



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

LIGHTNING OPTOELECTRONIC TECHNOLOGY (SZ) Co., LTD.

Building B.WenTao Technological Park. Yingrenshi Community. Shiyan Street. Baoan
District.ShenZhen.518108 China

Model: T3B

Report Type: 9000 Hours Interim Report		Product Type: LED Package	
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Report Number:	RSZ140122505-10-9000		
Test Date:	2014-04-08 to 2015-05-11		
Report Date:	2015-05-22		
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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: T3B
 Part Type: LED Package
 Nominal CCT: 2700K
 Test Driver Current: 120mA

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, diameter:0.3m ,0-1999Lumen	2015-03-04	2016-03-04
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2015-03-05	2016-03-05
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2015-03-04	2016-03-04
Standard Light Source	EVERFINE	D062	1011093	N/A	2014-08-05	2015-08-05
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987CJ 7321114	300VA	2015-03-05	2016-03-05
LM-80 Aging equipment	BACL	N/A	#5	N/A	2015-03-19	2016-03-19
Adjustable constant-current DC switching power supply	GOTER	LLA1200111 2-U	7#	N/A	2014-12-04	2015-12-04
Adjustable constant-current DC switching power supply	GOTER	LLA1200111 2-U	8#	N/A	2014-12-04	2015-12-04
Adjustable constant-current DC switching power supply	GOTER	LLA1200111 2-U	9#	N/A	2014-12-04	2015-12-04

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, Ts 85 °C and Ts 105 °C were received at 2014-04-06 and tested during 2014-04-08 to 2015-05-11. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

Data Set 1: 55 °C, 120mA

Part Number:	T3B
Number of Units:	25
Actual Case Temperature(T _S):	T _S =54.8 °C
Actual Ambient Temperature(T _A):	T _A =53.2 °C
Life Test Drive Current:	I _F = 120mA
Measurement Current:	I _F = 120mA

Data Set 2: 85 °C,120mA

Part Number:	T3B
Number of Units:	25
Actual Case Temperature(T _S):	T _S =84.2 °C
Actual Ambient Temperature(T _A):	T _A =81.1 °C
Life Test Drive Current:	I _F = 120mA
Measurement Current:	I _F = 120mA

Data Set 3: 105 °C, 120mA

Part Number:	T3B
Number of Units:	25
Actual Case Temperature(T _S):	T _S =103.6 °C
Actual Ambient Temperature(T _A):	T _A =101.2 °C
Life Test Drive Current:	I _F = 120mA
Measurement Current:	I _F = 120mA

2 - SUMMARY OF TEST RESULT

Data Set:	Data Set 1, 55 °C, 120mA
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:	97.64%
Average. Lumen Maintenance at 9000 hours:	96.01%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0019
Average Chromaticity Shift at 9000 hours ($\Delta u'v'$):	0.0028
Reported TM-21 L ₇₀ Lifetime:	>54,000hrs

Data Set:	Data Set 2, 85 °C, 120mA
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:	97.08%
Average. Lumen Maintenance at 9000 hours:	94.98%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0023
Average Chromaticity Shift at 9000 hours($\Delta u'v'$):	0.0032
Reported TM-21 L ₇₀ Lifetime	50,000hrs

Data Set:	Data Set 3, 105 °C, 120mA
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:	96.46%
Average. Lumen Maintenance at 9000 hours:	94.40%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0028
Average Chromaticity Shift at 9000 hours($\Delta u'v'$):	0.0039
Reported TM-21 L ₇₀ Lifetime	47,000hrs

