



TEST REPORT

According to ANSI/IES LM-80-15
For

Jiangxi MTC Optronics Co.,Ltd

199 Hujia road, changdong industrial park, qingshanhu district, nanchang city, jiangxi province

Model: MKXWM-FX

Report Type: 10000 Hours Test Report	Product Type: LED Package
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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 2020-09-10. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

Manufacturer:	Jiangxi MTC Optronics Co.,Ltd
Part Number:	MKXWM-FX
Part Type:	LED Package
#Drive Level:	DC 150mA
#Nominal CCT:	2700K
#Power:	1W
#Average Current Density per LED die:	969mA/mm ²
#Average Power Density per LED die:	3.2 W/mm ²
#CRI:	80
#Die Spacing:	0.4mm

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:

Test Models	Multiple Models	Differences Items
MKXWM-FX	MKXxM-xx	x1=CCT, x2,x3=Lm Rank
MKXWM-FX	MTR-28XxM-xxx	x1=CCT .x2,x3,x4==Product specification

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
High Accuracy Array Spectroradiometer	EVERFINE	HAAS 2000	P600674CM5391140	2021-09-27	2022-09-26
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2021-09-27	2022-09-26
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2021-09-24	2022-09-23

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D062	1011093	2021-10-15	2022-10-14
Multilayer aging machine	BACL	B2-270	20013	2021-02-24	2022-02-23
Program-controlled D.C. Stabilized Voltage Supply	Hanshenpuyuan	HSPY-200-01	N/A	2021-06-30	2022-06-29

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: 85°C, 150mA

Part Number: MKXWM-FX
Number of Units: 25
Case Temperature: >83°C
Ambient Temperature: >80°C
Life Test Drive Current: 150mA
Measurement Current: 150mA

Data Set 2: 105°C, 150mA

Part Number: MKXWM-FX
Number of Units: 25
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 150mA
Measurement Current: 150mA

Data Set 3: 115° C, 150mA

Part Number: MKXWM-FX
Number of Units: 25
Case Temperature: >113°C
Ambient Temperature: >110°C
Life Test Drive Current: 150mA
Measurement Current: 150mA

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	10000hrs	2.123E-06	1.004	>60000 hours	51,000 hours
2	25	0	1000hrs	10000hrs	2.422E-06	1.003	>60000 hours	45,000 hours
3	25	0	1000hrs	10000hrs	2.884E-06	1.003	>60000 hours	38,000 hours

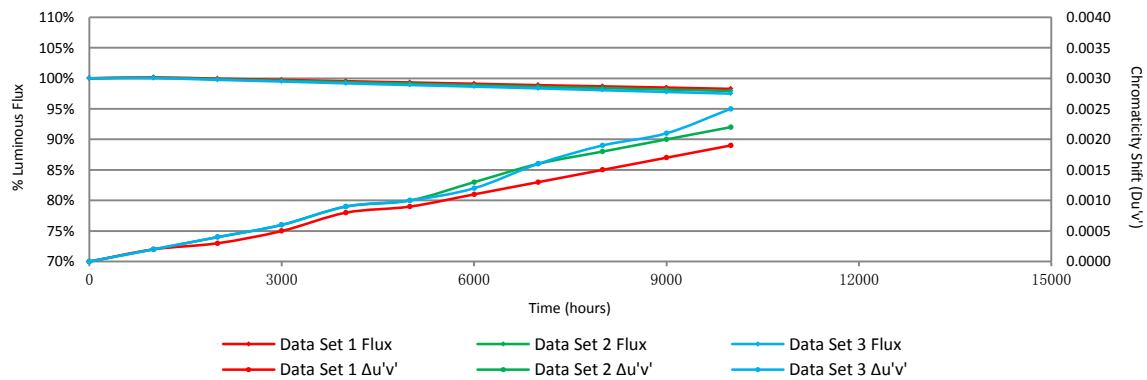
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	100.15%	99.94%	99.74%	99.53%	99.32%	99.11%	98.88%	98.68%	98.48%	98.27%
2	100.09%	99.85%	99.61%	99.37%	99.12%	98.87%	98.62%	98.40%	98.16%	97.92%
3	100.02%	99.74%	99.47%	99.17%	98.89%	98.63%	98.35%	98.05%	97.76%	97.49%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.0002	0.0003	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
2	0.0002	0.0004	0.0006	0.0009	0.001	0.0013	0.0016	0.0018	0.002	0.0022
3	0.0002	0.0004	0.0006	0.0009	0.001	0.0012	0.0016	0.0019	0.0021	0.0025

