# IESNA LM-80-08

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

## MEASUREMENT AND TEST REPORT

For

## HongliZhihui Group Co.,Ltd. Guangzhou Branch

Room 316, Building 2, No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China

## Model: HL-AS-2835H466W-3C-S1-08L-PCT-HR3(R9)

| | |
|---|---|
| **Report Type:**<br>10000 Hours Test Report | **Product Type:**<br>LED Package |
| **Reviewed By:** | Pote Wang |
| **Report Number:** | SZ2220121-03120E-10 |
| **Test Date:** | 2014-10-04 to 2015-11-24 |
| **Report Date:** | 2022-01-24 |
| **Approved By:** | Blake Zhang / EE Engineer |
| **Prepared By:** | Bay Area Compliance Laboratories Corp. (Dongguan).<br>No.12, Pulong East 1st 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

| | |
|---|---|
| Part Number: | HL-AS-2835H466W-3C-S1-08L-PCT-HR3(R9) |
| Part Name: | 2835 |
| Part Type: | LED Package |
| #Nominal CCT: | 3000K |
| #Power: | 1W |
| #Average Current Density per LED die: | 906.43 mA/mm$^2$ |
| #Average Power Density per LED die: | 3.07W/mm$^2$ |
| #CRI: | 80 |
| #Die Spacing: | 0.15mm |

**Family products covered by this report:**
According to ENERGY STAR® Requirements for the Use of LM-80 Data, the following products can be covered by this report base on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements of ENERGY STAR® Requirements for the Use of LM-80 Data (September 28, 2017)
This report covers the following models:

| Model type | Model name | CRI | CCT (K) | Series | Parallel | Power density (W/mm$^2$) | Current density per LED die (mA/mm$^2$) | Current per die (mA) | Distance between of dies(mm) | Current (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| Master model | HL-AS-2835H466W-3C-S1-08L-PCT-HR3(R9) | 80 | 3000 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |
| Multiple model | HL-**-2835H***W-3C-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |
| | HL-**-2835H***W-3C-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |
| | HL-**-2835D***W-3C-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 516.668 | 100 | 0.15 | 100 |
| | HL-**-2835D***W-3C-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 516.668 | 100 | 0.15 | 100 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 516.668 | 100 | 0.15 | 300 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 516.668 | 100 | 0.15 | 300 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 906.43 | 100 | 0.15 | 300 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 906.43 | 100 | 0.15 | 300 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 103.334 | 20 | 0.15 | 60 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 103.334 | 20 | 0.15 | 60 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 181.287 | 20 | 0.15 | 60 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 181.287 | 20 | 0.15 | 60 |

| Model type | Model name | CRI | CCT (K) | Series | Parallel | Power density（W/mm$^2$） | Current density per LED die (mA/mm$^2$) | Current per die (mA) | Distance between of dies(mm) | Current (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| Multiple model | HL-**-2835H***W-2-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 679.825 | 75 | 0.15 | 150 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 679.825 | 75 | 0.15 | 150 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 387.5 | 75 | 0.15 | 150 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 387.5 | 75 | 0.15 | 150 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 271.93 | 30 | 0.15 | 60 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 271.93 | 30 | 0.15 | 60 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 155 | 30 | 0.15 | 60 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 155 | 30 | 0.15 | 60 |
| | HL-**-2835D***W-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 775 | 150 | / | 150 |
| | HL-**-2835D***W-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 775 | 150 | / | 150 |
| | HL-**-2835H***W-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 906.43 | 150 | / | 150 |
| | HL-**-2835H***W-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 906.43 | 150 | / | 150 |
| | HL-**-2835D***W-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 310 | 60 | / | 60 |
| | HL-**-2835D***W-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 310 | 60 | / | 60 |
| | HL-**-2835H***W-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 531.429 | 60 | / | 60 |
| | HL-**-2835H***W-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 531.429 | 60 | / | 60 |
| | HL-**-2835D***W-2C-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 775 | 150 | 0.15 | 150 |
| | HL-**-2835D***W-2C-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 775 | 150 | 0.15 | 150 |
| | HL-**-2835H***W-2C-S1-08*-PCT-HR3(R9)-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 906.43 | 150 | 0.15 | 150 |
| | HL-**-2835H***W-2C-S1-08*-PCT-HR3-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 906.43 | 150 | 0.15 | 150 |
| | HL-**-2835H***W-3C-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |

| Model type | Model name | CRI | CCT (K) | Series | Parallel | Power density（$W/mm^2$） | Current density per LED die ($mA/mm^2$) | Current per die (mA) | Distance between of dies(mm) | Current (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| Multiple model | HL-**-2835H***W-3C-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |
| | HL-**-2835D***W-3C-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 516.668 | 100 | 0.15 | 100 |
| | HL-**-2835D***W-3C-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 516.668 | 100 | 0.15 | 100 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 516.668 | 100 | 0.15 | 300 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 516.668 | 100 | 0.15 | 300 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 906.43 | 100 | 0.15 | 300 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.102041 | 906.43 | 100 | 0.15 | 300 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 103.334 | 20 | 0.15 | 60 |
| | HL-**-2835D***W-3-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 103.334 | 20 | 0.15 | 60 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 181.287 | 20 | 0.15 | 60 |
| | HL-**-2835H***W-3-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 3 | 0.0208 | 181.287 | 20 | 0.15 | 60 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 679.825 | 75 | 0.15 | 150 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 679.825 | 75 | 0.15 | 150 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 387.5 | 75 | 0.15 | 150 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 387.5 | 75 | 0.15 | 150 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 271.93 | 30 | 0.15 | 60 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 271.93 | 30 | 0.15 | 60 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 155 | 30 | 0.15 | 60 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 155 | 30 | 0.15 | 60 |
| | HL-**-2835D***W-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 775 | 150 | / | 150 |
| | HL-**-2835D***W-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 775 | 150 | / | 150 |

