



TEST REPORT

According to ANSI/IES LM-80-15
For

Shenzhen Runlite Technology Co.,Ltd

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

Model: P40141-W27SF1F2FD2D4-MJ00

Report Type: 9000 Hours Test Report		Product Type: LED Package	
Test Engineer:	Pote Wang	<i>Pote Wang</i>	
Report Number:	RSZ180908502-10		
Test Date:	2018-09-10 to 2019-09-22		
Report Date:	2019-09-25		
Reviewed By:	Bill Xiong / EE Engineer	<i>Bill Xiong</i>	
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.		
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588		
Accreditation:	The IAS Accreditation Number TL-460.		

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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.

TABLE OF CONTENTS

1 - General Information	3
1.1 Description of LED Light Sources	3
1.2 Standards and Reference Documentations	4
1.3 Testing Equipment	4
1.4 Drive Level	4
1.5 Ambient Conditions for Maintenance Test	4
1.6 Photometric Measurement Method and Uncertainty.....	4
1.7 Statement of Traceability	4
1.8 Sample Set.....	5
2 - Summary of Test Result	6
3 - Test Data	7
3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance)	7
3.2 Data Set 1, 55°C, 60mA (Forward Voltage).....	8
3.3 Data Set 1, 55°C, 60mA (Chromaticity Shift)	9
3.4 Data Set 2, 85°C, 60mA (Lumen Maintenance)	10
3.5 Data Set 2, 85°C, 60mA (Forward Voltage).....	11
3.6 Data Set 2, 85°C, 60mA (Chromaticity Shift).....	12
3.7 Data Set 3, 105°C, 60mA (Lumen Maintenance)	13
3.8 Data Set 3, 105°C, 60mA (Forward Voltage).....	14
3.9 Data Set 3, 105°C, 60mA (Chromaticity Shift).....	15
4 - DUT Photo	16
4.1 Mechanical Dimensions	16
4.2 DUT Photo.....	16

1 - General Information

1.1 Description of LED Light Sources

Sample Size:

75 PCS samples were received on 2018-09-08. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

Manufacturer:	Shenzhen Runlite Technology Co.,Ltd
Part Number:	P40141-W27SF1F2FD2D4-MJ00
Part Type:	LED Package
Drive Level:	DC 60mA
Nominal CCT:	2700K
Power:	0.36 W
Average Current Density per LED die:	207 mA/mm ²
Average Power Density per LED die:	0.62 W/mm ²
CRI:	80
Die Spacing:	0.05 mm

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.

Family products covered by this report:

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

This report covers the following models:

Model Name	CCT (K)	Series	Parallel	Power intensity PCB (W/mm ²)	Current density per LED die (mA/mm ²)	Current per die (mA)	Die Spacing (mm)	Current (mA)
P40141-W27SF1F2FD2D4-MJ00	2700	2	1	0.0642	207	60	0.05	60
X4014X-XXXXXXXXXXXX-XXXX-AA	≥2200	2	1	0.0642	207	60	0.05	60
X4014X-XXXXXXXXXXXX-XXXX-AB	≥2200	1	2	0.0642	207	60	0.05	120
X4014X-XXXXXXXXXXXX-XXXX-AC	≥2200	1	1	0.0321	207	60	NA	60

Note:

1. Table "X" means internal code number; it can be Numbers or letters.
2. AA/AB/AC is not the part of our products code rules, we only use it to distinguish the parallel and series mode of the chip.

1.2 Standards and Reference Documentations

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs
- ENERGY STAR[®] Requirements for the Use of LM-80 Data (This standard was not accredited by IAS)

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.5m integrating sphere	EVERFINE	AIS-2	G185304TA1381172	2019-06-28	2020-06-27
LED Test Source	EVERFINE	LTS-300	P185616CD1371113	2019-07-23	2020-07-22
High Accuracy Array Spectroradiometer	EVERFINE	HAAS-2000	P600674CM1381123	2019-06-28	2020-06-27
Standard Light Source	EVERFINE	D062	G100278CJ7351206	2018-12-24	2019-12-24
Multilayer aging machine	BACL	B2-270	20024	2019-03-10	2020-03-09
DC Power Supply	BACL	B12001-12	90023	2019-01-07	2020-01-07

1.4 Drive Level

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

1.5 Ambient Conditions for Maintenance Test

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

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

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

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

For photometry measurement, the ambient temperature during test was set to $25^{\circ}C \pm 2^{\circ}C$, 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 driven by DC power supply. The forward current was regulated to within $\pm 0.5\%$ of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to $25^{\circ}C \pm 2^{\circ}C$, 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 $U=0.8671^{\circ}C$ ($K=2$), 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: 55°C, 60mA

Part Number: P40141-W27SF1F2FD2D4-MJ00
Number of Units: 25
Case Temperature: >53°C
Ambient Temperature: >50°C
Life Test Drive Current: 60mA
Measurement Current: 60mA

Data Set 2: 85°C, 60mA

Part Number: P40141-W27SF1F2FD2D4-MJ00
Number of Units: 25
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 60mA
Measurement Current: 60mA

