



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Xiamen Dacol Photoelectronics Technology Co.,Ltd.

8021 Xiang' an West Road(Xiang' an)industrial zone,Torch Hi-Tech Industrial Development Zone,Xiamen City,Fujian,China

Model: SMD 2835

Report Type: 9000 Hours Test Report	Product Type: LED Package
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Report Number: R2DG160309050-10-9000	
Test Date: 2016-03-11 to 2017-04-14	
Report Date: 2017-04-26	
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Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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1 - General Information

1.1 Description of LED Light Sources

Devices tested

Part Number: SMD 2835
 Part Type: LED Package
 Nominal CCT: 3500K

1.2 Standards Used:

- IESNA LM-80-08: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products(This test method was not accredited by IAS)

1.3 Test Facility

The testing facility used by Bay Area Compliance Laboratories Corp. (Dongguan). is located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

1.4 Description of Auxiliary Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integral Sphere	EVERFINE	Diameter 0.3m	1011119	0.3m	2017-03-09	2018-03-08
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2017-03-03	2018-03-02
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2017-03-09	2018-03-08
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-12
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ732 1114	300VA	2017-03-03	2018-03-02
Multilayer aging machine	BACL	B2-270	20013	25 °C~130 °C	2016-09-01	2017-09-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060010	(50V/15A)	2017-03-03	2018-03-02

1.5 Operating Cycle

Samples are driven with a constant direct current (DC)

1.6 Ambient Conditions

For lumen maintenance test, samples were operated in thermal chambers with minimal ambient airflow. For long term reliability test, the case temperature was controlled by mounting several thermocouples on a sample reliability stress board at the designated thermal measurement point, as shown in APPENDIX. The ambient temperature T_A was measured by several thermocouples at a distance of 5 mm above the reliability test board. The relative humidity within chamber was less than 65%.

For photometry measurement, temperature was set to $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, RH <65%.

1.7 Photometry Measurement Uncertainty

The uncertainty of the light output measurements is $U=1.59\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=21\text{K}$ ($K=2$), at the 95% confidence level. This calibration results traceable to the NATIONAL INSTITUTE OF METROLOGY (NIM).

1.8 Sample Set

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.

These manufacturing lots are picked to represent a wide parametric distribution.

Each Sample is soldered to all of the reliability stress boards for a given set of IESNA LM-80 tests.

Sample Size:

Total 75Pcs;

Each Ts test condition 25Pcs

The samples tested at Ts 55 °C, Ts 85 °C and Ts 105 °C were received at 2016-03-09 and tested during 2016-03-11 to 2017-04-14. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75

Data Set 1: 55 °C, 150mA

Part Number:	SMD 2835
Number of Units:	25
Actual Case Temperature(T _S):	T _S =54.2 °C
Actual Ambient Temperature(T _A):	T _A =51.5 °C
Life Test Drive Current:	I _F =150mA
Measurement Current:	I _F =150mA

Data Set 2: 85 °C,150mA

Part Number:	SMD 2835
Number of Units:	25
Actual Case Temperature(T _S):	T _S =84.1 °C
Actual Ambient Temperature(T _A):	T _A =82.7 °C
Life Test Drive Current:	I _F =150mA
Measurement Current:	I _F =150mA

Data Set 3: 105 °C, 150mA

Part Number:	SMD 2835
Number of Units:	25
Actual Case Temperature(T _S):	T _S =104.5 °C
Actual Ambient Temperature(T _A):	T _A =103.1 °C
Life Test Drive Current:	I _F =150mA
Measurement Current:	I _F =150mA

2 - Summary of Test Result

Data Set:	Data Set 1, 55 °C, 150mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h, 7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	99.15%
Average. Lumen Maintenance at 9000 hours:	98.56%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0019
Average Chromaticity Shift at 9000 hours ($\Delta u'v'$):	0.0024
Reported TM-21 L_{70} Lifetime:	>54,000 hours

Data Set:	Data Set 2, 85 °C, 150mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h, 7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	98.44%
Average. Lumen Maintenance at 9000 hours:	97.81%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0021
Average Chromaticity Shift at 9000 hours ($\Delta u'v'$):	0.0026
Reported TM-21 L_{70} Lifetime:	>54,000 hours

Data Set:	Data Set 3, 105 °C, 150mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h, 7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	97.94%
Average. Lumen Maintenance at 9000 hours:	97.25%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0024
Average Chromaticity Shift at 9000 hours ($\Delta u'v'$):	0.0029
Reported TM-21 L_{70} Lifetime:	>54,000 hours

