



# IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

## MEASUREMENT AND TEST REPORT

For

**Shineon (Beijing) Technology Co., Ltd.**

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**Model: SOW2835**

<b>Report Type:</b> 9000 Hours Test Report	<b>Product Type:</b> LED Package
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<b>Report Number:</b> R2DG141110053-10	
<b>Test Date:</b> 2014-11-14 to 2016-02-26	
<b>Report Date:</b> 2016-02-26	
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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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FINAL

## 1 - GENERAL INFORMATION

### 1.1 Description of LED Light Sources

Devices tested

Part Number: SOW2835  
 Part Type: LED package  
 Nominal CCT: 3000K

### 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(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, Diameter:0.3m,0-1999Lumen	2015-03-25	2016-03-25
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2015-03-05	2016-03-05
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2015-03-25	2016-03-25
Standard Light Source	EVERFINE	D062	1011093	3000K	2015-09-17	2016-09-16
Precision digital stabilized DC power supply	EVERFINE	WY605	G115987C J7321114	300VA	2015-03-05	2016-03-05
Multilayer aging machine	BACL	B2-270	20022	25°C~110°C	2015-11-23	2016-11-22
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	(50V/15A)	2015-03-05	2016-03-05

### 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%.

## 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 30Pcs;

Each Ts test condition 30Pcs

The samples tested at Ts 105°C were received at 2014-11-10 and tested during 2014-11-14 to 2016-02-26.

The samples were numbered from 1 to 30.

### Data Set 1: 105°C, 180mA

Part Number:	SOW2835
Number of Units:	30
Actual Case Temperature(T <sub>S</sub> ):	T <sub>S</sub> = 104.3°C
Actual Ambient Temperature(T <sub>A</sub> ):	T <sub>A</sub> = 103.2°C
Life Test Drive Current:	I <sub>F</sub> = 180mA
Measurement Current:	I <sub>F</sub> = 180mA

## 2 - SUMMARY OF TEST RESULT

<b>Data Set:</b>	<b>Data Set 1, 105°C, 180mA</b>
Number of Units:	30
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h,7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	96.35%
Average. Lumen Maintenance at 9000 hours:	95.16%
Average Chromaticity Shift at 6000 hours( $\Delta u'v'$ ):	0.0021
Average Chromaticity Shift at 9000 hours( $\Delta u'v'$ ):	0.0032
Reported TM-21 L <sub>70</sub> Lifetime:	>54,000 hours