3 - Test Data

3.1 Data Set 1, 55 °C, 120 mA (Lumen Maintenance)

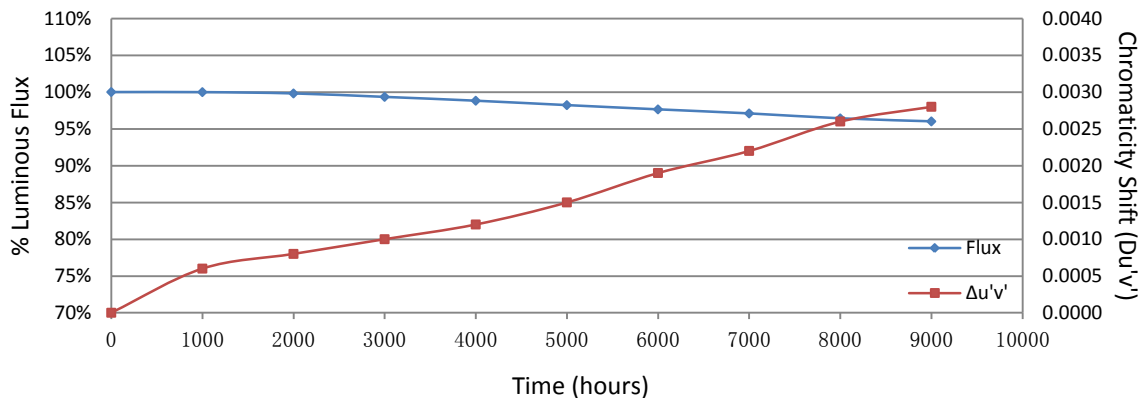
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	3.274	40.18	100.12	99.80	99.50	99.03	98.58	97.96	97.34	96.62	96.19
2	3.275	40.79	100.10	99.71	99.29	98.63	97.97	97.23	96.57	95.64	95.19
3	3.275	40.96	100.02	99.73	99.49	98.71	98.12	97.39	96.73	95.85	95.43
4	3.273	40.85	100.10	99.88	99.46	98.58	97.65	97.14	96.89	96.01	95.76
5	3.275	40.61	100.05	99.90	99.41	99.02	98.37	97.91	97.56	96.40	96.06
6	3.275	40.64	99.93	99.66	99.24	98.75	98.62	98.13	97.74	96.97	96.43
7	3.273	41.10	99.90	99.81	99.10	98.73	98.42	97.62	96.23	95.94	95.62
8	3.267	40.22	100.17	99.85	99.53	99.03	98.31	97.64	96.84	95.25	94.78
9	3.281	40.86	99.85	99.71	99.17	98.65	97.90	97.26	96.55	95.89	95.55
10	3.277	41.47	99.88	99.71	99.30	98.82	98.65	97.97	97.28	96.41	95.83
11	3.275	40.91	100.10	99.93	99.56	98.85	98.22	97.31	96.50	96.04	95.50
12	3.273	40.61	100.30	100.12	99.53	99.24	98.65	98.33	97.98	97.51	97.19
13	3.285	41.55	100.00	99.78	99.35	99.06	98.24	97.71	97.18	97.35	96.77
14	3.273	40.23	100.35	100.00	99.55	98.98	98.43	98.06	97.54	96.10	95.60
15	3.277	40.66	99.93	99.75	99.21	98.65	97.88	97.59	97.25	96.78	96.36
16	3.273	40.49	99.90	99.68	99.36	98.67	97.90	97.28	97.68	97.31	96.96
17	3.270	40.91	100.00	99.78	99.29	98.75	98.02	97.38	96.75	95.70	95.26
18	3.266	40.31	99.83	99.75	99.40	98.91	97.84	97.35	96.85	96.11	95.76
19	3.265	40.63	99.98	99.85	99.31	99.06	98.15	97.54	96.85	96.23	95.72
20	3.273	40.59	99.85	99.83	99.11	98.74	98.40	98.05	97.66	97.39	96.87
21	3.270	40.58	99.78	99.61	99.26	98.77	98.37	97.93	97.66	97.31	97.02
22	3.268	40.50	99.95	99.88	99.31	98.42	97.98	97.33	96.69	96.25	95.93
23	3.277	39.88	99.85	99.77	99.17	98.72	97.69	96.97	96.24	95.91	95.64
24	3.276	40.34	99.95	99.93	99.38	99.03	98.71	98.14	97.60	96.98	96.55
25	3.266	40.46	99.88	99.80	99.26	98.67	98.37	97.80	97.18	96.66	96.32
Ave.	3.273	40.65	99.99	99.81	99.34	98.82	98.22	97.64	97.09	96.42	96.01
Med.	3.273	40.61	99.95	99.80	99.31	98.75	98.24	97.62	97.18	96.25	95.83
st dev	0.0047	0.3820	0.1435	0.1140	0.1376	0.1943	0.3122	0.3702	0.5008	0.6328	0.6336
Min.	3.265	39.88	99.78	99.61	99.10	98.42	97.65	96.97	96.23	95.25	94.78
Max.	3.285	41.55	100.35	100.12	99.56	99.24	98.71	98.33	97.98	97.51	97.19

TM-21 Projection:

Test Duration: 9000hrs
Failures Observed: 0
 α : 5.868E-06
 β : 1.011
Calculated L₇₀: 63,000hrs
Reported L₇₀: >54,000hrs

