \text{ min}^{-1}$  Blade:  $\varnothing 230\text{mm}$  ( 9" ) Depth of Cut: 80mm**

- Warning: Hands Should Never Be Placed Under The Shoe Or Guard Of The Saw.
- Warning: When Operating The Saw, Never Over-reach, And Ensure That A Firm Footing And Proper Balance Is Kept At All Times.
- Warning: Ensure The Retracting Lower Guard Does Not Stick In The Open Position.
- Warning: Ensure The Saw Does Not Vibrate Or Seem Unsafe In Any Way While In Use. If The Saw Is Unsafe Tag It, And Remove From Service.
- Caution: All Electrical Power Cords Should Be Kept Clear Of The Cutting Area. Do Not Expose To Rain Or Use In Damp Locations.

No.:  2019/01

LEE YEONG INDUSTRIAL CO., LTD.  
No.2, Kejia Rd., Douliu, 64057 Taiwan







**AGP®**

**Metal Cutting Circular Saw**  
**Model: CS200**  
220-240V~ 50-60Hz 1700W  
 **$n_o= 3700 \text{ min}^{-1}$  Blade:  $\varnothing 200\text{mm}$  ( 8" ) Depth of Cut: 67mm**

- Warning: Hands Should Never Be Placed Under The Shoe Or Guard Of The Saw.
- Warning: When Operating The Saw, Never Over-reach, And Ensure That A Firm Footing And Proper Balance Is Kept At All Times.
- Warning: Ensure The Retracting Lower Guard Does Not Stick In The Open Position.
- Warning: Ensure The Saw Does Not Vibrate Or Seem Unsafe In Any Way While In Use. If The Saw Is Unsafe Tag It, And Remove From Service.
- Caution: All Electrical Power Cords Should Be Kept Clear Of The Cutting Area. Do Not Expose To Rain Or Use In Damp Locations.

No.:  2019/01

LEE YEONG INDUSTRIAL CO., LTD.  
No.2, Kejia Rd., Douliu, 64057 Taiwan



## 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	Jan. 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><b>Category I:</b> 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><b>Category II:</b> 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><b>Category III:</b> 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><b>Category IV:</b> All other apparatus covered by the scope of the EN 55014-2 standard.</p>
<p><b>Clock frequency:</b> 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

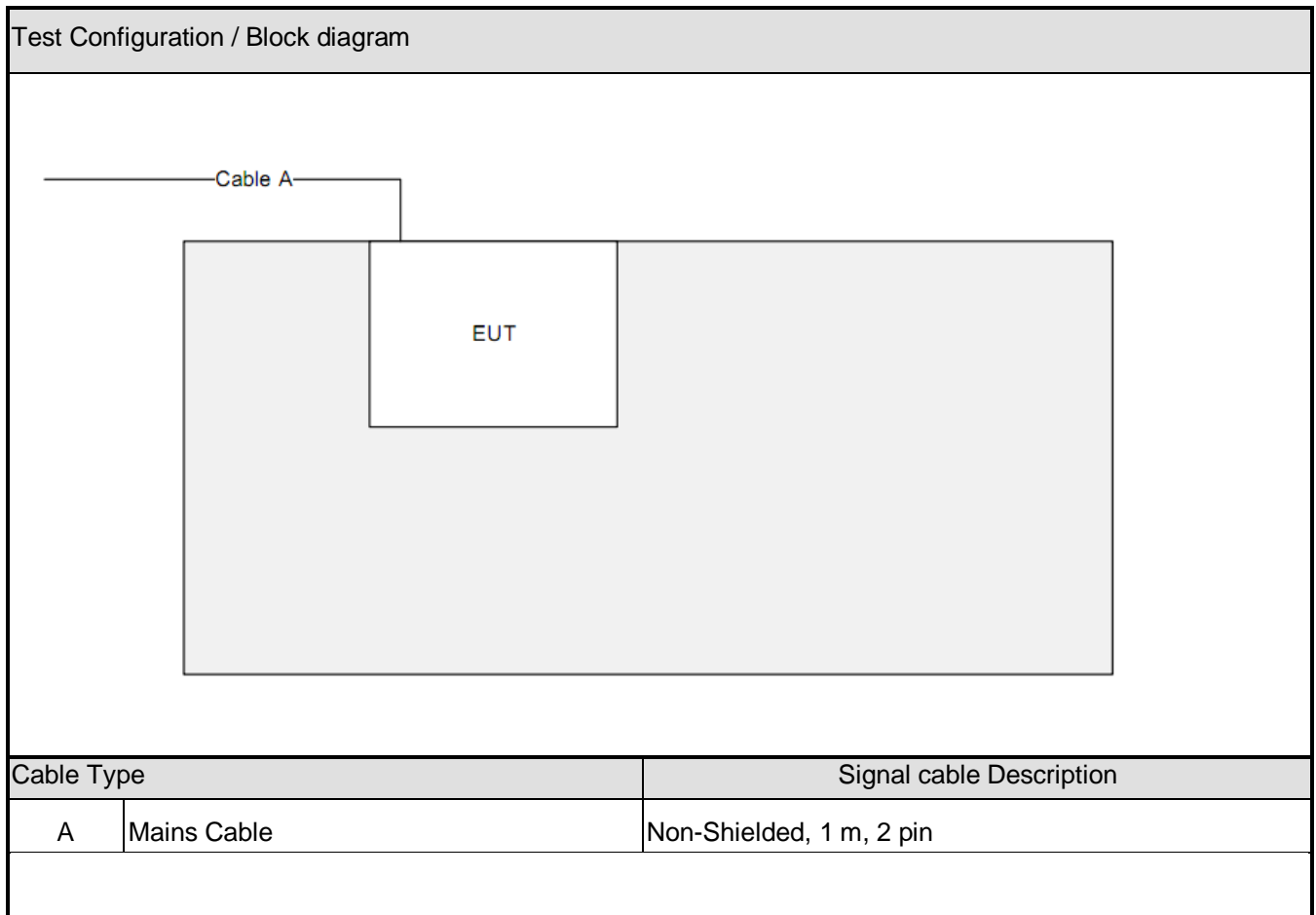
Port name and description	Connected to / Termination	Cable		
		Length used during test [m]	Attached during test	Shielded
N/A			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<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	2017 <sup>1)</sup>	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 <sup>1)</sup>	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	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