### 3 - Test Data

#### 3.1 Data Set 1, 105°C, 180 mA (Lumen Maintenance)

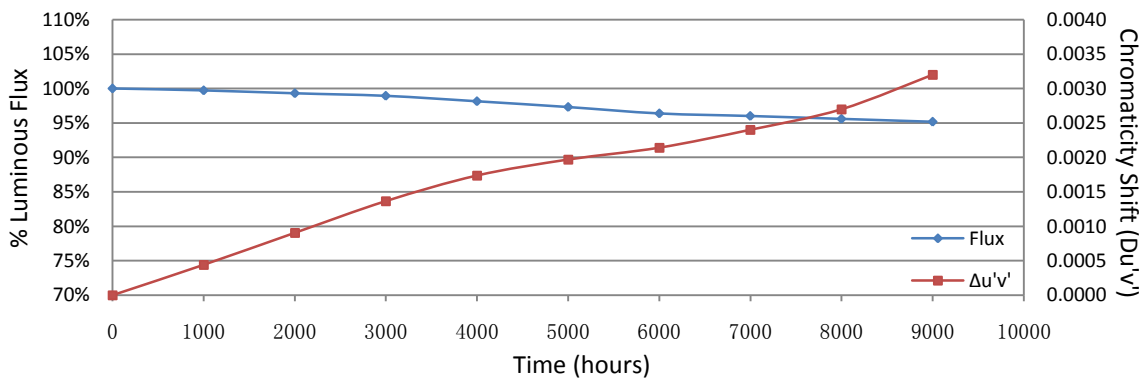
No.	V <sub>F</sub> (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	3.448	61.21	99.69	99.33	98.87	97.09	96.44	95.34	94.84	94.36	94.02
2	3.413	63.23	99.73	99.24	98.94	98.51	97.99	97.23	96.98	96.82	96.46
3	3.447	62.81	99.63	99.20	99.84	99.04	98.15	97.21	96.94	96.34	96.07
4	3.389	62.65	99.62	99.35	98.85	98.02	97.17	96.63	96.39	95.87	95.56
5	3.416	60.00	99.62	99.22	98.83	97.78	97.68	96.52	96.33	95.93	95.22
6	3.392	62.87	99.84	99.28	99.05	98.17	96.58	95.64	94.94	94.51	94.27
7	3.430	60.64	99.84	99.32	99.04	98.96	97.30	96.57	96.22	95.94	95.48
8	3.422	62.97	99.65	99.08	98.62	97.87	97.00	95.86	95.30	94.84	94.30
9	3.466	63.43	99.75	99.35	99.23	98.05	96.71	95.19	95.03	94.80	94.48
10	3.580	63.24	99.72	99.16	98.67	97.94	97.19	95.62	95.45	95.34	94.99
11	3.425	63.28	99.72	99.40	98.97	98.61	97.85	96.97	96.70	96.38	96.08
12	3.398	62.54	99.70	99.26	98.88	98.05	97.19	96.00	95.76	95.28	94.71
13	3.393	62.75	99.54	99.08	98.69	97.71	96.94	96.24	95.94	95.60	95.17
14	3.410	63.05	99.78	99.30	98.91	98.49	97.73	96.99	96.56	96.13	96.00
15	3.420	63.50	99.70	99.24	99.09	98.43	97.75	96.47	95.98	95.67	95.43
16	3.395	62.52	99.82	99.42	99.14	98.75	98.06	97.71	97.42	96.93	96.42
17	3.428	62.47	99.71	99.25	98.91	98.43	97.01	96.33	96.13	95.52	95.15
18	3.431	61.17	99.75	99.31	98.66	97.71	96.63	95.06	94.85	94.44	94.05
19	3.416	61.87	99.68	99.26	98.98	97.56	96.96	96.43	96.23	95.73	95.44
20	3.398	61.14	99.71	99.26	98.63	97.68	96.58	95.39	95.19	94.73	94.36
21	3.545	62.09	99.76	99.42	99.07	98.65	98.12	97.49	97.00	96.60	96.05
22	3.433	62.49	99.76	99.30	98.70	97.71	96.51	95.02	94.35	94.13	93.84
23	3.336	60.29	99.80	99.52	99.07	98.87	98.44	97.64	97.46	96.72	96.17
24	3.403	62.15	99.77	99.26	98.86	97.46	96.03	95.30	95.06	94.34	93.79
25	3.417	62.21	99.74	99.24	98.55	98.26	97.49	96.58	96.06	95.85	95.55
26	3.389	63.26	99.89	99.30	98.78	97.83	96.71	95.40	94.99	94.40	93.90
27	3.387	62.04	99.69	99.31	99.18	98.68	98.21	97.82	97.42	97.24	96.73
28	3.427	62.16	99.74	99.24	98.79	97.59	97.43	97.06	96.35	95.79	95.33
29	3.400	61.62	99.68	99.19	98.69	97.96	97.73	96.77	96.33	96.06	95.50
30	3.400	62.72	99.78	99.38	99.09	98.50	96.83	96.01	95.46	94.74	94.18
Ave.	3.422	62.28	99.73	99.28	98.92	98.15	97.28	96.35	95.99	95.57	95.16
Med.	3.416	62.51	99.72	99.27	98.89	98.05	97.19	96.45	96.09	95.70	95.28
st dev	0.0454	0.9342	0.0747	0.0948	0.2522	0.4955	0.6298	0.8395	0.8634	0.8786	0.8753
Min.	3.336	60.00	99.54	99.08	98.55	97.09	96.03	95.02	94.35	94.13	93.79
Max.	3.580	63.50	99.89	99.52	99.84	99.04	98.44	97.82	97.46	97.24	96.73