3.2 Data Set 1, 55 °C, 120 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	0.2592	0.5278	2767	0.0003	0.0004	0.0006	0.0009	0.0010	0.0014	0.0018	0.0021	0.0022
2	0.2579	0.5266	2802	0.0004	0.0005	0.0007	0.0011	0.0014	0.0018	0.0021	0.0022	0.0027
3	0.2579	0.5289	2790	0.0005	0.0004	0.0006	0.0010	0.0013	0.0017	0.0021	0.0024	0.0024
4	0.2587	0.5302	2768	0.0006	0.0008	0.0009	0.0009	0.0009	0.0012	0.0017	0.0018	0.0019
5	0.2586	0.5260	2788	0.0003	0.0005	0.0006	0.0009	0.0011	0.0014	0.0019	0.0023	0.0024
6	0.2604	0.5302	2733	0.0003	0.0005	0.0007	0.0009	0.0010	0.0014	0.0018	0.0022	0.0023
7	0.2591	0.5299	2760	0.0006	0.0008	0.0010	0.0013	0.0013	0.0016	0.0019	0.0023	0.0024
8	0.2613	0.5286	2720	0.0006	0.0007	0.0009	0.0011	0.0013	0.0017	0.0020	0.0026	0.0026
9	0.2602	0.5287	2743	0.0008	0.0010	0.0012	0.0016	0.0019	0.0022	0.0026	0.0024	0.0027
10	0.2595	0.5273	2764	0.0008	0.0011	0.0011	0.0012	0.0017	0.0020	0.0026	0.0024	0.0027
11	0.2622	0.5297	2698	0.0009	0.0011	0.0012	0.0012	0.0016	0.0021	0.0026	0.0031	0.0026
12	0.2609	0.5288	2728	0.0002	0.0009	0.0009	0.0011	0.0013	0.0016	0.0021	0.0026	0.0019
13	0.2611	0.5302	2718	0.0004	0.0010	0.0011	0.0013	0.0016	0.0019	0.0023	0.0030	0.0024
14	0.2589	0.5288	2769	0.0006	0.0010	0.0013	0.0015	0.0021	0.0023	0.0024	0.0030	0.0031
15	0.2602	0.5305	2736	0.0007	0.0009	0.0010	0.0014	0.0017	0.0021	0.0025	0.0032	0.0035
16	0.2602	0.5277	2746	0.0005	0.0007	0.0009	0.0011	0.0015	0.0019	0.0022	0.0029	0.0033
17	0.2610	0.5287	2726	0.0005	0.0007	0.0009	0.0011	0.0015	0.0019	0.0022	0.0026	0.0031
18	0.2629	0.5292	2684	0.0005	0.0008	0.0009	0.0012	0.0018	0.0022	0.0027	0.0031	0.0037
19	0.2606	0.5299	2728	0.0008	0.0008	0.0009	0.0011	0.0017	0.0020	0.0023	0.0027	0.0033
20	0.2605	0.5300	2731	0.0007	0.0008	0.0010	0.0013	0.0017	0.0021	0.0024	0.0027	0.0034
21	0.2610	0.5309	2718	0.0007	0.0010	0.0012	0.0013	0.0014	0.0017	0.0021	0.0025	0.0030
22	0.2624	0.5296	2694	0.0009	0.0010	0.0013	0.0015	0.0017	0.0021	0.0025	0.0028	0.0034
23	0.2605	0.5282	2738	0.0009	0.0010	0.0012	0.0014	0.0019	0.0023	0.0025	0.0029	0.0034
24	0.2583	0.5271	2790	0.0007	0.0009	0.0010	0.0012	0.0014	0.0018	0.0020	0.0023	0.0030
25	0.2620	0.5298	2700	0.0007	0.0008	0.0010	0.0012	0.0016	0.0019	0.0022	0.0025	0.0032
Ave.	0.2602	0.5289	2742	0.0006	0.0008	0.0010	0.0012	0.0015	0.0019	0.0022	0.0026	0.0028
Med.	0.2604	0.5289	2736	0.0006	0.0008	0.0010	0.0012	0.0015	0.0019	0.0022	0.0026	0.0027
st dev	0.0014	0.0013	32.3266	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0004	0.0005
Min.	0.2579	0.5260	2684	0.0002	0.0004	0.0006	0.0009	0.0009	0.0012	0.0017	0.0018	0.0019
Max.	0.2629	0.5309	2802	0.0009	0.0011	0.0013	0.0016	0.0021	0.0023	0.0027	0.0032	0.0037



