

Test Report of

California Building Energy Efficiency for High Efficacy Light Sources under Title 24

Applicant:

ARTIKA FOR LIVING INC

1756 50th avenue, Lachine, Qc, Canada H8T 2V5

Manufacturer:

Zhongshan Rixiao Optoelectronic Technology Co., Ltd

No. 4-1, South Huatai East Road, Caosan Pioneer Park, Guzhen Town, Zhongshan City, Guangdong Province, China

Models:

OUT-WIC-*****

("*****" can be A to Z and/or 0 to 9 and/or blank (commercial code).)

| | | | |
|----------------------|---|---------------------|--|
| Test Date: | From May. 04, 2022 to May. 06, 2022 | | |
| Test Lab.: | LCTECH Guangdong Testing Services Co., Ltd. 2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China Tel: +86-760-22833366 E-mail: Service@lccert.com http://www.lccert.com | | |
| Test Sites: | 2/F., Building II & 1/F., Building I, Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China | | |
| Template No.: | LC-RT-PL-025 Rev.2.0 | | |
| Lab. Note: | N/A | | |
| Complied by: | Kargel Yuan May. 10, 2022 <i>Kargel Yuan</i> | Reviewed by: | Lin Qiu May. 10, 2022 <i>Lin Qiu</i> |

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1. General

1.1 Product information

| | |
|------------------------------|---|
| Brand Name | ARTIKA |
| Model Number | OUT-WIC-***** |
| Indoor or Outdoor | Indoor and Outdoor |
| Luminaire Type | Inseparable SSL Luminaires |
| Rated Input | 120VAC, 60Hz |
| Rated Power | 14W |
| Rated Light Output | 750lm |
| Nominal CCT | 3000K, 4000K |
| LED Package, Array or Module | Model: BXEN-30G-13H-99, manufactured by Bridgelux Inc. |
| LED LM-80 Test Information | Please refer to Appendix A-1 for detail information. |
| Driver Information | LED driver |
| Dimming Information | Dimmable |
| Luminaire Features | Continuously Dimmable |
| Connected Luminaire or not | Not |
| Note | - |

1.2 Sample Received Record:

| Date | Model | Numbers | Sample Code of lab |
|------------|------------|---------|--------------------|
| 2022/04/29 | OUT-WIC-BL | 1 | 220429111002 |

1.3 Reference standards or methods

The following standards are partly or totally used or referenced for test and report.

| No. | Name |
|---|--|
| ANSI/NEMA/ANSLG C78.377-2011 or 2015 or 2017 | Specifications for the Chromaticity of Solid State Lighting Products |
| ANSI C82.77-2002 | Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment |
| ANSI/UL 1598-2008 | Standard for Safety of Luminaires |
| ANSI/UL 1598C | Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits |
| CIE Pub. No. 13.3-1995 | Method of Measuring and Specifying Color Rendering of Light Sources |
| CIE Pub. No. 15:2004 | Colorimetry |
| IES LM-79-08 | Electrical and Photometric Measurements of Solid-State Lighting Products |
| IES LM-80-08 | Measuring Lumen Maintenance of LED Light Sources |
| IES LM-80-15 | Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules |
| IES TM-21-11 | Projecting Long Term Lumen Maintenance of LED Sources |
| ENERGY STAR | ENERGY STAR® Program Requirements Product Specifications for Lamps 2.1: Start Time Test Method |
| ENERGY STAR | ENERGY STAR® Program Requirements Product Specification for Lamps Version 2.1: Noise Test Method |
| CEC-400-2018-017-CMF | 2019 Building Energy Efficiency standards for Residential and Nonresidential Buildings |
| CEC-400-2018-021-CMF | 2019 Building Energy Efficiency Standards |

1.4 Equipment list

All the equipment for the measurements were calibrated by ISO 17025 accredited laboratory or traceable to National Institute of Metrology (NIM) or National Institute of Standards and Technology (NIST), below are equipment list.