#### TM-21 Projection:

**Test Duration:** 9000 hours  
**Failures Observed:** 0  
 $\alpha$ : 4.793E-06  
 $\beta$ : 0.991  
**Calculated L<sub>70</sub>:** 73,000 hours  
**Reported L<sub>70</sub>:** >54,000 hours

### 3.2 Data Set 1, 105°C, 180 mA (Chromaticity Shift)

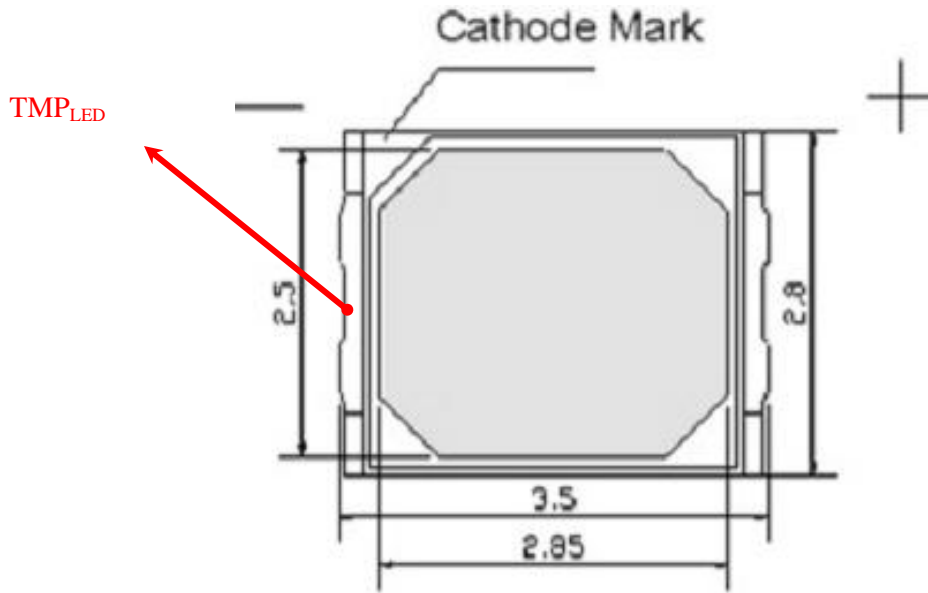
No.	u'	v'	CCT(K)	Chromaticity Shift ( $\Delta u'v'$ )								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	0.2504	0.5226	2998	0.0005	0.0008	0.0014	0.0018	0.0027	0.0036	0.0039	0.0043	0.0048
2	0.2524	0.5247	2937	0.0005	0.0012	0.0015	0.0018	0.0025	0.0034	0.0040	0.0043	0.0048
3	0.2510	0.5236	2977	0.0004	0.0010	0.0014	0.0017	0.0021	0.0027	0.0032	0.0038	0.0042
4	0.2512	0.5240	2970	0.0004	0.0009	0.0016	0.0019	0.0021	0.0028	0.0033	0.0039	0.0043
5	0.2512	0.5219	2982	0.0003	0.0005	0.0009	0.0012	0.0013	0.0016	0.0020	0.0027	0.0033
6	0.2516	0.5234	2962	0.0006	0.0009	0.0014	0.0017	0.0019	0.0022	0.0026	0.0033	0.0038
7	0.2525	0.5244	2935	0.0004	0.0009	0.0014	0.0016	0.0018	0.0020	0.0022	0.0030	0.0036
8	0.2510	0.5228	2982	0.0004	0.0008	0.0013	0.0015	0.0017	0.0019	0.0021	0.0027	0.0035
9	0.2520	0.5242	2948	0.0007	0.0011	0.0014	0.0019	0.0020	0.0023	0.0025	0.0031	0.0039
10	0.2528	0.5239	2931	0.0005	0.0009	0.0015	0.0017	0.0019	0.0021	0.0022	0.0029	0.0037
11	0.2512	0.5249	2964	0.0006	0.0009	0.0004	0.0010	0.0013	0.0017	0.0018	0.0020	0.0026
12	0.2516	0.5237	2960	0.0006	0.0009	0.0008	0.0004	0.0007	0.0013	0.0015	0.0022	0.0028
13	0.2508	0.5240	2977	0.0003	0.0006	0.0011	0.0008	0.0008	0.0012	0.0015	0.0023	0.0030
14	0.2523	0.5248	2938	0.0006	0.0010	0.0012	0.0012	0.0007	0.0006	0.0010	0.0013	0.0022
15	0.2513	0.5241	2967	0.0004	0.0009	0.0011	0.0016	0.0003	0.0009	0.0007	0.0009	0.0015
16	0.2524	0.5246	2936	0.0007	0.0011	0.0017	0.0018	0.0020	0.0013	0.0012	0.0015	0.0023
