TEST REPORT

According to ANSI/IES LM-80-15
For

Bridgelux Inc.

46430 Fremont Boulevard , Fremont ,CA 94538 USA

#Model: BXEM-27E-12H-6C

Report Type: 10000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	R2XM200616060-10
Test Date:	2019-03-20 to 2020-05-16
Report Date:	2020-06-23
Reviewed By:	Blake Zhang / EE Engineer
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

TABLE OF CONTENTS

1 - General Information

1.1 Description of LED Light Sources

Sample Size:

50 PCS test samples were in good condition and received on 2019-03-17. The samples were numbered from 1 to 25 and 26 to 50.

#Manufacturer:	Bridgelux Inc.
#Part Number:	BXEM-27E-12H-6C
#Part Type:	LED Package
#Drive Level:	DC 200mA
#Nominal CCT:	2700K
#Power:	1.3W
#Average Current Density per LED die:	688.89mA/mm^2
#Average Power Density per LED die:	2.17W/mm^2
#CRI:	80
#Die Spacing:	0.2mm

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.

#Family products covered by this report:

According to *ENERGY STAR® Requirements for the Use of LM-80 Data*, the following products can be covered by this report base on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements of *ENERGY STAR® Requirements for the Use of LM-80 Data* (September 28, 2017)

This report covers the following models:

Model Name	Total Input Current (mA)	Power (W)	CCT (K)	Number of dies	Driver current per die (mA)	Current Density per Die (mA/mm^2)	Power Density per PCB (W/mm^2)	Die Spacing (mm)
BXEM-27E-12H-6C(Tested)	200	1.3	2700K	2	200	688.89	0.14	0.2
BXEM-(A)(B)-(C)(D)(E)-(F)(G)	200	1.3	≧ 2200K	2	200	688.89	0.14	0.2

Here is part number designation for LED package products:

BXEM-(A)(B)-(C)(D)(E)-(F)(G)

BXEM: Designates product family

(A) CCT Variation,can be 22-65,for 2200K~6500K;

(B) CRI

(C) Parallel connected variation, can be 1~9, (totalchip number is less than 9)

(D) Series connected variation, can be 1~9, (totalchip number is less than 9)

(E) Power

(F) Voltage

(G) Customer code: can be 0~ZZ

Note:

1. The applicant Bridgelux Inc. declare that their products with model BXEM-27E-12H-6C are the same to the products in report# R2XM190317060-10-10000 and is authorized by original applicant to use their test data.

2. All the data in previous report (R2XM190317060-10-10000) is shared in this report.

1.2 Standards and Reference Documentations

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs
- ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by IAS)

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.5m integrating sphere	EVERFINE	AIS-2	G185304TA1381172	2019-10-22	2020-10-21
LED Test Source	EVERFINE	LTS-300	P185616CD1371113	2019-07-23	2020-07-22
High Accuracy Array Spectroradiometer	EVERFINE	HAAS-2000	P600674CM1381123	2019-10-22	2020-10-21
Standard Light Source	EVERFINE	D204	G100283CA8351158	2019-11-19	2020-11-18
Multilayer aging machine	BACL	B2-270	20015	2020-03-11	2021-03-10
DC Power Supply	BACL	B12001-12	90023	2020-03-16	2021-03-15

1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within ±3% of the specified value of the manufacturer during maintenance test, and was within ±0.5% during photometric and electrical measurement test.

1.5 Ambient Conditions for Maintenance Test

For lumen maintenance test, samples within one data set, were installed on cooling boards in thermal chambers with minimal ambient airflow. The case temperature and ambient temperature was monitored by thermocouples which one was soldered to the coldest DUTs' case (TMP_{LED}) location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP_{LED} of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within ±3% of the specified value of the manufacturer.

The relative humidity within chamber was kept less than 65% during test.

For photometry measurement, the ambient temperature during test was set to 25°C ± 2°C, RH <65%.

1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u'v'. 2π measurement was used and sample was drived by DC power supply. The forward current was regulated to within ±0.5% of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to 25°C ± 2°C, RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe.

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=21K (K=2), at the 95% confidence level.

The uncertainty of the temperature is U=0.8671°C (K=2), at the 95% confidence level.

