

# EDISON OPTO Laboratory Test Report

## IES LM-80-08

### MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCE

Report Number	Q131108
Test Sample	2T03X2WW11000002
Rating	DC 60mA 0.2W
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

Report NO. Q131108

## EDISON OPTO Laboratory Test Report

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 <sup>2</sup>
2T03X2WW11000002	2700K / 3000K / 3500K	0.2	0.02
2T03X2WWxx000xxx	2700K / 3000K / 3500K	0.2	0.02
2T03X2NWxx000xxx	4000K	0.2	0.02
2T03X2CWxx000xxx	5000K / 5700K / 6500K	0.2	0.02

# EDISON OPTO Laboratory Test Report

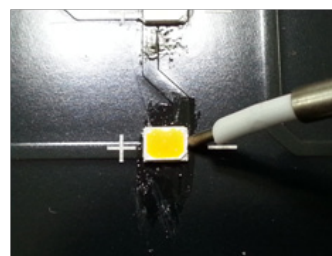
## 1. Test Summary

Case temperature (Ts)	83°C ≤ Ts	103°C ≤ Ts
Ambient conditions (T <sub>A</sub> )	80°C ≤ T <sub>A</sub> R.H. < 65 % Minimized airflow	100°C ≤ T <sub>A</sub> R.H. < 65 % Minimized airflow
Sample Size	22	22
Drive current of the LED	60mA	60mA
Initial flux (lm) / V <sub>F</sub> (V)	22.5 / 3.17	22.64 / 3.18
Lumen maintenance at 10000 hrs	95.55% Page 5	94.78% 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<sub>s</sub> is the temperature on the substrate; the ambient temperature T<sub>A</sub> is the temperature of the air at a distance of 50 mm above substrate.

Ts Measurement Point

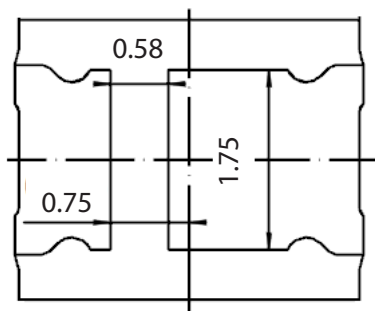
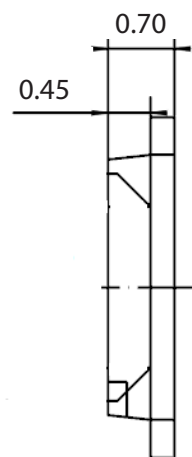
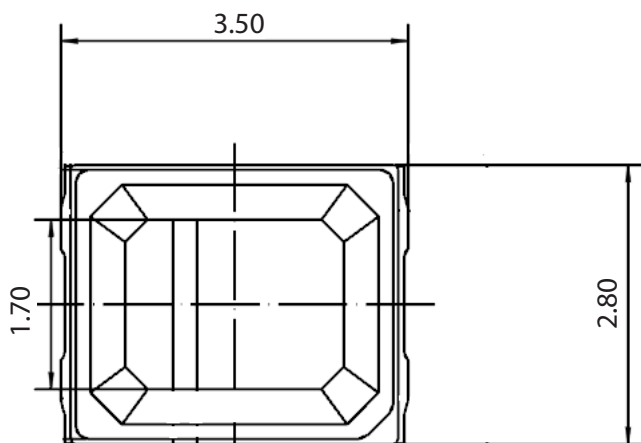


## 3. Description of test equipment

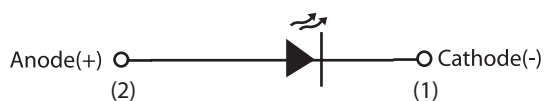
Equipment	Model No. / Serial No.	Cal. Laboratory	Report No.	Effective Date
Integrating sphere	ISP250 45392012	Standard Light Source L7386A	14-11-BAC-498- 01L	01.12.2015
DC power source	KEITHLEY 2425 1347276	SGS Taiwan Ltd.	ECAC1606814	16.06.2015
Temperature controlled test	VEKTREX/ SpikeSafe 200	Tai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