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 150mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	134.80	100.07	99.93	99.78	99.55	99.41	99.33	99.18	98.89	98.74	98.59
2	134.90	100.30	100.15	99.93	99.78	99.70	99.48	99.26	99.04	98.74	98.59
3	135.40	100.07	99.93	99.70	99.48	99.19	98.89	98.67	98.38	98.08	97.86
4	135.10	100.07	99.93	99.63	99.48	99.19	98.96	98.89	98.74	98.59	98.45
5	134.30	100.15	99.93	99.70	99.40	99.18	98.96	98.81	98.66	98.44	98.36
6	134.50	100.15	99.93	99.78	99.63	99.48	99.33	98.96	98.74	98.66	98.51
7	134.90	99.93	99.78	99.56	99.48	99.26	99.11	98.89	98.67	98.59	98.44
8	134.80	100.22	99.93	99.70	99.48	99.26	99.04	98.81	98.59	98.37	98.15
9	132.80	100.30	100.08	99.85	99.55	99.47	99.02	98.80	98.72	98.57	98.42
10	136.20	100.07	99.85	99.78	99.63	99.49	99.19	98.97	98.83	98.53	98.31
11	132.80	100.23	99.85	99.77	99.55	99.40	99.17	98.87	98.72	98.57	98.42
12	133.90	100.30	100.07	99.85	99.78	99.55	99.33	99.03	98.81	98.58	98.36
13	136.10	100.22	99.93	99.71	99.49	99.27	99.04	98.82	98.60	98.31	98.09
14	134.20	100.07	99.85	99.63	99.55	99.18	99.03	98.81	98.73	98.44	98.14
15	134.20	100.30	99.93	99.85	99.63	99.40	99.33	99.11	98.81	98.66	98.51
16	134.10	100.07	99.93	99.70	99.55	99.25	99.11	98.88	98.66	98.36	98.28
17	133.70	100.15	99.93	99.63	99.33	99.03	98.80	98.58	98.35	98.13	97.91
18	134.80	100.07	99.93	99.63	99.33	99.11	98.89	98.81	98.66	98.44	98.22
19	134.60	100.07	99.93	99.70	99.41	99.18	99.03	98.89	98.59	98.44	98.14
20	134.50	100.15	99.93	99.78	99.55	99.41	99.26	98.88	98.66	98.44	98.22
21	133.10	100.30	100.08	99.85	99.40	99.17	98.95	98.72	98.57	98.42	97.97
22	134.80	100.15	99.93	99.70	99.48	99.26	99.04	98.81	98.59	98.37	98.15
23	135.20	100.00	99.93	99.85	99.63	99.56	99.26	99.11	98.89	98.82	98.59
24	134.30	100.15	99.93	99.63	99.40	99.18	98.96	98.73	98.51	98.29	98.06
25	135.80	100.22	100.07	99.85	99.63	99.41	99.12	98.82	98.53	98.31	98.09
Avg.	134.55	100.15	99.94	99.74	99.53	99.32	99.11	98.88	98.68	98.48	98.27
Med.	134.60	100.15	99.93	99.71	99.55	99.26	99.04	98.87	98.66	98.44	98.28
st dev	0.88	0.10	0.08	0.10	0.12	0.16	0.17	0.16	0.15	0.18	0.22
Min.	132.80	99.93	99.78	99.56	99.33	99.03	98.80	98.58	98.35	98.08	97.86
Max.	136.20	100.30	100.15	99.93	99.78	99.70	99.48	99.26	99.04	98.82	98.59

3.2 Data Set 1, 85°C, 150mA (Forward Voltage)

No.	Forward Voltage (V)										
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	6.250	6.277	6.278	6.280	6.271	6.268	6.272	6.279	6.274	6.270	6.274
2	6.273	6.268	6.273	6.277	6.276	6.271	6.278	6.275	6.274	6.271	6.273
3	6.275	6.275	6.271	6.276	6.272	6.277	6.276	6.272	6.275	6.271	6.279
4	6.271	6.278	6.275	6.273	6.280	6.276	6.271	6.269	6.269	6.279	6.277
5	6.250	6.275	6.279	6.278	6.278	6.275	6.274	6.270	6.272	6.278	6.270
6	6.278	6.272	6.278	6.276	6.276	6.280	6.278	6.278	6.276	6.274	6.277
7	6.258	6.274	6.280	6.268	6.271	6.274	6.269	6.273	6.275	6.268	6.275
8	6.269	6.270	6.277	6.277	6.278	6.270	6.279	6.272	6.274	6.271	6.269
9	6.254	6.272	6.272	6.271	6.276	6.273	6.273	6.278	6.279	6.279	6.269
10	6.271	6.271	6.280	6.268	6.269	6.269	6.273	6.276	6.271	6.274	6.278
11	6.275	6.274	6.274	6.269	6.274	6.280	6.270	6.276	6.278	6.275	6.275
12	6.252	6.275	6.278	6.273	6.273	6.269	6.277	6.275	6.275	6.278	6.268
13	6.258	6.278	6.279	6.273	6.274	6.274	6.269	6.275	6.268	6.273	6.275
14	6.266	6.274	6.277	6.270	6.274	6.270	6.274	6.278	6.276	6.270	6.274
15	6.258	6.276	6.280	6.280	6.273	6.275	6.270	6.269	6.280	6.276	6.271
16	6.269	6.271	6.271	6.270	6.271	6.272	6.277	6.273	6.271	6.276	6.275
17	6.257	6.270	6.278	6.274	6.276	6.278	6.269	6.275	6.268	6.276	6.275
18	6.270	6.280	6.274	6.279	6.271	6.276	6.280	6.271	6.272	6.277	6.273
19	6.254	6.271	6.274	6.276	6.271	6.279	6.280	6.271	6.278	6.278	6.278
20	6.271	6.268	6.269	6.277	6.278	6.270	6.274	6.272	6.270	6.276	6.276
21	6.255	6.270	6.275	6.274	6.273	6.276	6.274	6.276	6.280	6.271	6.273
22	6.250	6.270	6.269	6.275	6.269	6.278	6.271	6.279	6.268	6.272	6.272
23	6.261	6.278	6.275	6.276	6.276	6.278	6.274	6.279	6.271	6.272	6.274
24	6.257	6.273	6.270	6.271	6.275	6.270	6.280	6.269	6.270	6.277	6.278
25	6.258	6.277	6.273	6.272	6.277	6.272	6.276	6.268	6.272	6.275	6.270
Avg.	6.262	6.273	6.275	6.274	6.274	6.274	6.274	6.274	6.273	6.274	6.274
Med.	6.258	6.274	6.275	6.274	6.274	6.274	6.274	6.275	6.274	6.275	6.274
st dev	0.009	0.003	0.004	0.004	0.003	0.004	0.004	0.004	0.004	0.003	0.003
Min.	6.250	6.268	6.269	6.268	6.269	6.268	6.269	6.268	6.268	6.268	6.268
Max.	6.278	6.280	6.280	6.280	6.280	6.280	6.280	6.279	6.280	6.279	6.279

