Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the

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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

50 PCS samples were received on 2017-05-10. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-EMC-3030DW-2C-S1-HR3
Part Type:	LED Package
Drive Level:	DC 150mA
Nominal CCT:	2700K
Power:	1.02W
Current Density per LED die:	930.0019mA/mm^2
Power Density per LED die:	3.162W/mm^2
CRI:	80
Die Spacing:	0.22mm

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.

Note:

1. The applicant Hongli Zhihui Group Co.,Ltd. Guangzhou Branch. declare that their products with model HL-EMC-3030DW-2C-S1-HR3 are the same to the products in report#R2DG170510050-10-9000 and is authorized by original applicant to use their test data.

2. All the data in previous report (R2DG170510050-10-9000) is shared in this report.

1.2 Standards Used:

- 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 IAS)
- ENERGY STAR® Requirements for the Use of LM-80 Data(This standard was not accredited by IAS)

1.3 Testing Equipment

Device	Manufacture

E

1.8 Sample Set

Data Set 1: 85°C, 150mA

Part Number:	HL-EMC-3030DW-2C-S1-HR3
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-3030DW-2C-S1-HR3
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			Reported TM-21 L_{70} Lifetime	Reported TM-21 L_{90} Lifetime
1	25	0	1000hrs	9000hrs	3.217E-06	1.005	>54000 hours	34000 hours
2	25	0	1000hrs	9000hrs	3.718E-06	1.005	>54000 hours	30000 hours

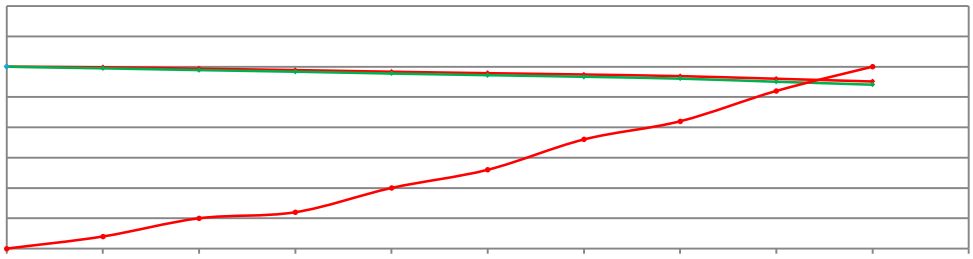
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	99.90%	99.67%	99.44%	99.17%	98.93%	98.71%	98.44%	98.01%	97.56%
2	99.73%	99.44%	99.17%	98.87%	98.60%	98.34%	98.03%	97.52%	97.03%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0002	0.0005	0.0006	0.0010	0.0013	0.0018	0.0021	0.0026	0.0030
2	0.0003	0.0007	0.0008	0.0013	0.0015	0.0019	0.0023	0.0028	0.0033

