

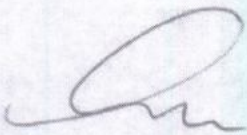



LM80 Test Report

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

Samsung Electronics LED Business Quality Team Report

Report No. : SLED-14-003
Test Initiated Date : 2013.02.21
Report issued Date : 2014.04.29

Test result reported for	Testing performed by
	SAMSUNG ELECTRONICS LED BUSINESS QUALITY TEAM San#24 Nongseo-Dong Giheung-Gu, Yongin-City Gyeonggi-Do 446-711, Korea
Tested By InPyo, Hong	Approved by HeeYoung, Lee
	
Test Personal Name & Signatory	Approval Name & Signatory

SAMSUNG ELECTRONICS LED BUSINESS Executive Vice President (signatory)
Accredited by KOLAS, Republic of KOREA

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

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SAMSUNG ELECTRONICS LED BUSINESS
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■ 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	100	55.0°C	10000	97.4	0.0012
2	100	84.9°C	10000	96.1	0.0022
3	100	105.0°C	10000	86.7	0.0042

1. Number of LED light sources tested

- 30 Packages tested at actual case temperature 55.0°C
- 30 Packages tested at actual case temperature 84.9°C
- 30 Packages tested at actual case temperature 105.0°C

2. Description of LED light sources

- Samsung Electronics LED Package : SPMWHT541MXXXXXXXX
- IF = 100mA, CCT(Nominal) = 3000K
- Package Dimension : 5.6 × 3.0 × 0.8 mm

3. Description of auxiliary equipment

- 1) Instrument Integrating sphere ISP1000-100
- 2) Instrument CAS140-CT
- 3) Keithley 2425 Sourcemeter

4. Operating time

LED packages are driven with a constant direct current.

- Number of units : 30 at 55°C, 85°C and 105°C
- Drive current : 100mA
- Typical voltage : 3.0 V

5. Ambient conditions including airflow, temperature and relative humidity

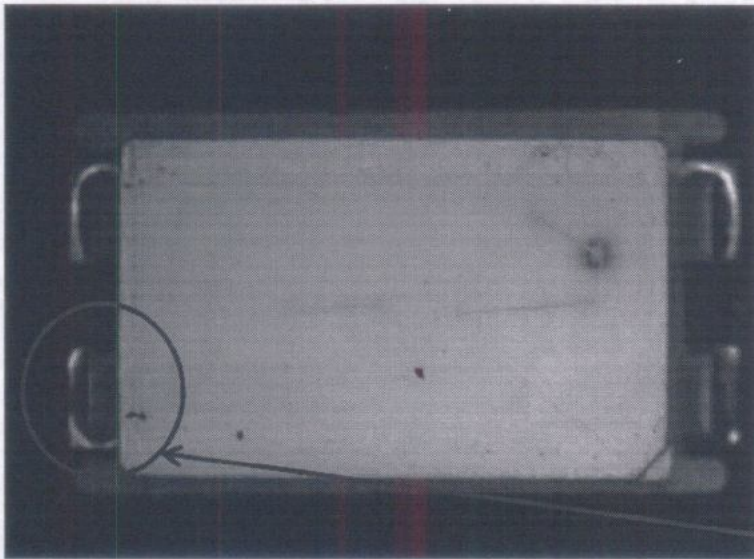
The minimal airflow is maintained in chamber.

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°C
- Surrounding air temperature : Controlled to -5°C
- Relative humidity : < 65%RH



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

Dirve Current

100mA

Measurement Current

100mA

No.	Flux (lm)	Vf (V)	Lumen Maintenance (%)						
	0 h		500 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	22.6	3.001	99.4	99.0	98.8	98.6	98.5	98.1	98.3
2	22.8	2.978	99.3	99.1	98.9	99.0	99.0	97.7	98.7
3	22.5	2.981	99.3	99.1	98.8	98.7	98.7	98.4	98.4
4	22.4	2.974	99.4	98.9	98.8	98.6	98.8	96.4	98.1
5	22.5	2.990	99.0	99.0	98.7	98.3	98.4	95.7	98.1
6	23.0	2.974	99.3	98.8	98.2	98.6	98.4	96.9	98.4
7	22.6	2.984	99.2	99.0	98.6	98.5	98.4	100.1	98.3
8	22.3	3.007	99.2	98.8	98.2	97.8	97.9	98.2	97.7
9	22.8	2.994	98.7	98.7	98.3	97.1	97.5	97.0	97.1
10	23.0	2.957	98.3	98.4	97.8	96.4	97.6	96.6	97.6
11	23.1	2.966	99.1	99.0	97.8	98.4	98.5	96.9	98.2
12	22.9	2.998	99.3	99.3	98.6	98.4	98.7	97.7	98.0
13	22.9	2.974	98.9	98.8	97.9	97.9	97.9	97.1	97.5
14	22.6	3.004	99.4	99.0	98.7	98.6	98.7	97.2	98.3
15	22.5	2.975	99.1	98.5	98.1	98.0	98.2	99.0	97.6
16	22.8	2.975	99.1	98.8	98.5	98.1	98.2	97.4	98.0
17	22.8	2.998	99.3	99.0	98.4	98.1	98.2	95.2	97.9
18	23.2	2.961	99.4	99.0	98.7	98.4	98.3	97.2	98.0
19	22.8	2.982	99.1	99.0	98.5	98.0	98.2	96.5	98.0
20	23.1	2.957	99.3	99.0	98.6	98.4	98.4	91.1	98.3
21	22.8	2.978	99.4	98.7	98.2	98.2	98.5	94.3	98.3
22	22.8	2.973	99.3	99.0	98.8	98.7	98.7	97.5	98.4
23	22.8	2.973	99.1	99.0	98.8	98.7	98.6	98.7	98.2
24	22.9	2.976	99.0	98.7	98.3	98.0	98.0	97.1	97.8
25	22.0	3.005	99.2	98.9	98.3	98.1	98.2	100.8	98.0
26	22.7	2.980	99.5	99.3	98.9	99.0	99.0	96.1	98.7
27	22.8	2.966	99.3	99.2	98.9	98.6	98.7	97.7	98.1
28	22.6	2.997	99.2	98.8	98.3	98.2	98.3	96.4	97.9
29	22.1	2.993	99.4	99.1	98.7	98.4	98.4	97.9	98.2
30	22.2	3.000	99.3	99.3	99.0	98.8	98.8	99.4	98.4
Mean	22.7	2.98	99.2	98.9	98.5	98.3	98.4	97.2	98.1
Median	22.8	2.98	99.3	99.0	98.6	98.4	98.4	97.2	98.1
std.dev	0.3	0.01	0.2	0.2	0.3	0.5	0.4	1.8	0.3
Max	23.2	3.01	99.5	99.3	99.0	99.0	99.0	100.8	98.7
Min	22.0	2.96	98.3	98.4	97.8	96.4	97.5	91.1	97.1

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9.1 Test condition 1

55°C

Dirve Current

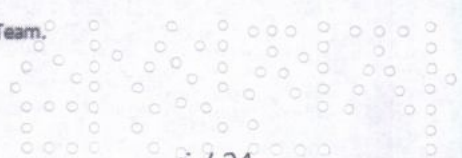
100mA

Measurement Current

100mA

No.	Lumen Maintenance (%)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	98.2	98.2	96.9	97.5					
2	98.4	98.6	97.5	98.2					
3	97.8	97.8	96.8	97.2					
4	97.8	98.0	96.8	97.4					
5	98.0	98.0	97.1	97.5					
6	98.0	98.2	97.2	97.9					
7	98.0	98.2	97.0	97.5					
8	97.4	97.2	96.1	97.1					
9	97.0	97.7	96.8	97.2					
10	97.5	97.2	96.4	96.9					
11	98.2	98.2	97.2	97.8					
12	98.0	98.0	97.1	97.6					
13	97.3	96.9	95.7	96.3					
14	97.2	97.6	96.7	97.2					
15	97.2	97.3	96.3	97.3					
16	97.8	97.8	96.5	97.1					
17	97.8	97.5	96.5	97.0					
18	98.0	98.1	96.9	97.6					
19	97.8	97.9	96.8	97.3					
20	98.3	98.3	97.4	98.1					
21	98.2	97.9	96.9	97.2					
22	98.1	98.2	97.0	97.6					
23	98.1	98.1	97.1	97.7					
24	97.6	97.7	96.7	97.3					
25	97.8	97.9	96.7	97.2					
26	98.4	98.4	97.4	97.5					
27	98.1	97.4	96.1	97.4					
28	97.7	97.4	96.4	96.8					
29	97.7	97.7	96.4	97.2					
30	97.9	97.6	96.6	97.0					
Mean	97.8	97.8	96.8	97.4					
Median	97.9	97.9	96.8	97.3					
std.dev	0.4	0.4	0.4	0.4					
Max	98.4	98.6	97.5	98.2	0.0	0.0	0.0	0.0	0.0
Min	97.0	96.9	95.7	96.3	0.0	0.0	0.0	0.0	0.0

