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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-YC-60W-40K-UNV-SM-CG

**Test Date:** Jan. 7, 2019 to Jan. 9, 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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**Test Note:**

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## 1. General

### 1.1 Product Information

Brand Name	LI-TIAN LIGHTING
Product Type	Parking Garage Luminaires
Model Number	LT-YC-60W-40K-UNV-SM-CG
Rated Inputs	100-277VAC, 50/60Hz
Rated Power	59.06W
Rated Light output	8672lm
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.	181228106003+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 <sup>*</sup> (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp <sup>**</sup>	LC-PL-I-011	D204C	2018-11-21	2019-11-20
Luminous Flux Standard Lamp <sup>***</sup>	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  $\pm 0.2$  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	120.05 V~60Hz
Input Current(A)	0.497	0.497
Total Power(W)	58.99	59.06
Power Factor	0.990	0.990
I-THD	11.38 %	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	8671.80
Luminaire Efficacy(lm/W)	-	146.83
Correlated Color Temperature (CCT)(K)	3954	-
Color Rendering Index (CRI)	73.0	-
R9	-15	-
Chromaticity Coordinate (x,y)	x = 0.3833 y = 0.3808	-
Chromaticity Coordinate (u,v)	u = 0.2254 v = 0.3359	-
Chromaticity Coordinate (u',v')	u' = 0.2254 v' = 0.5038	-
Duv	0.001	-
Zone Lumens between 60-80 °	-	38.00%
Zone Lumens between 70-80 °	-	11.60%

#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
71	79	83	73	70	68	83	58
R9	R10	R11	R12	R13	R14	R15	-
-15	47	67	38	72	90	67	-

#### 3.4 Electrical data on 277V

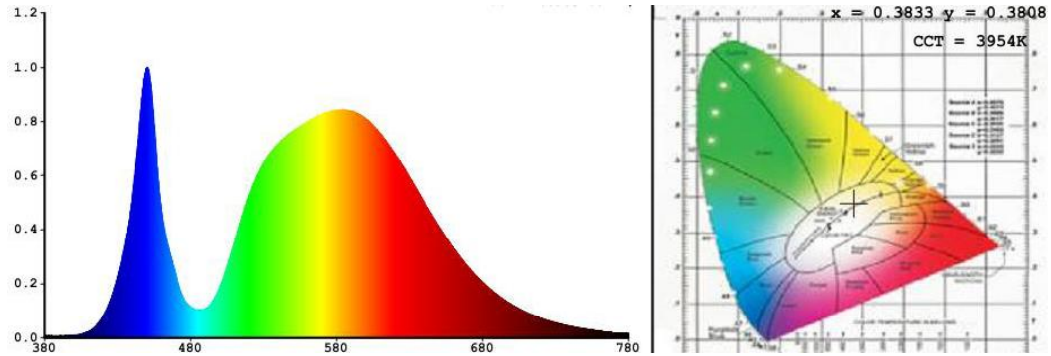
Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.00 V~60Hz	-
Power Factor	0.908	-
I-THD	11.42 %	-

Note:

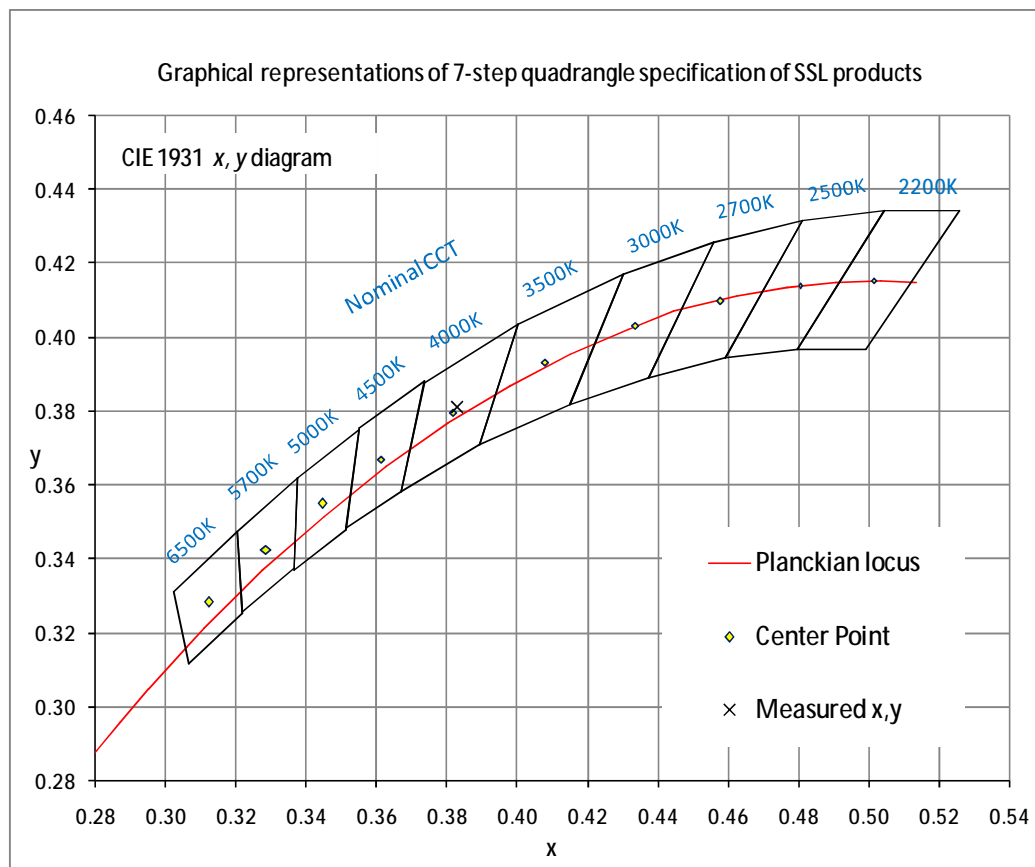
\*Self-absorption is 1.

