



Test Report

IES LM-80-15 Approved Method for Measuring Lumen Maintenance of LED Light Sources

Report no. : SLED-20-003-R01
 Testing start date : 2019.01.17
 Testing completion date : 2020.02.25
 Report issued date : 2020.01.16
 Report revised date : 2020.04.20

Client	Testing performed by
SAMSUNG ELECTRONICS LED BUSINESS Lighting Marketing Group	SAMSUNG ELECTRONICS LED BUSINESS 1, Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do 17113, Korea e-mail) kwon.sc@samsung.com
Tested By	Technical Manager
 KyungYeup Kwak	 DooSung Park
Test Personal Name & Signatory	Approval Name & Signatory

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

※ If you need confirmation about the authenticity of the test report, please contact the above contact information.

SAMSUNG ELECTRONICS LED BUSINESS
 Accredited by KOLAS, Republic of KOREA

■ Test Report Information ■

1. This test report complies with KS Q ISO/IEC 17025 and KOLAS accreditation regulations.
2. This test report does not comply with KS Q ISO/IEC 17025 and KOLAS accreditation regulations.
3. The test results are limited to samples provided by the client and cannot be partially replicated without the approval of this authority, except as a whole.
4. If a statement of conformity is provided in this report, the applied decision rule does not apply the measurement uncertainty except for the case where the measurement uncertainty is mentioned in the above test method.
5. The test results marked © are not accredited by KOLAS.
6. The test results received from external providers for the test results marked ㉠.

■ Revision History ■

Data	Revision History	Writer	
		Drawn	Approved
2020.01.16	Rev.0 : New Version(6kh)	K.Y.KWAK	D.S.PARK
2020.04.20	Rev.1 : Extended Test Duration(9kh)	K.Y.KWAK	D.S.PARK

■ Test Summary ■

Life test condition			Summary of result		
Test condition	Current (mA)	Case temperature (°C)	Test duration (h)	Average lumen maintenance (%)	Maximum chromaticity shift ($\Delta u'v'$)
1	740	55.2	9 000	97.1	0.002 2
2	740	85.0	9 000	96.9	0.002 4
3	740	105.1	9 000	94.1	0.003 3

1. Number of the sample

- 20 Packages tested at actual case temperature 55.2 °C
- 20 Packages tested at actual case temperature 85.0 °C
- 20 Packages tested at actual case temperature 105.1 °C

※ Sampling method : Minimum three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.

2. Description of LED light sources

- Tested model code : SPHWAHDNF25YZWPT1
- Product series : LC020T (SPHWH*HDN**5***T1)
- Sample manufacturer : Samsung Electronics
- Sample Type : LED Package
- Package dimension : (19.0 × 19.0) mm
- Minimum die spacing : 0.325 mm
- CCT / CRI (Nominal) : 2 700 K / 80

3. Location of Test

- Permanent Testing Lab On Site Testing

(Address : 1, Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do 17113, Korea)

4. Description of auxiliary equipment and Operating time

- 1) Instrument Integrating sphere ISP1000-100
- 2) Instrument CAS140-CT
- 3) Keithley 2425 Sourcemeter
- 4) Electrical condition
 - Drive current : 740 mA
 - Typical voltage : 35.91 V
 - Total input power : 26.57 W
 - Average current density per LED die : 543 mA/mm²
 - Average power density per LED die : 1.63 W/mm²
- * LED packages are driven with a constant direct current.
- 5) Test duration : 9 000 h

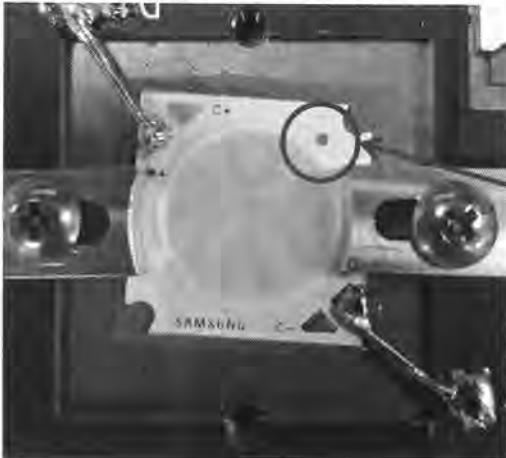
5. Ambient conditions including airflow, temperature and relative humidity

The minimal airflow is maintained in chamber.

The ambient temperature around the LED packages inside chamber is controlled by air flowing and the thermocouple readings are monitored.

- Case temperature : Controlled to $-2\text{ }^{\circ}\text{C}$
- Surrounding air temperature : Controlled to $-5\text{ }^{\circ}\text{C}$
- Relative humidity : $< 65\%$ R.H.

