

## 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	:	2835S 0.2W Series
Manufacturer	:	Everlight Electronics Co., LTD
Rating	:	DC 60 mA
Test Standard/Method	:	IES LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources
Revision	:	4

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**

Aug. 2, 2016

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

Aug. 2, 2016 ~ Sep. 22, 2017

**3 MATERIAL / SERIAL NUMBER**

67-23S/KK8C-HXXXXXXXXZ6/2T

**4 IDENTITY OF SAMPLES**

Quantity	Model	Serial Number
20	2835S 0.2W Series	# A01- # A20(55 °C)
20	2835S 0.2W Series	# B01- # B20(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 MRASUREMENT 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 If.

5.2.2 Correlated Color Temperature (CCT), CIE Color Coordinate (CIEx, CIEy) & 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)	2016/2/18	2019/2/18
Integrating Sphere	Labsphere	LMS-100CM			
Standard Light Source	Labsphere	SCL-1400			
Source Meter	Keithley	2612A	Chroma (TAF 0245)	2017/3/15	2018/3/15
Source Meter	Agilent	N5751A	宇正 (TAF 0742)	2017/3/18	2018/3/18
Digital Multimeter	Agilent	E3634A	ETC (TAF 0025)	2017/3/28	2018/3/28

7.2 Environmental Conditions:

Temperature: (25 ± 1) °C

Relative Humidity: < 65 %RH

7.3 Measurement Conditions:

Interval Time: 1000 h

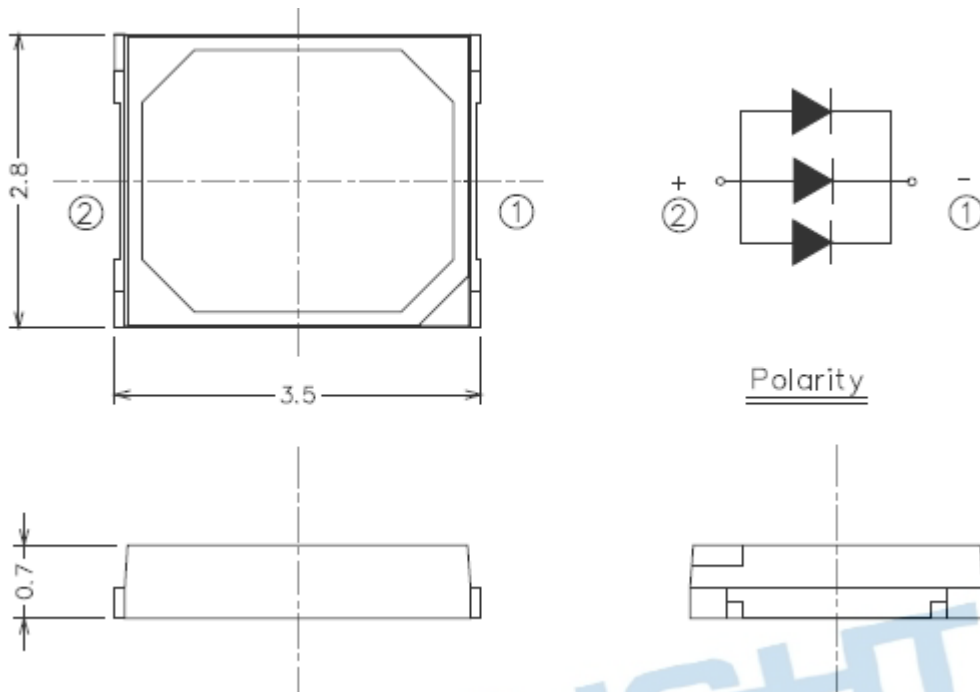
Warm up Time: < 1 minute (initial)

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

### 7.4 UUT Conditions:

Drive Current:	DC 60 mA
Forward Voltage:	3.0 V
Power Consumption:	0.2 W (Rated Value)
Lumen:	33 lm – 37 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:**

