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Test report of

IES LM-79-08

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Rendered to:

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For products:

Parking Garage Luminaires

Models No.:

LT-FC-60W-40K-UNV-SM-CG

Test Date: Jan. 7, 2019 to Jan. 8, 2019

Test Item: Total luminous flux, Luminous Efficacy, Electrical values, Luminous Intensity Distribution, Chromaticity coordinates, CCT and CRI, Spectral Power Distribution.

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1. General

1.1 Product Information

Brand Name	LI-TIAN LIGHTING
Product Type	Parking Garage Luminaires
Model Number	LT-FC-60W-40K-UNV-SM-CG
Rated Inputs	100-277VAC, 50/60Hz
Rated Power	59.33W
Rated Light output	8350lm
Declared CCT	4000K
Power Supply	LF-GLD060YA(P)1500U
LED Package, Array or Module	Model: L130-4070003000X21, manufactured by Philips Lumileds
Receipt Samples	1 unit
Sample Code of lab.	181228106001+4000K PCB+60W driver
Date of Receipt Samples	Dec. 28, 2018
Note	-

1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377-2015	Specifications for the Chromaticity of Solid State Lighting Products
ANSI C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004	Colorimetry
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-987	APW-120N	2019-01-08	2020-01-07
AC Power supply	LC-I-989	APW-120N	2019-01-08	2020-01-07
Power analyzer	LC-I-928	WT210	2019-01-02	2020-01-01
Power analyzer	LC-I-954	WT210	2019-01-08	2020-01-07
Multimeter	LC-I-972	Fluke 17B	2018-08-01	2019-07-31
Photometric colorimetric electric system [*] (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp ^{**}	LC-PL-I-011	D204C	2018-11-21	2019-11-20
Luminous Flux Standard Lamp ^{***}	LC-PL-I-003	24V100W	2018-11-21	2019-11-20
Goniophotometer(with mirror)	LC-I-902	GMS2000	2018-05-06	2019-05-05
Wireless temperature transmitter	LC-I-978	DWRF-B	2018-02-11	2019-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2018-02-11	2019-02-10

Note:

* Bandwidth of spectroradiometer is 1 nm.

** halogen lamp, 100W, omni-directional type, and its traceability to NIM.

*** halogen lamp, 100W, omni-directional type, and its traceability to NIM.

2. Test conducted and method

The luminaire was operated at least 2 hours to reach stabilization and temperature equilibrium before test.

2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$; the air flow around the sample(s) being tested did not affect the performance.

2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within ± 0.2 percent under load.

2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for AC voltage and current were less than 0.2 percent, and the calibration uncertainty of the AC power meter was less than 0.5 percent (95 % confidence interval, $k=2$).

2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.

3. Test Result Summary

3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	120.00 V~60Hz	119.95 V~60Hz
Input Current(A)	0.501	0.500
Total Power(W)	59.40	59.33
Power Factor	0.989	0.990
I-THD	11.39 %	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	8349.98
Luminaire Efficacy(lm/W)	-	140.74
Correlated Color Temperature (CCT)(K)	3926	-
Color Rendering Index (CRI)	72.8	-
R9	-15	-
Chromaticity Coordinate (x,y)	x = 0.3846 y = 0.3817	-
Chromaticity Coordinate (u,v)	u = 0.2259 v = 0.3363	-
Chromaticity Coordinate (u',v')	u' = 0.2259 v' = 0.5044	-
Duv	0.0011	-
Zone Lumens between 60-80 °	-	28.10%
Zone Lumens between 70-80 °	-	5.00%

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
71	78	82	72	69	68	83	58
R9	R10	R11	R12	R13	R14	R15	-
-15	47	67	38	72	90	67	-

