

EDISON OPTO Laboratory Test Report

IES LM-80-08

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCE

Report Number	Q131107
Test Sample	2T03X5WW11000003
Rating	DC 150mA 0.5W
Normal CCT	2,700 K
Test Date	January 16, 2014 to April 8, 2015
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
2T03X5WW11000003	2700K / 3000K / 3500K	0.5	0.05
2T03X5WWxx000xxx	2700K / 3000K / 3500K	0.5	0.05
2T03X5NWxx000xxx	4000K	0.5	0.05
2T03X5CWxx000xxx	5000K / 5700K / 6500K	0.5	0.05

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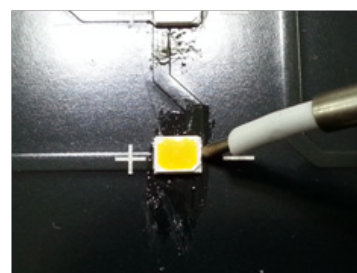
1. Test Summary

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	22	22
Drive current of the LED	150mA	150mA
Initial flux (lm) / V _f (V)	50.9 / 3.41	51.09 / 3.41
Lumen maintenance at 10,000 hrs	96.35% Page 5	94.50% Page 8
LED failure	0	0
Monitoring interval (hrs)	0,1000,2000,3000,4000,5000,6000,7000,8000,9000,10000	
Chromaticity shift	Page 7	Page 10

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

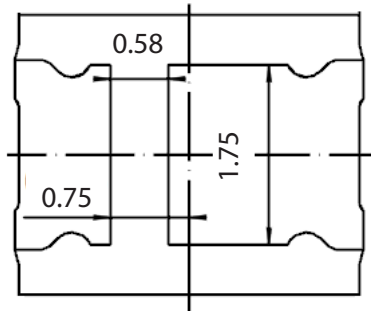
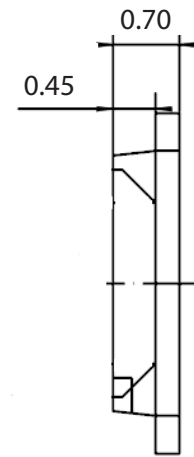
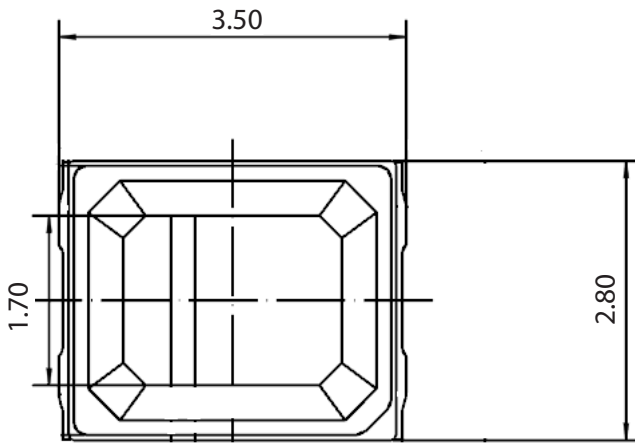


3. Description of test equipment

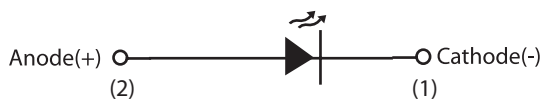
Equipment	Model No. / Serial No.	Cal. Laboratory	Report No.	Effective Date
Integrating sphere	ISP250 45392012	Standard Light Source L7386A	14-11-BAC-498- 01L	01.12.2015
DC power source	KEITHLEY 2425 1347276	SGS Taiwan Ltd.	ECAC1606814	16.06.2015
Temperature controlled test	VEKTREX/ SpikeSafe 200	Tai Yi TAF-1625	T3503041401	26.03.2016
	VEKTREX/ ITCS 428		T3503041501	
	VEKTREX/ ITCS 429		T3503041502	
	VEKTREX/ ITCS 430		T3503041503	
	VEKTREX/ ITCS 454		T3503041504	

