

LM-80 Test Report NVSL219C

| | | | |
|------------------------------|--------------------|------------------------------|------------------|
| Issue Date: | September 7, 2018 | Revision Date: | - |
| Test Initiation Date: | September 26, 2014 | Test Completion Date: | January 26, 2016 |
| Test Duration: | 10,000 hours | Report Number: | SQETMOJ75901 |

Customer Information:

Company Name: Nichia Corporation
Address: 491-100, Oka, Kaminaka-cho, Anan-shi, Tokushima, 774-8601, JAPAN

Description of Test Samples:

Manufacturer's Name: Nichia Corporation
Classification: LED Package
Model Name: Warm White LED
Model Number: NVSL219C
Nominal CCT: 2700 K

Test Summary:

| Data Set | Case Temperature [°C] | Ambient Temperature [°C] | Drive Current [mA] | Lumen maintenance at 10K hours [%] | Chromaticity Shift ($\Delta u'v'$) at 10K hours | TM-21 Projection $L_{70}(10K)$ [hours] | TM-21 Projection $L_{80}(10K)$ [hours] | TM-21 Projection $L_{90}(10K)$ [hours] |
|----------|-----------------------|--------------------------|--------------------|------------------------------------|---|--|--|--|
| 1 | 55 | > 50 | 700 | 99.8 | 0.0016 | > 60000 | > 60000 | > 60000 |
| 2 | 55 | > 50 | 1500 | 99.1 | 0.0019 | > 60000 | > 60000 | > 60000 |
| 3 | 85 | > 80 | 700 | 99.4 | 0.0019 | > 60000 | > 60000 | > 60000 |
| 4 | 85 | > 80 | 1200 | 97.0 | 0.0018 | > 60000 | > 60000 | 38400 |
| 5 | 85 | > 80 | 1500 | 99.4 | 0.0021 | > 60000 | > 60000 | > 60000 |
| 6 | 105 | > 100 | 700 | 94.4 | 0.0014 | > 60000 | 47900 | 20600 |
| 7 | 105 | > 100 | 1200 | 91.8 | 0.0017 | 54100 | 32200 | 13000 |
| 8 | 105 | > 100 | 1500 | 90.1 | 0.0022 | 46500 | 27100 | 9880 |
| 9 | 120 | > 115 | 700 | 94.4 | 0.0018 | > 60000 | > 60000 | 25200 |
| 10 | 120 | > 115 | 1200 | 94.5 | 0.0029 | > 60000 | 57900 | 23900 |
| 11 | 120 | > 115 | 1500 | 89.1 | 0.0037 | 49100 | 27300 | 8180 |
| | | | | | | | | |



Approved Signatory:

Hiroyuki HASHIMOTO, Lab Manager
Nichia Corporation LED Testing Laboratory
1-1, Tatsumi-Cho, Anan-Shi, TOKUSHIMA 774-0001, JAPAN

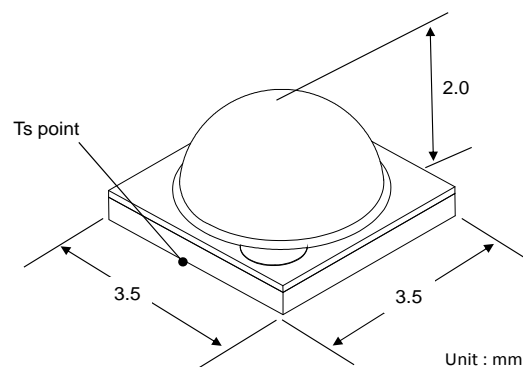
Applicable Model Numbers:**This LM-80 test report applies to the following models:**

| Series | Model Number | Case Temperature [°C] | Forward Current [mA] | Nominal CCT * [K] | Data Set Number |
|--------|-----------------------|-----------------------|----------------------|-------------------|-----------------|
| 219 | NVSL219C NVSL219CT | 55 | 700 | ≥ 2200 | 1 |
| | | 55 | 1500 | ≥ 2200 | 2 |
| | | 85 | 700 | ≥ 2200 | 3 |
| | | 85 | 1200 | ≥ 2200 | 4 |
| | | 85 | 1500 | ≥ 2200 | 5 |
| | | 105 | 700 | ≥ 2200 | 6 |
| | | 105 | 1200 | ≥ 2200 | 7 |
| | | 105 | 1500 | ≥ 2200 | 8 |
| | | 120 | 700 | ≥ 2200 | 9 |
| | | 120 | 1200 | ≥ 2200 | 10 |
| | | 120 | 1500 | ≥ 2200 | 11 |
| 219 | NVSW219C NVSW219CT | 55 | 700 | ≥ 5000 | 1 |
| | | 55 | 1500 | ≥ 5000 | 2 |
| | | 85 | 700 | ≥ 5000 | 3 |
| | | 85 | 1200 | ≥ 5000 | 4 |
| | | 85 | 1500 | ≥ 5000 | 5 |
| | | 105 | 700 | ≥ 5000 | 6 |
| | | 105 | 1200 | ≥ 5000 | 7 |
| | | 105 | 1500 | ≥ 5000 | 8 |
| | | 120 | 700 | ≥ 5000 | 9 |
| | | 120 | 1200 | ≥ 5000 | 10 |
| | | 120 | 1500 | ≥ 5000 | 11 |
| 219 | NVSW219D NVSW219DT | 55 | 700 | ≥ 2200 | 1 |
| | | 55 | 1500 | ≥ 2200 | 2 |
| | | 85 | 700 | ≥ 2200 | 3 |
| | | 85 | 1200 | ≥ 2200 | 4 |
| | | 85 | 1500 | ≥ 2200 | 5 |
| | | 105 | 700 | ≥ 2200 | 6 |
| | | 105 | 1200 | ≥ 2200 | 7 |
| | | 105 | 1500 | ≥ 2200 | 8 |
| | | 120 | 700 | ≥ 2200 | 9 |
| | | 120 | 1200 | ≥ 2200 | 10 |
| | | 120 | 1500 | ≥ 2200 | 11 |

* The Nominal CCT category in this document refers ENERGY STAR® Requirements for the Use of LM-80 Data.

IES LM-80 Test Report Requirement :

| | |
|---|--|
| 1. Number of LED light sources tested | See tables |
| 2. Description of LED light sources | See Description of Test Samples |
| 3. Description of auxiliary equipment | |
| Active cooling life test system | Consisting of small boxes, in which each box contains a reliability test board, and a water-cooled heat sink or a heater to control device temperature |
| LED Tester | Consisting of an integrating sphere, a programmable current-source meter, and a spectroradiometer |
| 4. Operating cycle | Constant direct current (DC) |
| 5. Ambient conditions | |
| Ambient Temperature (T_A) | See tables Ambient temperature is the temperature of the air at a distance of 1.5 mm above the reliability test board |
| Air flow | < 0.1 m/s |
| Relative Humidity | < 65 % |
| 6. Case temperature (Test point temperature) | See tables For the case temperature (T_S) measurement point, see the figure 1 |

Figure 1: The case temperature (T_S) measurement point

| | |
|--|--|
| 7. Drive current of the LED light sources during lifetime test | See tables |
| 8. Initial luminous flux, forward voltage and chromaticity coordinates | See tables |
| 9. Lumen maintenance data for each individual LED light source along with average value, median value, standard deviation, minimum and maximum lumen maintenance value for all of the LED light sources | See tables |
| 10. Observation of LED light sources failures including the failure conditions and time of failure | No failure observed |
| 11. LED light source monitoring interval | See tables |
| 12. Photometric measurement uncertainty | |
| Flux measurement | 4.8 % ($k=2$) |
| Lumen maintenance | 1.8 % ($k=2$) |
| 13. Chromaticity shift reported over the measurement time | See tables |
| 14. Photometric and electrical measurements | |
| Measurement point temperature | 25°C ± 2°C |
| Temperature measurement point location | Sphere ambient air temperature monitor |
| Measurement method | See LM-85-14 section 5.3 |

ENERGY STAR® LM-80 Cover Sheet

Administrative Information

| | |
|------------------------------------|--------------------|
| Tested subcomponent series : | Warm White LED |
| Tested subcomponent model number : | NVSL219C |
| Report issue date : | September 7, 2018 |
| Report revision date : | - |
| Testing start date : | September 26, 2014 |
| Testing completion date : | January 26, 2016 |
| LED sampling method : | Comply with LM-80 |
| LED sample size : | 24 Packages |

LED Identification

| | |
|---------------------------|--------------------|
| LED manufacturer's name : | Nichia Corporation |
| LED model number : | NVSL219C |
| Description of LED : | LED Package |

LED Characteristics

Total input power (W) :

Average current density per LED die (mA/mm²):

Average power density per LED die (W/mm²):

| Case Temperature [°C] | Drive Current [mA] | Total Input Power [W] | Average Current density per LED die [mA/mm ²] | Average Power density per LED die [W/mm ²] |
|-----------------------|--------------------|-----------------------|---|--|
| 55 | 700 | 2.08 | 357 | 1.06 |
| 55 | 1500 | 4.85 | 765 | 2.48 |
| 85 | 700 | 2.08 | 357 | 1.06 |
| 85 | 1200 | 3.78 | 612 | 1.93 |
| 85 | 1500 | 4.89 | 765 | 2.50 |
| 105 | 700 | 2.08 | 357 | 1.06 |
| 105 | 1200 | 3.75 | 612 | 1.91 |
| 105 | 1500 | 4.81 | 765 | 2.45 |
| 120 | 700 | 2.09 | 357 | 1.07 |
| 120 | 1200 | 3.73 | 612 | 1.90 |
| 120 | 1500 | 4.83 | 765 | 2.46 |
| | | | | |

Representative CRI (Ra) of the tested sample set : Ra = 82.3

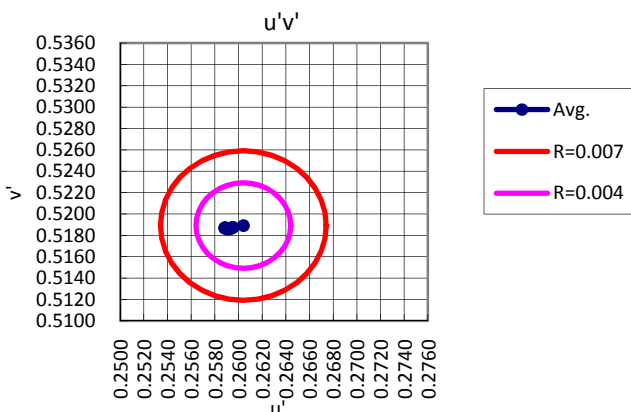
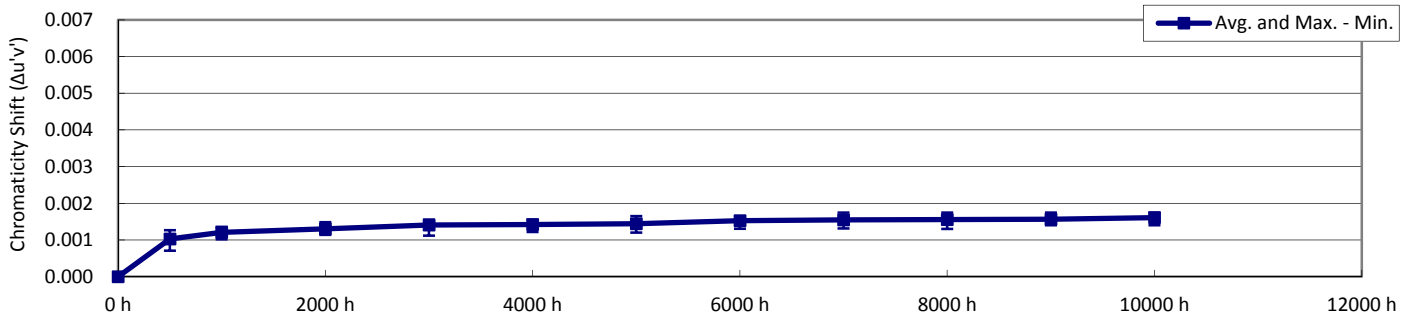
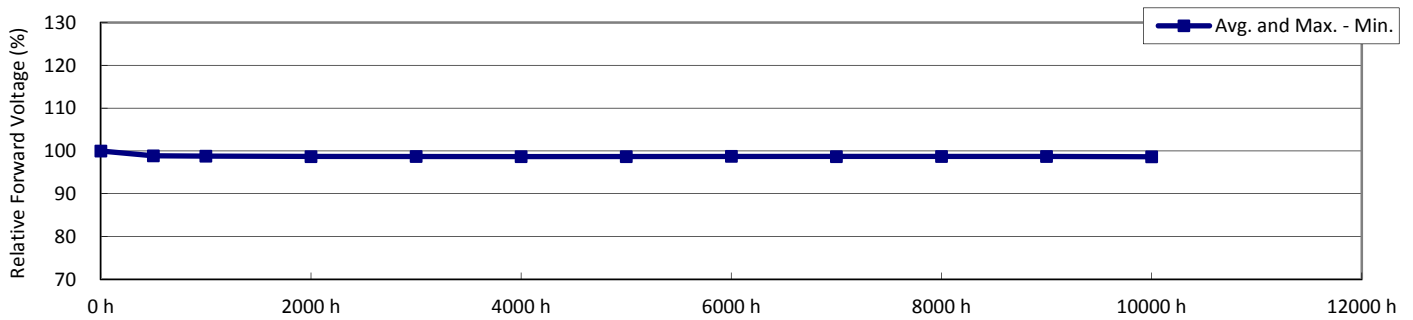
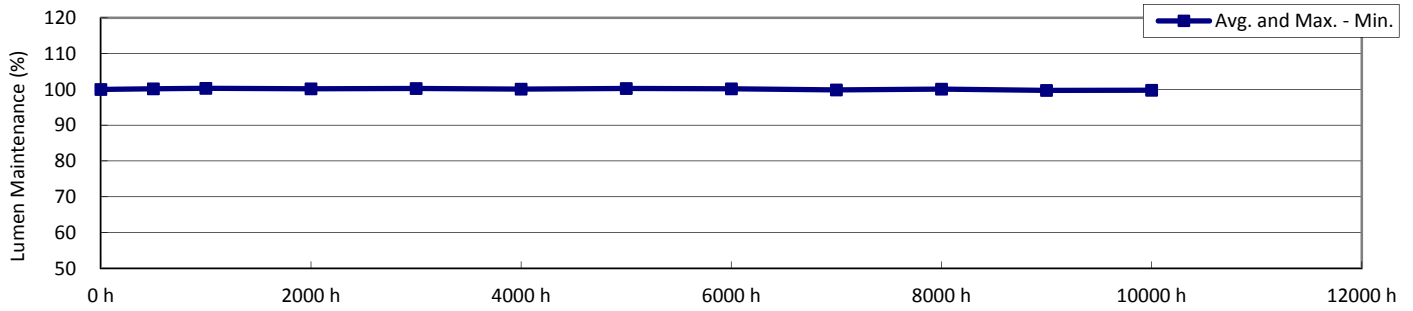
Minimum die edge to die edge spacing : N/A



Data Set 1 : 55 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _S] | 56.8 °C |
| Actual Ambient Temperature [T _A] | 55.6 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0



The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 1 : 55 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 56.8 °C |
| Actual Ambient Temperature [T _A] | 55.6 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 1-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 246 | 2.96 | 2714 | 2.07 | 0.454 | 0.401 | 0.263 | 0.523 | | | | |
| 2 | 249 | 2.95 | 2784 | 2.06 | 0.445 | 0.395 | 0.260 | 0.519 | | | | |
| 3 | 250 | 2.95 | 2810 | 2.07 | 0.443 | 0.392 | 0.259 | 0.518 | | | | |
| 4 | 247 | 2.95 | 2793 | 2.07 | 0.444 | 0.393 | 0.260 | 0.518 | | | | |
| 5 | 247 | 2.96 | 2743 | 2.07 | 0.450 | 0.398 | 0.262 | 0.521 | | | | |
| 6 | 250 | 2.95 | 2802 | 2.07 | 0.443 | 0.392 | 0.260 | 0.517 | | | | |
| 7 | 250 | 2.95 | 2819 | 2.07 | 0.442 | 0.393 | 0.259 | 0.518 | | | | |
| 8 | 247 | 2.95 | 2748 | 2.07 | 0.449 | 0.396 | 0.262 | 0.520 | | | | |
| 9 | 246 | 2.95 | 2761 | 2.06 | 0.448 | 0.396 | 0.261 | 0.520 | | | | |
| 10 | 249 | 2.95 | 2748 | 2.06 | 0.449 | 0.397 | 0.262 | 0.520 | | | | |
| 11 | 249 | 2.95 | 2789 | 2.07 | 0.445 | 0.395 | 0.260 | 0.519 | | | | |
| 12 | 248 | 2.95 | 2783 | 2.07 | 0.445 | 0.394 | 0.260 | 0.519 | | | | |
| 13 | 246 | 2.95 | 2743 | 2.07 | 0.451 | 0.399 | 0.262 | 0.522 | | | | |
| 14 | 249 | 2.99 | 2807 | 2.09 | 0.443 | 0.393 | 0.260 | 0.518 | | | | |
| 15 | 248 | 2.99 | 2807 | 2.09 | 0.444 | 0.394 | 0.259 | 0.519 | | | | |
| 16 | 251 | 3.00 | 2820 | 2.10 | 0.441 | 0.391 | 0.259 | 0.517 | | | | |
| 17 | 248 | 2.99 | 2774 | 2.09 | 0.446 | 0.394 | 0.261 | 0.519 | | | | |
| 18 | 248 | 2.99 | 2791 | 2.09 | 0.446 | 0.396 | 0.260 | 0.519 | | | | |
| 19 | 249 | 2.99 | 2831 | 2.09 | 0.441 | 0.392 | 0.259 | 0.517 | | | | |
| 20 | 247 | 2.99 | 2781 | 2.09 | 0.445 | 0.393 | 0.261 | 0.518 | | | | |
| 21 | 245 | 2.99 | 2760 | 2.09 | 0.446 | 0.394 | 0.262 | 0.519 | | | | |
| 22 | 250 | 2.99 | 2801 | 2.09 | 0.445 | 0.395 | 0.260 | 0.519 | | | | |
| 23 | 249 | 2.99 | 2810 | 2.09 | 0.443 | 0.393 | 0.259 | 0.518 | | | | |
| 24 | 246 | 2.99 | 2749 | 2.09 | 0.448 | 0.395 | 0.262 | 0.519 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 248 | 2.97 | 2782 | 2.08 | 0.446 | 0.395 | 0.260 | 0.519 | | | | |
| Med. | 248 | 2.96 | 2786 | 2.07 | 0.445 | 0.394 | 0.260 | 0.519 | | | | |
| σ | 1.5 | 0.020 | 30.4 | 0.014 | 0.0031 | 0.0024 | 0.0011 | 0.0014 | | | | |
| Min. | 245 | 2.95 | 2714 | 2.06 | 0.441 | 0.391 | 0.259 | 0.517 | | | | |
| Max. | 251 | 3.00 | 2831 | 2.10 | 0.454 | 0.401 | 0.263 | 0.523 | | | | |



Data Set 1 : 55 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 56.8 °C |
| Actual Ambient Temperature [T _A] | 55.6 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 1-2
 Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 99.6 | 100.2 | 99.9 | 100.1 | 100.0 | 100.1 | 99.6 | 99.8 | 100.1 | 99.7 | 99.8 | | | | |
| 2 | 100.0 | 99.8 | 99.7 | 99.5 | 99.6 | 99.7 | 99.6 | 99.8 | 99.3 | 99.5 | 99.3 | 99.3 | | | | |
| 3 | 100.0 | 98.8 | 99.6 | 99.5 | 99.7 | 99.5 | 99.9 | 99.7 | 99.4 | 99.6 | 99.2 | 99.3 | | | | |
| 4 | 100.0 | 100.9 | 101.0 | 100.8 | 100.8 | 100.8 | 101.0 | 101.0 | 100.6 | 100.8 | 99.5 | 100.5 | | | | |
| 5 | 100.0 | 100.0 | 100.6 | 100.4 | 100.8 | 100.4 | 100.7 | 100.7 | 100.3 | 100.6 | 100.5 | 100.3 | | | | |
| 6 | 100.0 | 100.2 | 99.8 | 99.6 | 99.8 | 99.6 | 100.0 | 99.7 | 99.3 | 99.7 | 99.4 | 99.3 | | | | |
| 7 | 100.0 | 100.8 | 100.9 | 100.6 | 100.8 | 100.6 | 100.8 | 100.6 | 100.4 | 100.6 | 100.3 | 100.4 | | | | |
| 8 | 100.0 | 99.2 | 100.3 | 100.5 | 100.7 | 100.4 | 100.5 | 100.7 | 100.2 | 100.5 | 100.5 | 100.2 | | | | |
| 9 | 100.0 | 99.7 | 100.8 | 100.9 | 101.0 | 100.8 | 101.3 | 101.0 | 100.7 | 100.9 | 100.8 | 100.6 | | | | |
| 10 | 100.0 | 99.5 | 99.9 | 99.9 | 100.1 | 99.9 | 100.2 | 100.0 | 99.9 | 99.9 | 99.2 | 99.3 | | | | |
| 11 | 100.0 | 100.0 | 99.7 | 99.7 | 99.8 | 99.6 | 100.0 | 100.1 | 99.6 | 99.9 | 99.7 | 99.6 | | | | |
| 12 | 100.0 | 99.3 | 100.3 | 100.6 | 100.9 | 100.7 | 101.2 | 100.8 | 100.5 | 100.8 | 100.5 | 100.4 | | | | |
| 13 | 100.0 | 100.6 | 100.6 | 100.3 | 100.5 | 100.2 | 100.6 | 100.5 | 100.2 | 100.5 | 100.4 | 100.2 | | | | |
| 14 | 100.0 | 101.2 | 100.7 | 100.6 | 100.6 | 100.5 | 100.5 | 100.3 | 100.1 | 100.3 | 100.0 | 100.0 | | | | |
| 15 | 100.0 | 101.3 | 101.0 | 100.8 | 100.8 | 100.6 | 100.7 | 100.6 | 100.2 | 100.6 | 100.2 | 100.2 | | | | |
| 16 | 100.0 | 100.0 | 100.0 | 99.6 | 99.7 | 99.6 | 99.8 | 99.8 | 99.2 | 99.3 | 99.1 | 99.0 | | | | |
| 17 | 100.0 | 100.4 | 100.3 | 100.1 | 100.2 | 99.8 | 100.2 | 100.1 | 99.8 | 100.1 | 99.6 | 99.6 | | | | |
| 18 | 100.0 | 100.6 | 100.5 | 100.3 | 100.4 | 100.1 | 100.4 | 100.2 | 99.9 | 100.0 | 99.1 | 99.6 | | | | |
| 19 | 100.0 | 100.9 | 100.7 | 100.4 | 100.4 | 100.1 | 100.2 | 100.0 | 99.8 | 99.9 | 99.7 | 99.5 | | | | |
| 20 | 100.0 | 100.3 | 100.5 | 100.2 | 100.2 | 100.1 | 100.3 | 100.3 | 99.9 | 100.0 | 99.7 | 99.7 | | | | |
| 21 | 100.0 | 100.2 | 100.2 | 99.9 | 100.0 | 99.8 | 100.2 | 100.1 | 99.7 | 99.8 | 99.6 | 99.5 | | | | |
| 22 | 100.0 | 100.0 | 99.9 | 99.5 | 99.4 | 99.3 | 99.1 | 99.3 | 98.8 | 98.9 | 98.9 | 98.7 | | | | |
| 23 | 100.0 | 100.5 | 100.3 | 100.0 | 100.0 | 99.8 | 99.7 | 99.9 | 99.7 | 99.8 | 99.4 | 99.5 | | | | |
| 24 | 100.0 | 100.3 | 100.1 | 100.0 | 100.0 | 99.8 | 99.5 | 99.8 | 99.5 | 99.8 | 99.4 | 99.3 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 100.2 | 100.3 | 100.2 | 100.3 | 100.1 | 100.3 | 100.2 | 99.9 | 100.1 | 99.7 | 99.8 | | | | |
| Med. | 100.0 | 100.2 | 100.3 | 100.2 | 100.2 | 100.0 | 100.2 | 100.1 | 99.8 | 100.0 | 99.6 | 99.6 | | | | |
| σ | 0.00 | 0.64 | 0.42 | 0.45 | 0.46 | 0.44 | 0.53 | 0.46 | 0.47 | 0.51 | 0.53 | 0.51 | | | | |
| Min. | 100.0 | 98.8 | 99.6 | 99.5 | 99.4 | 99.3 | 99.1 | 99.3 | 98.8 | 98.9 | 98.9 | 98.7 | | | | |
| Max. | 100.0 | 101.3 | 101.0 | 100.9 | 101.0 | 100.8 | 101.3 | 101.0 | 100.7 | 100.9 | 100.8 | 100.6 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|--------|--------|---------|--------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | 0.0027 | 0.0019 | -0.0013 | 0.0007 | -0.0026 | -0.0025 | | | | | | | | | | |

| | |
|----------------------------------|-------------------|
| Test duration used | 5000 h to 10000 h |
| B | 1.008 |
| α | 1.07E-06 |
| R ² | 0.782 |
| Calculated L ₇₀ (10K) | 340000 hours |
| Reported L ₇₀ (10K) | > 60000 hours |
| Calculated L ₈₀ (10K) | 215000 hours |
| Reported L ₈₀ (10K) | > 60000 hours |
| Calculated L ₉₀ (10K) | 106000 hours |
| Reported L ₉₀ (10K) | > 60000 hours |

Curve-fit equation:
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:

$L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*



Data Set 1 : 55 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 56.8 °C |
| Actual Ambient Temperature [T _A] | 55.6 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 1-3
 Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.9 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | | | | |
| 2 | 100.0 | 98.9 | 98.8 | 98.7 | 98.8 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | | | | |
| 3 | 100.0 | 98.8 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | | | | |
| 4 | 100.0 | 99.0 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.7 | | | | |
| 5 | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | | | | |
| 6 | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | | | | |
| 7 | 100.0 | 99.1 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | | | | |
| 8 | 100.0 | 99.1 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | | | | |
| 9 | 100.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | | | | |
| 10 | 100.0 | 99.2 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 99.1 | 99.0 | 99.0 | 99.0 | 98.9 | | | | |
| 11 | 100.0 | 99.1 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | | | | |
| 12 | 100.0 | 99.2 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | | | | |
| 13 | 100.0 | 99.2 | 99.2 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.1 | 99.1 | 99.1 | 99.0 | | | | |
| 14 | 100.0 | 98.7 | 98.6 | 98.5 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | | | | |
| 15 | 100.0 | 98.7 | 98.6 | 98.5 | 98.6 | 98.5 | 98.5 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | | | | |
| 16 | 100.0 | 98.4 | 98.3 | 98.3 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | | | | |
| 17 | 100.0 | 98.6 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | | | | |
| 18 | 100.0 | 98.6 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | | | | |
| 19 | 100.0 | 98.6 | 98.5 | 98.4 | 98.5 | 98.4 | 98.5 | 98.5 | 98.4 | 98.5 | 98.5 | 98.4 | | | | |
| 20 | 100.0 | 98.6 | 98.5 | 98.4 | 98.5 | 98.4 | 98.4 | 98.5 | 98.4 | 98.5 | 98.5 | 98.4 | | | | |
| 21 | 100.0 | 98.7 | 98.6 | 98.5 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | | | | |
| 22 | 100.0 | 98.7 | 98.6 | 98.5 | 98.6 | 98.5 | 98.5 | 98.6 | 98.5 | 98.6 | 98.6 | 98.5 | | | | |
| 23 | 100.0 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | 98.4 | 98.5 | 98.5 | 98.5 | 98.5 | 98.4 | | | | |
| 24 | 100.0 | 98.6 | 98.6 | 98.5 | 98.5 | 98.5 | 98.4 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.9 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | | | | |
| Med. | 100.0 | 98.9 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.6 | | | | |
| σ | 0.00 | 0.24 | 0.23 | 0.23 | 0.23 | 0.22 | 0.23 | 0.21 | 0.22 | 0.21 | 0.21 | 0.22 | | | | |
| Min. | 100.0 | 98.4 | 98.3 | 98.3 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | | | | |
| Max. | 100.0 | 99.2 | 99.2 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.1 | 99.1 | 99.1 | 99.0 | | | | |

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 1 : 55 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 56.8 °C |
| Actual Ambient Temperature [T _A] | 55.6 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 1-4
Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0009 | 0.0012 | 0.0012 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | | | | |
| 2 | 0.0000 | 0.0008 | 0.0010 | 0.0011 | 0.0011 | 0.0012 | 0.0012 | 0.0013 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | | | | |
| 3 | 0.0000 | 0.0008 | 0.0011 | 0.0012 | 0.0013 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | | | | |
| 4 | 0.0000 | 0.0011 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0017 | | | | |
| 5 | 0.0000 | 0.0009 | 0.0012 | 0.0013 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 6 | 0.0000 | 0.0009 | 0.0011 | 0.0012 | 0.0012 | 0.0013 | 0.0012 | 0.0014 | 0.0014 | 0.0013 | 0.0014 | 0.0015 | | | | |
| 7 | 0.0000 | 0.0011 | 0.0013 | 0.0014 | 0.0015 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | | | | |
| 8 | 0.0000 | 0.0007 | 0.0012 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | | | | |
| 9 | 0.0000 | 0.0008 | 0.0013 | 0.0014 | 0.0016 | 0.0016 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 10 | 0.0000 | 0.0008 | 0.0011 | 0.0012 | 0.0013 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0014 | 0.0015 | | | | |
| 11 | 0.0000 | 0.0010 | 0.0012 | 0.0012 | 0.0014 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | | | | |
| 12 | 0.0000 | 0.0010 | 0.0013 | 0.0015 | 0.0016 | 0.0016 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | | | | |
| 13 | 0.0000 | 0.0011 | 0.0012 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | | | | |
| 14 | 0.0000 | 0.0012 | 0.0012 | 0.0013 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | | | | |
| 15 | 0.0000 | 0.0012 | 0.0012 | 0.0014 | 0.0015 | 0.0014 | 0.0014 | 0.0016 | 0.0016 | 0.0015 | 0.0016 | 0.0017 | | | | |
| 16 | 0.0000 | 0.0011 | 0.0012 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | | | | |
| 17 | 0.0000 | 0.0010 | 0.0011 | 0.0012 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | | | | |
| 18 | 0.0000 | 0.0013 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0014 | 0.0016 | | | | |
| 19 | 0.0000 | 0.0012 | 0.0012 | 0.0013 | 0.0015 | 0.0015 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | | | | |
| 20 | 0.0000 | 0.0010 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0016 | 0.0016 | | | | |
| 21 | 0.0000 | 0.0011 | 0.0013 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | | | | |
| 22 | 0.0000 | 0.0010 | 0.0011 | 0.0012 | 0.0014 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | | | | |
| 23 | 0.0000 | 0.0011 | 0.0012 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | | | | |
| 24 | 0.0000 | 0.0011 | 0.0012 | 0.0014 | 0.0014 | 0.0014 | 0.0012 | 0.0015 | 0.0015 | 0.0014 | 0.0016 | 0.0016 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0010 | 0.0012 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | | | | |
| Med. | 0.0000 | 0.0010 | 0.0012 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | | | | |
| σ | 0.0000 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | |
| Min. | 0.0000 | 0.0007 | 0.0010 | 0.0011 | 0.0011 | 0.0012 | 0.0012 | 0.0013 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | | | | |
| Max. | 0.0000 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |

Data Set 1 : 55 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 56.8 °C |
| Actual Ambient Temperature [T _A] | 55.6 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 1-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2614 | 0.2605 | 0.2602 | 0.2602 | 0.2601 | 0.2600 | 0.2600 | 0.2599 | 0.2599 | 0.2598 | 0.2599 | 0.2598 | | | | |
| 2 | 0.2591 | 0.2583 | 0.2581 | 0.2580 | 0.2580 | 0.2579 | 0.2579 | 0.2578 | 0.2578 | 0.2578 | 0.2577 | 0.2577 | | | | |
| 3 | 0.2586 | 0.2578 | 0.2575 | 0.2574 | 0.2573 | 0.2573 | 0.2573 | 0.2572 | 0.2572 | 0.2572 | 0.2572 | 0.2571 | | | | |
| 4 | 0.2589 | 0.2578 | 0.2576 | 0.2575 | 0.2574 | 0.2574 | 0.2573 | 0.2573 | 0.2573 | 0.2573 | 0.2574 | 0.2572 | | | | |
| 5 | 0.2606 | 0.2597 | 0.2594 | 0.2593 | 0.2591 | 0.2591 | 0.2590 | 0.2590 | 0.2589 | 0.2589 | 0.2589 | 0.2589 | | | | |
| 6 | 0.2591 | 0.2582 | 0.2580 | 0.2579 | 0.2579 | 0.2578 | 0.2579 | 0.2577 | 0.2577 | 0.2578 | 0.2577 | 0.2576 | | | | |
| 7 | 0.2580 | 0.2569 | 0.2568 | 0.2567 | 0.2566 | 0.2566 | 0.2565 | 0.2564 | 0.2564 | 0.2564 | 0.2564 | 0.2563 | | | | |
| 8 | 0.2605 | 0.2598 | 0.2593 | 0.2592 | 0.2590 | 0.2591 | 0.2590 | 0.2589 | 0.2589 | 0.2589 | 0.2588 | 0.2588 | | | | |
| 9 | 0.2603 | 0.2595 | 0.2591 | 0.2590 | 0.2588 | 0.2588 | 0.2588 | 0.2587 | 0.2587 | 0.2586 | 0.2586 | 0.2586 | | | | |
| 10 | 0.2604 | 0.2596 | 0.2593 | 0.2592 | 0.2591 | 0.2591 | 0.2590 | 0.2589 | 0.2589 | 0.2589 | 0.2590 | 0.2589 | | | | |
| 11 | 0.2589 | 0.2579 | 0.2578 | 0.2577 | 0.2575 | 0.2576 | 0.2575 | 0.2574 | 0.2574 | 0.2574 | 0.2573 | 0.2574 | | | | |
| 12 | 0.2596 | 0.2586 | 0.2584 | 0.2582 | 0.2581 | 0.2581 | 0.2581 | 0.2580 | 0.2579 | 0.2580 | 0.2579 | 0.2579 | | | | |
| 13 | 0.2603 | 0.2592 | 0.2591 | 0.2590 | 0.2589 | 0.2588 | 0.2588 | 0.2588 | 0.2587 | 0.2587 | 0.2587 | 0.2586 | | | | |
| 14 | 0.2585 | 0.2573 | 0.2573 | 0.2572 | 0.2571 | 0.2571 | 0.2570 | 0.2570 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | | | | |
| 15 | 0.2583 | 0.2571 | 0.2571 | 0.2570 | 0.2569 | 0.2569 | 0.2569 | 0.2567 | 0.2567 | 0.2568 | 0.2567 | 0.2566 | | | | |
| 16 | 0.2580 | 0.2569 | 0.2568 | 0.2567 | 0.2566 | 0.2566 | 0.2565 | 0.2565 | 0.2565 | 0.2564 | 0.2565 | 0.2564 | | | | |
| 17 | 0.2594 | 0.2584 | 0.2583 | 0.2582 | 0.2581 | 0.2581 | 0.2580 | 0.2580 | 0.2580 | 0.2579 | 0.2579 | 0.2579 | | | | |
| 18 | 0.2589 | 0.2577 | 0.2577 | 0.2576 | 0.2575 | 0.2575 | 0.2575 | 0.2574 | 0.2574 | 0.2573 | 0.2575 | 0.2573 | | | | |
| 19 | 0.2574 | 0.2563 | 0.2563 | 0.2562 | 0.2560 | 0.2560 | 0.2560 | 0.2560 | 0.2559 | 0.2559 | 0.2558 | 0.2559 | | | | |
| 20 | 0.2594 | 0.2584 | 0.2582 | 0.2581 | 0.2580 | 0.2580 | 0.2579 | 0.2578 | 0.2578 | 0.2577 | 0.2578 | 0.2578 | | | | |
| 21 | 0.2607 | 0.2596 | 0.2595 | 0.2595 | 0.2594 | 0.2593 | 0.2593 | 0.2592 | 0.2592 | 0.2592 | 0.2591 | 0.2592 | | | | |
| 22 | 0.2584 | 0.2574 | 0.2573 | 0.2572 | 0.2571 | 0.2571 | 0.2571 | 0.2570 | 0.2570 | 0.2569 | 0.2569 | 0.2569 | | | | |
| 23 | 0.2581 | 0.2570 | 0.2569 | 0.2569 | 0.2568 | 0.2567 | 0.2567 | 0.2566 | 0.2566 | 0.2566 | 0.2566 | 0.2565 | | | | |
| 24 | 0.2605 | 0.2594 | 0.2593 | 0.2592 | 0.2592 | 0.2591 | 0.2593 | 0.2590 | 0.2590 | 0.2591 | 0.2589 | 0.2589 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2593 | 0.2583 | 0.2581 | 0.2580 | 0.2579 | 0.2579 | 0.2579 | 0.2578 | 0.2578 | 0.2578 | 0.2578 | 0.2577 | | | | |
| Med. | 0.2591 | 0.2583 | 0.2581 | 0.2580 | 0.2580 | 0.2579 | 0.2579 | 0.2578 | 0.2578 | 0.2578 | 0.2577 | 0.2577 | | | | |
| σ | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0010 | 0.0011 | 0.0011 | 0.0010 | 0.0011 | | | | |
| Min. | 0.2574 | 0.2563 | 0.2563 | 0.2562 | 0.2560 | 0.2560 | 0.2560 | 0.2560 | 0.2559 | 0.2559 | 0.2558 | 0.2559 | | | | |
| Max. | 0.2614 | 0.2605 | 0.2602 | 0.2602 | 0.2601 | 0.2600 | 0.2600 | 0.2599 | 0.2599 | 0.2598 | 0.2599 | 0.2598 | | | | |



Data Set 1 : 55 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _c] | 56.8 °C |
| Actual Ambient Temperature [T _A] | 55.6 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 1-6
 Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5216 | 0.5215 | 0.5214 | 0.5214 | 0.5214 | 0.5214 | 0.5214 | 0.5215 | 0.5214 | 0.5215 | 0.5215 | 0.5215 | | | | |
| 2 | 0.5177 | 0.5176 | 0.5175 | 0.5174 | 0.5175 | 0.5175 | 0.5175 | 0.5176 | 0.5175 | 0.5176 | 0.5176 | 0.5176 | | | | |
| 3 | 0.5167 | 0.5166 | 0.5164 | 0.5164 | 0.5165 | 0.5165 | 0.5165 | 0.5166 | 0.5165 | 0.5166 | 0.5166 | 0.5166 | | | | |
| 4 | 0.5169 | 0.5166 | 0.5165 | 0.5165 | 0.5165 | 0.5165 | 0.5165 | 0.5166 | 0.5166 | 0.5166 | 0.5169 | 0.5166 | | | | |
| 5 | 0.5196 | 0.5196 | 0.5194 | 0.5193 | 0.5193 | 0.5193 | 0.5193 | 0.5194 | 0.5193 | 0.5194 | 0.5194 | 0.5194 | | | | |
| 6 | 0.5162 | 0.5161 | 0.5160 | 0.5161 | 0.5160 | 0.5161 | 0.5162 | 0.5162 | 0.5161 | 0.5162 | 0.5162 | 0.5162 | | | | |
| 7 | 0.5167 | 0.5164 | 0.5163 | 0.5163 | 0.5163 | 0.5164 | 0.5164 | 0.5165 | 0.5164 | 0.5164 | 0.5165 | 0.5165 | | | | |
| 8 | 0.5188 | 0.5189 | 0.5185 | 0.5184 | 0.5185 | 0.5184 | 0.5185 | 0.5185 | 0.5185 | 0.5185 | 0.5185 | 0.5185 | | | | |
| 9 | 0.5188 | 0.5188 | 0.5184 | 0.5184 | 0.5184 | 0.5184 | 0.5185 | 0.5185 | 0.5185 | 0.5185 | 0.5186 | 0.5185 | | | | |
| 10 | 0.5190 | 0.5190 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5191 | 0.5190 | | | | |
| 11 | 0.5179 | 0.5176 | 0.5175 | 0.5176 | 0.5176 | 0.5176 | 0.5176 | 0.5177 | 0.5177 | 0.5177 | 0.5177 | 0.5177 | | | | |
| 12 | 0.5177 | 0.5175 | 0.5173 | 0.5172 | 0.5173 | 0.5173 | 0.5174 | 0.5173 | 0.5173 | 0.5174 | 0.5173 | 0.5173 | | | | |
| 13 | 0.5204 | 0.5202 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5202 | 0.5202 | 0.5202 | 0.5202 | 0.5202 | 0.5203 | | | | |
| 14 | 0.5166 | 0.5163 | 0.5163 | 0.5163 | 0.5162 | 0.5163 | 0.5163 | 0.5163 | 0.5164 | 0.5164 | 0.5163 | 0.5163 | | | | |
| 15 | 0.5173 | 0.5170 | 0.5170 | 0.5169 | 0.5169 | 0.5170 | 0.5170 | 0.5170 | 0.5170 | 0.5170 | 0.5170 | 0.5170 | | | | |
| 16 | 0.5154 | 0.5152 | 0.5152 | 0.5152 | 0.5152 | 0.5152 | 0.5152 | 0.5153 | 0.5153 | 0.5153 | 0.5153 | 0.5153 | | | | |
| 17 | 0.5174 | 0.5172 | 0.5171 | 0.5171 | 0.5171 | 0.5172 | 0.5171 | 0.5172 | 0.5172 | 0.5172 | 0.5172 | 0.5172 | | | | |
| 18 | 0.5181 | 0.5177 | 0.5177 | 0.5177 | 0.5177 | 0.5177 | 0.5178 | 0.5178 | 0.5178 | 0.5178 | 0.5179 | 0.5178 | | | | |
| 19 | 0.5158 | 0.5154 | 0.5154 | 0.5154 | 0.5154 | 0.5154 | 0.5154 | 0.5155 | 0.5155 | 0.5155 | 0.5155 | 0.5155 | | | | |
| 20 | 0.5167 | 0.5164 | 0.5163 | 0.5163 | 0.5163 | 0.5163 | 0.5163 | 0.5163 | 0.5163 | 0.5163 | 0.5163 | 0.5163 | | | | |
| 21 | 0.5186 | 0.5183 | 0.5182 | 0.5182 | 0.5183 | 0.5183 | 0.5183 | 0.5183 | 0.5183 | 0.5183 | 0.5183 | 0.5183 | | | | |
| 22 | 0.5175 | 0.5172 | 0.5172 | 0.5172 | 0.5171 | 0.5172 | 0.5172 | 0.5172 | 0.5172 | 0.5173 | 0.5173 | 0.5173 | | | | |
| 23 | 0.5164 | 0.5161 | 0.5161 | 0.5160 | 0.5160 | 0.5161 | 0.5161 | 0.5161 | 0.5161 | 0.5161 | 0.5161 | 0.5161 | | | | |
| 24 | 0.5181 | 0.5178 | 0.5178 | 0.5177 | 0.5177 | 0.5178 | 0.5179 | 0.5178 | 0.5178 | 0.5179 | 0.5179 | 0.5178 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5177 | 0.5175 | 0.5174 | 0.5174 | 0.5174 | 0.5175 | 0.5175 | 0.5175 | 0.5175 | 0.5175 | 0.5176 | 0.5175 | | | | |
| Med. | 0.5176 | 0.5174 | 0.5173 | 0.5172 | 0.5172 | 0.5173 | 0.5173 | 0.5173 | 0.5173 | 0.5174 | 0.5173 | 0.5173 | | | | |
| σ | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | | | | |
| Min. | 0.5154 | 0.5152 | 0.5152 | 0.5152 | 0.5152 | 0.5152 | 0.5152 | 0.5153 | 0.5153 | 0.5153 | 0.5153 | 0.5153 | | | | |
| Max. | 0.5216 | 0.5215 | 0.5214 | 0.5214 | 0.5214 | 0.5214 | 0.5214 | 0.5215 | 0.5214 | 0.5215 | 0.5215 | 0.5215 | | | | |

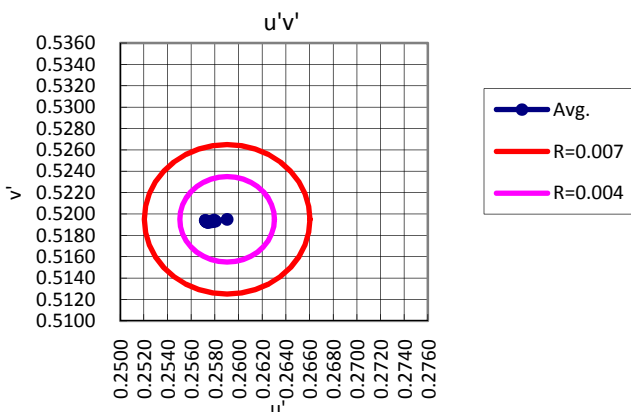
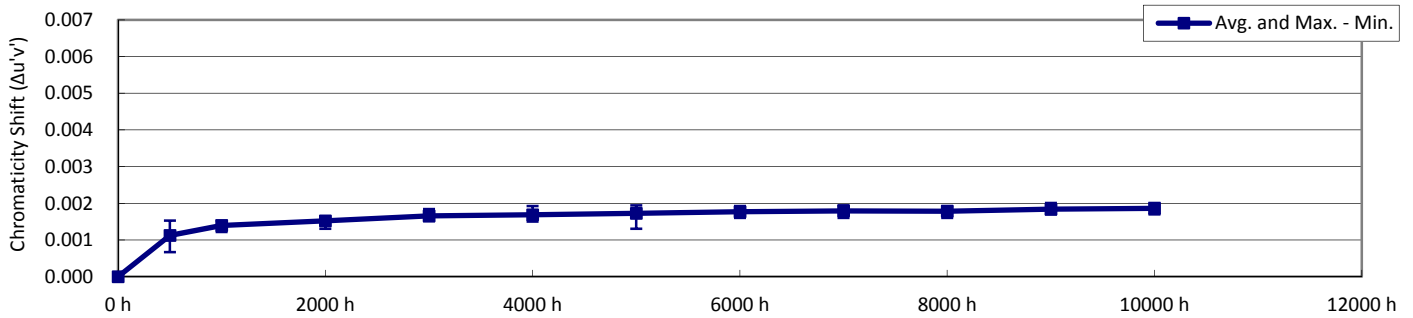
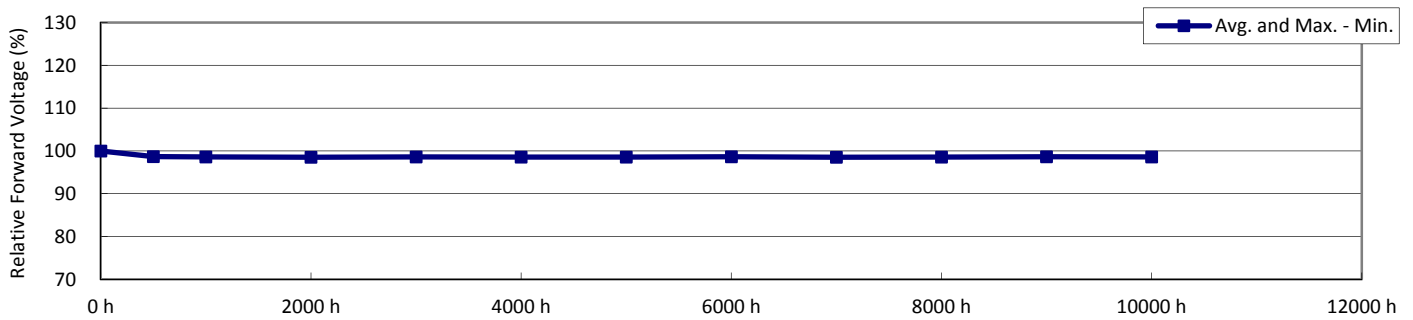
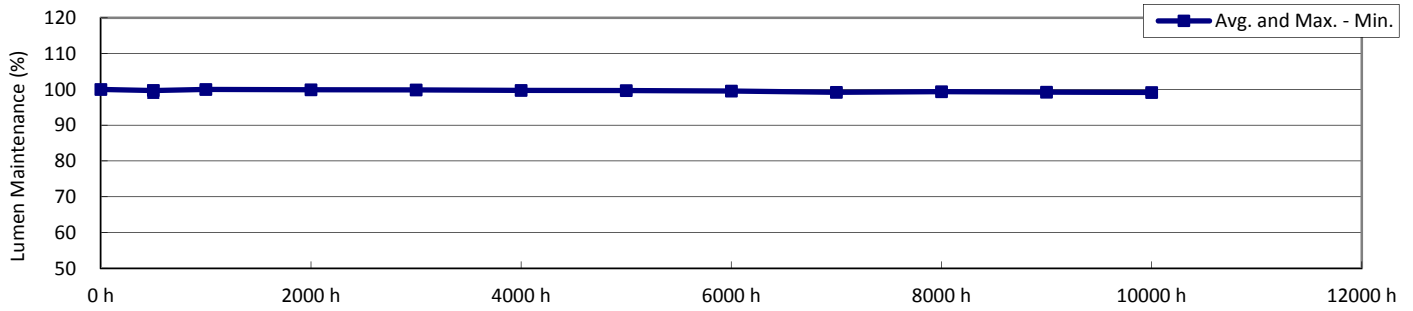
*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 2 : 55 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _S] | 59.8 °C |
| Actual Ambient Temperature [T _A] | 58.1 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0