6. Case temperature (Test point temperature)



Case Temperature
Measurement Point

7. Drive current of the LED light source during lifetime test

See Sub-clause 9.1, 9.2 and 9.3

8. Initial luminous flux and forward voltage

See the table

9. Lumen maintenance data for each individual LED light source

See the table

9.1 Test condition 1 **55 °C**
Drive Current **740 mA**
Measurement Current **740 mA**

No.	Flux (lm)	Vf (V)	Lumen Maintenance (%)						
	0 h		500 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	2632.7	35.798	100.1	99.3	98.8	98.4	98.3	98.0	97.7
2	2653.9	35.762	100.1	99.2	98.9	98.4	98.4	98.0	97.9
3	2613.8	35.806	100.2	99.4	99.1	98.8	98.5	98.4	98.2
4	2696.4	35.977	100.0	99.3	99.0	98.6	98.4	98.2	98.0
5	2697.6	35.885	100.1	99.3	98.9	98.6	98.4	98.1	97.9
6	2651.0	36.055	100.2	99.4	99.1	98.7	98.5	98.3	98.1
7	2663.9	35.844	99.9	99.0	98.8	98.4	98.2	97.9	97.8
8	2695.1	35.888	100.1	99.2	99.0	98.6	98.4	98.3	98.0
9	2668.0	35.835	100.0	99.1	98.8	98.5	98.2	98.1	97.8
10	2693.4	36.043	100.0	99.2	98.9	98.6	98.5	98.3	98.0
11	2658.0	36.059	100.0	99.0	98.9	98.5	98.3	98.2	98.0
12	2693.0	35.896	100.0	99.1	99.1	98.7	98.5	98.4	98.2
13	2679.1	35.861	100.1	99.3	99.2	98.8	98.6	98.4	98.2
14	2708.1	35.975	99.9	99.1	98.9	98.5	98.1	97.9	97.8
15	2674.1	36.048	99.9	99.0	98.7	98.4	98.1	98.1	97.9
16	2650.4	35.869	99.9	99.0	98.7	98.4	98.1	98.1	97.8
17	2668.5	35.912	100.1	99.4	99.1	98.6	98.5	98.4	98.1
18	2643.9	35.826	99.9	99.2	98.8	98.4	98.3	98.1	98.0
19	2665.8	35.923	99.9	99.1	98.7	98.3	98.1	98.1	97.9
20	2630.2	35.977	99.9	99.1	98.8	98.3	98.3	98.1	97.9
Mean	2666.9	35.91	100.0	99.2	98.9	98.5	98.3	98.2	98.0
Median	2666.9	35.89	100.0	99.2	98.9	98.5	98.3	98.1	97.9
std.dev	25.7	0.09	0.1	0.1	0.1	0.1	0.2	0.1	0.1
Max	2708.1	36.06	100.2	99.4	99.2	98.8	98.6	98.4	98.2
Min	2613.8	35.76	99.9	99.0	98.7	98.3	98.1	97.9	97.7

9.1 Test condition 1

55 °C

Drive Current

740 mA

Measurement Current

740 mA

No.	Lumen Maintenance (%)								
	7 000 h	8 000 h	9 000 h	10 000 h	11 000 h	12 000 h	13 000 h	14 000 h	15 000 h
1	97.5	97.4	97.1						
2	97.6	97.5	97.0						
3	97.9	97.7	97.4						
4	97.7	97.5	97.1						
5	97.7	97.4	97.0						
6	97.8	97.5	97.1						
7	97.5	97.3	96.9						
8	97.7	97.4	97.0						
9	97.6	97.5	97.2						
10	97.8	97.6	97.3						
11	97.6	97.3	97.1						
12	97.8	97.5	97.1						
13	97.9	97.7	97.1						
14	97.5	97.3	97.0						
15	97.7	97.6	97.3						
16	97.8	97.5	97.1						
17	97.8	97.8	97.5						
18	97.7	97.6	97.3						
19	97.6	97.5	97.2						
20	97.8	97.7	97.3						
Mean	97.7	97.5	97.1						
Median	97.7	97.5	97.1						
std.dev	0.1	0.1	0.2						
Max	97.9	97.8	97.5						
Min	97.5	97.3	96.9						

