



Ref. No.: LCZF19010018

Version: 1.0

Date of issue: Jan. 15, 2019

Total pages: 11



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-75W-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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Template No.: LC-RT-PL-045 Rev.1.0

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1. General

1.1 Product Information

Brand Name	LI-TIAN LIGHTING
Product Type	Parking Garage Luminaires
Model Number	LT-FC-75W-40K-UNV-SM-CG
Rated Inputs	100-277VAC, 50/60Hz
Rated Power	70.37W
Rated Light output	10171lm
Declared CCT	4000K
Power Supply	WP-HHA-075U0421800
LED Package, Array or Module	Model: L130-4070003000X21, manufactured by Philips Lumileds
Receipt Samples	1 unit
Sample Code of lab.	181228106001+4000K PCB+75W 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	120.00 V~60Hz
Input Current(A)	0.591	0.590
Total Power(W)	70.45	70.37
Power Factor	0.994	0.995
I-THD	14.23 %	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	10171.18
Luminaire Efficacy(lm/W)	-	144.54
Correlated Color Temperature (CCT)(K)	3980	-
Color Rendering Index (CRI)	73.1	-
R9	-14	-
Chromaticity Coordinate (x,y)	x = 0.3816 y = 0.3783	-
Chromaticity Coordinate (u,v)	u = 0.2252 v = 0.3350	-
Chromaticity Coordinate (u',v')	u' = 0.2252 v' = 0.5025	-
Duv	0.0004	-
Zone Lumens between 60-80 °	-	27.00%
Zone Lumens between 70-80 °	-	5.40%

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
71	79	83	73	70	68	83	59
R9	R10	R11	R12	R13	R14	R15	-
-14	47	67	39	72	90	67	-

3.4 Electrical data on 277V

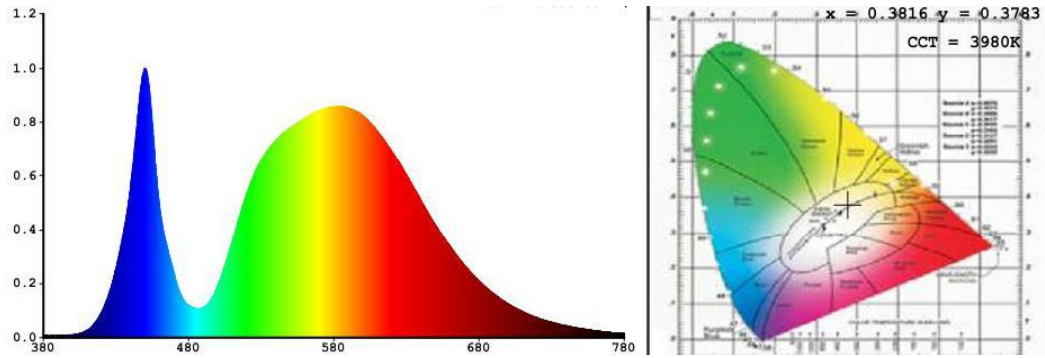
Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.00 V~60Hz	-
Power Factor	0.966	-
I-THD	14.45 %	-

Note:

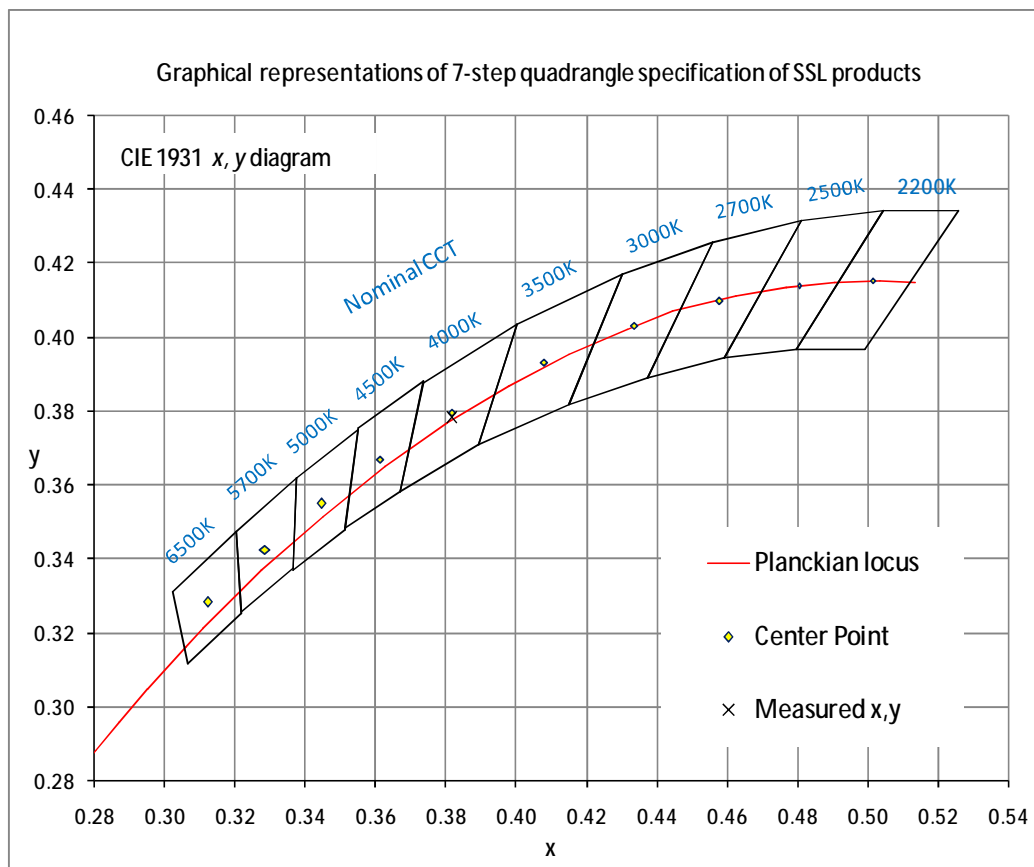
*Self-absorption is 1.

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)	2.90	Luminous Length	0.21 m
Spacing Criteria (90-270)	2.72	Luminous Width	0.21 m
Spacing Criteria (Diagonal)	2.94	Luminous Height	0.00 m
Test Distance	30.00 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	444.39	4.40	4.40
0-30	1212.95	11.90	11.90
0-40	2398.76	23.60	23.60
0-60	7020.4	69.00	69.00
0-80	9768.51	96.00	96.00
0-90	9904.02	97.40	97.40
10-90	9800.98	96.40	96.40
20-40	1954.37	19.20	19.20
20-50	3826.15	37.60	37.60
40-70	6816.68	67.00	67.00
60-80	2748.11	27.00	27.00
70-80	553.08	5.40	5.40
80-90	135.50	1.30	1.30
90-110	163.22	1.60	1.60
90-120	239.55	2.40	2.40
90-130	259.63	2.60	2.60
90-150	264.07	2.60	2.60
90-180	267.18	2.60	2.60
110-180	103.96	1.00	1.00
0-180	10171.2	100.00	100.00