Data Set 3: 105°C, 60mA

Part Number: P40141-W27SF1F2FD2D4-MJ00
Number of Units: 25
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	Reported TM-21 L ₉₀ Lifetime
1	25	0	1000hrs	9000hrs	2.679E-06	1.005	>54000 hours	41,000 hours
2	25	0	1000hrs	9000hrs	3.060E-06	1.004	>54000 hours	36,000 hours
3	25	0	1000hrs	9000hrs	3.625E-06	1.004	>54000 hours	30,000 hours

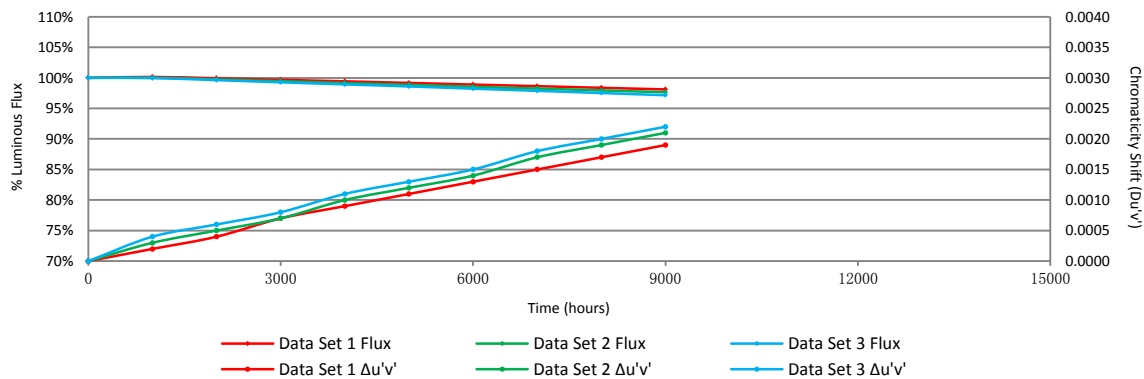
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.15%	99.93%	99.68%	99.43%	99.17%	98.90%	98.64%	98.37%	98.11%
2	100.03%	99.76%	99.46%	99.15%	98.86%	98.53%	98.25%	97.94%	97.65%
3	99.96%	99.63%	99.27%	98.93%	98.60%	98.23%	97.88%	97.52%	97.16%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
2	0.0003	0.0005	0.0007	0.001	0.0012	0.0014	0.0017	0.0019	0.0021
3	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0018	0.002	0.0022

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

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

No.	Φ(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	64.85	100.22	100.03	99.74	99.55	99.35	99.03	98.70	98.37	98.10
2	65.09	100.11	99.91	99.75	99.43	99.20	99.05	98.76	98.46	98.22
3	64.27	100.14	99.88	99.74	99.46	99.18	98.91	98.62	98.34	98.09
4	65.98	100.05	99.89	99.59	99.33	99.06	98.80	98.51	98.27	98.01
5	65.89	100.06	99.86	99.54	99.27	99.04	98.80	98.51	98.32	97.97
6	65.31	100.23	100.02	99.88	99.71	99.45	99.11	98.90	98.62	98.45
7	65.35	100.17	100.03	99.79	99.54	99.39	99.13	98.85	98.58	98.29
8	65.07	100.09	99.86	99.55	99.26	99.02	98.66	98.40	98.06	97.82
9	65.95	100.21	99.95	99.62	99.30	98.98	98.67	98.47	98.27	97.91
10	65.89	100.08	99.88	99.70	99.50	99.30	98.98	98.65	98.44	98.18
11	64.94	100.14	99.94	99.57	99.23	98.95	98.71	98.43	98.21	97.95
12	64.33	100.14	99.88	99.67	99.30	99.04	98.79	98.52	98.15	97.87
13	65.31	100.11	99.83	99.68	99.36	99.05	98.76	98.65	98.35	98.18
14	65.40	100.28	99.97	99.76	99.46	99.20	98.96	98.73	98.43	98.23
15	65.23	100.12	99.97	99.74	99.57	99.33	98.97	98.82	98.65	98.41
16	65.97	100.15	99.92	99.65	99.47	99.17	98.89	98.61	98.41	98.26
17	64.72	100.05	99.88	99.61	99.24	99.01	98.86	98.62	98.24	97.96
18	64.84	100.14	99.83	99.54	99.23	99.01	98.74	98.44	98.24	97.95
19	64.09	100.09	99.94	99.56	99.36	99.03	98.72	98.47	98.31	97.97
20	64.89	100.20	99.97	99.86	99.63	99.29	99.04	98.81	98.44	98.29
21	64.33	100.11	99.95	99.61	99.49	99.21	98.99	98.74	98.49	98.20
22	64.37	100.23	99.97	99.69	99.50	99.36	99.15	98.87	98.54	98.21
23	65.42	100.21	100.02	99.76	99.45	99.27	98.88	98.61	98.38	98.15
24	65.55	100.14	99.85	99.57	99.27	99.01	98.83	98.52	98.18	97.88
25	64.86	100.20	99.98	99.86	99.71	99.43	99.11	98.80	98.40	98.17
Avg.	65.12	100.15	99.93	99.68	99.43	99.17	98.90	98.64	98.37	98.11
Med.	65.09	100.14	99.94	99.68	99.45	99.18	98.89	98.62	98.37	98.15
st dev	0.57	0.06	0.06	0.10	0.15	0.16	0.15	0.15	0.15	0.17
Min.	64.09	100.05	99.83	99.54	99.23	98.95	98.66	98.40	98.06	97.82
Max.	65.98	100.28	100.03	99.88	99.71	99.45	99.15	98.90	98.65	98.45

