TEST REPORT

According to ANSI/IES LM-80-15
For

Lumileds Holding B.V.

370 W. Trimble Road, San Jose, CA 95131, USA

Model: L128-2780RB35000N1

Report Type: 17000 Hours Test Report	**Product Type:** LED Package
Reviewed By:	Pote Wang
Report Number:	DG3230222-07980E-EE
Test Date:	2020-12-17 to 2022-11-27
Report Date:	2023-02-24
Approved by:	Bill Xiong / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China. Tel: +86-755-33320018 Fax: +86-755-33320008
Test Facility:	Test facility was located at No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

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1 - General Information

1.1 Description of LED Light Sources#

Sample Size:

50 PCS test samples were in good condition and received on 2020-12-15. The samples were numbered from 1 to 25 and 26 to 50.

Manufacturer:	Lumileds Holding B.V.
Part Number:	L128-2780RB35000N1
Part Type:	LED Package
Drive Level:	DC 150mA
Nominal CCT:	2700K
Power:	1W
Average Current Density per LED die:	516.67 mA/mm^2
Average Power Density per LED die:	1.550W/mm^2
CRI:	80
Die Spacing:	0.25mm

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:

Tested model	Multiple model	Total Input Current(mA)	Power(W)	CCT(K)	Current Density per Die(mA/mm^2)	Power Density per PCB (W/mm^2)	Die Spacing (mm)
L128-2780RB35000N1	L128-xxxxRB35xxxxx	150	1	2200-6500	516.67	0.102	0.25

NOTES:
1. The first and second x denote designates nominal CCT (22=2200K,27=2700K, 30=3000K, 35=3500K, 40=4000K, 45=4500K, 50=5000K, 57=5700K, 60=6000K, 65=6500K).
2. The three and four x is a different product solution (Color coordinate and applications and special solution etc…).
3.
4. The last five x denote designates= Lumileds internal codes (000A1, 000B1, 000C1, etc.=shares the same base part).
5. The materials and workmanship of all series models are consistent with the test model.

Note:
1、The applicant Lumileds Holding B.V. declare that their products with model L128-2780RB35000N1 are the same to the products in report# DG3201215-30578E-EE-17000 and is authorized by original applicant to use their test data.
2、All the data in previous report (DG3201215-30578E-EE-17000) is shared in this report.

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 (This standard was not accredited by NVLAP)
- *ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by NVLAP)

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
High Accuracy Array Spectroradiometer	EVERFINE	HAAS 2000	P600674CM5391140	2022-09-27	2023-09-26
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2022-09-27	2023-09-26
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D062	1011093	2021-10-15	2023-10-14
Multilayer aging machine	BACL	B2-270	20013	2022-11-18	2023-11-17
Program-controlled D.C. Stabilized Voltage Supply	Hanshenpuyuan	HSPY-60-03	N/A	2022-11-18	2023-11-17

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. (Shenzhen) 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:	L128-2780RB35000N1
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:	L128-2780RB35000N1
Number of Units:	25
Case Temperature:	>103°C
Ambient Temperature:	>100°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	17000hrs	1.990E-06	1.002	>102000 hours	54000 hours
2	25	0	1000hrs	17000hrs	2.154E-06	1.002	>102000 hours	50000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	100.10%	99.87%	99.67%	99.47%	99.28%	99.07%	98.87%	98.67%	98.46%	98.26%	98.06%	97.86%
2	100.02%	99.81%	99.58%	99.38%	99.17%	98.96%	98.74%	98.53%	98.32%	98.10%	97.89%	97.69%

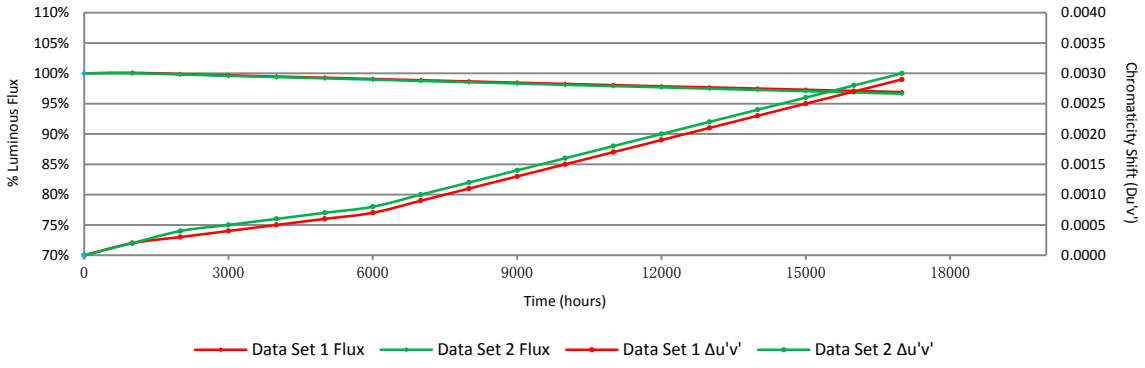
13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
97.68%	97.49%	97.29%	97.10%	96.91%
97.47%	97.26%	97.06%	96.84%	96.64%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
2	0.0002	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020

13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
0.0021	0.0023	0.0025	0.0027	0.0029
0.0022	0.0024	0.0026	0.0028	0.0030

