



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-A-3528H343W-S1-13HL-HR5

Report Type: 10000 Hours Test Report		Product Type: LED Package	
Reviewed By:	Pote Wang	<i>Pote Wang</i>	
Report Number:	SZ2220402-12245E-10-10000		
Test Date:	2022-04-09 to 2023-07-03		
Report Date:	2023-07-07		
Approved by:	Blake Zhang / EE Engineer	<i>Blake Zhang</i>	
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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.



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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 2022-04-02. 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-S1-13HL-HR5
Part Type:	LED Package
Drive Level:	DC 20mA
Nominal CCT:	2700K
Power:	0.064W
Average Current Density per LED die:	246.032mA/mm ²
Average Power Density per LED die:	0.787W/mm ²
CRI:	90
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.

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:

Series Name	Model Name	CRI (typ.)	Total Input Current (mA)	Power (W)	CCT (K)	Number of dies	Driver current per die(mA)	Current Density per Die(mA/mm ²)	Power Density per PCB (W/mm ²)	Die Spacing (mm)
Test model	HL-A-3528H343W-S1-13HL-HR5	90	20	0.064	2700	1	20	246.032	0.00653	/
Multiple model	HL-A-3528H***W-S1-13**-HR5-***	90	20	0.064	2700-6500	1	20	246.032	0.00653	/
Multiple model	HL-A-3528H***W-S1**-HR5-***	90	20	0.064	2700-6500	1	20	246.032	0.00653	/

Note:

The model name begins with "HL", such as "HL-A-3528H***W-S1-13**-HR5-***", " " 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 None which stands for the bonding wire style.
3. The third "****" is the letter which stands for the customer code.

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	2022-11-18	2023-11-17
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2022-11-18	2023-11-17
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D062	1011093	2021-09-15	2023-09-14
Multilayer aging machine	BACL	B2-270	20015	2022-10-19	2023-10-18
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	2022-10-20	2023-10-19

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 $2^{\circ}C$ below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to $5^{\circ}C$ 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 $25^{\circ}C \pm 2^{\circ}C$, RH <65%.

1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate $u'v'$. 2π 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 $25^{\circ}C \pm 2^{\circ}C$, 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 $U=0.8671^{\circ}C$ ($K=2$), 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, 20mA

Part Number: HL-A-3528H343W-S1-13HL-HR5
Number of Units: 25
Case Temperature: >53°C
Ambient Temperature: >50°C
Life Test Drive Current: 20mA
Measurement Current: 20mA

Data Set 2: 85°C, 20mA

Part Number: HL-A-3528H343W-S1-13HL-HR5
Number of Units: 25
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 20mA
Measurement Current: 20mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L ₇₀ Lifetime
1	25	0	1000hrs	10000hrs	2.037E-06	1.004	>60,000 hours
2	25	0	1000hrs	10000hrs	2.560E-06	1.004	>60,000 hours

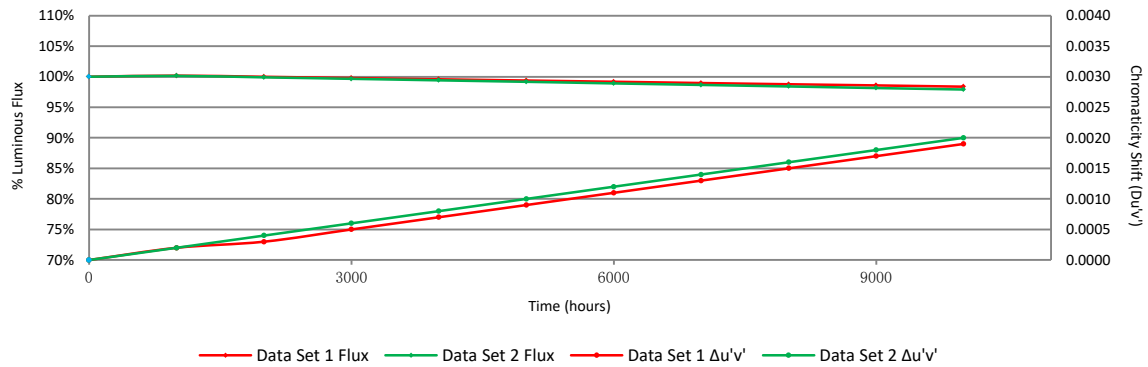
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	100.18%	99.99%	99.78%	99.58%	99.38%	99.18%	98.97%	98.77%	98.58%	98.37%
2	100.14%	99.90%	99.66%	99.41%	99.17%	98.91%	98.66%	98.41%	98.15%	97.91%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
2	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

