



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Shenzhen Lepower Opto Electronics Corp.,Ltd

Building B,Chuangfu Science Technology Park,Beihuan Rd.,Shiyan Town,Bao' an District,Shenzhen

Model:LY-IE300102Y1833-80

Report Type: 6000 Hours Test Report	Product Type: LED Package
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Report Number: RSZ141126503-10	
Test Date: 2014-11-27 to 2015-08-07	
Report Date: 2015-08-14	
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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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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, 320MA (LUMEN MAINTENANCE)	7
3.2 DATA SET 1, 55 °C, 320MA (CHROMATICITY SHIFT)	8
3.3 DATA SET 2, 100 °C, 320MA (LUMEN MAINTENANCE)	9
3.4 DATA SET 2, 100 °C, 320MA (CHROMATICITY SHIFT)	10
APPENDIX A – EUT PHOTO	11
A.1 MECHANICAL DIMENSIONS (TA = 25 °C)	11
A.2 EUT PHOTO	11

1 - GENERAL INFORMATION

1.1 Description of LED Light Sources

Devices tested

Part Number: LY-IE300102Y1833-80
 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	2015-08-05	2016-08-05
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	11090009	(50V/15A)	2015-07-08	2016-07-07
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090004	(50V/15A)	2015-03-05	2016-03-04

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 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 2015-08-07. The samples were numbered from 1to 25 and 26 to 50

Data Set 1: 55 °C, 320mA

Part Number:	LY-IE300102Y1833-80
Number of Units:	25
Actual Case Temperature(T _S):	T _S =53.9 °C
Actual Ambient Temperature(T _A):	T _A =52.6 °C
Life Test Drive Current:	I _F = 320mA
Measurement Current:	I _F = 320mA

Data Set 2: 100 °C,320mA

Part Number:	LY-IE300102Y1833-80
Number of Units:	25
Actual Case Temperature(T _S):	T _S =99.1 °C
Actual Ambient Temperature(T _A):	T _A =95.9 °C
Life Test Drive Current:	I _F =320mA
Measurement Current:	I _F = 320mA

2 - SUMMARY OF TEST RESULT

Data Set:	Data Set 1, 55 °C, 320mA
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:	97.07%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0020
Reported TM-21 L ₇₀ Lifetime:	>36,000 hours

Data Set:	Data Set 2, 100 °C, 320mA
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:	96.22%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0025
Reported TM-21 L ₇₀ Lifetime:	>36,000 hours