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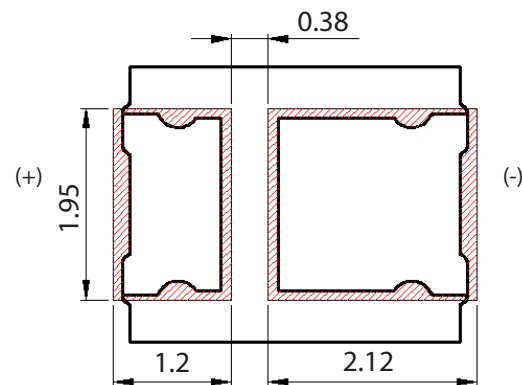
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Circuit



Solder Pad



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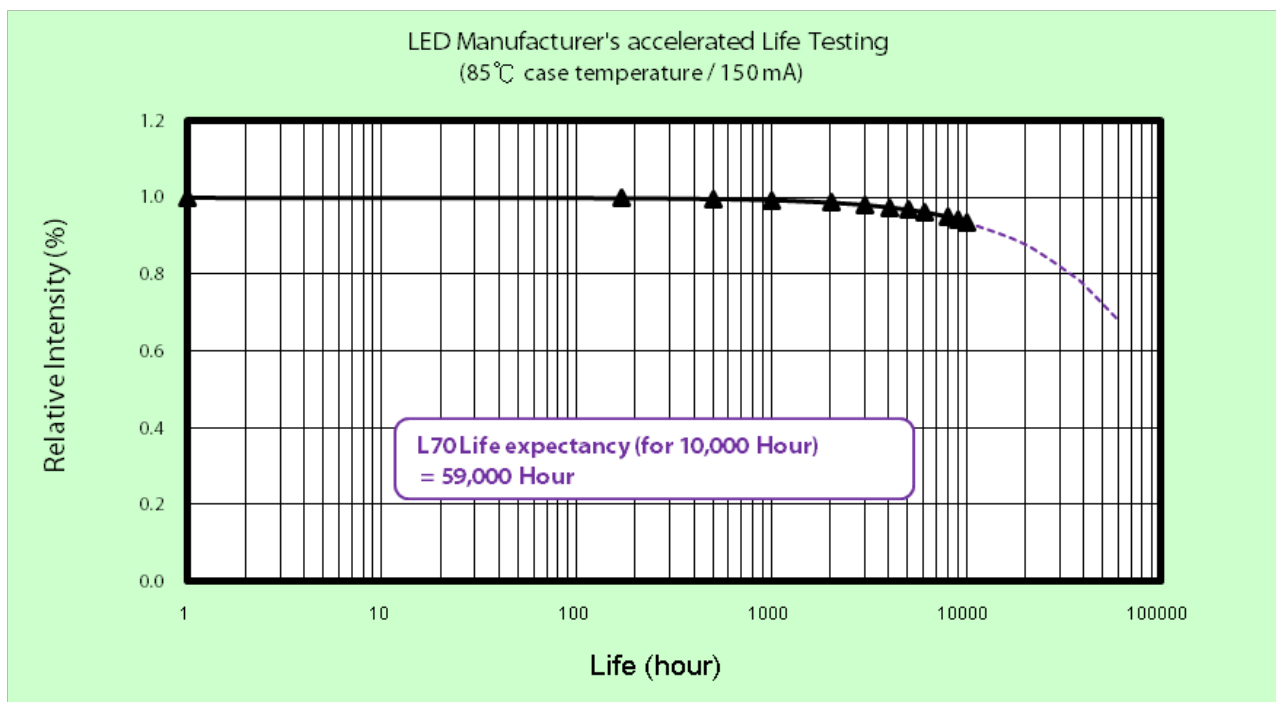
4. Test Results

4.1 Lumen and Color Maintenance data (85 °C)

■ Lumen Maintenance data (85 °C)