Report NO. Q131108

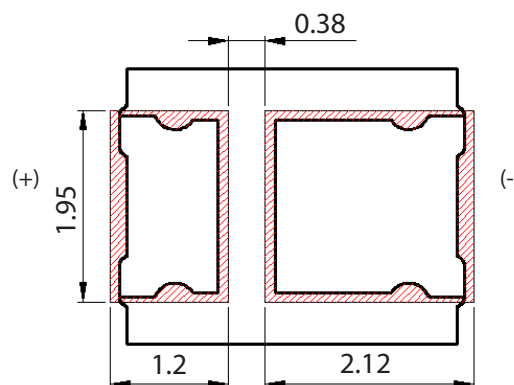
# EDISON OPTO Laboratory Test Report



## Circuit



## Solder Pad



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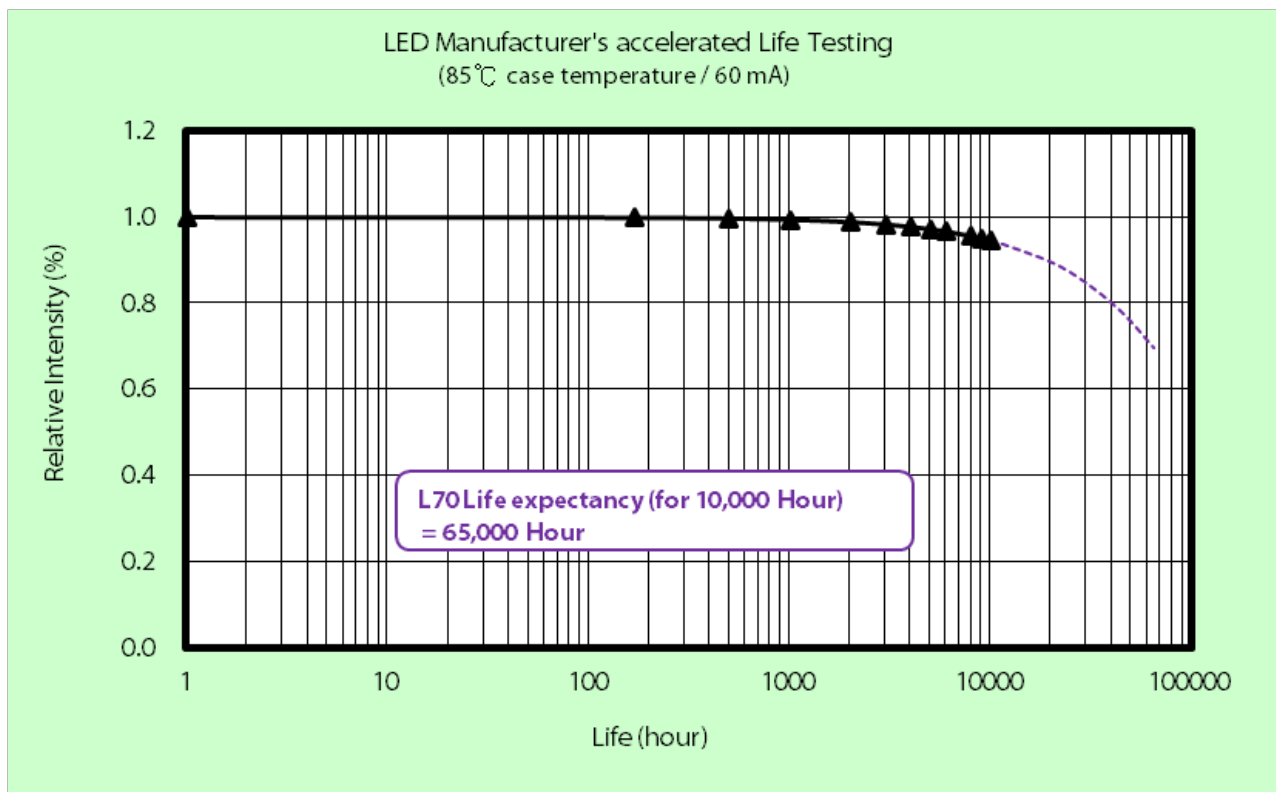
## 4. Test Results