3.2 Data Set 1, 55°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	5.665	5.674	5.675	5.669	5.672	5.670	5.671	5.671	5.672	5.674
2	5.678	5.672	5.675	5.667	5.672	5.667	5.667	5.667	5.671	5.672
3	5.663	5.671	5.675	5.666	5.670	5.667	5.667	5.669	5.671	5.670
4	5.711	5.675	5.679	5.677	5.674	5.674	5.673	5.672	5.675	5.674
5	5.675	5.674	5.675	5.673	5.671	5.674	5.674	5.670	5.673	5.672
6	5.659	5.668	5.667	5.662	5.662	5.665	5.659	5.661	5.665	5.662
7	5.668	5.671	5.672	5.667	5.671	5.670	5.664	5.668	5.671	5.667
8	5.675	5.677	5.680	5.673	5.675	5.675	5.675	5.675	5.679	5.678
9	5.675	5.665	5.674	5.664	5.665	5.664	5.663	5.663	5.669	5.666
10	5.670	5.675	5.680	5.672	5.671	5.673	5.673	5.673	5.675	5.674
11	5.664	5.673	5.676	5.673	5.671	5.668	5.667	5.667	5.669	5.669
12	5.659	5.664	5.673	5.666	5.666	5.666	5.662	5.659	5.665	5.664
13	5.664	5.667	5.673	5.670	5.666	5.662	5.664	5.662	5.663	5.662
14	5.673	5.679	5.684	5.676	5.675	5.674	5.676	5.674	5.680	5.678
15	5.666	5.672	5.675	5.674	5.671	5.668	5.670	5.668	5.671	5.672
16	5.660	5.674	5.675	5.672	5.666	5.668	5.663	5.665	5.665	5.668
17	5.663	5.680	5.682	5.675	5.676	5.669	5.670	5.673	5.673	5.674
18	5.672	5.683	5.684	5.678	5.677	5.675	5.675	5.674	5.678	5.679
19	5.663	5.676	5.676	5.670	5.664	5.663	5.666	5.662	5.667	5.667
20	5.663	5.675	5.674	5.670	5.670	5.670	5.667	5.666	5.670	5.676
21	5.670	5.680	5.685	5.680	5.677	5.674	5.675	5.671	5.674	5.676
22	5.659	5.676	5.672	5.672	5.668	5.667	5.664	5.664	5.665	5.671
23	5.666	5.677	5.678	5.675	5.671	5.672	5.670	5.667	5.672	5.672
24	5.673	5.675	5.674	5.671	5.666	5.665	5.663	5.661	5.669	5.670
25	5.686	5.674	5.676	5.673	5.670	5.665	5.664	5.665	5.666	5.671
Avg.	5.670	5.674	5.676	5.671	5.670	5.669	5.668	5.667	5.671	5.671
Med.	5.666	5.674	5.675	5.672	5.671	5.668	5.667	5.667	5.671	5.672
st dev	0.011	0.005	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005
Min.	5.659	5.664	5.667	5.662	5.662	5.662	5.659	5.659	5.663	5.662
Max.	5.711	5.683	5.685	5.680	5.677	5.675	5.676	5.675	5.680	5.679

