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:	R2XM200616061-10
Test Date:	2019-03-20 to 2020-05-22
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 240mA
#Nominal CCT:	2700K
#Power:	1.5W
#Average Current Density per LED die:	826.67mA/mm^2
#Average Power Density per LED die:	2.65W/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)	240	1.5	2700K	2	240	826.67	0.17	0.2
BXEM-(A)(B)-(C)(D)(E)-(F)(G)	240	1.5	≧ 2200K	2	240	826.67	0.17	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# R2XM190317061-10-10000 and is authorized by original applicant to use their test data.

2. All the data in previous report (R2XM190317061-10-10000) 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, 240mA

Part Number:	BXEM-27E-12H-6C
Number of Units:	25
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	240mA
Measurement Current:	240mA

Data Set 2: 105°C, 240mA

Part Number:	BXEM-27E-12H-6C
Number of Units:	25
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	240mA
Measurement Current:	240mA

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	3.015E-06	1.002	>60000 hours
2	25	0	1000hrs	10000hrs	3.477E-06	1.004	>60000 hours

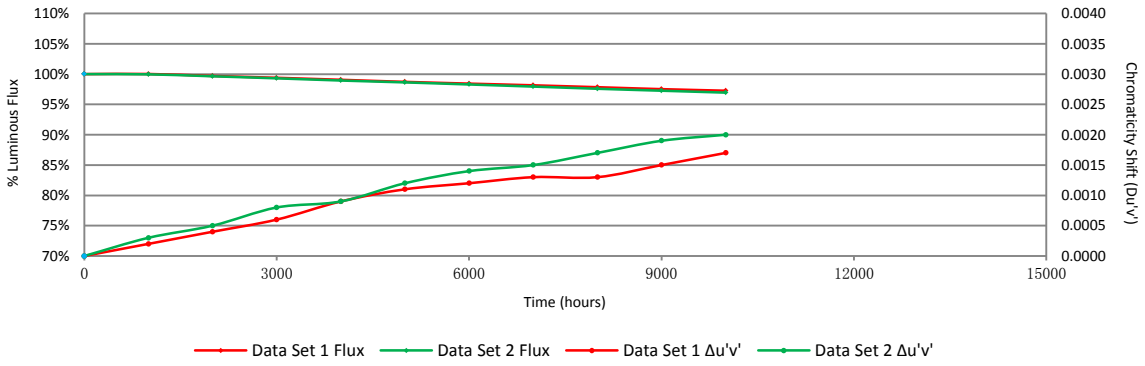
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	100.02%	99.69%	99.39%	99.06%	98.72%	98.43%	98.15%	97.84%	97.52%	97.26%
2	99.96%	99.64%	99.30%	98.94%	98.63%	98.29%	97.94%	97.58%	97.26%	96.94%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.0002	0.0004	0.0006	0.0009	0.0011	0.0012	0.0013	0.0013	0.0015	0.0017
2	0.0003	0.0005	0.0008	0.0009	0.0012	0.0014	0.0015	0.0017	0.0019	0.0020

