

# IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

## MEASUREMENT AND TEST REPORT

For

### Xiamen Dacol Photoelectronics Technology Co., Ltd.

8021 Xiang'an West Road(Xiang'an) industrial zone, Torch Hi-Tech Industrial Development Zone , Xiamen City,Fujian,China

**Model:2835**

<b>Report Type:</b> 6000 Hours Test Report		<b>Product Type:</b> LED Package	
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<b>Report Number:</b>	R2DG130530050-10		
<b>Test Date:</b>	2013-06-25 to 2014-03-06		
<b>Report Date:</b>	2014-03-11		
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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: 2835  
 Part Name: SMD  
 Part Type: LED Package  
 Nominal CCT: 3500K

### 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

### 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 2013-05-30 and tested during 2013-06-25 to 2014-03-06. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

#### Data Set 1: 55 °C, 60mA

Part Number:	2835
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> =53.7 °C
Life Test Drive Current:	I <sub>F</sub> = 60mA
Measurement Current:	I <sub>F</sub> = 60mA

#### Data Set 2: 85°C, 60mA

Part Number:	2835
Number of Units:	25
Actual Case Temperature(T <sub>S</sub> ):	T <sub>S</sub> =85.4 °C
Actual Ambient Temperature(T <sub>A</sub> ):	T <sub>A</sub> =83.6 °C
Life Test Drive Current:	I <sub>F</sub> = 60mA
Measurement Current:	I <sub>F</sub> = 60mA

#### Data Set 3: 105 °C, 60mA

Part Number:	2835
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> =103.5 °C
Life Test Drive Current:	I <sub>F</sub> = 60mA
Measurement Current:	I <sub>F</sub> = 60mA

## 2 - SUMMARY OF TEST RESULT

<b>Data Set:</b>	<b>Data Set 1, 55 °C, 60mA</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:	97.42%
Average Chromaticity Shift at 6000 hours ( $\Delta u'v'$ ):	0.0015
Reported TM-21 L <sub>70</sub> Lifetime:	>36,000 hours

<b>Data Set:</b>	<b>Data Set 2, 85°C, 60mA</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:	97.04%
Average Chromaticity Shift at 6000 hours( $\Delta u'v'$ ):	0.0017
Reported TM-21 L <sub>70</sub> Lifetime	>36,000 hours

<b>Data Set:</b>	<b>Data Set 3, 105 °C, 60mA</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:	96.43%
Average Chromaticity Shift at 6000 hours( $\Delta u'v'$ ):	0.0017
Reported TM-21 L <sub>70</sub> Lifetime	>36,000 hours