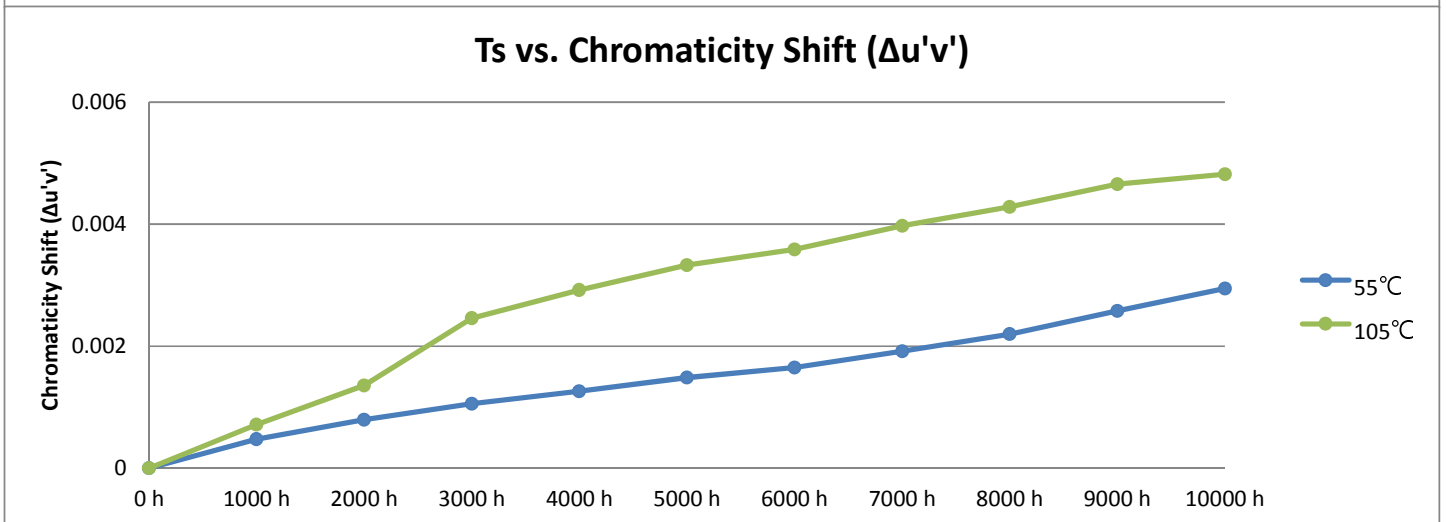
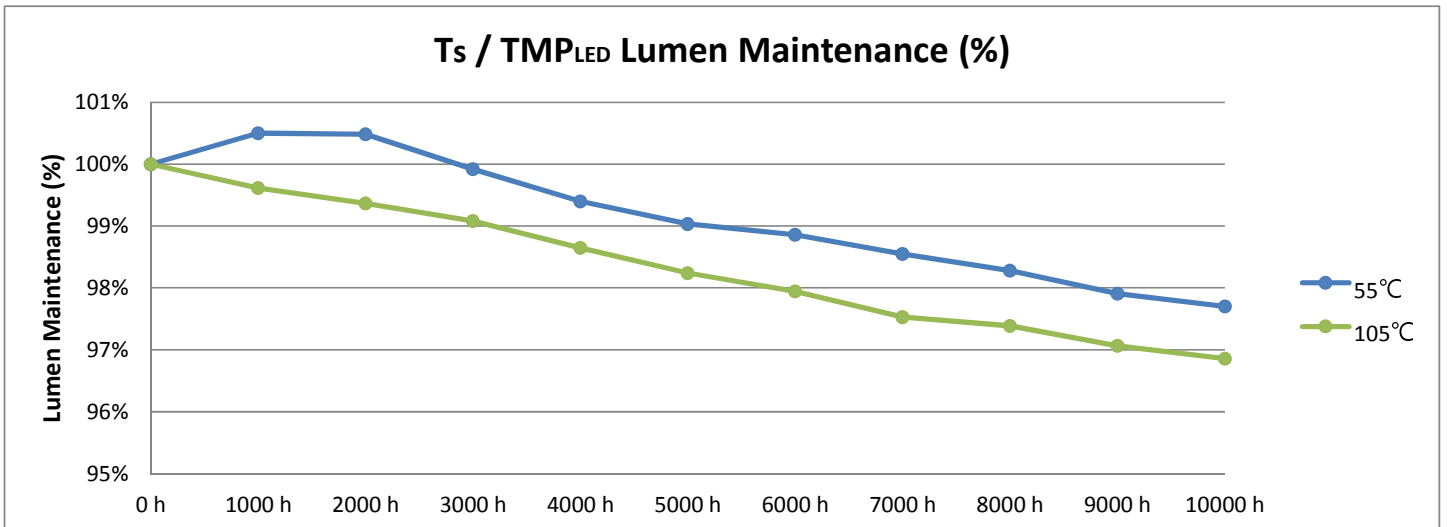
**8.1 Data Summary of Lumen and Color Maintenance**