3.3 Data Set 2, 85 °C, 120 mA (Lumen Maintenance)

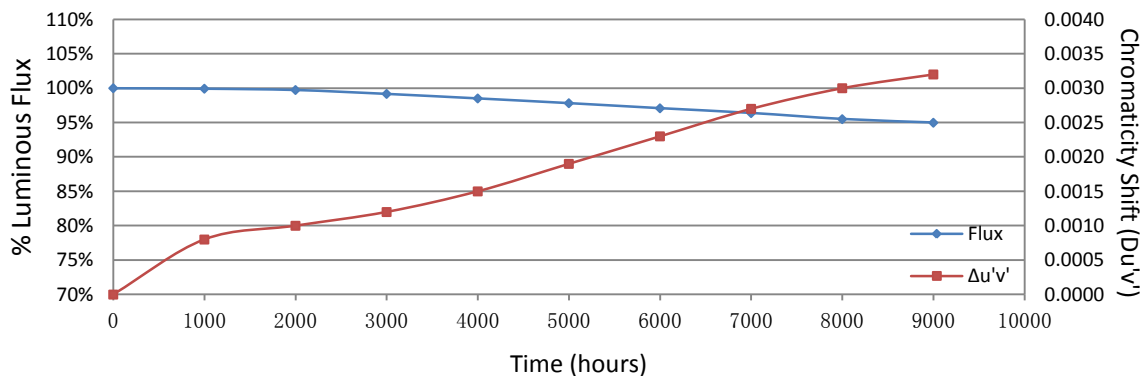
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	3.272	40.63	99.63	99.56	98.92	98.57	97.69	97.00	96.38	95.72	95.25
27	3.283	40.35	99.65	99.38	99.03	98.41	97.94	97.32	96.70	95.74	95.12
28	3.297	40.48	99.88	99.75	99.01	98.39	97.90	97.33	96.67	96.22	95.73
29	3.275	40.65	99.88	99.85	99.36	98.55	97.44	96.78	96.11	96.06	95.65
30	3.275	40.59	99.78	99.51	98.97	98.20	97.41	96.55	95.52	95.29	94.78
31	3.279	40.81	99.93	99.66	99.09	98.06	97.48	96.81	96.30	95.74	95.27
32	3.267	40.94	100.00	99.80	99.17	98.66	97.70	97.07	96.43	95.92	95.36
33	3.272	40.85	99.95	99.90	99.22	98.43	97.82	96.99	96.16	95.03	94.52
34	3.270	40.86	100.10	99.98	99.34	98.43	97.80	97.04	96.18	95.25	94.74
35	3.276	41.10	100.00	99.90	99.49	98.83	97.91	97.20	96.64	94.16	93.65
36	3.267	41.39	99.86	99.83	99.32	98.65	97.61	96.18	95.05	94.42	93.89
37	3.272	40.69	100.02	99.85	99.43	98.87	97.94	97.10	96.39	95.77	95.21
38	3.267	40.52	99.98	99.83	99.46	98.79	98.49	98.12	97.66	96.30	95.85
39	3.275	41.13	100.02	99.88	99.37	98.76	98.30	97.30	96.35	95.79	95.26
40	3.274	40.89	99.85	99.56	98.90	98.29	97.92	97.29	96.43	95.43	94.99
41	3.270	40.57	100.02	99.80	98.94	98.15	97.58	97.07	96.55	96.13	95.59
42	3.269	40.51	100.00	99.68	98.86	98.22	97.31	96.77	96.22	95.51	94.96
43	3.270	40.67	99.98	99.70	99.04	98.33	97.39	96.53	95.62	95.77	95.18
44	3.266	40.66	100.05	99.68	98.99	98.57	97.54	96.75	95.94	95.06	94.39
45	3.272	40.47	100.05	99.83	99.23	98.59	98.15	97.11	96.10	94.00	93.35
46	3.276	41.36	99.81	99.71	99.01	98.45	97.51	96.66	96.20	94.92	94.51
47	3.267	41.02	99.95	99.80	99.66	98.95	98.71	97.98	97.42	96.15	95.69
48	3.275	40.57	100.10	99.90	99.43	98.92	98.45	97.51	96.62	95.91	95.34
49	3.274	40.75	99.88	99.56	98.99	98.40	97.84	97.42	96.98	95.56	95.14
50	3.270	40.70	99.80	99.51	98.99	98.18	97.69	97.20	96.83	95.65	95.04
Ave.	3.273	40.77	99.93	99.74	99.17	98.51	97.82	97.08	96.38	95.50	94.98
Med.	3.272	40.69	99.95	99.80	99.09	98.45	97.80	97.07	96.38	95.72	95.14
st dev	0.0064	0.2703	0.1245	0.1537	0.2243	0.2528	0.3662	0.4274	0.5479	0.6171	0.6380
Min.	3.266	40.35	99.63	99.38	98.86	98.06	97.31	96.18	95.05	94.00	93.35
Max.	3.297	41.39	100.10	99.98	99.66	98.95	98.71	98.12	97.66	96.30	95.85

