

# EDISON OPTO Laboratory Test Report

## IES LM-80-08

### MEASURING LUMEN MAINTENANCE OF LED LIGHT SOURCE

Report Number	Q140402
Test Sample	2T03X4WW38000001
Rating	DC 60mA 0.4W
Normal CCT	2,700 K
Test Date	April 18, 2014 to February 26, 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 <sup>2</sup>
2T03X4WW38000001	2700K	0.4W	0.041
2T03X4WWxx000xxx	3500K/3000K/2700K	0.4W	0.041
2T03X4NWxx000xxx	4000K	0.4W	0.041
2T03X4CWxx000xxx	5000K/5700K/6500K	0.4W	0.041

# EDISON OPTO Laboratory Test Report

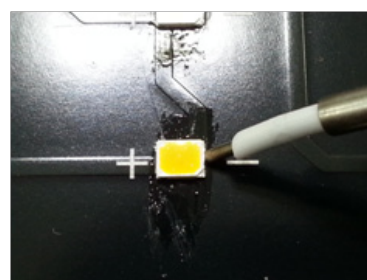
## 1. Test Summary

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)	45.00 / 6.20	44.99 / 6.18
Lumen maintenance at 7,000 hrs	96.49% Page 5	95.62% Page 8
LED failure	0	0
Monitoring interval (hrs)	0, 1000, 2000, 3000, 4000, 5000, 6000, 7000	
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



