IESNA LM-80-2008

Measurement and Test Report
For

SHENZHEN LEPOWER OPTO ELECTRONICS CORP., LTD

3-5 Floors, Bldg B, Chuangfu Science Technology Park, Shihuan Rd No.202, Shangwu Community, Shiyan St, Bao'an District, Shenzhen

Report No:	R011603983L
Model No:	LY-D4046
Product Name:	Flip chip COB
Test Initiation Date:	03/30/2016 - 08/02/2016
Revision Date:	08/04/2016
Test Completion Date:	08/04/2016
Tested By:	Alcander Lou
Reviewed By:	Vic Zhou
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1-GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Applicant :	SHENZHEN LEPOWER OPTO ELECTRONICS CORP., LTD
Trade Mark :	LEPOWER
Model Number :	LY-D4046
Part Type:	LED package
Nominal CCT:	3000K
Number of LED Light Source tested :	See tables.
Case temperature (test point temperature) :	See tables.
Drive current of the LED light source during lifetime test :	See tables.
Initial luminous flux and forward voltage at photometric measurement current :	See tables.
Lumen maintenance data for each individual LED light source along with median value, standard deviation, minimum and maximum lumen maintenance value for all of the LED Light sources :	See tables.
Observation of LED light source failure including the failure conditions and time of failure. :	See tables.
LED light source monitoring interval :	The LED light source are inspected at regular interval (24 hours) throughout the 6000 hours test.
Photometric measurement uncertainty :	±1.5 on flux measurements for LM-80 testing.
Chromaticity shift reported over the Measurement time :	See tables.
LED Light Source Test interval :	At regular intervals(1000 hours) throughout the 6000 hours test.
Date of Receiving Sample :	03/29/2016
Test Duration :	03/30/2016 - 08/02/2016

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.

1.3 Test Facility Description

The test facility used by Shenzhen Anbotek Compliance Laboratory Limited is located at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road,Nanshan District,Shenzhen, Guangdong, China.

1.4 Test Equipment List

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Temperature & Humidity meter	XINIXI	CTH-608	-	0℃~50℃, 10% to 90%RH	2016-03-14	2017-03-13
0.3m Integral Sphere	LINKCOLOR	LCB-03	-	380nm-780nm,0.01lm～6.00×10^5lm	2016-04-06	2017-04-05
Digital Power Meter	YOKOGAWA	WT210	-	0-600V/0-10A/0-100Hz	2016-04-06	2017-04-05
DC Power Supply	Linkcolor	Linkcolor	-	DC 30V, 5A	2016-03-28	2017-03-27
Total Luminous Flux Standard Lamp	SENSING	12V/10W	LSD1210111	Refer specification	2016-03-30	2017-03-29
Total Luminous Flux Standard Lamp	SENSING	12V/10W	SL1054	Refer specification	2016-03-30	2017-03-29
Temperature & Humidity meter	XINIXI	CTH-608	-	0℃~50℃, 10% to 90%RH	2016-03-14	2017-03-13
LM-80aging measurement system	KEYI	KY-3X-LH60	-	55, 85, 105℃	2016-04-06	2017-04-05

2-Summary of Test Result

Data Set	Case Temperature(Ts) ℃	Ambient Temperature(Ta)℃	Drive Current (mA)	Average Lumen Maintenance at 6000 hours	Average Chromaticity Shift (△u'v') at 6000 hours
1	54.5	53.2	3400	/	/
2	84.8	83.9	3400	/	/
3	104.3	103.2	3400	/	/

3-Test Method

3.1 Photometric and Electrical Measurement

Total light output (luminous flux) for the 25℃±1℃ ambient temperature conditions is measured using a integrating sphere. Each LED package is operated at rated drive current(CC Mode).

The total uncertainty of the light output measurements is estimated, at the 95% confidence level, not to exceed±1.6% over the wavelength range 380-800nm.

