



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Edison Opto Corporation

4F, No. 800, Chung-Cheng Rd., Chung-Ho Dist, New Taipei City, Taiwan

Model: 2T01X2WW11000001

Report Type: 10000 Hours Test Report		Product Type: LED Package	
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Report Number:	RSZ131017501-10-10000		
Test Date:	2013-10-18 to 2014-12-07		
Report Date:	2014-12-15		
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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: 3014
 Part Type: LED Package
 Nominal CCT: 3000K

Family Declaration

The LED manufacturer *Edison Opto Corporation*, declared that the LED Package products listed below are designed with identical material and construction processes. The difference between them is their CCT and/or input current.

The tested model has the highest power and according to program guidance from ENERGY STAR, warm white and cool white products can be covered.

Model type	Model name	CCT (K)	Number of dies	Power (Watt)	Input Current (mA)
Test model	2T01X2WW11000001	3000K	1	0.2	60
Covered model	2T01x2CWxx000xxx	5000K/5700K/6500K	1	0.2	60
Covered model	2T01x2NWxx000xxx	4000K	1	0.2	60
Covered model	2T01x2WWxx000xxx	2700K/3000K/3500K	1	0.2	60
Covered model	2T01x1CWxx000xxx	5000K/5700K/6500K	1	0.1	30
Covered model	2T01x1NWxx000xxx	4000K	1	0.1	30
Covered model	2T01x1WWxx000xxx	2700K/3000K/3500K	1	0.1	30

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 Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.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	380-780nm, length:0.3M ,0-1999LUMEN	2014-03-04	2015-03-04
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2014-03-12	2015-03-12
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2013-12-26	2014-12-26
Standard Light Source	SENSING	12V 10W	LSD090923	3000K	2014-05-06	2015-05-06
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987CJ7 321114	300VA	2014-03-12	2015-03-12
LM-80 Aging equipment	BACL	N/A	#2	N/A	2014-03-19	2015-03-19
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090004	(50/15A)	2014-03-12	2015-03-12

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, 85 °C, 105 °C received at 2013-10-17 and tested during 2013-10-18 to 2014-12-07. The samples were numbered from 1 to 25, 26 to 50, 51 to 75.

Data Set 1: 55 °C, 60mA

Part Number:	3014
Number of Units:	25
Actual Case Temperature(T_S):	$T_S = 54.5 \text{ }^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A = 51.1 \text{ }^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

Data Set 2: 85 °C, 60mA

Part Number:	3014
Number of Units:	25
Actual Case Temperature(T_S):	$T_S = 84.4 \text{ }^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A = 82.3 \text{ }^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

Data Set 3: 105 °C, 60mA

Part Number:	3014
Number of Units:	25
Actual Case Temperature(T_S):	$T_S = 104.4 \text{ }^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A = 103.2 \text{ }^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

2 - SUMMARY OF TEST RESULT

Data Set:	Data Set 1, 55 °C, 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h,7000h,8000h,9000h,10000h
Average. Lumen Maintenance at 6000 hours:	97.54%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0022
Average. Lumen Maintenance at 10000 hours:	96.01%
Average Chromaticity Shift at 10000 hours ($\Delta u'v'$):	0.0032
Calculated TM-21 L ₇₀ Lifetime:	81,000 hours
Reported TM-21 L ₇₀ Lifetime:	>60,000 hours

Data Set:	Data Set 2, 85 °C, 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h,7000h,8000h,9000h,10000h
Average. Lumen Maintenance at 6000 hours:	96.99%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0025
Average. Lumen Maintenance at 10000 hours:	94.78%
Average Chromaticity Shift at 10000 hours($\Delta u'v'$):	0.0040
Calculated TM-21 L ₇₀ Lifetime:	58,000 hours
Reported TM-21 L ₇₀ Lifetime:	58,000 hours

Data Set:	Data Set 3, 105 °C, 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h,7000h,8000h,9000h,10000h
Average. Lumen Maintenance at 6000 hours:	96.29%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0025
Average. Lumen Maintenance at 10000 hours:	93.77%
Average Chromaticity Shift at 10000 hours($\Delta u'v'$):	0.0037
Calculated TM-21 L ₇₀ Lifetime:	51,000 hours
Reported TM-21 L ₇₀ Lifetime:	51,000 hours