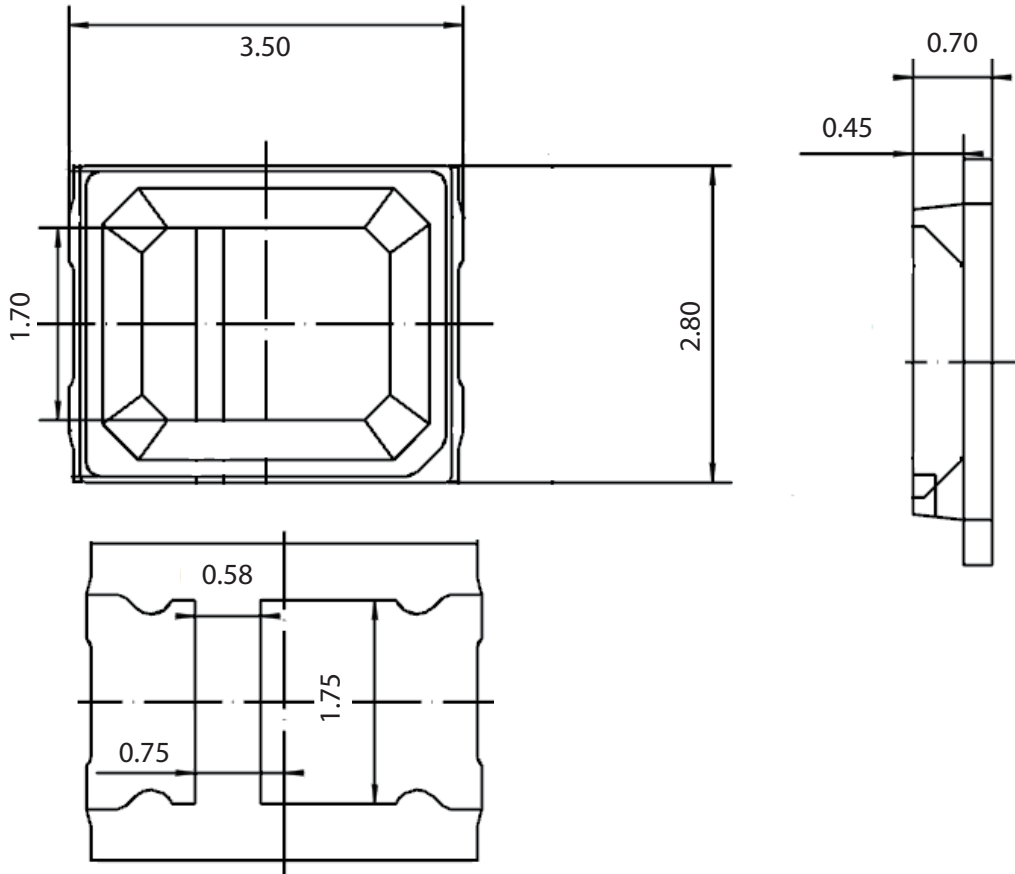
## 3. Description of test equipment

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 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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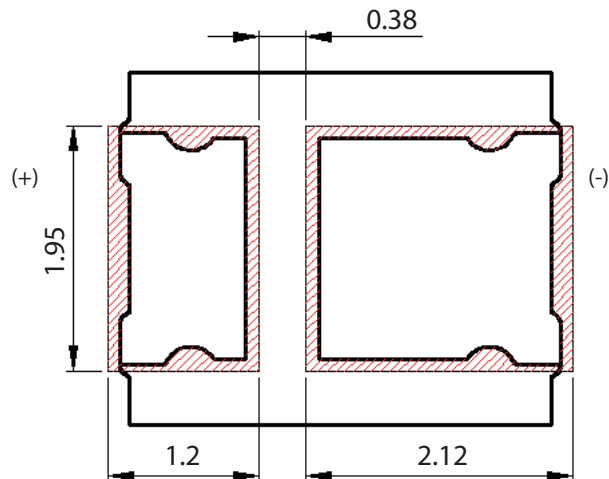
## Emitter Type Dimension



## Circuit



## Solder Pad



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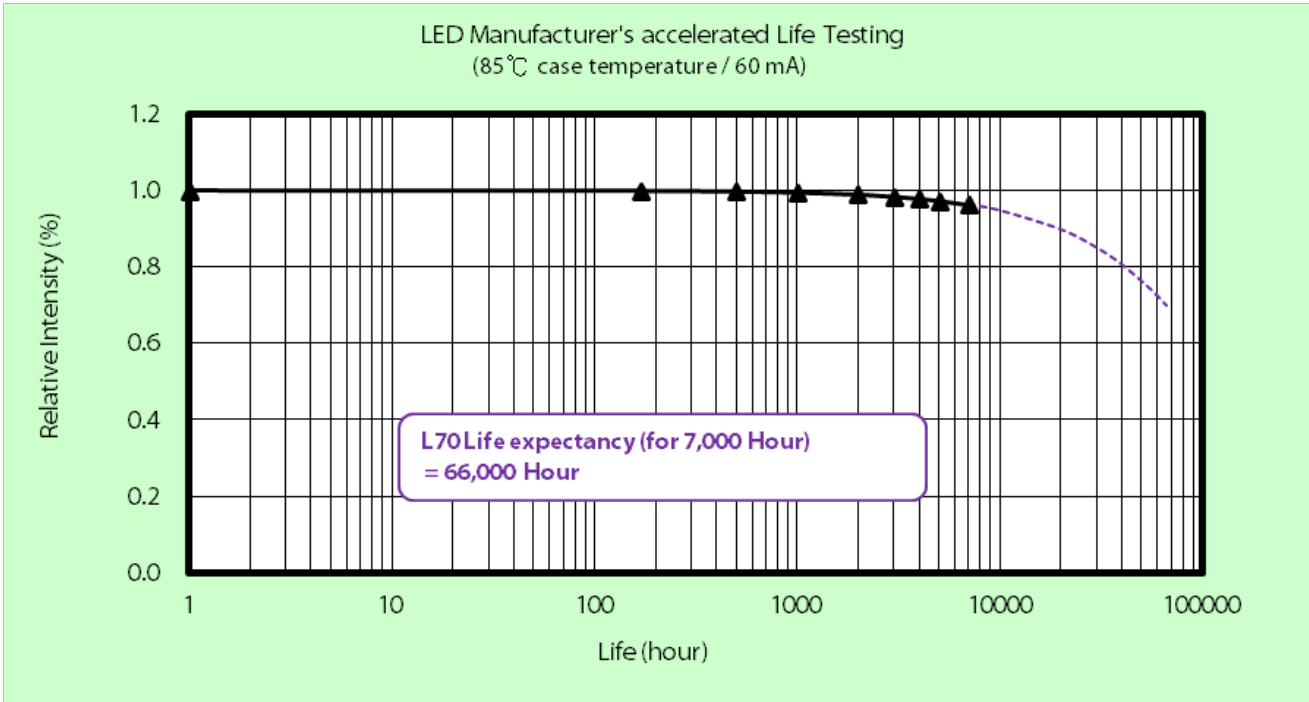
## 4. Test Results

