



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-2C-S1-08-PCT-HR5

Report Type: 9000 Hours Test Report	Product Type: LED Package
Test Engineer:	Pote Wang
Report Number:	RSZ181027501-10-9000
Test Date:	2018-10-27 to 2019-11-20
Report Date:	2019-11-21
Reviewed By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxihu Industrial Area, Tangxia , Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxihu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

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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 2018-10-27. 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-2C-S1-08-PCT-HR5
#Part Type:	LED Package
#Drive Level:	DC 150mA
#Nominal CCT:	2700K
#Power:	1 W
#Average Current Density per LED die:	861.11 mA/mm ²
#Average Power Density per LED die:	2.768 W/mm ²
#CRI:	90
#Die Spacing:	0.15 mm

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 name	CRI	CCT	Series	Parallel	Power density W/mm ²	Current density per LED die mA/mm ²	Current per die (mA)	Distance between of dies	Current (mA)
HL-AS-2835HW-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835HW-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835HW-2C-S1-08L-PCT-HR5	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835HW-2C-S1-08L-PCT-HR5(R9)	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835DW-2C-S1-08-PCT-HR5	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835DW-2C-S1-08-PCT-HR5(R9)	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835DW-2C-S1-08L-PCT-HR5	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835DW-2C-S1-08L-PCT-HR5(R9)	90	2700K	2	1	0.1021	861.11	150	0.15	150
HL-AS-2835HW-S1-08-PCT-HR5	90	2700K	1	1	0.0510	861.11	150	/	150
HL-AS-2835HW-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0510	861.11	150	/	150
HL-AS-2835HW-S1-08L-PCT-HR5	90	2700K	1	1	0.0510	861.11	150	/	150

HL-AS-2835HW-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0510	861.11	150	/	150
HL-AS-2835DW-S1-08-PCT-HR5	90	2700K	1	1	0.0510	861.11	150	/	150
HL-AS-2835DW-S1-08-PCT-HR5(R9)	90	2700K	1	1	0.0510	861.11	150	/	150
HL-AS-2835DW-S1-08L-PCT-HR5	90	2700K	1	1	0.0510	861.11	150	/	150
HL-AS-2835DW-S1-08L-PCT-HR5(R9)	90	2700K	1	1	0.0510	861.11	150	/	150
HL-AS-2835D90W-2C-S1-08-PCT-HR5-CS-KY	90	2700K	2	1	0.1021	301.84	150	0.15	150
HL-AS-2835D90W-2C-S1-08-PCT-HR5 -KY	90	2700K	2	1	0.1021	301.84	150	0.15	150
HL-AS-2835D90W-2C-S1-08L-PCT-HR5-CS-KY	90	2700K	2	1	0.1021	301.84	150	0.15	150
HL-AS-2835D90W-2C-S1-08L-PCT-HR5 -KY	90	2700K	2	1	0.1021	301.84	150	0.15	150
HL-AS-2835DW-2C-S1-08-PCT-HR5-CS-KY	90	2700K	2	1	0.1021	301.84	150	0.15	150
HL-AS-2835DW-2C-S1-08-PCT-HR5 -KY	90	2700K	2	1	0.1021	301.84	150		

Note:

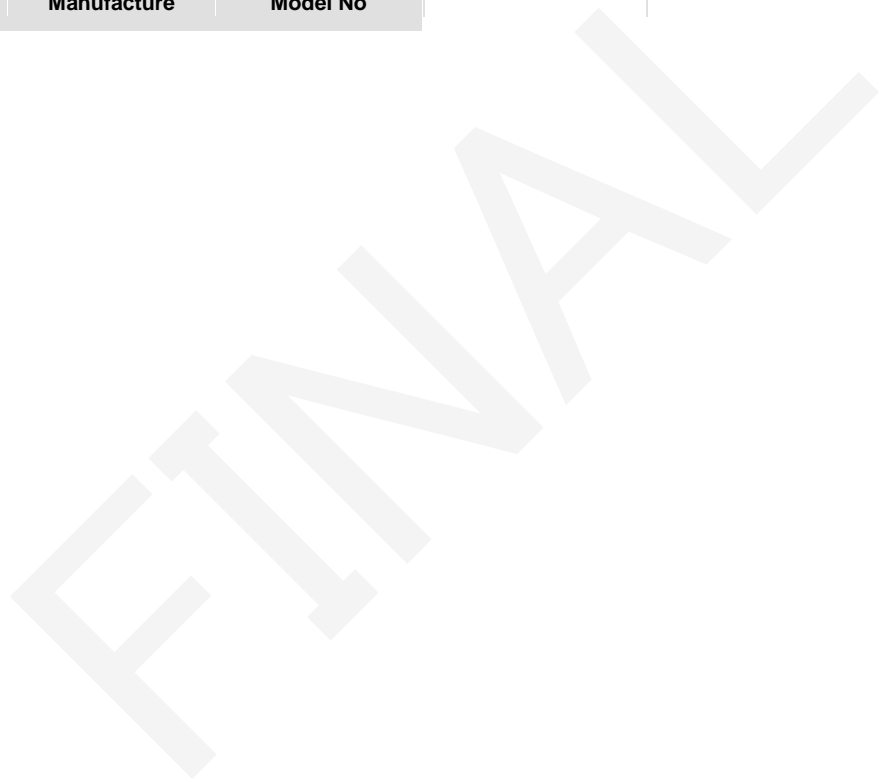
1. The first * is the letters I, N, W representing CCT. I means less than 3700K; N means 3700K-4700K; W For more than 4700K. The second * is different product solutions (color coordination and application, special solutions, etc.), the third * and the fourth * and the fifth are different version numbers.
2. The first and second * of SL-***-TA-3-1KA***-APH** is a numbers 27, 30,40,50,65, which stand for CCT; Number From three to six * is a different product solution (Color coordinate and applications and special solution etc...), from seven to nine * is Different version numbers.

