TEST REPORT

According to ANSI/IES LM-80-15
For

Lumileds Holding B.V.

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

#Model: L128-2780RB35000G1

Report Type: 9000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	RSZ200107509-10
Test Date:	2018-09-17 to 2019-10-11
Report Date:	2020-01-07
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.

TABLE OF CONTENTS

1 - General Information

1.1 Description of LED Light Sources

Sample Size:

60 PCS test samples were in good condition and received on 2018-09-12. The samples were numbered from 1 to 30 and 31 to 60.

#Manufacturer:	Lumileds Holding B.V.
#Part Number:	L128-2780RB35000G1
#Part Type:	LED Package
#Drive Level:	DC 150mA
#Nominal CCT:	2700K
#Power:	0.96W
#Average Current Density per LED die:	1159.555 mA/mm^2
#Average Power Density per LED die:	3.827 W/mm^2
#CRI:	80
#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:

Model type	Model name	CRI (typ.)	CCT (typ.)	Series	Parallel	Power density（W/mm^2）	Current density per LED die（mA/mm^2）	Current per die (mA)	Distance between of dies	Current (mA)
Master model	L128-2780RB35000G1	80	2700K	2	1	0.0979	1159.555	150	0.15	150
Master model	L128-XX80RB3500XXX	80	2700K ~6500K	2	1	0.0979	1159.555	150	0.15	150
multiple model	L128-XX80RA3500XXX	80	2700K ~6500K	1	1	0.0510	930.002	150	/	150

The family models and tested model could meet all the requirements listed as below:

a. The testes model has the greatest number of LED dies. and,

b. Minimum die edge of die edge spacing of the family models is greater than or equal to that of the tested LED package; and,

c. The family models' electrical power density (i.e. W/mm2 of PCB or substrate total area, or equivalent calculation) less than or equal to the tested LED package; and,

d. Average current density per LED die (i.e. mA/mm2 of epitaxial structures) less than or equal to the tested LED package; and,

e. identical materials used (note: this does not constrain phosphor quantity and/or dimensional adjustments); and,

f. Identical construction processes used;

g. The first and second X designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K,

45=4500K, 50=5000K, 57=5700K, 60=6000K, 65=6500K); The last three X designates Lumileds internal codes (0A1, 0B1, 0C1, etc.=shares the same base).

Note:

1. The applicant Lumileds Holding B.V. declare that their products with model L128-2780RB35000G1 are the same to the products in report # RSZ180912501-10.
2. All the data in previous report (RSZ180912501-10) 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
0.5m 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	20015	2019-03-10	2020-03-09
DC Power Supply	BACL	B12001-12	90023	2019-01-07	2020-01-07

1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within ±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=1.8% (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.

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:	L128-2780RB35000G1
Number of Units:	30
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	150mA
Measurement Current:	150mA

Data Set 2: 105°C, 150mA

Part Number:	L128-2780RB35000G1
Number of Units:	30
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
1	30	0	1000hrs	9000hrs	2.375E-06	0.998	>54000hrs
2	30	0	1000hrs	9000hrs	3.038E-06	0.997	>54000hrs

