



TEST REPORT

ACCORDING TO IES LM-80-2015
For

Shenzhen Runlite Technology Co., Ltd

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

Model: CP2017M09-0904WWC1P0P1FM0M3-0000

Report Type: 6000 Hours Test Report		Product Type: LED Array	
Test Engineer:	Pote Wang	<i>Pote Wang</i>	
Report Number:	RSZ161024501-10		
Test Date:	2016-10-26 to 2017-07-03		
Report Date:	2017-07-27		
Reviewed By:	Daniel Duan / EE Manager	<i>Daniel Duan</i>	
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.		
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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

Sample Size:

72 PCS samples were received on 2016-10-24.

Manufacturer: Shenzhen Runlite Technology Co., Ltd
 Part Number: CP2017M09-0904WWC1P0P1FM0M3-0000
 Part Type: LED Array
 Drive Level: DC 300mA
 Nominal CCT: 3000K, 4000K, 6000K

The EUT is designed color tunable within the range 3000K to 6000K. Data set 1 and 2, corresponding to sample No. 01-24, were aged and tested at 3000K only. Date set 5 and 6, corresponding to sample No. 49-72, were aged and tested at 6000K only. Date set 3 and 4, corresponding to sample No. 25-48, were aged and tested at total input current 300mA for both of 3000K and 6000K.

1.2 Standards Used:

- IESNA LM-80-15: 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 Testing 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	2017-07-07	2018-07-07
spectroradiometer	SENSING	SCD-20008	N/A	N/A	2017-07-07	2018-07-07
DC Power Supply	Hanshenpuyuan	HSPY-100-05	2013010210003	N/A	2017-05-05	2018-05-05
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-13
Multilayer aging machine	BACL	B2-270	20013	25°C~130°C	2016-09-01	2017-09-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090005	(50/15A)	2017-03-03	2018-03-03
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090006	(50/15A)	2017-03-03	2018-03-03

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090009	(50/15A)	2016-12-15	2017-12-15

1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within $\pm 3\%$ of the specified value of the manufacturer during maintenance test, and was within $\pm 0.5\%$ during photometric and electrical measurement test.

1.5 Ambient Conditions for Maintenance Test

For lumen maintenance test, samples within one data set, were installed on cooling boards in thermal chambers with minimal ambient airflow. The case temperature and ambient temperature was monitored by thermocouples which one was soldered to the coldest DUTs' case (TMP_{LED}) location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP_{LED} of the coldest LEDs were 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. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within $\pm 3\%$ of the specified value of the manufacturer.

The relative humidity within chamber was kept less than 65% during test.

For photometry measurement, the ambient temperature during test was set to $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, RH <65%.

1.6 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.

The uncertainty of the temperature is $U=0.8671^{\circ}\text{C}$ ($K=2$), at the 95% confidence level.

1.7 Statement of Traceability

Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

1.8 Sample Set

Data Set 1: 85°C,300mA (3000K)

Part Number: CP2017M09-0904WWC1P0P1FM0M3-0000
Number of Units: 12
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 300mA
Measurement Current: 300mA

Data Set 2: 105°C,300mA (3000K)

Part Number: CP2017M09-0904WWC1P0P1FM0M3-0000
Number of Units: 12
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 300mA
Measurement Current: 300mA

Data Set 3: 85°C,300mA (4000K)

Part Number: CP2017M09-0904WWC1P0P1FM0M3-0000
Number of Units: 12
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 300mA
Measurement Current: 300mA

Data Set 4: 105°C,300mA (4000K)

Part Number: CP2017M09-0904WWC1P0P1FM0M3-0000
Number of Units: 12
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 300mA
Measurement Current: 300mA

Data Set 5: 85°C,300mA (6000K)

Part Number: CP2017M09-0904WWC1P0P1FM0M3-0000
Number of Units: 12
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 300mA
Measurement Current: 300mA

Data Set 6: 105°C,300mA (6000K)

Part Number: CP2017M09-0904WWC1P0P1FM0M3-0000

Number of Units: 12

Case Temperature: >103°C

Ambient Temperature: >100°C

Life Test Drive Current: 300mA

Measurement Current: 300mA

FINAL

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval(hours)	Test Duration(hours)	Reported TM-21 L ₇₀ Lifetime
1	12	0	1000	6000	>33000hours
2	12	0	1000	6000	>33000hours
3	12	0	1000	6000	>33000hours
4	12	0	1000	6000	>33000hours
5	12	0	1000	6000	>33000hours
6	12	0	1000	6000	>33000hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000
1	100.02%	99.72%	99.44%	99.00%	98.56%	98.22%
2	99.77%	99.40%	98.93%	98.14%	97.34%	96.95%
3	99.73%	99.51%	99.31%	99.00%	98.69%	98.32%
4	99.63%	99.25%	98.99%	98.47%	97.94%	97.57%
5	99.78%	99.59%	99.41%	98.99%	98.57%	98.20%
6	99.44%	98.89%	98.52%	97.92%	97.36%	97.09%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000
1	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011
2	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014
3	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017
4	0.0006	0.0008	0.0010	0.0013	0.0016	0.0019
5	0.0002	0.0004	0.0007	0.0008	0.0010	0.0012
6	0.0004	0.0007	0.0009	0.0011	0.0014	0.0016