Temp.	Initial( 0 h)		Luminous Maintenance (%)										
	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	34.2	3.0	100%	100.50%	100.48%	99.92%	99.40%	99.03%	98.86%	98.55%	98.28%	97.91%	97.70%
105 °C	34.1	3.0	100%	99.62%	99.37%	99.08%	98.65%	98.24%	97.95%	97.53%	97.39%	97.06%	96.86%

Temp.	Initial( 0 h)			Chromaticity Shift ( $\Delta u'v'$ )									
	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	0.2628	0.5295	2674	0.00048	0.00080	0.00106	0.00126	0.00149	0.00165	0.00192	0.00220	0.00258	0.00294
105 °C	0.2623	0.5298	2698	0.00071	0.00135	0.00246	0.00292	0.00333	0.00359	0.00397	0.00428	0.00466	0.00482

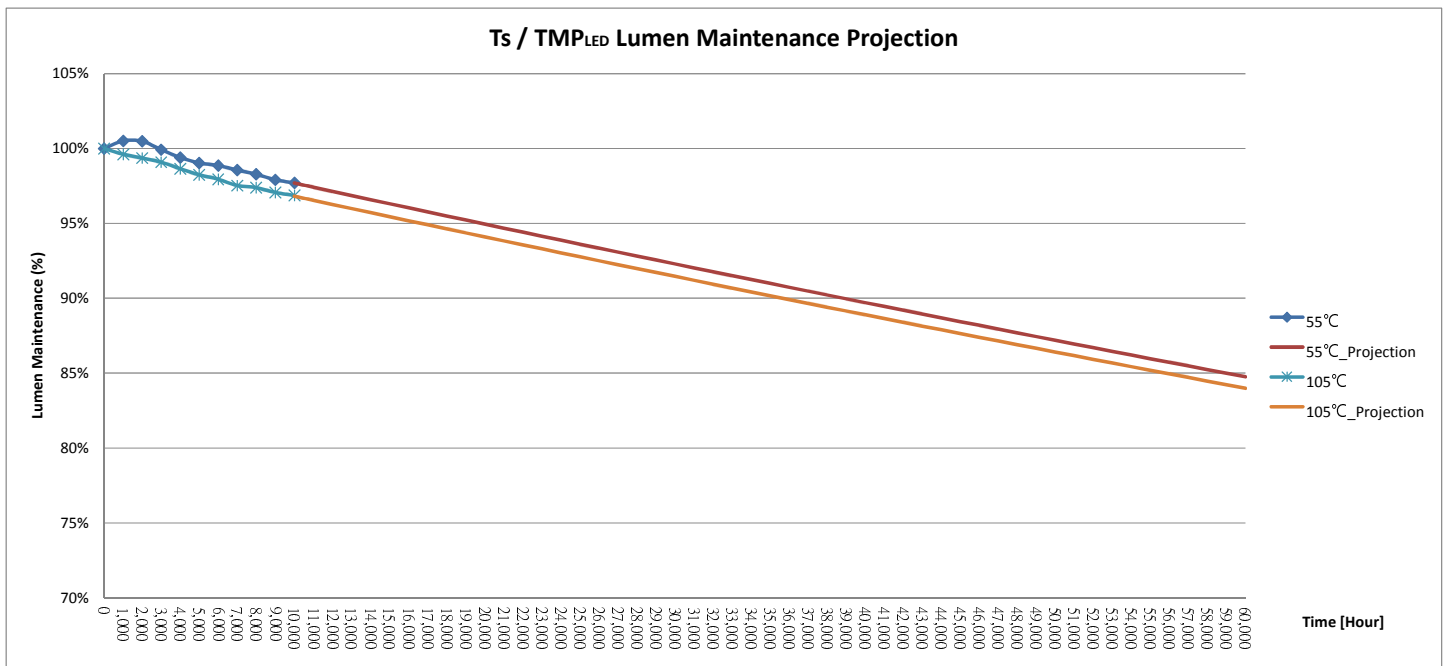
**8.2 Chart of lumen maintenance and TM-21 projection**