3 - Test Data

3.1 Data Set 1, 55 °C, 150mA (Lumen Maintenance)

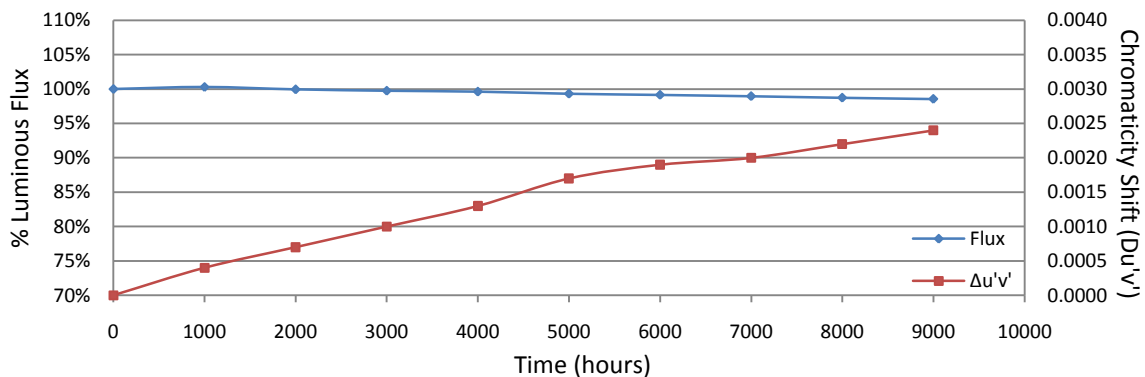
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	2.969	58.45	100.22	99.79	99.67	99.52	99.23	99.14	98.94	98.61	98.48
2	2.962	59.70	100.15	99.75	99.56	99.40	99.15	98.99	98.81	98.64	98.53
3	2.962	59.68	100.35	99.92	99.73	99.70	99.26	99.08	98.94	98.78	98.66
4	2.981	58.88	100.31	99.95	99.71	99.56	99.30	99.17	98.85	98.51	98.34
5	2.962	59.12	100.42	99.97	99.76	99.63	99.44	99.31	99.31	99.21	99.12
6	2.962	58.34	100.24	99.93	99.71	99.54	99.31	99.13	98.85	98.58	98.29
7	2.970	58.56	100.38	99.93	99.74	99.71	99.45	99.32	98.91	98.79	98.53
8	2.964	58.72	100.34	100.09	99.78	99.68	99.39	99.27	99.18	99.03	98.74
9	2.958	59.25	100.29	99.90	99.70	99.51	99.17	98.97	98.78	98.45	98.23
10	2.964	58.68	100.10	99.74	99.40	99.16	98.89	98.70	98.38	97.97	97.85
11	2.961	58.75	100.24	99.97	99.81	99.71	99.47	99.27	99.01	98.77	98.57
12	2.961	59.39	100.19	99.88	99.75	99.61	99.29	99.16	98.82	98.52	98.38
13	2.962	59.63	100.35	99.92	99.88	99.77	99.35	99.21	99.09	99.04	98.86
14	2.963	58.96	100.22	99.93	99.75	99.54	99.25	99.19	99.10	98.91	98.81
15	2.963	58.99	100.17	99.90	99.61	99.41	99.00	98.98	98.81	98.41	98.22
16	2.963	58.36	100.36	100.03	99.78	99.71	99.52	99.26	99.11	99.01	98.83
17	2.963	59.11	100.29	100.15	99.90	99.78	99.58	99.29	99.22	99.09	98.95
18	2.961	59.07	100.24	99.93	99.78	99.64	99.37	99.20	98.95	98.92	98.70
19	2.966	58.90	100.36	99.92	99.63	99.47	99.24	99.19	99.15	98.98	98.86
20	2.964	58.70	100.34	99.97	99.73	99.64	99.28	98.99	98.72	98.50	98.28
21	2.961	58.67	100.29	99.83	99.69	99.59	99.28	99.11	99.08	98.70	98.47
22	2.962	58.73	100.36	100.12	100.07	99.93	99.47	99.28	99.00	98.69	98.52
23	2.978	58.28	100.39	100.10	99.88	99.76	99.49	99.18	99.07	98.95	98.82
24	2.962	58.63	100.24	100.00	99.91	99.83	99.52	99.27	99.15	98.79	98.64
25	2.961	58.77	100.34	100.05	99.90	99.66	99.34	99.03	98.83	98.66	98.33
Ave.	2.964	58.89	100.29	99.95	99.75	99.62	99.32	99.15	98.96	98.74	98.56
Med.	2.962	58.77	100.29	99.93	99.75	99.64	99.31	99.18	98.95	98.77	98.53
st dev	0.0053	0.4030	0.0830	0.1056	0.1320	0.1590	0.1614	0.1418	0.1971	0.2713	0.2852
Min.	2.958	58.28	100.10	99.74	99.40	99.16	98.89	98.70	98.38	97.97	97.85
Max.	2.981	59.70	100.42	100.15	100.07	99.93	99.58	99.32	99.31	99.21	99.12