Total Luminaire Efficiency = 100.00%

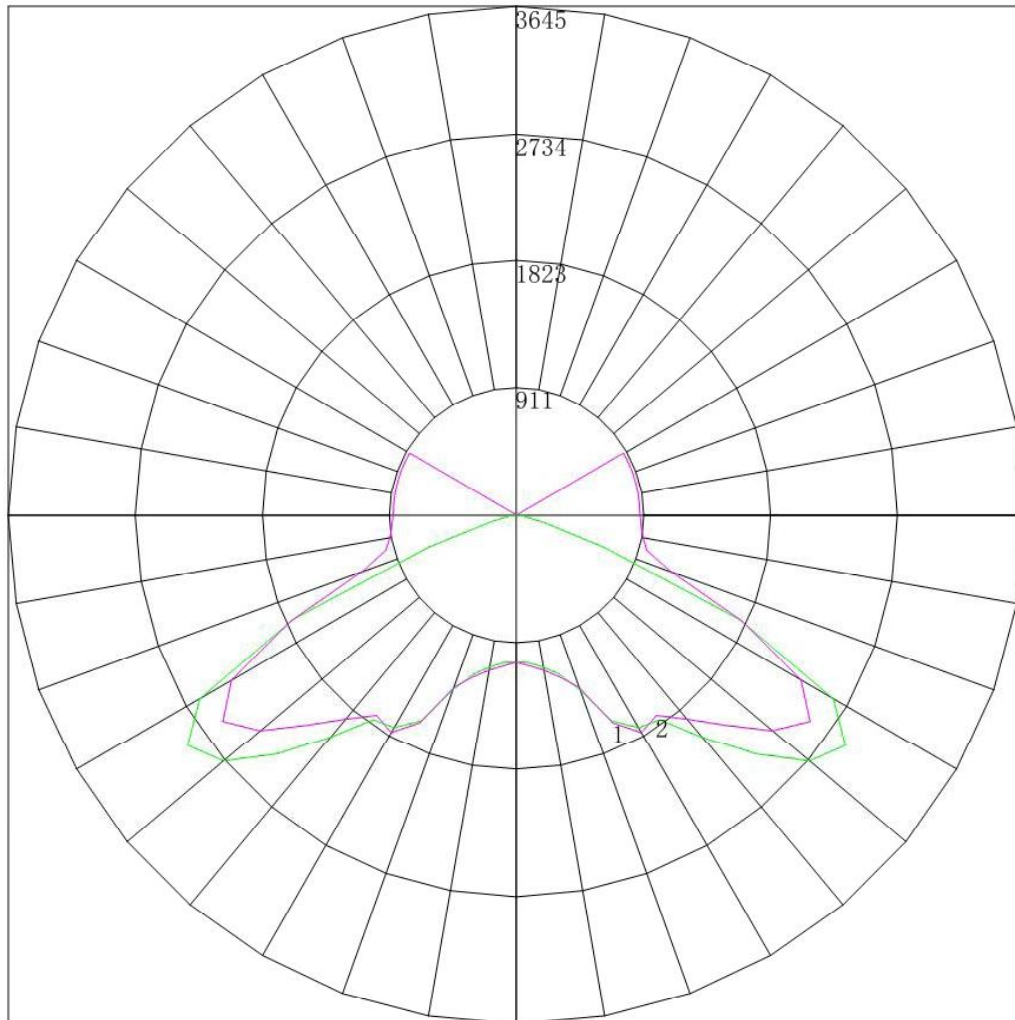
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	103.04
10-20	341.35
20-30	768.56
30-40	1185.81
40-50	1871.78
50-60	2749.87
60-70	2195.04
70-80	553.08
80-90	135.50
90-100	82.36
100-110	80.86
110-120	76.33
120-130	20.07
130-140	2.41
140-150	2.03
150-160	1.57
160-170	1.13
170-180	0.41



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4.5 Polar Curves



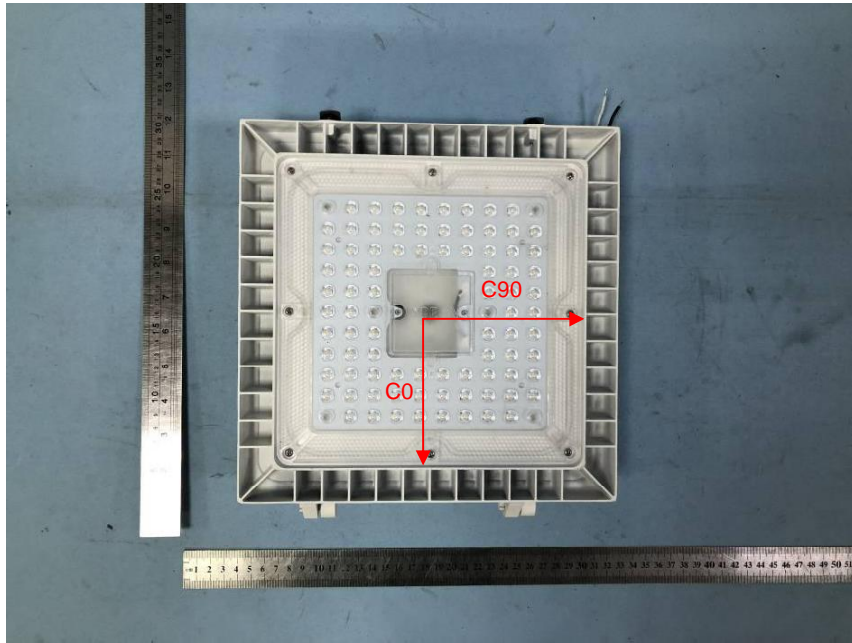
Maximum Candela = 3645.309 Located At Horizontal Angle = 45, Vertical Angle = 60

- # 1 - Vertical Plane Through Horizontal Angles (0 - 180)
- # 2 - Vertical Plane Through Horizontal Angles (90 - 270)