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	11000hrs	12000hrs
1	128.00	100.23	100.08	99.92	99.77	99.61	99.45	99.22	99.06	98.91	98.75	98.59	98.44
2	129.80	100.08	99.77	99.54	99.31	99.15	98.92	98.69	98.54	98.31	98.07	97.77	97.53
3	128.90	100.23	99.92	99.69	99.53	99.38	99.22	99.07	98.91	98.76	98.60	98.45	98.29
4	129.20	100.15	99.92	99.69	99.38	99.07	98.76	98.61	98.37	98.07	97.91	97.76	97.60
5	127.80	100.08	99.77	99.53	99.30	99.14	98.83	98.51	98.20	98.04	97.81	97.57	97.34
6	129.80	100.15	99.92	99.61	99.38	99.23	99.00	98.69	98.46	98.23	98.00	97.69	97.53
7	128.60	99.92	99.77	99.53	99.22	98.99	98.76	98.52	98.29	98.13	97.90	97.59	97.43
8	129.20	99.92	99.69	99.46	99.30	99.07	98.92	98.76	98.61	98.45	98.30	98.07	97.91
9	129.10	100.08	99.85	99.61	99.38	99.15	98.92	98.68	98.53	98.37	98.22	98.06	97.91
10	129.30	100.15	99.92	99.77	99.61	99.46	99.30	99.15	98.99	98.76	98.61	98.45	98.30
11	129.10	100.15	99.92	99.69	99.54	99.38	99.23	99.07	98.92	98.76	98.61	98.45	98.30
12	129.00	100.23	100.08	99.92	99.77	99.61	99.46	99.30	99.15	98.99	98.84	98.68	98.53
13	129.00	100.16	99.92	99.77	99.61	99.46	99.30	99.15	98.99	98.84	98.68	98.53	98.37
14	129.20	100.31	100.08	99.92	99.61	99.46	99.23	98.92	98.68	98.37	98.22	97.99	97.68
15	130.00	99.85	99.69	99.46	99.23	98.92	98.69	98.46	98.31	98.00	97.77	97.46	97.15
16	128.80	99.92	99.69	99.53	99.38	99.22	99.07	98.91	98.76	98.60	98.45	98.29	98.14
17	127.90	100.16	99.92	99.77	99.53	99.30	99.06	98.91	98.59	98.28	98.05	97.89	97.65
18	128.40	100.23	99.92	99.77	99.61	99.45	99.22	98.91	98.68	98.44	98.13	97.98	97.66
19	127.20	100.08	99.92	99.76	99.61	99.45	99.29	99.06	98.90	98.74	98.58	98.43	98.27
20	127.40	100.24	100.08	99.92	99.69	99.53	99.29	99.14	98.98	98.82	98.67	98.51	98.35
21	128.00	100.16	99.92	99.77	99.53	99.38	99.06	98.91	98.59	98.28	97.97	97.81	97.58
22	127.60	99.76	99.53	99.29	99.06	98.82	98.59	98.35	98.20	98.04	97.88	97.73	97.57
23	129.20	99.92	99.77	99.61	99.46	99.30	99.15	98.99	98.84	98.68	98.53	98.37	98.22
24	129.50	99.92	99.69	99.54	99.38	99.15	99.00	98.84	98.61	98.30	98.07	97.68	97.37
25	128.00	100.31	100.08	99.77	99.45	99.30	99.06	98.83	98.52	98.20	97.97	97.73	97.42
Avg.	128.72	100.10	99.87	99.67	99.47	99.28	99.07	98.87	98.67	98.46	98.26	98.06	97.86
Med.	129.00	100.15	99.92	99.69	99.46	99.30	99.06	98.91	98.61	98.37	98.22	97.99	97.68
st dev	0.79	0.15	0.15	0.16	0.18	0.21	0.2339	0.2530	0.28	0.31	0.34	0.38	0.42
Min.	127.20	99.76	99.53	99.29	99.06	98.82	98.59	98.35	98.20	98.00	97.77	97.46	97.15
Max.	130.00	100.31	100.08	99.92	99.77	99.61	99.46	99.30	99.15	98.99	98.84	98.68	98.53

No.	Lumen Maintenance (%)				
	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	98.28	98.13	97.97	97.81	97.66
2	97.38	97.00	96.69	96.46	96.22
3	98.14	97.98	97.83	97.67	97.52
4	97.37	97.21	96.90	96.59	96.28
5	97.18	97.03	96.87	96.71	96.56
6	97.38	97.23	97.07	96.92	96.76
7	97.20	97.05	96.73	96.42	96.19
8	97.76	97.60	97.45	97.29	97.14
9	97.75	97.60	97.44	97.29	97.13
10	98.14	97.99	97.83	97.68	97.53
11	98.14	97.99	97.83	97.68	97.60
12	98.37	98.22	98.06	97.91	97.75
13	98.22	98.06	97.91	97.75	97.67
14	97.52	97.21	97.06	96.75	96.52
15	96.92	96.77	96.54	96.31	96.15
16	97.98	97.83	97.67	97.52	97.36
17	97.50	97.26	97.03	96.72	96.56
18	97.51	97.12	96.81	96.57	96.18
19	98.11	97.96	97.80	97.64	97.48
20	98.12	97.96	97.80	97.65	97.49
21	97.19	97.03	96.88	96.72	96.56
22	97.41	97.26	97.10	96.94	96.79
23	98.07	97.91	97.76	97.52	97.29
24	97.07	96.83	96.60	96.45	96.22
25	97.19	97.03	96.72	96.56	96.25
Avg.	97.68	97.49	97.29	97.10	96.91
Med.	97.52	97.26	97.10	96.94	96.79
st dev	0.44	0.47	0.51	0.54	0.58
Min.	96.92	96.77	96.54	96.31	96.15
Max.	98.37	98.22	98.06	97.91	97.75