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2573	0.5278	2809	0.0001	0.0003	0.0006	0.0008	0.0011	0.0013	0.0015	0.0016	0.0018
2	0.2588	0.5274	2777	0.0003	0.0004	0.0006	0.0008	0.0010	0.0011	0.0013	0.0015	0.0016
3	0.2638	0.5331	2652	0.0003	0.0006	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018
4	0.2586	0.5280	2781	0.0001	0.0005	0.0008	0.0010	0.0011	0.0014	0.0016	0.0017	0.0018
5	0.2606	0.5301	2729	0.0003	0.0006	0.0008	0.0010	0.0012	0.0013	0.0016	0.0018	0.0019
6	0.2583	0.5265	2792	0.0001	0.0003	0.0005	0.0009	0.0011	0.0015	0.0018	0.0020	0.0022
7	0.2584	0.5274	2788	0.0002	0.0004	0.0006	0.0009	0.0012	0.0015	0.0018	0.0020	0.0023
8	0.2588	0.5276	2778	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0012	0.0014	0.0018
9	0.2563	0.5272	2834	0.0002	0.0005	0.0007	0.0008	0.0011	0.0013	0.0014	0.0015	0.0017
10	0.2579	0.5290	2789	0.0003	0.0006	0.0008	0.0010	0.0011	0.0012	0.0014	0.0016	0.0017
11	0.2615	0.5299	2710	0.0002	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016	0.0017	0.0019
12	0.2610	0.5276	2730	0.0001	0.0004	0.0008	0.0009	0.0013	0.0015	0.0016	0.0017	0.0019
13	0.2601	0.5278	2747	0.0001	0.0004	0.0007	0.0009	0.0011	0.0014	0.0016	0.0018	0.0019
14	0.2603	0.5302	2733	0.0002	0.0004	0.0007	0.0009	0.0012	0.0015	0.0018	0.0020	0.0023
15	0.2601	0.5276	2749	0.0002	0.0004	0.0006	0.0009	0.0012	0.0015	0.0017	0.0020	0.0022
16	0.2586	0.5282	2778	0.0001	0.0003	0.0006	0.0007	0.0009	0.0011	0.0014	0.0017	0.0019
17	0.2612	0.5288	2721	0.0001	0.0002	0.0006	0.0007	0.0009	0.0011	0.0012	0.0014	0.0015
18	0.2617	0.5296	2708	0.0001	0.0003	0.0005	0.0009	0.0012	0.0013	0.0014	0.0016	0.0017
19	0.2659	0.5319	2615	0.0002	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0016
20	0.2615	0.5299	2710	0.0001	0.0004	0.0006	0.0009	0.0010	0.0011	0.0013	0.0015	0.0016
21	0.2616	0.5280	2717	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0016	0.0018
22	0.2582	0.5278	2790	0.0002	0.0005	0.0007	0.0010	0.0014	0.0016	0.0018	0.0019	0.0021
23	0.2577	0.5274	2801	0.0003	0.0006	0.0008	0.0010	0.0013	0.0016	0.0018	0.0021	0.0022
24	0.2596	0.5283	2756	0.0002	0.0005	0.0007	0.0009	0.0011	0.0015	0.0019	0.0022	0.0025
25	0.2607	0.5292	2730	0.0002	0.0004	0.0009	0.0010	0.0012	0.0014	0.0017	0.0021	0.0025
Avg.	0.2599	0.5287	2749	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
Med.	0.2601	0.5280	2749	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0016	0.0017	0.0019
st dev	0.0021	0.0015	50	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.2563	0.5265	2615	0.0001	0.0002	0.0005	0.0006	0.0007	0.0009	0.0012	0.0014	0.0015
Max.	0.2659	0.5331	2834	0.0003	0.0006	0.0009	0.0010	0.0014	0.0016	0.0019	0.0022	0.0025

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

No.	Φ(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	64.75	100.03	99.68	99.34	99.06	98.72	98.41	98.19	97.90	97.67
27	65.14	99.95	99.66	99.34	99.00	98.74	98.40	98.05	97.82	97.57
28	65.67	99.94	99.71	99.41	99.13	98.84	98.54	98.19	97.87	97.56
29	65.69	100.02	99.74	99.39	99.07	98.72	98.48	98.23	97.94	97.61
30	64.07	100.11	99.81	99.66	99.34	99.05	98.70	98.44	98.22	97.97
31	65.98	100.05	99.89	99.55	99.18	98.91	98.51	98.15	97.86	97.50
32	64.38	99.98	99.64	99.44	99.10	98.76	98.42	98.09	97.72	97.39
33	65.33	100.15	99.86	99.51	99.25	99.05	98.73	98.45	98.13	97.92
34	65.49	100.06	99.77	99.56	99.21	98.95	98.58	98.27	97.91	97.60
35	64.33	99.97	99.78	99.46	99.11	98.87	98.54	98.23	98.01	97.71
36	64.83	100.17	99.92	99.69	99.34	99.04	98.80	98.52	98.24	97.92
37	64.02	100.05	99.89	99.55	99.20	98.98	98.58	98.28	97.94	97.59
38	65.10	100.08	99.83	99.62	99.34	99.05	98.73	98.42	98.05	97.82
39	65.86	100.03	99.67	99.36	99.09	98.79	98.41	98.21	97.90	97.60
40	64.56	99.98	99.75	99.49	99.26	98.93	98.68	98.39	98.03	97.80
41	65.24	100.08	99.79	99.48	99.22	98.94	98.59	98.28	97.90	97.67
42	64.45	100.09	99.81	99.58	99.29	98.99	98.59	98.37	98.12	97.84
43	64.89	99.97	99.61	99.23	98.94	98.69	98.40	98.17	97.77	97.46
44	65.26	99.98	99.65	99.40	99.08	98.73	98.50	98.24	97.93	97.56
45	64.78	99.98	99.66	99.34	99.04	98.81	98.53	98.33	98.04	97.78
46	65.12	99.94	99.72	99.31	98.91	98.60	98.30	97.96	97.67	97.44
47	64.56	100.11	99.86	99.49	99.09	98.84	98.54	98.19	98.02	97.74
48	65.10	100.12	99.80	99.54	99.29	98.97	98.71	98.34	98.14	97.85
49	64.96	100.06	99.83	99.46	99.17	98.80	98.43	98.20	97.83	97.60
50	63.01	99.92	99.60	99.29	99.05	98.71	98.29	97.97	97.52	97.16
Avg.	64.90	100.03	99.76	99.46	99.15	98.86	98.53	98.25	97.94	97.65
Med.	64.96	100.03	99.77	99.46	99.13	98.84	98.54	98.23	97.93	97.61
st dev	0.66	0.07	0.09	0.12	0.12	0.13	0.14	0.14	0.17	0.19
Min.	63.01	99.92	99.60	99.23	98.91	98.60	98.29	97.96	97.52	97.16
Max.	65.98	100.17	99.92	99.69	99.34	99.05	98.80	98.52	98.24	97.97

