TEST REPORT

ACCORDING TO IES LM-80-2015
For

Samsung Electronics Co., LTD.

1,Samsung-Ro,Giheung-Gu,Yongin-City,Gyeonggi-Do 17113, Korea

Multiple Model: SPMWHX224XXXXXXXXX
Test Model: SPMWHX2246D5XXW0XX

Report Type: 9000 Hours Test Report	**Product Type:** LED Package
Test Engineer:	Pote Wang
Report Number:	RSZ170525502-10
Test Date:	2016-05-05 to 2017-06-05
Report Date:	2017-07-01
Reviewed By:	Daniel Duan / EE Manager
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

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1 - General Information

1.1 Description of LED Light Sources

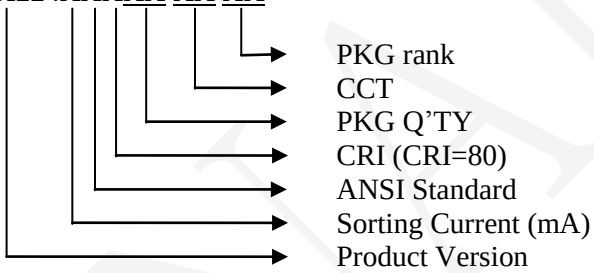
Sample Size:

60 PCS samples were received on 2016-05-05. The samples were numbered from 1 to 20, 21 to 40 and 41 to 60.

Manufacturer:	Samsung Electronics Co., LTD.
Part Number:	SPMWHX2246D5XXW0XX
Part Type:	LED Package
Drive Level:	CC 60mA
Nominal CCT:	2700K

Covered models and nomenclature:

Multiple Models: SPMWHX224XXXXX XX XX



Note:

The CCT can be W0=2700K, V0=3000K, U0=3500K, T0=4000K, R0=5000K, Q0=5700K, P0=6500K

Note:

1、The applicant Samsung Electronics Co., LTD. declared that their product with model SPMWHX2246D5XXW0XX are the same to the product in report# RSZ160505515-10 and is authorized by original applicant to use their test data.

2、All the data in previous report (RSZ160505515-10) is shared in report.

1.2 Standards Used:

- IESNA LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products(This test method was not accredited by IAS)

1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integral Sphere	EVERFINE	Diameter 0.3m	1011119	0.3m	2017-03-09	2018-03-08
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	15V/2000mA	2017-03-03	2018-03-02
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2017-03-09	2018-03-08
Standard Light Source	EVERFINE	D062	1011093	3000K	2016-09-13	2017-09-12
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	300VA	2017-03-03	2018-03-02
Multilayer aging machine	BACL	B2-270	20005	25°C~130°C	2016-09-01	2017-09-01
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090007	(50/15A)	2017-03-03	2018-03-02
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090009	(50/15A)	2016-12-15	2017-12-14

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 Measurement Uncertainty

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, 60mA

Part Number:	SPMWHX2246D5XXW0XX
Number of Units:	20
Case Temperature:	>53°C
Ambient Temperature:	>50°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

Data Set 2: 85°C,60mA

Part Number:	SPMWHX2246D5XXW0XX
Number of Units:	20
Case Temperature:	>83°C
Ambient Temperature:	>80°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

Data Set 3: 105°C,60mA

Part Number:	SPMWHX2246D5XXW0XX
Number of Units:	20
Case Temperature:	>103°C
Ambient Temperature:	>100°C
Life Test Drive Current:	60mA
Measurement Current:	60mA

2 - Summary of Test Result

Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	Reported TM-21 L_{70} Lifetime
1	20	0	1000	9000	>54,000hours
2	20	0	1000	9000	>54,000hours
3	20	0	1000	9000	>54,000hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000
1	100.11%	99.88%	99.66%	99.44%	99.22%	99.00%	98.79%	98.56%	98.35%
2	99.89%	99.65%	99.40%	99.13%	98.88%	98.62%	98.38%	98.13%	97.87%
3	99.71%	99.44%	99.15%	98.85%	98.53%	98.27%	97.98%	97.70%	97.40%

Average Color Maintenance

Data Set:	1000	2000	3000	4000	5000	6000	7000	8000	9000
1	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0023
2	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0019	0.0022	0.0026
3	0.0005	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028