3 - Test Data

3.1 Data Set 1, 85°C, 300mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	1100.65	100.11	99.73	99.33	98.99	98.66	98.46
2	1106.80	100.02	99.68	99.59	99.05	98.50	97.92
3	1106.80	99.85	99.63	99.22	98.82	98.43	98.04
4	1106.53	100.25	99.95	99.69	99.09	98.49	98.12
5	1105.04	100.04	99.84	99.56	99.03	98.52	98.07
6	1112.61	99.81	99.48	99.16	98.62	98.09	97.84
7	1107.88	99.93	99.59	99.34	98.92	98.48	97.90
8	1107.21	100.03	99.72	99.46	99.07	98.66	98.26
9	1102.88	100.27	100.02	99.77	99.52	99.26	99.00
10	1105.99	100.23	99.89	99.57	99.14	98.70	98.44
11	1105.04	99.85	99.53	99.21	98.73	98.23	97.95
12	1107.48	99.91	99.60	99.34	99.03	98.72	98.67
Ave.	1106.24	100.02	99.72	99.44	99.00	98.56	98.22
Med.	1106.67	100.02	99.70	99.40	99.03	98.51	98.09
st dev	2.89	0.1630	0.1706	0.2007	0.2265	0.2879	0.3573
Min.	1100.65	99.81	99.48	99.16	98.62	98.09	97.84
Max.	1112.61	100.27	100.02	99.77	99.52	99.26	99.00

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 3.724E-06

β: 1.005

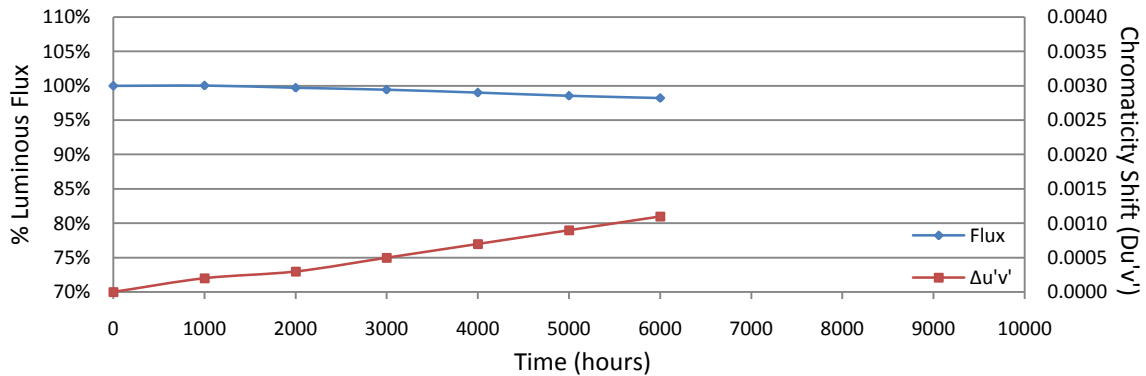
Reported L₇₀: >33000 hours

3.2 Data Set 1, 85°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	28.36	28.39	28.28	28.43	28.34	28.55	28.40
2	28.55	28.38	28.30	28.41	28.30	28.50	28.30
3	28.56	28.55	28.27	28.39	28.29	28.48	28.31
4	28.41	28.36	28.24	28.39	28.27	28.44	28.30
5	28.38	28.41	28.22	28.43	28.25	28.45	28.28
6	28.44	28.40	28.21	28.41	28.24	28.43	28.27
7	28.37	28.33	28.21	28.39	28.24	28.43	28.27
8	28.27	28.24	28.19	28.39	28.24	28.41	28.29
9	28.58	28.34	28.18	28.38	28.25	28.43	28.32
10	28.52	28.32	28.19	28.38	28.25	28.42	28.31
11	28.69	28.51	28.19	28.39	28.24	28.43	28.29
12	28.69	28.54	28.19	28.38	28.25	28.41	28.31
Ave.	28.49	28.40	28.22	28.40	28.26	28.45	28.30
Med.	28.48	28.39	28.21	28.39	28.25	28.43	28.30
st dev	0.13	0.09	0.04	0.02	0.03	0.04	0.03
Min.	28.27	28.24	28.18	28.38	28.24	28.41	28.27
Max.	28.69	28.55	28.30	28.43	28.34	28.55	28.40

3.3 Data Set 1, 85°C, 300mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
1	0.2450	0.5211	3144	0.0002	0.0001	0.0003	0.0005	0.0008	0.0011
2	0.2454	0.5217	3130	0.0001	0.0004	0.0006	0.0009	0.0011	0.0012
3	0.2458	0.5218	3118	0.0002	0.0005	0.0007	0.0011	0.0013	0.0016
4	0.2459	0.5215	3118	0.0002	0.0002	0.0003	0.0004	0.0004	0.0004
5	0.2453	0.5210	3138	0.0002	0.0004	0.0006	0.0008	0.0009	0.0010
6	0.2454	0.5218	3128	0.0001	0.0002	0.0005	0.0007	0.0010	0.0013
7	0.2445	0.5210	3156	0.0001	0.0002	0.0003	0.0005	0.0005	0.0005
8	0.2456	0.5207	3132	0.0001	0.0004	0.0004	0.0006	0.0008	0.0010
9	0.2462	0.5215	3110	0.0001	0.0004	0.0005	0.0007	0.0008	0.0010
10	0.2447	0.5211	3152	0.0001	0.0001	0.0002	0.0004	0.0006	0.0009
11	0.2467	0.5221	3092	0.0001	0.0004	0.0005	0.0007	0.0009	0.0012
12	0.2457	0.5220	3120	0.0002	0.0005	0.0006	0.0008	0.0011	0.0014
Ave.	0.2455	0.5214	3128	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011
Med.	0.2455	0.5215	3129	0.0001	0.0004	0.0005	0.0007	0.0009	0.0011
st dev	0.0006	0.0005	18	0.0000	0.0001	0.0002	0.0002	0.0003	0.0003
Min.	0.2445	0.5207	3092	0.0001	0.0001	0.0002	0.0004	0.0004	0.0004
Max.	0.2467	0.5221	3156	0.0002	0.0005	0.0007	0.0011	0.0013	0.0016



