

## 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
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	:	Low-Mid Power LED
Model/ Serial Number	:	2835ST/JKE Series
Manufacturer	:	Everlight Electronics Co., LTD
Rating	:	DC 120 mA
Test Standard/Method	:	IES LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources
Revision	:	2

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.

Signed for and on behalf of  
EVERLIGHT Ltd.

*Luca Tai*

**1 DATE OF RECEIPT OF SAMPLES**

Nov. 30, 2017

**2 DATE(S) OF PERFORMANCE OF THE TEST**

Dec. 3, 2017 ~ Jan. 24, 2019

**3 MATERIAL / SERIAL NUMBER****4 IDENTITY OF SAMPLES**

Quantity	Model	Serial Number
20	2835ST/JKE Series	# A01- # A20(55 °C)
20	2835ST/JKE Series	# C01- # C20(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-80-08 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( $\Phi_v$ )**

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 MEASUREMENT OF LEDS and IES LM-80-08 Approved

Method: Measuring Lumen Maintenance of LED Light Sources, when the UUTs were powered with constant current of  $I_F$ .

**5.2.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIE<sub>x</sub>, CIE<sub>y</sub>) & 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 2<sup>nd</sup> 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. :  
L2773-130705

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)	2018/2/18	2021/2/18
Integrating Sphere	Labsphere	LMS-100CM			
Standard Light Source	Labsphere	SCL-1400			
Source Meter	Keithley	2612A	Chroma (TAF 0245)	2018/9/15	2019/9/15
Source Meter	Agilent	N5751A	宇正 (TAF 0742)	2018/10/18	2019/10/18
Digital Multimeter	Agilent	E3634A	ETC (TAF 0025)	2018/9/28	2019/9/28

### 7.2 Environmental Conditions:

Temperature: (25 ± 1) °C

Relative Humidity: < 65 %RH

### 7.3 Measurement Conditions:

Interval Time: 1000 h

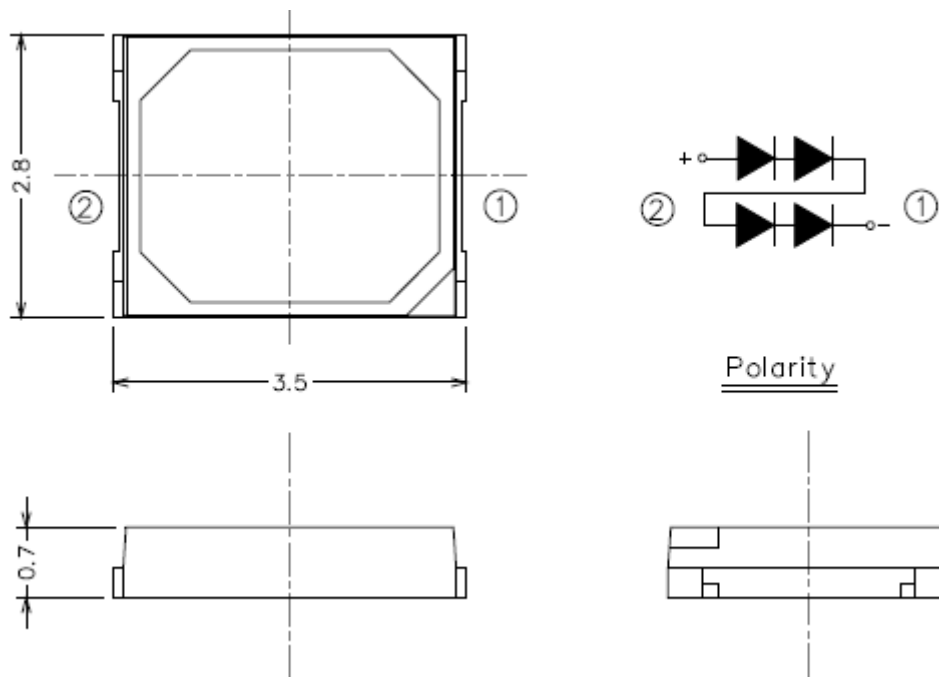
Warm up Time: < 1 minute (initial)

