TEST REPORT

ACCORDING TO IES LM-80-2015
For

LEDYI LIGHTING CO.,LTD

Yuechang Industrial Park,Shiyan,Bao'an,Shenzhen,China

Model: 5050 White SMD LED

Report Type: 9000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	R2DG160721052-10-9000
Test Date:	2016-07-26 to 2017-08-05
Report Date:	2017-08-16
Reviewed By:	Daniel Duan / EE Manager
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588

TABLE OF CONTENTS

1 - General Information

1.1 Description of LED Light Sources

Sample Size:

75 PCS samples were received by 2016-07-21. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

Manufacturer:	LEDYI LIGHTING CO.,LTD
Part Number:	5050 White SMD LED
Part Type:	LED Package
Drive Level:	DC 60mA
Nominal CCT:	2700K

1.2 Standards Used:

- IESNA LM-80-15: 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 Testing 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	G115987C J7321114	300VA	2017-03-03	2018-03-02
Multilayer aging machine	BACL	B2-270	20005	25°C~130°C	2016-09-01	2017-09-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	(50/15A)	2017-03-03	2018-03-02
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090009	(50/15A)	2016-12-15	2017-12-14

1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within ±3% of the specified value of the manufacturer during maintenance test, and was within ±0.5% during photometric and electrical measurement test.

1.5 Ambient Conditions for Maintenance Test

For lumen maintenance test, samples within one data set, were installed on cooling boards in thermal chambers with minimal ambient airflow. The case temperature and ambient temperature was monitored by thermocouples which one was soldered to the coldest DUTs' case (TMP_{LED}) location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP_{LED} of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within ±3% of the specified value of the manufacturer.

The relative humidity within chamber was kept less than 65% during test.

For photometry measurement, the ambient temperature during test was set to 25°C ± 2°C, RH <65%.

1.6 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=21K (K=2), at the 95% confidence level.

The uncertainty of the temperature is U=0.8671°C (K=2), at the 95% confidence level.

1.7 Statement of Traceability

Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

1.8 Sample Set

Data Set 1: 55°C, 60mA

Part Number:	5050 White SMD LED
Number of Units:	25
Case Temperature:	>53°C
Ambient Temperature:	>50°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

Data Set 2: 70°C,60mA

Part Number:	5050 White SMD LED
Number of Units:	25
Case Temperature:	>68°C
Ambient Temperature:	>65°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

Data Set 3: 85°C,60mA

Part Number:	5050 White SMD LED
Number of Units:	25
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	Reported TM-21 L_{70} Lifetime
1	25	0	1000	9000	>54000hours
2	25	0	1000	9000	>54000hours
3	25	0	1000	9000	>54000hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000
1	100.30%	100.10%	99.96%	99.80%	99.63%	99.45%	99.26%	99.07%	98.88%
2	100.21%	99.94%	99.72%	99.55%	99.32%	99.13%	98.89%	98.64%	98.42%
3	100.13%	99.78%	99.51%	99.28%	98.98%	98.77%	98.51%	98.24%	97.99%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000
1	0.0002	0.0004	0.0005	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022
2	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0019	0.0021
3	0.0004	0.0007	0.0009	0.0011	0.0015	0.0016	0.0017	0.0021	0.0024

3 - Test Data

3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	23.97	100.29	100.21	100.04	99.67	99.46	99.29	99.00	98.79	98.50
2	22.09	100.41	100.23	100.09	99.91	99.82	99.77	99.68	99.55	99.14
3	22.10	100.36	100.32	100.18	99.91	99.73	99.68	99.41	99.28	99.19
4	22.13	100.32	100.18	99.91	99.68	99.46	99.37	99.14	99.05	99.01
5	22.52	100.22	100.13	100.04	99.73	99.51	99.25	99.07	98.93	98.71
6	23.70	100.21	100.08	99.92	99.62	99.49	99.45	99.28	99.20	98.99
7	22.05	100.36	100.18	100.09	99.86	99.64	99.46	99.18	99.05	98.91
8	23.73	100.25	99.96	99.83	99.58	99.24	99.16	98.90	98.74	98.53
9	22.03	100.32	100.14	99.91	99.77	99.68	99.46	99.23	99.00	98.68
10	22.05	100.36	100.23	100.18	100.09	99.95	99.77	99.64	99.41	99.27
11	22.05	100.27	100.09	100.05	99.91	99.73	99.50	99.37	99.05	98.87
12	23.78	100.25	100.04	99.87	99.71	99.45	99.29	99.07	98.99	98.70
13	22.04	100.05	99.86	99.68	99.64	99.36	99.18	99.00	98.73	98.59
14	24.13	100.25	100.08	99.88	99.83	99.75	99.54	99.46	99.25	99.13
15	22.44	100.31	100.13	100.09	100.00	99.91	99.73	99.47	99.29	99.11
16	22.33	100.22	99.91	99.82	99.73	99.60	99.51	99.37	99.24	99.15
17	22.06	100.27	100.05	99.91	99.77	99.59	99.23	99.00	98.82	98.69
18	22.34	100.36	99.96	99.87	99.69	99.46	99.19	99.02	98.79	98.57
19	22.39	100.22	99.87	99.82	99.55	99.33	99.20	99.11	98.75	98.53
20	22.21	100.36	100.09	99.91	99.77	99.55	99.41	99.19	99.05	98.92
21	22.60	100.44	100.18	100.04	99.96	99.69	99.51	99.38	99.12	98.89
22	22.49	100.36	100.22	99.96	99.91	99.82	99.69	99.42	99.07	98.93
23	22.17	100.32	100.18	100.09	100.05	99.91	99.73	99.68	99.50	99.23
24	22.51	100.31	100.09	99.96	99.91	99.78	99.47	99.16	98.98	98.80
25	22.44	100.40	100.13	99.91	99.82	99.73	99.51	99.33	99.11	98.93
Ave.	22.57	100.30	100.10	99.96	99.80	99.63	99.45	99.26	99.07	98.88
Med.	22.34	100.31	100.13	99.92	99.77	99.64	99.46	99.23	99.05	98.91
st dev	0.68	0.0827	0.1174	0.1231	0.1455	0.1914	0.1978	0.2232	0.2320	0.2402
Min.	22.03	100.05	99.86	99.68	99.55	99.24	99.16	98.90	98.73	98.50
Max.	24.13	100.44	100.32	100.18	100.09	99.95	99.77	99.68	99.55	99.27