No.	Im(Initial)	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	49.90	1	1.016	1.013	1.002	0.998	0.994	0.985	0.978	0.968	0.965	0.959
2	50.92	1	1.011	1.001	0.999	0.998	0.996	0.990	0.983	0.975	0.971	0.966
3	50.08	1	1.022	1.011	1.001	0.996	0.990	0.985	0.976	0.968	0.963	0.957
4	51.75	1	1.021	1.008	0.995	0.989	0.990	0.985	0.977	0.968	0.962	0.956
5	50.77	1	1.007	1.002	0.993	0.993	0.992	0.990	0.981	0.974	0.970	0.967
6	51.94	1	1.011	0.998	0.994	0.992	0.994	0.993	0.985	0.978	0.976	0.970
7	51.27	1	1.017	1.007	0.997	0.991	0.988	0.983	0.974	0.965	0.960	0.956
8	49.46	1	1.022	1.012	1.004	0.996	0.992	0.988	0.980	0.971	0.966	0.960
9	51.36	1	1.012	1.010	0.999	0.999	0.995	0.991	0.985	0.976	0.970	0.968
10	50.82	1	1.016	1.006	0.996	0.990	0.986	0.982	0.975	0.965	0.961	0.955
11	51.28	1	1.010	0.998	0.989	0.985	0.982	0.975	0.969	0.960	0.956	0.949
12	51.29	1	1.010	1.003	0.996	0.992	0.987	0.982	0.974	0.965	0.963	0.956
13	50.76	1	1.012	1.007	1.000	0.997	0.996	0.991	0.985	0.979	0.975	0.970
14	48.64	1	1.055	1.046	1.032	1.026	1.022	1.016	1.009	1.001	0.996	0.992
15	49.85	1	1.023	1.015	1.006	1.000	0.998	0.993	0.985	0.978	0.959	0.966
16	51.93	1	1.012	0.999	0.991	0.988	0.985	0.981	0.975	0.969	0.964	0.959
17	51.11	1	1.022	1.012	1.007	1.002	0.997	0.990	0.984	0.976	0.969	0.965
18	51.01	1	1.016	1.015	1.001	0.996	0.990	0.984	0.976	0.967	0.965	0.959
19	51.74	1	1.022	1.009	0.998	0.993	0.990	0.976	0.976	0.966	0.963	0.956
20	52.33	1	1.018	1.010	1.005	1.002	1.001	0.998	0.992	0.984	0.981	0.977
21	50.69	1	1.043	1.027	1.018	1.015	1.009	1.002	0.993	0.987	0.982	0.976
22	50.89	1	1.028	1.016	1.006	0.999	0.992	0.986	0.977	0.969	0.964	0.958
AVG	50.90	1	1.019	1.010	1.001	0.997	0.994	0.989	0.981	0.973	0.968	0.964
MIN	48.64	1	1.007	0.998	0.989	0.985	0.982	0.975	0.969	0.960	0.956	0.949
MAX	52.33	1	1.055	1.046	1.032	1.026	1.022	1.016	1.009	1.001	0.996	0.992

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Test Condition 1 - 85°C Case Temp	
Sample size	22
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	6.442E-06
B	1.026
Calculated L70(10k) (hours)	59,000
Reported L70(10k) (hours)	59,000

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■ Color Maintenance data (85 °C)

