EU Declaration of Conformity

According to
EMC Directive 2004/108/EC

For the following
Product : LED CONVERTER
Model Name : OLW160P351N1A

Manufactured at : SoluM Co., Ltd.
Address : 150, Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16674, Republic of Korea

We hereby declare, Electromagnetic Compatibility Directives (2004/108/EC) are fulfilled, as laid out in the guideline set down by the member states of the EEC Commission.
This declaration is valid for all samples that are part of this declaration, which are manufactured according to the production charts appendix.

The standards relevant for the evaluation of EMC requirements are as follows:
Test Standards : EN 55015:2013
EN 61547:2009
EN 61000-3-2:2014
EN 61000-3-3:2013

Date of issue: March 02, 2016

SoluM Co., Ltd.
150, Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16674, Republic of Korea

(Name and signature of authorized person)
TEST REPORT

KCTL Inc.
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 443-390, Korea
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Report No.: KCTL16-SCE0041
Page(1) / (60) Pages

Applicant : SoluM Co., Ltd.
150, Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,
16674, Republic of Korea

Manufacturer : SoluM Co., Ltd.
150, Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,
16674, Republic of Korea

Factory #1 : Dongguan Solum Electronics Co., Ltd.
Factory #2 : Dongguan Samsung Electro-Mechanics Co., Ltd.
Factory #3 : Dongguan Atech Electronics Co., Ltd.
Factory #4 : Dongguan City Yingju Electronics Co., Ltd.
Factory #5 : Dongguan Yingju Power Co., Ltd.

Type of equipment : LED CONVERTER
Model Name : OLW160P351N1A
Date of Receipt : February 03, 2016
Date of Test : February 15 ~ February 18, 2016
Test method used : EN 55015:2013
EN 61547:2009
EN 61000-3-2:2014
EN 61000-3-3:2013

Test Results : Complied

This product complies with the requirements of the EMC Directive 2004/108/EC.
The results in this report apply only to the sample tested.
This Test Report cannot be reproduced, except in full, without the written approval of
KCTL Laboratory.

[Signature]
Name: KIM, JIN-WON

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2016. 03. 02
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1. Applicant information

Applicant: SoluM Co., Ltd.
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Contact name: Lee Ki Dong

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E-mail: kdlee007@solu-m.com
Contact name: Lee Ki Dong

Factory #1: Dongguan Solum Electronics Co., Ltd.
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Address: Yewuji Village, Sijia, Shijie Town Dongguan, Guangdong 523300 People’s Republic of China

Factory #5: Dongguan Yingju Power Co., Ltd.
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2. Laboratory information

Address

KCTL Inc.
65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea
Telephone Number: 82 70 5008 1021
Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040, FCC Site Registration No: 687132
VCCI Registration No.: R-3327, G-198, C-3706, T-1849
Industry Canada Registration No.: 8035A
KOLAS NO.: KT231

SITE MAP
3. Test system configuration

3.1 Operation environment

<table>
<thead>
<tr>
<th></th>
<th>Temperature</th>
<th>Humidity</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamber(10 m)</td>
<td>20.2 °C</td>
<td>18.2 % R.H.</td>
<td>-</td>
</tr>
<tr>
<td>Shielded room(CE)</td>
<td>21.5 °C</td>
<td>13.4 % R.H.</td>
<td>-</td>
</tr>
<tr>
<td>Shielded room(ESD)</td>
<td>22.4 °C</td>
<td>39.8 % R.H.</td>
<td>101.3 kPa</td>
</tr>
</tbody>
</table>

Test site

These testing items were performed following locations:

<table>
<thead>
<tr>
<th>Test item</th>
<th>Test site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbance Voltages</td>
<td>Shielded Room</td>
</tr>
<tr>
<td>Radiated Electromagnetic disturbance</td>
<td>Shielded Room</td>
</tr>
<tr>
<td>Radiated Emission</td>
<td>10 m Chamber</td>
</tr>
<tr>
<td>Harmonics current</td>
<td>EMI Test area(6F)</td>
</tr>
<tr>
<td>Voltage fluctuations and flickers</td>
<td>EMI Test area(6F)</td>
</tr>
<tr>
<td>Electrostatic discharge</td>
<td>Shielded Room</td>
</tr>
<tr>
<td>Radiated RF immunity</td>
<td>3F Fully anechoic chamber (3 m)</td>
</tr>
<tr>
<td>Electrical Fast Transient/BURST</td>
<td>Shielded Room</td>
</tr>
<tr>
<td>Surge</td>
<td>Shielded Room</td>
</tr>
<tr>
<td>Conducted RF immunity</td>
<td>Shielded Room</td>
</tr>
<tr>
<td>Magnetic field immunity</td>
<td>Shielded Room</td>
</tr>
<tr>
<td>Voltage dip/interruption</td>
<td>Shielded Room</td>
</tr>
</tbody>
</table>
3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration,
Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna
frequency interpolation, measurement distance variation, site imperfection, mismatch, and system
repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95% confidence
level was applied.

<table>
<thead>
<tr>
<th>Conducted emission measurement (C.L: Approx 95 %, ( k = 2 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shielded Room (CE#1) 9 kHz ~ 150 kHz: ± 3.75 dB</td>
</tr>
<tr>
<td>150 kHz ~ 30 MHz: ± 3.36 dB</td>
</tr>
<tr>
<td>Shielded Room (CE#2) 9 kHz ~ 150 kHz: ± 3.77 dB</td>
</tr>
<tr>
<td>150 kHz ~ 30 MHz: ± 3.35 dB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radiated Emission measurement (C.L: Approx 95 %, ( k = 2 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 m Chamber (4F) 30 MHz ~ 300 MHz</td>
</tr>
<tr>
<td>3 m: + 5.48 dB, - 5.93 dB</td>
</tr>
<tr>
<td>10 m: + 5.47 dB, - 5.92 dB</td>
</tr>
<tr>
<td>300 MHz ~ 1 000 MHz</td>
</tr>
<tr>
<td>3 m: + 5.60 dB, - 6.03 dB</td>
</tr>
<tr>
<td>10 m: + 5.48 dB, - 5.93 dB</td>
</tr>
<tr>
<td>1 GHz ~ 6 GHz</td>
</tr>
<tr>
<td>3 m: + 5.99 dB, - 6.04 dB</td>
</tr>
</tbody>
</table>

| 10 m Chamber (2F) 30 MHz ~ 300 MHz                            |
| 3 m: + 4.86 dB, - 4.98 dB                                     |
| 10 m: + 4.85 dB, - 4.97 dB                                    |
| 300 MHz ~ 1 000 MHz                                           |
| 3 m: + 4.99 dB, - 5.09 dB                                     |
| 10 m: + 4.85 dB, - 4.97 dB                                    |
| 1 GHz ~ 6 GHz                                                 |
| 3 m: + 6.03 dB, - 6.05 dB                                     |

Radio Frequency Electromagnetic Fields (C.L: Approx 95 %, \( k = 2 \))
± 1.85 dB

Disturbance power Electromagnetic Fields (C.L: Approx 95 %, \( k = 2 \))
± 3.049 dB
### 3.3 Measurement Program

These test items were performed by software programs:

