LUMILEDS

ILLUMINATION

Lumen Maintenance Package for LUXEON 5050

(published: Dec 10, 2021)

Section 1 - Model Description, Models Covered, LM-80 Summary Sheet and TM-21-11 Data

Section 2 - LM-80 Test Reports

Section 1

1.1 Models Description

LUXEON 5050 24V with model number L150-2780502400000 (nominal CCT 2700K, 8-die in series) was used in this LM-80 testing. Figure 1 shows the overall mechanical dimension of this product in mm.

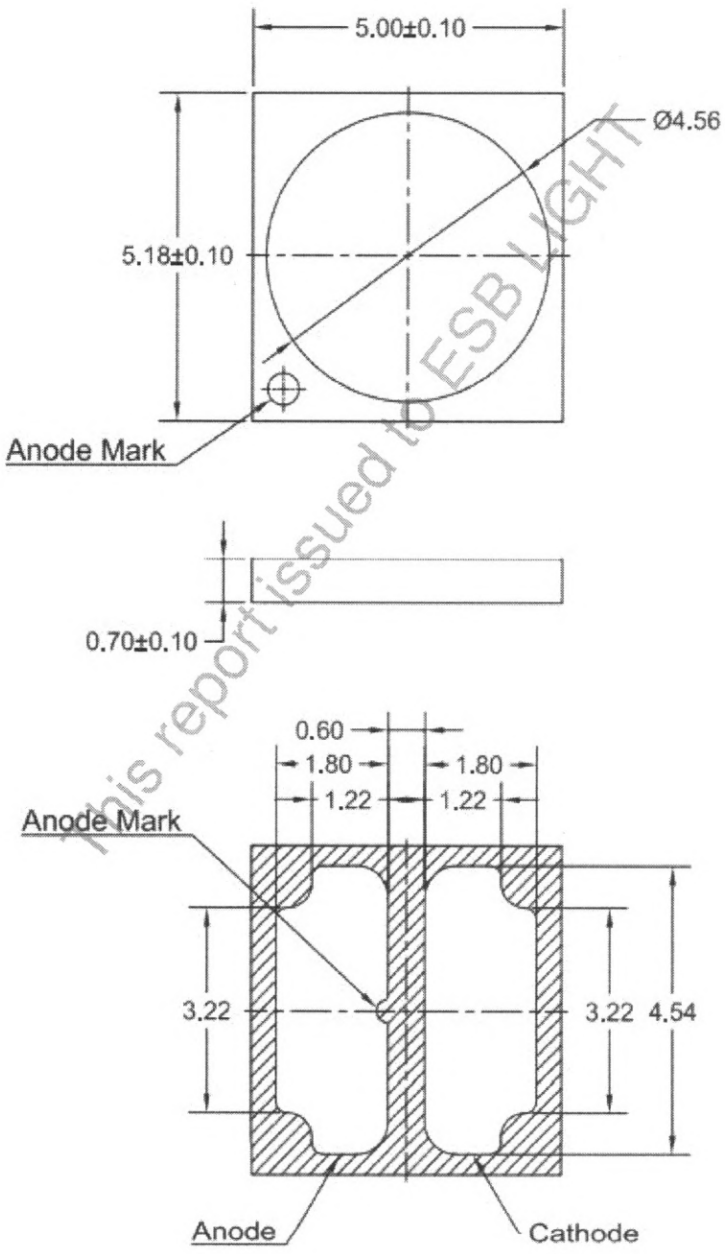

Figure 1. Mechanical drawings for LUXEON 5050

1.2 Additional Models Covered

The LM-80 test result here can be applied to the following part numbers:

Product Family	Part Number	Die Configuration	Equivalent maintenance currents
LUXEON 5050 24V	L150-aabb5024xxx0x	8 die in series	60mA, 100mA, 200mA
LUXEON 5050 6V	L150-aabb5006xxx0x	2 die in series x 4 parallel strings	240mA, 400mA, 800mA
LUXEON 5050 HE 24V	L150-aabb5024xxxHx	8 die in series	60mA, 100mA, 200mA
LUXEON 5050 HE 6V	L150-aabb5006xxxHx	2 die in series x 4 parallel strings	240mA, 400mA, 800mA

Notes:
- aa: designates nominal CCT from 2200K to 6500K (27 = 2700K, 30 = 3000K, etc)
- bb: designates minimum CRI (70 = 70CRI, 80 = 80CRI, etc)
- x: designates for marketing use (e.g. binning, etc)

1.3 LM-80 Summary Sheet

LM-80 Summary Sheet

Administrative Information

Tested subcomponent series: LUXEON 5050
Tested subcomponent model number: L150-2780502400000 (nominal 2700K)
Report issue date: 2021 (see Section 2 for details)
Report revision date (if applicable): n/a
Testing start date: Dec 30, 2016
Testing completion date: Oct 8, 2019
DUT sampling method: 30 samples per test condition

DUT Identification

DUT manufacturer's name: Lumileds LLC
DUT identification, e.g., model number: L150-2780502400000
Description of DUT, including if the DUT is an LED package or module: LED package

DUT Characteristics

Total input power (W): 5.19 W initial average power at max maintenance current
Average current density per LED die (mA/mm²): 388 mA/mm² at max current
Average power density per LED die (W/mm²): 0.044 W/mm² at max current
Representative CRI (R_a) of the tested sample set: 81
(Indicate whether the reported value is the mean
or median value of the sample set, or per unit)

1.4 TM-21-11 Data

Lumen maintenance L_{70} lifetimes are calculated according to IESNA TM-21-11 method with 17,000 hrs of maintenance data and sample size of 30 per test condition.

			L_{70} (hrs)	
Test Conditions	alpha	B	Reported	Projected
60mA 70°C	2.4810E-06	1.0100	102,000	147,776
60mA 85°C	2.9141E-06	1.0100	102,000	125,794
60mA 105°C	3.3408E-06	1.0083	102,000	109,232
100mA 85°C	3.0919E-06	1.0093	102,000	118,350
100mA 105°C	3.5230E-06	1.0060	102,000	102,948
200mA 85°C	3.3137E-06	1.0092	102,000	110,399
200mA 105°C	3.9159E-06	1.0084	93,231	-

Additional Projected L_{xx} per TM-21-11:

Projected L_{80}

	If = 60mA	If = 100mA	If = 200mA
Ts = 70°C	93,955		
Ts = 85°C	79,971	75,163	70,102
Ts = 105°C	69,262	65,045	59,131

Projected L_{90}

	If = 60mA	If = 100mA	If = 200mA
Ts = 70°C	46,482		
Ts = 85°C	39,553	37,069	34,558
Ts = 105°C	34,006	31,612	29,053

Section 2. LM-80 Test Report

Report Reference No.	Current	Ts Temperature
R2SH161210050-10-17000-M2	60mA	70°C
	60mA	85°C
	60mA	105°C
R2SH161210051-10-17000-M2	100mA	85°C
	100mA	105°C
R2SH161210052-10-17000-M4	200mA	85°C
	200mA	105°C

ACCREDITED
Testing Laboratory
TL-460

Bay Area Compliance Labs Corp.

TEST REPORT

According to IES LM-80-15
For

Lumileds Malaysia Sdn Bhd

No.3, Lintang Bayan Lepas 8, Kawasan Perindustrian Bayan Lepas Fasa 4, Mukim 12,

Model: LUXEON 5050

Report Type: 17000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	R2SH161210050-10-17000-M2
Test Date:	2016-12-30 to 2019-10-08
Report Date:	2021-03-12
Reviewed By:	Blake Zhang / EE Engineer
Revised Note:	The previous report R2SH161210050-10-17000-M1 is replaced by this report on 2021-03-12
Test Facility:	Test facility was located at No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

Scan QR Code to verify

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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

90 PCS test samples were in good condition and received on 2016-12-10. The samples were numbered from 1 to 30, 31 to 60 and 61 to 90.

Manufacturer:	Lumileds Malaysia Sdn Bhd
Model:	LUXEON 5050
Part Number:	L150-2780502400000
Part Type:	LED Package
Drive Level:	DC 60mA
Nominal CCT:	2700K

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.
These manufacturing lots are picked to represent a wide parametric distribution.
Each Sample is soldered to all of the reliability stress boards for a given set of IESNA LM-80 tests.

1.2 Standards Used:

- IESNA LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2019-03-08	2020-03-07
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2019-03-08	2020-03-07
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2019-03-08	2020-03-07
Standard Light Source	EVERFINE	D062	G100278CJ7351206	2018-12-24	2019-12-24
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2019-03-08	2020-03-07
Multilayer aging machine	BACL	B2-270	20024	2019-03-10	2020-03-09
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090008	2019-07-23	2020-07-22
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	2019-07-23	2020-07-22
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	2019-04-10	2020-04-09

1.4 Drive Level

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

1.5 Ambient Conditions for Maintenance Test

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

During life testing, TMP_{LED} of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

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

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

For photometry measurement, the ambient temperature during test was set to 25°C ± 2°C, RH <65%.

1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u'v'. 2π measurement was used and sample was drived by DC power supply. The forward current was regulated to within ±0.5% of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to 25°C ± 2°C, RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe.

The uncertainty of the light output measurements is U=1.59% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=21K (K=2), at the 95% confidence level.

The uncertainty of the temperature is U=0.8671°C (K=2), at the 95% confidence level.

1.7 Statement of Traceability

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

1.8 Sample Set

Data Set 1: 70°C, 60mA

Part Number:	L150-2780502400000
Number of Units:	30
Case Temperature:	>68°C
Ambient Temperature:	>65°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

Data Set 2: 85°C, 60mA

Part Number:	L150-2780502400000
Number of Units:	30
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

Data Set 3: 105°C, 60mA

Part Number:	L150-2780502400000
Number of Units:	30
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α:	β:	Reported TM-21 L_{70} Lifetime
1	30	0	1000hrs	17000hrs	2.476E-06	1.010	>102000 hrs
2	30	0	1000hrs	17000hrs	2.916E-06	1.010	>102000 hrs
3	30	0	1000hrs	17000hrs	3.341E-06	1.008	>102000 hrs

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.32%	100.15%	99.96%	99.78%	99.60%	99.40%	99.20%	99.00%	98.81%
2	100.20%	99.99%	99.79%	99.58%	99.37%	99.14%	98.91%	98.68%	98.41%
3	99.98%	99.71%	99.46%	99.19%	98.94%	98.69%	98.42%	98.16%	97.86%

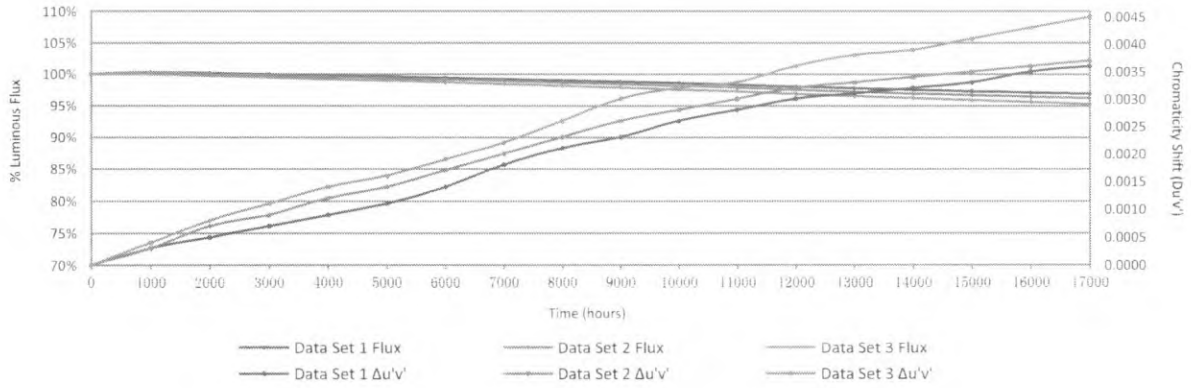
Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	98.54%	98.31%	98.03%	97.74%	97.50%	97.28%	97.07%	96.91%
2	98.09%	97.84%	97.51%	97.18%	96.91%	96.67%	96.39%	96.18%
3	97.52%	97.24%	96.85%	96.49%	96.18%	95.91%	95.59%	95.29%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0003	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0023
2	0.0003	0.0007	0.0009	0.0012	0.0014	0.0017	0.0020	0.0023	0.0026
3	0.0004	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022	0.0026	0.0030

Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	0.0026	0.0028	0.0030	0.0031	0.0032	0.0033	0.0035	0.0036
2	0.0028	0.0030	0.0032	0.0033	0.0034	0.0035	0.0036	0.0037
3	0.0032	0.0033	0.0036	0.0038	0.0039	0.0041	0.0043	0.0045

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 70°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	259.1	100.27	100.08	99.88	99.77	99.58	99.31	99.11	98.92	98.69
2	267.8	100.30	100.04	99.89	99.70	99.40	99.25	98.92	98.88	98.69
3	258.6	100.39	100.23	100.08	99.73	99.57	99.34	99.07	98.88	98.76
4	264.6	100.34	100.30	100.11	99.77	99.66	99.43	99.17	98.98	98.72
5	258.8	100.23	100.15	100.04	99.92	99.77	99.61	99.34	99.07	98.96
6	256.4	100.27	100.04	99.96	99.92	99.80	99.73	99.57	99.38	99.22
7	262.0	100.38	100.08	100.04	99.89	99.77	99.54	99.31	99.16	99.12
8	261.3	100.31	100.04	99.85	99.58	99.54	99.31	99.16	98.97	98.66
9	267.3	100.34	100.11	99.96	99.74	99.63	99.36	99.21	99.06	98.84
10	265.4	100.26	100.23	99.89	99.85	99.70	99.51	99.21	99.02	98.76
11	260.4	100.27	100.12	99.88	99.65	99.54	99.31	99.04	98.81	98.62
12	264.0	100.30	100.15	100.11	99.73	99.43	99.36	99.17	98.94	98.71
13	263.8	100.34	100.04	99.81	99.62	99.36	99.24	99.01	98.90	98.64
14	265.0	100.34	100.19	99.89	99.77	99.58	99.40	99.21	98.94	98.79
15	262.7	100.42	100.27	100.08	99.81	99.62	99.47	99.20	99.05	98.97
16	261.3	100.38	100.19	99.96	99.69	99.62	99.31	99.16	98.93	98.66
17	261.0	100.34	100.11	99.85	99.50	99.39	99.16	98.93	98.70	98.51
18	259.9	100.46	100.27	100.15	99.92	99.65	99.46	99.19	99.08	98.81
19	268.0	100.30	100.19	99.96	99.85	99.81	99.63	99.48	99.22	98.99
20	262.3	100.34	100.23	99.92	99.89	99.81	99.58	99.54	99.43	99.24
21	259.7	100.31	100.15	99.92	99.69	99.58	99.35	99.15	98.96	98.77
22	260.7	100.31	100.04	99.88	99.85	99.62	99.42	99.16	98.93	98.66
23	265.3	100.30	100.15	99.89	99.77	99.62	99.36	99.21	99.06	98.83
24	262.9	100.38	100.23	100.04	99.89	99.66	99.47	99.32	99.05	98.86
25	265.9	100.34	100.15	99.92	99.89	99.62	99.36	99.29	99.02	98.83
26	257.8	100.35	100.12	100.04	99.96	99.81	99.50	99.38	99.22	99.07
27	253.9	100.24	100.08	99.88	99.65	99.49	99.21	98.98	98.78	98.66
28	262.5	100.23	100.19	99.89	99.73	99.47	99.28	99.09	98.86	98.74
29	264.6	100.34	100.15	100.08	99.92	99.66	99.51	99.28	99.06	98.87
30	258.6	100.27	100.08	99.85	99.65	99.38	99.34	99.03	98.88	98.57
Ave.	262.1	100.32	100.15	99.96	99.78	99.60	99.40	99.20	99.00	98.81
Med.	262.2	100.32	100.15	99.92	99.77	99.62	99.36	99.18	98.97	98.77
st dev	3.4	0.06	0.08	0.10	0.12	0.13	0.13	0.16	0.16	0.18
Min.	253.9	100.23	100.04	99.81	99.50	99.36	99.16	98.92	98.70	98.51
Max.	268.0	100.46	100.30	100.15	99.96	99.81	99.73	99.57	99.43	99.24

No.	Lumen Maintenance (%)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	98.26	98.03	97.84	97.65	97.38	97.11	96.87	96.49
2	98.51	98.36	98.10	97.83	97.68	97.50	97.31	96.98
3	98.53	98.30	97.95	97.64	97.37	97.22	97.06	96.87
4	98.45	98.15	97.85	97.43	97.24	97.09	96.94	96.67
5	98.61	98.45	98.18	97.95	97.64	97.18	96.99	96.83
6	99.02	98.87	98.67	98.48	98.36	97.93	97.70	97.50
7	99.01	98.89	98.70	98.55	98.28	98.13	97.75	97.60
8	98.43	98.24	97.93	97.74	97.59	97.47	97.32	97.13
9	98.62	98.35	98.02	97.87	97.68	97.61	97.57	97.49
10	98.38	98.15	97.89	97.51	97.21	97.14	97.06	97.02
11	98.39	98.12	97.73	97.62	97.31	96.85	96.62	96.47
12	98.52	98.33	98.18	98.11	97.92	97.88	97.46	97.20
13	98.29	98.07	97.69	97.42	97.16	96.93	96.47	96.40
14	98.53	98.26	98.04	97.81	97.51	97.13	96.94	96.91
15	98.71	98.44	98.25	97.79	97.49	97.15	96.95	96.88
16	98.35	98.01	97.74	96.98	96.71	96.36	96.25	96.13
17	98.31	98.16	97.82	97.70	97.43	96.90	96.86	96.59
18	98.50	98.19	98.00	97.46	97.08	96.58	96.46	96.34
19	98.77	98.58	98.25	98.06	97.69	97.46	97.20	97.13
20	98.97	98.70	98.40	97.90	97.67	97.56	97.14	97.10
21	98.54	98.27	98.04	97.84	97.69	97.54	97.42	97.34
22	98.35	98.12	97.81	97.66	97.47	97.31	97.12	96.97
23	98.68	98.49	98.08	97.96	97.70	97.59	97.32	97.21
24	98.55	98.29	98.02	97.57	97.34	97.11	96.92	96.80
25	98.46	98.12	97.86	97.25	97.14	97.03	96.84	96.73
26	98.80	98.53	98.18	97.60	97.36	97.32	97.21	97.09
27	98.35	98.19	97.91	97.72	97.32	97.12	96.65	96.34
28	98.44	98.13	97.79	97.37	97.14	97.07	96.95	96.57
29	98.72	98.53	98.30	98.15	98.00	97.96	97.77	97.69
30	98.26	98.11	97.80	97.56	97.33	97.18	96.95	96.75
Ave.	98.54	98.31	98.03	97.74	97.50	97.28	97.07	96.91
Med.	98.51	98.27	98.01	97.71	97.45	97.18	97.02	96.89
st dev	0.21	0.23	0.26	0.33	0.35	0.40	0.38	0.40
Min.	98.26	98.01	97.69	96.98	96.71	96.36	96.25	96.13
Max.	99.02	98.89	98.70	98.55	98.36	98.13	97.77	97.69

3.2 Data Set 1, 70°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	22.43	22.46	22.42	22.42	22.42	22.44	22.43	22.44	22.44	22.44
2	22.37	22.40	22.35	22.36	22.36	22.37	22.37	22.37	22.39	22.38
3	22.29	22.33	22.29	22.28	22.29	22.30	22.29	22.30	22.27	22.27
4	22.39	22.42	22.38	22.38	22.38	22.40	22.39	22.40	22.42	22.41
5	22.37	22.41	22.36	22.36	22.36	22.37	22.37	22.38	22.38	22.38
6	22.45	22.48	22.43	22.44	22.44	22.45	22.45	22.46	22.46	22.45
7	22.42	22.45	22.40	22.41	22.41	22.42	22.41	22.42	22.42	22.42
8	22.39	22.42	22.38	22.38	22.38	22.39	22.39	22.40	22.41	22.41
9	22.32	22.36	22.31	22.32	22.32	22.33	22.32	22.34	22.34	22.33
10	22.49	22.53	22.48	22.49	22.49	22.50	22.49	22.50	22.51	22.50
11	22.37	22.41	22.37	22.37	22.37	22.38	22.38	22.39	22.40	22.39
12	22.41	22.44	22.40	22.41	22.40	22.41	22.41	22.42	22.41	22.41
13	22.41	22.44	22.40	22.41	22.41	22.42	22.42	22.43	22.44	22.43
14	22.47	22.50	22.46	22.47	22.47	22.47	22.47	22.49	22.49	22.48
15	22.51	22.55	22.50	22.51	22.51	22.52	22.52	22.54	22.54	22.53
16	22.33	22.37	22.33	22.34	22.33	22.34	22.34	22.35	22.36	22.35
17	22.38	22.43	22.38	22.38	22.38	22.39	22.38	22.40	22.40	22.39
18	22.31	22.35	22.31	22.32	22.31	22.32	22.31	22.32	22.32	22.31
19	22.67	22.72	22.66	22.67	22.66	22.67	22.67	22.68	22.69	22.68
20	22.44	22.48	22.43	22.43	22.43	22.44	22.44	22.45	22.48	22.47
21	22.26	22.30	22.26	22.26	22.26	22.27	22.26	22.28	22.28	22.27
22	22.48	22.52	22.47	22.48	22.48	22.49	22.48	22.50	22.50	22.50
23	22.35	22.38	22.34	22.34	22.34	22.35	22.35	22.36	22.36	22.36
24	22.40	22.44	22.40	22.40	22.40	22.41	22.40	22.42	22.43	22.42
25	22.37	22.41	22.37	22.37	22.37	22.38	22.37	22.39	22.39	22.39
26	22.35	22.39	22.35	22.35	22.34	22.36	22.35	22.37	22.37	22.36
27	22.35	22.39	22.35	22.35	22.35	22.36	22.35	22.37	22.37	22.36
28	22.35	22.39	22.35	22.36	22.35	22.36	22.36	22.37	22.37	22.36
29	22.38	22.43	22.38	22.38	22.37	22.39	22.39	22.40	22.40	22.39
30	22.29	22.33	22.29	22.29	22.28	22.29	22.30	22.31	22.29	22.28
Ave.	22.39	22.43	22.39	22.39	22.39	22.40	22.40	22.41	22.41	22.40
Med.	22.38	22.42	22.38	22.38	22.38	22.39	22.39	22.40	22.40	22.39
st dev	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Min.	22.26	22.30	22.26	22.26	22.26	22.27	22.26	22.28	22.27	22.27
Max.	22.67	22.72	22.66	22.67	22.66	22.67	22.67	22.68	22.69	22.68