Data Set 2 : 55 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 59.8 °C |
| Actual Ambient Temperature [T _A] | 58.1 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 2-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 476 | 3.24 | 2827 | 4.87 | 0.444 | 0.397 | 0.258 | 0.520 | | | | |
| 2 | 478 | 3.25 | 2815 | 4.87 | 0.444 | 0.396 | 0.259 | 0.519 | | | | |
| 3 | 480 | 3.25 | 2806 | 4.87 | 0.445 | 0.397 | 0.259 | 0.520 | | | | |
| 4 | 479 | 3.24 | 2813 | 4.86 | 0.445 | 0.397 | 0.259 | 0.520 | | | | |
| 5 | 481 | 3.24 | 2866 | 4.86 | 0.440 | 0.394 | 0.257 | 0.518 | | | | |
| 6 | 481 | 3.24 | 2829 | 4.86 | 0.445 | 0.400 | 0.258 | 0.521 | | | | |
| 7 | 484 | 3.24 | 2845 | 4.86 | 0.445 | 0.401 | 0.257 | 0.521 | | | | |
| 8 | 477 | 3.24 | 2815 | 4.86 | 0.444 | 0.395 | 0.259 | 0.519 | | | | |
| 9 | 476 | 3.24 | 2774 | 4.86 | 0.448 | 0.399 | 0.260 | 0.521 | | | | |
| 10 | 480 | 3.24 | 2814 | 4.85 | 0.445 | 0.398 | 0.259 | 0.520 | | | | |
| 11 | 478 | 3.24 | 2788 | 4.85 | 0.448 | 0.400 | 0.260 | 0.521 | | | | |
| 12 | 479 | 3.24 | 2797 | 4.86 | 0.448 | 0.400 | 0.259 | 0.522 | | | | |
| 13 | 477 | 3.24 | 2767 | 4.86 | 0.451 | 0.404 | 0.260 | 0.523 | | | | |
| 14 | 480 | 3.25 | 2841 | 4.88 | 0.442 | 0.395 | 0.258 | 0.519 | | | | |
| 15 | 473 | 3.24 | 2826 | 4.86 | 0.442 | 0.393 | 0.259 | 0.518 | | | | |
| 16 | 473 | 3.24 | 2808 | 4.86 | 0.444 | 0.396 | 0.259 | 0.519 | | | | |
| 17 | 471 | 3.24 | 2783 | 4.86 | 0.448 | 0.398 | 0.260 | 0.521 | | | | |
| 18 | 478 | 3.25 | 2831 | 4.88 | 0.442 | 0.394 | 0.258 | 0.518 | | | | |
| 19 | 477 | 3.25 | 2839 | 4.88 | 0.440 | 0.392 | 0.258 | 0.517 | | | | |
| 20 | 475 | 3.25 | 2856 | 4.88 | 0.439 | 0.391 | 0.258 | 0.517 | | | | |
| 21 | 468 | 3.25 | 2726 | 4.88 | 0.452 | 0.399 | 0.262 | 0.522 | | | | |
| 22 | 480 | 3.18 | 2802 | 4.77 | 0.444 | 0.393 | 0.260 | 0.518 | | | | |
| 23 | 478 | 3.18 | 2794 | 4.77 | 0.443 | 0.392 | 0.260 | 0.518 | | | | |
| 24 | 469 | 3.19 | 2789 | 4.78 | 0.444 | 0.392 | 0.260 | 0.518 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 477 | 3.24 | 2810 | 4.85 | 0.445 | 0.396 | 0.259 | 0.520 | | | | |
| Med. | 478 | 3.24 | 2813 | 4.86 | 0.444 | 0.396 | 0.259 | 0.519 | | | | |
| σ | 3.9 | 0.021 | 31.1 | 0.032 | 0.0032 | 0.0033 | 0.0012 | 0.0017 | | | | |
| Min. | 468 | 3.18 | 2726 | 4.77 | 0.439 | 0.391 | 0.257 | 0.517 | | | | |
| Max. | 484 | 3.25 | 2866 | 4.88 | 0.452 | 0.404 | 0.262 | 0.523 | | | | |



Data Set 2 : 55 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 59.8 °C |
| Actual Ambient Temperature [T _A] | 58.1 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 2-2
 Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.7 | 99.6 | 99.5 | 99.4 | 99.2 | 99.4 | 99.1 | 98.8 | 98.9 | 98.8 | 98.7 | | | | |
| 2 | 100.0 | 99.1 | 99.5 | 99.6 | 99.4 | 99.2 | 99.2 | 99.3 | 98.9 | 98.9 | 98.8 | 98.8 | | | | |
| 3 | 100.0 | 99.3 | 99.8 | 100.0 | 99.7 | 99.7 | 99.8 | 99.4 | 99.0 | 99.2 | 99.0 | 99.0 | | | | |
| 4 | 100.0 | 99.1 | 99.8 | 99.7 | 99.5 | 99.2 | 99.5 | 99.3 | 99.0 | 98.9 | 98.9 | 98.8 | | | | |
| 5 | 100.0 | 99.1 | 99.3 | 99.3 | 99.3 | 99.1 | 99.0 | 98.9 | 98.5 | 98.9 | 98.6 | 98.5 | | | | |
| 6 | 100.0 | 98.3 | 99.5 | 99.6 | 99.4 | 99.3 | 99.5 | 99.3 | 98.9 | 99.1 | 98.9 | 98.9 | | | | |
| 7 | 100.0 | 100.2 | 100.1 | 99.7 | 99.6 | 99.6 | 99.8 | 99.4 | 99.1 | 99.2 | 99.2 | 98.9 | | | | |
| 8 | 100.0 | 97.7 | 98.8 | 99.3 | 99.3 | 99.1 | 99.1 | 99.2 | 98.7 | 98.8 | 98.7 | 98.8 | | | | |
| 9 | 100.0 | 100.3 | 100.1 | 99.9 | 99.9 | 99.9 | 99.5 | 99.3 | 98.9 | 99.0 | 98.9 | 98.8 | | | | |
| 10 | 100.0 | 99.4 | 100.1 | 99.7 | 99.6 | 99.4 | 99.7 | 99.4 | 99.1 | 99.2 | 99.0 | 99.2 | | | | |
| 11 | 100.0 | 98.3 | 99.5 | 99.3 | 99.2 | 99.3 | 99.3 | 99.2 | 98.7 | 98.8 | 98.9 | 98.6 | | | | |
| 12 | 100.0 | 100.0 | 100.2 | 100.0 | 100.0 | 100.2 | 99.0 | 99.4 | 99.3 | 99.7 | 99.4 | 99.3 | | | | |
| 13 | 100.0 | 101.0 | 100.8 | 100.5 | 100.5 | 100.2 | 100.2 | 100.2 | 99.7 | 99.6 | 99.7 | 99.4 | | | | |
| 14 | 100.0 | 99.8 | 99.8 | 99.9 | 99.7 | 99.6 | 99.5 | 99.4 | 99.1 | 99.4 | 99.1 | 99.2 | | | | |
| 15 | 100.0 | 100.3 | 100.4 | 100.3 | 100.4 | 100.2 | 100.4 | 100.1 | 99.8 | 100.0 | 99.8 | 99.7 | | | | |
| 16 | 100.0 | 100.7 | 100.9 | 100.7 | 100.7 | 100.3 | 100.3 | 100.4 | 100.1 | 100.1 | 100.1 | 99.9 | | | | |
| 17 | 100.0 | 100.4 | 100.2 | 100.0 | 100.0 | 99.9 | 100.1 | 99.7 | 99.3 | 99.6 | 99.4 | 99.5 | | | | |
| 18 | 100.0 | 98.7 | 99.5 | 99.8 | 99.9 | 99.7 | 99.9 | 99.6 | 99.2 | 99.5 | 99.3 | 99.2 | | | | |
| 19 | 100.0 | 100.5 | 100.6 | 100.3 | 100.3 | 100.2 | 100.2 | 100.2 | 99.6 | 99.9 | 99.9 | 99.8 | | | | |
| 20 | 100.0 | 99.5 | 99.8 | 99.9 | 99.9 | 99.6 | 99.8 | 99.6 | 99.4 | 99.4 | 99.3 | 99.2 | | | | |
| 21 | 100.0 | 100.7 | 100.8 | 100.6 | 100.6 | 100.4 | 100.5 | 100.4 | 100.1 | 100.3 | 100.1 | 100.0 | | | | |
| 22 | 100.0 | 100.5 | 100.2 | 99.8 | 99.8 | 99.6 | 99.5 | 99.3 | 99.0 | 98.9 | 99.0 | 98.9 | | | | |
| 23 | 100.0 | 100.2 | 99.9 | 99.8 | 99.6 | 99.4 | 99.4 | 99.4 | 98.7 | 99.1 | 98.9 | 98.6 | | | | |
| 24 | 100.0 | 101.1 | 100.9 | 100.6 | 100.5 | 100.3 | 100.1 | 100.1 | 99.7 | 99.9 | 99.8 | 99.7 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 99.7 | 100.0 | 99.9 | 99.8 | 99.7 | 99.7 | 99.6 | 99.2 | 99.4 | 99.2 | 99.1 | | | | |
| Med. | 100.0 | 99.9 | 100.0 | 99.9 | 99.8 | 99.6 | 99.6 | 99.4 | 99.1 | 99.2 | 99.1 | 99.1 | | | | |
| σ | 0.00 | 0.93 | 0.54 | 0.41 | 0.45 | 0.44 | 0.44 | 0.43 | 0.44 | 0.45 | 0.45 | 0.43 | | | | |
| Min. | 100.0 | 97.7 | 98.8 | 99.3 | 99.2 | 99.1 | 99.0 | 98.9 | 98.5 | 98.8 | 98.6 | 98.5 | | | | |
| Max. | 100.0 | 101.1 | 100.9 | 100.7 | 100.7 | 100.4 | 100.5 | 100.4 | 100.1 | 100.3 | 100.1 | 100.0 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0031 | -0.0044 | -0.0081 | -0.0065 | -0.0078 | -0.0086 | | | | | | | | | | |

| | |
|----------------------------------|-------------------|
| Test duration used | 5000 h to 10000 h |
| B | 1.001 |
| α | 1.03E-06 |
| R ² | 0.762 |
| Calculated L ₇₀ (10K) | 348000 hours |
| Reported L ₇₀ (10K) | > 60000 hours |
| Calculated L ₈₀ (10K) | 218000 hours |
| Reported L ₈₀ (10K) | > 60000 hours |
| Calculated L ₉₀ (10K) | 104000 hours |
| Reported L ₉₀ (10K) | > 60000 hours |

Curve-fit equation:
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:
 $L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 2 : 55 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 59.8 °C |
| Actual Ambient Temperature [T _A] | 58.1 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 2-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | |
| 1 | 100.0 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| 2 | 100.0 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.6 | | | | |
| 3 | 100.0 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.5 | 98.6 | 98.7 | 98.6 | | | | |
| 4 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| 5 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.8 | 98.7 | | | | |
| 6 | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| 7 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.8 | 98.7 | | | | |
| 8 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.8 | 98.7 | | | | |
| 9 | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| 10 | 100.0 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.8 | 98.7 | | | | |
| 11 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.6 | 98.7 | 98.8 | 98.7 | | | | |
| 12 | 100.0 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.8 | 98.7 | | | | |
| 13 | 100.0 | 98.8 | 98.6 | 98.6 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| 14 | 100.0 | 98.6 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.6 | 98.5 | | | | |
| 15 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | | | | |
| 16 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.6 | 98.6 | 98.7 | 98.7 | | | | |
| 17 | 100.0 | 98.7 | 98.6 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.6 | 98.7 | 98.7 | | | | |
| 18 | 100.0 | 98.6 | 98.5 | 98.4 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.4 | 98.4 | 98.5 | 98.5 | | | | |
| 19 | 100.0 | 98.6 | 98.5 | 98.4 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.4 | 98.5 | 98.5 | 98.5 | | | | |
| 20 | 100.0 | 98.6 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.6 | 98.6 | | | | |
| 21 | 100.0 | 98.6 | 98.5 | 98.4 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.4 | 98.5 | 98.5 | 98.5 | | | | |
| 22 | 100.0 | 98.7 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | | | | |
| 23 | 100.0 | 98.7 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.4 | 98.4 | 98.5 | 98.5 | | | | |
| 24 | 100.0 | 98.1 | 97.9 | 97.8 | 97.9 | 97.9 | 97.8 | 97.9 | 97.8 | 97.8 | 97.8 | 97.9 | 97.8 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.7 | 98.6 | 98.5 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.5 | 98.6 | 98.6 | 98.6 | | | | |
| Med. | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.7 | | | | |
| σ | 0.00 | 0.15 | 0.16 | 0.17 | 0.18 | 0.17 | 0.18 | 0.18 | 0.19 | 0.18 | 0.18 | 0.19 | 0.19 | | | | |
| Min. | 100.0 | 98.1 | 97.9 | 97.8 | 97.9 | 97.9 | 97.8 | 97.9 | 97.8 | 97.8 | 97.8 | 97.9 | 97.8 | | | | |
| Max. | 100.0 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.8 | 98.7 | | | | |

Data Set 2 : 55 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 59.8 °C |
| Actual Ambient Temperature [T _A] | 58.1 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 2-4
Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0008 | 0.0012 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 2 | 0.0000 | 0.0009 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 3 | 0.0000 | 0.0010 | 0.0013 | 0.0013 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | | | | |
| 4 | 0.0000 | 0.0010 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | | | | |
| 5 | 0.0000 | 0.0011 | 0.0013 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | | | | |
| 6 | 0.0000 | 0.0010 | 0.0014 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0019 | 0.0019 | 0.0018 | 0.0019 | 0.0019 | | | | |
| 7 | 0.0000 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| 8 | 0.0000 | 0.0007 | 0.0012 | 0.0014 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 9 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | | | | |
| 10 | 0.0000 | 0.0011 | 0.0015 | 0.0015 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | | | | |
| 11 | 0.0000 | 0.0008 | 0.0013 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 12 | 0.0000 | 0.0011 | 0.0013 | 0.0014 | 0.0016 | 0.0015 | 0.0013 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | | | | |
| 13 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| 14 | 0.0000 | 0.0010 | 0.0013 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | | | | |
| 15 | 0.0000 | 0.0012 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0018 | 0.0019 | 0.0020 | | | | |
| 16 | 0.0000 | 0.0013 | 0.0015 | 0.0016 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | | | | |
| 17 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| 18 | 0.0000 | 0.0010 | 0.0013 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0019 | | | | |
| 19 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0016 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 20 | 0.0000 | 0.0012 | 0.0013 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| 21 | 0.0000 | 0.0013 | 0.0015 | 0.0016 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0018 | 0.0020 | 0.0020 | | | | |
| 22 | 0.0000 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | | | | |
| 23 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 24 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0011 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| Med. | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| σ | 0.0000 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | |
| Min. | 0.0000 | 0.0007 | 0.0012 | 0.0013 | 0.0015 | 0.0015 | 0.0013 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | | | | |
| Max. | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | | | | |

Data Set 2 : 55 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _S] | 59.8 °C |
| Actual Ambient Temperature [T _A] | 58.1 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 2-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2572 | 0.2564 | 0.2560 | 0.2558 | 0.2557 | 0.2556 | 0.2555 | 0.2555 | 0.2555 | 0.2554 | 0.2554 | 0.2554 | | | | |
| 2 | 0.2579 | 0.2570 | 0.2566 | 0.2565 | 0.2564 | 0.2564 | 0.2563 | 0.2563 | 0.2563 | 0.2562 | 0.2562 | 0.2562 | | | | |
| 3 | 0.2585 | 0.2575 | 0.2572 | 0.2572 | 0.2570 | 0.2570 | 0.2570 | 0.2569 | 0.2569 | 0.2569 | 0.2568 | 0.2568 | | | | |
| 4 | 0.2580 | 0.2570 | 0.2566 | 0.2565 | 0.2564 | 0.2564 | 0.2563 | 0.2563 | 0.2563 | 0.2563 | 0.2562 | 0.2562 | | | | |
| 5 | 0.2560 | 0.2549 | 0.2547 | 0.2545 | 0.2544 | 0.2544 | 0.2543 | 0.2542 | 0.2542 | 0.2542 | 0.2541 | 0.2541 | | | | |
| 6 | 0.2574 | 0.2564 | 0.2560 | 0.2558 | 0.2557 | 0.2557 | 0.2557 | 0.2555 | 0.2555 | 0.2556 | 0.2555 | 0.2555 | | | | |
| 7 | 0.2562 | 0.2549 | 0.2548 | 0.2547 | 0.2546 | 0.2545 | 0.2545 | 0.2545 | 0.2544 | 0.2544 | 0.2544 | 0.2543 | | | | |
| 8 | 0.2580 | 0.2574 | 0.2568 | 0.2566 | 0.2565 | 0.2563 | 0.2563 | 0.2563 | 0.2563 | 0.2562 | 0.2562 | 0.2562 | | | | |
| 9 | 0.2597 | 0.2585 | 0.2583 | 0.2582 | 0.2581 | 0.2582 | 0.2581 | 0.2580 | 0.2579 | 0.2580 | 0.2579 | 0.2579 | | | | |
| 10 | 0.2578 | 0.2567 | 0.2563 | 0.2563 | 0.2561 | 0.2560 | 0.2559 | 0.2559 | 0.2559 | 0.2559 | 0.2558 | 0.2558 | | | | |
| 11 | 0.2585 | 0.2577 | 0.2572 | 0.2571 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | 0.2568 | 0.2568 | 0.2568 | | | | |
| 12 | 0.2583 | 0.2572 | 0.2570 | 0.2569 | 0.2567 | 0.2568 | 0.2570 | 0.2567 | 0.2566 | 0.2566 | 0.2565 | 0.2565 | | | | |
| 13 | 0.2592 | 0.2579 | 0.2578 | 0.2576 | 0.2576 | 0.2575 | 0.2574 | 0.2575 | 0.2574 | 0.2574 | 0.2574 | 0.2573 | | | | |
| 14 | 0.2568 | 0.2558 | 0.2555 | 0.2553 | 0.2552 | 0.2552 | 0.2551 | 0.2551 | 0.2551 | 0.2551 | 0.2550 | 0.2550 | | | | |
| 15 | 0.2579 | 0.2567 | 0.2564 | 0.2563 | 0.2562 | 0.2561 | 0.2561 | 0.2560 | 0.2560 | 0.2561 | 0.2560 | 0.2559 | | | | |
| 16 | 0.2581 | 0.2568 | 0.2566 | 0.2565 | 0.2563 | 0.2563 | 0.2562 | 0.2562 | 0.2562 | 0.2562 | 0.2561 | 0.2561 | | | | |
| 17 | 0.2587 | 0.2575 | 0.2573 | 0.2572 | 0.2570 | 0.2570 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | 0.2568 | | | | |
| 18 | 0.2577 | 0.2567 | 0.2564 | 0.2562 | 0.2561 | 0.2560 | 0.2560 | 0.2559 | 0.2559 | 0.2560 | 0.2559 | 0.2558 | | | | |
| 19 | 0.2573 | 0.2560 | 0.2559 | 0.2557 | 0.2557 | 0.2555 | 0.2555 | 0.2555 | 0.2554 | 0.2554 | 0.2554 | 0.2554 | | | | |
| 20 | 0.2565 | 0.2553 | 0.2552 | 0.2549 | 0.2548 | 0.2548 | 0.2547 | 0.2547 | 0.2547 | 0.2547 | 0.2547 | 0.2546 | | | | |
| 21 | 0.2614 | 0.2601 | 0.2599 | 0.2598 | 0.2596 | 0.2596 | 0.2596 | 0.2595 | 0.2595 | 0.2596 | 0.2594 | 0.2594 | | | | |
| 22 | 0.2588 | 0.2575 | 0.2574 | 0.2573 | 0.2572 | 0.2571 | 0.2571 | 0.2571 | 0.2570 | 0.2571 | 0.2570 | 0.2570 | | | | |
| 23 | 0.2592 | 0.2580 | 0.2578 | 0.2577 | 0.2576 | 0.2575 | 0.2575 | 0.2575 | 0.2575 | 0.2574 | 0.2574 | 0.2574 | | | | |
| 24 | 0.2596 | 0.2581 | 0.2581 | 0.2580 | 0.2578 | 0.2577 | 0.2578 | 0.2577 | 0.2577 | 0.2577 | 0.2577 | 0.2577 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2581 | 0.2570 | 0.2567 | 0.2566 | 0.2565 | 0.2564 | 0.2564 | 0.2564 | 0.2563 | 0.2563 | 0.2563 | 0.2563 | | | | |
| Med. | 0.2580 | 0.2570 | 0.2566 | 0.2565 | 0.2564 | 0.2564 | 0.2563 | 0.2563 | 0.2563 | 0.2562 | 0.2562 | 0.2562 | | | | |
| σ | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | | | | |
| Min. | 0.2560 | 0.2549 | 0.2547 | 0.2545 | 0.2544 | 0.2544 | 0.2543 | 0.2542 | 0.2542 | 0.2542 | 0.2541 | 0.2541 | | | | |
| Max. | 0.2614 | 0.2601 | 0.2599 | 0.2598 | 0.2596 | 0.2596 | 0.2596 | 0.2595 | 0.2595 | 0.2596 | 0.2594 | 0.2594 | | | | |

Data Set 2 : 55 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _c] | 59.8 °C |
| Actual Ambient Temperature [T _A] | 58.1 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 2-6
Chromaticity

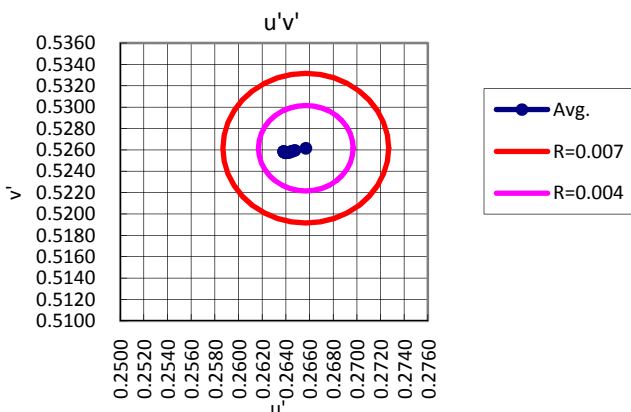
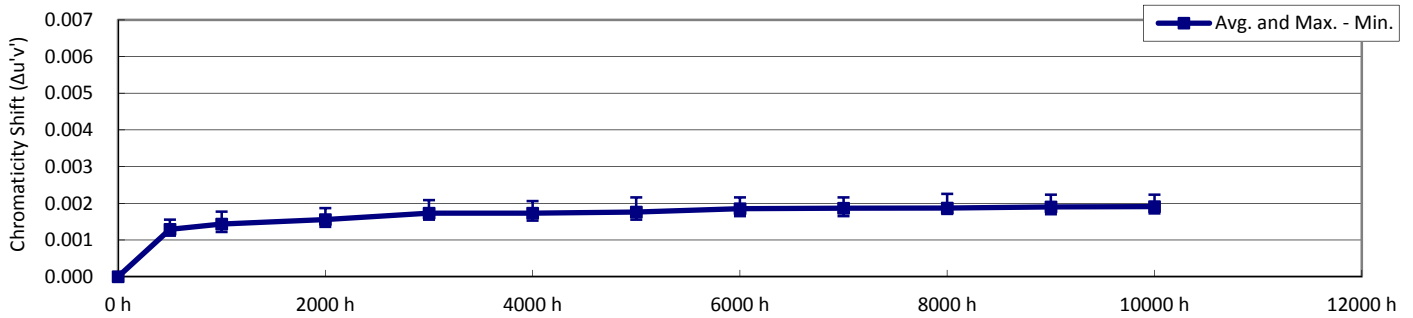
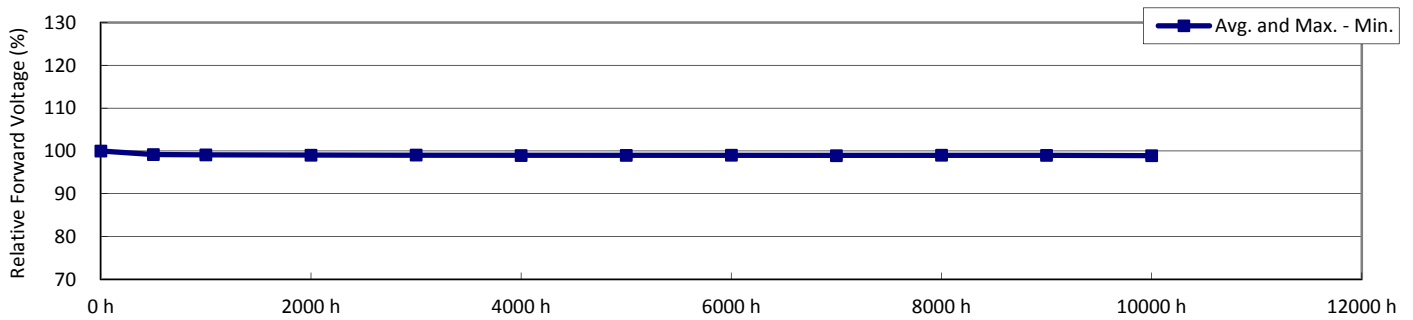
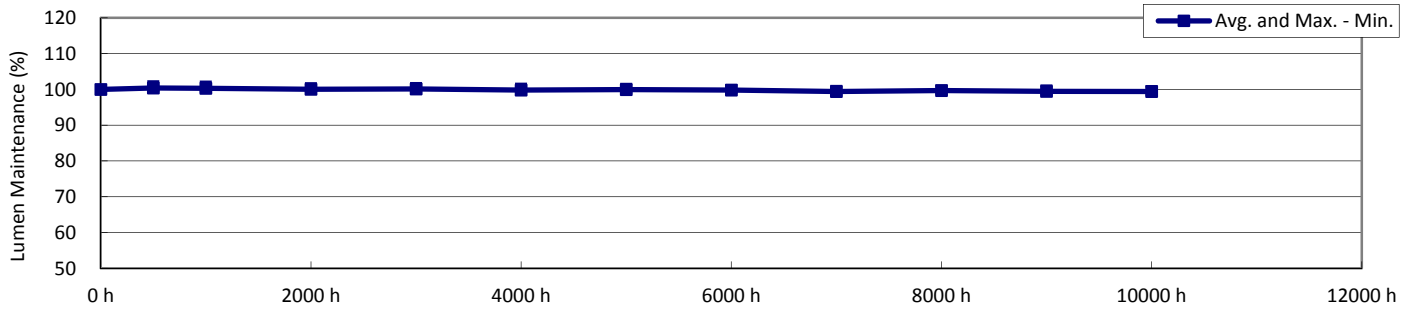
| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5186 | 0.5187 | 0.5184 | 0.5184 | 0.5183 | 0.5184 | 0.5183 | 0.5183 | 0.5183 | 0.5184 | 0.5185 | 0.5185 | | | | |
| 2 | 0.5178 | 0.5180 | 0.5176 | 0.5177 | 0.5176 | 0.5177 | 0.5177 | 0.5177 | 0.5177 | 0.5177 | 0.5178 | 0.5178 | | | | |
| 3 | 0.5188 | 0.5188 | 0.5186 | 0.5187 | 0.5186 | 0.5187 | 0.5187 | 0.5187 | 0.5187 | 0.5187 | 0.5187 | 0.5187 | | | | |
| 4 | 0.5185 | 0.5185 | 0.5183 | 0.5183 | 0.5183 | 0.5184 | 0.5183 | 0.5184 | 0.5184 | 0.5184 | 0.5185 | 0.5185 | | | | |
| 5 | 0.5169 | 0.5168 | 0.5166 | 0.5166 | 0.5165 | 0.5166 | 0.5166 | 0.5166 | 0.5166 | 0.5166 | 0.5167 | 0.5167 | | | | |
| 6 | 0.5202 | 0.5202 | 0.5199 | 0.5199 | 0.5198 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5200 | 0.5200 | 0.5201 | | | | |
| 7 | 0.5202 | 0.5201 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5201 | 0.5201 | 0.5201 | | | | |
| 8 | 0.5178 | 0.5181 | 0.5176 | 0.5175 | 0.5174 | 0.5175 | 0.5174 | 0.5175 | 0.5175 | 0.5175 | 0.5176 | 0.5176 | | | | |
| 9 | 0.5204 | 0.5202 | 0.5202 | 0.5203 | 0.5202 | 0.5203 | 0.5202 | 0.5202 | 0.5203 | 0.5203 | 0.5203 | 0.5204 | | | | |
| 10 | 0.5192 | 0.5191 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5189 | 0.5190 | 0.5190 | | | | |
| 11 | 0.5200 | 0.5202 | 0.5198 | 0.5198 | 0.5198 | 0.5199 | 0.5198 | 0.5198 | 0.5199 | 0.5199 | 0.5200 | 0.5199 | | | | |
| 12 | 0.5207 | 0.5206 | 0.5204 | 0.5205 | 0.5204 | 0.5206 | 0.5208 | 0.5206 | 0.5205 | 0.5206 | 0.5206 | 0.5206 | | | | |
| 13 | 0.5224 | 0.5224 | 0.5223 | 0.5224 | 0.5223 | 0.5224 | 0.5223 | 0.5224 | 0.5224 | 0.5224 | 0.5225 | 0.5225 | | | | |
| 14 | 0.5173 | 0.5173 | 0.5171 | 0.5171 | 0.5170 | 0.5171 | 0.5171 | 0.5171 | 0.5171 | 0.5171 | 0.5172 | 0.5172 | | | | |
| 15 | 0.5170 | 0.5168 | 0.5167 | 0.5167 | 0.5167 | 0.5167 | 0.5167 | 0.5168 | 0.5168 | 0.5168 | 0.5169 | 0.5169 | | | | |
| 16 | 0.5179 | 0.5177 | 0.5176 | 0.5176 | 0.5175 | 0.5176 | 0.5175 | 0.5176 | 0.5176 | 0.5176 | 0.5177 | 0.5177 | | | | |
| 17 | 0.5195 | 0.5194 | 0.5192 | 0.5193 | 0.5192 | 0.5193 | 0.5193 | 0.5193 | 0.5193 | 0.5193 | 0.5194 | 0.5194 | | | | |
| 18 | 0.5172 | 0.5173 | 0.5171 | 0.5170 | 0.5169 | 0.5170 | 0.5171 | 0.5170 | 0.5170 | 0.5172 | 0.5172 | 0.5172 | | | | |
| 19 | 0.5158 | 0.5156 | 0.5155 | 0.5155 | 0.5154 | 0.5155 | 0.5155 | 0.5155 | 0.5155 | 0.5154 | 0.5155 | 0.5156 | | | | |
| 20 | 0.5152 | 0.5151 | 0.5149 | 0.5149 | 0.5148 | 0.5150 | 0.5149 | 0.5149 | 0.5149 | 0.5150 | 0.5151 | 0.5151 | | | | |
| 21 | 0.5208 | 0.5207 | 0.5206 | 0.5207 | 0.5206 | 0.5206 | 0.5207 | 0.5206 | 0.5207 | 0.5207 | 0.5207 | 0.5208 | | | | |
| 22 | 0.5171 | 0.5168 | 0.5168 | 0.5168 | 0.5168 | 0.5169 | 0.5168 | 0.5168 | 0.5169 | 0.5169 | 0.5169 | 0.5170 | | | | |
| 23 | 0.5165 | 0.5163 | 0.5162 | 0.5162 | 0.5161 | 0.5162 | 0.5162 | 0.5162 | 0.5162 | 0.5163 | 0.5163 | 0.5163 | | | | |
| 24 | 0.5170 | 0.5167 | 0.5167 | 0.5167 | 0.5167 | 0.5167 | 0.5168 | 0.5167 | 0.5168 | 0.5168 | 0.5168 | 0.5169 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5185 | 0.5184 | 0.5182 | 0.5182 | 0.5182 | 0.5182 | 0.5182 | 0.5182 | 0.5182 | 0.5183 | 0.5183 | 0.5184 | | | | |
| Med. | 0.5182 | 0.5183 | 0.5180 | 0.5180 | 0.5180 | 0.5181 | 0.5180 | 0.5180 | 0.5180 | 0.5181 | 0.5182 | 0.5182 | | | | |
| σ | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0018 | 0.0018 | 0.0018 | | | | |
| Min. | 0.5152 | 0.5151 | 0.5149 | 0.5149 | 0.5148 | 0.5150 | 0.5149 | 0.5149 | 0.5149 | 0.5150 | 0.5151 | 0.5151 | | | | |
| Max. | 0.5224 | 0.5224 | 0.5223 | 0.5224 | 0.5223 | 0.5224 | 0.5223 | 0.5224 | 0.5224 | 0.5224 | 0.5225 | 0.5225 | | | | |

Data Set 3 : 85 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _S] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.9 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0



Data Set 3 : 85 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.9 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 3-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 243 | 3.04 | 2639 | 2.13 | 0.461 | 0.405 | 0.266 | 0.526 | | | | |
| 2 | 246 | 3.05 | 2679 | 2.13 | 0.459 | 0.406 | 0.264 | 0.526 | | | | |
| 3 | 244 | 3.04 | 2649 | 2.13 | 0.461 | 0.406 | 0.265 | 0.526 | | | | |
| 4 | 245 | 3.03 | 2640 | 2.12 | 0.462 | 0.407 | 0.266 | 0.526 | | | | |
| 5 | 244 | 3.04 | 2629 | 2.13 | 0.464 | 0.409 | 0.266 | 0.527 | | | | |
| 6 | 241 | 3.05 | 2578 | 2.13 | 0.470 | 0.413 | 0.268 | 0.530 | | | | |
| 7 | 237 | 2.95 | 2589 | 2.06 | 0.467 | 0.408 | 0.268 | 0.528 | | | | |
| 8 | 240 | 2.95 | 2609 | 2.06 | 0.464 | 0.406 | 0.267 | 0.526 | | | | |
| 9 | 243 | 2.95 | 2685 | 2.06 | 0.458 | 0.406 | 0.264 | 0.525 | | | | |
| 10 | 243 | 2.95 | 2670 | 2.06 | 0.458 | 0.404 | 0.264 | 0.525 | | | | |
| 11 | 243 | 2.95 | 2662 | 2.06 | 0.459 | 0.405 | 0.265 | 0.525 | | | | |
| 12 | 243 | 2.95 | 2638 | 2.07 | 0.462 | 0.406 | 0.266 | 0.526 | | | | |
| 13 | 244 | 2.95 | 2659 | 2.06 | 0.461 | 0.407 | 0.265 | 0.526 | | | | |
| 14 | 246 | 2.95 | 2671 | 2.07 | 0.459 | 0.405 | 0.264 | 0.525 | | | | |
| 15 | 243 | 2.95 | 2634 | 2.06 | 0.462 | 0.406 | 0.266 | 0.526 | | | | |
| 16 | 242 | 2.95 | 2624 | 2.06 | 0.464 | 0.409 | 0.266 | 0.527 | | | | |
| 17 | 240 | 2.95 | 2590 | 2.06 | 0.469 | 0.412 | 0.268 | 0.529 | | | | |
| 18 | 243 | 2.97 | 2639 | 2.08 | 0.461 | 0.405 | 0.266 | 0.526 | | | | |
| 19 | 244 | 2.96 | 2629 | 2.07 | 0.462 | 0.405 | 0.266 | 0.526 | | | | |
| 20 | 243 | 2.95 | 2633 | 2.06 | 0.462 | 0.406 | 0.266 | 0.526 | | | | |
| 21 | 245 | 2.95 | 2667 | 2.07 | 0.460 | 0.406 | 0.264 | 0.526 | | | | |
| 22 | 243 | 2.95 | 2634 | 2.06 | 0.461 | 0.405 | 0.266 | 0.525 | | | | |
| 23 | 246 | 2.95 | 2657 | 2.06 | 0.461 | 0.407 | 0.265 | 0.526 | | | | |
| 24 | 247 | 2.97 | 2646 | 2.08 | 0.462 | 0.407 | 0.265 | 0.526 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 243 | 2.97 | 2640 | 2.08 | 0.462 | 0.407 | 0.266 | 0.526 | | | | |
| Med. | 243 | 2.95 | 2639 | 2.07 | 0.461 | 0.406 | 0.266 | 0.526 | | | | |
| σ | 2.2 | 0.040 | 27.9 | 0.028 | 0.0031 | 0.0021 | 0.0012 | 0.0012 | | | | |
| Min. | 237 | 2.95 | 2578 | 2.06 | 0.458 | 0.404 | 0.264 | 0.525 | | | | |
| Max. | 247 | 3.05 | 2685 | 2.13 | 0.470 | 0.413 | 0.268 | 0.530 | | | | |



Data Set 3 : 85 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.9 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 3-2
 Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h |
| 1 | 100.0 | 100.5 | 100.4 | 100.3 | 100.3 | 100.0 | 100.3 | 100.1 | 99.7 | 99.9 | 99.7 | 99.7 |
| 2 | 100.0 | 100.5 | 100.0 | 100.1 | 100.2 | 99.9 | 99.9 | 100.1 | 99.8 | 100.0 | 99.7 | 99.6 |
| 3 | 100.0 | 100.0 | 99.9 | 99.8 | 100.0 | 99.6 | 100.0 | 99.9 | 99.7 | 99.8 | 99.6 | 99.6 |
| 4 | 100.0 | 100.4 | 100.3 | 100.1 | 100.1 | 100.0 | 100.1 | 100.1 | 99.7 | 99.8 | 99.8 | 99.8 |
| 5 | 100.0 | 100.2 | 100.3 | 100.1 | 100.3 | 100.0 | 100.2 | 100.0 | 99.7 | 100.1 | 99.8 | 99.8 |
| 6 | 100.0 | 101.2 | 101.2 | 101.0 | 101.1 | 100.8 | 101.2 | 100.9 | 100.6 | 100.8 | 100.5 | 100.5 |
| 7 | 100.0 | 102.2 | 102.1 | 101.7 | 101.7 | 101.5 | 101.5 | 101.2 | 100.9 | 101.0 | 101.0 | 100.9 |
| 8 | 100.0 | 100.1 | 100.1 | 99.9 | 100.0 | 99.5 | 99.6 | 99.7 | 99.1 | 99.5 | 99.1 | 99.1 |
| 9 | 100.0 | 100.7 | 100.5 | 100.2 | 100.4 | 100.0 | 100.5 | 100.0 | 99.6 | 100.0 | 99.6 | 99.5 |
| 10 | 100.0 | 100.6 | 100.5 | 100.1 | 100.1 | 99.8 | 99.8 | 99.7 | 99.3 | 99.6 | 99.2 | 99.3 |
| 11 | 100.0 | 100.2 | 99.8 | 99.5 | 99.6 | 99.3 | 99.2 | 99.2 | 98.9 | 99.0 | 99.0 | 98.8 |
| 12 | 100.0 | 100.5 | 100.3 | 100.1 | 100.3 | 99.9 | 100.4 | 100.0 | 99.5 | 99.8 | 99.6 | 99.5 |
| 13 | 100.0 | 99.6 | 99.6 | 99.2 | 99.3 | 98.9 | 99.3 | 99.1 | 98.8 | 99.0 | 98.7 | 98.9 |
| 14 | 100.0 | 99.9 | 99.5 | 99.3 | 99.4 | 99.3 | 99.2 | 99.1 | 98.6 | 98.8 | 98.8 | 98.5 |
| 15 | 100.0 | 100.2 | 100.0 | 99.7 | 99.8 | 99.5 | 99.7 | 99.5 | 99.1 | 99.5 | 99.1 | 99.1 |
| 16 | 100.0 | 99.8 | 99.8 | 99.7 | 99.6 | 99.5 | 99.5 | 99.5 | 99.1 | 99.3 | 99.2 | 99.1 |
| 17 | 100.0 | 100.6 | 100.6 | 100.1 | 100.4 | 99.9 | 100.0 | 99.7 | 99.3 | 99.7 | 99.3 | 99.3 |
| 18 | 100.0 | 101.3 | 101.2 | 100.8 | 100.9 | 100.6 | 100.8 | 100.6 | 100.1 | 100.4 | 100.3 | 100.2 |
| 19 | 100.0 | 101.1 | 101.0 | 100.5 | 100.5 | 100.2 | 100.2 | 99.9 | 99.5 | 99.7 | 99.7 | 99.6 |
| 20 | 100.0 | 99.6 | 99.8 | 99.6 | 99.5 | 99.2 | 99.6 | 99.6 | 98.8 | 99.3 | 98.9 | 98.8 |
| 21 | 100.0 | 100.6 | 100.5 | 100.2 | 100.3 | 100.0 | 100.2 | 99.9 | 99.5 | 99.8 | 99.6 | 99.5 |
| 22 | 100.0 | 100.4 | 100.3 | 99.8 | 100.0 | 99.7 | 99.5 | 99.6 | 99.3 | 99.4 | 99.2 | 99.2 |
| 23 | 100.0 | 99.6 | 99.4 | 99.3 | 99.1 | 99.0 | 99.1 | 99.1 | 98.7 | 98.9 | 98.7 | 98.5 |
| 24 | 100.0 | 100.0 | 99.8 | 99.6 | 99.7 | 99.4 | 99.6 | 99.3 | 99.0 | 99.2 | 99.0 | 98.9 |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Avg. | 100.0 | 100.4 | 100.3 | 100.0 | 100.1 | 99.8 | 100.0 | 99.8 | 99.4 | 99.7 | 99.5 | 99.4 |
| Med. | 100.0 | 100.4 | 100.3 | 100.1 | 100.1 | 99.8 | 99.9 | 99.8 | 99.4 | 99.7 | 99.5 | 99.4 |
| σ | 0.00 | 0.61 | 0.62 | 0.56 | 0.59 | 0.59 | 0.61 | 0.53 | 0.56 | 0.55 | 0.57 | 0.57 |
| Min. | 100.0 | 99.6 | 99.4 | 99.2 | 99.1 | 98.9 | 99.1 | 99.1 | 98.6 | 98.8 | 98.7 | 98.5 |
| Max. | 100.0 | 102.2 | 102.1 | 101.7 | 101.7 | 101.5 | 101.5 | 101.2 | 100.9 | 101.0 | 101.0 | 100.9 |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h |
|----------|---------|---------|---------|---------|---------|---------|
| ln(Avg.) | -0.0003 | -0.0018 | -0.0057 | -0.0032 | -0.0054 | -0.0060 |

| | |
|----------------------------------|-------------------|
| Test duration used | 5000 h to 10000 h |
| B | 1.004 |
| α | 1.04E-06 |
| R ² | 0.696 |
| Calculated L ₇₀ (10K) | 347000 hours |
| Reported L ₇₀ (10K) | > 60000 hours |
| Calculated L ₈₀ (10K) | 218000 hours |
| Reported L ₈₀ (10K) | > 60000 hours |
| Calculated L ₉₀ (10K) | 105000 hours |
| Reported L ₉₀ (10K) | > 60000 hours |

Curve-fit equation:
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:

$L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 3 : 85 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.9 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 3-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.7 | 98.6 | 98.5 | 98.6 | 98.3 | 98.4 | 98.5 | 98.4 | 98.5 | 98.4 | 98.4 | | | | |
| 2 | 100.0 | 98.7 | 98.6 | 98.5 | 98.5 | 98.3 | 98.4 | 98.5 | 98.4 | 98.5 | 98.4 | 98.3 | | | | |
| 3 | 100.0 | 98.7 | 98.7 | 98.6 | 98.6 | 98.4 | 98.5 | 98.6 | 98.5 | 98.6 | 98.5 | 98.5 | | | | |
| 4 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.5 | 98.7 | 98.6 | 98.5 | | | | |
| 5 | 100.0 | 98.8 | 98.7 | 98.6 | 98.6 | 98.5 | 98.5 | 98.6 | 98.4 | 98.6 | 98.5 | 98.4 | | | | |
| 6 | 100.0 | 98.6 | 98.5 | 98.4 | 98.4 | 98.3 | 98.3 | 98.4 | 98.2 | 98.4 | 98.4 | 98.2 | | | | |
| 7 | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.1 | 99.1 | 99.2 | 99.1 | 99.1 | 99.1 | 99.1 | | | | |
| 8 | 100.0 | 99.3 | 99.2 | 99.1 | 99.2 | 99.1 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 9 | 100.0 | 99.2 | 99.1 | 99.1 | 99.1 | 99.0 | 99.0 | 99.1 | 98.9 | 99.0 | 99.1 | 99.0 | | | | |
| 10 | 100.0 | 99.3 | 99.2 | 99.1 | 99.2 | 99.0 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 11 | 100.0 | 99.3 | 99.2 | 99.1 | 99.2 | 99.1 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 12 | 100.0 | 99.4 | 99.3 | 99.2 | 99.3 | 99.2 | 99.2 | 99.3 | 99.1 | 99.3 | 99.3 | 99.1 | | | | |
| 13 | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.1 | 99.2 | 99.2 | 99.1 | 99.2 | 99.2 | 99.1 | | | | |
| 14 | 100.0 | 99.4 | 99.3 | 99.3 | 99.3 | 99.2 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.2 | | | | |
| 15 | 100.0 | 99.3 | 99.2 | 99.1 | 99.2 | 99.0 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 16 | 100.0 | 99.3 | 99.2 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 17 | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.1 | 99.1 | 99.2 | 99.0 | 99.2 | 99.1 | 99.1 | | | | |
| 18 | 100.0 | 99.3 | 99.2 | 99.1 | 99.2 | 99.1 | 99.1 | 99.1 | 99.1 | 99.2 | 99.1 | 99.1 | | | | |
| 19 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.2 | 99.2 | 99.2 | 99.1 | 99.3 | 99.2 | 99.2 | | | | |
| 20 | 100.0 | 99.4 | 99.3 | 99.2 | 99.3 | 99.2 | 99.2 | 99.2 | 99.1 | 99.2 | 99.2 | 99.1 | | | | |
| 21 | 100.0 | 99.4 | 99.4 | 99.3 | 99.3 | 99.2 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.2 | | | | |
| 22 | 100.0 | 99.4 | 99.3 | 99.3 | 99.3 | 99.2 | 99.2 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | | | | |
| 23 | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.1 | 99.2 | 99.2 | 99.1 | 99.2 | 99.1 | 99.1 | | | | |
| 24 | 100.0 | 99.1 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 99.2 | 99.1 | 99.0 | 99.1 | 98.9 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | | | | |
| Med. | 100.0 | 99.3 | 99.2 | 99.1 | 99.2 | 99.1 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| σ | 0.00 | 0.28 | 0.29 | 0.30 | 0.29 | 0.34 | 0.31 | 0.29 | 0.30 | 0.30 | 0.31 | 0.31 | | | | |
| Min. | 100.0 | 98.6 | 98.5 | 98.4 | 98.4 | 98.3 | 98.3 | 98.4 | 98.2 | 98.4 | 98.4 | 98.2 | | | | |
| Max. | 100.0 | 99.4 | 99.4 | 99.3 | 99.3 | 99.2 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.2 | | | | |



Data Set 3 : 85 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.9 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 3-4
 Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | |
| 1 | 0.0000 | 0.0012 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | | |
| 2 | 0.0000 | 0.0012 | 0.0012 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | | | | |
| 3 | 0.0000 | 0.0012 | 0.0014 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| 4 | 0.0000 | 0.0014 | 0.0015 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | | | | |
| 5 | 0.0000 | 0.0012 | 0.0015 | 0.0016 | 0.0018 | 0.0018 | 0.0019 | 0.0020 | 0.0020 | 0.0020 | 0.0020 | 0.0020 | 0.0020 | | | | |
| 6 | 0.0000 | 0.0016 | 0.0016 | 0.0017 | 0.0019 | 0.0019 | 0.0019 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0022 | 0.0021 | | | | |
| 7 | 0.0000 | 0.0016 | 0.0018 | 0.0019 | 0.0021 | 0.0021 | 0.0022 | 0.0022 | 0.0022 | 0.0023 | 0.0022 | 0.0022 | 0.0022 | | | | |
| 8 | 0.0000 | 0.0012 | 0.0015 | 0.0016 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 9 | 0.0000 | 0.0014 | 0.0014 | 0.0016 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 10 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 11 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 12 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 13 | 0.0000 | 0.0011 | 0.0013 | 0.0014 | 0.0016 | 0.0015 | 0.0017 | 0.0018 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | | | | |
| 14 | 0.0000 | 0.0011 | 0.0013 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 15 | 0.0000 | 0.0013 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 16 | 0.0000 | 0.0011 | 0.0013 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | | | | |
| 17 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 18 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0020 | 0.0020 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 19 | 0.0000 | 0.0013 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 20 | 0.0000 | 0.0013 | 0.0015 | 0.0016 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | 0.0020 | | | | |
| 21 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0019 | 0.0018 | | | | |
| 22 | 0.0000 | 0.0013 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| 23 | 0.0000 | 0.0012 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | | | | |
| 24 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0017 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| Med. | 0.0000 | 0.0012 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | |
| Min. | 0.0000 | 0.0011 | 0.0012 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |
| Max. | 0.0000 | 0.0016 | 0.0018 | 0.0019 | 0.0021 | 0.0021 | 0.0022 | 0.0022 | 0.0022 | 0.0023 | 0.0022 | 0.0022 | 0.0022 | | | | |