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9.1 Test condition 1

55°C

Drive Current

100mA

Measurement Current

100mA

No.	Cx	Cy	Chromaticity Shift ($\Delta u'v'$)						
			0 h	500 h	1000 h	2000 h	3000 h	4000 h	5000 h
1	0.4304	0.3991	0.0003	0.0001	0.0002	0.0006	0.0005	0.0028	0.0004
2	0.4276	0.3987	0.0002	0.0001	0.0002	0.0006	0.0004	0.0010	0.0003
3	0.4317	0.4005	0.0001	0.0006	0.0005	0.0009	0.0007	0.0011	0.0006
4	0.4320	0.4011	0.0001	0.0002	0.0004	0.0006	0.0006	0.0011	0.0006
5	0.4280	0.3982	0.0001	0.0001	0.0004	0.0007	0.0005	0.0014	0.0004
6	0.4308	0.4000	0.0001	0.0002	0.0004	0.0009	0.0007	0.0003	0.0006
7	0.4287	0.3971	0.0002	0.0003	0.0007	0.0009	0.0010	0.0016	0.0007
8	0.4314	0.4007	0.0001	0.0002	0.0007	0.0012	0.0012	0.0017	0.0011
9	0.4314	0.4008	0.0001	0.0003	0.0007	0.0014	0.0011	0.0012	0.0010
10	0.4281	0.3994	0.0003	0.0004	0.0011	0.0018	0.0012	0.0004	0.0010
11	0.4265	0.3952	0.0001	0.0002	0.0009	0.0010	0.0008	0.0016	0.0006
12	0.4303	0.3994	0.0002	0.0003	0.0008	0.0008	0.0007	0.0011	0.0007
13	0.4282	0.3991	0.0002	0.0002	0.0010	0.0011	0.0010	0.0017	0.0010
14	0.4316	0.4005	0.0001	0.0002	0.0006	0.0008	0.0007	0.0020	0.0007
15	0.4314	0.3983	0.0000	0.0003	0.0009	0.0010	0.0009	0.0015	0.0011
16	0.4292	0.3981	0.0002	0.0003	0.0007	0.0011	0.0010	0.0014	0.0013
17	0.4309	0.4007	0.0001	0.0003	0.0004	0.0010	0.0009	0.0036	0.0008
18	0.4275	0.3972	0.0002	0.0003	0.0006	0.0009	0.0007	0.0006	0.0008
19	0.4324	0.3985	0.0001	0.0002	0.0007	0.0011	0.0010	0.0034	0.0010
20	0.4303	0.3992	0.0002	0.0003	0.0010	0.0010	0.0009	0.0010	0.0011
21	0.4299	0.3995	0.0002	0.0006	0.0010	0.0010	0.0009	0.0006	0.0008
22	0.4315	0.3994	0.0002	0.0003	0.0005	0.0009	0.0009	0.0032	0.0008
23	0.4300	0.3987	0.0002	0.0001	0.0004	0.0007	0.0007	0.0025	0.0008
24	0.4283	0.3989	0.0001	0.0003	0.0007	0.0009	0.0010	0.0008	0.0010
25	0.4304	0.3968	0.0000	0.0002	0.0006	0.0011	0.0009	0.0016	0.0009
26	0.4295	0.3990	0.0001	0.0002	0.0003	0.0005	0.0006	0.0012	0.0004
27	0.4326	0.4005	0.0000	0.0001	0.0004	0.0009	0.0008	0.0025	0.0008
28	0.4306	0.3979	0.0003	0.0003	0.0007	0.0009	0.0008	0.0026	0.0008
29	0.4315	0.4008	0.0002	0.0003	0.0004	0.0007	0.0007	0.0005	0.0006
30	0.4310	0.4007	0.0000	0.0001	0.0004	0.0006	0.0006	0.0003	0.0006
Mean	0.4301	0.3991	0.0002	0.0003	0.0006	0.0009	0.0008	0.0015	0.0008
Median	0.4304	0.3992	0.0001	0.0003	0.0006	0.0009	0.0008	0.0014	0.0008
std.dev	0.0016	0.0014	0.0001	0.0001	0.0002	0.0003	0.0002	0.0009	0.0002
Max	0.4326	0.4011	0.0003	0.0006	0.0011	0.0018	0.0012	0.0036	0.0013
Min	0.4265	0.3952	0.0000	0.0001	0.0002	0.0005	0.0004	0.0003	0.0003

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SAMSUNG ELECTRONICS LED BUSINESS
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9.1 Test condition 1

55°C

Drive Current

100mA

Measurement Current

100mA

No.	Chromaticity Shift ($\Delta u'v'$)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	0.0005	0.0005	0.0004	0.0004					
2	0.0004	0.0002	0.0002	0.0002					
3	0.0007	0.0005	0.0006	0.0006					
4	0.0007	0.0006	0.0007	0.0006					
5	0.0004	0.0003	0.0004	0.0004					
6	0.0006	0.0005	0.0005	0.0004					
7	0.0008	0.0007	0.0009	0.0007					
8	0.0013	0.0012	0.0012	0.0010					
9	0.0009	0.0007	0.0009	0.0007					
10	0.0009	0.0012	0.0013	0.0011					
11	0.0007	0.0005	0.0009	0.0006					
12	0.0005	0.0005	0.0006	0.0006					
13	0.0010	0.0011	0.0013	0.0012					
14	0.0006	0.0008	0.0008	0.0009					
15	0.0012	0.0010	0.0010	0.0011					
16	0.0013	0.0012	0.0012	0.0012					
17	0.0008	0.0008	0.0009	0.0008					
18	0.0008	0.0007	0.0008	0.0007					
19	0.0009	0.0009	0.0010	0.0008					
20	0.0010	0.0007	0.0007	0.0007					
21	0.0009	0.0008	0.0009	0.0007					
22	0.0008	0.0007	0.0008	0.0005					
23	0.0008	0.0009	0.0007	0.0007					
24	0.0011	0.0010	0.0009	0.0008					
25	0.0009	0.0009	0.0009	0.0009					
26	0.0004	0.0003	0.0004	0.0003					
27	0.0010	0.0008	0.0009	0.0008					
28	0.0008	0.0008	0.0008	0.0008					
29	0.0006	0.0008	0.0007	0.0007					
30	0.0007	0.0009	0.0006	0.0006					
Mean	0.0008	0.0008	0.0008	0.0007					
Median	0.0008	0.0008	0.0008	0.0007					
std.dev	0.0002	0.0003	0.0003	0.0002					
Max	0.0013	0.0012	0.0013	0.0012					
Min	0.0004	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000