3 - Test Data

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

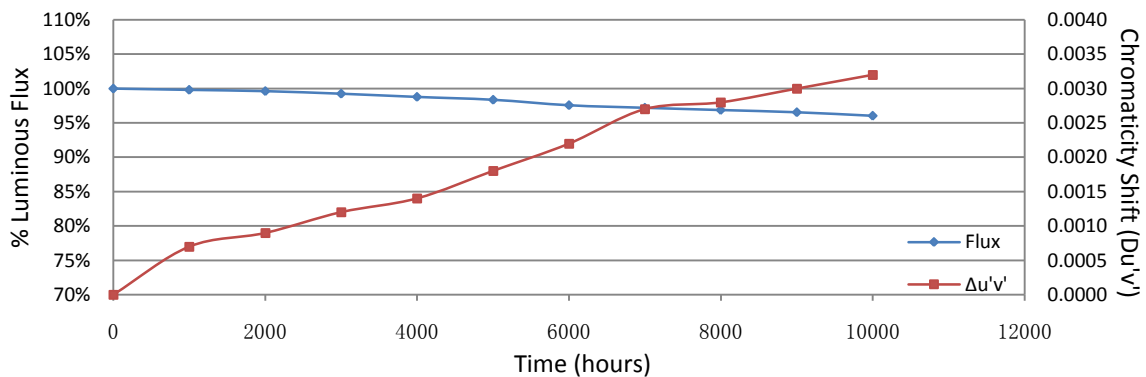
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)									
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	3.030	19.20	99.84	99.69	99.27	98.80	98.59	97.45	97.24	97.08	96.72	96.15
2	3.033	18.88	99.89	99.47	99.26	98.99	98.57	97.78	97.09	96.77	96.66	95.92
3	3.042	19.06	100.05	99.84	99.32	98.85	98.01	96.90	96.69	96.54	95.96	95.44
4	3.032	19.00	99.95	99.68	99.16	98.63	98.26	97.58	97.00	96.74	96.53	96.05
5	3.035	19.13	99.69	99.53	99.32	99.01	98.75	98.12	98.07	97.80	97.54	96.55
6	3.034	18.87	99.89	99.42	99.15	98.94	98.62	97.51	97.14	96.93	96.61	95.97
7	3.036	19.00	99.79	99.58	99.21	98.21	97.95	97.58	97.37	97.00	96.74	96.32
8	3.032	18.73	99.84	99.57	99.31	98.99	98.83	98.29	98.18	98.02	97.65	96.96
9	3.030	18.82	99.73	99.47	99.15	98.41	98.19	97.24	97.18	96.92	96.81	96.55
10	3.030	19.12	99.69	99.63	99.37	98.48	97.86	96.97	96.71	96.23	96.03	95.45
11	3.029	18.92	99.74	99.63	99.37	98.94	98.63	97.04	96.35	96.04	95.82	95.35
12	3.029	19.19	99.84	99.53	99.22	98.80	98.49	97.71	97.08	96.72	96.51	96.14
13	3.030	19.03	99.84	99.68	99.11	98.63	98.21	97.90	97.64	97.21	96.90	96.43
14	3.029	18.61	99.79	99.57	99.09	98.44	98.23	97.69	97.31	97.04	96.72	96.29
15	3.030	18.81	99.73	99.52	99.04	98.62	98.30	97.71	97.45	97.08	96.76	96.38
16	3.034	18.86	99.68	99.63	99.26	98.78	98.46	97.99	97.67	97.24	96.87	96.18
17	3.032	19.03	99.63	99.42	99.21	98.74	98.42	97.53	97.32	96.95	96.64	95.90
18	3.030	18.71	100.05	99.89	99.57	99.14	98.82	98.08	97.33	97.06	96.69	96.53
19	3.028	19.07	99.69	99.63	99.11	98.69	98.27	97.17	96.75	96.22	95.91	95.49
20	3.036	19.01	99.89	99.53	99.21	98.90	98.53	96.84	96.69	96.42	96.05	95.27
21	3.030	19.36	99.95	99.74	99.43	98.92	98.40	97.47	97.31	96.95	96.59	95.66
22	3.031	19.14	99.90	99.79	99.22	98.59	98.22	97.23	96.97	96.60	96.24	95.66
23	3.038	18.69	99.73	99.57	99.25	99.04	98.45	97.65	97.22	96.58	96.25	95.77
24	3.030	18.85	99.63	99.36	98.89	98.36	97.77	96.98	96.39	96.02	95.65	95.38
25	3.033	18.69	99.89	99.63	99.30	99.09	98.34	98.07	97.65	97.11	96.84	96.47
Ave.	3.032	18.95	99.81	99.60	99.23	98.76	98.37	97.54	97.19	96.85	96.55	96.01
Med.	3.031	19.00	99.84	99.58	99.22	98.80	98.40	97.58	97.22	96.93	96.64	96.05
st dev	0.0033	0.1890	0.1202	0.1303	0.1370	0.2480	0.2805	0.4120	0.4534	0.4770	0.4813	0.4620
Min.	3.028	18.61	99.63	99.36	98.89	98.21	97.77	96.84	96.35	96.02	95.65	95.27
Max.	3.042	19.36	100.05	99.89	99.57	99.14	98.83	98.29	98.18	98.02	97.65	96.96

TM-21 Projection:

Test Duration: 10000 hours
Failures Observed: 0
α: 4.444E-06
β: 1.004
Calculated L₇₀: 81,000 hours
Reported L₇₀: >60,000 hours