<table>
<thead>
<tr>
<th>Test item</th>
<th>Measurement Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducted Emission</td>
<td>EP5CE_V 5.4.0 (TOYO)</td>
</tr>
<tr>
<td>Radiated Electromagnetic disturbance</td>
<td>EMC32_V 9.01.0 (ROHDE &amp; SCHWARZ)</td>
</tr>
<tr>
<td>Harmonics current,</td>
<td>CTS 4_V 4.6.2 (AMETEK)</td>
</tr>
<tr>
<td>Voltage fluctuations and flickers</td>
<td></td>
</tr>
<tr>
<td>Radiated RF immunity</td>
<td>3F EMC32_V 9.01.0 (ROHDE &amp; SCHWARZ)</td>
</tr>
<tr>
<td></td>
<td>6F EMC32_V 8.53.0 (ROHDE &amp; SCHWARZ)</td>
</tr>
<tr>
<td>Electrical Fast Transient/BURST,</td>
<td>6F(#1) ISMIEC_V 4.08 (EM TEST)</td>
</tr>
<tr>
<td>Surge,</td>
<td>6F(#2) ISMIEC_V 4.07 (EM TEST)</td>
</tr>
<tr>
<td>Magnetic field immunity,</td>
<td>3F(#3) IEC_V 5.2.9 (EM TEST)</td>
</tr>
<tr>
<td>Voltage dip/interruption</td>
<td></td>
</tr>
<tr>
<td>Conducted RF immunity</td>
<td>6F(#1) ICD_V 3.53.01 (EM TEST)</td>
</tr>
<tr>
<td></td>
<td>6F(#2) WIN2070_V 3.00 (SCHAFFNER)</td>
</tr>
<tr>
<td></td>
<td>3F(#3) ICD_V 5.3.4 (EM TEST)</td>
</tr>
</tbody>
</table>
4. Description of E.U.T.

4.1 General information

- Input: 110 - 240 V, 50/60 Hz, 0.35 A, 17 W
- Output: DC 23 - 41 V (MAX 53 V : Open Lamp) / 15 W)
4.2 Product description

<table>
<thead>
<tr>
<th>Type of product</th>
<th>LED CONVERTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name (Basic)</td>
<td>OLW160P351N1A</td>
</tr>
<tr>
<td>Model name (Variant)</td>
<td>-</td>
</tr>
<tr>
<td>Difference</td>
<td>-</td>
</tr>
<tr>
<td>Serial no</td>
<td>-</td>
</tr>
<tr>
<td>Testing voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Input range</td>
<td>AC 110 - 240 V, 50 /60 Hz</td>
</tr>
<tr>
<td>Internal clock frequency</td>
<td>Below 108 MHz</td>
</tr>
<tr>
<td>Note</td>
<td>-</td>
</tr>
</tbody>
</table>

4.3 Auxiliary equipments

<table>
<thead>
<tr>
<th>Type</th>
<th>Model / Part #</th>
<th>Serial number</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4.4 Test configuration

<table>
<thead>
<tr>
<th>Note</th>
<th>Start</th>
<th>End</th>
<th>Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>Name</td>
<td>I/O port</td>
<td>Name</td>
</tr>
<tr>
<td>1</td>
<td>EUT (LED CONVERTER)</td>
<td>Power</td>
<td>AC Main</td>
</tr>
<tr>
<td>2</td>
<td>LED(+-)</td>
<td>LED(+-)</td>
<td>LED</td>
</tr>
</tbody>
</table>

4.5 Operating conditions

The EUT was configured as normal intended use.

<table>
<thead>
<tr>
<th>Test mode</th>
<th>Normal operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check the LED lighting test.</td>
</tr>
</tbody>
</table>
5. Summary of test results

5.1 Summary of EMI emission test results

<table>
<thead>
<tr>
<th>Applied</th>
<th>Test items</th>
<th>Test method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disturbance Voltages</td>
<td>EN 55015:2013</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Radiated Electromagnetic</td>
<td>EN 55015:2013</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>disturbance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radiated Emission</td>
<td>EN 55015:2013</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Harmonics current</td>
<td>EN 61000-3-2:2014</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Voltage fluctuations and</td>
<td>EN 61000-3-3:2013</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>flickers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2 Summary of immunity test results

<table>
<thead>
<tr>
<th>Applied</th>
<th>Test items</th>
<th>Test method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>* EN 61547:2009</td>
<td>Electrostatic discharge</td>
<td>EN 61000-4-2:2009</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Radiated RF immunity</td>
<td>EN 61000-4-3:2006/A2:2010</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Electrical Fast Transient/BURST</td>
<td>EN 61000-4-4:2012</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Surge</td>
<td>EN 61000-4-5:2014</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Conducted RF immunity</td>
<td>EN 61000-4-6:2014</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Magnetic field immunity</td>
<td>EN 61000-4-8:2010</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Voltage dip/interruption</td>
<td>EN 61000-4-11:2004</td>
<td>Pass</td>
</tr>
</tbody>
</table>
5.3 Performance criteria

**Performance criterion A:**
During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.
(The luminous intensity shall be deemed to be unchanged if the measured intensities do not deviate by more than 15%.)

**Performance criterion B:**
During the test the luminous may change the any value.
After the test the luminous intensity shall be restored to its initial value within 1 min. Regulating controls needs not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

**Performance criterion C:**
During and after the test change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal if necessary by temporary interruption of the mains supply and/or operating the regulating control. Additional requirement for lighting equipment incorporating a starting device: After the test the lighting equipment is switch off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.
6. Test results

6.1 Disturbance Voltages

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 55015:2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>Shielded room (CE#2)</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 15</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>21.5 °C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>13.4 % R.H.</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass</td>
</tr>
</tbody>
</table>

6.1.1 Limits of disturbance voltages measurement

Mains terminals

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Limits dB(μV)^a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quasi-peak</td>
</tr>
<tr>
<td>9 kHz ~ 50 kHz</td>
<td>110</td>
</tr>
<tr>
<td>50 kHz ~ 150 kHz</td>
<td>90 ~ 80 b</td>
</tr>
<tr>
<td>150 kHz ~ 0.5 MHz</td>
<td>66 ~ 56 b</td>
</tr>
<tr>
<td>150 MHz ~ 50 MHz</td>
<td>56 c</td>
</tr>
<tr>
<td>5 MHz ~ 30 MHz</td>
<td>60</td>
</tr>
</tbody>
</table>

^a At the transition frequency, the lower limit applies.

^b The limit decreases linearly with the logarithm of the frequency in the ranges

50 kHz – 150 kHz and 150 kHz – 0.5 MHz

^c For electrode less lamps and luminaries, the limit in the frequency range of

2.51 MHz – 3.0 MHz is 73 dB(μV) quasi-peak and 63 dB(μV) average

Load terminals

<table>
<thead>
<tr>
<th>Frequency [MHz]</th>
<th>Limits dB(μV)^a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quasi-peak</td>
</tr>
<tr>
<td>0.15 ~ 0.50</td>
<td>80</td>
</tr>
<tr>
<td>0.50 ~ 30</td>
<td>74</td>
</tr>
</tbody>
</table>

^a At the transition frequency, the lower limit applies.
Control terminals

<table>
<thead>
<tr>
<th>Frequency [MHz]</th>
<th>Limits dB[μV]^2</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15 ~ 0.50</td>
<td>84 ~ 74</td>
<td>74 ~ 64</td>
</tr>
<tr>
<td>0.50 ~ 30</td>
<td>74</td>
<td>64</td>
</tr>
</tbody>
</table>

Note #1 The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

Note #2 The voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 15Ω to the control terminal.

6.1.2 Measurement procedure

The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement.

