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-AF-5060H343W-3-S1-THL-HR3

Report Type: 10000 Hours Test Report	**Product Type:** LED Package
Reviewed By:	Pote Wang
Report Number:	SZ2220402-12242E-10-10000
Test Date:	2022-04-09 to 2023-07-03
Report Date:	2023-07-12
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China. Tel: +86-755-33320018 Fax: +86-755-33320008
Test Facility:	Test facility was located at No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

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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 2022-04-02. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-AF-5060H343W-3-S1-THL-HR3
Part Type:	LED Package
Drive Level:	DC 60mA
Nominal CCT:	2700K
Power:	0.192W
Average Current Density per LED die:	229.630mA/mm^2
Average Power Density per LED die:	0.689W/mm^2
CRI:	80
Die Spacing:	0.728mm

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.)	CCT (typ.)	Series	Parallel	Power density W/mm^2	Current density per LED die mA/mm^2	Current per die (mA)	Distance between of dies (mm)	Current (mA)
Test model	HL-AF-5060H343W-3-S1-THL-HR3	80	2700K	1	3	0.00711	229.630	20	0.728	60
Multiple models	HL-AF-5060H***W-3-S1-T**-HR*-***	70-80	2700K-6500K	1	3					

Model type	Model name	CRI (typ.)	CCT (typ.)	Series	Parallel	Power density W/mm^2	Current density per LED die mA/mm^2	Current per die (mA)	Distance between of dies (mm)	Current (mA)
Multiple models	HL-AF-5060H***W-2-S1-T**-HR*(R9)-***	70-80	2700K-6500K	1	2	0.00474	229.630	20	0.728	40
Multiple models	HL-AF-5060H***W-2-S1-P**-HR*(R9)-***	70-80	2700K-6500K	1	2	0.00474	229.630	20	0.728	40
Multiple models	HL-AF-5060H***W-1-S1-T**-HR*-***	70-80	2700K-6500K	1	1	0.00237	229.630	20	/	20
Multiple models	HL-AF-5060H***W-1-S1-P**-HR*-***	70-80	2700K-6500K	1	1	0.00237	229.630	20	/	20
Multiple models	HL-AF-5060H***W-1-S1-T**-HR*(R9)-***	70-80	2700K-6500K	1	1	0.00237	229.630	20	/	20
Multiple models	HL-AF-5060H***W-1-S1-P**-HR*(R9)-***	70-80	2700K-6500K	1	1	0.00237	229.630	20	/	20

Note

The model name begins with "HL", such as " HL-AF-5060H***W-3-S1-T**-HR*-***" , "*" is described in detail as follows :

1.

2. s the letter HL or the number 1 which stands for the bonding wire style.

3. The

4.

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 (This standard was not accredited by NVLAP)
- *ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by NVLAP)

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
High Accuracy Array Spectroradiometer	EVERFINE	HAAS 2000	P600674CM5391140	2022-11-18	2023-11-17
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2022-11-18	2023-11-17
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D062	1011093	2021-09-15	2023-09-14
Multilayer aging machine	BACL	B2-270	20015	2022-10-19	2023-10-18
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	2022-10-20	2023-10-19

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

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration		Reported TM-21 L_{70}

3.2 Data Set 1, 55°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2.908	2.816	2.857	2.877	2.832	2.870	2.812	2.811	2.816	2.820	2.810
2	2.838	2.811	2.850	2.837							