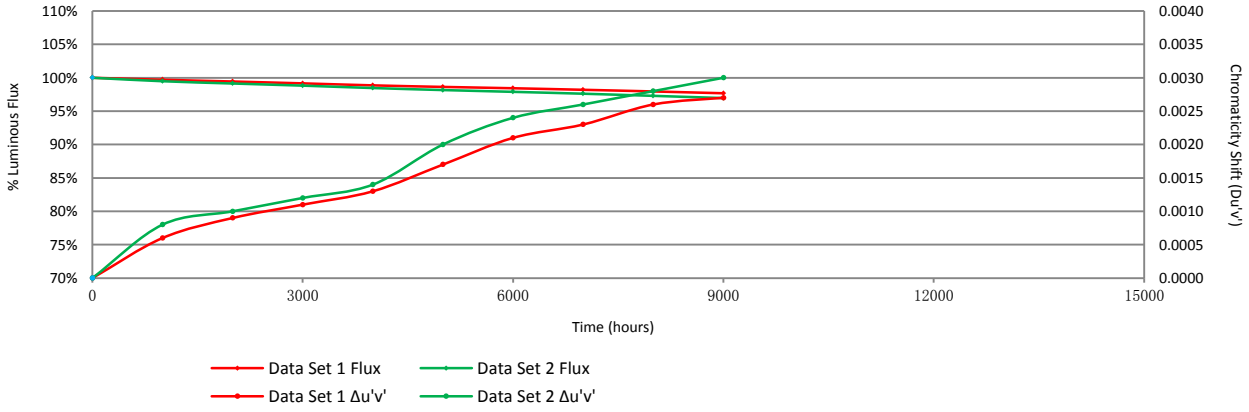
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	99.70%	99.44%	99.16%	98.86%	98.63%	98.43%	98.20%	97.95%	97.68%
2	99.48%	99.14%	98.82%	98.46%	98.16%	97.89%	97.61%	97.29%	96.96%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0006	0.0009	0.0011	0.0013	0.0017	0.0021	0.0023	0.0026	0.0027
2	0.0008	0.0010	0.0012	0.0014	0.0020	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
1	100.00	99.52	99.22	98.87	98.48	98.17	97.91	97.67	97.49	97.05
2	99.61	99.94	99.61	99.40	99.20	98.96	98.84	98.67	98.32	97.84
3	99.45	99.88	99.61	99.30	99.02	98.80	98.49	98.22	97.91	97.87
4	99.06	99.62	99.30	99.08	98.85	98.57	98.47	98.06	97.86	97.65
5	100.10	99.55	99.26	98.91	98.53	98.44	98.19	97.99	97.89	97.85
6	101.70	99.61	99.21	98.92	98.53	98.24	98.20	98.00	97.83	97.67
7	100.70	99.60	99.30	99.10	98.74	98.47	98.30	98.01	97.76	97.54
8	98.55	99.81	99.56	99.20	98.99	98.84	98.67	98.43	98.20	98.05
9	98.80	99.51	99.09	98.86	98.48	98.20	97.98	97.60	97.25	97.15
10	98.59	99.64	99.37	99.06	98.83	98.64	98.38	98.25	97.98	97.76
11	100.10	99.78	99.70	99.39	99.05	98.81	98.53	98.38	98.10	97.82
12	100.30	99.52	99.47	99.18	98.90	98.65	98.46	98.14	97.82	97.53
13	100.10	99.81	99.55	99.23	98.91	98.68	98.53	98.23	98.00	97.81
14	99.05	99.74	99.52	99.22	98.93	98.79	98.66	98.49	98.12	97.87
15	100.70	99.60	99.40	99.14	98.81	98.61	98.43	98.22	97.93	97.90
16	99.08	99.89	99.68	99.55	99.22	98.88	98.56	98.27	98.02	97.91
17	98.65	99.64	99.26	99.02	98.64	98.50	98.25	98.11	97.72	97.50
18	98.87	99.66	99.32	99.00	98.66	98.31	98.12	98.02	97.67	97.06
19	99.61	99.89	99.69	99.48	99.26	99.15	98.91	98.60	98.31	98.13
20	101.20	99.60	99.41	99.11	98.91	98.78	98.57	98.35	98.17	97.88
21	99.97	99.56	99.41	99.18	98.98	98.69	98.55	98.37	98.13	97.92
22	98.40	99.83	99.70	99.41	99.08	98.86	98.72	98.50	98.34	98.18
23	98.83	99.79	99.37	99.16	98.86	98.57	98.40	98.10	97.81	97.32
24	100.30	99.59	99.35	98.95	98.62	98.40	98.29	98.19	97.99	97.47
25	99.25	99.76	99.60	99.38	99.12	98.93	98.70	98.55	98.33	98.10
26	100.40	99.70	99.48	99.06	98.69	98.48	98.24	97.98	97.79	97.57
27	100.00	99.62	99.46	99.15	98.89	98.71	98.62	98.48	98.18	97.62
28	98.70	99.66	99.42	99.07	98.74	98.59	98.39	98.15	97.89	97.57
29	95.90	99.80	99.42	99.28	98.88	98.67	98.28	98.04	97.84	97.49
30	99.37	99.76	99.45	99.30	98.86	98.51	98.35	98.04	97.72	97.47
Avg.	99.51	99.70	99.44	99.16	98.86	98.63	98.43	98.20	97.95	97.68
Med.	99.53	99.66	99.42	99.16	98.87	98.65	98.45	98.20	97.92	97.71
st dev	1.08	0.12	0.16	0.18	0.21	0.23	0.23	0.25	0.25	0.30
Min.	95.90	99.51	99.09	98.86	98.48	98.17	97.91	97.60	97.25	97.05
Max.	101.70	99.94	99.70	99.55	99.26	99.15	98.91	98.67	98.34	98.18