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

No.	Φ(lm) Ohr(Initial)	Lumen Maintenance (%)									
		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	7.584	100.17	99.93	99.71	99.51	99.21	98.98	98.83	98.63	98.43	98.33
2	7.629	100.10	99.88	99.75	99.42	99.21	98.93	98.75	98.49	98.27	97.98
3	7.608	100.20	99.97	99.80	99.61	99.38	99.22	99.04	98.80	98.55	98.26
4	7.599	100.24	100.12	99.86	99.68	99.49	99.36	99.17	98.87	98.58	98.39
5	7.538	100.12	99.99	99.84	99.73	99.50	99.36	99.11	98.94	98.71	98.50
6	7.601	100.20	99.87	99.70	99.55	99.41	99.17	99.00	98.92	98.70	98.54
7	7.485	100.21	99.96	99.75	99.59	99.39	99.16	98.94	98.84	98.72	98.58
8	7.447	100.17	100.05	99.80	99.56	99.41	99.15	98.91	98.76	98.63	98.36
9	7.575	100.22	100.03	99.78	99.66	99.47	99.29	98.94	98.73	98.63	98.36
10	7.543	100.23	100.05	99.92	99.68	99.56	99.35	99.20	99.05	98.90	98.73
11	7.505	100.25	100.12	99.95	99.69	99.55	99.27	99.12	98.92	98.81	98.67
12	7.604	100.18	99.92	99.61	99.30	99.08	98.83	98.66	98.44	98.25	98.15
13	7.522	100.12	99.91	99.71	99.47	99.27	99.03	98.72	98.48	98.29	98.05
14	7.631	100.21	99.93	99.71	99.50	99.21	99.02	98.86	98.73	98.48	98.27
15	7.607	100.25	100.12	99.96	99.76	99.50	99.33	99.08	98.86	98.76	98.49
16	7.535	100.15	99.87	99.65	99.46	99.20	99.11	98.83	98.67	98.49	98.37
17	7.616	100.22	100.01	99.88	99.71	99.46	99.30	99.09	98.90	98.69	98.36
18	7.402	100.18	99.99	99.74	99.54	99.39	99.15	98.96	98.70	98.47	98.16
19	7.524	100.17	100.08	99.92	99.79	99.63	99.40	99.22	99.02	98.88	98.62
20	7.469	100.13	99.99	99.68	99.48	99.34	99.24	99.02	98.90	98.69	98.58
21	7.554	100.15	99.93	99.70	99.46	99.35	99.18	98.91	98.78	98.60	98.40
22	7.549	100.13	100.04	99.83	99.55	99.34	99.15	99.02	98.77	98.46	98.29
23	7.402	100.14	99.93	99.72	99.49	99.19	99.00	98.78	98.57	98.27	98.22
24	7.485	100.27	100.04	99.77	99.64	99.51	99.17	98.97	98.77	98.50	98.33
25	7.288	100.16	100.04	99.79	99.66	99.38	99.26	99.15	98.78	98.64	98.37
Avg.	7.532	100.18	99.99	99.78	99.58	99.38	99.18	98.97	98.77	98.58	98.37
Med.	7.543	100.18	99.99	99.77	99.56	99.39	99.17	98.97	98.78	98.60	98.36
st dev	0.084	0.05	0.08	0.09	0.12	0.14	0.15	0.15	0.16	0.19	0.19
Min.	7.288	100.10	99.87	99.61	99.30	99.08	98.83	98.66	98.44	98.25	97.98
Max.	7.631	100.27	100.12	99.96	99.79	99.63	99.40	99.22	99.05	98.90	98.73



