TEST REPORT

According to ANSI/IES LM-80-15
For

Guangdong Elite Optoelectronic Technology Co.,Ltd

Hu An Wei Village,Gaobu Town,Dongguan City,Guangdong Province,China

#Model: SMD2835

Report Type: 9000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	R2DG190401062-10-9000
Test Date:	2019-04-02 to 2020-05-15
Report Date:	2020-05-26
Reviewed By:	Bill Xiong / 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.

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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 2019-07-29. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

#Manufacturer:	Guangdong Elite Optoelectronic Technology Co.,Ltd
#Part Number:	SMD2835
#Part Type:	LED Package
#Drive Level:	DC 120mA
#Nominal CCT:	3000K
#Power:	1.0W
#Average Current Density per LED die:	250mA/mm^2
#Average Power Density per LED die:	0.685W/mm^2
#CRI:	80
#Die Spacing:	2mm

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.
These manufacturing lots are picked to represent a wide parametric distribution.

1.2 Standards and Reference Documentations

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- CIE 127:2007: Measurement of LEDs
- ENERGY STAR® Requirements for the Use of LM-80 Data (This standard was not accredited by IAS)

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
0.3m integrating sphere	EVERFINE	Diameter 0.3m	1011119	2020-03-08	2021-03-07
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2020-03-08	2021-03-07
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2020-03-08	2021-03-07
Standard Light Source	EVERFINE	D204	G100283CA8351158	2019-11-19	2020-11-18
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2020-03-16	2021-03-15
Multilayer aging machine	BACL	B2-270	20024	2020-03-11	2021-03-10
DC Power Supply	BACL	B12001-12	90023	2020-03-16	2021-03-15

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

1.8 Sample Set

Data Set 1: 55°C, 120mA

Part Number:	SMD2835
Number of Units:	25
Case Temperature:	>53°C
Ambient Temperature:	>50°C
Life Test Drive Current:	120mA
Measurement Current:	120mA

Data Set 2: 85°C, 120mA

Part Number:	SMD2835
Number of Units:	25
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	120mA
Measurement Current:	120mA

Data Set 3: 115° C, 120mA

Part Number:	SMD2835
Number of Units:	25
Case Temperature:	>113°C
Ambient Temperature:	>110°C
Life Test Drive Current:	120mA
Measurement Current:	120mA

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	9000hrs	2.321E-06	1.004	>54000 hours	47000 hours
2	25	0	1000hrs	9000hrs	2.840E-06	1.001	>54000 hours	37000 hours
3	25	0	1000hrs	9000hrs	3.508E-06	1.001	>54000 hours	30000 hours

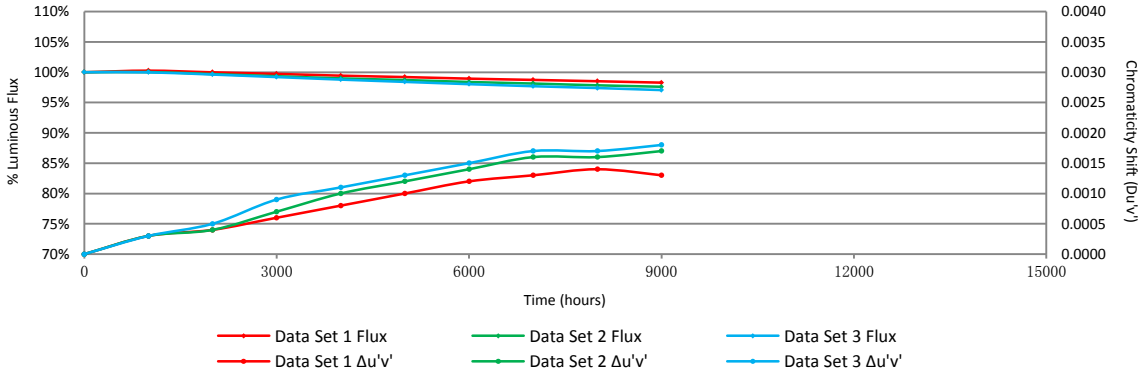
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.26%	99.98%	99.72%	99.43%	99.20%	98.94%	98.73%	98.51%	98.28%
2	100.03%	99.69%	99.34%	98.98%	98.71%	98.39%	98.13%	97.84%	97.60%
3	99.98%	99.61%	99.20%	98.78%	98.40%	98.03%	97.69%	97.39%	97.05%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0003	0.0004	0.0006	0.0008	0.001	0.0012	0.0013	0.0014	0.0013
2	0.0003	0.0004	0.0007	0.001	0.0012	0.0014	0.0016	0.0016	0.0017
3	0.0003	0.0005	0.0009	0.0011	0.0013	0.0015	0.0017	0.0017	0.0018