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

No.	Forward Voltage (V)												
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	5.801	5.857	5.860	5.863	5.851	5.842	5.862	5.842	5.866	5.867	5.872	5.858	5.879
2	5.888	5.868	5.862	5.857	5.887	5.860	5.859	5.870	5.886	5.848	5.885	5.881	5.883
3	5.846	5.848	5.867	5.873	5.866	5.854	5.867	5.868	5.871	5.852	5.852	5.877	5.853
4	5.881	5.862	5.888	5.899	5.896	5.864	5.844	5.889	5.864	5.875	5.867	5.899	5.858
5	5.880	5.873	5.858	5.874	5.849	5.855	5.885	5.851	5.853	5.876	5.863	5.865	5.898
6	5.810	5.840	5.863	5.874	5.867	5.849	5.855	5.860	5.861	5.851	5.859	5.898	5.853
7	5.857	5.854	5.855	5.883	5.861	5.854	5.870	5.844	5.830	5.889	5.884	5.852	5.867
8	5.876	5.886	5.877	5.890	5.868	5.865	5.862	5.858	5.864	5.884	5.855	5.883	5.877
9	5.889	5.855	5.855	5.845	5.862	5.846	5.861	5.874	5.864	5.872	5.863	5.898	5.843
10	5.868	5.865	5.863	5.855	5.867	5.876	5.860	5.856	5.858	5.865	5.861	5.883	5.872
11	5.858	5.863	5.868	5.864	5.854	5.865	5.868	5.863	5.861	5.852	5.855	5.873	5.861
12	5.883	5.853	5.848	5.842	5.857	5.849	5.844	5.856	5.845	5.892	5.847	5.867	5.863
13	5.863	5.841	5.863	5.883	5.853	5.887	5.856	5.861	5.865	5.897	5.877	5.848	5.851
14	5.864	5.845	5.863	5.868	5.853	5.875	5.873	5.844	5.860	5.869	5.856	5.861	5.865
15	5.828	5.868	5.895	5.863	5.891	5.861	5.866	5.882	5.862	5.891	5.893	5.867	5.856
16	5.856	5.887	5.841	5.861	5.843	5.862	5.860	5.869	5.888	5.870	5.866	5.868	5.860
17	5.863	5.862	5.866	5.851	5.899	5.853	5.861	5.885	5.875	5.850	5.877	5.882	5.864
18	5.880	5.869	5.867	5.879	5.860	5.865	5.893	5.859	5.853	5.867	5.878	5.847	5.865
19	5.848	5.863	5.843	5.856	5.851	5.884	5.868	5.846	5.860	5.868	5.840	5.898	5.870
20	5.819	5.853	5.866	5.863	5.896	5.867	5.859	5.860	5.856	5.859	5.884	5.868	5.868
21	5.869	5.862	5.859	5.847	5.865	5.867	5.891	5.857	5.845	5.852	5.865	5.866	5.874
22	5.867	5.867	5.892	5.859	5.850	5.871	5.881	5.865	5.847	5.866	5.851	5.892	5.881
23	5.803	5.842	5.861	5.857	5.899	5.865	5.893	5.877	5.874	5.872	5.865	5.867	5.857
24	5.882	5.861	5.863	5.845	5.860	5.889	5.840	5.866	5.850	5.860	5.884	5.851	5.886
25	5.866	5.864	5.845	5.863	5.899	5.863	5.869	5.853	5.863	5.869	5.860	5.878	5.884
Avg.	5.858	5.860	5.864	5.865	5.868	5.864	5.866	5.862	5.861	5.869	5.866	5.873	5.868
Med.	5.864	5.862	5.863	5.863	5.862	5.864	5.862	5.860	5.861	5.868	5.865	5.868	5.865
st dev	0.026	0.012	0.013	0.015	0.019	0.012	0.014	0.013	0.013	0.014	0.014	0.016	0.013
Min.	5.801	5.840	5.841	5.842	5.843	5.842	5.840	5.842	5.830	5.848	5.840	5.847	5.843
Max.	5.889	5.887	5.895	5.899	5.899	5.889	5.893	5.889	5.888	5.897	5.893	5.899	5.898

No.	Forward Voltage (V)				
	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	5.869	5.881	5.899	5.864	5.859
2	5.869	5.866	5.855	5.874	5.863
3	5.880	5.852	5.898	5.852	5.865
4	5.858	5.893	5.850	5.858	5.868
5	5.861	5.860	5.864	5.891	5.867
6	5.865	5.866	5.851	5.865	5.884
7	5.874	5.869	5.867	5.868	5.864
8	5.859	5.840	5.863	5.868	5.869
9	5.842	5.868	5.849	5.861	5.851
10	5.899	5.868	5.856	5.867	5.850
11	5.879	5.843	5.855	5.851	5.861
12	5.892	5.869	5.866	5.869	5.889
13	5.862	5.860	5.849	5.863	5.889
14	5.888	5.882	5.863	5.869	5.878
15	5.840	5.864	5.877	5.866	5.862
16	5.890	5.886	5.891	5.844	5.865
17	5.867	5.898	5.887	5.876	5.885
18	5.882	5.854	5.843	5.888	5.866
19	5.840	5.896	5.864	5.860	5.869
20	5.868	5.868	5.893	5.863	5.852
21	5.864	5.888	5.853	5.890	5.894
22	5.887	5.853	5.866	5.879	5.864
23	5.892	5.860	5.852	5.871	5.868
24	5.870	5.859	5.887	5.866	5.898
25	5.873	5.861	5.856	5.873	5.857
Avg.	5.871	5.868	5.866	5.868	5.869
Med.	5.869	5.866	5.863	5.867	5.866
st dev	0.016	0.016	0.017	0.011	0.013
Min.	5.840	5.840	5.843	5.844	5.850
Max.	5.899	5.898	5.899	5.891	5.898