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

No.	Forward Voltage (V)										
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2.817	2.830	2.826	2.828	2.827	2.805	2.804	2.806	2.810	2.801	2.835
2	2.819	2.841	2.828	2.823	2.806	2.811	2.830	2.815	2.802	2.811	2.801
3	2.811	2.827	2.821	2.825	2.814	2.838	2.805	2.808	2.803	2.818	2.834
4	2.796	2.810	2.804	2.795	2.802	2.805	2.817	2.819	2.805	2.803	2.831
5	2.815	2.829	2.823	2.811	2.838	2.825	2.821	2.817	2.805	2.806	2.817
6	2.810	2.823	2.820	2.827	2.844	2.841	2.823	2.835	2.826	2.804	2.810
7	2.816	2.828	2.823	2.828	2.818	2.810	2.809	2.823	2.803	2.842	2.811
8	2.814	2.825	2.821	2.816	2.804	2.803	2.826	2.812	2.810	2.830	2.801
9	2.815	2.826	2.822	2.820	2.806	2.809	2.806	2.812	2.833	2.809	2.810
10	2.815	2.828	2.823	2.829	2.810	2.804	2.804	2.813	2.803	2.817	2.838
11	2.818	2.828	2.826	2.824	2.829	2.813	2.806	2.813	2.818	2.836	2.815
12	2.817	2.830	2.826	2.826	2.808	2.809	2.814	2.801	2.811	2.829	2.809
13	2.817	2.833	2.830	2.814	2.817	2.802	2.820	2.838	2.842	2.812	2.804
14	2.811	2.824	2.820	2.817	2.802	2.829	2.810	2.811	2.800	2.807	2.808
15	2.813	2.829	2.823	2.828	2.810	2.835	2.808	2.831	2.829	2.804	2.802
16	2.814	2.827	2.827	2.828	2.827	2.812	2.819	2.815	2.806	2.813	2.809
17	2.817	2.829	2.829	2.809	2.801	2.831	2.807	2.803	2.815	2.816	2.801
18	2.820	2.831	2.830	2.825	2.818	2.834	2.814	2.825	2.836	2.803	2.801
19	2.808	2.823	2.819	2.810	2.821	2.815	2.804	2.809	2.816	2.842	2.800
20	2.817	2.831	2.828	2.828	2.829	2.801	2.800	2.806	2.802	2.802	2.808
21	2.813	2.826	2.825	2.814	2.826	2.816	2.809	2.815	2.812	2.819	2.819
22	2.808	2.827	2.820	2.819	2.805	2.803	2.831	2.817	2.843	2.816	2.823
23	2.819	2.836	2.830	2.826	2.836	2.818	2.805	2.836	2.816	2.834	2.807
24	2.818	2.834	2.830	2.814	2.817	2.821	2.802	2.815	2.813	2.802	2.819
25	2.797	2.812	2.808	2.817	2.811	2.812	2.812	2.817	2.840	2.802	2.832
Avg.	2.813	2.827	2.823	2.820	2.817	2.816	2.812	2.816	2.816	2.815	2.814
Med.	2.815	2.828	2.823	2.823	2.817	2.812	2.809	2.815	2.812	2.812	2.810
st dev	0.006	0.006	0.006	0.008	0.012	0.012	0.009	0.010	0.014	0.013	0.012
Min.	2.796	2.810	2.804	2.795	2.801	2.801	2.800	2.801	2.800	2.801	2.800
Max.	2.820	2.841	2.830	2.829	2.844	2.841	2.831	2.838	2.843	2.842	2.838