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No.	CCT Initial	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	2622.72	0	0.0006	0.0008	0.0009	0.0014	0.0016	0.0019	0.0022	0.0024	0.0027	0.0030
2	2664.64	0	0.0010	0.0011	0.0011	0.0016	0.0017	0.0019	0.0021	0.0023	0.0026	0.0030
3	2666.44	0	0.0010	0.0011	0.0012	0.0017	0.0018	0.0021	0.0023	0.0026	0.0030	0.0034
4	2589.31	0	0.0013	0.0012	0.0014	0.0021	0.0024	0.0025	0.0028	0.0033	0.0034	0.0037
5	2682.59	0	0.0012	0.0012	0.0013	0.0018	0.0019	0.0021	0.0024	0.0027	0.0030	0.0033
6	2677.97	0	0.0011	0.0012	0.0013	0.0020	0.0020	0.0022	0.0025	0.0028	0.0030	0.0033
7	2627.15	0	0.0010	0.0012	0.0013	0.0017	0.0019	0.0022	0.0025	0.0028	0.0031	0.0035
8	2567.85	0	0.0012	0.0012	0.0013	0.0018	0.0019	0.0022	0.0026	0.0029	0.0032	0.0036
9	2668.11	0	0.0012	0.0012	0.0013	0.0019	0.0020	0.0023	0.0025	0.0027	0.0030	0.0032
10	2732.07	0	0.0008	0.0009	0.0011	0.0017	0.0018	0.0022	0.0023	0.0026	0.0030	0.0033
11	2658.88	0	0.0013	0.0012	0.0013	0.0017	0.0020	0.0023	0.0025	0.0028	0.0031	0.0035
12	2650.82	0	0.0007	0.0009	0.0012	0.0018	0.0018	0.0023	0.0025	0.0026	0.0028	0.0031
13	2651.42	0	0.0012	0.0012	0.0015	0.0020	0.0021	0.0025	0.0028	0.0028	0.0031	0.0035
14	2595.58	0	0.0007	0.0008	0.0010	0.0016	0.0019	0.0021	0.0023	0.0024	0.0026	0.0029
15	2603.71	0	0.0008	0.0009	0.0009	0.0015	0.0016	0.0020	0.0022	0.0025	0.0026	0.0030
16	2745.79	0	0.0013	0.0013	0.0015	0.0020	0.0021	0.0025	0.0028	0.0031	0.0035	0.0039
17	2635.71	0	0.0009	0.0010	0.0011	0.0020	0.0022	0.0025	0.0026	0.0029	0.0031	0.0034
18	2618.72	0	0.0010	0.0011	0.0014	0.0022	0.0023	0.0026	0.0029	0.0031	0.0033	0.0036
19	2649.99	0	0.0010	0.0012	0.0015	0.0023	0.0024	0.0027	0.0030	0.0034	0.0037	0.0040
20	2661.69	0	0.0008	0.0010	0.0013	0.0018	0.0021	0.0023	0.0025	0.0027	0.0029	0.0032
21	2692.09	0	0.0013	0.0012	0.0015	0.0022	0.0023	0.0027	0.0032	0.0035	0.0037	0.0041
22	2706.45	0	0.0005	0.0007	0.0010	0.0018	0.0021	0.0024	0.0026	0.0029	0.0032	0.0036
AVG	2653.17	0	0.0010	0.0011	0.0012	0.0018	0.0020	0.0023	0.0026	0.0028	0.0031	0.0035
MIN	2567.85	0	0.0005	0.0007	0.0009	0.0014	0.0016	0.0019	0.0021	0.0023	0.0026	0.0029
MAX	2745.79	0	0.0013	0.0013	0.0015	0.0023	0.0024	0.0027	0.0032	0.0035	0.0037	0.0041

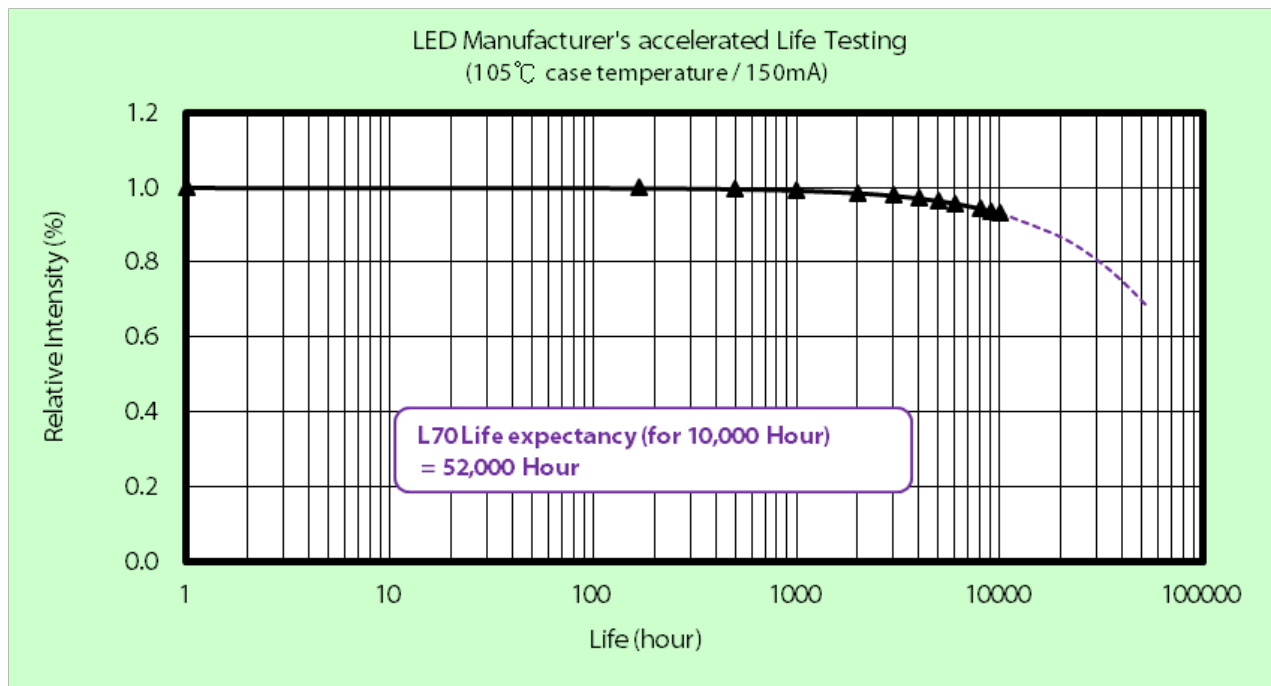
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4.2 Lumen and Color Maintenance data (105 °C)

