



Shenzhen Belling Efficiency Testing Lab Co., Ltd



# TEST REPORT

## ANSI/IES LM-80-15

### MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCES For

**Shenzhen HoneBright Technology Co.,Ltd**

Floor, 5 Building, Hongyu Guangming Valley, 11 Youmagang Road,  
Gongming Town, Guangming District, Shenzhen, China

**Report No.:** BL210721006-9

**Product Description:** SMD LED

**Model No.:** AW-48/D2B1C27Y40FJ

**Test Initiation Date:** 2021-07-22

**Test Completion Date:** 2021-07-22 to 2023-08-17

**Report Issue Date:** 2023-08-23

**Test Standard:** ANSI/IES LM-80-15

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

**Tested by**

Sam Chen

**Reviewed by**

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.

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## 1-GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test (EUT)

**Manufacturer:** Shenzhen HoneBright Technology Co.,Ltd

**Brand name:** HoneBright

**Part Number:** AW-48/D2B1C27Y40FJ

**Part Type:** SMD LED

**Product Description:** VF 3V, IF 300mA

**CCT:** 2700K

**Die Spacing(mm):** N/A

**Average Power Density per LED die(W/mm2):** 1.182

**Average Current Density per LED die(mA/mm2):** 394.166

**Repersnetative 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)

This report covers the following models:

Test Model Name	Family Model Name	Difference
AW-48/D2B1C27Y40FJ	AW-48/A2B1CXXXXXXJ	First XXX: CCT code; Sencond XX: Flux code; Last X: CRI code.
	AW-48/B2B1CXXXXXXJ	
	AW-48/C2B1CXXXXXXJ	
	AW-48/D2B1CXXXXXXJ	

### 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)

### 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	WT310	N.A	2024-03-27
Integral Sphere(0.5M)	SENSING	Ball0516	N.A	2024-03-27
Spectral radiometer	SENSING	SPR-3000	S1101108	2024-03-27
Stop watch	KISLO	K610	N/A	2024-04-19
LED aging equipment	Guangzhou CK	Box0516	N.A	2024-04-11
DC Power Supply	AIKESAI	APS300-5	N.A	2024-03-27
Thermocouple K	OMEGA	Type K	23736-1	2024-04-17

## 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  $T_s$  55°C,  $T_s$  85°C and  $T_s$  105°C were received at 2021-07-21 and tested during 2021-07-22 to 2023-08-17. The samples were numbered from L1 to L25, L26 to L50 and L51 to L75.

## 2-Summary of Test Result

Data Set	1	2	3
Nominal case temperatures	55°C	85°C	105°C
Drive Current	300mA	300mA	300mA
Condition	Ts=54.1°C Ta=53.4°C	Ts=84.3°C Ta=83.5°C	Ts=104.7°C Ta=103.2°C
Sample size	25	25	25
Duration (in Hours)	17000	17000	17000
Intervals (in Hours)	1000	1000	1000
Failure	0	0	0
$\alpha$	2.078E-06	2.193E-06	2.254E-06
$\beta$	1.008	1.005	1.003
Reported L70 (17k) (17000h)	>102000	>102000	>102000
Reported L90 (17k) (17000h)	55,000	51,000	48,000

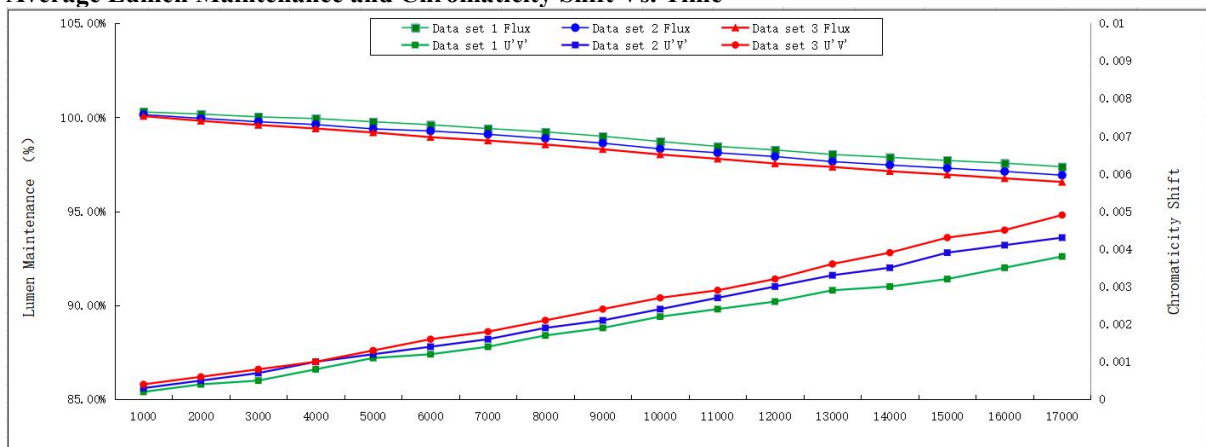
### Average Lumen Maintenance (%)

Data Set	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
1	100.28	100.17	100.02	99.93	99.76	99.60	99.40	99.22	98.99
2	100.14	99.94	99.76	99.61	99.38	99.27	99.09	98.87	98.62
3	100.06	99.81	99.59	99.40	99.19	98.94	98.76	98.55	98.30
Data Set	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
1	98.71	98.45	98.26	98.02	97.87	97.70	97.56	97.37	-
2	98.32	98.11	97.91	97.64	97.46	97.29	97.12	96.92	-
3	98.02	97.79	97.54	97.36	97.13	96.95	96.75	96.56	-

### Average Chromaticity Shift

Data Set	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
1	0.0002	0.0004	0.0005	0.0008	0.0011	0.0012	0.0014	0.0017	0.0019
2	0.0003	0.0005	0.0007	0.0010	0.0012	0.0014	0.0016	0.0019	0.0021
3	0.0004	0.0006	0.0008	0.0010	0.0013	0.0016	0.0018	0.0021	0.0024
Data Set	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
1	0.0022	0.0024	0.0026	0.0029	0.0030	0.0032	0.0035	0.0038	-
2	0.0024	0.0027	0.0030	0.0033	0.0035	0.0039	0.0041	0.0043	-
3	0.0027	0.0029	0.0032	0.0036	0.0039	0.0043	0.0045	0.0049	-

### Average Lumen Maintenance and Chromaticity Shift Vs. Time



### TM-21 Report for Lumen Maintenance

Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Description of LED Light Source Tested (manufacturer, model, catalog number)		Shenzhen HoneBright Technology Co.,Ltd AW-48/D2B1C27Y40FJ				$T_{s,1}$ (°C)	105.00
Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp		Test Condition 3 - 105°C Case Temp		$T_{s,1}$ (K)	378.15
Sample size	25	Sample size	25	Sample size	25	$\alpha_1$	2.254E-06
Number of failures	0	Number of failures	0	Number of failures	0	$B_1$	1.003
DUT drive current used in the test (mA)	300	DUT drive current used in the test (mA)	300	DUT drive current used in the test (mA)	300	$T_{s,2}$ (°C)	-
Test duration (hours)	17,000	Test duration (hours)	17,000	Test duration (hours)	17,000	$T_{s,2}$ (K)	-
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	$\alpha_2$	-
Tested case temperature (°C)	55	Tested case temperature (°C)	85	Tested case temperature (°C)	105	$B_2$	-
$\alpha$	2.078E-06	$\alpha$	2.193E-06	$\alpha$	2.254E-06	$E_{9}/k_6$	-
B	1.008	B	1.005	B	1.003	A	-
Reported L70(17k) (hours)	>102000	Reported L70(17k) (hours)	>102000	Reported L70(17k) (hours)	>102000	$B_0$	1.003
						$T_{s,1}$ (°C)	105.00
						$T_{s,1}$ (K)	378.15
						$\alpha_1$	2.254E-06
						Reported L70(17k) at 105°C (hours)	>102000

Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Description of LED Light Source Tested (manufacturer, model, catalog number)		Shenzhen HoneBright Technology Co.,Ltd AW-48/D2B1C27Y40FJ				$T_{s,1}$ (°C)	105.00
Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp		Test Condition 3 - 105°C Case Temp		$T_{s,1}$ (K)	378.15
Sample size	25	Sample size	25	Sample size	25	$\alpha_1$	2.254E-06
Number of failures	0	Number of failures	0	Number of failures	0	$B_1$	1.003
DUT drive current used in the test (mA)	300	DUT drive current used in the test (mA)	300	DUT drive current used in the test (mA)	300	$T_{s,2}$ (°C)	-
Test duration (hours)	17,000	Test duration (hours)	17,000	Test duration (hours)	17,000	$T_{s,2}$ (K)	-
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	$\alpha_2$	-
Tested case temperature (°C)	55	Tested case temperature (°C)	85	Tested case temperature (°C)	105	$B_2$	-
$\alpha$	2.078E-06	$\alpha$	2.193E-06	$\alpha$	2.254E-06	$E_{9}/k_6$	-
B	1.008	B	1.005	B	1.003	A	-
Reported L90(17k) (hours)	55,000	Reported L90(17k) (hours)	51,000	Reported L90(17k) (hours)	48,000	$B_0$	1.003
						$T_{s,1}$ (°C)	105.00
						$T_{s,1}$ (K)	378.15
						$\alpha_1$	2.254E-06
						Reported L90(17k) at 105°C (hours)	48,000

