



# IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

## MEASUREMENT AND TEST REPORT

For

### Shenzhen Lepower Opto Electronics Corp., Ltd

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**Model: LY-IE280101Y1833-80**

<b>Report Type:</b> 6000 Hours Test Report	<b>Product Type:</b> LED Package
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<b>Test Date:</b> 2014-11-27 to 2015-08-05	
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<b>Reviewed By:</b> Jeanne Han /EE Manager	<i>Jeanne Han</i>
<b>Revised Note:</b>	The previous report RSZ141126502-10 is replaced by this report on 2015-11-11
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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: LY-IE280101Y1833-80  
 Part Type: LED Package  
 Nominal CCT: 3000K

### 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	2015-03-25	2016-03-25
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	2015-03-25	2016-03-25
Standard Light Source	EVERFINE	D062	1011093	N/A	2014-08-05	2015-08-05
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987C J7321114	300VA	2015-03-05	2016-03-05
Multilayer aging machine	BACL	B2-270	20022	25°C~110°C	2014-10-27	2015-10-27
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	(50V/15A)	2015-7-8	2016-7-7
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	(50V/15A)	2015-03-05	2016-03-05

## 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  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 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 50Pcs;

Each Ts test condition 25Pcs

The samples tested at Ts 55°C and Ts 100°C were received at 2014-11-26 and tested during 2014-11-27 to 2015-08-05. The samples were numbered from 1to 25 and 26 to 50

#### Data Set 1: 55°C, 150mA

Part Number:	LY-IE280101Y1833-80
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> =52.8°C
Life Test Drive Current:	I <sub>F</sub> = 150mA
Measurement Current:	I <sub>F</sub> = 150mA

#### Data Set 2: 100°C,150mA

Part Number:	LY-IE280101Y1833-80
Number of Units:	25
Actual Case Temperature(T <sub>S</sub> ):	T <sub>S</sub> =98.9°C
Actual Ambient Temperature(T <sub>A</sub> ):	T <sub>A</sub> =97.5°C
Life Test Drive Current:	I <sub>F</sub> =150mA
Measurement Current:	I <sub>F</sub> = 150mA

## 2 - SUMMARY OF TEST RESULT

<b>Data Set:</b>	<b>Data Set 1, 55°C, 150mA</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:	97.20%
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, 100°C, 150mA</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:	96.23%
Average Chromaticity Shift at 6000 hours( $\Delta u'v'$ ):	0.0020
Reported TM-21 L <sub>70</sub> Lifetime:	>36,000 hours

