

IESNA LM-80-2008 With Errata 2014

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Shenzhen XuYu Optoelectronics Co.,Ltd

8th Floor, Building A1, Sunshine Industrial Park, No.2- 3 South Industrial area of Hezhou, Xixiang, Bao'an District, Shenzhen, Guangdong, China

Model: XUYUSMD2835

Report Type: 6000 Hours Test Report	Product Type: LED Package
Test Engineer: Daniel Duan	<i>Daniel Duan</i>
Report Number: RSZ131014505-10-M1	
Test Date: 2013-10-29 to 2014-06-24	
Report Date: 2015-10-10	
Reviewed By: Jeanne Han /Safety Manager	<i>Jeanne Han</i>
Revised Note:	The previous report RSZ131014505-10 is replaced by this report on 2015-10-10
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588

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: XUYUSMD2835
 Part Type: LED Package
 Nominal CCT: 3000K

1.2 Standards Used:

- IESNA LM-80-2008 with Errata 2014: 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(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	2014-03-04	2015-03-04
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2014-03-12	2015-03-12
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2013-12-26	2014-12-26
Standard Light Source	EVERFINE	D062	1011093	N/A	2014-05-06	2015-05-06
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987C J7321114	300VA	2014-03-12	2015-03-12
Multilayen aging machine	BACL	B2-270	20013	N/A	2013-08-01	2014-08-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090003	(50/15A)	2014-03-12	2015-03-12

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 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, RH <65%.

According to the LM-80-08 Errata, during life testing, T_s was 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.

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 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 40Pcs;

Each Ts test condition 20Pcs

The samples tested at Ts 55°C, 85°C were received at 2013-10-27 and tested during 2013-10-29 to 2014-06-24. The samples were numbered from 1 to 20, 21 to 40.

Data Set 1: 55°C, 60mA

Part Number:	XUYUSMD2835
Number of Units:	20
Actual Case Temperature(T _S):	T _S =59.6°C
Actual Ambient Temperature(T _A):	T _A =57.2°C
Life Test Drive Current:	I _F = 60mA
Measurement Current:	I _F = 60mA

Data Set 2: 85°C,60mA

Part Number:	XUYUSMD2835
Number of Units:	20
Actual Case Temperature(T _S):	T _S =89.3°C
Actual Ambient Temperature(T _A):	T _A =87.4°C
Life Test Drive Current:	I _F =60mA
Measurement Current:	I _F = 60mA

2 - SUMMARY OF TEST RESULT

Data Set:	Data Set 1, 55°C, 60mA
Number of Units:	20
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	97.61%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0018
Reported TM-21 L ₇₀ Lifetime:	>36,000 hours

Data Set:	Data Set 2, 85°C, 60mA
Number of Units:	20
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	96.88%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0025
Reported TM-21 L ₇₀ Lifetime:	>36,000 hours

3 - Test Data

3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance)