3.4 Electrical data on 277V

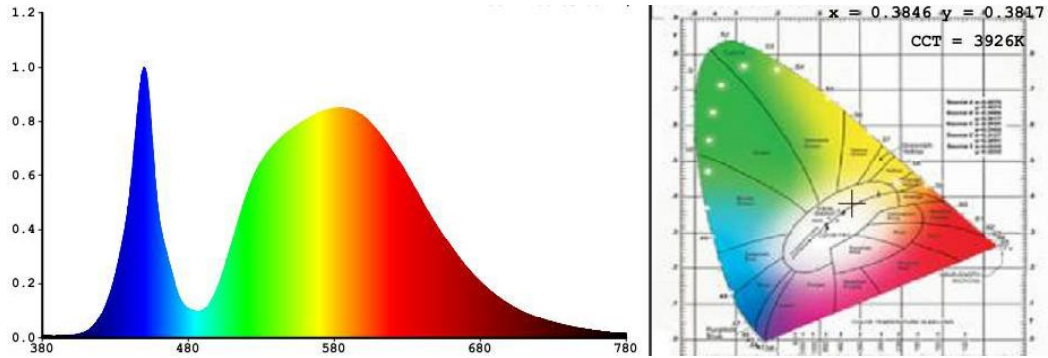
Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.00 V~60Hz	-
Power Factor	0.902	-
I-THD	11.44 %	-

Note:

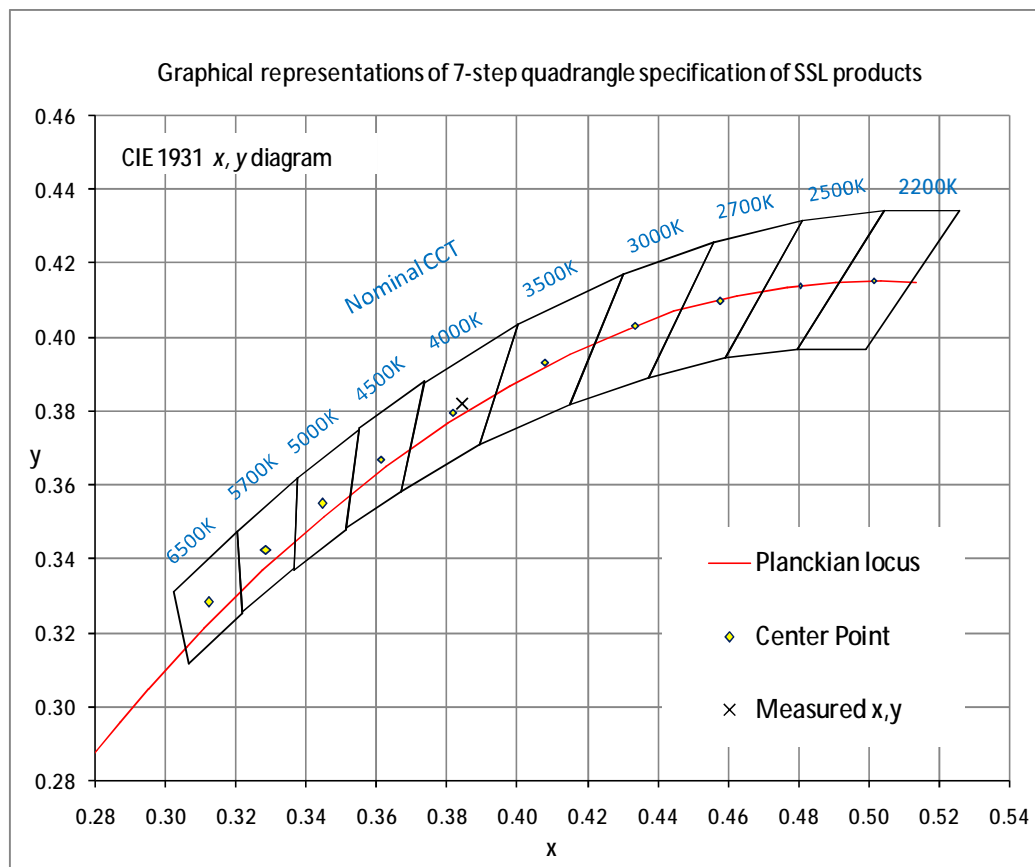
*Self-absorption is 1.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180)	2.96	Luminous Length	0.21 m
Spacing Criteria (90-270)	2.98	Luminous Width	0.21 m
Spacing Criteria (Diagonal)	2.96	Luminous Height	0.00 m
Test Distance	30.00 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	371.76	4.50	4.50
0-30	1001.57	12.00	12.00
0-40	1990.49	23.80	23.80
0-60	5938.1	71.10	71.10
0-80	8285.42	99.20	99.20
0-90	8333.24	99.80	99.80
10-90	8246.39	98.80	98.80
20-40	1618.73	19.40	19.40
20-50	3187.58	38.20	38.20
40-70	5873.38	70.30	70.30
60-80	2347.32	28.10	28.10
70-80	421.55	5.00	5.00
80-90	47.82	0.60	0.60
90-110	4.95	0.10	0.10
90-120	7.82	0.10	0.10
90-130	10.41	0.10	0.10
90-150	14.10	0.20	0.20
90-180	16.74	0.20	0.20
110-180	11.79	0.10	0.10
0-180	8349.98	100.00	100.00