No.	Forward Voltage (V)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	22.43	22.44	22.43	22.47	22.47	22.46	22.46	22.47
2	22.37	22.39	22.38	22.42	22.42	22.41	22.42	22.43
3	22.26	22.28	22.27	22.32	22.30	22.29	22.31	22.31
4	22.40	22.42	22.41	22.45	22.45	22.43	22.47	22.51
5	22.37	22.39	22.39	22.41	22.42	22.40	22.45	22.43
6	22.44	22.46	22.45	22.48	22.49	22.47	22.49	22.50
7	22.41	22.43	22.42	22.45	22.46	22.44	22.47	22.46
8	22.40	22.42	22.41	22.45	22.45	22.43	22.46	22.45
9	22.33	22.34	22.33	22.37	22.37	22.35	22.38	22.38
10	22.49	22.53	22.50	22.54	22.54	22.52	22.55	22.55
11	22.38	22.39	22.38	22.42	22.43	22.41	22.44	22.43
12	22.40	22.41	22.40	22.43	22.45	22.43	22.46	22.45
13	22.42	22.44	22.43	22.46	22.47	22.45	22.51	22.48
14	22.47	22.50	22.48	22.51	22.52	22.50	22.53	22.54
15	22.52	22.54	22.53	22.55	22.57	22.56	22.57	22.59
16	22.34	22.36	22.35	22.36	22.38	22.37	22.39	22.39
17	22.39	22.40	22.39	22.41	22.42	22.41	22.57	22.43
18	22.30	22.32	22.32	22.33	22.34	22.33	22.36	22.36
19	22.67	22.69	22.68	22.70	22.71	22.70	22.72	22.72
20	22.46	22.48	22.48	22.49	22.51	22.50	22.58	22.51
21	22.26	22.28	22.27	22.28	22.30	22.29	22.31	22.31
22	22.48	22.51	22.50	22.51	22.53	22.52	22.55	22.54
23	22.35	22.37	22.36	22.37	22.39	22.38	22.41	22.40
24	22.41	22.43	22.42	22.44	22.45	22.44	22.46	22.46
25	22.38	22.40	22.40	22.40	22.42	22.41	22.43	22.43
26	22.35	22.37	22.36	22.38	22.40	22.38	22.41	22.41
27	22.35	22.37	22.35	22.37	22.39	22.38	22.43	22.40
28	22.35	22.37	22.36	22.37	22.39	22.38	22.41	22.41
29	22.38	22.40	22.39	22.41	22.43	22.41	22.45	22.43
30	22.27	22.28	22.28	22.30	22.33	22.30	22.32	22.32
Ave.	22.39	22.41	22.40	22.43	22.44	22.43	22.46	22.45
Med.	22.39	22.40	22.40	22.42	22.43	22.41	22.46	22.43
st dev	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09
Min.	22.26	22.28	22.27	22.28	22.30	22.29	22.31	22.31
Max.	22.67	22.69	22.68	22.70	22.71	22.70	22.72	22.72

3.3 Data Set 1, 70°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
1	0.2594	0.5258	2772	0.0002	0.0004	0.0006	0.0009	0.0012	0.0016	0.0019
2	0.2593	0.5249	2780	0.0002	0.0005	0.0008	0.0008	0.0012	0.0016	0.0019
3	0.2599	0.5253	2763	0.0002	0.0003	0.0007	0.0008	0.0010	0.0015	0.0018
4	0.2604	0.5262	2749	0.0002	0.0004	0.0006	0.0008	0.0011	0.0015	0.0018
5	0.2599	0.5253	2763	0.0003	0.0005	0.0008	0.0009	0.0013	0.0017	0.0020
6	0.2586	0.5287	2776	0.0002	0.0004	0.0006	0.0007	0.0010	0.0013	0.0017
7	0.2596	0.5254	2770	0.0003	0.0004	0.0007	0.0009	0.0012	0.0015	0.0018
8	0.2600	0.5254	2761	0.0003	0.0005	0.0007	0.0009	0.0011	0.0015	0.0018
9	0.2598	0.5259	2764	0.0003	0.0004	0.0007	0.0009	0.0011	0.0014	0.0017
10	0.2594	0.5264	2771	0.0004	0.0005	0.0007	0.0009	0.0012	0.0015	0.0017
11	0.2598	0.5259	2763	0.0003	0.0006	0.0007	0.0009	0.0011	0.0015	0.0019
12	0.2598	0.5251	2766	0.0003	0.0005	0.0007	0.0009	0.0011	0.0015	0.0018
13	0.2592	0.5253	2778	0.0002	0.0004	0.0006	0.0008	0.0010	0.0014	0.0017
14	0.2590	0.5252	2785	0.0004	0.0005	0.0007	0.0009	0.0012	0.0015	0.0018
15	0.2592	0.5245	2784	0.0005	0.0005	0.0007	0.0009	0.0012	0.0016	0.0019
16	0.2609	0.5254	2741	0.0002	0.0004	0.0006	0.0008	0.0011	0.0014	0.0018
17	0.2602	0.5253	2756	0.0002	0.0004	0.0006	0.0008	0.0010	0.0013	0.0017
18	0.2596	0.5259	2768	0.0003	0.0005	0.0007	0.0009	0.0011	0.0015	0.0018
19	0.2598	0.5252	2766	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
20	0.2597	0.5250	2768	0.0002	0.0005	0.0006	0.0009	0.0011	0.0013	0.0018
21	0.2588	0.5241	2793	0.0003	0.0004	0.0006	0.0009	0.0010	0.0014	0.0017
22	0.2608	0.5267	2739	0.0003	0.0005	0.0007	0.0009	0.0011	0.0014	0.0017
23	0.2603	0.5262	2750	0.0002	0.0005	0.0005	0.0008	0.0010	0.0013	0.0016
24	0.2600	0.5251	2763	0.0002	0.0004	0.0006	0.0008	0.0010	0.0014	0.0017
25	0.2589	0.5250	2786	0.0002	0.0004	0.0006	0.0008	0.0011	0.0014	0.0017
26	0.2599	0.5259	2760	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0017
27	0.2596	0.5242	2775	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0017
28	0.2599	0.5253	2764	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0017
29	0.2603	0.5252	2755	0.0002	0.0003	0.0006	0.0008	0.0010	0.0013	0.0016
30	0.2604	0.5260	2751	0.0002	0.0005	0.0007	0.0011	0.0013	0.0015	0.0019
Ave.	0.2597	0.5255	2766	0.0003	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
Med.	0.2598	0.5253	2765	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
st dev	0.0006	0.0009	13	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2586	0.5241	2739	0.0002	0.0003	0.0005	0.0007	0.0010	0.0013	0.0016
Max.	0.2609	0.5287	2793	0.0005	0.0006	0.0008	0.0011	0.0013	0.0017	0.0020

No.	Chromaticity Shift (Δu'v')									
	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	0.0021	0.0023	0.0027	0.0028	0.0031	0.0030	0.0031	0.0032	0.0034	0.0035
2	0.0019	0.0022	0.0025	0.0027	0.0030	0.0031	0.0033	0.0034	0.0034	0.0035
3	0.0021	0.0022	0.0025	0.0027	0.0030	0.0031	0.0033	0.0034	0.0035	0.0036
4	0.0018	0.0021	0.0025	0.0028	0.0029	0.0030	0.0032	0.0033	0.0034	0.0035
5	0.0026	0.0027	0.0029	0.0032	0.0034	0.0033	0.0034	0.0037	0.0037	0.0038
6	0.0019	0.0019	0.0022	0.0025	0.0027	0.0028	0.0028	0.0030	0.0031	0.0032
7	0.0021	0.0024	0.0024	0.0028	0.0030	0.0031	0.0031	0.0034	0.0035	0.0035
8	0.0022	0.0024	0.0025	0.0028	0.0031	0.0031	0.0032	0.0034	0.0034	0.0035
9	0.0024	0.0025	0.0027	0.0029	0.0032	0.0033	0.0034	0.0035	0.0036	0.0036
10	0.0023	0.0024	0.0026	0.0028	0.0030	0.0032	0.0033	0.0034	0.0035	0.0035
11	0.0023	0.0027	0.0029	0.0032	0.0033	0.0034	0.0033	0.0035	0.0040	0.0040
12	0.0019	0.0023	0.0026	0.0028	0.0030	0.0031	0.0032	0.0032	0.0036	0.0036
13	0.0021	0.0024	0.0027	0.0030	0.0031	0.0032	0.0034	0.0034	0.0036	0.0038
14	0.0021	0.0025	0.0027	0.0029	0.0032	0.0032	0.0033	0.0034	0.0036	0.0037
15	0.0020	0.0024	0.0025	0.0028	0.0031	0.0031	0.0032	0.0034	0.0036	0.0037
16	0.0021	0.0027	0.0029	0.0031	0.0034	0.0034	0.0034	0.0034	0.0037	0.0038
17	0.0019	0.0022	0.0025	0.0028	0.0030	0.0030	0.0031	0.0033	0.0034	0.0035
18	0.0021	0.0024	0.0027	0.0029	0.0031	0.0032	0.0033	0.0034	0.0035	0.0037
19	0.0019	0.0023	0.0026	0.0029	0.0031	0.0033	0.0034	0.0034	0.0036	0.0037
20	0.0020	0.0024	0.0027	0.0029	0.0031	0.0031	0.0033	0.0034	0.0035	0.0037
21	0.0018	0.0021	0.0025	0.0027	0.0028	0.0030	0.0031	0.0032	0.0034	0.0036
22	0.0022	0.0021	0.0025	0.0026	0.0029	0.0030	0.0031	0.0033	0.0034	0.0035
23	0.0018	0.0019	0.0023	0.0026	0.0028	0.0029	0.0030	0.0032	0.0033	0.0034
24	0.0019	0.0021	0.0025	0.0027	0.0029	0.0030	0.0031	0.0032	0.0034	0.0035
25	0.0019	0.0023	0.0026	0.0028	0.0030	0.0031	0.0032	0.0032	0.0034	0.0036
26	0.0020	0.0023	0.0027	0.0029	0.0031	0.0031	0.0031	0.0033	0.0034	0.0036
27	0.0023	0.0024	0.0026	0.0027	0.0030	0.0030	0.0031	0.0033	0.0033	0.0036
28	0.0021	0.0022	0.0026	0.0028	0.0031	0.0031	0.0032	0.0034	0.0036	0.0038
29	0.0021	0.0023	0.0024	0.0026	0.0028	0.0028	0.0030	0.0031	0.0033	0.0034
30	0.0020	0.0024	0.0027	0.0028	0.0031	0.0032	0.0032	0.0034	0.0035	0.0037
Ave.	0.0021	0.0023	0.0026	0.0028	0.0030	0.0031	0.0032	0.0033	0.0035	0.0036
Med.	0.0021	0.0023	0.0026	0.0028	0.0030	0.0031	0.0032	0.0034	0.0035	0.0036
st dev	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002
Min.	0.0018	0.0019	0.0022	0.0025	0.0027	0.0028	0.0028	0.0030	0.0031	0.0032
Max.	0.0026	0.0027	0.0029	0.0032	0.0034	0.0034	0.0034	0.0037	0.0040	0.0040

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

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	263.9	100.27	100.11	99.96	99.81	99.58	99.39	99.17	99.01	98.79
32	263.0	100.30	100.04	99.92	99.89	99.51	99.20	99.13	98.86	98.75
33	261.3	100.19	99.96	99.66	99.43	99.20	98.97	98.74	98.47	98.20
34	265.6	100.11	99.89	99.70	99.44	99.17	98.95	98.76	98.61	98.34
35	265.4	100.11	99.96	99.66	99.43	99.17	98.91	98.72	98.42	98.34
36	269.2	100.15	100.04	99.78	99.52	99.29	99.11	98.85	98.63	98.25
37	261.2	100.19	99.96	99.66	99.39	99.16	99.00	98.81	98.55	98.28
38	258.4	100.19	99.88	99.73	99.50	99.23	98.96	98.68	98.49	98.30
39	264.6	100.26	99.89	99.74	99.58	99.28	99.06	98.83	98.56	98.11
40	262.9	100.19	100.04	99.77	99.66	99.39	99.32	98.86	98.59	98.33
41	264.5	100.19	99.96	99.81	99.66	99.55	99.32	98.94	98.75	98.45
42	268.3	100.15	99.89	99.70	99.52	99.40	99.07	98.77	98.51	98.29
43	266.0	100.19	99.85	99.59	99.40	99.32	99.02	98.80	98.65	98.31
44	260.5	100.19	99.96	99.77	99.62	99.46	99.16	98.96	98.69	98.35
45	264.2	100.30	99.85	99.66	99.51	99.46	99.24	99.02	98.75	98.33
46	264.2	100.26	99.96	99.70	99.47	99.36	99.05	98.90	98.71	98.45
47	261.8	100.23	100.11	99.89	99.58	99.47	99.24	99.01	98.82	98.55
48	268.5	100.26	100.15	100.07	99.70	99.52	99.37	99.07	98.77	98.55
49	259.8	100.19	99.88	99.77	99.62	99.42	99.31	99.04	98.92	98.61
50	259.6	100.23	99.96	99.85	99.54	99.27	98.96	98.77	98.57	98.19
51	254.5	100.12	99.92	99.84	99.57	99.29	99.02	98.70	98.51	98.35
52	266.6	100.15	99.89	99.77	99.47	99.17	98.95	98.84	98.54	98.12
53	258.4	100.15	99.92	99.65	99.50	99.23	99.03	98.76	98.45	98.14
54	263.0	100.19	100.08	99.81	99.66	99.47	99.24	99.09	98.71	98.56
55	264.0	100.15	100.11	99.96	99.70	99.47	99.24	99.05	98.79	98.52
56	260.2	100.15	99.92	99.69	99.54	99.35	99.19	99.04	98.69	98.42
57	260.8	100.23	100.12	99.81	99.65	99.42	99.27	98.96	98.85	98.62
58	260.6	100.27	100.15	99.92	99.81	99.65	99.39	99.23	99.00	98.89
59	262.0	100.23	100.04	99.85	99.62	99.43	99.24	99.01	98.78	98.51
60	259.3	100.31	100.08	99.92	99.58	99.42	99.19	98.92	98.61	98.30
Ave.	262.7	100.20	99.99	99.79	99.58	99.37	99.14	98.91	98.68	98.41
Med.	263.0	100.19	99.96	99.77	99.57	99.40	99.17	98.91	98.67	98.35
st dev	3.3	0.06	0.09	0.12	0.12	0.13	0.15	0.15	0.16	0.20
Min.	254.5	100.11	99.85	99.59	99.39	99.16	98.91	98.68	98.42	98.11
Max.	269.2	100.31	100.15	100.07	99.89	99.65	99.39	99.23	99.01	98.89

No.	Lumen Maintenance (%)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	98.41	98.07	97.73	97.23	96.97	96.70	96.40	96.36
32	98.40	98.17	97.76	97.03	96.73	96.54	96.31	96.16
33	97.93	97.78	97.51	97.17	96.79	96.52	96.25	95.83
34	98.12	97.82	97.59	97.21	96.99	96.72	96.46	96.27
35	98.00	97.85	97.51	96.99	96.72	96.31	96.08	95.78
36	97.81	97.62	97.36	96.92	96.58	96.06	95.91	95.77
37	98.01	97.63	97.28	97.05	96.78	96.48	96.17	95.98
38	98.07	97.87	97.56	97.45	97.17	96.79	96.36	96.32
39	97.81	97.62	97.28	97.13	96.83	96.52	96.22	96.18
40	97.98	97.57	97.11	96.69	96.42	96.01	95.66	95.47
41	98.15	97.88	97.47	97.20	96.79	96.60	96.37	96.07
42	97.91	97.61	97.28	96.94	96.79	96.57	96.05	95.83
43	97.89	97.63	97.37	97.14	96.84	96.77	96.32	96.20
44	98.00	97.85	97.50	96.89	96.58	96.51	96.05	95.74
45	98.11	97.88	97.46	97.01	96.90	96.59	96.03	95.53
46	98.22	98.07	97.77	97.58	97.31	97.12	96.97	96.82
47	98.17	97.86	97.52	97.06	96.75	96.60	96.18	96.10
48	98.29	98.10	97.73	97.65	97.47	97.24	97.09	96.98
49	98.42	98.19	97.81	97.65	97.50	97.31	96.92	96.73
50	97.92	97.53	97.07	97.03	96.73	96.53	96.34	96.26
51	97.96	97.68	97.33	97.09	96.74	96.54	96.11	95.95
52	97.86	97.56	97.22	96.85	96.62	96.44	96.10	96.06
53	97.76	97.41	97.14	96.56	96.28	96.17	95.94	95.70
54	98.21	98.06	97.68	97.38	97.07	96.96	96.65	96.31
55	98.33	98.07	97.80	97.58	97.31	97.16	96.86	96.52
56	98.08	97.89	97.66	97.16	96.73	96.50	96.35	96.00
57	98.35	98.08	97.78	97.55	97.35	97.09	96.97	96.78
58	98.62	98.31	97.93	97.62	97.35	97.12	96.97	96.58
59	98.17	98.02	97.82	97.56	97.37	97.21	97.14	97.02
60	97.88	97.65	97.26	96.99	96.80	96.41	96.37	96.14
Ave.	98.09	97.84	97.51	97.18	96.91	96.67	96.39	96.18
Med.	98.07	97.86	97.51	97.14	96.80	96.58	96.33	96.15
st dev	0.22	0.23	0.24	0.29	0.32	0.35	0.39	0.41
Min.	97.76	97.41	97.07	96.56	96.28	96.01	95.66	95.47
Max.	98.62	98.31	97.93	97.65	97.50	97.31	97.14	97.02

3.5 Data Set 2, 85°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	22.37	22.40	22.37	22.37	22.36	22.38	22.38	22.39	22.39	22.39
32	22.30	22.34	22.30	22.30	22.30	22.31	22.31	22.32	22.33	22.32
33	22.42	22.47	22.42	22.43	22.42	22.43	22.43	22.44	22.44	22.44
34	22.45	22.50	22.45	22.46	22.45	22.46	22.46	22.47	22.48	22.47
35	22.45	22.49	22.44	22.45	22.44	22.45	22.45	22.47	22.47	22.47
36	22.52	22.56	22.52	22.53	22.52	22.53	22.53	22.54	22.55	22.54
37	22.30	22.34	22.30	22.30	22.30	22.31	22.31	22.33	22.32	22.31
38	22.51	22.55	22.50	22.51	22.50	22.52	22.52	22.53	22.54	22.53
39	22.35	22.39	22.35	22.35	22.35	22.36	22.36	22.37	22.38	22.37
40	22.29	22.33	22.29	22.29	22.29	22.30	22.31	22.32	22.32	22.31
41	22.55	22.60	22.55	22.55	22.55	22.56	22.57	22.58	22.59	22.58
42	22.32	22.36	22.32	22.33	22.32	22.34	22.34	22.35	22.36	22.35
43	22.38	22.41	22.37	22.38	22.37	22.38	22.39	22.40	22.41	22.40
44	22.27	22.31	22.27	22.29	22.27	22.28	22.29	22.29	22.29	22.28
45	22.34	22.39	22.34	22.34	22.33	22.35	22.35	22.36	22.34	22.33
46	22.40	22.44	22.39	22.41	22.40	22.41	22.41	22.42	22.43	22.42
47	22.33	22.36	22.32	22.34	22.32	22.33	22.34	22.34	22.37	22.35
48	22.43	22.47	22.42	22.44	22.42	22.43	22.44	22.45	22.47	22.46
49	22.36	22.40	22.35	22.36	22.35	22.37	22.37	22.38	22.36	22.35
50	22.38	22.41	22.37	22.37	22.37	22.38	22.38	22.40	22.37	22.37
51	22.43	22.46	22.42	22.43	22.42	22.44	22.44	22.45	22.45	22.44
52	22.48	22.50	22.46	22.47	22.46	22.47	22.48	22.49	22.52	22.51
53	22.39	22.41	22.38	22.38	22.38	22.39	22.39	22.41	22.41	22.40
54	22.38	22.41	22.37	22.38	22.38	22.38	22.38	22.40	22.41	22.40
55	22.41	22.43	22.40	22.40	22.40	22.41	22.41	22.42	22.42	22.42
56	22.40	22.42	22.39	22.39	22.39	22.40	22.40	22.41	22.43	22.42
57	22.29	22.32	22.28	22.28	22.28	22.29	22.29	22.30	22.31	22.29
58	22.33	22.36	22.32	22.32	22.32	22.33	22.33	22.34	22.35	22.34
59	22.58	22.62	22.57	22.57	22.57	22.58	22.59	22.60	22.61	22.59
60	22.54	22.58	22.54	22.54	22.54	22.55	22.56	22.57	22.57	22.56
Ave.	22.40	22.43	22.39	22.40	22.39	22.40	22.41	22.42	22.42	22.41
Med.	22.39	22.41	22.38	22.38	22.38	22.39	22.39	22.41	22.41	22.40
st dev	0.08	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09
Min.	22.27	22.31	22.27	22.28	22.27	22.28	22.29	22.29	22.29	22.28
Max.	22.58	22.62	22.57	22.57	22.57	22.58	22.59	22.60	22.61	22.59

No.	Forward Voltage (V)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	22.37	22.39	22.39	22.40	22.42	22.41	22.43	22.46
32	22.31	22.32	22.32	22.33	22.35	22.34	22.38	22.37
33	22.42	22.44	22.44	22.44	22.47	22.46	22.48	22.50
34	22.46	22.47	22.47	22.48	22.50	22.51	22.51	22.53
35	22.45	22.47	22.46	22.47	22.49	22.50	22.50	22.51
36	22.53	22.55	22.54	22.54	22.57	22.59	22.60	22.59
37	22.30	22.32	22.30	22.31	22.34	22.33	22.35	22.35
38	22.51	22.53	22.55	22.55	22.58	22.57	22.67	22.60
39	22.36	22.37	22.37	22.38	22.40	22.39	22.43	22.42
40	22.30	22.31	22.31	22.32	22.34	22.33	22.36	22.35
41	22.57	22.59	22.61	22.59	22.83	22.61	22.66	22.64
42	22.35	22.40	22.35	22.37	22.39	22.38	22.39	22.41
43	22.39	22.42	22.40	22.41	22.44	22.42	22.44	22.46
44	22.28	22.29	22.28	22.29	22.32	22.31	22.34	22.34
45	22.31	22.34	22.32	22.33	22.36	22.36	22.38	22.39
46	22.41	22.48	22.42	22.43	22.46	22.45	22.48	22.48
47	22.35	22.38	22.35	22.36	22.39	22.38	22.40	22.42
48	22.45	22.49	22.45	22.46	22.50	22.50	22.51	22.53
49	22.34	22.40	22.34	22.35	22.38	22.38	22.39	22.40
50	22.36	22.42	22.36	22.37	22.40	22.40	22.41	22.42
51	22.44	22.47	22.44	22.45	22.47	22.47	22.63	22.50
52	22.51	22.53	22.51	22.52	22.54	22.54	22.60	22.58
53	22.40	22.42	22.44	22.41	22.43	22.45	22.48	22.49
54	22.39	22.42	22.42	22.40	22.43	22.45	22.46	22.47
55	22.41	22.43	22.46	22.42	22.45	22.46	22.49	22.48
56	22.41	22.43	22.42	22.43	22.46	22.46	22.48	22.48
57	22.28	22.30	22.30	22.29	22.33	22.34	22.34	22.36
58	22.32	22.34	22.34	22.38	22.36	22.38	22.38	22.39
59	22.58	22.60	22.59	22.59	22.62	22.63	22.64	22.65
60	22.55	22.57	22.55	22.56	22.59	22.60	22.60	22.61
Ave.	22.40	22.43	22.42	22.42	22.45	22.45	22.47	22.47
Med.	22.40	22.42	22.42	22.41	22.44	22.45	22.47	22.48
st dev	0.09	0.09	0.09	0.09	0.11	0.09	0.10	0.09
Min.	22.28	22.29	22.28	22.29	22.32	22.31	22.34	22.34
Max.	22.58	22.60	22.61	22.59	22.83	22.63	22.67	22.65