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

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')											
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
1	0.2614	0.5238	2739	0.0001	0.0003	0.0004	0.0004	0.0006	0.0009	0.0011	0.0012	0.0014	0.0017	0.0017	0.0019
2	0.2589	0.5253	2785	0.0001	0.0004	0.0005	0.0006	0.0007	0.0009	0.0010	0.0013	0.0014	0.0015	0.0018	0.0021
3	0.2609	0.5230	2753	0.0001	0.0002	0.0002	0.0004	0.0005	0.0005	0.0008	0.0010	0.0011	0.0012	0.0015	0.0017
4	0.2612	0.5245	2739	0.0001	0.0002	0.0003	0.0004	0.0005	0.0005	0.0007	0.0008	0.0011	0.0011	0.0014	0.0016
5	0.2622	0.5218	2729	0.0001	0.0003	0.0003	0.0003	0.0004	0.0005	0.0007	0.0009	0.0011	0.0012	0.0014	0.0016
6	0.2593	0.5244	2781	0.0003	0.0004	0.0005	0.0006	0.0006	0.0007	0.0009	0.0010	0.0011	0.0013	0.0015	0.0018
7	0.2604	0.5216	2770	0.0001	0.0002	0.0004	0.0006	0.0007	0.0009	0.0011	0.0011	0.0011	0.0013	0.0014	0.0015
8	0.2619	0.5250	2723	0.0002	0.0003	0.0004	0.0004	0.0006	0.0008	0.0010	0.0011	0.0011	0.0013	0.0014	0.0015
9	0.2600	0.5245	2765	0.0003	0.0003	0.0004	0.0005	0.0007	0.0008	0.0010	0.0012	0.0013	0.0016	0.0016	0.0016
10	0.2594	0.5241	2780	0.0003	0.0004	0.0004	0.0006	0.0006	0.0007	0.0009	0.0011	0.0012	0.0015	0.0015	0.0015
11	0.2602	0.5239	2764	0.0001	0.0004	0.0006	0.0006	0.0007	0.0009	0.0011	0.0013	0.0014	0.0018	0.0021	0.0022
12	0.2595	0.5251	2774	0.0001	0.0003	0.0005	0.0006	0.0006	0.0007	0.0007	0.0008	0.0011	0.0014	0.0019	0.0021
13	0.2605	0.5251	2751	0.0001	0.0001	0.0003	0.0005	0.0005	0.0006	0.0007	0.0008	0.0008	0.0010	0.0014	0.0017
14	0.2582	0.5243	2804	0.0001	0.0002	0.0004	0.0006	0.0007	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0018
15	0.2603	0.5237	2763	0.0002	0.0002	0.0004	0.0006	0.0007	0.0009	0.0009	0.0011	0.0014	0.0017	0.0019	0.0021
16	0.2621	0.5232	2726	0.0002	0.0002	0.0003	0.0004	0.0006	0.0008	0.0010	0.0011	0.0013	0.0016	0.0019	0.0020
17	0.2622	0.5248	2718	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	0.0014	0.0017	0.0019	0.0021
18	0.2603	0.5246	2759	0.0002	0.0004	0.0005	0.0006	0.0008	0.0010	0.0011	0.0012	0.0015	0.0018	0.0019	0.0022
19	0.2613	0.5228	2743	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0011	0.0013	0.0015	0.0017
20	0.2596	0.5231	2779	0.0001	0.0001	0.0001	0.0003	0.0003	0.0004	0.0006	0.0007	0.0012	0.0012	0.0014	0.0016
21	0.2597	0.5236	2775	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0012	0.0016	0.0018
22	0.2614	0.5236	2738	0.0002	0.0004	0.0004	0.0005	0.0006	0.0008	0.0008	0.0010	0.0013	0.0014	0.0018	0.0021
23	0.2594	0.5236	2783	0.0001	0.0003	0.0004	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016	0.0017	0.0020	0.0023
24	0.2614	0.5257	2730	0.0002	0.0004	0.0004	0.0004	0.0005	0.0005	0.0007	0.0014	0.0016	0.0019	0.0020	0.0023
25	0.2601	0.5222	2773	0.0001	0.0001	0.0003	0.0003	0.0003	0.0004	0.0006	0.0013	0.0014	0.0016	0.0016	0.0020
Avg.	0.2605	0.5239	2758	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
Med.	0.2603	0.5239	2763	0.0001	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0016	0.0018
st dev	0.0011	0.0011	23	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.2582	0.5216	2718	0.0001	0.0001	0.0001	0.0003	0.0003	0.0004	0.0006	0.0007	0.0008	0.0010	0.0014	0.0015
Max.	0.2622	0.5257	2804	0.0003	0.0004	0.0006	0.0006	0.0008	0.0010	0.0011	0.0014	0.0016	0.0019	0.0021	0.0023

No.	Chromaticity Shift (Δu'v')				
	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
1	0.0023	0.0025	0.0025	0.0028	0.0030
2	0.0021	0.0024	0.0027	0.0030	0.0032
3	0.0019	0.0022	0.0025	0.0028	0.0031
4	0.0017	0.0018	0.0021	0.0027	0.0029
5	0.0018	0.0019	0.0021	0.0028	0.0029
6	0.0018	0.0020	0.0024	0.0029	0.0030
7	0.0019	0.0021	0.0024	0.0027	0.0029
8	0.0018	0.0019	0.0022	0.0025	0.0028
9	0.0018	0.0020	0.0021	0.0025	0.0028
10	0.0018	0.0021	0.0022	0.0026	0.0026
11	0.0023	0.0023	0.0025	0.0025	0.0027
12	0.0021	0.0021	0.0023	0.0025	0.0026
13	0.0020	0.0021	0.0022	0.0024	0.0024
14	0.0023	0.0024	0.0026	0.0027	0.0028
15	0.0024	0.0026	0.0028	0.0028	0.0030
16	0.0025	0.0027	0.0028	0.0029	0.0030
17	0.0025	0.0027	0.0028	0.0030	0.0031
18	0.0023	0.0026	0.0028	0.0032	0.0033
19	0.0017	0.0022	0.0025	0.0028	0.0030
20	0.0016	0.0021	0.0023	0.0024	0.0027
21	0.0018	0.0021	0.0023	0.0024	0.0026
22	0.0023	0.0025	0.0028	0.0027	0.0028
23	0.0025	0.0028	0.0029	0.0030	0.0032
24	0.0025	0.0027	0.0028	0.0029	0.0030
25	0.0021	0.0023	0.0025	0.0026	0.0028
Avg.	0.0021	0.0023	0.0025	0.0027	0.0029
Med.	0.0021	0.0022	0.0025	0.0027	0.0029
st dev	0.0003	0.0003	0.0003	0.0002	0.0002
Min.	0.0016	0.0018	0.0021	0.0024	0.0024
Max.	0.0025	0.0028	0.0029	0.0032	0.0033

