TEST REPORT

According to ANSI/IES LM-80-15
For

Lumileds Holding B.V.

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

Model: L128-2790RD35000J1

Report Type: 9000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	R2DG190719050-10
Test Date:	2018-04-23 to 2019-04-30
Report Date:	2019-07-22
Reviewed By:	Blake Zhang / EE Engineer
Test Facility:	Test facility was located at No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China.
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

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

1.1 Description of LED Light Sources

Sample Size:

60 PCS samples were received on 2018-04-23. The samples were numbered from 1 to 30 and 31 to 60.

Manufacturer:	Lumileds Holding B.V.
Part Number:	L128-2790RD35000J1
Part Type:	LED Package
Drive Level:	DC 60mA
Nominal CCT:	2700K
Power:	1.14W
Average Current Density per LED die:	310.00mA/mm^2
Average Power Density per LED die:	5.89W/mm^2
CRI:	90
Die Spacing:	0.15mm

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)	Number of dies	Driver current per die (mA)	Current Density per Die (mA/mm^2)	Power Density per PCB (W/mm^2)	Die Spacing (mm)
L128-2790RD35000J1	L128-xx90RD35xxxxx	60	1.14	2700	2	60	310	0.1163	0.15

Note 1:

1. The first and second x denote designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 45=4500K, 50=5000K, 57=5700K, 60=6000K, 65=6500K);

2. The last five x denote designates= Lumileds internal codes (0A1, 0B1, 0C1, etc. = shares the same base part).

Note 2:

1. The applicant *Lumileds Holding B.V.*declare that their products with model L128-2790RD35000J1 are the same to the products in report # R2DG180423052-10 and is authorized by original applicant to use their test data.

2. All the data in previous report (R2DG180423052-10) 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
- 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
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2019-03-18	2020-03-17
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2019-03-26	2020-03-25
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2019-03-18	2020-03-17
Standard Light Source	EVERFINE	D062	G100278CJ7351206	2018-12-24	2019-12-24
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2019-03-26	2020-03-25
Multilayer aging machine	BACL	B2-270	20024	2019-03-13	2020-03-12
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11060010	2019-03-26	2020-03-25

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 (luminous flux) measurements is U=1.6% (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=1.6 (K=2) , at the 95% confidence level.

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

1.7 Statement of Traceability

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

1.8 Sample Set

Data Set 1: 85°C, 60mA

Part Number:	L128-2790RD35000J1
Number of Units:	30
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

Data Set 2: 105°C, 60mA

Part Number:	L128-2790RD35000J1
Number of Units:	30
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

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2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	β	Reported TM-21 L_{70} Lifetime
1	30	0	1000hrs	9000hrs	2.774E-06	1.000	>54000 hours
2	30	0	1000hrs	9000hrs	3.364E-06	0.997	>54000 hours

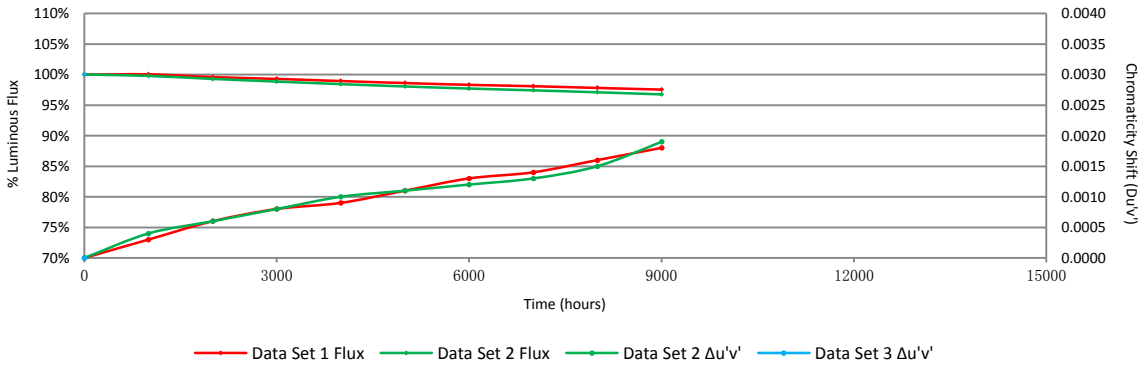
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.06%	99.61%	99.31%	98.96%	98.63%	98.34%	98.12%	97.84%	97.57%
2	99.78%	99.29%	98.86%	98.44%	98.06%	97.72%	97.43%	97.11%	96.77%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0003	0.0006	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018
2	0.0004	0.0006	0.0008	0.0010	0.0011	0.0012	0.0013	0.0015	0.0019