3.6 Data Set 2, 85°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
31	0.2590	0.5245	2787	0.0003	0.0007	0.0008	0.0010	0.0014	0.0015	0.0018
32	0.2592	0.5259	2775	0.0002	0.0007	0.0008	0.0010	0.0014	0.0015	0.0020
33	0.2595	0.5257	2771	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020
34	0.2605	0.5259	2749	0.0005	0.0009	0.0009	0.0012	0.0015	0.0017	0.0021
35	0.2603	0.5261	2751	0.0004	0.0008	0.0008	0.0011	0.0014	0.0017	0.0020
36	0.2606	0.5270	2741	0.0002	0.0007	0.0009	0.0011	0.0014	0.0016	0.0018
37	0.2606	0.5247	2752	0.0004	0.0007	0.0009	0.0011	0.0014	0.0017	0.0021
38	0.2597	0.5251	2768	0.0003	0.0008	0.0010	0.0012	0.0015	0.0017	0.0021
39	0.2605	0.5257	2749	0.0003	0.0008	0.0010	0.0011	0.0015	0.0017	0.0021
40	0.2591	0.5258	2778	0.0003	0.0007	0.0009	0.0011	0.0014	0.0015	0.0021
41	0.2602	0.5255	2756	0.0003	0.0007	0.0009	0.0010	0.0014	0.0016	0.0019
42	0.2595	0.5247	2775	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0021
43	0.2608	0.5259	2742	0.0003	0.0007	0.0009	0.0011	0.0014	0.0017	0.0021
44	0.2597	0.5251	2768	0.0004	0.0009	0.0010	0.0013	0.0015	0.0017	0.0021
45	0.2601	0.5265	2755	0.0001	0.0007	0.0009	0.0011	0.0014	0.0016	0.0021
46	0.2604	0.5249	2754	0.0002	0.0007	0.0009	0.0011	0.0014	0.0016	0.0020
47	0.2607	0.5249	2748	0.0004	0.0007	0.0009	0.0010	0.0014	0.0017	0.0020
48	0.2598	0.5260	2762	0.0003	0.0008	0.0010	0.0011	0.0015	0.0017	0.0021
49	0.2593	0.5265	2771	0.0004	0.0007	0.0010	0.0012	0.0015	0.0017	0.0021
50	0.2595	0.5267	2767	0.0004	0.0008	0.0010	0.0011	0.0015	0.0017	0.0021
51	0.2590	0.5288	2767	0.0002	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018
52	0.2597	0.5255	2768	0.0003	0.0009	0.0010	0.0012	0.0015	0.0017	0.0021
53	0.2602	0.5255	2757	0.0005	0.0009	0.0010	0.0013	0.0015	0.0018	0.0021
54	0.2596	0.5249	2772	0.0003	0.0009	0.0010	0.0012	0.0015	0.0017	0.0022
55	0.2610	0.5257	2739	0.0003	0.0007	0.0010	0.0013	0.0015	0.0018	0.0021
56	0.2597	0.5261	2764	0.0003	0.0006	0.0009	0.0011	0.0015	0.0017	0.0021
57	0.2606	0.5245	2751	0.0003	0.0006	0.0009	0.0011	0.0015	0.0017	0.0020
58	0.2604	0.5249	2754	0.0002	0.0006	0.0010	0.0012	0.0015	0.0017	0.0021
59	0.2598	0.5240	2771	0.0003	0.0006	0.0009	0.0011	0.0015	0.0016	0.0021
60	0.2606	0.5262	2745	0.0003	0.0006	0.0010	0.0013	0.0015	0.0017	0.0021
Ave.	0.2600	0.5256	2760	0.0003	0.0007	0.0009	0.0012	0.0014	0.0017	0.0020
Med.	0.2600	0.5257	2760	0.0003	0.0007	0.0009	0.0011	0.0015	0.0017	0.0021
st dev	0.0006	0.0009	12	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2590	0.5240	2739	0.0001	0.0006	0.0008	0.0010	0.0013	0.0015	0.0018
Max.	0.2610	0.5288	2787	0.0005	0.0009	0.0010	0.0013	0.0015	0.0018	0.0022

No.	Chromaticity Shift (Δu'v')									
	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	0.0023	0.0026	0.0028	0.0030	0.0032	0.0034	0.0032	0.0033	0.0035	0.0036
32	0.0021	0.0024	0.0027	0.0029	0.0031	0.0032	0.0033	0.0034	0.0034	0.0034
33	0.0021	0.0024	0.0027	0.0029	0.0031	0.0031	0.0032	0.0034	0.0034	0.0034
34	0.0023	0.0026	0.0028	0.0030	0.0032	0.0033	0.0034	0.0034	0.0036	0.0036
35	0.0024	0.0026	0.0029	0.0031	0.0033	0.0033	0.0034	0.0035	0.0036	0.0036
36	0.0023	0.0024	0.0026	0.0029	0.0031	0.0031	0.0032	0.0034	0.0035	0.0035
37	0.0024	0.0029	0.0030	0.0033	0.0035	0.0036	0.0037	0.0037	0.0038	0.0038
38	0.0024	0.0026	0.0029	0.0030	0.0032	0.0033	0.0035	0.0035	0.0036	0.0036
39	0.0022	0.0025	0.0027	0.0030	0.0032	0.0032	0.0034	0.0035	0.0035	0.0036
40	0.0021	0.0025	0.0027	0.0029	0.0031	0.0031	0.0033	0.0033	0.0034	0.0036
41	0.0022	0.0024	0.0026	0.0028	0.0031	0.0031	0.0032	0.0034	0.0035	0.0037
42	0.0023	0.0027	0.0029	0.0031	0.0033	0.0033	0.0034	0.0036	0.0036	0.0037
43	0.0024	0.0026	0.0028	0.0031	0.0032	0.0033	0.0034	0.0036	0.0036	0.0037
44	0.0025	0.0027	0.0029	0.0031	0.0034	0.0035	0.0036	0.0037	0.0037	0.0038
45	0.0024	0.0026	0.0029	0.0032	0.0033	0.0036	0.0035	0.0038	0.0040	0.0042
46	0.0022	0.0024	0.0026	0.0028	0.0031	0.0031	0.0032	0.0034	0.0035	0.0036
47	0.0025	0.0028	0.0029	0.0032	0.0033	0.0034	0.0035	0.0036	0.0036	0.0038
48	0.0026	0.0028	0.0030	0.0031	0.0034	0.0034	0.0035	0.0035	0.0035	0.0037
49	0.0023	0.0025	0.0027	0.0029	0.0031	0.0032	0.0034	0.0035	0.0036	0.0038
50	0.0023	0.0026	0.0029	0.0031	0.0032	0.0033	0.0034	0.0035	0.0036	0.0038
51	0.0020	0.0023	0.0026	0.0027	0.0029	0.0029	0.0031	0.0032	0.0032	0.0035
52	0.0022	0.0025	0.0027	0.0029	0.0031	0.0032	0.0034	0.0035	0.0035	0.0037
53	0.0024	0.0027	0.0028	0.0031	0.0033	0.0033	0.0035	0.0035	0.0036	0.0038
54	0.0024	0.0027	0.0030	0.0031	0.0034	0.0034	0.0035	0.0037	0.0037	0.0039
55	0.0024	0.0026	0.0029	0.0031	0.0033	0.0033	0.0035	0.0036	0.0037	0.0039
56	0.0026	0.0029	0.0031	0.0032	0.0034	0.0035	0.0035	0.0037	0.0038	0.0040
57	0.0023	0.0026	0.0028	0.0030	0.0032	0.0034	0.0032	0.0035	0.0037	0.0038
58	0.0027	0.0030	0.0032	0.0033	0.0036	0.0037	0.0036	0.0037	0.0039	0.0041
59	0.0023	0.0026	0.0027	0.0029	0.0032	0.0034	0.0032	0.0034	0.0036	0.0038
60	0.0023	0.0026	0.0028	0.0030	0.0033	0.0033	0.0033	0.0035	0.0037	0.0039
Ave.	0.0023	0.0026	0.0028	0.0030	0.0032	0.0033	0.0034	0.0035	0.0036	0.0037
Med.	0.0023	0.0026	0.0028	0.0030	0.0032	0.0033	0.0034	0.0035	0.0036	0.0037
st dev	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002	0.0002
Min.	0.0020	0.0023	0.0026	0.0027	0.0029	0.0029	0.0031	0.0032	0.0032	0.0034
Max.	0.0027	0.0030	0.0032	0.0033	0.0036	0.0037	0.0037	0.0038	0.0040	0.0042

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

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
61	262.5	100.04	99.89	99.77	99.43	99.24	99.12	98.78	98.55	98.25
62	267.1	99.93	99.66	99.44	99.25	99.18	98.88	98.65	98.43	98.13
63	257.4	99.88	99.57	99.30	99.07	98.83	98.56	98.29	98.02	97.63
64	262.0	99.89	99.54	99.20	98.97	98.78	98.63	98.44	98.21	97.86
65	261.3	99.96	99.66	99.35	99.00	98.89	98.62	98.47	98.28	97.97
66	259.4	99.92	99.69	99.50	99.23	98.88	98.61	98.34	98.11	97.80
67	259.1	99.88	99.61	99.34	99.19	98.96	98.80	98.42	98.07	97.72
68	262.2	99.77	99.58	99.39	99.05	98.86	98.78	98.47	98.36	97.98
69	259.6	99.81	99.69	99.42	99.08	98.96	98.65	98.38	98.07	97.80
70	258.2	99.96	99.69	99.46	99.11	98.80	98.45	98.26	97.87	97.60
71	266.9	99.78	99.59	99.21	99.10	98.76	98.43	98.16	97.86	97.53
72	262.9	99.81	99.54	99.39	99.20	98.93	98.59	98.36	98.17	97.95
73	259.5	99.92	99.73	99.61	99.23	98.88	98.61	98.30	98.07	97.80
74	268.1	100.04	99.66	99.48	99.25	98.92	98.77	98.47	98.17	97.87
75	261.1	100.04	99.73	99.50	99.23	98.85	98.66	98.43	98.12	97.78
76	261.9	100.04	99.73	99.47	99.12	98.93	98.70	98.43	98.13	97.71
77	264.6	100.11	99.77	99.58	99.13	98.90	98.60	98.45	98.19	97.88
78	264.2	100.04	99.74	99.32	99.13	98.98	98.71	98.49	98.07	97.84
79	263.5	100.04	99.81	99.54	99.13	98.94	98.63	98.25	97.99	97.72
80	258.3	100.04	99.92	99.61	99.30	99.07	98.68	98.34	98.14	97.75
81	257.9	99.96	99.65	99.46	99.11	98.91	98.49	98.22	97.98	97.79
82	264.2	100.11	99.81	99.62	99.36	99.05	98.68	98.26	97.88	97.62
83	266.0	100.04	99.85	99.55	99.36	99.02	98.72	98.38	98.23	97.93
84	260.8	100.27	99.96	99.73	99.54	99.31	98.96	98.70	98.43	98.08
85	262.3	100.11	99.77	99.54	99.28	99.16	98.89	98.59	98.40	98.21
86	258.4	100.12	99.88	99.73	99.30	99.03	98.80	98.65	98.30	98.07
87	261.3	99.96	99.66	99.43	99.23	99.00	98.85	98.66	98.43	98.05
88	256.8	99.96	99.73	99.38	99.14	98.83	98.60	98.36	98.17	97.98
89	258.3	99.96	99.54	99.11	98.84	98.53	98.30	98.03	97.75	97.41
90	254.4	100.08	99.76	99.49	99.29	98.90	98.78	98.55	98.27	98.07
Ave.	261.3	99.98	99.71	99.46	99.19	98.94	98.69	98.42	98.16	97.86
Med.	261.3	99.96	99.71	99.46	99.20	98.92	98.67	98.42	98.16	97.85
st dev	3.3	0.11	0.11	0.16	0.14	0.15	0.17	0.17	0.19	0.20
Min.	254.4	99.77	99.54	99.11	98.84	98.53	98.30	98.03	97.75	97.41
Max.	268.1	100.27	99.96	99.77	99.54	99.31	99.12	98.78	98.55	98.25

No.	Lumen Maintenance (%)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
61	97.90	97.64	97.22	96.88	96.50	96.11	95.85	95.54
62	97.87	97.72	97.53	97.04	96.78	96.52	96.11	95.84
63	97.32	97.13	96.70	96.66	96.46	96.19	96.08	95.88
64	97.44	97.10	96.76	96.03	95.69	95.57	95.38	95.11
65	97.67	97.28	96.79	96.33	96.02	95.75	95.52	95.45
66	97.53	97.15	96.68	96.18	95.88	95.61	95.37	95.34
67	97.34	97.14	96.72	96.10	95.79	95.64	95.37	95.14
68	97.71	97.37	96.99	96.61	96.19	95.84	95.39	94.85
69	97.57	97.34	97.11	96.92	96.57	96.42	96.07	95.57
70	97.29	97.10	96.63	96.44	96.05	95.86	95.55	94.93
71	97.26	96.93	96.59	96.40	96.07	95.69	95.58	95.28
72	97.72	97.38	97.03	96.80	96.65	96.39	96.16	95.93
73	97.34	97.11	97.03	96.92	96.80	96.61	96.18	95.92
74	97.61	97.31	96.87	96.72	96.53	96.34	96.01	95.71
75	97.40	97.01	96.67	96.13	95.75	95.60	95.37	95.14
76	97.33	96.98	96.56	96.18	95.88	95.72	95.61	95.30
77	97.43	97.09	96.56	96.26	95.88	95.69	95.50	95.24
78	97.46	97.20	96.74	95.99	95.72	95.46	95.34	94.85
79	97.46	97.31	96.96	96.55	96.17	95.94	95.29	94.84
80	97.41	97.21	96.86	96.40	96.09	95.70	95.08	94.66
81	97.40	97.09	96.70	96.43	96.20	95.93	95.58	95.15
82	97.16	96.86	96.40	96.10	95.87	95.76	95.16	94.66
83	97.63	97.41	97.03	96.88	96.65	96.39	96.09	95.86
84	97.70	97.35	96.89	96.40	96.05	95.82	95.48	95.21
85	97.83	97.60	97.22	96.80	96.45	95.81	95.20	94.70
86	97.72	97.52	97.17	96.94	96.59	96.13	95.78	95.59
87	97.63	97.36	96.82	96.40	96.06	95.64	95.29	95.06
88	97.62	97.43	96.88	96.73	96.46	96.11	95.95	95.72
89	97.14	96.83	96.44	96.01	95.74	95.39	95.08	95.01
90	97.64	97.37	96.97	96.42	95.99	95.64	95.28	95.13
Ave.	97.52	97.24	96.85	96.49	96.18	95.91	95.59	95.29
Med.	97.50	97.25	96.84	96.43	96.08	95.81	95.51	95.22
st dev	0.20	0.22	0.25	0.32	0.35	0.33	0.35	0.40
Min.	97.14	96.83	96.40	95.99	95.69	95.39	95.08	94.66
Max.	97.90	97.72	97.53	97.04	96.80	96.61	96.18	95.93

3.8 Data Set 3, 105°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
61	22.35	22.39	22.35	22.36	22.35	22.36	22.34	22.37	22.37	22.36
62	22.35	22.39	22.35	22.38	22.35	22.36	22.34	22.37	22.39	22.39
63	22.47	22.51	22.48	22.49	22.47	22.48	22.46	22.50	22.50	22.49
64	22.29	22.33	22.29	22.30	22.29	22.30	22.28	22.31	22.32	22.32
65	22.41	22.45	22.41	22.42	22.41	22.42	22.40	22.43	22.43	22.42
66	22.40	22.45	22.40	22.41	22.40	22.41	22.40	22.42	22.43	22.42
67	22.35	22.39	22.34	22.36	22.34	22.35	22.33	22.37	22.36	22.35
68	22.29	22.33	22.29	22.29	22.28	22.30	22.28	22.31	22.32	22.32
69	22.33	22.38	22.33	22.34	22.33	22.34	22.33	22.35	22.33	22.33
70	22.29	22.33	22.29	22.29	22.28	22.29	22.28	22.31	22.31	22.32
71	22.51	22.54	22.51	22.52	22.50	22.51	22.50	22.53	22.55	22.55
72	22.62	22.66	22.62	22.71	22.62	22.62	22.61	22.65	22.66	22.54
73	22.52	22.55	22.52	22.53	22.52	22.52	22.51	22.54	22.54	22.54
74	22.43	22.47	22.43	22.44	22.44	22.44	22.43	22.45	22.47	22.46
75	22.36	22.39	22.36	22.37	22.36	22.36	22.36	22.38	22.39	22.38
76	22.35	22.39	22.35	22.35	22.35	22.36	22.35	22.37	22.35	22.35
77	22.40	22.43	22.39	22.42	22.39	22.40	22.39	22.42	22.42	22.41
78	22.36	22.40	22.36	22.37	22.36	22.37	22.36	22.39	22.41	22.40
79	22.51	22.55	22.51	22.52	22.51	22.52	22.51	22.54	22.55	22.54
80	22.33	22.36	22.32	22.34	22.32	22.34	22.32	22.35	22.36	22.35
81	22.39	22.41	22.37	22.44	22.37	22.39	22.37	22.40	22.40	22.40
82	22.45	22.48	22.44	22.45	22.44	22.45	22.44	22.47	22.48	22.47
83	22.56	22.59	22.55	22.58	22.55	22.57	22.54	22.58	22.58	22.57
84	22.39	22.41	22.37	22.39	22.38	22.39	22.37	22.40	22.41	22.40
85	22.33	22.36	22.32	22.33	22.32	22.34	22.32	22.35	22.36	22.35
86	22.46	22.49	22.45	22.47	22.45	22.47	22.45	22.48	22.50	22.49
87	22.48	22.51	22.47	22.48	22.47	22.48	22.47	22.50	22.51	22.49
88	22.36	22.39	22.36	22.36	22.35	22.36	22.34	22.38	22.38	22.36
89	22.36	22.38	22.36	22.36	22.35	22.36	22.35	22.38	22.40	22.39
90	22.43	22.46	22.43	22.45	22.43	22.44	22.43	22.46	22.46	22.44
Ave.	22.40	22.44	22.40	22.42	22.40	22.41	22.40	22.43	22.43	22.42
Med.	22.39	22.41	22.37	22.40	22.38	22.39	22.37	22.40	22.41	22.40
st dev	0.08	0.08	0.08	0.09	0.08	0.08	0.08	0.08	0.09	0.08
Min.	22.29	22.33	22.29	22.29	22.28	22.29	22.28	22.31	22.31	22.32
Max.	22.62	22.66	22.62	22.71	22.62	22.62	22.61	22.65	22.66	22.57

No.	Forward Voltage (V)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
61	22.35	22.37	22.35	22.36	22.38	22.38	22.40	22.42
62	22.37	22.41	22.41	22.39	22.41	22.40	22.43	22.44
63	22.48	22.50	22.49	22.49	22.52	22.51	22.53	22.55
64	22.30	22.33	22.31	22.32	22.34	22.34	22.37	22.39
65	22.41	22.43	22.79	22.42	22.46	22.44	22.47	22.48
66	22.40	22.43	22.58	22.42	22.45	22.44	22.47	22.47
67	22.34	22.36	22.48	22.35	22.38	22.37	22.40	22.42
68	22.31	22.33	22.43	22.31	22.35	22.35	22.38	22.37
69	22.32	22.35	22.33	22.33	22.36	22.36	22.37	22.38
70	22.30	22.31	22.31	22.31	22.34	22.34	22.38	22.36
71	22.53	22.55	22.54	22.54	22.58	22.57	22.61	22.60
72	22.64	22.66	22.65	22.65	22.69	22.68	22.70	22.71
73	22.53	22.54	22.53	22.53	22.57	22.56	22.59	22.59
74	22.46	22.47	22.49	22.47	22.50	22.49	22.52	22.57
75	22.38	22.39	22.40	22.39	22.42	22.41	22.43	22.45
76	22.34	22.35	22.35	22.35	22.38	22.37	22.40	22.41
77	22.41	22.42	22.43	22.41	22.44	22.44	22.45	22.48
78	22.40	22.41	22.43	22.40	22.43	22.42	22.45	22.51
79	22.54	22.55	22.64	22.55	22.58	22.57	22.60	22.61
80	22.35	22.35	22.40	22.35	22.38	22.37	22.40	22.42
81	22.40	22.40	22.40	22.41	22.43	22.42	22.45	22.48
82	22.48	22.48	22.48	22.48	22.51	22.50	22.52	22.56
83	22.57	22.61	22.57	22.58	22.61	22.59	22.62	22.64
84	22.40	22.42	22.40	22.41	22.43	22.42	22.45	22.46
85	22.35	22.36	22.35	22.36	22.39	22.37	22.39	22.41
86	22.49	22.50	22.49	22.50	22.53	22.51	22.54	22.55
87	22.49	22.51	22.49	22.51	22.54	22.52	22.57	22.55
88	22.36	22.38	22.37	22.38	22.41	22.39	22.42	22.44
89	22.39	22.40	22.39	22.40	22.43	22.41	22.44	22.52
90	22.44	22.45	22.44	22.46	22.48	22.46	22.49	22.51
Ave.	22.42	22.43	22.46	22.43	22.46	22.45	22.47	22.49
Med.	22.40	22.42	22.43	22.41	22.43	22.42	22.45	22.48
st dev	0.09	0.09	0.11	0.09	0.09	0.09	0.09	0.09
Min.	22.30	22.31	22.31	22.31	22.34	22.34	22.37	22.36
Max.	22.64	22.66	22.79	22.65	22.69	22.68	22.70	22.71

