



Shenzhen Belling Efficiency Testing Lab Co., Ltd



TEST REPORT

ANSI/IES LM-80-15

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES For

Bridgelux Inc

46410 Fremont Boulevard, Fremont, CA 94538 USA

Report No.: BL211123002-9

Product Description: LED Package

Model No.: BXVN-XXE-21M-3CV

Test Initiation Date: 2019-09-12

Test Completion Date: 2019-09-17 to 2021-10-11

Report Issue Date: 2021-11-29

Test Standard: ANSI/IES LM-80-15

Test Laboratory: Shenzhen Belling Efficiency Testing Lab Co.,Ltd

Tested by

Jaky Li

Jaky Li

Reviewed by

Jason Zhou

Jason Zhou



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 use in part without prior written consent from Shenzhen Belling Efficiency Testing Lab Co., Ltd. This report must not be used by the customer to claim product certification, approval, or endorsement By NVLAP, NIST, or any agency of the U.S. Government.

TABLE OF CONTENTS

1-GENERAL INFORMATION.....	3
1.1 Product Description for Equipment under Test (EUT).....	3
1.2 Family products covered by this report:.....	3
1.3 Drive Level.....	4
1.4 Ambient Conditions for Maintenance Test.....	4
1.5 Photometric measurement uncertainty.....	4
1.6 Standards Used:.....	4
1.7 Test Facility Description.....	4
1.8 Statement of Traceability.....	4
1.9 Test Equipment List.....	5
1.10 Sample Set.....	5
1.11 Description.....	5
2-Summary of Test Result.....	6
3 Test Data.....	10
3.1 Data Set 1, 55°C, 150mA (Lumen Maintenance).....	10
3.2 Data Set 1, 55°C, 150mA (Photosynthetic Photon Flux Maintenance).....	12
3.3 Data Set 1, 55°C, 150mA (Forward Voltage).....	14
3.4 Data Set 1, 55°C, 150mA (Wavelength).....	16
3.5 Data Set 1, 55°C, 150mA (Chromaticity Shift).....	18
3.6 Data Set 2, 85°C, 150mA (Lumen Maintenance).....	20
3.7 Data Set 2, 85°C, 150mA (Photosynthetic Photon Flux Maintenance).....	22
3.8 Data Set 2, 85°C, 150mA (Forward Voltage).....	24
3.9 Data Set 2, 85°C, 150mA (Wavelength).....	26
3.10 Data Set 2, 85°C, 150mA (Chromaticity Shift).....	28
3.11 Data Set 3, 105°C, 150mA (Lumen Maintenance).....	30
3.12 Data Set 3, 105°C, 150mA (Photosynthetic Photon Flux Maintenance).....	32
3.13 Data Set 3, 105°C, 150mA (Forward Voltage).....	34
3.14 Data Set 3, 105°C, 150mA (Wavelength).....	36
3.15 Data Set 3, 105°C, 150mA (Chromaticity Shift).....	38
4-EUT Photos.....	40

1-GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Part Number: BXVN-XXE-21M-3CV

Part Type: LED Package

Product Description: VF 3V, IF 150mA

CCT: 2700K

Die Spacing(mm): 0.25

Average Power Density per LED die(W/mm²): 2.2

Average Current Density per LED die(mA/mm²): 660.79

**Repernsnetative CRI (Ra) of the tested sample set
(Indicate whether the reported calue s the mean or
median value of the sample set, or per unit):** 80

LED light source monitoring interval: The LED array are inspected at regular interval (24 hours) throughout the 17000 hours test.

Photometric measurement uncertainty: 1.8% on flux measurements for LM-80 testing.

1.2 Family products covered by this report:

According to ENERGY STAR® Requirements for the Use of LM-80 Data, the following products can be covered by this report base on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements of ENERGY STAR® Requirements for the Use of IES/NA LM-80 Data (September 28, 2017)

Model Name	Total Input Current (mA)	Power (W)	CCT (K)	Number of dies	Driver current per die (mA)	Current Density per Die (mA/mm ²)	Power Density per PCB (W/mm ²)	Die Spacing (mm)
BXVN-XXE-21M-3CV	150	0.45	2700	2	150	660.79	2.2	0.25
BXVN-(A)(B)-(C)(D)(E)-(F)(G)	150	0.45	≧2200	≦2	150	≦660.79	≦2.2	/

Part number designation: BXVN-(A)(B)-(C)(D)(E)-(F)(G)

(A) CCT variation, can be 22-65, for 2200K - 6500K

(B) CRI

(C) Parallel connected variation,, can be 1-2

(D) Series connected variation, can be 1-2

(E) Power

(F) Voltage:3V

(G) Customer code, can be 0-ZZ.

1.3 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.

1.4 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 $2^{\circ}C$ below the corresponding nominal case temperature.

Surrounding air was maintained at a temperature that was greater than or equal to $5^{\circ}C$ below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with Type K.

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.

Surrounding Air temperature for life test : controlled to within $-5^{\circ}C$ of the case temperature (T_s)

Humidity : $< 65\%$ RH

Ambient temperature for Photometry measurement : maintained at $25^{\circ}C \pm 2^{\circ}C$

1.5 Photometric measurement uncertainty

The uncertainty of the light output measurements is $U=1.8\%$ ($K=2$)

Long term measurement uncertainty is based on reproducibility tests done over a period of one year, calculated to $K=2$ coverage (i.e. 95% coverage).

1.6 Standards Used:

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs(This test method was not accredited by NVLAP)
- ANSI/ASABE S642 SEP2018: Recommended Methods for Measurement and Testing of LED Products for Plant Growth and Development (This standard was not accredited by NVLAP)

1.7 Test Facility Description

The test facility used by Shenzhen Belling Efficiency Testing Lab Co., Ltd is located at 1Floor, No.1 Building, Meibaohe Industrial Park, Dalang Street, Longhua District, Shenzhen, Guangdong Prov.518101 China.

1.8 Statement of Traceability

Shenzhen Belling Efficiency Testing Lab Co., Ltd attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

1.9 Test Equipment List

Device	Manufacture	Model No.	Serial No.	Calibration due date
Digital Power Meter	YOKOGAWA	WT210	91L929742	2022-03-31
Integral Sphere	SENSING	SPR-600M	N.A	2022-03-31
Optical Color and Electrical Measurement System	SENSING	SPR-3000	S1101108	2022-03-31
Stop watch	KISLO	K610	N/A	2022-04-20
LED aging equipment	Guangzhou CK	Box0516	N.A	2022-04-13
DC Power Supply	Hong Duo Yuan	APS300-5	N/A	2022-03-31
Thermocouple K	Type K	OMEGA	23736-1	2022-04-20

1.10 Sample Set

Sampling Method:

LED samples for ANSI/IES LM-80-15 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 ANSI/IES LM-80-15 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 2019-09-12 and tested during 2019-09-17 to 2021-10-11. The samples were numbered from L1 to L25, L26 to L50 and L51 to L75.

1.11 Description

Declaration: Bridgelux Inc declare that their product with model BXVN-XXE-21M-3CV are the same to the product in the report BL210913007-9 and is authorized by original applicant to use their test data.

Note: All the data in previous report BL210913007-9 is shared in report.

2-Summary of Test Result

Data Set	1	2	3
Nominal case temperatures	55°C	85°C	105°C
Drive Current	150 mA	150 mA	150 mA
Condition	Ts=54.8°C Ta=53.7°C	Ts=84.5°C Ta=83.8°C	Ts=104.8°C Ta=103.5°C
Sample size	25	25	25
Duration (in Hours)	17000	17000	17000
Intervals (in Hours)	1000	1000	1000
Failure	0	0	0
α	2.421E-06	2.694E-06	3.005E-06
β	1.015	1.015	1.016
Reported L70 (17k) (17000h)	>102000 hours	>102000 hours	>102000 hours
Reported L90 (17k) (17000h)	50,000 hours	45,000 hours	40,000 hours
Reported Q90 (17k) (17000h) (PPF)	63,000 hours	47,000 hours	40,000 hours

Average Lumen Maintenance (%)

Data Set	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
1	100.34%	100.26%	100.17%	100.05%	99.93%	99.80%	99.67%	99.49%	99.27%
2	100.23%	100.14%	100.04%	99.92%	99.78%	99.64%	99.49%	99.31%	99.07%
3	100.17%	100.06%	99.94%	99.81%	99.66%	99.49%	99.32%	99.13%	98.88%
Data Set	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	
1	99.06%	98.85%	98.63%	98.38%	98.12%	97.86%	97.61%	97.35%	
2	98.82%	98.58%	98.33%	98.06%	97.78%	97.49%	97.23%	96.93%	
3	98.62%	98.35%	98.08%	97.78%	97.47%	97.15%	96.84%	96.47%	

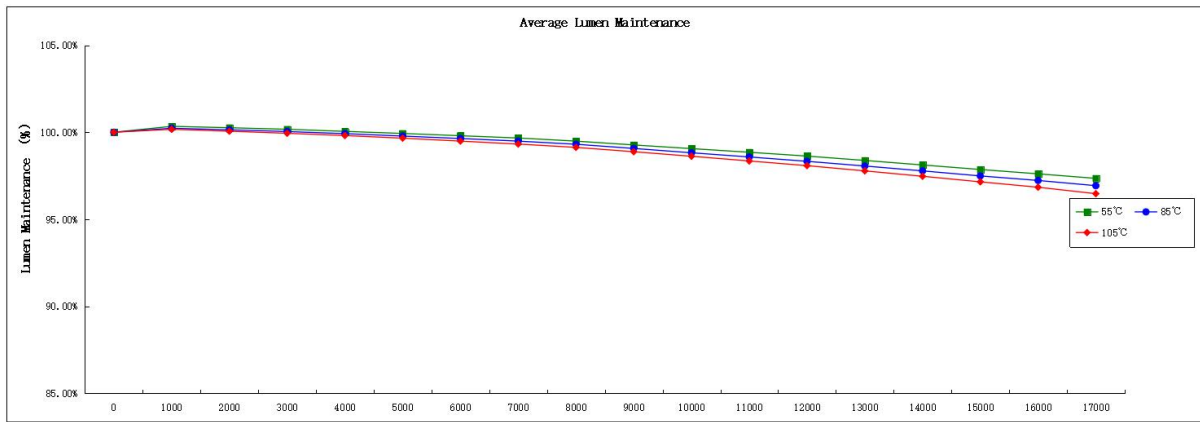
Average Photosynthetic Photon Flux Maintenance (%)

Data Set	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
1	100.37%	100.25%	100.16%	100.03%	99.91%	99.79%	99.68%	99.53%	99.35%
2	100.26%	100.17%	100.08%	99.97%	99.88%	99.77%	99.51%	99.27%	99.03%
3	100.18%	100.07%	99.95%	99.84%	99.70%	99.55%	99.37%	99.16%	98.90%
Data Set	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	
1	99.12%	98.97%	98.82%	98.65%	98.46%	98.26%	98.10%	97.87%	
2	98.79%	98.57%	98.35%	98.09%	97.83%	97.58%	97.31%	96.99%	
3	98.63%	98.37%	98.12%	97.81%	97.53%	97.18%	96.82%	96.47%	

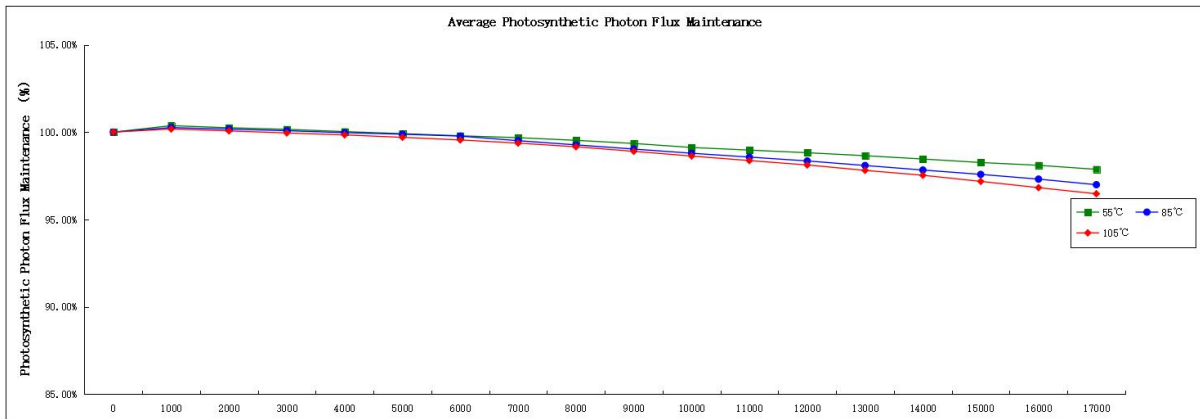
Average Chromaticity Shift

Data Set	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
1	0.0001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0007	0.0008	0.0010
2	0.0001	0.0003	0.0004	0.0005	0.0007	0.0008	0.0010	0.0011	0.0013
3	0.0002	0.0003	0.0004	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016
Data Set	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	
1	0.0012	0.0013	0.0016	0.0017	0.0020	0.0022	0.0024	0.0026	
2	0.0014	0.0016	0.0018	0.0021	0.0023	0.0026	0.0028	0.0031	
3	0.0018	0.0021	0.0024	0.0027	0.0029	0.0033	0.0036	0.0039	

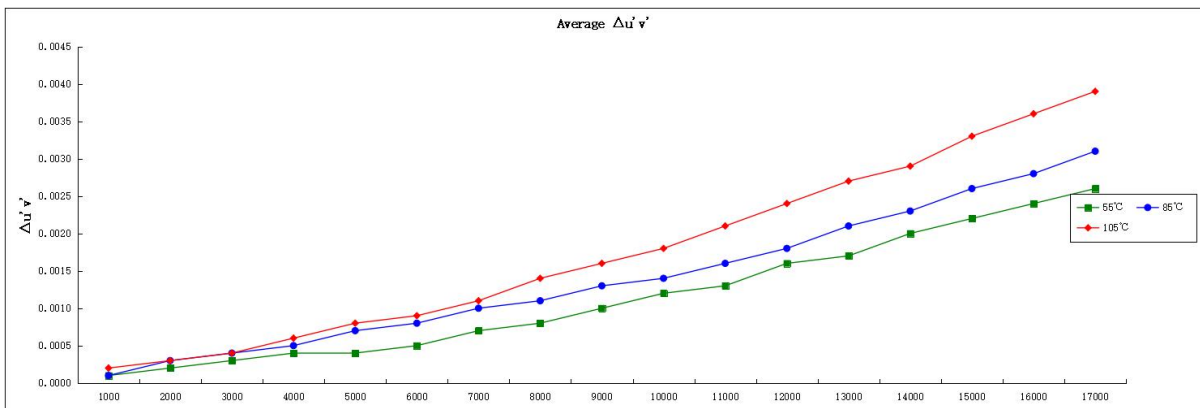
Average Lumen Maintenance



Average Photosynthetic Photon Flux Maintenance



Average Chromaticity Shift



TM-21 Report for Lumen Maintenance

Description of LED Light Source Tested (manufacturer, model, catalog number)		Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Bridgelux Inc BXVN-XXE-21M-3CV		Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp		Test Condition 3 - 105°C Case Temp		$T_{s,1}$ (°C)	105.00
Sample size	25	Sample size	25	Sample size	25	Sample size	25	$T_{s,1}$ (K)	378.15
Number of failures	0	Number of failures	0	Number of failures	0	Number of failures	0	α_1	3.005E-06
DUT drive current used in the test (mA)	150	DUT drive current used in the test (mA)	150	DUT drive current used in the test (mA)	150	DUT drive current used in the test (mA)	150	B_1	1.016
Test duration (hours)	17,000	Test duration (hours)	17,000	Test duration (hours)	17,000	Test duration (hours)	17,000	$T_{s,2}$ (°C)	-
Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000	$T_{s,2}$ (K)	-
Tested case temperature (°C)	55	Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	105	α_2	-
α	2.421E-06	α	2.694E-06	α	3.005E-06	α	3.005E-06	B_2	-
B	1.015	B	1.015	B	1.016	B	1.016	E_{s/k_b}	-
Reported L70(17k) (hours)	>102000	Reported L70(17k) (hours)	>102000	Reported L70(17k) (hours)	>102000	Reported L70(17k) (hours)	>102000	A	-
								B_0	1.016
								$T_{s,i}$ (°C)	105.00
								$T_{s,i}$ (K)	378.15
								α_i	3.005E-06
								Reported L70(17k) at 105°C (hours)	>102000