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
26	5.664	5.675	5.676	5.667	5.672	5.668	5.671	5.667	5.671	5.673
27	5.658	5.674	5.674	5.665	5.666	5.666	5.666	5.660	5.669	5.667
28	5.665	5.677	5.679	5.670	5.672	5.670	5.671	5.670	5.675	5.674
29	5.663	5.677	5.676	5.668	5.671	5.670	5.674	5.666	5.668	5.673
30	5.659	5.673	5.674	5.663	5.665	5.668	5.667	5.666	5.665	5.666
31	5.669	5.680	5.684	5.674	5.695	5.670	5.677	5.674	5.686	5.678
32	5.672	5.679	5.682	5.676	5.671	5.674	5.675	5.675	5.675	5.676
33	5.664	5.680	5.672	5.672	5.673	5.672	5.673	5.670	5.674	5.678
34	5.663	5.679	5.676	5.672	5.672	5.672	5.675	5.670	5.673	5.677
35	5.660	5.671	5.671	5.663	5.663	5.665	5.662	5.663	5.669	5.670
36	5.672	5.678	5.675	5.675	5.673	5.673	5.674	5.670	5.675	5.680
37	5.660	5.671	5.666	5.665	5.664	5.663	5.668	5.662	5.665	5.668
38	5.670	5.679	5.669	5.672	5.675	5.671	5.673	5.673	5.676	5.679
39	5.665	5.678	5.668	5.669	5.671	5.669	5.670	5.668	5.672	5.676
40	5.670	5.683	5.676	5.674	5.674	5.673	5.679	5.674	5.678	5.683
41	5.651	5.673	5.663	5.662	5.664	5.663	5.660	5.661	5.664	5.664
42	5.665	5.672	5.667	5.663	5.664	5.665	5.666	5.667	5.667	5.666
43	5.665	5.673	5.668	5.667	5.668	5.665	5.668	5.668	5.670	5.672
44	5.658	5.673	5.664	5.666	5.669	5.665	5.666	5.668	5.673	5.671
45	5.662	5.678	5.663	5.667	5.667	5.666	5.667	5.667	5.666	5.668
46	5.663	5.676	5.667	5.667	5.671	5.670	5.669	5.670	5.668	5.675
47	5.667	5.678	5.671	5.671	5.675	5.672	5.672	5.672	5.671	5.675
48	5.656	5.668	5.662	5.662	5.660	5.659	5.661	5.664	5.665	5.666
49	5.664	5.676	5.666	5.669	5.672	5.667	5.667	5.670	5.671	5.669
50	5.666	5.680	5.672	5.676	5.675	5.674	5.674	5.673	5.675	5.676
Avg.	5.664	5.676	5.671	5.669	5.670	5.668	5.670	5.668	5.671	5.673
Med.	5.664	5.677	5.671	5.668	5.671	5.669	5.670	5.668	5.671	5.673
st dev	0.005	0.004	0.006	0.004	0.007	0.004	0.005	0.004	0.005	0.005
Min.	5.651	5.668	5.662	5.662	5.660	5.659	5.660	5.660	5.664	5.664
Max.	5.672	5.683	5.684	5.676	5.695	5.674	5.679	5.675	5.686	5.683

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2610	0.5284	2726	0.0001	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0018	0.0020
27	0.2607	0.5302	2725	0.0002	0.0003	0.0006	0.0007	0.0009	0.0012	0.0014	0.0016	0.0018
28	0.2575	0.5282	2802	0.0002	0.0003	0.0005	0.0006	0.0008	0.0009	0.0011	0.0012	0.0013
29	0.2573	0.5269	2813	0.0003	0.0004	0.0006	0.0009	0.0011	0.0012	0.0015	0.0016	0.0018
30	0.2621	0.5288	2702	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0014	0.0016	0.0019
31	0.2588	0.5285	2773	0.0003	0.0006	0.0008	0.0010	0.0011	0.0014	0.0016	0.0018	0.0019
32	0.2609	0.5280	2731	0.0003	0.0006	0.0009	0.0011	0.0014	0.0016	0.0018	0.0020	0.0023
33	0.2608	0.5279	2734	0.0002	0.0003	0.0006	0.0009	0.0013	0.0016	0.0018	0.0021	0.0022
34	0.2600	0.5287	2747	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0021	0.0024
35	0.2617	0.5300	2706	0.0003	0.0005	0.0008	0.0010	0.0011	0.0013	0.0015	0.0017	0.0021
36	0.2607	0.5275	2736	0.0005	0.0006	0.0009	0.0011	0.0014	0.0015	0.0018	0.0021	0.0023
37	0.2623	0.5309	2690	0.0003	0.0005	0.0008	0.0010	0.0013	0.0014	0.0016	0.0019	0.0021
38	0.2612	0.5291	2721	0.0003	0.0005	0.0007	0.0009	0.0012	0.0013	0.0015	0.0018	0.0022
39	0.2584	0.5275	2785	0.0004	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016	0.0019	0.0021
40	0.2615	0.5294	2713	0.0003	0.0005	0.0006	0.0009	0.0011	0.0013	0.0015	0.0018	0.0021
41	0.2589	0.5265	2780	0.0003	0.0004	0.0005	0.0008	0.0010	0.0014	0.0016	0.0020	0.0023
42	0.2603	0.5278	2744	0.0002	0.0006	0.0008	0.0011	0.0013	0.0015	0.0018	0.0020	0.0022
43	0.2606	0.5287	2734	0.0004	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0024
44	0.2593	0.5277	2766	0.0003	0.0006	0.0009	0.0011	0.0013	0.0016	0.0018	0.0020	0.0022
45	0.2606	0.5274	2741	0.0004	0.0005	0.0007	0.0009	0.0012	0.0015	0.0018	0.0020	0.0022
46	0.2595	0.5287	2758	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0017	0.0020	0.0023
47	0.2589	0.5283	2772	0.0004	0.0005	0.0008	0.0011	0.0013	0.0014	0.0017	0.0019	0.0021
48	0.2611	0.5284	2726	0.0003	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0018	0.0021
49	0.2578	0.5266	2804	0.0004	0.0006	0.0008	0.0010	0.0014	0.0017	0.0020	0.0023	0.0025
50	0.2624	0.5281	2699	0.0004	0.0008	0.0010	0.0012	0.0015	0.0017	0.0019	0.0023	0.0027
Avg.	0.2602	0.5283	2745	0.0003	0.0005	0.0007	0.0010	0.0012	0.0014	0.0017	0.0019	0.0021
Med.	0.2606	0.5283	2736	0.0003	0.0005	0.0008	0.0010	0.0012	0.0014	0.0016	0.0019	0.0022
st dev	0.0015	0.0011	34	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.2573	0.5265	2690	0.0001	0.0003	0.0005	0.0006	0.0008	0.0009	0.0011	0.0012	0.0013
Max.	0.2624	0.5309	2813	0.0005	0.0008	0.0010	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027

