



# IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

## MEASUREMENT AND TEST REPORT

For

### Yuji-Xinguang Optoelectronic Tech Co. LTD.

Room 808, Science & Technology Building, No.9 Zhongguancun South Road, Haidian District, Beijing,  
P.R. China

**Model: LED SMD 5730**

<b>Report Type:</b> 6000 Hours Test Report	<b>Product Type:</b> LED Package
<b>Test Engineer:</b> Daniel Duan	<i>Daniel Duan</i>
<b>Report Number:</b> R2DG140512050-10	
<b>Test Date:</b> 2014-07-31 to 2015-04-08	
<b>Report Date:</b> 2015-04-10	
<b>Reviewed By:</b> Jeanne Han /EE Manager	<i>Jeanne Han</i>
<b>Prepared By:</b>	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**

<b>1 - GENERAL INFORMATION.....</b>	<b>3</b>
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
<b>2 - SUMMARY OF TEST RESULT .....</b>	<b>6</b>
<b>3 - TEST DATA .....</b>	<b>7</b>
3.1 DATA SET 1, 55 °C, 120 mA (LUMEN MAINTENANCE).....	7
3.2 DATA SET 1, 55 °C, 120 mA (CHROMATICITY SHIFT) .....	8
3.3 DATA SET 2, 85 °C, 120 mA (LUMEN MAINTENANCE).....	9
3.4 DATA SET 2, 85 °C, 120 mA (CHROMATICITY SHIFT) .....	10
3.5 DATA SET 3, 105 °C, 120 mA (LUMEN MAINTENANCE).....	11
3.6 DATA SET 3, 105 °C, 120 mA (CHROMATICITY SHIFT) .....	12
<b>APPENDIX A – EUT PHOTO .....</b>	<b>13</b>
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: LED SMD 5730  
 Part Name: 5730  
 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, 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	2014-05-06	2015-05-06
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987C J7321114	300VA	2015-03-05	2016-03-05
Multilayer aging machine	BACL	B2-270	20005	25°C~110°C	2014-08-11	2015-08-11
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	(50V/15A)	2014-07-11	2015-07-11
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090008	(50V/15A)	2014-07-11	2015-07-11

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090009	(50V/15A)	2014-07-11	2015-07-11

### 1.5 Operating Cycle

Samples are driven with a constant direct current (DC)

### 1.6 Ambient Conditions

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

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

### 1.7 Photometry Measurement Uncertainty

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

## 1.8 Sample Set

### Sampling Method:

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

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

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

### Sample Size:

Total 75Pcs;

Each Ts test condition 25Pcs

The samples tested at Ts 55 °C, Ts 85 °C and Ts 105 °C were received at 2014-05-12 and tested during 2014-05-19 to 2015-01-24. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

#### Data Set 1: 55 °C, 120 mA

Part Number:	LED SMD 5730
Number of Units:	25
Actual Case Temperature(T <sub>S</sub> ):	T <sub>S</sub> =54.1 °C
Actual Ambient Temperature(T <sub>A</sub> ):	T <sub>A</sub> =51.3 °C
Life Test Drive Current:	I <sub>F</sub> = 120mA
Measurement Current:	I <sub>F</sub> = 120mA

#### Data Set 2: 85 °C, 120 mA

Part Number:	LED SMD 5730
Number of Units:	25
Actual Case Temperature(T <sub>S</sub> ):	T <sub>S</sub> =84.2 °C
Actual Ambient Temperature(T <sub>A</sub> ):	T <sub>A</sub> =82.4 °C
Life Test Drive Current:	I <sub>F</sub> =120mA
Measurement Current:	I <sub>F</sub> = 120mA

#### Data Set 3: 105 °C, 120 mA

Part Number:	LED SMD 5730
Number of Units:	25
Actual Case Temperature(T <sub>S</sub> ):	T <sub>S</sub> =104.3 °C
Actual Ambient Temperature(T <sub>A</sub> ):	T <sub>A</sub> =103.2 °C
Life Test Drive Current:	I <sub>F</sub> = 120mA
Measurement Current:	I <sub>F</sub> = 120mA

