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HONGLIZHIHUI  
Hongli Zhihui Group Co.,Ltd.

# IESNA LM-80-2008

## Measuring Lumen Maintenance of LED Light Sources

### Measurement and Test Report

FOR

**Guangzhou Hongli Opto-Electronic Co.,Ltd Engineering Department**

No.1,Xianke Yi Road,Huadong Town,Huadu District,Guangzhou,China

**Model: P2835W1D5-D01-8D1A01**

Report type: 9000 hours Test report

Product Type: LED Package

Test Date: 2014-12-19 to 2015-12-29

Report Date: 2016-7-26

Test Engineer: 梁枢

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Approved by/ Position: 李培 Senior Engineer

Test Agency: GuangZhou Hongli Opto-Electronic Co.,Ltd Lab

**Note:**

1. The results shall be related to the samples tested only.
2. The test report shall not be copied and used without the written approval by Laboratory.

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## 1.General Information

### 1.1 Description of LED Light Sources

Model: P2835W1D5-D01-8D1A01

Product Type: LED Package

Nominal CCT:2700K

#### Family products covered by this report :

According to ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products, the following products can be covered by this report base on the declaration letter of manufacturer [Engineering Department] ( see attachment A for more information). The information of these models Shows that the covered products meet all section 3 item 3 requirements of ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products( September 9, 2011)

Model type	Model name	CCT(typ.)	CRI(typ.)	Current(mA)
Package 2835 series	P2835W2D5-D01-8D1A01	3000k	80	150
	P2835W3D5-D01-8D1A01	4000k	80	150
	P2835W4D5-D01-8D1A01	5000k	80	150
	P2835W5D5-D01-8D1A01	6000K	80	150
	P2835W6D5-D01-8D1A01	6500k	80	150
	P2835W8D5-D01-8D1A01	3500k	80	150
	P2835W2D4-D01-8D1A01	3000k	80	150
	P2835W3D4-D01-8D1A01	4000k	80	150
	P2835W4D4-D01-8D1A01	5000k	80	150
	P2835W5D4-D01-8D1A01	6000k	80	150
	P2835W6D4-D01-8D1A01	6500k	80	150
	P2835W8D4-D01-8D1A01	3500k	80	150
	P2835W1F4-D01-8D1A01	2700	80	150
	P2835W2F4-D01-8D1A01	3000	80	150
	P2835W3F4-D01-8D1A01	4000	80	150
	P2835W4F4-D01-8D1A01	5000	80	150
	P2835W5F4-D01-8D1A01	6000	80	150
	P2835W6F4-D01-8D1A01	6500	80	150
P2835W8F4-D01-8D1A01	3500	80	150	

#### Disclaimer:

The truthfulness and accuracy of all the technical information above for the covered LED products is ensure by manufacturer of LED light source (Engineering Department). GuangZhou Hongli Opto-Electronic Co.,Ltd Lab isn't responsible or gives any guarantees for the truthfulness of the technical information.

### 1.2 Standards Used

- IESNA LM-80-08:IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- ENERGY STAR® Program Guidance Regarding LED package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products.(\* The standard is not in the scope of accreditation)

### 1.3 Test Facility

The testing Facility used by Guangzhou Hongli Opto-electronic Co., Ltd lab, is located at No.1 xianke Yi Road Huadong Town Huadu District GuangZhou China.

### 1.4 Description of Auxiliary Equipment

Device	Manufacture	Model No	Equipment No	Test Range	Calibration Date	Calibration due date
Integral Sphere	EVERFINE	Diameter 0.5M	HL-W-087-003	380-1100nm	2015-6-15	2016-6-14
Programmable test Power for LEDS	EVERFINE	LED300E	HL-W-048-021	15V/2000mA	2015-12-01	2016-11-30
Standard Light Source	EVERFINE	D062	HL-Y-014-001	N/A	2015-1-19	2016-1-18
high accuracy	EVERFINE	HAAS-2000	HL-W-122-004	380-1100nm	2015-6-15	2016-6-14

array spectroradiometer							
Ruler	Guanglu shuce	STAINLESS	HL-Y-011-012	0-200mm	2015-12-2	2016-12-1	
Multilayer LM-80 aging machine	BACL	B2-270	HL-W-175-001	270Pcs	2015-6-16	2016-6-15	
DC regulated Power supply	Interlock	IPD-6006SLU	HL-W-048-034 HL-W-048-033	60V/6A	2015-6-15	2016-6-14	

### 1.5 Operating Cycle

Samples are driven with a constant direct current (DC).

### 1.6 Test interval

Samples are tested in every 1000 hour.

### 1.7 Ambient conditions

For lumen maintenance test ,samples were operated in thermal chambers with minimal ambient airflow. for long term reliability test . The case temperature was controlled by mounting several thermocouples on a sample reliability stress board at the designated thermal measurement point ,as shown in APPENDIX .The ambient temperature Ta was measured by several thermocouples at a distance of 1.5mm above the reliability test board. The relative humidity within chamber was less than 65%. For photometry measurement ,temperature was set to  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , RH < 65%

### 1.8 Photometry Measurement Uncertainty

The uncertainty of the light output measurements is  $U=2.52\%(k=2)$ ,at the95% confidence level.

