

LM-80 TEST REPORT



The following tested product(s) were submitted and identified by the vendor as:

Applicant : EVERLIGHT ELECTRONICS CO., LTD

Address of Applicant : No. 6-8, Zhonghua Rd., Shulin Dist., New Taipei City 23860, Taiwan

Organization : Everlight Electronics Co., LTD

Testing Laboratory : Reliability Lab, Everlight Electronics

Testing Address : No.25, Lane 76, Sec. 3, Chung Yang Road, Tucheng, New Taipei City 23673, Taiwan

Product Name : High Power LED

Model/ Serial Number : 67-22ST Series

Manufacturer : Everlight Electronics Co., LTD

Rating : DC 180 mA

Test Standard/Method : IES LM-80-15 Approved Method: Measuring Lumen Maintenance of LED Light Sources

Revision : 1

1. The submitted products have been tested as requested and the following results were obtained, and the report, not applicable for lawsuit, refers only to the unit(s) submitted for test.
2. This report will be invalid if reproduced in whole in part.
3. This report is only valid with the examination seal and signature of this institute.

Signed for and on behalf of
EVERLIGHT Ltd.

Alan Ke

1 DATE OF RECEIPT OF SAMPLES

Aug. 11, 2020

2 DATE(S) OF PERFORMANCE OF THE TEST

Aug. 20, 2020 ~ Jun. 22, 2022

3 MATERIAL / SERIAL NUMBER

4 IDENTITY OF SAMPLES

Quantity	Model	Serial Number
22	67-22ST Series	# A01- # A22(55 °C)
22	67-22ST Series	# B01- # B22(85 °C)
22	67-22ST Series	# C01- # C22(105 °C)

5 TEST ITEMS

5.1 Date Summary of Lumen and Color Maintenance

Test results were concluded by different Temperatures (Ts)

5.2 Lumen Maintenance and Color Maintenance Test

Testing specifications by different case temperatures according to IES LM-80-15 approved. Method: Measuring Lumen Maintenance of LED Light Sources and client’s requirements were implemented per the following items.

5.2.1 Total Luminous Flux(Φ_v)

The test results of total luminous flux were implemented referring to Clause 2 PROPERTIES OF LEDS & Clause 6 MEASUREMENT OF LUMINOUS FLUX of CIE127:2007 2nd edition MRASUREMENT OF LEDS and IES LM-80-15 Approved Method: Measuring Lumen Maintenance of LED Light Sources, when the UUTs were powered with constant current of If.

5.2.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIE_x, CIE_y) & Chromaticity shift($\Delta u'$, $\Delta v'$)

The test results of correlated color temperature were implemented referring to CIE 127:2007 2nd editions MRASUREMENT OF LEDS, CIE 15:2004 COLORIMETY. The test results of color coordinate were implemented referring to CIE 127:2007 2nd edition MRASUREMENT OF LEDS, CIE 15:2004 COLORIMETRY

6 TESTING LABORATORY IS ACCREDITED BY

6.1 ISO 17025 accredited in respect of laboratory is approved by TAF Certificate No. : L2773-190717

6.2 EPA-Recognized Laboratories No.: 1125371

7 TEST CONDITIONS

7.1 Main Test Equipment:

Name	Brand	Model	Traceability	Calibration Date	Due Date
Spectroradiometer	Photal	LE-5400	NVLAP (200951-0)	2021/11/30	2024/11/29
Integrating Sphere	Labsphere	LMS-100CM			
Standard Light Source	Labsphere	SCL-1400			
Source Meter	Keithley	2612A	SGS (TAF 0143)	2022/2/9	2023/2/8
Source Meter	Agilent	N5751A	SGS (TAF 0143)	2022/5/5	2023/5/4
Digital Multimeter	Agilent	E3634A	SGS (TAF 0143)	2022/5/5	2023/5/4

7.2 Environmental Conditions:

Temperature: (25 ± 1) °C

Relative Humidity: < 65 %RH

7.3 Measurement Conditions:

Interval Time: 1000 h

Warm up Time: < 1 minute (initial)

Relative measurement uncertainty: 1.1 % (95 % Confidence Level)

7.4 UUT Conditions:

Drive Current: DC 180 mA

Forward Voltage: 3.35 V

Power Consumption: 0.6 W (Rated Value)

Lumen: 55 lm – 70 lm

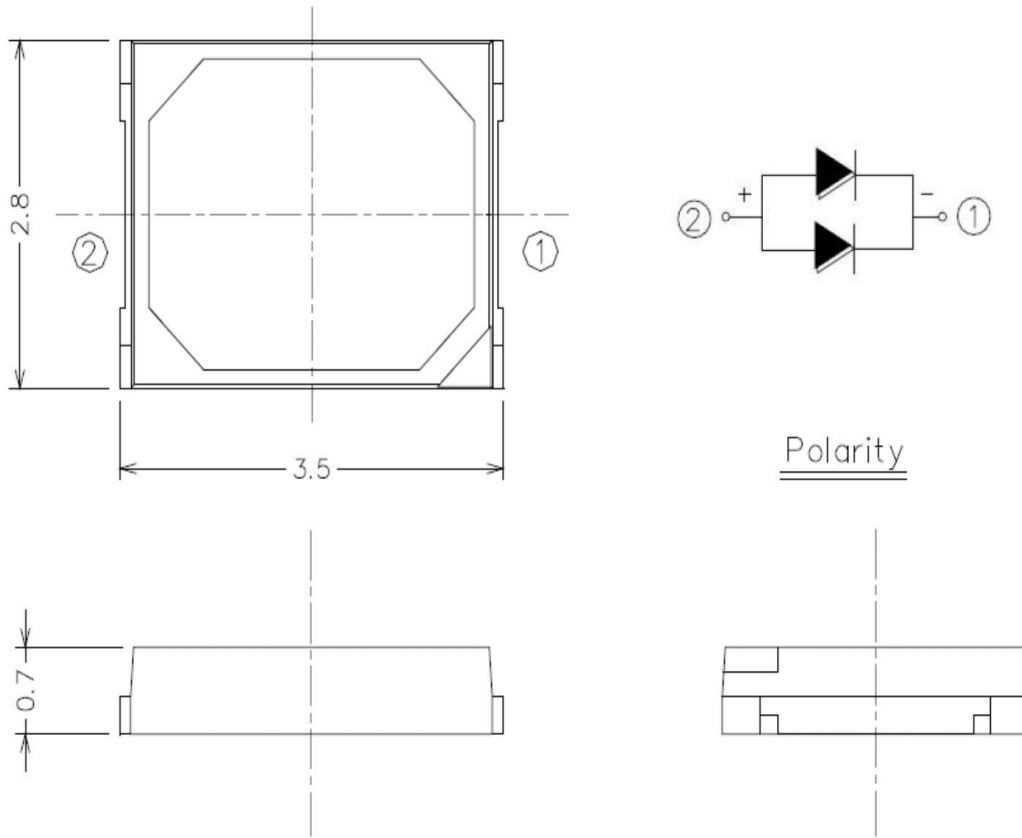
CCT: 2700 K

Package Dimension: L 3.5 mm x W 2.8 mm

Prior operation: 0 h

Total Operation Duration: 15000 h

7.5 Photograph of device



8 TEST SUMMARY:

8.1 Data Summary of Lumen and Color Maintenance

Initial(0 h)			Luminous Maintenance (%)										
Temp.	TLF(lm)	Vf(V)	0 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000 h
55°C	63.4	3.35	100.00%	101.78%	101.46%	101.45%	101.33%	101.16%	101.04%	100.88%	100.76%	100.62%	100.47%
85°C	63.8	3.35	100.00%	101.38%	101.19%	101.08%	100.95%	100.74%	100.57%	100.23%	100.19%	100.01%	99.70%
105°C	63.4	3.35	100.00%	101.15%	100.90%	100.65%	100.60%	100.17%	99.91%	99.65%	99.42%	99.42%	98.94%

