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Test report No:

6060146.50V1.2

## TEST REPORT

### Electromagnetic Compatibility (EMC)

|   |   |   |
|---|---|---|
| Identification of item tested             | Air Pump  |   |
| Trademark                                 | N/A   |   |
| Model and /or type reference              | #62098, #62145  |   |
| Ratings                                   | 220-240 V~; #62145 210W / #62098 190W   |   |
| Test Laboratory / address                 | DEKRA Testing and Certification (Shanghai) Ltd.<br>3 F., No. 250 Jiangchangsang Road, Jing'an District, Shanghai<br>City, 200436, China |   |
| Applicant's name / address                | Bestway (Hongkong) International Ltd<br>Suite 713, 7/Floor, East Wing, Tsim Sha Tsui Centre, 66 Mody<br>Road, Kowloon, Hongkong         |   |
| Test method requested, standard           | EN 55014-1:2006+A1:2009+A2:2011<br>EN 55014-1:2017<br>EN 55014-2:2015;<br>EN 61000-3-2:2014<br>EN 61000-3-3:2013                        |   |
| Verdict Summary                           | IN COMPLIANCE   |   |
| Tested by (name / position & signature)   | Xingyu He<br>Test Engineer  |  |
| Approved by (name / position & signature) | Zuyao Fan<br>Project Manager  |  |
| Date of issue                             | 2020-04-14  |   |
| Report template No                        | TRF_EN55014-1_EN55014-2 EMC01 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.

## 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%. Refer to the Annex 1 for further information.

## 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 type="checkbox"/> | Comma (,) | <input checked="" type="checkbox"/> Point (.) |

## ABBREVIATIONS

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

|       |                               |
|-------|-------------------------------|
| EUT   | : Equipment Under Test        |
| QP    | : Quasi-Peak                  |
| CAV   | : CISPR Average               |
| AV    | : Average                     |
| CDN   | : Coupling Decoupling Network |
| SAC   | : Semi-Anechoic Chamber       |
| OATS  | : Open Area Test Site         |
| BW    | : Bandwidth                   |
| AM    | : Amplitude Modulation        |
| PM    | : Pulse Modulation            |
| HCP   | : Horizontal Coupling Plane   |
| VCP   | : Vertical Coupling Plane     |
| $U_N$ | : Nominal voltage             |
| N/A   | : Not Applicable              |
| N/M   | : Not Measured                |

## DOCUMENT HISTORY

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| Report nr.     | Date       | Description     |
|----------------|------------|-----------------|
| 6060146.50     | 2019-10-16 | First release.  |
| 6060146.50V1.1 | 2019-11-19 | Second release. |
| 6060146.50V1.2 | 2020-04-14 | Third release.  |

## REMARKS AND COMMENTS

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

The test results relate only to the samples tested.

According to the declaration from manufacturer, both models are identical except the model name

The test results stated in this report of model #62145 are also representative for the others.

## 1 GENERAL INFORMATION

### 1.1 General Description of the Item(s)

|                               |   |
|-------------------------------|---|
| Description of the item ..... | Air Pump  |
| Model / Type number.....      | #62098, #62145  |
| Serial number .....           | N/A   |
| Trademark.....                | N/A   |
| Manufacturer.....             | Bestway Inflatables & Material Corp<br>No. 3065 Cao An Road , Shanghai 201812 , P. R. China   |
| Factory .....                 | GOLEADER INDUSTRIES (JINHUA) CO., LTD.<br>No.618 Wenxi Road, Jinpan Development New Zone, Jinhua, Zhejiang Province, 321025, China. |

| Rated power supply ..... | Voltage and Frequency               |                                | Reference poles          |                          |                          |                          |                          |
|--------------------------|-------------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                          |                                     |                                | L1                       | L2                       | L3                       | N                        | PE                       |
|                          | <input checked="" type="checkbox"/> | AC: 220-240 V~                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                          | <input type="checkbox"/>            | AC: 100 – 240 V, 50/60 Hz      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                          | <input type="checkbox"/>            | DC: 12 V, 24 V, 12 / 24 V      |                          |                          |                          |                          |                          |
|                          | <input type="checkbox"/>            | Battery: 12 V                  |                          |                          |                          |                          |                          |
| Rated Power .....        | #62145 210W /# 62098 190W           |                                |                          |                          |                          |                          |                          |
| Clock frequencies .....  | N/A                                 |                                |                          |                          |                          |                          |                          |
| 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)  |
|---|
| The apparatus as supplied for the test is Air Pump, intended for residential and commercial use. These products have no electronic control unit |

| No | Module/parts of test item | Type | Manufacturer |
|----|---------------------------|------|--------------|
| 1  | N/A                       |      |              |
|    |                           |      |              |
|    |                           |      |              |

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

|   |                                     |     |                          |                           |
|---|-------------------------------------|-----|--------------------------|---------------------------|
| Modifications to the test item during testing ..... | <input checked="" type="checkbox"/> | N/A | <input type="checkbox"/> | Supplemental information: |
|---|-------------------------------------|-----|--------------------------|---------------------------|

Copy of marking plate:

N/A

## 1.2 Environment

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

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

## 1.3 Test data

|                      |  |
|----------------------|--|
| Test Location        | DEKRA Testing and Certification (Shanghai) Ltd.<br>1 F, No. 250, Jiangchangsan Road, Shanghai City |
| Date(receive sample) | 2019-11  |
| Date (start test)    | 2019-11  |
| Date (finish test)   | 2019-11  |



## 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 clock frequency higher than 15 MHz. (For toys, examples include educational computers, organs, track sets with electronic control units.)</p>  |
| <input type="checkbox"/>  | <p><b>Category III:</b> equipment which in normal use, is not connected to a power network and has no cables attached. This category includes apparatus provided with rechargeable batteries, solar or other similar d.c. power sources which can be charged or operated by connecting the apparatus to the mains power. However, this apparatus shall also be tested as an apparatus in category II while it is connected to the mains network.( For toys, examples include musical soft toys, cord-controlled toys and motor-operated electronic toys.)</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                                | The EUT operates normally. | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2                                |                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 3                                |                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 4                                |                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 5                                |                            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <u>Supplemental information:</u> |                            |                                     |                                     |

### 2.2 Port(s) of the EUT

| Port name and description        | Connected to / Termination | Cable                       |                                     |                          |
|----------------------------------|----------------------------|-----------------------------|-------------------------------------|--------------------------|
|                                  |                            | Length used during test [m] | Attached during test                | Shielded                 |
| AC input port                    | AC mains                   | 0.8 m                       | <input checked="" 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> |                            |                             |                                     |                          |

