



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Xiamen Dacol Photoelectronics Technology Co.,Ltd.

8021 Xiang' an West Road(Xiang' an)industrial zone,Torch Hi-Tech Industrial Development Zone,Xiamen City,Fujian,China

Model: 2835

Report Type: 9000 Hours Test Report	Product Type: LED Package
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Report Number: R2DG141201054-10-9000	
Test Date: 2014-12-25 to 2017-04-18	
Report Date: 2017-04-26	
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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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1 - GENERAL INFORMATION

1.1 Description of LED Light Sources

Devices tested

Part Number: 2835
 Part Type: LED Package
 Nominal CCT: 3500K (Multiple CCT: 2700K, 3000K, 4000K,4500K,5000K,5700K,6500K)

Note: The applicant *Xiamen Dacol Photoelectronics Technology Co.,Ltd.* declare that their product with model 2835 can multiple the model for 2700K, 3000K, 4000K, 4500K,5000K, 5700K,6500K. (See attachment B – Declaration Letter)

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
Integral Sphere	EVERFINE	Diameter 0.3m	1011119	0.3m	2017-03-09	2018-03-08
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2017-03-03	2018-03-02
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2017-03-09	2018-03-08
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-12
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	300VA	2017-03-03	2018-03-02
Multilayer aging machine	BACL	B2-270	20022	25 °C~130 °C	2016-12-08	2017-12-07
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060010	(50V/15A)	2017-03-03	2018-03-02

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090008	(50V/15A)	2016-07-07	2017-07-06
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	(50V/15A)	2016-07-07	2017-07-06

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 75Pcs;

Each Ts test condition 25Pcs

The samples tested at Ts 55 °C, Ts 85 °C and Ts 105 °C were received at 2014-12-01 and tested during 2014-12-25 to 2017-04-18. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75

Data Set 1: 55 °C, 100mA

Part Number:	2835
Number of Units:	25
Actual Case Temperature(T _S):	T _S =54.1 °C
Actual Ambient Temperature(T _A):	T _A =52.6 °C
Life Test Drive Current:	I _F = 100mA
Measurement Current:	I _F = 100mA

Data Set 2: 85 °C,100mA

Part Number:	2835
Number of Units:	25
Actual Case Temperature(T _S):	T _S =83.6 °C
Actual Ambient Temperature(T _A):	T _A =82.5 °C
Life Test Drive Current:	I _F =100mA
Measurement Current:	I _F = 100mA

Data Set 3: 105 °C, 100mA

Part Number:	2835
Number of Units:	25
Actual Case Temperature(T _S):	T _S =103.6 °C
Actual Ambient Temperature(T _A):	T _A =102.3 °C
Life Test Drive Current:	I _F = 100mA
Measurement Current:	I _F = 100mA

2 - SUMMARY OF TEST RESULT

Data Set:	Data Set 1, 55 °C, 100mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h, 7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	97.15%
Average. Lumen Maintenance at 9000 hours:	96.50%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0023
Average Chromaticity Shift at 9000 hours ($\Delta u'v'$):	0.0031
Reported TM-21 L ₇₀ Lifetime:	>54,000 hours

Data Set:	Data Set 2, 85 °C, 100mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h, 7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	96.79%
Average. Lumen Maintenance at 9000 hours:	96.02%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0023
Average Chromaticity Shift at 9000 hours ($\Delta u'v'$):	0.0035
Reported TM-21 L ₇₀ Lifetime:	>54,000 hours

Data Set:	Data Set 3, 105 °C, 100mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h, 7000h,8000h,9000h
Average. Lumen Maintenance at 6000 hours:	95.81%
Average. Lumen Maintenance at 9000 hours:	94.86%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0027
Average Chromaticity Shift at 9000 hours ($\Delta u'v'$):	0.0035
Reported TM-21 L ₇₀ Lifetime:	>54,000 hours