3.4 Data Set 2, 105°C, 300mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
13	1107.07	99.97	99.52	98.97	98.04	97.09	96.78
14	1109.64	100.02	99.75	99.18	98.59	97.99	97.78
15	1104.50	99.55	99.25	98.88	97.91	96.93	96.63
16	1117.21	99.53	99.14	98.66	97.86	97.06	96.93
17	1109.91	100.09	99.81	99.39	98.57	97.71	97.08
18	1109.50	99.80	99.38	98.91	98.06	97.18	96.73
19	1118.16	99.99	99.64	99.23	98.38	97.50	97.32
20	1105.45	99.74	99.29	98.81	98.11	97.40	96.59
21	1079.90	99.68	99.31	98.95	98.17	97.40	97.11
22	1106.13	99.46	99.13	98.66	97.96	97.26	97.07
23	1104.10	99.57	99.16	98.57	97.83	97.09	96.59
24	1103.69	99.79	99.47	98.98	98.24	97.52	96.81
Ave.	1106.27	99.77	99.40	98.93	98.14	97.34	96.95
Med.	1106.60	99.76	99.34	98.93	98.09	97.33	96.87
st dev	9.57	0.2145	0.2341	0.2452	0.2590	0.3069	0.3500
Min.	1079.90	99.46	99.13	98.57	97.83	96.93	96.59
Max.	1118.16	100.09	99.81	99.39	98.59	97.99	97.78

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 6.120E-06

β: 1.005

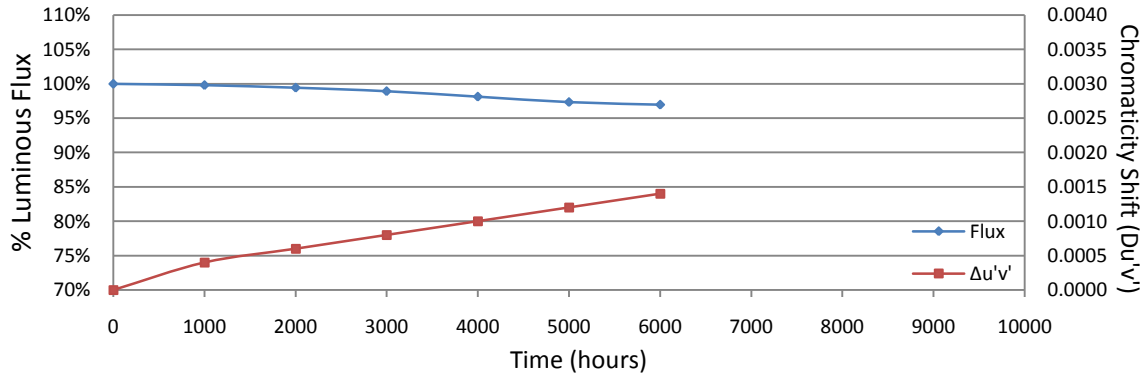
Reported L₇₀: >33000 hours

3.5 Data Set 2, 105°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
13	28.48	28.43	28.43	28.28	28.28	28.54	28.43
14	28.64	28.33	28.41	28.30	28.26	28.50	28.41
15	28.48	28.37	28.39	28.27	28.24	28.46	28.39
16	28.64	28.35	28.39	28.24	28.23	28.44	28.37
17	28.32	28.32	28.38	28.22	28.22	28.41	28.36
18	28.28	28.28	28.38	28.21	28.22	28.42	28.36
19	28.23	28.32	28.40	28.21	28.22	28.41	28.34
20	28.46	28.48	28.39	28.28	28.28	28.40	28.47
21	28.85	28.22	28.37	28.30	28.24	28.39	28.41
22	28.47	28.50	28.38	28.24	28.22	28.39	28.36
23	28.40	28.30	28.39	28.22	28.19	28.39	28.29
24	28.32	28.35	28.38	28.21	28.22	28.39	28.36
Ave.	28.46	28.35	28.39	28.25	28.24	28.43	28.38
Med.	28.47	28.34	28.39	28.24	28.23	28.41	28.37
st dev	0.18	0.08	0.02	0.04	0.03	0.05	0.05
Min.	28.23	28.22	28.37	28.21	28.19	28.39	28.29
Max.	28.85	28.50	28.43	28.30	28.28	28.54	28.47

3.6 Data Set 2, 105°C, 300mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
13	0.2459	0.5215	3118	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016
14	0.2450	0.5213	3142	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014
15	0.2459	0.5219	3114	0.0001	0.0003	0.0004	0.0005	0.0007	0.0009
16	0.2448	0.5215	3146	0.0005	0.0009	0.0011	0.0011	0.0012	0.0014
17	0.2451	0.5219	3136	0.0006	0.0006	0.0008	0.0009	0.0011	0.0013
18	0.2456	0.5211	3128	0.0004	0.0007	0.0009	0.0010	0.0014	0.0017
19	0.2455	0.5217	3128	0.0004	0.0004	0.0006	0.0008	0.0010	0.0012
20	0.2456	0.5217	3124	0.0003	0.0005	0.0006	0.0015	0.0016	0.0017
21	0.2461	0.5212	3114	0.0007	0.0010	0.0012	0.0006	0.0007	0.0009
22	0.2460	0.5217	3114	0.0002	0.0003	0.0004	0.0010	0.0012	0.0014
23	0.2459	0.5219	3114	0.0005	0.0005	0.0007	0.0014	0.0016	0.0018
24	0.2457	0.5217	3122	0.0004	0.0007	0.0008	0.0007	0.0009	0.0010
Ave.	0.2456	0.5216	3125	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014
Med.	0.2457	0.5217	3123	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014
st dev	0.0004	0.0003	11	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003
Min.	0.2448	0.5211	3114	0.0001	0.0003	0.0004	0.0005	0.0007	0.0009
Max.	0.2461	0.5219	3146	0.0007	0.0010	0.0012	0.0015	0.0016	0.0018