6.1.3 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model</th>
<th>Serial No.</th>
<th>Makers</th>
<th>Next Cal. Date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Receiver</td>
<td>ESCI</td>
<td>101408</td>
<td>R&amp;S</td>
<td>2016.09.01</td>
<td>☐</td>
</tr>
<tr>
<td>Test Receiver</td>
<td>ESCI</td>
<td>100001</td>
<td>R&amp;S</td>
<td>2016.08.04</td>
<td>☐</td>
</tr>
<tr>
<td>Test Receiver</td>
<td>ESCI</td>
<td>100710</td>
<td>R&amp;S</td>
<td>2016.09.01</td>
<td>☒</td>
</tr>
<tr>
<td>TWO-LINE V-NETWORK</td>
<td>ENV216</td>
<td>101352</td>
<td>R&amp;S</td>
<td>2016.09.02</td>
<td>☒</td>
</tr>
<tr>
<td>TWO-LINE V-NETWORK</td>
<td>NNLK8121</td>
<td>8121-472</td>
<td>SCHWARZBECK</td>
<td>2016.06.16</td>
<td>☐</td>
</tr>
<tr>
<td>8-WIRE ISN</td>
<td>NTFM 8158 CAT5</td>
<td>CAT5-8158-0071</td>
<td>SCHWARZBECK</td>
<td>2016.09.02</td>
<td>☐</td>
</tr>
<tr>
<td>8-WIRE ISN</td>
<td>NTFM 8158 CAT3</td>
<td>CAT3-8158-0020</td>
<td>SCHWARZBECK</td>
<td>2016.09.02</td>
<td>☐</td>
</tr>
</tbody>
</table>
6.1.4 Photographs of test setup

* Mains terminals
6.1.5 Disturbance Voltages measurement result

* Main terminals (OLW160P351N1A)

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>[Level (dB(uV))]</th>
<th>Result (dB)</th>
<th>Limit (dB)</th>
<th>Margin (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.002</td>
<td>55.5</td>
<td>9.4</td>
<td>64.9</td>
<td>0.0</td>
</tr>
<tr>
<td>0.062</td>
<td>55.5</td>
<td>9.4</td>
<td>64.9</td>
<td>0.0</td>
</tr>
<tr>
<td>0.16899</td>
<td>48.2</td>
<td>36.3</td>
<td>9.5</td>
<td>57.7</td>
</tr>
<tr>
<td>0.62517</td>
<td>20.5</td>
<td>3.4</td>
<td>9.5</td>
<td>30.0</td>
</tr>
<tr>
<td>1.00013</td>
<td>9.5</td>
<td>5.4</td>
<td>9.5</td>
<td>19.0</td>
</tr>
<tr>
<td>2.0</td>
<td>8.7</td>
<td>3.6</td>
<td>9.7</td>
<td>18.4</td>
</tr>
<tr>
<td>5.06989</td>
<td>48.2</td>
<td>36.3</td>
<td>9.5</td>
<td>57.7</td>
</tr>
<tr>
<td>0.06477</td>
<td>55.5</td>
<td>9.4</td>
<td>64.9</td>
<td>0.0</td>
</tr>
<tr>
<td>0.1642</td>
<td>50.8</td>
<td>35.8</td>
<td>9.5</td>
<td>60.3</td>
</tr>
<tr>
<td>0.62721</td>
<td>23.3</td>
<td>5.0</td>
<td>9.5</td>
<td>32.8</td>
</tr>
<tr>
<td>3.9309</td>
<td>12.5</td>
<td>7.1</td>
<td>9.5</td>
<td>22.0</td>
</tr>
<tr>
<td>5.78277</td>
<td>11.5</td>
<td>6.4</td>
<td>9.7</td>
<td>21.2</td>
</tr>
</tbody>
</table>

--- L1 Phase ---

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>[Level (dB(uV))]</th>
<th>Result (dB)</th>
<th>Limit (dB)</th>
<th>Margin (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.21287</td>
<td>8.7</td>
<td>3.6</td>
<td>9.7</td>
<td>18.4</td>
</tr>
<tr>
<td>0.06477</td>
<td>55.5</td>
<td>9.4</td>
<td>64.9</td>
<td>0.0</td>
</tr>
<tr>
<td>0.1642</td>
<td>50.8</td>
<td>35.8</td>
<td>9.5</td>
<td>60.3</td>
</tr>
<tr>
<td>0.62721</td>
<td>23.3</td>
<td>5.0</td>
<td>9.5</td>
<td>32.8</td>
</tr>
<tr>
<td>3.9309</td>
<td>12.5</td>
<td>7.1</td>
<td>9.5</td>
<td>22.0</td>
</tr>
<tr>
<td>5.78277</td>
<td>11.5</td>
<td>6.4</td>
<td>9.7</td>
<td>21.2</td>
</tr>
</tbody>
</table>
6.2 Radiated Electromagnetic disturbance

Test specification | EN 55015:2013
Testing voltage | 230 V, 50 Hz
Test facility | Shielded room(4F)
Date | 2016. 02. 15
Temperature (°C) | 21.5 °C
Humidity (% R.H.) | 13.4 % R.H.
Remarks | Pass

6.2.1 Limits of radiated electromagnetic disturbance measurement

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Limits for loop diameter dB(µA) ^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 kHz ~ 70 kHz</td>
<td>88</td>
</tr>
<tr>
<td>70 kHz ~ 150 kHz</td>
<td>88 ~ 58 ^b</td>
</tr>
<tr>
<td>150 kHz ~ 3.0 MHz</td>
<td>58 ~ 22 ^b</td>
</tr>
<tr>
<td>3.0 MHz ~ 30 MHz</td>
<td>22</td>
</tr>
</tbody>
</table>

^a At the transition frequency, the lower limit applies.
^b Decreasing linearly with the logarithm of the frequency. For electrode less lamps and luminaries, the limit in the frequency range of 2.2 MHz ~ 3.0 MHz is 58 dB(µA) for 2 m, 51 dB(µA) for 3 m, and 45 dB(µA) for 4 m loop diameter.
^c Increasing linearly with the logarithm of the frequency.
* Margin(dB) = Limit(dB(µA)) - QuasiPeak(dB(µA))

6.2.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model</th>
<th>Serial No.</th>
<th>Makers</th>
<th>Next Cal. Date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Receiver</td>
<td>ESCI</td>
<td>100710</td>
<td>R&amp;S</td>
<td>2016.09.01</td>
<td>X</td>
</tr>
<tr>
<td>Triple Loop Antenna</td>
<td>HXYZ9170</td>
<td>HFCD 9171-218</td>
<td>SCHWARZBECK</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>
6.2.3 Photographs of test setup
6.2.4 Radiated Electromagnetic disturbance result

* X (2 m)

<table>
<thead>
<tr>
<th>Frequency (㎒)</th>
<th>Corr. (㏈)</th>
<th>QuasiPeak (㏈(㎝))</th>
<th>Limit (㏈(㎝))</th>
<th>Margin (㏈)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1792</td>
<td>0.07</td>
<td>1.70</td>
<td>22.00</td>
<td>20.30</td>
</tr>
<tr>
<td>4.9271</td>
<td>0.07</td>
<td>3.50</td>
<td>22.00</td>
<td>18.50</td>
</tr>
<tr>
<td>5.3611</td>
<td>0.07</td>
<td>1.37</td>
<td>22.00</td>
<td>20.63</td>
</tr>
<tr>
<td>7.8185</td>
<td>0.07</td>
<td>5.25</td>
<td>22.00</td>
<td>16.75</td>
</tr>
<tr>
<td>26.3492</td>
<td>0.14</td>
<td>4.40</td>
<td>22.00</td>
<td>17.60</td>
</tr>
</tbody>
</table>
* Y (2 m)

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Corr. (dB)</th>
<th>QuasiPeak (dB(μA))</th>
<th>Limit (dB(μA))</th>
<th>Margin (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1928</td>
<td>0.07</td>
<td>1.07</td>
<td>22.00</td>
<td>20.93</td>
</tr>
<tr>
<td>3.3804</td>
<td>0.07</td>
<td>1.39</td>
<td>22.00</td>
<td>20.61</td>
</tr>
<tr>
<td>3.8460</td>
<td>0.07</td>
<td>3.02</td>
<td>22.00</td>
<td>18.98</td>
</tr>
<tr>
<td>22.7340</td>
<td>0.13</td>
<td>0.97</td>
<td>22.00</td>
<td>21.03</td>
</tr>
<tr>
<td>26.9187</td>
<td>0.14</td>
<td>3.01</td>
<td>22.00</td>
<td>18.99</td>
</tr>
</tbody>
</table>
* Z (2 m)