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2530	0.5185	2958	0.0006	0.0009	0.0011	0.0013	0.0018	0.0020	0.0024	0.0025	0.0028	0.0032
2	0.2538	0.5197	2931	0.0006	0.0010	0.0011	0.0016	0.0016	0.0027	0.0035	0.0038	0.0039	0.0043
3	0.2544	0.5214	2908	0.0005	0.0006	0.0011	0.0014	0.0018	0.0025	0.0029	0.0030	0.0032	0.0032
4	0.2532	0.5184	2954	0.0005	0.0009	0.0010	0.0007	0.0015	0.0018	0.0029	0.0029	0.0032	0.0035
5	0.2525	0.5171	2980	0.0008	0.0008	0.0013	0.0013	0.0017	0.0019	0.0023	0.0025	0.0027	0.0033
6	0.2533	0.5198	2944	0.0006	0.0009	0.0011	0.0016	0.0018	0.0033	0.0041	0.0044	0.0045	0.0046
7	0.2537	0.5182	2943	0.0008	0.0010	0.0012	0.0014	0.0019	0.0027	0.0033	0.0034	0.0034	0.0036
8	0.2535	0.5181	2947	0.0007	0.0010	0.0012	0.0014	0.0019	0.0026	0.0032	0.0035	0.0038	0.0042
9	0.2532	0.5173	2960	0.0006	0.0007	0.0012	0.0012	0.0014	0.0025	0.0029	0.0027	0.0028	0.0026
10	0.2528	0.5190	2959	0.0007	0.0009	0.0011	0.0013	0.0013	0.0019	0.0022	0.0022	0.0024	0.0024
11	0.2522	0.5187	2977	0.0006	0.0011	0.0012	0.0013	0.0017	0.0027	0.0031	0.0026	0.0026	0.0025
12	0.2534	0.5194	2944	0.0009	0.0009	0.0013	0.0016	0.0017	0.0018	0.0021	0.0023	0.0024	0.0028
13	0.2525	0.5182	2971	0.0009	0.0012	0.0014	0.0017	0.0020	0.0018	0.0023	0.0021	0.0022	0.0021
14	0.2530	0.5186	2957	0.0006	0.0006	0.0009	0.0013	0.0015	0.0018	0.0021	0.0023	0.0024	0.0023
15	0.2509	0.5160	3028	0.0008	0.0011	0.0013	0.0017	0.0018	0.0030	0.0035	0.0038	0.0041	0.0043
16	0.2544	0.5201	2916	0.0005	0.0006	0.0008	0.0009	0.0013	0.0016	0.0019	0.0019	0.0019	0.0022
17	0.2536	0.5221	2921	0.0005	0.0006	0.0012	0.0014	0.0018	0.0020	0.0022	0.0021	0.0023	0.0025
18	0.2554	0.5226	2879	0.0006	0.0005	0.0010	0.0012	0.0019	0.0025	0.0026	0.0026	0.0023	0.0023
19	0.2549	0.5204	2901	0.0008	0.0008	0.0011	0.0014	0.0018	0.0016	0.0020	0.0018	0.0017	0.0020
20	0.2546	0.5199	2911	0.0006	0.0006	0.0013	0.0015	0.0018	0.0016	0.0023	0.0026	0.0028	0.0031
21	0.2530	0.5218	2940	0.0006	0.0009	0.0011	0.0017	0.0019	0.0023	0.0030	0.0030	0.0032	0.0033
22	0.2536	0.5208	2930	0.0008	0.0010	0.0014	0.0018	0.0023	0.0023	0.0026	0.0030	0.0034	0.0040
23	0.2529	0.5182	2962	0.0008	0.0010	0.0010	0.0012	0.0018	0.0021	0.0023	0.0022	0.0024	0.0024
24	0.2518	0.5158	3006	0.0005	0.0009	0.0011	0.0012	0.0021	0.0023	0.0026	0.0030	0.0035	0.0040
25	0.2545	0.5211	2908	0.0008	0.0010	0.0012	0.0013	0.0020	0.0030	0.0039	0.0044	0.0046	0.0048
Ave.	0.2534	0.5192	2945	0.0007	0.0009	0.0012	0.0014	0.0018	0.0022	0.0027	0.0028	0.0030	0.0032
Med.	0.2533	0.5190	2944	0.0006	0.0009	0.0011	0.0014	0.0018	0.0023	0.0026	0.0026	0.0028	0.0032
st dev	0.0010	0.0018	33.3504	0.0001	0.0002	0.0001	0.0002	0.0002	0.0005	0.0006	0.0007	0.0008	0.0009
Min.	0.2509	0.5158	2879	0.0005	0.0005	0.0008	0.0007	0.0013	0.0016	0.0019	0.0018	0.0017	0.0020
Max.	0.2554	0.5226	3028	0.0009	0.0012	0.0014	0.0018	0.0023	0.0033	0.0041	0.0044	0.0046	0.0048