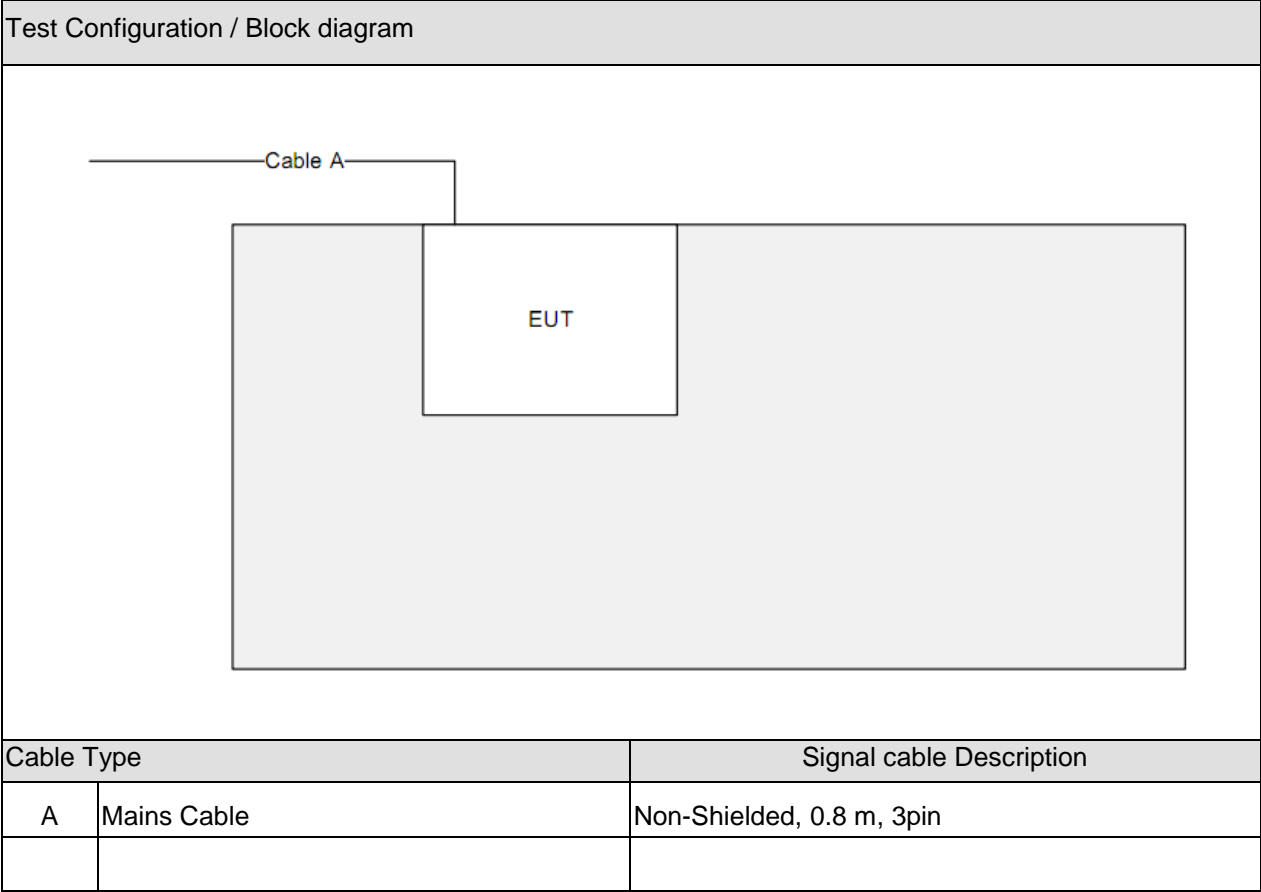
### 2.3 Support / Auxiliary equipment / unit / software for the EUT

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

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

2.4 Test Configuration / Block diagram used for tests

The following test setup / configuration / block diagram has been used during the 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<br>A1<br>A2     | 2006<br>2009<br>2011 | Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission.   |
| EN 55014-1                 | 2017                 |   |
| 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<br>+A1<br>+A2 | 2010<br>2010<br>2014 | Methods of measurement of disturbances and immunity - Radiated disturbance measurements.  |
| EN 61000-3-2               | 2014                 | Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase).  |
| EN 61000-3-3               | 2013                 | Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current $\leq 16$ A per phase and not subject to conditional connection. |
| EN 55014-2                 | 2015                 | 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<br>+A1<br>+A2 | 2006<br>2008<br>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.  |
| EN 50498                   | 2010                 | Product family standard for aftermarket electronic equipment in vehicles  |

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

The following deviation(s) was / were made from the published requirements of the listed standards:

N/A.

### 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 3) |
| Radiated electromagnetic disturbances (30 - 1000 MHz)  | EN 55016-2-3      | N/A     | ---    |
| Radiated disturbances  | EN 50498          | N/A     | ---    |
| Conducted transient disturbances   | EN 50498          | N/A     |        |
| Discontinuous disturbance (clicks) on AC power leads   | EN 55014-1        | N/A     | See 1) |
| <b>Supplementary information:</b><br>1) Exemptions from click measurements applicable (clause 4.2.3).<br>2) Not applicable because no test requirements have been specified for DC/battery powered apparatus.<br>3) According to clause 4.3.4.2 procedure (a) of the CISRP 14-1 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    | ---    |
| <b>Supplementary information:</b><br>1) The EUT is regarded as an “Equipment with rated power of $\leq 75$ W”. According to “Clause 7, Figure 1 - Flowchart for determining conformity” the EUT is deemed to comply with the requirements of the EN 61000-3-2 standard.<br>2) The EUT is regarded as a professional equipment with a total rated power greater than 1 KW. The test is not applicable. |                   |         |        |

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

| 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  | 66 – 56 <sup>2)</sup>           | 59 - 46 <sup>2)</sup>           | 9 KHz | QP, CAV     |
| 0,50 - 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.<br><sup>2)</sup> The limit decreases linearly with the logarithm of the frequency. |                                 |                                 |       |             |

### Performed measurements

|                           |   |                          |                                     |                         |                                     |    |                          |              |                          |    |
|---------------------------|---|--------------------------|-------------------------------------|-------------------------|-------------------------------------|----|--------------------------|--------------|--------------------------|----|
| 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]       | 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 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                    | ---   |                          |                                     |                         |                                     |    |                          |              |                          |    |

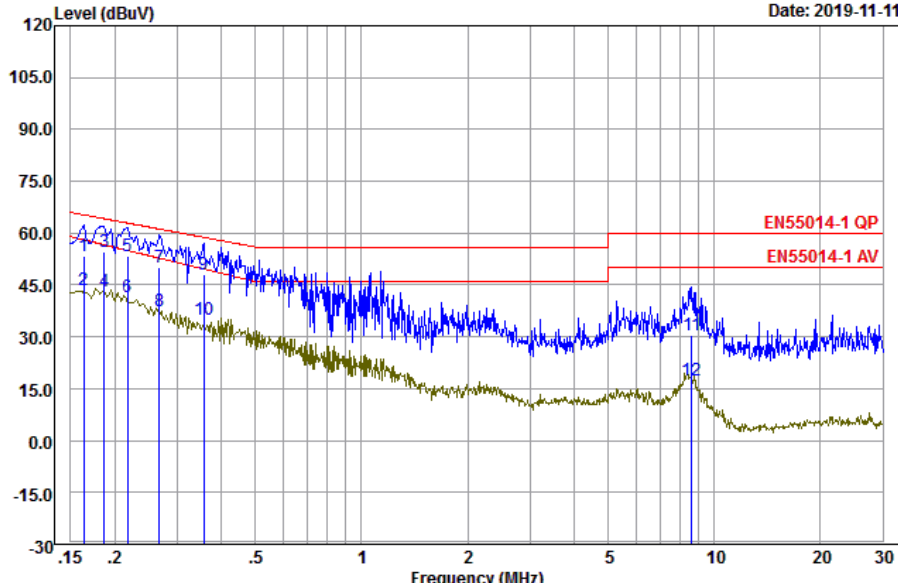
See next page.