TM-21 Projection:

Test Duration: 9,000 hours
Failures Observed: 0
 α : 2.085E-06
 β : 1.004
Reported L₇₀: >54,000 hours

3.2 Data Set 1, 55 °C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	0.2358	0.5093	3520	0.0003	0.0007	0.0010	0.0012	0.0015	0.0017	0.0018	0.0020	0.0023
2	0.2358	0.5121	3488	0.0003	0.0008	0.0011	0.0014	0.0016	0.0017	0.0018	0.0019	0.0023
3	0.2357	0.5123	3489	0.0002	0.0007	0.0011	0.0015	0.0016	0.0018	0.0016	0.0019	0.0023
4	0.2361	0.5098	3505	0.0003	0.0006	0.0011	0.0015	0.0017	0.0019	0.0017	0.0020	0.0024
5	0.2361	0.5113	3489	0.0003	0.0006	0.0008	0.0011	0.0016	0.0018	0.0019	0.0019	0.0022
6	0.2374	0.5101	3461	0.0004	0.0006	0.0009	0.0013	0.0017	0.0019	0.0022	0.0023	0.0025
7	0.2366	0.5093	3493	0.0004	0.0006	0.0009	0.0011	0.0016	0.0018	0.0017	0.0020	0.0023
8	0.2370	0.5087	3489	0.0004	0.0006	0.0009	0.0012	0.0017	0.0019	0.0021	0.0024	0.0025
9	0.2362	0.5124	3473	0.0004	0.0008	0.0009	0.0013	0.0017	0.0018	0.0018	0.0020	0.0023
10	0.2356	0.5089	3530	0.0004	0.0007	0.0010	0.0013	0.0018	0.0019	0.0022	0.0024	0.0026
11	0.2364	0.5093	3502	0.0004	0.0006	0.0010	0.0014	0.0018	0.0019	0.0019	0.0022	0.0024
12	0.2365	0.5114	3476	0.0004	0.0009	0.0011	0.0013	0.0018	0.0020	0.0021	0.0024	0.0026
13	0.2361	0.5112	3488	0.0004	0.0007	0.0009	0.0013	0.0016	0.0018	0.0019	0.0022	0.0024
14	0.2366	0.5112	3472	0.0004	0.0006	0.0008	0.0012	0.0016	0.0019	0.0020	0.0020	0.0025
15	0.2366	0.5111	3473	0.0004	0.0007	0.0010	0.0011	0.0016	0.0019	0.0020	0.0022	0.0025
16	0.2358	0.5087	3525	0.0003	0.0006	0.0009	0.0013	0.0016	0.0018	0.0018	0.0022	0.0024
17	0.2360	0.5095	3512	0.0004	0.0006	0.0009	0.0013	0.0017	0.0018	0.0022	0.0022	0.0025
18	0.2365	0.5108	3479	0.0004	0.0006	0.0009	0.0013	0.0016	0.0018	0.0022	0.0023	0.0024
19	0.2361	0.5090	3514	0.0004	0.0006	0.0009	0.0013	0.0017	0.0019	0.0020	0.0023	0.0025
20	0.2369	0.5107	3468	0.0004	0.0006	0.0008	0.0012	0.0016	0.0019	0.0022	0.0022	0.0024
21	0.2373	0.5097	3468	0.0004	0.0006	0.0008	0.0012	0.0015	0.0017	0.0022	0.0022	0.0025
22	0.2361	0.5108	3494	0.0005	0.0006	0.0010	0.0013	0.0017	0.0019	0.0022	0.0024	0.0026
23	0.2356	0.5094	3524	0.0004	0.0006	0.0008	0.0013	0.0017	0.0019	0.0021	0.0022	0.0025
24	0.2367	0.5101	3483	0.0004	0.0007	0.0010	0.0013	0.0017	0.0019	0.0022	0.0023	0.0024
25	0.2369	0.5087	3490	0.0004	0.0005	0.0008	0.0013	0.0017	0.0018	0.0020	0.0022	0.0024
Ave.	0.2363	0.5102	3492	0.0004	0.0007	0.0010	0.0013	0.0017	0.0019	0.0020	0.0022	0.0024
Med.	0.2362	0.5101	3489	0.0004	0.0006	0.0009	0.0013	0.0017	0.0019	0.0020	0.0022	0.0024
st dev	0.0005	0.0012	19.6871	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001
Min.	0.2356	0.5087	3461	0.0002	0.0005	0.0008	0.0011	0.0015	0.0017	0.0016	0.0019	0.0022
Max.	0.2374	0.5124	3530	0.0005	0.0009	0.0011	0.0015	0.0018	0.0020	0.0022	0.0024	0.0026