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
1	6.436	6.423	6.411	6.466	6.467	6.385	6.393	6.376	6.383	6.380
2	6.437	6.418	6.419	6.436	6.450	6.388	6.399	6.384	6.388	6.385
3	6.429	6.404	6.403	6.464	6.450	6.372	6.373	6.376	6.379	6.387
4	6.426	6.392	6.394	6.414	6.402	6.365	6.404	6.363	6.374	6.360
5	6.431	6.385	6.401	6.463	6.436	6.383	6.376	6.369	6.376	6.382
6	6.450	6.409	6.426	6.450	6.475	6.408	6.428	6.402	6.409	6.412
7	6.453	6.420	6.434	6.448	6.452	6.407	6.406	6.405	6.411	6.405
8	6.432	6.394	6.417	6.434	6.455	6.387	6.379	6.382	6.392	6.401
9	6.430	6.388	6.402	6.423	6.436	6.372	6.372	6.372	6.378	6.387
10	6.462	6.421	6.447	6.458	6.476	6.418	6.425	6.413	6.424	6.427
11	6.447	6.407	6.431	6.447	6.469	6.413	6.401	6.404	6.404	6.417
12	6.450	6.415	6.435	6.453	6.468	6.414	6.415	6.407	6.411	6.402
13	6.437	6.402	6.418	6.433	6.470	6.406	6.429	6.388	6.395	6.408
14	6.450	6.418	6.434	6.449	6.498	6.416	6.453	6.411	6.411	6.420
15	6.447	6.411	6.436	6.448	6.480	6.414	6.418	6.416	6.415	6.424
16	6.454	6.409	6.435	6.486	6.480	6.406	6.418	6.423	6.415	6.435
17	6.420	6.388	6.406	6.418	6.454	6.385	6.398	6.395	6.387	6.385
18	6.421	6.381	6.401	6.449	6.447	6.377	6.375	6.380	6.375	6.408
19	6.449	6.415	6.431	6.482	6.472	6.401	6.409	6.410	6.407	6.412
20	6.430	6.399	6.415	6.417	6.453	6.397	6.389	6.399	6.387	6.423
21	6.443	6.420	6.435	6.437	6.470	6.415	6.407	6.441	6.415	6.407
22	6.404	6.375	6.384	6.397	6.431	6.373	6.366	6.398	6.382	6.406
23	6.433	6.412	6.427	6.399	6.466	6.409	6.407	6.422	6.416	6.420
24	6.408	6.380	6.403	6.369	6.433	6.368	6.375	6.389	6.384	6.424
25	6.403	6.371	6.385	6.397	6.426	6.357	6.364	6.364	6.369	6.399
26	6.411	6.388	6.408	6.373	6.436	6.372	6.383	6.379	6.383	6.387
27	6.430	6.399	6.419	6.430	6.456	6.410	6.427	6.414	6.414	6.433
28	6.416	6.390	6.404	6.373	6.440	6.388	6.384	6.406	6.424	6.402
29	6.410	6.389	6.400	6.367	6.429	6.385	6.383	6.400	6.368	6.412
30	6.425	6.398	6.413	6.417	6.446	6.400	6.414	6.400	6.390	6.413
Avg.	6.432	6.401	6.416	6.430	6.454	6.393	6.399	6.396	6.396	6.405
Med.	6.432	6.401	6.416	6.435	6.454	6.393	6.400	6.400	6.391	6.408
st dev	0.016	0.015	0.016	0.033	0.021	0.018	0.022	0.019	0.017	0.018
Min.	6.403	6.371	6.384	6.367	6.402	6.357	6.364	6.363	6.368	6.360
Max.	6.462	6.423	6.447	6.486	6.498	6.418	6.453	6.441	6.424	6.435