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

### Limits – Tools

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1]</sup>	Limit: AV [dB(μV) <sup>1]</sup>	IF BW	Detector(s)
0,15 - 0,35	66 – 56 <sup>2)</sup>	59 - 46 <sup>2)</sup>	9 KHz	QP, CAV
0,35 - 5,0	56	46	9 KHz	QP, CAV
5,0 - 30	60	50	9 KHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

<sup>2)</sup> 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

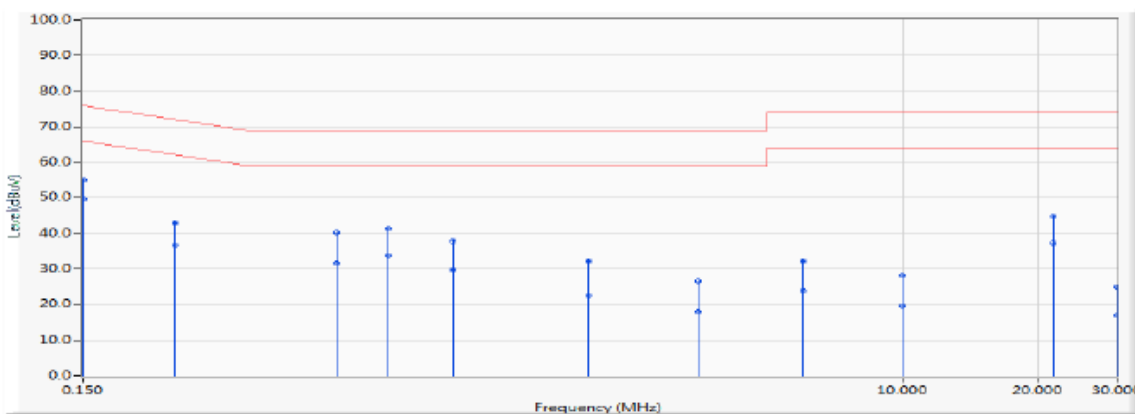
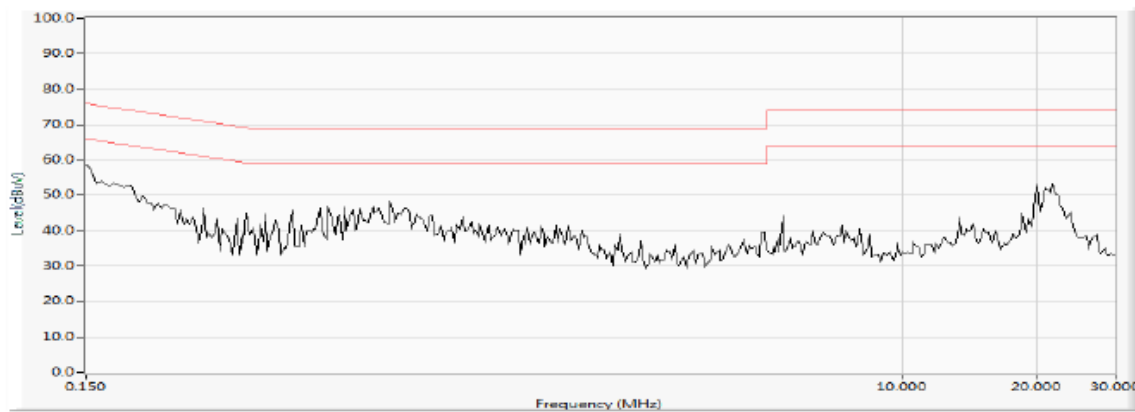
### Performed measurements

Scan range (0,9 – 1,1 U <sub>N</sub> )	<input type="checkbox"/>	198 – 264 V <sub>AC</sub>	<input type="checkbox"/>	207 – 253 V <sub>AC</sub>	<input checked="" type="checkbox"/>	230 V <sub>AC</sub>
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