3.3 Data Set 2, 85 °C, 150mA (Lumen Maintenance)

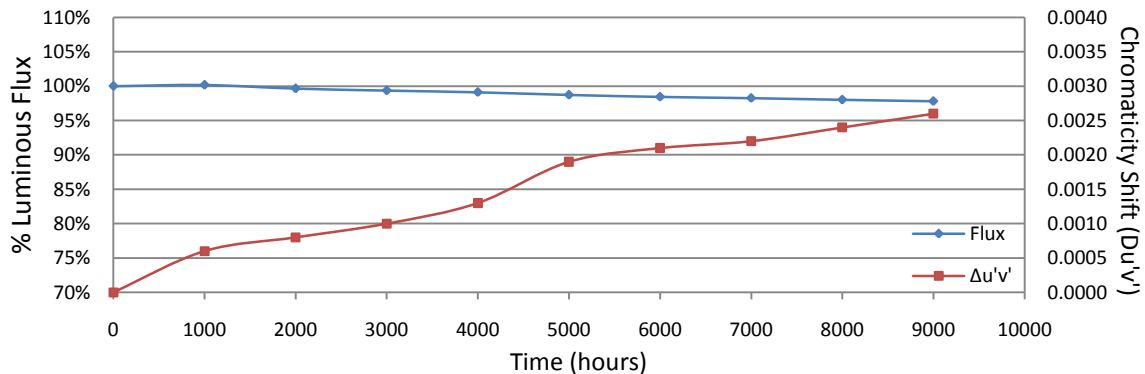
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
26	2.961	58.94	100.14	99.69	99.30	99.05	98.52	98.39	98.17	97.73	97.35
27	2.962	59.62	100.15	99.61	99.33	99.21	98.86	98.66	98.47	98.42	98.14
28	2.969	59.60	100.23	99.77	99.48	99.36	98.99	98.66	98.61	98.51	98.36
29	2.962	58.91	100.24	99.80	99.59	99.46	99.10	98.74	98.73	98.51	98.18
30	2.971	59.26	100.25	99.80	99.65	99.49	99.00	98.75	98.46	98.30	98.03
31	2.961	58.48	100.26	99.88	99.66	99.50	99.04	98.85	98.68	98.51	98.50
32	2.981	58.81	100.15	99.74	99.69	99.51	99.10	98.72	98.55	98.20	98.06
33	2.963	58.89	100.10	99.61	99.35	99.00	98.59	98.28	98.12	97.93	97.69
34	2.960	58.73	100.24	99.63	99.18	98.88	98.50	98.21	98.18	98.08	97.92
35	2.981	58.56	100.12	99.68	99.23	98.94	98.67	98.45	98.31	98.26	98.12
36	2.963	58.90	100.05	99.54	99.30	99.13	98.73	98.66	98.57	98.42	98.32
37	2.963	58.98	100.12	99.46	99.19	99.03	98.59	98.47	98.44	98.24	98.03
38	2.966	59.07	100.15	99.58	99.17	98.93	98.59	98.19	97.75	97.49	97.17
39	2.967	59.18	100.08	99.56	99.09	98.97	98.58	98.28	98.24	97.70	97.60
40	2.979	59.49	100.25	99.68	99.33	99.04	98.77	98.45	98.29	97.81	97.55
41	2.968	59.44	100.15	99.51	99.28	98.89	98.52	98.27	98.25	98.01	97.83
42	2.967	57.60	100.21	99.74	99.48	99.08	98.56	98.13	97.83	97.59	97.40
43	2.966	58.87	100.20	99.71	99.37	99.13	98.81	98.49	98.37	98.18	98.05
44	2.965	59.50	100.18	99.56	99.34	99.08	98.64	98.40	98.17	97.97	97.68
45	2.960	58.26	100.22	99.69	99.49	99.12	98.70	98.34	98.06	97.75	97.41
46	2.963	57.99	100.28	99.74	99.53	99.22	98.86	98.41	98.09	97.86	97.48
47	2.963	58.85	100.15	99.47	99.00	98.67	98.28	97.89	97.84	97.49	97.32
48	2.977	58.10	100.03	99.57	99.31	99.10	98.76	98.49	98.38	98.19	97.90
49	2.960	58.37	100.10	99.54	99.37	99.09	98.80	98.48	98.13	97.79	97.64
50	2.968	58.39	100.12	99.66	99.37	98.96	98.58	98.27	97.91	97.64	97.43
Ave.	2.967	58.83	100.17	99.65	99.36	99.11	98.73	98.44	98.26	98.02	97.81
Med.	2.965	58.89	100.15	99.66	99.34	99.08	98.70	98.45	98.25	98.01	97.83
st dev	0.0065	0.5235	0.0680	0.1093	0.1766	0.2134	0.2088	0.2264	0.2683	0.3290	0.3666
Min.	2.960	57.60	100.03	99.46	99.00	98.67	98.28	97.89	97.75	97.49	97.17
Max.	2.981	59.62	100.28	99.88	99.69	99.51	99.10	98.85	98.73	98.51	98.50