## 2 - SUMMARY OF TEST RESULT

<b>Data Set:</b>	<b>Data Set 1, 55 °C, 120 mA</b>
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:	96.60%
Average Chromaticity Shift at 6000 hours ( $\Delta u'v'$ ):	0.0026
Reported TM-21 L <sub>70</sub> Lifetime:	>36,000 hours

<b>Data Set:</b>	<b>Data Set 2, 85 °C, 120 mA</b>
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:	96.30%
Average Chromaticity Shift at 6000 hours( $\Delta u'v'$ ):	0.0027
Reported TM-21 L <sub>70</sub> Lifetime:	>36,000 hours

<b>Data Set:</b>	<b>Data Set 3, 105 °C, 120 mA</b>
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:	95.72%
Average Chromaticity Shift at 6000 hours( $\Delta u'v'$ ):	0.0028
Reported TM-21 L <sub>70</sub> Lifetime:	>36,000 hours

### 3 - Test Data

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

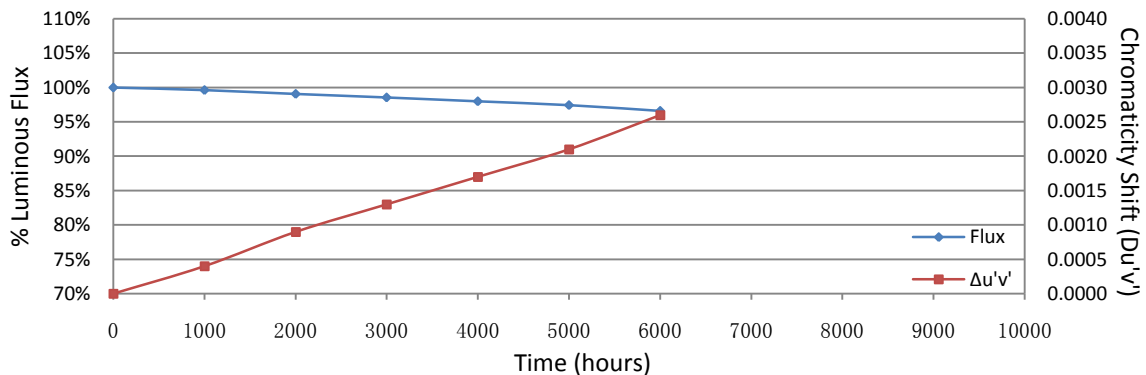
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	2.878	33.38	99.61	98.65	98.05	97.51	96.97	96.17
2	2.867	33.65	99.82	99.05	98.37	97.77	97.00	96.32
3	2.870	33.81	99.73	99.50	99.20	98.55	97.34	96.63
4	2.867	33.56	99.52	98.72	98.18	97.65	96.75	96.10
5	2.889	33.41	100.09	99.52	99.10	98.68	97.73	96.26
6	2.890	34.09	99.56	98.65	98.12	97.48	97.18	96.80
7	2.882	32.85	99.76	99.30	99.00	98.45	97.90	96.47
8	2.878	32.80	99.30	99.09	98.78	98.08	97.68	96.95
9	2.865	32.96	99.76	99.36	98.94	98.39	98.21	97.48
10	2.888	33.08	99.61	98.88	97.97	97.34	97.37	96.89
11	2.868	33.59	99.52	99.11	98.75	98.21	97.41	97.32
12	2.882	33.45	99.85	99.37	99.04	98.30	97.70	96.86
13	2.886	31.99	99.87	99.34	98.94	98.44	98.28	97.41
14	2.876	34.42	99.07	98.87	98.58	98.00	97.88	97.44
15	2.875	32.69	99.94	98.84	97.95	97.52	96.54	96.57
16	2.891	34.14	99.74	99.50	99.33	98.62	97.83	96.72
17	2.878	33.42	99.61	98.68	97.70	97.28	96.89	96.05
18	2.863	32.81	99.85	99.51	99.21	98.38	97.78	96.59
19	2.881	33.79	99.73	99.14	98.55	98.05	97.54	96.15
20	2.893	33.95	99.53	99.09	98.67	98.00	97.61	96.61
21	2.891	33.34	99.55	98.77	98.11	97.27	96.94	96.10
22	2.880	33.22	99.61	97.77	96.93	96.36	96.66	96.00
23	2.887	33.54	99.34	99.05	98.78	98.18	97.64	95.95
24	2.882	33.94	99.29	99.20	99.03	98.50	97.88	97.05
25	2.885	34.20	99.44	99.01	98.74	98.07	97.05	96.23
Ave.	2.880	33.44	99.63	99.04	98.56	97.96	97.43	96.60
Med.	2.881	33.45	99.61	99.09	98.74	98.07	97.54	96.59
st dev	0.0090	0.5610	0.2294	0.3877	0.5689	0.5533	0.4805	0.4802
Min.	2.863	31.99	99.07	97.77	96.93	96.36	96.54	95.95
Max.	2.893	34.42	100.09	99.52	99.33	98.68	98.28	97.48