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	111.3	100.09	99.91	99.82	99.55	99.28	99.01	98.92	98.56	98.38
2	115.5	100.26	99.74	99.31	99.22	98.96	98.70	98.53	98.27	98.10
3	113.4	99.82	99.21	99.03	98.85	98.32	97.97	97.62	97.44	97.27
4	112.0	100.18	99.64	99.38	99.29	99.11	98.93	98.75	98.57	98.13
5	109.5	100.27	99.91	99.63	99.27	98.90	98.72	98.45	98.17	97.90
6	113.7	100.26	99.74	99.30	98.77	98.50	98.24	98.07	97.71	97.36
7	114.1	99.91	99.30	98.86	98.42	97.98	97.55	97.46	97.11	96.84
8	115.3	100.26	99.83	99.48	98.96	98.70	98.44	98.35	98.01	97.66
9	118.9	100.08	99.75	99.50	99.33	98.82	98.49	98.23	98.07	97.90
10	114.5	100.17	99.56	99.39	99.13	98.69	98.34	98.17	97.82	97.55
11	113.0	100.27	100.09	99.47	99.20	98.94	98.76	98.67	98.50	98.23
12	113.3	99.82	99.21	98.59	98.41	98.15	97.97	97.88	97.53	97.26
13	113.9	100.18	99.91	99.82	99.30	98.95	98.60	98.42	97.98	97.72
14	111.2	100.09	99.55	99.19	99.10	98.92	98.56	98.29	98.02	97.66
15	112.8	99.73	99.11	98.85	98.32	97.96	97.70	97.52	97.34	97.07
16	114.0	99.82	99.56	99.47	99.04	98.77	98.42	98.33	98.16	97.89
17	114.1	100.18	99.74	99.30	99.04	98.60	98.42	98.16	97.81	97.63
18	110.3	100.27	100.09	99.55	99.37	98.91	98.55	98.28	98.01	97.64
19	116.1	99.91	99.48	99.22	98.79	98.45	98.19	98.02	97.76	97.42
20	112.5	100.09	99.47	99.20	99.11	98.84	98.58	98.22	97.87	97.42
21	115.7	100.26	99.57	99.14	98.88	98.53	98.10	97.84	97.49	97.15
22	114.1	100.18	100.09	99.74	99.56	99.21	98.95	98.69	98.51	98.25
23	115.8	99.83	99.48	99.31	98.96	98.53	98.27	98.01	97.75	97.50
24	116.5	100.17	99.57	99.06	98.63	98.37	98.20	97.85	97.51	97.25
25	112.1	99.73	99.20	99.11	98.84	98.66	98.22	97.95	97.77	97.50
26	112.6	100.18	99.82	99.64	98.93	98.67	98.49	98.13	97.78	97.51
27	113.1	99.91	99.38	99.20	98.85	98.32	98.14	97.70	97.35	97.17
28	114.4	99.91	99.30	99.13	98.51	98.25	97.90	97.55	97.29	97.12
29	115.3	99.83	99.31	98.96	98.27	98.01	97.66	97.48	97.22	96.96
30	114.2	100.09	99.82	99.56	99.04	98.60	98.25	98.07	97.81	97.55
Avg.	113.8	100.06	99.61	99.31	98.96	98.63	98.34	98.12	97.84	97.57
Med.	114.0	100.09	99.57	99.30	99.00	98.66	98.38	98.15	97.81	97.53
st dev	2.0	0.18	0.28	0.29	0.34	0.35	0.37	0.39	0.40	0.40
Min.	109.5	99.73	99.11	98.59	98.27	97.96	97.55	97.46	97.11	96.84
Max.	118.9	100.27	100.09	99.82	99.56	99.28	99.01	98.92	98.57	98.38