TM-21 Projection:

Test Duration: 9,000 hours
Failures Observed: 0
α: 2.557E-06
β: 1.000
Reported L₇₀: >54,000 hours

3.4 Data Set 2, 85 °C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
26	0.2369	0.5102	3475	0.0005	0.0009	0.0011	0.0013	0.0018	0.0022	0.0020	0.0022	0.0024
27	0.2366	0.5123	3460	0.0006	0.0009	0.0011	0.0013	0.0017	0.0021	0.0022	0.0022	0.0023
28	0.2363	0.5118	3477	0.0006	0.0010	0.0011	0.0014	0.0020	0.0022	0.0029	0.0029	0.0028
29	0.2365	0.5109	3480	0.0005	0.0009	0.0011	0.0013	0.0018	0.0021	0.0022	0.0025	0.0025
30	0.2361	0.5112	3488	0.0005	0.0009	0.0010	0.0013	0.0018	0.0021	0.0025	0.0025	0.0026
31	0.2356	0.5088	3532	0.0005	0.0008	0.0010	0.0012	0.0019	0.0021	0.0022	0.0022	0.0026
32	0.2359	0.5111	3496	0.0005	0.0009	0.0011	0.0012	0.0018	0.0021	0.0022	0.0024	0.0026
33	0.2373	0.5090	3474	0.0005	0.0008	0.0010	0.0012	0.0018	0.0021	0.0021	0.0023	0.0027
34	0.2361	0.5092	3513	0.0007	0.0009	0.0011	0.0013	0.0020	0.0021	0.0022	0.0025	0.0027
35	0.2356	0.5102	3514	0.0004	0.0008	0.0010	0.0013	0.0018	0.0021	0.0022	0.0023	0.0026
36	0.2368	0.5105	3475	0.0006	0.0009	0.0011	0.0014	0.0020	0.0022	0.0023	0.0024	0.0027
37	0.2369	0.5107	3471	0.0005	0.0009	0.0011	0.0012	0.0018	0.0022	0.0023	0.0024	0.0027
38	0.2358	0.5100	3510	0.0005	0.0009	0.0010	0.0012	0.0017	0.0020	0.0019	0.0024	0.0026
39	0.2366	0.5109	3476	0.0005	0.0009	0.0011	0.0013	0.0019	0.0022	0.0022	0.0024	0.0027
40	0.2364	0.5120	3471	0.0005	0.0010	0.0011	0.0013	0.0019	0.0022	0.0022	0.0025	0.0027
41	0.2364	0.5111	3481	0.0006	0.0010	0.0012	0.0013	0.0018	0.0021	0.0020	0.0023	0.0027
42	0.2373	0.5101	3462	0.0007	0.0009	0.0013	0.0017	0.0022	0.0024	0.0024	0.0028	0.0030
43	0.2368	0.5107	3472	0.0005	0.0007	0.0009	0.0013	0.0018	0.0020	0.0020	0.0023	0.0026
44	0.2364	0.5115	3478	0.0006	0.0007	0.0009	0.0013	0.0018	0.0021	0.0023	0.0025	0.0028
45	0.2366	0.5098	3488	0.0004	0.0006	0.0009	0.0013	0.0019	0.0021	0.0022	0.0024	0.0026
46	0.2361	0.5085	3519	0.0005	0.0006	0.0009	0.0012	0.0017	0.0020	0.0022	0.0023	0.0027
47	0.2361	0.5111	3491	0.0004	0.0006	0.0010	0.0013	0.0018	0.0020	0.0022	0.0025	0.0027
48	0.2367	0.5103	3479	0.0005	0.0008	0.0009	0.0013	0.0018	0.0020	0.0020	0.0022	0.0025
49	0.2364	0.5105	3486	0.0006	0.0008	0.0009	0.0013	0.0018	0.0021	0.0020	0.0024	0.0025
50	0.2362	0.5104	3495	0.0006	0.0007	0.0009	0.0012	0.0017	0.0020	0.0019	0.0022	0.0024
Ave.	0.2364	0.5105	3487	0.0006	0.0008	0.0010	0.0013	0.0019	0.0021	0.0022	0.0024	0.0026
Med.	0.2364	0.5105	3480	0.0005	0.0009	0.0010	0.0013	0.0018	0.0021	0.0022	0.0024	0.0026
st dev	0.0005	0.0010	18.4167	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002
Min.	0.2356	0.5085	3460	0.0004	0.0006	0.0009	0.0012	0.0017	0.0020	0.0019	0.0022	0.0023
Max.	0.2373	0.5123	3532	0.0007	0.0010	0.0013	0.0017	0.0022	0.0024	0.0029	0.0029	0.0030