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2578	0.5280	2797	0.0002	0.0004	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0017	0.0020
2	0.2584	0.5321	2767	0.0001	0.0002	0.0005	0.0006	0.0008	0.0009	0.0012	0.0014	0.0015	0.0015
3	0.2586	0.5303	2768	0.0001	0.0002	0.0001	0.0001	0.0002	0.0005	0.0009	0.0009	0.0012	0.0018
4	0.2581	0.5283	2790	0.0002	0.0004	0.0008	0.0010	0.0011	0.0013	0.0015	0.0016	0.0017	0.0019
5	0.2594	0.5312	2750	0.0002	0.0004	0.0007	0.0008	0.0010	0.0012	0.0013	0.0016	0.0017	0.0020
6	0.2578	0.5295	2790	0.0001	0.0003	0.0006	0.0006	0.0007	0.0010	0.0013	0.0014	0.0015	0.0015
7	0.2617	0.5302	2706	0.0001	0.0001	0.0004	0.0005	0.0006	0.0011	0.0012	0.0013	0.0015	0.0017
8	0.2609	0.5301	2723	0.0002	0.0005	0.0006	0.0007	0.0008	0.0013	0.0015	0.0019	0.0018	0.0021
9	0.2598	0.5312	2741	0.0002	0.0003	0.0005	0.0005	0.0007	0.0009	0.0011	0.0013	0.0016	0.0018
10	0.2578	0.5298	2789	0.0001	0.0001	0.0006	0.0006	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021
11	0.2577	0.5292	2794	0.0002	0.0005	0.0007	0.0007	0.0009	0.0013	0.0015	0.0017	0.0017	0.0020
12	0.2584	0.5309	2771	0.0001	0.0001	0.0004	0.0004	0.0005	0.0007	0.0008	0.0009	0.0014	0.0018
13	0.2585	0.5317	2766	0.0002	0.0003	0.0005	0.0008	0.0009	0.0009	0.0011	0.0013	0.0016	0.0017
14	0.2561	0.5301	2825	0.0001	0.0001	0.0003	0.0004	0.0007	0.0009	0.0011	0.0012	0.0013	0.0014
15	0.2559	0.5310	2825	0.0002	0.0001	0.0004	0.0005	0.0009	0.0009	0.0009	0.0013	0.0014	0.0018
16	0.2583	0.5315	2771	0.0002	0.0002	0.0004	0.0004	0.0008	0.0008	0.0011	0.0013	0.0014	0.0015
17	0.2567	0.5292	2815	0.0002	0.0003	0.0003	0.0004	0.0005	0.0009	0.0014	0.0017	0.0018	0.0020
18	0.2621	0.5313	2692	0.0002	0.0001	0.0001	0.0003	0.0005	0.0006	0.0009	0.0012	0.0013	0.0017
19	0.2571	0.5311	2798	0.0002	0.0004	0.0005	0.0006	0.0012	0.0011	0.0012	0.0016	0.0018	0.0021
20	0.2607	0.5298	2727	0.0001	0.0004	0.0004	0.0004	0.0009	0.0012	0.0012	0.0014	0.0017	0.0020
21	0.2591	0.5298	2762	0.0002	0.0006	0.0003	0.0006	0.0006	0.0007	0.0010	0.0012	0.0013	0.0013
22	0.2598	0.5311	2741	0.0002	0.0005	0.0007	0.0012	0.0013	0.0015	0.0016	0.0017	0.0020	0.0022
23	0.2583	0.5299	2777	0.0001	0.0003	0.0001	0.0009	0.0014	0.0014	0.0016	0.0017	0.0021	0.0025
24	0.2594	0.5300	2753	0.0001	0.0001	0.0002	0.0010	0.0016	0.0017	0.0017	0.0020	0.0022	0.0024
25	0.2565	0.5305	2814	0.0002	0.0004	0.0007	0.0015	0.0016	0.0016	0.0018	0.0020	0.0026	0.0027
Avg.	0.2586	0.5303	2770	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
Med.	0.2584	0.5302	2771	0.0002	0.0003	0.0005	0.0006	0.0008	0.0011	0.0012	0.0014	0.0017	0.0019
st dev	0.0016	0.0010	35	0.0000	0.0002	0.0002	0.0003	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003
Min.	0.2559	0.5280	2692	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0008	0.0009	0.0012	0.0013
Max.	0.2621	0.5321	2825	0.0002	0.0006	0.0008	0.0015	0.0016	0.0017	0.0018	0.0020	0.0026	0.0027