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
1	0.2627	0.5284	2693	0.0003	0.0005	0.0007	0.0008	0.0011	0.0014	0.0017	0.0021	0.0027
2	0.2632	0.5291	2680	0.0004	0.0006	0.0007	0.0009	0.0020	0.0021	0.0022	0.0025	0.0027
3	0.2643	0.5280	2661	0.0004	0.0007	0.0010	0.0011	0.0014	0.0015	0.0019	0.0021	0.0018
4	0.2636	0.5278	2676	0.0006	0.0008	0.0009	0.0012	0.0018	0.0021	0.0022	0.0025	0.0031
5	0.2612	0.5278	2725	0.0007	0.0011	0.0014	0.0015	0.0019	0.0023	0.0025	0.0027	0.0030
6	0.2617	0.5279	2715	0.0006	0.0009	0.0012	0.0014	0.0020	0.0031	0.0035	0.0039	0.0035
7	0.2614	0.5267	2726	0.0004	0.0006	0.0007	0.0009	0.0009	0.0011	0.0012	0.0013	0.0018
8	0.2628	0.5270	2695	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	0.0027	0.0030	0.0031
9	0.2625	0.5283	2697	0.0007	0.0011	0.0012	0.0013	0.0015	0.0021	0.0022	0.0025	0.0035
10	0.2644	0.5290	2655	0.0005	0.0008	0.0011	0.0013	0.0014	0.0016	0.0017	0.0018	0.0016
11	0.2634	0.5293	2673	0.0004	0.0007	0.0009	0.0011	0.0017	0.0021	0.0024	0.0027	0.0025
12	0.2620	0.5274	2710	0.0009	0.0014	0.0016	0.0019	0.0023	0.0034	0.0036	0.0038	0.0038
13	0.2629	0.5301	2681	0.0007	0.0012	0.0014	0.0016	0.0020	0.0026	0.0028	0.0031	0.0037
14	0.2642	0.5281	2663	0.0006	0.0008	0.0009	0.0010	0.0011	0.0013	0.0015	0.0017	0.0018
15	0.2637	0.5285	2672	0.0005	0.0008	0.0010	0.0011	0.0013	0.0016	0.0019	0.0021	0.0017
16	0.2616	0.5276	2718	0.0007	0.0009	0.0011	0.0014	0.0023	0.0026	0.0029	0.0032	0.0039
17	0.2628	0.5296	2684	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0018	0.0022
18	0.2626	0.5284	2694	0.0007	0.0009	0.0011	0.0012	0.0014	0.0018	0.0020	0.0022	0.0013
19	0.2630	0.5285	2685	0.0009	0.0012	0.0014	0.0017	0.0023	0.0037	0.0040	0.0043	0.0041
20	0.2631	0.5306	2675	0.0006	0.0008	0.0011	0.0014	0.0019	0.0025	0.0026	0.0027	0.0033
21	0.2635	0.5292	2673	0.0007	0.0010	0.0011	0.0014	0.0020	0.0025	0.0026	0.0027	0.0032
22	0.2634	0.5278	2680	0.0003	0.0004	0.0005	0.0007	0.0009	0.0010	0.0010	0.0011	0.0014
23	0.2637	0.5285	2670	0.0008	0.0011	0.0014	0.0015	0.0017	0.0020	0.0021	0.0024	0.0023
24	0.2618	0.5294	2707	0.0008	0.0011	0.0013	0.0014	0.0020	0.0025	0.0028	0.0031	0.0029
25	0.2633	0.5303	2672	0.0007	0.0011	0.0013	0.0016	0.0020	0.0031	0.0034	0.0036	0.0040
26	0.2631	0.5294	2680	0.0007	0.0010	0.0013	0.0014	0.0015	0.0016	0.0016	0.0018	0.0016
27	0.2618	0.5286	2709	0.0005	0.0008	0.0011	0.0013	0.0016	0.0018	0.0021	0.0023	0.0016
28	0.2630	0.5296	2682	0.0005	0.0009	0.0010	0.0013	0.0019	0.0024	0.0027	0.0030	0.0031
29	0.2604	0.5248	2756	0.0006	0.0009	0.0010	0.0011	0.0016	0.0022	0.0025	0.0028	0.0031
30	0.2621	0.5269	2710	0.0004	0.0005	0.0007	0.0009	0.0015	0.0017	0.0022	0.0024	0.0020
Avg.	0.2628	0.5284	2691	0.0006	0.0009	0.0011	0.0013	0.0017	0.0021	0.0023	0.0026	0.0027
Med.	0.2630	0.5285	2683	0.0006	0.0009	0.0011	0.0013	0.0017	0.0021	0.0022	0.0025	0.0028
st dev	0.0010	0.0012	23	0.0002	0.0002	0.0003	0.0003	0.0004	0.0007	0.0007	0.0007	0.0009
Min.	0.2604	0.5248	2655	0.0003	0.0004	0.0005	0.0007	0.0009	0.0010	0.0010	0.0011	0.0013
Max.	0.2644	0.5306	2756	0.0009	0.0014	0.0016	0.0019	0.0023	0.0037	0.0040	0.0043	0.0041

