

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, 2013 to October 14, 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
2T03X2CW11000002	5000K / 5700K / 6500K	0.2	0.02
2T03X2NW11000002	4000K	0.2	0.02
2T03X2WW11000002	2700K / 3000K / 3500K	0.2	0.02
2T03X2CW23000001	5000K / 5700K / 6500K	0.2	0.02
2T03X2NW23000001	4000K	0.2	0.02
2T03X2WW23000001	2700K / 3000K / 3500K	0.2	0.02
2T03X2CW38000001	5000K / 5700K / 6500K	0.2	0.02
2T03X2NW38000001	4000K	0.2	0.02
2T03X2WW38000001	2700K / 3000K / 3500K	0.2	0.02
2T03X2CW11000004	5000K / 6500K	0.2	0.02
2T03X2NW11000004	4000K	0.2	0.02
2T03X2WW11000004	2700K / 3000K / 3500K	0.2	0.02
2T03X2CW11000006	6000K	0.2	0.02

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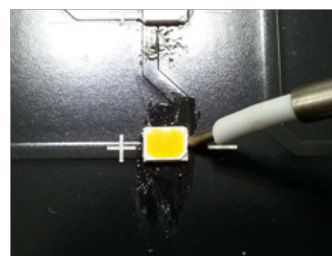
1. Test Summary

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	60mA	60mA
Initial flux (lm) / V _F (V)	22.5 / 3.17	22.64 / 3.18
Lumen maintenance at 6000 hrs	97.61% Page 5	97.44% Page 8
LED failure	0	0
Monitoring interval (hrs)	0,1000,2000,3000,4000,5000,6000	
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.

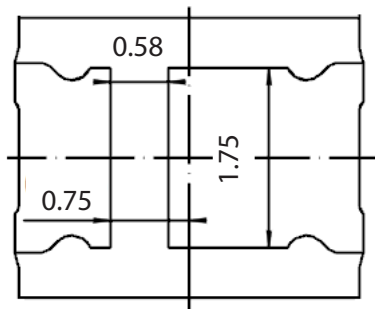
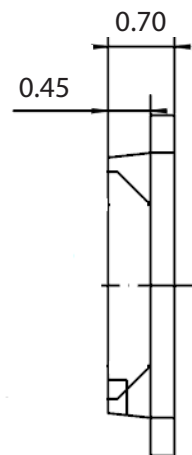
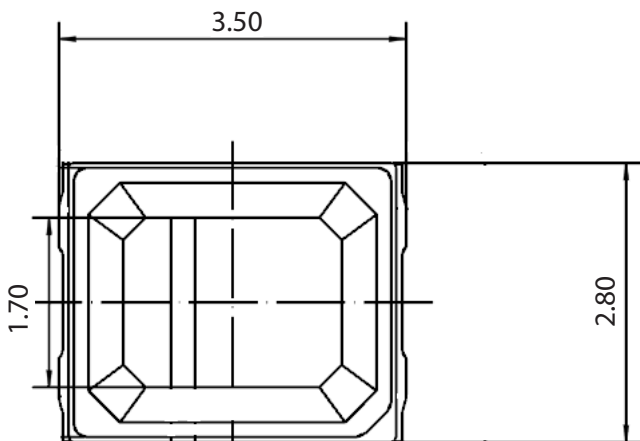
T_s Measurement Point



3. Description of test equipment

Equipment	Model No. / Serial No.	Cal. Laboratory	Report No.	Effective Date
Integrating sphere	ISP250 45392012	Standard Light Source L7386A	O130434A	03.12.2014
DC power source	KEITHLEY 2425 1347276	SGS Taiwan Ltd.	ECAC1606814	16.06.2015
Temperature controlled test	VEKTREX/ SpikeSafe 200	SGS Taiwan Ltd.	ECAC0780614A	27.03.2015
	VEKTREX/ ITCS 428		ECAC0780214A	
	VEKTREX/ ITCS 429		ECAC0780314A	
	VEKTREX/ ITCS 430		ECAC0780414A	
	VEKTREX/ ITCS 454		ECAC0780514A	

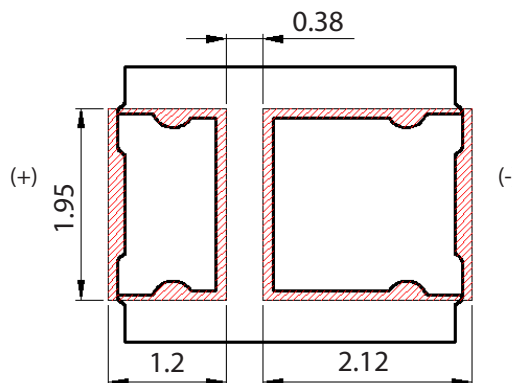
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Circuit



