

IES LM-80-08

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCE

Report Number	Q131006
Test Sample	2T05X5WW38000001
Rating	DC 150mA 0.5W
Normal CCT	2,700 K
Test Date	October 9, 2013 to December 29, 2014
Test Address	9F, NO.800, Chung-Cheng Rd., Chung-Ho Dist., New Taipei City 235, Taiwan
Test Standard	IES LM-80-08 Approved Method : Measuring Lumen Maintenance of Led Lighting Sources
Temp. Measure point	See page 3
Description of test equipment	See page 3
Test Engineer	Amos Huang <i>Amos Huang</i>
Review By	Kenny Yen <i>Kenny yen</i>

Notes:

1. The test center executes the test operations with prudent manners. All the test results are detail stated in the report. All test service meet under the regulations of ISO/IEC 17025.
2. The report is only responsible to the assigned test. It shall not be any of the bases of Compliance judgments.
3. There are 11 pages in the test report (include the cover page). It is invalid when being used separately.
4. The test report is forbidden to reproduce in separate pages. The complete report copy is unrestricted.
5. The recorded contents in this report shall not be used as advertising, publications or merchandising purposes without written permissions by the test center.
6. Lumen maintenance(lm) uncertainty=1.601%(K=1.97) at 95% confidence level
7. Chromaticity(x,y) uncertainty=0.000018 (K=2) at 95% confidence level

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According to section 3 item 7 and section 4 item 5 of ENERGY STAR® Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products, the test report also applies to the following products:

Part Number	Normal CCT	Watt	W/mm ²
2T05X5WW38000001	2700K	0.5	0.029
2T05X5CWxx000xxx	5000K/5700K/6500K	0.5	0.029
2T05X5NWxx000xxx	4000K	0.5	0.029
2T05X5WWxx000xxx	2700K/3000K/3500K	0.5	0.029

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1. Test Summary

Case temperature (Ts)	83°C ≤ Ts	103°C ≤ Ts
Ambient conditions (T _A)	80°C ≤ T _A R.H. < 65 % Minimized airflow	100°C ≤ T _A R.H. < 65 % Minimized airflow
Sample Size	20	20
Drive current of the LED	150mA	150mA
Initial flux (lm) / V _f (V)	54.75 / 3.27	53.67 / 3.27
Lumen maintenance at 10000 hrs	95.76% Page 5	93.04% Page 8
LED failure	0	0
Monitoring interval (hrs)	0, 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000	
Chromaticity shift	Page 6	Page 9

2. Case and ambient temperature

The case temperature T_s is the temperature on the substrate; the ambient temperature T_A is the temperature of the air at a distance of 50 mm above substrate.

Ts Measurement Point



3. Description of test equipment

Equipment	Model No. / Serial No.	Cal. Laboratory/ Standard	Report No.	Effective Date
Integrating sphere	ISP250 45392012	Standard Light Source L7386A	14-11-BAC-498- 01L	01.12.2015
DC power source	KEITHLEY 2425 1347276	SGS Taiwan Ltd.	ECAC1606814	16.06.2015
Temperature controlled test	VEKTREX/ SpikeSafe 200 1080030009	SGS Taiwan Ltd.	ECAC0780614A	27.03.2015
	VEKTREX/ ITCS 428		ECAC0780214A	
	VEKTREX/ ITCS 429		ECAC0780314A	
	VEKTREX/ ITCS 430		ECAC0780414A	
	VEKTREX/ ITCS 454		ECAC0780514A	

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4. Test Results

4.1 Lumen and Color Maintenance data (85 °C)

■ Lumen Maintenance data (85 °C)

