



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: 6000 Hours Test Report | | Product Type: LED Package | |
| Reviewed By: | Pote Wang | | |
| Report Number: | SZ2220402-12242E-10-6000 | | |
| Test Date: | 2022-04-09 to 2022-12-15 | | |
| Report Date: | 2023-01-12 | | |
| Approved by: | Blake Zhang / EE Engineer | | <i>Blake Zhang</i> |
| 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 1 st Road, Tangxia Town, Dongguan, Guangdong, China. | | |

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 without prior written consent from Bay Area Compliance Laboratories Corp.(Shenzhen). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, or any agency of the U.S. Government.



TABLE OF CONTENTS

| | |
|---|-----------|
| 1 - General Information | 3 |
| 1.1 Description of LED Light Sources [#] | 3 |
| 1.2 Standards and Reference Documentations..... | 4 |
| 1.3 Testing Equipment..... | 4 |
| 1.4 Drive Level..... | 4 |
| 1.5 Ambient Conditions for Maintenance Test..... | 4 |
| 1.6 Photometric Measurement Method and Uncertainty..... | 4 |
| 1.7 Statement of Traceability..... | 5 |
| 1.8 Sample Set..... | 5 |
| 2 - Summary of Test Result | 6 |
| 3 - Test Data | 7 |
| 3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance)..... | 7 |
| 3.2 Data Set 1, 55°C, 60mA (Forward Voltage)..... | 8 |
| 3.3 Data Set 1, 55°C, 60mA (Chromaticity Shift)..... | 9 |
| 3.4 Data Set 2, 85°C, 60mA (Lumen Maintenance)..... | 10 |
| 3.5 Data Set 2, 85°C, 60mA (Forward Voltage)..... | 11 |
| 3.6 Data Set 2, 85°C, 60mA (Chromaticity Shift)..... | 12 |
| 4 - DUT Photo | 13 |
| 4.1 Mechanical Dimensions..... | 13 |
| 4.2 DUT Photo..... | 13 |
| Directions | 14 |

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.
The NVLAP Lab Code is 200707-0



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.
The NVLAP Lab Code is 200707-0

Note:

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

1. The first"****" is the number from 1 to 999 which stands for the brightness level.
2. The second "****" is the letter HL or the number 1 which stands for the bonding wire style.
3. The third"***" is the number 1 or 2 or 3 which stands for the CRI style.
4. The fourth"****" is the letter, which stands for the customer code.

1.2 Standards and Reference Documentations

- ANSI/IES LM-80-15: IES Approved



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.
The NVLAP Lab Code is 200707-0

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. (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, 60mA

Part Number: HL-AF-5060H343W-3-S1-THL-HR3
Number of Units: 25
Case Temperature: $>53^{\circ}\text{C}$
Ambient Temperature: $>50^{\circ}\text{C}$
Life Test Drive Current: 60mA
Measurement Current: 60mA

Data Set 2: 85°C, 60mA

Part Number: HL-AF-5060H343W-3-S1-THL-HR3
Number of Units: 25
Case Temperature: $>83^{\circ}\text{C}$
Ambient Temperature: $>80^{\circ}\text{C}$
Life Test Drive Current: 60mA
Measurement Current: 60mA



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 | 2.079E-06 | 1.004 | >36000 hours |
| 2 | 25 | 0 | 1000hrs | 6000hrs | 2.487E-06 | 1.004 | >36000 hours |

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

| Data Set: | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
|-----------|---------|---------|---------|---------|---------|---------|
| 1 | 100.16% | 99.96% | 99.75% | 99.54% | 99.33% | 99.13% |
| 2 | 100.12% | 99.87% | 99.62% | 99.38% | 99.13% | 98.88% |

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 | | | | | |



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.
The NVLAP Lab Code is 200707-0

3 - Test Data

3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance)

| No. | (lm) | Lumen Maintenance (%) | | | | | |
|-----|--------------|-----------------------|---------|---------|---------|---------|---------|
| | 0hr(Initial) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
| 1 | 24.10 | 100.04 | 99.88 | 99.75 | 99.59 | 99.38 | 99.09 |



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.
 The NVLAP Lab Code is 200707-0

3.2 Data Set 1, 55°C, 60mA (Forward Voltage) 48°0.42. ET Q q 471.03 44.0505.093T0.48322.49 481 0.480 11.28 T05.07 TJ ET 6 518.47 44.04 0.48001505.093T

| No. | Forward Voltage (V) | | | | | | |
|-----|---------------------|---------|---------|---------|---------|---------|---------|
| | 0hr(Initial) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
| 1 | 2.908 | 2.816 | 2.857 | 2.877 | 2.832 | 2.870 | 2.812 |
| 2 | 2.838 | 2.811 | 2.850 | 2.837 | 2.843 | 2.842 | 2.816 |
| 3 | 2.843 | 2.829 | 2.838 | 2.826 | 2.822 | 2.851 | 2.839 |
| 4 | 2.891 | 2.855 | 2.855 | 2.858 | 2.837 | 2.839 | 2.875 |
| 5 | 2.832 | 2.833 | 2.834 | 2.848 | 2.882 | 2.821 | 2.839 |
| 6 | 2.804 | 2.827 | 2.817 | 2.822 | 2.850 | 2.855 | 2.842 |
| 7 | 2.871 | 2.816 | 2.856 | 2.848 | 2.821 | 2.875 | 2.866 |
| 8 | 2.913 | 2.844 | 2.872 | 2.870 | 2.884 | 2.884 | 2.863 |
| 9 | 2.916 | 2.876 | 2.876 | 2.873 | 2.857 | 2.858 | 2.856 |
| 10 | 2.903 | 2.881 | 2.876 | 2.871 | 2.858 | 2.883 | 2.827 |
| 11 | 2.831 | 2.817 | 2.852 | 2.855 | 2.875 | 2.880 | 2.848 |
| 12 | 2.908 | 2.840 | 2.872 | 2.887 | 2.879 | 2.894 | 2.874 |
| 13 | 2.936 | 2.840 | 2.863 | 2.867 | 2.892 | 2.842 | 2.852 |
| 14 | 2.905 | 2.816 | 2.825 | 2.851 | 2.906 | | 2.866 |
| | | | | 2.825 | 2.850 | 2.869 | 2.865 |



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

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

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.