### 3 - Test Data

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

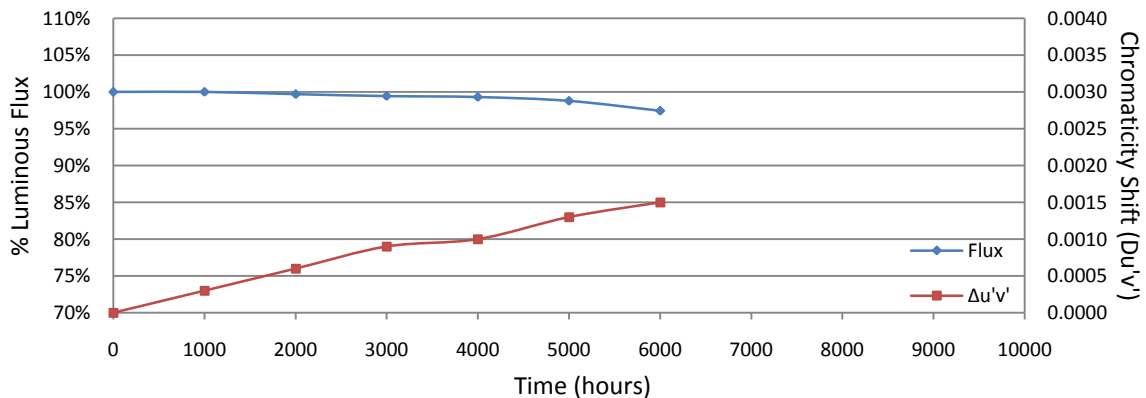
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	2.859	23.79	100.04	99.66	99.50	99.41	98.65	97.31
2	2.861	23.95	99.92	99.50	99.33	99.16	98.71	97.04
3	2.904	23.89	99.96	99.54	99.41	99.25	98.49	97.03
4	2.917	24.53	99.92	99.67	99.47	99.35	98.70	97.11
5	2.891	24.25	100.00	99.63	99.22	99.18	98.85	97.44
6	2.895	24.16	100.08	99.63	99.46	99.25	98.72	97.39
7	2.898	24.02	100.17	99.67	99.46	99.33	98.88	97.63
8	2.891	24.15	100.00	99.59	99.21	99.05	98.80	97.85
9	2.927	24.67	100.04	99.55	99.11	98.99	98.62	97.32
10	2.869	23.92	99.87	99.79	99.29	99.21	99.04	97.74
11	2.867	24.16	100.00	99.79	99.54	99.46	99.05	97.10
12	2.887	23.50	99.96	99.66	99.45	99.15	98.77	97.70
13	2.887	23.88	99.96	99.50	99.33	99.16	98.83	97.45
14	2.886	24.08	99.92	99.63	99.42	99.29	99.04	97.76
15	2.911	24.34	99.88	99.55	99.47	99.34	98.73	97.49
16	2.904	23.93	100.04	99.71	99.54	99.41	98.83	97.70
17	2.877	24.11	100.04	99.63	99.54	99.50	99.05	97.72
18	2.911	24.44	99.96	99.80	99.63	99.51	98.94	97.59
19	2.890	24.39	100.12	99.88	99.75	99.63	99.18	97.05
20	2.869	23.93	99.96	99.79	99.37	99.21	98.50	97.37
21	2.875	24.42	100.00	99.75	99.63	99.55	98.69	97.50
22	2.895	24.06	99.92	99.67	99.63	99.54	98.67	97.42
23	2.888	24.32	99.96	99.75	99.51	99.38	98.81	97.45
24	2.898	24.05	100.08	99.71	99.29	99.21	98.59	97.13
25	2.901	23.87	100.08	99.87	99.29	99.20	98.62	97.28
Ave.	2.890	24.11	100.00	99.68	99.43	99.31	98.79	97.42
Med.	2.891	24.08	100.00	99.67	99.46	99.29	98.77	97.44
st dev	0.0175	0.2639	0.0760	0.1079	0.1522	0.1651	0.1813	0.2501
Min.	2.859	23.50	99.87	99.50	99.11	98.99	98.49	97.03
Max.	2.927	24.67	100.17	99.88	99.75	99.63	99.18	97.85

TM-21 Projection:

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
 $\alpha$ : 4.537E-06  
 $\beta$ : 1.007  
**Calculated L<sub>70</sub>:** 80,000 hours  
**Reported L<sub>70</sub>:** >36,000hours

