

IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Shenzhen Refond Optoelectronic Co., Ltd.

6th wing, 2nd block of Baiwangxin Industry Park, Songbai Road, Nanshan District, Shenzhen, China

Model: RF-I32

Report Type: 6000 Hours Test Report	Product Type: LED Package
Test Engineer: Daniel Duan	<i>Daniel Duan</i>
Report Number: R2DG130515050-10	
Test Date: 2013-05-03 to 2014-01-10	
Report Date: 2014-01-22	
Reviewed By: Jeanne Han /Safety Manager	<i>Jeanne Han</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588

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).

This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

1 - GENERAL INFORMATION.....	3
1.1 DESCRIPTION OF LED LIGHT SOURCES	3
1.2 STANDARDS USED:.....	3
1.3 TEST FACILITY	3
1.4 DESCRIPTION OF AUXILIARY EQUIPMENT	3
1.5 OPERATING CYCLE.....	4
1.6 AMBIENT CONDITIONS	4
1.7 PHOTOMETRY MEASUREMENT UNCERTAINTY	4
1.8 SAMPLE SET	5
2 - SUMMARY OF TEST RESULT	6
3 - TEST DATA	7
3.1 DATA SET 1, 55 °C, 60MA (LUMEN MAINTENANCE)	7
3.2 DATA SET 1, 55 °C, 60MA (CHROMATICITY SHIFT)	8
3.3 DATA SET 2, 85°C, 60MA (LUMEN MAINTENANCE).....	9
3.4 DATA SET 2, 85°C, 60MA (CHROMATICITY SHIFT)	10
3.5 DATA SET 3, 105 °C, 60MA (LUMEN MAINTENANCE)	11
3.6 DATA SET 3, 105 °C, 60MA (CHROMATICITY SHIFT).....	12
APPENDIX A – EUT PHOTO	13
A.1 MECHANICAL DIMENSIONS (TA = 25 °C).....	13
A.2 EUT PHOTO	13

1 - GENERAL INFORMATION

1.1 Description of LED Light Sources

Devices tested

Part Number: RF-I32
 Part Name: /
 Part Type: LED Package
 Nominal CCT: 2700K

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	2013-03-08	2014-03-08
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2013-03-25	2014-03-25
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2013-03-08	2014-03-08
Standard Light Source	EVERFINE	D062	1011064	2856K	2013-05-23	2014-05-23
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987CJ 7321114	300VA	2013-03-25	2014-03-25
LM-80 Aging equipment	BACL	N/A	#1	N/A	2013-03-25	2014-03-25
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	(50V/15A)	2013-03-25	2014-03-25
Multilayer LM-80 aging machine	BACL	B2-270	20005	270pcs	2013-08-01	2014-08-01
Multi-channel DC source	Tai Shan Xing Guang	T01000F2	ST04392	5V/1000mA	2013-08-01	2014-08-01

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 75pcs samples tested at Ts 55 °C, 85 °C and Ts 105 °C were received at 2013-05-02 and tested during 2013-05-03 to 2014-01-10. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

Data Set 1: 55 °C, 60mA

Part Number:	RF-I32
Number of Units:	25
Actual Case Temperature(T_S):	$T_S = 54.3$ °C
Actual Ambient Temperature(T_A):	$T_A = 53.6$ °C
Life Test Drive Current:	$I_F = 60$ mA
Measurement Current:	$I_F = 60$ mA

Data Set 2: 85°C, 60mA

Part Number:	RF-I32
Number of Units:	25
Actual Case Temperature(T_S):	$T_S = 85.2$ °C
Actual Ambient Temperature(T_A):	$T_A = 83.7$ °C
Life Test Drive Current:	$I_F = 60$ mA
Measurement Current:	$I_F = 60$ mA

Data Set 3: 105 °C, 60mA

Part Number:	RF-I32
Number of Units:	25
Actual Case Temperature(T_S):	$T_S = 104.1$ °C
Actual Ambient Temperature(T_A):	$T_A = 103.6$ °C
Life Test Drive Current:	$I_F = 60$ mA
Measurement Current:	$I_F = 60$ 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
Average. Lumen Maintenance at 6000 hours:	97.00%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0016
Reported TM-21 L ₇₀ Lifetime:	>36,000 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
Average. Lumen Maintenance at 6000 hours:	96.47%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0017
Reported TM-21 L ₇₀ Lifetime	>36,000 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
Average. Lumen Maintenance at 6000 hours:	95.89%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0019
Reported TM-21 L ₇₀ Lifetime	>36,000 hours

