

TEST REPORT

Prepared For

Shenzhen Brillloop Lighting Co., Ltd

6F, B6 Building, Junfeng Industrial Park, Yonghe Road, Fuyong, Bao'an District, Shenzhen City, Guangdong Province, P.R.China

Model: BLP-HBL100W04-3000

Report Type:	Report is prepared for the client above to present the result of measured temperature of samples and projected lumen maintenance life of LED lighting product according to projecting method from IES: IES TM-21-11
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	R2DG160822054-10
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Report Date:	2016-08-25
Reviewed By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588

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)

(Rev. 2.0, 2012-10-05 effected) 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.

1. General Description

Information of Final Products:

One sample was received on 2016-08-20 and used for testing.

Model Number: BLP-HBL100W04-3000
 Model Name: LED High Bay Light
 Manufacturer: Shenzhen Brillloop Lighting Co., Ltd
 Rated Voltage: 100-240V,50Hz
 Test Voltage: 240V,50Hz
 Rated Power: 100W

Information of LED Light Source:

Model Number of LED Light Source: LUXEON 3030 2D: L130-2780003000W21
 Manufacturer: Philips Lumileds

Declaration:

The manufacturer applied declaration to our Lab on Aug. 29th 2016 and declare that there are some differences between Multiple Models and testing products. Details as below:

Testing Model	Multiple Models	Difference	Details
BLP-HBL100W04-3000	BLP-HBL100W04-XXXX	CCT	XXXX is CCT, it can be 3000=3000K, 4000=4000K, 5700=5700K.

2. Standards Used

- IES TM-21-11 Projecting Long Term Lumen Maintenance of LED Light Sources
- ANSI/UL 1598-2008: Standard for Safety of Luminaires
- Annex A of IES LM-84-14 Recommendations for measurement of IN-SITU conditions LED case temperature

3. Test Method

Lumen maintenance life of LED light source and LED lamp or luminaire (if any) is the elapsed operating time over which an LED light source maintains a given percentage of its initial light output. L₇₀ in this report is the time (in hours) when the light output from the LED has dropped to 70% of its initial output.

The LED light source is LED package, array, or module which is tested in IES LM-80-08 test report. Final product means LED lamp or luminaire which the LED light source will be included. TMP_{LED} is the temperature of the thermocouple attachment point on the LED light source package as defined by the manufacturer of the LED light source. The *in situ* temperature of LED light source used in final product was used to calculate the lumen maintenance life of final product, if any.

The *in situ* temperature is measured according to ANSI/UL 1598 and IES LM-84 Annex A. The LED which has the highest temperature was measured at the location of LED case which is specified by LED source manufacturer and detailed by LM-80 report. The hottest LED was found by the following procedure:

An IR thermography may be used to find the hottest LEDs. Or if the layout of PCB is symmetrical, the hottest LED should be at the center or close to the center of the array. Or in question, more than one TMP should be measured to find out the hottest LED. The case temperature of the hottest LED source at *in situ* condition is reported and is used to project L₇₀ life time.

The reported temperature value for each point should be the readings of the hybrid recorder after the temperature of each point is stabilized and constant. A temperature is considered constant if the test has been running for at least 3 hours; and three successive readings, taken at 15-minute intervals, are within 1 degree C of one another and are not rising. Or the test was run for a minimum of 7.5 h. Ambient temperature variations above or below 25 °C have been respectively subtracted from or added to temperatures recorded at points on the device.

The drive current of LED package/module/ array was calculated as the total output current of the driver measured by multimeter, divided by the number of branches in parallel of LEDs.

The calculation of the L_{70} life is according to IES TM-21-11.

FINAL

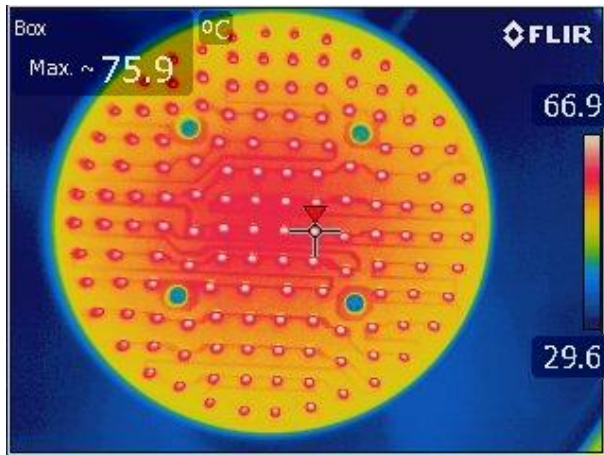
4. Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Multimeter	FLUKE	17B	1573 1328	400nV~4000nV, 4V~1000V	2016-03-04	2017-03-03
Hybrid Recorder	YOKOGAWA	DR240	10#	N/A	2016-03-04	2017-03-03
Power Supply	HengPu	HPA 1103	0003394	3KVA	2016-03-04	2017-03-03
Thermography	FLIR	E60	49037877	-20°C-120 °C 0°C-650 °C	N/A	N/A

