



IESNA LM-80-2008

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES

MEASUREMENT AND TEST REPORT

For

Queendom Group Technology Co., Ltd

Xinji Industrial Second Road Dafen Community, Wanjiang Street, Dongguan City, Guangdong Province.China.

Model: superflux piranha LEDs 0.2W

Report Type: 6000 Hours Test Report		Product Type: LED Package	
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Report Number:	R2DG161016059-10 superflux piranha LEDs		
Test Date:	2015-10-17 to 2016-06-24		
Report Date:	2016-06-25		
Reviewed By:	Jeanne Han /EE Manager <i>Jeanne Han</i>		
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.		



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: SU**W309DK
 Part Name: piranha 0.2W
 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	N/A	2014-08-05	2015-08-05
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	2014-10-27	2015-10-27
DC Power Supply	Taishan Xingguang	T0150E8.5-80	ST06605	0~5V,0~40A	2014-11-10	2015-11-10
DC Power Supply	Taishan Xingguang	T0150E8.5-80	ST06604	0~5V,0~40A	2014-11-10	2015-11-10

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
DC Power Supply	Taishan Xingguang	T0150E8.5-80	ST06607	0~5V,0~40A	2014-11-10	2015-11-10

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 75Pcs;

Each Ts test condition 25Pcs

The samples tested at $T_s 55^\circ\text{C}$, $T_s 85^\circ\text{C}$ and $T_s 105^\circ\text{C}$ were received at 2014-10-16 and tested during 2014-10-17 to 2015-06-24. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75

Data Set 1: 55°C , 60mA

Part Number:	SUB5W309DK
Number of Units:	25
Actual Case Temperature(T_s):	$T_s = 54.4^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A = 51.1^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

Data Set 2: 85°C , 60mA

Part Number:	SUB5W309DK
Number of Units:	25
Actual Case Temperature(T_s):	$T_s = 84.3^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A = 82.2^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

Data Set 3: 105°C , 60mA

Part Number:	SUB5W309DK
Number of Units:	25
Actual Case Temperature(T_s):	$T_s = 104.5^\circ\text{C}$
Actual Ambient Temperature(T_A):	$T_A = 103.2^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

2 - SUMMARY OF TEST RESULT

Data Set:	Data Set 1, 55°C , 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	97.47%
Average Chromaticity Shift at 6000 hours ($\Delta u'v'$):	0.0016
Reported TM-21 L ₇₀ Lifetime:	>36,000 hours

Data Set:	Data Set 2, 85°C, 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	96.81%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0020
Reported TM-21 L ₇₀ Lifetime:	>36,000 hours

Data Set:	Data Set 3, 105°C, 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	96.30%
Average Chromaticity Shift at 6000 hours($\Delta u'v'$):	0.0014
Reported TM-21 L ₇₀ Lifetime:	>36,000 hours