3 - Test Data

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

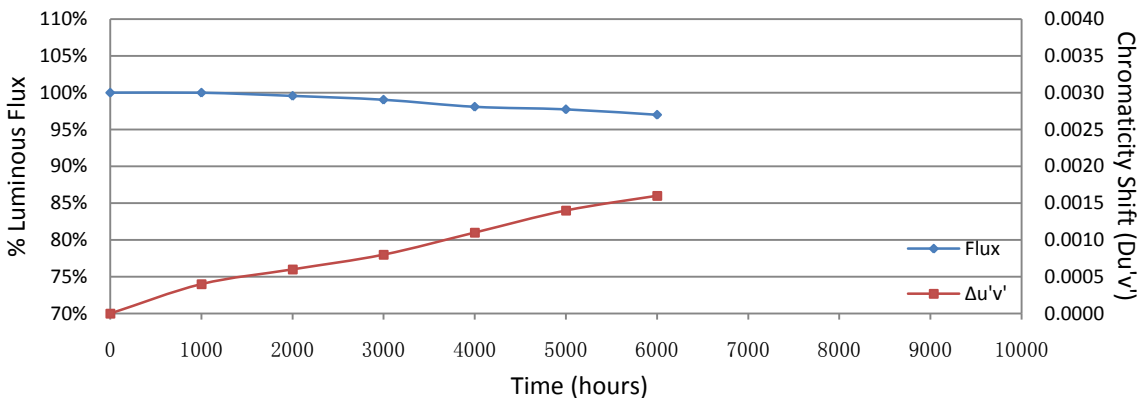
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	3.050	20.54	99.85	99.56	99.07	98.05	97.96	96.98
2	3.044	20.43	99.85	99.51	99.07	98.04	97.85	97.01
3	3.041	20.70	100.00	99.57	99.08	98.16	98.02	96.91
4	3.037	20.67	99.90	99.47	99.13	98.11	97.77	96.95
5	3.039	20.71	99.95	99.61	99.03	97.88	97.49	96.72
6	3.041	20.26	99.90	99.36	99.01	97.98	97.58	96.84
7	3.043	20.30	100.10	99.75	98.82	97.98	97.88	97.00
8	3.044	20.38	99.90	99.66	98.82	97.94	97.69	96.81
9	3.043	20.40	99.90	99.36	98.82	98.19	97.70	97.01
10	3.041	20.69	100.14	99.66	98.99	97.83	97.58	96.91
11	3.046	20.58	99.95	99.37	98.88	98.25	98.15	97.38
12	3.044	20.55	99.95	99.37	99.12	98.20	98.05	97.08
13	3.039	20.59	100.15	99.61	99.27	98.30	98.01	97.43
14	3.040	20.41	99.95	99.56	99.12	98.29	98.24	97.60
15	3.045	20.41	99.85	99.41	99.07	98.24	97.75	97.35
16	3.044	20.49	99.80	99.41	99.07	97.80	97.61	97.12
17	3.042	20.46	99.85	99.46	99.02	98.14	97.46	96.87
18	3.037	20.65	100.00	99.47	98.98	97.82	97.43	96.76
19	3.044	20.38	100.10	99.75	99.21	98.33	97.64	97.01
20	3.043	20.73	99.95	99.61	99.13	98.07	97.44	96.82
21	3.040	20.16	100.05	99.65	99.26	98.31	97.82	97.17
22	3.047	20.54	100.15	99.76	99.03	97.96	97.52	96.79
23	3.043	19.49	100.00	99.54	99.08	98.05	97.54	96.87
24	3.043	20.68	100.10	99.71	98.94	97.82	97.49	96.76
25	3.038	20.28	100.10	99.70	98.96	98.08	97.53	96.79
Ave.	3.042	20.46	99.98	99.56	99.04	98.07	97.73	97.00
Med.	3.043	20.49	99.95	99.56	99.07	98.07	97.69	96.95
st dev	0.0031	0.2565	0.1055	0.1322	0.1225	0.1675	0.2371	0.2320
Min.	3.037	19.49	99.80	99.36	98.82	97.80	97.43	96.72
Max.	3.050	20.73	100.15	99.76	99.27	98.33	98.24	97.60