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram



#### 4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Circular
Spacing Criteria (0-180)	2.40	Luminous Length	0.15 m (Diameter)
Spacing Criteria (90-270)	2.38	Luminous Width	0.15 m (Diameter)
Spacing Criteria (Diagonal)	2.60	Luminous Height	0.00 m
Test Distance	30.00 m		

#### 4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	419.81	4.80	4.80
0-30	973.97	11.20	11.20
0-40	1855.09	21.40	21.40
0-60	5300.44	61.10	61.10
0-80	8591.8	99.10	99.10
0-90	8651.44	99.80	99.80
10-90	8547.42	98.60	98.60
20-40	1435.29	16.60	16.60
20-50	2826.16	32.60	32.60
40-70	5728.73	66.10	66.10
60-80	3291.36	38.00	38.00
70-80	1007.97	11.60	11.60
80-90	59.64	0.70	0.70
90-110	6.96	0.10	0.10
90-120	10.55	0.10	0.10
90-130	13.49	0.20	0.20
90-150	17.32	0.20	0.20
90-180	20.35	0.20	0.20
110-180	13.39	0.20	0.20
0-180	8671.79	100.00	100.00

Total Luminaire Efficiency = 100.00%

#### ZONAL LUMEN SUMMARY

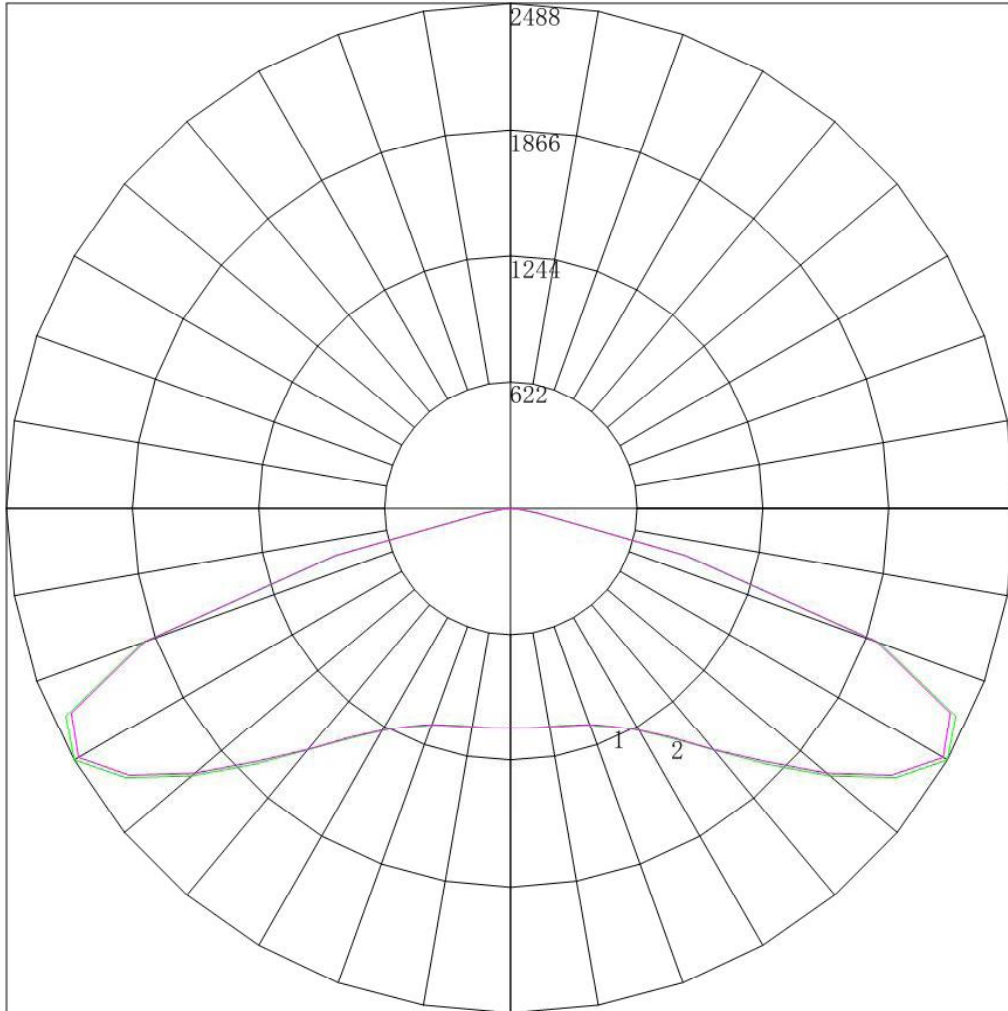
Zone	Lumens
0-10	104.02
10-20	315.79
20-30	554.16
30-40	881.12
40-50	1390.88
50-60	2054.47
60-70	2283.39
70-80	1007.97
80-90	59.64
90-100	3.22
100-110	3.74
110-120	3.59
120-130	2.95
130-140	2.05
140-150	1.78
150-160	1.48
160-170	1.12
170-180	0.43