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 55°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	199.70	100.15	99.65	99.25	99.05	98.75	98.50	98.35	97.95	97.90
2	200.30	100.15	99.70	99.40	99.15	99.00	98.95	98.75	98.55	98.15
3	199.50	100.25	100.10	99.80	99.40	99.10	98.75	98.55	98.50	98.45
4	199.00	100.15	99.75	99.55	99.15	98.94	98.49	98.19	97.99	97.79
5	198.40	100.25	99.80	99.50	99.24	99.04	98.69	98.54	98.24	97.88
6	200.30	100.20	99.80	99.60	99.20	99.05	98.85	98.60	98.30	97.95
7	199.30	100.45	100.15	99.85	99.50	99.20	98.90	98.70	98.65	98.39
8	199.30	100.45	100.15	99.80	99.60	99.45	99.10	99.00	98.85	98.54
9	198.70	100.10	99.85	99.70	99.40	99.04	98.74	98.59	98.49	98.29
10	199.10	100.20	100.10	99.80	99.65	99.50	99.35	99.05	98.74	98.19
11	199.10	100.10	100.05	99.90	99.65	99.35	99.15	98.90	98.69	98.59
12	199.40	100.20	100.10	99.75	99.50	99.25	99.15	98.90	98.45	98.29
13	199.70	100.05	99.90	99.75	99.40	99.10	99.00	98.75	98.45	98.20
14	199.90	100.40	100.20	100.15	99.85	99.60	99.45	99.20	99.05	98.85
15	199.60	100.35	100.15	99.80	99.50	99.20	98.95	98.80	98.70	98.55
16	198.60	100.30	100.20	99.85	99.60	99.45	99.04	98.74	98.59	98.49
17	199.70	100.30	100.15	99.80	99.70	99.50	99.20	98.90	98.55	98.05
18	200.10	100.20	99.70	99.40	99.10	98.90	98.55	98.35	98.15	97.85
19	199.20	100.45	100.20	100.05	99.80	99.50	99.40	99.20	98.90	98.49
20	200.20	100.40	100.15	99.80	99.45	99.25	98.95	98.70	98.55	98.45
21	198.50	100.15	100.10	99.90	99.50	99.19	98.99	98.94	98.89	98.69
22	199.90	100.35	100.05	99.75	99.60	99.40	99.05	98.75	98.35	98.15
23	198.80	100.45	99.95	99.70	99.45	99.35	99.20	99.04	98.74	98.64
24	200.60	100.45	99.85	99.70	99.25	98.95	98.70	98.35	98.26	98.11
25	199.00	100.10	99.80	99.50	99.05	98.84	98.49	98.39	98.29	98.04
Avg.	199.44	100.26	99.98	99.72	99.43	99.20	98.94	98.73	98.51	98.28
Med.	199.40	100.25	100.05	99.75	99.45	99.20	98.95	98.75	98.55	98.29
st dev	0.61	0.13	0.18	0.20	0.23	0.23	0.28	0.27	0.28	0.29
Min.	198.40	100.05	99.65	99.25	99.05	98.75	98.49	98.19	97.95	97.79
Max.	200.60	100.45	100.20	100.15	99.85	99.60	99.45	99.20	99.05	98.85

3.2 Data Set 1, 55°C, 120mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	8.826	8.752	8.749	8.738	8.771	8.755	8.739	8.731	8.733	8.730
2	8.835	8.758	8.753	8.738	8.773	8.764	8.739	8.736	8.736	8.731
3	8.896	8.749	8.746	8.732	8.764	8.752	8.738	8.731	8.729	8.727
4	8.807	8.745	8.742	8.730	8.758	8.747	8.734	8.724	8.724	8.720
5	8.810	8.744	8.742	8.729	8.762	8.749	8.736	8.721	8.728	8.727
6	8.870	8.779	8.776	8.763	8.793	8.787	8.760	8.760	8.758	8.753
7	8.826	8.753	8.750	8.735	8.767	8.762	8.740	8.733	8.731	8.732
8	8.850	8.771	8.767	8.757	8.783	8.785	8.766	8.749	8.751	8.751
9	8.862	8.786	8.782	8.770	8.808	8.792	8.774	8.765	8.768	8.763
10	8.823	8.752	8.748	8.739	8.772	8.758	8.739	8.727	8.730	8.722
11	8.839	8.760	8.758	8.748	8.782	8.774	8.759	8.739	8.746	8.723
12	8.813	8.746	8.743	8.730	8.763	8.750	8.741	8.726	8.728	8.723
13	8.836	8.764	8.762	8.748	8.779	8.767	8.757	8.745	8.740	8.740
14	8.829	8.755	8.751	8.744	8.772	8.760	8.747	8.731	8.738	8.738
15	8.839	8.766	8.764	8.753	8.788	8.771	8.757	8.744	8.750	8.745
16	8.832	8.764	8.761	8.753	8.785	8.769	8.755	8.744	8.741	8.741
17	8.817	8.746	8.741	8.733	8.762	8.749	8.733	8.722	8.728	8.726
18	8.819	8.752	8.746	8.740	8.768	8.755	8.735	8.730	8.732	8.729
19	8.836	8.757	8.753	8.746	8.775	8.771	8.743	8.736	8.740	8.737
20	8.900	8.798	8.795	8.785	8.817	8.800	8.788	8.774	8.779	8.774
21	8.836	8.748	8.743	8.738	8.765	8.749	8.797	8.729	8.726	8.728
22	8.825	8.771	8.761	8.751	8.783	8.766	8.746	8.738	8.739	8.740
23	8.903	8.784	8.773	8.760	8.795	8.780	8.764	8.754	8.753	8.754
24	8.818	8.768	8.758	8.745	8.778	8.768	8.743	8.740	8.739	8.737
25	8.873	8.790	8.779	8.773	8.799	8.783	8.769	8.760	8.765	8.758
Avg.	8.841	8.762	8.758	8.747	8.778	8.767	8.752	8.740	8.741	8.738
Med.	8.835	8.758	8.753	8.745	8.775	8.766	8.746	8.736	8.739	8.737
st dev	0.028	0.015	0.014	0.015	0.015	0.015	0.017	0.014	0.014	0.014
Min.	8.807	8.744	8.741	8.729	8.758	8.747	8.733	8.721	8.724	8.720
Max.	8.903	8.798	8.795	8.785	8.817	8.800	8.797	8.774	8.779	8.774