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 240mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	207.30	100.14	99.95	99.71	99.42	99.13	98.89	98.60	98.41	98.17	97.93
2	211.50	100.14	99.81	99.48	99.15	98.87	98.53	98.16	97.78	97.40	97.02
3	210.90	100.19	99.57	99.19	98.77	98.29	97.72	97.34	97.01	96.73	96.44
4	207.20	100.05	99.61	99.37	99.28	98.99	98.84	98.46	98.07	97.64	97.54
5	211.60	100.09	99.81	99.43	99.15	98.96	98.77	98.53	98.20	97.83	97.59
6	207.60	100.24	99.90	99.52	99.28	98.99	98.84	98.65	98.46	98.12	97.98
7	210.10	100.24	99.95	99.43	99.05	98.71	98.29	97.91	97.43	96.86	96.43
8	210.60	100.14	99.95	99.81	99.53	99.05	98.86	98.72	98.48	98.10	97.96
9	208.40	100.05	99.76	99.57	99.38	98.94	98.75	98.66	98.32	98.13	97.94
10	211.40	99.95	99.81	99.62	99.39	99.20	98.91	98.63	98.30	97.97	97.73
11	210.40	100.24	99.76	99.38	98.95	98.48	98.10	97.58	97.05	96.63	96.34
12	209.00	100.05	99.33	98.85	98.42	98.04	97.66	97.46	97.08	96.75	96.51
13	208.10	100.29	100.05	99.76	99.52	99.23	98.89	98.61	98.32	97.89	97.65
14	205.00	99.90	99.46	99.41	99.17	98.93	98.63	98.39	98.15	97.95	97.80
15	211.30	99.91	99.72	99.62	99.20	98.77	98.58	98.53	98.15	97.92	97.87
16	206.80	100.10	99.95	99.81	99.37	98.84	98.74	98.69	98.36	98.16	98.02
17	209.60	99.86	99.48	99.09	98.62	98.23	97.81	97.52	97.28	96.90	96.61
18	206.80	99.81	99.42	98.98	98.50	97.97	97.53	97.20	96.91	96.66	96.32
19	207.80	100.10	99.57	99.23	98.85	98.46	97.93	97.50	97.06	96.63	96.34
20	209.90	100.05	99.76	99.43	99.14	98.86	98.52	98.24	97.95	97.67	97.28
21	206.20	99.85	99.47	99.13	98.79	98.45	98.74	98.35	98.06	97.72	97.33
22	208.10	100.05	99.47	98.94	98.61	98.17	97.79	97.36	96.92	96.59	96.30
23	211.40	99.91	99.81	99.43	99.34	99.01	98.58	98.25	98.01	97.97	97.63
24	209.60	99.52	99.43	99.09	98.71	98.47	98.33	98.09	97.90	97.71	97.28
25	211.40	99.76	99.48	99.39	99.01	98.96	98.49	98.30	98.25	98.01	97.63
Avg.	209.12	100.02	99.69	99.39	99.06	98.72	98.43	98.15	97.84	97.52	97.26
Med.	209.60	100.05	99.76	99.43	99.15	98.86	98.58	98.30	98.06	97.72	97.54
st dev	1.95	0.18	0.21	0.27	0.33	0.37	0.45	0.51	0.55	0.59	0.64
Min.	205.00	99.52	99.33	98.85	98.42	97.97	97.53	97.20	96.91	96.59	96.30
Max.	211.60	100.29	100.05	99.81	99.53	99.23	98.91	98.72	98.48	98.17	98.02

