

# TEST REPORT

Reference No..... : WTS18F12131379N  
Applicant..... : Shenzhen Destar Opto-Electronics Co., LTD  
Address..... : 6th floor, 3 building HanHaiDa 7th Industry park, GongMing YuLv Village, Guangming New district, ShenZhen, GuangDong  
Manufacturer..... : Shenzhen Destar Opto-Electronics Co., LTD  
Address..... : 6th floor, 3 building HanHaiDa 7th Industry park, GongMing YuLv Village, Guangming New district, ShenZhen, GuangDong  
Product Name..... : LED Package  
Model No..... : SMD2835 0.2W  
Ratings..... : 2.8-3.2V, 60mA  
Standards..... : IES LM-80-08  
Approved Method: Measuring Lumen Maintenance of LED Light Source  
Date of Receipt sample ..... : 2018-02-26  
Date of Test ..... : 2018-02-26 to 2018-12-24  
Date of Issue..... : 2019-01-03  
Test Report Form No. .... : WPL-LM8008A-02A  
Test Result..... : See the attached sheets

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

**Waltek Services (Foshan) Co., Ltd.**

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Compiled by:



Finn Yu / Project Engineer

Approved by:



Akin Xu / Manager

## 1. Description of Test Samples

Classification: SMD2835  
Part Name: LED Package  
Part Number: SMD2835 0.2W  
Nominal CCT: 3000K

This report also covers the following Series products:

Cover Nominal CCT: 3000-6500K

## 2. Standards Used:

- IESNA LM-80-08: IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products(This test method was not accredited by CNAS)
- IES TM-21-11: Projecting long term lumen maintenance of LED light sources

## 3. Test Facility

The testing facility used by Waltek Services (Foshan) Co., Ltd. is located at No. 13-19, 2/F, 2nd Building, Sunlink International Machinery City, Chencun Town, Shunde District, Foshan, Guangdong, China

## 4. Operating Cycle

Samples are driven with a constant direct current (DC)

## 5. Ambient Conditions

For lumen maintenance test, samples were operated in thermal chambers with minimal ambient airflow. For long term reliability test, the case temperature was controlled by mounting several thermocouples on a sample reliability stress board at the designated thermal measurement point, as shown in Attachment. The ambient temperature  $T_A$  was measured by several thermocouples at a distance of 5 mm above the reliability test board. The relative humidity within chamber was less than 65%.

For photometry measurement, temperature was set to  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , RH <65%.

## 6. Photometry Measurement Uncertainty

The uncertainty of the light output measurements is  $U=1.8\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=20\text{K}$  ( $K=2$ ), at the 95% confidence level. This calibration results traceable to the Guangzhou Institute of Measurement and Testing Technology.

## 7. Sample Set

Part Number:	SMD2835 0.2W
Number of Units:	25
Actual Case Temperature( $T_S$ ):	$T_S = 54.3^\circ\text{C}$
Actual Ambient Temperature( $T_A$ ):	$T_A = 52.5^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

Part Number:	SMD2835 0.2W
Number of Units:	25
Actual Case Temperature( $T_S$ ):	$T_S = 84.2^\circ\text{C}$
Actual Ambient Temperature( $T_A$ ):	$T_A = 82.7^\circ\text{C}$
Life Test Drive Current:	$I_F = 60\text{mA}$
Measurement Current:	$I_F = 60\text{mA}$

## 8. SUMMARY OF TEST RESULT

Data Set:	Data sheet 1, $55^\circ\text{C}$ , 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	97.24%
Average Chromaticity Shift at 6000 hours ( $\Delta u'v'$ ):	0.0020
Reported TM-21 $L_{70}$ Lifetime:	> 36000h

Data Set:	Data sheet 2, $85^\circ\text{C}$ , 60mA
Number of Units:	25
Failures Observed:	0
Test Interval and Test Duration:	0h,1000h,2000h,3000h,4000h,5000h,6000h
Average. Lumen Maintenance at 6000 hours:	96.63%
Average Chromaticity Shift at 6000 hours ( $\Delta u'v'$ ):	0.0027
Reported TM-21 $L_{70}$ Lifetime:	> 36000h

**Data sheet 1:**

Driver current	60mA	Target Case temperature	55°C
Measurement current	60mA	Actual case temperature	54.3°C