3 - Test Data

3.1 Data Set 1, 55 °C, 320mA (Lumen Maintenance)

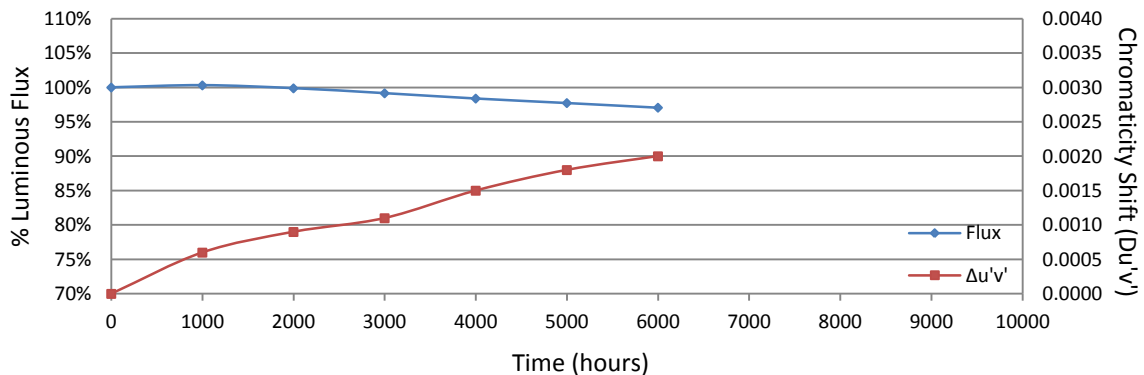
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	3.185	102.03	100.46	100.26	99.48	98.70	98.01	97.52
2	3.185	104.79	100.01	99.34	99.25	98.39	97.62	97.15
3	3.186	103.91	101.05	100.38	99.61	98.64	97.87	97.20
4	3.186	103.65	100.34	99.76	99.86	99.18	98.31	97.93
5	3.187	104.98	99.54	99.26	98.59	98.02	97.35	96.49
6	3.212	106.64	100.43	100.06	98.93	98.18	97.24	96.77
7	3.197	106.60	99.53	98.78	98.12	97.47	96.53	95.97
8	3.194	104.40	100.77	100.48	100.19	99.52	99.04	98.28
9	3.186	104.07	100.12	99.64	99.07	98.49	97.63	97.43
10	3.186	104.10	100.58	100.00	98.85	98.08	97.41	97.21
11	3.182	103.15	99.76	99.95	99.47	98.69	98.21	97.24
12	3.207	104.61	100.95	100.85	99.61	98.94	98.37	96.64
13	3.195	105.13	99.69	99.12	98.45	97.59	97.02	96.26
14	3.193	104.79	99.44	99.06	98.39	97.81	97.24	96.29
15	3.201	106.08	99.74	99.26	98.51	97.47	96.63	96.15
16	3.190	104.75	100.53	100.14	99.19	98.42	97.76	96.61
17	3.204	105.91	100.46	100.37	99.71	98.76	98.48	97.54
18	3.190	105.28	100.68	100.21	99.26	98.69	98.31	97.74
19	3.181	103.79	100.49	99.82	99.14	98.37	98.08	97.60
20	3.186	104.48	100.98	100.11	98.87	98.01	97.34	97.15
21	3.185	104.58	100.21	99.83	99.25	98.68	97.92	96.86
22	3.184	105.12	100.36	99.70	98.65	97.89	97.03	96.84
23	3.206	105.35	100.81	100.33	99.29	98.34	97.77	97.39
24	3.216	104.46	100.90	100.61	99.85	98.89	98.51	97.55
25	3.185	104.28	100.02	99.64	99.35	98.48	97.72	96.95
Ave.	3.192	104.68	100.31	99.88	99.16	98.39	97.74	97.07
Med.	3.186	104.61	100.43	99.95	99.25	98.42	97.76	97.15
st dev	0.0099	1.02	0.4896	0.5267	0.5172	0.5153	0.6123	0.5817
Min.	3.181	102.03	99.44	98.78	98.12	97.47	96.53	95.97
Max.	3.216	106.64	101.05	100.85	100.19	99.52	99.04	98.28

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
α: 6.770E-06
β: 1.011
Calculated L₇₀: 54,000hours
Reported L₇₀: >36,000hours