TM-21 Projection:

Test Duration: 9000hrs
Failures Observed: 0
 α : 7.477E-06
 β : 1.015
Calculated L₇₀: 50,000hrs
Reported L₇₀: 50,000hrs

3.4 Data Set 2, 85 °C, 120 mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2594	0.5291	2759	0.0010	0.0011	0.0014	0.0016	0.0019	0.0024	0.0026	0.0029	0.0036
27	0.2624	0.5276	2700	0.0008	0.0010	0.0012	0.0014	0.0019	0.0023	0.0026	0.0027	0.0035
28	0.2596	0.5250	2771	0.0007	0.0010	0.0011	0.0014	0.0017	0.0022	0.0024	0.0027	0.0031
29	0.2615	0.5287	2715	0.0008	0.0008	0.0009	0.0012	0.0017	0.0020	0.0022	0.0024	0.0029
30	0.2605	0.5289	2736	0.0011	0.0012	0.0014	0.0017	0.0021	0.0025	0.0030	0.0032	0.0038
31	0.2610	0.5307	2718	0.0008	0.0010	0.0013	0.0017	0.0020	0.0023	0.0027	0.0028	0.0035
32	0.2593	0.5290	2760	0.0009	0.0010	0.0012	0.0015	0.0020	0.0023	0.0025	0.0027	0.0033
33	0.2608	0.5307	2722	0.0010	0.0010	0.0013	0.0018	0.0021	0.0026	0.0027	0.0029	0.0035
34	0.2604	0.5298	2735	0.0010	0.0011	0.0012	0.0017	0.0021	0.0026	0.0029	0.0030	0.0036
35	0.2621	0.5295	2699	0.0009	0.0009	0.0010	0.0014	0.0019	0.0022	0.0029	0.0025	0.0033
36	0.2607	0.5291	2729	0.0005	0.0009	0.0010	0.0014	0.0021	0.0024	0.0028	0.0029	0.0030
37	0.2618	0.5299	2705	0.0008	0.0011	0.0013	0.0017	0.0022	0.0026	0.0029	0.0030	0.0031
38	0.2615	0.5289	2715	0.0006	0.0009	0.0011	0.0013	0.0018	0.0023	0.0027	0.0029	0.0029
39	0.2592	0.5285	2764	0.0005	0.0008	0.0010	0.0013	0.0019	0.0022	0.0026	0.0031	0.0029
40	0.2598	0.5282	2753	0.0006	0.0010	0.0011	0.0015	0.0019	0.0023	0.0025	0.0033	0.0031
41	0.2599	0.5262	2759	0.0007	0.0010	0.0012	0.0017	0.0020	0.0023	0.0026	0.0030	0.0028
42	0.2597	0.5287	2753	0.0006	0.0009	0.0010	0.0013	0.0017	0.0021	0.0026	0.0030	0.0028
43	0.2599	0.5293	2746	0.0006	0.0009	0.0011	0.0014	0.0018	0.0022	0.0026	0.0030	0.0030
44	0.2586	0.5286	2778	0.0006	0.0009	0.0012	0.0014	0.0018	0.0022	0.0026	0.0030	0.0030
45	0.2607	0.5266	2742	0.0005	0.0009	0.0012	0.0016	0.0022	0.0027	0.0031	0.0037	0.0035
46	0.2602	0.5297	2737	0.0009	0.0010	0.0011	0.0014	0.0019	0.0024	0.0026	0.0033	0.0031
47	0.2597	0.5298	2747	0.0009	0.0009	0.0010	0.0013	0.0018	0.0022	0.0025	0.0032	0.0030
48	0.2596	0.5279	2759	0.0008	0.0010	0.0011	0.0014	0.0015	0.0019	0.0023	0.0029	0.0030
49	0.2597	0.5270	2760	0.0008	0.0010	0.0016	0.0017	0.0017	0.0022	0.0026	0.0033	0.0030
50	0.2599	0.5290	2747	0.0003	0.0010	0.0011	0.0016	0.0019	0.0023	0.0026	0.0032	0.0029
Ave.	0.2603	0.5287	2740	0.0008	0.0010	0.0012	0.0015	0.0019	0.0023	0.0027	0.0030	0.0032
Med.	0.2599	0.5289	2746	0.0008	0.0010	0.0011	0.0014	0.0019	0.0023	0.0026	0.0030	0.0031
st dev	0.0010	0.0014	22.4274	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003
Min.	0.2586	0.5250	2699	0.0003	0.0008	0.0009	0.0012	0.0015	0.0019	0.0022	0.0024	0.0028
Max.	0.2624	0.5307	2778	0.0011	0.0012	0.0016	0.0018	0.0022	0.0027	0.0031	0.0037	0.0038