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9.1 Test condition 1

55°C

Dirve Current

100mA

Measurement Current

100mA

No.	CCT (K)							
	0 h	500 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	3072	3066	3072	3076	3085	3082	3144	3081
2	3119	3114	3120	3124	3135	3130	3138	3127
3	3061	3064	3076	3073	3084	3080	3090	3077
4	3061	3063	3066	3072	3076	3076	3090	3078
5	3108	3111	3111	3118	3127	3123	3077	3118
6	3072	3074	3075	3083	3095	3089	3063	3088
7	3086	3091	3093	3104	3110	3113	3067	3106
8	3067	3066	3073	3086	3098	3098	3090	3096
9	3069	3073	3077	3086	3106	3098	3091	3096
10	3115	3123	3125	3146	3162	3147	3108	3143
11	3110	3111	3113	3135	3136	3132	3113	3126
12	3077	3081	3084	3097	3099	3096	3103	3096
13	3112	3117	3117	3137	3142	3139	3102	3138
14	3063	3065	3069	3078	3084	3080	3110	3081
15	3047	3048	3056	3070	3073	3071	3087	3077
16	3085	3090	3093	3105	3115	3114	3123	3119
17	3076	3079	3083	3088	3104	3101	3164	3097
18	3109	3112	3116	3125	3134	3129	3122	3131
19	3032	3031	3038	3049	3060	3056	3120	3058
20	3075	3079	3084	3101	3102	3099	3093	3105
21	3085	3092	3101	3111	3112	3109	3091	3108
22	3055	3059	3063	3069	3078	3079	3140	3075
23	3076	3078	3080	3088	3095	3096	3134	3097
24	3107	3110	3117	3127	3133	3134	3087	3136
25	3052	3052	3056	3069	3080	3077	3094	3076
26	3088	3087	3093	3097	3102	3104	3117	3098
27	3045	3045	3047	3054	3067	3066	3109	3065
28	3059	3066	3068	3077	3083	3079	3127	3079
29	3067	3073	3075	3078	3086	3086	3079	3083
30	3075	3074	3078	3084	3092	3090	3080	3090
Mean	3078	3080	3084	3094	3102	3099	3105	3098
Median	3075	3076	3079	3087	3098	3097	3102	3096
std.dev	23	23	23	25	25	24	24	23
Max	3119	3123	3125	3146	3162	3147	3164	3143
Min	3032	3031	3038	3049	3060	3056	3063	3058

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SAMSUNG ELECTRONICS LED BUSINESS QUALITY TEAM

San#24 Nongseo-Dong
Giheung-Gu, Yongin-City
Gyeonggi-Do 446-711, Korea



9.1 Test condition 1

55°C

Dirve Current

100mA

Measurement Current

100mA

No.	CCT (K)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	3078	3078	3081	3077					
2	3129	3123	3125	3123					
3	3079	3074	3077	3077					
4	3080	3075	3078	3077					
5	3120	3117	3118	3118					
6	3088	3084	3084	3083					
7	3108	3105	3107	3105					
8	3101	3099	3098	3095					
9	3094	3089	3092	3087					
10	3141	3148	3147	3145					
11	3129	3125	3132	3127					
12	3091	3092	3092	3093					
13	3137	3143	3143	3142					
14	3078	3083	3084	3087					
15	3078	3074	3074	3075					
16	3120	3119	3118	3118					
17	3097	3099	3099	3097					
18	3130	3129	3130	3129					
19	3056	3056	3057	3053					
20	3102	3095	3094	3093					
21	3109	3106	3108	3105					
22	3076	3074	3075	3069					
23	3099	3100	3094	3095					
24	3138	3136	3132	3130					
25	3076	3076	3075	3076					
26	3099	3096	3100	3096					
27	3070	3067	3067	3066					
28	3080	3082	3078	3080					
29	3083	3089	3086	3085					
30	3093	3098	3091	3091					
Mean	3098	3098	3098	3097					
Median	3096	3094	3093	3093					
std.dev	23	23	23	23					
Max	3148	3148	3147	3145	0	0	0	0	0
Min	3056	3056	3057	3053	0	0	0	0	0

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9.2 Test condition 2

85°C

Dirve Current

100mA

Measurement Current

100mA

No.	Flux (lm)	Vf (V)	Lumen Maintenance (%)						
	0 h		500 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	22.9	3.001	99.3	98.8	97.9	97.5	97.1	97.0	96.6
2	22.9	2.978	99.5	99.1	98.3	97.6	97.4	98.0	97.1
3	22.9	2.959	99.5	99.1	98.1	96.8	96.9	96.7	96.5
4	22.2	3.012	99.4	98.9	97.8	97.3	97.2	99.1	97.1
5	22.0	3.008	99.2	98.6	98.1	97.6	97.7	100.1	97.5
6	22.8	2.975	99.3	99.1	98.3	97.9	97.6	99.1	97.3
7	23.2	2.959	99.5	99.0	98.4	97.9	97.7	95.7	97.4
8	22.5	3.011	99.4	98.7	97.7	97.4	97.2	96.7	96.9
9	22.7	2.972	99.4	99.1	98.2	97.8	97.6	97.6	97.4
10	22.9	2.957	99.6	99.2	98.5	97.4	97.5	97.8	96.9
11	23.0	2.966	99.4	99.3	98.4	97.8	97.6	98.4	96.9
12	23.0	2.981	99.5	99.1	98.1	97.7	97.3	97.2	96.9
13	22.9	2.959	99.3	99.0	98.2	97.6	97.3	97.8	97.1
14	22.6	2.971	99.2	98.8	98.1	97.6	97.5	98.5	97.0
15	22.9	2.970	98.1	98.0	97.5	97.0	96.9	95.8	96.4
16	22.9	2.978	99.2	99.0	98.0	97.5	97.2	97.5	96.8
17	22.5	2.975	99.4	99.2	97.7	96.9	96.6	99.0	96.3
18	23.0	2.971	99.5	99.5	98.6	97.9	97.8	98.6	97.4
19	22.7	2.994	99.5	99.2	98.0	97.4	97.3	97.9	96.6
20	22.1	2.991	99.2	98.0	96.1	95.5	95.2	102.4	94.8
21	22.5	2.984	97.8	98.0	96.5	96.2	95.9	99.7	95.6
22	23.0	2.996	98.0	98.0	97.2	96.6	96.3	97.1	95.6
23	23.0	2.968	99.6	99.4	98.7	97.8	97.9	97.3	97.5
24	22.7	2.974	99.4	99.2	98.4	97.9	97.3	98.1	97.3
25	22.7	2.959	99.3	98.9	97.9	97.6	97.5	94.5	97.1
26	22.3	3.018	99.3	99.0	98.1	97.7	97.6	100.3	97.2
27	22.9	2.967	99.6	99.3	98.1	97.5	97.3	97.9	97.0
28	22.5	2.999	99.4	99.0	98.3	97.0	96.7	98.3	96.5
29	22.2	3.013	99.2	98.8	98.0	97.5	97.3	97.3	96.8
30	22.5	2.959	99.5	99.2	98.2	97.7	97.7	96.5	97.1
Mean	22.7	2.98	99.3	98.9	98.0	97.4	97.2	97.9	96.8
Median	22.8	2.98	99.4	99.0	98.1	97.5	97.3	97.9	97.0
std.dev	0.3	0.02	0.4	0.4	0.6	0.5	0.6	1.5	0.6
Max	23.2	3.02	99.6	99.5	98.7	97.9	97.9	102.4	97.5
Min	22.0	2.96	97.8	98.0	96.1	95.5	95.2	94.5	94.8