![Graph showing frequency and level in dB]

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Corr. (dB)</th>
<th>QuasiPeak (dB(μA))</th>
<th>Limit (dB(μA))</th>
<th>Margin (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7088</td>
<td>0.07</td>
<td>1.45</td>
<td>22.00</td>
<td>20.55</td>
</tr>
<tr>
<td>6.6349</td>
<td>0.09</td>
<td>2.14</td>
<td>22.00</td>
<td>19.86</td>
</tr>
<tr>
<td>7.5890</td>
<td>0.07</td>
<td>1.63</td>
<td>22.00</td>
<td>20.37</td>
</tr>
<tr>
<td>24.6138</td>
<td>0.12</td>
<td>4.96</td>
<td>22.00</td>
<td>17.04</td>
</tr>
<tr>
<td>25.2311</td>
<td>0.12</td>
<td>1.87</td>
<td>22.00</td>
<td>20.13</td>
</tr>
</tbody>
</table>
6.3 Radiated Emission

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 55015:2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>10 m Chamber (4F)</td>
</tr>
<tr>
<td>Test distance</td>
<td>10 m</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 15</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>20.2 °C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>18.2 % R.H.</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass</td>
</tr>
</tbody>
</table>

6.3.1 Limits of radiated emission measurement

<table>
<thead>
<tr>
<th>Frequency [MHz]</th>
<th>Quasi-peak limits (dB(μV/m))²</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 ~ 230</td>
<td>30</td>
</tr>
<tr>
<td>230 ~ 300</td>
<td>37</td>
</tr>
</tbody>
</table>

*: At the transition frequency, the lower limit applies.

6.3.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane. Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
6.3.3 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. Date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Receiver</td>
<td>ESR</td>
<td>101078</td>
<td>R&amp;S</td>
<td>2016.09.02</td>
<td>✔</td>
</tr>
<tr>
<td>Bi-Log Antenna</td>
<td>CBL 6112D</td>
<td>37876</td>
<td>TESEQ</td>
<td>2016.08.28</td>
<td>✔</td>
</tr>
<tr>
<td>Amplifier</td>
<td>310N</td>
<td>293004</td>
<td>SONOMA INSTRUMENT</td>
<td>2016.09.02</td>
<td>✔</td>
</tr>
<tr>
<td>Coaxial Fixed Attenuator</td>
<td>8491A</td>
<td>16861</td>
<td>HP</td>
<td>2016.06.29</td>
<td>✔</td>
</tr>
<tr>
<td>Antenna Mast</td>
<td>AM4.0</td>
<td>079/3440509</td>
<td>MATURO</td>
<td>-</td>
<td>✔</td>
</tr>
<tr>
<td>Turn Table</td>
<td>CO2000-SOFT</td>
<td>-</td>
<td>MATURO</td>
<td>-</td>
<td>✔</td>
</tr>
<tr>
<td>Preamplifier</td>
<td>8449B</td>
<td>3008A01802</td>
<td>AGILENT</td>
<td>2016.07.30</td>
<td>✔</td>
</tr>
<tr>
<td>Horn ANT</td>
<td>3115</td>
<td>00086706</td>
<td>ETS</td>
<td>2016.09.02</td>
<td>✔</td>
</tr>
<tr>
<td>Spectrum Analyzer</td>
<td>FSV40</td>
<td>100988</td>
<td>R&amp;S</td>
<td>2016.01.26</td>
<td>✔</td>
</tr>
</tbody>
</table>

6.3.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading. The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L +3 dB Att – A.G)

M.R = Meter Reading
C.F = Correction Factor
A.F = Antenna Factor
C.L = Cable Loss
A.G = Amplifier Gain
3 dB Att = 3 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

30 + 12 + 5 + 3 – 35 = 15 dB(mV/m)
6.3.5 Photographs of test setup

* 30 MHz ~ 300 MHz
6.3.6 Radiated emission measurement result

* Graph and Data

* 30 MHz ~ 300 MHz (OLW160P351N1A)

<table>
<thead>
<tr>
<th>Frequency [MHz]</th>
<th>Reading [dB(uV/m)]</th>
<th>Result [dB(uV/m)]</th>
<th>Limit [dB(uV/m)]</th>
<th>Margin [dB]</th>
<th>Height [cm]</th>
<th>Angle [deg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.378</td>
<td>V</td>
<td>-17.4</td>
<td>18.8</td>
<td>30.0</td>
<td>11.2</td>
<td>100.0</td>
</tr>
<tr>
<td>56.696</td>
<td>V</td>
<td>-21.6</td>
<td>12.4</td>
<td>30.0</td>
<td>17.5</td>
<td>296.0</td>
</tr>
<tr>
<td>100.976</td>
<td>V</td>
<td>-16.7</td>
<td>14.7</td>
<td>30.0</td>
<td>15.3</td>
<td>296.0</td>
</tr>
<tr>
<td>149.374</td>
<td>V</td>
<td>-16.4</td>
<td>14.8</td>
<td>30.0</td>
<td>15.2</td>
<td>296.0</td>
</tr>
<tr>
<td>200.100</td>
<td>V</td>
<td>-17.3</td>
<td>16.3</td>
<td>30.0</td>
<td>13.7</td>
<td>100.0</td>
</tr>
<tr>
<td>208.706</td>
<td>V</td>
<td>-17.1</td>
<td>15.7</td>
<td>30.0</td>
<td>14.3</td>
<td>399.0</td>
</tr>
<tr>
<td>234.863</td>
<td>H</td>
<td>-15.1</td>
<td>14.6</td>
<td>30.0</td>
<td>22.4</td>
<td>399.0</td>
</tr>
<tr>
<td>295.815</td>
<td>V</td>
<td>-12.9</td>
<td>12.0</td>
<td>37.0</td>
<td>25.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Final Result:

[Graph showing radiated emission measurement results]
6.4 Harmonics

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 61000-3-2:2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>EMI Test area(6F)</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 15</td>
</tr>
<tr>
<td>Temperature(°C)</td>
<td>21.2°C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>14.9 % R.H.</td>
</tr>
<tr>
<td>Pressure (kPa)</td>
<td>101.8 kPa</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass</td>
</tr>
</tbody>
</table>

6.4.1 Measurement procedure

The equipment is supplied in series with shunt(s) Rm or current transformer(s) from a source having the same nominal voltage and frequency as the rated supply voltage and frequency of the equipment. Measurements shall be made under normal load, or conditions for adequate heat discharge, and under normal operating conditions. User’s operation controls or automatic programmers shall be set to produce the maximum harmonic component, for each successive harmonic component in turn. For the purpose of harmonic current limitation, equipment is classified as follows:

Class A: Equipment not specified in one of the three other Classes shall be considered as Class A equipment.
- Balanced three-phase equipment;
- Household appliances excluding equipment identified as Class D;
- Tools excluding portable tools;
- Dimmers for incandescent lamps;
- Audio equipment.

Class B: Portable tools; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power according to 6.2.2 less than or equal to 600 w, of the following types:
- Personal computers and personal computer monitors;
- Television receivers.