3.3 Data Set 1, 55°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2502	0.5179	3031	0.0002	0.0003	0.0005	0.0007	0.0009	0.0009	0.0009	0.0007	0.0004
2	0.2497	0.5185	3040	0.0002	0.0004	0.0005	0.0006	0.0007	0.0010	0.0012	0.0011	0.0004
3	0.2491	0.5178	3062	0.0002	0.0004	0.0004	0.0005	0.0008	0.0010	0.0011	0.0012	0.0013
4	0.2505	0.5177	3025	0.0002	0.0004	0.0005	0.0006	0.0007	0.0011	0.0012	0.0011	0.0013
5	0.2507	0.5184	3016	0.0003	0.0005	0.0007	0.0008	0.0009	0.0013	0.0015	0.0013	0.0014
6	0.2508	0.5191	3009	0.0002	0.0005	0.0008	0.0009	0.0011	0.0012	0.0013	0.0013	0.0016
7	0.2509	0.5186	3011	0.0003	0.0005	0.0008	0.0009	0.0010	0.0011	0.0013	0.0013	0.0016
8	0.2511	0.5187	3004	0.0003	0.0004	0.0006	0.0009	0.0011	0.0009	0.0012	0.0012	0.0016
9	0.2493	0.5173	3058	0.0003	0.0004	0.0005	0.0007	0.0010	0.0009	0.0010	0.0011	0.0016
10	0.2489	0.5172	3070	0.0003	0.0004	0.0005	0.0008	0.0011	0.0009	0.0012	0.0012	0.0016
11	0.2503	0.5189	3022	0.0004	0.0005	0.0007	0.0008	0.0011	0.0013	0.0013	0.0013	0.0009
12	0.2490	0.5191	3055	0.0003	0.0004	0.0006	0.0008	0.0009	0.0011	0.0012	0.0012	0.0013
13	0.2502	0.5183	3030	0.0002	0.0005	0.0006	0.0009	0.0010	0.0013	0.0013	0.0013	0.0013
14	0.2503	0.5191	3022	0.0003	0.0004	0.0006	0.0008	0.0011	0.0012	0.0012	0.0016	0.0015
15	0.2496	0.5188	3040	0.0004	0.0005	0.0008	0.0010	0.0012	0.0013	0.0013	0.0016	0.0014
16	0.2501	0.5172	3039	0.0003	0.0005	0.0008	0.0011	0.0012	0.0014	0.0013	0.0016	0.0013
17	0.2501	0.5178	3035	0.0004	0.0004	0.0006	0.0009	0.0012	0.0012	0.0012	0.0016	0.0013
18	0.2501	0.5192	3025	0.0002	0.0004	0.0008	0.0010	0.0011	0.0014	0.0015	0.0018	0.0014
19	0.2520	0.5201	2972	0.0004	0.0004	0.0006	0.0009	0.0011	0.0012	0.0014	0.0017	0.0015
20	0.2501	0.5194	3024	0.0003	0.0005	0.0006	0.0009	0.0012	0.0016	0.0017	0.0020	0.0016
21	0.2500	0.5174	3041	0.0001	0.0003	0.0004	0.0007	0.0009	0.0012	0.0012	0.0015	0.0012
22	0.2496	0.5177	3049	0.0003	0.0005	0.0006	0.0008	0.0011	0.0015	0.0015	0.0017	0.0014
23	0.2501	0.5179	3034	0.0003	0.0006	0.0008	0.0009	0.0012	0.0013	0.0017	0.0018	0.0015
24	0.2504	0.5192	3019	0.0001	0.0004	0.0008	0.0011	0.0012	0.0013	0.0015	0.0017	0.0015
25	0.2496	0.5184	3045	0.0001	0.0004	0.0006	0.0009	0.0012	0.0014	0.0014	0.0016	0.0012
Avg.	0.2501	0.5184	3031	0.0003	0.0004	0.0006	0.0008	0.0010	0.0012	0.0013	0.0014	0.0013
Med.	0.2501	0.5184	3031	0.0003	0.0004	0.0006	0.0009	0.0011	0.0012	0.0013	0.0013	0.0014
st dev	0.0007	0.0008	21	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003
Min.	0.2489	0.5172	2972	0.0001	0.0003	0.0004	0.0005	0.0007	0.0009	0.0009	0.0007	0.0004
Max.	0.2520	0.5201	3070	0.0004	0.0006	0.0008	0.0011	0.0012	0.0016	0.0017	0.0020	0.0016