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Gyeonggi-Do 446-711, Korea



9.2 Test condition 2

85°C

Dirve Current

100mA

Measurement Current

100mA

No.	Lumen Maintenance (%)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	96.4	96.4	95.5	96.0					
2	96.9	96.9	95.8	96.4					
3	96.1	96.4	95.4	95.5					
4	97.0	97.1	96.1	96.5					
5	97.1	97.2	96.7	96.4					
6	97.1	97.1	96.1	96.5					
7	97.0	97.2	96.3	96.7					
8	96.7	96.8	95.8	96.4					
9	95.5	95.9	94.9	95.4					
10	96.3	96.5	96.0	96.1					
11	96.7	96.8	96.0	96.4					
12	96.4	96.4	95.8	96.2					
13	96.8	96.9	95.9	96.2					
14	96.7	96.9	96.2	96.3					
15	96.4	96.3	95.1	95.6					
16	96.6	96.7	95.7	96.3					
17	96.5	96.7	95.7	96.3					
18	97.2	97.2	96.3	97.0					
19	96.2	96.2	95.5	95.8					
20	94.4	94.9	94.0	94.3					
21	95.2	95.5	94.5	94.8					
22	95.7	95.8	94.9	95.4					
23	97.2	97.5	96.7	97.2					
24	97.0	97.1	96.5	96.7					
25	96.7	96.9	96.2	96.4					
26	97.2	97.2	96.1	96.3					
27	97.0	97.2	96.3	96.8					
28	96.2	96.2	95.6	95.9					
29	96.5	96.7	96.1	96.3					
30	96.8	97.1	96.6	96.4					
Mean	96.5	96.7	95.8	96.1					
Median	96.7	96.8	95.9	96.3					
std.dev	0.6	0.6	0.6	0.6					
Max	97.2	97.5	96.7	97.2					
Min	94.4	94.9	94.0	94.3	0.0	0.0	0.0	0.0	0.0

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9.2 Test condition 2

85°C

Drive Current

100mA

Measurement Current

100mA

No.	Cx	Cy	Chromaticity Shift ($\Delta u'v'$)						
			0h	500 h	1000 h	2000 h	3000 h	4000 h	5000 h
1	0.4280	0.3981	0.0001	0.0001	0.0005	0.0008	0.0011	0.0012	0.0014
2	0.4280	0.3977	0.0001	0.0002	0.0006	0.0011	0.0011	0.0012	0.0015
3	0.4324	0.4008	0.0000	0.0000	0.0006	0.0012	0.0014	0.0011	0.0015
4	0.4325	0.4014	0.0002	0.0002	0.0005	0.0012	0.0012	0.0009	0.0014
5	0.4324	0.4000	0.0001	0.0001	0.0005	0.0010	0.0010	0.0030	0.0010
6	0.4334	0.4005	0.0003	0.0002	0.0004	0.0008	0.0009	0.0021	0.0012
7	0.4329	0.4007	0.0002	0.0003	0.0004	0.0007	0.0010	0.0031	0.0012
8	0.4311	0.3985	0.0001	0.0003	0.0007	0.0010	0.0013	0.0018	0.0014
9	0.4312	0.3997	0.0001	0.0001	0.0009	0.0008	0.0009	0.0013	0.0011
10	0.4308	0.3999	0.0001	0.0001	0.0005	0.0011	0.0012	0.0028	0.0015
11	0.4296	0.3990	0.0000	0.0001	0.0004	0.0009	0.0011	0.0026	0.0014
12	0.4307	0.3991	0.0001	0.0002	0.0006	0.0010	0.0012	0.0010	0.0014
13	0.4295	0.3966	0.0001	0.0002	0.0006	0.0010	0.0011	0.0027	0.0014
14	0.4299	0.3990	0.0002	0.0002	0.0016	0.0010	0.0010	0.0009	0.0012
15	0.4320	0.4000	0.0006	0.0011	0.0010	0.0012	0.0013	0.0012	0.0015
16	0.4293	0.3985	0.0000	0.0002	0.0007	0.0012	0.0012	0.0013	0.0013
17	0.4273	0.3979	0.0001	0.0002	0.0016	0.0014	0.0015	0.0014	0.0016
18	0.4279	0.3966	0.0001	0.0002	0.0004	0.0007	0.0010	0.0013	0.0010
19	0.4307	0.4008	0.0001	0.0001	0.0012	0.0011	0.0011	0.0015	0.0016
20	0.4334	0.4021	0.0002	0.0004	0.0014	0.0016	0.0017	0.0024	0.0020
21	0.4333	0.4021	0.0004	0.0003	0.0010	0.0014	0.0018	0.0027	0.0019
22	0.4285	0.3984	0.0006	0.0003	0.0007	0.0012	0.0014	0.0010	0.0016
23	0.4274	0.3969	0.0000	0.0001	0.0003	0.0010	0.0009	0.0009	0.0011
24	0.4311	0.3989	0.0001	0.0002	0.0003	0.0009	0.0008	0.0027	0.0012
25	0.4303	0.3983	0.0002	0.0001	0.0013	0.0008	0.0010	0.0010	0.0012
26	0.4299	0.4002	0.0002	0.0002	0.0005	0.0008	0.0010	0.0006	0.0011
27	0.4305	0.3997	0.0001	0.0001	0.0012	0.0009	0.0011	0.0005	0.0013
28	0.4300	0.4005	0.0001	0.0001	0.0005	0.0010	0.0013	0.0014	0.0015
29	0.4327	0.4012	0.0001	0.0001	0.0007	0.0009	0.0010	0.0014	0.0013
30	0.4323	0.4009	0.0001	0.0001	0.0008	0.0009	0.0010	0.0014	0.0013
Mean	0.4306	0.3995	0.0002	0.0002	0.0008	0.0010	0.0012	0.0016	0.0014
Median	0.4307	0.3997	0.0001	0.0002	0.0006	0.0010	0.0011	0.0013	0.0014
std.dev	0.0019	0.0015	0.0001	0.0002	0.0004	0.0002	0.0002	0.0008	0.0002
Max	0.4334	0.4021	0.0006	0.0011	0.0016	0.0016	0.0018	0.0031	0.0020
Min	0.4273	0.3966	0.0000	0.0000	0.0003	0.0007	0.0008	0.0005	0.0010

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9.2 Test condition 2

85°C

Dirve Current

100mA

Measurement Current

100mA

No.	Chromaticity Shift ($\Delta u'v'$)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	0.0016	0.0016	0.0017	0.0017					
2	0.0016	0.0015	0.0017	0.0016					
3	0.0018	0.0018	0.0019	0.0020					
4	0.0015	0.0015	0.0017	0.0017					
5	0.0013	0.0013	0.0013	0.0016					
6	0.0013	0.0013	0.0016	0.0014					
7	0.0012	0.0011	0.0012	0.0012					
8	0.0015	0.0015	0.0016	0.0015					
9	0.0008	0.0007	0.0009	0.0009					
10	0.0017	0.0019	0.0019	0.0019					
11	0.0015	0.0013	0.0016	0.0016					
12	0.0018	0.0019	0.0020	0.0018					
13	0.0016	0.0015	0.0017	0.0018					
14	0.0014	0.0013	0.0015	0.0016					
15	0.0016	0.0017	0.0021	0.0021					
16	0.0016	0.0016	0.0017	0.0017					
17	0.0017	0.0017	0.0018	0.0018					
18	0.0012	0.0012	0.0013	0.0012					
19	0.0018	0.0016	0.0019	0.0018					
20	0.0019	0.0019	0.0021	0.0020					
21	0.0020	0.0019	0.0021	0.0022					
22	0.0017	0.0018	0.0017	0.0017					
23	0.0011	0.0011	0.0013	0.0012					
24	0.0014	0.0013	0.0014	0.0013					
25	0.0013	0.0012	0.0014	0.0013					
26	0.0014	0.0012	0.0014	0.0015					
27	0.0014	0.0013	0.0015	0.0014					
28	0.0016	0.0017	0.0017	0.0018					
29	0.0015	0.0014	0.0014	0.0016					
30	0.0014	0.0014	0.0015	0.0015					
Mean	0.0015	0.0015	0.0016	0.0016					
Median	0.0015	0.0015	0.0017	0.0016					
std.dev	0.0003	0.0003	0.0003	0.0003					
Max	0.0020	0.0019	0.0021	0.0022					
Min	0.0008	0.0007	0.0009	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000