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

No.	Φ(lm)	Lumen Maintenance (%)											
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
26	128.40	100.23	100.08	99.84	99.69	99.38	99.14	98.91	98.60	98.29	98.05	97.82	97.59
27	129.40	99.77	99.61	99.38	99.23	98.92	98.61	98.38	98.22	98.07	97.76	97.53	97.37
28	127.40	100.16	99.92	99.69	99.53	99.22	99.06	98.90	98.59	98.27	98.04	97.72	97.65
29	127.50	100.31	100.08	99.76	99.45	99.22	98.90	98.59	98.27	98.04	97.88	97.65	97.33
30	128.60	100.31	100.08	99.77	99.53	99.46	99.22	98.91	98.76	98.60	98.29	98.06	97.90
31	128.80	100.31	100.08	99.84	99.69	99.53	99.38	99.22	98.99	98.68	98.52	98.29	98.14
32	129.40	100.15	99.85	99.69	99.54	99.38	99.15	98.92	98.69	98.38	98.07	97.76	97.45
33	128.70	100.16	99.84	99.61	99.46	99.22	99.07	98.91	98.68	98.37	98.14	97.98	97.82
34	127.40	99.84	99.76	99.45	99.29	99.22	98.98	98.82	98.51	98.27	98.04	97.80	97.49
35	129.30	99.85	99.69	99.46	99.15	98.92	98.61	98.30	98.07	97.83	97.60	97.45	97.22
36	127.20	99.76	99.53	99.37	99.29	98.98	98.66	98.51	98.19	98.03	97.80	97.56	97.41
37	128.40	100.08	99.92	99.69	99.38	99.14	98.91	98.60	98.36	98.13	97.90	97.66	97.43
38	127.70	99.92	99.84	99.61	99.45	99.14	98.98	98.83	98.59	98.36	98.04	97.81	97.49
39	127.10	100.24	99.92	99.69	99.45	99.13	99.06	98.74	98.51	98.27	98.11	97.88	97.72
40	126.10	100.16	99.92	99.68	99.44	99.29	99.13	98.81	98.49	98.26	98.10	97.86	97.70
41	127.80	100.23	99.92	99.77	99.45	99.37	99.14	98.98	98.90	98.75	98.51	98.20	97.89
42	128.30	100.08	99.92	99.77	99.61	99.45	99.22	98.99	98.83	98.67	98.44	98.21	97.97
43	127.40	100.08	99.92	99.69	99.45	99.29	99.14	98.90	98.82	98.59	98.35	98.12	97.96
44	127.50	100.08	99.92	99.61	99.45	99.22	99.06	98.90	98.82	98.67	98.43	98.27	98.12
45	127.70	99.84	99.53	99.45	99.22	99.06	98.83	98.59	98.36	98.20	98.04	97.89	97.73
46	128.40	99.84	99.61	99.38	99.14	98.91	98.75	98.52	98.36	98.21	98.05	97.90	97.74
47	127.90	99.77	99.53	99.30	99.06	98.83	98.59	98.44	98.36	98.12	97.97	97.81	97.65
48	127.40	99.84	99.61	99.45	99.29	99.14	98.98	98.82	98.67	98.51	98.35	98.19	98.04
49	127.70	99.84	99.61	99.37	99.14	98.90	98.67	98.43	98.28	98.12	97.96	97.81	97.65
50	128.80	99.61	99.46	99.30	99.15	98.99	98.84	98.60	98.45	98.29	98.14	97.98	97.83
Avg.	128.01	100.02	99.81	99.58	99.38	99.17	98.96	98.74	98.53	98.32	98.10	97.89	97.69
Med.	127.80	100.08	99.85	99.61	99.45	99.22	98.98	98.82	98.51	98.27	98.05	97.86	97.70
st dev	0.81	0.21	0.20	0.18	0.18	0.20	0.22	0.23	0.24	0.24	0.24	0.23	0.25
Min.	126.10	99.61	99.46	99.30	99.06	98.83	98.59	98.30	98.07	97.83	97.60	97.45	97.22
Max.	129.40	100.31	100.08	99.84	99.69	99.53	99.38	99.22	98.99	98.75	98.52	98.29	98.14