3.3 Data Set 1, 85°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	0.2622	0.5253	2714	0.0001	0.0000	0.0003	0.0003	0.0006	0.0006	0.0011	0.0012	0.0015	0.0017
2	0.2598	0.5232	2776	0.0002	0.0002	0.0006	0.0006	0.0008	0.0009	0.0011	0.0014	0.0019	0.0023
3	0.2576	0.5237	2821	0.0002	0.0004	0.0005	0.0008	0.0009	0.0013	0.0012	0.0014	0.0016	0.0020
4	0.2604	0.5249	2754	0.0001	0.0004	0.0004	0.0007	0.0007	0.0011	0.0013	0.0013	0.0016	0.0018
5	0.2605	0.5242	2755	0.0002	0.0004	0.0004	0.0008	0.0007	0.0011	0.0013	0.0013	0.0014	0.0017
6	0.2583	0.5253	2798	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0013	0.0013	0.0015	0.0017
7	0.2597	0.5244	2772	0.0002	0.0003	0.0005	0.0006	0.0008	0.0011	0.0013	0.0014	0.0014	0.0016
8	0.2610	0.5256	2739	0.0002	0.0004	0.0006	0.0009	0.0009	0.0011	0.0013	0.0015	0.0016	0.0018
9	0.2575	0.5248	2817	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0013	0.0016	0.0018	0.0016
10	0.2580	0.5248	2807	0.0002	0.0003	0.0005	0.0008	0.0008	0.0011	0.0013	0.0015	0.0018	0.0018
11	0.2602	0.5221	2772	0.0002	0.0003	0.0006	0.0009	0.0010	0.0013	0.0014	0.0016	0.0019	0.0020
12	0.2588	0.5257	2785	0.0001	0.0003	0.0004	0.0008	0.0008	0.0013	0.0014	0.0016	0.0018	0.0019
13	0.2578	0.5256	2808	0.0002	0.0003	0.0004	0.0008	0.0009	0.0011	0.0013	0.0015	0.0018	0.0019
14	0.2609	0.5232	2750	0.0001	0.0004	0.0005	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019
15	0.2594	0.5257	2772	0.0001	0.0003	0.0005	0.0009	0.0010	0.0011	0.0014	0.0016	0.0018	0.0020
16	0.2596	0.5267	2765	0.0001	0.0004	0.0006	0.0009	0.0010	0.0011	0.0014	0.0016	0.0017	0.0019
17	0.2582	0.5262	2795	0.0003	0.0003	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0018
18	0.2591	0.5258	2778	0.0002	0.0004	0.0006	0.0009	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
19	0.2594	0.5257	2773	0.0001	0.0004	0.0005	0.0008	0.0010	0.0011	0.0013	0.0015	0.0018	0.0020
20	0.2594	0.5248	2777	0.0001	0.0004	0.0006	0.0008	0.0009	0.0012	0.0014	0.0016	0.0021	0.0020
21	0.2601	0.5239	2766	0.0002	0.0004	0.0007	0.0009	0.0010	0.0012	0.0013	0.0016	0.0018	0.0020
22	0.2597	0.5253	2768	0.0002	0.0003	0.0006	0.0008	0.0010	0.0011	0.0013	0.0016	0.0018	0.0021
23	0.2580	0.5246	2809	0.0001	0.0004	0.0006	0.0009	0.0009	0.0011	0.0014	0.0016	0.0018	0.0020
24	0.2599	0.5257	2762	0.0002	0.0004	0.0006	0.0009	0.0011	0.0011	0.0014	0.0016	0.0018	0.0021
25	0.2588	0.5242	2793	0.0001	0.0003	0.0006	0.0009	0.0009	0.0012	0.0014	0.0015	0.0018	0.0020
Avg.	0.2594	0.5249	2777	0.0002	0.0003	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
Med.	0.2594	0.5249	2773	0.0002	0.0004	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015	0.0018	0.0019
st dev	0.0012	0.0011	25	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002
Min.	0.2575	0.5221	2714	0.0001	0.0000	0.0003	0.0003	0.0006	0.0006	0.0011	0.0012	0.0014	0.0016
Max.	0.2622	0.5267	2821	0.0003	0.0004	0.0007	0.0009	0.0011	0.0013	0.0014	0.0016	0.0021	0.0023