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9.2 Test condition 2

85°C

Drive Current

100mA

Measurement Current

100mA

No.	CCT (K)							
	0h	500 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	3107	3109	3107	3121	3129	3136	3080	3144
2	3103	3105	3108	3121	3131	3132	3131	3143
3	3051	3051	3051	3067	3081	3086	3080	3089
4	3054	3057	3058	3069	3085	3087	3079	3092
5	3045	3045	3047	3059	3071	3071	3123	3070
6	3031	3038	3036	3042	3050	3055	3087	3063
7	3041	3045	3050	3052	3060	3066	3110	3071
8	3054	3058	3061	3072	3080	3087	3097	3090
9	3063	3063	3065	3085	3083	3085	3095	3093
10	3071	3072	3073	3086	3101	3103	3147	3110
11	3085	3086	3086	3096	3109	3114	3135	3123
12	3067	3070	3073	3083	3093	3097	3095	3103
13	3068	3069	3071	3083	3093	3096	3136	3103
14	3080	3084	3083	3121	3105	3105	3087	3111
15	3051	3065	3079	3077	3082	3084	3074	3090
16	3088	3088	3092	3106	3117	3118	3121	3121
17	3117	3120	3119	3157	3154	3156	3097	3159
18	3096	3094	3094	3107	3116	3124	3132	3124
19	3081	3083	3082	3110	3108	3108	3059	3123
20	3045	3050	3055	3081	3087	3086	3098	3095
21	3045	3054	3053	3070	3077	3089	3110	3093
22	3101	3117	3109	3120	3132	3138	3078	3144
23	3108	3109	3106	3114	3134	3131	3095	3137
24	3059	3059	3063	3067	3082	3078	3133	3091
25	3067	3071	3066	3099	3088	3093	3076	3098
26	3089	3087	3089	3102	3111	3115	3101	3120
27	3075	3073	3073	3106	3098	3102	3066	3107
28	3091	3092	3091	3102	3115	3125	3080	3128
29	3049	3051	3051	3068	3071	3073	3084	3082
30	3054	3052	3054	3075	3076	3080	3092	3086
Mean	3071	3074	3075	3091	3097	3101	3099	3107
Median	3068	3070	3073	3085	3093	3096	3095	3103
std.dev	23	23	22	25	24	24	23	24
Max	3117	3120	3119	3157	3154	3156	3147	3159
Min	3031	3038	3036	3042	3050	3055	3059	3063

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9.2 Test condition 2

85°C

Dirve Current

100mA

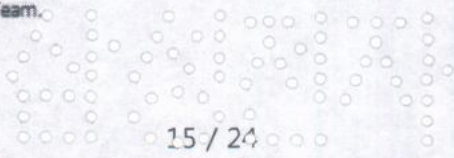
Measurement Current

100mA

No.	CCT (K)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	3147	3151	3151	3152					
2	3144	3144	3148	3146					
3	3096	3097	3097	3102					
4	3093	3094	3096	3099					
5	3079	3078	3077	3086					
6	3064	3065	3070	3066					
7	3071	3070	3072	3072					
8	3094	3092	3094	3094					
9	3082	3080	3085	3087					
10	3115	3121	3118	3121					
11	3124	3117	3125	3126					
12	3114	3117	3116	3113					
13	3111	3105	3110	3114					
14	3115	3114	3116	3119					
15	3093	3095	3104	3104					
16	3129	3130	3131	3132					
17	3163	3161	3164	3165					
18	3128	3128	3130	3129					
19	3126	3124	3130	3128					
20	3093	3093	3096	3094					
21	3096	3093	3097	3101					
22	3144	3148	3143	3147					
23	3136	3138	3140	3139					
24	3094	3092	3093	3093					
25	3100	3099	3100	3101					
26	3126	3123	3127	3129					
27	3110	3111	3112	3112					
28	3133	3134	3132	3136					
29	3086	3086	3085	3090					
30	3088	3089	3088	3093					
Mean	3110	3111	3112	3113					
Median	3110	3110	3111	3112					
std.dev	25	25	25	24					
Max	3163	3164	3164	3165	0	0	0	0	0
Min	3064	3065	3070	3066	0	0	0	0	0

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9.3 Test condition 3

105°C

Dirve Current

100mA

Measurement Current

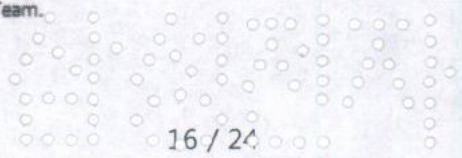
100mA

No.	Flux (lm)	Vf (V)	Lumen Maintenance (%)						
	0 h		500 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	22.3	2.998	98.9	99.2	98.6	97.7	96.0	93.5	92.4
2	22.7	2.966	99.6	99.7	99.3	98.7	96.9	94.1	92.3
3	22.2	2.978	98.9	99.3	98.9	98.1	96.2	93.8	92.0
4	22.1	2.999	99.3	99.6	99.1	98.2	96.2	93.4	91.3
5	22.1	2.990	98.5	98.6	98.6	97.6	96.1	93.9	92.4
6	22.5	3.006	99.4	99.9	99.7	99.2	97.9	96.5	95.6
7	22.9	3.006	98.4	99.7	99.4	98.7	96.8	95.4	94.2
8	22.8	2.976	99.4	99.9	99.6	99.0	97.4	96.0	95.1
9	22.8	2.970	99.3	100.1	100.0	99.5	98.3	96.8	95.9
10	22.8	2.968	98.4	98.8	98.5	97.7	96.8	95.2	94.3
11	22.5	3.004	99.2	99.7	99.4	98.9	97.5	96.4	95.5
12	23.2	2.974	99.5	100.3	100.0	99.5	98.0	96.7	95.7
13	22.5	3.010	99.4	100.1	100.1	99.6	98.5	97.6	97.0
14	22.7	2.960	99.4	100.0	99.7	99.1	98.3	97.5	96.4
15	22.7	2.972	98.7	99.6	99.4	98.7	97.5	96.5	95.5
16	22.8	2.999	98.9	99.4	99.3	98.6	97.4	96.4	95.5
17	22.9	2.963	99.4	99.9	100.1	99.6	98.4	97.5	96.8
18	22.7	2.997	99.4	99.9	99.4	98.7	96.9	96.2	95.3
19	23.1	2.960	98.9	99.8	99.5	98.3	97.1	96.2	95.3
20	22.7	2.971	99.7	100.5	100.4	100.0	98.9	98.0	97.0
21	22.6	3.000	99.0	99.9	99.4	99.1	97.9	96.7	96.0
22	22.9	2.965	99.4	99.9	99.7	99.1	97.8	96.7	96.0
23	22.6	2.978	99.5	100.2	100.0	99.5	98.3	97.5	96.7
24	22.7	2.962	99.3	99.9	99.7	99.2	97.5	96.1	95.2
25	22.7	2.971	99.2	99.3	99.6	99.0	97.9	96.9	96.1
26	22.8	2.968	99.4	100.1	99.7	99.1	98.4	97.2	96.8
27	22.9	2.980	99.3	100.0	99.9	99.6	98.4	97.4	96.7
28	22.8	2.964	99.4	100.2	100.1	99.0	98.2	96.8	96.1
29	22.0	2.997	99.6	100.0	100.0	99.5	98.0	96.5	95.7
30	22.3	2.962	98.2	98.9	98.9	98.4	97.5	96.3	95.6
Mean	22.7	2.98	99.2	99.7	99.5	98.9	97.6	96.2	95.2
Median	22.7	2.97	99.3	99.9	99.6	99.0	97.7	96.5	95.6
std.dev	0.3	0.02	0.4	0.4	0.5	0.6	0.8	1.3	1.6
Max	23.2	3.01	99.7	100.5	100.4	100.0	98.9	98.0	97.0
Min	22.0	2.96	98.2	98.6	98.5	97.6	96.0	93.4	91.3

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9.3 Test condition 3 105°C
 Drive Current 100mA
 Measurement Current 100mA