Lumen Maintenance:								
S/N	TLF(lm)	V <sub>F</sub> (V)	Lumen Maintenance (%)					
	Initial(0hr)		1000h	2000h	3000h	4000h	5000h	6000h
A01	31.350	2.905	100.08	99.77	99.73	98.98	98.33	97.16
A02	30.544	2.894	100.15	99.85	99.35	98.82	98.44	97.23
A03	31.030	2.898	100.19	99.88	99.65	99.23	98.58	97.43
A04	31.157	2.884	100.16	99.76	99.22	98.82	98.35	97.41
A05	31.660	2.886	100.07	99.93	99.48	98.48	97.78	96.89
A06	30.887	2.884	100.08	99.89	99.39	98.24	97.55	96.60
A07	30.867	2.903	100.11	99.85	99.44	98.83	98.01	96.80
A08	31.512	2.891	100.11	99.85	99.70	98.99	98.39	97.26
A09	31.711	2.896	100.00	99.92	99.69	98.97	98.28	97.14
A10	31.533	2.906	100.20	99.96	99.76	99.76	99.07	98.05
A11	32.187	2.899	100.08	99.70	99.58	98.90	98.25	97.34
A12	31.179	2.903	99.96	99.69	99.16	98.89	98.20	97.21
A13	31.363	2.885	100.08	99.72	99.48	98.61	97.86	97.02
A14	30.983	2.904	100.00	99.92	99.69	99.07	98.25	97.35
A15	31.452	2.906	100.04	99.96	99.85	98.80	98.22	97.44
A16	32.123	2.907	100.00	99.69	99.50	98.76	97.94	96.98
A17	32.162	2.882	100.08	99.88	99.69	99.46	98.68	97.82
A18	32.073	2.895	100.04	99.69	99.31	98.96	98.19	97.22
A19	31.357	2.890	100.08	99.88	99.42	99.03	98.28	97.31
A20	32.132	2.896	100.00	99.77	99.27	98.78	98.05	97.02
A21	31.970	2.905	100.04	99.77	99.20	98.78	98.06	97.14
A22	30.655	2.884	99.96	99.81	99.35	99.01	98.24	97.25
A23	31.685	2.882	99.96	99.80	99.33	99.05	98.31	97.36
A24	31.374	2.892	100.11	99.77	99.58	99.20	98.59	97.38
A25	31.877	2.890	100.19	99.96	99.35	99.20	98.36	97.25
<b>Ave.</b>	<b>31.473</b>	<b>2.895</b>	<b>100.07</b>	<b>99.83</b>	<b>99.49</b>	<b>98.94</b>	<b>98.25</b>	<b>97.24</b>
Max	32.187	2.907	100.20	99.96	99.85	99.76	99.07	98.05
Min	30.544	2.882	99.96	99.69	99.16	98.24	97.55	96.60
Med	31.452	2.895	100.08	99.85	99.48	98.96	98.25	97.25
Std. dev	0.486	0.009	0.07	0.09	0.20	0.30	0.31	0.29

**TM-21 Projection:**

Test Duration	6000 hours
Failures Observed	0
$\alpha$	5.624E-06
$\beta$	1.009
Calculated L <sub>70</sub>	65000 hours
Calculated L <sub>90</sub>	20000 hours
Reported L <sub>70</sub>	>36000 hours