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
31	100.40	99.70	99.45	99.20	98.87	98.57	98.50	98.28	97.81	97.16
32	99.72	99.74	99.47	99.03	98.73	98.69	98.55	98.26	98.07	97.83
33	100.30	99.30	98.97	98.60	98.29	98.22	98.06	97.83	97.42	97.06
34	98.73	99.29	99.09	98.75	98.24	97.88	97.70	97.35	97.22	96.78
35	98.27	99.07	98.73	98.37	98.06	97.79	97.36	97.04	96.84	96.61
36	101.70	99.51	99.41	99.02	98.62	98.33	97.95	97.69	97.21	96.88
37	98.24	99.54	99.18	98.99	98.79	98.44	98.03	97.73	97.38	97.19
38	101.30	99.51	99.11	98.91	98.47	98.23	97.91	97.67	97.37	97.16
39	100.20	99.45	99.17	98.86	98.56	98.23	98.13	97.84	97.30	97.05
40	96.62	99.53	99.04	98.77	98.34	98.09	97.76	97.51	97.28	96.64
41	101.00	99.50	99.11	98.93	98.50	98.44	98.18	97.91	97.71	97.28
42	98.13	99.39	98.91	98.60	98.34	98.01	97.67	97.25	96.93	96.72
43	98.43	99.49	98.88	98.55	98.14	97.68	97.59	97.42	97.12	96.86
44	99.95	99.64	99.43	99.13	98.79	98.49	98.05	97.85	97.48	97.02
45	100.70	99.40	99.04	98.73	98.28	98.03	97.80	97.56	97.25	97.03
46	98.31	99.40	98.98	98.63	98.33	98.28	98.21	97.92	97.55	97.46
47	99.29	99.33	99.12	98.69	98.26	98.03	97.87	97.52	97.29	97.08
48	99.53	99.51	99.04	98.81	98.53	98.10	97.73	97.54	97.13	96.82
49	99.71	99.57	99.29	99.05	98.73	98.44	98.23	98.06	97.60	97.28
50	99.94	99.69	99.53	99.17	98.86	98.66	98.33	97.91	97.56	96.84
51	100.10	99.55	99.39	99.06	98.70	98.34	98.02	97.72	97.34	97.08
52	98.71	99.67	99.39	99.06	98.67	98.43	98.18	97.71	97.41	97.15
53	99.42	99.41	98.84	98.58	98.22	98.11	97.94	97.66	97.36	96.56
54	99.92	99.47	99.16	98.79	98.46	98.24	97.91	97.64	97.32	96.92
55	97.92	99.58	99.07	98.71	98.38	97.93	97.52	97.18	96.84	96.56
56	98.49	99.28	99.11	98.74	98.38	97.93	97.46	97.15	96.75	96.37
57	99.59	99.71	99.41	99.08	98.59	98.08	97.79	97.53	97.41	97.35
58	98.77	99.14	98.84	98.35	97.94	97.43	97.17	96.96	96.63	96.50
59	100.00	99.47	99.11	98.78	98.46	98.05	97.69	97.48	97.34	97.16
60	100.20	99.45	98.90	98.53	98.11	97.62	97.38	97.11	96.75	96.54
Avg.	99.45	99.48	99.14	98.82	98.46	98.16	97.89	97.61	97.29	96.96
Med.	99.65	99.50	99.11	98.78	98.46	98.16	97.91	97.65	97.33	97.02
st dev	1.12	0.16	0.22	0.23	0.25	0.30	0.33	0.33	0.32	0.33
Min.	96.62	99.07	98.73	98.35	97.94	97.43	97.17	96.96	96.63	96.37
Max.	101.70	99.74	99.53	99.20	98.87	98.69	98.55	98.28	98.07	97.83