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
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Bay Area Compliance Laboratories Corp. (Dongguan)

No.69, Pulongcun, Puxinhu Industrial Area Tangxia ,
Dongguan, Guangdong, China.
The IAS Accreditation Number TL-460

system was calibrated by halogen reference lamp. The ambient temperature during test was set to $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 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 $U=21\text{K}$ (K=2), at the 95% confidence level.

The uncertainty of the temperature is $U=0.8671^{\circ}\text{C}$ (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).

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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	9000hrs	2.694E-06	1.005	>54000 hours
2	25	0	1000hrs	9000hrs	3.267E-06	1.004	>54000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.08%	99.85%	99.63%	99.41%	99.16%	98.90%	98.62%	98.35%	98.09%
2	100.02%	99.72%	99.42%	99.11%	98.81%	98.49%	98.16%	97.84%	97.51%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	71 329.57

3 - Test Data

3.1 Data Set 1, 85°C, 150mA (Lumen Maintenance)

No.	(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	112.1	99.91	99.73	99.46	99.38	98.93	98.75	98.57	98.22	98.04
2	108.8	100.18	99.82	99.45	99.26	99.08	98.62	98.44	98.16	97.70
3	112.8	100.09	99.91	99.73	99.47	99.29	98.94	98.67	98.32	98.14
4	111.8	100.18	99.91	99.55	99.28	99.02	98.75	98.48	98.21	97.94
5	111.9	100.09	100.00	99.91	99.64	99.37	99.29	99.02	98.75	98.48
6	113.0	100.35	100.09	99.82	99.73	99.56	99.38	99.03	98.67	98.32
7	109.9	100.18	100.09	100.00	99.73	99.45	99.09	98.73	98.45	98.18
8	110.5	100.27	99.82	99.64	99.55	99.37	99.19	99.00	98.82	98.46
9	111.5	100.27	100.09	99.82	99.55	99.37	99.01	98.65	98.48	98.30
10	110.7	100.18	100.00	99.73	99.64	99.19	99.01	98.74	98.46	98.28
11	111.7	100.18	100.09	99.91	99.64	99.37	99.10	98.75	98.39	98.12
12	112.0	99.82	99.64	99.38	99.29	99.11	98.84	98.48	98.30	98.13
13	110.6	100.27	100.09	100.00	99.91	99.73	99.37	99.10	98.73	98.55
14	111.1	100.18	100.00	99.91	99.82	99.55	99.28	98.92	98.65	98.38
15	109.6	99.82	99.54	99.09	98.81	98.63	98.36	98.18	97.99	97.81
16	112.0	99.91	99.46	99.20	98.93	98.66	98.48	98.13	97.95	97.59
17	110.8	100.09	99.64	99.37	99.10	98.83	98.47	98.19	97.92	97.65
18	111.6	99.82	99.46	99.10	98.84	98.66	98.48	98.21	97.85	97.58
19	112.5	100.09	99.82	99.47	99.02	98.93	98.76	98.58	98.40	98.04
20	111.7	99.91	99.73	99.64	99.37	99.10	98.75	98.57	98.21	98.03
21	111.7	100.09	99.82	99.55	99.46	99.28	99.19	98.84	98.66	98.48
22	111.6	100.09	99.91	99.82	99.46	99.28	98.84	98.66	98.30	98.03
23	112.2	100.27	100.09	100.00	99.64	99.20	99.02	98.66	98.40	98.13
24	111.7	99.91	99.64	99.37	99.10	98.84	98.48	98.21	98.03	97.76
25	112.3	99.91	99.82	99.73	99.55	99.29	99.11	98.75	98.40	98.13
Avg.	111.4	100.08	99.85	99.63	99.41	99.16	98.90	98.62	98.35	98.09
Med.	111.7	100.09	99.82	99.64	99.46	99.20	98.94	98.66	98.39	98.13
st dev	1.0	0.16	0.20	0.28	0.30	0.30	0.31	0.28	0.27	0.29
Min.	108.8	99.82	99.46	99.09	98.81	98.63	98.36	98.13	97.85	97.58
Max.	113.0	100.35								