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

Line:

Level (dBuV)

Date: 2019-11-11



|      | Freq | Limit | Level | Read  | Cable  | Over |                |
|------|------|-------|-------|-------|--------|------|----------------|
|      | MHz  | Line  | dBuV  | Level | Factor | Loss | Limit Remark   |
|      |      |       | dBuV  | dBuV  | dB     | dB   | dB             |
| 1    | 0.16 | 65.30 | 53.24 | 43.59 | 9.65   | 0.02 | -12.06 QP      |
| 2    | 0.16 | 58.08 | 43.44 | 33.79 | 9.65   | 0.02 | -14.64 Average |
| 3    | 0.19 | 64.20 | 54.55 | 44.89 | 9.66   | 0.02 | -9.65 QP       |
| 4 av | 0.19 | 56.65 | 43.15 | 33.49 | 9.66   | 0.02 | -13.50 Average |
| 5 pp | 0.22 | 62.92 | 53.36 | 43.70 | 9.66   | 0.02 | -9.56 QP       |
| 6    | 0.22 | 55.00 | 41.36 | 31.70 | 9.66   | 0.02 | -13.64 Average |
| 7    | 0.27 | 61.20 | 50.07 | 40.40 | 9.67   | 0.02 | -11.13 QP      |
| 8    | 0.27 | 52.76 | 37.57 | 27.90 | 9.67   | 0.02 | -15.19 Average |
| 9    | 0.36 | 58.78 | 47.99 | 38.30 | 9.69   | 0.03 | -10.79 QP      |
| 10   | 0.36 | 49.62 | 34.79 | 25.10 | 9.69   | 0.03 | -14.83 Average |
| 11   | 8.64 | 60.00 | 30.55 | 20.60 | 9.95   | 0.12 | -29.45 QP      |
| 12   | 8.64 | 50.00 | 17.35 | 7.40  | 9.95   | 0.12 | -32.65 Average |

Note:

1. All Readings are performed with Quasi-Peak and/or average measurements as necessary.

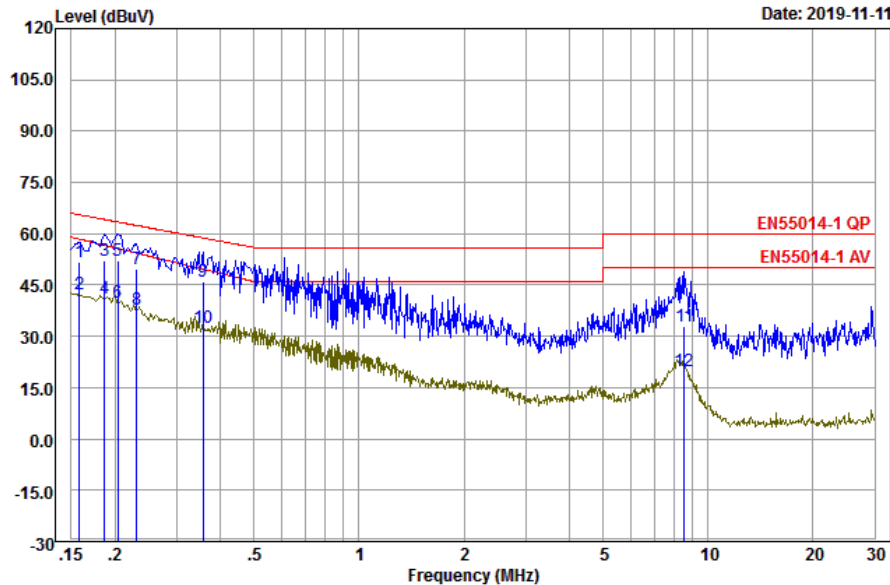
2. Measurement Level = Reading Level + Factor +Cable Loss.

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

Neutral:

Level (dBuV)

Date: 2019-11-11



Frequency (MHz)

|      | Freq | Limit | Level | Read  | Cable  | Over | Remark         |
|------|------|-------|-------|-------|--------|------|----------------|
|      | MHz  | dBuV  | dBuV  | Level | Factor | Loss | Limit          |
| 1    | 0.16 | 65.56 | 51.54 | 41.90 | 9.64   | 0.02 | -14.02 QP      |
| 2    | 0.16 | 58.43 | 42.34 | 32.70 | 9.64   | 0.02 | -16.09 Average |
| 3    | 0.19 | 64.20 | 51.95 | 42.29 | 9.66   | 0.02 | -12.25 QP      |
| 4    | 0.19 | 56.65 | 40.95 | 31.29 | 9.66   | 0.02 | -15.70 Average |
| 5 pp | 0.20 | 63.45 | 51.96 | 42.30 | 9.66   | 0.02 | -11.49 QP      |
| 6 av | 0.20 | 55.68 | 40.06 | 30.40 | 9.66   | 0.02 | -15.62 Average |
| 7    | 0.23 | 62.44 | 49.77 | 40.11 | 9.66   | 0.02 | -12.67 QP      |
| 8    | 0.23 | 54.37 | 37.97 | 28.31 | 9.66   | 0.02 | -16.40 Average |
| 9    | 0.36 | 58.78 | 45.99 | 36.30 | 9.69   | 0.03 | -12.79 QP      |
| 10   | 0.36 | 49.62 | 32.69 | 23.00 | 9.69   | 0.03 | -16.93 Average |
| 11   | 8.55 | 60.00 | 32.75 | 22.80 | 9.95   | 0.12 | -27.25 QP      |
| 12   | 8.55 | 50.00 | 20.05 | 10.10 | 9.95   | 0.12 | -29.95 Average |

Note:

1. All Readings are performed with Quasi-Peak and/or average measurements as necessary.

2. Measurement Level = Reading Level + Factor +Cable Loss.

|        |     |
|--------|-----|
| Remark | --- |
|--------|-----|

**Note:**

1. All Readings are performed with Quasi-Peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Factor + Cable Loss.



|     |   |                      |
|-----|---|----------------------|
| 4.2 | <b>Disturbance power (30 MHz – 300 MHz)</b> | <b>VERDICT: PASS</b> |
|-----|---|----------------------|

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

#### Limits

| Frequency range [MHz]  | Limit: QP [dB(pW)]    | Limit: AV [dB(pW)]    | IF BW   | Detector(s) |
|--|-----------------------|-----------------------|---------|-------------|
| 30 - 300   | 45 – 55 <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. |                       |                       |         |             |