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
 α : 6.194E-06
 β : 1.007
Calculated L₇₀: 59,000 hours
Reported L₇₀: >36,000 hours

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs
1	0.2575	0.5262	2812	0.0001	0.0002	0.0004	0.0007	0.0009	0.0013
2	0.2584	0.5281	2783	0.0003	0.0006	0.0007	0.0009	0.0010	0.0013
3	0.2559	0.5267	2844	0.0003	0.0004	0.0008	0.0014	0.0016	0.0017
4	0.2573	0.5265	2815	0.0003	0.0004	0.0007	0.0012	0.0013	0.0016
5	0.2553	0.5254	2865	0.0004	0.0007	0.0009	0.0013	0.0015	0.0018
6	0.2576	0.5254	2815	0.0004	0.0006	0.0010	0.0012	0.0014	0.0016
7	0.2587	0.5267	2782	0.0004	0.0006	0.0009	0.0011	0.0021	0.0022
8	0.2604	0.5266	2746	0.0001	0.0003	0.0005	0.0010	0.0012	0.0016
9	0.2565	0.5257	2838	0.0003	0.0004	0.0008	0.0013	0.0015	0.0016
10	0.2557	0.5271	2847	0.0007	0.0009	0.0009	0.0011	0.0015	0.0016
11	0.2569	0.5257	2828	0.0006	0.0007	0.0009	0.0011	0.0015	0.0016
12	0.2576	0.5267	2807	0.0006	0.0007	0.0008	0.0013	0.0017	0.0019
13	0.2581	0.5256	2802	0.0002	0.0004	0.0008	0.0010	0.0015	0.0019
14	0.2581	0.5258	2800	0.0005	0.0007	0.0010	0.0012	0.0016	0.0018
15	0.2593	0.5269	2769	0.0004	0.0004	0.0006	0.0012	0.0013	0.0016
16	0.2580	0.5254	2805	0.0006	0.0008	0.0009	0.0012	0.0013	0.0014
17	0.2582	0.5278	2790	0.0004	0.0005	0.0007	0.0010	0.0014	0.0016
18	0.2568	0.5255	2831	0.0006	0.0008	0.0010	0.0012	0.0013	0.0015
19	0.2574	0.5254	2817	0.0006	0.0008	0.0012	0.0014	0.0015	0.0018
20	0.2559	0.5255	2850	0.0004	0.0007	0.0009	0.0013	0.0014	0.0017
21	0.2599	0.5274	2754	0.0005	0.0007	0.0011	0.0014	0.0016	0.0019
22	0.2572	0.5253	2823	0.0006	0.0007	0.0008	0.0009	0.0011	0.0015
23	0.2609	0.5279	2732	0.0003	0.0005	0.0008	0.0011	0.0013	0.0018
24	0.2558	0.5264	2848	0.0003	0.0005	0.0008	0.0009	0.0011	0.0013
25	0.2592	0.5274	2770	0.0001	0.0004	0.0005	0.0008	0.0009	0.0014
Ave.	0.2577	0.5264	2807	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016
Med.	0.2576	0.5264	2812	0.0004	0.0006	0.0008	0.0012	0.0014	0.0016
st dev	0.0015	0.0009	34.6926	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002
Min.	0.2553	0.5253	2732	0.0001	0.0002	0.0004	0.0007	0.0009	0.0013
Max.	0.2609	0.5281	2865	0.0007	0.0009	0.0012	0.0014	0.0021	0.0022



