IES LM-80 Test Report

Report Issue Date : September 30, 2016 **Report Number :** I-150612-31-K-04

Testing Start Date : June 20, 2015 **Testing Completion Date :** August 16, 2016

Revision Number : 04 **Test Duration :** 9 000 h

Manufacturer Information :

Applicant : Seoul Semiconductor Co., LTD
Address : 97-11, Sandan-ro 163, Danwon-gu, Ansan, Gyeonggi-do, Korea 15429

Description of Test Samples :

Classification : LED Package
PKG Name : 3528
Part Number : STWxA12D-xx
Drive Current : 150 mA

Test Procedure :

IES LM-80-08 Approved Method for Measuring Lumen Maintenance of LED Light Sources

Tested by

InHoi SIM, Research Engineer

Approved by

YoungJoon WON, Laboratory Manager

The above testing certificate is the accredited test result by
Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

Seoul Semiconductor Testing Laboratory

97-11, Sandan-ro 163, Danwon-gu, Ansan, Gyeonggi-do, Korea 15429
Accredited by KOLAS, Republic of KOREA

1. Test Summary

Items	Nominal Case Temperature		
	55 ℃	85 ℃	105 ℃
Number of LED tested	20	20	20
Drive Current	150 mA	150 mA	150 mA
Measurment Current	150 mA	150 mA	150 mA
Test Duration	9 000 h	9 000 h	9 000 h
Actual Case Temperature	≥54.3 ℃	≥83.9 ℃	≥103.1 ℃
Actual Ambient Temperature	≥53.5 ℃	≥81.8 ℃	≥101.2 ℃
Air Flow Velocity	≤0.87 m/s	≤0.61 m/s	≤0.18 m/s
Averaged Initial Luminous Flux	56.6 lm	56.2 lm	56.5 lm
Averaged Initial CCT	2883 K	2696 K	2845 K
Averaged Forward Voltage	3.19 V	3.18 V	3.18 V
Averaged Lumen Maintenance	93.4 %	94.3 %	91.1 %
Averaged Chromacity Shift	0.003 3	0.002 9	0.002 2
α	2.962E-06	3.946E-06	7.943E-06
B	0.960	0.976	0.986
TM-21 Projection L_{70}	>54000	>54000	43000
TM-21 Projection L_{80}	>54000	50000	26000
TM-21 Projection L_{90}	22000	21000	12000

※ The results shown in this certificate refer only to the sample(s) tested unless otherwise stated.
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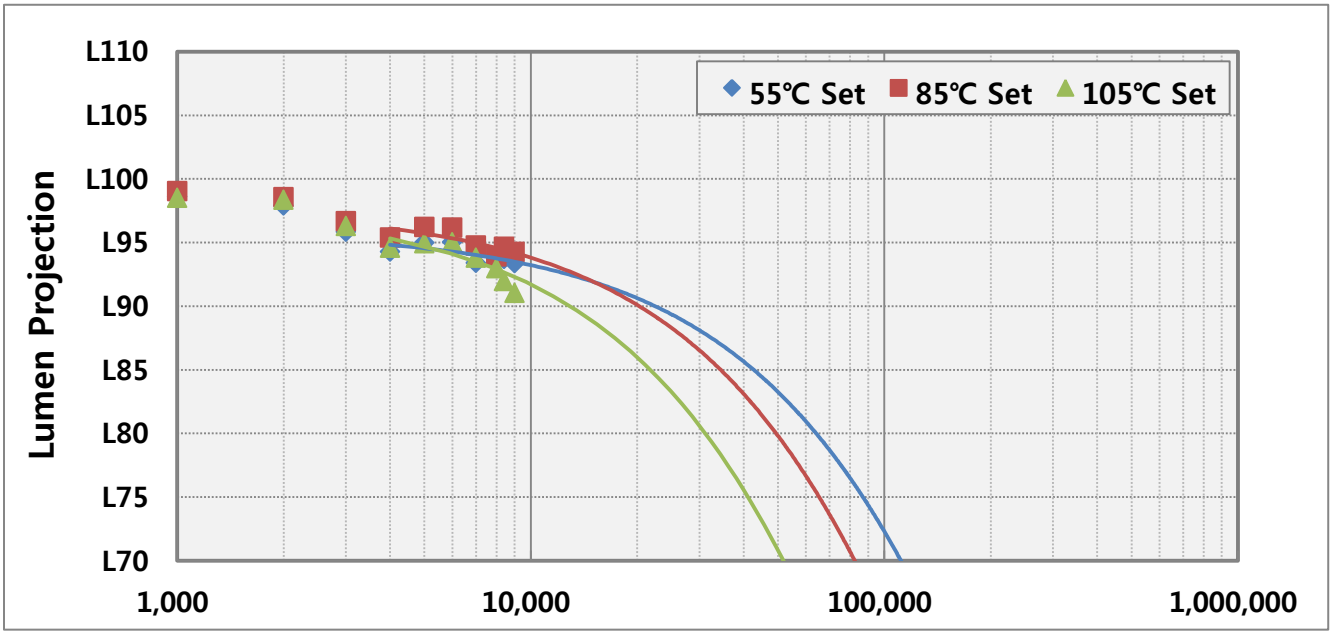


2. IES LM-80-08 Test Report Requirement :

Number of LED Light Sources Tested

See the Test Summary

Description of LED Light Sources

See the Description of Test samples at the cover of certificate

Description of auxiliary equipment

Active cooling Test System

Temperature controlling chamber for LED package/array/module consists of the water cooling heat-sink plates to control the case temperature of each device and of the power supply required by LM-80 test conditions.