3.5 Data Set 3, 105 °C, 120 mA (Lumen Maintenance)

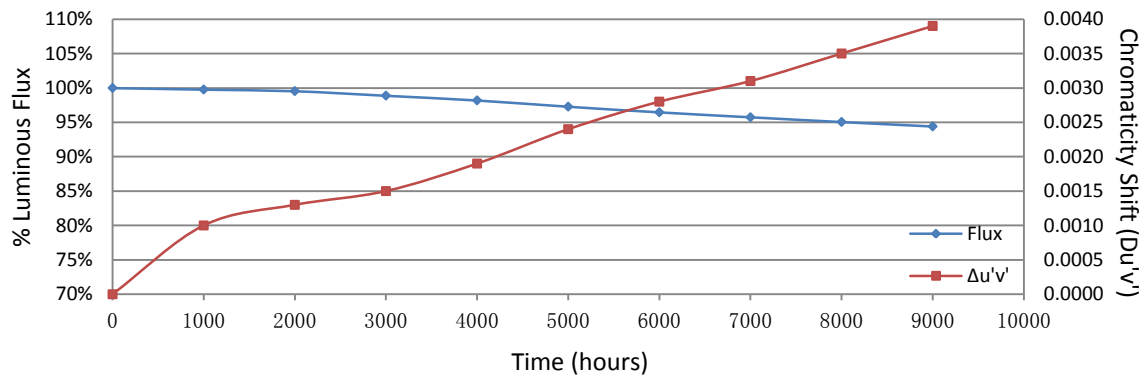
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	3.271	40.59	99.63	99.33	98.62	97.88	96.92	96.18	95.61	94.41	93.74
52	3.270	40.83	99.76	99.53	98.82	98.33	97.18	96.55	95.96	94.95	94.15
53	3.280	40.83	99.80	99.68	99.04	98.29	97.55	96.91	96.28	94.95	94.24
54	3.276	40.57	99.83	99.58	98.72	97.98	97.09	96.52	95.93	95.27	94.53
55	3.271	40.83	99.49	99.22	98.75	98.07	97.38	96.60	95.84	94.66	93.83
56	3.268	40.54	100.02	99.65	98.91	98.27	97.61	96.92	96.10	95.26	94.38
57	3.278	41.37	100.17	99.85	98.96	98.16	96.88	95.79	95.41	94.05	93.40
58	3.267	40.67	100.02	99.83	98.84	98.28	97.42	96.29	94.96	93.71	93.16
59	3.277	40.55	99.78	99.53	98.79	98.20	97.58	96.89	96.18	95.81	95.22
60	3.272	40.57	99.83	99.53	98.72	98.00	97.07	96.30	95.66	95.12	94.50
61	3.270	40.48	99.83	99.65	98.99	98.20	97.65	96.71	95.92	94.61	94.00
62	3.270	40.51	99.51	99.43	98.91	98.37	97.28	96.32	95.58	95.14	94.52
63	3.269	39.92	99.67	99.47	99.15	98.65	97.70	96.79	95.99	95.72	95.17
64	3.267	40.37	99.60	99.46	99.13	98.34	97.67	96.90	96.23	95.71	95.27
65	3.267	40.87	99.56	99.31	98.87	98.29	97.46	96.60	95.77	95.94	95.28
66	3.273	41.08	99.42	99.25	98.83	98.00	97.13	96.45	95.72	94.96	94.16
67	3.267	41.33	99.44	99.18	98.69	97.80	96.69	96.08	95.45	94.94	94.44
68	3.279	41.28	99.88	99.54	99.08	98.35	97.63	97.21	96.66	96.08	95.45
69	3.272	41.45	99.83	99.40	98.82	98.05	96.72	95.83	95.20	94.31	93.56
70	3.258	40.59	99.73	99.53	98.69	97.98	96.67	95.98	95.27	94.95	94.48
71	3.270	40.97	99.80	99.59	98.93	98.56	97.90	96.70	95.48	94.43	93.92
72	3.274	41.30	99.95	99.66	98.81	98.21	97.41	97.00	96.59	95.86	95.30
73	3.266	40.61	100.07	99.80	98.97	97.98	97.02	95.37	94.51	95.10	94.53
74	3.264	40.37	99.90	99.65	99.03	98.37	97.18	96.11	95.44	94.97	94.20
75	3.265	40.39	99.83	99.80	98.98	98.27	97.20	96.51	95.79	95.37	94.63
Ave.	3.270	40.75	99.77	99.54	98.88	98.19	97.28	96.46	95.74	95.05	94.40
Med.	3.270	40.61	99.80	99.53	98.87	98.21	97.28	96.52	95.77	94.97	94.44
st dev	0.0051	0.3791	0.1986	0.1890	0.1437	0.2048	0.3440	0.4387	0.4849	0.6023	0.6249
Min.	3.258	39.92	99.42	99.18	98.62	97.80	96.67	95.37	94.51	93.71	93.16
Max.	3.280	41.45	100.17	99.85	99.15	98.65	97.90	97.21	96.66	96.08	95.45

