Test Report Of ANSI/IES LM-80-21

Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources

Report Number.....	:	N01A26110077L00201
Client.....	:	EVERSTAR OPTOELECTRONICS PVT.LTD
Address.....	:	809/810, 8th FLOOR, TOWER B, LODHA SUPREMUS, KOLSHET ROAD, THANE WEST400607
Test Model.....	:	6V 1W
Brand Name.....	:	N/A
Testing Laboratory...	:	Guangdong GTG Testing Technology Co., Ltd.
Address.....	:	1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road,Songshan Lake Hi-tech Industrial Development Zone,Dongguan City,Guangdong Pr., China.
Testing Location.....	:	As above
Date of receipt.....	:	2022-09-27
Date of test	:	2022-09-27 to 2024-12-04
Date of report.....	:	2026-11-09

Tested by:

Sujay Zhou/ Test Engineer

Checked by:

Will Yang/ Project Engineer

Approved by:

Meiko Wang/ Approver

Note 1: The test data was only valid for the test sample(s).This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or use in part without prior written consent from Guangdong GTG Testing Technology Co., Ltd. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP,NIST, or any agency of the Federal Government.
Note 2: This report does not imply product certification, approval, or endorsement by NVLAP, NIST,or any agency of the Federal Government.

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1.General Information

1.1 Description of LED Light Sources

Sample Size:

75Pcs samples were received on 2022-09-27.The samples were numbered from S1 to S75.

Manufacture:	EVERSTAR OPTOELECTRONICS PVT.LTD
Part Number:	6V 1W
Part Type:	LED Package
Drive Level:	DC150mA
Tested CCT:	2700K
Nominal CCT:	≥2200K
Power:	1W
CRI:	80

Note: This report is based on the original report N01A24111021L00201 for changes. Due to customer requirements, only Client, Manufacture, Nominal CCT, Overlay mode description and Reported TM-21 Lifetime has been modified. Other unchanged, this modification does not involve testing.

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from 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:

Overlay mode description: 2835 XX XXX XX XXX XX- XX X XX/-X
① ② ③ ④ ⑤ ⑥ ⑦⑧ ⑨ ⑩

X is for description
① Product spec
② Luminous color: CCT≥2200K. Such as: PW-6500K, NW - 4000K, WW-2700K
③ Product power. Such as: 001-0.1W,002-0.2W,003-0.3W,005-0.5W,006-0.6W,010-1W
④ indicates product grade. Such as:B1-B8
⑤ Voltage range
⑥ Mount. Such as: TA、T7 round cup, T1、T9、T8 square cup
⑦ Serial & Parallel Mode
⑧ Craft code
⑨Indicates the color rendering index (CRI)
⑩Special requirements

Disclaimer:
The truthfulness and accuracy of all the technical information above for the covered LED products is ensured by manufacturer of LED light source.Guangdong GTG Testing Technology Co., Ltd. isn't responsible or gives any guarantees for the truthfulness of the technical information.

1.2 Standards Used

▪ ANSI/IES LM-80-21: Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources
▪ ANSI/IES TM-21-21: Projecting Long-Term Luminous, Photon, and Radiant Flux Maintenance of LED Light Sources(This standard was not accredited by NVLAP)

1.3 Test equipment list

Test Equipment	Serial No	Model No	Calibration due date
Integrating Sphere System	01-L-187	0.5m	2025/03/13
Standard Light Source	01-L-188	D062	2025/03/13
High Accuracy Array Spectroradio Meter	01-L-169	HAAS-3000	2025/03/13
Digital Power Meter	01-L-166	PF310	2025/03/13
Precision digital stabilized DC power supply	01-L-167	WY305	2025/03/13
Temperature Tester	01-L-192	UIS-D8036	2025/02/22

Statement of Traceability: Guangdong GTG Testing Technology Co., Ltd.attested that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit(SI).

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 minimalambient airflow.The case temperature and Air Temperature was monitoredby 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 Air Temperature during test was set to 25°C ± 2°C, RH＜65%.

1.6 Photometric Measurement Method

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 Air Temperature during test was set to 25°C ± 2°C, RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe. The uncertainty of the light output(luminous flux) measurements is U=2.1%(K=2),at the 95% confidence level.The uncertainty of the correlated color temperature measurements is U=18K(K=2),at the 95% confidence level.The uncertainty of the temperature is U=0.5°C(K=2),at the 95% confidence level.

1.7 Sample Set

Data Set 1:55°C,150mA	
Part number：	6V 1W
Number of Units:	25
Case Temperature(T_S):	＞53°C
Ambient Temperature(T_A):	＞50°C
Life Test Drive Current:	150mA
Measurement Current:	150mA

Data Set 2:85°C,150mA	
Part number：	6V 1W
Number of Units:	25
Case Temperature(T_S):	＞83°C
Ambient Temperature(T_A):	＞80°C
Life Test Drive Current:	150mA
Measurement Current:	150mA

Data Set 3:105°C,150mA	
Part number：	6V 1W
Number of Units:	25
Case Temperature(T_S):	＞103°C
Ambient Temperature(T_A):	＞100°C
Life Test Drive Current:	150mA
Measurement Current:	150mA

2. Summary of Test Result

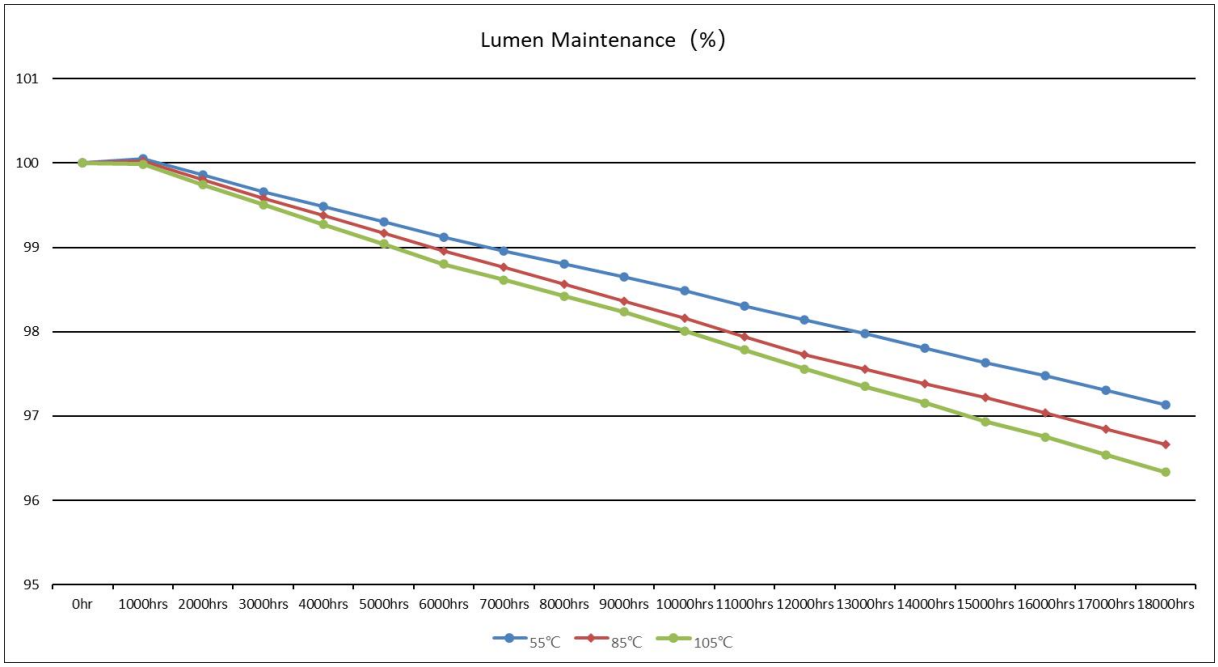
Data Set:	Sample Size	Failures Observed:	Test Interval	Test Duration	α	B	Reported TM-21 L_{70} Lifetime	Reported TM-21 L_{80} Lifetime	Reported TM-21 L_{90} Lifetime
1	25	0	1000hrs	18000hrs	2.000E-06	1.0070	>108000hours	>108000hours	56200hours
2	25	0	1000hrs	18000hrs	2.000E-06	1.0020	>108000hours	>108000hours	53700hours
3	25	0	1000hrs	18000hrs	2.158E-06	1.0014	>108000hours	104000hours	49500hours