**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
$\alpha$ :	2.84E-06	$\alpha$ :	2.84E-06
B:	1.01	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):	36000



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:	60 mA	Air Flow: Minimized
Measurement Current:	60 mA	Relative Humidity: < 65 %RH

8.2.3.1 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
A01	34.2	3.0	99.65%	99.61%	98.95%	98.16%	97.71%	97.63%	97.53%	97.38%	97.03%	96.83%
A02	34.0	2.9	102.88%	103.14%	102.15%	101.91%	101.33%	101.36%	100.86%	100.70%	100.00%	99.85%
A03	33.8	3.0	100.66%	100.69%	99.99%	99.60%	99.26%	98.90%	98.62%	98.38%	97.51%	97.16%
A04	34.0	2.9	101.83%	101.77%	101.35%	100.77%	100.28%	100.09%	99.82%	99.60%	99.26%	99.09%
A05	33.6	3.0	100.35%	100.49%	100.19%	99.80%	99.17%	99.40%	99.14%	98.62%	98.77%	98.44%
A06	33.9	3.0	101.68%	101.85%	101.40%	100.87%	100.34%	100.18%	99.63%	99.40%	99.10%	98.96%
A07	33.8	2.9	100.75%	100.52%	99.67%	99.01%	98.46%	98.20%	97.92%	97.76%	97.33%	97.15%
A08	34.0	3.0	100.09%	100.11%	99.71%	99.26%	98.72%	98.94%	98.54%	98.18%	97.69%	97.42%
A09	34.0	2.9	101.75%	101.80%	100.94%	100.61%	100.23%	100.18%	99.81%	99.32%	98.93%	98.55%
A10	34.8	2.9	102.79%	102.68%	101.93%	101.38%	101.04%	101.12%	101.12%	101.11%	100.48%	100.39%
A11	34.2	3.0	100.11%	99.97%	99.48%	98.70%	98.39%	98.25%	98.13%	97.71%	97.16%	96.99%
A12	34.3	2.9	99.12%	99.07%	98.50%	97.85%	97.64%	97.45%	97.26%	97.37%	97.35%	97.17%
A13	34.3	3.0	101.15%	101.06%	100.80%	100.30%	99.88%	99.36%	98.55%	98.14%	97.96%	97.81%
A14	34.5	3.0	98.24%	98.03%	97.40%	96.72%	96.70%	96.69%	96.50%	96.02%	95.74%	95.54%
A15	34.3	3.0	98.42%	98.54%	97.77%	97.45%	97.40%	97.01%	96.89%	96.31%	95.48%	95.19%
A16	34.5	2.9	100.64%	100.37%	99.81%	99.16%	98.77%	98.23%	98.02%	97.62%	97.17%	97.03%
A17	34.4	2.9	99.30%	99.08%	98.63%	98.12%	97.90%	97.79%	97.39%	97.20%	97.08%	96.93%
A18	34.4	3.0	100.83%	100.64%	100.28%	99.78%	99.54%	99.30%	98.71%	98.78%	98.64%	98.38%
A19	34.3	2.9	100.88%	101.01%	100.59%	100.07%	99.84%	99.33%	98.95%	98.47%	98.32%	98.17%
A20	34.1	3.0	98.93%	99.24%	98.83%	98.49%	98.07%	97.79%	97.60%	97.47%	97.18%	97.00%
Avg.	34.2	3.0	100.50%	100.48%	99.92%	99.40%	99.03%	98.86%	98.55%	98.28%	97.91%	97.70%
Min.	33.6	2.9	98.24%	98.03%	97.40%	96.72%	96.70%	96.69%	96.50%	96.02%	95.48%	95.19%
Max.	34.8	3.0	102.88%	103.14%	102.15%	101.91%	101.33%	101.36%	101.12%	101.11%	100.48%	100.39%
Med.	34.2	3.0	100.65%	100.51%	99.90%	99.43%	98.97%	98.92%	98.55%	98.16%	97.60%	97.29%
STD.	0.3	0.02	0.013	0.013	0.013	0.014	0.013	0.013	0.012	0.013	0.013	0.013