3.3 Data Set 2, 85 °C, 60 mA (Lumen Maintenance)

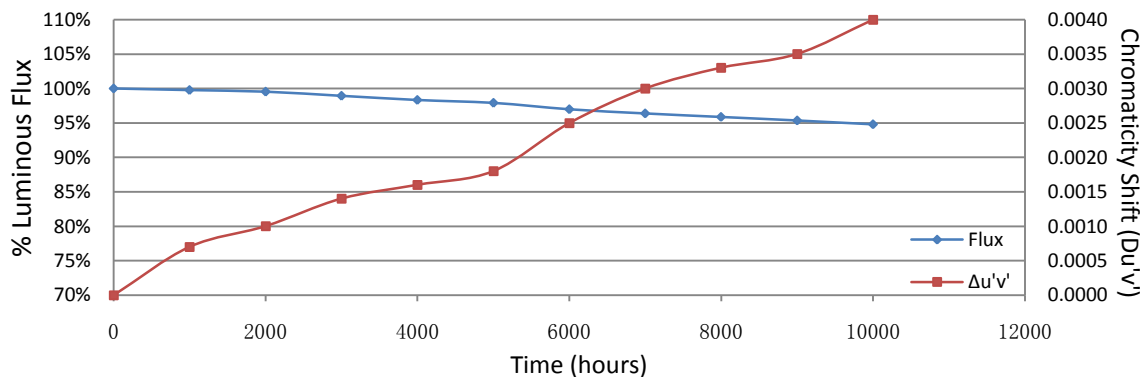
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)									
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	3.032	19.09	99.84	99.53	98.95	98.43	98.01	97.12	96.60	96.12	95.55	95.23
27	3.033	19.00	100.00	99.79	99.16	98.74	98.26	97.89	97.32	96.63	96.16	95.63
28	3.031	19.21	99.90	99.69	99.32	98.59	98.07	97.29	96.51	95.89	95.47	94.69
29	3.035	18.84	99.89	99.63	99.20	98.14	97.88	97.19	96.60	95.97	95.44	95.06
30	3.030	18.85	99.73	99.63	98.67	98.20	97.82	96.71	95.81	95.23	94.96	94.22
31	3.033	19.09	100.00	99.90	99.37	98.11	97.96	97.12	96.39	95.81	95.34	94.87
32	3.037	18.82	99.79	99.73	99.04	98.51	98.14	97.87	97.34	96.87	96.33	95.54
33	3.034	18.77	99.63	99.47	98.83	98.67	98.30	97.39	96.91	96.43	96.00	95.05
34	3.032	18.87	99.68	99.42	98.73	98.20	97.83	96.66	96.08	95.60	95.07	94.86
35	3.037	18.78	99.68	99.31	98.78	98.30	97.60	97.23	96.54	96.01	95.47	94.99
36	3.032	19.10	99.74	99.32	99.11	98.43	98.06	96.54	96.02	95.55	95.08	94.82
37	3.037	18.82	99.79	99.68	99.15	98.09	97.61	96.33	95.54	95.06	94.79	94.42
38	3.036	18.66	99.68	99.46	98.93	98.29	97.43	95.93	95.18	94.91	94.48	93.46
39	3.032	18.96	99.63	99.53	98.84	98.31	97.84	97.36	96.94	96.36	96.04	95.78
40	3.037	19.10	99.69	99.42	98.85	97.96	97.54	96.54	96.23	95.71	95.24	95.03
41	3.030	19.17	99.84	99.79	99.01	98.28	97.81	97.03	96.24	95.72	95.20	95.04
42	3.031	19.15	99.79	99.43	98.85	98.22	98.02	97.08	96.40	95.87	95.56	94.78
43	3.037	19.03	99.63	99.21	98.53	98.11	97.85	96.85	96.22	95.85	95.43	94.85
44	3.037	18.77	99.89	99.63	98.88	98.19	97.44	96.16	95.58	94.99	94.67	94.19
45	3.031	18.91	99.74	99.52	99.10	98.63	98.04	97.25	96.19	95.77	95.40	94.76
46	3.032	19.18	99.69	99.32	99.06	98.59	98.38	97.76	97.34	97.08	96.56	96.04
47	3.035	19.00	99.63	99.26	98.74	98.58	98.26	97.37	96.74	96.26	95.79	95.16
48	3.030	18.85	99.68	99.20	98.62	98.04	97.77	96.45	95.70	95.23	94.80	94.22
49	3.033	18.99	99.79	99.42	99.05	98.47	97.63	97.05	96.52	96.00	95.52	94.84
50	3.030	18.74	99.68	99.36	98.93	98.40	97.76	96.48	95.84	95.30	92.90	92.05
Ave.	3.033	18.95	99.76	99.51	98.95	98.34	97.89	96.99	96.35	95.85	95.33	94.78
Med.	3.033	18.96	99.74	99.47	98.93	98.30	97.85	97.08	96.39	95.85	95.43	94.86
st dev	0.0026	0.1584	0.1114	0.1907	0.2129	0.2170	0.2651	0.5139	0.5698	0.5621	0.7214	0.7876
Min.	3.030	18.66	99.63	99.20	98.53	97.96	97.43	95.93	95.18	94.91	92.90	92.05
Max.	3.037	19.21	100.00	99.90	99.37	98.74	98.38	97.89	97.34	97.08	96.56	96.04

TM-21 Projection:

Test Duration: 10000 hours
Failures Observed: 0
α: 6.241E-06
β: 1.008
Calculated L₇₀: 58,000 hours
Reported L₇₀: 58,000 hours