3 - Test Data

3.1 Data Set 1, 55 °C, 100mA (Lumen Maintenance)

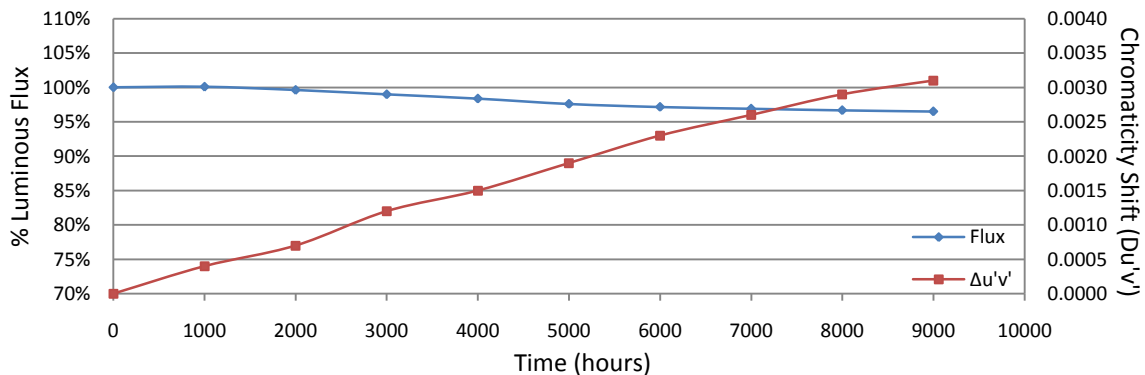
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	9.147	110.8	99.91	99.46	98.74	98.10	97.20	96.75	96.48	96.21	96.12
2	9.065	113.3	100.09	99.65	98.76	98.23	97.62	97.18	96.82	96.56	96.29
3	9.179	110.2	99.73	99.18	98.64	98.09	97.19	97.10	96.91	96.73	96.55
4	9.140	110.0	99.82	99.36	98.82	98.18	97.18	96.82	96.64	96.36	96.18
5	9.212	110.3	100.27	100.00	99.46	99.00	98.91	97.19	97.10	96.92	96.65
6	9.242	109.2	100.09	99.63	99.18	98.35	97.53	97.07	96.79	96.52	96.25
7	9.415	107.4	100.09	99.53	98.88	98.04	97.11	96.83	96.46	96.28	96.09
8	9.240	111.4	100.09	99.55	99.01	98.20	97.40	96.86	96.68	96.32	96.23
9	9.367	108.1	100.19	99.63	98.98	98.52	97.41	97.04	96.58	96.39	96.11
10	9.206	111.4	100.27	100.00	99.37	98.74	98.20	97.76	97.40	97.13	96.86
11	9.300	107.2	100.28	99.91	99.16	98.32	97.95	97.48	97.29	97.11	97.01
12	9.217	109.6	99.91	99.54	99.00	98.45	97.45	96.72	96.35	96.08	95.89
13	9.237	110.2	100.09	99.64	99.09	98.73	97.28	97.01	96.82	96.55	96.37
14	9.239	109.7	100.18	99.64	99.00	98.36	97.81	97.36	97.17	97.08	96.99
15	9.022	111.4	100.18	99.82	99.37	98.83	97.49	96.95	96.68	96.41	96.32
16	9.403	107.8	100.28	100.00	99.07	98.42	97.77	97.31	97.12	96.94	96.85
17	9.412	106.9	99.81	99.35	98.69	98.04	97.29	97.10	97.01	96.73	96.63
18	9.430	107.3	100.19	99.72	98.79	98.51	97.86	97.30	96.92	96.55	96.37
19	9.243	109.8	100.09	99.54	99.00	98.18	97.27	97.09	96.81	96.63	96.45
20	9.137	111.6	100.27	99.82	99.28	98.75	98.03	97.67	97.22	97.04	96.95
21	9.216	109.6	100.09	99.27	98.72	98.27	97.72	97.35	97.08	96.81	96.72
22	9.404	107.6	100.19	99.54	98.98	97.96	97.58	97.21	97.12	97.03	96.84
23	9.143	110.5	100.09	99.64	99.19	98.55	98.01	97.65	97.47	97.19	97.01
24	9.150	110.1	99.91	99.46	98.82	98.37	97.18	97.00	96.91	96.73	96.64
25	9.408	108.1	100.00	99.44	98.61	97.87	97.22	96.85	96.58	96.39	96.21
Ave.	9.247	109.6	100.08	99.61	98.98	98.36	97.59	97.15	96.90	96.67	96.50
Med.	9.237	109.8	100.09	99.63	99.00	98.35	97.49	97.10	96.91	96.63	96.45
st dev	0.1169	1.6633	0.1581	0.2213	0.2386	0.2903	0.4181	0.2867	0.3001	0.3227	0.3363
Min.	9.022	106.9	99.73	99.18	98.61	97.87	97.11	96.72	96.35	96.08	95.89
Max.	9.430	113.3	100.28	100.00	99.46	99.00	98.91	97.76	97.47	97.19	97.01

TM-21 Projection:

Test Duration: 9,000 hours
Failures Observed: 0
 α : 3.613E-06
 β : 0.995
Reported L₇₀: >54,000 hours

3.2 Data Set 1, 55 °C, 100mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
1	0.2364	0.5140	3450	0.0004	0.0009	0.0014	0.0017	0.0022	0.0026	0.0030	0.0036	0.0039
2	0.2357	0.5164	3444	0.0002	0.0005	0.0009	0.0014	0.0016	0.0022	0.0024	0.0029	0.0031
3	0.2356	0.5160	3451	0.0004	0.0007	0.0012	0.0016	0.0018	0.0022	0.0026	0.0031	0.0034
4	0.2363	0.5141	3451	0.0006	0.0009	0.0014	0.0017	0.0021	0.0023	0.0027	0.0032	0.0036
5	0.2370	0.5170	3401	0.0003	0.0004	0.0007	0.0011	0.0016	0.0018	0.0021	0.0025	0.0026
6	0.2364	0.5154	3434	0.0004	0.0009	0.0013	0.0017	0.0021	0.0023	0.0024	0.0027	0.0031
7	0.2369	0.5170	3405	0.0004	0.0006	0.0011	0.0014	0.0018	0.0021	0.0023	0.0022	0.0026
8	0.2360	0.5177	3423	0.0005	0.0009	0.0012	0.0016	0.0021	0.0023	0.0027	0.0025	0.0029
9	0.2370	0.5165	3407	0.0004	0.0006	0.0010	0.0013	0.0018	0.0021	0.0023	0.0025	0.0025
10	0.2369	0.5170	3405	0.0004	0.0005	0.0009	0.0012	0.0016	0.0021	0.0020	0.0021	0.0024
11	0.2359	0.5137	3467	0.0003	0.0006	0.0011	0.0016	0.0020	0.0023	0.0029	0.0028	0.0027
12	0.2368	0.5154	3421	0.0004	0.0008	0.0012	0.0016	0.0019	0.0023	0.0025	0.0026	0.0025
13	0.2358	0.5162	3446	0.0006	0.0010	0.0015	0.0018	0.0021	0.0025	0.0028	0.0029	0.0028
14	0.2358	0.5143	3466	0.0004	0.0007	0.0011	0.0013	0.0018	0.0023	0.0026	0.0027	0.0029
15	0.2355	0.5151	3465	0.0004	0.0008	0.0014	0.0017	0.0021	0.0024	0.0029	0.0030	0.0033
16	0.2353	0.5172	3450	0.0003	0.0005	0.0009	0.0013	0.0017	0.0021	0.0023	0.0027	0.0033
17	0.2354	0.5138	3482	0.0005	0.0009	0.0015	0.0019	0.0025	0.0029	0.0031	0.0036	0.0041
18	0.2362	0.5154	3441	0.0004	0.0006	0.0010	0.0014	0.0018	0.0021	0.0024	0.0028	0.0033
19	0.2362	0.5137	3459	0.0006	0.0009	0.0014	0.0018	0.0022	0.0025	0.0028	0.0033	0.0036
20	0.2361	0.5154	3443	0.0004	0.0006	0.0009	0.0013	0.0018	0.0021	0.0024	0.0028	0.0030
21	0.2355	0.5159	3457	0.0004	0.0007	0.0010	0.0014	0.0018	0.0021	0.0023	0.0028	0.0030
22	0.2373	0.5160	3403	0.0005	0.0007	0.0012	0.0016	0.0020	0.0023	0.0026	0.0031	0.0031
23	0.2359	0.5153	3451	0.0005	0.0007	0.0012	0.0017	0.0021	0.0023	0.0026	0.0029	0.0033
24	0.2347	0.5136	3506	0.0006	0.0009	0.0014	0.0018	0.0021	0.0026	0.0028	0.0033	0.0035
25	0.2356	0.5169	3443	0.0006	0.0007	0.0013	0.0016	0.0021	0.0025	0.0027	0.0031	0.0034
Ave.	0.2361	0.5156	3443	0.0004	0.0007	0.0012	0.0015	0.0019	0.0023	0.0026	0.0029	0.0031
Med.	0.2360	0.5154	3446	0.0004	0.0007	0.0012	0.0016	0.0020	0.0023	0.0026	0.0028	0.0031
st dev	0.0006	0.0013	26.0987	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0004
Min.	0.2347	0.5136	3401	0.0002	0.0004	0.0007	0.0011	0.0016	0.0018	0.0020	0.0021	0.0024
Max.	0.2373	0.5177	3506	0.0006	0.0010	0.0015	0.0019	0.0025	0.0029	0.0031	0.0036	0.0041