No.	Lumen Maintenance (%)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	88.8	85.9	84.1	82.7					
2	88.5	84.5	81.9	81.1					
3	88.7	84.2	82.2	81.1					
4	87.1	82.6	80.6	79.2					
5	89.0	83.9	81.5	79.6					
6	93.4	90.5	88.2	86.3					
7	91.5	88.3	86.8	85.2					
8	92.5	89.8	87.5	86.2					
9	93.7	90.4	88.3	86.8					
10	92.3	90.3	88.5	86.9					
11	93.5	90.5	88.3	86.4					
12	93.7	91.1	89.1	87.8					
13	95.4	93.5	91.5	90.3					
14	94.6	91.5	89.5	88.1					
15	93.3	90.7	88.6	87.4					
16	93.5	90.1	87.8	86.0					
17	94.4	92.7	90.9	89.7					
18	93.2	90.6	88.9	87.3					
19	93.5	91.3	89.5	88.0					
20	95.2	92.8	91.1	90.1					
21	94.3	91.7	89.4	88.6					
22	94.0	91.7	89.9	88.3					
23	95.2	92.8	90.9	89.1					
24	92.7	89.5	87.4	85.7					
25	93.7	91.6	90.0	88.5					
26	95.2	93.3	91.4	90.4					
27	95.3	93.2	91.6	90.4					
28	94.2	91.7	90.0	88.6					
29	93.1	89.8	88.0	86.1					
30	93.8	91.3	89.7	87.7					
Mean	92.9	90.1	88.1	86.7					
Median	93.5	90.7	88.7	87.4					
std.dev	2.3	2.9	3.1	3.1					
Max	95.4	93.5	91.6	90.4					
Min	87.1	82.6	80.6	79.2	0.0	0.0	0.0	0.0	0.0

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9.3 Test condition 3

105°C

Dirve Current

100mA

Measurement Current

100mA

No.	Cx	Cy	Chromaticity Shift ($\Delta u'v'$)						
			0h	500 h	1000 h	2000 h	3000 h	4000 h	5000 h
1	0.4312	0.3992	0.0000	0.0001	0.0002	0.0004	0.0007	0.0012	0.0014
2	0.4279	0.3995	0.0002	0.0001	0.0002	0.0003	0.0008	0.0013	0.0015
3	0.4321	0.3988	0.0004	0.0003	0.0002	0.0005	0.0009	0.0011	0.0013
4	0.4312	0.4002	0.0001	0.0002	0.0003	0.0001	0.0004	0.0011	0.0016
5	0.4318	0.4009	0.0002	0.0002	0.0001	0.0004	0.0007	0.0012	0.0014
6	0.4325	0.4007	0.0001	0.0004	0.0005	0.0002	0.0001	0.0003	0.0005
7	0.4319	0.4010	0.0001	0.0002	0.0004	0.0002	0.0003	0.0007	0.0009
8	0.4309	0.3986	0.0002	0.0002	0.0002	0.0002	0.0005	0.0007	0.0009
9	0.4303	0.4004	0.0001	0.0001	0.0003	0.0002	0.0003	0.0007	0.0008
10	0.4270	0.3981	0.0004	0.0001	0.0001	0.0002	0.0004	0.0007	0.0011
11	0.4318	0.3995	0.0000	0.0003	0.0004	0.0003	0.0001	0.0002	0.0006
12	0.4279	0.3990	0.0000	0.0003	0.0003	0.0001	0.0002	0.0005	0.0008
13	0.4277	0.3989	0.0002	0.0004	0.0004	0.0003	0.0002	0.0003	0.0004
14	0.4333	0.4018	0.0001	0.0003	0.0003	0.0002	0.0003	0.0004	0.0007
15	0.4323	0.4001	0.0003	0.0001	0.0002	0.0002	0.0004	0.0006	0.0009
16	0.4313	0.3993	0.0001	0.0002	0.0004	0.0001	0.0003	0.0004	0.0005
17	0.4305	0.4003	0.0001	0.0002	0.0003	0.0001	0.0001	0.0003	0.0003
18	0.4284	0.3966	0.0001	0.0003	0.0004	0.0002	0.0005	0.0005	0.0006
19	0.4284	0.3982	0.0002	0.0001	0.0001	0.0006	0.0007	0.0007	0.0011
20	0.4274	0.3982	0.0004	0.0005	0.0006	0.0004	0.0002	0.0003	0.0005
21	0.4319	0.3997	0.0001	0.0003	0.0002	0.0002	0.0001	0.0002	0.0004
22	0.4311	0.3999	0.0001	0.0001	0.0003	0.0002	0.0001	0.0004	0.0007
23	0.4303	0.4003	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002	0.0004
24	0.4321	0.4010	0.0001	0.0002	0.0004	0.0001	0.0004	0.0007	0.0009
25	0.4271	0.3957	0.0001	0.0001	0.0003	0.0002	0.0004	0.0006	0.0007
26	0.4287	0.3974	0.0002	0.0003	0.0003	0.0002	0.0001	0.0005	0.0005
27	0.4283	0.3984	0.0001	0.0003	0.0004	0.0001	0.0001	0.0002	0.0003
28	0.4321	0.4010	0.0001	0.0004	0.0005	0.0002	0.0001	0.0004	0.0006
29	0.4331	0.4005	0.0001	0.0002	0.0004	0.0002	0.0001	0.0003	0.0004
30	0.4303	0.3996	0.0004	0.0001	0.0002	0.0002	0.0003	0.0005	0.0007
Mean	0.4304	0.3994	0.0002	0.0002	0.0003	0.0002	0.0003	0.0006	0.0008
Median	0.4310	0.3995	0.0001	0.0002	0.0003	0.0002	0.0003	0.0005	0.0007
std.dev	0.0020	0.0014	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0004
Max	0.4333	0.4018	0.0004	0.0005	0.0006	0.0006	0.0009	0.0013	0.0016
Min	0.4270	0.3957	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003

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9.3 Test condition 3

105°C

Drive Current

100mA

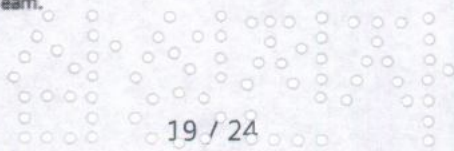
Measurement Current

100mA

No.	Chromaticity Shift ($\Delta u'v'$)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	0.0021	0.0025	0.0030	0.0033					
2	0.0023	0.0029	0.0039	0.0038					
3	0.0021	0.0031	0.0034	0.0036					
4	0.0025	0.0032	0.0038	0.0042					
5	0.0020	0.0028	0.0033	0.0039					
6	0.0009	0.0012	0.0015	0.0019					
7	0.0016	0.0021	0.0026	0.0024					
8	0.0015	0.0017	0.0024	0.0025					
9	0.0012	0.0019	0.0021	0.0021					
10	0.0016	0.0019	0.0024	0.0028					
11	0.0010	0.0011	0.0016	0.0017					
12	0.0014	0.0017	0.0023	0.0025					
13	0.0008	0.0011	0.0016	0.0015					
14	0.0008	0.0012	0.0015	0.0016					
15	0.0015	0.0017	0.0022	0.0024					
16	0.0010	0.0016	0.0020	0.0022					
17	0.0008	0.0009	0.0015	0.0016					
18	0.0010	0.0016	0.0018	0.0022					
19	0.0014	0.0017	0.0022	0.0026					
20	0.0008	0.0011	0.0015	0.0016					
21	0.0008	0.0011	0.0016	0.0016					
22	0.0012	0.0016	0.0018	0.0021					
23	0.0007	0.0011	0.0014	0.0014					
24	0.0014	0.0018	0.0024	0.0026					
25	0.0013	0.0018	0.0022	0.0024					
26	0.0007	0.0011	0.0014	0.0016					
27	0.0006	0.0008	0.0012	0.0013					
28	0.0009	0.0012	0.0015	0.0015					
29	0.0009	0.0014	0.0019	0.0021					
30	0.0010	0.0014	0.0017	0.0019					
Mean	0.0013	0.0017	0.0021	0.0023					
Median	0.0011	0.0016	0.0020	0.0021					
std.dev	0.0005	0.0007	0.0007	0.0008					
Max	0.0025	0.0032	0.0039	0.0042					
Min	0.0006	0.0008	0.0012	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000