Chromaticity Shift( $\Delta u'v'$ ):									
S/N	Initial(0hr)			1000h	2000h	3000h	4000h	5000h	6000h
	CIEu'	CIEv'	CCT (K)						
A01	0.2511	0.5203	2995	0.0000	0.0006	0.0008	0.0009	0.0016	0.0021
A02	0.2518	0.5182	2989	0.0004	0.0006	0.0010	0.0012	0.0017	0.0021
A03	0.2524	0.5206	2960	0.0002	0.0004	0.0005	0.0007	0.0012	0.0017
A04	0.2525	0.5187	2970	0.0002	0.0006	0.0010	0.0012	0.0017	0.0022
A05	0.2538	0.5187	2936	0.0001	0.0002	0.0007	0.0013	0.0017	0.0020
A06	0.2518	0.5199	2945	0.0002	0.0004	0.0009	0.0010	0.0012	0.0016
A07	0.2529	0.5200	2992	0.0003	0.0005	0.0008	0.0013	0.0017	0.0021
A08	0.2533	0.5197	2944	0.0004	0.0004	0.0007	0.0015	0.0014	0.0020
A09	0.2531	0.5198	2950	0.0004	0.0005	0.0009	0.0009	0.0010	0.0017
A10	0.2532	0.5200	2964	0.0003	0.0004	0.0007	0.0009	0.0015	0.0020
A11	0.2512	0.5196	2946	0.0003	0.0005	0.0009	0.0013	0.0015	0.0019
A12	0.2520	0.5199	2990	0.0002	0.0005	0.0010	0.0011	0.0012	0.0017
A13	0.2522	0.5188	2959	0.0002	0.0005	0.0011	0.0017	0.0017	0.0020
A14	0.2532	0.5192	2989	0.0003	0.0004	0.0007	0.0012	0.0015	0.0019
A15	0.2524	0.5196	2956	0.0002	0.0005	0.0008	0.0010	0.0012	0.0016
A16	0.2521	0.5195	2985	0.0003	0.0004	0.0008	0.0015	0.0016	0.0020
A17	0.2528	0.5202	2970	0.0002	0.0004	0.0007	0.0012	0.0018	0.0022
A18	0.2521	0.5198	2977	0.0004	0.0004	0.0008	0.0014	0.0015	0.0019
A19	0.2513	0.5201	2990	0.0003	0.0004	0.0008	0.0009	0.0012	0.0016
A20	0.2532	0.5189	2965	0.0001	0.0005	0.0009	0.0014	0.0013	0.0018
A21	0.2514	0.5190	2973	0.0002	0.0004	0.0011	0.0013	0.0014	0.0019
A22	0.2520	0.5193	2981	0.0002	0.0002	0.0008	0.0010	0.0015	0.0021
A23	0.2522	0.5199	2987	0.0002	0.0005	0.0009	0.0015	0.0019	0.0024
A24	0.2517	0.5201	2956	0.0003	0.0005	0.0007	0.0017	0.0019	0.0023
A25	0.2515	0.5193	2975	0.0002	0.0004	0.0009	0.0014	0.0018	0.0022
<b>Ave.</b>	<b>0.2523</b>	<b>0.5196</b>	<b>2970</b>	<b>0.0002</b>	<b>0.0004</b>	<b>0.0008</b>	<b>0.0012</b>	<b>0.0015</b>	<b>0.0020</b>
Max	0.2538	0.5206	2995	0.0004	0.0006	0.0011	0.0017	0.0019	0.0024
Min	0.2511	0.5182	2936	0.0000	0.0002	0.0005	0.0007	0.0010	0.0016
Med	0.2522	0.5197	2970	0.0002	0.0004	0.0008	0.0012	0.0015	0.0020
Std. dev	0.0007	0.0006	18	0.0001	0.0001	0.0001	0.0003	0.0002	0.0002

**Data sheet 2:**

<b>Driver current</b>	<b>60mA</b>	<b>Target Case temperature</b>	<b>85°C</b>
<b>Measurement current</b>	<b>60mA</b>	<b>Actual case temperature</b>	<b>84.2°C</b>