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4.5 Polar Curves



Maximum Candela = 2488.227 Located At Horizontal Angle = 0, Vertical Angle = 60

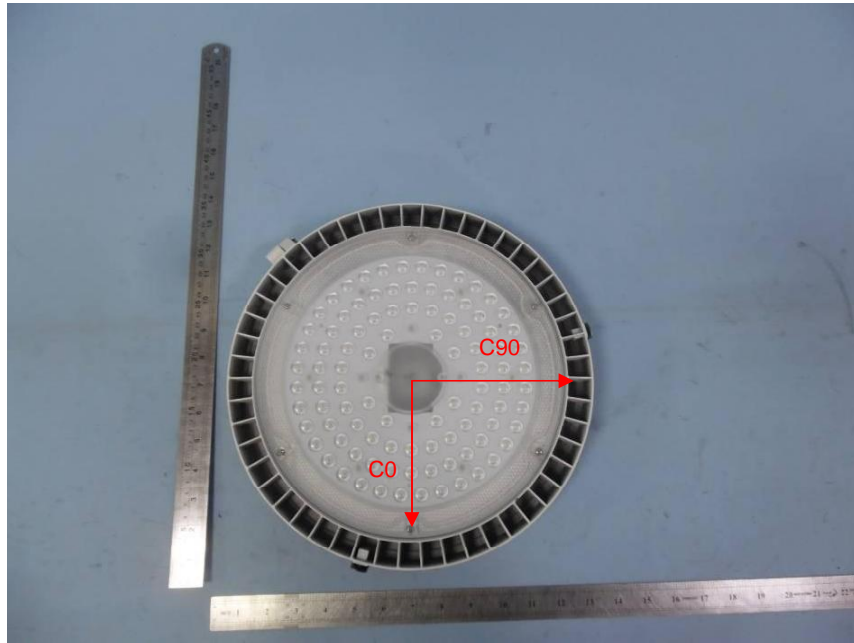
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)