TM-21 Projection:

Test Duration: 9000 hours

Failures Observed: 0

α: 1.861E-06

β: 1.006

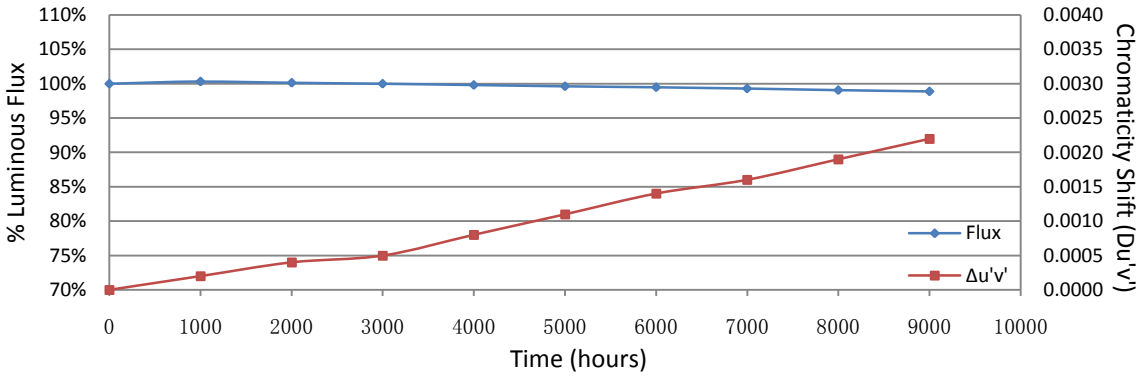
Reported L_{70}: >54000 hours

3.2 Data Set 1, 55°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2.815	2.800	2.797	2.807	2.803	2.799	2.799	2.796	2.795	2.798
2	2.902	2.887	2.884	2.892	2.889	2.888	2.887	2.885	2.883	2.887
3	2.889	2.874	2.872	2.881	2.877	2.874	2.876	2.872	2.869	2.872
4	2.900	2.884	2.884	2.891	2.888	2.961	2.887	2.883	2.881	2.886
5	2.903	2.886	2.886	2.895	2.889	2.888	2.890	2.887	2.882	2.888
6	2.815	2.796	2.797	2.808	2.802	2.798	2.799	2.797	2.792	2.799
7	2.889	2.869	2.869	2.878	2.873	2.871	2.872	2.868	2.866	2.871
8	2.830	2.802	2.801	2.813	2.807	2.804	2.802	2.802	2.801	2.805
9	2.915	2.887	2.887	2.895	2.891	2.889	2.888	2.886	2.884	2.888
10	2.919	2.874	2.875	2.884	2.881	2.877	2.875	2.876	2.874	2.877
11	2.896	2.872	2.873	2.882	2.876	2.876	2.875	2.874	2.871	2.875
12	2.826	2.800	2.799	2.809	2.805	2.802	2.804	2.802	2.797	2.801
13	2.907	2.879	2.878	2.887	2.884	2.881	2.883	2.880	2.876	2.880
14	2.829	2.801	2.801	2.812	2.807	2.804	2.803	2.804	2.801	2.804
15	2.921	2.888	2.889	2.898	2.894	2.891	2.891	2.890	2.887	2.892
16	2.924	2.888	2.889	2.897	2.894	2.892	2.891	2.892	2.889	2.891
17	2.922	2.888	2.888	2.895	2.893	2.891	2.888	2.891	2.893	2.890
18	2.917	2.886	2.887	2.894	2.890	2.889	2.888	2.888	2.886	2.887
19	2.915	2.885	2.884	2.894	2.888	2.888	2.885	2.888	2.883	2.886
20	2.902	2.875	2.875	2.883	2.879	2.878	2.875	2.877	2.871	2.875
21	2.920	2.891	2.891	2.901	2.897	2.896	2.894	2.895	2.897	2.893
22	2.908	2.880	2.881	2.888	2.884	2.885	2.882	2.883	2.881	2.883
23	2.900	2.873	2.873	2.881	2.876	2.875	2.875	2.875	2.869	2.875
24	2.917	2.890	2.889	2.898	2.892	2.893	2.890	2.892	2.888	2.890
25	2.914	2.886	2.886	2.893	2.890	2.889	2.888	2.888	2.882	2.888
Ave.	2.892	2.866	2.865	2.874	2.870	2.871	2.867	2.867	2.864	2.867
Med.	2.903	2.880	2.881	2.888	2.884	2.885	2.883	2.883	2.881	2.883
st dev	0.037	0.034	0.034	0.033	0.034	0.039	0.034	0.035	0.035	0.034
Min.	2.815	2.796	2.797	2.807	2.802	2.798	2.799	2.796	2.792	2.798
Max.	2.924	2.891	2.891	2.901	2.897	2.961	2.894	2.895	2.897	2.893