3.4 Data Set 2, 105°C, 150mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	136.60	100.07	99.85	99.63	99.34	99.12	98.90	98.68	98.46	98.17	97.95
27	135.50	100.15	99.93	99.70	99.34	99.26	98.82	98.38	98.23	98.08	97.93
28	134.50	100.07	99.85	99.70	99.41	99.18	98.88	98.66	98.36	98.14	97.92
29	134.80	100.07	99.78	99.63	99.41	99.11	98.81	98.52	98.22	98.00	97.77
30	134.70	100.15	99.93	99.70	99.33	99.11	98.81	98.59	98.29	98.07	97.70
31	134.80	100.07	99.85	99.78	99.55	99.11	98.96	98.74	98.44	98.15	97.92
32	136.30	100.15	100.07	99.78	99.49	99.27	98.97	98.68	98.46	98.31	97.95
33	135.20	100.30	100.07	99.85	99.56	99.48	99.04	98.82	98.67	98.45	98.08
34	134.90	100.07	99.85	99.56	99.33	99.11	98.81	98.59	98.37	98.07	97.85
35	134.70	100.22	99.85	99.55	99.48	99.33	98.96	98.81	98.52	98.37	98.22
36	133.70	100.07	99.93	99.78	99.55	99.48	99.18	98.80	98.65	98.43	98.28
37	134.80	100.15	99.93	99.78	99.55	99.26	99.11	98.81	98.74	98.52	98.22
38	135.70	100.07	99.85	99.56	99.26	98.97	98.75	98.53	98.31	98.01	97.79
39	134.00	100.07	99.85	99.63	99.40	99.10	98.88	98.58	98.28	98.06	97.76
40	135.20	100.07	99.78	99.48	99.41	99.11	98.96	98.74	98.52	98.30	98.08
41	135.30	100.07	99.78	99.56	99.26	98.97	98.89	98.52	98.23	98.15	98.08
42	134.20	100.07	99.93	99.63	99.48	99.11	99.03	98.66	98.51	98.29	98.14
43	134.10	99.93	99.70	99.40	99.11	98.96	98.88	98.73	98.51	98.28	97.91
44	134.90	99.93	99.70	99.41	99.11	98.89	98.67	98.52	98.22	98.00	97.78
45	133.20	99.92	99.77	99.47	99.25	98.87	98.65	98.42	98.35	98.05	97.82
46	133.10	100.08	99.85	99.47	99.32	98.95	98.65	98.50	98.27	97.97	97.82
47	132.80	100.08	99.85	99.62	99.40	98.95	98.80	98.42	98.34	98.12	97.97
48	133.90	100.07	99.78	99.63	99.33	99.03	98.73	98.58	98.28	97.91	97.61
49	133.40	100.07	99.70	99.48	99.25	99.03	98.73	98.65	98.58	98.20	97.90
50	133.50	100.15	99.70	99.40	99.33	99.18	98.80	98.50	98.20	97.90	97.60
Avg.	134.55	100.09	99.85	99.61	99.37	99.12	98.87	98.62	98.40	98.16	97.92
Med.	134.70	100.07	99.85	99.63	99.34	99.11	98.88	98.59	98.36	98.14	97.92
st dev	0.97	0.08	0.10	0.13	0.13	0.16	0.14	0.13	0.16	0.17	0.18
Min.	132.80	99.92	99.70	99.40	99.11	98.87	98.65	98.38	98.20	97.90	97.60
Max.	136.60	100.30	100.07	99.85	99.56	99.48	99.18	98.82	98.74	98.52	98.28