TM-21 Projection:

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
 $\alpha$ : 5.991E-06  
 $\beta$ : 1.003  
**Calculated L<sub>70</sub>:** 60,000hours  
**Reported L<sub>70</sub>:** >36,000hours

**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
1	0.2598	0.5252	2765	0.0004	0.0011	0.0013	0.0017	0.0021	0.0025
2	0.2583	0.5257	2797	0.0005	0.0010	0.0013	0.0017	0.0022	0.0026
3	0.2580	0.5260	2801	0.0004	0.0009	0.0012	0.0017	0.0021	0.0027
4	0.2601	0.5239	2765	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026
5	0.2607	0.5293	2729	0.0002	0.0008	0.0010	0.0014	0.0020	0.0023
6	0.2596	0.5295	2753	0.0005	0.0010	0.0013	0.0017	0.0021	0.0026
7	0.2639	0.5291	2664	0.0002	0.0009	0.0014	0.0019	0.0032	0.0037
8	0.2614	0.5309	2709	0.0004	0.0009	0.0011	0.0016	0.0018	0.0023
9	0.2633	0.5325	2664	0.0003	0.0010	0.0012	0.0017	0.0021	0.0026
10	0.2622	0.5294	2698	0.0004	0.0010	0.0012	0.0017	0.0020	0.0025
11	0.2592	0.5255	2778	0.0004	0.0009	0.0011	0.0016	0.0021	0.0026
12	0.2597	0.5274	2758	0.0004	0.0012	0.0013	0.0019	0.0022	0.0028
13	0.2676	0.5301	2589	0.0004	0.0009	0.0012	0.0017	0.0020	0.0025
14	0.2567	0.5259	2831	0.0004	0.0007	0.0010	0.0013	0.0017	0.0025
15	0.2587	0.5260	2786	0.0005	0.0011	0.0016	0.0019	0.0023	0.0033
16	0.2576	0.5264	2808	0.0004	0.0009	0.0013	0.0018	0.0020	0.0026
17	0.2578	0.5241	2815	0.0003	0.0009	0.0012	0.0016	0.0016	0.0023
18	0.2618	0.5275	2714	0.0004	0.0009	0.0012	0.0020	0.0021	0.0026
19	0.2583	0.5253	2798	0.0002	0.0009	0.0012	0.0017	0.0019	0.0025
20	0.2565	0.5258	2836	0.0003	0.0009	0.0012	0.0016	0.0019	0.0024
21	0.2592	0.5254	2779	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026
22	0.2620	0.5278	2710	0.0004	0.0007	0.0010	0.0015	0.0020	0.0025
23	0.2596	0.5273	2761	0.0003	0.0010	0.0016	0.0020	0.0022	0.0029
24	0.2591	0.5298	2762	0.0004	0.0011	0.0015	0.0018	0.0024	0.0029
25	0.2583	0.5272	2790	0.0004	0.0010	0.0014	0.0017	0.0022	0.0026
Ave.	0.2600	0.5273	2754	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026
Med.	0.2596	0.5272	2765	0.0004	0.0009	0.0012	0.0017	0.0021	0.0026
st dev	0.0025	0.0022	58.4237	0.0001	0.0001	0.0001	0.0002	0.0003	0.0003
Min.	0.2565	0.5239	2589	0.0002	0.0007	0.0010	0.0013	0.0016	0.0023
Max.	0.2676	0.5325	2836	0.0005	0.0012	0.0016	0.0020	0.0032	0.0037