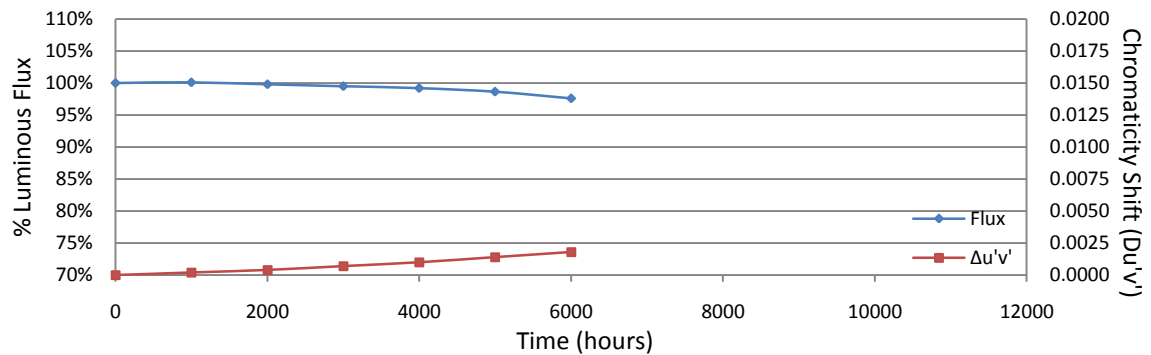
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	2.860	23.72	100.25	99.92	99.58	99.24	98.74	97.51
2	2.864	24.65	100.08	99.68	99.23	98.95	98.30	97.04
3	2.854	24.64	100.12	99.55	99.31	99.15	98.58	97.65
4	2.863	25.08	100.12	99.72	99.56	99.44	98.76	97.49
5	2.864	24.84	100.08	99.84	99.40	98.99	98.27	97.10
6	2.875	24.53	100.12	99.88	99.55	99.23	98.37	97.31
7	2.863	24.67	100.16	99.88	99.64	99.35	98.82	97.41
8	2.867	24.19	100.12	99.75	99.42	99.17	98.64	97.35
9	2.865	24.87	100.20	99.80	99.60	99.48	98.71	97.51
10	2.868	24.65	100.08	99.84	99.72	99.31	98.86	98.05
11	2.868	24.50	100.04	99.71	99.47	99.06	98.69	98.12
12	2.932	24.51	100.12	99.76	99.63	99.39	99.14	98.49
13	2.871	24.85	100.08	99.68	99.44	99.28	98.63	97.51
14	2.862	24.61	100.20	99.84	99.67	99.15	98.62	97.93
15	2.857	25.01	100.12	99.88	99.68	99.24	98.72	97.96
16	2.862	24.54	100.04	99.71	99.51	99.06	98.37	97.35
17	2.866	24.52	100.08	99.84	99.63	99.35	99.02	98.25
18	2.864	24.45	100.08	99.92	99.84	99.67	98.53	97.46
19	2.864	24.86	100.12	99.92	99.32	98.91	98.51	97.43
20	2.863	24.52	100.04	99.76	99.47	99.14	98.61	97.39
Ave.	2.868	24.61	100.11	99.79	99.53	99.23	98.65	97.61
Med.	2.864	24.63	100.12	99.82	99.56	99.23	98.63	97.50
st dev	0.0158	0.2967	0.0563	0.0982	0.1527	0.1895	0.2245	0.3882
Min.	2.854	23.72	100.04	99.55	99.23	98.91	98.27	97.04
Max.	2.932	25.08	100.25	99.92	99.84	99.67	99.14	98.49

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
 α : 4.684E-06
 β : 1.008
Calculated L₇₀: 78,000hrs
Reported L₇₀: >36,000hrs

3.2 Data Set 1, 55°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2452	0.5269	3098	0.0001	0.0003	0.0005	0.0009	0.0014	0.0018
2	0.2440	0.5258	3135	0.0001	0.0002	0.0004	0.0007	0.0015	0.0020
3	0.2461	0.5268	3074	0.0001	0.0003	0.0005	0.0007	0.0015	0.0018
4	0.2429	0.5257	3164	0.0004	0.0004	0.0007	0.0010	0.0011	0.0017
5	0.2440	0.5250	3140	0.0002	0.0005	0.0007	0.0010	0.0016	0.0024
6	0.2444	0.5269	3117	0.0003	0.0006	0.0008	0.0007	0.0016	0.0022
7	0.2456	0.5272	3086	0.0003	0.0004	0.0008	0.0009	0.0015	0.0020
8	0.2440	0.5267	3130	0.0001	0.0004	0.0008	0.0012	0.0015	0.0022
9	0.2459	0.5268	3082	0.0002	0.0002	0.0008	0.0013	0.0013	0.0019
10	0.2439	0.5265	3133	0.0003	0.0005	0.0007	0.0009	0.0014	0.0018
11	0.2447	0.5261	3116	0.0001	0.0005	0.0009	0.0011	0.0008	0.0014
12	0.2453	0.5262	3099	0.0002	0.0003	0.0007	0.0013	0.0021	0.0015
13	0.2452	0.5250	3111	0.0003	0.0006	0.0009	0.0015	0.0018	0.0019
14	0.2459	0.5270	3080	0.0002	0.0003	0.0007	0.0011	0.0016	0.0019
15	0.2443	0.5272	3118	0.0004	0.0005	0.0007	0.0011	0.0016	0.0020
16	0.2449	0.5259	3111	0.0004	0.0004	0.0006	0.0011	0.0006	0.0014
17	0.2451	0.5271	3098	0.0004	0.0005	0.0007	0.0004	0.0018	0.0023
18	0.2455	0.5275	3086	0.0003	0.0004	0.0005	0.0004	0.0015	0.0018
19	0.2437	0.5267	3135	0.0003	0.0004	0.0005	0.0010	0.0007	0.0012
20	0.2460	0.5257	3086	0.0001	0.0004	0.0005	0.0013	0.0008	0.0015
Ave.	0.2448	0.5264	3110	0.0002	0.0004	0.0007	0.0010	0.0014	0.0018
Med.	0.2450	0.5267	3111	0.0003	0.0004	0.0007	0.0010	0.0015	0.0019
st dev	0.0009	0.0007	24.3472	0.0001	0.0001	0.0001	0.0003	0.0004	0.0003
Min.	0.2429	0.5250	3074	0.0001	0.0002	0.0004	0.0004	0.0006	0.0012
Max.	0.2461	0.5275	3164	0.0004	0.0006	0.0009	0.0015	0.0021	0.0024