The uncertainty of the correlated color temperature measurements is  $U=21.5K(K=2)$ ,at the95% confidence level. This calibration results traceable to the CHINA CEPREI LABORATORY .

### 1.9 Sample Set

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.

Each Sample is soldered to all of the reliability stress boards for a given set of IESNA LM-80 tests.

Sample Size:

Total 60 Pcs;

Status: Normal;

Each Ts test condition 25Pcs for sampling ,The other 10pcs samples were retain;

The samples tested at Ts  $85^{\circ}\text{C}$  and  $105^{\circ}\text{C}$  were received at 2014-12-19 and tested during 2014-12-19 to 2015-12-29.

The Samples were numbered from 1# to 25#, 26# to 50#.

#### (1) Data set : $85^{\circ}\text{C}$ ,150mA

**Part Number:** P2835W1D5-D01-8D1A01

Number of Units: 25Pcs

Actual Case Temperature(Ts):  $T_s=84.8^{\circ}\text{C}$

Actual Ambient Temperature(Ta):  $T_A=83.2^{\circ}\text{C}$

Life Test Drive Current:  $I_f=150\text{mA}$

Measurement Current:  $I_f=150\text{mA}$

#### (2) Data set : $105^{\circ}\text{C}$ ,150mA

**Part Number:** P2835W1D5-D01-8D1A01

Number of Units: 25PCS

Actual Case Temperature(Ts):  $T_s=104.5^{\circ}\text{C}$

Actual Ambient Temperature( $T_A$ ):  $T_A=103.7^{\circ}\text{C}$ Life Test Drive Current:  $I_F=150\text{mA}$ Measurement Current:  $I_F=150\text{mA}$ **2. Summary Of Test Result****(1) Data set: Data Set 1 85°C150mA**

Number of Units: 25 Pcs

Number of Failures : 0 Pcs

Average. Lumen Maintenance at 9000 hours : 95.39%

Average Chromaticity Shift at 9000 hours ( $\Delta u'v'$ ): 0.00442

Reported TM-21 L70 Life time: &gt;54000 H

**(2) Data set: Data Set 1 105°C150mA**

Number of Units: 25 Pcs

Number of Failures : 0 Pcs

Average. Lumen Maintenance at 9000 hours : 94.99%

Average Chromaticity Shift at 9000 hours ( $\Delta u'v'$ ): 0.00434

Reported TM-21 L70 Life time: 53000H

**3. Test Data**

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

No	VF(V)	$\Phi(\text{lm})$	Lumen Maintenance(%)								
			0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	3.006	62.54	103.37%	97.63%	97.73%	97.03%	96.82%	96.61%	96.24%	95.67%	95.22%
2	2.997	63.58	101.76%	95.56%	96.29%	96.21%	95.58%	95.09%	94.54%	94.18%	93.94%
3	2.977	59.77	105.12%	101.37%	101.54%	100.64%	98.06%	97.04%	96.32%	95.67%	95.37%
4	2.992	60.95	102.43%	98.61%	98.67%	98.97%	97.70%	97.19%	96.55%	96.37%	95.72%
5	2.971	61.88	102.25%	98.71%	99.19%	99.10%	97.95%	97.17%	96.82%	96.61%	95.54%
6	3.003	62.95	102.40%	97.54%	97.51%	97.57%	97.36%	97.01%	96.55%	95.71%	94.54%
7	3.002	62.15	102.96%	98.07%	97.49%	97.14%	95.43%	95.29%	95.09%	94.93%	94.09%
8	2.995	62.47	102.99%	97.61%	97.47%	96.75%	96.62%	96.32%	95.76%	95.28%	95.05%
9	2.994	62.84	102.78%	97.84%	97.55%	96.99%	96.18%	95.94%	95.64%	94.86%	94.43%
10	2.987	61.32	102.45%	99.82%	99.71%	99.30%	98.79%	98.55%	98.14%	97.21%	96.93%
11	2.998	61.91	104.18%	99.45%	99.45%	99.18%	98.98%	98.19%	97.80%	97.29%	96.79%
12	2.994	62.59	102.64%	97.72%	97.67%	97.30%	96.87%	96.42%	96.15%	95.00%	94.44%
13	3.001	62.88	102.61%	97.31%	97.11%	96.80%	96.07%	95.87%	95.15%	94.90%	94.27%
14	2.996	58.21	109.47%	104.33%	103.52%	101.12%	99.95%	99.43%	98.66%	98.40%	97.73%
15	2.985	61.3	103.13%	99.62%	99.53%	99.25%	97.96%	97.26%	96.85%	96.56%	96.05%
16	3.001	62.49	101.09%	98.53%	98.53%	98.22%	96.67%	96.16%	96.00%	95.39%	94.70%
17	2.99	61.06	101.31%	97.38%	97.28%	97.61%	97.13%	96.38%	96.04%	95.91%	95.40%
18	2.986	61	102.82%	100.03%	99.38%	98.93%	97.77%	97.16%	96.31%	95.90%	95.69%
19	3.002	62.36	102.87%	97.71%	97.59%	97.16%	96.62%	96.14%	95.53%	94.87%	94.40%
20	2.994	61.11	105.97%	100.75%	100.72%	100.28%	98.41%	97.99%	97.64%	96.48%	95.91%
21	2.998	62.79	103.92%	98.65%	98.79%	98.39%	97.55%	97.12%	96.56%	95.97%	95.56%
22	2.967	61.42	102.90%	98.49%	98.11%	97.85%	97.75%	97.33%	96.83%	96.60%	95.90%
23	2.985	60.95	102.76%	99.95%	99.79%	98.93%	98.69%	98.29%	97.54%	97.29%	97.10%
24	3.003	63.3	102.84%	97.46%	97.84%	97.44%	96.87%	96.52%	95.58%	95.24%	95.06%

