



Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part



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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 2022-01-19. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-AM-2835H421W-S1-08HL-HR3
Part Type:	LED Package
Drive Level:	DC 150mA
Nominal CCT:	2700K
Power:	0.51 W
Average Current Density per LED die:	861.113 mA/mm ²
Average Power Density per LED die:	2.928 W/mm ²
CRI:	80
Die Spacing:	/

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.

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	2022-09-27	2023-09-26
0.5M Integrating Sphere	EVERFINE				



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 coldest DUTs' case (TMP_{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 ASTM E230 Table 1 "Special Limits".

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 driven 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. (Shenzhen) 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-AM-2835H421W-S1-08HL-HR3
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-AM-2835H421W-S1-08HL-HR3
Number of Units: 25
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current:



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	6000hrs	2.314E-06	1.003	>36000 hours
2	25	0	1000hrs	6000hrs	2.668E-06	1.002	>36000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	100.12%	99.86%	99.62%	99.40%	99.18%	98.96%
2	99.96%	99.67%	99.39%	99.14%	98.88%	98.63%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.0002	0.0003	0.0005	0.0003	0.0005	0.0007



3 - Test Data

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

No.	(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	62.82	100.38	99.98	99.73	99.46	99.22	98.98
2	61.90	100.24	100.03	99.85	99.66	99.37	99.18
3	63.08	99.98	99.71	99.43	99.18	98.95	98.78
4	62.04	100.13	99.89	99.63	99.44	99.19	98.97
5	61.34	100.39	100.18	99.93	99.71	99.54	99.33
6	61.34	100.28	99.82	99.54	99.35	99.15	99.02
7	61.37	100.34	99.98	99.64	99.41	99.15	98.83
8	62.30	99.81	99.68	99.58	99.37	99.13	98.91
9	61.69	100.36	99.97	99.55	99.30	99.09	98.83
10	61.74	100.37	99.97	99.72	99.50	99.30	99.01



Bay Area Compliance Laboratories Corp. (Shenzhen)

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

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	3.153	3.147	3.156	3.147	3.129	3.145	3.136
2	3.128	3.130	3.127	3.128	3.141	3.131	3.142
3	3.145	3.145	3.147	3.147	3.133	3.136	3.131
4	3.128	3.126	3.137	3.135	3.137	3.138	3.145
5	3.145	3.143	3.147	3.147	3.158	3.145	3.128
6	3.139	3.136	3.138	3.138	3.131	3.126	3.130
7	3.134	3.130	3.131	3.136	3.132	3.130	3.140
8	3.120	3.118	3.118	3.125	3.139	3.149	3.148
9	3.149	3.145	3.146	3.148	3.148	3.133	3.122
10	3.118	3.116	3.121	3.143	3.130	3.143	3.142
11	3.132	3.130	3.133	3.157	3.131	3.131	3.135
12	3.126	3.130	3.127	3.125	3.133	3.147	3.135
13	3.132	3.126	3.132	3.140	3.129	3.134	3.149
14	3.134	3.130	3.135	3.133	3.132	3.149	3.145
15	3.122	3.126	3.120	3.126	3.147	3.132	3.138



3.3 Data Set 1, 55°C, 150mA (Chromaticity Shift) 24

No.	u'	v'	CCT(K)	Chromaticity Shift (u'v')					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2595	0.5293	2753	0.0004	0.0002	0.0006	0.0001	0.0004	0.0005
2	0.2627	0.5304	2684	0.0001	0.0001	0.0001	0.0002	0.0004	0.0005
3	0.2610	0.5303	2720	0.0004	0.0001	0.0003	0.0002	0.0003	0.0005
4	0.2599	0.5293	2746	0.0001	0.0003	0.0004	0.0001	0.0003	0.0006
5	0.2605	0.5292	2734	0.0001	0.0002	0.0005	0.0001	0.0004	0.0005
6	0.2604	0.5289	2736	0.0000	0.0002	0.0004	0.0001	0.0002	0.0005
7	0.2590	0.5294	2765	0.0001	0.0000	0.0008	0.0004	0.0005	0.0007
8	0.2602	0.5291	2741	0.0002	0.0003	0.0008	0.0006	0.0008	0.0008
9	0.2619	0.5297	2703	0.0003	0.0002	0.0004	0.0002	0.0004	0.0006
10	0.2616	0.5297	2710	0.0004	0.0003	0.0009	0.0009	0.0010	0.0012
11	0.2636	0.5305	2665	0.0001	0.0002	0.0005	0.0002	0.0004	0.0004
12	0.2617	0.5288	2711	0.0004	0.0008	0.0007	0.0007	0.0009	0.0010
13	0.2604	0.5315	2726	0.0001	0.0005	0.0007	0.0006	0.0008	0.0010
14	0.2601	0.5305	2737	0.0002	0.0004	0.0004	0.0001	0.0003	0.0005
15	0.2600	0.5300	2741	0.0001	0.0001	0.0007	0.0004	0.0005	0.0005
16	0.2620	0.5279	2708	0.0002	0.0003	0.0006	0.0001	0.0003	0.0006
17	0.2642	0.5299	2656	0.0003	0.0003	0.0003	0.0002	0.0005	0.0007
18	0.2629	0.5301	2682	0.0002	0.0003	0.0003	0.0001	0.0002	0.0005
19	0.2636	0.5306	2666	0.0002	0.0002	0.0005	0.0001	0.0003	0.0007
20	0.2607	0.5287	2732	0.0001	0.0004	0.0003	0.0001	0.0004	0.0008
21	0.2605	0.5298	2732	0.0002	0.0002	0.0005	0.0004	0.0006	0.0009
22	0.2620	0.5303	2698	0.0004	0.0004	0.0003	0.0004	0.0006	0.0009
23	0.2622	0.5295	2697	0.0001	0.0003	0.0003	0.0003	0.0006	0.0008
24	0.2643	0.5287	2659	0.0004	0.0004	0.0005	0.0002	0.0004	0.0007



