

DATA SHEET (Luminaires)

Project No.	4786795152-08	Tested By	Jackson Zeng
Applicant	Elec-Tech International Co., Ltd.	Test Date	2/2/2015
Model No.	542831XX	Rated	50000 h
Standard/Method	ENERGY STAR® Program Requirements Product Specification for Luminaires (Light Fixtures) Eligibility Criteria Version 1.2		
Test Laboratory	UL Verification Services (Guangzhou) Co., Ltd. ADD: Building A1, 1F & 2F, Nansha Science and Technology Innovation Center, No. 25, South Huanshi Avenue , Nansha District, Guangzhou 511458, China		
Remarks	542831XX (where "xx" denotes color temperature, 01~10 identifies 2700K, 11~30 identifies 3000K, 31~40 identifies 3500K, 41~50 identifies 4000K)		

Sample Information

Electrical Rating	Voltage (V AC)	Frequency (Hz)	Current (A)	Power Factor	Power (W)
Input	120	60	/	/	40

Other data	External Length (mm)	External Width (mm)	External Height (mm)	Product Type
	N/A	N/A	N/A	Inseparable SSL Luminaire

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ENERGY STAR Requirements

Item	ENERGY STAR Requirements	Methods of Measurement and/or Reference Documents	Supplemental Testing Guidance
Luminaire Minimum Light Output & Luminous Efficacy & Zonal Lumen Density	Cove Mount	≥ 200 lumens per lineal foot ≥ 45 lm/W $\geq 35\%$ of total lumens(30-60° zone)	Sample Size: 1 complete luminaire. Passing Test: The luminaire shall pass. Laboratory test results shall be produced using the specific models of lamp and ballast or LED package, LED module or LED array and LED driver that will be used in production. For downlights, one trim ring and one reflector may be used with the three luminaire samples.
	Downlights: recessed surface pendant SSL downlight retrofits	$\leq 4.5"$ aperture: 345 lumens $> 4.5"$ aperture: 575 lumens ≥ 42 lm/W $\geq 75\%$ of total lumens (0-60° zone)	
	Accent Lights includes line voltage track heads	≥ 200 lumens per head ≥ 35 lm/W $\geq 85\%$ of total lumens (0-40° zone)	
	Under Cabinet	≥ 125 lumens per lineal foot ≥ 29 lm/W $\geq 60\%$ of total lumens (0-60° zone) $\geq 12.5\%$ of total lumens (60-90° zone)	
	Outdoor, Wall-, Porch-, Pendant-, and Post- Mounted Luminaires	≥ 300 lumens per head ≥ 35 lm/W $\geq 95\%$ of total lumens (0-85° zone)	
	Portable Desk Task	≥ 200 lumens per lineal foot ≥ 29 lm/W $\geq 85\%$ of total lumens (0-60° zone)	
	Inseparable SSL Luminaire	≥ 70 lm/W	
Correlated Color Temperature (CCT)	Rated CCT	Target CCT(K) & Tolerance	Target Duv and Tolerance
	2700K	2725 ± 145	0.000 ± 0.006
	3000K	3045 ± 175	0.000 ± 0.006
	3500K	3465 ± 245	0.000 ± 0.006
	4000K	3985 ± 275	0.001 ± 0.006
5000K	5028 ± 283	0.002 ± 0.006	
Color Rendering Index (CRI)	Ra ≥ 80		
Color Angular Uniform	The variation of chromaticity shall be within 0.004 from the weighted average point on the CIE 1976 (u',v') diagram		