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9.3 Test condition 3 105°C
 Drive Current 100mA
 Measurement Current 100mA

No.	CCT (K)							
	0h	500 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	3059	3060	3055	3058	3071	3075	3086	3090
2	3121	3122	3119	3121	3127	3142	3154	3155
3	3040	3052	3047	3044	3053	3062	3067	3069
4	3067	3070	3064	3060	3070	3076	3091	3098
5	3062	3066	3067	3063	3073	3078	3088	3092
6	3047	3044	3039	3035	3045	3047	3054	3057
7	3062	3066	3057	3056	3063	3067	3079	3083
8	3059	3063	3061	3056	3065	3071	3075	3078
9	3084	3088	3080	3081	3087	3093	3101	3103
10	3126	3137	3129	3126	3132	3135	3142	3149
11	3051	3051	3046	3045	3048	3053	3057	3064
12	3117	3117	3111	3108	3117	3119	3130	3133
13	3119	3122	3112	3115	3121	3126	3127	3130
14	3043	3043	3039	3041	3047	3050	3052	3061
15	3046	3052	3047	3041	3052	3054	3060	3064
16	3057	3059	3053	3048	3059	3057	3065	3066
17	3080	3078	3073	3073	3078	3083	3087	3086
18	3087	3086	3081	3077	3083	3099	3098	3101
19	3101	3107	3099	3098	3116	3118	3118	3127
20	3119	3109	3104	3102	3108	3114	3118	3122
21	3051	3051	3045	3048	3048	3049	3053	3059
22	3066	3065	3064	3060	3068	3069	3076	3081
23	3084	3087	3083	3079	3084	3088	3090	3094
24	3057	3057	3054	3051	3058	3066	3073	3077
25	3104	3106	3103	3099	3109	3114	3118	3120
26	3088	3091	3085	3092	3092	3092	3102	3101
27	3104	3104	3096	3095	3102	3107	3108	3110
28	3057	3054	3048	3045	3055	3057	3066	3069
29	3037	3037	3032	3026	3033	3036	3038	3043
30	3078	3088	3079	3076	3082	3086	3091	3096
Mean	3076	3078	3073	3071	3078	3083	3089	3093
Median	3067	3068	3065	3062	3072	3077	3088	3091
std.dev	27	27	27	28	28	29	29	29
Max	3126	3137	3129	3126	3132	3142	3154	3155
Min	3037	3037	3032	3026	3033	3036	3038	3043

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9.3 Test condition 3 105°C
 Drive Current 100mA
 Measurement Current 100mA

No.	CCT (K)								
	7000 h	8000 h	9000 h	10000 h	11000 h	12000 h	13000 h	14000 h	15000 h
1	3100	3109	3116	3123					
2	3171	3182	3202	3201					
3	3081	3108	3110	3116					
4	3115	3128	3138	3149					
5	3100	3111	3118	3133					
6	3066	3069	3074	3077					
7	3097	3104	3115	3112					
8	3092	3094	3104	3112					
9	3112	3125	3124	3125					
10	3158	3166	3173	3183					
11	3072	3073	3078	3078					
12	3148	3154	3165	3170					
13	3138	3145	3152	3149					
14	3061	3069	3070	3074					
15	3076	3080	3087	3091					
16	3077	3088	3089	3093					
17	3093	3098	3107	3109					
18	3106	3118	3121	3129					
19	3131	3139	3146	3154					
20	3127	3135	3140	3143					
21	3061	3070	3075	3072					
22	3090	3103	3102	3108					
23	3100	3109	3110	3108					
24	3085	3094	3102	3107					
25	3133	3144	3149	3154					
26	3105	3115	3118	3122					
27	3114	3121	3127	3128					
28	3075	3082	3084	3084					
29	3047	3060	3069	3071					
30	3101	3108	3112	3115					
Mean	3106	3113	3116	3120					
Median	3104	3110	3114	3115					
std.dev	30	31	32	33					
Max	3182	3202	3202	3201	0	0	0	0	0
Min	3047	3060	3069	3071	0	0	0	0	0

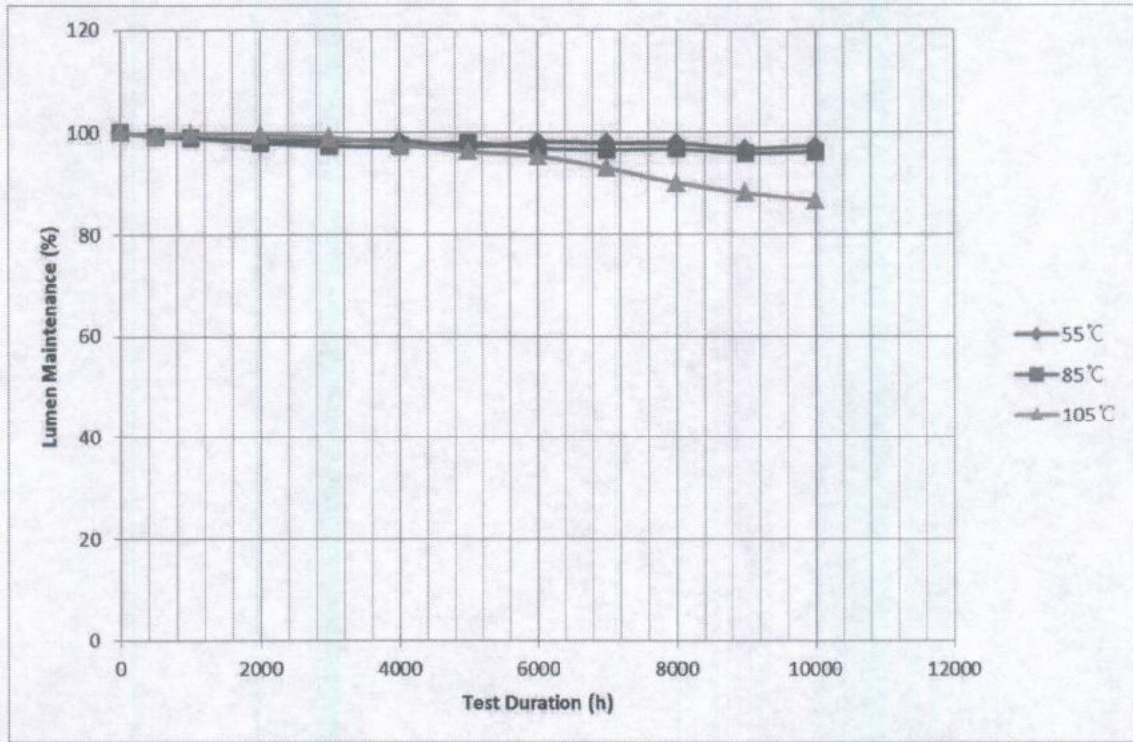
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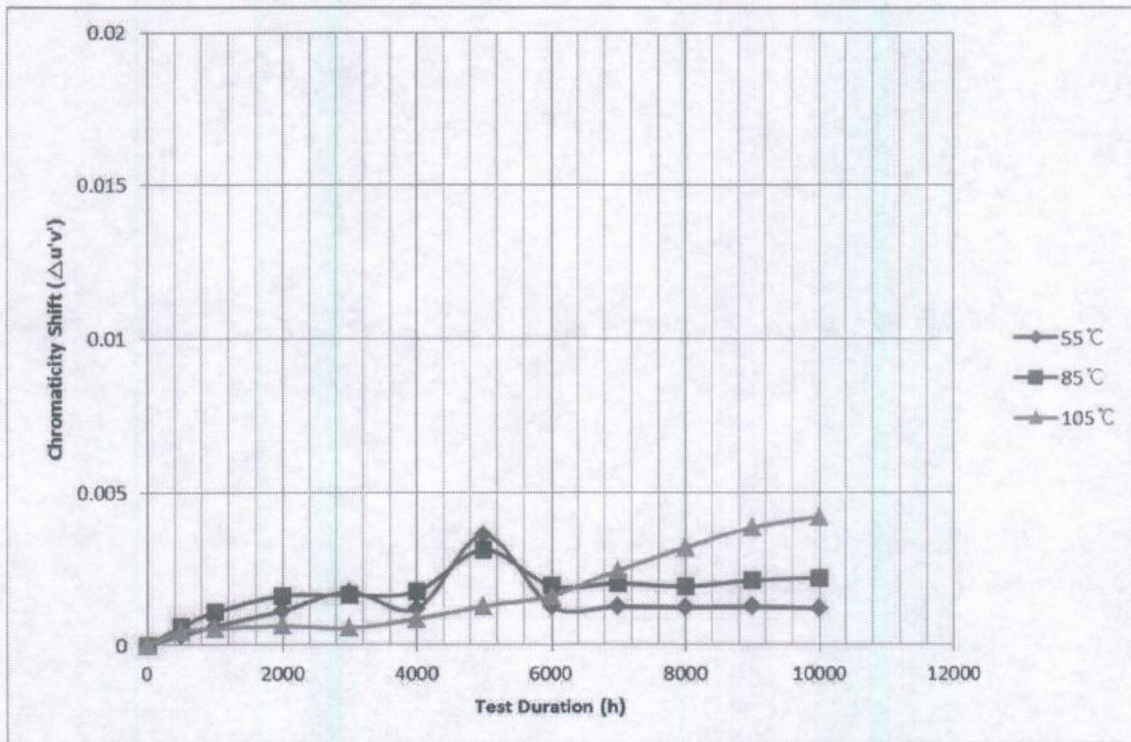