### 3 Test Data

#### 3.1 Data Set 1, 55°C, 300mA (Lumen Maintenance)

Sample No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	139.2	100.23	100.14	99.94	99.83	99.68	99.50	99.28	99.03	98.80
L2	139.6	100.22	100.11	99.98	99.88	99.66	99.52	99.34	99.14	98.87
L3	138.7	100.34	100.22	99.99	99.91	99.79	99.65	99.38	99.15	98.92
L4	139.1	100.34	100.24	100.12	100.02	99.84	99.65	99.42	99.19	98.94
L5	140.4	100.19	100.09	99.89	99.81	99.70	99.57	99.33	99.13	98.88
L6	140.8	100.23	100.11	99.92	99.82	99.61	99.43	99.17	99.02	98.74
L7	139.0	100.19	100.05	99.97	99.90	99.70	99.50	99.31	99.07	98.85
L8	138.8	100.34	100.26	100.18	100.13	100.01	99.82	99.62	99.47	99.22
L9	139.1	100.32	100.18	99.96	99.84	99.60	99.48	99.33	99.17	98.95
L10	141.3	100.21	100.12	99.99	99.90	99.70	99.57	99.37	99.24	98.98
L11	140.8	100.22	100.11	99.94	99.87	99.68	99.48	99.33	99.17	98.93
L12	139.7	100.35	100.25	100.11	100.05	99.90	99.75	99.57	99.45	99.26
L13	139.4	100.29	100.17	100.02	99.95	99.75	99.62	99.31	99.09	98.86
L14	138.7	100.33	100.23	100.13	100.01	99.91	99.76	99.58	99.47	99.22
L15	140.0	100.36	100.28	100.11	100.01	99.87	99.69	99.58	99.40	99.16
L16	141.3	100.25	100.14	100.04	99.98	99.83	99.64	99.41	99.20	98.98
L17	140.4	100.23	100.14	100.00	99.90	99.76	99.55	99.35	99.23	98.99
L18	139.1	100.25	100.15	100.06	99.93	99.73	99.58	99.42	99.19	98.99
L19	140.6	100.35	100.22	100.05	99.96	99.75	99.61	99.39	99.26	99.06
L20	138.8	100.24	100.13	99.99	99.92	99.75	99.59	99.49	99.35	99.16
L21	140.2	100.22	100.10	99.98	99.91	99.69	99.55	99.27	99.13	98.91
L22	139.0	100.31	100.22	100.13	100.07	99.95	99.77	99.64	99.51	99.28
L23	139.9	100.34	100.19	100.01	99.88	99.73	99.53	99.28	99.08	98.83
L24	140.5	100.36	100.25	100.03	99.91	99.74	99.54	99.31	99.17	98.96
L25	140.2	100.32	100.21	100.02	99.90	99.71	99.54	99.41	99.23	98.98
Ave.	139.8	100.28	100.17	100.02	99.93	99.76	99.60	99.40	99.22	98.99
Med.	139.7	100.29	100.17	100.01	99.91	99.74	99.57	99.37	99.19	98.96
st dev	0.8280	0.0600	0.0628	0.0739	0.0808	0.1034	0.1008	0.1213	0.1423	0.1490
Min.	138.7	100.19	100.05	99.89	99.81	99.60	99.43	99.17	99.02	98.74
Max.	141.3	100.36	100.28	100.18	100.13	100.01	99.82	99.64	99.51	99.28



Sample No.	Lumen Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L1	98.56	98.28	98.12	97.85	97.74	97.58	97.46	97.30	-
L2	98.63	98.39	98.19	97.97	97.84	97.63	97.49	97.26	-
L3	98.65	98.34	98.12	97.88	97.73	97.53	97.39	97.18	-
L4	98.62	98.33	98.18	97.92	97.74	97.55	97.39	97.18	-
L5	98.54	98.26	98.10	97.85	97.68	97.51	97.37	97.21	-
L6	98.43	98.12	97.88	97.67	97.56	97.37	97.24	97.06	-
L7	98.61	98.32	98.13	97.89	97.74	97.60	97.51	97.29	-
L8	98.91	98.70	98.54	98.34	98.23	98.03	97.93	97.70	-
L9	98.72	98.43	98.21	97.92	97.72	97.55	97.46	97.28	-
L10	98.66	98.37	98.21	97.93	97.74	97.58	97.44	97.21	-
L11	98.60	98.29	98.13	97.90	97.76	97.61	97.42	97.24	-
L12	99.01	98.78	98.57	98.32	98.19	98.03	97.87	97.71	-
L13	98.64	98.43	98.23	98.04	97.90	97.73	97.61	97.46	-
L14	98.90	98.70	98.55	98.30	98.14	97.97	97.86	97.61	-
L15	98.90	98.69	98.54	98.24	98.10	97.95	97.74	97.57	-
L16	98.70	98.44	98.22	97.94	97.80	97.65	97.57	97.42	-
L17	98.72	98.46	98.33	98.14	98.03	97.82	97.70	97.51	-
L18	98.77	98.48	98.31	98.01	97.84	97.68	97.49	97.32	-
L19	98.81	98.55	98.31	98.06	97.92	97.75	97.66	97.50	-
L20	98.93	98.65	98.46	98.22	98.07	97.88	97.78	97.64	-
L21	98.63	98.37	98.19	97.96	97.84	97.67	97.50	97.29	-
L22	98.96	98.71	98.50	98.29	98.13	97.93	97.77	97.54	-
L23	98.51	98.30	98.05	97.87	97.69	97.53	97.41	97.17	-
L24	98.65	98.42	98.18	97.92	97.75	97.56	97.42	97.26	-
L25	98.68	98.48	98.34	98.07	97.94	97.76	97.59	97.39	-
Ave.	98.71	98.45	98.26	98.02	97.87	97.70	97.56	97.37	-
Med.	98.66	98.43	98.21	97.96	97.84	97.65	97.50	97.30	-
st dev	0.1521	0.1701	0.1789	0.1774	0.1834	0.1806	0.1813	0.1826	-
Min.	98.43	98.12	97.88	97.67	97.56	97.37	97.24	97.06	-
Max.	99.01	98.78	98.57	98.34	98.23	98.03	97.93	97.71	-

### 3.2 Data Set 1, 55°C, 300mA (Forward Voltage)

Sample No.	Forward Voltage (V)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	3.126	3.124	3.134	3.150	3.105	3.113	3.137	3.106	3.138	3.127
L2	3.145	3.148	3.148	3.136	3.110	3.142	3.123	3.103	3.113	3.106
L3	3.119	3.127	3.128	3.130	3.115	3.145	3.147	3.151	3.149	3.150
L4	3.132	3.153	3.118	3.144	3.121	3.110	3.152	3.137	3.123	3.143
L5	3.127	3.155	3.126	3.129	3.113	3.135	3.145	3.140	3.118	3.126
L6	3.124	3.134	3.122	3.142	3.126	3.127	3.143	3.118	3.137	3.117
L7	3.126	3.145	3.123	3.129	3.154	3.121	3.112	3.140	3.114	3.147
L8	3.135	3.109	3.138	3.129	3.149	3.141	3.122	3.146	3.128	3.126
L9	3.144	3.154	3.120	3.140	3.148	3.127	3.104	3.104	3.132	3.117
L10	3.121	3.139	3.113	3.142	3.118	3.134	3.141	3.145	3.129	3.115
L11	3.123	3.141	3.122	3.139	3.153	3.124	3.141	3.130	3.141	3.135
L12	3.122	3.131	3.111	3.140	3.122	3.141	3.121	3.117	3.132	3.155
L13	3.146	3.151	3.148	3.111	3.108	3.122	3.103	3.117	3.123	3.150
L14	3.151	3.137	3.140	3.149	3.106	3.148	3.108	3.116	3.112	3.111
L15	3.120	3.129	3.127	3.129	3.123	3.111	3.120	3.125	3.125	3.103
L16	3.124	3.151	3.147	3.135	3.124	3.130	3.105	3.152	3.138	3.118
L17	3.123	3.112	3.148	3.146	3.146	3.112	3.115	3.103	3.115	3.123
L18	3.122	3.150	3.148	3.137	3.134	3.116	3.143	3.143	3.112	3.148
L19	3.126	3.104	3.120	3.140	3.141	3.139	3.136	3.114	3.111	3.135
L20	3.121	3.141	3.139	3.122	3.137	3.128	3.149	3.130	3.134	3.127
L21	3.115	3.150	3.143	3.126	3.105	3.128	3.120	3.107	3.118	3.140
L22	3.121	3.108	3.114	3.126	3.128	3.139	3.109	3.148	3.141	3.117
L23	3.124	3.143	3.129	3.138	3.150	3.147	3.121	3.142	3.131	3.146
L24	3.125	3.123	3.145	3.118	3.147	3.129	3.131	3.105	3.142	3.129
L25	3.125	3.121	3.143	3.132	3.129	3.128	3.116	3.150	3.141	3.123
Ave.	3.127	3.135	3.132	3.134	3.128	3.129	3.127	3.128	3.128	3.129
Med.	3.124	3.139	3.129	3.136	3.126	3.128	3.122	3.130	3.129	3.127
st dev	0.0094	0.0157	0.0126	0.0096	0.0164	0.0116	0.0157	0.0175	0.0115	0.0149
Min.	3.115	3.104	3.111	3.111	3.105	3.110	3.103	3.103	3.111	3.103
Max.	3.151	3.155	3.148	3.150	3.154	3.148	3.152	3.152	3.149	3.155

