

# Lumen Maintenance Package for LUXEON 3030 2D, LUXEON 3030 HE & LUXEON 3030 HE Plus Deep Dimming

(published: Aug 20, 2021)

Section 1 - Model Description, Models Covered, Energy  
Star LM-80 Cover Sheet and TM-21-11 Data

Section 2 - LM-80 Test Reports

# Section 1

## 1.1 Models Description

LUXEON 3030 2D with model number L130-3080003000W21 (nominal CCT 3000K, 2-die in series) was used in this LM-80 testing. Figure 1 shows the overall mechanical dimension of this product in mm.

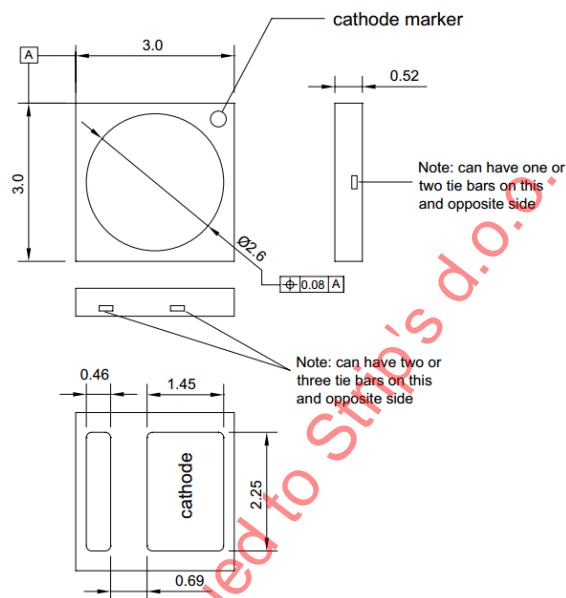


Figure 1. Mechanical drawings for LUXEON 3030 2D Line

## 1.2 Additional Models Covered

The LM-80 test result here can be applied to the following part numbers per the [Energy Star Requirements for the Use of LM-80 data](#) document. All of these products share similar package size.

| Product Family                   | Part Number        | Die Configuration | Equivalent maintenance current |
|----------------------------------|--------------------|-------------------|--------------------------------|
| LUXEON 3030 2D                   | L130-aabb0030xxcxx | 2 die in series   | 100mA, 150mA                   |
| LUXEON 3030 HE                   | L130-aabbHB30xxxxx | 1 die             | 100mA, 150mA                   |
| LUXEON 3030 HE Plus              | L130-aabbHA30xxxxx | 2 die in parallel | 200mA, 300mA                   |
| LUXEON 3030 HE Plus Deep Dimming | L130-aabbHA3000DD1 | 2 die in parallel | 200mA, 300mA                   |

### Notes:

- aa: designates nominal CCT from 2700K to 6500K (27 = 2700K, 30 = 3000K, etc)
- bb: designates minimum CRI (70 = 70CRI, 80 = 80CRI, etc)
- c: designates W (round LES) or X (square LES)
- x: designates for marketing use (e.g. binning, etc)

### 1.3 ENERGY STAR® Cover Sheet

## **ENERGY STAR® LM-80 Cover Sheet**

### **Administrative Information**

**Tested subcomponent series:** LUXEON 3030 2D

**Tested subcomponent model number:** L130-3080003000W21 (nominal 3000K)

**Report issue date:** Feb 24, 2021 (see Section 2 for details)

**Report revision date (if applicable):** n/a

**Testing start date:** Aug 24, 2016

**Testing completion date:** Nov 26, 2020

**DUT sampling method:** 50 samples per test condition

### **DUT Identification**

**DUT manufacturer's name:** Lumileds LLC

**DUT identification, e.g., model number:** L130-3080003000W21

**Description of DUT, including if the DUT is an LED package or module:** LED package

### **DUT Characteristics**

**Total input power (W):** 0.90 W initial average power at max maintenance current

**Average current density per LED die (mA/mm<sup>2</sup>):** 300 mA/mm<sup>2</sup> at max current

**Average power density per LED die (W/mm<sup>2</sup>):** 0.14 W/mm<sup>2</sup> at max current

**Representative CRI (R<sub>a</sub>) of the tested sample set:** 83

(Indicate whether the reported value is the mean  
or median value of the sample set, or per unit)

**Minimum die edge to die edge spacing:** 0.15mm

## 1.4 TM-21-11 Data

Lumen maintenance  $L_{70}$  lifetimes are calculated according to IESNA TM-21-11 method with 20,000 hrs of maintenance data and sample size of 50 per test condition.

| Test Conditions | alpha      | B      | $L_{70}$ (hrs) |           |
|-----------------|------------|--------|----------------|-----------|
|                 |            |        | Reported       | Projected |
| 100mA_85degC    | 2.1723E-06 | 0.9993 | 120,000        | 163,889   |
| 150mA_105degC   | 2.5348E-06 | 0.9926 | 120,000        | 137,793   |

Additional Projected  $L_{xx}$  per TM-21-11:

### Projected $L_{80}$

|                             | If = 100mA | If = 150mA |
|-----------------------------|------------|------------|
| $T_s = 85^{\circ}\text{C}$  | 102,418    | -          |
| $T_s = 105^{\circ}\text{C}$ | -          | 85,114     |

### Projected $L_{90}$

|                             | If = 100mA | If = 150mA |
|-----------------------------|------------|------------|
| $T_s = 85^{\circ}\text{C}$  | 48,197     | -          |
| $T_s = 105^{\circ}\text{C}$ | -          | 38,647     |

## Section 2. LM-80 Test Report

| Report Reference No.      | Current | Ts Temperature |
|---------------------------|---------|----------------|
| R2SH160822052-10-20000-M2 | 100mA   | 85°C           |
| R2SH160822054-10-20000-M2 | 150mA   | 105°C          |

This report issued to Strip's d.o.o.

# TEST REPORT

ACCORDING TO IES LM-80-2015  
For

**Lumileds Holding B.V.**

370 W. Trimble Road, San Jose, CA 95131, USA.

**Model: L130-3080003000W21**

|  |  |                                     |  |
|--|--|-------------------------------------|--|
| <b>Report Type:</b><br>20000 Hours Test Report |  | <b>Product Type:</b><br>LED Package |  |
| <b>Test Engineer:</b>                          | Pote Wang <i>Pote Wang</i>   |                                     |  |
| <b>Report Number:</b>                          | R2SH160822052-10-20000-M2  |                                     |  |
| <b>Test Date:</b>                              | 2016-08-24 to 2020-11-26   |                                     |  |
| <b>Report Date:</b>                            | 2021-02-24   |                                     |  |
| <b>Reviewed By:</b>                            | Blake Zhang / EE Engineer <i>Blake Zhang</i>   |                                     |  |
| <b>Revised Note:</b>                           | The previous report R2SH160822052-10-20000-M1 is replaced by this report on 2021-02-24   |                                     |  |
| <b>Test Facility:</b>                          | Test facility was located at No.12, Pulong East 1 <sup>st</sup> Road, Tangxia Town, Dongguan, Guangdong, China.  |                                     |  |
| <b>Prepared By:</b>                            | Bay Area Compliance Laboratories Corp. (Dongguan).<br>No.12, Pulong East 1 <sup>st</sup> Road, Tangxia Town, Dongguan, Guangdong, China.<br>Tel: +86-0769-86858888<br>Fax: +86-0769-86858588 |                                     |  |



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## 1 - General Information

### 1.1 Description of LED Light Sources

#### Sample Size:

50 PCS samples were received on 2016-08-22. The samples were numbered from 1 to 50.

Manufacturer: Lumileds Holding B.V.  
Part Number: L130-3080003000W21  
Part Type: LED Package  
Drive Level: DC 100mA  
Nominal CCT: 3000K

### 1.2 Standards Used:

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs

### 1.3 Testing Equipment

| Device                                       | Manufacture | Model No      | Serial No        | Calibration date | Calibration due date |
|--|-------------|---------------|------------------|------------------|----------------------|
| 0.3m integrating sphere                      | EVERFINE    | Diameter 0.3m | 1011119          | 2020-03-08       | 2021-03-07           |
| Programmable Test Power for LEDs             | EVERFINE    | LED300E       | 1008002          | 2020-03-08       | 2021-03-07           |
| High accuracy array spectroradiometer        | EVERFINE    | HAAS-2000     | 1012016T         | 2020-03-08       | 2021-03-07           |
| Standard Light Source                        | EVERFINE    | D062          | 1011093          | 2020-10-20       | 2021-10-19           |
| Precision digital stabilized DC power supply | EVERFINE    | WY605-V110    | G115987CJ7321114 | 2020-03-16       | 2021-03-15           |
| Multilayer aging machine                     | BACL        | B2-270        | 20023            | 2020-03-11       | 2021-03-10           |
| Digital CC&CV DC Power Supply                | EVERFINE    | WY5015        | 11060002         | 2020-07-01       | 2021-06-30           |

### 1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within  $\pm 3\%$  of the specified value of the manufacturer during maintenance test, and was within  $\pm 0.5\%$  during photometric and electrical measurement test.



## 1.5 Ambient Conditions for Maintenance Test

For lumen maintenance test, samples within one data set, were installed on cooling boards in thermal chambers with minimal ambient airflow. The case temperature and ambient temperature was monitored by thermocouples which one was soldered to the coldest DUTs' case (TMP<sub>LED</sub>) location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP<sub>LED</sub> of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within ±3% of the specified value of the manufacturer.

The relative humidity within chamber was kept less than 65% during test.

For photometry measurement, the ambient temperature during test was set to 25°C ± 2°C, RH <65%.

## 1.6 Measurement Uncertainty

The uncertainty of the light output measurements is U=1.59% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=21K (K=2), at the 95% confidence level.

The uncertainty of the temperature is U=0.8671°C (K=2), at the 95% confidence level.

## 1.7 Statement of Traceability

Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

## 1.8 Sample Set

### Data Set 1: 85°C, 100mA

Part Number: L130-3080003000W21

Number of Units: 50

Case Temperature: >83°C

Ambient Temperature: >80°C

Life Test Drive Current: 100mA

Measurement Current: 100mA

## 2 - Summary of Test Result

| Data Set: | Sample Size | Failures Observed: | Test Interval | Test Duration | Reported TM-21 L <sub>70</sub> Lifetime |
|-----------|-------------|--------------------|---------------|---------------|---|
| 1         | 50          | 0                  | 1000          | 20000         | >120000hours                            |

### Average Lumen Maintenance (Percentage of Initial Luminous Flux)

| Data Set: | 1000   | 2000   | 3000   | 4000   | 5000   | 6000   | 7000   | 8000   | 9000   | 10000  | 11000  | 12000  | 13000  |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1         | 99.91% | 99.72% | 99.54% | 99.34% | 99.08% | 98.84% | 98.62% | 98.38% | 98.13% | 97.88% | 97.62% | 97.36% | 97.11% |
|           | 14000  | 15000  | 16000  | 17000  | 18000  | 19000  | 20000  |        |        |        |        |        |        |
|           | 96.89% | 96.64% | 96.41% | 96.32% | 96.13% | 95.94% | 95.75% |        |        |        |        |        |        |

### Average Color Maintenance

| Data Set: | 1000   | 2000   | 3000   | 4000   | 5000   | 6000   | 7000   | 8000   | 9000   | 10000  | 11000  | 12000  | 13000  |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1         | 0.0005 | 0.0007 | 0.0009 | 0.0012 | 0.0015 | 0.0017 | 0.0021 | 0.0024 | 0.0028 | 0.0031 | 0.0033 | 0.0035 | 0.0037 |
|           | 14000  | 15000  | 16000  | 17000  | 18000  | 19000  | 20000  |        |        |        |        |        |        |
|           | 0.0039 | 0.0041 | 0.0041 | 0.0044 | 0.0046 | 0.0049 | 0.0051 |        |        |        |        |        |        |

### 3 - Test Data

#### 3.1 Data Set 1, 85°C, 100mA (Lumen Maintenance)

| No.    | Φ(lm)        | Lumen Maintenance (%) |         |         |         |         |         |         |         |         |          |          |          |
|--------|--------------|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
|        | 0hr(Initial) | 1000hrs               | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs | 11000hrs | 12000hrs |
| 1      | 107.8        | 99.91                 | 99.81   | 99.63   | 99.26   | 98.89   | 98.70   | 98.52   | 98.24   | 97.96   | 97.68    | 97.40    | 97.12    |
| 2      | 107.1        | 100.09                | 99.91   | 99.81   | 99.53   | 99.25   | 98.97   | 98.69   | 98.51   | 98.32   | 97.95    | 97.76    | 97.48    |
| 3      | 107.7        | 100.19                | 100.09  | 99.91   | 99.72   | 99.44   | 99.07   | 98.89   | 98.61   | 98.42   | 98.33    | 98.05    | 97.86    |
| 4      | 108.4        | 100.28                | 100.18  | 99.91   | 99.82   | 99.63   | 99.35   | 99.08   | 98.89   | 98.71   | 98.52    | 98.25    | 97.97    |
| 5      | 108.7        | 100.18                | 99.82   | 99.72   | 99.45   | 99.17   | 99.08   | 98.99   | 98.90   | 98.53   | 98.44    | 98.25    | 98.07    |
| 6      | 106.5        | 100.19                | 100.09  | 99.81   | 99.62   | 99.34   | 99.15   | 98.87   | 98.78   | 98.50   | 98.31    | 98.12    | 97.93    |
| 7      | 109.3        | 99.82                 | 99.63   | 99.54   | 99.45   | 99.18   | 98.99   | 98.81   | 98.63   | 98.44   | 98.08    | 97.90    | 97.62    |
| 8      | 107.0        | 99.91                 | 99.72   | 99.63   | 99.53   | 99.35   | 98.97   | 98.79   | 98.69   | 98.41   | 98.13    | 97.85    | 97.57    |
| 9      | 108.7        | 99.82                 | 99.63   | 99.45   | 99.26   | 98.99   | 98.80   | 98.71   | 98.53   | 98.44   | 98.16    | 97.88    | 97.61    |
| 10     | 109.2        | 99.73                 | 99.45   | 99.18   | 98.99   | 98.81   | 98.53   | 98.35   | 97.99   | 97.71   | 97.44    | 97.07    | 96.70    |
| 11     | 106.9        | 99.91                 | 99.81   | 99.72   | 99.53   | 99.25   | 99.06   | 98.88   | 98.69   | 98.41   | 98.13    | 97.94    | 97.57    |
| 12     | 106.4        | 99.62                 | 99.44   | 99.34   | 99.25   | 98.97   | 98.87   | 98.50   | 98.31   | 98.03   | 97.65    | 97.56    | 97.18    |
| 13     | 106.4        | 99.81                 | 99.72   | 99.44   | 99.15   | 98.78   | 98.68   | 98.59   | 98.42   | 97.93   | 97.74    | 97.46    | 97.27    |
| 14     | 108.6        | 99.91                 | 99.82   | 99.63   | 99.36   | 99.08   | 98.80   | 98.62   | 98.25   | 97.88   | 97.70    | 97.33    | 97.15    |
| 15     | 108.1        | 99.81                 | 99.63   | 99.54   | 99.35   | 99.17   | 98.89   | 98.61   | 98.33   | 98.15   | 97.87    | 97.69    | 97.32    |
| 16     | 108.7        | 99.91                 | 99.72   | 99.63   | 99.45   | 99.26   | 99.17   | 98.99   | 98.90   | 98.53   | 98.34    | 97.98    | 97.70    |
| 17     | 107.5        | 100.09                | 99.91   | 99.72   | 99.53   | 99.35   | 99.16   | 98.98   | 98.79   | 98.60   | 98.42    | 98.23    | 98.05    |
| 18     | 107.9        | 99.91                 | 99.81   | 99.54   | 99.35   | 99.07   | 98.89   | 98.70   | 98.42   | 98.15   | 97.87    | 97.59    | 97.41    |
| 19     | 108.3        | 99.82                 | 99.63   | 99.45   | 99.26   | 98.89   | 98.80   | 98.61   | 98.34   | 97.88   | 97.78    | 97.41    | 97.14    |
| 20     | 107.2        | 100.09                | 99.91   | 99.63   | 99.35   | 99.07   | 98.88   | 98.51   | 98.41   | 98.04   | 97.85    | 97.57    | 97.29    |
| 21     | 105.9        | 100.19                | 100.09  | 99.91   | 99.81   | 99.62   | 99.34   | 99.15   | 98.96   | 98.77   | 98.49    | 98.30    | 98.11    |
| 22     | 106.6        | 99.91                 | 99.81   | 99.62   | 99.34   | 99.16   | 98.78   | 98.50   | 98.12   | 97.75   | 97.47    | 97.19    | 96.90    |
| 23     | 109.0        | 99.82                 | 99.54   | 99.36   | 99.17   | 98.99   | 98.72   | 98.35   | 98.07   | 97.89   | 97.52    | 97.25    | 96.79    |
| 24     | 107.6        | 99.91                 | 99.72   | 99.63   | 99.35   | 99.07   | 98.70   | 98.51   | 98.23   | 97.86   | 97.68    | 97.49    | 97.12    |
| 25     | 107.7        | 99.81                 | 99.54   | 99.35   | 98.98   | 98.79   | 98.51   | 98.24   | 98.05   | 97.86   | 97.49    | 97.12    | 96.94    |
| 26     | 109.7        | 99.64                 | 99.45   | 99.36   | 99.18   | 99.00   | 98.72   | 98.36   | 98.18   | 97.99   | 97.72    | 97.45    | 97.17    |
| 27     | 107.4        | 99.91                 | 99.63   | 99.53   | 99.44   | 99.26   | 98.98   | 98.70   | 98.32   | 98.23   | 98.14    | 97.95    | 97.77    |
| 28     | 108.5        | 99.82                 | 99.63   | 99.35   | 99.08   | 98.89   | 98.80   | 98.43   | 98.16   | 97.97   | 97.70    | 97.51    | 97.24    |
| 29     | 107.0        | 100.09                | 99.72   | 99.63   | 99.35   | 99.07   | 98.79   | 98.60   | 98.32   | 98.13   | 97.85    | 97.48    | 97.29    |
| 30     | 108.3        | 99.91                 | 99.82   | 99.54   | 99.45   | 99.17   | 98.80   | 98.61   | 98.43   | 98.15   | 97.97    | 97.51    | 97.32    |
| 31     | 108.4        | 99.72                 | 99.63   | 99.35   | 99.17   | 98.99   | 98.71   | 98.43   | 98.06   | 97.88   | 97.69    | 97.32    | 97.05    |
| 32     | 108.4        | 99.63                 | 99.35   | 99.26   | 99.08   | 98.80   | 98.62   | 98.52   | 98.25   | 98.06   | 97.79    | 97.51    | 97.14    |
| 33     | 107.7        | 99.72                 | 99.54   | 99.35   | 99.26   | 99.07   | 98.79   | 98.61   | 98.51   | 98.33   | 98.14    | 97.77    | 97.40    |
| 34     | 108.7        | 99.82                 | 99.72   | 99.54   | 99.17   | 98.99   | 98.62   | 98.34   | 98.07   | 97.98   | 97.79    | 97.52    | 97.24    |
| 35     | 107.7        | 99.91                 | 99.63   | 99.44   | 99.35   | 99.07   | 98.89   | 98.61   | 98.24   | 98.05   | 97.77    | 97.40    | 97.31    |
| 36     | 109.3        | 99.73                 | 99.54   | 99.45   | 99.27   | 99.18   | 98.99   | 98.81   | 98.54   | 98.26   | 97.90    | 97.71    | 97.35    |
| 37     | 106.7        | 100.09                | 99.81   | 99.63   | 99.44   | 99.06   | 98.88   | 98.78   | 98.59   | 98.41   | 98.13    | 97.84    | 97.66    |
| 38     | 107.0        | 99.72                 | 99.63   | 99.44   | 99.35   | 99.07   | 98.69   | 98.41   | 98.22   | 98.04   | 97.76    | 97.48    | 97.20    |
| 39     | 106.6        | 99.62                 | 99.53   | 99.25   | 99.06   | 98.87   | 98.59   | 98.50   | 98.22   | 97.84   | 97.75    | 97.65    | 97.28    |
| 40     | 107.6        | 99.81                 | 99.54   | 99.44   | 99.16   | 98.88   | 98.61   | 98.23   | 98.05   | 97.77   | 97.49    | 97.21    | 97.12    |
| 41     | 108.4        | 100.09                | 99.91   | 99.63   | 99.35   | 98.99   | 98.62   | 98.34   | 98.06   | 97.69   | 97.60    | 97.14    | 96.96    |
| 42     | 107.9        | 99.91                 | 99.81   | 99.63   | 99.44   | 99.17   | 98.89   | 98.61   | 98.42   | 98.15   | 97.78    | 97.41    | 97.22    |
| 43     | 106.0        | 100.19                | 99.91   | 99.81   | 99.53   | 99.34   | 99.06   | 98.87   | 98.58   | 98.21   | 97.83    | 97.55    | 97.17    |
| 44     | 108.4        | 100.09                | 99.82   | 99.72   | 99.54   | 99.26   | 99.17   | 98.99   | 98.71   | 98.52   | 98.15    | 97.97    | 97.69    |
| 45     | 108.4        | 99.91                 | 99.72   | 99.54   | 99.45   | 99.17   | 98.99   | 98.71   | 98.52   | 98.25   | 97.97    | 97.79    | 97.51    |
| 46     | 107.2        | 99.81                 | 99.53   | 99.44   | 99.25   | 99.16   | 98.97   | 98.79   | 98.51   | 98.23   | 97.85    | 97.57    | 97.39    |
| 47     | 108.0        | 99.91                 | 99.54   | 99.26   | 99.17   | 98.80   | 98.61   | 98.33   | 98.24   | 98.06   | 97.78    | 97.59    | 97.50    |
| 48     | 106.8        | 100.09                | 99.91   | 99.53   | 99.16   | 98.69   | 98.41   | 98.31   | 98.13   | 97.75   | 97.57    | 97.47    | 97.28    |
| 49     | 108.1        | 99.72                 | 99.54   | 99.26   | 98.98   | 98.61   | 98.24   | 97.87   | 97.59   | 97.41   | 97.13    | 96.95    | 96.67    |
| 50     | 109.0        | 100.09                | 99.91   | 99.72   | 99.36   | 99.08   | 98.81   | 98.62   | 98.26   | 97.89   | 97.71    | 97.43    | 97.34    |
| Ave.   | 107.8        | 99.91                 | 99.72   | 99.54   | 99.34   | 99.08   | 98.84   | 98.62   | 98.38   | 98.13   | 97.88    | 97.62    | 97.36    |
| Med.   | 107.9        | 99.91                 | 99.72   | 99.54   | 99.35   | 99.07   | 98.81   | 98.61   | 98.33   | 98.10   | 97.81    | 97.55    | 97.30    |
| st dev | 0.9          | 0.1717                | 0.1863  | 0.1835  | 0.1953  | 0.2149  | 0.2261  | 0.2506  | 0.2842  | 0.2940  | 0.3017   | 0.33     | 0.34     |
| Min.   | 105.9        | 99.62                 | 99.35   | 99.18   | 98.98   | 98.61   | 98.24   | 97.87   | 97.59   | 97.41   | 97.13    | 96.95    | 96.67    |
| Max.   | 109.7        | 100.28                | 100.18  | 99.91   | 99.82   | 99.63   | 99.35   | 99.15   | 98.96   | 98.77   | 98.52    | 98.30    | 98.11    |

