



TEST REPORT

According to ANSI/IES LM-80-15
For

TOYODA GOSEI CO., LTD.

1-1, Higashitakasuga, Futatsudera, Ama, Aichi, 490-1207 Japan.

Model: ETSC3-YK19C-AS

Report Type: 15000 Hours Test Report		Product Type: LED Package	
Reviewed By:	Pote Wang 		
Report Number:	SZ2220303-07067E-10-M1		
Test Date:	2020-03-04 to 2021-12-14		
Report Date:	2022-03-11		
Approved by:	Bill Xiong / EE Engineer		
Revised Note:	The previous report SZ2220303-07067E-10 is replaced by this report on 2022-03-11.		
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1 st Road, Tangxia Town, 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:

75 PCS test samples were in good condition and received on 2020-01-03. The samples were numbered from 1 to 25, 26 to 50 and 51 to 75.

Manufacturer:	TOYODA GOSEI CO., LTD.
Part Number:	ETSC3-YK19C-AS
Part Type:	LED Package
#Drive Level:	DC 120mA
#Nominal CCT:	2700K
#Power:	1.152W
#Average Current Density per LED die:	861mA/mm ²
#Average Power Density per LED die:	2.76W/mm ²
#CRI:	80
#Die Spacing:	0.07mm

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 Name	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 (mW/mm ²)	Die Spacing (mm)
ETSC3-YK19C-AS	120	1.152	2700	3	120	861	118	0.07
ETSC3-Y (x) 19C-AS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSC3-Y (x) 111-BS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSC3-Y (x) 11E-CS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSC3-Y (x) 11A-DS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSC3-Y (x) 10F-KS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSC3-Y (x) 00F-KS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSK3-Y (x) 10W-ON	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSD3-Y (x) 12K-AS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07
ETSD3-Y (x) 02K-AS	120	≤1.152	≥2200	3	120	≤861	≤118	0.07

Note: (x) CCT Variation, can be N/K/E/T/J/H/Q/D for 2200K-7000K

Note:

- The applicant TOYODA GOSEI CO., LTD. declare that their products with model ETSC3-YK19C-AS are the same to the products in report# RSZ200103508-10-15000 and is authorized by original applicant to use their test data.
- All the data in previous report (RSZ200103508-10-15000) 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	2021-03-08	2022-03-07
Programmable Test Power for LEDs	EVERFINE	LED300E	1008002	2021-02-24	2022-02-23
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	2021-03-08	2022-03-07
Standard Light Source	EVERFINE	D062	1011093	2021-10-15	2022-10-14
Precision digital stabilized DC power supply	EVERFINE	WY605-V110	G115987CJ7321114	2021-02-24	2022-02-23
Multilayer aging machine	BACL	B2-270	20023	2021-02-24	2022-02-23
DC Power Supply	BACL	B12001-12	90023	2021-02-24	2022-02-23

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 $\pm 3\%$ of the specified value of the manufacturer during maintenance test, and was within $\pm 0.5\%$ 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 $\pm 3\%$ 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 $\pm$ 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'. 2 π measurement was used and sample was driven by DC power supply. The forward current was regulated to within $\pm 0.5\%$ of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to 25°C $\pm$ 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.



Bay Area Compliance Laboratories Corp. (Dongguan)

No.12, Pulong East 1st Road, Tangxia Town,
Dongguan, Guangdong, China.

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, 120mA

Part Number: ETSC3-YK19C-AS

Number of Units: 25

Case Temperature: >83°C

Ambient Temperature: >80°C

Life Test Drive Current: 120mA

Measurement Current: 120mA

Data Set 2: 105°C, 120mA

Part Number: ETSC3-YK19C-AS

Number of Units: 25

Case Temperature: >103°C

Ambient Temperature: >100°C

Life Test Drive Current: 120mA

Measurement Current: 120mA

Data Set 3: 115°C, 120mA

Part Number: ETSC3-YK19C-AS

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	15000hrs	2.542E-06	1.003	>90000 hours	43,000 hours
2	25	0	1000hrs	15000hrs	3.007E-06	1.002	>90000 hours	36,000 hours
3	25	0	1000hrs	15000hrs	3.446E-06	1.001	>90000 hours	31,000 hours

Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	100.14%	99.89%	99.64%	99.38%	99.13%	98.85%	98.59%	98.29%	98.03%
2	100.03%	99.71%	99.42%	99.08%	98.79%	98.45%	98.12%	97.79%	97.48%
3	99.95%	99.60%	99.27%	98.90%	98.56%	98.18%	97.80%	97.42%	97.07%

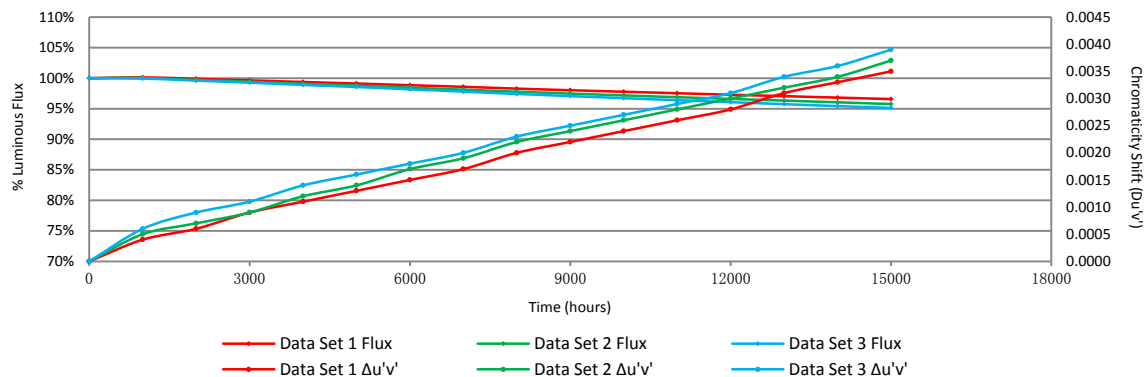
Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
1	97.78%	97.54%	97.29%	97.06%	96.82%	96.58%
2	97.18%	96.89%	96.61%	96.33%	96.05%	95.77%
3	96.73%	96.40%	96.08%	95.75%	95.43%	95.13%

Average Chromaticity Shift

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.0004	0.0006	0.0009	0.0011	0.0013	0.0015	0.0017	0.002	0.0022
2	0.0005	0.0007	0.0009	0.0012	0.0014	0.0017	0.0019	0.0022	0.0024
3	0.0006	0.0009	0.0011	0.0014	0.0016	0.0018	0.002	0.0023	0.0025

Data Set:	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
1	0.0024	0.0026	0.0028	0.0031	0.0033	0.0035
2	0.0026	0.0028	0.003	0.0032	0.0034	0.0037
3	0.0027	0.0029	0.0031	0.0034	0.0036	0.0039