Measurement System

Photometric measurement tester for LED package/array/module consists of the integrating sphere with temperature controlling system(TEC) and of programmable current source meter.

Operating Cycle

Constant Direct Current (DC)

Ambient Conditions Including Airflow, Temperature and Relative Humidity

Airflow : < 1 m/s

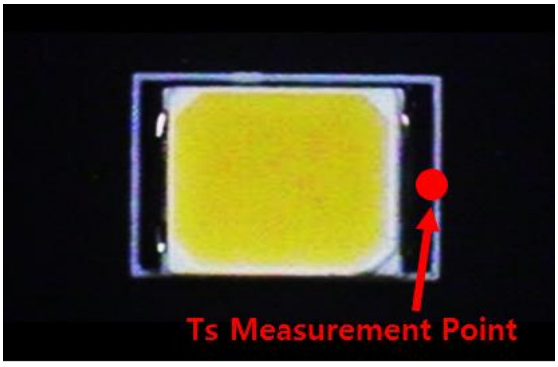
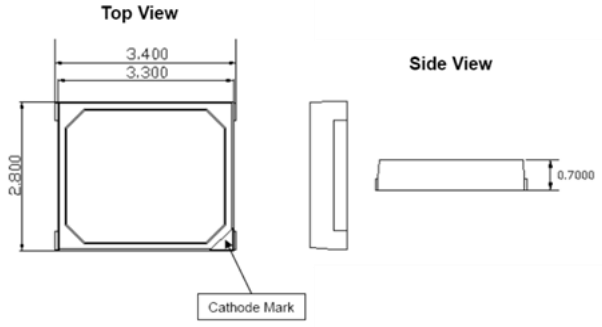
Ambient temperature : ≥ -5 ℃ of Nominal T_A

(See the Test Summary for actual T_A)

Relative Humidity : ≤ 65% RH

Case Temperature (Test Point Temperature)

See the figure below, for the case temperature (T_S) measurement point and dimension

Case Temperature Measurement Point	Package Dimension
	

Drive Current of the LED Light Source During Lifetime Test

See the Test Summary

Initial Luminous Flux and Forward Voltage at Photometric Measurement Current

See the Test Summary

Lumen Maintenance Data for Each Individual LED Light Source Along with Median Value, Standard Deviation, Minimum and Maximum Lumen Maintenance Value for All of the LED Light Sources

See the table of each data set

Observation of LED light Sources Failures

No failure observed

LED Light Source Monitoring Interval

See the table of each data set

Photometric Measurement Uncertainty

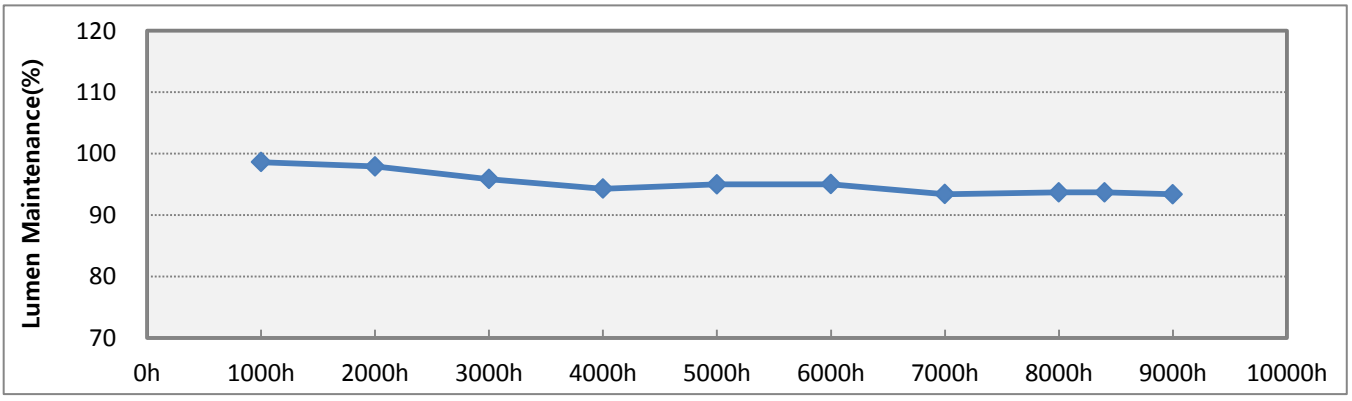
Seoul Semiconducr maintain a tolerance of ± 3.04 % at 95% confidence level (k = 2)