3.2 Data Set 1, 85°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	17.91	17.95	18.19	17.94	17.98	17.95	17.98	17.99	18.00	17.94
2	17.75	17.77	17.97	17.76	17.80	17.77	17.81	17.82	17.83	17.79
3	17.89	17.90	18.15	17.90	17.94	17.93	17.95	17.97	17.98	17.93
4	17.96	17.99	18.24	17.98	18.03	18.02	18.03	18.05	18.06	18.02
5	17.88	17.91	18.16	17.90	17.95	17.94	17.93	17.98	17.99	17.95
6	17.79	17.80	18.03	17.79	17.84	17.83	17.84	17.87	17.87	17.84
7	17.81	17.83	18.06	17.81	17.87	17.86	17.87	17.90	17.90	17.86
8	17.90	17.93	18.17	17.91	18.02	17.95	17.97	17.99	18.00	17.97
9	18.01	18.04	18.29	18.02	18.11	18.05	18.08	18.09	18.10	18.05
10	17.81	17.83	18.06	17.81	17.80	17.86	17.88	17.88	17.90	17.91
11	17.90	17.93	18.18	17.91	17.98	17.95	17.98	17.99	17.99	18.04
12	17.92	17.94	18.20	17.93	18.04	17.99	18.01	18.03	18.03	18.00
13	17.93	17.95	18.20	17.94	17.99	17.98	18.00	18.01	18.02	18.09
14	17.84	17.86	18.10	17.84	18.03	17.89	17.91	17.92	17.93	18.07
15	17.96	17.98	18.24	17.96	18.03	18.01	18.03	18.05	18.05	18.08
16	17.95	17.98	18.23	17.96	17.98	18.00	18.02	18.05	18.05	18.00
17	18.01	18.03	18.27	18.01	18.12	18.06	18.08	18.10	18.10	18.03
18	17.95	17.98	18.24	17.96	18.02	18.02	18.03	18.06	18.05	18.03
19	18.04	18.06	18.32	18.05	18.10	18.10	18.13	18.15	18.15	18.12
20	17.95	17.97	18.23	17.96	18.01	18.01	18.03	18.05	18.05	18.02
21	17.91	17.93	18.17	17.92	17.92	17.96	17.98	18.01	18.01	17.93
22	17.95	17.97	18.22	17.96	18.01	18.01	18.02	18.04	18.05	18.03
23	17.98	18.00	18.24	17.98	18.04	18.03	18.06	18.06	18.08	18.03
24	17.96	17.99	18.23	17.97	18.12	18.03	18.06	18.07	18.05	18.01
25	17.92	17.94	18.20	17.93	17.92	17.98	18.00	18.01	18.01	17.97
26	18.03	18.04	18.30	18.03	18.08	18.07	18.10	18.12	18.11	18.06
27	17.94	17.96	18.21	17.95	17.99	18.00	18.01	18.03	18.02	17.97
28	18.02	18.03	18.28	18.02	18.06	18.07	18.08	18.10	18.10	18.25
29	17.90	17.79	18.01	17.79	17.93	17.83	17.82	17.86	17.86	17.93
30	17.79	17.80	18.03	17.81	18.01	18.01	17.84	17.85	17.85	17.82
Avg.	17.92	17.94	18.18	17.92	17.99	17.97	17.98	18.00	18.01	17.99
Med.	17.93	17.95	18.20	17.94	18.01	18.00	18.01	18.02	18.02	18.01
st dev	0.07	0.08	0.09	0.08	0.09	0.08	0.09	0.09	0.08	0.09
Min.	17.75	17.77	17.97	17.76	17.80	17.77	17.81	17.82	17.83	17.79
Max.	18.04	18.06	18.32	18.05	18.12	18.10	18.13	18.15	18.15	18.25