Data Set 1, 55°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2628	0.5165	2738	0.0002	0.0003	0.0005	0.0009	0.0013	0.0017	0.0021	0.0020	0.0022
2	0.2639	0.5161	2717	0.0003	0.0004	0.0007	0.0012	0.0012	0.0015	0.0019	0.0017	0.0020
3	0.2625	0.5159	2749	0.0001	0.0003	0.0005	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022
4	0.2619	0.5157	2764	0.0002	0.0004	0.0006	0.0009	0.0011	0.0014	0.0018	0.0019	0.0023
5	0.2629	0.5167	2737	0.0003	0.0004	0.0006	0.0009	0.0012	0.0014	0.0019	0.0020	0.0022
6	0.2620	0.5153	2763	0.0001	0.0002	0.0004	0.0008	0.0011	0.0013	0.0016	0.0019	0.0024
7	0.2619	0.5149	2768	0.0002	0.0004	0.0005	0.0009	0.0011	0.0014	0.0018	0.0020	0.0023
8	0.2620	0.5160	2760	0.0001	0.0003	0.0005	0.0009	0.0011	0.0015	0.0017	0.0019	0.0023
9	0.2611	0.5153	2784	0.0002	0.0002	0.0003	0.0008	0.0008	0.0012	0.0017	0.0016	0.0019
10	0.2630	0.5156	2738	0.0000	0.0002	0.0003	0.0004	0.0008	0.0012	0.0011	0.0014	0.0018
11	0.2617	0.5156	2769	0.0003	0.0004	0.0006	0.0007	0.0011	0.0015	0.0017	0.0018	0.0022
12	0.2625	0.5156	2749	0.0001	0.0003	0.0004	0.0007	0.0011	0.0014	0.0018	0.0019	0.0024
13	0.2612	0.5158	2778	0.0003	0.0004	0.0005	0.0007	0.0011	0.0014	0.0015	0.0021	0.0023
14	0.2627	0.5170	2740	0.0002	0.0004	0.0007	0.0010	0.0013	0.0016	0.0015	0.0020	0.0021
15	0.2625	0.5159	2748	0.0001	0.0004	0.0005	0.0008	0.0011	0.0013	0.0018	0.0019	0.0021
16	0.2620	0.5156	2762	0.0002	0.0004	0.0005	0.0007	0.0011	0.0014	0.0015	0.0018	0.0020
17	0.2623	0.5151	2756	0.0004	0.0004	0.0006	0.0006	0.0012	0.0015	0.0015	0.0018	0.0021
18	0.2628	0.5167	2739	0.0002	0.0003	0.0004	0.0006	0.0011	0.0015	0.0015	0.0018	0.0020
19	0.2622	0.5156	2756	0.0001	0.0003	0.0005	0.0007	0.0010	0.0015	0.0015	0.0020	0.0024
20	0.2619	0.5160	2762	0.0001	0.0003	0.0004	0.0008	0.0010	0.0014	0.0017	0.0019	0.0021
21	0.2629	0.5166	2737	0.0002	0.0004	0.0006	0.0007	0.0011	0.0013	0.0016	0.0019	0.0021
22	0.2603	0.5153	2803	0.0002	0.0004	0.0005	0.0006	0.0010	0.0013	0.0016	0.0020	0.0022
23	0.2625	0.5166	2746	0.0001	0.0004	0.0006	0.0007	0.0011	0.0013	0.0014	0.0019	0.0021
24	0.2626	0.5170	2742	0.0001	0.0004	0.0005	0.0008	0.0011	0.0015	0.0014	0.0019	0.0022
25	0.2624	0.5159	2750	0.0001	0.0004	0.0006	0.0006	0.0012	0.0016	0.0015	0.0022	0.0023
Ave.	0.2623	0.5159	2754	0.0002	0.0004	0.0005	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022
Med.	0.2624	0.5159	2750	0.0002	0.0004	0.0005	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022
st dev	0.0007	0.0006	18	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002	0.0001	0.0002
Min.	0.2603	0.5149	2717	0.0000	0.0002	0.0003	0.0004	0.0008	0.0012	0.0011	0.0014	0.0018
Max.	0.2639	0.5170	2803	0.0004	0.0004	0.0007	0.0012	0.0013	0.0017	0.0021	0.0022	0.0024