3.4 Data Set 2, 85°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	200.30	99.80	99.70	99.35	98.90	98.65	98.15	98.05	97.55	97.30
27	199.70	100.10	100.05	99.70	99.45	99.10	98.55	98.30	98.00	97.65
28	200.40	100.10	99.85	99.65	99.30	99.00	98.55	98.30	97.95	97.65
29	199.90	99.90	99.85	99.55	99.10	98.80	98.55	98.20	97.85	97.65
30	199.60	99.70	99.35	99.00	98.65	98.40	98.15	98.10	97.80	97.55
31	198.90	100.20	100.10	99.60	99.15	98.89	98.84	98.29	98.09	97.94
32	198.40	100.10	99.65	99.40	99.09	98.89	98.44	98.08	97.63	97.33
33	199.60	100.15	99.95	99.65	99.30	99.05	98.80	98.35	98.20	97.60
34	199.90	100.25	99.80	99.45	99.10	98.90	98.55	98.20	97.95	97.80
35	201.00	99.90	99.35	99.05	98.81	98.51	98.46	98.16	98.11	97.91
36	199.00	100.30	99.70	99.25	98.94	98.69	98.29	98.24	97.89	97.64
37	199.60	100.20	99.70	99.35	99.05	98.85	98.40	98.35	97.95	97.80
38	198.20	100.25	99.65	99.29	98.94	98.79	98.44	98.34	97.88	97.78
39	200.10	99.85	99.45	99.00	98.60	98.30	97.85	97.45	97.40	97.15
40	199.50	100.10	99.80	99.40	99.05	98.70	98.55	98.10	97.89	97.59
41	200.90	99.60	99.40	98.95	98.56	98.31	97.86	97.51	97.26	97.21
42	198.90	99.70	99.50	99.15	98.64	98.24	97.99	97.69	97.23	96.98
43	199.60	99.90	99.55	99.30	98.85	98.60	98.45	98.35	98.10	97.75
44	200.00	100.20	99.70	99.55	99.15	98.85	98.80	98.70	98.55	98.30
45	198.40	100.05	99.45	99.04	98.59	98.44	97.93	97.68	97.53	97.23
46	198.70	100.15	99.70	99.30	98.89	98.59	98.19	97.99	97.79	97.63
47	199.90	100.05	99.85	99.45	99.10	98.85	98.45	98.35	98.00	97.85
48	199.40	100.10	99.85	99.55	99.25	99.00	98.80	98.60	98.29	97.99
49	200.60	99.90	99.60	99.25	98.95	98.65	98.26	97.71	97.46	97.31
50	199.70	100.20	99.70	99.40	99.00	98.65	98.40	98.15	97.75	97.45
Avg.	199.61	100.03	99.69	99.34	98.98	98.71	98.39	98.13	97.84	97.60
Med.	199.60	100.10	99.70	99.35	99.00	98.70	98.44	98.20	97.89	97.64
st dev	0.75	0.19	0.20	0.22	0.24	0.24	0.29	0.31	0.32	0.30
Min.	198.20	99.60	99.35	98.95	98.56	98.24	97.85	97.45	97.23	96.98
Max.	201.00	100.30	100.10	99.70	99.45	99.10	98.84	98.70	98.55	98.30