3.3 Data Set 1, 85°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2595	0.5294	2754	0.0004	0.0009	0.0011	0.0013	0.0014	0.0016	0.0017	0.0019	0.0022
2	0.2568	0.5305	2806	0.0001	0.0001	0.0007	0.0009	0.0010	0.0010	0.0013	0.0016	0.0019
3	0.2578	0.5284	2795	0.0006	0.0009	0.0009	0.0007	0.0007	0.0007	0.0008	0.0010	0.0011
4	0.2607	0.5318	2720	0.0006	0.0007	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0024
5	0.2610	0.5317	2713	0.0006	0.0006	0.0007	0.0009	0.0009	0.0011	0.0013	0.0014	0.0016
6	0.2581	0.5289	2786	0.0002	0.0002	0.0003	0.0004	0.0004	0.0006	0.0005	0.0007	0.0009
7	0.2590	0.5299	2762	0.0004	0.0006	0.0007	0.0008	0.0008	0.0010	0.0009	0.0010	0.0011
8	0.2560	0.5281	2837	0.0000	0.0004	0.0008	0.0006	0.0004	0.0006	0.0007	0.0010	0.0012
9	0.2544	0.5298	2864	0.0004	0.0007	0.0006	0.0007	0.0008	0.0008	0.0010	0.0011	0.0013
10	0.2571	0.5289	2808	0.0003	0.0010	0.0008	0.0011	0.0011	0.0012	0.0014	0.0015	0.0016
11	0.2574	0.5276	2808	0.0006	0.0010	0.0007	0.0009	0.0012	0.0013	0.0015	0.0017	0.0019
12	0.2582	0.5293	2782	0.0005	0.0007	0.0007	0.0012	0.0013	0.0013	0.0016	0.0017	0.0018
13	0.2568	0.5288	2815	0.0004	0.0005	0.0007	0.0010	0.0012	0.0014	0.0017	0.0020	0.0021
14	0.2581	0.5273	2795	0.0005	0.0009	0.0008	0.0011	0.0013	0.0014	0.0014	0.0015	0.0017
15	0.2589	0.5291	2769	0.0002	0.0004	0.0006	0.0011	0.0015	0.0018	0.0020	0.0021	0.0022
16	0.2580	0.5290	2788	0.0006	0.0009	0.0009	0.0008	0.0008	0.0012	0.0015	0.0016	0.0017
17	0.2585	0.5301	2772	0.0003	0.0006	0.0012	0.0013	0.0017	0.0020	0.0022	0.0025	0.0027
18	0.2608	0.5294	2728	0.0000	0.0001	0.0008	0.0010	0.0013	0.0017	0.0019	0.0021	0.0024
19	0.2586	0.5302	2770	0.0004	0.0007	0.0009	0.0013	0.0015	0.0019	0.0019	0.0020	0.0021
20	0.2594	0.5294	2756	0.0002	0.0004	0.0006	0.0008	0.0009	0.0013	0.0015	0.0017	0.0019
21	0.2580	0.5294	2786	0.0004	0.0002	0.0005	0.0008	0.0011	0.0013	0.0016	0.0018	0.0020
22	0.2576	0.5280	2801	0.0003	0.0005	0.0011	0.0009	0.0012	0.0015	0.0015	0.0017	0.0019
23	0.2575	0.5303	2792	0.0004	0.0004	0.0007	0.0009	0.0011	0.0015	0.0017	0.0018	0.0019
24	0.2575	0.5303	2793	0.0005	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0018	0.0019
25	0.2595	0.5291	2756	0.0001	0.0004	0.0009	0.0010	0.0011	0.0014	0.0016	0.0019	0.0020
26	0.2609	0.5304	2721	0.0003	0.0006	0.0008	0.0008	0.0009	0.0009	0.0012	0.0013	0.0014
27	0.2574	0.5291	2801	0.0001	0.0004	0.0008	0.0009	0.0011	0.0012	0.0014	0.0016	0.0017
28	0.2581	0.5289	2787	0.0002	0.0005	0.0004	0.0004	0.0005	0.0009	0.0011	0.0014	0.0016
29	0.2568	0.5288	2815	0.0003	0.0005	0.0005	0.0011	0.0010	0.0008	0.0006	0.0007	0.0009
30	0.2581	0.5290	2785	0.0003	0.0007	0.0007	0.0006	0.0009	0.0012	0.0013	0.0014	0.0013
Avg.	0.2582	0.5294	2782	0.0003	0.0006	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018
Med.	0.2581	0.5292	2787	0.0003	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019
st dev	0.0015	0.0010	34	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0004	0.0004	0.0004
Min.	0.2544	0.5273	2713	0.0000	0.0001	0.0003	0.0004	0.0004	0.0006	0.0005	0.0007	0.0009
Max.	0.2610	0.5318	2864	0.0006	0.0010	0.0012	0.0013	0.0017	0.0020	0.0022	0.0025	0.0027