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

#### 7.4 UUT Conditions:

Drive Current:	DC 120 mA
Forward Voltage:	9V
Power Consumption:	1.0 W (Rated Value)
Lumen:	110 lm – 125 lm
CCT:	2700K
Package Dimension:	L 3.5 mm x W 2.8 mm
Prior operation:	0 h
Total Operation Duration:	10000 h

#### 7.5 Photograph of device



## 8 TEST SUMMARY:

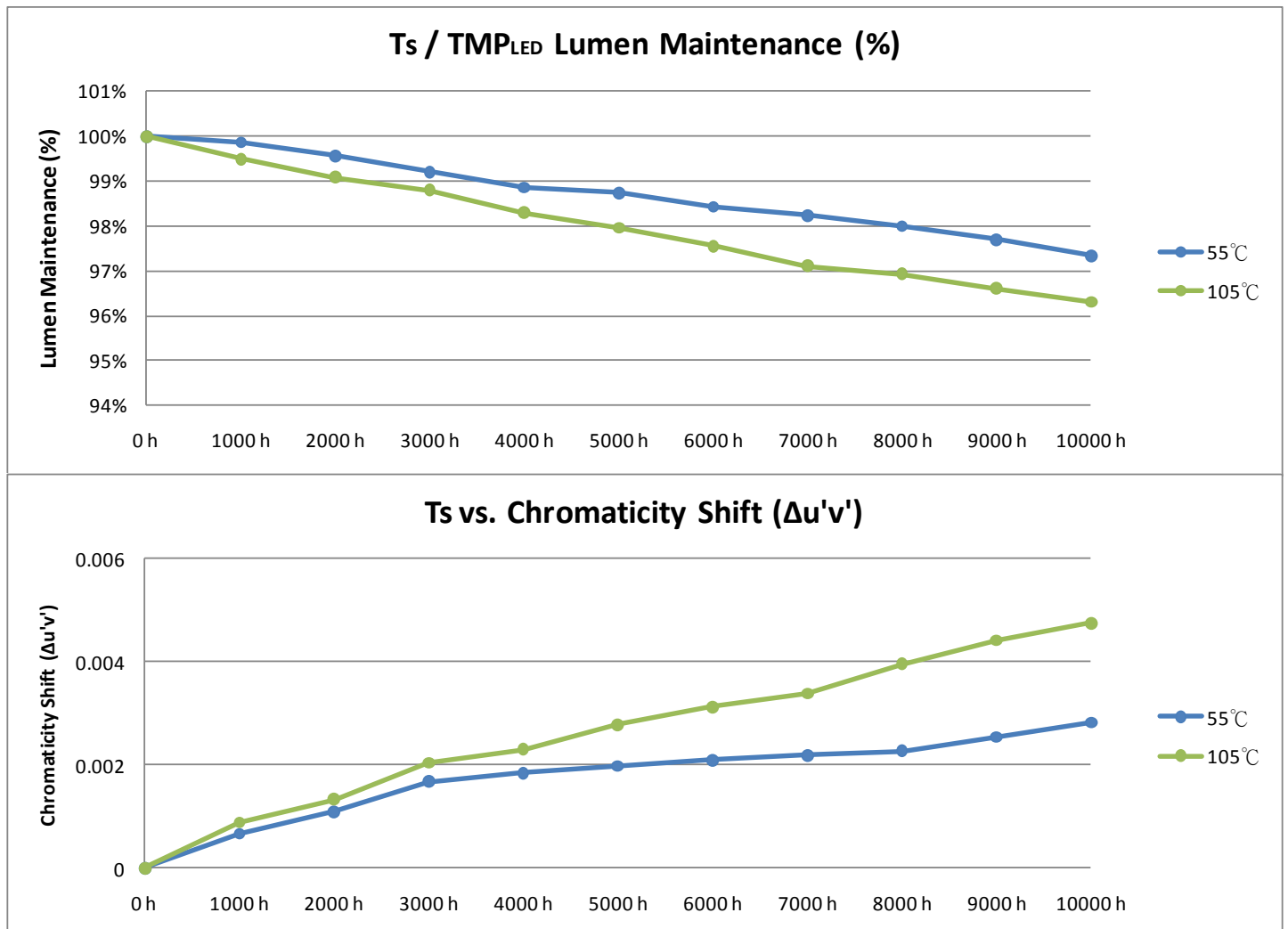
### 8.1 Data Summary of Lumen and Color Maintenance

