



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Shenzhen Runlite Technology Co., Ltd

Building A15, Tantou the 4th Industrial Estate, SongGang Town, BaoAn District, ShenZhen, China.

Model:CP2522

Report Type: 6000 Hours Test Report for 55 °C 9000 Hours Test Report for 100 °C	Product Type: LED Array
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Report Number:	RSZ150925509-10-9000
Test Date:	2015-09-30 to 2017-02-28
Report Date:	2017-03-23
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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: CP2522
 Part Type: LED Array
 Nominal CCT: 2700K

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 No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

1.4 Description of Auxiliary Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
1.0m integrating sphere	SENSING	SCD-20008	N/A	N/A	2016-07-11	2017-07-10
spectroradiometer	SENSING	SCD-20008	N/A	N/A	2016-07-11	2017-07-10
DC Power Supply	Hanshenpuyuan	HSPY-100-05	2013010210003	N/A	2016-05-18	2017-05-17
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-12
Multilayer aging machine	BACL	B2-270	20005	25 °C~130 °C	2016-09-01	2017-09-01
Multilayer aging machine	BACL	B2-270	20022	25 °C~130 °C	2016-12-08	2017-12-07
Adjustable constant-current DC switching power supply	GUTE	DK-60V20A	120 5036	1200W	2016-08-29	2017-08-29

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 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 20Pcs;

Each Ts test condition 10Pcs

The samples tested at Ts 55 °C and Ts 100 °C were received at 2015-09-25 and tested during 2015-09-30 to 2017-02-28. The samples were numbered from 1 to 10 and 11 to 20

Data Set 1: 55 °C, 1050mA

Part Number:	CP2522
Number of Units:	10
Actual Case Temperature(T _S):	T _S =54.2 °C
Actual Ambient Temperature(T _A):	T _A =51.5 °C
Life Test Drive Current:	I _F = 1050mA
Measurement Current:	I _F = 1050mA

Data Set 2: 100 °C,1050mA

Part Number:	CP2522
Number of Units:	10
Actual Case Temperature(T _S):	T _S =98.8 °C
Actual Ambient Temperature(T _A):	T _A =97.2 °C
Life Test Drive Current:	I _F =1050mA
Measurement Current:	I _F = 1050mA

2 - Summary of Test Result

Data Set:	Data Set 1, 55 °C, 1050mA
Number of Units:	10
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	98.28%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0015
Reported TM-21 L_{70} Lifetime:	>33,000 hours

Data Set:	Data Set 2, 100 °C, 1050mA
Number of Units:	10
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h, 7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	97.20%
Average. Lumen Maintenance at 9000 hours:	95.66%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0018
Average Chromaticity Shift at 9000 hours($\Delta u'v'$):	0.0032
Reported TM-21 L_{70} Lifetime:	>50,000 hours