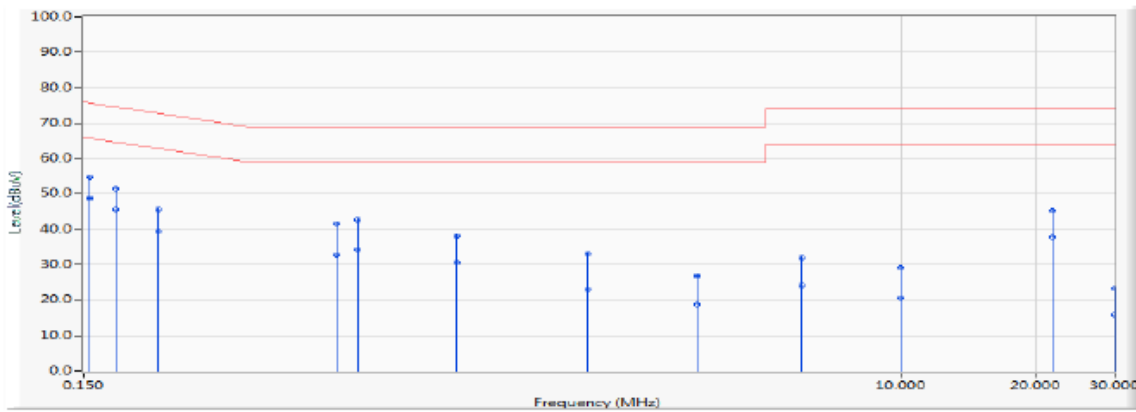
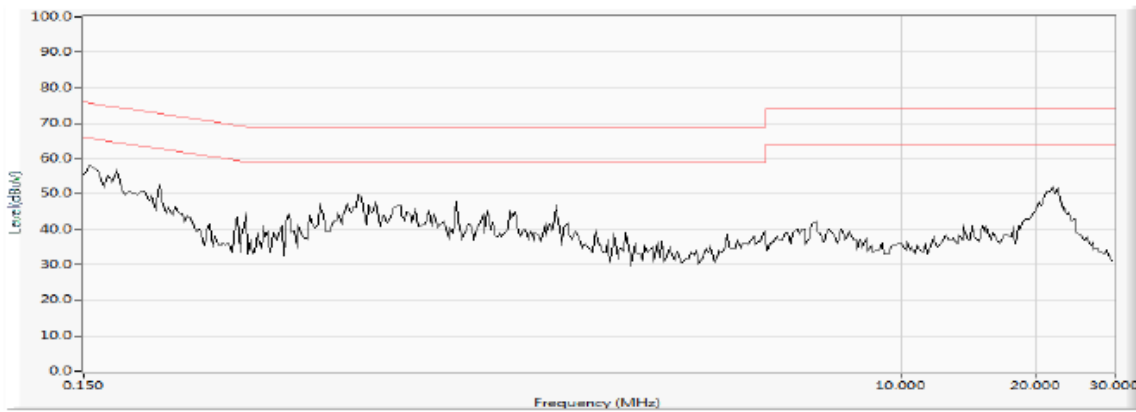
Line



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	45.350	55.030	-20.970	76.000	QUASIPeAK
2	*	0.150	9.680	39.800	49.480	-19.520	69.000	AVERAGE
3		0.240	9.680	33.140	42.820	-29.297	72.117	QUASIPeAK
4		0.240	9.680	26.930	36.610	-26.843	63.453	AVERAGE
5		0.550	9.693	30.590	40.282	-28.718	69.000	QUASIPeAK
6		0.550	9.693	21.990	31.682	-27.318	59.000	AVERAGE
7		0.716	9.728	31.630	41.358	-27.642	69.000	QUASIPeAK
8		0.716	9.728	24.130	33.858	-25.142	59.000	AVERAGE
9		1.000	9.790	28.000	37.790	-31.210	69.000	QUASIPeAK
10		1.000	9.790	20.020	29.810	-29.190	59.000	AVERAGE
11		2.000	9.800	22.260	32.060	-36.940	69.000	QUASIPeAK
12		2.000	9.800	12.690	22.490	-36.510	59.000	AVERAGE
13		3.500	9.807	16.730	26.537	-42.463	69.000	QUASIPeAK
14		3.500	9.807	8.140	17.947	-41.053	59.000	AVERAGE
15		6.000	9.877	22.390	32.267	-41.733	74.000	QUASIPeAK
16		6.000	9.877	14.060	23.937	-40.063	64.000	AVERAGE
17		10.000	10.090	18.140	28.230	-45.770	74.000	QUASIPeAK
18		10.000	10.090	9.470	19.560	-44.440	64.000	AVERAGE
19		21.673	10.422	34.380	44.802	-29.198	74.000	QUASIPeAK
20		21.673	10.422	26.920	37.342	-26.658	64.000	AVERAGE
21		30.000	10.580	14.300	24.880	-49.120	74.000	QUASIPeAK
22		30.000	10.580	6.350	16.930	-47.070	64.000	AVERAGE
Remark								