Total Luminaire Efficiency = 100.00%

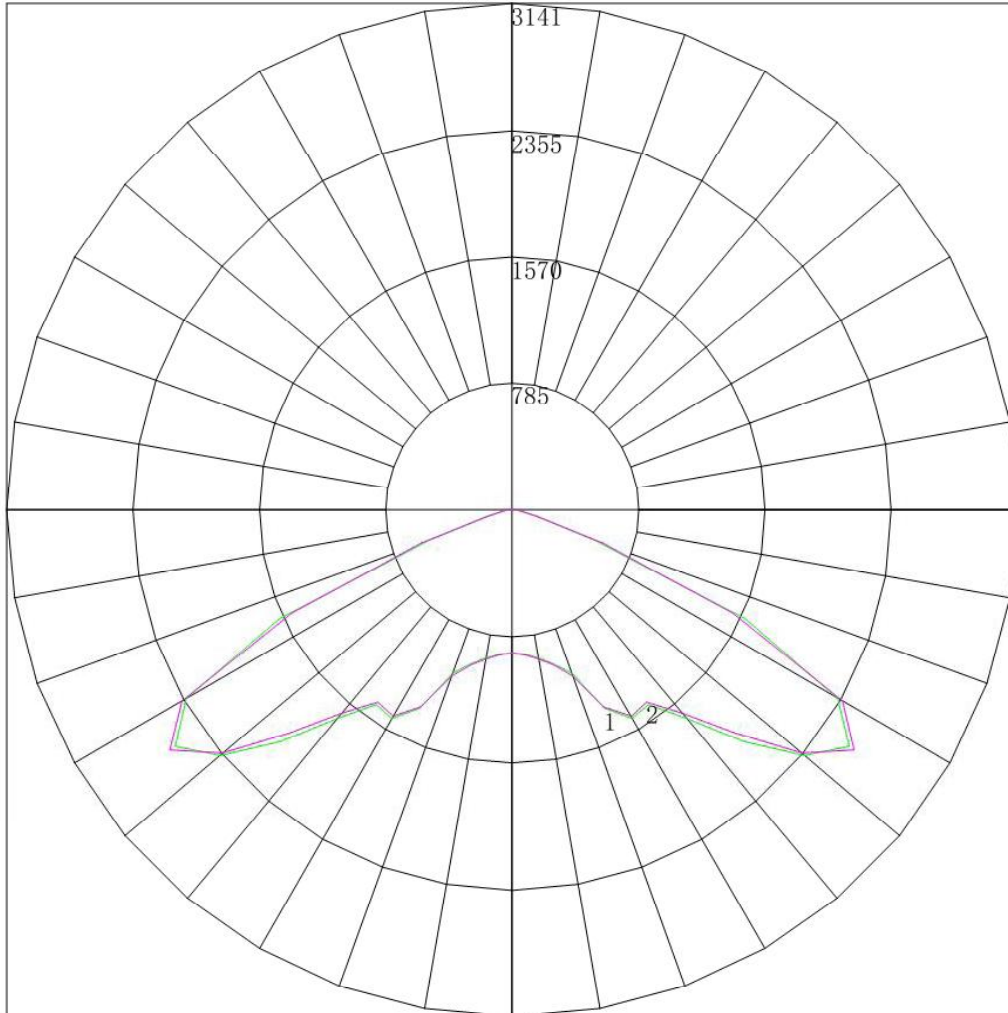
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	86.85
10-20	284.91
20-30	629.81
30-40	988.92
40-50	1568.85
50-60	2378.77
60-70	1925.77
70-80	421.55
80-90	47.82
90-100	2.30
100-110	2.65
110-120	2.87
120-130	2.59
130-140	1.98
140-150	1.71
150-160	1.33
160-170	0.95
170-180	0.35