3.2 Season the LED Package from 0 hours to 6000 hours

Three LM-80 aging measurement system Temperature Chambers are using for Seasoning, and the temperature is set to 55 ℃,85 ℃,105 ℃（manufacture defined）,the airflow is minimum to keep the uniformity to temperature. LED package are operated steady state (no cycling) for a period of 6000 hours, checked the lumen flux and Chromaticity Shift every 1000 hours. The samples are inspected at regular intervals (24 hours) throughout the 6000 hours. The time and date of failure of each lamp is recorded. The actual elapsed time for each light package is in hour.

4-Data Set 1: 55℃; 3400mA

Description of Light Sources tested :	LY-D4046
Case Temperature :	54.5℃
Ambient Temperature :	53.2℃
Drive Current :	3400mA
Measure Current :	3400mA
Failures Observed :	None

Lumen Maintenance (%)

Sample No.	V_F(V)	Φ(lm)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
L1	28.81	9863.674	100.01%	99.72%	99.18%	/	/	/
L2	29.01	9893.931	100.03%	99.55%	99.11%	/	/	/
L3	28.20	10012.939	100.01%	99.68%	99.22%	/	/	/
L4	28.35	9981.663	100.00%	99.58%	99.06%	/	/	/
L5	28.33	10171.766	100.01%	99.49%	99.02%	/	/	/
L6	29.57	9917.056	99.98%	99.48%	99.06%	/	/	/
L7	28.26	9977.374	99.97%	99.53%	99.16%	/	/	/
L8	29.48	10160.481	100.07%	99.66%	99.22%	/	/	/
L9	28.63	9833.625	100.00%	99.59%	99.22%	/	/	/
L10	29.19	10006.043	99.98%	99.51%	98.94%	/	/	/
L11	28.79	9939.442	100.04%	99.59%	99.21%	/	/	/
L12	28.83	9886.517	100.00%	99.59%	99.09%	/	/	/
L13	28.01	9872.350	100.00%	99.63%	99.15%	/	/	/
L14	29.57	10178.033	100.07%	99.73%	99.09%	/	/	/
L15	29.46	10183.545	99.99%	99.69%	98.96%	/	/	/
Avg.	28.83	9991.896	100.01%	99.60%	99.11%	/	/	/
MIN	28.01	9833.625	99.97%	99.48%	98.94%	/	/	/
MAX	29.57	10183.545	100.07%	99.73%	99.22%	/	/	/
STDEV	0.5341	124.7698	0.0304	0.0008	0.0009	/	/	/
N	15	15	15	15	15	/	/	/

Description of Light Sources tested :	LY-D4046
Case Temperature :	54.5℃
Ambient Temperature :	53.2℃
Drive Current :	3400mA
Measure Current :	3400mA
Failures Observed :	None

Chromaticity Shift (△u'v')

Sample No.	u'	v'	CCT(K)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
L1	0.2503	0.5218	3004	0.0007	0.0010	0.0015	/	/	/
L2	0.2514	0.5225	2974	0.0008	0.0010	0.0014	/	/	/
L3	0.2506	0.5220	2996	0.0007	0.0011	0.0016	/	/	/
L4	0.2522	0.5234	2948	0.0006	0.0010	0.0016	/	/	/
L5	0.2514	0.5229	2970	0.0007	0.0011	0.0014	/	/	/
L6	0.2512	0.5227	2978	0.0005	0.0011	0.0015	/	/	/
L7	0.2510	0.5226	2981	0.0007	0.0012	0.0014	/	/	/
L8	0.2509	0.5225	2986	0.0008	0.0010	0.0015	/	/	/
L9	0.2525	0.5240	2938	0.0006	0.0011	0.0016	/	/	/
L10	0.2522	0.5238	2946	0.0005	0.0012	0.0015	/	/	/
L11	0.2520	0.5237	2951	0.0007	0.0011	0.0015	/	/	/
L12	0.2519	0.5236	2955	0.0006	0.0011	0.0014	/	/	/
L13	0.2522	0.5241	2944	0.0007	0.0009	0.0014	/	/	/
L14	0.2520	0.5240	2950	0.0007	0.0010	0.0016	/	/	/
L15	0.2513	0.5235	2969	0.0008	0.0009	0.0015	/	/	/
AV	0.2515	0.5231	2966	0.0007	0.0011	0.0015	/	/	/
MIN	0.2503	0.5218	2938	0.0005	0.0009	0.0014	/	/	/
MAX	0.2525	0.5241	3004	0.0008	0.0012	0.0016	/	/	/
STDEV	0.0007	0.0008	20	0.0001	0.0001	0.0001	/	/	/
N	15	15	15	15	15	15	/	/	/