TM-21 Projection:

Test Duration: 9000hrs
Failures Observed: 0
 α : 7.825E-06
 β : 1.012
Calculated L₇₀: 47,000hrs
Reported L₇₀: 47,000hrs

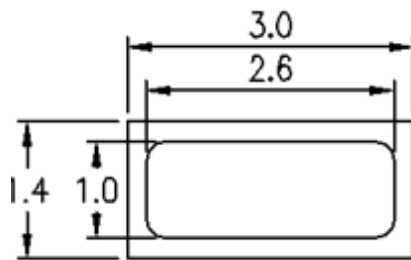
3.6 Data Set 3, 105 °C, 120 mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2603	0.5292	2739	0.0008	0.0010	0.0013	0.0017	0.0025	0.0029	0.0032	0.0036	0.0040
52	0.2582	0.5283	2787	0.0007	0.0011	0.0014	0.0016	0.0025	0.0029	0.0031	0.0036	0.0039
53	0.2615	0.5293	2713	0.0010	0.0012	0.0013	0.0017	0.0023	0.0027	0.0029	0.0036	0.0039
54	0.2613	0.5281	2723	0.0009	0.0011	0.0012	0.0015	0.0022	0.0027	0.0028	0.0033	0.0037
55	0.2594	0.5296	2756	0.0009	0.0009	0.0013	0.0017	0.0023	0.0027	0.0029	0.0034	0.0037
56	0.2628	0.5297	2685	0.0006	0.0012	0.0015	0.0018	0.0023	0.0027	0.0031	0.0034	0.0036
57	0.2614	0.5311	2707	0.0009	0.0012	0.0015	0.0019	0.0027	0.0030	0.0033	0.0038	0.0040
58	0.2611	0.5287	2724	0.0009	0.0012	0.0015	0.0019	0.0027	0.0031	0.0034	0.0039	0.0042
59	0.2613	0.5303	2713	0.0016	0.0015	0.0015	0.0018	0.0023	0.0027	0.0029	0.0034	0.0037
60	0.2612	0.5292	2718	0.0014	0.0014	0.0016	0.0019	0.0024	0.0028	0.0030	0.0035	0.0038
61	0.2605	0.5287	2737	0.0015	0.0017	0.0018	0.0021	0.0025	0.0028	0.0030	0.0034	0.0037
62	0.2605	0.5295	2733	0.0012	0.0015	0.0016	0.0019	0.0026	0.0031	0.0032	0.0037	0.0041
63	0.2607	0.5282	2733	0.0008	0.0014	0.0015	0.0018	0.0023	0.0028	0.0031	0.0036	0.0039
64	0.2608	0.5291	2728	0.0009	0.0014	0.0017	0.0021	0.0022	0.0027	0.0030	0.0034	0.0038
65	0.2589	0.5274	2775	0.0008	0.0013	0.0015	0.0019	0.0022	0.0025	0.0029	0.0030	0.0034
66	0.2606	0.5297	2729	0.0008	0.0011	0.0014	0.0019	0.0024	0.0027	0.0031	0.0033	0.0037
67	0.2612	0.5296	2719	0.0009	0.0012	0.0015	0.0019	0.0026	0.0029	0.0034	0.0036	0.0040
68	0.2595	0.5278	2762	0.0008	0.0012	0.0014	0.0017	0.0022	0.0026	0.0030	0.0033	0.0037
69	0.2581	0.5272	2793	0.0008	0.0012	0.0015	0.0021	0.0026	0.0030	0.0033	0.0037	0.0042
70	0.2580	0.5289	2788	0.0008	0.0013	0.0016	0.0020	0.0024	0.0028	0.0031	0.0034	0.0038
71	0.2587	0.5302	2768	0.0008	0.0013	0.0015	0.0019	0.0027	0.0032	0.0036	0.0040	0.0044
72	0.2591	0.5283	2769	0.0011	0.0014	0.0016	0.0018	0.0022	0.0025	0.0028	0.0032	0.0036
73	0.2606	0.5305	2726	0.0009	0.0010	0.0012	0.0015	0.0024	0.0028	0.0034	0.0037	0.0040
74	0.2602	0.5282	2745	0.0010	0.0013	0.0015	0.0020	0.0022	0.0025	0.0029	0.0034	0.0038
75	0.2610	0.5289	2726	0.0013	0.0015	0.0018	0.0023	0.0024	0.0029	0.0033	0.0037	0.0039
Ave.	0.2603	0.5290	2740	0.0010	0.0013	0.0015	0.0019	0.0024	0.0028	0.0031	0.0035	0.0039
Med.	0.2606	0.5291	2733	0.0009	0.0012	0.0015	0.0019	0.0024	0.0028	0.0031	0.0035	0.0038
st dev	0.0012	0.0010	27.9459	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2580	0.5272	2685	0.0006	0.0009	0.0012	0.0015	0.0022	0.0025	0.0028	0.0030	0.0034
Max.	0.2628	0.5311	2793	0.0016	0.0017	0.0018	0.0023	0.0027	0.0032	0.0036	0.0040	0.0044