3 - Test Data

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

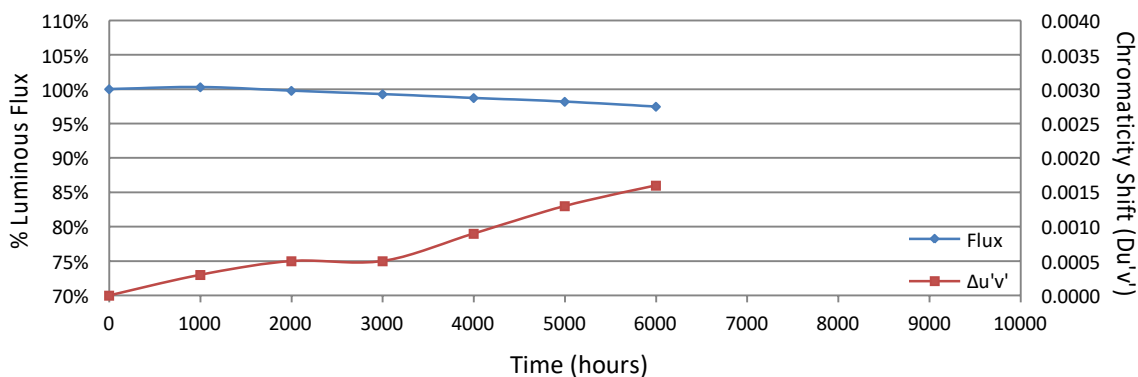
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	2.903	23.22	100.00	99.70	99.27	98.75	98.28	97.59
2	2.910	23.82	100.13	99.71	99.29	98.70	98.19	97.31
3	2.908	23.68	99.92	99.37	98.90	98.23	97.59	96.92
4	2.906	23.77	100.50	99.92	99.54	99.03	98.65	98.15
5	2.910	23.71	100.30	99.70	99.28	98.78	98.14	97.43
6	2.906	23.76	99.96	99.37	98.95	98.40	97.81	96.93
7	2.907	23.90	100.63	100.25	99.58	99.00	98.45	97.66
8	2.909	23.47	100.38	99.96	99.40	98.93	98.21	97.53
9	2.907	23.88	100.42	99.83	99.25	98.62	98.24	97.65
10	2.907	23.20	100.69	100.17	99.78	99.01	98.45	97.63
11	2.909	23.72	100.17	99.70	99.45	98.90	98.31	97.64
12	2.904	23.45	100.17	99.66	99.45	99.15	98.51	97.87
13	2.904	23.49	100.43	99.87	99.53	99.15	98.68	97.79
14	2.905	23.36	100.39	99.79	99.36	98.84	98.29	97.47
15	2.907	23.69	100.46	99.83	99.49	98.99	98.56	97.85
16	2.904	23.60	100.64	99.83	99.24	99.07	98.56	97.92
17	2.900	23.10	100.30	99.65	98.92	98.48	97.92	97.23
18	2.910	23.48	100.43	99.62	98.94	98.59	98.13	97.53
19	2.903	23.20	100.56	99.83	99.18	98.41	97.84	97.16
20	2.906	23.66	100.13	99.66	98.90	98.18	97.76	96.87
21	2.911	22.80	100.75	100.44	99.65	99.08	98.51	97.89
22	2.906	23.35	99.91	99.49	99.06	98.37	97.77	96.96
23	2.903	23.36	100.56	100.09	99.61	99.06	98.63	98.03
24	2.907	23.42	100.34	99.74	99.19	98.51	97.87	97.22
25	2.906	22.44	99.47	99.11	98.62	97.77	97.28	96.48
Ave.	2.906	23.46	100.30	99.77	99.27	98.72	98.19	97.47
Med.	2.906	23.48	100.38	99.74	99.28	98.78	98.24	97.53
st dev	0.0027	0.3422	0.2978	0.2845	0.2887	0.3559	0.3700	0.4158
Min.	2.900	22.44	99.47	99.11	98.62	97.77	97.28	96.48
Max.	2.911	23.90	100.75	100.44	99.78	99.15	98.68	98.15

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
α: 5.616E-06
β: 1.009
Calculated L₇₀: 65,000hours
Reported L₇₀: >36,000hours

