TEST REPORT

According to ANSI/IES LM-80-15
For

Hongli Zhihui Group Co.,Ltd. Guangzhou Branch

Room 316, Building 2, No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China

Model: HL-A-3014H416W-S1-08HL-HR3

Report Type: 10000 Hours Test Report	**Product Type:** LED Package
Reviewed By:	Pote Wang
Report Number:	SZ2220725-33706E-EE-10000
Test Date:	2022-07-29 to 2023-10-20
Report Date:	2023-10-31
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588

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1 - General Information

1.1 Description of LED Light Sources#

Sample Size:

50 PCS test samples were in good condition and received on 2022-07-25. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-A-3014H416W-S1-08HL-HR3
Part Type:	LED Package
Drive Level:	DC 30mA
Nominal CCT:	2700K
Power:	0.102W
Average Current Density per LED die:	387.5mA/mm^2
Average Power Density per LED die:	1.318W/mm^2
CRI:	80
Die Spacing:	N/A

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 Type	Model Name	CRI (typ.)	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)

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	2022-11-18	2023-11-17
LED Test Source	EVERFINE	LTS-300	P185616CD1371113	2022-11-18	2023-11-17
High Accuracy Array Spectroradiometer	EVERFINE	HAAS-2000	P600674CM1381123	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D062	M133799CM1381112	2023-05-12	2025-05-11
Multilayer aging machine	BACL	B2-270	20015	2022-11-18	2023-11-17
Program-controlled D.C. Stabilized Voltage Supply	Hanshenpuyuan	HSPY-200-01	N/A	2022-11-18	2023-11-17

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 $_{LED}$) 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 .

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 . 2 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: 55°C, 30mA

Part Number:	HL-A-3014H416W-S1-08HL-HR3
Number of Units:	25
Case Temperature:	>53°C
Ambient Temperature:	>50°C
Life Test Drive Current:	30mA
Measurement Current:	30mA

Data Set 2: 85°C, 30mA

Part Number:	HL-A-3014H416W-S1-08HL-HR3
Number of Units:	25
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	30mA
Measurement Current:	30mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration			Reported TM-21 L_{70} Lifetime
1	25	0	1000hrs	10000hrs	2.100E-06	1.005	>60000 hours
2	25	0	1000hrs	10000hrs	2.559E-06	1.006	>60000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	**1000hrs	**2000hrs	**3000hrs	**4000hrs	**5000hrs	**6000hrs	7000hrs	8000hrs	9

3 - Test Data

3.1 Data Set 1, 55°C, 30mA (Lumen Maintenance)

No.		Lumen Maintenance (%)									
	**0hr(Initial)	**1000hrs	**2000hrs	**3000hrs	**4000hrs	**5000hrs	**6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	11.88	100.25	100.17	100.08	99.92	99.75	99.49	99.33	99.07	98.82	98.57
2	11.74	100.26	100.09	99.91	99.83	99.66	99.49	99.32	99.15	98.98	98.81
3	11.83	100.25	99.92	99.75	99.66	99.58	99.41	99.24	98.99	98.73	98.56
4	11.17	100.27	100.18	99.91	99.73	99.55	99.37	99.10	98.93	98.75	98.57
5	11.71	100.26	100.09	99.91	99.66	99.32	99.15	98.98	98.72	98.46	98.29
6	11.66	100.26	100.09	99.91	99.74	99.57	99.31	99.14	98.97	98.71	98.46
7	11.80	100.17	99.92	99.75	99.58	99.41	99.24	98.98	98.81	98.73	98.47
8	11.24	100.27	100.09	99.91	99.73	99.47	99.29	99.02	98.84	98.67	98.49
9	11.89	100.08	99.83	99.58	99.33	99.07	98.82	98.57	98.40	98.23	98.07
10	11.63	100.26	100.09	99.91	99.66	99.40	99.23	98.97	98.80	98.62	98.37
11	11.77	100.25	99.92	99.66	99.58	99.41	99.24	98.98	98.73	98.47	98.30

