



SEOUL SEMICONDUCTOR



# IES LM-80-08 TEST REPORT

## Measuring Lumen Maintenance of LED Light Sources

**Manufacturer : Seoul Semiconductor Co., Ltd.**

1B-25, 727, Wonsi-dong, Danwon-gu, Ansan-city,  
Gyeonggi-do, Korea

**Classification : LED Package**

**Test Sample : 3030B  
(STWxC2SB)**

**Test Date : July. 29, 2014 ~ Jul. 22, 2015**

**Report Date : Aug. 05, 2015**

**Report Number : I-140721-12-K-03**

**Revision Number : 03**

<b>Tested by</b>		<b>Reviewed by</b>	
In Hoi Sim	(signature)	Jung Hee Lee	(signature)
Engineer		Technical Manager	

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

# SEOUL SEMICONDUCTOR CO., LTD



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## 1. Summary

### 1.1 Test Result

Items	Condition 1	Condition 2	Condition 3
Required Temperature	55 °C	85 °C	105 °C
Number of LED light sources tested (ea)	25	25	25
Test Duration (h)	7 000	7 000	7 000
Drive Current (mA)	200	200	200
Actual Case Temperature (°C)	53.1	83.1	103.0
Actual Ambient Temperature (°C)	51.0	80.5	100.7
Air flow velocity (m/s)	0.83	0.49	0.14
Average Initial Luminous Flux (lm)	120.996	121.424	120.773
Average Initial CCT (K)	2 675	2 664	2 662
Average Initial Volatge (V)	6.52	6.52	6.52
Average Lumen maintenance (%)	99.1	96.1	90.2
Average Chromaticity Shift	0.003 0	0.005 5	0.005 8

※ The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full.



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## 2. General Information : IES LM-80-08 Test Report Requirement

### 2.1 Number of LED Light Sources tested

- 25 Packages tested at actual case temperature 53.1 °C
- 25 Packages tested at actual case temperature 83.1 °C
- 25 Packages tested at actual case temperature 103.0 °C

### 2.2 Description of LED light Sources

- LED Package Part Number : STWxC2SB
- LED Forward Current [IF] : 200 mA
- LED Package Dimension : 3.0 mm X 3.0 mm

### 2.3 Description of Auxiliary equipment

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

### 2.4 Operating Cycle

- Drive Current : 200 mA
  - Typical Voltage : 6.52 V
- All tested LED packages are driven with a constant direct current.

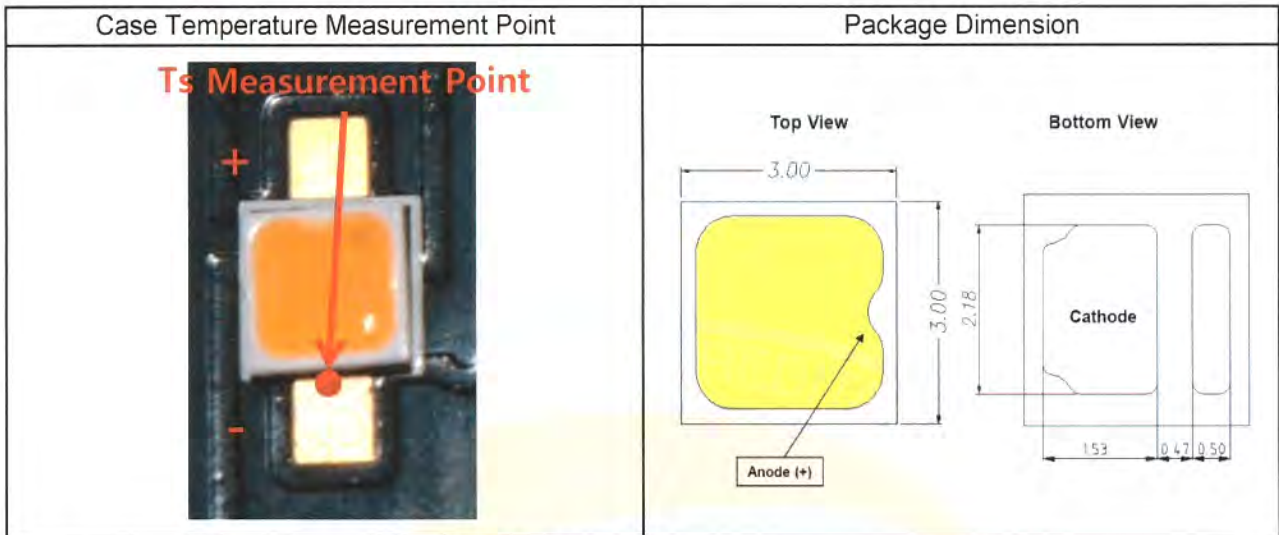
### 2.5 Ambient conditions including airflow, temperature and relative humidity

- Controlled ambient conditions

Ambient temperature	- 5 °C
Air flow velocity	< 1 m/s
Relative humidity	< 65% R.H.

**2.6 Case Temperature (Test Point temperature)**

- LED temperature measurement point is shown in the picture below.



(STWxC2SA)

**2.7 Drive Current of the LED light source during lifetime test**

- See the Test Result.

**2.8 Lumen maintenance data for each individual LED light source**

- See the Test Data.