1.7 Statement of Traceability

Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

1.8 Sample Set

Data Set 1: 85°C, 200mA

Part Number:	BXEM-27E-12H-6C
Number of Units:	25
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	200mA
Measurement Current:	200mA

Data Set 2: 105°C, 200mA

Part Number:	BXEM-27E-12H-6C
Number of Units:	25
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	200mA
Measurement Current:	200mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L_{70} Lifetime
1	25	0	1000hrs	10000hrs	2.126E-06	1.002	>60000 hours
2	25	0	1000hrs	10000hrs	2.813E-06	1.002	>60000 hours

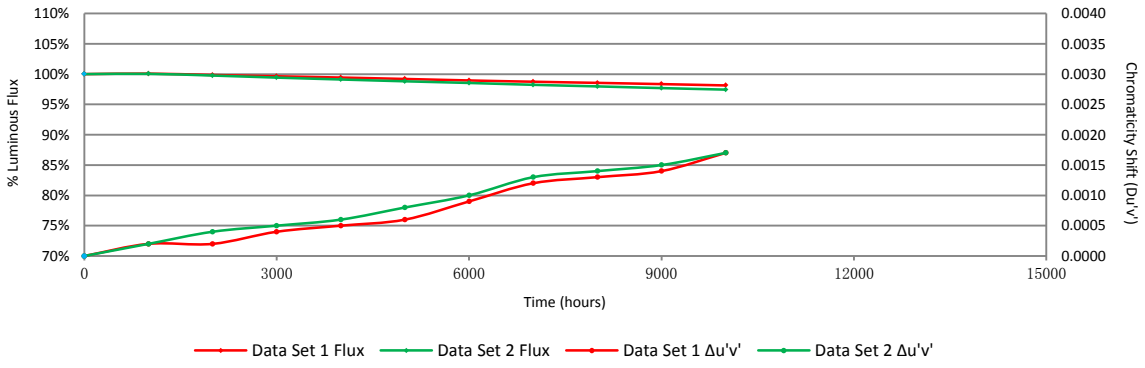
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	100.08%	99.85%	99.64%	99.43%	99.20%	98.95%	98.74%	98.55%	98.35%	98.13%
2	100.04%	99.76%	99.42%	99.11%	98.81%	98.54%	98.23%	97.97%	97.69%	97.44%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.0002	0.0002	0.0004	0.0005	0.0006	0.0009	0.0012	0.0013	0.0014	0.0017
2	0.0002	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0014	0.0015	0.0017

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 200mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	178.40	100.28	100.11	99.94	99.78	99.66	99.50	99.38	99.22	99.05	98.88
2	181.10	100.06	99.83	99.78	99.72	99.61	98.90	98.84	98.67	98.51	98.40
3	179.20	99.94	99.50	99.39	99.27	99.00	98.77	98.44	98.21	98.10	97.99
4	175.60	100.11	99.94	99.83	99.66	99.54	99.43	99.26	98.97	98.80	98.63
5	180.20	100.28	99.83	99.28	99.11	98.78	98.67	98.56	98.39	98.00	97.61
6	178.40	100.06	99.94	99.78	99.55	99.27	99.16	98.82	98.43	97.98	97.65
7	179.30	100.11	100.06	99.78	99.55	99.27	99.05	98.88	98.55	98.44	98.38
8	179.90	100.11	99.89	99.67	99.39	99.17	99.11	99.06	98.89	98.72	98.50
9	181.60	99.94	99.78	99.56	99.39	99.12	99.01	98.79	98.51	98.24	98.13
10	176.90	99.94	99.60	99.38	99.15	99.04	98.81	98.64	98.47	98.25	97.91
11	180.70	100.17	100.06	99.94	99.61	99.56	99.17	98.84	98.73	98.56	98.34
12	177.40	100.28	99.89	99.61	99.38	99.10	98.70	98.65	98.37	98.20	97.97
13	181.10	100.28	99.94	99.78	99.50	99.01	98.73	98.56	98.40	98.18	98.07
14	177.50	100.06	99.72	99.55	99.10	98.76	98.48	98.03	97.97	97.86	97.58
15	181.50	99.94	99.78	99.61	99.06	98.79	98.51	98.07	97.96	97.74	97.58
16	179.10	100.11	99.72	99.61	99.44	98.99	98.60	98.10	98.05	97.77	97.54
17	181.40	100.17	99.78	99.67	99.50	99.12	98.79	98.62	98.29	98.07	97.74
18	180.60	100.33	100.06	99.67	99.56	99.34	98.95	98.73	98.39	98.23	97.73
19	181.60	100.44	100.22	99.83	99.72	99.61	99.34	99.01	98.90	98.73	98.57
20	178.90	100.45	100.17	99.83	99.44	99.33	99.11	98.94	98.77	98.32	97.88
21	179.00	99.89	99.78	99.66	99.50	99.27	99.11	98.99	98.88	98.72	98.55
22	181.90	99.95	99.84	99.67	99.51	99.40	99.23	99.12	98.96	98.79	98.68
23	178.80	99.50	99.38	99.16	98.99	98.83	98.66	98.55	98.43	98.27	98.15
24	181.00	99.94	99.78	99.67	99.50	99.34	99.23	99.06	98.90	98.78	98.62
25	181.40	99.72	99.61	99.39	99.23	99.06	98.84	98.62	98.51	98.35	98.18
Avg.	179.70	100.08	99.85	99.64	99.43	99.20	98.95	98.74	98.55	98.35	98.13
Med.	179.90	100.11	99.83	99.67	99.50	99.17	98.95	98.79	98.51	98.27	98.13
st dev	1.70	0.22	0.20	0.20	0.22	0.27	0.28	0.35	0.33	0.35	0.41
Min.	175.60	99.50	99.38	99.16	98.99	98.76	98.48	98.03	97.96	97.74	97.54
Max.	181.90	100.45	100.22	99.94	99.78	99.66	99.50	99.38	99.22	99.05	98.88

