



TEST REPORT

According to ANSI/IES LM-80-15
For

Xiamen Dacol Photoelectronics Technology Co., Ltd
No. 8021 Xiang'an West Road(Xiang'an) industrial zone, Torch Hi-Tech Industrial Development Zone ,

#Model: 2835

Report Type: 9000 Hours Test Report		Product Type: LED Package	
Test Engineer:	Pote Wang <i>Pote Wang</i>		
Report Number:	R2DG180914053-10		
Test Date:	2018-09-26 to 2019-10-17		
Report Date:	2019-11-27		
Reviewed By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>		
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.		
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Accreditation:	The IAS Accreditation Number TL-460.		

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1 - General Information

1.1 Description of LED Light Sources

Sample Size:

75 PCS test samples were in good condition and received on 2018-09-14. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

#Manufacturer:	Xiamen Dacol Photoelectronics Technology Co., Ltd
#Part Number:	2835
#Part Type:	LED Package
#Drive Level:	DC 20mA
#Nominal CCT:	2700K
#Power:	1.08W
#Average Current Density per LED die:	71.76mA/ mm ²
#Average Power Density per LED die:	1.292W/ mm ²
#CRI:	80
#Die Spacing:	0.12mm

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 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	20023	2019-03-10	2020-03-09
High power LED aging dc power supply	BACL	B06010	90022	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 ±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 driven 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 (luminous flux) measurements is U=1.8% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=20K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=1.5 (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: 55°C, 20mA

Part Number: 2835
Number of Units: 25
Case Temperature: >53°C
Ambient Temperature: >50°C
Life Test Drive Current: 20mA
Measurement Current: 20mA

Data Set 2: 85°C, 20mA

Part Number: 2835
Number of Units: 25
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 20mA
Measurement Current: 20mA

Data Set 3: 115° C, 20mA

Part Number: 2835
Number of Units: 25
Case Temperature: >113°C
Ambient Temperature: >110°C
Life Test Drive Current: 20mA
Measurement Current: 20mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L ₇₀ Lifetime
1	25	0	1000hrs	9000hrs	2.569E-06	1.004	>54000 hours
2	25	0	1000hrs	9000hrs	3.219E-06	1.004	>54000 hours
3	25	0	1000hrs	9000hrs	3.707E-06	1.004	>54000 hours

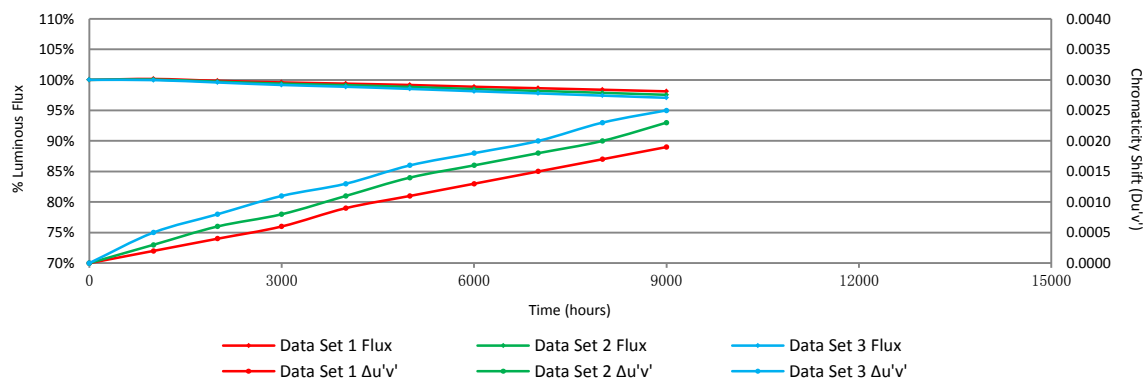
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.15%	99.84%	99.58%	99.38%	99.16%	98.87%	98.63%	98.38%	98.12%
2	100.05%	99.70%	99.38%	99.13%	98.84%	98.49%	98.19%	97.88%	97.55%
3	99.96%	99.57%	99.16%	98.87%	98.52%	98.14%	97.78%	97.42%	97.06%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
2	0.0003	0.0006	0.0008	0.0011	0.0014	0.0016	0.0018	0.002	0.0023
3	0.0005	0.0008	0.0011	0.0013	0.0016	0.0018	0.002	0.0023	0.0025

