



# IES LM-80-15 Test Report

For

## Beyond LED Technology

1939 Parker Court Suite C Stone Mountain, GA 30087

LED Chip

Model: SPMWH6229XXXXXXXXXX

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

No.1805, DongLiu road, BinJiang District, Hangzhou, China

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ17060021a

(All the test data in this report are come from original report No.HZ15120045c/R1 dated May25, 2017)

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

### Test specifications:

|                           |  |
|---------------------------|--|
| <b>Date of Receipt</b>    | : Dec. 20, 2015  |
| <b>Date of Test</b>       | : Dec. 20, 2015 to Jan. 20, 2017   |
| <b>Test item</b>          | : 9000 hours Lumen Maintenance, 9000 hours Chromaticity Shift                        |
| <b>Reference Standard</b> | : IES LM-80-2015 Approved Method for Measuring Lumen Maintenance of LED Light Source |

Review by:

Engineer: April Zou  
Jul. 24, 2017



Manager: Jim Zhang  
Jul. 24, 2017

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Quality Assured

**Test Summary**

Model Number: SPMWH6229AQ5SGW0SA(Nominal CCT 2700K, 100mA)

| Rated Ts (°C) | Measured Ts(°C) | Drive Current (A) | Number of LED Light Sources Tested | Average Lumen Maintenance (%) at 9000 hours | Average Chromaticity ( $\Delta u'v'$ ) at 9000 hours |
|---------------|-----------------|-------------------|------------------------------------|---|--|
| 55            | 54              | 0.10              | 20                                 | 94.6%                                       | 0.0048   |
| 85            | 84              | 0.10              | 20                                 | 93.4%                                       | 0.0059   |
| 105           | 104             | 0.10              | 20                                 | 89.7%                                       | 0.0065   |

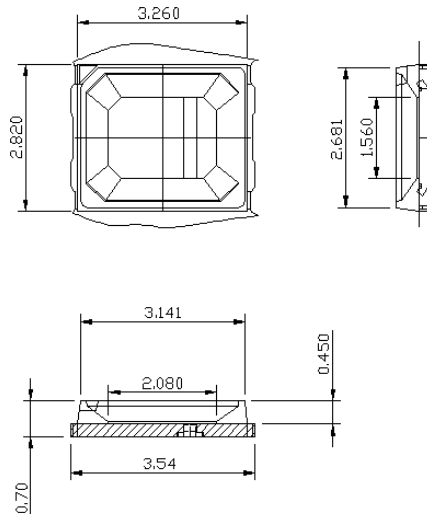
**IES LM-80-15 Test Report Requirement:**

**1. Number of LED Light Sources Tested**

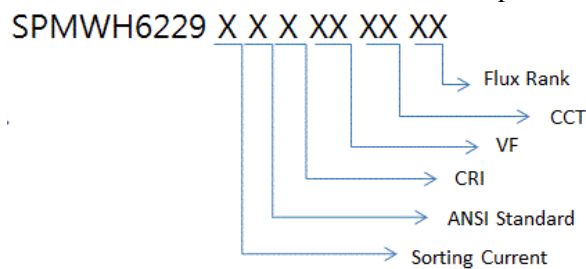
See test summary.

**2. Description of LED light sources**

Device under test is LED package with model number: SPMWH6229AQ5SGW0SA, Nominal CCT 2700K.



All models listed below cover in this report.



**3. Description of auxiliary equipment**

| Test Equipment                  | Model                        | Equipment No. | Calibration Date | Calibration Due Date |
|---------------------------------|------------------------------|---------------|------------------|----------------------|
| Lifetest thermal chamber        | NMT 830                      | HZTE021-04    | -                | -                    |
| Lifetest data recorder          | GRAPHTEC GL820               | HZTE010-06    | Dec. 25, 2016    | Dec. 24, 2017        |
| Photometric test current source | Itech IT6154                 | HZTE004-04    | Jul. 27, 2016    | Jul. 26, 2017        |
| Multi-meter                     | FLUKE15B                     | HZTE020-02    | Jul. 27, 2016    | Jul. 26, 2017        |
| Multi-meter                     | FLUKE15B                     | HZTE020-03    | Dec. 25, 2016    | Dec. 24, 2017        |
| Photometric test system         | 0.5m Integrate Sphere system | HZTE015-02    | Jul. 26, 2016    | Jul. 25, 2017        |
| Standard Lamp                   | 10W                          | HZTE012-03    | Jul. 26, 2016    | Jul. 25, 2017        |

#### 4. Operating cycle

LEDs are driven with a constant direct current (DC).

#### 5. Ambient conditions including airflow, temperature, and relative humidity

Ambient Temperature ( $T_a$ ): See Tables

Humidity: <65%

No force air flow

#### 6. Case temperatures (test point temperature)

In all cases, both  $T_s$  and  $T_a$  meet the IES LM-80-15 limits.



Ts Point (Cathode)

#### 7. Drive current of the LED light source during Lumen maintenance test.

See tables.

#### 8. Initial luminous flux and forward voltage at photometric measurement current

See tables.

#### 9. Lumen maintenance for data for each individual light source along with median value, standard deviation, minimum and maximum lumen maintenance value for all of the light sources

See tables.

#### 10. Observation of LED light source failures including the failure conditions and time of failure

No failures observed.

#### 11. LED light source monitoring interval

See tables

#### 12. Photometric measurement uncertainty

Flux measurement: 1.06% ( $k=2$ )

#### 13. Chromaticity shift reported over the measurement time

See tables.

#### 14. Sampling Method/Sample size

IES LM-80 tests require LED samples to be operated at drive current 100mA, three temperature 55°C, 85°C, and 105°C chosen by the LED manufacturer.

The LED samples are selected randomly from different production date of products. These samples are picked to represent a wide parametric distribution.

**Test Result:**

Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)

Case temperature: 55°C

Drive current: 0.10 A

Forward Voltage Data:

| Sample No.         | Vf(V) |       |       |       |       |       |       |       |       |       |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                    | 0h    | 1000h | 2000h | 3000h | 4000h | 5000h | 6000h | 7000h | 8000h | 9000h |
| 1                  | 9.27  | 9.25  | 9.22  | 9.17  | 9.19  | 9.20  | 9.18  | 9.17  | 9.21  | 9.23  |
| 2                  | 9.48  | 9.45  | 9.39  | 9.36  | 9.40  | 9.42  | 9.36  | 9.34  | 9.36  | 9.33  |
| 3                  | 9.34  | 9.34  | 9.33  | 9.28  | 9.30  | 9.32  | 9.30  | 9.29  | 9.33  | 9.36  |
| 4                  | 9.33  | 9.29  | 9.23  | 9.22  | 9.24  | 9.23  | 9.21  | 9.21  | 9.25  | 9.23  |
| 5                  | 9.37  | 9.37  | 9.33  | 9.33  | 9.37  | 9.40  | 9.39  | 9.37  | 9.40  | 9.39  |
| 6                  | 9.18  | 9.16  | 9.10  | 9.09  | 9.12  | 9.15  | 9.11  | 9.12  | 9.16  | 9.17  |
| 7                  | 9.13  | 9.10  | 9.08  | 9.04  | 9.08  | 9.13  | 9.09  | 9.08  | 9.14  | 9.13  |
| 8                  | 9.12  | 9.13  | 9.13  | 9.14  | 9.16  | 9.18  | 9.16  | 9.18  | 9.20  | 9.23  |
| 9                  | 9.21  | 9.20  | 9.16  | 9.14  | 9.13  | 9.14  | 9.09  | 9.09  | 9.14  | 9.15  |
| 10                 | 9.20  | 9.17  | 9.11  | 9.08  | 9.12  | 9.12  | 9.08  | 9.11  | 9.13  | 9.12  |
| 11                 | 9.29  | 9.25  | 9.21  | 9.19  | 9.19  | 9.21  | 9.21  | 9.24  | 9.27  | 9.26  |
| 12                 | 9.15  | 9.12  | 9.09  | 9.07  | 9.07  | 9.09  | 9.03  | 9.01  | 9.06  | 9.04  |
| 13                 | 9.25  | 9.24  | 9.20  | 9.20  | 9.25  | 9.27  | 9.25  | 9.24  | 9.29  | 9.30  |
| 14                 | 9.15  | 9.11  | 9.06  | 9.02  | 9.04  | 9.04  | 9.02  | 9.00  | 9.00  | 8.99  |
| 15                 | 9.22  | 9.22  | 9.20  | 9.18  | 9.23  | 9.27  | 9.23  | 9.22  | 9.27  | 9.28  |
| 16                 | 9.17  | 9.15  | 9.13  | 9.08  | 9.11  | 9.14  | 9.09  | 9.09  | 9.10  | 9.10  |
| 17                 | 9.26  | 9.21  | 9.20  | 9.16  | 9.15  | 9.15  | 9.12  | 9.15  | 9.16  | 9.15  |
| 18                 | 9.15  | 9.12  | 9.09  | 9.06  | 9.06  | 9.07  | 9.02  | 9.00  | 9.03  | 9.04  |
| 19                 | 9.20  | 9.17  | 9.13  | 9.08  | 9.10  | 9.12  | 9.08  | 9.07  | 9.08  | 9.05  |
| 20                 | 9.33  | 9.33  | 9.31  | 9.26  | 9.28  | 9.32  | 9.28  | 9.27  | 9.28  | 9.30  |
| Avg                | 9.24  | 9.22  | 9.19  | 9.16  | 9.18  | 9.20  | 9.17  | 9.16  | 9.19  | 9.19  |
| Median             | 9.21  | 9.20  | 9.16  | 9.14  | 9.15  | 9.15  | 9.12  | 9.15  | 9.16  | 9.17  |
| Standard Variation | 0.09  | 0.10  | 0.09  | 0.10  | 0.10  | 0.10  | 0.11  | 0.11  | 0.11  | 0.12  |
| Max                | 9.48  | 9.45  | 9.39  | 9.36  | 9.40  | 9.42  | 9.39  | 9.37  | 9.40  | 9.39  |
| Min                | 9.12  | 9.10  | 9.06  | 9.02  | 9.04  | 9.04  | 9.02  | 9.00  | 9.00  | 8.99  |

Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)

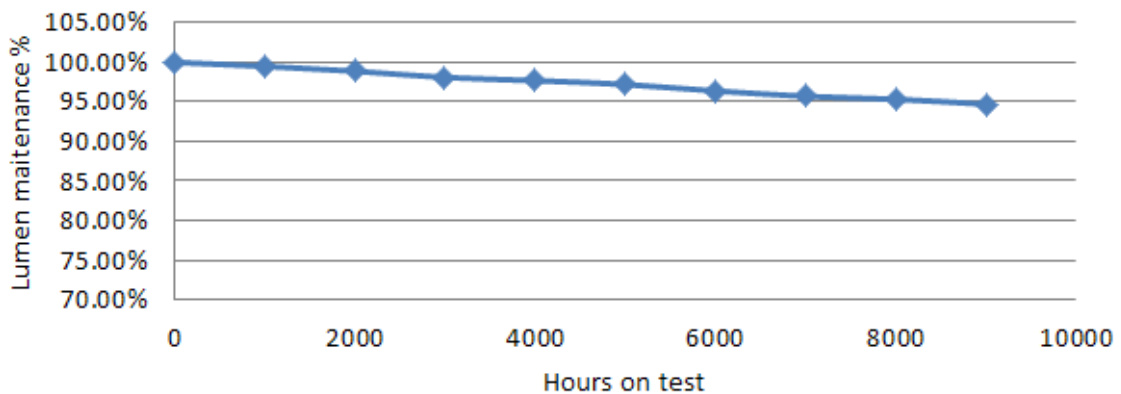
Case temperature: 55°C

Drive current: 0.10 A

Lumen Maintenance Data:

| Sample No.         | 0h     |           | Lumen Maintenance (%) |       |       |       |       |       |       |       |       |
|--------------------|--------|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|                    | Vf (V) | Flux (lm) | 1000h                 | 2000h | 3000h | 4000h | 5000h | 6000h | 7000h | 8000h | 9000h |
| 1                  | 9.27   | 97.29     | 98.4%                 | 98.1% | 97.6% | 96.7% | 96.3% | 96.3% | 95.6% | 95.0% | 94.4% |
| 2                  | 9.48   | 98.52     | 99.1%                 | 98.0% | 98.0% | 97.0% | 97.4% | 95.2% | 95.7% | 95.6% | 94.6% |
| 3                  | 9.34   | 100.46    | 99.0%                 | 98.6% | 99.0% | 97.1% | 96.3% | 95.3% | 95.6% | 95.4% | 94.6% |
| 4                  | 9.33   | 101.2     | 99.8%                 | 98.9% | 98.6% | 97.1% | 97.7% | 96.7% | 95.6% | 95.1% | 94.8% |
| 5                  | 9.37   | 96.7      | 99.4%                 | 97.9% | 98.5% | 97.7% | 96.5% | 96.3% | 95.8% | 95.3% | 94.4% |
| 6                  | 9.18   | 93.4      | 99.9%                 | 98.4% | 98.7% | 97.1% | 97.3% | 96.0% | 95.7% | 95.1% | 94.9% |
| 7                  | 9.13   | 95.21     | 98.9%                 | 98.0% | 99.0% | 96.8% | 96.5% | 95.7% | 96.0% | 95.5% | 94.8% |
| 8                  | 9.12   | 96.12     | 99.1%                 | 98.7% | 98.5% | 97.1% | 96.2% | 96.1% | 95.8% | 95.0% | 94.7% |
| 9                  | 9.21   | 98.74     | 99.5%                 | 97.8% | 98.9% | 97.1% | 96.6% | 96.4% | 96.0% | 95.2% | 95.0% |
| 10                 | 9.20   | 94.88     | 99.8%                 | 98.1% | 97.8% | 97.6% | 97.4% | 95.7% | 95.8% | 95.3% | 94.5% |
| 11                 | 9.29   | 99.56     | 98.8%                 | 97.7% | 98.6% | 96.8% | 96.9% | 95.9% | 96.0% | 95.3% | 94.6% |
| 12                 | 9.15   | 96.49     | 99.4%                 | 98.5% | 98.8% | 96.7% | 97.1% | 95.2% | 95.7% | 95.7% | 94.8% |
| 13                 | 9.25   | 98.29     | 99.5%                 | 98.8% | 99.0% | 97.0% | 96.8% | 96.1% | 95.7% | 95.7% | 94.7% |
| 14                 | 9.15   | 97.44     | 98.7%                 | 98.1% | 98.2% | 97.0% | 97.0% | 95.6% | 95.9% | 95.0% | 94.6% |
| 15                 | 9.22   | 98.28     | 99.9%                 | 98.0% | 98.0% | 97.6% | 96.9% | 96.4% | 95.9% | 95.1% | 94.5% |
| 16                 | 9.17   | 97.56     | 98.5%                 | 98.8% | 97.8% | 97.2% | 97.4% | 96.5% | 95.6% | 95.2% | 94.4% |
| 17                 | 9.26   | 98.52     | 98.5%                 | 98.1% | 98.4% | 97.5% | 96.3% | 95.2% | 95.8% | 95.5% | 94.5% |
| 18                 | 9.15   | 98.71     | 98.9%                 | 98.3% | 98.8% | 96.7% | 96.2% | 96.5% | 95.7% | 95.6% | 94.7% |
| 19                 | 9.20   | 97.82     | 98.8%                 | 98.9% | 98.9% | 96.5% | 97.7% | 96.5% | 95.8% | 95.2% | 94.5% |
| 20                 | 9.33   | 98.78     | 99.0%                 | 98.8% | 98.4% | 97.3% | 96.3% | 96.5% | 95.8% | 95.1% | 94.7% |
| Avg                | 9.24   | 97.70     | 99.1%                 | 98.3% | 98.5% | 97.1% | 96.8% | 96.0% | 95.8% | 95.3% | 94.6% |
| Median             | 9.21   | 97.82     | 99.1%                 | 98.1% | 98.6% | 97.1% | 96.9% | 96.1% | 95.8% | 95.3% | 94.6% |
| Standard Variation | 0.09   | 1.90      | 0.5%                  | 0.4%  | 0.5%  | 0.3%  | 0.5%  | 0.5%  | 0.1%  | 0.2%  | 0.2%  |
| Max                | 9.48   | 101.20    | 99.9%                 | 98.9% | 99.0% | 97.7% | 97.7% | 96.7% | 96.0% | 95.7% | 95.0% |
| Min                | 9.12   | 93.40     | 98.4%                 | 97.7% | 97.6% | 96.5% | 96.2% | 95.2% | 95.6% | 95.0% | 94.4% |