| Model type | Model name | CRI | CCT (K) | Series | Parallel | Power density（W/mm$^2$） | Current density per LED die (mA/mm$^2$) | Current per die (mA) | Distance between of dies(mm) | Current (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| Multiple model | HL-**-2835H***W-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 906.43 | 150 | / | 150 |
| | HL-**-2835H***W-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.052 | 906.43 | 150 | / | 150 |
| | HL-**-2835D***W-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 310 | 60 | / | 60 |
| | HL-**-2835D***W-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 310 | 60 | / | 60 |
| | HL-**-2835H***W-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 531.429 | 60 | / | 60 |
| | HL-**-2835H***W-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 1 | 1 | 0.0208 | 531.429 | 60 | / | 60 |
| | HL-**-2835D***W-2C-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 775 | 150 | 0.15 | 150 |
| | HL-**-2835D***W-2C-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 775 | 150 | 0.15 | 150 |
| | HL-**-2835H***W-2C-S1-08*-PCT-HR3(R9)-T6-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 906.43 | 150 | 0.15 | 150 |
| | HL-**-2835H***W-2C-S1-08*-PCT-HR3-T6-*** | 80 | 2700-6500 | 2 | 1 | 0.102041 | 906.43 | 150 | 0.15 | 150 |

**Note:**

The model name begins with "HL", such as "HL-**-2835H***W-3C-S1-08*-PCT-HR3(R9)-***","*" is described in detail as follows :

1. The first "**" is a letter A or AS which stands for the Market demand .
2. The second "***" is a number from 1 to 999 which stands for the brightness level.
3. The third "*" is a letter L or None which stands for the bonding wire style.
4. The fourth "***" is the letter or None, which stands for the customer code.

**Note:**

1. The applicant HongliZhihui Group Co.,Ltd. Guangzhou Branch declare that their products with model HL-AS-2835H466W-3C-S1-08L-PCT-HR3(R9) are the same to the products in report# R2DG140930050-10-10000-M5 and is authorized by original applicant to use their test data.
2. All the data in previous report (R2DG140930050-10-10000-M5) is shared in this report.

## 1.2 Standards Used:

- IESNA LM-80-08: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs (This standard was not accredited by IAS)
- ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by IAS)

## 1.3 Test Facility

The testing facility used by Bay Area Compliance Laboratories Corp. (Dongguan). Is located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

## 1.4 Description of Auxiliary Equipment

| Device | Manufacture | Model No | Serial No | Calibration date | Calibration due date |
|---|---|---|---|---|---|
| Integral Sphere | EVERFINE | Diameter 0.3m | 1011119 | 2016-03-10 | 2017-03-09 |
| Programmable Test Power for LEDs | EVERFINE | LED300E | 1008002 | 2016-03-04 | 2017-03-03 |
| High accuracy array spectroradiometer | EVERFINE | HAAS-2000 | 1012016T | 2016-03-10 | 2017-03-09 |
| Standard Light Source | EVERFINE | D062 | 1011093 | 2015-09-17 | 2016-09-16 |
| Precision digital stabilized DC power supply | EVERFINE | WY605-V110 | G115987CJ7321114 | 2016-03-04 | 2017-03-03 |
| Multilayer aging machine | BACL | B2-270 | 20013 | 2015-09-14 | 2016-09-13 |
| Digital CC&CV DC Power Supply | EVERFINE | WY5015 | 11060002 | 2015-07-08 | 2016-07-07 |
| Digital CC&CV DC Power Supply | EVERFINE | WY5015 | 11090008 | 2015-07-08 | 2016-07-07 |

## 1.5 Operating Cycle

Samples are driven with a constant direct current (DC)

## 1.6 Ambient Conditions

For lumen maintenance test, samples were operated in thermal chambers with minimal ambient airflow. For long term reliability test, the case temperature was controlled by mounting several thermocouples on a sample reliability stress board at the designated thermal measurement point, as shown in APPENDIX. The ambient temperature $T_A$ was measured by several thermocouples at a distance of 5 mm above the reliability test board. The relative humidity within chamber was less than 65%.

For photometry measurement, temperature was set to 25℃ ±2℃, RH <65%.

## 1.7 Photometry 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. This calibration results traceable to the NATIONAL INSTITUTE OF METROLOGY (NIM).

## 1.8 Sample Set

**Sampling Method:**
LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.
These manufacturing lots are picked to represent a wide parametric distribution.

**Sample Size:**
Total 50Pcs;
Each Ts test condition 25Pcs
The samples tested at Ts 85℃ and Ts 105℃ were received at 2014-09-30 and tested during 2014-10-04 to 2015-11-24. The samples were numbered from 1 to 25 and 26 to 50

| **Data Set 1: 85℃,100mA** | |
|---|---|
| Part Number: | HL-AS-2835H466W-3C-S1-08L-PCT-HR3(R9) |
| Number of Units: | 25 |
| Actual Case Temperature($T_S$): | $T_S$ =84.2℃ |
| Actual Ambient Temperature($T_A$): | $T_A$ =82.4℃ |
| Life Test Drive Current: | $I_F$ =100mA |
| Measurement Current: | $I_F$ =100mA |

| **Data Set 2: 105℃, 100mA** | |
|---|---|
| Part Number: | HL-AS-2835H466W-3C-S1-08L-PCT-HR3(R9) |
| Number of Units: | 25 |
| Actual Case Temperature($T_S$): | $T_S$ =104.3℃ |
| Actual Ambient Temperature($T_A$): | $T_A$ =103.2℃ |
| Life Test Drive Current: | $I_F$ = 100mA |
| Measurement Current: | $I_F$ = 100mA |