Solder Pad



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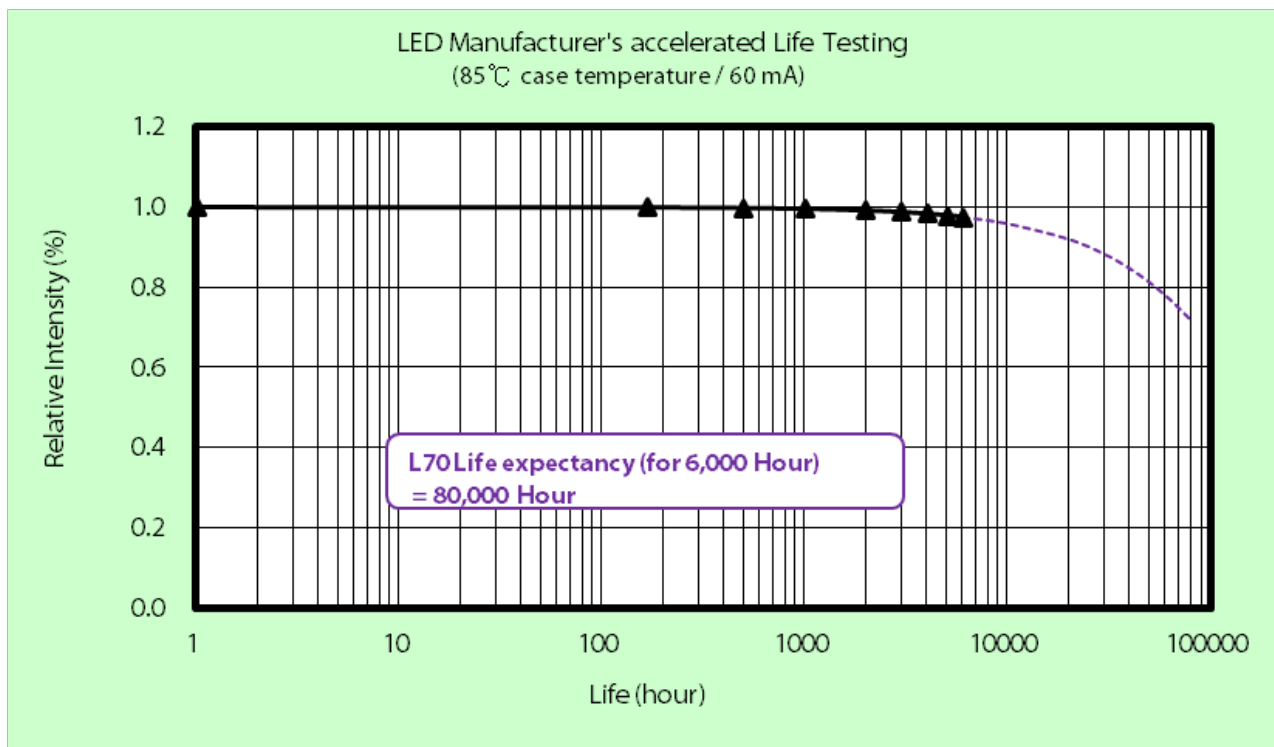
4. Test Results

4.1 Lumen and Color Maintenance data (85 °C)

■ Lumen Maintenance data (85 °C)

No.	Im(Initial)	0h	1000h	2000h	3000h	4000h	5000h	6000h
1	22.36	1	0.996	0.997	0.989	0.985	0.980	0.974
2	22.52	1	0.999	0.999	0.992	0.991	0.988	0.981
3	22.22	1	0.999	0.997	0.992	0.988	0.983	0.978
4	22.10	1	1.000	0.999	0.992	0.988	0.983	0.977
5	22.26	1	0.998	0.998	0.993	0.989	0.985	0.981
6	22.65	1	1.000	0.996	0.993	0.991	0.987	0.980
7	22.53	1	0.999	0.998	0.989	0.988	0.982	0.975
8	22.36	1	0.997	0.997	0.986	0.982	0.979	0.972
9	22.50	1	1.000	1.001	0.996	0.997	0.990	0.984
10	22.83	1	0.999	0.999	0.990	0.988	0.982	0.975
11	22.34	1	1.000	1.000	0.993	0.993	0.987	0.980
12	22.11	1	0.998	0.998	1.002	1.000	0.995	0.989
13	22.04	1	0.998	0.998	0.988	0.985	0.980	0.975
14	22.23	1	0.999	1.004	0.987	0.981	0.978	0.972
15	22.30	1	0.999	0.998	0.992	0.990	0.986	0.979
16	22.48	1	0.997	0.995	0.986	0.982	0.977	0.970
17	22.74	1	0.999	0.996	0.990	0.988	0.982	0.976
18	22.78	1	0.996	0.990	0.989	0.988	0.984	0.978
19	22.73	1	0.993	0.993	0.987	0.983	0.977	0.971
20	23.02	1	0.996	0.993	0.982	0.977	0.972	0.965
21	22.88	1	0.999	0.998	0.987	0.985	0.978	0.971
22	23.03	1	0.997	0.996	0.987	0.985	0.979	0.973
AVG	22.50	1	0.998	0.997	0.990	0.987	0.982	0.976
MIN	22.04	1	0.993	0.990	0.982	0.977	0.972	0.965
MAX	23.03	1	1.000	1.004	1.002	1.000	0.995	0.989