Sample No.	Forward Voltage (V)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L1	3.144	3.145	3.106	3.117	3.120	3.116	3.113	3.142	-
L2	3.120	3.126	3.154	3.146	3.135	3.103	3.142	3.105	-
L3	3.142	3.145	3.124	3.116	3.122	3.146	3.118	3.133	-
L4	3.152	3.123	3.141	3.141	3.140	3.145	3.113	3.122	-
L5	3.144	3.121	3.112	3.111	3.146	3.129	3.148	3.147	-
L6	3.146	3.126	3.148	3.147	3.112	3.123	3.128	3.154	-
L7	3.121	3.135	3.153	3.140	3.131	3.124	3.134	3.141	-
L8	3.110	3.121	3.146	3.149	3.144	3.145	3.123	3.108	-
L9	3.135	3.135	3.149	3.114	3.144	3.148	3.133	3.133	-
L10	3.118	3.140	3.129	3.142	3.139	3.146	3.149	3.131	-
L11	3.119	3.148	3.148	3.145	3.125	3.135	3.111	3.134	-
L12	3.122	3.129	3.152	3.130	3.134	3.121	3.125	3.135	-
L13	3.118	3.119	3.136	3.120	3.115	3.120	3.136	3.116	-
L14	3.141	3.120	3.127	3.132	3.136	3.146	3.116	3.115	-
L15	3.152	3.113	3.121	3.136	3.131	3.106	3.149	3.152	-
L16	3.120	3.142	3.143	3.150	3.129	3.113	3.130	3.115	-
L17	3.115	3.134	3.103	3.140	3.119	3.137	3.130	3.125	-
L18	3.119	3.138	3.130	3.151	3.122	3.130	3.139	3.123	-
L19	3.131	3.140	3.114	3.130	3.149	3.117	3.135	3.145	-
L20	3.125	3.145	3.104	3.153	3.110	3.125	3.128	3.129	-
L21	3.129	3.121	3.111	3.106	3.113	3.116	3.138	3.120	-
L22	3.143	3.135	3.103	3.126	3.135	3.153	3.132	3.113	-
L23	3.121	3.129	3.135	3.134	3.122	3.117	3.131	3.152	-
L24	3.135	3.142	3.117	3.105	3.145	3.155	3.138	3.118	-
L25	3.104	3.123	3.151	3.148	3.112	3.133	3.117	3.135	-
Ave.	3.129	3.132	3.130	3.133	3.129	3.130	3.130	3.130	-
Med.	3.125	3.134	3.130	3.136	3.131	3.129	3.131	3.131	-
st dev	0.0135	0.0101	0.0178	0.0150	0.0121	0.0150	0.0112	0.0142	-
Min.	3.104	3.113	3.103	3.105	3.110	3.103	3.111	3.105	-
Max.	3.152	3.148	3.154	3.153	3.149	3.155	3.149	3.154	-

### 3.3 Data Set 1, 55°C, 300mA (Chromaticity Shift)

Sample No.	u'	v'	CCT(K)	Chromaticity Shift Δu'v'								
	0hr(Initial)			1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L1	0.2596	0.5279	2759	0.0002	0.0004	0.0005	0.0007	0.0008	0.0010	0.0013	0.0016	0.0018
L2	0.2601	0.5287	2745	0.0001	0.0003	0.0004	0.0008	0.0011	0.0012	0.0014	0.0015	0.0017
L3	0.2628	0.5284	2689	0.0003	0.0004	0.0007	0.0009	0.0010	0.0013	0.0014	0.0016	0.0019
L4	0.2602	0.5285	2742	0.0001	0.0003	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017
L5	0.2602	0.5289	2742	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0017	0.0019
L6	0.2585	0.5299	2773	0.0003	0.0005	0.0006	0.0010	0.0014	0.0015	0.0016	0.0020	0.0023
L7	0.2634	0.5291	2675	0.0001	0.0002	0.0004	0.0005	0.0008	0.0009	0.0012	0.0015	0.0018
L8	0.2618	0.5280	2713	0.0002	0.0003	0.0005	0.0006	0.0007	0.0009	0.0011	0.0015	0.0017
L9	0.2613	0.5282	2722	0.0002	0.0003	0.0006	0.0009	0.0013	0.0016	0.0018	0.0021	0.0023
L10	0.2593	0.5307	2753	0.0004	0.0005	0.0007	0.0009	0.0012	0.0014	0.0016	0.0020	0.0021
L11	0.2602	0.5302	2736	0.0001	0.0003	0.0005	0.0007	0.0011	0.0013	0.0015	0.0018	0.0021
L12	0.2618	0.5295	2706	0.0003	0.0005	0.0007	0.0008	0.0012	0.0015	0.0017	0.0020	0.0021
L13	0.2593	0.5287	2761	0.0002	0.0003	0.0006	0.0008	0.0009	0.0010	0.0013	0.0016	0.0017
L14	0.2597	0.5289	2753	0.0002	0.0004	0.0006	0.0010	0.0014	0.0016	0.0019	0.0022	0.0023
L15	0.2589	0.5285	2771	0.0001	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017
L16	0.2602	0.5300	2736	0.0002	0.0003	0.0004	0.0007	0.0010	0.0012	0.0015	0.0016	0.0018
L17	0.2598	0.5292	2748	0.0003	0.0005	0.0008	0.0012	0.0013	0.0015	0.0016	0.0019	0.0021
L18	0.2615	0.5267	2723	0.0003	0.0004	0.0005	0.0008	0.0009	0.0012	0.0014	0.0016	0.0018
L19	0.2597	0.5276	2757	0.0001	0.0003	0.0005	0.0008	0.0012	0.0014	0.0016	0.0017	0.0019
L20	0.2614	0.5279	2720	0.0002	0.0003	0.0004	0.0007	0.0008	0.0009	0.0011	0.0012	0.0013
L21	0.2606	0.5292	2732	0.0001	0.0002	0.0005	0.0008	0.0010	0.0011	0.0014	0.0017	0.0019
L22	0.2627	0.5287	2691	0.0001	0.0003	0.0005	0.0007	0.0010	0.0012	0.0013	0.0017	0.0020
L23	0.2591	0.5285	2767	0.0003	0.0005	0.0007	0.0011	0.0014	0.0016	0.0018	0.0021	0.0022
L24	0.2572	0.5255	2821	0.0001	0.0002	0.0003	0.0006	0.0010	0.0011	0.0012	0.0013	0.0016
L25	0.2611	0.5286	2724	0.0002	0.0004	0.0006	0.0008	0.0011	0.0014	0.0015	0.0018	0.0020
Ave.	0.2604	0.5286	2738	0.0002	0.0004	0.0005	0.0008	0.0011	0.0012	0.0014	0.0017	0.0019
Med.	0.2602	0.5287	2742	0.0002	0.0003	0.0005	0.0008	0.0010	0.0012	0.0014	0.0017	0.0019
st dev	0.0014	0.0011	31.14	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002
Min.	0.2572	0.5255	2675	0.0001	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011	0.0012	0.0013
Max.	0.2634	0.5307	2821	0.0004	0.0005	0.0008	0.0012	0.0014	0.0016	0.0019	0.0022	0.0023