Average Lumen Maintenance and Chromaticity Shift VS. Time



3 - Test Data

3.1 Data Set 1, 85°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	159.30	99.94	99.69	99.50	99.31	99.06	98.87	98.68	98.49	98.31
2	159.10	100.19	99.87	99.69	99.37	99.06	98.74	98.49	98.18	97.86
3	160.00	100.06	99.75	99.38	99.25	98.94	98.63	98.38	98.00	97.75
4	159.90	100.19	100.06	99.75	99.44	99.19	98.87	98.69	98.50	98.31
5	160.10	100.06	99.75	99.56	99.31	98.94	98.56	98.31	98.00	97.63
6	158.20	99.94	99.68	99.56	99.24	98.93	98.67	98.42	98.23	97.91
7	159.50	100.25	100.06	99.81	99.44	99.06	98.75	98.43	98.12	97.87
8	159.20	100.31	99.94	99.62	99.50	99.25	98.93	98.68	98.49	98.12
9	159.70	100.19	99.94	99.69	99.37	99.12	98.94	98.62	98.43	98.12
10	159.30	100.25	100.06	99.81	99.62	99.37	99.18	98.93	98.56	98.31
11	159.70	100.06	99.94	99.69	99.31	99.12	98.94	98.62	98.37	98.25
12	159.00	100.13	99.81	99.50	99.31	99.06	98.74	98.49	98.11	97.86
13	159.00	100.25	99.94	99.75	99.62	99.37	99.06	98.74	98.43	98.18
14	158.20	100.06	99.75	99.56	99.30	99.05	98.74	98.36	98.10	97.91
15	158.90	100.25	99.94	99.69	99.31	98.93	98.68	98.49	98.17	97.80
16	159.50	100.06	99.81	99.50	99.25	99.06	98.75	98.50	98.12	97.87
17	158.20	100.13	99.94	99.56	99.30	99.12	98.86	98.55	98.29	98.10
18	160.40	99.94	99.81	99.56	99.25	99.19	98.94	98.69	98.32	98.00
19	159.20	100.13	99.87	99.62	99.37	99.12	98.81	98.49	98.18	97.86
20	160.80	100.12	99.88	99.63	99.25	98.94	98.76	98.57	98.26	98.01
21	160.60	100.19	99.94	99.75	99.50	99.38	99.07	98.88	98.63	98.38
22	159.40	100.13	99.94	99.75	99.44	99.31	99.06	98.68	98.24	97.99
23	158.00	100.32	100.19	99.87	99.56	99.30	99.05	98.86	98.61	98.35
24	160.80	100.19	99.94	99.69	99.50	99.38	99.07	98.82	98.45	98.13
25	159.10	100.13	99.75	99.50	99.25	98.93	98.62	98.30	98.05	97.80
Avg.	159.40	100.14	99.89	99.64	99.38	99.13	98.85	98.59	98.29	98.03
Med.	159.30	100.13	99.94	99.63	99.31	99.12	98.86	98.57	98.26	98.00
st dev	0.79	0.11	0.13	0.12	0.12	0.16	0.17	0.18	0.19	0.21
Min.	158.00	99.94	99.68	99.38	99.24	98.93	98.56	98.30	98.00	97.63
Max.	160.80	100.32	100.19	99.87	99.62	99.38	99.18	98.93	98.63	98.38

No.	Lumen Maintenance (%)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
1	97.99	97.80	97.55	97.30	97.11	96.92
2	97.55	97.30	97.05	96.86	96.48	96.17
3	97.44	97.25	96.88	96.69	96.50	96.31
4	98.12	97.87	97.69	97.44	97.12	96.87
5	97.44	97.19	97.00	96.81	96.63	96.44
6	97.60	97.35	97.09	96.90	96.59	96.46
7	97.68	97.43	97.12	96.93	96.68	96.43
8	97.99	97.74	97.55	97.36	97.11	96.92
9	97.93	97.62	97.37	97.06	96.93	96.62
10	97.99	97.68	97.36	97.11	96.86	96.61
11	98.00	97.75	97.50	97.24	97.06	96.81
12	97.61	97.30	97.17	96.92	96.67	96.42
13	97.92	97.61	97.23	97.04	96.73	96.42
14	97.60	97.47	97.28	97.09	96.90	96.78
15	97.48	97.17	96.85	96.54	96.22	96.04
16	97.62	97.43	97.24	96.93	96.68	96.49
17	97.85	97.60	97.28	97.09	96.84	96.65
18	97.88	97.69	97.38	97.13	97.01	96.82
19	97.61	97.36	97.17	96.98	96.86	96.55
20	97.76	97.45	97.33	96.95	96.70	96.39
21	98.13	97.95	97.70	97.45	97.14	96.89
22	97.80	97.55	97.30	97.05	96.80	96.49
23	98.16	97.91	97.78	97.59	97.47	97.15
24	97.95	97.76	97.45	97.20	96.95	96.70
25	97.42	97.17	97.05	96.79	96.54	96.23
Avg.	97.78	97.54	97.29	97.06	96.82	96.58
Med.	97.80	97.55	97.28	97.05	96.84	96.55
st dev	0.23	0.24	0.25	0.25	0.27	0.27
Min.	97.42	97.17	96.85	96.54	96.22	96.04
Max.	98.16	97.95	97.78	97.59	97.47	97.15

3.2 Data Set 1, 85°C, 120mA (Forward Voltage)

No.	Forward Voltage (V)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	9.077	9.141	9.079	9.087	9.125	9.104	9.076	9.083	9.080	9.080
2	9.034	9.037	9.031	9.046	9.056	9.063	9.029	9.037	9.033	9.034
3	9.097	9.094	9.092	9.103	9.109	9.102	9.095	9.103	9.099	9.093
4	9.047	9.050	9.041	9.050	9.072	9.073	9.044	9.054	9.051	9.044
5	9.081	9.081	9.072	9.083	9.095	9.085	9.080	9.084	9.082	9.077
6	9.095	9.090	9.090	9.100	9.099	9.105	9.089	9.101	9.093	9.090
7	9.072	9.069	9.065	9.077	9.073	9.083	9.064	9.079	9.071	9.066
8	9.075	9.073	9.069	9.072	9.081	9.087	9.068	9.081	9.077	9.069
9	9.058	9.059	9.051	9.056	9.068	9.064	9.056	9.062	9.059	9.053
10	9.083	9.087	9.078	9.079	9.104	9.106	9.081	9.087	9.085	9.082
11	9.090	9.099	9.085	9.085	9.105	9.109	9.086	9.095	9.091	9.086
12	9.107	9.124	9.102	9.105	9.102	9.106	9.104	9.113	9.110	9.105
13	9.073	9.070	9.068	9.075	9.088	9.083	9.068	9.080	9.070	9.072
14	9.078	9.088	9.073	9.077	9.101	9.104	9.075	9.081	9.077	9.077
15	9.068	9.075	9.063	9.068	9.087	9.086	9.066	9.071	9.068	9.066
16	9.077	9.086	9.071	9.081	9.087	9.085	9.076	9.086	9.078	9.077
17	9.053	9.062	9.047	9.056	9.058	9.068	9.053	9.060	9.056	9.055
18	9.089	9.103	9.086	9.088	9.102	9.106	9.088	9.095	9.090	9.083
19	9.094	9.094	9.090	9.096	9.102	9.102	9.092	9.107	9.093	9.089
20	9.085	9.085	9.081	9.085	9.100	9.106	9.082	9.099	9.085	9.080
21	9.051	9.047	9.047	9.053	9.057	9.067	9.047	9.063	9.054	9.047
22	9.079	9.078	9.071	9.084	9.088	9.078	9.075	9.089	9.083	9.075
23	9.078	9.081	9.075	9.085	9.103	9.105	9.075	9.088	9.082	9.078
24	9.081	9.090	9.076	9.085	9.088	9.088	9.076	9.094	9.084	9.080
25	9.094	9.097	9.085	9.100	9.106	9.105	9.089	9.104	9.094	9.090
Avg.	9.077	9.082	9.072	9.079	9.090	9.091	9.073	9.084	9.078	9.074
Med.	9.078	9.085	9.073	9.083	9.095	9.088	9.076	9.086	9.082	9.077
st dev	0.017	0.023	0.017	0.017	0.018	0.015	0.017	0.018	0.017	0.017
Min.	9.034	9.037	9.031	9.046	9.056	9.063	9.029	9.037	9.033	9.034
Max.	9.107	9.141	9.102	9.105	9.125	9.109	9.104	9.113	9.110	9.105