3.3 Data Set 2, 85 °C, 100mA (Lumen Maintenance)

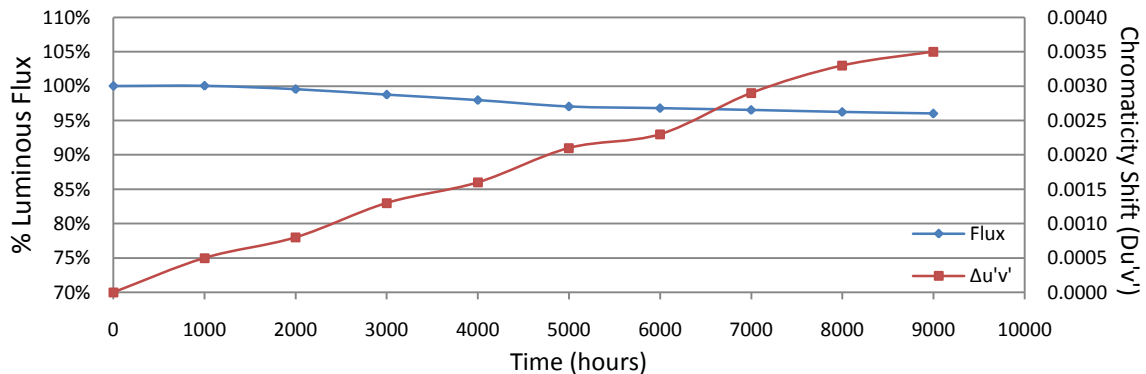
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
26	9.418	108.6	100.18	99.72	98.80	98.07	96.96	96.87	96.59	96.32	96.13
27	9.224	110.5	99.55	98.91	98.28	97.56	96.47	96.11	95.84	95.57	95.29
28	9.386	109.8	99.73	99.09	98.18	97.18	96.36	96.17	95.90	95.72	95.45
29	9.248	111.4	100.09	99.64	98.74	98.29	97.31	97.22	97.04	96.68	96.50
30	9.238	110.4	100.00	99.46	98.46	97.46	96.74	96.47	96.29	95.92	95.65
31	9.231	111.1	100.09	99.82	98.83	98.29	97.39	96.94	96.76	96.49	96.22
32	9.234	110.1	100.09	99.64	98.73	97.91	96.73	96.64	96.19	96.00	95.73
33	9.434	107.6	99.81	99.26	98.33	97.30	97.21	96.84	96.56	96.38	96.19
34	9.062	112.6	99.82	99.47	98.49	97.96	96.27	96.00	95.65	95.20	95.03
35	9.422	108.7	100.18	99.63	98.99	97.98	97.06	96.87	96.78	96.60	96.41
36	9.167	111.3	99.64	99.37	98.65	97.75	96.95	96.77	96.59	96.23	96.14
37	9.256	109.8	99.91	99.27	98.54	97.81	96.72	96.45	96.27	96.08	95.81
38	9.403	109.2	99.82	99.45	98.99	98.17	97.99	97.71	97.44	97.25	97.07
39	9.192	110.9	100.09	99.64	98.83	97.93	96.93	96.57	96.30	96.03	95.67
40	9.149	111.8	100.18	99.55	98.75	98.12	97.14	96.96	96.87	96.69	96.60
41	9.242	109.1	100.09	99.63	98.81	97.89	96.88	96.61	96.33	95.88	95.69
42	9.414	107.8	100.37	99.81	99.07	98.05	97.12	96.85	96.57	96.29	96.01
43	9.258	108.1	100.28	99.81	98.98	98.61	98.33	98.06	97.87	97.50	97.32
44	9.251	109.9	100.09	99.55	99.00	98.09	97.09	96.63	96.45	96.09	95.81
45	9.325	107.8	100.00	99.63	99.07	97.96	97.40	97.22	97.03	96.66	96.38
46	9.237	109.9	100.27	99.82	99.00	98.18	97.00	96.91	96.54	96.27	96.00
47	9.142	109.9	100.09	99.45	98.64	98.00	96.27	95.81	95.45	95.09	94.72
48	9.411	107.8	100.19	99.72	98.98	97.96	96.94	96.75	96.47	96.20	96.01
49	9.117	111.5	99.91	99.46	98.74	98.12	97.22	97.13	96.68	96.32	96.14
50	9.422	108.0	100.28	99.72	98.98	98.43	97.22	97.13	96.85	96.67	96.57
Ave.	9.275	109.7	100.03	99.54	98.75	97.96	97.03	96.79	96.53	96.24	96.02
Med.	9.248	109.9	100.09	99.63	98.80	97.98	97.00	96.84	96.56	96.27	96.01
st dev	0.1104	1.4405	0.2101	0.2301	0.2557	0.3271	0.4715	0.4956	0.5269	0.5442	0.5815
Min.	9.062	107.6	99.55	98.91	98.18	97.18	96.27	95.81	95.45	95.09	94.72
Max.	9.434	112.6	100.37	99.82	99.07	98.61	98.33	98.06	97.87	97.50	97.32