Sample No.	Chromaticity Shift $\Delta u'v'$								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L1	0.0021	0.0023	0.0024	0.0027	0.0030	0.0032	0.0035	0.0036	-
L2	0.0018	0.0021	0.0023	0.0025	0.0028	0.0029	0.0032	0.0034	-
L3	0.0022	0.0025	0.0026	0.0029	0.0031	0.0034	0.0038	0.0040	-
L4	0.0020	0.0024	0.0025	0.0027	0.0028	0.0030	0.0033	0.0038	-
L5	0.0021	0.0025	0.0026	0.0029	0.0032	0.0034	0.0038	0.0042	-
L6	0.0026	0.0027	0.0028	0.0031	0.0032	0.0033	0.0037	0.0039	-
L7	0.0020	0.0023	0.0025	0.0027	0.0028	0.0030	0.0032	0.0036	-
L8	0.0021	0.0023	0.0025	0.0028	0.0030	0.0033	0.0036	0.0039	-
L9	0.0026	0.0028	0.0030	0.0032	0.0034	0.0036	0.0037	0.0041	-
L10	0.0023	0.0024	0.0026	0.0029	0.0030	0.0032	0.0035	0.0039	-
L11	0.0025	0.0029	0.0031	0.0032	0.0034	0.0036	0.0037	0.0039	-
L12	0.0024	0.0027	0.0029	0.0032	0.0033	0.0034	0.0035	0.0037	-
L13	0.0019	0.0023	0.0025	0.0029	0.0030	0.0031	0.0034	0.0038	-
L14	0.0025	0.0028	0.0030	0.0034	0.0036	0.0039	0.0042	0.0045	-
L15	0.0018	0.0022	0.0025	0.0028	0.0031	0.0032	0.0034	0.0037	-
L16	0.0022	0.0024	0.0025	0.0027	0.0028	0.0030	0.0032	0.0035	-
L17	0.0023	0.0025	0.0027	0.0030	0.0033	0.0036	0.0040	0.0043	-
L18	0.0021	0.0024	0.0026	0.0028	0.0030	0.0031	0.0034	0.0036	-
L19	0.0022	0.0023	0.0026	0.0030	0.0033	0.0035	0.0037	0.0040	-
L20	0.0017	0.0018	0.0019	0.0020	0.0022	0.0025	0.0029	0.0033	-
L21	0.0021	0.0023	0.0024	0.0025	0.0026	0.0028	0.0029	0.0031	-
L22	0.0023	0.0024	0.0027	0.0030	0.0032	0.0033	0.0035	0.0036	-
L23	0.0023	0.0027	0.0029	0.0030	0.0032	0.0034	0.0035	0.0037	-
L24	0.0018	0.0020	0.0022	0.0023	0.0026	0.0028	0.0030	0.0033	-
L25	0.0022	0.0025	0.0028	0.0031	0.0032	0.0035	0.0037	0.0042	-
Ave.	0.0022	0.0024	0.0026	0.0029	0.0030	0.0032	0.0035	0.0038	-
Med.	0.0022	0.0024	0.0026	0.0029	0.0031	0.0033	0.0035	0.0038	-
st dev	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-
Min.	0.0017	0.0018	0.0019	0.0020	0.0022	0.0025	0.0029	0.0031	-
Max.	0.0026	0.0029	0.0031	0.0034	0.0036	0.0039	0.0042	0.0045	-

**3.4 Data Set 2, 85°C, 300mA (Lumen Maintenance)**

Sample No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L26	138.8	100.20	100.01	99.89	99.77	99.54	99.45	99.30	99.11	98.89
L27	138.2	100.08	99.90	99.73	99.58	99.35	99.25	99.05	98.85	98.60
L28	141.3	100.11	99.88	99.68	99.51	99.30	99.15	98.96	98.73	98.47
L29	140.2	100.18	100.02	99.86	99.69	99.48	99.34	99.15	98.93	98.64
L30	138.7	100.12	99.88	99.64	99.42	99.20	99.13	98.92	98.69	98.44
L31	140.1	100.13	99.97	99.85	99.76	99.55	99.42	99.21	99.03	98.76
L32	140.4	100.14	99.92	99.74	99.62	99.39	99.26	99.09	98.91	98.68
L33	138.9	100.12	99.88	99.74	99.63	99.39	99.26	99.08	98.90	98.64
L34	140.2	100.17	99.96	99.79	99.64	99.43	99.30	99.11	98.92	98.69
L35	139.4	100.14	99.90	99.70	99.56	99.34	99.25	99.05	98.78	98.51
L36	138.1	100.08	99.87	99.66	99.48	99.22	99.08	98.87	98.63	98.37
L37	140.2	100.17	99.95	99.82	99.67	99.46	99.32	99.12	98.89	98.63
L38	138.4	100.13	99.92	99.72	99.52	99.29	99.16	99.01	98.83	98.54
L39	140.6	100.16	99.92	99.72	99.58	99.33	99.21	99.03	98.77	98.50
L40	139.8	100.20	100.00	99.78	99.66	99.44	99.30	99.14	98.93	98.69
L41	140.0	100.10	99.88	99.68	99.55	99.30	99.21	99.01	98.74	98.50
L42	139.8	100.08	99.87	99.71	99.60	99.39	99.28	99.09	98.90	98.67
L43	138.7	100.17	99.99	99.85	99.68	99.47	99.34	99.19	98.95	98.73
L44	138.1	100.09	99.85	99.62	99.47	99.22	99.15	98.94	98.74	98.46
L45	140.4	100.11	99.92	99.74	99.56	99.35	99.23	99.07	98.83	98.60
L46	139.5	100.09	99.90	99.71	99.63	99.41	99.34	99.20	98.97	98.74
L47	139.0	100.20	99.97	99.82	99.62	99.37	99.25	99.09	98.89	98.62
L48	139.2	100.16	99.97	99.74	99.64	99.39	99.26	99.06	98.88	98.64
L49	139.9	100.20	100.04	99.85	99.76	99.52	99.42	99.22	98.98	98.70
L50	140.2	100.19	100.04	99.87	99.67	99.42	99.35	99.20	98.99	98.74
Ave.	139.5	100.14	99.94	99.76	99.61	99.38	99.27	99.09	98.87	98.62
Med.	139.8	100.14	99.92	99.74	99.62	99.39	99.26	99.09	98.89	98.64
st dev	0.8724	0.0419	0.0574	0.0771	0.0903	0.0953	0.0935	0.1030	0.1128	0.1204
Min.	138.1	100.08	99.85	99.62	99.42	99.20	99.08	98.87	98.63	98.37
Max.	141.3	100.20	100.04	99.89	99.77	99.55	99.45	99.30	99.11	98.89

Sample No.	Lumen Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L26	98.58	98.35	98.15	97.89	97.71	97.53	97.32	97.09	-
L27	98.31	98.14	97.90	97.66	97.51	97.38	97.18	97.00	-
L28	98.11	97.89	97.65	97.42	97.26	97.11	96.93	96.76	-
L29	98.40	98.16	97.93	97.70	97.53	97.32	97.20	97.05	-
L30	98.13	97.92	97.68	97.46	97.29	97.13	97.00	96.82	-
L31	98.46	98.25	98.01	97.75	97.59	97.40	97.26	97.01	-
L32	98.40	98.18	97.96	97.65	97.46	97.31	97.16	96.93	-
L33	98.29	98.12	97.92	97.69	97.49	97.33	97.14	96.91	-
L34	98.43	98.24	98.04	97.76	97.52	97.37	97.17	97.00	-
L35	98.24	98.00	97.83	97.58	97.41	97.24	97.06	96.89	-
L36	98.08	97.85	97.61	97.29	97.10	96.95	96.78	96.54	-
L37	98.38	98.17	98.01	97.76	97.59	97.41	97.21	97.04	-
L38	98.28	98.04	97.86	97.61	97.42	97.21	97.08	96.83	-
L39	98.14	97.91	97.68	97.37	97.20	97.04	96.83	96.60	-
L40	98.40	98.17	97.99	97.67	97.43	97.22	97.03	96.80	-
L41	98.25	98.05	97.89	97.64	97.44	97.28	97.12	96.88	-
L42	98.41	98.19	98.01	97.75	97.58	97.40	97.26	97.03	-
L43	98.48	98.25	98.07	97.84	97.64	97.49	97.37	97.13	-
L44	98.16	97.92	97.70	97.42	97.24	97.08	96.86	96.70	-
L45	98.30	98.07	97.83	97.54	97.36	97.18	97.06	96.84	-
L46	98.39	98.20	98.03	97.77	97.59	97.44	97.24	97.06	-
L47	98.37	98.15	97.94	97.66	97.48	97.33	97.20	96.98	-
L48	98.32	98.13	97.89	97.67	97.46	97.27	97.11	96.93	-
L49	98.37	98.14	97.97	97.69	97.45	97.25	97.11	96.91	-
L50	98.43	98.27	98.09	97.86	97.69	97.51	97.38	97.23	-
Ave.	98.32	98.11	97.91	97.64	97.46	97.29	97.12	96.92	-
Med.	98.37	98.14	97.93	97.67	97.46	97.31	97.14	96.93	-
st dev	0.1271	0.1327	0.1463	0.1542	0.1521	0.1492	0.1565	0.1606	-
Min.	98.08	97.85	97.61	97.29	97.10	96.95	96.78	96.54	-
Max.	98.58	98.35	98.15	97.89	97.71	97.53	97.38	97.23	-

