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-EMC-5050D68W-B1C10-S1-HR3-Y

Report Type: 12000 Hours Test Report	**Product Type:** LED Package
Reviewed By:	Pote Wang
Report Number:	SZ2211013-52377E-10
Test Date:	2018-11-21 to 2021-09-20
Report Date:	2021-10-15
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588

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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 2018-11-20. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-EMC-5050D68W-B1C10-S1-HR3-Y
Part Type:	LED Package
#Drive Level:	DC 150mA
#Nominal CCT:	3000K
#Power:	4.6W
#Average Current Density per LED die:	517.24mA/mm2
#Average Power Density per LED die:	1.585W/mm2
#CRI:	80
#Die Spacing:	0.2mm

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 type	Model name	CRI (typ.)	CCT (typ.)	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)
Master model	HL-EMC-5050D68W-B1C10-S1-HR3-Y	80	3000K	10	1	0.184	517.24	150	0.2	150
multiple model	HL-EMC-5050D***W-B1C10-S1-HR3-Y-***	80	2700-6500K	10	1	0.184	517.24	150	0.2	150
	HL-EMC-5050D***W-B1C8-S1-HR3-Y-***	80	2700-6500K	8	1	0.144	516.67	150	0.2	150
	HL-EMC-5050D***W-B1C6-S1-HR3-Y-***	80	2700-6500K	6	1	0.108	516.67	150	0.2	150
	HL-EMC-5050D***W-B4C2-S1-HR3-Y-***	80	2700-6500K	2	4	0.144	516.67	150	0.2	600
	HL-EMC-5050D***W-B2C4-S1-HR3-Y-***	80	2700-6500K	4	2	0.144	516.67	150	0.2	300
	HL-EMC-5050D***W-B1C9-S1-HR3-Y-***	80	2700-6500K	9	1	0.162	517.24	150	0.2	150
	HL-EMC-5050D***W-B3C3-S1-HR3-Y-***	80	2700-6500K	3	3	0.162	517.24	150	0.2	450

Note:

The model name begins with "HL", such as"HL-EMC-5050D***W- B1C10-S1-HR3-Y-***","*" is described in detail as follows :
1. The first"***" is a number from 1 to 999 which stands for the brightness level.
2. The second"***" is the letter, which stands for the customer code.

Note:

1、 The applicant Hongli Zhihui Group Co.,Ltd. Guangzhou Branch declare that their products with model HL-EMC-5050D68W-B1C10-S1-HR3-Y are the same to the products in report #R2DG181120070-10-12000 and is authorized by original applicant to use their test data.
2、 All the data in previous report (R2DG181120070-10-12000) is shared in this report.

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	Serial No	Calibration date	Calibration due date
0.5m integrating sphere	EVERFINE	AIS-2	G185304TA1381172	2020-10-22	2021-10-21
LED Test Source	EVERFINE	LTS-300	P185616CD1371113	2020-10-21	2021-10-20
High Accuracy Array Spectroradiometer	EVERFINE	HAAS-2000	P600674CM1381123	2020-10-22	2021-10-21
Standard Light Source	EVERFINE	D062	1011093	2020-10-20	2021-10-19
Multilayer aging machine	BACL	B2-270	20022	2021-02-24	2022-02-23
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090008	2021-02-24	2022-02-23

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 ±3% of the specified value of the manufacturer during maintenance test, and was within ±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°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'. 2π measurement was used and sample was drived 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. (Dongguan) 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: 85°C, 150mA

Part Number:	HL-EMC-5050D68W-B1C10-S1-HR3-Y
Number of Units:	25
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	150mA
Measurement Current:	150mA

Data Set 2: 105°C, 150mA

Part Number:	HL-EMC-5050D68W-B1C10-S1-HR3-Y
Number of Units:	25
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	150mA
Measurement Current:	150mA

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	12000hrs	2.478E-06	0.999	>72000 hours
2	25	0	1000hrs	12000hrs	2.733E-06	0.996	>72000 hours