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

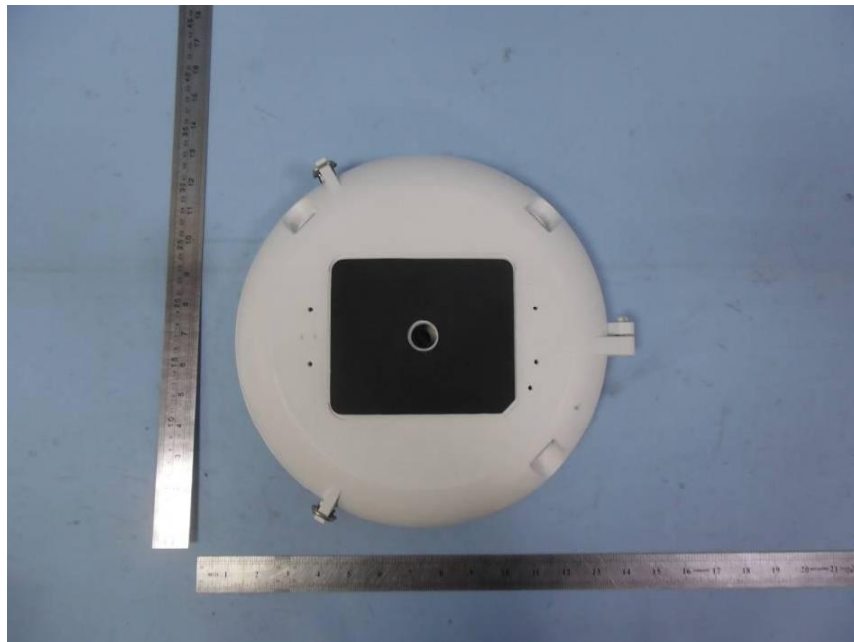
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	1086.295	1086.295	1086.295	1086.295	1086.295	1086.295	1086.295
<b>5</b>	1087.644	1086.970	1087.874	1088.322	1086.521	1085.848	1088.090
<b>10</b>	1093.938	1092.823	1093.953	1095.753	1094.402	1092.817	1096.180
<b>15</b>	1107.877	1108.129	1108.359	1110.842	1109.039	1107.653	1111.017
<b>20</b>	1137.552	1140.317	1136.948	1137.414	1137.863	1133.058	1136.648
<b>25</b>	1188.810	1190.962	1186.920	1186.278	1185.827	1184.091	1187.012
<b>30</b>	1268.393	1268.170	1268.180	1265.094	1265.769	1260.751	1265.698
<b>35</b>	1388.443	1388.593	1387.701	1384.441	1384.217	1378.999	1383.058
<b>40</b>	1560.650	1561.689	1562.150	1555.582	1553.556	1548.284	1556.172
<b>45</b>	1789.509	1787.006	1780.705	1780.089	1777.838	1771.301	1767.054
<b>50</b>	2053.889	2056.892	2049.695	2045.585	2049.863	2036.581	2037.728
<b>55</b>	2319.617	2318.002	2308.999	2317.383	2312.878	2300.062	2296.707
<b>60</b>	2488.227	2485.470	2476.242	2478.387	2478.614	2470.022	2463.941
<b>65</b>	2423.031	2421.542	2403.298	2405.432	2403.183	2393.143	2393.745
<b>70</b>	1936.761	1931.432	1924.075	1920.628	1926.597	1911.899	1917.825
<b>75</b>	881.266	886.819	867.435	866.635	888.645	907.500	899.747
<b>80</b>	129.312	141.445	149.003	142.630	130.450	136.267	141.688
<b>85</b>	35.520	36.622	39.209	37.402	38.125	40.533	37.758
<b>90</b>	4.226	4.119	4.232	3.851	3.467	3.394	2.968
<b>95</b>	2.428	2.476	2.476	2.477	2.432	2.473	2.429
<b>100</b>	3.147	3.129	3.106	3.085	3.063	3.035	3.059
<b>105</b>	3.687	3.669	3.669	3.625	3.648	3.619	3.553
<b>110</b>	3.822	3.827	3.804	3.806	3.783	3.732	3.688
<b>115</b>	3.687	3.579	3.669	3.625	3.580	3.574	3.598
<b>120</b>	3.507	3.466	3.421	3.445	3.445	3.440	3.418
<b>125</b>	3.372	3.354	3.354	3.333	3.333	3.372	3.283
<b>130</b>	3.012	2.994	2.949	2.995	2.995	2.967	3.013
<b>135</b>	2.473	2.499	2.454	2.455	2.432	2.473	2.473
<b>140</b>	2.698	2.701	2.678	2.680	2.680	2.698	2.653
<b>145</b>	2.878	2.859	2.814	2.860	2.860	2.833	2.833
<b>150</b>	2.968	2.994	2.971	2.972	2.927	2.945	2.968
<b>155</b>	3.057	3.151	3.151	3.130	3.198	3.057	3.103
<b>160</b>	3.642	3.601	3.624	3.603	3.558	3.597	3.552
<b>165</b>	3.957	4.007	4.007	4.031	4.031	4.002	4.001
<b>170</b>	4.316	4.299	4.277	4.324	4.301	4.294	4.271
<b>175</b>	4.541	4.614	4.614	4.549	4.616	4.564	4.631
<b>180</b>	4.789	4.789	4.789	4.789	4.789	4.789	4.789

## Appendix A Product Photo



Picture 1



Picture 2

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