#### 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:  |
| 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 checked="" type="checkbox"/>           | Maximum clock frequency < 30 MHz                |                          |                          |         |
| Operating mode(s) used                                   |   | Mode 1  |                          |                          |         |
| Remark   |   | ---   |                          |                          |         |

See next page.

| Measurement data   |  | Port under test | AC input power           |  |
|--|--|-----------------|--------------------------|--|
| Operating mode / voltage / frequency used during the test  |  |                 | Mode 1 / 230 Vac / 50 Hz |  |
| <div><div><div>Level (dBpW)</div><div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><d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|  |                 |                          |  |

|     |  |                 |            |
|-----|--|-----------------|------------|
| 4.3 | <b>Radiated electromagnetic disturbances (30 – 1000 MHz)</b> | <b>VERDICT:</b> | <b>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<br>[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]                           | ---                                 |  |
| Frequency — Mains [Hz]                        | ---                                 |  |
| 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                        | Mode 1                              |  |
| Remark  | ---                                 |  |

|     |  |          |     |
|-----|--|----------|-----|
| 4.4 | 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**

|                        |   |                          |   |
|------------------------|---|--------------------------|---|
| Voltage — Mains [V]    | 230 Vac                                       |                          |   |
| Frequency — Mains [Hz] | 50 Hz , 60 Hz                                 |                          |   |
| Test method applied    | <input checked="" type="checkbox"/>           | Artificial mains network |   |
|                        | <input type="checkbox"/>                      | Voltage probe            |   |
| Test setup             | <input checked="" type="checkbox"/>           | Table top                | <input 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                 | ---   |                          |   |

|                                     |  |   |  |                          |                          |                |                          |                       |
|-------------------------------------|--|---|--|--------------------------|--------------------------|----------------|--------------------------|-----------------------|
| 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                        | 120                      | 5              | 16                       | 82                    |
| 0,5                                 | 56   | 0   | 0  | 0                        | 120                      | 5              | 16                       | 72                    |
| 1,4                                 | 56   | 0   | 0  | 0                        | 120                      | 5              | 16                       | 72                    |
| 30                                  | 60   | 0   | 0  | 0                        | 120                      | 5              | 16                       | 76                    |
| <input checked="" type="checkbox"/> | 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>4.5 Harmonic current emissions</b> | <b>VERDICT: PASS</b> |
|---------------------------------------|----------------------|

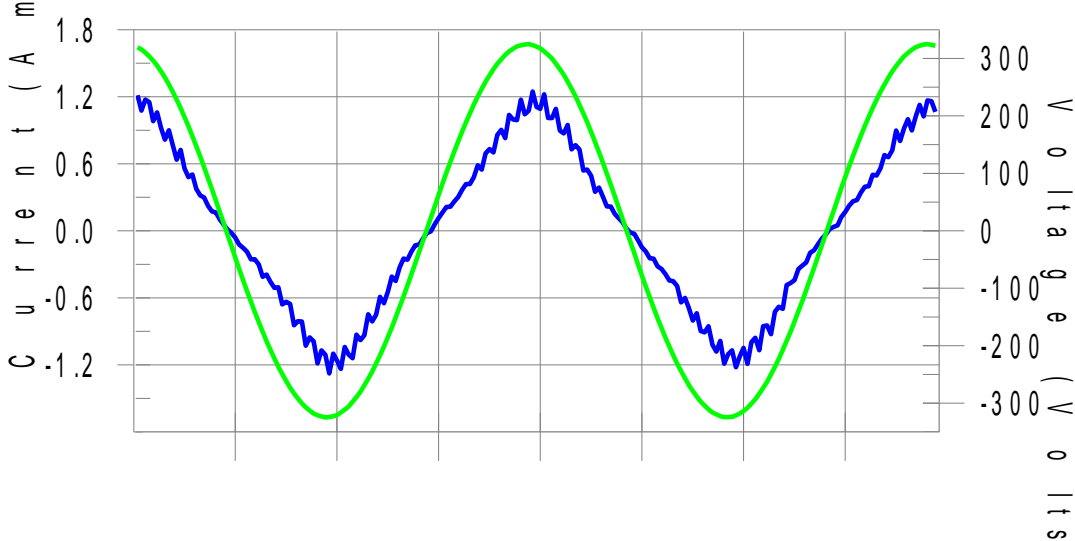
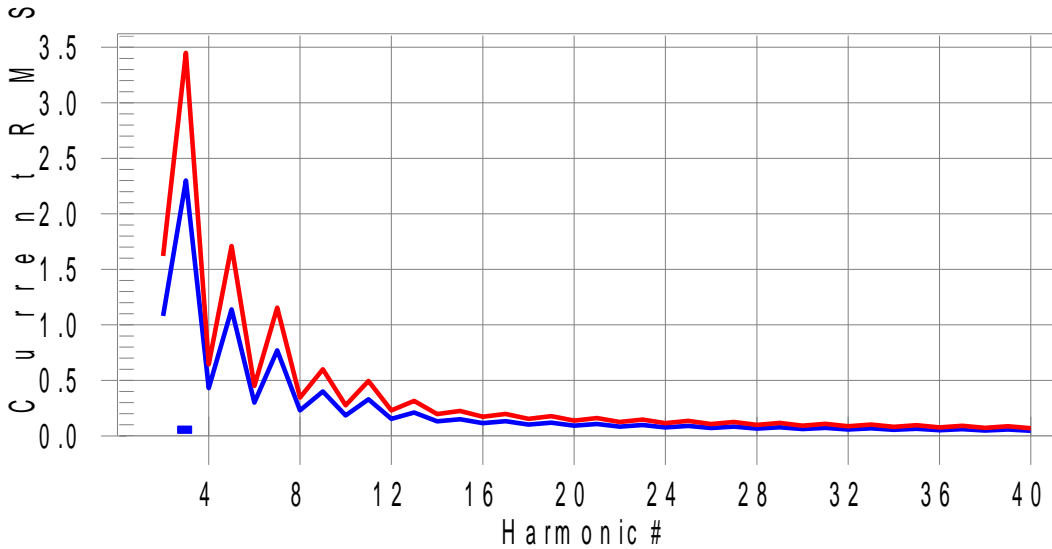
| Standard   | EN 61000-3-2             |  |
|--|--------------------------|--|
| Exclusions<br>(For these categories of equipment, limits are not specified in the EN 61000-3-2 standard) | <input type="checkbox"/> | Arc welding equipment intended for professional use.                               |
|  | <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, arc welding equipment which is not professional equipment.  |
| <input type="checkbox"/>            | Class C | <input type="checkbox"/> Lighting equipment with active input power > 25 W  |
|                                     |         | <input type="checkbox"/> Lighting equipment with active input power ≤ 25 W<br>(First requirement, Table 3 column 2)                           |
|                                     |         | <input type="checkbox"/> Lighting equipment with active input power ≤ 25 W (Second requirement)   |
| <input type="checkbox"/>            | Class D | Personal computers, television receivers, refrigerators and freezers having one or more variable-speed drives to control compressor motor(s). |