3.5 Data Set 2, 105°C, 150mA (Forward Voltage)

No.	Forward Voltage (V)										
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	6.272	6.270	6.275	6.268	6.271	6.280	6.261	6.265	6.267	6.260	6.263
27	6.263	6.258	6.278	6.262	6.274	6.269	6.261	6.280	6.275	6.262	6.282
28	6.277	6.262	6.262	6.270	6.268	6.259	6.276	6.267	6.267	6.274	6.279
29	6.267	6.274	6.259	6.269	6.272	6.262	6.273	6.273	6.271	6.274	6.260
30	6.263	6.281	6.276	6.264	6.261	6.278	6.269	6.267	6.279	6.271	6.274
31	6.251	6.258	6.264	6.281	6.269	6.267	6.262	6.278	6.269	6.270	6.282
32	6.261	6.268	6.270	6.274	6.269	6.282	6.272	6.278	6.265	6.264	6.270
33	6.259	6.272	6.259	6.273	6.276	6.265	6.260	6.259	6.279	6.262	6.275
34	6.254	6.264	6.272	6.273	6.267	6.267	6.271	6.263	6.280	6.267	6.278
35	6.258	6.273	6.267	6.264	6.260	6.259	6.269	6.263	6.263	6.263	6.280
36	6.252	6.270	6.269	6.263	6.278	6.258	6.267	6.272	6.263	6.276	6.272
37	6.262	6.260	6.266	6.269	6.274	6.279	6.270	6.264	6.279	6.266	6.267
38	6.261	6.265	6.270	6.259	6.261	6.274	6.268	6.272	6.273	6.278	6.269
39	6.268	6.273	6.273	6.259	6.271	6.281	6.274	6.265	6.280	6.281	6.276
40	6.262	6.261	6.268	6.260	6.280	6.266	6.272	6.262	6.261	6.278	6.264
41	6.264	6.260	6.276	6.278	6.275	6.262	6.264	6.267	6.269	6.266	6.268
42	6.262	6.261	6.275	6.264	6.268	6.270	6.276	6.277	6.281	6.264	6.264
43	6.261	6.278	6.264	6.273	6.266	6.275	6.272	6.271	6.260	6.276	6.277
44	6.263	6.263	6.273	6.270	6.275	6.279	6.282	6.259	6.260	6.266	6.268
45	6.261	6.267	6.269	6.280	6.280	6.274	6.281	6.276	6.281	6.270	6.267
46	6.263	6.265	6.264	6.261	6.277	6.270	6.281	6.277	6.271	6.259	6.268
47	6.276	6.265	6.262	6.281	6.260	6.270	6.272	6.266	6.270	6.276	6.262
48	6.273	6.263	6.273	6.277	6.268	6.276	6.273	6.281	6.279	6.259	6.258
49	6.260	6.259	6.260	6.264	6.274	6.276	6.263	6.267	6.279	6.262	6.260
50	6.265	6.273	6.262	6.278	6.276	6.278	6.279	6.271	6.271	6.263	6.277
Avg.	6.263	6.267	6.268	6.269	6.271	6.271	6.271	6.270	6.272	6.268	6.270
Med.	6.262	6.265	6.269	6.269	6.271	6.270	6.272	6.267	6.271	6.266	6.269
st dev	0.006	0.006	0.006	0.007	0.006	0.007	0.006	0.007	0.007	0.007	0.007
Min.	6.251	6.258	6.259	6.259	6.260	6.258	6.260	6.259	6.260	6.259	6.258
Max.	6.277	6.281	6.278	6.281	6.280	6.282	6.282	6.281	6.281	6.281	6.282

3.6 Data Set 2, 105°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
26	0.2585	0.5274	2784	0.0001	0.0004	0.0006	0.0008	0.0009	0.0012	0.0013	0.0016	0.0018	0.0020
27	0.2594	0.5253	2776	0.0002	0.0004	0.0006	0.0009	0.0010	0.0012	0.0013	0.0016	0.0019	0.0021
28	0.2615	0.5251	2730	0.0002	0.0003	0.0006	0.0008	0.0009	0.0012	0.0015	0.0015	0.0018	0.0020
29	0.2597	0.5248	2771	0.0003	0.0004	0.0007	0.0009	0.0011	0.0013	0.0016	0.0016	0.0020	0.0021
30	0.2621	0.5245	2721	0.0002	0.0004	0.0006	0.0009	0.0010	0.0013	0.0016	0.0016	0.0018	0.0022
31	0.2602	0.5248	2760	0.0002	0.0005	0.0006	0.0008	0.0010	0.0013	0.0016	0.0016	0.0019	0.0021
32	0.2593	0.5239	2782	0.0001	0.0004	0.0006	0.0008	0.0010	0.0013	0.0016	0.0017	0.0018	0.0021
33	0.2601	0.5242	2765	0.0002	0.0004	0.0006	0.0009	0.0010	0.0012	0.0016	0.0018	0.0018	0.0021
34	0.2600	0.5247	2764	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0018	0.0020	0.0022
35	0.2601	0.5247	2762	0.0001	0.0004	0.0006	0.0009	0.0009	0.0011	0.0016	0.0016	0.0019	0.0021
36	0.2610	0.5254	2739	0.0002	0.0004	0.0005	0.0008	0.0009	0.0013	0.0015	0.0017	0.0018	0.0021
37	0.2619	0.5253	2720	0.0001	0.0003	0.0005	0.0008	0.0008	0.0012	0.0015	0.0017	0.0018	0.0021
38	0.2589	0.5242	2790	0.0002	0.0004	0.0006	0.0008	0.0010	0.0013	0.0016	0.0018	0.0020	0.0022
39	0.2603	0.5246	2757	0.0002	0.0004	0.0006	0.0009	0.0010	0.0013	0.0016	0.0019	0.0021	0.0021
40	0.2591	0.5245	2785	0.0001	0.0004	0.0006	0.0009	0.0009	0.0012	0.0016	0.0019	0.0021	0.0023
41	0.2586	0.5240	2799	0.0003	0.0005	0.0007	0.0010	0.0011	0.0013	0.0017	0.0020	0.0022	0.0024
42	0.2607	0.5256	2745	0.0002	0.0004	0.0006	0.0008	0.0009	0.0012	0.0015	0.0019	0.0021	0.0023
43	0.2603	0.5234	2764	0.0002	0.0005	0.0006	0.0010	0.0011	0.0012	0.0017	0.0021	0.0021	0.0024
44	0.2595	0.5247	2776	0.0002	0.0004	0.0006	0.0009	0.0010	0.0013	0.0016	0.0020	0.0022	0.0023
45	0.2581	0.5232	2813	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021	0.0023
46	0.2607	0.5226	2758	0.0003	0.0004	0.0006	0.0008	0.0011	0.0013	0.0017	0.0020	0.0022	0.0023
47	0.2599	0.5233	2773	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021	0.0023
48	0.2586	0.5242	2797	0.0002	0.0004	0.0006	0.0008	0.0010	0.0013	0.0016	0.0019	0.0021	0.0023
49	0.2612	0.5251	2737	0.0001	0.0004	0.0007	0.0008	0.0010	0.0013	0.0016	0.0020	0.0022	0.0023
50	0.2600	0.5250	2763	0.0002	0.0004	0.0006	0.0008	0.0011	0.0012	0.0016	0.0020	0.0022	0.0024
Avg.	0.2600	0.5246	2765	0.0002	0.0004	0.0006	0.0009	0.0010	0.0013	0.0016	0.0018	0.0020	0.0022
Med.	0.2600	0.5247	2764	0.0002	0.0004	0.0006	0.0009	0.0010	0.0013	0.0016	0.0018	0.0020	0.0022
st dev	0.0011	0.0010	24	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001
Min.	0.2581	0.5226	2720	0.0001	0.0003	0.0005	0.0008	0.0008	0.0011	0.0013	0.0015	0.0018	0.0020
Max.	0.2621	0.5274	2813	0.0003	0.0005	0.0007	0.0010	0.0011	0.0013	0.0017	0.0021	0.0022	0.0024