**2.9 Observation of LED light source failures**

- No failures

**2.10 LED Light source monitoring interval**

- All tested package measurement at each case temperature conditions have 1 000 h interval. 0, 1 000, 2 000, 3 000, 4 000, 5 000, 6 000 and 7 000 h

**2.11 Photometric measurement uncertainty**

- Seoul Semiconductor maintain a tolerance of  $\pm 3.0 \%$  on flux measurements for LM-80 testing

**2.12 Chromaticity shift over the measurement time**

- See the Test Data.



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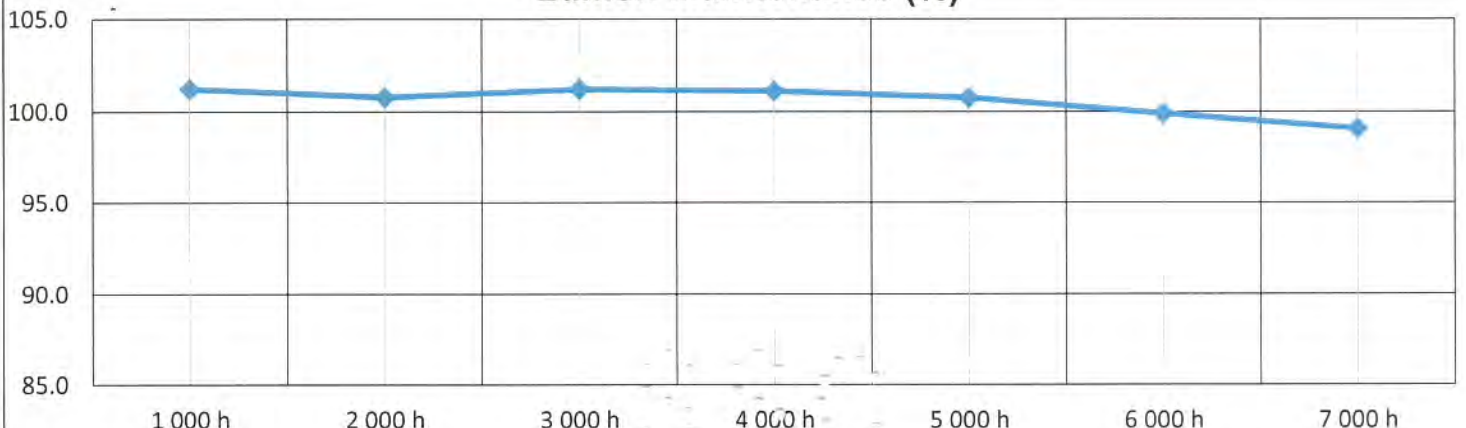
## 3. Test Data