| Instrument | ID | Model name | Cal. date | Next cal. Date |
|---|-------------|-------------|-------------|----------------|
| AC power supply | LC-I-923 | CHP-500 | 2021-12-16 | 2022-12-15 |
| AC power supply | LC-I-987 | APW-120N | 2021-12-16 | 2022-12-15 |
| AC power supply | LC-I-988 | APW-120N | 2021-12-16 | 2022-12-15 |
| AC Power Source | LC-I-948 | AFW-215A | Before used | Before used |
| AC Power Source | LC-I-950 | AFW-215A | Before used | Before used |
| Power analyzer | LC-I-954 | WT210 | 2021-12-20 | 2022-12-19 |
| Power analyzer | LC-I-PL-024 | WT310E | 2022-03-01 | 2023-02-28 |
| Digital caliper | LC-I-973 | (0~200)mm | 2021-07-16 | 2022-07-15 |
| High Accuracy Array Spectroradiometer | LC-I-956 | HAAS-2000 | Before used | Before used |
| Standard lamp | LC-I-PL-030 | D204C | 2021-07-09 | 2022-07-08 |
| Lighting flicker measuring instrument | LC-I-PL-028 | LFA-3000 | 2022-02-24 | 2023-02-23 |
| Luminous Flux Standard Lamp | LC-I-PL-027 | 24V/100W | 2021-07-09 | 2022-07-08 |
| Timer | LC-I-930-21 | DH48S-S | 2020-12-28 | 2021-12-27 |
| Timer | LC-I-930-22 | DH48S-S | 2020-12-28 | 2021-12-27 |
| Life test system | LC-I-930 | LCTECH-1 | Before used | Before used |
| Temperature chamber | LC-I-920 | DY6000 | 2021-12-14 | 2022-12-13 |
| Goniophotometer(with mirror) | LC-I-902 | GMS2000 | 2022-04-21 | 2023-04-20 |
| Digital oscilloscope | LC-I-919 | TDS 1012 | 2021-12-22 | 2022-12-21 |
| Sound level meter | LC-I-951 | AWA5661 | 2021-12-20 | 2022-12-19 |
| Anechoic room | LC-I-952 | TNX-03 | 2021-12-16 | 2022-12-15 |
| Steel tape | LC-I-PL-023 | 5M | 2022-02-23 | 2023-02-22 |
| Wireless temperature and humidity transmitter | LC-I-PL-008 | DWLR-DLR | 2021-12-16 | 2022-12-15 |
| Wireless temperature and humidity transmitter | LC-I-PL-009 | DWLR-DLR | 2021-12-16 | 2022-12-15 |
| T&H recorder | LC-I-SF-008 | W2305001 | 2022-01-14 | 2023-01-13 |
| J thermocouple | LC-I-SF-022 | TT-J-30-SLE | 2022-01-14 | 2023-01-13 |
| Data acquisition/Switch unit | LC-I-098 | 34970A | 2021-12-14 | 2022-12-13 |

2. Test conducted and method

2.1 Test conducted

2.1.1 Light Output, Efficacy, and color quantities

2.1.1.1 The sample was tested without seasoning according to LM-79. Before measurements were taken, the sample was operated for about 2 hours to reach stabilization and temperature equilibrium. Stabilization in which the variation (maximum -minimum) of at least 3 readings of the light output and electrical power over a period of 30min, taken 15 minutes apart, is less than 0.5%. The ambient temperature in the whole test process was kept in $25\pm 1^{\circ}\text{C}$, and the sample was in its designated orientation for all the measurements as LM-79 requirement.

2.1.1.2 The sample was first used to color and photometric quantities measurements by spectroradiometer with 2 meters integrated sphere (4π) and power analyzer.

2.1.1.3 After integrated sphere test, the sample was removed to a mirror-type goniophotometer (Type C) with photometer ($f1 < 1.5\%$) for light distribution and photometric quantities test. The angle interval was settled based on the sample beam angle, and horizontal angle interval was 15° , vertical angle interval was 1° in normally.

2.1.2 ISTM and TM-21

2.1.2.1 The LED module used in the luminaire was tested in accordance with ANSI/UL 1598(Section 19.7, 19.10-16), ANSI/UL 1574 (Section 54) or ANSI/UL 153(Sections 124-128A) and LM-80.

2.1.2.2 Thermocouples were in contact with the TMP_{LED} location described in LM-80 test report. In order to gain the maximum temperature, if appropriate, more than one thermocouple may use.

