



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Guangzhou Hongli Opto-Electronic Co., Ltd.

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

Model: HL-LB019H358W-10B10C8(Ra2)

Report Type: 6000 Hours Test Report		Product Type: LED Array	
Test Engineer:	Daniel Duan	<i>Daniel Duan</i>	
Report Number:	RSZ121226505-10-M1		
Test Date:	2013-02-03 to 2013-10-22		
Report Date:	2015-03-04		
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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 device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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1 - GENERAL INFORMATION

1.1 Description of LED Light Sources

Devices tested

Part Number: HL-LB019H358W-10B10C8(Ra2)
 Part Name: /
 Part Type: LED Array
 Nominal CCT: 3000K

1.2 Standards Used:

- IESNA LM-80-08: IESNA 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(This test method was not accredited by IAS)

1.3 Test Facility

The testing facility used by Bay Area Compliance Laboratories Corp. (Dongguan). is located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.

1.4 Description of Auxiliary Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integral Sphere	EVERFINE	Diameter 0.3M	1011119	380-780nm, length:0.3M ,0-1999LUMEN	2013-03-08	2014-03-08
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987CJ 7321114	300VA	2013-03-25	2014-03-25
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2013-03-08	2014-03-08
Standard Light Source	EVERFINE	D062	1011093	3000K	2013-05-23	2014-05-23
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987CJ 7321114	300VA	2013-03-25	2014-03-25
Multilayer aging machine	BACL	B2-270	20005	N/A	2013-08-01	2014-08-01
Digital CC&CV DC Power Supply	everfine	WY5015	11090007	(50/15A)	2013-03-25	2014-03-25

1.5 Operating Cycle

Samples are driven with a constant direct current (DC)

1.6 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 T_A was measured by several thermocouples at a distance of 5 mm above the reliability test board. The relative humidity within chamber was less than 65%.

For photometry measurement, temperature was set to $25\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$, RH <65%.

1.7 Photometry Measurement Uncertainty

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 $U=21\text{K}$ ($K=2$), at the 95% confidence level. This calibration results traceable to the NATIONAL INSTITUTE OF METROLOGY (NIM).

1.8 Sample Set

Sampling Method:

LED samples for IES 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 IES LM-80 tests.

Sample Size:

Total 30Pcs;

Each T_s test condition 15Pcs

Data Set 1: 55 °C,400mA

Part Number:	HL-LB019H358W-10B10C8(Ra2)
Number of Units:	15
Actual Case Temperature(T_s):	$T_s=54.6\text{ }^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A=53.7\text{ }^\circ\text{C}$
Life Test Drive Current:	$I_F=400\text{mA}$
Measurement Current:	$I_F=400\text{mA}$

Data Set 3: 85 °C, 400mA

Part Number:	HL-LB019H358W-10B10C8(Ra2)
Number of Units:	15
Actual Case Temperature(T_s):	$T_s=84.8\text{ }^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A=83.5\text{ }^\circ\text{C}$
Life Test Drive Current:	$I_F=400\text{mA}$
Measurement Current:	$I_F=400\text{mA}$

1.9 Report Revision

Report Number	Report Date	Contents
RSZ121226505-10	2013-11-15	Original report.
RSZ121226505-10-M1	2015-03-04	Update the logo of accredited body

2 - SUMMARY OF TEST RESULT

Data Set:	Data Set 1, 55 °C, 400mA
Number of Units:	15
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	96.72%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0018
Reported TM-21 L ₇₀ Lifetime:	>33,000 hours

Data Set:	Data Set 3, 85 °C, 400mA
Number of Units:	15
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	95.66%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0019
Reported TM-21 L ₇₀ Lifetime	>33,000 hours