3.4 Data Set 2, 85°C, 20mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	7.550	100.30	100.05	99.89	99.75	99.52	99.23	99.07	98.86	98.60	98.26
27	7.588	100.17	99.93	99.66	99.51	99.33	99.06	98.79	98.60	98.43	98.14
28	7.543	100.05	99.71	99.50	99.34	99.22	98.98	98.77	98.55	98.24	98.12
29	7.442	100.03	99.85	99.61	99.37	98.97	98.66	98.51	98.25	98.01	97.89
30	7.426	100.08	99.81	99.58	99.33	99.02	98.71	98.48	98.29	98.03	97.90
31	7.407	100.31	100.05	99.81	99.49	99.19	98.99	98.76	98.60	98.20	98.04
32	7.640	100.26	99.93	99.58	99.33	99.07	98.76	98.57	98.36	98.21	98.09
33	7.500	100.28	100.00	99.77	99.47	99.25	99.03	98.88	98.63	98.45	98.16
34	7.414	99.84	99.70	99.50	99.26	98.99	98.71	98.44	98.25	97.91	97.56
35	7.581	100.28	100.01	99.75	99.53	99.26	98.94	98.72	98.38	98.07	97.90
36	7.557	100.26	100.03	99.81	99.54	99.36	99.10	98.94	98.58	98.19	97.90
37	7.570	100.25	99.97	99.80	99.43	99.27	99.15	98.86	98.60	98.23	97.98
38	7.445	99.97	99.80	99.61	99.41	99.22	98.94	98.62	98.32	98.05	97.89
39	7.593	100.26	99.96	99.76	99.35	99.09	98.87	98.75	98.59	98.35	98.13
40	7.594	100.16	99.92	99.64	99.50	99.17	98.89	98.66	98.29	98.08	97.88
41	7.588	100.14	99.86	99.66	99.33	99.14	98.88	98.68	98.34	98.17	97.97
42	7.364	100.03	99.92	99.69	99.46	99.27	99.10	98.82	98.59	98.32	98.02
43	7.518	100.19	99.93	99.69	99.49	99.27	98.92	98.68	98.31	98.18	97.90
44	7.588	100.18	99.92	99.68	99.38	99.17	98.93	98.70	98.48	98.23	97.96
45	7.478	99.87	99.73	99.45	99.28	99.05	98.88	98.54	98.30	97.97	97.66
46	7.617	99.93	99.72	99.44	99.09	98.78	98.52	98.11	97.91	97.64	97.53
47	7.527	100.20	99.97	99.68	99.42	99.11	98.84	98.54	98.23	98.07	97.87
48	7.599	100.26	99.99	99.67	99.50	99.28	98.87	98.51	98.21	97.99	97.70
49	7.522	100.20	99.97	99.81	99.60	99.31	99.06	98.72	98.55	98.36	97.95
50	7.564	100.08	99.81	99.55	99.21	98.92	98.66	98.36	98.12	97.74	97.37
Avg.	7.529	100.14	99.90	99.66	99.41	99.17	98.91	98.66	98.41	98.15	97.91
Med.	7.550	100.18	99.93	99.67	99.42	99.19	98.92	98.68	98.36	98.18	97.90
st dev	0.075	0.14	0.11	0.12	0.14	0.16	0.17	0.20	0.21	0.22	0.21
Min.	7.364	99.84	99.70	99.44	99.09	98.78	98.52	98.11	97.91	97.64	97.37
Max.	7.640	100.31	100.05	99.89	99.75	99.52	99.23	99.07	98.86	98.60	98.26