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

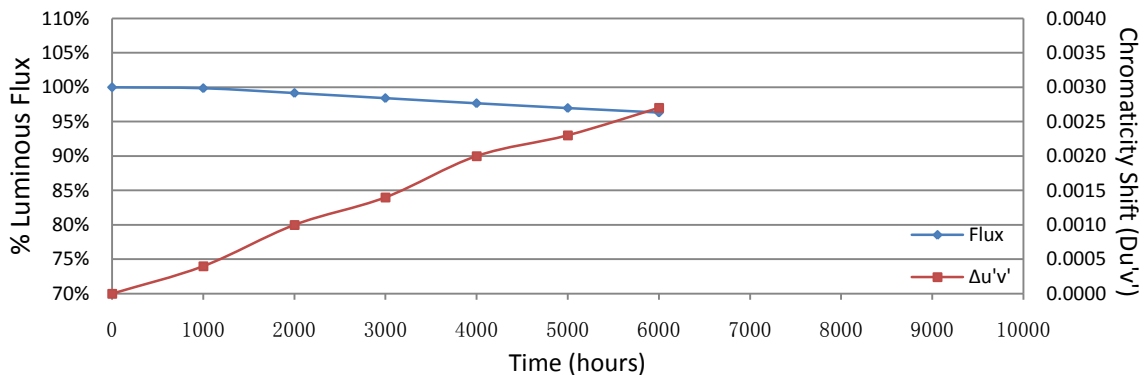
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	2.879	33.25	99.85	99.28	98.74	97.95	97.26	96.78
27	2.886	34.10	100.03	99.24	98.42	97.86	96.42	96.10
28	2.883	33.10	99.79	99.06	98.31	97.43	96.89	95.86
29	2.875	33.47	99.43	99.01	98.51	98.00	97.10	97.04
30	2.889	34.12	99.36	99.09	98.65	97.60	96.92	96.81
31	2.864	34.61	100.14	99.36	98.61	97.89	97.34	96.91
32	2.850	33.83	99.94	98.88	97.78	97.01	96.72	96.19
33	2.847	32.90	99.73	98.91	98.15	97.29	96.14	95.93
34	2.878	33.91	100.09	99.20	98.35	98.61	97.49	96.49
35	2.877	34.74	100.09	99.34	98.56	97.78	97.38	97.35
36	2.865	33.30	99.58	99.19	98.74	97.96	96.91	96.25
37	2.866	33.36	99.88	99.52	99.07	98.32	97.21	96.55
38	2.854	33.50	99.64	99.04	98.42	97.85	97.16	96.66
39	2.878	33.44	99.85	98.47	97.88	97.07	96.89	96.26
40	2.877	33.58	100.18	99.11	98.15	97.59	97.17	97.02
41	2.884	33.24	99.85	99.10	97.41	96.54	96.63	96.30
42	2.871	33.82	99.94	98.64	97.43	96.60	96.57	96.19
43	2.881	33.59	99.82	99.20	98.42	97.65	96.67	95.45
44	2.870	33.01	100.06	99.49	98.64	97.88	96.40	95.58
45	2.865	33.85	99.76	99.50	99.23	98.14	96.43	95.60
46	2.888	33.37	99.52	99.28	99.01	98.20	97.12	95.74
47	2.895	34.31	100.61	99.97	99.33	98.54	98.83	97.11
48	2.871	34.30	99.97	98.92	98.02	97.17	96.53	95.63
49	2.885	33.63	99.85	98.99	97.92	97.15	97.09	95.66
50	2.856	33.44	99.64	98.77	97.73	96.98	96.92	95.93
Ave.	2.873	33.67	99.86	99.14	98.38	97.64	96.97	96.30
Med.	2.877	33.58	99.85	99.11	98.42	97.78	96.92	96.25
st dev	0.0126	0.4826	0.2667	0.3087	0.5140	0.5564	0.5242	0.5546
Min.	2.847	32.90	99.36	98.47	97.41	96.54	96.14	95.45
Max.	2.895	34.74	100.61	99.97	99.33	98.61	98.83	97.35