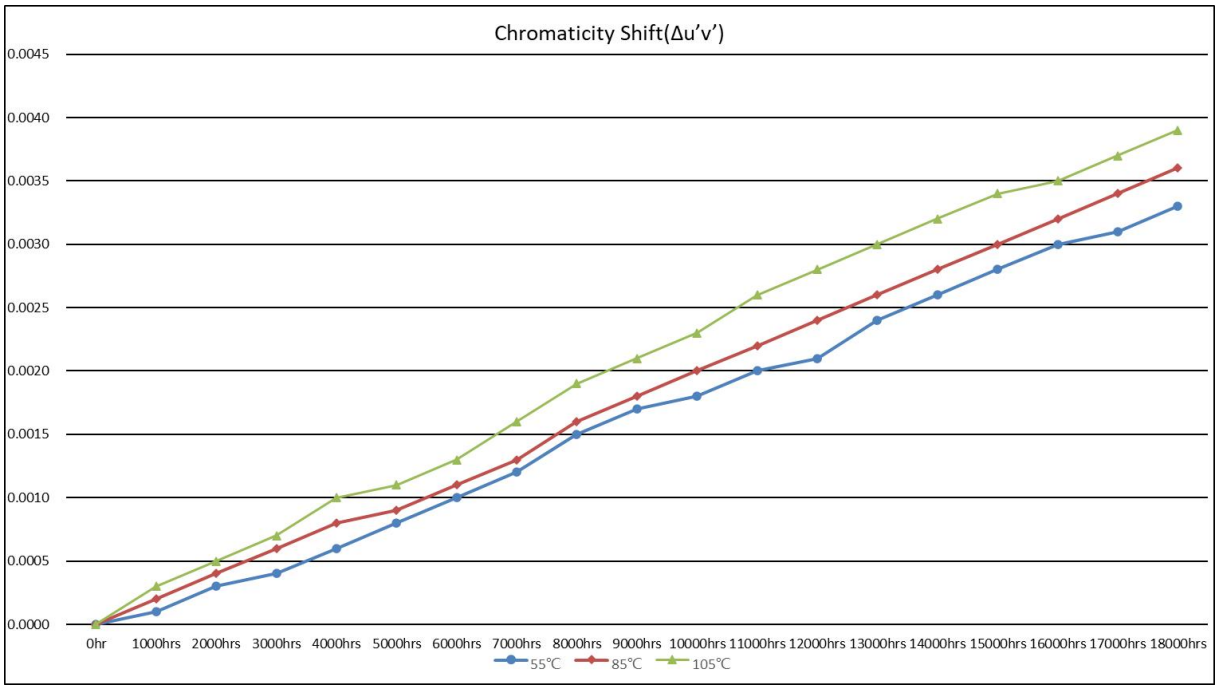
Average Lumen Maintenance (Percentage of Initial Luminous Flux)

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	18000hrs
1	100.06%	99.86%	99.66%	99.48%	99.30%	99.12%	98.96%	98.80%	98.65%	98.48%	98.31%	98.14%	97.97%	97.80%	97.63%	97.48%	97.30%	97.14%
2	100.02%	99.80%	99.58%	99.38%	99.17%	98.96%	98.76%	98.57%	98.36%	98.16%	97.94%	97.73%	97.56%	97.39%	97.22%	97.03%	96.84%	96.66%
3	99.99%	99.74%	99.51%	99.27%	99.04%	98.80%	98.61%	98.42%	98.23%	98.01%	97.79%	97.56%	97.35%	97.16%	96.94%	96.75%	96.54%	96.33%

Average Chromaticity Shift (Δu'v')

Data Set:	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	18000hrs
1	0.0001	0.0003	0.0004	0.0006	0.0008	0.0010	0.0012	0.0015	0.0017	0.0018	0.0020	0.0021	0.0024	0.0026	0.0028	0.0030	0.0031	0.0033
2	0.0002	0.0004	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0018	0.0020	0.0022	0.0024	0.0026	0.0028	0.0030	0.0032	0.0034	0.0036
3	0.0003	0.0005	0.0007	0.0010	0.0011	0.0013	0.0016	0.0019	0.0021	0.0023	0.0026	0.0028	0.0030	0.0032	0.0034	0.0035	0.0037	0.0039


Lumen Maintenance (%)
101
100
99
98
97
96
95
0hr
1000hrs
2000hrs
3000hrs
4000hrs
5000hrs
6000hrs
7000hrs
8000hrs
9000hrs
10000hrs
11000hrs
12000hrs
13000hrs
14000hrs
15000hrs
16000hrs
17000hrs
18000hrs
55℃
85℃
105℃


Chromaticity Shift(Δu'v')
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0hr
1000hrs
2000hrs
3000hrs
4000hrs
5000hrs
6000hrs
7000hrs
8000hrs
9000hrs
10000hrs
11000hrs
12000hrs
13000hrs
14000hrs
15000hrs
16000hrs
17000hrs
18000hrs
55℃
85℃
105℃

3. Test Data

3.1 Data Set 1, 55° C,150mA (Lumen Maintenance)

Sample Number	Φ(lm)	Lumen Maintenance (%)																	
	0hr (Initial)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	11000 hrs	12000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S1	117.60	100.03	99.84	99.64	99.48	99.30	99.12	98.94	98.82	98.65	98.47	98.29	98.10	97.96	97.80	97.66	97.53	97.40	97.21
S2	120.30	100.07	99.88	99.68	99.51	99.31	99.13	99.01	98.89	98.77	98.59	98.40	98.22	98.08	97.92	97.71	97.58	97.39	97.21
S3	117.30	100.06	99.86	99.66	99.49	99.29	99.13	98.95	98.77	98.65	98.47	98.29	98.11	97.94	97.80	97.64	97.45	97.27	97.08
S4	117.20	100.04	99.85	99.65	99.49	99.29	99.11	98.94	98.77	98.59	98.41	98.23	98.05	97.89	97.75	97.61	97.42	97.24	97.11
S5	120.00	100.05	99.85	99.65	99.45	99.28	99.08	98.91	98.79	98.62	98.44	98.26	98.08	97.93	97.73	97.59	97.40	97.27	97.09
S6	117.70	100.04	99.85	99.64	99.45	99.27	99.07	98.90	98.72	98.59	98.46	98.28	98.14	97.98	97.77	97.63	97.50	97.31	97.12
S7	117.80	100.06	99.87	99.67	99.51	99.34	99.17	98.99	98.81	98.64	98.46	98.27	98.09	97.95	97.81	97.65	97.46	97.27	97.08
S8	120.00	100.06	99.85	99.65	99.47	99.31	99.13	99.01	98.89	98.71	98.53	98.34	98.21	98.07	97.90	97.70	97.57	97.38	97.25
S9	117.00	100.06	99.86	99.67	99.49	99.32	99.12	98.94	98.76	98.59	98.41	98.23	98.04	97.90	97.69	97.55	97.43	97.24	97.05
S10	120.10	100.08	99.88	99.68	99.51	99.35	99.17	99.05	98.87	98.69	98.56	98.42	98.24	98.03	97.89	97.75	97.62	97.44	97.25
S11	118.10	100.07	99.87	99.67	99.47	99.28	99.10	98.92	98.75	98.58	98.40	98.26	98.08	97.87	97.71	97.55	97.42	97.23	97.04
S12	120.60	100.06	99.87	99.66	99.47	99.27	99.10	98.93	98.81	98.64	98.46	98.28	98.14	97.98	97.77	97.56	97.44	97.25	97.07
S13	117.70	100.03	99.84	99.63	99.46	99.26	99.07	98.89	98.71	98.54	98.35	98.17	97.99	97.84	97.64	97.47	97.29	97.10	96.91
S14	117.50	100.04	99.85	99.64	99.48	99.30	99.13	98.95	98.77	98.64	98.46	98.28	98.10	97.90	97.76	97.61	97.43	97.24	97.05
S15	117.80	100.06	99.86	99.66	99.49	99.33	99.16	98.99	98.87	98.70	98.52	98.34	98.16	97.95	97.74	97.60	97.42	97.29	97.16
S16	120.80	100.04	99.83	99.63	99.47	99.29	99.12	98.94	98.76	98.64	98.51	98.37	98.19	97.98	97.84	97.68	97.55	97.37	97.24
S17	118.30	100.08	99.88	99.68	99.51	99.34	99.17	99.00	98.88	98.76	98.58	98.39	98.26	98.12	97.95	97.79	97.66	97.47	97.29
S18	120.50	100.08	99.88	99.68	99.49	99.29	99.12	98.94	98.82	98.70	98.52	98.34	98.16	97.99	97.85	97.71	97.52	97.34	97.21
S19	117.60	100.05	99.85	99.66	99.48	99.30	99.11	98.94	98.76	98.59	98.45	98.31	98.13	97.92	97.76	97.60	97.47	97.28	97.10
S20	117.90	100.05	99.85	99.65	99.48	99.28	99.12	98.95	98.77	98.60	98.46	98.28	98.14	98.00	97.79	97.59	97.40	97.21	97.08
S21	118.10	100.06	99.86	99.67	99.49	99.32	99.13	98.95	98.78	98.66	98.52	98.34	98.16	97.99	97.79	97.62	97.44	97.26	97.07
S22	115.70	100.04	99.85	99.65	99.48	99.31	99.14	99.02	98.90	98.73	98.55	98.37	98.23	98.09	97.95	97.74	97.61	97.48	97.36
S23	115.30	100.06	99.87	99.66	99.49	99.31	99.15	99.03	98.85	98.73	98.60	98.42	98.24	98.07	97.91	97.70	97.52	97.33	97.20
S24	117.70	100.07	99.88	99.67	99.48	99.28	99.10	98.93	98.76	98.58	98.40	98.22	98.08	97.92	97.71	97.50	97.38	97.25	97.06
S25	115.50	100.03	99.83	99.63	99.46	99.29	99.11	98.93	98.81	98.63	98.50	98.32	98.13	97.99	97.78	97.64	97.46	97.27	97.08
Ave.	118.16	100.06	99.86	99.66	99.48	99.30	99.12	98.96	98.80	98.65	98.48	98.31	98.14	97.97	97.80	97.63	97.48	97.30	97.14
Med.	117.80	100.06	99.86	99.66	99.48	99.30	99.12	98.94	98.79	98.64	98.47	98.29	98.14	97.98	97.79	97.63	97.46	97.27	97.10
St dev	1.5795	0.0149	0.0158	0.0159	0.0176	0.0234	0.0280	0.0427	0.0560	0.0617	0.0635	0.0654	0.0689	0.0717	0.0831	0.0768	0.0874	0.0889	0.0987
Min.	115.30	100.03	99.83	99.63	99.45	99.26	99.07	98.89	98.71	98.54	98.35	98.17	97.99	97.84	97.64	97.47	97.29	97.10	96.91
Max.	120.80	100.08	99.88	99.68	99.51	99.35	99.17	99.05	98.90	98.77	98.60	98.42	98.26	98.12	97.95	97.79	97.66	97.48	97.36