Description of LED Light Source Tested (manufacturer, model, catalog number)		Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Bridgelux Inc BXVN-XXE-21M-3CV		Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp		Test Condition 3 - 105°C Case Temp		$T_{s,1}$ (°C)	105.00
Sample size	25	Sample size	25	Sample size	25	Sample size	25	$T_{s,1}$ (K)	378.15
Number of failures	0	Number of failures	0	Number of failures	0	Number of failures	0	α_1	3.005E-06
DUT drive current used in the test (mA)	150	DUT drive current used in the test (mA)	150	DUT drive current used in the test (mA)	150	DUT drive current used in the test (mA)	150	B_1	1.016
Test duration (hours)	17,000	Test duration (hours)	17,000	Test duration (hours)	17,000	Test duration (hours)	17,000	$T_{s,2}$ (°C)	-
Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000	$T_{s,2}$ (K)	-
Tested case temperature (°C)	55	Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	105	α_2	-
α	2.421E-06	α	2.694E-06	α	3.005E-06	α	3.005E-06	B_2	-
B	1.015	B	1.015	B	1.016	B	1.016	E_{s/k_b}	-
Reported L90(17k) (hours)	50,000	Reported L90(17k) (hours)	45,000	Reported L90(17k) (hours)	40,000	Reported L90(17k) (hours)	40,000	A	-
								B_0	1.016
								$T_{s,i}$ (°C)	105.00
								$T_{s,i}$ (K)	378.15
								α_i	3.005E-06
								Reported L90(17k) at 105°C (hours)	40,000

TM-21 Report for Photosynthetic Photon Flux Maintenance

Description of LED Light Source Tested (manufacturer, model, catalog number)		Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Bridgelux Inc BXVN-XXE-21M-3CV		Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp		Test Condition 3 - 105°C Case Temp		$T_{s,1}$ (°C)	105.00
		Sample size		Sample size		Sample size		$T_{s,1}$ (K)	378.15
		Number of failures		Number of failures		Number of failures		α_1	3.026E-06
		DUT drive current used in the test (mA)		DUT drive current used in the test (mA)		DUT drive current used in the test (mA)		B_1	1.017
		Test duration (hours)		Test duration (hours)		Test duration (hours)		$T_{s,2}$ (°C)	-
		Test duration used for projection (hour to hour)		Test duration used for projection (hour to hour)		Test duration used for projection (hour to hour)		$T_{s,2}$ (K)	-
		Tested case temperature (°C)		Tested case temperature (°C)		Tested case temperature (°C)		α_2	-
		α		α		α		B_2	-
		B		B		B		E_g/k_b	-
		Reported L70(17k) (hours)		Reported L70(17k) (hours)		Reported L70(17k) (hours)		A	-
								B_0	1.017
								$T_{s,i}$ (°C)	105.00
								$T_{s,i}$ (K)	378.15
								α_i	3.026E-06
								Reported L70(17k) at 105°C (hours)	>102000

Description of LED Light Source Tested (manufacturer, model, catalog number)		Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Bridgelux Inc BXVN-XXE-21M-3CV		Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp		Test Condition 3 - 105°C Case Temp		$T_{s,1}$ (°C)	105.00
		Sample size		Sample size		Sample size		$T_{s,1}$ (K)	378.15
		Number of failures		Number of failures		Number of failures		α_1	3.026E-06
		DUT drive current used in the test (mA)		DUT drive current used in the test (mA)		DUT drive current used in the test (mA)		B_1	1.017
		Test duration (hours)		Test duration (hours)		Test duration (hours)		$T_{s,2}$ (°C)	-
		Test duration used for projection (hour to hour)		Test duration used for projection (hour to hour)		Test duration used for projection (hour to hour)		$T_{s,2}$ (K)	-
		Tested case temperature (°C)		Tested case temperature (°C)		Tested case temperature (°C)		α_2	-
		α		α		α		B_2	-
		B		B		B		E_g/k_b	-
		Reported L90(17k) (hours)		Reported L90(17k) (hours)		Reported L90(17k) (hours)		A	-
								B_0	1.017
								$T_{s,i}$ (°C)	105.00
								$T_{s,i}$ (K)	378.15
								α_i	3.026E-06
								Reported L90(17k) at 105°C (hours)	40,000

3 Test Data

3.1 Data Set 1, 55°C, 150mA (Lumen Maintenance)

Sample No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	52.12	100.23	100.22	100.14	100.09	99.88	99.83	99.57	99.44	99.34
L2	51.55	100.35	100.25	100.15	99.98	99.85	99.81	99.69	99.47	99.40
L3	51.65	100.42	100.23	100.14	100.13	100.00	99.73	99.64	99.43	99.18
L4	51.44	100.33	100.30	100.12	100.04	99.91	99.78	99.66	99.61	99.14
L5	51.14	100.26	100.24	100.15	100.01	99.95	99.72	99.64	99.42	99.28
L6	51.99	100.26	100.24	100.23	100.03	99.84	99.76	99.75	99.56	99.28
L7	51.96	100.29	100.24	100.20	100.13	100.02	99.85	99.59	99.46	99.16
L8	51.87	100.42	100.24	100.19	100.00	99.97	99.86	99.73	99.56	99.29
L9	52.65	100.41	100.23	100.19	100.04	99.98	99.87	99.58	99.53	99.40
L10	52.38	100.30	100.25	100.22	100.14	99.89	99.79	99.69	99.44	99.20
L11	52.10	100.30	100.29	100.23	100.11	99.88	99.72	99.60	99.41	99.39
L12	52.79	100.35	100.27	100.22	100.10	100.00	99.87	99.72	99.46	99.34
L13	52.46	100.44	100.22	100.19	100.02	99.98	99.72	99.58	99.44	99.30
L14	52.42	100.29	100.28	100.15	99.97	99.87	99.82	99.60	99.48	99.17
L15	52.82	100.39	100.24	100.18	100.06	99.98	99.69	99.60	99.57	99.19
L16	52.78	100.41	100.31	100.19	100.01	99.98	99.87	99.77	99.42	99.20
L17	52.69	100.34	100.25	100.23	100.00	99.86	99.79	99.72	99.63	99.37
L18	52.38	100.35	100.30	100.19	99.97	99.83	99.82	99.72	99.46	99.18
L19	52.01	100.33	100.30	100.18	100.07	99.91	99.88	99.73	99.56	99.39
L20	51.85	100.43	100.28	100.11	100.10	100.00	99.82	99.57	99.56	99.23
L21	51.74	100.33	100.23	100.14	100.10	99.84	99.82	99.73	99.53	99.29
L22	51.53	100.43	100.25	100.15	99.99	99.94	99.79	99.72	99.42	99.30
L23	51.43	100.29	100.28	100.15	100.08	100.01	99.87	99.76	99.42	99.22
L24	51.30	100.30	100.28	100.17	100.07	99.90	99.76	99.59	99.53	99.39
L25	52.78	100.30	100.27	100.12	99.97	99.89	99.78	99.71	99.55	99.20
Ave.	52.07	100.34	100.26	100.17	100.05	99.93	99.80	99.67	99.49	99.27
Med.	52.01	100.33	100.25	100.18	100.04	99.91	99.81	99.69	99.47	99.28
st dev	0.52	0.0614	0.0276	0.0365	0.0551	0.0619	0.0560	0.0686	0.0671	0.0865
Min.	51.14	100.23	100.22	100.11	99.97	99.83	99.69	99.57	99.41	99.14
Max.	52.82	100.44	100.31	100.23	100.14	100.02	99.88	99.77	99.63	99.40

Sample No.	Lumen Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L1	99.15	98.89	98.59	98.22	98.17	97.79	97.49	97.29	/
L2	99.20	98.96	98.81	98.30	97.98	97.74	97.55	97.34	/
L3	99.00	98.77	98.54	98.48	98.07	97.79	97.51	97.37	/
L4	99.12	98.80	98.58	98.54	98.22	97.81	97.80	97.54	/
L5	99.11	98.82	98.61	98.23	98.11	97.98	97.52	97.39	/
L6	98.99	98.87	98.78	98.32	98.04	97.76	97.72	97.29	/
L7	99.01	98.95	98.64	98.32	98.23	97.87	97.58	97.53	/
L8	99.01	98.89	98.75	98.34	97.99	97.93	97.55	97.31	/
L9	98.99	98.89	98.51	98.40	98.14	97.74	97.49	97.30	/
L10	99.02	99.00	98.75	98.24	98.08	97.87	97.80	97.28	/
L11	99.07	98.85	98.58	98.43	98.02	97.91	97.53	97.26	/
L12	99.21	98.85	98.62	98.24	98.15	97.85	97.48	97.29	/
L13	99.03	98.89	98.65	98.32	98.23	97.89	97.77	97.44	/
L14	98.94	98.73	98.58	98.55	98.23	97.74	97.42	97.40	/
L15	99.08	98.84	98.81	98.40	97.99	97.79	97.75	97.48	/
L16	98.99	98.76	98.50	98.49	98.02	97.84	97.48	97.25	/
L17	99.12	98.77	98.60	98.36	98.02	97.79	97.63	97.37	/
L18	99.12	98.80	98.54	98.36	98.02	97.99	97.57	97.27	/
L19	99.11	98.80	98.66	98.60	98.32	97.82	97.66	97.22	/
L20	99.02	98.76	98.63	98.55	98.17	98.00	97.77	97.32	/
L21	98.96	98.84	98.50	98.38	98.04	97.88	97.75	97.54	/
L22	99.12	98.95	98.56	98.46	98.23	97.80	97.77	97.33	/
L23	99.18	98.99	98.72	98.32	98.22	98.01	97.49	97.23	/
L24	99.04	98.75	98.62	98.45	98.14	97.93	97.44	97.34	/
L25	99.01	98.90	98.65	98.26	98.17	97.93	97.63	97.28	/
Ave.	99.06	98.85	98.63	98.38	98.12	97.86	97.61	97.35	/
Med.	99.04	98.85	98.62	98.36	98.14	97.85	97.57	97.32	/
st dev	0.0760	0.0778	0.0926	0.1105	0.0975	0.0849	0.1257	0.0949	/
Min.	98.94	98.73	98.50	98.22	97.98	97.74	97.42	97.22	/
Max.	99.21	99.00	98.81	98.60	98.32	98.01	97.80	97.54	/

3.2 Data Set 1, 55°C, 150mA (Photosynthetic Photon Flux Maintenance)

Sample No.	PPF ($\mu\text{mol/s}$)	Photosynthetic Photon Flux Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	0.7351	100.25	100.18	100.10	99.96	99.93	99.80	99.75	99.56	99.39
L2	0.7272	100.33	100.21	100.20	100.01	99.97	99.75	99.59	99.56	99.35
L3	0.7286	100.34	100.26	100.21	100.03	99.84	99.78	99.57	99.47	99.43
L4	0.7258	100.31	100.21	100.16	99.99	99.86	99.84	99.63	99.44	99.36
L5	0.7216	100.36	100.32	100.20	100.10	99.86	99.85	99.62	99.53	99.39
L6	0.7196	100.33	100.29	100.22	100.03	99.94	99.86	99.73	99.56	99.36
L7	0.7189	100.29	100.24	100.19	99.99	99.88	99.72	99.65	99.54	99.35
L8	0.7178	100.44	100.30	100.18	100.09	99.94	99.86	99.72	99.53	99.30
L9	0.7606	100.41	100.27	100.07	100.01	99.99	99.88	99.77	99.58	99.32
L10	0.7567	100.44	100.21	100.20	100.09	99.93	99.68	99.64	99.41	99.30
L11	0.7529	100.45	100.30	100.19	100.05	99.87	99.78	99.75	99.61	99.35
L12	0.7488	100.38	100.16	100.10	99.96	99.85	99.67	99.59	99.44	99.31
L13	0.7442	100.34	100.19	100.11	100.01	100.00	99.79	99.67	99.49	99.39
L14	0.7437	100.39	100.24	100.23	100.00	99.92	99.69	99.63	99.51	99.44
L15	0.7493	100.39	100.23	100.11	100.00	99.85	99.79	99.73	99.47	99.22
L16	0.7490	100.30	100.22	100.19	100.11	99.86	99.80	99.71	99.53	99.28
L17	0.7563	100.34	100.28	100.07	100.00	99.89	99.84	99.74	99.40	99.28
L18	0.7521	100.34	100.23	100.20	100.08	99.98	99.77	99.74	99.64	99.45
L19	0.7469	100.44	100.31	100.17	99.98	99.84	99.67	99.63	99.48	99.41
L20	0.7446	100.42	100.21	100.15	100.07	99.93	99.88	99.77	99.61	99.26
L21	0.7430	100.38	100.31	100.16	100.03	99.94	99.90	99.76	99.54	99.41
L22	0.7402	100.45	100.30	100.10	100.04	99.91	99.71	99.63	99.55	99.33
L23	0.7388	100.32	100.29	100.14	100.07	99.93	99.89	99.78	99.63	99.24
L24	0.7370	100.30	100.28	100.22	99.96	99.87	99.79	99.69	99.64	99.46
L25	0.7553	100.47	100.25	100.18	99.99	99.90	99.70	99.59	99.57	99.43
Ave.	0.7406	100.37	100.25	100.16	100.03	99.91	99.79	99.68	99.53	99.35
Med.	0.7437	100.36	100.25	100.18	100.01	99.91	99.79	99.69	99.54	99.35
st dev	0.0130	0.0599	0.0456	0.0487	0.0457	0.0484	0.0734	0.0676	0.0688	0.0677
Min.	0.7178	100.25	100.16	100.07	99.96	99.84	99.67	99.57	99.40	99.22
Max.	0.7606	100.47	100.32	100.23	100.11	100.00	99.90	99.78	99.64	99.46