<b>Measurement data</b>	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	45.110	54.791	-20.992	75.783	QUASIPeAK
2	*	0.154	9.681	39.200	48.881	-19.809	68.689	AVERAGE
3		0.177	9.680	41.740	51.420	-23.213	74.633	QUASIPeAK
4		0.177	9.680	36.010	45.690	-21.357	67.047	AVERAGE
5		0.220	9.680	35.880	45.560	-27.276	72.836	QUASIPeAK
6		0.220	9.680	29.790	39.470	-25.010	64.480	AVERAGE
7		0.550	9.693	31.750	41.442	-27.558	69.000	QUASIPeAK
8		0.550	9.693	23.140	32.832	-26.168	59.000	AVERAGE
9		0.611	9.706	32.820	42.526	-26.474	69.000	QUASIPeAK
10		0.611	9.706	24.570	34.276	-24.724	59.000	AVERAGE
11		1.021	9.790	28.390	38.180	-30.820	69.000	QUASIPeAK
12		1.021	9.790	20.660	30.450	-28.550	59.000	AVERAGE
13		2.000	9.800	23.210	33.010	-35.990	69.000	QUASIPeAK
14		2.000	9.800	13.240	23.040	-35.960	59.000	AVERAGE
15		3.500	9.815	17.000	26.815	-42.185	69.000	QUASIPeAK
16		3.500	9.815	8.820	18.635	-40.365	59.000	AVERAGE
17		6.000	9.880	22.050	31.930	-42.070	74.000	QUASIPeAK
18		6.000	9.880	14.200	24.080	-39.920	64.000	AVERAGE
19		10.000	10.080	19.170	29.250	-44.750	74.000	QUASIPeAK
20		10.000	10.080	10.490	20.570	-43.430	64.000	AVERAGE
21		21.802	10.358	34.960	45.318	-28.682	74.000	QUASIPeAK
22		21.802	10.358	27.320	37.678	-26.322	64.000	AVERAGE
23		30.000	10.450	12.870	23.320	-50.680	74.000	QUASIPeAK
24		30.000	10.450	5.300	15.750	-48.250	64.000	AVERAGE
Remark								

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

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

**Limits**

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

<sup>1)</sup> At the transition frequency, the lower limit applies.

**Performed measurements**

<b>Port(s) / Terminal(s) under test</b>	
<input type="checkbox"/> (please write the name of the port under test)	<input type="checkbox"/> Other:
<input type="checkbox"/> Other:	<input type="checkbox"/> Other:
<b>Voltage—Mains [V]</b>	(Please write the voltage/voltages used for testing)
<b>Frequency—Mains [Hz]</b>	(Please write the frequency/frequencies used for testing)
<b>Test method applied</b>	<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
<b>Test setup</b>	<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).
<b>Operating mode(s) used</b>	Please write the operating mode(s) used during testing
<b>Remark</b>	---

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

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

**Limits**

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

<sup>1)</sup> At the transition frequency, the lower limit applies.

**Performed measurements**

<b>Port(s) / Terminal(s) under test</b>			
<input type="checkbox"/>	(please write the name of the port under test)		<input type="checkbox"/> Other:
<input type="checkbox"/>	Other:		<input type="checkbox"/> Other:
<b>Voltage—Mains [V]</b>		(Please write the voltage/voltages used for testing)	
<b>Frequency—Mains [Hz]</b>		(Please write the frequency/frequencies used for testing)	
<b>Test method applied</b>	<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:	
<b>Test setup</b>	<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).		
<b>Operating mode(s) used</b>		Please write the operating mode(s) used during testing	
<b>Remark</b>		---	

<b>4.4 Disturbance power (30 MHz – 300 MHz)</b>	<b>VERDICT: PASS</b>
---	----------------------

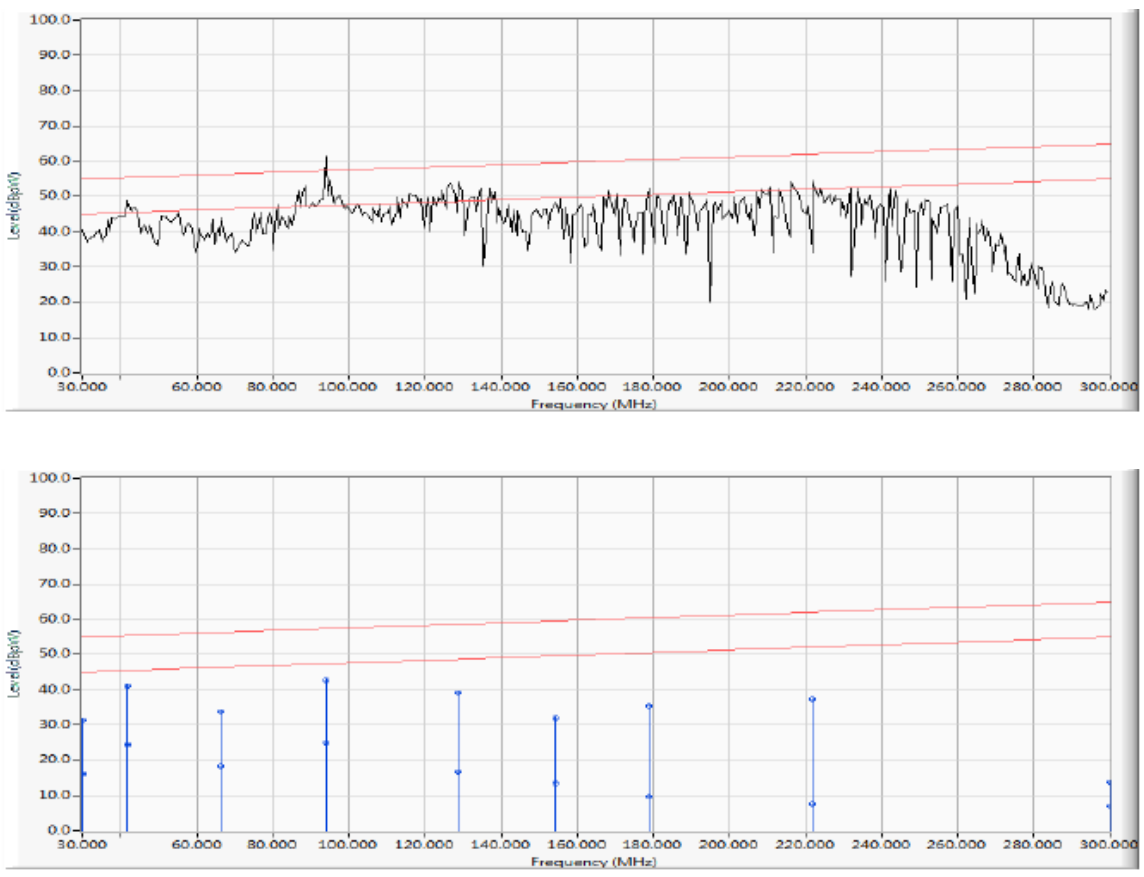
Standard	EN 55014-1
Basic standard	EN 55016-2-2