### 3 - Test Data

#### 3.1 Data Set 1, 55°C, 150mA (Lumen Maintenance)

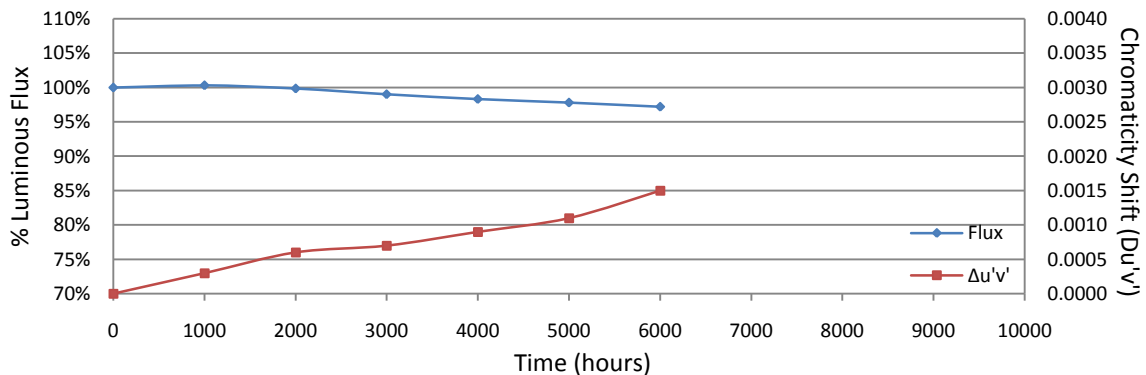
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	3.186	54.36	99.72	99.47	99.06	98.34	97.77	97.20
2	3.178	54.90	101.60	101.09	100.49	99.80	99.23	98.87
3	3.188	54.17	99.74	99.13	98.63	97.95	97.06	96.94
4	3.175	54.19	99.35	98.63	97.82	97.20	96.59	96.29
5	3.186	54.68	100.46	99.85	99.36	98.61	98.13	97.68
6	3.176	54.82	100.07	99.78	99.12	98.49	97.94	97.63
7	3.179	54.90	100.33	99.58	98.65	97.83	97.09	96.79
8	3.177	55.28	100.34	98.81	97.97	97.29	96.89	96.69
9	3.190	54.97	99.40	98.93	98.09	97.51	97.16	96.34
10	3.170	52.89	101.00	100.53	99.28	98.64	97.98	96.54
11	3.176	53.02	100.87	100.45	99.66	98.98	98.42	97.28
12	3.177	51.84	99.00	98.71	98.13	97.43	96.61	96.55
13	3.173	55.04	100.35	99.91	98.80	97.93	97.31	96.77
14	3.173	53.54	100.30	99.96	99.22	98.54	97.91	97.20
15	3.187	54.12	100.39	99.94	98.28	97.75	97.03	96.60
16	3.179	53.58	101.08	100.69	99.27	98.36	97.87	97.69
17	3.178	53.10	101.13	100.92	99.25	98.57	98.04	97.19
18	3.171	54.02	99.39	99.11	98.56	97.96	97.56	96.50
19	3.175	54.27	100.96	100.37	99.87	99.26	98.67	96.92
20	3.182	53.69	100.48	100.13	99.83	99.01	98.38	97.75
21	3.178	54.94	100.25	99.96	98.93	98.05	97.36	97.01
22	3.177	54.72	100.79	100.35	99.56	98.79	98.23	97.02
23	3.178	53.02	98.98	98.79	98.06	97.36	96.55	96.19
24	3.179	55.10	100.64	100.42	99.66	98.87	98.37	98.29
25	3.181	53.34	100.51	100.09	99.91	99.29	98.54	98.16
Ave.	3.179	54.10	100.29	99.82	99.02	98.31	97.79	97.20
Med.	3.178	54.19	100.35	99.94	99.12	98.36	97.91	97.02
st dev	0.0052	0.8805	0.6884	0.7174	0.7074	0.6936	0.7041	0.7185
Min.	3.170	51.84	98.98	98.63	97.82	97.20	96.55	96.19
Max.	3.190	55.28	101.60	101.09	100.49	99.80	99.23	98.87

TM-21 Projection:

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
 $\alpha$ : 6.437E-06  
 $\beta$ : 1.010  
**Calculated L<sub>70</sub>:** 57,000hours  
**Reported L<sub>70</sub>:** >36,000hours