Chromaticity Shift Over the Measurement Time

See the table of each data set

3. 55℃ Data Set

No.	Initial Characteristics			Lumen Maintenance								
	Vf (V)	Flux (lm)	CCT (K)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	8400 h
01	3.19	53.08	2871	98.0	97.3	95.4	93.1	93.9	94.5	92.5	92.9	93.0
02	3.19	55.81	2877	98.3	97.6	95.4	93.7	94.4	94.9	93.0	93.3	93.3
03	3.18	56.89	2891	98.6	97.8	95.9	94.2	95.0	95.1	93.4	94.0	93.8
04	3.18	57.36	2879	98.8	98.3	96.2	94.7	95.4	95.5	93.6	94.0	93.7
05	3.17	57.34	2855	98.6	97.9	95.9	94.5	94.9	94.6	93.1	93.6	93.5
06	3.20	56.83	2896	98.8	98.3	96.2	94.7	95.0	94.8	93.6	93.7	93.9
07	3.21	56.32	2864	98.7	98.0	95.6	94.1	94.8	94.8	93.2	93.5	93.6
08	3.19	54.90	2869	98.0	97.2	95.2	93.2	94.2	94.6	92.4	93.0	92.8
09	3.21	56.62	2904	98.8	98.0	96.1	94.5	95.4	95.5	93.8	94.1	94.5
10	3.18	57.33	2892	99.1	98.2	96.4	94.9	95.4	95.4	93.8	94.2	94.0
11	3.17	57.51	2846	98.9	98.1	96.0	94.7	95.3	95.2	93.7	93.7	93.5
12	3.19	57.48	2871	99.2	98.6	96.4	95.1	95.8	95.7	94.3	94.8	94.6
13	3.19	57.56	2895	99.0	98.1	96.0	94.8	95.6	95.4	94.1	94.3	94.4
14	3.19	55.73	2943	98.3	97.6	95.6	93.9	94.7	95.1	92.9	93.2	93.2
15	3.18	56.60	2880	98.8	98.0	96.0	94.4	95.3	95.2	93.6	93.9	94.0
16	3.18	57.27	2899	99.0	98.5	96.5	95.0	95.4	95.4	93.9	94.4	94.4
17	3.19	56.94	2882	99.1	98.5	96.5	95.0	95.7	95.7	94.1	94.4	94.2
18	3.19	57.99	2871	98.5	97.7	95.4	93.9	94.8	94.6	93.0	93.1	93.1
19	3.19	57.13	2885	98.4	97.7	95.7	94.2	95.1	94.8	93.4	93.5	94.0
20	3.18	54.32	2895	97.3	96.5	94.6	93.2	93.8	93.7	92.3	92.3	92.4
Ave.	3.19	56.55	2883	98.6	97.9	95.8	94.3	95.0	95.0	93.4	93.7	93.7
Med.	3.19	56.92	2881	98.7	98.0	96.0	94.4	95.0	95.1	93.5	93.7	93.7
Min.	3.17	53.08	2846	97.3	96.5	94.6	93.1	93.8	93.7	92.3	92.3	92.4
Max.	3.21	57.99	2943	99.2	98.6	96.5	95.1	95.8	95.7	94.3	94.8	94.6
σ	0.01	1.24	21	0.5	0.5	0.5	0.6	0.6	0.5	0.6	0.6	0.6

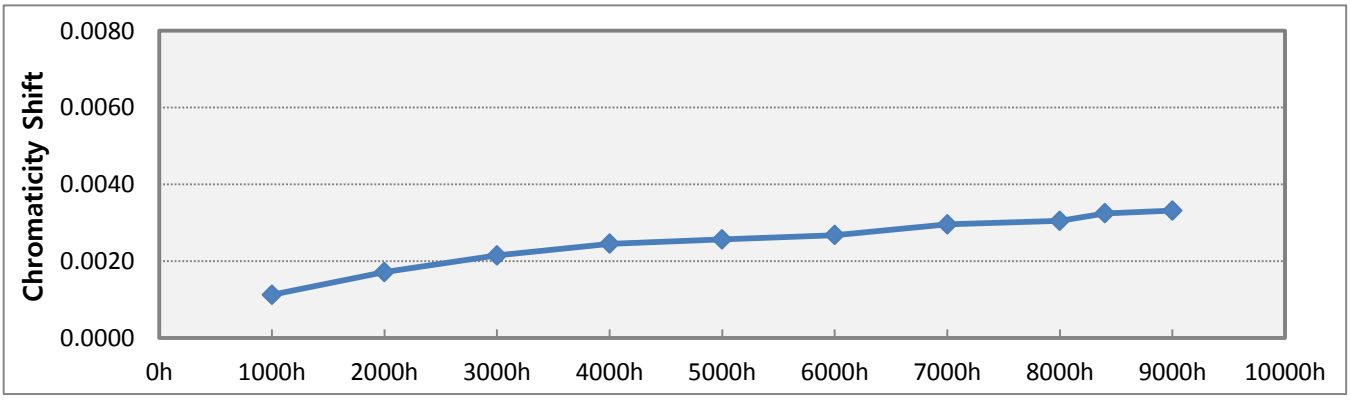


3. 55℃ Data Set

No.				Lumen Maintenance								
				9000 h								
01				93.2								
02				93.9								
03				93.5								
04				93.3								
05				92.8								
06				93.1								
07				93.2								
08				93.4								
09				94.4								
10				94.2								
11				93.1								
12				94.0								
13				94.1								
14				93.1								
15				93.4								
16				93.7								
17				93.8								
18				92.7								
19				93.0								
20				91.6								
21												
22												
23												
24												
25												
Ave.				93.4								
Med.				93.3								
Min.				91.6								
Max.				94.4								
σ				0.6								