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 55°C, 20mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	144.3	99.93	99.65	99.38	99.17	98.89	98.61	98.41	98.13	97.92
2	146.0	99.93	99.73	99.45	99.32	99.11	98.97	98.70	98.36	98.01
3	143.9	100.21	99.86	99.65	99.37	99.17	98.82	98.54	98.26	97.92
4	145.5	100.07	99.86	99.59	99.31	98.97	98.83	98.69	98.63	98.35
5	142.8	100.21	100.07	99.79	99.72	99.51	99.16	98.88	98.74	98.60
6	143.7	100.28	99.93	99.58	99.51	99.16	98.96	98.75	98.61	98.26
7	145.3	99.79	99.66	99.11	99.04	98.76	98.55	98.21	97.94	97.73
8	145.8	99.93	99.52	99.11	98.97	98.70	98.29	98.01	97.87	97.60
9	142.8	100.07	99.79	99.65	99.30	99.16	98.88	98.53	98.32	97.97
10	144.1	100.14	99.93	99.51	99.24	99.03	98.68	98.40	98.13	97.92
11	145.1	100.07	99.79	99.38	99.17	99.04	98.62	98.48	98.14	97.86
12	142.2	100.28	99.93	99.79	99.51	99.30	98.95	98.73	98.52	98.24
13	142.3	100.21	99.72	99.37	99.09	98.81	98.52	98.38	98.24	97.96
14	142.5	100.28	99.86	99.65	99.30	99.09	98.95	98.74	98.53	98.18
15	143.8	100.28	99.93	99.72	99.65	99.44	99.10	98.82	98.54	98.33
16	143.9	100.35	100.07	99.72	99.58	99.31	99.10	98.89	98.47	98.19
17	145.2	100.21	99.86	99.66	99.59	99.38	99.10	98.90	98.69	98.35
18	143.9	99.93	99.37	99.31	99.03	98.61	98.12	97.85	97.57	97.22
19	141.7	100.14	99.79	99.72	99.44	99.29	99.08	98.87	98.59	98.38
20	145.3	100.21	99.72	99.38	99.17	98.97	98.76	98.49	98.35	98.14
21	144.5	100.21	100.07	99.93	99.65	99.52	99.24	99.10	98.96	98.82
22	142.6	100.28	100.14	99.86	99.65	99.37	99.16	98.74	98.18	97.97
23	142.5	100.14	99.79	99.58	99.44	99.30	99.02	98.74	98.32	98.11
24	144.4	100.21	99.93	99.65	99.52	99.45	99.10	98.89	98.82	98.61
25	142.1	100.42	100.07	99.93	99.72	99.58	99.23	99.01	98.73	98.38
Avg.	143.8	100.15	99.84	99.58	99.38	99.16	98.87	98.63	98.38	98.12
Med.	143.9	100.21	99.86	99.65	99.37	99.16	98.95	98.73	98.36	98.14
st dev	1.3	0.15	0.18	0.22	0.2294	0.27	0.29	0.30	0.32	0.34
Min.	141.7	99.79	99.37	99.11	98.97	98.61	98.12	97.85	97.57	97.22
Max.	146.0	100.42	100.14	99.93	99.72	99.58	99.24	99.10	98.96	98.82

3.2 Data Set 1, 55°C, 20mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	53.90	53.84	53.86	53.90	53.90	53.74	53.76	53.77	53.75	53.74
2	53.62	53.65	53.69	53.74	53.69	53.57	53.59	53.61	53.59	53.57
3	53.32	53.39	53.40	53.44	53.42	53.31	53.35	53.34	53.34	53.31
4	53.72	53.75	53.84	53.91	53.82	53.71	53.79	53.73	53.83	53.69
5	53.73	53.75	53.77	53.82	53.81	53.72	53.70	53.71	53.71	53.72
6	53.45	53.44	53.49	53.52	53.51	53.45	53.36	53.38	53.38	53.37
7	53.60	53.81	53.88	53.98	54.10	54.03	53.36	54.07	53.67	53.34
8	53.74	53.74	53.79	54.02	53.80	53.70	53.67	53.69	53.69	53.64
9	53.34	53.37	53.43	53.47	53.44	53.32	53.34	53.36	53.32	53.32
10	53.67	53.71	53.74	53.79	53.78	53.64	53.65	53.64	53.66	53.64
11	53.55	53.63	53.67	53.72	53.68	53.54	53.58	53.57	53.57	53.58
12	53.35	53.37	53.45	53.45	53.44	53.31	53.31	53.37	53.31	53.33
13	53.51	53.48	53.48	53.51	53.49	53.39	53.40	53.42	53.41	53.38
14	53.68	53.93	53.77	53.83	53.81	53.66	53.66	53.70	53.69	53.69
15	53.64	53.73	53.73	53.83	53.75	53.63	53.66	53.71	53.69	53.67
16	53.60	53.67	53.72	53.74	53.74	53.65	53.61	53.62	53.64	53.58
17	53.63	53.67	53.67	53.77	53.74	53.56	53.60	53.64	53.64	53.66
18	53.64	53.65	53.74	53.77	53.75	53.62	53.61	53.67	53.65	53.63
19	53.31	53.36	53.56	53.46	53.44	53.27	53.34	53.36	53.35	53.34
20	53.35	53.41	53.48	53.49	53.47	53.33	53.37	53.37	53.41	53.52
21	53.44	53.45	53.69	53.60	53.58	53.42	53.46	53.49	53.50	53.50
22	53.63	53.67	53.77	53.74	53.74	53.60	53.63	53.66	53.64	53.66
23	53.69	53.91	53.96	53.96	53.94	53.82	53.69	53.72	53.72	53.71
24	53.75	53.74	53.87	53.85	53.88	53.72	53.74	53.78	53.77	53.77
25	53.65	53.70	53.80	53.78	53.79	53.67	53.68	53.68	53.69	53.67
Avg.	53.58	53.63	53.69	53.72	53.70	53.58	53.56	53.60	53.58	53.56
Med.	53.63	53.67	53.73	53.77	53.74	53.62	53.61	53.64	53.64	53.63
st dev	0.16	0.17	0.16	0.18	0.18	0.19	0.16	0.18	0.16	0.15
Min.	53.31	53.36	53.40	53.44	53.42	53.27	53.31	53.34	53.31	53.31
Max.	53.90	53.93	53.96	54.02	54.10	54.03	53.79	54.07	53.83	53.77