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	116.4	9.1	100%	99.86%	99.57%	99.21%	98.85%	98.74%	98.43%	98.23%	97.99%	97.69%	97.33%
105 °C	116.1	9.1	100%	99.49%	99.08%	98.80%	98.29%	97.96%	97.56%	97.11%	96.93%	96.61%	96.31%

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	0.2619	0.5281	2713	0.00066	0.00109	0.00167	0.00184	0.00197	0.00209	0.00218	0.00227	0.00254	0.00282
105 °C	0.2624	0.5282	2702	0.00088	0.00133	0.00204	0.00230	0.00278	0.00312	0.00338	0.00396	0.00441	0.00475

### 8.2 Chart of lumen maintenance and TM-21 projection

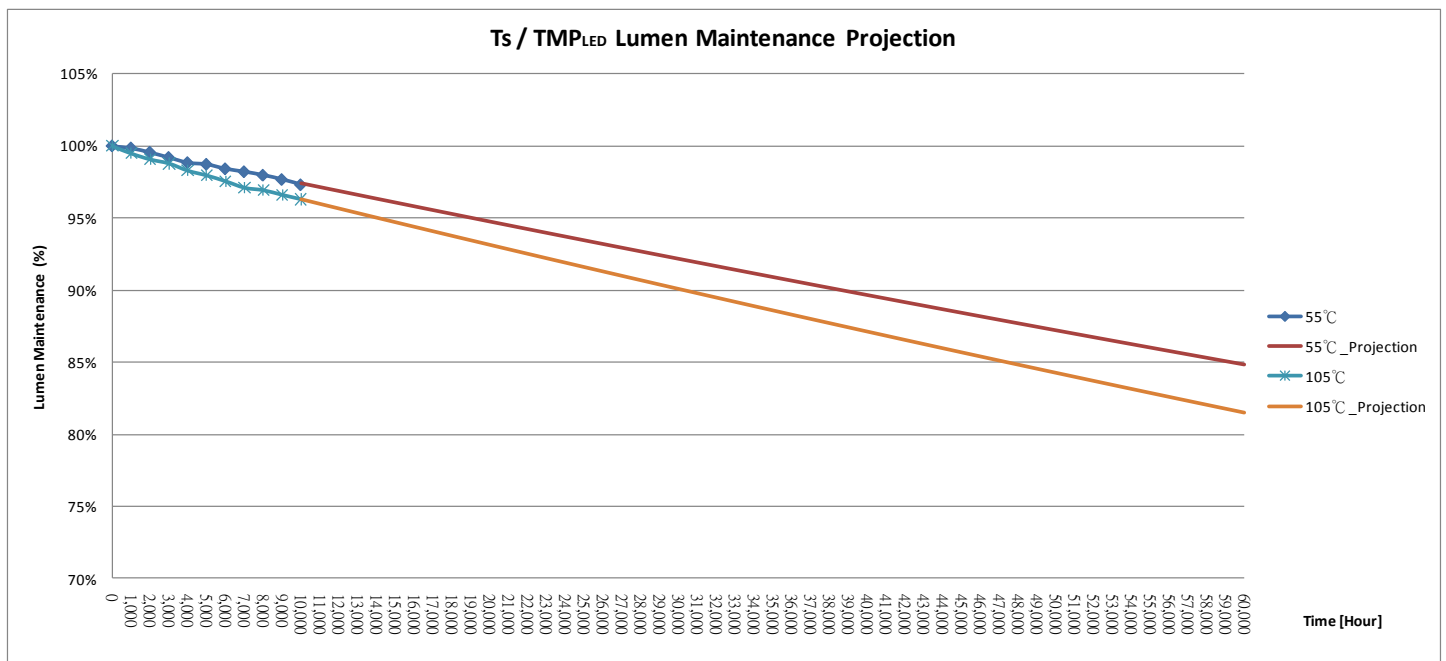
#### 8.2.1 Chart of lumen maintenance



## 8.2.2 LM-80 test and TM-21 Projection

Table 1: Report at each LM-80 Test Condition

Case Temperature 1		Case Temperature 2	
Temperature (°C):	55	Temperature (°C):	105
Temperature (°K):	328.15	Temperature (°K):	378.15
$\alpha$ :	2.76E-06	$\alpha$ :	3.32E-06
B:	1.00	B:	1.00
Reported L70 (hrs):	>60000	Reported L70 (hrs):	>60000
Reported L80 (hrs):	>60000	Reported L80 (hrs):	>60000
Reported L90 (hrs):	39000	Reported L90 (hrs):	30000



Lumen Maintenance and Color Maintenance Test

8.2.3 Test Condition: Ts = 55 °C

Requirement

Case Temperature [Ts]: 53.8 °C

Average [Ts]: 53.8 °C

Ambient Temperature [Ta]: 52.1 °C

Average [Ta]: 52.2 °C

Driver Current: 120 mA

Air Flow: Minimized

Measurement Current: 120 mA

Relative Humidity: < 65 %RH

8.2.3.1 Total Luminous Flux ( $\Phi_v$ )

S/N	Initial(0 h)		Luminous Maintenance( $\Phi_v$ )									
	TLF(lm)	Vf(V)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000 h
A01	113.7	9.1	100.66%	100.34%	99.75%	99.62%	99.31%	99.28%	98.81%	97.85%	97.75%	100.66%
A02	115.5	9.1	99.57%	98.94%	98.40%	98.32%	98.05%	97.76%	97.14%	97.09%	96.91%	99.57%
A03	114.8	9.1	99.76%	99.00%	98.51%	98.31%	98.04%	97.91%	97.68%	97.68%	96.86%	99.76%