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

No.	Φ(lm)	Lumen Maintenance (%)								
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	64.96	100.05	99.68	99.31	98.97	98.69	98.34	97.94	97.52	97.14
52	64.34	99.89	99.70	99.33	99.01	98.66	98.32	98.01	97.68	97.40
53	65.56	100.02	99.59	99.27	98.87	98.44	98.11	97.79	97.48	97.18
54	64.78	99.91	99.71	99.46	99.20	98.97	98.50	98.21	97.89	97.44
55	64.81	99.89	99.58	99.14	98.77	98.38	98.10	97.78	97.35	97.10
56	65.27	99.97	99.72	99.45	99.13	98.88	98.48	98.15	97.75	97.43
57	65.60	99.92	99.57	99.24	98.96	98.63	98.22	97.80	97.45	97.06
58	65.20	100.06	99.83	99.34	99.05	98.76	98.47	98.04	97.71	97.35
59	65.17	99.97	99.68	99.20	98.83	98.53	98.20	97.82	97.36	96.95
60	65.94	100.08	99.77	99.45	99.06	98.77	98.36	98.04	97.74	97.44
61	65.84	99.86	99.41	99.13	98.82	98.47	98.04	97.80	97.43	97.01
62	64.98	100.03	99.71	99.46	99.12	98.77	98.43	98.03	97.66	97.35
63	65.07	99.91	99.57	99.25	98.92	98.52	98.17	97.86	97.59	97.34
64	64.13	99.92	99.55	99.14	98.74	98.46	97.99	97.63	97.21	96.77
65	65.92	99.88	99.51	99.20	98.74	98.30	97.98	97.60	97.24	96.94
66	64.97	100.03	99.72	99.35	99.00	98.72	98.43	98.01	97.74	97.43
67	64.97	99.94	99.62	99.20	98.78	98.45	98.05	97.77	97.41	97.03
68	64.63	99.83	99.50	99.24	98.81	98.50	98.16	97.85	97.43	97.09
69	65.33	100.05	99.77	99.33	98.94	98.56	98.15	97.73	97.40	97.08
70	64.45	99.95	99.52	99.16	98.79	98.40	98.01	97.66	97.28	96.88
71	64.45	99.91	99.57	99.22	98.98	98.63	98.29	97.94	97.53	97.19
72	64.46	100.12	99.86	99.60	99.27	98.95	98.59	98.23	97.86	97.47
73	65.34	99.86	99.48	99.10	98.81	98.56	98.22	97.92	97.46	97.17
74	64.24	99.94	99.52	99.13	98.83	98.49	98.07	97.77	97.34	97.01
75	65.01	99.95	99.57	99.17	98.77	98.43	98.05	97.74	97.37	96.89
Avg.	65.02	99.96	99.63	99.27	98.93	98.60	98.23	97.88	97.52	97.16
Med.	64.98	99.94	99.59	99.24	98.92	98.56	98.20	97.85	97.46	97.14
st dev	0.51	0.08	0.12	0.13	0.15	0.18	0.18	0.17	0.19	0.21
Min.	64.13	99.83	99.41	99.10	98.74	98.30	97.98	97.60	97.21	96.77
Max.	65.94	100.12	99.86	99.60	99.27	98.97	98.59	98.23	97.89	97.47