3.2 Data Set 1, 55° C,150mA (Forward Voltage)

Sample Number	Forward Voltage(V)																		
	0hr (Initial)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	11000 hrs	12000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S1	6.217	6.211	6.232	6.242	6.210	6.232	6.214	6.206	6.221	6.232	6.200	6.200	6.210	6.224	6.211	6.208	6.210	6.200	6.236
S2	6.186	6.205	6.181	6.181	6.211	6.177	6.177	6.169	6.169	6.169	6.207	6.182	6.169	6.169	6.182	6.182	6.211	6.205	6.182
S3	6.221	6.236	6.210	6.215	6.236	6.240	6.204	6.210	6.204	6.228	6.240	6.225	6.246	6.246	6.216	6.215	6.246	6.218	6.216
S4	6.228	6.222	6.223	6.223	6.243	6.249	6.219	6.225	6.235	6.219	6.223	6.219	6.222	6.232	6.211	6.222	6.243	6.247	6.235
S5	6.221	6.212	6.212	6.215	6.216	6.210	6.210	6.236	6.217	6.204	6.212	6.246	6.212	6.204	6.236	6.236	6.240	6.217	6.214
S6	6.212	6.216	6.208	6.205	6.227	6.195	6.203	6.203	6.233	6.237	6.206	6.216	6.203	6.195	6.201	6.231	6.208	6.203	6.208
S7	6.216	6.209	6.209	6.199	6.207	6.231	6.199	6.212	6.241	6.210	6.211	6.223	6.220	6.199	6.209	6.237	6.220	6.231	6.211
S8	6.215	6.198	6.198	6.210	6.198	6.210	6.219	6.234	6.230	6.209	6.209	6.198	6.240	6.209	6.204	6.208	6.204	6.236	6.208
S9	6.231	6.227	6.235	6.235	6.250	6.225	6.256	6.227	6.250	6.224	6.225	6.214	6.238	6.227	6.235	6.214	6.225	6.246	6.227
S10	6.229	6.224	6.220	6.212	6.226	6.226	6.248	6.222	6.212	6.233	6.250	6.212	6.225	6.220	6.248	6.223	6.220	6.233	6.212
S11	6.308	6.291	6.299	6.299	6.303	6.291	6.312	6.327	6.305	6.299	6.297	6.333	6.291	6.297	6.305	6.327	6.312	6.291	6.333
S12	6.278	6.275	6.269	6.275	6.303	6.297	6.299	6.267	6.273	6.273	6.272	6.297	6.273	6.275	6.282	6.285	6.303	6.285	6.274
S13	6.313	6.309	6.296	6.296	6.320	6.328	6.304	6.317	6.306	6.296	6.306	6.309	6.320	6.302	6.296	6.304	6.302	6.304	6.309
S14	6.319	6.338	6.308	6.323	6.326	6.312	6.308	6.312	6.323	6.308	6.310	6.340	6.344	6.314	6.302	6.326	6.340	6.302	6.302
S15	6.313	6.320	6.334	6.338	6.332	6.307	6.328	6.307	6.304	6.310	6.310	6.302	6.304	6.320	6.320	6.307	6.307	6.338	6.304
S16	6.305	6.330	6.301	6.330	6.298	6.330	6.296	6.296	6.309	6.301	6.300	6.300	6.326	6.298	6.299	6.330	6.301	6.320	6.299
S17	6.310	6.301	6.304	6.304	6.307	6.304	6.301	6.307	6.303	6.301	6.301	6.301	6.307	6.317	6.305	6.314	6.314	6.301	6.305
S18	6.308	6.329	6.291	6.297	6.327	6.303	6.329	6.303	6.291	6.329	6.299	6.305	6.301	6.291	6.305	6.302	6.291	6.329	6.303
S19	6.324	6.315	6.328	6.317	6.343	6.318	6.343	6.315	6.345	6.328	6.328	6.345	6.345	6.328	6.343	6.317	6.320	6.319	6.349
S20	6.322	6.317	6.318	6.329	6.347	6.315	6.337	6.316	6.313	6.329	6.311	6.305	6.347	6.329	6.326	6.337	6.341	6.313	6.329
S21	6.176	6.167	6.165	6.191	6.159	6.173	6.167	6.165	6.180	6.165	6.191	6.169	6.195	6.173	6.197	6.172	6.171	6.197	6.165
S22	6.145	6.136	6.128	6.128	6.128	6.170	6.164	6.164	6.142	6.136	6.166	6.170	6.136	6.149	6.134	6.136	6.136	6.152	6.166
S23	6.179	6.162	6.168	6.175	6.172	6.162	6.174	6.173	6.168	6.183	6.200	6.168	6.204	6.172	6.200	6.183	6.204	6.172	6.170
S24	6.186	6.205	6.211	6.201	6.177	6.179	6.207	6.207	6.175	6.182	6.190	6.169	6.175	6.193	6.183	6.181	6.169	6.179	6.190
S25	6.179	6.183	6.176	6.162	6.170	6.194	6.200	6.170	6.204	6.198	6.186	6.170	6.194	6.162	6.198	6.175	6.174	6.194	6.183
Ave.	6.246	6.246	6.241	6.244	6.250	6.247	6.249	6.244	6.246	6.244	6.246	6.245	6.250	6.242	6.246	6.247	6.248	6.249	6.245
Med.	6.228	6.224	6.223	6.223	6.236	6.232	6.219	6.227	6.235	6.232	6.225	6.223	6.238	6.227	6.235	6.231	6.240	6.236	6.227
St dev	0.0576	0.0608	0.0588	0.0612	0.0658	0.0576	0.0604	0.0572	0.0575	0.0584	0.0512	0.0617	0.0613	0.0596	0.0570	0.0617	0.0597	0.0559	0.0591
Min.	6.145	6.136	6.128	6.128	6.128	6.162	6.164	6.164	6.142	6.136	6.166	6.168	6.136	6.149	6.134	6.136	6.136	6.152	6.165
Max.	6.324	6.338	6.334	6.338	6.347	6.330	6.343	6.327	6.345	6.329	6.328	6.345	6.347	6.329	6.343	6.337	6.341	6.338	6.349