A04	115.9	9.1	99.81%	98.83%	98.13%	98.07%	97.49%	97.17%	96.50%	96.30%	95.81%	99.81%
A05	116.5	9.1	100.07%	99.78%	99.22%	99.12%	99.08%	98.95%	98.19%	97.63%	97.05%	100.07%
A06	117.6	9.1	100.08%	99.94%	99.36%	99.30%	98.56%	98.44%	99.26%	99.18%	98.88%	100.08%
A07	118.1	9.1	99.59%	99.31%	98.70%	98.56%	98.32%	97.87%	97.59%	97.27%	97.22%	99.59%
A08	116.1	9.1	99.65%	99.39%	98.65%	98.56%	98.03%	97.76%	97.52%	97.29%	97.28%	99.65%
A09	116.8	9.1	99.68%	99.57%	99.10%	98.97%	98.74%	98.62%	98.29%	97.76%	97.39%	99.68%
A10	117.0	9.1	99.95%	99.64%	99.11%	98.99%	98.56%	98.37%	97.78%	97.41%	96.71%	99.95%
A11	117.1	9.1	99.49%	99.43%	98.94%	98.85%	98.58%	98.36%	97.72%	97.43%	96.81%	99.49%
A12	117.5	9.1	99.57%	99.51%	98.89%	98.74%	98.56%	98.29%	98.12%	97.99%	97.77%	99.57%
A13	116.9	9.1	99.85%	99.71%	98.78%	98.70%	98.43%	98.34%	98.15%	97.93%	97.43%	99.85%
A14	116.8	9.1	99.66%	99.52%	98.31%	98.18%	98.06%	97.91%	97.56%	96.97%	96.51%	99.66%
A15	116.3	9.1	99.82%	99.66%	98.48%	98.34%	98.22%	98.02%	98.45%	98.39%	97.78%	99.82%
A16	115.6	9.1	100.59%	100.26%	99.62%	99.51%	99.44%	99.26%	99.22%	98.96%	98.93%	100.59%
A17	116.6	9.1	99.71%	99.46%	99.09%	99.01%	98.42%	98.12%	98.93%	98.78%	98.31%	99.71%
A18	115.4	9.1	100.14%	100.00%	98.94%	98.82%	98.37%	98.10%	97.42%	97.38%	96.71%	100.14%
A19	116.7	9.1	99.92%	99.64%	98.83%	98.67%	98.57%	98.46%	97.99%	97.28%	97.86%	99.92%
A20	117.3	9.1	99.59%	99.41%	98.25%	98.14%	97.77%	97.58%	97.49%	97.33%	96.70%	99.59%
Avg.	116.4	9.1	99.86%	99.57%	98.85%	98.74%	98.43%	98.23%	97.99%	97.69%	97.33%	99.86%
Min.	113.7	9.1	99.49%	98.83%	98.13%	98.07%	97.49%	97.17%	96.50%	96.30%	95.81%	99.49%
Max.	118.1	9.1	100.66%	100.34%	99.75%	99.62%	99.44%	99.28%	99.26%	99.18%	98.93%	100.66%
Med.	116.6	9.1	99.78%	99.54%	98.86%	98.72%	98.43%	98.21%	97.88%	97.53%	97.25%	99.78%
STD.	1.0	0.0	0.003	0.004	0.004	0.004	0.005	0.005	0.007	0.007	0.008	0.003