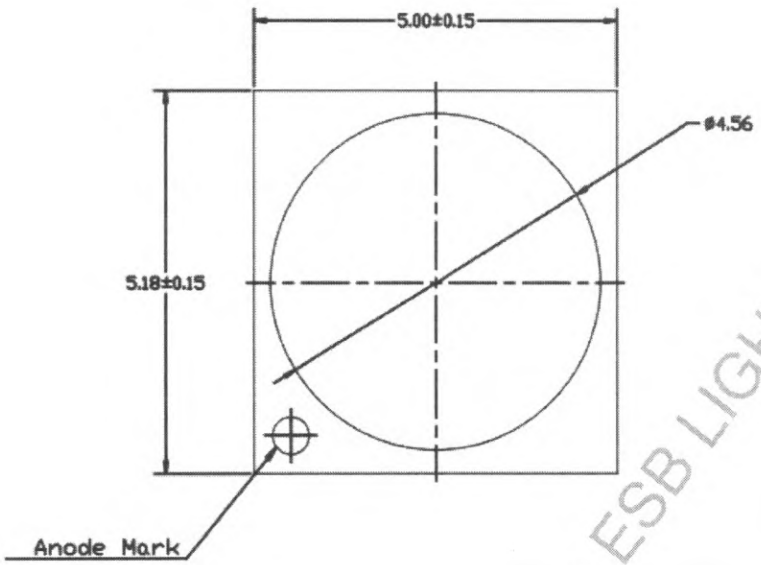
3.9 Data Set 3, 105°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
61	0.2598	0.5254	2767	0.0003	0.0008	0.0012	0.0014	0.0016	0.0018	0.0022
62	0.2595	0.5264	2767	0.0003	0.0008	0.0011	0.0015	0.0017	0.0019	0.0023
63	0.2594	0.5246	2779	0.0003	0.0009	0.0011	0.0014	0.0016	0.0021	0.0023
64	0.2601	0.5257	2757	0.0002	0.0008	0.0011	0.0013	0.0016	0.0018	0.0022
65	0.2609	0.5265	2736	0.0003	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021
66	0.2609	0.5259	2739	0.0003	0.0009	0.0012	0.0015	0.0017	0.0021	0.0023
67	0.2585	0.5250	2796	0.0003	0.0008	0.0011	0.0013	0.0016	0.0019	0.0022
68	0.2600	0.5242	2767	0.0003	0.0009	0.0011	0.0014	0.0016	0.0019	0.0021
69	0.2593	0.5269	2769	0.0003	0.0009	0.0013	0.0014	0.0017	0.0020	0.0023
70	0.2601	0.5255	2758	0.0005	0.0010	0.0013	0.0015	0.0017	0.0021	0.0024
71	0.2605	0.5264	2746	0.0003	0.0007	0.0011	0.0013	0.0015	0.0019	0.0021
72	0.2605	0.5264	2747	0.0004	0.0008	0.0011	0.0013	0.0016	0.0019	0.0022
73	0.2606	0.5263	2745	0.0005	0.0008	0.0011	0.0013	0.0015	0.0019	0.0021
74	0.2603	0.5265	2750	0.0003	0.0009	0.0011	0.0013	0.0016	0.0019	0.0022
75	0.2592	0.5248	2780	0.0003	0.0008	0.0011	0.0013	0.0016	0.0018	0.0022
76	0.2598	0.5255	2766	0.0005	0.0008	0.0012	0.0014	0.0016	0.0019	0.0022
77	0.2596	0.5247	2773	0.0004	0.0007	0.0011	0.0014	0.0016	0.0020	0.0022
78	0.2603	0.5254	2754	0.0004	0.0008	0.0010	0.0013	0.0016	0.0019	0.0021
79	0.2592	0.5256	2777	0.0003	0.0007	0.0010	0.0012	0.0015	0.0017	0.0021
80	0.2589	0.5258	2784	0.0005	0.0009	0.0013	0.0015	0.0017	0.0020	0.0023
81	0.2607	0.5252	2746	0.0003	0.0008	0.0012	0.0013	0.0016	0.0019	0.0022
82	0.2604	0.5259	2751	0.0004	0.0008	0.0011	0.0013	0.0015	0.0019	0.0021
83	0.2595	0.5257	2770	0.0003	0.0009	0.0011	0.0014	0.0015	0.0019	0.0021
84	0.2600	0.5250	2763	0.0004	0.0008	0.0012	0.0015	0.0016	0.0019	0.0023
85	0.2599	0.5260	2760	0.0004	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021
86	0.2606	0.5255	2747	0.0004	0.0008	0.0013	0.0014	0.0016	0.0019	0.0022
87	0.2603	0.5261	2753	0.0005	0.0010	0.0012	0.0015	0.0017	0.0020	0.0023
88	0.2595	0.5253	2773	0.0004	0.0008	0.0012	0.0015	0.0017	0.0020	0.0023
89	0.2603	0.5256	2754	0.0005	0.0009	0.0012	0.0014	0.0016	0.0019	0.0022
90	0.2583	0.5281	2786	0.0005	0.0008	0.0011	0.0014	0.0015	0.0019	0.0021
Ave.	0.2599	0.5257	2762	0.0004	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022
Med.	0.2600	0.5257	2762	0.0004	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022
st dev	0.0007	0.0008	15	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2583	0.5242	2736	0.0002	0.0007	0.0010	0.0012	0.0015	0.0017	0.0021
Max.	0.2609	0.5281	2796	0.0005	0.0010	0.0013	0.0015	0.0017	0.0021	0.0024

No.	Chromaticity Shift (Δu'v')									
	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
61	0.0026	0.0028	0.0031	0.0033	0.0035	0.0038	0.0038	0.0039	0.0040	0.0041
62	0.0028	0.0030	0.0032	0.0034	0.0037	0.0040	0.0039	0.0041	0.0042	0.0042
63	0.0026	0.0029	0.0032	0.0033	0.0036	0.0039	0.0040	0.0042	0.0042	0.0042
64	0.0027	0.0028	0.0032	0.0033	0.0036	0.0037	0.0039	0.0041	0.0042	0.0042
65	0.0029	0.0031	0.0035	0.0035	0.0038	0.0040	0.0040	0.0041	0.0043	0.0044
66	0.0027	0.0030	0.0032	0.0034	0.0036	0.0039	0.0040	0.0041	0.0042	0.0042
67	0.0028	0.0030	0.0033	0.0035	0.0037	0.0040	0.0040	0.0041	0.0042	0.0044
68	0.0027	0.0030	0.0033	0.0035	0.0036	0.0039	0.0040	0.0041	0.0043	0.0043
69	0.0024	0.0028	0.0031	0.0032	0.0035	0.0039	0.0041	0.0042	0.0042	0.0042
70	0.0027	0.0031	0.0034	0.0036	0.0038	0.0040	0.0042	0.0045	0.0047	0.0047
71	0.0026	0.0029	0.0032	0.0034	0.0036	0.0038	0.0039	0.0041	0.0044	0.0046
72	0.0026	0.0027	0.0033	0.0034	0.0037	0.0040	0.0041	0.0042	0.0045	0.0048
73	0.0023	0.0028	0.0030	0.0031	0.0034	0.0036	0.0037	0.0038	0.0042	0.0043
74	0.0026	0.0029	0.0032	0.0033	0.0035	0.0036	0.0038	0.0039	0.0042	0.0044
75	0.0026	0.0030	0.0032	0.0034	0.0037	0.0039	0.0040	0.0041	0.0044	0.0046
76	0.0027	0.0033	0.0034	0.0035	0.0038	0.0039	0.0040	0.0043	0.0046	0.0047
77	0.0027	0.0031	0.0034	0.0034	0.0036	0.0039	0.0040	0.0042	0.0045	0.0047
78	0.0025	0.0030	0.0032	0.0033	0.0035	0.0038	0.0038	0.0041	0.0044	0.0046
79	0.0027	0.0031	0.0032	0.0034	0.0036	0.0039	0.0037	0.0040	0.0043	0.0045
80	0.0030	0.0035	0.0035	0.0037	0.0039	0.0042	0.0041	0.0044	0.0047	0.0049
81	0.0024	0.0028	0.0030	0.0032	0.0034	0.0036	0.0038	0.0039	0.0042	0.0044
82	0.0024	0.0029	0.0031	0.0033	0.0036	0.0038	0.0040	0.0040	0.0043	0.0045
83	0.0023	0.0028	0.0029	0.0031	0.0034	0.0036	0.0037	0.0039	0.0041	0.0044
84	0.0024	0.0029	0.0030	0.0032	0.0034	0.0036	0.0037	0.0040	0.0043	0.0045
85	0.0024	0.0028	0.0030	0.0031	0.0034	0.0037	0.0038	0.0039	0.0042	0.0044
86	0.0024	0.0029	0.0030	0.0033	0.0034	0.0037	0.0039	0.0040	0.0043	0.0045
87	0.0026	0.0031	0.0032	0.0034	0.0036	0.0038	0.0040	0.0042	0.0045	0.0047
88	0.0025	0.0031	0.0032	0.0034	0.0036	0.0039	0.0040	0.0042	0.0044	0.0046
89	0.0026	0.0031	0.0032	0.0034	0.0036	0.0038	0.0039	0.0042	0.0045	0.0047
90	0.0022	0.0028	0.0030	0.0031	0.0034	0.0036	0.0038	0.0039	0.0041	0.0043
Ave.	0.0026	0.0030	0.0032	0.0033	0.0036	0.0038	0.0039	0.0041	0.0043	0.0045
Med.	0.0026	0.0030	0.0032	0.0034	0.0036	0.0039	0.0040	0.0041	0.0043	0.0045
st dev	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002
Min.	0.0022	0.0027	0.0029	0.0031	0.0034	0.0036	0.0037	0.0038	0.0040	0.0041
Max.	0.0030	0.0035	0.0035	0.0037	0.0039	0.0042	0.0042	0.0045	0.0047	0.0049

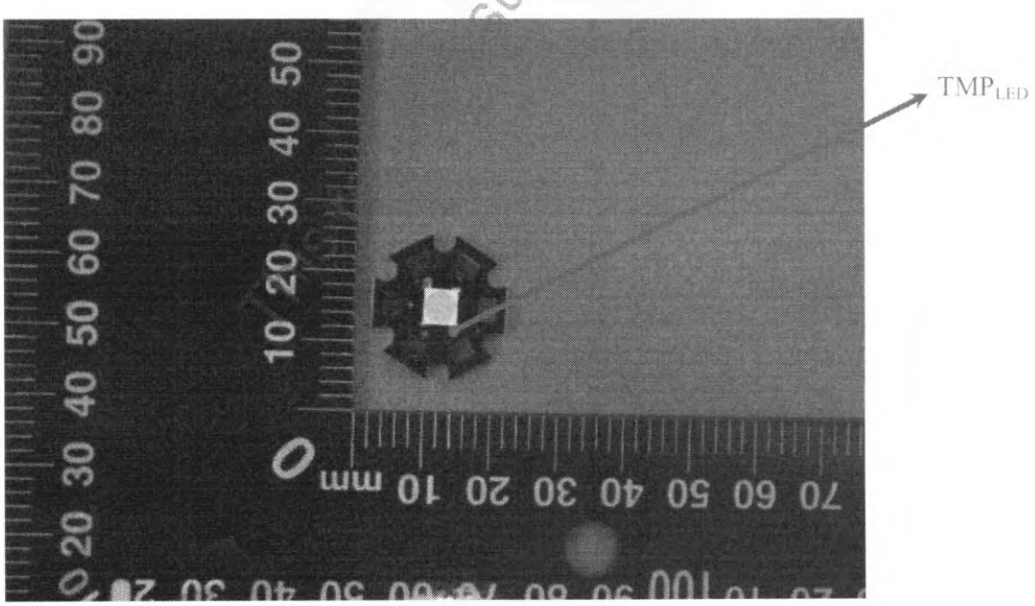
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



5 - Report Revision

Report Number	Report Date	Contents
R2SH161210050-10-17000	2019-12-04	Original report.
R2SH161210050-10-17000-M1	2020-08-17	Update the Family products covered.
R2SH161210050-10-17000-M2	2021-03-12	Remove the DUT characteristics and family products covered

Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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

TEST REPORT

According to IES LM-80-15
For

Lumileds Malaysia Sdn Bhd

No.3, Lintang Bayan Lepas 8, Kawasan Perindustrian Bayan Lepas Fasa 4, Mukim 12,

Model: LUXEON 5050

Report Type: 17000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	R2SH161210051-10-17000-M2
Test Date:	2016-10-30 to 2019-10-08
Report Date:	2021-03-12
Reviewed By:	Blake Zhang / EE Engineer
Revised Note:	The previous report R2SH161210051-10-17000-M1 is replaced by this report on 2021-03-12
Test Facility:	Test facility was located at No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

Scan QR Code to verify

TABLE OF CONTENTS

1 - General Information

1.1 Description of LED Light Sources

Sample Size:

60 PCS test samples were in good condition and received on 2016-10-30. The samples were numbered from 1 to 30 and 31 to 60.

Manufacturer:	Lumileds Malaysia Sdn Bhd
Model:	LUXEON 5050
Part Number:	L150-2780502400000
Part Type:	LED Package
Drive Level:	DC 100mA
Nominal CCT:	2700K

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.
These manufacturing lots are picked to represent a wide parametric distribution.
Each Sample is soldered to all of the reliability stress boards for a given set of IESNA LM-80 tests.

1.2 Standards Used:

- IESNA LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2019-03-08	2020-03-07
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2019-03-08	2020-03-07
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2019-03-08	2020-03-07
Standard Light Source	EVERFINE	D062	G100278CJ7351206	2018-12-24	2019-12-24
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2019-03-08	2020-03-07
Multilayer aging machine	BACL	B2-270	20015	2019-03-10	2020-03-09
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060010	2019-04-10	2020-04-09
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090008	2019-07-23	2020-07-22
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060002	2019-07-23	2020-07-22

1.4 Drive Level

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

1.5 Ambient Conditions for Maintenance Test

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

During life testing, TMP_{LED} of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

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

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

For photometry measurement, the ambient temperature during test was set to 25°C ± 2°C, RH <65%.

1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u'v'. 2π measurement was used and sample was drived by DC power supply. The forward current was regulated to within ±0.5% of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to 25°C ± 2°C, RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe.

The uncertainty of the light output measurements is U=1.59% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=21K (K=2), at the 95% confidence level.

The uncertainty of the temperature is U=0.8671°C (K=2), at the 95% confidence level.

1.7 Statement of Traceability

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

1.8 Sample Set

Data Set 1: 85°C, 100mA

Part Number:	L150-2780502400000
Number of Units:	30
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	100mA
Measurement Current:	100mA

Data Set 2: 105°C, 100mA

Part Number:	L150-2780502400000
Number of Units:	30
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	100mA
Measurement Current:	100mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α:	β:	Reported TM-21 L_{70} Lifetime
1	30	0	1000hrs	17000hrs	3.093E-06	1.009	>102000 hrs
2	30	0	1000hrs	17000hrs	3.523E-06	1.006	>102000 hrs

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.21%	99.97%	99.72%	99.45%	99.20%	98.94%	98.71%	98.45%	98.17%
2	99.86%	99.58%	99.29%	98.96%	98.68%	98.40%	98.14%	97.83%	97.49%

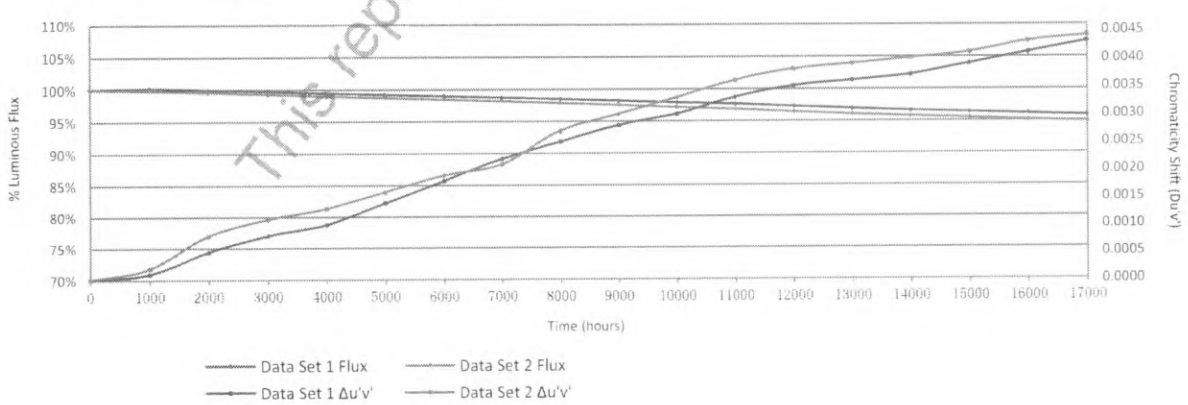
Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	97.88%	97.61%	97.24%	96.90%	96.59%	96.34%	96.07%	95.81%
2	97.14%	96.82%	96.39%	96.02%	95.69%	95.41%	95.11%	94.84%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0001	0.0005	0.0008	0.0010	0.0014	0.0018	0.0022	0.0025	0.0028
2	0.0002	0.0008	0.0011	0.0013	0.0016	0.0019	0.0021	0.0027	0.0030

Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	0.0030	0.0033	0.0035	0.0036	0.0037	0.0039	0.0041	0.0043
2	0.0033	0.0036	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 100mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	401.2	100.22	100.02	99.75	99.40	99.23	99.05	99.00	98.73	98.43
2	411.6	100.10	99.81	99.51	99.15	98.76	98.57	98.32	98.13	97.79
3	414.4	100.24	100.02	99.81	99.54	99.23	98.79	98.46	98.17	97.90
4	417.7	100.36	100.10	99.88	99.52	99.21	98.83	98.37	98.16	97.82
5	419.4	100.10	99.90	99.69	99.55	99.26	98.97	98.78	98.33	98.04
6	425.9	100.12	100.07	99.81	99.72	99.41	99.08	98.85	98.54	98.24
7	417.1	100.29	100.17	99.93	99.62	99.38	99.28	99.14	98.78	98.44
8	414.9	100.12	99.95	99.66	99.47	99.28	99.04	98.87	98.77	98.55
9	418.0	100.29	100.19	99.83	99.69	99.33	99.04	98.80	98.54	98.21
10	419.8	100.21	100.17	99.93	99.74	99.52	99.31	99.07	98.86	98.57
11	419.0	100.24	100.07	99.93	99.83	99.45	99.31	99.09	98.93	98.54
12	419.5	100.21	99.95	99.69	99.40	99.17	98.93	98.71	98.38	98.07
13	424.7	100.21	99.86	99.67	99.27	99.03	98.80	98.63	98.26	98.09
14	414.7	100.27	99.98	99.71	99.35	99.08	98.82	98.72	98.53	98.36
15	414.3	100.22	99.93	99.69	99.35	99.13	98.87	98.50	98.41	98.14
16	418.6	100.19	99.88	99.55	99.31	99.00	98.78	98.59	98.40	98.11
17	411.2	100.22	100.02	99.71	99.42	99.22	98.98	98.86	98.69	98.44
18	416.4	100.26	99.90	99.62	99.28	99.14	98.90	98.73	98.51	98.20
19	427.7	100.16	99.81	99.67	99.25	99.09	98.83	98.69	98.41	98.20
20	419.0	100.24	99.95	99.69	99.36	99.07	98.81	98.57	98.26	98.11
21	418.9	100.17	99.98	99.69	99.26	98.88	98.62	98.16	97.95	97.64
22	422.6	100.19	100.09	99.98	99.69	99.41	98.94	98.63	98.27	97.94
23	412.9	100.29	99.93	99.64	99.42	99.32	98.93	98.60	98.43	98.14
24	414.6	100.17	99.81	99.47	99.23	98.96	98.79	98.48	98.12	97.90
25	409.6	100.32	100.02	99.68	99.29	99.00	98.80	98.51	98.14	97.92
26	422.1	100.19	100.14	99.79	99.72	99.43	99.12	98.82	98.48	98.13
27	424.8	100.16	99.88	99.67	99.44	99.29	99.11	98.87	98.61	98.31
28	415.0	100.27	99.90	99.64	99.49	99.28	99.01	98.96	98.77	98.41
29	414.4	100.05	99.69	99.57	99.16	99.01	98.82	98.65	98.46	98.31
30	419.3	100.31	100.02	99.90	99.67	99.36	99.09	98.86	98.59	98.26
Ave.	417.3	100.21	99.97	99.72	99.45	99.20	98.94	98.71	98.45	98.17
Med.	417.9	100.22	99.96	99.69	99.42	99.22	98.93	98.72	98.44	98.17
st dev	5.4	0.07	0.12	0.13	0.19	0.18	0.18	0.23	0.25	0.24
Min.	401.2	100.05	99.69	99.47	99.15	98.76	98.57	98.16	97.95	97.64
Max.	427.7	100.36	100.19	99.98	99.83	99.52	99.31	99.14	98.93	98.57

No.	Lumen Maintenance (%)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	98.26	98.01	97.68	97.31	96.98	96.68	96.44	96.26
2	97.38	96.96	96.67	96.38	96.16	95.75	95.38	95.24
3	97.59	97.27	96.72	96.31	95.99	95.61	95.42	95.32
4	97.58	97.22	96.84	96.58	96.36	95.88	95.45	95.04
5	97.66	97.38	97.02	96.42	96.14	95.80	95.57	95.54
6	98.03	97.77	97.35	97.11	96.81	96.53	96.08	95.87
7	98.11	97.84	97.46	97.29	96.96	96.69	96.24	95.78
8	98.24	98.02	97.64	97.32	97.08	96.87	96.38	95.88
9	97.89	97.49	97.18	97.13	96.94	96.77	96.39	96.10
10	98.40	98.07	97.81	97.28	96.90	96.67	96.31	96.00
11	98.21	98.02	97.80	97.52	97.18	97.02	96.63	96.13
12	97.78	97.52	97.26	97.09	96.88	96.66	96.45	96.26
13	97.93	97.72	97.36	96.92	96.49	96.37	96.11	95.95
14	98.07	97.93	97.56	97.32	96.99	96.70	96.36	96.33
15	97.78	97.32	96.96	96.77	96.36	96.23	96.21	95.90
16	97.92	97.71	97.20	96.75	96.37	95.89	95.77	95.51
17	98.22	97.86	97.52	97.06	96.74	96.30	96.18	96.06
18	97.84	97.57	97.33	96.83	96.47	95.97	95.80	95.53
19	97.87	97.59	97.31	96.80	96.59	96.47	96.07	95.74
20	97.76	97.45	97.21	96.75	96.42	96.25	95.89	95.66
21	97.45	97.14	96.83	96.68	96.28	95.97	95.80	95.63
22	97.59	97.47	97.04	96.66	96.47	96.24	95.98	95.88
23	97.84	97.65	97.36	96.88	96.51	96.20	95.93	95.88
24	97.64	97.32	96.86	96.67	96.43	96.31	96.24	95.92
25	97.68	97.51	97.07	96.68	96.26	96.17	96.07	95.85
26	97.87	97.51	97.11	96.56	96.26	96.14	95.76	95.45
27	97.95	97.67	97.22	96.98	96.66	96.63	96.61	96.09
28	98.07	97.83	97.40	97.18	96.82	96.65	96.43	96.05
29	97.97	97.73	97.37	96.69	96.33	96.09	95.83	95.58
30	97.88	97.62	97.14	96.99	96.80	96.71	96.47	95.99
Ave.	97.88	97.61	97.24	96.90	96.59	96.34	96.07	95.81
Med.	97.87	97.60	97.24	96.85	96.50	96.31	96.10	95.88
st dev	0.25	0.28	0.30	0.31	0.32	0.37	0.35	0.31
Min.	97.38	96.96	96.67	96.31	95.99	95.61	95.38	95.04
Max.	98.40	98.07	97.81	97.52	97.18	97.02	96.63	96.33