3 - Test Data

3.1 Data Set 1, 55 °C, 400mA (Lumen Maintenance)

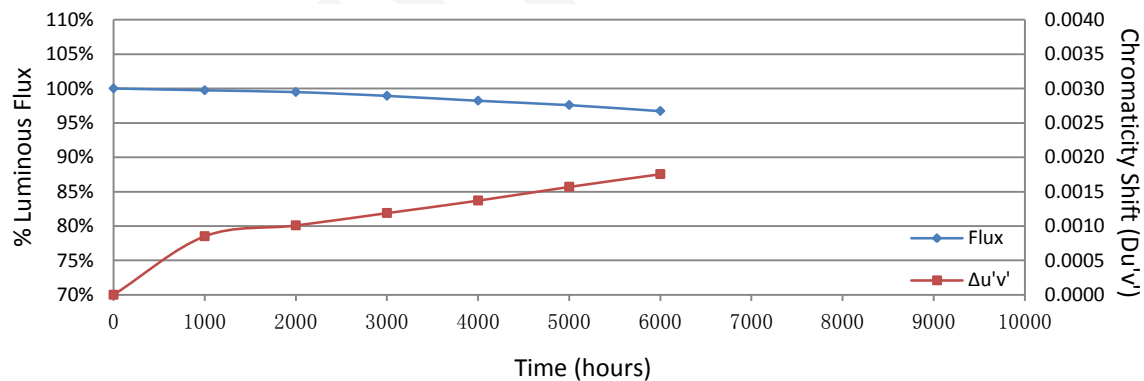
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	23.71	1086	100.09	99.63	98.99	98.16	97.88	96.59
2	23.75	1068	99.81	99.44	98.88	98.31	97.47	96.91
3	23.44	1061	99.91	99.43	98.96	98.30	97.55	96.61
4	23.60	1070	99.81	99.53	98.79	98.32	97.48	96.54
5	23.60	1080	99.63	99.54	99.07	98.24	97.69	96.67
6	23.56	1075	99.53	99.44	98.88	98.42	97.67	96.47
7	23.47	1049	99.81	99.33	98.76	98.19	97.43	96.76
8	23.64	1045	99.71	99.62	98.95	98.09	97.42	96.94
9	23.68	1089	99.82	99.36	98.99	98.16	97.61	96.69
10	23.29	1067	99.53	99.34	98.88	98.31	97.47	96.91
11	23.39	1101	99.73	99.36	99.00	98.00	97.82	96.55
12	23.37	1061	99.72	99.53	98.96	98.21	97.55	96.89
13	23.58	1081	99.54	99.54	99.07	98.24	97.50	96.58
14	23.47	1070	99.63	99.53	98.97	98.32	97.66	96.73
15	23.67	1078	99.72	99.54	98.79	98.05	97.68	96.94
Ave.	23.55	1072	99.73	99.48	98.93	98.22	97.59	96.72
Med.	23.58	1070	99.72	99.53	98.96	98.24	97.55	96.69
st dev	0.1367	14.7961	0.1524	0.0976	0.0979	0.1152	0.1409	0.1638
Min.	23.29	1045	99.53	99.33	98.76	98.00	97.42	96.47
Max.	23.75	1101	100.09	99.63	99.07	98.42	97.88	96.94

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
 α : 6.231E-06
 β : 1.006
Calculated L₇₀: 58,000 hours
Reported L₇₀: >33,000 hours

3.2 Data Set 1, 55 °C, 400mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2440	0.5188	3188	0.0007	0.0007	0.0009	0.0010	0.0014	0.0017
2	0.2444	0.5185	3179	0.0006	0.0007	0.0010	0.0012	0.0013	0.0016
3	0.2433	0.5171	3220	0.0008	0.0009	0.0013	0.0013	0.0016	0.0016
4	0.2440	0.5183	3191	0.0007	0.0009	0.0012	0.0013	0.0015	0.0016
5	0.2436	0.5186	3199	0.0006	0.0009	0.0010	0.0014	0.0016	0.0018
6	0.2441	0.5182	3191	0.0009	0.0009	0.0010	0.0012	0.0015	0.0016
7	0.2445	0.5171	3187	0.0009	0.0011	0.0013	0.0013	0.0015	0.0018
8	0.2459	0.5205	3125	0.0011	0.0013	0.0014	0.0017	0.0018	0.0018
9	0.2450	0.5187	3161	0.0011	0.0012	0.0014	0.0016	0.0017	0.0019
10	0.2439	0.5185	3194	0.0009	0.0013	0.0013	0.0015	0.0016	0.0018
11	0.2434	0.5183	3209	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018
12	0.2441	0.5175	3195	0.0008	0.0010	0.0012	0.0014	0.0016	0.0019
13	0.2440	0.5184	3192	0.0009	0.0010	0.0012	0.0014	0.0017	0.0017
14	0.2446	0.5177	3180	0.0008	0.0010	0.0011	0.0013	0.0015	0.0019
15	0.2440	0.5178	3196	0.0008	0.0010	0.0012	0.0015	0.0017	0.0017
Ave.	0.2442	0.5183	3187	0.0009	0.0010	0.0012	0.0014	0.0016	0.0018
Med.	0.2440	0.5183	3191	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018
st dev	0.0006	0.0008	21.7153	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001
Min.	0.2433	0.5171	3125	0.0006	0.0007	0.0009	0.0010	0.0013	0.0016
Max.	0.2459	0.5205	3220	0.0011	0.0013	0.0014	0.0017	0.0018	0.0019