**3.5 Data Set 2, 85°C, 300mA (Forward Voltage)**

Sample No.	Forward Voltage (V)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L26	3.148	3.148	3.120	3.122	3.111	3.117	3.106	3.111	3.139	3.137
L27	3.151	3.127	3.134	3.117	3.132	3.121	3.123	3.121	3.151	3.136
L28	3.125	3.135	3.120	3.119	3.153	3.127	3.111	3.123	3.138	3.135
L29	3.119	3.121	3.134	3.149	3.154	3.150	3.152	3.125	3.146	3.133
L30	3.132	3.134	3.129	3.134	3.111	3.117	3.144	3.120	3.135	3.115
L31	3.127	3.111	3.135	3.150	3.129	3.133	3.149	3.129	3.108	3.118
L32	3.123	3.125	3.118	3.121	3.144	3.113	3.137	3.143	3.109	3.135
L33	3.123	3.136	3.105	3.132	3.144	3.147	3.111	3.146	3.111	3.117
L34	3.124	3.118	3.146	3.147	3.136	3.112	3.153	3.148	3.132	3.124
L35	3.124	3.148	3.116	3.137	3.103	3.112	3.107	3.145	3.123	3.117
L36	3.131	3.143	3.142	3.121	3.111	3.111	3.112	3.139	3.134	3.145
L37	3.127	3.117	3.143	3.128	3.107	3.141	3.112	3.123	3.125	3.122
L38	3.127	3.132	3.151	3.149	3.154	3.111	3.128	3.134	3.130	3.129
L39	3.131	3.114	3.149	3.129	3.134	3.106	3.150	3.130	3.108	3.128
L40	3.120	3.111	3.143	3.121	3.135	3.107	3.107	3.124	3.119	3.135
L41	3.126	3.134	3.141	3.133	3.154	3.126	3.127	3.138	3.154	3.135
L42	3.128	3.127	3.117	3.113	3.153	3.129	3.146	3.138	3.126	3.113
L43	3.145	3.113	3.143	3.130	3.140	3.125	3.122	3.146	3.141	3.121
L44	3.124	3.116	3.125	3.147	3.145	3.136	3.150	3.141	3.147	3.111
L45	3.123	3.122	3.148	3.126	3.144	3.128	3.131	3.113	3.112	3.127
L46	3.123	3.124	3.148	3.148	3.119	3.145	3.103	3.137	3.112	3.149
L47	3.144	3.132	3.126	3.112	3.115	3.134	3.140	3.116	3.153	3.147
L48	3.129	3.138	3.138	3.143	3.154	3.144	3.111	3.119	3.106	3.132
L49	3.128	3.128	3.149	3.122	3.132	3.154	3.137	3.120	3.114	3.136
L50	3.120	3.147	3.105	3.123	3.118	3.114	3.123	3.136	3.143	3.134
Ave.	3.129	3.128	3.133	3.131	3.133	3.126	3.128	3.131	3.129	3.129
Med.	3.127	3.127	3.135	3.129	3.135	3.126	3.127	3.130	3.130	3.132
st dev	0.0088	0.0115	0.0140	0.0122	0.0170	0.0145	0.0170	0.0113	0.0158	0.0105
Min.	3.119	3.111	3.105	3.112	3.103	3.106	3.103	3.111	3.106	3.111
Max.	3.151	3.148	3.151	3.150	3.154	3.154	3.153	3.148	3.154	3.149



Sample No.	Forward Voltage (V)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L26	3.140	3.113	3.132	3.149	3.143	3.114	3.129	3.132	-
L27	3.117	3.130	3.143	3.137	3.144	3.119	3.122	3.147	-
L28	3.136	3.126	3.118	3.120	3.118	3.136	3.123	3.126	-
L29	3.110	3.146	3.124	3.122	3.124	3.135	3.132	3.113	-
L30	3.123	3.114	3.117	3.123	3.120	3.131	3.133	3.130	-
L31	3.130	3.112	3.137	3.130	3.144	3.129	3.121	3.137	-
L32	3.114	3.116	3.149	3.142	3.113	3.114	3.143	3.115	-
L33	3.120	3.146	3.112	3.139	3.124	3.121	3.135	3.149	-
L34	3.114	3.140	3.125	3.113	3.130	3.146	3.144	3.149	-
L35	3.135	3.114	3.125	3.105	3.138	3.153	3.125	3.105	-
L36	3.110	3.129	3.125	3.148	3.119	3.119	3.143	3.129	-
L37	3.137	3.141	3.117	3.145	3.121	3.146	3.146	3.127	-
L38	3.119	3.133	3.114	3.133	3.136	3.104	3.117	3.127	-
L39	3.125	3.128	3.123	3.147	3.114	3.136	3.122	3.110	-
L40	3.138	3.131	3.117	3.146	3.119	3.120	3.113	3.125	-
L41	3.119	3.115	3.125	3.138	3.137	3.114	3.145	3.118	-
L42	3.126	3.132	3.150	3.137	3.148	3.108	3.128	3.135	-
L43	3.133	3.135	3.119	3.111	3.143	3.143	3.143	3.114	-
L44	3.126	3.120	3.127	3.127	3.147	3.118	3.112	3.132	-
L45	3.119	3.143	3.121	3.115	3.115	3.127	3.123	3.118	-
L46	3.147	3.144	3.134	3.135	3.144	3.134	3.138	3.144	-
L47	3.108	3.135	3.120	3.125	3.125	3.120	3.142	3.154	-
L48	3.154	3.139	3.132	3.125	3.119	3.129	3.111	3.103	-
L49	3.123	3.131	3.131	3.113	3.118	3.112	3.145	3.136	-
L50	3.114	3.147	3.138	3.136	3.146	3.110	3.134	3.135	-
Ave.	3.125	3.130	3.127	3.130	3.130	3.126	3.131	3.128	-
Med.	3.123	3.131	3.125	3.133	3.125	3.121	3.132	3.129	-
st dev	0.0120	0.0115	0.0103	0.0129	0.0123	0.0132	0.0114	0.0140	-
Min.	3.108	3.112	3.112	3.105	3.113	3.104	3.111	3.103	-
Max.	3.154	3.147	3.150	3.149	3.148	3.153	3.146	3.154	-

### 3.6 Data Set 2, 85°C, 300mA (Chromaticity Shift)

Sample No.	u'	v'	CCT(K)	Chromaticity Shift Δu'v'								
				0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h
L26	0.2619	0.5289	2705	0.0002	0.0003	0.0004	0.0006	0.0008	0.0011	0.0012	0.0013	0.0017
L27	0.2603	0.5280	2743	0.0001	0.0003	0.0005	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018
L28	0.2590	0.5288	2767	0.0003	0.0004	0.0006	0.0010	0.0012	0.0013	0.0015	0.0019	0.0021
L29	0.2605	0.5293	2734	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0016	0.0019
L30	0.2597	0.5279	2756	0.0005	0.0006	0.0008	0.0012	0.0014	0.0017	0.0019	0.0022	0.0024
L31	0.2608	0.5299	2725	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0012	0.0015	0.0017
L32	0.2609	0.5297	2724	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0014	0.0016	0.0019
L33	0.2631	0.5292	2680	0.0001	0.0003	0.0006	0.0010	0.0011	0.0012	0.0014	0.0017	0.0018
L34	0.2612	0.5299	2716	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0015	0.0018	0.0022
L35	0.2606	0.5276	2739	0.0002	0.0004	0.0006	0.0010	0.0013	0.0015	0.0017	0.0020	0.0023
L36	0.2623	0.5281	2702	0.0003	0.0005	0.0007	0.0009	0.0011	0.0012	0.0013	0.0014	0.0015
L37	0.2597	0.5276	2758	0.0001	0.0004	0.0007	0.0010	0.0012	0.0016	0.0018	0.0021	0.0023
L38	0.2627	0.5283	2691	0.0005	0.0008	0.0010	0.0014	0.0016	0.0020	0.0022	0.0024	0.0027
L39	0.2603	0.5277	2745	0.0004	0.0005	0.0007	0.0009	0.0012	0.0015	0.0016	0.0020	0.0022
L40	0.2621	0.5288	2702	0.0006	0.0007	0.0010	0.0012	0.0015	0.0017	0.0019	0.0021	0.0022
L41	0.2623	0.5304	2692	0.0001	0.0004	0.0006	0.0009	0.0012	0.0015	0.0016	0.0020	0.0022
L42	0.2608	0.5281	2733	0.0003	0.0006	0.0008	0.0011	0.0013	0.0016	0.0017	0.0020	0.0024
L43	0.2595	0.5266	2766	0.0005	0.0007	0.0008	0.0011	0.0014	0.0015	0.0016	0.0019	0.0021
L44	0.2610	0.5274	2730	0.0002	0.0005	0.0008	0.0010	0.0013	0.0015	0.0016	0.0020	0.0023
L45	0.2609	0.5296	2725	0.0001	0.0003	0.0006	0.0009	0.0012	0.0013	0.0014	0.0017	0.0020
L46	0.2616	0.5282	2716	0.0003	0.0005	0.0008	0.0011	0.0012	0.0014	0.0016	0.0018	0.0020
L47	0.2608	0.5271	2738	0.0004	0.0006	0.0008	0.0012	0.0013	0.0016	0.0018	0.0022	0.0024
L48	0.2613	0.5278	2724	0.0002	0.0004	0.0006	0.0009	0.0012	0.0015	0.0016	0.0020	0.0023
L49	0.2614	0.5293	2715	0.0006	0.0009	0.0012	0.0013	0.0016	0.0018	0.0019	0.0021	0.0025
L50	0.2623	0.5303	2693	0.0001	0.0002	0.0005	0.0006	0.0007	0.0011	0.0013	0.0015	0.0018
Ave.	0.2611	0.5286	2725	0.0003	0.0005	0.0007	0.0010	0.0012	0.0014	0.0016	0.0019	0.0021
Med.	0.2609	0.5283	2725	0.0003	0.0005	0.0007	0.0010	0.0012	0.0015	0.0016	0.0019	0.0022
st dev	0.0010	0.0010	23.95	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003
Min.	0.2590	0.5266	2680	0.0001	0.0002	0.0004	0.0006	0.0007	0.0011	0.0012	0.0013	0.0015
Max.	0.2631	0.5304	2767	0.0006	0.0009	0.0012	0.0014	0.0016	0.0020	0.0022	0.0024	0.0027