3.2 Data Set 1, 85°C, 100mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	23.28	23.35	23.30	23.32	23.31	23.31	23.28	23.33	23.32	23.30
2	23.29	23.35	23.29	23.30	23.31	23.31	23.29	23.33	23.32	23.30
3	23.14	23.18	23.14	23.14	23.15	23.14	23.13	23.16	23.15	23.14
4	23.07	23.12	23.07	23.07	23.08	23.08	23.07	23.09	23.08	23.07
5	23.34	23.39	23.33	23.34	23.33	23.33	23.32	23.35	23.34	23.33
6	23.35	23.40	23.34	23.35	23.35	23.35	23.33	23.36	23.35	23.34
7	23.00	23.06	23.00	23.00	23.00	23.00	22.99	23.02	23.01	22.99
8	23.04	23.09	23.04	23.06	23.04	23.04	23.03	23.05	23.05	23.04
9	23.20	23.25	23.21	23.20	23.21	23.21	23.20	23.21	23.21	23.20
10	23.12	23.16	23.12	23.15	23.13	23.13	23.11	23.13	23.13	23.11
11	23.21	23.25	23.21	23.22	23.22	23.22	23.20	23.22	23.22	23.20
12	23.16	23.20	23.15	23.20	23.16	23.16	23.15	23.16	23.16	23.15
13	23.15	23.20	23.15	23.15	23.15	23.16	23.14	23.16	23.16	23.14
14	23.22	23.27	23.22	23.22	23.23	23.22	23.21	23.23	23.23	23.21
15	23.05	23.09	23.04	23.04	23.05	23.05	23.03	23.05	23.05	23.04
16	23.45	23.52	23.45	23.45	23.46	23.45	23.44	23.46	23.46	23.44
17	23.19	23.23	23.19	23.19	23.19	23.19	23.18	23.20	23.20	23.18
18	23.14	23.19	23.15	23.14	23.15	23.15	23.14	23.16	23.15	23.14
19	23.44	23.49	23.44	23.44	23.44	23.45	23.43	23.46	23.45	23.45
20	23.16	23.20	23.16	23.17	23.16	23.17	23.16	23.17	23.17	23.17
21	23.16	23.20	23.15	23.16	23.16	23.16	23.15	23.17	23.17	23.16
22	23.53	23.58	23.54	23.54	23.53	23.54	23.52	23.54	23.54	23.53
23	23.05	23.11	23.04	23.08	23.05	23.06	23.04	23.06	23.07	23.05
24	23.19	23.23	23.19	23.20	23.19	23.19	23.19	23.20	23.20	23.19
25	23.18	23.21	23.17	23.18	23.17	23.17	23.16	23.18	23.18	23.17
26	23.35	23.40	23.34	23.36	23.35	23.35	23.34	23.35	23.36	23.35
27	23.36	23.41	23.35	23.37	23.35	23.35	23.34	23.36	23.36	23.35
28	23.15	23.19	23.14	23.16	23.15	23.15	23.13	23.15	23.16	23.14
29	23.19	23.23	23.19	23.20	23.19	23.19	23.18	23.20	23.20	23.19
30	23.18	23.23	23.17	23.20	23.18	23.18	23.19	23.19	23.19	23.18
Ave.	23.21	23.26	23.21	23.22	23.21	23.22	23.20	23.22	23.22	23.21
Med.	23.19	23.23	23.18	23.20	23.19	23.19	23.18	23.20	23.20	23.18
st dev	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Min.	23.00	23.06	23.00	23.00	23.00	23.00	22.99	23.02	23.01	22.99
Max.	23.53	23.58	23.54	23.54	23.53	23.54	23.52	23.54	23.54	23.53

No.	Forward Voltage (V)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	23.31	23.32	23.31	23.36	23.36	23.35	23.52	23.39
2	23.30	23.33	23.32	23.34	23.35	23.35	23.40	23.51
3	23.14	23.15	23.15	23.17	23.19	23.18	23.23	23.30
4	23.08	23.08	23.08	23.10	23.12	23.10	23.21	23.19
5	23.33	23.34	23.33	23.35	23.38	23.36	23.46	23.45
6	23.34	23.37	23.34	23.35	23.40	23.37	23.53	23.56
7	23.00	23.15	23.00	23.01	23.12	23.05	23.12	23.11
8	23.03	23.04	23.04	23.05	23.22	23.09	23.21	23.16
9	23.20	23.21	23.20	23.21	23.27	23.25	23.29	23.27
10	23.12	23.13	23.12	23.13	23.21	23.16	23.23	23.23
11	23.21	23.22	23.21	23.22	23.26	23.25	23.52	23.33
12	23.16	23.16	23.15	23.17	23.22	23.19	23.44	23.34
13	23.15	23.16	23.15	23.16	23.20	23.18	23.27	23.27
14	23.22	23.23	23.22	23.23	23.29	23.25	23.37	23.32
15	23.04	23.05	23.04	23.05	23.11	23.06	23.14	23.13
16	23.45	23.52	23.45	23.47	23.53	23.49	23.53	23.59
17	23.19	23.23	23.20	23.20	23.26	23.22	23.38	23.33
18	23.14	23.15	23.15	23.16	23.21	23.18	23.50	23.24
19	23.44	23.45	23.44	23.46	23.50	23.48	23.55	23.58
20	23.16	23.17	23.17	23.18	23.23	23.20	23.31	23.27
21	23.16	23.17	23.16	23.18	23.22	23.19	23.26	23.45
22	23.54	23.54	23.53	23.55	23.59	23.57	23.71	23.76
23	23.05	23.06	23.06	23.06	23.11	23.09	23.12	23.14
24	23.19	23.20	23.19	23.20	23.25	23.23	23.44	23.27
25	23.18	23.18	23.17	23.18	23.23	23.21	23.27	23.29
26	23.35	23.35	23.34	23.36	23.41	23.39	23.45	23.51
27	23.36	23.36	23.35	23.36	23.41	23.40	23.47	23.54
28	23.16	23.16	23.15	23.15	23.21	23.19	23.29	23.23
29	23.19	23.20	23.19	23.20	23.25	23.23	23.28	23.30
30	23.18	23.20	23.18	23.19	23.24	23.23	23.28	23.47
Ave.	23.21	23.23	23.21	23.23	23.28	23.25	23.36	23.35
Med.	23.19	23.20	23.19	23.20	23.25	23.23	23.34	23.31
st dev	0.13	0.13	0.13	0.13	0.12	0.13	0.15	0.16
Min.	23.00	23.04	23.00	23.01	23.11	23.05	23.12	23.11
Max.	23.54	23.54	23.53	23.55	23.59	23.57	23.71	23.76

3.3 Data Set 1, 85°C, 100mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
1	0.2583	0.5285	2785	0.0001	0.0004	0.0007	0.0011	0.0014	0.0017	0.0021
2	0.2582	0.5295	2781	0.0001	0.0005	0.0007	0.0009	0.0014	0.0016	0.0021
3	0.2589	0.5253	2785	0.0001	0.0005	0.0009	0.0009	0.0015	0.0018	0.0022
4	0.2589	0.5246	2789	0.0002	0.0005	0.0007	0.0009	0.0014	0.0017	0.0022
5	0.2594	0.5251	2775	0.0002	0.0005	0.0008	0.0010	0.0014	0.0017	0.0022
6	0.2588	0.5254	2787	0.0002	0.0005	0.0008	0.0010	0.0015	0.0017	0.0023
7	0.2593	0.5254	2776	0.0001	0.0005	0.0009	0.0010	0.0015	0.0018	0.0023
8	0.2599	0.5256	2762	0.0001	0.0006	0.0008	0.0010	0.0015	0.0018	0.0023
9	0.2597	0.5263	2764	0.0001	0.0005	0.0009	0.0010	0.0015	0.0019	0.0023
10	0.2590	0.5252	2784	0.0001	0.0005	0.0009	0.0009	0.0012	0.0019	0.0023
11	0.2594	0.5266	2770	0.0001	0.0006	0.0009	0.0010	0.0014	0.0019	0.0023
12	0.2596	0.5252	2770	0.0001	0.0005	0.0008	0.0009	0.0013	0.0017	0.0021
13	0.2588	0.5250	2788	0.0001	0.0005	0.0008	0.0010	0.0013	0.0018	0.0021
14	0.2598	0.5262	2763	0.0002	0.0005	0.0009	0.0010	0.0014	0.0018	0.0022
15	0.2592	0.5260	2776	0.0001	0.0006	0.0009	0.0011	0.0015	0.0019	0.0024
16	0.2593	0.5255	2775	0.0002	0.0004	0.0007	0.0009	0.0012	0.0016	0.0021
17	0.2588	0.5255	2787	0.0001	0.0006	0.0009	0.0011	0.0015	0.0019	0.0021
18	0.2591	0.5241	2787	0.0002	0.0004	0.0008	0.0009	0.0012	0.0017	0.0020
19	0.2586	0.5254	2792	0.0001	0.0005	0.0009	0.0010	0.0013	0.0018	0.0020
20	0.2591	0.5257	2778	0.0002	0.0006	0.0008	0.0010	0.0013	0.0018	0.0020
21	0.2601	0.5247	2761	0.0001	0.0005	0.0008	0.0010	0.0013	0.0018	0.0022
22	0.2595	0.5265	2767	0.0001	0.0006	0.0009	0.0011	0.0015	0.0018	0.0024
23	0.2583	0.5248	2801	0.0002	0.0005	0.0007	0.0010	0.0012	0.0017	0.0020
24	0.2598	0.5254	2766	0.0001	0.0005	0.0007	0.0010	0.0014	0.0018	0.0021
25	0.2595	0.5262	2767	0.0000	0.0006	0.0009	0.0011	0.0013	0.0018	0.0021
26	0.2598	0.5255	2765	0.0002	0.0005	0.0007	0.0010	0.0014	0.0018	0.0022
27	0.2588	0.5265	2782	0.0001	0.0006	0.0008	0.0011	0.0013	0.0018	0.0020
28	0.2595	0.5259	2770	0.0001	0.0005	0.0007	0.0011	0.0014	0.0019	0.0021
29	0.2588	0.5258	2785	0.0001	0.0005	0.0009	0.0010	0.0013	0.0018	0.0021
30	0.2584	0.5249	2797	0.0001	0.0006	0.0008	0.0010	0.0014	0.0018	0.0022
Ave.	0.2592	0.5257	2778	0.0001	0.0005	0.0008	0.0010	0.0014	0.0018	0.0022
Med.	0.2592	0.5255	2777	0.0001	0.0005	0.0008	0.0010	0.0014	0.0018	0.0022
st dev	0.0005	0.0011	11	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2582	0.5241	2761	0.0000	0.0004	0.0007	0.0009	0.0012	0.0016	0.0020
Max.	0.2601	0.5295	2801	0.0002	0.0006	0.0009	0.0011	0.0015	0.0019	0.0024

No.	Chromaticity Shift (Δu'v')									
	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	0.0022	0.0026	0.0029	0.0030	0.0034	0.0034	0.0035	0.0037	0.0040	0.0041
2	0.0022	0.0026	0.0028	0.0030	0.0032	0.0035	0.0036	0.0038	0.0040	0.0041
3	0.0026	0.0029	0.0030	0.0033	0.0035	0.0037	0.0038	0.0040	0.0043	0.0046
4	0.0025	0.0027	0.0029	0.0033	0.0034	0.0037	0.0038	0.0041	0.0043	0.0045
5	0.0025	0.0027	0.0029	0.0032	0.0034	0.0035	0.0036	0.0037	0.0042	0.0043
6	0.0025	0.0029	0.0030	0.0033	0.0035	0.0037	0.0038	0.0038	0.0041	0.0044
7	0.0027	0.0030	0.0032	0.0034	0.0036	0.0036	0.0038	0.0039	0.0042	0.0044
8	0.0024	0.0029	0.0032	0.0034	0.0036	0.0036	0.0038	0.0039	0.0041	0.0044
9	0.0025	0.0029	0.0032	0.0034	0.0036	0.0036	0.0038	0.0040	0.0041	0.0044
10	0.0025	0.0029	0.0031	0.0033	0.0036	0.0036	0.0038	0.0040	0.0042	0.0044
11	0.0025	0.0029	0.0031	0.0034	0.0036	0.0038	0.0037	0.0039	0.0042	0.0044
12	0.0025	0.0029	0.0031	0.0033	0.0035	0.0036	0.0038	0.0040	0.0043	0.0045
13	0.0026	0.0030	0.0032	0.0034	0.0036	0.0037	0.0038	0.0041	0.0042	0.0044
14	0.0026	0.0030	0.0032	0.0034	0.0035	0.0037	0.0038	0.0038	0.0040	0.0042
15	0.0027	0.0030	0.0032	0.0034	0.0037	0.0037	0.0039	0.0040	0.0043	0.0044
16	0.0024	0.0028	0.0030	0.0033	0.0035	0.0035	0.0037	0.0039	0.0041	0.0043
17	0.0025	0.0029	0.0031	0.0034	0.0036	0.0037	0.0037	0.0040	0.0042	0.0044
18	0.0024	0.0027	0.0030	0.0032	0.0034	0.0035	0.0036	0.0036	0.0040	0.0042
19	0.0024	0.0026	0.0030	0.0032	0.0034	0.0036	0.0037	0.0037	0.0041	0.0043
20	0.0025	0.0026	0.0030	0.0033	0.0034	0.0035	0.0037	0.0038	0.0041	0.0043
21	0.0026	0.0028	0.0031	0.0033	0.0036	0.0036	0.0038	0.0038	0.0041	0.0043
22	0.0027	0.0029	0.0031	0.0034	0.0037	0.0038	0.0039	0.0040	0.0042	0.0044
23	0.0023	0.0026	0.0029	0.0031	0.0034	0.0035	0.0037	0.0038	0.0042	0.0043
24	0.0025	0.0027	0.0030	0.0033	0.0035	0.0036	0.0037	0.0038	0.0041	0.0043
25	0.0025	0.0027	0.0030	0.0034	0.0036	0.0036	0.0037	0.0039	0.0041	0.0044
26	0.0025	0.0027	0.0030	0.0033	0.0036	0.0036	0.0037	0.0038	0.0041	0.0043
27	0.0024	0.0026	0.0030	0.0032	0.0034	0.0035	0.0037	0.0038	0.0039	0.0042
28	0.0025	0.0027	0.0030	0.0033	0.0035	0.0036	0.0037	0.0038	0.0040	0.0043
29	0.0025	0.0027	0.0031	0.0033	0.0034	0.0036	0.0037	0.0039	0.0040	0.0043
30	0.0025	0.0027	0.0031	0.0033	0.0035	0.0036	0.0037	0.0038	0.0040	0.0043
Ave.	0.0025	0.0028	0.0030	0.0033	0.0035	0.0036	0.0037	0.0039	0.0041	0.0043
Med.	0.0025	0.0028	0.0030	0.0033	0.0035	0.0036	0.0037	0.0039	0.0041	0.0043
st dev	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.0022	0.0026	0.0028	0.0030	0.0032	0.0034	0.0035	0.0036	0.0039	0.0041
Max.	0.0027	0.0030	0.0032	0.0034	0.0037	0.0038	0.0039	0.0041	0.0043	0.0046

3.4 Data Set 2, 105°C, 100mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	415.6	99.81	99.59	99.42	99.01	98.82	98.60	98.36	98.15	97.81
32	414.7	99.93	99.57	99.25	98.89	98.67	98.38	98.05	97.69	97.25
33	417.9	99.93	99.55	99.26	99.09	98.68	98.28	98.18	97.87	97.63
34	419.5	100.02	99.74	99.28	98.93	98.81	98.52	98.16	98.00	97.88
35	414.6	99.76	99.59	99.16	98.91	98.58	98.26	97.95	97.66	97.23
36	421.6	99.91	99.60	99.34	99.07	98.74	98.34	98.03	97.56	97.15
37	415.1	99.90	99.54	99.25	98.92	98.68	98.43	98.05	97.76	97.30
38	421.8	99.98	99.57	99.24	98.79	98.65	98.27	97.96	97.56	97.18
39	414.7	99.83	99.57	99.35	98.99	98.77	98.43	98.07	97.88	97.42
40	420.3	99.88	99.62	99.31	99.05	98.72	98.48	98.19	97.86	97.48
41	416.2	99.88	99.71	99.45	99.04	98.82	98.70	98.51	98.15	97.77
42	425.0	99.91	99.62	99.36	99.08	98.85	98.56	98.31	97.93	97.55
43	418.3	99.81	99.64	99.28	99.04	98.76	98.49	98.23	97.87	97.61
44	412.5	99.73	99.61	99.27	98.81	98.57	98.30	97.99	97.77	97.50
45	419.3	99.83	99.50	99.19	98.83	98.47	98.09	97.85	97.47	97.07
46	403.7	99.90	99.73	99.50	99.11	98.71	98.41	98.37	97.94	97.65
47	415.7	99.78	99.52	99.33	98.92	98.48	98.24	98.08	97.76	97.33
48	419.7	99.88	99.57	99.38	99.07	98.69	98.38	98.14	98.00	97.55
49	416.9	99.88	99.59	99.14	98.66	98.32	98.06	97.82	97.55	97.24
50	426.4	99.81	99.46	99.11	98.80	98.36	98.01	97.61	97.40	97.12
51	419.4	99.79	99.50	99.17	98.83	98.47	98.12	97.90	97.78	97.33
52	414.7	99.73	99.54	99.23	98.84	98.58	98.34	98.05	97.69	97.35
53	422.6	99.86	99.48	99.24	98.84	98.56	98.39	98.04	97.66	97.40
54	414.5	99.76	99.47	99.23	98.91	98.77	98.60	98.41	98.05	97.78
55	418.0	99.76	99.52	99.35	98.97	98.83	98.64	98.49	98.23	97.94
56	426.7	99.88	99.46	99.11	98.92	98.59	98.34	98.15	97.80	97.42
57	420.2	99.83	99.45	99.14	98.67	98.43	98.12	97.93	97.50	97.19
58	420.6	99.88	99.55	99.36	99.22	98.88	98.55	98.45	98.24	97.98
59	417.6	99.88	99.71	99.50	99.28	98.97	98.80	98.49	98.18	97.87
60	419.6	100.05	99.83	99.62	99.43	99.17	98.88	98.43	98.00	97.66
Ave.	418.1	99.86	99.58	99.29	98.96	98.68	98.40	98.14	97.83	97.49
Med.	418.2	99.88	99.57	99.28	98.92	98.69	98.39	98.11	97.83	97.45
st dev	4.5	0.08	0.09	0.12	0.17	0.18	0.21	0.23	0.23	0.26
Min.	403.7	99.73	99.45	99.11	98.66	98.32	98.01	97.61	97.40	97.07
Max.	426.7	100.05	99.83	99.62	99.43	99.17	98.88	98.51	98.24	97.98

No.	Lumen Maintenance (%)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	97.45	97.28	96.94	96.68	96.39	95.96	95.64	95.24
32	96.87	96.50	96.17	96.07	95.83	95.80	95.37	95.06
33	97.20	96.84	96.31	96.15	95.76	95.57	95.24	95.21
34	97.50	97.19	96.73	96.04	95.83	95.59	95.26	95.14
35	96.89	96.70	96.41	96.24	95.83	95.56	94.96	94.55
36	96.82	96.61	96.30	96.06	95.66	95.21	94.76	94.26
37	96.94	96.63	96.17	96.12	95.83	95.59	95.33	94.97
38	96.75	96.37	96.14	95.95	95.54	95.14	94.76	94.36
39	96.94	96.58	96.21	95.73	95.44	95.18	95.13	94.82
40	97.22	96.91	96.26	95.74	95.34	95.07	94.60	94.41
41	97.41	97.09	96.61	95.89	95.65	95.41	95.10	94.91
42	97.22	96.82	96.45	96.02	95.62	95.36	95.11	94.94
43	97.32	96.87	96.37	95.72	95.36	95.12	94.74	94.67
44	97.24	97.02	96.51	95.98	95.66	95.13	94.86	94.76
45	96.64	96.30	95.90	95.52	95.25	95.16	94.90	94.71
46	97.18	96.88	96.36	95.94	95.54	95.32	95.10	94.80
47	96.99	96.75	96.18	95.69	95.38	95.19	95.00	94.76
48	97.28	97.02	96.55	96.07	95.64	95.33	95.23	95.02
49	96.88	96.55	96.16	96.04	95.68	95.15	94.84	94.67
50	96.76	96.55	95.97	95.61	95.33	95.08	94.84	94.54
51	96.95	96.54	96.04	95.76	95.35	94.92	94.80	94.25
52	97.03	96.72	96.21	95.83	95.35	95.25	95.03	94.62
53	96.99	96.76	96.26	95.65	95.22	95.08	94.89	94.53
54	97.49	97.13	96.65	96.19	95.75	95.51	95.25	94.74
55	97.46	97.13	96.91	96.39	96.20	95.96	95.84	95.57
56	97.16	96.86	96.44	96.18	95.92	95.76	95.62	95.48
57	96.93	96.62	96.12	95.84	95.64	95.41	95.03	94.86
58	97.62	97.29	96.81	96.39	96.10	95.89	95.22	95.10
59	97.61	97.25	96.82	96.79	96.41	96.07	95.47	95.28
60	97.33	96.97	96.71	96.38	96.04	95.61	95.40	94.92
Ave.	97.14	96.82	96.39	96.02	95.69	95.41	95.11	94.84
Med.	97.17	96.83	96.34	96.03	95.66	95.35	95.10	94.81
st dev	0.27	0.27	0.28	0.30	0.32	0.31	0.30	0.33
Min.	96.64	96.30	95.90	95.52	95.22	94.92	94.60	94.25
Max.	97.62	97.29	96.94	96.79	96.41	96.07	95.84	95.57