<b>Lumen Maintenance:</b>								
S/N	TLF(lm)	V <sub>F</sub> (V)	Lumen Maintenance (%)					
	Initial(0hr)		1000h	2000h	3000h	4000h	5000h	6000h
B01	31.493	2.896	100.19	99.88	99.50	98.81	98.08	96.85
B02	31.797	2.905	100.11	99.66	99.28	98.53	97.74	96.49
B03	31.025	2.888	100.08	99.73	99.19	98.37	97.52	96.63
B04	30.749	2.910	99.92	99.53	99.22	98.12	97.30	96.29
B05	31.283	2.907	100.04	99.65	99.23	98.00	97.39	96.23
B06	30.641	2.888	100.08	99.69	99.23	98.12	97.42	96.31
B07	31.179	2.903	100.04	99.73	99.11	98.22	97.48	96.24
B08	31.340	2.894	100.04	99.84	99.34	98.16	97.62	96.21
B09	31.598	2.895	100.11	99.85	99.62	98.36	98.09	96.60
B10	31.898	2.904	100.20	99.92	99.65	98.94	98.04	96.98
B11	31.162	2.895	100.08	99.66	99.43	98.40	97.98	96.53
B12	32.180	2.884	100.11	99.92	99.17	98.00	97.66	96.34
B13	30.983	2.894	99.96	99.80	99.57	99.34	98.98	97.61
B14	31.569	2.907	100.04	99.92	99.33	98.78	98.23	96.90
B15	31.688	2.886	100.08	99.70	99.28	98.41	97.95	96.66
B16	31.729	2.901	99.96	99.63	99.10	98.32	97.57	96.30
B17	31.934	2.903	100.24	99.96	99.80	99.33	98.30	97.20
B18	30.664	2.892	100.04	99.71	99.38	98.75	97.83	96.70
B19	31.085	2.901	100.04	99.89	99.54	98.77	97.89	96.86
B20	31.616	2.887	99.96	99.89	99.66	98.71	97.72	96.73
B21	31.723	2.884	100.00	99.69	99.69	98.73	97.96	96.69
B22	32.097	2.906	100.11	99.81	99.47	98.82	97.72	96.55
B23	31.184	2.900	100.08	99.77	99.32	99.28	98.03	96.77
B24	31.227	2.889	100.12	99.81	99.18	98.95	97.97	96.77
B25	31.328	2.895	99.92	99.72	99.10	98.74	97.72	96.38
<b>Ave.</b>	<b>31.407</b>	<b>2.897</b>	<b>100.06</b>	<b>99.77</b>	<b>99.38</b>	<b>98.60</b>	<b>97.85</b>	<b>96.63</b>
Max	32.180	2.910	100.24	99.96	99.80	99.34	98.98	97.61
Min	30.641	2.884	99.92	99.53	99.10	98.00	97.30	96.21
Med	31.340	2.895	100.08	99.77	99.33	98.71	97.83	96.63
Std. dev	0.426	0.008	0.08	0.11	0.21	0.40	0.36	0.33

**TM-21 Projection:**

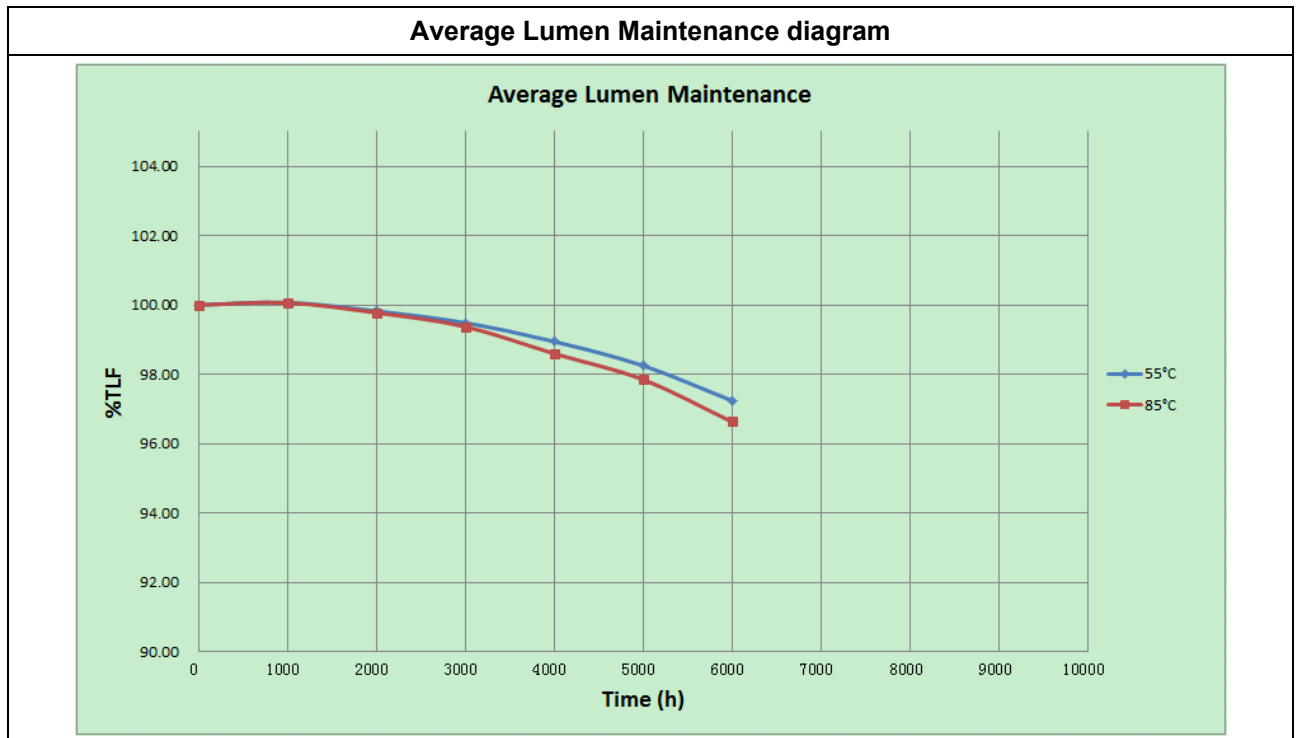
Test Duration	6000 hours
Failures Observed	0
$\alpha$	6.874E-06
$\beta$	1.011
Calculated L <sub>70</sub>	53000 hours
Calculated L <sub>90</sub>	17000 hours
Reported L <sub>70</sub>	>36000 hours