**TM-21 Projection:**

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
**α:** 7.299E-06  
**β:** 1.006  
**Calculated L<sub>70</sub>:** 50,000hours  
**Reported L<sub>70</sub>:** >36,000hours

**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
26	0.2591	0.5283	2767	0.0003	0.0010	0.0012	0.0017	0.0021	0.0026
27	0.2572	0.5254	2822	0.0002	0.0009	0.0011	0.0015	0.0020	0.0024
28	0.2627	0.5305	2684	0.0004	0.0010	0.0014	0.0019	0.0022	0.0028
29	0.2578	0.5241	2814	0.0002	0.0009	0.0011	0.0016	0.0019	0.0024
30	0.2569	0.5253	2829	0.0004	0.0009	0.0013	0.0019	0.0017	0.0021
31	0.2581	0.5265	2797	0.0004	0.0009	0.0014	0.0021	0.0020	0.0025
32	0.2585	0.5280	2781	0.0004	0.0009	0.0014	0.0020	0.0020	0.0024
33	0.2627	0.5288	2691	0.0003	0.0009	0.0015	0.0022	0.0024	0.0026
34	0.2568	0.5229	2845	0.0004	0.0011	0.0017	0.0021	0.0025	0.0028
35	0.2553	0.5269	2858	0.0004	0.0010	0.0015	0.0020	0.0025	0.0028
36	0.2597	0.5272	2760	0.0003	0.0009	0.0016	0.0021	0.0025	0.0029
37	0.2598	0.5238	2772	0.0004	0.0009	0.0015	0.0020	0.0023	0.0028
38	0.2614	0.5293	2715	0.0004	0.0011	0.0016	0.0022	0.0026	0.0031
39	0.2595	0.5241	2778	0.0004	0.0009	0.0013	0.0019	0.0023	0.0027
40	0.2566	0.5229	2848	0.0003	0.0009	0.0014	0.0019	0.0022	0.0027
41	0.2614	0.5275	2722	0.0004	0.0010	0.0015	0.0020	0.0023	0.0027
42	0.2583	0.5246	2801	0.0005	0.0011	0.0013	0.0018	0.0023	0.0028
43	0.2602	0.5297	2737	0.0003	0.0010	0.0015	0.0019	0.0023	0.0027
44	0.2637	0.5279	2673	0.0004	0.0009	0.0013	0.0019	0.0022	0.0028
45	0.2581	0.5271	2795	0.0004	0.0012	0.0016	0.0022	0.0025	0.0028
46	0.2593	0.5233	2785	0.0004	0.0011	0.0015	0.0020	0.0025	0.0031
47	0.2567	0.5279	2822	0.0003	0.0008	0.0011	0.0018	0.0023	0.0027
48	0.2583	0.5247	2801	0.0004	0.0010	0.0015	0.0020	0.0023	0.0029
49	0.2590	0.5261	2780	0.0004	0.0010	0.0014	0.0020	0.0023	0.0027
50	0.2598	0.5284	2753	0.0004	0.0010	0.0015	0.0021	0.0024	0.0029
Ave.	0.2591	0.5264	2777	0.0004	0.0010	0.0014	0.0020	0.0023	0.0027
Med.	0.2590	0.5269	2781	0.0004	0.0010	0.0014	0.0020	0.0023	0.0027
st dev	0.0021	0.0022	51.0857	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002
Min.	0.2553	0.5229	2673	0.0002	0.0008	0.0011	0.0015	0.0017	0.0021
Max.	0.2637	0.5305	2858	0.0005	0.0012	0.0017	0.0022	0.0026	0.0031