Sample No.	Chromaticity Shift $\Delta u'v'$								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L26	0.0021	0.0023	0.0026	0.0028	0.0030	0.0035	0.0037	0.0041	-
L27	0.0022	0.0026	0.0030	0.0033	0.0036	0.0037	0.0038	0.0042	-
L28	0.0022	0.0024	0.0027	0.0030	0.0033	0.0038	0.0039	0.0040	-
L29	0.0021	0.0024	0.0027	0.0029	0.0030	0.0035	0.0036	0.0038	-
L30	0.0026	0.0028	0.0031	0.0033	0.0035	0.0040	0.0041	0.0043	-
L31	0.0018	0.0019	0.0021	0.0024	0.0027	0.0032	0.0034	0.0038	-
L32	0.0022	0.0024	0.0027	0.0030	0.0032	0.0035	0.0038	0.0042	-
L33	0.0020	0.0021	0.0023	0.0025	0.0029	0.0034	0.0037	0.0039	-
L34	0.0027	0.0030	0.0033	0.0037	0.0041	0.0043	0.0044	0.0045	-
L35	0.0028	0.0030	0.0032	0.0034	0.0036	0.0040	0.0043	0.0046	-
L36	0.0019	0.0021	0.0024	0.0028	0.0030	0.0035	0.0038	0.0041	-
L37	0.0026	0.0027	0.0032	0.0036	0.0038	0.0040	0.0042	0.0045	-
L38	0.0029	0.0031	0.0034	0.0038	0.0040	0.0043	0.0045	0.0047	-
L39	0.0023	0.0027	0.0032	0.0036	0.0039	0.0041	0.0043	0.0046	-
L40	0.0024	0.0027	0.0031	0.0034	0.0036	0.0038	0.0039	0.0042	-
L41	0.0024	0.0028	0.0032	0.0034	0.0038	0.0040	0.0042	0.0045	-
L42	0.0027	0.0030	0.0034	0.0037	0.0038	0.0041	0.0043	0.0046	-
L43	0.0026	0.0029	0.0031	0.0034	0.0038	0.0041	0.0044	0.0047	-
L44	0.0024	0.0028	0.0033	0.0036	0.0039	0.0042	0.0045	0.0048	-
L45	0.0024	0.0026	0.0028	0.0030	0.0032	0.0036	0.0038	0.0039	-
L46	0.0022	0.0024	0.0029	0.0031	0.0032	0.0035	0.0036	0.0038	-
L47	0.0027	0.0030	0.0033	0.0036	0.0038	0.0042	0.0045	0.0049	-
L48	0.0028	0.0032	0.0036	0.0039	0.0041	0.0045	0.0046	0.0048	-
L49	0.0028	0.0031	0.0035	0.0039	0.0042	0.0044	0.0047	0.0049	-
L50	0.0023	0.0025	0.0029	0.0033	0.0034	0.0037	0.0039	0.0042	-
Ave.	0.0024	0.0027	0.0030	0.0033	0.0035	0.0039	0.0041	0.0043	-
Med.	0.0024	0.0027	0.0031	0.0034	0.0036	0.0040	0.0041	0.0043	-
st dev	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	-
Min.	0.0018	0.0019	0.0021	0.0024	0.0027	0.0032	0.0034	0.0038	-
Max.	0.0029	0.0032	0.0036	0.0039	0.0042	0.0045	0.0047	0.0049	-

### 3.7 Data Set 3, 105°C, 300mA (Lumen Maintenance)

Sample No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	139.1	100.07	99.80	99.61	99.38	99.13	98.88	98.70	98.49	98.23
L52	139.3	100.07	99.84	99.61	99.36	99.13	98.88	98.66	98.43	98.17
L53	139.3	100.11	99.87	99.66	99.48	99.26	99.06	98.89	98.68	98.39
L54	140.3	100.06	99.80	99.57	99.39	99.15	98.95	98.78	98.54	98.26
L55	138.7	100.05	99.79	99.55	99.40	99.16	98.91	98.72	98.52	98.30
L56	141.0	100.07	99.79	99.57	99.39	99.21	98.91	98.69	98.47	98.21
L57	139.3	100.06	99.84	99.66	99.53	99.32	99.09	98.88	98.68	98.47
L58	140.2	100.06	99.85	99.65	99.48	99.22	98.97	98.78	98.59	98.30
L59	139.7	100.08	99.81	99.57	99.36	99.10	98.88	98.67	98.50	98.28
L60	138.1	100.01	99.73	99.46	99.28	99.05	98.84	98.62	98.43	98.19
L61	140.1	100.03	99.82	99.63	99.40	99.21	98.94	98.81	98.63	98.41
L62	139.1	100.12	99.84	99.61	99.45	99.28	98.99	98.85	98.64	98.41
L63	139.8	100.09	99.83	99.57	99.38	99.18	98.92	98.72	98.47	98.20
L64	139.8	100.06	99.79	99.61	99.36	99.10	98.88	98.72	98.52	98.28
L65	140.2	100.06	99.80	99.56	99.32	99.07	98.80	98.65	98.42	98.23
L66	139.9	100.02	99.76	99.52	99.33	99.13	98.91	98.76	98.51	98.29
L67	139.1	100.07	99.83	99.58	99.44	99.23	98.99	98.85	98.59	98.32
L68	138.9	100.02	99.80	99.60	99.34	99.17	98.87	98.70	98.49	98.29
L69	140.1	100.07	99.80	99.53	99.32	99.16	98.93	98.75	98.54	98.25
L70	138.2	100.02	99.79	99.61	99.45	99.26	98.98	98.77	98.58	98.30
L71	139.8	100.09	99.84	99.56	99.31	99.13	98.93	98.72	98.53	98.30
L72	140.5	100.12	99.86	99.68	99.52	99.33	99.06	98.88	98.65	98.45
L73	138.9	100.07	99.85	99.60	99.42	99.22	98.95	98.79	98.59	98.40
L74	141.4	100.04	99.79	99.52	99.34	99.16	98.90	98.71	98.46	98.21
L75	138.9	100.04	99.83	99.64	99.46	99.30	99.11	98.91	98.68	98.43
Ave.	139.6	100.06	99.81	99.59	99.40	99.19	98.94	98.76	98.55	98.30
Med.	139.7	100.06	99.81	99.60	99.39	99.17	98.93	98.75	98.53	98.29
st dev	0.8022	0.0299	0.0324	0.0513	0.0669	0.0763	0.0768	0.0815	0.0818	0.0868
Min.	138.1	100.01	99.73	99.46	99.28	99.05	98.80	98.62	98.42	98.17
Max.	141.4	100.12	99.87	99.68	99.53	99.33	99.11	98.91	98.68	98.47

Sample No.	Lumen Maintenance (%)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L51	98.02	97.77	97.57	97.34	97.14	96.96	96.77	96.59	-
L52	97.87	97.67	97.41	97.22	97.02	96.85	96.67	96.49	-
L53	98.16	97.97	97.78	97.58	97.40	97.23	97.06	96.87	-
L54	97.93	97.64	97.38	97.17	96.96	96.74	96.54	96.38	-
L55	98.07	97.86	97.64	97.53	97.26	97.05	96.88	96.75	-
L56	97.91	97.70	97.40	97.27	97.07	96.94	96.73	96.56	-
L57	98.17	97.99	97.77	97.60	97.37	97.15	96.99	96.82	-
L58	98.07	97.84	97.62	97.39	97.13	96.98	96.83	96.66	-
L59	98.01	97.74	97.54	97.33	97.14	96.95	96.79	96.61	-
L60	97.88	97.65	97.42	97.20	96.92	96.69	96.51	96.29	-
L61	98.13	97.84	97.55	97.33	97.16	97.02	96.77	96.61	-
L62	98.10	97.84	97.54	97.40	97.18	96.97	96.80	96.62	-
L63	97.92	97.64	97.38	97.19	96.97	96.81	96.60	96.42	-
L64	97.94	97.72	97.54	97.41	97.13	96.90	96.66	96.48	-
L65	98.01	97.73	97.45	97.23	96.95	96.76	96.58	96.35	-
L66	97.97	97.80	97.59	97.41	97.18	97.02	96.77	96.58	-
L67	98.02	97.84	97.60	97.46	97.22	97.04	96.84	96.63	-
L68	98.06	97.79	97.52	97.38	97.11	96.97	96.76	96.54	-
L69	97.94	97.77	97.54	97.41	97.23	97.03	96.81	96.56	-
L70	98.07	97.82	97.57	97.43	97.20	97.03	96.79	96.57	-
L71	98.03	97.77	97.51	97.28	97.07	96.94	96.74	96.52	-
L72	98.12	97.89	97.60	97.36	97.13	96.97	96.73	96.50	-
L73	98.13	97.93	97.68	97.44	97.18	97.00	96.84	96.64	-
L74	97.92	97.73	97.43	97.30	97.06	96.82	96.59	96.43	-
L75	98.09	97.86	97.59	97.37	97.12	96.97	96.75	96.60	-
Ave.	98.02	97.79	97.54	97.36	97.13	96.95	96.75	96.56	-
Med.	98.02	97.79	97.54	97.37	97.13	96.97	96.77	96.57	-
st dev	0.0900	0.0970	0.1087	0.1144	0.1181	0.1227	0.1287	0.1347	-
Min.	97.87	97.64	97.38	97.17	96.92	96.69	96.51	96.29	-
Max.	98.17	97.99	97.78	97.60	97.40	97.23	97.06	96.87	-