Data Set 3 : 85 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.9 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 3-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2645 | 0.2633 | 0.2631 | 0.2630 | 0.2628 | 0.2628 | 0.2628 | 0.2626 | 0.2626 | 0.2626 | 0.2626 | 0.2626 | | | | |
| 2 | 0.2623 | 0.2611 | 0.2611 | 0.2609 | 0.2607 | 0.2608 | 0.2607 | 0.2606 | 0.2606 | 0.2606 | 0.2606 | 0.2605 | | | | |
| 3 | 0.2642 | 0.2630 | 0.2628 | 0.2627 | 0.2625 | 0.2625 | 0.2625 | 0.2624 | 0.2624 | 0.2624 | 0.2624 | 0.2623 | | | | |
| 4 | 0.2643 | 0.2630 | 0.2629 | 0.2627 | 0.2626 | 0.2626 | 0.2624 | 0.2624 | 0.2624 | 0.2624 | 0.2623 | 0.2623 | | | | |
| 5 | 0.2646 | 0.2634 | 0.2632 | 0.2630 | 0.2628 | 0.2628 | 0.2627 | 0.2626 | 0.2626 | 0.2626 | 0.2626 | 0.2626 | | | | |
| 6 | 0.2668 | 0.2653 | 0.2652 | 0.2651 | 0.2649 | 0.2649 | 0.2649 | 0.2647 | 0.2647 | 0.2647 | 0.2646 | 0.2647 | | | | |
| 7 | 0.2663 | 0.2648 | 0.2646 | 0.2645 | 0.2643 | 0.2643 | 0.2642 | 0.2642 | 0.2642 | 0.2641 | 0.2641 | 0.2641 | | | | |
| 8 | 0.2657 | 0.2645 | 0.2643 | 0.2642 | 0.2640 | 0.2640 | 0.2639 | 0.2639 | 0.2638 | 0.2638 | 0.2638 | 0.2638 | | | | |
| 9 | 0.2624 | 0.2611 | 0.2611 | 0.2609 | 0.2608 | 0.2607 | 0.2608 | 0.2607 | 0.2606 | 0.2607 | 0.2606 | 0.2606 | | | | |
| 10 | 0.2631 | 0.2618 | 0.2617 | 0.2616 | 0.2615 | 0.2614 | 0.2614 | 0.2612 | 0.2613 | 0.2613 | 0.2612 | 0.2612 | | | | |
| 11 | 0.2634 | 0.2622 | 0.2621 | 0.2620 | 0.2618 | 0.2618 | 0.2618 | 0.2617 | 0.2617 | 0.2616 | 0.2616 | 0.2616 | | | | |
| 12 | 0.2648 | 0.2636 | 0.2635 | 0.2634 | 0.2632 | 0.2632 | 0.2632 | 0.2631 | 0.2631 | 0.2630 | 0.2630 | 0.2630 | | | | |
| 13 | 0.2634 | 0.2623 | 0.2621 | 0.2620 | 0.2618 | 0.2619 | 0.2617 | 0.2616 | 0.2617 | 0.2617 | 0.2617 | 0.2616 | | | | |
| 14 | 0.2629 | 0.2618 | 0.2617 | 0.2616 | 0.2614 | 0.2614 | 0.2613 | 0.2612 | 0.2613 | 0.2612 | 0.2612 | 0.2612 | | | | |
| 15 | 0.2649 | 0.2637 | 0.2635 | 0.2635 | 0.2633 | 0.2632 | 0.2633 | 0.2632 | 0.2631 | 0.2632 | 0.2631 | 0.2631 | | | | |
| 16 | 0.2648 | 0.2637 | 0.2635 | 0.2633 | 0.2632 | 0.2632 | 0.2631 | 0.2630 | 0.2630 | 0.2630 | 0.2629 | 0.2629 | | | | |
| 17 | 0.2659 | 0.2647 | 0.2645 | 0.2644 | 0.2642 | 0.2642 | 0.2642 | 0.2641 | 0.2641 | 0.2640 | 0.2640 | 0.2640 | | | | |
| 18 | 0.2645 | 0.2631 | 0.2630 | 0.2629 | 0.2628 | 0.2628 | 0.2628 | 0.2627 | 0.2626 | 0.2626 | 0.2626 | 0.2626 | | | | |
| 19 | 0.2650 | 0.2637 | 0.2636 | 0.2635 | 0.2633 | 0.2633 | 0.2633 | 0.2632 | 0.2632 | 0.2632 | 0.2632 | 0.2632 | | | | |
| 20 | 0.2646 | 0.2633 | 0.2632 | 0.2630 | 0.2629 | 0.2629 | 0.2628 | 0.2627 | 0.2627 | 0.2627 | 0.2626 | 0.2626 | | | | |
| 21 | 0.2634 | 0.2621 | 0.2620 | 0.2619 | 0.2617 | 0.2617 | 0.2617 | 0.2616 | 0.2616 | 0.2616 | 0.2615 | 0.2616 | | | | |
| 22 | 0.2648 | 0.2635 | 0.2634 | 0.2633 | 0.2631 | 0.2630 | 0.2631 | 0.2630 | 0.2630 | 0.2630 | 0.2630 | 0.2629 | | | | |
| 23 | 0.2637 | 0.2625 | 0.2623 | 0.2622 | 0.2621 | 0.2621 | 0.2620 | 0.2620 | 0.2619 | 0.2619 | 0.2618 | 0.2618 | | | | |
| 24 | 0.2643 | 0.2631 | 0.2630 | 0.2629 | 0.2627 | 0.2628 | 0.2628 | 0.2627 | 0.2626 | 0.2626 | 0.2626 | 0.2626 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2644 | 0.2631 | 0.2630 | 0.2629 | 0.2627 | 0.2627 | 0.2626 | 0.2625 | 0.2625 | 0.2625 | 0.2625 | 0.2625 | | | | |
| Med. | 0.2645 | 0.2632 | 0.2631 | 0.2630 | 0.2628 | 0.2628 | 0.2628 | 0.2627 | 0.2626 | 0.2626 | 0.2626 | 0.2626 | | | | |
| σ | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | | | | |
| Min. | 0.2623 | 0.2611 | 0.2611 | 0.2609 | 0.2607 | 0.2607 | 0.2607 | 0.2606 | 0.2606 | 0.2606 | 0.2606 | 0.2605 | | | | |
| Max. | 0.2668 | 0.2653 | 0.2652 | 0.2651 | 0.2649 | 0.2649 | 0.2649 | 0.2647 | 0.2647 | 0.2647 | 0.2646 | 0.2647 | | | | |



Data Set 3 : 85 °C, 700 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.9 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 3-6
 Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5242 | 0.5239 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5239 | 0.5239 | 0.5239 | 0.5240 | | | | |
| 2 | 0.5241 | 0.5239 | 0.5239 | 0.5239 | 0.5238 | 0.5238 | 0.5238 | 0.5239 | 0.5239 | 0.5239 | 0.5240 | 0.5239 | | | | |
| 3 | 0.5243 | 0.5240 | 0.5240 | 0.5239 | 0.5239 | 0.5239 | 0.5240 | 0.5240 | 0.5240 | 0.5240 | 0.5241 | 0.5241 | | | | |
| 4 | 0.5248 | 0.5244 | 0.5244 | 0.5243 | 0.5243 | 0.5243 | 0.5244 | 0.5244 | 0.5244 | 0.5244 | 0.5245 | 0.5245 | | | | |
| 5 | 0.5260 | 0.5258 | 0.5256 | 0.5256 | 0.5256 | 0.5256 | 0.5256 | 0.5256 | 0.5256 | 0.5256 | 0.5257 | 0.5257 | | | | |
| 6 | 0.5285 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5282 | 0.5282 | | | | |
| 7 | 0.5262 | 0.5258 | 0.5257 | 0.5257 | 0.5256 | 0.5257 | 0.5257 | 0.5257 | 0.5257 | 0.5257 | 0.5258 | 0.5258 | | | | |
| 8 | 0.5247 | 0.5244 | 0.5243 | 0.5243 | 0.5242 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5244 | 0.5244 | | | | |
| 9 | 0.5242 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5238 | 0.5239 | 0.5239 | 0.5239 | | | | |
| 10 | 0.5235 | 0.5231 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5231 | 0.5231 | 0.5231 | 0.5231 | 0.5231 | | | | |
| 11 | 0.5239 | 0.5236 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5236 | 0.5236 | 0.5236 | | | | |
| 12 | 0.5248 | 0.5245 | 0.5244 | 0.5244 | 0.5244 | 0.5244 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | | | | |
| 13 | 0.5246 | 0.5244 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5244 | | | | |
| 14 | 0.5234 | 0.5231 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5231 | 0.5231 | | | | |
| 15 | 0.5250 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5247 | 0.5247 | 0.5247 | 0.5247 | | | | |
| 16 | 0.5261 | 0.5259 | 0.5258 | 0.5258 | 0.5257 | 0.5258 | 0.5258 | 0.5258 | 0.5258 | 0.5258 | 0.5258 | 0.5258 | | | | |
| 17 | 0.5280 | 0.5278 | 0.5277 | 0.5277 | 0.5276 | 0.5277 | 0.5277 | 0.5277 | 0.5277 | 0.5277 | 0.5278 | 0.5278 | | | | |
| 18 | 0.5244 | 0.5240 | 0.5240 | 0.5239 | 0.5239 | 0.5239 | 0.5239 | 0.5240 | 0.5239 | 0.5239 | 0.5240 | 0.5240 | | | | |
| 19 | 0.5243 | 0.5240 | 0.5239 | 0.5239 | 0.5239 | 0.5238 | 0.5239 | 0.5239 | 0.5239 | 0.5239 | 0.5239 | 0.5239 | | | | |
| 20 | 0.5247 | 0.5244 | 0.5243 | 0.5243 | 0.5242 | 0.5242 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | | | | |
| 21 | 0.5248 | 0.5244 | 0.5244 | 0.5244 | 0.5243 | 0.5243 | 0.5243 | 0.5244 | 0.5243 | 0.5244 | 0.5244 | 0.5244 | | | | |
| 22 | 0.5239 | 0.5236 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5235 | 0.5236 | 0.5236 | 0.5236 | | | | |
| 23 | 0.5248 | 0.5245 | 0.5244 | 0.5244 | 0.5244 | 0.5244 | 0.5244 | 0.5245 | 0.5244 | 0.5245 | 0.5245 | 0.5245 | | | | |
| 24 | 0.5252 | 0.5249 | 0.5248 | 0.5248 | 0.5247 | 0.5248 | 0.5248 | 0.5248 | 0.5248 | 0.5248 | 0.5249 | 0.5248 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5249 | 0.5246 | 0.5246 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | | | | |
| Med. | 0.5247 | 0.5244 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5243 | 0.5244 | 0.5244 | | | | |
| σ | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0012 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0012 | 0.0013 | 0.0013 | | | | |
| Min. | 0.5234 | 0.5231 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5230 | 0.5231 | 0.5231 | | | | |
| Max. | 0.5285 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5281 | 0.5282 | 0.5282 | | | | |

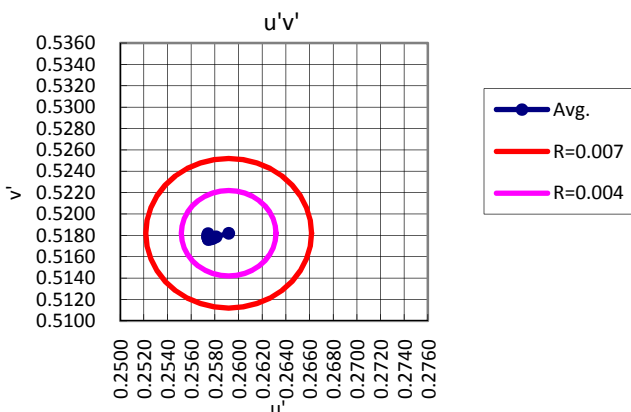
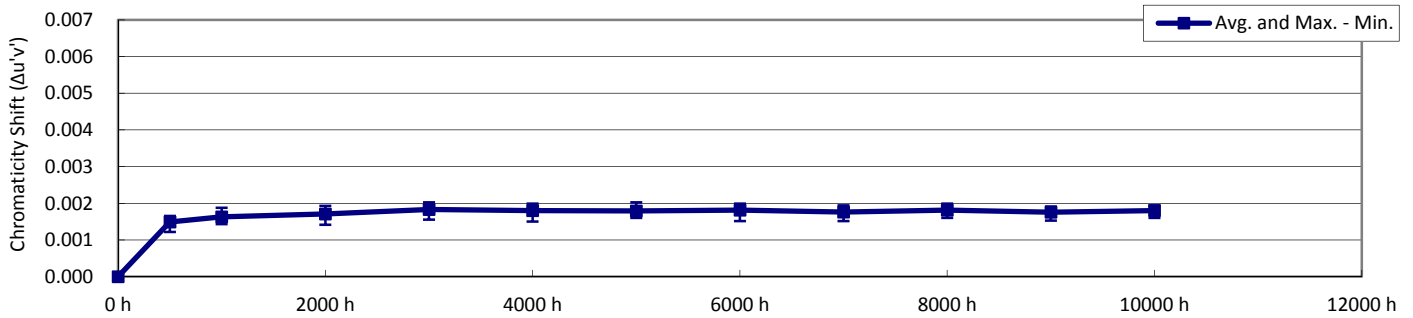
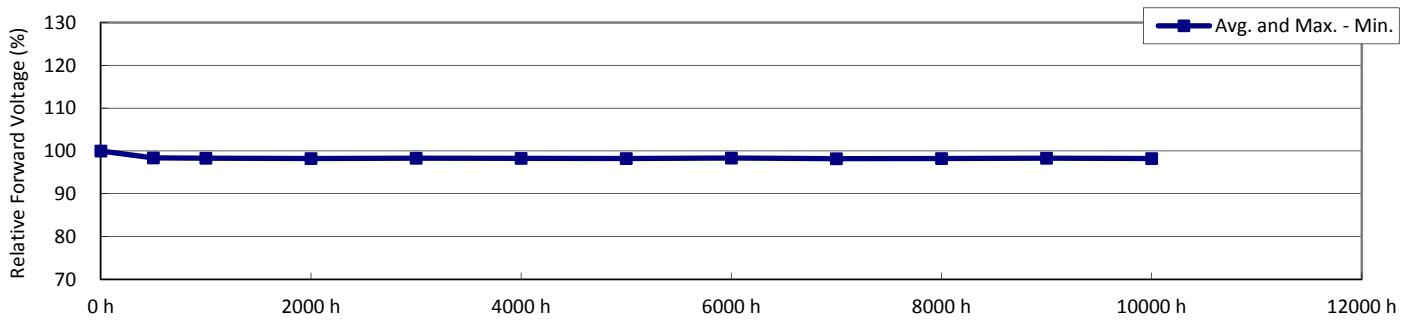
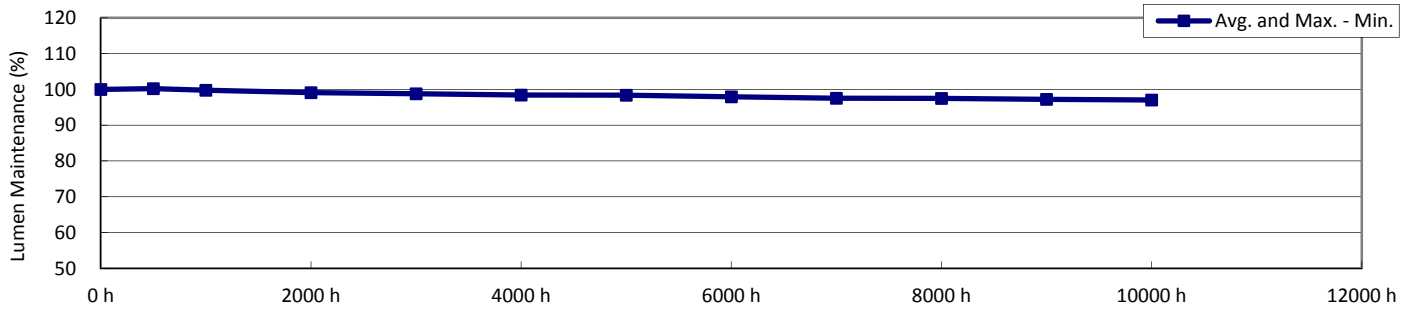
*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*



Data Set 4 : 85 °C, 1200 mA

| | |
|--|---------|
| Actual Case Temperature [T _S] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0



The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 4 : 85 °C, 1200 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 4-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 389 | 3.15 | 2725 | 3.77 | 0.453 | 0.401 | 0.262 | 0.523 | | | | |
| 2 | 398 | 3.14 | 2813 | 3.77 | 0.444 | 0.396 | 0.259 | 0.519 | | | | |
| 3 | 399 | 3.15 | 2828 | 3.77 | 0.441 | 0.391 | 0.259 | 0.517 | | | | |
| 4 | 397 | 3.15 | 2846 | 3.77 | 0.439 | 0.390 | 0.258 | 0.516 | | | | |
| 5 | 390 | 3.15 | 2818 | 3.77 | 0.442 | 0.393 | 0.259 | 0.518 | | | | |
| 6 | 389 | 3.14 | 2775 | 3.77 | 0.448 | 0.399 | 0.260 | 0.521 | | | | |
| 7 | 390 | 3.16 | 2795 | 3.79 | 0.445 | 0.396 | 0.260 | 0.519 | | | | |
| 8 | 395 | 3.15 | 2837 | 3.78 | 0.441 | 0.392 | 0.258 | 0.517 | | | | |
| 9 | 389 | 3.14 | 2757 | 3.77 | 0.450 | 0.400 | 0.261 | 0.522 | | | | |
| 10 | 390 | 3.15 | 2805 | 3.77 | 0.444 | 0.394 | 0.259 | 0.519 | | | | |
| 11 | 396 | 3.15 | 2854 | 3.78 | 0.438 | 0.390 | 0.258 | 0.516 | | | | |
| 12 | 392 | 3.15 | 2834 | 3.78 | 0.440 | 0.391 | 0.259 | 0.517 | | | | |
| 13 | 386 | 3.15 | 2787 | 3.78 | 0.445 | 0.395 | 0.260 | 0.519 | | | | |
| 14 | 386 | 3.16 | 2767 | 3.79 | 0.448 | 0.398 | 0.261 | 0.521 | | | | |
| 15 | 392 | 3.15 | 2812 | 3.77 | 0.444 | 0.395 | 0.259 | 0.519 | | | | |
| 16 | 391 | 3.15 | 2836 | 3.78 | 0.440 | 0.391 | 0.259 | 0.517 | | | | |
| 17 | 388 | 3.15 | 2801 | 3.78 | 0.444 | 0.395 | 0.260 | 0.519 | | | | |
| 18 | 391 | 3.14 | 2774 | 3.77 | 0.449 | 0.399 | 0.260 | 0.521 | | | | |
| 19 | 393 | 3.15 | 2848 | 3.78 | 0.441 | 0.395 | 0.258 | 0.518 | | | | |
| 20 | 393 | 3.15 | 2852 | 3.78 | 0.439 | 0.390 | 0.258 | 0.516 | | | | |
| 21 | 396 | 3.14 | 2840 | 3.76 | 0.439 | 0.390 | 0.259 | 0.516 | | | | |
| 22 | 393 | 3.14 | 2843 | 3.77 | 0.440 | 0.390 | 0.258 | 0.516 | | | | |
| 23 | 394 | 3.15 | 2852 | 3.78 | 0.439 | 0.391 | 0.258 | 0.516 | | | | |
| 24 | 388 | 3.15 | 2831 | 3.78 | 0.440 | 0.391 | 0.259 | 0.516 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 392 | 3.15 | 2814 | 3.78 | 0.443 | 0.394 | 0.259 | 0.518 | | | | |
| Med. | 391 | 3.15 | 2823 | 3.78 | 0.442 | 0.393 | 0.259 | 0.518 | | | | |
| σ | 3.6 | 0.004 | 34.8 | 0.005 | 0.0041 | 0.0036 | 0.0011 | 0.0021 | | | | |
| Min. | 386 | 3.14 | 2725 | 3.76 | 0.438 | 0.390 | 0.258 | 0.516 | | | | |
| Max. | 399 | 3.16 | 2854 | 3.79 | 0.453 | 0.401 | 0.262 | 0.523 | | | | |

Data Set 4 : 85 °C, 1200 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 4-2
Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 99.8 | 99.5 | 98.7 | 98.4 | 97.8 | 97.8 | 97.2 | 96.9 | 96.9 | 96.5 | 96.3 | | | | |
| 2 | 100.0 | 100.0 | 99.4 | 98.6 | 98.3 | 98.1 | 97.7 | 97.4 | 97.0 | 96.8 | 96.7 | 96.6 | | | | |
| 3 | 100.0 | 99.7 | 99.1 | 98.5 | 98.2 | 97.8 | 97.9 | 97.2 | 96.9 | 97.0 | 96.5 | 96.3 | | | | |
| 4 | 100.0 | 99.9 | 99.4 | 98.6 | 98.5 | 98.2 | 98.0 | 97.7 | 97.2 | 97.2 | 97.1 | 96.8 | | | | |
| 5 | 100.0 | 100.5 | 100.0 | 99.4 | 98.9 | 98.6 | 98.4 | 97.8 | 97.7 | 97.6 | 97.2 | 97.1 | | | | |
| 6 | 100.0 | 100.6 | 100.1 | 99.2 | 98.8 | 98.6 | 98.6 | 98.1 | 97.7 | 97.7 | 97.4 | 97.2 | | | | |
| 7 | 100.0 | 99.7 | 99.5 | 99.0 | 98.7 | 98.3 | 98.4 | 98.0 | 97.6 | 97.5 | 97.2 | 97.1 | | | | |
| 8 | 100.0 | 99.9 | 99.2 | 98.5 | 98.2 | 97.9 | 97.7 | 97.3 | 97.0 | 96.9 | 96.8 | 96.4 | | | | |
| 9 | 100.0 | 100.9 | 100.4 | 99.5 | 99.4 | 98.9 | 99.0 | 98.4 | 98.0 | 98.1 | 97.7 | 97.5 | | | | |
| 10 | 100.0 | 100.4 | 99.9 | 99.1 | 98.9 | 98.6 | 98.5 | 98.2 | 97.8 | 97.7 | 97.4 | 97.3 | | | | |
| 11 | 100.0 | 99.7 | 99.2 | 98.6 | 98.1 | 97.8 | 98.0 | 97.5 | 97.2 | 97.1 | 96.8 | 96.7 | | | | |
| 12 | 100.0 | 100.7 | 100.2 | 99.5 | 99.3 | 98.9 | 99.0 | 98.4 | 97.9 | 98.1 | 97.5 | 97.3 | | | | |
| 13 | 100.0 | 100.6 | 100.2 | 99.4 | 99.3 | 98.8 | 98.8 | 98.4 | 98.2 | 98.1 | 97.7 | 97.7 | | | | |
| 14 | 100.0 | 99.5 | 99.2 | 98.7 | 98.3 | 97.9 | 98.1 | 97.8 | 97.3 | 97.3 | 96.9 | 96.8 | | | | |
| 15 | 100.0 | 101.0 | 100.5 | 99.9 | 99.5 | 99.1 | 99.2 | 98.6 | 98.2 | 98.2 | 97.9 | 97.7 | | | | |
| 16 | 100.0 | 100.4 | 100.1 | 99.7 | 99.3 | 98.9 | 98.5 | 98.4 | 98.0 | 97.8 | 97.7 | 97.5 | | | | |
| 17 | 100.0 | 101.0 | 100.4 | 99.6 | 99.3 | 98.8 | 99.1 | 98.5 | 98.1 | 98.2 | 97.7 | 97.5 | | | | |
| 18 | 100.0 | 100.5 | 100.2 | 99.5 | 99.2 | 98.8 | 99.1 | 98.4 | 98.0 | 98.1 | 97.7 | 97.5 | | | | |
| 19 | 100.0 | 100.8 | 100.3 | 99.4 | 99.0 | 98.8 | 98.6 | 98.3 | 97.9 | 97.7 | 97.5 | 97.3 | | | | |
| 20 | 100.0 | 99.9 | 99.4 | 98.9 | 98.6 | 98.1 | 98.0 | 97.5 | 97.0 | 97.1 | 96.7 | 96.6 | | | | |
| 21 | 100.0 | 100.2 | 99.7 | 99.1 | 98.9 | 98.5 | 98.7 | 98.0 | 97.6 | 97.6 | 97.3 | 97.1 | | | | |
| 22 | 100.0 | 99.6 | 99.2 | 98.7 | 98.5 | 98.2 | 98.3 | 97.9 | 97.6 | 97.2 | 97.3 | 97.0 | | | | |
| 23 | 100.0 | 100.0 | 99.5 | 98.8 | 98.3 | 97.9 | 97.8 | 97.4 | 97.0 | 97.1 | 96.7 | 96.5 | | | | |
| 24 | 100.0 | 100.0 | 99.6 | 98.9 | 98.5 | 98.5 | 98.2 | 97.7 | 97.3 | 97.2 | 97.0 | 96.8 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 100.2 | 99.8 | 99.1 | 98.8 | 98.4 | 98.4 | 97.9 | 97.6 | 97.5 | 97.2 | 97.0 | | | | |
| Med. | 100.0 | 100.1 | 99.6 | 99.0 | 98.8 | 98.5 | 98.4 | 97.9 | 97.6 | 97.6 | 97.2 | 97.1 | | | | |
| σ | 0.00 | 0.48 | 0.46 | 0.42 | 0.44 | 0.43 | 0.48 | 0.45 | 0.44 | 0.46 | 0.43 | 0.44 | | | | |
| Min. | 100.0 | 99.5 | 99.1 | 98.5 | 98.1 | 97.8 | 97.7 | 97.2 | 96.9 | 96.8 | 96.5 | 96.3 | | | | |
| Max. | 100.0 | 101.0 | 100.5 | 99.9 | 99.5 | 99.1 | 99.2 | 98.6 | 98.2 | 98.2 | 97.9 | 97.7 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0162 | -0.0210 | -0.0248 | -0.0253 | -0.0283 | -0.0301 | | | | | | | | | | |

| Test duration used | 5000 h | to | 10000 h |
|----------------------------------|---------|-------|----------|
| B | | | 0.995 |
| α | | | 2.63E-06 |
| R ² | | | 0.947 |
| Calculated L ₇₀ (10K) | 134000 | hours | |
| Reported L ₇₀ (10K) | > 60000 | hours | |
| Calculated L ₈₀ (10K) | 83200 | hours | |
| Reported L ₈₀ (10K) | > 60000 | hours | |
| Calculated L ₉₀ (10K) | 38400 | hours | |
| Reported L ₉₀ (10K) | 38400 | hours | |

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

The certificate shall not be reproduced, except in full, without written approval of the laboratory.

The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 4 : 85 °C, 1200 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 4-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.5 | 98.4 | 98.3 | 98.4 | 98.3 | 98.3 | 98.4 | 98.3 | 98.3 | 98.4 | 98.4 | | | | |
| 2 | 100.0 | 98.4 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | | | | |
| 3 | 100.0 | 98.4 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | | | | |
| 4 | 100.0 | 98.4 | 98.4 | 98.3 | 98.4 | 98.3 | 98.3 | 98.4 | 98.2 | 98.3 | 98.4 | 98.3 | | | | |
| 5 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.3 | 98.2 | 98.2 | 98.3 | 98.3 | | | | |
| 6 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | | | | |
| 7 | 100.0 | 98.1 | 98.1 | 97.9 | 98.0 | 98.0 | 98.0 | 98.0 | 97.9 | 98.0 | 98.0 | 98.0 | | | | |
| 8 | 100.0 | 98.3 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.1 | 98.2 | 98.3 | 98.2 | | | | |
| 9 | 100.0 | 98.4 | 98.3 | 98.3 | 98.4 | 98.3 | 98.3 | 98.4 | 98.2 | 98.3 | 98.4 | 98.3 | | | | |
| 10 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.3 | | | | |
| 11 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.1 | 98.2 | 98.3 | 98.2 | | | | |
| 12 | 100.0 | 98.3 | 98.3 | 98.1 | 98.3 | 98.2 | 98.2 | 98.3 | 98.1 | 98.2 | 98.3 | 98.2 | | | | |
| 13 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.3 | 98.2 | 98.2 | 98.3 | 98.3 | | | | |
| 14 | 100.0 | 98.2 | 98.1 | 98.0 | 98.1 | 98.1 | 98.0 | 98.1 | 97.9 | 98.0 | 98.1 | 98.0 | | | | |
| 15 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.3 | 98.2 | 98.2 | 98.3 | 98.3 | | | | |
| 16 | 100.0 | 98.3 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.2 | | | | |
| 17 | 100.0 | 98.3 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.1 | 98.2 | 98.3 | 98.2 | | | | |
| 18 | 100.0 | 98.4 | 98.4 | 98.3 | 98.4 | 98.3 | 98.3 | 98.4 | 98.2 | 98.3 | 98.4 | 98.3 | | | | |
| 19 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.4 | 98.2 | 98.3 | 98.3 | 98.3 | | | | |
| 20 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.2 | | | | |
| 21 | 100.0 | 98.5 | 98.5 | 98.4 | 98.5 | 98.4 | 98.4 | 98.5 | 98.3 | 98.4 | 98.5 | 98.4 | | | | |
| 22 | 100.0 | 98.5 | 98.4 | 98.3 | 98.4 | 98.3 | 98.3 | 98.4 | 98.3 | 98.3 | 98.4 | 98.3 | | | | |
| 23 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.3 | 98.2 | 98.2 | 98.3 | 98.3 | | | | |
| 24 | 100.0 | 98.3 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.1 | 98.2 | 98.3 | 98.2 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.2 | 98.3 | 98.2 | 98.2 | 98.3 | 98.2 | | | | |
| Med. | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.3 | 98.2 | 98.2 | 98.3 | 98.3 | | | | |
| σ | 0.00 | 0.08 | 0.08 | 0.09 | 0.08 | 0.09 | 0.09 | 0.09 | 0.10 | 0.09 | 0.09 | 0.09 | | | | |
| Min. | 100.0 | 98.1 | 98.1 | 97.9 | 98.0 | 98.0 | 98.0 | 98.0 | 97.9 | 98.0 | 98.0 | 98.0 | | | | |
| Max. | 100.0 | 98.5 | 98.5 | 98.4 | 98.5 | 98.4 | 98.4 | 98.5 | 98.3 | 98.4 | 98.5 | 98.4 | | | | |

Data Set 4 : 85 °C, 1200 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.7 °C |
| Drive Current [I _f] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 4-4
Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0014 | 0.0015 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 2 | 0.0000 | 0.0012 | 0.0014 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | | | | |
| 3 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0018 | 0.0017 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | | | | |
| 4 | 0.0000 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | | | | |
| 5 | 0.0000 | 0.0017 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | 0.0020 | 0.0020 | 0.0019 | 0.0020 | 0.0019 | 0.0019 | | | | |
| 6 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0019 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 7 | 0.0000 | 0.0015 | 0.0017 | 0.0018 | 0.0019 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0018 | 0.0018 | | | | |
| 8 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | | | | |
| 9 | 0.0000 | 0.0016 | 0.0018 | 0.0017 | 0.0019 | 0.0019 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 10 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | | | | |
| 11 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0018 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 12 | 0.0000 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0016 | 0.0018 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | | | | |
| 13 | 0.0000 | 0.0014 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 14 | 0.0000 | 0.0014 | 0.0016 | 0.0017 | 0.0019 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | | | | |
| 15 | 0.0000 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0017 | 0.0019 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | | | | |
| 16 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0018 | 0.0019 | 0.0018 | 0.0018 | | | | |
| 17 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0018 | 0.0019 | 0.0018 | 0.0018 | | | | |
| 18 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 19 | 0.0000 | 0.0016 | 0.0018 | 0.0019 | 0.0020 | 0.0020 | 0.0020 | 0.0020 | 0.0018 | 0.0019 | 0.0018 | 0.0019 | | | | |
| 20 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 21 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 22 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 23 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0017 | | | | |
| 24 | 0.0000 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| Med. | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | |
| Min. | 0.0000 | 0.0012 | 0.0014 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | | | | |
| Max. | 0.0000 | 0.0017 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | 0.0020 | 0.0020 | 0.0019 | 0.0020 | 0.0019 | 0.0019 | | | | |

Data Set 4 : 85 °C, 1200 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 4-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2610 | 0.2596 | 0.2595 | 0.2593 | 0.2592 | 0.2592 | 0.2593 | 0.2592 | 0.2593 | 0.2592 | 0.2592 | 0.2592 | | | | |
| 2 | 0.2579 | 0.2567 | 0.2565 | 0.2565 | 0.2564 | 0.2564 | 0.2563 | 0.2564 | 0.2564 | 0.2563 | 0.2564 | 0.2563 | | | | |
| 3 | 0.2582 | 0.2568 | 0.2568 | 0.2567 | 0.2565 | 0.2565 | 0.2566 | 0.2566 | 0.2566 | 0.2566 | 0.2566 | 0.2566 | | | | |
| 4 | 0.2573 | 0.2558 | 0.2557 | 0.2556 | 0.2555 | 0.2555 | 0.2555 | 0.2555 | 0.2555 | 0.2555 | 0.2555 | 0.2554 | | | | |
| 5 | 0.2578 | 0.2563 | 0.2561 | 0.2560 | 0.2560 | 0.2559 | 0.2559 | 0.2559 | 0.2559 | 0.2559 | 0.2559 | 0.2559 | | | | |
| 6 | 0.2590 | 0.2576 | 0.2574 | 0.2573 | 0.2572 | 0.2572 | 0.2572 | 0.2572 | 0.2572 | 0.2572 | 0.2572 | 0.2572 | | | | |
| 7 | 0.2585 | 0.2571 | 0.2569 | 0.2568 | 0.2567 | 0.2567 | 0.2567 | 0.2567 | 0.2567 | 0.2566 | 0.2567 | 0.2567 | | | | |
| 8 | 0.2572 | 0.2558 | 0.2557 | 0.2556 | 0.2555 | 0.2555 | 0.2555 | 0.2555 | 0.2555 | 0.2554 | 0.2555 | 0.2554 | | | | |
| 9 | 0.2600 | 0.2584 | 0.2583 | 0.2583 | 0.2582 | 0.2581 | 0.2582 | 0.2581 | 0.2582 | 0.2581 | 0.2581 | 0.2581 | | | | |
| 10 | 0.2582 | 0.2568 | 0.2567 | 0.2566 | 0.2565 | 0.2565 | 0.2564 | 0.2564 | 0.2564 | 0.2564 | 0.2565 | 0.2564 | | | | |
| 11 | 0.2567 | 0.2554 | 0.2553 | 0.2552 | 0.2551 | 0.2551 | 0.2550 | 0.2550 | 0.2551 | 0.2550 | 0.2550 | 0.2550 | | | | |
| 12 | 0.2576 | 0.2562 | 0.2561 | 0.2560 | 0.2559 | 0.2559 | 0.2560 | 0.2559 | 0.2559 | 0.2560 | 0.2559 | 0.2559 | | | | |
| 13 | 0.2587 | 0.2573 | 0.2572 | 0.2570 | 0.2570 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | 0.2569 | | | | |
| 14 | 0.2592 | 0.2579 | 0.2577 | 0.2576 | 0.2574 | 0.2575 | 0.2574 | 0.2574 | 0.2575 | 0.2574 | 0.2575 | 0.2574 | | | | |
| 15 | 0.2579 | 0.2564 | 0.2563 | 0.2562 | 0.2561 | 0.2561 | 0.2562 | 0.2561 | 0.2561 | 0.2561 | 0.2561 | 0.2560 | | | | |
| 16 | 0.2572 | 0.2558 | 0.2557 | 0.2556 | 0.2555 | 0.2554 | 0.2554 | 0.2554 | 0.2554 | 0.2554 | 0.2554 | 0.2554 | | | | |
| 17 | 0.2582 | 0.2568 | 0.2567 | 0.2566 | 0.2565 | 0.2565 | 0.2564 | 0.2564 | 0.2564 | 0.2564 | 0.2564 | 0.2564 | | | | |
| 18 | 0.2593 | 0.2579 | 0.2577 | 0.2576 | 0.2575 | 0.2575 | 0.2576 | 0.2575 | 0.2575 | 0.2575 | 0.2575 | 0.2575 | | | | |
| 19 | 0.2562 | 0.2547 | 0.2545 | 0.2544 | 0.2543 | 0.2543 | 0.2543 | 0.2543 | 0.2544 | 0.2543 | 0.2544 | 0.2543 | | | | |
| 20 | 0.2568 | 0.2554 | 0.2553 | 0.2552 | 0.2551 | 0.2551 | 0.2551 | 0.2551 | 0.2551 | 0.2551 | 0.2551 | 0.2551 | | | | |
| 21 | 0.2577 | 0.2563 | 0.2562 | 0.2561 | 0.2560 | 0.2560 | 0.2561 | 0.2560 | 0.2560 | 0.2560 | 0.2560 | 0.2560 | | | | |
| 22 | 0.2571 | 0.2557 | 0.2556 | 0.2555 | 0.2554 | 0.2553 | 0.2553 | 0.2553 | 0.2553 | 0.2553 | 0.2553 | 0.2553 | | | | |
| 23 | 0.2566 | 0.2552 | 0.2551 | 0.2550 | 0.2549 | 0.2549 | 0.2549 | 0.2549 | 0.2549 | 0.2548 | 0.2549 | 0.2548 | | | | |
| 24 | 0.2576 | 0.2562 | 0.2560 | 0.2560 | 0.2559 | 0.2560 | 0.2559 | 0.2559 | 0.2559 | 0.2558 | 0.2559 | 0.2558 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2580 | 0.2566 | 0.2565 | 0.2564 | 0.2563 | 0.2563 | 0.2563 | 0.2562 | 0.2563 | 0.2562 | 0.2562 | 0.2562 | | | | |
| Med. | 0.2579 | 0.2564 | 0.2563 | 0.2562 | 0.2561 | 0.2561 | 0.2562 | 0.2561 | 0.2561 | 0.2561 | 0.2561 | 0.2560 | | | | |
| σ | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | | | | |
| Min. | 0.2562 | 0.2547 | 0.2545 | 0.2544 | 0.2543 | 0.2543 | 0.2543 | 0.2543 | 0.2544 | 0.2543 | 0.2544 | 0.2543 | | | | |
| Max. | 0.2610 | 0.2596 | 0.2595 | 0.2593 | 0.2592 | 0.2592 | 0.2593 | 0.2592 | 0.2593 | 0.2592 | 0.2592 | 0.2592 | | | | |

Data Set 4 : 85 °C, 1200 mA

| | |
|--|---------|
| Actual Case Temperature [T _S] | 87.6 °C |
| Actual Ambient Temperature [T _A] | 84.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 4-6
Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5212 | 0.5210 | 0.5209 | 0.5210 | 0.5208 | 0.5211 | 0.5210 | 0.5210 | 0.5214 | 0.5211 | 0.5215 | 0.5213 | | | | |
| 2 | 0.5176 | 0.5174 | 0.5173 | 0.5174 | 0.5172 | 0.5175 | 0.5175 | 0.5174 | 0.5178 | 0.5175 | 0.5179 | 0.5178 | | | | |
| 3 | 0.5154 | 0.5149 | 0.5148 | 0.5150 | 0.5149 | 0.5150 | 0.5151 | 0.5150 | 0.5153 | 0.5152 | 0.5154 | 0.5153 | | | | |
| 4 | 0.5146 | 0.5140 | 0.5140 | 0.5140 | 0.5140 | 0.5141 | 0.5141 | 0.5141 | 0.5143 | 0.5141 | 0.5144 | 0.5143 | | | | |
| 5 | 0.5162 | 0.5155 | 0.5154 | 0.5155 | 0.5154 | 0.5156 | 0.5155 | 0.5156 | 0.5158 | 0.5156 | 0.5160 | 0.5158 | | | | |
| 6 | 0.5199 | 0.5195 | 0.5195 | 0.5196 | 0.5194 | 0.5196 | 0.5196 | 0.5196 | 0.5199 | 0.5197 | 0.5200 | 0.5199 | | | | |
| 7 | 0.5179 | 0.5174 | 0.5174 | 0.5174 | 0.5173 | 0.5175 | 0.5175 | 0.5175 | 0.5177 | 0.5176 | 0.5179 | 0.5177 | | | | |
| 8 | 0.5159 | 0.5154 | 0.5154 | 0.5154 | 0.5153 | 0.5155 | 0.5155 | 0.5155 | 0.5157 | 0.5156 | 0.5159 | 0.5157 | | | | |
| 9 | 0.5206 | 0.5202 | 0.5201 | 0.5202 | 0.5200 | 0.5202 | 0.5203 | 0.5202 | 0.5205 | 0.5203 | 0.5207 | 0.5205 | | | | |
| 10 | 0.5171 | 0.5166 | 0.5166 | 0.5166 | 0.5166 | 0.5167 | 0.5167 | 0.5167 | 0.5169 | 0.5168 | 0.5171 | 0.5170 | | | | |
| 11 | 0.5144 | 0.5139 | 0.5139 | 0.5139 | 0.5139 | 0.5140 | 0.5140 | 0.5139 | 0.5141 | 0.5140 | 0.5143 | 0.5142 | | | | |
| 12 | 0.5157 | 0.5151 | 0.5150 | 0.5151 | 0.5150 | 0.5151 | 0.5153 | 0.5151 | 0.5153 | 0.5153 | 0.5155 | 0.5154 | | | | |
| 13 | 0.5176 | 0.5173 | 0.5172 | 0.5172 | 0.5171 | 0.5173 | 0.5173 | 0.5173 | 0.5174 | 0.5174 | 0.5177 | 0.5176 | | | | |
| 14 | 0.5193 | 0.5188 | 0.5187 | 0.5188 | 0.5187 | 0.5189 | 0.5189 | 0.5189 | 0.5191 | 0.5189 | 0.5193 | 0.5191 | | | | |
| 15 | 0.5177 | 0.5171 | 0.5171 | 0.5171 | 0.5170 | 0.5172 | 0.5173 | 0.5172 | 0.5174 | 0.5173 | 0.5176 | 0.5175 | | | | |
| 16 | 0.5152 | 0.5147 | 0.5146 | 0.5146 | 0.5145 | 0.5146 | 0.5146 | 0.5146 | 0.5148 | 0.5147 | 0.5150 | 0.5149 | | | | |
| 17 | 0.5174 | 0.5168 | 0.5168 | 0.5168 | 0.5167 | 0.5169 | 0.5168 | 0.5169 | 0.5170 | 0.5169 | 0.5173 | 0.5171 | | | | |
| 18 | 0.5202 | 0.5198 | 0.5198 | 0.5198 | 0.5198 | 0.5199 | 0.5200 | 0.5199 | 0.5202 | 0.5200 | 0.5203 | 0.5202 | | | | |
| 19 | 0.5167 | 0.5161 | 0.5161 | 0.5161 | 0.5160 | 0.5162 | 0.5162 | 0.5162 | 0.5164 | 0.5163 | 0.5166 | 0.5165 | | | | |
| 20 | 0.5144 | 0.5140 | 0.5138 | 0.5139 | 0.5138 | 0.5139 | 0.5139 | 0.5140 | 0.5141 | 0.5140 | 0.5143 | 0.5142 | | | | |
| 21 | 0.5148 | 0.5143 | 0.5142 | 0.5142 | 0.5142 | 0.5143 | 0.5145 | 0.5144 | 0.5145 | 0.5144 | 0.5147 | 0.5146 | | | | |
| 22 | 0.5148 | 0.5143 | 0.5143 | 0.5143 | 0.5142 | 0.5143 | 0.5144 | 0.5144 | 0.5145 | 0.5144 | 0.5147 | 0.5146 | | | | |
| 23 | 0.5147 | 0.5142 | 0.5141 | 0.5141 | 0.5141 | 0.5142 | 0.5142 | 0.5142 | 0.5144 | 0.5143 | 0.5145 | 0.5145 | | | | |
| 24 | 0.5150 | 0.5146 | 0.5145 | 0.5145 | 0.5145 | 0.5147 | 0.5146 | 0.5147 | 0.5147 | 0.5147 | 0.5150 | 0.5149 | | | | |
| | | | | | | | | | | | | | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5168 | 0.5164 | 0.5163 | 0.5164 | 0.5163 | 0.5164 | 0.5165 | 0.5164 | 0.5166 | 0.5165 | 0.5168 | 0.5167 | | | | |
| Med. | 0.5165 | 0.5158 | 0.5158 | 0.5158 | 0.5157 | 0.5159 | 0.5159 | 0.5159 | 0.5161 | 0.5160 | 0.5163 | 0.5162 | | | | |
| σ | 0.0021 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | | | | |
| Min. | 0.5144 | 0.5139 | 0.5138 | 0.5139 | 0.5138 | 0.5139 | 0.5139 | 0.5139 | 0.5141 | 0.5140 | 0.5143 | 0.5142 | | | | |
| Max. | 0.5212 | 0.5210 | 0.5209 | 0.5210 | 0.5208 | 0.5211 | 0.5210 | 0.5210 | 0.5214 | 0.5211 | 0.5215 | 0.5213 | | | | |

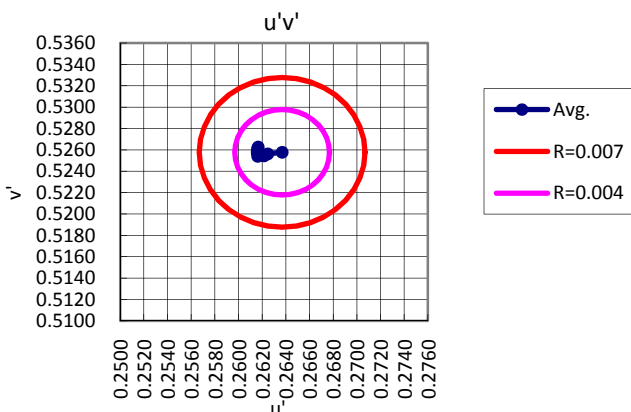
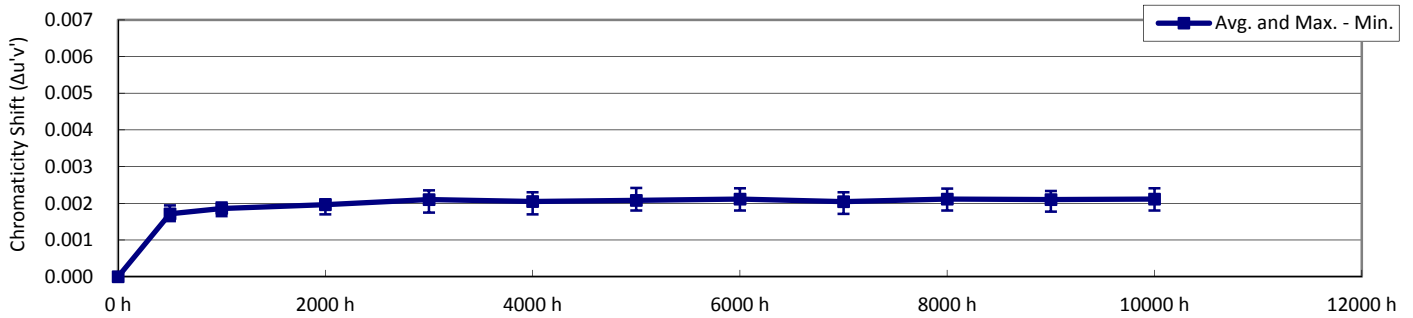
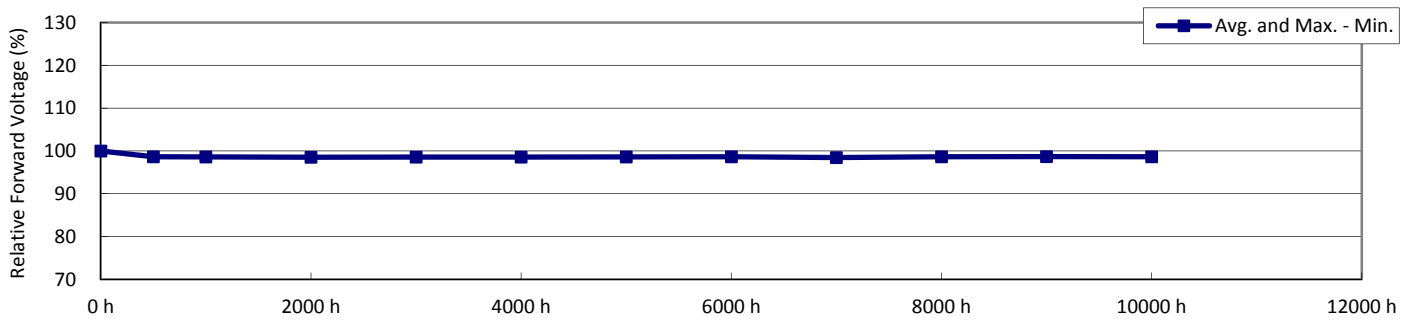
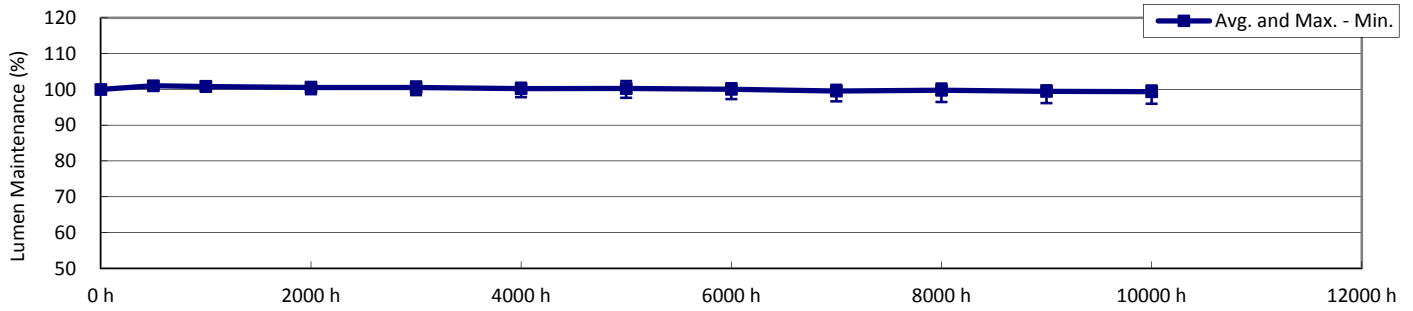


Data Set 5 : 85 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _S] | 88.2 °C |
| Actual Ambient Temperature [T _A] | 86.3 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0



The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 5 : 85 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 88.2 °C |
| Actual Ambient Temperature [T _A] | 86.3 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 5-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 461 | 3.23 | 2794 | 4.84 | 0.444 | 0.394 | 0.260 | 0.518 | | | | |
| 2 | 462 | 3.23 | 2739 | 4.84 | 0.451 | 0.400 | 0.262 | 0.522 | | | | |
| 3 | 456 | 3.25 | 2606 | 4.87 | 0.468 | 0.413 | 0.267 | 0.530 | | | | |
| 4 | 460 | 3.25 | 2653 | 4.87 | 0.464 | 0.411 | 0.265 | 0.528 | | | | |
| 5 | 463 | 3.25 | 2716 | 4.87 | 0.456 | 0.406 | 0.262 | 0.525 | | | | |
| 6 | 461 | 3.25 | 2777 | 4.87 | 0.449 | 0.401 | 0.260 | 0.522 | | | | |
| 7 | 460 | 3.25 | 2680 | 4.87 | 0.460 | 0.409 | 0.264 | 0.527 | | | | |
| 8 | 462 | 3.24 | 2720 | 4.87 | 0.458 | 0.409 | 0.262 | 0.526 | | | | |
| 9 | 460 | 3.24 | 2687 | 4.87 | 0.461 | 0.411 | 0.263 | 0.528 | | | | |
| 10 | 455 | 3.24 | 2623 | 4.87 | 0.466 | 0.412 | 0.266 | 0.529 | | | | |
| 11 | 458 | 3.24 | 2619 | 4.86 | 0.468 | 0.414 | 0.266 | 0.530 | | | | |
| 12 | 455 | 3.28 | 2643 | 4.92 | 0.463 | 0.409 | 0.265 | 0.527 | | | | |
| 13 | 455 | 3.28 | 2693 | 4.92 | 0.458 | 0.406 | 0.263 | 0.525 | | | | |
| 14 | 461 | 3.28 | 2761 | 4.93 | 0.451 | 0.403 | 0.261 | 0.523 | | | | |
| 15 | 459 | 3.29 | 2717 | 4.94 | 0.454 | 0.403 | 0.262 | 0.524 | | | | |
| 16 | 461 | 3.27 | 2666 | 4.90 | 0.460 | 0.407 | 0.264 | 0.526 | | | | |
| 17 | 464 | 3.26 | 2658 | 4.89 | 0.462 | 0.409 | 0.265 | 0.527 | | | | |
| 18 | 464 | 3.26 | 2663 | 4.89 | 0.462 | 0.410 | 0.264 | 0.527 | | | | |
| 19 | 453 | 3.26 | 2610 | 4.89 | 0.467 | 0.412 | 0.267 | 0.529 | | | | |
| 20 | 451 | 3.27 | 2630 | 4.91 | 0.464 | 0.409 | 0.266 | 0.527 | | | | |
| 21 | 454 | 3.28 | 2666 | 4.92 | 0.460 | 0.406 | 0.265 | 0.526 | | | | |
| 22 | 455 | 3.28 | 2677 | 4.92 | 0.458 | 0.404 | 0.264 | 0.524 | | | | |
| 23 | 459 | 3.28 | 2701 | 4.93 | 0.456 | 0.403 | 0.263 | 0.524 | | | | |
| 24 | 460 | 3.30 | 2693 | 4.95 | 0.457 | 0.404 | 0.263 | 0.524 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 459 | 3.26 | 2683 | 4.89 | 0.459 | 0.407 | 0.264 | 0.526 | | | | |
| Med. | 460 | 3.26 | 2679 | 4.89 | 0.460 | 0.408 | 0.264 | 0.526 | | | | |
| σ | 3.6 | 0.020 | 51.3 | 0.031 | 0.0061 | 0.0048 | 0.0020 | 0.0028 | | | | |
| Min. | 451 | 3.23 | 2606 | 4.84 | 0.444 | 0.394 | 0.260 | 0.518 | | | | |
| Max. | 464 | 3.30 | 2794 | 4.95 | 0.468 | 0.414 | 0.267 | 0.530 | | | | |