# 2 - SUMMARY OF TEST RESULT

| **Data Set:** | **Data Set 1, 85℃, 100mA** |
|---|---|
| Number of Units: | 25 |
| Failures Observed: | 0 |
| Test Interval and Test Duration: | 0h,1000h,2000h,3000h,4000h,5000h,6000h,7000h,8000, 9000h,10000h |
| Average. Lumen Maintenance at 10000 hours: | 96.16% |
| Average Chromaticity Shift at 10000 hours(Δu'v'): | 0.0032 |
| Reported TM-21 $L_{70}$ Lifetime: | >60,000 hours |

| **Data Set:** | **Data Set 2, 105℃, 100mA** |
|---|---|
| Number of Units: | 25 |
| Failures Observed: | 0 |
| Test Interval and Test Duration: | 0h,1000h,2000h,3000h,4000h,5000h,6000h,7000h,8000, 9000h,10000h |
| Average. Lumen Maintenance at 10000 hours: | 94.52% |
| Average Chromaticity Shift at 10000 hours(Δu'v'): | 0.0029 |
| Reported TM-21 $L_{70}$ Lifetime: | 58,000 hours |

# 3 - Test Data

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

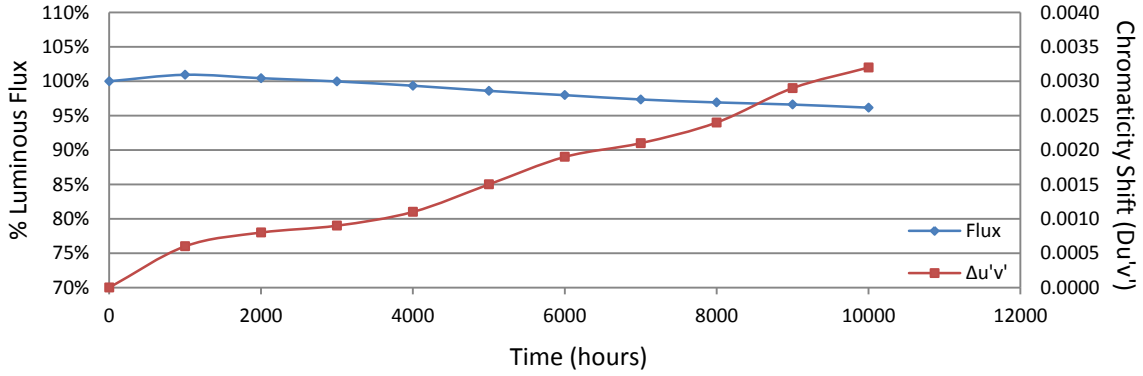
| No. | $V_F$(V) | Φ(lm) | Lumen Maintenance (%) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0hr(Initial) | | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs |
| 1 | 9.154 | 118.7 | 100.67 | 100.51 | 100.42 | 99.83 | 99.16 | 98.57 | 97.81 | 97.56 | 97.30 | 97.05 |
| 2 | 9.176 | 116.9 | 101.45 | 101.03 | 100.77 | 100.26 | 99.57 | 98.97 | 98.46 | 98.20 | 97.95 | 97.43 |
| 3 | 9.147 | 117.1 | 101.02 | 100.94 | 100.77 | 100.26 | 99.40 | 98.98 | 98.21 | 97.95 | 97.69 | 97.10 |
| 4 | 9.144 | 117.4 | 101.28 | 100.77 | 100.26 | 99.49 | 98.72 | 98.04 | 97.53 | 97.19 | 96.85 | 96.51 |
| 5 | 9.138 | 117.3 | 100.85 | 100.43 | 100.00 | 99.49 | 98.81 | 98.29 | 97.70 | 97.10 | 96.85 | 96.33 |
| 6 | 9.094 | 116.5 | 101.29 | 100.77 | 100.34 | 99.74 | 99.14 | 98.63 | 98.28 | 97.94 | 97.60 | 97.00 |
| 7 | 9.137 | 119.3 | 100.25 | 99.92 | 99.50 | 98.91 | 98.41 | 97.74 | 96.90 | 96.65 | 96.14 | 96.06 |
| 8 | 9.193 | 117.7 | 101.10 | 100.68 | 100.34 | 100.08 | 99.49 | 98.64 | 98.05 | 97.88 | 97.45 | 97.11 |
| 9 | 9.170 | 117.4 | 101.28 | 100.85 | 100.43 | 99.83 | 99.15 | 98.55 | 98.21 | 97.96 | 97.70 | 97.27 |
| 10 | 9.156 | 118.7 | 100.84 | 100.25 | 99.49 | 98.99 | 98.32 | 97.64 | 96.88 | 96.29 | 95.96 | 95.45 |
| 11 | 9.153 | 117.9 | 101.70 | 101.10 | 100.51 | 99.75 | 98.98 | 98.22 | 97.54 | 96.86 | 96.69 | 96.27 |
| 12 | 9.130 | 118.2 | 101.10 | 100.76 | 100.17 | 99.58 | 98.73 | 97.97 | 97.38 | 96.70 | 96.28 | 95.69 |
| 13 | 9.136 | 118.1 | 101.19 | 100.85 | 100.34 | 99.92 | 99.15 | 98.48 | 97.54 | 97.21 | 96.95 | 96.53 |
| 14 | 9.173 | 118.8 | 100.51 | 100.00 | 99.58 | 98.99 | 98.23 | 97.64 | 96.97 | 96.80 | 96.38 | 95.88 |
| 15 | 9.171 | 120.2 | 100.50 | 100.25 | 99.75 | 99.00 | 98.17 | 97.50 | 96.76 | 96.51 | 96.34 | 96.01 |
| 16 | 9.172 | 117.5 | 101.11 | 100.26 | 99.83 | 99.15 | 98.47 | 97.96 | 97.28 | 96.68 | 96.43 | 96.09 |
| 17 | 9.131 | 118.7 | 100.84 | 100.51 | 100.08 | 99.07 | 98.32 | 97.73 | 97.22 | 96.97 | 96.38 | 95.96 |
| 18 | 9.172 | 117.1 | 101.20 | 100.85 | 100.43 | 99.66 | 98.89 | 98.21 | 97.52 | 97.01 | 96.84 | 96.24 |
| 19 | 9.147 | 119.1 | 100.92 | 100.50 | 100.34 | 99.50 | 98.66 | 98.07 | 97.06 | 96.56 | 96.14 | 95.89 |
| 20 | 9.108 | 119.2 | 100.67 | 99.92 | 99.75 | 99.08 | 98.49 | 97.65 | 97.06 | 96.31 | 95.97 | 95.47 |
| 21 | 9.148 | 118.3 | 101.27 | 100.51 | 99.83 | 98.56 | 97.46 | 96.79 | 96.45 | 96.03 | 95.69 | 95.01 |
| 22 | 9.150 | 117.4 | 100.85 | 100.00 | 99.40 | 98.89 | 98.38 | 97.96 | 97.19 | 96.76 | 96.34 | 96.00 |
| 23 | 9.206 | 117.5 | 100.94 | 100.00 | 99.23 | 98.81 | 97.96 | 97.28 | 96.60 | 95.91 | 95.74 | 95.15 |
| 24 | 9.079 | 118.6 | 100.25 | 99.58 | 98.74 | 98.40 | 97.22 | 96.88 | 96.29 | 95.78 | 95.62 | 95.03 |
| 25 | 9.137 | 119.3 | 100.50 | 99.66 | 98.91 | 98.49 | 97.65 | 97.07 | 96.81 | 96.23 | 96.06 | 95.39 |
| Ave. | 9.149 | 118.1 | 100.94 | 100.44 | 99.97 | 99.35 | 98.60 | 97.98 | 97.35 | 96.92 | 96.61 | 96.16 |
| Med. | 9.148 | 118.1 | 100.94 | 100.51 | 100.08 | 99.49 | 98.66 | 97.97 | 97.28 | 96.80 | 96.38 | 96.06 |
| st dev | 0.0285 | 0.9 | 0.3654 | 0.4336 | 0.5446 | 0.5406 | 0.6127 | 0.5992 | 0.5936 | 0.6834 | 0.6820 | 0.7110 |
| Min. | 9.079 | 116.5 | 100.25 | 99.58 | 98.74 | 98.40 | 97.22 | 96.79 | 96.29 | 95.78 | 95.62 | 95.01 |
| Max. | 9.206 | 120.2 | 101.70 | 101.10 | 100.77 | 100.26 | 99.57 | 98.98 | 98.46 | 98.20 | 97.95 | 97.43 |