**Limits – Tools**

Frequency range [MHz]	Limit: QP [dB(pW)]	Limit: AV [dB(pW)]	IF BW	Detector(s)
30 - 300	45 – 55 <sup>1)</sup>	35 – 45 <sup>1)</sup>	120 KHz	QP, CAV
Margin				
200 - 300	0 – 10 <sup>1)</sup>	---	120 KHz	QP, CAV
<sup>1)</sup> 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 <sub>N</sub> )	<input type="checkbox"/>	198 – 264 V <sub>AC</sub>	<input type="checkbox"/>	207 – 253 V <sub>AC</sub>	<input checked="" type="checkbox"/>	230 V <sub>AC</sub>
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
 <p>The figure contains two EMI test plots. The top plot shows a continuous spectrum of electromagnetic interference (EMI) with a level between 30 dBµV and 60 dBµV across the frequency range of 30,000 MHz to 300,000 MHz. The bottom plot shows a discrete spectrum with several sharp peaks at various frequencies, with the highest peak around 100 MHz reaching approximately 45 dBµV.</p>		



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	28.470	31.470	-23.530	55.000	QUASIPeAK
2		30.000	3.000	13.060	16.060	-28.940	45.000	AVERAGE
3	*	41.625	1.751	39.280	41.031	-15.391	56.422	QUASIPeAK
4		41.625	1.751	22.690	24.441	-21.981	46.422	AVERAGE
5		66.500	0.465	33.420	33.885	-24.572	58.457	QUASIPeAK
6		66.500	0.465	17.850	18.315	-30.142	48.457	AVERAGE
7		94.062	0.659	42.070	42.729	-17.234	59.963	QUASIPeAK
8		94.062	0.659	24.390	25.049	-24.914	49.963	AVERAGE
9		128.562	0.258	38.960	39.218	-22.102	61.320	QUASIPeAK
10		128.562	0.258	16.450	16.708	-34.612	51.320	AVERAGE
11		154.125	-0.624	32.410	31.786	-30.321	62.108	QUASIPeAK
12		154.125	-0.624	13.920	13.296	-38.811	52.108	AVERAGE
13		178.812	-1.176	36.550	35.374	-27.379	62.753	QUASIPeAK
14		178.812	-1.176	10.900	9.724	-43.029	52.753	AVERAGE
15		221.875	-1.253	38.430	37.177	-26.513	63.690	QUASIPeAK
16		221.875	-1.253	8.810	7.557	-46.133	53.690	AVERAGE
17		300.000	-1.095	14.790	13.695	-51.305	65.000	QUASIPeAK
18		300.000	-1.095	8.060	6.965	-48.035	55.000	AVERAGE
Remark								

<b>4.5</b>	<b>Radiated electromagnetic disturbances (30 – 1000 MHz)</b>	<b>VERDICT: N/A</b>
------------	--	---------------------

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) <sup>1)</sup>			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

<sup>1)</sup> 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	---				

<b>4.6 Discontinuous disturbance (clicks) on AC power leads</b>	<b>VERDICT: N/A</b>
---	---------------------

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 <sub>AC</sub>	<input type="checkbox"/> 207 – 253 V <sub>AC</sub>	<input type="checkbox"/> $\sim$ V <sub>AC</sub>
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.
------------------------------------	-------------------------------------	---

Measurement results	<input checked="" type="checkbox"/> Neutral	<input checked="" type="checkbox"/> Line 1	<input type="checkbox"/> Line 2	<input type="checkbox"/> Line 3
---------------------	---	--	---------------------------------	---------------------------------

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 ( $t \leq 10$  ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.