No.	Forward Voltage (V)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
1	9.090	9.136	9.088	9.082	9.090	9.096
2	9.048	9.053	9.039	9.042	9.040	9.047
3	9.103	9.124	9.105	9.134	9.108	9.117
4	9.051	9.068	9.055	9.069	9.053	9.091
5	9.082	9.090	9.088	9.087	9.086	9.125
6	9.096	9.109	9.102	9.110	9.100	9.124
7	9.076	9.084	9.087	9.086	9.075	9.107
8	9.079	9.093	9.084	9.081	9.082	9.097
9	9.059	9.078	9.073	9.066	9.066	9.084
10	9.087	9.104	9.096	9.092	9.090	9.102
11	9.091	9.104	9.099	9.091	9.095	9.107
12	9.117	9.129	9.126	9.133	9.115	9.127
13	9.083	9.090	9.089	9.081	9.079	9.091
14	9.086	9.092	9.088	9.089	9.081	9.092
15	9.081	9.083	9.078	9.079	9.072	9.082
16	9.091	9.089	9.148	9.095	9.084	9.090
17	9.062	9.070	9.077	9.059	9.060	9.065
18	9.101	9.104	9.116	9.096	9.095	9.103
19	9.110	9.108	9.109	9.111	9.100	9.104
20	9.092	9.117	9.104	9.097	9.090	9.096
21	9.056	9.081	9.068	9.077	9.059	9.064
22	9.083	9.104	9.090	9.081	9.083	9.092
23	9.086	9.097	9.086	9.082	9.084	9.092
24	9.084	9.100	9.084	9.141	9.086	9.093
25	9.100	9.110	9.096	9.095	9.099	9.107
Avg.	9.084	9.097	9.091	9.090	9.083	9.096
Med.	9.086	9.097	9.088	9.087	9.084	9.096
st dev	0.018	0.019	0.022	0.023	0.017	0.019
Min.	9.048	9.053	9.039	9.042	9.040	9.047
Max.	9.117	9.136	9.148	9.141	9.115	9.127

3.3 Data Set 1, 85°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	0.2612	0.5286	2722	0.0004	0.0007	0.0009	0.0011	0.0012	0.0014	0.0017	0.0020	0.0023
2	0.2619	0.5319	2694	0.0004	0.0006	0.0009	0.0012	0.0014	0.0017	0.0018	0.0020	0.0023
3	0.2614	0.5286	2718	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016	0.0019	0.0020	0.0023
4	0.2603	0.5296	2737	0.0005	0.0008	0.0010	0.0011	0.0015	0.0017	0.0018	0.0020	0.0022
5	0.2611	0.5293	2721	0.0004	0.0006	0.0009	0.0010	0.0012	0.0013	0.0016	0.0019	0.0022
6	0.2639	0.5287	2666	0.0006	0.0008	0.0011	0.0013	0.0014	0.0016	0.0018	0.0020	0.0022
7	0.2624	0.5292	2695	0.0004	0.0006	0.0009	0.0012	0.0013	0.0014	0.0016	0.0017	0.0020
8	0.2623	0.5304	2691	0.0003	0.0005	0.0007	0.0010	0.0013	0.0016	0.0018	0.0019	0.0021
9	0.2631	0.5311	2674	0.0005	0.0006	0.0008	0.0011	0.0014	0.0017	0.0020	0.0022	0.0023
10	0.2635	0.5292	2671	0.0002	0.0005	0.0008	0.0010	0.0013	0.0014	0.0016	0.0019	0.0021
11	0.2618	0.5276	2713	0.0004	0.0006	0.0009	0.0012	0.0015	0.0018	0.0020	0.0022	0.0024
12	0.2637	0.5314	2660	0.0003	0.0006	0.0008	0.0011	0.0012	0.0015	0.0018	0.0020	0.0022
13	0.2623	0.5281	2701	0.0004	0.0006	0.0009	0.0011	0.0015	0.0017	0.0019	0.0022	0.0023
14	0.2640	0.5297	2661	0.0004	0.0007	0.0009	0.0011	0.0013	0.0015	0.0018	0.0022	0.0023
15	0.2638	0.5304	2661	0.0004	0.0006	0.0009	0.0011	0.0013	0.0014	0.0017	0.0019	0.0021
16	0.2632	0.5304	2674	0.0003	0.0006	0.0008	0.0011	0.0012	0.0014	0.0016	0.0018	0.0021
17	0.2639	0.5287	2667	0.0003	0.0006	0.0009	0.0011	0.0013	0.0016	0.0018	0.0018	0.0020
18	0.2607	0.5291	2730	0.0004	0.0007	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0023
19	0.2616	0.5296	2709	0.0004	0.0006	0.0007	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023
20	0.2613	0.5300	2714	0.0004	0.0006	0.0008	0.0010	0.0014	0.0016	0.0019	0.0021	0.0023
21	0.2606	0.5304	2727	0.0001	0.0005	0.0007	0.0009	0.0011	0.0013	0.0016	0.0019	0.0022
22	0.2608	0.5275	2734	0.0003	0.0005	0.0006	0.0008	0.0011	0.0014	0.0015	0.0017	0.0020
23	0.2643	0.5302	2653	0.0004	0.0007	0.0009	0.0012	0.0013	0.0016	0.0017	0.0016	0.0019
24	0.2603	0.5294	2738	0.0002	0.0006	0.0009	0.0011	0.0012	0.0014	0.0016	0.0017	0.0020
25	0.2620	0.5279	2709	0.0003	0.0006	0.0009	0.0011	0.0011	0.0013	0.0016	0.0018	0.0021
Avg.	0.2622	0.5295	2698	0.0004	0.0006	0.0009	0.0011	0.0013	0.0015	0.0017	0.0020	0.0022
Med.	0.2620	0.5294	2701	0.0004	0.0006	0.0009	0.0011	0.0013	0.0015	0.0018	0.0020	0.0022
st dev	0.0013	0.0011	28	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001
Min.	0.2603	0.5275	2653	0.0001	0.0005	0.0006	0.0008	0.0011	0.0013	0.0015	0.0016	0.0019
Max.	0.2643	0.5319	2738	0.0006	0.0008	0.0011	0.0013	0.0015	0.0018	0.0020	0.0022	0.0024

No.	Chromaticity Shift ($\Delta u'v'$)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
1	0.0025	0.0028	0.0030	0.0032	0.0033	0.0034
2	0.0025	0.0028	0.0031	0.0034	0.0036	0.0038
3	0.0025	0.0028	0.0030	0.0033	0.0035	0.0038
4	0.0024	0.0027	0.0030	0.0033	0.0035	0.0038
5	0.0024	0.0027	0.0029	0.0031	0.0034	0.0037
6	0.0023	0.0025	0.0028	0.0030	0.0033	0.0035
7	0.0022	0.0023	0.0025	0.0027	0.0029	0.0032
8	0.0021	0.0023	0.0024	0.0026	0.0029	0.0032
9	0.0024	0.0025	0.0027	0.0028	0.0030	0.0032
10	0.0022	0.0023	0.0025	0.0026	0.0027	0.0028
11	0.0027	0.0028	0.0031	0.0032	0.0033	0.0035
12	0.0025	0.0027	0.0029	0.0031	0.0033	0.0034
13	0.0026	0.0028	0.0030	0.0033	0.0035	0.0038
14	0.0025	0.0026	0.0029	0.0031	0.0034	0.0036
15	0.0024	0.0025	0.0028	0.0030	0.0033	0.0035
16	0.0024	0.0026	0.0029	0.0031	0.0034	0.0036
17	0.0022	0.0025	0.0027	0.0030	0.0031	0.0035
18	0.0025	0.0026	0.0029	0.0031	0.0032	0.0033
19	0.0025	0.0026	0.0028	0.0030	0.0031	0.0035
20	0.0024	0.0027	0.0029	0.0031	0.0033	0.0035
21	0.0024	0.0026	0.0028	0.0031	0.0033	0.0034
22	0.0023	0.0026	0.0029	0.0031	0.0033	0.0036
23	0.0022	0.0025	0.0027	0.0030	0.0032	0.0035
24	0.0023	0.0025	0.0028	0.0031	0.0033	0.0036
25	0.0023	0.0026	0.0029	0.0031	0.0033	0.0037
Avg.	0.0024	0.0026	0.0028	0.0031	0.0033	0.0035
Med.	0.0024	0.0026	0.0029	0.0031	0.0033	0.0035
st dev	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.0021	0.0023	0.0024	0.0026	0.0027	0.0028
Max.	0.0027	0.0028	0.0031	0.0034	0.0036	0.0038