3.7 Data Set 3, 115° C, 150mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
51	132.40	100.15	99.92	99.62	99.47	99.09	98.79	98.49	98.11	97.81	97.51
52	133.30	100.08	99.85	99.55	99.17	98.87	98.57	98.27	98.05	97.82	97.52
53	131.70	100.08	99.77	99.47	99.09	98.79	98.63	98.41	98.10	97.80	97.57
54	132.90	99.92	99.85	99.40	99.10	98.87	98.57	98.34	98.12	97.82	97.59
55	132.60	99.85	99.62	99.32	99.02	98.64	98.49	98.19	97.96	97.74	97.59
56	134.00	100.07	99.70	99.40	99.03	98.66	98.43	97.99	97.69	97.39	97.01
57	135.60	99.93	99.63	99.34	99.04	98.67	98.45	98.16	97.79	97.42	97.12
58	133.10	99.92	99.62	99.40	99.02	98.80	98.50	98.20	97.97	97.82	97.45
59	132.70	99.92	99.62	99.40	99.02	98.79	98.57	98.19	97.81	97.51	97.14
60	136.40	99.93	99.63	99.41	99.12	98.90	98.61	98.31	97.95	97.58	97.43
61	135.70	100.07	99.93	99.78	99.34	99.19	98.89	98.60	98.23	97.94	97.64
62	133.20	99.92	99.62	99.47	99.32	99.02	98.65	98.35	98.27	97.90	97.75
63	133.80	100.07	99.70	99.25	98.95	98.73	98.43	98.36	98.28	97.83	97.61
64	134.50	100.07	99.78	99.55	99.26	98.96	98.81	98.59	98.22	97.84	97.62
65	132.90	100.08	99.77	99.40	99.17	99.10	98.80	98.65	98.19	98.04	97.74
66	134.50	100.07	99.70	99.33	99.03	98.88	98.59	98.22	97.99	97.70	97.32
67	134.50	100.07	99.78	99.55	99.26	99.03	98.74	98.51	98.22	97.99	97.70
68	132.50	100.08	99.77	99.62	99.40	99.02	98.72	98.42	98.19	97.74	97.58
69	132.90	99.92	99.77	99.55	99.25	99.10	98.87	98.65	98.27	97.82	97.59
70	133.70	99.93	99.70	99.55	99.18	98.95	98.88	98.50	98.06	97.83	97.61
71	133.80	100.15	99.78	99.48	99.25	98.80	98.58	98.51	98.13	97.91	97.61
72	133.50	100.07	99.78	99.55	99.10	98.88	98.58	98.28	97.98	97.60	97.38
73	133.20	100.15	99.77	99.47	99.17	98.87	98.42	98.20	97.90	97.75	97.30
74	134.70	99.93	99.70	99.41	99.26	98.89	98.52	98.22	97.92	97.77	97.48
75	134.20	100.07	99.70	99.48	99.18	98.81	98.58	98.21	97.84	97.62	97.32
Avg.	133.69	100.02	99.74	99.47	99.17	98.89	98.63	98.35	98.05	97.76	97.49
Med.	133.50	100.07	99.77	99.47	99.17	98.88	98.58	98.34	98.06	97.81	97.57
st dev	1.13	0.09	0.09	0.12	0.13	0.15	0.15	0.17	0.17	0.16	0.19
Min.	131.70	99.85	99.62	99.25	98.95	98.64	98.42	97.99	97.69	97.39	97.01
Max.	136.40	100.15	99.93	99.78	99.47	99.19	98.89	98.65	98.28	98.04	97.75