Data Set 5 : 85 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 88.2 °C |
| Actual Ambient Temperature [T _A] | 86.3 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.
Number of LED failures: 0

TABLE 5-2
Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 100.3 | 99.7 | 98.7 | 98.4 | 97.8 | 97.6 | 97.3 | 96.7 | 96.5 | 96.2 | 96.0 | | | | |
| 2 | 100.0 | 100.9 | 99.9 | 99.1 | 98.7 | 98.2 | 97.7 | 97.3 | 96.8 | 96.8 | 96.2 | 96.0 | | | | |
| 3 | 100.0 | 101.7 | 101.4 | 101.2 | 101.3 | 101.0 | 101.1 | 100.9 | 100.4 | 100.7 | 100.4 | 100.6 | | | | |
| 4 | 100.0 | 100.6 | 100.2 | 100.0 | 100.0 | 99.6 | 99.8 | 99.6 | 99.2 | 99.2 | 99.1 | 99.1 | | | | |
| 5 | 100.0 | 100.5 | 100.3 | 100.1 | 100.1 | 99.8 | 99.8 | 99.7 | 99.2 | 99.6 | 99.2 | 99.1 | | | | |
| 6 | 100.0 | 101.6 | 101.2 | 101.0 | 100.9 | 100.7 | 101.0 | 100.6 | 100.2 | 100.6 | 100.2 | 100.2 | | | | |
| 7 | 100.0 | 100.9 | 100.8 | 100.3 | 100.3 | 100.2 | 100.1 | 99.8 | 99.5 | 99.6 | 99.4 | 99.4 | | | | |
| 8 | 100.0 | 100.3 | 99.9 | 99.7 | 99.7 | 99.2 | 99.4 | 99.3 | 98.6 | 98.9 | 98.6 | 98.5 | | | | |
| 9 | 100.0 | 101.5 | 101.4 | 101.1 | 101.2 | 100.8 | 101.0 | 100.7 | 100.2 | 100.5 | 100.3 | 100.2 | | | | |
| 10 | 100.0 | 100.7 | 100.4 | 100.1 | 100.2 | 99.8 | 99.8 | 99.7 | 99.2 | 99.3 | 99.1 | 99.1 | | | | |
| 11 | 100.0 | 100.1 | 99.8 | 99.5 | 99.5 | 99.3 | 99.2 | 99.0 | 98.5 | 98.6 | 98.4 | 98.4 | | | | |
| 12 | 100.0 | 101.7 | 101.7 | 101.5 | 101.5 | 101.1 | 101.2 | 101.1 | 100.6 | 100.9 | 100.5 | 100.5 | | | | |
| 13 | 100.0 | 101.1 | 101.0 | 100.7 | 100.8 | 100.6 | 100.5 | 100.4 | 100.0 | 100.1 | 100.0 | 100.0 | | | | |
| 14 | 100.0 | 101.3 | 101.0 | 101.0 | 100.9 | 100.7 | 100.8 | 100.7 | 100.3 | 100.4 | 100.1 | 100.0 | | | | |
| 15 | 100.0 | 101.7 | 101.7 | 101.5 | 101.6 | 101.4 | 101.5 | 101.3 | 100.8 | 101.1 | 100.8 | 100.7 | | | | |
| 16 | 100.0 | 100.4 | 100.6 | 100.3 | 100.3 | 100.1 | 100.0 | 99.9 | 99.3 | 99.4 | 99.3 | 99.3 | | | | |
| 17 | 100.0 | 100.1 | 99.9 | 99.7 | 99.6 | 99.3 | 99.2 | 99.1 | 98.8 | 98.9 | 98.5 | 98.4 | | | | |
| 18 | 100.0 | 100.7 | 100.4 | 100.2 | 100.2 | 99.9 | 100.2 | 99.8 | 99.3 | 99.6 | 99.1 | 99.1 | | | | |
| 19 | 100.0 | 101.4 | 101.2 | 100.8 | 100.9 | 100.6 | 100.2 | 100.3 | 99.8 | 100.0 | 99.6 | 99.6 | | | | |
| 20 | 100.0 | 101.7 | 101.6 | 101.5 | 101.4 | 101.1 | 101.1 | 100.9 | 100.4 | 100.6 | 100.5 | 100.4 | | | | |
| 21 | 100.0 | 102.3 | 102.3 | 102.1 | 102.2 | 101.9 | 102.3 | 101.7 | 101.3 | 101.6 | 101.1 | 101.1 | | | | |
| 22 | 100.0 | 101.0 | 101.1 | 100.8 | 101.0 | 100.8 | 100.5 | 100.5 | 100.0 | 100.2 | 100.0 | 100.0 | | | | |
| 23 | 100.0 | 101.3 | 101.0 | 101.0 | 100.9 | 100.6 | 100.6 | 100.4 | 100.2 | 100.2 | 99.9 | 99.5 | | | | |
| 24 | 100.0 | 101.2 | 101.1 | 100.9 | 100.9 | 100.7 | 100.9 | 100.7 | 100.2 | 100.6 | 100.3 | 100.2 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 101.0 | 100.8 | 100.5 | 100.5 | 100.2 | 100.2 | 100.0 | 99.6 | 99.7 | 99.5 | 99.4 | | | | |
| Med. | 100.0 | 101.0 | 101.0 | 100.8 | 100.8 | 100.6 | 100.4 | 100.3 | 99.9 | 100.0 | 99.8 | 99.5 | | | | |
| σ | 0.00 | 0.59 | 0.71 | 0.82 | 0.91 | 0.97 | 1.09 | 1.09 | 1.12 | 1.23 | 1.24 | 1.27 | | | | |
| Min. | 100.0 | 100.1 | 99.7 | 98.7 | 98.4 | 97.8 | 97.6 | 97.3 | 96.7 | 96.5 | 96.2 | 96.0 | | | | |
| Max. | 100.0 | 102.3 | 102.3 | 102.1 | 102.2 | 101.9 | 102.3 | 101.7 | 101.3 | 101.6 | 101.1 | 101.1 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|--------|--------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | 0.0024 | 0.0003 | -0.0044 | -0.0026 | -0.0055 | -0.0062 | | | | | | | | | | |

| Test duration used | 5000 h to 10000 h |
|----------------------------------|-------------------|
| B | 1.010 |
| α | 1.67E-06 |
| R ² | 0.845 |
| Calculated L ₇₀ (10K) | 220000 hours |
| Reported L ₇₀ (10K) | > 60000 hours |
| Calculated L ₈₀ (10K) | 140000 hours |
| Reported L ₈₀ (10K) | > 60000 hours |
| Calculated L ₉₀ (10K) | 69100 hours |
| Reported L ₉₀ (10K) | > 60000 hours |

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 5 : 85 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 88.2 °C |
| Actual Ambient Temperature [T _A] | 86.3 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 5-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.3 | 98.2 | 98.2 | 98.2 | 98.2 | 98.2 | 98.3 | 98.1 | 98.3 | 98.3 | 98.2 | | | | |
| 2 | 100.0 | 98.3 | 98.2 | 98.1 | 98.2 | 98.2 | 98.2 | 98.2 | 98.1 | 98.3 | 98.3 | 98.2 | | | | |
| 3 | 100.0 | 98.9 | 98.8 | 98.7 | 98.8 | 98.8 | 98.8 | 98.9 | 98.7 | 98.9 | 98.9 | 98.8 | | | | |
| 4 | 100.0 | 98.8 | 98.8 | 98.7 | 98.7 | 98.7 | 98.8 | 98.8 | 98.6 | 98.8 | 98.9 | 98.8 | | | | |
| 5 | 100.0 | 98.8 | 98.8 | 98.7 | 98.7 | 98.8 | 98.8 | 98.8 | 98.6 | 98.8 | 98.9 | 98.8 | | | | |
| 6 | 100.0 | 98.9 | 98.8 | 98.7 | 98.8 | 98.8 | 98.8 | 98.9 | 98.7 | 98.9 | 98.9 | 98.9 | | | | |
| 7 | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.8 | 99.0 | 99.0 | 99.0 | | | | |
| 8 | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.8 | 99.0 | 99.0 | 99.0 | | | | |
| 9 | 100.0 | 99.0 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | 99.0 | 98.7 | 99.0 | 99.0 | 98.9 | | | | |
| 10 | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.8 | 99.0 | 99.0 | 99.0 | | | | |
| 11 | 100.0 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | 99.0 | 98.7 | 98.9 | 99.0 | 98.9 | | | | |
| 12 | 100.0 | 98.5 | 98.4 | 98.3 | 98.4 | 98.4 | 98.4 | 98.5 | 98.3 | 98.5 | 98.6 | 98.5 | | | | |
| 13 | 100.0 | 98.5 | 98.4 | 98.3 | 98.4 | 98.4 | 98.4 | 98.5 | 98.3 | 98.4 | 98.5 | 98.5 | | | | |
| 14 | 100.0 | 98.4 | 98.3 | 98.3 | 98.3 | 98.4 | 98.4 | 98.4 | 98.2 | 98.4 | 98.5 | 98.4 | | | | |
| 15 | 100.0 | 98.3 | 98.2 | 98.1 | 98.1 | 98.2 | 98.2 | 98.3 | 98.0 | 98.3 | 98.3 | 98.3 | | | | |
| 16 | 100.0 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.5 | 98.7 | 98.8 | 98.7 | | | | |
| 17 | 100.0 | 98.7 | 98.7 | 98.6 | 98.6 | 98.6 | 98.7 | 98.7 | 98.5 | 98.7 | 98.8 | 98.7 | | | | |
| 18 | 100.0 | 98.8 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.6 | 98.8 | 98.9 | 98.8 | | | | |
| 19 | 100.0 | 98.8 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.5 | 98.7 | 98.8 | 98.7 | | | | |
| 20 | 100.0 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.6 | 98.4 | 98.6 | 98.7 | 98.6 | | | | |
| 21 | 100.0 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.3 | 98.4 | 98.2 | 98.3 | 98.4 | 98.4 | | | | |
| 22 | 100.0 | 98.5 | 98.4 | 98.4 | 98.4 | 98.4 | 98.4 | 98.5 | 98.3 | 98.5 | 98.5 | 98.5 | | | | |
| 23 | 100.0 | 98.4 | 98.3 | 98.3 | 98.3 | 98.3 | 98.3 | 98.4 | 98.2 | 98.4 | 98.5 | 98.4 | | | | |
| 24 | 100.0 | 98.2 | 98.1 | 98.0 | 98.1 | 98.1 | 98.1 | 98.2 | 98.0 | 98.2 | 98.2 | 98.2 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.7 | 98.6 | 98.5 | 98.6 | 98.6 | 98.6 | 98.7 | 98.5 | 98.6 | 98.7 | 98.6 | | | | |
| Med. | 100.0 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.5 | 98.7 | 98.8 | 98.7 | | | | |
| σ | 0.00 | 0.26 | 0.27 | 0.27 | 0.28 | 0.27 | 0.27 | 0.28 | 0.26 | 0.28 | 0.28 | 0.27 | | | | |
| Min. | 100.0 | 98.2 | 98.1 | 98.0 | 98.1 | 98.1 | 98.1 | 98.2 | 98.0 | 98.2 | 98.2 | 98.2 | | | | |
| Max. | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.8 | 99.0 | 99.0 | 99.0 | | | | |

Data Set 5 : 85 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 88.2 °C |
| Actual Ambient Temperature [T _A] | 86.3 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 5-4
Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 2 | 0.0000 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 3 | 0.0000 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0022 | 0.0022 | | | | |
| 4 | 0.0000 | 0.0017 | 0.0018 | 0.0019 | 0.0020 | 0.0020 | 0.0021 | 0.0021 | 0.0020 | 0.0021 | 0.0020 | 0.0021 | | | | |
| 5 | 0.0000 | 0.0016 | 0.0018 | 0.0019 | 0.0021 | 0.0020 | 0.0020 | 0.0020 | 0.0019 | 0.0020 | 0.0020 | 0.0020 | | | | |
| 6 | 0.0000 | 0.0019 | 0.0020 | 0.0020 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | 0.0021 | 0.0022 | 0.0021 | 0.0022 | | | | |
| 7 | 0.0000 | 0.0017 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | 0.0021 | 0.0021 | 0.0020 | 0.0021 | 0.0021 | 0.0021 | | | | |
| 8 | 0.0000 | 0.0015 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | 0.0019 | | | | |
| 9 | 0.0000 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | 0.0021 | 0.0020 | 0.0021 | 0.0020 | 0.0021 | 0.0022 | 0.0021 | | | | |
| 10 | 0.0000 | 0.0017 | 0.0018 | 0.0020 | 0.0021 | 0.0020 | 0.0020 | 0.0021 | 0.0021 | 0.0022 | 0.0021 | 0.0021 | | | | |
| 11 | 0.0000 | 0.0016 | 0.0017 | 0.0018 | 0.0020 | 0.0019 | 0.0020 | 0.0020 | 0.0019 | 0.0020 | 0.0021 | 0.0021 | | | | |
| 12 | 0.0000 | 0.0018 | 0.0019 | 0.0021 | 0.0022 | 0.0022 | 0.0021 | 0.0022 | 0.0021 | 0.0023 | 0.0023 | 0.0022 | | | | |
| 13 | 0.0000 | 0.0017 | 0.0018 | 0.0020 | 0.0020 | 0.0020 | 0.0020 | 0.0021 | 0.0020 | 0.0021 | 0.0021 | 0.0021 | | | | |
| 14 | 0.0000 | 0.0018 | 0.0020 | 0.0021 | 0.0024 | 0.0022 | 0.0023 | 0.0023 | 0.0022 | 0.0023 | 0.0023 | 0.0023 | | | | |
| 15 | 0.0000 | 0.0018 | 0.0020 | 0.0021 | 0.0023 | 0.0022 | 0.0022 | 0.0023 | 0.0022 | 0.0022 | 0.0023 | 0.0022 | | | | |
| 16 | 0.0000 | 0.0016 | 0.0018 | 0.0020 | 0.0022 | 0.0020 | 0.0021 | 0.0022 | 0.0021 | 0.0022 | 0.0021 | 0.0021 | | | | |
| 17 | 0.0000 | 0.0015 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0020 | 0.0020 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 18 | 0.0000 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0020 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 19 | 0.0000 | 0.0018 | 0.0019 | 0.0021 | 0.0022 | 0.0022 | 0.0023 | 0.0022 | 0.0021 | 0.0023 | 0.0023 | 0.0023 | | | | |
| 20 | 0.0000 | 0.0018 | 0.0020 | 0.0021 | 0.0024 | 0.0023 | 0.0024 | 0.0024 | 0.0023 | 0.0024 | 0.0023 | 0.0024 | | | | |
| 21 | 0.0000 | 0.0019 | 0.0020 | 0.0021 | 0.0023 | 0.0022 | 0.0021 | 0.0023 | 0.0022 | 0.0022 | 0.0022 | 0.0022 | | | | |
| 22 | 0.0000 | 0.0017 | 0.0019 | 0.0021 | 0.0021 | 0.0021 | 0.0022 | 0.0022 | 0.0021 | 0.0022 | 0.0022 | 0.0022 | | | | |
| 23 | 0.0000 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | 0.0020 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | | | | |
| 24 | 0.0000 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | 0.0021 | 0.0021 | 0.0022 | 0.0021 | 0.0021 | 0.0022 | 0.0021 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | 0.0020 | 0.0021 | 0.0021 | 0.0020 | 0.0021 | 0.0021 | 0.0021 | | | | |
| Med. | 0.0000 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | 0.0020 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0002 | 0.0002 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | | | | |
| Min. | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| Max. | 0.0000 | 0.0019 | 0.0020 | 0.0021 | 0.0024 | 0.0023 | 0.0024 | 0.0024 | 0.0023 | 0.0024 | 0.0023 | 0.0024 | | | | |

Data Set 5 : 85 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 88.2 °C |
| Actual Ambient Temperature [T _A] | 86.3 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 5-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2588 | 0.2573 | 0.2572 | 0.2571 | 0.2571 | 0.2571 | 0.2570 | 0.2570 | 0.2571 | 0.2570 | 0.2571 | 0.2570 | | | | |
| 2 | 0.2607 | 0.2592 | 0.2590 | 0.2590 | 0.2589 | 0.2589 | 0.2589 | 0.2589 | 0.2590 | 0.2589 | 0.2590 | 0.2590 | | | | |
| 3 | 0.2658 | 0.2641 | 0.2639 | 0.2638 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | | | | |
| 4 | 0.2632 | 0.2615 | 0.2614 | 0.2613 | 0.2612 | 0.2612 | 0.2611 | 0.2611 | 0.2612 | 0.2611 | 0.2613 | 0.2612 | | | | |
| 5 | 0.2606 | 0.2590 | 0.2588 | 0.2587 | 0.2586 | 0.2586 | 0.2586 | 0.2586 | 0.2587 | 0.2586 | 0.2587 | 0.2586 | | | | |
| 6 | 0.2588 | 0.2570 | 0.2569 | 0.2568 | 0.2567 | 0.2566 | 0.2566 | 0.2566 | 0.2567 | 0.2566 | 0.2567 | 0.2566 | | | | |
| 7 | 0.2621 | 0.2604 | 0.2602 | 0.2602 | 0.2601 | 0.2601 | 0.2600 | 0.2600 | 0.2601 | 0.2600 | 0.2601 | 0.2600 | | | | |
| 8 | 0.2599 | 0.2584 | 0.2582 | 0.2581 | 0.2580 | 0.2580 | 0.2580 | 0.2580 | 0.2580 | 0.2579 | 0.2580 | 0.2580 | | | | |
| 9 | 0.2616 | 0.2599 | 0.2597 | 0.2596 | 0.2595 | 0.2595 | 0.2596 | 0.2595 | 0.2596 | 0.2595 | 0.2595 | 0.2595 | | | | |
| 10 | 0.2642 | 0.2625 | 0.2624 | 0.2622 | 0.2621 | 0.2622 | 0.2622 | 0.2621 | 0.2621 | 0.2620 | 0.2622 | 0.2621 | | | | |
| 11 | 0.2642 | 0.2626 | 0.2625 | 0.2624 | 0.2622 | 0.2623 | 0.2622 | 0.2622 | 0.2623 | 0.2622 | 0.2622 | 0.2622 | | | | |
| 12 | 0.2641 | 0.2623 | 0.2622 | 0.2620 | 0.2619 | 0.2619 | 0.2620 | 0.2619 | 0.2620 | 0.2618 | 0.2619 | 0.2619 | | | | |
| 13 | 0.2616 | 0.2599 | 0.2598 | 0.2596 | 0.2596 | 0.2596 | 0.2596 | 0.2595 | 0.2596 | 0.2595 | 0.2596 | 0.2595 | | | | |
| 14 | 0.2590 | 0.2572 | 0.2570 | 0.2569 | 0.2567 | 0.2568 | 0.2567 | 0.2567 | 0.2568 | 0.2567 | 0.2567 | 0.2567 | | | | |
| 15 | 0.2613 | 0.2595 | 0.2593 | 0.2592 | 0.2590 | 0.2591 | 0.2591 | 0.2590 | 0.2591 | 0.2591 | 0.2591 | 0.2591 | | | | |
| 16 | 0.2631 | 0.2615 | 0.2613 | 0.2611 | 0.2610 | 0.2611 | 0.2610 | 0.2609 | 0.2610 | 0.2609 | 0.2610 | 0.2610 | | | | |
| 17 | 0.2633 | 0.2618 | 0.2616 | 0.2615 | 0.2614 | 0.2614 | 0.2613 | 0.2613 | 0.2614 | 0.2614 | 0.2615 | 0.2614 | | | | |
| 18 | 0.2633 | 0.2617 | 0.2616 | 0.2615 | 0.2614 | 0.2614 | 0.2614 | 0.2613 | 0.2614 | 0.2614 | 0.2615 | 0.2614 | | | | |
| 19 | 0.2653 | 0.2635 | 0.2634 | 0.2632 | 0.2631 | 0.2631 | 0.2630 | 0.2631 | 0.2632 | 0.2630 | 0.2631 | 0.2630 | | | | |
| 20 | 0.2643 | 0.2625 | 0.2623 | 0.2622 | 0.2620 | 0.2620 | 0.2619 | 0.2619 | 0.2620 | 0.2619 | 0.2620 | 0.2619 | | | | |
| 21 | 0.2632 | 0.2613 | 0.2612 | 0.2611 | 0.2609 | 0.2610 | 0.2611 | 0.2609 | 0.2610 | 0.2610 | 0.2610 | 0.2609 | | | | |
| 22 | 0.2628 | 0.2611 | 0.2609 | 0.2607 | 0.2607 | 0.2607 | 0.2606 | 0.2606 | 0.2607 | 0.2606 | 0.2607 | 0.2606 | | | | |
| 23 | 0.2618 | 0.2601 | 0.2599 | 0.2598 | 0.2597 | 0.2598 | 0.2597 | 0.2597 | 0.2597 | 0.2597 | 0.2597 | 0.2598 | | | | |
| 24 | 0.2624 | 0.2607 | 0.2605 | 0.2604 | 0.2603 | 0.2603 | 0.2603 | 0.2602 | 0.2603 | 0.2603 | 0.2603 | 0.2603 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2623 | 0.2606 | 0.2605 | 0.2604 | 0.2602 | 0.2603 | 0.2602 | 0.2602 | 0.2603 | 0.2602 | 0.2603 | 0.2602 | | | | |
| Med. | 0.2626 | 0.2609 | 0.2607 | 0.2606 | 0.2605 | 0.2605 | 0.2605 | 0.2604 | 0.2605 | 0.2605 | 0.2605 | 0.2605 | | | | |
| σ | 0.0020 | 0.0019 | 0.0020 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | | | | |
| Min. | 0.2588 | 0.2570 | 0.2569 | 0.2568 | 0.2567 | 0.2566 | 0.2566 | 0.2566 | 0.2567 | 0.2566 | 0.2567 | 0.2566 | | | | |
| Max. | 0.2658 | 0.2641 | 0.2639 | 0.2638 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | 0.2637 | | | | |



Data Set 5 : 85 °C, 1500 mA

| | |
|--|---------|
| Actual Case Temperature [T _s] | 88.2 °C |
| Actual Ambient Temperature [T _A] | 86.3 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 5-6
 Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5170 | 0.5166 | 0.5166 | 0.5168 | 0.5166 | 0.5170 | 0.5169 | 0.5169 | 0.5172 | 0.5171 | 0.5175 | 0.5173 | | | | |
| 2 | 0.5208 | 0.5205 | 0.5206 | 0.5208 | 0.5205 | 0.5210 | 0.5209 | 0.5209 | 0.5212 | 0.5211 | 0.5215 | 0.5214 | | | | |
| 3 | 0.5289 | 0.5288 | 0.5289 | 0.5290 | 0.5287 | 0.5292 | 0.5291 | 0.5291 | 0.5293 | 0.5292 | 0.5295 | 0.5295 | | | | |
| 4 | 0.5271 | 0.5269 | 0.5271 | 0.5272 | 0.5269 | 0.5273 | 0.5272 | 0.5272 | 0.5275 | 0.5273 | 0.5277 | 0.5276 | | | | |
| 5 | 0.5241 | 0.5237 | 0.5238 | 0.5240 | 0.5236 | 0.5241 | 0.5240 | 0.5240 | 0.5242 | 0.5241 | 0.5246 | 0.5243 | | | | |
| 6 | 0.5206 | 0.5200 | 0.5201 | 0.5202 | 0.5200 | 0.5204 | 0.5203 | 0.5203 | 0.5205 | 0.5205 | 0.5208 | 0.5206 | | | | |
| 7 | 0.5256 | 0.5252 | 0.5254 | 0.5255 | 0.5252 | 0.5257 | 0.5255 | 0.5255 | 0.5258 | 0.5257 | 0.5261 | 0.5259 | | | | |
| 8 | 0.5249 | 0.5246 | 0.5247 | 0.5248 | 0.5245 | 0.5249 | 0.5248 | 0.5248 | 0.5251 | 0.5250 | 0.5254 | 0.5252 | | | | |
| 9 | 0.5266 | 0.5263 | 0.5264 | 0.5265 | 0.5262 | 0.5267 | 0.5265 | 0.5266 | 0.5268 | 0.5267 | 0.5271 | 0.5269 | | | | |
| 10 | 0.5274 | 0.5272 | 0.5273 | 0.5275 | 0.5271 | 0.5276 | 0.5274 | 0.5274 | 0.5276 | 0.5274 | 0.5280 | 0.5278 | | | | |
| 11 | 0.5286 | 0.5286 | 0.5287 | 0.5288 | 0.5284 | 0.5289 | 0.5288 | 0.5288 | 0.5290 | 0.5287 | 0.5293 | 0.5291 | | | | |
| 12 | 0.5265 | 0.5262 | 0.5263 | 0.5265 | 0.5261 | 0.5266 | 0.5265 | 0.5265 | 0.5267 | 0.5265 | 0.5270 | 0.5268 | | | | |
| 13 | 0.5241 | 0.5238 | 0.5239 | 0.5241 | 0.5238 | 0.5242 | 0.5241 | 0.5241 | 0.5243 | 0.5242 | 0.5246 | 0.5245 | | | | |
| 14 | 0.5218 | 0.5214 | 0.5215 | 0.5217 | 0.5213 | 0.5218 | 0.5216 | 0.5216 | 0.5219 | 0.5218 | 0.5222 | 0.5220 | | | | |
| 15 | 0.5224 | 0.5221 | 0.5223 | 0.5224 | 0.5221 | 0.5226 | 0.5224 | 0.5224 | 0.5227 | 0.5226 | 0.5230 | 0.5228 | | | | |
| 16 | 0.5248 | 0.5245 | 0.5245 | 0.5246 | 0.5243 | 0.5247 | 0.5246 | 0.5246 | 0.5248 | 0.5247 | 0.5251 | 0.5250 | | | | |
| 17 | 0.5257 | 0.5255 | 0.5256 | 0.5257 | 0.5254 | 0.5259 | 0.5258 | 0.5258 | 0.5261 | 0.5259 | 0.5263 | 0.5261 | | | | |
| 18 | 0.5264 | 0.5261 | 0.5263 | 0.5264 | 0.5261 | 0.5266 | 0.5266 | 0.5264 | 0.5267 | 0.5266 | 0.5270 | 0.5268 | | | | |
| 19 | 0.5277 | 0.5275 | 0.5276 | 0.5277 | 0.5274 | 0.5278 | 0.5276 | 0.5277 | 0.5279 | 0.5278 | 0.5283 | 0.5281 | | | | |
| 20 | 0.5263 | 0.5259 | 0.5260 | 0.5261 | 0.5258 | 0.5262 | 0.5260 | 0.5261 | 0.5264 | 0.5263 | 0.5266 | 0.5265 | | | | |
| 21 | 0.5247 | 0.5243 | 0.5244 | 0.5245 | 0.5243 | 0.5246 | 0.5245 | 0.5246 | 0.5248 | 0.5248 | 0.5251 | 0.5250 | | | | |
| 22 | 0.5230 | 0.5226 | 0.5228 | 0.5229 | 0.5226 | 0.5231 | 0.5229 | 0.5229 | 0.5232 | 0.5231 | 0.5235 | 0.5233 | | | | |
| 23 | 0.5227 | 0.5224 | 0.5225 | 0.5226 | 0.5223 | 0.5227 | 0.5226 | 0.5226 | 0.5229 | 0.5228 | 0.5231 | 0.5231 | | | | |
| 24 | 0.5234 | 0.5231 | 0.5232 | 0.5233 | 0.5231 | 0.5235 | 0.5234 | 0.5233 | 0.5236 | 0.5235 | 0.5239 | 0.5238 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5246 | 0.5243 | 0.5244 | 0.5246 | 0.5243 | 0.5247 | 0.5246 | 0.5246 | 0.5248 | 0.5247 | 0.5251 | 0.5250 | | | | |
| Med. | 0.5249 | 0.5246 | 0.5246 | 0.5247 | 0.5244 | 0.5248 | 0.5247 | 0.5247 | 0.5250 | 0.5249 | 0.5253 | 0.5251 | | | | |
| σ | 0.0028 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | 0.0028 | 0.0029 | 0.0029 | | | | |
| Min. | 0.5170 | 0.5166 | 0.5166 | 0.5168 | 0.5166 | 0.5170 | 0.5169 | 0.5169 | 0.5172 | 0.5171 | 0.5175 | 0.5173 | | | | |
| Max. | 0.5289 | 0.5288 | 0.5289 | 0.5290 | 0.5287 | 0.5292 | 0.5291 | 0.5291 | 0.5293 | 0.5292 | 0.5295 | 0.5295 | | | | |

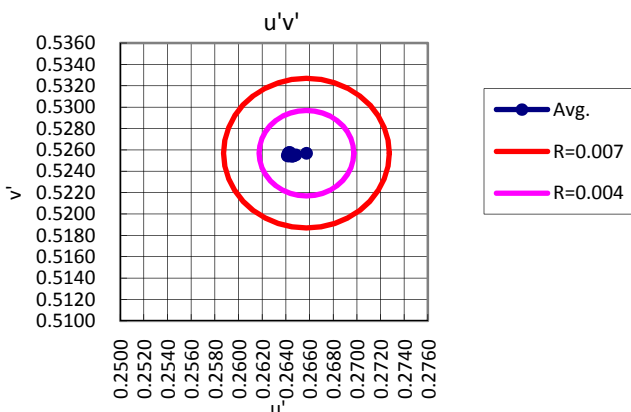
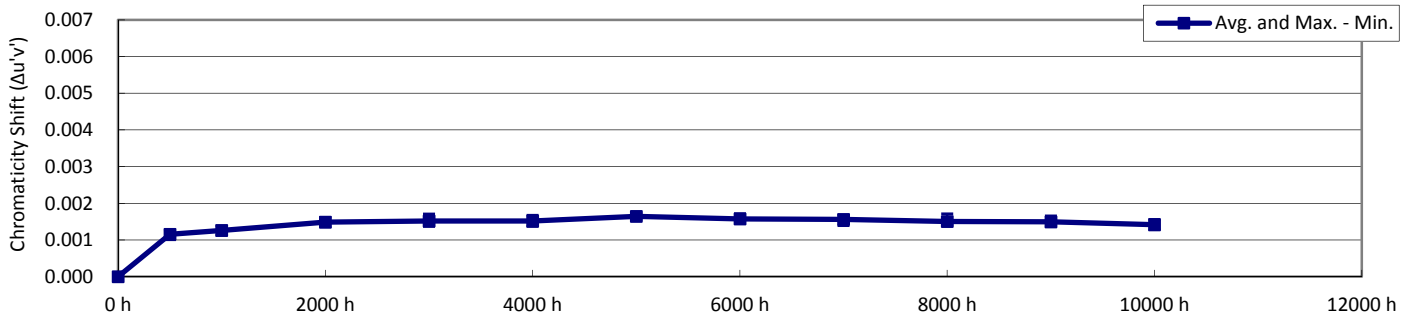
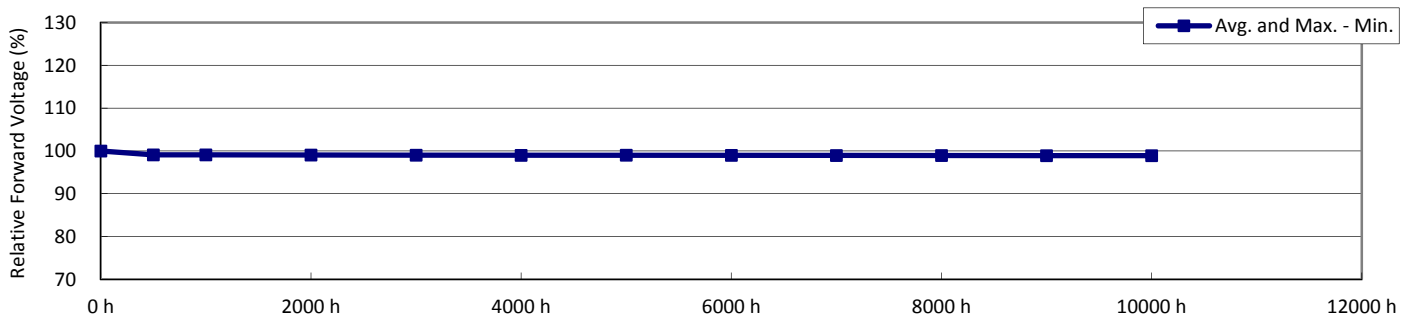
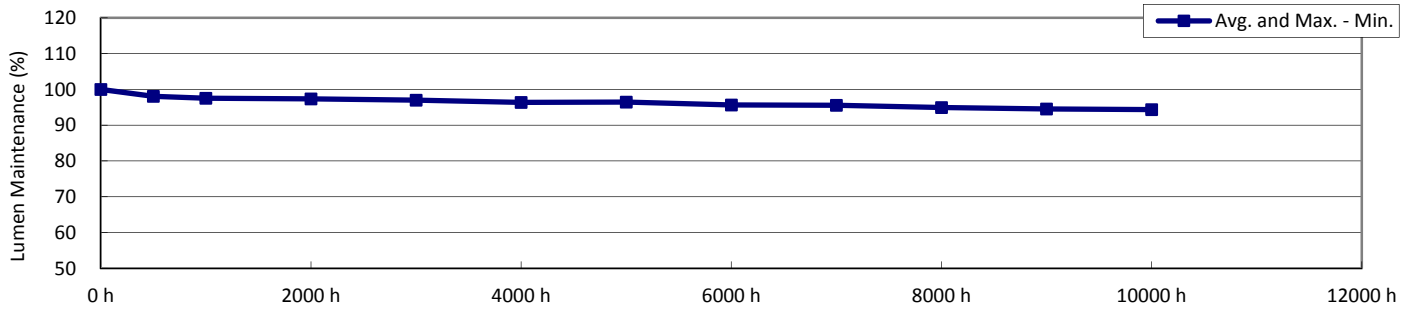
*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 6 : 105 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 105.7 °C |
| Actual Ambient Temperature [T _A] | 102.3 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0



Data Set 6 : 105 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.7 °C |
| Actual Ambient Temperature [T _A] | 102.3 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 6-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 246 | 2.98 | 2589 | 2.09 | 0.469 | 0.412 | 0.268 | 0.529 | | | | |
| 2 | 249 | 2.97 | 2698 | 2.08 | 0.455 | 0.401 | 0.263 | 0.523 | | | | |
| 3 | 247 | 2.97 | 2674 | 2.08 | 0.457 | 0.403 | 0.264 | 0.524 | | | | |
| 4 | 246 | 2.98 | 2671 | 2.08 | 0.459 | 0.405 | 0.264 | 0.525 | | | | |
| 5 | 246 | 2.98 | 2646 | 2.08 | 0.461 | 0.405 | 0.266 | 0.525 | | | | |
| 6 | 246 | 2.97 | 2627 | 2.08 | 0.461 | 0.403 | 0.267 | 0.524 | | | | |
| 7 | 248 | 2.97 | 2652 | 2.08 | 0.460 | 0.405 | 0.265 | 0.525 | | | | |
| 8 | 248 | 2.97 | 2654 | 2.08 | 0.460 | 0.404 | 0.265 | 0.525 | | | | |
| 9 | 248 | 2.97 | 2631 | 2.08 | 0.462 | 0.405 | 0.266 | 0.525 | | | | |
| 10 | 247 | 2.97 | 2591 | 2.08 | 0.467 | 0.408 | 0.268 | 0.527 | | | | |
| 11 | 250 | 2.97 | 2659 | 2.08 | 0.460 | 0.405 | 0.265 | 0.525 | | | | |
| 12 | 251 | 2.97 | 2688 | 2.08 | 0.457 | 0.404 | 0.264 | 0.524 | | | | |
| 13 | 250 | 2.97 | 2661 | 2.08 | 0.459 | 0.404 | 0.265 | 0.525 | | | | |
| 14 | 250 | 2.97 | 2662 | 2.08 | 0.460 | 0.405 | 0.265 | 0.525 | | | | |
| 15 | 249 | 2.97 | 2661 | 2.08 | 0.460 | 0.406 | 0.265 | 0.525 | | | | |
| 16 | 246 | 2.97 | 2621 | 2.08 | 0.463 | 0.407 | 0.267 | 0.526 | | | | |
| 17 | 249 | 2.98 | 2628 | 2.08 | 0.463 | 0.408 | 0.266 | 0.527 | | | | |
| 18 | 249 | 2.97 | 2621 | 2.08 | 0.465 | 0.409 | 0.266 | 0.528 | | | | |
| 19 | 248 | 2.97 | 2603 | 2.08 | 0.465 | 0.408 | 0.267 | 0.527 | | | | |
| 20 | 246 | 2.97 | 2601 | 2.08 | 0.464 | 0.406 | 0.268 | 0.526 | | | | |
| 21 | 246 | 2.98 | 2625 | 2.08 | 0.462 | 0.405 | 0.266 | 0.526 | | | | |
| 22 | 245 | 2.98 | 2605 | 2.09 | 0.465 | 0.408 | 0.267 | 0.527 | | | | |
| 23 | 246 | 2.98 | 2631 | 2.09 | 0.463 | 0.407 | 0.266 | 0.526 | | | | |
| 24 | 250 | 2.98 | 2675 | 2.08 | 0.458 | 0.404 | 0.264 | 0.525 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 248 | 2.97 | 2641 | 2.08 | 0.461 | 0.406 | 0.266 | 0.526 | | | | |
| Med. | 248 | 2.97 | 2638 | 2.08 | 0.461 | 0.405 | 0.266 | 0.525 | | | | |
| σ | 1.6 | 0.003 | 30.6 | 0.002 | 0.0034 | 0.0024 | 0.0013 | 0.0014 | | | | |
| Min. | 245 | 2.97 | 2589 | 2.08 | 0.455 | 0.401 | 0.263 | 0.523 | | | | |
| Max. | 251 | 2.98 | 2698 | 2.09 | 0.469 | 0.412 | 0.268 | 0.529 | | | | |

Data Set 6 : 105 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.7 °C |
| Actual Ambient Temperature [T _A] | 102.3 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 6-2
Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.1 | 97.6 | 97.5 | 96.9 | 96.6 | 96.5 | 95.9 | 95.7 | 95.1 | 94.8 | 94.6 | | | | |
| 2 | 100.0 | 97.8 | 97.3 | 97.1 | 96.8 | 96.3 | 96.2 | 95.6 | 95.5 | 94.9 | 94.6 | 94.4 | | | | |
| 3 | 100.0 | 98.4 | 97.8 | 98.0 | 97.3 | 96.8 | 96.7 | 96.0 | 95.7 | 95.1 | 94.7 | 94.3 | | | | |
| 4 | 100.0 | 97.4 | 96.9 | 96.6 | 96.2 | 95.6 | 95.6 | 95.0 | 94.8 | 94.2 | 93.9 | 93.6 | | | | |
| 5 | 100.0 | 97.6 | 97.1 | 96.9 | 96.5 | 95.9 | 95.9 | 95.3 | 95.1 | 94.5 | 94.2 | 93.9 | | | | |
| 6 | 100.0 | 98.3 | 98.0 | 97.6 | 97.3 | 96.9 | 96.7 | 95.9 | 95.8 | 95.0 | 94.7 | 94.3 | | | | |
| 7 | 100.0 | 97.8 | 97.3 | 97.0 | 96.6 | 96.1 | 96.1 | 95.4 | 95.4 | 94.8 | 94.5 | 94.3 | | | | |
| 8 | 100.0 | 97.8 | 97.2 | 97.2 | 96.8 | 96.2 | 96.3 | 95.7 | 95.6 | 94.9 | 94.6 | 94.5 | | | | |
| 9 | 100.0 | 98.8 | 98.3 | 97.9 | 97.4 | 96.7 | 97.0 | 96.2 | 96.0 | 95.4 | 94.8 | 94.6 | | | | |
| 10 | 100.0 | 98.0 | 97.4 | 97.2 | 96.7 | 96.2 | 96.2 | 95.5 | 95.3 | 94.8 | 94.5 | 94.5 | | | | |
| 11 | 100.0 | 98.1 | 97.5 | 97.4 | 97.0 | 96.5 | 96.5 | 95.9 | 95.7 | 95.1 | 94.9 | 94.8 | | | | |
| 12 | 100.0 | 99.0 | 98.3 | 98.1 | 97.9 | 97.1 | 97.2 | 96.4 | 96.2 | 95.6 | 95.1 | 94.9 | | | | |
| 13 | 100.0 | 98.2 | 97.6 | 97.4 | 97.2 | 96.5 | 96.6 | 95.9 | 95.7 | 95.2 | 94.9 | 94.7 | | | | |
| 14 | 100.0 | 98.3 | 97.7 | 97.6 | 97.2 | 96.5 | 96.7 | 95.9 | 95.8 | 95.2 | 94.9 | 94.8 | | | | |
| 15 | 100.0 | 98.5 | 97.8 | 97.7 | 97.7 | 96.9 | 96.8 | 95.9 | 95.8 | 95.0 | 94.6 | 94.4 | | | | |
| 16 | 100.0 | 97.6 | 97.1 | 96.9 | 96.6 | 96.0 | 96.0 | 95.2 | 95.2 | 94.6 | 94.2 | 94.1 | | | | |
| 17 | 100.0 | 98.2 | 97.6 | 97.4 | 97.1 | 96.6 | 96.6 | 95.8 | 95.8 | 95.2 | 94.9 | 94.7 | | | | |
| 18 | 100.0 | 98.5 | 97.9 | 97.6 | 97.4 | 96.8 | 96.8 | 95.9 | 95.7 | 95.2 | 94.6 | 94.5 | | | | |
| 19 | 100.0 | 97.9 | 97.4 | 97.4 | 96.8 | 96.2 | 96.5 | 95.6 | 95.4 | 94.9 | 94.5 | 94.5 | | | | |
| 20 | 100.0 | 97.8 | 97.2 | 97.3 | 96.7 | 96.1 | 96.3 | 95.5 | 95.3 | 94.8 | 94.4 | 94.3 | | | | |
| 21 | 100.0 | 98.1 | 97.7 | 97.5 | 97.1 | 96.3 | 96.7 | 95.5 | 95.4 | 94.8 | 94.1 | 94.0 | | | | |
| 22 | 100.0 | 97.6 | 97.0 | 97.0 | 96.5 | 95.8 | 96.0 | 95.0 | 95.0 | 94.3 | 94.0 | 93.8 | | | | |
| 23 | 100.0 | 97.5 | 97.0 | 96.9 | 96.4 | 95.8 | 96.0 | 95.1 | 95.1 | 94.5 | 94.1 | 93.9 | | | | |
| 24 | 100.0 | 98.4 | 97.8 | 97.8 | 97.5 | 96.6 | 96.9 | 95.8 | 95.8 | 95.0 | 94.4 | 94.4 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.1 | 97.5 | 97.4 | 97.0 | 96.4 | 96.5 | 95.7 | 95.5 | 94.9 | 94.5 | 94.4 | | | | |
| Med. | 100.0 | 98.1 | 97.5 | 97.4 | 97.0 | 96.4 | 96.5 | 95.7 | 95.6 | 95.0 | 94.6 | 94.4 | | | | |
| σ | 0.00 | 0.40 | 0.39 | 0.38 | 0.43 | 0.39 | 0.38 | 0.37 | 0.34 | 0.33 | 0.33 | 0.34 | | | | |
| Min. | 100.0 | 97.4 | 96.9 | 96.6 | 96.2 | 95.6 | 95.6 | 95.0 | 94.8 | 94.2 | 93.9 | 93.6 | | | | |
| Max. | 100.0 | 99.0 | 98.3 | 98.1 | 97.9 | 97.1 | 97.2 | 96.4 | 96.2 | 95.6 | 95.1 | 94.9 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0361 | -0.0443 | -0.0456 | -0.0521 | -0.0562 | -0.0580 | | | | | | | | | | |

| Test duration used | 5000 h | to | 10000 h |
|----------------------------------|---------|-------|----------|
| B | | | 0.984 |
| α | | | 4.32E-06 |
| R ² | | | 0.962 |
| Calculated L ₇₀ (10K) | 78700 | hours | |
| Reported L ₇₀ (10K) | > 60000 | hours | |
| Calculated L ₈₀ (10K) | 47900 | hours | |
| Reported L ₈₀ (10K) | 47900 | hours | |
| Calculated L ₉₀ (10K) | 20600 | hours | |
| Reported L ₉₀ (10K) | 20600 | hours | |

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

The certificate shall not be reproduced, except in full, without written approval of the laboratory.
The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 6 : 105 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.7 °C |
| Actual Ambient Temperature [T _A] | 102.3 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
Number of LED failures: 0

TABLE 6-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 99.1 | 99.0 | 98.9 | 99.0 | 98.9 | 99.0 | | | | |
| 2 | 100.0 | 99.2 | 99.0 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | | | | |
| 3 | 100.0 | 98.8 | 98.9 | 98.8 | 98.9 | 98.7 | 98.8 | 98.7 | 98.8 | 98.7 | 98.8 | 98.7 | | | | |
| 4 | 100.0 | 98.7 | 98.7 | 98.6 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.4 | 98.4 | | | | |
| 5 | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.7 | 98.7 | 99.0 | 98.7 | 98.7 | 98.7 | 98.6 | | | | |
| 6 | 100.0 | 99.0 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | | | | |
| 7 | 100.0 | 99.1 | 99.0 | 99.0 | 99.0 | 98.9 | 98.9 | 99.0 | 99.0 | 98.9 | 98.8 | 98.8 | | | | |
| 8 | 100.0 | 99.1 | 99.1 | 99.1 | 98.9 | 99.0 | 99.0 | 99.0 | 98.8 | 99.0 | 98.9 | 98.9 | | | | |
| 9 | 100.0 | 99.2 | 99.2 | 99.3 | 99.3 | 99.2 | 99.2 | 99.1 | 99.3 | 99.1 | 99.1 | 99.1 | | | | |
| 10 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | 99.2 | 99.1 | 99.1 | | | | |
| 11 | 100.0 | 99.4 | 99.2 | 99.3 | 99.2 | 99.1 | 99.2 | 99.1 | 99.2 | 99.1 | 99.2 | 99.1 | | | | |
| 12 | 100.0 | 99.1 | 99.2 | 99.1 | 99.1 | 99.2 | 99.1 | 99.1 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 13 | 100.0 | 99.0 | 99.2 | 99.2 | 99.1 | 99.1 | 99.1 | 99.1 | 98.9 | 99.1 | 99.1 | 99.1 | | | | |
| 14 | 100.0 | 98.9 | 99.1 | 99.2 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | | | | |
| 15 | 100.0 | 99.1 | 99.1 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 98.9 | 99.0 | 98.9 | | | | |
| 16 | 100.0 | 99.2 | 99.2 | 99.1 | 99.0 | 99.0 | 99.0 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | | | | |
| 17 | 100.0 | 99.3 | 99.1 | 99.0 | 99.2 | 99.1 | 99.0 | 98.9 | 99.2 | 99.1 | 99.0 | 99.0 | | | | |
| 18 | 100.0 | 99.1 | 99.2 | 99.2 | 99.1 | 99.1 | 99.2 | 99.1 | 99.1 | 99.1 | 99.0 | 99.1 | | | | |
| 19 | 100.0 | 99.3 | 99.2 | 99.1 | 99.1 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | 99.1 | 99.1 | | | | |
| 20 | 100.0 | 99.2 | 99.1 | 99.2 | 99.2 | 99.0 | 99.2 | 99.1 | 99.1 | 99.0 | 98.9 | 99.0 | | | | |
| 21 | 100.0 | 98.9 | 99.0 | 98.9 | 98.8 | 98.8 | 98.8 | 98.7 | 98.8 | 98.8 | 98.7 | 98.7 | | | | |
| 22 | 100.0 | 98.9 | 98.8 | 98.7 | 98.8 | 98.5 | 98.8 | 98.7 | 98.7 | 98.6 | 98.6 | 98.6 | | | | |
| 23 | 100.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.7 | 98.7 | | | | |
| 24 | 100.0 | 99.2 | 99.1 | 99.1 | 99.1 | 99.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 99.1 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | | | | |
| Med. | 100.0 | 99.1 | 99.1 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | | | | |
| σ | 0.00 | 0.17 | 0.14 | 0.18 | 0.18 | 0.21 | 0.18 | 0.16 | 0.18 | 0.19 | 0.18 | 0.19 | | | | |
| Min. | 100.0 | 98.7 | 98.7 | 98.6 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.4 | 98.4 | | | | |
| Max. | 100.0 | 99.4 | 99.3 | 99.3 | 99.3 | 99.3 | 99.2 | 99.2 | 99.3 | 99.2 | 99.2 | 99.1 | | | | |