3.4 Data Set 2, 105°C, 120mA (Lumen Maintenance)

No.	Φ(lm)	Lumen Maintenance (%)								
	0hr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	158.30	100.13	99.87	99.43	99.24	98.93	98.55	98.17	97.92	97.66
27	157.70	99.94	99.56	99.24	98.99	98.60	98.35	98.10	97.84	97.46
28	157.60	99.87	99.62	99.18	98.79	98.54	98.16	97.72	97.46	97.21
29	158.50	99.94	99.68	99.37	98.93	98.74	98.49	98.23	97.79	97.41
30	157.00	100.06	99.75	99.49	99.11	98.73	98.34	97.90	97.58	97.32
31	159.00	100.06	99.75	99.50	99.18	98.99	98.62	98.36	97.99	97.61
32	158.70	99.87	99.56	99.24	98.87	98.61	98.36	98.05	97.61	97.35
33	158.10	99.94	99.49	99.18	98.80	98.36	98.04	97.79	97.41	97.15
34	159.30	100.06	99.75	99.44	99.06	98.74	98.37	98.05	97.74	97.30
35	159.50	100.06	99.75	99.56	99.25	98.81	98.50	98.31	97.99	97.62
36	159.00	99.94	99.50	99.31	98.93	98.81	98.49	98.18	97.92	97.61
37	157.80	99.94	99.68	99.30	99.11	98.80	98.35	97.97	97.53	97.40
38	157.80	100.13	99.75	99.56	99.30	99.05	98.80	98.42	98.16	97.78
39	158.10	100.25	99.87	99.49	99.24	99.05	98.61	98.36	97.98	97.79
40	158.00	100.13	99.75	99.49	99.18	99.11	98.86	98.48	98.04	97.78
41	160.90	99.88	99.50	99.25	98.88	98.57	98.20	97.95	97.64	97.33
42	158.20	99.94	99.62	99.49	99.12	98.61	98.23	97.91	97.60	97.16
43	158.80	100.06	99.81	99.50	99.12	98.87	98.61	98.30	97.92	97.61
44	158.00	99.94	99.56	99.37	98.99	98.73	98.35	97.91	97.66	97.34
45	159.70	100.13	99.87	99.50	99.12	98.81	98.37	98.00	97.62	97.37
46	157.60	100.06	99.81	99.49	99.05	98.86	98.60	98.35	98.10	97.65
47	158.30	99.81	99.49	99.18	98.93	98.67	98.23	97.85	97.47	97.16
48	158.60	100.19	99.87	99.50	99.18	98.80	98.42	98.11	97.73	97.48
49	157.90	100.19	99.87	99.62	99.24	98.99	98.67	98.35	98.10	97.78
50	159.60	100.13	99.94	99.75	99.31	98.93	98.62	98.31	97.87	97.56
Avg.	158.48	100.03	99.71	99.42	99.08	98.79	98.45	98.12	97.79	97.48
Med.	158.30	100.06	99.75	99.49	99.11	98.80	98.42	98.11	97.79	97.46
st dev	0.85	0.12	0.14	0.15	0.16	0.18	0.20	0.22	0.22	0.21
Min.	157.00	99.81	99.49	99.18	98.79	98.36	98.04	97.72	97.41	97.15
Max.	160.90	100.25	99.94	99.75	99.31	99.11	98.86	98.48	98.16	97.79

No.	Lumen Maintenance (%)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
26	97.47	97.22	96.97	96.72	96.40	96.08
27	97.15	96.89	96.64	96.39	96.13	95.94
28	96.95	96.57	96.19	95.81	95.49	95.24
29	97.10	96.78	96.53	96.15	96.03	95.71
30	97.01	96.75	96.50	96.18	95.92	95.61
31	97.30	96.98	96.54	96.29	95.97	95.60
32	96.91	96.60	96.22	95.97	95.65	95.27
33	96.90	96.58	96.27	95.95	95.64	95.32
34	96.99	96.74	96.42	96.11	95.98	95.67
35	97.43	97.18	96.93	96.61	96.30	96.05
36	97.30	96.92	96.67	96.35	96.04	95.72
37	97.15	96.89	96.51	96.32	96.01	95.69
38	97.40	97.08	96.70	96.39	96.07	95.88
39	97.53	97.28	97.03	96.84	96.52	96.20
40	97.53	97.22	96.90	96.65	96.33	96.20
41	97.02	96.83	96.58	96.27	96.02	95.77
42	96.84	96.52	96.33	96.14	95.76	95.58
43	97.29	97.10	96.85	96.66	96.41	96.22
44	96.96	96.58	96.39	96.08	95.89	95.70
45	96.99	96.74	96.49	96.18	95.99	95.74
46	97.40	96.95	96.76	96.45	96.13	95.75
47	96.90	96.65	96.40	96.08	95.89	95.64
48	97.23	96.97	96.78	96.53	96.15	95.78
49	97.47	97.15	96.96	96.71	96.39	96.14
50	97.24	96.93	96.68	96.37	96.24	95.86
Avg.	97.18	96.89	96.61	96.33	96.05	95.77
Med.	97.15	96.89	96.58	96.32	96.03	95.74
st dev	0.22	0.23	0.24	0.27	0.26	0.27
Min.	96.84	96.52	96.19	95.81	95.49	95.24
Max.	97.53	97.28	97.03	96.84	96.52	96.22

3.5 Data Set 2, 105°C, 120mA (Forward Voltage)

No.	Forward Voltage (V)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	9.022	9.037	9.019	9.021	9.063	9.059	9.023	9.031	9.023	9.020
27	9.054	9.057	9.047	9.054	9.076	9.073	9.052	9.061	9.059	9.054
28	9.039	9.066	9.036	9.046	9.069	9.074	9.038	9.046	9.041	9.040
29	9.063	9.062	9.064	9.063	9.111	9.106	9.062	9.070	9.066	9.065
30	9.062	9.070	9.060	9.062	9.072	9.082	9.059	9.068	9.063	9.060
31	9.106	9.104	9.105	9.110	9.114	9.112	9.104	9.114	9.108	9.105
32	9.112	9.110	9.108	9.109	9.105	9.106	9.113	9.123	9.116	9.112
33	9.064	9.071	9.062	9.061	9.110	9.115	9.066	9.078	9.066	9.062
34	9.070	9.072	9.069	9.072	9.109	9.096	9.072	9.083	9.075	9.070
35	9.039	9.042	9.035	9.040	9.046	9.058	9.039	9.048	9.040	9.037
36	9.107	9.109	9.108	9.108	9.111	9.108	9.108	9.114	9.111	9.105
37	9.033	9.040	9.037	9.034	9.038	9.046	9.034	9.040	9.035	9.031
38	9.076	9.078	9.071	9.076	9.081	9.085	9.077	9.083	9.077	9.070
39	9.071	9.075	9.068	9.075	9.078	9.086	9.069	9.079	9.077	9.072
40	9.071	9.073	9.073	9.075	9.081	9.086	9.071	9.079	9.077	9.071
41	9.105	9.105	9.100	9.105	9.114	9.105	9.103	9.111	9.106	9.105
42	9.110	9.107	9.104	9.110	9.119	9.109	9.109	9.116	9.111	9.106
43	9.083	9.085	9.080	9.083	9.109	9.113	9.087	9.088	9.083	9.084
44	9.101	9.100	9.095	9.095	9.108	9.101	9.105	9.108	9.102	9.103
45	9.106	9.113	9.103	9.106	9.104	9.101	9.110	9.116	9.108	9.109
46	9.062	9.070	9.064	9.065	9.077	9.075	9.064	9.072	9.067	9.061
47	9.037	9.048	9.040	9.040	9.052	9.067	9.041	9.047	9.041	9.036
48	9.095	9.113	9.093	9.094	9.107	9.108	9.094	9.104	9.103	9.094
49	9.033	9.036	9.032	9.033	9.043	9.053	9.035	9.037	9.037	9.035
50	9.112	9.116	9.116	9.110	9.118	9.113	9.113	9.119	9.114	9.117
Avg.	9.073	9.078	9.072	9.074	9.089	9.089	9.074	9.081	9.076	9.073
Med.	9.071	9.073	9.069	9.075	9.104	9.096	9.071	9.079	9.077	9.070
st dev	0.029	0.026	0.029	0.028	0.026	0.021	0.029	0.029	0.029	0.030
Min.	9.022	9.036	9.019	9.021	9.038	9.046	9.023	9.031	9.023	9.020
Max.	9.112	9.116	9.116	9.110	9.119	9.115	9.113	9.123	9.116	9.117