3.3 Data Set 1, 55°C, 20mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2662	0.5279	2623	0.0001	0.0002	0.0003	0.0005	0.0009	0.0010	0.0012	0.0013	0.0016
2	0.2627	0.5276	2696	0.0001	0.0004	0.0005	0.0007	0.0009	0.0012	0.0014	0.0015	0.0016
3	0.2627	0.5267	2699	0.0001	0.0003	0.0005	0.0009	0.0011	0.0013	0.0014	0.0015	0.0017
4	0.2621	0.5276	2708	0.0001	0.0003	0.0005	0.0008	0.0011	0.0013	0.0017	0.0018	0.0021
5	0.2656	0.5282	2633	0.0001	0.0002	0.0004	0.0007	0.0009	0.0012	0.0015	0.0018	0.0020
6	0.2640	0.5291	2662	0.0004	0.0005	0.0007	0.0008	0.0009	0.0011	0.0012	0.0014	0.0017
7	0.2625	0.5271	2702	0.0001	0.0006	0.0009	0.0011	0.0012	0.0014	0.0017	0.0019	0.0020
8	0.2642	0.5278	2663	0.0002	0.0004	0.0007	0.0011	0.0012	0.0013	0.0014	0.0015	0.0016
9	0.2659	0.5293	2624	0.0001	0.0003	0.0006	0.0010	0.0013	0.0016	0.0017	0.0019	0.0021
10	0.2632	0.5291	2680	0.0002	0.0004	0.0007	0.0010	0.0013	0.0015	0.0018	0.0021	0.0023
11	0.2641	0.5285	2663	0.0001	0.0003	0.0007	0.0011	0.0014	0.0016	0.0019	0.0021	0.0023
12	0.2637	0.5281	2673	0.0001	0.0003	0.0004	0.0007	0.0011	0.0014	0.0016	0.0019	0.0022
13	0.2661	0.5299	2618	0.0002	0.0004	0.0007	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023
14	0.2645	0.5282	2656	0.0002	0.0004	0.0007	0.0009	0.0013	0.0015	0.0016	0.0018	0.0021
15	0.2634	0.5278	2680	0.0001	0.0003	0.0006	0.0009	0.0013	0.0016	0.0018	0.0018	0.0019
16	0.2628	0.5259	2699	0.0002	0.0004	0.0006	0.0009	0.0010	0.0011	0.0015	0.0018	0.0019
17	0.2643	0.5274	2662	0.0001	0.0004	0.0007	0.0010	0.0013	0.0014	0.0015	0.0016	0.0017
18	0.2660	0.5302	2618	0.0002	0.0005	0.0007	0.0013	0.0016	0.0017	0.0018	0.0019	0.0020
19	0.2653	0.5280	2641	0.0001	0.0004	0.0008	0.0011	0.0014	0.0017	0.0018	0.0021	0.0023
20	0.2632	0.5264	2689	0.0001	0.0004	0.0005	0.0006	0.0009	0.0012	0.0015	0.0017	0.0019
21	0.2651	0.5284	2642	0.0001	0.0002	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0019
22	0.2643	0.5271	2665	0.0001	0.0002	0.0004	0.0007	0.0009	0.0011	0.0014	0.0015	0.0017
23	0.2637	0.5276	2674	0.0003	0.0003	0.0006	0.0008	0.0009	0.0010	0.0012	0.0015	0.0017
24	0.2655	0.5274	2638	0.0002	0.0004	0.0008	0.0011	0.0011	0.0012	0.0013	0.0014	0.0015
25	0.2654	0.5294	2633	0.0003	0.0005	0.0008	0.0010	0.0011	0.0012	0.0013	0.0014	0.0017
Avg.	0.2643	0.5280	2662	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
Med.	0.2642	0.5279	2663	0.0001	0.0004	0.0006	0.0009	0.0011	0.0013	0.0015	0.0018	0.0019
st dev	0.0013	0.0011	28	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.2621	0.5259	2618	0.0001	0.0002	0.0003	0.0005	0.0009	0.0010	0.0012	0.0013	0.0015
Max.	0.2662	0.5302	2708	0.0004	0.0006	0.0009	0.0013	0.0016	0.0017	0.0019	0.0021	0.0023