3.3 Data Set 1, 55°C, 60mA (Chromaticity Shift)

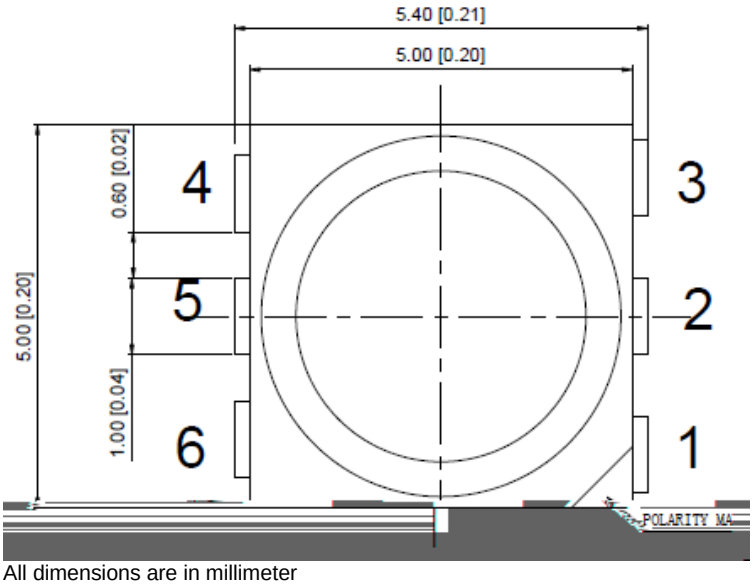
No.			CCT(K)										
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2585	0.5271	2787	0.0002	0.0004	0.0004	0.0005	0.0008	0.0011	0.0012	0.0014	0.0016	0.0017
2	0.2602	0.5272	2750	0.0002	0.0005	0.0006	0.0006	0.0010	0.0013	0.0014	0.0016	0.0016	0.0018
3	0.2599	0.5259	2762	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0016	0.0017	0.0020	0.0021
4	0.2588	0.5254	2787	0.0001	0.0002	0.0005	0.0006	0.0011	0.0013	0.0016	0.0016	0.0018	0.0019
5	0.2594	0.5261	2772	0.0002	0.0003	0.0004	0.0008	0.0008	0.0009	0.0010	0.0013	0.0016	0.0018
6	0.2572	0.5270	2814	0.0002	0.0001	0.0002	0.0005	0.0006	0.0008	0.0008	0.0010	0.0016	0.0018
7	0.2563	0.5274	2833	0.0002	0.0001	0.0003	0.0005	0.0006	0.0009	0.0009	0.0011	0.0013	0.0017
8	0.2577	0.5249	2813	0.0002	0.0001	0.0003	0.0006	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021
9	0.2581	0.5274	2793	0.0001	0.0001	0.0004	0.0005	0.0006	0.0009	0.0011	0.0015	0.0016	0.0020
10	0.2622	0.5265	2709	0.0001	0.0002	0.0005	0.0008	0.0011	0.0011	0.0012	0.0013	0.0018	0.0019
11	0.2624	0.5289	2696	0.0002	0.0003	0.0005	0.0007	0.0008	0.0012	0.0012	0.0014	0.0017	0.0018
12	0.2598	0.5277	2755	0.0001	0.0001	0.0004	0.0006	0.0006	0.0008	0.0011	0.0013	0.0016	0.0016
13	0.2599	0.5272	2754	0.0001	0.0003	0.0002	0.0006	0.0007	0.0009	0.0011	0.0014	0.0016	0.0016
14	0.2576	0.5267	2807	0.0001	0.0003	0.0004	0.0006	0.0007	0.0009	0.0011	0.0015	0.0016	0.0018
15	0.2592	0.5267	2773	0.0001	0.0001	0.0003	0.0007	0.0010	0.0011	0.0011	0.0014	0.0017	0.0019
16	0.2585	0.5271	2785	0.0001	0.0004	0.0003	0.0003	0.0007	0.0009	0.0010	0.0013	0.0013	0.0016
17	0.2581	0.5247	2806	0.0002	0.0004	0.0003	0.0005	0.0007	0.0009	0.0010	0.0013	0.0014	0.0017
18	0.2573	0.5255	2820	0.0002	0.0003	0.0004	0.0008	0.0011	0.0012	0.0014	0.0017	0.0019	0.0021
19	0.2604	0.5261	2750	0.0001	0.0003	0.0004	0.0004	0.0007	0.0009	0.0013	0.0015	0.0014	0.0017
20	0.2587	0.5249	2791	0.0002	0.0002	0.0006	0.0006	0.0007	0.0009	0.0014	0.0014	0.0015	0.0018
21	0.2590	0.5264	2778	0.0001	0.0005	0.0005	0.0008	0.0009	0.0010	0.0012	0.0013	0.0016	0.0017
22	0.2605	0.5257	2748	0.0001	0.0003	0.0006	0.0009	0.0010	0.0012	0.0015	0.0016	0.0018	0.0021
23	0.2589	0.5269	2777	0.0001	0.0003	0.0007	0.0011	0.0012	0.0015	0.0016	0.0018	0.0019	0.0023
24	0.2583	0.5270	2791	0.0001	0.0001	0.0007	0.0009	0.0013	0.0016	0.0018	0.0021	0.0022	0.0025
25	0.2594	0.5261	2770	0.0002	0.0002	0.0009	0.0012	0.0013	0.0015	0.0018	0.0021	0.0023	0.0025
Avg.	0.2591	0.5265	2777	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
Med.	0.2589	0.5267	2778	0.0001	0.0003	0.0004	0.0006	0.0008	0.0011	0.0012	0.0014	0.0016	0.0018
st dev	0.0014	0.0010	32	0.0000	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003
Min.	0.2563	0.5247	2696	0.0001	0.0001	0.0002	0.0003	0.0006	0.0008	0.0008	0.0010	0.0013	0.0016
Max.	0.2624	0.5289	2833	0.0002	0.0005	0.0009	0.0012	0.0013	0.0016	0.0018	0.0021	0.0023	0.0025