3.3 Data Set 2, 70°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	22.14	100.27	100.05	99.95	99.86	99.73	99.68	99.50	99.32	99.19
27	22.13	100.14	99.82	99.68	99.55	99.41	99.28	99.01	98.87	98.78
28	21.99	100.18	99.73	99.45	99.41	99.32	99.14	98.95	98.54	98.32
29	22.41	100.22	100.04	99.87	99.82	99.51	99.33	99.06	98.80	98.48
30	22.52	100.36	99.96	99.73	99.64	99.47	99.42	99.33	99.07	98.76
31	22.15	100.23	99.95	99.86	99.50	99.28	99.10	98.78	98.60	98.47
32	22.18	100.18	99.86	99.68	99.55	99.41	99.23	98.92	98.60	98.51
33	23.62	100.13	99.79	99.45	99.32	99.24	99.03	98.73	98.56	98.39
34	22.20	100.23	99.82	99.46	99.41	99.23	99.01	98.56	98.33	98.24
35	22.09	100.14	99.91	99.68	99.50	99.14	98.96	98.73	98.55	98.28
36	23.77	100.08	99.83	99.50	99.20	98.86	98.53	98.23	97.94	97.56
37	22.41	100.31	100.13	100.04	99.96	99.73	99.51	99.24	99.06	98.88
38	22.19	100.09	99.91	99.73	99.64	99.41	99.37	99.28	99.05	98.92
39	22.60	100.13	99.87	99.69	99.56	99.29	99.16	98.89	98.63	98.36
40	22.21	100.09	99.77	99.64	99.46	99.28	99.10	98.87	98.69	98.47
41	22.50	100.31	100.18	99.87	99.60	99.38	99.20	98.93	98.71	98.36
42	22.23	100.22	100.13	99.91	99.64	99.37	99.24	98.97	98.61	98.11
43	22.13	100.18	100.05	99.68	99.41	99.19	99.01	98.78	98.46	98.24
44	22.35	100.22	100.04	99.73	99.51	99.24	98.97	98.66	98.52	98.21
45	22.09	100.23	100.00	99.77	99.50	99.23	99.00	98.69	98.42	98.28
46	22.42	100.18	100.09	99.87	99.64	99.51	99.11	98.84	98.48	98.31
47	22.17	100.23	100.05	99.91	99.68	99.41	99.14	99.05	98.87	98.56
48	22.26	100.27	99.78	99.46	99.28	99.15	98.92	98.74	98.47	98.20
49	22.05	100.36	99.91	99.73	99.46	99.14	99.05	98.87	98.59	98.37
50	22.26	100.31	99.96	99.64	99.60	99.15	98.74	98.61	98.29	98.16
Ave.	22.36	100.21	99.94	99.72	99.55	99.32	99.13	98.89	98.64	98.42
Med.	22.21	100.22	99.95	99.73	99.55	99.29	99.11	98.87	98.60	98.36
st dev	0.43	0.0808	0.1275	0.1670	0.1735	0.1888	0.2381	0.2697	0.2902	0.3204
Min.	21.99	100.08	99.73	99.45	99.20	98.86	98.53	98.23	97.94	97.56
Max.	23.77	100.36	100.18	100.04	99.96	99.73	99.68	99.50	99.32	99.19

TM-21 Projection:

Test Duration: 9000 hours

Failures Observed: 0

α: 2.289E-06

β: 1.005

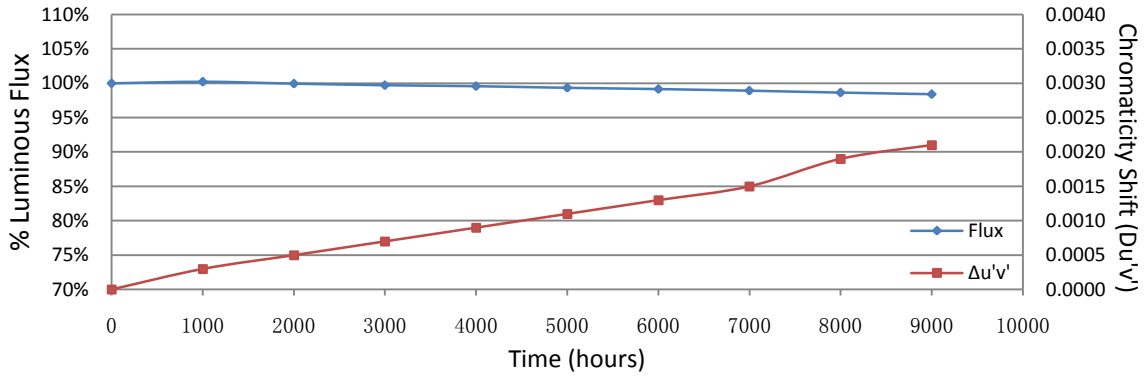
Reported L_{70}: >54000 hours

3.4 Data Set 2, 70°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	2.908	2.884	2.885	2.897	2.888	2.887	2.886	2.886	2.882	2.888
27	2.892	2.875	2.875	2.888	2.877	2.878	2.877	2.875	2.871	2.877
28	2.899	2.884	2.883	2.899	2.886	2.888	2.886	2.887	2.882	2.885
29	2.896	2.887	2.886	2.900	2.888	2.890	2.888	2.889	2.885	2.889
30	2.895	2.883	2.884	2.896	2.886	2.885	2.888	2.884	2.883	2.885
31	2.906	2.892	2.894	2.906	2.895	2.896	2.895	2.895	2.891	2.895
32	2.900	2.889	2.889	2.902	2.890	2.891	2.889	2.892	2.890	2.889
33	2.809	2.800	2.799	2.817	2.804	2.804	2.802	2.802	2.799	2.801
34	2.895	2.885	2.887	2.900	2.888	2.890	2.890	2.889	2.887	2.887
35	2.897	2.888	2.887	2.900	2.890	2.890	2.888	2.889	2.889	2.890
36	2.810	2.801	2.801	2.818	2.804	2.804	2.801	2.802	2.800	2.803
37	2.896	2.885	2.884	2.897	2.888	2.889	2.887	2.887	2.884	2.888
38	2.904	2.875	2.875	2.888	2.878	2.879	2.875	2.877	2.875	2.877
39	2.919	2.888	2.889	2.901	2.893	2.893	2.889	2.891	2.891	2.892
40	2.912	2.888	2.888	2.902	2.890	2.892	2.890	2.889	2.889	2.889
41	2.911	2.886	2.887	2.902	2.897	2.889	2.890	2.887	2.887	2.887
42	2.904	2.874	2.875	2.890	2.885	2.878	2.876	2.878	2.880	2.876
43	2.908	2.881	2.880	2.894	2.890	2.882	2.883	2.883	2.886	2.881
44	2.908	2.881	2.881	2.893	2.889	2.884	2.883	2.884	2.891	2.881
45	2.902	2.876	2.877	2.891	2.886	2.881	2.879	2.879	2.924	2.877
46	2.900	2.876	2.877	2.892	2.886	2.878	2.877	2.879	2.877	2.877
47	2.911	2.886	2.887	2.904	2.895	2.890	2.887	2.889	2.894	2.888
48	2.903	2.883	2.884	2.897	2.892	2.888	2.884	2.887	2.883	2.886
49	2.900	2.880	2.881	2.895	2.890	2.885	2.881	2.884	2.884	2.882
50	3.066	2.876	2.875	2.891	2.887	2.880	2.878	2.878	2.880	2.877
Ave.	2.902	2.876	2.876	2.890	2.882	2.880	2.878	2.878	2.879	2.878
Med.	2.902	2.883	2.884	2.897	2.888	2.887	2.886	2.886	2.884	2.885
st dev	0.043	0.023	0.024	0.022	0.024	0.023	0.024	0.024	0.026	0.023
Min.	2.809	2.800	2.799	2.817	2.804	2.804	2.801	2.802	2.799	2.801
Max.	3.066	2.892	2.894	2.906	2.897	2.896	2.895	2.895	2.924	2.895

3.5 Data Set 2, 70°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2615	0.5165	2767	0.0004	0.0006	0.0008	0.0011	0.0014	0.0017	0.0019	0.0022	0.0026
27	0.2628	0.5162	2741	0.0003	0.0005	0.0007	0.0011	0.0011	0.0013	0.0015	0.0021	0.0022
28	0.2615	0.5164	2770	0.0003	0.0007	0.0008	0.0010	0.0013	0.0015	0.0017	0.0022	0.0024
29	0.2623	0.5158	2753	0.0003	0.0005	0.0007	0.0008	0.0011	0.0013	0.0014	0.0017	0.0019
30	0.2618	0.5163	2762	0.0003	0.0004	0.0007	0.0009	0.0011	0.0013	0.0015	0.0019	0.0021
31	0.2630	0.5167	2733	0.0003	0.0006	0.0008	0.0009	0.0011	0.0015	0.0017	0.0020	0.0021
32	0.2629	0.5162	2738	0.0002	0.0005	0.0008	0.0008	0.0010	0.0012	0.0015	0.0018	0.0019
33	0.2628	0.5158	2742	0.0002	0.0005	0.0007	0.0008	0.0011	0.0013	0.0015	0.0020	0.0021
34	0.2626	0.5167	2744	0.0002	0.0005	0.0008	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021
35	0.2626	0.5158	2747	0.0002	0.0005	0.0008	0.0009	0.0011	0.0014	0.0015	0.0020	0.0021
36	0.2636	0.5162	2723	0.0002	0.0001	0.0002	0.0004	0.0010	0.0011	0.0014	0.0018	0.0020
37	0.2626	0.5159	2746	0.0002	0.0005	0.0007	0.0008	0.0011	0.0013	0.0015	0.0019	0.0022
38	0.2623	0.5157	2754	0.0002	0.0005	0.0008	0.0009	0.0010	0.0013	0.0015	0.0018	0.0021
39	0.2634	0.5162	2728	0.0003	0.0005	0.0008	0.0010	0.0010	0.0013	0.0014	0.0017	0.0019
40	0.2629	0.5159	2739	0.0002	0.0006	0.0008	0.0009	0.0010	0.0015	0.0015	0.0018	0.0021
41	0.2607	0.5164	2787	0.0002	0.0005	0.0008	0.0009	0.0010	0.0013	0.0016	0.0018	0.0021
42	0.2626	0.5164	2744	0.0003	0.0006	0.0008	0.0012	0.0013	0.0016	0.0017	0.0021	0.0022
43	0.2621	0.5160	2758	0.0003	0.0006	0.0007	0.0009	0.0010	0.0013	0.0014	0.0018	0.0020
44	0.2625	0.5158	2750	0.0004	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021
45	0.2627	0.5149	2748	0.0002	0.0006	0.0008	0.0009	0.0010	0.0013	0.0017	0.0022	0.0024
46	0.2619	0.5163	2760	0.0001	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018	0.0021	0.0022
47	0.2621	0.5157	2760	0.0002	0.0005	0.0008	0.0008	0.0010	0.0012	0.0014	0.0018	0.0021
48	0.2617	0.5155	2769	0.0002	0.0004	0.0007	0.0008	0.0011	0.0013	0.0015	0.0020	0.0021
49	0.2625	0.5157	2749	0.0002	0.0004	0.0007	0.0008	0.0013	0.0012	0.0013	0.0021	0.0018
50	0.2609	0.5152	2788	0.0002	0.0004	0.0006	0.0007	0.0012	0.0010	0.0014	0.0018	0.0019
Ave.	0.2623	0.5160	2752	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0019	0.0021
Med.	0.2625	0.5160	2749	0.0002	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015	0.0019	0.0021
st dev	0.0007	0.0004	16	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0001	0.0001	0.0002
Min.	0.2607	0.5149	2723	0.0001	0.0001	0.0002	0.0004	0.0010	0.0010	0.0013	0.0017	0.0018
Max.	0.2636	0.5167	2788	0.0004	0.0007	0.0008	0.0012	0.0014	0.0017	0.0019	0.0022	0.0026