### 3.8 Data Set 3, 105°C, 300mA (Forward Voltage)

Sample No.	Forward Voltage (V)									
	0hr(Initial)	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	3.143	3.153	3.129	3.120	3.154	3.137	3.141	3.120	3.111	3.119
L52	3.139	3.125	3.113	3.148	3.105	3.126	3.133	3.133	3.118	3.135
L53	3.122	3.126	3.144	3.119	3.130	3.125	3.141	3.140	3.142	3.153
L54	3.124	3.142	3.127	3.124	3.114	3.153	3.151	3.130	3.128	3.126
L55	3.123	3.127	3.131	3.136	3.134	3.115	3.148	3.140	3.134	3.153
L56	3.126	3.152	3.120	3.132	3.112	3.121	3.114	3.125	3.130	3.126
L57	3.127	3.135	3.122	3.145	3.125	3.136	3.125	3.130	3.116	3.116
L58	3.120	3.127	3.123	3.115	3.112	3.156	3.136	3.124	3.132	3.152
L59	3.130	3.106	3.114	3.118	3.118	3.124	3.144	3.135	3.127	3.122
L60	3.142	3.131	3.121	3.143	3.152	3.131	3.119	3.122	3.114	3.127
L61	3.118	3.127	3.141	3.141	3.105	3.140	3.113	3.122	3.114	3.117
L62	3.123	3.153	3.131	3.117	3.115	3.152	3.143	3.116	3.127	3.150
L63	3.128	3.123	3.144	3.130	3.131	3.133	3.144	3.155	3.126	3.121
L64	3.126	3.129	3.143	3.116	3.110	3.138	3.116	3.136	3.136	3.155
L65	3.143	3.147	3.122	3.139	3.119	3.142	3.138	3.131	3.150	3.155
L66	3.121	3.138	3.138	3.122	3.145	3.116	3.127	3.153	3.155	3.118
L67	3.126	3.129	3.130	3.135	3.149	3.149	3.133	3.141	3.150	3.141
L68	3.128	3.129	3.117	3.150	3.134	3.115	3.147	3.139	3.107	3.136
L69	3.146	3.149	3.148	3.125	3.143	3.140	3.141	3.157	3.136	3.148
L70	3.146	3.138	3.128	3.153	3.144	3.126	3.144	3.127	3.115	3.142
L71	3.136	3.117	3.151	3.118	3.143	3.142	3.146	3.140	3.147	3.143
L72	3.144	3.107	3.130	3.142	3.145	3.120	3.112	3.125	3.140	3.131
L73	3.147	3.145	3.118	3.129	3.144	3.130	3.123	3.140	3.110	3.147
L74	3.121	3.115	3.114	3.116	3.117	3.145	3.128	3.149	3.145	3.157
L75	3.142	3.104	3.127	3.138	3.136	3.133	3.117	3.145	3.118	3.147
Ave.	3.132	3.131	3.129	3.131	3.129	3.134	3.133	3.135	3.129	3.137
Med.	3.128	3.129	3.128	3.130	3.131	3.133	3.136	3.135	3.128	3.141
st dev	0.0099	0.0144	0.0112	0.0121	0.0157	0.0121	0.0125	0.0112	0.0141	0.0140
Min.	3.118	3.104	3.113	3.115	3.105	3.115	3.112	3.116	3.107	3.116
Max.	3.147	3.153	3.151	3.153	3.154	3.156	3.151	3.157	3.155	3.157

Sample No.	Forward Voltage (V)								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L51	3.132	3.127	3.123	3.124	3.116	3.119	3.129	3.154	-
L52	3.106	3.142	3.143	3.134	3.121	3.151	3.142	3.122	-
L53	3.127	3.128	3.146	3.116	3.143	3.134	3.117	3.154	-
L54	3.134	3.129	3.140	3.144	3.123	3.148	3.115	3.121	-
L55	3.122	3.141	3.154	3.148	3.119	3.156	3.139	3.148	-
L56	3.131	3.122	3.136	3.112	3.113	3.125	3.132	3.135	-
L57	3.110	3.150	3.116	3.136	3.138	3.136	3.113	3.151	-
L58	3.129	3.144	3.119	3.126	3.121	3.151	3.134	3.123	-
L59	3.125	3.154	3.123	3.137	3.136	3.143	3.144	3.153	-
L60	3.129	3.118	3.119	3.145	3.144	3.142	3.112	3.137	-
L61	3.132	3.130	3.145	3.117	3.128	3.150	3.143	3.138	-
L62	3.106	3.120	3.132	3.142	3.139	3.153	3.152	3.134	-
L63	3.107	3.153	3.120	3.119	3.142	3.141	3.115	3.143	-
L64	3.141	3.146	3.120	3.133	3.124	3.151	3.129	3.133	-
L65	3.141	3.134	3.147	3.149	3.108	3.138	3.124	3.113	-
L66	3.142	3.117	3.148	3.139	3.117	3.128	3.118	3.143	-
L67	3.138	3.152	3.130	3.124	3.113	3.143	3.131	3.124	-
L68	3.142	3.115	3.142	3.142	3.137	3.148	3.133	3.143	-
L69	3.140	3.149	3.140	3.130	3.120	3.147	3.144	3.113	-
L70	3.144	3.115	3.118	3.116	3.122	3.124	3.151	3.136	-
L71	3.104	3.152	3.120	3.126	3.134	3.129	3.135	3.120	-
L72	3.125	3.125	3.122	3.138	3.119	3.117	3.117	3.118	-
L73	3.150	3.138	3.137	3.148	3.119	3.157	3.131	3.130	-
L74	3.108	3.145	3.119	3.141	3.122	3.156	3.124	3.145	-
L75	3.107	3.124	3.116	3.141	3.140	3.141	3.150	3.106	-
Ave.	3.127	3.135	3.131	3.133	3.126	3.141	3.131	3.133	-
Med.	3.129	3.134	3.130	3.136	3.122	3.143	3.131	3.135	-
st dev	0.0144	0.0134	0.0123	0.0113	0.0108	0.0119	0.0125	0.0140	-
Min.	3.104	3.115	3.116	3.112	3.108	3.117	3.112	3.106	-
Max.	3.150	3.154	3.154	3.149	3.144	3.157	3.152	3.154	-