Sample No.	Photosynthetic Photon Flux Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L1	98.99	98.97	98.87	98.60	98.45	98.30	98.19	97.77	/
L2	99.13	99.02	98.76	98.75	98.47	98.30	98.08	97.81	/
L3	99.18	98.98	98.73	98.55	98.48	98.19	98.13	97.81	/
L4	99.13	99.04	98.77	98.70	98.57	98.17	98.02	97.82	/
L5	99.16	99.01	98.82	98.57	98.39	98.18	98.13	97.82	/
L6	99.16	98.94	98.88	98.64	98.57	98.32	98.17	97.89	/
L7	99.15	98.91	98.79	98.68	98.45	98.17	98.05	98.03	/
L8	99.17	98.87	98.71	98.69	98.55	98.15	98.09	97.91	/
L9	99.17	99.00	98.76	98.74	98.34	98.14	98.13	97.85	/
L10	98.98	98.95	98.86	98.56	98.55	98.39	98.11	97.94	/
L11	99.11	99.03	98.78	98.58	98.52	98.37	98.13	97.92	/
L12	99.13	98.99	98.86	98.69	98.48	98.23	98.14	97.80	/
L13	99.13	98.90	98.88	98.59	98.45	98.24	98.09	98.03	/
L14	99.03	99.00	98.88	98.67	98.36	98.28	98.14	97.86	/
L15	99.13	98.93	98.90	98.72	98.53	98.19	98.01	97.79	/
L16	99.10	99.04	98.80	98.69	98.36	98.33	98.15	97.87	/
L17	99.05	98.91	98.79	98.72	98.44	98.40	98.04	98.03	/
L18	99.09	99.04	98.90	98.60	98.41	98.37	97.99	97.94	/
L19	99.15	99.03	98.80	98.55	98.54	98.29	98.12	97.75	/
L20	99.12	99.00	98.74	98.65	98.52	98.31	98.16	97.78	/
L21	99.16	98.99	98.76	98.72	98.41	98.14	97.97	97.69	/
L22	99.11	98.93	98.87	98.55	98.49	98.24	98.01	97.73	/
L23	99.13	98.96	98.87	98.69	98.37	98.23	98.20	97.99	/
L24	99.11	98.91	98.88	98.58	98.48	98.21	98.18	98.05	/
L25	99.15	99.00	98.93	98.76	98.39	98.31	98.04	97.93	/
Ave.	99.12	98.97	98.82	98.65	98.46	98.26	98.10	97.87	/
Med.	99.13	98.99	98.82	98.67	98.47	98.24	98.12	97.86	/
st dev	0.0531	0.0502	0.0625	0.0701	0.0704	0.0809	0.0660	0.1020	/
Min.	98.98	98.87	98.71	98.55	98.34	98.14	97.97	97.69	/
Max.	99.18	99.04	98.93	98.76	98.57	98.40	98.20	98.05	/

3.3 Data Set 1, 55°C, 150mA (Forward Voltage)

Sample No.	Forward Voltage (V)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	3.239	3.231	3.244	3.222	3.212	3.239	3.211	3.203	3.238	3.204
L2	3.234	3.244	3.217	3.234	3.236	3.221	3.216	3.217	3.222	3.250
L3	3.231	3.252	3.246	3.226	3.227	3.204	3.258	3.219	3.246	3.200
L4	3.229	3.235	3.236	3.216	3.223	3.230	3.229	3.207	3.214	3.218
L5	3.224	3.251	3.228	3.257	3.213	3.244	3.212	3.241	3.243	3.248
L6	3.223	3.247	3.236	3.240	3.243	3.220	3.214	3.203	3.258	3.211
L7	3.222	3.251	3.237	3.222	3.244	3.200	3.237	3.230	3.226	3.217
L8	3.251	3.233	3.259	3.222	3.214	3.222	3.216	3.213	3.241	3.226
L9	3.226	3.255	3.235	3.236	3.221	3.227	3.217	3.213	3.219	3.224
L10	3.241	3.216	3.238	3.255	3.234	3.253	3.253	3.247	3.242	3.245
L11	3.221	3.241	3.251	3.241	3.230	3.239	3.213	3.238	3.240	3.234
L12	3.217	3.250	3.250	3.255	3.250	3.227	3.212	3.237	3.237	3.219
L13	3.216	3.220	3.217	3.242	3.257	3.238	3.250	3.220	3.242	3.233
L14	3.216	3.251	3.219	3.234	3.224	3.248	3.255	3.210	3.213	3.211
L15	3.213	3.212	3.225	3.243	3.253	3.234	3.241	3.230	3.257	3.235
L16	3.212	3.251	3.212	3.214	3.222	3.241	3.253	3.244	3.236	3.226
L17	3.246	3.258	3.252	3.244	3.225	3.215	3.220	3.218	3.248	3.202
L18	3.242	3.228	3.243	3.222	3.232	3.244	3.219	3.241	3.214	3.234
L19	3.238	3.210	3.228	3.249	3.210	3.236	3.251	3.221	3.250	3.233
L20	3.237	3.223	3.244	3.238	3.214	3.234	3.227	3.221	3.235	3.230
L21	3.236	3.225	3.213	3.229	3.233	3.225	3.231	3.221	3.239	3.211
L22	3.234	3.248	3.252	3.213	3.252	3.201	3.237	3.223	3.241	3.220
L23	3.232	3.233	3.241	3.259	3.239	3.221	3.258	3.220	3.258	3.245
L24	3.231	3.233	3.216	3.235	3.235	3.227	3.258	3.222	3.216	3.222
L25	3.242	3.249	3.230	3.237	3.211	3.228	3.211	3.235	3.215	3.237
Ave.	3.230	3.238	3.235	3.235	3.230	3.229	3.232	3.224	3.236	3.225
Med.	3.231	3.241	3.236	3.236	3.230	3.228	3.229	3.221	3.239	3.226
st dev	0.0108	0.0144	0.0137	0.0135	0.0142	0.0139	0.0179	0.0127	0.0144	0.0143
Min.	3.212	3.210	3.212	3.213	3.210	3.200	3.211	3.203	3.213	3.200
Max.	3.251	3.258	3.259	3.259	3.257	3.253	3.258	3.247	3.258	3.250

Sample No.	Forward Voltage (V)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L1	3.223	3.204	3.212	3.212	3.230	3.226	3.248	3.236	/
L2	3.239	3.252	3.211	3.206	3.227	3.217	3.243	3.218	/
L3	3.221	3.226	3.241	3.241	3.222	3.226	3.227	3.241	/
L4	3.229	3.224	3.208	3.252	3.247	3.212	3.221	3.241	/
L5	3.212	3.213	3.223	3.209	3.238	3.217	3.222	3.250	/
L6	3.252	3.206	3.227	3.233	3.232	3.239	3.223	3.207	/
L7	3.213	3.201	3.215	3.223	3.235	3.260	3.234	3.213	/
L8	3.227	3.211	3.244	3.214	3.245	3.232	3.229	3.247	/
L9	3.254	3.212	3.221	3.251	3.234	3.228	3.210	3.217	/
L10	3.243	3.229	3.209	3.210	3.231	3.256	3.202	3.245	/
L11	3.257	3.227	3.247	3.253	3.229	3.244	3.205	3.203	/
L12	3.221	3.239	3.209	3.226	3.217	3.216	3.244	3.205	/
L13	3.243	3.249	3.240	3.207	3.256	3.227	3.244	3.202	/
L14	3.212	3.230	3.206	3.207	3.257	3.217	3.219	3.222	/
L15	3.228	3.249	3.216	3.231	3.242	3.246	3.252	3.254	/
L16	3.214	3.236	3.221	3.218	3.215	3.226	3.245	3.202	/
L17	3.234	3.241	3.224	3.207	3.245	3.232	3.229	3.230	/
L18	3.255	3.212	3.242	3.223	3.259	3.256	3.248	3.230	/
L19	3.219	3.237	3.215	3.209	3.252	3.256	3.215	3.252	/
L20	3.222	3.230	3.229	3.239	3.217	3.255	3.227	3.249	/
L21	3.251	3.212	3.216	3.240	3.248	3.251	3.230	3.207	/
L22	3.217	3.235	3.242	3.202	3.240	3.247	3.209	3.248	/
L23	3.259	3.212	3.238	3.228	3.215	3.225	3.228	3.241	/
L24	3.230	3.228	3.242	3.243	3.244	3.250	3.249	3.228	/
L25	3.252	3.225	3.248	3.201	3.226	3.239	3.236	3.229	/
Ave.	3.233	3.226	3.226	3.223	3.236	3.236	3.230	3.229	/
Med.	3.229	3.227	3.223	3.223	3.235	3.232	3.229	3.230	/
st dev	0.0160	0.0147	0.0142	0.0168	0.0134	0.0152	0.0146	0.0179	/
Min.	3.212	3.201	3.206	3.201	3.215	3.212	3.202	3.202	/
Max.	3.259	3.252	3.248	3.253	3.259	3.260	3.252	3.254	/

3.4 Data Set 1, 55°C, 150mA (Wavelength)

Sample No.	Wavelength (nm)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	603.3	603.3	603.6	604.3	602.5	602.9	604.1	603.5	603.0	603.4
L2	602.4	603.1	603.8	603.4	602.3	603.6	603.6	604.0	602.9	603.7
L3	602.6	603.2	604.1	603.2	602.9	602.7	603.3	602.7	603.3	602.9
L4	602.4	603.6	603.7	603.8	602.9	603.4	602.7	603.1	602.4	603.1
L5	602.6	603.0	603.5	604.0	602.2	603.1	603.3	602.6	603.0	603.6
L6	603.0	603.3	602.8	603.7	602.6	603.8	602.8	604.5	602.6	603.3
L7	603.0	603.1	603.3	604.1	602.4	602.9	603.6	603.2	603.6	603.9
L8	602.3	603.1	603.9	604.3	603.4	603.3	602.8	603.2	602.7	604.0
L9	602.9	602.5	603.6	602.6	603.5	602.7	604.1	603.8	602.9	604.0
L10	603.4	602.8	603.6	603.6	603.3	603.3	604.3	604.5	602.9	603.9
L11	603.0	603.1	602.9	603.2	603.1	603.9	603.4	604.3	602.6	604.2
L12	602.8	603.3	603.0	602.8	602.6	602.7	603.8	604.2	603.0	603.4
L13	602.9	602.3	603.1	603.4	603.2	602.8	602.9	603.9	602.7	604.1
L14	603.3	603.1	603.6	602.6	602.7	603.5	603.2	604.3	603.6	603.6
L15	603.1	602.6	603.0	603.9	603.6	602.6	604.3	603.8	603.6	603.4
L16	603.3	602.7	604.1	603.5	602.3	603.8	603.2	603.5	603.1	602.6
L17	602.3	603.2	603.3	604.3	602.3	603.3	604.5	604.3	602.3	604.3
L18	602.8	603.5	603.8	603.6	603.1	603.5	603.6	603.4	602.5	603.7
L19	602.4	603.4	604.0	602.7	602.2	602.7	603.4	603.1	602.8	604.1
L20	602.5	602.5	602.6	604.3	603.5	604.2	602.9	603.1	602.7	603.2
L21	602.8	602.6	602.9	604.2	603.4	603.1	603.0	602.8	603.3	603.5
L22	602.3	602.4	604.0	603.9	602.5	604.0	603.9	603.0	603.6	602.6
L23	602.9	603.1	603.5	603.2	602.6	602.9	603.5	604.5	603.1	603.1
L24	603.3	603.1	603.6	603.1	603.7	603.7	603.6	603.0	603.5	603.7
L25	603.4	602.8	603.2	604.4	603.0	602.7	603.9	604.4	603.6	603.9
Ave.	602.8	603.0	603.5	603.6	602.9	603.2	603.5	603.6	603.0	603.6
Med.	602.9	603.1	603.6	603.6	602.9	603.3	603.5	603.5	603.0	603.6
st dev	0.3719	0.3551	0.4311	0.5726	0.4835	0.4797	0.5131	0.6295	0.4086	0.4706
Min.	602.3	602.3	602.6	602.6	602.2	602.6	602.7	602.6	602.3	602.6
Max.	603.4	603.6	604.1	604.4	603.7	604.2	604.5	604.5	603.6	604.3

Sample No.	Wavelength (nm)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L1	604.1	602.8	602.7	603.4	603.7	602.9	602.9	603.8	/
L2	603.1	604.2	602.6	603.2	604.4	603.2	602.2	603.0	/
L3	603.2	602.7	603.9	603.6	604.0	603.2	603.7	602.7	/
L4	603.5	603.5	604.5	602.6	603.3	603.9	602.6	603.6	/
L5	603.4	603.4	602.8	602.7	603.2	603.4	602.5	604.1	/
L6	603.0	603.1	603.8	603.7	603.6	604.0	602.5	603.0	/
L7	603.6	603.0	603.6	603.6	603.8	603.8	602.5	602.7	/
L8	603.1	603.6	603.6	603.5	603.0	604.5	602.6	603.7	/
L9	604.0	603.9	604.0	603.4	602.9	602.6	602.4	603.5	/
L10	603.4	602.8	603.1	603.2	604.4	603.9	602.6	602.7	/
L11	603.6	603.0	604.4	602.7	603.1	603.9	602.4	603.5	/
L12	603.8	604.1	602.9	603.1	603.0	602.7	603.5	603.8	/
L13	602.8	604.0	603.7	602.9	603.1	603.1	603.4	604.2	/
L14	604.0	604.0	604.0	603.0	602.8	604.4	603.1	602.9	/
L15	604.1	603.2	604.5	602.3	604.2	603.3	603.7	603.5	/
L16	602.8	603.3	603.4	603.1	603.2	603.6	603.4	603.2	/
L17	603.5	602.9	603.6	603.3	603.9	603.0	603.2	603.2	/
L18	603.4	603.2	604.0	602.8	604.2	602.9	602.6	603.3	/
L19	602.9	603.7	602.8	603.3	603.0	602.8	602.2	603.4	/
L20	603.8	603.6	603.9	602.6	604.0	604.0	603.4	604.2	/
L21	603.7	602.8	603.9	602.7	603.0	603.8	603.3	603.7	/
L22	603.3	603.7	602.8	603.2	604.2	604.1	603.6	602.7	/
L23	603.9	603.2	603.7	603.6	602.8	602.8	603.2	603.6	/
L24	603.7	603.4	604.5	603.6	603.7	603.5	602.5	604.1	/
L25	603.1	604.1	603.1	603.4	602.8	604.0	602.4	603.6	/
Ave.	603.5	603.4	603.6	603.1	603.5	603.5	602.9	603.4	/
Med.	603.5	603.4	603.7	603.2	603.3	603.5	602.6	603.5	/
st dev	0.4016	0.4663	0.5999	0.3884	0.5515	0.5545	0.4996	0.4792	/
Min.	602.8	602.7	602.6	602.3	602.8	602.6	602.2	602.7	/
Max.	604.1	604.2	604.5	603.7	604.4	604.5	603.7	604.2	/