### 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
1	45.27	1.000	0.998	0.993	0.994	0.987	0.976	0.959	0.943
2	45.20	1.000	0.998	0.993	0.983	0.977	0.972	0.969	0.976
3	44.97	1.000	1.002	0.996	0.987	0.985	0.977	0.972	0.973
4	44.78	1.000	1.002	0.998	0.991	0.988	0.976	0.953	0.931
5	45.26	1.000	0.995	0.988	0.987	0.984	0.979	0.981	0.987
6	44.45	1.000	1.002	0.997	0.993	0.985	0.975	0.962	0.946
7	45.58	1.000	1.001	0.996	0.988	0.980	0.979	0.976	0.979
8	45.11	1.000	0.987	0.975	0.979	0.981	0.977	0.985	0.990
9	45.31	1.000	0.987	0.977	0.969	0.969	0.970	0.972	0.970
10	45.50	1.000	0.994	0.978	0.972	0.967	0.966	0.973	0.979
11	44.83	1.000	1.006	1.000	0.994	0.983	0.974	0.965	0.956
12	44.75	1.000	1.000	0.992	0.985	0.982	0.980	0.976	0.976
13	43.08	1.000	1.005	0.999	0.994	0.993	0.993	0.989	0.987
14	45.37	1.000	1.002	0.979	0.988	0.990	0.983	0.978	0.971
15	45.22	1.000	1.000	0.994	0.981	0.982	0.977	0.978	0.985
16	45.35	1.000	0.981	0.977	0.973	0.970	0.963	0.955	0.952
17	44.60	1.000	1.003	0.997	0.991	0.985	0.971	0.953	0.934
18	45.32	1.000	1.001	0.995	0.988	0.982	0.969	0.954	0.940
19	45.01	1.000	0.998	0.992	0.980	0.976	0.973	0.971	0.973
20	45.00	1.000	1.000	0.994	0.989	0.983	0.978	0.977	0.984
21	44.84	1.000	1.000	0.994	0.989	0.982	0.974	0.959	0.956
22	45.19	1.000	1.004	0.995	0.990	0.982	0.973	0.957	0.938
AVG	45.00	1.000	0.998	0.991	0.986	0.981	0.975	0.969	0.965
MIN	43.08	1.000	0.981	0.975	0.969	0.967	0.963	0.953	0.931
MAX	45.58	1.000	1.006	1.000	0.994	0.993	0.993	0.989	0.990

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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)	60
Test duration (hours)	7,000
Test duration used for projection (hour to hour)	2,000 - 7,000
Tested case temperature (°C)	85
$\alpha$	5.437E-06
B	1.002
Calculated L70(7k) (hours)	66,000
Reported L70(7k) (hours)	>42000



# EDISON OPTO Laboratory Test Report

■ Color Maintenance data (85 °C)