### 3.1 Condition 1 : [ Ts = 55 °C ]

#### [ LUMEN MAINTENANCE ]

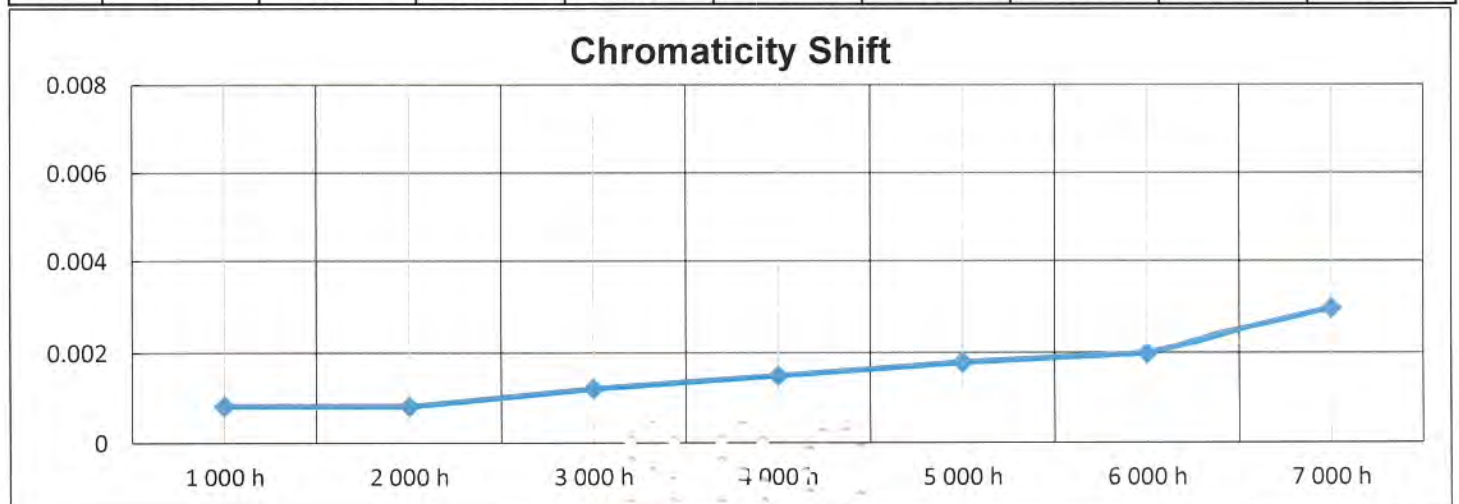
No.	Vf(V)	Flux(lm)	CCT(K)	Lumen Maintenance (%)						
				0 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	6.50	122.241	2 697	100.9	100.0	100.9	100.6	100.6	99.9	98.8
2	6.53	123.694	2 670	101.4	100.9	101.0	100.6	100.4	99.4	98.6
3	6.52	123.466	2 632	101.4	101.2	101.6	101.0	100.8	99.5	98.9
4	6.54	122.796	2 672	101.9	101.2	102.0	102.0	102.2	101.5	100.4
5	6.50	123.180	2 674	101.3	101.1	101.3	101.4	100.7	100.0	98.9
6	6.49	122.200	2 670	101.4	101.0	101.2	100.8	100.8	99.9	99.1
7	6.51	120.349	2 668	101.0	100.4	101.4	101.2	100.8	100.7	99.7
8	6.51	114.299	2 660	101.4	100.9	101.4	102.5	101.6	101.5	100.4
9	6.54	121.686	2 674	101.2	100.5	101.1	99.6	100.1	98.5	98.1
10	6.50	123.177	2 651	101.5	100.5	101.2	101.0	100.2	99.0	98.8
11	6.56	123.173	2 690	101.2	100.4	101.5	101.7	100.9	100.3	99.1
12	6.54	123.635	2 658	101.4	101.0	101.2	101.0	100.3	99.9	99.0
13	6.52	122.101	2 684	101.4	101.0	101.2	101.1	100.7	99.5	98.8
14	6.53	121.419	2 676	101.1	100.8	101.5	102.0	101.1	100.9	99.5
15	6.52	117.380	2 696	100.7	100.0	100.9	101.5	101.0	100.9	100.3
16	6.50	109.346	2 697	101.4	100.8	101.6	102.5	102.9	102.5	101.8
17	6.52	113.784	2 681	101.1	101.1	101.0	99.4	99.6	98.2	97.5
18	6.55	120.173	2 680	100.7	100.5	101.2	99.7	100.3	98.7	98.0
19	6.51	124.395	2 676	100.4	100.0	100.7	100.3	100.5	98.7	98.6
20	6.51	125.510	2 688	100.7	100.6	101.1	100.8	100.3	99.0	98.4
21	6.53	124.499	2 661	101.4	101.0	101.0	101.4	100.3	99.6	98.5
22	6.51	123.385	2 672	101.5	101.2	100.9	101.5	100.7	99.3	98.4
23	6.51	121.909	2 678	101.5	101.1	101.2	101.6	100.9	100.2	99.0
24	6.52	119.584	2 684	101.4	101.3	101.5	101.6	100.9	100.3	99.7
25	6.54	117.509	2 693	101.0	100.5	100.8	101.2	100.4	100.2	99.4
Max.	6.56	125.510	2 697	101.9	101.3	102.0	102.5	102.9	102.5	101.8
Ave.	6.52	120.996	2 675	101.2	100.8	101.2	101.1	100.8	99.9	99.1
Min.	6.49	109.346	2 632	100.4	100.0	100.7	99.4	99.6	98.2	97.5
Med.	6.52	122.200	2 676	101.4	100.9	101.2	101.2	100.7	99.9	98.9
Std.	0.02	3.843	15	0.3	0.4	0.3	0.8	0.7	1.0	0.9