■ Lumen Maintenance data (105 °C)

No.	Im(Initial)	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	50.21	1	1.000	0.981	0.975	0.971	0.963	0.957	0.951	0.944	0.937	0.926
2	49.77	1	1.018	1.012	1.005	1.002	0.992	0.985	0.977	0.972	0.963	0.953
3	50.37	1	1.019	1.004	0.999	0.991	0.984	0.979	0.967	0.965	0.958	0.946
4	51.69	1	1.012	1.007	1.000	0.992	0.983	0.979	0.971	0.964	0.958	0.947
5	51.13	1	1.016	1.017	1.013	1.006	0.995	0.991	0.981	0.976	0.968	0.958
6	49.46	1	1.012	1.015	1.008	1.000	0.989	0.985	0.975	0.972	0.962	0.950
7	50.43	1	1.026	1.035	1.026	1.020	1.009	1.004	0.992	0.986	0.979	0.967
8	51.37	1	1.006	0.991	0.995	0.992	0.984	0.984	0.974	0.968	0.964	0.952
9	51.17	1	1.005	1.004	0.998	0.994	0.987	0.980	0.970	0.969	0.960	0.949
10	50.64	1	1.003	0.994	0.992	0.990	0.985	0.979	0.973	0.968	0.959	0.949
11	51.46	1	1.000	0.981	0.977	0.976	0.969	0.966	0.955	0.952	0.947	0.936
12	51.21	1	1.009	1.002	0.999	0.993	0.982	0.976	0.969	0.961	0.954	0.942
13	50.83	1	1.011	0.996	0.985	0.978	0.971	0.969	0.957	0.954	0.947	0.934
14	51.87	1	1.013	0.994	0.986	0.979	0.970	0.966	0.956	0.954	0.944	0.933
15	52.35	1	0.996	0.999	0.998	0.993	0.987	0.981	0.973	0.970	0.962	0.951
16	49.97	1	1.026	1.015	1.005	1.003	0.994	0.988	0.979	0.974	0.969	0.955
17	51.15	1	1.005	1.003	1.002	0.997	0.992	0.988	0.978	0.976	0.969	0.958
18	51.99	1	0.995	0.990	0.988	0.985	0.977	0.979	0.968	0.966	0.960	0.949
19	51.26	1	1.014	1.002	1.002	1.005	0.998	0.997	0.989	0.985	0.980	0.967
20	51.57	1	1.000	0.981	0.976	0.966	0.958	0.954	0.944	0.941	0.934	0.924
21	52.53	1	0.997	0.985	0.979	0.976	0.966	0.963	0.954	0.950	0.945	0.933
22	51.59	1	0.987	0.952	0.951	0.949	0.944	0.944	0.935	0.931	0.928	0.914
AVG	51.09	1	1.008	0.998	0.994	0.989	0.981	0.977	0.968	0.964	0.957	0.945
MIN	49.46	1	0.987	0.952	0.951	0.949	0.944	0.944	0.935	0.931	0.928	0.914
MAX	52.53	1	1.026	1.035	1.026	1.020	1.009	1.004	0.992	0.986	0.980	0.967