3.2 Data Set 1, 85°C, 240mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	6.377	6.399	6.403	6.400	6.403	6.413	6.403	6.399	6.400	6.398	6.401
2	6.369	6.409	6.402	6.409	6.401	6.404	6.407	6.418	6.409	6.409	6.401
3	6.376	6.407	6.405	6.407	6.415	6.396	6.406	6.393	6.403	6.405	6.403
4	6.407	6.410	6.413	6.399	6.410	6.418	6.414	6.408	6.424	6.407	6.404
5	6.457	6.485	6.486	6.483	6.470	6.487	6.488	6.478	6.485	6.481	6.486
6	6.400	6.413	6.411	6.410	6.415	6.408	6.415	6.406	6.408	6.411	6.415
7	6.392	6.393	6.396	6.393	6.401	6.402	6.396	6.399	6.399	6.404	6.412
8	6.383	6.382	6.385	6.387	6.390	6.403	6.388	6.383	6.397	6.390	6.383
9	6.369	6.395	6.395	6.404	6.405	6.411	6.394	6.392	6.413	6.398	6.408
10	6.387	6.402	6.402	6.404	6.407	6.404	6.403	6.401	6.404	6.403	6.400
11	6.411	6.401	6.404	6.404	6.405	6.406	6.404	6.401	6.401	6.400	6.404
12	6.399	6.425	6.430	6.414	6.437	6.438	6.418	6.443	6.438	6.431	6.415
13	6.493	6.498	6.496	6.494	6.506	6.507	6.507	6.501	6.506	6.504	6.503
14	6.426	6.424	6.419	6.427	6.426	6.438	6.428	6.417	6.426	6.430	6.433
15	6.427	6.430	6.453	6.482	6.464	6.456	6.459	6.459	6.454	6.443	6.451
16	6.392	6.406	6.411	6.417	6.416	6.426	6.415	6.407	6.410	6.409	6.415
17	6.473	6.451	6.451	6.453	6.453	6.454	6.449	6.450	6.449	6.450	6.459
18	6.405	6.428	6.425	6.420	6.427	6.427	6.418	6.424	6.421	6.423	6.426
19	6.413	6.445	6.455	6.452	6.454	6.452	6.450	6.445	6.443	6.445	6.448
20	6.431	6.448	6.447	6.447	6.452	6.451	6.451	6.448	6.449	6.447	6.448
21	6.419	6.423	6.423	6.424	6.425	6.432	6.423	6.423	6.421	6.424	6.429
22	6.425	6.471	6.452	6.445	6.458	6.451	6.447	6.465	6.446	6.457	6.453
23	6.409	6.420	6.440	6.445	6.421	6.423	6.420	6.410	6.407	6.424	6.418
24	6.380	6.396	6.394	6.396	6.402	6.401	6.401	6.396	6.393	6.404	6.400
25	6.434	6.477	6.460	6.480	6.480	6.481	6.475	6.482	6.481	6.481	6.485
Avg.	6.410	6.426	6.426	6.428	6.430	6.432	6.427	6.426	6.427	6.427	6.428
Med.	6.407	6.420	6.419	6.417	6.421	6.426	6.418	6.417	6.421	6.423	6.415
st dev	0.031	0.031	0.030	0.032	0.030	0.030	0.031	0.032	0.030	0.030	0.031
Min.	6.369	6.382	6.385	6.387	6.390	6.396	6.388	6.383	6.393	6.390	6.383
Max.	6.493	6.498	6.496	6.494	6.506	6.507	6.507	6.501	6.506	6.504	6.503