3. 55℃ Data Set

No.	Initial Characteristics		Chromaticity Shift du'v'								
	CIE1976 u'	CIE1976 v'	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	8400 h
01	0.2562	0.5204	0.0013	0.0018	0.0022	0.0025	0.0026	0.0027	0.0030	0.0031	0.0031
02	0.2561	0.5198	0.0011	0.0016	0.0020	0.0022	0.0024	0.0024	0.0027	0.0028	0.0029
03	0.2554	0.5202	0.0013	0.0019	0.0025	0.0027	0.0026	0.0028	0.0031	0.0032	0.0034
04	0.2557	0.5209	0.0011	0.0016	0.0022	0.0025	0.0026	0.0026	0.0030	0.0031	0.0034
05	0.2568	0.5209	0.0012	0.0017	0.0022	0.0025	0.0028	0.0029	0.0031	0.0031	0.0034
06	0.2552	0.5198	0.0011	0.0017	0.0021	0.0024	0.0027	0.0029	0.0031	0.0032	0.0033
07	0.2563	0.5214	0.0010	0.0015	0.0017	0.0022	0.0022	0.0023	0.0026	0.0028	0.0030
08	0.2564	0.5196	0.0012	0.0019	0.0024	0.0027	0.0027	0.0028	0.0032	0.0032	0.0034
09	0.2552	0.5186	0.0011	0.0017	0.0020	0.0023	0.0024	0.0024	0.0027	0.0028	0.0028
10	0.2555	0.5195	0.0010	0.0016	0.0021	0.0023	0.0025	0.0026	0.0028	0.0029	0.0032
11	0.2572	0.5206	0.0012	0.0018	0.0022	0.0026	0.0026	0.0028	0.0030	0.0032	0.0035
12	0.2561	0.5206	0.0010	0.0016	0.0020	0.0023	0.0023	0.0024	0.0027	0.0026	0.0029
13	0.2555	0.5191	0.0012	0.0017	0.0021	0.0025	0.0025	0.0027	0.0029	0.0030	0.0033
14	0.2541	0.5166	0.0010	0.0016	0.0022	0.0024	0.0025	0.0026	0.0030	0.0032	0.0034
15	0.2561	0.5188	0.0011	0.0017	0.0021	0.0025	0.0026	0.0027	0.0029	0.0031	0.0032
16	0.2553	0.5192	0.0010	0.0016	0.0020	0.0022	0.0026	0.0027	0.0030	0.0030	0.0032
17	0.2558	0.5199	0.0010	0.0015	0.0018	0.0022	0.0023	0.0024	0.0026	0.0026	0.0028
18	0.2560	0.5212	0.0011	0.0018	0.0022	0.0027	0.0028	0.0029	0.0032	0.0034	0.0037
19	0.2555	0.5208	0.0011	0.0017	0.0022	0.0024	0.0026	0.0027	0.0029	0.0030	0.0031
20	0.2556	0.5187	0.0012	0.0021	0.0025	0.0030	0.0031	0.0031	0.0036	0.0037	0.0039
Ave.	0.2558	0.5198	0.0011	0.0017	0.0021	0.0025	0.0026	0.0027	0.0030	0.0030	0.0032
Med.	0.2558	0.5199	0.0011	0.0017	0.0021	0.0024	0.0026	0.0027	0.0030	0.0031	0.0032
Min.	0.2541	0.5166	0.0010	0.0015	0.0017	0.0022	0.0022	0.0023	0.0026	0.0026	0.0028
Max.	0.2572	0.5214	0.0013	0.0021	0.0025	0.0030	0.0031	0.0031	0.0036	0.0037	0.0039
σ	0.0007	0.0011	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003

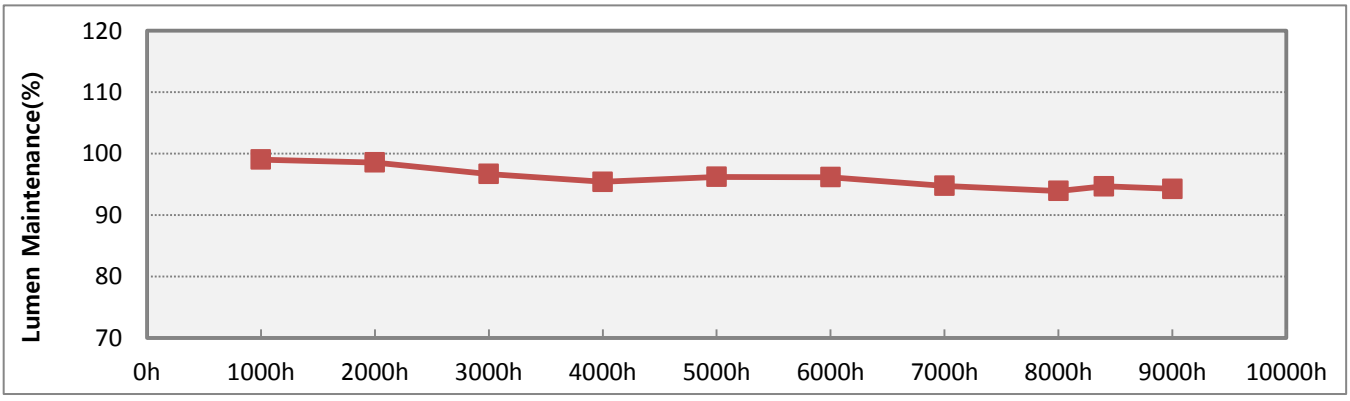


3. 55℃ Data Set

No.			Chromaticity Shift du'v'								
			9000 h								
01			0.0033								
02			0.0028								
03			0.0034								
04			0.0035								
05			0.0036								
06			0.0035								
07			0.0030								
08			0.0034								
09			0.0029								
10			0.0031								
11			0.0036								
12			0.0029								
13			0.0033								
14			0.0034								
15			0.0034								
16			0.0033								
17			0.0029								
18			0.0038								
19			0.0032								
20			0.0039								
21											
22											
23											
24											
25											
Ave.			0.0033								
Med.			0.0034								
Min.			0.0028								
Max.			0.0039								
σ			0.0003								

