

IES LM-80-08

MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCE

Report Number	Q131202
Test Sample	2T0301WW38000001
Rating	DC 150mA 1W
Normal CCT	2,700 K
Test Date	December 10, 2013 to March3, 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
2T0301WW3800001	2700K	1W	0.102
2T0301WWxx000xxx	2700K/3000K/3500K	1W	0.102
2T0301NWxx000xxx	4000K	1W	0.102
2T0301CWxx000xxx	5000K/5700K/6500K	1W	0.102

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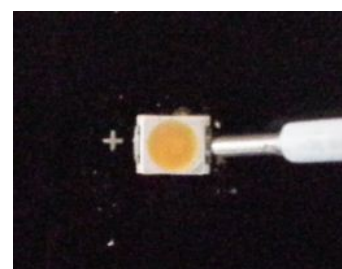
1. Test Summary

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)	97.74 / 6.61	97.93 / 6.60
Lumen maintenance at 10,000 hrs	95.56% Page 5	94.35% 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



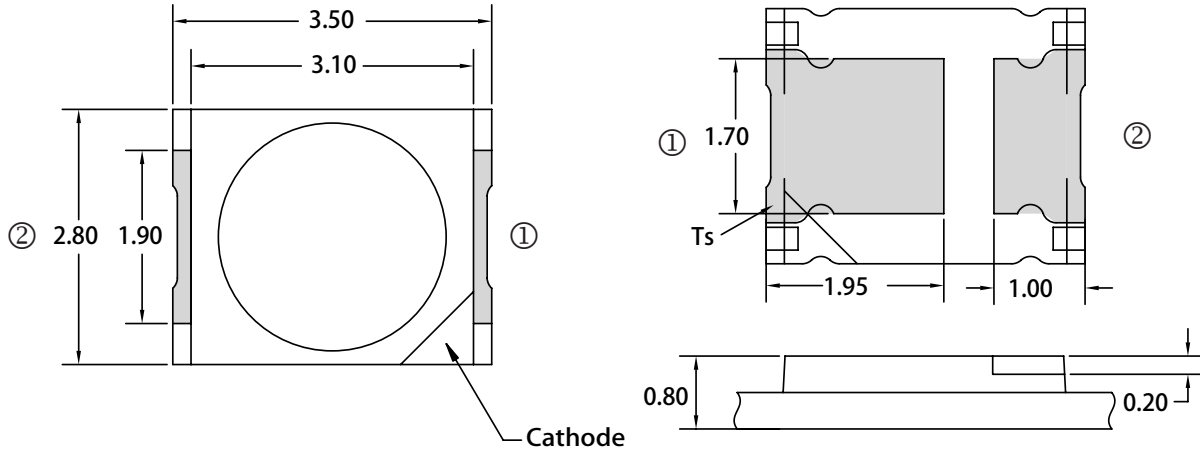
3. Description of test equipment

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 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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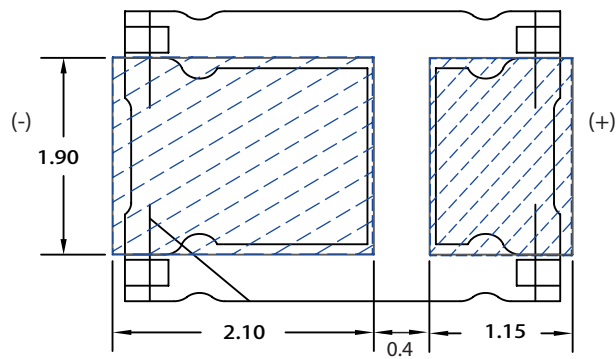
Emitter Type Dimension



