



# TEST REPORT

ACCORDING TO IES LM-80-2015  
For

## Hongli Zhihui Group Co.,Ltd. Guangzhou Branch

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

**Model: HL-AM-2835DW-S1-08-HR5**

|   |   |                                     |  |
|---|---|-------------------------------------|--|
| <b>Report Type:</b><br>9000 Hours Test Report |   | <b>Product Type:</b><br>LED Package |  |
| <b>Test Engineer:</b>                         | Pote Wang <i>Pote Wang</i>  |                                     |  |
| <b>Report Number:</b>                         | RSZ160329506-10-M1  |                                     |  |
| <b>Test Date:</b>                             | 2016-03-31 to 2017-04-10  |                                     |  |
| <b>Report Date:</b>                           | 2019-01-14  |                                     |  |
| <b>Revised Note:</b>                          | The previous report RSZ160329506-10 is replaced by this report on 2019-01-14  |                                     |  |
| <b>Reviewed By:</b>                           | Daniel Duan / EE Manager <i>Daniel</i>  |                                     |  |
| <b>Test Facility:</b>                         | Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.  |                                     |  |
| <b>Prepared By:</b>                           | Bay Area Compliance Laboratories Corp. (Dongguan).<br>No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia ,<br>Dongguan, Guangdong, China.<br>Tel: +86-0769-86858888<br>Fax:+86-0769-86858588 |                                     |  |

**Note:** The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).  
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.

## TABLE OF CONTENTS

|            |   |           |
|------------|---|-----------|
| <b>1 -</b> | <b>General Information .....</b>                    | <b>3</b>  |
| 1.1        | Description of LED Light Sources .....              | 3         |
| 1.2        | Standards Used: .....                               | 3         |
| 1.3        | Testing Equipment .....                             | 3         |
| 1.4        | Drive Level.....                                    | 4         |
| 1.5        | Ambient Conditions for Maintenance Test.....        | 4         |
| 1.6        | Measurement Uncertainty .....                       | 5         |
| 1.7        | Statement of Traceability.....                      | 5         |
| 1.8        | Sample Set.....                                     | 6         |
| <b>2 -</b> | <b>Summary of Test Result .....</b>                 | <b>7</b>  |
| <b>3 -</b> | <b>Test Data .....</b>                              | <b>8</b>  |
| 3.1        | Data Set 1, 55°C, 150mA (Lumen Maintenance) .....   | 8         |
| 3.2        | Data Set 1, 55°C, 150mA (Forward Voltage) .....     | 9         |
| 3.3        | Data Set 1, 55°C, 150mA (Chromaticity Shift) .....  | 10        |
| 3.4        | Data Set 2, 85°C, 150mA (Lumen Maintenance) .....   | 11        |
| 3.5        | Data Set 2, 85°C, 150mA (Forward Voltage) .....     | 12        |
| 3.6        | Data Set 2, 85°C, 150mA (Chromaticity Shift) .....  | 13        |
| 3.7        | Data Set 3, 105°C, 150mA (Lumen Maintenance) .....  | 14        |
| 3.8        | Data Set 3, 105°C, 150mA (Forward Voltage) .....    | 15        |
| 3.9        | Data Set 3, 105°C, 150mA (Chromaticity Shift) ..... | 16        |
| <b>4 -</b> | <b>EUT Photo.....</b>                               | <b>17</b> |
| 4.1        | Mechanical Dimensions.....                          | 17        |
| 4.2        | EUT Photo .....                                     | 17        |
| 4.3        | Report Revision .....                               | 18        |

## 1 - General Information

### 1.1 Description of LED Light Sources

#### Sample Size:

90 PCS samples were received on 2016-03-29. The samples were numbered from 1 to 30 , 31 to 60 and 61 to 90.

|                                      |   |
|--------------------------------------|---|
| Manufacturer:                        | Hongli Zhihui Group Co.,Ltd. Guangzhou Branch |
| Part Number:                         | HL-AM-2835DW-S1-08-HR5                        |
| Part Type:                           | LED Package                                   |
| Drive Level:                         | DC 150mA                                      |
| Nominal CCT:                         | 2700K   |
| Power:                               | 0.578W  |
| Average Current Density per LED die: | 639.31mA/mm <sup>2</sup>                      |
| Average Power Density per LED die:   | 2.18 W/mm <sup>2</sup>                        |
| CRI:                                 | 90  |
| Die Spacing:                         | N/A   |

#### 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)

| Tested Model           | Multiple Models          | Differences | Details  |
|------------------------|--------------------------|-------------|--|
| HL-AM-2835DW-S1-08-HR5 | HL-AW-2835DW-S1-08-HR5   | Model Name  | The performance enhancing product, has the same appearance |
|                        | HL-AW-PU2835DW-S1-08-HR5 | Model Name  | Only different model name for patent demand market         |
|                        | HL-AM-PU2835DW-S1-08-HR5 |             |  |

#### Disclaimer:

The truthfulness and accuracy of all the technical information above for the covered LED products is ensured by manufacturer of LED light source. Bay Area Compliance Laboratories Corp. (Dongguan) isn't responsible or gives any guarantees for the truthfulness of the technical information.

### 1.2 Standards Used:

- IESNA LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by IAS)

### 1.3 Testing Equipment

| Device          | Manufacture | Model No      | Serial No | Test Range | Calibration date | Calibration due date |
|-----------------|-------------|---------------|-----------|------------|------------------|----------------------|
| Integral Sphere | EVERFINE    | Diameter 0.3m | 1011119   | 0.3m       | 2017-03-09       | 2018-03-08           |

| Device                                       | Manufacture | Model No   | Serial No            | Test Range | Calibration date | Calibration due date |
|--|-------------|------------|----------------------|------------|------------------|----------------------|
| Programmable Test Power for LEDs             | EVERFINE    | LED300E    | 1008002              | 15V/2000mA | 2017-03-03       | 2018-03-02           |
| High accuracy array spectroradiometer        | EVERFINE    | HAAS-2000  | 1012016T             | 380-780nm  | 2017-03-09       | 2018-03-08           |
| Standard Light Source                        | EVERFINE    | D062       | 1011093              | 3000K      | 2016-09-13       | 2017-09-12           |
| Precision digital stabilized DC power supply | EVERFINE    | WY605-V110 | G115987CJ73<br>21114 | 300VA      | 2017-03-03       | 2018-03-02           |
| Multilayer aging machine                     | BACL        | B2-270     | 20015                | 25°C~130°C | 2017-03-03       | 2018-03-02           |
| Digital CC&CV DC Power Supply                | EVERFINE    | WY5015     | 11090008             | (50/15A)   | 2016-07-07       | 2017-07-06           |
| Digital CC&CV DC Power Supply                | EVERFINE    | WY5015     | 11060002             | (50/15A)   | 2016-07-07       | 2017-07-06           |
| Digital CC&CV DC Power Supply                | EVERFINE    | WY5015     | 11090007             | (50/15A)   | 2017-03-03       | 2018-03-02           |

#### 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 ( $TMP_{LED}$ ) location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing,  $TMP_{LED}$  of the coldest LEDs were maintained at a temperature that was greater than or equal to  $2^{\circ}\text{C}$  below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to  $5^{\circ}\text{C}$  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  $\pm 3\%$  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  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 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  $U=0.8671^{\circ}C$  ( $K=2$ ), 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).

FINAL

## 1.8 Sample Set

### Data Set 1: 55°C, 150mA

Part Number: HL-AM-2835DW-S1-08-HR5  
Number of Units: 30  
Case Temperature: >53°C  
Ambient Temperature: >50°C  
Life Test Drive Current: 150mA  
Measurement Current: 150mA

### Data Set 2: 85°C,150mA

Part Number: HL-AM-2835DW-S1-08-HR5  
Number of Units: 30  
Case Temperature: >83°C  
Ambient Temperature: >80°C  
Life Test Drive Current: 150mA  
Measurement Current: 150mA

### Data Set 3: 105°C,150mA

Part Number: HL-AM-2835DW-S1-08-HR5  
Number of Units: 30  
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         | 30          | 0                  | 1000          | 9000          | >54,000 hours                           |
| 2         | 30          | 0                  | 1000          | 9000          | >54,000 hours                           |
| 3         | 30          | 0                  | 1000          | 9000          | >54,000 hours                           |

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

| Data Set: | 1000    | 2000    | 3000   | 4000   | 5000   | 6000   | 7000   | 8000   | 9000   |
|-----------|---------|---------|--------|--------|--------|--------|--------|--------|--------|
| 1         | 100.29% | 100.01% | 99.91% | 99.70% | 99.53% | 99.35% | 99.13% | 98.96% | 98.77% |
| 2         | 100.20% | 99.81%  | 99.64% | 99.36% | 99.07% | 98.80% | 98.42% | 98.18% | 97.92% |
| 3         | 100.10% | 99.63%  | 99.35% | 98.95% | 98.57% | 98.20% | 97.78% | 97.45% | 97.14% |

### Average Color Maintenance

| Data Set: | 1000   | 2000   | 3000   | 4000   | 5000   | 6000   | 7000   | 8000   | 9000   |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1         | 0.0002 | 0.0004 | 0.0006 | 0.0009 | 0.0011 | 0.0013 | 0.0015 | 0.0019 | 0.0022 |
| 2         | 0.0003 | 0.0006 | 0.0008 | 0.0011 | 0.0013 | 0.0015 | 0.0017 | 0.002  | 0.0024 |
| 3         | 0.0004 | 0.0006 | 0.0008 | 0.0014 | 0.0016 | 0.0019 | 0.0019 | 0.0022 | 0.0025 |

