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-AS-2835HW-3C-S1-08L-PCT-HR5

Report Type: 6000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	RSZ181103501-10
Test Date:	2018-11-05 to 2019-07-15
Report Date:	2019-07-23

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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

50 PCS samples were received on 2018-11-03. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-AS-2835HW-3C-S1-08L-PCT-HR5
Part Type:	LED Package
Drive Level:	DC 100mA
Nominal CCT:	2700K
Power:	1 W
Average Current Density per LED die:	620.001mA/mm2
Average Power Density per LED die:	2.067 W/mm2
CRI:	90
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® 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	CCT (K)	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)
Master model	HL-AS-2835HW-3C-S1-08L-PCT-HR5	90	2700K	3	1	0.1021	620.00	100	0.15	100
multiple model	HL-AS-2835HW-3C-S1-08L-PCT-HR5(R9)	90	2700K	3	1	0.1021	620.00	100	0.15	100
	HL-AS-2835HW-3C-S1-08-PCT-HR5	90	2700K	3	1	0.1021	620.00	100	0.15	100
	HL-AS-2835HW-3C-S1-08-PCT-HR5(R9)	90	2700K	3	1	0.1021				

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2019-03-18	2020-03-17
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2019-03-26	2020-03-25
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2019-03-18	2020-03-17
Standard Light Source	EVERFINE	D062	G100278CJ7351206	2018-12-24	2019-12-24
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2019-03-26	2020-03-25
Multilayer aging machine	BACL	B2-270	20023	2019-03-13	2020-03-12
DC Power Supply	BACL	B12001-12	90023	2018-12-17	2019-12-17

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).

2 - S

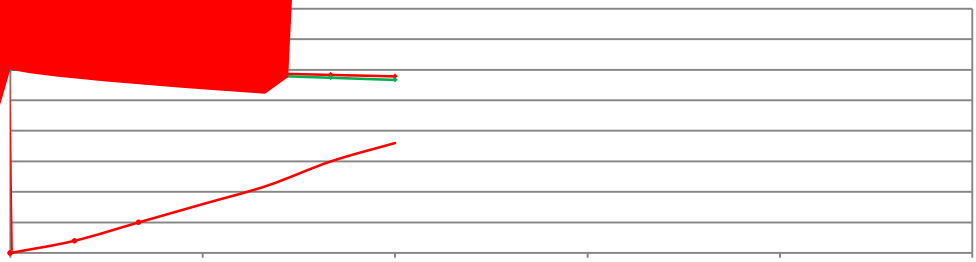
Data	Test Interval	Test Duration			Reported TM-21 L_{70} Lifetime
	1000hrs	6000hrs	2.409E-06	1.004	>36000 hours
	1000hrs	6000hrs	3.428E-06	1.004	>36000 hours

Av e of Initial Luminous Flux)

Da	hrs	4000hrs	5000hrs	6000hrs
	3%	99.40%	99.15%	98.91%
	7%	99.03%	98.68%	98.33%

	0hrs	4000hrs	5000hrs	6000hrs
	0008	0.0011	0.0015	0.0018
	0009	0.0013	0.0016	0.0019

maticity Shift VS. Time



Data Set 1, 85°C, 100mA (Chromaticity Shift)