6.4.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmonics/Flicker meter</td>
<td>5001x-CTS -400-413</td>
<td>54894</td>
<td>C.I.</td>
<td>2017.03.16</td>
<td>☐</td>
</tr>
<tr>
<td>(AC POWER SOURCE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harmonics/Flicker meter (Analyzer)</td>
<td>PACS-1</td>
<td>72072</td>
<td>C.I.</td>
<td>2017.03.16</td>
<td>☐</td>
</tr>
</tbody>
</table>

KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea
TEL: 82 70 5008 1021  FAX: 82 505 299 8311

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[KCTL-TIT004-004/1]
6.4.3 Photographs of test setup
6.4.4 Measurement result

Harmonics – Class-C (≤ 25W) per Ed. 4.0 (2014) (Run time)

EUT: OLW160P351N1A  Tested by: Test Operator
Test category: Class-C per Ed. 4.0 (2014) (European limits)  Test Margin: 100
Test date: 15/02/2016  Start time: 14:08:23  End time: 14:11:14
Test duration (min): 2.5  Data file name: H-000241.cts_data
Comment: Comment
Customer: SoBoM Co., Ltd.

Test Result: Pass  Source qualification: Normal

Current & voltage waveforms

Harmonics and Class C limit line (Table-3 Class-D)  European Limits

Test result: Pass
### Current Test Result Summary (Run time)

EUT: OLW160P351N1A  
Test category: Class-C per Ed. 4.0 (2014) (European limits)  
Test date: 15/02/2016  
Test duration (min): 2.5  
Comment: Comment  
Customer: SoluM Co., Ltd.

Test Result: Pass  
Source qualification: Normal  
THC(A): 0.000  
I-TTHD(%): 0.0  
POHC(A): 0.000  
POHC Limit(A): 0.000

Highest parameter values during test:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>V RMS (Volts)</td>
<td>229.39</td>
</tr>
<tr>
<td>Frequency (Hz)</td>
<td>50.06</td>
</tr>
<tr>
<td>I Peak (Amps)</td>
<td>0.136</td>
</tr>
<tr>
<td>I RMS (Amps)</td>
<td>0.065</td>
</tr>
<tr>
<td>Crest Factor</td>
<td>1.062</td>
</tr>
<tr>
<td>Power (Watts)</td>
<td>14.3</td>
</tr>
<tr>
<td>Power Factor</td>
<td>0.964</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Harmonic #</th>
<th>Harmonic (avg)</th>
<th>100% Limit</th>
<th>% of Limit</th>
<th>Harmonic (max)</th>
<th>150% Limit</th>
<th>% of Limit</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>N/A</td>
<td>0.000</td>
<td>0.000</td>
<td>N/A</td>
<td>Pass</td>
</tr>
<tr>
<td>3</td>
<td>0.003</td>
<td>0.048</td>
<td>N/A</td>
<td>0.003</td>
<td>0.073</td>
<td>N/A</td>
<td>Pass</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>N/A</td>
<td>0.000</td>
<td>0.000</td>
<td>N/A</td>
<td>Pass</td>
</tr>
<tr>
<td>5</td>
<td>0.001</td>
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<td>Pass</td>
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</table>

*Note: All harmonics are below minimum limit and are ignored.*
## Voltage Source Verification Data (Run time)

**EUT:** OLV160P351NA  
**Test category:** Class-C per Ed. 4.0 (2014) (European limits)  
**Test date:** 15/02/2016  
**Test operator:**  
**Test duration (min):** 2.5  
**Comment:** Comment  
**Customer:** SooM Co., Ltd.

**Test Result:** Pass  
**Source qualification:** Normal

### Highest parameter values during test:

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<tr>
<th>Harmonics</th>
<th>V-rms</th>
<th>Limit V-rms</th>
<th>% of Limit</th>
<th>Status</th>
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<td>4</td>
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6.5 Flicker

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<th>Test specification</th>
<th>EN 61000-3-3:2013</th>
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<td>Testing voltage</td>
<td>230 V, 50 Hz</td>
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<tr>
<td>Test facility</td>
<td>EMI Test area(6F)</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 15</td>
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<tr>
<td>Temperature(°C)</td>
<td>21.2 °C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>14.9 % R.H.</td>
</tr>
<tr>
<td>Pressure (㎪)</td>
<td>101.8 ㎪</td>
</tr>
</tbody>
</table>

Remarks: Pass

6.5.1 Measurement procedure

EUT was connected to the power analyzer system. Measurement was performed to obtain the desired flicker parameters. The measuring time depends on which parameters are to be measured.

\[ P_{st} = 2 \text{ h} \]
\[ P_{rt} = 10 \text{ min} \]

Controls and automatic programs shall be set to produce the most unfavorable sequence of voltage changes, using only those combinations of controls and programs are mentioned by the manufacturer in the instruction manual.

6.5.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmonics/Flicker meter (AC POWER SOURCE)</td>
<td>5001x-CTS-400-413</td>
<td>54894</td>
<td>C.I.</td>
<td>2017.03.16</td>
<td>☒</td>
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<td>Harmonics/Flicker meter (Analyzer)</td>
<td>PACS-1</td>
<td>72072</td>
<td>C.I.</td>
<td>2017.03.16</td>
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</table>
6.5.3 Photographs of test setup
6.5.4 Measurement result

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: OLW160P351N1A  
Tested by: Test Operator
Test category: All parameters (European limits)  
Test date: 15/02/2016  
Start time: 14:18:14  
End time: 14:28:44
Test duration (min): 10  
Data file name: F-000242.cts_data
Comment: Comment
Customer: SoluM Co., Ltd.

Test Result: Pass  
Status: Test Completed

Pst and limit line

European Limits

Parameter values recorded during the test:

- Vrms at the end of test (Volt): 229.36
- T-max (mS): 0.00  
  Test limit (mS): 500.0  
  Pass
- Highest dc (%): 0.00  
  Test limit (%): 3.30  
  Pass
- Highest dmax (%): -0.02  
  Test limit (%): 4.00  
  Pass
- Highest Pst (10 min. period): 0.271  
  Test limit: 1.000  
  Pass
- Highest Pst (2 hr. period): 0.119  
  Test limit: 0.650  
  Pass
6.6 Electrostatic Discharge

<table>
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<tr>
<th>Test specification</th>
<th>EN 61000-4-2:2009, Criteria : B</th>
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<tbody>
<tr>
<td>Test level</td>
<td>Contact: ± 4 kV&lt;br&gt;Air: ± 2 kV, ± 4 kV, ± 8 kV&lt;br&gt;HCP: ± 4 kV&lt;br&gt;VCP: ± 4 kV</td>
</tr>
<tr>
<td>Discharge impedance</td>
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</tr>
<tr>
<td>Number of discharge</td>
<td>Contact: 10&lt;br&gt;Air: 10&lt;br&gt;HCP / VCP: 10</td>
</tr>
<tr>
<td>Interval between discharges</td>
<td>1 s</td>
</tr>
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<td>Testing voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>Shielded room (3F)</td>
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<td>Date</td>
<td>2016. 02. 16</td>
</tr>
<tr>
<td>Temperature(°C)</td>
<td>22.4 °C&lt;br&gt;Humidity (% R.H.) 39.8 % R.H</td>
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<tr>
<td>Pressure (kPa)</td>
<td>101.3 kPa</td>
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<tr>
<td>Remarks</td>
<td>Pass&lt;br&gt;- A: There was no change of operation status during above testing.</td>
</tr>
</tbody>
</table>