#### Performed measurements

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

See next page.

| Measurement data   | Port under test | AC input power           |
|--|-----------------|--------------------------|
| Operating mode / voltage / frequency used during the test  |                 | Mode 1 / 230 Vac / 50 Hz |
| <div>Test Result: Pass      Source qualification: Normal</div> <div>Current &amp; voltage waveforms</div> <div></div> <div>Harmonics and Class A limit line      European Limits</div> <div></div> <div>Test result: Pass      Worst harmonics H3-2.8% of 150% limit, H3-3.9% of 100% limit</div> |                 |                          |

| Measurement data   |            |           |           | Port under test      | AC input power |           |        |
|--|------------|-----------|-----------|----------------------|----------------|-----------|--------|
| Test Result: Pass      Source qualification: Normal<br>THC(A): 0.090    I-THD(%): 12.6      POHC(A): 0.003      POHC Limit(A): 0.251 |            |           |           |                      |                |           |        |
| Highest parameter values during test:  |            |           |           |                      |                |           |        |
| V_RMS (Volts): 229.65  |            |           |           | Frequency(Hz): 50.00 |                |           |        |
| I_Peak (Amps): 1.308   |            |           |           | I_RMS (Amps): 0.726  |                |           |        |
| I_Fund (Amps): 0.715   |            |           |           | Crest Factor: 1.821  |                |           |        |
| Power (Watts): 163.7   |            |           |           | Power Factor: 0.988  |                |           |        |
| Harm#  | Harms(avg) | 100%Limit | %of Limit | Harms(max)           | 150%Limit      | %of Limit | Status |
| 2  | 0.001      | 1.080     | N/A       | 0.002                | 1.620          | N/A       | Pass   |
| 3  | 0.089      | 2.300     | 3.9       | 0.096                | 3.450          | 2.8       | Pass   |
| 4  | 0.001      | 0.430     | N/A       | 0.002                | 0.645          | N/A       | Pass   |
| 5  | 0.008      | 1.140     | 0.7       | 0.009                | 1.710          | 0.5       | Pass   |
| 6  | 0.001      | 0.300     | N/A       | 0.002                | 0.450          | N/A       | Pass   |
| 7  | 0.004      | 0.770     | N/A       | 0.004                | 1.155          | N/A       | Pass   |
| 8  | 0.001      | 0.230     | N/A       | 0.002                | 0.345          | N/A       | Pass   |
| 9  | 0.003      | 0.400     | N/A       | 0.003                | 0.600          | N/A       | Pass   |
| 10   | 0.001      | 0.184     | N/A       | 0.001                | 0.276          | N/A       | Pass   |
| 11   | 0.002      | 0.330     | N/A       | 0.003                | 0.495          | N/A       | Pass   |
| 12   | 0.001      | 0.153     | N/A       | 0.003                | 0.230          | N/A       | Pass   |
| 13   | 0.003      | 0.210     | N/A       | 0.003                | 0.315          | N/A       | Pass   |
| 14   | 0.001      | 0.131     | N/A       | 0.002                | 0.197          | N/A       | Pass   |
| 15   | 0.002      | 0.150     | N/A       | 0.003                | 0.225          | N/A       | Pass   |
| 16   | 0.001      | 0.115     | N/A       | 0.001                | 0.173          | N/A       | Pass   |
| 17   | 0.002      | 0.132     | N/A       | 0.002                | 0.198          | N/A       | Pass   |
| 18   | 0.001      | 0.102     | N/A       | 0.001                | 0.153          | N/A       | Pass   |
| 19   | 0.001      | 0.118     | N/A       | 0.002                | 0.178          | N/A       | Pass   |
| 20   | 0.001      | 0.092     | N/A       | 0.001                | 0.138          | N/A       | Pass   |
| 21   | 0.001      | 0.107     | N/A       | 0.001                | 0.161          | N/A       | Pass   |
| 22   | 0.001      | 0.084     | N/A       | 0.001                | 0.125          | N/A       | Pass   |
| 23   | 0.001      | 0.098     | N/A       | 0.001                | 0.147          | N/A       | Pass   |
| 24   | 0.001      | 0.077     | N/A       | 0.001                | 0.115          | N/A       | Pass   |
| 25   | 0.001      | 0.090     | N/A       | 0.001                | 0.135          | N/A       | Pass   |
| 26   | 0.002      | 0.071     | N/A       | 0.002                | 0.107          | N/A       | Pass   |
| 27   | 0.001      | 0.083     | N/A       | 0.001                | 0.125          | N/A       | Pass   |
| 28   | 0.001      | 0.066     | N/A       | 0.002                | 0.099          | N/A       | Pass   |
| 29   | 0.001      | 0.078     | N/A       | 0.002                | 0.116          | N/A       | Pass   |
| 30   | 0.001      | 0.061     | N/A       | 0.001                | 0.092          | N/A       | Pass   |
| 31   | 0.001      | 0.073     | N/A       | 0.001                | 0.109          | N/A       | Pass   |
| 32   | 0.001      | 0.058     | N/A       | 0.001                | 0.086          | N/A       | Pass   |
| 33   | 0.001      | 0.068     | N/A       | 0.001                | 0.102          | N/A       | Pass   |
| 34   | 0.001      | 0.054     | N/A       | 0.001                | 0.081          | N/A       | Pass   |
| 35   | 0.001      | 0.064     | N/A       | 0.001                | 0.096          | N/A       | Pass   |
| 36   | 0.001      | 0.051     | N/A       | 0.001                | 0.077          | N/A       | Pass   |
| 37   | 0.001      | 0.061     | N/A       | 0.001                | 0.091          | N/A       | Pass   |
| 38   | 0.001      | 0.048     | N/A       | 0.001                | 0.073          | N/A       | Pass   |
| 39   | 0.001      | 0.058     | N/A       | 0.001                | 0.087          | N/A       | Pass   |
| 40   | 0.001      | 0.046     | N/A       | 0.001                | 0.069          | N/A       | Pass   |
| Remark   | ---        |           |           |                      |                |           |        |

|  |                      |
|--|----------------------|
| <b>4.6 Voltage changes, voltage fluctuations and flicker</b> | <b>VERDICT: PASS</b> |
|--|----------------------|

|          |              |
|----------|--------------|
| Standard | EN 61000-3-3 |
|----------|--------------|

**Limits**

|  |                                     |        |                          |                |
|--|-------------------------------------|--------|--------------------------|----------------|
| P <sub>ST</sub> (Short term flicker)     | <input checked="" type="checkbox"/> | ≤ 1    | <input type="checkbox"/> | Not Applicable |
| P <sub>LT</sub> (Long term flicker)      | <input checked="" type="checkbox"/> | ≤ 0,65 | <input type="checkbox"/> | Not Applicable |
| d <sub>c</sub> (Relative Voltage change) | <input checked="" type="checkbox"/> | ≤ 3,3% | <input type="checkbox"/> | Not Applicable |
| T <sub>MAX</sub> (Maximum time duration) | <input checked="" type="checkbox"/> | 500ms  | <input type="checkbox"/> | Not Applicable |
| d <sub>MAX</sub> (Max. voltage change)   | <input checked="" type="checkbox"/> | ≤ 4%   | <input type="checkbox"/> | 6%             |
|  | <input type="checkbox"/>            | 7%     | <input type="checkbox"/> | Not Applicable |