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

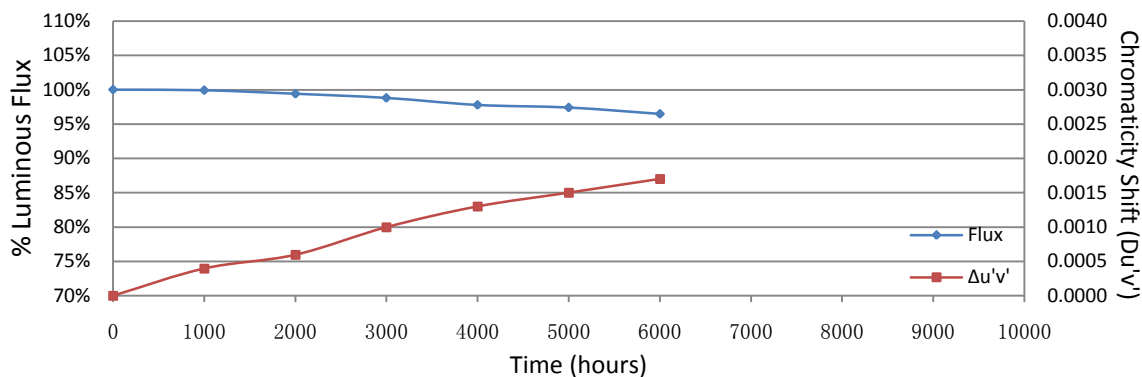
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	3.044	20.47	100.10	99.56	98.78	97.95	97.75	96.92
27	3.044	20.32	99.85	99.31	98.67	97.74	97.34	96.46
28	3.055	20.41	99.90	99.31	98.68	97.94	97.45	96.72
29	3.040	20.47	99.95	99.32	98.97	97.95	97.75	96.82
30	3.042	20.28	99.95	99.56	98.82	97.58	97.24	96.79
31	3.041	20.67	99.71	99.23	98.74	97.82	97.44	96.27
32	3.044	20.41	99.76	99.31	98.92	97.50	97.31	96.42
33	3.043	20.41	99.85	99.41	98.78	97.45	97.21	96.13
34	3.044	20.51	99.85	99.41	98.83	98.00	97.51	96.15
35	3.039	20.42	99.90	99.46	98.92	97.99	97.40	96.47
36	3.042	20.46	100.05	99.61	99.02	97.95	97.46	96.33
37	3.040	20.05	100.05	99.50	99.05	98.05	97.76	96.86
38	3.044	19.97	99.90	99.30	98.75	98.00	97.30	96.49
39	3.044	20.17	100.05	99.60	99.06	97.57	97.32	96.28
40	3.039	20.73	100.10	99.57	98.89	98.07	97.54	96.33
41	3.047	20.08	99.70	99.45	98.85	98.01	97.31	96.66
42	3.049	20.45	99.80	99.46	98.78	97.70	97.46	96.28
43	3.041	20.34	99.95	99.36	98.62	97.49	97.25	96.17
44	3.047	20.53	99.95	99.27	98.64	97.47	97.22	96.20
45	3.040	20.40	99.71	99.41	98.92	97.50	97.35	96.47
46	3.050	20.49	99.95	99.37	98.73	97.66	97.27	96.49
47	3.045	20.78	99.76	99.37	98.80	97.93	97.35	96.63
48	3.042	20.44	100.05	99.41	98.73	97.75	97.21	96.48
49	3.039	20.48	100.05	99.37	98.73	98.00	97.17	96.14
50	3.042	20.46	100.00	99.27	98.83	97.51	97.41	96.68
Ave.	3.043	20.41	99.92	99.41	98.82	97.78	97.39	96.47
Med.	3.043	20.44	99.95	99.41	98.80	97.82	97.35	96.47
st dev	0.0038	0.1912	0.1251	0.1103	0.1241	0.2199	0.1687	0.2410
Min.	3.039	19.97	99.70	99.23	98.62	97.45	97.17	96.13
Max.	3.055	20.78	100.10	99.61	99.06	98.07	97.76	96.92