No.	Forward Voltage (V)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
26	9.032	9.037	9.035	9.032	9.030	9.045
27	9.072	9.068	9.069	9.063	9.060	9.080
28	9.053	9.051	9.047	9.048	9.045	9.066
29	9.086	9.078	9.075	9.074	9.068	9.089
30	9.091	9.071	9.078	9.089	9.090	9.083
31	9.112	9.113	9.112	9.123	9.117	9.121
32	9.121	9.120	9.128	9.118	9.121	9.132
33	9.076	9.073	9.082	9.069	9.072	9.088
34	9.088	9.081	9.086	9.086	9.077	9.093
35	9.057	9.046	9.054	9.050	9.044	9.054
36	9.121	9.118	9.115	9.137	9.111	9.132
37	9.085	9.046	9.088	9.049	9.037	9.057
38	9.087	9.091	9.106	9.098	9.081	9.099
39	9.113	9.081	9.107	9.077	9.078	9.086
40	9.096	9.088	9.076	9.080	9.082	9.088
41	9.120	9.113	9.115	9.111	9.111	9.118
42	9.125	9.123	9.132	9.115	9.114	9.129
43	9.095	9.097	9.102	9.089	9.087	9.102
44	9.116	9.114	9.108	9.106	9.106	9.117
45	9.134	9.125	9.116	9.117	9.111	9.127
46	9.087	9.083	9.086	9.073	9.069	9.087
47	9.050	9.052	9.071	9.040	9.043	9.062
48	9.113	9.110	9.114	9.099	9.103	9.117
49	9.058	9.044	9.061	9.036	9.038	9.051
50	9.132	9.128	9.131	9.123	9.114	9.128
Avg.	9.093	9.086	9.092	9.084	9.080	9.094
Med.	9.091	9.083	9.088	9.086	9.081	9.089
st dev	0.028	0.029	0.027	0.030	0.029	0.028
Min.	9.032	9.037	9.035	9.032	9.030	9.045
Max.	9.134	9.128	9.132	9.137	9.121	9.132

3.6 Data Set 2, 105°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
26	0.2622	0.5294	2699	0.0004	0.0005	0.0008	0.0011	0.0012	0.0015	0.0018	0.0021	0.0024
27	0.2629	0.5288	2686	0.0004	0.0006	0.0009	0.0011	0.0011	0.0014	0.0016	0.0019	0.0022
28	0.2642	0.5303	2654	0.0003	0.0005	0.0007	0.0011	0.0011	0.0014	0.0017	0.0019	0.0022
29	0.2616	0.5296	2709	0.0004	0.0005	0.0008	0.0011	0.0013	0.0015	0.0018	0.0021	0.0023
30	0.2645	0.5300	2649	0.0004	0.0005	0.0006	0.0010	0.0013	0.0016	0.0018	0.0022	0.0024
31	0.2632	0.5302	2674	0.0004	0.0005	0.0007	0.0010	0.0012	0.0013	0.0016	0.0019	0.0022
32	0.2645	0.5299	2649	0.0006	0.0007	0.0009	0.0012	0.0014	0.0016	0.0018	0.0019	0.0020
33	0.2631	0.5291	2680	0.0004	0.0006	0.0008	0.0011	0.0013	0.0015	0.0016	0.0019	0.0020
34	0.2628	0.5312	2679	0.0006	0.0009	0.0012	0.0014	0.0017	0.0019	0.0021	0.0022	0.0020
35	0.2613	0.5303	2714	0.0005	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021	0.0023	0.0023
36	0.2638	0.5298	2663	0.0004	0.0007	0.0009	0.0013	0.0016	0.0019	0.0022	0.0025	0.0027
37	0.2638	0.5304	2661	0.0005	0.0008	0.0010	0.0013	0.0016	0.0019	0.0021	0.0024	0.0026
38	0.2642	0.5319	2649	0.0005	0.0007	0.0010	0.0012	0.0013	0.0016	0.0019	0.0022	0.0024
39	0.2641	0.5313	2653	0.0004	0.0007	0.0008	0.0012	0.0014	0.0017	0.0018	0.0022	0.0024
40	0.2625	0.5282	2697	0.0004	0.0007	0.0010	0.0013	0.0016	0.0017	0.0018	0.0021	0.0023
41	0.2609	0.5312	2718	0.0006	0.0009	0.0012	0.0013	0.0016	0.0019	0.0021	0.0024	0.0026
42	0.2639	0.5285	2667	0.0005	0.0009	0.0011	0.0015	0.0017	0.0019	0.0022	0.0024	0.0026
43	0.2618	0.5281	2712	0.0004	0.0007	0.0010	0.0014	0.0018	0.0019	0.0022	0.0025	0.0027
44	0.2641	0.5291	2660	0.0006	0.0007	0.0010	0.0011	0.0013	0.0016	0.0018	0.0021	0.0025
45	0.2624	0.5287	2697	0.0007	0.0009	0.0012	0.0015	0.0015	0.0016	0.0019	0.0022	0.0026
46	0.2617	0.5276	2716	0.0004	0.0006	0.0008	0.0011	0.0014	0.0016	0.0018	0.0019	0.0022
47	0.2646	0.5308	2645	0.0004	0.0008	0.0009	0.0012	0.0014	0.0016	0.0017	0.0019	0.0022
48	0.2644	0.5302	2651	0.0005	0.0008	0.0009	0.0013	0.0014	0.0016	0.0019	0.0022	0.0024
49	0.2638	0.5312	2660	0.0005	0.0006	0.0009	0.0012	0.0013	0.0016	0.0019	0.0021	0.0023
50	0.2621	0.5291	2701	0.0004	0.0005	0.0008	0.0011	0.0014	0.0016	0.0018	0.0021	0.0022
Avg.	0.2631	0.5298	2678	0.0005	0.0007	0.0009	0.0012	0.0014	0.0017	0.0019	0.0022	0.0024
Med.	0.2632	0.5299	2674	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0018	0.0021	0.0023
st dev	0.0011	0.0011	25	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2609	0.5276	2645	0.0003	0.0005	0.0006	0.0010	0.0011	0.0013	0.0016	0.0019	0.0020
Max.	0.2646	0.5319	2718	0.0007	0.0009	0.0012	0.0015	0.0018	0.0019	0.0022	0.0025	0.0027