3.8 Data Set 3, 115° C, 150mA (Forward Voltage)

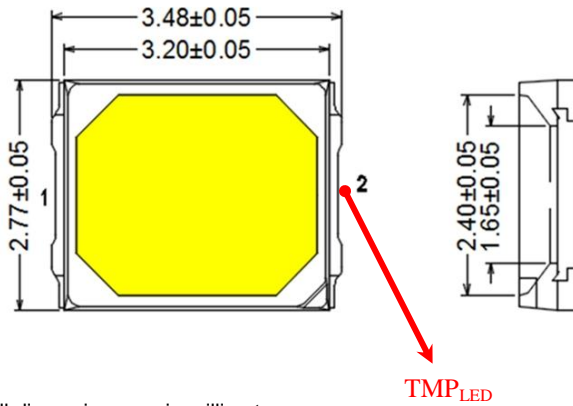
No.	Forward Voltage (V)										
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
51	6.250	6.256	6.258	6.256	6.260	6.272	6.262	6.255	6.266	6.254	6.268
52	6.270	6.272	6.268	6.269	6.258	6.253	6.261	6.255	6.271	6.258	6.266
53	6.274	6.256	6.268	6.274	6.253	6.259	6.261	6.266	6.264	6.276	6.258
54	6.265	6.259	6.275	6.274	6.275	6.273	6.270	6.264	6.274	6.254	6.254
55	6.255	6.259	6.256	6.265	6.264	6.274	6.260	6.260	6.261	6.274	6.256
56	6.266	6.256	6.253	6.274	6.274	6.275	6.265	6.257	6.267	6.260	6.278
57	6.251	6.252	6.259	6.263	6.273	6.270	6.272	6.268	6.266	6.261	6.258
58	6.270	6.260	6.269	6.260	6.271	6.266	6.278	6.272	6.256	6.278	6.255
59	6.258	6.256	6.259	6.262	6.259	6.257	6.274	6.257	6.257	6.276	6.263
60	6.268	6.263	6.265	6.274	6.260	6.278	6.264	6.271	6.253	6.260	6.257
61	6.255	6.274	6.273	6.260	6.264	6.256	6.264	6.276	6.269	6.261	6.270
62	6.251	6.257	6.268	6.255	6.259	6.277	6.268	6.260	6.270	6.273	6.264
63	6.262	6.275	6.263	6.270	6.256	6.276	6.265	6.268	6.253	6.271	6.260
64	6.257	6.275	6.264	6.276	6.272	6.265	6.256	6.254	6.259	6.265	6.273
65	6.271	6.276	6.253	6.264	6.258	6.261	6.255	6.258	6.259	6.274	6.274
66	6.262	6.265	6.255	6.278	6.271	6.274	6.270	6.275	6.253	6.272	6.267
67	6.265	6.275	6.257	6.271	6.263	6.267	6.269	6.256	6.267	6.256	6.270
68	6.263	6.260	6.277	6.278	6.262	6.266	6.264	6.254	6.268	6.277	6.263
69	6.266	6.274	6.254	6.260	6.271	6.268	6.262	6.261	6.270	6.255	6.275
70	6.264	6.268	6.264	6.258	6.266	6.270	6.254	6.263	6.253	6.273	6.277
71	6.266	6.264	6.268	6.270	6.274	6.268	6.253	6.259	6.257	6.253	6.273
72	6.261	6.252	6.270	6.267	6.254	6.255	6.263	6.267	6.260	6.266	6.274
73	6.256	6.264	6.275	6.257	6.272	6.268	6.264	6.258	6.264	6.274	6.261
74	6.269	6.260	6.259	6.270	6.257	6.268	6.272	6.277	6.255	6.252	6.268
75	6.262	6.254	6.268	6.269	6.262	6.254	6.253	6.257	6.263	6.255	6.261
Avg.	6.262	6.263	6.264	6.267	6.264	6.267	6.264	6.263	6.262	6.265	6.266
Med.	6.263	6.260	6.264	6.269	6.263	6.268	6.264	6.260	6.263	6.265	6.266
st dev	0.007	0.008	0.007	0.007	0.007	0.008	0.007	0.007	0.006	0.009	0.007
Min.	6.250	6.252	6.253	6.255	6.253	6.253	6.253	6.254	6.253	6.252	6.254
Max.	6.274	6.276	6.277	6.278	6.275	6.278	6.278	6.277	6.274	6.278	6.278