3.3 Data Set 1, 55° C,150mA (Chromaticity Shift)

Sample Number	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')																
	0hr (Initial)			1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	12000 hrs	18000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S1	0.2607	0.5319	2719	0.0001	0.0002	0.0003	0.0005	0.0006	0.0009	0.0012	0.0014	0.0016	0.0018	0.0019	0.0020	0.0022	0.0025	0.0027	0.0029	0.0030	0.0032
S2	0.2609	0.5319	2715	0.0001	0.0002	0.0005	0.0007	0.0008	0.0011	0.0012	0.0015	0.0017	0.0018	0.0020	0.0021	0.0024	0.0027	0.0028	0.0031	0.0032	0.0034
S3	0.2610	0.5324	2710	0.0002	0.0003	0.0006	0.0007	0.0008	0.0011	0.0013	0.0015	0.0018	0.0020	0.0021	0.0022	0.0025	0.0027	0.0030	0.0031	0.0032	0.0034
S4	0.2612	0.5326	2706	0.0001	0.0003	0.0005	0.0006	0.0009	0.0010	0.0012	0.0014	0.0017	0.0018	0.0019	0.0021	0.0023	0.0026	0.0028	0.0030	0.0031	0.0033
S5	0.2607	0.5317	2720	0.0001	0.0002	0.0004	0.0005	0.0007	0.0010	0.0013	0.0015	0.0017	0.0018	0.0019	0.0020	0.0023	0.0026	0.0028	0.0029	0.0031	0.0032
S6	0.2617	0.5331	2695	0.0001	0.0002	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015	0.0018	0.0019	0.0020	0.0021	0.0024	0.0026	0.0028	0.0030	0.0031	0.0032
S7	0.2610	0.5333	2706	0.0001	0.0002	0.0004	0.0006	0.0009	0.0011	0.0012	0.0014	0.0017	0.0018	0.0019	0.0020	0.0023	0.0025	0.0028	0.0030	0.0031	0.0033
S8	0.2612	0.5334	2703	0.0001	0.0002	0.0004	0.0006	0.0009	0.0012	0.0015	0.0017	0.0019	0.0020	0.0022	0.0024	0.0027	0.0029	0.0032	0.0033	0.0034	0.0036
S9	0.2607	0.5318	2719	0.0001	0.0003	0.0005	0.0006	0.0007	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0019	0.0022	0.0025	0.0027	0.0028	0.0030	0.0031
S10	0.2614	0.5331	2701	0.0001	0.0002	0.0003	0.0005	0.0007	0.0008	0.0011	0.0012	0.0014	0.0016	0.0018	0.0019	0.0021	0.0024	0.0027	0.0028	0.0029	0.0031
S11	0.2644	0.5305	2649	0.0001	0.0002	0.0003	0.0005	0.0008	0.0010	0.0012	0.0014	0.0017	0.0018	0.0019	0.0021	0.0023	0.0026	0.0029	0.0030	0.0031	0.0032
S12	0.2645	0.5306	2648	0.0001	0.0003	0.0005	0.0008	0.0009	0.0012	0.0014	0.0016	0.0019	0.0020	0.0021	0.0023	0.0026	0.0028	0.0027	0.0032	0.0034	0.0036
S13	0.2645	0.5311	2645	0.0001	0.0003	0.0006	0.0009	0.0010	0.0012	0.0013	0.0015	0.0017	0.0018	0.0020	0.0021	0.0023	0.0026	0.0028	0.0029	0.0030	0.0031
S14	0.2649	0.5313	2638	0.0001	0.0003	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0018	0.0020	0.0022	0.0025	0.0027	0.0029	0.0030	0.0031
S15	0.2645	0.5303	2649	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011	0.0012	0.0015	0.0016	0.0018	0.0020	0.0021	0.0023	0.0026	0.0029	0.0030	0.0031	0.0032
S16	0.2650	0.5318	2634	0.0002	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0020	0.0021	0.0023	0.0025	0.0028	0.0029	0.0030	0.0032
S17	0.2647	0.5320	2639	0.0001	0.0002	0.0005	0.0008	0.0009	0.0012	0.0014	0.0017	0.0018	0.0019	0.0021	0.0022	0.0025	0.0028	0.0030	0.0031	0.0034	0.0035
S18	0.2647	0.5321	2637	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0013	0.0015	0.0016	0.0018	0.0020	0.0022	0.0025	0.0027	0.0029	0.0030	0.0032
S19	0.2643	0.5305	2651	0.0001	0.0003	0.0005	0.0006	0.0007	0.0010	0.0012	0.0014	0.0017	0.0018	0.0020	0.0021	0.0024	0.0026	0.0028	0.0030	0.0031	0.0032
S20	0.2652	0.5318	2630	0.0001	0.0002	0.0004	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018	0.0021	0.0023	0.0026	0.0027	0.0028	0.0029
S21	0.2610	0.5323	2711	0.0001	0.0002	0.0004	0.0007	0.0009	0.0012	0.0015	0.0017	0.0019	0.0020	0.0021	0.0023	0.0025	0.0027	0.0030	0.0031	0.0034	0.0036
S22	0.2615	0.5324	2701	0.0001	0.0002	0.0004	0.0005	0.0006	0.0009	0.0010	0.0012	0.0014	0.0016	0.0017	0.0019	0.0022	0.0024	0.0026	0.0027	0.0028	0.0031
S23	0.2614	0.5329	2700	0.0002	0.0003	0.0006	0.0008	0.0009	0.0012	0.0014	0.0016	0.0019	0.0020	0.0022	0.0023	0.0026	0.0028	0.0027	0.0034	0.0035	0.0036
S24	0.2615	0.5331	2698	0.0001	0.0002	0.0004	0.0006	0.0009	0.0011	0.0014	0.0016	0.0018	0.0020	0.0021	0.0022	0.0025	0.0027	0.0029	0.0030	0.0032	0.0033
S25	0.2612	0.5322	2707	0.0002	0.0005	0.0006	0.0009	0.0012	0.0014	0.0015	0.0017	0.0019	0.0021	0.0023	0.0024	0.0027	0.0029	0.0032	0.0034	0.0035	0.0038
Ave.	0.2626	0.5320	2681	0.0001	0.0003	0.0004	0.0006	0.0008	0.0010	0.0012	0.0015	0.0017	0.0018	0.0020	0.0021	0.0024	0.0026	0.0028	0.0030	0.0031	0.0033
Med.	0.2615	0.5320	2700	0.0001	0.0002	0.0005	0.0006	0.0009	0.0011	0.0012	0.0015	0.0017	0.0018	0.0020	0.0021	0.0023	0.0026	0.0028	0.0030	0.0031	0.0032
St dev	0.0018	0.0009	33.5737	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2607	0.5303	2630	0.0001	0.0002	0.0003	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018	0.0021	0.0023	0.0026	0.0027	0.0028	0.0029
Max.	0.2652	0.5334	2720	0.0002	0.0005	0.0006	0.0009	0.0012	0.0014	0.0015	0.0017	0.0019	0.0021	0.0023	0.0024	0.0027	0.0029	0.0032	0.0034	0.0035	0.0038

3.4 Data Set 2, 85° C,150mA (Lumen Maintenance)

Sample Number	Φ(lm)	Lumen Maintenance (%)																	
	0hr (Initial)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	11000 hrs	12000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S26	117.30	100.03	99.80	99.57	99.37	99.14	98.91	98.69	98.47	98.26	98.07	97.85	97.64	97.45	97.26	97.07	96.88	96.70	96.54
S27	119.70	100.01	99.80	99.57	99.38	99.19	98.99	98.83	98.61	98.45	98.26	98.04	97.83	97.66	97.50	97.35	97.16	96.96	96.80
S28	116.60	100.00	99.77	99.54	99.36	99.13	98.93	98.76	98.54	98.33	98.10	97.88	97.69	97.52	97.33	97.18	96.99	96.79	96.63
S29	118.80	100.03	99.80	99.57	99.37	99.18	98.99	98.82	98.66	98.44	98.22	97.99	97.77	97.61	97.43	97.26	97.10	96.89	96.74
S30	116.60	100.01	99.78	99.55	99.32	99.13	98.90	98.68	98.47	98.25	98.06	97.84	97.61	97.46	97.31	97.14	96.95	96.79	96.59
S31	117.10	100.01	99.78	99.55	99.36	99.13	98.90	98.69	98.47	98.25	98.02	97.81	97.59	97.43	97.28	97.11	96.91	96.72	96.53
S32	117.20	100.01	99.78	99.56	99.34	99.15	98.95	98.73	98.52	98.30	98.09	97.89	97.66	97.47	97.28	97.13	96.94	96.74	96.53
S33	119.30	100.03	99.81	99.59	99.36	99.18	98.99	98.82	98.66	98.44	98.24	98.03	97.80	97.65	97.46	97.27	97.09	96.88	96.68
S34	116.60	100.05	99.82	99.59	99.39	99.20	99.00	98.78	98.62	98.40	98.22	97.99	97.81	97.64	97.45	97.26	97.10	96.90	96.71
S35	116.90	100.05	99.83	99.60	99.41	99.21	99.02	98.80	98.58	98.36	98.15	97.93	97.74	97.57	97.38	97.19	97.04	96.85	96.66
S36	119.70	100.03	99.80	99.57	99.37	99.18	98.95	98.73	98.57	98.35	98.17	97.94	97.74	97.55	97.38	97.21	97.05	96.85	96.64
S37	117.20	100.02	99.79	99.57	99.34	99.15	98.92	98.70	98.54	98.32	98.14	97.91	97.68	97.50	97.33	97.17	96.98	96.79	96.61
S38	116.60	100.00	99.78	99.57	99.34	99.15	98.92	98.76	98.54	98.37	98.15	97.96	97.76	97.57	97.40	97.23	97.02	96.82	96.66
S39	116.30	100.00	99.79	99.56	99.37	99.17	98.97	98.75	98.59	98.43	98.22	98.01	97.80	97.65	97.46	97.27	97.12	96.91	96.71
S40	116.60	100.04	99.83	99.61	99.42	99.22	99.00	98.83	98.61	98.45	98.24	98.06	97.83	97.64	97.49	97.33	97.18	96.97	96.78
S41	119.90	100.03	99.80	99.58	99.39	99.16	98.93	98.71	98.49	98.27	98.09	97.90	97.72	97.55	97.39	97.20	97.00	96.80	96.61
S42	117.60	100.04	99.81	99.59	99.40	99.17	98.95	98.73	98.51	98.29	98.06	97.84	97.65	97.48	97.31	97.16	97.00	96.81	96.66
S43	119.70	100.04	99.81	99.59	99.41	99.18	98.95	98.79	98.62	98.46	98.27	98.05	97.82	97.67	97.48	97.32	97.14	96.95	96.79
S44	117.10	100.03	99.81	99.59	99.41	99.21	99.01	98.79	98.57	98.35	98.17	97.96	97.74	97.57	97.39	97.22	97.02	96.86	96.71
S45	117.30	100.00	99.77	99.55	99.36	99.13	98.90	98.68	98.46	98.24	98.06	97.83	97.61	97.42	97.26	97.08	96.87	96.68	96.48
S46	120.30	100.02	99.80	99.58	99.40	99.17	98.97	98.75	98.59	98.37	98.16	97.98	97.75	97.58	97.43	97.24	97.08	96.89	96.69
S47	118.00	100.04	99.82	99.61	99.42	99.19	99.00	98.84	98.68	98.46	98.23	98.04	97.86	97.67	97.48	97.33	97.14	96.98	96.78
S48	117.60	100.03	99.81	99.59	99.40	99.21	99.02	98.81	98.64	98.42	98.21	97.99	97.76	97.59	97.44	97.27	97.07	96.86	96.66
S49	119.80	100.04	99.82	99.60	99.37	99.14	98.95	98.79	98.57	98.36	98.17	97.95	97.72	97.57	97.41	97.24	97.05	96.90	96.71
S50	117.70	100.02	99.80	99.57	99.39	99.20	99.01	98.80	98.58	98.36	98.13	97.93	97.70	97.51	97.34	97.19	97.00	96.81	96.65
Ave.	117.90	100.02	99.80	99.58	99.38	99.17	98.96	98.76	98.57	98.36	98.16	97.94	97.73	97.56	97.39	97.22	97.03	96.84	96.66
Med.	117.30	100.03	99.80	99.57	99.37	99.17	98.95	98.76	98.57	98.36	98.16	97.95	97.74	97.57	97.39	97.22	97.04	96.85	96.66
St dev	1.3083	0.0146	0.0168	0.0193	0.0276	0.0292	0.0399	0.0513	0.0644	0.0726	0.0719	0.0748	0.0758	0.0782	0.0755	0.0774	0.0839	0.0830	0.0854
Min.	116.30	100.00	99.77	99.54	99.32	99.13	98.90	98.68	98.46	98.24	98.02	97.81	97.59	97.42	97.26	97.07	96.87	96.68	96.48
Max.	120.30	100.05	99.83	99.61	99.42	99.22	99.02	98.84	98.68	98.46	98.27	98.06	97.86	97.67	97.50	97.35	97.18	96.98	96.80