2.1.2.3 The sample was tested in the housing as provided by customer which was the designated application, and the housing with the sample was mounted according to the standard requirement.

2.1.2.4 The sample was operated for 7.5 hours to obtain constant temperatures; an Agilent data logger was used for data recording.

2.1.2.5 The ambient temperature was kept in $25\pm 5^{\circ}\text{C}$, and final measured values were normalized to an ambient of 25°C . The sample was in its designated orientation.

2.1.3 Start Time Test

2.1.3.1 The luminaire was not seasoned before test. Start time was measured by digital oscilloscope and photometer.

2.1.3.2 Connect oscilloscope probe to measure the input voltage to the luminaire, and light output.

2.1.3.3 Set trigger level at 10V to trigger off the input voltage signal.

2.1.3.4 Set the power supply to rated voltage and frequency of the device (Normal 120V/60Hz applied). If a range is specified, test sample at the midpoint of the range.

2.1.3.5 Record the starting time was based on the point where the light source is continuously illuminated, and the light output is either constant or increasing.

2.1.3.6 The ambient temperature in the whole test process was kept in $25\pm 1^{\circ}\text{C}$, and in its designated orientation.

2.1.4 Dimming, Reduced Flicker Operation and Audible Noise

2.1.4.1 Set and apply 120V-60Hz AC power to the device

2.1.4.2 Adjust the dimmer to the maximum, 20% light output and minimum light output with recommended dimmer, measure the light output by 2 meters integrated sphere (4π). The lowest light output level was recommended by customer.

2.1.4.3 The sample was connected to a dimmer recommended by customer and operated in center of an anechoic room

with a background noise lower than 15 dBA. The microphone was located at place less than 1 meter at the minimum output; maximum value was used as the test result.

2.1.4.4 During the whole tests, ambient temperature was kept in $25\pm5^{\circ}\text{C}$, and the sample was in its designated orientation.

2.1.4.5 Measurements shall be taken within 2 percent of the following increments of full light output: 100 percent, 20 percent, and minimum dimming level where 100 percent full light output is defined as operating the light source at the maximum setting provided by the control. When the minimum light output of the systems is greater than 20 percent of full light output, then the flicker measurements are taken at the minimum light output.

2.1.4.6 Lamp light output shall be stabilized in advance of taking measurements at each dimming level. Light output shall be considered stabilized when consecutive measurements taken at one-minute intervals deviate by no more than 0.5%.

2.1.4.7 Measured data shall be recorded to a digital file with an interval between each measurement no greater than 0.00005 sec (50 microseconds) corresponding to an equipment measurement rate of no less than 20kHz, and capture at least 1 second of data.

2.1.4.8 For each dimming level after the lamps have stabilized, record lighting measurements (in footcandles or volts) from test equipment with readings taken at intervals of no greater than 50 microseconds. These readings shall be recorded for a test period of no less than one second.