6.6.1 Measurement procedure

A ground reference plane was located on the floor, and connected to earth via a low Impedance connection. The return cable of the ESD generator was connected to the reference plane. In case of floor standing equipment, EUT was placed on the reference plane on 0.1 m of insulating Support. In case of table top equipment, EUT was placed on a wooden table 0.8 m above the reference grounded floor. A horizontal coupling plane (HCP) was placed on the table, and Connected to the reference plane via a 470 kΩ resistor located in each end (0.5 mm insulating support between EUT and HCP). In both cases a vertical coupling plane (VCP) OF 0.5 X 0.5 m was located 0.1 m from the EUT’s sides. The VCP was connected to the reference plane in the same matter as the HCP.
6.6.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model No.</th>
<th>Serial No.</th>
<th>Makers</th>
<th>Next Cal. Date</th>
<th>Used</th>
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<td>PESD-1600</td>
<td>H011 309</td>
<td>HAEFELY</td>
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<td>ESD Tester</td>
<td>NSG 437</td>
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<td>TESEQ</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>✔</td>
</tr>
<tr>
<td>VCP</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>90501870</td>
<td>TES</td>
<td>2016.09.11</td>
<td>✔</td>
</tr>
</tbody>
</table>

6.6.3 Photographs of test setup
6.6.4 Measurement result
Electrostatic Discharge (Test Point)

- Air discharge
- Contact discharge
### HCP/VCP discharge

<table>
<thead>
<tr>
<th>Location (EUT)</th>
<th>Applied level (±)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCP (All 4 sides)</td>
<td>±2 kV, ±4 kV</td>
<td>A</td>
</tr>
<tr>
<td>VCP (All 4 sides)</td>
<td>±2 kV, ±4 kV</td>
<td>A</td>
</tr>
</tbody>
</table>

### Contact discharge

<table>
<thead>
<tr>
<th>Location (EUT)</th>
<th>Applied level (±)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>±4 kV</td>
<td>A</td>
</tr>
<tr>
<td>Rear</td>
<td>±4 kV</td>
<td>A</td>
</tr>
<tr>
<td>Left</td>
<td>±4 kV</td>
<td>A</td>
</tr>
<tr>
<td>Right</td>
<td>±4 kV</td>
<td>A</td>
</tr>
</tbody>
</table>

### Air discharge

<table>
<thead>
<tr>
<th>Location (EUT)</th>
<th>Applied level (±)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>±2 kV, ±4 kV, ±8 kV</td>
<td>-</td>
</tr>
<tr>
<td>Rear</td>
<td>±2 kV, ±4 kV, ±8 kV</td>
<td>-</td>
</tr>
<tr>
<td>Left</td>
<td>±2 kV, ±4 kV, ±8 kV</td>
<td>-</td>
</tr>
<tr>
<td>Right</td>
<td>±2 kV, ±4 kV, ±8 kV</td>
<td>-</td>
</tr>
</tbody>
</table>

* Lux Meter

<table>
<thead>
<tr>
<th>Mode</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED lighting monitoring mode</td>
<td>47.8 klux</td>
<td>47.9 klux</td>
</tr>
</tbody>
</table>
6.7 Radio Frequency Electromagnetic Fields

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 61000-4-3:2006/A2:2010, Criteria : A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested frequency</td>
<td>80 MHz ~ 1 GHz</td>
</tr>
<tr>
<td>Test level &amp;</td>
<td></td>
</tr>
<tr>
<td>Modulation</td>
<td>3 V/m, 80 % Amplitude Modulation (1 kHz)</td>
</tr>
<tr>
<td>Frequency Step</td>
<td>log 1 % step</td>
</tr>
<tr>
<td>Dwell time</td>
<td>1 s</td>
</tr>
<tr>
<td>Distance</td>
<td>3 m from EUT to tip of antenna</td>
</tr>
<tr>
<td>Testing Voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>3F Fully anechoic chamber (3 m)</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 16</td>
</tr>
<tr>
<td>Temperature(°C)</td>
<td>20.2 °C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>14.9 % R.H.</td>
</tr>
<tr>
<td>Pressure (kPa)</td>
<td>101.5 kPa</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass</td>
</tr>
</tbody>
</table>

- A: There was no change of operation status during above testing.

6.7.1 Measurement procedure

The test was performed at 3 m full anechoic chamber.

For floor standing equipment, the EUT was standing on the floor.

For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor.

The EUT was tested all sides, horizontal and vertical polarization.
6.7.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power meter</td>
<td>PH2000</td>
<td>26872</td>
<td>AR</td>
<td>2016.07.17</td>
<td>☒</td>
</tr>
<tr>
<td>Power sensor</td>
<td>PH2000</td>
<td>24889</td>
<td>AR</td>
<td>2016.07.17</td>
<td>☒</td>
</tr>
<tr>
<td>Power sensor</td>
<td>PM2002</td>
<td>25002</td>
<td>AR</td>
<td>2016.07.17</td>
<td>☒</td>
</tr>
<tr>
<td>Directional coupler</td>
<td>DC6080A</td>
<td>342174</td>
<td>AR</td>
<td>2016.07.16</td>
<td>☒</td>
</tr>
<tr>
<td>Signal generator</td>
<td>SMT06</td>
<td>847054/012</td>
<td>R&amp;S</td>
<td>2016.07.16</td>
<td>☒</td>
</tr>
<tr>
<td>Amplifier</td>
<td>150W1000M2</td>
<td>303843</td>
<td>AR</td>
<td>-</td>
<td>☒</td>
</tr>
<tr>
<td>Bi-Log Ant.</td>
<td>VULB9163</td>
<td>552</td>
<td>SCHWARZBECK</td>
<td>2016.05.14</td>
<td>☒</td>
</tr>
<tr>
<td>Antenna Mast</td>
<td>MA4000-EP</td>
<td>303</td>
<td>Innco Systems</td>
<td>-</td>
<td>☒</td>
</tr>
<tr>
<td>Light Meter</td>
<td>1335</td>
<td>90501870</td>
<td>TES</td>
<td>2016.09.11</td>
<td>☒</td>
</tr>
</tbody>
</table>

6.7.3 Photographs of test setup
### 6.7.4 Measurement result

<table>
<thead>
<tr>
<th>Location (EUT)</th>
<th>Antenna polarization</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front side</td>
<td>Horizontal</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>A</td>
</tr>
<tr>
<td>Rear side</td>
<td>Horizontal</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>A</td>
</tr>
<tr>
<td>Left side</td>
<td>Horizontal</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>A</td>
</tr>
<tr>
<td>Right side</td>
<td>Horizontal</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>A</td>
</tr>
</tbody>
</table>

* Lux Meter

<table>
<thead>
<tr>
<th>Location (EUT)</th>
<th>Antenna polarization</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front side</td>
<td>Horizontal</td>
<td>47.8 klux</td>
<td>47.3 klux</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>48.1 klux</td>
<td>48.0 klux</td>
</tr>
<tr>
<td>Rear side</td>
<td>Horizontal</td>
<td>48.9 klux</td>
<td>48.5 klux</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>48.2 klux</td>
<td>48.4 klux</td>
</tr>
<tr>
<td>Left side</td>
<td>Horizontal</td>
<td>47.3 klux</td>
<td>47.0 klux</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>48.1 klux</td>
<td>48.6 klux</td>
</tr>
<tr>
<td>Right side</td>
<td>Horizontal</td>
<td>49.1 klux</td>
<td>46.8 klux</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>48.3 klux</td>
<td>47.8 klux</td>
</tr>
</tbody>
</table>
### 6.8 Electrical Fast Transient/BURST