3.3 Data Set 2, 85°C, 60mA (Lumen Maintenance)

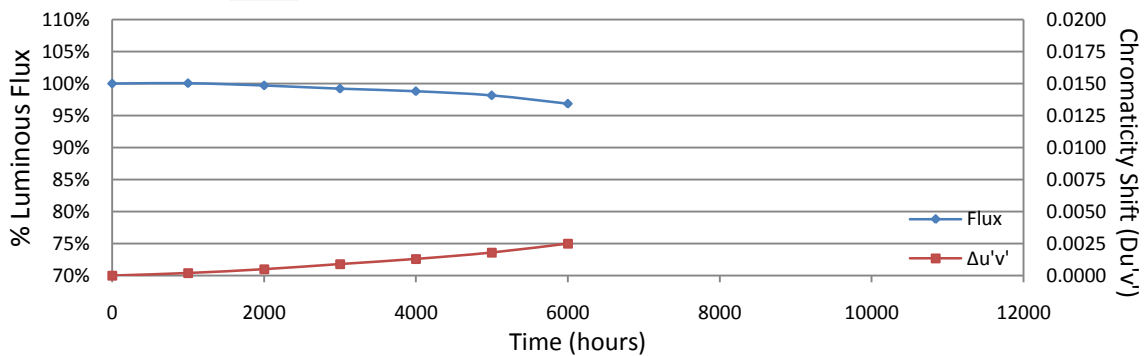
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
21	2.869	24.65	100.12	99.84	99.43	99.11	98.58	97.44
22	2.858	24.88	100.04	99.60	99.16	98.71	98.19	96.78
23	2.862	24.59	100.12	99.63	99.31	98.98	98.82	97.07
24	2.867	24.41	100.12	99.80	99.51	99.18	98.61	97.54
25	2.904	24.58	100.00	99.63	99.10	98.58	97.88	96.30
26	2.866	24.66	100.12	99.84	99.39	98.42	97.97	96.43
27	2.859	24.25	100.12	99.88	99.63	99.18	98.89	97.44
28	2.863	24.32	100.12	99.71	99.38	99.26	98.27	97.12
29	2.862	24.65	100.04	99.80	99.15	98.95	98.30	97.04
30	2.869	24.63	100.12	99.68	98.98	98.82	98.29	97.08
31	2.867	24.69	100.00	99.59	98.95	98.87	98.06	96.68
32	2.863	24.58	100.12	99.63	98.90	98.74	97.88	96.50
33	2.862	24.66	100.04	99.72	98.86	98.34	97.53	96.31
34	2.882	24.50	100.04	99.59	98.94	98.69	97.71	96.53
35	2.855	24.58	100.16	99.67	99.02	98.94	98.37	96.87
36	2.864	24.25	100.08	99.84	99.34	99.09	98.60	96.95
37	2.878	24.44	100.04	99.22	98.85	98.45	97.71	96.85
38	2.876	24.19	100.08	99.88	99.63	98.68	97.68	96.86
39	2.910	24.28	100.00	99.59	99.51	98.60	98.15	96.87
40	2.911	24.27	100.08	99.63	99.30	98.60	98.06	96.99
Ave.	2.872	24.50	100.08	99.69	99.22	98.81	98.18	96.88
Med.	2.867	24.58	100.08	99.67	99.23	98.78	98.17	96.87
st dev	0.0169	0.1902	0.0504	0.1499	0.2575	0.2724	0.3879	0.3578
Min.	2.855	24.19	100.00	99.22	98.85	98.34	97.53	96.30
Max.	2.911	24.88	100.16	99.88	99.63	99.26	98.89	97.54

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
 α : 6.069E-06
 β : 1.009
Calculated L₇₀: 60,000hrs
Reported L₇₀: >36,000hrs