17	0.2523	0.5235	2946	0.0006	0.0011	0.0014	0.0013	0.0012	0.0011	0.0010	0.0011	0.0016
18	0.2524	0.5209	2959	0.0004	0.0011	0.0013	0.0014	0.0013	0.0013	0.0013	0.0019	0.0023
19	0.2529	0.5243	2927	0.0006	0.0010	0.0016	0.0021	0.0021	0.0020	0.0021	0.0023	0.0028
20	0.2506	0.5215	2999	0.0000	0.0006	0.0010	0.0014	0.0013	0.0013	0.0016	0.0018	0.0023
21	0.2525	0.5245	2936	0.0005	0.0011	0.0019	0.0023	0.0023	0.0022	0.0024	0.0030	0.0032
22	0.2512	0.5236	2971	0.0003	0.0008	0.0010	0.0013	0.0014	0.0013	0.0015	0.0021	0.0022
23	0.2490	0.5205	3046	0.0007	0.0012	0.0009	0.0010	0.0007	0.0017	0.0022	0.0030	0.0031
24	0.2532	0.5226	2929	0.0004	0.0008	0.0019	0.0029	0.0031	0.0026	0.0024	0.0024	0.0026
25	0.2506	0.5218	2997	0.0001	0.0006	0.0012	0.0021	0.0024	0.0018	0.0020	0.0020	0.0022
26	0.2512	0.5227	2977	0.0002	0.0008	0.0015	0.0026	0.0030	0.0023	0.0023	0.0022	0.0022
27	0.2531	0.5238	2925	0.0004	0.0009	0.0019	0.0027	0.0036	0.0037	0.0040	0.0035	0.0038
28	0.2512	0.5229	2975	0.0003	0.0009	0.0017	0.0025	0.0037	0.0038	0.0040	0.0039	0.0041
29	0.2531	0.5230	2929	0.0003	0.0007	0.0014	0.0023	0.0036	0.0037	0.0040	0.0038	0.0040
30	0.2525	0.5233	2941	0.0004	0.0010	0.0019	0.0023	0.0035	0.0040	0.0043	0.0041	0.0045
Ave.	0.2517	0.5234	2961	0.0004	0.0009	0.0014	0.0017	0.0020	0.0021	0.0024	0.0027	0.0032
Med.	0.2516	0.5236	2961	0.0004	0.0009	0.0014	0.0017	0.0019	0.0020	0.0022	0.0027	0.0032
st dev	0.0010	0.0012	27.9373	0.0002	0.0002	0.0004	0.0006	0.0009	0.0009	0.0010	0.0010	0.0009
Min.	0.2490	0.5205	2925	0.0000	0.0005	0.0004	0.0004	0.0003	0.0006	0.0007	0.0009	0.0015
Max.	0.2532	0.5249	3046	0.0007	0.0012	0.0019	0.0029	0.0037	0.0040	0.0043	0.0043	0.0048





## Appendix A – EUT PHOTO

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



All dimensions are in millimeter

### A.2 EUT Photo



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