Circuit



Solder Pad



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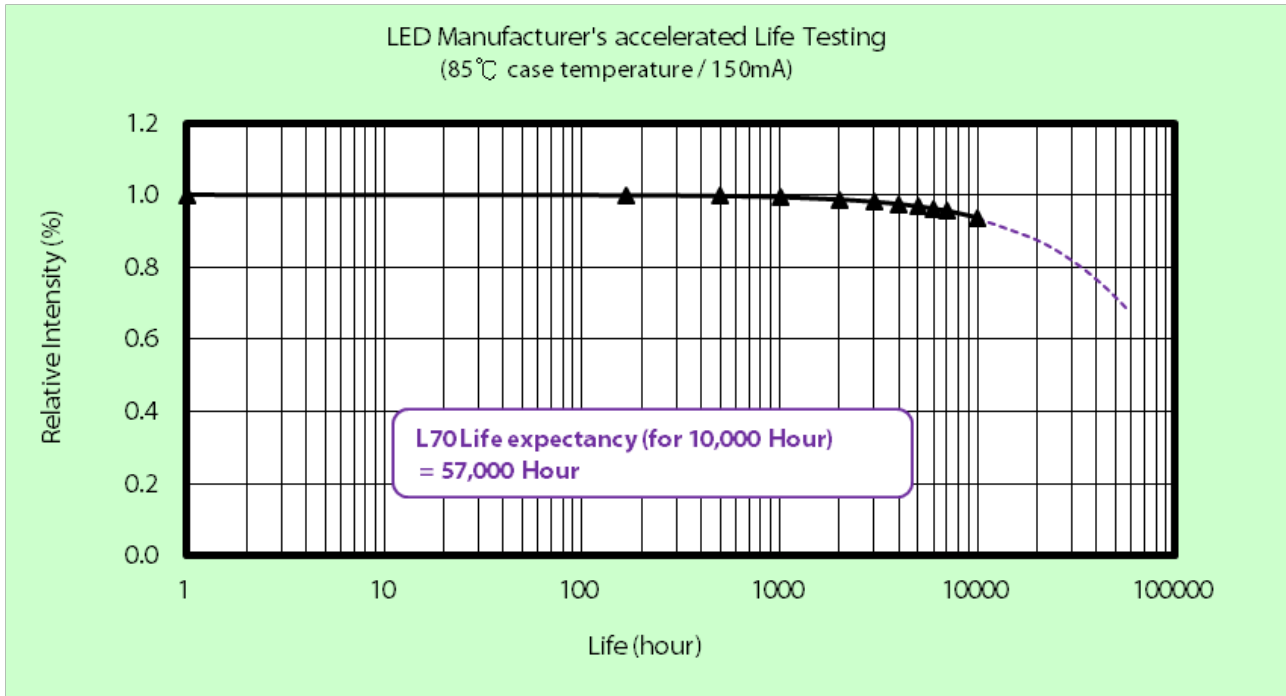
4. Test Results