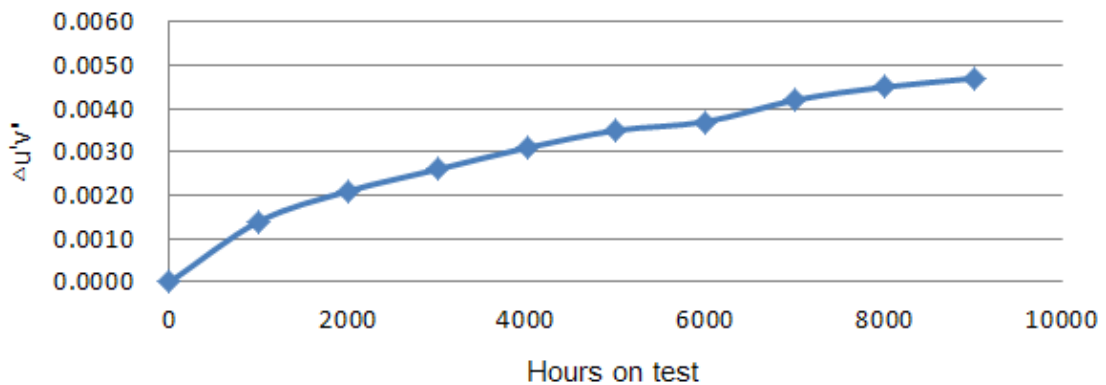
Lumen Maintenance 55 °C



Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)  
 Case temperature: 55°C  
 Drive current: 0.10 A  
 Chromaticity Shift Data:

| Sample No.         | 0h     |        |       | Chromaticity Shift |        |        |        |        |        |        |        |        |
|--------------------|--------|--------|-------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|
|                    | u'     | v'     | CCT K | 1000h              | 2000h  | 3000h  | 4000h  | 5000h  | 6000h  | 7000h  | 8000h  | 9000h  |
| 1                  | 0.2608 | 0.5312 | 2720  | 0.0022             | 0.0019 | 0.0024 | 0.0037 | 0.0030 | 0.0039 | 0.0038 | 0.0040 | 0.0046 |
| 2                  | 0.2623 | 0.5306 | 2691  | 0.0021             | 0.0027 | 0.0029 | 0.0035 | 0.0041 | 0.0046 | 0.0042 | 0.0047 | 0.0050 |
| 3                  | 0.2623 | 0.5303 | 2693  | 0.0024             | 0.0018 | 0.0029 | 0.0034 | 0.0031 | 0.0035 | 0.0038 | 0.0044 | 0.0047 |
| 4                  | 0.2619 | 0.5312 | 2697  | 0.0011             | 0.0020 | 0.0018 | 0.0038 | 0.0039 | 0.0031 | 0.0044 | 0.0040 | 0.0046 |
| 5                  | 0.2596 | 0.5300 | 2749  | 0.0019             | 0.0027 | 0.0021 | 0.0030 | 0.0037 | 0.0041 | 0.0040 | 0.0047 | 0.0045 |
| 6                  | 0.2606 | 0.5298 | 2730  | 0.0014             | 0.0019 | 0.0026 | 0.0037 | 0.0037 | 0.0039 | 0.0046 | 0.0043 | 0.0050 |
| 7                  | 0.2612 | 0.5298 | 2718  | 0.0021             | 0.0017 | 0.0019 | 0.0031 | 0.0033 | 0.0042 | 0.0043 | 0.0044 | 0.0050 |
| 8                  | 0.2600 | 0.5274 | 2753  | 0.0022             | 0.0027 | 0.0023 | 0.0031 | 0.0039 | 0.0044 | 0.0038 | 0.0047 | 0.0050 |
| 9                  | 0.2617 | 0.5306 | 2703  | 0.0010             | 0.0030 | 0.0031 | 0.0038 | 0.0034 | 0.0044 | 0.0045 | 0.0042 | 0.0052 |
| 10                 | 0.2630 | 0.5309 | 2677  | 0.0012             | 0.0029 | 0.0026 | 0.0039 | 0.0039 | 0.0041 | 0.0045 | 0.0043 | 0.0048 |
| 11                 | 0.2621 | 0.5316 | 2691  | 0.0022             | 0.0017 | 0.0027 | 0.0035 | 0.0031 | 0.0035 | 0.0046 | 0.0041 | 0.0047 |
| 12                 | 0.2635 | 0.5330 | 2658  | 0.0018             | 0.0029 | 0.0026 | 0.0039 | 0.0043 | 0.0040 | 0.0043 | 0.0047 | 0.0050 |
| 13                 | 0.2608 | 0.5312 | 2720  | 0.0027             | 0.0020 | 0.0021 | 0.0037 | 0.0042 | 0.0043 | 0.0044 | 0.0042 | 0.0046 |
| 14                 | 0.2626 | 0.5317 | 2681  | 0.0015             | 0.0020 | 0.0017 | 0.0030 | 0.0037 | 0.0043 | 0.0043 | 0.0047 | 0.0049 |
| 15                 | 0.2619 | 0.5316 | 2696  | 0.0014             | 0.0019 | 0.0020 | 0.0033 | 0.0033 | 0.0034 | 0.0039 | 0.0046 | 0.0049 |
| 16                 | 0.2589 | 0.531  | 2759  | 0.0024             | 0.0018 | 0.0020 | 0.0034 | 0.0033 | 0.0036 | 0.0046 | 0.0048 | 0.0047 |
| 17                 | 0.2615 | 0.5319 | 2702  | 0.0017             | 0.0023 | 0.0029 | 0.0037 | 0.0037 | 0.0045 | 0.0040 | 0.0048 | 0.0049 |
| 18                 | 0.2623 | 0.5325 | 2684  | 0.0011             | 0.0027 | 0.0017 | 0.0036 | 0.0031 | 0.0037 | 0.0039 | 0.0044 | 0.0047 |
| 19                 | 0.2612 | 0.5306 | 2714  | 0.0013             | 0.0028 | 0.0025 | 0.0033 | 0.0044 | 0.0044 | 0.0040 | 0.0047 | 0.0045 |
| 20                 | 0.2616 | 0.5307 | 2706  | 0.0024             | 0.0030 | 0.0031 | 0.0032 | 0.0041 | 0.0034 | 0.0040 | 0.0047 | 0.0047 |
| Avg                | 0.2615 | 0.5309 | 2707  | 0.0018             | 0.0023 | 0.0024 | 0.0035 | 0.0037 | 0.0040 | 0.0042 | 0.0045 | 0.0048 |
| Median             | 0.2617 | 0.5310 | 2702  | 0.0018             | 0.0020 | 0.0024 | 0.0035 | 0.0037 | 0.0041 | 0.0043 | 0.0044 | 0.0048 |
| Standard Variation | 0.0012 | 0.0012 | 27    | 0.0005             | 0.0005 | 0.0004 | 0.0003 | 0.0004 | 0.0004 | 0.0003 | 0.0003 | 0.0002 |
| Max                | 0.2635 | 0.5330 | 2759  | 0.0027             | 0.0030 | 0.0031 | 0.0039 | 0.0044 | 0.0046 | 0.0046 | 0.0048 | 0.0052 |
| Min                | 0.2589 | 0.5274 | 2658  | 0.0010             | 0.0017 | 0.0017 | 0.0030 | 0.0030 | 0.0031 | 0.0038 | 0.0040 | 0.0045 |