3.4 Data Set 2, 85°C, 20mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	142.5	100.07	99.86	99.58	99.37	99.09	98.88	98.53	98.18	97.82
27	143.5	100.07	99.79	99.44	99.02	98.68	98.40	98.12	97.91	97.63
28	143.5	100.14	99.79	99.44	99.16	98.95	98.54	98.12	97.77	97.42
29	141.4	99.86	99.36	99.08	98.73	98.37	98.02	97.67	97.31	96.96
30	144.0	99.79	99.44	99.24	98.96	98.61	98.13	97.78	97.57	97.22
31	141.4	99.86	99.72	99.43	99.15	99.01	98.59	98.30	97.88	97.67
32	144.1	100.14	99.65	99.31	98.96	98.61	98.40	98.13	97.85	97.57
33	142.2	100.07	99.58	99.16	98.87	98.52	98.10	97.75	97.54	97.19
34	143.8	100.14	99.86	99.51	99.30	98.96	98.61	98.40	98.05	97.71
35	143.8	100.14	99.79	99.72	99.24	99.10	98.75	98.47	98.19	97.91
36	143.2	100.14	99.79	99.44	99.09	98.81	98.39	98.04	97.63	97.21
37	143.0	100.21	99.79	99.44	99.23	98.81	98.53	98.11	97.83	97.41
38	143.7	100.21	99.86	99.44	99.30	99.03	98.75	98.54	98.19	97.91
39	142.2	100.14	99.79	99.44	99.30	99.16	98.73	98.38	98.10	97.75
40	142.4	100.07	99.58	99.09	98.88	98.53	98.10	97.75	97.40	96.98
41	142.0	100.21	99.86	99.44	99.23	98.94	98.66	98.45	98.24	97.96
42	142.6	99.86	99.58	99.09	99.02	98.74	98.39	98.04	97.62	97.19
43	137.5	100.15	99.64	99.49	99.13	99.05	98.76	98.62	98.33	97.96
44	142.3	99.93	99.65	99.23	99.02	98.95	98.74	98.45	98.10	97.75
45	143.5	100.07	99.72	99.58	99.44	99.02	98.68	98.40	98.12	97.77
46	141.6	99.79	99.65	99.22	99.01	98.73	98.23	97.88	97.67	97.39
47	143.4	99.86	99.58	99.37	99.16	98.81	98.47	98.19	97.77	97.56
48	143.1	100.07	99.86	99.58	99.30	99.09	98.67	98.39	98.11	97.90
49	144.6	100.14	99.79	99.52	99.24	98.96	98.62	98.34	98.06	97.72
50	144.7	100.21	99.52	99.17	99.10	98.41	98.20	97.79	97.58	97.30
Avg.	142.8	100.05	99.70	99.38	99.13	98.84	98.49	98.19	97.88	97.55
Med.	143.1	100.07	99.72	99.44	99.15	98.94	98.54	98.19	97.88	97.63
st dev	1.4	0.14	0.14	0.18	0.1733	0.23	0.25	0.29	0.28	0.31
Min.	137.5	99.79	99.36	99.08	98.73	98.37	98.02	97.67	97.31	96.96
Max.	144.7	100.21	99.86	99.72	99.44	99.16	98.88	98.62	98.33	97.96