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

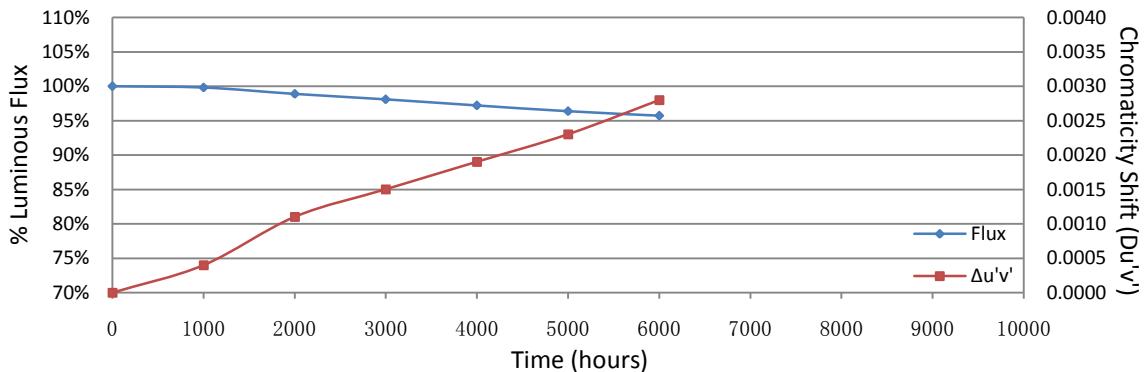
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	2.886	33.82	100.06	99.38	98.76	97.84	97.52	95.86
52	2.885	33.86	100.03	98.88	97.96	97.08	96.43	96.22
53	2.886	34.31	99.80	98.63	97.84	96.85	96.18	95.42
54	2.868	34.03	100.29	99.06	98.21	97.47	96.71	96.21
55	2.880	34.42	99.74	99.01	98.34	97.18	96.22	95.55
56	2.885	33.49	99.91	98.90	98.00	97.16	96.45	95.67
57	2.872	34.29	99.74	98.95	98.16	97.14	96.15	95.39
58	2.877	34.42	100.03	99.22	98.37	97.47	96.08	95.32
59	2.896	33.85	99.76	98.97	98.32	97.37	95.98	95.33
60	2.876	33.66	100.09	98.84	97.89	97.06	96.20	95.72
61	2.873	33.27	100.24	99.37	98.32	97.45	96.15	96.12
62	2.885	34.08	100.09	99.21	98.44	97.51	96.33	95.83
63	2.874	34.23	99.88	98.86	97.96	97.11	95.94	95.24
64	2.874	33.78	99.97	99.32	98.70	97.81	96.95	96.33
65	2.869	34.32	99.68	98.92	98.11	97.38	97.06	95.37
66	2.890	33.40	99.49	98.86	98.14	97.25	96.53	95.72
67	2.881	33.99	99.15	98.09	97.15	96.32	96.12	96.09
68	2.873	33.12	99.37	98.40	97.46	96.53	95.77	95.41
69	2.881	33.98	99.59	98.73	97.97	97.03	96.17	95.50
70	2.881	34.15	99.97	99.03	98.13	97.25	96.66	96.43
71	2.888	33.40	99.25	97.87	97.07	96.08	95.33	95.27
72	2.874	33.92	99.73	99.06	98.38	97.46	96.23	96.08
73	2.878	33.36	99.88	98.86	97.99	97.18	95.65	95.47
74	2.877	33.83	99.76	98.99	98.32	97.40	96.54	95.45
75	2.884	34.71	99.60	98.82	98.16	97.21	97.09	95.88
Ave.	2.880	33.91	99.80	98.89	98.09	97.18	96.34	95.72
Med.	2.880	33.92	99.80	98.92	98.14	97.21	96.22	95.67
st dev	0.0069	0.4072	0.2877	0.3530	0.4005	0.4048	0.4813	0.3661
Min.	2.868	33.12	99.15	97.87	97.07	96.08	95.33	95.24
Max.	2.896	34.71	100.29	99.38	98.76	97.84	97.52	96.43