25	3.000	62.45	102.58%	98.03%	98.01%	97.55%	97.01%	96.59%	96.37%	95.68%	94.94%
AVE.	2.993	61.851	103.18%	98.73%	98.66%	98.23%	97.39%	96.92%	96.43%	95.92%	95.39%
Med.	2.995	62.15	102.82%	98.49%	98.11%	97.85%	97.36%	97.01%	96.32%	95.71%	95.37%
st dev.	0.0101	1.1836	0.0167	0.0172	0.0159	0.0129	0.0109	0.0101	0.0098	0.0098	0.0099
Min	2.967	58.21	101.09%	95.56%	96.29%	96.21%	95.43%	95.09%	94.54%	94.18%	93.94%
Max	3.006	63.58	109.47%	104.33%	103.52%	101.12%	99.95%	99.43%	98.66%	98.40%	97.73%

**TM-21 Projection:**

Test Duration: 9000hours

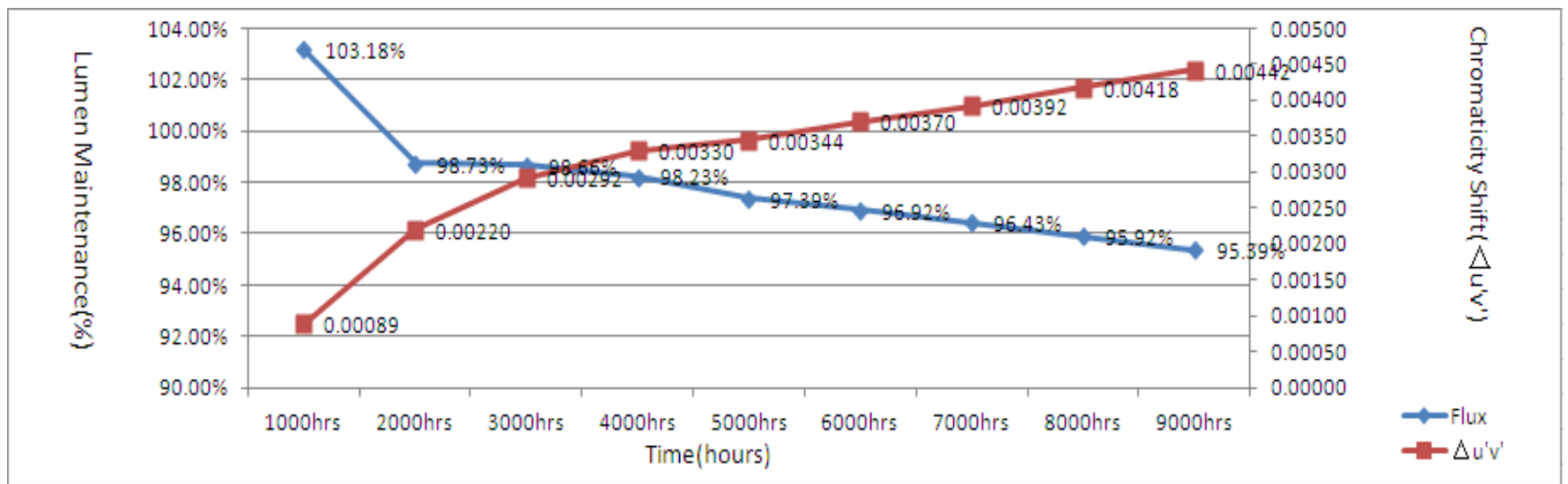
 $\alpha$  : 5.640E-06 $\beta$  : 1.003

Calculated L70: 64000H

Reported L70 : &gt;54000H

## 3.2 Data Set, 85°C, 150mA(Chromaticity Shift)

No	u'	v'	CCT (K)	Ra	Chromaticity Shift( $\Delta u'v'$ )								
					0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	0.2621	0.5285	2704	80.6	0.00122	0.00262	0.00283	0.00306	0.00318	0.00354	0.00367	0.00386	0.00425
2	0.2589	0.5236	2792	81.5	0.00139	0.00260	0.00273	0.00264	0.00292	0.00322	0.00361	0.00394	0.00455
3	0.2605	0.5288	2735	81.2	0.00063	0.00196	0.00250	0.00247	0.00263	0.00284	0.00298	0.00338	0.00361
4	0.2618	0.5302	2703	80.8	0.00102	0.00262	0.00295	0.00326	0.00385	0.00430	0.00458	0.00520	0.00551
5	0.2616	0.5304	2706	80.6	0.00095	0.00256	0.00277	0.00331	0.00380	0.00402	0.00416	0.00461	0.00492
6	0.2586	0.5251	2792	81.2	0.00117	0.00227	0.00248	0.00283	0.00320	0.00334	0.00341	0.00355	0.00383
7	0.2625	0.528	2698	80.7	0.00126	0.00220	0.00305	0.00364	0.00403	0.00439	0.00496	0.00533	0.00552
8	0.2639	0.5292	2664	80.5	0.00081	0.00320	0.00457	0.00523	0.00546	0.00586	0.00599	0.00613	0.00640
9	0.2601	0.5259	2757	81.1	0.00082	0.00313	0.00409	0.00526	0.00550	0.00564	0.00577	0.00595	0.00654
10	0.2634	0.5314	2666	80.3	0.00091	0.00143	0.00304	0.00446	0.00536	0.00560	0.00573	0.00592	0.00604
11	0.2605	0.5271	2743	81	0.00051	0.00255	0.00282	0.00328	0.00352	0.00378	0.00412	0.00447	0.00475