TM-21 Projection:

**Test Duration:** 10000 hours
**Failures Observed:** 0
**α:** 4.913E-06
**β:** 1.009
**Calculated $L_{70}$:** 74,000hours
**Reported $L_{70}$:** >60,000hours

## 3.2 Data Set 1, 85 ℃, 100 mA (Chromaticity Shift)

| No. | u' | v' | CCT(K) | Chromaticity Shift (Δu'v') | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0hr(Initial) | | | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs |
| 1 | 0.2524 | 0.5217 | 2953 | 0.0006 | 0.0008 | 0.0008 | 0.0010 | 0.0013 | 0.0021 | 0.0025 | 0.0026 | 0.0031 | 0.0031 |
| 2 | 0.2524 | 0.5205 | 2960 | 0.0007 | 0.0007 | 0.0007 | 0.0008 | 0.0011 | 0.0016 | 0.0020 | 0.0023 | 0.0026 | 0.0027 |
| 3 | 0.2520 | 0.5187 | 2982 | 0.0006 | 0.0008 | 0.0010 | 0.0012 | 0.0016 | 0.0020 | 0.0023 | 0.0027 | 0.0031 | 0.0034 |
| 4 | 0.2536 | 0.5204 | 2932 | 0.0006 | 0.0008 | 0.0009 | 0.0011 | 0.0014 | 0.0019 | 0.0022 | 0.0026 | 0.0031 | 0.0034 |
| 5 | 0.2535 | 0.5218 | 2928 | 0.0006 | 0.0008 | 0.0009 | 0.0012 | 0.0017 | 0.0018 | 0.0021 | 0.0026 | 0.0031 | 0.0034 |
| 6 | 0.2530 | 0.5203 | 2946 | 0.0007 | 0.0009 | 0.0009 | 0.0011 | 0.0014 | 0.0020 | 0.0023 | 0.0026 | 0.0031 | 0.0035 |
| 7 | 0.2521 | 0.5199 | 2973 | 0.0006 | 0.0008 | 0.0009 | 0.0012 | 0.0015 | 0.0017 | 0.0022 | 0.0025 | 0.0030 | 0.0032 |
| 8 | 0.2532 | 0.5219 | 2933 | 0.0007 | 0.0009 | 0.0009 | 0.0012 | 0.0014 | 0.0016 | 0.0021 | 0.0024 | 0.0030 | 0.0031 |
| 9 | 0.2526 | 0.5214 | 2950 | 0.0006 | 0.0008 | 0.0009 | 0.0011 | 0.0014 | 0.0017 | 0.0019 | 0.0023 | 0.0028 | 0.0031 |
| 10 | 0.2524 | 0.5204 | 2962 | 0.0006 | 0.0008 | 0.0010 | 0.0011 | 0.0014 | 0.0017 | 0.0019 | 0.0023 | 0.0028 | 0.0032 |
| 11 | 0.2525 | 0.5212 | 2953 | 0.0006 | 0.0009 | 0.0010 | 0.0012 | 0.0017 | 0.0019 | 0.0021 | 0.0024 | 0.0030 | 0.0033 |
| 12 | 0.2530 | 0.5190 | 2955 | 0.0006 | 0.0009 | 0.0010 | 0.0012 | 0.0016 | 0.0018 | 0.0021 | 0.0024 | 0.0030 | 0.0032 |
| 13 | 0.2529 | 0.5209 | 2947 | 0.0006 | 0.0009 | 0.0009 | 0.0012 | 0.0016 | 0.0018 | 0.0021 | 0.0024 | 0.0029 | 0.0032 |
| 14 | 0.2538 | 0.5219 | 2919 | 0.0006 | 0.0009 | 0.0012 | 0.0013 | 0.0016 | 0.0018 | 0.0021 | 0.0024 | 0.0030 | 0.0033 |
| 15 | 0.2526 | 0.5215 | 2949 | 0.0005 | 0.0007 | 0.0009 | 0.0011 | 0.0016 | 0.0018 | 0.0020 | 0.0023 | 0.0029 | 0.0032 |
| 16 | 0.2528 | 0.5187 | 2961 | 0.0005 | 0.0007 | 0.0007 | 0.0008 | 0.0013 | 0.0017 | 0.0020 | 0.0022 | 0.0028 | 0.0032 |
| 17 | 0.2532 | 0.5219 | 2934 | 0.0005 | 0.0008 | 0.0010 | 0.0012 | 0.0017 | 0.0018 | 0.0021 | 0.0023 | 0.0028 | 0.0032 |
| 18 | 0.2537 | 0.5216 | 2923 | 0.0005 | 0.0008 | 0.0009 | 0.0011 | 0.0016 | 0.0019 | 0.0021 | 0.0023 | 0.0028 | 0.0031 |
| 19 | 0.2524 | 0.5203 | 2963 | 0.0005 | 0.0008 | 0.0009 | 0.0011 | 0.0015 | 0.0019 | 0.0020 | 0.0023 | 0.0028 | 0.0032 |
| 20 | 0.2524 | 0.5205 | 2961 | 0.0007 | 0.0011 | 0.0011 | 0.0011 | 0.0015 | 0.0019 | 0.0021 | 0.0022 | 0.0027 | 0.0031 |
| 21 | 0.2531 | 0.5215 | 2937 | 0.0005 | 0.0007 | 0.0009 | 0.0011 | 0.0015 | 0.0019 | 0.0021 | 0.0023 | 0.0027 | 0.0031 |
| 22 | 0.2534 | 0.5220 | 2927 | 0.0006 | 0.0007 | 0.0008 | 0.0010 | 0.0015 | 0.0020 | 0.0022 | 0.0023 | 0.0030 | 0.0032 |
| 23 | 0.2534 | 0.5214 | 2932 | 0.0005 | 0.0007 | 0.0009 | 0.0012 | 0.0016 | 0.0020 | 0.0023 | 0.0024 | 0.0031 | 0.0034 |
| 24 | 0.2525 | 0.5199 | 2962 | 0.0006 | 0.0011 | 0.0011 | 0.0014 | 0.0017 | 0.0021 | 0.0022 | 0.0023 | 0.0030 | 0.0032 |
| 25 | 0.2526 | 0.5210 | 2952 | 0.0004 | 0.0006 | 0.0009 | 0.0012 | 0.0017 | 0.0020 | 0.0022 | 0.0023 | 0.0028 | 0.0032 |
| Ave. | 0.2529 | 0.5208 | 2948 | 0.0006 | 0.0008 | 0.0009 | 0.0011 | 0.0015 | 0.0019 | 0.0021 | 0.0024 | 0.0029 | 0.0032 |
| Med. | 0.2528 | 0.5210 | 2950 | 0.0006 | 0.0008 | 0.0009 | 0.0011 | 0.0015 | 0.0019 | 0.0021 | 0.0023 | 0.0030 | 0.0032 |
| st dev | 0.0005 | 0.0010 | 16.2847 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0002 |
| Min. | 0.2520 | 0.5187 | 2919 | 0.0004 | 0.0006 | 0.0007 | 0.0008 | 0.0011 | 0.0016 | 0.0019 | 0.0022 | 0.0026 | 0.0027 |
| Max. | 0.2538 | 0.5220 | 2982 | 0.0007 | 0.0011 | 0.0012 | 0.0014 | 0.0017 | 0.0021 | 0.0025 | 0.0027 | 0.0031 | 0.0035 |