3.5 Data Set 1, 55°C, 150mA (Chromaticity Shift)

Sample No.	u'	v'	CCT(K)	Chromaticity Shift Δu'v'								
	0hr(Initial)			1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	0.2584	0.5298	2776	0.0001	0.0002	0.0002	0.0003	0.0004	0.0007	0.0007	0.0008	0.0010
L2	0.2583	0.5296	2778	0.0001	0.0003	0.0004	0.0004	0.0005	0.0006	0.0007	0.0009	0.0009
L3	0.2582	0.5294	2781	0.0002	0.0002	0.0003	0.0003	0.0005	0.0005	0.0006	0.0007	0.0011
L4	0.2581	0.5294	2784	0.0001	0.0001	0.0003	0.0003	0.0004	0.0005	0.0006	0.0009	0.0011
L5	0.2581	0.5293	2785	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0009	0.0010
L6	0.2581	0.5292	2786	0.0002	0.0002	0.0003	0.0004	0.0004	0.0004	0.0008	0.0008	0.0009
L7	0.2580	0.5292	2787	0.0001	0.0002	0.0003	0.0003	0.0003	0.0005	0.0005	0.0008	0.0009
L8	0.2580	0.5292	2788	0.0002	0.0002	0.0003	0.0004	0.0005	0.0005	0.0005	0.0010	0.0010
L9	0.2559	0.5252	2852	0.0001	0.0002	0.0003	0.0005	0.0005	0.0005	0.0006	0.0007	0.0011
L10	0.2558	0.5250	2855	0.0001	0.0001	0.0003	0.0004	0.0005	0.0005	0.0005	0.0007	0.0010
L11	0.2557	0.5249	2858	0.0001	0.0001	0.0003	0.0004	0.0005	0.0005	0.0006	0.0007	0.0011
L12	0.2557	0.5248	2860	0.0002	0.0003	0.0003	0.0004	0.0004	0.0005	0.0008	0.0010	0.0011
L13	0.2556	0.5247	2862	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0008	0.0009	0.0009
L14	0.2556	0.5247	2861	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0009	0.0011
L15	0.2555	0.5245	2865	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007	0.0007	0.0010
L16	0.2555	0.5245	2864	0.0002	0.0002	0.0003	0.0004	0.0004	0.0005	0.0008	0.0010	0.0010
L17	0.2606	0.5259	2746	0.0002	0.0002	0.0003	0.0004	0.0004	0.0006	0.0006	0.0009	0.0009
L18	0.2605	0.5257	2749	0.0002	0.0002	0.0004	0.0005	0.0005	0.0007	0.0008	0.0008	0.0009
L19	0.2605	0.5256	2751	0.0001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0009
L20	0.2604	0.5255	2752	0.0001	0.0003	0.0003	0.0003	0.0004	0.0004	0.0006	0.0008	0.0009
L21	0.2604	0.5254	2753	0.0002	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0009	0.0010
L22	0.2603	0.5253	2754	0.0002	0.0002	0.0002	0.0003	0.0005	0.0005	0.0005	0.0007	0.0010
L23	0.2603	0.5254	2755	0.0001	0.0002	0.0004	0.0004	0.0005	0.0005	0.0007	0.0008	0.0008
L24	0.2603	0.5253	2756	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0007	0.0011
L25	0.2581	0.5248	2805	0.0001	0.0003	0.0004	0.0004	0.0004	0.0007	0.0008	0.0008	0.0008
Ave.	0.2581	0.5265	2799	0.0001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0007	0.0008	0.0010
Med.	0.2581	0.5254	2785	0.0001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0006	0.0008	0.0010
st dev	0.0019	0.0021	45.40	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2555	0.5245	2746	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007	0.0008
Max.	0.2606	0.5298	2865	0.0002	0.0003	0.0004	0.0005	0.0005	0.0007	0.0008	0.0010	0.0011

Sample No.	Chromaticity Shift $\Delta u'v'$								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L1	0.0011	0.0013	0.0015	0.0017	0.0018	0.0022	0.0025	0.0025	/
L2	0.0013	0.0013	0.0015	0.0018	0.0020	0.0020	0.0025	0.0025	/
L3	0.0011	0.0014	0.0017	0.0017	0.0020	0.0023	0.0023	0.0027	/
L4	0.0011	0.0013	0.0014	0.0016	0.0019	0.0023	0.0023	0.0027	/
L5	0.0012	0.0012	0.0016	0.0018	0.0020	0.0022	0.0024	0.0025	/
L6	0.0010	0.0014	0.0017	0.0018	0.0021	0.0022	0.0023	0.0027	/
L7	0.0012	0.0012	0.0016	0.0016	0.0019	0.0022	0.0022	0.0025	/
L8	0.0011	0.0014	0.0014	0.0017	0.0019	0.0023	0.0023	0.0027	/
L9	0.0011	0.0013	0.0015	0.0016	0.0020	0.0020	0.0023	0.0027	/
L10	0.0012	0.0013	0.0016	0.0017	0.0021	0.0021	0.0023	0.0024	/
L11	0.0012	0.0014	0.0017	0.0017	0.0019	0.0022	0.0024	0.0027	/
L12	0.0011	0.0013	0.0015	0.0016	0.0020	0.0022	0.0023	0.0026	/
L13	0.0012	0.0014	0.0015	0.0018	0.0020	0.0023	0.0023	0.0025	/
L14	0.0012	0.0014	0.0015	0.0017	0.0018	0.0022	0.0023	0.0027	/
L15	0.0012	0.0013	0.0016	0.0016	0.0018	0.0023	0.0024	0.0025	/
L16	0.0012	0.0015	0.0016	0.0016	0.0021	0.0022	0.0023	0.0024	/
L17	0.0012	0.0013	0.0016	0.0018	0.0020	0.0022	0.0023	0.0025	/
L18	0.0013	0.0014	0.0015	0.0017	0.0019	0.0020	0.0024	0.0028	/
L19	0.0011	0.0012	0.0016	0.0017	0.0021	0.0023	0.0024	0.0026	/
L20	0.0010	0.0014	0.0016	0.0017	0.0020	0.0022	0.0024	0.0027	/
L21	0.0012	0.0013	0.0017	0.0018	0.0020	0.0021	0.0024	0.0027	/
L22	0.0012	0.0014	0.0014	0.0017	0.0021	0.0023	0.0024	0.0025	/
L23	0.0011	0.0014	0.0016	0.0017	0.0019	0.0022	0.0024	0.0025	/
L24	0.0012	0.0013	0.0016	0.0018	0.0018	0.0023	0.0023	0.0025	/
L25	0.0010	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	0.0025	/
Ave.	0.0012	0.0013	0.0016	0.0017	0.0020	0.0022	0.0024	0.0026	/
Med.	0.0012	0.0013	0.0016	0.0017	0.0020	0.0022	0.0023	0.0025	/
st dev	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	/
Min.	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	0.0022	0.0024	/
Max.	0.0013	0.0015	0.0017	0.0018	0.0021	0.0023	0.0025	0.0028	/

3.6 Data Set 2, 85°C, 150mA (Lumen Maintenance)

Sample No.	Φ (lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L26	52.21	100.33	100.16	99.97	99.95	99.81	99.62	99.48	99.39	99.01
L27	52.08	100.25	100.07	100.04	99.85	99.74	99.68	99.54	99.23	98.98
L28	51.81	100.21	100.16	100.00	99.98	99.81	99.67	99.45	99.33	99.15
L29	51.71	100.31	100.15	100.09	99.86	99.79	99.60	99.56	99.22	99.04
L30	51.52	100.18	100.10	100.00	99.97	99.68	99.66	99.60	99.22	99.01
L31	51.47	100.23	100.12	100.02	99.95	99.85	99.72	99.44	99.28	99.07
L32	51.88	100.13	100.12	99.98	99.90	99.85	99.73	99.64	99.28	99.02
L33	51.34	100.23	100.11	100.05	100.03	99.82	99.63	99.41	99.39	99.13
L34	51.27	100.19	100.18	100.02	99.83	99.67	99.57	99.41	99.40	99.07
L35	52.01	100.28	100.20	100.12	99.92	99.84	99.61	99.58	99.42	99.17
L36	51.40	100.27	100.19	100.05	99.95	99.87	99.71	99.47	99.37	98.97
L37	51.12	100.23	100.18	99.98	99.96	99.73	99.64	99.52	99.28	99.16
L38	51.11	100.22	100.19	100.04	99.89	99.71	99.62	99.54	99.24	99.08
L39	51.93	100.26	100.14	100.11	99.91	99.69	99.60	99.42	99.41	99.24
L40	51.96	100.21	100.09	100.02	99.85	99.83	99.72	99.38	99.36	98.99
L41	51.28	100.23	100.14	100.12	99.99	99.86	99.65	99.36	99.35	98.97
L42	51.25	100.17	100.14	100.07	99.88	99.87	99.70	99.64	99.45	99.18
L43	52.77	100.18	100.13	100.05	100.01	99.75	99.58	99.46	99.34	99.21
L44	51.96	100.16	100.06	100.11	99.87	99.75	99.62	99.36	99.24	99.01
L45	51.86	100.21	100.18	100.02	99.95	99.73	99.71	99.51	99.23	99.17
L46	51.66	100.20	100.12	100.07	99.85	99.80	99.60	99.59	99.22	99.00
L47	51.55	100.28	100.22	100.09	99.86	99.69	99.64	99.60	99.29	98.95
L48	52.78	100.28	100.20	99.99	99.97	99.92	99.62	99.39	99.30	99.06
L49	52.58	100.24	100.16	100.01	99.90	99.71	99.63	99.57	99.24	99.17
L50	52.29	100.19	100.10	100.04	99.84	99.82	99.58	99.38	99.36	98.98
Ave.	51.79	100.23	100.14	100.04	99.92	99.78	99.64	99.49	99.31	99.07
Med.	51.81	100.23	100.14	100.04	99.91	99.80	99.63	99.48	99.30	99.06
st dev	0.48	0.0481	0.0425	0.0456	0.0581	0.0706	0.0485	0.0904	0.0733	0.0878
Min.	51.11	100.13	100.06	99.97	99.83	99.67	99.57	99.36	99.22	98.95
Max.	52.78	100.33	100.22	100.12	100.03	99.92	99.73	99.64	99.45	99.24

Sample No.	Lumen Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L26	98.96	98.62	98.21	98.06	97.93	97.61	97.10	96.84	/
L27	98.95	98.59	98.19	97.94	97.63	97.44	97.29	96.79	/
L28	98.68	98.65	98.45	97.91	97.67	97.41	97.39	96.99	/
L29	98.77	98.66	98.47	98.17	97.82	97.58	97.24	97.11	/
L30	98.96	98.71	98.43	98.16	97.98	97.61	97.36	97.05	/
L31	99.01	98.65	98.34	98.22	97.65	97.34	97.08	96.95	/
L32	98.89	98.53	98.33	98.03	97.76	97.57	97.32	97.04	/
L33	98.75	98.50	98.17	98.07	97.71	97.54	97.23	96.81	/
L34	98.78	98.52	98.23	97.93	97.65	97.61	97.30	96.90	/
L35	98.90	98.70	98.27	98.09	97.91	97.60	97.17	96.84	/
L36	98.69	98.49	98.25	98.03	97.77	97.54	97.27	96.96	/
L37	98.70	98.61	98.26	98.05	97.84	97.42	97.32	96.89	/
L38	98.68	98.48	98.40	98.25	97.77	97.45	97.12	96.98	/
L39	98.98	98.67	98.20	98.04	97.86	97.48	97.18	97.03	/
L40	98.68	98.45	98.21	97.95	97.74	97.35	97.14	96.86	/
L41	98.68	98.52	98.45	97.94	97.90	97.43	97.18	97.03	/
L42	98.83	98.55	98.44	97.99	97.87	97.50	97.40	96.91	/
L43	98.84	98.58	98.29	97.91	97.83	97.60	97.17	96.94	/
L44	98.93	98.52	98.35	98.07	97.71	97.47	97.41	96.87	/
L45	98.75	98.56	98.31	97.97	97.65	97.38	97.33	96.79	/
L46	98.75	98.66	98.46	98.16	97.87	97.43	97.28	96.80	/
L47	98.87	98.49	98.47	98.25	97.64	97.47	97.14	96.78	/
L48	98.78	98.58	98.52	98.21	97.74	97.56	97.17	96.99	/
L49	98.79	98.61	98.30	98.17	97.75	97.41	97.11	97.10	/
L50	98.94	98.54	98.26	97.95	97.86	97.54	97.12	97.07	/
Ave.	98.82	98.58	98.33	98.06	97.78	97.49	97.23	96.93	/
Med.	98.79	98.58	98.31	98.05	97.77	97.48	97.23	96.94	/
st dev	0.1098	0.0739	0.1065	0.1110	0.1020	0.0862	0.1026	0.1039	/
Min.	98.68	98.45	98.17	97.91	97.63	97.34	97.08	96.78	/
Max.	99.01	98.71	98.52	98.25	97.98	97.61	97.41	97.11	/