12	0.2616	0.5271	2720	80.9	0.00108	0.00237	0.00280	0.00352	0.00386	0.00405	0.00432	0.00468	0.00476
13	0.2614	0.5263	2726	80.9	0.00095	0.00239	0.00283	0.00316	0.00352	0.00374	0.00397	0.00424	0.00444
14	0.261	0.5278	2730	81	0.00041	0.00260	0.00286	0.00340	0.00377	0.00408	0.00460	0.00474	0.00494
15	0.2592	0.5288	2762	81.1	0.00073	0.00238	0.00268	0.00304	0.00331	0.00354	0.00367	0.00400	0.00419
16	0.2627	0.5281	2692	80.5	0.00133	0.00292	0.00342	0.00368	0.00412	0.00435	0.00461	0.00479	0.00492
17	0.2606	0.5274	2739	81.3	0.00117	0.00143	0.00179	0.00201	0.00215	0.00242	0.00264	0.00278	0.00300
18	0.2604	0.5283	2741	81	0.00091	0.00114	0.00134	0.00157	0.00179	0.00201	0.00220	0.00247	0.00266
19	0.2616	0.5254	2726	81.1	0.00054	0.00095	0.00117	0.00143	0.00170	0.00184	0.00206	0.00220	0.00228
20	0.2603	0.5264	2750	81.1	0.00000	0.00050	0.00078	0.00100	0.00122	0.00135	0.00149	0.00170	0.00192
21	0.2611	0.5275	2728	80.7	0.00085	0.00269	0.00326	0.00345	0.00364	0.00377	0.00391	0.00405	0.00427
22	0.2633	0.5301	2674	80.6	0.00102	0.00206	0.00411	0.00424	0.00437	0.00462	0.00488	0.00502	0.00515
23	0.2629	0.5297	2682	80.7	0.00081	0.00125	0.00189	0.00216	0.00242	0.00278	0.00300	0.00331	0.00362
24	0.2613	0.5269	2727	80.8	0.00102	0.00263	0.00723	0.00716	0.00329	0.00351	0.00376	0.00398	0.00411
25	0.2614	0.5271	2724	80.9	0.00082	0.00264	0.00304	0.00336	0.00350	0.00386	0.00400	0.00422	0.00436
AVE.	0.2613	0.5278	2723	80.9	0.00089	0.00220	0.00292	0.00330	0.00344	0.00370	0.00392	0.00418	0.00442
Med.	0.2614	0.5278	2726	80.9	0.00091	0.00239	0.00283	0.00328	0.00352	0.00377	0.00397	0.00422	0.00444
st dev.	0.001	0.002	33.922	0.287	0.00031	0.00070	0.00125	0.00131	0.00110	0.00112	0.00113	0.00114	0.00117
Min	0.2586	0.5236	2664	80.3	0.00000	0.00050	0.00078	0.00100	0.00122	0.00135	0.00149	0.00170	0.00192
Max	0.2639	0.5314	2792	81.5	0.00139	0.00320	0.00723	0.00716	0.00550	0.00586	0.00599	0.00613	0.00654