Supplemental information:

**Performed measurements**

|  |                                     |  |                          |          |                          |        |
|--|-------------------------------------|--|--------------------------|----------|--------------------------|--------|
| Reason for not performing the measurement(s) | <input type="checkbox"/>            | Tests are not necessary because the EUT is unlikely to produce significant voltage fluctuations or flicker (clause 6.1). |                          |          |                          |        |
|  |                                     |  |                          |          |                          |        |
| Port under test                              | AC Mains power input                |  |                          |          |                          |        |
| Voltage – Mains [V]                          | 230 Vac                             |  |                          |          |                          |        |
| Frequency – Mains [Hz]                       | 50Hz                                |  |                          |          |                          |        |
|  |                                     |  |                          |          |                          |        |
| Test method                                  | <input checked="" type="checkbox"/> | Flickermeter according EN / IEC 61000-4-15:2011  |                          |          |                          |        |
|  | <input type="checkbox"/>            | Simulation (Clause 4.2.3 of EN / IEC 61000-3-3)  |                          |          |                          |        |
|  | <input type="checkbox"/>            | Analytical method (Clause 4.2.4 of EN / IEC 61000-3-3)   |                          |          |                          |        |
|  | <input type="checkbox"/>            | Use of $P_{st} = 1$ curve (Clause 4.2.5 of EN / IEC 61000-3-3)   |                          |          |                          |        |
|  |                                     |  |                          |          |                          |        |
| Observation peroid                           | <input checked="" type="checkbox"/> | 10 min.  | <input type="checkbox"/> | 120 min. | <input type="checkbox"/> | Other: |
|  | <input 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 input power |
|--|--|--------------------------|----------------|
| Operating mode used during the test              |  | Mode 1 / 230 Vac / 50 Hz |                |
| Results  |  |                          |                |
| Tmax (dt > 3,3%)                                 |  | 0,0 ms                   |                |
| Maximum relative voltage change d <sub>MAX</sub> |  | 0.62%                    |                |
| Relative Voltage change d <sub>c</sub>           |  | <0,050%                  |                |
| Short term flicker P <sub>ST</sub>               |  | 0.143                    |                |
| Long term flicker P <sub>LT</sub>                |  | 0,00                     |                |
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## 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 checked="" 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                         | ---  | Visual          |
| Radio-frequency electromagnetic fields          | ---  | Visual / Camera |
| Fast transients                                 | ---  | Visual          |
| Surge transient                                 | ---  | Visual          |
| Injected currents (radio-frequency common mode) | ---  | Visual          |
| Voltage dips and short interruptions            | ---  | Visual          |
| <u>Supplementary information</u> : ---          |  |                 |

|     |   |                 |            |
|-----|---|-----------------|------------|
| 5.3 | <b>Electrostatic discharge immunity</b> | <b>VERDICT:</b> | <b>N/A</b> |
|-----|---|-----------------|------------|

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 type="checkbox"/>                 | ±2 kV | <input 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] | 20.7-22.8°C                         |           | Relative Humidity air [%] | 46.5-46.7%     |
| Voltage—Mains [V]        | ---                                 |           |                           |                |
| Frequency—Mains [Hz]     | ---                                 |           |                           |                |
| Operating mode(s) used   | Mode 1,2                            |           |                           |                |

| Test Point                          |                                   | Test Voltage [kV]<br>& Polarity   | Coupling<br>type | # of applied<br>discharges / polarity | Discharge<br>interval [s] |
|-------------------------------------|-----------------------------------|---|------------------|---------------------------------------|---------------------------|
| <input checked="" type="checkbox"/> | Points on conductive surface.     | ±4  | Contact          | 10                                    | 1                         |
| <input checked="" type="checkbox"/> | Points on non-conductive surface. | ±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 | <b>Radio-frequency electromagnetic fields immunity</b> | <b>VERDICT:</b> | <b>N/A</b> |
|-----|--|-----------------|------------|

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%      |
| Supplementary information: --- |              |               |            |           |

#### 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)              |                                     |                      |                                     |        |
| (see Annex 3 for photo)        | <input type="checkbox"/>  | Equipment standing on floor (0,05 — 0,15 m height) |                                     |                      |                                     |        |
|                                |   |  |                                     |                      |                                     |        |
| Voltage — Mains [V]            | ---   |  |                                     |                      |                                     |        |
| Frequency — Mains [Hz]         | ---   |  |                                     |                      |                                     |        |
| Operating mode(s) used         | Mode 1,2  |  |                                     |                      |                                     |        |
| 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 checked="" type="checkbox"/> | Top    |
|                                | <input checked="" type="checkbox"/>   | Rear (180°)  | <input checked="" type="checkbox"/> | Left (270°)          | <input checked="" 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. |  |                                     |                      |                                     |        |
| Supplementary information: --- |   |  |                                     |                      |                                     |        |

|     |                                     |          |     |
|-----|-------------------------------------|----------|-----|
| 5.5 | Electrical Fast Transients immunity | VERDICT: | N/A |
|-----|-------------------------------------|----------|-----|

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                | 1 min. / polarity |
| <input type="checkbox"/>   | DC input-output power <sup>2)</sup>    | ± 500 V    | 5 KHz                | 1 min. / polarity |
| <input type="checkbox"/>   | Signal and Control lines <sup>3)</sup> | ± 500 V    | 5 KHz                | 1 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.<br><sup>2)</sup> Not applicable to battery operated appliances that cannot be connected to the mains while in use.<br><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]                   | 50Hz                                |  |                                 |
| Operating mode(s) used                 | Mode 1                              |  |                                 |
| Test Set-up<br>(see Annex 3 for photo) | <input type="checkbox"/>            | Equipment standing on floor at (0,1 ± 0,01) m above ground plane |                                 |
|  | <input checked="" type="checkbox"/> | Equipment on the table (0,1 ± 0,01) m above ground plane         |                                 |
|  | <input type="checkbox"/>            | Artificial hand applied. Location refer to Annex 3.              |                                 |
| Coupling                               | <input checked="" type="checkbox"/> | Common mode  | <input type="checkbox"/> Other: |

| Port(s) under test             | Test Voltage &Polarity  | Repetition Frequency | Test duration /polarity | Injection method                    |     |                                     |       |
|--------------------------------|---|----------------------|-------------------------|-------------------------------------|-----|-------------------------------------|-------|
| AC power input                 | ± 1 kV  | 5-KHz                | 60 s                    | <input checked="" type="checkbox"/> | CDN | <input type="checkbox"/>            | Clamp |
| AC / DC power output           | ± 0.5 kV  | 5-KHz                | 60 s                    | <input type="checkbox"/>            | CDN | <input type="checkbox"/>            | Clamp |
| Ethernet / LAN                 |   | 5-KHz                | 60 s                    | <input type="checkbox"/>            | CDN | <input checked="" type="checkbox"/> | Clamp |
|                                |   |                      |                         |                                     |     |                                     |       |
| Observation(s)                 | During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed. |                      |                         |                                     |     |                                     |       |
| Supplementary information: --- |   |                      |                         |                                     |     |                                     |       |

|     |                          |          |     |
|-----|--------------------------|----------|-----|
| 5.6 | Surge transient immunity | VERDICT: | N/A |
|-----|--------------------------|----------|-----|