3. 85℃ Data Set

No.	Initial Characteristics			Lumen Maintenance								
	Vf (V)	Flux (lm)	CCT (K)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	8400 h
01	3.17	53.14	2726	97.9	97.6	95.6	94.0	95.1	95.1	93.6	93.1	93.6
02	3.21	57.00	2698	99.1	98.3	96.6	95.1	96.1	95.8	94.6	93.8	94.7
03	3.18	56.63	2690	99.4	98.5	96.9	95.5	96.4	96.1	95.0	94.1	94.5
04	3.17	57.33	2712	99.3	98.9	96.9	95.8	96.5	96.3	95.0	94.4	95.2
05	3.18	56.02	2656	99.6	99.1	97.4	96.3	97.1	97.3	95.7	94.9	95.7
06	3.18	54.75	2671	98.8	98.2	96.5	95.2	95.8	95.8	94.2	92.9	93.5
07	3.17	53.60	2685	99.6	98.7	96.8	95.5	95.9	96.1	94.5	93.4	93.8
08	3.21	54.93	2700	98.1	97.9	95.7	94.4	95.4	95.1	93.7	93.1	93.6
09	3.17	56.10	2690	99.3	98.8	96.9	95.7	96.6	96.4	95.1	95.0	95.2
10	3.19	57.88	2699	99.1	98.8	97.0	95.8	96.7	96.5	95.1	94.3	95.0
11	3.18	57.34	2685	98.9	98.7	97.0	95.8	96.7	96.7	95.2	94.4	95.2
12	3.18	57.52	2710	99.5	98.7	96.6	95.3	96.0	95.8	94.5	93.4	94.1
13	3.20	57.59	2705	99.5	99.3	97.5	96.4	97.2	97.2	95.8	94.9	96.2
14	3.18	56.82	2726	99.5	99.2	97.6	96.3	97.1	97.2	95.8	94.9	96.1
15	3.17	55.40	2711	99.3	98.7	96.9	95.6	96.2	96.1	95.1	94.0	94.6
16	3.18	53.68	2722	97.5	97.4	95.4	94.0	95.2	94.9	93.5	93.0	93.9
17	3.19	57.15	2697	98.9	98.5	96.3	95.0	95.8	95.8	94.4	93.4	94.1
18	3.18	57.36	2667	99.6	98.9	96.6	95.2	96.1	95.9	94.5	93.4	94.1
19	3.18	57.38	2703	99.1	98.4	96.3	94.9	95.6	95.7	94.1	93.0	94.0
20	3.18	56.13	2673	98.5	98.8	97.2	96.2	97.0	97.4	95.8	95.0	96.2
Ave.	3.18	56.19	2696	99.0	98.6	96.7	95.4	96.2	96.2	94.8	93.9	94.7
Med.	3.18	56.73	2698	99.2	98.7	96.8	95.5	96.2	96.1	94.8	93.9	94.6
Min.	3.17	53.14	2656	97.5	97.4	95.4	94.0	95.1	94.9	93.5	92.9	93.5
Max.	3.21	57.88	2726	99.6	99.3	97.6	96.4	97.2	97.4	95.8	95.0	96.2
σ	0.01	1.47	19	0.6	0.5	0.6	0.7	0.6	0.7	0.7	0.8	0.9

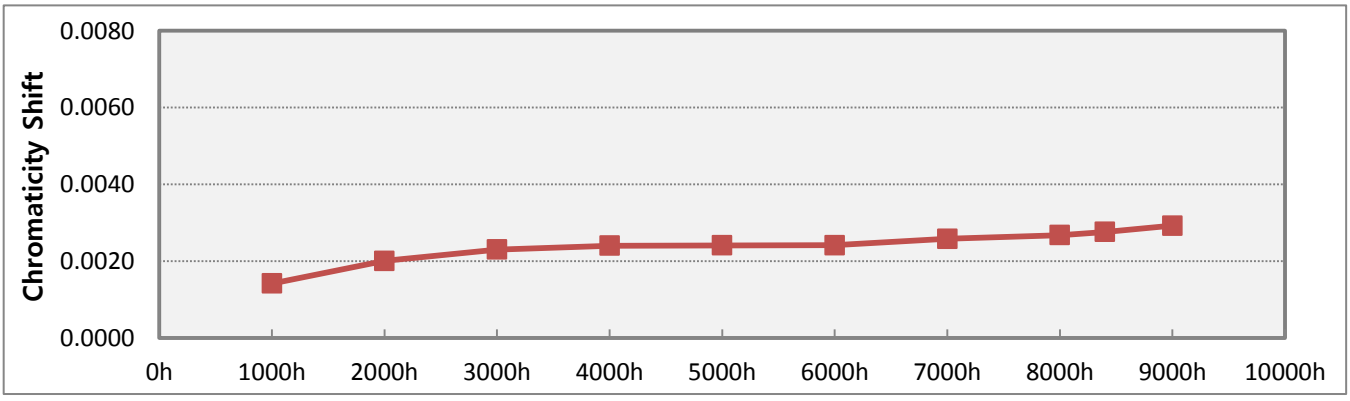


3. 85℃ Data Set

No.				Lumen Maintenance								
				9000 h								
01				93.4								
02				94.2								
03				94.1								
04				94.5								
05				95.8								
06				93.1								
07				93.5								
08				93.3								
09				95.3								
10				94.6								
11				95.1								
12				93.5								
13				95.6								
14				95.6								
15				94.1								
16				93.6								
17				93.6								
18				93.4								
19				93.4								
20				95.6								
21												
22												
23												
24												
25												
Ave.				94.3								
Med.				94.1								
Min.				93.1								
Max.				95.8								
σ				0.9								