3.3 Data Set 1, 85°C, 240mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2601	0.5266	2753	0.0001	0.0004	0.0004	0.0011	0.0012	0.0013	0.0015	0.0014	0.0017	0.0017
2	0.2596	0.5284	2756	0.0004	0.0006	0.0005	0.0011	0.0013	0.0014	0.0015	0.0016	0.0016	0.0018
3	0.2593	0.5266	2772	0.0003	0.0004	0.0007	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017
4	0.2595	0.5253	2772	0.0003	0.0005	0.0006	0.0010	0.0011	0.0013	0.0015	0.0014	0.0016	0.0017
5	0.2573	0.5256	2820	0.0001	0.0003	0.0004	0.0007	0.0010	0.0009	0.0012	0.0012	0.0015	0.0016
6	0.2591	0.5271	2774	0.0003	0.0006	0.0006	0.0009	0.0012	0.0013	0.0014	0.0014	0.0016	0.0020
7	0.2598	0.5295	2748	0.0002	0.0004	0.0005	0.0008	0.0011	0.0010	0.0013	0.0012	0.0014	0.0015
8	0.2581	0.5266	2798	0.0003	0.0004	0.0004	0.0007	0.0009	0.0011	0.0011	0.0012	0.0015	0.0015
9	0.2594	0.5257	2774	0.0004	0.0005	0.0006	0.0009	0.0011	0.0013	0.0013	0.0013	0.0016	0.0016
10	0.2595	0.5292	2756	0.0002	0.0004	0.0006	0.0008	0.0010	0.0010	0.0012	0.0012	0.0014	0.0014
11	0.2583	0.5283	2784	0.0003	0.0004	0.0007	0.0009	0.0011	0.0013	0.0013	0.0013	0.0015	0.0017
12	0.2580	0.5251	2806	0.0002	0.0005	0.0006	0.0009	0.0012	0.0013	0.0014	0.0015	0.0017	0.0019
13	0.2578	0.5271	2801	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0014	0.0017	0.0018
14	0.2601	0.5275	2751	0.0003	0.0005	0.0007	0.0011	0.0011	0.0013	0.0013	0.0015	0.0016	0.0019
15	0.2575	0.5253	2817	0.0002	0.0004	0.0006	0.0010	0.0011	0.0013	0.0013	0.0013	0.0015	0.0017
16	0.2577	0.5251	2812	0.0002	0.0004	0.0006	0.0008	0.0009	0.0011	0.0012	0.0014	0.0014	0.0017
17	0.2579	0.5254	2808	0.0003	0.0003	0.0007	0.0009	0.0010	0.0012	0.0014	0.0014	0.0017	0.0018
18	0.2596	0.5257	2768	0.0003	0.0004	0.0005	0.0007	0.0008	0.0011	0.0011	0.0011	0.0014	0.0016
19	0.2590	0.5270	2777	0.0002	0.0004	0.0007	0.0010	0.0011	0.0012	0.0013	0.0014	0.0015	0.0018
20	0.2570	0.5261	2824	0.0001	0.0003	0.0006	0.0009	0.0010	0.0011	0.0013	0.0013	0.0015	0.0017
21	0.2596	0.5258	2769	0.0003	0.0006	0.0007	0.0009	0.0012	0.0014	0.0015	0.0013	0.0016	0.0016
22	0.2576	0.5251	2814	0.0001	0.0004	0.0006	0.0008	0.0011	0.0011	0.0012	0.0012	0.0014	0.0015
23	0.2596	0.5261	2766	0.0003	0.0004	0.0007	0.0009	0.0011	0.0013	0.0013	0.0013	0.0016	0.0017
24	0.2589	0.526	2783	0.0002	0.0004	0.0007	0.0009	0.0013	0.0012	0.0014	0.0013	0.0015	0.0017
25	0.2580	0.5275	2795	0.0001	0.0002	0.0005	0.0008	0.0009	0.0011	0.0011	0.0011	0.0013	0.0015
Avg.	0.2587	0.5265	2784	0.0002	0.0004	0.0006	0.0009	0.0011	0.0012	0.0013	0.0013	0.0015	0.0017
Med.	0.2590	0.5261	2777	0.0003	0.0004	0.0006	0.0009	0.0011	0.0013	0.0013	0.0013	0.0015	0.0017
st dev	0.0010	0.0013	24	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2570	0.5251	2748	0.0001	0.0002	0.0004	0.0007	0.0008	0.0009	0.0011	0.0011	0.0013	0.0014
Max.	0.2601	0.5295	2824	0.0004	0.0006	0.0007	0.0013	0.0014	0.0014	0.0015	0.0016	0.0017	0.0020