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

No	VF(V)	Φ(lm)	Lumen Maintenance(%)								
			0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	2.992	62.74	102.49%	98.85%	98.92%	98.02%	97.85%	97.51%	97.23%	97.04%	96.54%
2	2.995	62.6	102.76%	100.45%	100.22%	99.38%	98.83%	98.47%	98.05%	97.73%	95.83%
3	2.994	61.48	101.72%	99.76%	99.80%	98.86%	97.82%	97.64%	97.40%	96.36%	95.66%
4	3.005	64.78	101.07%	98.55%	98.24%	97.79%	97.28%	96.94%	96.71%	96.22%	94.47%
5	2.979	61.98	102.16%	100.44%	100.18%	98.92%	98.06%	97.43%	96.76%	96.06%	95.51%
6	3.002	63.05	101.09%	98.48%	98.37%	98.05%	97.43%	96.18%	95.73%	95.45%	94.85%
7	3.01	63.02	101.36%	99.33%	98.91%	98.60%	96.43%	95.92%	94.83%	94.62%	94.22%
8	2.989	61.35	100.91%	99.05%	98.74%	98.03%	96.98%	96.74%	96.28%	95.42%	94.69%
9	3.007	63.2	100.82%	98.35%	98.10%	97.31%	96.09%	95.49%	95.21%	94.79%	94.46%
10	2.985	61.38	102.00%	100.03%	99.51%	97.82%	96.99%	96.42%	96.12%	95.63%	95.31%
11	2.963	61.59	102.06%	98.85%	97.92%	97.04%	96.61%	96.04%	95.71%	95.28%	94.84%
12	3.004	62.49	102.50%	98.46%	98.29%	97.89%	96.94%	95.81%	95.70%	95.30%	94.96%
13	2.954	62.27	102.07%	99.21%	99.07%	98.30%	97.22%	96.63%	95.66%	95.46%	95.09%
14	3.001	62.88	103.01%	99.92%	99.11%	98.58%	96.29%	95.18%	94.37%	93.86%	93.59%
15	2.998	61.54	104.97%	100.83%	99.94%	99.61%	99.29%	98.80%	98.21%	97.32%	96.83%
16	2.959	61.55	103.14%	100.36%	99.45%	99.19%	97.55%	97.16%	96.99%	96.67%	96.10%
17	3.004	62.45	104.53%	100.43%	99.68%	98.25%	96.61%	96.32%	96.04%	94.99%	94.65%
18	2.997	62.91	102.05%	100.33%	100.05%	99.87%	97.25%	96.34%	95.98%	95.53%	94.90%
19	2.994	62.13	103.64%	101.69%	100.06%	99.42%	97.89%	97.67%	96.14%	95.80%	95.57%
20	2.994	62.47	103.06%	100.53%	99.78%	99.63%	97.58%	96.54%	95.37%	94.35%	93.40%
21	2.978	61.59	102.00%	101.15%	100.62%	100.03%	98.25%	98.04%	96.67%	96.31%	95.44%
22	2.964	61.51	102.44%	100.96%	99.93%	99.58%	97.20%	96.75%	96.21%	95.72%	94.62%
23	3.001	63.05	102.00%	100.06%	98.79%	97.54%	96.61%	96.38%	95.46%	94.78%	94.34%
24	2.994	62.64	101.92%	99.25%	98.55%	98.37%	97.11%	96.58%	96.14%	95.40%	94.27%
25	3.007	62.44	101.99%	100.43%	98.65%	98.25%	97.79%	96.86%	95.58%	94.94%	94.49%
AVE.	2.991	62.364	102.31%	99.83%	99.24%	98.57%	97.36%	96.79%	96.18%	95.64%	94.99%
Med.	2.994	62.45	102.06%	100.03%	99.11%	98.37%	97.25%	96.63%	96.12%	95.46%	94.85%
st dev.	0.0160	0.7917	0.0102	0.0094	0.0077	0.0084	0.0077	0.0088	0.0092	0.0092	0.0082
Min	2.954	61.35	100.82%	98.35%	97.92%	97.04%	96.09%	95.18%	94.37%	93.86%	93.40%
Max	3.01	64.78	104.97%	101.69%	100.62%	100.03%	99.29%	98.80%	98.21%	97.73%	96.83%

TM-21 Projection:

Test Duration: 9000hours

α : 6.993E-06

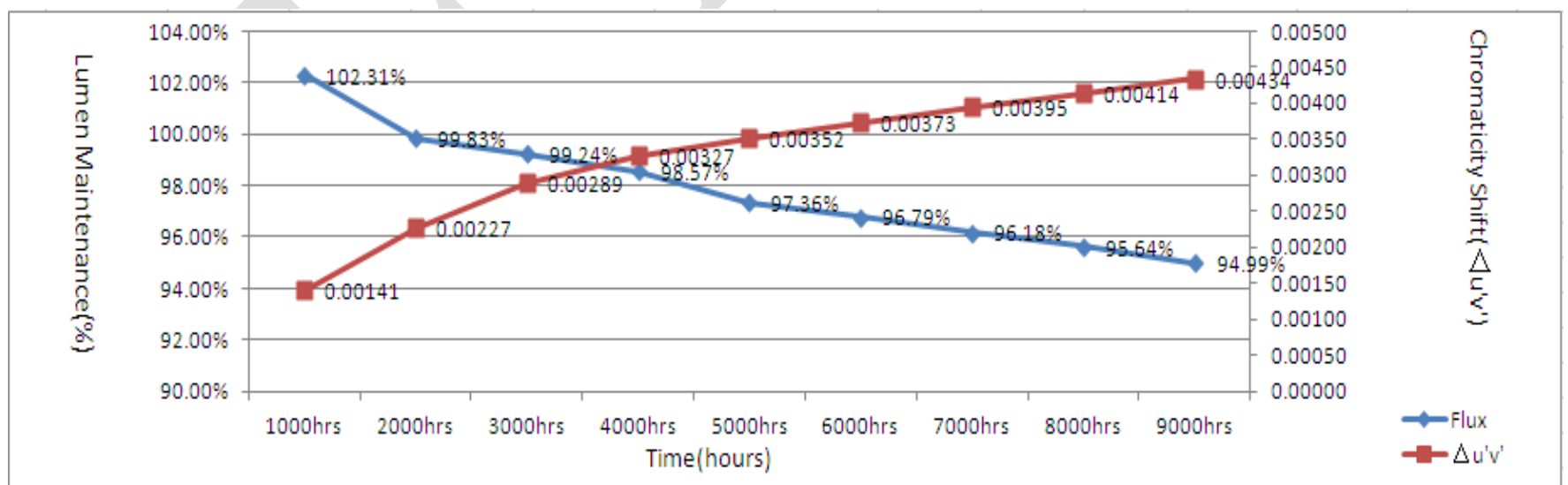
β : 1.011

Calculated L70: 53000H

Reported L70: 53000H

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

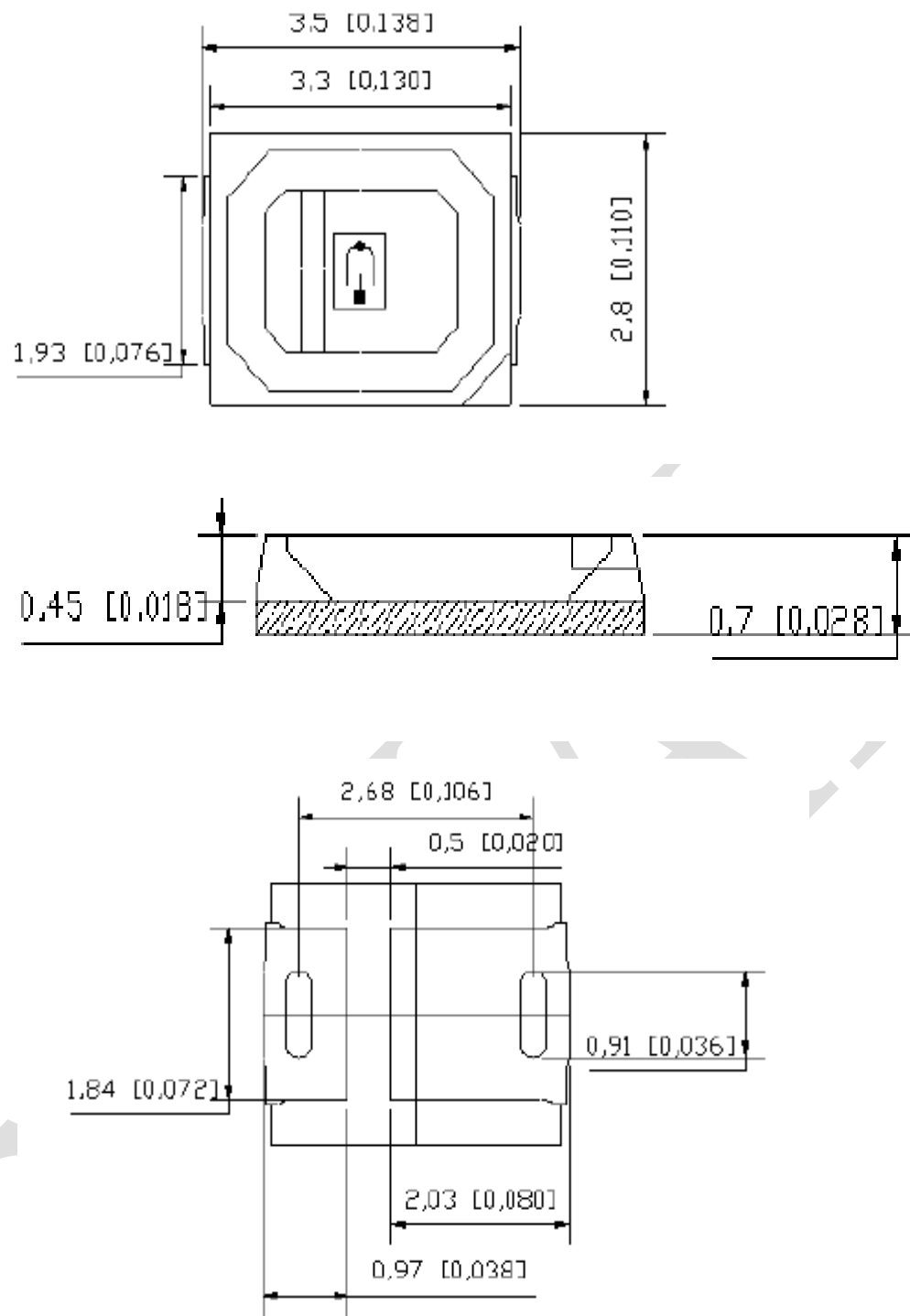
No	u'	v'	CCT (K)	Ra	Chromaticity Shift( $\Delta u'v'$ )								
					0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	0.2612	0.5267	2729	81	0.00122	0.00266	0.00345	0.00367	0.00402	0.00431	0.00444	0.00461	0.00483
2	0.264	0.5297	2661	80.3	0.00112	0.00228	0.00323	0.00376	0.00396	0.00424	0.00449	0.00502	0.00533
3	0.262	0.5299	2700	80.8	0.00146	0.00247	0.00364	0.00478	0.00498	0.00520	0.00550	0.00564	0.00586
4	0.2611	0.528	2727	80.6	0.00136	0.00253	0.00361	0.00414	0.00440	0.00466	0.00498	0.00511	0.00528
5	0.263	0.5302	2679	80.6	0.00153	0.00245	0.00357	0.00446	0.00468	0.00493	0.00515	0.00528	0.00544
6	0.2598	0.5264	2762	81	0.00165	0.00323	0.00415	0.00462	0.00478	0.00490	0.00511	0.00524	0.00537
7	0.2631	0.5278	2686	80.6	0.00136	0.00247	0.00345	0.00392	0.00418	0.00435	0.00452	0.00479	0.00492
8	0.2618	0.5288	2709	81	0.00165	0.00269	0.00374	0.00392	0.00409	0.00440	0.00462	0.00475	0.00488
9	0.2621	0.5304	2696	80.3	0.00184	0.00318	0.00386	0.00418	0.00435	0.00452	0.00465	0.00479	0.00492
10	0.2614	0.5299	2713	80.6	0.00153	0.00260	0.00304	0.00327	0.00371	0.00385	0.00407	0.00430	0.00458
11	0.2629	0.5301	2681	80.7	0.00155	0.00250	0.00275	0.00405	0.00433	0.00468	0.00502	0.00524	0.00546
12	0.2628	0.5285	2690	80.6	0.00136	0.00262	0.00414	0.00427	0.00490	0.00503	0.00520	0.00541	0.00568
13	0.2625	0.5302	2690	80.9	0.00153	0.00257	0.00310	0.00323	0.00358	0.00398	0.00425	0.00457	0.00485