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Source Start Time	Light source shall remain continuously illuminated within one second of application of electrical power	None referenced	≥ 3 samples of LED package/LED module/LED array and LED driver model combination
Power Factor	Total luminaire input power less than or equal to 5 watts: PF ≥ 0.5 Total luminaire input power greater than 5 watts: Residential: PF ≥ 0.7 Commercial: PF ≥ 0.9	ANSI C82.77-2002 sections 6 and 7	≥ 3 samples of LED package/LED module/LED array and LED driver model combination
Transient Protection	The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode.	ANSI/IEEE C62.41.1-2002 ANSI/IEEE C62.41.2-2002	≥ 3 samples of LED package/LED module/LED array and LED driver model combination
Off-state Power Consumption	Luminaires incorporating an integral method of switching shall not draw power in the off state	None referenced	1 complete luminaire
LED Operating Frequency	≥ 120 Hz	None referenced	≥ 3 samples of LED package/LED module/LED array and LED driver model combination
Maximum Measured Ballast or Driver Case Temperature	At the temperature measurement point for the hottest location on the driver case (TMPC as detailed by the driver manufacturer), the measured driver case temperature at thermal equilibrium shall not exceed the driver manufacturer's maximum recommended temperature during in situ (installed in the luminaire) operation.	ANSI/UL 153:2002 (Sections 124-128A) ANSI/UL 1574:2004 (Section 54) ANSI/UL 1598:2008 (Sections 19.7, 19.10-16)	1 complete luminaire
Maximum In-Situ Source Temperature	1. In the sample luminaire, the in situ TMPLD temperature is less than or equal to the temperature specified in the LM-80 test report for the corresponding or higher drive current, within the manufacturer's specified operating current range. 2. The drive current measured in the luminaire is less than or equal to the drive current specified in the LM-80 test report at the corresponding temperature or higher.		

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TEST METHODS

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79

Photometric and Electrical measurements – Light Distribution Method

The sample was tested according to the IES LM-79-2008.

Photometric parameters were measured using a type C goniophotometer and software.

The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample.

The sample was operated at 120 Volts AC, 60Hz. It was stabilized before measurement was made.

Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5° vertical intervals and 22.5° horizontal intervals.

Photometric and Electrical Measurements – Integrating Sphere Method

The sample was tested according to the IES LM-79-2008.

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C.

The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Color Angular Uniform

The sample was tested according to the IES LM-79-2008.

Photometric parameters were measured using a type C goniophotometer and software.

The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample.

The sample was operated at 120 Volts AC, 60Hz. It was stabilized before measurement was made. Color spatial uniformity was calculated from the software taken at 1° vertical intervals and 90° horizontal intervals.

Transient Protection Test

The transient protection tests at ambient temperature were performed on five lamp samples. Each lamp was operated at rated input voltage in the base - up orientation during the tests. A Model Tesseq NSG 2060 test system with an 100kHz Ring Wave Module and a Coupler/Decoupler Module was used to generate the 2500 volt ring wave transient strike across the lamp base contacts. Each wave consisted of a 0.5 microsecond rise time. Seven strikes were performed on each lamp sample in accordance with ANSI/IEEE C62.41 (Category A): Recommended Practice on Surge Voltages in Low – Voltage AC Circuits.

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Operating Frequency

Each test sample was operated at rated input voltage. Light output waveform shall be measured with a photodetector, transimpedance amplifier and oscilloscope. The AC ripple on the output DC line was measured and recorded by the oscilloscope according to Energy Star directions.

Source Start Time & Run-Up Time

Each test sample was operated in its designated orientation at rated input voltage in a $25 \pm 5^\circ$ C ambient . A photodetector is used to monitor the luminaire light output. Time was recorded when the sample was fully illuminated and reached 90% of stabilized lumen output.

In-Situ Temperature Measurement Test (ISTMT)

Maximum led source operating temperature measurements were taken on one test sample per model with a thermocouple and YOKOGAWA temperature meter. The SSL sample was allowed to reach thermal equilibrium for at least 3 hours before measurements were taken. Led source temperature was measured at the point as indicated by the included diagram in accordance with manufacturers declared hot spot location. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 as applicable.

Maximum Measured Ballast or Driver Case Temperature

Maximum driver case temperature measurement was taken on one test sample per model with a thermocouple and YOKOGAWA temperature meter. The SSL sample was allowed to reach thermal equilibrium for at least 3 hours before measurements were taken. Driver case temperature was measured at the point as indicated by the included diagram in accordance with manufacturers declared hot spot location. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 as applicable.

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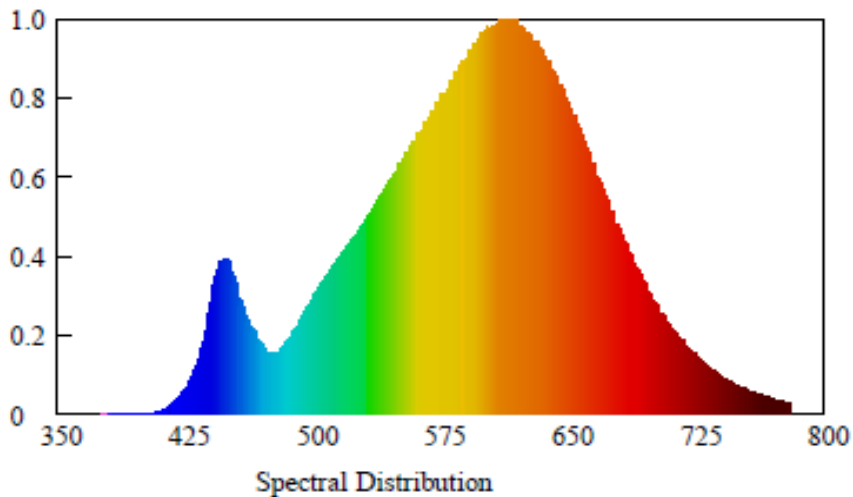
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RESULTS OF TESTS

