

FEN



## TABLE OF CONTENTS

<b>1 - General Information</b> .....	<b>3</b>
1.1 Description of LED Light Sources .....	3
1.2 Standards and Reference Documentations .....	4
1.3 Testing Equipment .....	5
1.4 Drive Level .....	5
1.5 Ambient Conditions for Maintenance Test .....	5
1.6 Photometric Measurement Method and Uncertainty.....	5
1.7 Statement of Traceability .....	5
1.8 Sample Set.....	6
<b>2 - Summary of Test Result</b> .....	<b>7</b>
<b>3 - Test Data</b> .....	<b>8</b>
3.1 Data Set 1, 55°C, 150mA (Lumen Maintenance).....	8
3.2 Data Set 1, 55°C, 150mA (Forward Voltage).....	9
3.3 Data Set 1, 55°C, 150mA (Chromaticity Shift) .....	10
3.4 Data Set 2, 105°C, 150mA (Lumen Maintenance) .....	11
3.5 Data Set 2, 105°C, 150mA (Forward Voltage).....	12
3.6 Data Set 2, 105°C, 150mA (Chromaticity Shift).....	13
<b>4 - DUT Photo</b> .....	<b>14</b>
4.1 Mechanical Dimensions .....	14
4.2 DUT Photo.....	14
<b>Directions</b> .....	<b>15</b>



## 1 - General Information

### 1.1 Description of LED Light Sources

#### Sample Size:

50 PCS test samples were in good condition and received on 2020-12-03. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-AS-3030HW-2C-S1-08L-PCT-HR3(R9)
Part Type:	LED Package
#Drive Level:	DC 150mA
#Nominal CCT:	2700K
#Power:	0.99W
#Average Current Density per LED die:	1033.343mA/mm <sup>2</sup>
#Average Power Density per LED die:	3.410W/mm <sup>2</sup>
#CRI:	80
#Die Spacing:	0.15mm

#### 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<sup>®</sup> 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<sup>®</sup> Requirements for the Use of LM-80 Data* (September 28, 2017)

This report covers the following models:

Model type	Model name	CRI (typ.)	CCT (typ.)	Series	Parallel	Power density (W/mm <sup>2</sup> )	Current density per LED die (mA/mm <sup>2</sup> )	Current per die (mA)	Distance between of dies(mm)	Current (mA)
Test model	HL-AS-3030H466W-2C-S1-08L-PCT-HR3(R9)	80	2700K	2	1	0.11	1033.343	150	0.15	150
Multiple model	HL-AS-3030HW-2C-S1-08L-PCT-HR3(R9)	80	2700K	2	1	0.11	1033.343	150	0.15	150
Multiple model	HL-**-3030H***W-2C-S1-08*-PCT-HR3(R9)-***	80	2200-6500K	2	1	0.11	1033.343	150	0.15	150
Multiple model	HL-**-3030H***W-2C-S1-08*-PCT-HR3-***	80	2200-6500K	2	1	0.11	1033.343	150	0.15	150
Multiple model	HL-**-3030D***W-2C-S1-08*-PCT-HR3(R9)-***									



### 1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
High Accuracy Array Spectroradiometer	EVERFINE	HAAS 2000	P600674CM5391140	2020-10-22	2021-10-21
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2020-10-22	2021-10-21
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2020-10-21	2021-10-20
Standard Light Source	EVERFINE	D062	1011093	2020-10-20	2021-10-19
Multilayer aging machine	BACL	B2-270	20005	2021-02-24	2022-02-23
Program-controlled D.C. Stabilized Voltage Supply	Hanshenpu yuan	HSPY-200-01	N/A	2021-06-30	2022-06-29

### 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  $\pm 3\%$  of the specified value of the manufacturer during maintenance test, and was within  $\pm 0.5\%$  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 <sub>LED</sub> 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  $2^{\circ}C$  below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to  $5^{\circ}C$  below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within  $\pm 3\%$  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  $25^{\circ}C \pm 2^{\circ}C$ , RH <65%.