### 3 - Test Data

#### 3.1 Data Set 1, 55°C, 150mA (Lumen Maintenance)

| No.    | Φ(lm)        | Lumen Maintenance (%) |         |         |         |         |         |         |         |         |
|--------|--------------|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|
|        | 0hr(Initial) | 1000hrs               | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs |
| 1      | 53.83        | 100.33                | 99.98   | 99.93   | 99.67   | 99.55   | 99.52   | 99.46   | 99.35   | 99.15   |
| 2      | 53.18        | 100.28                | 99.94   | 99.83   | 99.70   | 99.68   | 99.49   | 99.42   | 99.14   | 99.08   |
| 3      | 56.60        | 100.19                | 99.91   | 99.81   | 99.59   | 99.38   | 99.10   | 98.90   | 98.69   | 98.46   |
| 4      | 55.52        | 100.25                | 99.80   | 99.77   | 99.48   | 99.21   | 98.94   | 98.61   | 98.38   | 98.14   |
| 5      | 57.60        | 100.10                | 99.83   | 99.79   | 99.55   | 99.44   | 99.25   | 98.91   | 98.65   | 98.52   |
| 6      | 56.41        | 100.39                | 99.82   | 99.68   | 99.47   | 99.31   | 99.20   | 98.97   | 98.81   | 98.71   |
| 7      | 55.07        | 100.42                | 100.16  | 100.11  | 99.73   | 99.55   | 99.44   | 99.36   | 99.24   | 98.95   |
| 8      | 57.39        | 100.31                | 100.03  | 99.93   | 99.83   | 99.69   | 99.39   | 99.04   | 98.88   | 98.75   |
| 9      | 54.87        | 100.33                | 99.93   | 99.82   | 99.65   | 99.42   | 99.33   | 99.27   | 99.14   | 99.03   |
| 10     | 55.89        | 100.38                | 100.21  | 100.11  | 99.84   | 99.62   | 99.46   | 99.36   | 99.18   | 99.03   |
| 11     | 57.34        | 100.19                | 99.83   | 99.76   | 99.55   | 99.32   | 99.13   | 98.69   | 98.48   | 98.15   |
| 12     | 56.76        | 100.30                | 99.89   | 99.79   | 99.61   | 99.42   | 99.24   | 99.12   | 99.00   | 98.84   |
| 13     | 56.45        | 100.39                | 100.12  | 100.05  | 99.86   | 99.66   | 99.33   | 99.06   | 99.03   | 98.88   |
| 14     | 56.08        | 100.34                | 100.23  | 100.12  | 99.98   | 99.86   | 99.61   | 99.36   | 99.27   | 99.16   |
| 15     | 55.12        | 100.22                | 100.02  | 99.91   | 99.71   | 99.51   | 99.22   | 99.11   | 99.00   | 98.73   |
| 16     | 54.65        | 100.29                | 100.16  | 100.11  | 99.84   | 99.63   | 99.51   | 99.23   | 99.05   | 98.92   |
| 17     | 56.97        | 100.23                | 99.98   | 99.84   | 99.70   | 99.46   | 99.39   | 98.96   | 98.70   | 98.68   |
| 18     | 55.42        | 100.29                | 99.87   | 99.73   | 99.62   | 99.55   | 99.40   | 99.39   | 99.21   | 99.03   |
| 19     | 56.30        | 100.37                | 99.91   | 99.80   | 99.66   | 99.56   | 99.52   | 99.43   | 99.17   | 99.13   |
| 20     | 57.52        | 100.35                | 100.02  | 99.95   | 99.79   | 99.70   | 99.65   | 99.50   | 99.27   | 99.08   |
| 21     | 54.53        | 100.24                | 100.06  | 99.94   | 99.60   | 99.32   | 99.21   | 99.06   | 98.92   | 98.64   |
| 22     | 54.60        | 100.22                | 99.98   | 99.82   | 99.65   | 99.56   | 99.34   | 99.03   | 98.96   | 98.70   |
| 23     | 56.18        | 100.30                | 100.11  | 100.04  | 99.82   | 99.54   | 99.18   | 98.91   | 98.67   | 98.52   |
| 24     | 56.56        | 100.16                | 99.75   | 99.59   | 99.40   | 99.26   | 98.99   | 98.76   | 98.53   | 98.32   |
| 25     | 55.28        | 100.36                | 100.05  | 99.95   | 99.82   | 99.67   | 99.64   | 99.53   | 99.48   | 99.37   |
| 26     | 56.05        | 100.27                | 100.11  | 100.05  | 99.88   | 99.64   | 99.38   | 99.16   | 99.05   | 98.84   |
| 27     | 56.68        | 100.26                | 100.04  | 99.95   | 99.65   | 99.40   | 99.21   | 98.76   | 98.48   | 98.34   |
| 28     | 56.16        | 100.25                | 100.05  | 99.80   | 99.79   | 99.48   | 99.31   | 99.06   | 98.84   | 98.52   |
| 29     | 55.42        | 100.29                | 100.25  | 100.14  | 99.93   | 99.86   | 99.64   | 99.46   | 99.26   | 98.95   |
| 30     | 56.18        | 100.30                | 100.21  | 100.11  | 99.73   | 99.61   | 99.47   | 99.00   | 98.84   | 98.56   |
| Ave.   | 55.89        | 100.29                | 100.01  | 99.91   | 99.70   | 99.53   | 99.35   | 99.13   | 98.96   | 98.77   |
| Med.   | 56.12        | 100.29                | 100.02  | 99.92   | 99.70   | 99.55   | 99.36   | 99.09   | 99.00   | 98.79   |
| st dev | 1.0889       | 0.0736                | 0.1384  | 0.1487  | 0.1406  | 0.1624  | 0.1864  | 0.2570  | 0.2859  | 0.3108  |
| Min.   | 53.18        | 100.10                | 99.75   | 99.59   | 99.40   | 99.21   | 98.94   | 98.61   | 98.38   | 98.14   |
| Max.   | 57.60        | 100.42                | 100.25  | 100.14  | 99.98   | 99.86   | 99.65   | 99.53   | 99.48   | 99.37   |

TM-21 Projection:

**Test Duration:** 9,000 hours  
**Failures Observed:** 0  
 $\alpha$ : 1.894E-06  
 $\beta$ : 1.005  
**Reported L<sub>70</sub>:** >54000 hours