Luminous Maintenance (%)				
11000 h	12000 h	13000 h	14000 h	15000 h
100.38%	100.17%	100.02%	99.93%	99.84%
99.64%	99.44%	99.33%	99.04%	98.94%
98.91%	98.45%	98.44%	98.35%	98.15%

Initial(0 h)				Chromaticity Shift ($\Delta u'v'$)									
Temp.	CIE u'	CIE v'	CCT	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000 h
55°C	0.2629	0.5290	2631	0.0007	0.0008	0.0009	0.0010	0.0011	0.0012	0.0014	0.0017	0.0018	0.0021
85°C	0.2657	0.5300	2644	0.0008	0.0011	0.0013	0.0016	0.0018	0.0021	0.0023	0.0025	0.0027	0.0028
105°C	0.2646	0.5294	2666	0.0013	0.0017	0.0020	0.0024	0.0025	0.0026	0.0030	0.0031	0.0035	0.0038

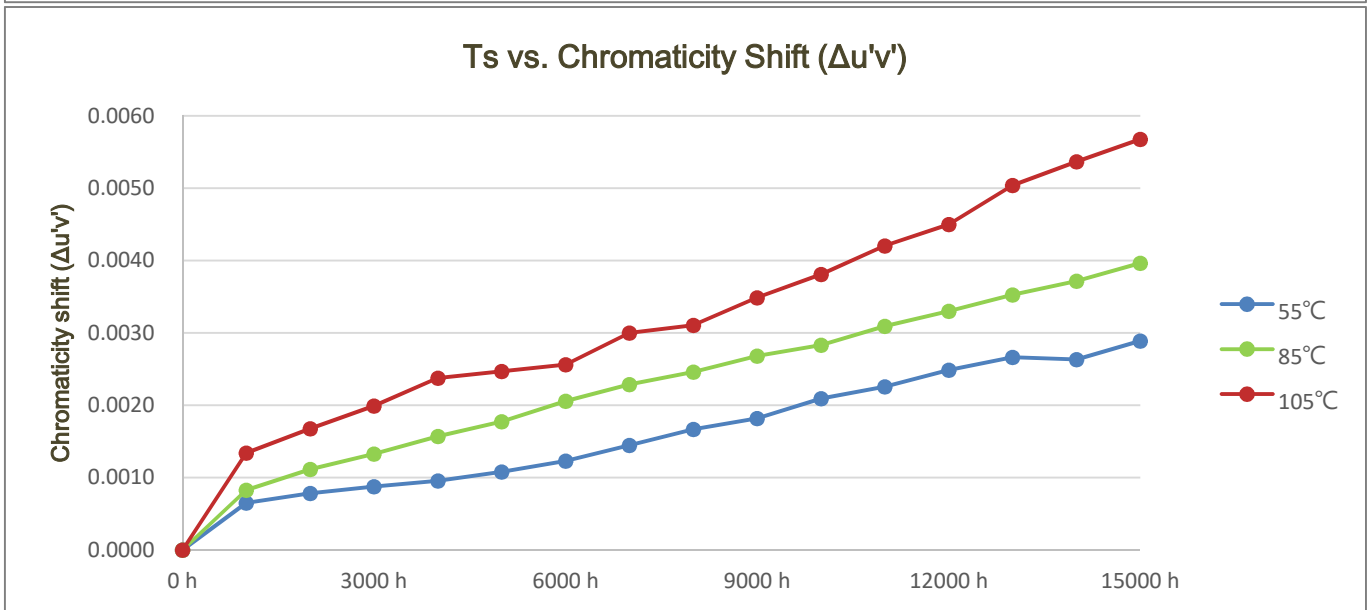
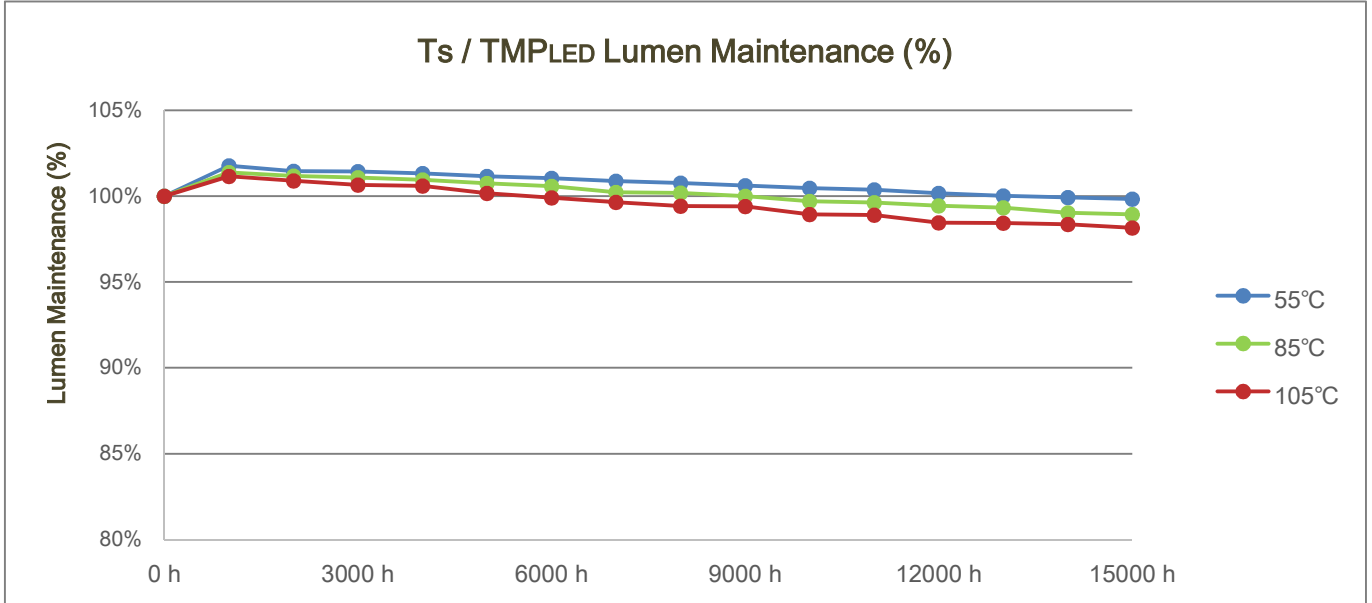
Chromaticity Shift ($\Delta u'v'$)				
11000 h	12000 h	13000 h	14000 h	15000 h
0.0023	0.0025	0.0027	0.0026	0.0029
0.0031	0.0033	0.0035	0.0037	0.0040
0.0042	0.0045	0.0050	0.0054	0.0057

8.2 Determination Results

Item	Temp	Criteria(at15000Hrs)	Determination
(lm)	55 °C	>90%	Pass
(lm)	85 °C	>90%	Pass
(lm)	105 °C	>90%	Pass