3.2 Data Set 1, 85°C, 200mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	6.239	6.263	6.256	6.251	6.252	6.254	6.250	6.255	6.248	6.259	6.253
2	6.241	6.271	6.262	6.266	6.264	6.269	6.258	6.272	6.262	6.259	6.259
3	6.228	6.269	6.309	6.293	6.311	6.324	6.313	6.325	6.301	6.301	6.305
4	6.220	6.269	6.261	6.265	6.273	6.288	6.289	6.292	6.303	6.301	6.305
5	6.350	6.332	6.327	6.337	6.339	6.357	6.331	6.354	6.334	6.352	6.345
6	6.238	6.275	6.254	6.262	6.257	6.256	6.256	6.257	6.253	6.254	6.261
7	6.228	6.265	6.241	6.238	6.242	6.238	6.240	6.239	6.235	6.231	6.236
8	6.205	6.238	6.227	6.226	6.225	6.226	6.228	6.230	6.228	6.227	6.228
9	6.275	6.273	6.277	6.258	6.261	6.253	6.254	6.266	6.257	6.253	6.255
10	6.220	6.248	6.240	6.239	6.238	6.238	6.238	6.238	6.238	6.238	6.240
11	6.202	6.232	6.230	6.227	6.225	6.221	6.222	6.226	6.222	6.228	6.225
12	6.285	6.302	6.304	6.307	6.323	6.322	6.321	6.329	6.303	6.304	6.320
13	6.213	6.253	6.303	6.272	6.300	6.290	6.306	6.293	6.262	6.271	6.303
14	6.219	6.230	6.223	6.224	6.224	6.217	6.219	6.244	6.221	6.273	6.238
15	6.306	6.304	6.302	6.304	6.309	6.307	6.302	6.307	6.305	6.306	6.308
16	6.199	6.242	6.226	6.226	6.224	6.223	6.224	6.228	6.223	6.227	6.234
17	6.244	6.251	6.244	6.238	6.242	6.235	6.236	6.247	6.238	6.239	6.240
18	6.213	6.241	6.237	6.233	6.234	6.232	6.233	6.234	6.235	6.237	6.238
19	6.245	6.254	6.275	6.248	6.247	6.243	6.248	6.243	6.243	6.243	6.241
20	6.194	6.231	6.226	6.225	6.223	6.222	6.222	6.222	6.223	6.227	6.226
21	6.217	6.249	6.242	6.244	6.241	6.240	6.239	6.246	6.241	6.255	6.251
22	6.232	6.248	6.248	6.253	6.261	6.271	6.258	6.268	6.254	6.292	6.254
23	6.236	6.269	6.247	6.289	6.298	6.289	6.309	6.307	6.284	6.264	6.282
24	6.291	6.287	6.276	6.280	6.274	6.276	6.276	6.283	6.276	6.294	6.306
25	6.222	6.252	6.256	6.254	6.272	6.286	6.232	6.260	6.250	6.283	6.234
Avg.	6.238	6.262	6.260	6.258	6.262	6.263	6.260	6.267	6.258	6.265	6.263
Med.	6.228	6.254	6.254	6.253	6.257	6.254	6.250	6.257	6.250	6.259	6.253
st dev	0.037	0.025	0.030	0.030	0.034	0.037	0.035	0.036	0.031	0.032	0.035
Min.	6.194	6.230	6.223	6.224	6.223	6.217	6.219	6.222	6.221	6.227	6.225
Max.	6.350	6.332	6.327	6.337	6.339	6.357	6.331	6.354	6.334	6.352	6.345