| No.    | Lumen Maintenance (%) |          |          |          |          |          |          |          |
|--------|-----------------------|----------|----------|----------|----------|----------|----------|----------|
|        | 13000hrs              | 14000hrs | 15000hrs | 16000hrs | 17000hrs | 18000hrs | 19000hrs | 20000hrs |
| 1      | 96.85                 | 96.57    | 96.38    | 96.20    | 96.10    | 96.01    | 95.92    | 95.83    |
| 2      | 97.20                 | 96.83    | 96.55    | 96.27    | 96.36    | 96.27    | 96.17    | 95.99    |
| 3      | 97.49                 | 97.21    | 96.75    | 96.56    | 96.66    | 96.47    | 96.29    | 96.10    |
| 4      | 97.79                 | 97.51    | 97.14    | 96.96    | 96.86    | 96.68    | 96.59    | 96.40    |
| 5      | 97.70                 | 97.42    | 97.15    | 96.96    | 96.87    | 96.69    | 96.50    | 96.32    |
| 6      | 97.75                 | 97.56    | 97.28    | 96.90    | 96.81    | 96.43    | 96.24    | 96.06    |
| 7      | 97.35                 | 97.16    | 96.98    | 96.80    | 96.89    | 96.71    | 96.52    | 96.34    |
| 8      | 97.29                 | 97.01    | 96.73    | 96.64    | 96.73    | 96.54    | 96.36    | 96.17    |
| 9      | 97.42                 | 97.15    | 96.96    | 96.78    | 96.69    | 96.41    | 96.14    | 95.95    |
| 10     | 96.34                 | 96.15    | 95.97    | 95.70    | 95.60    | 95.42    | 95.15    | 94.96    |
| 11     | 97.38                 | 97.10    | 97.01    | 96.63    | 96.54    | 96.26    | 96.16    | 95.88    |
| 12     | 96.80                 | 96.62    | 96.43    | 96.15    | 95.86    | 95.58    | 95.49    | 95.30    |
| 13     | 96.99                 | 96.80    | 96.43    | 96.24    | 96.15    | 96.05    | 95.86    | 95.68    |
| 14     | 96.87                 | 96.69    | 96.41    | 96.13    | 96.13    | 96.04    | 95.95    | 95.67    |
| 15     | 97.13                 | 97.04    | 96.76    | 96.58    | 96.48    | 96.30    | 96.02    | 95.84    |
| 16     | 97.33                 | 97.15    | 96.78    | 96.50    | 96.32    | 96.14    | 95.95    | 95.77    |
| 17     | 97.86                 | 97.67    | 97.21    | 96.93    | 97.02    | 96.84    | 96.65    | 96.47    |
| 18     | 97.13                 | 97.03    | 96.94    | 96.66    | 96.76    | 96.39    | 96.11    | 96.01    |
| 19     | 96.77                 | 96.58    | 96.49    | 96.31    | 96.12    | 96.03    | 95.84    | 95.66    |
| 20     | 97.11                 | 96.92    | 96.64    | 96.27    | 96.36    | 96.27    | 96.08    | 95.80    |
| 21     | 97.83                 | 97.73    | 97.54    | 97.26    | 97.07    | 96.79    | 96.60    | 96.41    |
| 22     | 96.72                 | 96.44    | 96.34    | 95.97    | 95.87    | 95.68    | 95.50    | 95.31    |
| 23     | 96.51                 | 96.33    | 96.24    | 96.06    | 95.96    | 95.78    | 95.60    | 95.41    |
| 24     | 96.93                 | 96.75    | 96.28    | 96.00    | 96.10    | 95.91    | 95.82    | 95.72    |
| 25     | 96.75                 | 96.56    | 96.38    | 96.01    | 95.82    | 95.64    | 95.45    | 95.17    |
| 26     | 96.90                 | 96.72    | 96.35    | 96.08    | 95.90    | 95.72    | 95.53    | 95.26    |
| 27     | 97.49                 | 97.30    | 97.11    | 97.02    | 97.11    | 96.93    | 96.65    | 96.46    |
| 28     | 96.96                 | 96.87    | 96.59    | 96.22    | 96.13    | 96.04    | 95.85    | 95.58    |
| 29     | 97.10                 | 96.92    | 96.64    | 96.45    | 96.17    | 96.07    | 95.89    | 95.70    |
| 30     | 97.14                 | 96.95    | 96.68    | 96.49    | 96.40    | 96.31    | 95.94    | 95.75    |
| 31     | 96.77                 | 96.68    | 96.31    | 96.13    | 95.94    | 95.76    | 95.57    | 95.39    |
| 32     | 96.96                 | 96.68    | 96.22    | 95.94    | 95.76    | 95.57    | 95.39    | 95.11    |
| 33     | 97.12                 | 96.94    | 96.75    | 96.66    | 96.47    | 96.19    | 95.91    | 95.73    |
| 34     | 96.87                 | 96.60    | 96.32    | 96.14    | 95.95    | 95.77    | 95.68    | 95.49    |
| 35     | 96.94                 | 96.66    | 96.38    | 96.19    | 96.10    | 95.91    | 95.82    | 95.64    |
| 36     | 97.07                 | 96.89    | 96.61    | 96.43    | 96.34    | 96.07    | 95.88    | 95.61    |
| 37     | 97.38                 | 97.19    | 97.09    | 96.91    | 96.63    | 96.25    | 95.97    | 95.78    |
| 38     | 97.01                 | 96.82    | 96.64    | 96.45    | 96.36    | 96.26    | 96.07    | 95.89    |
| 39     | 97.19                 | 96.90    | 96.72    | 96.62    | 96.53    | 96.34    | 96.15    | 95.97    |
| 40     | 96.93                 | 96.75    | 96.56    | 96.28    | 96.38    | 96.10    | 95.82    | 95.72    |
| 41     | 96.68                 | 96.49    | 96.22    | 95.85    | 95.66    | 95.48    | 95.39    | 95.20    |
| 42     | 96.94                 | 96.76    | 96.39    | 96.11    | 95.83    | 95.74    | 95.64    | 95.55    |
| 43     | 96.79                 | 96.51    | 96.42    | 96.23    | 95.85    | 95.66    | 95.47    | 95.28    |
| 44     | 97.60                 | 97.32    | 96.86    | 96.77    | 96.68    | 96.40    | 96.13    | 95.85    |
| 45     | 97.23                 | 97.05    | 96.59    | 96.40    | 96.13    | 95.94    | 95.76    | 95.57    |
| 46     | 97.01                 | 96.74    | 96.55    | 96.36    | 96.08    | 95.90    | 95.71    | 95.52    |
| 47     | 97.41                 | 97.13    | 97.04    | 96.85    | 96.94    | 96.76    | 96.67    | 96.48    |
| 48     | 97.00                 | 96.72    | 96.63    | 96.54    | 96.63    | 96.16    | 95.88    | 95.69    |
| 49     | 96.48                 | 96.39    | 96.30    | 96.02    | 96.02    | 95.84    | 95.65    | 95.47    |
| 50     | 97.06                 | 96.79    | 96.42    | 96.15    | 96.06    | 95.87    | 95.60    | 95.41    |
| Ave.   | 97.11                 | 96.89    | 96.64    | 96.41    | 96.32    | 96.13    | 95.94    | 95.75    |
| Med.   | 97.07                 | 96.85    | 96.60    | 96.38    | 96.33    | 96.09    | 95.90    | 95.72    |
| st dev | 0.35                  | 0.34     | 0.33     | 0.35     | 0.40     | 0.38     | 0.37     | 0.38     |
| Min.   | 96.34                 | 96.15    | 95.97    | 95.70    | 95.60    | 95.42    | 95.15    | 94.96    |
| Max.   | 97.86                 | 97.73    | 97.54    | 97.26    | 97.11    | 96.93    | 96.67    | 96.48    |

TM-21 Projection:

**Test Duration:** 20000 hours  
**Failures Observed:** 0  
 **$\alpha$ :** 2.172E-06  
 **$\beta$ :** 0.999  
**Reported L<sub>70</sub>:** >120000 hours

FINAL  
This report issued to Strip's d.o.o.

### 3.2 Data Set 1, 85°C, 100mA (Forward Voltage)

| No.    | Forward Voltage (V) |         |         |         |         |         |         |         |         |         |          |          |          |
|--------|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
|        | 0hr(Initial)        | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs | 11000hrs | 12000hrs |
| 1      | 5.763               | 5.767   | 5.763   | 5.795   | 5.777   | 5.878   | 5.764   | 5.761   | 5.760   | 5.764   | 5.763    | 5.786    | 5.768    |
| 2      | 5.761               | 5.794   | 5.746   | 5.761   | 5.747   | 5.759   | 5.738   | 5.757   | 5.731   | 5.735   | 5.737    | 5.738    | 5.738    |
| 3      | 5.792               | 5.997   | 5.780   | 5.796   | 5.788   | 5.787   | 5.787   | 5.776   | 5.777   | 5.777   | 5.777    | 5.785    | 5.781    |
| 4      | 5.742               | 6.466   | 5.754   | 5.757   | 5.751   | 5.755   | 5.745   | 5.742   | 5.744   | 5.745   | 5.740    | 5.749    | 5.745    |
| 5      | 5.754               | 5.800   | 5.755   | 5.867   | 5.740   | 5.757   | 5.745   | 5.737   | 5.735   | 5.739   | 5.738    | 5.749    | 5.742    |
| 6      | 5.765               | 5.713   | 5.819   | 5.831   | 5.796   | 5.753   | 5.712   | 5.709   | 5.705   | 5.709   | 5.708    | 5.714    | 5.721    |
| 7      | 5.765               | 5.773   | 5.800   | 5.782   | 5.767   | 5.771   | 5.771   | 5.765   | 5.766   | 5.784   | 5.767    | 5.773    | 5.774    |
| 8      | 5.721               | 5.720   | 5.951   | 5.737   | 5.730   | 5.723   | 5.720   | 5.717   | 5.715   | 5.723   | 5.713    | 5.721    | 5.797    |
| 9      | 5.815               | 5.793   | 5.796   | 5.900   | 5.810   | 5.831   | 5.790   | 5.785   | 5.803   | 5.789   | 5.785    | 5.865    | 5.794    |
| 10     | 5.769               | 5.778   | 6.149   | 5.812   | 5.793   | 5.770   | 5.776   | 5.771   | 5.762   | 5.766   | 5.764    | 5.770    | 5.768    |
| 11     | 5.763               | 5.766   | 5.764   | 5.781   | 5.868   | 5.778   | 5.776   | 5.998   | 5.758   | 5.852   | 5.760    | 5.772    | 5.769    |
| 12     | 5.786               | 6.164   | 5.922   | 5.790   | 5.746   | 5.747   | 5.744   | 5.740   | 5.754   | 5.738   | 5.741    | 5.749    | 5.742    |
| 13     | 5.747               | 5.853   | 5.745   | 5.778   | 5.750   | 5.751   | 5.745   | 5.738   | 5.742   | 5.740   | 5.772    | 5.750    | 5.742    |
| 14     | 5.781               | 5.793   | 5.781   | 5.805   | 5.788   | 5.791   | 6.136   | 5.779   | 5.780   | 5.786   | 5.785    | 5.786    | 5.788    |
| 15     | 5.775               | 5.782   | 5.782   | 5.811   | 5.782   | 6.069   | 5.787   | 5.777   | 5.776   | 5.781   | 5.778    | 5.787    | 5.790    |
| 16     | 5.771               | 5.808   | 5.825   | 5.819   | 5.829   | 5.778   | 5.792   | 5.770   | 5.771   | 5.774   | 5.770    | 5.779    | 5.779    |
| 17     | 5.732               | 5.741   | 6.137   | 5.746   | 5.738   | 5.739   | 5.739   | 5.733   | 5.735   | 5.735   | 5.732    | 5.739    | 5.740    |
| 18     | 5.952               | 5.810   | 5.820   | 5.798   | 5.882   | 5.783   | 5.781   | 5.774   | 5.776   | 5.779   | 5.775    | 5.781    | 5.782    |
| 19     | 5.763               | 5.774   | 5.774   | 5.793   | 5.778   | 5.776   | 5.774   | 5.769   | 5.763   | 5.767   | 5.770    | 5.775    | 5.772    |
| 20     | 5.754               | 5.758   | 5.758   | 5.768   | 5.762   | 5.760   | 5.761   | 5.752   | 5.750   | 5.755   | 5.758    | 5.758    | 5.760    |
| 21     | 5.827               | 5.773   | 5.770   | 5.781   | 5.895   | 5.767   | 5.765   | 5.760   | 5.760   | 5.762   | 5.759    | 5.768    | 5.764    |
| 22     | 5.795               | 5.866   | 5.791   | 5.880   | 5.797   | 5.798   | 5.795   | 5.787   | 5.784   | 5.794   | 5.790    | 5.796    | 5.796    |
| 23     | 5.722               | 5.744   | 5.729   | 5.763   | 5.728   | 5.732   | 5.727   | 5.721   | 5.719   | 5.725   | 5.723    | 5.725    | 5.729    |
| 24     | 5.768               | 5.767   | 5.772   | 5.766   | 5.763   | 5.759   | 5.758   | 5.748   | 5.747   | 5.754   | 5.749    | 5.755    | 5.756    |
| 25     | 5.779               | 5.780   | 5.976   | 5.725   | 5.714   | 5.733   | 5.713   | 5.709   | 5.749   | 5.714   | 5.711    | 5.713    | 5.713    |
| 26     | 5.786               | 5.822   | 5.788   | 5.801   | 5.809   | 5.788   | 5.788   | 5.779   | 5.707   | 5.784   | 5.784    | 5.790    | 5.788    |
| 27     | 5.721               | 5.722   | 5.727   | 5.736   | 5.729   | 5.728   | 5.934   | 5.722   | 5.724   | 5.722   | 5.722    | 5.727    | 5.728    |
| 28     | 5.791               | 5.795   | 5.797   | 5.807   | 5.798   | 5.801   | 5.799   | 5.788   | 5.790   | 5.799   | 5.793    | 5.816    | 5.797    |
| 29     | 5.706               | 5.710   | 5.716   | 5.718   | 5.707   | 5.715   | 5.707   | 5.702   | 5.704   | 5.707   | 5.706    | 5.714    | 5.710    |
| 30     | 5.727               | 5.726   | 5.738   | 5.740   | 5.740   | 5.732   | 5.732   | 5.727   | 5.724   | 5.726   | 5.728    | 5.730    | 5.731    |
| 31     | 5.751               | 5.752   | 5.749   | 5.761   | 5.755   | 5.760   | 5.869   | 5.748   | 5.746   | 5.748   | 5.749    | 5.755    | 5.754    |
| 32     | 5.734               | 5.889   | 5.741   | 5.755   | 5.744   | 5.743   | 5.741   | 5.740   | 5.735   | 5.740   | 5.752    | 5.743    | 5.742    |
| 33     | 5.755               | 5.760   | 5.766   | 5.772   | 5.761   | 5.751   | 5.751   | 5.752   | 5.745   | 5.750   | 5.750    | 5.751    | 5.757    |
| 34     | 5.771               | 5.846   | 5.856   | 5.806   | 5.784   | 5.780   | 5.775   | 5.771   | 5.772   | 5.776   | 5.787    | 5.782    | 5.781    |
| 35     | 5.720               | 5.956   | 5.726   | 5.755   | 5.728   | 5.732   | 5.726   | 5.730   | 5.722   | 5.724   | 5.720    | 5.775    | 5.727    |
| 36     | 5.776               | 5.888   | 5.745   | 5.755   | 5.910   | 5.758   | 5.742   | 5.742   | 5.741   | 5.742   | 5.738    | 5.744    | 5.745    |
| 37     | 5.742               | 5.725   | 5.731   | 5.743   | 5.728   | 5.734   | 5.727   | 5.723   | 5.814   | 5.725   | 5.724    | 5.728    | 5.728    |
| 38     | 5.821               | 5.792   | 5.731   | 5.744   | 5.731   | 5.735   | 5.730   | 5.732   | 5.726   | 5.727   | 5.728    | 5.731    | 5.733    |
| 39     | 5.772               | 5.730   | 5.709   | 5.726   | 5.708   | 5.718   | 5.711   | 5.709   | 5.720   | 5.705   | 5.706    | 5.716    | 5.708    |
| 40     | 5.699               | 5.744   | 5.721   | 5.714   | 5.702   | 5.667   | 5.707   | 5.706   | 5.701   | 5.701   | 5.703    | 5.705    | 5.704    |
| 41     | 5.819               | 5.771   | 5.776   | 5.785   | 5.773   | 5.799   | 5.773   | 5.770   | 5.769   | 5.767   | 5.767    | 5.771    | 5.770    |
| 42     | 5.869               | 5.753   | 5.735   | 5.758   | 5.837   | 5.743   | 5.744   | 5.744   | 5.734   | 5.734   | 5.735    | 5.739    | 5.738    |
| 43     | 5.780               | 5.788   | 5.790   | 5.942   | 5.810   | 5.838   | 5.790   | 5.787   | 5.783   | 5.784   | 5.787    | 5.789    | 5.792    |
| 44     | 5.736               | 5.807   | 5.740   | 5.752   | 5.741   | 5.748   | 5.741   | 5.740   | 5.739   | 5.741   | 5.737    | 5.739    | 5.744    |
| 45     | 5.774               | 5.798   | 5.775   | 5.753   | 5.745   | 5.760   | 5.744   | 5.739   | 5.733   | 5.737   | 5.738    | 5.742    | 5.744    |
| 46     | 5.732               | 5.737   | 5.732   | 5.748   | 5.733   | 5.738   | 5.738   | 5.749   | 5.728   | 5.732   | 5.733    | 5.736    | 5.735    |
| 47     | 5.730               | 5.736   | 5.738   | 5.753   | 5.738   | 5.740   | 5.737   | 5.732   | 5.726   | 5.730   | 5.733    | 5.733    | 5.739    |
| 48     | 5.745               | 5.718   | 5.722   | 5.726   | 5.717   | 5.812   | 5.718   | 5.747   | 5.714   | 5.711   | 5.714    | 5.717    | 5.715    |
| 49     | 5.749               | 5.756   | 5.748   | 5.761   | 5.748   | 5.763   | 5.757   | 5.775   | 5.739   | 5.744   | 5.746    | 5.768    | 5.750    |
| 50     | 5.788               | 5.781   | 5.784   | 5.797   | 5.785   | 5.812   | 5.792   | 5.779   | 5.777   | 5.781   | 5.782    | 5.788    | 5.783    |
| Ave.   | 5.767               | 5.806   | 5.789   | 5.779   | 5.770   | 5.769   | 5.766   | 5.754   | 5.748   | 5.750   | 5.749    | 5.756    | 5.754    |
| Med.   | 5.764               | 5.776   | 5.765   | 5.767   | 5.758   | 5.759   | 5.748   | 5.748   | 5.745   | 5.743   | 5.748    | 5.751    | 5.748    |
| st dev | 0.042               | 0.124   | 0.091   | 0.046   | 0.048   | 0.056   | 0.067   | 0.043   | 0.027   | 0.030   | 0.026    | 0.031    | 0.026    |
| Min.   | 5.699               | 5.710   | 5.709   | 5.714   | 5.702   | 5.667   | 5.707   | 5.702   | 5.701   | 5.701   | 5.703    | 5.705    | 5.704    |
| Max.   | 5.952               | 6.466   | 6.149   | 5.942   | 5.910   | 6.069   | 6.136   | 5.998   | 5.814   | 5.852   | 5.793    | 5.865    | 5.797    |