3.5 Data Set 2, 105°C, 100mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	23.13	23.18	23.14	23.15	23.15	23.15	23.15	23.15	23.15	23.14
32	23.21	23.26	23.21	23.23	23.22	23.22	23.22	23.23	23.23	23.22
33	23.13	23.20	23.12	23.14	23.12	23.13	23.13	23.15	23.14	23.12
34	23.41	23.47	23.41	23.42	23.41	23.42	23.41	23.42	23.42	23.41
35	23.22	23.26	23.21	23.22	23.22	23.22	23.21	23.23	23.22	23.21
36	23.18	23.23	23.17	23.19	23.18	23.18	23.17	23.19	23.19	23.17
37	23.06	23.11	23.05	23.06	23.06	23.05	23.06	23.06	23.07	23.05
38	23.45	23.53	23.45	23.46	23.46	23.46	23.46	23.46	23.48	23.45
39	23.12	23.17	23.12	23.13	23.12	23.12	23.13	23.13	23.13	23.12
40	23.13	23.18	23.13	23.14	23.13	23.13	23.13	23.14	23.14	23.13
41	23.13	23.19	23.13	23.16	23.13	23.13	23.14	23.14	23.14	23.13
42	23.36	23.41	23.36	23.37	23.36	23.36	23.36	23.36	23.37	23.36
43	23.37	23.43	23.37	23.37	23.36	23.38	23.36	23.38	23.38	23.37
44	23.20	23.25	23.20	23.20	23.20	23.20	23.20	23.20	23.22	23.20
45	23.15	23.20	23.15	23.16	23.15	23.16	23.15	23.16	23.17	23.15
46	23.28	23.33	23.29	23.28	23.28	23.28	23.28	23.30	23.30	23.28
47	23.04	23.09	23.04	23.04	23.03	23.04	23.04	23.05	23.05	23.04
48	23.19	23.24	23.19	23.19	23.19	23.20	23.19	23.20	23.21	23.20
49	23.20	23.25	23.20	23.20	23.20	23.20	23.20	23.21	23.21	23.20
50	23.31	23.37	23.30	23.31	23.30	23.30	23.30	23.32	23.32	23.31
51	23.13	23.18	23.13	23.12	23.12	23.13	23.12	23.13	23.15	23.12
52	23.18	23.24	23.18	23.18	23.18	23.18	23.18	23.19	23.20	23.18
53	23.19	23.24	23.19	23.19	23.19	23.19	23.19	23.20	23.20	23.19
54	23.22	23.26	23.21	23.21	23.21	23.21	23.21	23.22	23.22	23.21
55	23.24	23.29	23.23	23.25	23.24	23.24	23.24	23.25	23.25	23.23
56	23.10	23.14	23.09	23.10	23.10	23.10	23.10	23.11	23.12	23.10
57	23.15	23.19	23.14	23.14	23.14	23.15	23.15	23.15	23.16	23.14
58	23.26	23.30	23.25	23.25	23.25	23.25	23.25	23.26	23.27	23.25
59	23.20	23.23	23.19	23.20	23.19	23.19	23.18	23.20	23.21	23.19
60	23.28	23.32	23.27	23.28	23.28	23.28	23.28	23.29	23.30	23.28
Ave.	23.21	23.26	23.20	23.21	23.21	23.21	23.21	23.22	23.22	23.21
Med.	23.20	23.24	23.19	23.20	23.19	23.20	23.19	23.20	23.21	23.20
st dev	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Min.	23.04	23.09	23.04	23.04	23.03	23.04	23.04	23.05	23.05	23.04
Max.	23.45	23.53	23.45	23.46	23.46	23.46	23.46	23.46	23.48	23.45

No.	Forward Voltage (V)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	23.14	23.16	23.15	23.15	23.20	23.19	23.24	23.23
32	23.22	23.24	23.22	23.23	23.28	23.26	23.32	23.48
33	23.12	23.14	23.13	23.15	23.19	23.17	23.25	23.23
34	23.41	23.42	23.41	23.42	23.48	23.46	23.51	23.51
35	23.22	23.23	23.23	23.23	23.27	23.26	23.31	23.31
36	23.18	23.19	23.18	23.18	23.23	23.22	23.26	23.33
37	23.05	23.06	23.05	23.05	23.11	23.09	23.35	23.24
38	23.46	23.47	23.46	23.46	23.51	23.51	23.54	23.66
39	23.13	23.14	23.13	23.12	23.18	23.17	23.21	23.21
40	23.13	23.15	23.15	23.14	23.18	23.18	23.24	23.23
41	23.13	23.15	23.13	23.14	23.19	23.18	23.23	23.25
42	23.36	23.37	23.36	23.37	23.41	23.40	23.46	23.46
43	23.37	23.38	23.37	23.39	23.42	23.42	23.51	23.49
44	23.20	23.21	23.20	23.23	23.25	23.24	23.30	23.43
45	23.15	23.17	23.16	23.18	23.21	23.20	23.25	23.27
46	23.28	23.29	23.28	23.30	23.34	23.34	23.36	23.57
47	23.04	23.06	23.04	23.06	23.09	23.10	23.14	23.13
48	23.19	23.20	23.19	23.22	23.25	23.24	23.27	23.29
49	23.20	23.26	23.21	23.23	23.25	23.25	23.31	23.29
50	23.31	23.32	23.31	23.34	23.37	23.35	23.42	23.43
51	23.13	23.13	23.12	23.16	23.20	23.18	23.33	23.23
52	23.18	23.19	23.18	23.21	23.25	23.24	23.25	23.49
53	23.19	23.21	23.19	23.21	23.25	23.23	23.27	23.27
54	23.21	23.22	23.21	23.23	23.29	23.25	23.29	23.31
55	23.23	23.25	23.24	23.26	23.40	23.28	23.32	23.32
56	23.10	23.11	23.10	23.13	23.20	23.16	23.19	23.21
57	23.14	23.17	23.16	23.16	23.23	23.19	23.24	23.23
58	23.25	23.27	23.25	23.27	23.35	23.29	23.37	23.34
59	23.19	23.20	23.19	23.21	23.30	23.23	23.31	23.29
60	23.28	23.29	23.29	23.28	23.35	23.31	23.52	23.35
Ave.	23.21	23.22	23.21	23.22	23.27	23.25	23.32	23.34
Med.	23.19	23.21	23.19	23.22	23.25	23.24	23.31	23.30
st dev	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.13
Min.	23.04	23.06	23.04	23.05	23.09	23.09	23.14	23.13
Max.	23.46	23.47	23.46	23.46	23.51	23.51	23.54	23.66

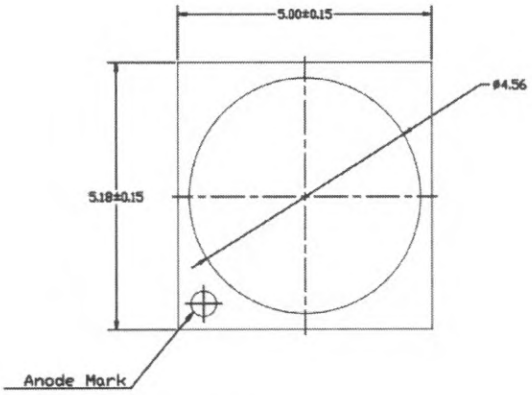
3.6 Data Set 2, 105°C, 100mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
31	0.2594	0.5254	2774	0.0001	0.0007	0.0010	0.0010	0.0015	0.0019	0.0022
32	0.2596	0.5266	2764	0.0001	0.0007	0.0009	0.0009	0.0015	0.0019	0.0022
33	0.2594	0.5264	2770	0.0002	0.0008	0.0010	0.0014	0.0016	0.0018	0.0021
34	0.2595	0.5251	2774	0.0002	0.0007	0.0009	0.0012	0.0015	0.0019	0.0021
35	0.2598	0.5260	2763	0.0002	0.0007	0.0009	0.0012	0.0015	0.0019	0.0021
36	0.2597	0.5259	2766	0.0002	0.0007	0.0011	0.0012	0.0016	0.0018	0.0022
37	0.2586	0.5253	2792	0.0001	0.0007	0.0010	0.0012	0.0016	0.0017	0.0022
38	0.2593	0.5259	2773	0.0002	0.0007	0.0010	0.0013	0.0016	0.0018	0.0021
39	0.2597	0.5255	2767	0.0001	0.0008	0.0010	0.0014	0.0016	0.0019	0.0021
40	0.2591	0.5254	2781	0.0001	0.0008	0.0011	0.0014	0.0017	0.0019	0.0022
41	0.2584	0.5257	2795	0.0003	0.0007	0.0011	0.0012	0.0015	0.0019	0.0021
42	0.2589	0.5270	2777	0.0002	0.0007	0.0009	0.0012	0.0015	0.0017	0.0021
43	0.2590	0.5251	2783	0.0001	0.0007	0.0010	0.0013	0.0016	0.0019	0.0021
44	0.2595	0.5251	2773	0.0001	0.0008	0.0010	0.0013	0.0016	0.0019	0.0021
45	0.2596	0.5257	2769	0.0001	0.0008	0.0011	0.0013	0.0016	0.0019	0.0022
46	0.2583	0.5246	2801	0.0002	0.0007	0.0010	0.0012	0.0015	0.0018	0.0020
47	0.2590	0.5257	2781	0.0001	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021
48	0.2598	0.5262	2762	0.0001	0.0010	0.0013	0.0015	0.0018	0.0021	0.0023
49	0.2590	0.5242	2788	0.0001	0.0007	0.0012	0.0013	0.0016	0.0018	0.0021
50	0.2591	0.5261	2778	0.0003	0.0009	0.0012	0.0014	0.0016	0.0019	0.0021
51	0.2594	0.5248	2777	0.0002	0.0008	0.0010	0.0013	0.0016	0.0018	0.0021
52	0.2592	0.5256	2778	0.0001	0.0008	0.0011	0.0013	0.0017	0.0019	0.0021
53	0.2593	0.5261	2773	0.0001	0.0008	0.0012	0.0013	0.0016	0.0019	0.0020
54	0.2588	0.5253	2788	0.0002	0.0007	0.0011	0.0013	0.0016	0.0018	0.0021
55	0.2588	0.5262	2783	0.0001	0.0008	0.0012	0.0013	0.0017	0.0019	0.0021
56	0.2590	0.5257	2782	0.0001	0.0008	0.0010	0.0013	0.0016	0.0018	0.0020
57	0.2588	0.5257	2785	0.0001	0.0008	0.0012	0.0014	0.0016	0.0019	0.0021
58	0.2595	0.5249	2775	0.0002	0.0007	0.0011	0.0013	0.0016	0.0020	0.0022
59	0.2589	0.5249	2787	0.0001	0.0007	0.0010	0.0013	0.0016	0.0019	0.0021
60	0.2599	0.5259	2761	0.0001	0.0008	0.0011	0.0013	0.0016	0.0019	0.0022
Ave.	0.2592	0.5256	2777	0.0002	0.0008	0.0011	0.0013	0.0016	0.0019	0.0021
Med.	0.2593	0.5257	2777	0.0001	0.0008	0.0011	0.0013	0.0016	0.0019	0.0021
st dev	0.0004	0.0006	10	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2583	0.5242	2761	0.0001	0.0007	0.0009	0.0009	0.0015	0.0017	0.0020
Max.	0.2599	0.5270	2801	0.0003	0.0010	0.0013	0.0015	0.0018	0.0021	0.0023

No.	Chromaticity Shift (Δu'v')									
	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	0.0028	0.0029	0.0033	0.0035	0.0037	0.0037	0.0038	0.0039	0.0041	0.0042
32	0.0028	0.0028	0.0032	0.0035	0.0037	0.0038	0.0039	0.0039	0.0040	0.0043
33	0.0027	0.0029	0.0032	0.0035	0.0038	0.0038	0.0039	0.0039	0.0039	0.0042
34	0.0027	0.0030	0.0032	0.0035	0.0038	0.0038	0.0039	0.0040	0.0040	0.0042
35	0.0027	0.0029	0.0032	0.0035	0.0037	0.0037	0.0038	0.0040	0.0040	0.0043
36	0.0027	0.0031	0.0033	0.0035	0.0038	0.0039	0.0041	0.0043	0.0044	0.0047
37	0.0027	0.0030	0.0033	0.0035	0.0037	0.0038	0.0040	0.0041	0.0042	0.0043
38	0.0026	0.0030	0.0032	0.0035	0.0037	0.0038	0.0040	0.0041	0.0042	0.0044
39	0.0027	0.0030	0.0034	0.0035	0.0038	0.0039	0.0041	0.0042	0.0042	0.0044
40	0.0028	0.0031	0.0034	0.0036	0.0038	0.0040	0.0040	0.0042	0.0043	0.0045
41	0.0027	0.0029	0.0034	0.0035	0.0038	0.0038	0.0039	0.0040	0.0041	0.0042
42	0.0026	0.0029	0.0032	0.0035	0.0036	0.0037	0.0038	0.0038	0.0040	0.0041
43	0.0028	0.0030	0.0033	0.0035	0.0037	0.0038	0.0039	0.0040	0.0042	0.0043
44	0.0026	0.0030	0.0033	0.0035	0.0037	0.0038	0.0040	0.0041	0.0042	0.0043
45	0.0027	0.0031	0.0034	0.0036	0.0038	0.0040	0.0042	0.0042	0.0042	0.0042
46	0.0025	0.0029	0.0033	0.0036	0.0038	0.0037	0.0039	0.0039	0.0040	0.0042
47	0.0027	0.0030	0.0033	0.0036	0.0037	0.0039	0.0041	0.0042	0.0043	0.0043
48	0.0029	0.0032	0.0035	0.0038	0.0039	0.0040	0.0042	0.0044	0.0045	0.0044
49	0.0027	0.0030	0.0032	0.0036	0.0038	0.0038	0.0039	0.0042	0.0044	0.0043
50	0.0026	0.0030	0.0032	0.0035	0.0037	0.0038	0.0040	0.0042	0.0049	0.0051
51	0.0027	0.0030	0.0033	0.0036	0.0038	0.0038	0.0039	0.0040	0.0043	0.0043
52	0.0027	0.0030	0.0034	0.0036	0.0036	0.0038	0.0039	0.0040	0.0045	0.0042
53	0.0026	0.0030	0.0034	0.0036	0.0037	0.0038	0.0037	0.0037	0.0037	0.0040
54	0.0027	0.0030	0.0034	0.0037	0.0039	0.0039	0.0040	0.0043	0.0045	0.0045
55	0.0026	0.0030	0.0035	0.0037	0.0038	0.0038	0.0040	0.0042	0.0045	0.0045
56	0.0027	0.0030	0.0034	0.0036	0.0038	0.0038	0.0039	0.0041	0.0044	0.0044
57	0.0027	0.0031	0.0035	0.0037	0.0039	0.0039	0.0041	0.0044	0.0046	0.0046
58	0.0026	0.0031	0.0035	0.0037	0.0039	0.0040	0.0040	0.0043	0.0044	0.0047
59	0.0027	0.0031	0.0034	0.0036	0.0039	0.0040	0.0042	0.0044	0.0046	0.0048
60	0.0027	0.0030	0.0034	0.0036	0.0038	0.0039	0.0041	0.0044	0.0045	0.0049
Ave.	0.0027	0.0030	0.0033	0.0036	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044
Med.	0.0027	0.0030	0.0033	0.0036	0.0038	0.0038	0.0040	0.0041	0.0042	0.0043
st dev	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0002
Min.	0.0025	0.0028	0.0032	0.0035	0.0036	0.0037	0.0037	0.0037	0.0037	0.0040
Max.	0.0029	0.0032	0.0035	0.0038	0.0039	0.0040	0.0042	0.0044	0.0049	0.0051

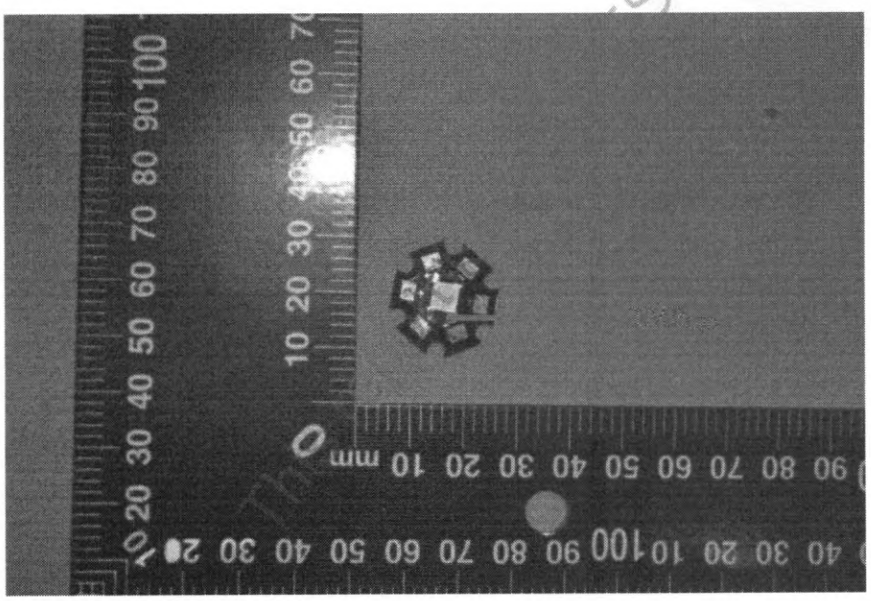
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



5 - Report Revision

Report Number	Report Date	Contents
R2SH161210051-10-17000	2019-12-04	Original report.
R2SH161210051-10-17000-M1	2020-08-17	Update the Family products covered.
R2SH161210051-10-17000-M2	2021-03-12	Remove the DUT characteristics and family products covered

Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.
7. The lab has been accredited by IAS and the detaisl see:
   https://www.iasonline.org/?post_type=ias_certificate&orderby=org&order=ASC&s=&global=1&service=0&keyword=TL-460&number=&org=&city=&state=&country=&zip=&status=

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

TEST REPORT

According to IES LM-80-2015
For

Lumileds Malaysia Sdn Bhd

No.3, Lintang Bayan Lepas 8, Kawasan Perindustrian Bayan Lepas Fasa 4, Mukim 12

Model: LUXEON 5050

Report Type: 17000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	R2SH161210052-10-17000-M4
Test Date:	2016-12-30 to 2019-10-08
Report Date:	2021-03-12
Reviewed By:	Blake Zhang / EE Engineer
Revised Note:	The previous report R2SH161210052-10-17000-M3 is replaced by this report on 2021-03-12
Test Facility:	Test facility was located at No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

Scan QR Code to verify

TABLE OF CONTENTS

1 - General Information

1.1 Description of LED Light Sources

Sample Size:

60 PCS test samples were in good condition and received on 2016-12-10. The samples were numbered from 1 to 30 and 31 to 60.

Manufacturer:	Lumileds Malaysia Sdn Bhd
Model:	LUXEON 5050
Part Number:	L150-2780502400000
Part Type:	LED Package
Drive Level:	DC 200mA
Nominal CCT:	2700K

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.
These manufacturing lots are picked to represent a wide parametric distribution.

1.2 Standards Used:

- IESNA LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs (This standard was not accredited by IAS)

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2019-03-08	2020-03-07
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2019-03-08	2020-03-07
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2019-03-08	2020-03-07
Standard Light Source	EVERFINE	D062	G100278CJ7351206	2018-12-24	2019-12-24
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2019-03-08	2020-03-07
Multilayer aging machine	BACL	B2-270	20022	2019-03-10	2020-03-09
Multilayer aging machine	BACL	B2-270	20013	2019-03-10	2020-03-09
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090008	2019-07-23	2020-07-22

1.4 Drive Level

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

1.5 Ambient Conditions for Maintenance Test

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

During life testing, TMP_{LED} of the coldest LEDs were maintained at a temperature that was greater than or equal to 2°C below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to 5°C below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with ASTM E230 Table 1 "Special Limits".

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

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

For photometry measurement, the ambient temperature during test was set to 25°C ± 2°C, RH <65%.

1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u'v'. 2π measurement was used and sample was drived by DC power supply. The forward current was regulated to within ±0.5% of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to 25°C ± 2°C, RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe.

The uncertainty of the light output measurements is U=1.59% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=21K (K=2), at the 95% confidence level.

The uncertainty of the temperature is U=0.8671°C (K=2), at the 95% confidence level.

1.7 Statement of Traceability

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

1.8 Sample Set

Data Set 1: 85°C, 200mA

Part Number:	L150-2780502400000
Number of Units:	30
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	200mA
Measurement Current:	200mA

Data Set 2: 105°C, 200mA

Part Number:	L150-2780502400000
Number of Units:	30
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	200mA
Measurement Current:	200mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α:	β:	Reported TM-21 L_{70} Lifetime
1	30	0	1000hrs	17000hrs	3.317E-06	1.009	>102000 hrs
2	30	0	1000hrs	17000hrs	3.911E-06	1.008	93,000 hrs

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.11%	99.84%	99.61%	99.34%	99.08%	98.79%	98.55%	98.28%	97.98%
2	99.92%	99.60%	99.29%	98.95%	98.63%	98.31%	98.05%	97.72%	97.37%

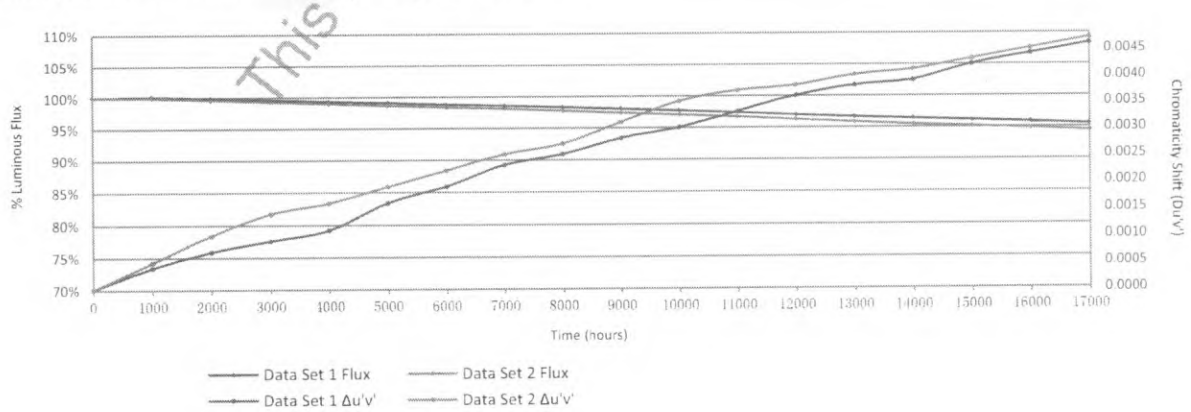
Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	97.66%	97.33%	96.93%	96.60%	96.31%	96.04%	95.74%	95.41%
2	97.00%	96.66%	96.18%	95.77%	95.40%	95.09%	94.76%	94.39%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0004	0.0007	0.0009	0.0011	0.0016	0.0019	0.0023	0.0025	0.0028
2	0.0005	0.0010	0.0014	0.0016	0.0019	0.0022	0.0025	0.0027	0.0031

Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	0.0030	0.0033	0.0036	0.0038	0.0039	0.0042	0.0044	0.0046
2	0.0035	0.0037	0.0038	0.0040	0.0041	0.0043	0.0045	0.0047