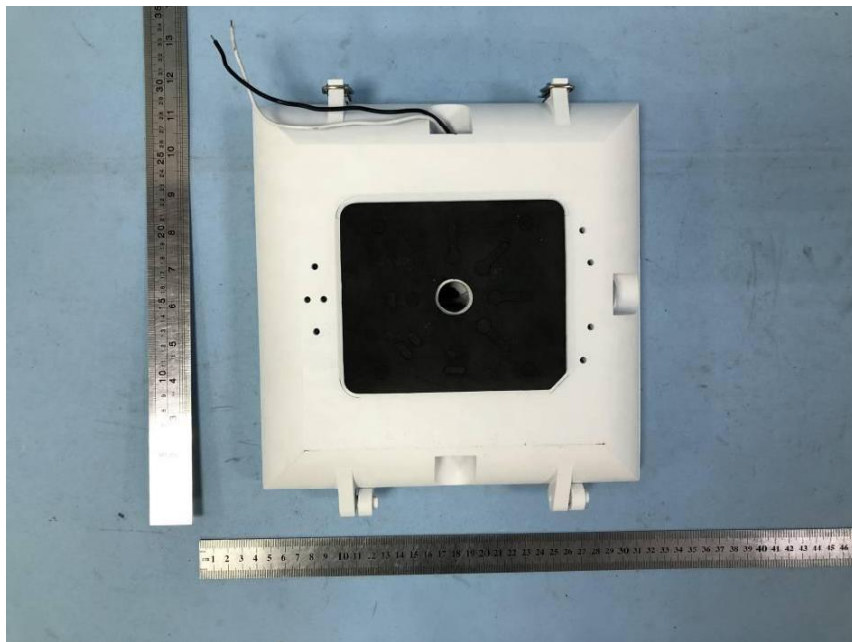
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	1052.390	1052.390	1052.390	1052.390	1052.390	1052.390	1052.390
5	1061.835	1062.534	1064.347	1063.014	1063.704	1063.004	1083.467
10	1104.560	1105.328	1108.288	1104.648	1108.067	1107.075	1123.531
15	1175.169	1176.932	1180.140	1176.905	1180.727	1181.898	1198.276
20	1328.980	1327.115	1317.329	1312.653	1310.652	1298.196	1309.142
25	1621.761	1651.579	1703.203	1736.615	1713.273	1664.562	1635.456
30	1753.984	1820.350	1973.368	2060.185	1976.431	1832.852	1794.118
35	1785.916	1804.049	1837.026	1844.713	1808.822	1760.264	1748.596
40	2075.998	2068.144	2065.439	2061.431	2017.005	1973.930	1903.462
45	2420.948	2432.648	2438.682	2433.161	2401.905	2370.738	2120.993
50	2743.411	2778.939	2864.138	2930.768	2910.744	2871.614	2398.058
55	2880.582	2971.702	3216.082	3458.983	3393.365	3221.526	2570.250
60	2623.780	2785.333	3226.798	3645.309	3445.791	3014.800	2358.674
65	1766.352	2005.050	2593.440	3092.630	2530.111	1910.020	1789.751
70	669.932	837.128	1372.383	1731.588	1258.187	758.632	1181.489
75	197.031	238.349	393.081	541.423	371.163	200.458	968.813
80	75.556	97.688	128.623	133.977	117.821	99.294	923.017
85	32.426	46.300	65.998	47.566	57.038	44.286	898.700
90	1.214	1.419	1.893	2.409	2.050	1.821	885.190
95	1.304	1.441	1.803	2.027	1.756	1.350	885.556
100	1.844	1.982	2.389	2.680	2.409	1.912	885.877
105	2.339	2.657	3.064	3.309	3.061	2.564	886.289
110	2.743	2.950	3.447	3.714	3.534	3.058	886.609
115	2.833	2.995	3.379	3.647	3.534	3.057	886.655
120	2.878	3.108	3.447	3.714	3.466	3.125	886.472
125	3.238	3.333	3.604	3.759	3.579	3.305	3.110
130	3.328	3.310	3.536	3.602	3.489	3.260	3.195
135	2.968	2.905	2.951	3.016	2.926	2.878	2.781
140	3.103	3.175	3.244	3.218	3.240	3.170	3.149
145	3.193	3.265	3.266	3.263	3.219	3.215	3.242
150	3.283	3.242	3.289	3.241	3.219	3.215	3.291
155	3.238	3.355	3.289	3.331	3.354	3.350	3.377
160	3.688	3.693	3.694	3.737	3.692	3.687	3.823
165	4.003	4.030	4.010	3.984	4.052	4.001	4.044
170	4.228	4.233	4.235	4.276	4.276	4.271	4.314
175	4.317	4.346	4.370	4.344	4.366	4.383	4.451
180	4.507	4.507	4.507	4.507	4.507	4.507	4.507

Appendix A Product Photo



Picture 1



Picture 2

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