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	95.33	1.000	1.027	1.013	1.003	0.997	0.993	0.998	0.996	0.984	0.981	0.972
2	98.58	1.000	1.031	1.020	1.016	1.009	1.006	1.005	0.998	0.983	0.981	0.973
3	94.72	1.000	1.010	0.996	0.990	0.991	0.983	0.984	0.979	0.964	0.960	0.952
4	98.36	1.000	1.006	0.992	0.988	0.980	0.977	0.975	0.973	0.960	0.955	0.949
5	96.53	1.000	1.025	1.009	1.000	0.996	0.994	0.993	0.985	0.974	0.970	0.964
6	95.97	1.000	1.014	1.005	0.991	0.990	0.988	0.988	0.980	0.964	0.964	0.956
7	96.69	1.000	1.015	0.998	0.992	0.989	0.986	0.986	0.976	0.967	0.960	0.956
8	97.37	1.000	1.022	1.000	0.995	0.992	0.985	0.987	0.985	0.972	0.972	0.963
9	95.69	1.000	1.008	0.990	0.986	0.982	0.974	0.976	0.970	0.959	0.956	0.949
10	96.26	1.000	1.017	1.000	0.994	0.992	0.987	0.984	0.977	0.967	0.966	0.955
11	98.14	1.000	1.013	1.004	0.994	0.988	0.984	0.983	0.977	0.967	0.964	0.958
12	97.26	1.000	1.019	1.008	1.001	1.001	0.993	0.995	0.984	0.972	0.970	0.963
13	99.05	1.000	1.013	1.000	0.992	0.988	0.985	0.984	0.974	0.964	0.961	0.953
14	101.35	1.000	1.012	0.998	0.988	0.983	0.977	0.976	0.967	0.956	0.955	0.944
15	99.39	1.000	0.994	0.987	0.984	0.980	0.973	0.974	0.968	0.955	0.955	0.944
16	97.35	1.000	1.017	1.010	0.996	0.998	0.990	0.990	0.984	0.969	0.966	0.955
17	96.27	1.000	1.013	1.000	0.988	0.983	0.980	0.981	0.976	0.965	0.958	0.951
18	100.56	1.000	1.007	0.996	0.988	0.984	0.978	0.980	0.969	0.961	0.954	0.948
19	100.94	1.000	1.006	1.000	0.986	0.980	0.974	0.976	0.969	0.959	0.955	0.948
20	99.84	1.000	1.017	1.013	1.005	1.002	0.994	0.993	0.985	0.978	0.970	0.963
21	98.79	1.000	1.007	0.996	0.989	0.988	0.981	0.984	0.972	0.959	0.956	0.948
22	95.85	1.000	1.013	0.999	0.997	0.991	0.989	0.992	0.985	0.971	0.967	0.961
AVG	97.74	1.000	1.014	1.001	0.994	0.990	0.985	0.986	0.979	0.967	0.964	0.956
MIN	94.72	1.000	0.994	0.987	0.984	0.980	0.973	0.974	0.967	0.955	0.954	0.944
MAX	101.35	1.000	1.031	1.020	1.016	1.009	1.006	1.005	0.998	0.984	0.981	0.973

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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	6.629E-06
B	1.022
Calculated L70(10k) (hours)	57,000
Reported L70(10k) (hours)	>57000

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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	2709.44	0	0.0000	0.0003	0.0006	0.0004	0.0009	0.0011	0.0014	0.0016	0.0019	0.0021
2	2712.66	0	0.0010	0.0013	0.0015	0.0012	0.0016	0.0017	0.0019	0.0020	0.0022	0.0025
3	2743.84	0	0.0012	0.0015	0.0016	0.0014	0.0017	0.0019	0.0021	0.0023	0.0025	0.0028
4	2698.49	0	0.0011	0.0014	0.0015	0.0015	0.0018	0.0020	0.0022	0.0023	0.0026	0.0028
5	2729.22	0	0.0011	0.0013	0.0015	0.0014	0.0016	0.0017	0.0018	0.0020	0.0022	0.0025
6	2712.50	0	0.0012	0.0014	0.0016	0.0015	0.0018	0.0020	0.0024	0.0025	0.0027	0.0029
7	2698.94	0	0.0013	0.0014	0.0015	0.0016	0.0018	0.0020	0.0023	0.0024	0.0026	0.0028
8	2651.35	0	0.0012	0.0015	0.0016	0.0017	0.0019	0.0020	0.0022	0.0023	0.0025	0.0027
9	2707.89	0	0.0013	0.0015	0.0017	0.0018	0.0020	0.0021	0.0023	0.0025	0.0028	0.0029
10	2653.48	0	0.0014	0.0014	0.0015	0.0016	0.0017	0.0018	0.0020	0.0023	0.0026	0.0028
11	2633.66	0	0.0009	0.0011	0.0013	0.0016	0.0018	0.0019	0.0020	0.0022	0.0025	0.0027
12	2737.88	0	0.0010	0.0014	0.0015	0.0013	0.0015	0.0016	0.0017	0.0018	0.0019	0.0021
13	2751.88	0	0.0010	0.0013	0.0014	0.0012	0.0015	0.0017	0.0017	0.0019	0.0020	0.0021
14	2697.42	0	0.0013	0.0013	0.0013	0.0015	0.0017	0.0019	0.0020	0.0022	0.0023	0.0025
15	2697.89	0	0.0013	0.0015	0.0014	0.0012	0.0017	0.0018	0.0023	0.0023	0.0026	0.0028
16	2697.47	0	0.0010	0.0013	0.0015	0.0016	0.0019	0.0021	0.0024	0.0026	0.0028	0.0031
17	2649.36	0	0.0013	0.0013	0.0015	0.0015	0.0018	0.0020	0.0021	0.0022	0.0025	0.0027
18	2649.03	0	0.0014	0.0015	0.0016	0.0018	0.0021	0.0022	0.0024	0.0024	0.0026	0.0029
19	2729.58	0	0.0013	0.0013	0.0015	0.0017	0.0020	0.0022	0.0023	0.0024	0.0026	0.0029
20	2711.66	0	0.0013	0.0015	0.0015	0.0017	0.0019	0.0021	0.0022	0.0024	0.0027	0.0029
21	2678.35	0	0.0012	0.0013	0.0013	0.0014	0.0016	0.0018	0.0020	0.0021	0.0024	0.0026
22	2670.18	0	0.0010	0.0011	0.0013	0.0015	0.0017	0.0019	0.0021	0.0022	0.0025	0.0026
AVG	2696.46	0	0.0011	0.0013	0.0014	0.0015	0.0017	0.0019	0.0021	0.0022	0.0025	0.0027
MIN	2633.66	0	0.0000	0.0003	0.0006	0.0004	0.0009	0.0011	0.0014	0.0016	0.0019	0.0021
MAX	2751.88	0	0.0014	0.0015	0.0017	0.0018	0.0021	0.0022	0.0024	0.0026	0.0028	0.0031