3.4 Data Set 2, 105°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	114.9	99.91	99.74	99.30	98.96	98.52	98.17	98.00	97.65	97.30
32	114.8	99.91	99.22	98.95	98.69	98.43	98.26	97.91	97.56	97.21
33	114.6	99.83	99.13	98.52	97.82	97.56	97.12	96.95	96.68	96.51
34	114.6	99.56	98.95	98.43	97.99	97.56	97.21	97.03	96.60	96.25
35	111.0	99.73	99.55	99.10	98.74	98.29	97.93	97.66	97.48	97.30
36	114.0	99.82	99.21	99.12	98.95	98.68	98.51	98.07	97.89	97.54
37	112.8	100.09	99.56	99.47	98.76	98.32	97.96	97.78	97.52	97.25
38	116.7	99.83	99.57	99.14	98.71	98.29	97.86	97.51	97.09	96.66
39	114.0	99.91	99.12	98.68	98.16	97.89	97.54	97.19	96.84	96.58
40	114.6	99.83	99.21	98.43	97.99	97.56	97.21	96.86	96.51	95.90
41	114.1	99.91	99.65	99.56	99.21	98.60	98.16	97.98	97.63	97.28
42	116.0	99.74	99.48	98.71	98.28	98.02	97.59	97.16	96.81	96.38
43	117.6	99.57	99.06	98.72	98.38	98.04	97.53	97.28	96.77	96.51
44	112.4	99.82	99.47	99.11	98.75	98.40	98.13	97.78	97.51	97.33
45	114.3	99.65	98.86	98.69	98.16	97.90	97.38	96.94	96.50	96.06
46	112.9	99.82	99.03	98.32	97.70	97.34	96.81	96.55	96.19	95.93
47	111.5	99.91	99.64	99.01	98.48	98.21	97.76	97.49	97.13	96.86
48	114.6	99.65	99.39	98.78	98.25	97.99	97.56	97.21	96.77	96.34
49	111.3	99.64	99.19	98.83	98.65	98.20	97.93	97.75	97.39	97.04
50	112.3	99.55	98.66	98.40	97.77	97.42	96.88	96.71	96.44	95.81
51	113.6	99.65	99.47	99.12	98.59	98.15	97.80	97.62	97.27	96.92
52	113.7	99.74	99.03	98.50	98.33	97.71	97.45	97.01	96.66	96.39
53	114.8	99.74	99.04	98.34	98.00	97.74	97.47	97.21	96.78	96.43
54	113.1	99.65	99.38	99.20	98.94	98.41	98.14	97.97	97.79	97.52
55	114.4	99.74	99.48	99.13	98.78	98.34	98.16	97.81	97.64	97.20
56	112.6	99.91	99.29	98.85	98.40	98.13	97.96	97.51	97.07	96.80
57	114.6	99.91	99.13	98.60	98.08	97.73	97.21	97.03	96.68	96.34
58	114.4	99.91	99.56	99.21	98.78	98.34	98.08	97.81	97.47	97.20
59	109.7	99.82	99.36	98.91	98.54	98.27	98.09	97.81	97.63	97.17
60	113.2	99.56	99.29	98.76	98.32	97.88	97.61	97.44	97.26	97.00
Avg.	113.8	99.78	99.29	98.86	98.44	98.06	97.72	97.43	97.11	96.77
Med.	114.1	99.82	99.29	98.84	98.44	98.14	97.78	97.50	97.11	96.83
st dev	1.7	0.14	0.26	0.34	0.39	0.36	0.43	0.43	0.47	0.51
Min.	109.7	99.55	98.66	98.32	97.70	97.34	96.81	96.55	96.19	95.81
Max.	117.6	100.09	99.74	99.56	99.21	98.68	98.51	98.07	97.89	97.54