3 - Test Data

3.1 Data Set 1, 55 °C, 1050mA (Lumen Maintenance)

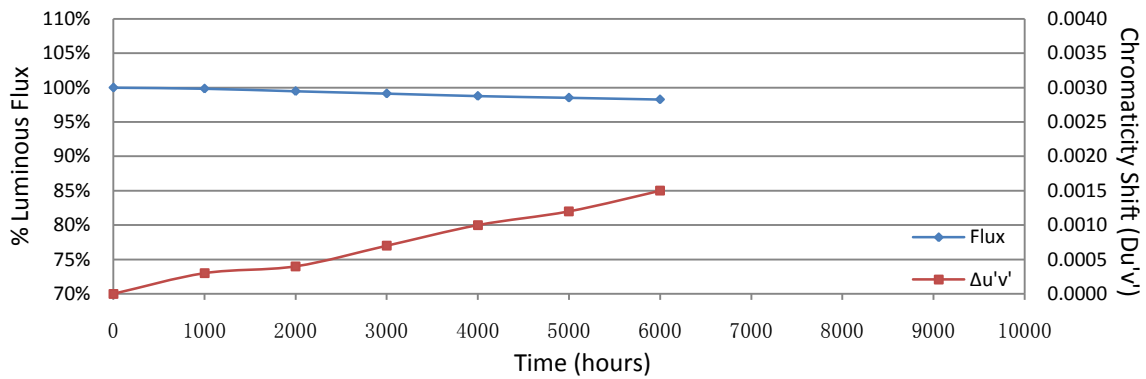
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	38.82	4504.31	99.98	99.56	99.16	98.76	98.43	98.18
2	38.88	4635.03	99.75	99.32	98.93	98.83	98.53	98.09
3	38.88	4624.13	99.51	99.02	98.80	98.53	98.30	98.20
4	38.92	4558.77	99.86	99.46	99.25	98.95	98.65	98.07
5	39.23	4613.24	99.98	99.38	98.94	98.89	98.61	98.43
6	38.94	4575.11	99.86	99.40	99.08	98.28	98.20	98.03
7	38.93	4602.35	99.74	99.49	99.20	99.00	98.63	98.52
8	38.88	4613.24	99.98	99.65	99.06	98.52	98.28	98.05
9	39.11	4596.90	99.98	99.83	99.34	98.55	98.29	98.03
10	39.52	4596.90	99.86	99.70	99.61	99.46	99.38	99.18
Ave.	39.01	4592.00	99.85	99.48	99.14	98.78	98.53	98.28
Med.	38.93	4599.63	99.86	99.47	99.12	98.79	98.48	98.13
st dev	0.2172	38.0356	0.1513	0.2255	0.2311	0.3310	0.3419	0.3593
Min.	38.82	4504.31	99.51	99.02	98.80	98.28	98.20	98.03
Max.	39.52	4635.03	99.98	99.83	99.61	99.46	99.38	99.18

TM-21 Projection:

Test Duration: 6,000 hours
Failures Observed: 0
α: 3.190E-06
β: 1.001
Reported L₇₀: >33,000 hours

3.2 Data Set 1, 55 °C, 1050mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2661	0.5317	2612	0.0001	0.0003	0.0005	0.0007	0.0006	0.0009
2	0.2660	0.5321	2614	0.0004	0.0006	0.0008	0.0012	0.0014	0.0016
3	0.2663	0.5324	2606	0.0004	0.0007	0.0010	0.0014	0.0019	0.0022
4	0.2674	0.5327	2584	0.0002	0.0002	0.0004	0.0009	0.0011	0.0015
5	0.2674	0.5323	2584	0.0001	0.0002	0.0006	0.0007	0.0007	0.0010
6	0.2667	0.5320	2600	0.0003	0.0003	0.0005	0.0008	0.0011	0.0014
7	0.2657	0.5321	2620	0.0005	0.0007	0.0007	0.0010	0.0013	0.0016
8	0.2674	0.5329	2582	0.0002	0.0002	0.0005	0.0007	0.0009	0.0013
9	0.2672	0.5327	2588	0.0002	0.0006	0.0008	0.0010	0.0011	0.0016
10	0.2673	0.5327	2586	0.0002	0.0006	0.0009	0.0013	0.0018	0.0020
Ave.	0.2668	0.5324	2598	0.0003	0.0004	0.0007	0.0010	0.0012	0.0015
Med.	0.2670	0.5324	2594	0.0002	0.0004	0.0007	0.0010	0.0011	0.0015
st dev	0.0007	0.0004	14.5082	0.0001	0.0002	0.0002	0.0002	0.0004	0.0004
Min.	0.2657	0.5317	2582	0.0001	0.0002	0.0004	0.0007	0.0006	0.0009
Max.	0.2674	0.5329	2620	0.0005	0.0007	0.0010	0.0014	0.0019	0.0022