$\Delta u'v'$

No.	CCT Initial	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h
1	2710.09	0	0.0012	0.0013	0.0013	0.0014	0.0015	0.0019	0.0022
2	2750.35	0	0.0010	0.0013	0.0014	0.0015	0.0016	0.0018	0.0022
3	2693.24	0	0.0009	0.0012	0.0014	0.0015	0.0016	0.0019	0.0022
4	2687.54	0	0.0009	0.0010	0.0011	0.0012	0.0015	0.0017	0.0021
5	2686.54	0	0.0015	0.0016	0.0015	0.0017	0.0019	0.0022	0.0025
6	2713.50	0	0.0008	0.0010	0.0011	0.0012	0.0012	0.0013	0.0016
7	2743.55	0	0.0009	0.0011	0.0012	0.0014	0.0015	0.0018	0.0021
8	2686.30	0	0.0014	0.0017	0.0017	0.0018	0.0022	0.0025	0.0027
9	2673.58	0	0.0014	0.0015	0.0016	0.0017	0.0018	0.0021	0.0024
10	2737.90	0	0.0012	0.0016	0.0018	0.0019	0.0022	0.0023	0.0027
11	2745.64	0	0.0008	0.0011	0.0012	0.0012	0.0014	0.0016	0.0019
12	2679.98	0	0.0010	0.0013	0.0015	0.0016	0.0016	0.0019	0.0021
13	2706.03	0	0.0008	0.0010	0.0012	0.0012	0.0013	0.0015	0.0018
14	2714.69	0	0.0010	0.0012	0.0015	0.0016	0.0018	0.0019	0.0023
15	2737.52	0	0.0009	0.0012	0.0016	0.0017	0.0019	0.0021	0.0024
16	2740.54	0	0.0015	0.0014	0.0016	0.0018	0.0020	0.0022	0.0024
17	2687.29	0	0.0009	0.0011	0.0013	0.0013	0.0015	0.0019	0.0022
18	2712.07	0	0.0009	0.0011	0.0014	0.0015	0.0016	0.0018	0.0021
19	2697.25	0	0.0011	0.0015	0.0017	0.0017	0.0019	0.0021	0.0025
20	2712.08	0	0.0007	0.0011	0.0014	0.0013	0.0015	0.0017	0.0020
21	2651.32	0	0.0010	0.0013	0.0014	0.0014	0.0016	0.0018	0.0021
22	2733.82	0	0.0009	0.0009	0.0013	0.0013	0.0014	0.0016	0.0021
AVG	2709.13	0	0.0010	0.0012	0.0014	0.0015	0.0017	0.0019	0.0022
MIN	2651.32	0	0.0007	0.0009	0.0011	0.0012	0.0012	0.0013	0.0016
MAX	2750.35	0	0.0015	0.0017	0.0018	0.0019	0.0022	0.0025	0.0027