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Test Condition 2 - 105°C Case Temp	
Sample size	22
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	7.223E-06
B	1.019
Calculated L70(10k) (hours)	52,000
Reported L70(10k) (hours)	52,000

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■ Color Maintenance data (105 °C)

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No.	CCT Initial	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	2653.97	0	0.0009	0.0010	0.0013	0.0018	0.0020	0.0026	0.0030	0.0033	0.0037	0.0041
2	2665.59	0	0.0010	0.0010	0.0012	0.0017	0.0020	0.0027	0.0030	0.0032	0.0036	0.0040
3	2685.96	0	0.0013	0.0013	0.0016	0.0024	0.0029	0.0031	0.0035	0.0038	0.0042	0.0045
4	2682.92	0	0.0011	0.0008	0.0011	0.0016	0.0018	0.0022	0.0026	0.0029	0.0033	0.0037
5	2622.21	0	0.0012	0.0013	0.0016	0.0023	0.0028	0.0035	0.0037	0.0040	0.0044	0.0047
6	2564.44	0	0.0013	0.0014	0.0016	0.0024	0.0028	0.0033	0.0037	0.0039	0.0042	0.0046
7	2622.32	0	0.0013	0.0013	0.0016	0.0022	0.0026	0.0033	0.0037	0.0040	0.0043	0.0047
8	2676.40	0	0.0013	0.0013	0.0015	0.0021	0.0026	0.0032	0.0034	0.0039	0.0041	0.0045
9	2647.60	0	0.0011	0.0012	0.0015	0.0020	0.0022	0.0027	0.0031	0.0034	0.0036	0.0040
10	2686.96	0	0.0011	0.0011	0.0013	0.0017	0.0019	0.0025	0.0029	0.0032	0.0036	0.0040
11	2770.11	0	0.0011	0.0012	0.0015	0.0021	0.0025	0.0032	0.0035	0.0039	0.0042	0.0046
12	2618.33	0	0.0008	0.0009	0.0012	0.0018	0.0020	0.0022	0.0027	0.0029	0.0034	0.0038
13	2717.27	0	0.0010	0.0009	0.0012	0.0017	0.0019	0.0026	0.0029	0.0032	0.0036	0.0040
14	2709.83	0	0.0006	0.0006	0.0009	0.0017	0.0021	0.0028	0.0032	0.0035	0.0039	0.0044
15	2705.85	0	0.0010	0.0007	0.0011	0.0016	0.0019	0.0024	0.0027	0.0030	0.0033	0.0037
16	2614.75	0	0.0011	0.0012	0.0015	0.0022	0.0024	0.0028	0.0032	0.0034	0.0036	0.0040
17	2726.73	0	0.0011	0.0009	0.0011	0.0017	0.0019	0.0028	0.0032	0.0035	0.0038	0.0042
18	2608.48	0	0.0011	0.0011	0.0013	0.0018	0.0023	0.0027	0.0031	0.0034	0.0037	0.0040
19	2711.05	0	0.0012	0.0012	0.0015	0.0020	0.0023	0.0030	0.0033	0.0037	0.0040	0.0045
20	2676.41	0	0.0008	0.0010	0.0013	0.0019	0.0023	0.0028	0.0030	0.0033	0.0037	0.0040
21	2695.48	0	0.0012	0.0012	0.0015	0.0022	0.0026	0.0031	0.0035	0.0037	0.0041	0.0044
22	2632.43	0	0.0012	0.0012	0.0014	0.0021	0.0023	0.0030	0.0033	0.0037	0.0041	0.0045
AVG	2667.96	0	0.0011	0.0011	0.0013	0.0020	0.0023	0.0028	0.0032	0.0035	0.0038	0.0042
MIN	2564.44	0	0.0006	0.0006	0.0009	0.0016	0.0018	0.0022	0.0026	0.0029	0.0033	0.0037
MAX	2770.11	0	0.0013	0.0014	0.0016	0.0024	0.0029	0.0035	0.0037	0.0040	0.0044	0.0047

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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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