No.	Chromaticity Shift ($\Delta u'v'$)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
26	0.0025	0.0027	0.0029	0.0032	0.0034	0.0036
27	0.0025	0.0027	0.0028	0.0030	0.0033	0.0035
28	0.0025	0.0028	0.0029	0.0031	0.0033	0.0036
29	0.0023	0.0026	0.0028	0.0030	0.0033	0.0034
30	0.0026	0.0027	0.0029	0.0031	0.0033	0.0036
31	0.0025	0.0028	0.0031	0.0034	0.0037	0.0038
32	0.0021	0.0024	0.0026	0.0029	0.0032	0.0035
33	0.0021	0.0023	0.0026	0.0029	0.0030	0.0034
34	0.0021	0.0022	0.0024	0.0027	0.0029	0.0033
35	0.0024	0.0025	0.0028	0.0029	0.0030	0.0034
36	0.0030	0.0032	0.0034	0.0035	0.0036	0.0037
37	0.0028	0.0028	0.0031	0.0034	0.0036	0.0038
38	0.0027	0.0030	0.0031	0.0033	0.0034	0.0036
39	0.0027	0.0030	0.0031	0.0033	0.0035	0.0039
40	0.0026	0.0028	0.0031	0.0033	0.0035	0.0038
41	0.0029	0.0031	0.0032	0.0035	0.0036	0.0039
42	0.0028	0.0031	0.0034	0.0036	0.0038	0.0042
43	0.0028	0.0030	0.0032	0.0034	0.0037	0.0040
44	0.0027	0.0030	0.0032	0.0034	0.0037	0.0041
45	0.0028	0.0030	0.0032	0.0034	0.0036	0.0038
46	0.0025	0.0026	0.0028	0.0029	0.0032	0.0034
47	0.0025	0.0026	0.0028	0.0031	0.0032	0.0036
48	0.0027	0.0029	0.0031	0.0033	0.0035	0.0039
49	0.0026	0.0029	0.0031	0.0034	0.0036	0.0039
50	0.0024	0.0026	0.0028	0.0030	0.0033	0.0038
Avg.	0.0026	0.0028	0.0030	0.0032	0.0034	0.0037
Med.	0.0026	0.0028	0.0031	0.0033	0.0034	0.0037
st dev	0.0003	0.0003	0.0002	0.0002	0.0002	0.0002
Min.	0.0021	0.0022	0.0024	0.0027	0.0029	0.0033
Max.	0.0030	0.0032	0.0034	0.0036	0.0038	0.0042

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	160.00	100.06	99.81	99.50	99.13	98.69	98.25	97.94	97.63	97.31
52	161.30	100.06	99.63	99.26	98.82	98.51	98.08	97.83	97.52	97.27
53	158.50	100.13	99.87	99.56	99.18	98.93	98.61	98.23	97.85	97.54
54	158.50	99.94	99.62	99.18	98.74	98.42	98.11	97.73	97.29	96.85
55	159.60	99.87	99.62	99.31	98.93	98.81	98.43	98.18	97.87	97.49
56	160.50	99.81	99.38	99.13	98.75	98.63	98.13	97.76	97.38	97.01
57	159.60	99.87	99.50	99.12	98.68	98.37	98.06	97.68	97.31	96.93
58	159.30	99.94	99.50	99.06	98.81	98.43	97.93	97.61	97.18	96.92
59	159.80	99.87	99.56	99.25	98.94	98.44	98.00	97.62	97.12	96.81
60	159.30	100.06	99.75	99.31	98.93	98.74	98.43	98.05	97.68	97.30
61	158.80	100.06	99.75	99.37	98.99	98.74	98.36	97.98	97.61	97.29
62	160.30	99.94	99.63	99.31	99.06	98.63	98.19	97.75	97.32	96.94
63	158.60	99.81	99.56	99.12	98.74	98.36	98.05	97.54	97.10	96.72
64	157.40	99.87	99.36	99.11	98.79	98.48	98.09	97.71	97.27	96.95
65	157.90	99.81	99.43	98.99	98.61	98.10	97.72	97.34	96.96	96.58
66	159.70	99.75	99.37	98.94	98.50	98.12	97.81	97.43	97.06	96.68
67	159.30	99.94	99.50	99.12	98.68	98.56	98.12	97.68	97.18	96.74
68	158.50	100.13	99.75	99.43	99.12	98.74	98.42	97.98	97.54	97.16
69	158.60	100.13	99.81	99.62	99.24	98.99	98.55	98.17	97.86	97.60
70	158.90	100.06	99.75	99.43	99.12	98.93	98.62	98.17	97.92	97.61
71	160.40	100.12	99.88	99.69	99.25	98.82	98.38	98.07	97.63	97.26
72	157.80	99.75	99.30	99.11	98.73	98.23	97.91	97.66	97.40	96.96
73	159.10	99.81	99.37	98.99	98.62	98.11	97.74	97.23	96.86	96.54
74	159.70	99.87	99.50	99.12	98.81	98.31	98.00	97.56	97.24	96.93
75	158.10	100.19	99.87	99.68	99.30	98.86	98.42	98.10	97.85	97.47
Avg.	159.18	99.95	99.60	99.27	98.90	98.56	98.18	97.80	97.42	97.07
Med.	159.30	99.94	99.62	99.25	98.82	98.56	98.12	97.75	97.38	96.96
st dev	0.94	0.13	0.18	0.22	0.23	0.27	0.26	0.28	0.31	0.32
Min.	157.40	99.75	99.30	98.94	98.50	98.10	97.72	97.23	96.86	96.54
Max.	161.30	100.19	99.88	99.69	99.30	98.99	98.62	98.23	97.92	97.61

No.	Lumen Maintenance (%)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
51	97.00	96.81	96.38	96.19	96.00	95.63
52	97.02	96.78	96.40	96.03	95.72	95.41
53	97.10	96.72	96.47	96.03	95.65	95.33
54	96.40	96.03	95.71	95.39	95.08	94.89
55	97.12	96.68	96.24	95.86	95.49	95.11
56	96.70	96.39	96.01	95.83	95.45	95.33
57	96.62	96.30	95.93	95.55	95.11	94.74
58	96.55	96.11	95.79	95.48	95.17	94.85
59	96.50	96.06	95.81	95.49	95.12	94.93
60	96.99	96.55	96.30	95.86	95.67	95.42
61	96.98	96.60	96.22	95.91	95.53	95.15
62	96.69	96.44	96.26	96.07	95.76	95.32
63	96.41	96.09	95.84	95.52	95.40	95.08
64	96.63	96.25	96.06	95.62	95.24	94.85
65	96.14	95.95	95.63	95.25	95.00	94.62
66	96.37	96.06	95.80	95.49	95.05	94.74
67	96.36	96.05	95.61	95.29	94.92	94.79
68	96.78	96.34	95.96	95.71	95.33	94.95
69	97.23	96.97	96.78	96.47	96.15	95.90
70	97.36	96.92	96.60	96.29	95.97	95.85
71	96.82	96.51	96.13	95.82	95.51	95.14
72	96.58	96.26	95.94	95.63	95.50	95.12
73	96.23	95.98	95.66	95.29	94.91	94.59
74	96.56	96.31	95.99	95.62	95.37	94.99
75	97.09	96.77	96.52	96.14	95.76	95.45
Avg.	96.73	96.40	96.08	95.75	95.43	95.13
Med.	96.69	96.34	96.01	95.71	95.45	95.11
st dev	0.33	0.32	0.32	0.33	0.35	0.35
Min.	96.14	95.95	95.61	95.25	94.91	94.59
Max.	97.36	96.97	96.78	96.47	96.15	95.90