2. Test Result Summary

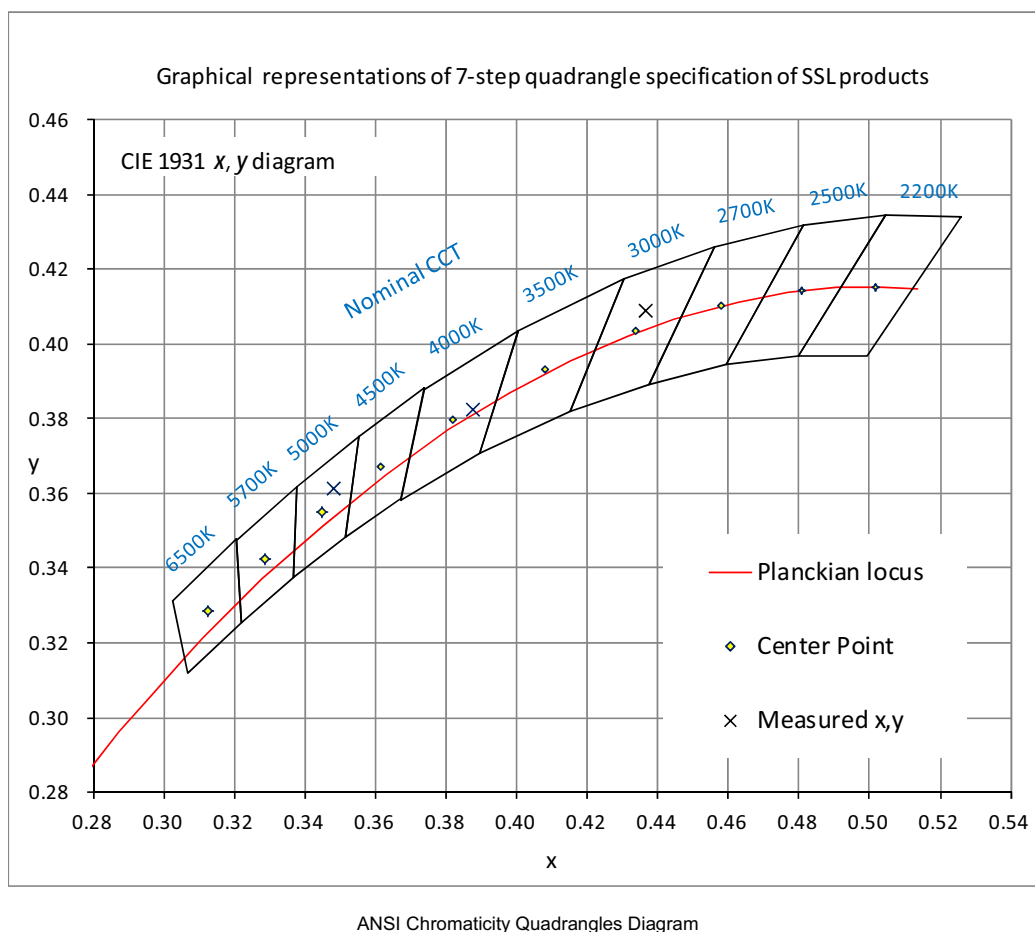
| Item | Result | Requirement |
|-----------------------------------|--|--|
| Power | Measured: <u>13.24 W</u> | None |
| Luminaire Efficacy (initial) | Measured: <u>56.80</u> lm/W | ≥45 lm/W |
| Luminaire Light Output (initial) | Measured: <u>751.99</u> lm | None |
| Power Factor at Full Rated Power | <u>0.921</u> | PF ≥ 0.90 |
| Start time | <u>32</u> ms | ≤ 0.5 sec |
| Correlated color temperature(CCT) | Measured: <u>3047</u> K falls within the <u>3000K</u> 7-step chromaticity quadrangles | For inseparable SSL luminaires, LED light engines, ≤4000 Kelvin. |
| Duv | Measured: <u>0.002</u> | - |
| Color Rendering Index | Ra: <u>95.9</u> R9: <u>81</u> | Ra ≥ 90 R9 ≥ 50 |
| Lumen Maintenance _TM-21 Method | <i>In situ</i> TMP _{LED} : <u>59.7 °C</u> Lumen maintenance at <u>6000</u> hours: <u>94.01</u> % Current on each LED: <u>100</u> mA | LM-80 with TM-21 method: 3000 hours ≥ 93.1% 6000 hours ≥ 86.7% |
| Rated life | <u>50000</u> hours | ≥ 15,000 hours |
| Standby Mode Consuming | <u>N/A</u> | ≤ 0.2W |
| Minimum dimming level | Dimming Range: Measured dimming from <u>100% to 8.9%</u> | The luminaire and its components shall provide continuous dimming from 100% to 10% of light output. |
| Dimming control compatibility | <u>Forward Phase cut</u> | At least one type must be listed as below: Forward Phase cut control, reverse phase cut, powerline carrier, digital, 0 - 10 VDC, other. |
| NEMA SSL 7A compatible? | <u>Yes</u> | If compatible with forward phase cut dimmer control, "Yes". If not, "No". |