8.3 Chart of lumen maintenance and TM-21 projection

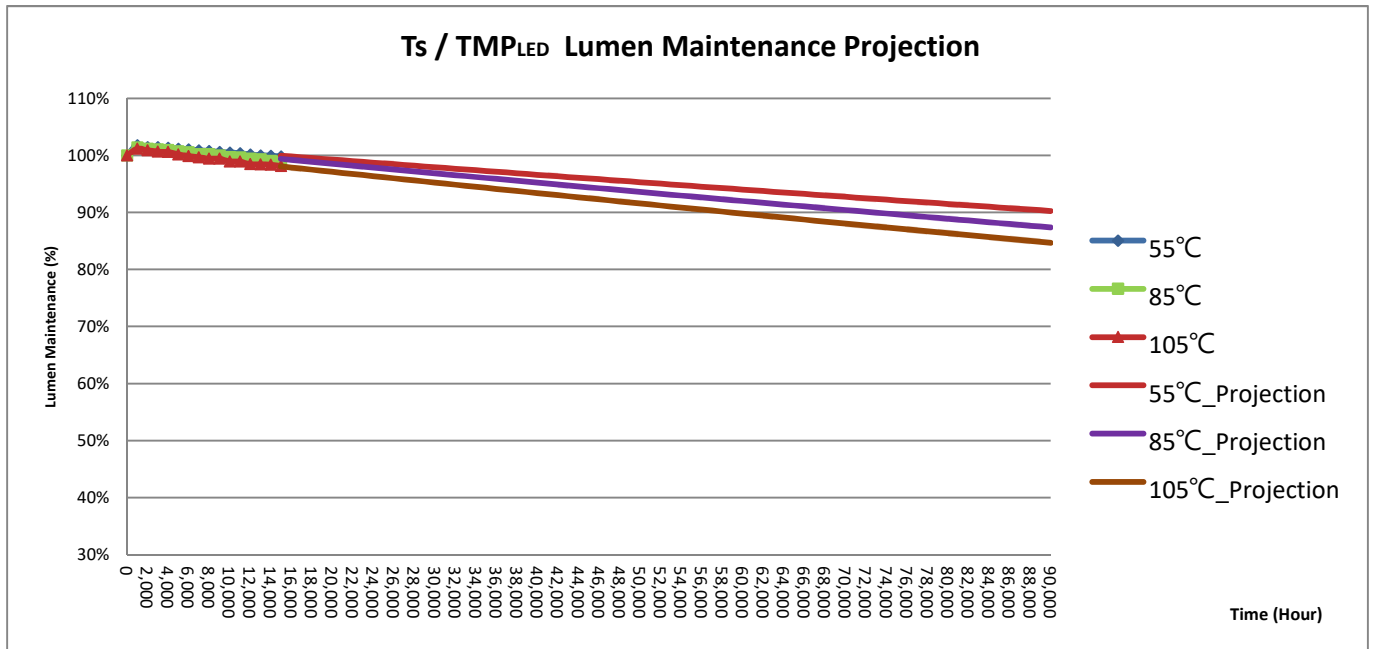
8.3.1 Chart of lumen maintenance



8.3.2 LM-80 test and TM-21 Projection

Table 1: Report at each LM-80 Test Condition

Case Temperature 1		Case Temperature 2		Case Temperature 3	
Temperature (°C):	55	Temperature (°C):	85	Temperature (°C):	105
Temperature (°K):	328.15	Temperature (°K):	358.15	Temperature (°K):	378.15
α :	1.36E-06	α :	1.72E-06	α :	1.96E-06
B:	1.02	B:	1.02	B:	1.01
Reported L70 (hrs):	>90000	Reported L70 (hrs):	>90000	Reported L70 (hrs):	>90000
Reported L90 (hrs):	>90000	Reported L90 (hrs):	70000	Reported L90 (hrs):	59000



8.3.3 Test Condition: Ts = 55 °C

Requirement

Case Temperature [Ts]: 54.3 °C	Average [Ts]: 54.3 °C
Ambient Temperature [Ta]: 53.5 °C	Average [Ta]: 53.5 °C
Driver Current: 180mA	Air Flow: Minimized
Measurement Current: 180mA	Relative Humidity: < 65 %RH

8.3.3.1 Total Luminous Flux (Φ_v)

S/N	Initial(0 h)		Luminous Maintenance(Φ_v)									
	TLF(lm)	Vf(V)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000h
A01	62.7	3.35	100.76%	100.39%	100.46%	100.42%	100.25%	100.19%	100.04%	99.87%	99.62%	99.40%
A02	63.0	3.36	101.92%	101.35%	101.62%	101.38%	101.08%	101.07%	101.00%	100.97%	100.92%	100.85%
A03	63.2	3.35	102.00%	101.76%	101.58%	101.36%	101.15%	100.92%	100.91%	100.66%	100.44%	100.23%
A04	63.2	3.36	101.75%	101.33%	101.54%	101.54%	101.35%	101.20%	101.12%	101.11%	100.97%	100.76%
A05	63.3	3.36	102.28%	101.75%	101.75%	101.59%	101.35%	101.16%	100.99%	100.82%	100.54%	100.48%
A06	63.4	3.35	101.99%	101.75%	101.49%	101.27%	100.99%	100.73%	100.50%	100.27%	100.24%	100.22%
A07	63.4	3.35	102.26%	102.12%	101.91%	101.90%	101.68%	101.46%	101.46%	101.32%	101.10%	100.87%
A08	63.5	3.35	101.86%	101.61%	101.78%	101.70%	101.61%	101.51%	101.37%	101.29%	100.99%	100.95%
A09	63.5	3.35	101.68%	101.26%	101.18%	101.15%	101.08%	100.81%	100.55%	100.45%	100.44%	100.26%
A10	63.5	3.36	102.24%	102.03%	102.01%	101.86%	101.74%	101.71%	101.44%	101.40%	101.39%	101.17%
A11	63.5	3.35	100.74%	100.45%	100.47%	100.39%	100.28%	100.09%	99.94%	99.83%	99.56%	99.49%
A12	63.5	3.35	101.39%	101.07%	101.14%	101.05%	101.00%	100.80%	100.57%	100.51%	100.44%	100.23%
A13	63.6	3.35	101.83%	101.58%	101.44%	101.42%	101.15%	101.08%	100.92%	100.73%	100.71%	100.49%
A14	63.6	3.36	101.65%	101.32%	101.40%	101.20%	101.05%	100.97%	100.68%	100.65%	100.48%	100.37%
A15	63.6	3.36	100.74%	100.68%	100.41%	100.30%	100.09%	99.97%	99.75%	99.60%	99.47%	99.19%
A16	63.6	3.36	101.99%	101.72%	101.77%	101.54%	101.39%	101.39%	101.13%	100.97%	100.96%	100.66%
A17	63.6	3.35	101.71%	101.51%	101.23%	101.17%	100.90%	100.71%	100.61%	100.52%	100.33%	100.18%
A18	63.6	3.36	102.22%	101.92%	101.71%	101.64%	101.61%	101.60%	101.47%	101.23%	100.97%	100.87%
A19	63.6	3.35	102.42%	102.29%	102.18%	101.98%	101.95%	101.82%	101.65%	101.65%	101.60%	101.50%
A20	63.6	3.36	102.40%	101.91%	101.92%	101.88%	101.65%	101.62%	101.39%	101.39%	101.17%	101.11%
A21	63.7	3.36	101.86%	101.46%	101.63%	101.39%	101.23%	101.21%	101.18%	100.96%	100.75%	100.62%
A22	63.7	3.36	101.45%	100.99%	101.17%	101.16%	101.05%	100.86%	100.78%	100.58%	100.56%	100.50%
Avg.	63.4	3.35	101.78%	101.46%	101.45%	101.33%	101.16%	101.04%	100.88%	100.76%	100.62%	100.47%
Min.	62.7	3.35	100.74%	100.39%	100.41%	100.30%	100.09%	99.97%	99.75%	99.60%	99.47%	99.19%
Max.	63.7	3.36	102.42%	102.29%	102.18%	101.98%	101.95%	101.82%	101.65%	101.65%	101.60%	101.50%
Med.	63.5	3.35	101.86%	101.54%	101.56%	101.38%	101.15%	101.08%	100.95%	100.77%	100.63%	100.49%
St. Dev.	0.24	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	0.006