3.7 Data Set 2, 85°C, 150mA (Photosynthetic Photon Flux Maintenance)

Sample No.	PPF ($\mu\text{mol/s}$)	Photosynthetic Photon Flux Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L26	0.7474	100.29	100.19	100.14	99.93	99.89	99.78	99.55	99.16	99.07
L27	0.7452	100.34	100.19	100.09	100.05	99.89	99.69	99.62	99.40	99.02
L28	0.7418	100.22	100.17	100.02	99.96	99.94	99.84	99.43	99.32	99.08
L29	0.7403	100.30	100.22	100.03	99.95	99.85	99.83	99.43	99.38	98.91
L30	0.7377	100.21	100.17	100.09	99.96	99.95	99.79	99.48	99.35	98.99
L31	0.7370	100.19	100.17	100.04	100.04	99.96	99.81	99.59	99.23	99.10
L32	0.7316	100.19	100.16	100.06	99.99	99.83	99.73	99.62	99.20	99.03
L33	0.7242	100.28	100.20	100.04	99.94	99.84	99.80	99.48	99.32	99.12
L34	0.7234	100.33	100.13	100.05	100.01	99.92	99.85	99.48	99.36	99.12
L35	0.7386	100.29	100.15	100.12	99.94	99.89	99.70	99.42	99.23	99.10
L36	0.7302	100.24	100.20	100.05	99.99	99.86	99.84	99.46	99.34	98.94
L37	0.7264	100.21	100.20	100.09	99.91	99.84	99.82	99.39	99.32	99.05
L38	0.7341	100.25	100.14	100.10	99.96	99.91	99.70	99.56	99.12	98.98
L39	0.7314	100.22	100.13	100.12	100.05	99.87	99.79	99.56	99.15	98.93
L40	0.7319	100.24	100.20	100.12	100.02	99.97	99.80	99.45	99.33	98.96
L41	0.7366	100.20	100.14	100.09	99.90	99.83	99.81	99.60	99.18	99.05
L42	0.7361	100.23	100.18	100.16	99.99	99.89	99.72	99.43	99.17	99.11
L43	0.7638	100.25	100.15	100.12	99.93	99.87	99.71	99.63	99.38	99.11
L44	0.7527	100.22	100.18	100.12	99.93	99.88	99.75	99.44	99.26	99.12
L45	0.7512	100.32	100.20	100.07	99.94	99.90	99.72	99.52	99.17	98.98
L46	0.7485	100.25	100.21	100.07	100.04	99.85	99.77	99.57	99.34	98.98
L47	0.7468	100.23	100.16	100.06	99.97	99.85	99.74	99.43	99.39	98.92
L48	0.7666	100.31	100.19	100.02	99.95	99.88	99.79	99.58	99.17	99.05
L49	0.7501	100.33	100.17	100.16	99.90	99.83	99.79	99.42	99.32	98.94
L50	0.7460	100.28	100.14	100.08	99.90	99.84	99.72	99.60	99.22	99.02
Ave.	0.7408	100.26	100.17	100.08	99.97	99.88	99.77	99.51	99.27	99.03
Med.	0.7386	100.25	100.17	100.09	99.96	99.88	99.79	99.48	99.32	99.03
st dev	0.0111	0.0467	0.0263	0.0410	0.0476	0.0418	0.0496	0.0781	0.0892	0.0704
Min.	0.7234	100.19	100.13	100.02	99.90	99.83	99.69	99.39	99.12	98.91
Max.	0.7666	100.34	100.22	100.16	100.05	99.97	99.85	99.63	99.40	99.12

Sample No.	Photosynthetic Photon Flux Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L26	98.70	98.64	98.22	98.08	97.91	97.52	97.28	96.96	/
L27	98.80	98.58	98.42	98.06	97.88	97.53	97.23	96.95	/
L28	98.77	98.58	98.34	98.01	97.79	97.67	97.27	97.12	/
L29	98.87	98.44	98.26	98.18	97.68	97.53	97.26	96.96	/
L30	98.89	98.52	98.44	98.10	97.84	97.64	97.27	97.03	/
L31	98.82	98.61	98.41	98.05	97.97	97.57	97.33	96.99	/
L32	98.70	98.62	98.44	98.08	97.83	97.57	97.43	97.25	/
L33	98.79	98.53	98.35	98.04	97.77	97.46	97.40	96.92	/
L34	98.68	98.60	98.44	98.08	97.84	97.73	97.28	97.13	/
L35	98.90	98.45	98.23	98.12	97.94	97.55	97.40	96.86	/
L36	98.71	98.59	98.41	98.16	97.76	97.62	97.26	96.97	/
L37	98.72	98.49	98.35	98.16	97.89	97.57	97.47	96.88	/
L38	98.91	98.64	98.42	98.12	97.82	97.49	97.23	96.98	/
L39	98.89	98.54	98.25	98.02	97.73	97.68	97.37	96.87	/
L40	98.72	98.46	98.45	97.99	97.69	97.49	97.28	97.14	/
L41	98.80	98.45	98.32	98.05	97.93	97.47	97.20	97.07	/
L42	98.88	98.68	98.43	97.99	97.98	97.47	97.40	97.17	/
L43	98.72	98.48	98.29	98.08	97.82	97.75	97.35	96.88	/
L44	98.71	98.70	98.38	98.19	97.75	97.64	97.39	96.85	/
L45	98.81	98.60	98.24	98.22	97.81	97.79	97.23	96.86	/
L46	98.81	98.69	98.29	98.09	97.82	97.49	97.27	97.04	/
L47	98.72	98.67	98.47	98.09	97.79	97.60	97.28	96.94	/
L48	98.76	98.63	98.34	98.23	98.00	97.58	97.32	97.21	/
L49	98.76	98.47	98.37	98.13	97.74	97.60	97.21	96.90	/
L50	98.87	98.64	98.27	98.00	97.82	97.55	97.42	96.84	/
Ave.	98.79	98.57	98.35	98.09	97.83	97.58	97.31	96.99	/
Med.	98.79	98.59	98.35	98.08	97.82	97.57	97.28	96.96	/
st dev	0.0742	0.0830	0.0789	0.0690	0.0877	0.0905	0.0772	0.1211	/
Min.	98.68	98.44	98.22	97.99	97.68	97.46	97.20	96.84	/
Max.	98.91	98.70	98.47	98.23	98.00	97.79	97.47	97.25	/

3.8 Data Set 2, 85°C, 150mA (Forward Voltage)

Sample No.	Forward Voltage (V)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L26	3.235	3.236	3.204	3.231	3.215	3.237	3.238	3.260	3.207	3.209
L27	3.233	3.241	3.234	3.247	3.246	3.209	3.219	3.217	3.223	3.220
L28	3.230	3.221	3.212	3.224	3.257	3.241	3.222	3.247	3.220	3.219
L29	3.229	3.211	3.240	3.259	3.247	3.208	3.232	3.217	3.256	3.210
L30	3.226	3.251	3.208	3.255	3.248	3.215	3.243	3.222	3.219	3.223
L31	3.226	3.253	3.213	3.242	3.225	3.235	3.258	3.227	3.213	3.205
L32	3.226	3.213	3.225	3.248	3.238	3.241	3.210	3.216	3.251	3.255
L33	3.222	3.212	3.258	3.246	3.201	3.215	3.214	3.220	3.206	3.214
L34	3.221	3.257	3.208	3.225	3.247	3.204	3.232	3.221	3.240	3.235
L35	3.237	3.201	3.246	3.223	3.215	3.253	3.212	3.210	3.239	3.218
L36	3.231	3.244	3.229	3.235	3.215	3.226	3.218	3.227	3.237	3.250
L37	3.228	3.253	3.242	3.223	3.202	3.226	3.218	3.216	3.222	3.249
L38	3.217	3.220	3.213	3.236	3.228	3.240	3.231	3.244	3.236	3.230
L39	3.215	3.244	3.207	3.212	3.209	3.242	3.245	3.253	3.223	3.250
L40	3.215	3.224	3.217	3.248	3.212	3.234	3.219	3.219	3.251	3.230
L41	3.215	3.224	3.215	3.244	3.248	3.200	3.231	3.261	3.236	3.235
L42	3.215	3.217	3.228	3.255	3.214	3.247	3.218	3.261	3.208	3.223
L43	3.252	3.235	3.233	3.253	3.217	3.209	3.233	3.221	3.247	3.221
L44	3.222	3.230	3.228	3.211	3.215	3.225	3.232	3.246	3.210	3.240
L45	3.220	3.244	3.215	3.210	3.232	3.251	3.249	3.255	3.240	3.220
L46	3.219	3.247	3.240	3.223	3.210	3.251	3.242	3.235	3.207	3.221
L47	3.217	3.207	3.201	3.216	3.208	3.223	3.222	3.242	3.236	3.221
L48	3.260	3.221	3.241	3.230	3.225	3.225	3.258	3.233	3.204	3.224
L49	3.246	3.231	3.208	3.213	3.247	3.250	3.211	3.219	3.252	3.205
L50	3.245	3.242	3.201	3.229	3.243	3.238	3.215	3.218	3.207	3.259
Ave.	3.228	3.231	3.223	3.234	3.227	3.230	3.229	3.232	3.228	3.227
Med.	3.226	3.231	3.217	3.231	3.225	3.234	3.231	3.227	3.223	3.223
st dev	0.0122	0.0161	0.0159	0.0154	0.0172	0.0162	0.0143	0.0166	0.0171	0.0155
Min.	3.215	3.201	3.201	3.210	3.201	3.200	3.210	3.210	3.204	3.205
Max.	3.260	3.257	3.258	3.259	3.257	3.253	3.258	3.261	3.256	3.259

Sample No.	Forward Voltage (V)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L26	3.250	3.247	3.221	3.222	3.244	3.242	3.256	3.207	/
L27	3.236	3.219	3.241	3.226	3.250	3.243	3.240	3.234	/
L28	3.236	3.253	3.216	3.251	3.221	3.248	3.258	3.254	/
L29	3.235	3.206	3.211	3.224	3.213	3.253	3.249	3.250	/
L30	3.222	3.241	3.217	3.260	3.239	3.236	3.237	3.203	/
L31	3.251	3.223	3.203	3.211	3.218	3.230	3.226	3.206	/
L32	3.241	3.205	3.206	3.219	3.255	3.256	3.240	3.231	/
L33	3.217	3.247	3.207	3.218	3.237	3.256	3.239	3.220	/
L34	3.257	3.247	3.232	3.221	3.245	3.233	3.214	3.255	/
L35	3.229	3.205	3.233	3.217	3.219	3.257	3.217	3.211	/
L36	3.252	3.209	3.248	3.250	3.215	3.211	3.232	3.229	/
L37	3.248	3.222	3.221	3.250	3.212	3.248	3.219	3.232	/
L38	3.244	3.211	3.211	3.256	3.216	3.226	3.221	3.201	/
L39	3.226	3.216	3.239	3.224	3.228	3.224	3.210	3.202	/
L40	3.246	3.209	3.211	3.232	3.237	3.251	3.218	3.225	/
L41	3.214	3.210	3.243	3.218	3.245	3.260	3.236	3.240	/
L42	3.220	3.221	3.227	3.259	3.213	3.256	3.257	3.210	/
L43	3.228	3.224	3.224	3.246	3.232	3.227	3.250	3.207	/
L44	3.237	3.203	3.224	3.233	3.205	3.236	3.254	3.251	/
L45	3.220	3.216	3.240	3.240	3.225	3.243	3.245	3.214	/
L46	3.217	3.244	3.238	3.240	3.244	3.239	3.214	3.231	/
L47	3.230	3.231	3.239	3.212	3.237	3.258	3.255	3.239	/
L48	3.233	3.212	3.244	3.223	3.247	3.212	3.233	3.221	/
L49	3.232	3.212	3.208	3.220	3.239	3.222	3.256	3.249	/
L50	3.233	3.252	3.240	3.235	3.206	3.228	3.243	3.207	/
Ave.	3.234	3.223	3.226	3.232	3.230	3.240	3.237	3.225	/
Med.	3.233	3.219	3.224	3.226	3.232	3.242	3.239	3.225	/
st dev	0.0122	0.0167	0.0142	0.0154	0.0150	0.0146	0.0157	0.0180	/
Min.	3.214	3.203	3.203	3.211	3.205	3.211	3.210	3.201	/
Max.	3.257	3.253	3.248	3.260	3.255	3.260	3.258	3.255	/

3.9 Data Set 2, 85°C, 150mA (Wavelength)

Sample No.	Wavelength (nm)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L26	603.1	603.6	603.6	603.6	604.0	603.2	603.6	603.9	604.2	603.8
L27	603.0	604.1	602.8	604.1	604.1	603.0	604.1	603.9	604.2	603.9
L28	603.9	602.8	604.2	603.6	604.1	604.0	603.8	604.0	603.7	603.6
L29	603.3	603.8	603.9	603.8	603.5	604.3	604.1	603.3	603.2	603.9
L30	603.7	604.0	603.4	603.3	603.4	603.5	604.2	604.4	604.2	603.7
L31	603.6	603.4	602.7	603.6	603.2	603.1	603.8	603.1	603.6	603.2
L32	604.3	604.0	603.8	604.0	603.4	603.6	604.1	603.0	603.1	604.0
L33	603.3	603.6	603.8	603.2	603.2	604.0	604.2	604.1	603.1	603.7
L34	604.0	604.1	603.3	603.4	603.6	603.3	603.6	604.1	604.2	604.0
L35	603.8	602.9	602.6	603.7	604.1	603.6	603.8	603.0	603.2	603.6
L36	603.5	603.0	602.5	603.8	603.8	604.1	603.5	604.3	604.3	603.3
L37	603.9	602.8	603.1	603.4	604.2	603.6	603.9	604.1	604.0	604.0
L38	604.1	603.9	603.7	603.1	603.7	603.8	604.1	602.9	603.4	603.5
L39	603.9	603.3	604.2	603.7	603.3	603.1	603.9	603.0	603.7	604.0
L40	603.6	603.9	604.3	603.8	603.7	603.5	603.6	604.1	604.2	603.6
L41	603.8	604.2	603.6	603.8	604.0	603.5	603.3	603.4	604.0	603.3
L42	603.2	603.4	604.1	603.7	603.5	603.7	603.9	603.9	604.1	603.8
L43	603.9	602.9	602.8	603.4	603.6	603.0	603.9	603.8	603.9	603.5
L44	604.1	604.2	604.4	603.9	603.4	603.4	604.0	603.6	603.9	603.9
L45	603.5	603.5	604.0	603.2	603.3	603.1	604.2	602.5	603.5	603.7
L46	603.4	603.5	602.6	603.2	603.7	603.9	603.7	603.2	603.1	604.0
L47	603.9	603.8	603.4	603.7	604.2	603.9	603.9	603.0	603.8	603.9
L48	603.3	603.7	602.8	603.9	603.6	603.4	604.3	603.5	604.1	604.0
L49	604.2	603.5	602.9	603.8	604.2	604.1	603.7	603.9	603.6	603.5
L50	603.0	604.3	603.3	603.4	604.1	604.0	603.2	604.2	603.9	603.6
Ave.	603.7	603.6	603.4	603.6	603.7	603.6	603.9	603.6	603.8	603.7
Med.	603.7	603.6	603.4	603.7	603.7	603.6	603.9	603.8	603.9	603.7
st dev	0.3787	0.4618	0.6012	0.2746	0.3400	0.3833	0.2844	0.5299	0.4007	0.2449
Min.	603.0	602.8	602.5	603.1	603.2	603.0	603.2	602.5	603.1	603.2
Max.	604.3	604.3	604.4	604.1	604.2	604.3	604.3	604.4	604.3	604.0