3.5 Data Set 2, 85° C,150mA (Forward Voltage)

Sample Number	Forward Voltage(V)																		
	0hr (Initial)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	11000 hrs	12000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S26	6.174	6.156	6.156	6.182	6.182	6.150	6.186	6.171	6.171	6.151	6.186	6.150	6.181	6.179	6.143	6.158	6.156	6.171	6.193
S27	6.176	6.184	6.152	6.183	6.143	6.143	6.180	6.152	6.188	6.152	6.184	6.153	6.144	6.183	6.173	6.152	6.153	6.180	6.188
S28	6.173	6.178	6.181	6.140	6.181	6.157	6.192	6.149	6.185	6.177	6.178	6.170	6.181	6.142	6.142	6.157	6.141	6.177	6.181
S29	6.190	6.166	6.197	6.202	6.198	6.166	6.197	6.209	6.157	6.159	6.198	6.202	6.194	6.198	6.187	6.194	6.166	6.194	6.174
S30	6.187	6.171	6.156	6.156	6.192	6.164	6.155	6.191	6.195	6.195	6.155	6.169	6.199	6.156	6.163	6.195	6.192	6.163	6.195
S31	6.267	6.251	6.274	6.279	6.243	6.236	6.274	6.244	6.249	6.244	6.234	6.272	6.275	6.236	6.275	6.243	6.243	6.272	6.244
S32	6.235	6.203	6.240	6.204	6.203	6.243	6.204	6.202	6.219	6.232	6.212	6.203	6.219	6.202	6.202	6.212	6.204	6.204	6.211
S33	6.268	6.280	6.273	6.287	6.244	6.265	6.252	6.273	6.245	6.250	6.275	6.273	6.276	6.272	6.280	6.244	6.244	6.244	6.244
S34	6.274	6.281	6.250	6.286	6.256	6.251	6.243	6.278	6.286	6.278	6.241	6.282	6.241	6.251	6.278	6.282	6.286	6.279	6.282
S35	6.266	6.274	6.263	6.242	6.248	6.250	6.270	6.285	6.285	6.274	6.242	6.233	6.274	6.271	6.242	6.273	6.270	6.233	6.243
S36	6.257	6.264	6.233	6.224	6.233	6.269	6.276	6.261	6.269	6.265	6.264	6.262	6.265	6.261	6.265	6.226	6.225	6.276	6.239
S37	6.260	6.228	6.265	6.268	6.265	6.279	6.242	6.228	6.228	6.237	6.236	6.268	6.228	6.242	6.244	6.229	6.267	6.242	6.242
S38	6.256	6.223	6.240	6.264	6.233	6.238	6.261	6.225	6.240	6.261	6.261	6.223	6.233	6.224	6.238	6.264	6.268	6.268	6.260
S39	6.272	6.280	6.279	6.256	6.269	6.256	6.248	6.280	6.241	6.239	6.276	6.254	6.280	6.248	6.280	6.284	6.241	6.241	6.284
S40	6.269	6.236	6.251	6.277	6.281	6.277	6.281	6.288	6.266	6.277	6.274	6.288	6.276	6.245	6.266	6.236	6.266	6.238	6.281
S41	6.234	6.210	6.218	6.201	6.241	6.203	6.218	6.210	6.202	6.210	6.241	6.253	6.203	6.231	6.231	6.203	6.210	6.242	6.216
S42	6.204	6.211	6.216	6.172	6.172	6.181	6.181	6.212	6.173	6.209	6.171	6.208	6.212	6.171	6.181	6.208	6.208	6.172	6.223
S43	6.239	6.258	6.223	6.207	6.208	6.208	6.246	6.251	6.247	6.243	6.208	6.221	6.247	6.215	6.215	6.246	6.221	6.223	6.243
S44	6.246	6.250	6.214	6.253	6.254	6.243	6.254	6.253	6.214	6.265	6.265	6.258	6.214	6.251	6.258	6.258	6.228	6.250	6.254
S45	6.239	6.243	6.208	6.208	6.243	6.208	6.244	6.247	6.247	6.215	6.208	6.247	6.244	6.206	6.208	6.243	6.247	6.243	6.251
S46	6.231	6.215	6.243	6.235	6.236	6.200	6.239	6.239	6.239	6.213	6.239	6.239	6.198	6.228	6.250	6.207	6.213	6.236	6.207
S47	6.239	6.223	6.206	6.216	6.223	6.246	6.207	6.206	6.223	6.223	6.221	6.247	6.208	6.244	6.215	6.221	6.236	6.216	6.215
S48	6.237	6.205	6.245	6.214	6.244	6.205	6.245	6.242	6.205	6.206	6.206	6.241	6.242	6.213	6.206	6.241	6.241	6.249	6.206
S49	6.254	6.273	6.223	6.259	6.238	6.251	6.251	6.231	6.222	6.259	6.251	6.230	6.258	6.258	6.222	6.273	6.222	6.258	6.230
S50	6.252	6.229	6.249	6.220	6.220	6.260	6.221	6.260	6.228	6.220	6.229	6.257	6.234	6.259	6.257	6.271	6.221	6.221	6.249
Ave.	6.236	6.228	6.226	6.225	6.226	6.222	6.231	6.232	6.225	6.226	6.226	6.232	6.229	6.223	6.225	6.229	6.223	6.228	6.230
Med.	6.239	6.228	6.233	6.220	6.236	6.238	6.243	6.239	6.228	6.232	6.234	6.241	6.233	6.231	6.231	6.236	6.225	6.238	6.239
St dev	0.0328	0.0379	0.0366	0.0413	0.0336	0.0423	0.0345	0.0392	0.0347	0.0380	0.0347	0.0395	0.0359	0.0362	0.0426	0.0383	0.0385	0.0347	0.0312
Min.	6.173	6.156	6.152	6.140	6.143	6.143	6.155	6.149	6.157	6.151	6.155	6.150	6.144	6.142	6.142	6.152	6.141	6.163	6.174
Max.	6.274	6.281	6.279	6.287	6.281	6.279	6.281	6.288	6.286	6.278	6.276	6.288	6.280	6.272	6.280	6.284	6.286	6.279	6.284