3.5 Data Set 2, 85°C, 120mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	8.877	8.762	8.757	8.738	8.774	8.756	8.747	8.733	8.734	8.744
27	8.848	8.788	8.784	8.768	8.798	8.783	8.773	8.763	8.757	8.759
28	8.838	8.782	8.777	8.760	8.794	8.787	8.771	8.758	8.755	8.753
29	8.818	8.763	8.754	8.740	8.775	8.757	8.744	8.735	8.737	8.734
30	8.825	8.757	8.749	8.729	8.767	8.754	8.737	8.732	8.726	8.730
31	8.834	8.980	8.754	8.739	8.773	8.759	8.744	8.738	8.735	8.730
32	8.824	8.754	8.746	8.729	8.761	8.752	8.741	8.730	8.729	8.727
33	8.825	8.767	8.760	8.745	8.775	8.767	8.749	8.744	8.740	8.739
34	8.808	8.758	8.754	8.736	8.770	8.758	8.742	8.737	8.736	8.731
35	8.807	8.752	8.747	8.736	8.772	8.756	8.733	8.732	8.737	8.728
36	8.804	8.751	8.750	8.739	8.767	8.753	8.739	8.726	8.732	8.728
37	8.848	8.795	8.794	8.779	8.808	8.799	8.780	8.774	8.778	8.771
38	8.814	8.755	8.752	8.740	8.772	8.765	8.740	8.731	8.735	8.730
39	8.807	8.753	8.748	8.737	8.766	8.762	8.734	8.732	8.731	8.728
40	8.846	8.787	8.782	8.773	8.803	8.791	8.774	8.763	8.767	8.763
41	8.827	8.768	8.766	8.754	8.785	8.774	8.761	8.743	8.752	8.749
42	8.855	8.783	8.779	8.771	8.798	8.790	8.772	8.756	8.758	8.758
43	8.811	8.751	8.749	8.733	8.768	8.760	8.737	8.730	8.733	8.724
44	8.838	8.752	8.747	8.738	8.768	8.762	8.742	8.731	8.730	8.730
45	8.836	8.749	8.747	8.731	8.768	8.764	8.736	8.722	8.730	8.729
46	8.808	8.747	8.746	8.739	8.767	8.755	8.740	8.728	8.734	8.729
47	8.842	8.780	8.777	8.769	8.802	8.785	8.774	8.758	8.760	8.759
48	8.834	8.762	8.763	8.744	8.780	8.766	8.755	8.744	8.745	8.741
49	8.832	8.765	8.765	8.753	8.783	8.769	8.760	8.732	8.748	8.745
50	8.806	8.753	8.751	8.734	8.772	8.756	8.744	8.732	8.731	8.728
Avg.	8.828	8.773	8.760	8.746	8.779	8.767	8.751	8.740	8.742	8.739
Med.	8.827	8.762	8.754	8.739	8.773	8.762	8.744	8.733	8.736	8.731
st dev	0.018	0.045	0.014	0.015	0.014	0.014	0.015	0.014	0.014	0.014
Min.	8.804	8.747	8.746	8.729	8.761	8.752	8.733	8.722	8.726	8.724
Max.	8.877	8.980	8.794	8.779	8.808	8.799	8.780	8.774	8.778	8.771

3.6 Data Set 2, 85°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2496	0.5190	3040	0.0001	0.0004	0.0007	0.0009	0.0012	0.0013	0.0012	0.0018	0.0014
27	0.2509	0.5199	3001	0.0004	0.0004	0.0006	0.0008	0.0009	0.0015	0.0016	0.0017	0.0018
28	0.2499	0.5195	3030	0.0004	0.0004	0.0005	0.0008	0.0010	0.0015	0.0017	0.0017	0.0018
29	0.2508	0.5190	3009	0.0004	0.0004	0.0007	0.0008	0.0010	0.0011	0.0015	0.0015	0.0016
30	0.2495	0.5180	3049	0.0002	0.0004	0.0009	0.0010	0.0011	0.0014	0.0016	0.0016	0.0017
31	0.2497	0.5172	3049	0.0004	0.0004	0.0008	0.0011	0.0012	0.0010	0.0016	0.0015	0.0016
32	0.2513	0.5195	2995	0.0002	0.0005	0.0011	0.0012	0.0015	0.0014	0.0018	0.0017	0.0018
33	0.2497	0.5188	3039	0.0002	0.0004	0.0008	0.0010	0.0012	0.0014	0.0015	0.0015	0.0017
34	0.2508	0.5203	3001	0.0004	0.0005	0.0010	0.0012	0.0015	0.0015	0.0016	0.0017	0.0019
35	0.2496	0.5194	3037	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0015	0.0015	0.0017
36	0.2511	0.5183	3006	0.0002	0.0004	0.0006	0.0009	0.0010	0.0015	0.0016	0.0015	0.0017
37	0.2509	0.5191	3006	0.0002	0.0004	0.0007	0.0009	0.0010	0.0014	0.0016	0.0015	0.0016
38	0.2506	0.5172	3027	0.0003	0.0004	0.0007	0.0009	0.0012	0.0015	0.0016	0.0016	0.0017
39	0.2501	0.5182	3032	0.0002	0.0004	0.0007	0.0009	0.0011	0.0014	0.0017	0.0015	0.0018
40	0.2494	0.5179	3052	0.0002	0.0004	0.0009	0.0010	0.0011	0.0014	0.0016	0.0015	0.0017
41	0.2496	0.5206	3029	0.0002	0.0004	0.0009	0.0011	0.0012	0.0014	0.0017	0.0016	0.0016
42	0.2503	0.5176	3030	0.0003	0.0004	0.0008	0.0011	0.0013	0.0015	0.0016	0.0015	0.0017
43	0.2510	0.5186	3007	0.0002	0.0004	0.0006	0.0009	0.0012	0.0013	0.0016	0.0016	0.0016
44	0.2491	0.5177	3060	0.0003	0.0004	0.0005	0.0007	0.0010	0.0014	0.0015	0.0014	0.0019
45	0.2507	0.5169	3026	0.0001	0.0006	0.0008	0.0011	0.0013	0.0017	0.0017	0.0017	0.0018
46	0.2506	0.5191	3013	0.0003	0.0004	0.0007	0.0009	0.0012	0.0013	0.0016	0.0017	0.0017
47	0.2515	0.5201	2985	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0018	0.0016	0.0017
48	0.2501	0.5187	3028	0.0003	0.0005	0.0007	0.0009	0.0011	0.0014	0.0016	0.0015	0.0015
49	0.2500	0.5190	3031	0.0003	0.0004	0.0008	0.0009	0.0012	0.0014	0.0019	0.0016	0.0017
50	0.2510	0.5188	3006	0.0002	0.0005	0.0009	0.0011	0.0013	0.0014	0.0017	0.0017	0.0017
Avg.	0.2503	0.5187	3024	0.0003	0.0004	0.0007	0.0010	0.0012	0.0014	0.0016	0.0016	0.0017
Med.	0.2503	0.5188	3028	0.0002	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0016	0.0017
st dev	0.0007	0.0010	20	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2491	0.5169	2985	0.0001	0.0003	0.0005	0.0007	0.0009	0.0010	0.0012	0.0014	0.0014
Max.	0.2515	0.5206	3060	0.0004	0.0006	0.0011	0.0012	0.0015	0.0017	0.0019	0.0018	0.0019