3 - Test Data

3.1 Data Set 1, 55°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	131.8	100.08	99.85	99.54	99.39	99.32	99.24	99.01	98.86	98.71
2	129.1	100.08	99.77	99.46	99.30	99.07	98.76	98.61	98.37	98.14
3	128.2	100.16	99.92	99.84	99.61	99.38	99.22	98.99	98.83	98.60
4	129.5	100.23	100.08	99.77	99.46	99.31	99.00	98.76	98.61	98.46
5	130.4	100.23	100.15	99.92	99.62	99.54	99.31	99.23	99.00	98.70
6	130.7	100.23	100.08	99.77	99.54	99.39	99.16	98.85	98.62	98.55
7	130.1	100.08	99.92	99.85	99.54	99.31	99.23	99.00	98.62	98.39
8	129.0	100.16	99.77	99.53	99.38	99.22	99.07	98.99	98.76	98.45
9	128.5	100.08	99.84	99.61	99.46	99.30	99.14	98.83	98.68	98.60
10	128.5	99.92	99.69	99.53	99.22	98.99	98.68	98.60	98.37	98.13
11	129.3	100.08	99.92	99.69	99.46	99.23	98.99	98.76	98.61	98.38
12	129.2	99.92	99.85	99.54	99.30	98.92	98.84	98.68	98.37	98.07
13	129.4	99.92	99.69	99.38	99.23	99.07	98.76	98.61	98.45	98.22
14	131.4	100.08	99.92	99.85	99.62	99.32	98.93	98.63	98.33	98.25
15	129.0	100.16	99.84	99.69	99.61	99.22	99.07	98.91	98.76	98.53
16	129.9	100.23	99.85	99.54	99.31	99.00	98.77	98.54	98.31	98.00
17	128.2	100.31	99.92	99.69	99.45	99.22	98.99	98.75	98.36	98.05
18	130.4	100.08	99.77	99.62	99.54	99.23	99.08	98.70	98.54	98.39
19	129.4	100.23	100.08	99.92	99.61	99.46	99.15	99.00	98.84	98.53
20	129.3	99.92	99.69	99.38	99.15	98.84	98.61	98.30	97.99	97.83
Ave.	129.6	100.11	99.88	99.66	99.44	99.22	99.00	98.79	98.56	98.35
Med.	129.4	100.08	99.85	99.65	99.46	99.23	99.03	98.76	98.61	98.39
st dev	1.0	0.1188	0.1361	0.1692	0.1490	0.1828	0.2047	0.2165	0.2457	0.2490
Min.	128.2	99.92	99.69	99.38	99.15	98.84	98.61	98.30	97.99	97.83
Max.	131.8	100.31	100.15	99.92	99.62	99.54	99.31	99.23	99.00	98.71

TM-21 Projection:

Test Duration: 9,000 hours

Failures Observed: 0

α: 2.207E-06

β: 1.003

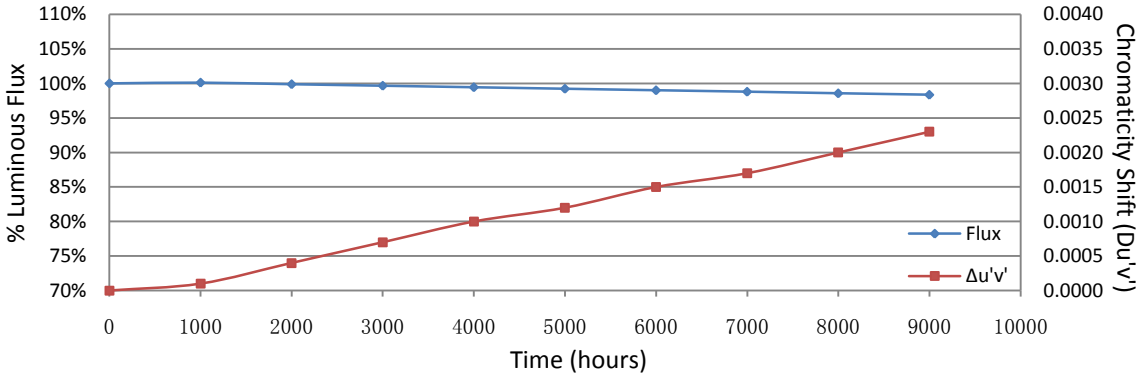
Reported L_{70}: >54,000 hours

3.2 Data Set 1, 55°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	17.63	17.63	17.63	17.61	17.62	17.63	17.62	17.64	17.62	17.62
2	17.64	17.91	17.64	17.62	17.62	17.64	17.62	17.65	17.64	17.62
3	17.67	17.73	17.66	17.65	17.65	17.70	17.65	17.68	17.66	17.65
4	17.65	17.82	17.74	17.63	17.63	17.62	17.63	17.65	17.64	17.62
5	17.55	17.68	17.57	17.54	17.53	17.55	17.53	17.55	17.55	17.54
6	17.45	17.43	17.45	17.41	17.43	17.46	17.43	17.46	17.44	17.42
7	17.45	17.44	17.62	17.42	17.43	17.51	17.43	17.48	17.44	17.42
8	17.57	17.57	17.56	17.55	17.54	17.57	17.55	17.58	17.56	17.54
9	17.75	17.77	17.73	17.73	17.72	17.84	17.74	17.76	17.74	17.73
10	17.63	17.62	17.62	17.62	17.61	17.66	17.62	17.65	17.62	17.62
11	17.65	17.63	17.61	17.61	17.61	17.66	17.63	17.64	17.63	17.62
12	17.60	17.58	17.57	17.55	17.55	17.58	17.57	17.58	17.56	17.56
13	17.63	17.61	17.60	17.60	17.58	17.63	17.65	17.62	17.60	17.60
14	17.47	17.44	17.46	17.45	17.42	17.49	17.47	17.47	17.44	17.43
15	17.65	17.64	17.63	17.64	17.62	17.64	17.66	17.65	17.63	17.62
16	17.56	17.54	17.54	17.54	17.53	17.54	17.55	17.55	17.54	17.54
17	17.61	17.60	17.59	17.59	17.58	17.61	17.60	17.61	17.60	17.59
18	17.64	17.63	17.62	17.61	17.60	17.64	17.62	17.63	17.61	17.62
19	17.64	17.63	17.61	17.60	17.59	17.60	17.62	17.61	17.61	17.60
20	17.62	17.61	17.59	17.58	17.59	17.62	17.60	17.61	17.59	17.59
Ave.	17.60	17.63	17.60	17.58	17.57	17.61	17.59	17.60	17.59	17.58
Med.	17.63	17.63	17.61	17.60	17.59	17.62	17.62	17.62	17.61	17.60
st dev	0.08	0.12	0.07	0.08	0.08	0.08	0.08	0.07	0.08	0.08
Min.	17.45	17.43	17.45	17.41	17.42	17.46	17.43	17.46	17.44	17.42
Max.	17.75	17.91	17.74	17.73	17.72	17.84	17.74	17.76	17.74	17.73

3.3 Data Set 1, 55°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	0.2564	0.5333	2804	0.0002	0.0005	0.0008	0.0011	0.0012	0.0015	0.0018	0.0021	0.0024
2	0.2567	0.5332	2796	0.0001	0.0003	0.0006	0.0009	0.0011	0.0015	0.0016	0.0019	0.0022
3	0.2599	0.5361	2719	0.0002	0.0004	0.0006	0.0010	0.0011	0.0016	0.0017	0.0020	0.0023
4	0.2564	0.5323	2807	0.0001	0.0004	0.0007	0.0010	0.0013	0.0015	0.0017	0.0021	0.0024
5	0.2597	0.5355	2724	0.0001	0.0004	0.0007	0.0009	0.0011	0.0015	0.0017	0.0020	0.0021
6	0.2567	0.5321	2801	0.0001	0.0004	0.0008	0.0010	0.0012	0.0015	0.0016	0.0021	0.0023
7	0.2591	0.5336	2745	0.0001	0.0004	0.0006	0.0009	0.0010	0.0014	0.0016	0.0019	0.0022
8	0.2565	0.5338	2799	0.0002	0.0005	0.0008	0.0011	0.0013	0.0015	0.0017	0.0021	0.0024
9	0.2575	0.5326	2783	0.0002	0.0004	0.0007	0.0009	0.0012	0.0014	0.0017	0.0019	0.0022
10	0.2571	0.5334	2788	0.0002	0.0005	0.0009	0.0011	0.0013	0.0016	0.0018	0.0022	0.0024
11	0.2598	0.5333	2731	0.0001	0.0004	0.0007	0.0009	0.0011	0.0014	0.0016	0.0019	0.0021
12	0.2587	0.5345	2749	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0016	0.0020	0.0022
13	0.2568	0.5334	2793	0.0001	0.0005	0.0007	0.0010	0.0013	0.0015	0.0017	0.0020	0.0024
14	0.2566	0.5318	2805	0.0001	0.0005	0.0007	0.0010	0.0012	0.0015	0.0016	0.0021	0.0023
15	0.2571	0.5330	2789	0.0001	0.0004	0.0007	0.0010	0.0012	0.0016	0.0017	0.0021	0.0023
16	0.2593	0.5354	2734	0.0002	0.0004	0.0008	0.0011	0.0012	0.0015	0.0017	0.0020	0.0023
17	0.2582	0.5335	2765	0.0002	0.0004	0.0006	0.0009	0.0013	0.0015	0.0016	0.0020	0.0022
18	0.2581	0.5350	2759	0.0001	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0019	0.0022
19	0.2580	0.5323	2774	0.0001	0.0004	0.0008	0.0010	0.0013	0.0015	0.0017	0.0020	0.0023
20	0.2588	0.5344	2747	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0016	0.0020	0.0022
Ave.	0.2579	0.5336	2771	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0023
Med.	0.2578	0.5334	2779	0.0001	0.0004	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0023
st dev	0.0012	0.0012	30	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2564	0.5318	2719	0.0001	0.0003	0.0006	0.0009	0.0010	0.0014	0.0016	0.0019	0.0021
Max.	0.2599	0.5361	2807	0.0002	0.0005	0.0009	0.0011	0.0013	0.0016	0.0018	0.0022	0.0024