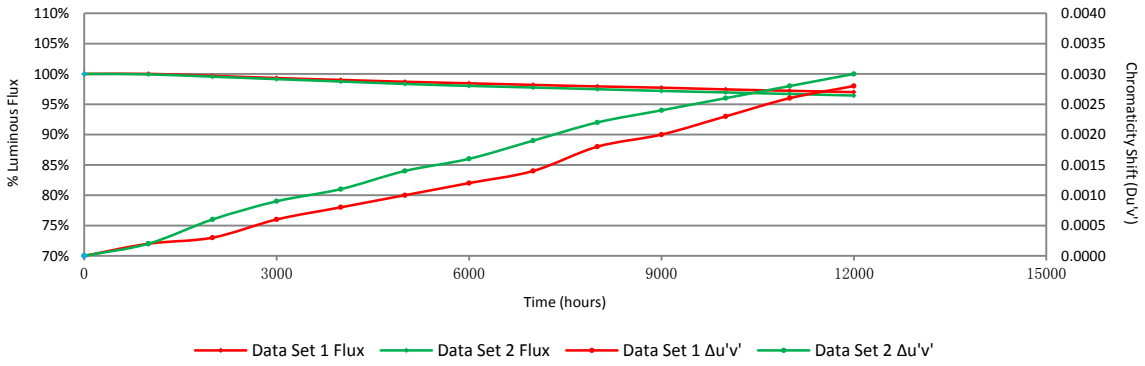
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	100.01%	99.68%	99.32%	99.01%	98.71%	98.45%	98.19%	97.94%	97.73%	97.45%	97.22%	97.00%
2	99.93%	99.54%	99.14%	98.75%	98.35%	98.03%	97.76%	97.48%	97.20%	96.95%	96.69%	96.44%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	0.0002	0.0003	0.0006	0.0008	0.0010	0.0012	0.0014	0.0018	0.0020	0.0023	0.0026	0.0028
2	0.0002	0.0006	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0024	0.0026	0.0028	0.0030

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

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

No.	Φ(lm)	Lumen Maintenance (%)											
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	604.0	100.17	100.07	99.92	99.85	99.57	99.24	98.99	98.64	98.43	98.33	98.10	97.88
2	611.2	100.28	99.79	99.53	99.39	99.13	99.12	98.97	98.76	98.63	98.36	97.99	97.64
3	603.2	100.28	99.92	99.50	98.94	98.47	98.39	98.18	98.01	97.66	97.53	97.35	97.30
4	602.7	100.03	99.80	99.68	99.47	98.92	98.69	98.54	98.17	98.06	97.78	97.49	97.21
5	601.4	100.03	99.65	99.17	98.65	98.64	98.24	97.95	97.56	97.51	97.31	97.14	97.02
6	600.4	99.92	99.83	99.63	99.32	98.80	98.37	98.08	97.78	97.58	97.25	97.02	96.80
7	607.3	100.25	99.65	99.26	99.16	99.01	98.68	98.45	98.21	98.11	97.66	97.56	97.45
8	606.9	100.07	99.79	99.62	99.32	98.85	98.50	98.17	98.09	97.91	97.73	97.54	97.38
9	608.3	99.87	99.52	99.01	98.98	98.67	98.44	98.08	97.96	97.86	97.58	97.24	97.19
10	609.1	99.97	99.31	99.08	98.67	98.51	98.36	97.98	97.67	97.44	96.81	96.54	96.31
11	605.9	100.08	99.46	99.22	98.50	98.18	98.00	97.71	97.59	97.49	97.05	96.77	96.65
12	604.4	100.13	99.83	99.35	98.99	98.59	98.23	97.87	97.63	97.14	97.04	96.86	96.58
13	605.5	99.92	99.83	99.54	99.16	98.58	98.20	97.95	97.80	97.62	97.44	97.18	97.01
14	606.5	99.98	99.82	99.21	98.71	98.53	98.15	97.96	97.76	97.54	97.21	97.05	96.82
15	603.4	100.05	99.95	99.62	99.04	98.66	98.24	97.94	97.50	97.36	97.07	96.83	96.67
16	601.5	99.92	99.73	99.29	99.19	98.95	98.59	98.34	97.89	97.62	97.41	97.12	96.89
17	608.1	100.02	99.61	99.14	99.08	98.95	98.78	98.52	98.29	97.90	97.80	97.40	97.19
18	607.1	99.90	99.75	99.34	99.09	98.98	98.67	98.30	98.07	97.91	97.76	97.50	97.22
19	601.2	99.92	99.62	99.25	99.02	98.99	98.95	98.69	98.67	98.50	97.77	97.65	97.32
20	602.5	99.92	99.63	99.45	99.30	99.02	98.82	98.57	98.31	98.14	97.69	97.41	97.20
21	599.4	99.75	99.42	98.90	98.72	98.62	98.33	98.25	98.08	97.90	97.61	97.48	97.20
22	604.0	99.85	99.24	98.64	98.41	97.80	97.47	97.37	97.10	96.92	96.67	96.49	96.26
23	604.4	100.12	99.83	99.27	98.92	98.44	98.31	98.08	97.85	97.60	97.30	97.02	96.58
24	603.4	99.88	99.47	98.94	98.48	98.33	98.01	97.88	97.50	97.08	96.93	96.70	96.49
25	604.0	99.98	99.50	99.37	98.96	98.59	98.38	98.01	97.55	97.38	97.17	96.95	96.72
Avg.	604.6	100.01	99.68	99.32	99.01	98.71	98.45	98.19	97.94	97.73	97.45	97.22	97.00
Med.	604.0	99.98	99.73	99.29	99.02	98.66	98.38	98.08	97.89	97.62	97.44	97.18	97.02
st dev	2.9	0.14	0.20	0.28	0.34	0.35	0.38	0.38	0.40	0.43	0.42	0.41	0.41
Min.	599.4	99.75	99.24	98.64	98.41	97.80	97.47	97.37	97.10	96.92	96.67	96.49	96.26
Max.	611.2	100.28	100.07	99.92	99.85	99.57	99.24	98.99	98.76	98.63	98.36	98.10	97.88