### 8.2.3.2 CCT, CIE<sub>x</sub>, CIE<sub>y</sub> & Chromaticity Shift( $\Delta u'v'$ )

S/N	Initial( 0 h)			Chromaticity Shift( $\Delta u'v'$ )									
	CIE <sub>x</sub>	CIE <sub>y</sub>	CCT	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000 h
A01	0.4597	0.4100	2701	0.00032	0.00064	0.00120	0.00153	0.00161	0.00161	0.00170	0.00181	0.00214	0.00240
A02	0.4620	0.4124	2687	0.00082	0.00108	0.00180	0.00210	0.00231	0.00231	0.00231	0.00253	0.00262	0.00267
A03	0.4611	0.4143	2714	0.00061	0.00095	0.00170	0.00181	0.00191	0.00200	0.00200	0.00222	0.00260	0.00307
A04	0.4584	0.4112	2727	0.00081	0.00126	0.00200	0.00210	0.00210	0.00222	0.00204	0.00228	0.00260	0.00251
A05	0.4574	0.4099	2733	0.00041	0.00072	0.00140	0.00143	0.00161	0.00170	0.00170	0.00182	0.00235	0.00286
A06	0.4580	0.4125	2744	0.00020	0.00045	0.00095	0.00121	0.00133	0.00153	0.00133	0.00140	0.00150	0.00173
A07	0.4615	0.4142	2708	0.00073	0.00134	0.00191	0.00190	0.00192	0.00206	0.00225	0.00251	0.00320	0.00362
A08	0.4594	0.4127	2726	0.00058	0.00114	0.00171	0.00180	0.00201	0.00231	0.00242	0.00245	0.00245	0.00255
A09	0.4639	0.4130	2666	0.00061	0.00108	0.00170	0.00190	0.00200	0.00211	0.00222	0.00241	0.00275	0.00301
A10	0.4601	0.4129	2717	0.00051	0.00085	0.00150	0.00151	0.00161	0.00170	0.00170	0.00150	0.00130	0.00143
A11	0.4586	0.4116	2728	0.00080	0.00126	0.00180	0.00191	0.00211	0.00233	0.00253	0.00261	0.00262	0.00321
A12	0.4615	0.4142	2708	0.00051	0.00103	0.00170	0.00180	0.00190	0.00201	0.00224	0.00241	0.00281	0.00330
A13	0.4608	0.4118	2700	0.00050	0.00095	0.00150	0.00171	0.00181	0.00192	0.00212	0.00230	0.00252	0.00293
A14	0.4610	0.4143	2716	0.00132	0.00190	0.00221	0.00230	0.00241	0.00251	0.00262	0.00255	0.00275	0.00352
A15	0.4601	0.4135	2723	0.00126	0.00184	0.00230	0.00250	0.00260	0.00270	0.00291	0.00270	0.00291	0.00321
A16	0.4603	0.4137	2721	0.00041	0.00092	0.00151	0.00165	0.00192	0.00202	0.00220	0.00240	0.00284	0.00296
A17	0.4599	0.4114	2709	0.00032	0.00072	0.00110	0.00132	0.00141	0.00163	0.00180	0.00200	0.00250	0.00283
A18	0.4574	0.4091	2726	0.00070	0.00104	0.00163	0.00194	0.00224	0.00238	0.00225	0.00202	0.00209	0.00139
A19	0.4628	0.4132	2683	0.00091	0.00126	0.00160	0.00192	0.00202	0.00212	0.00247	0.00255	0.00283	0.00394
A20	0.4588	0.4117	2726	0.00092	0.00130	0.00220	0.00250	0.00260	0.00270	0.00281	0.00293	0.00337	0.00327
Avg.	0.4601	0.4124	2713	0.00066	0.00109	0.00167	0.00184	0.00197	0.00209	0.00218	0.00227	0.00254	0.00282
Min.	0.4574	0.4091	2666	0.00020	0.00045	0.00095	0.00121	0.00133	0.00153	0.00133	0.00140	0.00130	0.00139
Max.	0.4639	0.4143	2744	0.00132	0.00190	0.00230	0.00250	0.00260	0.00270	0.00291	0.00293	0.00337	0.00394
Med.	0.4601	0.4126	2717	0.00061	0.00106	0.00170	0.00186	0.00196	0.00209	0.00223	0.00241	0.00261	0.00294
STD.	0.0017	0.0015	18.70	0.00029	0.00036	0.00035	0.00035	0.00035	0.00035	0.00040	0.00040	0.00049	0.00068