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4.5 Polar Curves

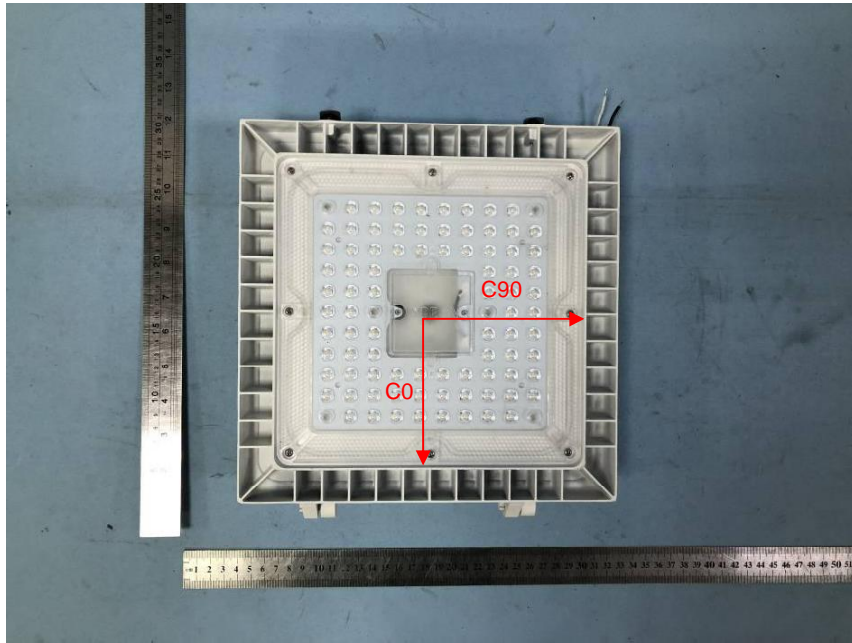


Maximum Candela = 3140.651 Located At Horizontal Angle = 45, Vertical Angle = 60
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