3.5 Data Set 2, 85°C, 20mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	53.62	53.67	53.77	53.80	53.81	53.62	53.65	53.70	53.71	53.65
27	53.43	53.46	53.54	53.59	53.58	53.41	53.45	53.46	53.46	53.47
28	53.67	53.73	53.89	53.82	53.84	53.66	53.72	53.72	53.72	53.69
29	53.33	53.41	53.48	53.47	53.49	53.33	53.38	53.41	53.40	53.35
30	53.52	53.53	53.63	53.67	53.66	53.51	53.55	53.54	53.55	53.52
31	53.83	53.84	53.86	53.90	53.87	53.69	53.75	53.77	53.77	53.73
32	53.42	53.45	53.54	53.62	53.71	53.52	53.42	53.45	53.54	53.44
33	53.39	53.42	53.67	53.52	53.54	53.37	53.43	53.44	53.39	53.40
34	53.34	53.38	53.45	53.48	53.48	53.34	53.34	53.38	53.39	53.39
35	53.30	53.36	53.56	53.50	53.48	53.29	53.38	53.34	53.39	53.37
36	53.34	53.41	53.49	53.49	53.52	53.34	53.41	53.44	53.41	53.38
37	53.39	53.49	53.55	53.57	53.58	53.42	53.48	53.45	53.45	53.46
38	53.66	53.75	53.80	53.88	53.83	53.64	53.68	53.71	53.72	53.72
39	53.30	53.33	53.55	53.49	53.46	53.29	53.32	53.34	53.35	53.34
40	53.61	53.36	53.45	53.48	53.51	53.32	53.35	53.38	53.36	53.37
41	53.21	53.29	53.36	53.38	53.40	53.23	53.26	53.27	53.29	53.26
42	53.69	53.74	53.84	53.87	53.94	53.70	53.73	53.76	53.74	53.74
43	53.61	53.68	53.86	53.77	53.78	53.59	53.65	53.67	53.64	53.63
44	53.57	53.48	53.55	53.60	53.59	53.44	53.47	53.50	53.49	53.48
45	53.73	53.78	53.85	53.92	53.90	53.72	53.77	53.77	53.79	53.77
46	53.30	53.34	53.42	53.47	53.48	53.31	53.35	53.32	53.34	53.32
47	53.45	53.48	53.64	53.59	53.59	53.46	53.44	53.49	53.46	53.42
48	53.35	53.39	53.51	53.63	53.71	53.55	53.28	53.25	53.63	53.49
49	53.71	53.77	53.87	53.91	53.94	53.79	53.80	53.79	53.78	53.73
50	53.36	53.40	53.44	53.50	53.52	53.31	53.41	53.38	53.39	53.36
Avg.	53.49	53.52	53.62	53.64	53.65	53.47	53.50	53.51	53.53	53.50
Med.	53.43	53.46	53.55	53.59	53.59	53.44	53.44	53.45	53.46	53.46
st dev	0.17	0.17	0.17	0.17	0.17	0.16	0.17	0.17	0.16	0.16
Min.	53.21	53.29	53.36	53.38	53.40	53.23	53.26	53.25	53.29	53.26
Max.	53.83	53.84	53.89	53.92	53.94	53.79	53.80	53.79	53.79	53.77

3.6 Data Set 2, 85°C, 20mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2648	0.5279	2651	0.0003	0.0006	0.0008	0.0010	0.0012	0.0015	0.0016	0.0018	0.0019
27	0.2654	0.5281	2639	0.0003	0.0005	0.0009	0.0011	0.0013	0.0015	0.0016	0.0018	0.0021
28	0.2631	0.5273	2688	0.0002	0.0005	0.0008	0.0011	0.0013	0.0015	0.0018	0.0020	0.0021
29	0.2638	0.5287	2668	0.0001	0.0005	0.0009	0.0013	0.0014	0.0016	0.0018	0.0020	0.0022
30	0.2632	0.5269	2687	0.0004	0.0005	0.0009	0.0011	0.0014	0.0017	0.0018	0.0019	0.0022
31	0.2644	0.5284	2657	0.0003	0.0008	0.0013	0.0017	0.0021	0.0023	0.0025	0.0028	0.0029
32	0.2632	0.5277	2684	0.0002	0.0004	0.0006	0.0007	0.0013	0.0016	0.0019	0.0023	0.0025
33	0.2647	0.5288	2649	0.0003	0.0005	0.0008	0.0011	0.0012	0.0015	0.0017	0.0021	0.0023
34	0.2657	0.5288	2629	0.0004	0.0006	0.0008	0.0009	0.0012	0.0013	0.0016	0.0018	0.0022
35	0.2630	0.5260	2695	0.0001	0.0004	0.0006	0.0009	0.0013	0.0014	0.0015	0.0016	0.0019
36	0.2656	0.5284	2634	0.0003	0.0006	0.0008	0.0009	0.0012	0.0015	0.0017	0.0018	0.0020
37	0.2617	0.5278	2714	0.0002	0.0004	0.0008	0.0011	0.0011	0.0013	0.0015	0.0018	0.0020
38	0.2633	0.5286	2679	0.0004	0.0007	0.0010	0.0013	0.0014	0.0017	0.0018	0.0020	0.0021
39	0.2634	0.5280	2680	0.0004	0.0007	0.0008	0.0013	0.0014	0.0016	0.0018	0.0021	0.0022
40	0.2635	0.5282	2677	0.0002	0.0005	0.0007	0.0010	0.0014	0.0016	0.0018	0.0021	0.0023
41	0.2626	0.5271	2699	0.0001	0.0006	0.0008	0.0010	0.0012	0.0013	0.0016	0.0021	0.0023
42	0.2632	0.5268	2687	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0018	0.0019	0.0022
43	0.2662	0.5289	2619	0.0002	0.0006	0.0009	0.0013	0.0015	0.0017	0.0018	0.0018	0.0021
44	0.2628	0.5267	2696	0.0001	0.0004	0.0008	0.0012	0.0015	0.0017	0.0018	0.0019	0.0021
45	0.2643	0.5297	2654	0.0004	0.0006	0.0009	0.0012	0.0016	0.0018	0.0019	0.0021	0.0022
46	0.2640	0.5283	2666	0.0004	0.0006	0.0009	0.0013	0.0016	0.0018	0.0020	0.0022	0.0023
47	0.2622	0.5265	2709	0.0003	0.0005	0.0007	0.0011	0.0014	0.0018	0.0019	0.0023	0.0026
48	0.2624	0.5287	2696	0.0001	0.0004	0.0005	0.0008	0.0012	0.0016	0.0019	0.0025	0.0027
49	0.2660	0.5303	2619	0.0004	0.0006	0.0008	0.0010	0.0013	0.0017	0.0019	0.0022	0.0023
50	0.2641	0.5285	2662	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019	0.0021	0.0024	0.0025
Avg.	0.2639	0.5280	2670	0.0003	0.0006	0.0008	0.0011	0.0014	0.0016	0.0018	0.0020	0.0023
Med.	0.2635	0.5282	2677	0.0003	0.0006	0.0008	0.0011	0.0014	0.0016	0.0018	0.0020	0.0022
st dev	0.0012	0.0010	27	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002
Min.	0.2617	0.5260	2619	0.0001	0.0004	0.0005	0.0007	0.0011	0.0013	0.0015	0.0016	0.0019
Max.	0.2662	0.5303	2714	0.0005	0.0008	0.0013	0.0017	0.0021	0.0023	0.0025	0.0028	0.0029