S/N	Luminous Maintenance(Φ_v)				
	11000 h	12000 h	13000 h	14000 h	15000 h
A01	99.27%	99.12%	99.06%	98.98%	98.79%
A02	100.77%	100.54%	100.52%	100.32%	100.34%
A03	100.21%	99.94%	99.89%	99.91%	99.70%
A04	100.74%	100.38%	100.16%	99.94%	99.71%
A05	100.43%	100.06%	99.78%	99.69%	99.80%
A06	100.12%	99.94%	99.92%	99.89%	99.64%
A07	100.69%	100.42%	100.41%	100.27%	100.28%
A08	100.92%	100.77%	100.65%	100.63%	100.59%
A09	100.14%	99.89%	99.70%	99.50%	99.47%
A10	101.04%	101.01%	100.90%	100.81%	100.70%
A11	99.39%	99.34%	99.09%	99.12%	98.90%
A12	100.19%	100.02%	99.85%	99.81%	99.84%
A13	100.49%	100.23%	100.11%	100.11%	99.94%
A14	100.26%	100.29%	100.11%	100.20%	100.15%
A15	99.16%	99.04%	98.88%	98.74%	98.57%
A16	100.54%	100.30%	100.02%	99.97%	99.89%
A17	100.05%	99.95%	99.66%	99.43%	99.52%
A18	100.68%	100.36%	100.22%	100.22%	100.13%
A19	101.31%	101.20%	101.19%	101.02%	100.97%
A20	101.04%	100.62%	100.45%	100.31%	100.20%
A21	100.56%	100.19%	99.98%	99.92%	99.62%
A22	100.33%	100.21%	99.92%	99.71%	99.71%
Avg.	100.38%	100.17%	100.02%	99.93%	99.84%
Min.	99.16%	99.04%	98.88%	98.74%	98.57%
Max.	101.31%	101.20%	101.19%	101.02%	100.97%
Med.	100.46%	100.22%	100.00%	99.93%	99.82%
St. Dev.	0.006	0.005	0.006	0.006	0.006

8.3.3.2 CCT, CIE_x, CIE_y & Chromaticity Shift($\Delta u'v'$)

S/N	Initial(0 h)			Chromaticity Shift($\Delta u'v'$)									
	CIE _x	CIE _y	CCT	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000h
A01	0.4649	0.4160	2452	0.0011	0.0011	0.0012	0.0014	0.0015	0.0017	0.0020	0.0019	0.0022	0.0026
A02	0.4644	0.4142	2742	0.0007	0.0009	0.0010	0.0010	0.0012	0.0014	0.0015	0.0016	0.0019	0.0019
A03	0.4645	0.4153	2643	0.0007	0.0008	0.0009	0.0008	0.0008	0.0011	0.0014	0.0013	0.0014	0.0017
A04	0.4634	0.4160	2569	0.0010	0.0012	0.0013	0.0014	0.0017	0.0019	0.0022	0.0023	0.0024	0.0026
A05	0.4615	0.4137	2594	0.0005	0.0007	0.0009	0.0008	0.0008	0.0009	0.0013	0.0017	0.0018	0.0019
A06	0.4636	0.4149	2684	0.0002	0.0004	0.0005	0.0007	0.0009	0.0010	0.0011	0.0015	0.0017	0.0019
A07	0.4590	0.4115	2561	0.0005	0.0005	0.0007	0.0008	0.0011	0.0011	0.0015	0.0018	0.0018	0.0020
A08	0.4646	0.4166	2595	0.0005	0.0006	0.0007	0.0007	0.0007	0.0008	0.0011	0.0012	0.0013	0.0016
A09	0.4610	0.4116	2760	0.0006	0.0008	0.0009	0.0009	0.0009	0.0012	0.0012	0.0014	0.0014	0.0015
A10	0.4657	0.4168	2611	0.0011	0.0011	0.0011	0.0013	0.0014	0.0014	0.0015	0.0019	0.0020	0.0023
A11	0.4648	0.4153	2574	0.0006	0.0006	0.0008	0.0008	0.0009	0.0010	0.0012	0.0011	0.0014	0.0016
A12	0.4653	0.4158	2631	0.0009	0.0010	0.0011	0.0013	0.0016	0.0016	0.0020	0.0023	0.0026	0.0027
A13	0.4653	0.4164	2657	0.0005	0.0007	0.0009	0.0009	0.0011	0.0012	0.0013	0.0020	0.0020	0.0022
A14	0.4612	0.4133	2646	0.0003	0.0005	0.0005	0.0007	0.0009	0.0010	0.0013	0.0013	0.0014	0.0018
A15	0.4635	0.4143	2637	0.0001	0.0003	0.0003	0.0003	0.0004	0.0007	0.0011	0.0014	0.0015	0.0017
A16	0.4630	0.4150	2605	0.0008	0.0009	0.0009	0.0010	0.0010	0.0012	0.0013	0.0017	0.0021	0.0025
A17	0.4619	0.4119	2715	0.0005	0.0007	0.0009	0.0009	0.0010	0.0013	0.0015	0.0016	0.0018	0.0020
A18	0.4537	0.4041	2596	0.0010	0.0012	0.0012	0.0014	0.0014	0.0016	0.0017	0.0019	0.0019	0.0022
A19	0.4622	0.4136	2651	0.0007	0.0009	0.0010	0.0012	0.0013	0.0014	0.0014	0.0017	0.0020	0.0025
A20	0.4594	0.4091	2677	0.0005	0.0007	0.0008	0.0008	0.0010	0.0012	0.0016	0.0017	0.0018	0.0023
A21	0.4642	0.4147	2640	0.0009	0.0009	0.0010	0.0011	0.0011	0.0013	0.0013	0.0018	0.0020	0.0025
A22	0.4639	0.4132	2634	0.0006	0.0007	0.0007	0.0008	0.0010	0.0010	0.0013	0.0016	0.0016	0.0020
Avg.	0.4628	0.4138	2631	0.0007	0.0008	0.0009	0.0010	0.0011	0.0012	0.0014	0.0017	0.0018	0.0021
Min.	0.4537	0.4041	2452	0.0001	0.0003	0.0003	0.0003	0.0004	0.0007	0.0011	0.0011	0.0013	0.0015
Max.	0.4657	0.4168	2760	0.0011	0.0012	0.0013	0.0014	0.0017	0.0019	0.0022	0.0023	0.0026	0.0027
Med.	0.4636	0.4145	2635	0.0006	0.0008	0.0009	0.0009	0.0010	0.0012	0.0014	0.0017	0.0018	0.0020
St. Dev.	0.0028	0.0029	66	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004