| No.    | Forward Voltage (V) |          |          |          |          |          |          |          |
|--------|---------------------|----------|----------|----------|----------|----------|----------|----------|
|        | 13000hrs            | 14000hrs | 15000hrs | 16000hrs | 17000hrs | 18000hrs | 19000hrs | 20000hrs |
| 1      | 5.776               | 5.819    | 5.793    | 5.793    | 5.787    | 5.801    | 5.819    | 5.791    |
| 2      | 5.748               | 5.787    | 5.823    | 5.813    | 5.758    | 5.773    | 5.773    | 5.778    |
| 3      | 5.796               | 5.825    | 5.838    | 5.857    | 5.831    | 5.824    | 5.821    | 5.821    |
| 4      | 5.756               | 5.790    | 5.799    | 5.773    | 5.769    | 5.759    | 5.755    | 5.781    |
| 5      | 5.757               | 5.789    | 5.794    | 5.788    | 5.763    | 5.752    | 5.756    | 5.759    |
| 6      | 5.727               | 5.759    | 5.767    | 5.726    | 5.737    | 5.727    | 5.738    | 5.779    |
| 7      | 5.785               | 5.829    | 5.827    | 5.783    | 5.790    | 5.773    | 5.773    | 5.796    |
| 8      | 5.737               | 5.771    | 5.776    | 5.744    | 5.759    | 5.762    | 5.790    | 5.801    |
| 9      | 5.807               | 5.836    | 5.858    | 5.873    | 5.813    | 5.788    | 5.813    | 5.753    |
| 10     | 5.783               | 5.812    | 5.820    | 5.822    | 5.791    | 5.782    | 5.792    | 5.793    |
| 11     | 5.781               | 5.809    | 5.823    | 5.834    | 5.790    | 5.777    | 5.783    | 5.810    |
| 12     | 5.758               | 5.811    | 5.810    | 5.821    | 5.781    | 5.772    | 5.783    | 5.785    |
| 13     | 5.758               | 5.819    | 5.801    | 5.820    | 5.768    | 5.755    | 5.770    | 5.772    |
| 14     | 5.799               | 5.798    | 5.846    | 5.771    | 5.806    | 5.786    | 5.811    | 5.806    |
| 15     | 5.801               | 5.822    | 5.842    | 5.798    | 5.806    | 5.790    | 5.792    | 5.818    |
| 16     | 5.788               | 5.819    | 5.840    | 5.774    | 5.799    | 5.778    | 5.792    | 5.805    |
| 17     | 5.753               | 5.789    | 5.794    | 5.731    | 5.761    | 5.748    | 5.775    | 5.809    |
| 18     | 5.797               | 5.829    | 5.835    | 5.774    | 5.803    | 5.791    | 5.818    | 5.813    |
| 19     | 5.786               | 5.815    | 5.830    | 5.795    | 5.794    | 5.778    | 5.771    | 5.788    |
| 20     | 5.770               | 5.803    | 5.809    | 5.755    | 5.780    | 5.771    | 5.797    | 5.804    |
| 21     | 5.777               | 5.810    | 5.816    | 5.780    | 5.788    | 5.780    | 5.790    | 5.802    |
| 22     | 5.804               | 5.840    | 5.852    | 5.810    | 5.816    | 5.800    | 5.800    | 5.804    |
| 23     | 5.738               | 5.768    | 5.789    | 5.725    | 5.749    | 5.749    | 5.743    | 5.777    |
| 24     | 5.767               | 5.821    | 5.818    | 5.808    | 5.776    | 5.754    | 5.771    | 5.804    |
| 25     | 5.725               | 5.758    | 5.774    | 5.727    | 5.759    | 5.764    | 5.811    | 5.803    |
| 26     | 5.798               | 5.847    | 5.847    | 5.822    | 5.819    | 5.811    | 5.810    | 5.801    |
| 27     | 5.743               | 5.778    | 5.791    | 5.751    | 5.751    | 5.761    | 5.771    | 5.771    |
| 28     | 5.808               | 5.844    | 5.857    | 5.771    | 5.818    | 5.799    | 5.807    | 5.796    |
| 29     | 5.723               | 5.751    | 5.764    | 5.724    | 5.734    | 5.724    | 5.734    | 5.724    |
| 30     | 5.742               | 5.773    | 5.789    | 5.783    | 5.756    | 5.773    | 5.813    | 5.810    |
| 31     | 5.791               | 5.794    | 5.810    | 5.831    | 5.772    | 5.754    | 5.770    | 5.764    |
| 32     | 5.756               | 5.784    | 5.801    | 5.767    | 5.762    | 5.773    | 5.779    | 5.786    |
| 33     | 5.766               | 5.789    | 5.870    | 5.736    | 5.775    | 5.770    | 5.767    | 5.813    |
| 34     | 5.792               | 5.819    | 5.837    | 5.807    | 5.811    | 5.805    | 5.813    | 5.815    |
| 35     | 5.742               | 5.768    | 5.786    | 5.763    | 5.748    | 5.730    | 5.757    | 5.756    |
| 36     | 5.761               | 5.787    | 5.813    | 5.777    | 5.766    | 5.779    | 5.771    | 5.786    |
| 37     | 5.739               | 5.771    | 5.792    | 5.763    | 5.755    | 5.758    | 5.763    | 5.771    |
| 38     | 5.746               | 5.774    | 5.787    | 5.795    | 5.752    | 5.787    | 5.789    | 5.766    |
| 39     | 5.724               | 5.748    | 5.768    | 5.734    | 5.729    | 5.731    | 5.750    | 5.753    |
| 40     | 5.717               | 5.752    | 5.760    | 5.743    | 5.734    | 5.728    | 5.723    | 5.752    |
| 41     | 5.784               | 5.812    | 5.823    | 5.788    | 5.793    | 5.783    | 5.788    | 5.803    |
| 42     | 5.751               | 5.792    | 5.800    | 5.750    | 5.768    | 5.776    | 5.772    | 5.816    |
| 43     | 5.801               | 5.842    | 5.827    | 5.819    | 5.813    | 5.819    | 5.829    | 5.805    |
| 44     | 5.757               | 5.788    | 5.795    | 5.767    | 5.765    | 5.755    | 5.753    | 5.781    |
| 45     | 5.757               | 5.785    | 5.804    | 5.796    | 5.763    | 5.772    | 5.780    | 5.773    |
| 46     | 5.748               | 5.776    | 5.801    | 5.772    | 5.759    | 5.767    | 5.772    | 5.785    |
| 47     | 5.752               | 5.776    | 5.799    | 5.770    | 5.760    | 5.771    | 5.782    | 5.784    |
| 48     | 5.729               | 5.757    | 5.776    | 5.751    | 5.739    | 5.762    | 5.763    | 5.777    |
| 49     | 5.761               | 5.795    | 5.805    | 5.733    | 5.778    | 5.771    | 5.819    | 5.800    |
| 50     | 5.794               | 5.831    | 5.845    | 5.789    | 5.808    | 5.791    | 5.803    | 5.808    |
| Ave.   | 5.765               | 5.797    | 5.810    | 5.780    | 5.776    | 5.772    | 5.782    | 5.789    |
| Med.   | 5.760               | 5.793    | 5.807    | 5.776    | 5.771    | 5.773    | 5.781    | 5.792    |
| st dev | 0.026               | 0.027    | 0.027    | 0.035    | 0.026    | 0.023    | 0.025    | 0.021    |
| Min.   | 5.717               | 5.748    | 5.760    | 5.724    | 5.729    | 5.724    | 5.723    | 5.724    |
| Max.   | 5.808               | 5.847    | 5.870    | 5.873    | 5.831    | 5.824    | 5.829    | 5.821    |