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

No.	Forward Voltage (V)												
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	24.13	24.16	24.14	24.14	24.13	24.13	24.24	24.17	24.16	24.17	24.08	24.17	24.17
2	24.19	24.20	24.17	24.17	24.16	24.16	24.20	24.19	24.18	24.21	24.16	24.13	24.15
3	24.12	24.15	24.13	24.13	24.14	24.12	24.17	24.16	24.14	24.17	24.11	24.18	24.19
4	24.02	24.05	24.03	24.04	24.03	24.02	24.09	24.05	24.04	24.07	23.99	24.09	24.11
5	24.08	24.12	24.11	24.11	24.10	24.09	24.13	24.12	24.12	24.14	24.11	24.16	24.18
6	24.06	24.08	24.07	24.08	24.06	24.06	24.12	24.09	24.11	24.12	24.10	24.15	24.18
7	24.15	24.17	24.16	24.17	24.14	24.14	24.20	24.17	24.16	24.19	24.12	24.11	24.13
8	24.04	24.07	24.06	24.06	24.04	24.05	24.12	24.07	24.07	24.10	24.02	24.13	24.16
9	24.09	24.13	24.11	24.12	24.10	24.10	24.16	24.14	24.12	24.16	24.08	24.18	24.12
10	24.10	24.14	24.12	24.14	24.11	24.12	24.15	24.13	24.12	24.15	24.09	24.17	24.19
11	24.11	24.15	24.14	24.14	24.13	24.11	24.17	24.16	24.13	24.16	24.09	24.16	24.16
12	24.06	24.10	24.08	24.11	24.09	24.07	24.13	24.11	24.09	24.12	24.05	24.13	24.14
13	24.04	24.08	24.07	24.08	24.07	24.05	24.10	24.09	24.07	24.11	24.04	24.13	24.15
14	24.08	24.11	24.09	24.12	24.10	24.09	24.15	24.12	24.11	24.13	24.07	24.14	24.15
15	24.11	24.14	24.14	24.14	24.13	24.12	24.17	24.16	24.14	24.17	24.11	24.18	24.19
16	24.11	24.14	24.13	24.14	24.13	24.12	24.18	24.15	24.13	24.16	24.08	24.17	24.18
17	24.01	24.04	24.04	24.04	24.03	24.02	24.06	24.06	24.03	24.06	24.00	24.06	24.06
18	24.04	24.07	24.08	24.08	24.06	24.05	24.10	24.06	24.07	24.10	24.04	24.14	24.18
19	24.08	24.12	24.13	24.11	24.12	24.10	24.14	24.13	24.11	24.15	24.08	24.17	24.19
20	24.02	24.05	24.06	24.05	24.05	24.03	24.09	24.07	24.06	24.09	24.03	24.11	24.13
21	24.07	24.11	24.11	24.11	24.09	24.09	24.14	24.13	24.10	24.13	24.06	24.13	24.13
22	24.05	24.07	24.09	24.07	24.07	24.05	24.11	24.10	24.08	24.10	24.05	24.10	24.10
23	24.09	24.13	24.13	24.12	24.12	24.11	24.16	24.14	24.13	24.15	24.10	24.16	24.17
24	24.10	24.13	24.13	24.13	24.11	24.09	24.16	24.13	24.12	24.14	24.08	24.15	24.16
25	24.11	24.14	24.14	24.14	24.13	24.11	24.16	24.16	24.13	24.17	24.10	24.18	24.19
Avg.	24.08	24.11	24.11	24.11	24.10	24.09	24.14	24.12	24.11	24.14	24.07	24.14	24.15
Med.	24.08	24.12	24.11	24.12	24.10	24.09	24.15	24.13	24.12	24.14	24.08	24.15	24.16
st dev	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03
Min.	24.01	24.04	24.03	24.04	24.03	24.02	24.06	24.05	24.03	24.06	23.99	24.06	24.06
Max.	24.19	24.20	24.17	24.17	24.16	24.16	24.24	24.19	24.18	24.21	24.16	24.18	24.19

