



Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used for any other purpose without the written consent of the testing laboratory.



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## 1 - General Information

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### 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-A-3528H343W-S1



### 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	0.5m	NA	2022-09-27	2023-09-26
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D062	1011093	2021-10-15	2023-10-14
Multilayer aging machine	BACL	B2-270	20015	2022-11-18	2023-11-17
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	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  $\pm 3\%$  of the specified value of the manufacturer during maintenance test, and was within  $\pm 0.5\%$  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 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  $2\text{C}$  below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to  $5\text{C}$  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  $\pm 3\%$  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  $25\text{C} \pm 2\text{C}$ , RH <65 %.

### 1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate  $u'v'$ .  $2\sigma$  measurement was used and sample was driven by DC power supply. The forward current was regulated to within  $\pm 0.5\%$  of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to  $25\text{C} \pm 2\text{C}$ , 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  $U=0.8671\text{C}$  ( $K=2$ ), 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).



# Bay Area Compliance Laboratories Corp.(Shenzhen)

5/F(B-West)-7/F, the 3rd Phase of Wan Li Indust  
Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong  
The NVLAP Lab Code is 200760

1.8 Sample So /F33 9 7.22 Tm 0 g .22 T8 395.23 Tm f\* 3f\* 3f22 15 9 02 g 0.502 (I)-5(E)10(S)-4(N)6(A)-4( )-5(C242.0)4( 4(AN)6(A)7



## 2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration			Reported TM -21 L <sub>70</sub> Lifetime
1	25	0	1000hrs	6000hrs	2.015E-06	1.004	>36000 hours
2	25	0	1000hrs	6000hrs	2.466E-06	1.004	>36000 hours

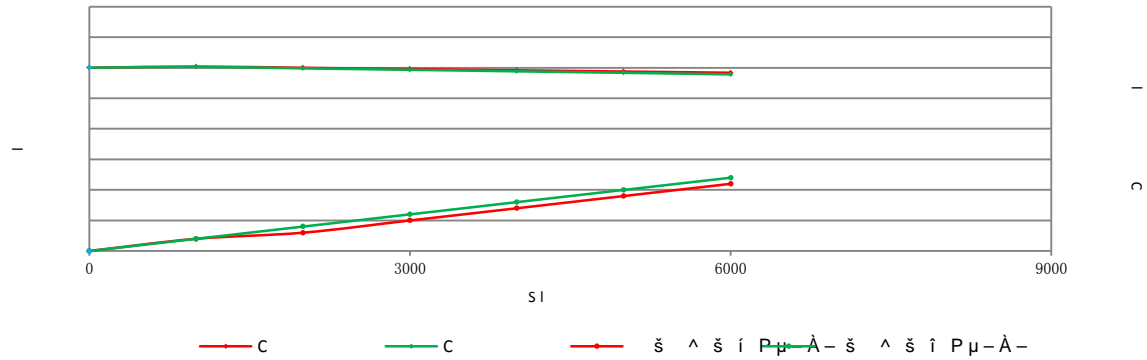
### Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	100.18%	99.99%	99.78%	99.58%	99.38%	99.18%
2	100.14%	99.90%	99.66%	99.41%	99.17%	98.91%

### Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011
2	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012