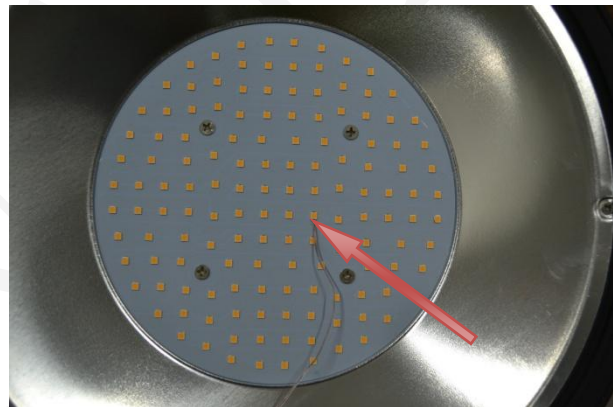
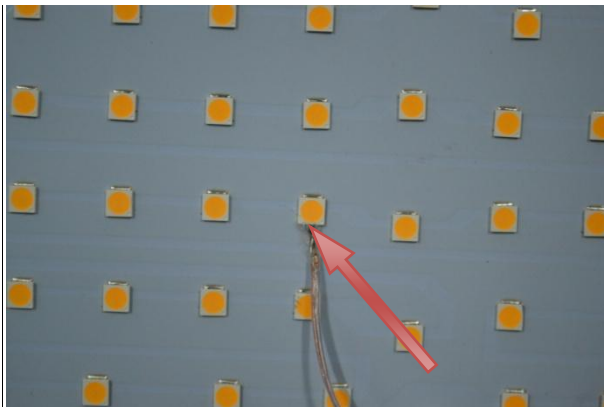
Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

5. In situ Temperature and Driver Current Measurements of Final Product

IR thermograph from hot PCBAs of Sample



Temperature measurement point on TMPLED



Temperature Measurement Data

Test Condition

Ambient Temperature:	25°C±5°C
Relative Humidity:	60.8 %
Supply voltage:	240 V 50 Hz
Type of thermocouples:	T
Test Duration	≥3.5Hours

Test Result

Hottest TMP _{LED} :	57.7°C
Forward Current(I _F):	101.05 mA

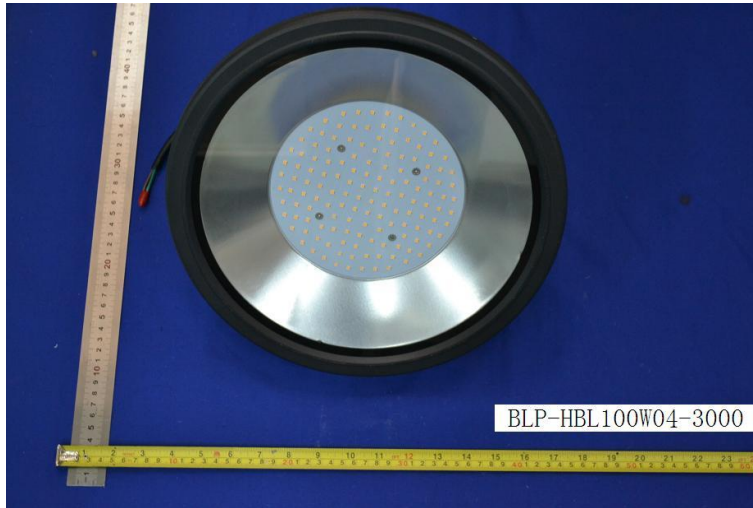
6. Lumen Maintenance Data of LED Light Source from LM-80 Report

Test Data for 55°C Case Temperature		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature	
Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
1000	99.26	1000	98.97	1000	98.91
2000	98.64	2000	98.43	2000	98.15
3000	98.36	3000	98.01	3000	97.68
4000	97.69	4000	97.28	4000	96.74
5000	97.25	5000	96.71	5000	96.27
6000	96.81	6000	96.24	6000	95.73
7000	96.34	7000	95.77	7000	95.36
8000	95.84	8000	95.66	8000	95.25
9000	95.49	9000	95.19	9000	94.56

7. Calculate Result of Life Time Projection

Temperature Interpolation at 57.7° C (projection based on in-situ temperature entered)	
$T_{s,1}$ (°C)	55.00
$T_{s,1}$ (K)	328.15
α_1	4.645E-06
B_1	0.995
$T_{s,2}$ (°C)	85.00
$T_{s,2}$ (K)	358.15
α_2	4.178E-06
B_2	0.988
E_a/k_b	-4.15E+02
A	1.312E-06
B_0	0.992
$T_{s,i}$ (°C)	57.70
$T_{s,i}$ (K)	330.85
α_i	4.597E-06
Reported $L_{70}(10k)$ at 57.7°C (hours)	>54000

8. Final Product Photo



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