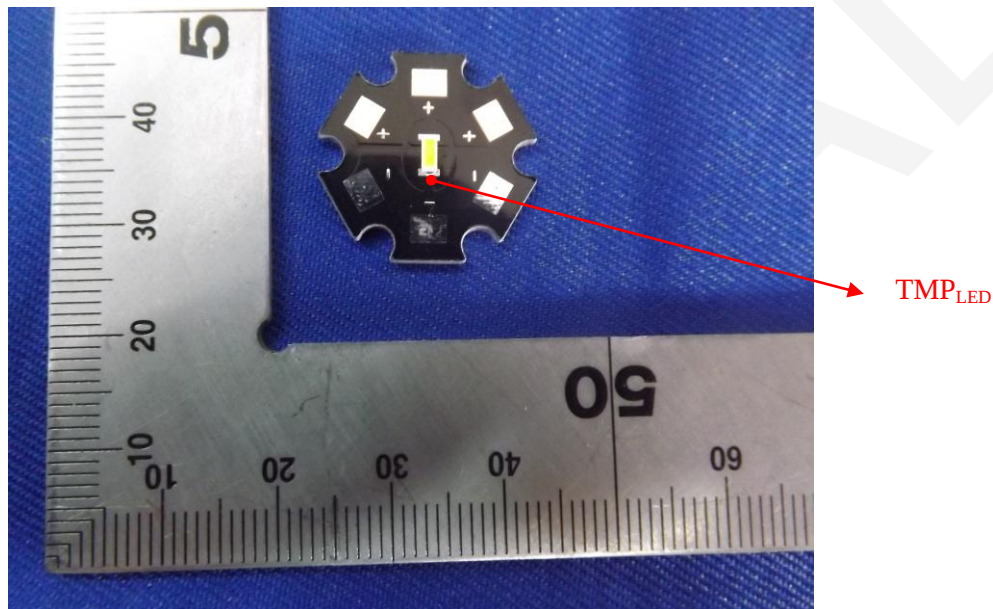
Appendix A – EUT PHOTO

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



All dimensions are in millimeter

A.2 EUT Photo



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