3.2 Data Set 1, 55 °C, 320mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2541	0.5225	2910	0.0002	0.0005	0.0010	0.0016	0.0017	0.0020
2	0.2530	0.5221	2938	0.0008	0.0012	0.0011	0.0014	0.0014	0.0015
3	0.2531	0.5224	2932	0.0006	0.0008	0.0011	0.0013	0.0015	0.0016
4	0.2530	0.5214	2942	0.0005	0.0006	0.0009	0.0013	0.0017	0.0019
5	0.2524	0.5222	2951	0.0006	0.0007	0.0010	0.0013	0.0017	0.0015
6	0.2497	0.5192	3035	0.0003	0.0004	0.0009	0.0015	0.0019	0.0016
7	0.2541	0.5247	2896	0.0009	0.0011	0.0012	0.0016	0.0020	0.0018
8	0.2548	0.5232	2889	0.0006	0.0007	0.0013	0.0018	0.0022	0.0026
9	0.2535	0.5230	2919	0.0006	0.0011	0.0010	0.0012	0.0016	0.0021
10	0.2539	0.5220	2916	0.0004	0.0008	0.0004	0.0009	0.0018	0.0021
11	0.2542	0.5223	2907	0.0007	0.0010	0.0013	0.0020	0.0019	0.0022
12	0.2488	0.5168	3076	0.0009	0.0011	0.0012	0.0014	0.0020	0.0022
13	0.2526	0.5232	2940	0.0006	0.0011	0.0012	0.0017	0.0018	0.0021
14	0.2543	0.5223	2905	0.0008	0.0011	0.0009	0.0012	0.0018	0.0019
15	0.2532	0.5239	2922	0.0007	0.0011	0.0012	0.0014	0.0017	0.0021
16	0.2539	0.5240	2905	0.0003	0.0004	0.0009	0.0014	0.0017	0.0020
17	0.2538	0.5226	2916	0.0006	0.0010	0.0011	0.0016	0.0018	0.0021
18	0.2541	0.5259	2890	0.0007	0.0011	0.0012	0.0016	0.0017	0.0020
19	0.2542	0.5249	2893	0.0006	0.0011	0.0010	0.0014	0.0017	0.0019
20	0.2533	0.5230	2925	0.0005	0.0010	0.0012	0.0017	0.0017	0.0019
21	0.2541	0.5250	2895	0.0007	0.0011	0.0012	0.0017	0.0017	0.0018
22	0.2542	0.5257	2888	0.0006	0.0010	0.0009	0.0012	0.0018	0.0020
23	0.2544	0.5274	2875	0.0009	0.0011	0.0012	0.0016	0.0019	0.0021
24	0.2517	0.5229	2964	0.0009	0.0011	0.0013	0.0015	0.0018	0.0021
25	0.2526	0.5245	2932	0.0008	0.0011	0.0010	0.0013	0.0020	0.0022
Ave.	0.2532	0.5231	2926	0.0006	0.0009	0.0011	0.0015	0.0018	0.0020
Med.	0.2538	0.5230	2916	0.0006	0.0011	0.0011	0.0014	0.0018	0.0020
st dev	0.0014	0.0021	44.9714	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.2488	0.5168	2875	0.0002	0.0004	0.0004	0.0009	0.0014	0.0015
Max.	0.2548	0.5274	3076	0.0009	0.0012	0.0013	0.0020	0.0022	0.0026