3.3 Data Set 1, 85°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')											
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	0.2481	0.5204	3069	0.0002	0.0001	0.0004	0.0007	0.0008	0.0012	0.0016	0.0017	0.0020	0.0023	0.0027	0.0031
2	0.2474	0.5198	3090	0.0002	0.0001	0.0003	0.0005	0.0008	0.0009	0.0013	0.0015	0.0020	0.0026	0.0028	0.0030
3	0.2473	0.5183	3103	0.0002	0.0004	0.0004	0.0006	0.0012	0.0015	0.0016	0.0019	0.0023	0.0029	0.0031	0.0032
4	0.2481	0.5191	3077	0.0001	0.0003	0.0004	0.0006	0.0006	0.0008	0.0012	0.0015	0.0016	0.0019	0.0021	0.0025
5	0.2472	0.5186	3106	0.0002	0.0008	0.0010	0.0009	0.0012	0.0016	0.0018	0.0021	0.0024	0.0028	0.0033	0.0034
6	0.2477	0.5184	3094	0.0001	0.0004	0.0008	0.0008	0.0006	0.0007	0.0011	0.0025	0.0024	0.0023	0.0022	0.0021
7	0.2471	0.5192	3104	0.0002	0.0006	0.0011	0.0010	0.0011	0.0014	0.0016	0.0019	0.0019	0.0020	0.0021	0.0023
8	0.2484	0.5195	3067	0.0001	0.0001	0.0005	0.0007	0.0010	0.0013	0.0011	0.0017	0.0015	0.0014	0.0013	0.0013
9	0.2476	0.5198	3086	0.0000	0.0003	0.0009	0.0010	0.0011	0.0011	0.0015	0.0019	0.0019	0.0020	0.0021	0.0023
10	0.2465	0.5184	3124	0.0001	0.0005	0.0010	0.0012	0.0012	0.0013	0.0015	0.0018	0.0018	0.0018	0.0018	0.0019
11	0.2483	0.5195	3069	0.0003	0.0006	0.0011	0.0013	0.0013	0.0013	0.0016	0.0019	0.0018	0.0019	0.0019	0.0020
12	0.2485	0.5184	3072	0.0002	0.0003	0.0009	0.0010	0.0007	0.0007	0.0012	0.0015	0.0019	0.0023	0.0027	0.0031
13	0.2470	0.5182	3113	0.0001	0.0005	0.0008	0.0012	0.0012	0.0012	0.0014	0.0019	0.0021	0.0023	0.0025	0.0027
14	0.2477	0.5201	3080	0.0001	0.0000	0.0005	0.0008	0.0010	0.0010	0.0013	0.0016	0.0019	0.0023	0.0026	0.0030
15	0.2480	0.5202	3072	0.0002	0.0001	0.0004	0.0007	0.0012	0.0013	0.0016	0.0018	0.0021	0.0025	0.0028	0.0032
16	0.2475	0.5186	3096	0.0002	0.0001	0.0002	0.0005	0.0008	0.0009	0.0012	0.0014	0.0018	0.0023	0.0028	0.0033
17	0.2470	0.5191	3107	0.0001	0.0004	0.0006	0.0009	0.0012	0.0014	0.0016	0.0020	0.0021	0.0022	0.0023	0.0025
18	0.2480	0.5208	3068	0.0002	0.0001	0.0004	0.0007	0.0009	0.0013	0.0015	0.0017	0.0022	0.0028	0.0033	0.0038
19	0.2482	0.5203	3066	0.0003	0.0003	0.0003	0.0009	0.0014	0.0015	0.0021	0.0024	0.0026	0.0029	0.0032	0.0035
20	0.2471	0.5183	3108	0.0002	0.0001	0.0004	0.0005	0.0008	0.0011	0.0011	0.0015	0.0020	0.0025	0.0030	0.0035
21	0.2473	0.5176	3109	0.0002	0.0005	0.0007	0.0010	0.0012	0.0013	0.0015	0.0017	0.0021	0.0024	0.0028	0.0031
22	0.2471	0.5187	3106	0.0001	0.0004	0.0006	0.0008	0.0012	0.0014	0.0012	0.0019	0.0021	0.0024	0.0027	0.0030
23	0.2469	0.5193	3106	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0021	0.0025	0.0029	0.0033
24	0.2490	0.5209	3042	0.0001	0.0005	0.0004	0.0007	0.0010	0.0010	0.0012	0.0016	0.0019	0.0021	0.0024	0.0027
25	0.2481	0.5195	3075	0.0001	0.0002	0.0004	0.0008	0.0010	0.0012	0.0012	0.0017	0.0019	0.0023	0.0026	0.0030
Avg.	0.2476	0.5192	3088	0.0002	0.0003	0.0006	0.0008	0.0010	0.0012	0.0014	0.0018	0.0020	0.0023	0.0026	0.0028
Med.	0.2476	0.5192	3090	0.0002	0.0003	0.0005	0.0008	0.0010	0.0012	0.0014	0.0017	0.0020	0.0023	0.0027	0.0030
st dev	0.0006	0.0009	20	0.0001	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006
Min.	0.2465	0.5176	3042	0.0000	0.0000	0.0002	0.0005	0.0006	0.0007	0.0011	0.0014	0.0015	0.0014	0.0013	0.0013
Max.	0.2490	0.5209	3124	0.0003	0.0008	0.0011	0.0013	0.0014	0.0016	0.0021	0.0025	0.0026	0.0029	0.0033	0.0038