3.5 Data Set 2, 85°C, 20mA (Forward Voltage)

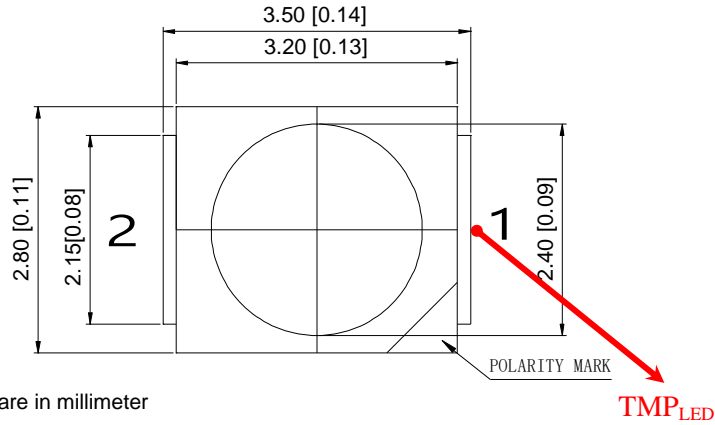
No.	Forward Voltage (V)										
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	2.815	2.830	2.825	2.838	2.803	2.809	2.835	2.843	2.805	2.814	2.814
27	2.820	2.835	2.833	2.835	2.820	2.816	2.822	2.828	2.848	2.812	2.803
28	2.808	2.823	2.819	2.814	2.802	2.835	2.813	2.801	2.839	2.842	2.831
29	2.818	2.830	2.828	2.799	2.833	2.803	2.813	2.811	2.802	2.811	2.805
30	2.809	2.823	2.825	2.826	2.806	2.827	2.807	2.815	2.815	2.807	2.841
31	2.811	2.825	2.825	2.839	2.808	2.845	2.825	2.804	2.846	2.822	2.819
32	2.807	2.820	2.821	2.843	2.806	2.803	2.827	2.815	2.827	2.816	2.805
33	2.809	2.822	2.822	2.824	2.813	2.815	2.835	2.813	2.819	2.818	2.816
34	2.816	2.827	2.828	2.826	2.818	2.804	2.827	2.816	2.815	2.817	2.809
35	2.818	2.833	2.833	2.832	2.816	2.812	2.831	2.826	2.806	2.801	2.816
36	2.813	2.827	2.827	2.823	2.809	2.838	2.801	2.816	2.814	2.813	2.818
37	2.813	2.824	2.825	2.811	2.811	2.805	2.803	2.818	2.805	2.813	2.803
38	2.816	2.827	2.828	2.829	2.839	2.805	2.841	2.811	2.843	2.829	2.803
39	2.813	2.825	2.825	2.801	2.802	2.820	2.837	2.813	2.818	2.818	2.802
40	2.811	2.826	2.826	2.829	2.812	2.824	2.804	2.811	2.818	2.805	2.809
41	2.814	2.829	2.827	2.825	2.830	2.814	2.816	2.832	2.803	2.814	2.803
42	2.815	2.829	2.825	2.825	2.806	2.803	2.800	2.839	2.806	2.807	2.819
43	2.821	2.835	2.832	2.828	2.821	2.833	2.810	2.834	2.845	2.800	2.841
44	2.802	2.814	2.811	2.797	2.811	2.829	2.827	2.816	2.803	2.818	2.804
45	2.811	2.828	2.822	2.825	2.815	2.816	2.805	2.814	2.802	2.816	2.801
46	2.798	2.815	2.811	2.828	2.800	2.818	2.801	2.841	2.819	2.832	2.802
47	2.815	2.828	2.825	2.828	2.843	2.814	2.817	2.844	2.807	2.800	2.825
48	2.798	2.810	2.808	2.811	2.826	2.832	2.804	2.842	2.837	2.823	2.839
49	2.811	2.825	2.822	2.813	2.812	2.803	2.829	2.816	2.845	2.841	2.804
50	2.809	2.827	2.821	2.798	2.822	2.816	2.818	2.817	2.844	2.813	2.809
Avg.	2.812	2.825	2.824	2.822	2.815	2.818	2.818	2.821	2.821	2.816	2.814
Med.	2.813	2.827	2.825	2.825	2.812	2.816	2.817	2.816	2.818	2.814	2.809
st dev	0.006	0.006	0.006	0.013	0.012	0.012	0.013	0.013	0.017	0.011	0.013
Min.	2.798	2.810	2.808	2.797	2.800	2.803	2.800	2.801	2.802	2.800	2.801
Max.	2.821	2.835	2.833	2.843	2.843	2.845	2.841	2.844	2.848	2.842	2.841