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
1	139.5	100.07	99.93	99.64	99.43	99.28	99.21	98.92	98.42	97.85
2	137.8	99.93	99.78	99.64	99.56	99.35	99.13	98.84	98.40	97.97
3	138.1	100.07	99.71	99.42	99.06	98.84	98.70	98.48	98.04	97.61
4	139.2	99.86	99.71	99.57	99.35	98.99	98.92	98.71	98.28	97.99
5	137.3	99.85	99.64	99.42	99.27	98.98	98.91	98.54	98.18	97.67
6	140.8	100.07	99.93	99.50	99.15	99.01	98.86	98.44	97.94	97.51
7	142.3	99.86	99.58	99.44	99.09	98.95	98.74	98.38	98.03	97.33
8	139.1	99.78	99.64	99.42	99.28	98.99	98.85	98.71	98.20	97.70
9	140.2	99.93	99.79	99.43	99.22	99.00	98.86	98.57	97.86	97.43
10	141.3	99.86	99.65	99.50	99.15	98.94	98.80	98.51	98.02	97.38
11	141.3	100.07	99.72	99.36	99.01	98.73	98.30	98.02	97.74	97.31
12	138.5	100.14	99.78	99.57	99.28	99.06	98.92	98.56	98.19	97.76
13	137.0	100.07	99.78	99.64	99.34	99.12	98.76	98.61	98.18	97.88
14	136.7	100.15	99.93	99.78	99.41	99.20	98.76	98.46	98.17	97.59
15	137.5	99.85	99.71	99.35	99.05	98.76	98.69	98.47	98.18	97.75
16	138.3	99.93	99.71	99.49	99.20	98.92	98.77	98.63	98.26	98.05
17	138.8	99.86	99.78	99.71	99.28	99.06	98.70	98.49	97.98	97.77
18	138.2	99.71	99.42	99.35	99.06	98.70	98.63	98.34	97.83	97.40
19	136.5	99.78	99.56	99.19	99.12	98.90	98.83	98.53	98.17	97.66
20	138.5	99.71	99.49	99.28	99.13	98.92	98.84	98.41	98.05	97.40
21	137.2	99.85	99.49	99.20	98.91	98.69	98.54	98.40	98.03	97.81
22	136.3	99.78	99.41	99.05	98.68	98.53	98.17	97.87	97.43	96.77
23	139.4	99.86	99.50	99.35	99.00	98.78	98.57	98.28	97.56	96.84
24	140.0	99.71	99.36	99.14	98.86	98.57	97.64	97.29	97.07	96.79
25	138.5	99.78	99.71	99.49	99.28	98.92	98.70	98.56	98.12	97.91
Avg.	138.7	99.90	99.67	99.44	99.17	98.93	98.71	98.44	98.01	97.56
Med.	138.5	99.86	99.71	99.43	99.15	98.94	98.76	98.49	98.05	97.66
	1.5968	0.1365	0.1602	0.1796	0.1958	0.2003	0.3114	0.3260		

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
1	5.980	5.975	5.979	5.975	5.978	5.979	6.004	5.981	5.995	5.994
2	5.892	5.883	5.886	5.883	5.885	5.888	5.906	5.888	5.900	5.917
3	5.898	5.895	5.895	5.888	5.894	5.895	5.912	5.894	5.904	5.912
4	5.906	5.888	5.889	5.889	5.902	5.894	5.908	5.893	5.904	5.916
5	5.895	5.886	5.889	5.890	5.894	5.891	5.907	5.892	5.899	5.914
6	6.009	5.998	6.000	6.001	6.012	6.006	6.031	6.003	6.015	6.024
7	6.008	6.000	5.997	6.002	6.006	6.004	6.033	6.010	6.014	6.021
8	5.900	5.893	5.901	5.894	5.898	5.902	5.913	5.900	5.906	5.933
9	6.032	6.027	6.026	6.028	6.031	6.032	6.056	6.033	6.041	6.050
10	5.981	5.974	5.975	5.977	5.979	5.985	6.003	5.981	5.987	5.997
11	5.983	5.976	5.980	5.981	5.984	5.989	6.005	5.984	5.991	6.000
12	5.969	5.963	5.963	5.963	5.967	5.970	5.986	5.967	5.976	5.982
13	5.895	5.904	5.889	5.892	5.903	5.897	5.907	5.896	5.899	5.917
14	5.976	5.972	5.968	5.973	5.980	5.979	5.996	5.972	5.982	5.996
15	5.889	5.876	5.880	5.880	5.887	5.882	5.902	5.886	5.889	5.903
16	5.895	5.885	5.884	5.887	5.891	5.887	5.902	5.890	5.893	5.907
17	6.012	6.001	6.003	6.008	6.009	6.013	6.032	6.008	6.014	6.025
18	5.888	5.873	5.878	5.882	5.881	5.883	5.895	5.881	5.887	5.903
19	5.886	5.875	5.881	5.883	5.890	5.886	5.896	5.884	5.889	5.900
20	5.896	5.884	5.889	5.894	5.891	5.894	5.906	5.894	5.898	5.910
21	5.880	5.870	5.875	5.881	5.879	5.882	5.894	5.881	5.886	5.904
22	5.949	5.927	5.937	5.938	5.971	5.939	5.955	5.937	5.944	5.962