#### Lumen Maintenance (%)



**[ CHROMATICITY SHIFT ]**

No.	u'	v'	Chromaticity Shift						
			0 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	0.263	0.524	0.000 7	0.000 8	0.001 4	0.001 6	0.002 0	0.002 2	0.002 9
2	0.264	0.527	0.000 7	0.000 8	0.001 1	0.001 4	0.001 8	0.002 1	0.003 1
3	0.266	0.528	0.000 6	0.000 8	0.001 2	0.001 5	0.001 9	0.002 1	0.003 2
4	0.264	0.526	0.000 6	0.000 7	0.001 2	0.001 6	0.002 0	0.002 2	0.003 1
5	0.264	0.527	0.000 6	0.000 7	0.001 1	0.001 6	0.001 9	0.002 3	0.003 1
6	0.264	0.528	0.000 8	0.000 8	0.001 1	0.001 2	0.001 8	0.002 1	0.003 1
7	0.264	0.528	0.000 8	0.000 9	0.001 2	0.001 4	0.001 8	0.002 1	0.003 1
8	0.265	0.527	0.000 8	0.000 9	0.001 2	0.001 7	0.002 2	0.002 5	0.003 3
9	0.264	0.528	0.000 8	0.000 7	0.001 0	0.001 1	0.001 7	0.002 0	0.003 1
10	0.265	0.528	0.000 6	0.000 7	0.001 2	0.001 6	0.001 8	0.002 0	0.003 1
11	0.263	0.526	0.000 8	0.000 8	0.001 4	0.001 8	0.002 1	0.002 6	0.003 5
12	0.264	0.528	0.000 7	0.000 8	0.001 1	0.001 5	0.001 7	0.002 0	0.002 8
13	0.263	0.527	0.000 6	0.000 8	0.001 2	0.001 6	0.002 0	0.002 4	0.003 5
14	0.264	0.526	0.000 7	0.000 8	0.001 3	0.001 8	0.002 1	0.002 5	0.003 5
15	0.263	0.526	0.000 9	0.000 8	0.001 2	0.001 6	0.001 9	0.002 2	0.003 3
16	0.263	0.526	0.000 9	0.000 8	0.001 2	0.001 6	0.002 2	0.002 4	0.003 5
17	0.264	0.526	0.001 1	0.001 0	0.001 2	0.001 4	0.001 7	0.001 8	0.002 8
18	0.264	0.526	0.000 9	0.000 8	0.001 1	0.001 1	0.001 5	0.001 5	0.002 5
19	0.264	0.526	0.000 8	0.000 9	0.001 2	0.001 5	0.001 9	0.001 9	0.003 0
20	0.263	0.527	0.000 9	0.000 9	0.001 2	0.001 4	0.001 7	0.001 6	0.002 4
21	0.265	0.526	0.001 1	0.001 0	0.001 2	0.001 5	0.001 6	0.001 9	0.002 6
22	0.264	0.528	0.001 0	0.000 9	0.001 1	0.001 5	0.001 7	0.001 7	0.002 5
23	0.264	0.527	0.000 9	0.000 9	0.001 1	0.001 5	0.001 7	0.001 8	0.002 6
24	0.263	0.527	0.001 1	0.000 9	0.001 0	0.001 3	0.001 4	0.001 4	0.002 2
25	0.263	0.527	0.001 0	0.000 9	0.001 1	0.001 4	0.001 6	0.001 7	0.002 5
Max.	0.266	0.528	0.001 1	0.001 0	0.001 4	0.001 8	0.002 2	0.002 6	0.003 5
Ave.	0.264	0.527	0.000 8	0.000 8	0.001 2	0.001 5	0.001 8	0.002 0	0.003 0
Min.	0.263	0.524	0.000 6	0.000 7	0.001 0	0.001 1	0.001 4	0.001 4	0.002 2
Med.	0.264	0.527	0.000 8	0.000 8	0.001 2	0.001 5	0.001 8	0.002 1	0.003 1
Std.	0.001	0.001	0.000 2	0.000 1	0.000 1	0.000 2	0.000 2	0.000 3	0.000 4





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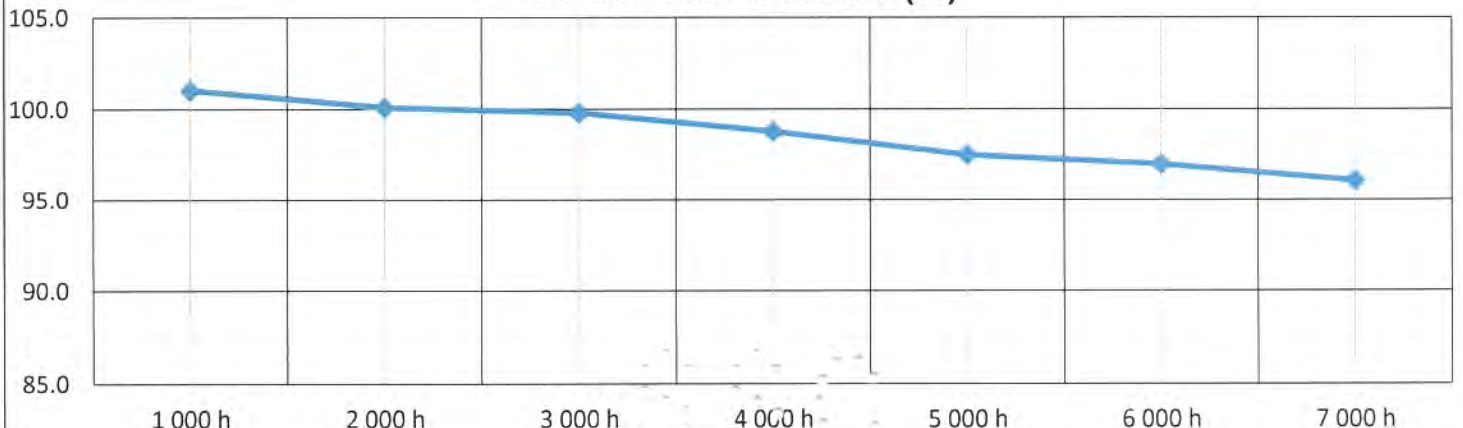