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	0.2576	0.5301	2792	0.0001	0.0005	0.0008	0.0008	0.0011	0.0012	0.0013	0.0016	0.0018	0.0021
27	0.2570	0.5304	2804	0.0001	0.0005	0.0008	0.0009	0.0010	0.0013	0.0014	0.0014	0.0017	0.0020
28	0.2586	0.5316	2763	0.0001	0.0003	0.0004	0.0007	0.0009	0.0012	0.0013	0.0015	0.0016	0.0017
29	0.2570	0.5285	2811	0.0001	0.0005	0.0005	0.0007	0.0009	0.0012	0.0014	0.0015	0.0015	0.0018
30	0.2633	0.5293	2675	0.0002	0.0004	0.0007	0.0010	0.0012	0.0012	0.0015	0.0017	0.0020	0.0022
31	0.2558	0.5286	2838	0.0002	0.0004	0.0007	0.0009	0.0010	0.0011	0.0014	0.0016	0.0019	0.0021
32	0.2547	0.5290	2860	0.0001	0.0005	0.0009	0.0010	0.0010	0.0012	0.0014	0.0017	0.0021	0.0022
33	0.2595	0.5306	2749	0.0001	0.0003	0.0006	0.0006	0.0008	0.0009	0.0013	0.0016	0.0018	0.0018
34	0.2623	0.5300	2693	0.0001	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	0.0012	0.0014	0.0016
35	0.2583	0.5282	2784	0.0003	0.0004	0.0008	0.0009	0.0009	0.0011	0.0013	0.0016	0.0017	0.0016
36	0.2583	0.5297	2778	0.0002	0.0005	0.0007	0.0007	0.0009	0.0010	0.0014	0.0015	0.0015	0.0018
37	0.2566	0.5294	2817	0.0002	0.0004	0.0004	0.0004	0.0007	0.0009	0.0010	0.0011	0.0013	0.0016
38	0.2604	0.5298	2734	0.0001	0.0002	0.0005	0.0006	0.0009	0.0009	0.0012	0.0013	0.0016	0.0016
39	0.2572	0.5288	2807	0.0002	0.0001	0.0004	0.0006	0.0007	0.0009	0.0012	0.0012	0.0014	0.0018
40	0.2590	0.5315	2757	0.0003	0.0005	0.0006	0.0006	0.0009	0.0011	0.0013	0.0015	0.0018	0.0019
41	0.2577	0.5292	2793	0.0001	0.0005	0.0005	0.0004	0.0006	0.0006	0.0007	0.0008	0.0012	0.0016
42	0.2600	0.5294	2743	0.0002	0.0004	0.0007	0.0008	0.0009	0.0011	0.0012	0.0013	0.0015	0.0018
43	0.2578	0.5309	2783	0.0001	0.0004	0.0007	0.0008	0.0009	0.0012	0.0013	0.0014	0.0014	0.0018
44	0.2582	0.5300	2780	0.0003	0.0001	0.0004	0.0005	0.0008	0.0010	0.0013	0.0015	0.0019	0.0021
45	0.2606	0.5290	2732	0.0002	0.0003	0.0007	0.0009	0.0012	0.0013	0.0015	0.0016	0.0020	0.0023
46	0.2562	0.5301	2823	0.0001	0.0003	0.0007	0.0008	0.0012	0.0018	0.0019	0.0021	0.0021	0.0024
47	0.2583	0.5298	2779	0.0003	0.0005	0.0009	0.0012	0.0013	0.0016	0.0018	0.0021	0.0024	0.0026
48	0.2592	0.5304	2756	0.0001	0.0003	0.0006	0.0007	0.0014	0.0016	0.0019	0.0020	0.0023	0.0024
49	0.2571	0.5305	2802	0.0001	0.0001	0.0007	0.0009	0.0013	0.0017	0.0020	0.0024	0.0024	0.0026
50	0.2593	0.5294	2757	0.0001	0.0006	0.0006	0.0007	0.0008	0.0009	0.0012	0.0016	0.0019	0.0023
Avg.	0.2584	0.5298	2776	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020
Med.	0.2583	0.5298	2780	0.0001	0.0004	0.0007	0.0007	0.0009	0.0011	0.0013	0.0015	0.0018	0.0019
st dev	0.0019	0.0009	42	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003
Min.	0.2547	0.5282	2675	0.0001	0.0001	0.0004	0.0004	0.0006	0.0006	0.0007	0.0008	0.0012	0.0016
Max.	0.2633	0.5316	2860	0.0003	0.0006	0.0009	0.0012	0.0014	0.0018	0.0020	0.0024	0.0024	0.0026

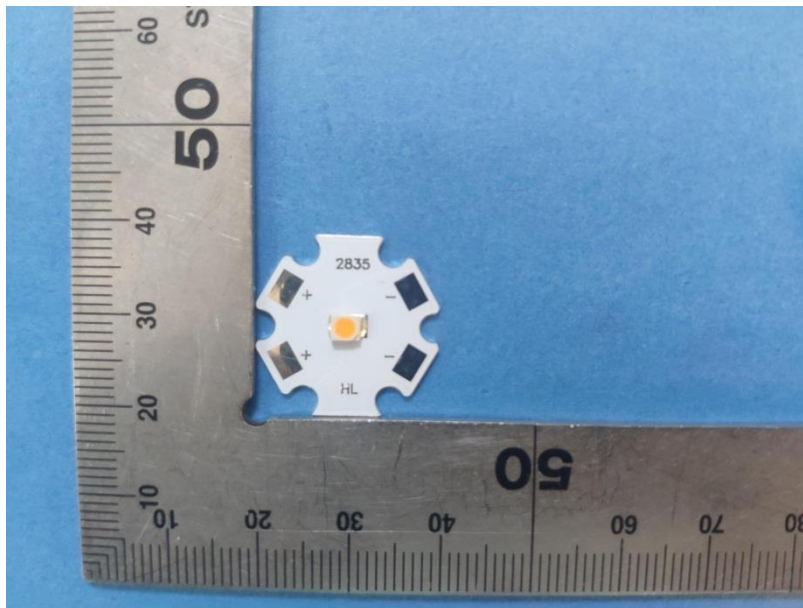
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



Directions

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2. This report includes some test methods are not in NVLAP accreditation scope marked *.
3. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested .
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K=2 with the 95% confidence interval.
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