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2526	0.5229	2942	0.0003	0.0006	0.0005	0.0009	0.0013	0.0019
2	0.2507	0.5227	2990	0.0003	0.0005	0.0006	0.0010	0.0013	0.0017
3	0.2518	0.5238	2955	0.0002	0.0003	0.0004	0.0010	0.0014	0.0017
4	0.2497	0.5233	3009	0.0004	0.0006	0.0005	0.0009	0.0012	0.0015
5	0.2510	0.5235	2976	0.0002	0.0005	0.0003	0.0009	0.0012	0.0018
6	0.2512	0.5230	2974	0.0003	0.0005	0.0004	0.0010	0.0014	0.0018
7	0.2507	0.5240	2980	0.0005	0.0007	0.0004	0.0008	0.0012	0.0015
8	0.2513	0.5221	2978	0.0003	0.0005	0.0005	0.0010	0.0014	0.0014
9	0.2521	0.5224	2957	0.0002	0.0005	0.0006	0.0011	0.0014	0.0016
10	0.2506	0.5219	2996	0.0003	0.0006	0.0004	0.0009	0.0013	0.0014
11	0.2521	0.5238	2948	0.0004	0.0005	0.0006	0.0010	0.0014	0.0016
12	0.2509	0.5227	2984	0.0004	0.0007	0.0004	0.0009	0.0012	0.0016
13	0.2502	0.5228	2999	0.0002	0.0005	0.0004	0.0010	0.0014	0.0016
14	0.2515	0.5234	2965	0.0002	0.0006	0.0004	0.0009	0.0012	0.0014
15	0.2523	0.5244	2941	0.0004	0.0005	0.0006	0.0010	0.0012	0.0018
16	0.2528	0.5245	2928	0.0003	0.0004	0.0005	0.0010	0.0013	0.0016
17	0.2538	0.5221	2919	0.0004	0.0005	0.0005	0.0009	0.0013	0.0017
18	0.2517	0.5202	2980	0.0003	0.0005	0.0005	0.0010	0.0014	0.0018
19	0.2523	0.5230	2949	0.0005	0.0006	0.0007	0.0010	0.0013	0.0017
20	0.2524	0.5235	2943	0.0002	0.0005	0.0009	0.0010	0.0014	0.0017
21	0.2498	0.5214	3020	0.0004	0.0006	0.0006	0.0008	0.0012	0.0017
22	0.2501	0.5202	3020	0.0002	0.0005	0.0006	0.0009	0.0011	0.0017
23	0.2497	0.5224	3014	0.0003	0.0005	0.0004	0.0007	0.0011	0.0013
24	0.2517	0.5235	2961	0.0004	0.0005	0.0007	0.0009	0.0011	0.0017
25	0.2513	0.5218	2980	0.0002	0.0005	0.0006	0.0009	0.0012	0.0018
Ave.	0.2514	0.5228	2972	0.0003	0.0005	0.0005	0.0009	0.0013	0.0016
Med.	0.2513	0.5229	2976	0.0003	0.0005	0.0005	0.0009	0.0013	0.0017
st dev	0.0011	0.0011	28.1332	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2497	0.5202	2919	0.0002	0.0003	0.0003	0.0007	0.0011	0.0013
Max.	0.2538	0.5245	3020	0.0005	0.0007	0.0009	0.0011	0.0014	0.0019