TM-21 Projection:

Test Duration: 9,000 hours
Failures Observed: 0
α: 3.635E-06
β: 0.991
Reported L₇₀: >54,000 hours

3.4 Data Set 2, 85 °C, 100mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
26	0.2347	0.5168	3472	0.0005	0.0008	0.0012	0.0017	0.0018	0.0023	0.0027	0.0033	0.0034
27	0.2356	0.5146	3468	0.0004	0.0011	0.0019	0.0022	0.0026	0.0032	0.0034	0.0039	0.0041
28	0.2368	0.5186	3390	0.0004	0.0004	0.0011	0.0014	0.0019	0.0024	0.0028	0.0032	0.0034
29	0.2356	0.5185	3426	0.0003	0.0005	0.0010	0.0015	0.0018	0.0021	0.0024	0.0028	0.0031
30	0.2365	0.5158	3426	0.0002	0.0005	0.0011	0.0013	0.0020	0.0023	0.0028	0.0032	0.0035
31	0.2363	0.5181	3409	0.0004	0.0006	0.0011	0.0014	0.0018	0.0021	0.0025	0.0031	0.0031
32	0.2350	0.5137	3495	0.0004	0.0008	0.0014	0.0018	0.0024	0.0027	0.0031	0.0036	0.0038
33	0.2369	0.5151	3423	0.0003	0.0004	0.0010	0.0014	0.0019	0.0022	0.0027	0.0032	0.0033
34	0.2364	0.5159	3429	0.0002	0.0004	0.0009	0.0012	0.0017	0.0021	0.0023	0.0029	0.0030
35	0.2366	0.5172	3411	0.0004	0.0005	0.0009	0.0011	0.0018	0.0021	0.0024	0.0029	0.0033
36	0.2358	0.5159	3449	0.0006	0.0008	0.0011	0.0016	0.0019	0.0022	0.0024	0.0030	0.0033
37	0.2362	0.5168	3425	0.0006	0.0009	0.0011	0.0014	0.0021	0.0023	0.0027	0.0032	0.0035
38	0.2364	0.5173	3414	0.0005	0.0008	0.0012	0.0015	0.0019	0.0021	0.0024	0.0031	0.0032
39	0.2353	0.5140	3483	0.0005	0.0009	0.0013	0.0017	0.0021	0.0022	0.0027	0.0032	0.0036
40	0.2361	0.5166	3430	0.0005	0.0007	0.0011	0.0014	0.0017	0.0018	0.0023	0.0029	0.0033
41	0.2354	0.5147	3472	0.0007	0.0011	0.0014	0.0017	0.0023	0.0023	0.0027	0.0033	0.0036
42	0.2357	0.5150	3460	0.0006	0.0010	0.0014	0.0017	0.0022	0.0023	0.0027	0.0033	0.0034
43	0.2373	0.5144	3418	0.0004	0.0009	0.0013	0.0018	0.0021	0.0025	0.0029	0.0038	0.0039
44	0.2365	0.5146	3440	0.0004	0.0009	0.0014	0.0017	0.0025	0.0030	0.0039	0.0039	0.0042
45	0.2365	0.5155	3432	0.0007	0.0014	0.0020	0.0025	0.0037	0.0035	0.0042	0.0039	0.0043
46	0.2362	0.5151	3444	0.0004	0.0009	0.0014	0.0018	0.0024	0.0018	0.0025	0.0028	0.0031
47	0.2359	0.5137	3468	0.0005	0.0009	0.0014	0.0017	0.0040	0.0047	0.0050	0.0050	0.0051
48	0.2365	0.5171	3414	0.0004	0.0009	0.0014	0.0018	0.0019	0.0019	0.0026	0.0030	0.0027
49	0.2348	0.5161	3475	0.0007	0.0012	0.0015	0.0019	0.0016	0.0013	0.0043	0.0035	0.0038
50	0.2366	0.5156	3427	0.0005	0.0008	0.0011	0.0015	0.0014	0.0012	0.0014	0.0024	0.0024
Ave.	0.2361	0.5159	3440	0.0005	0.0008	0.0013	0.0016	0.0021	0.0023	0.0029	0.0033	0.0035
Med.	0.2362	0.5158	3430	0.0004	0.0008	0.0012	0.0017	0.0019	0.0022	0.0027	0.0032	0.0034
st dev	0.0007	0.0014	27.1646	0.0001	0.0002	0.0003	0.0003	0.0006	0.0007	0.0008	0.0005	0.0005
Min.	0.2347	0.5137	3390	0.0002	0.0004	0.0009	0.0011	0.0014	0.0012	0.0014	0.0024	0.0024
Max.	0.2373	0.5186	3495	0.0007	0.0014	0.0020	0.0025	0.0040	0.0047	0.0050	0.0050	0.0051