Photometric Measurements – Integrating Sphere Test

Sample No.	Voltage (V AC)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Correlated Color Temperature (K)	Duv	Color Rendering Index (Ra)
2044204-S001	120.06	60	0.319	37.55	0.979	2728	-0.00041	86.2

Spectral Data Over Visible Wavelengths



Power Factor

Sample No.	Power Factor
2044204-S001	0.979
2044204-S002	0.978
2044204-S003	0.978

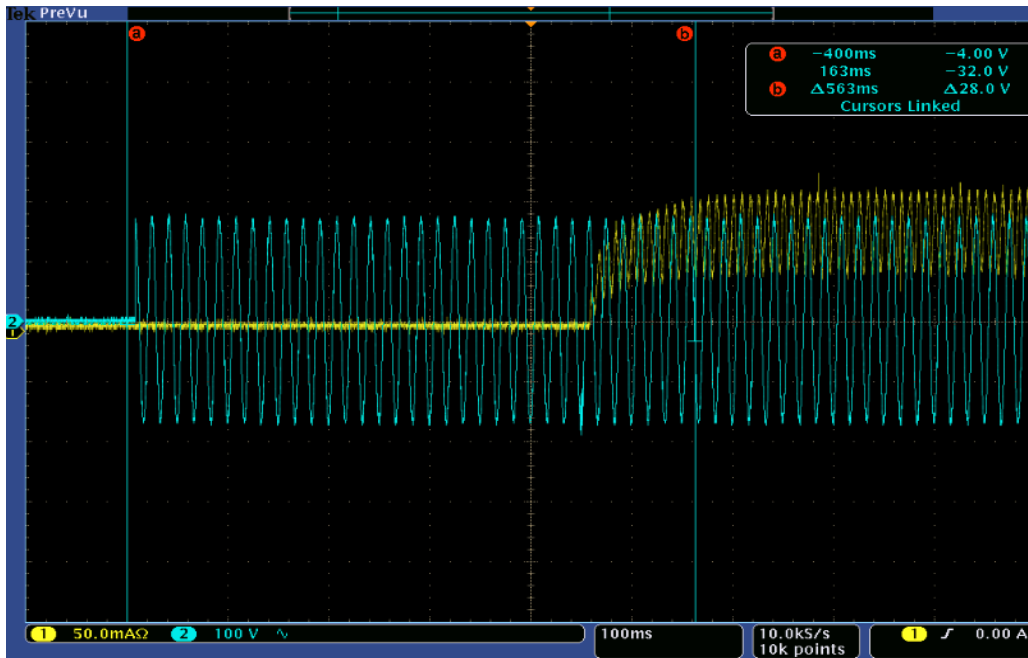
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Source Start Time