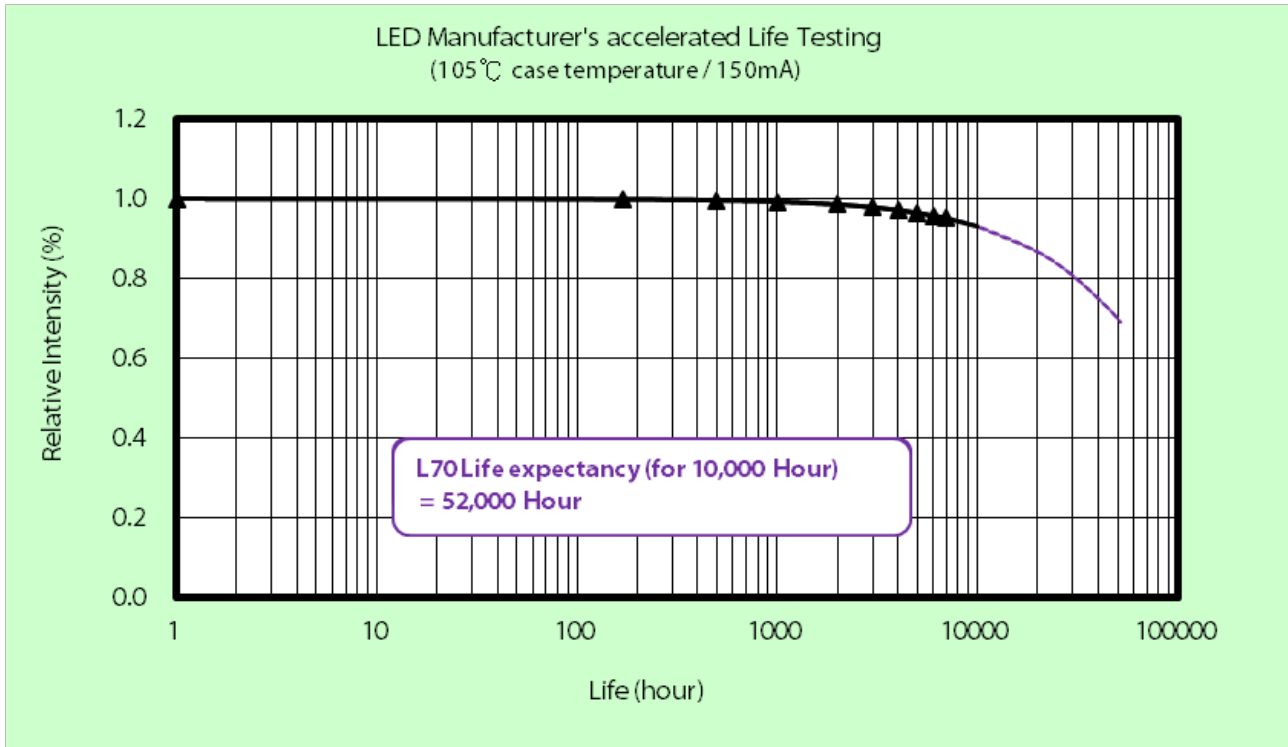
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4.2 Lumen and Color Maintenance data (105 °C)