S/N	Chromaticity Shift($\Delta u'v'$)				
	11000 h	12000 h	13000 h	14000 h	15000 h
A01	0.0027	0.0034	0.0037	0.0037	0.0040
A02	0.0020	0.0023	0.0023	0.0024	0.0028
A03	0.0017	0.0022	0.0023	0.0024	0.0022
A04	0.0027	0.0031	0.0031	0.0032	0.0033
A05	0.0023	0.0023	0.0023	0.0020	0.0027
A06	0.0019	0.0021	0.0022	0.0023	0.0025
A07	0.0022	0.0022	0.0022	0.0024	0.0027
A08	0.0018	0.0020	0.0021	0.0019	0.0020
A09	0.0019	0.0020	0.0023	0.0025	0.0029
A10	0.0025	0.0025	0.0030	0.0031	0.0030
A11	0.0017	0.0021	0.0018	0.0019	0.0023
A12	0.0030	0.0032	0.0034	0.0033	0.0036
A13	0.0024	0.0026	0.0026	0.0025	0.0028
A14	0.0020	0.0020	0.0025	0.0022	0.0025
A15	0.0020	0.0018	0.0021	0.0018	0.0022
A16	0.0026	0.0029	0.0032	0.0032	0.0031
A17	0.0021	0.0025	0.0030	0.0028	0.0033
A18	0.0025	0.0028	0.0029	0.0029	0.0035
A19	0.0027	0.0031	0.0030	0.0030	0.0029
A20	0.0024	0.0026	0.0026	0.0026	0.0030
A21	0.0025	0.0029	0.0029	0.0028	0.0032
A22	0.0020	0.0025	0.0030	0.0029	0.0032
Avg.	0.0023	0.0025	0.0027	0.0026	0.0029
Min.	0.0017	0.0018	0.0018	0.0018	0.0020
Max.	0.0030	0.0034	0.0037	0.0037	0.0040
Med.	0.0023	0.0025	0.0026	0.0025	0.0029
St. Dev.	0.0004	0.0004	0.0005	0.0005	0.0005

8.3.4 Test Condition: Ts = 85 °C

Requirement

Case Temperature [Ts]: 84.5 °C	Average [Ts]: 84.5 °C
Ambient Temperature [Ta]: 83.8 °C	Average [Ta]: 83.8 °C
Driver Current: 180mA	Air Flow: Minimized
Measurement Current: 180mA	Relative Humidity: < 65 %RH

8.3.4.1 Total Luminous Flux (Φ_v)

S/N	Initial(0 h)		Luminous Maintenance(Φ_v)									
	TLF(lm)	Vf(V)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000h
B01	63.7	3.35	101.25%	101.12%	100.88%	100.55%	100.12%	99.91%	99.68%	99.45%	99.25%	99.03%
B02	63.7	3.35	101.51%	101.50%	101.14%	101.05%	100.95%	100.70%	100.44%	100.38%	100.34%	100.13%
B03	63.7	3.35	101.39%	101.14%	101.09%	101.11%	101.10%	100.79%	100.75%	100.62%	100.46%	100.00%
B04	63.7	3.36	101.64%	101.30%	101.37%	101.19%	100.73%	100.63%	100.53%	100.26%	100.21%	99.68%
B05	63.7	3.36	101.61%	101.38%	101.59%	101.45%	101.31%	100.99%	100.63%	100.84%	100.79%	100.40%
B06	63.8	3.36	101.35%	101.04%	100.96%	100.79%	100.71%	100.41%	99.82%	100.07%	99.88%	99.65%
B07	63.8	3.35	100.89%	100.69%	100.85%	100.53%	100.48%	100.17%	99.72%	99.84%	99.77%	99.32%
B08	63.8	3.35	100.76%	100.54%	100.58%	100.58%	100.26%	100.09%	99.86%	100.01%	99.78%	99.41%
B09	63.8	3.35	101.83%	101.81%	101.74%	101.53%	101.17%	101.15%	100.94%	100.74%	100.50%	100.18%
B10	63.8	3.35	101.09%	101.16%	100.86%	100.92%	100.66%	100.44%	99.91%	99.78%	99.78%	99.62%
B11	63.8	3.35	101.19%	101.19%	100.99%	101.06%	100.96%	100.94%	100.63%	100.47%	100.27%	99.82%
B12	63.8	3.36	100.96%	100.61%	100.37%	100.11%	100.06%	99.77%	99.75%	99.52%	99.32%	98.85%
B13	63.8	3.36	100.99%	100.88%	100.98%	100.98%	100.85%	100.88%	100.37%	100.19%	99.83%	99.79%
B14	63.8	3.35	101.62%	101.26%	101.28%	101.37%	100.92%	100.92%	100.39%	100.53%	100.43%	100.10%
B15	63.9	3.36	101.64%	101.52%	101.33%	101.23%	100.96%	100.75%	100.19%	100.14%	99.82%	99.70%
B16	63.9	3.36	101.18%	101.02%	101.03%	100.72%	100.46%	100.24%	100.03%	99.93%	99.62%	99.32%
B17	63.9	3.35	101.76%	101.20%	101.04%	100.83%	100.77%	100.57%	100.18%	100.26%	100.01%	99.63%
B18	63.9	3.36	101.70%	101.44%	101.49%	101.26%	100.89%	100.77%	100.47%	100.49%	100.19%	99.71%
B19	63.9	3.35	101.49%	101.44%	100.90%	100.71%	100.61%	100.45%	99.83%	100.05%	99.82%	99.62%
B20	63.9	3.36	102.05%	101.77%	101.36%	101.38%	101.16%	101.02%	100.59%	100.66%	100.58%	100.17%
B21	63.9	3.35	101.57%	101.28%	101.04%	100.79%	100.39%	100.14%	99.88%	99.87%	99.73%	99.39%
B22	64.0	3.36	100.92%	100.80%	100.98%	100.83%	100.85%	100.88%	100.57%	100.19%	99.83%	99.78%
Avg.	63.8	3.35	101.38%	101.19%	101.08%	100.95%	100.74%	100.57%	100.23%	100.19%	100.01%	99.70%
Min.	63.7	3.35	100.76%	100.54%	100.37%	100.11%	100.06%	99.77%	99.68%	99.45%	99.25%	98.85%
Max.	64.0	3.36	102.05%	101.81%	101.74%	101.53%	101.31%	101.15%	100.94%	100.84%	100.79%	100.40%
Med.	63.8	3.35	101.44%	101.20%	101.03%	100.95%	100.81%	100.67%	100.28%	100.19%	99.86%	99.69%
St. Dev.	0.09	0.005	0.003	0.003	0.003	0.004	0.003	0.004	0.004	0.004	0.004	0.004

S/N	Luminous Maintenance(Φ_v)				
	11000 h	12000 h	13000 h	14000 h	15000 h
B01	98.93%	98.92%	98.87%	98.69%	98.77%
B02	99.98%	99.68%	99.74%	99.41%	99.31%
B03	100.00%	99.68%	99.54%	99.07%	98.96%
B04	99.76%	99.56%	99.36%	99.12%	99.01%
B05	100.44%	100.15%	100.12%	99.93%	99.81%
B06	99.54%	99.44%	99.15%	98.78%	98.59%
B07	99.23%	98.88%	98.75%	98.54%	98.46%
B08	99.09%	98.93%	98.65%	98.51%	98.46%
B09	100.24%	100.08%	99.79%	99.49%	99.44%
B10	99.41%	99.15%	99.14%	98.68%	98.74%
B11	99.78%	99.56%	99.35%	99.19%	99.23%
B12	98.84%	98.74%	98.68%	98.32%	98.09%
B13	99.45%	99.07%	99.10%	98.60%	98.35%
B14	99.99%	99.84%	99.71%	99.47%	99.28%
B15	99.70%	99.53%	99.44%	99.28%	99.29%
B16	99.28%	99.27%	99.17%	98.94%	98.69%
B17	99.55%	99.39%	99.45%	99.08%	98.99%
B18	99.86%	99.61%	99.32%	99.23%	99.17%
B19	99.51%	99.49%	99.50%	98.75%	98.87%
B20	100.32%	100.02%	99.95%	99.79%	99.86%
B21	99.63%	99.33%	99.29%	98.98%	98.68%
B22	99.53%	99.37%	99.15%	98.97%	98.53%
Avg.	99.64%	99.44%	99.33%	99.04%	98.94%
Min.	98.84%	98.74%	98.65%	98.32%	98.09%
Max.	100.44%	100.15%	100.12%	99.93%	99.86%
Med.	99.59%	99.46%	99.34%	99.03%	98.91%
St. Dev.	0.004	0.004	0.004	0.004	0.005