Data Set 6 : 105 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.7 °C |
| Actual Ambient Temperature [T _A] | 102.3 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 6-4
 Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0012 | 0.0013 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | 0.0013 | | | | |
| 2 | 0.0000 | 0.0011 | 0.0011 | 0.0015 | 0.0014 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | 0.0013 | | | | |
| 3 | 0.0000 | 0.0011 | 0.0012 | 0.0014 | 0.0015 | 0.0014 | 0.0016 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0014 | | | | |
| 4 | 0.0000 | 0.0011 | 0.0013 | 0.0015 | 0.0016 | 0.0015 | 0.0017 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0014 | | | | |
| 5 | 0.0000 | 0.0012 | 0.0013 | 0.0015 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0015 | | | | |
| 6 | 0.0000 | 0.0011 | 0.0012 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | | | | |
| 7 | 0.0000 | 0.0011 | 0.0012 | 0.0014 | 0.0015 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | | | | |
| 8 | 0.0000 | 0.0012 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | 0.0016 | 0.0015 | | | | |
| 9 | 0.0000 | 0.0012 | 0.0014 | 0.0016 | 0.0016 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | 0.0016 | 0.0015 | | | | |
| 10 | 0.0000 | 0.0012 | 0.0013 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0014 | 0.0015 | 0.0014 | | | | |
| 11 | 0.0000 | 0.0012 | 0.0012 | 0.0016 | 0.0016 | 0.0015 | 0.0017 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | | | | |
| 12 | 0.0000 | 0.0012 | 0.0012 | 0.0014 | 0.0015 | 0.0015 | 0.0017 | 0.0014 | 0.0015 | 0.0014 | 0.0014 | 0.0013 | | | | |
| 13 | 0.0000 | 0.0010 | 0.0012 | 0.0014 | 0.0014 | 0.0014 | 0.0016 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0013 | | | | |
| 14 | 0.0000 | 0.0012 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0016 | 0.0016 | 0.0015 | 0.0016 | 0.0014 | | | | |
| 15 | 0.0000 | 0.0011 | 0.0012 | 0.0014 | 0.0014 | 0.0014 | 0.0016 | 0.0014 | 0.0015 | 0.0014 | 0.0014 | 0.0013 | | | | |
| 16 | 0.0000 | 0.0011 | 0.0012 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0016 | 0.0014 | 0.0015 | 0.0014 | | | | |
| 17 | 0.0000 | 0.0011 | 0.0013 | 0.0016 | 0.0015 | 0.0016 | 0.0017 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0015 | | | | |
| 18 | 0.0000 | 0.0012 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | 0.0015 | | | | |
| 19 | 0.0000 | 0.0012 | 0.0013 | 0.0016 | 0.0016 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0013 | | | | |
| 20 | 0.0000 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | | | | |
| 21 | 0.0000 | 0.0012 | 0.0012 | 0.0014 | 0.0016 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0015 | | | | |
| 22 | 0.0000 | 0.0011 | 0.0012 | 0.0014 | 0.0014 | 0.0014 | 0.0017 | 0.0015 | 0.0015 | 0.0014 | 0.0015 | 0.0014 | | | | |
| 23 | 0.0000 | 0.0012 | 0.0012 | 0.0015 | 0.0014 | 0.0015 | 0.0017 | 0.0015 | 0.0016 | 0.0014 | 0.0015 | 0.0015 | | | | |
| 24 | 0.0000 | 0.0012 | 0.0013 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0016 | 0.0016 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0012 | 0.0013 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | | | | |
| Med. | 0.0000 | 0.0012 | 0.0013 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | |
| Min. | 0.0000 | 0.0010 | 0.0011 | 0.0014 | 0.0014 | 0.0014 | 0.0016 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0013 | | | | |
| Max. | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | | | | |



Data Set 6 : 105 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 105.7 °C |
| Actual Ambient Temperature [T _A] | 102.3 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 6-5
 Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2681 | 0.2669 | 0.2668 | 0.2666 | 0.2666 | 0.2665 | 0.2665 | 0.2665 | 0.2666 | 0.2666 | 0.2667 | 0.2669 | | | | |
| 2 | 0.2639 | 0.2628 | 0.2628 | 0.2624 | 0.2625 | 0.2625 | 0.2623 | 0.2623 | 0.2623 | 0.2624 | 0.2623 | 0.2625 | | | | |
| 3 | 0.2646 | 0.2636 | 0.2635 | 0.2633 | 0.2632 | 0.2633 | 0.2630 | 0.2631 | 0.2632 | 0.2632 | 0.2631 | 0.2633 | | | | |
| 4 | 0.2647 | 0.2636 | 0.2634 | 0.2632 | 0.2631 | 0.2632 | 0.2630 | 0.2631 | 0.2631 | 0.2631 | 0.2632 | 0.2632 | | | | |
| 5 | 0.2658 | 0.2647 | 0.2646 | 0.2643 | 0.2642 | 0.2642 | 0.2642 | 0.2641 | 0.2642 | 0.2642 | 0.2642 | 0.2643 | | | | |
| 6 | 0.2668 | 0.2657 | 0.2656 | 0.2654 | 0.2653 | 0.2653 | 0.2652 | 0.2652 | 0.2652 | 0.2653 | 0.2653 | 0.2654 | | | | |
| 7 | 0.2655 | 0.2645 | 0.2643 | 0.2641 | 0.2640 | 0.2641 | 0.2640 | 0.2639 | 0.2640 | 0.2640 | 0.2640 | 0.2642 | | | | |
| 8 | 0.2655 | 0.2644 | 0.2642 | 0.2640 | 0.2640 | 0.2639 | 0.2638 | 0.2639 | 0.2639 | 0.2639 | 0.2639 | 0.2641 | | | | |
| 9 | 0.2665 | 0.2654 | 0.2652 | 0.2650 | 0.2650 | 0.2650 | 0.2648 | 0.2648 | 0.2649 | 0.2650 | 0.2650 | 0.2650 | | | | |
| 10 | 0.2682 | 0.2670 | 0.2670 | 0.2668 | 0.2668 | 0.2667 | 0.2666 | 0.2666 | 0.2667 | 0.2668 | 0.2668 | 0.2668 | | | | |
| 11 | 0.2652 | 0.2640 | 0.2640 | 0.2637 | 0.2637 | 0.2637 | 0.2636 | 0.2637 | 0.2636 | 0.2638 | 0.2638 | 0.2639 | | | | |
| 12 | 0.2638 | 0.2626 | 0.2626 | 0.2624 | 0.2623 | 0.2623 | 0.2621 | 0.2624 | 0.2623 | 0.2624 | 0.2624 | 0.2625 | | | | |
| 13 | 0.2651 | 0.2641 | 0.2639 | 0.2637 | 0.2637 | 0.2637 | 0.2635 | 0.2636 | 0.2637 | 0.2636 | 0.2637 | 0.2638 | | | | |
| 14 | 0.2651 | 0.2639 | 0.2638 | 0.2636 | 0.2635 | 0.2635 | 0.2634 | 0.2634 | 0.2635 | 0.2636 | 0.2635 | 0.2637 | | | | |
| 15 | 0.2650 | 0.2640 | 0.2638 | 0.2637 | 0.2636 | 0.2636 | 0.2635 | 0.2636 | 0.2636 | 0.2636 | 0.2636 | 0.2637 | | | | |
| 16 | 0.2669 | 0.2658 | 0.2658 | 0.2654 | 0.2654 | 0.2653 | 0.2652 | 0.2653 | 0.2654 | 0.2654 | 0.2654 | 0.2654 | | | | |
| 17 | 0.2665 | 0.2654 | 0.2652 | 0.2649 | 0.2649 | 0.2649 | 0.2648 | 0.2649 | 0.2649 | 0.2650 | 0.2650 | 0.2649 | | | | |
| 18 | 0.2666 | 0.2654 | 0.2654 | 0.2652 | 0.2651 | 0.2650 | 0.2650 | 0.2650 | 0.2651 | 0.2650 | 0.2652 | 0.2651 | | | | |
| 19 | 0.2676 | 0.2665 | 0.2664 | 0.2661 | 0.2661 | 0.2661 | 0.2660 | 0.2661 | 0.2661 | 0.2662 | 0.2662 | 0.2663 | | | | |
| 20 | 0.2679 | 0.2667 | 0.2666 | 0.2664 | 0.2664 | 0.2663 | 0.2663 | 0.2663 | 0.2664 | 0.2664 | 0.2664 | 0.2664 | | | | |
| 21 | 0.2667 | 0.2655 | 0.2655 | 0.2653 | 0.2651 | 0.2652 | 0.2651 | 0.2650 | 0.2651 | 0.2651 | 0.2652 | 0.2651 | | | | |
| 22 | 0.2676 | 0.2665 | 0.2664 | 0.2661 | 0.2662 | 0.2661 | 0.2659 | 0.2661 | 0.2661 | 0.2662 | 0.2661 | 0.2662 | | | | |
| 23 | 0.2663 | 0.2652 | 0.2651 | 0.2649 | 0.2650 | 0.2648 | 0.2647 | 0.2649 | 0.2648 | 0.2649 | 0.2648 | 0.2649 | | | | |
| 24 | 0.2645 | 0.2633 | 0.2632 | 0.2629 | 0.2629 | 0.2629 | 0.2629 | 0.2628 | 0.2629 | 0.2628 | 0.2629 | 0.2629 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2660 | 0.2649 | 0.2648 | 0.2645 | 0.2645 | 0.2645 | 0.2644 | 0.2644 | 0.2645 | 0.2645 | 0.2645 | 0.2646 | | | | |
| Med. | 0.2661 | 0.2650 | 0.2649 | 0.2646 | 0.2646 | 0.2645 | 0.2644 | 0.2645 | 0.2645 | 0.2645 | 0.2645 | 0.2646 | | | | |
| σ | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | | | | |
| Min. | 0.2638 | 0.2626 | 0.2626 | 0.2624 | 0.2623 | 0.2623 | 0.2621 | 0.2623 | 0.2623 | 0.2624 | 0.2623 | 0.2625 | | | | |
| Max. | 0.2682 | 0.2670 | 0.2670 | 0.2668 | 0.2668 | 0.2667 | 0.2666 | 0.2666 | 0.2667 | 0.2668 | 0.2668 | 0.2669 | | | | |

Data Set 6 : 105 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.7 °C |
| Actual Ambient Temperature [T _A] | 102.3 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 6-6

Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5290 | 0.5289 | 0.5289 | 0.5290 | 0.5291 | 0.5291 | 0.5291 | 0.5293 | 0.5290 | 0.5293 | 0.5293 | 0.5294 | | | | |
| 2 | 0.5225 | 0.5223 | 0.5222 | 0.5223 | 0.5223 | 0.5223 | 0.5223 | 0.5224 | 0.5222 | 0.5225 | 0.5225 | 0.5226 | | | | |
| 3 | 0.5232 | 0.5229 | 0.5230 | 0.5231 | 0.5230 | 0.5230 | 0.5230 | 0.5232 | 0.5230 | 0.5232 | 0.5234 | 0.5233 | | | | |
| 4 | 0.5248 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | 0.5246 | 0.5246 | 0.5247 | 0.5245 | 0.5249 | 0.5248 | 0.5248 | | | | |
| 5 | 0.5251 | 0.5247 | 0.5247 | 0.5247 | 0.5248 | 0.5248 | 0.5248 | 0.5249 | 0.5248 | 0.5250 | 0.5250 | 0.5250 | | | | |
| 6 | 0.5238 | 0.5235 | 0.5236 | 0.5236 | 0.5235 | 0.5235 | 0.5235 | 0.5237 | 0.5235 | 0.5237 | 0.5238 | 0.5238 | | | | |
| 7 | 0.5249 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5246 | 0.5248 | 0.5246 | 0.5248 | 0.5249 | 0.5249 | | | | |
| 8 | 0.5246 | 0.5244 | 0.5243 | 0.5244 | 0.5243 | 0.5244 | 0.5243 | 0.5245 | 0.5243 | 0.5246 | 0.5245 | 0.5246 | | | | |
| 9 | 0.5248 | 0.5246 | 0.5245 | 0.5246 | 0.5246 | 0.5246 | 0.5245 | 0.5247 | 0.5245 | 0.5247 | 0.5248 | 0.5247 | | | | |
| 10 | 0.5272 | 0.5270 | 0.5269 | 0.5269 | 0.5269 | 0.5270 | 0.5270 | 0.5272 | 0.5269 | 0.5273 | 0.5274 | 0.5273 | | | | |
| 11 | 0.5250 | 0.5248 | 0.5247 | 0.5248 | 0.5248 | 0.5249 | 0.5248 | 0.5250 | 0.5248 | 0.5252 | 0.5252 | 0.5252 | | | | |
| 12 | 0.5237 | 0.5236 | 0.5235 | 0.5234 | 0.5235 | 0.5235 | 0.5234 | 0.5236 | 0.5234 | 0.5237 | 0.5237 | 0.5238 | | | | |
| 13 | 0.5243 | 0.5241 | 0.5241 | 0.5241 | 0.5242 | 0.5241 | 0.5241 | 0.5243 | 0.5240 | 0.5243 | 0.5243 | 0.5244 | | | | |
| 14 | 0.5250 | 0.5246 | 0.5246 | 0.5247 | 0.5247 | 0.5247 | 0.5247 | 0.5249 | 0.5246 | 0.5249 | 0.5250 | 0.5249 | | | | |
| 15 | 0.5247 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | 0.5245 | 0.5247 | 0.5244 | 0.5248 | 0.5248 | 0.5248 | | | | |
| 16 | 0.5260 | 0.5257 | 0.5256 | 0.5258 | 0.5257 | 0.5258 | 0.5257 | 0.5258 | 0.5256 | 0.5259 | 0.5260 | 0.5261 | | | | |
| 17 | 0.5264 | 0.5261 | 0.5261 | 0.5261 | 0.5262 | 0.5262 | 0.5262 | 0.5264 | 0.5262 | 0.5265 | 0.5265 | 0.5264 | | | | |
| 18 | 0.5270 | 0.5268 | 0.5267 | 0.5268 | 0.5268 | 0.5269 | 0.5268 | 0.5270 | 0.5268 | 0.5271 | 0.5270 | 0.5271 | | | | |
| 19 | 0.5268 | 0.5265 | 0.5265 | 0.5266 | 0.5265 | 0.5266 | 0.5266 | 0.5267 | 0.5265 | 0.5269 | 0.5268 | 0.5269 | | | | |
| 20 | 0.5258 | 0.5255 | 0.5255 | 0.5256 | 0.5255 | 0.5256 | 0.5256 | 0.5258 | 0.5255 | 0.5259 | 0.5258 | 0.5259 | | | | |
| 21 | 0.5251 | 0.5249 | 0.5247 | 0.5249 | 0.5248 | 0.5249 | 0.5249 | 0.5251 | 0.5248 | 0.5251 | 0.5251 | 0.5252 | | | | |
| 22 | 0.5268 | 0.5265 | 0.5266 | 0.5266 | 0.5267 | 0.5267 | 0.5267 | 0.5269 | 0.5267 | 0.5270 | 0.5270 | 0.5270 | | | | |
| 23 | 0.5259 | 0.5256 | 0.5255 | 0.5256 | 0.5256 | 0.5256 | 0.5258 | 0.5258 | 0.5256 | 0.5260 | 0.5260 | 0.5260 | | | | |
| 24 | 0.5239 | 0.5237 | 0.5236 | 0.5237 | 0.5236 | 0.5237 | 0.5237 | 0.5238 | 0.5236 | 0.5239 | 0.5239 | 0.5240 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5253 | 0.5250 | 0.5250 | 0.5250 | 0.5250 | 0.5251 | 0.5250 | 0.5252 | 0.5250 | 0.5253 | 0.5253 | 0.5253 | | | | |
| Med. | 0.5250 | 0.5247 | 0.5247 | 0.5247 | 0.5247 | 0.5248 | 0.5247 | 0.5249 | 0.5247 | 0.5250 | 0.5250 | 0.5250 | | | | |
| σ | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | | | | |
| Min. | 0.5225 | 0.5223 | 0.5222 | 0.5223 | 0.5223 | 0.5223 | 0.5223 | 0.5224 | 0.5222 | 0.5225 | 0.5225 | 0.5226 | | | | |
| Max. | 0.5290 | 0.5289 | 0.5289 | 0.5290 | 0.5291 | 0.5291 | 0.5291 | 0.5293 | 0.5290 | 0.5293 | 0.5293 | 0.5294 | | | | |

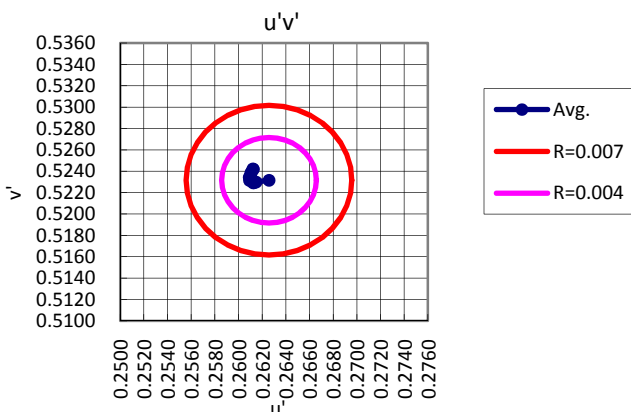
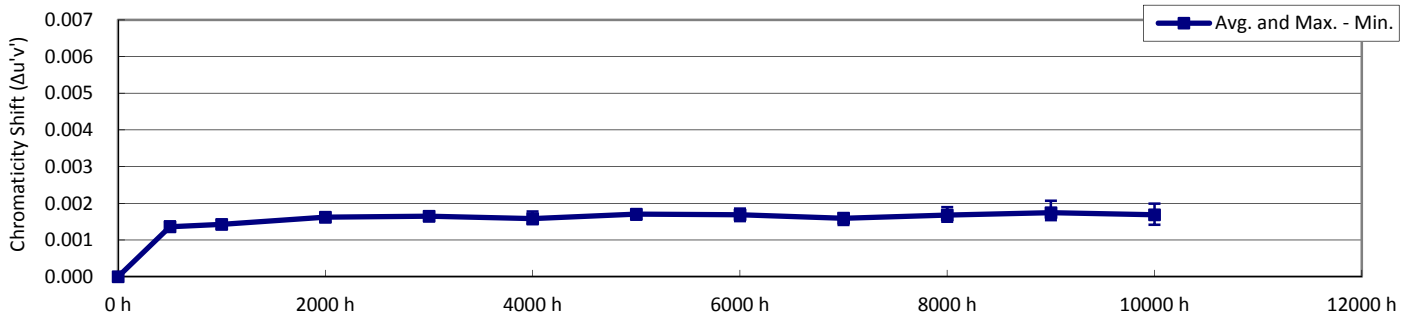
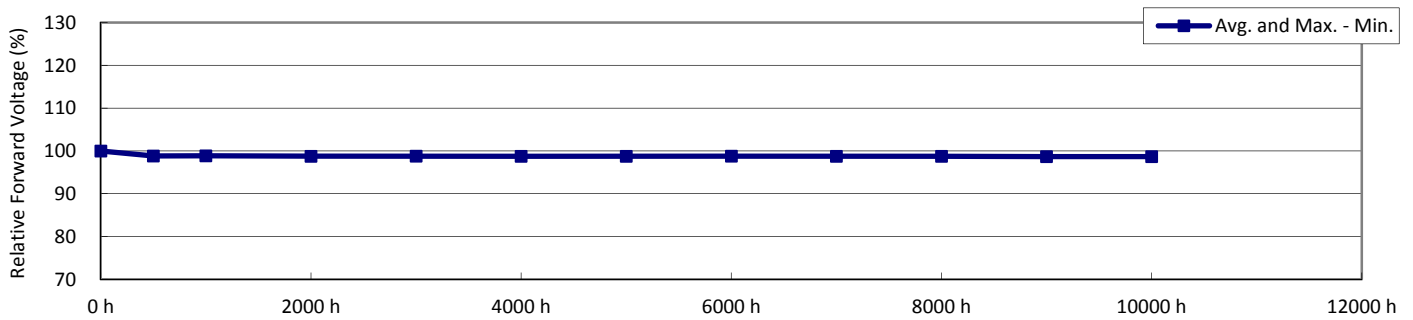
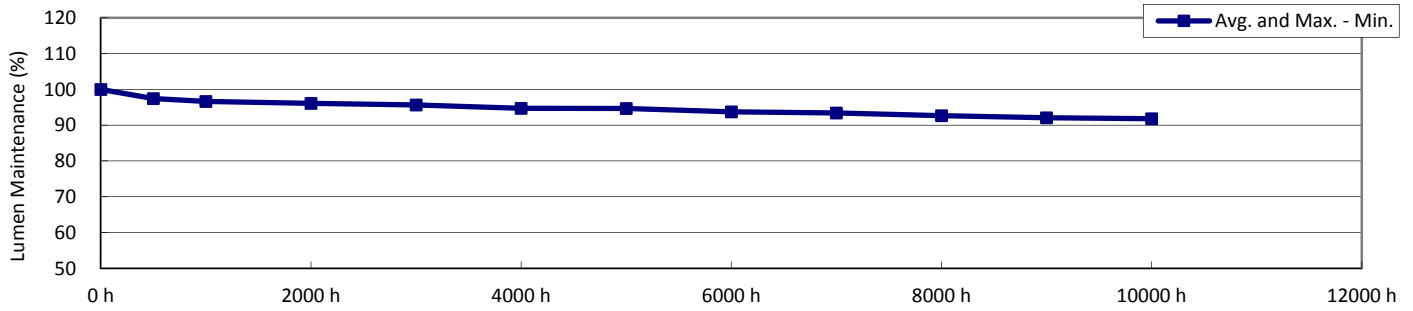


Data Set 7 : 105 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 105.8 °C |
| Actual Ambient Temperature [T _A] | 103.1 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0



The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 7 : 105 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.8 °C |
| Actual Ambient Temperature [T _A] | 103.1 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 7-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 394 | 3.13 | 2634 | 3.76 | 0.463 | 0.407 | 0.266 | 0.526 | | | | |
| 2 | 395 | 3.13 | 2664 | 3.75 | 0.458 | 0.402 | 0.265 | 0.524 | | | | |
| 3 | 395 | 3.13 | 2642 | 3.75 | 0.460 | 0.404 | 0.266 | 0.525 | | | | |
| 4 | 402 | 3.12 | 2754 | 3.75 | 0.451 | 0.401 | 0.261 | 0.522 | | | | |
| 5 | 399 | 3.12 | 2735 | 3.75 | 0.451 | 0.399 | 0.262 | 0.522 | | | | |
| 6 | 402 | 3.12 | 2760 | 3.74 | 0.451 | 0.401 | 0.261 | 0.522 | | | | |
| 7 | 400 | 3.12 | 2745 | 3.75 | 0.452 | 0.402 | 0.261 | 0.523 | | | | |
| 8 | 397 | 3.12 | 2731 | 3.74 | 0.452 | 0.401 | 0.262 | 0.523 | | | | |
| 9 | 396 | 3.13 | 2737 | 3.75 | 0.453 | 0.402 | 0.262 | 0.523 | | | | |
| 10 | 390 | 3.14 | 2678 | 3.76 | 0.458 | 0.404 | 0.264 | 0.524 | | | | |
| 11 | 390 | 3.13 | 2639 | 3.75 | 0.462 | 0.406 | 0.266 | 0.526 | | | | |
| 12 | 392 | 3.12 | 2665 | 3.75 | 0.460 | 0.407 | 0.264 | 0.526 | | | | |
| 13 | 392 | 3.13 | 2695 | 3.76 | 0.457 | 0.405 | 0.263 | 0.525 | | | | |
| 14 | 402 | 3.13 | 2752 | 3.76 | 0.450 | 0.400 | 0.261 | 0.522 | | | | |
| 15 | 404 | 3.13 | 2783 | 3.75 | 0.448 | 0.399 | 0.260 | 0.521 | | | | |
| 16 | 401 | 3.13 | 2745 | 3.75 | 0.451 | 0.399 | 0.262 | 0.522 | | | | |
| 17 | 401 | 3.12 | 2748 | 3.75 | 0.450 | 0.399 | 0.261 | 0.521 | | | | |
| 18 | 401 | 3.12 | 2735 | 3.75 | 0.452 | 0.400 | 0.262 | 0.522 | | | | |
| 19 | 401 | 3.12 | 2746 | 3.75 | 0.452 | 0.401 | 0.261 | 0.522 | | | | |
| 20 | 399 | 3.12 | 2709 | 3.74 | 0.455 | 0.402 | 0.263 | 0.523 | | | | |
| 21 | 396 | 3.12 | 2696 | 3.75 | 0.457 | 0.406 | 0.263 | 0.525 | | | | |
| 22 | 395 | 3.13 | 2718 | 3.75 | 0.454 | 0.403 | 0.262 | 0.524 | | | | |
| 23 | 392 | 3.13 | 2719 | 3.76 | 0.452 | 0.399 | 0.263 | 0.522 | | | | |
| 24 | 397 | 3.13 | 2761 | 3.76 | 0.449 | 0.399 | 0.261 | 0.521 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 397 | 3.13 | 2716 | 3.75 | 0.454 | 0.402 | 0.263 | 0.523 | | | | |
| Med. | 397 | 3.13 | 2733 | 3.75 | 0.452 | 0.402 | 0.262 | 0.523 | | | | |
| σ | 4.2 | 0.005 | 42.7 | 0.006 | 0.0042 | 0.0026 | 0.0017 | 0.0016 | | | | |
| Min. | 390 | 3.12 | 2634 | 3.74 | 0.448 | 0.399 | 0.260 | 0.521 | | | | |
| Max. | 404 | 3.14 | 2783 | 3.76 | 0.463 | 0.407 | 0.266 | 0.526 | | | | |

Data Set 7 : 105 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.8 °C |
| Actual Ambient Temperature [T _A] | 103.1 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.
Number of LED failures: 0

TABLE 7-2
Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 97.5 | 96.8 | 96.2 | 96.0 | 95.0 | 95.0 | 94.1 | 93.9 | 93.3 | 92.6 | 92.5 | | | | |
| 2 | 100.0 | 97.5 | 96.7 | 96.3 | 95.7 | 94.8 | 94.9 | 94.0 | 93.8 | 93.1 | 92.6 | 92.4 | | | | |
| 3 | 100.0 | 98.1 | 97.2 | 96.9 | 96.4 | 95.2 | 95.2 | 94.3 | 94.0 | 93.3 | 92.4 | 92.5 | | | | |
| 4 | 100.0 | 97.4 | 96.6 | 96.1 | 95.6 | 94.6 | 94.5 | 93.7 | 93.5 | 92.8 | 92.2 | 91.9 | | | | |
| 5 | 100.0 | 97.3 | 96.5 | 95.9 | 95.4 | 94.4 | 94.3 | 93.5 | 93.3 | 92.6 | 92.0 | 91.8 | | | | |
| 6 | 100.0 | 98.4 | 97.3 | 96.6 | 96.2 | 95.1 | 95.1 | 94.0 | 94.0 | 92.9 | 92.3 | 92.1 | | | | |
| 7 | 100.0 | 97.1 | 96.4 | 95.8 | 95.4 | 94.4 | 94.3 | 93.4 | 93.1 | 92.4 | 92.0 | 91.6 | | | | |
| 8 | 100.0 | 97.0 | 96.4 | 95.8 | 95.2 | 94.5 | 94.4 | 93.6 | 93.1 | 92.5 | 92.1 | 91.6 | | | | |
| 9 | 100.0 | 97.9 | 96.9 | 96.2 | 95.9 | 94.7 | 94.6 | 93.7 | 93.3 | 92.6 | 91.7 | 91.4 | | | | |
| 10 | 100.0 | 96.7 | 96.0 | 95.4 | 94.8 | 93.9 | 93.8 | 92.8 | 92.4 | 91.7 | 91.1 | 90.7 | | | | |
| 11 | 100.0 | 96.8 | 96.0 | 95.5 | 95.0 | 94.1 | 94.0 | 93.1 | 92.7 | 91.9 | 91.5 | 91.2 | | | | |
| 12 | 100.0 | 97.8 | 96.7 | 96.1 | 95.7 | 94.6 | 94.6 | 93.4 | 93.0 | 92.2 | 91.4 | 91.0 | | | | |
| 13 | 100.0 | 96.9 | 96.2 | 95.6 | 95.2 | 94.3 | 94.3 | 93.3 | 92.9 | 92.2 | 91.7 | 91.4 | | | | |
| 14 | 100.0 | 97.5 | 96.5 | 96.3 | 95.9 | 95.0 | 95.2 | 94.3 | 93.9 | 93.3 | 92.9 | 92.7 | | | | |
| 15 | 100.0 | 98.3 | 97.1 | 96.6 | 96.5 | 95.5 | 95.5 | 94.4 | 94.0 | 93.2 | 92.5 | 92.3 | | | | |
| 16 | 100.0 | 97.3 | 96.7 | 96.2 | 95.6 | 94.9 | 94.8 | 94.0 | 93.7 | 92.9 | 92.4 | 92.2 | | | | |
| 17 | 100.0 | 97.3 | 96.6 | 96.1 | 95.5 | 94.7 | 94.6 | 93.8 | 93.5 | 92.7 | 92.3 | 91.9 | | | | |
| 18 | 100.0 | 97.8 | 97.1 | 96.3 | 96.0 | 95.1 | 94.9 | 93.9 | 93.6 | 92.7 | 92.0 | 91.9 | | | | |
| 19 | 100.0 | 97.3 | 96.5 | 96.0 | 95.5 | 94.6 | 94.4 | 93.7 | 93.4 | 92.5 | 92.1 | 91.7 | | | | |
| 20 | 100.0 | 97.1 | 96.2 | 95.8 | 95.2 | 94.4 | 94.2 | 93.5 | 93.1 | 92.3 | 91.9 | 91.6 | | | | |
| 21 | 100.0 | 98.1 | 96.9 | 96.5 | 96.1 | 95.0 | 95.0 | 94.0 | 93.6 | 92.8 | 92.2 | 91.8 | | | | |
| 22 | 100.0 | 97.0 | 96.4 | 95.9 | 95.4 | 94.6 | 94.5 | 93.6 | 93.2 | 92.4 | 92.0 | 91.7 | | | | |
| 23 | 100.0 | 97.0 | 96.3 | 96.0 | 95.3 | 94.5 | 94.5 | 93.5 | 93.1 | 92.3 | 91.9 | 91.7 | | | | |
| 24 | 100.0 | 97.7 | 97.1 | 96.7 | 96.5 | 95.3 | 95.3 | 94.2 | 93.9 | 93.0 | 92.3 | 92.1 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 97.5 | 96.6 | 96.1 | 95.7 | 94.7 | 94.7 | 93.7 | 93.4 | 92.6 | 92.1 | 91.8 | | | | |
| Med. | 100.0 | 97.4 | 96.6 | 96.1 | 95.6 | 94.7 | 94.6 | 93.7 | 93.4 | 92.6 | 92.1 | 91.8 | | | | |
| σ | 0.00 | 0.47 | 0.36 | 0.38 | 0.46 | 0.38 | 0.42 | 0.40 | 0.45 | 0.43 | 0.41 | 0.48 | | | | |
| Min. | 100.0 | 96.7 | 96.0 | 95.4 | 94.8 | 93.9 | 93.8 | 92.8 | 92.4 | 91.7 | 91.1 | 90.7 | | | | |
| Max. | 100.0 | 98.4 | 97.3 | 96.9 | 96.5 | 95.5 | 95.5 | 94.4 | 94.0 | 93.3 | 92.9 | 92.7 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0549 | -0.0647 | -0.0680 | -0.0763 | -0.0824 | -0.0854 | | | | | | | | | | |

| Test duration used | 5000 h | to | 10000 h |
|----------------------------------|--------|-------|----------|
| B | | | 0.974 |
| α | | | 6.11E-06 |
| R ² | | | 0.978 |
| Calculated L ₇₀ (10K) | 54100 | hours | |
| Reported L ₇₀ (10K) | 54100 | hours | |
| Calculated L ₈₀ (10K) | 32200 | hours | |
| Reported L ₈₀ (10K) | 32200 | hours | |
| Calculated L ₉₀ (10K) | 13000 | hours | |
| Reported L ₉₀ (10K) | 13000 | hours | |

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*



Data Set 7 : 105 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.8 °C |
| Actual Ambient Temperature [T _A] | 103.1 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 7-3
 Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|------|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 99.1 | 99.1 | 99.0 | 98.9 | 98.8 | 99.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.8 | | | | |
| 2 | 100.0 | 98.9 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.8 | | | |
| 3 | 100.0 | 98.9 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | | | |
| 4 | 100.0 | 99.1 | 99.1 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | | | |
| 5 | 100.0 | 99.1 | 99.1 | 99.1 | 99.1 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | | | |
| 6 | 100.0 | 99.1 | 99.1 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | | | |
| 7 | 100.0 | 98.9 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.8 | 98.9 | 98.9 | | | |
| 8 | 100.0 | 98.8 | 99.0 | 98.8 | 98.8 | 98.7 | 98.8 | 98.8 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | | | |
| 9 | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.5 | 98.5 | 98.6 | 98.6 | 98.5 | 98.5 | 98.5 | | | |
| 10 | 100.0 | 98.5 | 98.5 | 98.4 | 98.4 | 98.4 | 98.3 | 98.4 | 98.3 | 98.4 | 98.4 | 98.3 | 98.3 | | | |
| 11 | 100.0 | 98.7 | 98.7 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.6 | 98.5 | 98.4 | 98.3 | 98.3 | | | |
| 12 | 100.0 | 98.8 | 98.8 | 98.6 | 98.6 | 98.7 | 98.7 | 98.6 | 98.6 | 98.7 | 98.6 | 98.5 | 98.5 | | | |
| 13 | 100.0 | 98.7 | 98.8 | 98.6 | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 | 98.6 | 98.5 | 98.4 | 98.4 | | | |
| 14 | 100.0 | 98.8 | 98.8 | 98.8 | 98.7 | 98.8 | 98.9 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | | | |
| 15 | 100.0 | 98.8 | 98.9 | 98.8 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | 98.9 | 98.7 | 98.6 | 98.6 | | | |
| 16 | 100.0 | 99.1 | 99.1 | 99.0 | 99.1 | 98.9 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | | | |
| 17 | 100.0 | 98.9 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | | | |
| 18 | 100.0 | 98.9 | 98.9 | 98.8 | 98.9 | 99.0 | 98.9 | 98.9 | 98.8 | 98.9 | 98.7 | 98.8 | 98.8 | | | |
| 19 | 100.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 98.8 | 98.8 | 98.8 | | | |
| 20 | 100.0 | 98.9 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.8 | 98.8 | 98.8 | | | |
| 21 | 100.0 | 98.8 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.6 | 98.6 | 98.6 | | | |
| 22 | 100.0 | 98.7 | 98.6 | 98.4 | 98.6 | 98.5 | 98.5 | 98.6 | 98.5 | 98.5 | 98.4 | 98.4 | 98.4 | | | |
| 23 | 100.0 | 98.6 | 98.6 | 98.4 | 98.4 | 98.4 | 98.4 | 98.4 | 98.4 | 98.3 | 98.4 | 98.5 | 98.4 | | | |
| 24 | 100.0 | 98.4 | 98.5 | 98.4 | 98.4 | 98.2 | 98.4 | 98.4 | 98.2 | 98.3 | 98.2 | 98.2 | 98.2 | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | |
| Avg. | 100.0 | 98.8 | 98.9 | 98.8 | 98.8 | 98.7 | 98.8 | 98.8 | 98.7 | 98.8 | 98.7 | 98.7 | 98.7 | | | |
| Med. | 100.0 | 98.9 | 98.9 | 98.8 | 98.9 | 98.8 | 98.9 | 98.8 | 98.8 | 98.9 | 98.7 | 98.7 | 98.7 | | | |
| σ | 0.00 | 0.19 | 0.21 | 0.22 | 0.23 | 0.23 | 0.21 | 0.20 | 0.23 | 0.22 | 0.21 | 0.22 | 0.22 | | | |
| Min. | 100.0 | 98.4 | 98.5 | 98.4 | 98.4 | 98.2 | 98.3 | 98.4 | 98.2 | 98.3 | 98.2 | 98.2 | 98.2 | | | |
| Max. | 100.0 | 99.1 | 99.1 | 99.1 | 99.1 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | | | |

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*



Data Set 7 : 105 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.8 °C |
| Actual Ambient Temperature [T _A] | 103.1 °C |
| Drive Current [I _f] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 7-4
 Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | |
| 1 | 0.0000 | 0.0014 | 0.0014 | 0.0017 | 0.0015 | 0.0015 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0018 | 0.0016 | | | | | |
| 2 | 0.0000 | 0.0014 | 0.0014 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0016 | 0.0016 | 0.0016 | 0.0018 | 0.0017 | | | | |
| 3 | 0.0000 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0016 | 0.0018 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 4 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0018 | 0.0018 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 5 | 0.0000 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0015 | 0.0017 | 0.0016 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | | | | |
| 6 | 0.0000 | 0.0014 | 0.0013 | 0.0016 | 0.0017 | 0.0015 | 0.0016 | 0.0017 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | | | | |
| 7 | 0.0000 | 0.0013 | 0.0013 | 0.0016 | 0.0015 | 0.0014 | 0.0016 | 0.0015 | 0.0014 | 0.0016 | 0.0016 | 0.0018 | 0.0017 | | | | |
| 8 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0019 | 0.0018 | 0.0018 | | | | |
| 9 | 0.0000 | 0.0014 | 0.0014 | 0.0016 | 0.0018 | 0.0016 | 0.0018 | 0.0018 | 0.0016 | 0.0019 | 0.0020 | 0.0019 | 0.0019 | | | | |
| 10 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0018 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0017 | | | | |
| 11 | 0.0000 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | 0.0016 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 12 | 0.0000 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0017 | 0.0019 | 0.0021 | 0.0020 | 0.0020 | | | | |
| 13 | 0.0000 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0016 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| 14 | 0.0000 | 0.0013 | 0.0013 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0014 | | | | |
| 15 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0018 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | 0.0016 | 0.0016 | | | | |
| 16 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0017 | 0.0016 | 0.0017 | 0.0016 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | | | | |
| 17 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | | | | |
| 18 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0016 | 0.0015 | 0.0017 | 0.0018 | 0.0017 | 0.0017 | | | | |
| 19 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0015 | 0.0015 | 0.0017 | 0.0016 | 0.0016 | | | | |
| 20 | 0.0000 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0015 | 0.0017 | 0.0016 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | | | | |
| 21 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0017 | 0.0016 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0017 | | | | |
| 22 | 0.0000 | 0.0013 | 0.0014 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | | | | |
| 23 | 0.0000 | 0.0013 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0017 | 0.0018 | 0.0017 | 0.0017 | 0.0017 | | | | |
| 24 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0014 | 0.0014 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | | | | |
| Med. | 0.0000 | 0.0014 | 0.0014 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0017 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | |
| Min. | 0.0000 | 0.0013 | 0.0013 | 0.0015 | 0.0015 | 0.0014 | 0.0016 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0014 | 0.0014 | | | | |
| Max. | 0.0000 | 0.0015 | 0.0015 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0017 | 0.0019 | 0.0021 | 0.0020 | 0.0020 | | | | |

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 7 : 105 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 105.8 °C |
| Actual Ambient Temperature [T _A] | 103.1 °C |
| Drive Current [I _f] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 7-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2664 | 0.2650 | 0.2650 | 0.2648 | 0.2648 | 0.2649 | 0.2648 | 0.2649 | 0.2648 | 0.2650 | 0.2651 | 0.2652 | | | | |
| 2 | 0.2655 | 0.2641 | 0.2640 | 0.2638 | 0.2638 | 0.2639 | 0.2638 | 0.2639 | 0.2639 | 0.2641 | 0.2641 | 0.2641 | | | | |
| 3 | 0.2662 | 0.2648 | 0.2647 | 0.2645 | 0.2645 | 0.2646 | 0.2645 | 0.2647 | 0.2645 | 0.2646 | 0.2648 | 0.2648 | | | | |
| 4 | 0.2615 | 0.2600 | 0.2600 | 0.2598 | 0.2598 | 0.2599 | 0.2597 | 0.2598 | 0.2598 | 0.2600 | 0.2601 | 0.2600 | | | | |
| 5 | 0.2624 | 0.2611 | 0.2611 | 0.2609 | 0.2608 | 0.2610 | 0.2607 | 0.2609 | 0.2610 | 0.2610 | 0.2612 | 0.2611 | | | | |
| 6 | 0.2610 | 0.2596 | 0.2597 | 0.2593 | 0.2593 | 0.2595 | 0.2594 | 0.2595 | 0.2595 | 0.2597 | 0.2597 | 0.2597 | | | | |
| 7 | 0.2616 | 0.2603 | 0.2603 | 0.2600 | 0.2600 | 0.2602 | 0.2600 | 0.2602 | 0.2602 | 0.2602 | 0.2604 | 0.2604 | | | | |
| 8 | 0.2623 | 0.2610 | 0.2609 | 0.2607 | 0.2608 | 0.2608 | 0.2607 | 0.2608 | 0.2608 | 0.2608 | 0.2609 | 0.2610 | | | | |
| 9 | 0.2619 | 0.2605 | 0.2606 | 0.2603 | 0.2602 | 0.2604 | 0.2602 | 0.2604 | 0.2604 | 0.2604 | 0.2605 | 0.2606 | | | | |
| 10 | 0.2645 | 0.2631 | 0.2630 | 0.2629 | 0.2628 | 0.2629 | 0.2628 | 0.2629 | 0.2629 | 0.2630 | 0.2631 | 0.2633 | | | | |
| 11 | 0.2662 | 0.2648 | 0.2647 | 0.2646 | 0.2645 | 0.2646 | 0.2646 | 0.2647 | 0.2647 | 0.2649 | 0.2649 | 0.2649 | | | | |
| 12 | 0.2648 | 0.2634 | 0.2634 | 0.2631 | 0.2631 | 0.2632 | 0.2631 | 0.2633 | 0.2632 | 0.2634 | 0.2635 | 0.2635 | | | | |
| 13 | 0.2636 | 0.2622 | 0.2621 | 0.2619 | 0.2618 | 0.2619 | 0.2619 | 0.2619 | 0.2620 | 0.2620 | 0.2622 | 0.2622 | | | | |
| 14 | 0.2614 | 0.2602 | 0.2602 | 0.2599 | 0.2599 | 0.2600 | 0.2599 | 0.2600 | 0.2599 | 0.2600 | 0.2601 | 0.2603 | | | | |
| 15 | 0.2603 | 0.2589 | 0.2588 | 0.2587 | 0.2586 | 0.2587 | 0.2585 | 0.2586 | 0.2586 | 0.2587 | 0.2589 | 0.2589 | | | | |
| 16 | 0.2619 | 0.2606 | 0.2605 | 0.2603 | 0.2602 | 0.2603 | 0.2602 | 0.2603 | 0.2603 | 0.2604 | 0.2605 | 0.2605 | | | | |
| 17 | 0.2618 | 0.2605 | 0.2604 | 0.2602 | 0.2602 | 0.2602 | 0.2601 | 0.2602 | 0.2602 | 0.2603 | 0.2604 | 0.2605 | | | | |
| 18 | 0.2622 | 0.2608 | 0.2607 | 0.2606 | 0.2606 | 0.2606 | 0.2605 | 0.2607 | 0.2607 | 0.2607 | 0.2608 | 0.2608 | | | | |
| 19 | 0.2617 | 0.2604 | 0.2603 | 0.2600 | 0.2601 | 0.2601 | 0.2601 | 0.2601 | 0.2601 | 0.2603 | 0.2603 | 0.2604 | | | | |
| 20 | 0.2631 | 0.2619 | 0.2617 | 0.2616 | 0.2615 | 0.2616 | 0.2614 | 0.2617 | 0.2616 | 0.2618 | 0.2618 | 0.2618 | | | | |
| 21 | 0.2634 | 0.2621 | 0.2619 | 0.2618 | 0.2617 | 0.2618 | 0.2617 | 0.2618 | 0.2618 | 0.2619 | 0.2620 | 0.2621 | | | | |
| 22 | 0.2627 | 0.2614 | 0.2613 | 0.2610 | 0.2610 | 0.2610 | 0.2610 | 0.2611 | 0.2611 | 0.2612 | 0.2612 | 0.2613 | | | | |
| 23 | 0.2629 | 0.2617 | 0.2615 | 0.2612 | 0.2613 | 0.2613 | 0.2612 | 0.2613 | 0.2613 | 0.2613 | 0.2615 | 0.2614 | | | | |
| 24 | 0.2610 | 0.2597 | 0.2596 | 0.2594 | 0.2593 | 0.2594 | 0.2593 | 0.2593 | 0.2594 | 0.2594 | 0.2595 | 0.2596 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2629 | 0.2616 | 0.2615 | 0.2613 | 0.2613 | 0.2614 | 0.2613 | 0.2614 | 0.2614 | 0.2615 | 0.2616 | 0.2616 | | | | |
| Med. | 0.2624 | 0.2611 | 0.2610 | 0.2608 | 0.2608 | 0.2609 | 0.2607 | 0.2609 | 0.2609 | 0.2609 | 0.2610 | 0.2611 | | | | |
| σ | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| Min. | 0.2603 | 0.2589 | 0.2588 | 0.2587 | 0.2586 | 0.2587 | 0.2585 | 0.2586 | 0.2586 | 0.2587 | 0.2589 | 0.2589 | | | | |
| Max. | 0.2664 | 0.2650 | 0.2650 | 0.2648 | 0.2648 | 0.2649 | 0.2648 | 0.2649 | 0.2648 | 0.2650 | 0.2651 | 0.2652 | | | | |

Data Set 7 : 105 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _c] | 105.8 °C |
| Actual Ambient Temperature [T _A] | 103.1 °C |
| Drive Current [I _f] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 7-6
Chromaticity