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.
The NVLAP Lab Code is 200707-0



3.6 Data Set 2, 85°C, 60mA (Chromaticity Shift)

| No. | u' | v' | CCT(K) | Chromaticity Shift (u'v') | | | | | |
|--------|--------------|--------|--------|----------------------------|---------|---------|---------|---------|---------|
| | 0hr(Initial) | | | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
| 26 | 0.2590 | 0.5257 | 2782 | 0.0001 | 0.0003 | 0.0007 | 0.0010 | 0.0012 | 0.0014 |
| 27 | 0.2594 | 0.5270 | 2767 | 0.0001 | 0.0003 | 0.0005 | 0.0006 | 0.0008 | 0.0011 |
| 28 | 0.2588 | 0.5277 | 2776 | 0.0001 | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0010 |
| 29 | 0.2574 | 0.5269 | 2812 | 0.0001 | 0.0005 | 0.0005 | 0.0006 | 0.0008 | 0.0011 |
| 30 | 0.2600 | 0.5285 | 2748 | 0.0002 | 0.0005 | 0.0004 | 0.0006 | 0.0009 | 0.0011 |
| 31 | 0.2589 | 0.5283 | 2771 | 0.0001 | 0.0005 | 0.0005 | 0.0007 | 0.0008 | 0.0011 |
| 32 | 0.2584 | 0.5270 | 2788 | 0.0002 | 0.0004 | 0.0006 | 0.0008 | 0.0009 | 0.0011 |
| 33 | 0.2584 | 0.5272 | 2787 | 0.0001 | 0.0004 | 0.0006 | 0.0006 | 0.0008 | 0.0009 |
| 34 | 0.2572 | 0.5281 | 2809 | 0.0001 | 0.0004 | 0.0006 | 0.0006 | 0.0008 | 0.0009 |
| 35 | 0.2585 | 0.5263 | 2789 | 0.0002 | 0.0004 | 0.0006 | 0.0007 | 0.0009 | 0.0011 |
| 36 | 0.2566 | 0.5249 | 2838 | 0.0002 | 0.0004 | 0.0006 | 0.0007 | 0.0009 | 0.0011 |
| 37 | 0.2585 | 0.5278 | 2782 | 0.0001 | 0.0004 | 0.0006 | 0.0006 | 0.0009 | 0.0013 |
| 38 | 0.2598 | 0.5276 | 2757 | 0.0001 | 0.0004 | 0.0006 | 0.0007 | 0.0009 | 0.0013 |
| 39 | 0.2587 | 0.5275 | 2779 | 0.0001 | 0.0004 | 0.0005 | 0.0006 | 0.0008 | 0.0012 |
| 40 | 0.2577 | 0.5271 | 2803 | 0.0001 | 0.0004 | 0.0005 | 0.0008 | 0.0009 | 0.0013 |
| 41 | 0.2592 | 0.5262 | 2775 | 0.0002 | 0.0004 | 0.0006 | 0.0007 | 0.0010 | 0.0013 |
| 42 | 0.2597 | 0.5263 | 2763 | 0.0002 | 0.0005 | 0.0006 | 0.0008 | 0.0011 | 0.0015 |
| 43 | 0.2571 | 0.5271 | 2817 | 0.0001 | 0.0004 | 0.0006 | 0.0007 | 0.0010 | 0.0013 |
| 44 | 0.2564 | 0.5249 | 2843 | 0.0001 | 0.0005 | 0.0004 | 0.0009 | 0.0009 | 0.0013 |
| 45 | 0.2593 | 0.5262 | 2773 | 0.0001 | 0.0003 | 0.0006 | 0.0007 | 0.0009 | 0.0012 |
| 46 | 0.2601 | 0.5279 | 2748 | 0.0002 | 0.0005 | 0.0005 | 0.0007 | 0.0008 | 0.0009 |
| 47 | 0.2577 | 0.5251 | 2814 | 0.0002 | 0.0004 | 0.0008 | 0.0010 | 0.0014 | 0.0016 |
| 48 | 0.2594 | 0.5259 | 2772 | 0.0001 | 0.0004 | 0.0006 | 0.0010 | 0.0013 | 0.0015 |
| 49 | 0.2582 | 0.5264 | 2795 | 0.0001 | 0.0004 | 0.0004 | 0.0011 | 0.0015 | 0.0015 |
| 50 | 0.2602 | 0.5278 | 2747 | 0.0001 | 0.0006 | 0.0004 | 0.0008 | 0.0013 | 0.0012 |
| Avg. | 0.2586 | 0.5269 | 2785 | 0.0002 | 0.0004 | 0.0006 | 0.0008 | 0.0010 | 0.0012 |
| Med. | 0.2587 | 0.5270 | 2782 | 0.0001 | 0.0004 | 0.0006 | 0.0007 | 0.0009 | 0.0012 |
| st dev | 0.0011 | 0.0010 | 26 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 |
| Min. | 0.2564 | 0.5249 | 2747 | 0.0001 | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0009 |
| Max. | 0.2602 | 0.5285 | 2843 | 0.0002 | 0.0006 | 0.0008 | 0.0011 | 0.0015 | 0.0016 |

Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial



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.
The NVLAP Lab Code is 200707-0

Directions

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