3.6 Data Set 2, 85° C,150mA (Chromaticity Shift)

Sample Number	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')																
	0hr (Initial)			1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	12000 hrs	18000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S26	0.2621	0.5336	2684	0.0003	0.0006	0.0008	0.0010	0.0011	0.0013	0.0016	0.0018	0.0020	0.0023	0.0024	0.0026	0.0027	0.0029	0.0031	0.0033	0.0035	0.0037
S27	0.2613	0.5338	2700	0.0003	0.0006	0.0009	0.0011	0.0012	0.0014	0.0016	0.0017	0.0020	0.0023	0.0024	0.0026	0.0028	0.0030	0.0032	0.0033	0.0035	0.0038
S28	0.2618	0.5340	2689	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0012	0.0015	0.0018	0.0019	0.0022	0.0025	0.0026	0.0028	0.0030	0.0031	0.0034	0.0036
S29	0.2610	0.5323	2712	0.0003	0.0004	0.0007	0.0009	0.0010	0.0012	0.0015	0.0016	0.0019	0.0021	0.0024	0.0026	0.0028	0.0030	0.0032	0.0034	0.0037	0.0039
S30	0.2620	0.5336	2686	0.0002	0.0003	0.0006	0.0008	0.0009	0.0011	0.0014	0.0016	0.0018	0.0019	0.0021	0.0022	0.0024	0.0025	0.0027	0.0028	0.0031	0.0034
S31	0.2636	0.5337	2653	0.0001	0.0003	0.0006	0.0007	0.0009	0.0011	0.0012	0.0015	0.0017	0.0018	0.0020	0.0023	0.0025	0.0027	0.0029	0.0030	0.0032	0.0034
S32	0.2641	0.5338	2644	0.0001	0.0004	0.0005	0.0007	0.0009	0.0010	0.0013	0.0016	0.0019	0.0022	0.0023	0.0026	0.0028	0.0029	0.0032	0.0033	0.0035	0.0038
S33	0.2638	0.5342	2649	0.0002	0.0005	0.0006	0.0007	0.0009	0.0011	0.0014	0.0017	0.0019	0.0022	0.0025	0.0027	0.0029	0.0031	0.0033	0.0034	0.0035	0.0038
S34	0.2642	0.5345	2640	0.0002	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0014	0.0017	0.0018	0.0020	0.0023	0.0024	0.0026	0.0028	0.0030	0.0033	0.0034
S35	0.2638	0.5335	2650	0.0003	0.0004	0.0007	0.0009	0.0010	0.0012	0.0014	0.0016	0.0018	0.0021	0.0022	0.0024	0.0026	0.0028	0.0030	0.0033	0.0035	0.0036
S36	0.2643	0.5349	2636	0.0002	0.0005	0.0006	0.0007	0.0009	0.0010	0.0013	0.0014	0.0017	0.0019	0.0022	0.0023	0.0025	0.0027	0.0028	0.0031	0.0034	0.0035
S37	0.2640	0.5351	2640	0.0001	0.0004	0.0005	0.0007	0.0009	0.0010	0.0013	0.0015	0.0017	0.0018	0.0020	0.0021	0.0023	0.0025	0.0027	0.0028	0.0031	0.0034
S38	0.2643	0.5353	2634	0.0001	0.0003	0.0005	0.0007	0.0008	0.0010	0.0011	0.0013	0.0016	0.0018	0.0020	0.0021	0.0024	0.0025	0.0027	0.0028	0.0030	0.0032
S39	0.2637	0.5337	2653	0.0002	0.0003	0.0006	0.0008	0.0010	0.0011	0.0013	0.0016	0.0019	0.0022	0.0023	0.0026	0.0028	0.0029	0.0031	0.0034	0.0035	0.0037
S40	0.2645	0.5349	2633	0.0001	0.0003	0.0005	0.0006	0.0008	0.0010	0.0013	0.0015	0.0017	0.0018	0.0021	0.0022	0.0025	0.0027	0.0029	0.0032	0.0034	0.0036
S41	0.2629	0.5319	2674	0.0001	0.0002	0.0004	0.0006	0.0007	0.0009	0.0012	0.0014	0.0015	0.0017	0.0020	0.0021	0.0023	0.0025	0.0027	0.0030	0.0032	0.0034
S42	0.2635	0.5320	2663	0.0001	0.0004	0.0006	0.0008	0.0009	0.0011	0.0014	0.0015	0.0018	0.0020	0.0023	0.0024	0.0026	0.0027	0.0029	0.0030	0.0031	0.0034
S43	0.2631	0.5324	2668	0.0002	0.0005	0.0008	0.0009	0.0011	0.0012	0.0015	0.0017	0.0018	0.0021	0.0023	0.0024	0.0026	0.0028	0.0030	0.0031	0.0033	0.0034
S44	0.2635	0.5326	2660	0.0002	0.0005	0.0008	0.0009	0.0011	0.0013	0.0015	0.0018	0.0021	0.0022	0.0024	0.0026	0.0029	0.0031	0.0033	0.0034	0.0036	0.0038
S45	0.2632	0.5317	2669	0.0002	0.0005	0.0007	0.0008	0.0010	0.0011	0.0013	0.0014	0.0017	0.0019	0.0020	0.0023	0.0025	0.0027	0.0028	0.0031	0.0034	0.0036
S46	0.2637	0.5331	2653	0.0001	0.0004	0.0007	0.0008	0.0010	0.0012	0.0014	0.0017	0.0019	0.0022	0.0024	0.0026	0.0027	0.0030	0.0032	0.0034	0.0037	0.0038
S47	0.2634	0.5334	2659	0.0001	0.0002	0.0005	0.0007	0.0008	0.0010	0.0012	0.0013	0.0016	0.0018	0.0020	0.0023	0.0025	0.0027	0.0029	0.0032	0.0033	0.0036
S48	0.2637	0.5336	2652	0.0003	0.0004	0.0005	0.0007	0.0009	0.0011	0.0013	0.0016	0.0017	0.0019	0.0020	0.0022	0.0024	0.0026	0.0028	0.0031	0.0034	0.0037
S49	0.2629	0.5319	2675	0.0003	0.0006	0.0009	0.0010	0.0012	0.0013	0.0016	0.0019	0.0022	0.0024	0.0026	0.0028	0.0029	0.0032	0.0034	0.0037	0.0038	0.0040
S50	0.2638	0.5332	2651	0.0001	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0014	0.0017	0.0019	0.0020	0.0022	0.0024	0.0025	0.0027	0.0030	0.0033	0.0035
Ave.	0.2633	0.5335	2661	0.0002	0.0004	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0018	0.0020	0.0022	0.0024	0.0026	0.0028	0.0030	0.0032	0.0034	0.0036
Med.	0.2636	0.5336	2653	0.0002	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0024	0.0026	0.0027	0.0029	0.0031	0.0034	0.0036
St dev	0.0010	0.0010	20.9104	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2610	0.5317	2633	0.0001	0.0002	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0015	0.0017	0.0020	0.0021	0.0023	0.0025	0.0027	0.0028	0.0030	0.0032
Max.	0.2645	0.5353	2712	0.0003	0.0006	0.0009	0.0011	0.0012	0.0014	0.0016	0.0019	0.0022	0.0024	0.0026	0.0028	0.0029	0.0032	0.0034	0.0037	0.0038	0.0040

3.7 Data Set 3, 105° C,150mA (Lumen Maintenance)

Sample Number	Φ(lm)	Lumen Maintenance (%)																	
	0hr (Initial)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	11000 hrs	12000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S51	120.10	100.02	99.81	99.54	99.27	99.07	98.80	98.62	98.44	98.27	97.99	97.85	97.58	97.38	97.13	96.87	96.71	96.55	96.33
S52	119.10	99.96	99.74	99.53	99.26	98.99	98.72	98.51	98.34	98.16	97.88	97.60	97.33	97.16	96.97	96.81	96.58	96.36	96.14
S53	120.70	100.01	99.74	99.47	99.27	99.00	98.73	98.52	98.35	98.14	97.86	97.58	97.30	97.05	96.89	96.63	96.47	96.25	96.09
S54	117.90	100.02	99.80	99.53	99.26	99.06	98.86	98.68	98.51	98.33	98.06	97.79	97.51	97.34	97.09	96.83	96.67	96.44	96.21
S55	120.80	99.99	99.78	99.56	99.36	99.15	98.95	98.78	98.60	98.39	98.11	97.97	97.69	97.44	97.25	97.08	96.86	96.63	96.47
S56	118.50	99.95	99.68	99.47	99.27	99.00	98.78	98.58	98.40	98.22	98.08	97.81	97.67	97.41	97.25	97.06	96.90	96.67	96.44
S57	121.20	99.97	99.76	99.49	99.22	99.02	98.75	98.57	98.36	98.19	97.91	97.63	97.35	97.09	96.84	96.65	96.49	96.32	96.09
S58	118.10	99.98	99.77	99.56	99.34	99.07	98.86	98.68	98.51	98.30	98.16	97.89	97.75	97.59	97.43	97.17	96.95	96.73	96.50
S59	117.80	99.97	99.70	99.48	99.28	99.07	98.80	98.62	98.45	98.27	98.00	97.86	97.72	97.53	97.37	97.18	97.02	96.86	96.69
S60	120.70	99.95	99.68	99.47	99.26	98.99	98.72	98.51	98.33	98.16	97.88	97.74	97.47	97.21	97.02	96.86	96.70	96.48	96.26
S61	118.00	100.02	99.81	99.60	99.39	99.12	98.92	98.74	98.56	98.35	98.21	98.08	97.94	97.78	97.62	97.36	97.20	96.97	96.74
S62	120.80	100.03	99.82	99.60	99.39	99.19	98.98	98.80	98.60	98.42	98.28	98.01	97.73	97.47	97.31	97.12	96.89	96.73	96.56
S63	118.30	99.99	99.77	99.56	99.35	99.15	98.95	98.77	98.56	98.38	98.11	97.84	97.56	97.36	97.20	96.95	96.78	96.55	96.33
S64	120.40	99.98	99.71	99.44	99.23	99.03	98.76	98.59	98.41	98.21	97.92	97.64	97.36	97.17	96.91	96.66	96.43	96.21	95.98
S65	117.80	99.96	99.69	99.47	99.20	98.99	98.72	98.55	98.34	98.16	97.89	97.61	97.47	97.28	97.09	96.83	96.61	96.45	96.23
S66	118.00	100.01	99.74	99.52	99.32	99.05	98.85	98.64	98.46	98.29	98.01	97.87	97.59	97.33	97.14	96.88	96.72	96.56	96.33
S67	120.60	99.96	99.69	99.47	99.20	98.99	98.79	98.62	98.44	98.23	98.09	97.95	97.82	97.66	97.46	97.21	96.98	96.75	96.58
S68	117.60	99.98	99.71	99.44	99.17	98.90	98.63	98.45	98.24	98.04	97.90	97.63	97.49	97.30	97.13	96.94	96.78	96.56	96.34
S69	117.30	99.96	99.75	99.47	99.21	98.94	98.72	98.52	98.31	98.10	97.82	97.55	97.27	97.02	96.83	96.57	96.41	96.19	96.03
S70	117.70	100.02	99.75	99.53	99.26	98.99	98.73	98.54	98.36	98.18	98.05	97.91	97.77	97.58	97.42	97.16	96.94	96.71	96.49
S71	120.20	99.98	99.70	99.49	99.22	99.01	98.80	98.59	98.38	98.17	97.89	97.62	97.48	97.32	97.16	96.97	96.80	96.57	96.35
S72	117.70	100.00	99.79	99.52	99.25	99.05	98.78	98.57	98.36	98.18	98.04	97.77	97.50	97.34	97.08	96.92	96.70	96.48	96.26
S73	120.00	99.98	99.71	99.49	99.22	99.02	98.75	98.55	98.37	98.19	98.05	97.78	97.50	97.24	97.05	96.80	96.63	96.41	96.18
S74	117.20	99.96	99.74	99.47	99.26	99.05	98.84	98.66	98.45	98.24	97.96	97.69	97.40	97.15	96.89	96.70	96.54	96.32	96.16
S75	117.40	100.00	99.73	99.52	99.31	99.10	98.83	98.65	98.44	98.26	98.13	97.99	97.71	97.54	97.35	97.16	97.00	96.78	96.55
Ave.	118.96	99.99	99.74	99.51	99.27	99.04	98.80	98.61	98.42	98.23	98.01	97.79	97.56	97.35	97.16	96.94	96.75	96.54	96.33
Med.	118.30	99.98	99.74	99.49	99.26	99.03	98.79	98.59	98.41	98.22	98.01	97.79	97.51	97.34	97.13	96.92	96.72	96.55	96.33
St dev	1.3979	0.0255	0.0433	0.0455	0.0598	0.0672	0.0853	0.0914	0.0930	0.0943	0.1202	0.1529	0.1769	0.1939	0.2109	0.2097	0.2055	0.2042	0.2050
Min.	117.20	99.95	99.68	99.44	99.17	98.90	98.63	98.45	98.24	98.04	97.82	97.55	97.27	97.02	96.83	96.57	96.41	96.19	95.98
Max.	121.20	100.03	99.82	99.60	99.39	99.19	98.98	98.80	98.60	98.42	98.28	98.08	97.94	97.78	97.62	97.36	97.20	96.97	96.74