■ Lumen Maintenance data (105 °C)

No.	Im(Initial)	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	94.48	1.000	1.036	1.020	1.015	1.012	1.004	0.999	0.995	0.983	0.977	0.972
2	94.60	1.000	1.014	1.004	1.006	1.003	0.993	0.988	0.981	0.971	0.965	0.960
3	96.97	1.000	1.006	0.992	0.995	0.996	0.988	0.980	0.974	0.962	0.960	0.955
4	99.42	1.000	0.992	0.980	0.976	0.969	0.967	0.958	0.955	0.938	0.939	0.931
5	96.82	1.000	1.000	0.983	0.986	0.977	0.974	0.968	0.968	0.953	0.956	0.946
6	98.09	1.000	0.999	0.988	0.979	0.975	0.969	0.963	0.957	0.946	0.945	0.942
7	93.69	1.000	1.030	1.011	1.011	1.004	0.999	0.995	0.990	0.978	0.973	0.965
8	102.10	1.000	0.988	0.977	0.974	0.964	0.959	0.957	0.952	0.939	0.937	0.933
9	97.36	1.000	0.996	0.983	0.982	0.975	0.973	0.969	0.961	0.945	0.947	0.939
10	99.09	1.000	1.003	0.992	0.984	0.987	0.978	0.973	0.965	0.956	0.952	0.948
11	97.19	1.000	0.999	0.984	0.982	0.976	0.974	0.968	0.957	0.946	0.941	0.940
12	101.00	1.000	0.996	0.975	0.977	0.971	0.967	0.960	0.953	0.944	0.939	0.935
13	102.28	1.000	0.989	0.977	0.980	0.971	0.963	0.957	0.947	0.937	0.935	0.928
14	98.49	1.000	0.993	0.985	0.987	0.983	0.975	0.971	0.963	0.951	0.949	0.943
15	99.99	1.000	0.994	0.984	0.981	0.980	0.974	0.966	0.963	0.949	0.947	0.941
16	95.09	1.000	1.006	0.998	0.989	0.988	0.982	0.976	0.968	0.958	0.955	0.951
17	98.26	1.000	0.990	0.986	0.982	0.984	0.974	0.969	0.955	0.946	0.946	0.939
18	95.87	1.000	1.004	0.988	0.994	0.989	0.984	0.974	0.968	0.957	0.955	0.949
19	96.41	1.000	0.993	0.984	0.975	0.971	0.965	0.962	0.954	0.942	0.933	0.931
20	100.67	1.000	1.001	0.986	0.982	0.979	0.970	0.968	0.956	0.945	0.940	0.933
21	96.77	1.000	0.998	0.989	0.985	0.983	0.979	0.974	0.966	0.952	0.948	0.947
22	99.84	1.000	0.987	0.975	0.970	0.968	0.960	0.959	0.950	0.941	0.935	0.933
AVG	97.93	1.000	1.001	0.988	0.986	0.982	0.976	0.971	0.963	0.952	0.949	0.944
MIN	93.69	1.000	0.987	0.975	0.970	0.964	0.959	0.957	0.947	0.937	0.933	0.928
MAX	102.28	1.000	1.036	1.020	1.015	1.012	1.004	0.999	0.995	0.983	0.977	0.972