3.3 Data Set 2, 100 °C, 320mA (Lumen Maintenance)

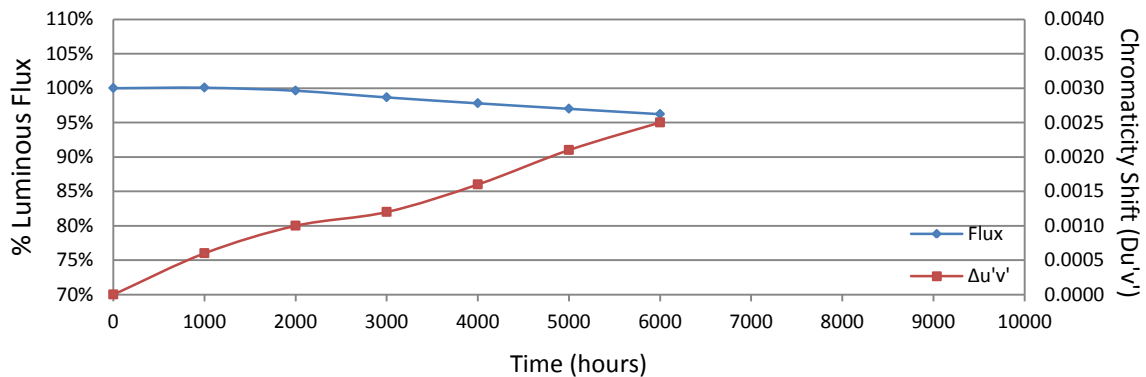
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	3.187	103.32	100.66	100.27	99.21	98.34	97.46	96.55
27	3.187	103.60	100.58	100.10	99.03	97.97	97.10	96.12
28	3.188	103.46	100.23	99.85	98.88	98.01	97.04	96.85
29	3.204	103.34	100.93	100.45	99.48	98.51	97.83	96.96
30	3.186	103.36	99.36	98.88	97.91	97.23	96.51	96.31
31	3.186	104.73	99.40	98.83	98.25	97.11	96.44	95.48
32	3.188	103.69	100.49	100.11	98.66	97.50	96.92	95.56
33	3.205	105.49	100.77	100.10	99.73	98.97	98.30	97.64
34	3.183	103.88	99.44	98.96	98.00	97.23	96.46	95.75
35	3.192	104.62	99.69	99.41	98.36	97.50	96.73	95.58
36	3.186	104.54	99.87	100.06	98.53	98.05	97.19	96.23
37	3.216	105.35	99.95	99.57	99.10	98.34	97.48	97.01
38	3.205	103.66	100.52	99.94	98.59	97.72	96.66	96.07
39	3.183	103.06	99.84	99.17	98.20	97.22	96.58	95.50
40	3.192	103.47	100.03	99.64	98.87	98.29	97.42	96.74
41	3.180	104.45	99.66	99.28	98.61	97.75	97.08	95.74
42	3.185	103.93	99.49	99.11	98.53	97.57	96.80	96.04
43	3.179	104.10	99.71	99.42	98.75	98.08	97.21	96.35
44	3.188	104.16	100.13	99.65	98.41	97.64	96.58	95.76
45	3.190	103.99	100.30	99.72	98.76	97.70	97.03	96.55
46	3.221	102.56	100.04	99.55	98.09	97.40	96.44	96.03
47	3.189	105.35	100.14	99.38	98.43	97.29	96.44	95.68
48	3.187	102.98	99.83	99.44	98.76	97.98	97.20	97.00
49	3.188	104.98	100.50	99.92	98.78	98.11	97.64	96.49
50	3.183	103.74	100.25	99.96	98.71	97.55	96.49	95.48
Ave.	3.191	103.99	100.07	99.63	98.66	97.80	97.00	96.22
Med.	3.188	103.88	100.04	99.64	98.66	97.72	97.03	96.12
st dev	0.0107	0.78	0.4472	0.4449	0.4344	0.4675	0.4951	0.5880
Min.	3.179	102.56	99.36	98.83	97.91	97.11	96.44	95.48
Max.	3.221	105.49	100.93	100.45	99.73	98.97	98.30	97.64