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

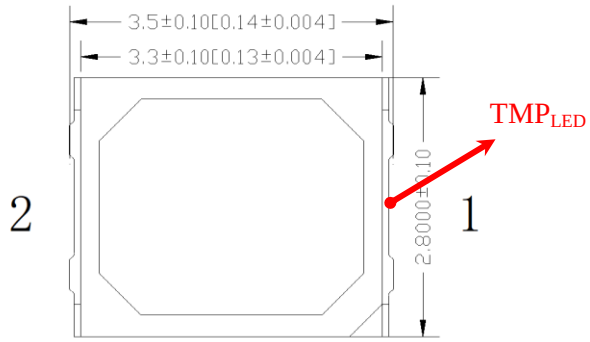
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
31	6.466	6.432	6.454	6.484	6.490	6.431	6.438	6.456	6.450	6.440
32	6.443	6.408	6.428	6.455	6.459	6.397	6.406	6.411	6.404	6.401
33	6.431	6.397	6.417	6.442	6.453	6.402	6.398	6.398	6.404	6.408
34	6.444	6.403	6.426	6.494	6.456	6.414	6.402	6.403	6.407	6.401
35	6.411	6.368	6.384	6.417	6.426	6.372	6.375	6.369	6.362	6.376
36	6.383	6.331	6.347	6.378	6.391	6.334	6.331	6.334	6.333	6.342
37	6.442	6.411	6.427	6.451	6.457	6.405	6.404	6.407	6.400	6.412
38	6.446	6.413	6.429	6.451	6.458	6.413	6.401	6.407	6.401	6.405
39	6.434	6.412	6.426	6.481	6.453	6.406	6.389	6.408	6.398	6.387
40	6.439	6.409	6.426	6.451	6.458	6.411	6.466	6.408	6.404	6.410
41	6.462	6.431	6.451	6.464	6.475	6.434	6.424	6.428	6.420	6.407
42	6.419	6.383	6.400	6.428	6.438	6.387	6.435	6.368	6.422	6.368
43	6.417	6.394	6.403	6.428	6.439	6.390	6.376	6.371	6.377	6.375
44	6.455	6.444	6.446	6.465	6.485	6.430	6.418	6.417	6.421	6.406
45	6.418	6.416	6.426	6.433	6.462	6.392	6.380	6.453	6.372	6.397
46	6.427	6.416	6.418	6.444	6.457	6.403	6.391	6.393	6.385	6.390
47	6.436	6.415	6.427	6.450	6.465	6.417	6.410	6.413	6.400	6.384
48	6.458	6.435	6.451	6.489	6.494	6.433	6.425	6.461	6.427	6.420
49	6.436	6.415	6.430	6.507	6.478	6.407	6.400	6.429	6.401	6.394
50	6.416	6.412	6.410	6.449	6.459	6.396	6.382	6.374	6.383	6.382
51	6.429	6.411	6.427	6.499	6.478	6.409	6.401	6.404	6.409	6.399
52	6.451	6.420	6.440	6.514	6.505	6.432	6.423	6.429	6.423	6.428
53	6.409	6.390	6.398	6.445	6.442	6.378	6.377	6.371	6.371	6.383
54	6.438	6.415	6.433	6.471	6.470	6.423	6.436	6.408	6.411	6.404
55	6.420	6.395	6.406	6.485	6.452	6.399	6.447	6.402	6.382	6.386
56	6.417	6.391	6.405	6.444	6.445	6.409	6.388	6.377	6.375	6.389
57	6.458	6.435	6.450	6.487	6.489	6.435	6.426	6.435	6.426	6.423
58	6.426	6.402	6.417	6.464	6.470	6.413	6.414	6.411	6.390	6.396
59	6.451	6.422	6.442	6.476	6.480	6.429	6.423	6.427	6.421	6.429
60	6.437	6.413	6.435	6.467	6.475	6.413	6.414	6.413	6.413	6.413
Avg.	6.434	6.408	6.423	6.460	6.462	6.407	6.407	6.406	6.400	6.399
Med.	6.436	6.412	6.427	6.460	6.459	6.409	6.405	6.408	6.403	6.400
st dev	0.018	0.022	0.022	0.029	0.023	0.022	0.027	0.028	0.024	0.020
Min.	6.383	6.331	6.347	6.378	6.391	6.334	6.331	6.334	6.333	6.342
Max.	6.466	6.444	6.454	6.514	6.505	6.435	6.466	6.461	6.450	6.440