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

No.	(lm)	Lumen Maintenance (%)					
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	60.55	100.07	99.85	99.64	99.32	99.04	98.78
27	61.01	100.02	99.95	99.66	99.44	99.25	99.02
28	60.74	99.70	99.31	98.96	98.75	98.50	98.32
29	60.73	100.03	99.82	99.59	99.37	99.09	98.81
30	61.81	99.87	99.71	99.34	99.05	98.79	98.56
31	61.13	100.26	99.97	99.59	99.36	99.10	98.81
32	61.94	99.98	99.84	99.39	99.16	98.93	98.66
33	62.54	99.89	99.55	99.31	99.06	98.74	98.53
34	61.97	99.85	99.35	98.97	98.74	98.52	98.22
35	60.91	100.16	99.95	99.62	99.41	99.08	98.82
36	61.18	100.16	99.95	99.79	99.56	99.31	99.02
37	62.01	99.98	99.65	99.47	99.24	98.95	98.61
38	61.49	99.77	99.25	98.88	98.50	98.31	98.06
39	61.05	99.77	99.41	99.10	98.89	98.64	98.31
40	62.31	99.92	99.79	99.65	99.36	99.12	98.86
41	61.11	100.23	99.98	99.82	99.56	99.28	98.95
42	62.46	99.82	99.52	99.23	99.02	98.82	98.61
43	61.03	99.90	99.49	99.10	98.84	98.62	98.39
44	61.18	100.05	99.61	99.44	99.20	98.94	98.69
45	61.70	99.84	99.59	99.50	99.25	99.03	98.80
46	61.02	99.95	99.75	99.67	99.41	99.16	98.95
47	60.97	100.07	99.79	99.62	99.33	99.11	98.87
48	60.02	99.83	99.43	99.15	98.95	98.68	98.47
49	61.55	100.03	99.71	99.38	99.11	98.80	98.51
50	61.86	99.73	99.47	98.79	98.55	98.29	98.08
Avg.	61.37	99.96	99.67	99.39	99.14	98.88	98.63
Med.	61.18	99.95	99.71	99.44	99.20	98.94	98.66
st dev	0.63	0.1530	0.2230	0.2941	0.2978	0.2904	0.2794
Min.	60.02	99.70	99.25	98.79	98.50	98.29	98.06
Max.	62.54	100.26	99.98	99.82	99.56	99.31	99.02