3.5 Data Set 3, 105 °C, 100mA (Lumen Maintenance)

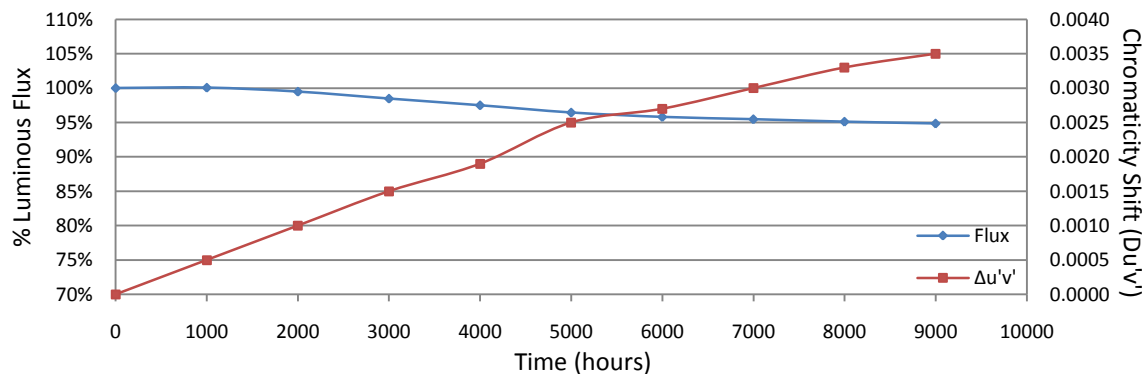
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)								
			0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
51	9.436	107.7	99.81	99.26	98.33	97.31	96.29	95.54	95.26	94.89	94.61
52	9.031	110.6	100.45	100.00	99.01	98.19	96.84	95.84	95.57	95.30	95.03
53	9.254	109.1	100.18	99.63	98.44	97.62	95.78	94.87	94.50	94.13	93.86
54	9.178	110.0	100.27	99.73	98.64	97.45	96.09	95.73	95.27	94.82	94.64
55	9.167	110.1	100.27	99.55	98.55	97.55	96.91	96.00	95.82	95.46	95.19
56	9.093	111.6	100.09	99.55	98.03	97.31	96.06	95.61	95.43	95.07	94.80
57	9.132	110.3	99.82	99.18	98.01	97.28	95.83	94.92	94.74	94.47	94.29
58	9.369	107.8	100.00	99.54	98.52	97.12	97.03	96.57	96.29	95.83	95.55
59	8.994	110.1	100.09	99.36	98.46	97.55	97.00	96.64	96.46	96.09	95.64
60	9.227	110.5	99.91	99.46	98.37	97.38	96.29	95.29	95.20	95.02	94.75
61	9.253	109.4	100.18	99.63	98.63	97.71	96.62	95.80	95.52	95.06	94.79
62	9.306	107.3	100.09	99.44	98.70	97.30	96.92	96.55	96.18	95.81	95.43
63	9.155	111.2	99.91	99.46	98.56	97.84	97.39	96.58	96.13	95.77	95.59
64	9.411	107.4	99.91	99.63	98.60	97.67	95.90	94.97	94.60	94.13	93.85
65	9.314	108.1	99.81	99.07	98.06	97.04	96.58	96.30	96.11	95.74	95.56
66	9.371	106.9	100.09	99.53	98.60	97.66	96.07	95.42	95.14	94.95	94.67
67	9.363	108.4	99.82	99.35	98.34	97.05	95.94	95.39	95.11	94.83	94.56
68	9.217	109.8	99.91	99.45	98.54	97.54	95.90	95.54	95.17	94.81	94.44
69	9.180	109.3	100.18	99.45	98.44	97.26	96.52	96.16	95.70	95.33	95.15
70	9.030	111.7	99.91	99.28	98.21	97.40	96.51	95.97	95.61	95.17	94.99
71	9.398	107.8	100.09	99.54	98.70	97.96	96.47	95.64	95.27	94.99	94.81
72	9.250	108.8	100.09	99.36	98.44	97.52	96.32	95.31	94.85	94.39	94.21
73	9.234	110.6	100.27	99.64	98.64	97.65	95.84	95.48	94.94	94.48	94.21
74	9.598	109.6	100.18	99.45	98.27	97.45	96.81	96.44	95.89	95.53	95.26
75	9.190	109.6	100.18	99.54	98.72	97.81	97.35	96.81	96.26	95.89	95.62
Ave.	9.246	109.3	100.06	99.48	98.47	97.50	96.45	95.81	95.48	95.12	94.86
Med.	9.234	109.6	100.09	99.46	98.52	97.52	96.47	95.73	95.43	95.06	94.80
st dev	0.1420	1.3784	0.1739	0.1867	0.2357	0.2780	0.4861	0.5694	0.5564	0.5545	0.5409
Min.	8.994	106.9	99.81	99.07	98.01	97.04	95.78	94.87	94.50	94.13	93.85
Max.	9.598	111.7	100.45	100.00	99.01	98.19	97.39	96.81	96.46	96.09	95.64