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

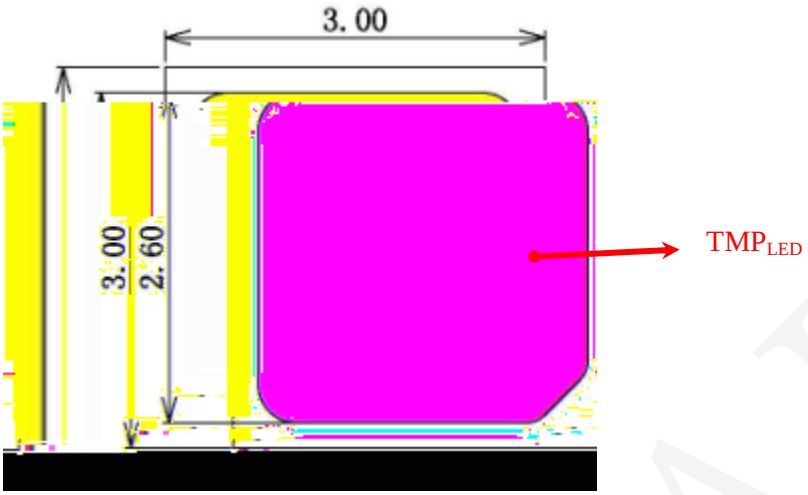
No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2631	0.5279	2686	0.0003	0.0004	0.0007	0.0011	0.0015	0.0018	0.0021	0.0025	0.0028
2	0.2618	0.5242	2727	0.0002	0.0005	0.0007	0.0010	0.0014	0.0020	0.0022	0.0025	0.0030
3	0.2612	0.5237	2742	0.0001	0.0004	0.0005	0.0009	0.0011	0.0018	0.0021	0.0025	0.0029
4	0.2604	0.5239	2758	0.0002	0.0006	0.0007	0.0012	0.0013	0.0018	0.0023	0.0027	0.0031
5	0.2620	0.5251	2720	0.0002	0.0004	0.0007	0.0009	0.0012	0.0016	0.0020	0.0024	0.0029
6	0.2621	0.5241	2723	0.0002	0.0006	0.0007	0.0011	0.0015	0.0019	0.0022	0.0026	0.0031
7	0.2606	0.5251	2749	0.0002	0.0004	0.0005	0.0010	0.0013	0.0017	0.0021	0.0027	0.0031
8	0.2609	0.5247	2744	0.0002	0.0005	0.0006	0.0009	0.0012	0.0017	0.0019	0.0024	0.0030
9	0.2629	0.5243	2704	0.0002	0.0006	0.0007	0.0010	0.0015	0.0018	0.0022	0.0027	0.0031
10	0.2609	0.5242	2747	0.0002	0.0005	0.0006	0.0010	0.0014	0.0018	0.0022	0.0026	0.0030
11	0.2617	0.5246	2729	0.0002	0.0006	0.0006	0.0011	0.0013	0.0018	0.0022	0.0026	0.0030
12	0.2616	0.5236	2735	0.0001	0.0004	0.0004	0.0008	0.0013	0.0016	0.0021	0.0025	0.0029
13	0.2625	0.5253	2708	0.0001	0.0006	0.0007	0.0012	0.0014	0.0020	0.0024	0.0029	0.0033
14	0.2624	0.5243	2715	0.0002	0.0005	0.0008	0.0011	0.0013	0.0017	0.0021	0.0026	0.0030
15	0.2626	0.5244	2710	0.0002	0.0004	0.0006	0.0010	0.0012	0.0017	0.0021	0.0025	0.0030
16	0.2619	0.5246	2723	0.0001	0.0005	0.0006	0.0009	0.0014	0.0017	0.0021	0.0026	0.0028
17	0.2623	0.5251	2714	0.0001	0.0004	0.0005	0.0009	0.0009	0.0017	0.0019	0.0025	0.0027
18	0.2614	0.5246	2734	0.0003	0.0006	0.0007	0.0013	0.0016	0.0021	0.0025	0.0029	0.0034
19	0.2615	0.5243	2734	0.0002	0.0006	0.0009	0.0013	0.0015	0.0020	0.0024	0.0029	0.0032
20	0.2625	0.5250	2710	0.0002	0.0006	0.0009	0.0012	0.0014	0.0018	0.0021	0.0026	0.0031
21	0.2619	0.5251	2723	0.0002	0.0005	0.0005	0.0008	0.0009	0.0015	0.0019	0.0024	0.0026
22	0.2612	0.5219	2751	0.0002	0.0005	0.0005	0.0008	0.0013	0.0017	0.0021	0.0026	0.0028
23	0.2616	0.5245	2732	0.0001	0.0004	0.0007	0.0008	0.0011	0.0019	0.0021	0.0025	0.0027
24	0.2602	0.5248	2759	0.0002	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0024	0.0027
25	0.2607	0.5247	2748	0.0000	0.0003	0.0006	0.0008	0.0010	0.0014	0.0019	0.0024	0.0027
Avg.	0.2617	0.5246	2729	0.0002	0.0005	0.0006	0.0010	0.0013	0.0018			