**3.2 Data Set 1, 55°C, 150mA (Chromaticity Shift)**

No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2513	0.5241	2965	0.0005	0.0009	0.0007	0.0009	0.0014	0.0021
2	0.2509	0.5240	2976	0.0004	0.0008	0.0007	0.0008	0.0009	0.0013
3	0.2524	0.5253	2932	0.0002	0.0006	0.0009	0.0012	0.0014	0.0017
4	0.2525	0.5231	2942	0.0003	0.0007	0.0003	0.0004	0.0010	0.0016
5	0.2514	0.5238	2965	0.0004	0.0007	0.0005	0.0004	0.0008	0.0012
6	0.2512	0.5249	2963	0.0004	0.0006	0.0004	0.0006	0.0008	0.0016
7	0.2531	0.5226	2931	0.0003	0.0005	0.0008	0.0011	0.0012	0.0015
8	0.2538	0.5257	2898	0.0003	0.0006	0.0007	0.0009	0.0010	0.0014
9	0.2514	0.5234	2967	0.0004	0.0007	0.0005	0.0005	0.0009	0.0014
10	0.2522	0.5231	2950	0.0003	0.0005	0.0006	0.0009	0.0011	0.0016
11	0.2526	0.5227	2942	0.0003	0.0006	0.0008	0.0010	0.0008	0.0013
12	0.2526	0.5215	2949	0.0002	0.0004	0.0007	0.0011	0.0013	0.0015
13	0.2508	0.5244	2975	0.0004	0.0005	0.0008	0.0009	0.0013	0.0017
14	0.2515	0.5227	2969	0.0004	0.0005	0.0011	0.0014	0.0017	0.0020
15	0.2527	0.5248	2929	0.0003	0.0005	0.0007	0.0009	0.0012	0.0015
16	0.2529	0.5248	2924	0.0003	0.0006	0.0007	0.0009	0.0011	0.0015
17	0.2510	0.5226	2982	0.0003	0.0005	0.0006	0.0009	0.0011	0.0014
18	0.2529	0.5246	2924	0.0004	0.0006	0.0006	0.0008	0.0011	0.0014
19	0.2521	0.5240	2948	0.0003	0.0004	0.0007	0.0010	0.0012	0.0016
20	0.2540	0.5248	2898	0.0002	0.0005	0.0008	0.0009	0.0012	0.0016
21	0.2505	0.5241	2985	0.0002	0.0005	0.0007	0.0010	0.0013	0.0017
22	0.2512	0.5244	2967	0.0004	0.0006	0.0008	0.0009	0.0013	0.0015
23	0.2509	0.5216	2991	0.0004	0.0005	0.0008	0.0011	0.0012	0.0015
24	0.2523	0.5248	2939	0.0004	0.0007	0.0008	0.0010	0.0012	0.0015
25	0.2519	0.5233	2957	0.0003	0.0005	0.0008	0.0011	0.0012	0.0016
Ave.	0.2520	0.5238	2951	0.0003	0.0006	0.0007	0.0009	0.0011	0.0015
Med.	0.2521	0.5240	2950	0.0003	0.0006	0.0007	0.0009	0.0012	0.0015
st dev	0.0010	0.0011	24.9708	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002
Min.	0.2505	0.5215	2898	0.0002	0.0004	0.0003	0.0004	0.0008	0.0012
Max.	0.2540	0.5257	2991	0.0005	0.0009	0.0011	0.0014	0.0017	0.0021





**3.3 Data Set 2, 100°C, 150mA (Lumen Maintenance)**

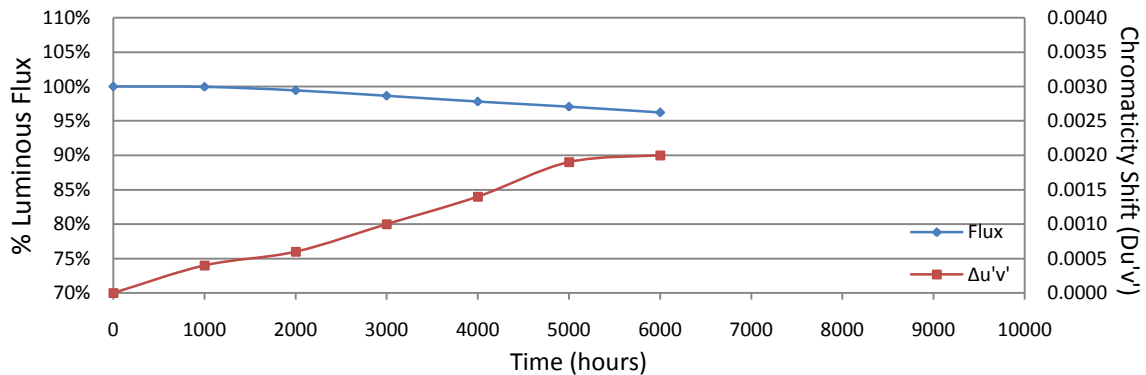
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	3.171	55.27	100.69	100.20	99.57	98.73	98.03	97.83
27	3.183	54.63	99.69	99.30	99.18	98.33	97.68	96.63
28	3.187	54.24	100.15	99.67	99.04	98.06	97.22	96.48
29	3.174	55.40	99.96	99.51	99.39	98.70	98.09	97.47
30	3.193	54.62	99.40	98.96	98.00	97.31	96.52	96.27
31	3.173	53.86	100.54	99.94	99.07	97.99	97.16	96.79
32	3.181	53.97	100.02	99.44	98.26	97.65	96.87	96.20
33	3.181	55.86	99.71	99.30	98.01	97.24	96.54	95.67
34	3.175	54.69	100.20	99.69	98.99	98.06	97.37	95.96
35	3.179	54.69	100.26	99.73	99.27	98.39	97.66	96.91
36	3.187	54.71	99.98	99.45	98.45	97.66	96.93	96.64
37	3.181	55.98	98.00	97.66	98.00	97.21	96.41	95.23
38	3.179	53.92	100.43	99.72	98.91	98.02	97.20	96.40
39	3.179	53.04	100.09	99.70	98.89	98.10	97.29	96.83
40	3.180	53.85	99.81	99.09	98.31	97.59	96.75	95.65
41	3.175	54.07	100.07	99.50	98.30	97.36	96.58	96.02
42	3.188	54.73	100.27	99.73	98.87	97.97	97.06	96.22
43	3.184	54.29	99.93	99.32	98.62	97.86	97.14	95.67
44	3.185	54.57	99.65	99.29	98.24	97.40	96.48	95.73
45	3.183	54.53	99.65	99.14	97.32	96.50	95.62	95.21
46	3.180	53.96	100.13	99.63	98.18	97.52	96.83	95.18
47	3.192	54.11	100.11	99.67	99.08	98.21	97.60	96.62
48	3.179	54.51	99.93	99.50	98.79	97.87	97.12	95.73
49	3.182	54.82	100.00	99.58	99.01	98.14	97.45	96.68
50	3.179	54.98	99.71	99.18	98.31	97.44	96.73	95.69
Ave.	3.181	54.53	99.94	99.44	98.64	97.81	97.05	96.23
Med.	3.181	54.57	100.00	99.50	98.79	97.87	97.12	96.22
st dev	0.0055	0.6544	0.5003	0.4625	0.5376	0.5081	0.5521	0.6774
Min.	3.171	53.04	98.00	97.66	97.32	96.50	95.62	95.18
Max.	3.193	55.98	100.69	100.20	99.57	98.73	98.09	97.83