Sample No.	Start Time (ms)
2044204-S001	563
2044204-S002	513
2044204-S003	503

Start Time of Sample No. 2044204-S001



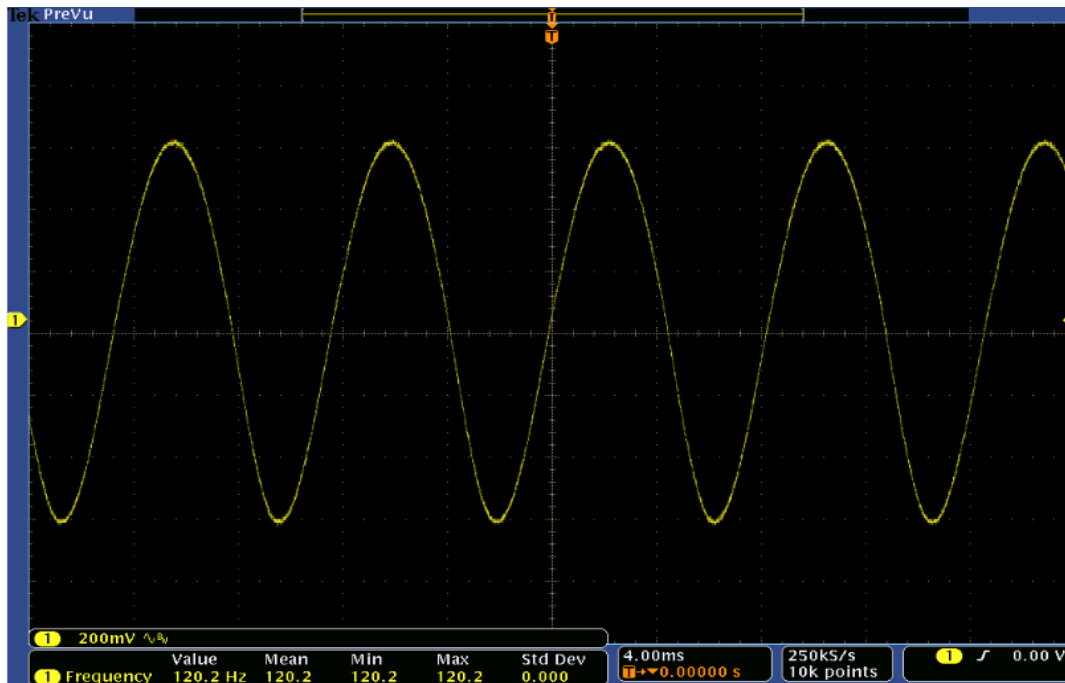
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Operating Frequency Test

Sample No.	Operating Frequency (Hz)
2044204-S001	≥120
2044204-S002	≥120
2044204-S003	≥120

Frequency of Sample No. 2044204-S001 :



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Off-state Power Consumption

Sample No.	Power Consumption (W)
N/A	N/A

Transient Protection Test

Sample No.	Transient Protection Test - Seven Strikes
2044204-S001	Pass
2044204-S002	Pass
2044204-S003	Pass

Dimming

Sample No.	Dimming
N/A	N/A

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In-Situ Temperature Measurement Test (ISTMT)

Sample No.	LED Package Model No.	In-situ Case Temperature (TMP _{LED} , °C)	LM-80 Case Temperature (°C)	Results from TM-21 Calculator (Hours)
2044204-S001	67-21D	56.5	95.0	63000.0

Measured Drive Current 110 mA

Drive current as specified in LM-80 report 150 mA

In-Situ Picture - Ts:



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Maximum Measured Ballast or Driver Case Temperature

Sample No.	Maximum Measured Driver Case Temperature (TMP _c , °C)	Maximum Driver Case Temperature (°C) (As indicated by manufacturer)
2044204-S001	49.8	90.0

In-Situ Picture - TMP_c:



Color Angular Uniformity

Sample No.	Maximum $\Delta u'v'$
N/A	N/A

Minimum Operating Temperature

Sample No.	Minimum Operating Temperature(°C)
N/A	N/A

Photometric Measurements – Integrating Sphere Test for 4000K

Sample No.	Voltage (V AC)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Correlated Color Temperature (K)	Duv	Color Rendering Index (Ra)
2044204-S004	119.99	60	0.333	39.05	0.976	4054	-0.00122	88.6

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Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
GVS-LE-GS001	Goniophotometer system	Before Use	Before Use
GVS-LE-FS019	Measurement Standard Lamp	8/19/2014	8/18/2015
GVS-LE-PE001	1.5-meter Integrating Sphere	Before Use	Before Use
GVS-LE-PE002	2.0-meter Integrating Sphere	Before Use	Before Use
GVS-LE-PE003	3.0-meter Integrating Sphere	Before Use	Before Use
GVS-LE-CA008	Digital Caliper	9/18/2014	9/17/2015
GVS-LE-DL006	Temperature data logger	6/10/2014	6/9/2015
GVS-LE-OS001	Digital Phosphor Oscilloscope	8/20/2014	8/19/2015
GVS-LE-PS008	AC Power Source	----	----
GVS-LE-PM010	Digital Power Meter	6/10/2014	6/9/2015
GVS-LE-EM001	Surge Generator	5/2/2014	5/1/2015
GVS-LE-EM002	EMC Coupler/Decoupler Module	5/2/2014	5/1/2015

END OF THE DATASHEET