3.3 Data Set 2, 100 °C, 1050mA (Lumen Maintenance)

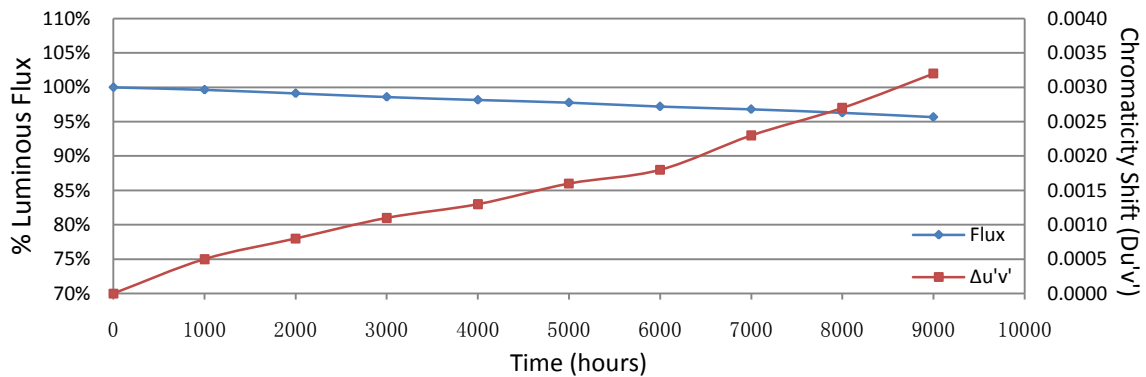
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
11	39.25	4613.24	99.53	99.27	98.86	98.69	98.21	97.62	97.19	96.65	96.02
12	39.49	4662.26	99.59	99.02	98.36	97.48	97.20	96.64	96.19	95.63	95.04
13	39.23	4618.69	99.62	99.02	98.80	98.65	98.37	97.69	97.35	96.79	96.10
14	39.29	4613.24	99.74	98.91	98.43	98.27	98.11	97.45	97.09	96.95	96.45
15	39.16	4602.35	99.41	99.10	98.62	98.01	97.84	97.56	97.33	96.74	96.08
16	39.47	4618.69	99.88	99.29	98.85	98.10	97.87	97.46	97.25	96.73	96.13
17	38.81	4602.35	99.88	99.35	98.79	98.57	98.14	97.37	97.08	96.58	95.99
18	38.88	4531.54	99.78	99.24	98.61	97.94	97.32	96.60	95.86	95.28	94.66
19	38.76	4640.47	99.51	98.86	98.10	97.94	97.16	96.62	96.18	95.62	94.87
20	38.88	4515.20	99.50	99.12	98.48	97.97	97.46	97.02	96.50	95.94	95.25
Ave.	39.12	4601.80	99.64	99.12	98.59	98.16	97.77	97.20	96.80	96.29	95.66
Med.	39.20	4613.24	99.61	99.11	98.61	98.05	97.86	97.41	97.08	96.61	96.01
st dev	0.2708	45.2397	0.1672	0.1673	0.2499	0.3817	0.4496	0.4403	0.5620	0.6061	0.6349
Min.	38.76	4515.20	99.41	98.86	98.10	97.48	97.16	96.60	95.86	95.28	94.66
Max.	39.49	4662.26	99.88	99.35	98.86	98.69	98.37	97.69	97.35	96.95	96.45

TM-21 Projection:

Test Duration: 9,000 hours
Failures Observed: 0
 α : 5.111E-06
 β : 1.003
Reported L₇₀: >50,000 hours