3.7 Data Set 3, 85°C, 300mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
25	1257.93	99.37	99.26	99.03	98.51	98.00	97.51
26	1252.11	99.55	99.37	99.22	98.83	98.43	98.11
27	1263.74	99.17	99.01	98.88	98.54	98.20	97.77
28	1256.98	99.94	99.73	99.59	99.36	99.13	98.52
29	1262.12	99.98	99.65	99.45	99.06	98.66	98.34
30	1259.68	99.92	99.74	99.42	99.22	99.02	98.67
31	1257.38	99.81	99.62	99.42	99.12	98.81	98.56
32	1257.52	99.76	99.50	99.28	99.08	98.87	98.57
33	1259.28	99.72	99.45	99.20	98.97	98.73	98.38
34	1235.89	100.10	99.88	99.62	99.39	99.16	98.84
35	1248.46	99.84	99.58	99.45	99.10	98.74	98.33
36	1252.25	99.55	99.38	99.10	98.84	98.57	98.27
Ave.	1255.28	99.73	99.51	99.31	99.00	98.69	98.32
Med.	1257.45	99.78	99.54	99.35	99.07	98.73	98.36
st dev	7.48	0.2693	0.2400	0.2270	0.2825	0.3540	0.3763
Min.	1235.89	99.17	99.01	98.88	98.51	98.00	97.51
Max.	1263.74	100.10	99.88	99.62	99.39	99.16	98.84

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 2.833E-06

β: 1.001

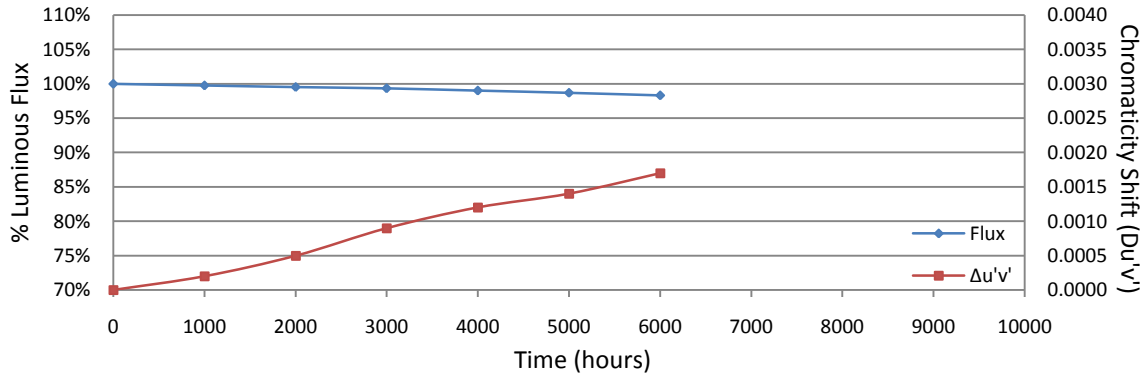
Reported L₇₀: >33000 hours

3.8 Data Set 3, 85°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
25	26.39	26.40	26.39	26.72	26.63	26.42	26.57
26	26.64	26.41	26.39	26.71	26.60	26.40	26.51
27	26.42	26.41	26.40	26.88	26.60	26.39	26.50
28	26.95	26.47	26.38	26.67	26.58	26.39	26.48
29	26.58	26.64	26.37	26.56	26.58	26.37	26.49
30	26.60	26.48	26.37	26.84	26.57	26.37	26.47
31	26.64	26.52	26.39	26.78	26.57	26.36	26.45
32	26.62	26.50	26.38	26.71	26.56	26.37	26.44
33	26.36	26.39	26.37	26.67	26.56	26.37	26.45
34	26.45	26.47	26.37	26.65	26.56	26.37	26.45
35	26.43	26.41	26.37	26.63	26.56	26.36	26.45
36	26.52	26.63	26.37	26.59	26.56	26.36	26.45
Ave.	26.55	26.48	26.38	26.70	26.58	26.38	26.48
Med.	26.55	26.47	26.38	26.69	26.57	26.37	26.46
st dev	0.16	0.08	0.01	0.10	0.02	0.02	0.04
Min.	26.36	26.39	26.37	26.56	26.56	26.36	26.44
Max.	26.95	26.64	26.40	26.88	26.63	26.42	26.57