<b>Chromaticity Shift(<math>\Delta u'v'</math>):</b>									
S/N	Initial(0hr)			1000h	2000h	3000h	4000h	5000h	6000h
	CIEu'	CIEv'	CCT (K)						
B01	0.2512	0.5198	2972	0.0004	0.0005	0.0006	0.0014	0.0021	0.0024
B02	0.2532	0.5189	2969	0.0002	0.0005	0.0008	0.0017	0.0021	0.0026
B03	0.2519	0.5192	2991	0.0003	0.0004	0.0008	0.0014	0.0019	0.0024
B04	0.2531	0.5202	2951	0.0000	0.0006	0.0012	0.0018	0.0022	0.0026
B05	0.2527	0.5199	2976	0.0004	0.0007	0.0011	0.0019	0.0023	0.0028
B06	0.2521	0.5189	2985	0.0003	0.0006	0.0009	0.0016	0.0019	0.0025
B07	0.2519	0.5204	2967	0.0004	0.0007	0.0010	0.0017	0.0023	0.0028
B08	0.2514	0.5200	2938	0.0001	0.0005	0.0012	0.0016	0.0023	0.0028
B09	0.2518	0.5195	2956	0.0001	0.0004	0.0011	0.0018	0.0021	0.0027
B10	0.2526	0.5191	2989	0.0001	0.0005	0.0010	0.0014	0.0022	0.0027
B11	0.2533	0.5198	2961	0.0004	0.0006	0.0010	0.0012	0.0018	0.0023
B12	0.2527	0.5194	2983	0.0002	0.0005	0.0011	0.0018	0.0023	0.0029
B13	0.2521	0.5188	2984	0.0001	0.0005	0.0011	0.0017	0.0022	0.0027
B14	0.2536	0.5198	2942	0.0002	0.0004	0.0007	0.0013	0.0021	0.0027
B15	0.2512	0.5202	2975	0.0001	0.0006	0.0010	0.0015	0.0022	0.0027
B16	0.2535	0.5203	2948	0.0004	0.0006	0.0010	0.0015	0.0019	0.0026
B17	0.2524	0.5194	2951	0.0004	0.0005	0.0009	0.0014	0.0020	0.0026
B18	0.2529	0.5194	2961	0.0002	0.0005	0.0010	0.0015	0.0022	0.0029
B19	0.2524	0.5199	2967	0.0002	0.0006	0.0011	0.0016	0.0021	0.0027
B20	0.2527	0.5198	2987	0.0000	0.0007	0.0011	0.0015	0.0023	0.0027
B21	0.2535	0.5198	2972	0.0003	0.0006	0.0010	0.0017	0.0022	0.0029
B22	0.2518	0.5200	2983	0.0002	0.0005	0.0013	0.0016	0.0020	0.0026
B23	0.2528	0.5193	2961	0.0002	0.0004	0.0010	0.0017	0.0022	0.0027
B24	0.2531	0.5198	2965	0.0002	0.0003	0.0011	0.0016	0.0019	0.0024
B25	0.2518	0.5203	2937	0.0004	0.0005	0.0010	0.0012	0.0021	0.0028
<b>Ave.</b>	<b>0.2525</b>	<b>0.5197</b>	<b>2967</b>	<b>0.0002</b>	<b>0.0005</b>	<b>0.0010</b>	<b>0.0016</b>	<b>0.0021</b>	<b>0.0027</b>
Max	0.2536	0.5204	2991	0.0004	0.0007	0.0013	0.0019	0.0023	0.0029
Min	0.2512	0.5188	2937	0.0000	0.0003	0.0006	0.0012	0.0018	0.0023
Med	0.2526	0.5198	2967	0.0002	0.0005	0.0010	0.0016	0.0021	0.0027
Std. dev	0.0007	0.0005	16	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002