3.2 Data Set 1, 85°C, 150mA (Forward Voltage)

No.	Forward Voltage (V)
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3.3 Data Set 1, 85°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (u'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2617	0.5315	2701	0.0001	0.0004	0.0009	0.0014	0.0017	0.0020	0.0022	0.0023	0.0025
2	0.2610	0.5305	2719	0.0004	0.0006	0.0011	0.0015	0.0018	0.0021	0.0025	0.0027	0.0030
3	0.2575	0.5284	2802	0.0003	0.0005	0.0010	0.0011	0.0017	0.0022	0.0025	0.0028	0.0030

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3.4 Data Set 2, 105°C, 150mA (Lumen Maintenance)

No.	(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	110.9	99.91	99.64	99.37	99.19	99.01	98.74	98.47	98.11	97.75
27	110.9	99.91	99.64	99.19	99.10	98.74	98.38	98.20	97.84	97.39
28	111.8	100.00	99.64	99.37	98.93	98.57	98.03	97.76	97.58	97.32
29	111.4	100.18	99.82	99.37	99.01	98.65	98.20	97.76	97.49	97.04
30	110.8	100.18	99.91	99.46	99.10	98.74	98.29	97.92	97.47	97.11
31	111.5	99.91	99.55	99.37	99.10	99.01	98.65	98.30	97.85	97.49
32	110.7	99.82	99.55	99.28	98.92	98.64	98.28	97.92	97.56	97.20
33	109.6	100.27	99.82	99.45	99.18	98.91	98.54	98.08	97.72	97.45
34	111.7	99.91	99.55	99.10	98.66	98.48	98.39	97.94		

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

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	6.431	6.430	6.428	6.424	6.420	6.422	6.416	6.437	6.423	6.435
27	6.368	6.410	6.389	6.386	6.380	6.385	6.385	6.394	6.385	6.434
28	6.352	6.370	6.369	6.369	6.367	6.367	6.361	6.405	6.369	6.420
29	6.359	6.372	6.365	6.367	6.365	6.373	6.361	6.423	6.364	6.418
30	6.369	6.313	6.311	6.315	6.319	6.311	6.307	6.324	6.312	6.336
31	6.297	6.319	6.319	6.314	6.314	6.314	6.308	6.322	6.311	6.323
32	6.345	6.374	6.372	6.362	6.376	6.377	6.363	6.372	6.366	6.376
33	6.275	6.293	6.289	6.293	6.293	6.293	6.284	6.299	6.284	6.291
34	6.293	6.311	6.313	6.306	6.316	6.315	6.301	6.365	6.307	6.313
35	6.302	6.318	6.316	6.314	6.316	6.322	6.309	6.331	6.310	6.327
36	6.405	6.436	6.427	6.430	6.427	6.443	6.413	6.485	6.423	6.442
37	6.273	6.285	6.287	6.298	6.287	6.289	6.283	6.310	6.284	6.294
38	6.307	6.313	6.319	6.313	6.309	6.319	6.307	6.329	6.311	6.322
39	6.298	6.312	6.321	6.317	6.314	6.332	6.305	6.335	6.313	6.324
40	6.262	6.284	6.291	6.290	6.288	6.298	6.283	6.299	6.286	6.293
41	6.384	6.410	6.408	6.413	6.407	6.413	6.396	6.428	6.402	6.422
42	6.378	6.391	6.401	6.397	6.393	6.400	6.387	6.423	6.394	6.399
43	6.290	6.306	6.306	6.314	6.299	6.306	6.294	6.318	6.301	6.313
44	6.321	6.336	6.331	6.343	6.332	6.348	6.326	6.522	6.334	6.337
45	6.348	6.364	6.362	6.369	6.364	6.379	6.361	6.395	6.368	6.376
46	6.345	6.356	6.356	6.356	6.355	6.432	6.355	6.427	6.354	6.369
47	6.284	6.294	6.300	6.294	6.297	6.307	6.295	6.331	6.294	6.307
48	6.328	6.338	6.341	6.355	6.337	6.340	6.334	6.394	6.336	6.349
49	6.354	6.365	6.359	6.380	6.372	6.389	6.359	6.370	6.363	6.371
50	6.357	6.371	6.378	6.380	6.367	6.372	6.365	6.393	6.373	6.379
Avg.	6.333	6.347	6.346	6.348	6.345	6.354	6.338	6.377	6.343	6.359
Med.	6.345	6.338	6.341	6.355	6.337	6.348	6.334	6.372	6.336	6.349
st dev	0.044	0.046	0.043	0.043	0.042	0.047	0.042	0.058	0.043	0.049
Min.	6.262	6.284	6.287	6.290	6.287	6.289	6.283	6.299	6.284	6.291
Max.	6.431	6.436	6.428	6.430	6.427	6.443	6.416	6.522	6.423	6.442