3.9 Data Set 3, 85°C, 300mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
25	0.2205	0.4969	4272	0.0001	0.0006	0.0010	0.0013	0.0016	0.0019
26	0.2190	0.4948	4378	0.0002	0.0004	0.0011	0.0016	0.0019	0.0023
27	0.2201	0.4969	4286	0.0001	0.0003	0.0007	0.0011	0.0013	0.0016
28	0.2206	0.4972	4262	0.0002	0.0006	0.0013	0.0016	0.0019	0.0023
29	0.2199	0.4964	4306	0.0003	0.0004	0.0008	0.0009	0.0013	0.0016
30	0.2199	0.4962	4310	0.0001	0.0004	0.0008	0.0009	0.0013	0.0017
31	0.2203	0.4974	4270	0.0001	0.0006	0.0011	0.0012	0.0014	0.0016
32	0.2194	0.4956	4344	0.0000	0.0004	0.0008	0.0011	0.0014	0.0016
33	0.2201	0.4964	4296	0.0001	0.0003	0.0006	0.0009	0.0011	0.0013
34	0.2190	0.4951	4374	0.0001	0.0004	0.0009	0.0012	0.0014	0.0017
35	0.2198	0.4949	4344	0.0001	0.0002	0.0003	0.0004	0.0007	0.0009
36	0.2205	0.4975	4260	0.0003	0.0008	0.0013	0.0016	0.0018	0.0020
Ave.	0.2199	0.4963	4309	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017
Med.	0.2200	0.4964	4301	0.0001	0.0004	0.0009	0.0012	0.0014	0.0016
st dev	0.0005	0.0010	42	0.0001	0.0002	0.0003	0.0003	0.0004	0.0004
Min.	0.2190	0.4948	4260	0.0000	0.0002	0.0003	0.0004	0.0007	0.0009
Max.	0.2206	0.4975	4378	0.0003	0.0008	0.0013	0.0016	0.0019	0.0023



3.10 Data Set 4, 105°C, 300mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
37	1251.03	99.46	99.18	98.83	98.17	97.51	97.35
38	1265.09	99.29	98.91	98.80	98.20	97.60	97.46
39	1251.71	99.34	99.03	98.79	98.27	97.76	97.40
40	1262.39	99.59	99.19	98.96	98.58	98.19	97.88
41	1254.14	99.80	99.49	99.24	98.89	98.54	97.99
42	1250.90	99.62	99.25	98.99	98.47	97.94	97.81
43	1261.30	99.54	99.15	98.91	98.52	98.13	97.69
44	1257.52	99.68	99.19	98.93	98.43	97.90	97.51
45	1257.93	99.77	99.33	99.09	98.32	97.53	96.81
46	1259.01	99.64	99.28	99.00	98.35	97.71	97.48
47	1253.87	99.85	99.47	99.18	98.69	98.19	97.71
48	1246.16	99.97	99.52	99.20	98.77	98.32	97.80
Ave.	1255.92	99.63	99.25	98.99	98.47	97.94	97.57
Med.	1255.83	99.63	99.22	98.98	98.45	97.92	97.60
st dev	5.56	0.2022	0.1837	0.1545	0.2266	0.3336	0.3143
Min.	1246.16	99.29	98.91	98.79	98.17	97.51	96.81
Max.	1265.09	99.97	99.52	99.24	98.89	98.54	97.99

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 4.274E-06

β: 1.001

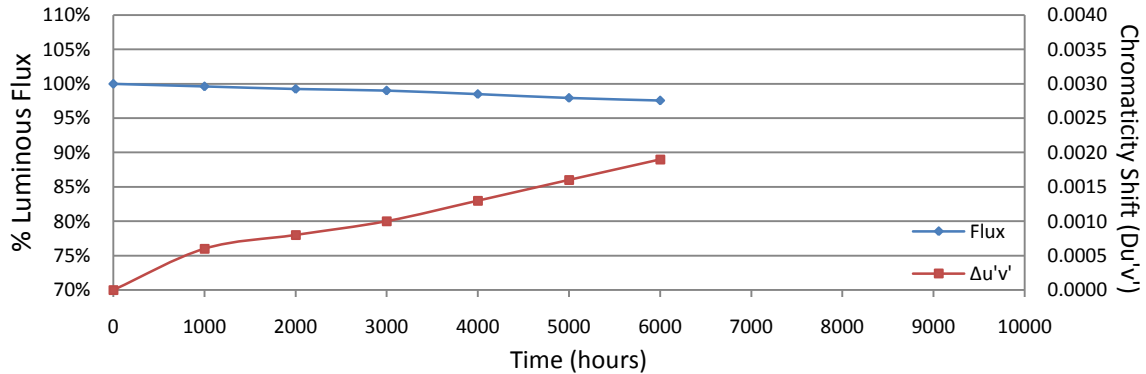
Reported L₇₀: >33000 hours

3.11 Data Set 4, 105°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
37	26.51	26.50	26.54	26.87	26.59	26.40	26.34
38	26.44	26.44	26.48	26.76	26.70	26.38	26.62
39	26.49	26.54	26.50	26.72	26.68	26.36	26.56
40	26.34	26.52	26.47	26.70	26.67	26.36	26.57
41	26.38	26.46	26.46	26.67	26.70	26.36	26.64
42	26.36	26.41	26.45	26.79	26.67	26.36	26.59
43	26.47	26.50	26.45	26.77	26.65	26.36	26.55
44	26.47	26.65	26.45	26.72	26.65	26.36	26.55
45	26.37	26.37	26.45	26.67	26.64	26.36	26.53
46	26.50	26.58	26.45	26.65	26.64	26.36	26.53
47	26.41	26.48	26.46	26.62	26.67	26.35	26.58
48	26.36	26.46	26.46	26.60	26.65	26.34	26.54
Ave.	26.43	26.49	26.47	26.71	26.66	26.36	26.55
Med.	26.43	26.49	26.46	26.71	26.66	26.36	26.56
st dev	0.06	0.08	0.03	0.08	0.03	0.01	0.07
Min.	26.34	26.37	26.45	26.60	26.59	26.34	26.34
Max.	26.51	26.65	26.54	26.87	26.70	26.40	26.64