No.	Lumen Maintenance (%)				
	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
26	97.27	97.04	96.73	96.42	96.26
27	97.14	96.99	96.68	96.37	96.29
28	97.57	97.41	97.17	96.94	96.62
29	97.10	97.02	96.86	96.78	96.63
30	97.74	97.43	97.20	96.97	96.73
31	97.83	97.52	97.20	96.97	96.66
32	97.22	97.06	96.91	96.75	96.52
33	97.51	97.28	96.97	96.74	96.58
34	97.33	97.02	96.78	96.47	96.31
35	97.06	96.91	96.75	96.60	96.37
36	97.09	96.93	96.78	96.62	96.46
37	97.20	96.96	96.81	96.57	96.34
38	97.18	96.95	96.79	96.71	96.55
39	97.48	97.25	97.01	96.77	96.46
40	97.38	97.15	96.99	96.83	96.59
41	97.57	97.34	97.18	96.95	96.79
42	97.74	97.51	97.19	96.80	96.65
43	97.80	97.57	97.33	97.02	96.78
44	97.80	97.49	97.25	97.02	96.63
45	97.57	97.42	97.34	97.10	96.87
46	97.59	97.35	97.20	97.04	96.88
47	97.50	97.42	97.26	97.11	96.95
48	97.88	97.72	97.57	97.41	97.25
49	97.49	97.34	97.10	96.95	96.79
50	97.67	97.52	97.36	97.20	96.97
Avg.	97.47	97.26	97.06	96.84	96.64
Med.	97.50	97.34	97.10	96.83	96.63
st dev	0.26	0.24	0.24	0.25	0.24
Min.	97.06	96.91	96.68	96.37	96.26
Max.	97.88	97.72	97.57	97.41	97.25

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

No.	Forward Voltage (V)												
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
26	5.887	5.804	5.870	5.851	5.892	5.808	5.899	5.898	5.850	5.827	5.856	5.812	5.823
27	5.892	5.867	5.878	5.886	5.880	5.841	5.869	5.875	5.809	5.813	5.848	5.898	5.836
28	5.818	5.866	5.847	5.835	5.873	5.868	5.894	5.801	5.865	5.823	5.880	5.841	5.872
29	5.886	5.847	5.824	5.814	5.803	5.896	5.806	5.830	5.823	5.840	5.852	5.850	5.895
30	5.803	5.812	5.891	5.834	5.831	5.891	5.896	5.847	5.859	5.866	5.867	5.856	5.828
31	5.803	5.813	5.804	5.825	5.826	5.894	5.857	5.858	5.899	5.877	5.856	5.863	5.870
32	5.820	5.881	5.896	5.812	5.864	5.822	5.814	5.822	5.848	5.855	5.824	5.881	5.823
33	5.883	5.850	5.818	5.834	5.886	5.828	5.851	5.800	5.821	5.820	5.886	5.854	5.857
34	5.828	5.891	5.827	5.871	5.879	5.805	5.804	5.817	5.833	5.865	5.838	5.809	5.862
35	5.849	5.845	5.868	5.879	5.835	5.804	5.817	5.845	5.852	5.890	5.837	5.850	5.829
36	5.820	5.828	5.840	5.836	5.848	5.870	5.889	5.824	5.823	5.846	5.810	5.806	5.868
37	5.838	5.888	5.830	5.861	5.872	5.891	5.804	5.859	5.833	5.881	5.842	5.827	5.815
38	5.814	5.823	5.816	5.813	5.865	5.869	5.877	5.818	5.879	5.857	5.850	5.870	5.840
39	5.846	5.859	5.893	5.865	5.807	5.882	5.819	5.865	5.884	5.889	5.896	5.863	5.822
40	5.899	5.882	5.863	5.832	5.848	5.842	5.883	5.869	5.896	5.833	5.883	5.891	5.851
41	5.817	5.857	5.840	5.803	5.802	5.858	5.841	5.854	5.855	5.824	5.815	5.851	5.877
42	5.885	5.804	5.876	5.846	5.809	5.891	5.839	5.857	5.845	5.866	5.888	5.873	5.802
43	5.896	5.868	5.859	5.865	5.855	5.882	5.850	5.865	5.855	5.841	5.889	5.846	5.879
44	5.906	5.849	5.820	5.831	5.857	5.897	5.804	5.882	5.868	5.825	5.889	5.831	5.870
45	5.904	5.824	5.802	5.869	5.826	5.823	5.891	5.815	5.886	5.882	5.898	5.846	5.866
46	5.909	5.873	5.846	5.897	5.871	5.802	5.839	5.800	5.889	5.830	5.815	5.808	5.853
47	5.902	5.805	5.826	5.870	5.831	5.813	5.826	5.838	5.881	5.818	5.833	5.885	5.828
48	5.900	5.813	5.879	5.857	5.824	5.881	5.891	5.849	5.826	5.868	5.817	5.827	5.880
49	5.829	5.846	5.800	5.877	5.889	5.863	5.825	5.838	5.893	5.871	5.871	5.826	5.837
50	5.870	5.895	5.897	5.886	5.832	5.857	5.857	5.832	5.807	5.830	5.849	5.855	5.833
Avg.	5.860	5.848	5.848	5.850	5.848	5.855	5.850	5.842	5.855	5.849	5.856	5.849	5.849
Med.	5.870	5.849	5.846	5.851	5.848	5.863	5.850	5.845	5.855	5.846	5.852	5.850	5.851
st dev	0.038	0.030	0.031	0.026	0.028	0.033	0.033	0.026	0.028	0.025	0.028	0.026	0.025
Min.	5.803	5.804	5.800	5.803	5.802	5.802	5.804	5.800	5.807	5.813	5.810	5.806	5.802
Max.	5.909	5.895	5.897	5.897	5.892	5.897	5.899	5.898	5.899	5.890	5.898	5.898	5.895