3.3 Data Set 1, 85°C, 200mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2598	0.5267	2761	0.0002	0.0003	0.0005	0.0007	0.0008	0.0010	0.0013	0.0015	0.0015	0.0019
2	0.2600	0.5286	2746	0.0001	0.0003	0.0006	0.0006	0.0008	0.0009	0.0013	0.0013	0.0014	0.0017
3	0.2604	0.5273	2745	0.0002	0.0002	0.0005	0.0006	0.0007	0.0009	0.0012	0.0013	0.0014	0.0017
4	0.2595	0.5263	2769	0.0003	0.0004	0.0014	0.0016	0.0015	0.0017	0.0021	0.0023	0.0026	0.0029
5	0.2592	0.5273	2770	0.0002	0.0002	0.0005	0.0006	0.0006	0.0008	0.0012	0.0014	0.0014	0.0017
6	0.2608	0.5263	2741	0.0001	0.0001	0.0004	0.0005	0.0006	0.0008	0.0011	0.0012	0.0013	0.0017
7	0.2597	0.5276	2757	0.0002	0.0001	0.0004	0.0005	0.0006	0.0007	0.0011	0.0011	0.0014	0.0015
8	0.2603	0.5286	2741	0.0003	0.0002	0.0004	0.0004	0.0007	0.0009	0.0010	0.0011	0.0012	0.0015
9	0.2577	0.5258	2810	0.0002	0.0002	0.0004	0.0005	0.0006	0.0009	0.0012	0.0013	0.0013	0.0017
10	0.2606	0.5275	2740	0.0003	0.0001	0.0004	0.0005	0.0005	0.0009	0.0010	0.0012	0.0013	0.0015
11	0.2576	0.5251	2814	0.0001	0.0001	0.0003	0.0004	0.0005	0.0008	0.0011	0.0013	0.0013	0.0015
12	0.2593	0.5277	2767	0.0004	0.0003	0.0003	0.0004	0.0006	0.0008	0.0011	0.0013	0.0013	0.0016
13	0.2579	0.5246	2811	0.0003	0.0001	0.0002	0.0003	0.0005	0.0009	0.0008	0.0011	0.0011	0.0015
14	0.2587	0.5292	2771	0.0001	0.0000	0.0002	0.0004	0.0004	0.0008	0.0009	0.0012	0.0011	0.0015
15	0.2575	0.5248	2820	0.0001	0.0005	0.0003	0.0005	0.0007	0.0008	0.0011	0.0013	0.0013	0.0017
16	0.2578	0.5257	2807	0.0003	0.0003	0.0003	0.0003	0.0004	0.0008	0.0010	0.0011	0.0012	0.0014
17	0.2597	0.5260	2765	0.0003	0.0004	0.0002	0.0003	0.0005	0.0008	0.0011	0.0012	0.0012	0.0014
18	0.2589	0.5277	2774	0.0002	0.0001	0.0003	0.0004	0.0005	0.0009	0.0009	0.0012	0.0012	0.0015
19	0.2581	0.5260	2800	0.0003	0.0002	0.0002	0.0004	0.0003	0.0008	0.0009	0.0012	0.0012	0.0015
20	0.2593	0.5252	2776	0.0001	0.0007	0.0006	0.0006	0.0007	0.0011	0.0012	0.0014	0.0014	0.0017
21	0.2598	0.5259	2764	0.0000	0.0003	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016	0.0016	0.0018
22	0.2598	0.5274	2757	0.0001	0.0001	0.0003	0.0005	0.0006	0.0009	0.0012	0.0012	0.0013	0.0016
23	0.2595	0.5272	2764	0.0002	0.0004	0.0006	0.0006	0.0007	0.0011	0.0013	0.0015	0.0016	0.0018
24	0.2604	0.5266	2747	0.0002	0.0004	0.0004	0.0005	0.0007	0.0012	0.0013	0.0016	0.0014	0.0017
25	0.2587	0.5262	2787	0.0001	0.0000	0.0003	0.0004	0.0006	0.0009	0.0011	0.0013	0.0014	0.0017
Avg.	0.2592	0.5267	2772	0.0002	0.0002	0.0004	0.0005	0.0006	0.0009	0.0012	0.0013	0.0014	0.0017
Med.	0.2595	0.5266	2767	0.0002	0.0002	0.0004	0.0005	0.0006	0.0009	0.0011	0.0013	0.0013	0.0017
st dev	0.0010	0.0012	25	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003
Min.	0.2575	0.5246	2740	0.0000	0.0000	0.0002	0.0003	0.0003	0.0007	0.0008	0.0011	0.0011	0.0014
Max.	0.2608	0.5292	2820	0.0004	0.0007	0.0014	0.0016	0.0015	0.0017	0.0021	0.0023	0.0026	0.0029