**TM-21 Projection:**

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
**α:** 8.469E-06  
**β:** 1.006  
**Calculated L<sub>70</sub>:** 43,000 hours  
**Reported L<sub>70</sub>:** >36,000 hours

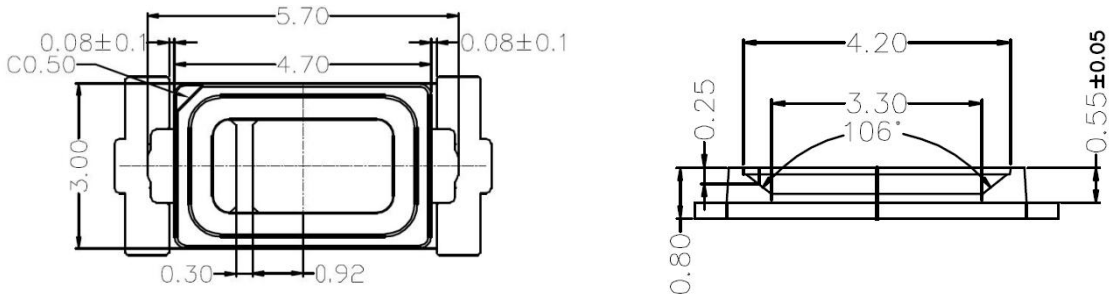
**3.6 Data Set 3, 105 °C, 120 mA (Chromaticity Shift)**