**Test result:****Data Summary of Lumen and Color Maintenance:**

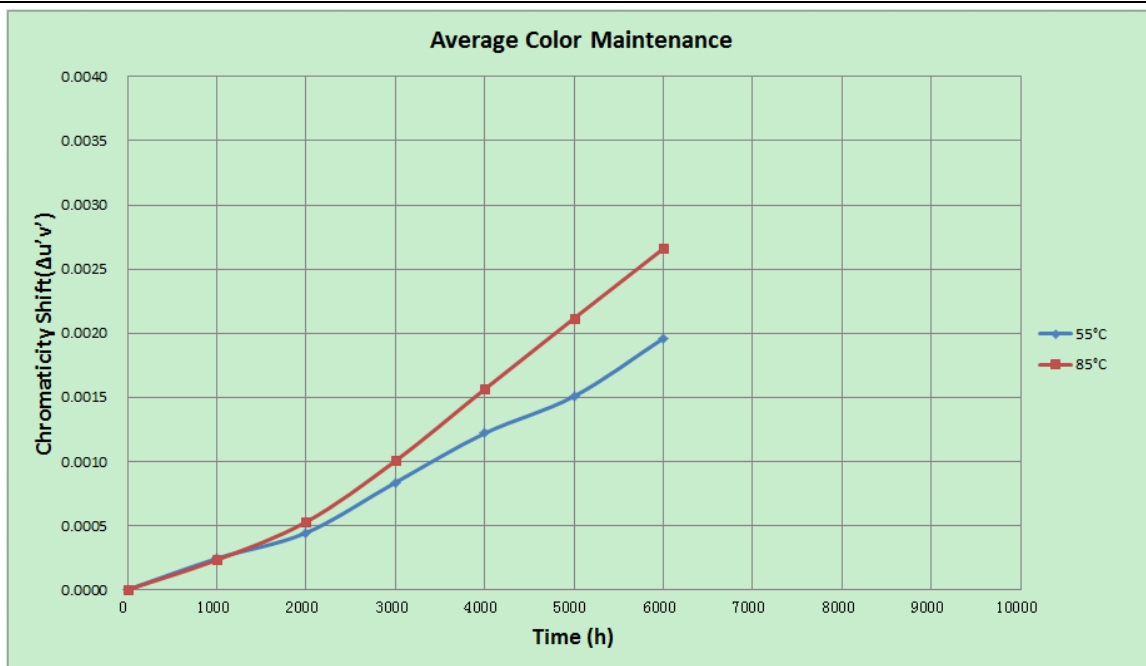
Temp.	TLF(lm)	VF(V)	Luminous Maintenance (%)					
	Initial(0hr)		1000h	2000h	3000h	4000h	5000h	6000h
55°C (Ave.)	31.473	2.895	100.07	99.83	99.49	98.94	98.25	97.24
85°C (Ave.)	31.407	2.897	100.06	99.77	99.38	98.60	97.85	96.63

Temp.	CIEu'	CIEv'	CCT	Chromaticity Shift ( $\Delta u'v'$ )					
	Initial(0hr)			1000h	2000h	3000h	4000h	5000h	6000h
55°C (Ave.)	0.2523	0.5196	2970	0.0002	0.0004	0.0008	0.0012	0.0015	0.0020
85°C (Ave.)	0.2525	0.5197	2967	0.0002	0.0005	0.0010	0.0016	0.0021	0.0027





### Average Color Maintenance diagram



**Attachment 1: Equipment List**

<b>Equipment</b>	<b>Model</b>	<b>Calibration due date</b>
The LED accelerated aging and longevity test system	EVERFINE LT-200A	2019-03-07
Temperature & Humidity Datalogger	Testo 608-H1	2019-03-07
High accuracy array spectroradio meter	EVERFINE HAAS-2000-VIS-V1	2019-03-07
Standard light source	EVERFINE D204	2019-03-07
DC power supply	EVERFINE WY12010	2019-03-07
Caliper	MITUTOYO CD-6"CS	2019-03-07