3.4 Data Set 2, 105°C, 200mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	176.50	100.17	99.83	99.49	99.43	99.21	98.92	98.64	98.53	98.47	98.30
27	180.70	100.22	99.83	99.45	99.23	99.00	98.84	98.51	98.12	97.90	97.84
28	180.10	100.06	99.89	99.56	98.95	98.67	98.45	98.17	97.72	97.50	97.11
29	179.30	99.94	99.72	99.55	99.27	98.72	98.49	98.10	97.60	97.55	97.16
30	178.50	99.89	99.66	99.38	99.05	98.49	98.04	97.76	97.48	97.20	96.92
31	178.40	99.89	99.61	99.50	99.10	98.54	98.32	97.87	97.53	97.37	96.92
32	179.50	100.06	99.89	99.61	99.16	98.61	98.44	98.16	97.72	97.49	96.99
33	181.60	100.06	99.89	99.61	99.39	99.23	98.57	98.29	97.85	97.30	97.19
34	179.70	100.28	100.06	99.78	99.61	99.39	98.72	98.39	98.16	97.50	97.33
35	178.70	100.34	100.17	99.78	99.55	99.27	98.77	98.49	98.27	97.99	97.48
36	181.60	100.11	99.89	99.45	98.73	98.68	98.57	98.02	97.96	97.69	97.52
37	180.00	100.17	99.89	99.11	98.61	98.39	98.33	97.83	97.78	97.33	97.17
38	180.20	100.22	99.67	99.11	98.72	98.34	98.11	97.84	97.72	97.34	97.28
39	180.60	99.94	99.50	98.95	98.56	98.06	97.90	97.73	97.40	97.01	96.95
40	180.10	99.83	99.50	99.33	99.22	98.83	98.67	98.50	98.28	98.06	97.83
41	178.80	100.06	99.33	99.22	98.94	98.83	98.60	98.43	98.27	97.99	97.82
42	178.70	100.22	100.06	99.89	99.66	99.44	99.27	99.05	98.82	98.60	98.43
43	181.20	100.28	99.67	99.34	98.84	98.62	98.40	97.96	97.63	97.30	96.74
44	179.00	100.11	99.89	99.44	99.27	99.11	98.88	98.72	98.44	98.21	97.99
45	179.40	99.83	99.67	99.33	98.77	98.61	98.22	98.16	97.99	97.60	97.10
46	176.10	99.94	99.89	99.20	99.15	98.81	98.30	97.73	97.50	97.16	97.05
47	178.20	100.06	99.94	99.38	99.10	98.60	98.32	97.76	97.42	97.19	97.03
48	180.30	99.72	99.56	99.22	99.06	98.89	98.72	98.56	98.39	98.17	98.00
49	178.50	99.78	99.55	99.33	99.05	98.82	98.60	98.43	98.21	98.04	97.82
50	179.80	99.78	99.56	99.44	99.28	99.11	98.94	98.72	98.50	98.28	98.11
Avg.	179.42	100.04	99.76	99.42	99.11	98.81	98.54	98.23	97.97	97.69	97.44
Med.	179.50	100.06	99.83	99.44	99.10	98.81	98.57	98.17	97.96	97.55	97.28
st dev	1.35	0.18	0.20	0.22	0.30	0.34	0.32	0.37	0.40	0.45	0.49
Min.	176.10	99.72	99.33	98.95	98.56	98.06	97.90	97.73	97.40	97.01	96.74
Max.	181.60	100.34	100.17	99.89	99.66	99.44	99.27	99.05	98.82	98.60	98.43