**TM-21 Projection:**

**Test Duration:** 6000 hours  
**Failures Observed:** 0  
 $\alpha$ : 7.731E-06  
 $\beta$ : 1.009  
**Calculated L<sub>70</sub>:** 47,000hours  
**Reported L<sub>70</sub>:** >36,000hours

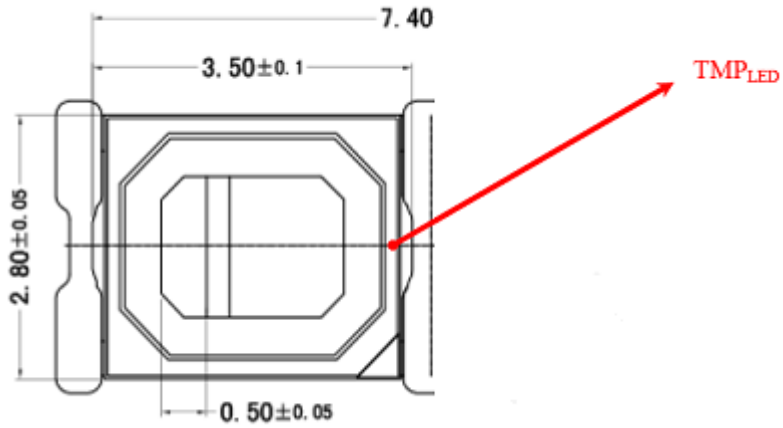
**3.4 Data Set 2, 100°C, 150mA (Chromaticity Shift)**