## 3.3 Data Set 2, 105 ℃, 100 mA (Lumen Maintenance)

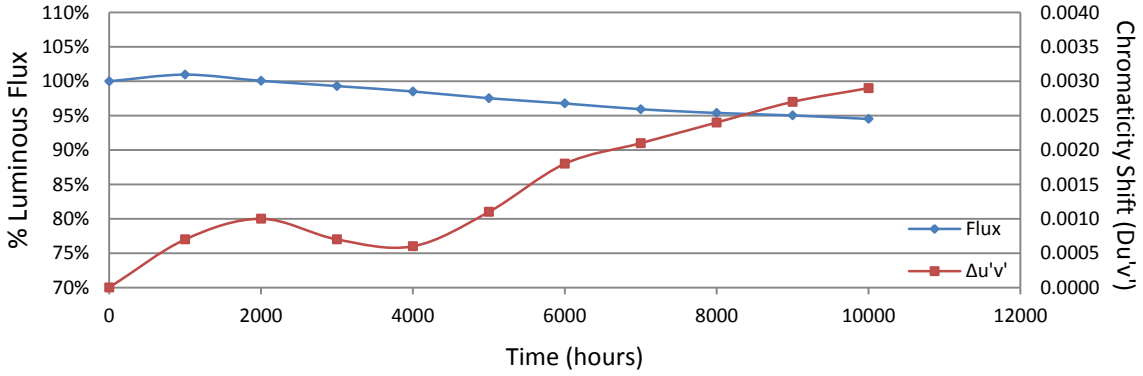
| No. | $V_F$(V) | Φ(lm) | Lumen Maintenance (%) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0hr(Initial) | | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs |
| 26 | 9.172 | 117.3 | 100.85 | 99.91 | 99.15 | 98.29 | 97.44 | 96.59 | 95.57 | 94.80 | 94.54 | 94.29 |
| 27 | 9.174 | 117.2 | 100.85 | 99.91 | 99.32 | 98.98 | 98.21 | 97.61 | 95.56 | 94.88 | 94.37 | 93.77 |
| 28 | 9.130 | 117.0 | 100.34 | 99.83 | 99.32 | 98.55 | 97.62 | 96.85 | 96.09 | 95.92 | 95.49 | 94.90 |
| 29 | 9.157 | 117.5 | 100.60 | 100.00 | 99.32 | 98.81 | 97.79 | 96.85 | 96.17 | 95.32 | 94.89 | 94.47 |
| 30 | 9.194 | 117.2 | 100.77 | 99.91 | 99.23 | 98.81 | 97.95 | 97.18 | 96.33 | 96.16 | 95.90 | 95.56 |
| 31 | 9.138 | 117.7 | 101.19 | 100.17 | 99.07 | 98.13 | 97.28 | 96.35 | 95.33 | 94.73 | 94.14 | 93.71 |
| 32 | 9.196 | 117.3 | 100.94 | 99.74 | 98.64 | 97.70 | 96.76 | 96.08 | 95.57 | 94.97 | 94.54 | 94.12 |
| 33 | 9.112 | 119.0 | 100.92 | 99.83 | 98.91 | 97.82 | 96.72 | 95.88 | 95.04 | 94.54 | 94.12 | 93.78 |
| 34 | 9.173 | 118.1 | 101.52 | 100.68 | 99.58 | 98.81 | 97.97 | 97.29 | 96.53 | 95.85 | 95.34 | 94.83 |
| 35 | 9.155 | 119.9 | 100.50 | 99.83 | 99.17 | 97.83 | 96.83 | 96.08 | 95.33 | 94.75 | 94.33 | 93.83 |
| 36 | 9.095 | 119.2 | 100.92 | 100.25 | 99.50 | 98.91 | 98.15 | 97.57 | 96.81 | 96.39 | 95.97 | 95.39 |
| 37 | 9.118 | 119.1 | 100.67 | 99.92 | 99.33 | 98.66 | 97.65 | 96.81 | 96.73 | 96.22 | 95.72 | 95.21 |
| 38 | 9.127 | 119.7 | 100.58 | 99.67 | 99.08 | 98.50 | 97.66 | 96.74 | 95.99 | 95.57 | 95.15 | 94.65 |
| 39 | 9.172 | 117.7 | 101.70 | 100.85 | 99.92 | 99.07 | 97.96 | 97.11 | 96.52 | 96.18 | 95.75 | 95.07 |
| 40 | 9.165 | 117.6 | 101.36 | 100.26 | 99.23 | 98.38 | 97.28 | 96.68 | 95.92 | 95.83 | 95.58 | 94.90 |
| 41 | 9.150 | 117.9 | 101.78 | 100.93 | 99.92 | 98.98 | 97.79 | 97.03 | 96.18 | 95.50 | 95.17 | 94.66 |
| 42 | 9.104 | 117.7 | 100.08 | 99.15 | 98.73 | 98.05 | 97.20 | 96.69 | 96.01 | 95.33 | 95.16 | 94.65 |
| 43 | 9.131 | 118.9 | 100.93 | 99.16 | 98.82 | 97.98 | 96.80 | 96.13 | 95.29 | 94.70 | 94.37 | 93.78 |
| 44 | 9.163 | 118.6 | 101.35 | 100.51 | 99.83 | 98.65 | 97.22 | 96.63 | 95.70 | 95.19 | 94.77 | 94.10 |
| 45 | 9.177 | 118.2 | 101.02 | 100.08 | 98.98 | 97.97 | 97.12 | 96.36 | 95.52 | 94.75 | 94.59 | 93.91 |
| 46 | 9.166 | 118.2 | 100.51 | 99.83 | 99.15 | 97.80 | 97.04 | 96.19 | 95.18 | 94.59 | 94.25 | 93.74 |
| 47 | 9.155 | 118.7 | 101.52 | 100.51 | 99.92 | 99.24 | 97.47 | 96.71 | 95.53 | 94.95 | 94.44 | 93.93 |
| 48 | 9.121 | 117.9 | 100.76 | 100.08 | 99.32 | 98.73 | 97.88 | 97.20 | 96.27 | 95.76 | 95.42 | 94.83 |
| 49 | 9.142 | 119.1 | 100.42 | 99.41 | 98.66 | 98.24 | 97.48 | 96.47 | 95.89 | 95.38 | 95.21 | 94.63 |
| 50 | 9.158 | 117.4 | 101.87 | 101.11 | 100.43 | 99.91 | 98.98 | 98.21 | 97.27 | 96.59 | 96.42 | 96.25 |
| Ave. | 9.150 | 118.2 | 100.96 | 100.06 | 99.30 | 98.51 | 97.53 | 96.77 | 95.93 | 95.39 | 95.03 | 94.52 |
| Med. | 9.155 | 117.9 | 100.92 | 99.92 | 99.23 | 98.55 | 97.48 | 96.71 | 95.92 | 95.33 | 95.15 | 94.63 |
| st dev | 0.0271 | 0.8 | 0.4730 | 0.4983 | 0.4399 | 0.5381 | 0.5328 | 0.5491 | 0.5635 | 0.6243 | 0.6504 | 0.6671 |
| Min. | 9.095 | 117.0 | 100.08 | 99.15 | 98.64 | 97.70 | 96.72 | 95.88 | 95.04 | 94.54 | 94.12 | 93.71 |
| Max. | 9.196 | 119.9 | 101.87 | 101.11 | 100.43 | 99.91 | 98.98 | 98.21 | 97.27 | 96.59 | 96.42 | 96.25 |