3. 85℃ Data Set

No.	Initial Characteristics		Chromaticity Shift du'v'								
	CIE1976 u'	CIE1976 v'	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	8400 h
01	0.2612	0.5278	0.0015	0.0021	0.0024	0.0025	0.0025	0.0025	0.0027	0.0027	0.0028
02	0.2624	0.5283	0.0012	0.0018	0.0020	0.0022	0.0021	0.0022	0.0023	0.0022	0.0024
03	0.2628	0.5281	0.0013	0.0018	0.0023	0.0023	0.0023	0.0023	0.0024	0.0025	0.0027
04	0.2618	0.5281	0.0014	0.0018	0.0021	0.0022	0.0022	0.0022	0.0023	0.0023	0.0023
05	0.2640	0.5308	0.0013	0.0020	0.0023	0.0026	0.0026	0.0026	0.0029	0.0030	0.0031
06	0.2637	0.5282	0.0021	0.0032	0.0037	0.0039	0.0040	0.0040	0.0043	0.0048	0.0049
07	0.2626	0.5304	0.0013	0.0021	0.0024	0.0024	0.0025	0.0024	0.0026	0.0027	0.0029
08	0.2620	0.5296	0.0015	0.0020	0.0024	0.0025	0.0025	0.0025	0.0027	0.0028	0.0028
09	0.2628	0.5282	0.0011	0.0016	0.0018	0.0020	0.0020	0.0019	0.0020	0.0019	0.0021
10	0.2622	0.5290	0.0012	0.0017	0.0018	0.0020	0.0020	0.0021	0.0023	0.0023	0.0024
11	0.2626	0.5306	0.0017	0.0022	0.0024	0.0024	0.0024	0.0024	0.0026	0.0026	0.0026
12	0.2620	0.5275	0.0014	0.0020	0.0025	0.0026	0.0026	0.0026	0.0028	0.0030	0.0030
13	0.2620	0.5290	0.0013	0.0017	0.0020	0.0020	0.0020	0.0020	0.0022	0.0022	0.0022
14	0.2611	0.5282	0.0013	0.0017	0.0018	0.0019	0.0019	0.0019	0.0021	0.0020	0.0021
15	0.2619	0.5275	0.0014	0.0020	0.0022	0.0023	0.0022	0.0023	0.0024	0.0025	0.0026
16	0.2614	0.5277	0.0019	0.0024	0.0026	0.0027	0.0027	0.0028	0.0029	0.0030	0.0030
17	0.2624	0.5287	0.0014	0.0020	0.0023	0.0024	0.0024	0.0024	0.0027	0.0030	0.0032
18	0.2637	0.5299	0.0013	0.0020	0.0025	0.0026	0.0026	0.0026	0.0027	0.0029	0.0031
19	0.2621	0.5290	0.0015	0.0022	0.0026	0.0027	0.0027	0.0027	0.0029	0.0031	0.0032
20	0.2635	0.5290	0.0012	0.0018	0.0020	0.0020	0.0019	0.0018	0.0019	0.0018	0.0018
Ave.	0.2624	0.5288	0.0014	0.0020	0.0023	0.0024	0.0024	0.0024	0.0026	0.0027	0.0028
Med.	0.2623	0.5285	0.0014	0.0020	0.0023	0.0024	0.0024	0.0024	0.0026	0.0027	0.0027
Min.	0.2611	0.5275	0.0011	0.0016	0.0018	0.0019	0.0019	0.0018	0.0019	0.0018	0.0018
Max.	0.2640	0.5308	0.0021	0.0032	0.0037	0.0039	0.0040	0.0040	0.0043	0.0048	0.0049
σ	0.0008	0.0010	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0005	0.0006	0.0007