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	0.4602	0.4140	2725	0.00036	0.00054	0.00072	0.00094	0.00106	0.00128	0.00172	0.00194	0.00252	0.00300
A02	0.4641	0.4110	2647	0.00073	0.00095	0.00117	0.00148	0.00170	0.00184	0.00237	0.00264	0.00314	0.00364
A03	0.4653	0.4144	2658	0.00028	0.00045	0.00076	0.00086	0.00106	0.00120	0.00166	0.00197	0.00230	0.00272
A04	0.4693	0.4180	2632	0.00020	0.00036	0.00050	0.00067	0.00086	0.00099	0.00099	0.00120	0.00149	0.00184
A05	0.4635	0.4140	2680	0.00028	0.00028	0.00036	0.00054	0.00081	0.00103	0.00149	0.00170	0.00213	0.00262
A06	0.4661	0.4178	2674	0.00032	0.00050	0.00064	0.00086	0.00114	0.00128	0.00156	0.00186	0.00220	0.00284
A07	0.4643	0.4158	2682	0.00057	0.00089	0.00108	0.00128	0.00142	0.00172	0.00186	0.00216	0.00244	0.00280
A08	0.4663	0.4163	2659	0.00072	0.00130	0.00162	0.00184	0.00197	0.00220	0.00237	0.00259	0.00273	0.00300
A09	0.4634	0.4132	2674	0.00057	0.00081	0.00139	0.00166	0.00194	0.00208	0.00242	0.00264	0.00295	0.00322
A10	0.4684	0.4213	2669	0.00050	0.00094	0.00114	0.00135	0.00163	0.00184	0.00191	0.00266	0.00314	0.00352
A11	0.4654	0.4148	2659	0.00064	0.00103	0.00148	0.00158	0.00172	0.00184	0.00202	0.00230	0.00275	0.00306
A12	0.4608	0.4113	2695	0.00032	0.00067	0.00081	0.00114	0.00128	0.00150	0.00202	0.00225	0.00280	0.00314
A13	0.4557	0.4157	2802	0.00036	0.00072	0.00114	0.00135	0.00164	0.00184	0.00184	0.00192	0.00220	0.00269
A14	0.4591	0.4090	2701	0.00042	0.00067	0.00086	0.00099	0.00113	0.00120	0.00127	0.00149	0.00192	0.00213
A15	0.4617	0.4114	2683	0.00058	0.00114	0.00139	0.00161	0.00197	0.00206	0.00255	0.00277	0.00304	0.00322
A16	0.4718	0.4190	2607	0.00081	0.00117	0.00152	0.00179	0.00201	0.00210	0.00247	0.00307	0.00342	0.00355
A17	0.4628	0.4131	2682	0.00042	0.00072	0.00117	0.00144	0.00164	0.00192	0.00208	0.00239	0.00288	0.00324
A18	0.4625	0.4128	2683	0.00064	0.00108	0.00130	0.00142	0.00172	0.00194	0.00239	0.00247	0.00288	0.00330
A19	0.4664	0.4159	2655	0.00040	0.00064	0.00092	0.00106	0.00141	0.00141	0.00149	0.00156	0.00192	0.00234
A20	0.4676	0.4127	2614	0.00042	0.00104	0.00117	0.00139	0.00158	0.00172	0.00189	0.00233	0.00273	0.00297
Avg.	0.4642	0.4146	2674	0.00048	0.00080	0.00106	0.00126	0.00149	0.00165	0.00192	0.00220	0.00258	0.00294
Min.	0.4557	0.4090	2607	0.00020	0.00028	0.00036	0.00054	0.00081	0.00099	0.00099	0.00120	0.00149	0.00184
Max.	0.4718	0.4213	2802	0.00081	0.00130	0.00162	0.00184	0.00201	0.00220	0.00255	0.00307	0.00342	0.00364
Med.	0.4642	0.4142	2674	0.00042	0.00076	0.00114	0.00135	0.00160	0.00178	0.00190	0.00227	0.00273	0.00300
STD.	0.0037	0.0030	41	0.00017	0.00029	0.00035	0.00037	0.00038	0.00038	0.00043	0.00048	0.00049	0.00046