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 61000-4-4:2012, Criteria : B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coupling</strong></td>
<td>☑ AC main</td>
</tr>
<tr>
<td></td>
<td>☑ DC Line</td>
</tr>
<tr>
<td></td>
<td>☐ Control: Clamp</td>
</tr>
<tr>
<td></td>
<td>☐ Telecommunication: Clamp</td>
</tr>
<tr>
<td><strong>Test level</strong></td>
<td>☑ AC main: ± 1 kV Peak</td>
</tr>
<tr>
<td></td>
<td>☑ DC Line: ± 0.5 kV Peak</td>
</tr>
<tr>
<td></td>
<td>☐ Control: ± 0.5 kV Peak</td>
</tr>
<tr>
<td></td>
<td>☐ Telecommunication: ± 0.5 kV Peak</td>
</tr>
<tr>
<td><strong>Repetition frequency</strong></td>
<td>5 kHz, Tr/Th = 5 / 50 ns</td>
</tr>
<tr>
<td><strong>Coupling time (Minimum)</strong></td>
<td>120 s</td>
</tr>
<tr>
<td><strong>Testing Voltage</strong></td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td><strong>Test facility</strong></td>
<td>Shielded room (3F)</td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>2016. 02. 17</td>
</tr>
<tr>
<td><strong>Temperature(°C)</strong></td>
<td>22.0 °C</td>
</tr>
<tr>
<td><strong>Remarks</strong></td>
<td>Pass</td>
</tr>
</tbody>
</table>

**6.8.1 Measurement procedure**

A ground reference plane was located on the floor.
EFT generator was connected to reference ground plane via low impedance connection.
For floor standing equipment, EUT was placed on a 0.1 m wooden table.
For tabletop equipment, EUT was placed on a 0.1 m above the ground reference plane.
Test generator and coupling/decoupling network was placed on, and bounded to, the ground reference plane. When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, Shall be 0.5 m.
6.8.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra compact simulator</td>
<td>UCS500N</td>
<td>V1238113636</td>
<td>EM TEST</td>
<td>2016.09.02</td>
<td>☑</td>
</tr>
<tr>
<td>Capacitive coupling clamp</td>
<td>HFK</td>
<td>P1411132494</td>
<td>EM TEST</td>
<td>2016.04.21</td>
<td>☐</td>
</tr>
<tr>
<td>Light Meter</td>
<td>1335</td>
<td>90501870</td>
<td>TES</td>
<td>2016.09.11</td>
<td>☑</td>
</tr>
</tbody>
</table>

6.8.3 Photographs of test setup

* AC main
* DC Line
6.8.4 Measurement result

**AC main**

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>(+)</th>
<th>(-)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>+1 kV</td>
<td>-1 kV</td>
<td>A</td>
</tr>
</tbody>
</table>

**DC Line**

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>(+)</th>
<th>(-)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>+0.5 kV</td>
<td>-0.5 kV</td>
<td>A</td>
</tr>
</tbody>
</table>

**Control**

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>(+)</th>
<th>(-)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Telecommunication**

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>(+)</th>
<th>(-)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Lux Meter**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC main</td>
<td>47.9 klux</td>
<td>47.6 klux</td>
</tr>
<tr>
<td>DC Line</td>
<td>48.1 klux</td>
<td>48.0 klux</td>
</tr>
</tbody>
</table>
6.9 Surge

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 61000-4-5:2014, Criteria : B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling</td>
<td>☑ AC main: Direct</td>
</tr>
<tr>
<td></td>
<td>☑ Control: Direct / CDN</td>
</tr>
<tr>
<td>Test level</td>
<td>☑ AC main: Differential mode: ±0.5 kV</td>
</tr>
<tr>
<td></td>
<td>☑ Common mode: ±0.5 kV, ±1 kV</td>
</tr>
<tr>
<td></td>
<td>☑ Control: ±0.5 kV, ±1 kV</td>
</tr>
<tr>
<td>Coupling Impedance</td>
<td>☑ Differential mode: 18 µF</td>
</tr>
<tr>
<td></td>
<td>☑ Common mode: 10 Ω + 9 µF</td>
</tr>
<tr>
<td></td>
<td>☑ Direct</td>
</tr>
<tr>
<td>Surge pulse shape</td>
<td>Tr/Th = 1.2 / 50 µs</td>
</tr>
<tr>
<td>Angles</td>
<td>(+) 90 °, (-) 270 °</td>
</tr>
<tr>
<td>Number of surge</td>
<td>5</td>
</tr>
<tr>
<td>Coupling time</td>
<td>1 min</td>
</tr>
<tr>
<td>Testing Voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>Shielded room (3F)</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 17</td>
</tr>
<tr>
<td>Temperature(°C)</td>
<td>22.0 °C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>35.4 % R.H.</td>
</tr>
<tr>
<td>Pressure (kPa)</td>
<td>101.2 kPa</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass</td>
</tr>
</tbody>
</table>

6.9.1 Measurement procedure

A ground reference plane was located on the floor. SURGE generator was connected to reference ground plane via low impedance connection. For floor standing equipment & table top equipment, EUT was placed on a wooden table.

6.9.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra compact simulator</td>
<td>UCS500N</td>
<td>V1238113636</td>
<td>EM TEST</td>
<td>2016.09.02</td>
<td>☑</td>
</tr>
<tr>
<td>CDN</td>
<td>CNV 508 N1</td>
<td>V1108108861</td>
<td>EM TEST</td>
<td>2016.09.02</td>
<td>☑</td>
</tr>
<tr>
<td>Light Meter</td>
<td>1335</td>
<td>90501870</td>
<td>TES</td>
<td>2016.09.11</td>
<td>☑</td>
</tr>
</tbody>
</table>
6.9.3 Photographs of test setup

![Test Setup Image]

6.9.4 Measurement result

* AC main

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>(+)</th>
<th>(-)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N</td>
<td>+ 0.5 kV</td>
<td>- 0.5 kV</td>
<td>A</td>
</tr>
</tbody>
</table>

* Control

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>(+)</th>
<th>(-)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Lux Meter

<table>
<thead>
<tr>
<th>Mode</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED lighting monitoring mode</td>
<td>51.3 klux</td>
<td>51.0 klux</td>
</tr>
</tbody>
</table>
6.10 Conducted Immunity

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 61000-4-6:2014, Criteria : A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested frequency</td>
<td>0.15 \text{MHz} \sim 80 \text{MHz}</td>
</tr>
<tr>
<td>Test level &amp; Modulation</td>
<td>3 \text{V}, 80% Amplitude Modulation (1 kHz)</td>
</tr>
<tr>
<td>Frequency Step</td>
<td>\log 1 % step</td>
</tr>
<tr>
<td>Dwell time</td>
<td>1 s</td>
</tr>
<tr>
<td>Coupling method</td>
<td>\checkmark \text{AC main: CDN(M2)} \checkmark \text{DC Line: CDN(M2)} \square \text{Control: Clamp} \square \text{Telecommunication: Clamp}</td>
</tr>
<tr>
<td>Testing Voltage</td>
<td>230 \text{V}, 50 \text{Hz}</td>
</tr>
<tr>
<td>Test facility</td>
<td>Shielded room (3F)</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 16</td>
</tr>
<tr>
<td>Temperature(°C)</td>
<td>22.0 °C</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass - A: There was no change of operation status during above testing.</td>
</tr>
</tbody>
</table>