9.1 Test condition 1

55 °C

Drive Current

740 mA

Measurement Current

740 mA

No.	CCT (K)							
	0 h	500 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	2 701	2 695	2 689	2 681	2 679	2 678	2 675	2 672
2	2 661	2 656	2 651	2 641	2 640	2 638	2 635	2 630
3	2 709	2 702	2 699	2 688	2 687	2 686	2 683	2 677
4	2 720	2 715	2 712	2 702	2 698	2 697	2 697	2 692
5	2 749	2 745	2 742	2 731	2 729	2 729	2 727	2 722
6	2 723	2 718	2 713	2 706	2 700	2 699	2 698	2 695
7	2 720	2 715	2 707	2 698	2 697	2 694	2 692	2 690
8	2 693	2 687	2 684	2 673	2 671	2 668	2 669	2 661
9	2 716	2 712	2 706	2 698	2 695	2 693	2 690	2 690
10	2 694	2 688	2 682	2 674	2 673	2 672	2 668	2 665
11	2 671	2 668	2 660	2 652	2 649	2 649	2 649	2 641
12	2 728	2 721	2 718	2 710	2 704	2 702	2 704	2 699
13	2 738	2 732	2 728	2 720	2 717	2 717	2 714	2 709
14	2 726	2 720	2 719	2 707	2 703	2 702	2 701	2 697
15	2 707	2 701	2 699	2 687	2 685	2 684	2 684	2 677
16	2 688	2 683	2 677	2 670	2 667	2 663	2 663	2 660
17	2 679	2 673	2 668	2 658	2 655	2 656	2 653	2 650
18	2 680	2 675	2 672	2 660	2 657	2 655	2 653	2 648
19	2 713	2 708	2 703	2 692	2 689	2 687	2 684	2 682
20	2 643	2 639	2 632	2 625	2 620	2 619	2 617	2 615
Mean	2 703	2 698	2 693	2 684	2 681	2 679	2 678	2 674
Median	2 708	2 702	2 699	2 688	2 686	2 685	2 683	2 677
std.dev	27	27	27	27	27	27	27	27
Max	2 749	2 745	2 742	2 731	2 729	2 729	2 727	2 722
Min	2 643	2 639	2 632	2 625	2 620	2 619	2 617	2 615

9.1 Test condition 1 55 °C
 Drive Current 740 mA
 Measurement Current 740 mA

No.	CCT (K)								
	7 000 h	8 000 h	9 000 h	10 000 h	11 000 h	12 000 h	13 000 h	14 000 h	15 000 h
1	2 670	2 668	2 668						
2	2 632	2 628	2 628						
3	2 678	2 675	2 675						
4	2 693	2 687	2 687						
5	2 721	2 715	2 718						
6	2 692	2 691	2 691						
7	2 689	2 683	2 686						
8	2 662	2 659	2 661						
9	2 687	2 685	2 683						
10	2 665	2 661	2 663						
11	2 642	2 638	2 640						
12	2 697	2 694	2 692						
13	2 711	2 707	2 706						
14	2 697	2 693	2 694						
15	2 679	2 673	2 676						
16	2 659	2 657	2 657						
17	2 649	2 647	2 646						
18	2 649	2 647	2 646						
19	2 680	2 676	2 678						
20	2 613	2 610	2 610						
Mean	2 673	2 670	2 670						
Median	2 679	2 674	2 676						
std.dev	27	27	27						
Max	2 721	2 715	2 718						
Min	2 613	2 610	2 610						

9.2 Test condition 2 85 °C
 Drive Current 740 mA
 Measurement Current 740 mA

No.	Flux (lm)	Vf (V)	Lumen Maintenance (%)						
	0 h		500 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	2631.5	36.048	99.8	99.3	98.8	98.3	98.2	98.1	98.0
2	2617.4	35.990	100.0	99.5	98.9	98.5	98.5	98.4	98.2
3	2698.5	36.020	99.7	99.2	98.8	98.1	97.9	97.9	97.6
4	2713.9	36.033	99.8	99.2	98.6	98.1	97.9	97.9	97.6
5	2665.6	35.890	99.8	99.5	99.0	98.5	98.3	98.4	98.1
6	2706.5	35.984	99.8	99.3	98.9	98.2	98.1	98.0	97.7
7	2625.7	36.274	99.9	99.4	98.9	98.4	98.4	98.3	98.0
8	2706.9	36.069	100.0	99.4	98.9	98.4	98.2	98.1	97.8
9	2688.2	36.196	100.0	99.4	98.9	98.3	98.2	98.1	97.8
10	2668.2	36.019	100.0	99.4	98.9	98.3	98.3	98.2	97.9
11	2630.3	36.119	99.7	99.2	98.9	98.3	98.3	98.1	97.9
12	2694.8	35.960	99.9	99.4	98.9	98.3	98.2	98.1	97.8
13	2672.9	36.027	99.9	99.4	98.8	98.4	98.3	98.2	98.0
14	2696.4	35.885	100.0	99.3	98.9	98.3	97.9	98.1	97.9
15	2659.5	36.170	99.8	99.2	98.8	98.1	98.0	98.1	97.7
16	2681.5	35.956	100.0	99.4	99.0	98.3	98.1	98.2	97.9
17	2684.1	36.282	100.0	99.4	98.9	98.4	98.2	98.2	97.9
18	2649.1	35.766	99.9	99.2	98.8	98.1	98.0	98.1	97.8
19	2696.6	36.029	99.9	99.2	98.7	98.3	98.1	98.1	97.8
20	2666.3	35.928	99.9	99.4	98.8	98.3	98.1	98.1	97.8
Mean	2672.7	36.03	99.9	99.3	98.8	98.3	98.2	98.1	97.9
Median	2677.2	36.02	99.9	99.4	98.9	98.3	98.2	98.1	97.9
std.dev	29.3	0.13	0.1	0.1	0.1	0.1	0.2	0.1	0.1
Max	2713.9	36.28	100.0	99.5	99.0	98.5	98.5	98.4	98.2
Min	2617.4	35.77	99.7	99.2	98.6	98.1	97.9	97.9	97.6