| | | | |
|---------------|---|------------------------------------|---|
| Flicker | Amplitude modulation unfiltered | 100% light output: <u>2.12%</u> | <30% for frequencies of 200 Hz or below, at 100% and 20% light output |
| | | 20% light output: <u>2.11%</u> | |
| | | Minimum light output: <u>3.91%</u> | |
| | Percent amplitude modulation with 1000 Hz cut - off | 100% light output: <u>1.96%</u> | |
| | | 20% light output: <u>1.85%</u> | |
| | | Minimum light output: <u>2.38%</u> | |
| | Percent amplitude modulation with 400 Hz cut - off | 100% light output: <u>1.92%</u> | |
| | | 20% light output: <u>1.06%</u> | |
| | | Minimum light output: <u>1.20%</u> | |
| | Percent amplitude modulation with 200 Hz cut - off | 100% light output: <u>1.85%</u> | |
| | | 20% light output: <u>0.56%</u> | |
| | | Minimum light output: <u>0.63%</u> | |
| | Percent amplitude modulation with 90 Hz cut- off | 100% light output: <u>0.08%</u> | |
| | | 20% light output: <u>0.18%</u> | |
| | | Minimum light output: <u>0.28%</u> | |
| | Percent amplitude modulation with 40 Hz cut- off | 100% light output: <u>0.06%</u> | |
| | | 20% light output: <u>0.17%</u> | |
| | | Minimum light output: <u>0.26%</u> | |
| Audible Noise | 100% light output: <u>16.1 dBA</u> | | ≤ 24dBA at 1 meter or less at the 100% and 20% light output |
| | 20% light output: <u>15.7 dBA</u> | | |
| Marking | <u>Yes, JA8-2019</u> | | Marked in accordance with JA8.5, light sources that do comply with JA8 shall be marked with “JA8-2019” or “JA8-2019-E”. |

3. Test Data

3.1 Initial Photometric and Electrical Data

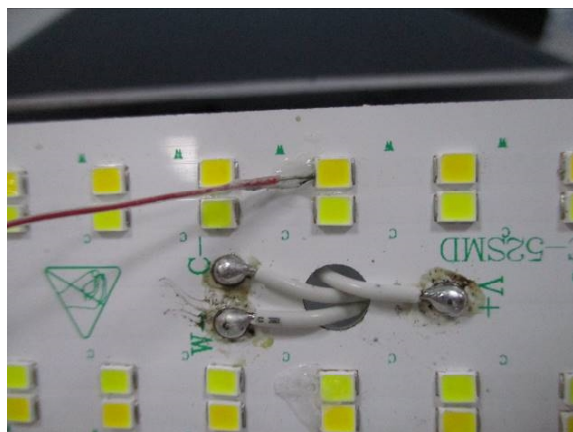
| CCT | Voltage (V) | Current (A) | Power (W) | Power factor | Light output (lm) | Luminaire efficacy (lm/w) |
|-------|------------------|------------------|-----------|--------------|-------------------|---------------------------|
| 3000K | 120.01 | 0.120 | 13.24 | 0.921 | 751.99 | 56.80 |
| 4000K | 120.00 | 0.122 | 13.53 | 0.926 | 839.60 | 62.05 |
| 5000K | 119.99 | 0.120 | 13.31 | 0.922 | 796.17 | 59.82 |
| CCT | Chromaticity (x) | Chromaticity (y) | CCT (K) | Ra | R9 | Duv |
| 3000K | 0.4365 | 0.4090 | 3047 | 95.9 | 81 | 0.002 |
| 4000K | 0.3876 | 0.3826 | 3854 | 97.2 | 91 | -0.0007 |
| 5000K | 0.3482 | 0.3614 | 4922 | 94.5 | 81 | 0.0036 |



3.2 In-situ TMP_{LED} and LED driver current

| $TMP_{LED}(^{\circ}C)$ |
|------------------------|
| 59.7 |

Thermocouple contact photograph (TMP_{LED}):



3.3 Start Time and Standby power

| Test Item | Test Result |
|---------------|-------------|
| Start time | 32 ms |
| Standby power | 0.0 W |

3.4 Dimming and Noise Test Data

| Dimming | Maximum light output | Minimum light output | Diming range |
|---------|----------------------|----------------------|---------------------------|
| | 751.13 lm | 66.49 lm | Dimming from 100% to 8.9% |
| Noise | 100% light output | | 20% light output |
| | 16.1dBA | | 15.7dBA |