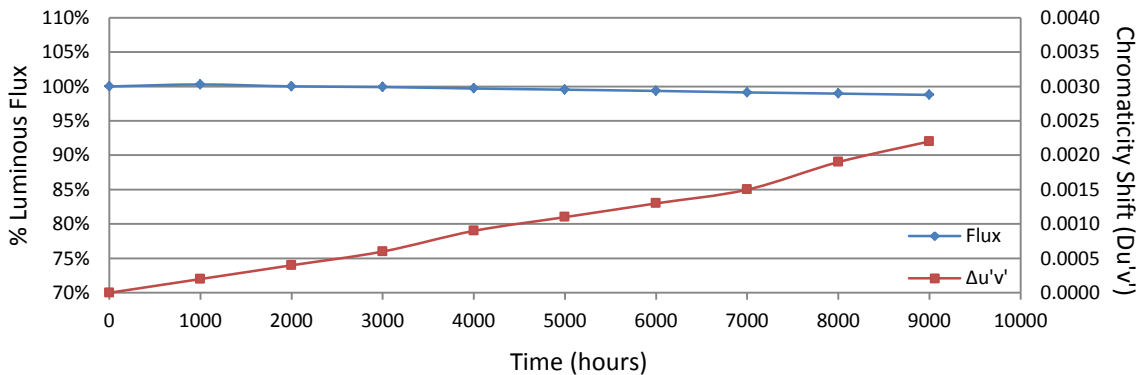


### 3.2 Data Set 1, 55°C, 150mA (Forward Voltage)

| No.    | Forward Voltage (V) |         |         |         |         |         |         |         |         |         |
|--------|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|        | 0hr(Initial)        | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs |
| 1      | 3.024               | 3.130   | 3.023   | 3.107   | 3.022   | 3.019   | 3.025   | 3.029   | 3.030   | 3.045   |
| 2      | 3.030               | 3.205   | 3.043   | 3.110   | 3.026   | 3.028   | 3.030   | 3.035   | 3.042   | 3.127   |
| 3      | 3.058               | 3.202   | 3.039   | 3.050   | 3.053   | 3.051   | 3.055   | 3.062   | 3.066   | 3.146   |
| 4      | 3.515               | 3.131   | 3.159   | 3.622   | 3.500   | 3.497   | 3.503   | 3.511   | 3.515   | 3.555   |
| 5      | 3.061               | 3.158   | 3.091   | 3.046   | 3.051   | 3.053   | 3.054   | 3.061   | 3.064   | 3.101   |
| 6      | 3.043               | 3.091   | 3.174   | 3.135   | 3.040   | 3.040   | 3.041   | 3.045   | 3.050   | 3.190   |
| 7      | 3.066               | 3.187   | 3.016   | 3.144   | 3.041   | 3.042   | 3.044   | 3.049   | 3.054   | 3.172   |
| 8      | 3.050               | 3.102   | 3.056   | 3.048   | 3.048   | 3.046   | 3.053   | 3.058   | 3.066   | 3.142   |
| 9      | 3.038               | 3.111   | 3.007   | 3.065   | 3.031   | 3.028   | 3.032   | 3.038   | 3.070   | 3.068   |
| 10     | 3.067               | 3.066   | 3.057   | 3.114   | 3.049   | 3.048   | 3.054   | 3.059   | 3.074   | 3.176   |
| 11     | 3.047               | 3.148   | 3.096   | 3.115   | 3.040   | 3.038   | 3.043   | 3.047   | 3.064   | 3.073   |
| 12     | 3.080               | 3.062   | 3.133   | 3.094   | 3.042   | 3.041   | 3.048   | 3.051   | 3.059   | 3.094   |
| 13     | 3.130               | 3.092   | 3.049   | 3.085   | 3.048   | 3.048   | 3.052   | 3.056   | 3.073   | 3.089   |
| 14     | 3.151               | 3.058   | 3.163   | 3.153   | 3.054   | 3.051   | 3.054   | 3.062   | 3.073   | 3.188   |
| 15     | 3.060               | 3.096   | 3.071   | 3.102   | 3.032   | 3.030   | 3.035   | 3.039   | 3.055   | 3.097   |
| 16     | 3.072               | 3.102   | 3.078   | 3.122   | 3.037   | 3.039   | 3.039   | 3.044   | 3.056   | 3.072   |
| 17     | 3.115               | 3.087   | 3.085   | 3.177   | 3.048   | 3.047   | 3.050   | 3.055   | 3.067   | 3.068   |
| 18     | 3.067               | 3.139   | 3.149   | 3.042   | 3.030   | 3.027   | 3.032   | 3.041   | 3.041   | 3.084   |
| 19     | 3.089               | 3.127   | 3.156   | 3.013   | 3.040   | 3.041   | 3.044   | 3.049   | 3.055   | 3.144   |
| 20     | 3.098               | 3.109   | 3.064   | 3.168   | 3.059   | 3.056   | 3.060   | 3.068   | 3.078   | 3.081   |
| 21     | 3.494               | 3.111   | 3.115   | 3.112   | 3.496   | 3.487   | 3.489   | 3.501   | 3.505   | 3.497   |
| 22     | 3.488               | 3.453   | 3.431   | 3.502   | 3.477   | 3.478   | 3.484   | 3.488   | 3.493   | 3.499   |
| 23     | 3.065               | 3.338   | 3.042   | 3.078   | 3.059   | 3.055   | 3.061   | 3.067   | 3.074   | 3.087   |
| 24     | 3.029               | 3.067   | 3.137   | 3.084   | 3.049   | 3.047   | 3.052   | 3.055   | 3.062   | 3.095   |
| 25     | 3.091               | 3.080   | 3.122   | 3.059   | 3.033   | 3.030   | 3.038   | 3.042   | 3.048   | 3.089   |
| 26     | 3.058               | 3.078   | 2.991   | 3.064   | 3.035   | 3.033   | 3.038   | 3.044   | 3.048   | 3.082   |
| 27     | 3.123               | 3.071   | 3.119   | 3.132   | 3.110   | 3.107   | 3.112   | 3.117   | 3.126   | 3.200   |
| 28     | 3.119               | 3.073   | 3.039   | 3.056   | 3.046   | 3.042   | 3.049   | 3.051   | 3.057   | 3.150   |
| 29     | 3.176               | 3.503   | 3.056   | 3.221   | 3.045   | 3.043   | 3.050   | 3.054   | 3.066   | 3.156   |
| 30     | 3.109               | 3.087   | 3.005   | 3.121   | 3.049   | 3.041   | 3.046   | 3.049   | 3.058   | 3.094   |
| Ave.   | 3.120               | 3.142   | 3.092   | 3.131   | 3.090   | 3.088   | 3.092   | 3.098   | 3.106   | 3.155   |
| Med.   | 3.070               | 3.106   | 3.075   | 3.109   | 3.047   | 3.043   | 3.050   | 3.053   | 3.064   | 3.099   |
| st dev | 0.1335              | 0.1079  | 0.0825  | 0.1266  | 0.1370  | 0.1363  | 0.1364  | 0.1373  | 0.1360  | 0.1298  |
| Min.   | 3.024               | 3.058   | 2.991   | 3.013   | 3.022   | 3.019   | 3.025   | 3.029   | 3.030   | 3.045   |
| Max.   | 3.515               | 3.503   | 3.431   | 3.622   | 3.500   | 3.497   | 3.503   | 3.511   | 3.515   | 3.555   |

### 3.3 Data Set 1, 55°C, 150mA (Chromaticity Shift)

| No.    | u'     | v'     | CCT(K)  | Chromaticity Shift ( $\Delta u'v'$ ) |         |         |         |         |         |         |         |         |
|--------|--------|--------|---------|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
|        |        |        |         | 0hr(Initial)                         | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs |
| 1      | 0.2569 | 0.5218 | 2846    | 0.0003                               | 0.0004  | 0.0007  | 0.0008  | 0.0010  | 0.0012  | 0.0013  | 0.0015  | 0.0017  |
| 2      | 0.2600 | 0.5232 | 2771    | 0.0005                               | 0.0003  | 0.0005  | 0.0008  | 0.0009  | 0.0012  | 0.0015  | 0.0017  | 0.0019  |
| 3      | 0.2585 | 0.5264 | 2790    | 0.0001                               | 0.0004  | 0.0006  | 0.0008  | 0.0009  | 0.0013  | 0.0013  | 0.0019  | 0.0020  |
| 4      | 0.2610 | 0.5290 | 2724    | 0.0002                               | 0.0006  | 0.0009  | 0.0010  | 0.0012  | 0.0014  | 0.0016  | 0.0021  | 0.0024  |
| 5      | 0.2606 | 0.5281 | 2737    | 0.0002                               | 0.0006  | 0.0008  | 0.0011  | 0.0012  | 0.0014  | 0.0016  | 0.0020  | 0.0024  |
| 6      | 0.2607 | 0.5277 | 2736    | 0.0002                               | 0.0005  | 0.0008  | 0.0011  | 0.0012  | 0.0015  | 0.0016  | 0.0020  | 0.0024  |
| 7      | 0.2604 | 0.5262 | 2748    | 0.0001                               | 0.0003  | 0.0006  | 0.0009  | 0.0009  | 0.0012  | 0.0013  | 0.0017  | 0.0021  |
| 8      | 0.2569 | 0.5261 | 2826    | 0.0002                               | 0.0004  | 0.0006  | 0.0010  | 0.0012  | 0.0014  | 0.0015  | 0.0020  | 0.0023  |
| 9      | 0.2569 | 0.5219 | 2846    | 0.0003                               | 0.0004  | 0.0006  | 0.0010  | 0.0013  | 0.0014  | 0.0015  | 0.0018  | 0.0023  |
| 10     | 0.2585 | 0.5258 | 2791    | 0.0002                               | 0.0004  | 0.0006  | 0.0009  | 0.0010  | 0.0014  | 0.0015  | 0.0018  | 0.0022  |
| 11     | 0.2585 | 0.5262 | 2791    | 0.0001                               | 0.0003  | 0.0005  | 0.0008  | 0.0010  | 0.0012  | 0.0014  | 0.0017  | 0.0021  |
| 12     | 0.2569 | 0.5235 | 2837    | 0.0004                               | 0.0004  | 0.0006  | 0.0009  | 0.0012  | 0.0014  | 0.0015  | 0.0020  | 0.0022  |
| 13     | 0.2606 | 0.5250 | 2749    | 0.0002                               | 0.0004  | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0015  | 0.0019  | 0.0022  |
| 14     | 0.2589 | 0.5254 | 2785    | 0.0002                               | 0.0004  | 0.0006  | 0.0008  | 0.0010  | 0.0012  | 0.0014  | 0.0017  | 0.0021  |
| 15     | 0.2603 | 0.5237 | 2763    | 0.0002                               | 0.0005  | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0015  | 0.0019  | 0.0024  |
| 16     | 0.2632 | 0.5274 | 2687    | 0.0002                               | 0.0004  | 0.0006  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0020  | 0.0023  |
| 17     | 0.2571 | 0.5246 | 2829    | 0.0002                               | 0.0004  | 0.0006  | 0.0009  | 0.0011  | 0.0014  | 0.0015  | 0.0019  | 0.0022  |
| 18     | 0.2577 | 0.5233 | 2822    | 0.0003                               | 0.0006  | 0.0008  | 0.0010  | 0.0013  | 0.0015  | 0.0016  | 0.0020  | 0.0025  |
| 19     | 0.2602 | 0.5251 | 2757    | 0.0002                               | 0.0004  | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0019  | 0.0022  |
| 20     | 0.2557 | 0.5254 | 2856    | 0.0002                               | 0.0003  | 0.0005  | 0.0008  | 0.0010  | 0.0012  | 0.0014  | 0.0018  | 0.0021  |
| 21     | 0.2656 | 0.5288 | 2631    | 0.0002                               | 0.0003  | 0.0004  | 0.0007  | 0.0010  | 0.0012  | 0.0014  | 0.0017  | 0.0021  |
| 22     | 0.2621 | 0.5280 | 2707    | 0.0002                               | 0.0004  | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0014  | 0.0018  | 0.0022  |
| 23     | 0.2595 | 0.5260 | 2770    | 0.0002                               | 0.0004  | 0.0006  | 0.0009  | 0.0011  | 0.0012  | 0.0014  | 0.0018  | 0.0022  |
| 24     | 0.2577 | 0.5242 | 2817    | 0.0000                               | 0.0003  | 0.0006  | 0.0007  | 0.0010  | 0.0011  | 0.0012  | 0.0017  | 0.0020  |
| 25     | 0.2558 | 0.5228 | 2867    | 0.0002                               | 0.0004  | 0.0007  | 0.0009  | 0.0013  | 0.0014  | 0.0014  | 0.0018  | 0.0022  |
| 26     | 0.2568 | 0.5243 | 2838    | 0.0002                               | 0.0004  | 0.0006  | 0.0008  | 0.0011  | 0.0012  | 0.0016  | 0.0018  | 0.0022  |
| 27     | 0.2555 | 0.5256 | 2860    | 0.0002                               | 0.0006  | 0.0006  | 0.0009  | 0.0013  | 0.0014  | 0.0017  | 0.0021  | 0.0024  |
| 28     | 0.2619 | 0.5270 | 2713    | 0.0002                               | 0.0003  | 0.0005  | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0019  | 0.0022  |
| 29     | 0.2602 | 0.5249 | 2759    | 0.0002                               | 0.0004  | 0.0004  | 0.0007  | 0.0011  | 0.0012  | 0.0014  | 0.0017  | 0.0021  |
| 30     | 0.2574 | 0.5250 | 2821    | 0.0003                               | 0.0004  | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0017  | 0.0020  | 0.0022  |
| Ave.   | 0.2591 | 0.5254 | 2782    | 0.0002                               | 0.0004  | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0019  | 0.0022  |
| Med.   | 0.2587 | 0.5254 | 2788    | 0.0002                               | 0.0004  | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0019  | 0.0022  |
| st dev | 0.0024 | 0.0019 | 57.4154 | 0.0001                               | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0002  |
| Min.   | 0.2555 | 0.5218 | 2631    | 0.0000                               | 0.0003  | 0.0004  | 0.0007  | 0.0009  | 0.0011  | 0.0012  | 0.0015  | 0.0017  |
| Max.   | 0.2656 | 0.5290 | 2867    | 0.0005                               | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0017  | 0.0021  | 0.0025  |