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

Supplementary information: ---

<b>4.7 Harmonic current emissions</b>	<b>VERDICT: PASS</b>
---------------------------------------	----------------------

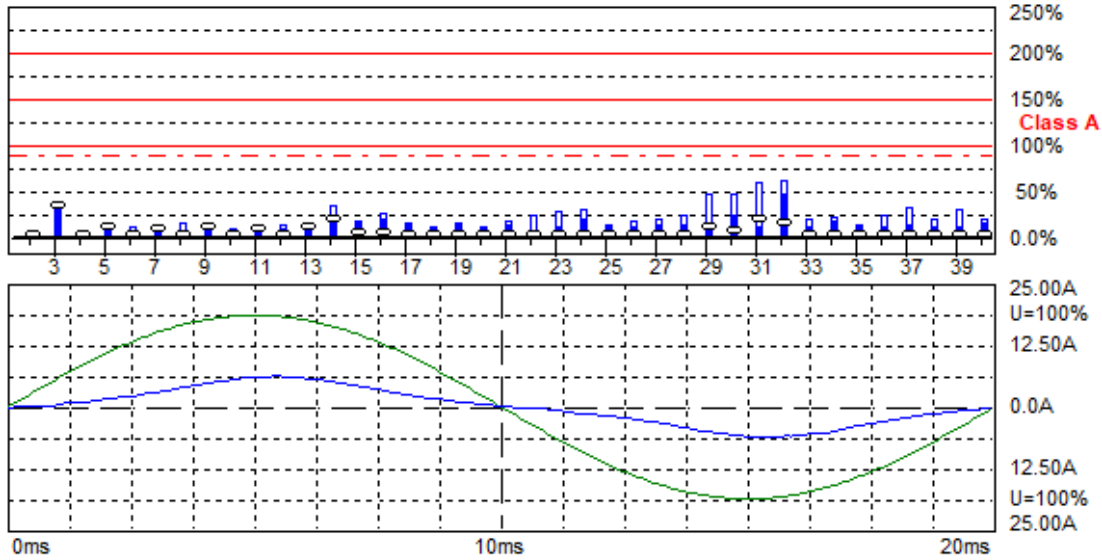
Standard	EN 61000-3-2	
Exclusions (For these categories of equipment, limits are not specified in the EN 61000-3-2 standard)	<input type="checkbox"/>	Arc welding equipment intended for professional use.
	<input type="checkbox"/>	System(s) with nominal voltage(s) less than 220 V <sub>AC</sub> (line-to-neutral).
	<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 checked="" type="checkbox"/>	Class A	All apparatus not classified as Class B, C or D	
<input 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						

<b>Measurement data</b>	Port under test	AC mains power input
Operating mode / voltage / frequency used during the test		Mode 1/ 230 Vac/ 50 Hz
WS620		220-240v model



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

2019/1/3 下午 01:12:35

Urms = 230.1 V    P = 810.5 W    THC = 0.715 A  
 Irms = 3.613 A    pf = 0.975

Range: 25 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:	25 A						
Irms =	3.613A	Ipk =	6.348A	cf =	1.757						
P =	810.5W	S =	831.4VA	pf =	0.975						
THDi =	20.3 %	THDu =	0.10 %	Class A							
Test - Time :		5min		( 100 %)							
Test completed, Result: PASSED											
Order	Freq. [Hz]	Iavg [A]	Irms [A]	Irms% [%]	Irms%L [%]	I <sub>max</sub> [A]	I <sub>max</sub> % [%]	I <sub>max</sub> %L [%]	Limit [A]	Status	
1	50	3.5700	3.5233	97.508		3.8101	105.45			0.00	
2	100	0.0000	0.0137	0.3801	1.2716	0.0168	0.4645	1.5541	1.0800	0.00	
3	150	0.7235	0.7050	19.510	30.650	0.8408	23.269	36.555	2.3000	0.00	
4	200	0.0000	0.0122	0.3378	2.8388	0.0153	0.4223	3.5486	0.4300	0.00	
5	250	0.0969	0.0931	2.5760	8.1648	0.1236	3.4206	10.842	1.1400	0.00	
6	300	0.0007	0.0122	0.3378	4.0690	0.0259	0.7179	8.6466	0.3000	0.00	
7	350	0.0454	0.0305	0.8446	3.9633	0.0641	1.7736	8.3230	0.7700	0.00	
8	400	0.0010	0.0076	0.2111	3.3171	0.0290	0.8024	12.605	0.2300	0.00	
9	450	0.0404	0.0244	0.6757	6.1035	0.0565	1.5625	14.114	0.4000	0.00	
10	500	0.0000	0.0107	0.2956	5.8050	0.0122	0.3378	6.6343	0.1840	0.00	
11	550	0.0243	0.0244	0.6757	7.3982	0.0305	0.8446	9.2478	0.3300	0.00	
12	600	0.0000	0.0107	0.2956	6.9660	0.0183	0.5068	11.942	0.1533	0.00	
13	650	0.0174	0.0229	0.6334	10.899	0.0259	0.7179	12.352	0.2100	0.00	
14	700	0.0249	0.0229	0.6334	17.415	0.0412	1.1402	31.347	0.1314	0.00	
15	750	0.0053	0.0198	0.5490	13.224	0.0214	0.5912	14.242	0.1500	0.00	
16	800	0.0031	0.0183	0.5068	15.922	0.0275	0.7601	23.883	0.1150	0.00	
17	850	0.0000	0.0168	0.4645	12.682	0.0183	0.5068	13.835	0.1324	0.00	
18	900	0.0000	0.0061	0.1689	5.9708	0.0107	0.2956	10.449	0.1022	0.00	
19	950	0.0000	0.0137	0.3801	11.597	0.0168	0.4645	14.174	0.1184	0.00	
20	1000	0.0000	0.0061	0.1689	6.6343	0.0092	0.2534	9.9514	0.0920	0.00	
21	1050	0.0000	0.0122	0.3378	11.393	0.0168	0.4645	15.666	0.1071	0.00	
22	1100	0.0000	0.0046	0.1267	5.4733	0.0183	0.5068	21.893	0.0836	0.00	
23	1150	0.0004	0.0092	0.2534	9.3587	0.0259	0.7179	26.516	0.0978	0.00	
24	1200	0.0000	0.0137	0.3801	17.912	0.0214	0.5912	27.864	0.0767	0.00	
25	1250	0.0000	0.0092	0.2534	10.173	0.0107	0.2956	11.868	0.0900	0.00	
26	1300	0.0000	0.0061	0.1689	8.6245	0.0107	0.2956	15.093	0.0708	0.00	
27	1350	0.0000	0.0092	0.2534	10.986	0.0137	0.3801	16.479	0.0833	0.00	
28	1400	0.0000	0.0076	0.2111	11.610	0.0137	0.3801	20.898	0.0657	0.00	
29	1450	0.0062	0.0076	0.2111	9.8334	0.0351	0.9713	45.234	0.0776	0.00	
30	1500	0.0034	0.0137	0.3801	22.391	0.0275	0.7601	44.781	0.0613	0.00	
31	1550	0.0118	0.0061	0.1689	8.4093	0.0412	1.1402	56.763	0.0726	0.00	
32	1600	0.0077	0.0259	0.7179	45.113	0.0336	0.9291	58.381	0.0575	0.00	
33	1650	0.0000	0.0061	0.1689	8.9518	0.0122	0.3378	17.904	0.0682	0.00	
34	1700	0.0000	0.0076	0.2111	14.098	0.0107	0.2956	19.737	0.0541	0.00	
35	1750	0.0000	0.0061	0.1689	9.4944	0.0076	0.2111	11.868	0.0643	0.00	
36	1800	0.0000	0.0046	0.1267	8.9562	0.0107	0.2956	20.898	0.0511	0.00	
37	1850	0.0000	0.0076	0.2111	12.546	0.0183	0.5068	30.111	0.0608	0.00	
38	1900	0.0000	0.0046	0.1267	9.4538	0.0092	0.2534	18.908	0.0484	0.00	
39	1950	0.0000	0.0061	0.1689	10.579	0.0168	0.4645	29.093	0.0577	0.00	
40	2000	0.0000	0.0061	0.1689	13.269	0.0076	0.2111	16.586	0.0460	0.00	
Remark											