## 3.2 Condition 2 : [ Ts = 85 °C ]

### [ LUMEN MAINTENANCE ]

No.	Vf(V)	Flux(lm)	CCT(K)	Lumen Maintenance (%)						
				0 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	6.48	113.091	2 659	99.9	99.2	99.7	98.9	96.4	94.1	94.1
2	6.51	119.951	2 647	100.3	99.2	99.7	98.1	97.0	96.0	95.0
3	6.50	121.150	2 654	100.5	99.6	99.6	98.3	96.5	96.9	95.8
4	6.54	123.094	2 665	101.1	100.0	99.9	98.7	97.7	96.9	96.2
5	6.51	123.255	2 672	101.1	100.3	100.0	99.2	97.5	97.4	96.6
6	6.54	124.092	2 642	101.3	100.1	99.3	95.3	93.6	93.5	93.4
7	6.52	124.650	2 678	100.5	100.0	99.4	98.6	97.9	97.8	96.9
8	6.51	123.051	2 654	101.5	100.3	99.6	98.4	97.1	96.1	95.4
9	6.53	124.363	2 658	101.4	100.0	99.2	98.5	97.8	97.0	96.5
10	6.53	117.908	2 652	100.5	99.3	99.3	97.1	95.8	94.9	94.6
11	6.55	122.626	2 686	100.4	99.5	99.2	98.1	96.9	96.8	96.1
12	6.50	124.096	2 680	101.5	100.6	100.3	98.9	97.7	97.7	96.7
13	6.55	122.513	2 633	102.2	100.8	101.0	99.9	98.7	98.4	97.4
14	6.50	121.459	2 667	100.8	99.7	99.2	97.8	97.1	97.7	95.9
15	6.53	115.760	2 659	101.0	99.5	99.4	98.6	97.5	96.1	94.8
16	6.49	114.946	2 647	101.9	100.9	100.2	99.9	98.1	97.6	96.9
17	6.53	123.387	2 680	100.7	100.1	99.6	99.2	98.2	98.4	96.9
18	6.50	122.976	2 656	101.2	100.5	100.2	100.5	98.3	98.0	97.4
19	6.56	124.270	2 673	101.0	100.4	99.6	98.8	97.1	96.4	95.4
20	6.55	122.046	2 661	101.3	100.8	101.2	100.9	100.4	98.7	98.1
21	6.53	125.229	2 688	101.2	100.2	99.9	98.7	98.0	97.3	96.4
22	6.51	121.569	2 692	100.9	100.4	99.7	99.1	98.6	97.6	97.1
23	6.54	122.642	2 654	100.8	99.8	99.4	98.7	97.0	97.4	95.3
24	6.52	121.161	2 651	101.3	100.3	100.2	99.8	98.3	97.7	96.1
25	6.51	116.306	2 687	100.4	100.0	99.8	99.0	98.3	98.5	97.2
Max.	6.56	125.229	2 692	102.2	100.9	101.2	100.9	100.4	98.7	98.1
Ave.	6.52	121.424	2 664	101.0	100.1	99.8	98.8	97.5	97.0	96.1
Min.	6.48	113.091	2 633	99.9	99.2	99.2	95.3	93.6	93.5	93.4
Med.	6.52	122.626	2 659	101.0	100.1	99.7	98.7	97.7	97.4	96.2
Std.	0.02	3.290	16	0.5	0.5	0.5	1.1	1.2	1.3	1.1

### Lumen Maintenance (%)

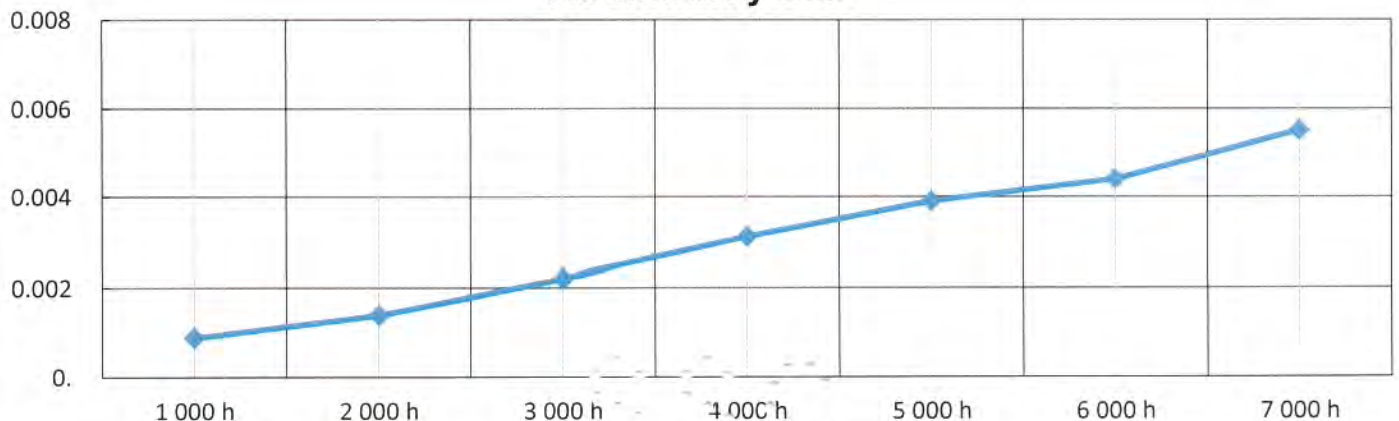




[ CHROMATICITY SHIFT ]