3.6 Data Set 2, 105°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (u'v')								
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2624	0.5307	2689	0.0002	0.0004	0.0006	0.0009	0.0011	0.0014	0.0016	0.0017	0.0020
27	0.2649	0.5301	2641	0.0004	0.0005	0.0006	0.0007	0.0011	0.0014	0.0017	0.0018	0.0019
28	0.2633	0.5319	2667	0.0003	0.0007	0.0009	0.0011	0.0012	0.0013	0.0016	0.0020	0.0021
29	0.2611	0.5288	2723	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0020	0.0024
30	0.2605	0.5298	2731	0.0002	0.0005	0.0010	0.0011	0.0014	0.0016	0.0017	0.0018	0.0020
31	0.2592	0.5295	2760	0.0005	0.0008	0.0010	0.0011	0.0013	0.0016	0.0017	0.0018	0.0020
32	0.2651	0.5305	2636	0.0003	0.0007	0.0011	0.0014	0.0015	0.0017	0.0019	0.0020	0.0021
33	0.2639	0.5328	2651	0.0006	0.0011	0.0014	0.0018	0.0019	0.0022	0.0024	0.0026	0.0028
34	0.2579	0.5292	2789	0.0004	0.0009	0.0012	0.0016	0.0020	0.0023	0.0027	0.0030	0.0032
35	0.2589	0.5289	2768	0.0003	0.0007	0.0011	0.0016	0.0019	0.0021	0.0024	0.0025	0.0028
36	0.2633	0.5300	2674	0.0004	0.0009	0.0013	0.0017	0.0020	0.0026	0.0029	0.0031	0.0034
37	0.2621	0.5303	2697	0.0001	0.0007	0.0011	0.0014	0.0017	0.0019	0.0021	0.0023	0.0025
38	0.2650	0.5304	2638	0.0002	0.0007	0.0013	0.0015	0.0016	0.0017	0.0022	0.0024	0.0028
39	0.2614	0.5304	2711	0.0002	0.0005	0.0011	0.0014	0.0018	0.0020	0.0021	0.0022	0.0025
40	0.2617	0.5291	2709	0.0004	0.0005	0.0008	0.0011	0.0015	0.0020	0.0021	0.0022	0.0023
41	0.2614	0.5306	2710	0.0004	0.0008	0.0011	0.0014	0.0019	0.0023	0.0025	0.0028	0.0029
42	0.2618	0.5301	2704	0.0003	0.0007	0.0011	0.0014	0.0018	0.0022	0.0023	0.0025	0.0028
43	0.2601	0.5296	2740	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0026	0.0029
44	0.2621	0.5293	2700	0.0004	0.0006	0.0010	0.0015	0.0018	0.0021	0.0022	0.0023	0.0024
45	0.2593	0.5300	2756	0.0004	0.0007	0.0008	0.0013	0.0016	0.0021	0.0022	0.0023	0.0026
46	0.2604	0.5301	2733	0.0004	0.0007	0.0011	0.0013	0.0018	0.0021	0.0023	0.0026	0.0029
47	0.2620	0.5309	2696	0.0005	0.0009	0.0009	0.0012	0.0014	0.0019	0.0022	0.0024	0.0026
48	0.2619	0.5299	2702	0.0005	0.0011	0.0013	0.0014	0.0015	0.0016	0.0021	0.0025	0.0028
49	0.2626	0.5297	2688	0.0004	0.0009	0.0010	0.0012	0.0013	0.0017	0.0020	0.0022	0.0024
50	0.2617	0.5295	2707	0.0001	0.0007	0.0011	0.0015	0.0017	0.0018	0.0019	0.0023	0.0024
Avg.	0.2618	0.5301	2705	0.0004	0.0007	0.0010	0.0013	0.0016	0.0019	0.0021	0.0023	0.0025

Bay Area Compliance Laboratories Corp. (Dongguan)

No.69, Pulongcun, Puxinhu Industrial Area Tangxia

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Directions

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

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