### 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	22.36	1	0.996	0.997	0.989	0.985	0.980	0.974	0.970	0.963	0.959	0.953
2	22.52	1	0.999	0.999	0.992	0.991	0.988	0.981	0.976	0.970	0.965	0.961
3	22.22	1	0.999	0.997	0.992	0.988	0.983	0.978	0.973	0.966	0.963	0.957
4	22.10	1	1.000	0.999	0.992	0.988	0.983	0.977	0.972	0.965	0.962	0.955
5	22.26	1	0.998	0.998	0.993	0.989	0.985	0.981	0.976	0.969	0.964	0.959
6	22.65	1	1.000	0.996	0.993	0.991	0.987	0.980	0.975	0.968	0.963	0.958
7	22.53	1	0.999	0.998	0.989	0.988	0.982	0.975	0.971	0.964	0.961	0.956
8	22.36	1	0.997	0.997	0.986	0.982	0.979	0.972	0.967	0.960	0.957	0.952
9	22.50	1	1.000	1.001	0.996	0.997	0.990	0.984	0.979	0.972	0.968	0.964
10	22.83	1	0.999	0.999	0.990	0.988	0.982	0.975	0.971	0.964	0.959	0.955
11	22.34	1	1.000	1.000	0.993	0.993	0.987	0.980	0.975	0.968	0.964	0.959
12	22.11	1	0.998	0.998	1.002	1.000	0.995	0.989	0.985	0.978	0.975	0.970
13	22.04	1	0.998	0.998	0.988	0.985	0.980	0.975	0.971	0.963	0.959	0.955
14	22.23	1	0.999	1.004	0.987	0.981	0.978	0.972	0.966	0.960	0.956	0.948
15	22.30	1	0.999	0.998	0.992	0.990	0.986	0.979	0.974	0.966	0.962	0.957
16	22.48	1	0.997	0.995	0.986	0.982	0.977	0.970	0.966	0.958	0.956	0.951
17	22.74	1	0.999	0.996	0.990	0.988	0.982	0.976	0.971	0.964	0.960	0.956
18	22.78	1	0.996	0.990	0.989	0.988	0.984	0.978	0.972	0.965	0.959	0.956
19	22.73	1	0.993	0.993	0.987	0.983	0.977	0.971	0.966	0.959	0.954	0.950
20	23.02	1	0.996	0.993	0.982	0.977	0.972	0.965	0.960	0.953	0.949	0.944
21	22.88	1	0.999	0.998	0.987	0.985	0.978	0.971	0.967	0.959	0.956	0.951
22	23.03	1	0.997	0.996	0.987	0.985	0.979	0.973	0.967	0.960	0.954	0.952
AVG	22.50	1	0.998	0.997	0.990	0.987	0.982	0.976	0.971	0.964	0.960	0.956
MIN	22.04	1	0.993	0.990	0.982	0.977	0.972	0.965	0.960	0.953	0.949	0.944
MAX	23.03	1	1.000	1.004	1.002	1.000	0.995	0.989	0.985	0.978	0.975	0.970

# EDISON OPTO Laboratory Test Report



Test Condition 1 - 85°C Case Temp	
Sample size	22
Number of failures	0
DUT drive current used in the test (mA)	60
Test duration (hours)	10,000
Test duration used for projection (hour to hour)	5,000 - 10,000
Tested case temperature (°C)	85
$\alpha$	5.596E-06
B	1.010
Calculated L70(10k) (hours)	65,000
Reported L70(10k) (hours)	>60000

# EDISON OPTO Laboratory Test Report

■ Color Maintenance data (85 °C)