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

No.	Φ(lm)	Lumen Maintenance (%)											
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
26	603.6	100.08	99.59	98.97	98.91	98.82	98.31	97.98	97.78	97.38	97.12	96.89	96.54
27	606.9	99.80	99.42	99.31	98.75	98.65	98.43	98.14	97.74	97.73	97.41	97.08	96.74
28	605.7	99.87	99.32	99.06	98.60	98.13	97.85	97.79	97.29	96.78	96.57	96.40	96.17
29	605.3	100.03	99.39	99.22	98.45	97.82	97.46	97.13	96.93	96.68	96.43	96.20	95.99
30	607.6	99.84	99.54	98.82	98.29	97.76	97.51	97.33	97.14	96.86	96.82	96.54	96.25
31	598.2	100.17	99.97	99.73	99.15	98.83	98.55	98.40	98.18	98.01	97.73	97.49	97.16
32	605.4	100.12	99.90	99.52	99.06	98.94	98.63	98.28	97.98	97.69	97.24	96.96	96.68
33	604.2	99.78	99.40	98.78	98.31	97.98	97.60	97.53	97.32	96.92	96.62	96.34	96.23
34	606.1	99.60	99.21	98.83	98.48	97.82	97.57	97.39	96.88	96.65	96.44	96.21	95.97
35	607.5	99.95	99.26	99.09	98.35	97.94	97.45	97.09	96.76	96.44	96.28	95.98	95.79
36	600.6	100.23	100.15	99.60	99.35	98.92	98.57	98.40	98.19	97.89	97.54	97.25	96.99
37	602.9	99.88	99.67	99.30	98.94	98.62	98.37	98.14	97.76	97.45	97.26	97.10	96.88
38	604.2	99.74	99.52	98.99	98.63	98.26	98.01	97.83	97.48	97.27	97.00	96.82	96.71
39	602.6	99.72	99.14	98.99	98.59	98.31	97.88	97.53	97.30	97.15	96.98	96.75	96.53
40	599.6	99.77	99.13	98.65	98.10	97.80	97.45	96.96	96.85	96.60	96.46	96.18	96.01
41	603.5	99.82	99.59	99.06	98.29	97.68	97.53	97.27	96.88	96.40	96.16	95.97	95.74
42	600.3	99.95	99.83	98.97	98.95	98.48	98.23	97.68	97.23	96.98	96.87	96.49	96.09
43	602.8	99.90	99.49	99.12	98.92	98.51	98.01	97.74	97.54	97.28	96.86	96.47	96.13
44	598.6	99.98	99.57	98.88	98.71	98.10	97.84	97.58	97.23	97.03	96.83	96.49	96.21
45	602.7	99.97	99.62	99.34	98.84	98.39	97.86	97.74	97.53	97.21	97.03	96.86	96.63
46	600.3	100.33	99.88	99.55	99.48	99.03	98.78	98.35	98.02	97.72	97.27	96.88	96.60
47	602.7	99.70	99.25	99.07	98.82	98.74	98.44	98.22	98.09	97.74	97.48	97.20	96.86
48	600.9	100.27	99.47	98.87	98.57	98.12	97.85	97.77	97.45	97.37	97.22	97.09	96.90
49	599.1	100.08	99.62	99.38	99.25	98.60	98.38	98.00	97.71	97.45	97.13	96.80	96.51
50	600.5	99.73	99.52	99.37	99.00	98.37	98.10	97.64	97.62	97.35	97.05	96.82	96.60
Avg.	602.9	99.93	99.54	99.14	98.75	98.35	98.03	97.76	97.48	97.20	96.95	96.69	96.44
Med.	602.8	99.90	99.52	99.07	98.75	98.37	98.01	97.74	97.48	97.27	97.00	96.80	96.53
st dev	2.8	0.19	0.26	0.28	0.36	0.42	0.42	0.42	0.43	0.46	0.41	0.41	0.39
Min.	598.2	99.60	99.13	98.65	98.10	97.68	97.45	96.96	96.76	96.40	96.16	95.97	95.74
Max.	607.6	100.33	100.15	99.73	99.48	99.03	98.78	98.40	98.19	98.01	97.73	97.49	97.16