3.7 Data Set 3, 115° C, 20mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	142.9	100.14	99.58	99.23	99.16	98.88	98.60	98.25	97.76	97.34
52	142.6	99.79	99.37	98.81	98.32	97.90	97.48	97.05	96.63	96.42
53	145.1	99.93	99.72	99.31	98.90	98.55	98.14	97.79	97.66	97.38
54	143.8	99.93	99.51	99.10	98.75	98.19	97.77	97.43	96.94	96.87
55	142.5	100.07	99.44	99.09	98.81	98.60	98.18	97.75	97.54	97.12
56	143.9	100.21	99.79	99.31	99.03	98.75	98.33	97.98	97.92	97.50
57	143.5	100.07	99.58	99.09	98.75	98.26	97.91	97.56	97.21	96.72
58	142.6	100.21	99.93	99.51	99.30	99.09	98.81	98.46	98.25	97.90
59	142.2	99.93	99.44	99.23	99.02	98.59	98.24	97.89	97.54	97.26
60	143.8	100.07	99.79	99.44	98.96	98.54	98.19	97.77	97.64	97.57
61	142.3	99.93	99.72	99.58	99.16	99.09	98.59	98.10	97.61	97.12
62	141.5	99.86	99.43	98.94	98.73	98.37	98.02	97.74	97.31	96.96
63	143.1	99.93	99.37	98.88	98.53	98.25	97.97	97.55	97.06	96.72
64	143.7	99.93	99.44	99.23	99.16	98.89	98.54	98.26	98.05	97.70
65	143.4	99.86	99.51	99.09	98.74	98.33	97.91	97.42	96.86	96.37
66	144.2	100.14	99.65	99.10	98.89	98.54	98.06	97.85	97.43	97.09
67	142.8	99.93	99.44	99.16	98.95	98.67	98.39	97.90	97.48	97.27
68	144.7	99.72	99.31	98.96	98.62	98.27	97.86	97.51	97.37	96.82
69	143.9	99.93	99.72	99.31	99.03	98.54	98.26	97.98	97.57	97.36
70	142.4	99.72	99.51	99.16	98.81	98.53	98.10	97.68	97.40	96.98
71	142.4	100.07	99.72	99.44	98.95	98.60	98.31	97.89	97.40	96.91
72	143.6	99.72	99.44	98.89	98.75	98.33	97.91	97.63	97.21	96.80
73	141.5	100.14	99.79	99.22	98.87	98.52	98.16	97.81	97.31	96.82
74	142.4	99.93	99.51	99.09	98.95	98.67	98.17	97.68	97.33	97.05
75	141.3	99.93	99.58	98.94	98.66	98.16	97.66	97.45	97.10	96.53
Avg.	143.0	99.96	99.57	99.16	98.87	98.52	98.14	97.78	97.42	97.06
Med.	142.9	99.93	99.51	99.16	98.89	98.54	98.16	97.77	97.40	97.05
st dev	1.0	0.14	0.16	0.20	0.2192	0.28	0.31	0.31	0.36	0.39
Min.	141.3	99.72	99.31	98.81	98.32	97.90	97.48	97.05	96.63	96.37
Max.	145.1	100.21	99.93	99.58	99.30	99.09	98.81	98.46	98.25	97.90