No.	Im(Initial)	0h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	54.45	1	0.987	1.003	0.995	0.991	0.986	0.984	0.976	0.971
2	56.06	1	0.985	0.989	0.983	0.978	0.976	0.970	0.960	0.952
3	53.70	1	1.003	1.005	0.998	0.994	0.990	0.983	0.974	0.970
4	54.14	1	0.991	0.988	0.981	0.977	0.971	0.964	0.956	0.951
5	54.76	1	0.983	0.988	0.977	0.974	0.970	0.967	0.963	0.957
6	55.18	1	0.994	0.990	0.985	0.981	0.976	0.969	0.961	0.955
7	54.03	1	0.994	0.993	0.986	0.983	0.977	0.969	0.961	0.957
8	54.06	1	0.992	0.989	0.983	0.977	0.973	0.967	0.960	0.953
9	55.86	1	0.983	0.993	0.984	0.980	0.974	0.970	0.967	0.965
10	54.84	1	0.993	0.993	0.986	0.983	0.979	0.971	0.964	0.959
11	53.70	1	0.990	0.989	0.984	0.981	0.976	0.969	0.960	0.956
12	54.57	1	0.985	0.991	0.985	0.982	0.980	0.969	0.961	0.955
13	56.31	1	0.987	0.986	0.978	0.977	0.973	0.971	0.966	0.961
14	54.24	1	0.990	0.991	0.984	0.981	0.974	0.969	0.961	0.954
15	54.34	1	0.991	0.987	0.979	0.977	0.974	0.968	0.960	0.955
16	55.84	1	0.980	0.982	0.977	0.976	0.975	0.969	0.962	0.955
17	54.35	1	0.990	0.986	0.980	0.978	0.967	0.967	0.962	0.957
18	55.77	1	0.989	0.989	0.982	0.982	0.975	0.969	0.963	0.957
19	54.20	1	0.990	0.993	0.987	0.987	0.986	0.978	0.971	0.964
20	54.69	1	0.982	0.979	0.974	0.970	0.960	0.956	0.949	0.947
AVG	54.75	1	0.989	0.990	0.983	0.980	0.976	0.970	0.963	0.958
MIN	53.70	1	0.980	0.979	0.974	0.970	0.960	0.956	0.949	0.947
MAX	56.31	1	1.003	1.005	0.998	0.994	0.990	0.984	0.976	0.971



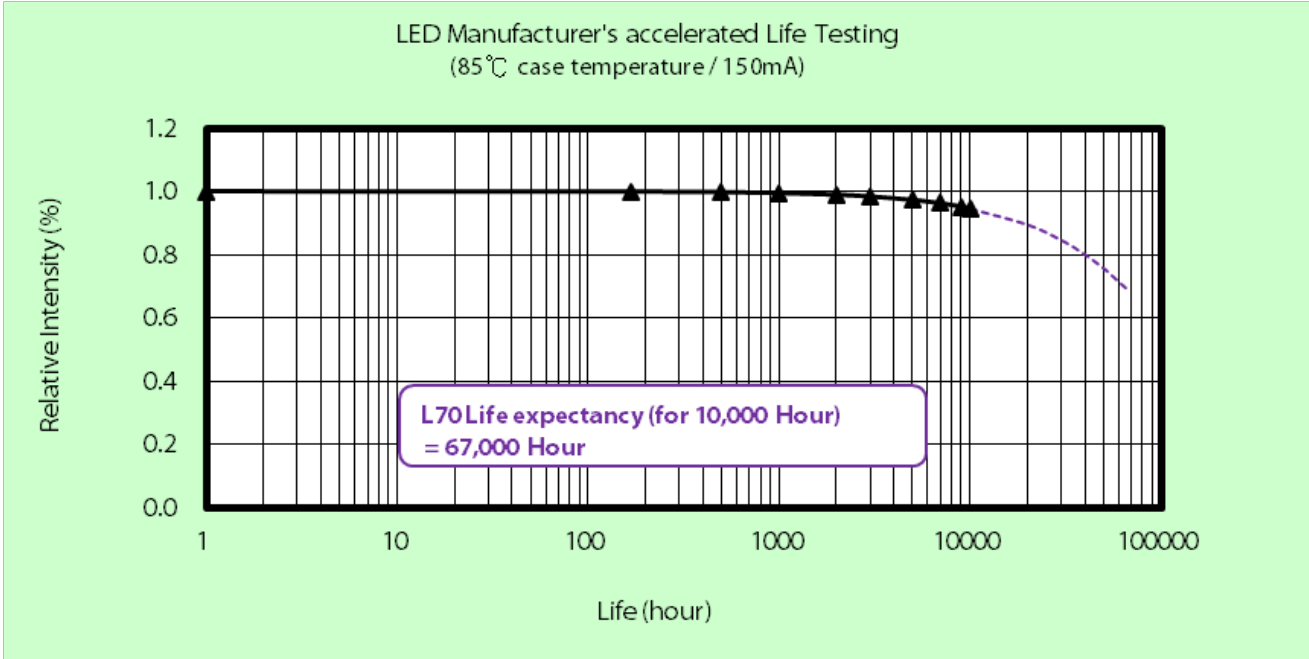
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■ Color Maintenance data (85 °C)