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
 α : 7.082E-06
 β : 1.008
Calculated L₇₀: 51,000 hours
Reported L₇₀: >36,000 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
26	0.2559	0.5259	2849	0.0006	0.0007	0.0009	0.0012	0.0013	0.0017
27	0.2594	0.5265	2770	0.0000	0.0004	0.0009	0.0012	0.0016	0.0018
28	0.2572	0.5255	2822	0.0006	0.0008	0.0009	0.0013	0.0016	0.0018
29	0.2601	0.5275	2749	0.0004	0.0006	0.0009	0.0013	0.0016	0.0016
30	0.2591	0.5265	2776	0.0006	0.0007	0.0011	0.0014	0.0015	0.0018
31	0.2571	0.5266	2818	0.0006	0.0006	0.0011	0.0013	0.0014	0.0015
32	0.2582	0.5268	2794	0.0001	0.0005	0.0009	0.0012	0.0014	0.0018
33	0.2563	0.5249	2845	0.0003	0.0005	0.0010	0.0014	0.0016	0.0021
34	0.2551	0.5256	2868	0.0005	0.0006	0.0008	0.0009	0.0010	0.0013
35	0.2568	0.5275	2821	0.0004	0.0006	0.0012	0.0014	0.0014	0.0017
36	0.2577	0.5270	2804	0.0004	0.0006	0.0011	0.0015	0.0016	0.0017
37	0.2573	0.5255	2820	0.0004	0.0006	0.0008	0.0014	0.0018	0.0020
38	0.2603	0.5255	2755	0.0006	0.0007	0.0012	0.0016	0.0016	0.0017
39	0.2594	0.5259	2772	0.0001	0.0005	0.0009	0.0014	0.0014	0.0016
40	0.2566	0.5272	2828	0.0002	0.0003	0.0006	0.0011	0.0015	0.0019
41	0.2607	0.5263	2743	0.0001	0.0002	0.0009	0.0015	0.0016	0.0018
42	0.2570	0.5265	2823	0.0004	0.0004	0.0006	0.0009	0.0010	0.0015
43	0.2582	0.5260	2797	0.0005	0.0007	0.0008	0.0011	0.0012	0.0015
44	0.2575	0.5254	2816	0.0005	0.0007	0.0011	0.0012	0.0016	0.0020
45	0.2566	0.5243	2841	0.0005	0.0007	0.0013	0.0015	0.0017	0.0019
46	0.2579	0.5283	2794	0.0004	0.0008	0.0010	0.0013	0.0014	0.0014
47	0.2555	0.5257	2859	0.0003	0.0004	0.0010	0.0012	0.0012	0.0012
48	0.2567	0.5260	2830	0.0005	0.0008	0.0012	0.0013	0.0017	0.0018
49	0.2564	0.5250	2841	0.0005	0.0007	0.0010	0.0013	0.0017	0.0017
50	0.2565	0.5268	2832	0.0003	0.0005	0.0010	0.0014	0.0017	0.0019
Ave.	0.2576	0.5262	2811	0.0004	0.0006	0.0010	0.0013	0.0015	0.0017
Med.	0.2572	0.5260	2820	0.0004	0.0006	0.0010	0.0013	0.0016	0.0017