3.2 Data Set 1, 55°C, 30mA (Forward Voltage)

No.	Forward Voltage (V)										
	**0hr(Initial)	**1000hrs	**2000hrs	**3000hrs	**4000hrs	**5000hrs	**6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2.889	2.888	2.888	2.888	2.888	2.888	2.889	2.888	2.887	2.886	2.890
2	2.873	2.872	2.873	2.873	2.872	2.873	2.877	2.872	2.872	2.873	2.873
3	2.881	2.882	2.883	2.883	2.880	2.881	2.886	2.882	2.881	2.881	2.884
4	2.870	2.887	2.887	2.891	2.886	2.888	2.889	2.887	2.888	2.886	2.886
5	2.879	2.881	2.882	2.883	2.880	2.883	2.882	2.881	2.880	2.879	2.881
6	2.878	2.877	2.877	2.881	2.877	2.878	2.878	2.877	2.877	2.878	2.878
7	2.884	2.882	2.883	2.885	2.883	2.886	2.885	2.885	2.885	2.883	2.883
8	2.877	2.877	2.879	2.881	2.880	2.879	2.881	2.879	2.880	2.878	2.878
9	2.886	2.888	2.888	2.891	2.886	2.888	2.889	2.888	2.891	2.888	2.887
10	2.876	2.879	2.882	2.883	2.880	2.880	2.880	2.881	2.880	2.880	2.881
11	2.879	2.880	2.883	2.883	2.884	2.883	2.882	2.880	2.882	2.881	2.881
12	2.883	2.885	2.886	2.887	2.888	2.887	2.888	2.886	2.885	2.886	2.886
13	2.878	2.879	2.881	2.882	2.882	2.881	2.880	2.880	2.881	2.879	2.881
14	2.883	2.885	2.888	2.887	2.884	2.885	2.885	2.886	2.886	2.886	2.885
15	2.877	2.877	2.878	2.879	2.879	2.878	2.879	2.878	2.878	2.879	2.878
16	2.870	2.872	2.874	2.874	2.874	2.873	2.873	2.872	2.872	2.872	2.873

3.3 Data Set 1, 55°C, 30mA (Chromaticity Shift)

No.			CCT(K)										
	**0hr(Initial)			**1000hrs	**2000hrs	**3000hrs	**4000hrs	**5000hrs	**6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2550	0.5286	2859	0.0001	0.0002	0.0001	0.0004	0.0006	0.0007	0.0009	0.0009	0.0009	0.0009
2	0.2552	0.5267	2861	0.0001	0.0002	0.0004	0.0007	0.0008	0.0009	0.0009	0.0009	0.0011	0.0013
3	0.2608												

0.2608

3.4 Data Set 2, 85°C, 30mA (Lumen Maintenance)

No.		Lumen Maintenance (%)									
	**0hr(Initial)	**1000hrs	**2000hrs	**3000hrs	**4000hrs	**5000hrs	**6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	11.76	100.26	99.91	99.74	99.49	99.15	98.98	98.72	98.47	98.21	98.04
27	11.66	100.17	99.91	99.66	99.40	99.23	98.97	98.71	98.46	98.28	98.03
28	11.42	100.35	100.09	99.91	99.74	99.56	99.21	98.95	98.69	98.42	98.16
29	11.67	100.09	99.91	99.83	99.74	99.40	99.23	99.06	98.89	98.71	98.37
30	11.69	100.34	100.17	99.83	99.66	99.49	99.23	98.97	98.63	98.29	98.03
31	11.35	100.35	100.09	99.82	99.65	99.38	99.12	98.85	98.59	98.24	97.97
32	11.47	100.17	99.83	99.65	99.48	99.22	99.04	98.87	98.61	98.34	98.08
33	11.49	100.26	100.09	99.83	99.56	99.30	99.04	98.78	98.61	98.35	98.00
34	11.82	100.25	99.92	99.58	99.41	99.15	98.90	98.65	98.39	98.05	97.88
35	11.36	100.18	99.82	99.56	99.38	99.21	99.03	98.86	98.68	98.42	98.24
36	11.88	100.17	99.83	99.58	99.41	99.24	99.07	98.91	98.74	98.57	98.40
37	11.57	100.26	99.91	99.65	99.39	99.22	99.05	98.79	98.53	98.36	98.01
38	11.61	100.09	99.83	99.66	99.40	99.22	98.97	98.79	98.54	98.28	97.93
39	11.86	100.34	100.17	99.92	99.66	99.41	99.16	98.99	98.65	98.48	98.23
40	11.51	100.26	100.09	99.74	99.57	99.30	99.13	98.87	98.61	98.26	98.09
41	11.66	100.34	100.09	99.83	99.66	99.40	99.14	98.89	98.63	98.37	98.11
42	11.42	99.82	99.74	99.65	99.56	99.47	99.12	98.86	98.60	98.34	97.99
43	12.16	100.25	100.16	99.92	99.59	99.34	99.10	98.77	98.44	98.19	97.94
44	11.62	100.09	99.91	99.83	99.66	99.40	99.14	98.80	98.54	98.28	98.02
45	11.60	100.26	100.17	99.91	99.66	99.40	99.05	98.79	98.53	98.28	98.02
46	11.84	99.92	99.83	99.75	99.66	99.41	99.16	98.90	98.65	98.48	98.31
47	11.60	100.26	99.91	99.74	99.57	99.31	99.05	98.79	98.53	98.28	98.02
48	11.52	99.83	99.65	99.57	99.48	99.31	99.05	98.78	98.52	98.26	98.00
49	11.73	100.34	100.09	99.83	99.66	99.40	99.15	98.81	98.47	98.29	98.04
50	11.68	100.17	99.91	99.74	99.57	99.32	99.06	98.80	98.46	98.12	97.86
Avg.	11.64	100.19	99.96	99.75	99.56	99.33	99.09	98.84	98.58	98.33	98.07
Med.	11.62	100.25	99.91	99.74	99.57	99.32	99.07	98.81	98.59	98.29	98.03
st dev	0.19	0.15	0.15	0.12	0.11	0.11	0.08	0.09	0.11	0.14	0.14
Min.	11.35	99.82	99.65	99.56	99.38	99.15	98.90	98.65	98.39	98.05	97.86
Max.	12.16	100.35	100.17	99.92	99.74	99.56	99.23	99.06	98.89	98.71	98.40