No.	Forward Voltage (V)				
	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
26	5.877	5.865	5.843	5.815	5.804
27	5.848	5.809	5.890	5.807	5.872
28	5.832	5.899	5.825	5.824	5.848
29	5.846	5.877	5.891	5.889	5.896
30	5.825	5.840	5.865	5.810	5.852
31	5.811	5.895	5.884	5.893	5.808
32	5.851	5.884	5.826	5.857	5.809
33	5.824	5.873	5.800	5.837	5.817
34	5.850	5.809	5.889	5.883	5.857
35	5.804	5.815	5.877	5.892	5.813
36	5.872	5.889	5.852	5.814	5.854
37	5.809	5.840	5.803	5.893	5.854
38	5.829	5.880	5.856	5.811	5.873
39	5.892	5.881	5.887	5.891	5.852
40	5.809	5.809	5.843	5.830	5.805
41	5.803	5.816	5.884	5.896	5.863
42	5.849	5.817	5.816	5.883	5.870
43	5.859	5.857	5.824	5.839	5.835
44	5.806	5.814	5.860	5.808	5.847
45	5.839	5.886	5.886	5.862	5.803
46	5.823	5.891	5.834	5.802	5.837
47	5.839	5.863	5.862	5.877	5.839
48	5.818	5.819	5.856	5.826	5.800
49	5.887	5.817	5.801	5.820	5.883
50	5.846	5.821	5.851	5.887	5.809
Avg.	5.838	5.851	5.852	5.850	5.840
Med.	5.839	5.857	5.856	5.839	5.847
st dev	0.026	0.033	0.030	0.035	0.028
Min.	5.803	5.809	5.800	5.802	5.800
Max.	5.892	5.899	5.891	5.896	5.896

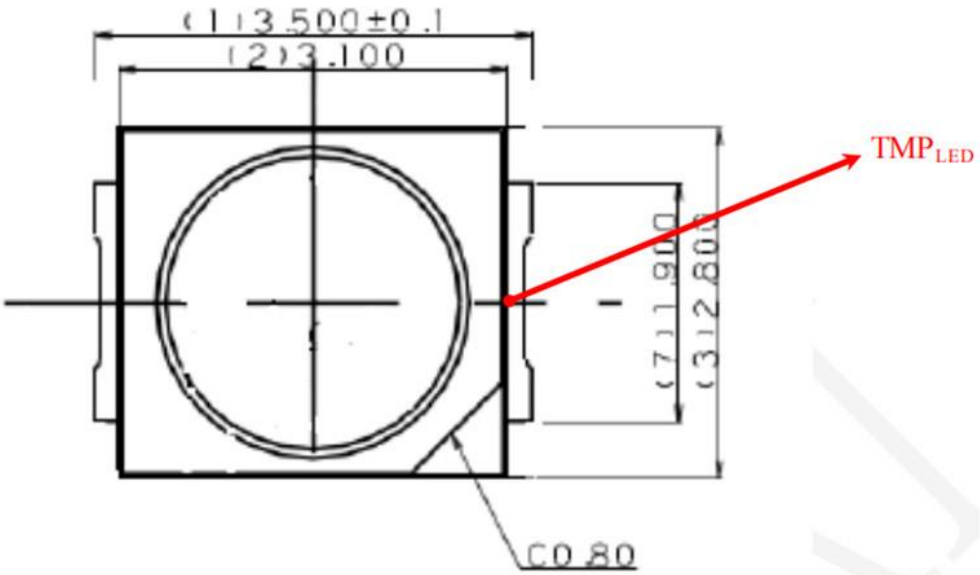
3.6 Data Set 2, 105°C, 150mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')											
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs
26	0.2599	0.5241	2770	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0013	0.0015	0.0017
27	0.2586	0.5226	2805	0.0001	0.0002	0.0004	0.0006	0.0006	0.0008	0.0009	0.0011	0.0011	0.0015	0.0017	0.0019
28	0.2616	0.5239	2734	0.0002	0.0003	0.0004	0.0006	0.0006	0.0007	0.0008	0.0009	0.0011	0.0014	0.0019	0.0020
29	0.2610	0.5224	2754	0.0003	0.0004	0.0004	0.0006	0.0007	0.0008	0.0009	0.0009	0.0011	0.0014	0.0018	0.0021
30	0.2606	0.5242	2754	0.0002	0.0003	0.0004	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011	0.0014	0.0017	0.0021
31	0.2597	0.5216	2785	0.0002	0.0002	0.0005	0.0006	0.0006	0.0007	0.0008	0.0008	0.0009	0.0013	0.0016	0.0018
32	0.2599	0.5250	2764	0.0001	0.0001	0.0002	0.0004	0.0005	0.0006	0.0006	0.0007	0.0009	0.0010	0.0013	0.0017
33	0.2597	0.5233	2777	0.0004	0.0004	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0011	0.0014	0.0015	0.0018
34	0.2608	0.5235	2752	0.0004	0.0004	0.0005	0.0006	0.0008	0.0008	0.0009	0.0009	0.0012	0.0015	0.0017	0.0021
35	0.2584	0.5233	2807	0.0004	0.0004	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011	0.0013	0.0016	0.0017	0.0021
36	0.2608	0.5249	2745	0.0001	0.0004	0.0006	0.0007	0.0009	0.0011	0.0011	0.0011	0.0016	0.0017	0.0017	0.0019
37	0.2598	0.5243	2770	0.0002	0.0004	0.0006	0.0007	0.0008	0.0010	0.0011	0.0014	0.0016	0.0018	0.0020	0.0021
38	0.2608	0.5245	2749	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	0.0011	0.0013	0.0016	0.0019	0.0020	0.0023
39	0.2618	0.5228	2734	0.0002	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	0.0012	0.0016	0.0018	0.0019	0.0021
40	0.2613	0.5244	2736	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0014	0.0017	0.0019	0.0020	0.0023
41	0.2615	0.5239	2735	0.0001	0.0003	0.0004	0.0004	0.0005	0.0009	0.0010	0.0011	0.0016	0.0019	0.0019	0.0019
42	0.2617	0.5253	2725	0.0001	0.0002	0.0004	0.0004	0.0006	0.0007	0.0009	0.0012	0.0016	0.0019	0.0019	0.0020
43	0.2610	0.5242	2745	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0010	0.0012	0.0016	0.0019	0.0019	0.0020
44	0.2612	0.5218	2752	0.0004	0.0004	0.0004	0.0004	0.0004	0.0007	0.0009	0.0010	0.0015	0.0019	0.0021	0.0021
45	0.2596	0.5215	2788	0.0004	0.0005	0.0006	0.0006	0.0006	0.0008	0.0010	0.0013	0.0015	0.0016	0.0018	0.0019
46	0.2601	0.5240	2766	0.0004	0.0006	0.0006	0.0007	0.0007	0.0009	0.0010	0.0014	0.0015	0.0016	0.0017	0.0019
47	0.2608	0.5244	2748	0.0005	0.0005	0.0007	0.0009	0.0009	0.0010	0.0012	0.0014	0.0016	0.0019	0.0019	0.0021
48	0.2594	0.5229	2785	0.0003	0.0005	0.0007	0.0008	0.0009	0.0010	0.0011	0.0015	0.0016	0.0017	0.0020	0.0021
49	0.2608	0.5237	2750	0.0001	0.0003	0.0004	0.0006	0.0008	0.0009	0.0010	0.0016	0.0017	0.0018	0.0021	0.0021
50	0.2599	0.5244	2767	0.0001	0.0004	0.0006	0.0007	0.0009	0.0010	0.0010	0.0017	0.0018	0.0019	0.0021	0.0023
Avg.	0.2604	0.5236	2760	0.0002	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020
Med.	0.2608	0.5239	2754	0.0002	0.0004	0.0005	0.0006	0.0007	0.0009	0.0010	0.0011	0.0015	0.0017	0.0019	0.0021
st dev	0.0009	0.0010	22	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0003	0.0003	0.0002	0.0002
Min.	0.2584	0.5215	2725	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0010	0.0013	0.0017
Max.	0.2618	0.5253	2807	0.0005	0.0006	0.0007	0.0009	0.0009	0.0011	0.0013	0.0017	0.0018	0.0019	0.0021	0.0023