3.7 Data Set 3, 115°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	199.30	99.80	99.65	99.25	98.95	98.49	97.94	97.89	97.84	97.59
52	200.90	100.15	99.60	99.25	98.90	98.46	98.11	97.81	97.56	97.36
53	200.30	100.10	99.75	99.25	99.05	98.80	98.35	97.90	97.20	97.00
54	199.30	100.15	99.65	99.15	98.60	98.19	97.74	97.49	97.24	97.04
55	198.90	100.05	99.40	99.10	98.54	98.09	97.84	97.69	97.29	96.93
56	198.70	100.10	99.80	99.35	98.89	98.49	98.14	97.79	97.58	96.93
57	200.90	100.05	99.60	99.15	98.81	98.41	98.11	97.36	97.11	96.57
58	200.70	99.85	99.50	99.15	98.65	98.46	98.16	97.71	97.41	97.11
59	198.80	100.15	99.85	99.45	98.89	98.44	98.29	97.99	97.84	97.48
60	199.00	100.05	99.60	99.20	98.74	98.34	98.04	97.69	97.49	97.34
61	200.40	100.20	99.80	99.25	98.85	98.55	98.30	97.80	97.41	97.16
62	198.80	100.15	99.50	99.14	98.69	98.29	98.09	97.94	97.69	97.28
63	199.30	99.95	99.35	98.80	98.34	97.94	97.24	97.09	96.74	96.34
64	200.70	100.20	99.70	99.40	99.05	98.70	98.36	97.86	97.76	97.31
65	200.40	100.40	99.85	99.50	99.00	98.60	98.40	98.05	97.75	97.60
66	198.60	100.05	99.95	99.40	99.04	98.59	98.44	98.04	97.89	97.23
67	199.70	99.85	99.70	99.25	98.80	98.40	97.95	97.70	97.00	96.54
68	199.60	100.05	99.50	99.15	98.70	98.40	98.05	97.49	97.24	96.69
69	200.20	99.70	99.60	99.10	98.75	98.40	97.90	97.40	97.20	96.75
70	199.40	99.80	99.55	99.25	98.95	98.50	97.89	97.54	97.19	96.74
71	200.80	99.70	99.20	98.90	98.51	98.26	97.96	97.51	96.86	96.56
72	199.50	99.85	99.60	99.35	99.00	98.50	98.05	97.89	97.54	97.39
73	199.30	99.60	99.45	99.10	98.54	98.19	97.69	97.44	97.24	97.04
74	197.80	99.75	99.60	99.19	98.74	98.48	98.23	97.93	97.37	97.17
75	198.10	99.85	99.39	98.89	98.49	97.98	97.58	97.27	97.22	97.07
Avg.	199.58	99.98	99.61	99.20	98.78	98.40	98.03	97.69	97.39	97.05
Med.	199.40	100.05	99.60	99.20	98.80	98.44	98.05	97.71	97.37	97.07
st dev	0.89	0.20	0.17	0.17	0.20	0.20	0.28	0.26	0.31	0.34
Min.	197.80	99.60	99.20	98.80	98.34	97.94	97.24	97.09	96.74	96.34
Max.	200.90	100.40	99.95	99.50	99.05	98.80	98.44	98.05	97.89	97.60