3.5 Data Set 2, 85°C, 30mA (Forward Voltage)

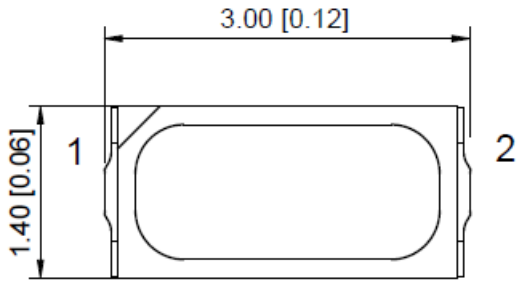
No.	Forward Voltage (V)										
	**0hr(Initial)	**1000hrs	**2000hrs	**3000hrs	**4000hrs	**5000hrs	**6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	2.893	2.895	2.897	2.899	2.900	2.896	2.898	2.896	2.899	2.898	2.900
27	2.881	2.884	2.883	2.888	2.889	2.887	2.886	2.885	2.886	2.885	2.885
28	2.890	2.890	2.896	2.895	2.895	2.893	2.893	2.893	2.893	2.893	2.893
29	2.893	2.896	2.898	2.898	2.900	2.899	2.899	2.896	2.896	2.897	2.899
30	2.882	2.885	2.884	2.886	2.885	2.889	2.886	2.885	2.885	2.884	2.885
31	2.874	2.876	2.877	2.880	2.878	2.880	2.878	2.878	2.879	2.878	2.879
32	2.874	2.878	2.879	2.879	2.879	2.879	2.877	2.878	2.878	2.879	2.878
33	2.891	2.897	2.897	2.893	2.895	2.896	2.897	2.893	2.895	2.895	2.897
34	2.883	2.888	2.887	2.887	2.889	2.888	2.887	2.885	2.888	2.887	2.887
35	2.885	2.888	2.887	2.890	2.890	2.889	2.890	2.886	2.888	2.889	2.888
36	2.886	2.890	2.891	2.889	2.891	2.890	2.888	2.890	2.889	2.889	2.891
37	2.875	2.880	2.880	2.882	2.881	2.879	2.881	2.881	2.879	2.880	2.912
38	2.877	2.882	2.882	2.883	2.881	2.880	2.883	2.882	2.881	2.879	2.882
39	2.879	2.883	2.886	2.884	2.884	2.883	2.885	2.883	2.884	2.884	2.884
40	2.883	2.886	2.887	2.887	2.890	2.887	2.887	2.886	2.886	2.886	2.886
41	2.873	2.878	2.878	2.877	2.882	2.878	2.879	2.877	2.878	2.877	2.879