Sample No.	Wavelength (nm)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L26	604.1	603.8	602.7	603.7	604.2	603.5	603.0	603.0	/
L27	604.1	603.7	603.1	603.6	603.7	603.5	603.3	603.1	/
L28	604.2	603.2	602.6	603.1	603.1	603.4	603.3	603.6	/
L29	603.3	603.4	604.3	603.7	603.1	603.4	603.8	603.5	/
L30	603.3	603.7	604.3	603.7	603.0	603.4	604.2	603.4	/
L31	604.1	603.9	604.3	603.1	603.2	603.4	603.7	603.3	/
L32	603.3	603.1	603.9	603.8	603.0	603.5	602.8	603.9	/
L33	604.2	603.6	604.3	603.3	603.1	603.3	603.1	603.6	/
L34	603.3	603.6	603.9	603.1	604.1	603.1	603.7	603.4	/
L35	603.3	603.4	603.0	603.5	603.4	603.6	603.8	603.5	/
L36	603.2	603.5	602.7	603.6	603.6	603.5	603.1	603.8	/
L37	604.2	603.1	603.5	603.8	603.1	603.7	603.9	603.5	/
L38	603.9	603.9	602.6	603.8	603.7	604.1	603.3	603.3	/
L39	604.0	603.8	603.7	603.4	604.1	603.7	603.3	603.4	/
L40	603.9	603.9	603.0	603.3	603.0	603.8	604.1	603.9	/
L41	603.9	604.0	603.6	603.3	603.1	603.9	603.7	603.4	/
L42	603.5	603.3	604.0	603.7	603.3	604.1	603.3	603.2	/
L43	603.3	603.2	603.8	603.7	603.5	604.1	603.1	603.5	/
L44	603.6	603.6	603.1	603.1	603.2	603.1	602.8	603.3	/
L45	603.5	604.0	602.8	603.5	604.0	603.3	603.4	603.8	/
L46	603.3	603.0	602.8	603.2	603.3	603.0	603.1	603.8	/
L47	603.2	603.5	603.1	603.3	603.3	603.7	602.8	603.2	/
L48	603.9	604.1	603.5	603.5	603.7	603.1	602.8	604.1	/
L49	604.1	603.4	604.2	603.8	603.4	603.2	603.8	603.6	/
L50	603.2	603.5	603.8	603.9	603.4	604.0	602.9	603.8	/
Ave.	603.7	603.6	603.5	603.5	603.4	603.5	603.4	603.5	/
Med.	603.6	603.6	603.5	603.5	603.3	603.5	603.3	603.5	/
st dev	0.3865	0.3119	0.6013	0.2614	0.3722	0.3303	0.4261	0.2749	/
Min.	603.2	603.0	602.6	603.1	603.0	603.0	602.8	603.0	/
Max.	604.2	604.1	604.3	603.9	604.2	604.1	604.2	604.1	/

3.10 Data Set 2, 85°C, 150mA (Chromaticity Shift)

Sample No.	u'	v'	CCT(K)	Chromaticity Shift $\Delta u'v'$								
				0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h
L26	0.2580	0.5245	2809	0.0002	0.0004	0.0004	0.0005	0.0007	0.0007	0.0009	0.0011	0.0012
L27	0.2579	0.5245	2810	0.0002	0.0002	0.0004	0.0005	0.0006	0.0008	0.0010	0.0010	0.0013
L28	0.2579	0.5244	2813	0.0002	0.0003	0.0003	0.0005	0.0008	0.0009	0.0010	0.0010	0.0013
L29	0.2579	0.5244	2812	0.0001	0.0003	0.0004	0.0005	0.0007	0.0008	0.0010	0.0011	0.0013
L30	0.2578	0.5243	2814	0.0001	0.0004	0.0005	0.0006	0.0006	0.0008	0.0009	0.0011	0.0013
L31	0.2578	0.5243	2815	0.0002	0.0003	0.0004	0.0005	0.0008	0.0008	0.0010	0.0010	0.0013
L32	0.2579	0.5293	2790	0.0002	0.0003	0.0004	0.0005	0.0007	0.0008	0.0011	0.0011	0.0013
L33	0.2579	0.5291	2791	0.0001	0.0004	0.0004	0.0006	0.0008	0.0009	0.0010	0.0012	0.0012
L34	0.2578	0.5291	2792	0.0002	0.0002	0.0003	0.0005	0.0006	0.0008	0.0011	0.0012	0.0012
L35	0.2601	0.5287	2745	0.0001	0.0003	0.0004	0.0005	0.0007	0.0008	0.0010	0.0010	0.0013
L36	0.2599	0.5285	2750	0.0001	0.0004	0.0004	0.0006	0.0007	0.0007	0.0011	0.0011	0.0013
L37	0.2600	0.5284	2748	0.0002	0.0003	0.0005	0.0006	0.0007	0.0008	0.0009	0.0012	0.0014
L38	0.2601	0.5258	2757	0.0001	0.0004	0.0004	0.0004	0.0007	0.0008	0.0009	0.0011	0.0013
L39	0.2600	0.5258	2759	0.0002	0.0002	0.0005	0.0006	0.0007	0.0008	0.0010	0.0010	0.0014
L40	0.2601	0.5258	2758	0.0002	0.0002	0.0004	0.0005	0.0006	0.0009	0.0010	0.0011	0.0012
L41	0.2600	0.5256	2760	0.0001	0.0002	0.0004	0.0005	0.0007	0.0007	0.0010	0.0011	0.0013
L42	0.2600	0.5256	2761	0.0001	0.0002	0.0004	0.0004	0.0007	0.0008	0.0009	0.0012	0.0013
L43	0.2603	0.5228	2767	0.0001	0.0003	0.0003	0.0006	0.0008	0.0009	0.0010	0.0012	0.0013
L44	0.2601	0.5225	2772	0.0002	0.0003	0.0003	0.0004	0.0008	0.0009	0.0010	0.0012	0.0012
L45	0.2601	0.5224	2773	0.0001	0.0004	0.0005	0.0005	0.0007	0.0007	0.0009	0.0012	0.0013
L46	0.2601	0.5223	2774	0.0001	0.0003	0.0004	0.0005	0.0007	0.0007	0.0010	0.0011	0.0012
L47	0.2600	0.5223	2775	0.0001	0.0002	0.0004	0.0006	0.0007	0.0007	0.0011	0.0011	0.0013
L48	0.2578	0.5249	2811	0.0002	0.0003	0.0004	0.0006	0.0007	0.0007	0.0011	0.0012	0.0013
L49	0.2577	0.5244	2817	0.0001	0.0004	0.0005	0.0005	0.0006	0.0008	0.0010	0.0011	0.0013
L50	0.2576	0.5244	2818	0.0002	0.0003	0.0004	0.0004	0.0006	0.0008	0.0009	0.0010	0.0012
Ave.	0.2590	0.5254	2784	0.0001	0.0003	0.0004	0.0005	0.0007	0.0008	0.0010	0.0011	0.0013
Med.	0.2599	0.5245	2775	0.0001	0.0003	0.0004	0.0005	0.0007	0.0008	0.0010	0.0011	0.0013
st dev	0.0011	0.0023	25.62	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2576	0.5223	2745	0.0001	0.0002	0.0003	0.0004	0.0006	0.0007	0.0009	0.0010	0.0012
Max.	0.2603	0.5293	2818	0.0002	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	0.0012	0.0014

Sample No.	Chromaticity Shift $\Delta u'v'$								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L26	0.0015	0.0015	0.0018	0.0019	0.0024	0.0024	0.0028	0.0031	/
L27	0.0014	0.0017	0.0017	0.0021	0.0023	0.0026	0.0028	0.0029	/
L28	0.0015	0.0017	0.0020	0.0021	0.0021	0.0027	0.0029	0.0032	/
L29	0.0014	0.0015	0.0018	0.0021	0.0023	0.0027	0.0028	0.0032	/
L30	0.0014	0.0016	0.0019	0.0022	0.0023	0.0028	0.0030	0.0031	/
L31	0.0014	0.0015	0.0018	0.0019	0.0022	0.0027	0.0028	0.0031	/
L32	0.0014	0.0016	0.0018	0.0021	0.0024	0.0026	0.0028	0.0031	/
L33	0.0013	0.0015	0.0018	0.0021	0.0024	0.0026	0.0029	0.0030	/
L34	0.0015	0.0017	0.0019	0.0023	0.0025	0.0025	0.0030	0.0031	/
L35	0.0014	0.0015	0.0017	0.0020	0.0024	0.0025	0.0029	0.0029	/
L36	0.0015	0.0015	0.0019	0.0022	0.0023	0.0026	0.0028	0.0030	/
L37	0.0014	0.0016	0.0017	0.0020	0.0024	0.0025	0.0026	0.0032	/
L38	0.0014	0.0014	0.0019	0.0023	0.0024	0.0025	0.0026	0.0029	/
L39	0.0015	0.0017	0.0018	0.0021	0.0021	0.0026	0.0029	0.0032	/
L40	0.0014	0.0016	0.0019	0.0022	0.0024	0.0027	0.0028	0.0030	/
L41	0.0014	0.0014	0.0020	0.0020	0.0023	0.0027	0.0030	0.0034	/
L42	0.0013	0.0016	0.0017	0.0022	0.0024	0.0028	0.0029	0.0033	/
L43	0.0014	0.0014	0.0019	0.0019	0.0020	0.0025	0.0027	0.0031	/
L44	0.0014	0.0015	0.0018	0.0018	0.0020	0.0026	0.0027	0.0029	/
L45	0.0014	0.0015	0.0016	0.0020	0.0021	0.0024	0.0029	0.0033	/
L46	0.0015	0.0016	0.0017	0.0021	0.0023	0.0025	0.0028	0.0031	/
L47	0.0013	0.0015	0.0020	0.0022	0.0025	0.0025	0.0028	0.0030	/
L48	0.0014	0.0015	0.0017	0.0020	0.0024	0.0026	0.0029	0.0030	/
L49	0.0014	0.0017	0.0019	0.0019	0.0023	0.0025	0.0027	0.0032	/
L50	0.0014	0.0017	0.0018	0.0019	0.0022	0.0026	0.0027	0.0031	/
Ave.	0.0014	0.0016	0.0018	0.0021	0.0023	0.0026	0.0028	0.0031	/
Med.	0.0014	0.0015	0.0018	0.0021	0.0023	0.0026	0.0028	0.0031	/
st dev	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	/
Min.	0.0013	0.0014	0.0016	0.0018	0.0020	0.0024	0.0026	0.0029	/
Max.	0.0015	0.0017	0.0020	0.0023	0.0025	0.0028	0.0030	0.0034	/

3.11 Data Set 3, 105°C, 150mA (Lumen Maintenance)

Sample No.	Φ(lm)	Photosynthetic Photon Flux Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	52.04	100.17	100.05	100.00	99.81	99.62	99.44	99.41	99.04	98.84
L52	52.66	100.22	100.08	99.89	99.88	99.64	99.63	99.45	99.21	98.97
L53	52.73	100.12	100.02	99.93	99.81	99.65	99.49	99.28	99.22	98.84
L54	52.69	100.19	99.99	99.93	99.78	99.58	99.52	99.24	99.19	98.97
L55	52.54	100.22	100.03	99.93	99.90	99.74	99.42	99.32	99.08	98.98
L56	52.52	100.21	100.07	99.90	99.83	99.63	99.38	99.21	99.12	98.72
L57	51.74	100.20	100.08	99.90	99.79	99.65	99.60	99.21	99.14	99.04
L58	51.34	100.16	100.02	99.87	99.82	99.76	99.53	99.39	99.25	99.02
L59	51.14	100.20	100.06	99.93	99.86	99.63	99.57	99.42	99.21	98.78
L60	52.16	100.17	100.07	100.01	99.79	99.76	99.39	99.32	99.21	99.02
L61	52.95	100.12	100.10	100.00	99.76	99.66	99.53	99.19	98.98	98.85
L62	52.68	100.18	100.10	99.87	99.78	99.54	99.38	99.26	99.24	98.98
L63	52.49	100.17	100.00	99.97	99.74	99.70	99.60	99.34	99.21	98.75
L64	52.32	100.17	100.08	99.99	99.77	99.72	99.58	99.46	98.99	98.82
L65	51.86	100.10	100.08	99.93	99.78	99.54	99.37	99.33	99.00	98.86
L66	51.69	100.11	100.09	99.98	99.80	99.68	99.35	99.17	99.09	98.81
L67	51.61	100.18	100.08	99.92	99.91	99.79	99.38	99.30	98.99	98.72
L68	52.22	100.13	100.08	99.96	99.80	99.60	99.39	99.36	99.16	98.79
L69	52.41	100.19	100.12	99.93	99.90	99.65	99.63	99.38	99.04	98.99
L70	52.31	100.12	100.03	99.98	99.76	99.56	99.44	99.43	99.19	98.75
L71	51.96	100.19	100.10	99.93	99.76	99.66	99.35	99.25	99.23	99.04
L72	51.93	100.16	100.02	99.97	99.81	99.77	99.64	99.32	99.13	98.94
L73	52.48	100.16	100.00	99.96	99.88	99.65	99.46	99.39	99.23	98.87
L74	52.09	100.22	100.05	99.95	99.84	99.64	99.47	99.36	98.97	98.86
L75	52.78	100.15	100.00	99.88	99.73	99.63	99.62	99.17	99.16	98.91
Ave.	52.21	100.17	100.06	99.94	99.81	99.66	99.49	99.32	99.13	98.88
Med.	52.31	100.17	100.07	99.93	99.80	99.65	99.47	99.32	99.16	98.86
st dev	0.47	0.0357	0.0376	0.0412	0.0516	0.0693	0.1005	0.0882	0.0944	0.1039
Min.	51.14	100.10	99.99	99.87	99.73	99.54	99.35	99.17	98.97	98.72
Max.	52.95	100.22	100.12	100.01	99.91	99.79	99.64	99.46	99.25	99.04

Sample No.	Lumen Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L51	98.52	98.18	97.99	97.85	97.65	97.32	96.93	96.47	/
L52	98.63	98.38	98.14	97.79	97.28	97.09	96.75	96.39	/
L53	98.69	98.22	98.19	97.83	97.36	97.34	96.82	96.45	/
L54	98.72	98.16	98.02	97.90	97.53	97.15	96.95	96.41	/
L55	98.75	98.21	98.17	97.79	97.41	97.05	96.82	96.47	/
L56	98.57	98.24	98.16	97.74	97.46	97.33	96.79	96.67	/
L57	98.72	98.59	97.89	97.67	97.51	97.02	96.88	96.43	/
L58	98.58	98.33	98.03	97.66	97.55	97.15	96.98	96.40	/
L59	98.44	98.24	97.88	97.80	97.28	97.02	96.99	96.38	/
L60	98.53	98.49	98.21	97.67	97.60	97.23	96.95	96.46	/
L61	98.58	98.51	97.94	97.93	97.29	97.10	96.77	96.57	/
L62	98.52	98.45	98.11	97.83	97.47	97.24	96.71	96.59	/
L63	98.72	98.35	98.08	97.60	97.59	97.26	96.91	96.33	/
L64	98.67	98.24	98.18	97.83	97.34	96.96	96.72	96.32	/
L65	98.51	98.37	98.23	97.82	97.61	97.24	97.00	96.48	/
L66	98.79	98.45	98.11	97.75	97.29	97.21	96.70	96.42	/
L67	98.57	98.22	98.16	97.87	97.64	97.17	97.00	96.52	/
L68	98.57	98.43	98.07	97.86	97.46	97.15	96.75	96.70	/
L69	98.70	98.57	98.18	97.82	97.41	97.01	96.88	96.46	/
L70	98.73	98.22	97.99	97.58	97.55	97.08	96.84	96.37	/
L71	98.56	98.52	98.22	97.92	97.65	97.10	96.72	96.67	/
L72	98.54	98.25	98.12	97.81	97.29	96.95	96.70	96.44	/
L73	98.58	98.32	97.95	97.88	97.45	97.30	96.89	96.38	/
L74	98.78	98.54	97.96	97.61	97.42	96.99	96.77	96.47	/
L75	98.63	98.23	97.95	97.61	97.59	97.29	96.73	96.41	/
Ave.	98.62	98.35	98.08	97.78	97.47	97.15	96.84	96.47	/
Med.	98.58	98.33	98.11	97.81	97.46	97.15	96.82	96.45	/
st dev	0.0962	0.1356	0.1090	0.1059	0.1267	0.1219	0.1046	0.1025	/
Min.	98.44	98.16	97.88	97.58	97.28	96.95	96.70	96.32	/
Max.	98.79	98.59	98.23	97.93	97.65	97.34	97.00	96.70	/