5-Data Set 2: 85℃; 3400mA

Description of Light Sources tested :	LY-D4046
Case Temperature :	84.8℃
Ambient Temperature :	83.9℃
Drive Current :	3400mA
Measure Current :	3400mA
Failures Observed :	None

Lumen Maintenance (%)

Sample No.	V_F(V)	Φ(lm)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
L16	28.31	10031.245	99.74%	99.39%	98.61%	/	/	/
L17	29.37	10003.683	99.70%	99.35%	98.86%	/	/	/
L18	28.12	10107.767	99.74%	99.40%	98.55%	/	/	/
L19	29.06	9913.577	99.70%	99.20%	98.66%	/	/	/
L20	29.74	10149.637	99.77%	99.15%	98.85%	/	/	/
L21	28.02	10029.011	99.74%	99.36%	98.63%	/	/	/
L22	28.78	10072.065	99.70%	99.33%	98.71%	/	/	/
L23	28.08	9981.771	99.71%	99.26%	98.83%	/	/	/
L24	28.26	9880.250	99.71%	99.38%	98.62%	/	/	/
L25	29.99	9884.095	99.73%	99.18%	98.66%	/	/	/
L26	28.90	9956.768	99.74%	99.43%	98.51%	/	/	/
L27	28.51	10120.613	99.77%	99.49%	98.75%	/	/	/
L28	28.56	10086.995	99.79%	99.42%	98.61%	/	/	/
L29	28.20	10150.406	99.77%	99.34%	98.75%	/	/	/
L30	29.45	10112.314	99.76%	99.43%	98.54%	/	/	/
Avg.	28.76	10032.013	99.74%	99.34%	98.67%	/	/	/
MIN	28.02	9880.250	99.70%	99.15%	98.51%	/	/	/
MAX	29.99	10150.406	99.79%	99.49%	98.86%	/	/	/
STDEV	0.6392	92.7568	0.0284	0.0010	0.0011	/	/	/
N	15	15	15	15	15	/	/	/

Description of Light Sources tested :	LY-D4046
Case Temperature :	84.8℃
Ambient Temperature :	83.9℃
Drive Current :	3400mA
Measure Current :	3400mA
Failures Observed :	None

Chromaticity Shift (△u'v')

Sample No.	u'	v'	CCT(K)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
L16	0.2493	0.5259	3003	0.0009	0.0011	0.0019	/	/	/
L17	0.2497	0.5276	2983	0.0010	0.0015	0.0020	/	/	/
L18	0.2491	0.5270	3000	0.0008	0.0012	0.0019	/	/	/
L19	0.2491	0.5269	3003	0.0009	0.0014	0.0018	/	/	/
L20	0.2489	0.5268	3006	0.0008	0.0012	0.0020	/	/	/
L21	0.2497	0.5286	2976	0.0007	0.0013	0.0019	/	/	/
L22	0.2497	0.5281	2981	0.0010	0.0014	0.0019	/	/	/
L23	0.2495	0.5278	2988	0.0009	0.0011	0.0020	/	/	/
L24	0.2495	0.5273	2989	0.0011	0.0015	0.0019	/	/	/
L25	0.2495	0.5273	2989	0.0007	0.0011	0.0021	/	/	/
L26	0.2495	0.5271	2992	0.0008	0.0015	0.0019	/	/	/
L27	0.2494	0.5270	2994	0.0006	0.0013	0.0020	/	/	/
L28	0.2492	0.5273	2998	0.0009	0.0012	0.0021	/	/	/
L29	0.2491	0.5273	3000	0.0008	0.0013	0.0019	/	/	/
L30	0.2491	0.5272	3000	0.0009	0.0013	0.0020	/	/	/
AV	0.2494	0.5273	2993	0.0009	0.0013	0.0020	/	/	/
MIN	0.2489	0.5259	2976	0.0006	0.0011	0.0018	/	/	/
MAX	0.2497	0.5286	3006	0.0011	0.0015	0.0021	/	/	/
STDEV	0.0003	0.0006	8	0.0001	0.0001	0.0001	/	/	/
N	15	15	15	15	15	15	/	/	/