3.5 Data Set 3, 105 °C, 150mA (Lumen Maintenance)

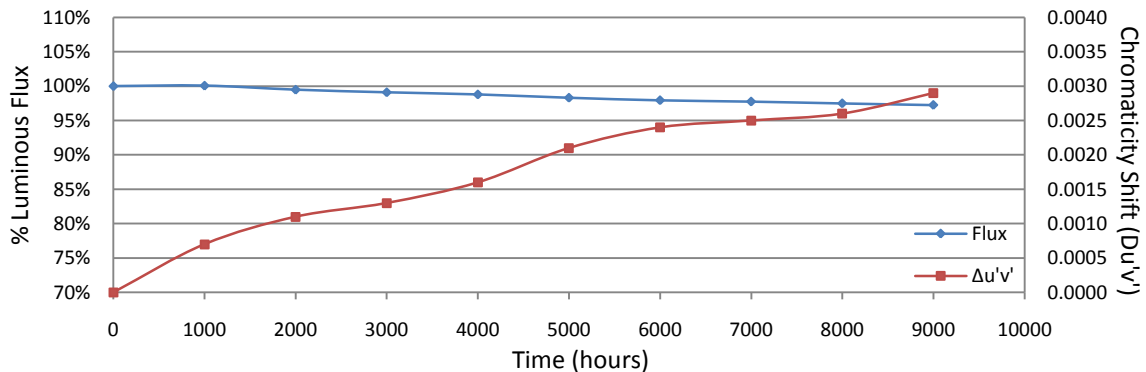
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
51	2.968	58.67	100.15	99.63	99.34	98.81	98.47	98.06	97.85	97.58	97.32
52	2.967	58.78	100.14	99.47	99.10	98.76	98.35	97.91	97.84	97.67	97.36
53	2.975	59.42	99.95	99.28	99.02	98.75	98.20	97.96	97.83	97.61	97.49
54	2.974	59.59	100.13	99.53	99.16	98.79	98.14	97.94	97.62	97.33	97.16
55	2.975	58.76	100.14	99.49	99.15	98.94	98.42	97.99	97.65	97.21	97.09
56	2.974	59.26	100.13	99.48	99.17	98.94	98.46	97.96	97.64	97.35	97.13
57	2.987	58.87	99.98	99.42	99.07	98.78	98.47	98.22	98.11	97.77	97.42
58	2.961	59.03	100.07	99.58	99.17	98.90	98.49	98.19	97.90	97.70	97.46
59	2.965	59.20	99.98	99.43	98.99	98.72	98.23	97.79	97.48	97.15	96.88
60	2.964	58.69	100.03	99.59	99.13	98.96	98.43	97.92	97.87	97.61	97.44
61	2.962	58.77	99.97	99.35	98.98	98.62	98.15	97.62	97.46	97.35	96.99
62	2.978	59.13	100.08	99.42	99.02	98.61	98.12	97.65	97.43	97.31	96.92
63	2.962	58.84	100.17	99.42	98.86	98.62	98.15	97.72	97.64	97.52	97.37
64	2.966	58.22	100.10	99.52	99.00	98.66	98.04	97.75	97.44	97.05	96.75
65	2.962	58.94	100.08	99.41	98.97	98.51	98.07	97.57	97.32	97.23	97.12
66	2.958	58.80	100.12	99.49	99.03	98.42	97.89	97.50	97.35	97.06	96.90
67	2.981	58.84	100.03	99.49	98.93	98.56	98.06	97.62	97.43	97.18	96.94
68	2.969	59.24	100.07	99.54	99.05	98.73	98.19	97.79	97.70	97.52	97.35
69	2.961	59.11	100.12	99.46	99.14	98.82	98.36	98.12	98.07	97.80	97.63
70	2.958	58.97	99.97	99.41	99.24	98.97	98.54	98.17	98.10	98.03	97.85
71	2.984	58.79	100.05	99.52	99.15	98.95	98.67	98.33	98.11	97.86	97.72
72	2.961	59.25	99.97	99.46	99.31	99.09	98.58	98.36	98.13	97.79	97.59
73	2.963	59.54	100.08	99.60	99.43	99.19	98.62	98.17	98.17	97.63	97.31
74	2.966	58.94	100.17	99.61	99.22	98.76	98.32	98.13	97.85	97.59	97.25
75	2.956	59.04	100.14	99.51	99.00	98.88	98.34	97.95	97.75	97.27	96.92
Ave.	2.968	58.99	100.07	99.48	99.10	98.79	98.31	97.94	97.75	97.49	97.25
Med.	2.966	58.94	100.08	99.49	99.10	98.78	98.34	97.95	97.75	97.52	97.31
st dev	0.0085	0.3030	0.0705	0.0831	0.1341	0.1817	0.2057	0.2426	0.2686	0.2684	0.2889
Min.	2.956	58.22	99.95	99.28	98.86	98.42	97.89	97.50	97.32	97.05	96.75
Max.	2.987	59.59	100.17	99.63	99.43	99.19	98.67	98.36	98.17	98.03	97.85