TM-21 Projection:

**Test Duration:** 10000 hours
**Failures Observed:** 0
**α:** 6.195E-06
**β:** 1.004
**Calculated $L_{70}$:** 58,000 hours
**Reported $L_{70}$:** 58,000 hours

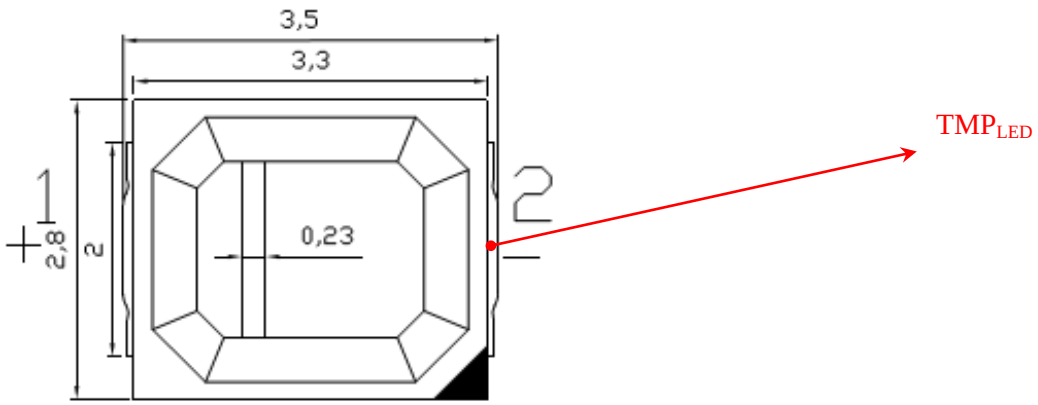
## 3.4 Data Set 2, 105 ℃, 100 mA (Chromaticity Shift)