<b>4.8 Voltage changes, voltage fluctuations and flicker</b>	<b>VERDICT: PASS</b>
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Standard	EN 61000-3-3
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**Limits**

P <sub>ST</sub> (Short term flicker)	<input type="checkbox"/>	≤ 1	<input checked="" type="checkbox"/>	Not Applicable
P <sub>LT</sub> (Long term flicker)	<input type="checkbox"/>	≤ 0,65	<input checked="" type="checkbox"/>	Not Applicable
d <sub>c</sub> (Relative Voltage change)	<input checked="" type="checkbox"/>	≤ 3,3%	<input type="checkbox"/>	Not Applicable
d <sub>MAX</sub> (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 <sub>st</sub> = 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<sub>MAX</sub></td> <td data-bbox="999 521 1337 566">2,22%</td> </tr> <tr> <td data-bbox="193 566 999 611">Relative Voltage change d<sub>C</sub></td> <td data-bbox="999 566 1337 611">0,76%</td> </tr> <tr> <td data-bbox="193 611 999 656">Short term flicker P<sub>ST</sub></td> <td data-bbox="999 611 1337 656">0,23</td> </tr> <tr> <td data-bbox="193 656 999 701">Long term flicker P<sub>LT</sub></td> <td data-bbox="999 656 1337 701">0,24</td> </tr> </tbody> </table>			Relative voltage change characteristic dt	0,0	Maximum voltage change d <sub>MAX</sub>	2,22%	Relative Voltage change d <sub>C</sub>	0,76%	Short term flicker P <sub>ST</sub>	0,23	Long term flicker P <sub>LT</sub>	0,24
Relative voltage change characteristic dt	0,0											
Maximum voltage change d <sub>MAX</sub>	2,22%											
Relative Voltage change d <sub>C</sub>	0,76%											
Short term flicker P <sub>ST</sub>	0,23											
Long term flicker P <sub>LT</sub>	0,24											
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 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>		

<b>5.3 Electrostatic discharge immunity</b>	<b>VERDICT: N/A</b>
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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 <sup>1)</sup>	<input checked="" type="checkbox"/>	±2 kV	<input checked="" type="checkbox"/>	±4 kV	<input checked="" type="checkbox"/>	±8 kV	<input type="checkbox"/>	kV
Contact discharges <sup>1)</sup>	<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.							
<sup>1)</sup> 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:					

<b>5.4</b>	<b>Radio-frequency electromagnetic fields immunity</b>	<b>VERDICT: N/A</b>
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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>						

<b>5.5</b>	<b>Electrical Fast Transients immunity</b>	<b>VERDICT: N/A</b>
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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 <sup>1)</sup>	± 1000 V	5 KHz	2 min. / polarity
<input type="checkbox"/>	DC input-output power <sup>2)</sup>	± 500 V	5 KHz	2 min. / polarity
<input type="checkbox"/>	Signal and Control lines <sup>3)</sup>	± 500 V	5 KHz	2 min. / polarity
<sup>1)</sup> 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. <sup>2)</sup> Not applicable to battery operated appliances that cannot be connected to the mains while in use. <sup>3)</sup> 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"/> Other
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.					