### 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	6000hrs
1	0.2363	0.5039	3568	0.0004	0.0008	0.0010	0.0010	0.0013	0.0014
2	0.2354	0.5041	3594	0.0003	0.0008	0.0010	0.0012	0.0014	0.0015
3	0.2357	0.5034	3595	0.0004	0.0007	0.0009	0.0011	0.0015	0.0017
4	0.2367	0.5063	3527	0.0004	0.0005	0.0010	0.0011	0.0013	0.0016
5	0.2354	0.5073	3555	0.0004	0.0005	0.0010	0.0010	0.0015	0.0017
6	0.2352	0.5068	3570	0.0001	0.0003	0.0010	0.0010	0.0014	0.0015
7	0.2366	0.5043	3553	0.0003	0.0004	0.0006	0.0009	0.0012	0.0017
8	0.2364	0.5032	3572	0.0001	0.0005	0.0006	0.0009	0.0013	0.0015
9	0.2359	0.5071	3541	0.0003	0.0004	0.0006	0.0007	0.0012	0.0015
10	0.2352	0.5076	3560	0.0004	0.0005	0.0006	0.0006	0.0013	0.0017
11	0.2360	0.5069	3540	0.0001	0.0006	0.0010	0.0010	0.0012	0.0016
12	0.2377	0.5028	3533	0.0004	0.0008	0.0009	0.0011	0.0013	0.0016
13	0.2360	0.5077	3530	0.0002	0.0005	0.0008	0.0009	0.0011	0.0013
14	0.2354	0.5065	3566	0.0005	0.0008	0.0010	0.0010	0.0010	0.0012
15	0.2365	0.5066	3530	0.0004	0.0007	0.0010	0.0013	0.0015	0.0017
16	0.2354	0.5021	3621	0.0002	0.0006	0.0007	0.0008	0.0014	0.0014
17	0.2354	0.5026	3615	0.0002	0.0003	0.0009	0.0009	0.0014	0.0015
18	0.2358	0.5056	3563	0.0001	0.0005	0.0007	0.0008	0.0013	0.0014
19	0.2365	0.5072	3523	0.0004	0.0007	0.0010	0.0010	0.0012	0.0015
20	0.2367	0.5051	3541	0.0004	0.0006	0.0008	0.0007	0.0010	0.0013
21	0.2368	0.5076	3507	0.0001	0.0008	0.0011	0.0011	0.0011	0.0014
22	0.2357	0.5048	3576	0.0001	0.0004	0.0011	0.0012	0.0013	0.0014
23	0.2367	0.5069	3518	0.0004	0.0005	0.0011	0.0012	0.0013	0.0014
24	0.2358	0.5021	3607	0.0005	0.0007	0.0009	0.0012	0.0013	0.0014
25	0.2363	0.5063	3539	0.0001	0.0006	0.0008	0.0010	0.0011	0.0011
Ave.	0.2361	0.5054	3558	0.0003	0.0006	0.0009	0.0010	0.0013	0.0015
Med.	0.2360	0.5063	3555	0.0003	0.0006	0.0009	0.0010	0.0013	0.0015
st dev	0.0006	0.0019	30.9681	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002
Min.	0.2352	0.5021	3507	0.0001	0.0003	0.0006	0.0006	0.0010	0.0011
Max.	0.2377	0.5077	3621	0.0005	0.0008	0.0011	0.0013	0.0015	0.0017