TM-21 Projection:

Test Duration: 9,000 hours
Failures Observed: 0
 α : 3.018E-06
 β : 0.999
Reported L₇₀: >54,000 hours

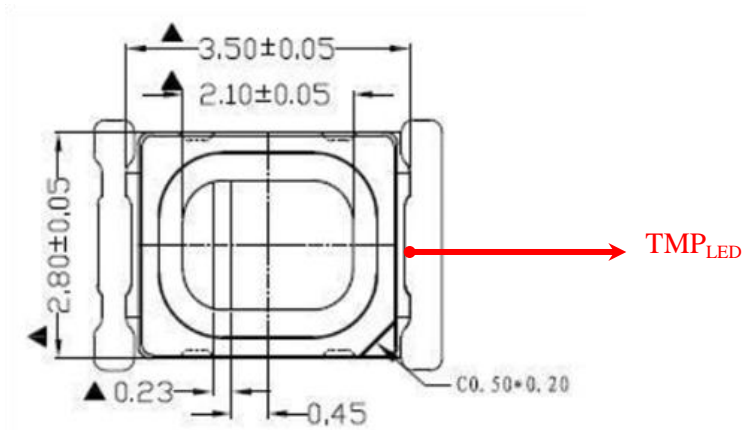
3.6 Data Set 3, 105 °C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
51	0.2366	0.5105	3481	0.0007	0.0011	0.0013	0.0014	0.0021	0.0024	0.0022	0.0023	0.0021
52	0.2369	0.5090	3489	0.0007	0.0010	0.0013	0.0015	0.0021	0.0023	0.0021	0.0026	0.0023
53	0.2365	0.5099	3491	0.0008	0.0011	0.0014	0.0014	0.0022	0.0025	0.0025	0.0027	0.0026
54	0.2356	0.5105	3511	0.0006	0.0009	0.0013	0.0016	0.0020	0.0023	0.0022	0.0026	0.0026
55	0.2365	0.5093	3499	0.0007	0.0011	0.0013	0.0016	0.0021	0.0024	0.0023	0.0025	0.0026
56	0.2360	0.5114	3488	0.0006	0.0010	0.0012	0.0015	0.0019	0.0022	0.0022	0.0026	0.0026
57	0.2360	0.5100	3505	0.0007	0.0011	0.0013	0.0016	0.0020	0.0024	0.0026	0.0027	0.0031
58	0.2358	0.5122	3487	0.0006	0.0012	0.0013	0.0015	0.0020	0.0024	0.0027	0.0027	0.0030
59	0.2355	0.5095	3527	0.0007	0.0011	0.0014	0.0016	0.0021	0.0024	0.0025	0.0026	0.0030
60	0.2361	0.5095	3507	0.0007	0.0010	0.0013	0.0016	0.0020	0.0023	0.0024	0.0026	0.0029
61	0.2362	0.5098	3502	0.0007	0.0011	0.0013	0.0016	0.0021	0.0024	0.0025	0.0026	0.0029
62	0.2367	0.5094	3491	0.0007	0.0010	0.0013	0.0016	0.0020	0.0022	0.0025	0.0026	0.0030
63	0.2360	0.5109	3496	0.0007	0.0011	0.0013	0.0016	0.0021	0.0024	0.0026	0.0026	0.0029
64	0.2368	0.5094	3487	0.0006	0.0009	0.0013	0.0016	0.0020	0.0023	0.0025	0.0026	0.0030
65	0.2364	0.5111	3480	0.0007	0.0011	0.0014	0.0017	0.0021	0.0024	0.0026	0.0027	0.0030