Note: Test Dimmer model number: DVCL-153P LUTRON

3.5 Flicker

| 100% of Lighting Output | | | | | |
|--|---------|---------|--------|-----------|-------|
| Voltage | Current | Power | PF | Frequency | THDi |
| 120.00 V | 0.118 A | 12.86 W | 0.905 | 60Hz | - |
| Recording interval: 50 microseconds. Equipment Measurement Period: 1 Seconds | | | | | |
| Percent Amplitude Modulation | | | | | |
| Unfiltered | 1000 Hz | 400 Hz | 200 Hz | 90 Hz | 40 Hz |
| 2.12% | 1.96% | 1.92% | 1.85% | 0.08% | 0.06% |

| 20% of Lighting Output | | | | | |
|--|---------|--------|--------|-----------|-------|
| Voltage | Current | Power | PF | Frequency | THDi |
| 119.97 V | 0.050 A | 2.37 W | 0.392 | 60Hz | - |
| Recording interval: 50 microseconds. Equipment Measurement Period: 1 Seconds | | | | | |
| Percent Amplitude Modulation | | | | | |
| Unfiltered | 1000 Hz | 400 Hz | 200 Hz | 90 Hz | 40 Hz |
| 2.11% | 1.85% | 1.06% | 0.56% | 0.18% | 0.17% |

| Minimum fraction of Lighting Output | | | | | |
|--|---------|--------|--------|-----------|-------|
| Voltage | Current | Power | PF | Frequency | THDi |
| 119.97 V | 0.036 A | 1.43 W | 0.334 | 60Hz | - |
| Recording interval: 50 microseconds. Equipment Measurement Period: 1 Seconds | | | | | |
| Percent Amplitude Modulation | | | | | |
| Unfiltered | 1000 Hz | 400 Hz | 200 Hz | 90 Hz | 40 Hz |
| 3.91% | 2.38% | 1.20% | 0.63% | 0.28% | 0.26% |

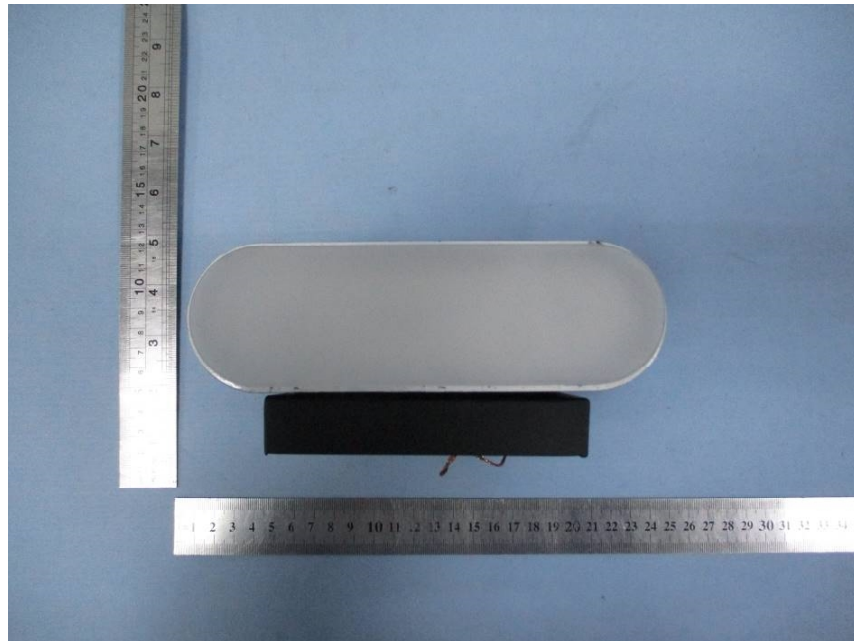
Appendix-A LM-80 Report information

| | | | |
|--|--|--------|---|
| Report originated by | Great One Global Certification Co., Ltd. | | |
| Manufactured by | Bridgelux Inc. | | |
| LM-80 report No. | GO17080303-101 | | |
| LED Model | BXEN-30G-13H-99 | | |
| LED Part Number | BXEN-30G-13H-99 | | |
| Number of LED light source tested | 25 units per case temperature | | |
| Drive Current | 100 mA | | |
| Case temperature | 85°C | 105°C | - |
| lumen maintenance during 10000 hours test | 91.8% | 90.2% | - |
| Color maintenance($\Delta u'v'$) during 10000 hours test | 0.0024 | 0.0026 | - |