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: 60 mA	Air Flow: Minimized
Measurement Current: 60 mA	Relative Humidity: < 65 %RH

8.2.4.1 Total Luminous Flux (Φv)

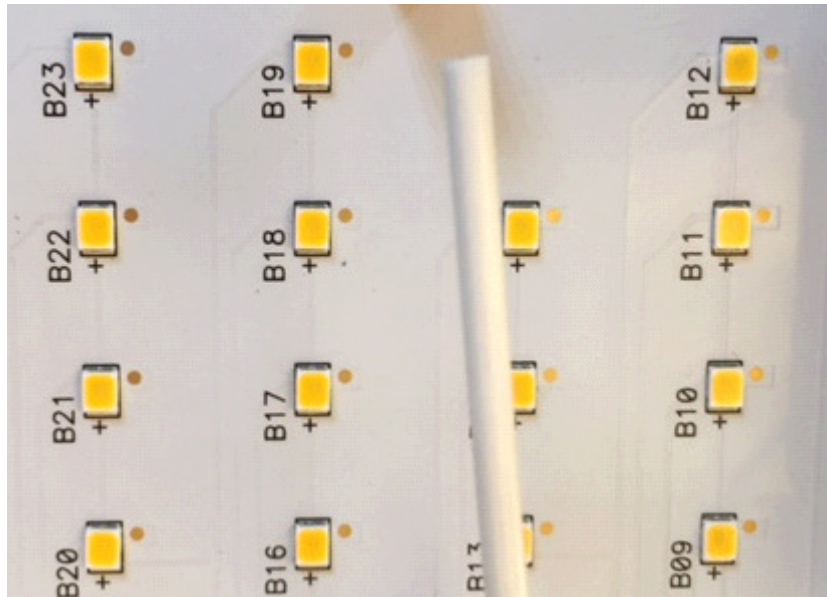
S/N	Initial(0 h)		Luminous Maintenance(Φv)									
	TLF(lm)	Vf(V)	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	7000 h	8000 h	9000 h	10000 h
B01	33.8	3.0	99.64%	99.41%	98.96%	98.45%	97.96%	97.81%	97.57%	97.37%	97.04%	96.76%
B02	33.9	2.9	99.79%	99.28%	98.93%	98.50%	97.99%	97.94%	97.76%	97.56%	97.12%	96.95%
B03	34.4	3.0	99.63%	99.52%	98.95%	98.72%	98.28%	97.54%	96.97%	96.77%	96.32%	96.14%
B04	34.0	3.0	99.59%	99.20%	99.05%	98.81%	98.59%	98.25%	98.00%	97.86%	97.35%	97.14%
B05	34.1	2.9	99.46%	99.21%	99.11%	98.63%	98.26%	97.88%	97.28%	97.28%	96.96%	96.68%
B06	34.4	3.0	99.68%	99.23%	99.08%	98.64%	98.19%	98.04%	97.88%	97.70%	97.43%	97.30%
B07	33.6	2.9	99.58%	99.29%	99.02%	99.06%	98.75%	98.28%	97.99%	97.78%	97.45%	97.28%
B08	33.8	3.0	99.40%	99.04%	98.76%	97.98%	97.52%	97.17%	96.71%	96.57%	96.28%	96.03%
B09	34.0	3.0	99.97%	99.76%	99.07%	98.46%	98.10%	97.73%	97.43%	97.26%	97.02%	96.85%
B10	34.4	3.0	99.43%	99.24%	98.99%	98.68%	98.22%	97.88%	97.18%	97.10%	96.75%	96.50%