## EDISON OPTO Laboratory Test Report

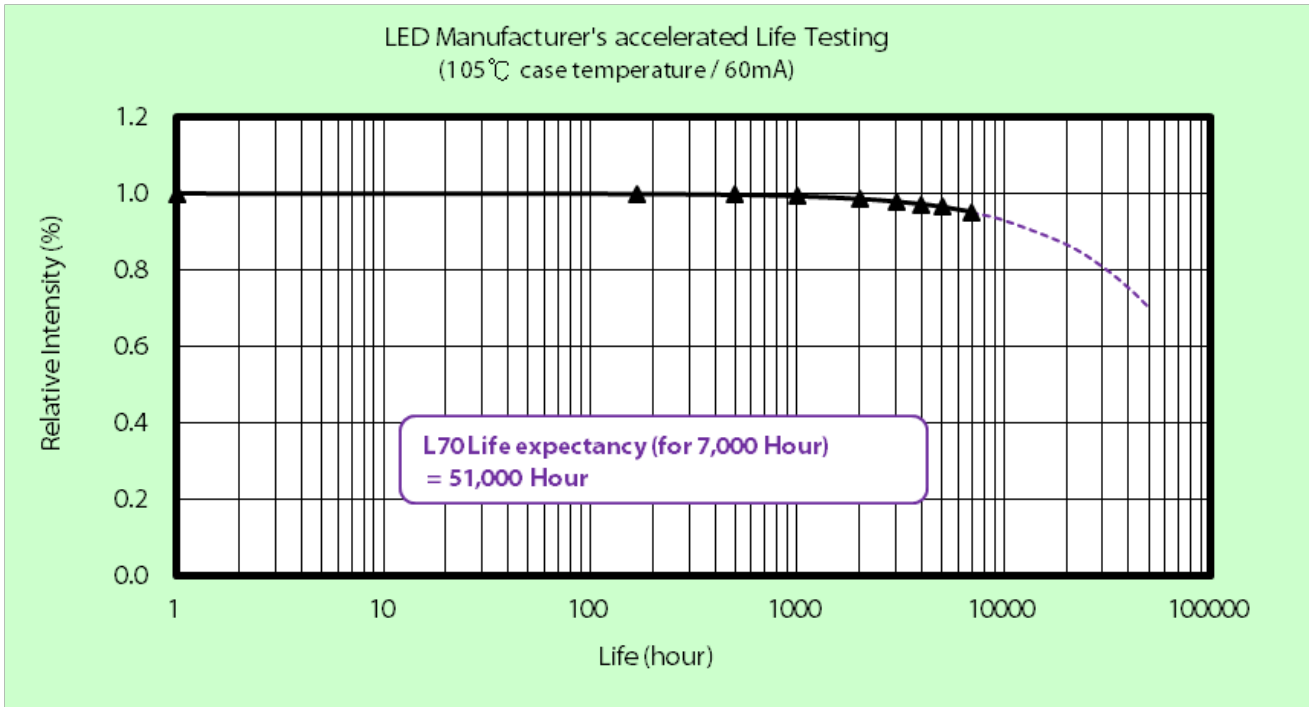
### 4.2 Lumen and Color Maintenance data (105 °C)

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

No.	Im(Initial)	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h
1	44.94	1.000	0.992	0.982	0.979	0.976	0.965	0.959	0.953
2	45.43	1.000	0.979	0.960	0.964	0.962	0.951	0.946	0.942
3	44.69	1.000	0.997	0.992	0.987	0.982	0.972	0.966	0.962
4	44.82	1.000	1.000	0.991	0.985	0.978	0.967	0.961	0.955
5	44.48	1.000	0.987	0.997	0.986	0.983	0.973	0.967	0.961
6	45.12	1.000	0.995	0.980	0.976	0.968	0.959	0.953	0.948
7	44.46	1.000	1.002	0.996	0.991	0.984	0.973	0.967	0.962
8	44.44	1.000	0.983	1.003	0.993	0.988	0.976	0.970	0.965
9	45.86	1.000	0.990	0.983	0.976	0.969	0.959	0.953	0.948
10	44.36	1.000	0.999	1.002	0.992	0.989	0.978	0.972	0.967
11	45.22	1.000	1.003	0.992	0.985	0.979	0.967	0.961	0.957
12	45.46	1.000	0.982	0.981	0.971	0.970	0.958	0.952	0.947
13	45.26	1.000	0.994	0.984	0.977	0.971	0.962	0.956	0.952
14	44.83	1.000	0.992	0.991	0.988	0.982	0.972	0.965	0.960
15	43.90	1.000	1.005	1.005	1.004	0.999	0.987	0.982	0.977
16	45.42	1.000	0.988	0.997	0.987	0.983	0.972	0.966	0.960
17	45.39	1.000	0.982	0.980	0.973	0.967	0.957	0.950	0.945
18	45.17	1.000	0.997	0.984	0.981	0.975	0.965	0.958	0.953
19	44.96	1.000	0.996	0.995	0.988	0.982	0.971	0.964	0.958
20	45.36	1.000	1.001	0.987	0.980	0.977	0.965	0.958	0.955
21	45.16	1.000	0.992	0.974	0.971	0.964	0.957	0.953	0.950
22	45.08	1.000	0.993	0.998	0.987	0.980	0.970	0.964	0.960
AVG	44.99	1.000	0.993	0.989	0.983	0.978	0.967	0.961	0.956
MIN	43.90	1.000	0.979	0.960	0.964	0.962	0.951	0.946	0.942
MAX	45.86	1.000	1.005	1.005	1.004	0.999	0.987	0.982	0.977