| No. | u' | v' | CCT(K) | Chromaticity Shift (Δu'v') | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0hr(Initial) | | | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs |
| 26 | 0.2532 | 0.5202 | 2942 | 0.0006 | 0.0009 | 0.0006 | 0.0008 | 0.0014 | 0.0019 | 0.0020 | 0.0023 | 0.0028 | 0.0031 |
| 27 | 0.2534 | 0.5216 | 2931 | 0.0006 | 0.0008 | 0.0004 | 0.0006 | 0.0012 | 0.0020 | 0.0022 | 0.0025 | 0.0029 | 0.0032 |
| 28 | 0.2540 | 0.5208 | 2921 | 0.0008 | 0.0009 | 0.0006 | 0.0007 | 0.0013 | 0.0021 | 0.0024 | 0.0026 | 0.0029 | 0.0032 |
| 29 | 0.2533 | 0.5225 | 2927 | 0.0006 | 0.0008 | 0.0004 | 0.0006 | 0.0010 | 0.0018 | 0.0021 | 0.0023 | 0.0026 | 0.0030 |
| 30 | 0.2529 | 0.5202 | 2949 | 0.0006 | 0.0009 | 0.0006 | 0.0006 | 0.0014 | 0.0020 | 0.0022 | 0.0026 | 0.0028 | 0.0031 |
| 31 | 0.2536 | 0.5215 | 2925 | 0.0006 | 0.0010 | 0.0007 | 0.0006 | 0.0010 | 0.0017 | 0.0020 | 0.0023 | 0.0025 | 0.0028 |
| 32 | 0.2536 | 0.5211 | 2928 | 0.0006 | 0.0008 | 0.0006 | 0.0008 | 0.0015 | 0.0022 | 0.0026 | 0.0028 | 0.0031 | 0.0034 |
| 33 | 0.2526 | 0.5211 | 2952 | 0.0007 | 0.0011 | 0.0006 | 0.0006 | 0.0011 | 0.0018 | 0.0022 | 0.0024 | 0.0026 | 0.0029 |
| 34 | 0.2527 | 0.5224 | 2942 | 0.0007 | 0.0011 | 0.0007 | 0.0006 | 0.0010 | 0.0016 | 0.0019 | 0.0021 | 0.0024 | 0.0026 |
| 35 | 0.2521 | 0.5212 | 2965 | 0.0008 | 0.0011 | 0.0008 | 0.0006 | 0.0011 | 0.0018 | 0.0020 | 0.0022 | 0.0026 | 0.0027 |
| 36 | 0.2527 | 0.5223 | 2943 | 0.0010 | 0.0015 | 0.0010 | 0.0009 | 0.0011 | 0.0017 | 0.0019 | 0.0021 | 0.0024 | 0.0027 |
| 37 | 0.2527 | 0.5204 | 2954 | 0.0008 | 0.0011 | 0.0006 | 0.0007 | 0.0011 | 0.0019 | 0.0022 | 0.0023 | 0.0027 | 0.0028 |
| 38 | 0.2529 | 0.5216 | 2943 | 0.0007 | 0.0009 | 0.0006 | 0.0007 | 0.0013 | 0.0020 | 0.0024 | 0.0026 | 0.0029 | 0.0032 |
| 39 | 0.2532 | 0.5215 | 2935 | 0.0007 | 0.0011 | 0.0007 | 0.0006 | 0.0010 | 0.0017 | 0.0019 | 0.0022 | 0.0025 | 0.0027 |
| 40 | 0.2530 | 0.5200 | 2948 | 0.0007 | 0.0010 | 0.0006 | 0.0005 | 0.0010 | 0.0017 | 0.0020 | 0.0022 | 0.0025 | 0.0029 |
| 41 | 0.2516 | 0.5198 | 2985 | 0.0008 | 0.0011 | 0.0008 | 0.0006 | 0.0010 | 0.0017 | 0.0021 | 0.0024 | 0.0025 | 0.0027 |