8.3.4.2 CCT, CIE_x, CIE_y & Chromaticity Shift($\Delta u'v'$)

S/N	Initial(0 h)			Chromaticity Shift($\Delta u'v'$)									
	CIE _x	CIE _y	CCT	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000h
B01	0.4793	0.4200	2536	0.0015	0.0016	0.0020	0.0026	0.0027	0.0027	0.0028	0.0030	0.0034	0.0035
B02	0.4660	0.4120	2643	0.0010	0.0010	0.0013	0.0013	0.0019	0.0024	0.0030	0.0030	0.0033	0.0033
B03	0.4591	0.4094	2717	0.0008	0.0012	0.0010	0.0018	0.0018	0.0027	0.0030	0.0031	0.0031	0.0033
B04	0.4627	0.4118	2686	0.0012	0.0015	0.0013	0.0016	0.0022	0.0024	0.0024	0.0025	0.0027	0.0028
B05	0.4611	0.4101	2695	0.0006	0.0008	0.0012	0.0017	0.0014	0.0017	0.0022	0.0023	0.0026	0.0027
B06	0.4764	0.4208	2578	0.0006	0.0009	0.0009	0.0014	0.0016	0.0016	0.0022	0.0028	0.0029	0.0032
B07	0.4680	0.4127	2622	0.0007	0.0010	0.0010	0.0014	0.0013	0.0016	0.0018	0.0022	0.0025	0.0023
B08	0.4706	0.4157	2612	0.0006	0.0009	0.0015	0.0015	0.0017	0.0022	0.0022	0.0029	0.0030	0.0031
B09	0.4641	0.4136	2681	0.0007	0.0011	0.0011	0.0014	0.0017	0.0017	0.0017	0.0017	0.0018	0.0022
B10	0.4679	0.4126	2623	0.0014	0.0019	0.0016	0.0019	0.0021	0.0021	0.0025	0.0024	0.0027	0.0028
B11	0.4701	0.4158	2619	0.0006	0.0007	0.0013	0.0016	0.0020	0.0024	0.0024	0.0030	0.0033	0.0034
B12	0.4756	0.4219	2596	0.0013	0.0017	0.0016	0.0017	0.0016	0.0021	0.0022	0.0024	0.0028	0.0028
B13	0.4727	0.4183	2605	0.0006	0.0008	0.0015	0.0015	0.0016	0.0017	0.0017	0.0016	0.0018	0.0022
B14	0.4642	0.4134	2679	0.0004	0.0007	0.0011	0.0012	0.0017	0.0023	0.0024	0.0024	0.0025	0.0026
B15	0.4700	0.4179	2637	0.0002	0.0004	0.0006	0.0007	0.0010	0.0018	0.0019	0.0022	0.0024	0.0023
B16	0.4690	0.4168	2641	0.0011	0.0011	0.0016	0.0022	0.0021	0.0026	0.0027	0.0031	0.0032	0.0035
B17	0.4687	0.4148	2630	0.0006	0.0010	0.0010	0.0011	0.0010	0.0013	0.0014	0.0018	0.0020	0.0019
B18	0.4614	0.4126	2711	0.0012	0.0015	0.0019	0.0020	0.0023	0.0023	0.0026	0.0027	0.0031	0.0033
B19	0.4691	0.4156	2631	0.0012	0.0017	0.0017	0.0017	0.0019	0.0021	0.0026	0.0026	0.0027	0.0031
B20	0.4618	0.4108	2691	0.0007	0.0011	0.0012	0.0013	0.0018	0.0021	0.0021	0.0021	0.0024	0.0027
B21	0.4687	0.4136	2620	0.0009	0.0012	0.0014	0.0016	0.0018	0.0018	0.0021	0.0022	0.0025	0.0028
B22	0.4608	0.4115	2710	0.0006	0.0010	0.0014	0.0016	0.0018	0.0019	0.0025	0.0023	0.0025	0.0026
Avg.	0.4676	0.4146	2644	0.0008	0.0011	0.0013	0.0016	0.0018	0.0021	0.0023	0.0025	0.0027	0.0028
Min.	0.4591	0.4094	2536	0.0002	0.0004	0.0006	0.0007	0.0010	0.0013	0.0014	0.0016	0.0018	0.0019
Max.	0.4793	0.4219	2717	0.0015	0.0019	0.0020	0.0026	0.0027	0.0027	0.0030	0.0031	0.0034	0.0035
Med.	0.4684	0.4136	2634	0.0007	0.0011	0.0013	0.0016	0.0018	0.0021	0.0023	0.0024	0.0027	0.0028
St. Dev.	0.0054	0.0035	47	0.0003	0.0004	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005

S/N	Chromaticity Shift($\Delta u'v'$)				
	11000 h	12000 h	13000 h	14000 h	15000 h
B01	0.0038	0.0040	0.0040	0.0043	0.0045
B02	0.0036	0.0040	0.0044	0.0045	0.0049
B03	0.0036	0.0040	0.0042	0.0044	0.0049
B04	0.0032	0.0035	0.0036	0.0039	0.0040
B05	0.0027	0.0030	0.0035	0.0036	0.0039
B06	0.0034	0.0037	0.0039	0.0041	0.0043
B07	0.0027	0.0027	0.0033	0.0033	0.0034
B08	0.0036	0.0034	0.0036	0.0038	0.0041
B09	0.0024	0.0025	0.0028	0.0030	0.0033
B10	0.0031	0.0035	0.0037	0.0040	0.0043
B11	0.0037	0.0038	0.0042	0.0046	0.0046
B12	0.0026	0.0029	0.0029	0.0029	0.0036
B13	0.0026	0.0027	0.0029	0.0031	0.0030
B14	0.0031	0.0034	0.0035	0.0033	0.0038
B15	0.0027	0.0030	0.0032	0.0034	0.0037
B16	0.0038	0.0042	0.0043	0.0047	0.0047
B17	0.0022	0.0027	0.0026	0.0029	0.0032
B18	0.0036	0.0036	0.0038	0.0038	0.0042
B19	0.0031	0.0033	0.0034	0.0039	0.0040
B20	0.0026	0.0028	0.0032	0.0034	0.0040
B21	0.0030	0.0031	0.0035	0.0037	0.0038
B22	0.0030	0.0028	0.0031	0.0033	0.0034
Avg.	0.0031	0.0033	0.0035	0.0037	0.0040
Min.	0.0022	0.0025	0.0026	0.0029	0.0030
Max.	0.0038	0.0042	0.0044	0.0047	0.0049
Med.	0.0031	0.0034	0.0035	0.0037	0.0040
St. Dev.	0.0005	0.0005	0.0005	0.0006	0.0005