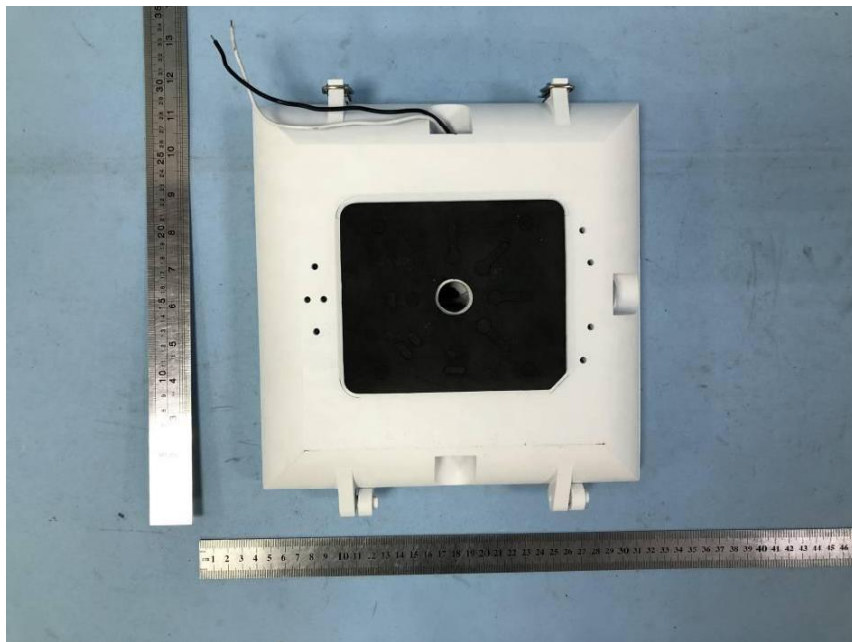
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	885.043	885.043	885.043	885.043	885.043	885.043	885.043
5	899.013	898.794	897.669	897.433	896.954	896.270	901.200
10	931.008	933.737	933.063	934.370	933.812	935.112	937.105
15	988.238	989.644	990.551	992.473	992.470	992.364	995.898
20	1077.013	1076.210	1079.374	1079.394	1077.197	1078.803	1094.635
25	1357.757	1365.882	1379.373	1364.397	1338.120	1327.796	1346.863
30	1492.046	1534.282	1649.026	1746.564	1679.091	1534.328	1478.812
35	1473.119	1496.415	1525.949	1546.036	1522.866	1478.667	1455.474
40	1688.071	1695.024	1694.572	1694.661	1666.924	1640.548	1642.626
45	2032.355	2014.011	2011.081	2016.909	1986.064	1961.153	1959.931
50	2368.076	2377.844	2416.600	2449.945	2414.875	2383.461	2348.596
55	2556.441	2625.354	2783.985	2903.056	2836.072	2695.741	2595.438
60	2337.433	2489.625	2851.297	3140.651	2932.979	2565.490	2370.587
65	1594.610	1788.319	2290.153	2694.171	2289.971	1714.896	1512.158
70	554.098	700.647	1182.071	1499.155	1120.539	701.090	601.309
75	157.451	187.097	311.864	470.145	330.021	178.068	163.141
80	68.361	89.558	113.583	112.483	101.764	82.238	68.667
85	26.632	36.922	48.918	38.516	42.655	37.559	28.634
90	3.064	3.922	3.718	3.846	3.955	3.166	2.648
95	1.082	1.240	1.555	1.779	1.618	1.257	1.257
100	1.577	1.781	2.141	2.387	2.158	1.751	1.661
105	2.118	2.367	2.795	3.085	2.719	2.313	2.199
110	2.524	2.660	3.088	3.333	3.146	2.649	2.558
115	2.478	2.705	3.088	3.265	3.124	2.672	2.603
120	2.614	2.728	3.043	3.175	3.012	2.694	2.603
125	2.704	2.818	3.066	3.198	3.012	2.739	2.783
130	2.659	2.683	2.863	2.973	2.899	2.762	2.783
135	2.298	2.322	2.390	2.410	2.427	2.335	2.334
140	2.614	2.638	2.750	2.702	2.719	2.649	2.603
145	2.704	2.773	2.750	2.747	2.697	2.672	2.693
150	2.749	2.773	2.841	2.793	2.787	2.717	2.738
155	2.794	2.818	2.863	2.837	2.832	2.829	2.783
160	3.064	3.134	3.133	3.130	3.169	3.121	3.052
165	3.380	3.404	3.381	3.423	3.394	3.413	3.366
170	3.560	3.607	3.652	3.603	3.596	3.592	3.546
175	3.695	3.675	3.697	3.716	3.663	3.660	3.680
180	3.786	3.786	3.786	3.786	3.786	3.786	3.786

Appendix A Product Photo



Picture 1



Picture 2

****End of test report****