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
31	0.2622	0.5296	2698	0.0003	0.0006	0.0007	0.0009	0.0014	0.0017	0.0019	0.0021	0.0021
32	0.2626	0.5291	2691	0.0004	0.0005	0.0007	0.0008	0.0011	0.0015	0.0018	0.0021	0.0025
33	0.2621	0.5303	2696	0.0006	0.0009	0.0012	0.0013	0.0014	0.0017	0.0019	0.0021	0.0028
34	0.2618	0.5264	2719	0.0006	0.0008	0.0011	0.0013	0.0022	0.0027	0.0028	0.0029	0.0029
35	0.2645	0.5306	2648	0.0003	0.0005	0.0006	0.0008	0.0010	0.0015	0.0016	0.0018	0.0030
36	0.2646	0.5303	2647	0.0009	0.0012	0.0015	0.0017	0.0020	0.0021	0.0024	0.0026	0.0027
37	0.2643	0.5271	2664	0.0008	0.0010	0.0012	0.0013	0.0020	0.0025	0.0028	0.0031	0.0037
38	0.2622	0.5292	2699	0.0005	0.0007	0.0010	0.0013	0.0016	0.0018	0.0019	0.0021	0.0022
39	0.2613	0.5279	2722	0.0008	0.0009	0.0012	0.0015	0.0018	0.0020	0.0022	0.0024	0.0024
40	0.2588	0.5222	2802	0.0009	0.0012	0.0013	0.0016	0.0024	0.0031	0.0033	0.0037	0.0036
41	0.2605	0.5270	2744	0.0006	0.0010	0.0012	0.0014	0.0024	0.0029	0.0032	0.0033	0.0038
42	0.2618	0.5256	2721	0.0011	0.0013	0.0015	0.0017	0.0021	0.0028	0.0030	0.0033	0.0037
43	0.2608	0.5271	2737	0.0010	0.0013	0.0014	0.0017	0.0025	0.0031	0.0034	0.0035	0.0036
44	0.2632	0.5301	2676	0.0006	0.0008	0.0010	0.0012	0.0013	0.0014	0.0015	0.0017	0.0016
45	0.2637	0.5300	2666	0.0007	0.0010	0.0012	0.0013	0.0017	0.0019	0.0021	0.0022	0.0022
46	0.2647	0.5278	2654	0.0008	0.0012	0.0014	0.0017	0.0022	0.0026	0.0030	0.0033	0.0034
47	0.2635	0.5281	2677	0.0009	0.0012	0.0013	0.0015	0.0026	0.0031	0.0034	0.0036	0.0040
48	0.2616	0.5289	2713	0.0005	0.0007	0.0009	0.0010	0.0013	0.0016	0.0018	0.0019	0.0018
49	0.2637	0.5294	2667	0.0007	0.0011	0.0012	0.0013	0.0015	0.0016	0.0017	0.0018	0.0023