$\Delta u'v'$

No.	CCT Initial	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	2629.96	0	0.0005	0.0008	0.0008	0.0013	0.0013	0.0014	0.0016	0.0018	0.0021	0.0025
2	2622.22	0	0.0005	0.0008	0.0009	0.0014	0.0014	0.0015	0.0018	0.0019	0.0021	0.0025
3	2571.22	0	0.0005	0.0009	0.0010	0.0014	0.0015	0.0017	0.0019	0.0020	0.0022	0.0026
4	2569.49	0	0.0004	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	0.0020	0.0022	0.0025
5	2576.80	0	0.0004	0.0010	0.0010	0.0014	0.0014	0.0015	0.0016	0.0017	0.0018	0.0021
6	2597.86	0	0.0005	0.0010	0.0011	0.0014	0.0014	0.0014	0.0016	0.0018	0.0021	0.0025
7	2616.52	0	0.0005	0.0009	0.0010	0.0013	0.0013	0.0014	0.0016	0.0018	0.0020	0.0023
8	2619.99	0	0.0005	0.0009	0.0010	0.0015	0.0016	0.0017	0.0019	0.0020	0.0023	0.0026
9	2589.28	0	0.0005	0.0008	0.0009	0.0012	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026
10	2570.47	0	0.0004	0.0009	0.0010	0.0013	0.0014	0.0015	0.0017	0.0020	0.0022	0.0025
11	2594.74	0	0.0004	0.0008	0.0009	0.0011	0.0012	0.0015	0.0016	0.0018	0.0022	0.0025
12	2633.18	0	0.0008	0.0009	0.0010	0.0019	0.0021	0.0022	0.0023	0.0024	0.0027	0.0031
13	2608.59	0	0.0006	0.0010	0.0011	0.0015	0.0016	0.0020	0.0023	0.0025	0.0028	0.0031
14	2647.22	0	0.0006	0.0010	0.0011	0.0016	0.0017	0.0018	0.0019	0.0021	0.0023	0.0026
15	2628.21	0	0.0005	0.0008	0.0010	0.0014	0.0013	0.0014	0.0015	0.0017	0.0020	0.0023
16	2641.69	0	0.0005	0.0008	0.0010	0.0016	0.0017	0.0019	0.0021	0.0022	0.0025	0.0028
17	2695.21	0	0.0005	0.0008	0.0010	0.0014	0.0015	0.0016	0.0018	0.0020	0.0022	0.0026
18	2615.34	0	0.0006	0.0009	0.0010	0.0013	0.0013	0.0017	0.0018	0.0020	0.0023	0.0026
19	2642.45	0	0.0007	0.0008	0.0010	0.0016	0.0016	0.0017	0.0018	0.0019	0.0022	0.0025
20	2662.04	0	0.0006	0.0007	0.0009	0.0016	0.0016	0.0017	0.0018	0.0021	0.0023	0.0026
21	2672.50	0	0.0006	0.0010	0.0011	0.0014	0.0016	0.0017	0.0019	0.0022	0.0025	0.0028
22	2619.68	0	0.0006	0.0009	0.0010	0.0015	0.0016	0.0016	0.0018	0.0019	0.0022	0.0025
AVG	2619.30	0	0.0005	0.0009	0.0010	0.0014	0.0015	0.0016	0.0018	0.0020	0.0023	0.0026
MIN	2569.49	0	0.0004	0.0007	0.0008	0.0011	0.0012	0.0014	0.0015	0.0017	0.0018	0.0021
MAX	2695.21	0	0.0008	0.0010	0.0011	0.0019	0.0021	0.0022	0.0023	0.0025	0.0028	0.0031

## EDISON OPTO Laboratory Test Report

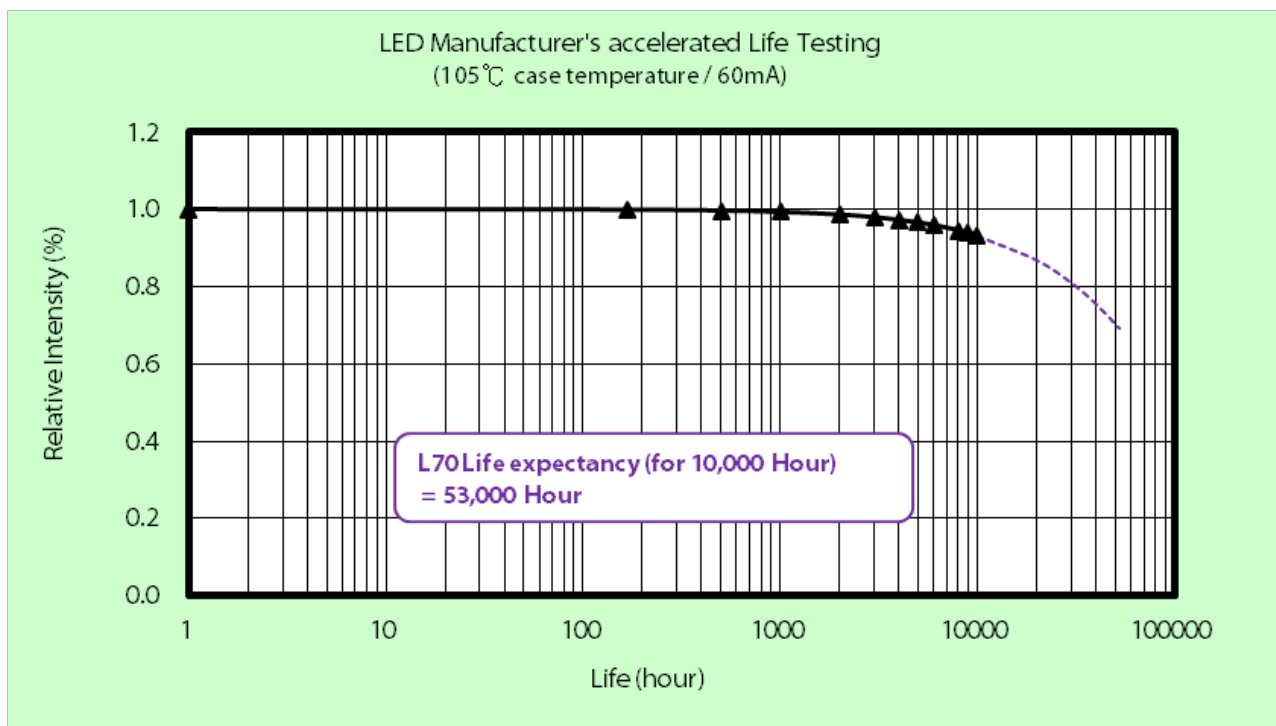
### 4.2 Lumen and Color Maintenance data (105 °C)