TM-21 Projection:

Test Duration: 9,000 hours
Failures Observed: 0
α: 5.210E-06
β: 0.992
Reported L₇₀: >54,000 hours

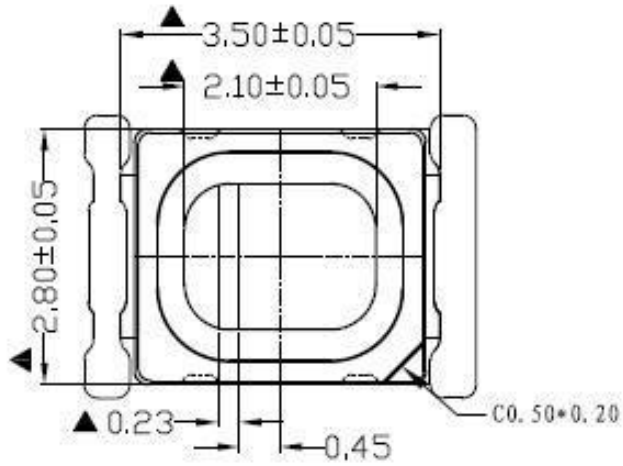
3.6 Data Set 3, 105 °C, 100mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs
51	0.2360	0.5154	3446	0.0004	0.0008	0.0012	0.0017	0.0021	0.0023	0.0025	0.0032	0.0035
52	0.2368	0.5134	3444	0.0004	0.0008	0.0012	0.0018	0.0021	0.0022	0.0025	0.0028	0.0030
53	0.2364	0.5163	3425	0.0004	0.0009	0.0017	0.0021	0.0032	0.0037	0.0039	0.0044	0.0048
54	0.2372	0.5166	3398	0.0006	0.0008	0.0012	0.0016	0.0019	0.0021	0.0023	0.0028	0.0028
55	0.2363	0.5157	3435	0.0006	0.0010	0.0015	0.0019	0.0036	0.0042	0.0045	0.0045	0.0048
56	0.2369	0.5165	3410	0.0006	0.0011	0.0017	0.0021	0.0030	0.0035	0.0038	0.0033	0.0036
57	0.2362	0.5154	3442	0.0006	0.0013	0.0020	0.0024	0.0026	0.0028	0.0030	0.0027	0.0025
58	0.2341	0.5153	3505	0.0006	0.0009	0.0013	0.0017	0.0017	0.0020	0.0022	0.0023	0.0024
59	0.2374	0.5151	3408	0.0006	0.0009	0.0014	0.0018	0.0018	0.0020	0.0022	0.0027	0.0026
60	0.2360	0.5144	3457	0.0006	0.0008	0.0013	0.0018	0.0020	0.0024	0.0027	0.0032	0.0037
61	0.2377	0.5134	3417	0.0006	0.0008	0.0013	0.0016	0.0018	0.0022	0.0025	0.0026	0.0030
62	0.2363	0.5145	3446	0.0005	0.0008	0.0013	0.0018	0.0018	0.0020	0.0022	0.0032	0.0037
63	0.2344	0.5143	3509	0.0006	0.0010	0.0016	0.0021	0.0029	0.0038	0.0041	0.0039	0.0043
64	0.2367	0.5163	3417	0.0005	0.0007	0.0013	0.0016	0.0032	0.0045	0.0047	0.0044	0.0048
65	0.2367	0.5168	3412	0.0007	0.0011	0.0016	0.0021	0.0026	0.0031	0.0034	0.0034	0.0037
66	0.2364	0.5147	3441	0.0005	0.0007	0.0012	0.0015	0.0019	0.0013	0.0016	0.0025	0.0022
67	0.2357	0.5161	3449	0.0004	0.0004	0.0006	0.0011	0.0012	0.0012	0.0015	0.0023	0.0024
68	0.2367	0.5156	3424	0.0006	0.0011	0.0012	0.0016	0.0017	0.0015	0.0018	0.0032	0.0035
69	0.2362	0.5177	3417	0.0005	0.0013	0.0013	0.0017	0.0019	0.0018	0.0021	0.0032	0.0034
70	0.2368	0.5160	3418	0.0006	0.0013	0.0019	0.0024	0.0034	0.0042	0.0045	0.0042	0.0047
71	0.2365	0.5181	3405	0.0005	0.0012	0.0016	0.0021	0.0022	0.0022	0.0025	0.0025	0.0027
72	0.2365	0.5169	3417	0.0005	0.0012	0.0019	0.0023	0.0036	0.0046	0.0049	0.0049	0.0054
73	0.2364	0.5161	3429	0.0004	0.0010	0.0015	0.0019	0.0035	0.0041	0.0044	0.0045	0.0047
74	0.2356	0.5151	3462	0.0006	0.0013	0.0021	0.0025	0.0034	0.0036	0.0039	0.0037	0.0041
75	0.2353	0.5152	3471	0.0006	0.0012	0.0015	0.0019	0.0024	0.0015	0.0017	0.0021	0.0020
Ave.	0.2363	0.5156	3436	0.0005	0.0010	0.0015	0.0019	0.0025	0.0027	0.0030	0.0033	0.0035
Med.	0.2364	0.5156	3429	0.0006	0.0010	0.0014	0.0018	0.0022	0.0023	0.0025	0.0032	0.0035
st dev	0.0008	0.0012	28.4673	0.0001	0.0002	0.0003	0.0003	0.0007	0.0011	0.0011	0.0008	0.0010
Min.	0.2341	0.5134	3398	0.0004	0.0004	0.0006	0.0011	0.0012	0.0012	0.0015	0.0021	0.0020
Max.	0.2377	0.5181	3509	0.0007	0.0013	0.0021	0.0025	0.0036	0.0046	0.0049	0.0049	0.0054