st dev	0.0015	0.0009	34.4090	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2551	0.5243	2743	0.0000	0.0002	0.0006	0.0009	0.0010	0.0012
Max.	0.2607	0.5283	2868	0.0006	0.0008	0.0013	0.0016	0.0018	0.0021



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

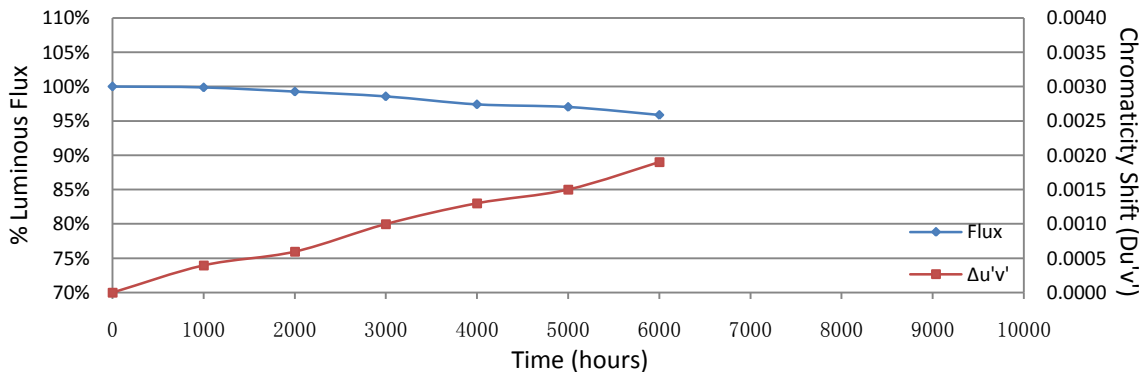
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	3.044	20.35	100.00	99.16	98.62	97.49	97.15	96.46
52	3.044	20.54	99.95	99.46	98.64	97.71	97.22	96.11
53	3.044	20.43	99.76	99.31	98.58	97.75	97.31	96.52
54	3.037	20.15	99.65	99.16	98.51	97.27	96.97	95.68
55	3.039	20.42	100.00	99.22	98.48	97.55	97.31	96.47
56	3.041	20.60	100.05	99.56	98.74	97.33	96.99	95.68
57	3.042	20.63	99.76	99.13	98.59	97.53	96.90	95.59
58	3.042	20.48	100.00	99.27	98.63	97.17	96.88	95.65
59	3.039	20.30	99.85	99.11	98.67	97.54	97.04	95.71
60	3.039	20.51	100.00	99.41	98.73	97.56	97.17	96.20
61	3.037	20.32	100.05	99.51	98.87	97.44	97.10	95.62
62	3.039	20.40	99.95	99.17	98.63	97.60	97.21	95.93
63	3.042	20.65	99.95	99.52	98.60	97.43	96.90	95.84
64	3.042	20.55	99.85	99.27	98.59	97.27	97.18	96.35
65	3.043	20.45	99.76	99.12	98.53	97.16	97.02	96.09
66	3.044	20.03	99.75	99.10	98.75	97.15	97.00	95.86
67	3.045	20.27	100.05	99.41	98.52	97.24	96.74	95.71
68	3.046	20.68	100.00	99.37	98.74	97.53	97.05	95.65
69	3.043	20.41	99.90	99.31	98.53	97.31	96.72	95.54
70	3.042	20.34	100.00	99.26	98.53	97.59	97.10	95.72
71	3.045	20.45	99.80	99.17	98.48	97.46	96.77	95.70
72	3.041	20.37	99.90	99.26	98.48	97.30	96.76	95.53
73	3.034	20.19	99.80	99.21	98.46	97.28	96.78	95.59
74	3.043	20.59	99.76	99.27	98.40	97.57	97.13	96.16
75	3.043	20.47	99.76	99.22	98.49	97.31	96.78	95.80
Ave.	3.042	20.42	99.89	99.28	98.59	97.42	97.01	95.89
Med.	3.042	20.43	99.90	99.26	98.59	97.44	97.02	95.72
st dev	0.0029	0.1597	0.1196	0.1359	0.1124	0.1713	0.1821	0.3152
Min.	3.034	20.03	99.65	99.10	98.40	97.15	96.72	95.53
Max.	3.046	20.68	100.05	99.83	98.87	97.75	97.31	96.52