3.4 Data Set 2, 85°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
21	129.5	99.85	99.61	99.23	98.92	98.69	98.38	98.15	97.99	97.76
22	130.2	99.92	99.54	99.23	99.08	98.77	98.39	98.23	98.00	97.85
23	131.4	100.23	99.92	99.77	99.47	99.16	98.93	98.63	98.33	97.95
24	130.1	100.08	99.85	99.54	99.39	99.15	98.85	98.62	98.31	98.00
25	131.2	99.92	99.77	99.47	99.09	99.01	98.78	98.40	98.25	98.02
26	129.4	99.92	99.61	99.46	99.23	99.07	98.84	98.53	98.30	98.07
27	130.5	99.92	99.54	99.39	99.16	98.77	98.47	98.16	97.85	97.55
28	128.7	99.92	99.69	99.46	99.22	98.83	98.45	98.21	97.98	97.75
29	127.1	99.84	99.61	99.29	99.13	98.82	98.58	98.51	98.19	97.80
30	127.3	99.92	99.69	99.29	98.98	98.74	98.66	98.43	98.27	97.88
31	129.1	99.77	99.54	99.23	98.84	98.53	98.37	98.30	98.14	97.99
32	129.0	99.92	99.77	99.46	99.22	98.91	98.68	98.45	98.14	97.83
33	128.9	100.08	99.84	99.61	99.22	98.99	98.76	98.45	98.06	97.83
34	129.8	99.85	99.69	99.54	99.23	99.00	98.69	98.46	98.15	97.84
35	127.5	99.84	99.76	99.45	99.22	99.06	98.67	98.51	98.12	97.73
36	128.3	99.84	99.77	99.45	99.22	98.99	98.75	98.44	98.13	98.05
37	129.9	99.77	99.46	99.31	99.15	98.92	98.61	98.31	98.08	97.92
38	131.0	99.69	99.47	99.16	98.85	98.70	98.47	98.24	98.02	97.71
39	129.8	99.69	99.46	99.31	98.92	98.61	98.54	98.23	98.07	97.92
40	129.9	99.85	99.46	99.38	99.15	98.85	98.61	98.38	98.15	97.92
Ave.	129.4	99.89	99.65	99.40	99.13	98.88	98.62	98.38	98.13	97.87
Med.	129.7	99.88	99.65	99.42	99.16	98.88	98.64	98.41	98.13	97.86
st dev	1.2	0.1280	0.1441	0.1501	0.1651	0.1769	0.1672	0.1455	0.1247	0.1309
Min.	127.1	99.69	99.46	99.16	98.84	98.53	98.37	98.15	97.85	97.55
Max.	131.4	100.23	99.92	99.77	99.47	99.16	98.93	98.63	98.33	98.07

TM-21 Projection:

Test Duration: 9,000 hours

Failures Observed: 0

α: 2.550E-06

β: 1.001

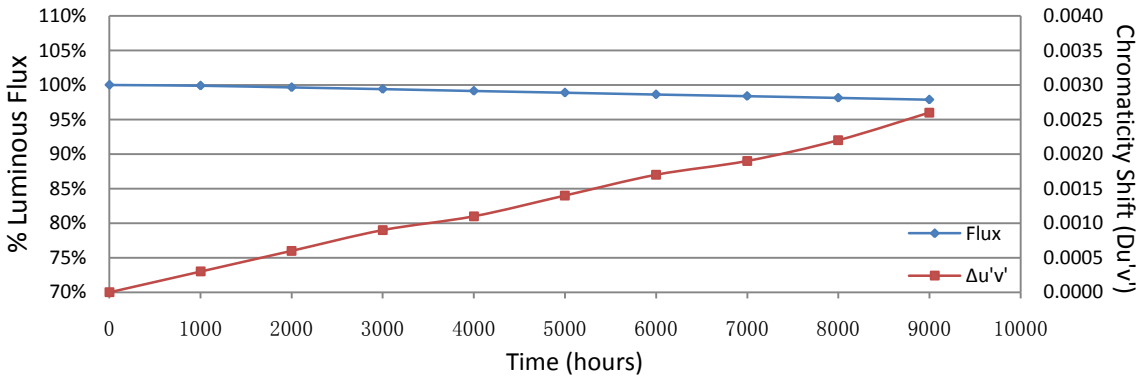
Reported L_{70}: >54,000 hours

3.5 Data Set 2, 85°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
21	17.59	17.60	17.59	17.57	17.57	17.59	17.58	17.58	17.59	17.60
22	17.59	17.59	17.65	17.57	17.56	17.58	17.59	17.58	17.58	17.57
23	17.46	17.49	17.45	17.43	17.43	17.45	17.45	17.45	17.46	17.44
24	17.51	17.56	17.49	17.49	17.48	17.50	17.51	17.49	17.52	17.49
25	17.49	17.50	17.45	17.46	17.44	17.50	17.46	17.46	17.47	17.46
26	17.68	17.70	17.67	17.65	17.64	17.67	17.66	17.66	17.67	17.64
27	17.43	17.48	17.44	17.43	17.41	17.45	17.43	17.42	17.44	17.41
28	17.65	17.70	17.64	17.65	17.62	17.64	17.64	17.63	17.66	17.64
29	17.61	17.63	17.60	17.60	17.59	17.62	17.62	17.60	17.61	17.61
30	17.65	17.68	17.65	17.68	17.64	17.64	17.67	17.64	17.65	17.63
31	17.64	17.70	17.63	17.64	17.62	17.63	17.65	17.63	17.64	17.63
32	17.68	17.70	17.66	17.70	17.65	17.66	17.67	17.67	17.68	17.66
33	17.57	17.59	17.63	17.56	17.56	17.56	17.56	17.56	17.57	17.57
34	17.54	17.55	17.56	17.54	17.53	17.53	17.60	17.53	17.54	17.55
35	17.61	17.62	17.69	17.60	17.59	17.60	17.60	17.62	17.61	17.65
36	17.65	17.66	17.65	17.67	17.64	17.65	17.65	17.66	17.65	17.65
37	17.66	17.67	17.67	17.67	17.63	17.65	17.65	17.66	17.65	17.64
38	17.56	17.55	17.52	17.54	17.51	17.53	17.54	17.54	17.54	17.52
39	17.49	17.47	17.49	17.45	17.43	17.46	17.49	17.46	17.46	17.44
40	17.63	17.62	17.60	17.58	17.57	17.60	17.60	17.59	17.60	17.59
Ave.	17.58	17.60	17.59	17.57	17.56	17.58	17.58	17.57	17.58	17.57
Med.	17.60	17.61	17.62	17.58	17.57	17.60	17.60	17.59	17.60	17.60
st dev	0.08	0.08	0.08	0.09	0.08	0.07	0.08	0.08	0.08	0.08
Min.	17.43	17.47	17.44	17.43	17.41	17.45	17.43	17.42	17.44	17.41
Max.	17.68	17.70	17.69	17.70	17.65	17.67	17.67	17.67	17.68	17.66

3.6 Data Set 2, 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
21	0.2564	0.5321	2808	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
22	0.2577	0.5347	2769	0.0003	0.0006	0.0009	0.0012	0.0015	0.0017	0.0019	0.0023	0.0026
23	0.2543	0.5318	2856	0.0002	0.0006	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025
24	0.2601	0.5364	2713	0.0002	0.0006	0.0008	0.0011	0.0014	0.0017	0.0018	0.0021	0.0025
25	0.2572	0.5322	2790	0.0002	0.0006	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025
26	0.2574	0.5310	2791	0.0002	0.0006	0.0009	0.0012	0.0014	0.0017	0.0020	0.0023	0.0026
27	0.2555	0.5323	2827	0.0002	0.0005	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021	0.0026
28	0.2564	0.5320	2809	0.0004	0.0006	0.0008	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
29	0.2599	0.5341	2726	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022	0.0026
30	0.2603	0.5340	2719	0.0003	0.0006	0.0008	0.0011	0.0014	0.0016	0.0018	0.0021	0.0025
31	0.2582	0.5358	2755	0.0004	0.0007	0.0008	0.0011	0.0015	0.0017	0.0019	0.0022	0.0025
32	0.2593	0.5337	2741	0.0004	0.0007	0.0008	0.0011	0.0014	0.0017	0.0019	0.0023	0.0025
33	0.2570	0.5327	2794	0.0004	0.0008	0.0009	0.0012	0.0012	0.0017	0.0020	0.0023	0.0026
34	0.2583	0.5337	2760	0.0003	0.0006	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025
35	0.2585	0.5316	2765	0.0004	0.0006	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025
36	0.2578	0.5326	2776	0.0003	0.0006	0.0008	0.0011	0.0014	0.0016	0.0018	0.0021	0.0025
37	0.2560	0.5323	2816	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016	0.0020	0.0022	0.0026
38	0.2571	0.5339	2785	0.0004	0.0007	0.0009	0.0012	0.0015	0.0017	0.0019	0.0022	0.0025
39	0.2584	0.5329	2763	0.0004	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024	0.0027
40	0.2579	0.5347	2764	0.0004	0.0007	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0026
Ave.	0.2577	0.5332	2776	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0019	0.0022	0.0026
Med.	0.2578	0.5328	2773	0.0003	0.0006	0.0008	0.0011	0.0014	0.0016	0.0019	0.0022	0.0026
st dev	0.0015	0.0014	37	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
Min.	0.2543	0.5310	2713	0.0002	0.0005	0.0008	0.0011	0.0012	0.0016	0.0018	0.0021	0.0025
Max.	0.2603	0.5364	2856	0.0004	0.0008	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024	0.0027