Chromaticity Shift at 55 °C





Quality Assured

Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)

Case temperature: 85°C

Drive current: 0.10 A

Forward Voltage Data:

| Sample No.         | Vf(V) |       |       |       |       |       |       |       |       |       |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                    | 0h    | 1000h | 2000h | 3000h | 4000h | 5000h | 6000h | 7000h | 8000h | 9000h |
| 1                  | 9.32  | 9.28  | 9.22  | 9.19  | 9.20  | 9.19  | 9.16  | 9.14  | 9.19  | 9.18  |
| 2                  | 9.34  | 9.35  | 9.30  | 9.26  | 9.28  | 9.28  | 9.23  | 9.20  | 9.25  | 9.25  |
| 3                  | 9.33  | 9.33  | 9.31  | 9.31  | 9.34  | 9.34  | 9.28  | 9.29  | 9.32  | 9.31  |
| 4                  | 9.18  | 9.17  | 9.13  | 9.13  | 9.16  | 9.20  | 9.15  | 9.18  | 9.18  | 9.20  |
| 5                  | 9.31  | 9.31  | 9.28  | 9.24  | 9.26  | 9.30  | 9.25  | 9.26  | 9.31  | 9.30  |
| 6                  | 9.26  | 9.22  | 9.20  | 9.20  | 9.23  | 9.26  | 9.23  | 9.21  | 9.22  | 9.24  |
| 7                  | 9.21  | 9.18  | 9.18  | 9.16  | 9.19  | 9.20  | 9.17  | 9.15  | 9.18  | 9.17  |
| 8                  | 9.29  | 9.25  | 9.19  | 9.15  | 9.14  | 9.13  | 9.07  | 9.04  | 9.08  | 9.06  |
| 9                  | 9.19  | 9.19  | 9.16  | 9.11  | 9.11  | 9.14  | 9.09  | 9.12  | 9.14  | 9.14  |
| 10                 | 9.19  | 9.20  | 9.18  | 9.18  | 9.23  | 9.24  | 9.23  | 9.20  | 9.23  | 9.24  |
| 11                 | 9.20  | 9.20  | 9.19  | 9.16  | 9.20  | 9.24  | 9.20  | 9.18  | 9.22  | 9.20  |
| 12                 | 9.19  | 9.16  | 9.11  | 9.08  | 9.11  | 9.13  | 9.08  | 9.06  | 9.11  | 9.13  |
| 13                 | 9.26  | 9.21  | 9.16  | 9.16  | 9.20  | 9.22  | 9.17  | 9.16  | 9.19  | 9.17  |
| 14                 | 9.18  | 9.15  | 9.12  | 9.12  | 9.13  | 9.14  | 9.09  | 9.12  | 9.13  | 9.12  |
| 15                 | 9.21  | 9.16  | 9.13  | 9.12  | 9.15  | 9.19  | 9.18  | 9.19  | 9.21  | 9.19  |
| 16                 | 9.26  | 9.26  | 9.22  | 9.18  | 9.23  | 9.23  | 9.22  | 9.23  | 9.23  | 9.24  |
| 17                 | 9.19  | 9.14  | 9.10  | 9.07  | 9.10  | 9.12  | 9.12  | 9.12  | 9.13  | 9.12  |
| 18                 | 9.19  | 9.14  | 9.11  | 9.08  | 9.11  | 9.15  | 9.15  | 9.14  | 9.18  | 9.16  |
| 19                 | 9.21  | 9.19  | 9.15  | 9.15  | 9.15  | 9.17  | 9.14  | 9.15  | 9.18  | 9.19  |
| 20                 | 9.28  | 9.25  | 9.21  | 9.21  | 9.20  | 9.22  | 9.17  | 9.17  | 9.22  | 9.24  |
| Avg                | 9.24  | 9.22  | 9.18  | 9.16  | 9.19  | 9.20  | 9.17  | 9.17  | 9.20  | 9.19  |
| Median             | 9.21  | 9.20  | 9.18  | 9.16  | 9.19  | 9.20  | 9.17  | 9.16  | 9.19  | 9.19  |
| Standard Variation | 0.06  | 0.06  | 0.06  | 0.06  | 0.07  | 0.06  | 0.06  | 0.06  | 0.06  | 0.06  |
| Max                | 9.34  | 9.35  | 9.31  | 9.31  | 9.34  | 9.34  | 9.28  | 9.29  | 9.32  | 9.31  |
| Min                | 9.18  | 9.14  | 9.10  | 9.07  | 9.10  | 9.12  | 9.07  | 9.04  | 9.08  | 9.06  |



Quality Assured

Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)

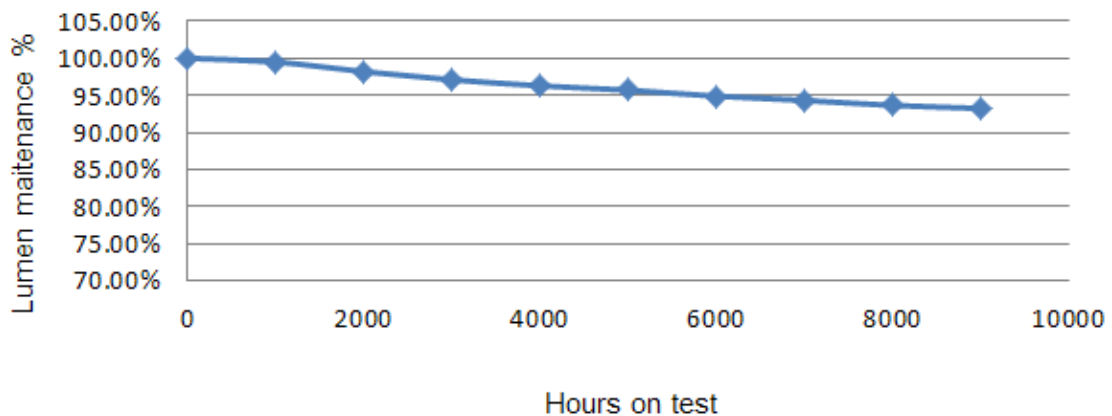
Case temperature: 85°C

Drive current: 0.10 A

Lumen Maintenance Data:

| Sample No.         | 0h     |           | Lumen Maintenance (%) |       |       |       |       |       |       |       |       |
|--------------------|--------|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|                    | Vf (V) | Flux (lm) | 1000h                 | 2000h | 3000h | 4000h | 5000h | 6000h | 7000h | 8000h | 9000h |
| 1                  | 9.32   | 101.23    | 99.1%                 | 98.6% | 97.3% | 95.9% | 95.9% | 95.0% | 94.2% | 93.9% | 93.5% |
| 2                  | 9.34   | 100.79    | 98.7%                 | 97.6% | 96.7% | 95.4% | 95.3% | 94.1% | 94.5% | 93.8% | 93.6% |
| 3                  | 9.33   | 101.38    | 98.4%                 | 98.4% | 96.5% | 95.4% | 95.5% | 94.1% | 94.4% | 93.9% | 93.2% |
| 4                  | 9.18   | 96.33     | 98.8%                 | 97.9% | 97.0% | 95.4% | 95.5% | 94.9% | 94.1% | 93.6% | 93.4% |
| 5                  | 9.31   | 97.27     | 99.2%                 | 97.4% | 97.3% | 95.3% | 95.6% | 94.4% | 94.1% | 93.9% | 93.2% |
| 6                  | 9.26   | 99.85     | 99.4%                 | 97.7% | 97.1% | 95.8% | 95.6% | 95.2% | 94.2% | 93.6% | 93.2% |
| 7                  | 9.21   | 97.05     | 98.6%                 | 98.5% | 96.3% | 96.2% | 94.7% | 94.0% | 94.4% | 93.6% | 93.5% |
| 8                  | 9.29   | 98.29     | 98.8%                 | 98.3% | 96.4% | 95.8% | 95.1% | 94.6% | 94.6% | 93.9% | 93.5% |
| 9                  | 9.19   | 97.94     | 98.8%                 | 98.5% | 96.2% | 95.2% | 95.7% | 95.0% | 94.1% | 93.5% | 93.5% |
| 10                 | 9.19   | 98.51     | 98.8%                 | 98.4% | 96.9% | 95.9% | 95.5% | 93.7% | 94.4% | 93.9% | 93.1% |
| 11                 | 9.20   | 97.51     | 99.5%                 | 97.1% | 96.4% | 95.2% | 95.0% | 94.4% | 94.5% | 94.0% | 93.2% |
| 12                 | 9.19   | 97.71     | 98.7%                 | 98.4% | 96.2% | 96.3% | 95.3% | 95.2% | 94.1% | 93.9% | 93.5% |
| 13                 | 9.26   | 97.29     | 98.8%                 | 97.1% | 96.2% | 95.5% | 94.9% | 94.7% | 94.2% | 94.0% | 93.4% |
| 14                 | 9.18   | 95.86     | 98.5%                 | 98.5% | 97.0% | 96.6% | 95.3% | 95.0% | 94.7% | 94.0% | 93.5% |
| 15                 | 9.21   | 97.48     | 99.5%                 | 97.9% | 96.6% | 95.1% | 95.1% | 94.3% | 94.5% | 93.7% | 93.5% |
| 16                 | 9.26   | 101.24    | 99.1%                 | 98.6% | 96.5% | 95.3% | 95.3% | 94.9% | 94.3% | 93.9% | 93.3% |
| 17                 | 9.19   | 99.05     | 99.2%                 | 98.0% | 97.1% | 96.1% | 94.8% | 93.7% | 94.4% | 93.6% | 93.5% |
| 18                 | 9.19   | 98.35     | 99.3%                 | 97.8% | 97.3% | 95.7% | 94.8% | 94.3% | 94.4% | 94.0% | 93.2% |
| 19                 | 9.21   | 97.93     | 99.7%                 | 97.4% | 96.2% | 96.3% | 95.0% | 94.0% | 94.3% | 94.0% | 93.3% |
| 20                 | 9.28   | 99.84     | 98.4%                 | 97.4% | 96.2% | 95.6% | 95.8% | 93.8% | 94.5% | 93.4% | 93.5% |
| Avg                | 9.24   | 98.55     | 99.0%                 | 98.0% | 96.7% | 95.7% | 95.3% | 94.5% | 94.3% | 93.8% | 93.4% |
| Median             | 9.21   | 97.94     | 98.8%                 | 98.0% | 96.6% | 95.7% | 95.3% | 94.4% | 94.4% | 93.9% | 93.4% |
| Standard Variation | 0.06   | 1.68      | 0.4%                  | 0.5%  | 0.4%  | 0.4%  | 0.3%  | 0.5%  | 0.2%  | 0.2%  | 0.2%  |
| Max                | 9.34   | 101.38    | 99.7%                 | 98.6% | 97.3% | 96.6% | 95.9% | 95.2% | 94.7% | 94.0% | 93.6% |
| Min                | 9.18   | 95.86     | 98.4%                 | 97.1% | 96.2% | 95.1% | 94.7% | 93.7% | 94.1% | 93.4% | 93.1% |

Lumen Maintenance 85 °C





Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)

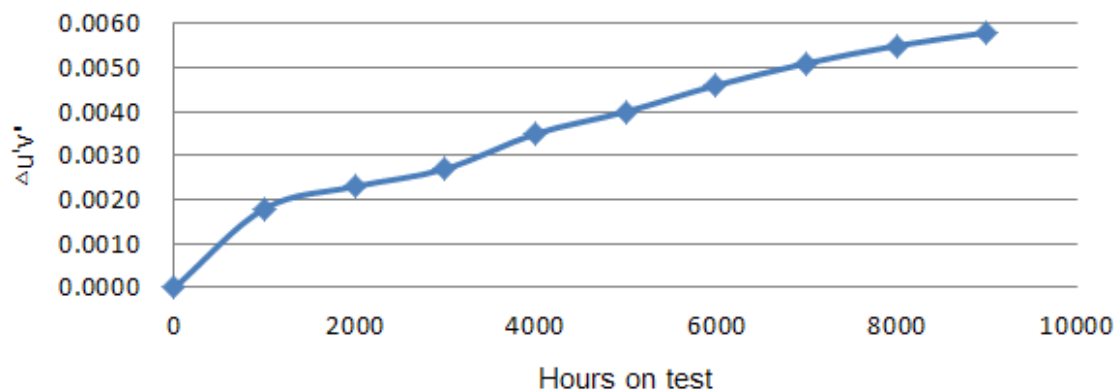
Case temperature: 85°C

Drive current: 0.10 A

Chromaticity Shift Data:

| Sample No.         | 0h     |        |       | Chromaticity Shift |        |        |        |        |        |        |        |        |
|--------------------|--------|--------|-------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|
|                    | u'     | v'     | CCT K | 1000h              | 2000h  | 3000h  | 4000h  | 5000h  | 6000h  | 7000h  | 8000h  | 9000h  |
| 1                  | 0.2603 | 0.5304 | 2733  | 0.0020             | 0.0027 | 0.0022 | 0.0031 | 0.0042 | 0.0040 | 0.0054 | 0.0054 | 0.0058 |
| 2                  | 0.2628 | 0.531  | 2680  | 0.0018             | 0.0028 | 0.0027 | 0.0036 | 0.0046 | 0.0053 | 0.0053 | 0.0058 | 0.0059 |
| 3                  | 0.2621 | 0.5306 | 2697  | 0.0018             | 0.0030 | 0.0029 | 0.0037 | 0.0046 | 0.0056 | 0.0054 | 0.0055 | 0.0058 |
| 4                  | 0.2619 | 0.5307 | 2700  | 0.0020             | 0.0019 | 0.0023 | 0.0034 | 0.0041 | 0.0046 | 0.0049 | 0.0056 | 0.0056 |
| 5                  | 0.261  | 0.5304 | 2718  | 0.0026             | 0.0020 | 0.0028 | 0.0037 | 0.0034 | 0.0038 | 0.0054 | 0.0057 | 0.0060 |
| 6                  | 0.2629 | 0.5307 | 2679  | 0.0013             | 0.0030 | 0.0022 | 0.0029 | 0.0044 | 0.0039 | 0.0047 | 0.0058 | 0.0062 |
| 7                  | 0.2602 | 0.5292 | 2741  | 0.0024             | 0.0024 | 0.0033 | 0.0037 | 0.0034 | 0.0044 | 0.0054 | 0.0055 | 0.0057 |
| 8                  | 0.2592 | 0.5304 | 2756  | 0.0022             | 0.0019 | 0.0026 | 0.0028 | 0.0036 | 0.0039 | 0.0054 | 0.0055 | 0.0061 |
| 9                  | 0.2613 | 0.5304 | 2712  | 0.0016             | 0.0021 | 0.0023 | 0.0037 | 0.0034 | 0.0053 | 0.0052 | 0.0059 | 0.0061 |
| 10                 | 0.2614 | 0.5297 | 2713  | 0.0026             | 0.0028 | 0.0019 | 0.0036 | 0.0036 | 0.0046 | 0.0053 | 0.0053 | 0.0061 |
| 11                 | 0.2634 | 0.5319 | 2664  | 0.0027             | 0.0031 | 0.0025 | 0.0031 | 0.0038 | 0.0057 | 0.0053 | 0.0060 | 0.0060 |
| 12                 | 0.2619 | 0.5319 | 2693  | 0.0018             | 0.0030 | 0.0030 | 0.0041 | 0.0037 | 0.0049 | 0.0050 | 0.0052 | 0.0058 |
| 13                 | 0.2634 | 0.5312 | 2666  | 0.0016             | 0.0030 | 0.0033 | 0.0029 | 0.0045 | 0.0039 | 0.0054 | 0.0055 | 0.0057 |
| 14                 | 0.2625 | 0.5324 | 2680  | 0.0025             | 0.0031 | 0.0023 | 0.0034 | 0.0034 | 0.0052 | 0.0052 | 0.0053 | 0.0059 |
| 15                 | 0.2621 | 0.5325 | 2688  | 0.0026             | 0.0019 | 0.0030 | 0.0041 | 0.0033 | 0.0057 | 0.0052 | 0.0052 | 0.0060 |
| 16                 | 0.261  | 0.5319 | 2713  | 0.0018             | 0.0028 | 0.0032 | 0.0031 | 0.0034 | 0.0041 | 0.0054 | 0.0058 | 0.0060 |
| 17                 | 0.2636 | 0.5317 | 2661  | 0.0019             | 0.0031 | 0.0031 | 0.0037 | 0.0043 | 0.0056 | 0.0053 | 0.0059 | 0.0060 |
| 18                 | 0.262  | 0.533  | 2689  | 0.0028             | 0.0020 | 0.0030 | 0.0036 | 0.0032 | 0.0056 | 0.0046 | 0.0053 | 0.0058 |
| 19                 | 0.2621 | 0.5312 | 2694  | 0.0019             | 0.0025 | 0.0025 | 0.0041 | 0.0039 | 0.0054 | 0.0053 | 0.0053 | 0.0061 |
| 20                 | 0.2609 | 0.5316 | 2715  | 0.0023             | 0.0018 | 0.0028 | 0.0036 | 0.0037 | 0.0054 | 0.0050 | 0.0055 | 0.0059 |
| Avg                | 0.2618 | 0.5311 | 2700  | 0.0021             | 0.0025 | 0.0027 | 0.0035 | 0.0038 | 0.0048 | 0.0052 | 0.0056 | 0.0059 |
| Median             | 0.2620 | 0.5310 | 2694  | 0.0020             | 0.0028 | 0.0027 | 0.0036 | 0.0037 | 0.0049 | 0.0053 | 0.0055 | 0.0060 |
| Standard Variation | 0.0012 | 0.0010 | 26    | 0.0004             | 0.0005 | 0.0004 | 0.0004 | 0.0005 | 0.0007 | 0.0002 | 0.0003 | 0.0002 |
| Max                | 0.2636 | 0.5330 | 2756  | 0.0028             | 0.0031 | 0.0033 | 0.0041 | 0.0046 | 0.0057 | 0.0054 | 0.0060 | 0.0062 |
| Min                | 0.2592 | 0.5292 | 2661  | 0.0013             | 0.0019 | 0.0019 | 0.0028 | 0.0032 | 0.0038 | 0.0046 | 0.0052 | 0.0056 |

Chromaticity Shift at 85 °C





Quality Assured

Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)

Case temperature: 105°C

Drive current: 0.10 A

Forward Voltage Data:

| Sample No.         | Vf(V) |       |       |       |       |       |       |       |       |       |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                    | 0h    | 1000h | 2000h | 3000h | 4000h | 5000h | 6000h | 7000h | 8000h | 9000h |
| 1                  | 9.21  | 9.21  | 9.17  | 9.16  | 9.19  | 9.22  | 9.17  | 9.19  | 9.25  | 9.24  |
| 2                  | 9.05  | 9.00  | 8.95  | 8.96  | 8.96  | 8.96  | 8.90  | 8.92  | 8.96  | 8.93  |
| 3                  | 9.14  | 9.10  | 9.08  | 9.06  | 9.08  | 9.11  | 9.09  | 9.08  | 9.08  | 9.06  |
| 4                  | 9.17  | 9.13  | 9.13  | 9.08  | 9.08  | 9.07  | 9.06  | 9.06  | 9.07  | 9.10  |
| 5                  | 9.18  | 9.17  | 9.16  | 9.12  | 9.15  | 9.18  | 9.13  | 9.10  | 9.10  | 9.08  |
| 6                  | 9.27  | 9.22  | 9.17  | 9.16  | 9.18  | 9.22  | 9.19  | 9.22  | 9.26  | 9.29  |
| 7                  | 9.20  | 9.16  | 9.11  | 9.08  | 9.11  | 9.15  | 9.11  | 9.10  | 9.11  | 9.10  |
| 8                  | 9.03  | 9.03  | 9.01  | 8.98  | 9.02  | 9.04  | 9.02  | 9.03  | 9.03  | 9.05  |
| 9                  | 9.27  | 9.23  | 9.22  | 9.21  | 9.24  | 9.27  | 9.25  | 9.25  | 9.29  | 9.29  |
| 10                 | 9.25  | 9.21  | 9.19  | 9.15  | 9.16  | 9.17  | 9.12  | 9.15  | 9.16  | 9.17  |
| 11                 | 9.22  | 9.18  | 9.12  | 9.10  | 9.14  | 9.13  | 9.10  | 9.11  | 9.16  | 9.17  |
| 12                 | 9.16  | 9.17  | 9.17  | 9.18  | 9.21  | 9.26  | 9.21  | 9.22  | 9.24  | 9.26  |
| 13                 | 9.21  | 9.21  | 9.18  | 9.14  | 9.13  | 9.17  | 9.16  | 9.19  | 9.23  | 9.22  |
| 14                 | 9.19  | 9.17  | 9.15  | 9.15  | 9.18  | 9.19  | 9.18  | 9.21  | 9.25  | 9.23  |
| 15                 | 9.35  | 9.34  | 9.30  | 9.29  | 9.30  | 9.33  | 9.30  | 9.31  | 9.36  | 9.35  |
| 16                 | 9.20  | 9.16  | 9.10  | 9.05  | 9.09  | 9.12  | 9.09  | 9.08  | 9.13  | 9.10  |
| 17                 | 9.31  | 9.30  | 9.28  | 9.27  | 9.30  | 9.32  | 9.28  | 9.27  | 9.30  | 9.28  |
| 18                 | 9.34  | 9.35  | 9.32  | 9.32  | 9.35  | 9.38  | 9.38  | 9.37  | 9.39  | 9.41  |
| 19                 | 9.28  | 9.28  | 9.23  | 9.24  | 9.23  | 9.25  | 9.23  | 9.22  | 9.23  | 9.21  |
| 20                 | 9.15  | 9.13  | 9.12  | 9.12  | 9.17  | 9.20  | 9.18  | 9.16  | 9.18  | 9.17  |
| Avg                | 9.21  | 9.19  | 9.16  | 9.14  | 9.16  | 9.19  | 9.16  | 9.16  | 9.19  | 9.19  |
| Median             | 9.21  | 9.18  | 9.17  | 9.15  | 9.16  | 9.18  | 9.16  | 9.19  | 9.23  | 9.21  |
| Standard Variation | 0.08  | 0.09  | 0.09  | 0.10  | 0.10  | 0.10  | 0.11  | 0.11  | 0.11  | 0.12  |
| Max                | 9.35  | 9.35  | 9.32  | 9.32  | 9.35  | 9.38  | 9.38  | 9.37  | 9.39  | 9.41  |
| Min                | 9.03  | 9.00  | 8.95  | 8.96  | 8.96  | 8.96  | 8.90  | 8.92  | 8.96  | 8.93  |