6.10.1 Measurement procedure

A ground reference plane was located on the floor.
The test was performed on a ground reference plane on a 0.1 m wooden table.
This test were performed using CDN for mains, clamp for signal and injection probe.
The frequency range was swept from 0.15 MHz to 80 MHz. This frequency range was
Modulated with 1 kHz sine wave at 80 \%.
The signal generators provided the modulated frequency at a 1 \% step size.
The power and all network cable, I/O cables longer than 3 m length were tested.
6.10.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Wave Simulator</td>
<td>CWS500N1.4</td>
<td>P1409132195</td>
<td>EM TEST</td>
<td>2016.05.12</td>
<td>☒</td>
</tr>
<tr>
<td>CDN</td>
<td>CDN M2/M3</td>
<td>P1402128648</td>
<td>EM TEST</td>
<td>2016.05.14</td>
<td>☒</td>
</tr>
<tr>
<td>CDN</td>
<td>CDN M2/M3</td>
<td>P1402128649</td>
<td>EM TEST</td>
<td>2016.05.14</td>
<td>☒</td>
</tr>
<tr>
<td>Attenuator</td>
<td>ATT6/80</td>
<td>P1402129094</td>
<td>EM TEST</td>
<td>2016.05.12</td>
<td>☒</td>
</tr>
<tr>
<td>Electromagnetic Injection Clamp</td>
<td>EM101</td>
<td>36197</td>
<td>EM TEST</td>
<td>2016.05.13</td>
<td>☐</td>
</tr>
<tr>
<td>CDN</td>
<td>CDN S1-75</td>
<td>P1404129801</td>
<td>EM TEST</td>
<td>2016.05.14</td>
<td>☐</td>
</tr>
<tr>
<td>CDN</td>
<td>CDN-T8-RJ45</td>
<td>P1404129872</td>
<td>EM TEST</td>
<td>2016.05.14</td>
<td>☐</td>
</tr>
<tr>
<td>Light Meter</td>
<td>1335</td>
<td>90501870</td>
<td>TES</td>
<td>2016.09.11</td>
<td>☒</td>
</tr>
</tbody>
</table>

6.10.3 Photographs of test setup

* AC main
* DC Line
6.10.4 Measurement result

* AC main

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>Coupling method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>CDN(M2)</td>
<td>A</td>
</tr>
</tbody>
</table>

* DC Line

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>Coupling method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>CDN(M2)</td>
<td>A</td>
</tr>
</tbody>
</table>

* Control

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>Coupling method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

* Telecommunication

<table>
<thead>
<tr>
<th>Coupling point</th>
<th>Coupling method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

* Lux Meter

<table>
<thead>
<tr>
<th>Mode</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC main</td>
<td>48.2 klux</td>
<td>48.4 klux</td>
</tr>
<tr>
<td>DC Line</td>
<td>49.0 klux</td>
<td>48.9 klux</td>
</tr>
</tbody>
</table>
6.11 Magnetic field immunity

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 61000-4-8:2010, Criteria : A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic field strength</td>
<td>3 A/m (rms)</td>
</tr>
<tr>
<td>Coupling time</td>
<td>60 s</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 / 60 Hz</td>
</tr>
<tr>
<td>Testing Voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>Shielded room (3F)</td>
</tr>
<tr>
<td>Polarization</td>
<td>X, Y, Z</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 17</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>22.0 °C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>35.4 % R.H.</td>
</tr>
<tr>
<td>Pressure (kPa)</td>
<td>101.2 kPa</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass - A: There was no change of operation status during above testing.</td>
</tr>
</tbody>
</table>

6.11.1 Measurement procedure

The test was performed on a ground reference plane (GRP) on a 0.8 m wooden table. The EUT was isolated 10 cm isolating support. The ground plane was connected to floor reference ground plane via low impedance connection. The test generator was placed 3 m distance from the induction coil. The generator was connected reference ground plane. Preliminary verification of equipment performances was carried out prior to applying the test magnetic field. The field was applied to the EUT horizontal, vertical polarization.

6.11.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra compact simulator</td>
<td>UCS500N</td>
<td>V1238113636</td>
<td>EM TEST</td>
<td>2016.09.02</td>
<td>✔</td>
</tr>
<tr>
<td>Magnetic coil</td>
<td>MS 100</td>
<td>0701-03</td>
<td>EM TEST</td>
<td>-</td>
<td>✔</td>
</tr>
<tr>
<td>Current transformer</td>
<td>MC 2630</td>
<td>113-97</td>
<td>EM TEST</td>
<td>-</td>
<td>✔</td>
</tr>
<tr>
<td>ELF Field Monitor</td>
<td>ELF-66D</td>
<td>K316093</td>
<td>WALKER</td>
<td>2016.04.17</td>
<td>✔</td>
</tr>
<tr>
<td>Light Meter</td>
<td>1335</td>
<td>90501870</td>
<td>TES</td>
<td>2016.09.11</td>
<td>☑</td>
</tr>
</tbody>
</table>
6.11.3 Photographs of test setup

6.11.4 Measurement result

<table>
<thead>
<tr>
<th>Positions</th>
<th>Polarity</th>
<th>Test level</th>
<th>Frequency</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>X</td>
<td>3 A/m</td>
<td>50/60 Hz</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td></td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>

* Lux Meter

<table>
<thead>
<tr>
<th>Positions</th>
<th>Polarity</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>X</td>
<td>47.8 klux</td>
<td>47.2 klux</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>47.3 klux</td>
<td>47.3 klux</td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td>47.6 klux</td>
<td>47.3 klux</td>
</tr>
</tbody>
</table>
6.12 Dips and Interruptions

<table>
<thead>
<tr>
<th>Test specification</th>
<th>EN 61000-4-11:2004 , Criteria: B or C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of dips</td>
<td>3 T</td>
</tr>
<tr>
<td>Duration</td>
<td>60 s</td>
</tr>
<tr>
<td>Phase</td>
<td>Zero crossing (0 °, 180 °)</td>
</tr>
<tr>
<td>Testing Voltage</td>
<td>230 V, 50 Hz</td>
</tr>
<tr>
<td>Test facility</td>
<td>Shielded room (3F)</td>
</tr>
<tr>
<td>Date</td>
<td>2016. 02. 17</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>22.0 °C</td>
</tr>
<tr>
<td>Humidity (% R.H.)</td>
<td>35.4 % R.H.</td>
</tr>
<tr>
<td>Pressure (kPa)</td>
<td>101.2 kPa</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pass</td>
</tr>
</tbody>
</table>

6.12.1 Measurement procedure

The dips/interruption test is only applicable to AC mains.
The dips/interruptions were applied at zero crossing.

6.12.2 Used equipments

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Model no.</th>
<th>Serial no.</th>
<th>Makers</th>
<th>Next Cal. date</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra compact simulator</td>
<td>UCS500N</td>
<td>V1238113636</td>
<td>EM TEST</td>
<td>2016.09.02</td>
<td>☒</td>
</tr>
<tr>
<td>Light Meter</td>
<td>1335</td>
<td>90501870</td>
<td>TES</td>
<td>2016.09.11</td>
<td>☒</td>
</tr>
</tbody>
</table>
6.12.3 Photographs of test setup

6.12.4 Measurement result

* 230 V, 50 Hz

<table>
<thead>
<tr>
<th>Test Level (%UT)</th>
<th>Dip/Int. (%UT)</th>
<th>Duration /Period</th>
<th>Angle (°)</th>
<th>Count number</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 %</td>
<td>30 %</td>
<td>12 Period</td>
<td>0</td>
<td>3T</td>
<td>A</td>
</tr>
<tr>
<td>0 %</td>
<td>100 %</td>
<td>0.5 Period</td>
<td>0 / 180</td>
<td>3T</td>
<td>A</td>
</tr>
</tbody>
</table>

Comment:

- A: There was no change of operation status during above testing. (0.5 Period, 12 Period)

* Lux Meter

<table>
<thead>
<tr>
<th>Test Level</th>
<th>Dip/Int.</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 %</td>
<td>30 %</td>
<td>50.2 klux</td>
<td>50.0 klux</td>
</tr>
<tr>
<td>0 %</td>
<td>100 %</td>
<td>51.2 klux</td>
<td>51.0 klux</td>
</tr>
</tbody>
</table>
7. E.U.T. photographs

Front View

![Front View Image]

Rear View

![Rear View Image]
Inside

![Image of a component]
Main Board