3.3 Data Set 2, 85 °C, 400mA (Lumen Maintenance)

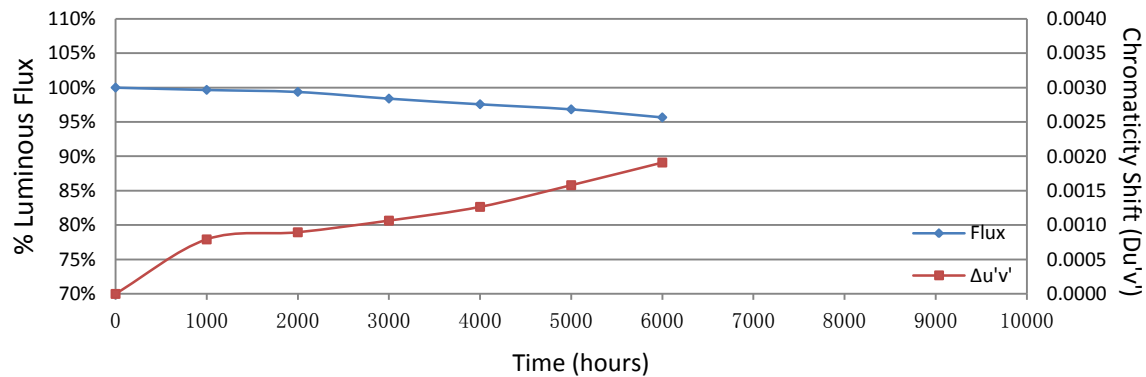
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
31	23.42	1059	99.62	99.24	98.49	97.73	96.98	95.85
32	23.60	1075	99.72	99.35	98.33	97.40	96.84	95.63
33	23.42	1069	99.53	99.44	98.41	97.75	96.82	95.88
34	23.59	1084	99.72	99.35	98.43	97.69	97.05	95.94
35	23.36	1070	99.53	99.25	98.50	97.76	96.82	95.61
36	23.27	1058	99.62	99.43	98.30	97.45	96.79	95.37
37	23.64	1074	99.81	99.44	98.32	97.67	96.65	95.81
38	23.51	1066	99.44	99.34	98.41	97.47	96.62	95.50
39	23.42	1065	99.53	99.34	98.22	97.65	97.09	95.68
40	23.62	1087	99.54	99.26	98.53	97.61	96.78	95.68
41	23.64	1072	99.72	99.25	98.32	97.57	96.83	95.52
42	23.64	1065	99.91	99.53	98.31	97.46	97.00	95.59
43	23.49	1064	99.72	99.44	98.50	97.46	96.90	95.77
44	23.57	1071	99.72	99.53	98.32	97.48	96.64	95.42
45	23.60	1075	99.81	99.35	98.60	97.49	96.74	95.72
Ave.	23.52	1070	99.66	99.37	98.40	97.58	96.84	95.66
Med.	23.57	1070	99.72	99.35	98.41	97.57	96.82	95.68
st dev	0.1173	8.1193	0.1315	0.0954	0.1082	0.1262	0.1446	0.1684
Min.	23.27	1058	99.44	99.24	98.22	97.40	96.62	95.37
Max.	23.64	1087	99.91	99.53	98.60	97.76	97.09	95.94

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
 α : 8.306E-06
 β : 1.008
Calculated L₇₀: 44,000 hours
Reported L₇₀: >33,000 hours