o.			CCT(K)						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
	0.2620	0.5239	2726	0.0001	0.0004	0.0007	0.0011	0.0017	0.0019
2	0.2612	0.5207	2757	0.0001	0.0002	0.0009	0.0012	0.0013	0.0016
3	0.2624	0.5213	2728	0.0002	0.0004	0.0005	0.0008	0.0013	0.0015
	0.2606	0.5238	2755	0.0001	0.0003	0.0003	0.0007	0.0011	0.0013
5	0.2580	0.5210	2826	0.0001	0.0002	0.0003	0.0004	0.0009	0.0011
6	0.2617	0.5224	2738	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015
7	0.2626	0.5262	2703	0.0002	0.0004	0.0008	0.0011	0.0013	0.0016
8	0.2599	0.5206	2786	0.0002	0.0001	0.0004	0.0006	0.0009	0.0015
9	0.2622	0.5218	2730	0.0004	0.0007	0.0008	0.0010	0.0011	0.0013
10	0.2631	0.5230	2706	0.0003	0.0004	0.0010	0.0013	0.0015	0.0018
11	0.2563	0.5236	2851	0.0002	0.0006	0.0013	0.0017	0.0023	0.0026
12	0.2628	0.5281	2691	0.0002	0.0005	0.0009	0.0013	0.0018	0.0021
13	0.2648	0.5239	2666	0.0002	0.0004	0.0009	0.0014	0.0016	0.0019
14	0.2627	0.5218	2719	0.0002	0.0004	0.0008	0.0011	0.0017	0.0020
15	0.2582	0.5264	2796	0.0002	0.0002	0.0006	0.0009	0.0011	0.0015
16	0.2605	0.5194	2778	0.0001	0.0001	0.0001	0.0002	0.0004	0.0005
17	0.2599	0.5213	2782	0.0003	0.0006	0.0009	0.0010	0.0011	0.0012
18	0.2606	0.5225	2760	0.0004	0.0007	0.0009	0.0011	0.0014	0.0017
19	0.2614	0.5242	2737	0.0003	0.0006	0.0010	0.0016	0.0020	0.0027
20	0.2601	0.5237	2767	0.0001	0.0002	0.0002	0.0004	0.0009	0.0011
21	0.2580	[redacted]	2806	0.0003	0.0009	0.0014	0.0020	0.0027	0.0031
22	0.2592	0.5244	2782	0.0004	0.0008	0.0012	0.0016	0.0017	0.0018
23	0.2625	0.5232	2716	0.0002	0.0005	0.0011	0.0015	0.0019	0.0022
24	0.2615	0.5263	2726	0.0004	0.0008	0.0009	0.0015	0.0019	0.0023
25	0.2594	0.5229	2786	0.0002	0.0007	0.0013	0.0017	0.0018	0.0021
g.	0.2609	0.5233	2753	0.0002	0.0005	0.0008	0.0011	0.0015	0.0018