### 3.4 Data Set 2, 85°C, 150mA (Lumen Maintenance)

| No.    | Φ(lm)        | Lumen Maintenance (%) |         |         |         |         |         |         |         |         |
|--------|--------------|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|
|        | Ohr(Initial) | 1000hrs               | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs |
| 31     | 56.92        | 100.25                | 99.75   | 99.61   | 99.39   | 99.16   | 98.89   | 98.59   | 98.45   | 98.30   |
| 32     | 56.13        | 100.12                | 99.66   | 99.48   | 99.02   | 98.66   | 98.59   | 98.33   | 98.09   | 97.74   |
| 33     | 57.09        | 100.21                | 99.72   | 99.65   | 99.30   | 99.07   | 98.72   | 98.23   | 97.88   | 97.69   |
| 34     | 57.21        | 100.31                | 100.10  | 99.88   | 99.62   | 99.44   | 99.14   | 98.50   | 98.16   | 97.99   |
| 35     | 55.28        | 100.16                | 99.60   | 99.51   | 99.29   | 99.15   | 98.95   | 98.63   | 98.35   | 98.08   |
| 36     | 54.60        | 100.29                | 99.60   | 99.40   | 99.18   | 98.79   | 98.53   | 98.22   | 98.00   | 97.84   |
| 37     | 56.67        | 100.02                | 99.42   | 99.21   | 98.85   | 98.64   | 98.34   | 97.74   | 97.62   | 97.55   |
| 38     | 55.88        | 100.11                | 99.53   | 99.30   | 99.12   | 98.89   | 98.57   | 98.12   | 98.00   | 97.83   |
| 39     | 57.96        | 100.16                | 99.64   | 99.43   | 99.22   | 98.79   | 98.45   | 97.91   | 97.62   | 97.36   |
| 40     | 53.96        | 100.33                | 99.80   | 99.74   | 99.41   | 99.20   | 98.81   | 98.31   | 98.18   | 97.89   |
| 41     | 54.39        | 100.24                | 99.60   | 99.43   | 99.21   | 98.90   | 98.55   | 97.98   | 97.78   | 97.50   |
| 42     | 55.71        | 100.22                | 100.02  | 99.96   | 99.69   | 99.37   | 99.10   | 98.83   | 98.53   | 98.24   |
| 43     | 55.74        | 100.30                | 100.16  | 100.05  | 99.96   | 99.73   | 99.48   | 99.10   | 98.91   | 98.67   |
| 44     | 54.40        | 100.20                | 100.07  | 99.76   | 99.58   | 99.25   | 98.99   | 98.68   | 98.51   | 98.22   |
| 45     | 56.58        | 100.23                | 99.86   | 99.79   | 99.54   | 99.17   | 98.80   | 98.14   | 97.90   | 97.68   |
| 46     | 56.12        | 100.09                | 99.84   | 99.63   | 99.45   | 99.29   | 99.18   | 98.82   | 98.47   | 98.22   |
| 47     | 56.69        | 100.25                | 99.96   | 99.79   | 99.47   | 99.22   | 98.91   | 98.71   | 98.57   | 98.22   |
| 48     | 56.47        | 100.23                | 99.93   | 99.77   | 99.50   | 99.15   | 98.92   | 98.69   | 98.51   | 98.25   |
| 49     | 54.07        | 100.06                | 99.78   | 99.52   | 99.39   | 98.95   | 98.67   | 98.37   | 98.13   | 97.85   |
| 50     | 54.55        | 100.04                | 99.67   | 99.36   | 99.12   | 98.75   | 98.37   | 98.13   | 97.86   | 97.65   |
| 51     | 57.47        | 100.23                | 99.86   | 99.58   | 99.29   | 98.83   | 98.31   | 98.21   | 97.81   | 97.58   |
| 52     | 56.92        | 100.18                | 99.77   | 99.65   | 99.26   | 98.89   | 98.72   | 98.12   | 97.89   | 97.51   |
| 53     | 54.79        | 100.05                | 99.65   | 99.53   | 99.27   | 98.83   | 98.70   | 98.25   | 98.12   | 97.81   |
| 54     | 56.36        | 100.32                | 99.86   | 99.70   | 99.43   | 99.15   | 98.86   | 98.60   | 98.33   | 98.01   |
| 55     | 56.86        | 100.25                | 99.79   | 99.67   | 99.53   | 99.28   | 98.93   | 98.87   | 98.72   | 98.35   |
| 56     | 55.70        | 100.32                | 99.86   | 99.69   | 99.39   | 99.10   | 99.03   | 98.65   | 98.47   | 98.17   |
| 57     | 55.76        | 100.29                | 99.95   | 99.86   | 99.39   | 99.21   | 98.98   | 98.57   | 98.31   | 98.08   |
| 58     | 55.76        | 100.32                | 99.96   | 99.80   | 99.44   | 99.25   | 99.01   | 98.73   | 98.49   | 98.21   |
| 59     | 54.62        | 100.11                | 99.91   | 99.60   | 99.18   | 98.86   | 98.52   | 97.93   | 97.53   | 97.14   |
| 60     | 56.51        | 100.25                | 99.95   | 99.75   | 99.42   | 99.12   | 98.90   | 98.66   | 98.25   | 98.05   |
| Ave.   | 55.91        | 100.20                | 99.81   | 99.64   | 99.36   | 99.07   | 98.80   | 98.42   | 98.18   | 97.92   |
| Med.   | 56.00        | 100.23                | 99.82   | 99.65   | 99.39   | 99.13   | 98.84   | 98.43   | 98.17   | 97.94   |
| st dev | 1.0841       | 0.0939                | 0.1778  | 0.1961  | 0.2147  | 0.2482  | 0.2742  | 0.3337  | 0.3485  | 0.3402  |
| Min.   | 53.96        | 100.02                | 99.42   | 99.21   | 98.85   | 98.64   | 98.31   | 97.74   | 97.53   | 97.14   |
| Max.   | 57.96        | 100.33                | 100.16  | 100.05  | 99.96   | 99.73   | 99.48   | 99.10   | 98.91   | 98.67   |

TM-21 Projection:

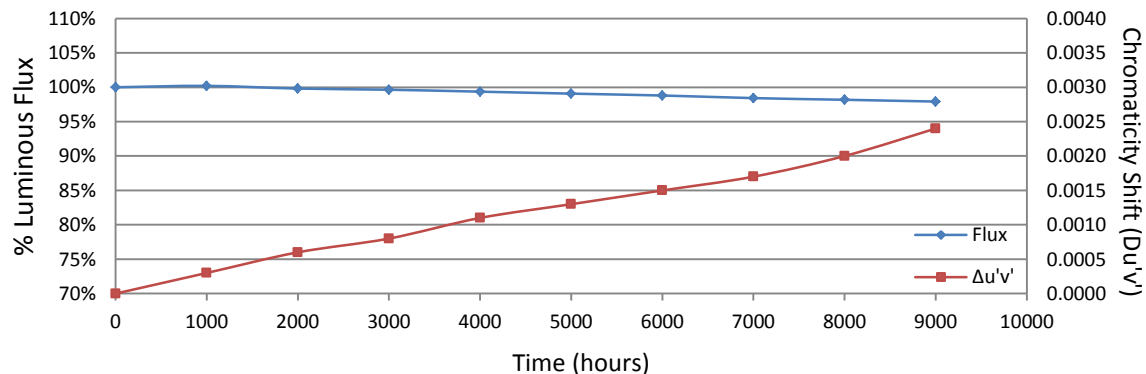
**Test Duration:** 9,000 hours  
**Failures Observed:** 0  
 $\alpha$ : 2.969E-06  
 $\beta$ : 1.005  
**Reported L<sub>70</sub>:** >54000 hours