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

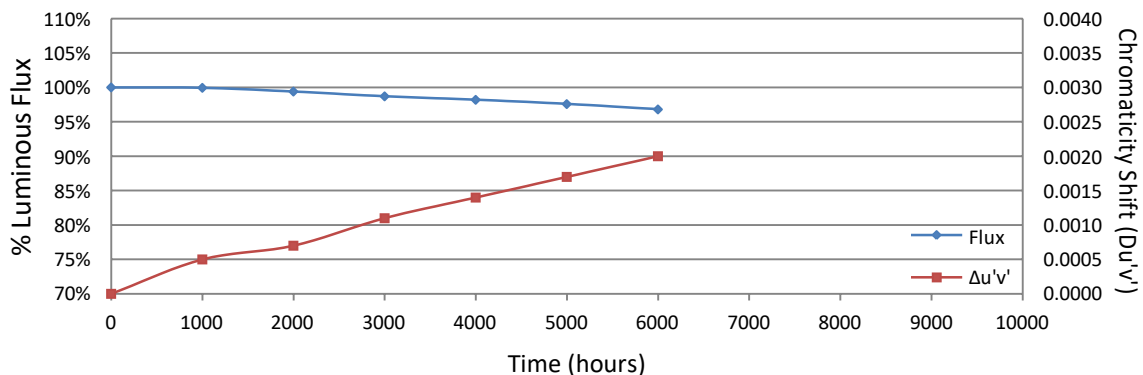
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
26	2.911	23.80	99.71	99.08	98.36	97.86	97.27	96.47
27	2.911	23.19	99.05	98.62	98.02	97.41	96.72	96.08
28	2.910	24.03	100.04	99.71	98.92	98.42	98.00	97.25
29	2.908	23.58	100.00	99.58	98.81	98.35	97.79	96.82
30	2.904	23.85	99.66	99.20	98.49	97.99	97.40	96.65
31	2.904	23.41	99.70	99.23	98.72	98.16	97.61	96.75
32	2.903	23.05	99.74	99.26	98.61	97.96	97.27	96.49
33	2.906	23.66	100.17	99.83	99.20	98.52	98.06	97.30
34	2.906	23.77	99.92	99.45	98.82	98.23	97.69	96.89
35	2.907	23.76	99.62	99.20	98.53	98.36	97.60	96.84
36	2.906	23.55	100.04	99.58	98.94	98.39	97.88	97.20
37	2.907	23.85	100.25	99.62	99.25	98.57	98.07	97.11
38	2.905	23.97	99.92	99.21	98.71	98.33	97.83	97.12
39	2.907	23.66	98.99	98.52	97.97	97.55	97.04	96.37
40	2.906	23.76	99.96	99.45	98.48	98.11	97.60	96.89
41	2.911	23.65	99.79	99.45	98.69	98.01	97.34	96.74
42	2.910	23.74	100.17	99.62	99.12	98.27	97.51	96.71
43	2.903	23.51	99.83	99.19	98.51	98.09	97.36	96.55
44	2.911	23.81	99.79	99.37	98.49	98.32	97.77	96.85
45	2.905	23.61	99.92	99.32	98.56	98.01	97.50	96.87
46	2.910	23.78	99.96	99.16	98.32	98.07	97.35	96.64
47	2.904	23.37	99.79	98.93	98.33	97.73	96.88	95.93
48	2.909	23.80	100.17	99.24	98.61	97.86	97.10	96.47
49	2.906	23.16	102.20	101.34	100.43	99.87	99.27	98.45
50	2.905	23.25	100.34	99.74	98.97	98.45	97.76	96.90
Ave.	2.907	23.62	99.95	99.40	98.71	98.20	97.59	96.81
Med.	2.906	23.66	99.92	99.32	98.61	98.16	97.60	96.82
st dev	0.0027	0.2571	0.5653	0.5134	0.4807	0.4554	0.4965	0.4763
Min.	2.903	23.05	98.99	98.52	97.97	97.41	96.72	95.93
Max.	2.911	24.03	102.20	101.34	100.43	99.87	99.27	98.45

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
α: 6.283E-06
β: 1.006
Calculated L₇₀: 58,000hours
Reported L₇₀: >36,000hours