#### ■ Lumen Maintenance data (105 °C)

No.	Im(Initial)	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	23.29	1	0.987	1.002	0.996	0.993	0.988	0.982	0.973	0.965	0.961	0.955
2	22.69	1	1.000	0.999	0.991	0.988	0.984	0.977	0.970	0.961	0.957	0.945
3	23.06	1	0.997	0.993	0.983	0.980	0.976	0.969	0.961	0.952	0.949	0.942
4	22.29	1	0.998	0.972	0.963	0.959	0.957	0.951	0.941	0.935	0.932	0.926
5	22.86	1	0.990	0.978	0.975	0.972	0.967	0.962	0.954	0.947	0.943	0.937
6	22.87	1	0.999	1.002	0.994	0.989	0.985	0.979	0.971	0.965	0.960	0.955
7	22.44	1	0.997	0.973	0.966	0.963	0.961	0.955	0.946	0.938	0.934	0.929
8	23.09	1	0.984	0.991	0.985	0.991	0.990	0.984	0.975	0.968	0.963	0.957
9	22.45	1	1.002	1.008	1.000	0.996	0.993	0.985	0.977	0.969	0.964	0.958
10	22.21	1	0.997	1.003	0.993	0.990	0.991	0.985	0.977	0.969	0.965	0.958
11	22.32	1	0.997	0.979	0.970	0.969	0.966	0.960	0.951	0.940	0.938	0.933
12	22.54	1	0.998	0.980	0.977	0.977	0.973	0.966	0.957	0.949	0.945	0.939
13	22.73	1	1.000	0.994	0.985	0.982	0.978	0.971	0.963	0.955	0.950	0.945
14	22.76	1	0.999	1.010	0.999	0.997	0.993	0.985	0.977	0.970	0.964	0.959
15	22.50	1	0.999	0.998	0.992	0.987	0.983	0.977	0.968	0.960	0.955	0.950
16	22.66	1	0.998	1.008	1.004	0.999	0.995	0.989	0.981	0.973	0.969	0.962
17	22.69	1	0.996	0.985	0.977	0.971	0.968	0.962	0.956	0.948	0.942	0.938
18	22.67	1	0.998	1.002	0.993	0.991	0.990	0.985	0.978	0.969	0.964	0.959
19	22.73	1	0.998	0.996	0.988	0.981	0.980	0.974	0.966	0.957	0.952	0.947
20	22.59	1	1.000	0.989	0.979	0.973	0.971	0.965	0.957	0.948	0.943	0.938
21	22.31	1	1.002	1.011	1.005	0.998	0.994	0.988	0.980	0.971	0.965	0.960
22	22.30	1	0.994	1.001	1.000	0.994	0.993	0.986	0.979	0.970	0.964	0.960
AVG	22.64	1	0.997	0.994	0.987	0.984	0.981	0.974	0.966	0.958	0.954	0.948
MIN	22.21	1	0.984	0.972	0.963	0.959	0.957	0.951	0.941	0.935	0.932	0.926
MAX	23.29	1	1.002	1.011	1.005	0.999	0.995	0.989	0.981	0.973	0.969	0.962