No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	0.2577	0.5229	2824	0.0006	0.0013	0.0015	0.0021	0.0026	0.0031
52	0.2560	0.5216	2870	0.0003	0.0012	0.0013	0.0017	0.0024	0.0031
53	0.2580	0.5260	2801	0.0003	0.0010	0.0011	0.0017	0.0022	0.0027
54	0.2586	0.5298	2771	0.0002	0.0009	0.0012	0.0015	0.0020	0.0025
55	0.2574	0.5246	2821	0.0002	0.0010	0.0015	0.0018	0.0022	0.0028
56	0.2590	0.5253	2784	0.0003	0.0011	0.0014	0.0017	0.0022	0.0025
57	0.2564	0.5247	2843	0.0003	0.0010	0.0013	0.0016	0.0021	0.0024
58	0.2590	0.5280	2771	0.0004	0.0010	0.0014	0.0018	0.0020	0.0027
59	0.2579	0.5265	2802	0.0004	0.0012	0.0017	0.0019	0.0024	0.0029
60	0.2591	0.5277	2770	0.0002	0.0009	0.0015	0.0018	0.0022	0.0027
61	0.2605	0.5239	2758	0.0004	0.0012	0.0017	0.0023	0.0024	0.0031
62	0.2562	0.5236	2854	0.0003	0.0010	0.0014	0.0019	0.0021	0.0026
63	0.2575	0.5259	2814	0.0003	0.0010	0.0014	0.0021	0.0023	0.0027
64	0.2589	0.5288	2769	0.0003	0.0011	0.0015	0.0022	0.0023	0.0028
65	0.2586	0.5288	2775	0.0004	0.0011	0.0014	0.0017	0.0021	0.0026
66	0.2608	0.5294	2727	0.0003	0.0009	0.0011	0.0017	0.0023	0.0027
67	0.2576	0.5235	2822	0.0006	0.0012	0.0016	0.0018	0.0025	0.0030
68	0.2616	0.5226	2738	0.0005	0.0012	0.0016	0.0019	0.0020	0.0026
69	0.2580	0.5220	2821	0.0005	0.0013	0.0015	0.0022	0.0028	0.0033
70	0.2572	0.5263	2819	0.0005	0.0012	0.0015	0.0019	0.0022	0.0028
71	0.2615	0.5307	2707	0.0006	0.0012	0.0016	0.0019	0.0022	0.0027
72	0.2575	0.5257	2814	0.0004	0.0011	0.0014	0.0019	0.0020	0.0025
73	0.2612	0.5271	2729	0.0005	0.0013	0.0017	0.0024	0.0026	0.0031
74	0.2600	0.5265	2756	0.0005	0.0012	0.0016	0.0022	0.0025	0.0030
75	0.2552	0.5264	2863	0.0005	0.0014	0.0017	0.0025	0.0025	0.0028
Ave.	0.2585	0.5259	2793	0.0004	0.0011	0.0015	0.0019	0.0023	0.0028
Med.	0.2580	0.5260	2801	0.0004	0.0011	0.0015	0.0019	0.0022	0.0027
st dev	0.0017	0.0025	43.8120	0.0127	0.0142	0.0178	0.0253	0.0002	0.0002
Min.	0.2552	0.5216	2707	0.0002	0.0009	0.0011	0.0015	0.0020	0.0024
Max.	0.2616	0.5307	2870	0.0006	0.0014	0.0017	0.0025	0.0028	0.0033



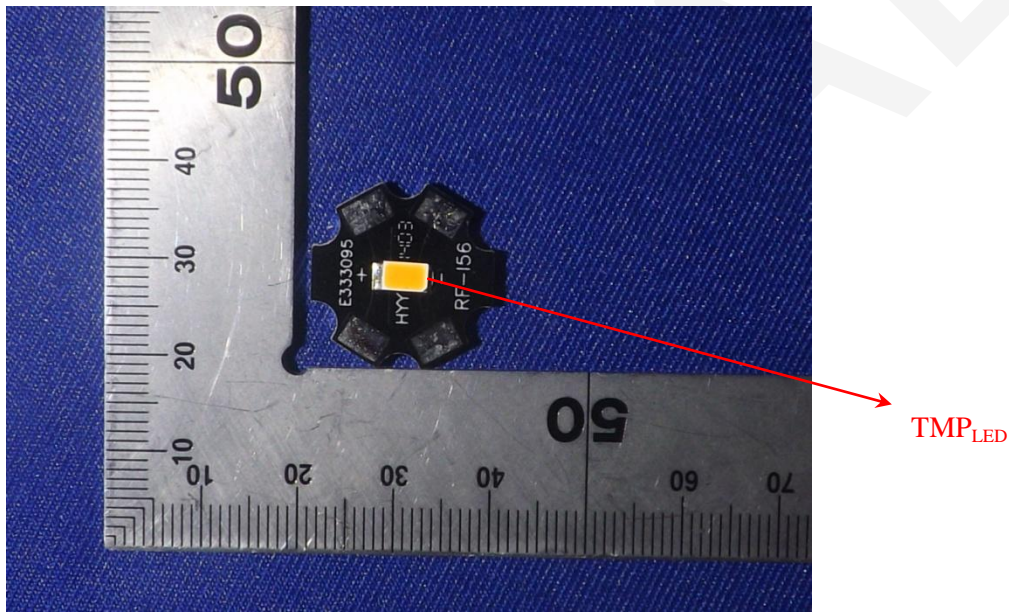
## Appendix A – EUT PHOTO

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



All dimensions are in millimeter

### A.2 EUT Photo



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