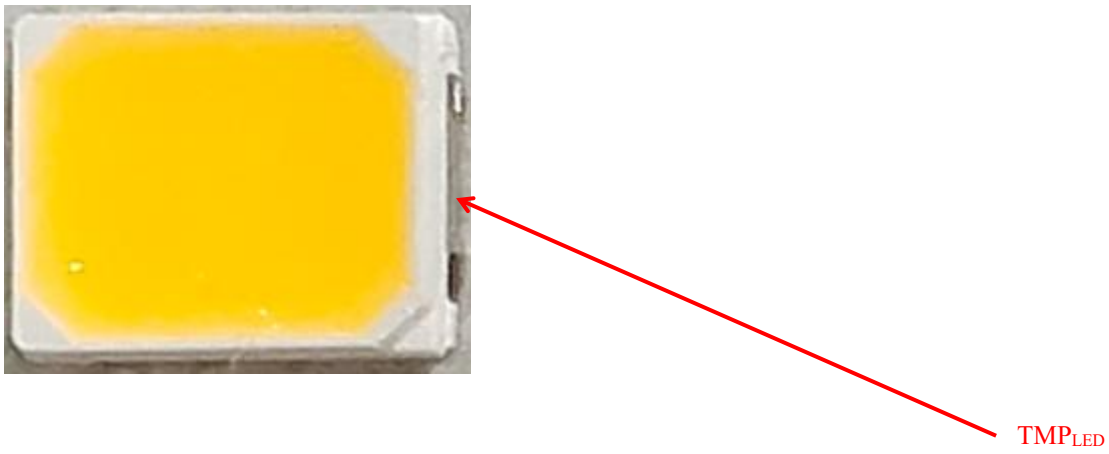
3.8 Data Set 3, 105° C,150mA (Forward Voltage)

Sample Number	Forward Voltage(V)																		
	0hr (Initial)	1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	11000 hrs	12000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S51	6.283	6.255	6.293	6.266	6.237	6.293	6.266	6.255	6.237	6.273	6.273	6.273	6.241	6.242	6.266	6.263	6.279	6.267	6.279
S52	6.253	6.236	6.212	6.211	6.243	6.243	6.238	6.213	6.238	6.233	6.251	6.237	6.233	6.237	6.207	6.207	6.249	6.238	6.211
S53	6.289	6.273	6.279	6.243	6.269	6.269	6.273	6.269	6.299	6.279	6.247	6.243	6.272	6.272	6.273	6.274	6.287	6.269	6.285
S54	6.296	6.294	6.288	6.250	6.286	6.292	6.276	6.256	6.256	6.256	6.299	6.292	6.254	6.306	6.281	6.286	6.256	6.250	6.268
S55	6.289	6.269	6.243	6.261	6.243	6.272	6.249	6.287	6.287	6.273	6.243	6.274	6.247	6.248	6.272	6.299	6.247	6.279	6.279
S56	6.279	6.263	6.259	6.251	6.275	6.238	6.262	6.271	6.239	6.237	6.269	6.262	6.237	6.271	6.264	6.238	6.289	6.277	6.282
S57	6.284	6.269	6.242	6.256	6.269	6.256	6.256	6.242	6.264	6.244	6.294	6.267	6.238	6.294	6.276	6.276	6.269	6.276	6.269
S58	6.282	6.242	6.262	6.285	6.254	6.278	6.265	6.254	6.274	6.242	6.265	6.240	6.267	6.280	6.240	6.285	6.240	6.272	6.267
S59	6.299	6.302	6.309	6.295	6.283	6.271	6.259	6.282	6.302	6.302	6.283	6.295	6.284	6.295	6.271	6.259	6.282	6.259	6.259
S60	6.297	6.300	6.293	6.269	6.293	6.282	6.269	6.300	6.269	6.280	6.280	6.307	6.287	6.307	6.287	6.280	6.251	6.257	6.295
S61	6.311	6.296	6.303	6.295	6.283	6.314	6.301	6.314	6.309	6.295	6.307	6.303	6.294	6.295	6.301	6.269	6.295	6.294	6.303
S62	6.294	6.252	6.284	6.252	6.279	6.266	6.292	6.248	6.252	6.274	6.248	6.277	6.290	6.297	6.248	6.278	6.292	6.277	6.279
S63	6.262	6.242	6.222	6.260	6.222	6.247	6.247	6.252	6.245	6.242	6.216	6.272	6.254	6.242	6.265	6.252	6.265	6.247	6.216
S64	6.298	6.308	6.270	6.281	6.270	6.278	6.301	6.308	6.281	6.296	6.256	6.258	6.281	6.270	6.290	6.308	6.281	6.296	6.257
S65	6.306	6.298	6.304	6.296	6.264	6.260	6.296	6.286	6.290	6.264	6.266	6.289	6.264	6.316	6.291	6.264	6.260	6.309	6.296
S66	6.298	6.288	6.256	6.281	6.294	6.257	6.308	6.294	6.256	6.308	6.290	6.283	6.257	6.294	6.282	6.281	6.282	6.281	6.283
S67	6.296	6.286	6.254	6.254	6.254	6.279	6.254	6.279	6.279	6.256	6.254	6.286	6.294	6.299	6.306	6.294	6.286	6.306	6.280
S68	6.295	6.254	6.278	6.267	6.255	6.291	6.278	6.298	6.280	6.278	6.305	6.279	6.298	6.249	6.254	6.305	6.278	6.267	6.287
S69	6.311	6.296	6.283	6.295	6.301	6.307	6.295	6.294	6.265	6.309	6.265	6.296	6.265	6.296	6.294	6.265	6.269	6.270	6.309
S70	6.309	6.319	6.292	6.312	6.269	6.299	6.305	6.292	6.301	6.319	6.263	6.292	6.289	6.301	6.263	6.267	6.307	6.269	6.312
S71	6.183	6.137	6.173	6.143	6.142	6.181	6.168	6.166	6.163	6.173	6.167	6.173	6.186	6.142	6.142	6.141	6.181	6.166	6.141
S72	6.151	6.147	6.154	6.147	6.136	6.123	6.136	6.154	6.141	6.105	6.111	6.109	6.141	6.134	6.110	6.143	6.134	6.109	6.111
S73	6.185	6.157	6.139	6.144	6.175	6.169	6.177	6.165	6.145	6.183	6.181	6.157	6.188	6.183	6.177	6.143	6.169	6.169	6.165
S74	6.192	6.202	6.151	6.152	6.172	6.184	6.152	6.176	6.184	6.175	6.152	6.146	6.175	6.184	6.146	6.176	6.150	6.188	6.150
S75	6.184	6.164	6.156	6.138	6.142	6.138	6.138	6.167	6.180	6.167	6.180	6.144	6.138	6.169	6.176	6.194	6.156	6.168	6.169
Ave.	6.269	6.254	6.248	6.244	6.244	6.252	6.250	6.253	6.249	6.250	6.247	6.250	6.247	6.257	6.247	6.250	6.250	6.250	6.250
Med.	6.289	6.269	6.262	6.260	6.264	6.269	6.265	6.269	6.264	6.264	6.263	6.273	6.257	6.272	6.266	6.267	6.269	6.269	6.279
St dev	0.0483	0.0531	0.0537	0.0550	0.0506	0.0520	0.0532	0.0502	0.0493	0.0530	0.0510	0.0571	0.0469	0.0540	0.0548	0.0515	0.0502	0.0504	0.0581
Min.	6.151	6.137	6.139	6.138	6.136	6.123	6.136	6.154	6.141	6.105	6.111	6.109	6.138	6.134	6.110	6.141	6.134	6.109	6.111
Max.	6.311	6.319	6.309	6.312	6.301	6.314	6.308	6.314	6.309	6.319	6.307	6.307	6.298	6.316	6.306	6.308	6.307	6.309	6.312