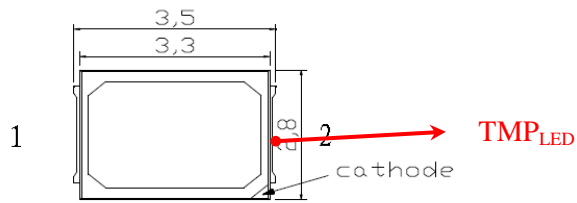
3.4 Data Set 2, 85°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
21	0.2454	0.5254	3102	0.0003	0.0005	0.0007	0.0015	0.0016	0.0022
22	0.2438	0.5257	3141	0.0003	0.0004	0.0007	0.0012	0.0018	0.0023
23	0.2443	0.5260	3126	0.0001	0.0004	0.0009	0.0011	0.0019	0.0025
24	0.2448	0.5255	3117	0.0002	0.0007	0.0008	0.0017	0.0014	0.0020
25	0.2460	0.5261	3081	0.0004	0.0004	0.0006	0.0011	0.0020	0.0026
26	0.2467	0.5287	3048	0.0001	0.0002	0.0009	0.0017	0.0015	0.0023
27	0.2464	0.5261	3074	0.0002	0.0006	0.0010	0.0013	0.0019	0.0026
28	0.2456	0.5282	3078	0.0000	0.0005	0.0008	0.0010	0.0022	0.0029
29	0.2466	0.5293	3047	0.0004	0.0005	0.0010	0.0011	0.0021	0.0030
30	0.2457	0.5267	3085	0.0003	0.0004	0.0009	0.0012	0.0017	0.0023
31	0.2449	0.5280	3098	0.0002	0.0004	0.0007	0.0013	0.0021	0.0027
32	0.2471	0.5309	3026	0.0001	0.0006	0.0008	0.0012	0.0016	0.0022
33	0.2444	0.5263	3123	0.0002	0.0005	0.0010	0.0014	0.0020	0.0025
34	0.2453	0.5259	3102	0.0001	0.0006	0.0009	0.0010	0.0015	0.0021
35	0.2448	0.5278	3101	0.0004	0.0004	0.0009	0.0013	0.0015	0.0024
36	0.2452	0.5258	3106	0.0003	0.0005	0.0010	0.0012	0.0019	0.0026
37	0.2466	0.5297	3045	0.0003	0.0005	0.0009	0.0015	0.0017	0.0026
38	0.2461	0.5276	3069	0.0003	0.0004	0.0010	0.0014	0.0022	0.0028
39	0.2446	0.5266	3114	0.0002	0.0003	0.0007	0.0015	0.0023	0.0028
40	0.2445	0.5267	3116	0.0002	0.0003	0.0008	0.0019	0.0018	0.0022
Ave.	0.2454	0.5272	3090	0.0002	0.0005	0.0009	0.0013	0.0018	0.0025
Med.	0.2454	0.5267	3100	0.0002	0.0005	0.0009	0.0013	0.0019	0.0025
st dev	0.0009	0.0016	31.1000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003
Min.	0.2438	0.5254	3026	0.0000	0.0002	0.0006	0.0010	0.0014	0.0020
Max.	0.2471	0.5309	3141	0.0004	0.0007	0.0010	0.0019	0.0023	0.0030



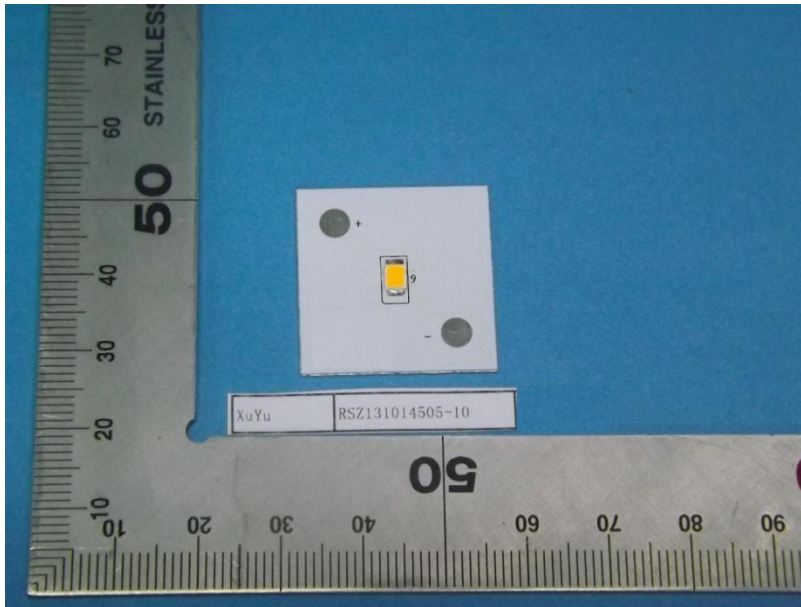
Appendix A – EUT PHOTO

A.1 Mechanical Dimensions (Ta = 25°C)



All dimensions are in millimeter

A.2 EUT Photo



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