3.9 Data Set 3, 115° C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)									
				0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2609	0.5248	2743	0.0002	0.0003	0.0006	0.0009	0.0011	0.0011	0.0016	0.0019	0.0021	0.0023
52	0.2602	0.5252	2758	0.0002	0.0005	0.0006	0.0009	0.0011	0.0013	0.0016	0.0020	0.0021	0.0023
53	0.2617	0.5247	2728	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021	0.0025
54	0.2616	0.5259	2725	0.0001	0.0004	0.0006	0.0009	0.0011	0.0012	0.0015	0.0019	0.0022	0.0025
55	0.2585	0.5250	2796	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0015	0.0019	0.0021	0.0025
56	0.2606	0.5246	2752	0.0003	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0019	0.0022	0.0025
57	0.2598	0.5235	2775	0.0002	0.0005	0.0006	0.0009	0.0011	0.0013	0.0016	0.0020	0.0022	0.0025
58	0.2591	0.5230	2792	0.0002	0.0005	0.0006	0.0008	0.0011	0.0013	0.0016	0.0020	0.0022	0.0024
59	0.2611	0.5249	2741	0.0003	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0020	0.0021	0.0024
60	0.2579	0.5246	2810	0.0001	0.0004	0.0007	0.0008	0.0010	0.0012	0.0016	0.0018	0.0021	0.0024
61	0.2586	0.5233	2802	0.0002	0.0004	0.0006	0.0008	0.0010	0.0013	0.0016	0.0019	0.0022	0.0026
62	0.2600	0.5226	2773	0.0001	0.0004	0.0007	0.0009	0.0011	0.0013	0.0016	0.0020	0.0021	0.0025
63	0.2603	0.5260	2752	0.0001	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0018	0.0021	0.0025
64	0.2596	0.5249	2772	0.0001	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	0.0019	0.0021	0.0025
65	0.2612	0.5231	2745	0.0001	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0018	0.0020	0.0024
66	0.2591	0.5252	2781	0.0001	0.0004	0.0006	0.0008	0.0011	0.0012	0.0016	0.0019	0.0021	0.0025
67	0.2581	0.5236	2812	0.0002	0.0005	0.0007	0.0010	0.0011	0.0013	0.0016	0.0020	0.0022	0.0025
68	0.2598	0.5252	2768	0.0002	0.0004	0.0007	0.0008	0.0011	0.0012	0.0016	0.0019	0.0021	0.0025
69	0.2617	0.5246	2728	0.0001	0.0004	0.0006	0.0009	0.0010	0.0013	0.0015	0.0019	0.0021	0.0024
70	0.2600	0.5240	2767	0.0001	0.0004	0.0006	0.0008	0.0010	0.0011	0.0015	0.0019	0.0020	0.0024
71	0.2608	0.5258	2743	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021	0.0025
72	0.2602	0.5234	2766	0.0002	0.0004	0.0007	0.0008	0.0011	0.0013	0.0016	0.0020	0.0022	0.0026
73	0.2625	0.5250	2709	0.0002	0.0004	0.0007	0.0008	0.0010	0.0012	0.0015	0.0019	0.0021	0.0025
74	0.2605	0.5255	2749	0.0002	0.0004	0.0007	0.0008	0.0010	0.0012	0.0016	0.0019	0.0021	0.0026
75	0.2594	0.5223	2788	0.0001	0.0004	0.0007	0.0010	0.0010	0.0013	0.0016	0.0020	0.0022	0.0025
Avg.	0.2601	0.5244	2763	0.0002	0.0004	0.0006	0.0009	0.0010	0.0012	0.0016	0.0019	0.0021	0.0025
Med.	0.2602	0.5247	2766	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021	0.0025
st dev	0.0012	0.0011	28	0.0001	0.0001	0.0001	0.0000	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001
Min.	0.2579	0.5223	2709	0.0001	0.0003	0.0006	0.0008	0.0009	0.0011	0.0015	0.0018	0.0020	0.0023
Max.	0.2625	0.5260	2812	0.0003	0.0005	0.0007	0.0010	0.0011	0.0013	0.0016	0.0020	0.0022	0.0026

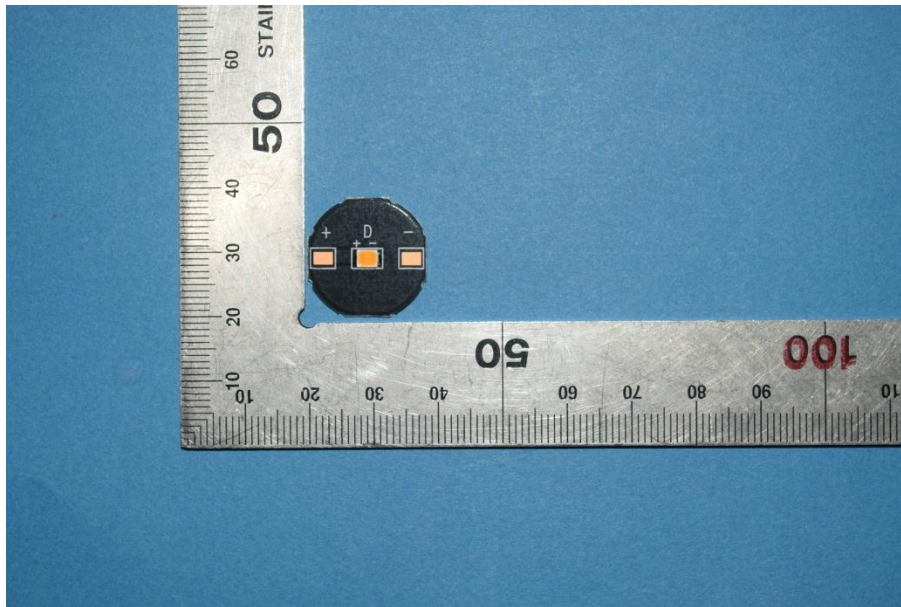
4 - DUT Photo

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