3.6 Data Set 3, 85°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	22.19	100.23	99.95	99.55	99.41	99.19	99.05	98.92	98.60	98.33
52	21.96	100.18	99.82	99.54	99.45	99.18	99.09	98.91	98.68	98.45
53	23.87	100.08	99.71	99.41	99.08	98.91	98.87	98.49	98.24	98.07
54	23.79	100.17	99.75	99.58	99.24	98.78	98.57	98.19	97.90	97.81
55	23.69	100.13	99.83	99.54	99.28	98.99	98.65	98.18	97.97	97.68
56	22.16	100.14	99.73	99.46	99.32	98.96	98.56	98.38	97.92	97.61
57	22.25	100.22	99.78	99.42	99.37	98.97	98.65	98.38	98.02	97.71
58	22.38	100.18	99.73	99.37	99.02	98.88	98.66	98.44	98.12	97.86
59	22.65	100.09	99.56	99.29	98.81	98.63	98.50	98.19	97.92	97.53
60	22.18	100.14	99.68	99.50	99.32	98.96	98.65	98.47	98.11	98.02
61	22.43	100.09	99.82	99.55	99.38	99.15	98.84	98.53	98.26	98.04
62	22.13	100.05	99.59	99.37	99.10	98.92	98.78	98.60	98.37	98.01
63	22.61	100.04	99.65	99.29	98.89	98.76	98.63	98.45	98.28	97.92
64	22.12	100.14	99.68	99.46	99.32	99.01	98.73	98.51	98.37	98.10
65	22.40	100.13	99.73	99.38	99.29	99.02	98.66	98.39	98.26	97.81
66	22.19	100.09	99.77	99.50	99.37	99.05	98.78	98.33	98.11	97.97
67	21.65	99.95	99.72	99.58	99.40	99.08	98.89	98.71	98.48	98.43
68	22.12	100.14	99.91	99.64	99.32	98.96	98.73	98.46	98.15	97.88
69	22.32	100.18	99.96	99.78	99.46	99.06	98.79	98.61	98.39	98.12
70	22.49	100.22	99.87	99.60	99.38	98.98	98.89	98.58	98.22	98.09
71	22.14	100.05	99.59	99.32	99.23	98.87	98.74	98.37	98.24	98.10
72	22.07	100.27	99.91	99.68	99.23	99.00	98.87	98.64	98.37	98.14
73	22.06	100.23	100.05	99.86	99.77	99.41	99.14	98.82	98.50	98.19
74	21.92	100.14	99.86	99.64	99.45	98.95	98.86	98.59	98.31	98.04
75	22.01	100.09	99.77	99.36	99.18	98.73	98.64	98.50	98.14	97.91
Ave.	22.39	100.13	99.78	99.51	99.28	98.98	98.77	98.51	98.24	97.99
Med.	22.19	100.14	99.77	99.50	99.32	98.97	98.74	98.49	98.24	98.02
st dev	0.57	0.0725	0.1220	0.1462	0.1981	0.1616	0.1643	0.1964	0.2075	0.2319
Min.	21.65	99.95	99.56	99.29	98.81	98.63	98.50	98.18	97.90	97.53
Max.	23.87	100.27	100.05	99.86	99.77	99.41	99.14	98.92	98.68	98.45

TM-21 Projection:

Test Duration: 9000 hours

Failures Observed: 0

α: 2.587E-06

β: 1.003

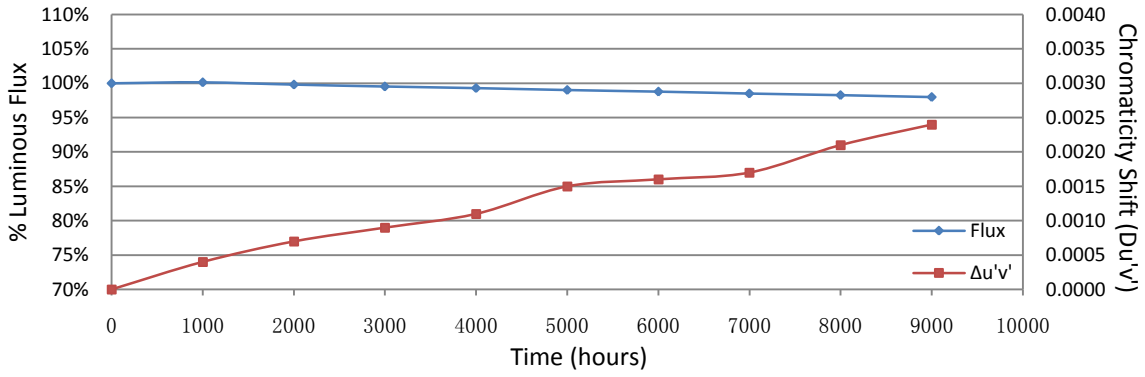
Reported L_{70}: >54000 hours

3.7 Data Set 3, 85°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	2.902	2.887	2.889	2.902	2.897	2.892	2.887	2.891	2.888	2.890
52	2.887	2.871	2.872	2.886	2.881	2.875	2.875	2.875	2.873	2.873
53	2.818	2.801	2.801	2.819	2.813	2.803	2.802	2.805	2.802	2.803
54	2.817	2.799	2.799	2.819	2.810	2.801	2.801	2.802	2.799	2.801
55	2.812	2.794	2.795	2.811	2.807	2.798	2.796	2.797	2.796	2.796
56	2.904	2.886	2.887	2.901	2.895	2.889	2.888	2.891	2.887	2.889
57	2.892	2.875	2.875	2.889	2.884	2.877	2.876	2.877	2.884	2.875
58	2.910	2.880	2.881	2.896	2.891	2.882	2.881	2.883	2.886	2.881
59	2.934	2.888	2.888	2.904	2.898	2.892	2.890	2.893	2.901	2.889
60	2.909	2.878	2.878	2.893	2.888	2.881	2.878	2.881	2.880	2.879
61	2.961	2.887	2.886	2.900	2.895	2.889	2.886	2.889	2.891	2.888
62	3.063	2.885	2.884	2.900	2.894	2.888	2.887	2.888	2.887	2.886
63	3.013	2.885	2.885	2.902	2.895	2.889	2.888	2.889	2.892	2.888
64	2.935	2.880	2.881	2.894	2.890	2.885	2.881	2.882	2.884	2.883
65	3.081	2.890	2.891	2.904	2.900	2.894	2.892	2.893	2.897	2.892
66	3.060	2.882	2.884	2.898	2.893	2.887	2.884	2.887	2.885	2.886
67	3.130	2.871	2.870	2.886	2.881	2.873	2.872	2.875	2.871	2.871
68	3.100	2.884	2.884	2.898	2.894	2.888	2.886	2.888	2.887	2.886
69	3.088	2.882	2.882	2.895	2.891	2.884	2.881	2.885	2.883	2.882
70	2.999	2.887	2.886	2.899	2.895	2.890	2.887	2.889	2.888	2.888
71	2.944	2.883	2.882	2.896	2.890	2.886	2.882	2.885	2.884	2.885
72	2.940	2.881	2.883	2.894	2.890	2.883	2.881	2.883	2.883	2.884
73	2.956	2.869	2.869	2.884	2.876	2.871	2.873	2.872	2.875	2.870
74	2.922	2.873	2.874	2.888	2.883	2.877	2.885	2.877	2.873	2.876
75	2.931	2.885	2.885	2.900	2.894	2.888	2.886	2.889	2.886	2.888
Ave.	2.956	2.871	2.872	2.886	2.881	2.874	2.873	2.875	2.874	2.873
Med.	2.935	2.882	2.882	2.896	2.891	2.885	2.882	2.885	2.884	2.884
st dev	0.090	0.028	0.028	0.027	0.027	0.028	0.028	0.028	0.029	0.028
Min.	2.812	2.794	2.795	2.811	2.807	2.798	2.796	2.797	2.796	2.796
Max.	3.130	2.890	2.891	2.904	2.900	2.894	2.892	2.893	2.901	2.892