6-Data Set 3: 105℃; 3400mA

Description of Light Sources tested :	LY-D4046
Case Temperature :	104.3℃
Ambient Temperature :	103.2℃
Drive Current :	3400mA
Measure Current :	3400mA
Failures Observed :	None

Lumen Maintenance (%)

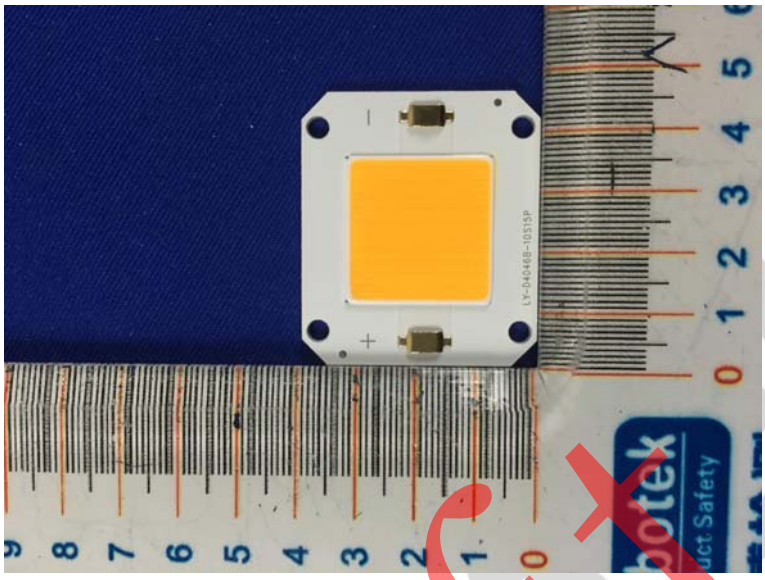
Sample No.	V_F(V)	Φ(lm)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
L31	29.42	9874.707	99.49%	98.89%	98.30%	/	/	/
L32	28.38	10022.548	99.51%	98.83%	98.40%	/	/	/
L33	28.27	9805.414	99.52%	98.67%	98.34%	/	/	/
L34	28.34	9816.633	99.48%	98.94%	98.39%	/	/	/
L35	28.60	9871.978	99.49%	98.71%	98.21%	/	/	/
L36	28.35	9864.756	99.46%	98.77%	98.32%	/	/	/
L37	28.18	9909.866	99.53%	98.82%	98.18%	/	/	/
L38	28.28	10058.782	99.46%	98.73%	98.42%	/	/	/
L39	29.85	9926.565	99.47%	98.84%	98.39%	/	/	/
L40	29.27	10039.525	99.54%	98.88%	98.23%	/	/	/
L41	28.23	10065.698	99.51%	98.64%	98.25%	/	/	/
L42	29.46	9935.482	99.48%	98.75%	98.40%	/	/	/
L43	29.50	9984.579	99.52%	98.94%	98.43%	/	/	/
L44	28.69	9865.990	99.49%	98.68%	98.28%	/	/	/
L45	29.00	10114.723	99.48%	98.99%	98.38%	/	/	/
Avg.	28.79	9943.816	99.49%	98.80%	98.33%	/	/	/
MIN	28.18	9805.414	99.46%	98.64%	98.18%	/	/	/
MAX	29.85	10114.723	99.54%	98.99%	98.43%	/	/	/
STDEV	0.5716	97.6131	0.0249	0.0011	0.0008	/	/	/
N	15	15	15	15	15	/	/	/

Description of Light Sources tested :	LY-D4046
Case Temperature :	104.3℃
Ambient Temperature :	103.2℃
Drive Current :	3400mA
Measure Current :	3400mA
Failures Observed :	None