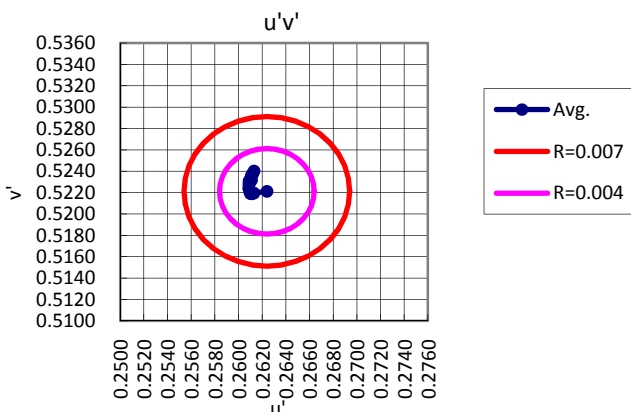
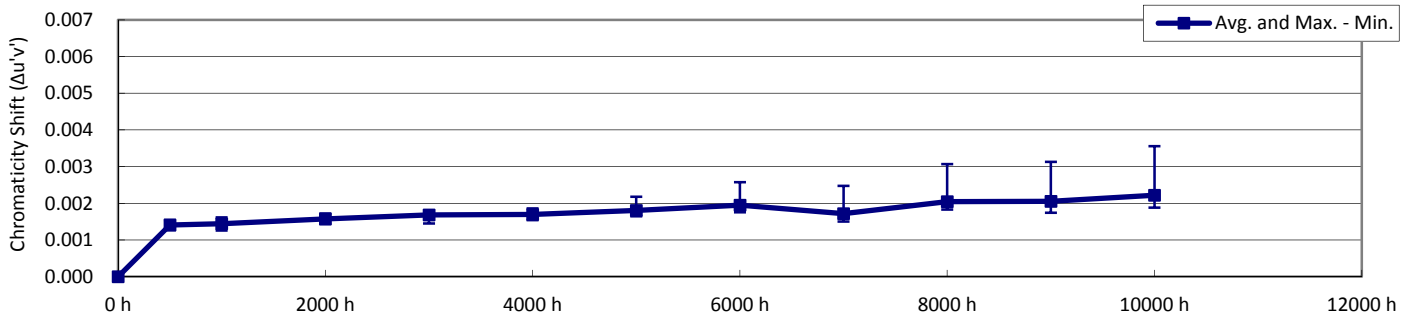
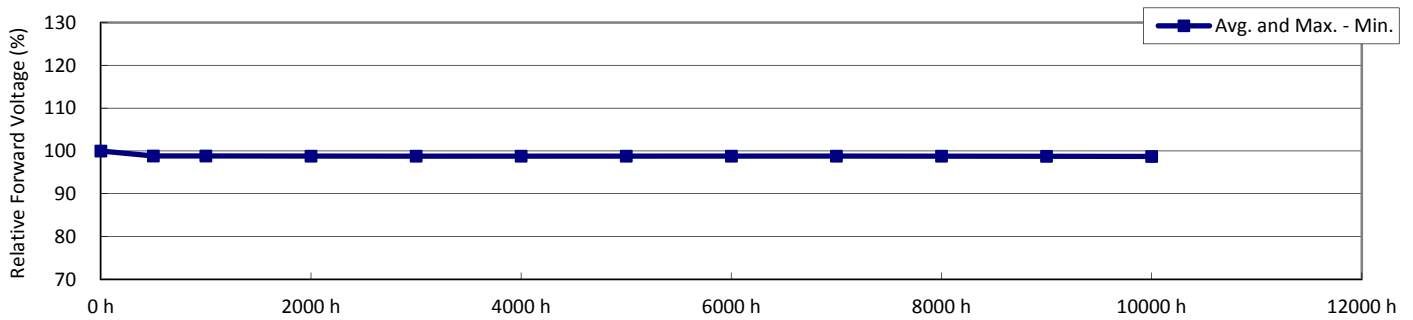
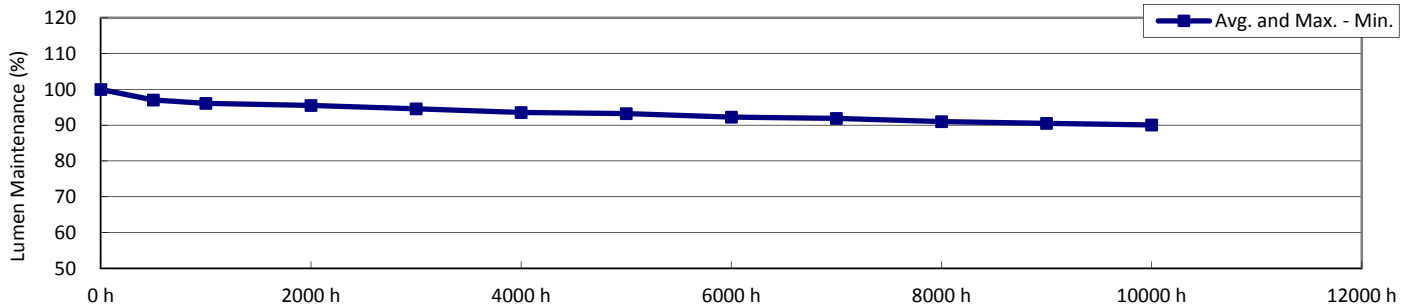
| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5262 | 0.5260 | 0.5262 | 0.5265 | 0.5263 | 0.5265 | 0.5266 | 0.5270 | 0.5265 | 0.5271 | 0.5274 | 0.5272 | | | | |
| 2 | 0.5234 | 0.5232 | 0.5234 | 0.5237 | 0.5235 | 0.5237 | 0.5238 | 0.5242 | 0.5237 | 0.5243 | 0.5246 | 0.5245 | | | | |
| 3 | 0.5242 | 0.5241 | 0.5243 | 0.5245 | 0.5242 | 0.5245 | 0.5246 | 0.5249 | 0.5245 | 0.5251 | 0.5253 | 0.5253 | | | | |
| 4 | 0.5221 | 0.5219 | 0.5220 | 0.5222 | 0.5221 | 0.5224 | 0.5224 | 0.5229 | 0.5225 | 0.5230 | 0.5233 | 0.5232 | | | | |
| 5 | 0.5213 | 0.5210 | 0.5211 | 0.5213 | 0.5212 | 0.5214 | 0.5215 | 0.5218 | 0.5215 | 0.5220 | 0.5223 | 0.5223 | | | | |
| 6 | 0.5217 | 0.5215 | 0.5216 | 0.5218 | 0.5217 | 0.5220 | 0.5220 | 0.5225 | 0.5221 | 0.5227 | 0.5230 | 0.5230 | | | | |
| 7 | 0.5225 | 0.5222 | 0.5225 | 0.5226 | 0.5226 | 0.5228 | 0.5229 | 0.5233 | 0.5229 | 0.5235 | 0.5238 | 0.5238 | | | | |
| 8 | 0.5222 | 0.5219 | 0.5222 | 0.5223 | 0.5223 | 0.5225 | 0.5226 | 0.5230 | 0.5225 | 0.5231 | 0.5235 | 0.5234 | | | | |
| 9 | 0.5223 | 0.5221 | 0.5223 | 0.5225 | 0.5224 | 0.5228 | 0.5228 | 0.5232 | 0.5228 | 0.5234 | 0.5237 | 0.5236 | | | | |
| 10 | 0.5242 | 0.5239 | 0.5241 | 0.5243 | 0.5242 | 0.5245 | 0.5246 | 0.5249 | 0.5245 | 0.5250 | 0.5254 | 0.5253 | | | | |
| 11 | 0.5255 | 0.5253 | 0.5256 | 0.5258 | 0.5257 | 0.5260 | 0.5259 | 0.5263 | 0.5260 | 0.5264 | 0.5267 | 0.5267 | | | | |
| 12 | 0.5254 | 0.5253 | 0.5256 | 0.5258 | 0.5257 | 0.5260 | 0.5260 | 0.5264 | 0.5261 | 0.5266 | 0.5269 | 0.5269 | | | | |
| 13 | 0.5246 | 0.5243 | 0.5245 | 0.5248 | 0.5246 | 0.5248 | 0.5249 | 0.5253 | 0.5249 | 0.5254 | 0.5256 | 0.5257 | | | | |
| 14 | 0.5214 | 0.5210 | 0.5212 | 0.5214 | 0.5212 | 0.5214 | 0.5215 | 0.5218 | 0.5215 | 0.5220 | 0.5222 | 0.5222 | | | | |
| 15 | 0.5201 | 0.5198 | 0.5197 | 0.5199 | 0.5198 | 0.5201 | 0.5201 | 0.5204 | 0.5201 | 0.5207 | 0.5209 | 0.5209 | | | | |
| 16 | 0.5212 | 0.5209 | 0.5209 | 0.5211 | 0.5210 | 0.5213 | 0.5212 | 0.5216 | 0.5212 | 0.5217 | 0.5220 | 0.5220 | | | | |
| 17 | 0.5210 | 0.5208 | 0.5208 | 0.5211 | 0.5209 | 0.5211 | 0.5211 | 0.5215 | 0.5211 | 0.5216 | 0.5219 | 0.5219 | | | | |
| 18 | 0.5215 | 0.5212 | 0.5214 | 0.5216 | 0.5214 | 0.5217 | 0.5217 | 0.5221 | 0.5217 | 0.5222 | 0.5225 | 0.5225 | | | | |
| 19 | 0.5221 | 0.5219 | 0.5220 | 0.5222 | 0.5221 | 0.5224 | 0.5224 | 0.5228 | 0.5224 | 0.5228 | 0.5231 | 0.5231 | | | | |
| 20 | 0.5231 | 0.5228 | 0.5230 | 0.5232 | 0.5230 | 0.5233 | 0.5233 | 0.5237 | 0.5233 | 0.5238 | 0.5240 | 0.5240 | | | | |
| 21 | 0.5245 | 0.5244 | 0.5246 | 0.5248 | 0.5246 | 0.5249 | 0.5250 | 0.5253 | 0.5249 | 0.5254 | 0.5257 | 0.5256 | | | | |
| 22 | 0.5233 | 0.5230 | 0.5232 | 0.5233 | 0.5232 | 0.5235 | 0.5235 | 0.5239 | 0.5234 | 0.5240 | 0.5242 | 0.5241 | | | | |
| 23 | 0.5214 | 0.5212 | 0.5213 | 0.5215 | 0.5213 | 0.5216 | 0.5216 | 0.5220 | 0.5215 | 0.5220 | 0.5222 | 0.5222 | | | | |
| 24 | 0.5206 | 0.5204 | 0.5205 | 0.5207 | 0.5205 | 0.5208 | 0.5208 | 0.5211 | 0.5207 | 0.5212 | 0.5214 | 0.5214 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5227 | 0.5225 | 0.5227 | 0.5229 | 0.5227 | 0.5230 | 0.5230 | 0.5234 | 0.5230 | 0.5235 | 0.5238 | 0.5238 | | | | |
| Med. | 0.5223 | 0.5220 | 0.5223 | 0.5224 | 0.5224 | 0.5226 | 0.5227 | 0.5231 | 0.5227 | 0.5233 | 0.5236 | 0.5235 | | | | |
| σ | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | 0.0018 | | | | |
| Min. | 0.5201 | 0.5198 | 0.5197 | 0.5199 | 0.5198 | 0.5201 | 0.5201 | 0.5204 | 0.5201 | 0.5207 | 0.5209 | 0.5209 | | | | |
| Max. | 0.5262 | 0.5260 | 0.5262 | 0.5265 | 0.5263 | 0.5265 | 0.5266 | 0.5270 | 0.5265 | 0.5271 | 0.5274 | 0.5272 | | | | |



Data Set 8 : 105 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 106.0 °C |
| Actual Ambient Temperature [T _A] | 102.7 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0



The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 8 : 105 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 106.0 °C |
| Actual Ambient Temperature [T _A] | 102.7 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 8-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 479 | 3.20 | 2757 | 4.81 | 0.449 | 0.397 | 0.261 | 0.521 | | | | |
| 2 | 483 | 3.20 | 2787 | 4.80 | 0.447 | 0.397 | 0.260 | 0.520 | | | | |
| 3 | 482 | 3.20 | 2759 | 4.81 | 0.448 | 0.397 | 0.261 | 0.520 | | | | |
| 4 | 483 | 3.21 | 2762 | 4.81 | 0.448 | 0.398 | 0.261 | 0.521 | | | | |
| 5 | 483 | 3.20 | 2763 | 4.81 | 0.448 | 0.397 | 0.261 | 0.520 | | | | |
| 6 | 482 | 3.21 | 2750 | 4.81 | 0.450 | 0.399 | 0.261 | 0.521 | | | | |
| 7 | 480 | 3.21 | 2756 | 4.81 | 0.449 | 0.399 | 0.261 | 0.521 | | | | |
| 8 | 479 | 3.21 | 2743 | 4.81 | 0.450 | 0.398 | 0.262 | 0.521 | | | | |
| 9 | 473 | 3.20 | 2675 | 4.81 | 0.456 | 0.401 | 0.265 | 0.523 | | | | |
| 10 | 477 | 3.20 | 2686 | 4.81 | 0.457 | 0.405 | 0.264 | 0.525 | | | | |
| 11 | 478 | 3.21 | 2703 | 4.81 | 0.455 | 0.403 | 0.263 | 0.524 | | | | |
| 12 | 481 | 3.21 | 2725 | 4.81 | 0.452 | 0.399 | 0.262 | 0.522 | | | | |
| 13 | 482 | 3.21 | 2741 | 4.81 | 0.450 | 0.399 | 0.262 | 0.521 | | | | |
| 14 | 483 | 3.21 | 2760 | 4.81 | 0.449 | 0.399 | 0.261 | 0.521 | | | | |
| 15 | 482 | 3.21 | 2738 | 4.81 | 0.451 | 0.399 | 0.262 | 0.521 | | | | |
| 16 | 480 | 3.21 | 2727 | 4.81 | 0.452 | 0.399 | 0.262 | 0.522 | | | | |
| 17 | 478 | 3.21 | 2717 | 4.81 | 0.453 | 0.400 | 0.263 | 0.522 | | | | |
| 18 | 476 | 3.21 | 2705 | 4.81 | 0.454 | 0.402 | 0.263 | 0.523 | | | | |
| 19 | 479 | 3.20 | 2711 | 4.80 | 0.454 | 0.401 | 0.263 | 0.522 | | | | |
| 20 | 477 | 3.20 | 2701 | 4.80 | 0.454 | 0.400 | 0.263 | 0.522 | | | | |
| 21 | 478 | 3.21 | 2686 | 4.81 | 0.457 | 0.403 | 0.264 | 0.524 | | | | |
| 22 | 474 | 3.21 | 2644 | 4.81 | 0.461 | 0.406 | 0.266 | 0.526 | | | | |
| 23 | 477 | 3.21 | 2674 | 4.82 | 0.460 | 0.407 | 0.264 | 0.526 | | | | |
| 24 | 478 | 3.20 | 2714 | 4.81 | 0.453 | 0.400 | 0.263 | 0.522 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 479 | 3.21 | 2724 | 4.81 | 0.452 | 0.400 | 0.262 | 0.522 | | | | |
| Med. | 479 | 3.21 | 2726 | 4.81 | 0.452 | 0.399 | 0.262 | 0.522 | | | | |
| σ | 2.9 | 0.002 | 35.6 | 0.003 | 0.0038 | 0.0027 | 0.0014 | 0.0016 | | | | |
| Min. | 473 | 3.20 | 2644 | 4.80 | 0.447 | 0.397 | 0.260 | 0.520 | | | | |
| Max. | 483 | 3.21 | 2787 | 4.82 | 0.461 | 0.407 | 0.266 | 0.526 | | | | |



Data Set 8 : 105 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 106.0 °C |
| Actual Ambient Temperature [T _A] | 102.7 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 8-2
 Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 96.8 | 96.0 | 95.5 | 94.4 | 93.4 | 93.2 | 92.2 | 91.9 | 91.1 | 90.6 | 90.1 | | | | |
| 2 | 100.0 | 96.8 | 95.8 | 94.9 | 94.3 | 93.2 | 93.0 | 92.0 | 91.6 | 90.8 | 90.3 | 90.0 | | | | |
| 3 | 100.0 | 97.8 | 96.9 | 96.3 | 95.0 | 93.8 | 93.8 | 92.5 | 92.3 | 91.2 | 90.5 | 90.3 | | | | |
| 4 | 100.0 | 96.9 | 96.1 | 95.5 | 94.6 | 93.5 | 93.2 | 92.3 | 92.1 | 91.1 | 90.9 | 90.3 | | | | |
| 5 | 100.0 | 97.0 | 96.0 | 95.4 | 94.5 | 93.4 | 93.1 | 92.1 | 91.9 | 91.1 | 90.8 | 90.1 | | | | |
| 6 | 100.0 | 97.6 | 96.4 | 95.8 | 94.8 | 93.6 | 93.1 | 92.1 | 91.9 | 90.7 | 90.1 | 89.3 | | | | |
| 7 | 100.0 | 96.7 | 95.9 | 95.4 | 94.4 | 93.2 | 93.1 | 92.1 | 91.7 | 91.0 | 90.5 | 90.0 | | | | |
| 8 | 100.0 | 96.7 | 95.8 | 95.3 | 94.3 | 93.1 | 93.0 | 92.0 | 91.6 | 90.9 | 90.3 | 90.0 | | | | |
| 9 | 100.0 | 97.3 | 96.4 | 95.7 | 95.2 | 93.4 | 93.4 | 92.2 | 92.0 | 90.8 | 90.2 | 89.8 | | | | |
| 10 | 100.0 | 96.5 | 95.6 | 95.1 | 94.0 | 93.1 | 92.7 | 91.6 | 91.4 | 90.5 | 90.3 | 89.7 | | | | |
| 11 | 100.0 | 96.6 | 95.7 | 95.2 | 94.0 | 93.1 | 92.9 | 92.0 | 91.7 | 90.8 | 90.7 | 90.0 | | | | |
| 12 | 100.0 | 97.4 | 96.7 | 95.9 | 94.7 | 93.7 | 93.5 | 92.4 | 91.7 | 90.2 | 90.2 | 89.4 | | | | |
| 13 | 100.0 | 97.0 | 96.1 | 95.5 | 94.6 | 94.0 | 93.3 | 92.4 | 92.1 | 91.3 | 91.0 | 90.4 | | | | |
| 14 | 100.0 | 97.0 | 96.1 | 95.5 | 94.5 | 94.0 | 93.3 | 92.5 | 92.2 | 91.3 | 91.1 | 90.5 | | | | |
| 15 | 100.0 | 97.6 | 96.7 | 96.3 | 95.2 | 94.4 | 93.7 | 92.6 | 92.3 | 91.2 | 90.7 | 90.3 | | | | |
| 16 | 100.0 | 96.9 | 96.0 | 95.6 | 94.6 | 93.6 | 93.4 | 92.3 | 92.0 | 91.2 | 90.7 | 90.3 | | | | |
| 17 | 100.0 | 96.9 | 96.0 | 95.3 | 94.4 | 93.6 | 93.3 | 92.3 | 91.8 | 91.2 | 90.6 | 90.2 | | | | |
| 18 | 100.0 | 97.5 | 96.6 | 96.0 | 95.5 | 94.2 | 94.0 | 92.9 | 92.4 | 91.5 | 90.7 | 90.7 | | | | |
| 19 | 100.0 | 96.8 | 96.0 | 95.4 | 94.4 | 93.3 | 93.0 | 92.2 | 91.8 | 90.9 | 90.5 | 90.0 | | | | |
| 20 | 100.0 | 96.7 | 95.8 | 95.3 | 94.3 | 93.3 | 93.0 | 92.0 | 91.6 | 90.8 | 90.4 | 90.0 | | | | |
| 21 | 100.0 | 97.5 | 96.4 | 95.8 | 95.3 | 93.8 | 93.7 | 92.5 | 91.9 | 91.2 | 90.3 | 90.1 | | | | |
| 22 | 100.0 | 96.6 | 95.7 | 95.1 | 94.1 | 93.2 | 92.7 | 91.6 | 91.5 | 90.8 | 90.3 | 89.8 | | | | |
| 23 | 100.0 | 96.6 | 95.8 | 95.2 | 94.3 | 93.3 | 93.1 | 92.2 | 91.9 | 91.0 | 90.6 | 90.3 | | | | |
| 24 | 100.0 | 97.2 | 96.3 | 95.7 | 94.8 | 93.8 | 93.4 | 92.5 | 92.0 | 91.0 | 90.3 | 90.0 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 97.0 | 96.1 | 95.5 | 94.6 | 93.5 | 93.3 | 92.2 | 91.9 | 91.0 | 90.5 | 90.1 | | | | |
| Med. | 100.0 | 96.9 | 96.0 | 95.5 | 94.5 | 93.5 | 93.2 | 92.2 | 91.9 | 91.0 | 90.5 | 90.1 | | | | |
| σ | 0.00 | 0.38 | 0.37 | 0.36 | 0.40 | 0.37 | 0.32 | 0.29 | 0.25 | 0.28 | 0.27 | 0.33 | | | | |
| Min. | 100.0 | 96.5 | 95.6 | 94.9 | 94.0 | 93.1 | 92.7 | 91.6 | 91.4 | 90.2 | 90.1 | 89.3 | | | | |
| Max. | 100.0 | 97.8 | 96.9 | 96.3 | 95.5 | 94.4 | 94.0 | 92.9 | 92.4 | 91.5 | 91.1 | 90.7 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0699 | -0.0809 | -0.0846 | -0.0945 | -0.0995 | -0.1047 | | | | | | | | | | |

| | | | |
|----------------------------------|----------|-------|---------|
| Test duration used | 5000 h | to | 10000 h |
| B | 0.963 | | |
| α | 6.86E-06 | | |
| R ² | 0.981 | | |
| Calculated L ₇₀ (10K) | 46500 | hours | |
| Reported L ₇₀ (10K) | 46500 | hours | |
| Calculated L ₈₀ (10K) | 27100 | hours | |
| Reported L ₈₀ (10K) | 27100 | hours | |
| Calculated L ₉₀ (10K) | 9880 | hours | |
| Reported L ₉₀ (10K) | 9880 | hours | |

Curve-fit equation:
 $\Phi(t)=Bexp(-\alpha t)$

Lumen maintenance life equation:
 $L_{70} = \ln(B/0.7)/\alpha$

$L_{80} = \ln(B/0.8)/\alpha$

$L_{90} = \ln(B/0.9)/\alpha$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 8 : 105 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 106.0 °C |
| Actual Ambient Temperature [T _A] | 102.7 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 8-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.8 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | 98.6 | 98.6 | 98.5 | 98.6 | 98.6 | | | | |
| 2 | 100.0 | 98.8 | 98.9 | 98.8 | 98.9 | 98.8 | 99.0 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | | | | |
| 3 | 100.0 | 98.9 | 99.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.8 | | | | |
| 4 | 100.0 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | | | | |
| 5 | 100.0 | 98.8 | 98.8 | 98.7 | 98.9 | 98.8 | 98.8 | 98.7 | 98.8 | 98.7 | 98.7 | 98.7 | | | | |
| 6 | 100.0 | 99.0 | 98.9 | 98.9 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | | | | |
| 7 | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.5 | | | | |
| 8 | 100.0 | 98.7 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.5 | 98.7 | 98.5 | 98.6 | | | | |
| 9 | 100.0 | 98.7 | 98.7 | 98.7 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.6 | | | | |
| 10 | 100.0 | 98.8 | 98.9 | 98.9 | 98.8 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | 98.8 | 98.7 | | | | |
| 11 | 100.0 | 98.9 | 98.9 | 98.9 | 98.7 | 98.8 | 98.9 | 99.0 | 98.8 | 98.8 | 98.8 | 98.9 | | | | |
| 12 | 100.0 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | 98.7 | 98.9 | 98.7 | | | | |
| 13 | 100.0 | 98.9 | 98.9 | 98.9 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | 98.9 | 98.7 | | | | |
| 14 | 100.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.1 | 99.0 | 98.9 | 98.9 | 99.0 | 98.9 | 98.9 | | | | |
| 15 | 100.0 | 98.9 | 98.9 | 98.8 | 98.8 | 99.0 | 98.8 | 98.8 | 98.8 | 98.8 | 98.9 | 98.8 | | | | |
| 16 | 100.0 | 98.9 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | 98.9 | 98.9 | 98.9 | 98.7 | 98.7 | | | | |
| 17 | 100.0 | 98.8 | 98.8 | 98.8 | 98.7 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | | | | |
| 18 | 100.0 | 98.7 | 98.6 | 98.6 | 98.5 | 98.7 | 98.6 | 98.6 | 98.6 | 98.6 | 98.5 | 98.4 | | | | |
| 19 | 100.0 | 98.9 | 98.9 | 98.8 | 98.8 | 98.8 | 98.9 | 98.9 | 98.7 | 98.8 | 98.8 | 98.8 | | | | |
| 20 | 100.0 | 98.7 | 98.8 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | | | | |
| 21 | 100.0 | 98.9 | 98.8 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.8 | 98.9 | | | | |
| 22 | 100.0 | 98.9 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | | | | |
| 23 | 100.0 | 98.9 | 98.8 | 98.7 | 98.8 | 98.8 | 98.8 | 98.9 | 98.7 | 98.8 | 98.7 | 98.7 | | | | |
| 24 | 100.0 | 98.8 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.7 | | | | |
| Med. | 100.0 | 98.9 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.8 | 98.7 | | | | |
| σ | 0.00 | 0.09 | 0.10 | 0.10 | 0.12 | 0.13 | 0.12 | 0.12 | 0.12 | 0.11 | 0.12 | 0.12 | | | | |
| Min. | 100.0 | 98.7 | 98.6 | 98.6 | 98.5 | 98.6 | 98.6 | 98.6 | 98.5 | 98.5 | 98.5 | 98.4 | | | | |
| Max. | 100.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.1 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 98.9 | | | | |



Data Set 8 : 105 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 106.0 °C |
| Actual Ambient Temperature [T _A] | 102.7 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 8-4
 Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0018 | 0.0017 | 0.0019 | 0.0019 | 0.0016 | 0.0021 | 0.0020 | 0.0021 | | | | |
| 2 | 0.0000 | 0.0014 | 0.0013 | 0.0015 | 0.0018 | 0.0017 | 0.0018 | 0.0019 | 0.0016 | 0.0021 | 0.0021 | 0.0021 | | | | |
| 3 | 0.0000 | 0.0015 | 0.0015 | 0.0017 | 0.0018 | 0.0017 | 0.0019 | 0.0020 | 0.0017 | 0.0020 | 0.0020 | 0.0020 | | | | |
| 4 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0017 | 0.0019 | 0.0016 | 0.0019 | 0.0019 | 0.0022 | | | | |
| 5 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0018 | 0.0018 | 0.0016 | 0.0018 | 0.0017 | 0.0019 | | | | |
| 6 | 0.0000 | 0.0013 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0023 | 0.0020 | 0.0024 | 0.0024 | 0.0030 | | | | |
| 7 | 0.0000 | 0.0014 | 0.0014 | 0.0017 | 0.0018 | 0.0017 | 0.0019 | 0.0019 | 0.0017 | 0.0020 | 0.0021 | 0.0022 | | | | |
| 8 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0020 | 0.0017 | 0.0019 | 0.0021 | 0.0021 | | | | |
| 9 | 0.0000 | 0.0013 | 0.0015 | 0.0015 | 0.0018 | 0.0017 | 0.0019 | 0.0019 | 0.0018 | 0.0020 | 0.0022 | 0.0023 | | | | |
| 10 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0017 | 0.0017 | 0.0019 | 0.0020 | 0.0018 | 0.0022 | 0.0021 | 0.0024 | | | | |
| 11 | 0.0000 | 0.0015 | 0.0014 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0020 | 0.0017 | 0.0020 | 0.0019 | 0.0022 | | | | |
| 12 | 0.0000 | 0.0014 | 0.0014 | 0.0015 | 0.0017 | 0.0019 | 0.0022 | 0.0026 | 0.0025 | 0.0031 | 0.0031 | 0.0036 | | | | |
| 13 | 0.0000 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | 0.0017 | 0.0019 | 0.0016 | 0.0020 | 0.0019 | 0.0022 | | | | |
| 14 | 0.0000 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0016 | 0.0019 | 0.0019 | 0.0021 | | | | |
| 15 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0019 | 0.0021 | 0.0019 | 0.0023 | 0.0023 | 0.0027 | | | | |
| 16 | 0.0000 | 0.0015 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | | | | |
| 17 | 0.0000 | 0.0014 | 0.0013 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0018 | 0.0016 | 0.0020 | 0.0019 | 0.0020 | | | | |
| 18 | 0.0000 | 0.0013 | 0.0014 | 0.0017 | 0.0017 | 0.0017 | 0.0018 | 0.0019 | 0.0017 | 0.0020 | 0.0019 | 0.0020 | | | | |
| 19 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0016 | 0.0019 | 0.0020 | 0.0020 | | | | |
| 20 | 0.0000 | 0.0014 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0018 | 0.0016 | 0.0019 | 0.0021 | 0.0021 | | | | |
| 21 | 0.0000 | 0.0014 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0019 | 0.0017 | 0.0021 | 0.0020 | 0.0022 | | | | |
| 22 | 0.0000 | 0.0014 | 0.0014 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0017 | 0.0020 | 0.0021 | 0.0020 | | | | |
| 23 | 0.0000 | 0.0015 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0019 | 0.0017 | 0.0019 | 0.0019 | 0.0019 | | | | |
| 24 | 0.0000 | 0.0013 | 0.0013 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0018 | 0.0015 | 0.0018 | 0.0018 | 0.0019 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0014 | 0.0014 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0020 | 0.0017 | 0.0020 | 0.0021 | 0.0022 | | | | |
| Med. | 0.0000 | 0.0014 | 0.0014 | 0.0015 | 0.0017 | 0.0017 | 0.0018 | 0.0019 | 0.0017 | 0.0020 | 0.0020 | 0.0021 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0004 | | | | |
| Min. | 0.0000 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0016 | 0.0018 | 0.0015 | 0.0018 | 0.0017 | 0.0019 | | | | |
| Max. | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0022 | 0.0026 | 0.0025 | 0.0031 | 0.0031 | 0.0036 | | | | |

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 8 : 105 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 106.0 °C |
| Actual Ambient Temperature [T _A] | 102.7 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 8-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2615 | 0.2602 | 0.2601 | 0.2600 | 0.2599 | 0.2600 | 0.2599 | 0.2602 | 0.2601 | 0.2601 | 0.2603 | 0.2603 | | | | |
| 2 | 0.2602 | 0.2589 | 0.2589 | 0.2587 | 0.2586 | 0.2587 | 0.2587 | 0.2588 | 0.2589 | 0.2589 | 0.2590 | 0.2591 | | | | |
| 3 | 0.2614 | 0.2599 | 0.2599 | 0.2597 | 0.2597 | 0.2598 | 0.2597 | 0.2599 | 0.2599 | 0.2601 | 0.2600 | 0.2601 | | | | |
| 4 | 0.2613 | 0.2599 | 0.2598 | 0.2596 | 0.2597 | 0.2598 | 0.2597 | 0.2599 | 0.2600 | 0.2599 | 0.2598 | 0.2600 | | | | |
| 5 | 0.2613 | 0.2599 | 0.2599 | 0.2597 | 0.2598 | 0.2598 | 0.2597 | 0.2599 | 0.2599 | 0.2599 | 0.2599 | 0.2601 | | | | |
| 6 | 0.2616 | 0.2603 | 0.2601 | 0.2600 | 0.2602 | 0.2602 | 0.2602 | 0.2604 | 0.2605 | 0.2605 | 0.2606 | 0.2608 | | | | |
| 7 | 0.2613 | 0.2599 | 0.2599 | 0.2597 | 0.2597 | 0.2598 | 0.2597 | 0.2600 | 0.2600 | 0.2600 | 0.2601 | 0.2602 | | | | |
| 8 | 0.2620 | 0.2605 | 0.2604 | 0.2604 | 0.2604 | 0.2604 | 0.2604 | 0.2606 | 0.2606 | 0.2607 | 0.2608 | 0.2608 | | | | |
| 9 | 0.2647 | 0.2634 | 0.2633 | 0.2633 | 0.2632 | 0.2633 | 0.2632 | 0.2635 | 0.2634 | 0.2636 | 0.2636 | 0.2637 | | | | |
| 10 | 0.2641 | 0.2627 | 0.2626 | 0.2625 | 0.2626 | 0.2627 | 0.2627 | 0.2629 | 0.2628 | 0.2628 | 0.2629 | 0.2631 | | | | |
| 11 | 0.2634 | 0.2619 | 0.2620 | 0.2619 | 0.2620 | 0.2620 | 0.2620 | 0.2621 | 0.2622 | 0.2621 | 0.2622 | 0.2624 | | | | |
| 12 | 0.2626 | 0.2612 | 0.2612 | 0.2611 | 0.2613 | 0.2614 | 0.2614 | 0.2617 | 0.2618 | 0.2617 | 0.2619 | 0.2621 | | | | |
| 13 | 0.2619 | 0.2607 | 0.2605 | 0.2605 | 0.2605 | 0.2604 | 0.2605 | 0.2607 | 0.2607 | 0.2608 | 0.2608 | 0.2610 | | | | |
| 14 | 0.2612 | 0.2598 | 0.2597 | 0.2597 | 0.2596 | 0.2596 | 0.2596 | 0.2600 | 0.2599 | 0.2600 | 0.2599 | 0.2601 | | | | |
| 15 | 0.2621 | 0.2607 | 0.2606 | 0.2606 | 0.2606 | 0.2606 | 0.2607 | 0.2608 | 0.2609 | 0.2610 | 0.2610 | 0.2612 | | | | |
| 16 | 0.2627 | 0.2613 | 0.2612 | 0.2610 | 0.2611 | 0.2612 | 0.2611 | 0.2611 | 0.2612 | 0.2614 | 0.2614 | 0.2615 | | | | |
| 17 | 0.2629 | 0.2615 | 0.2615 | 0.2614 | 0.2614 | 0.2614 | 0.2613 | 0.2614 | 0.2615 | 0.2615 | 0.2616 | 0.2617 | | | | |
| 18 | 0.2633 | 0.2619 | 0.2618 | 0.2616 | 0.2616 | 0.2617 | 0.2617 | 0.2617 | 0.2617 | 0.2618 | 0.2620 | 0.2620 | | | | |
| 19 | 0.2632 | 0.2619 | 0.2618 | 0.2617 | 0.2618 | 0.2618 | 0.2618 | 0.2619 | 0.2619 | 0.2620 | 0.2620 | 0.2621 | | | | |
| 20 | 0.2637 | 0.2623 | 0.2623 | 0.2622 | 0.2623 | 0.2623 | 0.2623 | 0.2624 | 0.2625 | 0.2626 | 0.2626 | 0.2627 | | | | |
| 21 | 0.2641 | 0.2627 | 0.2627 | 0.2626 | 0.2626 | 0.2627 | 0.2626 | 0.2628 | 0.2628 | 0.2628 | 0.2630 | 0.2629 | | | | |
| 22 | 0.2659 | 0.2645 | 0.2645 | 0.2644 | 0.2645 | 0.2645 | 0.2644 | 0.2647 | 0.2646 | 0.2647 | 0.2646 | 0.2648 | | | | |
| 23 | 0.2643 | 0.2628 | 0.2628 | 0.2627 | 0.2628 | 0.2627 | 0.2627 | 0.2628 | 0.2628 | 0.2629 | 0.2629 | 0.2630 | | | | |
| 24 | 0.2630 | 0.2617 | 0.2617 | 0.2615 | 0.2615 | 0.2616 | 0.2615 | 0.2616 | 0.2617 | 0.2618 | 0.2618 | 0.2618 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2627 | 0.2613 | 0.2612 | 0.2611 | 0.2611 | 0.2612 | 0.2611 | 0.2613 | 0.2613 | 0.2614 | 0.2614 | 0.2616 | | | | |
| Med. | 0.2626 | 0.2612 | 0.2612 | 0.2611 | 0.2612 | 0.2613 | 0.2612 | 0.2613 | 0.2613 | 0.2615 | 0.2615 | 0.2616 | | | | |
| σ | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | | | | |
| Min. | 0.2602 | 0.2589 | 0.2589 | 0.2587 | 0.2586 | 0.2587 | 0.2587 | 0.2588 | 0.2589 | 0.2589 | 0.2590 | 0.2591 | | | | |
| Max. | 0.2659 | 0.2645 | 0.2645 | 0.2644 | 0.2645 | 0.2645 | 0.2644 | 0.2647 | 0.2646 | 0.2647 | 0.2646 | 0.2648 | | | | |

Data Set 8 : 105 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 106.0 °C |
| Actual Ambient Temperature [T _A] | 102.7 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 8-6

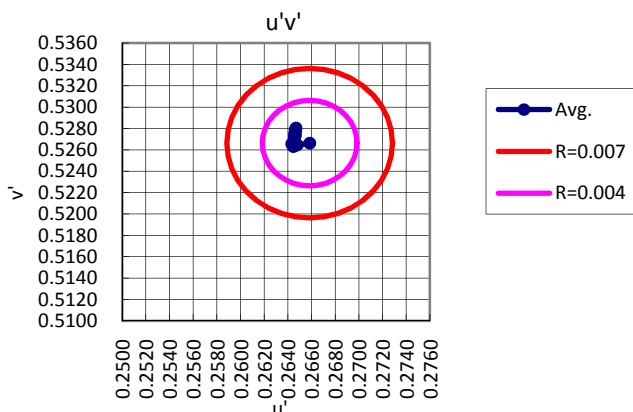
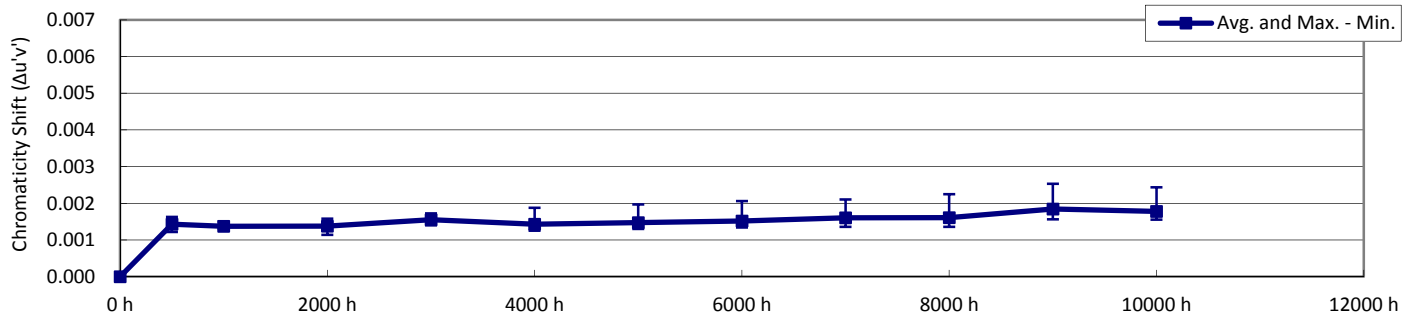
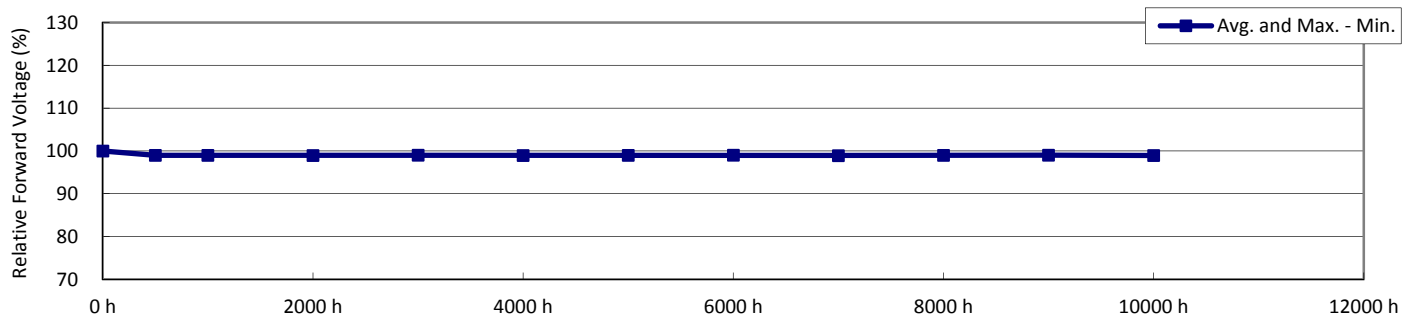
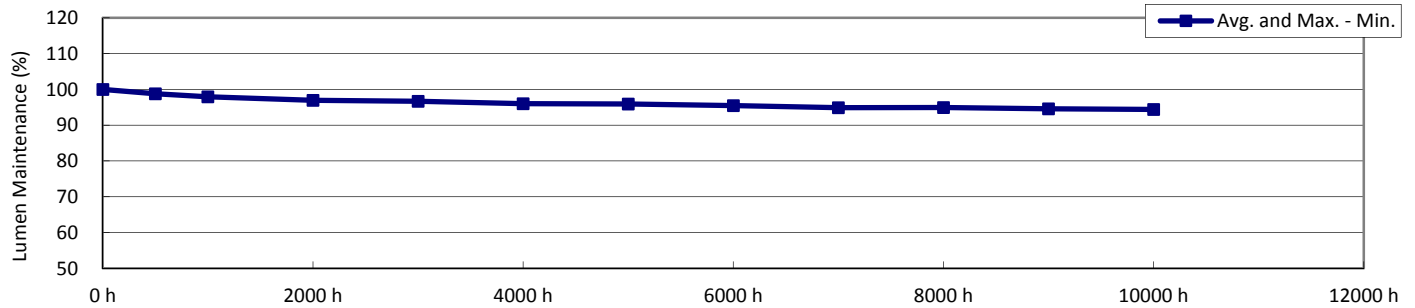
Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5202 | 0.5200 | 0.5202 | 0.5204 | 0.5209 | 0.5210 | 0.5211 | 0.5216 | 0.5210 | 0.5217 | 0.5217 | 0.5219 | | | | |
| 2 | 0.5199 | 0.5197 | 0.5199 | 0.5200 | 0.5206 | 0.5207 | 0.5208 | 0.5212 | 0.5209 | 0.5215 | 0.5216 | 0.5217 | | | | |
| 3 | 0.5197 | 0.5194 | 0.5196 | 0.5199 | 0.5204 | 0.5205 | 0.5206 | 0.5210 | 0.5205 | 0.5212 | 0.5212 | 0.5213 | | | | |
| 4 | 0.5203 | 0.5199 | 0.5201 | 0.5204 | 0.5209 | 0.5210 | 0.5211 | 0.5215 | 0.5212 | 0.5215 | 0.5214 | 0.5221 | | | | |
| 5 | 0.5198 | 0.5195 | 0.5196 | 0.5200 | 0.5203 | 0.5204 | 0.5204 | 0.5209 | 0.5205 | 0.5209 | 0.5208 | 0.5213 | | | | |
| 6 | 0.5204 | 0.5203 | 0.5204 | 0.5208 | 0.5213 | 0.5215 | 0.5217 | 0.5224 | 0.5222 | 0.5226 | 0.5226 | 0.5234 | | | | |
| 7 | 0.5208 | 0.5205 | 0.5207 | 0.5211 | 0.5215 | 0.5216 | 0.5217 | 0.5221 | 0.5218 | 0.5222 | 0.5225 | 0.5227 | | | | |
| 8 | 0.5207 | 0.5205 | 0.5207 | 0.5210 | 0.5215 | 0.5215 | 0.5216 | 0.5221 | 0.5217 | 0.5221 | 0.5223 | 0.5224 | | | | |
| 9 | 0.5224 | 0.5223 | 0.5225 | 0.5229 | 0.5233 | 0.5233 | 0.5235 | 0.5239 | 0.5236 | 0.5240 | 0.5242 | 0.5244 | | | | |
| 10 | 0.5243 | 0.5243 | 0.5245 | 0.5249 | 0.5253 | 0.5254 | 0.5256 | 0.5260 | 0.5257 | 0.5261 | 0.5261 | 0.5266 | | | | |
| 11 | 0.5232 | 0.5231 | 0.5232 | 0.5236 | 0.5241 | 0.5242 | 0.5243 | 0.5247 | 0.5243 | 0.5247 | 0.5247 | 0.5252 | | | | |
| 12 | 0.5208 | 0.5206 | 0.5208 | 0.5212 | 0.5219 | 0.5222 | 0.5226 | 0.5232 | 0.5232 | 0.5238 | 0.5239 | 0.5243 | | | | |
| 13 | 0.5209 | 0.5206 | 0.5207 | 0.5210 | 0.5210 | 0.5211 | 0.5218 | 0.5222 | 0.5219 | 0.5225 | 0.5224 | 0.5228 | | | | |
| 14 | 0.5207 | 0.5204 | 0.5205 | 0.5208 | 0.5207 | 0.5208 | 0.5215 | 0.5219 | 0.5215 | 0.5221 | 0.5221 | 0.5225 | | | | |
| 15 | 0.5206 | 0.5204 | 0.5205 | 0.5208 | 0.5208 | 0.5211 | 0.5218 | 0.5223 | 0.5221 | 0.5226 | 0.5226 | 0.5231 | | | | |
| 16 | 0.5215 | 0.5212 | 0.5213 | 0.5216 | 0.5220 | 0.5222 | 0.5222 | 0.5225 | 0.5223 | 0.5229 | 0.5230 | 0.5232 | | | | |
| 17 | 0.5220 | 0.5218 | 0.5218 | 0.5222 | 0.5225 | 0.5227 | 0.5227 | 0.5231 | 0.5229 | 0.5234 | 0.5234 | 0.5236 | | | | |
| 18 | 0.5224 | 0.5222 | 0.5223 | 0.5226 | 0.5230 | 0.5231 | 0.5232 | 0.5234 | 0.5232 | 0.5238 | 0.5238 | 0.5239 | | | | |
| 19 | 0.5222 | 0.5220 | 0.5221 | 0.5224 | 0.5228 | 0.5230 | 0.5230 | 0.5234 | 0.5231 | 0.5236 | 0.5237 | 0.5238 | | | | |
| 20 | 0.5218 | 0.5216 | 0.5217 | 0.5221 | 0.5225 | 0.5226 | 0.5226 | 0.5231 | 0.5228 | 0.5233 | 0.5235 | 0.5236 | | | | |
| 21 | 0.5232 | 0.5231 | 0.5232 | 0.5236 | 0.5240 | 0.5241 | 0.5242 | 0.5246 | 0.5243 | 0.5248 | 0.5248 | 0.5251 | | | | |
| 22 | 0.5253 | 0.5254 | 0.5256 | 0.5259 | 0.5263 | 0.5264 | 0.5264 | 0.5268 | 0.5263 | 0.5270 | 0.5270 | 0.5270 | | | | |
| 23 | 0.5255 | 0.5253 | 0.5254 | 0.5258 | 0.5261 | 0.5262 | 0.5262 | 0.5266 | 0.5261 | 0.5267 | 0.5268 | 0.5269 | | | | |
| 24 | 0.5214 | 0.5212 | 0.5213 | 0.5217 | 0.5221 | 0.5222 | 0.5222 | 0.5226 | 0.5222 | 0.5228 | 0.5229 | 0.5229 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5217 | 0.5215 | 0.5216 | 0.5220 | 0.5223 | 0.5225 | 0.5226 | 0.5231 | 0.5227 | 0.5232 | 0.5233 | 0.5236 | | | | |
| Med. | 0.5211 | 0.5209 | 0.5210 | 0.5214 | 0.5220 | 0.5222 | 0.5222 | 0.5226 | 0.5223 | 0.5228 | 0.5229 | 0.5233 | | | | |
| σ | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0016 | | | | |
| Min. | 0.5197 | 0.5194 | 0.5196 | 0.5199 | 0.5203 | 0.5204 | 0.5204 | 0.5209 | 0.5205 | 0.5209 | 0.5208 | 0.5213 | | | | |
| Max. | 0.5255 | 0.5254 | 0.5256 | 0.5259 | 0.5263 | 0.5264 | 0.5264 | 0.5268 | 0.5263 | 0.5270 | 0.5270 | 0.5270 | | | | |

Data Set 9 : 120 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 121.5 °C |
| Actual Ambient Temperature [T _A] | 117.8 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0



Data Set 9 : 120 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 121.5 °C |
| Actual Ambient Temperature [T _A] | 117.8 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 9-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 246 | 2.99 | 2667 | 2.09 | 0.457 | 0.401 | 0.265 | 0.523 | | | | |
| 2 | 247 | 2.99 | 2644 | 2.09 | 0.461 | 0.406 | 0.266 | 0.526 | | | | |
| 3 | 246 | 2.99 | 2612 | 2.09 | 0.467 | 0.412 | 0.267 | 0.529 | | | | |
| 4 | 242 | 2.99 | 2600 | 2.09 | 0.469 | 0.414 | 0.267 | 0.530 | | | | |
| 5 | 245 | 2.99 | 2674 | 2.09 | 0.457 | 0.403 | 0.264 | 0.524 | | | | |
| 6 | 244 | 2.98 | 2627 | 2.09 | 0.465 | 0.410 | 0.266 | 0.528 | | | | |
| 7 | 246 | 2.99 | 2648 | 2.09 | 0.462 | 0.408 | 0.265 | 0.527 | | | | |
| 8 | 247 | 2.98 | 2670 | 2.09 | 0.460 | 0.407 | 0.264 | 0.526 | | | | |
| 9 | 247 | 2.99 | 2671 | 2.09 | 0.460 | 0.406 | 0.264 | 0.526 | | | | |
| 10 | 246 | 2.99 | 2639 | 2.09 | 0.461 | 0.405 | 0.266 | 0.526 | | | | |
| 11 | 244 | 2.99 | 2621 | 2.09 | 0.463 | 0.406 | 0.267 | 0.526 | | | | |
| 12 | 247 | 2.98 | 2653 | 2.09 | 0.461 | 0.406 | 0.265 | 0.526 | | | | |
| 13 | 246 | 2.98 | 2650 | 2.09 | 0.461 | 0.407 | 0.265 | 0.526 | | | | |
| 14 | 246 | 2.98 | 2638 | 2.09 | 0.463 | 0.408 | 0.266 | 0.527 | | | | |
| 15 | 246 | 2.98 | 2633 | 2.09 | 0.464 | 0.410 | 0.266 | 0.528 | | | | |
| 16 | 242 | 2.99 | 2589 | 2.09 | 0.468 | 0.410 | 0.268 | 0.528 | | | | |
| 17 | 244 | 2.99 | 2633 | 2.09 | 0.462 | 0.405 | 0.266 | 0.526 | | | | |
| 18 | 244 | 2.99 | 2609 | 2.09 | 0.466 | 0.410 | 0.267 | 0.528 | | | | |
| 19 | 245 | 2.99 | 2619 | 2.09 | 0.465 | 0.409 | 0.267 | 0.528 | | | | |
| 20 | 245 | 2.99 | 2620 | 2.09 | 0.465 | 0.409 | 0.267 | 0.527 | | | | |
| 21 | 247 | 2.99 | 2646 | 2.09 | 0.463 | 0.409 | 0.265 | 0.527 | | | | |
| 22 | 244 | 2.99 | 2601 | 2.10 | 0.465 | 0.407 | 0.268 | 0.527 | | | | |
| 23 | 248 | 2.99 | 2640 | 2.10 | 0.462 | 0.407 | 0.266 | 0.526 | | | | |
| 24 | 246 | 3.00 | 2637 | 2.10 | 0.463 | 0.407 | 0.266 | 0.526 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 245 | 2.99 | 2635 | 2.09 | 0.463 | 0.408 | 0.266 | 0.527 | | | | |
| Med. | 246 | 2.99 | 2637 | 2.09 | 0.463 | 0.407 | 0.266 | 0.527 | | | | |
| σ | 1.4 | 0.004 | 23.3 | 0.002 | 0.0030 | 0.0027 | 0.0010 | 0.0014 | | | | |
| Min. | 242 | 2.98 | 2589 | 2.09 | 0.457 | 0.401 | 0.264 | 0.523 | | | | |
| Max. | 248 | 3.00 | 2674 | 2.10 | 0.469 | 0.414 | 0.268 | 0.530 | | | | |

Data Set 9 : 120 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 121.5 °C |
| Actual Ambient Temperature [T _A] | 117.8 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
Number of LED failures: 0

TABLE 9-2
Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.5 | 98.0 | 97.1 | 96.7 | 96.1 | 95.9 | 95.4 | 95.0 | 94.8 | 94.6 | 94.3 | | | | |
| 2 | 100.0 | 98.9 | 97.9 | 97.0 | 96.8 | 95.8 | 95.7 | 95.4 | 94.8 | 94.8 | 94.4 | 94.2 | | | | |
| 3 | 100.0 | 99.4 | 97.6 | 96.7 | 96.4 | 95.5 | 95.5 | 95.0 | 94.4 | 94.4 | 94.1 | 93.8 | | | | |
| 4 | 100.0 | 98.7 | 98.0 | 97.0 | 96.6 | 96.1 | 95.9 | 95.5 | 95.0 | 94.8 | 94.7 | 94.5 | | | | |
| 5 | 100.0 | 98.9 | 97.8 | 96.9 | 96.8 | 95.9 | 95.7 | 95.5 | 94.8 | 95.1 | 94.6 | 94.4 | | | | |
| 6 | 100.0 | 98.7 | 97.8 | 96.9 | 96.6 | 96.0 | 96.0 | 95.4 | 94.9 | 95.0 | 94.6 | 94.3 | | | | |
| 7 | 100.0 | 98.9 | 98.1 | 97.1 | 96.9 | 96.3 | 96.0 | 95.7 | 95.1 | 95.1 | 94.8 | 94.6 | | | | |
| 8 | 100.0 | 98.7 | 97.8 | 96.9 | 96.6 | 95.8 | 95.8 | 95.4 | 94.7 | 94.8 | 94.4 | 94.3 | | | | |
| 9 | 100.0 | 99.0 | 98.3 | 97.4 | 97.1 | 96.5 | 96.7 | 95.9 | 95.3 | 95.5 | 95.0 | 94.8 | | | | |
| 10 | 100.0 | 98.9 | 98.0 | 97.0 | 96.8 | 96.2 | 95.8 | 95.5 | 94.8 | 94.9 | 94.6 | 94.4 | | | | |
| 11 | 100.0 | 98.6 | 98.1 | 97.2 | 96.9 | 96.2 | 96.1 | 95.8 | 95.2 | 95.1 | 94.7 | 94.5 | | | | |
| 12 | 100.0 | 98.9 | 98.1 | 97.2 | 97.0 | 96.3 | 96.4 | 95.7 | 95.1 | 95.3 | 94.8 | 94.6 | | | | |
| 13 | 100.0 | 98.6 | 97.7 | 96.8 | 96.4 | 95.8 | 95.5 | 95.0 | 94.6 | 94.4 | 94.2 | 94.1 | | | | |
| 14 | 100.0 | 99.0 | 98.0 | 96.8 | 96.6 | 95.9 | 95.8 | 95.4 | 94.9 | 94.9 | 94.5 | 94.3 | | | | |
| 15 | 100.0 | 98.9 | 97.9 | 97.0 | 96.7 | 96.0 | 95.9 | 95.4 | 94.9 | 94.9 | 94.6 | 94.4 | | | | |
| 16 | 100.0 | 98.9 | 98.1 | 97.1 | 96.7 | 96.2 | 96.1 | 95.6 | 95.1 | 94.9 | 94.8 | 94.6 | | | | |
| 17 | 100.0 | 98.6 | 98.1 | 97.0 | 96.9 | 96.0 | 95.8 | 95.5 | 94.9 | 95.1 | 94.6 | 94.4 | | | | |
| 18 | 100.0 | 99.0 | 98.2 | 97.2 | 97.0 | 96.2 | 96.1 | 95.7 | 95.1 | 95.1 | 94.8 | 94.6 | | | | |
| 19 | 100.0 | 98.8 | 98.0 | 97.0 | 96.7 | 96.1 | 95.9 | 95.6 | 94.9 | 94.9 | 94.7 | 94.5 | | | | |
| 20 | 100.0 | 98.6 | 97.8 | 96.9 | 96.7 | 95.9 | 95.8 | 95.3 | 94.9 | 95.0 | 94.5 | 94.3 | | | | |
| 21 | 100.0 | 98.6 | 97.7 | 96.6 | 96.5 | 95.9 | 96.0 | 95.5 | 94.9 | 95.0 | 94.6 | 94.4 | | | | |
| 22 | 100.0 | 98.5 | 97.7 | 96.5 | 96.4 | 95.6 | 95.3 | 95.0 | 94.5 | 94.4 | 94.3 | 94.1 | | | | |
| 23 | 100.0 | 98.7 | 97.8 | 96.9 | 96.5 | 95.9 | 95.6 | 95.4 | 94.6 | 94.8 | 94.4 | 94.2 | | | | |
| 24 | 100.0 | 98.7 | 97.8 | 96.9 | 96.6 | 96.0 | 96.1 | 95.5 | 94.9 | 95.1 | 94.6 | 94.5 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.8 | 97.9 | 97.0 | 96.7 | 96.0 | 95.9 | 95.5 | 94.9 | 94.9 | 94.6 | 94.4 | | | | |
| Med. | 100.0 | 98.8 | 97.9 | 97.0 | 96.7 | 96.0 | 95.9 | 95.5 | 94.9 | 94.9 | 94.6 | 94.4 | | | | |
| σ | 0.00 | 0.21 | 0.18 | 0.20 | 0.19 | 0.22 | 0.28 | 0.22 | 0.21 | 0.26 | 0.21 | 0.21 | | | | |
| Min. | 100.0 | 98.5 | 97.6 | 96.5 | 96.4 | 95.5 | 95.3 | 95.0 | 94.4 | 94.4 | 94.1 | 93.8 | | | | |
| Max. | 100.0 | 99.4 | 98.3 | 97.4 | 97.1 | 96.5 | 96.7 | 95.9 | 95.3 | 95.5 | 95.0 | 94.8 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0419 | -0.0463 | -0.0525 | -0.0522 | -0.0556 | -0.0578 | | | | | | | | | | |

| Test duration used | 5000 h | to | 10000 h |
|----------------------------------|--------|----|---------------|
| B | | | 0.972 |
| α | | | 3.06E-06 |
| R ² | | | 0.931 |
| Calculated L ₇₀ (10K) | | | 107000 hours |
| Reported L ₇₀ (10K) | | | > 60000 hours |
| Calculated L ₈₀ (10K) | | | 63700 hours |
| Reported L ₈₀ (10K) | | | > 60000 hours |
| Calculated L ₉₀ (10K) | | | 25200 hours |
| Reported L ₉₀ (10K) | | | 25200 hours |