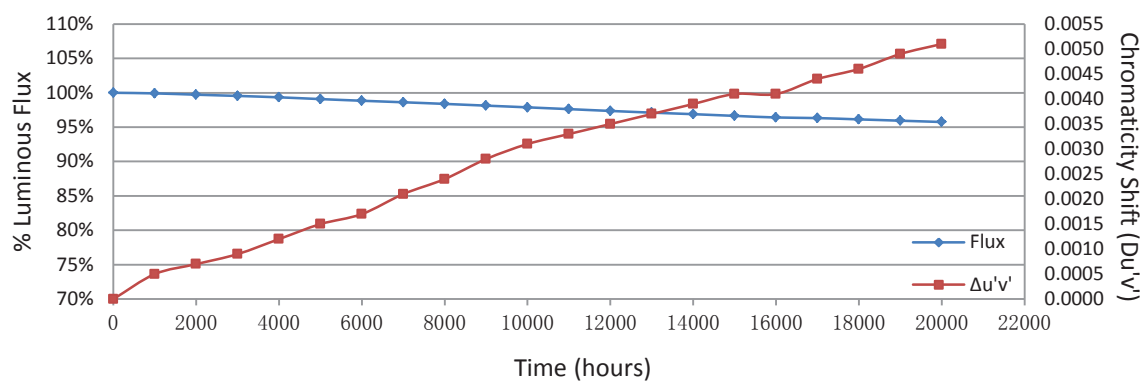


### 3.3 Data Set 1, 85°C, 100mA (Chromaticity Shift)

| No.    | u'           | v'     | CCT<br>(K) | Chromaticity Shift ( $\Delta u'v'$ ) |         |         |         |         |         |         |         |         |          |          |          |
|--------|--------------|--------|------------|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
|        | 0hr(Initial) |        |            | 1000hrs                              | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs | 11000hrs | 12000hrs |
| 1      | 0.2472       | 0.5184 | 3105       | 0.0004                               | 0.0007  | 0.0008  | 0.0013  | 0.0017  | 0.0019  | 0.0022  | 0.0024  | 0.0026  | 0.0030   | 0.0033   | 0.0036   |
| 2      | 0.2470       | 0.5183 | 3112       | 0.0006                               | 0.0008  | 0.0009  | 0.0013  | 0.0017  | 0.0019  | 0.0021  | 0.0026  | 0.0028  | 0.0030   | 0.0034   | 0.0036   |
| 3      | 0.2487       | 0.5191 | 3062       | 0.0006                               | 0.0007  | 0.0009  | 0.0012  | 0.0015  | 0.0018  | 0.0019  | 0.0023  | 0.0027  | 0.0030   | 0.0033   | 0.0036   |
| 4      | 0.2467       | 0.5184 | 3119       | 0.0008                               | 0.0011  | 0.0014  | 0.0017  | 0.0020  | 0.0022  | 0.0025  | 0.0028  | 0.0032  | 0.0035   | 0.0038   | 0.0041   |
| 5      | 0.2462       | 0.5191 | 3127       | 0.0008                               | 0.0009  | 0.0011  | 0.0015  | 0.0018  | 0.0021  | 0.0022  | 0.0026  | 0.0030  | 0.0032   | 0.0035   | 0.0038   |
| 6      | 0.2461       | 0.5177 | 3140       | 0.0004                               | 0.0006  | 0.0008  | 0.0009  | 0.0013  | 0.0016  | 0.0019  | 0.0021  | 0.0025  | 0.0030   | 0.0033   | 0.0036   |
| 7      | 0.2468       | 0.5191 | 3110       | 0.0004                               | 0.0006  | 0.0009  | 0.0012  | 0.0014  | 0.0018  | 0.0020  | 0.0023  | 0.0026  | 0.0029   | 0.0032   | 0.0034   |
| 8      | 0.2464       | 0.5180 | 3129       | 0.0004                               | 0.0006  | 0.0009  | 0.0012  | 0.0015  | 0.0018  | 0.0020  | 0.0022  | 0.0026  | 0.0030   | 0.0032   | 0.0035   |
| 9      | 0.2463       | 0.5184 | 3131       | 0.0006                               | 0.0008  | 0.0009  | 0.0014  | 0.0016  | 0.0020  | 0.0021  | 0.0024  | 0.0029  | 0.0031   | 0.0033   | 0.0036   |
| 10     | 0.2458       | 0.5204 | 3129       | 0.0006                               | 0.0009  | 0.0010  | 0.0014  | 0.0017  | 0.0020  | 0.0022  | 0.0029  | 0.0032  | 0.0034   | 0.0037   | 0.0039   |
| 11     | 0.2461       | 0.5184 | 3135       | 0.0004                               | 0.0005  | 0.0008  | 0.0011  | 0.0014  | 0.0017  | 0.0020  | 0.0022  | 0.0026  | 0.0029   | 0.0031   | 0.0034   |
| 12     | 0.2467       | 0.5167 | 3132       | 0.0008                               | 0.0009  | 0.0011  | 0.0016  | 0.0017  | 0.0020  | 0.0022  | 0.0025  | 0.0030  | 0.0032   | 0.0035   | 0.0037   |
| 13     | 0.2466       | 0.5167 | 3135       | 0.0006                               | 0.0009  | 0.0010  | 0.0015  | 0.0016  | 0.0020  | 0.0022  | 0.0026  | 0.0028  | 0.0032   | 0.0033   | 0.0035   |
| 14     | 0.2462       | 0.5188 | 3130       | 0.0005                               | 0.0008  | 0.0009  | 0.0013  | 0.0015  | 0.0019  | 0.0022  | 0.0024  | 0.0027  | 0.0031   | 0.0032   | 0.0034   |
| 15     | 0.2469       | 0.5189 | 3111       | 0.0006                               | 0.0007  | 0.0010  | 0.0014  | 0.0015  | 0.0020  | 0.0022  | 0.0025  | 0.0029  | 0.0032   | 0.0033   | 0.0035   |
| 16     | 0.2463       | 0.5190 | 3125       | 0.0004                               | 0.0006  | 0.0009  | 0.0012  | 0.0014  | 0.0019  | 0.0022  | 0.0024  | 0.0028  | 0.0031   | 0.0032   | 0.0034   |
| 17     | 0.2467       | 0.5168 | 3132       | 0.0005                               | 0.0006  | 0.0008  | 0.0012  | 0.0013  | 0.0017  | 0.0019  | 0.0022  | 0.0026  | 0.0029   | 0.0030   | 0.0033   |
| 18     | 0.2460       | 0.5192 | 3133       | 0.0004                               | 0.0005  | 0.0007  | 0.0010  | 0.0012  | 0.0016  | 0.0019  | 0.0022  | 0.0025  | 0.0029   | 0.0030   | 0.0032   |
| 19     | 0.2486       | 0.5180 | 3073       | 0.0005                               | 0.0005  | 0.0008  | 0.0011  | 0.0013  | 0.0018  | 0.0020  | 0.0023  | 0.0026  | 0.0030   | 0.0031   | 0.0034   |
| 20     | 0.2461       | 0.5200 | 3124       | 0.0006                               | 0.0007  | 0.0010  | 0.0013  | 0.0015  | 0.0020  | 0.0022  | 0.0025  | 0.0028  | 0.0031   | 0.0033   | 0.0035   |
| 21     | 0.2482       | 0.5185 | 3080       | 0.0009                               | 0.0010  | 0.0012  | 0.0015  | 0.0016  | 0.0021  | 0.0024  | 0.0026  | 0.0030  | 0.0033   | 0.0034   | 0.0037   |
| 22     | 0.2513       | 0.5231 | 2973       | 0.0006                               | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0021  | 0.0023  | 0.0026  | 0.0029  | 0.0033   | 0.0034   | 0.0036   |
| 23     | 0.2480       | 0.5182 | 3087       | 0.0006                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0019  | 0.0021  | 0.0025  | 0.0028  | 0.0031   | 0.0033   | 0.0035   |
| 24     | 0.2467       | 0.5181 | 3122       | 0.0005                               | 0.0006  | 0.0009  | 0.0012  | 0.0015  | 0.0020  | 0.0021  | 0.0025  | 0.0029  | 0.0032   | 0.0034   | 0.0036   |
| 25     | 0.2464       | 0.5198 | 3116       | 0.0005                               | 0.0005  | 0.0009  | 0.0012  | 0.0014  | 0.0019  | 0.0021  | 0.0039  | 0.0027  | 0.0031   | 0.0033   | 0.0035   |
| 26     | 0.2447       | 0.5196 | 3162       | 0.0004                               | 0.0005  | 0.0008  | 0.0011  | 0.0014  | 0.0019  | 0.0020  | 0.0021  | 0.0028  | 0.0031   | 0.0032   | 0.0035   |
| 27     | 0.2465       | 0.5185 | 3122       | 0.0002                               | 0.0006  | 0.0008  | 0.0010  | 0.0012  | 0.0017  | 0.0020  | 0.0021  | 0.0025  | 0.0028   | 0.0030   | 0.0033   |
| 28     | 0.2469       | 0.5192 | 3107       | 0.0006                               | 0.0006  | 0.0009  | 0.0011  | 0.0014  | 0.0018  | 0.0020  | 0.0022  | 0.0027  | 0.0030   | 0.0030   | 0.0034   |
| 29     | 0.2475       | 0.5186 | 3097       | 0.0005                               | 0.0007  | 0.0009  | 0.0011  | 0.0014  | 0.0019  | 0.0021  | 0.0023  | 0.0027  | 0.0031   | 0.0031   | 0.0034   |
| 30     | 0.2465       | 0.5177 | 3130       | 0.0006                               | 0.0008  | 0.0010  | 0.0013  | 0.0016  | 0.0020  | 0.0022  | 0.0024  | 0.0028  | 0.0032   | 0.0033   | 0.0036   |
| 31     | 0.2454       | 0.5188 | 3151       | 0.0004                               | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0019  | 0.0020  | 0.0022  | 0.0027  | 0.0031   | 0.0032   | 0.0035   |
| 32     | 0.2453       | 0.5194 | 3150       | 0.0006                               | 0.0007  | 0.0008  | 0.0012  | 0.0014  | 0.0013  | 0.0022  | 0.0023  | 0.0028  | 0.0031   | 0.0032   | 0.0035   |
| 33     | 0.2461       | 0.5192 | 3128       | 0.0005                               | 0.0007  | 0.0010  | 0.0012  | 0.0014  | 0.0013  | 0.0021  | 0.0023  | 0.0028  | 0.0030   | 0.0032   | 0.0034   |
| 34     | 0.2473       | 0.5179 | 3108       | 0.0006                               | 0.0007  | 0.0008  | 0.0012  | 0.0014  | 0.0012  | 0.0022  | 0.0023  | 0.0027  | 0.0031   | 0.0032   | 0.0035   |
| 35     | 0.2471       | 0.5190 | 3103       | 0.0004                               | 0.0006  | 0.0009  | 0.0012  | 0.0014  | 0.0014  | 0.0021  | 0.0023  | 0.0028  | 0.0030   | 0.0032   | 0.0035   |
| 36     | 0.2460       | 0.5190 | 3132       | 0.0006                               | 0.0008  | 0.0010  | 0.0012  | 0.0015  | 0.0015  | 0.0022  | 0.0024  | 0.0028  | 0.0032   | 0.0033   | 0.0037   |
| 37     | 0.2463       | 0.5174 | 3137       | 0.0006                               | 0.0006  | 0.0009  | 0.0012  | 0.0013  | 0.0013  | 0.0021  | 0.0023  | 0.0028  | 0.0031   | 0.0033   | 0.0036   |
| 38     | 0.2476       | 0.5178 | 3101       | 0.0006                               | 0.0008  | 0.0009  | 0.0012  | 0.0014  | 0.0015  | 0.0023  | 0.0025  | 0.0030  | 0.0032   | 0.0034   | 0.0036   |
| 39     | 0.2469       | 0.5182 | 3116       | 0.0006                               | 0.0008  | 0.0009  | 0.0013  | 0.0014  | 0.0015  | 0.0021  | 0.0024  | 0.0029  | 0.0031   | 0.0033   | 0.0036   |
| 40     | 0.2464       | 0.5180 | 3131       | 0.0005                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0014  | 0.0020  | 0.0023  | 0.0028  | 0.0030   | 0.0032   | 0.0035   |
| 41     | 0.2458       | 0.5189 | 3140       | 0.0004                               | 0.0006  | 0.0008  | 0.0011  | 0.0013  | 0.0015  | 0.0020  | 0.0023  | 0.0027  | 0.0030   | 0.0032   | 0.0035   |
| 42     | 0.2481       | 0.5175 | 3088       | 0.0004                               | 0.0006  | 0.0009  | 0.0012  | 0.0013  | 0.0013  | 0.0020  | 0.0022  | 0.0027  | 0.0029   | 0.0031   | 0.0034   |
| 43     | 0.2525       | 0.5219 | 2949       | 0.0004                               | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0013  | 0.0019  | 0.0021  | 0.0025  | 0.0030   | 0.0030   | 0.0034   |
| 44     | 0.2456       | 0.5192 | 3142       | 0.0004                               | 0.0008  | 0.0009  | 0.0011  | 0.0013  | 0.0013  | 0.0020  | 0.0022  | 0.0027  | 0.0030   | 0.0032   | 0.0034   |
| 45     | 0.2468       | 0.5183 | 3118       | 0.0004                               | 0.0007  | 0.0009  | 0.0011  | 0.0013  | 0.0014  | 0.0019  | 0.0023  | 0.0027  | 0.0030   | 0.0032   | 0.0035   |
| 46     | 0.2467       | 0.5180 | 3121       | 0.0005                               | 0.0006  | 0.0009  | 0.0012  | 0.0013  | 0.0013  | 0.0022  | 0.0024  | 0.0028  | 0.0031   | 0.0033   | 0.0036   |
| 47     | 0.2471       | 0.5183 | 3109       | 0.0004                               | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0013  | 0.0019  | 0.0022  | 0.0026  | 0.0029   | 0.0031   | 0.0033   |
| 48     | 0.2471       | 0.5186 | 3108       | 0.0006                               | 0.0007  | 0.0009  | 0.0013  | 0.0013  | 0.0014  | 0.0020  | 0.0024  | 0.0028  | 0.0030   | 0.0032   | 0.0035   |
| 49     | 0.2481       | 0.5185 | 3081       | 0.0008                               | 0.0009  | 0.0012  | 0.0015  | 0.0017  | 0.0016  | 0.0023  | 0.0025  | 0.0030  | 0.0033   | 0.0035   | 0.0039   |
| 50     | 0.2468       | 0.5188 | 3114       | 0.0007                               | 0.0009  | 0.0011  | 0.0014  | 0.0017  | 0.0017  | 0.0024  | 0.0027  | 0.0031  | 0.0034   | 0.0036   | 0.0038   |
| Ave.   | 0.2469       | 0.5187 | 3112       | 0.0005                               | 0.0007  | 0.0009  | 0.0012  | 0.0015  | 0.0017  | 0.0021  | 0.0024  | 0.0028  | 0.0031   | 0.0033   | 0.0035   |
| Med.   | 0.2467       | 0.5185 | 3122       | 0.0005                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0018  | 0.0021  | 0.0024  | 0.0028  | 0.0031   | 0.0033   | 0.0035   |
| st dev | 0.0013       | 0.0011 | 37         | 0.0001                               | 0.0001  | 0.0001  | 0.0002  | 0.0002  | 0.0003  | 0.0001  | 0.0003  | 0.0002  | 0.0001   | 0.0002   | 0.0002   |
| Min.   | 0.2447       | 0.5167 | 2949       | 0.0002                               | 0.0005  | 0.0007  | 0.0009  | 0.0012  | 0.0012  | 0.0019  | 0.0021  | 0.0025  | 0.0028   | 0.0030   | 0.0032   |
| Max.   | 0.2525       | 0.5231 | 3162       | 0.0009                               | 0.0011  | 0.0014  | 0.0017  | 0.0020  | 0.0022  | 0.0025  | 0.0039  | 0.0032  | 0.0035   | 0.0038   | 0.0041   |



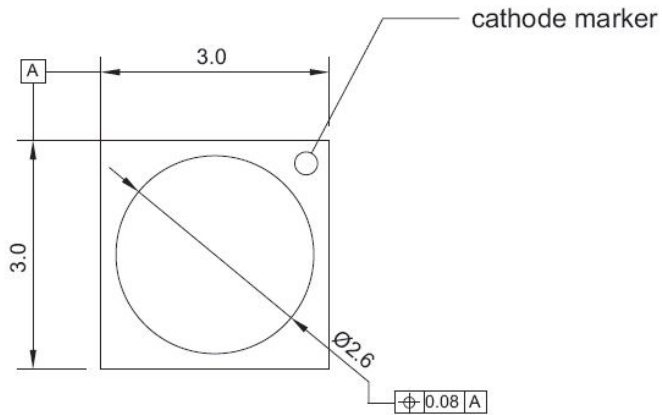
| No.    | Chromaticity Shift ( $\Delta u'v'$ ) |          |          |          |          |          |          |          |
|--------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|
|        | 13000hrs                             | 14000hrs | 15000hrs | 16000hrs | 17000hrs | 18000hrs | 19000hrs | 20000hrs |
| 1      | 0.0038                               | 0.0039   | 0.0042   | 0.0043   | 0.0044   | 0.0046   | 0.0047   | 0.0048   |
| 2      | 0.0040                               | 0.0042   | 0.0042   | 0.0042   | 0.0044   | 0.0046   | 0.0048   | 0.0051   |
| 3      | 0.0040                               | 0.0042   | 0.0044   | 0.0040   | 0.0043   | 0.0045   | 0.0048   | 0.0051   |
| 4      | 0.0044                               | 0.0046   | 0.0049   | 0.0049   | 0.0049   | 0.0050   | 0.0051   | 0.0052   |
| 5      | 0.0042                               | 0.0043   | 0.0048   | 0.0050   | 0.0052   | 0.0054   | 0.0056   | 0.0057   |
| 6      | 0.0039                               | 0.0041   | 0.0047   | 0.0047   | 0.0053   | 0.0054   | 0.0054   | 0.0055   |
| 7      | 0.0037                               | 0.0038   | 0.0042   | 0.0043   | 0.0044   | 0.0046   | 0.0048   | 0.0050   |
| 8      | 0.0038                               | 0.0039   | 0.0043   | 0.0044   | 0.0044   | 0.0044   | 0.0044   | 0.0044   |
| 9      | 0.0038                               | 0.0039   | 0.0043   | 0.0042   | 0.0046   | 0.0049   | 0.0053   | 0.0057   |
| 10     | 0.0042                               | 0.0044   | 0.0045   | 0.0047   | 0.0049   | 0.0050   | 0.0051   | 0.0052   |
| 11     | 0.0037                               | 0.0038   | 0.0041   | 0.0042   | 0.0044   | 0.0045   | 0.0047   | 0.0047   |
| 12     | 0.0039                               | 0.0040   | 0.0041   | 0.0037   | 0.0037   | 0.0039   | 0.0041   | 0.0040   |
| 13     | 0.0038                               | 0.0040   | 0.0049   | 0.0048   | 0.0046   | 0.0045   | 0.0043   | 0.0042   |
| 14     | 0.0037                               | 0.0038   | 0.0044   | 0.0047   | 0.0047   | 0.0047   | 0.0048   | 0.0048   |
| 15     | 0.0037                               | 0.0039   | 0.0039   | 0.0042   | 0.0046   | 0.0050   | 0.0051   | 0.0054   |
| 16     | 0.0036                               | 0.0038   | 0.0041   | 0.0043   | 0.0047   | 0.0050   | 0.0054   | 0.0055   |
| 17     | 0.0034                               | 0.0035   | 0.0036   | 0.0038   | 0.0040   | 0.0043   | 0.0045   | 0.0048   |
| 18     | 0.0033                               | 0.0034   | 0.0034   | 0.0035   | 0.0040   | 0.0045   | 0.0051   | 0.0056   |
| 19     | 0.0036                               | 0.0038   | 0.0039   | 0.0041   | 0.0043   | 0.0045   | 0.0047   | 0.0049   |
| 20     | 0.0036                               | 0.0037   | 0.0037   | 0.0039   | 0.0044   | 0.0046   | 0.0048   | 0.0051   |
| 21     | 0.0038                               | 0.0039   | 0.0040   | 0.0039   | 0.0044   | 0.0049   | 0.0053   | 0.0058   |
| 22     | 0.0037                               | 0.0039   | 0.0039   | 0.0041   | 0.0045   | 0.0049   | 0.0054   | 0.0055   |
| 23     | 0.0036                               | 0.0038   | 0.0039   | 0.0038   | 0.0042   | 0.0047   | 0.0051   | 0.0056   |
| 24     | 0.0035                               | 0.0037   | 0.0039   | 0.0040   | 0.0043   | 0.0046   | 0.0049   | 0.0052   |
| 25     | 0.0036                               | 0.0038   | 0.0042   | 0.0041   | 0.0045   | 0.0049   | 0.0053   | 0.0057   |
| 26     | 0.0036                               | 0.0037   | 0.0043   | 0.0041   | 0.0045   | 0.0049   | 0.0053   | 0.0057   |
| 27     | 0.0033                               | 0.0034   | 0.0038   | 0.0039   | 0.0040   | 0.0041   | 0.0043   | 0.0044   |
| 28     | 0.0034                               | 0.0036   | 0.0039   | 0.0040   | 0.0041   | 0.0042   | 0.0043   | 0.0044   |
| 29     | 0.0035                               | 0.0037   | 0.0040   | 0.0040   | 0.0041   | 0.0042   | 0.0044   | 0.0045   |
| 30     | 0.0037                               | 0.0039   | 0.0042   | 0.0044   | 0.0044   | 0.0044   | 0.0045   | 0.0045   |
| 31     | 0.0036                               | 0.0038   | 0.0039   | 0.0039   | 0.0043   | 0.0046   | 0.0050   | 0.0054   |
| 32     | 0.0035                               | 0.0036   | 0.0040   | 0.0038   | 0.0041   | 0.0045   | 0.0048   | 0.0051   |
| 33     | 0.0036                               | 0.0037   | 0.0039   | 0.0037   | 0.0041   | 0.0045   | 0.0049   | 0.0054   |
| 34     | 0.0035                               | 0.0037   | 0.0039   | 0.0037   | 0.0040   | 0.0043   | 0.0047   | 0.0050   |
| 35     | 0.0036                               | 0.0037   | 0.0040   | 0.0041   | 0.0040   | 0.0039   | 0.0038   | 0.0037   |
| 36     | 0.0039                               | 0.0040   | 0.0042   | 0.0044   | 0.0050   | 0.0052   | 0.0053   | 0.0054   |
| 37     | 0.0037                               | 0.0038   | 0.0038   | 0.0041   | 0.0044   | 0.0048   | 0.0051   | 0.0054   |
| 38     | 0.0038                               | 0.0039   | 0.0041   | 0.0040   | 0.0042   | 0.0045   | 0.0048   | 0.0051   |
| 39     | 0.0037                               | 0.0039   | 0.0041   | 0.0041   | 0.0043   | 0.0045   | 0.0047   | 0.0050   |
| 40     | 0.0036                               | 0.0036   | 0.0039   | 0.0038   | 0.0044   | 0.0045   | 0.0046   | 0.0049   |
| 41     | 0.0037                               | 0.0038   | 0.0038   | 0.0038   | 0.0044   | 0.0050   | 0.0051   | 0.0053   |
| 42     | 0.0036                               | 0.0037   | 0.0038   | 0.0038   | 0.0041   | 0.0044   | 0.0047   | 0.0049   |
| 43     | 0.0034                               | 0.0036   | 0.0040   | 0.0037   | 0.0041   | 0.0045   | 0.0049   | 0.0053   |
| 44     | 0.0036                               | 0.0037   | 0.0040   | 0.0039   | 0.0041   | 0.0043   | 0.0045   | 0.0048   |
| 45     | 0.0036                               | 0.0039   | 0.0043   | 0.0042   | 0.0044   | 0.0046   | 0.0049   | 0.0052   |
| 46     | 0.0038                               | 0.0040   | 0.0045   | 0.0043   | 0.0046   | 0.0049   | 0.0052   | 0.0056   |
| 47     | 0.0034                               | 0.0036   | 0.0042   | 0.0041   | 0.0041   | 0.0041   | 0.0042   | 0.0044   |
| 48     | 0.0036                               | 0.0037   | 0.0042   | 0.0040   | 0.0045   | 0.0050   | 0.0054   | 0.0057   |
| 49     | 0.0040                               | 0.0042   | 0.0046   | 0.0046   | 0.0047   | 0.0049   | 0.0050   | 0.0052   |
| 50     | 0.0040                               | 0.0042   | 0.0045   | 0.0043   | 0.0047   | 0.0052   | 0.0054   | 0.0056   |
| Ave.   | 0.0037                               | 0.0039   | 0.0041   | 0.0041   | 0.0044   | 0.0046   | 0.0049   | 0.0051   |
| Med.   | 0.0037                               | 0.0038   | 0.0041   | 0.0041   | 0.0044   | 0.0046   | 0.0049   | 0.0052   |
| st dev | 0.0002                               | 0.0002   | 0.0003   | 0.0003   | 0.0003   | 0.0003   | 0.0004   | 0.0005   |
| Min.   | 0.0033                               | 0.0034   | 0.0034   | 0.0035   | 0.0037   | 0.0039   | 0.0038   | 0.0037   |
| Max.   | 0.0044                               | 0.0046   | 0.0049   | 0.0050   | 0.0053   | 0.0054   | 0.0056   | 0.0058   |



This report issued to Strip's d.o.o.