9.2 Test condition 2 85 °C
 Drive Current 740 mA
 Measurement Current 740 mA

No.	Lumen Maintenance (%)								
	7 000 h	8 000 h	9 000 h	10 000 h	11 000 h	12 000 h	13 000 h	14 000 h	15 000 h
1	97.7	97.6	97.1						
2	97.9	97.7	97.2						
3	97.5	97.3	96.9						
4	97.5	97.1	96.7						
5	97.8	97.5	96.9						
6	97.5	97.3	96.7						
7	97.8	97.7	97.2						
8	97.5	97.3	96.8						
9	97.5	97.4	96.8						
10	97.8	97.5	96.9						
11	97.7	97.6	97.1						
12	97.6	97.4	96.9						
13	97.6	97.5	97.0						
14	97.6	97.2	96.6						
15	97.5	97.2	96.6						
16	97.6	97.3	96.8						
17	97.7	97.3	97.0						
18	97.6	97.3	96.9						
19	97.6	97.1	96.7						
20	97.5	97.2	96.7						
Mean	97.6	97.4	96.9						
Median	97.6	97.3	96.9						
std.dev	0.1	0.2	0.2						
Max	97.9	97.7	97.2						
Min	97.5	97.1	96.6						

9.3 Test condition 3 105 °C
 Drive Current 740 mA
 Measurement Current 740 mA

No.	Lumen Maintenance (%)								
	7 000 h	8 000 h	9 000 h	10 000 h	11 000 h	12 000 h	13 000 h	14 000 h	15 000 h
1	95.6	95.1	94.4						
2	95.3	94.4	93.7						
3	95.5	94.8	94.2						
4	95.7	95.2	94.6						
5	95.9	95.3	94.5						
6	95.5	94.6	93.5						
7	95.3	94.4	93.8						
8	95.6	95.0	94.1						
9	95.4	94.8	94.0						
10	95.6	94.9	93.9						
11	95.3	94.7	94.1						
12	95.6	95.0	94.3						
13	95.7	95.3	94.4						
14	95.7	95.1	94.1						
15	95.1	94.7	94.0						
16	95.2	94.7	93.9						
17	95.7	94.9	94.0						
18	96.0	95.5	94.7						
19	95.4	94.4	93.8						
20	95.5	94.9	94.2						
Mean	95.5	94.9	94.1						
Median	95.6	94.9	94.1						
std.dev	0.2	0.3	0.3						
Max	96.0	95.5	94.7						
Min	95.1	94.4	93.5						

9.3 Test condition 3 105 °C
 Drive Current 740 mA
 Measurement Current 740 mA

No.	u'	v'	Chromaticity Shift ($\Delta u'v'$)						
			0 h	500 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h
1	0.264 5	0.528 0	0.000 4	0.001 0	0.001 7	0.002 0	0.002 2	0.002 4	0.002 6
2	0.260 9	0.526 0	0.000 3	0.000 9	0.001 5	0.001 7	0.001 7	0.002 0	0.002 3
3	0.261 5	0.525 7	0.000 3	0.000 8	0.001 6	0.001 7	0.001 8	0.002 0	0.002 2
4	0.263 0	0.528 5	0.000 4	0.001 1	0.001 7	0.001 9	0.002 0	0.002 3	0.002 6
5	0.262 4	0.528 1	0.000 3	0.000 8	0.001 7	0.001 9	0.002 1	0.002 2	0.002 5
6	0.262 7	0.528 5	0.000 3	0.000 9	0.001 6	0.001 7	0.001 8	0.001 9	0.002 3
7	0.262 2	0.526 5	0.000 4	0.001 0	0.001 7	0.001 8	0.001 9	0.001 9	0.002 5
8	0.262 5	0.526 8	0.000 4	0.000 9	0.001 5	0.001 7	0.001 7	0.002 1	0.002 3
9	0.260 3	0.527 2	0.000 5	0.001 0	0.001 6	0.001 8	0.001 9	0.002 0	0.002 2
10	0.262 5	0.527 5	0.000 6	0.001 0	0.001 8	0.001 8	0.001 9	0.002 3	0.002 6
11	0.263 0	0.527 3	0.000 3	0.000 8	0.001 5	0.001 6	0.001 7	0.002 0	0.002 3
12	0.260 7	0.526 4	0.000 3	0.000 9	0.001 5	0.001 7	0.001 8	0.002 1	0.002 3
13	0.262 1	0.526 6	0.000 4	0.000 8	0.001 7	0.001 8	0.002 0	0.002 2	0.002 4
14	0.261 6	0.528 4	0.000 3	0.000 9	0.001 6	0.001 7	0.001 8	0.002 2	0.002 5
15	0.262 3	0.528 0	0.000 4	0.000 9	0.001 7	0.001 7	0.001 8	0.002 1	0.002 4
16	0.261 9	0.528 6	0.000 4	0.000 9	0.001 7	0.001 8	0.002 0	0.002 1	0.002 5
17	0.260 4	0.527 7	0.000 5	0.001 0	0.001 8	0.001 8	0.001 9	0.002 1	0.002 4
18	0.263 2	0.528 0	0.000 5	0.001 1	0.001 8	0.002 1	0.002 2	0.002 5	0.002 8
19	0.262 5	0.525 5	0.000 4	0.000 9	0.001 7	0.001 7	0.001 8	0.002 1	0.002 5
20	0.262 8	0.528 6	0.000 4	0.001 0	0.001 6	0.001 8	0.001 9	0.002 1	0.002 5
Mean	0.262 2	0.527 4	0.000 4	0.000 9	0.001 6	0.001 8	0.001 9	0.002 1	0.002 4
Median	0.262 4	0.527 6	0.000 4	0.000 9	0.001 7	0.001 8	0.001 9	0.002 1	0.002 5
std.dev	0.001 0	0.001 0	0.000 1	0.000 1	0.000 1	0.000 1	0.000 1	0.000 1	0.000 2
Max	0.264 5	0.528 6	0.000 6	0.001 1	0.001 8	0.002 1	0.002 2	0.002 5	0.002 8
Min	0.260 3	0.525 5	0.000 3	0.000 8	0.001 5	0.001 6	0.001 7	0.001 9	0.002 2