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 9 : 120 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 121.5 °C |
| Actual Ambient Temperature [T _A] | 117.8 °C |
| Drive Current [I _F] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 9-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 99.1 | 99.1 | 99.0 | 99.1 | 98.9 | 99.0 | 99.1 | 99.0 | 99.0 | 99.1 | 99.0 | | | | |
| 2 | 100.0 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | | | | |
| 3 | 100.0 | 99.0 | 99.0 | 98.9 | 98.9 | 98.8 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | | | | |
| 4 | 100.0 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | 98.9 | 99.0 | 98.9 | | | | |
| 5 | 100.0 | 99.1 | 99.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | 99.0 | 99.1 | 99.0 | | | | |
| 6 | 100.0 | 99.1 | 99.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | 99.0 | 99.1 | 99.0 | | | | |
| 7 | 100.0 | 99.0 | 99.0 | 99.0 | 99.1 | 99.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 8 | 100.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 9 | 100.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 10 | 100.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.1 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 11 | 100.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 12 | 100.0 | 99.0 | 99.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 98.9 | 99.1 | 99.1 | 99.0 | | | | |
| 13 | 100.0 | 99.0 | 99.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 98.9 | 99.1 | 99.1 | 99.0 | | | | |
| 14 | 100.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 15 | 100.0 | 99.0 | 99.0 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |
| 16 | 100.0 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 98.8 | 98.9 | 99.0 | 98.9 | | | | |
| 17 | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | | | | |
| 18 | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | | | | |
| 19 | 100.0 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 98.8 | 99.0 | 99.0 | 98.9 | | | | |
| 20 | 100.0 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 98.9 | 99.0 | 98.8 | 99.0 | 99.0 | 98.9 | | | | |
| 21 | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | | | | |
| 22 | 100.0 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | | | | |
| 23 | 100.0 | 98.8 | 98.9 | 98.8 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | | | | |
| 24 | 100.0 | 98.8 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | 98.9 | 98.7 | 98.9 | 98.8 | 98.8 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | | | | |
| Med. | 100.0 | 99.0 | 99.0 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| σ | 0.00 | 0.07 | 0.07 | 0.07 | 0.06 | 0.07 | 0.07 | 0.07 | 0.08 | 0.07 | 0.07 | 0.07 | | | | |
| Min. | 100.0 | 98.8 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | 98.9 | 98.7 | 98.9 | 98.8 | 98.8 | | | | |
| Max. | 100.0 | 99.1 | 99.1 | 99.0 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | 99.1 | 99.1 | 99.0 | | | | |

Data Set 9 : 120 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 121.5 °C |
| Actual Ambient Temperature [T _A] | 117.8 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 9-4
Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0012 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0017 | 0.0016 | 0.0019 | 0.0018 | | | | |
| 2 | 0.0000 | 0.0013 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0016 | 0.0018 | 0.0017 | 0.0020 | 0.0020 | | | | |
| 3 | 0.0000 | 0.0016 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0019 | 0.0019 | | | | |
| 4 | 0.0000 | 0.0014 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0020 | 0.0018 | | | | |
| 5 | 0.0000 | 0.0016 | 0.0015 | 0.0015 | 0.0017 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0017 | | | | |
| 6 | 0.0000 | 0.0012 | 0.0014 | 0.0016 | 0.0016 | 0.0019 | 0.0020 | 0.0021 | 0.0021 | 0.0022 | 0.0025 | 0.0024 | | | | |
| 7 | 0.0000 | 0.0014 | 0.0014 | 0.0014 | 0.0016 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0018 | | | | |
| 8 | 0.0000 | 0.0015 | 0.0014 | 0.0013 | 0.0016 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0017 | | | | |
| 9 | 0.0000 | 0.0014 | 0.0013 | 0.0013 | 0.0015 | 0.0013 | 0.0013 | 0.0015 | 0.0015 | 0.0015 | 0.0018 | 0.0017 | | | | |
| 10 | 0.0000 | 0.0014 | 0.0013 | 0.0013 | 0.0015 | 0.0015 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0019 | 0.0018 | | | | |
| 11 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0017 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0019 | 0.0018 | | | | |
| 12 | 0.0000 | 0.0016 | 0.0014 | 0.0014 | 0.0016 | 0.0014 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0018 | 0.0017 | | | | |
| 13 | 0.0000 | 0.0013 | 0.0013 | 0.0014 | 0.0015 | 0.0014 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0019 | 0.0019 | | | | |
| 14 | 0.0000 | 0.0014 | 0.0013 | 0.0014 | 0.0015 | 0.0014 | 0.0015 | 0.0014 | 0.0017 | 0.0016 | 0.0019 | 0.0018 | | | | |
| 15 | 0.0000 | 0.0014 | 0.0014 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0017 | 0.0020 | 0.0018 | | | | |
| 16 | 0.0000 | 0.0015 | 0.0013 | 0.0013 | 0.0015 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0017 | 0.0016 | | | | |
| 17 | 0.0000 | 0.0015 | 0.0015 | 0.0014 | 0.0017 | 0.0015 | 0.0016 | 0.0015 | 0.0015 | 0.0017 | 0.0018 | 0.0018 | | | | |
| 18 | 0.0000 | 0.0016 | 0.0014 | 0.0014 | 0.0016 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0018 | 0.0017 | | | | |
| 19 | 0.0000 | 0.0015 | 0.0013 | 0.0013 | 0.0015 | 0.0013 | 0.0015 | 0.0015 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | | | | |
| 20 | 0.0000 | 0.0015 | 0.0014 | 0.0013 | 0.0016 | 0.0013 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0017 | 0.0016 | | | | |
| 21 | 0.0000 | 0.0014 | 0.0013 | 0.0011 | 0.0014 | 0.0013 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0016 | 0.0016 | | | | |
| 22 | 0.0000 | 0.0014 | 0.0013 | 0.0013 | 0.0015 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0018 | 0.0017 | | | | |
| 23 | 0.0000 | 0.0016 | 0.0014 | 0.0013 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | 0.0016 | 0.0015 | 0.0017 | 0.0017 | | | | |
| 24 | 0.0000 | 0.0013 | 0.0013 | 0.0014 | 0.0015 | 0.0014 | 0.0013 | 0.0015 | 0.0015 | 0.0015 | 0.0018 | 0.0017 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0014 | 0.0014 | 0.0014 | 0.0016 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0018 | | | | |
| Med. | 0.0000 | 0.0014 | 0.0014 | 0.0014 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0017 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | | | | |
| Min. | 0.0000 | 0.0012 | 0.0013 | 0.0011 | 0.0014 | 0.0013 | 0.0013 | 0.0013 | 0.0014 | 0.0014 | 0.0016 | 0.0016 | | | | |
| Max. | 0.0000 | 0.0016 | 0.0015 | 0.0016 | 0.0017 | 0.0019 | 0.0020 | 0.0021 | 0.0021 | 0.0022 | 0.0025 | 0.0024 | | | | |

Data Set 9 : 120 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 121.5 °C |
| Actual Ambient Temperature [T _A] | 117.8 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 9-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2637 | 0.2625 | 0.2624 | 0.2625 | 0.2623 | 0.2625 | 0.2625 | 0.2626 | 0.2625 | 0.2625 | 0.2626 | 0.2626 | | | | |
| 2 | 0.2643 | 0.2630 | 0.2630 | 0.2631 | 0.2629 | 0.2632 | 0.2631 | 0.2632 | 0.2632 | 0.2631 | 0.2633 | 0.2632 | | | | |
| 3 | 0.2656 | 0.2640 | 0.2643 | 0.2644 | 0.2642 | 0.2645 | 0.2645 | 0.2645 | 0.2646 | 0.2645 | 0.2646 | 0.2645 | | | | |
| 4 | 0.2655 | 0.2641 | 0.2641 | 0.2642 | 0.2640 | 0.2643 | 0.2642 | 0.2642 | 0.2643 | 0.2642 | 0.2643 | 0.2643 | | | | |
| 5 | 0.2636 | 0.2621 | 0.2621 | 0.2621 | 0.2619 | 0.2623 | 0.2621 | 0.2622 | 0.2622 | 0.2622 | 0.2623 | 0.2622 | | | | |
| 6 | 0.2650 | 0.2638 | 0.2639 | 0.2641 | 0.2640 | 0.2642 | 0.2642 | 0.2642 | 0.2641 | 0.2642 | 0.2642 | 0.2642 | | | | |
| 7 | 0.2639 | 0.2625 | 0.2625 | 0.2625 | 0.2623 | 0.2626 | 0.2625 | 0.2625 | 0.2626 | 0.2625 | 0.2626 | 0.2625 | | | | |
| 8 | 0.2630 | 0.2616 | 0.2616 | 0.2617 | 0.2614 | 0.2617 | 0.2616 | 0.2616 | 0.2617 | 0.2616 | 0.2618 | 0.2617 | | | | |
| 9 | 0.2634 | 0.2621 | 0.2621 | 0.2621 | 0.2619 | 0.2622 | 0.2622 | 0.2621 | 0.2622 | 0.2622 | 0.2623 | 0.2622 | | | | |
| 10 | 0.2647 | 0.2633 | 0.2634 | 0.2634 | 0.2632 | 0.2634 | 0.2634 | 0.2634 | 0.2635 | 0.2634 | 0.2636 | 0.2635 | | | | |
| 11 | 0.2655 | 0.2641 | 0.2640 | 0.2640 | 0.2638 | 0.2641 | 0.2640 | 0.2640 | 0.2642 | 0.2641 | 0.2642 | 0.2641 | | | | |
| 12 | 0.2641 | 0.2626 | 0.2627 | 0.2627 | 0.2625 | 0.2628 | 0.2628 | 0.2627 | 0.2628 | 0.2628 | 0.2629 | 0.2629 | | | | |
| 13 | 0.2639 | 0.2626 | 0.2626 | 0.2626 | 0.2624 | 0.2627 | 0.2627 | 0.2627 | 0.2627 | 0.2627 | 0.2628 | 0.2628 | | | | |
| 14 | 0.2644 | 0.2630 | 0.2631 | 0.2631 | 0.2629 | 0.2632 | 0.2631 | 0.2632 | 0.2632 | 0.2631 | 0.2632 | 0.2632 | | | | |
| 15 | 0.2648 | 0.2634 | 0.2634 | 0.2634 | 0.2632 | 0.2635 | 0.2635 | 0.2635 | 0.2636 | 0.2635 | 0.2636 | 0.2636 | | | | |
| 16 | 0.2665 | 0.2651 | 0.2652 | 0.2652 | 0.2650 | 0.2654 | 0.2652 | 0.2652 | 0.2653 | 0.2652 | 0.2654 | 0.2653 | | | | |
| 17 | 0.2650 | 0.2636 | 0.2635 | 0.2636 | 0.2633 | 0.2636 | 0.2635 | 0.2636 | 0.2637 | 0.2635 | 0.2637 | 0.2636 | | | | |
| 18 | 0.2660 | 0.2645 | 0.2646 | 0.2646 | 0.2644 | 0.2647 | 0.2646 | 0.2646 | 0.2647 | 0.2647 | 0.2648 | 0.2647 | | | | |
| 19 | 0.2652 | 0.2638 | 0.2639 | 0.2639 | 0.2637 | 0.2640 | 0.2638 | 0.2638 | 0.2639 | 0.2638 | 0.2640 | 0.2639 | | | | |
| 20 | 0.2652 | 0.2638 | 0.2638 | 0.2639 | 0.2636 | 0.2640 | 0.2638 | 0.2639 | 0.2639 | 0.2639 | 0.2640 | 0.2639 | | | | |
| 21 | 0.2642 | 0.2629 | 0.2629 | 0.2631 | 0.2628 | 0.2631 | 0.2630 | 0.2630 | 0.2631 | 0.2631 | 0.2632 | 0.2631 | | | | |
| 22 | 0.2662 | 0.2648 | 0.2649 | 0.2649 | 0.2647 | 0.2650 | 0.2649 | 0.2649 | 0.2650 | 0.2649 | 0.2650 | 0.2649 | | | | |
| 23 | 0.2645 | 0.2630 | 0.2631 | 0.2632 | 0.2629 | 0.2632 | 0.2631 | 0.2632 | 0.2632 | 0.2632 | 0.2633 | 0.2632 | | | | |
| 24 | 0.2648 | 0.2635 | 0.2635 | 0.2635 | 0.2633 | 0.2636 | 0.2636 | 0.2635 | 0.2636 | 0.2636 | 0.2636 | 0.2636 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2647 | 0.2633 | 0.2634 | 0.2634 | 0.2632 | 0.2635 | 0.2634 | 0.2634 | 0.2635 | 0.2634 | 0.2636 | 0.2635 | | | | |
| Med. | 0.2648 | 0.2634 | 0.2634 | 0.2634 | 0.2632 | 0.2635 | 0.2635 | 0.2635 | 0.2636 | 0.2635 | 0.2636 | 0.2636 | | | | |
| σ | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | | | | |
| Min. | 0.2630 | 0.2616 | 0.2616 | 0.2617 | 0.2614 | 0.2617 | 0.2616 | 0.2616 | 0.2617 | 0.2616 | 0.2618 | 0.2617 | | | | |
| Max. | 0.2665 | 0.2651 | 0.2652 | 0.2652 | 0.2650 | 0.2654 | 0.2652 | 0.2652 | 0.2653 | 0.2652 | 0.2654 | 0.2653 | | | | |



Data Set 9 : 120 °C, 700 mA

| | |
|--|----------|
| Actual Case Temperature [T _c] | 121.5 °C |
| Actual Ambient Temperature [T _A] | 117.8 °C |
| Drive Current [I _f] | 700 mA |
| Measurement Current | 700 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 9-6
 Chromaticity

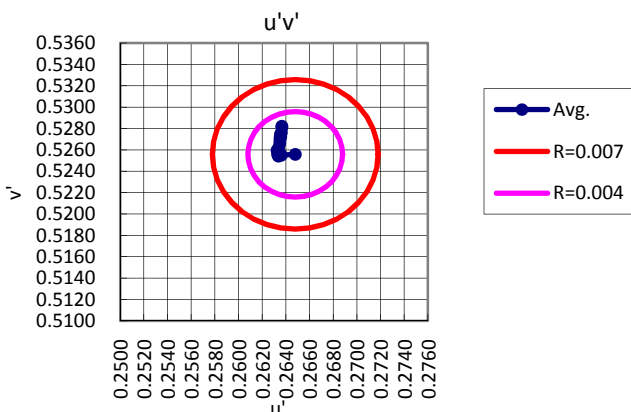
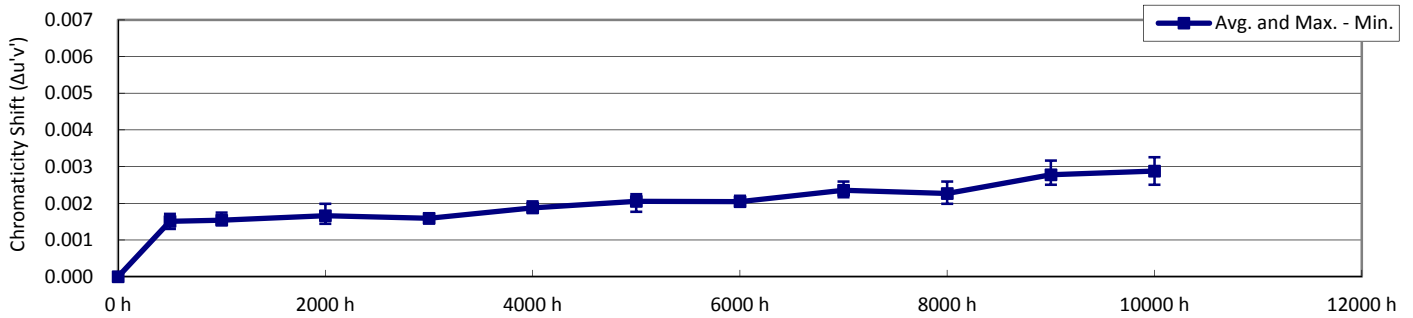
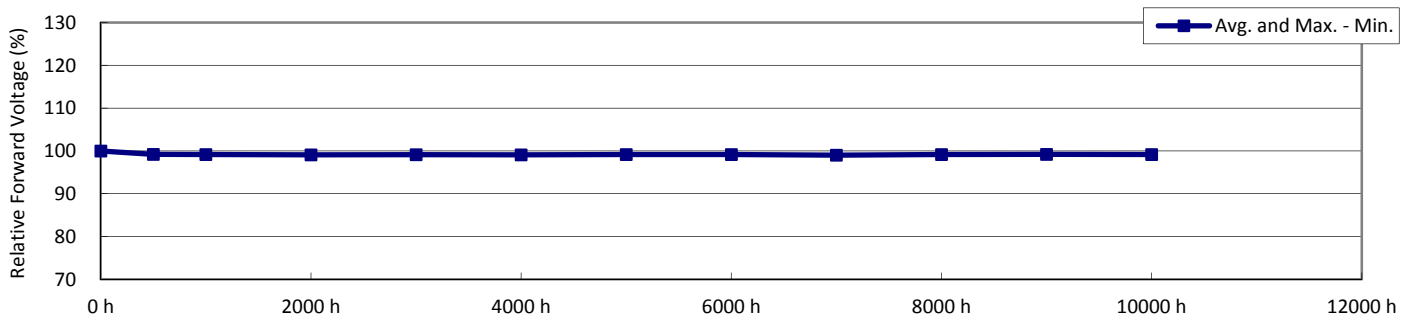
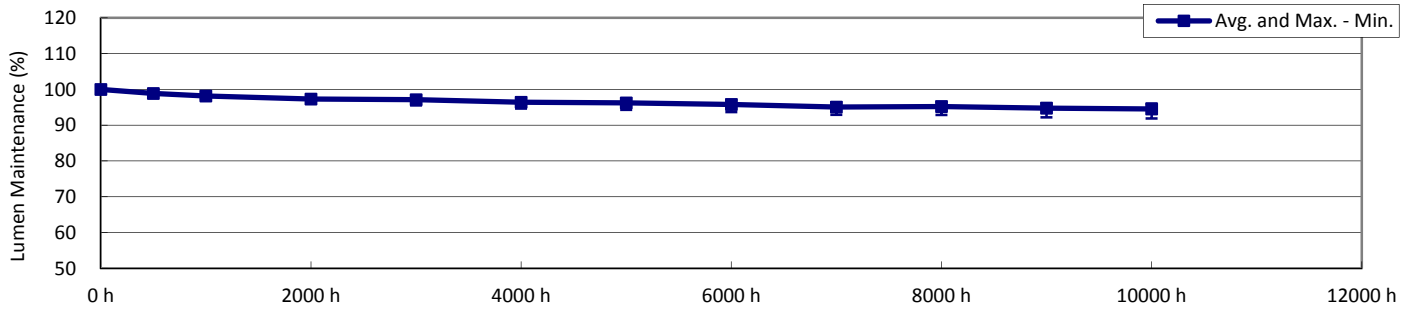
| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5226 | 0.5224 | 0.5228 | 0.5230 | 0.5225 | 0.5233 | 0.5233 | 0.5235 | 0.5238 | 0.5236 | 0.5241 | 0.5240 | | | | |
| 2 | 0.5244 | 0.5241 | 0.5247 | 0.5250 | 0.5245 | 0.5253 | 0.5253 | 0.5255 | 0.5258 | 0.5256 | 0.5261 | 0.5261 | | | | |
| 3 | 0.5279 | 0.5276 | 0.5284 | 0.5286 | 0.5281 | 0.5288 | 0.5288 | 0.5289 | 0.5292 | 0.5291 | 0.5295 | 0.5294 | | | | |
| 4 | 0.5288 | 0.5286 | 0.5292 | 0.5294 | 0.5290 | 0.5297 | 0.5297 | 0.5298 | 0.5300 | 0.5299 | 0.5304 | 0.5302 | | | | |
| 5 | 0.5237 | 0.5232 | 0.5236 | 0.5239 | 0.5234 | 0.5242 | 0.5241 | 0.5242 | 0.5245 | 0.5244 | 0.5249 | 0.5247 | | | | |
| 6 | 0.5266 | 0.5269 | 0.5275 | 0.5279 | 0.5279 | 0.5283 | 0.5284 | 0.5285 | 0.5285 | 0.5287 | 0.5290 | 0.5289 | | | | |
| 7 | 0.5255 | 0.5252 | 0.5255 | 0.5257 | 0.5253 | 0.5261 | 0.5259 | 0.5261 | 0.5264 | 0.5263 | 0.5268 | 0.5266 | | | | |
| 8 | 0.5249 | 0.5245 | 0.5249 | 0.5251 | 0.5247 | 0.5255 | 0.5254 | 0.5255 | 0.5258 | 0.5257 | 0.5263 | 0.5260 | | | | |
| 9 | 0.5247 | 0.5243 | 0.5247 | 0.5249 | 0.5245 | 0.5253 | 0.5253 | 0.5254 | 0.5256 | 0.5256 | 0.5261 | 0.5259 | | | | |
| 10 | 0.5243 | 0.5240 | 0.5244 | 0.5246 | 0.5242 | 0.5250 | 0.5249 | 0.5250 | 0.5253 | 0.5253 | 0.5258 | 0.5256 | | | | |
| 11 | 0.5248 | 0.5245 | 0.5248 | 0.5250 | 0.5246 | 0.5254 | 0.5253 | 0.5254 | 0.5257 | 0.5256 | 0.5262 | 0.5259 | | | | |
| 12 | 0.5247 | 0.5243 | 0.5247 | 0.5249 | 0.5245 | 0.5253 | 0.5253 | 0.5254 | 0.5257 | 0.5257 | 0.5261 | 0.5259 | | | | |
| 13 | 0.5249 | 0.5246 | 0.5251 | 0.5254 | 0.5248 | 0.5257 | 0.5256 | 0.5258 | 0.5260 | 0.5259 | 0.5264 | 0.5264 | | | | |
| 14 | 0.5255 | 0.5252 | 0.5257 | 0.5259 | 0.5254 | 0.5263 | 0.5262 | 0.5263 | 0.5267 | 0.5265 | 0.5270 | 0.5269 | | | | |
| 15 | 0.5269 | 0.5267 | 0.5272 | 0.5274 | 0.5268 | 0.5277 | 0.5276 | 0.5278 | 0.5281 | 0.5280 | 0.5285 | 0.5283 | | | | |
| 16 | 0.5273 | 0.5269 | 0.5274 | 0.5276 | 0.5271 | 0.5279 | 0.5278 | 0.5279 | 0.5282 | 0.5281 | 0.5286 | 0.5284 | | | | |
| 17 | 0.5244 | 0.5240 | 0.5244 | 0.5246 | 0.5241 | 0.5249 | 0.5248 | 0.5249 | 0.5252 | 0.5251 | 0.5256 | 0.5255 | | | | |
| 18 | 0.5270 | 0.5266 | 0.5270 | 0.5273 | 0.5268 | 0.5276 | 0.5275 | 0.5276 | 0.5279 | 0.5278 | 0.5283 | 0.5281 | | | | |
| 19 | 0.5265 | 0.5261 | 0.5265 | 0.5267 | 0.5263 | 0.5271 | 0.5269 | 0.5271 | 0.5273 | 0.5273 | 0.5277 | 0.5275 | | | | |
| 20 | 0.5263 | 0.5259 | 0.5263 | 0.5265 | 0.5261 | 0.5268 | 0.5267 | 0.5268 | 0.5270 | 0.5270 | 0.5275 | 0.5273 | | | | |
| 21 | 0.5262 | 0.5258 | 0.5262 | 0.5265 | 0.5260 | 0.5268 | 0.5267 | 0.5268 | 0.5270 | 0.5270 | 0.5274 | 0.5273 | | | | |
| 22 | 0.5255 | 0.5252 | 0.5256 | 0.5258 | 0.5254 | 0.5261 | 0.5260 | 0.5261 | 0.5264 | 0.5263 | 0.5268 | 0.5266 | | | | |
| 23 | 0.5251 | 0.5247 | 0.5251 | 0.5254 | 0.5249 | 0.5258 | 0.5256 | 0.5257 | 0.5260 | 0.5259 | 0.5263 | 0.5262 | | | | |
| 24 | 0.5254 | 0.5251 | 0.5255 | 0.5258 | 0.5252 | 0.5261 | 0.5260 | 0.5261 | 0.5263 | 0.5263 | 0.5267 | 0.5266 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5256 | 0.5253 | 0.5257 | 0.5260 | 0.5255 | 0.5263 | 0.5262 | 0.5263 | 0.5266 | 0.5265 | 0.5270 | 0.5268 | | | | |
| Med. | 0.5255 | 0.5252 | 0.5255 | 0.5258 | 0.5253 | 0.5261 | 0.5260 | 0.5261 | 0.5264 | 0.5263 | 0.5268 | 0.5266 | | | | |
| σ | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | | | | |
| Min. | 0.5226 | 0.5224 | 0.5228 | 0.5230 | 0.5225 | 0.5233 | 0.5233 | 0.5235 | 0.5238 | 0.5236 | 0.5241 | 0.5240 | | | | |
| Max. | 0.5288 | 0.5286 | 0.5292 | 0.5294 | 0.5290 | 0.5297 | 0.5297 | 0.5298 | 0.5300 | 0.5299 | 0.5304 | 0.5302 | | | | |

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
 The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 10 : 120 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 121.1 °C |
| Actual Ambient Temperature [T _A] | 117.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0



Data Set 10 : 120 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 121.1 °C |
| Actual Ambient Temperature [T _A] | 117.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 10-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 384 | 3.12 | 2615 | 3.75 | 0.464 | 0.407 | 0.267 | 0.527 | | | | |
| 2 | 387 | 3.11 | 2633 | 3.74 | 0.465 | 0.410 | 0.266 | 0.528 | | | | |
| 3 | 377 | 3.10 | 2631 | 3.72 | 0.463 | 0.407 | 0.266 | 0.526 | | | | |
| 4 | 388 | 3.11 | 2643 | 3.73 | 0.461 | 0.405 | 0.266 | 0.525 | | | | |
| 5 | 392 | 3.11 | 2677 | 3.73 | 0.458 | 0.404 | 0.264 | 0.525 | | | | |
| 6 | 395 | 3.11 | 2687 | 3.74 | 0.458 | 0.405 | 0.264 | 0.525 | | | | |
| 7 | 393 | 3.11 | 2683 | 3.73 | 0.459 | 0.406 | 0.264 | 0.526 | | | | |
| 8 | 394 | 3.11 | 2693 | 3.73 | 0.457 | 0.405 | 0.263 | 0.525 | | | | |
| 9 | 393 | 3.11 | 2668 | 3.73 | 0.458 | 0.404 | 0.265 | 0.524 | | | | |
| 10 | 394 | 3.11 | 2677 | 3.74 | 0.459 | 0.405 | 0.264 | 0.525 | | | | |
| 11 | 387 | 3.11 | 2599 | 3.74 | 0.467 | 0.410 | 0.267 | 0.528 | | | | |
| 12 | 390 | 3.12 | 2653 | 3.75 | 0.460 | 0.405 | 0.265 | 0.525 | | | | |
| 13 | 386 | 3.09 | 2662 | 3.71 | 0.459 | 0.405 | 0.265 | 0.525 | | | | |
| 14 | 389 | 3.09 | 2670 | 3.71 | 0.459 | 0.404 | 0.265 | 0.525 | | | | |
| 15 | 393 | 3.10 | 2695 | 3.72 | 0.457 | 0.405 | 0.263 | 0.525 | | | | |
| 16 | 389 | 3.09 | 2668 | 3.71 | 0.459 | 0.404 | 0.265 | 0.525 | | | | |
| 17 | 390 | 3.09 | 2636 | 3.71 | 0.464 | 0.410 | 0.266 | 0.528 | | | | |
| 18 | 394 | 3.09 | 2728 | 3.70 | 0.452 | 0.400 | 0.262 | 0.522 | | | | |
| 19 | 392 | 3.09 | 2683 | 3.71 | 0.457 | 0.403 | 0.264 | 0.524 | | | | |
| 20 | 393 | 3.10 | 2674 | 3.72 | 0.459 | 0.406 | 0.264 | 0.525 | | | | |
| 21 | 383 | 3.14 | 2608 | 3.76 | 0.468 | 0.412 | 0.267 | 0.529 | | | | |
| 22 | 381 | 3.14 | 2619 | 3.77 | 0.465 | 0.409 | 0.267 | 0.527 | | | | |
| 23 | 387 | 3.14 | 2661 | 3.77 | 0.460 | 0.405 | 0.265 | 0.525 | | | | |
| 24 | 389 | 3.14 | 2685 | 3.77 | 0.458 | 0.405 | 0.264 | 0.525 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 389 | 3.11 | 2660 | 3.73 | 0.460 | 0.406 | 0.265 | 0.526 | | | | |
| Med. | 390 | 3.11 | 2668 | 3.73 | 0.459 | 0.405 | 0.265 | 0.525 | | | | |
| σ | 4.5 | 0.016 | 31.5 | 0.019 | 0.0037 | 0.0027 | 0.0013 | 0.0016 | | | | |
| Min. | 377 | 3.09 | 2599 | 3.70 | 0.452 | 0.400 | 0.262 | 0.522 | | | | |
| Max. | 395 | 3.14 | 2728 | 3.77 | 0.468 | 0.412 | 0.267 | 0.529 | | | | |

Data Set 10 : 120 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 121.1 °C |
| Actual Ambient Temperature [T _A] | 117.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 10-2
Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.3 | 97.7 | 96.9 | 96.8 | 96.1 | 95.6 | 95.4 | 94.8 | 94.7 | 94.5 | 94.1 | | | | |
| 2 | 100.0 | 99.2 | 98.3 | 97.6 | 97.3 | 96.6 | 96.4 | 96.0 | 95.4 | 95.6 | 95.0 | 95.0 | | | | |
| 3 | 100.0 | 99.1 | 98.6 | 98.1 | 97.9 | 97.1 | 97.2 | 96.5 | 95.8 | 96.1 | 95.5 | 95.2 | | | | |
| 4 | 100.0 | 98.8 | 98.4 | 97.4 | 97.4 | 96.7 | 96.8 | 96.4 | 95.6 | 95.9 | 95.6 | 95.3 | | | | |
| 5 | 100.0 | 99.1 | 98.2 | 97.6 | 97.4 | 96.7 | 96.7 | 96.4 | 95.7 | 95.7 | 95.3 | 95.0 | | | | |
| 6 | 100.0 | 98.6 | 97.9 | 97.1 | 97.1 | 96.4 | 96.6 | 96.0 | 95.3 | 95.7 | 95.1 | 94.9 | | | | |
| 7 | 100.0 | 98.9 | 98.2 | 97.4 | 97.2 | 96.6 | 96.4 | 96.0 | 95.2 | 95.6 | 95.2 | 95.1 | | | | |
| 8 | 100.0 | 98.9 | 98.1 | 97.3 | 97.3 | 96.6 | 96.4 | 96.1 | 95.5 | 95.8 | 95.4 | 95.2 | | | | |
| 9 | 100.0 | 99.6 | 98.9 | 97.9 | 97.9 | 97.2 | 97.3 | 96.6 | 95.9 | 96.1 | 95.7 | 95.5 | | | | |
| 10 | 100.0 | 99.3 | 98.4 | 97.7 | 97.4 | 96.7 | 96.6 | 96.2 | 95.7 | 95.8 | 95.4 | 95.2 | | | | |
| 11 | 100.0 | 99.1 | 98.4 | 97.3 | 97.5 | 96.8 | 96.4 | 96.2 | 95.3 | 95.5 | 95.3 | 95.0 | | | | |
| 12 | 100.0 | 100.0 | 99.3 | 98.4 | 98.4 | 97.7 | 97.5 | 97.1 | 96.4 | 96.6 | 96.2 | 96.0 | | | | |
| 13 | 100.0 | 99.6 | 99.2 | 98.4 | 98.3 | 97.5 | 97.3 | 96.8 | 96.2 | 96.2 | 95.9 | 95.7 | | | | |
| 14 | 100.0 | 99.2 | 98.5 | 97.8 | 97.7 | 97.2 | 96.8 | 96.6 | 95.8 | 96.1 | 95.5 | 95.2 | | | | |
| 15 | 100.0 | 99.3 | 98.7 | 97.9 | 98.0 | 97.3 | 97.3 | 96.9 | 96.1 | 96.3 | 95.8 | 95.7 | | | | |
| 16 | 100.0 | 98.4 | 98.0 | 97.1 | 97.0 | 96.2 | 95.9 | 95.8 | 94.9 | 95.1 | 94.8 | 94.5 | | | | |
| 17 | 100.0 | 99.3 | 98.2 | 97.5 | 97.2 | 96.7 | 96.6 | 96.1 | 95.5 | 95.6 | 95.1 | 94.8 | | | | |
| 18 | 100.0 | 98.5 | 98.0 | 97.2 | 97.1 | 96.4 | 96.4 | 95.8 | 95.1 | 95.3 | 94.7 | 94.5 | | | | |
| 19 | 100.0 | 98.3 | 97.7 | 96.9 | 96.5 | 96.0 | 95.7 | 95.3 | 94.6 | 94.6 | 94.0 | 93.9 | | | | |
| 20 | 100.0 | 98.3 | 97.7 | 96.9 | 96.9 | 96.1 | 95.9 | 95.6 | 94.8 | 95.0 | 94.8 | 94.3 | | | | |
| 21 | 100.0 | 98.3 | 97.3 | 96.1 | 95.6 | 94.7 | 94.5 | 93.8 | 93.0 | 92.9 | 92.4 | 92.1 | | | | |
| 22 | 100.0 | 98.4 | 97.7 | 96.4 | 95.8 | 95.0 | 94.5 | 94.0 | 93.3 | 93.0 | 92.5 | 92.3 | | | | |
| 23 | 100.0 | 98.4 | 97.4 | 96.2 | 95.7 | 94.8 | 94.3 | 93.8 | 93.0 | 93.1 | 92.4 | 92.0 | | | | |
| 24 | 100.0 | 98.3 | 97.3 | 96.1 | 95.6 | 94.6 | 94.4 | 93.7 | 92.9 | 92.8 | 92.2 | 91.9 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.9 | 98.2 | 97.3 | 97.1 | 96.4 | 96.2 | 95.8 | 95.1 | 95.2 | 94.8 | 94.5 | | | | |
| Med. | 100.0 | 98.9 | 98.2 | 97.4 | 97.2 | 96.6 | 96.4 | 96.1 | 95.3 | 95.6 | 95.2 | 95.0 | | | | |
| σ | 0.00 | 0.50 | 0.54 | 0.66 | 0.79 | 0.86 | 0.97 | 1.01 | 1.03 | 1.13 | 1.19 | 1.24 | | | | |
| Min. | 100.0 | 98.3 | 97.3 | 96.1 | 95.6 | 94.6 | 94.3 | 93.7 | 92.9 | 92.8 | 92.2 | 91.9 | | | | |
| Max. | 100.0 | 100.0 | 99.3 | 98.4 | 98.4 | 97.7 | 97.5 | 97.1 | 96.4 | 96.6 | 96.2 | 96.0 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0385 | -0.0429 | -0.0506 | -0.0490 | -0.0539 | -0.0565 | | | | | | | | | | |

| Test duration used | 5000 h | to | 10000 h |
|----------------------------------|---------|-------|----------|
| B | | | 0.978 |
| α | | | 3.46E-06 |
| R ² | | | 0.918 |
| Calculated L ₇₀ (10K) | 96500 | hours | |
| Reported L ₇₀ (10K) | > 60000 | hours | |
| Calculated L ₈₀ (10K) | 57900 | hours | |
| Reported L ₈₀ (10K) | 57900 | hours | |
| Calculated L ₉₀ (10K) | 23900 | hours | |
| Reported L ₉₀ (10K) | 23900 | hours | |

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

The certificate shall not be reproduced, except in full, without written approval of the laboratory.

The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.

Data Set 10 : 120 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 121.1 °C |
| Actual Ambient Temperature [T _A] | 117.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 10-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.9 | 98.9 | 98.8 | 98.8 | 98.7 | 98.8 | 98.8 | 98.7 | 98.8 | 98.8 | 98.8 | | | | |
| 2 | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.2 | 99.3 | 99.3 | 99.1 | 99.3 | 99.3 | 99.3 | | | | |
| 3 | 100.0 | 98.9 | 98.8 | 98.7 | 98.8 | 98.7 | 98.8 | 98.8 | 98.7 | 98.8 | 98.8 | 98.9 | | | | |
| 4 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.3 | 99.3 | 99.3 | 99.2 | 99.3 | 99.4 | 99.3 | | | | |
| 5 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.1 | 99.3 | 99.3 | 99.3 | | | | |
| 6 | 100.0 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | 99.2 | 99.2 | 99.1 | 99.2 | 99.2 | 99.2 | | | | |
| 7 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.1 | 99.3 | 99.4 | 99.3 | | | | |
| 8 | 100.0 | 99.4 | 99.4 | 99.3 | 99.3 | 99.3 | 99.3 | 99.3 | 99.2 | 99.4 | 99.4 | 99.3 | | | | |
| 9 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.1 | 99.3 | 99.3 | 99.3 | | | | |
| 10 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.1 | 99.3 | 99.4 | 99.3 | | | | |
| 11 | 100.0 | 99.3 | 99.3 | 99.2 | 99.3 | 99.2 | 99.3 | 99.3 | 99.1 | 99.3 | 99.3 | 99.3 | | | | |
| 12 | 100.0 | 99.2 | 99.1 | 99.0 | 99.1 | 99.1 | 99.1 | 99.2 | 98.9 | 99.1 | 99.2 | 99.1 | | | | |
| 13 | 100.0 | 99.3 | 99.2 | 99.1 | 99.2 | 99.1 | 99.2 | 99.2 | 99.1 | 99.2 | 99.2 | 99.2 | | | | |
| 14 | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | 99.3 | 99.1 | 99.3 | 99.3 | 99.3 | | | | |
| 15 | 100.0 | 99.4 | 99.4 | 99.3 | 99.3 | 99.3 | 99.3 | 99.3 | 99.2 | 99.3 | 99.3 | 99.3 | | | | |
| 16 | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | 99.2 | 99.1 | 99.2 | 99.3 | 99.2 | | | | |
| 17 | 100.0 | 99.5 | 99.5 | 99.4 | 99.5 | 99.4 | 99.5 | 99.5 | 99.4 | 99.5 | 99.6 | 99.5 | | | | |
| 18 | 100.0 | 99.3 | 99.3 | 99.1 | 99.2 | 99.1 | 99.2 | 99.2 | 99.1 | 99.2 | 99.3 | 99.2 | | | | |
| 19 | 100.0 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | 99.2 | 99.2 | 99.1 | 99.2 | 99.3 | 99.2 | | | | |
| 20 | 100.0 | 99.4 | 99.4 | 99.3 | 99.3 | 99.3 | 99.3 | 99.3 | 99.2 | 99.3 | 99.4 | 99.3 | | | | |
| 21 | 100.0 | 98.8 | 98.8 | 98.7 | 98.8 | 98.7 | 98.8 | 98.8 | 98.6 | 98.8 | 98.8 | 98.8 | | | | |
| 22 | 100.0 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.6 | 98.8 | 98.8 | 98.8 | | | | |
| 23 | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.8 | 98.6 | 98.8 | 98.8 | 98.7 | | | | |
| 24 | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 99.2 | 99.2 | 99.1 | 99.1 | 99.1 | 99.2 | 99.2 | 99.0 | 99.2 | 99.2 | 99.2 | | | | |
| Med. | 100.0 | 99.3 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 | 99.3 | 99.1 | 99.3 | 99.3 | 99.3 | | | | |
| σ | 0.00 | 0.25 | 0.24 | 0.24 | 0.25 | 0.23 | 0.24 | 0.24 | 0.23 | 0.23 | 0.24 | 0.23 | | | | |
| Min. | 100.0 | 98.7 | 98.7 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| Max. | 100.0 | 99.5 | 99.5 | 99.4 | 99.5 | 99.4 | 99.5 | 99.5 | 99.4 | 99.5 | 99.6 | 99.5 | | | | |

Data Set 10 : 120 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 121.1 °C |
| Actual Ambient Temperature [T _A] | 117.7 °C |
| Drive Current [I _f] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 10-4
Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0015 | 0.0017 | 0.0018 | 0.0017 | 0.0020 | 0.0022 | 0.0021 | 0.0025 | 0.0024 | 0.0029 | 0.0030 | | | | |
| 2 | 0.0000 | 0.0015 | 0.0015 | 0.0018 | 0.0016 | 0.0019 | 0.0022 | 0.0021 | 0.0025 | 0.0023 | 0.0029 | 0.0029 | | | | |
| 3 | 0.0000 | 0.0016 | 0.0017 | 0.0020 | 0.0017 | 0.0021 | 0.0022 | 0.0022 | 0.0025 | 0.0023 | 0.0028 | 0.0029 | | | | |
| 4 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0018 | 0.0020 | 0.0022 | 0.0022 | 0.0027 | 0.0028 | | | | |
| 5 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0015 | 0.0018 | 0.0018 | 0.0020 | 0.0023 | 0.0022 | 0.0028 | 0.0030 | | | | |
| 6 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0015 | 0.0018 | 0.0018 | 0.0021 | 0.0024 | 0.0023 | 0.0028 | 0.0029 | | | | |
| 7 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0020 | 0.0021 | 0.0023 | 0.0023 | 0.0027 | 0.0028 | | | | |
| 8 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0015 | 0.0018 | 0.0020 | 0.0019 | 0.0022 | 0.0022 | 0.0026 | 0.0028 | | | | |
| 9 | 0.0000 | 0.0015 | 0.0015 | 0.0014 | 0.0015 | 0.0018 | 0.0020 | 0.0020 | 0.0023 | 0.0023 | 0.0028 | 0.0030 | | | | |
| 10 | 0.0000 | 0.0016 | 0.0015 | 0.0016 | 0.0015 | 0.0018 | 0.0019 | 0.0019 | 0.0022 | 0.0022 | 0.0027 | 0.0028 | | | | |
| 11 | 0.0000 | 0.0016 | 0.0016 | 0.0016 | 0.0017 | 0.0019 | 0.0021 | 0.0021 | 0.0023 | 0.0022 | 0.0028 | 0.0029 | | | | |
| 12 | 0.0000 | 0.0017 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0021 | 0.0020 | 0.0022 | 0.0022 | 0.0027 | 0.0028 | | | | |
| 13 | 0.0000 | 0.0016 | 0.0017 | 0.0018 | 0.0017 | 0.0020 | 0.0022 | 0.0022 | 0.0024 | 0.0023 | 0.0028 | 0.0030 | | | | |
| 14 | 0.0000 | 0.0015 | 0.0015 | 0.0017 | 0.0016 | 0.0020 | 0.0022 | 0.0021 | 0.0025 | 0.0024 | 0.0029 | 0.0030 | | | | |
| 15 | 0.0000 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0018 | 0.0021 | 0.0021 | 0.0023 | 0.0023 | 0.0028 | 0.0030 | | | | |
| 16 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0019 | 0.0021 | 0.0021 | 0.0023 | 0.0023 | 0.0029 | 0.0029 | | | | |
| 17 | 0.0000 | 0.0014 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0021 | 0.0020 | 0.0023 | 0.0022 | 0.0027 | 0.0028 | | | | |
| 18 | 0.0000 | 0.0015 | 0.0016 | 0.0017 | 0.0016 | 0.0020 | 0.0022 | 0.0021 | 0.0026 | 0.0025 | 0.0030 | 0.0031 | | | | |
| 19 | 0.0000 | 0.0014 | 0.0014 | 0.0016 | 0.0015 | 0.0019 | 0.0022 | 0.0022 | 0.0025 | 0.0026 | 0.0032 | 0.0033 | | | | |
| 20 | 0.0000 | 0.0013 | 0.0014 | 0.0016 | 0.0015 | 0.0018 | 0.0020 | 0.0020 | 0.0024 | 0.0024 | 0.0029 | 0.0030 | | | | |
| 21 | 0.0000 | 0.0016 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0019 | 0.0019 | 0.0022 | 0.0021 | 0.0025 | 0.0025 | | | | |
| 22 | 0.0000 | 0.0016 | 0.0016 | 0.0017 | 0.0017 | 0.0018 | 0.0019 | 0.0019 | 0.0022 | 0.0020 | 0.0025 | 0.0025 | | | | |
| 23 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0019 | 0.0020 | 0.0020 | 0.0023 | 0.0021 | 0.0027 | 0.0027 | | | | |
| 24 | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0015 | 0.0018 | 0.0020 | 0.0020 | 0.0024 | 0.0021 | 0.0027 | 0.0028 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0015 | 0.0015 | 0.0017 | 0.0016 | 0.0019 | 0.0021 | 0.0020 | 0.0024 | 0.0023 | 0.0028 | 0.0029 | | | | |
| Med. | 0.0000 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0018 | 0.0020 | 0.0020 | 0.0023 | 0.0023 | 0.0028 | 0.0029 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | | | | |
| Min. | 0.0000 | 0.0013 | 0.0014 | 0.0014 | 0.0015 | 0.0018 | 0.0018 | 0.0019 | 0.0022 | 0.0020 | 0.0025 | 0.0025 | | | | |
| Max. | 0.0000 | 0.0017 | 0.0017 | 0.0020 | 0.0017 | 0.0021 | 0.0022 | 0.0022 | 0.0026 | 0.0026 | 0.0032 | 0.0033 | | | | |