3.8 Data Set 3, 115°C, 120mA (Forward Voltage)

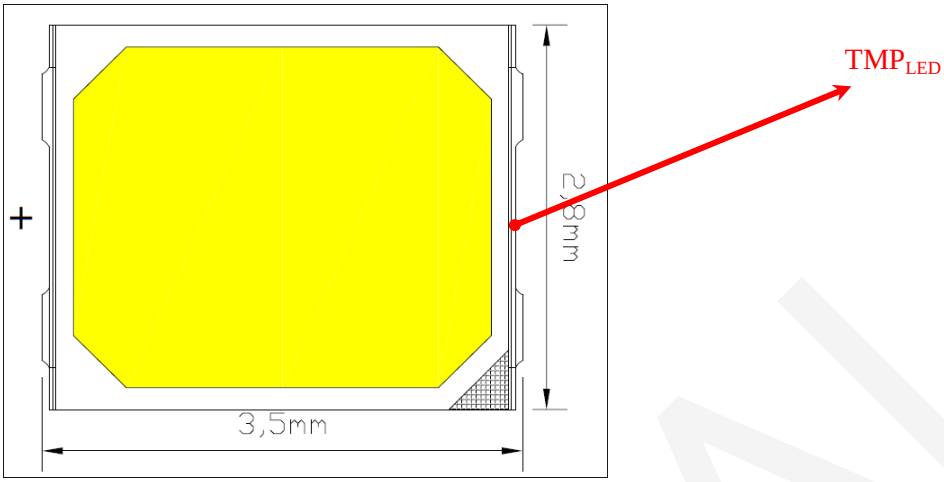
No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	8.830	8.769	8.772	8.758	8.789	8.770	8.756	8.749	8.752	8.744
52	8.855	8.791	8.791	8.775	8.810	8.789	8.776	8.771	8.767	8.769
53	8.808	8.745	8.744	8.734	8.769	8.754	8.736	8.721	8.728	8.727
54	8.824	8.762	8.763	8.751	8.784	8.770	8.751	8.743	8.752	8.741
55	8.809	8.753	8.753	8.740	8.779	8.757	8.740	8.740	8.733	8.730
56	8.800	8.743	8.743	8.729	8.768	8.750	8.733	8.724	8.727	8.721
57	8.841	8.787	8.786	8.773	8.809	8.795	8.776	8.767	8.769	8.763
58	8.840	8.777	8.777	8.765	8.798	8.789	8.771	8.750	8.765	8.756
59	8.809	8.747	8.747	8.737	8.774	8.761	8.738	8.728	8.737	8.728
60	8.798	8.740	8.740	8.725	8.763	8.749	8.727	8.722	8.726	8.722
61	8.810	8.756	8.754	8.745	8.776	8.767	8.745	8.736	8.744	8.733
62	8.810	8.752	8.748	8.733	8.765	8.757	8.740	8.727	8.728	8.728
63	8.794	8.744	8.741	8.728	8.760	8.747	8.729	8.723	8.725	8.723
64	8.813	8.759	8.755	8.741	8.774	8.759	8.742	8.732	8.741	8.738
65	8.838	8.783	8.786	8.768	8.801	8.787	8.775	8.759	8.761	8.760
66	8.832	8.777	8.772	8.756	8.794	8.784	8.764	8.753	8.761	8.758
67	8.813	8.757	8.754	8.747	8.779	8.784	8.745	8.738	8.745	8.734
68	8.819	8.762	8.762	8.746	8.778	8.771	8.750	8.748	8.745	8.740
69	8.819	8.756	8.763	8.747	8.777	8.768	8.746	8.736	8.740	8.734
70	8.809	8.746	8.747	8.737	8.766	8.754	8.740	8.726	8.729	8.726
71	8.827	8.766	8.764	8.756	8.785	8.781	8.756	8.746	8.747	8.745
72	8.811	8.752	8.751	8.738	8.773	8.762	8.740	8.730	8.733	8.728
73	8.800	8.743	8.744	8.734	8.767	8.749	8.734	8.723	8.727	8.722
74	8.841	8.782	8.781	8.764	8.798	8.790	8.772	8.760	8.764	8.762
75	8.805	8.742	8.745	8.728	8.762	8.749	8.737	8.724	8.726	8.724
Avg.	8.818	8.760	8.759	8.746	8.780	8.768	8.749	8.739	8.743	8.738
Med.	8.813	8.756	8.754	8.745	8.777	8.767	8.745	8.736	8.741	8.734
st dev	0.016	0.016	0.016	0.015	0.015	0.016	0.015	0.015	0.015	0.015
Min.	8.794	8.740	8.740	8.725	8.760	8.747	8.727	8.721	8.725	8.721
Max.	8.855	8.791	8.791	8.775	8.810	8.795	8.776	8.771	8.769	8.769