3.4 Data Set 2, 85°C, 60mA (Lumen Maintenance)

No.		Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	24.23	100.25	100.08	99.75	99.38	99.17	98.97	98.76	98.56	98.18	98.02
27	24.39	100.08	99.75	99.59	99.34	99.22	98.93	98.73	98.36	98.15	97.87
28	24.36	100.16	99.84	99.63	99.47	99.26	99.06	98.85	98.60	98.40	98.19
29	23.90	100.21	99.87	99.71	99.50	99.16	98.95	98.66	98.54	98.37	98.16
30	24.12	99.92	99.75	99.46	99.13	98.92	98.80	98.47	98.18	97.89	97.55
31	23.15	99.87	99.70	99.44	99.18	99.05	98.70	98.49	98.14	97.84	97.58
32	23.82	100.21	99.87	99.58	99.24	98.99	98.70	98.32	98.07	97.77	97.57
33	24.21	100.12	99.75	99.67	99.38	99.09	98.80	98.55	98.31	97.98	97.56
34	23.58	100.25	100.04	99.79	99.62	99.49	99.32	99.15	98.90	98.60	98.30
35	23.80	100.04	99.96	99.79	99.54	99.37	99.12	98.91	98.74	98.49	98.15
36	24.57	100.08	99.84	99.59	99.31	99.02	98.78	98.53	98.21	98.09	97.84
37	24.26	100.08	99.84	99.55	99.22	98.97	98.80	98.52	98.19	97.94	97.61
38	24.16	100.04	99.79	99.46	99.13	98.72	98.51	98.30	98.05	97.76	97.43
39	23.08	100.26	99.91	99.74	99.44	99.13	98.96	98.70	98.53	98.14	97.88
40	24.54	99.96	99.80	99.63	99.55	99.23	98.90	98.70	98.53	98.25	98.04
41	24.32	100.16	99.96	99.75	99.59	99.30	99.05	98.85	98.60	98.44	98.23
42	23.30	99.91	99.70	99.48	99.27	99.01	98.80	98.58	98.28	97.94	97.73
43	24.37	100.25	99.96	99.75	99.51	99.30	99.06	98.77	98.44	98.19	97.91
44	24.17	100.21	99.88	99.54	99.30	99.13	98.84	98.63	98.47	98.22	98.06
45	22.64	100.13	99.91	99.78	99.56	99.38	99.07	98.81	98.63	98.32	98.06
46	23.77	100.17	99.96	99.66	99.45	99.24	98.95	98.57	98.40	98.11	97.98
47	24.54	100.12	99.88	99.47	99.27	98.98	98.74	98.49	98.29	98.00	97.88
48	24.06	100.25	99.96	99.54	99.42	99.13	98.75	98.50	98.09	97.92	97.71
49	23.90	100.17	99.87	99.46	99.08	98.79	98.49	98.24	97.99	97.78	97.62
50	24.21	100.17	99.96	99.75	99.59	99.26	98.93	98.76	98.39	98.22	97.98
Avg.	23.98	100.12	99.87	99.62	99.38	99.13	98.88	98.63	98.38	98.12	97.88
Med.	24.16	100.16	99.87	99.63	99.38	99.13	98.90	98.63	98.39	98.14	97.88
st dev	0.50	0.1135	0.10	0.12	0.16	0.18	0.19	0.21	0.23	0.24	0.25
Min.	22.64	99.87	99.70	99.44	99.08	98.72	98.49	98.24	97.99	97.76	97.43
Max.	24.57	100.26	100.08	99.79	99.62	99.49	99.32	99.15	98.90	98.60	98.30

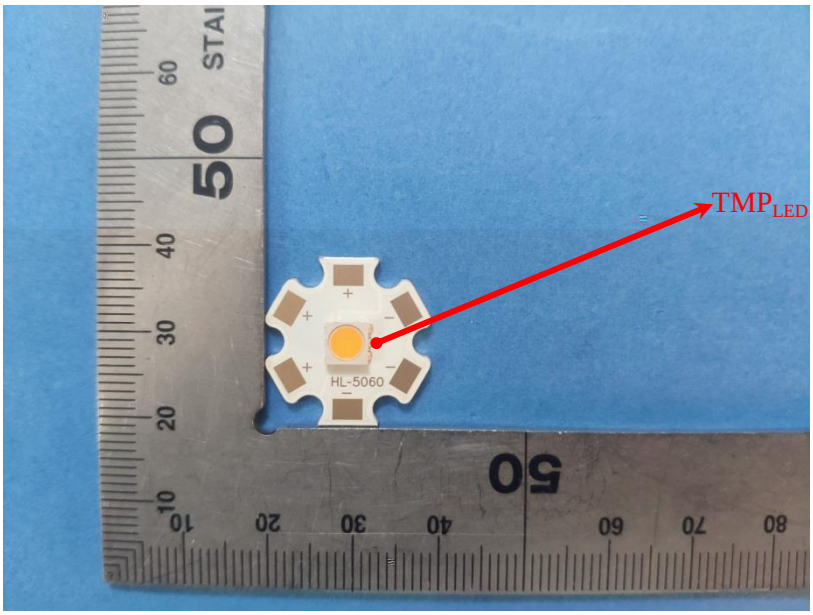
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



Directions