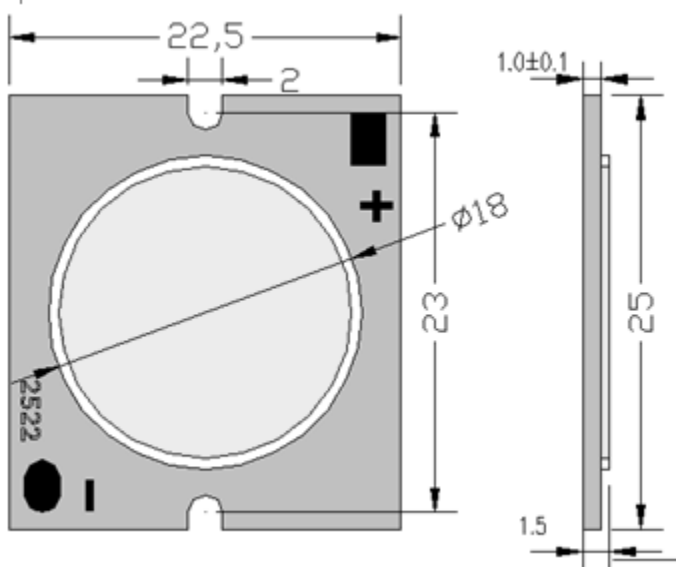
3.4 Data Set 2, 100 °C, 1050mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
11	0.2657	0.5319	2618	0.0004	0.0007	0.0010	0.0014	0.0017	0.0019	0.0023	0.0026	0.0030
12	0.2660	0.5322	2612	0.0008	0.0011	0.0014	0.0014	0.0018	0.0019	0.0023	0.0027	0.0030
13	0.2657	0.5323	2618	0.0009	0.0013	0.0017	0.0020	0.0022	0.0023	0.0025	0.0028	0.0030
14	0.2662	0.5327	2608	0.0008	0.0010	0.0014	0.0016	0.0020	0.0022	0.0024	0.0026	0.0028
15	0.2675	0.5329	2582	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0017	0.0021	0.0024
16	0.2655	0.5320	2622	0.0004	0.0007	0.0013	0.0014	0.0020	0.0023	0.0027	0.0030	0.0034
17	0.2676	0.5328	2580	0.0004	0.0005	0.0008	0.0011	0.0013	0.0015	0.0022	0.0029	0.0036
18	0.2661	0.5313	2614	0.0001	0.0004	0.0007	0.0008	0.0010	0.0014	0.0013	0.0015	0.0019
19	0.2665	0.5322	2604	0.0003	0.0005	0.0007	0.0011	0.0011	0.0014	0.0019	0.0031	0.0045
20	0.2675	0.5326	2582	0.0004	0.0006	0.0010	0.0013	0.0018	0.0021	0.0036	0.0039	0.0042
Ave.	0.2664	0.5323	2604	0.0005	0.0008	0.0011	0.0013	0.0016	0.0018	0.0023	0.0027	0.0032
Med.	0.2662	0.5323	2610	0.0004	0.0007	0.0010	0.0014	0.0018	0.0019	0.0023	0.0027	0.0030
st dev	0.0008	0.0005	16.4655	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0006	0.0006	0.0008
Min.	0.2655	0.5313	2580	0.0001	0.0004	0.0007	0.0008	0.0010	0.0014	0.0013	0.0015	0.0019
Max.	0.2676	0.5329	2622	0.0009	0.0013	0.0017	0.0020	0.0022	0.0023	0.0036	0.0039	0.0045



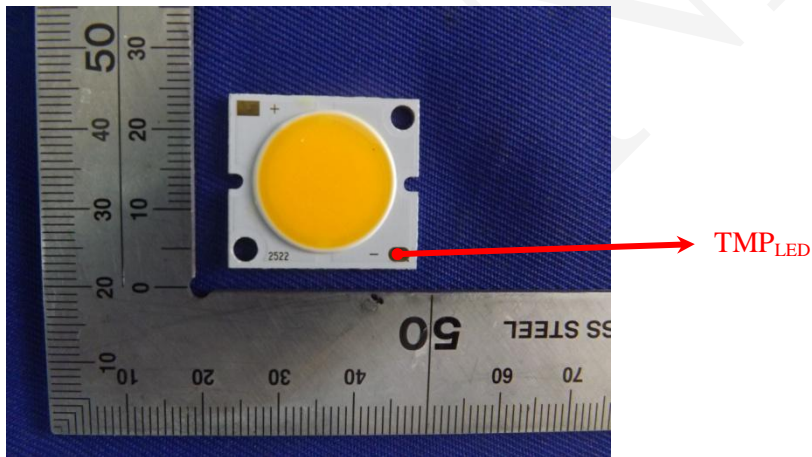
Attachment A – EUT Photo

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



All dimensions are in millimeter

A.2 EUT Photo



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