3.5 Data Set 2, 105°C, 60mA (Forward Voltage)

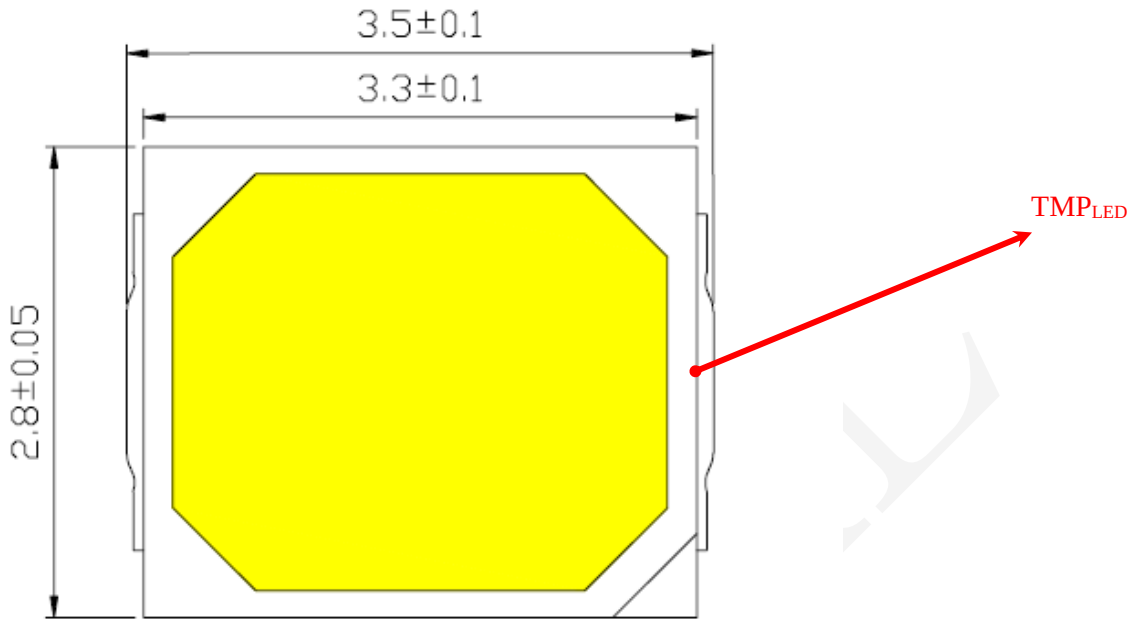
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	17.96	18.00	18.23	17.98	18.01	18.01	18.02	18.05	18.06	18.01
32	17.95	17.98	18.22	17.96	18.03	18.01	18.03	18.04	18.05	18.02
33	17.89	17.92	18.15	17.90	17.94	17.93	17.95	17.98	17.97	17.92
34	18.02	18.04	18.29	18.02	18.03	18.07	18.08	18.10	18.10	18.09
35	17.98	18.00	18.27	18.00	18.04	18.03	18.04	18.08	18.07	18.01
36	17.70	17.72	17.92	17.74	17.78	17.75	17.76	17.78	17.79	17.74
37	17.98	18.00	18.25	18.01	18.02	18.03	18.05	18.06	18.07	18.01
38	18.04	18.05	18.31	18.06	18.22	18.09	18.11	18.13	18.12	18.06
39	17.92	17.94	18.18	17.95	18.18	17.97	18.00	18.01	18.00	18.07
40	17.96	17.98	18.24	17.98	18.00	18.01	18.03	18.04	18.05	18.05
41	17.99	18.01	18.28	18.01	18.01	18.04	18.07	18.09	18.08	18.06
42	17.93	17.95	18.20	17.95	17.97	17.99	18.01	18.03	18.02	18.01
43	18.03	18.05	18.28	18.05	18.08	18.08	18.10	18.13	18.12	18.20
44	17.94	17.96	18.21	17.98	18.02	18.01	18.01	18.05	18.03	18.14
45	17.80	17.83	18.04	17.84	17.87	17.84	17.87	17.90	17.88	17.82
46	17.88	17.90	18.13	17.91	17.94	17.93	17.94	17.97	17.96	18.08
47	17.87	17.90	18.12	17.90	17.94	17.92	17.94	17.97	17.96	18.06
48	18.01	18.02	18.27	18.03	18.09	18.06	18.08	18.10	18.09	18.07
49	17.84	17.87	18.11	17.88	17.91	17.90	17.93	17.94	17.94	17.91
50	17.92	17.94	18.19	17.95	18.12	17.97	18.00	18.01	18.01	18.05
51	18.04	18.05	18.30	18.09	18.09	18.09	18.12	18.12	18.12	18.17
52	17.99	18.01	18.26	18.03	18.04	18.02	18.07	18.07	18.07	18.01
53	17.89	17.91	18.13	17.95	17.98	18.05	18.01	18.08	18.00	18.04
54	17.93	17.94	18.19	17.96	17.99	17.98	18.00	18.01	18.00	18.03
55	17.80	17.82	18.03	17.83	17.86	17.84	17.87	17.88	17.85	17.83
56	17.95	17.97	18.24	17.99	18.03	18.01	18.04	18.05	18.02	18.07
57	18.03	18.04	18.31	18.06	18.10	18.08	18.11	18.12	18.10	18.03
58	17.92	17.93	18.16	17.96	17.98	17.96	17.98	18.00	17.98	18.03
59	17.80	17.82	18.06	17.85	17.89	17.86	17.88	17.88	17.88	17.88
60	17.87	17.89	18.12	17.90	17.93	17.91	17.94	17.96	17.95	18.04
Avg.	17.93	17.95	18.19	17.96	18.00	17.98	18.00	18.02	18.01	18.02
Med.	17.94	17.96	18.21	17.96	18.01	18.01	18.01	18.04	18.02	18.04
st dev	0.08	0.08	0.09	0.08	0.09	0.08	0.08	0.08	0.08	0.10
Min.	17.70	17.72	17.92	17.74	17.78	17.75	17.76	17.78	17.79	17.74
Max.	18.04	18.05	18.31	18.09	18.22	18.09	18.12	18.13	18.12	18.20