9.3 Test condition 3**105 °C****Drive Current****740 mA****Measurement Current****740 mA**

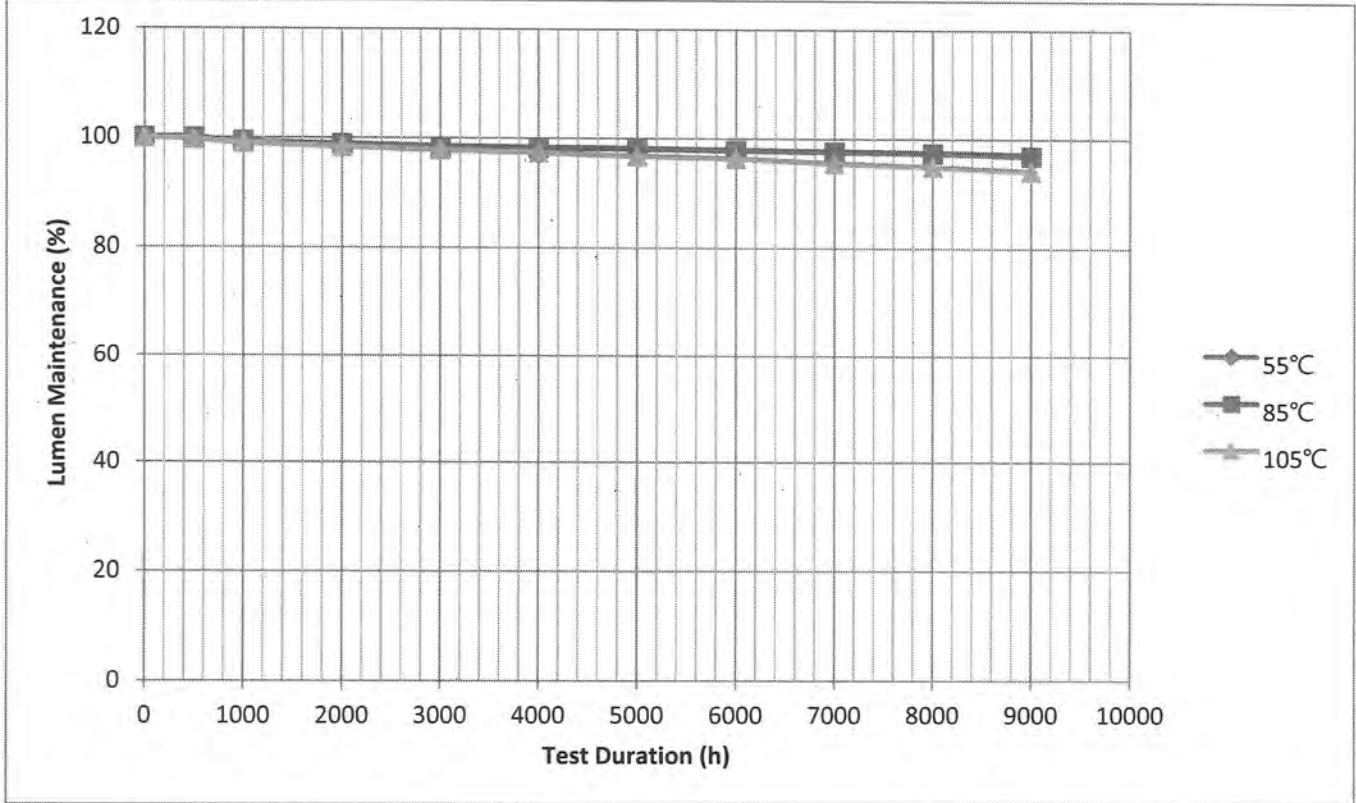
No.	CCT (K)							
	0 h	500 h	1 000 h	2 000 h	3 000 h	4 000 h	5 000 h	6 000 h
1	2 650	2 641	2 634	2 624	2 622	2 621	2 618	2 614
2	2 735	2 732	2 727	2 714	2 716	2 715	2 710	2 701
3	2 722	2 718	2 712	2 700	2 697	2 696	2 693	2 693
4	2 681	2 678	2 667	2 659	2 659	2 657	2 655	2 649
5	2 695	2 692	2 684	2 674	2 673	2 672	2 669	2 661
6	2 686	2 681	2 675	2 661	2 663	2 661	2 662	2 655
7	2 705	2 700	2 691	2 680	2 680	2 679	2 678	2 664
8	2 698	2 695	2 688	2 676	2 676	2 675	2 671	2 668
9	2 743	2 740	2 733	2 720	2 720	2 718	2 718	2 714
10	2 693	2 686	2 679	2 670	2 670	2 671	2 663	2 656
11	2 684	2 683	2 675	2 663	2 664	2 662	2 659	2 653
12	2 738	2 736	2 725	2 714	2 713	2 710	2 708	2 702
13	2 707	2 701	2 696	2 684	2 683	2 683	2 679	2 671
14	2 710	2 707	2 700	2 689	2 687	2 687	2 681	2 674
15	2 696	2 688	2 681	2 670	2 673	2 673	2 668	2 661
16	2 703	2 701	2 691	2 678	2 681	2 679	2 679	2 672
17	2 738	2 732	2 723	2 710	2 712	2 710	2 709	2 703
18	2 678	2 675	2 665	2 656	2 655	2 653	2 648	2 641
19	2 701	2 698	2 690	2 676	2 677	2 674	2 675	2 668
20	2 683	2 679	2 671	2 659	2 659	2 657	2 656	2 648
Mean	2 702	2 698	2 690	2 679	2 679	2 678	2 675	2 669
Median	2 699	2 696	2 689	2 676	2 676	2 674	2 673	2 666
std.dev	24	25	25	24	24	24	24	24
Max	2 743	2 740	2 733	2 720	2 720	2 718	2 718	2 714
Min	2 678	2 641	2 634	2 624	2 622	2 621	2 618	2 614