### Average Lumen Maintenance and Chromaticity Shift VS. Time





### 3 - Test Data

#### 3.1 Data Set 1, 55C, 20mA (Lumen Maintenance)

No.	(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	7.584	100.17	99.93	99.71	99.51	99.21	98.98
2	7.629	100.10	99.88	99.75	99.42	99.21	98.93
3	7.608	100.20	99.97	99.80	99.61	99.38	99.22
4	7.599	100.24	100.12	99.86	99.68	99.49	99.36
5	7.538	100.12	99.99	99.84	99.73	99.50	99.36
6	7.601	100.20	99.87	99.70	99.55	99.41	99.17
7	7.485	100.21	99.96	99.75	99.59	99.39	99.16
8	7.447	100.17	100.05	99.80	99.56	99.41	99.15
9	7.575	100.22	100.03	99.78	99.66	99.47	99.29
10	7.543	100.23	100.05	99.92	99.68	99.56	99.35
11	7.505	100.25	100.12	99.95	99.69	99.55	99.27
12	7.604	100.18	99.92	99.61	99.30	99.08	98.83
13	7.522	100.12	99.91	99.71	99.47	99.27	99.03
14	7.631	100.21	99.93	99.71	99.50	99.21	99.02
15	7.607	100.25	100.12	99.96	99.76	99.50	99.33
16	7.535	100.15	99.87	99.65	99.46	99.20	99.11
17	7.616	100.22	100.01	99.88	99.71	99.46	99.30
18	7.402	100.18	99.99	99.74	99.54	99.39	99.15
19	7.524	100.17	100.08	99.92	99.79	99.63	99.40
20	7.469	100.13	99.99	99.68	99.48	99.34	99.24
21	7.554	100.15	99.93	99.70	99.46	99.35	99.18
22	7.549	100.13	100.04	99.83	99.55	99.34	99.15
23	7.402	100.14					



3.2 Data Set 1, 55°C, 20mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	2.817	2.830	2.826	2.828	2.827	2.805	2.804
2	2.819	2.841	2.828	2.823	2.806	2.811	2.830
3	2.811	2.827	2.821	2.825	2.814	2.838	2.805
4	2.796	2.810	2.804	2.795	2.802	2.805	2.817
5	2.815	2.829	2.823	2.811	2.838	2.825	2.821
6	2.810	2.823	2.820	2.827	2.844	2.841	2.823
7	2.816	2.828	2.823	2.828	2.818	2.810	2.809
8	2.814	2.825	2.821	2.816	2.804	2.803	2.826





3.3 Data Set 1, 55°C , 20mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ( u'v')					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2578	0.5280	2797	0.0002	0.0004	0.0008	0.0009	0.0011	0.0013
2	0.2584	0.5321	2767	0.0001	0.0002	0.0005	0.0006	0.0008	0.0009
3	0.2586	0.5303	2768	0.0001	0.0002	0.0001	0.0001	0.0002	0.0005
4	0.2581	0.5283	2790	0.0002	0.0004	0.0008	0.0010	0.0011	0.0013
5	0.2594	0.5312	2750	0.0002	0.0004	0.0007	0.0008	0.0010	0.0012
6	0.2578	0.5295	2790	0.0001	0.0003	0.0006	0.0006	0.0007	0.0010
7	0.2617	0.5302	2706	0.0001	0.0001	0.0004	0.0005	0.0006	0.0011
8	0.2609	0.5301	2723	0.0002	0.0005	0.0006	0.0007	0.0008	0.0013
9	0.2598	0.5312	2741	0.0002	0.0003	0.0005	0.0005	0.0007	0.0009
10	0.2578	0.5298	2789	0.0001	0.0001	0.0006	0.0006	0.0008	0.0011
11	0.2577	0.5292	2794	0.0002	0.0005	0.0007	0.0007	0.0009	0.0013
12	0.2584	0.5309	2771	0.0001	0.0001	0.0004	0.0004	0.0005	0.0007
13	0.2585	0.5317	2766	0.0002	0.0003	0.0005	0.0008	0.0009	0.0009
14	0.2561	0.5301	2825	0.0001	0.0001	0.0003	0.0004	0.0007	0.0009
15	0.2559	0.5310	2825	0.0002	0.0001	0.0004	0.0005	0.0009	0.0009
16	0.2583	0.5315	2771	0.0002	0.0002	0.0004	0.0004	0.0008	0.0008
17	0.2567	0.5292	2815	0.0002	0.0003	0.0003	0.0004	0.0005	0.0009
18	0.2621	0.5313	2692	0.0002	0.0001	0.0001	0.0003	0.0005	0.0006
19	0.2571	0.5311	2798	0.0002	0.0004	0.0005	0.0006	0.0012	0.0011
20	0.2607	0.5298	2727	0.0001	0.0004	0.0004	0.0004	0.0009	0.0012
21	0.2591	0.5298	2762	0.0002	0.0006	0.0003	0.0006	0.0006	0.0007
22	0.2598	0.5311	2741	0.0002	0.0005	0.0007	0.0012	0.0013	0.0015
23	0.2583	0.5299	2777	0.0001	0.0003	0.0001	0.0009	0.0014	0.0014
24	0.2594	0.5300	2753	0.0001	0.0001	0.0002	0.0010	0.0016	0.0017
25	0.2565	0.5305	2814	0.0002	0.0004	0.0007	0.0015	0.0016	0.0016
Avg.	0.2586	0.5303	2770	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011
Med.	0.2584	0.5302	2771	0.0002	0.0003	0.0005	0.0006	0.0008	0.0011
st dev	0.0016	0.0010	35	0.0000	0.0002	0.0002	0.0003	0.0004	0.0003
Min.	0.2559	0.5280	2692	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005
Max.	0.2621	0.5321	2825	0.0002	0.0006	0.0008	0.0015	0.0016	0.0017