3.8 Data Set 3, 115° C, 20mA (Forward Voltage)

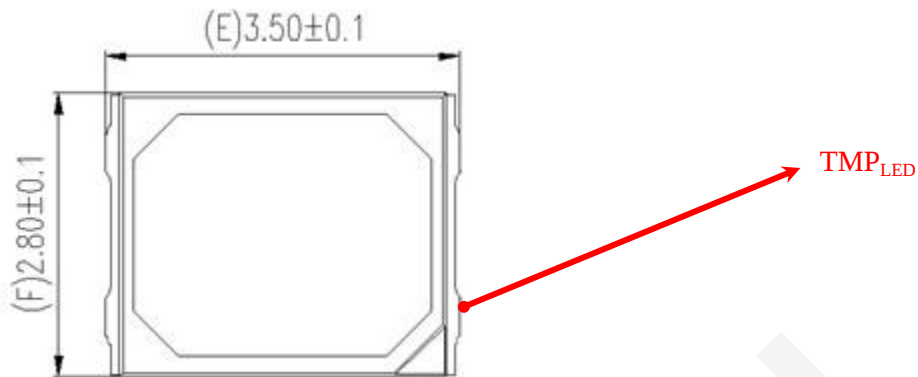
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	53.63	53.67	53.72	53.75	53.75	53.66	53.68	53.65	53.66	53.65
52	53.79	53.80	53.88	53.93	53.92	53.77	53.80	53.78	53.75	53.78
53	53.32	53.40	53.67	53.51	53.52	53.39	53.40	53.39	53.40	53.41
54	53.72	53.74	53.86	53.86	53.92	54.05	53.39	53.65	53.40	53.31
55	53.35	53.54	53.49	53.50	53.52	53.39	53.39	53.38	53.38	53.34
56	53.64	53.74	53.77	53.80	53.82	53.67	53.64	53.70	53.72	53.65
57	53.53	54.07	53.65	53.70	53.81	53.68	53.79	53.93	53.92	53.91
58	53.60	53.63	53.72	53.74	53.78	53.62	53.61	53.67	53.69	53.62
59	53.65	53.68	53.80	53.81	53.81	53.68	53.66	53.68	53.68	53.62
60	53.64	53.71	53.78	53.80	53.83	53.69	53.70	53.71	53.70	53.65
61	53.50	53.58	53.64	53.73	53.79	53.70	53.81	53.46	53.73	54.80
62	53.29	53.48	53.45	53.47	53.48	53.39	53.32	53.39	53.35	53.33
63	53.67	53.72	54.01	53.62	54.06	53.38	53.62	53.78	53.35	53.33
64	53.31	53.36	53.42	53.48	53.49	53.39	53.32	53.39	53.37	53.34
65	53.49	53.58	53.95	53.66	53.74	53.53	53.52	53.57	53.55	53.54
66	53.69	53.74	53.93	53.82	53.88	53.75	53.74	53.76	53.77	53.74
67	53.28	53.39	53.40	53.44	53.44	53.31	53.34	53.34	53.34	53.33
68	53.49	53.62	53.60	53.68	53.71	53.62	53.54	53.56	53.68	53.54
69	53.58	53.67	53.78	53.72	53.78	53.63	53.62	53.64	53.64	53.62
70	53.26	53.36	53.38	53.46	53.49	53.37	53.33	53.36	53.31	53.32
71	53.64	53.72	53.77	53.78	53.79	53.72	53.65	53.67	53.69	53.66
72	53.64	53.70	53.77	53.77	53.79	53.63	53.62	53.69	53.69	53.68
73	53.62	53.69	53.73	53.76	53.79	53.64	53.63	53.67	53.66	53.64
74	53.74	53.82	53.90	53.92	53.97	53.78	53.80	53.82	53.80	53.79
75	53.31	53.38	53.57	53.44	53.44	53.35	53.30	53.35	53.36	53.32
Avg.	53.54	53.63	53.71	53.69	53.73	53.59	53.57	53.60	53.58	53.60
Med.	53.60	53.67	53.73	53.73	53.79	53.63	53.62	53.65	53.66	53.62
st dev	0.16	0.17	0.18	0.15	0.18	0.18	0.17	0.17	0.18	0.31
Min.	53.26	53.36	53.38	53.44	53.44	53.31	53.30	53.34	53.31	53.31
Max.	53.79	54.07	54.01	53.93	54.06	54.05	53.81	53.93	53.92	54.80