3.4 Data Set 2, 85 °C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2536	0.5200	2935	0.0006	0.0008	0.0013	0.0017	0.0020	0.0025	0.0034	0.0037	0.0041	0.0047
27	0.2535	0.5228	2920	0.0005	0.0008	0.0011	0.0012	0.0016	0.0019	0.0022	0.0022	0.0025	0.0028
28	0.2522	0.5194	2971	0.0006	0.0011	0.0013	0.0016	0.0019	0.0019	0.0024	0.0026	0.0029	0.0034
29	0.2537	0.5195	2936	0.0008	0.0012	0.0015	0.0016	0.0017	0.0023	0.0033	0.0039	0.0044	0.0048
30	0.2520	0.5178	2986	0.0007	0.0013	0.0016	0.0018	0.0019	0.0019	0.0024	0.0028	0.0029	0.0038
31	0.2534	0.5187	2947	0.0006	0.0011	0.0015	0.0015	0.0018	0.0028	0.0035	0.0039	0.0042	0.0044
32	0.2532	0.5186	2953	0.0004	0.0010	0.0014	0.0015	0.0018	0.0036	0.0038	0.0040	0.0043	0.0048
33	0.2536	0.5202	2933	0.0008	0.0013	0.0016	0.0017	0.0016	0.0019	0.0024	0.0027	0.0030	0.0035
34	0.2530	0.5196	2951	0.0008	0.0010	0.0014	0.0015	0.0019	0.0021	0.0026	0.0030	0.0034	0.0040
35	0.2535	0.5194	2941	0.0008	0.0011	0.0015	0.0018	0.0020	0.0025	0.0032	0.0036	0.0036	0.0040
36	0.2520	0.5181	2986	0.0007	0.0007	0.0013	0.0016	0.0020	0.0029	0.0034	0.0038	0.0039	0.0047
37	0.2529	0.5186	2959	0.0008	0.0010	0.0014	0.0017	0.0022	0.0023	0.0030	0.0034	0.0035	0.0038
38	0.2545	0.5209	2908	0.0005	0.0011	0.0013	0.0015	0.0018	0.0032	0.0041	0.0044	0.0046	0.0047
39	0.2526	0.5187	2966	0.0005	0.0010	0.0014	0.0018	0.0020	0.0024	0.0027	0.0031	0.0034	0.0042
40	0.2525	0.5196	2963	0.0009	0.0012	0.0015	0.0017	0.0016	0.0025	0.0031	0.0035	0.0037	0.0044
41	0.2521	0.5181	2983	0.0006	0.0009	0.0013	0.0012	0.0017	0.0027	0.0027	0.0029	0.0034	0.0040
42	0.2524	0.5195	2967	0.0005	0.0012	0.0013	0.0014	0.0015	0.0026	0.0027	0.0030	0.0034	0.0040
43	0.2539	0.5230	2910	0.0006	0.0009	0.0012	0.0016	0.0009	0.0027	0.0029	0.0029	0.0032	0.0035
44	0.2541	0.5184	2932	0.0005	0.0009	0.0013	0.0018	0.0018	0.0020	0.0026	0.0028	0.0030	0.0035
45	0.2525	0.5166	2982	0.0007	0.0009	0.0011	0.0015	0.0020	0.0024	0.0032	0.0035	0.0036	0.0040
46	0.2543	0.5187	2926	0.0008	0.0009	0.0015	0.0016	0.0020	0.0029	0.0031	0.0033	0.0036	0.0040
47	0.2543	0.5206	2914	0.0005	0.0008	0.0009	0.0011	0.0012	0.0024	0.0030	0.0031	0.0031	0.0030
48	0.2526	0.5196	2961	0.0010	0.0011	0.0013	0.0013	0.0021	0.0025	0.0031	0.0034	0.0038	0.0040
49	0.2528	0.5228	2939	0.0007	0.0009	0.0014	0.0017	0.0020	0.0020	0.0029	0.0032	0.0035	0.0037
50	0.2541	0.5187	2931	0.0007	0.0012	0.0015	0.0016	0.0021	0.0025	0.0025	0.0028	0.0031	0.0036
Ave.	0.2532	0.5195	2948	0.0007	0.0010	0.0014	0.0016	0.0018	0.0025	0.0030	0.0033	0.0035	0.0040
Med.	0.2532	0.5194	2947	0.0007	0.0010	0.0014	0.0016	0.0019	0.0025	0.0030	0.0032	0.0035	0.0040
st dev	0.0008	0.0016	23.9043	0.0001	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0005	0.0005	0.0005
Min.	0.2520	0.5166	2908	0.0004	0.0007	0.0009	0.0011	0.0009	0.0019	0.0022	0.0022	0.0025	0.0028
Max.	0.2545	0.5230	2986	0.0010	0.0013	0.0016	0.0018	0.0022	0.0036	0.0041	0.0044	0.0046	0.0048