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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	7.103E-06
B	1.011
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	2715.04	0	0.0012	0.0013	0.0013	0.0015	0.0022	0.0023	0.0025	0.0027	0.0028	0.0032
2	2713.12	0	0.0013	0.0013	0.0014	0.0015	0.0022	0.0023	0.0026	0.0028	0.0030	0.0034
3	2723.59	0	0.0009	0.0011	0.0013	0.0014	0.0019	0.0020	0.0022	0.0025	0.0026	0.0028
4	2710.84	0	0.0012	0.0013	0.0015	0.0016	0.0020	0.0022	0.0023	0.0025	0.0027	0.0029
5	2697.01	0	0.0014	0.0014	0.0015	0.0016	0.0020	0.0021	0.0021	0.0023	0.0024	0.0026
6	2722.62	0	0.0014	0.0013	0.0013	0.0014	0.0019	0.0020	0.0022	0.0025	0.0028	0.0030
7	2732.30	0	0.0010	0.0011	0.0015	0.0018	0.0024	0.0025	0.0026	0.0027	0.0028	0.0030
8	2686.66	0	0.0011	0.0014	0.0016	0.0017	0.0019	0.0020	0.0023	0.0025	0.0027	0.0029
9	2690.34	0	0.0018	0.0017	0.0016	0.0017	0.0022	0.0024	0.0029	0.0031	0.0033	0.0036
10	2658.11	0	0.0016	0.0017	0.0018	0.0019	0.0026	0.0027	0.0031	0.0033	0.0035	0.0036
11	2691.89	0	0.0010	0.0013	0.0015	0.0019	0.0024	0.0025	0.0029	0.0030	0.0032	0.0034
12	2673.34	0	0.0010	0.0012	0.0014	0.0016	0.0020	0.0021	0.0024	0.0025	0.0027	0.0029
13	2676.99	0	0.0013	0.0014	0.0015	0.0016	0.0021	0.0022	0.0025	0.0026	0.0027	0.0029
14	2742.18	0	0.0014	0.0014	0.0014	0.0015	0.0023	0.0024	0.0028	0.0029	0.0029	0.0030
15	2764.01	0	0.0012	0.0012	0.0013	0.0015	0.0019	0.0020	0.0023	0.0024	0.0026	0.0028
16	2661.24	0	0.0009	0.0011	0.0013	0.0014	0.0019	0.0020	0.0024	0.0026	0.0029	0.0031
17	2715.89	0	0.0014	0.0014	0.0013	0.0015	0.0024	0.0025	0.0029	0.0031	0.0033	0.0035
18	2648.12	0	0.0018	0.0016	0.0016	0.0017	0.0021	0.0023	0.0027	0.0028	0.0030	0.0033
19	2682.90	0	0.0014	0.0015	0.0016	0.0018	0.0023	0.0025	0.0026	0.0028	0.0031	0.0033
20	2682.68	0	0.0013	0.0016	0.0018	0.0020	0.0024	0.0025	0.0030	0.0032	0.0034	0.0036
21	2703.35	0	0.0016	0.0015	0.0017	0.0019	0.0023	0.0024	0.0027	0.0029	0.0030	0.0032
22	2725.25	0	0.0016	0.0017	0.0018	0.0019	0.0024	0.0025	0.0028	0.0029	0.0032	0.0034
AVG	2700.79	0	0.0013	0.0014	0.0015	0.0017	0.0022	0.0023	0.0026	0.0028	0.0029	0.0032
MIN	2648.12	0	0.0009	0.0011	0.0013	0.0014	0.0019	0.0020	0.0021	0.0023	0.0024	0.0026
MAX	2764.01	0	0.0018	0.0017	0.0018	0.0020	0.0026	0.0027	0.0031	0.0033	0.0035	0.0036



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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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LED.Detective@edison-opto.com.tw

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