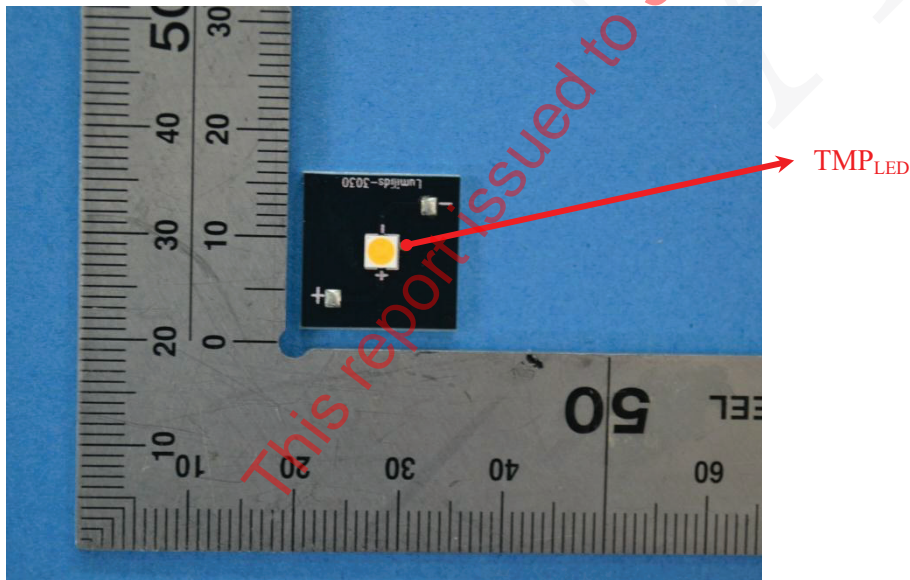
## 4 - EUT Photo

### 4.1 Mechanical Dimensions



All dimensions are in millimeter

### 4.2 EUT Photo



## 5 - Report Revision

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| Report Number             | Report Date | Contents   |
|---------------------------|-------------|--|
| R2SH160822052-10-20000    | 2020-12-08  | Original report.   |
| R2SH160822052-10-20000-M1 | 2020-12-15  | Update description of the multiple models.                 |
| R2SH160822052-10-20000-M2 | 2021-02-24  | Remove the DUT characteristics and family products covered |

FINAL  
This report issued to Strip's d.o.o.

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**Directions**

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1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
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\*\*\*\*\*END OF REPORT\*\*\*\*\*

# TEST REPORT

ACCORDING TO IES LM-80-2015  
For

**Lumileds Holding B.V.**

370 W. Trimble Road, San Jose, CA 95131, USA.

**Model: L130-3080003000W21**

|  |  |                                     |  |
|--|--|-------------------------------------|--|
| <b>Report Type:</b><br>20000 Hours Test Report |  | <b>Product Type:</b><br>LED Package |  |
| <b>Test Engineer:</b>                          | Pote Wang <i>Pote Wang</i>   |                                     |  |
| <b>Report Number:</b>                          | R2SH160822054-10-20000-M2  |                                     |  |
| <b>Test Date:</b>                              | 2016-08-24 to 2020-11-26   |                                     |  |
| <b>Report Date:</b>                            | 2021-02-24   |                                     |  |
| <b>Reviewed By:</b>                            | Blake Zhang / EE Engineer <i>Blake Zhang</i>   |                                     |  |
| <b>Revised Note:</b>                           | The previous report R2SH160822054-10-20000-M1 is replaced by this report on 2021-02-24   |                                     |  |
| <b>Test Facility:</b>                          | Test facility was located at No.12, Pulong East 1 <sup>st</sup> Road, Tangxia Town, Dongguan, Guangdong, China.  |                                     |  |
| <b>Prepared By:</b>                            | Bay Area Compliance Laboratories Corp. (Dongguan).<br>No.12, Pulong East 1 <sup>st</sup> Road, Tangxia Town, Dongguan, Guangdong, China.<br>Tel: +86-0769-86858888<br>Fax: +86-0769-86858588 |                                     |  |

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## 1 - General Information

### 1.1 Description of LED Light Sources

#### Sample Size:

50 PCS samples were received on 2016-08-22. The samples were numbered from 1 to 50.

Manufacturer: Lumileds Holding B.V.  
Part Number: L130-3080003000W21  
Part Type: LED Package  
Drive Level: DC 150mA  
Nominal CCT: 3000K

### 1.2 Standards Used:

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs

### 1.3 Testing Equipment

| Device                                       | Manufacture | Model No      | Serial No        | Calibration date | Calibration due date |
|--|-------------|---------------|------------------|------------------|----------------------|
| 0.3m integrating sphere                      | EVERFINE    | Diameter 0.3m | 1011119          | 2020-03-08       | 2021-03-07           |
| Programmable Test Power for LEDs             | EVERFINE    | LED300E       | 1008002          | 2020-03-08       | 2021-03-07           |
| High accuracy array spectroradiometer        | EVERFINE    | HAAS-2000     | 1012016T         | 2020-03-08       | 2021-03-07           |
| Standard Light Source                        | EVERFINE    | D062          | 1011093          | 2020-10-20       | 2021-10-19           |
| Precision digital stabilized DC power supply | EVERFINE    | WY605-V110    | G115987CJ7321114 | 2020-03-16       | 2021-03-15           |
| Multilayer aging machine                     | BACL        | B2-270        | 20023            | 2020-03-11       | 2021-03-10           |
| Digital CC&CV DC Power Supply                | EVERFINE    | WY5015        | 11090006         | 2020-03-16       | 2021-03-15           |

### 1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within  $\pm 3\%$  of the specified value of the manufacturer during maintenance test, and was within  $\pm 0.5\%$  during photometric and electrical measurement test.



## 1.5 Ambient Conditions for Maintenance Test

For lumen maintenance test, samples within one data set, were installed on cooling boards in thermal chambers with minimal ambient airflow. The case temperature and ambient temperature was monitored by thermocouples which one was soldered to the coldest DUTs' case (TMP<sub>LED</sub>) location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP<sub>LED</sub> of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within ±3% of the specified value of the manufacturer.

The relative humidity within chamber was kept less than 65% during test.

For photometry measurement, the ambient temperature during test was set to 25°C ± 2°C, RH <65%.

## 1.6 Measurement Uncertainty

The uncertainty of the light output measurements is U=1.59% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=21K (K=2), at the 95% confidence level.

The uncertainty of the temperature is U=0.8671°C (K=2), at the 95% confidence level.

## 1.7 Statement of Traceability

Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

## 1.8 Sample Set

### Data Set 1: 105°C, 150mA

Part Number: L130-3080003000W21

Number of Units: 50

Case Temperature: >103°C

Ambient Temperature: >100°C

Life Test Drive Current: 150mA

Measurement Current: 150mA

## 2 - Summary of Test Result

| Data Set: | Sample Size | Failures Observed: | Test Interval | Test Duration | Reported TM-21 L <sub>70</sub> Lifetime |
|-----------|-------------|--------------------|---------------|---------------|---|
| 1         | 50          | 0                  | 1000          | 20000         | >120000hours                            |

### Average Lumen Maintenance (Percentage of Initial Luminous Flux)

| Data Set: | 1000   | 2000   | 3000   | 4000   | 5000   | 6000   | 7000   | 8000   | 9000   | 10000  | 11000  | 12000  |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1         | 99.66% | 99.34% | 99.04% | 98.71% | 98.38% | 98.08% | 97.77% | 97.47% | 97.16% | 96.86% | 96.60% | 96.26% |
|           | 13000  | 14000  | 15000  | 16000  | 17000  | 18000  | 19000  | 20000  |        |        |        |        |
|           | 96.00% | 95.77% | 95.49% | 95.25% | 95.04% | 94.85% | 94.64% | 94.44% |        |        |        |        |

### Average Color Maintenance

| Data Set: | 1000   | 2000   | 3000   | 4000   | 5000   | 6000   | 7000   | 8000   | 9000   | 10000  | 11000  | 12000  |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1         | 0.0008 | 0.0011 | 0.0014 | 0.0019 | 0.0021 | 0.0022 | 0.0026 | 0.0029 | 0.0032 | 0.0036 | 0.0039 | 0.0042 |
|           | 13000  | 14000  | 15000  | 16000  | 17000  | 18000  | 19000  | 20000  |        |        |        |        |
|           | 0.0044 | 0.0046 | 0.0049 | 0.0049 | 0.0052 | 0.0053 | 0.0054 | 0.0055 |        |        |        |        |

### 3 - Test Data

#### 3.1 Data Set 1, 105°C, 150mA (Lumen Maintenance)

| No.    | Φ(lm)        | Lumen Maintenance (%) |         |         |         |         |         |         |         |         |          |          |          |
|--------|--------------|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
|        | 0hr(Initial) | 1000hrs               | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs | 11000hrs | 12000hrs |
| 1      | 155.2        | 99.68                 | 99.29   | 99.03   | 98.71   | 98.39   | 98.07   | 97.94   | 97.62   | 97.29   | 96.97    | 96.84    | 96.46    |
| 2      | 154.3        | 99.55                 | 99.29   | 98.83   | 98.44   | 97.93   | 97.60   | 97.21   | 96.89   | 96.44   | 96.24    | 96.18    | 95.66    |
| 3      | 154.0        | 99.81                 | 99.42   | 99.09   | 98.77   | 98.38   | 97.92   | 97.60   | 97.21   | 96.88   | 96.62    | 96.30    | 95.91    |
| 4      | 155.4        | 99.61                 | 99.29   | 98.91   | 98.52   | 98.20   | 97.88   | 97.62   | 97.30   | 97.10   | 96.78    | 96.46    | 96.07    |
| 5      | 155.8        | 99.29                 | 98.97   | 98.72   | 98.40   | 98.07   | 97.82   | 97.43   | 96.98   | 96.66   | 96.41    | 96.08    | 95.83    |
| 6      | 153.7        | 99.28                 | 98.96   | 98.63   | 98.44   | 98.05   | 97.85   | 97.53   | 97.20   | 96.88   | 96.55    | 96.23    | 95.77    |
| 7      | 156.9        | 99.49                 | 99.04   | 98.66   | 98.41   | 98.22   | 97.96   | 97.83   | 97.45   | 97.20   | 96.94    | 96.62    | 96.24    |
| 8      | 154.7        | 99.61                 | 99.35   | 99.03   | 98.58   | 98.19   | 98.00   | 97.87   | 97.61   | 97.41   | 97.29    | 97.03    | 96.77    |
| 9      | 154.8        | 99.68                 | 99.35   | 99.10   | 98.77   | 98.39   | 97.93   | 97.61   | 97.29   | 96.90   | 96.64    | 96.51    | 96.25    |
| 10     | 155.9        | 99.74                 | 99.62   | 99.42   | 99.23   | 98.91   | 98.65   | 98.20   | 97.69   | 97.31   | 96.99    | 96.79    | 96.47    |
| 11     | 155.5        | 99.81                 | 99.61   | 99.36   | 99.04   | 98.78   | 98.52   | 98.26   | 97.94   | 97.68   | 97.30    | 96.85    | 96.46    |
| 12     | 155.4        | 99.87                 | 99.49   | 99.36   | 98.97   | 98.65   | 98.26   | 98.01   | 97.75   | 97.43   | 97.23    | 96.91    | 96.59    |
| 13     | 153.0        | 99.67                 | 99.41   | 99.02   | 98.63   | 98.30   | 98.04   | 97.71   | 97.45   | 97.06   | 96.73    | 96.41    | 96.21    |
| 14     | 152.6        | 99.93                 | 99.80   | 99.61   | 99.28   | 99.08   | 98.62   | 98.36   | 98.03   | 97.64   | 97.44    | 97.25    | 96.99    |
| 15     | 156.2        | 99.49                 | 99.23   | 98.85   | 98.59   | 98.21   | 97.95   | 97.63   | 97.38   | 97.06   | 96.80    | 96.67    | 96.35    |
| 16     | 155.4        | 99.61                 | 99.29   | 99.03   | 98.65   | 98.13   | 97.75   | 97.36   | 97.10   | 96.85   | 96.53    | 96.27    | 95.82    |
| 17     | 156.2        | 99.87                 | 99.49   | 99.23   | 99.04   | 98.59   | 98.21   | 97.76   | 97.31   | 96.86   | 96.54    | 96.29    | 95.97    |
| 18     | 155.9        | 99.62                 | 99.42   | 99.04   | 98.59   | 98.33   | 98.08   | 97.63   | 97.24   | 96.92   | 96.54    | 96.47    | 96.22    |
| 19     | 157.0        | 99.75                 | 99.43   | 99.11   | 98.79   | 98.47   | 98.15   | 97.77   | 97.45   | 97.01   | 96.75    | 96.62    | 96.37    |
| 20     | 155.1        | 99.81                 | 99.48   | 99.23   | 98.77   | 98.39   | 98.13   | 97.74   | 97.49   | 97.16   | 96.91    | 96.58    | 96.20    |
| 21     | 154.8        | 99.42                 | 99.16   | 98.77   | 98.39   | 98.06   | 97.87   | 97.55   | 97.22   | 96.83   | 96.51    | 96.12    | 95.67    |
| 22     | 153.3        | 99.74                 | 99.35   | 99.02   | 98.56   | 98.11   | 97.85   | 97.46   | 97.13   | 96.80   | 96.54    | 96.09    | 95.69    |
| 23     | 153.0        | 100.13                | 99.80   | 99.54   | 99.35   | 98.95   | 98.50   | 98.30   | 98.10   | 97.84   | 97.58    | 97.25    | 96.99    |
| 24     | 157.2        | 99.49                 | 99.24   | 98.92   | 98.54   | 98.09   | 97.84   | 97.65   | 97.33   | 97.01   | 96.69    | 96.50    | 96.18    |
| 25     | 155.7        | 99.55                 | 99.23   | 98.91   | 98.59   | 98.27   | 97.94   | 97.50   | 97.24   | 96.92   | 96.53    | 96.27    | 95.95    |
| 26     | 156.2        | 99.42                 | 99.17   | 98.78   | 98.59   | 98.27   | 97.82   | 97.31   | 96.99   | 96.73   | 96.54    | 96.29    | 95.84    |
| 27     | 155.8        | 99.61                 | 99.29   | 98.91   | 98.65   | 98.20   | 97.88   | 97.56   | 97.30   | 96.92   | 96.66    | 96.41    | 96.02    |
| 28     | 155.2        | 99.81                 | 99.48   | 99.10   | 98.78   | 98.45   | 98.13   | 97.87   | 97.62   | 97.42   | 97.16    | 96.97    | 96.65    |
| 29     | 154.7        | 99.68                 | 99.42   | 99.29   | 98.84   | 98.64   | 98.38   | 98.13   | 97.80   | 97.41   | 97.16    | 96.83    | 96.44    |
| 30     | 153.8        | 99.54                 | 99.41   | 99.02   | 98.63   | 98.31   | 97.98   | 97.92   | 97.66   | 97.53   | 97.14    | 96.88    | 96.62    |
| 31     | 156.2        | 99.62                 | 99.36   | 98.98   | 98.66   | 98.34   | 98.21   | 98.08   | 97.89   | 97.57   | 97.25    | 96.86    | 96.48    |
| 32     | 153.5        | 99.87                 | 99.54   | 99.15   | 98.96   | 98.70   | 98.37   | 97.98   | 97.72   | 97.46   | 97.26    | 97.20    | 96.87    |
| 33     | 154.0        | 99.55                 | 99.29   | 98.96   | 98.51   | 98.12   | 97.92   | 97.60   | 97.47   | 97.21   | 96.75    | 96.36    | 96.10    |
| 34     | 155.8        | 99.68                 | 99.36   | 98.97   | 98.59   | 98.20   | 97.82   | 97.37   | 97.18   | 96.98   | 96.66    | 96.60    | 96.21    |
| 35     | 156.0        | 99.87                 | 99.42   | 99.04   | 98.65   | 98.21   | 97.88   | 97.50   | 97.12   | 96.92   | 96.67    | 96.60    | 96.15    |
| 36     | 157.0        | 99.55                 | 99.30   | 98.92   | 98.60   | 98.34   | 97.96   | 97.58   | 97.39   | 97.01   | 96.56    | 96.24    | 95.86    |
| 37     | 154.6        | 99.61                 | 99.22   | 98.77   | 98.64   | 98.38   | 98.12   | 97.80   | 97.41   | 96.96   | 96.77    | 96.44    | 96.05    |
| 38     | 156.4        | 99.87                 | 99.55   | 99.23   | 98.98   | 98.59   | 98.40   | 98.02   | 97.76   | 97.38   | 97.06    | 96.74    | 96.29    |
| 39     | 153.8        | 99.67                 | 99.22   | 98.99   | 98.76   | 98.50   | 98.24   | 97.98   | 97.85   | 97.53   | 97.07    | 97.01    | 96.62    |
| 40     | 154.2        | 99.74                 | 99.35   | 99.09   | 98.70   | 98.44   | 98.31   | 97.92   | 97.67   | 97.54   | 97.15    | 96.89    | 96.69    |
| 41     | 154.9        | 99.68                 | 99.48   | 99.29   | 98.84   | 98.64   | 98.26   | 98.13   | 97.87   | 97.61   | 97.22    | 96.97    | 96.58    |
| 42     | 153.7        | 99.61                 | 99.28   | 99.02   | 98.83   | 98.57   | 98.31   | 98.05   | 97.85   | 97.53   | 97.46    | 97.20    | 96.88    |
| 43     | 158.0        | 99.43                 | 99.18   | 98.80   | 98.61   | 98.48   | 98.16   | 97.72   | 97.59   | 97.28   | 97.15    | 96.71    | 96.58    |
| 44     | 154.6        | 99.55                 | 99.09   | 98.84   | 98.38   | 98.06   | 97.80   | 97.41   | 97.15   | 96.90   | 96.57    | 96.38    | 95.99    |
| 45     | 155.4        | 99.49                 | 99.23   | 99.03   | 98.71   | 98.33   | 98.07   | 97.75   | 97.30   | 96.98   | 96.72    | 96.40    | 95.95    |
| 46     | 158.2        | 99.56                 | 99.12   | 98.93   | 98.67   | 98.29   | 97.98   | 97.91   | 97.53   | 97.09   | 96.84    | 96.71    | 96.27    |
| 47     | 156.0        | 99.49                 | 99.17   | 98.91   | 98.53   | 98.27   | 97.82   | 97.56   | 97.37   | 96.99   | 96.67    | 96.54    | 96.28    |
| 48     | 155.8        | 99.87                 | 99.49   | 99.29   | 98.91   | 98.59   | 98.14   | 97.88   | 97.43   | 97.18   | 96.85    | 96.73    | 96.34    |
| 49     | 153.2        | 99.67                 | 99.22   | 98.96   | 98.76   | 98.63   | 98.37   | 97.91   | 97.45   | 97.26   | 96.93    | 96.41    | 96.02    |
| 50     | 153.2        | 99.87                 | 99.48   | 99.15   | 98.69   | 98.37   | 98.17   | 97.78   | 97.52   | 97.39   | 96.87    | 96.21    | 95.89    |
| Ave.   | 155.1        | 99.66                 | 99.34   | 99.04   | 98.71   | 98.38   | 98.08   | 97.77   | 97.47   | 97.16   | 96.86    | 96.60    | 96.26    |
| Med.   | 155.3        | 99.64                 | 99.35   | 99.03   | 98.65   | 98.34   | 98.05   | 97.75   | 97.45   | 97.10   | 96.79    | 96.59    | 96.23    |
| st dev | 1.3200       | 0.1700                | 0.1787  | 0.2119  | 0.2206  | 0.2488  | 0.2389  | 0.2706  | 0.2851  | 0.3047  | 0.3099   | 0.32     | 0.35     |
| Min.   | 152.6        | 99.28                 | 98.96   | 98.63   | 98.38   | 97.93   | 97.60   | 97.21   | 96.89   | 96.44   | 96.24    | 96.08    | 95.66    |
| Max.   | 158.2        | 100.13                | 99.80   | 99.61   | 99.35   | 99.08   | 98.65   | 98.36   | 98.10   | 97.84   | 97.58    | 97.25    | 96.99    |