### 1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate  $u, v, 2$  measurement was used and sample was driven by DC power supply. The forward current was regulated to within  $\pm 0.5\%$  of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to  $25^{\circ}C \pm 2^{\circ}C$ , 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  $U=0.8671^{\circ}C$  ( $K=2$ ), 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: 55°C, 150mA

Part Number: HL-AS-3030HW-2C-S1-08L-PCT-HR3(R9)

Number of Units: 25

Case Temperature: >53°C

Ambient Temperature: >50°C

Life Test Drive Current: 150mA

Measurement Current: 150mA

### Data Set 2: 105°C, 150mA

Part Number: HL-AS-3030HW-2C-S1-08L-PCT-HR3(R9)

Number of Units: 25

Case Temperature: >103°C

Ambient Temperature: >100°C

Life Test Drive Current: 150mA

Measurement Current: 150mA

FINAL

## 2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration			Reported TM-21 L <sub>70</sub> Lifetime
1	25	0	1000hrs	6000hrs	2.334E-06	1.006	>36000 hours
2	25	0	1000hrs	6000hrs	2.755E-06	1.005	>36000 hours

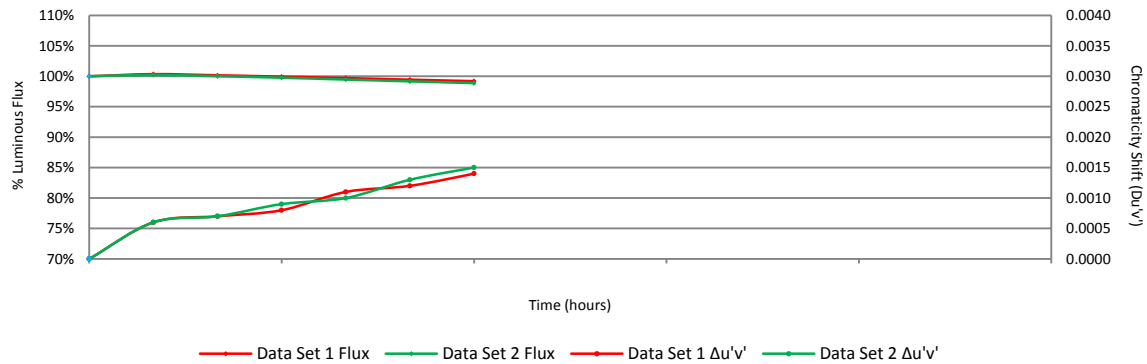
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	100.35%	100.16%	99.94%	99.70%	99.44%	99.20%
2	100.22%	100.01%	99.76%	99.46%	99.16%	98.87%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.0006	0.0007	0.0008	0.0011	0.0012	0.0014
2	0.0006	0.0007	0.0009	0.0010	0.0013	0.0015

Average Lumen Maintenance and Chromaticity Shift VS. Time





### 3 - Test Data

---

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

No.	Lumen Maintenance (%)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	111.70	100.09	99.73	99.55	99.46	99.19	98.93
2	112.50	100.18	100.09	99.82	99.56	99.38	99.11
3	112.40	100.36	100.18	99.91	99.38	99.11	98.84
4	111.10	100.18	100.09	99.91	99.64	99.28	98.92
5	111.20	100.45	100.18	100.09	99.73	99.37	99.19
6	110.80	100.54	100.45	100.36	100.18	99.91	99.55
7	112.00	100.27	100.18	99.91			