Quality Assured

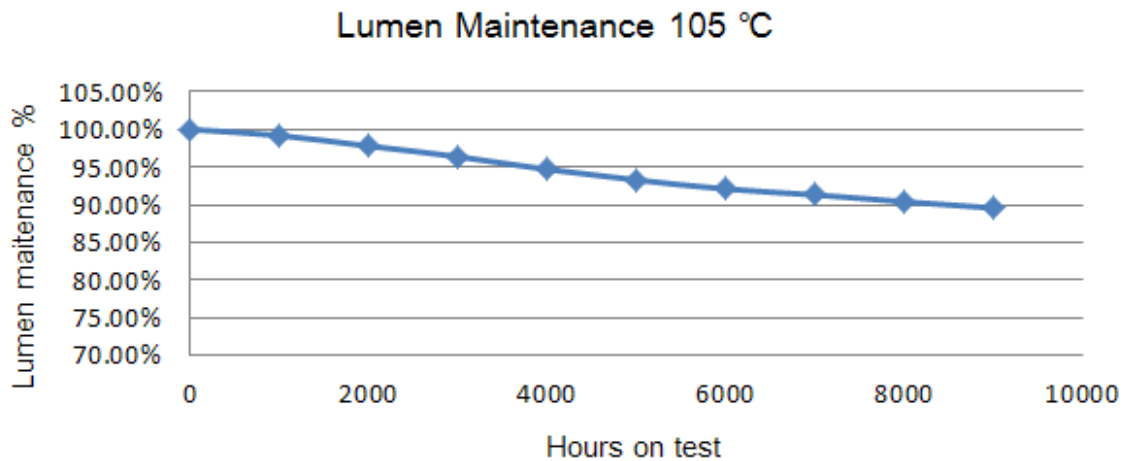
Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)

Case temperature: **105°C**

Drive current: **0.10 A**

Lumen Maintenance Data:

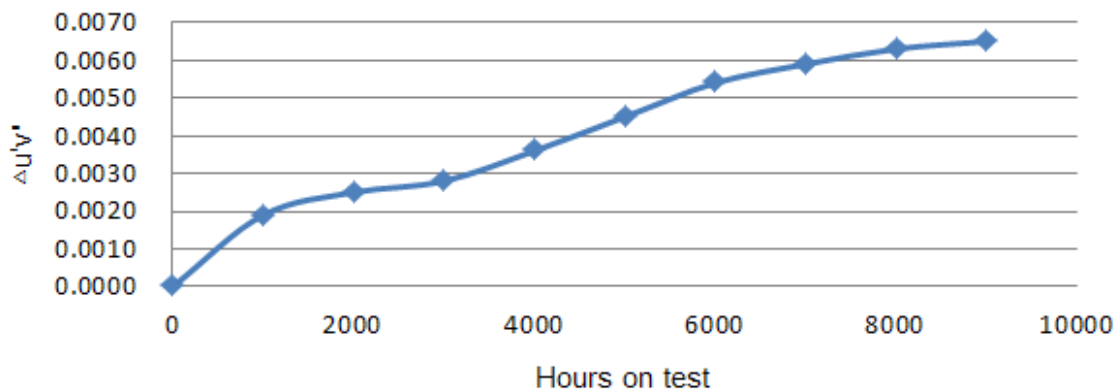
| Sample No.         | 0h    |           | Lumen Maintenance (%) |       |       |       |       |       |       |       |       |
|--------------------|-------|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|                    | Vf(V) | Flux (lm) | 1000h                 | 2000h | 3000h | 4000h | 5000h | 6000h | 7000h | 8000h | 9000h |
| 1                  | 9.21  | 99.63     | 98.8%                 | 97.1% | 96.4% | 93.7% | 93.7% | 92.1% | 91.3% | 90.3% | 89.4% |
| 2                  | 9.05  | 94.49     | 98.2%                 | 97.7% | 96.2% | 93.8% | 93.5% | 91.4% | 91.1% | 90.2% | 89.4% |
| 3                  | 9.14  | 95.11     | 98.3%                 | 97.0% | 96.5% | 93.9% | 93.6% | 92.3% | 91.0% | 90.1% | 89.5% |
| 4                  | 9.17  | 95.52     | 98.7%                 | 97.9% | 96.4% | 94.5% | 93.4% | 91.8% | 91.2% | 90.6% | 90.0% |
| 5                  | 9.18  | 97.97     | 99.1%                 | 97.4% | 95.7% | 94.8% | 93.3% | 91.7% | 91.2% | 90.6% | 89.5% |
| 6                  | 9.27  | 100.45    | 98.4%                 | 97.5% | 95.5% | 94.2% | 93.5% | 91.9% | 91.1% | 90.2% | 89.7% |
| 7                  | 9.20  | 97.26     | 98.4%                 | 97.4% | 95.6% | 94.9% | 93.1% | 92.4% | 91.5% | 90.1% | 89.8% |
| 8                  | 9.03  | 92.81     | 99.5%                 | 97.6% | 95.7% | 93.6% | 93.2% | 91.3% | 91.2% | 90.5% | 89.5% |
| 9                  | 9.27  | 100.44    | 98.8%                 | 97.5% | 96.4% | 94.3% | 92.9% | 91.5% | 91.3% | 90.6% | 89.6% |
| 10                 | 9.25  | 97.06     | 99.5%                 | 97.5% | 95.6% | 94.5% | 93.3% | 92.5% | 91.4% | 90.4% | 89.7% |
| 11                 | 9.22  | 97.5      | 98.4%                 | 97.8% | 96.0% | 94.5% | 92.9% | 92.2% | 91.0% | 90.6% | 89.5% |
| 12                 | 9.16  | 96.4      | 99.4%                 | 97.1% | 95.9% | 93.8% | 93.0% | 92.3% | 90.9% | 90.1% | 89.6% |
| 13                 | 9.21  | 98.68     | 99.4%                 | 98.1% | 95.7% | 94.7% | 92.7% | 91.5% | 91.4% | 90.1% | 89.8% |
| 14                 | 9.19  | 97.9      | 98.3%                 | 97.3% | 95.9% | 94.9% | 92.6% | 92.1% | 91.5% | 90.7% | 89.6% |
| 15                 | 9.35  | 99.39     | 98.7%                 | 98.2% | 96.5% | 94.3% | 93.3% | 91.5% | 90.9% | 90.4% | 89.9% |
| 16                 | 9.20  | 97.79     | 98.7%                 | 98.0% | 96.3% | 93.9% | 92.9% | 91.8% | 91.4% | 90.3% | 90.0% |
| 17                 | 9.31  | 100.5     | 98.3%                 | 97.7% | 95.6% | 94.3% | 93.1% | 91.7% | 91.2% | 90.3% | 89.5% |
| 18                 | 9.34  | 100.5     | 98.8%                 | 97.6% | 96.0% | 95.0% | 92.9% | 91.9% | 90.9% | 90.2% | 89.9% |
| 19                 | 9.28  | 100.02    | 99.2%                 | 98.3% | 96.4% | 93.6% | 93.6% | 91.5% | 91.4% | 90.2% | 89.9% |
| 20                 | 9.15  | 95        | 98.7%                 | 97.4% | 96.2% | 93.9% | 93.0% | 91.6% | 91.3% | 90.4% | 89.7% |
| Avg                | 9.21  | 97.72     | 98.8%                 | 97.6% | 96.0% | 94.3% | 93.2% | 91.9% | 91.2% | 90.3% | 89.7% |
| Median             | 9.21  | 97.90     | 98.7%                 | 97.6% | 96.0% | 94.3% | 93.2% | 91.8% | 91.2% | 90.3% | 89.7% |
| Standard Variation | 0.08  | 2.25      | 0.4%                  | 0.4%  | 0.4%  | 0.5%  | 0.3%  | 0.4%  | 0.2%  | 0.2%  | 0.2%  |
| Max                | 9.35  | 100.50    | 99.5%                 | 98.3% | 96.5% | 95.0% | 93.7% | 92.5% | 91.5% | 90.7% | 90.0% |
| Min                | 9.03  | 92.81     | 98.2%                 | 97.0% | 95.5% | 93.6% | 92.6% | 91.3% | 90.9% | 90.1% | 89.4% |



Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)  
 Case temperature: **105°C**  
 Drive current: **0.10 A**  
 Chromaticity Shift Data:

| Sample No.         | 0h     |        |       | Chromaticity Shift |        |        |        |        |        |        |        |        |
|--------------------|--------|--------|-------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|
|                    | u'     | v'     | CCT K | 1000h              | 2000h  | 3000h  | 4000h  | 5000h  | 6000h  | 7000h  | 8000h  | 9000h  |
| 1                  | 0.2632 | 0.5309 | 2673  | 0.0023             | 0.0019 | 0.0028 | 0.0044 | 0.0047 | 0.0055 | 0.0060 | 0.0060 | 0.0063 |
| 2                  | 0.2612 | 0.5301 | 2715  | 0.0016             | 0.0024 | 0.0027 | 0.0030 | 0.0043 | 0.0059 | 0.0059 | 0.0060 | 0.0065 |
| 3                  | 0.262  | 0.5315 | 2694  | 0.0020             | 0.0025 | 0.0034 | 0.0043 | 0.0041 | 0.0059 | 0.0054 | 0.0059 | 0.0066 |
| 4                  | 0.2622 | 0.5298 | 2697  | 0.0020             | 0.0024 | 0.0024 | 0.0041 | 0.0051 | 0.0055 | 0.0059 | 0.0064 | 0.0067 |
| 5                  | 0.2625 | 0.5306 | 2687  | 0.0023             | 0.0021 | 0.0025 | 0.0040 | 0.0048 | 0.0049 | 0.0056 | 0.0064 | 0.0068 |
| 6                  | 0.2621 | 0.531  | 2693  | 0.0019             | 0.0023 | 0.0021 | 0.0035 | 0.0051 | 0.0049 | 0.0058 | 0.0062 | 0.0067 |
| 7                  | 0.2603 | 0.5295 | 2738  | 0.0021             | 0.0030 | 0.0024 | 0.0031 | 0.0051 | 0.0051 | 0.0061 | 0.0065 | 0.0067 |
| 8                  | 0.2616 | 0.5303 | 2708  | 0.0018             | 0.0033 | 0.0031 | 0.0040 | 0.0047 | 0.0062 | 0.0056 | 0.0062 | 0.0063 |
| 9                  | 0.2629 | 0.53   | 2681  | 0.0015             | 0.0028 | 0.0031 | 0.0031 | 0.0050 | 0.0054 | 0.0057 | 0.0062 | 0.0065 |
| 10                 | 0.2586 | 0.5289 | 2776  | 0.0018             | 0.0026 | 0.0025 | 0.0038 | 0.0042 | 0.0051 | 0.0058 | 0.0060 | 0.0068 |
| 11                 | 0.2613 | 0.5317 | 2706  | 0.0023             | 0.0028 | 0.0022 | 0.0031 | 0.0047 | 0.0052 | 0.0056 | 0.0063 | 0.0068 |
| 12                 | 0.2616 | 0.5316 | 2702  | 0.0023             | 0.0030 | 0.0034 | 0.0044 | 0.0041 | 0.0057 | 0.0062 | 0.0064 | 0.0065 |
| 13                 | 0.2607 | 0.5315 | 2721  | 0.0024             | 0.0030 | 0.0036 | 0.0042 | 0.0048 | 0.0051 | 0.0057 | 0.0064 | 0.0065 |
| 14                 | 0.2613 | 0.5313 | 2710  | 0.0019             | 0.0029 | 0.0033 | 0.0034 | 0.0051 | 0.0054 | 0.0059 | 0.0064 | 0.0064 |
| 15                 | 0.2634 | 0.5322 | 2663  | 0.0014             | 0.0025 | 0.0036 | 0.0038 | 0.0044 | 0.0049 | 0.0061 | 0.0059 | 0.0066 |
| 16                 | 0.2624 | 0.5313 | 2687  | 0.0014             | 0.0018 | 0.0026 | 0.0031 | 0.0044 | 0.0051 | 0.0055 | 0.0065 | 0.0063 |
| 17                 | 0.2621 | 0.5317 | 2691  | 0.0020             | 0.0035 | 0.0037 | 0.0032 | 0.0049 | 0.0059 | 0.0057 | 0.0062 | 0.0063 |
| 18                 | 0.2629 | 0.5319 | 2674  | 0.0015             | 0.0022 | 0.0031 | 0.0040 | 0.0052 | 0.0057 | 0.0060 | 0.0061 | 0.0066 |
| 19                 | 0.2627 | 0.5307 | 2682  | 0.0022             | 0.0034 | 0.0026 | 0.0043 | 0.0046 | 0.0055 | 0.0061 | 0.0065 | 0.0065 |
| 20                 | 0.2616 | 0.5316 | 2702  | 0.0016             | 0.0033 | 0.0030 | 0.0036 | 0.0044 | 0.0053 | 0.0059 | 0.0063 | 0.0068 |
| Avg                | 0.2618 | 0.5309 | 2700  | 0.0019             | 0.0025 | 0.0028 | 0.0036 | 0.0045 | 0.0054 | 0.0059 | 0.0063 | 0.0065 |
| Median             | 0.2621 | 0.5310 | 2694  | 0.0020             | 0.0026 | 0.0028 | 0.0038 | 0.0047 | 0.0054 | 0.0058 | 0.0062 | 0.0065 |
| Standard Variation | 0.0011 | 0.0009 | 26    | 0.0003             | 0.0005 | 0.0005 | 0.0005 | 0.0004 | 0.0004 | 0.0002 | 0.0002 | 0.0002 |
| Max                | 0.2634 | 0.5322 | 2776  | 0.0025             | 0.0035 | 0.0037 | 0.0044 | 0.0052 | 0.0063 | 0.0062 | 0.0065 | 0.0068 |
| Min                | 0.2586 | 0.5289 | 2663  | 0.0014             | 0.0018 | 0.0021 | 0.0030 | 0.0039 | 0.0048 | 0.0054 | 0.0059 | 0.0063 |

Chromaticity Shift at 105 °C



TM-21 Report:

| Table 1: Report at each LM-80 Test Condition                                 |               |  |               |  |               |
|--|---------------|--|---------------|--|---------------|
| Description of LED Light Source Tested (manufacturer, model, catalog number) |               | <b>SAMSUNG ELECTRONICS CO., LTD.</b><br>Model Number: SPMWH6229AQ5SGW0SA (Nominal CCT 2700K)<br>Drive current: <b>0.10 A</b> |               |  |               |
| Test Condition 1 - 55°C Case Temp  |               | Test Condition 2 - 85°C Case Temp  |               | Test Condition 3 - 105°C Case Temp               |               |
| Sample size  | 20            | Sample size  | 20            | Sample size                                      | 20            |
| Number of failures   | 0             | Number of failures   | 0             | Number of failures                               | 0             |
| DUT drive current used in the test (mA)                                      | 100           | DUT drive current used in the test (mA)  | 100           | DUT drive current used in the test (mA)          | 100           |
| Test duration (hours)  | 9,000         | Test duration (hours)  | 9,000         | Test duration (hours)                            | 9,000         |
| Test duration used for projection (hour to hour)                             | 4,000 - 9,000 | Test duration used for projection (hour to hour)   | 4,000 - 9,000 | Test duration used for projection (hour to hour) | 4,000 - 9,000 |
| Tested case temperature (°C)   | 55            | Tested case temperature (°C)   | 85            | Tested case temperature (°C)                     | 105           |
| $\alpha$   | 6.356E-06     | $\alpha$   | 6.666E-06     | $\alpha$   | 1.086E-05     |
| B  | 1.002         | B  | 0.989         | B  | 0.986         |
| Reported L70(9k) (hours)   | >54000        | Reported L70(9k) (hours)   | 52,000        | Reported L70(9k) (hours)                         | 32,000        |

End of the Report

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.