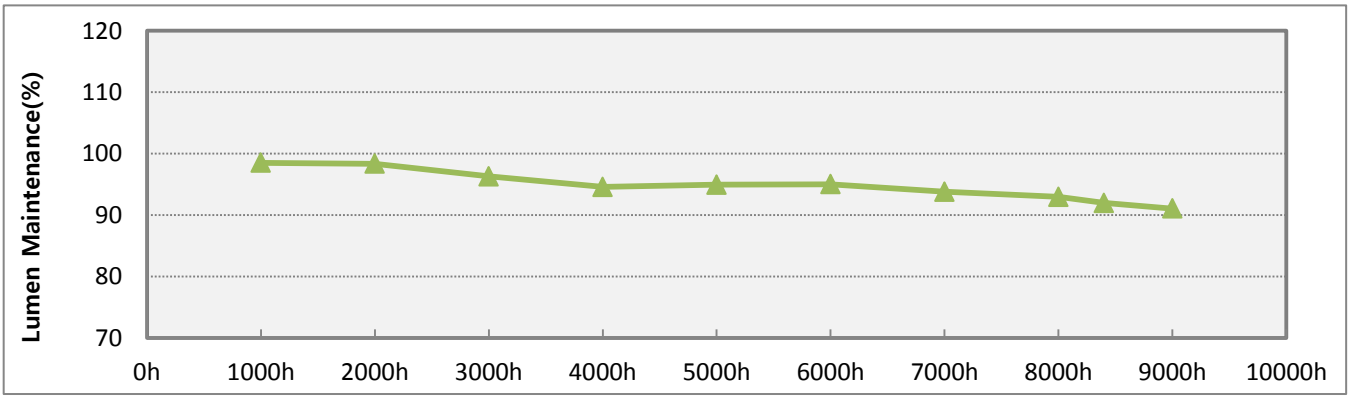


3. 85℃ Data Set

No.			Chromaticity Shift du'v'								
			9000 h								
01			0.0031								
02			0.0024								
03			0.0029								
04			0.0024								
05			0.0038								
06			0.0052								
07			0.0031								
08			0.0030								
09			0.0020								
10			0.0025								
11			0.0026								
12			0.0032								
13			0.0023								
14			0.0022								
15			0.0028								
16			0.0031								
17			0.0034								
18			0.0033								
19			0.0034								
20			0.0018								
21											
22											
23											
24											
25											
Ave.			0.0029								
Med.			0.0029								
Min.			0.0018								
Max.			0.0052								
σ			0.0007								

3. 105℃ Data Set

No.	Initial Characteristics			Lumen Maintenance								
	Vf (V)	Flux (lm)	CCT (K)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	8400 h
01	3.18	57.42	2882	98.8	98.7	96.9	94.9	95.6	95.5	94.8	93.8	92.7
02	3.17	57.45	2846	98.4	98.1	96.1	94.2	94.6	94.6	93.6	92.6	91.6
03	3.19	57.57	2879	98.5	98.2	96.3	94.6	94.9	95.2	94.1	92.9	91.9
04	3.17	56.78	2941	98.8	98.3	96.3	94.5	94.8	94.9	93.7	92.8	91.8
05	3.17	55.68	2858	99.2	98.7	96.8	95.0	95.3	95.3	94.4	93.4	92.4
06	3.17	53.50	2873	98.1	97.8	96.0	94.1	94.6	94.5	93.6	92.8	91.6
07	3.18	53.23	2338	98.5	98.8	96.8	94.4	95.3	95.4	94.0	93.4	92.3
08	3.18	56.97	2886	98.6	98.7	96.4	94.8	95.3	95.3	93.8	93.0	92.2
09	3.19	57.28	2866	98.8	98.8	96.9	95.3	95.6	95.5	94.4	93.3	92.5
10	3.19	57.35	2913	98.9	98.8	96.6	94.9	95.2	95.5	94.2	93.5	92.6
11	3.19	57.78	2900	98.6	98.4	96.1	94.5	94.8	95.0	93.6	93.0	91.8
12	3.17	57.02	2867	98.4	98.3	96.0	94.5	94.7	94.8	93.5	92.7	91.8
13	3.18	54.55	2834	98.7	98.5	96.5	95.2	95.2	95.2	93.8	93.3	92.1
14	3.17	56.20	2868	98.1	98.1	96.0	93.8	94.3	94.4	93.3	92.6	91.5
15	3.18	57.66	2899	98.8	98.7	96.6	94.9	95.5	95.3	94.1	93.2	92.2
16	3.17	56.85	2861	98.7	98.6	96.7	94.9	95.2	95.3	94.2	93.2	92.2
17	3.19	56.43	2819	98.6	98.6	96.4	94.9	95.0	94.9	93.6	93.0	91.9
18	3.17	57.40	2851	97.9	98.0	96.1	94.6	94.9	95.0	93.8	92.9	92.1
19	3.21	56.94	2827	98.0	97.7	95.6	94.1	94.4	94.6	93.1	92.2	91.4
20	3.20	55.05	2884	97.5	97.1	94.9	93.5	93.6	93.9	92.4	91.8	90.9
Ave.	3.18	56.46	2845	98.5	98.4	96.3	94.6	94.9	95.0	93.8	93.0	92.0
Med.	3.18	56.95	2867	98.6	98.4	96.3	94.6	95.0	95.1	93.8	93.0	92.0
Min.	3.17	53.23	2338	97.5	97.1	94.9	93.5	93.6	93.9	92.4	91.8	90.9
Max.	3.21	57.78	2941	99.2	98.8	96.9	95.3	95.6	95.5	94.8	93.8	92.7
σ	0.01	1.36	123	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4