### 8.2.4 Test Condition: Ts = 105 °C

Requirement	
Case Temperature [Ts]: 103.8 °C	Average [Ts]: 103.8 °C
Ambient Temperature [Ta]: 102.9 °C	Average [Ta]: 102.9 °C
Driver Current: 120 mA	Air Flow: Minimized
Measurement Current: 120 mA	Relative Humidity: < 65 %RH

#### 8.2.4.1 Total Luminous Flux (Φv)

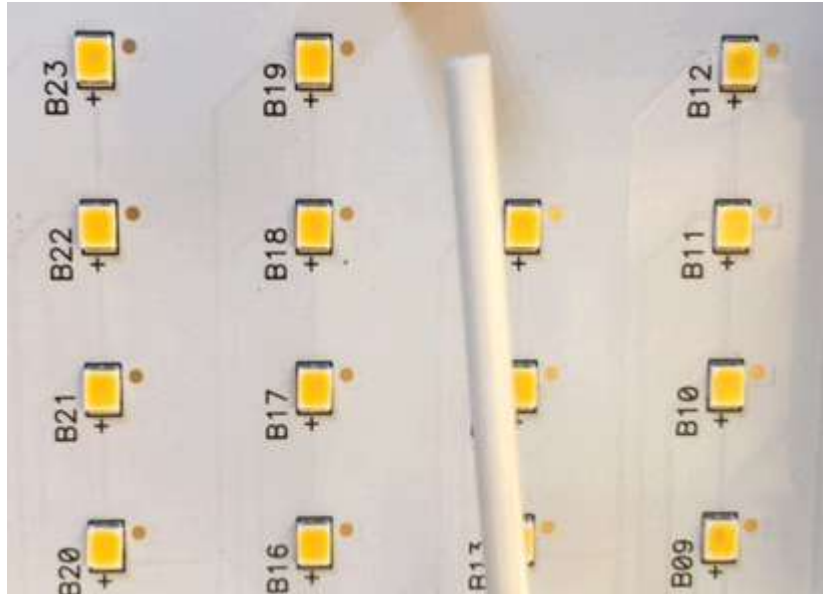
S/N	Initial(0 h)		Luminous Maintenance(Φv)									
	TLF(lm)	Vf(V)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000 h
B01	115.8	9.1	99.64%	99.04%	97.80%	97.65%	97.24%	97.03%	96.78%	96.42%	95.87%	99.64%
B02	114.3	9.1	99.22%	98.82%	98.39%	98.33%	98.12%	97.95%	97.79%	97.23%	97.16%	99.22%
B03	115.2	9.1	99.40%	98.80%	97.68%	96.84%	96.80%	96.10%	95.85%	95.67%	95.18%	99.40%
B04	114.9	9.1	99.74%	99.34%	98.23%	97.45%	96.47%	96.40%	96.17%	95.90%	95.70%	99.74%
B05	117.0	9.1	99.45%	99.19%	98.81%	98.51%	98.44%	97.40%	97.12%	97.02%	96.87%	99.45%
B06	115.1	9.1	99.42%	98.85%	97.47%	96.78%	96.72%	96.71%	96.65%	96.43%	96.33%	99.42%
B07	116.2	9.1	99.63%	99.36%	98.75%	98.41%	97.90%	97.81%	97.68%	97.40%	97.12%	99.63%
B08	116.4	9.1	99.77%	99.51%	98.86%	98.81%	98.77%	98.75%	98.58%	98.26%	97.92%	99.77%
B09	116.0	9.1	100.01%	99.11%	98.45%	98.07%	97.46%	97.06%	96.76%	96.65%	96.55%	100.01%
B10	116.1	9.1	99.61%	99.35%	98.99%	98.14%	97.23%	97.14%	96.98%	96.48%	96.44%	99.61%