### 3.9 Data Set 3, 105°C, 300mA (Chromaticity Shift)

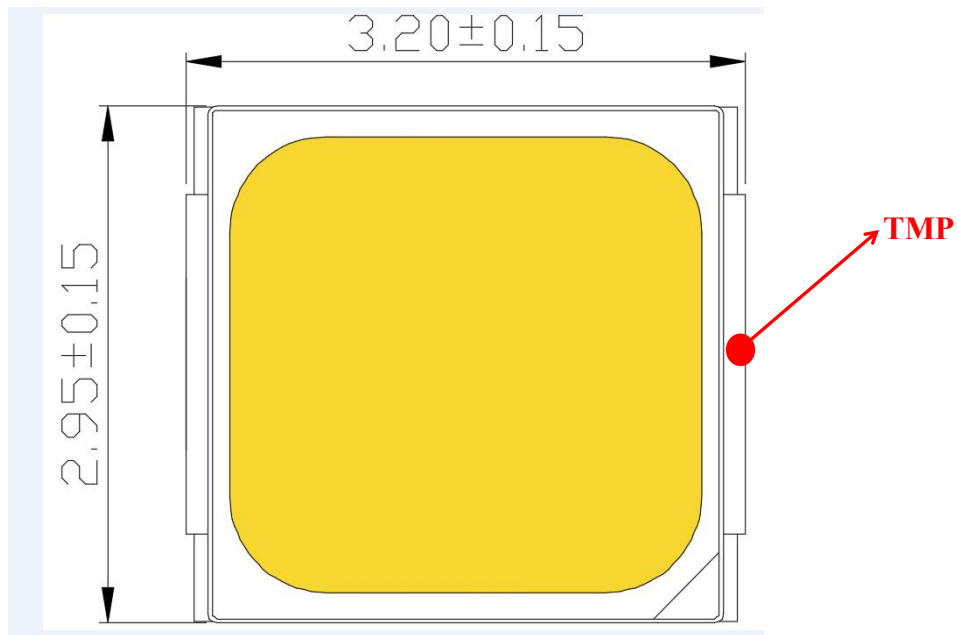
Sample No.	u'	v'	CCT(K)	Chromaticity Shift Δu'v'								
	0hr(Initial)			1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
L51	0.2598	0.5277	2756	0.0003	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028
L52	0.2595	0.5280	2760	0.0004	0.0005	0.0008	0.0011	0.0013	0.0015	0.0017	0.0019	0.0022
L53	0.2612	0.5283	2724	0.0006	0.0008	0.0010	0.0013	0.0015	0.0019	0.0021	0.0023	0.0027
L54	0.2608	0.5298	2726	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0016	0.0019	0.0021
L55	0.2623	0.5307	2690	0.0005	0.0007	0.0010	0.0011	0.0015	0.0017	0.0020	0.0021	0.0023
L56	0.2591	0.5292	2763	0.0001	0.0003	0.0006	0.0007	0.0010	0.0015	0.0019	0.0024	0.0028
L57	0.2616	0.5294	2711	0.0003	0.0005	0.0008	0.0010	0.0014	0.0016	0.0018	0.0023	0.0028
L58	0.2602	0.5288	2742	0.0001	0.0003	0.0007	0.0010	0.0014	0.0015	0.0016	0.0017	0.0019
L59	0.2609	0.5274	2734	0.0005	0.0008	0.0010	0.0012	0.0014	0.0018	0.0021	0.0023	0.0025
L60	0.2611	0.5281	2725	0.0001	0.0003	0.0004	0.0006	0.0011	0.0013	0.0015	0.0016	0.0020
L61	0.2604	0.5297	2735	0.0002	0.0004	0.0006	0.0009	0.0011	0.0014	0.0015	0.0020	0.0021
L62	0.2583	0.5271	2791	0.0004	0.0006	0.0009	0.0011	0.0015	0.0016	0.0018	0.0020	0.0023
L63	0.2613	0.5302	2714	0.0003	0.0005	0.0008	0.0010	0.0014	0.0015	0.0018	0.0021	0.0026
L64	0.2621	0.5298	2699	0.0006	0.0008	0.0010	0.0013	0.0016	0.0017	0.0020	0.0022	0.0024
L65	0.2584	0.5281	2784	0.0001	0.0004	0.0006	0.0009	0.0011	0.0012	0.0013	0.0015	0.0020
L66	0.2577	0.5284	2797	0.0005	0.0007	0.0009	0.0013	0.0016	0.0020	0.0022	0.0026	0.0028
L67	0.2603	0.5271	2747	0.0004	0.0007	0.0010	0.0012	0.0013	0.0016	0.0018	0.0021	0.0025
L68	0.2604	0.5273	2744	0.0003	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021
L69	0.2619	0.5309	2698	0.0006	0.0009	0.0011	0.0012	0.0016	0.0019	0.0022	0.0024	0.0025
L70	0.2605	0.5268	2745	0.0003	0.0004	0.0006	0.0008	0.0009	0.0014	0.0015	0.0021	0.0023
L71	0.2584	0.5290	2780	0.0005	0.0006	0.0008	0.0010	0.0012	0.0015	0.0017	0.0018	0.0021
L72	0.2576	0.5280	2801	0.0007	0.0009	0.0012	0.0015	0.0017	0.0021	0.0022	0.0026	0.0030
L73	0.2602	0.5288	2742	0.0002	0.0004	0.0006	0.0009	0.0013	0.0018	0.0021	0.0024	0.0026
L74	0.2589	0.5291	2769	0.0004	0.0007	0.0010	0.0012	0.0015	0.0016	0.0018	0.0020	0.0023
L75	0.2605	0.5288	2736	0.0003	0.0004	0.0007	0.0010	0.0012	0.0014	0.0016	0.0019	0.0021
Ave.	0.2601	0.5287	2745	0.0004	0.0006	0.0008	0.0010	0.0013	0.0016	0.0018	0.0021	0.0024
Med.	0.2604	0.5288	2742	0.0003	0.0005	0.0008	0.0010	0.0014	0.0016	0.0018	0.0021	0.0023
st dev	0.0013	0.0011	30.91	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003
Min.	0.2576	0.5268	2690	0.0001	0.0003	0.0004	0.0006	0.0009	0.0012	0.0013	0.0015	0.0019
Max.	0.2623	0.5309	2801	0.0007	0.0009	0.0012	0.0015	0.0017	0.0021	0.0022	0.0026	0.0030



Sample No.	Chromaticity Shift $\Delta u'v'$								
	10000h	11000h	12000h	13000h	14000h	15000h	16000h	17000h	-
L51	0.0031	0.0033	0.0037	0.0040	0.0044	0.0046	0.0047	0.0053	-
L52	0.0026	0.0028	0.0030	0.0033	0.0034	0.0035	0.0038	0.0043	-
L53	0.0030	0.0033	0.0036	0.0041	0.0045	0.0049	0.0051	0.0053	-
L54	0.0023	0.0025	0.0030	0.0035	0.0037	0.0040	0.0044	0.0048	-
L55	0.0028	0.0029	0.0035	0.0040	0.0044	0.0050	0.0051	0.0053	-
L56	0.0031	0.0033	0.0038	0.0040	0.0042	0.0044	0.0046	0.0049	-
L57	0.0029	0.0031	0.0033	0.0036	0.0039	0.0041	0.0042	0.0045	-
L58	0.0023	0.0025	0.0027	0.0029	0.0030	0.0033	0.0035	0.0040	-
L59	0.0029	0.0031	0.0035	0.0039	0.0043	0.0045	0.0049	0.0053	-
L60	0.0023	0.0025	0.0031	0.0035	0.0038	0.0043	0.0046	0.0050	-
L61	0.0022	0.0025	0.0026	0.0031	0.0033	0.0037	0.0039	0.0044	-
L62	0.0026	0.0028	0.0031	0.0037	0.0042	0.0044	0.0046	0.0049	-
L63	0.0029	0.0031	0.0035	0.0040	0.0043	0.0046	0.0047	0.0052	-
L64	0.0028	0.0030	0.0032	0.0038	0.0044	0.0047	0.0049	0.0050	-
L65	0.0023	0.0025	0.0027	0.0030	0.0035	0.0037	0.0040	0.0044	-
L66	0.0032	0.0033	0.0038	0.0044	0.0049	0.0054	0.0058	0.0061	-
L67	0.0027	0.0029	0.0033	0.0035	0.0039	0.0040	0.0045	0.0048	-
L68	0.0022	0.0025	0.0026	0.0030	0.0034	0.0039	0.0044	0.0048	-
L69	0.0028	0.0030	0.0034	0.0038	0.0041	0.0046	0.0048	0.0049	-
L70	0.0026	0.0027	0.0031	0.0033	0.0035	0.0039	0.0040	0.0041	-
L71	0.0023	0.0026	0.0028	0.0032	0.0035	0.0040	0.0043	0.0047	-
L72	0.0032	0.0034	0.0039	0.0043	0.0047	0.0052	0.0056	0.0060	-
L73	0.0031	0.0033	0.0038	0.0039	0.0044	0.0045	0.0046	0.0050	-
L74	0.0025	0.0028	0.0030	0.0031	0.0034	0.0039	0.0041	0.0045	-
L75	0.0025	0.0027	0.0028	0.0033	0.0035	0.0037	0.0040	0.0043	-
Ave.	0.0027	0.0029	0.0032	0.0036	0.0039	0.0043	0.0045	0.0049	-
Med.	0.0027	0.0029	0.0032	0.0036	0.0039	0.0043	0.0046	0.0049	-
st dev	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0005	0.0005	-
Min.	0.0022	0.0025	0.0026	0.0029	0.0030	0.0033	0.0035	0.0040	-
Max.	0.0032	0.0034	0.0039	0.0044	0.0049	0.0054	0.0058	0.0061	-

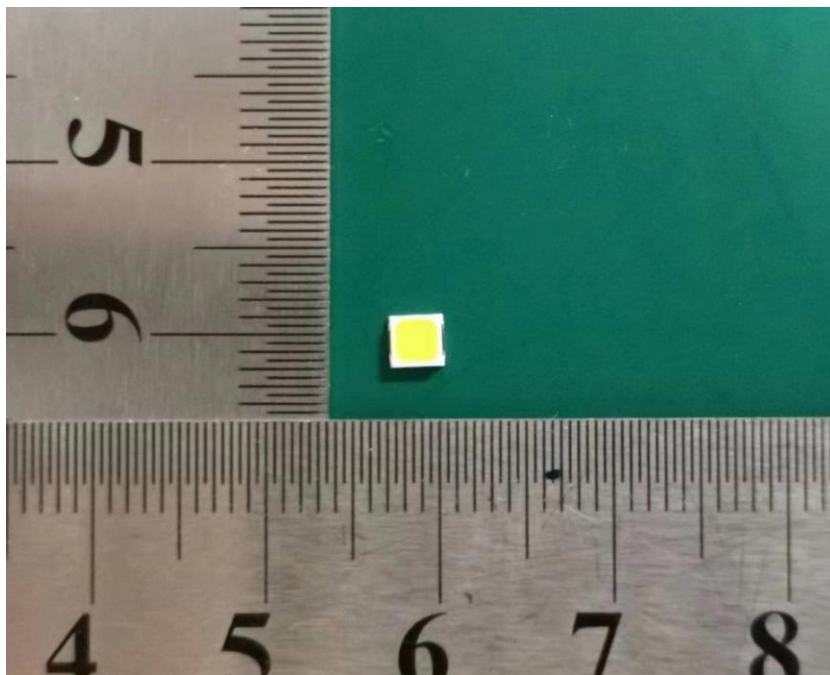
## 4-EUT Photos

### 4.1 Mechanical Dimensions



Note: All dimensions are in millimeters(mm).

### 4.2 EUT Photo



----End of report----