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
α: 8.148E-06
β: 1.011
Calculated L₇₀: 45,000hours
Reported L₇₀: >36,000hours

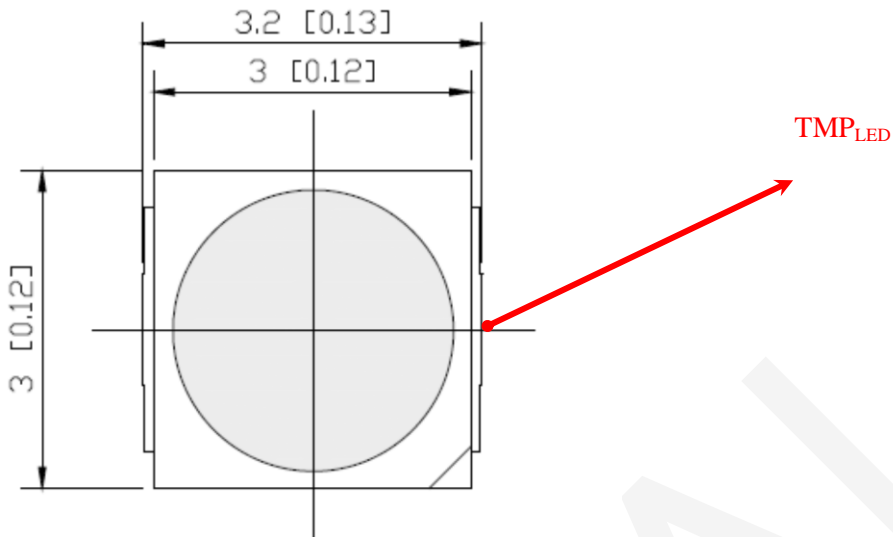
3.4 Data Set 2, 100 °C, 320mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.2535	0.5230	2920	0.0007	0.0010	0.0015	0.0019	0.0030	0.0026
27	0.2533	0.5234	2923	0.0005	0.0007	0.0009	0.0016	0.0024	0.0028
28	0.2531	0.5258	2914	0.0007	0.0009	0.0012	0.0015	0.0019	0.0023
29	0.2531	0.5246	2921	0.0004	0.0007	0.0009	0.0013	0.0021	0.0025
30	0.2537	0.5219	2920	0.0008	0.0010	0.0013	0.0017	0.0023	0.0026
31	0.2544	0.5237	2895	0.0008	0.0012	0.0015	0.0020	0.0024	0.0028
32	0.2539	0.5246	2901	0.0006	0.0010	0.0012	0.0016	0.0030	0.0034
33	0.2522	0.5254	2937	0.0004	0.0008	0.0009	0.0012	0.0014	0.0021
34	0.2533	0.5228	2925	0.0006	0.0009	0.0011	0.0015	0.0019	0.0028
35	0.2535	0.5235	2917	0.0007	0.0011	0.0012	0.0017	0.0020	0.0030
36	0.2519	0.5219	2964	0.0005	0.0010	0.0012	0.0017	0.0022	0.0030
37	0.2519	0.5244	2949	0.0004	0.0007	0.0005	0.0010	0.0016	0.0026
38	0.2508	0.5223	2988	0.0005	0.0008	0.0009	0.0010	0.0017	0.0026
39	0.2534	0.5237	2917	0.0007	0.0011	0.0013	0.0017	0.0018	0.0029
40	0.2542	0.5223	2907	0.0007	0.0010	0.0011	0.0015	0.0016	0.0024
41	0.2530	0.5229	2931	0.0007	0.0011	0.0013	0.0015	0.0018	0.0021
42	0.2541	0.5226	2907	0.0007	0.0009	0.0011	0.0015	0.0018	0.0021
43	0.2539	0.5237	2907	0.0008	0.0011	0.0014	0.0018	0.0022	0.0023
44	0.2551	0.5246	2875	0.0006	0.0009	0.0010	0.0014	0.0022	0.0021
45	0.2548	0.5252	2877	0.0006	0.0008	0.0009	0.0014	0.0022	0.0022
46	0.2542	0.5238	2898	0.0007	0.0011	0.0013	0.0017	0.0022	0.0023
47	0.2546	0.5265	2875	0.0007	0.0010	0.0013	0.0017	0.0021	0.0021
48	0.2542	0.5246	2894	0.0006	0.0009	0.0010	0.0014	0.0021	0.0020
49	0.2544	0.5243	2891	0.0007	0.0011	0.0014	0.0017	0.0024	0.0026
50	0.2530	0.5223	2937	0.0009	0.0012	0.0017	0.0021	0.0025	0.0022
Ave.	0.2535	0.5238	2916	0.0006	0.0010	0.0012	0.0016	0.0021	0.0025
Med.	0.2535	0.5237	2917	0.0007	0.0010	0.0012	0.0016	0.0021	0.0025
st dev	0.0010	0.0012	26.6911	0.0001	0.0002	0.0003	0.0003	0.0004	0.0004
Min.	0.2508	0.5219	2875	0.0004	0.0007	0.0005	0.0010	0.0014	0.0020
Max.	0.2551	0.5265	2988	0.0009	0.0012	0.0017	0.0021	0.0030	0.0034



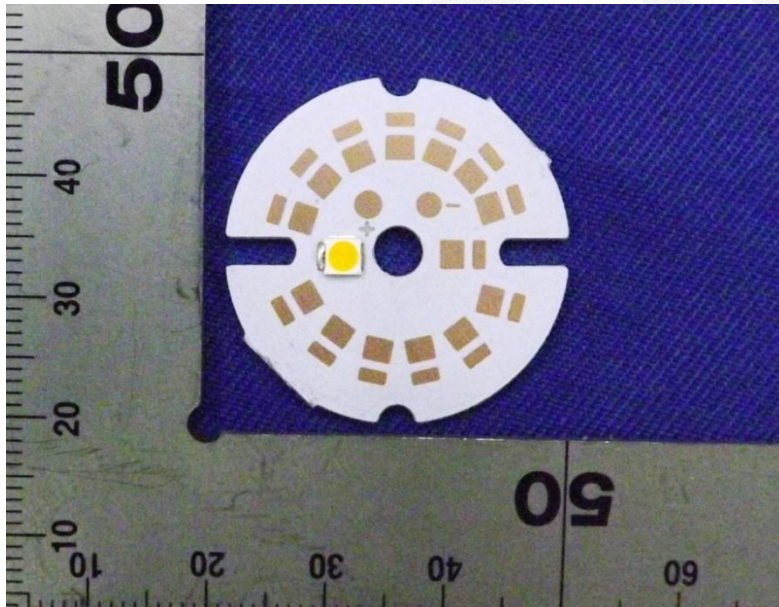
Appendix A – EUT PHOTO

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



All dimensions are in millimeter

A.2 EUT Photo



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