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

No.	Forward Voltage (V)									
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	9.087	9.088	9.125	9.085	9.107	9.109	9.093	9.093	9.094	9.084
52	9.087	9.087	9.108	9.086	9.103	9.102	9.087	9.093	9.092	9.088
53	9.073	9.077	9.072	9.078	9.102	9.104	9.078	9.082	9.082	9.077
54	9.041	9.050	9.043	9.041	9.079	9.069	9.044	9.050	9.047	9.042
55	9.063	9.065	9.071	9.066	9.066	9.062	9.070	9.073	9.071	9.064
56	9.106	9.114	9.110	9.105	9.107	9.107	9.109	9.117	9.115	9.108
57	9.100	9.106	9.102	9.100	9.104	9.105	9.106	9.108	9.114	9.101
58	9.044	9.048	9.047	9.044	9.089	9.074	9.051	9.055	9.057	9.043
59	9.104	9.115	9.101	9.103	9.110	9.109	9.108	9.108	9.115	9.100
60	9.037	9.041	9.037	9.036	9.047	9.055	9.041	9.041	9.045	9.036
61	9.095	9.099	9.114	9.097	9.116	9.116	9.103	9.102	9.103	9.092
62	9.089	9.091	9.089	9.090	9.121	9.124	9.092	9.094	9.097	9.086
63	9.065	9.070	9.066	9.068	9.096	9.084	9.065	9.069	9.076	9.060
64	9.069	9.071	9.073	9.073	9.096	9.107	9.072	9.079	9.081	9.066
65	9.053	9.064	9.060	9.059	9.061	9.064	9.060	9.060	9.067	9.057
66	9.040	9.040	9.043	9.039	9.042	9.049	9.042	9.045	9.050	9.039
67	9.066	9.065	9.068	9.068	9.068	9.072	9.070	9.073	9.078	9.066
68	9.080	9.078	9.077	9.080	9.080	9.079	9.079	9.084	9.088	9.078
69	9.103	9.103	9.104	9.109	9.109	9.108	9.107	9.110	9.117	9.107
70	9.060	9.060	9.061	9.064	9.095	9.079	9.064	9.061	9.068	9.060
71	9.074	9.080	9.092	9.084	9.093	9.087	9.082	9.084	9.089	9.081
72	9.063	9.061	9.068	9.069	9.070	9.072	9.073	9.072	9.077	9.067
73	9.062	9.062	9.067	9.064	9.068	9.071	9.072	9.075	9.071	9.063
74	9.091	9.099	9.097	9.092	9.099	9.107	9.100	9.103	9.103	9.090
75	9.094	9.093	9.096	9.095	9.113	9.101	9.097	9.106	9.105	9.094
Avg.	9.074	9.077	9.080	9.076	9.090	9.089	9.079	9.081	9.084	9.074
Med.	9.073	9.077	9.073	9.078	9.096	9.087	9.078	9.082	9.082	9.077
st dev	0.021	0.022	0.025	0.021	0.022	0.021	0.021	0.022	0.022	0.021
Min.	9.037	9.040	9.037	9.036	9.042	9.049	9.041	9.041	9.045	9.036
Max.	9.106	9.115	9.125	9.109	9.121	9.124	9.109	9.117	9.117	9.108

No.	Forward Voltage (V)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
51	9.106	9.099	9.102	9.094	9.089	9.102
52	9.103	9.096	9.106	9.093	9.088	9.102
53	9.089	9.088	9.079	9.079	9.078	9.087
54	9.062	9.054	9.067	9.068	9.043	9.050
55	9.086	9.078	9.085	9.072	9.070	9.075
56	9.126	9.117	9.119	9.111	9.112	9.117
57	9.118	9.107	9.116	9.108	9.105	9.110
58	9.060	9.057	9.070	9.051	9.054	9.055
59	9.119	9.113	9.102	9.109	9.106	9.111
60	9.046	9.051	9.055	9.051	9.041	9.046
61	9.107	9.109	9.104	9.099	9.103	9.104
62	9.096	9.103	9.102	9.096	9.092	9.100
63	9.077	9.076	9.072	9.074	9.067	9.089
64	9.078	9.085	9.083	9.076	9.072	9.079
65	9.061	9.064	9.066	9.057	9.060	9.065
66	9.043	9.045	9.061	9.041	9.040	9.045
67	9.071	9.078	9.072	9.071	9.068	9.078
68	9.081	9.093	9.087	9.084	9.081	9.089
69	9.108	9.118	9.114	9.111	9.106	9.121
70	9.063	9.070	9.072	9.064	9.062	9.063
71	9.082	9.089	9.087	9.086	9.084	9.079
72	9.065	9.077	9.071	9.080	9.070	9.066
73	9.068	9.073	9.071	9.077	9.069	9.075
74	9.096	9.101	9.101	9.104	9.099	9.107
75	9.100	9.103	9.097	9.116	9.101	9.106
Avg.	9.084	9.086	9.086	9.083	9.078	9.085
Med.	9.082	9.088	9.085	9.080	9.078	9.087
st dev	0.023	0.021	0.019	0.021	0.022	0.023
Min.	9.043	9.045	9.055	9.041	9.040	9.045
Max.	9.126	9.118	9.119	9.116	9.112	9.121

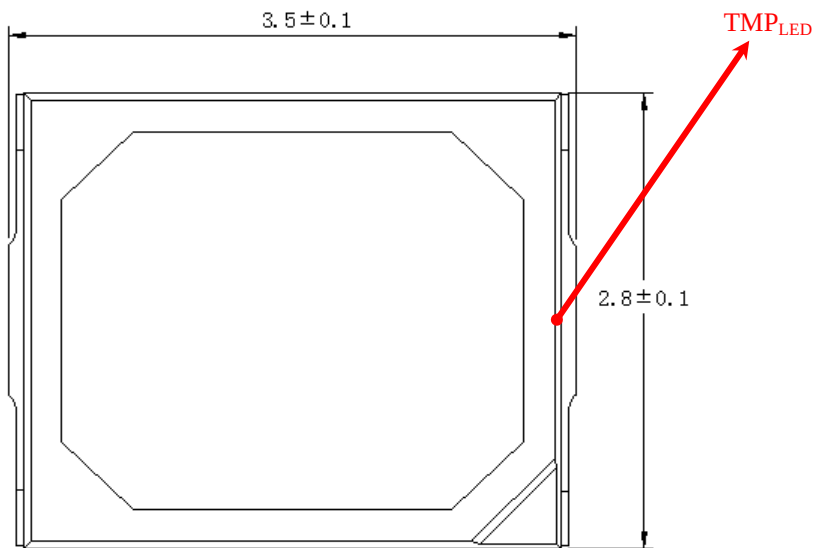
3.9 Data Set 3, 115°C, 120mA (Chromaticity Shift)