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

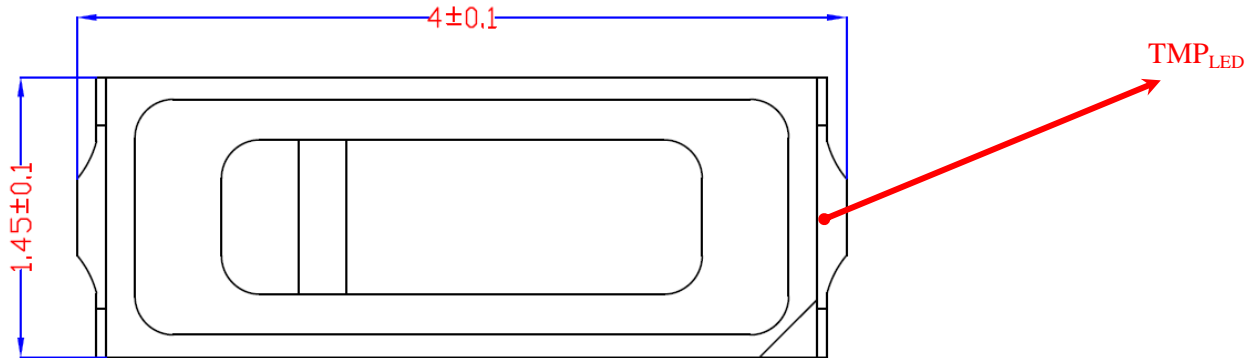
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	5.667	5.681	5.675	5.672	5.673	5.669	5.673	5.671	5.671	5.674
52	5.662	5.678	5.670	5.671	5.673	5.672	5.673	5.667	5.673	5.670
53	5.659	5.668	5.664	5.660	5.665	5.663	5.662	5.662	5.665	5.666
54	5.665	5.680	5.674	5.672	5.673	5.672	5.672	5.673	5.674	5.675
55	5.667	5.690	5.678	5.676	5.680	5.675	5.677	5.675	5.679	5.680
56	5.672	5.685	5.676	5.677	5.680	5.678	5.680	5.677	5.681	5.677
57	5.665	5.680	5.669	5.673	5.673	5.671	5.673	5.671	5.672	5.675
58	5.660	5.673	5.668	5.666	5.668	5.669	5.670	5.670	5.672	5.668
59	5.665	5.675	5.669	5.667	5.669	5.668	5.670	5.668	5.670	5.670
60	5.659	5.670	5.666	5.662	5.665	5.665	5.662	5.665	5.665	5.664
61	5.672	5.684	5.675	5.674	5.686	5.678	5.678	5.679	5.676	5.680
62	5.672	5.683	5.673	5.676	5.683	5.680	5.676	5.679	5.679	5.678
63	5.775	5.679	5.677	5.677	5.681	5.676	5.676	5.676	5.676	5.678
64	5.669	5.685	5.677	5.677	5.678	5.677	5.671	5.677	5.678	5.675
65	5.661	5.676	5.666	5.665	5.668	5.668	5.667	5.671	5.673	5.669
66	5.658	5.670	5.661	5.663	5.664	5.663	5.665	5.668	5.666	5.664
67	5.670	5.682	5.675	5.673	5.678	5.674	5.672	5.678	5.678	5.677
68	5.661	5.673	5.670	5.670	5.674	5.667	5.666	5.672	5.670	5.671
69	5.664	5.675	5.670	5.669	5.674	5.668	5.671	5.673	5.672	5.672
70	5.656	5.670	5.665	5.664	5.663	5.666	5.665	5.666	5.665	5.664
71	5.663	5.679	5.670	5.665	5.672	5.670	5.673	5.673	5.671	5.670
72	5.662	5.678	5.671	5.671	5.672	5.670	5.673	5.675	5.669	5.672
73	5.667	5.680	5.671	5.670	5.674	5.668	5.670	5.676	5.672	5.670
74	5.653	5.663	5.660	5.659	5.660	5.656	5.662	5.663	5.659	5.658
75	5.658	5.673	5.662	5.664	5.664	5.663	5.664	5.665	5.665	5.665
Avg.	5.668	5.677	5.670	5.669	5.672	5.670	5.670	5.672	5.672	5.671
Med.	5.664	5.678	5.670	5.670	5.673	5.669	5.671	5.672	5.672	5.671
st dev	0.023	0.006	0.005	0.006	0.007	0.006	0.005	0.005	0.005	0.006
Min.	5.653	5.663	5.660	5.659	5.660	5.656	5.662	5.662	5.659	5.658
Max.	5.775	5.690	5.678	5.677	5.686	5.680	5.680	5.679	5.681	5.680