3.6 Data Set 2, 105°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	0.2573	0.5285	2805	0.0003	0.0005	0.0007	0.0010	0.0012	0.0011	0.0011	0.0012	0.0014
32	0.2563	0.5293	2823	0.0003	0.0005	0.0007	0.0010	0.0010	0.0008	0.0007	0.0008	0.0011
33	0.2587	0.5283	2776	0.0004	0.0010	0.0010	0.0010	0.0014	0.0012	0.0011	0.0013	0.0015
34	0.2585	0.5295	2776	0.0001	0.0002	0.0004	0.0007	0.0007	0.0006	0.0008	0.0010	0.0014
35	0.2596	0.5307	2747	0.0001	0.0009	0.0012	0.0013	0.0013	0.0013	0.0015	0.0017	0.0019
36	0.2568	0.5282	2819	0.0004	0.0005	0.0009	0.0010	0.0010	0.0012	0.0011	0.0012	0.0013
37	0.2597	0.5292	2752	0.0001	0.0002	0.0007	0.0007	0.0008	0.0011	0.0012	0.0013	0.0014
38	0.2560	0.5270	2841	0.0006	0.0011	0.0009	0.0012	0.0015	0.0016	0.0014	0.0015	0.0016
39	0.2580	0.5291	2788	0.0006	0.0008	0.0008	0.0008	0.0009	0.0009	0.0008	0.0011	0.0019
40	0.2592	0.5287	2764	0.0007	0.0008	0.0009	0.0009	0.0009	0.0011	0.0010	0.0012	0.0017
41	0.2592	0.5301	2758	0.0002	0.0004	0.0006	0.0008	0.0009	0.0012	0.0012	0.0015	0.0020
42	0.2571	0.5304	2800	0.0006	0.0002	0.0007	0.0009	0.0009	0.0012	0.0014	0.0016	0.0021
43	0.2562	0.5292	2825	0.0003	0.0006	0.0007	0.0009	0.0009	0.0011	0.0015	0.0017	0.0022
44	0.2576	0.5293	2795	0.0005	0.0005	0.0009	0.0012	0.0011	0.0012	0.0013	0.0016	0.0022
45	0.2604	0.5315	2727	0.0003	0.0005	0.0008	0.0007	0.0007	0.0010	0.0011	0.0013	0.0021
46	0.2582	0.5278	2790	0.0004	0.0005	0.0009	0.0009	0.0010	0.0011	0.0013	0.0014	0.0020
47	0.2595	0.5295	2754	0.0003	0.0002	0.0005	0.0005	0.0006	0.0008	0.0010	0.0012	0.0018
48	0.2582	0.5289	2784	0.0006	0.0008	0.0011	0.0012	0.0012	0.0014	0.0014	0.0015	0.0020
49	0.2583	0.5280	2785	0.0004	0.0002	0.0005	0.0008	0.0012	0.0014	0.0014	0.0016	0.0018
50	0.2584	0.5295	2778	0.0006	0.0005	0.0009	0.0008	0.0012	0.0016	0.0016	0.0017	0.0022
51	0.2580	0.5292	2788	0.0005	0.0006	0.0009	0.0009	0.0009	0.0013	0.0012	0.0014	0.0020
52	0.2581	0.5287	2788	0.0006	0.0008	0.0009	0.0011	0.0012	0.0016	0.0014	0.0017	0.0021
53	0.2581	0.5290	2786	0.0003	0.0005	0.0010	0.0011	0.0014	0.0017	0.0016	0.0019	0.0020
54	0.2578	0.5295	2790	0.0004	0.0004	0.0004	0.0008	0.0013	0.0012	0.0015	0.0019	0.0028
55	0.2580	0.5294	2786	0.0004	0.0007	0.0007	0.0009	0.0011	0.0012	0.0015	0.0018	0.0024
56	0.2576	0.5289	2796	0.0005	0.0009	0.0009	0.0015	0.0016	0.0015	0.0016	0.0017	0.0022
57	0.2584	0.5288	2780	0.0007	0.0006	0.0010	0.0012	0.0014	0.0013	0.0013	0.0014	0.0020
58	0.2560	0.5276	2838	0.0002	0.0003	0.0006	0.0008	0.0010	0.0010	0.0013	0.0014	0.0024
59	0.2603	0.5287	2741	0.0006	0.0006	0.0009	0.0013	0.0015	0.0015	0.0014	0.0016	0.0021
60	0.2564	0.5282	2826	0.0004	0.0006	0.0009	0.0009	0.0014	0.0014	0.0015	0.0018	0.0025
Avg.	0.2581	0.5290	2787	0.0004	0.0006	0.0008	0.0010	0.0011	0.0012	0.0013	0.0015	0.0019
Med.	0.2581	0.5291	2787	0.0004	0.0005	0.0009	0.0009	0.0011	0.0012	0.0013	0.0015	0.0020
st dev	0.0012	0.0009	28	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0004
Min.	0.2560	0.5270	2727	0.0001	0.0002	0.0004	0.0005	0.0006	0.0006	0.0007	0.0008	0.0011
Max.	0.2604	0.5315	2841	0.0007	0.0011	0.0012	0.0015	0.0016	0.0017	0.0016	0.0019	0.0028