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No.	CCT Initial	0h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	2744.82	0	0.0004	0.0006	0.0007	0.0008	0.0008	0.0007	0.0008	0.0009
2	2740.93	0	0.0002	0.0003	0.0005	0.0004	0.0005	0.0005	0.0006	0.0008
3	2754.96	0	0.0004	0.0004	0.0005	0.0004	0.0006	0.0007	0.0006	0.0007
4	2728.84	0	0.0002	0.0003	0.0003	0.0003	0.0004	0.0005	0.0005	0.0005
5	2728.05	0	0.0004	0.0005	0.0006	0.0006	0.0007	0.0006	0.0007	0.0009
6	2769.41	0	0.0003	0.0004	0.0006	0.0004	0.0006	0.0006	0.0007	0.0009
7	2774.02	0	0.0002	0.0006	0.0007	0.0006	0.0007	0.0007	0.0007	0.0008
8	2747.48	0	0.0004	0.0004	0.0004	0.0004	0.0005	0.0006	0.0006	0.0008
9	2741.33	0	0.0004	0.0002	0.0003	0.0003	0.0006	0.0007	0.0006	0.0006
10	2760.18	0	0.0003	0.0004	0.0005	0.0004	0.0006	0.0005	0.0006	0.0006
11	2768.39	0	0.0003	0.0004	0.0005	0.0004	0.0005	0.0006	0.0008	0.0010
12	2697.02	0	0.0003	0.0005	0.0006	0.0005	0.0006	0.0007	0.0007	0.0008
13	2714.04	0	0.0002	0.0002	0.0004	0.0004	0.0005	0.0003	0.0003	0.0004
14	2742.35	0	0.0003	0.0003	0.0004	0.0003	0.0004	0.0005	0.0005	0.0007
15	2725.29	0	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0003	0.0003
16	2716.04	0	0.0004	0.0002	0.0002	0.0002	0.0004	0.0004	0.0004	0.0004
17	2687.53	0	0.0003	0.0002	0.0003	0.0003	0.0007	0.0005	0.0005	0.0005
18	2716.74	0	0.0002	0.0003	0.0004	0.0003	0.0007	0.0008	0.0008	0.0010
19	2770.14	0	0.0002	0.0003	0.0004	0.0003	0.0004	0.0006	0.0006	0.0008
20	2720.70	0	0.0002	0.0002	0.0003	0.0002	0.0003	0.0004	0.0004	0.0005
AVG	2737.41	0	0.0003	0.0003	0.0004	0.0004	0.0005	0.0006	0.0006	0.0007
MIN	2687.53	0	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003
MAX	2774.02	0	0.0004	0.0006	0.0007	0.0008	0.0008	0.0008	0.0008	0.0010

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Test Condition 1 - 85°C Case Temp	
Sample size	20
Number of failures	0
DUT drive current used in the test (mA)	150
Test duration (hours)	10,000
Test duration used for projection (hour to hour)	5,000 - 10,000
Tested case temperature (°C)	85
α	5.501E-06
B	1.012
Calculated L70(10k) (hours)	67,000
Reported L70(10k) (hours)	>60000



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4.2 Lumen and Color Maintenance data (105 °C)

■ Lumen Maintenance data (105 °C)

No.	Im(Initial)	0h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	52.14	1	0.966	0.964	0.948	0.944	0.938	0.934	0.926	0.912
2	51.33	1	0.963	0.956	0.949	0.943	0.937	0.929	0.921	0.914
3	54.26	1	0.975	0.977	0.966	0.962	0.961	0.950	0.942	0.934
4	51.70	1	0.959	0.954	0.943	0.937	0.932	0.923	0.912	0.909
5	54.40	1	0.981	0.986	0.979	0.974	0.966	0.963	0.954	0.945
6	54.33	1	0.976	0.975	0.967	0.962	0.962	0.956	0.948	0.938
7	52.89	1	0.978	0.972	0.964	0.959	0.953	0.945	0.934	0.930
8	53.86	1	0.975	0.970	0.960	0.954	0.945	0.938	0.930	0.930
9	54.53	1	0.977	0.978	0.968	0.965	0.960	0.954	0.946	0.942
10	55.32	1	0.985	0.986	0.977	0.972	0.969	0.963	0.956	0.948
11	54.43	1	0.982	0.984	0.976	0.972	0.970	0.961	0.953	0.950
12	51.32	1	0.960	0.956	0.944	0.939	0.931	0.923	0.913	0.903
13	53.95	1	0.978	0.971	0.964	0.959	0.952	0.947	0.938	0.935
14	53.39	1	0.963	0.955	0.946	0.942	0.936	0.926	0.920	0.912
15	55.69	1	0.986	0.984	0.976	0.971	0.967	0.960	0.952	0.943
16	54.11	1	0.984	0.988	0.981	0.972	0.970	0.964	0.957	0.950
17	54.84	1	0.973	0.975	0.967	0.963	0.960	0.953	0.944	0.936
18	53.42	1	0.974	0.972	0.965	0.959	0.954	0.951	0.941	0.929
19	53.76	1	0.968	0.967	0.954	0.949	0.944	0.943	0.932	0.924
20	53.70	1	0.969	0.962	0.956	0.950	0.945	0.944	0.935	0.920
AVG	53.67	1	0.974	0.972	0.963	0.958	0.953	0.946	0.938	0.930
MIN	51.32	1	0.959	0.954	0.943	0.937	0.931	0.923	0.912	0.903
MAX	55.69	1	0.986	0.988	0.981	0.974	0.970	0.964	0.957	0.950