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 200mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	711.3	100.30	100.04	99.83	99.65	99.42	99.11	98.76	98.47	98.21
2	747.7	100.09	99.91	99.59	99.34	98.84	98.38	98.19	97.82	97.49
3	733.4	99.86	99.44	99.32	99.07	98.81	98.55	98.21	97.93	97.68
4	700.6	99.94	99.77	99.41	99.03	98.74	98.57	98.32	98.04	97.80
5	733.4	100.16	99.82	99.54	99.18	98.99	98.61	98.25	97.85	97.55
6	716.7	100.29	99.94	99.61	99.50	99.25	99.07	98.87	98.52	98.26
7	729.9	100.08	99.79	99.64	99.59	99.36	99.15	98.82	98.56	98.33
8	743.8	99.97	99.70	99.57	99.33	99.23	98.94	98.76	98.49	98.13
9	715.5	100.15	99.85	99.62	99.25	98.91	98.57	98.45	98.27	97.85
10	732.2	100.12	99.81	99.71	99.33	98.91	98.80	98.58	98.20	97.79
11	730.3	100.10	99.73	99.64	99.27	99.11	98.97	98.81	98.48	98.25
12	743.9	100.01	99.88	99.64	99.45	99.21	98.88	98.63	98.37	98.01
13	728.1	100.18	99.92	99.57	99.46	98.91	98.74	98.24	97.99	97.65
14	716.0	99.96	99.69	99.53	99.36	99.19	98.84	98.70	98.49	98.28
15	729.1	100.19	99.89	99.71	99.47	99.30	98.92	98.68	98.31	98.04
16	728.3	99.97	99.68	99.60	99.40	99.16	98.94	98.54	98.27	97.90
17	691.1	100.10	99.86	99.62	99.23	98.93	98.54	98.42	98.21	97.89
18	740.6	100.20	100.01	99.66	99.50	99.00	98.70	98.65	98.42	98.19
19	723.8	99.96	99.78	99.52	99.17	98.72	98.48	98.26	97.94	97.65
20	745.5	100.07	99.70	99.36	99.05	98.85	98.66	98.40	98.05	97.72
21	722.1	100.15	99.72	99.52	99.17	98.88	98.75	98.60	98.41	98.27
22	705.9	100.07	99.93	99.52	99.38	99.08	98.65	98.44	98.06	97.90
23	713.5	100.20	99.92	99.64	99.15	99.03	98.88	98.61	98.35	98.00
24	701.9	100.23	100.11	99.89	99.52	99.49	99.20	99.17	98.79	98.36
25	729.3	100.04	99.62	99.51	99.31	99.25	98.90	98.86	98.52	98.35
26	729.0	100.29	99.90	99.85	99.59	99.45	99.00	98.67	98.57	98.31
27	723.9	99.90	99.85	99.74	99.54	99.36	98.99	98.89	98.72	98.37
28	734.8	100.15	100.08	99.85	99.51	99.25	98.86	98.46	98.31	98.07
29	719.5	100.25	99.90	99.46	99.17	98.85	98.37	97.97	97.69	97.44
30	706.1	100.27	99.97	99.62	99.31	98.92	98.68	98.39	98.14	97.79
Ave.	724.2	100.11	99.84	99.61	99.34	99.08	98.79	98.55	98.28	97.98
Med.	728.2	100.11	99.85	99.61	99.34	99.06	98.82	98.59	98.31	98.00
st dev	14.2475	0.1215	0.1438	0.1375	0.1712	0.2234	0.2225	0.2631	0.2752	0.2855
Min.	691.1	99.86	99.44	99.32	99.03	98.72	98.37	97.97	97.69	97.44
Max.	747.7	100.30	100.11	99.89	99.65	99.49	99.20	99.17	98.79	98.37

No.	Lumen Maintenance (%)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	97.86	97.60	97.33	96.94	96.50	96.06	96.02	95.63
2	97.07	96.64	96.35	95.99	95.65	95.01	94.65	94.22
3	97.40	96.95	96.30	96.07	95.76	95.53	95.32	94.91
4	97.67	97.27	96.70	96.22	96.00	95.58	95.23	94.70
5	97.26	97.14	96.60	96.10	95.85	95.68	95.20	94.86
6	97.96	97.66	97.20	96.68	96.37	96.00	95.48	95.44
7	98.05	97.88	97.37	96.84	96.59	96.38	95.94	95.52
8	97.80	97.39	96.91	96.50	96.33	95.82	95.70	95.40
9	97.32	96.87	96.45	96.10	95.78	95.67	95.50	95.00
10	97.39	97.10	96.68	96.22	96.07	95.83	95.37	95.02
11	97.90	97.55	97.17	97.04	96.73	96.28	95.97	95.50
12	97.74	97.37	97.14	96.77	96.61	96.34	96.01	95.68
13	97.46	97.25	96.66	96.33	96.11	95.95	95.88	95.52
14	97.99	97.68	97.57	97.37	97.15	97.05	96.87	96.30
15	97.83	97.46	97.31	96.78	96.67	96.49	96.37	96.23
16	97.61	97.13	96.65	96.42	96.11	95.65	95.32	95.18
17	97.53	97.41	97.06	96.90	96.57	96.27	96.06	95.70
18	97.93	97.73	97.25	96.73	96.57	96.22	96.11	95.81
19	97.36	97.11	96.79	96.71	96.44	96.19	96.10	95.79
20	97.36	96.97	96.70	96.51	96.15	96.04	95.94	95.88
21	98.01	97.56	97.04	96.94	96.63	96.41	95.83	95.64
22	97.62	97.27	96.69	96.50	96.08	95.89	95.54	95.48
23	97.52	97.22	96.94	96.71	96.47	96.08	95.50	95.36
24	97.95	97.49	97.01	96.75	96.30	96.21	95.65	94.99
25	97.97	97.55	97.09	96.96	96.53	96.46	96.30	95.87
26	98.04	97.67	97.24	96.71	96.47	96.21	95.95	95.62
27	98.14	97.96	97.83	97.39	96.96	96.71	96.23	95.77
28	97.77	97.29	96.80	96.65	96.41	96.23	96.04	95.66
29	96.93	96.50	96.16	95.62	95.32	94.94	94.59	94.45
30	97.46	97.25	96.81	96.59	96.18	96.13	95.65	95.13
Ave.	97.66	97.33	96.93	96.60	96.31	96.04	95.74	95.41
Med.	97.71	97.33	96.93	96.69	96.39	96.10	95.86	95.51
st dev.	0.3146	0.3390	0.3816	0.3982	0.40	0.45	0.49	0.48
Min.	96.93	96.50	96.16	95.62	95.32	94.94	94.59	94.22
Max.	98.14	97.96	97.83	97.39	97.15	97.05	96.87	96.30

3.2 Data Set 1, 85°C, 200mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	24.97	25.00	24.98	24.98	24.98	24.98	24.97	24.98	24.99	24.97
2	25.40	25.40	25.39	25.39	25.39	25.38	25.37	25.37	25.39	25.36
3	24.67	24.66	24.64	24.65	24.65	24.64	24.65	24.64	24.66	24.63
4	25.00	25.01	24.99	25.00	24.99	24.98	24.98	24.98	25.00	24.98
5	25.18	25.20	25.16	25.19	25.15	25.15	25.14	25.15	25.18	25.14
6	24.89	24.91	24.88	24.90	24.87	24.87	24.87	24.87	24.88	24.86
7	24.98	25.00	24.98	25.00	24.98	24.97	24.97	24.97	24.98	24.96
8	25.66	25.69	25.66	25.68	25.68	25.65	25.65	25.63	25.66	25.64
9	24.94	24.96	24.94	24.95	24.95	24.93	24.92	24.92	24.95	24.92
10	25.05	25.07	25.05	25.06	25.05	25.04	25.03	25.03	25.05	25.03
11	25.33	25.35	25.33	25.34	25.32	25.32	25.31	25.30	25.32	25.31
12	25.31	25.32	25.32	25.31	25.31	25.30	25.29	25.28	25.31	25.28
13	25.14	25.15	25.14	25.14	25.14	25.13	25.13	25.12	25.14	25.11
14	24.99	25.00	24.99	24.99	24.99	24.98	24.97	24.97	25.00	24.95
15	24.93	24.95	24.93	24.94	24.93	24.93	24.92	24.92	24.95	24.91
16	24.99	25.01	24.98	25.00	25.00	24.99	24.99	24.98	25.01	24.98
17	25.15	25.18	25.16	25.17	25.16	25.16	25.15	25.15	25.19	25.16
18	25.18	25.20	25.18	25.17	25.16	25.15	25.15	25.15	25.19	25.16
19	25.17	25.19	25.18	25.18	25.17	25.16	25.16	25.16	25.19	25.18
20	25.38	25.40	25.39	25.39	25.37	25.37	25.37	25.37	25.40	25.37
21	25.00	25.02	25.01	25.01	25.00	24.99	24.98	24.99	25.01	24.99
22	24.93	24.95	24.95	24.94	24.93	24.92	24.92	24.92	24.95	24.94
23	25.25	25.26	25.24	25.24	25.23	25.22	25.24	25.23	25.25	25.23
24	25.13	25.18	25.17	25.16	25.16	25.15	25.16	25.15	25.17	25.14
25	25.10	25.13	25.11	25.11	25.10	25.09	25.11	25.14	25.13	25.09
26	24.70	24.74	24.71	24.78	24.70	24.69	24.71	24.74	24.72	24.70
27	24.84	24.86	24.86	24.87	24.85	24.83	24.85	24.88	24.86	24.84
28	24.91	24.93	24.93	24.93	24.93	24.91	24.92	24.95	24.93	24.91
29	24.53	24.56	24.55	24.53	24.54	24.53	24.53	24.54	24.55	24.52
30	24.92	24.94	24.93	24.93	24.92	24.91	24.92	24.93	24.93	24.90
Ave.	25.05	25.07	25.06	25.06	25.05	25.04	25.04	25.05	25.06	25.04
Med.	25.00	25.02	25.00	25.01	25.00	24.99	24.99	24.99	25.01	24.99
st dev	0.2328	0.2327	0.2320	0.2326	0.2324	0.2319	0.2292	0.2233	0.2305	0.2310
Min.	24.53	24.56	24.55	24.53	24.54	24.53	24.53	24.54	24.55	24.52
Max.	25.66	25.69	25.66	25.68	25.68	25.65	25.65	25.63	25.66	25.64

No.	Forward Voltage (V)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	24.96	25.00	24.99	24.99	25.07	24.99	25.27	25.11
2	25.35	25.42	25.40	24.99	25.46	24.99	25.59	25.76
3	24.63	24.69	24.66	24.81	24.74	24.73	24.81	24.95
4	24.98	25.01	25.00	24.99	25.06	24.99	25.17	25.35
5	25.14	25.18	25.16	24.99	25.23	24.99	25.47	25.52
6	24.87	24.89	24.89	24.98	24.96	24.97	25.12	25.05
7	25.00	24.99	24.97	24.99	25.06	24.99	25.28	25.19
8	25.67	25.68	25.65	24.99	25.74	25.69	25.88	25.96
9	24.95	24.95	24.93	24.94	25.02	24.99	25.15	25.28
10	25.06	25.07	25.04	24.99	25.14	24.99	25.38	25.28
11	25.35	25.36	25.33	24.99	25.42	24.99	25.50	25.65
12	25.29	25.34	25.30	24.99	25.41	24.99	25.53	25.58
13	25.14	25.18	25.14	24.99	25.23	24.99	25.35	25.41
14	24.99	25.01	24.99	24.99	25.07	24.99	25.17	25.19
15	24.94	24.95	24.94	24.94	25.01	24.99	25.09	25.20
16	25.02	25.02	24.99	24.99	25.07	24.99	25.21	25.26
17	25.18	25.24	25.17	24.99	25.25	24.99	25.51	25.43
18	25.19	25.20	25.18	24.99	25.25	24.99	25.33	25.51
19	25.18	25.21	25.18	24.99	25.27	24.99	25.65	25.50
20	25.38	25.43	25.40	24.99	25.47	24.99	25.55	25.54
21	25.00	25.02	24.99	24.99	25.08	24.99	25.21	25.26
22	24.94	24.94	24.93	24.95	25.01	24.99	25.27	25.22
23	25.24	25.26	25.24	24.99	25.31	24.99	25.54	25.52
24	25.17	25.17	25.17	24.99	25.27	24.99	25.54	25.52
25	25.11	25.11	25.11	24.99	25.22	24.99	25.42	25.34
26	24.72	24.72	24.71	24.71	24.80	24.78	25.01	24.86
27	24.86	24.88	24.86	24.87	24.97	24.93	25.02	25.00
28	24.94	24.95	24.93	24.95	25.05	24.99	25.24	25.24
29	24.54	24.55	24.54	24.57	24.63	24.60	24.81	24.84
30	24.92	24.96	24.94	24.95	25.01	24.98	25.08	25.09
Ave.	25.06	25.08	25.06	24.95	25.14	24.98	25.31	25.32
Med.	25.01	25.02	25.00	24.99	25.08	24.99	25.28	25.28
st dev	0.2314	0.2362	0.2310	0.0949	0.23	0.16	0.25	0.26
Min.	24.54	24.55	24.54	24.57	24.63	24.60	24.81	24.84
Max.	25.67	25.68	25.65	24.99	25.74	25.69	25.88	25.96

3.3 Data Set 1, 85°C, 200mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
1	0.2568	0.5232	2843	0.0007	0.0006	0.0008	0.0011	0.0015	0.0018	0.0022
2	0.2577	0.5248	2815	0.0006	0.0007	0.0009	0.0013	0.0017	0.0023	0.0024
3	0.2583	0.5252	2799	0.0007	0.0009	0.0009	0.0014	0.0017	0.0021	0.0024
4	0.2582	0.5243	2805	0.0005	0.0007	0.0009	0.0014	0.0016	0.0021	0.0023
5	0.2577	0.5251	2813	0.0004	0.0009	0.0009	0.0015	0.0018	0.0023	0.0026
6	0.2574	0.5237	2826	0.0005	0.0007	0.0009	0.0013	0.0017	0.0020	0.0023
7	0.2575	0.5242	2822	0.0005	0.0009	0.0009	0.0013	0.0017	0.0022	0.0024
8	0.2571	0.5238	2831	0.0004	0.0007	0.0009	0.0009	0.0016	0.0020	0.0024
9	0.2583	0.5260	2795	0.0004	0.0006	0.0007	0.0009	0.0016	0.0021	0.0022
10	0.2577	0.5249	2813	0.0004	0.0006	0.0009	0.0012	0.0016	0.0022	0.0024
11	0.2572	0.5246	2825	0.0004	0.0007	0.0010	0.0012	0.0016	0.0019	0.0025
12	0.2585	0.5256	2792	0.0004	0.0006	0.0008	0.0010	0.0015	0.0016	0.0022
13	0.2569	0.5251	2831	0.0005	0.0007	0.0009	0.0010	0.0016	0.0017	0.0024
14	0.2575	0.5239	2824	0.0004	0.0007	0.0010	0.0012	0.0016	0.0019	0.0024
15	0.2574	0.5237	2827	0.0004	0.0008	0.0009	0.0011	0.0016	0.0018	0.0023
16	0.2580	0.5256	2803	0.0003	0.0008	0.0009	0.0010	0.0015	0.0017	0.0023
17	0.2571	0.5246	2828	0.0003	0.0007	0.0009	0.0010	0.0016	0.0018	0.0023
18	0.2574	0.5249	2820	0.0003	0.0006	0.0009	0.0011	0.0016	0.0018	0.0023
19	0.2571	0.5255	2823	0.0004	0.0007	0.0009	0.0012	0.0017	0.0018	0.0024
20	0.2572	0.5234	2832	0.0003	0.0008	0.0009	0.0012	0.0016	0.0018	0.0023
21	0.2577	0.5241	2817	0.0004	0.0006	0.0009	0.0012	0.0016	0.0019	0.0023
22	0.2574	0.5234	2827	0.0004	0.0006	0.0009	0.0011	0.0016	0.0018	0.0023
23	0.2576	0.5233	2823	0.0003	0.0006	0.0008	0.0010	0.0016	0.0017	0.0022
24	0.2562	0.5272	2835	0.0002	0.0005	0.0007	0.0009	0.0014	0.0016	0.0022
25	0.2570	0.5241	2833	0.0004	0.0006	0.0009	0.0010	0.0016	0.0017	0.0019
26	0.2578	0.5246	2813	0.0005	0.0008	0.0010	0.0013	0.0017	0.0018	0.0021
27	0.2576	0.5256	2811	0.0004	0.0006	0.0008	0.0010	0.0016	0.0017	0.0019
28	0.2580	0.5242	2810	0.0003	0.0006	0.0008	0.0010	0.0015	0.0017	0.0020
29	0.2573	0.5256	2819	0.0004	0.0007	0.0009	0.0012	0.0016	0.0019	0.0022
30	0.2579	0.5257	2806	0.0004	0.0005	0.0009	0.0011	0.0015	0.0017	0.0020
Ave.	0.2575	0.5247	2819	0.0004	0.0007	0.0009	0.0011	0.0016	0.0019	0.0023
Med.	0.2575	0.5246	2821	0.0004	0.0007	0.0009	0.0011	0.0016	0.0018	0.0023
st dev	0.0005	0.0009	12.3767	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002
Min.	0.2562	0.5232	2792	0.0002	0.0005	0.0007	0.0009	0.0014	0.0016	0.0019
Max.	0.2585	0.5272	2843	0.0007	0.0009	0.0010	0.0015	0.0018	0.0023	0.0026

No.	Chromaticity Shift (Δu'v')									
	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	0.0026	0.0029	0.0038	0.0038	0.0039	0.0038	0.0040	0.0041	0.0041	0.0045
2	0.0027	0.0031	0.0037	0.0039	0.0042	0.0037	0.0039	0.0040	0.0042	0.0047
3	0.0025	0.0029	0.0035	0.0038	0.0041	0.0039	0.0039	0.0041	0.0041	0.0045
4	0.0025	0.0028	0.0034	0.0036	0.0041	0.0038	0.0039	0.0041	0.0041	0.0045
5	0.0027	0.0029	0.0032	0.0037	0.0040	0.0037	0.0039	0.0039	0.0042	0.0046
6	0.0026	0.0029	0.0031	0.0034	0.0038	0.0039	0.0041	0.0042	0.0042	0.0044
7	0.0028	0.0029	0.0030	0.0034	0.0037	0.0039	0.0041	0.0043	0.0045	0.0047
8	0.0025	0.0027	0.0029	0.0031	0.0035	0.0032	0.0033	0.0034	0.0037	0.0044
9	0.0024	0.0027	0.0029	0.0032	0.0035	0.0039	0.0040	0.0042	0.0043	0.0044
10	0.0026	0.0028	0.0030	0.0033	0.0036	0.0039	0.0040	0.0041	0.0044	0.0044
11	0.0026	0.0027	0.0029	0.0031	0.0035	0.0035	0.0037	0.0039	0.0043	0.0045
12	0.0025	0.0027	0.0029	0.0030	0.0034	0.0036	0.0036	0.0040	0.0042	0.0044
13	0.0025	0.0030	0.0031	0.0033	0.0035	0.0039	0.0042	0.0045	0.0046	0.0046
14	0.0025	0.0030	0.0031	0.0033	0.0036	0.0039	0.0041	0.0044	0.0046	0.0047
15	0.0025	0.0029	0.0030	0.0032	0.0035	0.0040	0.0042	0.0045	0.0045	0.0046
16	0.0023	0.0027	0.0027	0.0032	0.0036	0.0039	0.0041	0.0043	0.0045	0.0045
17	0.0025	0.0027	0.0028	0.0031	0.0035	0.0038	0.0039	0.0042	0.0047	0.0047
18	0.0025	0.0027	0.0027	0.0031	0.0034	0.0035	0.0037	0.0041	0.0045	0.0046
19	0.0026	0.0027	0.0031	0.0031	0.0035	0.0036	0.0037	0.0040	0.0046	0.0048
20	0.0025	0.0027	0.0031	0.0031	0.0034	0.0034	0.0035	0.0038	0.0045	0.0048
21	0.0025	0.0028	0.0031	0.0034	0.0036	0.0039	0.0041	0.0042	0.0045	0.0049
22	0.0025	0.0027	0.0030	0.0033	0.0035	0.0039	0.0042	0.0043	0.0045	0.0049
23	0.0024	0.0027	0.0029	0.0032	0.0034	0.0036	0.0038	0.0040	0.0045	0.0046
24	0.0024	0.0026	0.0028	0.0031	0.0032	0.0036	0.0037	0.0039	0.0043	0.0045
25	0.0025	0.0028	0.0030	0.0033	0.0034	0.0039	0.0040	0.0043	0.0045	0.0048
26	0.0026	0.0029	0.0032	0.0035	0.0037	0.0042	0.0043	0.0047	0.0047	0.0050
27	0.0025	0.0027	0.0029	0.0032	0.0033	0.0039	0.0041	0.0044	0.0044	0.0048
28	0.0026	0.0028	0.0028	0.0032	0.0033	0.0040	0.0042	0.0045	0.0045	0.0049
29	0.0024	0.0029	0.0030	0.0033	0.0034	0.0040	0.0043	0.0045	0.0045	0.0048
30	0.0023	0.0028	0.0029	0.0031	0.0032	0.0038	0.0039	0.0043	0.0044	0.0047
Ave.	0.0025	0.0028	0.0030	0.0033	0.0036	0.0038	0.0039	0.0042	0.0044	0.0046
Med.	0.0025	0.0028	0.0030	0.0032	0.0035	0.0039	0.0040	0.0042	0.0045	0.0046
st dev	0.0001	0.0001	0.0003	0.0002	0.0003	0.0002	0.0002	0.0003	0.0002	0.0002
Min.	0.0023	0.0026	0.0027	0.0030	0.0032	0.0032	0.0033	0.0034	0.0037	0.0044
Max.	0.0028	0.0031	0.0038	0.0039	0.0042	0.0042	0.0043	0.0047	0.0047	0.0050