3.4 Data Set 2, 105°C, 100mA (Lumen Maintenance)

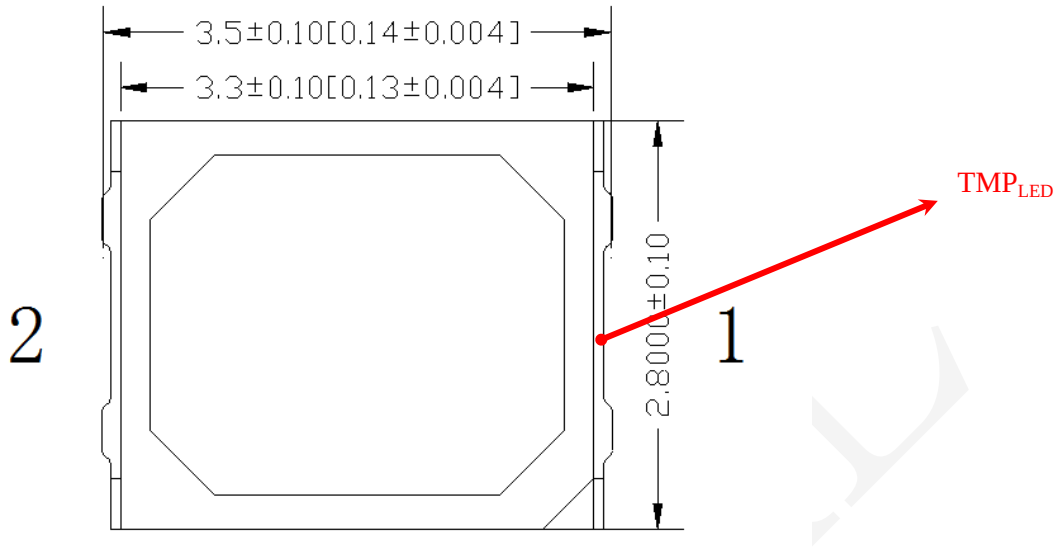
No.		Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	109.3	100.09	100.00	99.73	99.54	99.09	98.90
27	103.7	100.10	99.81	99.52	99.13	98.75	98.46
28	110.1	100.00	99.64	99.18	98.82	98.37	98.00
29	98.9	100.15	99.73	99.25	99.02	98.75	98.55
30	106.6	99.91	99.62	99.44	99.06	98.69	98.50
31	111.6	99.91	99.55	99.28	98.92	98.48	98.03
32	112.4	100.18	99.73	99.38	99.11	98.84	98.40
33	111.8	99.82	99.55	99.46	99.11	98.84	98.57
34	111.5	100.09	99.91	99.46	99.10	98.92	98.65
35	113.7	99.82	99.30	98.86	98.68	98.24	97.80
36	109.5	100.18	99.82	99.54	99.27	99.00	98.81
37	108.6	99.91	99.54	99.17	98.80	98.34	97.97
38	109.5	100.18	99.82	99.45	99.00	98.63	98.17
39	111.3	100.18	99.73	99.46	99.19	98.74	98.20
40	111.2	100.18	99.64	99.28	98.83	98.56	98.20
41	112.5	100.00	99.91	99.82	99.47	99.20	98.93
42	109.0	99.82	99.45	99.08	98.72	98.35	97.98
43	109.6	99.91	99.54	99.00	98.81	98.45	97.99
44	114.3	100.17	99.65	99.21	98.78	98.34	97.99
45	117.0	100.26	99.91	99.57	99.15	98.89	98.46
46	105.2	100.19	99.90	99.71	99.43	99.24	98.86
47	109.3	99.91	99.36	98.90	98.35	97.99	97.62
48	107.7	100.09	100.00	99.72	99.26	98.89	98.42
49	110.7	99.73	99.64	99.37	99.01	98.64	98.28
50	110.3	100.00	99.64	99.27	99.09	98.73	98.55
Avg.	109.8	100.03	99.70	99.37	99.03	98.68	98.33
Med.	110.1	100.09	99.65	99.38	99.06	98.73	98.40
st dev	3.6	0.15	0.19	0.25	0.27	0.31	0.36
Min.	98.9	99.73	99.30	98.86	98.35	97.99	97.62
Max.	117.0	100.26	100.00	99.82	99.54	99.24	98.93