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
26	0.2511	0.5222	2983	0.0005	0.0006	0.0008	0.0013	0.0015	0.0020
27	0.2517	0.5227	2965	0.0005	0.0006	0.0008	0.0013	0.0016	0.0019
28	0.2503	0.5222	3002	0.0006	0.0007	0.0009	0.0014	0.0017	0.0022
29	0.2513	0.5236	2968	0.0005	0.0006	0.0007	0.0012	0.0015	0.0019
30	0.2520	0.5225	2958	0.0005	0.0008	0.0010	0.0014	0.0018	0.0023
31	0.2542	0.5246	2895	0.0004	0.0005	0.0008	0.0012	0.0015	0.0019
32	0.2544	0.5234	2896	0.0004	0.0007	0.0009	0.0012	0.0016	0.0018
33	0.2532	0.5245	2918	0.0004	0.0005	0.0009	0.0011	0.0015	0.0017
34	0.2513	0.5236	2969	0.0004	0.0006	0.0009	0.0011	0.0015	0.0016
35	0.2530	0.5247	2922	0.0004	0.0006	0.0009	0.0011	0.0013	0.0017
36	0.2531	0.5230	2929	0.0005	0.0006	0.0010	0.0013	0.0016	0.0019
37	0.2508	0.5235	2982	0.0004	0.0008	0.0009	0.0011	0.0014	0.0016
38	0.2513	0.5248	2962	0.0004	0.0008	0.0011	0.0014	0.0017	0.0017
39	0.2519	0.5227	2960	0.0005	0.0008	0.0013	0.0015	0.0019	0.0018
40	0.2512	0.5231	2973	0.0004	0.0007	0.0012	0.0014	0.0017	0.0018
41	0.2532	0.5223	2931	0.0004	0.0006	0.0013	0.0014	0.0017	0.0017
42	0.2515	0.5211	2980	0.0004	0.0007	0.0013	0.0014	0.0018	0.0018
43	0.2531	0.5236	2926	0.0005	0.0006	0.0013	0.0014	0.0017	0.0019
44	0.2527	0.5228	2941	0.0005	0.0007	0.0013	0.0016	0.0020	0.0023
45	0.2528	0.5227	2938	0.0004	0.0007	0.0013	0.0016	0.0020	0.0023
46	0.2513	0.5226	2974	0.0004	0.0007	0.0015	0.0018	0.0021	0.0026
47	0.2541	0.5236	2903	0.0004	0.0007	0.0013	0.0017	0.0019	0.0023
48	0.2513	0.5211	2984	0.0005	0.0007	0.0012	0.0015	0.0017	0.0023
49	0.2495	0.5199	3036	0.0011	0.0010	0.0014	0.0016	0.0019	0.0022
50	0.2527	0.5234	2935	0.0002	0.0006	0.0013	0.0016	0.0019	0.0023
Ave.	0.2521	0.5230	2953	0.0005	0.0007	0.0011	0.0014	0.0017	0.0020
Med.	0.2519	0.5230	2960	0.0004	0.0007	0.0011	0.0014	0.0017	0.0019
st dev	0.0012	0.0012	34.2308	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003
Min.	0.2495	0.5199	2895	0.0002	0.0005	0.0007	0.0011	0.0013	0.0016
Max.	0.2544	0.5248	3036	0.0011	0.0010	0.0015	0.0018	0.0021	0.0026