3.7 Data Set 3, 105°C, 60mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
41	130.3	99.54	99.16	98.77	98.47	98.16	98.00	97.62	97.24	96.93
42	129.1	99.69	99.46	99.15	98.76	98.53	98.14	97.91	97.68	97.44
43	129.0	99.61	99.30	99.07	98.84	98.53	98.22	97.75	97.44	97.13
44	129.4	99.54	99.23	99.00	98.76	98.30	98.07	97.76	97.37	97.14
45	129.3	99.61	99.38	98.92	98.61	98.38	98.07	97.76	97.45	97.14
46	131.0	99.62	99.31	99.16	98.78	98.32	98.02	97.63	97.40	97.02
47	130.9	99.69	99.31	98.93	98.47	98.24	98.09	97.86	97.63	97.33
48	128.7	99.77	99.53	99.15	98.83	98.45	98.21	97.82	97.67	97.36
49	128.2	99.84	99.61	99.38	99.06	98.75	98.44	98.28	97.89	97.50
50	127.6	99.76	99.53	99.37	99.14	98.82	98.59	98.35	98.20	97.88
51	129.9	99.85	99.62	99.46	99.15	98.77	98.54	98.31	98.08	97.92
52	128.6	99.77	99.61	99.38	99.22	98.99	98.60	98.29	97.90	97.51
53	129.7	99.69	99.54	99.15	98.92	98.69	98.38	98.15	97.92	97.69
54	129.4	99.85	99.61	99.30	99.00	98.61	98.30	98.07	97.68	97.37
55	130.3	99.85	99.69	99.46	99.23	98.93	98.77	98.39	98.08	97.77
56	128.1	99.77	99.53	99.14	98.83	98.52	98.20	97.81	97.66	97.27
57	129.5	99.85	99.54	99.23	98.76	98.61	98.38	98.07	97.76	97.45
58	130.8	99.77	99.39	99.08	98.85	98.55	98.32	98.17	97.78	97.63
59	130.2	99.69	99.39	98.92	98.62	98.16	97.85	97.54	97.39	97.08
60	128.6	99.53	99.14	98.91	98.68	98.37	98.21	98.06	97.74	97.43
Ave.	129.4	99.71	99.44	99.15	98.85	98.53	98.27	97.98	97.70	97.40
Med.	129.4	99.73	99.49	99.15	98.83	98.53	98.21	97.98	97.68	97.40
st dev	1.0	0.1092	0.1624	0.2007	0.2287	0.2420	0.2348	0.2664	0.2632	0.2817
Min.	127.6	99.53	99.14	98.77	98.47	98.16	97.85	97.54	97.24	96.93
Max.	131.0	99.85	99.69	99.46	99.23	98.99	98.77	98.39	98.20	97.92

TM-21 Projection:

Test Duration: 9,000 hours

Failures Observed: 0

α: 2.921E-06

β: 1.000

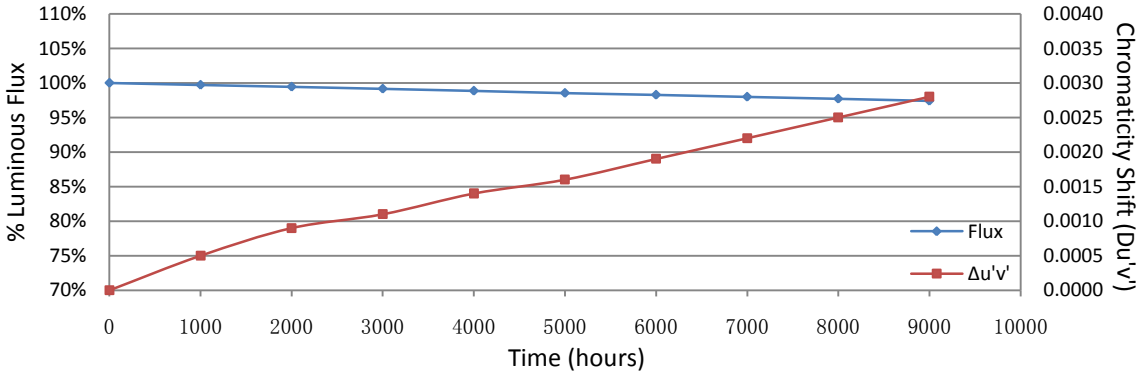
Reported L_{70}: >54,000 hours

3.8 Data Set 3, 105°C, 60mA (Forward Voltage)

No.	Forward Voltage (V)									
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
41	17.69	17.69	17.66	17.65	17.65	17.69	17.68	17.67	17.67	17.66
42	17.69	17.69	17.67	17.67	17.65	17.80	17.69	17.66	17.67	17.66
43	17.57	17.57	17.55	17.58	17.54	17.58	17.56	17.55	17.56	17.56
44	17.55	17.53	17.53	17.54	17.50	17.53	17.52	17.53	17.55	17.52
45	17.52	17.52	17.52	17.49	17.48	17.51	17.50	17.51	17.50	17.53
46	17.46	17.47	17.43	17.43	17.42	17.44	17.44	17.45	17.43	17.44
47	17.66	17.66	17.61	17.62	17.60	17.62	17.62	17.62	17.62	17.61
48	17.59	17.60	17.55	17.54	17.54	17.60	17.56	17.56	17.56	17.61
49	17.64	17.72	17.60	17.60	17.59	17.63	17.64	17.61	17.61	17.61
50	17.61	17.60	17.56	17.56	17.57	17.59	17.58	17.57	17.58	17.57
51	17.47	17.50	17.45	17.44	17.43	17.47	17.46	17.45	17.47	17.44
52	17.58	17.93	17.55	17.56	17.54	17.58	17.57	17.56	17.57	17.55
53	17.56	17.67	17.53	17.53	17.52	17.56	17.55	17.54	17.55	17.55
54	17.64	17.64	17.60	17.60	17.60	17.65	17.64	17.62	17.63	17.60
55	17.56	17.55	17.54	17.53	17.52	17.58	17.54	17.53	17.53	17.53
56	17.59	17.60	17.60	17.57	17.56	17.59	17.59	17.57	17.58	17.57
57	17.57	17.57	17.56	17.53	17.55	17.57	17.56	17.55	17.56	17.55
58	17.62	17.63	17.62	17.60	17.59	17.62	17.61	17.61	17.61	17.59
59	17.55	17.54	17.53	17.52	17.52	17.54	17.54	17.53	17.54	17.53
60	17.66	17.67	17.63	17.63	17.64	17.65	17.66	17.65	17.64	17.63
Ave.	17.59	17.62	17.56	17.56	17.55	17.59	17.58	17.57	17.57	17.57
Med.	17.59	17.60	17.56	17.56	17.55	17.59	17.57	17.56	17.57	17.57
st dev	0.06	0.10	0.06	0.06	0.06	0.08	0.07	0.06	0.06	0.06
Min.	17.46	17.47	17.43	17.43	17.42	17.44	17.44	17.45	17.43	17.44
Max.	17.69	17.93	17.67	17.67	17.65	17.80	17.69	17.67	17.67	17.66