**Attachment 2: Photo document**

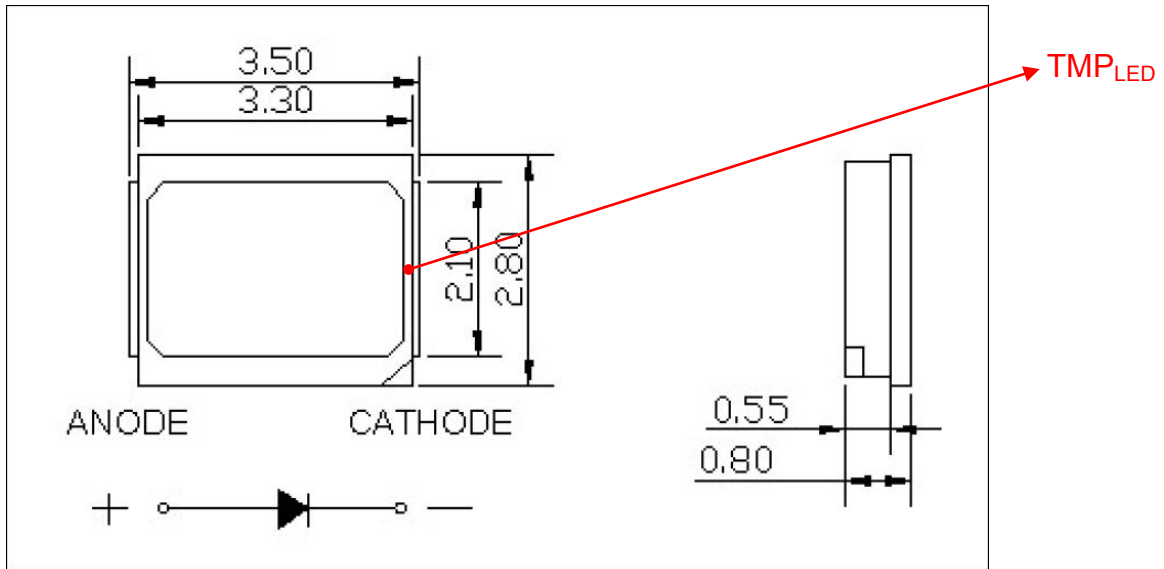


Photo 1 (Mechanical Dimensions: millimeter)

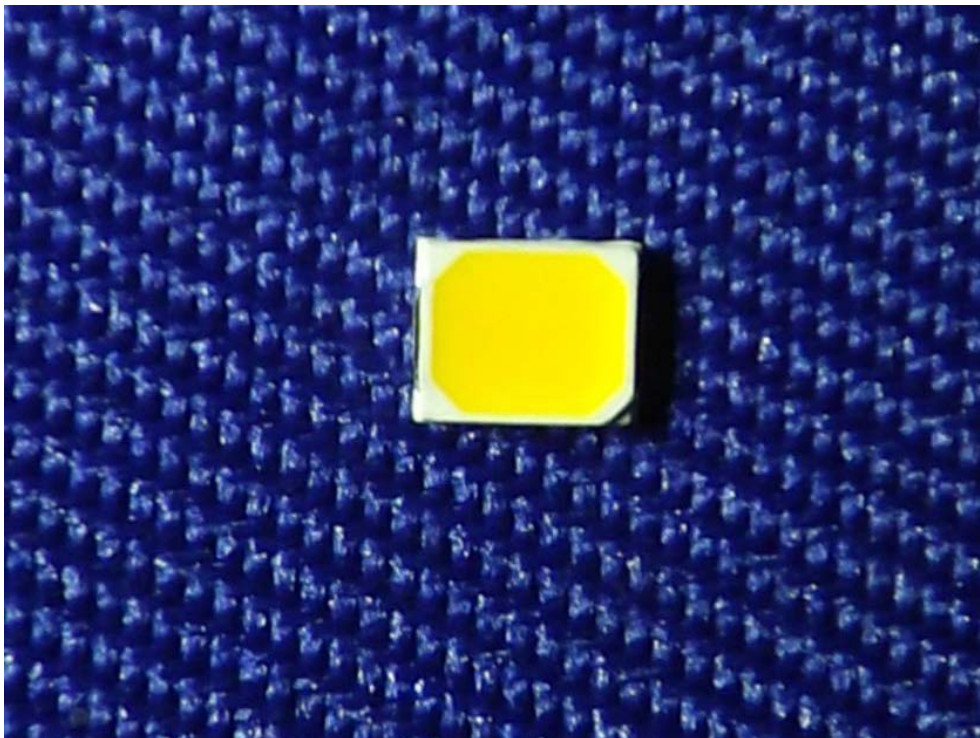


Photo 2

===== End of Report =====