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<br>[°] |
|   | Line to Line                                     | Line to Earth |                    |
| AC input power <sup>1)</sup>                              | + 1 kV   | + 2 kV        | 90                 |
| AC input power <sup>1)</sup>                              | - 1 kV   | - 2 kV        | 270                |
| <sup>1)</sup> Tests with lower voltages are not required. |  |               |                    |

#### Performed tests

|                        |  |
|------------------------|--|
| Voltage — Mains [V]    | 230 Vac  |
| Frequency — Mains [Hz] | 50Hz   |
| 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              | ---    |
| <input type="checkbox"/>            | AC mains input power | Line to Earth   | -2 kV                 | 270             | ---    |
| <input type="checkbox"/>            | AC mains input power | Neutral to Earth  | +2 kV                 | 90              | ---    |
| <input type="checkbox"/>            | AC mains input power | Neutral to Earth  | -2 kV                 | 270             | ---    |
| Observation(s)                      |                      | During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed. |                       |                 |        |
| Supplementary information:---       |                      |   |                       |                 |        |

|            |  |                 |            |
|------------|--|-----------------|------------|
| <b>5.7</b> | <b>Injected currents (RF common mode) immunity</b> | <b>VERDICT:</b> | <b>N/A</b> |
|------------|--|-----------------|------------|

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, <i>U</i> <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)        |  | 1%   |  |
| Voltage—Mains [V]                      |             |  |                                     | 230 Vac                             |   | Frequency—Mains [Hz] |  | 50Hz |  |
| Operating mode(s) used                 |             |  |                                     | Mode 1                              |   |                      |  |      |  |
| Test set-up<br>(see Annex 3 for photo) |             |  |                                     | <input checked="" type="checkbox"/> | Equipment standing on floor at (0,1 ± 0,01) m above ground plane. |                      |  |      |  |
|  |             |  |                                     | <input type="checkbox"/>            | Equipment on the table (0,1 ± 0,01) m above ground plane.         |                      |  |      |  |
|  |             |  |                                     | <input type="checkbox"/>            | Artificial hand applied. Location refer to Annex 3.               |                      |  |      |  |

|                    |                      |                    |                      |        |
|--------------------|----------------------|--------------------|----------------------|--------|
| Port(s) under test | Test Level (applied) | Injection method   | Dwell time (applied) | Remark |
| AC input power     | 3V                   | CDN-M2/3           | 3s                   | ---    |
| Ethernet / LAN     | 3V                   | RF-Injection Clamp | 3s                   | ---    |

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

|                                |
|--------------------------------|
| Supplementary information: --- |
|--------------------------------|



**5.8 Power supply interruptions and dips immunity****VERDICT: N/A**

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 Criterion                    |
|  |  | 50 Hz           | 60 Hz |  |
| AC input power port  | $U_{NOM} - 100\%$  | 0,5             | 0,5   | C; Refer to the chapter 5.1 for details. |
| AC input power port  | $U_{NOM} - 60\%$   | 10              | 12    | C; Refer to the chapter 5.1 for details. |
| AC input power port  | $U_{NOM} - 30\%$   | 25              | 30    | C; Refer to the chapter 5.1 for details. |
| <sup>1)</sup> Changes to the voltage level shall occur at a zero crossing point in the a.c. voltage waveform.<br><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 <sub>NOM</sub> [V <sub>AC</sub> ] | Terminal | Voltage dip [% U <sub>NOM</sub> ]   | Duration [cycles] |       | Repetition rate [s] | Number of dips per test | Phase angle [°] |
|-------------------------------------|----------|---|-------------------|-------|---------------------|-------------------------|-----------------|
|                                     |          |   | 50 Hz             | 60 Hz |                     |                         |                 |
| 240                                 | L-N      | 0   | 0,5               | 0,5   | 10                  | 3                       | 0, 180          |
| 240                                 | L-N      | 40  | 10                | 12    | 10                  | 3                       | 0, 180          |
| 240                                 | L-N      | 70  | 25                | 30    | 10                  | 3                       | 0, 180          |
|                                     |          |   |                   |       |                     |                         |                 |
| Operating mode(s) used              |          | Mode 1  |                   |       |                     |                         |                 |
| Observation(s)                      |          | During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed. |                   |       |                     |                         |                 |
| Supplementary information: ---      |          |   |                   |       |                     |                         |                 |

6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

EUT PHOTOS



## 7 ANNEX 1 – MEASUREMENT UNCERTAINTIES

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

| Emission tests  |                    | Uncertainty        | Ucisp              |
|---|--------------------|--------------------|--------------------|
| Conducted disturbance (mains port), 9 kHz – 30MHz       |                    | 3,08 dB            | 3,83 dB            |
| Conducted disturbance using an AAN, 150kHz – 30MHz      |                    | 4,04 dB<br>4,44 dB | 4,20 dB<br>4,59 dB |
| Conducted disturbance using a VP, 150kHz – 30MHz        |                    | 1,82 dB            | 2,91 dB            |
| Conducted disturbance using a CVP, 150kHz – 30MHz       |                    | 3,44 dB            | 3,85 dB            |
| Conducted disturbance using a CP, 150kHz – 30MHz        |                    | 2,06 dB            | 2,89 dB            |
| CDNE, 30MHz – 300MHz                                    |                    | 3,34 dB            | 3,79 dB            |
| Disturbance power, 30 MHz – 300 MHz                     |                    | 3,76 dB            | 4,52 dB            |
| Radiated electromagnetic disturbances, (9 KHz – 30 MHz) |                    | 2,62 dB            | 3,3 dB             |
| Radiated emissions; (Horz.)                             | 30 MHz – 300 MHz   | 3,60 dB            | 5,34 dB            |
|   | 300 MHz – 1000 MHz | 3,10 dB            |                    |
| Radiated emissions; (Vert.)                             | 30 MHz – 300 MHz   | 3,20 dB            | 6,32 dB            |
|   | 300 MHz – 1000 MHz | 3,20 dB            |                    |
| LF harmonic current emissions                           |                    | 0,2%               | na                 |
| LF voltage fluctuations                                 |                    | 2,5%               | na                 |
| EMF   |                    | 2,02 dB            | na                 |

| Immunity tests                                  | Uncertainty   |
|---|---|
| Electrostatic discharge                         | $U_{peak}=6\%$ , $U_{30ns}=6\%$ ,<br>$U_{60ns}=6\%$ , $U_{rt}=13\%$ |
| Radio-frequency electromagnetic fields          | 1,48 dB   |
| Fast transients                                 | $U_{tr}=6,2\%$ , $U_{pw}=3\%$ , $U_{bp}=3\%$ ,<br>$U_{bd}=3\%$      |
| Surges  | $U_{peak}=3,3\%$ , $U_{ft}=3\%$ , $U_{dt}=3\%$                      |
| Injected currents (radio-frequency common mode) | 1,71 dB   |
| Voltage dips and short interruptions            | $U_{out}=0,4\%$ , $U_i=3\%$ , $U_{r-d}=3\%$                         |