14	0.2614	0.529	2716	80.6	0.00124	0.00228	0.00250	0.00285	0.00307	0.00323	0.00345	0.00368	0.00399
15	0.2611	0.527	2658	80.4	0.00102	0.00240	0.00273	0.00318	0.00335	0.00358	0.00381	0.00394	0.00417
16	0.2611	0.5281	2727	81	0.00146	0.00171	0.00184	0.00210	0.00233	0.00255	0.00282	0.00297	0.00319
17	0.2594	0.5278	2764	80.9	0.00081	0.00117	0.00130	0.00153	0.00172	0.00192	0.00227	0.00248	0.00262
18	0.262	0.5262	2716	80.9	0.00146	0.00177	0.00202	0.00219	0.00251	0.00273	0.00286	0.00304	0.00326
19	0.2617	0.5275	2716	80.7	0.00102	0.00149	0.00202	0.00224	0.00242	0.00264	0.00292	0.00311	0.00336
20	0.2607	0.5276	2736	80.8	0.00112	0.00136	0.00158	0.00171	0.00188	0.00210	0.00228	0.00256	0.00275
21	0.2612	0.5281	2723	81	0.00228	0.00238	0.00247	0.00255	0.00263	0.00270	0.00290	0.00300	0.00311
22	0.2604	0.5293	2736	80.9	0.00158	0.00200	0.00222	0.00236	0.00256	0.00277	0.00291	0.00305	0.00319
23	0.2612	0.5288	2722	80.7	0.00133	0.00218	0.00234	0.00264	0.00277	0.00291	0.00304	0.00326	0.00340
24	0.2612	0.5281	2724	80.7	0.00143	0.00180	0.00206	0.00215	0.00242	0.00264	0.00282	0.00304	0.00326
25	0.2621	0.5272	2709	80.7	0.00136	0.00196	0.00351	0.00405	0.00427	0.00444	0.00457	0.00470	0.00483
AVE.	0.2616	0.5285	2711	80.7	0.00141	0.00227	0.00289	0.00327	0.00352	0.00373	0.00395	0.00414	0.00434
Med.	0.2614	0.5281	2716	80.7	0.00143	0.00240	0.00304	0.00327	0.00371	0.00398	0.00425	0.00457	0.00483
st dev.	0.001	0.001	26.694	0.212	0.00030	0.00051	0.00082	0.00098	0.00100	0.00101	0.00102	0.00102	0.00103
Min	0.2594	0.5262	2658	80.3	0.00081	0.00117	0.00130	0.00153	0.00172	0.00192	0.00227	0.00248	0.00262
Max	0.264	0.5304	2764	81	0.00228	0.00323	0.00415	0.00478	0.00498	0.00520	0.00550	0.00564	0.00586