FUNNIAL





**3.2 Data Set 1, 55°C, 150mA (Forward Voltage)**

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	6.211	6.211	6.203	6.213	6.200	6.204	6.204
2	6.184	6.184	6.169	6.199	6.176	6.173	6.175
3	6.171	6.169	6.167	6.188	6.168	6.183	6.199
4	6.196	6.196	6.190	6.209	6.194	6.209	6.203
5	6.167	6.175	6.167	6.184	6.165	6.175	6.184
6	6.157	6.207	6.165	6.171	6.161	6.171	6.179
7	6.171	6.173	6.167	6.181	6.169	6.175	6.173
8	6.167	6.167	6.165	6.175	6.166	6.167	6.176
9	6.173	6.186	6.173	6.184	6.173	6.177	6.186
10	6.194	6.186	6.186	6.201	6.188	6.187	6.179
11	6.171	6.186	6.165	6.208	6.170	6.183	6.171
12	6.190	6.196	6.184	6.208	6.188	6.206	6.204
13	6.142	6.142	6.136	6.162	6.142	6.150	6.172
14	6.171	6.167	6.163	6.176	6.169	6.172	6.178
15	6.182	6.192	6.178	6.181	6.180	6.188	6.182
16	6.165	6.173	6.161	6.187	6.166	6.187	6.183
17	6.155	6.157	6.157	6.167	6.155	6.165	6.152
18	6.167	6.175	6.171	6.205	6.169	6.185	6.163
19	6.148	6.146	6.146	6.166	6.149	6.159	6.150
20	6.153	6.159	6.157	6.171	6.161	6.167	6.164
21	6.171	6.165	6.165	6.187	6.162	6.178	6.171
22	6.165	6.165	6.163	6.177	6.170	6.177	6.161
23	6.165	6.169	6.169	6.176	6.177	6.174	6.173
24	6.169	6.167	6.169	6.174	6.179	6.175	6.168
25	6.161	6.161	6.165	6.179	6.169	6.170	6.166
Avg.	6.171	6.175	6.168	6.185	6.171	6.178	6.177
Med.	6.169	6.173	6.167	6.181	6.169	6.175	6.175
st dev	0.016	0.017	0.013	0.015	0.013	0.014	0.015
Min.	6.142	6.142	6.136	6.162	6.142	6.150	6.150
Max.	6.211	6.211	6.203	6.213	6.200	6.209	6.204



**3.3 Data Set 1, 55°C, 150mA (Chromaticity Shift) 0**

No.			CCT(K)						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2608	0.5325	2715	0.0007	0.0008	0.0010	0.0012	0.0015	0.0018
2	0.2595	0.5317	2745	0.0006	0.0006	0.0008	0.0011	0.0013	0.0015
3	0.2618	0.5329	2694	0.0006	0.0007	0.0008	0.0011	0.0014	0.0016
4	0.2596	0.5330	2736	0.0006	0.0006	0.0007	0.0011	0.0012	0.0013
5	0.2608	0.5320	2717	0.0007	0.0008	0.0011	0.0013	0.0015	0.0016
6	0.2603	0.5316	2727	0.0006	0.0007	0.0009	0.0009	0.0011	0.0013
7	0.2592	0.5330	2746	0.0005	0.0007	0.0007	0.0010	0.0013	0.0015
8	0.2607	0.5327	2716	0.0005	0.0008	0.0009	0.0013	0.0014	0.0017
9	0.2593	0.5326	2745	0.0004	0.0007	0.0007	0.0011	0.0013	0.0015
10	0.2606	0.5322	2720	0.0005	0.0006	0.0008	0.0010	0.0011	0.0014
11	0.2602	0.5325	2727	0.0007	0.0007	0.0011	0.0009	0.0011	0.0013
12	0.2596	0.5324	2740	0.0006	0.0008	0.0008	0.0011	0.0012	0.0015
13	0.2597	0.5313	2743	0.0006	0.0008	0.0009	0.0010	0.0011	0.0012
14	0.2600	0.5322	2733	0.0006	0.0007	0.0010	0.0011	0.0014	0.0016
15	0.2611	0.5336	2704	0.0006	0.0007	0.0009	0.0012	0.0014	0.0015
16	0.2581	0.5332	2768	0.0005	0.0007	0.0007	0.0011	0.0013	0.0015
17	0.2594	0.5326	2742	0.0005	0.0007	0.0008	0.0009	0.0011	0.0013
18	0.2592	0.5329	2746	0.0006	0.0008	0.0007	0.0012	0.0013	0.0016
19	0.2595	0.5315	2745	0.0006	0.0006	0.0007	0.0011	0.0013	0.0015
20	0.2587	0.5325	2758	0.0004	0.0005	0.0005	0.0008	0.0009	0.0011
21	0.2585	0.5330	2760	0.0005	0.0005	0.0005	0.0009	0.0010	0.0011
22	0.2595	0.5332	2738	0.0006	0.0006	0.0007	0.0009	0.0009	0.0012
23	0.2598	0.5320	2738	0.0005	0.0006	0.0009	0.0011	0.0013	0.0014
24	0.2610	0.5315	2715	0.0005	0.0007	0.0007	0.0012	0.0013	0.0016
25	0.2603	0.5321	2725	0.0005	0.0005	0.0007	0.0011	0.0014	0.0015
Avg.	0.2599	0.5324	2734	0.0006	0.0007	0.0008	0.0011	0.0012	0.0014
Med.	0.2597	0.5325	2738	0.0006	0.0007	0.0008	0.0011	0.0013	0.0015
st dev	0.0009	0.0006	18						