3.5 Data Set 3, 105 °C, 60 mA (Lumen Maintenance)

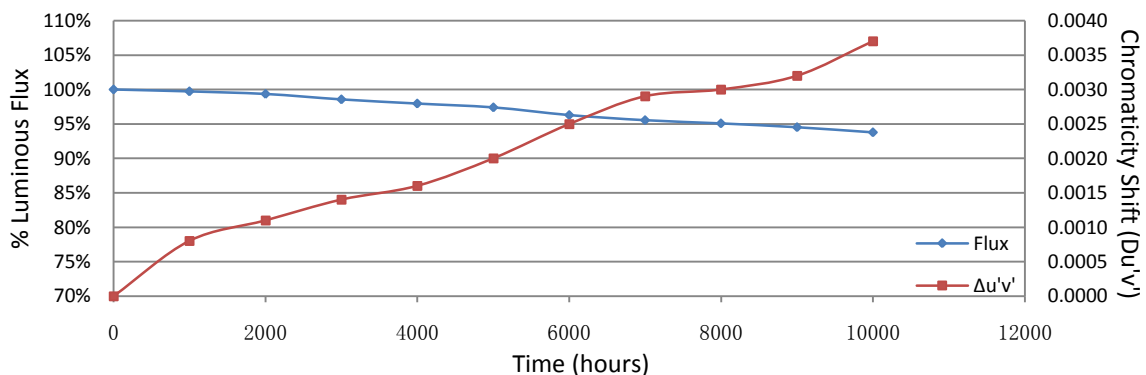
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)									
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
51	3.035	18.90	99.84	99.63	98.89	97.62	97.25	96.35	95.61	95.34	94.92	93.86
52	3.032	18.87	99.79	99.15	98.62	98.36	97.99	96.61	95.92	95.44	94.81	94.17
53	3.033	19.24	99.79	99.38	98.80	98.44	97.66	96.88	96.10	95.58	94.85	94.23
54	3.033	19.08	99.74	99.21	98.38	98.06	97.59	96.49	95.70	95.28	94.65	94.29
55	3.036	18.72	99.84	99.68	98.99	98.72	98.08	97.44	96.69	96.21	95.73	95.19
56	3.035	18.96	99.74	99.47	98.31	97.57	97.05	96.10	95.73	95.20	94.88	94.09
57	3.033	19.15	99.53	99.01	98.07	97.96	97.08	96.14	95.20	94.73	94.10	93.47
58	3.033	19.23	99.64	99.22	98.18	97.50	97.19	96.62	95.74	95.16	94.54	93.45
59	3.035	18.94	99.68	99.37	98.26	98.05	97.78	96.41	95.99	95.51	94.88	93.93
60	3.033	19.16	99.84	99.58	98.85	98.43	97.49	95.98	95.04	94.62	93.95	93.53
61	3.034	19.14	99.58	99.27	98.33	97.34	96.55	95.87	94.98	94.67	94.15	93.26
62	3.037	19.09	99.69	99.32	98.74	97.64	97.28	96.49	95.70	95.29	94.87	93.98
63	3.037	18.94	99.63	99.37	98.84	97.99	97.62	96.73	95.88	95.46	94.88	94.09
64	3.034	18.97	99.74	99.10	98.31	98.21	97.36	96.10	94.99	94.46	93.94	93.15
65	3.033	18.91	99.68	99.10	98.47	98.20	97.51	96.14	95.08	94.66	94.08	93.07
66	3.031	18.86	99.63	99.36	98.62	98.09	97.45	96.24	95.39	94.91	94.49	93.69
67	3.031	18.88	99.74	99.47	98.78	97.67	97.40	95.87	94.97	94.44	93.96	93.49
68	3.031	18.73	99.52	99.09	98.29	97.49	97.06	95.89	95.19	94.61	94.07	93.59
69	3.036	19.16	99.84	99.43	98.64	98.28	97.23	96.14	95.25	94.78	94.36	93.58
70	3.033	18.76	99.68	99.36	98.67	97.76	97.44	95.84	95.47	94.94	94.40	93.98
71	3.030	18.92	99.63	99.42	98.73	97.83	97.25	96.30	95.40	94.93	94.34	93.76
72	3.035	18.76	99.84	99.36	98.35	97.60	96.91	95.84	95.15	94.72	94.08	93.34
73	3.030	18.97	99.63	99.37	98.47	97.47	97.05	96.31	95.36	94.68	94.25	93.31
74	3.031	18.90	99.74	99.26	98.57	98.31	97.51	96.51	96.14	95.66	95.19	94.13
75	3.039	18.62	99.62	99.30	98.82	98.07	97.85	95.92	95.38	94.84	94.15	93.56
Ave.	3.034	18.95	99.70	99.33	98.56	97.95	97.39	96.29	95.52	95.05	94.50	93.77
Med.	3.033	18.94	99.69	99.36	98.62	97.99	97.40	96.24	95.40	94.93	94.40	93.69
st dev	0.0023	0.1675	0.0976	0.1674	0.2532	0.3689	0.3478	0.3820	0.4353	0.4410	0.4534	0.4611
Min.	3.030	18.62	99.52	99.01	98.07	97.34	96.55	95.84	94.97	94.44	93.94	93.07
Max.	3.039	19.24	99.84	99.68	98.99	98.72	98.08	97.44	96.69	96.21	95.73	95.19

TM-21 Projection:

Test Duration: 10000 hours
Failures Observed: 0
α: 7.161E-06
β: 1.007
Calculated L₇₀: 51,000 hours
Reported L₇₀: 51,000 hours

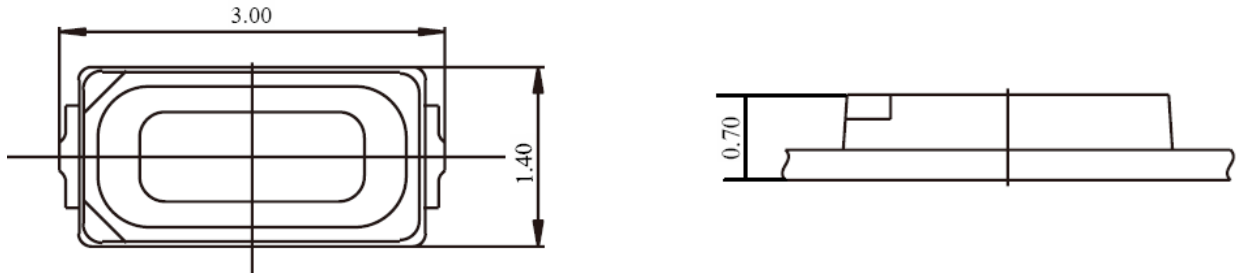
3.6 Data Set 3, 105 °C, 60 mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2532	0.5189	2951	0.0006	0.0011	0.0014	0.0017	0.0021	0.0023	0.0026	0.0030	0.0033	0.0040
52	0.2546	0.5195	2913	0.0006	0.0011	0.0016	0.0017	0.0022	0.0033	0.0037	0.0041	0.0044	0.0047
53	0.2532	0.5225	2928	0.0007	0.0013	0.0014	0.0017	0.0019	0.0024	0.0027	0.0030	0.0028	0.0035
54	0.2533	0.5200	2941	0.0008	0.0012	0.0015	0.0018	0.0017	0.0021	0.0029	0.0029	0.0027	0.0027
55	0.2537	0.5193	2937	0.0007	0.0011	0.0014	0.0014	0.0022	0.0022	0.0028	0.0028	0.0033	0.0035
56	0.2530	0.5171	2965	0.0007	0.0010	0.0012	0.0015	0.0014	0.0015	0.0020	0.0023	0.0026	0.0033
57	0.2521	0.5192	2975	0.0010	0.0011	0.0015	0.0019	0.0025	0.0027	0.0030	0.0033	0.0036	0.0041
58	0.2521	0.5187	2979	0.0007	0.0009	0.0014	0.0017	0.0018	0.0024	0.0029	0.0033	0.0035	0.0040
59	0.2528	0.5191	2960	0.0009	0.0010	0.0014	0.0015	0.0017	0.0022	0.0026	0.0029	0.0033	0.0038
60	0.2522	0.5192	2974	0.0005	0.0008	0.0014	0.0016	0.0019	0.0026	0.0031	0.0035	0.0036	0.0042
61	0.2536	0.5215	2925	0.0010	0.0011	0.0012	0.0016	0.0021	0.0030	0.0033	0.0035	0.0036	0.0041
62	0.2545	0.5222	2901	0.0008	0.0011	0.0011	0.0016	0.0019	0.0022	0.0023	0.0026	0.0030	0.0037
63	0.2524	0.5172	2981	0.0009	0.0011	0.0016	0.0018	0.0020	0.0024	0.0028	0.0029	0.0032	0.0051
64	0.2516	0.5186	2992	0.0007	0.0013	0.0016	0.0017	0.0021	0.0031	0.0031	0.0029	0.0028	0.0030
65	0.2539	0.5210	2923	0.0008	0.0009	0.0010	0.0012	0.0016	0.0033	0.0025	0.0022	0.0023	0.0021
66	0.2532	0.5178	2957	0.0007	0.0010	0.0014	0.0016	0.0020	0.0027	0.0027	0.0025	0.0028	0.0023
67	0.2539	0.5202	2925	0.0010	0.0010	0.0011	0.0014	0.0009	0.0019	0.0018	0.0017	0.0020	0.0023
68	0.2532	0.5189	2950	0.0008	0.0012	0.0015	0.0017	0.0019	0.0019	0.0023	0.0023	0.0026	0.0032
69	0.2538	0.5197	2933	0.0010	0.0011	0.0013	0.0016	0.0026	0.0029	0.0032	0.0031	0.0034	0.0037
70	0.2537	0.5183	2941	0.0008	0.0009	0.0014	0.0016	0.0024	0.0025	0.0033	0.0032	0.0034	0.0037
71	0.2526	0.5178	2971	0.0010	0.0013	0.0016	0.0018	0.0020	0.0021	0.0025	0.0029	0.0034	0.0043
72	0.2540	0.5189	2930	0.0009	0.0009	0.0015	0.0017	0.0024	0.0026	0.0035	0.0037	0.0037	0.0041
73	0.2534	0.5201	2938	0.0007	0.0012	0.0015	0.0015	0.0025	0.0035	0.0034	0.0036	0.0036	0.0040
74	0.2526	0.5179	2970	0.0008	0.0013	0.0015	0.0014	0.0024	0.0028	0.0036	0.0037	0.0041	0.0047
75	0.2530	0.5184	2958	0.0007	0.0009	0.0011	0.0007	0.0016	0.0019	0.0027	0.0029	0.0035	0.0036
Ave.	0.2532	0.5193	2949	0.0008	0.0011	0.0014	0.0016	0.0020	0.0025	0.0029	0.0030	0.0032	0.0037
Med.	0.2532	0.5191	2950	0.0008	0.0011	0.0014	0.0016	0.0020	0.0024	0.0028	0.0029	0.0033	0.0037
st dev	0.0008	0.0014	23.6318	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0005	0.0006	0.0005	0.0008
Min.	0.2516	0.5171	2901	0.0005	0.0008	0.0010	0.0007	0.0009	0.0015	0.0018	0.0017	0.0020	0.0021
Max.	0.2546	0.5225	2992	0.0010	0.0013	0.0016	0.0019	0.0026	0.0035	0.0037	0.0041	0.0044	0.0051