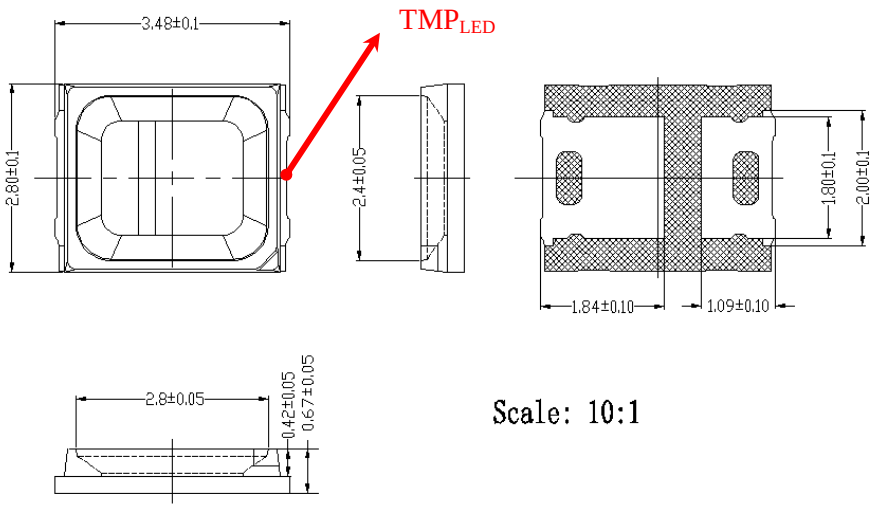
3.9 Data Set 3, 105°C, 60mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
41	0.2582	0.5345	2759	0.0004	0.0006	0.0010	0.0013	0.0015	0.0017	0.0021	0.0025	0.0028
42	0.2587	0.5349	2748	0.0005	0.0010	0.0011	0.0013	0.0015	0.0017	0.0021	0.0025	0.0027
43	0.2571	0.5336	2787	0.0005	0.0009	0.0011	0.0014	0.0016	0.0018	0.0022	0.0025	0.0028
44	0.2602	0.5359	2713	0.0004	0.0009	0.0012	0.0014	0.0016	0.0018	0.0021	0.0024	0.0028
45	0.2582	0.5338	2762	0.0006	0.0009	0.0012	0.0014	0.0016	0.0018	0.0022	0.0025	0.0028
46	0.2583	0.5337	2761	0.0006	0.0009	0.0012	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028
47	0.2567	0.5332	2796	0.0005	0.0009	0.0011	0.0014	0.0016	0.0018	0.0022	0.0025	0.0028
48	0.2585	0.5321	2763	0.0006	0.0009	0.0012	0.0014	0.0016	0.0019	0.0022	0.0025	0.0029
49	0.2581	0.5335	2766	0.0006	0.0009	0.0012	0.0014	0.0017	0.0019	0.0023	0.0026	0.0028
50	0.2560	0.5306	2824	0.0005	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028
51	0.2589	0.5341	2747	0.0005	0.0009	0.0011	0.0013	0.0016	0.0018	0.0021	0.0024	0.0027
52	0.2586	0.5334	2756	0.0005	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021	0.0025	0.0028
53	0.2589	0.5345	2746	0.0006	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028
54	0.2598	0.5349	2726	0.0006	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021	0.0025	0.0027
55	0.2582	0.5320	2770	0.0005	0.0009	0.0012	0.0015	0.0016	0.0020	0.0023	0.0026	0.0028
56	0.2575	0.5313	2789	0.0005	0.0009	0.0012	0.0014	0.0016	0.0020	0.0023	0.0026	0.0029
57	0.2570	0.5333	2790	0.0005	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021	0.0025	0.0028
58	0.2584	0.5337	2758	0.0005	0.0009	0.0011	0.0013	0.0016	0.0018	0.0021	0.0025	0.0028
59	0.2573	0.5326	2787	0.0005	0.0008	0.0011	0.0014	0.0016	0.0019	0.0021	0.0025	0.0028
60	0.2572	0.5320	2792	0.0005	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028
Ave.	0.2581	0.5334	2767	0.0005	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028
Med.	0.2582	0.5336	2763	0.0005	0.0009	0.0011	0.0014	0.0016	0.0018	0.0022	0.0025	0.0028
st dev	0.0010	0.0013	26	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Min.	0.2560	0.5306	2713	0.0004	0.0006	0.0010	0.0013	0.0015	0.0017	0.0021	0.0024	0.0027
Max.	0.2602	0.5359	2824	0.0006	0.0010	0.0012	0.0015	0.0017	0.0020	0.0023	0.0026	0.0029



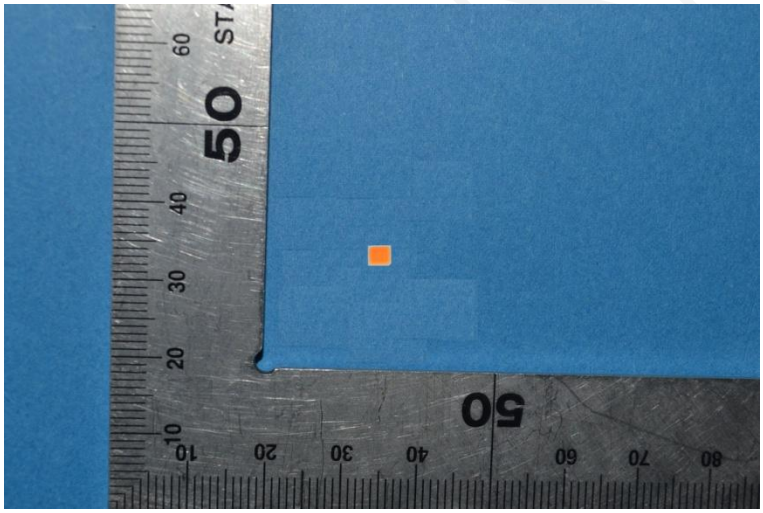
4 - EUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 EUT Photo



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