**3.5 Data Set 2, 105°C, 150mA (Forward Voltage)**

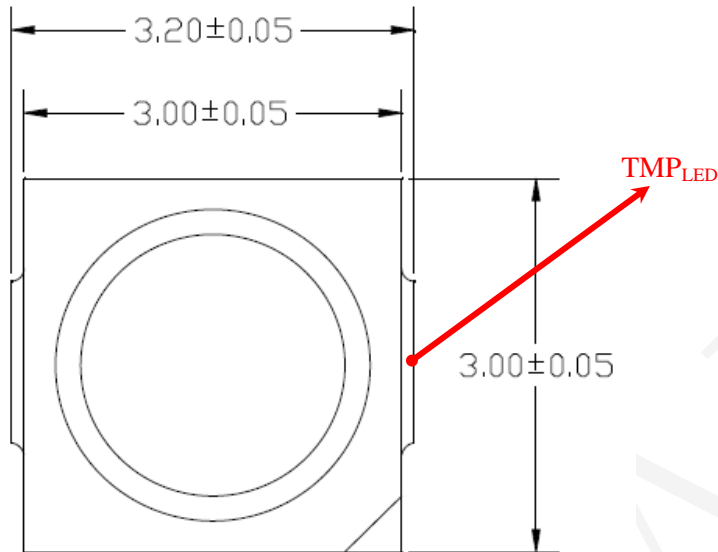
No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	6.146	6.150	6.148	6.155	6.162	6.166	6.168
27	6.167	6.167	6.165	6.177	6.179	6.183	6.180

FUNNIAL

FINAL

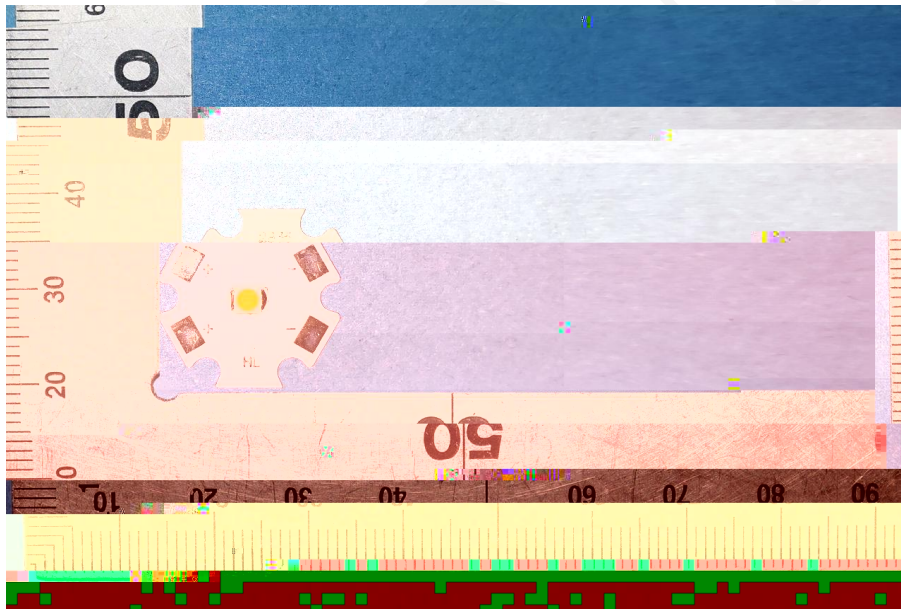
## 4 - DUT Photo

### 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\*\*\*\*\*