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

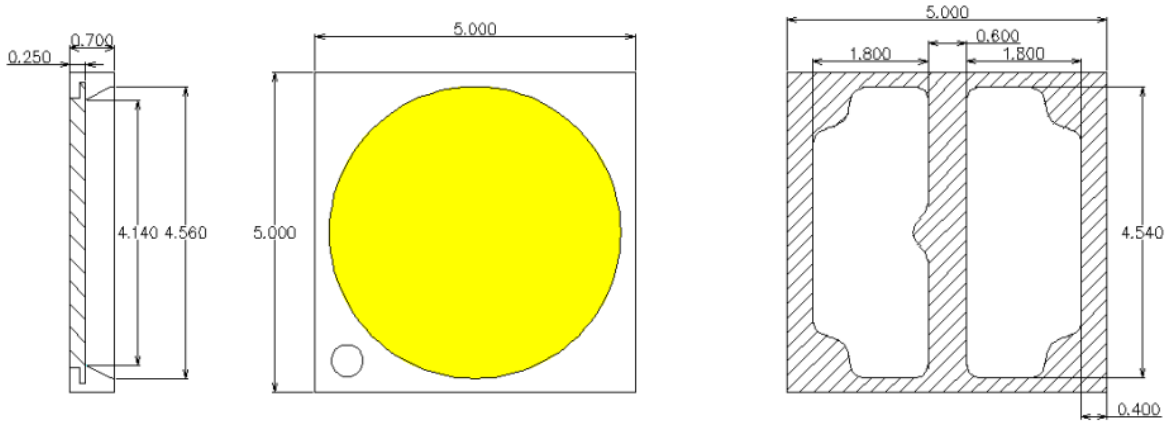
No.	Forward Voltage (V)												
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
26	24.05	24.09	24.09	24.05	24.06	24.11	24.10	24.10	24.10	24.11	24.10	24.12	24.13
27	24.09	24.14	24.13	24.11	24.09	24.16	24.15	24.15	24.15	24.13	24.15	24.11	24.09
28	24.11	24.16	24.16	24.13	24.13	24.18	24.18	24.18	24.16	24.17	24.14	24.16	24.15
29	24.05	24.09	24.09	24.06	24.06	24.12	24.12	24.12	24.10	24.10	24.08	24.08	24.06
30	24.05	24.08	24.08	24.08	24.07	24.12	24.11	24.11	24.11	24.10	24.11	24.09	24.08
31	24.07	24.11	24.09	24.08	24.08	24.13	24.12	24.12	24.11	24.21	24.10	24.13	24.19
32	24.13	24.16	24.16	24.14	24.14	24.21	24.21	24.21	24.19	24.18	24.17	24.15	24.12
33	24.09	24.13	24.11	24.11	24.10	24.15	24.15	24.15	24.14	24.13	24.13	24.11	24.09
34	24.12	24.13	24.12	24.13	24.12	24.18	24.15	24.15	24.16	24.15	24.17	24.15	24.15
35	24.06	24.11	24.09	24.08	24.07	24.13	24.12	24.12	24.10	24.11	24.08	24.10	24.09
36	24.09	24.04	24.15	24.06	24.01	24.06	24.05	24.05	24.04	24.05	24.03	24.05	24.05
37	24.11	24.15	24.14	24.13	24.13	24.18	24.17	24.17	24.16	24.17	24.15	24.17	24.17
38	24.08	24.45	24.10	24.10	24.09	24.14	24.12	24.12	24.12	24.13	24.12	24.14	24.15
39	24.05	24.09	24.07	24.07	24.06	24.12	24.10	24.10	24.10	24.10	24.10	24.10	24.10
40	24.05	24.08	24.07	24.07	24.05	24.11	24.10	24.10	24.09	24.09	24.08	24.08	24.07
41	24.13	24.19	24.14	24.13	24.14	24.18	24.17	24.17	24.16	24.16	24.15	24.15	24.14
42	24.05	24.09	24.07	24.06	24.06	24.10	24.09	24.09	24.09	24.09	24.09	24.09	24.09
43	24.03	24.07	24.04	24.05	24.05	24.09	24.08	24.08	24.07	24.08	24.06	24.08	24.08
44	24.12	24.15	24.13	24.13	24.13	24.17	24.17	24.17	24.16	24.17	24.15	24.17	24.17
45	24.11	24.14	24.12	24.13	24.13	24.19	24.16	24.16	24.15	24.17	24.14	24.18	24.19
46	24.01	24.04	24.01	24.02	24.02	24.06	24.05	24.05	24.04	24.04	24.03	24.03	24.02
47	24.09	24.04	24.10	24.09	24.09	24.14	24.13	24.13	24.11	24.13	24.09	24.13	24.13
48	24.01	24.05	24.03	24.02	24.02	24.07	24.06	24.06	24.06	24.07	24.06	24.08	24.09
49	24.10	24.13	24.10	24.10	24.10	24.14	24.14	24.14	24.12	24.15	24.10	24.16	24.17
50	24.11	24.13	24.12	24.12	24.13	24.16	24.16	24.16	24.15	24.17	24.14	24.18	24.19
Avg.	24.08	24.17	24.10	24.09	24.09	24.14	24.13	24.13	24.12	24.13	24.11	24.12	24.12
Med.	24.09	24.11	24.10	24.09	24.09	24.14	24.12	24.12	24.11	24.13	24.10	24.12	24.12
st dev	0.04	0.08	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
Min.	24.01	24.04	24.01	24.02	24.01	24.06	24.05	24.05	24.04	24.04	24.03	24.03	24.02
Max.	24.13	24.45	24.16	24.14	24.14	24.21	24.21	24.21	24.19	24.21	24.17	24.18	24.19