3.12 Data Set 4, 105°C, 300mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
37	0.2206	0.4970	4264	0.0004	0.0008	0.0010	0.0011	0.0016	0.0021
38	0.2205	0.4974	4258	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019
39	0.2204	0.4966	4280	0.0005	0.0009	0.0010	0.0013	0.0015	0.0018
40	0.2203	0.4971	4272	0.0007	0.0010	0.0018	0.0020	0.0022	0.0024
41	0.2201	0.4957	4312	0.0005	0.0006	0.0009	0.0011	0.0013	0.0016
42	0.2197	0.4954	4334	0.0006	0.0007	0.0009	0.0012	0.0013	0.0015
43	0.2200	0.4973	4280	0.0005	0.0006	0.0008	0.0012	0.0014	0.0017
44	0.2206	0.4975	4254	0.0008	0.0010	0.0011	0.0014	0.0017	0.0020
45	0.2202	0.4962	4296	0.0005	0.0006	0.0009	0.0013	0.0015	0.0018
46	0.2205	0.4978	4248	0.0004	0.0008	0.0009	0.0012	0.0014	0.0017
47	0.2199	0.4963	4306	0.0007	0.0008	0.0009	0.0012	0.0015	0.0018
48	0.2209	0.4969	4254	0.0007	0.0010	0.0011	0.0014	0.0016	0.0018
Ave.	0.2203	0.4968	4280	0.0006	0.0008	0.0010	0.0013	0.0016	0.0019
Med.	0.2204	0.4970	4276	0.0005	0.0008	0.0010	0.0012	0.0015	0.0018
st dev	0.0003	0.0007	27	0.0001	0.0001	0.0003	0.0002	0.0002	0.0002
Min.	0.2197	0.4954	4248	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015
Max.	0.2209	0.4978	4334	0.0008	0.0010	0.0018	0.0020	0.0022	0.0024



3.13 Data Set 5, 85°C, 300mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
49	1166.28	99.49	99.14	98.96	98.53	98.11	97.75
50	1177.77	99.59	99.44	99.22	98.53	97.85	97.68
51	1181.69	100.04	99.87	99.61	99.16	98.73	98.67
52	1182.36	100.09	99.92	99.75	99.31	98.86	98.36
53	1178.17	100.07	99.82	99.66	99.26	98.86	98.37
54	1174.25	100.05	99.84	99.66	99.36	99.07	98.52
55	1181.55	99.78	99.57	99.41	98.96	98.53	97.80
56	1187.36	99.56	99.47	99.35	99.00	98.65	98.31
57	1173.98	99.53	99.27	99.18	98.86	98.55	98.43
58	1188.04	99.43	99.34	99.22	98.68	98.14	97.78
59	1185.74	99.96	99.79	99.63	99.22	98.82	98.50
60	1188.04	99.81	99.56	99.34	99.00	98.66	98.18
Ave.	1180.44	99.78	99.59	99.41	98.99	98.57	98.20
Med.	1181.62	99.79	99.57	99.38	99.00	98.66	98.33
st dev	6.68	0.2545	0.2604	0.2464	0.2896	0.3622	0.3494
Min.	1166.28	99.43	99.14	98.96	98.53	97.85	97.68
Max.	1188.04	100.09	99.92	99.75	99.36	99.07	98.67

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 3.284E-06

β: 1.002

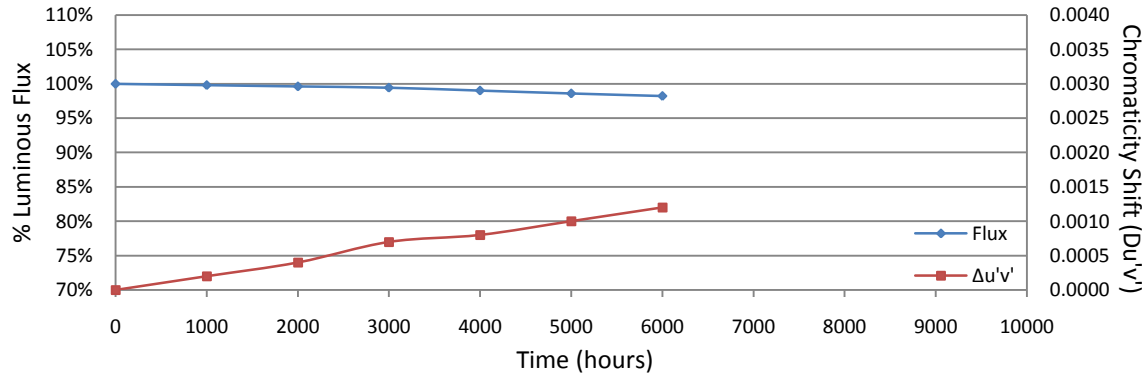
Reported L₇₀: >33000 hours

3.14 Data Set 5, 85°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
49	28.44	28.57	28.46	28.46	28.86	28.48	28.50
50	28.59	28.45	28.44	28.44	28.85	28.45	28.46
51	28.55	28.72	28.44	28.44	28.83	28.43	28.42
52	28.57	28.63	28.43	28.43	28.83	28.41	28.39
53	28.44	28.51	28.48	28.48	28.83	28.41	28.34
54	28.72	28.63	28.44	28.46	28.81	28.40	28.34
55	28.37	28.39	28.44	28.44	28.81	28.40	28.36
56	28.46	28.43	28.45	28.44	28.81	28.38	28.32
57	28.30	28.28	28.43	28.43	28.81	28.40	28.37
58	28.44	28.48	28.45	28.45	28.80	28.39	28.33
59	28.50	28.53	28.43	28.43	28.81	28.39	28.35
60	28.39	28.41	28.43	28.43	28.81	28.38	28.33
Ave.	28.48	28.50	28.44	28.44	28.82	28.41	28.38
Med.	28.45	28.50	28.44	28.44	28.81	28.40	28.36
st dev	0.11	0.12	0.01	0.02	0.02	0.03	0.06
Min.	28.30	28.28	28.43	28.43	28.80	28.38	28.32
Max.	28.72	28.72	28.48	28.48	28.86	28.48	28.50