3.6 Data Set 2, 105°C, 100mA (Chromaticity Shift)

No.			CCT(K)						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.2617	0.5234	2734	0.0001	0.0003	0.0007	0.0011	0.0011	0.0014
27	0.2603	0.5191	2784	0.0001	0.0004	0.0004	0.0005	0.0004	0.0005
28	0.2579	0.5229	2819	0.0005	0.0009	0.0012	0.0013	0.0014	0.0015
29	0.2589	0.5171	2826	0.0002	0.0004	0.0005	0.0008	0.0010	0.0012
30	0.2629	0.5215	2716	0.0004	0.0006	0.0013	0.0017	0.0024	0.0032
31	0.2605	0.5240	2757	0.0004	0.0006	0.0012	0.0019	0.0027	0.0033
32	0.2608	0.5242	2749	0.0002	0.0007	0.0011	0.0018	0.0021	0.0028
33	0.2599	0.5245	2767	0.0004	0.0007	0.0011	0.0016	0.0019	0.0025
34	0.2603	0.5235	2763	0.0003	0.0007	0.0011	0.0014	0.0024	0.0031
35	0.2597	0.5216	2786	0.0002	0.0003	0.0005	0.0009	0.0011	0.0016
36	0.2596	0.5195	2798	0.0002	0.0004	0.0006	0.0011	0.0011	0.0013
37	0.2612	0.5207	2756	0.0004	0.0006	0.0008	0.0008	0.0011	0.0012
38	0.2601	0.5229	2771	0.0005	0.0010	0.0012	0.0015	0.0019	0.0021
39	0.2581	0.5231	2813	0.0002	0.0009	0.0010	0.0015	0.0019	0.0019
40	0.2591	0.5207	2801	0.0003	0.0007	0.0013	0.0016	0.0021	0.0023
41	0.2610	0.5217	2756	0.0003	0.0001	0.0009	0.0016	0.0022	0.0025
42	0.2655	0.5232	2655	0.0002	0.0004	0.0003	0.0006	0.0009	0.0016
43	0.2611	0.5235	2745	0.0001	0.0006	0.0007	0.0008	0.0010	0.0011
44	0.2575	0.5195	2845	0.0004	0.0010	0.0015	0.0018	0.0021	0.0025
45	0.2552	0.5198	2898	0.0002	0.0008	0.0014	0.0018	0.0023	0.0026
46	0.2627	0.5234	2712	0.0002	0.0004	0.0008	0.0012	0.0015	0.0019
47	0.2620	0.5209	2737	0.0001	0.0003	0.0005	0.0006	0.0005	0.0007
48	0.2643	0.5247	2674	0.0002	0.0006	0.0011	0.0013	0.0015	0.0019
49	0.2596	0.5224	2785	0.0001	0.0005	0.0008	0.0012	0.0016	0.0019
50	0.2597	0.5209	2787	0.0003	0.0006	0.0007	0.0009	0.0013	0.0017
Avg.	0.2604	0.5219	2769	0.0003	0.0006	0.0009	0.0013	0.0016	0.0019
Med.	0.2603	0.5224	2767	0.0002	0.0006	0.0009	0.0013	0.0015	0.0019
st dev	0.0022	0.0019	52	0.0001	0.0002	0.0003	0.0004	0.0006	0.0008
Min.	0.2552	0.5171	2655	0.0001	0.0001	0.0003	0.0005	0.0004	0.0005
Max.	0.2655	0.5247	2898	0.0005	0.0010	0.0015	0.0019	0.0027	0.0033

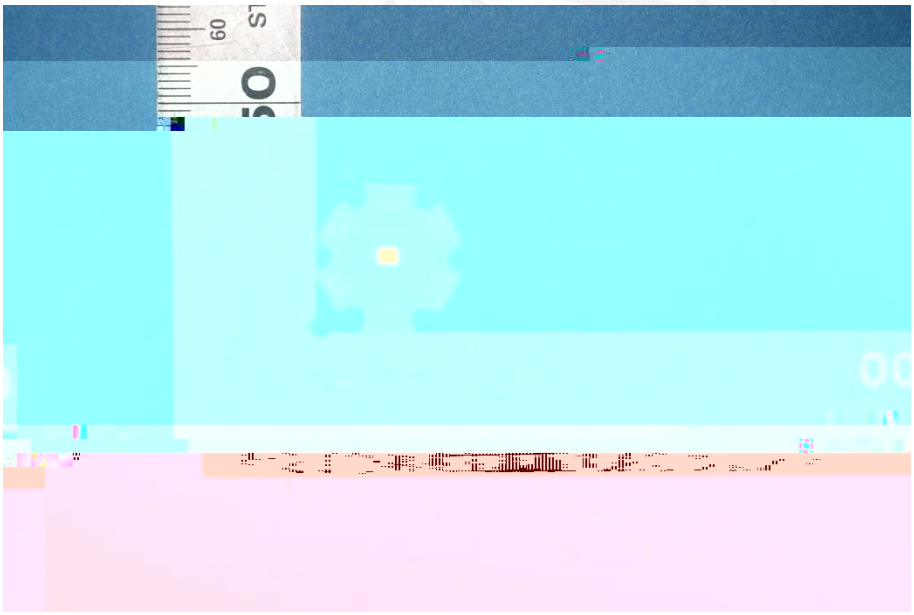
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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