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
26	138.2	99.71	99.57	99.42	99.13	98.91	98.77	98.41	97.90	97.61
27	125.1	99.76	99.44	98.96	98.56	98.08	97.60	97.20	96.72	96.08
28	137.2	99.78	99.64	99.56	99.27	98.83	98.47	98.32	97.81	97.52
29	133.3	99.70	99.47	99.32	99.25	98.87	98.65	98.20	97.75	97.52
30	139.0	99.64	99.42	99.21	98.99	98.78	98.63	98.35	97.91	97.41
31	136.3	99.71	99.41	99.19	98.90	98.61	98.39	98.17	97.58	97.14
32	137.3	99.64	99.34	99.20	98.98	98.69	98.54	98.32	97.67	97.16
33	138.3	99.78	99.42	99.13	98.84	98.77	98.41	98.12	97.61	97.25
34	137.2	99.64	99.13	98.83	98.47	98.32	98.10	[redacted]	97.08	96.50
35	140.3	99.71	99.43							

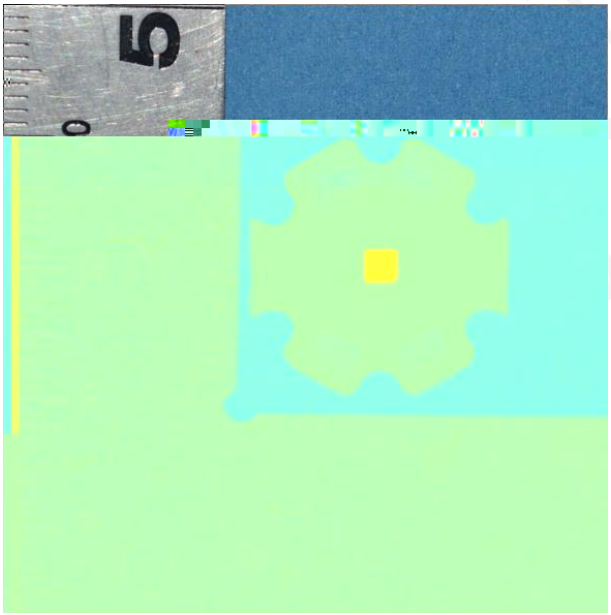
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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