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

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2611	0.5299	2719	0.0002	0.0003	0.0006	0.0010	0.0013	0.0016	0.0018	0.0021	0.0024
52	0.2601	0.5269	2753	0.0004	0.0005	0.0006	0.0007	0.0009	0.0012	0.0016	0.0018	0.0021
53	0.2591	0.5279	2770	0.0004	0.0007	0.0009	0.0011	0.0013	0.0014	0.0015	0.0018	0.0019
54	0.2590	0.5310	2759	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0017	0.0019	0.0021
55	0.2575	0.5262	2813	0.0003	0.0006	0.0009	0.0011	0.0015	0.0017	0.0019	0.0020	0.0022
56	0.2583	0.5264	2794	0.0004	0.0006	0.0007	0.0011	0.0013	0.0017	0.0021	0.0023	0.0025
57	0.2579	0.5276	2798	0.0003	0.0004	0.0007	0.0009	0.0012	0.0014	0.0015	0.0017	0.0019
58	0.2608	0.5294	2728	0.0003	0.0004	0.0006	0.0010	0.0013	0.0015	0.0018	0.0021	0.0023
59	0.2614	0.5289	2717	0.0004	0.0006	0.0007	0.0010	0.0013	0.0016	0.0017	0.0019	0.0021
60	0.2569	0.5272	2820	0.0004	0.0006	0.0008	0.0010	0.0013	0.0014	0.0015	0.0017	0.0018
61	0.2571	0.5283	2810	0.0005	0.0007	0.0009	0.0011	0.0014	0.0016	0.0017	0.0019	0.0021
62	0.2619	0.5294	2704	0.0004	0.0008	0.0009	0.0012	0.0015	0.0017	0.0020	0.0022	0.0024
63	0.2580	0.5274	2795	0.0004	0.0007	0.0011	0.0013	0.0015	0.0017	0.0019	0.0021	0.0023
64	0.2622	0.5296	2698	0.0004	0.0006	0.0009	0.0012	0.0014	0.0018	0.0021	0.0024	0.0028
65	0.2579	0.5272	2797	0.0003	0.0004	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0024
66	0.2622	0.5304	2694	0.0004	0.0006	0.0008	0.0011	0.0014	0.0015	0.0019	0.0022	0.0024
67	0.2602	0.5305	2736	0.0004	0.0007	0.0009	0.0013	0.0015	0.0017	0.0020	0.0022	0.0025
68	0.2587	0.5276	2779	0.0002	0.0004	0.0005	0.0008	0.0009	0.0012	0.0015	0.0017	0.0019
69	0.2605	0.5284	2737	0.0005	0.0006	0.0008	0.0011	0.0013	0.0016	0.0018	0.0020	0.0021
70	0.2619	0.5287	2707	0.0004	0.0007	0.0009	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022
71	0.2617	0.5280	2714	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016	0.0020	0.0023	0.0024
72	0.2609	0.5284	2729	0.0003	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016	0.0020	0.0023
73	0.2602	0.5272	2749	0.0004	0.0006	0.0008	0.0011	0.0012	0.0014	0.0015	0.0017	0.0019
74	0.2635	0.5288	2673	0.0003	0.0006	0.0007	0.0011	0.0013	0.0015	0.0018	0.0020	0.0021
75	0.2594	0.5273	2766	0.0003	0.0007	0.0008	0.0011	0.0014	0.0016	0.0018	0.0021	0.0023
Avg.	0.2599	0.5283	2750	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0018	0.0020	0.0022
Med.	0.2602	0.5283	2749	0.0004	0.0006	0.0008	0.0011	0.0013	0.0016	0.0018	0.0020	0.0022
st dev	0.0018	0.0013	42	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2569	0.5262	2673	0.0002	0.0003	0.0005	0.0007	0.0009	0.0012	0.0015	0.0017	0.0018
Max.	0.2635	0.5310	2820	0.0005	0.0008	0.0011	0.0013	0.0015	0.0018	0.0021	0.0024	0.0028

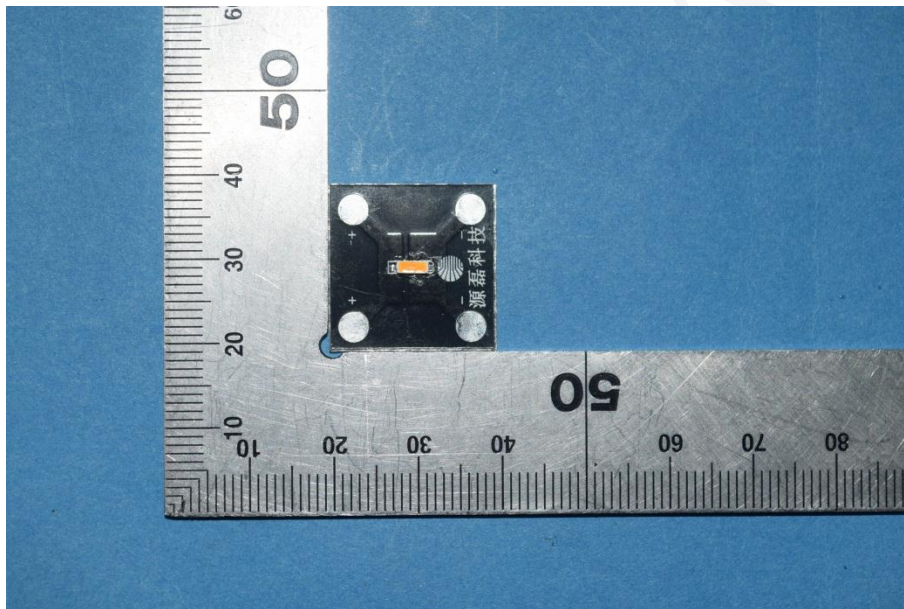
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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