3.4 Data Set 2, 105°C, 240mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	212.70	99.91	99.76	99.48	99.20	98.59	98.26	97.88	97.46	97.04	96.61
27	211.50	99.95	99.81	99.62	99.29	98.77	98.39	98.16	97.97	97.59	97.26
28	211.30	100.14	100.09	99.91	99.29	98.86	98.53	98.39	98.15	97.73	97.49
29	209.70	99.71	99.28	98.95	98.76	98.71	98.38	98.04	97.66	97.47	97.23
30	210.70	99.95	99.48	98.91	98.72	98.58	98.39	98.24	97.67	97.34	97.20
31	208.00	99.95	99.57	98.99	98.70	98.32	97.88	97.45	97.12	96.78	96.39
32	208.70	99.76	99.38	98.99	98.71	98.56	98.32	98.04	97.65	97.51	97.27
33	211.00	99.95	99.62	99.15	98.86	98.67	98.44	98.10	97.77	97.63	97.39
34	211.20	100.24	99.95	99.38	98.82	98.44	98.39	98.01	97.63	97.25	97.06
35	211.20	100.33	99.91	99.43	98.86	98.67	98.53	97.92	97.63	97.40	97.11
36	209.40	100.10	99.71	99.57	99.28	98.90	98.47	98.14	97.95	97.28	96.47
37	209.20	99.81	99.62	99.52	99.09	98.80	98.33	98.09	97.85	97.66	97.37
38	207.50	99.52	99.18	98.99	98.70	98.60	98.12	97.83	97.45	97.06	96.72
39	207.80	99.42	99.04	98.85	98.70	98.41	97.79	97.40	96.97	96.63	96.25
40	207.40	99.42	99.18	98.94	98.41	98.17	97.64	97.35	96.91	96.72	96.43
41	211.40	99.86	99.39	99.05	98.49	98.20	97.82	97.45	97.21	96.78	96.59
42	212.90	100.05	99.67	99.11	98.40	98.07	97.79	97.37	96.99	96.62	96.34
43	210.50	100.05	99.90	99.24	99.05	98.53	98.05	97.62	97.29	96.96	96.67
44	207.00	99.95	99.66	99.32	99.23	98.50	98.16	97.73	97.34	97.00	96.81
45	210.90	100.33	100.19	99.76	99.53	98.86	98.58	98.10	97.63	97.25	97.11
46	209.90	99.90	99.52	99.43	98.81	98.57	98.43	97.71	97.33	97.09	96.62
47	211.50	100.09	99.62	99.48	99.24	98.87	98.30	97.92	97.59	97.21	96.60
48	213.90	100.23	99.72	99.44	99.16	99.02	98.83	98.64	98.08	97.80	97.52
49	211.10	100.19	99.81	99.38	99.05	99.01	98.72	98.39	97.96	97.77	97.44
50	212.90	100.14	99.91	99.48	99.11	98.97	98.83	98.59	98.22	97.98	97.56
Avg.	210.37	99.96	99.64	99.30	98.94	98.63	98.29	97.94	97.58	97.26	96.94
Med.	210.90	99.95	99.66	99.38	98.86	98.60	98.38	98.01	97.63	97.25	97.06
st dev	1.87	0.25	0.29	0.29	0.30	0.26	0.32	0.37	0.37	0.39	0.42
Min.	207.00	99.42	99.04	98.85	98.40	98.07	97.64	97.35	96.91	96.62	96.25
Max.	213.90	100.33	100.19	99.91	99.53	99.02	98.83	98.64	98.22	97.98	97.56

3.5 Data Set 2, 105°C, 240mA (Forward Voltage)

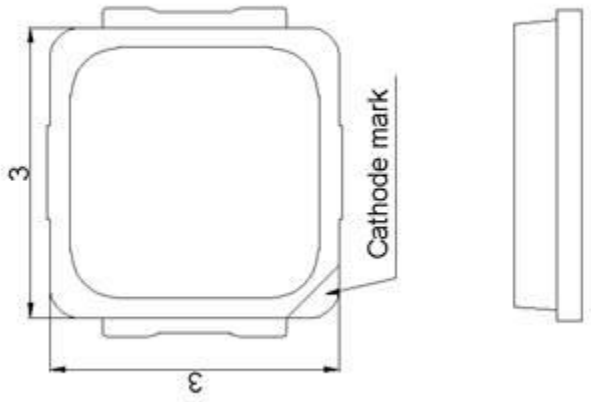
No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	6.407	6.415	6.408	6.406	6.415	6.410	6.409	6.410	6.410	6.407	6.408
27	6.405	6.450	6.441	6.419	6.432	6.435	6.438	6.448	6.474	6.438	6.432
28	6.408	6.430	6.422	6.432	6.459	6.451	6.454	6.459	6.445	6.446	6.452
29	6.486	6.431	6.426	6.423	6.438	6.431	6.426	6.430	6.430	6.427	6.428
30	6.421	6.451	6.474	6.471	6.477	6.459	6.455	6.458	6.458	6.459	6.459
31	6.405	6.417	6.421	6.420	6.434	6.427	6.424	6.420	6.429	6.424	6.424
32	6.425	6.417	6.414	6.414	6.414	6.416	6.412	6.413	6.422	6.425	6.421
33	6.406	6.401	6.401	6.402	6.402	6.407	6.403	6.402	6.422	6.408	6.400
34	6.464	6.428	6.426	6.428	6.433	6.430	6.440	6.435	6.430	6.436	6.427
35	6.458	6.470	6.469	6.469	6.475	6.487	6.454	6.455	6.408	6.413	6.472
36	6.379	6.391	6.390	6.391	6.394	6.392	6.392	6.391	6.386	6.388	6.386
37	6.385	6.415	6.400	6.388	6.395	6.415	6.384	6.416	6.390	6.397	6.375
38	6.459	6.440	6.428	6.423	6.439	6.444	6.459	6.450	6.460	6.438	6.433
39	6.444	6.416	6.411	6.410	6.423	6.419	6.418	6.423	6.416	6.426	6.413
40	6.455	6.454	6.451	6.454	6.452	6.467	6.456	6.459	6.457	6.457	6.467
41	6.396	6.410	6.417	6.408	6.425	6.418	6.416	6.415	6.413	6.416	6.411
42	6.395	6.405	6.407	6.407	6.417	6.407	6.405	6.408	6.408	6.413	6.413
43	6.405	6.383	6.384	6.386	6.388	6.392	6.384	6.391	6.385	6.386	6.384
44	6.450	6.402	6.403	6.406	6.410	6.421	6.402	6.407	6.401	6.408	6.405
45	6.440	6.455	6.455	6.456	6.459	6.458	6.458	6.454	6.454	6.455	6.454
46	6.410	6.415	6.412	6.413	6.415	6.417	6.415	6.410	6.413	6.418	6.423
47	6.411	6.428	6.432	6.426	6.425	6.423	6.418	6.461	6.434	6.420	6.419
48	6.389	6.401	6.423	6.412	6.407	6.404	6.434	6.399	6.429	6.415	6.423
49	6.463	6.418	6.418	6.418	6.425	6.424	6.427	6.420	6.415	6.417	6.420
50	6.459	6.464	6.463	6.455	6.462	6.464	6.469	6.464	6.457	6.454	6.459
Avg.	6.425	6.424	6.424	6.421	6.429	6.429	6.426	6.428	6.426	6.424	6.424
Med.	6.411	6.417	6.421	6.418	6.425	6.423	6.424	6.420	6.422	6.420	6.423
st dev	0.030	0.023	0.024	0.023	0.025	0.024	0.025	0.024	0.024	0.020	0.025
Min.	6.379	6.383	6.384	6.386	6.388	6.392	6.384	6.391	6.385	6.386	6.375
Max.	6.486	6.470	6.474	6.471	6.477	6.487	6.469	6.464	6.474	6.459	6.472