3.5 Data Set 3, 105°C, 60 mA (Lumen Maintenance)

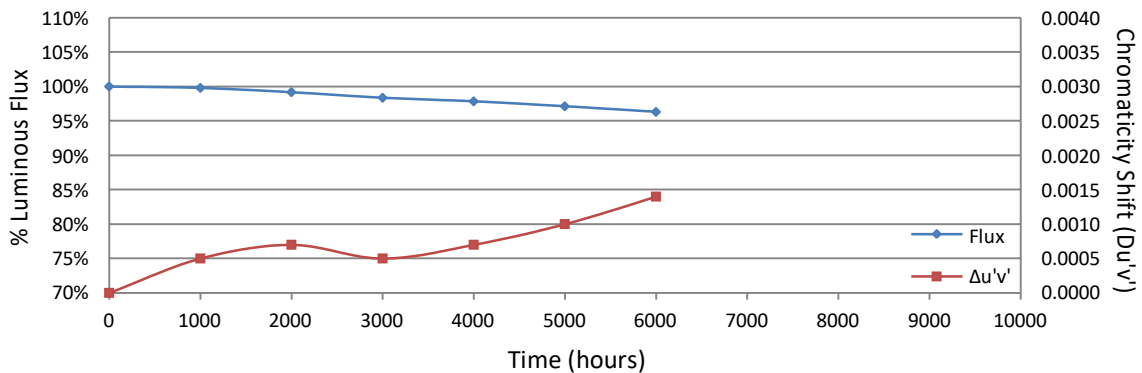
No.	V _F (V)	Φ(lm)	Lumen Maintenance (%)					
	Ohr(Initial)		1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	2.908	23.24	99.83	99.35	98.67	97.98	97.25	96.47
52	2.907	23.27	99.91	99.36	98.67	97.98	97.21	96.26
53	2.909	23.77	99.83	99.33	98.61	98.06	97.48	96.68
54	2.903	23.39	99.96	99.49	98.72	98.08	97.39	96.32
55	2.902	22.87	99.83	99.21	98.56	97.94	97.29	96.46
56	2.909	23.49	100.00	99.32	98.55	98.08	97.23	96.38
57	2.910	23.85	99.37	98.70	97.90	97.44	96.73	95.97
58	2.905	23.07	100.17	99.61	98.87	98.44	97.79	96.79
59	2.905	23.76	99.28	98.82	97.94	97.47	96.80	95.83
60	2.908	23.47	99.87	99.15	98.64	98.08	97.23	96.68
61	2.907	23.30	99.61	98.88	98.11	97.60	97.00	96.05
62	2.907	23.42	99.87	99.19	98.29	97.95	97.14	98.16
63	2.912	23.77	99.71	99.20	98.32	97.94	97.18	96.34
64	2.906	23.10	99.61	99.00	98.14	97.84	97.06	96.28
65	2.908	23.47	99.74	99.23	98.34	97.70	97.10	96.25
66	2.908	23.17	100.78	100.35	99.27	98.75	98.14	97.15
67	2.908	23.25	99.96	99.35	98.41	97.72	96.86	95.91
68	2.908	23.61	99.53	98.86	98.05	97.33	96.57	95.30
69	2.908	23.82	99.33	98.70	97.90	97.31	96.64	95.55
70	2.905	23.33	99.83	99.06	98.54	98.03	97.21	96.36
71	2.903	23.39	99.02	98.46	97.65	97.05	96.41	95.72
72	2.909	23.32	100.09	99.23	97.77	97.21	96.57	95.63
73	2.906	23.59	99.79	98.90	98.26	97.80	96.91	96.10
74	2.907	22.92	100.74	100.09	99.26	98.73	97.99	97.03
75	2.905	22.99	99.00	98.22	97.61	97.17	96.52	95.69
Ave.	2.907	23.39	99.79	99.16	98.36	97.83	97.11	96.30
Med.	2.907	23.39	99.83	99.20	98.34	97.94	97.14	96.28
st dev	0.0023	0.2808	0.4210	0.4540	0.4425	0.4425	0.4394	0.5995
Min.	2.902	22.87	99.00	98.22	97.61	97.05	96.41	95.30
Max.	2.912	23.85	100.78	100.35	99.27	98.75	98.14	98.16

TM-21 Projection:

Test Duration: 6000 hours
Failures Observed: 0
 α : 7.031E-06
 β : 1.005
Calculated L₇₀: 51,000 hours
Reported L₇₀: >36,000 hours