## 8 ANNEX 2 – USED EQUIPMENT

### DEKRA SH

#### Conducted Emission

| Equipment                     | Manufacturer | Model No. | Serial No. | Cal. due date |
|-------------------------------|--------------|-----------|------------|---------------|
| EMI test receiver             | R&S          | ESCI      | 101351     | 2020/07/18    |
| EMI test receiver             | R&S          | ESR3      | 102305     | 2020/07/18    |
| Artificial Mains Network      | R&S          | ENV216    | 101620     | 2020/08/12    |
| Artificial Mains Network      | SCHWARZBECK  | NSLK 8128 | 8128-287   | 2020/08/09    |
| Asymmetric artificial network | SCHWARZBECK  | NTFM8131  | 8131-151   | 2020/07/18    |
| Asymmetric artificial network | TESEQ        | ISN T800  | 30306      | 2020/07/18    |
| High power voltage probe      | SCHWARZBECK  | TK9421    | #308       | 2020/04/20    |
| Capacitive voltage probe      | TESEQ        | CVP 2200A | 43476      | 2020/07/18    |
| Current probe                 | ETS.LINDGREN | 91550-1L  | 218473     | 2020/08/12    |

#### CDNE

| Equipment                   | Manufacturer | Model No. | Serial No. | Cal. due date |
|-----------------------------|--------------|-----------|------------|---------------|
| EMI test receiver           | R&S          | ESCI      | 101351     | 2020/07/18    |
| EMI test receiver           | R&S          | ESR3      | 102305     | 2020/07/18    |
| Coupling/Decoupling Network | SCHWARZBECK  | CDNE M3   | 00088      | 2019/12/11    |
| Coupling/Decoupling Network | TESEQ        | CDN M016S | 34640      | 2020/07/18    |

#### Radiated electromagnetic disturbances (9 kHz to 30 MHz)

| Equipment                        | Manufacturer | Model No. | Serial No.   | Cal. due date |
|----------------------------------|--------------|-----------|--------------|---------------|
| EMI test receiver                | R&S          | ESCI      | 101351       | 2020/07/18    |
| EMI test receiver                | R&S          | ESR3      | 102305       | 2020/07/18    |
| 3-dimensional large loop antenna | SCHWARZBECK  | HXYZ 9170 | HXYZ9170-245 | 2020/07/18    |

#### Disturbance Power

| Equipment           | Manufacturer | Model No. | Serial No. | Cal. due date |
|---------------------|--------------|-----------|------------|---------------|
| EMI test receiver   | R&S          | ESCI      | 101351     | 2020/07/18    |
| EMI test receiver   | R&S          | ESR3      | 102305     | 2020/07/18    |
| EMI absorbing clamp | SCHWARZBECK  | MDS 21B   | 4183       | 2020/07/25    |

## Click

| Equipment                | Manufacturer | Model No. | Serial No. | Cal. due date |
|--------------------------|--------------|-----------|------------|---------------|
| EMI test receiver        | R&S          | ESR3      | 102305     | 2020/07/18    |
| Artificial Mains Network | R&S          | ENV216    | 101620     | 2020/07/18    |
| Artificial Mains Network | SCHWARZBECK  | NSLK 8128 | 8128-287   | 2020/08/09    |

## Harmonic &amp; Flicker

| Equipment                            | Manufacturer           | Model No.      | Serial No. | Cal. due date |
|--------------------------------------|------------------------|----------------|------------|---------------|
| Harmonic currents and flicker tester | California Instruments | CTS            | 1306A00135 | 2020/05/14    |
| AC power source                      | California Instruments | 5001iX-CTS-400 | 1306A00135 | 2020/05/14    |
| Harmonic currents and flicker tester | TESEQ                  | Proflin 2145   | 1736A02510 | 2020/08/09    |

## ESD

| Equipment     | Manufacturer | Model No. | Serial No. | Cal. due date |
|---------------|--------------|-----------|------------|---------------|
| ESD generator | TESEQ        | NSG 435   | 6716       | 2020/06/05    |

## EFT, Surge and V-Dips

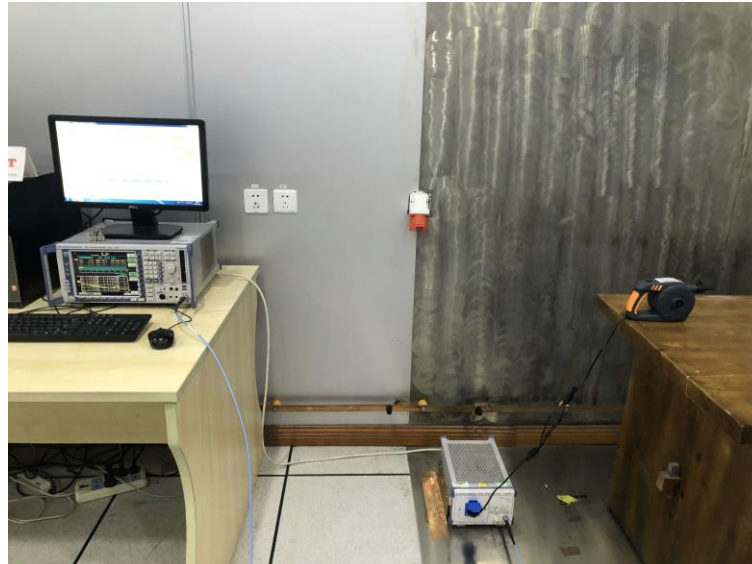
| Equipment                   | Manufacturer | Model No.   | Serial No.                                 | Cal. due date |
|-----------------------------|--------------|-------------|--|---------------|
| EFT, Surge, DIPS all-in-one | TESEQ        | NSG-3040-MF | 2006/EFT:0535<br>/SURGE:1234<br>/DIPS:2062 | 2020/05/14    |

## Injected currents

| Equipment                         | Manufacturer | Model No.   | Serial No. | Cal. due date |
|-----------------------------------|--------------|-------------|------------|---------------|
| Compact immunity test system (RF) | TESEQ        | NSG 4070-30 | 35895      | 2020/05/14    |
| Coupling decoupling network (CDN) | TESEQ        | CDN M016S   | 34640      | 2020/05/14    |
| Attenuator                        | TESEQ        | ANT 6050    | 34847      | 2020/05/14    |

## 9 ANNEX 3 – TEST PHOTOS

### Conducted disturbance voltage at mains terminals



### Disturbance power



## Harmonic current emissions & Flicker



End of the report