3.6 Data Set 2, 105°C, 240mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	0.2581	0.5262	2799	0.0004	0.0005	0.0008	0.0009	0.0014	0.0014	0.0018	0.0018	0.0019	0.0022
27	0.2580	0.5273	2795	0.0004	0.0005	0.0007	0.0008	0.0012	0.0013	0.0016	0.0016	0.0018	0.0020
28	0.2579	0.5256	2806	0.0004	0.0007	0.0008	0.0010	0.0014	0.0015	0.0017	0.0020	0.0019	0.0021
29	0.2583	0.5264	2794	0.0002	0.0003	0.0009	0.0009	0.0011	0.0013	0.0015	0.0018	0.0018	0.0020
30	0.2571	0.5243	2830	0.0001	0.0003	0.0006	0.0008	0.0009	0.0011	0.0014	0.0015	0.0016	0.0018
31	0.2598	0.5264	2760	0.0003	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0017	0.0020
32	0.2589	0.5260	2783	0.0004	0.0007	0.0008	0.0010	0.0012	0.0015	0.0017	0.0018	0.0021	0.0022
33	0.2583	0.5262	2794	0.0003	0.0005	0.0007	0.0009	0.0010	0.0012	0.0014	0.0016	0.0018	0.0019
34	0.2573	0.5259	2818	0.0003	0.0005	0.0008	0.0010	0.0013	0.0014	0.0016	0.0016	0.0018	0.0020
35	0.2579	0.5270	2800	0.0004	0.0006	0.0009	0.0011	0.0012	0.0016	0.0016	0.0018	0.0021	0.0022
36	0.2581	0.5267	2796	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0014	0.0016	0.0017	0.0021
37	0.2577	0.5258	2810	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0014	0.0016	0.0017	0.0019
38	0.2600	0.5271	2753	0.0004	0.0006	0.0008	0.0011	0.0013	0.0017	0.0018	0.0020	0.0020	0.0022
39	0.2597	0.5266	2762	0.0004	0.0006	0.0008	0.0009	0.0011	0.0014	0.0015	0.0017	0.0018	0.0019
40	0.2597	0.5288	2753	0.0004	0.0007	0.0008	0.0009	0.0013	0.0014	0.0015	0.0017	0.0018	0.0020
41	0.2594	0.5272	2766	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0015	0.0017	0.0019	0.0019
42	0.2578	0.5268	2802	0.0002	0.0005	0.0006	0.0010	0.0011	0.0013	0.0014	0.0016	0.0019	0.0019
43	0.2588	0.5262	2784	0.0002	0.0005	0.0007	0.0009	0.0010	0.0013	0.0015	0.0016	0.0018	0.0018
44	0.2601	0.5263	2756	0.0005	0.0007	0.0010	0.0012	0.0013	0.0016	0.0018	0.0019	0.0021	0.0020
45	0.2579	0.5262	2803	0.0005	0.0006	0.0010	0.0011	0.0014	0.0014	0.0016	0.0019	0.0021	0.0021
46	0.2587	0.5263	2785	0.0004	0.0005	0.0009	0.0009	0.0012	0.0014	0.0015	0.0016	0.0019	0.0019
47	0.2588	0.5273	2778	0.0003	0.0005	0.0006	0.0009	0.0010	0.0013	0.0014	0.0017	0.0017	0.0017
48	0.2592	0.5269	2771	0.0001	0.0003	0.0006	0.0008	0.0010	0.0013	0.0013	0.0015	0.0017	0.0018
49	0.2595	0.5261	2770	0.0003	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	0.0019	0.0020
50	0.2587	0.5259	2786	0.0003	0.0006	0.0009	0.0010	0.0013	0.0014	0.0016	0.0017	0.0019	0.0020
Avg.	0.2586	0.5265	2786	0.0003	0.0005	0.0008	0.0009	0.0012	0.0014	0.0015	0.0017	0.0019	0.0020
Med.	0.2587	0.5263	2786	0.0003	0.0005	0.0008	0.0009	0.0012	0.0014	0.0015	0.0017	0.0018	0.0020
st dev	0.0009	0.0008	21	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2571	0.5243	2753	0.0001	0.0003	0.0006	0.0008	0.0009	0.0011	0.0013	0.0015	0.0016	0.0017
Max.	0.2601	0.5288	2830	0.0005	0.0007	0.0010	0.0012	0.0014	0.0017	0.0018	0.0020	0.0021	0.0022