B11	34.5	2.9	99.41%	99.33%	98.94%	98.44%	98.01%	97.86%	97.51%	97.33%	97.04%	96.84%
B12	33.8	2.9	99.71%	99.59%	99.35%	99.09%	98.61%	98.49%	97.95%	97.83%	97.56%	97.29%
B13	34.5	2.9	99.61%	99.41%	99.38%	98.38%	97.88%	97.56%	97.22%	97.09%	96.68%	96.46%
B14	34.4	3.0	99.40%	99.23%	98.90%	98.49%	98.24%	97.78%	97.15%	97.05%	96.73%	96.55%
B15	34.0	3.0	99.58%	99.49%	99.13%	98.88%	98.63%	98.35%	98.00%	97.88%	97.51%	97.31%
B16	34.0	3.0	99.56%	99.46%	99.17%	99.24%	98.75%	98.60%	98.07%	98.04%	97.91%	97.70%
B17	34.7	3.0	99.65%	99.44%	98.91%	98.36%	97.82%	97.55%	97.07%	96.97%	96.62%	96.39%
B18	33.8	2.9	99.75%	99.26%	99.41%	98.46%	98.07%	97.74%	97.05%	96.99%	96.75%	96.64%
B19	34.2	2.9	99.71%	99.64%	99.45%	99.16%	98.86%	98.63%	98.29%	98.05%	97.67%	97.50%
B20	34.4	2.9	99.77%	99.33%	99.08%	98.51%	98.10%	97.84%	97.49%	97.26%	97.09%	96.88%
Avg.	34.1	3.0	99.62%	99.37%	99.08%	98.65%	98.24%	97.95%	97.53%	97.39%	97.06%	96.86%
Min.	33.6	2.9	99.40%	99.04%	98.76%	97.98%	97.52%	97.17%	96.71%	96.57%	96.28%	96.03%
Max.	34.7	3.0	99.97%	99.76%	99.45%	99.24%	98.86%	98.63%	98.29%	98.05%	97.91%	97.70%
Med.	34.0	3.0	99.62%	99.33%	99.06%	98.57%	98.21%	97.87%	97.50%	97.30%	97.04%	96.85%
STD.	0.3	0.03	0.001	0.002	0.002	0.003	0.004	0.004	0.004	0.004	0.004	0.005