3.9 Data Set 3, 105° C,150mA (Chromaticity Shift)

Sample Number	u'	v'	CCT(K)	Chromaticity Shift (Δu'v')																
	0hr (Initial)			1000 hrs	2000 hrs	3000 hrs	4000 hrs	5000 hrs	6000 hrs	7000 hrs	8000 hrs	9000 hrs	10000 hrs	12000 hrs	18000 hrs	13000 hrs	14000 hrs	15000 hrs	16000 hrs	17000 hrs	18000 hrs
S51		0.5327	2670	0.0003	0.0004	0.0008	0.0012	0.0009	0.0012	0.0015	0.0017	0.0020	0.0021	0.0022	0.0023	0.0026	0.0028	0.0029	0.0030	0.0032	0.0033
S52	0.2632	0.5327	2665	0.0003	0.0005	0.0005	0.0008	0.0010	0.0012	0.0015	0.0017	0.0020	0.0023	0.0026	0.0027	0.0028	0.0031	0.0033	0.0034	0.0036	0.0039
S53	0.2630	0.5331	2668	0.0003	0.0004	0.0005	0.0009	0.0010	0.0013	0.0016	0.0018	0.0020	0.0021	0.0024	0.0025	0.0027	0.0030	0.0032	0.0033	0.0035	0.0038
S54	0.2634	0.5334	2658	0.0003	0.0004	0.0007	0.0009	0.0012	0.0013	0.0016	0.0019	0.0021	0.0022	0.0025	0.0026	0.0028	0.0031	0.0032	0.0034	0.0036	0.0038
S55	0.2629	0.5324	2673	0.0003	0.0005	0.0006	0.0009	0.0012	0.0015	0.0018	0.0021	0.0023	0.0024	0.0027	0.0030	0.0033	0.0035	0.0037	0.0038	0.0040	0.0042
S56	0.2638	0.5338	2649	0.0003	0.0005	0.0007	0.0008	0.0008	0.0010	0.0013	0.0016	0.0019	0.0022	0.0025	0.0027	0.0029	0.0031	0.0033	0.0035	0.0036	0.0037
S57	0.2630	0.5341	2663	0.0003	0.0005	0.0008	0.0012	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	0.0027	0.0029	0.0031	0.0034	0.0035	0.0038	0.0039	0.0042
S58	0.2636	0.5343	2652	0.0003	0.0004	0.0007	0.0010	0.0010	0.0013	0.0016	0.0018	0.0021	0.0024	0.0026	0.0029	0.0031	0.0033	0.0035	0.0036	0.0038	0.0041
S59	0.2629	0.5326	2672	0.0003	0.0005	0.0008	0.0012	0.0013	0.0016	0.0018	0.0021	0.0024	0.0025	0.0028	0.0030	0.0033	0.0035	0.0036	0.0037	0.0040	0.0041
S60	0.2636	0.5338	2653	0.0003	0.0004	0.0007	0.0009	0.0011	0.0015	0.0017	0.0020	0.0023	0.0024	0.0026	0.0028	0.0030	0.0032	0.0033	0.0035	0.0036	0.0038
S61	0.2620	0.5326	2690	0.0004	0.0005	0.0008	0.0011	0.0013	0.0014	0.0016	0.0019	0.0022	0.0025	0.0026	0.0027	0.0030	0.0031	0.0033	0.0035	0.0037	0.0039
S62	0.2610	0.5313	2715	0.0003	0.0005	0.0008	0.0012	0.0008	0.0009	0.0012	0.0014	0.0017	0.0020	0.0023	0.0026	0.0027	0.0029	0.0030	0.0033	0.0035	0.0038
S63	0.2614	0.5314	2705	0.0004	0.0006	0.0007	0.0008	0.0012	0.0015	0.0018	0.0021	0.0023	0.0024	0.0027	0.0030	0.0032	0.0033	0.0036	0.0038	0.0040	0.0042
S64	0.2612	0.5318	2709	0.0004	0.0005	0.0007	0.0009	0.0012	0.0014	0.0017	0.0019	0.0021	0.0022	0.0025	0.0026	0.0028	0.0029	0.0031	0.0032	0.0034	0.0037
S65	0.2616	0.5321	2699	0.0003	0.0005	0.0007	0.0008	0.0012	0.0016	0.0018	0.0021	0.0024	0.0027	0.0030	0.0033	0.0034	0.0037	0.0039	0.0040	0.0041	0.0043
S66	0.2613	0.5312	2709	0.0003	0.0005	0.0007	0.0009	0.0009	0.0010	0.0013	0.0016	0.0019	0.0021	0.0024	0.0027	0.0030	0.0031	0.0033	0.0035	0.0037	0.0039
S67	0.2613	0.5328	2703	0.0003	0.0005	0.0006	0.0008	0.0011	0.0014	0.0017	0.0020	0.0023	0.0025	0.0026	0.0029	0.0031	0.0034	0.0035	0.0036	0.0037	0.0040
S68	0.2618	0.5331	2692	0.0003	0.0004	0.0008	0.0011	0.0010	0.0011	0.0014	0.0017	0.0020	0.0023	0.0025	0.0026	0.0029	0.0032	0.0034	0.0036	0.0039	0.0041
S69	0.2612	0.5314	2712	0.0003	0.0005	0.0007	0.0008	0.0012	0.0013	0.0015	0.0018	0.0021	0.0024	0.0027	0.0028	0.0030	0.0032	0.0034	0.0035	0.0037	0.0040
S70	0.2619	0.5327	2691	0.0003	0.0005	0.0008	0.0010	0.0012	0.0016	0.0018	0.0021	0.0024	0.0025	0.0027	0.0029	0.0031	0.0033	0.0034	0.0036	0.0038	0.0040
S71	0.2598	0.5312	2740	0.0004	0.0006	0.0007	0.0010	0.0008	0.0011	0.0014	0.0017	0.0019	0.0020	0.0023	0.0024	0.0027	0.0029	0.0030	0.0031	0.0032	0.0034
S72	0.2602	0.5313	2732	0.0003	0.0004	0.0007	0.0010	0.0010	0.0012	0.0015	0.0018	0.0021	0.0024	0.0027	0.0029	0.0031	0.0034	0.0035	0.0038	0.0039	0.0041
S73	0.2599	0.5317	2736	0.0003	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0017	0.0020	0.0021	0.0024	0.0027	0.0028	0.0031	0.0033	0.0035	0.0037	0.0039
S74	0.2604	0.5320	2725	0.0003	0.0005	0.0007	0.0009	0.0013	0.0016	0.0019	0.0021	0.0023	0.0024	0.0025	0.0026	0.0029	0.0031	0.0032	0.0034	0.0035	0.0038
S75	0.2600	0.5310	2737	0.0003	0.0004	0.0007	0.0011	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	0.0027	0.0030	0.0031	0.0033	0.0036	0.0037	0.0038	0.0040
Ave.	0.2619	0.5324	2693	0.0003	0.0005	0.0007	0.0010	0.0011	0.0013	0.0016	0.0019	0.0021	0.0023	0.0026	0.0028	0.0030	0.0032	0.0034	0.0035	0.0037	0.0039
Med.	0.2618	0.5326	2692	0.0003	0.0005	0.0007	0.0009	0.0011	0.0013	0.0016	0.0019	0.0021	0.0024	0.0026	0.0027	0.0030	0.0032	0.0033	0.0035	0.0037	0.0039
St dev	0.0013	0.0010	29.0897	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.2598	0.5310	2649	0.0003	0.0004	0.0005	0.0008	0.0008	0.0009	0.0012	0.0014	0.0017	0.0020	0.0022	0.0023	0.0026	0.0028	0.0029	0.0030	0.0032	0.0033
Max.	0.2638	0.5343	2740	0.0004	0.0006	0.0008	0.0012	0.0013	0.0016	0.0019	0.0021	0.0024	0.0027	0.0030	0.0033	0.0034	0.0037	0.0039	0.0040	0.0041	0.0043

4. EUT Photo



---End of Report---