No.	u'	v'	Chromaticity Shift						
	0 h		1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h	7 000 h
1	0.265	0.527	0.001 0	0.001 7	0.002 5	0.003 5	0.004 3	0.004 6	0.005 6
2	0.265	0.528	0.000 9	0.001 4	0.002 3	0.003 0	0.004 0	0.004 5	0.005 4
3	0.265	0.527	0.001 1	0.001 5	0.002 3	0.003 2	0.004 0	0.004 7	0.005 8
4	0.264	0.527	0.001 0	0.001 5	0.002 4	0.003 3	0.004 3	0.004 6	0.005 7
5	0.264	0.527	0.001 0	0.001 5	0.002 4	0.003 5	0.004 2	0.004 8	0.005 8
6	0.265	0.528	0.001 0	0.001 3	0.002 0	0.002 8	0.003 4	0.003 7	0.004 7
7	0.264	0.527	0.000 8	0.001 3	0.002 0	0.002 8	0.003 6	0.004 2	0.005 3
8	0.265	0.527	0.001 0	0.001 4	0.002 1	0.003 0	0.003 9	0.004 2	0.005 3
9	0.264	0.528	0.001 0	0.001 4	0.002 1	0.003 1	0.003 9	0.004 3	0.005 4
10	0.265	0.527	0.000 8	0.001 4	0.002 2	0.003 1	0.004 0	0.004 5	0.005 5
11	0.263	0.526	0.000 9	0.001 4	0.002 1	0.003 0	0.003 8	0.004 4	0.005 6
12	0.263	0.528	0.000 8	0.001 3	0.002 1	0.002 9	0.003 8	0.004 3	0.005 3
13	0.266	0.528	0.000 8	0.001 4	0.002 3	0.003 3	0.004 1	0.004 5	0.005 6
14	0.264	0.527	0.000 9	0.001 4	0.002 2	0.003 1	0.003 9	0.004 7	0.005 6
15	0.264	0.529	0.001 0	0.001 2	0.002 0	0.002 7	0.003 7	0.004 0	0.004 9
16	0.265	0.526	0.001 1	0.001 6	0.002 3	0.003 3	0.004 2	0.004 8	0.006 1
17	0.264	0.526	0.000 8	0.001 4	0.002 0	0.002 9	0.003 7	0.004 3	0.005 3
18	0.264	0.529	0.000 8	0.001 3	0.001 9	0.002 9	0.003 4	0.003 9	0.005 0
19	0.264	0.526	0.001 0	0.001 5	0.002 2	0.003 1	0.003 9	0.004 3	0.005 4
20	0.265	0.525	0.001 0	0.001 5	0.002 5	0.003 4	0.004 3	0.004 7	0.005 9
21	0.263	0.527	0.000 9	0.001 3	0.002 0	0.002 7	0.003 7	0.004 1	0.005 2
22	0.263	0.527	0.001 0	0.001 6	0.002 2	0.003 1	0.004 2	0.004 5	0.005 8
23	0.265	0.527	0.001 2	0.001 5	0.002 1	0.003 0	0.003 8	0.004 5	0.005 3
24	0.265	0.528	0.000 9	0.001 2	0.001 9	0.003 0	0.003 9	0.004 2	0.005 2
25	0.263	0.526	0.001 0	0.001 4	0.002 1	0.003 0	0.004 1	0.004 6	0.005 7
Max.	0.266	0.529	0.001 2	0.001 7	0.002 5	0.003 5	0.004 3	0.004 8	0.006 1
Ave.	0.264	0.527	0.000 9	0.001 4	0.002 2	0.003 1	0.003 9	0.004 4	0.005 5
Min.	0.263	0.525	0.000 8	0.001 2	0.001 9	0.002 7	0.003 4	0.003 7	0.004 7
Med.	0.264	0.527	0.001 0	0.001 4	0.002 1	0.003 0	0.003 9	0.004 5	0.005 4
Std.	0.001	0.001	0.000 1	0.000 1	0.000 2	0.000 2	0.000 3	0.000 3	0.000 3

Chromaticity Shift







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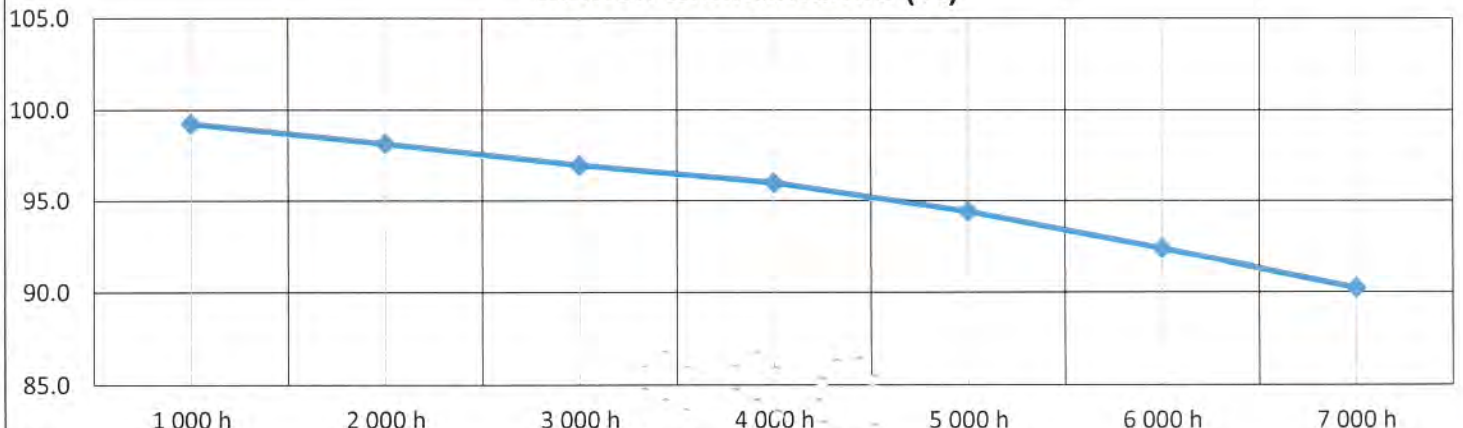