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

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')											
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
26	0.2484	0.5210	3057	0.0002	0.0003	0.0005	0.0008	0.0009	0.0011	0.0010	0.0015	0.0019	0.0024	0.0028	0.0033
27	0.2479	0.5203	3073	0.0003	0.0008	0.0009	0.0011	0.0014	0.0016	0.0015	0.0020	0.0023	0.0027	0.0030	0.0034
28	0.2483	0.5208	3060	0.0003	0.0005	0.0009	0.0008	0.0012	0.0014	0.0014	0.0017	0.0022	0.0028	0.0033	0.0038
29	0.2473	0.5199	3092	0.0001	0.0005	0.0006	0.0009	0.0015	0.0017	0.0021	0.0021	0.0027	0.0033	0.0038	0.0042
30	0.2482	0.5201	3069	0.0001	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0016	0.0022	0.0029	0.0034	0.0040
31	0.2491	0.5202	3045	0.0000	0.0007	0.0011	0.0013	0.0014	0.0019	0.0021	0.0022	0.0026	0.0030	0.0034	0.0038
32	0.2474	0.5205	3086	0.0002	0.0004	0.0010	0.0012	0.0015	0.0014	0.0017	0.0017	0.0024	0.0030	0.0036	0.0042
33	0.2480	0.5193	3079	0.0002	0.0004	0.0010	0.0010	0.0012	0.0015	0.0017	0.0017	0.0021	0.0024	0.0027	0.0030
34	0.2482	0.5200	3068	0.0002	0.0009	0.0010	0.0009	0.0009	0.0013	0.0016	0.0023	0.0022	0.0021	0.0020	0.0020
35	0.2482	0.5204	3066	0.0001	0.0004	0.0010	0.0010	0.0013	0.0014	0.0019	0.0023	0.0023	0.0022	0.0022	0.0022
36	0.2473	0.5176	3108	0.0003	0.0010	0.0014	0.0015	0.0012	0.0013	0.0014	0.0020	0.0021	0.0022	0.0023	0.0024
37	0.2470	0.5195	3103	0.0001	0.0007	0.0013	0.0017	0.0018	0.0018	0.0018	0.0025	0.0024	0.0024	0.0023	0.0022
38	0.2467	0.5183	3119	0.0000	0.0006	0.0008	0.0012	0.0014	0.0014	0.0015	0.0021	0.0021	0.0021	0.0021	0.0021
39	0.2486	0.5192	3063	0.0001	0.0007	0.0010	0.0016	0.0017	0.0019	0.0020	0.0023	0.0025	0.0028	0.0031	0.0033
40	0.2465	0.5170	3135	0.0000	0.0007	0.0011	0.0015	0.0017	0.0019	0.0022	0.0021	0.0024	0.0026	0.0028	0.0030
41	0.2473	0.5201	3092	0.0002	0.0006	0.0015	0.0019	0.0021	0.0023	0.0026	0.0026	0.0026	0.0025	0.0025	0.0024
42	0.2473	0.5183	3103	0.0001	0.0002	0.0008	0.0017	0.0018	0.0021	0.0021	0.0023	0.0025	0.0027	0.0030	0.0033
43	0.2478	0.5200	3080	0.0001	0.0002	0.0006	0.0011	0.0017	0.0019	0.0021	0.0023	0.0024	0.0026	0.0027	0.0029
44	0.2484	0.5199	3064	0.0001	0.0003	0.0003	0.0007	0.0012	0.0017	0.0023	0.0024	0.0024	0.0025	0.0027	0.0030
45	0.2481	0.5186	3082	0.0004	0.0005	0.0005	0.0007	0.0009	0.0016	0.0019	0.0023	0.0024	0.0025	0.0026	0.0027
46	0.2474	0.5181	3104	0.0006	0.0004	0.0007	0.0009	0.0014	0.0016	0.0023	0.0025	0.0027	0.0029	0.0030	0.0032
47	0.2470	0.5193	3104	0.0004	0.0005	0.0006	0.0009	0.0012	0.0015	0.0021	0.0023	0.0025	0.0028	0.0029	0.0031
48	0.2483	0.5189	3073	0.0003	0.0004	0.0008	0.0010	0.0016	0.0018	0.0023	0.0027	0.0026	0.0026	0.0024	0.0023
49	0.2490	0.5197	3051	0.0002	0.0010	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0021	0.0021	0.0021	0.0021
50	0.2469	0.5190	3110	0.0002	0.0006	0.0008	0.0008	0.0014	0.0017	0.0024	0.0024	0.0025	0.0027	0.0028	0.0029
Avg.	0.2478	0.5194	3083	0.0002	0.0006	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0024	0.0026	0.0028	0.0030
Med.	0.2479	0.5197	3080	0.0002	0.0005	0.0008	0.0010	0.0014	0.0016	0.0019	0.0023	0.0024	0.0026	0.0028	0.0030
st dev	0.0007	0.0010	23	0.0001	0.0002	0.0003	0.0004	0.0003	0.0003	0.0004	0.0003	0.0002	0.0003	0.0005	0.0007
Min.	0.2465	0.5170	3045	0.0000	0.0002	0.0003	0.0007	0.0009	0.0011	0.0010	0.0015	0.0019	0.0021	0.0020	0.0020
Max.	0.2491	0.5210	3135	0.0006	0.0010	0.0015	0.0019	0.0021	0.0023	0.0026	0.0027	0.0027	0.0033	0.0038	0.0042