50	0.2627	0.5267	2698	0.0010	0.0014	0.0016	0.0017	0.0021	0.0024	0.0026	0.0029	0.0025
51	0.2629	0.5282	2689	0.0010	0.0013	0.0016	0.0018	0.0022	0.0028	0.0031	0.0034	0.0035
52	0.2635	0.5295	2670	0.0010	0.0013	0.0015	0.0018	0.0023	0.0028	0.0030	0.0030	0.0035
53	0.2618	0.5302	2704	0.0009	0.0013	0.0015	0.0018	0.0023	0.0030	0.0033	0.0035	0.0036
54	0.2639	0.5301	2662	0.0009	0.0013	0.0016	0.0018	0.0023	0.0028	0.0031	0.0033	0.0036
55	0.2652	0.5285	2641	0.0011	0.0013	0.0015	0.0017	0.0027	0.0032	0.0035	0.0037	0.0039
56	0.2631	0.5263	2692	0.0010	0.0014	0.0017	0.0020	0.0029	0.0034	0.0036	0.0039	0.0037
57	0.2610	0.5288	2725	0.0006	0.0009	0.0010	0.0012	0.0017	0.0023	0.0026	0.0028	0.0033
58	0.2603	0.5263	2751	0.0007	0.0012	0.0015	0.0016	0.0024	0.0031	0.0033	0.0036	0.0042
59	0.2650	0.5292	2643	0.0007	0.0010	0.0011	0.0013	0.0017	0.0023	0.0024	0.0026	0.0023
60	0.2630	0.5269	2692	0.0007	0.0009	0.0012	0.0014	0.0018	0.0021	0.0023	0.0023	0.0027
Avg.	0.2627	0.5282	2694	0.0008	0.0010	0.0012	0.0014	0.0020	0.0024	0.0026	0.0028	0.0030
Med.	0.2628	0.5287	2692	0.0007	0.0010	0.0012	0.0015	0.0020	0.0024	0.0027	0.0029	0.0031
st dev	0.0015	0.0018	37	0.0002	0.0003	0.0003	0.0003	0.0005	0.0006	0.0007	0.0007	0.0007
Min.	0.2588	0.5222	2641	0.0003	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0016
Max.	0.2652	0.5306	2802	0.0011	0.0014	0.0017	0.0020	0.0029	0.0034	0.0036	0.0039	0.0042

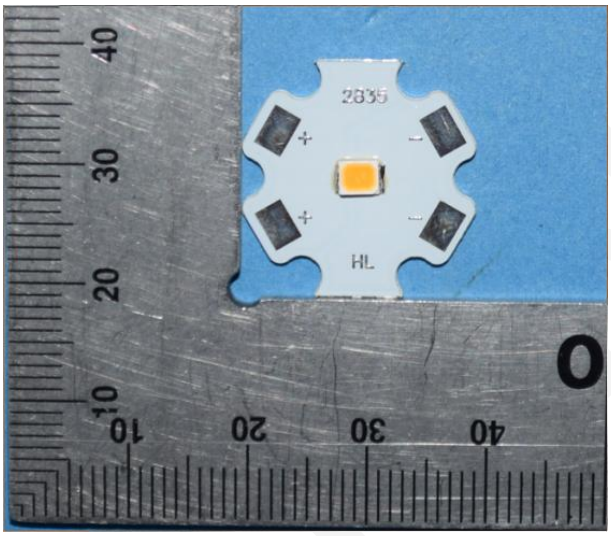
4 - DUT Photo

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.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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