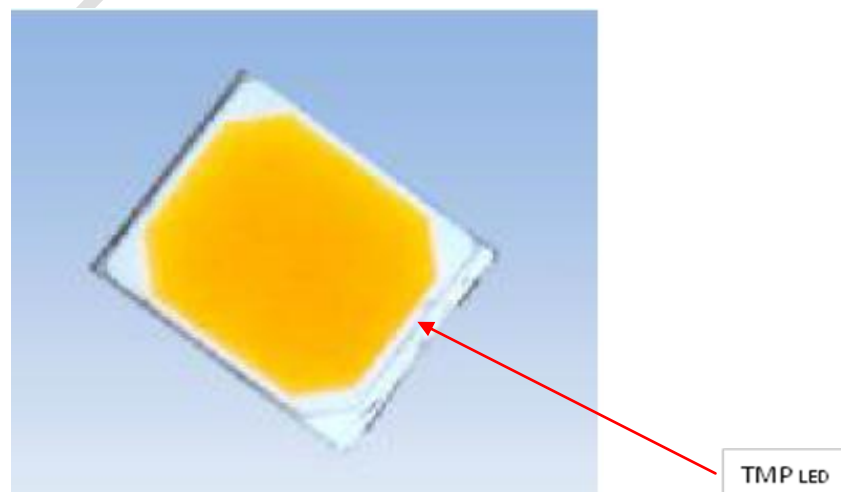
#### 4. Appendix A-EUT PHOTO

##### 4.1 Mechanical Dimensions (Ta=25°C)



All dimensions are in millimeter

##### 4.2 Eut Photo





FINAL

**Appendix A-Family Declaration letter****Declaration of Similarity**

Current Date: March 7, 2016

1, an officer of (engineering department), do hereby attest, that our LED package with the model number P2835W1D5-D01-8D1A01 was tested by hongli lab. The covered family models are in below table:

Model type	Model name	CCT(typ.)	CRI(typ.)	Current(mA)
Package 2835 series	P2835W2D5-D01-8D1A01	3000k	80	150
	P2835W3D5-D01-8D1A01	4000k	80	150
	P2835W4D5-D01-8D1A01	5000k	80	150
	P2835W5D5-D01-8D1A01	6000K	80	150
	P2835W6D5-D01-8D1A01	6500k	80	150
	P2835W8D5-D01-8D1A01	3500k	80	150
	P2835W2D4-D01-8D1A01	3000k	80	150
	P2835W3D4-D01-8D1A01	4000k	80	150
	P2835W4D4-D01-8D1A01	5000k	80	150
	P2835W5D4-D01-8D1A01	6000k	80	150
	P2835W6D4-D01-8D1A01	6500k	80	150
	P2835W8D4-D01-8D1A01	3500k	80	150
	P2835W1F4-D01-8D1A01	2700	80	150
	P2835W2F4-D01-8D1A01	3000	80	150
	P2835W3F4-D01-8D1A01	4000	80	150
	P2835W4F4-D01-8D1A01	5000	80	150
	P2835W5F4-D01-8D1A01	6000	80	150
	P2835W6F4-D01-8D1A01	6500	80	150
	P2835W8F4-D01-8D1A01	3500	80	150

The family models P2835WXDX-DXX-XDXAXX and P2835WAFX-DXX-XDXAXX, tested model P2835W1D5-D01-8D1A01 could meet all the requirements listed as below:

- the tested model has been conducted on the largest LED package and have the largest per chip current;
- the family models have the equal or fewer LED dies than the tested model;
- die spacing greater than or equal to the tested model;
- identical materials used;
- identical construction processes used;
- identical performance attributes.

**Certified by:**


&lt; contact name &gt;

&lt; Title &gt;

&lt; Date &gt; 2016/7/26

**Appendix B- REVISION HISTORY**

Report Number	Report Date	Contents
HL2014121901	2016-1-5	Original report
HL2014121901-B	2016-3-7	Add Family products covered
HL2014121901-B1	2016-7-26	Add Family models P2835WAFX-DXX-XDXAXX

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

FINAL