3.5 Data Set 2, 105°C, 200mA (Forward Voltage)

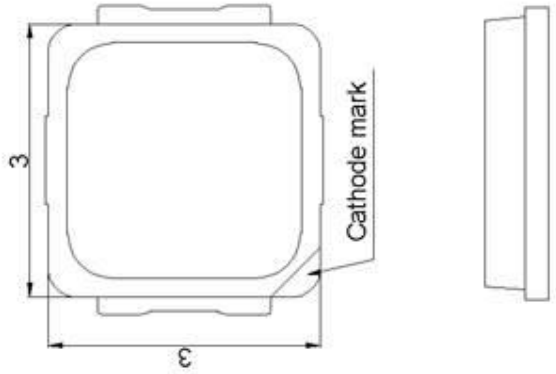
No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	6.260	6.288	6.282	6.279	6.282	6.279	6.282	6.276	6.279	6.281	6.286
27	6.286	6.302	6.305	6.292	6.298	6.297	6.294	6.296	6.293	6.291	6.304
28	6.253	6.302	6.302	6.307	6.310	6.308	6.307	6.304	6.312	6.307	6.287
29	6.227	6.228	6.222	6.224	6.220	6.220	6.221	6.218	6.223	6.224	6.227
30	6.294	6.307	6.305	6.304	6.315	6.305	6.315	6.302	6.305	6.319	6.316
31	6.215	6.250	6.243	6.239	6.243	6.239	6.244	6.238	6.243	6.237	6.245
32	6.226	6.255	6.240	6.235	6.236	6.235	6.234	6.237	6.235	6.235	6.239
33	6.238	6.271	6.263	6.262	6.263	6.263	6.265	6.265	6.264	6.265	6.266
34	6.214	6.252	6.222	6.219	6.225	6.220	6.222	6.227	6.236	6.217	6.220
35	6.204	6.241	6.235	6.234	6.235	6.234	6.234	6.232	6.235	6.235	6.239
36	6.285	6.306	6.303	6.303	6.302	6.302	6.301	6.315	6.302	6.303	6.305
37	6.217	6.237	6.231	6.223	6.236	6.230	6.242	6.238	6.227	6.230	6.224
38	6.271	6.308	6.289	6.306	6.324	6.305	6.318	6.301	6.296	6.293	6.297
39	6.298	6.272	6.266	6.275	6.265	6.262	6.267	6.275	6.266	6.270	6.271
40	6.268	6.300	6.302	6.308	6.302	6.307	6.309	6.305	6.302	6.301	6.309
41	6.230	6.269	6.260	6.259	6.260	6.260	6.266	6.274	6.262	6.260	6.256
42	6.207	6.240	6.225	6.225	6.227	6.228	6.231	6.245	6.226	6.229	6.221
43	6.201	6.234	6.227	6.229	6.229	6.228	6.236	6.252	6.226	6.229	6.228
44	6.252	6.251	6.262	6.236	6.253	6.239	6.248	6.249	6.237	6.236	6.236
45	6.192	6.218	6.213	6.212	6.211	6.212	6.217	6.213	6.213	6.212	6.213
46	6.221	6.248	6.243	6.248	6.244	6.239	6.243	6.239	6.252	6.244	6.250
47	6.210	6.297	6.237	6.237	6.239	6.236	6.248	6.238	6.250	6.231	6.234
48	6.262	6.306	6.304	6.303	6.304	6.309	6.304	6.306	6.296	6.283	6.289
49	6.279	6.256	6.249	6.250	6.249	6.245	6.248	6.243	6.268	6.252	6.256
50	6.208	6.306	6.303	6.318	6.305	6.294	6.305	6.304	6.302	6.305	6.269
Avg.	6.241	6.270	6.261	6.261	6.263	6.260	6.264	6.264	6.262	6.260	6.259
Med.	6.230	6.269	6.260	6.250	6.253	6.245	6.248	6.252	6.262	6.252	6.256
st dev	0.033	0.030	0.032	0.035	0.035	0.034	0.033	0.032	0.032	0.033	0.032
Min.	6.192	6.218	6.213	6.212	6.211	6.212	6.217	6.213	6.213	6.212	6.213
Max.	6.298	6.308	6.305	6.318	6.324	6.309	6.318	6.315	6.312	6.319	6.316