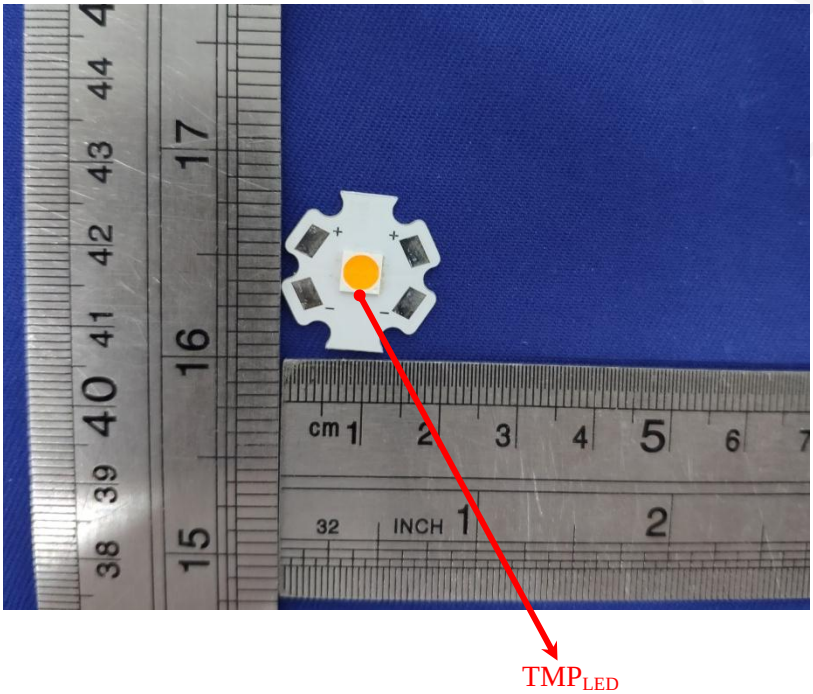
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



Directions

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. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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**********END OF REPORT**********