3.4 Data Set 2, 105°C, 200mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	727.4	99.99	99.49	99.15	98.76	98.42	98.03	97.62	97.44	97.24
32	722.4	100.06	99.64	99.38	98.81	98.41	98.24	97.88	97.34	96.93
33	719.1	99.90	99.43	99.10	98.76	98.40	98.00	97.91	97.55	97.26
34	713.9	99.80	99.71	99.59	99.41	98.95	98.66	98.46	98.14	97.77
35	737.3	99.74	99.62	99.36	99.20	98.83	98.40	97.88	97.55	97.08
36	737.0	99.96	99.55	99.19	98.87	98.62	98.45	98.30	98.18	97.79
37	744.6	99.88	99.72	99.49	99.34	99.01	98.67	98.58	98.07	97.80
38	721.6	100.03	99.79	99.60	99.32	98.92	98.70	98.27	97.82	97.60
39	714.0	99.83	99.68	99.26	98.98	98.70	98.22	97.97	97.86	97.49
40	707.6	99.79	99.63	99.35	99.01	98.88	98.52	98.16	97.68	97.57
41	723.6	99.92	99.39	99.07	98.91	98.58	98.26	98.01	97.66	97.28
42	712.6	99.71	99.58	99.26	98.92	98.84	98.36	97.99	97.66	97.18
43	749.9	99.84	99.51	99.16	98.72	98.61	98.35	97.93	97.56	97.33
44	742.0	99.95	99.53	99.35	98.91	98.73	98.19	97.83	97.39	97.01
45	713.8	99.94	99.66	99.38	98.85	98.60	98.40	98.37	98.09	97.65
46	723.8	99.71	99.20	98.76	98.60	98.30	98.04	97.71	97.43	97.24
47	723.7	99.99	99.54	99.14	98.94	98.52	98.08	97.80	97.66	97.18
48	742.1	100.07	99.93	99.58	99.08	98.57	98.15	98.06	97.71	97.33
49	747.1	99.85	99.40	99.14	98.69	98.43	98.22	97.85	97.68	97.42
50	735.0	100.16	99.73	99.56	99.18	98.80	98.59	98.19	97.77	97.35
51	715.4	99.86	99.59	99.37	98.97	98.48	98.13	97.97	97.62	97.22
52	738.9	99.99	99.62	99.20	98.77	98.59	98.48	98.39	98.05	97.81
53	752.3	100.17	99.83	99.48	99.07	98.87	98.59	98.34	98.01	97.53
54	757.6	99.71	99.23	98.93	98.59	98.44	98.02	97.82	97.49	97.19
55	726.9	100.04	99.70	99.20	98.87	98.32	98.07	97.94	97.77	97.36
56	720.2	100.12	99.83	99.63	99.29	98.92	98.51	98.22	97.95	97.53
57	730.4	99.93	99.74	99.32	99.03	98.59	98.11	97.93	97.45	97.21
58	710.8	99.90	99.58	99.31	98.94	98.64	98.51	98.07	97.93	97.44
59	739.4	99.78	99.34	98.80	98.43	98.05	97.88	97.78	97.35	96.96
60	742.1	100.08	99.81	99.54	99.26	98.90	98.45	98.21	97.80	97.35
Ave.	729.8	99.92	99.60	99.29	98.95	98.63	98.31	98.05	97.72	97.37
Med.	727.2	99.92	99.62	99.31	98.93	98.61	98.30	97.98	97.68	97.34
st dev	13.8130	0.1338	0.1768	0.2265	0.2398	0.2299	0.2298	0.2390	0.2462	0.2455
Min.	707.6	99.71	99.20	98.76	98.43	98.05	97.88	97.62	97.34	96.93
Max.	757.6	100.17	99.93	99.63	99.41	99.01	98.70	98.58	98.18	97.81

No.	Lumen Maintenance (%)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	96.89	96.44	96.03	95.82	95.41	94.95	94.75	94.65
32	96.62	96.44	95.75	95.49	95.24	95.03	94.82	94.50
33	97.02	96.76	96.05	95.34	95.16	94.67	94.60	94.48
34	97.44	96.99	96.82	96.34	96.16	95.99	95.45	95.03
35	96.73	96.43	95.84	95.19	94.83	94.21	93.87	93.56
36	97.48	97.10	96.61	96.02	95.45	95.05	94.65	94.30
37	97.45	97.06	96.56	96.48	96.15	95.84	95.45	94.99
38	97.38	96.97	96.47	95.98	95.45	95.01	94.94	94.68
39	97.06	96.82	96.15	95.64	95.35	95.01	94.75	94.36
40	97.20	96.71	96.31	95.99	95.72	95.36	94.94	94.33
41	96.78	96.35	96.01	95.34	94.91	94.35	94.26	93.92
42	96.94	96.91	96.46	96.23	95.72	95.44	95.36	94.72
43	97.04	96.60	96.33	96.07	95.71	95.49	95.19	95.07
44	96.58	96.35	95.59	95.11	94.77	94.39	93.85	93.54
45	97.27	96.96	96.22	95.69	95.25	94.98	94.30	94.02
46	96.86	96.63	96.37	95.91	95.57	95.21	94.57	94.22
47	96.79	96.59	96.19	95.85	95.61	95.36	95.14	94.53
48	97.04	96.77	96.07	95.59	95.16	94.87	94.68	94.27
49	96.95	96.48	95.90	95.72	95.38	95.17	94.63	94.19
50	96.98	96.64	96.37	96.01	95.54	95.51	95.16	94.61
51	96.76	96.27	95.72	95.39	95.14	95.12	95.00	94.37
52	97.50	97.04	96.52	96.03	95.67	95.29	95.21	94.82
53	97.22	96.85	96.34	96.25	95.80	95.40	94.82	94.34
54	96.77	96.44	96.12	95.55	95.09	94.42	94.14	94.02
55	96.88	96.59	96.12	95.43	95.13	94.72	94.47	94.04
56	97.11	96.79	96.36	95.99	95.57	95.13	94.52	94.20
57	96.78	96.28	95.63	95.24	94.74	94.48	94.28	94.06
58	97.09	96.60	96.23	95.67	95.30	95.19	94.88	94.58
59	96.58	96.19	95.79	95.78	95.55	95.47	95.12	94.62
60	96.93	96.69	96.38	95.86	95.62	95.47	94.99	94.54
Ave.	97.00	96.66	96.18	95.77	95.40	95.09	94.76	94.39
Med.	96.96	96.63	96.20	95.80	95.43	95.12	94.78	94.36
st dev	0.2677	0.2571	0.3053	0.3534	0.36	0.43	0.42	0.38
Min.	96.58	96.19	95.59	95.11	94.74	94.21	93.85	93.54
Max.	97.50	97.10	96.82	96.48	96.16	95.99	95.45	95.07

3.5 Data Set 2, 105°C, 200mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	25.07	25.09	25.08	25.09	25.07	25.08	25.07	25.08	25.09	25.07
32	25.04	25.05	25.05	25.06	25.03	25.04	25.04	25.03	25.05	25.02
33	24.89	24.91	24.88	24.92	24.88	24.89	24.88	24.88	24.89	24.88
34	24.86	24.87	24.86	24.88	24.87	24.86	24.86	24.87	24.87	24.86
35	25.27	25.27	25.26	25.29	25.28	25.26	25.26	25.26	25.27	25.26
36	25.21	25.22	25.20	25.21	25.21	25.20	25.22	25.20	25.22	25.19
37	24.98	24.99	24.97	24.99	24.99	24.97	24.99	24.98	24.99	24.96
38	25.13	25.15	25.13	25.14	25.13	25.12	25.14	25.13	25.12	25.12
39	25.21	25.23	25.22	25.22	25.22	25.21	25.22	25.22	25.22	25.21
40	24.83	24.85	24.84	24.84	24.86	24.83	24.84	24.84	24.85	24.84
41	25.15	25.17	25.14	25.16	25.18	25.15	25.16	25.16	25.15	25.15
42	24.95	24.97	24.95	24.96	24.98	24.94	24.95	24.96	24.95	24.95
43	24.91	24.94	24.89	24.91	24.89	24.88	24.90	24.89	24.89	24.89
44	24.90	24.93	24.90	24.92	24.91	24.90	24.90	24.90	24.90	24.89
45	24.87	24.89	24.87	24.89	24.87	24.86	24.88	24.88	24.87	24.87
46	24.63	24.63	24.62	24.63	24.62	24.62	24.63	24.63	24.62	24.63
47	24.91	24.92	24.91	24.94	24.93	24.91	24.92	24.92	24.92	24.91
48	25.31	25.33	25.32	25.32	25.32	25.30	25.31	25.33	25.32	25.29
49	25.25	25.25	25.24	25.26	25.24	25.23	25.24	25.26	25.26	25.23
50	24.99	25.00	25.00	25.03	24.99	24.99	25.00	25.01	25.02	24.98
51	24.83	24.84	24.84	24.85	24.83	24.82	24.83	24.83	24.83	24.81
52	24.97	24.99	24.99	24.99	24.97	24.97	24.97	24.98	24.98	24.95
53	24.66	24.68	24.68	24.67	24.65	24.66	24.66	24.67	24.67	24.63
54	25.05	25.06	25.05	25.08	25.04	25.04	25.04	25.05	25.05	25.03
55	25.08	25.10	25.08	25.10	25.08	25.08	25.08	25.09	25.08	25.07
56	24.67	24.61	24.61	24.62	24.59	24.60	24.59	24.60	24.60	24.58
57	25.13	25.15	25.14	25.16	25.13	25.13	25.13	25.14	25.15	25.14
58	25.37	25.39	25.38	25.38	25.37	25.38	25.38	25.37	25.41	25.38
59	24.99	25.00	24.99	25.00	25.01	25.00	25.00	25.00	25.03	24.99
60	24.98	24.99	24.98	24.99	25.00	24.97	24.97	24.98	25.00	24.97
Ave.	25.00	25.02	25.00	25.02	25.00	25.00	25.00	25.00	25.01	24.99
Med.	24.99	25.00	24.99	25.00	25.00	24.98	25.00	24.99	25.01	24.98
st dev	0.1881	0.1931	0.1920	0.1924	0.1952	0.1930	0.1942	0.1935	0.1972	0.1946
Min.	24.63	24.61	24.61	24.62	24.59	24.60	24.59	24.60	24.60	24.58
Max.	25.37	25.39	25.38	25.38	25.37	25.38	25.38	25.37	25.41	25.38

No.	Forward Voltage (V)							
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	25.07	25.12	25.09	24.99	25.16	24.99	25.34	25.40
32	25.03	25.07	25.05	24.99	25.12	24.99	25.34	25.26
33	24.90	24.93	24.89	24.94	24.98	24.95	25.04	25.01
34	24.88	24.90	24.88	24.96	24.95	24.96	25.00	25.04
35	25.27	25.30	25.28	24.99	25.35	24.99	25.41	25.47
36	25.20	25.22	25.23	24.99	25.30	24.99	25.33	25.42
37	24.97	25.00	24.99	24.99	25.08	24.99	25.33	25.30
38	25.12	25.14	25.14	24.99	25.22	24.99	25.29	25.30
39	25.22	25.25	25.24	24.99	25.34	24.99	25.52	25.45
40	24.85	24.85	24.86	24.89	24.94	24.92	25.11	25.02
41	25.16	25.15	25.18	24.99	25.25	24.99	25.52	25.44
42	24.97	24.97	24.97	24.99	25.11	24.99	25.30	25.13
43	24.91	24.92	24.91	24.98	24.99	24.98	25.26	25.15
44	24.91	24.92	24.91	24.97	25.02	24.98	25.24	25.08
45	24.87	24.91	24.89	24.95	24.97	24.96	25.08	25.02
46	24.63	24.66	24.64	24.70	24.73	24.70	24.83	24.77
47	24.92	24.94	24.93	24.99	25.07	24.99	25.22	25.07
48	25.31	25.33	25.32	24.99	25.51	24.99	25.64	25.47
49	25.24	25.26	25.26	24.99	25.56	24.99	25.59	25.40
50	25.00	25.03	25.02	24.99	25.14	24.99	25.33	25.27
51	24.83	24.85	24.84	24.86	24.94	24.93	25.11	25.00
52	24.97	25.00	24.99	24.99	25.09	24.99	25.25	25.25
53	24.66	24.69	24.68	24.70	24.81	24.74	24.92	24.90
54	25.04	25.18	25.07	24.99	25.17	24.99	25.38	25.41
55	25.08	25.11	25.10	24.99	25.20	24.99	25.39	25.30
56	24.60	24.63	24.62	24.61	24.71	24.68	25.01	24.90
57	25.14	25.15	25.16	24.99	25.23	24.99	25.49	25.32
58	25.39	25.41	25.42	24.99	25.47	24.99	25.48	25.73
59	25.01	25.09	25.04	24.99	25.11	24.99	25.35	25.31
60	24.98	25.00	25.00	24.99	25.08	24.99	25.27	25.28
Ave.	25.00	25.03	25.02	24.95	25.12	24.95	25.28	25.23
Med.	24.99	25.02	25.01	24.99	25.11	24.99	25.32	25.28
st dev	0.1922	0.1934	0.1957	0.0992	0.21	0.09	0.20	0.21
Min.	24.60	24.63	24.62	24.61	24.71	24.68	24.83	24.77
Max.	25.39	25.41	25.42	24.99	25.56	24.99	25.64	25.73

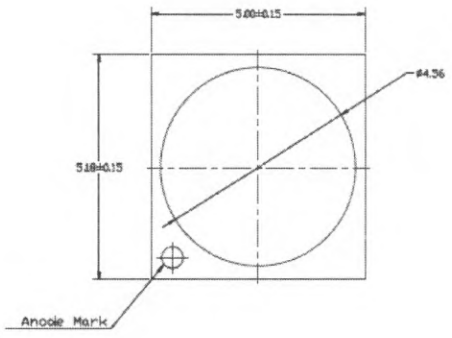
3.6 Data Set 2, 105°C, 200mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')						
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
31	0.2571	0.5246	2829	0.0003	0.0007	0.0013	0.0016	0.0017	0.0019	0.0021
32	0.2574	0.5236	2827	0.0004	0.0009	0.0014	0.0017	0.0019	0.0020	0.0024
33	0.2573	0.5236	2830	0.0004	0.0010	0.0014	0.0017	0.0019	0.0023	0.0023
34	0.2582	0.5249	2802	0.0003	0.0009	0.0013	0.0015	0.0019	0.0022	0.0022
35	0.2569	0.5243	2835	0.0004	0.0009	0.0013	0.0016	0.0019	0.0022	0.0026
36	0.2577	0.5246	2816	0.0006	0.0010	0.0014	0.0016	0.0020	0.0021	0.0026
37	0.2576	0.5237	2821	0.0007	0.0011	0.0015	0.0016	0.0020	0.0021	0.0026
38	0.2587	0.5255	2790	0.0006	0.0010	0.0015	0.0017	0.0020	0.0022	0.0027
39	0.2570	0.5239	2835	0.0007	0.0010	0.0016	0.0017	0.0020	0.0023	0.0027
40	0.2573	0.5250	2822	0.0005	0.0009	0.0014	0.0015	0.0019	0.0022	0.0026
41	0.2568	0.5274	2822	0.0003	0.0010	0.0013	0.0015	0.0018	0.0021	0.0022
42	0.2576	0.5254	2813	0.0004	0.0010	0.0014	0.0016	0.0019	0.0022	0.0025
43	0.2582	0.5248	2803	0.0004	0.0010	0.0014	0.0017	0.0020	0.0022	0.0025
44	0.2576	0.5250	2816	0.0004	0.0009	0.0013	0.0016	0.0019	0.0022	0.0024
45	0.2573	0.5249	2822	0.0004	0.0010	0.0015	0.0018	0.0020	0.0023	0.0026
46	0.2575	0.5253	2816	0.0005	0.0010	0.0015	0.0017	0.0020	0.0022	0.0026
47	0.2576	0.5249	2816	0.0004	0.0011	0.0015	0.0017	0.0020	0.0023	0.0024
48	0.2588	0.5267	2782	0.0005	0.0010	0.0016	0.0016	0.0020	0.0022	0.0024
49	0.2577	0.5251	2812	0.0004	0.0010	0.0015	0.0016	0.0020	0.0022	0.0024
50	0.2577	0.5242	2818	0.0004	0.0009	0.0014	0.0017	0.0019	0.0022	0.0024
51	0.2577	0.5261	2807	0.0004	0.0009	0.0014	0.0016	0.0019	0.0022	0.0024
52	0.2573	0.5245	2825	0.0004	0.0009	0.0014	0.0016	0.0019	0.0023	0.0024
53	0.2575	0.5246	2819	0.0003	0.0009	0.0014	0.0016	0.0019	0.0022	0.0025
54	0.2576	0.5243	2818	0.0004	0.0009	0.0015	0.0017	0.0020	0.0023	0.0025
55	0.2577	0.5254	2811	0.0004	0.0009	0.0014	0.0016	0.0019	0.0024	0.0024
56	0.2570	0.5250	2828	0.0002	0.0009	0.0013	0.0016	0.0018	0.0022	0.0024
57	0.2577	0.5238	2820	0.0004	0.0008	0.0013	0.0016	0.0018	0.0022	0.0024
58	0.2580	0.5243	2809	0.0008	0.0011	0.0017	0.0017	0.0020	0.0025	0.0027
59	0.2583	0.5269	2792	0.0006	0.0011	0.0015	0.0015	0.0018	0.0023	0.0025
60	0.2579	0.5251	2808	0.0005	0.0010	0.0014	0.0015	0.0020	0.0024	0.0024
Ave.	0.2576	0.5249	2815	0.0005	0.0010	0.0014	0.0016	0.0019	0.0022	0.0025
Med.	0.2576	0.5249	2817	0.0004	0.0010	0.0014	0.0016	0.0019	0.0022	0.0024
st dev	0.0005	0.0009	12.6047	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2568	0.5236	2782	0.0002	0.0007	0.0013	0.0015	0.0017	0.0019	0.0021
Max.	0.2588	0.5274	2835	0.0008	0.0011	0.0017	0.0018	0.0020	0.0025	0.0027

No.	Chromaticity Shift (Δu'v')									
	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
31	0.0025	0.0029	0.0032	0.0033	0.0034	0.0038	0.0040	0.0041	0.0043	0.0044
32	0.0028	0.0032	0.0035	0.0035	0.0039	0.0040	0.0041	0.0042	0.0044	0.0046
33	0.0027	0.0031	0.0033	0.0035	0.0038	0.0043	0.0044	0.0044	0.0045	0.0045
34	0.0026	0.0029	0.0034	0.0034	0.0036	0.0038	0.0040	0.0041	0.0044	0.0045
35	0.0027	0.0032	0.0035	0.0036	0.0037	0.0033	0.0035	0.0037	0.0045	0.0048
36	0.0027	0.0032	0.0037	0.0038	0.0039	0.0038	0.0040	0.0040	0.0046	0.0049
37	0.0029	0.0033	0.0038	0.0038	0.0039	0.0039	0.0039	0.0042	0.0046	0.0049
38	0.0030	0.0032	0.0037	0.0038	0.0038	0.0040	0.0042	0.0042	0.0045	0.0049
39	0.0029	0.0032	0.0036	0.0038	0.0038	0.0040	0.0041	0.0042	0.0045	0.0049
40	0.0027	0.0030	0.0034	0.0036	0.0035	0.0041	0.0042	0.0044	0.0044	0.0047
41	0.0026	0.0029	0.0033	0.0037	0.0034	0.0035	0.0037	0.0038	0.0042	0.0045
42	0.0028	0.0031	0.0035	0.0037	0.0039	0.0040	0.0041	0.0043	0.0045	0.0049
43	0.0028	0.0030	0.0035	0.0036	0.0038	0.0041	0.0042	0.0044	0.0045	0.0048
44	0.0028	0.0031	0.0033	0.0037	0.0038	0.0042	0.0043	0.0045	0.0046	0.0048
45	0.0029	0.0030	0.0036	0.0037	0.0038	0.0041	0.0043	0.0045	0.0046	0.0048
46	0.0029	0.0031	0.0035	0.0035	0.0038	0.0042	0.0043	0.0046	0.0047	0.0049
47	0.0027	0.0031	0.0036	0.0037	0.0038	0.0042	0.0043	0.0046	0.0048	0.0050
48	0.0028	0.0032	0.0034	0.0037	0.0038	0.0040	0.0042	0.0042	0.0046	0.0048
49	0.0026	0.0031	0.0035	0.0037	0.0040	0.0041	0.0041	0.0043	0.0047	0.0048
50	0.0025	0.0031	0.0034	0.0035	0.0034	0.0042	0.0043	0.0045	0.0046	0.0048
51	0.0027	0.0030	0.0033	0.0035	0.0038	0.0041	0.0042	0.0042	0.0044	0.0046
52	0.0027	0.0032	0.0034	0.0036	0.0037	0.0041	0.0042	0.0042	0.0044	0.0046
53	0.0027	0.0031	0.0034	0.0037	0.0037	0.0041	0.0042	0.0044	0.0045	0.0046
54	0.0028	0.0031	0.0036	0.0039	0.0038	0.0041	0.0043	0.0044	0.0047	0.0049
55	0.0028	0.0032	0.0036	0.0037	0.0039	0.0042	0.0043	0.0043	0.0046	0.0049
56	0.0027	0.0030	0.0034	0.0036	0.0037	0.0041	0.0042	0.0043	0.0044	0.0046
57	0.0025	0.0028	0.0034	0.0038	0.0037	0.0039	0.0040	0.0042	0.0044	0.0047
58	0.0030	0.0033	0.0037	0.0040	0.0040	0.0038	0.0040	0.0041	0.0046	0.0048
59	0.0026	0.0030	0.0034	0.0038	0.0037	0.0040	0.0041	0.0043	0.0045	0.0047
60	0.0026	0.0031	0.0035	0.0038	0.0038	0.0042	0.0043	0.0045	0.0046	0.0048
Ave.	0.0027	0.0031	0.0035	0.0037	0.0038	0.0040	0.0041	0.0043	0.0045	0.0047
Med.	0.0027	0.0031	0.0035	0.0037	0.0038	0.0041	0.0042	0.0043	0.0045	0.0048
st dev	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001
Min.	0.0025	0.0028	0.0032	0.0033	0.0034	0.0033	0.0035	0.0037	0.0042	0.0044
Max.	0.0030	0.0033	0.0038	0.0040	0.0040	0.0043	0.0044	0.0046	0.0048	0.0050

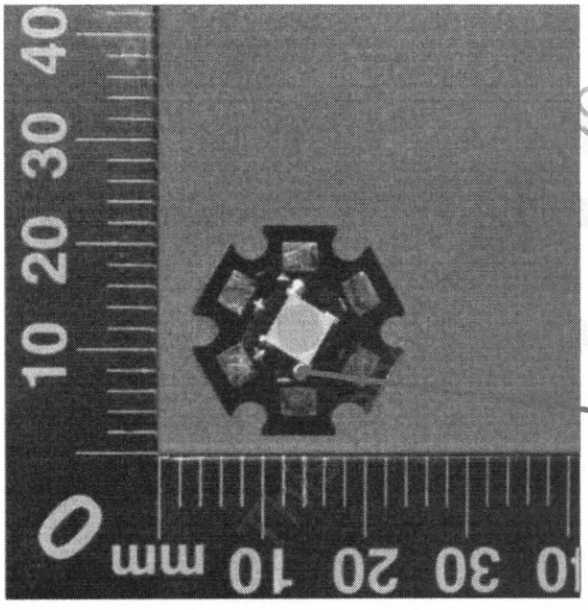
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



TMP_{LED}

5 - Report Revision

Report Number	Report Date	Contents
R2SH161210052-10-17000	2019-12-04	Original report.
R2SH161210052-10-17000-M1	2020-08-17	Update the Family products covered.
R2SH161210052-10-17000-M2	2020-12-29	Correct Part Number in section 1.8.
R2SH161210052-10-17000-M3	2021-01-08	Add DUT Characteristics for the Family products covered.
R2SH161210052-10-17000-M4	2021-03-12	Remove the DUT characteristics and family products covered

Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.
7. The lab has been accredited by IAS and the detaisl see:
   https://www.iasonline.org/?post_type=ias_certificate&orderby=org&order=ASC&s=&global=1&service=0&keyword=TL-460&number=&org=&city=&state=&country=&zip=&status=

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

About Lumileds

Lumileds is the global leader in light engine technology. The company develops, manufactures and distributes groundbreaking LEDs and automotive lighting products that shatter the status quo and help customers gain and maintain a competitive edge.

With a rich history of industry "firsts," Lumileds is uniquely positioned to deliver lighting advancements well into the future by maintaining an unwavering focus on quality, innovation and reliability.

To learn more about our portfolio of light engines, visit lumileds.com.

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