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
α: 8.162E-06
β: 1.008
Calculated L₇₀: 45,000 hours
Reported L₇₀: >36,000 hours

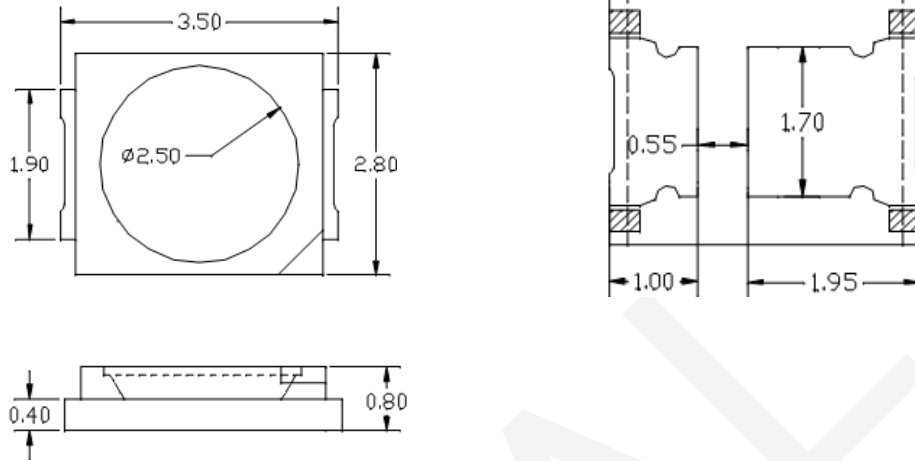
3.6 Data Set 3, 105 °C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs
51	0.2579	0.5251	2809	0.0003	0.0004	0.0009	0.0013	0.0015	0.0017
52	0.2584	0.5263	2793	0.0005	0.0006	0.0011	0.0015	0.0015	0.0020
53	0.2573	0.5262	2817	0.0002	0.0006	0.0011	0.0013	0.0014	0.0015
54	0.2598	0.5263	2761	0.0003	0.0004	0.0011	0.0014	0.0016	0.0020
55	0.2560	0.5256	2849	0.0004	0.0005	0.0011	0.0013	0.0014	0.0018
56	0.2553	0.5261	2862	0.0003	0.0004	0.0009	0.0010	0.0012	0.0014
57	0.2571	0.5267	2819	0.0002	0.0006	0.0008	0.0011	0.0012	0.0014
58	0.2571	0.5269	2817	0.0004	0.0006	0.0012	0.0014	0.0014	0.0020
59	0.2587	0.5260	2787	0.0001	0.0004	0.0009	0.0012	0.0013	0.0016
60	0.2563	0.5251	2844	0.0004	0.0005	0.0007	0.0011	0.0014	0.0018
61	0.2577	0.5268	2804	0.0004	0.0004	0.0014	0.0016	0.0017	0.0019
62	0.2560	0.5253	2850	0.0003	0.0004	0.0009	0.0012	0.0017	0.0019
63	0.2563	0.5266	2837	0.0004	0.0006	0.0008	0.0015	0.0017	0.0018
64	0.2566	0.5258	2834	0.0005	0.0006	0.0008	0.0013	0.0015	0.0022
65	0.2583	0.5273	2789	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017
66	0.2593	0.5270	2769	0.0005	0.0008	0.0013	0.0015	0.0016	0.0020
67	0.2575	0.5271	2808	0.0002	0.0004	0.0010	0.0014	0.0014	0.0020
68	0.2569	0.5258	2828	0.0003	0.0005	0.0009	0.0013	0.0016	0.0019
69	0.2563	0.5255	2842	0.0004	0.0006	0.0012	0.0014	0.0016	0.0020
70	0.2584	0.5277	2784	0.0006	0.0007	0.0010	0.0012	0.0015	0.0019
71	0.2585	0.5264	2789	0.0006	0.0008	0.0011	0.0013	0.0016	0.0022
72	0.2564	0.5259	2838	0.0004	0.0005	0.0013	0.0014	0.0016	0.0018
73	0.2588	0.5275	2777	0.0005	0.0006	0.0011	0.0014	0.0014	0.0018
74	0.2576	0.5267	2807	0.0003	0.0005	0.0010	0.0013	0.0015	0.0018
75	0.2583	0.5270	2790	0.0005	0.0007	0.0012	0.0015	0.0016	0.0021
Ave.	0.2575	0.5263	2812	0.0004	0.0006	0.0010	0.0013	0.0015	0.0019
Med.	0.2575	0.5263	2809	0.0004	0.0005	0.0010	0.0013	0.0015	0.0019
st dev	0.0012	0.0007	27.7469	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002
Min.	0.2553	0.5251	2761	0.0001	0.0004	0.0007	0.0010	0.0012	0.0014
Max.	0.2598	0.5277	2862	0.0006	0.0008	0.0014	0.0016	0.0017	0.0022



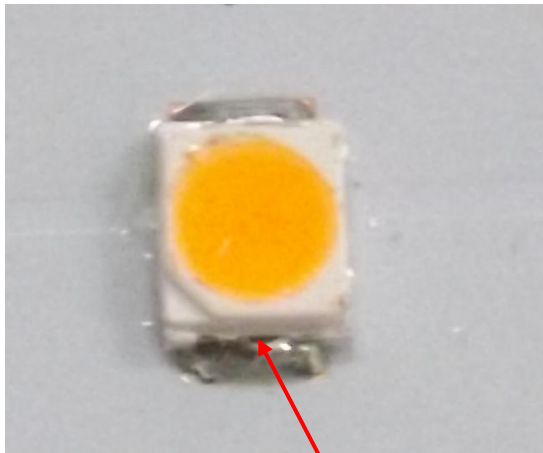
Appendix A – EUT PHOTO

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

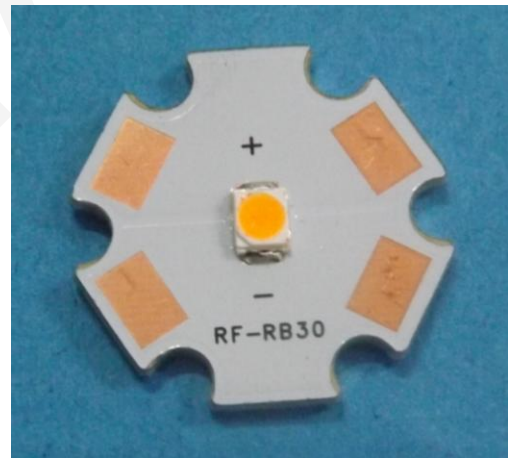


Unit: mm

A.2 EUT Photo



TMP_{LED}



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