66	0.2367	0.5103	3479	0.0006	0.0010	0.0013	0.0017	0.0021	0.0024	0.0024	0.0027	0.0030
67	0.2371	0.5111	3460	0.0008	0.0012	0.0014	0.0017	0.0022	0.0025	0.0024	0.0027	0.0032
68	0.2374	0.5106	3454	0.0006	0.0010	0.0013	0.0016	0.0020	0.0024	0.0028	0.0028	0.0033
69	0.2354	0.5114	3508	0.0007	0.0011	0.0014	0.0016	0.0020	0.0022	0.0026	0.0027	0.0030
70	0.2365	0.5097	3495	0.0007	0.0011	0.0014	0.0018	0.0022	0.0026	0.0028	0.0030	0.0032
71	0.2366	0.5103	3483	0.0007	0.0010	0.0014	0.0016	0.0021	0.0023	0.0026	0.0026	0.0029
72	0.2369	0.5101	3476	0.0007	0.0011	0.0014	0.0018	0.0023	0.0026	0.0028	0.0029	0.0032
73	0.2365	0.5109	3479	0.0008	0.0011	0.0014	0.0017	0.0020	0.0024	0.0027	0.0027	0.0030
74	0.2363	0.5100	3497	0.0008	0.0011	0.0014	0.0017	0.0021	0.0024	0.0027	0.0027	0.0032
75	0.2372	0.5094	3474	0.0005	0.0009	0.0014	0.0017	0.0022	0.0026	0.0027	0.0028	0.0031
Ave.	0.2364	0.5102	3490	0.0007	0.0011	0.0013	0.0016	0.0021	0.0024	0.0025	0.0026	0.0029
Med.	0.2365	0.5101	3489	0.0007	0.0011	0.0013	0.0016	0.0021	0.0024	0.0025	0.0027	0.0030
st dev	0.0005	0.0008	15.9783	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0003
Min.	0.2354	0.5090	3454	0.0005	0.0009	0.0012	0.0014	0.0019	0.0022	0.0021	0.0023	0.0021
Max.	0.2374	0.5122	3527	0.0008	0.0012	0.0014	0.0018	0.0023	0.0026	0.0028	0.0030	0.0033



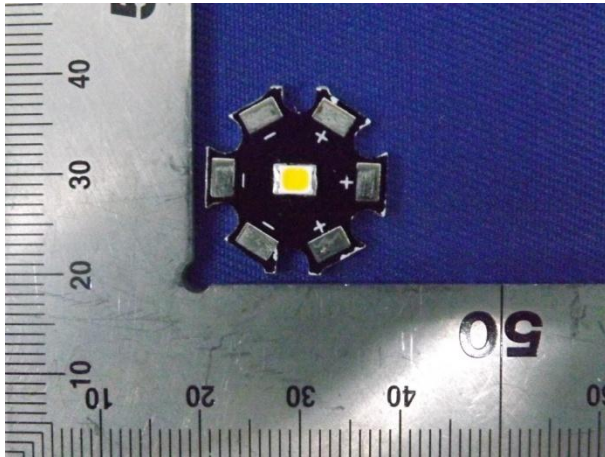
Attachment A – EUT Photo

A.1 Mechanical Dimensions (Ta = 25 °C)



All dimensions are in millimeter

A.2 EUT Photo



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