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

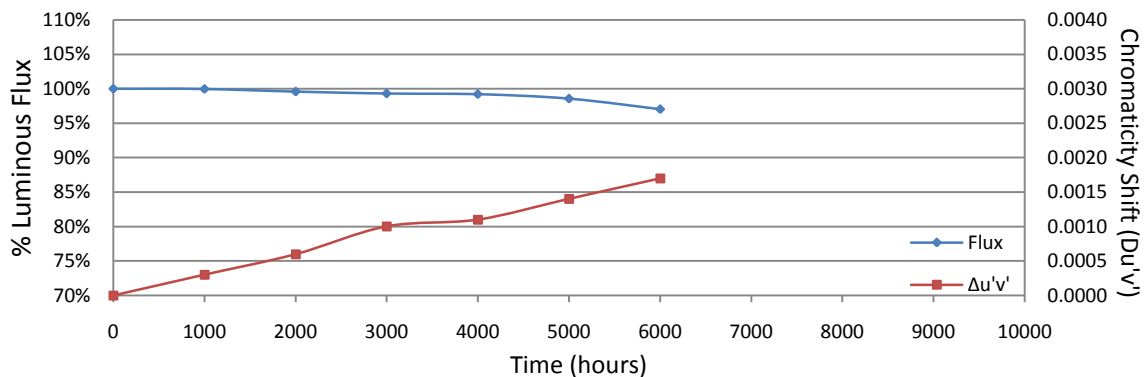
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	2.877	24.21	99.96	99.59	99.22	98.97	98.39	97.27
27	2.901	23.52	100.21	99.66	99.45	99.15	98.68	97.28
28	2.880	24.19	99.92	99.79	99.50	99.46	98.59	96.69
29	2.874	24.64	100.00	99.84	99.39	99.31	98.66	96.67
30	2.891	23.96	99.87	99.62	99.25	99.21	98.75	97.37
31	2.906	24.46	99.84	99.59	99.39	98.98	98.45	97.14
32	2.860	24.09	99.88	99.79	99.71	99.58	98.80	97.47
33	2.906	23.86	99.87	99.75	99.37	99.20	98.28	97.07
34	2.862	23.79	100.08	99.58	99.16	99.12	98.78	97.27
35	2.881	24.26	100.12	99.46	99.09	98.80	98.47	96.95
36	2.866	24.31	99.79	99.42	99.22	99.10	98.15	96.91
37	2.895	23.79	99.87	99.62	99.45	99.33	98.65	97.10
38	2.880	24.17	100.12	99.88	99.63	99.59	98.92	97.23
39	2.871	24.37	100.08	99.59	99.30	99.22	98.85	97.58
40	2.906	24.35	99.96	99.51	99.38	99.30	98.85	96.80
41	2.866	24.26	100.12	99.46	99.18	99.13	98.56	96.83
42	2.859	24.21	99.96	99.59	99.46	99.34	98.43	97.03
43	2.869	24.19	99.88	99.55	99.26	99.17	98.51	97.02
44	2.887	24.21	100.12	99.50	99.26	99.09	98.22	96.74
45	2.890	23.92	100.04	99.41	99.08	98.95	98.33	96.95
46	2.898	24.09	99.96	99.42	99.34	99.25	98.30	96.55
47	2.888	24.02	99.83	99.38	99.13	99.08	98.67	96.96
48	2.925	24.23	99.96	99.63	99.50	99.42	98.80	97.15
49	2.912	24.38	100.00	99.59	99.30	99.22	98.65	97.05
50	2.881	24.13	99.83	99.34	99.01	98.72	98.14	96.85
Ave.	2.885	24.14	99.97	99.58	99.32	99.19	98.56	97.04
Med.	2.881	24.19	99.96	99.59	99.30	99.20	98.59	97.03
st dev	0.0177	0.2416	0.1155	0.1448	0.1723	0.2121	0.2314	0.2559
Min.	2.859	23.52	99.79	99.34	99.01	98.72	98.14	96.55
Max.	2.925	24.64	100.21	99.88	99.71	99.59	98.92	97.58

TM-21 Projection:

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
 $\alpha$ : 5.173E-06  
 $\beta$ : 1.007  
**Calculated L<sub>70</sub>:** 70,000 hours  
**Reported L<sub>70</sub>:** >36,000hours

### 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
26	0.2366	0.5054	3541	0.0001	0.0002	0.0008	0.0010	0.0013	0.0015
27	0.2358	0.5012	3619	0.0004	0.0006	0.0009	0.0011	0.0016	0.0016
28	0.2369	0.5025	3564	0.0003	0.0004	0.0010	0.0011	0.0013	0.0015
29	0.2350	0.5085	3556	0.0003	0.0004	0.0007	0.0008	0.0013	0.0014
30	0.2366	0.5079	3510	0.0002	0.0003	0.0007	0.0010	0.0014	0.0016
31	0.2370	0.5082	3494	0.0002	0.0003	0.0008	0.0011	0.0014	0.0017
32	0.2351	0.5073	3565	0.0004	0.0005	0.0009	0.0012	0.0016	0.0019
33	0.2361	0.5047	3566	0.0002	0.0006	0.0009	0.0011	0.0014	0.0017
34	0.2356	0.5040	3591	0.0000	0.0008	0.0008	0.0010	0.0014	0.0017
35	0.2353	0.5065	3569	0.0002	0.0007	0.0009	0.0011	0.0014	0.0017
36	0.2349	0.5071	3576	0.0003	0.0008	0.0009	0.0011	0.0014	0.0018
37	0.2365	0.5012	3595	0.0006	0.0008	0.0009	0.0012	0.0012	0.0016
38	0.2370	0.5081	3494	0.0000	0.0006	0.0012	0.0012	0.0013	0.0016
39	0.2357	0.5075	3542	0.0004	0.0006	0.0013	0.0013	0.0015	0.0017
40	0.2367	0.5052	3537	0.0005	0.0006	0.0011	0.0011	0.0013	0.0015
41	0.2362	0.5103	3494	0.0002	0.0005	0.0010	0.0012	0.0015	0.0016
42	0.2359	0.5090	3522	0.0004	0.0006	0.0009	0.0010	0.0012	0.0015
43	0.2351	0.5070	3571	0.0004	0.0007	0.0010	0.0011	0.0012	0.0015
44	0.2359	0.5062	3555	0.0003	0.0009	0.0011	0.0012	0.0015	0.0017
45	0.2354	0.5044	3594	0.0001	0.0006	0.0013	0.0014	0.0015	0.0019
46	0.2363	0.5057	3546	0.0004	0.0008	0.0013	0.0012	0.0013	0.0016
47	0.2362	0.5041	3569	0.0003	0.0009	0.0013	0.0013	0.0015	0.0017
48	0.2360	0.5071	3537	0.0001	0.0008	0.0011	0.0012	0.0014	0.0019
49	0.2363	0.5068	3533	0.0002	0.0006	0.0009	0.0011	0.0012	0.0016
50	0.2357	0.5039	3587	0.0004	0.0006	0.0010	0.0012	0.0015	0.0018
Ave.	0.2360	0.5060	3553	0.0003	0.0006	0.0010	0.0011	0.0014	0.0017
Med.	0.2360	0.5065	3556	0.0003	0.0006	0.0009	0.0011	0.0014	0.0016
st dev	0.0006	0.0023	33.3491	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Min.	0.2349	0.5012	3494	0.0000	0.0002	0.0007	0.0008	0.0012	0.0014
Max.	0.2370	0.5103	3619	0.0006	0.0009	0.0013	0.0014	0.0016	0.0019