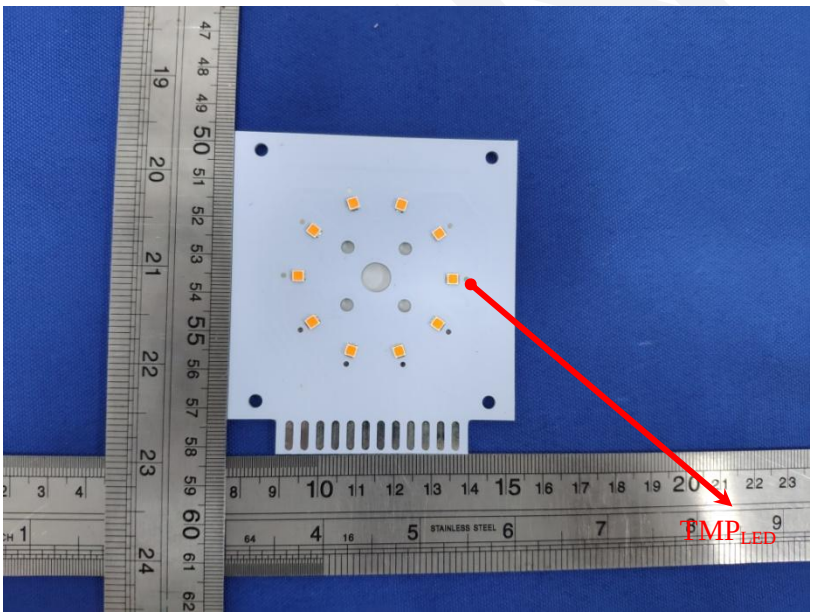
4 - DUT Photo

4.1 #Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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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)