3.12 Data Set 3, 105°C, 150mA (Photosynthetic Photon Flux Maintenance)

Sample No.	PPF ($\mu\text{mol/s}$) 0hr(Initial)	Photosynthetic Photon Flux Maintenance (%)								
		1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	0.7426	100.13	100.11	100.05	99.79	99.62	99.53	99.33	99.08	98.99
L52	0.7682	100.20	100.00	99.98	99.81	99.65	99.54	99.26	99.08	99.03
L53	0.7514	100.16	100.14	99.88	99.78	99.72	99.58	99.49	99.18	98.76
L54	0.7507	100.23	100.13	99.91	99.88	99.73	99.63	99.48	99.07	98.80
L55	0.7487	100.15	100.11	99.96	99.76	99.66	99.52	99.30	99.23	98.94
L56	0.7483	100.13	100.02	99.95	99.87	99.70	99.60	99.47	99.12	98.78
L57	0.7360	100.15	100.00	99.95	99.83	99.76	99.61	99.37	99.12	99.07
L58	0.7305	100.20	100.16	99.92	99.79	99.73	99.52	99.32	99.26	98.86
L59	0.7277	100.21	100.11	100.04	99.79	99.64	99.47	99.33	99.09	99.08
L60	0.7566	100.22	100.14	100.00	99.89	99.70	99.63	99.48	99.18	99.04
L61	0.7530	100.16	100.03	99.88	99.82	99.68	99.49	99.42	99.07	98.84
L62	0.7495	100.23	99.98	99.93	99.84	99.79	99.53	99.29	99.14	98.76
L63	0.7467	100.17	100.14	99.91	99.84	99.64	99.52	99.32	99.20	98.81
L64	0.7443	100.22	100.09	99.97	99.91	99.64	99.51	99.31	99.17	99.02
L65	0.7380	100.22	100.01	99.99	99.88	99.78	99.63	99.40	99.13	98.96
L66	0.7357	100.20	100.15	99.90	99.83	99.63	99.47	99.38	99.08	98.74
L67	0.7345	100.17	100.01	99.91	99.78	99.68	99.53	99.33	99.29	98.79
L68	0.7573	100.14	100.07	99.99	99.89	99.78	99.60	99.28	99.25	98.80
L69	0.7465	100.23	100.01	99.94	99.87	99.68	99.59	99.41	99.06	98.87
L70	0.7448	100.14	100.06	100.03	99.86	99.64	99.62	99.41	99.19	98.86
L71	0.7399	100.20	100.05	99.99	99.81	99.67	99.56	99.37	99.28	98.74
L72	0.7395	100.19	100.13	99.97	99.85	99.77	99.50	99.43	99.08	99.06
L73	0.7626	100.17	100.01	99.99	99.83	99.67	99.65	99.38	99.12	99.06
L74	0.7573	100.13	100.12	99.91	99.84	99.69	99.49	99.33	99.22	98.77
L75	0.7528	100.13	100.04	99.88	99.86	99.77	99.48	99.45	99.27	99.07
Ave.	0.7465	100.18	100.07	99.95	99.84	99.70	99.55	99.37	99.16	98.90
Med.	0.7467	100.17	100.07	99.95	99.84	99.68	99.53	99.37	99.14	98.86
st dev	0.0099	0.0359	0.0583	0.0500	0.0403	0.0537	0.0571	0.0682	0.0753	0.1250
Min.	0.7277	100.13	99.98	99.88	99.76	99.62	99.47	99.26	99.06	98.74
Max.	0.7682	100.23	100.16	100.05	99.91	99.79	99.65	99.49	99.29	99.08

Sample No.	Photosynthetic Photon Flux Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L51	98.58	98.54	98.00	97.80	97.66	97.23	96.99	96.60	/
L52	98.74	98.30	98.27	97.76	97.35	97.06	96.74	96.43	/
L53	98.65	98.46	98.18	97.82	97.40	97.07	96.92	96.40	/
L54	98.58	98.38	98.10	97.92	97.64	97.05	96.85	96.52	/
L55	98.56	98.44	98.13	97.70	97.61	97.15	96.83	96.29	/
L56	98.66	98.27	97.99	97.97	97.47	97.09	96.83	96.52	/
L57	98.52	98.27	98.04	97.74	97.52	97.16	96.72	96.44	/
L58	98.68	98.36	98.05	97.74	97.53	97.24	96.81	96.58	/
L59	98.53	98.27	98.06	97.77	97.60	97.32	96.85	96.70	/
L60	98.67	98.25	98.02	97.87	97.64	97.22	96.95	96.40	/
L61	98.59	98.28	98.22	97.92	97.52	97.20	96.94	96.57	/
L62	98.57	98.56	98.19	97.88	97.50	97.33	96.68	96.46	/
L63	98.67	98.40	98.04	97.72	97.53	97.11	96.73	96.58	/
L64	98.65	98.38	98.28	97.91	97.56	97.29	96.90	96.35	/
L65	98.63	98.52	98.25	97.73	97.47	97.25	96.73	96.54	/
L66	98.65	98.36	97.95	97.84	97.38	97.14	96.74	96.31	/
L67	98.67	98.47	98.01	97.76	97.48	97.08	96.89	96.41	/
L68	98.60	98.39	98.14	97.67	97.61	97.30	96.75	96.54	/
L69	98.74	98.41	98.12	97.90	97.52	97.16	96.86	96.66	/
L70	98.61	98.28	97.99	97.76	97.46	97.13	96.68	96.27	/
L71	98.52	98.26	98.10	97.86	97.58	97.24	96.74	96.44	/
L72	98.63	98.30	98.27	97.78	97.51	97.08	96.83	96.52	/
L73	98.79	98.31	98.26	97.70	97.59	97.09	96.89	96.30	/
L74	98.64	98.52	98.15	97.92	97.65	97.32	96.68	96.64	/
L75	98.56	98.35	98.14	97.69	97.52	97.12	96.90	96.29	/
Ave.	98.63	98.37	98.12	97.81	97.53	97.18	96.82	96.47	/
Med.	98.63	98.36	98.12	97.78	97.52	97.16	96.83	96.46	/
st dev	0.0691	0.0963	0.1018	0.0876	0.0837	0.0909	0.0925	0.1253	/
Min.	98.52	98.25	97.95	97.67	97.35	97.05	96.68	96.27	/
Max.	98.79	98.56	98.28	97.97	97.66	97.33	96.99	96.70	/

3.13 Data Set 3, 105°C, 150mA (Forward Voltage)

Sample No.	Forward Voltage (V)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	3.244	3.248	3.236	3.239	3.224	3.225	3.235	3.222	3.222	3.234
L52	3.259	3.238	3.254	3.253	3.252	3.242	3.248	3.213	3.242	3.249
L53	3.245	3.240	3.239	3.246	3.242	3.251	3.218	3.238	3.243	3.252
L54	3.244	3.220	3.235	3.217	3.240	3.216	3.240	3.232	3.243	3.212
L55	3.242	3.220	3.219	3.244	3.243	3.244	3.213	3.235	3.210	3.228
L56	3.241	3.240	3.240	3.245	3.221	3.233	3.220	3.213	3.242	3.235
L57	3.242	3.231	3.242	3.234	3.246	3.231	3.232	3.216	3.253	3.247
L58	3.238	3.227	3.236	3.240	3.250	3.214	3.230	3.240	3.236	3.232
L59	3.236	3.239	3.223	3.214	3.245	3.211	3.247	3.227	3.239	3.240
L60	3.234	3.248	3.219	3.251	3.249	3.233	3.238	3.250	3.241	3.212
L61	3.217	3.245	3.212	3.239	3.220	3.210	3.254	3.221	3.250	3.248
L62	3.214	3.221	3.220	3.223	3.246	3.215	3.228	3.224	3.232	3.238
L63	3.212	3.241	3.227	3.241	3.223	3.226	3.245	3.236	3.253	3.211
L64	3.210	3.216	3.213	3.231	3.237	3.241	3.243	3.225	3.246	3.222
L65	3.207	3.212	3.218	3.250	3.235	3.210	3.230	3.251	3.211	3.245
L66	3.205	3.211	3.233	3.212	3.246	3.253	3.244	3.236	3.226	3.226
L67	3.204	3.211	3.246	3.229	3.239	3.250	3.247	3.250	3.238	3.232
L68	3.206	3.251	3.252	3.216	3.246	3.223	3.244	3.250	3.215	3.219
L69	3.244	3.246	3.217	3.251	3.240	3.254	3.252	3.224	3.212	3.229
L70	3.242	3.226	3.241	3.217	3.242	3.212	3.240	3.228	3.251	3.238
L71	3.236	3.246	3.213	3.237	3.248	3.255	3.219	3.239	3.242	3.222
L72	3.234	3.251	3.229	3.228	3.230	3.236	3.224	3.252	3.254	3.224
L73	3.241	3.219	3.235	3.219	3.237	3.251	3.216	3.220	3.245	3.252
L74	3.237	3.226	3.224	3.250	3.251	3.242	3.233	3.236	3.228	3.239
L75	3.232	3.241	3.222	3.245	3.227	3.220	3.216	3.247	3.214	3.223
Ave.	3.231	3.233	3.230	3.235	3.239	3.232	3.234	3.233	3.236	3.232
Med.	3.236	3.238	3.229	3.239	3.242	3.233	3.235	3.235	3.241	3.232
st dev	0.0159	0.0135	0.0123	0.0133	0.0098	0.0157	0.0124	0.0124	0.0143	0.0125
Min.	3.204	3.211	3.212	3.212	3.220	3.210	3.213	3.213	3.210	3.211
Max.	3.259	3.251	3.254	3.253	3.252	3.255	3.254	3.252	3.254	3.252

Sample No.	Forward Voltage (V)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L51	3.254	3.243	3.215	3.214	3.215	3.221	3.226	3.232	/
L52	3.236	3.236	3.233	3.223	3.231	3.241	3.249	3.243	/
L53	3.218	3.251	3.228	3.249	3.253	3.214	3.249	3.225	/
L54	3.250	3.238	3.230	3.246	3.248	3.232	3.223	3.221	/
L55	3.253	3.248	3.217	3.236	3.244	3.227	3.217	3.223	/
L56	3.246	3.247	3.235	3.246	3.234	3.228	3.247	3.217	/
L57	3.237	3.224	3.253	3.237	3.244	3.234	3.233	3.248	/
L58	3.239	3.254	3.252	3.253	3.218	3.221	3.227	3.242	/
L59	3.252	3.247	3.213	3.212	3.215	3.235	3.245	3.243	/
L60	3.248	3.236	3.243	3.219	3.239	3.218	3.246	3.213	/
L61	3.227	3.243	3.229	3.226	3.239	3.241	3.231	3.232	/
L62	3.242	3.237	3.252	3.220	3.230	3.220	3.251	3.248	/
L63	3.238	3.224	3.224	3.215	3.239	3.213	3.233	3.245	/
L64	3.235	3.253	3.237	3.220	3.253	3.219	3.251	3.233	/
L65	3.222	3.252	3.243	3.249	3.219	3.237	3.252	3.239	/
L66	3.213	3.239	3.238	3.223	3.217	3.247	3.227	3.235	/
L67	3.216	3.224	3.252	3.229	3.214	3.230	3.244	3.253	/
L68	3.254	3.243	3.242	3.218	3.222	3.227	3.235	3.236	/
L69	3.246	3.212	3.216	3.241	3.218	3.253	3.226	3.221	/
L70	3.215	3.224	3.225	3.238	3.244	3.232	3.224	3.225	/
L71	3.252	3.250	3.219	3.235	3.240	3.249	3.242	3.238	/
L72	3.219	3.252	3.252	3.223	3.233	3.248	3.219	3.254	/
L73	3.232	3.231	3.213	3.220	3.226	3.224	3.227	3.218	/
L74	3.227	3.235	3.214	3.217	3.232	3.213	3.234	3.234	/
L75	3.239	3.219	3.211	3.240	3.236	3.238	3.234	3.244	/
Ave.	3.236	3.238	3.231	3.230	3.232	3.230	3.236	3.234	/
Med.	3.238	3.239	3.230	3.226	3.233	3.230	3.234	3.235	/
st dev	0.0135	0.0119	0.0145	0.0127	0.0123	0.0118	0.0110	0.0116	/
Min.	3.213	3.212	3.211	3.212	3.214	3.213	3.217	3.213	/
Max.	3.254	3.254	3.253	3.253	3.253	3.253	3.252	3.254	/

3.14 Data Set 3, 105°C, 150mA (Wavelength)

Sample No.	Wavelength (nm)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	602.9	603.7	604.3	604.4	603.2	604.3	602.9	603.6	603.0	603.4
L52	603.5	603.4	604.1	603.4	603.5	603.8	604.2	603.4	603.8	603.7
L53	603.8	603.9	603.9	603.4	604.0	603.3	603.5	603.8	603.4	603.4
L54	602.9	603.6	604.2	603.3	602.9	603.7	604.1	603.7	602.8	602.9
L55	602.8	603.5	603.7	602.6	603.5	603.0	603.9	603.8	603.5	603.7
L56	603.1	603.8	604.0	603.8	603.9	602.9	603.6	603.9	603.3	603.0
L57	602.9	603.7	604.1	603.7	603.8	604.2	604.2	603.3	603.1	604.2
L58	603.1	603.5	603.8	604.0	603.9	603.0	603.9	603.8	603.0	602.9
L59	603.1	603.5	603.2	602.7	604.3	602.7	603.0	604.0	603.3	604.1
L60	602.7	603.4	603.8	603.2	603.4	602.6	603.8	603.8	603.7	603.6
L61	603.5	603.2	603.8	603.7	604.2	602.7	603.2	603.3	602.7	603.5
L62	603.2	603.3	603.7	602.8	603.0	604.2	604.0	603.5	602.9	603.9
L63	602.9	604.0	604.2	602.8	604.3	602.9	602.9	603.3	603.1	603.5
L64	603.3	603.7	603.1	603.0	603.1	603.5	603.6	603.4	603.5	604.1
L65	602.7	603.7	603.6	602.5	603.9	604.4	603.1	603.9	603.1	603.0
L66	602.9	603.5	603.7	603.3	604.0	602.7	604.1	603.3	603.0	603.5
L67	602.8	603.5	604.3	602.9	603.7	603.2	603.4	603.2	603.5	604.1
L68	602.7	603.8	604.0	603.0	603.0	604.3	603.2	603.9	603.3	603.5
L69	603.2	603.5	604.3	603.4	603.5	603.8	603.2	603.9	602.9	604.0
L70	603.3	603.6	603.9	603.8	603.4	603.1	604.0	603.3	603.1	603.7
L71	603.5	603.9	604.2	602.8	603.1	604.3	604.2	603.7	603.1	603.8
L72	603.1	603.8	604.1	603.8	603.3	602.9	604.2	603.2	603.5	604.0
L73	602.9	603.7	603.9	603.0	604.3	602.9	602.9	603.7	603.0	604.2
L74	603.4	603.3	603.4	603.6	603.8	603.3	604.2	603.5	603.0	604.3
L75	602.9	603.8	604.3	602.6	604.0	602.7	604.2	603.8	603.2	604.1
Ave.	603.1	603.6	603.9	603.3	603.6	603.4	603.7	603.6	603.2	603.7
Med.	603.1	603.6	603.9	603.3	603.7	603.2	603.8	603.7	603.1	603.7
st dev	0.2954	0.2068	0.3335	0.5008	0.4425	0.6187	0.4882	0.2598	0.2798	0.4249
Min.	602.7	603.2	603.1	602.5	602.9	602.6	602.9	603.2	602.7	602.9
Max.	603.8	604.0	604.3	604.4	604.3	604.4	604.2	604.0	603.8	604.3