Data Set 10 : 120 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 121.1 °C |
| Actual Ambient Temperature [T _A] | 117.7 °C |
| Drive Current [I _F] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 10-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2653 | 0.2638 | 0.2638 | 0.2639 | 0.2637 | 0.2640 | 0.2641 | 0.2640 | 0.2641 | 0.2640 | 0.2641 | 0.2641 | | | | |
| 2 | 0.2639 | 0.2625 | 0.2626 | 0.2628 | 0.2625 | 0.2628 | 0.2629 | 0.2629 | 0.2629 | 0.2629 | 0.2629 | 0.2630 | | | | |
| 3 | 0.2648 | 0.2632 | 0.2632 | 0.2633 | 0.2632 | 0.2634 | 0.2636 | 0.2634 | 0.2636 | 0.2635 | 0.2636 | 0.2636 | | | | |
| 4 | 0.2641 | 0.2626 | 0.2627 | 0.2628 | 0.2625 | 0.2628 | 0.2627 | 0.2627 | 0.2628 | 0.2627 | 0.2628 | 0.2628 | | | | |
| 5 | 0.2628 | 0.2613 | 0.2614 | 0.2615 | 0.2613 | 0.2615 | 0.2615 | 0.2615 | 0.2616 | 0.2615 | 0.2616 | 0.2616 | | | | |
| 6 | 0.2624 | 0.2610 | 0.2611 | 0.2613 | 0.2610 | 0.2612 | 0.2613 | 0.2612 | 0.2613 | 0.2613 | 0.2614 | 0.2614 | | | | |
| 7 | 0.2623 | 0.2608 | 0.2609 | 0.2610 | 0.2608 | 0.2610 | 0.2611 | 0.2610 | 0.2611 | 0.2610 | 0.2612 | 0.2612 | | | | |
| 8 | 0.2619 | 0.2605 | 0.2605 | 0.2606 | 0.2604 | 0.2606 | 0.2607 | 0.2607 | 0.2608 | 0.2607 | 0.2608 | 0.2608 | | | | |
| 9 | 0.2636 | 0.2621 | 0.2622 | 0.2624 | 0.2622 | 0.2624 | 0.2626 | 0.2624 | 0.2625 | 0.2624 | 0.2626 | 0.2625 | | | | |
| 10 | 0.2628 | 0.2612 | 0.2614 | 0.2615 | 0.2613 | 0.2615 | 0.2616 | 0.2615 | 0.2616 | 0.2615 | 0.2616 | 0.2616 | | | | |
| 11 | 0.2657 | 0.2641 | 0.2642 | 0.2644 | 0.2641 | 0.2643 | 0.2644 | 0.2644 | 0.2645 | 0.2644 | 0.2645 | 0.2645 | | | | |
| 12 | 0.2642 | 0.2625 | 0.2626 | 0.2627 | 0.2625 | 0.2628 | 0.2628 | 0.2628 | 0.2629 | 0.2628 | 0.2630 | 0.2630 | | | | |
| 13 | 0.2636 | 0.2620 | 0.2620 | 0.2621 | 0.2619 | 0.2621 | 0.2621 | 0.2621 | 0.2622 | 0.2621 | 0.2623 | 0.2622 | | | | |
| 14 | 0.2632 | 0.2617 | 0.2618 | 0.2618 | 0.2616 | 0.2618 | 0.2618 | 0.2618 | 0.2619 | 0.2618 | 0.2619 | 0.2620 | | | | |
| 15 | 0.2624 | 0.2609 | 0.2609 | 0.2611 | 0.2608 | 0.2611 | 0.2611 | 0.2610 | 0.2612 | 0.2611 | 0.2612 | 0.2612 | | | | |
| 16 | 0.2634 | 0.2619 | 0.2620 | 0.2621 | 0.2618 | 0.2621 | 0.2621 | 0.2621 | 0.2622 | 0.2621 | 0.2622 | 0.2623 | | | | |
| 17 | 0.2642 | 0.2628 | 0.2629 | 0.2630 | 0.2627 | 0.2630 | 0.2630 | 0.2630 | 0.2631 | 0.2630 | 0.2631 | 0.2631 | | | | |
| 18 | 0.2613 | 0.2598 | 0.2598 | 0.2599 | 0.2597 | 0.2600 | 0.2601 | 0.2600 | 0.2601 | 0.2600 | 0.2601 | 0.2601 | | | | |
| 19 | 0.2628 | 0.2614 | 0.2615 | 0.2616 | 0.2614 | 0.2616 | 0.2616 | 0.2616 | 0.2617 | 0.2616 | 0.2618 | 0.2618 | | | | |
| 20 | 0.2627 | 0.2614 | 0.2614 | 0.2615 | 0.2613 | 0.2615 | 0.2616 | 0.2616 | 0.2617 | 0.2616 | 0.2617 | 0.2617 | | | | |
| 21 | 0.2654 | 0.2638 | 0.2640 | 0.2641 | 0.2639 | 0.2642 | 0.2643 | 0.2642 | 0.2643 | 0.2642 | 0.2643 | 0.2643 | | | | |
| 22 | 0.2649 | 0.2633 | 0.2634 | 0.2635 | 0.2632 | 0.2635 | 0.2636 | 0.2635 | 0.2637 | 0.2636 | 0.2637 | 0.2637 | | | | |
| 23 | 0.2634 | 0.2619 | 0.2620 | 0.2621 | 0.2619 | 0.2621 | 0.2622 | 0.2621 | 0.2623 | 0.2621 | 0.2623 | 0.2623 | | | | |
| 24 | 0.2626 | 0.2611 | 0.2612 | 0.2613 | 0.2611 | 0.2614 | 0.2615 | 0.2614 | 0.2615 | 0.2615 | 0.2616 | 0.2615 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2635 | 0.2620 | 0.2621 | 0.2622 | 0.2620 | 0.2622 | 0.2623 | 0.2622 | 0.2623 | 0.2622 | 0.2623 | 0.2623 | | | | |
| Med. | 0.2634 | 0.2619 | 0.2620 | 0.2621 | 0.2619 | 0.2621 | 0.2621 | 0.2621 | 0.2622 | 0.2621 | 0.2623 | 0.2623 | | | | |
| σ | 0.0012 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0011 | 0.0011 | | | | |
| Min. | 0.2613 | 0.2598 | 0.2598 | 0.2599 | 0.2597 | 0.2600 | 0.2601 | 0.2600 | 0.2601 | 0.2600 | 0.2601 | 0.2601 | | | | |
| Max. | 0.2657 | 0.2641 | 0.2642 | 0.2644 | 0.2641 | 0.2643 | 0.2644 | 0.2644 | 0.2645 | 0.2644 | 0.2645 | 0.2645 | | | | |

Data Set 10 : 120 °C, 1200 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 121.1 °C |
| Actual Ambient Temperature [T _A] | 117.7 °C |
| Drive Current [I _f] | 1200 mA |
| Measurement Current | 1200 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

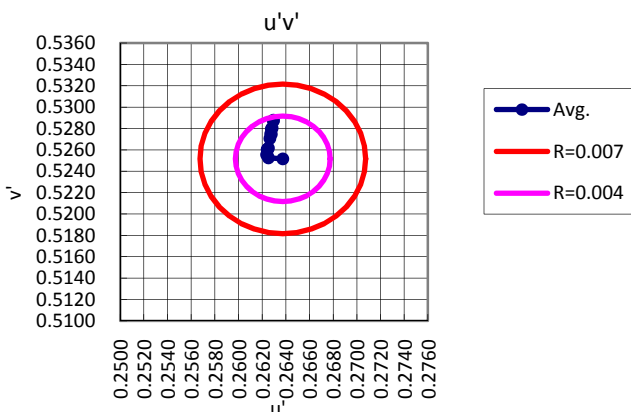
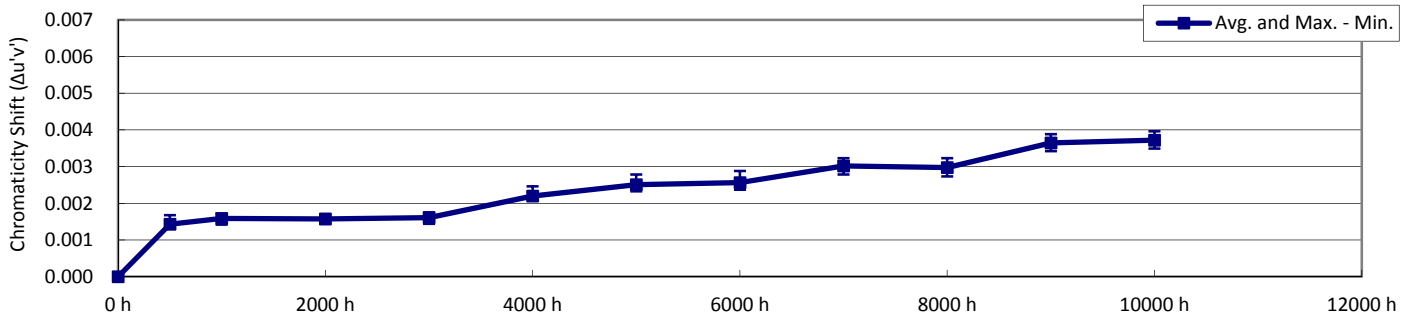
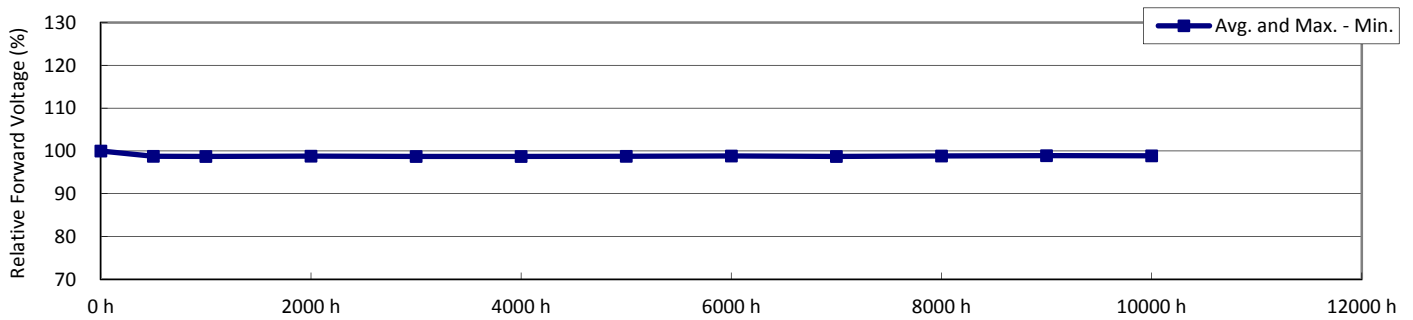
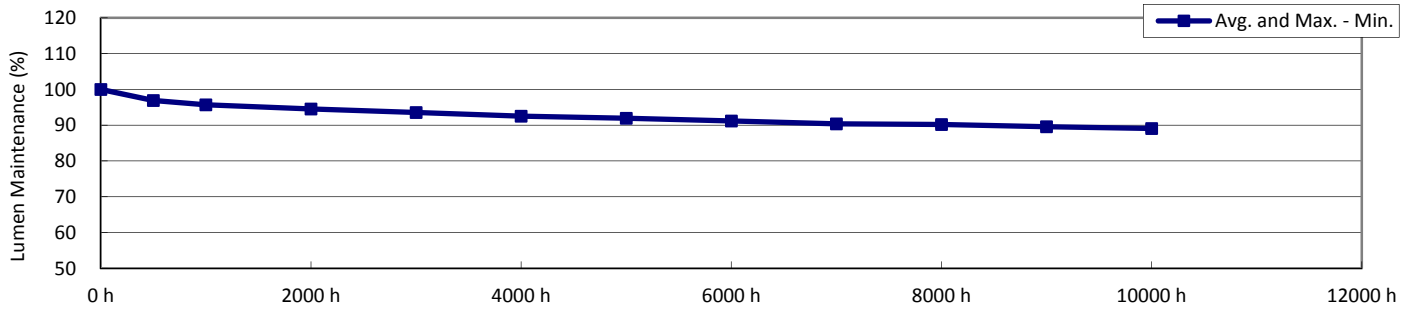
TABLE 10-6
Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5252 | 0.5254 | 0.5259 | 0.5264 | 0.5257 | 0.5267 | 0.5271 | 0.5269 | 0.5274 | 0.5272 | 0.5278 | 0.5279 | | | | |
| 2 | 0.5266 | 0.5270 | 0.5274 | 0.5280 | 0.5273 | 0.5282 | 0.5286 | 0.5285 | 0.5289 | 0.5287 | 0.5293 | 0.5294 | | | | |
| 3 | 0.5251 | 0.5253 | 0.5258 | 0.5264 | 0.5256 | 0.5266 | 0.5270 | 0.5268 | 0.5273 | 0.5270 | 0.5276 | 0.5277 | | | | |
| 4 | 0.5240 | 0.5240 | 0.5246 | 0.5250 | 0.5243 | 0.5252 | 0.5251 | 0.5254 | 0.5258 | 0.5257 | 0.5264 | 0.5265 | | | | |
| 5 | 0.5232 | 0.5233 | 0.5239 | 0.5243 | 0.5235 | 0.5245 | 0.5244 | 0.5247 | 0.5252 | 0.5250 | 0.5257 | 0.5259 | | | | |
| 6 | 0.5239 | 0.5240 | 0.5247 | 0.5250 | 0.5244 | 0.5253 | 0.5253 | 0.5256 | 0.5260 | 0.5259 | 0.5265 | 0.5266 | | | | |
| 7 | 0.5242 | 0.5242 | 0.5247 | 0.5251 | 0.5246 | 0.5255 | 0.5258 | 0.5258 | 0.5262 | 0.5261 | 0.5267 | 0.5268 | | | | |
| 8 | 0.5237 | 0.5236 | 0.5241 | 0.5246 | 0.5240 | 0.5249 | 0.5253 | 0.5252 | 0.5256 | 0.5255 | 0.5261 | 0.5263 | | | | |
| 9 | 0.5234 | 0.5233 | 0.5238 | 0.5242 | 0.5238 | 0.5247 | 0.5251 | 0.5250 | 0.5254 | 0.5254 | 0.5260 | 0.5262 | | | | |
| 10 | 0.5239 | 0.5238 | 0.5243 | 0.5248 | 0.5241 | 0.5251 | 0.5254 | 0.5253 | 0.5258 | 0.5257 | 0.5263 | 0.5264 | | | | |
| 11 | 0.5270 | 0.5271 | 0.5276 | 0.5280 | 0.5275 | 0.5283 | 0.5287 | 0.5286 | 0.5290 | 0.5288 | 0.5295 | 0.5296 | | | | |
| 12 | 0.5243 | 0.5241 | 0.5247 | 0.5251 | 0.5245 | 0.5255 | 0.5258 | 0.5257 | 0.5261 | 0.5260 | 0.5267 | 0.5268 | | | | |
| 13 | 0.5239 | 0.5238 | 0.5244 | 0.5249 | 0.5242 | 0.5252 | 0.5255 | 0.5255 | 0.5259 | 0.5257 | 0.5264 | 0.5265 | | | | |
| 14 | 0.5236 | 0.5236 | 0.5241 | 0.5246 | 0.5239 | 0.5250 | 0.5253 | 0.5252 | 0.5257 | 0.5255 | 0.5262 | 0.5263 | | | | |
| 15 | 0.5241 | 0.5240 | 0.5245 | 0.5250 | 0.5244 | 0.5254 | 0.5258 | 0.5257 | 0.5261 | 0.5260 | 0.5266 | 0.5268 | | | | |
| 16 | 0.5235 | 0.5234 | 0.5240 | 0.5245 | 0.5239 | 0.5249 | 0.5252 | 0.5251 | 0.5255 | 0.5254 | 0.5261 | 0.5262 | | | | |
| 17 | 0.5265 | 0.5266 | 0.5272 | 0.5276 | 0.5270 | 0.5279 | 0.5282 | 0.5281 | 0.5285 | 0.5284 | 0.5290 | 0.5291 | | | | |
| 18 | 0.5209 | 0.5208 | 0.5214 | 0.5219 | 0.5213 | 0.5224 | 0.5228 | 0.5226 | 0.5232 | 0.5230 | 0.5236 | 0.5238 | | | | |
| 19 | 0.5227 | 0.5227 | 0.5233 | 0.5237 | 0.5232 | 0.5242 | 0.5246 | 0.5245 | 0.5250 | 0.5250 | 0.5257 | 0.5258 | | | | |
| 20 | 0.5242 | 0.5242 | 0.5248 | 0.5253 | 0.5247 | 0.5256 | 0.5259 | 0.5259 | 0.5264 | 0.5263 | 0.5269 | 0.5270 | | | | |
| 21 | 0.5282 | 0.5282 | 0.5288 | 0.5291 | 0.5287 | 0.5295 | 0.5298 | 0.5297 | 0.5301 | 0.5299 | 0.5305 | 0.5305 | | | | |
| 22 | 0.5261 | 0.5261 | 0.5266 | 0.5270 | 0.5263 | 0.5273 | 0.5275 | 0.5274 | 0.5279 | 0.5276 | 0.5283 | 0.5283 | | | | |
| 23 | 0.5240 | 0.5240 | 0.5246 | 0.5250 | 0.5243 | 0.5254 | 0.5256 | 0.5255 | 0.5260 | 0.5257 | 0.5265 | 0.5265 | | | | |
| 24 | 0.5237 | 0.5237 | 0.5242 | 0.5247 | 0.5240 | 0.5251 | 0.5254 | 0.5253 | 0.5258 | 0.5255 | 0.5262 | 0.5263 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5244 | 0.5244 | 0.5250 | 0.5254 | 0.5248 | 0.5258 | 0.5261 | 0.5260 | 0.5265 | 0.5263 | 0.5269 | 0.5271 | | | | |
| Med. | 0.5240 | 0.5240 | 0.5246 | 0.5250 | 0.5244 | 0.5254 | 0.5256 | 0.5256 | 0.5260 | 0.5258 | 0.5265 | 0.5266 | | | | |
| σ | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | | | | |
| Min. | 0.5209 | 0.5208 | 0.5214 | 0.5219 | 0.5213 | 0.5224 | 0.5228 | 0.5226 | 0.5232 | 0.5230 | 0.5236 | 0.5238 | | | | |
| Max. | 0.5282 | 0.5282 | 0.5288 | 0.5291 | 0.5287 | 0.5295 | 0.5298 | 0.5297 | 0.5301 | 0.5299 | 0.5305 | 0.5305 | | | | |

Data Set 11 : 120 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _S] | 120.5 °C |
| Actual Ambient Temperature [T _A] | 117.5 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:
 T_S and T_A were measured during initial setup.
 Number of LED failures: 0



Data Set 11 : 120 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 120.5 °C |
| Actual Ambient Temperature [T _A] | 117.5 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 11-1
Initial Characteristics

| LED No. | Luminous flux | Forward voltage | CCT | Input Power | CIE1931 | | CIE1976 | | | | | |
|---------|---------------------|--------------------|---------------------|-------------|---------|--------|---------|--------|--|--|--|--|
| | Φ _V [lm] | V _F [V] | T _{CP} [K] | P [W] | x | y | u' | v' | | | | |
| 1 | 465 | 3.22 | 2694 | 4.83 | 0.457 | 0.404 | 0.263 | 0.524 | | | | |
| 2 | 471 | 3.22 | 2723 | 4.83 | 0.455 | 0.405 | 0.262 | 0.524 | | | | |
| 3 | 469 | 3.22 | 2683 | 4.83 | 0.457 | 0.404 | 0.264 | 0.524 | | | | |
| 4 | 469 | 3.22 | 2702 | 4.83 | 0.455 | 0.403 | 0.263 | 0.524 | | | | |
| 5 | 475 | 3.22 | 2749 | 4.83 | 0.452 | 0.403 | 0.261 | 0.523 | | | | |
| 6 | 466 | 3.22 | 2686 | 4.84 | 0.458 | 0.405 | 0.264 | 0.525 | | | | |
| 7 | 461 | 3.23 | 2630 | 4.84 | 0.464 | 0.409 | 0.266 | 0.528 | | | | |
| 8 | 459 | 3.22 | 2617 | 4.83 | 0.467 | 0.412 | 0.266 | 0.529 | | | | |
| 9 | 460 | 3.22 | 2666 | 4.83 | 0.460 | 0.407 | 0.264 | 0.526 | | | | |
| 10 | 461 | 3.22 | 2641 | 4.83 | 0.461 | 0.406 | 0.266 | 0.526 | | | | |
| 11 | 469 | 3.22 | 2724 | 4.83 | 0.453 | 0.402 | 0.262 | 0.523 | | | | |
| 12 | 471 | 3.22 | 2713 | 4.83 | 0.455 | 0.404 | 0.263 | 0.524 | | | | |
| 13 | 472 | 3.22 | 2702 | 4.83 | 0.456 | 0.404 | 0.263 | 0.524 | | | | |
| 14 | 468 | 3.22 | 2700 | 4.83 | 0.456 | 0.404 | 0.263 | 0.524 | | | | |
| 15 | 467 | 3.22 | 2698 | 4.84 | 0.456 | 0.404 | 0.263 | 0.524 | | | | |
| 16 | 467 | 3.22 | 2666 | 4.83 | 0.460 | 0.406 | 0.265 | 0.526 | | | | |
| 17 | 469 | 3.22 | 2686 | 4.83 | 0.461 | 0.410 | 0.263 | 0.527 | | | | |
| 18 | 460 | 3.22 | 2629 | 4.82 | 0.462 | 0.406 | 0.266 | 0.526 | | | | |
| 19 | 464 | 3.21 | 2634 | 4.82 | 0.463 | 0.408 | 0.266 | 0.527 | | | | |
| 20 | 468 | 3.21 | 2686 | 4.82 | 0.458 | 0.406 | 0.264 | 0.525 | | | | |
| 21 | 470 | 3.21 | 2693 | 4.82 | 0.458 | 0.407 | 0.263 | 0.526 | | | | |
| 22 | 468 | 3.21 | 2673 | 4.82 | 0.459 | 0.406 | 0.264 | 0.526 | | | | |
| 23 | 472 | 3.21 | 2708 | 4.82 | 0.456 | 0.405 | 0.263 | 0.525 | | | | |
| 24 | 470 | 3.21 | 2696 | 4.81 | 0.457 | 0.404 | 0.263 | 0.524 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 467 | 3.22 | 2683 | 4.83 | 0.458 | 0.406 | 0.264 | 0.525 | | | | |
| Med. | 468 | 3.22 | 2690 | 4.83 | 0.458 | 0.405 | 0.263 | 0.525 | | | | |
| σ | 4.3 | 0.005 | 33.5 | 0.007 | 0.0035 | 0.0024 | 0.0014 | 0.0014 | | | | |
| Min. | 459 | 3.21 | 2617 | 4.81 | 0.452 | 0.402 | 0.261 | 0.523 | | | | |
| Max. | 475 | 3.23 | 2749 | 4.84 | 0.467 | 0.412 | 0.266 | 0.529 | | | | |

Data Set 11 : 120 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _c] | 120.5 °C |
| Actual Ambient Temperature [T _A] | 117.5 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.
Number of LED failures: 0

TABLE 11-2
Lumen Maintenance

| LED No. | Lumen Maintenance % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 96.9 | 95.7 | 94.4 | 93.4 | 92.5 | 91.8 | 91.1 | 90.3 | 89.9 | 89.4 | 88.8 | | | | |
| 2 | 100.0 | 97.1 | 95.7 | 94.6 | 93.5 | 92.4 | 91.6 | 91.0 | 90.3 | 90.0 | 89.3 | 88.9 | | | | |
| 3 | 100.0 | 96.9 | 95.6 | 94.6 | 93.7 | 92.6 | 92.1 | 91.4 | 90.6 | 90.4 | 89.8 | 89.2 | | | | |
| 4 | 100.0 | 97.4 | 96.3 | 95.1 | 94.0 | 93.0 | 92.2 | 91.5 | 90.6 | 90.4 | 89.9 | 89.5 | | | | |
| 5 | 100.0 | 96.6 | 95.3 | 94.1 | 93.0 | 92.0 | 91.5 | 90.8 | 90.0 | 89.9 | 88.9 | 88.5 | | | | |
| 6 | 100.0 | 97.1 | 95.9 | 94.3 | 93.6 | 92.6 | 92.1 | 91.1 | 90.4 | 90.2 | 89.8 | 89.0 | | | | |
| 7 | 100.0 | 96.7 | 95.5 | 94.4 | 93.2 | 92.4 | 91.5 | 90.9 | 90.2 | 89.9 | 89.3 | 88.8 | | | | |
| 8 | 100.0 | 97.2 | 95.8 | 94.7 | 93.9 | 92.6 | 92.1 | 91.5 | 90.7 | 90.5 | 89.8 | 89.5 | | | | |
| 9 | 100.0 | 97.5 | 96.4 | 95.3 | 94.3 | 93.4 | 92.8 | 92.1 | 91.2 | 91.1 | 90.8 | 90.0 | | | | |
| 10 | 100.0 | 96.8 | 95.8 | 94.7 | 93.8 | 92.8 | 92.2 | 91.5 | 90.7 | 90.5 | 90.0 | 89.5 | | | | |
| 11 | 100.0 | 96.9 | 95.5 | 94.4 | 93.4 | 92.5 | 91.9 | 91.0 | 90.3 | 90.2 | 89.5 | 89.1 | | | | |
| 12 | 100.0 | 96.9 | 95.7 | 94.5 | 93.5 | 92.5 | 92.1 | 91.2 | 90.4 | 90.4 | 89.8 | 89.1 | | | | |
| 13 | 100.0 | 96.4 | 95.4 | 94.2 | 93.3 | 92.3 | 91.5 | 90.9 | 90.1 | 89.7 | 89.2 | 88.8 | | | | |
| 14 | 100.0 | 97.1 | 95.9 | 94.8 | 93.7 | 92.8 | 92.4 | 91.5 | 90.7 | 90.6 | 89.9 | 89.4 | | | | |
| 15 | 100.0 | 96.7 | 95.7 | 94.6 | 93.7 | 92.7 | 92.4 | 91.3 | 90.5 | 90.4 | 89.9 | 89.2 | | | | |
| 16 | 100.0 | 97.0 | 95.8 | 94.6 | 93.6 | 92.4 | 91.7 | 91.0 | 90.2 | 89.8 | 89.3 | 88.8 | | | | |
| 17 | 100.0 | 96.8 | 95.4 | 94.2 | 93.1 | 92.2 | 91.6 | 90.6 | 89.8 | 89.4 | 88.9 | 88.4 | | | | |
| 18 | 100.0 | 96.9 | 95.7 | 94.6 | 93.7 | 92.7 | 92.2 | 91.4 | 90.6 | 90.4 | 89.7 | 89.2 | | | | |
| 19 | 100.0 | 96.9 | 95.8 | 94.7 | 93.6 | 92.6 | 92.0 | 91.3 | 90.5 | 90.3 | 89.7 | 89.2 | | | | |
| 20 | 100.0 | 97.0 | 95.6 | 94.5 | 93.6 | 92.6 | 92.0 | 91.2 | 90.3 | 90.2 | 89.5 | 89.0 | | | | |
| 21 | 100.0 | 97.0 | 95.7 | 94.5 | 93.7 | 92.6 | 92.0 | 91.3 | 90.5 | 90.4 | 89.7 | 89.2 | | | | |
| 22 | 100.0 | 96.5 | 95.5 | 94.2 | 93.1 | 92.1 | 91.3 | 90.6 | 89.8 | 89.5 | 88.9 | 88.4 | | | | |
| 23 | 100.0 | 97.0 | 95.6 | 94.3 | 93.3 | 92.1 | 91.7 | 90.9 | 90.1 | 89.8 | 89.2 | 88.7 | | | | |
| 24 | 100.0 | 96.9 | 95.7 | 94.6 | 93.5 | 92.5 | 92.0 | 91.1 | 90.4 | 90.1 | 89.5 | 88.9 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 96.9 | 95.7 | 94.5 | 93.6 | 92.5 | 91.9 | 91.2 | 90.4 | 90.2 | 89.6 | 89.1 | | | | |
| Med. | 100.0 | 96.9 | 95.7 | 94.5 | 93.6 | 92.5 | 92.0 | 91.2 | 90.4 | 90.2 | 89.6 | 89.1 | | | | |
| σ | 0.00 | 0.25 | 0.26 | 0.28 | 0.30 | 0.30 | 0.35 | 0.33 | 0.33 | 0.39 | 0.43 | 0.38 | | | | |
| Min. | 100.0 | 96.4 | 95.3 | 94.1 | 93.0 | 92.0 | 91.3 | 90.6 | 89.8 | 89.4 | 88.9 | 88.4 | | | | |
| Max. | 100.0 | 97.5 | 96.4 | 95.3 | 94.3 | 93.4 | 92.8 | 92.1 | 91.2 | 91.1 | 90.8 | 90.0 | | | | |

TM-21 Projection

| Time | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| ln(Avg.) | -0.0840 | -0.0924 | -0.1011 | -0.1035 | -0.1102 | -0.1159 | | | | | | | | | | |

| Test duration used | 5000 h | to | 10000 h |
|----------------------------------|--------|-------|----------|
| B | | | 0.946 |
| α | | | 6.15E-06 |
| R ² | | | 0.980 |
| Calculated L ₇₀ (10K) | 49100 | hours | |
| Reported L ₇₀ (10K) | 49100 | hours | |
| Calculated L ₈₀ (10K) | 27300 | hours | |
| Reported L ₈₀ (10K) | 27300 | hours | |
| Calculated L ₉₀ (10K) | 8180 | hours | |
| Reported L ₉₀ (10K) | 8180 | hours | |

Curve-fit equation:

$$\Phi(t) = B \exp(-\alpha t)$$

Lumen maintenance life equation:

$$L_{70} = \ln(B/0.7)/\alpha$$

$$L_{80} = \ln(B/0.8)/\alpha$$

$$L_{90} = \ln(B/0.9)/\alpha$$

*The certificate shall not be reproduced, except in full, without written approval of the laboratory.
The laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.*

Data Set 11 : 120 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 120.5 °C |
| Actual Ambient Temperature [T _A] | 117.5 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 11-3
Forward Voltage

| LED No. | Relative Forward Voltage % (Normalized to 100 % at 0 hours) | | | | | | | | | | | | | | | |
|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 100.0 | 98.6 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.7 | 98.7 | 98.8 | 98.8 | 98.8 | | | | |
| 2 | 100.0 | 98.6 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.7 | 98.6 | 98.8 | 98.8 | 98.8 | | | | |
| 3 | 100.0 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.7 | 98.8 | 98.7 | | | | |
| 4 | 100.0 | 98.7 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.7 | 98.6 | 98.8 | 98.8 | 98.8 | | | | |
| 5 | 100.0 | 98.6 | 98.6 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | 98.8 | 98.8 | 98.8 | | | | |
| 6 | 100.0 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.7 | 98.6 | 98.7 | 98.8 | 98.7 | | | | |
| 7 | 100.0 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.7 | 98.8 | 98.7 | | | | |
| 8 | 100.0 | 98.8 | 98.7 | 98.8 | 98.8 | 98.7 | 98.8 | 98.8 | 98.7 | 98.9 | 99.0 | 98.9 | | | | |
| 9 | 100.0 | 98.8 | 98.7 | 98.8 | 98.7 | 98.7 | 98.8 | 98.8 | 98.7 | 98.9 | 98.9 | 98.9 | | | | |
| 10 | 100.0 | 98.8 | 98.7 | 98.8 | 98.7 | 98.7 | 98.8 | 98.8 | 98.7 | 98.9 | 98.9 | 98.9 | | | | |
| 11 | 100.0 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.8 | 98.9 | 98.9 | | | | |
| 12 | 100.0 | 98.7 | 98.6 | 98.7 | 98.6 | 98.6 | 98.7 | 98.7 | 98.6 | 98.8 | 98.8 | 98.8 | | | | |
| 13 | 100.0 | 98.7 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.8 | 98.8 | | | | |
| 14 | 100.0 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.8 | 98.8 | 98.8 | | | | |
| 15 | 100.0 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| 16 | 100.0 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.8 | 98.8 | 98.8 | | | | |
| 17 | 100.0 | 98.8 | 98.7 | 98.8 | 98.8 | 98.7 | 98.8 | 98.9 | 98.8 | 98.9 | 98.9 | 98.9 | | | | |
| 18 | 100.0 | 98.8 | 98.8 | 98.9 | 98.8 | 98.8 | 98.8 | 98.9 | 98.8 | 98.9 | 99.0 | 99.0 | | | | |
| 19 | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.8 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 20 | 100.0 | 98.9 | 98.8 | 98.9 | 98.8 | 98.8 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 21 | 100.0 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | 98.9 | 98.9 | 98.8 | 98.9 | 99.0 | 99.0 | | | | |
| 22 | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 23 | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| 24 | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 100.0 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.8 | 98.8 | 98.7 | 98.8 | 98.9 | 98.9 | | | | |
| Med. | 100.0 | 98.7 | 98.7 | 98.8 | 98.7 | 98.7 | 98.7 | 98.8 | 98.7 | 98.8 | 98.9 | 98.8 | | | | |
| σ | 0.00 | 0.11 | 0.10 | 0.10 | 0.11 | 0.10 | 0.10 | 0.11 | 0.11 | 0.10 | 0.10 | 0.11 | | | | |
| Min. | 100.0 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.6 | 98.7 | 98.6 | 98.7 | 98.7 | 98.7 | | | | |
| Max. | 100.0 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 98.9 | 99.0 | 98.9 | 99.0 | 99.0 | 99.0 | | | | |



Data Set 11 : 120 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 120.5 °C |
| Actual Ambient Temperature [T _A] | 117.5 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.
 Number of LED failures: 0

TABLE 11-4
 Chromaticity Shift

| LED No. | Chromaticity Shift Δu'v' | | | | | | | | | | | | | | | |
|---------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.0000 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0022 | 0.0025 | 0.0026 | 0.0031 | 0.0030 | 0.0036 | 0.0037 | | | | |
| 2 | 0.0000 | 0.0014 | 0.0017 | 0.0016 | 0.0017 | 0.0025 | 0.0028 | 0.0029 | 0.0032 | 0.0032 | 0.0039 | 0.0040 | | | | |
| 3 | 0.0000 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0022 | 0.0026 | 0.0025 | 0.0030 | 0.0030 | 0.0036 | 0.0037 | | | | |
| 4 | 0.0000 | 0.0014 | 0.0017 | 0.0017 | 0.0017 | 0.0022 | 0.0025 | 0.0026 | 0.0030 | 0.0030 | 0.0037 | 0.0038 | | | | |
| 5 | 0.0000 | 0.0013 | 0.0016 | 0.0015 | 0.0015 | 0.0022 | 0.0026 | 0.0026 | 0.0032 | 0.0031 | 0.0038 | 0.0039 | | | | |
| 6 | 0.0000 | 0.0015 | 0.0016 | 0.0015 | 0.0016 | 0.0022 | 0.0026 | 0.0026 | 0.0030 | 0.0031 | 0.0038 | 0.0038 | | | | |
| 7 | 0.0000 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0022 | 0.0025 | 0.0025 | 0.0029 | 0.0028 | 0.0034 | 0.0035 | | | | |
| 8 | 0.0000 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0022 | 0.0025 | 0.0025 | 0.0029 | 0.0029 | 0.0035 | 0.0035 | | | | |
| 9 | 0.0000 | 0.0015 | 0.0016 | 0.0016 | 0.0016 | 0.0021 | 0.0023 | 0.0024 | 0.0028 | 0.0027 | 0.0035 | 0.0035 | | | | |
| 10 | 0.0000 | 0.0015 | 0.0017 | 0.0017 | 0.0017 | 0.0022 | 0.0025 | 0.0025 | 0.0030 | 0.0030 | 0.0036 | 0.0037 | | | | |
| 11 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0021 | 0.0025 | 0.0025 | 0.0030 | 0.0030 | 0.0036 | 0.0038 | | | | |
| 12 | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0022 | 0.0026 | 0.0026 | 0.0030 | 0.0030 | 0.0038 | 0.0038 | | | | |
| 13 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0021 | 0.0024 | 0.0025 | 0.0030 | 0.0029 | 0.0036 | 0.0037 | | | | |
| 14 | 0.0000 | 0.0013 | 0.0016 | 0.0015 | 0.0015 | 0.0022 | 0.0024 | 0.0025 | 0.0030 | 0.0029 | 0.0036 | 0.0037 | | | | |
| 15 | 0.0000 | 0.0014 | 0.0016 | 0.0014 | 0.0014 | 0.0021 | 0.0025 | 0.0026 | 0.0031 | 0.0030 | 0.0037 | 0.0038 | | | | |
| 16 | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0017 | 0.0024 | 0.0027 | 0.0028 | 0.0032 | 0.0032 | 0.0039 | 0.0040 | | | | |
| 17 | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0017 | 0.0022 | 0.0026 | 0.0027 | 0.0031 | 0.0031 | 0.0038 | 0.0039 | | | | |
| 18 | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0021 | 0.0025 | 0.0025 | 0.0028 | 0.0028 | 0.0035 | 0.0036 | | | | |
| 19 | 0.0000 | 0.0014 | 0.0016 | 0.0015 | 0.0016 | 0.0021 | 0.0024 | 0.0025 | 0.0029 | 0.0028 | 0.0036 | 0.0036 | | | | |
| 20 | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0021 | 0.0025 | 0.0025 | 0.0030 | 0.0029 | 0.0036 | 0.0037 | | | | |
| 21 | 0.0000 | 0.0014 | 0.0015 | 0.0015 | 0.0015 | 0.0022 | 0.0024 | 0.0025 | 0.0029 | 0.0029 | 0.0036 | 0.0036 | | | | |
| 22 | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0023 | 0.0025 | 0.0026 | 0.0030 | 0.0029 | 0.0036 | 0.0037 | | | | |
| 23 | 0.0000 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0021 | 0.0025 | 0.0025 | 0.0030 | 0.0029 | 0.0036 | 0.0037 | | | | |
| 24 | 0.0000 | 0.0013 | 0.0015 | 0.0015 | 0.0017 | 0.0023 | 0.0025 | 0.0026 | 0.0030 | 0.0030 | 0.0037 | 0.0038 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0022 | 0.0025 | 0.0026 | 0.0030 | 0.0030 | 0.0036 | 0.0037 | | | | |
| Med. | 0.0000 | 0.0014 | 0.0016 | 0.0016 | 0.0016 | 0.0022 | 0.0025 | 0.0025 | 0.0030 | 0.0030 | 0.0036 | 0.0037 | | | | |
| σ | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | |
| Min. | 0.0000 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0021 | 0.0023 | 0.0024 | 0.0028 | 0.0027 | 0.0034 | 0.0035 | | | | |
| Max. | 0.0000 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0025 | 0.0028 | 0.0029 | 0.0032 | 0.0032 | 0.0039 | 0.0040 | | | | |

Data Set 11 : 120 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 120.5 °C |
| Actual Ambient Temperature [T _A] | 117.5 °C |
| Drive Current [I _f] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 11-5
Chromaticity

| LED No. | Chromaticity u' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.2622 | 0.2608 | 0.2609 | 0.2608 | 0.2608 | 0.2610 | 0.2612 | 0.2611 | 0.2612 | 0.2612 | 0.2612 | 0.2613 | | | | |
| 2 | 0.2609 | 0.2596 | 0.2597 | 0.2597 | 0.2597 | 0.2598 | 0.2599 | 0.2599 | 0.2600 | 0.2600 | 0.2601 | 0.2602 | | | | |
| 3 | 0.2631 | 0.2617 | 0.2619 | 0.2618 | 0.2618 | 0.2620 | 0.2622 | 0.2620 | 0.2622 | 0.2621 | 0.2623 | 0.2623 | | | | |
| 4 | 0.2620 | 0.2606 | 0.2606 | 0.2605 | 0.2605 | 0.2608 | 0.2609 | 0.2608 | 0.2610 | 0.2609 | 0.2611 | 0.2611 | | | | |
| 5 | 0.2599 | 0.2586 | 0.2587 | 0.2586 | 0.2586 | 0.2588 | 0.2589 | 0.2588 | 0.2589 | 0.2589 | 0.2591 | 0.2591 | | | | |
| 6 | 0.2625 | 0.2611 | 0.2613 | 0.2613 | 0.2612 | 0.2614 | 0.2616 | 0.2615 | 0.2616 | 0.2615 | 0.2618 | 0.2617 | | | | |
| 7 | 0.2647 | 0.2631 | 0.2634 | 0.2633 | 0.2632 | 0.2635 | 0.2636 | 0.2635 | 0.2637 | 0.2636 | 0.2638 | 0.2637 | | | | |
| 8 | 0.2647 | 0.2633 | 0.2635 | 0.2634 | 0.2634 | 0.2636 | 0.2638 | 0.2637 | 0.2638 | 0.2637 | 0.2639 | 0.2639 | | | | |
| 9 | 0.2632 | 0.2617 | 0.2619 | 0.2618 | 0.2618 | 0.2619 | 0.2622 | 0.2621 | 0.2622 | 0.2621 | 0.2624 | 0.2623 | | | | |
| 10 | 0.2645 | 0.2630 | 0.2631 | 0.2630 | 0.2630 | 0.2633 | 0.2633 | 0.2633 | 0.2634 | 0.2633 | 0.2635 | 0.2635 | | | | |
| 11 | 0.2611 | 0.2597 | 0.2599 | 0.2598 | 0.2598 | 0.2600 | 0.2600 | 0.2601 | 0.2602 | 0.2601 | 0.2602 | 0.2603 | | | | |
| 12 | 0.2616 | 0.2602 | 0.2603 | 0.2602 | 0.2603 | 0.2605 | 0.2607 | 0.2607 | 0.2607 | 0.2607 | 0.2609 | 0.2608 | | | | |
| 13 | 0.2619 | 0.2605 | 0.2607 | 0.2606 | 0.2606 | 0.2609 | 0.2609 | 0.2609 | 0.2610 | 0.2610 | 0.2611 | 0.2611 | | | | |
| 14 | 0.2618 | 0.2605 | 0.2606 | 0.2605 | 0.2605 | 0.2607 | 0.2608 | 0.2608 | 0.2609 | 0.2609 | 0.2610 | 0.2610 | | | | |
| 15 | 0.2622 | 0.2609 | 0.2610 | 0.2610 | 0.2610 | 0.2612 | 0.2614 | 0.2613 | 0.2614 | 0.2614 | 0.2616 | 0.2616 | | | | |
| 16 | 0.2631 | 0.2618 | 0.2620 | 0.2619 | 0.2618 | 0.2620 | 0.2622 | 0.2621 | 0.2622 | 0.2622 | 0.2624 | 0.2624 | | | | |
| 17 | 0.2618 | 0.2605 | 0.2607 | 0.2606 | 0.2606 | 0.2608 | 0.2609 | 0.2609 | 0.2610 | 0.2609 | 0.2611 | 0.2611 | | | | |
| 18 | 0.2652 | 0.2639 | 0.2640 | 0.2639 | 0.2639 | 0.2642 | 0.2643 | 0.2642 | 0.2644 | 0.2643 | 0.2644 | 0.2645 | | | | |
| 19 | 0.2645 | 0.2632 | 0.2633 | 0.2633 | 0.2632 | 0.2635 | 0.2635 | 0.2635 | 0.2637 | 0.2636 | 0.2637 | 0.2638 | | | | |
| 20 | 0.2623 | 0.2609 | 0.2610 | 0.2609 | 0.2609 | 0.2612 | 0.2612 | 0.2612 | 0.2613 | 0.2612 | 0.2615 | 0.2615 | | | | |
| 21 | 0.2622 | 0.2608 | 0.2610 | 0.2609 | 0.2609 | 0.2610 | 0.2612 | 0.2612 | 0.2613 | 0.2612 | 0.2614 | 0.2614 | | | | |
| 22 | 0.2629 | 0.2615 | 0.2617 | 0.2616 | 0.2616 | 0.2618 | 0.2619 | 0.2619 | 0.2620 | 0.2620 | 0.2621 | 0.2621 | | | | |
| 23 | 0.2615 | 0.2602 | 0.2604 | 0.2602 | 0.2602 | 0.2605 | 0.2606 | 0.2606 | 0.2607 | 0.2606 | 0.2607 | 0.2608 | | | | |
| 24 | 0.2625 | 0.2612 | 0.2613 | 0.2612 | 0.2611 | 0.2614 | 0.2616 | 0.2615 | 0.2616 | 0.2616 | 0.2616 | 0.2617 | | | | |
| | | | | | | | | | | | | | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.2626 | 0.2612 | 0.2614 | 0.2613 | 0.2613 | 0.2615 | 0.2616 | 0.2616 | 0.2617 | 0.2616 | 0.2618 | 0.2618 | | | | |
| Med. | 0.2623 | 0.2609 | 0.2610 | 0.2610 | 0.2610 | 0.2612 | 0.2613 | 0.2613 | 0.2614 | 0.2613 | 0.2616 | 0.2616 | | | | |
| σ | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | | | | |
| Min. | 0.2599 | 0.2586 | 0.2587 | 0.2586 | 0.2586 | 0.2588 | 0.2589 | 0.2588 | 0.2589 | 0.2589 | 0.2591 | 0.2591 | | | | |
| Max. | 0.2652 | 0.2639 | 0.2640 | 0.2639 | 0.2639 | 0.2642 | 0.2643 | 0.2642 | 0.2644 | 0.2643 | 0.2644 | 0.2645 | | | | |

Data Set 11 : 120 °C, 1500 mA

| | |
|--|----------|
| Actual Case Temperature [T _s] | 120.5 °C |
| Actual Ambient Temperature [T _A] | 117.5 °C |
| Drive Current [I _F] | 1500 mA |
| Measurement Current | 1500 mA |

NOTES:

T_S and T_A were measured during initial setup.

Number of LED failures: 0

TABLE 11-6
Chromaticity

| LED No. | Chromaticity v' | | | | | | | | | | | | | | | |
|---------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|
| | 0 h | 500 h | 1000 h | 2000 h | 3000 h | 4000 h | 5000 h | 6000 h | 7000 h | 8000 h | 9000 h | 10000 h | | | | |
| 1 | 0.5231 | 0.5235 | 0.5241 | 0.5239 | 0.5239 | 0.5250 | 0.5254 | 0.5255 | 0.5260 | 0.5259 | 0.5266 | 0.5267 | | | | |
| 2 | 0.5232 | 0.5238 | 0.5244 | 0.5243 | 0.5244 | 0.5254 | 0.5258 | 0.5259 | 0.5263 | 0.5263 | 0.5270 | 0.5271 | | | | |
| 3 | 0.5236 | 0.5240 | 0.5246 | 0.5245 | 0.5245 | 0.5255 | 0.5260 | 0.5259 | 0.5265 | 0.5264 | 0.5271 | 0.5272 | | | | |
| 4 | 0.5223 | 0.5226 | 0.5232 | 0.5231 | 0.5231 | 0.5241 | 0.5246 | 0.5246 | 0.5251 | 0.5251 | 0.5259 | 0.5260 | | | | |
| 5 | 0.5221 | 0.5224 | 0.5231 | 0.5229 | 0.5229 | 0.5240 | 0.5245 | 0.5245 | 0.5251 | 0.5250 | 0.5258 | 0.5259 | | | | |
| 6 | 0.5239 | 0.5243 | 0.5249 | 0.5248 | 0.5248 | 0.5258 | 0.5263 | 0.5263 | 0.5268 | 0.5268 | 0.5276 | 0.5276 | | | | |
| 7 | 0.5264 | 0.5269 | 0.5275 | 0.5273 | 0.5273 | 0.5282 | 0.5286 | 0.5286 | 0.5291 | 0.5290 | 0.5297 | 0.5298 | | | | |
| 8 | 0.5277 | 0.5283 | 0.5289 | 0.5288 | 0.5288 | 0.5296 | 0.5300 | 0.5300 | 0.5305 | 0.5304 | 0.5311 | 0.5311 | | | | |
| 9 | 0.5248 | 0.5250 | 0.5257 | 0.5255 | 0.5255 | 0.5265 | 0.5269 | 0.5269 | 0.5274 | 0.5273 | 0.5282 | 0.5282 | | | | |
| 10 | 0.5245 | 0.5248 | 0.5255 | 0.5253 | 0.5253 | 0.5263 | 0.5267 | 0.5267 | 0.5273 | 0.5272 | 0.5280 | 0.5281 | | | | |
| 11 | 0.5223 | 0.5225 | 0.5232 | 0.5230 | 0.5231 | 0.5241 | 0.5245 | 0.5246 | 0.5252 | 0.5251 | 0.5258 | 0.5260 | | | | |
| 12 | 0.5233 | 0.5236 | 0.5242 | 0.5241 | 0.5242 | 0.5252 | 0.5257 | 0.5257 | 0.5262 | 0.5262 | 0.5270 | 0.5270 | | | | |
| 13 | 0.5232 | 0.5235 | 0.5241 | 0.5240 | 0.5240 | 0.5251 | 0.5254 | 0.5255 | 0.5261 | 0.5260 | 0.5267 | 0.5268 | | | | |
| 14 | 0.5230 | 0.5233 | 0.5240 | 0.5238 | 0.5238 | 0.5249 | 0.5252 | 0.5253 | 0.5259 | 0.5258 | 0.5265 | 0.5266 | | | | |
| 15 | 0.5233 | 0.5237 | 0.5243 | 0.5241 | 0.5241 | 0.5252 | 0.5257 | 0.5257 | 0.5263 | 0.5262 | 0.5270 | 0.5271 | | | | |
| 16 | 0.5242 | 0.5248 | 0.5253 | 0.5252 | 0.5253 | 0.5263 | 0.5267 | 0.5268 | 0.5273 | 0.5273 | 0.5280 | 0.5281 | | | | |
| 17 | 0.5261 | 0.5267 | 0.5273 | 0.5272 | 0.5273 | 0.5281 | 0.5285 | 0.5286 | 0.5291 | 0.5291 | 0.5298 | 0.5299 | | | | |
| 18 | 0.5250 | 0.5254 | 0.5261 | 0.5259 | 0.5259 | 0.5269 | 0.5273 | 0.5273 | 0.5277 | 0.5277 | 0.5284 | 0.5285 | | | | |
| 19 | 0.5258 | 0.5262 | 0.5269 | 0.5267 | 0.5268 | 0.5277 | 0.5280 | 0.5281 | 0.5286 | 0.5285 | 0.5293 | 0.5293 | | | | |
| 20 | 0.5240 | 0.5243 | 0.5249 | 0.5248 | 0.5248 | 0.5258 | 0.5262 | 0.5262 | 0.5268 | 0.5267 | 0.5275 | 0.5276 | | | | |
| 21 | 0.5248 | 0.5251 | 0.5257 | 0.5256 | 0.5256 | 0.5266 | 0.5270 | 0.5271 | 0.5276 | 0.5275 | 0.5283 | 0.5283 | | | | |
| 22 | 0.5244 | 0.5247 | 0.5254 | 0.5253 | 0.5253 | 0.5264 | 0.5267 | 0.5268 | 0.5273 | 0.5272 | 0.5279 | 0.5280 | | | | |
| 23 | 0.5236 | 0.5239 | 0.5245 | 0.5244 | 0.5245 | 0.5255 | 0.5259 | 0.5259 | 0.5265 | 0.5264 | 0.5271 | 0.5272 | | | | |
| 24 | 0.5234 | 0.5237 | 0.5243 | 0.5242 | 0.5243 | 0.5254 | 0.5257 | 0.5258 | 0.5263 | 0.5263 | 0.5270 | 0.5271 | | | | |
| n | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | | |
| Avg. | 0.5241 | 0.5245 | 0.5251 | 0.5249 | 0.5250 | 0.5260 | 0.5264 | 0.5264 | 0.5270 | 0.5269 | 0.5276 | 0.5277 | | | | |
| Med. | 0.5238 | 0.5242 | 0.5248 | 0.5247 | 0.5247 | 0.5257 | 0.5261 | 0.5261 | 0.5267 | 0.5266 | 0.5273 | 0.5274 | | | | |
| σ | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | | | | |
| Min. | 0.5221 | 0.5224 | 0.5231 | 0.5229 | 0.5229 | 0.5240 | 0.5245 | 0.5245 | 0.5251 | 0.5250 | 0.5258 | 0.5259 | | | | |
| Max. | 0.5277 | 0.5283 | 0.5289 | 0.5288 | 0.5288 | 0.5296 | 0.5300 | 0.5300 | 0.5305 | 0.5304 | 0.5311 | 0.5311 | | | | |