3.6 Data Set 2, 105°C, 200mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	0.2603	0.5270	2748	0.0003	0.0004	0.0006	0.0007	0.0009	0.0013	0.0013	0.0016	0.0017	0.0019
27	0.2579	0.5264	2803	0.0001	0.0004	0.0006	0.0007	0.0007	0.0011	0.0014	0.0016	0.0017	0.0018
28	0.2596	0.5252	2770	0.0002	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
29	0.2600	0.5271	2753	0.0001	0.0001	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0013	0.0017
30	0.2590	0.5254	2782	0.0000	0.0001	0.0004	0.0005	0.0005	0.0009	0.0010	0.0014	0.0013	0.0016
31	0.2588	0.5265	2783	0.0002	0.0003	0.0004	0.0005	0.0007	0.0010	0.0011	0.0014	0.0014	0.0018
32	0.2588	0.5264	2783	0.0002	0.0004	0.0005	0.0005	0.0007	0.0009	0.0012	0.0013	0.0014	0.0017
33	0.2589	0.5268	2778	0.0001	0.0003	0.0005	0.0005	0.0007	0.0007	0.0012	0.0014	0.0014	0.0017
34	0.2599	0.5286	2748	0.0001	0.0002	0.0005	0.0004	0.0005	0.0009	0.0009	0.0013	0.0014	0.0015
35	0.2592	0.5277	2768	0.0000	0.0004	0.0005	0.0006	0.0008	0.0010	0.0012	0.0014	0.0018	0.0019
36	0.2583	0.5268	2791	0.0002	0.0004	0.0007	0.0006	0.0007	0.0010	0.0011	0.0014	0.0015	0.0017
37	0.2602	0.5282	2745	0.0001	0.0004	0.0005	0.0005	0.0006	0.0010	0.0012	0.0013	0.0014	0.0016
38	0.2591	0.5259	2779	0.0004	0.0006	0.0006	0.0008	0.0008	0.0011	0.0015	0.0015	0.0015	0.0018
39	0.2583	0.5289	2783	0.0001	0.0004	0.0006	0.0008	0.0008	0.0012	0.0014	0.0014	0.0015	0.0018
40	0.2578	0.5266	2804	0.0001	0.0003	0.0005	0.0006	0.0008	0.0010	0.0013	0.0013	0.0014	0.0016
41	0.2588	0.5240	2794	0.0001	0.0004	0.0006	0.0008	0.0009	0.0009	0.0013	0.0015	0.0015	0.0018
42	0.2597	0.5255	2767	0.0001	0.0003	0.0004	0.0005	0.0008	0.0009	0.0013	0.0015	0.0014	0.0017
43	0.2583	0.5280	2786	0.0001	0.0002	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0012	0.0015
44	0.2596	0.5262	2767	0.0002	0.0003	0.0004	0.0006	0.0008	0.0008	0.0012	0.0012	0.0013	0.0016
45	0.2596	0.5270	2762	0.0002	0.0005	0.0007	0.0009	0.0009	0.0011	0.0015	0.0015	0.0015	0.0018
46	0.2600	0.5253	2761	0.0004	0.0005	0.0007	0.0009	0.0011	0.0013	0.0016	0.0018	0.0018	0.0022
47	0.2595	0.5267	2767	0.0002	0.0002	0.0005	0.0008	0.0009	0.0012	0.0014	0.0015	0.0015	0.0017
48	0.2583	0.5265	2793	0.0001	0.0002	0.0005	0.0006	0.0008	0.0011	0.0011	0.0013	0.0015	0.0016
49	0.2590	0.5271	2774	0.0001	0.0004	0.0005	0.0007	0.0008	0.0012	0.0012	0.0014	0.0018	0.0017
50	0.2592	0.5264	2774	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0014	0.0014	0.0018	0.0018
Avg.	0.2591	0.5266	2775	0.0002	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0014	0.0015	0.0017
Med.	0.2591	0.5266	2774	0.0001	0.0004	0.0005	0.0006	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017
st dev	0.0007	0.0011	16	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002	0.0002
Min.	0.2578	0.5240	2745	0.0000	0.0001	0.0003	0.0004	0.0005	0.0007	0.0009	0.0012	0.0012	0.0015
Max.	0.2603	0.5289	2804	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0016	0.0018	0.0018	0.0022