3.9 Data Set 3, 115° C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2512	0.5185	3002	0.0005	0.0005	0.0008	0.0009	0.0011	0.0015	0.0015	0.0015	0.0017
52	0.2498	0.5196	3030	0.0004	0.0004	0.0007	0.0009	0.0011	0.0013	0.0015	0.0015	0.0017
53	0.2492	0.5191	3050	0.0002	0.0004	0.0008	0.0009	0.0012	0.0016	0.0018	0.0018	0.0018
54	0.2500	0.5178	3039	0.0002	0.0004	0.0008	0.0011	0.0013	0.0015	0.0016	0.0015	0.0017
55	0.2515	0.5190	2993	0.0003	0.0005	0.0007	0.0010	0.0013	0.0015	0.0016	0.0015	0.0017
56	0.2502	0.5174	3036	0.0002	0.0004	0.0006	0.0009	0.0012	0.0014	0.0015	0.0015	0.0015
57	0.2505	0.5193	3015	0.0002	0.0004	0.0008	0.0011	0.0013	0.0014	0.0016	0.0017	0.0017
58	0.2501	0.5187	3029	0.0002	0.0004	0.0007	0.0009	0.0013	0.0014	0.0016	0.0017	0.0019
59	0.2505	0.5177	3024	0.0003	0.0005	0.0007	0.0009	0.0011	0.0012	0.0015	0.0015	0.0017
60	0.2500	0.5178	3037	0.0003	0.0004	0.0008	0.0010	0.0012	0.0012	0.0014	0.0016	0.0018
61	0.2496	0.5196	3035	0.0004	0.0006	0.0009	0.0011	0.0013	0.0014	0.0016	0.0017	0.0018
62	0.2510	0.5170	3018	0.0003	0.0004	0.0008	0.0010	0.0013	0.0016	0.0016	0.0015	0.0018
63	0.2502	0.5188	3027	0.0003	0.0005	0.0011	0.0013	0.0016	0.0017	0.0018	0.0018	0.0019
64	0.2490	0.5192	3053	0.0002	0.0004	0.0008	0.0010	0.0013	0.0016	0.0018	0.0017	0.0018
65	0.2497	0.5193	3035	0.0004	0.0005	0.0010	0.0011	0.0013	0.0015	0.0016	0.0014	0.0016
66	0.2509	0.5184	3010	0.0004	0.0005	0.0009	0.0010	0.0012	0.0014	0.0017	0.0017	0.0018
67	0.2493	0.5181	3053	0.0004	0.0005	0.0009	0.0010	0.0012	0.0014	0.0017	0.0019	0.0018
68	0.2498	0.5188	3037	0.0002	0.0004	0.0009	0.0011	0.0013	0.0017	0.0018	0.0019	0.0021
69	0.2498	0.5190	3035	0.0003	0.0004	0.0009	0.0012	0.0013	0.0015	0.0017	0.0018	0.0020
70	0.2499	0.5183	3038	0.0003	0.0004	0.0010	0.0011	0.0014	0.0016	0.0018	0.0017	0.0020
71	0.2499	0.5190	3032	0.0003	0.0004	0.0010	0.0012	0.0013	0.0015	0.0016	0.0016	0.0020
72	0.2500	0.5187	3033	0.0003	0.0006	0.0012	0.0014	0.0017	0.0017	0.0018	0.0017	0.0019
73	0.2507	0.5180	3019	0.0001	0.0004	0.0009	0.0013	0.0014	0.0015	0.0016	0.0016	0.0016
74	0.2512	0.5179	3006	0.0003	0.0006	0.0009	0.0012	0.0014	0.0015	0.0018	0.0018	0.0018
75	0.2516	0.5186	2991	0.0003	0.0004	0.0011	0.0012	0.0016	0.0016	0.0018	0.0018	0.0018
Avg.	0.2502	0.5185	3027	0.0003	0.0005	0.0009	0.0011	0.0013	0.0015	0.0017	0.0017	0.0018
Med.	0.2500	0.5187	3032	0.0003	0.0004	0.0009	0.0011	0.0013	0.0015	0.0016	0.0017	0.0018
st dev	0.0007	0.0007	17	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2490	0.5170	2991	0.0001	0.0004	0.0006	0.0009	0.0011	0.0012	0.0014	0.0014	0.0015
Max.	0.2516	0.5196	3053	0.0005	0.0006	0.0012	0.0014	0.0017	0.0017	0.0018	0.0019	0.0021

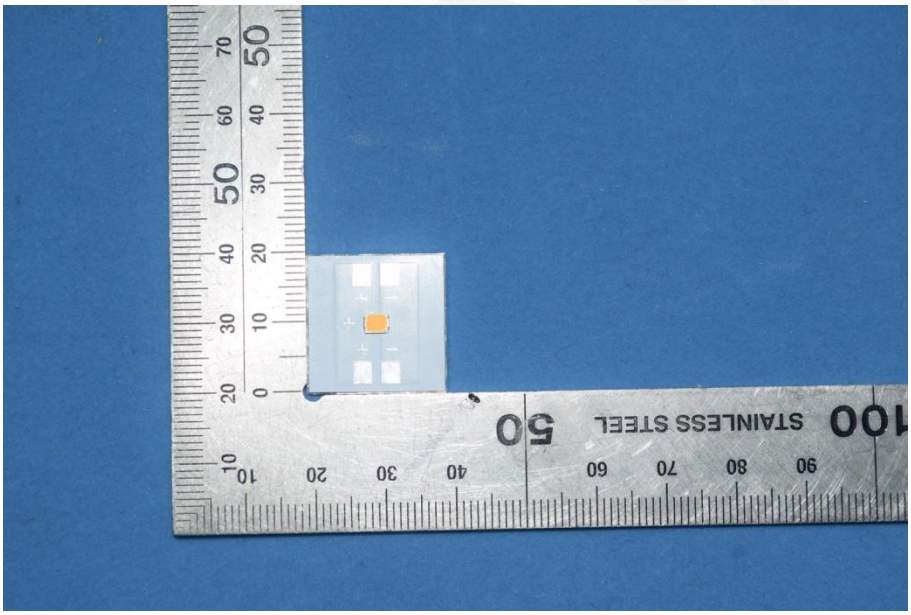
4 - DUT Photo

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**********