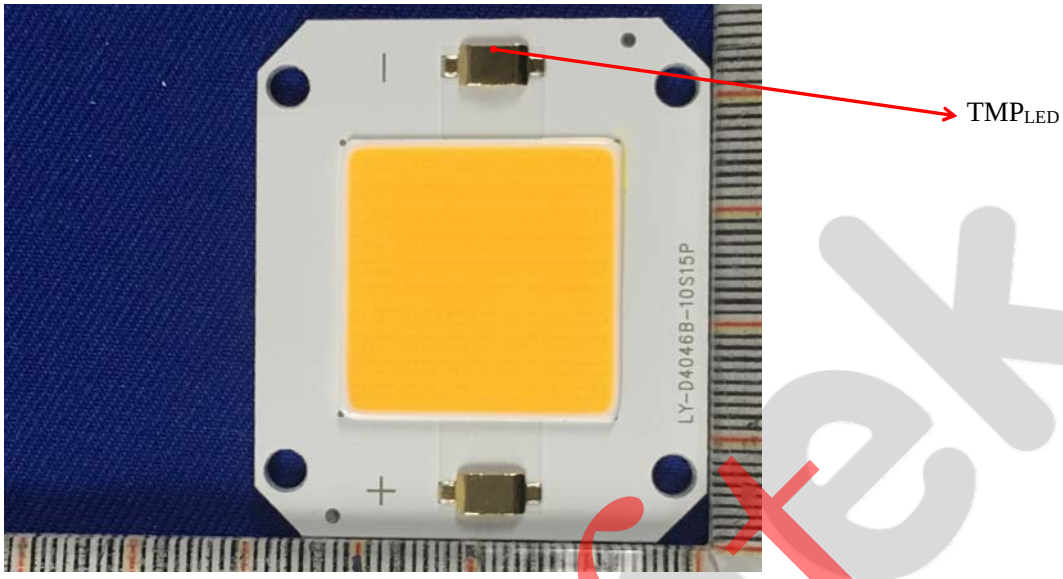
Chromaticity Shift (△u'v')

Sample No.	u'	v'	CCT(K)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
L31	0.2490	0.5272	3001	0.0012	0.0018	0.0022	/	/	/
L32	0.2490	0.5272	3002	0.0011	0.0017	0.0021	/	/	/
L33	0.2490	0.5272	3002	0.0012	0.0017	0.0020	/	/	/
L34	0.2493	0.5262	3002	0.0013	0.0018	0.0023	/	/	/
L35	0.2493	0.5261	3002	0.0010	0.0016	0.0023	/	/	/
L36	0.2492	0.5261	3003	0.0010	0.0016	0.0020	/	/	/
L37	0.2516	0.5237	2961	0.0011	0.0017	0.0022	/	/	/
L38	0.2516	0.5237	2962	0.0010	0.0018	0.0022	/	/	/
L39	0.2515	0.5236	2963	0.0012	0.0017	0.0021	/	/	/
L40	0.2511	0.5231	2977	0.0013	0.0018	0.0021	/	/	/
L41	0.2511	0.5231	2978	0.0012	0.0017	0.0021	/	/	/
L42	0.2510	0.5231	2979	0.0011	0.0017	0.0023	/	/	/
L43	0.2510	0.5231	2979	0.0012	0.0018	0.0022	/	/	/
L44	0.2511	0.5236	2973	0.0011	0.0017	0.0020	/	/	/
L45	0.2511	0.5236	2975	0.0010	0.0016	0.0021	/	/	/
AV	0.2504	0.5247	2984	0.0011	0.0017	0.0021	/	/	/
MIN	0.2490	0.5231	2961	0.0010	0.0016	0.0020	/	/	/
MAX	0.2516	0.5272	3003	0.0013	0.0018	0.0023	/	/	/
STDEV	0.0011	0.0017	16	0.0001	0.0001	0.0001	/	/	/
N	15	15	15	15	15	15	/	/	/

7-EUT Photos



8-TMP



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