8.3.5 Test Condition: Ts = 105 °C

Requirement

Case Temperature [Ts]: 104.3 °C	Average [Ts]: 104.3 °C
Ambient Temperature [Ta]: 103.6 °C	Average [Ta]: 103.6 °C
Driver Current: 180mA	Air Flow: Minimized
Measurement Current: 180mA	Relative Humidity: < 65 %RH

8.3.5.1 Total Luminous Flux (Φv)

S/N	Initial(0 h)		Luminous Maintenance(Φv)									
	TLF(lm)	Vf(V)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000h
C01	63.3	3.35	101.51%	101.46%	101.07%	101.09%	100.57%	100.15%	100.12%	100.12%	100.14%	99.70%
C02	63.2	3.36	101.74%	101.62%	101.40%	101.45%	101.19%	100.89%	100.46%	100.32%	100.32%	99.72%
C03	63.3	3.36	101.43%	101.21%	100.83%	100.63%	100.07%	99.73%	99.30%	98.88%	98.93%	98.62%
C04	63.4	3.35	100.89%	100.76%	100.67%	100.51%	99.88%	99.69%	99.35%	99.16%	98.95%	98.54%
C05	63.4	3.35	101.08%	100.67%	100.36%	100.43%	99.99%	99.51%	99.23%	98.99%	99.13%	98.76%
C06	63.5	3.35	100.80%	100.72%	100.43%	100.34%	99.82%	99.74%	99.69%	99.61%	99.58%	99.13%
C07	63.4	3.36	101.55%	101.31%	101.02%	101.14%	100.83%	100.49%	100.31%	100.19%	99.99%	99.69%
C08	63.4	3.36	101.64%	101.24%	101.05%	101.02%	100.43%	100.09%	99.83%	99.61%	99.65%	99.36%
C09	63.4	3.34	101.14%	100.92%	100.84%	100.91%	100.60%	100.45%	99.98%	99.53%	99.43%	99.20%
C10	63.3	3.36	101.61%	101.17%	100.76%	100.78%	100.33%	99.91%	99.85%	99.43%	99.19%	98.84%
C11	63.6	3.35	100.50%	100.18%	100.10%	99.84%	99.57%	99.49%	99.04%	98.88%	98.97%	98.30%
C12	63.4	3.35	101.16%	101.13%	101.04%	101.14%	100.48%	99.98%	99.79%	99.33%	99.87%	98.41%
C13	63.3	3.35	100.86%	100.45%	100.27%	100.02%	99.70%	99.54%	99.50%	99.25%	99.24%	99.04%
C14	63.4	3.35	100.66%	100.43%	99.98%	99.95%	99.49%	99.28%	98.87%	98.45%	98.53%	98.17%
C15	63.3	3.34	101.38%	101.11%	101.07%	101.09%	100.67%	100.31%	100.22%	99.93%	99.82%	99.59%
C16	63.4	3.36	101.32%	100.87%	100.38%	100.41%	100.11%	100.07%	99.73%	99.34%	99.08%	98.64%
C17	63.5	3.35	101.42%	101.30%	100.83%	100.68%	100.40%	100.16%	99.70%	99.59%	99.78%	99.11%
C18	63.3	3.34	101.34%	101.28%	100.79%	100.88%	100.54%	100.47%	100.27%	99.95%	99.95%	99.41%
C19	63.4	3.35	100.53%	100.18%	99.84%	99.69%	99.24%	98.92%	98.69%	98.56%	98.67%	98.22%
C20	63.4	3.36	100.97%	100.59%	100.57%	100.44%	99.88%	99.87%	99.50%	99.50%	99.32%	98.82%
C21	63.5	3.36	101.25%	100.91%	100.83%	100.75%	100.23%	99.79%	99.73%	99.68%	99.58%	98.99%
C22	63.4	3.35	100.59%	100.27%	100.24%	99.96%	99.64%	99.40%	99.21%	98.99%	99.00%	98.43%
Avg.	63.4	3.35	101.15%	100.90%	100.65%	100.60%	100.17%	99.91%	99.65%	99.42%	99.42%	98.94%
Min.	63.2	3.34	100.50%	100.18%	99.84%	99.69%	99.24%	98.92%	98.69%	98.45%	98.53%	98.17%
Max.	63.6	3.36	101.74%	101.62%	101.40%	101.45%	101.19%	100.89%	100.46%	100.32%	100.32%	99.72%
Med.	63.4	3.35	101.20%	100.91%	100.77%	100.66%	100.17%	99.89%	99.71%	99.47%	99.38%	98.91%
St. Dev.	0.07	0.006	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005

S/N	Luminous Maintenance(Φ_v)				
	11000 h	12000 h	13000 h	14000 h	15000 h
C01	99.48%	98.80%	98.88%	98.59%	98.21%
C02	99.54%	99.17%	98.92%	98.61%	98.42%
C03	98.64%	98.42%	98.56%	98.16%	98.14%
C04	98.28%	97.99%	98.06%	98.10%	98.10%
C05	98.75%	98.53%	98.51%	98.52%	98.31%
C06	99.02%	98.55%	98.67%	98.42%	98.22%
C07	99.65%	98.96%	98.70%	98.42%	98.25%
C08	99.50%	99.19%	98.94%	98.90%	98.60%
C09	99.28%	98.87%	98.60%	98.26%	97.96%
C10	98.77%	98.47%	98.61%	98.50%	98.43%
C11	98.03%	97.46%	97.41%	98.40%	98.19%
C12	98.55%	98.24%	98.40%	98.58%	98.54%
C13	99.12%	98.87%	98.93%	98.97%	98.40%
C14	98.22%	97.62%	97.52%	98.34%	98.02%
C15	99.30%	98.70%	98.52%	98.34%	97.85%
C16	98.61%	98.19%	98.21%	98.03%	97.94%
C17	99.14%	98.55%	98.65%	98.57%	98.28%
C18	99.37%	98.73%	98.71%	98.47%	98.26%
C19	98.27%	97.70%	97.85%	97.60%	97.21%
C20	98.91%	98.51%	98.60%	98.26%	98.15%
C21	98.99%	98.30%	98.50%	98.10%	98.21%
C22	98.57%	98.12%	97.97%	97.66%	97.60%
Avg.	98.91%	98.45%	98.44%	98.35%	98.15%
Min.	98.03%	97.46%	97.41%	97.60%	97.21%
Max.	99.65%	99.19%	98.94%	98.97%	98.60%
Med.	98.95%	98.52%	98.58%	98.41%	98.21%
St. Dev.	0.005	0.005	0.004	0.003	0.003

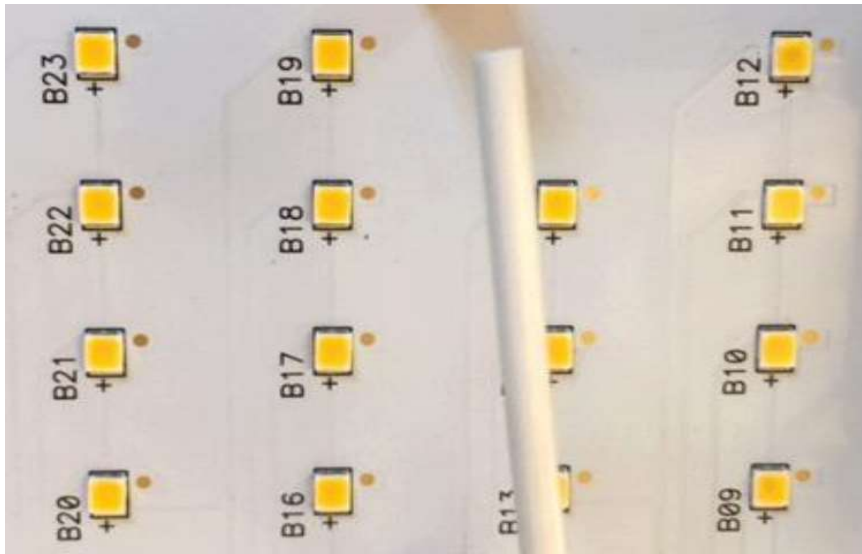
8.3.5.2 CCT, CIE_x, CIE_y & Chromaticity Shift($\Delta u'v'$)