| No.    | Lumen Maintenance (%) |          |          |          |          |          |          |          |
|--------|-----------------------|----------|----------|----------|----------|----------|----------|----------|
|        | 13000hrs              | 14000hrs | 15000hrs | 16000hrs | 17000hrs | 18000hrs | 19000hrs | 20000hrs |
| 1      | 96.20                 | 95.94    | 95.62    | 95.43    | 95.30    | 95.17    | 95.04    | 94.85    |
| 2      | 95.33                 | 95.07    | 94.69    | 94.43    | 94.30    | 94.04    | 93.78    | 93.65    |
| 3      | 95.58                 | 95.45    | 95.06    | 94.74    | 94.68    | 94.42    | 94.29    | 93.83    |
| 4      | 95.75                 | 95.62    | 95.05    | 94.79    | 94.66    | 94.40    | 94.21    | 94.02    |
| 5      | 95.44                 | 95.19    | 95.06    | 94.80    | 94.48    | 94.35    | 94.16    | 94.03    |
| 6      | 95.64                 | 95.32    | 95.19    | 95.06    | 94.93    | 94.80    | 94.53    | 94.21    |
| 7      | 95.98                 | 95.79    | 95.60    | 95.41    | 95.22    | 94.90    | 94.58    | 94.46    |
| 8      | 96.57                 | 96.32    | 95.93    | 95.73    | 95.54    | 95.35    | 95.22    | 95.09    |
| 9      | 95.99                 | 95.74    | 95.54    | 95.22    | 95.09    | 94.96    | 94.77    | 94.51    |
| 10     | 96.22                 | 95.89    | 95.77    | 95.57    | 95.38    | 95.25    | 95.06    | 94.80    |
| 11     | 96.27                 | 95.95    | 95.69    | 95.56    | 95.31    | 94.98    | 94.79    | 94.60    |
| 12     | 96.46                 | 96.27    | 96.01    | 95.56    | 95.50    | 95.30    | 95.05    | 94.92    |
| 13     | 95.95                 | 95.69    | 95.49    | 95.42    | 94.97    | 94.84    | 94.64    | 94.51    |
| 14     | 96.72                 | 96.53    | 96.00    | 95.87    | 95.67    | 95.54    | 95.28    | 95.09    |
| 15     | 96.22                 | 95.90    | 95.39    | 95.20    | 94.81    | 94.75    | 94.56    | 94.43    |
| 16     | 95.56                 | 95.30    | 94.92    | 94.47    | 94.34    | 94.21    | 94.08    | 93.95    |
| 17     | 95.77                 | 95.45    | 95.13    | 94.94    | 94.81    | 94.62    | 94.37    | 94.11    |
| 18     | 95.96                 | 95.70    | 95.64    | 95.45    | 95.25    | 95.13    | 95.00    | 94.68    |
| 19     | 96.18                 | 95.99    | 95.61    | 95.41    | 95.16    | 94.97    | 94.71    | 94.52    |
| 20     | 96.07                 | 95.81    | 95.55    | 95.29    | 95.04    | 94.91    | 94.58    | 94.46    |
| 21     | 95.35                 | 95.22    | 95.16    | 94.70    | 94.44    | 94.19    | 93.93    | 93.80    |
| 22     | 95.37                 | 95.11    | 94.91    | 94.59    | 94.46    | 94.26    | 94.13    | 94.00    |
| 23     | 96.80                 | 96.54    | 96.47    | 96.34    | 96.01    | 95.23    | 94.90    | 94.64    |
| 24     | 95.99                 | 95.80    | 95.36    | 95.04    | 94.91    | 94.78    | 94.59    | 94.40    |
| 25     | 95.76                 | 95.50    | 95.25    | 94.86    | 94.73    | 94.61    | 94.48    | 94.35    |
| 26     | 95.58                 | 95.33    | 95.13    | 94.81    | 94.75    | 94.62    | 94.49    | 94.30    |
| 27     | 95.70                 | 95.51    | 95.38    | 94.99    | 94.87    | 94.74    | 94.61    | 94.29    |
| 28     | 96.39                 | 96.20    | 95.81    | 95.55    | 95.43    | 95.17    | 94.91    | 94.72    |
| 29     | 96.32                 | 95.99    | 95.93    | 95.73    | 95.67    | 95.48    | 95.35    | 95.15    |
| 30     | 96.29                 | 96.03    | 95.77    | 95.38    | 95.12    | 94.86    | 94.54    | 94.34    |
| 31     | 96.16                 | 95.97    | 95.90    | 95.58    | 95.39    | 95.20    | 94.94    | 94.75    |
| 32     | 96.55                 | 96.35    | 96.03    | 95.90    | 95.44    | 95.31    | 95.18    | 94.92    |
| 33     | 95.91                 | 95.65    | 95.26    | 95.13    | 94.87    | 94.61    | 94.42    | 94.29    |
| 34     | 95.89                 | 95.70    | 95.06    | 94.80    | 94.67    | 94.48    | 94.35    | 94.16    |
| 35     | 96.03                 | 95.77    | 95.64    | 95.51    | 95.13    | 94.94    | 94.81    | 94.68    |
| 36     | 95.61                 | 95.41    | 95.16    | 94.90    | 94.59    | 94.46    | 94.27    | 93.95    |
| 37     | 95.80                 | 95.60    | 95.34    | 95.15    | 95.08    | 94.83    | 94.63    | 94.31    |
| 38     | 96.10                 | 95.91    | 95.40    | 94.76    | 94.63    | 94.50    | 94.25    | 93.99    |
| 39     | 96.36                 | 96.23    | 95.90    | 95.64    | 95.45    | 95.38    | 95.12    | 94.93    |
| 40     | 96.30                 | 96.11    | 95.98    | 95.78    | 95.65    | 95.46    | 95.14    | 94.94    |
| 41     | 96.38                 | 96.19    | 95.93    | 95.74    | 95.29    | 95.09    | 94.90    | 94.71    |
| 42     | 96.49                 | 96.16    | 95.71    | 95.45    | 95.32    | 95.12    | 94.99    | 94.86    |
| 43     | 96.39                 | 96.08    | 95.63    | 95.57    | 95.13    | 94.81    | 94.68    | 94.49    |
| 44     | 95.73                 | 95.47    | 95.34    | 95.15    | 95.08    | 94.83    | 94.63    | 94.44    |
| 45     | 95.69                 | 95.43    | 94.79    | 94.59    | 94.27    | 94.02    | 93.76    | 93.56    |
| 46     | 95.95                 | 95.70    | 95.26    | 95.07    | 94.88    | 94.82    | 94.63    | 94.31    |
| 47     | 95.90                 | 95.71    | 95.64    | 95.51    | 95.32    | 95.13    | 95.00    | 94.87    |
| 48     | 96.02                 | 95.89    | 95.76    | 95.64    | 95.44    | 95.31    | 95.12    | 94.67    |
| 49     | 95.63                 | 95.50    | 95.43    | 95.10    | 94.91    | 94.71    | 94.39    | 94.26    |
| 50     | 95.69                 | 95.30    | 95.17    | 95.10    | 94.71    | 94.45    | 94.26    | 93.99    |
| Ave.   | 96.00                 | 95.77    | 95.49    | 95.25    | 95.04    | 94.85    | 94.64    | 94.44    |
| Med.   | 95.99                 | 95.75    | 95.52    | 95.26    | 95.08    | 94.83    | 94.63    | 94.45    |
| st dev | 0.36                  | 0.37     | 0.38     | 0.42     | 0.40     | 0.39     | 0.39     | 0.39     |
| Min.   | 95.33                 | 95.07    | 94.69    | 94.43    | 94.27    | 94.02    | 93.76    | 93.56    |
| Max.   | 96.80                 | 96.54    | 96.47    | 96.34    | 96.01    | 95.54    | 95.35    | 95.15    |

TM-21 Projection:

**Test Duration:** 20000 hours  
**Failures Observed:** 0  
 **$\alpha$ :** 2.530E-06  
 **$\beta$ :** 0.993  
**Reported L<sub>70</sub>:** >120000 hours

FINAL  
This report issued to Strip's d.o.o.

### 3.2 Data Set 1, 105°C, 150mA (Forward Voltage)

| No.    | Forward Voltage (V) |         |         |         |         |         |         |         |         |         |          |          |          |
|--------|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
|        | Ohr(Initial)        | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs | 11000hrs | 12000hrs |
| 1      | 6.011               | 6.018   | 6.012   | 6.044   | 6.023   | 6.052   | 6.026   | 6.053   | 6.009   | 6.010   | 6.012    | 6.015    | 6.010    |
| 2      | 5.937               | 5.931   | 5.931   | 5.947   | 5.946   | 5.937   | 5.947   | 5.957   | 5.929   | 5.927   | 5.931    | 5.937    | 5.928    |
| 3      | 6.067               | 6.155   | 5.999   | 6.104   | 6.006   | 6.122   | 5.993   | 5.998   | 5.982   | 5.984   | 5.984    | 5.989    | 5.987    |
| 4      | 5.989               | 5.956   | 6.124   | 6.003   | 5.966   | 5.985   | 6.211   | 5.962   | 5.955   | 5.952   | 5.955    | 5.956    | 5.956    |
| 5      | 5.999               | 6.266   | 5.967   | 6.245   | 5.975   | 6.012   | 6.002   | 5.977   | 6.006   | 5.973   | 5.962    | 5.967    | 5.971    |
| 6      | 5.928               | 5.937   | 5.936   | 5.947   | 5.945   | 6.126   | 5.962   | 5.927   | 5.920   | 5.922   | 5.925    | 5.928    | 5.926    |
| 7      | 6.042               | 6.029   | 6.037   | 6.046   | 6.045   | 6.036   | 6.039   | 6.037   | 6.072   | 6.024   | 6.029    | 6.034    | 6.032    |
| 8      | 5.982               | 5.981   | 5.973   | 5.982   | 6.064   | 5.982   | 5.985   | 5.981   | 5.968   | 5.970   | 5.971    | 5.974    | 6.018    |
| 9      | 6.066               | 6.009   | 6.010   | 6.013   | 6.160   | 6.012   | 6.018   | 6.008   | 6.008   | 6.222   | 6.008    | 6.009    | 6.009    |
| 10     | 5.976               | 5.946   | 5.971   | 5.981   | 5.985   | 5.973   | 5.987   | 5.959   | 5.945   | 5.946   | 5.949    | 5.951    | 5.945    |
| 11     | 5.991               | 5.965   | 5.978   | 6.264   | 5.972   | 5.968   | 5.958   | 5.952   | 5.944   | 5.943   | 5.945    | 5.950    | 5.945    |
| 12     | 6.049               | 6.010   | 5.999   | 6.023   | 6.018   | 6.206   | 6.011   | 5.999   | 5.993   | 5.992   | 5.998    | 5.999    | 6.003    |
| 13     | 5.989               | 6.169   | 5.979   | 6.156   | 6.007   | 6.024   | 5.974   | 5.966   | 5.956   | 5.950   | 5.958    | 5.962    | 5.963    |
| 14     | 6.065               | 6.020   | 6.005   | 6.009   | 6.008   | 6.196   | 6.051   | 6.005   | 6.008   | 5.999   | 6.002    | 6.002    | 6.002    |
| 15     | 6.013               | 5.970   | 5.978   | 5.985   | 6.000   | 6.060   | 5.987   | 5.974   | 5.973   | 5.965   | 5.977    | 5.989    | 5.976    |
| 16     | 5.968               | 6.016   | 5.966   | 5.970   | 5.971   | 6.004   | 6.002   | 5.961   | 6.153   | 5.960   | 5.964    | 5.967    | 5.963    |
| 17     | 6.024               | 6.196   | 6.003   | 5.983   | 6.015   | 6.048   | 5.984   | 5.973   | 5.971   | 5.967   | 5.978    | 5.976    | 5.971    |
| 18     | 5.950               | 5.925   | 5.928   | 5.942   | 6.034   | 6.117   | 5.935   | 5.923   | 5.918   | 5.919   | 5.925    | 5.928    | 5.934    |
| 19     | 6.055               | 6.197   | 6.012   | 6.014   | 6.015   | 6.066   | 6.018   | 6.006   | 6.002   | 6.002   | 6.009    | 6.010    | 6.002    |
| 20     | 5.973               | 5.974   | 5.978   | 6.116   | 5.985   | 6.175   | 5.988   | 6.154   | 5.978   | 5.970   | 5.977    | 5.979    | 5.978    |
| 21     | 5.929               | 5.939   | 5.939   | 6.135   | 5.972   | 6.061   | 5.962   | 5.957   | 5.937   | 5.925   | 5.927    | 5.931    | 5.933    |
| 22     | 6.043               | 6.037   | 6.036   | 6.043   | 6.216   | 6.227   | 6.040   | 6.265   | 6.033   | 6.026   | 6.031    | 6.035    | 6.035    |
| 23     | 5.969               | 5.964   | 5.972   | 6.075   | 5.989   | 5.988   | 5.977   | 5.974   | 5.966   | 5.960   | 5.969    | 5.972    | 5.965    |
| 24     | 6.036               | 6.070   | 6.033   | 6.198   | 6.050   | 6.160   | 6.039   | 6.035   | 6.284   | 6.028   | 6.030    | 6.033    | 6.029    |
| 25     | 5.985               | 5.985   | 5.995   | 6.021   | 5.992   | 6.059   | 5.993   | 6.106   | 5.980   | 5.981   | 5.983    | 6.004    | 5.984    |
| 26     | 5.911               | 6.129   | 5.930   | 5.923   | 5.926   | 6.082   | 5.929   | 5.967   | 5.910   | 5.911   | 5.917    | 5.919    | 5.914    |
| 27     | 6.017               | 6.110   | 5.933   | 5.965   | 6.007   | 6.074   | 5.922   | 5.943   | 5.905   | 5.908   | 5.911    | 5.918    | 5.914    |
| 28     | 6.014               | 6.022   | 6.030   | 6.264   | 6.026   | 6.068   | 6.087   | 6.044   | 6.016   | 6.015   | 6.030    | 6.019    | 6.027    |
| 29     | 6.023               | 5.947   | 5.991   | 5.994   | 5.956   | 6.118   | 5.992   | 5.951   | 5.940   | 5.941   | 5.950    | 5.946    | 5.947    |
| 30     | 6.001               | 5.996   | 5.941   | 5.952   | 5.947   | 6.071   | 5.944   | 5.974   | 5.931   | 5.936   | 5.941    | 5.940    | 5.942    |
| 31     | 6.031               | 6.002   | 6.009   | 6.011   | 6.008   | 6.061   | 6.004   | 6.003   | 5.992   | 5.996   | 6.000    | 6.001    | 5.997    |
| 32     | 6.011               | 5.929   | 5.923   | 5.936   | 5.932   | 6.103   | 5.926   | 5.922   | 5.914   | 5.914   | 5.922    | 6.004    | 5.919    |
| 33     | 6.036               | 5.990   | 6.058   | 6.014   | 5.998   | 6.119   | 6.007   | 5.991   | 5.984   | 5.984   | 5.993    | 5.992    | 5.987    |
| 34     | 5.950               | 5.995   | 5.954   | 5.960   | 6.121   | 5.979   | 5.967   | 5.951   | 5.946   | 5.951   | 5.956    | 5.962    | 5.961    |
| 35     | 6.068               | 6.012   | 6.016   | 6.025   | 6.024   | 6.213   | 6.023   | 6.010   | 6.011   | 6.008   | 6.011    | 6.140    | 6.011    |
| 36     | 6.004               | 6.076   | 6.008   | 6.010   | 6.010   | 6.065   | 6.009   | 6.005   | 6.005   | 5.997   | 6.008    | 6.004    | 6.001    |
| 37     | 5.941               | 5.990   | 5.953   | 5.949   | 5.956   | 5.960   | 5.951   | 5.939   | 5.937   | 5.937   | 5.945    | 5.943    | 5.939    |
| 38     | 6.014               | 6.142   | 6.013   | 6.107   | 6.022   | 6.060   | 6.030   | 6.013   | 6.009   | 6.009   | 6.020    | 6.028    | 6.016    |
| 39     | 5.950               | 5.976   | 6.064   | 5.948   | 6.015   | 5.981   | 5.975   | 5.936   | 5.935   | 5.937   | 5.940    | 5.941    | 5.944    |
| 40     | 6.033               | 6.018   | 6.140   | 6.011   | 6.027   | 6.179   | 6.017   | 6.008   | 6.006   | 6.005   | 6.012    | 6.009    | 6.008    |
| 41     | 6.016               | 6.102   | 6.014   | 6.082   | 6.077   | 6.217   | 6.023   | 6.022   | 6.096   | 6.010   | 6.015    | 6.072    | 6.016    |
| 42     | 5.956               | 6.022   | 5.937   | 5.978   | 5.948   | 6.014   | 5.952   | 5.943   | 6.179   | 5.940   | 5.961    | 5.947    | 5.937    |
| 43     | 6.026               | 6.322   | 6.036   | 6.034   | 6.016   | 6.096   | 6.040   | 6.027   | 6.023   | 6.022   | 6.046    | 6.050    | 6.025    |
| 44     | 5.946               | 5.980   | 5.958   | 6.267   | 6.001   | 6.099   | 5.958   | 5.951   | 5.951   | 5.941   | 5.949    | 5.951    | 5.956    |
| 45     | 5.967               | 5.988   | 6.169   | 5.985   | 5.984   | 5.970   | 5.990   | 6.197   | 5.971   | 5.963   | 5.974    | 5.972    | 5.967    |
| 46     | 6.003               | 5.955   | 5.966   | 5.962   | 5.989   | 6.081   | 5.962   | 5.953   | 5.996   | 5.949   | 5.957    | 5.958    | 5.953    |
| 47     | 5.980               | 5.965   | 6.015   | 5.934   | 5.943   | 5.932   | 5.973   | 6.170   | 5.917   | 5.920   | 5.943    | 5.933    | 5.925    |
| 48     | 6.019               | 6.013   | 6.026   | 6.021   | 6.027   | 6.202   | 6.018   | 6.009   | 6.038   | 6.008   | 6.012    | 6.010    | 6.007    |
| 49     | 5.949               | 5.951   | 5.972   | 5.957   | 5.962   | 5.958   | 5.963   | 5.987   | 5.968   | 5.949   | 5.962    | 5.955    | 5.952    |
| 50     | 6.013               | 6.305   | 6.019   | 6.020   | 6.164   | 6.024   | 6.023   | 6.016   | 6.016   | 6.012   | 6.022    | 6.013    | 6.012    |
| Ave.   | 5.998               | 6.032   | 5.997   | 6.031   | 6.009   | 6.066   | 5.995   | 6.001   | 5.990   | 5.974   | 5.976    | 5.982    | 5.975    |
| Med.   | 6.004               | 6.006   | 5.997   | 6.011   | 6.007   | 6.061   | 5.991   | 5.984   | 5.979   | 5.966   | 5.973    | 5.975    | 5.971    |
| st dev | 0.0407              | 0.0972  | 0.0523  | 0.0906  | 0.0582  | 0.0801  | 0.0474  | 0.070   | 0.070   | 0.050   | 0.036    | 0.043    | 0.036    |
| Min.   | 5.911               | 5.925   | 5.923   | 5.923   | 5.926   | 5.932   | 5.922   | 5.922   | 5.905   | 5.908   | 5.911    | 5.918    | 5.914    |
| Max.   | 6.068               | 6.322   | 6.169   | 6.267   | 6.216   | 6.227   | 6.211   | 6.265   | 6.284   | 6.222   | 6.046    | 6.140    | 6.035    |