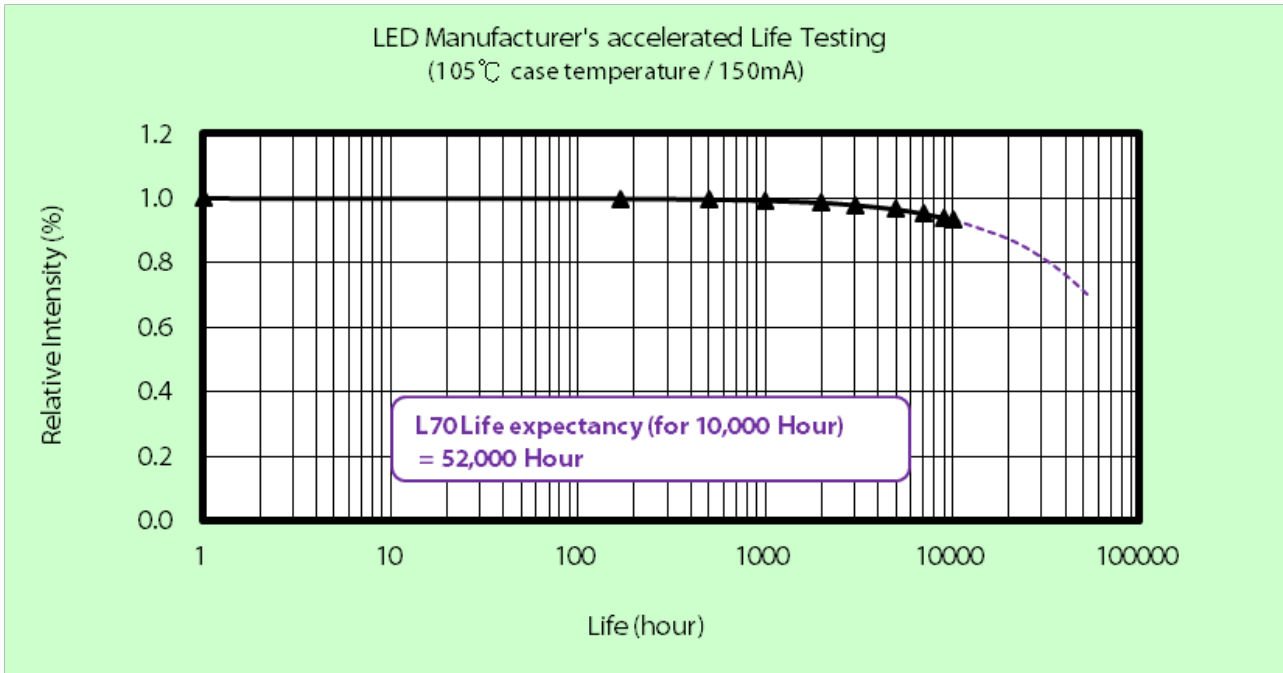
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■ Color Maintenance data (105 °C)