9.3 Test condition 3 105 °C
Drive Current 740 mA
Measurement Current 740 mA

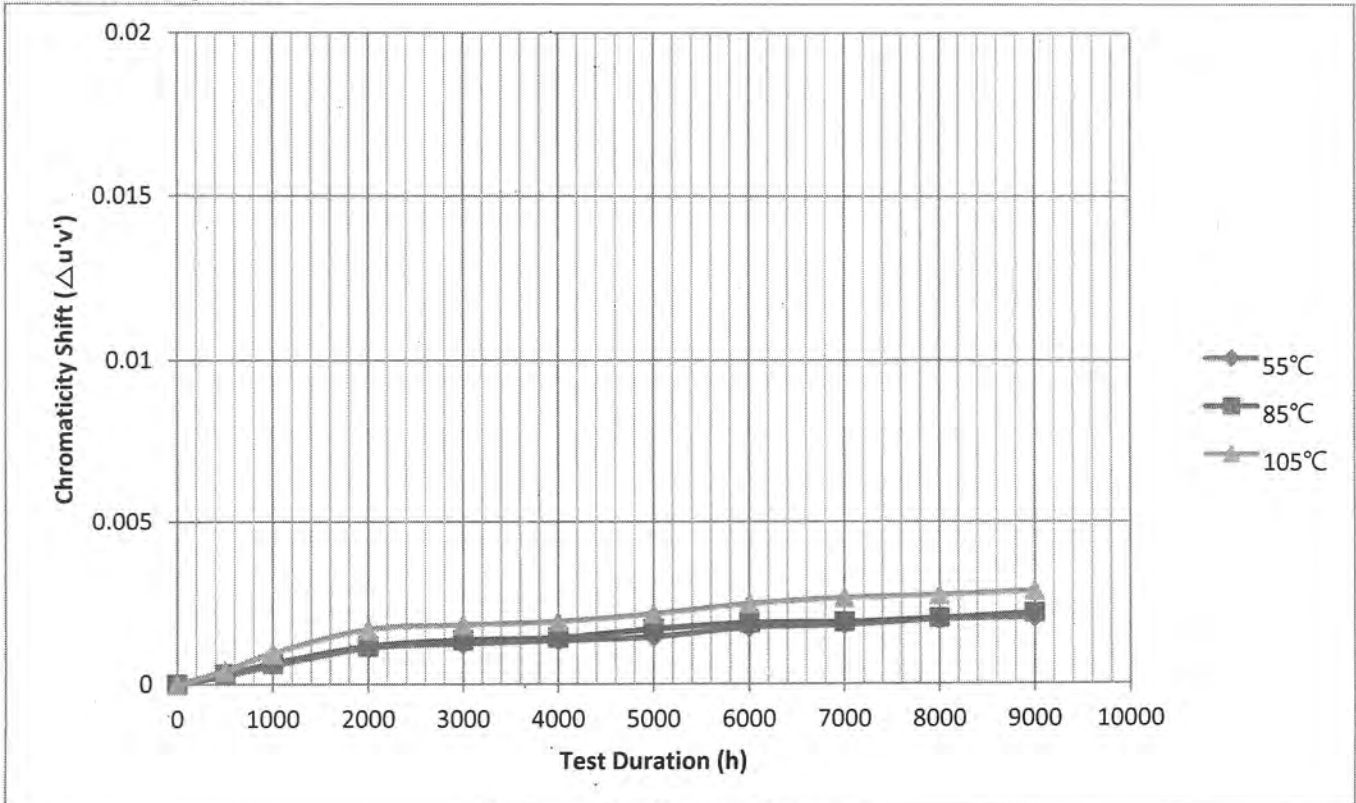
No.	CCT (K)								
	7 000 h	8 000 h	9 000 h	10 000 h	11 000 h	12 000 h	13 000 h	14 000 h	15 000 h
1	2 611	2 611	2 613						
2	2 699	2 699	2 697						
3	2 689	2 688	2 692						
4	2 647	2 650	2 654						
5	2 661	2 660	2 661						
6	2 651	2 643	2 638						
7	2 660	2 663	2 659						
8	2 663	2 662	2 656						
9	2 710	2 715	2 717						
10	2 649	2 648	2 643						
11	2 651	2 649	2 644						
12	2 698	2 698	2 697						
13	2 672	2 676	2 681						
14	2 672	2 672	2 671						
15	2 658	2 658	2 654						
16	2 668	2 662	2 663						
17	2 697	2 688	2 681						
18	2 641	2 639	2 639						
19	2 664	2 661	2 657						
20	2 644	2 648	2 648						
Mean	2 665	2 664	2 663						
Median	2 662	2 661	2 658						
std.dev	24	24	25						
Max	2 710	2 715	2 717						
Min	2 611	2 611	2 613						