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

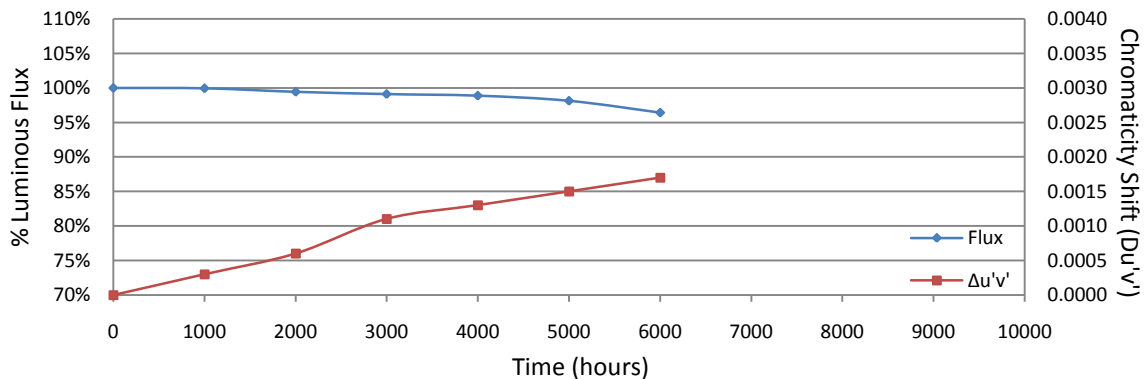
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	2.906	24.02	99.79	99.25	98.96	98.92	98.50	96.67
52	2.915	24.39	100.04	99.47	99.10	98.85	98.36	96.76
53	2.906	24.06	100.08	99.63	99.38	99.25	98.63	97.01
54	2.886	24.18	99.88	99.26	99.05	98.84	97.93	96.11
55	2.908	23.88	99.96	99.66	99.33	99.16	98.58	96.94
56	2.881	24.20	99.83	99.42	99.01	98.88	97.77	95.91
57	2.896	23.48	100.17	99.40	98.98	98.94	98.38	96.51
58	2.875	24.14	100.08	99.25	98.84	98.72	97.93	95.94
59	2.902	24.64	99.88	99.55	98.94	98.78	98.21	96.27
60	2.878	24.21	99.96	99.26	98.80	98.68	97.73	95.83
61	2.927	24.16	100.08	99.21	98.84	98.63	97.81	95.90
62	2.922	24.23	100.00	99.46	99.34	98.89	98.43	96.37
63	2.910	24.01	99.83	99.29	98.88	98.63	97.96	95.96
64	2.870	23.97	100.08	99.54	99.08	98.92	97.87	95.87
65	2.901	24.14	99.96	99.50	98.84	98.72	98.05	96.56
66	2.864	24.38	99.84	99.63	99.26	99.02	98.15	96.35
67	2.917	24.35	100.04	99.47	99.14	99.06	98.23	96.63
68	2.875	24.91	99.84	99.32	98.92	98.84	98.39	96.95
69	2.920	24.30	99.88	99.42	99.26	99.09	98.48	96.87
70	2.893	24.33	100.08	99.67	99.26	98.77	98.11	96.96
71	2.903	23.86	99.92	99.33	99.08	98.91	98.11	96.31
72	2.915	24.27	99.84	99.59	99.34	98.93	98.02	96.74
73	2.907	24.29	99.88	99.51	98.81	98.60	97.78	96.13
74	2.874	24.09	99.96	99.63	99.38	98.92	98.13	96.68
75	2.914	24.10	99.92	99.59	99.42	99.09	98.17	96.56
Ave.	2.899	24.18	99.95	99.45	99.09	98.88	98.15	96.43
Med.	2.903	24.18	99.96	99.47	99.08	98.89	98.13	96.51
st dev	0.0183	0.2686	0.1061	0.1476	0.2073	0.1697	0.2669	0.3915
Min.	2.864	23.48	99.79	99.21	98.80	98.60	97.73	95.83
Max.	2.927	24.91	100.17	99.67	99.42	99.25	98.63	97.01