| No.    | Forward Voltage (V) |          |          |          |          |          |          |          |
|--------|---------------------|----------|----------|----------|----------|----------|----------|----------|
|        | 13000hrs            | 14000hrs | 15000hrs | 16000hrs | 17000hrs | 18000hrs | 19000hrs | 20000hrs |
| 1      | 6.025               | 6.099    | 6.083    | 6.043    | 6.051    | 6.049    | 6.055    | 6.039    |
| 2      | 5.938               | 5.993    | 6.077    | 6.012    | 5.963    | 5.979    | 5.976    | 5.979    |
| 3      | 5.999               | 6.059    | 6.078    | 5.985    | 6.023    | 5.998    | 6.011    | 5.979    |
| 4      | 5.977               | 6.029    | 6.109    | 5.991    | 5.989    | 5.899    | 5.907    | 5.905    |
| 5      | 5.977               | 6.004    | 6.043    | 6.036    | 5.996    | 5.979    | 5.982    | 5.988    |
| 6      | 5.936               | 6.006    | 6.010    | 6.004    | 5.959    | 5.938    | 5.972    | 5.965    |
| 7      | 6.051               | 6.124    | 6.101    | 6.060    | 6.151    | 6.131    | 6.142    | 6.133    |
| 8      | 5.986               | 6.040    | 6.028    | 6.024    | 6.009    | 6.020    | 6.016    | 6.023    |
| 9      | 6.016               | 6.080    | 6.079    | 5.982    | 6.046    | 6.043    | 6.044    | 6.042    |
| 10     | 5.953               | 6.014    | 6.050    | 5.986    | 5.992    | 5.964    | 5.942    | 5.972    |
| 11     | 5.951               | 6.014    | 6.033    | 5.981    | 6.031    | 6.059    | 6.037    | 6.023    |
| 12     | 6.004               | 6.062    | 6.100    | 6.015    | 5.995    | 5.920    | 5.925    | 5.935    |
| 13     | 5.968               | 6.021    | 6.049    | 6.003    | 6.007    | 5.995    | 5.987    | 5.947    |
| 14     | 6.015               | 6.070    | 6.082    | 6.072    | 6.048    | 6.044    | 6.046    | 6.064    |
| 15     | 5.982               | 6.038    | 6.063    | 6.045    | 6.021    | 6.029    | 6.033    | 6.025    |
| 16     | 5.983               | 6.043    | 6.098    | 6.021    | 6.021    | 6.074    | 6.027    | 6.013    |
| 17     | 5.989               | 6.042    | 6.035    | 5.961    | 6.017    | 6.029    | 6.027    | 6.027    |
| 18     | 5.941               | 5.993    | 5.996    | 5.999    | 5.963    | 5.960    | 5.981    | 5.989    |
| 19     | 6.020               | 6.076    | 6.073    | 6.055    | 6.077    | 6.051    | 6.067    | 6.057    |
| 20     | 5.988               | 6.041    | 6.064    | 6.013    | 6.019    | 6.004    | 5.995    | 5.991    |
| 21     | 5.945               | 5.998    | 6.005    | 5.987    | 5.977    | 5.979    | 5.971    | 5.975    |
| 22     | 6.042               | 6.095    | 6.091    | 6.048    | 6.073    | 6.085    | 6.072    | 6.051    |
| 23     | 5.982               | 6.030    | 6.047    | 6.022    | 6.016    | 6.015    | 6.018    | 6.028    |
| 24     | 6.042               | 6.099    | 6.103    | 6.102    | 6.071    | 6.069    | 6.036    | 6.041    |
| 25     | 5.996               | 6.043    | 6.056    | 6.001    | 6.022    | 6.018    | 6.035    | 6.028    |
| 26     | 5.928               | 5.985    | 5.966    | 5.989    | 5.958    | 5.980    | 5.971    | 5.994    |
| 27     | 5.922               | 5.997    | 6.004    | 5.989    | 5.952    | 5.930    | 5.987    | 5.977    |
| 28     | 6.033               | 6.089    | 6.106    | 6.092    | 6.063    | 6.050    | 6.038    | 6.033    |
| 29     | 5.956               | 6.025    | 6.015    | 6.000    | 6.089    | 6.073    | 6.086    | 6.063    |
| 30     | 5.949               | 6.011    | 6.004    | 5.954    | 6.041    | 6.008    | 6.022    | 6.013    |
| 31     | 6.011               | 6.074    | 6.075    | 5.971    | 6.043    | 6.041    | 6.011    | 6.029    |
| 32     | 5.952               | 5.993    | 5.978    | 5.972    | 5.960    | 5.972    | 5.972    | 5.964    |
| 33     | 6.003               | 6.055    | 6.062    | 6.021    | 6.035    | 6.038    | 6.055    | 6.055    |
| 34     | 5.968               | 6.019    | 6.035    | 5.986    | 6.045    | 6.025    | 6.024    | 6.023    |
| 35     | 6.029               | 6.083    | 6.084    | 6.070    | 6.054    | 6.054    | 6.038    | 6.002    |
| 36     | 6.025               | 6.068    | 6.075    | 6.061    | 6.045    | 6.045    | 6.029    | 6.023    |
| 37     | 5.953               | 6.017    | 6.014    | 5.967    | 5.982    | 5.980    | 5.993    | 5.984    |
| 38     | 6.028               | 6.086    | 6.094    | 6.020    | 6.056    | 6.048    | 6.036    | 6.036    |
| 39     | 5.948               | 6.002    | 6.034    | 6.021    | 5.977    | 5.985    | 5.979    | 5.976    |
| 40     | 6.019               | 6.047    | 6.093    | 6.056    | 6.047    | 6.031    | 6.026    | 6.025    |
| 41     | 6.026               | 6.082    | 6.081    | 6.049    | 6.063    | 6.045    | 6.041    | 6.029    |
| 42     | 5.949               | 6.003    | 6.052    | 6.011    | 5.982    | 5.982    | 5.987    | 5.974    |
| 43     | 6.042               | 6.090    | 6.100    | 6.072    | 6.065    | 6.060    | 6.048    | 6.011    |
| 44     | 5.958               | 6.009    | 5.998    | 5.983    | 5.988    | 6.008    | 6.033    | 6.028    |
| 45     | 5.979               | 6.032    | 6.032    | 6.054    | 6.014    | 6.026    | 5.998    | 5.982    |
| 46     | 5.964               | 6.021    | 6.007    | 6.032    | 5.994    | 6.011    | 5.990    | 5.996    |
| 47     | 5.937               | 5.992    | 5.993    | 6.003    | 5.966    | 5.969    | 5.935    | 5.940    |
| 48     | 6.018               | 6.076    | 6.089    | 6.046    | 6.046    | 6.033    | 6.020    | 6.024    |
| 49     | 5.967               | 6.018    | 6.007    | 5.994    | 5.994    | 6.011    | 6.008    | 6.002    |
| 50     | 6.027               | 6.080    | 6.076    | 6.052    | 6.051    | 6.056    | 6.046    | 6.049    |
| Ave.   | 5.986               | 6.041    | 6.053    | 6.018    | 6.021    | 6.016    | 6.014    | 6.009    |
| Med.   | 5.983               | 6.039    | 6.059    | 6.014    | 6.021    | 6.023    | 6.021    | 6.018    |
| st dev | 0.036               | 0.036    | 0.039    | 0.035    | 0.041    | 0.045    | 0.042    | 0.040    |
| Min.   | 5.922               | 5.985    | 5.966    | 5.954    | 5.952    | 5.899    | 5.907    | 5.905    |
| Max.   | 6.051               | 6.124    | 6.109    | 6.102    | 6.151    | 6.131    | 6.142    | 6.133    |

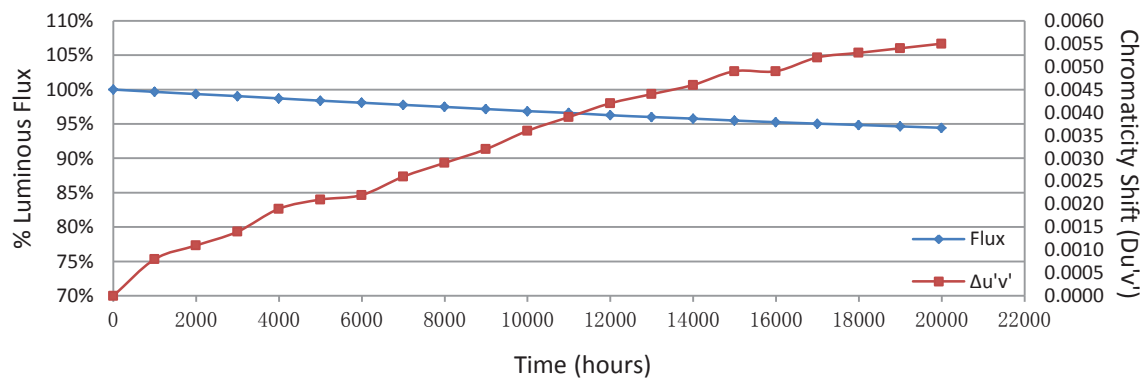


### 3.3 Data Set 1, 105°C, 150mA (Chromaticity Shift)

| No.    | u'           | v'     | CCT(K)  | Chromaticity Shift ( $\Delta u'v'$ ) |         |         |         |         |         |         |         |         |          |
|--------|--------------|--------|---------|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
|        | 0hr(Initial) |        |         | 1000hrs                              | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs |
| 1      | 0.2494       | 0.5249 | 3007    | 0.0006                               | 0.0010  | 0.0014  | 0.0017  | 0.0018  | 0.0021  | 0.0024  | 0.0027  | 0.0030  | 0.0033   |
| 2      | 0.2459       | 0.5200 | 3128    | 0.0008                               | 0.0010  | 0.0014  | 0.0018  | 0.0020  | 0.0022  | 0.0025  | 0.0028  | 0.0033  | 0.0036   |
| 3      | 0.2458       | 0.5186 | 3140    | 0.0007                               | 0.0010  | 0.0013  | 0.0017  | 0.0019  | 0.0022  | 0.0024  | 0.0027  | 0.0032  | 0.0035   |
| 4      | 0.2448       | 0.5211 | 3150    | 0.0007                               | 0.0009  | 0.0013  | 0.0017  | 0.0019  | 0.0021  | 0.0024  | 0.0027  | 0.0032  | 0.0036   |
| 5      | 0.2461       | 0.5192 | 3129    | 0.0007                               | 0.0010  | 0.0015  | 0.0018  | 0.0021  | 0.0023  | 0.0026  | 0.0028  | 0.0033  | 0.0036   |
| 6      | 0.2462       | 0.5183 | 3133    | 0.0009                               | 0.0012  | 0.0015  | 0.0019  | 0.0021  | 0.0023  | 0.0026  | 0.0030  | 0.0034  | 0.0038   |
| 7      | 0.2460       | 0.5190 | 3133    | 0.0009                               | 0.0012  | 0.0015  | 0.0019  | 0.0021  | 0.0023  | 0.0027  | 0.0029  | 0.0034  | 0.0038   |
| 8      | 0.2464       | 0.5183 | 3128    | 0.0008                               | 0.0011  | 0.0015  | 0.0019  | 0.0021  | 0.0023  | 0.0026  | 0.0030  | 0.0034  | 0.0038   |
| 9      | 0.2464       | 0.5191 | 3122    | 0.0009                               | 0.0011  | 0.0014  | 0.0018  | 0.0019  | 0.0021  | 0.0025  | 0.0029  | 0.0033  | 0.0036   |
| 10     | 0.2449       | 0.5202 | 3152    | 0.0009                               | 0.0012  | 0.0016  | 0.0020  | 0.0021  | 0.0023  | 0.0027  | 0.0030  | 0.0033  | 0.0038   |
| 11     | 0.2452       | 0.5198 | 3149    | 0.0008                               | 0.0010  | 0.0013  | 0.0017  | 0.0019  | 0.0021  | 0.0025  | 0.0029  | 0.0033  | 0.0037   |
| 12     | 0.2459       | 0.5184 | 3141    | 0.0007                               | 0.0011  | 0.0014  | 0.0019  | 0.0019  | 0.0021  | 0.0024  | 0.0029  | 0.0032  | 0.0036   |
| 13     | 0.2471       | 0.5170 | 3119    | 0.0009                               | 0.0011  | 0.0014  | 0.0018  | 0.0020  | 0.0023  | 0.0026  | 0.0030  | 0.0034  | 0.0038   |
| 14     | 0.2466       | 0.5185 | 3121    | 0.0010                               | 0.0012  | 0.0017  | 0.0021  | 0.0021  | 0.0023  | 0.0027  | 0.0031  | 0.0034  | 0.0038   |
| 15     | 0.2451       | 0.5183 | 3161    | 0.0008                               | 0.0010  | 0.0014  | 0.0018  | 0.0019  | 0.0021  | 0.0026  | 0.0029  | 0.0033  | 0.0036   |
| 16     | 0.2458       | 0.5194 | 3137    | 0.0008                               | 0.0011  | 0.0014  | 0.0019  | 0.0021  | 0.0022  | 0.0026  | 0.0029  | 0.0034  | 0.0038   |
| 17     | 0.2438       | 0.5191 | 3191    | 0.0008                               | 0.0011  | 0.0014  | 0.0018  | 0.0020  | 0.0021  | 0.0025  | 0.0028  | 0.0033  | 0.0037   |
| 18     | 0.2457       | 0.5193 | 3138    | 0.0008                               | 0.0011  | 0.0014  | 0.0019  | 0.0020  | 0.0022  | 0.0025  | 0.0028  | 0.0033  | 0.0036   |
| 19     | 0.2457       | 0.5192 | 3138    | 0.0007                               | 0.0010  | 0.0013  | 0.0017  | 0.0019  | 0.0020  | 0.0023  | 0.0026  | 0.0030  | 0.0034   |
| 20     | 0.2454       | 0.5203 | 3140    | 0.0007                               | 0.0009  | 0.0012  | 0.0017  | 0.0019  | 0.0020  | 0.0024  | 0.0027  | 0.0030  | 0.0034   |
| 21     | 0.2454       | 0.5180 | 3157    | 0.0009                               | 0.0011  | 0.0014  | 0.0021  | 0.0022  | 0.0022  | 0.0026  | 0.0030  | 0.0034  | 0.0037   |
| 22     | 0.2463       | 0.5189 | 3127    | 0.0007                               | 0.0009  | 0.0013  | 0.0017  | 0.0020  | 0.0020  | 0.0024  | 0.0026  | 0.0029  | 0.0034   |
| 23     | 0.2457       | 0.5183 | 3147    | 0.0007                               | 0.0009  | 0.0013  | 0.0017  | 0.0020  | 0.0021  | 0.0024  | 0.0027  | 0.0030  | 0.0034   |
| 24     | 0.2467       | 0.5190 | 3115    | 0.0009                               | 0.0011  | 0.0015  | 0.0019  | 0.0021  | 0.0022  | 0.0026  | 0.0030  | 0.0033  | 0.0037   |
| 25     | 0.2463       | 0.5178 | 3135    | 0.0008                               | 0.0010  | 0.0014  | 0.0020  | 0.0022  | 0.0022  | 0.0026  | 0.0029  | 0.0031  | 0.0038   |
| 26     | 0.2457       | 0.5189 | 3141    | 0.0007                               | 0.0009  | 0.0013  | 0.0018  | 0.0020  | 0.0022  | 0.0024  | 0.0028  | 0.0032  | 0.0036   |
| 27     | 0.2465       | 0.5184 | 3125    | 0.0009                               | 0.0010  | 0.0013  | 0.0018  | 0.0021  | 0.0023  | 0.0024  | 0.0029  | 0.0032  | 0.0036   |
| 28     | 0.2473       | 0.5179 | 3106    | 0.0007                               | 0.0011  | 0.0014  | 0.0018  | 0.0021  | 0.0023  | 0.0026  | 0.0029  | 0.0033  | 0.0036   |
| 29     | 0.2451       | 0.5181 | 3165    | 0.0007                               | 0.0010  | 0.0013  | 0.0017  | 0.0020  | 0.0022  | 0.0025  | 0.0028  | 0.0031  | 0.0035   |
| 30     | 0.2453       | 0.5177 | 3161    | 0.0008                               | 0.0010  | 0.0013  | 0.0019  | 0.0021  | 0.0022  | 0.0023  | 0.0029  | 0.0031  | 0.0035   |
| 31     | 0.2461       | 0.5190 | 3129    | 0.0007                               | 0.0010  | 0.0013  | 0.0018  | 0.0021  | 0.0023  | 0.0024  | 0.0028  | 0.0030  | 0.0035   |
| 32     | 0.2463       | 0.5187 | 3126    | 0.0009                               | 0.0011  | 0.0014  | 0.0019  | 0.0021  | 0.0023  | 0.0025  | 0.0028  | 0.0032  | 0.0035   |
| 33     | 0.2463       | 0.5186 | 3129    | 0.0008                               | 0.0011  | 0.0015  | 0.0019  | 0.0021  | 0.0022  | 0.0026  | 0.0029  | 0.0032  | 0.0037   |
| 34     | 0.2459       | 0.5188 | 3136    | 0.0007                               | 0.0009  | 0.0014  | 0.0018  | 0.0020  | 0.0022  | 0.0025  | 0.0027  | 0.0032  | 0.0036   |
| 35     | 0.2462       | 0.5183 | 3134    | 0.0007                               | 0.0010  | 0.0014  | 0.0018  | 0.0020  | 0.0022  | 0.0025  | 0.0028  | 0.0030  | 0.0035   |
| 36     | 0.2504       | 0.5242 | 2988    | 0.0010                               | 0.0012  | 0.0015  | 0.0020  | 0.0023  | 0.0024  | 0.0028  | 0.0030  | 0.0033  | 0.0037   |
| 37     | 0.2452       | 0.5188 | 3155    | 0.0009                               | 0.0011  | 0.0014  | 0.0018  | 0.0021  | 0.0023  | 0.0026  | 0.0028  | 0.0032  | 0.0036   |
| 38     | 0.2497       | 0.5254 | 2997    | 0.0007                               | 0.0009  | 0.0014  | 0.0017  | 0.0020  | 0.0022  | 0.0025  | 0.0027  | 0.0030  | 0.0034   |
| 39     | 0.2469       | 0.5190 | 3110    | 0.0009                               | 0.0012  | 0.0016  | 0.0021  | 0.0023  | 0.0025  | 0.0028  | 0.0030  | 0.0033  | 0.0040   |
| 40     | 0.2513       | 0.5237 | 2968    | 0.0009                               | 0.0012  | 0.0015  | 0.0019  | 0.0021  | 0.0023  | 0.0026  | 0.0028  | 0.0032  | 0.0036   |
| 41     | 0.2455       | 0.5174 | 3159    | 0.0008                               | 0.0011  | 0.0015  | 0.0020  | 0.0022  | 0.0023  | 0.0027  | 0.0029  | 0.0033  | 0.0038   |
| 42     | 0.2462       | 0.5187 | 3131    | 0.0010                               | 0.0011  | 0.0014  | 0.0019  | 0.0022  | 0.0024  | 0.0026  | 0.0028  | 0.0031  | 0.0035   |
| 43     | 0.2469       | 0.5192 | 3109    | 0.0009                               | 0.0011  | 0.0013  | 0.0020  | 0.0021  | 0.0023  | 0.0027  | 0.0030  | 0.0032  | 0.0036   |
| 44     | 0.2461       | 0.5185 | 3134    | 0.0008                               | 0.0011  | 0.0014  | 0.0020  | 0.0021  | 0.0022  | 0.0027  | 0.0028  | 0.0031  | 0.0036   |
| 45     | 0.2462       | 0.5184 | 3133    | 0.0009                               | 0.0011  | 0.0015  | 0.0020  | 0.0022  | 0.0023  | 0.0028  | 0.0030  | 0.0033  | 0.0038   |
| 46     | 0.2496       | 0.5271 | 2988    | 0.0009                               | 0.0011  | 0.0015  | 0.0020  | 0.0021  | 0.0023  | 0.0027  | 0.0030  | 0.0034  | 0.0037   |
| 47     | 0.2463       | 0.5183 | 3132    | 0.0009                               | 0.0011  | 0.0015  | 0.0020  | 0.0022  | 0.0024  | 0.0028  | 0.0030  | 0.0033  | 0.0038   |
| 48     | 0.2451       | 0.5184 | 3161    | 0.0007                               | 0.0010  | 0.0014  | 0.0018  | 0.0021  | 0.0022  | 0.0025  | 0.0028  | 0.0032  | 0.0035   |
| 49     | 0.2462       | 0.5184 | 3132    | 0.0008                               | 0.0010  | 0.0014  | 0.0019  | 0.0022  | 0.0023  | 0.0026  | 0.0028  | 0.0031  | 0.0035   |
| 50     | 0.2460       | 0.5197 | 3127    | 0.0009                               | 0.0012  | 0.0015  | 0.0020  | 0.0022  | 0.0023  | 0.0027  | 0.0029  | 0.0031  | 0.0036   |
| Ave.   | 0.2463       | 0.5194 | 3122    | 0.0008                               | 0.0011  | 0.0014  | 0.0019  | 0.0021  | 0.0022  | 0.0026  | 0.0029  | 0.0032  | 0.0036   |
| Med.   | 0.2461       | 0.5188 | 3133    | 0.0008                               | 0.0011  | 0.0014  | 0.0019  | 0.0021  | 0.0022  | 0.0026  | 0.0029  | 0.0032  | 0.0036   |
| st dev | 0.0014       | 0.0021 | 47.5296 | 0.0001                               | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001   |
| Min.   | 0.2438       | 0.5170 | 2968    | 0.0006                               | 0.0009  | 0.0012  | 0.0017  | 0.0018  | 0.0020  | 0.0023  | 0.0026  | 0.0029  | 0.0033   |
| Max.   | 0.2513       | 0.5271 | 3191    | 0.0010                               | 0.0012  | 0.0017  | 0.0021  | 0.0023  | 0.0025  | 0.0028  | 0.0031  | 0.0034  | 0.0040   |