3.6 Data Set 2, 85°C, 30mA (Chromaticity Shift)

No.			CCT(K)										
	**0hr(Initial)			**1000hrs	**2000hrs	**3000hrs	**4000hrs	**5000hrs	**6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	0.2560	0.5308	2823	0.0001	0.0002	0.0002	0.0004	0.0004	0.0007	0.0007	0.0009	0.0011	0.0011
27	0.2563	0.5274	2832	0.0001	0.0002	0.0003	0.0006	0.0007	0.0009	0.0009	0.0010	0.0012	0.0013
28	0.2605	0.5320	2723	0.0001	0.0002	0.0004	0.0005	0.0006	0.0008	0.0007	0.0008	0.0011	0.0011

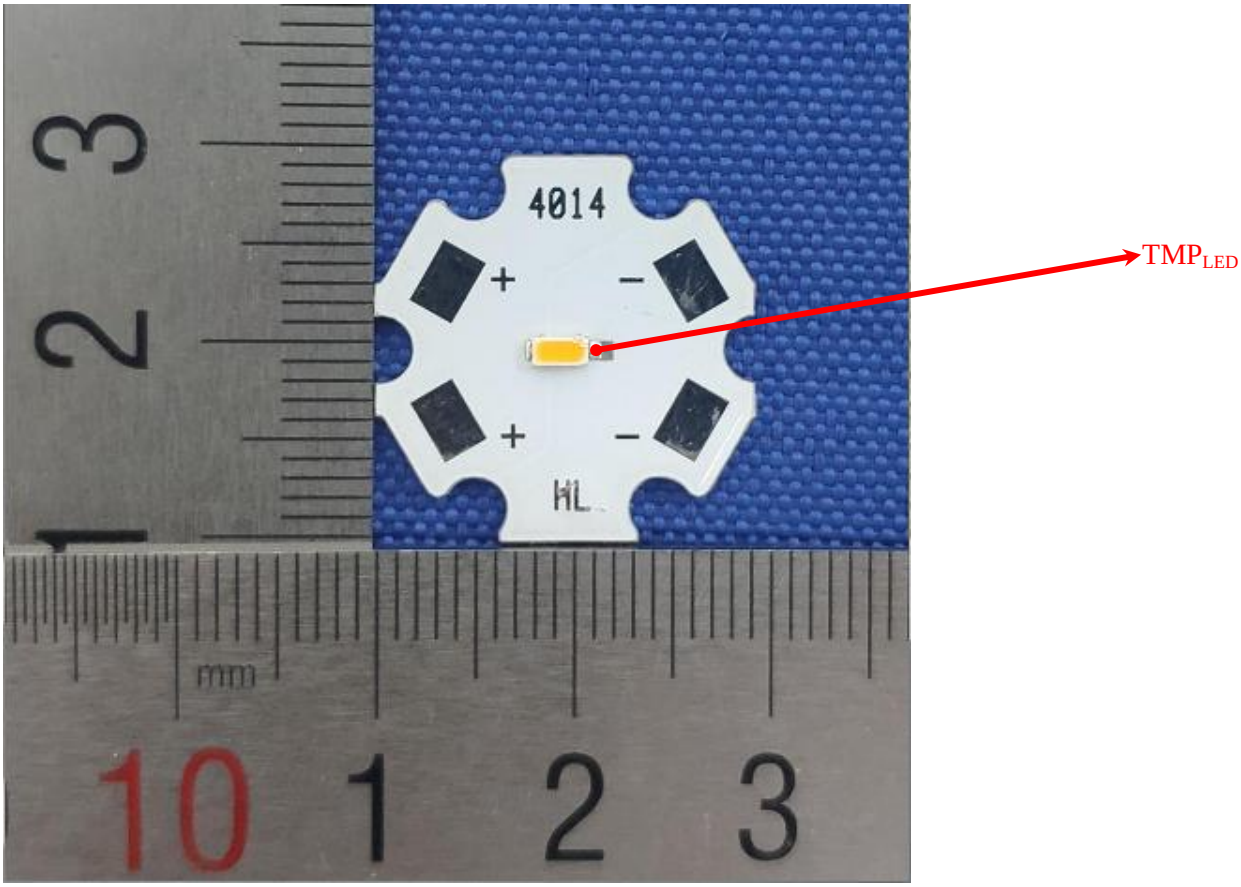
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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