## TM-21 Projection:

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
 $\alpha$ : 6.310E-06  
 $\beta$ : 1.009  
**Calculated L<sub>70</sub>:** 58,000 hours  
**Reported L<sub>70</sub>:** >36,000hours

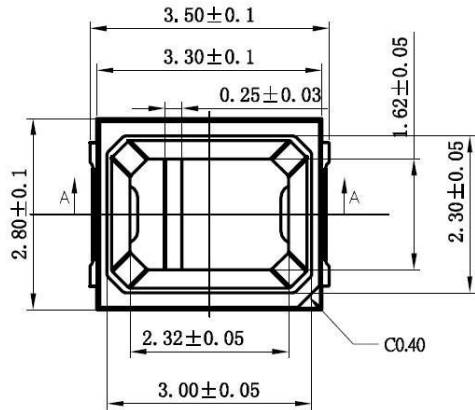
### 3.6 Data Set 3, 105 °C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	0.2373	0.5059	3511	0.0002	0.0004	0.0009	0.0011	0.0014	0.0016
52	0.2361	0.5070	3537	0.0002	0.0006	0.0012	0.0013	0.0016	0.0017
53	0.2372	0.5042	3535	0.0002	0.0007	0.0011	0.0012	0.0015	0.0016
54	0.2373	0.5037	3536	0.0003	0.0006	0.0012	0.0012	0.0016	0.0018
55	0.2365	0.5041	3560	0.0001	0.0007	0.0011	0.0013	0.0014	0.0018
56	0.2360	0.5035	3582	0.0002	0.0006	0.0010	0.0010	0.0013	0.0018
57	0.2363	0.5008	3609	0.0002	0.0007	0.0012	0.0012	0.0013	0.0017
58	0.2368	0.5072	3513	0.0001	0.0007	0.0010	0.0012	0.0014	0.0015
59	0.2373	0.5086	3479	0.0003	0.0007	0.0012	0.0013	0.0016	0.0019
60	0.2356	0.5090	3529	0.0002	0.0005	0.0011	0.0014	0.0016	0.0016
61	0.2359	0.5023	3601	0.0003	0.0006	0.0010	0.0013	0.0015	0.0018
62	0.2360	0.5032	3587	0.0004	0.0009	0.0010	0.0012	0.0013	0.0016
63	0.2358	0.5068	3550	0.0003	0.0006	0.0010	0.0013	0.0014	0.0018
64	0.2358	0.5045	3577	0.0003	0.0006	0.0012	0.0014	0.0015	0.0016
65	0.2360	0.5070	3541	0.0005	0.0007	0.0010	0.0012	0.0015	0.0017
66	0.2367	0.5096	3488	0.0004	0.0006	0.0010	0.0013	0.0016	0.0018
67	0.2360	0.5068	3541	0.0004	0.0006	0.0012	0.0014	0.0014	0.0018
68	0.2349	0.5077	3566	0.0002	0.0007	0.0010	0.0012	0.0015	0.0018
69	0.2365	0.5073	3522	0.0003	0.0006	0.0011	0.0013	0.0013	0.0017
70	0.2363	0.5093	3504	0.0004	0.0006	0.0011	0.0013	0.0015	0.0018
71	0.2371	0.5049	3530	0.0004	0.0007	0.0011	0.0013	0.0014	0.0017
72	0.2366	0.5072	3519	0.0003	0.0006	0.0013	0.0015	0.0015	0.0018
73	0.2363	0.5052	3553	0.0001	0.0006	0.0013	0.0015	0.0016	0.0017
74	0.2362	0.5070	3532	0.0001	0.0006	0.0011	0.0013	0.0016	0.0017
75	0.2358	0.5024	3603	0.0004	0.0007	0.0011	0.0012	0.0013	0.0016
Ave.	0.2363	0.5058	3544	0.0003	0.0006	0.0011	0.0013	0.0015	0.0017
Med.	0.2363	0.5068	3537	0.0003	0.0006	0.0011	0.0013	0.0015	0.0017
st dev	0.0006	0.0024	34.8150	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2349	0.5008	3479	0.0001	0.0004	0.0009	0.0010	0.0013	0.0015
Max.	0.2373	0.5096	3609	0.0005	0.0009	0.0013	0.0015	0.0016	0.0019