<b>5.6</b>	<b>Surge transient immunity</b>	<b>VERDICT: N/A</b>
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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 <sup>1)</sup>	+ 1 kV	N/A	90
AC input power <sup>1)</sup>	- 1 kV	N/A	270
<sup>1)</sup> 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	4
<input type="checkbox"/> AC mains input power	Line to Earth	-2 kV	270	4
<input type="checkbox"/> AC mains input power	Neutral to Earth	+2 kV	90	4
<input type="checkbox"/> AC mains input power	Neutral to Earth	-2 kV	270	4
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.				

<b>5.7</b>	<b>Injected currents (RF common mode) immunity</b>	<b>VERDICT: N/A</b>
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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 <sub>0</sub>	
<input checked="" type="checkbox"/>	AC input-output power <sup>1)</sup>		3 V	
<input type="checkbox"/>	DC input-output power <sup>2) 3)</sup>		1 V	
<input type="checkbox"/>	Signal and Control lines <sup>4)</sup>		1 V	
<sup>1)</sup> 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. <sup>2)</sup> Not applicable to battery operated appliances that cannot be connected to the mains while in use. <sup>3)</sup> 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. <sup>4)</sup> 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)
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:				

<b>5.8</b>	<b>Power supply interruptions and dips immunity</b>	<b>VERDICT: N/A</b>
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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 <sup>1)</sup>	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.
<sup>1)</sup> Changes to the voltage level shall occur at a zero crossing point in the a.c. voltage waveform. <b>NOTE:</b> Where the equipment has a rated voltage range the following shall apply: <ul style="list-style-type: none"> <li>- 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.</li> <li>- In all other cases, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range.</li> </ul>				

### 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  $\pm 2.26$  dB.

### Disturbance Power Emission

The measurement uncertainty is evaluated as  $\pm 3.34$  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	ESCI7	100879	2018/10/05	2019/10/04
Artificial Mains Network	R&S	ENV4200	848411/010	2019/01/11	2020/01/10
LISN	R&S	ENV216	100092	2018/07/23	2019/07/22
Coaxial Cable	Harbour	RG-400	SR2-H	2018/08/15	2019/08/14
DEKRA-EMI system	DEKRA	Version 1.0	SR2-H	N/A	N/A

### Disturbance Power Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Test Receiver	R&S	ESCI7	100879	2018/10/05	2019/10/04
Absorbing Clamp	Luthi	MDS 21B	P1602169770	2019/01/29	2020/01/28
DEKRA-EMI system	DEKRA	Version 1.0	SR2-H	N/A	N/A

### Power Harmonics / SR3-H

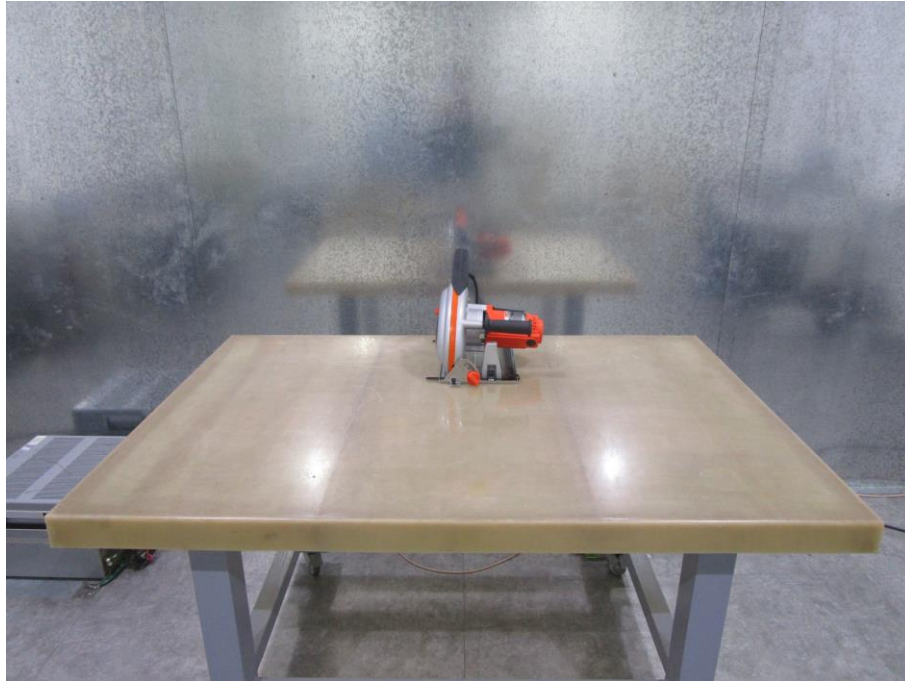
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EMC Emission Tester	EMC-Partner	HAR-1000-1P	109	2019/01/02	2020/01/01

### 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	2019/01/02	2020/01/01

## 9 TEST PHOTOS

### Conducted disturbance voltage at mains terminals



### Disturbance power



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