S/N	Initial(0 h)			Chromaticity Shift($\Delta u'v'$)									
	CIE _x	CIE _y	CCT	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000h
C01	0.4627	0.4136	2701	0.0014	0.0016	0.0019	0.0025	0.0026	0.0028	0.0033	0.0035	0.0039	0.0039
C02	0.4624	0.4106	2681	0.0016	0.0018	0.0023	0.0021	0.0022	0.0024	0.0031	0.0032	0.0033	0.0032
C03	0.4631	0.4125	2686	0.0018	0.0024	0.0024	0.0033	0.0033	0.0034	0.0041	0.0042	0.0039	0.0044
C04	0.4668	0.4154	2659	0.0013	0.0015	0.0018	0.0021	0.0021	0.0022	0.0024	0.0028	0.0030	0.0042
C05	0.467	0.4158	2660	0.0012	0.0013	0.0016	0.0023	0.0023	0.0024	0.0028	0.0025	0.0034	0.0041
C06	0.465	0.4122	2658	0.0012	0.0014	0.0020	0.0015	0.0015	0.0016	0.0019	0.0024	0.0028	0.0026
C07	0.4698	0.4184	2643	0.0015	0.0021	0.0028	0.0032	0.0033	0.0033	0.0035	0.0034	0.0041	0.0048
C08	0.4621	0.4108	2687	0.0017	0.0021	0.0023	0.0030	0.0031	0.0032	0.0038	0.0041	0.0042	0.0046
C09	0.4661	0.414	2658	0.0008	0.0008	0.0008	0.0015	0.0015	0.0016	0.0019	0.0021	0.0021	0.0020
C10	0.4608	0.4124	2717	0.0019	0.0025	0.0025	0.0035	0.0036	0.0037	0.0042	0.0045	0.0049	0.0051
C11	0.4695	0.4189	2651	0.0010	0.0016	0.0016	0.0022	0.0024	0.0026	0.0033	0.0032	0.0036	0.0040
C12	0.4666	0.4122	2637	0.0020	0.0021	0.0022	0.0024	0.0025	0.0027	0.0032	0.0034	0.0038	0.0044
C13	0.4709	0.4164	2613	0.0008	0.0013	0.0017	0.0025	0.0026	0.0027	0.0032	0.0031	0.0035	0.0034
C14	0.467	0.4172	2671	0.0015	0.0018	0.0020	0.0027	0.0029	0.0031	0.0035	0.0037	0.0039	0.0042
C15	0.4641	0.4112	2662	0.0007	0.0011	0.0016	0.0013	0.0015	0.0015	0.0018	0.0019	0.0024	0.0024
C16	0.4574	0.4094	2742	0.0007	0.0008	0.0012	0.0013	0.0015	0.0015	0.0020	0.0017	0.0017	0.0020
C17	0.4712	0.4142	2592	0.0013	0.0014	0.0018	0.0026	0.0027	0.0027	0.0028	0.0035	0.0036	0.0045
C18	0.4616	0.4127	2709	0.0014	0.0021	0.0026	0.0030	0.0031	0.0032	0.0037	0.0040	0.0039	0.0043
C19	0.4631	0.4129	2690	0.0013	0.0016	0.0023	0.0026	0.0027	0.0028	0.0035	0.0031	0.0038	0.0042
C20	0.472	0.4177	2609	0.0012	0.0018	0.0020	0.0020	0.0021	0.0022	0.0023	0.0025	0.0035	0.0033
C21	0.4632	0.4102	2667	0.0022	0.0027	0.0028	0.0030	0.0031	0.0031	0.0037	0.0036	0.0046	0.0045
C22	0.4667	0.4149	2657	0.0010	0.0011	0.0016	0.0017	0.0017	0.0017	0.0021	0.0019	0.0032	0.0038
Avg.	0.4654	0.4138	2666	0.0013	0.0017	0.0020	0.0024	0.0025	0.0026	0.0030	0.0031	0.0035	0.0038
Min.	0.4574	0.4094	2592	0.0007	0.0008	0.0008	0.0013	0.0015	0.0015	0.0018	0.0017	0.0017	0.0020
Max.	0.4720	0.4189	2742	0.0022	0.0027	0.0028	0.0035	0.0036	0.0037	0.0042	0.0045	0.0049	0.0051
Med.	0.4656	0.4133	2661	0.0013	0.0016	0.0020	0.0025	0.0026	0.0027	0.0032	0.0032	0.0036	0.0042
St. Dev.	0.0038	0.0027	35	0.0004	0.0005	0.0005	0.0006	0.0007	0.0007	0.0008	0.0008	0.0008	0.0009

S/N	Chromaticity Shift($\Delta u'v'$)				
	11000 h	12000 h	13000 h	14000 h	15000 h
C01	0.0044	0.0046	0.0053	0.0058	0.0059
C02	0.0042	0.0041	0.0048	0.0051	0.0058
C03	0.0052	0.0055	0.0050	0.0052	0.0057
C04	0.0044	0.0045	0.0054	0.0058	0.0060
C05	0.0048	0.0057	0.0063	0.0062	0.0070
C06	0.0034	0.0041	0.0041	0.0050	0.0049
C07	0.0047	0.0049	0.0053	0.0058	0.0055
C08	0.0047	0.0052	0.0058	0.0061	0.0062
C09	0.0028	0.0030	0.0039	0.0036	0.0040
C10	0.0050	0.0058	0.0065	0.0063	0.0064
C11	0.0044	0.0045	0.0051	0.0056	0.0062
C12	0.0039	0.0042	0.0054	0.0050	0.0052
C13	0.0042	0.0039	0.0048	0.0053	0.0061
C14	0.0048	0.0051	0.0062	0.0067	0.0062
C15	0.0029	0.0033	0.0040	0.0042	0.0043
C16	0.0023	0.0028	0.0036	0.0039	0.0045
C17	0.0046	0.0044	0.0048	0.0055	0.0062
C18	0.0044	0.0058	0.0059	0.0064	0.0064
C19	0.0042	0.0051	0.0051	0.0055	0.0057
C20	0.0038	0.0038	0.0037	0.0042	0.0053
C21	0.0052	0.0055	0.0057	0.0062	0.0064
C22	0.0041	0.0035	0.0043	0.0048	0.0049
Avg.	0.0042	0.0045	0.0050	0.0054	0.0057
Min.	0.0023	0.0028	0.0036	0.0036	0.0040
Max.	0.0052	0.0058	0.0065	0.0067	0.0070
Med.	0.0044	0.0045	0.0051	0.0055	0.0059
St. Dev.	0.0008	0.0009	0.0008	0.0008	0.0008

9 **TEMPERATURE MEASUREMENT POINT (TMP) DEFINITION**

Ta (Measured Point of Ambient Temperature)



Ts (Measured Point of Case Temperature)