No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.2512	0.5248	2964	0.0004	0.0006	0.0009	0.0014	0.0018	0.0019
27	0.2525	0.5254	2930	0.0005	0.0009	0.0011	0.0015	0.0020	0.0021
28	0.2526	0.5242	2935	0.0005	0.0008	0.0011	0.0015	0.0019	0.0019
29	0.2508	0.5247	2975	0.0003	0.0006	0.0010	0.0016	0.0018	0.0019
30	0.2524	0.5238	2941	0.0004	0.0007	0.0010	0.0015	0.0019	0.0019
31	0.2508	0.5234	2983	0.0004	0.0007	0.0010	0.0014	0.0018	0.0018
32	0.2532	0.5225	2930	0.0004	0.0008	0.0011	0.0016	0.0019	0.0018
33	0.2501	0.5242	2995	0.0005	0.0008	0.0012	0.0017	0.0021	0.0019
34	0.2511	0.5241	2970	0.0004	0.0006	0.0009	0.0012	0.0018	0.0017
35	0.2461	0.5165	3149	0.0003	0.0006	0.0008	0.0012	0.0018	0.0019
36	0.2497	0.5238	3008	0.0006	0.0007	0.0011	0.0017	0.0021	0.0024
37	0.2518	0.5238	2956	0.0003	0.0006	0.0011	0.0014	0.0019	0.0022
38	0.2518	0.5226	2962	0.0004	0.0006	0.0009	0.0013	0.0017	0.0019
39	0.2514	0.5233	2968	0.0004	0.0007	0.0010	0.0013	0.0017	0.0020
40	0.2534	0.5245	2914	0.0003	0.0006	0.0011	0.0015	0.0020	0.0022
41	0.2519	0.5239	2952	0.0003	0.0005	0.0011	0.0013	0.0019	0.0021
42	0.2517	0.5242	2956	0.0003	0.0005	0.0010	0.0014	0.0017	0.0020
43	0.2520	0.5231	2955	0.0004	0.0006	0.0011	0.0016	0.0018	0.0021
44	0.2519	0.5242	2951	0.0003	0.0005	0.0008	0.0013	0.0016	0.0019
45	0.2511	0.5233	2974	0.0006	0.0008	0.0012	0.0017	0.0022	0.0025
46	0.2517	0.5241	2955	0.0003	0.0006	0.0010	0.0015	0.0020	0.0021
47	0.2521	0.5245	2943	0.0003	0.0006	0.0009	0.0014	0.0020	0.0021
48	0.2498	0.5223	3013	0.0003	0.0006	0.0008	0.0013	0.0019	0.0019
49	0.2513	0.5243	2963	0.0003	0.0005	0.0008	0.0013	0.0017	0.0018
50	0.2530	0.5242	2925	0.0004	0.0006	0.0008	0.0013	0.0018	0.0019
Ave.	0.2514	0.5236	2967	0.0004	0.0006	0.0010	0.0014	0.0019	0.0020
Med.	0.2517	0.5241	2956	0.0004	0.0006	0.0010	0.0014	0.0019	0.0019
st dev	0.0015	0.0016	45.0599	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
Min.	0.2461	0.5165	2914	0.0003	0.0005	0.0008	0.0012	0.0016	0.0017
Max.	0.2534	0.5254	3149	0.0006	0.0009	0.0012	0.0017	0.0022	0.0025



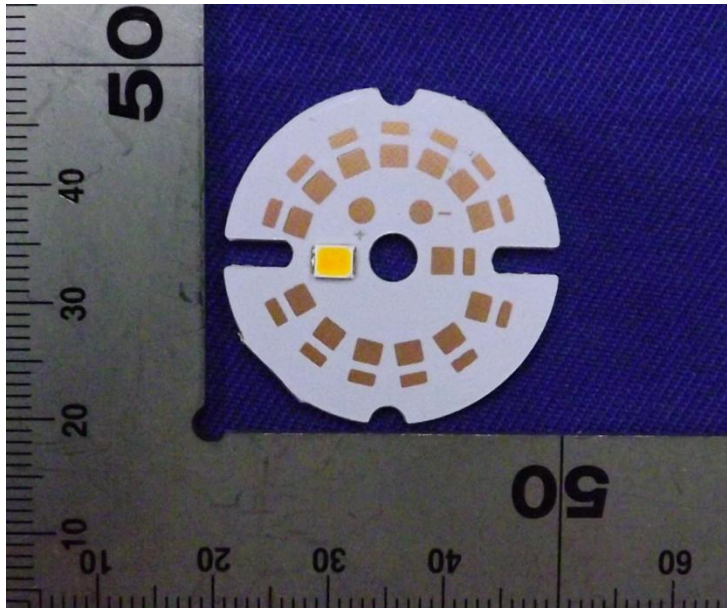
## Appendix A – EUT PHOTO

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



All dimensions are in millimeter

### A.2 EUT Photo



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