## 3.3 Condition 3 : [ Ts = 105 °C ]

### [ LUMEN MAINTENANCE ]

No.	Vf(V)	Flux(lm)	CCT(K)	Lumen Maintenance (%)						
				0 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	6.51	114.697	2 686	97.8	96.3	95.4	94.9	93.0	90.4	86.9
2	6.53	120.484	2 644	99.6	98.4	96.9	95.6	94.2	91.5	87.5
3	6.54	122.488	2 680	98.2	97.0	96.0	94.2	93.1	90.0	88.0
4	6.56	121.421	2 653	98.4	97.2	96.2	94.8	93.3	91.2	87.7
5	6.54	122.688	2 678	99.7	98.5	96.5	95.5	94.1	91.4	89.0
6	6.53	123.796	2 680	99.4	98.7	96.6	95.1	94.2	92.1	90.0
7	6.52	123.252	2 655	99.6	99.0	97.2	95.7	93.7	92.1	89.0
8	6.51	121.213	2 647	99.2	98.7	96.7	96.8	95.1	93.7	92.4
9	6.52	121.029	2 663	99.8	98.4	96.8	96.3	95.2	93.1	91.2
10	6.53	116.751	2 677	99.7	98.5	96.2	95.8	93.6	91.3	89.8
11	6.52	117.337	2 617	97.7	96.4	95.3	94.6	93.2	92.1	89.2
12	6.54	120.750	2 650	98.4	97.3	96.1	94.9	92.8	89.8	87.3
13	6.53	124.023	2 653	98.7	97.1	95.6	95.1	93.3	90.0	87.6
14	6.52	123.322	2 625	98.4	97.2	96.5	95.3	93.1	90.1	87.8
15	6.48	120.203	2 707	99.0	97.8	97.2	96.6	94.2	91.3	89.2
16	6.51	116.662	2 627	98.5	97.7	98.8	97.8	96.5	95.0	91.8
17	6.54	117.880	2 697	98.8	97.2	96.7	96.5	94.3	92.9	90.8
18	6.51	122.248	2 673	99.9	99.0	96.0	94.6	93.7	91.9	91.5
19	6.49	127.378	2 716	100.1	98.6	95.3	94.1	92.8	91.5	91.0
20	6.49	122.895	2 628	99.8	99.4	98.2	97.3	95.5	93.7	92.2
21	6.52	122.712	2 608	100.1	99.0	97.7	96.7	94.9	93.7	92.8
22	6.54	122.485	2 696	99.9	99.2	97.7	97.0	96.2	94.5	93.6
23	6.55	119.288	2 628	99.7	98.9	98.8	98.1	97.3	95.2	94.0
24	6.49	121.419	2 694	99.7	98.5	97.3	95.9	93.8	92.8	89.9
25	6.51	112.895	2 675	99.6	98.5	100.7	99.1	97.4	96.7	95.3
Max.	6.56	127.378	2 716	100.1	99.4	100.7	99.1	97.4	96.7	95.3
Ave.	6.52	120.773	2 662	99.2	98.1	96.9	95.9	94.3	92.3	90.2
Min.	6.48	112.895	2 608	97.7	96.3	95.3	94.1	92.8	89.8	86.9
Med.	6.52	121.419	2 663	99.6	98.5	96.7	95.7	94.1	92.1	89.9
Std.	0.02	3.240	30	0.7	0.9	1.2	1.3	1.4	1.8	2.3

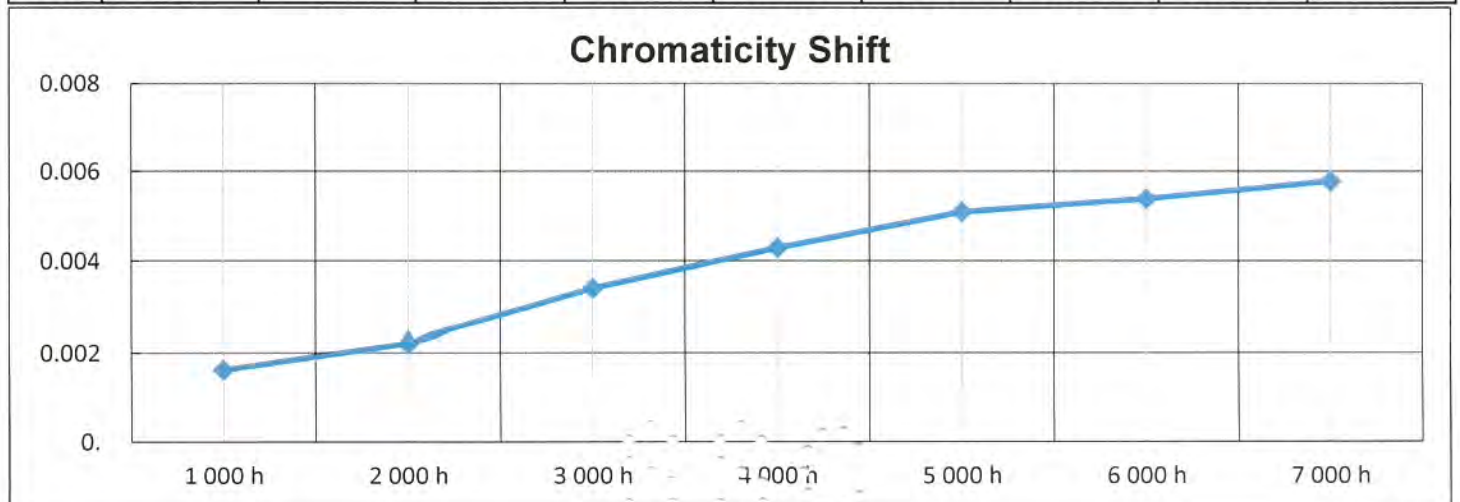
### Lumen Maintenance (%)