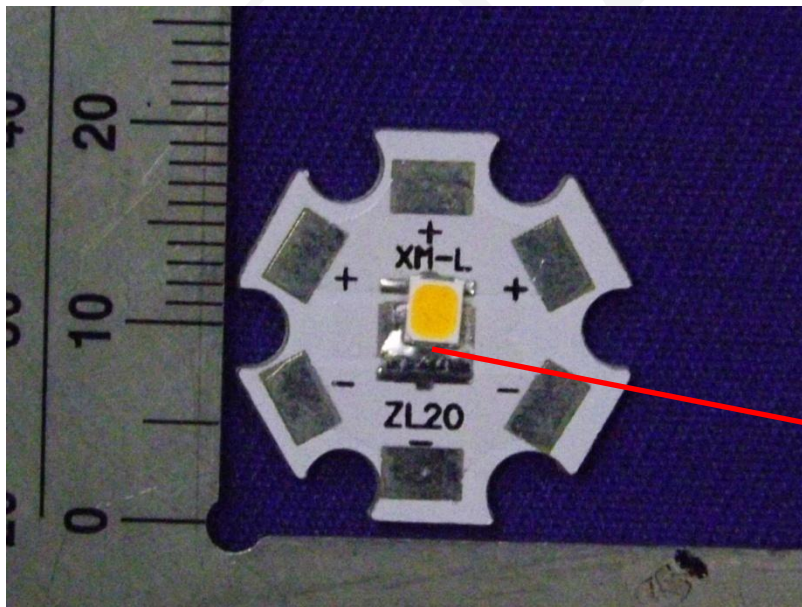
Attachment A – EUT PHOTO

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



All dimensions are in millimeter

A.2 EUT Photo



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