| 42 | 0.2526 | 0.5199 | 2959 | 0.0011 | 0.0014 | 0.0012 | 0.0009 | 0.0011 | 0.0016 | 0.0018 | 0.0022 | 0.0023 | 0.0025 |
| 43 | 0.2526 | 0.5221 | 2946 | 0.0007 | 0.0011 | 0.0007 | 0.0006 | 0.0012 | 0.0019 | 0.0023 | 0.0026 | 0.0028 | 0.0030 |
| 44 | 0.2522 | 0.5208 | 2964 | 0.0007 | 0.0010 | 0.0006 | 0.0005 | 0.0010 | 0.0017 | 0.0021 | 0.0025 | 0.0026 | 0.0028 |
| 45 | 0.2520 | 0.5198 | 2975 | 0.0006 | 0.0009 | 0.0008 | 0.0005 | 0.0010 | 0.0018 | 0.0022 | 0.0025 | 0.0027 | 0.0027 |
| 46 | 0.2540 | 0.5204 | 2924 | 0.0007 | 0.0011 | 0.0010 | 0.0008 | 0.0014 | 0.0019 | 0.0024 | 0.0027 | 0.0030 | 0.0031 |
| 47 | 0.2515 | 0.5204 | 2983 | 0.0007 | 0.0010 | 0.0008 | 0.0005 | 0.0010 | 0.0017 | 0.0022 | 0.0026 | 0.0028 | 0.0029 |
| 48 | 0.2534 | 0.5194 | 2942 | 0.0006 | 0.0008 | 0.0006 | 0.0005 | 0.0012 | 0.0018 | 0.0022 | 0.0028 | 0.0028 | 0.0031 |
| 49 | 0.2529 | 0.5199 | 2951 | 0.0008 | 0.0012 | 0.0009 | 0.0006 | 0.0012 | 0.0018 | 0.0021 | 0.0025 | 0.0027 | 0.0029 |
| 50 | 0.2529 | 0.5218 | 2941 | 0.0006 | 0.0011 | 0.0009 | 0.0005 | 0.0009 | 0.0017 | 0.0020 | 0.0025 | 0.0026 | 0.0028 |
| Ave. | 0.2529 | 0.5209 | 2947 | 0.0007 | 0.0010 | 0.0007 | 0.0006 | 0.0011 | 0.0018 | 0.0021 | 0.0024 | 0.0027 | 0.0029 |
| Med. | 0.2529 | 0.5208 | 2943 | 0.0007 | 0.0010 | 0.0007 | 0.0006 | 0.0011 | 0.0018 | 0.0021 | 0.0025 | 0.0027 | 0.0029 |
| st dev | 0.0007 | 0.0009 | 17.5238 | 0.0001 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
| Min. | 0.2515 | 0.5194 | 2921 | 0.0006 | 0.0008 | 0.0004 | 0.0005 | 0.0009 | 0.0016 | 0.0018 | 0.0021 | 0.0023 | 0.0025 |
| Max. | 0.2540 | 0.5225 | 2985 | 0.0011 | 0.0015 | 0.0012 | 0.0009 | 0.0015 | 0.0022 | 0.0026 | 0.0028 | 0.0031 | 0.0034 |



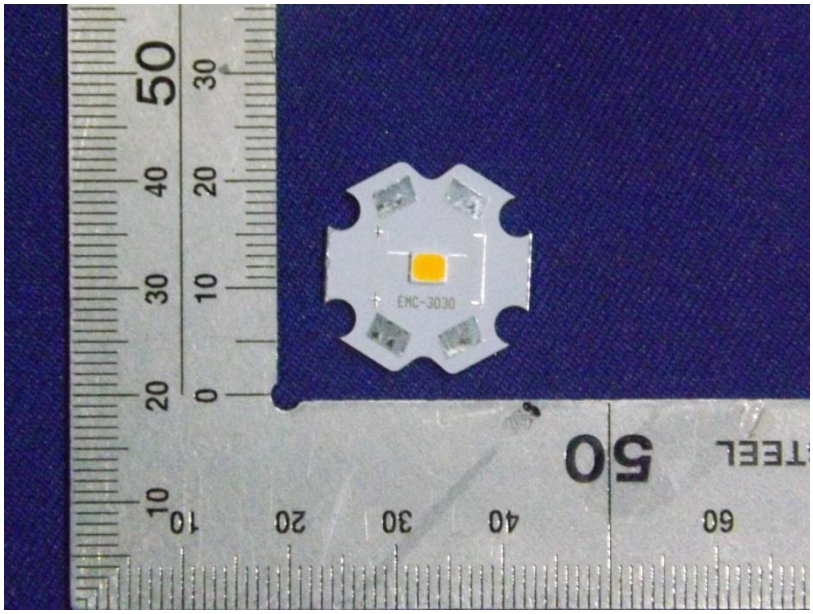
# Appendix A – EUT PHOTO

## A.1 Mechanical Dimensions (Ta = 25℃)




All dimensions are in millimeter

## A.2 EUT Photo



## Directions

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=2 with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

**********END OF REPORT**********