No.	u'	v'	CCT(K)	Chromaticity Shift ($\Delta u'v'$)								
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
51	0.2627	0.5308	2682	0.0004	0.0007	0.0011	0.0013	0.0013	0.0014	0.0016	0.0019	0.0021
52	0.2606	0.5310	2725	0.0004	0.0007	0.0010	0.0013	0.0014	0.0015	0.0016	0.0018	0.0021
53	0.2641	0.5300	2657	0.0003	0.0006	0.0009	0.0013	0.0016	0.0018	0.0020	0.0021	0.0022
54	0.2641	0.5312	2654	0.0004	0.0006	0.0009	0.0011	0.0015	0.0018	0.0020	0.0023	0.0023
55	0.2625	0.5295	2691	0.0006	0.0008	0.0011	0.0013	0.0014	0.0016	0.0018	0.0021	0.0023
56	0.2608	0.5286	2730	0.0007	0.0009	0.0011	0.0014	0.0016	0.0018	0.0021	0.0023	0.0025
57	0.2612	0.5276	2727	0.0005	0.0008	0.0011	0.0014	0.0015	0.0018	0.0021	0.0023	0.0025
58	0.2612	0.5300	2717	0.0006	0.0008	0.0011	0.0013	0.0015	0.0018	0.0021	0.0023	0.0024
59	0.2633	0.5315	2667	0.0007	0.0010	0.0013	0.0016	0.0016	0.0019	0.0021	0.0023	0.0024
60	0.2632	0.5308	2673	0.0008	0.0010	0.0013	0.0016	0.0018	0.0020	0.0023	0.0025	0.0027
61	0.2634	0.5295	2672	0.0006	0.0009	0.0011	0.0013	0.0016	0.0017	0.0021	0.0023	0.0025
62	0.2607	0.5294	2729	0.0007	0.0010	0.0013	0.0016	0.0019	0.0020	0.0023	0.0025	0.0028
63	0.2626	0.5290	2692	0.0007	0.0009	0.0013	0.0015	0.0018	0.0020	0.0023	0.0026	0.0028
64	0.2627	0.5286	2691	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028	0.0028
65	0.2634	0.5292	2675	0.0006	0.0009	0.0012	0.0013	0.0017	0.0019	0.0022	0.0025	0.0028
66	0.2618	0.5305	2703	0.0006	0.0009	0.0012	0.0014	0.0017	0.0019	0.0022	0.0024	0.0026
67	0.2630	0.5298	2681	0.0007	0.0008	0.0010	0.0012	0.0015	0.0018	0.0020	0.0022	0.0026
68	0.2634	0.5297	2673	0.0007	0.0010	0.0013	0.0014	0.0016	0.0018	0.0021	0.0024	0.0025
69	0.2641	0.5288	2662	0.0006	0.0009	0.0011	0.0012	0.0014	0.0017	0.0018	0.0022	0.0023
70	0.2618	0.5294	2706	0.0006	0.0007	0.0011	0.0013	0.0016	0.0017	0.0019	0.0022	0.0023
71	0.2587	0.5286	2775	0.0007	0.0009	0.0012	0.0015	0.0017	0.0019	0.0020	0.0022	0.0024
72	0.2625	0.5281	2696	0.0007	0.0010	0.0013	0.0015	0.0018	0.0020	0.0021	0.0021	0.0023
73	0.2624	0.5304	2690	0.0008	0.0009	0.0012	0.0015	0.0017	0.0018	0.0019	0.0021	0.0024
74	0.2611	0.5289	2722	0.0006	0.0008	0.0010	0.0012	0.0016	0.0018	0.0022	0.0023	0.0023
75	0.2631	0.5296	2679	0.0005	0.0008	0.0011	0.0013	0.0014	0.0017	0.0019	0.0021	0.0023
Avg.	0.2623	0.5296	2695	0.0006	0.0009	0.0011	0.0014	0.0016	0.0018	0.0020	0.0023	0.0025
Med.	0.2626	0.5295	2691	0.0006	0.0009	0.0011	0.0013	0.0016	0.0018	0.0021	0.0023	0.0024
st dev	0.0013	0.0010	29	0.0002	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2587	0.5276	2654	0.0003	0.0006	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018	0.0021
Max.	0.2641	0.5315	2775	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0025	0.0028	0.0028

No.	Chromaticity Shift ($\Delta u'v'$)					
	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs
51	0.0023	0.0025	0.0028	0.0031	0.0033	0.0036
52	0.0024	0.0026	0.0028	0.0031	0.0034	0.0036
53	0.0023	0.0026	0.0029	0.0032	0.0035	0.0039
54	0.0026	0.0026	0.0029	0.0032	0.0034	0.0037
55	0.0025	0.0026	0.0028	0.0030	0.0033	0.0036
56	0.0026	0.0027	0.0029	0.0030	0.0031	0.0033
57	0.0028	0.0030	0.0033	0.0034	0.0035	0.0037
58	0.0027	0.0029	0.0032	0.0033	0.0035	0.0037
59	0.0025	0.0028	0.0031	0.0033	0.0035	0.0037
60	0.0029	0.0031	0.0033	0.0036	0.0038	0.0039
61	0.0028	0.0030	0.0032	0.0035	0.0037	0.0040
62	0.0030	0.0033	0.0036	0.0038	0.0040	0.0044
63	0.0031	0.0034	0.0036	0.0038	0.0041	0.0045
64	0.0031	0.0033	0.0035	0.0037	0.0040	0.0044
65	0.0032	0.0034	0.0035	0.0036	0.0038	0.0043
66	0.0029	0.0031	0.0034	0.0036	0.0039	0.0043
67	0.0025	0.0028	0.0031	0.0034	0.0037	0.0041
68	0.0028	0.0030	0.0032	0.0033	0.0036	0.0041
69	0.0027	0.0029	0.0032	0.0033	0.0035	0.0038
70	0.0026	0.0028	0.0031	0.0034	0.0036	0.0040
71	0.0026	0.0029	0.0032	0.0033	0.0036	0.0040
72	0.0025	0.0028	0.0031	0.0034	0.0036	0.0039
73	0.0026	0.0028	0.0031	0.0034	0.0036	0.0039
74	0.0026	0.0029	0.0030	0.0031	0.0033	0.0035
75	0.0025	0.0028	0.0030	0.0031	0.0033	0.0036
Avg.	0.0027	0.0029	0.0031	0.0034	0.0036	0.0039
Med.	0.0026	0.0029	0.0031	0.0033	0.0036	0.0039
st dev	0.0002	0.0003	0.0002	0.0002	0.0003	0.0003
Min.	0.0023	0.0025	0.0028	0.0030	0.0031	0.0033
Max.	0.0032	0.0034	0.0036	0.0038	0.0041	0.0045

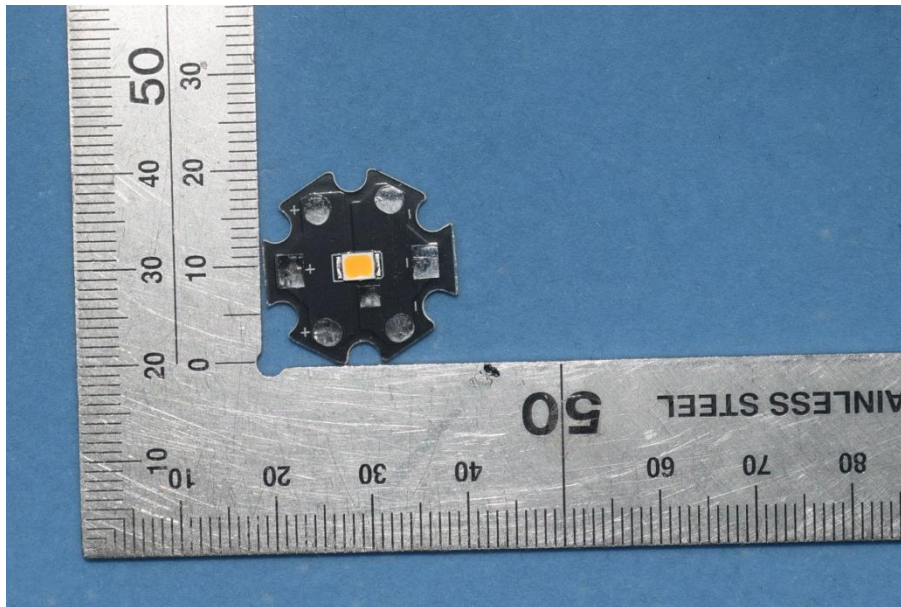
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo



5 - Report Revision

Report Number	Report Date	Contents
SZ2220303-07067E-10	2022-03-10	Original report.
SZ2220303-07067E-10-M1	2022-03-11	Add some Multiple Models.

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 $K=2$ with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
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*****END OF REPORT*****