**3.5 Data Set 2, 85°C, 150mA (Forward Voltage)**

| No.    | Forward Voltage (V) |         |         |         |         |         |         |         |         |         |
|--------|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|        | 0hr(Initial)        | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs |
| 31     | 3.100               | 3.069   | 3.197   | 3.134   | 3.052   | 3.055   | 3.060   | 3.063   | 3.069   | 3.157   |
| 32     | 3.061               | 3.069   | 3.033   | 3.132   | 3.044   | 3.040   | 3.043   | 3.050   | 3.055   | 3.077   |
| 33     | 3.083               | 3.088   | 3.028   | 3.084   | 3.047   | 3.045   | 3.049   | 3.054   | 3.060   | 3.074   |
| 34     | 3.165               | 3.113   | 3.034   | 3.062   | 3.054   | 3.051   | 3.055   | 3.062   | 3.067   | 3.191   |
| 35     | 3.059               | 3.057   | 3.010   | 3.071   | 3.038   | 3.034   | 3.039   | 3.044   | 3.050   | 3.146   |
| 36     | 3.050               | 3.054   | 3.160   | 3.111   | 3.036   | 3.030   | 3.038   | 3.042   | 3.047   | 3.137   |
| 37     | 3.070               | 3.065   | 3.041   | 3.112   | 3.041   | 3.044   | 3.049   | 3.053   | 3.057   | 3.195   |
| 38     | 3.062               | 3.066   | 3.008   | 3.064   | 3.041   | 3.043   | 3.046   | 3.053   | 3.060   | 3.071   |
| 39     | 3.068               | 3.071   | 3.073   | 3.109   | 3.048   | 3.048   | 3.053   | 3.059   | 3.066   | 3.124   |
| 40     | 3.055               | 3.051   | 3.017   | 3.080   | 3.020   | 3.022   | 3.026   | 3.030   | 3.036   | 3.064   |
| 41     | 3.043               | 3.075   | 2.995   | 2.974   | 3.025   | 3.028   | 3.029   | 3.034   | 3.041   | 3.046   |
| 42     | 3.049               | 3.070   | 3.076   | 3.066   | 3.033   | 3.034   | 3.038   | 3.043   | 3.046   | 3.092   |
| 43     | 3.058               | 3.068   | 3.041   | 3.020   | 3.042   | 3.042   | 3.048   | 3.056   | 3.054   | 3.102   |
| 44     | 3.044               | 3.051   | 3.110   | 3.067   | 3.022   | 3.023   | 3.030   | 3.034   | 3.037   | 3.105   |
| 45     | 3.054               | 3.067   | 3.115   | 2.985   | 3.038   | 3.039   | 3.045   | 3.062   | 3.056   | 3.078   |
| 46     | 3.081               | 3.079   | 3.093   | 3.040   | 3.048   | 3.048   | 3.053   | 3.082   | 3.065   | 3.071   |
| 47     | 3.061               | 3.083   | 3.112   | 3.093   | 3.038   | 3.040   | 3.048   | 3.049   | 3.058   | 3.111   |
| 48     | 3.098               | 3.138   | 3.100   | 3.190   | 3.043   | 3.045   | 3.050   | 3.069   | 3.075   | 3.097   |
| 49     | 3.036               | 3.118   | 3.031   | 3.072   | 3.019   | 3.019   | 3.023   | 3.058   | 3.039   | 3.050   |
| 50     | 3.037               | 3.143   | 3.074   | 3.097   | 3.024   | 3.024   | 3.031   | 3.039   | 3.045   | 3.048   |
| 51     | 3.062               | 3.128   | 3.060   | 3.097   | 3.053   | 3.054   | 3.057   | 3.073   | 3.085   | 3.077   |
| 52     | 3.061               | 3.080   | 3.158   | 3.135   | 3.042   | 3.042   | 3.047   | 3.077   | 3.062   | 3.079   |
| 53     | 3.045               | 3.052   | 2.979   | 3.056   | 3.029   | 3.031   | 3.034   | 3.043   | 3.050   | 3.064   |
| 54     | 3.053               | 3.073   | 3.236   | 3.121   | 3.039   | 3.041   | 3.045   | 3.054   | 3.055   | 3.149   |
| 55     | 3.071               | 3.078   | 3.063   | 3.100   | 3.043   | 3.044   | 3.048   | 3.063   | 3.065   | 3.083   |
| 56     | 3.039               | 3.200   | 3.022   | 3.097   | 3.032   | 3.032   | 3.037   | 3.047   | 3.049   | 3.041   |
| 57     | 3.053               | 3.070   | 3.122   | 3.110   | 3.037   | 3.042   | 3.043   | 3.050   | 3.055   | 3.046   |
| 58     | 3.052               | 3.072   | 3.031   | 3.163   | 3.032   | 3.035   | 3.037   | 3.040   | 3.044   | 3.034   |
| 59     | 3.074               | 3.066   | 3.060   | 3.073   | 3.487   | 3.486   | 3.490   | 3.497   | 3.503   | 3.486   |
| 60     | 3.062               | 3.116   | 3.079   | 3.115   | 3.040   | 3.043   | 3.048   | 3.049   | 3.061   | 3.045   |
| Ave.   | 3.064               | 3.084   | 3.072   | 3.088   | 3.053   | 3.053   | 3.058   | 3.068   | 3.070   | 3.105   |
| Med.   | 3.060               | 3.072   | 3.062   | 3.095   | 3.040   | 3.042   | 3.046   | 3.053   | 3.056   | 3.079   |
| st dev | 0.0249              | 0.0336  | 0.0602  | 0.0459  | 0.0825  | 0.0822  | 0.0821  | 0.0821  | 0.0825  | 0.0840  |
| Min.   | 3.036               | 3.051   | 2.979   | 2.974   | 3.019   | 3.019   | 3.023   | 3.030   | 3.036   | 3.034   |
| Max.   | 3.165               | 3.200   | 3.236   | 3.190   | 3.487   | 3.486   | 3.490   | 3.497   | 3.503   | 3.486   |

### 3.6 Data Set 2, 85°C, 150mA (Chromaticity Shift)

| No.    | u'     | v'     | CCT(K)  | Chromaticity Shift ( $\Delta u'v'$ ) |         |         |         |         |         |         |         |         |
|--------|--------|--------|---------|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
|        |        |        |         | 0hr(Initial)                         | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs |
| 31     | 0.2593 | 0.5275 | 2766    | 0.0002                               | 0.0003  | 0.0004  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0019  | 0.0022  |
| 32     | 0.2614 | 0.5265 | 2726    | 0.0003                               | 0.0006  | 0.0007  | 0.0012  | 0.0014  | 0.0016  | 0.0018  | 0.0022  | 0.0025  |
| 33     | 0.2580 | 0.5260 | 2803    | 0.0004                               | 0.0008  | 0.0009  | 0.0013  | 0.0014  | 0.0017  | 0.0019  | 0.0022  | 0.0025  |
| 34     | 0.2565 | 0.5255 | 2838    | 0.0002                               | 0.0004  | 0.0007  | 0.0010  | 0.0012  | 0.0014  | 0.0017  | 0.0020  | 0.0023  |
| 35     | 0.2576 | 0.5218 | 2831    | 0.0004                               | 0.0006  | 0.0008  | 0.0013  | 0.0014  | 0.0016  | 0.0017  | 0.0021  | 0.0024  |
| 36     | 0.2611 | 0.5257 | 2735    | 0.0002                               | 0.0004  | 0.0007  | 0.0011  | 0.0012  | 0.0015  | 0.0016  | 0.0020  | 0.0024  |
| 37     | 0.2588 | 0.5256 | 2786    | 0.0003                               | 0.0004  | 0.0007  | 0.0010  | 0.0012  | 0.0016  | 0.0017  | 0.0020  | 0.0024  |
| 38     | 0.2592 | 0.5253 | 2779    | 0.0004                               | 0.0005  | 0.0008  | 0.0013  | 0.0014  | 0.0016  | 0.0019  | 0.0022  | 0.0025  |
| 39     | 0.2558 | 0.5252 | 2854    | 0.0004                               | 0.0007  | 0.0008  | 0.0012  | 0.0013  | 0.0015  | 0.0018  | 0.0022  | 0.0024  |
| 40     | 0.2578 | 0.5249 | 2811    | 0.0003                               | 0.0005  | 0.0009  | 0.0010  | 0.0013  | 0.0014  | 0.0016  | 0.0018  | 0.0023  |
| 41     | 0.2563 | 0.5204 | 2869    | 0.0003                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0017  | 0.0020  | 0.0025  |
| 42     | 0.2614 | 0.5260 | 2729    | 0.0003                               | 0.0006  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0017  | 0.0021  | 0.0024  |
| 43     | 0.2578 | 0.5230 | 2820    | 0.0004                               | 0.0006  | 0.0009  | 0.0013  | 0.0013  | 0.0016  | 0.0018  | 0.0020  | 0.0024  |
| 44     | 0.2610 | 0.5253 | 2741    | 0.0003                               | 0.0006  | 0.0010  | 0.0012  | 0.0014  | 0.0015  | 0.0018  | 0.0020  | 0.0025  |
| 45     | 0.2580 | 0.5277 | 2795    | 0.0004                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0018  | 0.0021  | 0.0024  |
| 46     | 0.2608 | 0.5280 | 2732    | 0.0002                               | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0016  | 0.0020  | 0.0022  |
| 47     | 0.2577 | 0.5272 | 2803    | 0.0004                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0018  | 0.0021  | 0.0023  |
| 48     | 0.2608 | 0.5275 | 2735    | 0.0003                               | 0.0005  | 0.0008  | 0.0011  | 0.0012  | 0.0014  | 0.0017  | 0.0020  | 0.0022  |
| 49     | 0.2583 | 0.5229 | 2810    | 0.0003                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0018  | 0.0020  | 0.0024  |
| 50     | 0.2594 | 0.5261 | 2771    | 0.0003                               | 0.0006  | 0.0009  | 0.0011  | 0.0013  | 0.0015  | 0.0016  | 0.0019  | 0.0023  |
| 51     | 0.2602 | 0.5278 | 2745    | 0.0003                               | 0.0005  | 0.0007  | 0.0010  | 0.0012  | 0.0016  | 0.0018  | 0.0021  | 0.0023  |
| 52     | 0.2600 | 0.5278 | 2750    | 0.0003                               | 0.0006  | 0.0008  | 0.0011  | 0.0013  | 0.0016  | 0.0018  | 0.0021  | 0.0024  |
| 53     | 0.2589 | 0.5220 | 2801    | 0.0003                               | 0.0007  | 0.0009  | 0.0011  | 0.0013  | 0.0016  | 0.0017  | 0.0020  | 0.0024  |
| 54     | 0.2592 | 0.5263 | 2774    | 0.0004                               | 0.0006  | 0.0008  | 0.0011  | 0.0013  | 0.0016  | 0.0017  | 0.0021  | 0.0024  |
| 55     | 0.2606 | 0.5288 | 2734    | 0.0003                               | 0.0006  | 0.0007  | 0.0010  | 0.0013  | 0.0016  | 0.0017  | 0.0020  | 0.0023  |
| 56     | 0.2612 | 0.5266 | 2731    | 0.0003                               | 0.0005  | 0.0007  | 0.0010  | 0.0013  | 0.0015  | 0.0017  | 0.0019  | 0.0023  |
| 57     | 0.2596 | 0.5261 | 2767    | 0.0003                               | 0.0005  | 0.0008  | 0.0011  | 0.0013  | 0.0016  | 0.0017  | 0.0020  | 0.0024  |
| 58     | 0.2595 | 0.5272 | 2765    | 0.0003                               | 0.0006  | 0.0008  | 0.0011  | 0.0012  | 0.0016  | 0.0017  | 0.0020  | 0.0024  |
| 59     | 0.2596 | 0.5273 | 2762    | 0.0001                               | 0.0004  | 0.0008  | 0.0010  | 0.0012  | 0.0015  | 0.0015  | 0.0018  | 0.0023  |
| 60     | 0.2593 | 0.5254 | 2775    | 0.0002                               | 0.0007  | 0.0009  | 0.0012  | 0.0014  | 0.0016  | 0.0018  | 0.0021  | 0.0025  |
| Ave.   | 0.2592 | 0.5258 | 2778    | 0.0003                               | 0.0006  | 0.0008  | 0.0011  | 0.0013  | 0.0015  | 0.0017  | 0.0020  | 0.0024  |
| Med.   | 0.2593 | 0.5261 | 2773    | 0.0003                               | 0.0006  | 0.0008  | 0.0011  | 0.0013  | 0.0016  | 0.0017  | 0.0020  | 0.0024  |
| st dev | 0.0015 | 0.0020 | 39.6301 | 0.0001                               | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  | 0.0001  |
| Min.   | 0.2558 | 0.5204 | 2726    | 0.0001                               | 0.0003  | 0.0004  | 0.0009  | 0.0012  | 0.0014  | 0.0015  | 0.0018  | 0.0022  |
| Max.   | 0.2614 | 0.5288 | 2869    | 0.0004                               | 0.0008  | 0.0010  | 0.0013  | 0.0014  | 0.0017  | 0.0019  | 0.0022  | 0.0025  |