B11	117.8	9.1	99.47%	99.09%	98.36%	98.28%	97.30%	97.04%	96.96%	96.54%	96.08%	99.47%
B12	116.6	9.1	99.48%	99.04%	97.42%	97.32%	96.84%	96.80%	96.68%	96.17%	95.60%	99.48%
B13	115.8	9.1	99.56%	99.02%	98.01%	97.96%	97.14%	96.18%	96.03%	95.61%	95.25%	99.56%
B14	116.6	9.1	99.59%	99.26%	98.81%	98.76%	98.75%	98.52%	98.39%	97.93%	97.32%	99.59%
B15	117.2	9.1	98.95%	98.71%	97.74%	97.77%	97.59%	96.65%	96.44%	96.05%	95.76%	98.95%
B16	116.6	9.1	99.32%	98.96%	98.29%	98.04%	97.93%	97.03%	96.87%	96.48%	96.26%	99.32%
B17	115.5	9.1	99.54%	99.23%	98.58%	98.08%	97.54%	96.54%	96.42%	96.41%	96.21%	99.54%
B18	116.9	9.1	99.03%	98.72%	97.94%	97.88%	97.71%	96.77%	96.66%	96.18%	95.62%	99.03%
B19	115.9	9.1	99.59%	99.24%	98.86%	98.33%	98.19%	98.12%	97.87%	97.73%	97.34%	99.59%
B20	116.0	9.1	99.40%	98.99%	98.46%	97.81%	97.01%	96.15%	96.00%	95.64%	95.52%	99.40%
Avg.	116.1	9.1	99.49%	99.08%	98.29%	97.96%	97.56%	97.11%	96.93%	96.61%	96.31%	99.49%
Min.	114.3	9.1	98.95%	98.71%	97.42%	96.78%	96.47%	96.10%	95.85%	95.61%	95.18%	98.95%
Max.	117.8	9.1	100.01%	99.51%	98.99%	98.81%	98.77%	98.75%	98.58%	98.26%	97.92%	100.01%
Med.	116.1	9.1	99.51%	99.07%	98.38%	98.05%	97.50%	97.03%	96.77%	96.46%	96.23%	99.51%
STD.	0.8	0.0	0.002	0.002	0.005	0.006	0.007	0.008	0.008	0.008	0.008	0.002