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

No.	Forward Voltage (V)						
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	3.134	3.132	3.132	3.131	3.123	3.131	3.145
27	3.139	3.132	3.141	3.142	3.116	3.147	3.132
28	3.147	3.143	3.141	3.148	3.144	3.142	3.148
29	3.128	3.128	3.125	3.124	3.145	3.130	3.140
30	3.124	3.118	3.126	3.122	3.127	3.121	3.121
31	3.134	3.128	3.125	3.135	3.154	3.136	3.128
32	3.124	3.124	3.121	3.130	3.125	3.128	3.127
33	3.139	3.134	3.138	3.129	3.141	3.138	3.138
34	3.145	3.139	3.127	3.133	3.148	3.130	3.134
35	3.141	3.132	3.128	3.138	3.149	3.141	3.131
36	3.132	3.124	3.126	3.121	3.148	3.124	3.114
37	3.147	3.141	3.149	3.141	3.113	3.149	3.143
38	3.126	3.122	3.139	3.136	3.153	3.132	3.146
39	3.113	3.111	3.118	3.115	3.128	3.126	3.128
40	3.143	3.139	3.128	3.125	3.133	3.125	3.140
41	3.120	3.120	3.127	3.134	3.133	3.151	3.123
42	3.126	3.126	3.132	3.137	3.133	3.147	3.121
43	3.130	3.132	3.134	3.135	3.138	3.125	3.154
44	3.109	3.111	3.113	3.116	3.124	3.130	3.125
45	3.139	3.139	3.137	3.136	3.135	3.145	3.136
46	3.128	3.130	3.138	3.130	3.130	3.145	3.136
47	3.134	3.130	3.137	3.136	3.121	3.154	3.146
48	3.113	3.118	3.116	3.124	3.135	3.135	3.134
49	3.132	3.130	3.132	3.129	3.149	3.133	3.155
50	3.126	3.124	3.122	3.133	3.111	3.133	3.143
Avg.	3.131	3.128	3.130	3.131	3.134	3.136	3.136
Med.	3.132	3.130	3.128	3.133	3.133	3.133	3.136
st dev	0.010	0.009	0.009	0.008	0.013	0.009	0.011
Min.	3.109	3.111	3.113	3.115	3.111	3.121	3.114
Max.	3.147	3.143	3.149	3.148	3.154	3.154	3.155



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

No.	u'	v'	CCT(K)	Chromaticity Shift (u'v')					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.2620	0.5293	2703	0.0001	0.0005	0.0006	0.0007	0.0008	0.0010
27	0.2619	0.5288	2706	0.0001	0.0007	0.0010	0.0013	0.0013	0.0014
28	0.2625	0.5307	2686	0.0001	0.0004	0.0005	0.0006	0.0008	0.0011
29	0.2632	0.5281	2682	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007
30	0.2610	0.5288	2726	0.0004	0.0005	0.0006	0.0007	0.0008	0.0008
31	0.2623	0.5286	2700	0.0003	0.0005	0.0006	0.0007	0.0008	0.0009
32	0.2592	0.5280	2767	0.0004	0.0002	0.0002	0.0002	0.0005	0.0008
33	0.2619	0.5293	2704	0.0002	0.0005	0.0006	0.0007	0.0008	0.0009
34	0.2601	0.5285	2745	0.0001	0.0005	0.0006	0.0009	0.0010	0.0012
35	0.2583	0.5251	2798	0.0001	0.0002	0.0005	0.0006	0.0009	0.0010
36	0.2625	0.5300	2690	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007
37	0.2599	0.5291	2746	0.0001	0.0003	0.0006	0.0008	0.0009	0.0010
38	0.2603	0.5289	2739	0.0002	0.0005	0.0006	0.0008	0.0009	0.0009
39	0.2649	0.5275	2651	0.0005	0.0006	0.0008	0.0009	0.0009	0.0010
40	0.2613	0.5301	2714	0.0002	0.0005	0.0006	0.0009	0.0010	0.0011
41	0.2611	0.5306	2716	0.0002	0.0004	0.0004	0.0005	0.0007	0.0009
42	0.2609	0.5280	2732	0.0004	0.0003	0.0005	0.0005	0.0006	0.0007
43	0.2624	0.5298	2693	0.0003	0.0004	0.0007	0.0009	0.0009	0.0011
44	0.2636	0.5314	2663	0.0002	0.0005	0.0006	0.0006	0.0008	0.0009
45	0.2610	0.5285	2725	0.0001	0.0003	0.0004	0.0006	0.0008	0.0008
46	0.2625	0.5305	2688	0.0001	0.0006	0.0008	0.0008	0.0009	0.0011
47	0.2606	0.5302	2728	0.0000	0.0005	0.0007	0.0008	0.0011	0.0013
48	0.2651	0.5289	2641	0.0000	0.0004	0.0006	0.0007	0.0009	0.0009
49	0.2631	0.5298	2677	0.0001	0.0007	0.0007	0.0006	0.0006	0.0004
50	0.2610	0.5288	2724	0.0001	0.0002	0.0003	0.0004	0.0005	0.0007
Avg.	0.2617	0.5291	2710	0.0002	0.0004	0.0006	0.0007	0.0008	0.0009
Med.	0.2619	0.5289	2706	0.0002	0.0005	0.0006	0.0007	0.0008	0.0009
st dev	0.0016	0.0013	35	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2583	0.5251	2641	0.0000	0.0002	0.0002	0.0002	0.0005	0.0004
Max.	0.2651	0.5314	2798	0.0005	0.0007	0.0010	0.0013	0.0013	0.0014



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Directions

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