### 3.7 Data Set 3, 105°C, 150mA (Lumen Maintenance)

| No.    | Φ(lm)        | Lumen Maintenance (%) |         |         |         |         |         |         |         |         |
|--------|--------------|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|
|        | Ohr(Initial) | 1000hrs               | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs |
| 61     | 55.48        | 100.23                | 99.89   | 99.64   | 99.33   | 98.99   | 98.79   | 98.25   | 98.04   | 97.73   |
| 62     | 56.47        | 100.07                | 99.29   | 99.19   | 98.72   | 98.48   | 97.96   | 97.63   | 97.18   | 96.94   |
| 63     | 55.08        | 100.04                | 99.47   | 99.15   | 98.75   | 98.38   | 98.11   | 97.86   | 97.62   | 97.31   |
| 64     | 57.02        | 100.07                | 99.49   | 99.21   | 98.65   | 98.21   | 97.91   | 97.53   | 97.18   | 96.88   |
| 65     | 55.62        | 100.13                | 99.69   | 99.37   | 98.99   | 98.60   | 98.27   | 97.95   | 97.73   | 97.25   |
| 66     | 56.85        | 100.11                | 99.58   | 99.31   | 98.91   | 98.54   | 98.12   | 97.70   | 97.34   | 96.97   |
| 67     | 56.25        | 100.02                | 99.59   | 99.27   | 98.92   | 98.60   | 98.12   | 97.83   | 97.49   | 97.23   |
| 68     | 55.68        | 99.96                 | 99.43   | 99.19   | 98.72   | 98.37   | 98.15   | 97.67   | 97.41   | 97.00   |
| 69     | 55.52        | 100.04                | 99.66   | 99.24   | 98.69   | 98.32   | 98.14   | 97.98   | 97.75   | 97.42   |
| 70     | 57.12        | 100.02                | 99.58   | 99.23   | 98.72   | 98.34   | 98.13   | 97.64   | 97.27   | 97.01   |
| 71     | 54.04        | 100.07                | 99.61   | 99.39   | 98.82   | 98.41   | 98.15   | 97.76   | 97.59   | 97.28   |
| 72     | 56.61        | 99.96                 | 99.52   | 99.24   | 98.75   | 98.32   | 97.90   | 97.58   | 97.26   | 97.03   |
| 73     | 56.24        | 99.93                 | 99.29   | 98.86   | 98.38   | 98.06   | 97.80   | 97.16   | 96.66   | 96.18   |
| 74     | 56.42        | 100.12                | 99.66   | 99.38   | 98.97   | 98.53   | 98.25   | 97.86   | 97.48   | 97.24   |
| 75     | 57.30        | 100.19                | 100.03  | 99.84   | 99.37   | 98.83   | 98.57   | 98.46   | 98.12   | 97.75   |
| 76     | 55.02        | 100.20                | 99.84   | 99.73   | 99.33   | 98.80   | 98.40   | 97.86   | 97.55   | 97.29   |
| 77     | 56.35        | 100.25                | 99.73   | 99.38   | 99.09   | 98.90   | 98.33   | 97.62   | 97.32   | 97.11   |
| 78     | 57.42        | 100.24                | 99.60   | 99.22   | 98.82   | 98.62   | 98.22   | 97.58   | 97.28   | 97.07   |
| 79     | 55.30        | 100.20                | 99.84   | 99.66   | 99.42   | 99.02   | 98.52   | 97.99   | 97.61   | 97.18   |
| 80     | 56.30        | 100.07                | 99.56   | 99.38   | 99.11   | 98.77   | 98.24   | 97.73   | 97.41   | 97.07   |
| 81     | 55.94        | 100.09                | 99.50   | 99.36   | 99.00   | 98.55   | 98.19   | 97.78   | 97.46   | 97.07   |
| 82     | 55.27        | 100.24                | 99.80   | 99.60   | 99.26   | 98.93   | 98.61   | 98.26   | 98.01   | 97.79   |
| 83     | 56.00        | 100.27                | 99.80   | 99.50   | 99.13   | 98.82   | 98.52   | 98.23   | 97.86   | 97.61   |
| 84     | 55.69        | 100.04                | 99.59   | 99.19   | 98.76   | 98.40   | 97.90   | 97.32   | 96.89   | 96.39   |
| 85     | 56.79        | 99.84                 | 99.52   | 99.37   | 98.98   | 98.59   | 98.12   | 97.73   | 97.29   | 96.95   |
| 86     | 55.36        | 100.20                | 99.73   | 99.44   | 99.01   | 98.65   | 98.32   | 97.65   | 97.40   | 97.06   |
| 87     | 56.62        | 100.14                | 99.81   | 99.59   | 99.29   | 98.78   | 98.41   | 97.76   | 97.44   | 97.19   |
| 88     | 56.60        | 100.12                | 99.88   | 99.45   | 99.08   | 98.75   | 98.36   | 98.07   | 97.67   | 97.37   |
| 89     | 56.57        | 100.14                | 99.58   | 99.10   | 98.80   | 98.39   | 98.00   | 97.45   | 97.15   | 96.89   |
| 90     | 55.46        | 100.07                | 99.48   | 99.06   | 98.68   | 98.03   | 97.58   | 97.37   | 97.10   | 96.84   |
| Ave.   | 56.08        | 100.10                | 99.63   | 99.35   | 98.95   | 98.57   | 98.20   | 97.78   | 97.45   | 97.14   |
| Med.   | 56.25        | 100.10                | 99.60   | 99.36   | 98.94   | 98.57   | 98.17   | 97.74   | 97.43   | 97.09   |
| st dev | 0.7779       | 0.1039                | 0.1755  | 0.2131  | 0.2555  | 0.2598  | 0.2593  | 0.2924  | 0.3229  | 0.3465  |
| Min.   | 54.04        | 99.84                 | 99.29   | 98.86   | 98.38   | 98.03   | 97.58   | 97.16   | 96.66   | 96.18   |
| Max.   | 57.42        | 100.27                | 100.03  | 99.84   | 99.42   | 99.02   | 98.79   | 98.46   | 98.12   | 97.79   |

TM-21 Projection:

**Test Duration:** 9,000 hours

**Failures Observed:** 0

**α:** 3.739E-06

**β:** 1.004

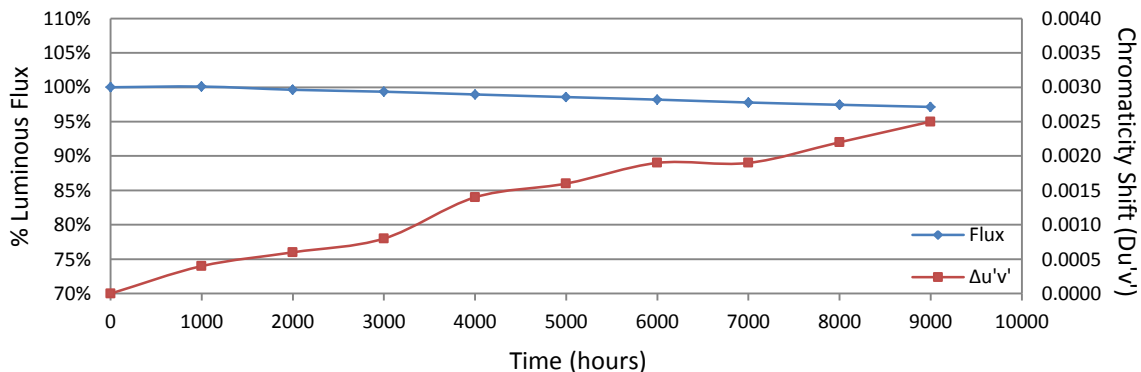
**Reported L<sub>70</sub>:** >54000 hours

### 3.8 Data Set 3, 105°C, 150mA (Forward Voltage)

| No.    | Forward Voltage (V) |         |         |         |         |         |         |         |         |         |
|--------|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|        | 0hr(Initial)        | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs |
| 61     | 3.057               | 3.092   | 3.123   | 3.161   | 3.040   | 3.039   | 3.045   | 3.052   | 3.059   | 3.047   |
| 62     | 3.058               | 3.095   | 3.263   | 3.038   | 3.040   | 3.041   | 3.046   | 3.051   | 3.060   | 3.045   |
| 63     | 3.055               | 3.082   | 3.116   | 3.007   | 3.030   | 3.031   | 3.037   | 3.041   | 3.045   | 3.039   |
| 64     | 3.074               | 3.116   | 3.129   | 3.065   | 3.042   | 3.043   | 3.048   | 3.051   | 3.063   | 3.072   |
| 65     | 3.044               | 3.086   | 3.174   | 3.063   | 3.032   | 3.033   | 3.039   | 3.041   | 3.049   | 3.069   |
| 66     | 3.048               | 3.074   | 3.180   | 3.016   | 3.038   | 3.037   | 3.044   | 3.047   | 3.054   | 3.053   |
| 67     | 3.045               | 3.084   | 3.166   | 2.998   | 3.038   | 3.037   | 3.042   | 3.043   | 3.051   | 3.055   |
| 68     | 3.048               | 3.088   | 3.114   | 3.013   | 3.037   | 3.038   | 3.044   | 3.044   | 3.052   | 3.042   |
| 69     | 3.044               | 3.085   | 3.124   | 3.014   | 3.035   | 3.037   | 3.041   | 3.043   | 3.054   | 3.048   |
| 70     | 3.064               | 3.100   | 3.128   | 2.987   | 3.045   | 3.047   | 3.050   | 3.063   | 3.062   | 3.082   |
| 71     | 3.027               | 3.055   | 3.128   | 2.985   | 3.020   | 3.020   | 3.027   | 3.029   | 3.042   | 3.027   |
| 72     | 3.056               | 3.123   | 3.209   | 3.069   | 3.046   | 3.049   | 3.053   | 3.055   | 3.067   | 3.050   |
| 73     | 3.039               | 3.093   | 3.172   | 3.012   | 3.031   | 3.037   | 3.038   | 3.043   | 3.048   | 3.033   |
| 74     | 3.054               | 3.065   | 3.113   | 2.999   | 3.039   | 3.042   | 3.047   | 3.048   | 3.053   | 3.043   |
| 75     | 3.067               | 3.078   | 3.164   | 3.030   | 3.056   | 3.060   | 3.060   | 3.067   | 3.073   | 3.057   |
| 76     | 3.044               | 3.071   | 3.187   | 2.988   | 3.033   | 3.035   | 3.037   | 3.045   | 3.049   | 3.034   |
| 77     | 3.060               | 3.090   | 3.186   | 3.083   | 3.047   | 3.056   | 3.054   | 3.062   | 3.065   | 3.054   |
| 78     | 3.062               | 3.093   | 3.234   | 3.147   | 3.048   | 3.052   | 3.055   | 3.061   | 3.064   | 3.051   |
| 79     | 3.043               | 3.068   | 3.272   | 3.233   | 3.034   | 3.034   | 3.041   | 3.047   | 3.057   | 3.038   |
| 80     | 3.051               | 3.077   | 3.212   | 3.049   | 3.041   | 3.043   | 3.046   | 3.055   | 3.059   | 3.043   |
| 81     | 3.091               | 3.057   | 3.156   | 3.071   | 3.028   | 3.028   | 3.030   | 3.037   | 3.041   | 3.031   |
| 82     | 3.038               | 3.057   | 3.337   | 3.020   | 3.027   | 3.029   | 3.033   | 3.042   | 3.045   | 3.040   |
| 83     | 3.051               | 3.068   | 3.142   | 3.092   | 3.041   | 3.043   | 3.047   | 3.052   | 3.062   | 3.045   |
| 84     | 3.049               | 3.085   | 3.107   | 3.045   | 3.033   | 3.039   | 3.041   | 3.043   | 3.059   | 3.041   |
| 85     | 3.072               | 3.080   | 3.146   | 3.162   | 3.041   | 3.040   | 3.048   | 3.052   | 3.058   | 3.045   |
| 86     | 3.038               | 3.065   | 3.074   | 2.994   | 3.028   | 3.027   | 3.032   | 3.036   | 3.051   | 3.030   |
| 87     | 3.050               | 3.074   | 3.260   | 3.142   | 3.042   | 3.042   | 3.048   | 3.054   | 3.063   | 3.046   |
| 88     | 3.048               | 3.079   | 3.128   | 3.128   | 3.038   | 3.039   | 3.044   | 3.052   | 3.058   | 3.043   |
| 89     | 3.055               | 3.096   | 3.294   | 3.055   | 3.046   | 3.047   | 3.051   | 3.057   | 3.068   | 3.050   |
| 90     | 3.040               | 3.064   | 3.326   | 3.110   | 3.030   | 3.031   | 3.037   | 3.047   | 3.050   | 3.037   |
| Ave.   | 3.052               | 3.081   | 3.179   | 3.059   | 3.038   | 3.039   | 3.044   | 3.049   | 3.056   | 3.046   |
| Med.   | 3.051               | 3.081   | 3.165   | 3.047   | 3.038   | 3.039   | 3.044   | 3.048   | 3.058   | 3.045   |
| st dev | 0.0128              | 0.0162  | 0.0684  | 0.0634  | 0.0076  | 0.0086  | 0.0077  | 0.0086  | 0.0080  | 0.0122  |
| Min.   | 3.027               | 3.055   | 3.074   | 2.985   | 3.020   | 3.020   | 3.027   | 3.029   | 3.041   | 3.027   |
| Max.   | 3.091               | 3.123   | 3.337   | 3.233   | 3.056   | 3.060   | 3.060   | 3.067   | 3.073   | 3.082   |