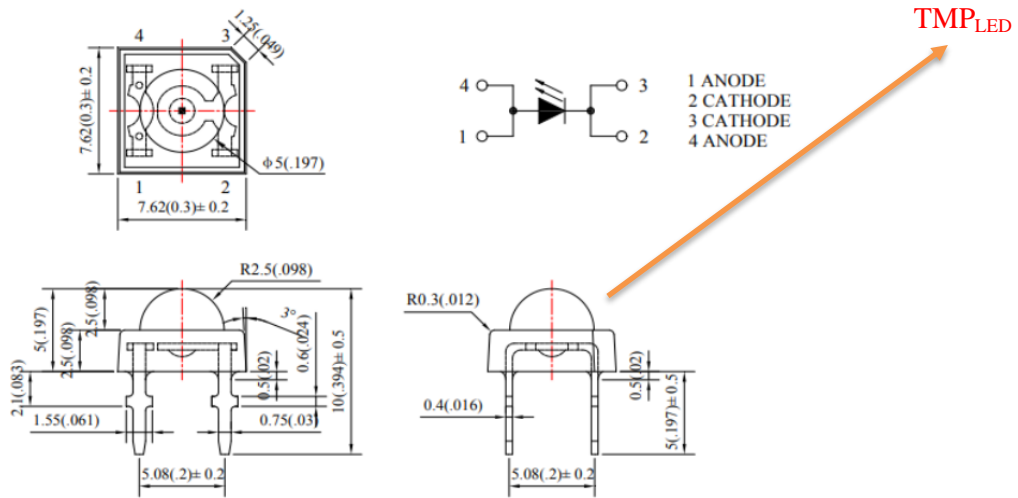
3.6 Data Set 3, 105°C, 60 mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
51	0.2533	0.5243	2919	0.0005	0.0006	0.0010	0.0007	0.0011	0.0017
52	0.2520	0.5240	2949	0.0007	0.0011	0.0008	0.0009	0.0013	0.0016
53	0.2497	0.5228	3012	0.0004	0.0007	0.0005	0.0007	0.0010	0.0015
54	0.2514	0.5219	2977	0.0006	0.0009	0.0003	0.0005	0.0009	0.0012
55	0.2503	0.5205	3013	0.0005	0.0008	0.0003	0.0006	0.0010	0.0012
56	0.2514	0.5222	2973	0.0004	0.0007	0.0004	0.0006	0.0010	0.0013
57	0.2487	0.5202	3054	0.0005	0.0006	0.0004	0.0006	0.0010	0.0013
58	0.2504	0.5216	3003	0.0005	0.0007	0.0004	0.0007	0.0010	0.0013
59	0.2505	0.5234	2989	0.0005	0.0006	0.0005	0.0008	0.0011	0.0013
60	0.2517	0.5224	2966	0.0005	0.0006	0.0004	0.0007	0.0011	0.0021
61	0.2513	0.5231	2972	0.0005	0.0006	0.0005	0.0006	0.0010	0.0015
62	0.2508	0.5235	2981	0.0005	0.0007	0.0004	0.0007	0.0011	0.0014
63	0.2518	0.5220	2966	0.0004	0.0008	0.0004	0.0007	0.0010	0.0013
64	0.2517	0.5228	2964	0.0003	0.0006	0.0002	0.0006	0.0009	0.0012
65	0.2511	0.5227	2979	0.0006	0.0008	0.0004	0.0007	0.0011	0.0014
66	0.2526	0.5244	2934	0.0005	0.0009	0.0002	0.0007	0.0010	0.0010
67	0.2520	0.5243	2947	0.0004	0.0007	0.0003	0.0006	0.0010	0.0012
68	0.2500	0.5213	3014	0.0004	0.0007	0.0003	0.0005	0.0009	0.0013
69	0.2496	0.5195	3038	0.0005	0.0007	0.0005	0.0007	0.0011	0.0013
70	0.2505	0.5224	2996	0.0004	0.0006	0.0004	0.0006	0.0010	0.0012
71	0.2539	0.5231	2911	0.0004	0.0005	0.0006	0.0006	0.0010	0.0014
72	0.2506	0.5236	2986	0.0005	0.0004	0.0009	0.0008	0.0010	0.0020
73	0.2526	0.5242	2934	0.0005	0.0008	0.0004	0.0007	0.0011	0.0017
74	0.2525	0.5222	2948	0.0005	0.0007	0.0004	0.0007	0.0010	0.0017
75	0.2538	0.5240	2908	0.0003	0.0005	0.0006	0.0005	0.0009	0.0014
Ave.	0.2514	0.5227	2973	0.0005	0.0007	0.0005	0.0007	0.0010	0.0014
Med.	0.2514	0.5228	2973	0.0005	0.0007	0.0004	0.0007	0.0010	0.0013
st dev	0.0013	0.0013	37.4385	0.0001	0.0001	0.0002	0.0001	0.0001	0.0003
Min.	0.2487	0.5195	2908	0.0003	0.0004	0.0002	0.0005	0.0009	0.0010
Max.	0.2539	0.5244	3054	0.0007	0.0011	0.0010	0.0009	0.0013	0.0021



Appendix A – EUT PHOTO

A.1 Mechanical Dimensions (Ta = 25°C)



All dimensions are in millimeter

4.2 DUT Photo