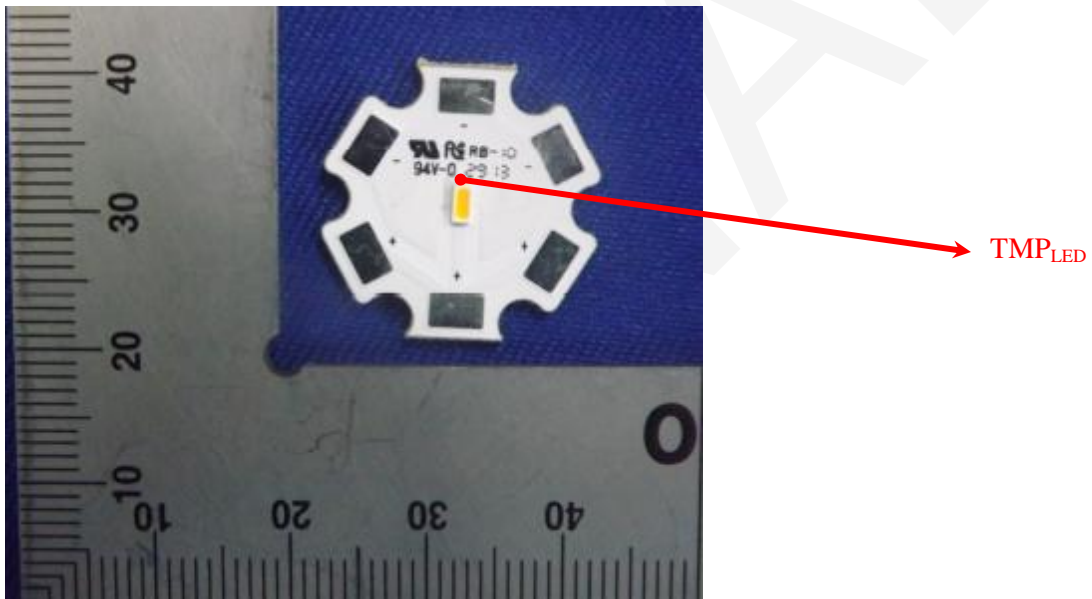
Appendix A – EUT PHOTO

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



All dimensions are in millimeter

A.2 EUT Photo



Appendix B – Family Declaration

Edison Opto Corporation
 4F, No.800, Chung-Cheng Rd., Chung-Ho Dist, New Taipei City, Taiwan
 Tel: +886-2-8227-6996 #5406

ATTESTATION OF SIMILARITY

To Whom It May Concern:

Edison Opto Corporation, hereby attest a series of LED Package products, are designed with identical material and construction processes. And the tested model 2T01X2WW11000001 was tested by BACL, the results of which are featured in BACL project: RSZ131017501-10.

The tested model and the other LED Package which attest similarity are designed with identical material and identical construction processes. The differences between the tested model and the other LED Package which attest similarity are only CCT and wattages.

The model numbers for the other LED Package sizes and series for which the test data is deemed applicable are detailed in the report, and they exhibit each of the following:

型号类型 Model type	型号名称 Model name	额定色温 CCT (K)	芯片数量 Number of dies	功率 Power (Watt)	总输入电 流(mA) The total input current
Test model	2T01X2WW11000001	3000K	1	0.2	60
Covered model	2T01x2CWxxx000xxx	5000K/5700K/6500K	1	0.2	60
Covered model	2T01x2NWxxx000xxx	4000K	1	0.2	60
Covered model	2T01x2WWxxx000xxx	2700K/3000K/3500K	1	0.2	60
Covered model	2T01x1CWxxx000xxx	5000K/5700K/6500K	1	0.1	30
Covered model	2T01x1NWxxx000xxx	4000K	1	0.1	30
Covered model	2T01x1WWxxx000xxx	2700K/3000K/3500K	1	0.1	30

Questions or concerns about the attestation of similarity should be directed to my attention.

Best Regards,

Signature : 

Kenny Yen
 Sub-manager
 Edison Opto Corporation

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