9.4 Chart <Lumen Maintenance>

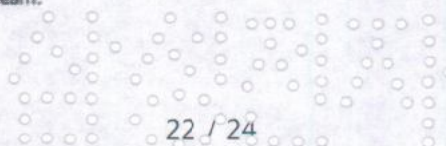


<Chromaticity Shift>



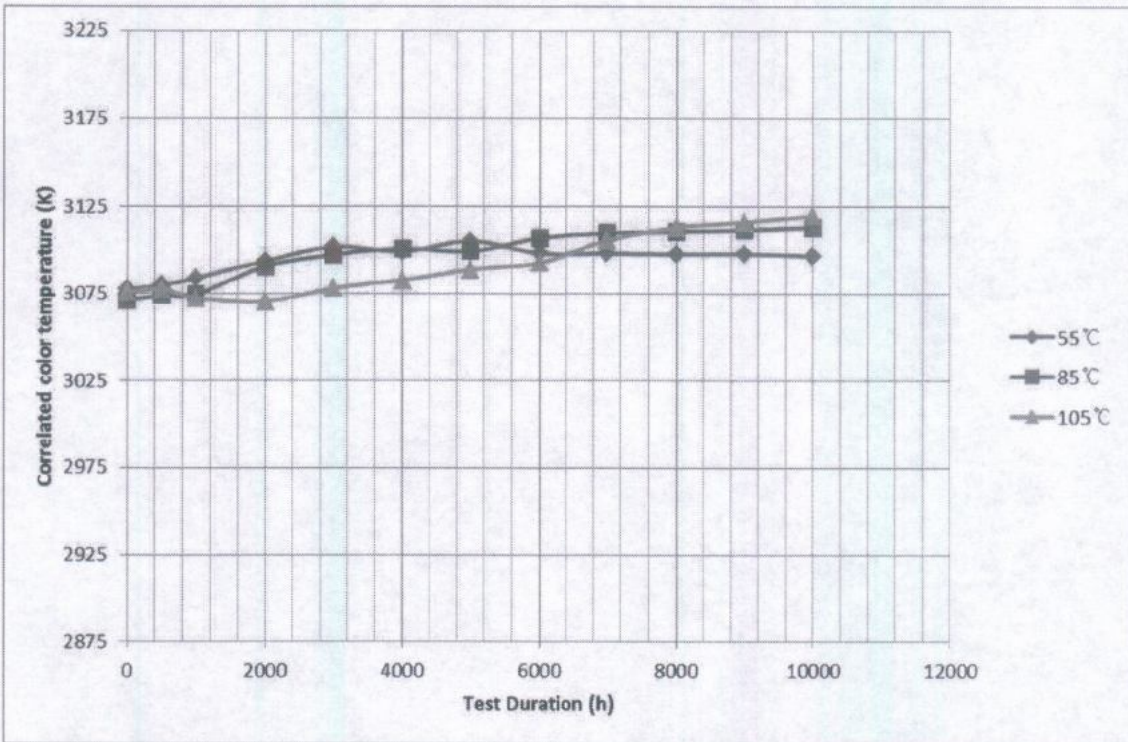
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<CCT>



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 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

12. Photometric measurement uncertainty

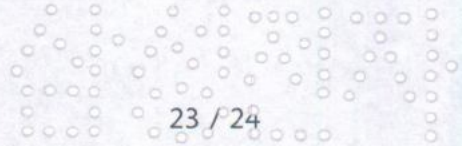
3.5%

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)		LED Test Data for:			
		Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp	
Sample size	30	Sample size	30	Sample size	30
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)	10,000	Test duration (hours)	10,000	Test duration (hours)	10,000
Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000
Tested case temperature (°C)	55	Tested case temperature (°C)	85	Tested case temperature (°C)	105
α	9.535E-07	α	3.483E-06	α	2.245E-05
B	0.982	B	0.992	B	1.082
Calculated L70(10k) (hours)	355,000	Calculated L70(10k) (hours)	100,000	Calculated L70(10k) (hours)	19,000
Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	19,000

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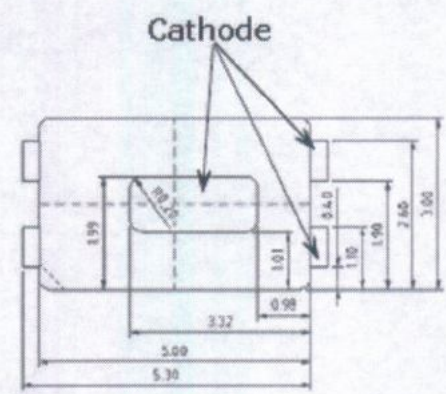
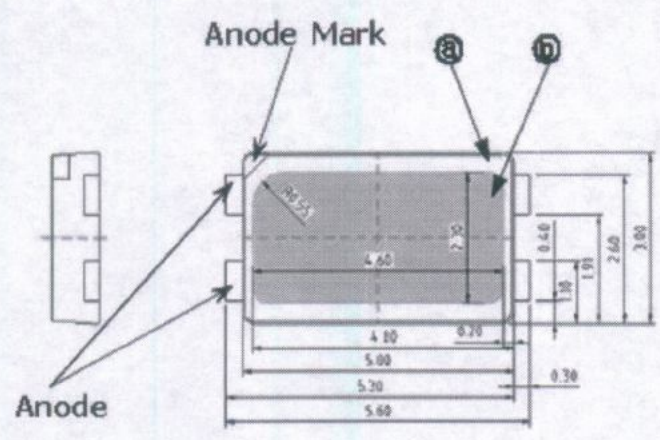
14. Photo of samples



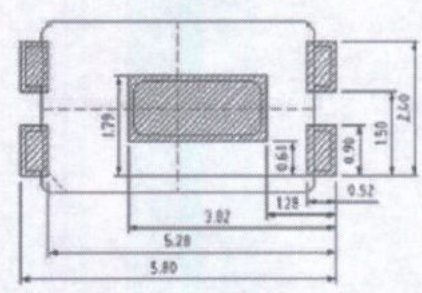
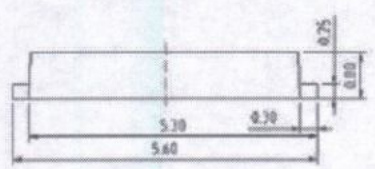
Left Side View

Top View

Bottom View



Front View



Recommended Land Pattern

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

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