20  
30

7.364	100.03	
518	100.19	99.92
	100.18	99.92

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3.6 Data Set 2, 85°C, 20mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ( u'v')					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	0.2576	0.5301	2792	0.0001	0.0005	0.0008	0.0008	0.0011	0.0012
27	0.2570	0.5304	2804	0.0001	0.0005	0.0008	0.0009	0.0010	0.0013
28	0.2586	0.5316	2763	0.0001	0.0003	0.0004	0.0007	0.0009	0.0012
29	0.2570	0.5285	2811	0.0001	0.0005	0.0005	0.0007	0.0009	0.0012
30	0.2633	0.5293	2675	0.0002	0.0004	0.0007	0.0010	0.0012	0.0012
31	0.2558	0.5286	2838	0.0002	0.0004	0.0007	0.0009	0.0010	0.0011
32	0.2547	0.5290	2860	0.0001	0.0005	0.0009	0.0010	0.0010	0.0012
33	0.2595	0.5306	2749	0.0001	0.0003	0.0006	0.0006	0.0008	0.0009
34	0.2623	0.5300	2693	0.0001	0.0004	0.0005	0.0006	0.0008	0.0009
35	0.2583	0.5282	2784	0.0003	0.0004	0.0008	0.0009	0.0009	0.0011
36	0.2583	0.5297	2778	0.0002	0.0005	0.0007	0.0007	0.0009	0.0010
37	0.2566	0.5294	2817	0.0002	0.0004	0.0004	0.0004	0.0007	0.0009
38	0.2604	0.5298	2734	0.0001	0.0002	0.0005	0.0006	0.0009	0.0009
39	0.2572	0.5288	2807	0.0002	0.0001	0.0004	0.0006	0.0007	0.0009
40	0.2590	0.5315	2757	0.0003	0.0005	0.0006	0.0006	0.0009	0.0011
41	0.2577	0.5292	2793	0.0001	0.0005	0.0005	0.0004	0.0006	0.0006
42	0.2600	0.5294	2743	0.0002	0.0004	0.0007	0.0008	0.0009	0.0011
43	0.2578	0.5309	2783	0.0001	0.0004	0.0007	0.0008	0.0009	0.0012
44	0.2582	0.5300	2780	0.0003	0.0001	0.0004	0.0005	0.0008	0.0010
45	0.2606	0.5290	2732	0.0002	0.0003	0.0007	0.0009	0.0012	0.0013
46	0.2562	0.5301	2823	0.0001	0.0003	0.0007	0.0008	0.0012	0.0018
47	0.2583	0.5298	2779	0.0003	0.0005	0.0009	0.0012	0.0013	0.0016
48	0.2592	0.5304	2756	0.0001	0.0003	0.0006	0.0007	0.0014	0.0016
49	0.2571	0.5305	2802	0.0001	0.0001	0.0007	0.0009	0.0013	0.0017
50	0.2593	0.5294	2757	0.0001	0.0006	0.0006	0.0007	0.0008	0.0009
Avg.	0.2584	0.5298	2776	0.0002	0.0004	0.0006	0.0008	0.00 ET	





## Directions

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1. The information marked “superscript #” is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. This report includes some test methods are not in NVLAP accreditation scope marked \*.
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\*\*\*\*\*END OF REPORT\*\*\*\*\*