Sample No.	Wavelength (nm)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L51	603.6	603.2	603.7	603.3	603.7	603.8	604.1	603.7	/
L52	603.6	603.1	603.7	603.7	603.7	603.8	603.6	603.6	/
L53	603.4	604.3	603.5	603.6	603.4	604.0	603.2	603.3	/
L54	603.3	603.6	603.3	603.5	603.4	602.9	603.8	603.5	/
L55	603.4	603.9	603.8	603.4	604.0	603.1	603.9	603.2	/
L56	603.5	603.5	603.3	602.9	602.9	603.4	602.6	603.7	/
L57	603.4	603.9	602.8	603.5	603.9	603.9	603.5	603.9	/
L58	603.5	604.2	603.1	603.4	603.7	603.2	602.7	603.4	/
L59	603.6	603.6	603.5	603.6	603.6	603.2	602.8	603.1	/
L60	603.9	603.2	603.7	603.4	602.9	604.2	603.6	603.6	/
L61	603.4	603.5	603.0	603.5	603.4	604.0	602.9	603.0	/
L62	603.9	603.9	603.1	603.5	603.6	604.2	603.4	603.7	/
L63	603.4	603.6	603.7	603.1	602.9	602.9	603.2	603.7	/
L64	603.5	603.5	603.2	603.4	603.8	603.6	604.5	603.0	/
L65	603.3	603.4	602.8	603.5	603.2	603.8	603.3	603.2	/
L66	603.2	603.7	603.4	603.4	603.4	604.1	603.9	603.3	/
L67	603.8	603.4	602.7	603.5	603.7	603.1	603.2	603.0	/
L68	603.4	603.2	602.9	602.9	603.2	604.3	602.6	603.1	/
L69	603.2	603.2	602.8	603.7	603.7	603.4	604.1	603.1	/
L70	603.6	603.7	603.3	603.5	604.1	604.3	602.5	603.2	/
L71	604.0	603.9	603.9	603.8	603.2	603.0	603.4	603.7	/
L72	603.3	603.3	603.6	603.2	603.2	604.0	603.8	602.8	/
L73	603.4	603.9	602.8	602.8	603.2	603.9	602.9	603.4	/
L74	603.7	603.1	603.0	602.8	603.5	603.4	602.7	602.8	/
L75	603.3	603.1	603.4	603.4	603.3	604.2	603.2	603.0	/
Ave.	603.5	603.6	603.3	603.4	603.5	603.7	603.3	603.3	/
Med.	603.4	603.5	603.3	603.4	603.4	603.8	603.3	603.3	/
st dev	0.2189	0.3453	0.3663	0.2762	0.3328	0.4679	0.5438	0.3162	/
Min.	603.2	603.1	602.7	602.8	602.9	602.9	602.5	602.8	/
Max.	604.0	604.3	603.9	603.8	604.1	604.3	604.5	603.9	/

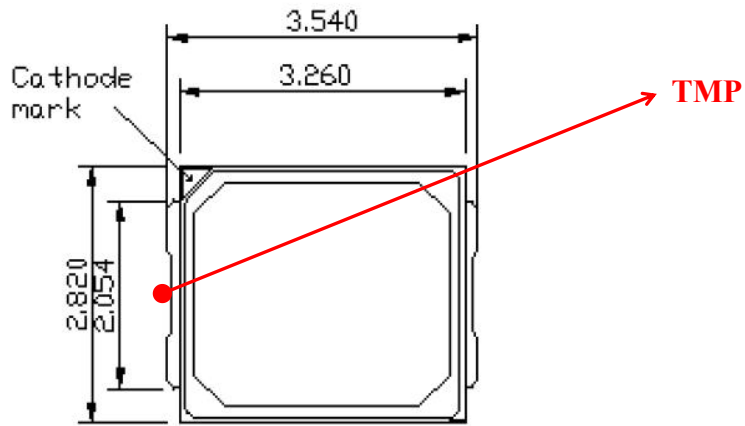
3.15 Data Set 3, 105°C, 150mA (Chromaticity Shift)

Sample No.	u'	v'	CCT(K)	Chromaticity Shift Δu'v'								
	0hr(Initial)			1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	0.2576	0.5243	2819	0.0002	0.0003	0.0005	0.0006	0.0007	0.0011	0.0012	0.0013	0.0016
L52	0.2607	0.5282	2733	0.0002	0.0004	0.0004	0.0005	0.0007	0.0009	0.0013	0.0013	0.0016
L53	0.2605	0.5278	2739	0.0001	0.0003	0.0005	0.0006	0.0006	0.0008	0.0013	0.0014	0.0016
L54	0.2605	0.5278	2740	0.0003	0.0003	0.0003	0.0006	0.0009	0.0009	0.0010	0.0013	0.0016
L55	0.2605	0.5277	2741	0.0003	0.0003	0.0003	0.0006	0.0007	0.0009	0.0011	0.0012	0.0016
L56	0.2604	0.5277	2742	0.0001	0.0002	0.0005	0.0007	0.0007	0.0008	0.0010	0.0012	0.0017
L57	0.2588	0.5269	2779	0.0003	0.0003	0.0003	0.0006	0.0008	0.0010	0.0010	0.0012	0.0016
L58	0.2588	0.5268	2782	0.0001	0.0002	0.0005	0.0006	0.0007	0.0010	0.0012	0.0013	0.0015
L59	0.2587	0.5268	2783	0.0001	0.0003	0.0006	0.0006	0.0006	0.0010	0.0010	0.0013	0.0016
L60	0.2593	0.5270	2770	0.0002	0.0003	0.0003	0.0007	0.0008	0.0008	0.0012	0.0014	0.0017
L61	0.2570	0.5252	2828	0.0001	0.0003	0.0003	0.0007	0.0007	0.0010	0.0010	0.0015	0.0016
L62	0.2570	0.5251	2830	0.0002	0.0003	0.0006	0.0006	0.0007	0.0009	0.0010	0.0014	0.0015
L63	0.2569	0.5250	2831	0.0001	0.0002	0.0003	0.0006	0.0009	0.0009	0.0010	0.0015	0.0014
L64	0.2568	0.5249	2833	0.0003	0.0003	0.0004	0.0007	0.0009	0.0011	0.0012	0.0015	0.0017
L65	0.2568	0.5248	2835	0.0001	0.0003	0.0005	0.0005	0.0008	0.0009	0.0011	0.0015	0.0016
L66	0.2568	0.5248	2834	0.0002	0.0004	0.0005	0.0006	0.0009	0.0009	0.0012	0.0013	0.0015
L67	0.2567	0.5248	2836	0.0002	0.0003	0.0005	0.0007	0.0009	0.0010	0.0010	0.0014	0.0017
L68	0.2567	0.5244	2839	0.0002	0.0003	0.0003	0.0006	0.0007	0.0008	0.0013	0.0014	0.0014
L69	0.2565	0.5241	2844	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0012	0.0013	0.0015
L70	0.2565	0.5241	2845	0.0002	0.0003	0.0004	0.0005	0.0007	0.0009	0.0012	0.0012	0.0017
L71	0.2565	0.5240	2846	0.0002	0.0002	0.0003	0.0007	0.0009	0.0010	0.0012	0.0014	0.0015
L72	0.2564	0.5240	2847	0.0002	0.0003	0.0006	0.0006	0.0008	0.0009	0.0011	0.0013	0.0015
L73	0.2583	0.5257	2796	0.0002	0.0003	0.0004	0.0005	0.0006	0.0011	0.0011	0.0015	0.0016
L74	0.2583	0.5256	2798	0.0002	0.0003	0.0004	0.0007	0.0009	0.0010	0.0012	0.0014	0.0017
L75	0.2581	0.5255	2801	0.0003	0.0003	0.0006	0.0005	0.0009	0.0009	0.0013	0.0015	0.0017
Ave.	0.2580	0.5257	2803	0.0002	0.0003	0.0004	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016
Med.	0.2576	0.5252	2819	0.0002	0.0003	0.0004	0.0006	0.0007	0.0009	0.0012	0.0014	0.0016
st dev	0.0015	0.0014	39.80	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2564	0.5240	2733	0.0001	0.0002	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0014
Max.	0.2607	0.5282	2847	0.0003	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017

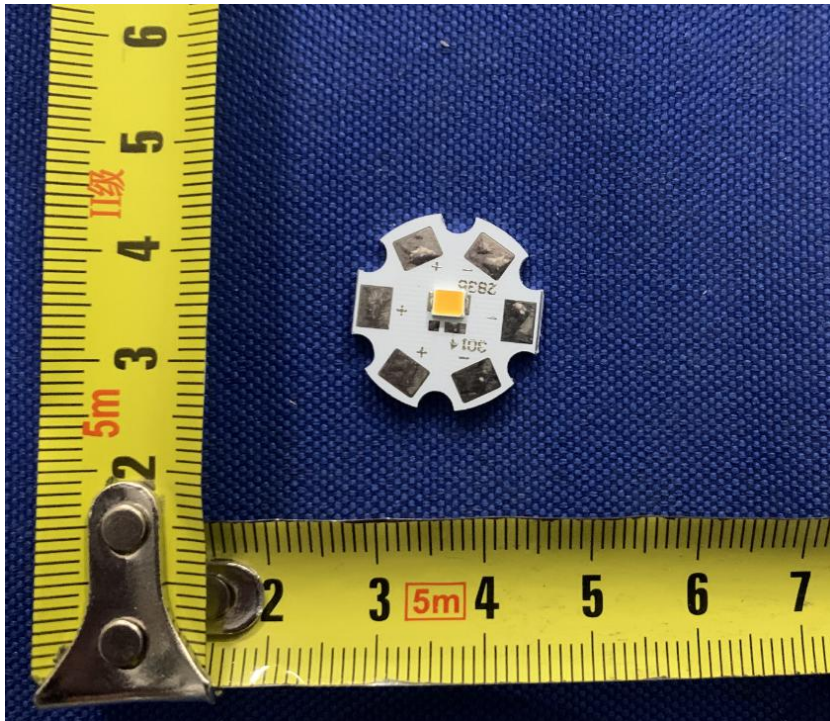
Sample No.	Chromaticity Shift $\Delta u'v'$								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	/
L51	0.0018	0.0023	0.0021	0.0025	0.0030	0.0031	0.0036	0.0041	/
L52	0.0017	0.0020	0.0023	0.0026	0.0030	0.0032	0.0036	0.0039	/
L53	0.0018	0.0022	0.0026	0.0028	0.0031	0.0034	0.0037	0.0038	/
L54	0.0017	0.0022	0.0022	0.0027	0.0028	0.0032	0.0035	0.0039	/
L55	0.0018	0.0019	0.0024	0.0029	0.0029	0.0031	0.0038	0.0037	/
L56	0.0019	0.0023	0.0022	0.0028	0.0030	0.0032	0.0038	0.0040	/
L57	0.0020	0.0019	0.0025	0.0029	0.0030	0.0033	0.0037	0.0037	/
L58	0.0019	0.0023	0.0026	0.0027	0.0029	0.0035	0.0035	0.0037	/
L59	0.0017	0.0022	0.0023	0.0025	0.0031	0.0034	0.0035	0.0040	/
L60	0.0018	0.0020	0.0023	0.0029	0.0031	0.0032	0.0037	0.0038	/
L61	0.0017	0.0020	0.0024	0.0027	0.0032	0.0034	0.0035	0.0036	/
L62	0.0018	0.0022	0.0025	0.0027	0.0027	0.0035	0.0034	0.0040	/
L63	0.0019	0.0019	0.0021	0.0029	0.0029	0.0032	0.0037	0.0040	/
L64	0.0017	0.0019	0.0021	0.0026	0.0029	0.0033	0.0037	0.0040	/
L65	0.0018	0.0021	0.0022	0.0026	0.0029	0.0032	0.0037	0.0040	/
L66	0.0019	0.0021	0.0025	0.0026	0.0031	0.0034	0.0037	0.0040	/
L67	0.0018	0.0022	0.0026	0.0029	0.0028	0.0035	0.0034	0.0040	/
L68	0.0018	0.0023	0.0027	0.0025	0.0031	0.0034	0.0035	0.0041	/
L69	0.0019	0.0021	0.0022	0.0026	0.0028	0.0035	0.0034	0.0038	/
L70	0.0018	0.0020	0.0026	0.0024	0.0028	0.0034	0.0034	0.0038	/
L71	0.0019	0.0020	0.0025	0.0024	0.0027	0.0034	0.0036	0.0038	/
L72	0.0019	0.0021	0.0027	0.0026	0.0029	0.0035	0.0034	0.0038	/
L73	0.0018	0.0022	0.0024	0.0026	0.0031	0.0032	0.0035	0.0037	/
L74	0.0018	0.0022	0.0026	0.0026	0.0032	0.0030	0.0034	0.0039	/
L75	0.0018	0.0020	0.0022	0.0024	0.0027	0.0033	0.0037	0.0037	/
Ave.	0.0018	0.0021	0.0024	0.0027	0.0029	0.0033	0.0036	0.0039	/
Med.	0.0018	0.0021	0.0024	0.0026	0.0029	0.0033	0.0036	0.0039	/
st dev	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	/
Min.	0.0017	0.0019	0.0021	0.0024	0.0027	0.0030	0.0034	0.0036	/
Max.	0.0020	0.0023	0.0027	0.0029	0.0032	0.0035	0.0038	0.0041	/

4-EUT Photos

4.1 Mechanical Dimensions



4.2 EUT Photo



----End of report----