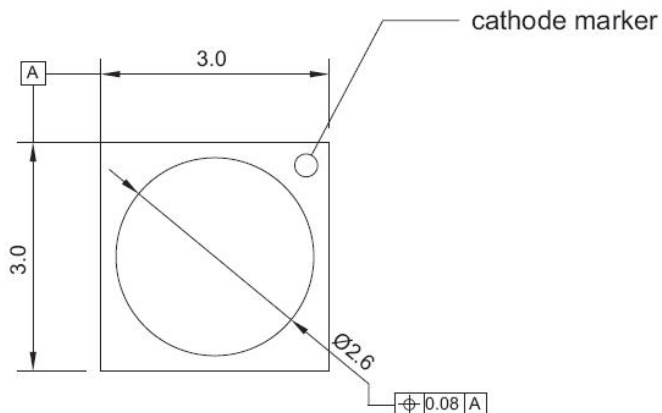
| No.    | Chromaticity Shift ( $\Delta u'v'$ ) |          |          |          |          |          |          |          |
|--------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|
|        | 13000hrs                             | 14000hrs | 15000hrs | 16000hrs | 17000hrs | 18000hrs | 19000hrs | 20000hrs |
| 1      | 0.0041                               | 0.0042   | 0.0043   | 0.0044   | 0.0043   | 0.0041   | 0.0040   | 0.0039   |
| 2      | 0.0045                               | 0.0047   | 0.0048   | 0.0048   | 0.0049   | 0.0051   | 0.0050   | 0.0050   |
| 3      | 0.0044                               | 0.0046   | 0.0048   | 0.0046   | 0.0047   | 0.0048   | 0.0049   | 0.0050   |
| 4      | 0.0044                               | 0.0046   | 0.0050   | 0.0050   | 0.0050   | 0.0051   | 0.0051   | 0.0052   |
| 5      | 0.0046                               | 0.0047   | 0.0051   | 0.0052   | 0.0053   | 0.0055   | 0.0056   | 0.0056   |
| 6      | 0.0048                               | 0.0050   | 0.0054   | 0.0054   | 0.0057   | 0.0059   | 0.0061   | 0.0062   |
| 7      | 0.0047                               | 0.0048   | 0.0051   | 0.0051   | 0.0052   | 0.0054   | 0.0055   | 0.0056   |
| 8      | 0.0045                               | 0.0047   | 0.0051   | 0.0051   | 0.0051   | 0.0051   | 0.0051   | 0.0051   |
| 9      | 0.0043                               | 0.0045   | 0.0050   | 0.0048   | 0.0049   | 0.0049   | 0.0050   | 0.0050   |
| 10     | 0.0043                               | 0.0045   | 0.0049   | 0.0051   | 0.0051   | 0.0051   | 0.0052   | 0.0052   |
| 11     | 0.0043                               | 0.0045   | 0.0047   | 0.0048   | 0.0049   | 0.0051   | 0.0053   | 0.0054   |
| 12     | 0.0044                               | 0.0046   | 0.0048   | 0.0049   | 0.0050   | 0.0051   | 0.0053   | 0.0052   |
| 13     | 0.0046                               | 0.0048   | 0.0049   | 0.0051   | 0.0054   | 0.0056   | 0.0057   | 0.0057   |
| 14     | 0.0045                               | 0.0047   | 0.0049   | 0.0050   | 0.0056   | 0.0057   | 0.0059   | 0.0060   |
| 15     | 0.0046                               | 0.0048   | 0.0052   | 0.0052   | 0.0057   | 0.0058   | 0.0059   | 0.0059   |
| 16     | 0.0048                               | 0.0050   | 0.0054   | 0.0055   | 0.0059   | 0.0062   | 0.0064   | 0.0064   |
| 17     | 0.0044                               | 0.0046   | 0.0047   | 0.0049   | 0.0051   | 0.0053   | 0.0056   | 0.0055   |
| 18     | 0.0043                               | 0.0045   | 0.0048   | 0.0051   | 0.0051   | 0.0052   | 0.0052   | 0.0053   |
| 19     | 0.0040                               | 0.0041   | 0.0047   | 0.0048   | 0.0048   | 0.0049   | 0.0050   | 0.0051   |
| 20     | 0.0039                               | 0.0041   | 0.0045   | 0.0047   | 0.0048   | 0.0049   | 0.0051   | 0.0052   |
| 21     | 0.0044                               | 0.0045   | 0.0049   | 0.0051   | 0.0051   | 0.0052   | 0.0053   | 0.0054   |
| 22     | 0.0041                               | 0.0042   | 0.0045   | 0.0048   | 0.0048   | 0.0048   | 0.0049   | 0.0050   |
| 23     | 0.0041                               | 0.0042   | 0.0045   | 0.0047   | 0.0048   | 0.0049   | 0.0051   | 0.0053   |
| 24     | 0.0043                               | 0.0044   | 0.0047   | 0.0049   | 0.0052   | 0.0056   | 0.0061   | 0.0061   |
| 25     | 0.0044                               | 0.0045   | 0.0050   | 0.0050   | 0.0055   | 0.0056   | 0.0057   | 0.0059   |
| 26     | 0.0043                               | 0.0044   | 0.0049   | 0.0050   | 0.0054   | 0.0054   | 0.0055   | 0.0056   |
| 27     | 0.0042                               | 0.0044   | 0.0047   | 0.0048   | 0.0049   | 0.0051   | 0.0052   | 0.0054   |
| 28     | 0.0043                               | 0.0044   | 0.0047   | 0.0048   | 0.0050   | 0.0052   | 0.0053   | 0.0054   |
| 29     | 0.0044                               | 0.0045   | 0.0047   | 0.0047   | 0.0049   | 0.0050   | 0.0051   | 0.0051   |
| 30     | 0.0042                               | 0.0044   | 0.0046   | 0.0048   | 0.0052   | 0.0055   | 0.0054   | 0.0055   |
| 31     | 0.0043                               | 0.0045   | 0.0046   | 0.0048   | 0.0050   | 0.0052   | 0.0053   | 0.0055   |
| 32     | 0.0043                               | 0.0045   | 0.0047   | 0.0049   | 0.0052   | 0.0054   | 0.0054   | 0.0056   |
| 33     | 0.0046                               | 0.0048   | 0.0050   | 0.0052   | 0.0056   | 0.0057   | 0.0056   | 0.0057   |
| 34     | 0.0043                               | 0.0045   | 0.0049   | 0.0050   | 0.0051   | 0.0052   | 0.0053   | 0.0054   |
| 35     | 0.0044                               | 0.0046   | 0.0048   | 0.0049   | 0.0052   | 0.0052   | 0.0053   | 0.0054   |
| 36     | 0.0045                               | 0.0047   | 0.0051   | 0.0052   | 0.0058   | 0.0058   | 0.0060   | 0.0062   |
| 37     | 0.0044                               | 0.0045   | 0.0048   | 0.0049   | 0.0052   | 0.0052   | 0.0051   | 0.0053   |
| 38     | 0.0041                               | 0.0043   | 0.0045   | 0.0046   | 0.0049   | 0.0048   | 0.0050   | 0.0050   |
| 39     | 0.0044                               | 0.0045   | 0.0046   | 0.0050   | 0.0055   | 0.0056   | 0.0057   | 0.0058   |
| 40     | 0.0046                               | 0.0048   | 0.0048   | 0.0049   | 0.0054   | 0.0055   | 0.0056   | 0.0057   |
| 41     | 0.0045                               | 0.0047   | 0.0049   | 0.0049   | 0.0051   | 0.0052   | 0.0053   | 0.0054   |
| 42     | 0.0044                               | 0.0045   | 0.0049   | 0.0050   | 0.0052   | 0.0053   | 0.0054   | 0.0055   |
| 43     | 0.0046                               | 0.0047   | 0.0050   | 0.0050   | 0.0055   | 0.0056   | 0.0056   | 0.0058   |
| 44     | 0.0044                               | 0.0046   | 0.0050   | 0.0049   | 0.0052   | 0.0053   | 0.0055   | 0.0056   |
| 45     | 0.0051                               | 0.0053   | 0.0056   | 0.0056   | 0.0057   | 0.0058   | 0.0054   | 0.0055   |
| 46     | 0.0046                               | 0.0048   | 0.0053   | 0.0053   | 0.0059   | 0.0059   | 0.0060   | 0.0062   |
| 47     | 0.0045                               | 0.0046   | 0.0050   | 0.0050   | 0.0051   | 0.0052   | 0.0052   | 0.0052   |
| 48     | 0.0044                               | 0.0045   | 0.0047   | 0.0049   | 0.0049   | 0.0050   | 0.0052   | 0.0053   |
| 49     | 0.0042                               | 0.0044   | 0.0047   | 0.0046   | 0.0048   | 0.0049   | 0.0050   | 0.0051   |
| 50     | 0.0045                               | 0.0047   | 0.0051   | 0.0051   | 0.0052   | 0.0053   | 0.0055   | 0.0056   |
| Ave.   | 0.0044                               | 0.0046   | 0.0049   | 0.0049   | 0.0052   | 0.0053   | 0.0054   | 0.0055   |
| Med.   | 0.0044                               | 0.0045   | 0.0048   | 0.0049   | 0.0051   | 0.0052   | 0.0053   | 0.0054   |
| st dev | 0.0002                               | 0.0002   | 0.0002   | 0.0002   | 0.0003   | 0.0004   | 0.0004   | 0.0004   |
| Min.   | 0.0039                               | 0.0041   | 0.0043   | 0.0044   | 0.0043   | 0.0041   | 0.0040   | 0.0039   |
| Max.   | 0.0051                               | 0.0053   | 0.0056   | 0.0056   | 0.0059   | 0.0062   | 0.0064   | 0.0064   |



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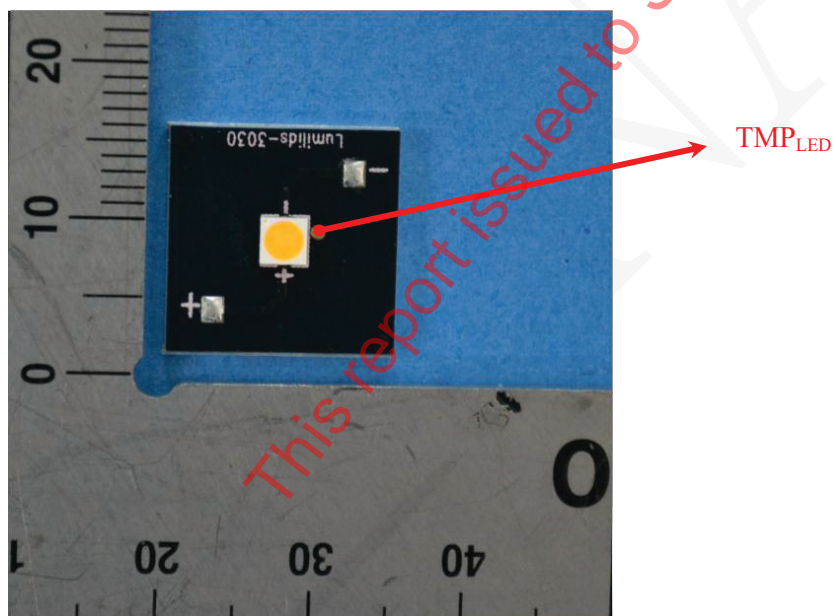
## 4 - EUT Photo

### 4.1 Mechanical Dimensions



All dimensions are in millimeter

### 4.2 EUT Photo



## 5 - Report Revision

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| Report Number             | Report Date | Contents   |
|---------------------------|-------------|--|
| R2SH160822054-10-20000    | 2020-12-08  | Original report.   |
| R2SH160822054-10-20000-M1 | 2020-12-15  | Update description of the multiple models.                 |
| R2SH160822054-10-20000-M2 | 2021-02-24  | Remove the DUT characteristics and family products covered |

FINAL  
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**Directions**

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1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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\*\*\*\*\*END OF REPORT\*\*\*\*\*

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## About Lumileds

Lumileds is the global leader in light engine technology. The company develops, manufactures and distributes groundbreaking LEDs and automotive lighting products that shatter the status quo and help customers gain and maintain a competitive edge.

With a rich history of industry “firsts,” Lumileds is uniquely positioned to deliver lighting advancements well into the future by maintaining an unwavering focus on quality, innovation and reliability.

To learn more about our portfolio of light engines, visit [lumileds.com](http://lumileds.com).

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