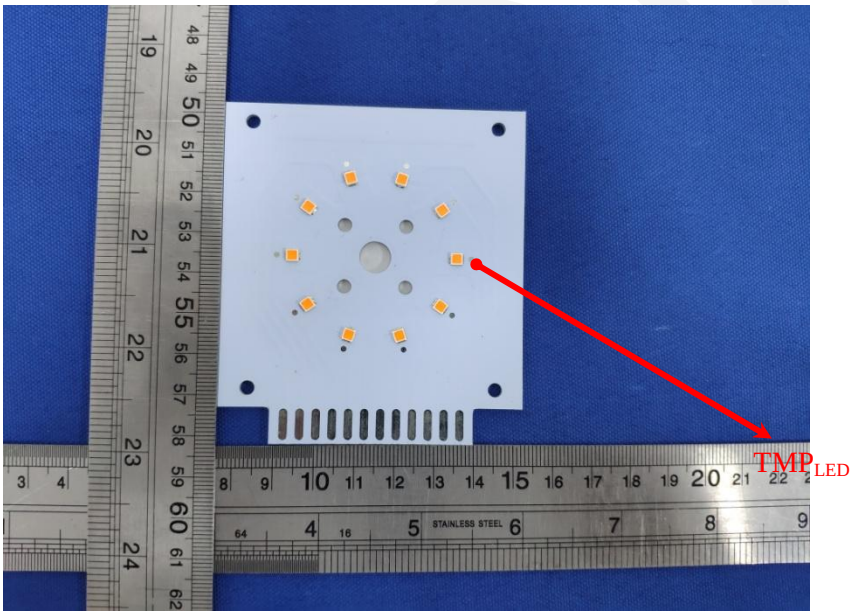
4 - DUT Photo

4.1 #Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



Directions

1. The information marked “superscript #” is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. 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.

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

INTERNATIONAL ACCREDITATION SERVICE®

CERTIFICATE OF ACCREDITATION

This is to attest that

BAY AREA LABORATORIES CORP (DONGGUAN)

PULONG CUN 69, PUXINHU INDUSTRIAL AREA
TANGXIA TOWN, GUANG DONG 523719
PEOPLE'S REPUBLIC OF CHINA

Testing Laboratory TL-460

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories,* and has demonstrated compliance with ISO/IEC Standard 17025:2005, *General requirements for the competence of testing and calibration laboratories.* This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

This certificate is is valid up to April 1, 2020

This accreditation certificate supersedes any IAS accreditation bearing an earlier effective date. The certificate becomes invalid upon suspension, cancellation or revocation of accreditation. See www.iasonline.org for current accreditation information, or contact IAS at 562-364-8201.

INTERNATIONAL ACCREDITATION SERVICE®

ilac-MRA

C.P. Ramani, P.E., C.B.O
President

13-12005

SCOPE OF ACCREDITATION

FIELDS OF TESTING	ACCREDITED TEST METHODS
ENERGY STAR Program Requirements for Lighting (except Electromagnetic and Radio Frequency Interference, Air Tight for Restricted Air Flow, and Mercury Content) (continued)	IES LM-78-17 IESNA approved method for total luminous flux measurement of lamps using an integrating sphere photometer IES LM-79-2008: Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products, Sections 9, 10 and 12 IES LM-80-2008: Approved Method for Measuring Lumen Maintenance of LED Light Sources (LED Packages/Modules/Arrays) IES LM-80-2015: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules IES LM-82-2012: Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature IES LM-84-2014: Approved Method for Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires IES LM-85-14 Electrical and Photometric Measurements of High-Power IES LM-86-2015 Measuring Luminous Flux and Color Maintenance of Remote Phosphor Components IES TM-16-2005: Technical Memorandum on Light Emitting Diode (LED) Sources and Systems IES TM-21-11 Projecting Long Term Lumen Maintenance of LED Light Sources IES TM-26-2015: Method for Projecting Catastrophic Failure Rate of LED Packages IES TM-28-2014: Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires NEMA SSL 7A-2013 Phase Cut Dimming for Solid-State Lighting – Basic Compatibility NEMA SSL 7A-2015 Phase cut dimming for solid-state lighting – basic compatibility NEMA 77-2017 Temporal Light Artifacts: Test Methods and Guidance for Acceptance Criteria SASO 2870:2015: Energy Efficiency, Functionality and Labeling Requirements for Lighting Products, Part 1 SASO 2870:2018: Energy Efficiency, Functionality and Labeling Requirements for Lighting Products, Part 1 SASO 2902:2018: Energy Efficiency, Functionality and Labeling Requirements for Lighting Products, Part 2 US EPA: ENERGY STAR Program Requirements V1.5 for decorative light strings Appendix A US EPA ENERGY STAR Program Requirements V1.1 for Lamps (Light Bulbs), (except Sections 4, 12, and 13)