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No.	CCT Initial	0h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	2821.92	0	0.0013	0.0014	0.0016	0.0017	0.0019	0.0020	0.0023	0.0026
2	2833.62	0	0.0013	0.0016	0.0019	0.0017	0.0018	0.0019	0.0022	0.0023
3	2759.18	0	0.0009	0.0011	0.0014	0.0013	0.0014	0.0014	0.0015	0.0017
4	2844.27	0	0.0013	0.0017	0.0020	0.0020	0.0020	0.0021	0.0022	0.0023
5	2741.12	0	0.0007	0.0011	0.0014	0.0013	0.0011	0.0012	0.0015	0.0017
6	2752.71	0	0.0006	0.0008	0.0010	0.0010	0.0011	0.0012	0.0013	0.0016
7	2691.39	0	0.0005	0.0008	0.0010	0.0010	0.0011	0.0011	0.0012	0.0013
8	2763.53	0	0.0007	0.0008	0.0011	0.0011	0.0012	0.0012	0.0014	0.0016
9	2702.58	0	0.0007	0.0008	0.0011	0.0010	0.0010	0.0010	0.0012	0.0013
10	2757.31	0	0.0006	0.0007	0.0010	0.0010	0.0010	0.0010	0.0012	0.0013
11	2758.73	0	0.0005	0.0005	0.0007	0.0008	0.0008	0.0007	0.0007	0.0011
12	2750.04	0	0.0007	0.0009	0.0012	0.0012	0.0012	0.0012	0.0014	0.0017
13	2772.52	0	0.0006	0.0007	0.0010	0.0010	0.0010	0.0010	0.0013	0.0016
14	2801.45	0	0.0007	0.0009	0.0011	0.0010	0.0012	0.0012	0.0015	0.0017
15	2786.84	0	0.0006	0.0008	0.0010	0.0010	0.0010	0.0009	0.0009	0.0011
16	2717.63	0	0.0007	0.0009	0.0011	0.0011	0.0010	0.0010	0.0012	0.0014
17	2796.79	0	0.0007	0.0010	0.0012	0.0012	0.0012	0.0011	0.0011	0.0011
18	2732.83	0	0.0010	0.0011	0.0014	0.0015	0.0016	0.0016	0.0018	0.0020
19	2725.31	0	0.0008	0.0010	0.0014	0.0013	0.0015	0.0015	0.0017	0.0020
20	2823.72	0	0.0011	0.0012	0.0015	0.0015	0.0016	0.0018	0.0019	0.0022
AVG	2766.67	0	0.0008	0.0010	0.0013	0.0012	0.0013	0.0013	0.0015	0.0017
MIN	2691.39	0	0.0005	0.0005	0.0007	0.0008	0.0008	0.0007	0.0007	0.0011
MAX	2844.27	0	0.0013	0.0017	0.0020	0.0020	0.0020	0.0021	0.0023	0.0026

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Test Condition 2 - 105°C Case Temp	
Sample size	20
Number of failures	0
DUT drive current used in the test (mA)	150
Test duration (hours)	10,000
Test duration used for projection (hour to hour)	5,000 - 10,000
Tested case temperature (°C)	105
α	6.842E-06
B	0.998
Calculated L70(10k) (hours)	52,000
Reported L70(10k) (hours)	>52000



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5. EPA Recognized Certification Laboratory Information

EPA Recognized Certification Bodies (CBs) and Laboratories List Results

Notes:

1. Only accredited laboratories are listed on this page. Laboratories that are EPA-recognized through enrolling in a Certification Body's WMTL or SMTL program are not listed here.
2. EPA encourages manufacturers to contact laboratories directly to ensure they have the capability and availability to test the particular products for which certification is sought, as some product types may require special testing equipment or capabilities. Manufacturers must also confirm with an EPA-recognized certification body (CB) that the laboratory is acceptable under the CB's program for that product type.
3. Windows, Doors, and Skylights partners are advised to contact the National Fenestration Rating Council(www.nfrc.org [EXIT ↗](#)) for a complete list of EPA-recognized laboratories for these products.
4. [Lighting \(CFLs, ILLs, Luminaires, and Decorative Light Strings\) Labs](#) and [CBs](#) are listed separately.
5. Please note, EPA recognizes the Association of Home Appliance Manufacturers (AHAM) only for administering verification testing.

Organization ID	Organization Name	Type of Recognized Body	If Lab is it 1st Party?	Programs	Organization Address	City	State	Country
1114690	Edison Opto Corporation - OPTO Testing Laboratory	Accredited Laboratory	Y	Luminaires	4F, NO.800, Chung-Cheng Rd., Chung-Ho Dist.,	New Taipei City	-	TW

About Edison Opto

Edison Opto is a leading manufacturer of high power LED and a solution provider experienced in LDMS. LDMS is an integrated program derived from the four essential technologies in LED lighting applications- Thermal Management, Electrical Scheme, Mechanical Refinement, Optical Optimization, to provide customer with various LED components and modules. More Information about the company and our products can be found at www.edison-opto.com

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