### 8.2.4.2 CCT, CIE<sub>x</sub>, CIE<sub>y</sub> & Chromaticity Shift( $\Delta u'v'$ )

S/N	Initial( 0 h)			Chromaticity Shift( $\Delta u'v'$ )									
	CIE <sub>x</sub>	CIE <sub>y</sub>	CCT	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000 h
B01	0.4640	0.4159	2687	0.00086	0.00128	0.00212	0.00244	0.00279	0.00323	0.00355	0.00453	0.00474	0.00528
B02	0.4602	0.4130	2717	0.00085	0.00142	0.00226	0.00256	0.00305	0.00336	0.00367	0.00447	0.00519	0.00559
B03	0.4587	0.4110	2722	0.00122	0.00156	0.00242	0.00269	0.00330	0.00352	0.00357	0.00418	0.00439	0.00501
B04	0.4566	0.4061	2714	0.00095	0.00108	0.00180	0.00211	0.00271	0.00301	0.00303	0.00347	0.00357	0.00383
B05	0.4589	0.4128	2734	0.00078	0.00142	0.00219	0.00224	0.00282	0.00326	0.00341	0.00402	0.00442	0.00506
B06	0.4596	0.4107	2707	0.00089	0.00114	0.00184	0.00188	0.00246	0.00277	0.00295	0.00350	0.00383	0.00405
B07	0.4645	0.4143	2669	0.00114	0.00156	0.00212	0.00240	0.00294	0.00316	0.00357	0.00409	0.00439	0.00470
B08	0.4611	0.4120	2698	0.00122	0.00149	0.00213	0.00262	0.00285	0.00320	0.00355	0.00453	0.00510	0.00537
B09	0.4576	0.4092	2724	0.00071	0.00149	0.00198	0.00238	0.00282	0.00313	0.00348	0.00409	0.00448	0.00479
B10	0.4603	0.4124	2711	0.00081	0.00135	0.00191	0.00218	0.00244	0.00294	0.00326	0.00373	0.00430	0.00439
B11	0.4577	0.4119	2743	0.00085	0.00156	0.00219	0.00238	0.00305	0.00340	0.00349	0.00408	0.00469	0.00516
B12	0.4646	0.4150	2672	0.00099	0.00170	0.00227	0.00272	0.00297	0.00351	0.00414	0.00457	0.00502	0.00528
B13	0.4601	0.4117	2708	0.00098	0.00136	0.00225	0.00238	0.00298	0.00323	0.00348	0.00396	0.00425	0.00430
B14	0.4600	0.4098	2695	0.00058	0.00106	0.00178	0.00194	0.00226	0.00272	0.00297	0.00368	0.00461	0.00501
B15	0.4670	0.4189	2670	0.00085	0.00122	0.00178	0.00233	0.00294	0.00337	0.00337	0.00383	0.00430	0.00455
B16	0.4613	0.4124	2697	0.00072	0.00113	0.00170	0.00199	0.00262	0.00310	0.00323	0.00376	0.00439	0.00453
B17	0.4612	0.4129	2702	0.00082	0.00148	0.00262	0.00297	0.00348	0.00386	0.00396	0.00435	0.00488	0.00533
B18	0.4640	0.4128	2664	0.00081	0.00099	0.00163	0.00187	0.00226	0.00250	0.00310	0.00373	0.00425	0.00474
B19	0.4588	0.4125	2733	0.00045	0.00085	0.00163	0.00177	0.00204	0.00228	0.00289	0.00338	0.00385	0.00416
B20	0.4622	0.4117	2678	0.00112	0.00156	0.00219	0.00218	0.00279	0.00291	0.00291	0.00329	0.00362	0.00381
Avg.	0.4609	0.4124	2702	0.00088	0.00133	0.00204	0.00230	0.00278	0.00312	0.00338	0.00396	0.00441	0.00475
Min.	0.4566	0.4061	2664	0.00045	0.00085	0.00163	0.00177	0.00204	0.00228	0.00289	0.00329	0.00357	0.00381
Max.	0.4670	0.4189	2743	0.00122	0.00170	0.00262	0.00297	0.00348	0.00386	0.00414	0.00457	0.00519	0.00559
Med.	0.4603	0.4124	2705	0.00085	0.00139	0.00212	0.00236	0.00282	0.00318	0.00345	0.00399	0.00439	0.00476
STD.	0.0027	0.0026	23.40	0.00020	0.00023	0.00027	0.00032	0.00035	0.00037	0.00034	0.00040	0.00046	0.00053

## 9 TEMPERATURE MEASUREMENT POINT (TMP) DEFINITION

Ta (Measured Point of Ambient Temperature)



Ts (Measured Point of Case Temperature)