9.4 Chart

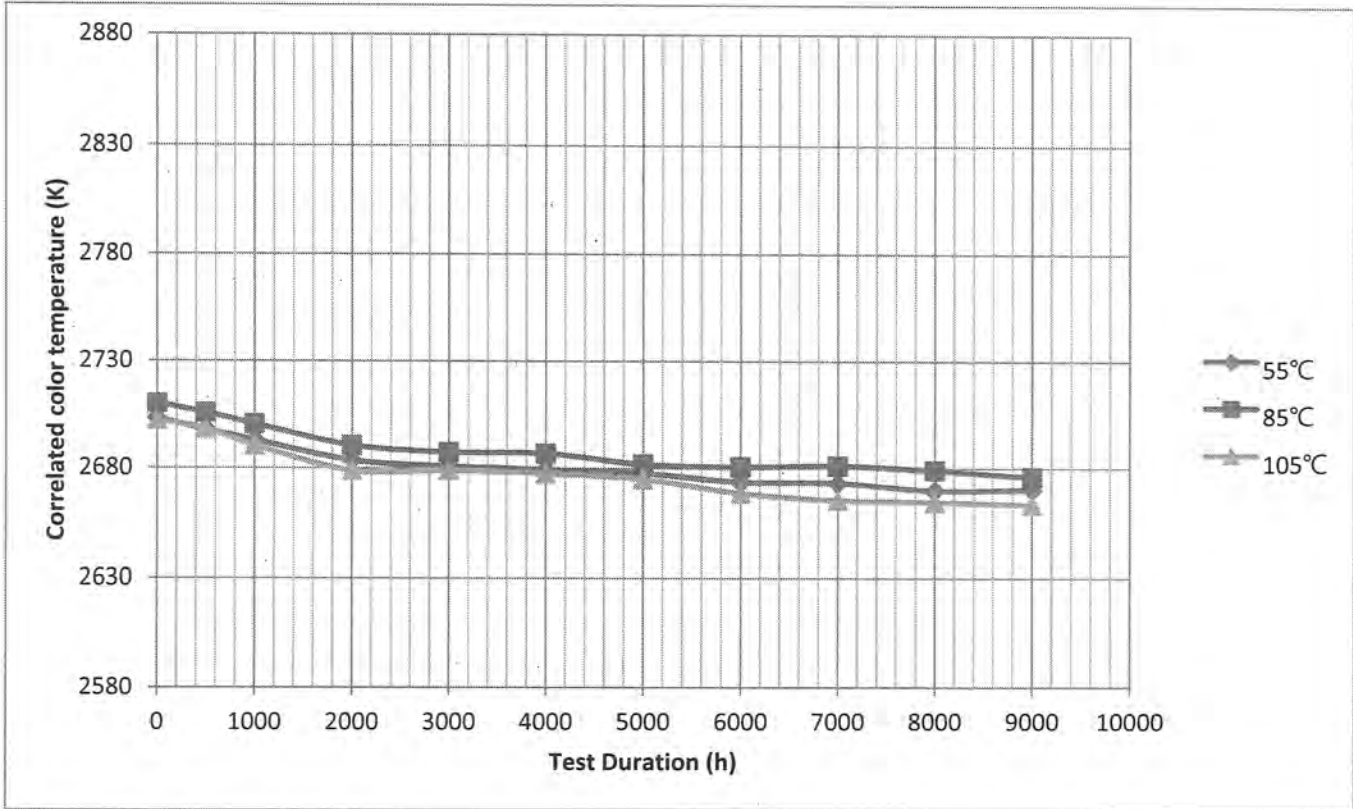
<Lumen Maintenance>



<Chromaticity Shift>



<CCT>



10. Observation of failures

No optical, Electrical or mechanical failure of any LED Package was seen during the lifetime testing.

11. LED light source monitoring interval

0 500 1 000 2 000 3 000 4 000 5 000 6 000 7 000 8 000 9 000

12. Photometric measurement uncertainty

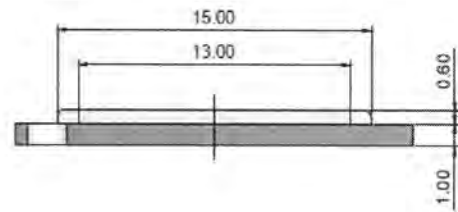
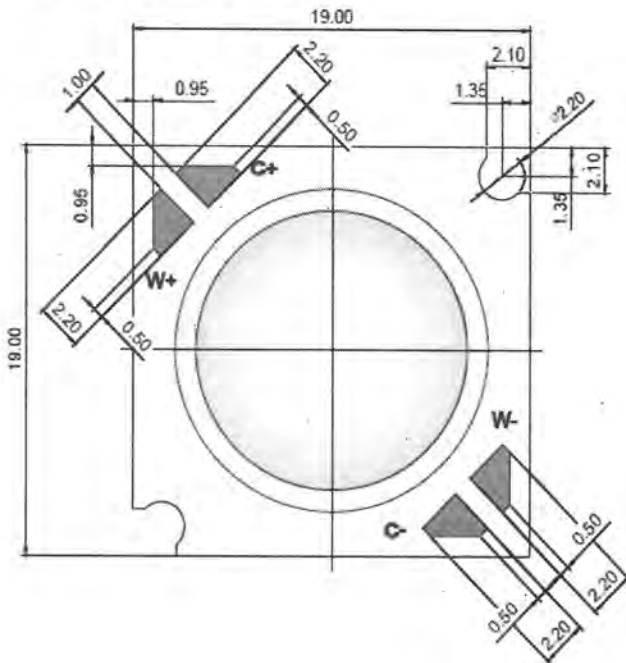
3.5%

13. TM-21-11 Report : Projecting Long Term Lumen Maintenance of LED Light Source

Table 1: Report at each LM-80 Test Condition

Description of LED Light Source Tested (manufacturer, model, catalog number)		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	Sample size	20
Number of failures	0	Number of failures	0	Number of failures	0	Number of failures	0
DUT drive current used in the test (mA)	740	DUT drive current used in the test (mA)	740	DUT drive current used in the test (mA)	740	DUT drive current used in the test (mA)	740
Test duration (hours)	9,000	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	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	Tested case temperature (°C)	105
α	2.455E-06	α	2.605E-06	α	6.715E-06	α	6.715E-06
B	0.994	B	0.994	B	1.001	B	1.001
Reported L80(9k) (hours)	>54000	Reported L80(9k) (hours)	>54000	Reported L80(9k) (hours)	>54000	Reported L80(9k) (hours)	33,000

14. Dimension of samples



15. Cover models

Product name	Size	Chip		LM80 Condition		
	Outer [mm]	Array	Distance (Chip to Chip) [mm]	If [mA]	Power Density [W/mm ²]	Current Density [mA/mm ²]
LC010T	19x19	12s X 1p X 2ch	0.337	370	0.038	543.3
LC020T		12s X 2p X 2ch	0.325	740	0.076	543.3

*******END OF TEST REPORT*******