No.	Chromaticity Shift (Δu'v')				
	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
26	0.0019	0.0022	0.0023	0.0025	0.0028
27	0.0021	0.0023	0.0026	0.0026	0.0028
28	0.0021	0.0023	0.0025	0.0028	0.0030
29	0.0022	0.0025	0.0026	0.0029	0.0032
30	0.0022	0.0023	0.0023	0.0026	0.0028
31	0.0020	0.0023	0.0024	0.0025	0.0026
32	0.0017	0.0019	0.0021	0.0024	0.0025
33	0.0020	0.0023	0.0025	0.0028	0.0028
34	0.0021	0.0023	0.0024	0.0027	0.0028
35	0.0023	0.0025	0.0026	0.0029	0.0029
36	0.0023	0.0025	0.0025	0.0026	0.0028
37	0.0023	0.0025	0.0026	0.0027	0.0028
38	0.0023	0.0026	0.0026	0.0028	0.0028
39	0.0022	0.0025	0.0025	0.0027	0.0028
40	0.0022	0.0023	0.0025	0.0028	0.0029
41	0.0022	0.0022	0.0024	0.0027	0.0028
42	0.0022	0.0023	0.0024	0.0028	0.0028
43	0.0023	0.0024	0.0024	0.0026	0.0029
44	0.0023	0.0023	0.0025	0.0028	0.0031
45	0.0022	0.0023	0.0024	0.0029	0.0031
46	0.0022	0.0024	0.0028	0.0028	0.0032
47	0.0022	0.0024	0.0028	0.0030	0.0033
48	0.0022	0.0028	0.0028	0.0030	0.0035
49	0.0022	0.0022	0.0029	0.0030	0.0035
50	0.0025	0.0026	0.0032	0.0032	0.0036
Avg.	0.0022	0.0024	0.0026	0.0028	0.0030
Med.	0.0022	0.0023	0.0025	0.0028	0.0028
st dev	0.0002	0.0002	0.0002	0.0002	0.0003
Min.	0.0017	0.0019	0.0021	0.0024	0.0025
Max.	0.0025	0.0028	0.0032	0.0032	0.0036

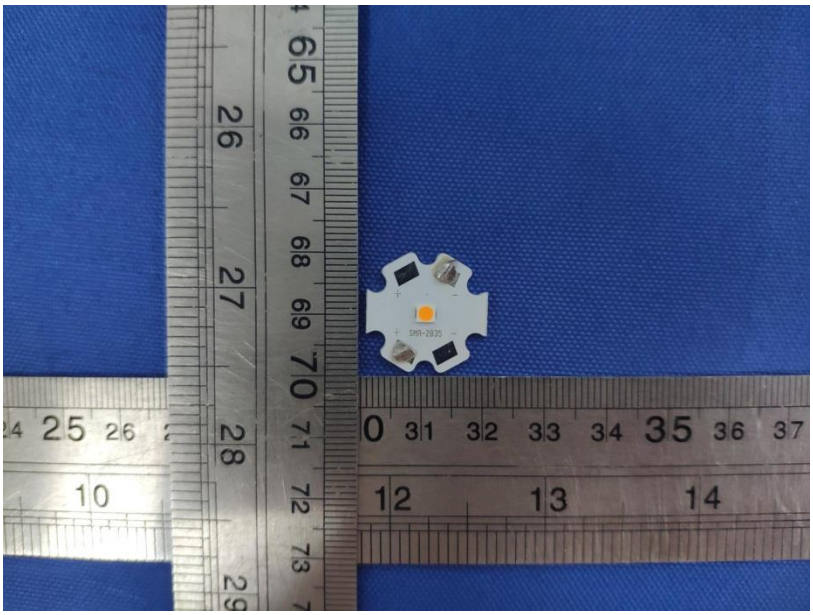
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



Directions

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