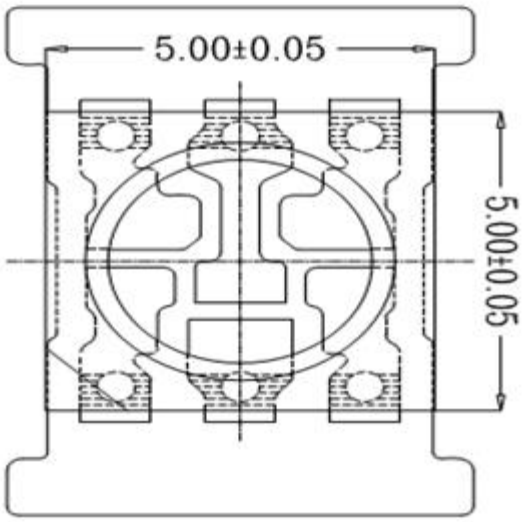
3.8 Data Set 3, 85°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2633	0.5168	2727	0.0004	0.0007	0.0010	0.0009	0.0016	0.0025	0.0024	0.0023	0.0022
52	0.2619	0.5153	2766	0.0004	0.0006	0.0009	0.0008	0.0015	0.0014	0.0017	0.0021	0.0020
53	0.2617	0.5160	2766	0.0004	0.0006	0.0008	0.0009	0.0015	0.0013	0.0017	0.0022	0.0022
54	0.2610	0.5146	2788	0.0004	0.0006	0.0008	0.0009	0.0014	0.0014	0.0017	0.0022	0.0023
55	0.2623	0.5150	2757	0.0004	0.0006	0.0008	0.0010	0.0015	0.0015	0.0016	0.0022	0.0024
56	0.2624	0.5156	2752	0.0004	0.0007	0.0009	0.0013	0.0016	0.0021	0.0020	0.0020	0.0022
57	0.2625	0.5164	2747	0.0004	0.0006	0.0009	0.0011	0.0015	0.0020	0.0020	0.0022	0.0025
58	0.2619	0.5154	2765	0.0004	0.0006	0.0009	0.0011	0.0014	0.0015	0.0018	0.0022	0.0024
59	0.2628	0.5162	2742	0.0004	0.0007	0.0010	0.0012	0.0016	0.0017	0.0020	0.0022	0.0026
60	0.2618	0.5158	2765	0.0004	0.0006	0.0008	0.0010	0.0015	0.0014	0.0018	0.0021	0.0022
61	0.2620	0.5163	2757	0.0003	0.0006	0.0009	0.0012	0.0016	0.0016	0.0019	0.0021	0.0022
62	0.2623	0.5165	2751	0.0004	0.0006	0.0008	0.0010	0.0014	0.0014	0.0016	0.0019	0.0022
63	0.2622	0.5165	2752	0.0004	0.0007	0.0010	0.0012	0.0016	0.0016	0.0018	0.0022	0.0024
64	0.2612	0.5151	2781	0.0003	0.0006	0.0009	0.0011	0.0015	0.0015	0.0017	0.0021	0.0024
65	0.2625	0.5164	2746	0.0004	0.0008	0.0011	0.0013	0.0017	0.0017	0.0019	0.0025	0.0030
66	0.2629	0.5157	2742	0.0004	0.0006	0.0009	0.0011	0.0016	0.0015	0.0019	0.0022	0.0025
67	0.2628	0.5156	2744	0.0004	0.0007	0.0009	0.0013	0.0017	0.0017	0.0018	0.0022	0.0024
68	0.2629	0.5155	2743	0.0004	0.0006	0.0009	0.0011	0.0015	0.0015	0.0017	0.0021	0.0026
69	0.2607	0.5159	2788	0.0003	0.0006	0.0009	0.0011	0.0014	0.0015	0.0014	0.0021	0.0024
70	0.2626	0.5156	2749	0.0003	0.0006	0.0009	0.0013	0.0018	0.0017	0.0016	0.0022	0.0024
71	0.2625	0.5153	2751	0.0004	0.0006	0.0009	0.0011	0.0016	0.0016	0.0016	0.0021	0.0024
72	0.2618	0.5160	2764	0.0004	0.0006	0.0008	0.0011	0.0015	0.0017	0.0016	0.0022	0.0024
73	0.2623	0.5159	2754	0.0004	0.0007	0.0010	0.0012	0.0015	0.0017	0.0016	0.0022	0.0025
74	0.2623	0.5164	2751	0.0004	0.0005	0.0007	0.0011	0.0014	0.0014	0.0013	0.0019	0.0021
75	0.2624	0.5162	2749	0.0003	0.0006	0.0008	0.0012	0.0015	0.0015	0.0014	0.0020	0.0023
Ave.	0.2622	0.5158	2756	0.0004	0.0007	0.0009	0.0011	0.0015	0.0016	0.0017	0.0021	0.0024
Med.	0.2623	0.5159	2752	0.0004	0.0006	0.0009	0.0011	0.0015	0.0015	0.0017	0.0022	0.0024
st dev	0.0006	0.0005	14	0.0000	0.0001	0.0001	0.0001	0.0001	0.0003	0.0002	0.0001	0.0002
Min.	0.2607	0.5146	2727	0.0003	0.0005	0.0007	0.0008	0.0014	0.0013	0.0013	0.0019	0.0020
Max.	0.2633	0.5168	2788	0.0004	0.0008	0.0011	0.0013	0.0018	0.0025	0.0024	0.0025	0.0030



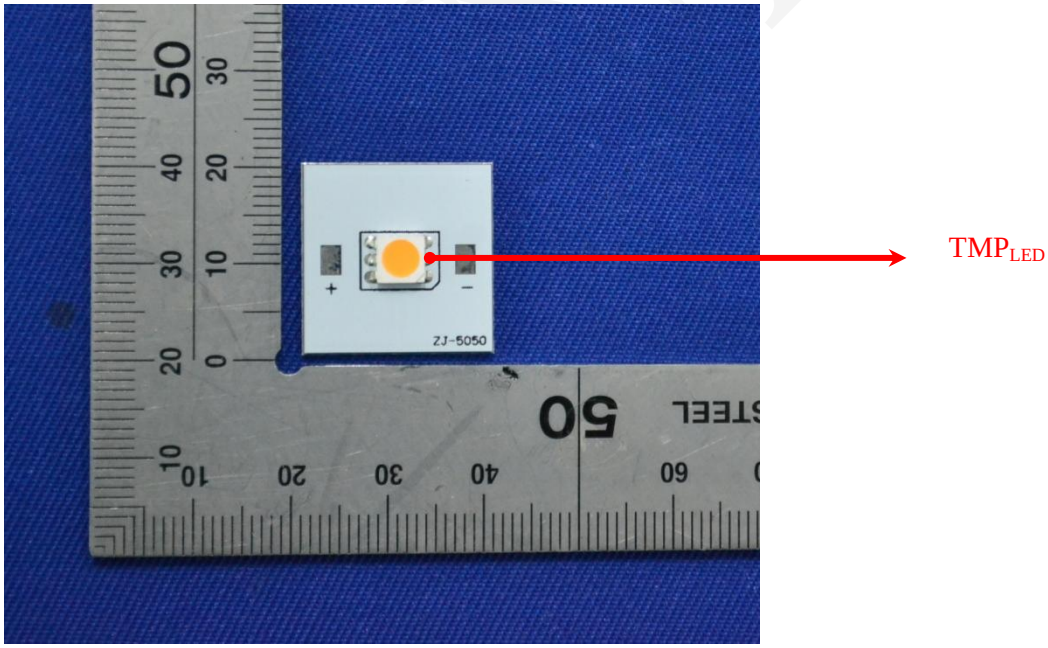
4 - EUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



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