Appendix-B TM-21

| TM-21 Inputs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-------------------------------------|-----------------------|--------------------------------------|--|--|-------------------------------------|--|--------------------------------------|---|---------------------------|------------------------|-------|----------------------------|--------------|---|--------------|---|--------------|---|--|--|---|---------|---|---------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|------|--------|------|--------|--|--|-------|--------|-------|--------|--|--|
| <p>Instructions</p> <p>Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.</p> <p>First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature 1". For only two case temperature data sets, complete 1 and 2.</p> <p>Next, further to the right, in the corresponding box(es) for each tested case temperature, enter the test data along with the time (in hours) at which each measurement was taken. Data entered must be normalized then averaged measured data (per TM-21 sections 5.2.1 and 5.2.2). If case temperatures have different test durations, enter data up to the lowest of the test durations for all of the case temperatures.</p> <p>Enter drive current, <i>in-situ</i> temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".</p> <p>Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".</p> | <p>LM-80 Test Inputs</p> <table border="1"> <thead> <tr> <th colspan="2">Description of LED Light Source Tested (manufacturer, model, catalog number)</th> <th colspan="2">Test Data for 85°C Case Temperature</th> <th colspan="2">Test Data for 105°C Case Temperature</th> <th colspan="2">Tested Case Temperature 3</th> </tr> <tr> <th>Model</th> <th>Manufacturer</th> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> </tr> </thead> <tbody> <tr><td colspan="2" rowspan="11">Model: BXEN-30G-13H-99, manufactured by Bridgelux Inc.</td><td>0</td><td>100.00%</td><td>0</td><td>100.00%</td><td></td><td></td></tr> <tr><td>1000</td><td>98.80%</td><td>1000</td><td>99.00%</td><td></td><td></td></tr> <tr><td>2000</td><td>98.10%</td><td>2000</td><td>97.80%</td><td></td><td></td></tr> <tr><td>3000</td><td>97.30%</td><td>3000</td><td>96.10%</td><td></td><td></td></tr> <tr><td>4000</td><td>95.80%</td><td>4000</td><td>94.40%</td><td></td><td></td></tr> <tr><td>5000</td><td>94.70%</td><td>5000</td><td>93.50%</td><td></td><td></td></tr> <tr><td>6000</td><td>93.90%</td><td>6000</td><td>92.30%</td><td></td><td></td></tr> <tr><td>7000</td><td>93.40%</td><td>7000</td><td>91.80%</td><td></td><td></td></tr> <tr><td>8000</td><td>92.90%</td><td>8000</td><td>91.40%</td><td></td><td></td></tr> <tr><td>9000</td><td>92.30%</td><td>9000</td><td>90.90%</td><td></td><td></td></tr> <tr><td>10000</td><td>91.80%</td><td>10000</td><td>90.20%</td><td></td><td></td></tr> </tbody> </table> | | | | | Description of LED Light Source Tested (manufacturer, model, catalog number) | | Test Data for 85°C Case Temperature | | Test Data for 105°C Case Temperature | | Tested Case Temperature 3 | | Model | Manufacturer | Time (hours) | Lumen Maintenance (%) | Time (hours) | Lumen Maintenance (%) | Time (hours) | Lumen Maintenance (%) | Model: BXEN-30G-13H-99, manufactured by Bridgelux Inc. | | 0 | 100.00% | 0 | 100.00% | | | 1000 | 98.80% | 1000 | 99.00% | | | 2000 | 98.10% | 2000 | 97.80% | | | 3000 | 97.30% | 3000 | 96.10% | | | 4000 | 95.80% | 4000 | 94.40% | | | 5000 | 94.70% | 5000 | 93.50% | | | 6000 | 93.90% | 6000 | 92.30% | | | 7000 | 93.40% | 7000 | 91.80% | | | 8000 | 92.90% | 8000 | 91.40% | | | 9000 | 92.30% | 9000 | 90.90% | | | 10000 | 91.80% | 10000 | 90.20% | | |
| | Description of LED Light Source Tested (manufacturer, model, catalog number) | | Test Data for 85°C Case Temperature | | Test Data for 105°C Case Temperature | | Tested Case Temperature 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Model | Manufacturer | Time (hours) | Lumen Maintenance (%) | Time (hours) | Lumen Maintenance (%) | Time (hours) | Lumen Maintenance (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Model: BXEN-30G-13H-99, manufactured by Bridgelux Inc. | | 0 | 100.00% | 0 | 100.00% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | | | 98.80% | 1000 | 99.00% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | | | 98.10% | 2000 | 97.80% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3000 | | | 97.30% | 3000 | 96.10% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4000 | | | 95.80% | 4000 | 94.40% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5000 | | | 94.70% | 5000 | 93.50% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6000 | | | 93.90% | 6000 | 92.30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7000 | | | 93.40% | 7000 | 91.80% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8000 | | | 92.90% | 8000 | 91.40% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9000 | | | 92.30% | 9000 | 90.90% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10000 | | | 91.80% | 10000 | 90.20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>LM-80 Testing Details</p> <table border="1"> <tbody> <tr><td>Total number of units tested per case temperature:</td><td>25</td></tr> <tr><td>Number of failures:</td><td>0</td></tr> <tr><td>Number of units measured:</td><td>25</td></tr> <tr><td>Test duration (hours):</td><td>10000</td></tr> <tr><td>Tested drive current (mA):</td><td>100</td></tr> <tr><td>Tested case temperature 1 (T_{case}, °C):</td><td>85</td></tr> <tr><td>Tested case temperature 2 (T_{case}, °C):</td><td>105</td></tr> <tr><td>Tested case temperature 3 (T_{case}, °C):</td><td></td></tr> </tbody> </table> | | | | | | | Total number of units tested per case temperature: | 25 | Number of failures: | 0 | Number of units measured: | 25 | Test duration (hours): | 10000 | Tested drive current (mA): | 100 | Tested case temperature 1 (T _{case} , °C): | 85 | Tested case temperature 2 (T _{case} , °C): | 105 | Tested case temperature 3 (T _{case} , °C): | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total number of units tested per case temperature: | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of failures: | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of units measured: | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test duration (hours): | 10000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tested drive current (mA): | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tested case temperature 1 (T _{case} , °C): | 85 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tested case temperature 2 (T _{case} , °C): | 105 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tested case temperature 3 (T _{case} , °C): | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>In-Situ Inputs</p> <table border="1"> <tbody> <tr><td>Drive current for each LED package/array/module (mA):</td><td>100</td></tr> <tr><td>In-situ case temperature (T_{case}, °C):</td><td>59.7</td></tr> <tr><td>Percentage of initial lumens to project to (e.g. for L₇₀, enter 70):</td><td>70</td></tr> </tbody> </table> | | | | | | | Drive current for each LED package/array/module (mA): | 100 | In-situ case temperature (T _{case} , °C): | 59.7 | Percentage of initial lumens to project to (e.g. for L ₇₀ , enter 70): | 70 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drive current for each LED package/array/module (mA): | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| In-situ case temperature (T _{case} , °C): | 59.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentage of initial lumens to project to (e.g. for L ₇₀ , enter 70): | 70 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Results</p> <table border="1"> <tbody> <tr><td>Time (t) at which to estimate lumen maintenance (hours):</td><td>6,000</td></tr> <tr><td>Lumen maintenance at time (t) (%):</td><td>94.01%</td></tr> <tr><td>Reported L70 (hours):</td><td>55,000</td></tr> </tbody> </table> | | | | | | | Time (t) at which to estimate lumen maintenance (hours): | 6,000 | Lumen maintenance at time (t) (%): | 94.01% | Reported L70 (hours): | 55,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Lumen maintenance at time (t) (%): | 94.01% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reported L70 (hours): | 55,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Appendix-C Photos



Representative Model Top View



Representative Model Back View

Appendix-D Report Update Record

| Report Version | Update Time | Update content |
|----------------|-------------|-----------------|
| V1.0 | 2022/05/10 | Original Report |

****End of test report****