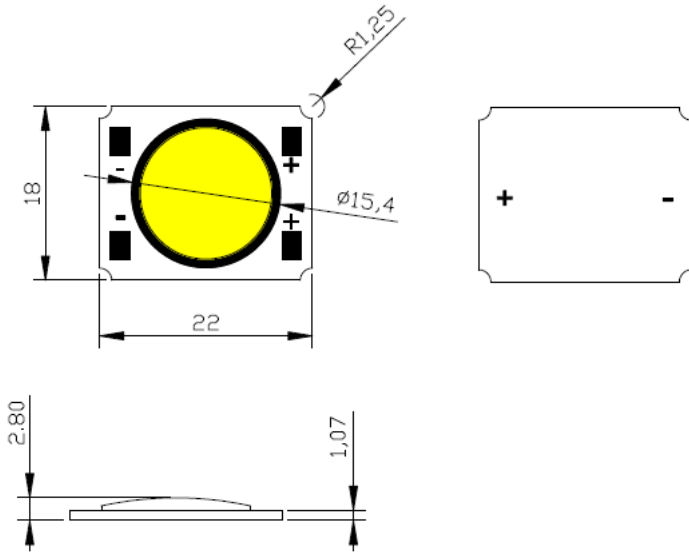
3.4 Data Set 2, 85 °C, 400mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
31	0.2446	0.5195	3166	0.0007	0.0008	0.0010	0.0012	0.0017	0.0018
32	0.2438	0.5179	3200	0.0008	0.0009	0.0010	0.0011	0.0015	0.0018
33	0.2435	0.5175	3211	0.0008	0.0011	0.0012	0.0013	0.0017	0.0020
34	0.2440	0.5179	3196	0.0008	0.0009	0.0012	0.0014	0.0016	0.0020
35	0.2440	0.5186	3190	0.0009	0.0009	0.0011	0.0014	0.0017	0.0020
36	0.2436	0.5177	3208	0.0009	0.0010	0.0012	0.0015	0.0016	0.0018
37	0.2438	0.5182	3198	0.0009	0.0009	0.0009	0.0011	0.0016	0.0019
38	0.2437	0.5172	3207	0.0009	0.0010	0.0011	0.0014	0.0015	0.0018
39	0.2434	0.5172	3216	0.0008	0.0010	0.0011	0.0013	0.0016	0.0019
40	0.2434	0.5171	3219	0.0008	0.0009	0.0010	0.0012	0.0014	0.0018
41	0.2438	0.5175	3203	0.0006	0.0008	0.0010	0.0012	0.0017	0.0019
42	0.2442	0.5180	3189	0.0007	0.0007	0.0009	0.0011	0.0014	0.0019
43	0.2433	0.5172	3219	0.0007	0.0007	0.0009	0.0012	0.0015	0.0020
44	0.2440	0.5183	3190	0.0007	0.0007	0.0009	0.0012	0.0015	0.0021
45	0.2435	0.5170	3217	0.0009	0.0010	0.0012	0.0013	0.0016	0.0019
Ave.	0.2438	0.5178	3202	0.0008	0.0009	0.0011	0.0013	0.0016	0.0019
Med.	0.2438	0.5177	3203	0.0008	0.0009	0.0010	0.0012	0.0016	0.0019
st dev	0.0003	0.0007	14.5183	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2433	0.5170	3166	0.0006	0.0007	0.0009	0.0011	0.0014	0.0018
Max.	0.2446	0.5195	3219	0.0009	0.0011	0.0012	0.0015	0.0017	0.0021



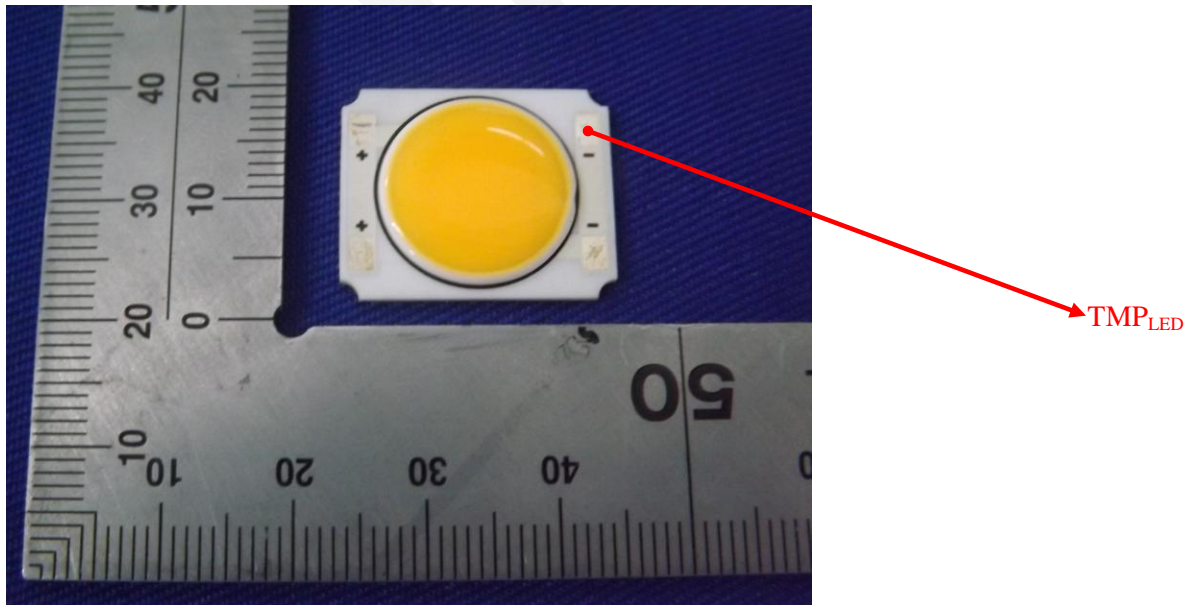
Appendix A – EUT PHOTO

A.1 Mechanical Dimensions (Ta = 25 °C)



All dimensions are in millimeter

A.2 EUT Photo



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