3.9 Data Set 3, 115° C, 20mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2641	0.5272	2668	0.0005	0.0006	0.0009	0.0011	0.0013	0.0014	0.0017	0.0021	0.0024
52	0.2620	0.5274	2711	0.0005	0.0007	0.0010	0.0012	0.0014	0.0016	0.0017	0.0019	0.0020
53	0.2627	0.5286	2691	0.0004	0.0006	0.0009	0.0012	0.0014	0.0016	0.0018	0.0021	0.0022
54	0.2640	0.5275	2668	0.0006	0.0008	0.0011	0.0013	0.0017	0.0019	0.0022	0.0023	0.0025
55	0.2630	0.5274	2689	0.0005	0.0008	0.0010	0.0012	0.0016	0.0018	0.0022	0.0023	0.0025
56	0.2626	0.5289	2692	0.0005	0.0008	0.0010	0.0013	0.0017	0.0018	0.0019	0.0023	0.0025
57	0.2627	0.5265	2700	0.0005	0.0008	0.0009	0.0014	0.0017	0.0020	0.0021	0.0022	0.0024
58	0.2651	0.5294	2639	0.0004	0.0007	0.0010	0.0013	0.0015	0.0019	0.0021	0.0023	0.0024
59	0.2647	0.5290	2650	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019	0.0020	0.0022	0.0025
60	0.2647	0.5293	2648	0.0004	0.0007	0.0010	0.0012	0.0015	0.0016	0.0019	0.0022	0.0025
61	0.2633	0.5280	2682	0.0006	0.0009	0.0013	0.0015	0.0018	0.0020	0.0021	0.0025	0.0026
62	0.2627	0.5284	2691	0.0004	0.0006	0.0009	0.0013	0.0016	0.0017	0.0018	0.0020	0.0023
63	0.2625	0.5272	2700	0.0003	0.0006	0.0008	0.0012	0.0021	0.0023	0.0024	0.0025	0.0027
64	0.2656	0.5269	2640	0.0005	0.0008	0.0010	0.0013	0.0016	0.0017	0.0019	0.0023	0.0025
65	0.2640	0.5265	2673	0.0007	0.0010	0.0012	0.0014	0.0015	0.0018	0.0020	0.0022	0.0025
66	0.2627	0.5276	2696	0.0005	0.0009	0.0012	0.0013	0.0014	0.0016	0.0018	0.0019	0.0021
67	0.2644	0.5272	2661	0.0004	0.0008	0.0009	0.0012	0.0016	0.0017	0.0019	0.0021	0.0024
68	0.2637	0.5269	2676	0.0005	0.0009	0.0013	0.0015	0.0019	0.0020	0.0021	0.0024	0.0025
69	0.2634	0.5274	2680	0.0005	0.0007	0.0011	0.0014	0.0019	0.0021	0.0023	0.0025	0.0026
70	0.2635	0.5263	2683	0.0004	0.0009	0.0012	0.0015	0.0017	0.0020	0.0022	0.0026	0.0030
71	0.2646	0.5273	2656	0.0005	0.0009	0.0012	0.0015	0.0017	0.0020	0.0022	0.0025	0.0028
72	0.2618	0.5277	2714	0.0005	0.0009	0.0011	0.0015	0.0018	0.0021	0.0023	0.0026	0.0028
73	0.2628	0.5261	2698	0.0004	0.0007	0.0009	0.0011	0.0015	0.0017	0.0019	0.0021	0.0025
74	0.2652	0.5299	2637	0.0005	0.0008	0.0012	0.0014	0.0018	0.0020	0.0022	0.0024	0.0026
75	0.2643	0.5289	2658	0.0005	0.0009	0.0013	0.0017	0.0018	0.0021	0.0023	0.0024	0.0026
Avg.	0.2636	0.5277	2676	0.0005	0.0008	0.0011	0.0013	0.0016	0.0018	0.0020	0.0023	0.0025
Med.	0.2635	0.5274	2680	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019	0.0021	0.0023	0.0025
st dev	0.0010	0.0010	23	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2618	0.5261	2637	0.0003	0.0006	0.0008	0.0011	0.0013	0.0014	0.0017	0.0019	0.0020
Max.	0.2656	0.5299	2714	0.0007	0.0010	0.0013	0.0017	0.0021	0.0023	0.0024	0.0026	0.0030

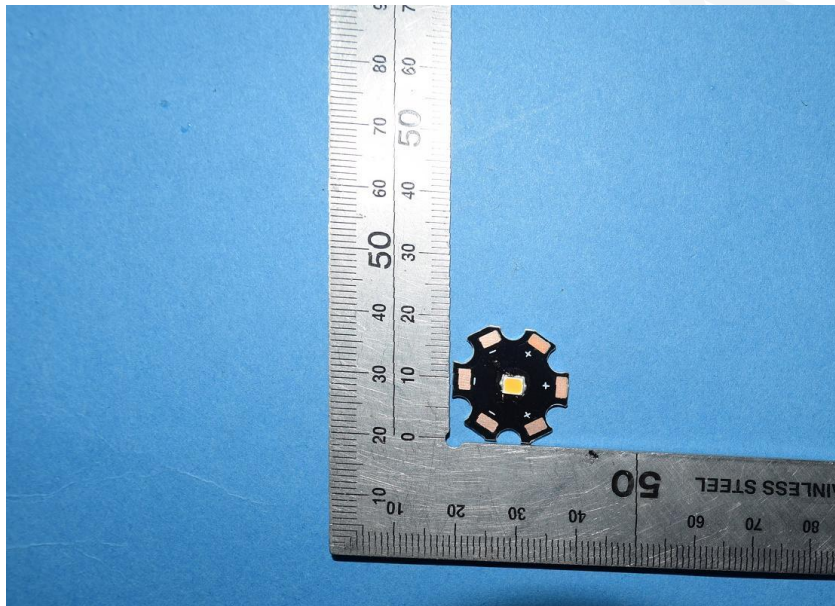
4 - DUT Photo

4.1 #Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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.
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