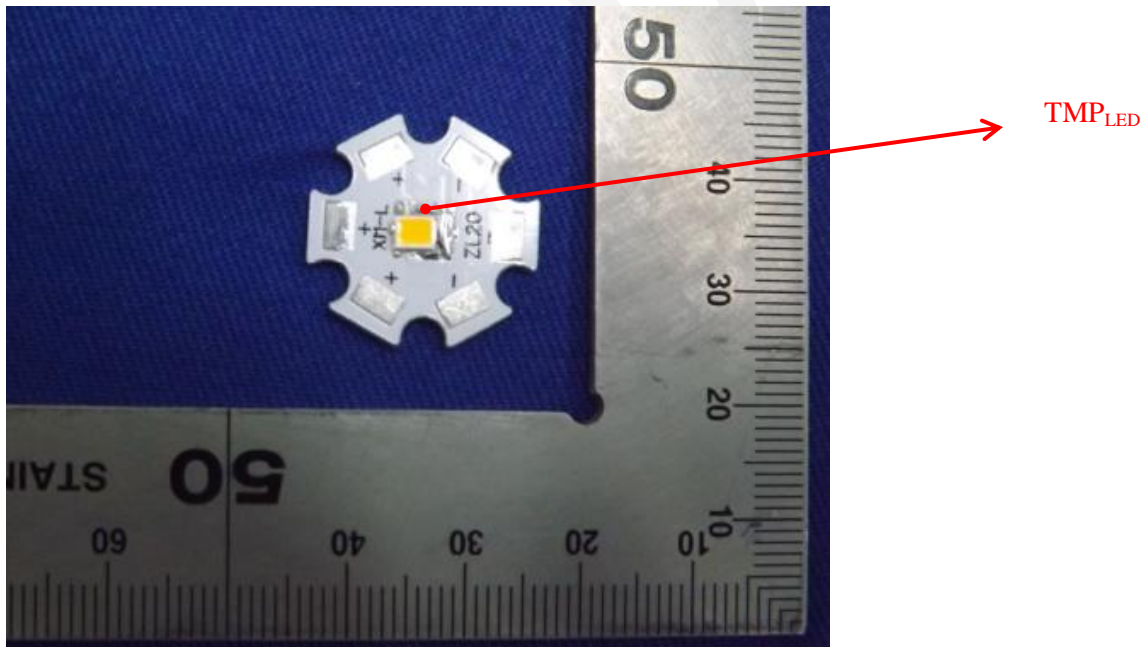
## Appendix A – EUT PHOTO

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



Unit: mm

### A.2 EUT Photo



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