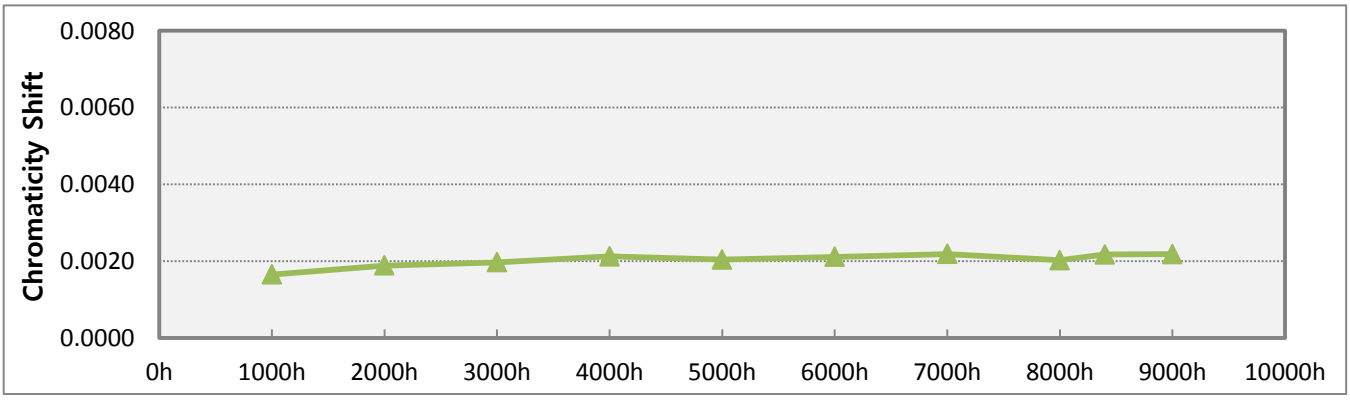


3. 105℃ Data Set

No.				Lumen Maintenance								
				9000 h								
01				91.9								
02				90.8								
03				90.9								
04				90.6								
05				91.0								
06				90.3								
07				91.8								
08				91.1								
09				91.8								
10				91.9								
11				91.1								
12				91.1								
13				91.3								
14				90.8								
15				91.6								
16				91.3								
17				90.8								
18				91.2								
19				90.1								
20				89.7								
21												
22												
23												
24												
25												
Ave.				91.1								
Med.				91.1								
Min.				89.7								
Max.				91.9								
σ				0.6								

3. 105℃ Data Set

No.	Initial Characteristics		Chromaticity Shift du'v'								
	CIE1976 u'	CIE1976 v'	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	8400 h
01	0.2554	0.5217	0.0015	0.0017	0.0017	0.0019	0.0019	0.0021	0.0022	0.0021	0.0022
02	0.2571	0.5210	0.0017	0.0019	0.0020	0.0021	0.0020	0.0021	0.0022	0.0019	0.0020
03	0.2558	0.5205	0.0017	0.0020	0.0022	0.0023	0.0022	0.0023	0.0024	0.0021	0.0023
04	0.2533	0.5201	0.0016	0.0019	0.0020	0.0021	0.0021	0.0021	0.0022	0.0020	0.0020
05	0.2564	0.5218	0.0014	0.0017	0.0018	0.0020	0.0019	0.0020	0.0021	0.0019	0.0020
06	0.2558	0.5215	0.0019	0.0022	0.0022	0.0025	0.0024	0.0023	0.0024	0.0022	0.0024
07	0.2801	0.5439	0.0017	0.0020	0.0020	0.0022	0.0020	0.0019	0.0019	0.0017	0.0018
08	0.2555	0.5207	0.0017	0.0019	0.0020	0.0021	0.0020	0.0021	0.0022	0.0020	0.0023
09	0.2562	0.5214	0.0017	0.0019	0.0020	0.0021	0.0020	0.0021	0.0023	0.0022	0.0023
10	0.2548	0.5187	0.0014	0.0017	0.0018	0.0020	0.0019	0.0020	0.0021	0.0019	0.0021
11	0.2552	0.5194	0.0017	0.0018	0.0020	0.0021	0.0020	0.0021	0.0021	0.0020	0.0021
12	0.2561	0.5214	0.0016	0.0019	0.0020	0.0021	0.0021	0.0021	0.0022	0.0020	0.0021
13	0.2581	0.5191	0.0016	0.0018	0.0018	0.0020	0.0020	0.0020	0.0021	0.0020	0.0022
14	0.2561	0.5213	0.0015	0.0017	0.0018	0.0020	0.0019	0.0020	0.0021	0.0019	0.0021
15	0.2551	0.5198	0.0015	0.0018	0.0019	0.0020	0.0019	0.0020	0.0021	0.0020	0.0021
16	0.2565	0.5207	0.0016	0.0017	0.0017	0.0019	0.0018	0.0019	0.0020	0.0018	0.0019
17	0.2582	0.5214	0.0018	0.0021	0.0023	0.0024	0.0023	0.0024	0.0024	0.0024	0.0026
18	0.2569	0.5210	0.0018	0.0021	0.0021	0.0023	0.0021	0.0022	0.0023	0.0022	0.0024
19	0.2576	0.5227	0.0017	0.0018	0.0019	0.0020	0.0020	0.0020	0.0021	0.0019	0.0020
20	0.2557	0.5199	0.0019	0.0021	0.0021	0.0024	0.0023	0.0023	0.0024	0.0023	0.0024
Ave.	0.2573	0.5219	0.0017	0.0019	0.0020	0.0021	0.0020	0.0021	0.0022	0.0020	0.0022
Med.	0.2561	0.5210	0.0017	0.0019	0.0020	0.0021	0.0020	0.0021	0.0022	0.0020	0.0021
Min.	0.2533	0.5187	0.0014	0.0017	0.0017	0.0019	0.0018	0.0019	0.0019	0.0017	0.0018
Max.	0.2801	0.5439	0.0019	0.0022	0.0023	0.0025	0.0024	0.0024	0.0024	0.0024	0.0026
σ	0.0055	0.0053	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0002



3. 105℃ Data Set

No.			Chromaticity Shift du'v'								
			9000 h								
01			0.0024								
02			0.0021								
03			0.0022								
04			0.0020								
05			0.0021								
06			0.0023								
07			0.0017								
08			0.0022								
09			0.0024								
10			0.0020								
11			0.0021								
12			0.0022								
13			0.0023								
14			0.0021								
15			0.0021								
16			0.0020								
17			0.0025								
18			0.0024								
19			0.0020								
20			0.0024								
21											
22											
23											
24											
25											
Ave.			0.0022								
Med.			0.0022								
Min.			0.0017								
Max.			0.0025								
σ			0.0002								