3.15 Data Set 5, 85°C, 300mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
49	0.1987	0.4736	6155	0.0002	0.0004	0.0006	0.0006	0.0008	0.0011
50	0.1991	0.4743	6095	0.0004	0.0006	0.0008	0.0011	0.0012	0.0014
51	0.1989	0.4753	6055	0.0001	0.0005	0.0007	0.0008	0.0011	0.0013
52	0.1994	0.4747	6055	0.0002	0.0004	0.0006	0.0008	0.0010	0.0013
53	0.1994	0.4747	6055	0.0001	0.0003	0.0007	0.0009	0.0010	0.0011
54	0.1987	0.4730	6185	0.0001	0.0004	0.0006	0.0008	0.0010	0.0013
55	0.1989	0.4744	6105	0.0002	0.0004	0.0007	0.0009	0.0010	0.0011
56	0.1987	0.4755	6060	0.0000	0.0001	0.0004	0.0004	0.0005	0.0006
57	0.1989	0.4718	6240	0.0007	0.0007	0.0010	0.0011	0.0012	0.0014
58	0.1993	0.4752	6035	0.0003	0.0004	0.0006	0.0009	0.0010	0.0011
59	0.1991	0.4767	5975	0.0003	0.0004	0.0007	0.0010	0.0011	0.0013
60	0.1984	0.4759	6055	0.0003	0.0004	0.0007	0.0007	0.0009	0.0012
Ave.	0.1990	0.4746	6089	0.0002	0.0004	0.0007	0.0008	0.0010	0.0012
Med.	0.1989	0.4747	6058	0.0002	0.0004	0.0007	0.0008	0.0010	0.0012
st dev	0.0003	0.0013	73	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002
Min.	0.1984	0.4718	5975	0.0000	0.0001	0.0004	0.0004	0.0005	0.0006
Max.	0.1994	0.4767	6240	0.0007	0.0007	0.0010	0.0011	0.0012	0.0014



3.16 Data Set 6, 105°C, 300mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)					
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
61	1169.52	99.86	99.56	99.37	98.69	98.02	97.75
62	1191.83	99.54	99.15	98.72	98.17	97.62	97.56
63	1178.31	99.45	99.13	98.64	98.13	97.63	97.22
64	1181.96	99.49	99.13	98.58	98.19	97.82	97.49
65	1181.28	99.64	99.19	98.78	98.19	97.62	96.91
66	1183.44	99.14	98.75	98.32	97.83	97.35	97.32
67	1164.25	99.43	98.99	98.37	97.67	96.96	96.51
68	1169.66	99.69	99.36	98.99	98.36	97.75	97.25
69	1182.23	99.45	99.09	98.75	98.13	97.52	97.17
70	1175.60	99.69	99.39	98.95	98.40	97.86	97.16
71	1177.63	99.39	99.04	98.71	98.02	97.33	97.22
72	1170.60	99.44	98.89	98.52	97.92	97.36	97.09
Ave.	1177.19	99.52	99.14	98.72	98.14	97.57	97.22
Med.	1177.97	99.47	99.13	98.71	98.15	97.62	97.22
st dev	7.68	0.1839	0.2198	0.2863	0.2699	0.2887	0.3181
Min.	1164.25	99.14	98.75	98.32	97.67	96.96	96.51
Max.	1191.83	99.86	99.56	99.37	98.69	98.02	97.75

TM-21 Projection:

Test Duration: 6000 hours

Failures Observed: 0

α: 4.928E-06

β: 0.999

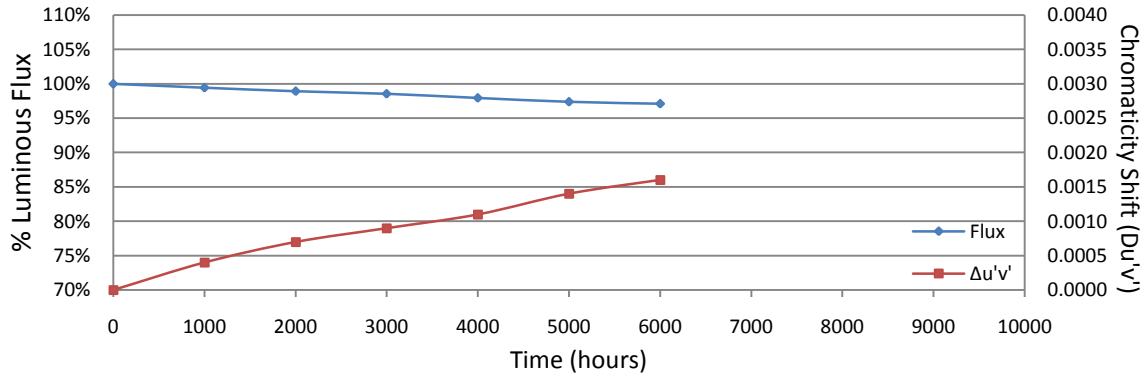
Reported L₇₀: >33000 hours

3.17 Data Set 6, 105°C, 300mA (Forward Voltage)

No.	Forward Voltage (V)						
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
61	28.42	28.39	28.33	28.28	28.85	28.41	29.37
62	28.52	28.50	28.32	28.35	28.82	28.41	29.32
63	28.71	28.40	28.31	28.33	28.83	28.39	29.35
64	28.29	28.34	28.30	28.31	28.82	28.39	29.34
65	28.55	28.56	28.29	28.30	28.83	28.39	29.37
66	28.39	28.38	28.28	28.33	28.81	28.37	29.34
67	28.72	28.50	28.28	28.31	28.81	28.38	29.34
68	28.80	28.45	28.35	28.30	28.81	28.39	29.27
69	28.60	28.35	28.33	28.30	28.80	28.37	29.27
70	28.80	28.55	28.31	28.31	28.79	28.39	29.27
71	28.60	28.54	28.30	28.30	28.79	28.39	29.28
72	28.70	28.48	28.30	28.30	28.80	28.40	29.30
Ave.	28.59	28.45	28.31	28.31	28.81	28.39	29.32
Med.	28.60	28.47	28.31	28.31	28.81	28.39	29.33
st dev	0.16	0.08	0.02	0.02	0.02	0.01	0.04
Min.	28.29	28.34	28.28	28.28	28.79	28.37	29.27
Max.	28.80	28.56	28.35	28.35	28.85	28.41	29.37

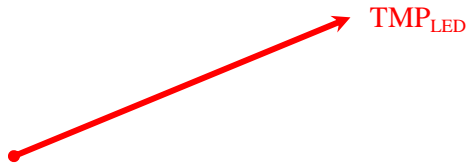
3.18 Data Set 6, 105°C, 300mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)					
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs
61	0.1986	0.4742	6130	0.0003	0.0008	0.0010	0.0012	0.0014	0.0017
62	0.1985	0.4751	6095	0.0004	0.0005	0.0008	0.0011	0.0013	0.0014
63	0.1991	0.4738	6120	0.0004	0.0007	0.0007	0.0009	0.0012	0.0015
64	0.1992	0.4733	6140	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015
65	0.1993	0.4760	5995	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015
66	0.1987	0.4735	6160	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015
67	0.1981	0.4702	6375	0.0002	0.0007	0.0010	0.0012	0.0015	0.0017
68	0.1990	0.4751	6065	0.0004	0.0009	0.0012	0.0014	0.0017	0.0021
69	0.1983	0.4749	6115	0.0002	0.0008	0.0009	0.0010	0.0011	0.0012
70	0.1994	0.4758	6000	0.0003	0.0008	0.0011	0.0014	0.0016	0.0018
71	0.1984	0.4730	6205	0.0003	0.0008	0.0008	0.0010	0.0011	0.0012
72	0.1982	0.4722	6255	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016
Ave.	0.1987	0.4739	6138	0.0004	0.0007	0.0009	0.0011	0.0014	0.0016
Med.	0.1987	0.4740	6125	0.0004	0.0007	0.0009	0.0011	0.0013	0.0015
st dev	0.0005	0.0016	105	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002
Min.	0.1981	0.4702	5995	0.0002	0.0005	0.0007	0.0009	0.0011	0.0012
Max.	0.1994	0.4760	6375	0.0005	0.0009	0.0012	0.0014	0.0017	0.0021



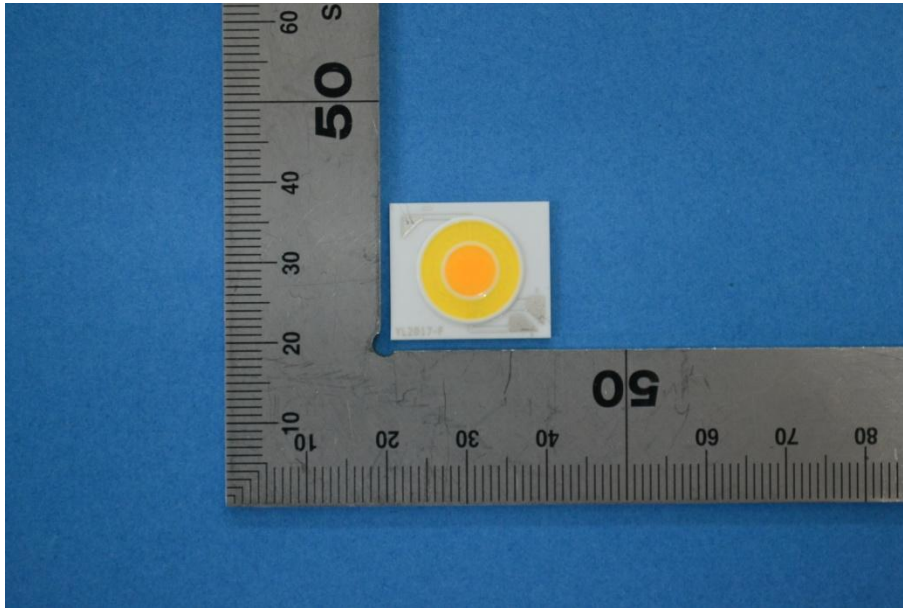
4 - EUT Photo

4.12 Mechanical Dimensions



All dimensions are in millimeter

4.13 EUT Photo



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