### 3.9 Data Set 3, 105°C, 150mA (Chromaticity Shift)

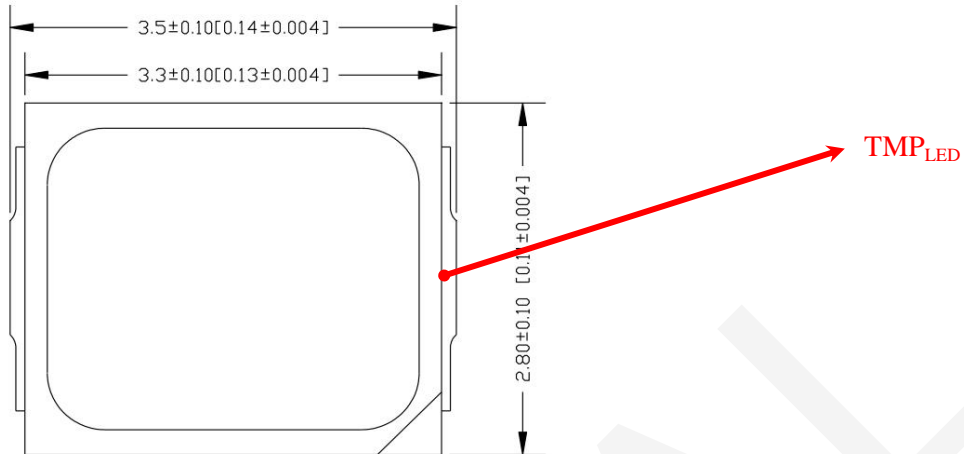
| No.    | u'     | v'     | CCT(K)  | Chromaticity Shift ( $\Delta u'v'$ ) |         |         |         |         |         |         |         |         |
|--------|--------|--------|---------|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
|        |        |        |         | 0hr(Initial)                         | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs |
| 61     | 0.2599 | 0.5261 | 2761    | 0.0004                               | 0.0007  | 0.0009  | 0.0014  | 0.0016  | 0.0017  | 0.0019  | 0.0022  | 0.0025  |
| 62     | 0.2614 | 0.5282 | 2719    | 0.0004                               | 0.0006  | 0.0007  | 0.0013  | 0.0016  | 0.0019  | 0.0019  | 0.0023  | 0.0025  |
| 63     | 0.2579 | 0.5234 | 2817    | 0.0004                               | 0.0007  | 0.0009  | 0.0014  | 0.0016  | 0.0018  | 0.0019  | 0.0022  | 0.0026  |
| 64     | 0.2567 | 0.5236 | 2842    | 0.0004                               | 0.0005  | 0.0007  | 0.0014  | 0.0016  | 0.0018  | 0.0020  | 0.0023  | 0.0025  |
| 65     | 0.2576 | 0.5245 | 2817    | 0.0004                               | 0.0006  | 0.0008  | 0.0012  | 0.0016  | 0.0018  | 0.0018  | 0.0022  | 0.0025  |
| 66     | 0.2604 | 0.5258 | 2752    | 0.0004                               | 0.0005  | 0.0007  | 0.0013  | 0.0015  | 0.0018  | 0.0019  | 0.0022  | 0.0025  |
| 67     | 0.2569 | 0.5216 | 2849    | 0.0004                               | 0.0005  | 0.0007  | 0.0013  | 0.0015  | 0.0018  | 0.0018  | 0.0021  | 0.0026  |
| 68     | 0.2595 | 0.5261 | 2769    | 0.0004                               | 0.0007  | 0.0009  | 0.0014  | 0.0016  | 0.0019  | 0.0020  | 0.0022  | 0.0026  |
| 69     | 0.2589 | 0.5248 | 2788    | 0.0004                               | 0.0007  | 0.0008  | 0.0013  | 0.0015  | 0.0018  | 0.0018  | 0.0021  | 0.0025  |
| 70     | 0.2592 | 0.5268 | 2771    | 0.0004                               | 0.0006  | 0.0008  | 0.0012  | 0.0014  | 0.0017  | 0.0018  | 0.0022  | 0.0024  |
| 71     | 0.2589 | 0.5242 | 2790    | 0.0005                               | 0.0006  | 0.0009  | 0.0014  | 0.0016  | 0.0019  | 0.0020  | 0.0022  | 0.0027  |
| 72     | 0.2587 | 0.5249 | 2792    | 0.0004                               | 0.0006  | 0.0008  | 0.0013  | 0.0016  | 0.0018  | 0.0020  | 0.0023  | 0.0025  |
| 73     | 0.2563 | 0.5239 | 2850    | 0.0003                               | 0.0005  | 0.0008  | 0.0013  | 0.0015  | 0.0017  | 0.0018  | 0.0021  | 0.0024  |
| 74     | 0.2565 | 0.5235 | 2848    | 0.0004                               | 0.0005  | 0.0007  | 0.0013  | 0.0015  | 0.0018  | 0.0019  | 0.0021  | 0.0025  |
| 75     | 0.2589 | 0.5275 | 2775    | 0.0004                               | 0.0005  | 0.0007  | 0.0012  | 0.0014  | 0.0017  | 0.0017  | 0.0022  | 0.0024  |
| 76     | 0.2599 | 0.5259 | 2760    | 0.0004                               | 0.0006  | 0.0008  | 0.0013  | 0.0015  | 0.0018  | 0.0019  | 0.0022  | 0.0025  |
| 77     | 0.2595 | 0.5249 | 2775    | 0.0004                               | 0.0005  | 0.0008  | 0.0013  | 0.0015  | 0.0019  | 0.0019  | 0.0022  | 0.0025  |
| 78     | 0.2588 | 0.5264 | 2783    | 0.0004                               | 0.0006  | 0.0007  | 0.0012  | 0.0015  | 0.0019  | 0.0019  | 0.0022  | 0.0024  |
| 79     | 0.2579 | 0.5232 | 2817    | 0.0004                               | 0.0005  | 0.0007  | 0.0013  | 0.0014  | 0.0017  | 0.0018  | 0.0020  | 0.0025  |
| 80     | 0.2592 | 0.5256 | 2778    | 0.0005                               | 0.0007  | 0.0009  | 0.0014  | 0.0016  | 0.0019  | 0.0020  | 0.0023  | 0.0025  |
| 81     | 0.2573 | 0.5238 | 2828    | 0.0003                               | 0.0006  | 0.0008  | 0.0012  | 0.0014  | 0.0019  | 0.0018  | 0.0021  | 0.0024  |
| 82     | 0.2561 | 0.5234 | 2857    | 0.0005                               | 0.0008  | 0.0009  | 0.0014  | 0.0017  | 0.0020  | 0.0020  | 0.0024  | 0.0027  |
| 83     | 0.2560 | 0.5247 | 2853    | 0.0008                               | 0.0013  | 0.0018  | 0.0022  | 0.0024  | 0.0025  | 0.0027  | 0.0030  | 0.0033  |
| 84     | 0.2595 | 0.5253 | 2772    | 0.0005                               | 0.0005  | 0.0009  | 0.0014  | 0.0016  | 0.0019  | 0.0020  | 0.0023  | 0.0025  |
| 85     | 0.2600 | 0.5247 | 2764    | 0.0005                               | 0.0008  | 0.0009  | 0.0013  | 0.0015  | 0.0018  | 0.0019  | 0.0022  | 0.0025  |
| 86     | 0.2587 | 0.5238 | 2798    | 0.0006                               | 0.0008  | 0.0010  | 0.0016  | 0.0017  | 0.0020  | 0.0020  | 0.0024  | 0.0027  |
| 87     | 0.2582 | 0.5258 | 2798    | 0.0004                               | 0.0007  | 0.0007  | 0.0014  | 0.0015  | 0.0018  | 0.0019  | 0.0023  | 0.0026  |
| 88     | 0.2574 | 0.5247 | 2821    | 0.0004                               | 0.0007  | 0.0009  | 0.0014  | 0.0016  | 0.0019  | 0.0020  | 0.0023  | 0.0025  |
| 89     | 0.2570 | 0.5229 | 2840    | 0.0004                               | 0.0007  | 0.0009  | 0.0014  | 0.0016  | 0.0018  | 0.0020  | 0.0023  | 0.0026  |
| 90     | 0.2566 | 0.5230 | 2849    | 0.0005                               | 0.0008  | 0.0009  | 0.0015  | 0.0016  | 0.0019  | 0.0020  | 0.0023  | 0.0027  |
| Ave.   | 0.2583 | 0.5248 | 2801    | 0.0004                               | 0.0006  | 0.0008  | 0.0014  | 0.0016  | 0.0019  | 0.0019  | 0.0022  | 0.0025  |
| Med.   | 0.2587 | 0.5247 | 2795    | 0.0004                               | 0.0006  | 0.0008  | 0.0013  | 0.0016  | 0.0018  | 0.0019  | 0.0022  | 0.0025  |
| st dev | 0.0014 | 0.0015 | 36.8083 | 0.0001                               | 0.0001  | 0.0002  | 0.0002  | 0.0002  | 0.0002  | 0.0002  | 0.0002  | 0.0002  |
| Min.   | 0.2560 | 0.5216 | 2719    | 0.0003                               | 0.0005  | 0.0007  | 0.0012  | 0.0014  | 0.0017  | 0.0017  | 0.0020  | 0.0024  |
| Max.   | 0.2614 | 0.5282 | 2857    | 0.0008                               | 0.0013  | 0.0018  | 0.0022  | 0.0024  | 0.0025  | 0.0027  | 0.0030  | 0.0033  |





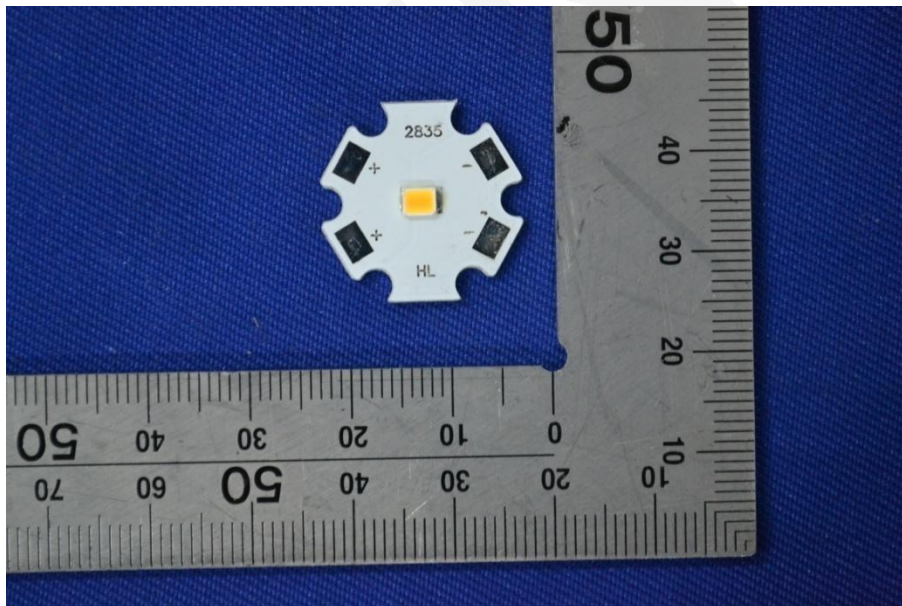
## 4 - EUT Photo

### 4.1 Mechanical Dimensions



All dimensions are in millimeter

### 4.2 EUT Photo



### 4.3 Report Revision

| Report Number      | Report Date | Contents  |
|--------------------|-------------|---|
| RSZ160329506-10    | 2017-05-05  | Original report.  |
| RSZ160329506-10-M1 | 2019-01-14  | Update the Logo of lab on the Page1<br>Update Company name and address on page 1.<br>Add DUT Characteristics on page 3 according to<br>ENERGY STAR requirements |

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

FINAL