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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)	6,000
Test duration used for projection (hour to hour)	1,000 - 6,000
Tested case temperature (°C)	85
α	4.514E-06
B	1.004
Calculated L70(6k) (hours)	80,000
Reported L70(6k) (hours)	>36000

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■ Color Maintenance data (85 °C)

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

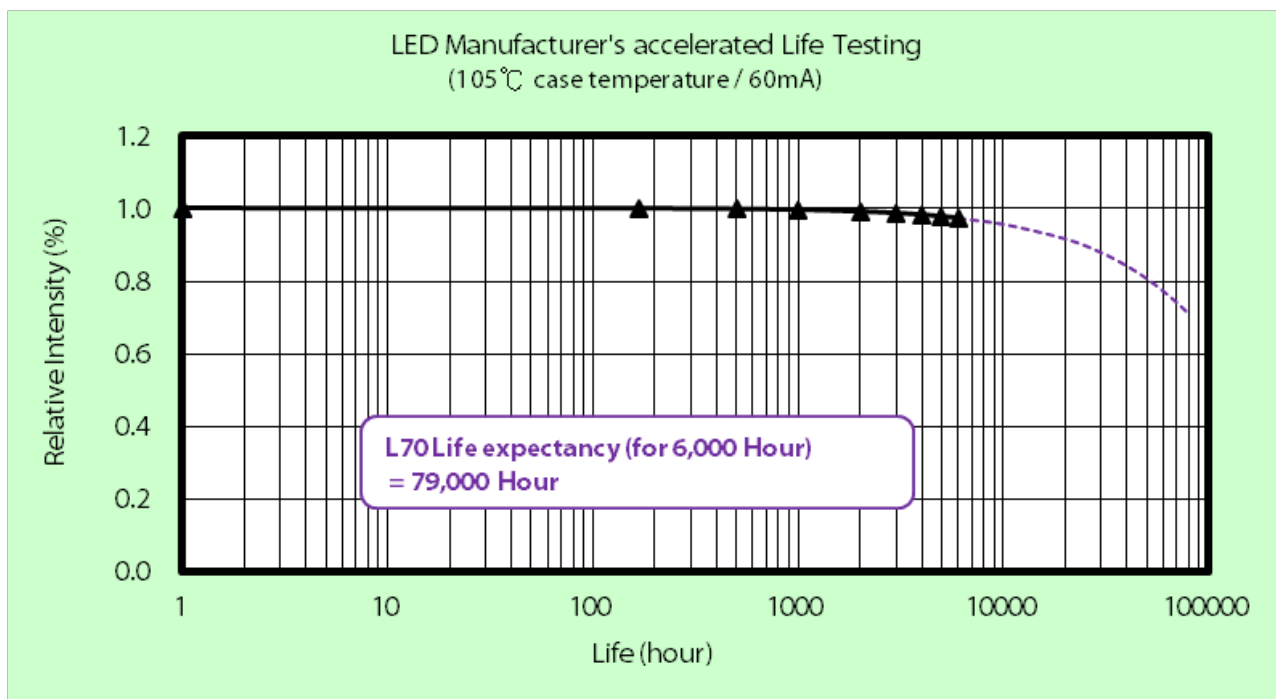
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4.2 Lumen and Color Maintenance data (105 °C)

■ Lumen Maintenance data (105 °C)

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

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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)	6,000
Test duration used for projection (hour to hour)	1,000 - 6,000
Tested case temperature (°C)	105
α	4.518E-06
B	1.002
Calculated L70(6k) (hours)	79,000
Reported L70(6k) (hours)	>36000

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■ Color Maintenance data (105 °C)

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

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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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