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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)	60
Test duration (hours)	7,000
Test duration used for projection (hour to hour)	2,000 - 7,000
Tested case temperature (°C)	105
$\alpha$	6.999E-06
B	1.003
Calculated L70(7k) (hours)	51,000
Reported L70(7k) (hours)	>42000



# EDISON OPTO Laboratory Test Report

■ Color Maintenance data (105 °C)

$\Delta u'v'$

No.	CCT Initial	0h	1000h	2000h	3000h	4000h	5000h	6000h	7000h
1	2738.08	0	0.0011	0.0012	0.0013	0.0020	0.0023	0.0026	0.0030
2	2724.66	0	0.0016	0.0018	0.0019	0.0021	0.0023	0.0026	0.0030
3	2684.41	0	0.0010	0.0011	0.0012	0.0016	0.0018	0.0021	0.0025
4	2711.93	0	0.0008	0.0009	0.0012	0.0017	0.0019	0.0023	0.0026
5	2661.72	0	0.0011	0.0012	0.0013	0.0022	0.0023	0.0025	0.0029
6	2670.34	0	0.0010	0.0011	0.0013	0.0017	0.0021	0.0024	0.0027
7	2641.80	0	0.0012	0.0014	0.0015	0.0019	0.0022	0.0026	0.0029
8	2717.26	0	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0029
9	2705.95	0	0.0011	0.0013	0.0014	0.0017	0.0018	0.0020	0.0024
10	2644.33	0	0.0009	0.0010	0.0014	0.0019	0.0022	0.0024	0.0027
11	2760.50	0	0.0012	0.0014	0.0015	0.0021	0.0024	0.0027	0.0031
12	2751.22	0	0.0015	0.0017	0.0018	0.0021	0.0024	0.0027	0.0031
13	2678.79	0	0.0010	0.0011	0.0012	0.0017	0.0019	0.0022	0.0026
14	2662.91	0	0.0011	0.0013	0.0016	0.0019	0.0021	0.0024	0.0028
15	2681.52	0	0.0008	0.0010	0.0013	0.0020	0.0023	0.0026	0.0031
16	2679.05	0	0.0009	0.0010	0.0013	0.0018	0.0022	0.0024	0.0028
17	2738.79	0	0.0017	0.0018	0.0018	0.0022	0.0024	0.0026	0.0031
18	2696.70	0	0.0009	0.0010	0.0013	0.0015	0.0017	0.0021	0.0025
19	2674.24	0	0.0010	0.0011	0.0012	0.0016	0.0018	0.0021	0.0026
20	2682.72	0	0.0010	0.0012	0.0013	0.0016	0.0018	0.0021	0.0025
21	2671.53	0	0.0011	0.0012	0.0015	0.0018	0.0021	0.0022	0.0026
22	2694.28	0	0.0010	0.0012	0.0014	0.0018	0.0021	0.0024	0.0028
AVG	2694.22	0	0.0011	0.0013	0.0014	0.0019	0.0021	0.0024	0.0028
MIN	2641.80	0	0.0008	0.0009	0.0012	0.0015	0.0017	0.0020	0.0024
MAX	2760.50	0	0.0017	0.0018	0.0019	0.0022	0.0024	0.0027	0.0031



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

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For technical assistance please contact:  
[LED.Detective@edison-opto.com.tw](mailto:LED.Detective@edison-opto.com.tw)

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