# EDISON OPTO Laboratory Test Report



Test Condition 2 - 105°C Case Temp	
Sample size	22
Number of failures	0
DUT drive current used in the test (mA)	60
Test duration (hours)	10,000
Test duration used for projection (hour to hour)	5,000 - 10,000
Tested case temperature (°C)	105
$\alpha$	6.981E-06
B	1.015
Calculated L70(10k) (hours)	53,000
Reported L70(10k) (hours)	53,000

# EDISON OPTO Laboratory Test Report

## ■ Color Maintenance data (105 °C)

$\Delta u'v'$

No.	CCT Initial	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h	10000h
1	2697.40	0	0.0009	0.0010	0.0011	0.0014	0.0016	0.0021	0.0022	0.0024	0.0027	0.0030
2	2640.64	0	0.0006	0.0008	0.0010	0.0012	0.0013	0.0016	0.0019	0.0021	0.0025	0.0028
3	2608.61	0	0.0007	0.0008	0.0010	0.0012	0.0015	0.0019	0.0020	0.0022	0.0025	0.0029
4	2631.74	0	0.0007	0.0009	0.0011	0.0021	0.0021	0.0026	0.0029	0.0033	0.0036	0.0040
5	2646.38	0	0.0008	0.0010	0.0011	0.0019	0.0020	0.0021	0.0024	0.0026	0.0029	0.0033
6	2692.19	0	0.0007	0.0009	0.0011	0.0013	0.0014	0.0016	0.0017	0.0019	0.0022	0.0025
7	2612.88	0	0.0006	0.0010	0.0012	0.0017	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033
8	2683.56	0	0.0011	0.0011	0.0012	0.0012	0.0015	0.0018	0.0019	0.0021	0.0024	0.0027
9	2684.59	0	0.0006	0.0010	0.0011	0.0013	0.0014	0.0016	0.0019	0.0022	0.0025	0.0027
10	2615.96	0	0.0006	0.0009	0.0011	0.0014	0.0016	0.0020	0.0021	0.0024	0.0028	0.0031
11	2620.20	0	0.0006	0.0010	0.0011	0.0015	0.0016	0.0020	0.0023	0.0025	0.0028	0.0032
12	2653.08	0	0.0006	0.0010	0.0012	0.0014	0.0015	0.0019	0.0021	0.0023	0.0027	0.0031
13	2651.26	0	0.0006	0.0010	0.0011	0.0011	0.0015	0.0018	0.0020	0.0023	0.0027	0.0030
14	2640.76	0	0.0006	0.0011	0.0012	0.0011	0.0015	0.0018	0.0021	0.0024	0.0027	0.0029
15	2623.40	0	0.0006	0.0011	0.0012	0.0013	0.0014	0.0018	0.0021	0.0024	0.0026	0.0029
16	2653.27	0	0.0006	0.0011	0.0009	0.0012	0.0014	0.0018	0.0019	0.0022	0.0025	0.0028
17	2652.00	0	0.0006	0.0010	0.0012	0.0016	0.0017	0.0019	0.0021	0.0024	0.0029	0.0032
18	2605.79	0	0.0006	0.0009	0.0010	0.0012	0.0015	0.0018	0.0020	0.0022	0.0025	0.0028
19	2620.36	0	0.0006	0.0008	0.0010	0.0016	0.0015	0.0017	0.0020	0.0022	0.0025	0.0028
20	2649.41	0	0.0006	0.0009	0.0011	0.0015	0.0016	0.0020	0.0021	0.0024	0.0027	0.0030
21	2622.60	0	0.0006	0.0010	0.0011	0.0010	0.0012	0.0015	0.0016	0.0019	0.0023	0.0025
22	2675.88	0	0.0008	0.0011	0.0013	0.0014	0.0016	0.0018	0.0020	0.0023	0.0025	0.0029
AVG	2644.63	0	0.0007	0.0010	0.0011	0.0014	0.0016	0.0019	0.0021	0.0023	0.0027	0.0030
MIN	2605.79	0	0.0006	0.0008	0.0009	0.0010	0.0012	0.0015	0.0016	0.0019	0.0022	0.0025
MAX	2697.40	0	0.0011	0.0011	0.0013	0.0021	0.0021	0.0026	0.0029	0.0033	0.0036	0.0040

## EDISON OPTO Laboratory Test Report

### 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](http://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](http://www.edison-opto.com)

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