[ CHROMATICITY SHIFT ]

No.	u'	v'	Chromaticity Shift						
	0 h		1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h	7 000 h
1	0.264	0.525	0.001 8	0.002 4	0.003 5	0.004 5	0.005 4	0.005 6	0.005 7
2	0.265	0.527	0.001 5	0.002 0	0.003 1	0.004 0	0.004 9	0.005 0	0.005 2
3	0.264	0.526	0.001 7	0.002 4	0.003 5	0.004 3	0.005 2	0.005 3	0.005 5
4	0.265	0.528	0.001 6	0.002 3	0.003 4	0.004 2	0.004 8	0.005 3	0.005 4
5	0.264	0.527	0.001 5	0.002 1	0.003 2	0.004 3	0.005 1	0.005 4	0.005 9
6	0.264	0.526	0.001 5	0.002 1	0.003 2	0.004 0	0.004 8	0.005 0	0.005 3
7	0.265	0.528	0.001 6	0.002 2	0.003 3	0.004 1	0.004 9	0.005 2	0.005 4
8	0.265	0.528	0.001 6	0.002 1	0.003 1	0.004 3	0.004 9	0.005 3	0.005 9
9	0.264	0.528	0.001 5	0.002 0	0.003 0	0.003 8	0.004 8	0.005 0	0.005 5
10	0.264	0.527	0.001 6	0.002 2	0.003 3	0.004 3	0.005 0	0.005 1	0.005 3
11	0.266	0.528	0.001 6	0.002 2	0.003 1	0.004 1	0.004 9	0.005 4	0.005 8
12	0.265	0.527	0.001 6	0.002 2	0.003 3	0.004 3	0.005 2	0.005 3	0.005 3
13	0.265	0.527	0.001 6	0.002 3	0.003 4	0.004 5	0.005 2	0.005 4	0.005 5
14	0.266	0.527	0.001 7	0.002 3	0.004 6	0.005 4	0.006 3	0.006 4	0.006 5
15	0.262	0.526	0.001 7	0.002 3	0.003 7	0.005 0	0.005 6	0.005 6	0.005 7
16	0.266	0.528	0.001 7	0.002 3	0.003 8	0.004 5	0.005 2	0.005 5	0.005 8
17	0.263	0.525	0.001 9	0.002 4	0.004 3	0.005 4	0.005 8	0.006 0	0.006 4
18	0.264	0.524	0.001 5	0.002 0	0.005 0	0.005 8	0.006 7	0.007 0	0.007 8
19	0.262	0.527	0.001 5	0.002 0	0.002 0	0.002 9	0.003 8	0.004 2	0.005 0
20	0.266	0.527	0.001 4	0.002 0	0.003 8	0.004 6	0.005 4	0.005 8	0.006 5
21	0.267	0.528	0.001 4	0.001 9	0.003 0	0.003 7	0.004 4	0.004 9	0.005 6
22	0.263	0.527	0.001 5	0.002 0	0.002 9	0.003 9	0.004 8	0.005 1	0.005 7
23	0.266	0.528	0.001 4	0.002 0	0.003 1	0.004 0	0.004 8	0.005 1	0.005 8
24	0.263	0.525	0.001 5	0.002 0	0.004 3	0.005 3	0.006 1	0.006 5	0.006 9
25	0.264	0.527	0.001 6	0.002 1	0.002 5	0.003 2	0.004 0	0.004 5	0.005 1
Max.	0.267	0.528	0.001 9	0.002 4	0.005 0	0.005 8	0.006 7	0.007 0	0.007 8
Ave.	0.264	0.527	0.001 6	0.002 2	0.003 4	0.004 3	0.005 1	0.005 4	0.005 8
Min.	0.262	0.524	0.001 4	0.001 9	0.002 0	0.002 9	0.003 8	0.004 2	0.005 0
Med.	0.264	0.527	0.001 6	0.002 1	0.003 3	0.004 3	0.005 0	0.005 3	0.005 7
Std.	0.001	0.001	0.000 1	0.000 2	0.000 6	0.000 7	0.000 6	0.000 6	0.000 6





# SEOUL SEMICONDUCTOR

## 4. Revision History

Revision No.	Revision Date	Contents
01	Mar. 24, 2015	First Issued
02	May. 11, 2015	Second Issued at 6 000 h
03	Aug. 05, 2015	Third Issued at 7 000 h