**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	0.4643	0.4171	2692	0.00067	0.00122	0.00200	0.00281	0.00321	0.00334	0.00385	0.00393	0.00437	0.00456
B02	0.4599	0.4129	2719	0.00072	0.00140	0.00251	0.00303	0.00347	0.00361	0.00364	0.00392	0.00422	0.00440
B03	0.4652	0.4201	2703	0.00102	0.00173	0.00275	0.00304	0.00326	0.00359	0.00396	0.00418	0.00468	0.00481
B04	0.4584	0.4110	2727	0.00064	0.00110	0.00311	0.00381	0.00433	0.00453	0.00479	0.00492	0.00514	0.00512
B05	0.4609	0.4114	2695	0.00114	0.00171	0.00284	0.00301	0.00354	0.00385	0.00432	0.00456	0.00506	0.00531
B06	0.4592	0.4100	2707	0.00081	0.00140	0.00192	0.00269	0.00338	0.00355	0.00412	0.00474	0.00516	0.00520
B07	0.4652	0.4181	2687	0.00067	0.00181	0.00273	0.00311	0.00367	0.00391	0.00446	0.00496	0.00542	0.00539
B08	0.4649	0.4194	2701	0.00085	0.00130	0.00210	0.00240	0.00282	0.00303	0.00355	0.00408	0.00427	0.00452
B09	0.4657	0.4214	2706	0.00067	0.00170	0.00250	0.00270	0.00331	0.00361	0.00426	0.00433	0.00490	0.00522
B10	0.4609	0.4176	2742	0.00072	0.00120	0.00200	0.00262	0.00277	0.00308	0.00354	0.00385	0.00434	0.00448
B11	0.4684	0.4210	2666	0.00067	0.00151	0.00240	0.00301	0.00334	0.00342	0.00404	0.00441	0.00483	0.00510
B12	0.4630	0.4100	2655	0.00067	0.00180	0.00300	0.00335	0.00369	0.00403	0.00437	0.00478	0.00512	0.00544
B13	0.4643	0.4178	2697	0.00058	0.00082	0.00280	0.00320	0.00351	0.00371	0.00367	0.00414	0.00444	0.00462
B14	0.4584	0.4102	2720	0.00064	0.00071	0.00210	0.00253	0.00289	0.00308	0.00342	0.00370	0.00386	0.00409
B15	0.4640	0.4183	2704	0.00063	0.00150	0.00220	0.00245	0.00267	0.00289	0.00335	0.00379	0.00411	0.00425
B16	0.4637	0.4170	2699	0.00064	0.00092	0.00260	0.00292	0.00328	0.00371	0.00415	0.00452	0.00503	0.00503
B17	0.4647	0.4167	2683	0.00067	0.00100	0.00220	0.00283	0.00332	0.00367	0.00392	0.00427	0.00466	0.00485
B18	0.4619	0.4170	2724	0.00058	0.00120	0.00230	0.00293	0.00324	0.00354	0.00379	0.00396	0.00440	0.00457
B19	0.4614	0.4129	2700	0.00064	0.00143	0.00231	0.00281	0.00328	0.00367	0.00403	0.00411	0.00443	0.00453
B20	0.4680	0.4170	2642	0.00058	0.00160	0.00280	0.00314	0.00369	0.00396	0.00421	0.00449	0.00470	0.00488
Avg.	0.4631	0.4158	2698	0.00071	0.00135	0.00246	0.00292	0.00333	0.00359	0.00397	0.00428	0.00466	0.00482
Min.	0.4584	0.4100	2642	0.00058	0.00071	0.00192	0.00240	0.00267	0.00289	0.00335	0.00370	0.00386	0.00409
Max.	0.4684	0.4214	2742	0.00114	0.00181	0.00311	0.00381	0.00433	0.00453	0.00479	0.00496	0.00542	0.00544
Med.	0.4639	0.4170	2700.5	0.00067	0.00140	0.00245	0.00292	0.00332	0.00361	0.00399	0.00422	0.00467	0.00483
STD.	0.0029	0.0038	24	0.00014	0.00033	0.00036	0.00033	0.00038	0.00039	0.00038	0.00038	0.00042	0.00039

9 TEMPERATURE MEASUREMENT POINT (TMP) DEFINITION

Ta (Measured Point of Ambient Temperature)



Ts (Measured Point of Case Temperature)