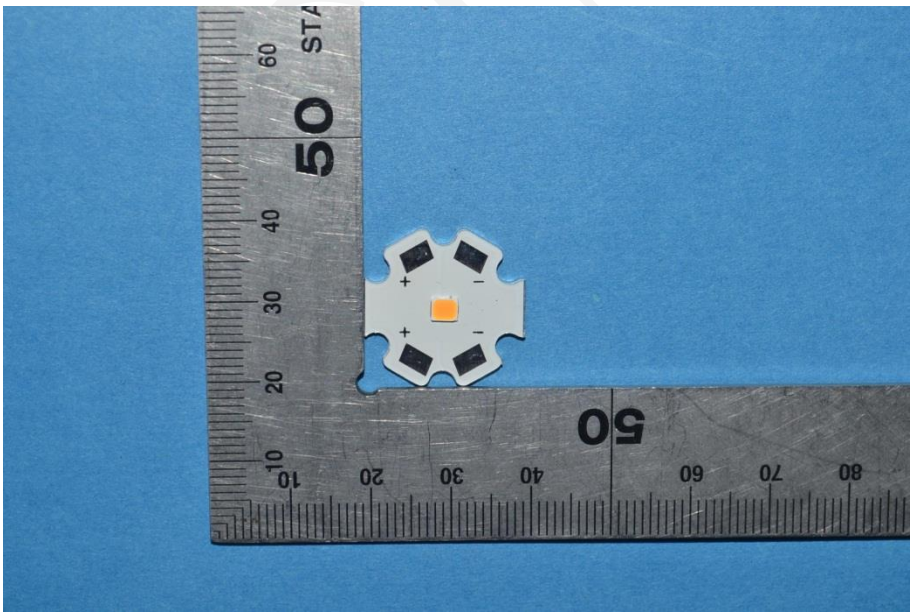
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



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