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Test Report of

## IES LM-79-08

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

Applicant:

### Senior LED Limited

Building H, Wanda Industrial Zone, Zhoushi Road, Shenzhen, China

For Products:

### 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Models:

### SL-35W-66-28-TG-01(3000K)

Test Date: From Jul. 22, 2016 to Jul. 23, 2016

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

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Lab. Note: /

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## 1. General

### 1.1 Product Information

Brand Name	SeniorLED
Category	Indoor
General Application	Troffer
Primary Use	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces
Model Number	SL-35W-66-28-TG-01(3000K)
Rated Inputs	120-277V, 50/60Hz
Rated Power	35W
Rated Light output	4550lm
Declared CCT	3000K
Power Supply	MPU45D-40
LED Package, Array or Module	67-21S Series, manufactured by EVERLIGHT ELECTRONICS CO., LTD
Sample Code:	1671510302
Date of Receipt Samples	2016/7/20
Note	/

### 1.2 Standards or methods

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

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011	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-923	CHP-500	2016/2/4	2017/2/3
AC Power supply	LC-I-987	APW-110N	2016/2/4	2017/2/3
Power analyzer	LC-I-928	WT210	2016/1/24	2017/1/24
Power analyzer	LC-I-954	WT210	2016/2/4	2017/2/3
Multimeter	LC-I-972	Fluke 17B	2015/8/17	2016/8/16
Photometric colorimetric electric system(2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-I-917	24V100W	2015/10/9	2016/10/8
Luminous Flux Standard Lamp	LC-I-946	110V/200W	2015/10/17	2016/10/16
Goniophotometer(with mirror)	LC-I-902	GMS2000	2016/5/7	2017/5/7
Wireless temperature transmitter	LC-I-978	DWRF-B	2016/2/3	2017/2/2
Wireless temperature transmitter	LC-I-979	DWRF-B	2016/2/3	2017/2/2

## 2. Test Conduct and Method

The lamp/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 (V)	120.00	120.04
Input Frequency (Hz)	60	60
Input Current (A)	0.299	0.299
Total Power (W)	35.76	35.72
Power Factor	0.996	0.996
I-THD (%)	2.59	-

#### 3.2 Photometric data

Criteria Item	Result (Sphere)	Result (Goniophotometer)
Total Lumens (Lm)	-	4383.37
Luminous Efficacy (Lm/W)	-	122.71
Correlated Color Temperature(CCT) (K)	2990	-
Color Rendering Index(Ra)	81	-
R9	1	-
Chromaticity Coordinate (x,y)	x=0.4391, y=0.4074	-
Chromaticity Coordinate (u,v)	u=0.2506, v=0.3487	-
Chromaticity Coordinate (u',v')	u'=0.2506, v'=0.523	-
Duv	0.0010	-
Zone Lumens between 0-60°	-	77.37%

#### 3.3 Color Rendering Details

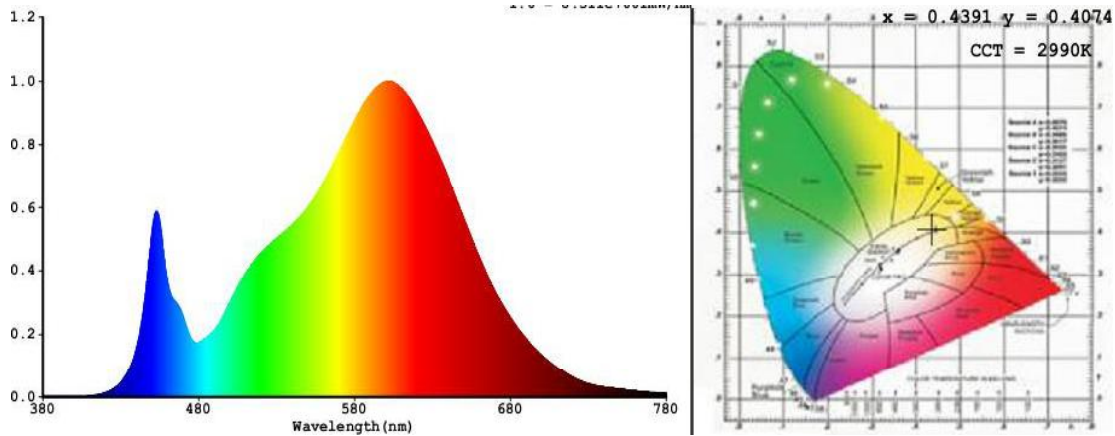
R1	R2	R3	R4	R5	R6	R7	R8
79	90	96	79	79	88	82	56
R9	R10	R11	R12	R13	R14	R15	-
1	78	78	67	82	99	71	-

#### 3.4 Electrical data

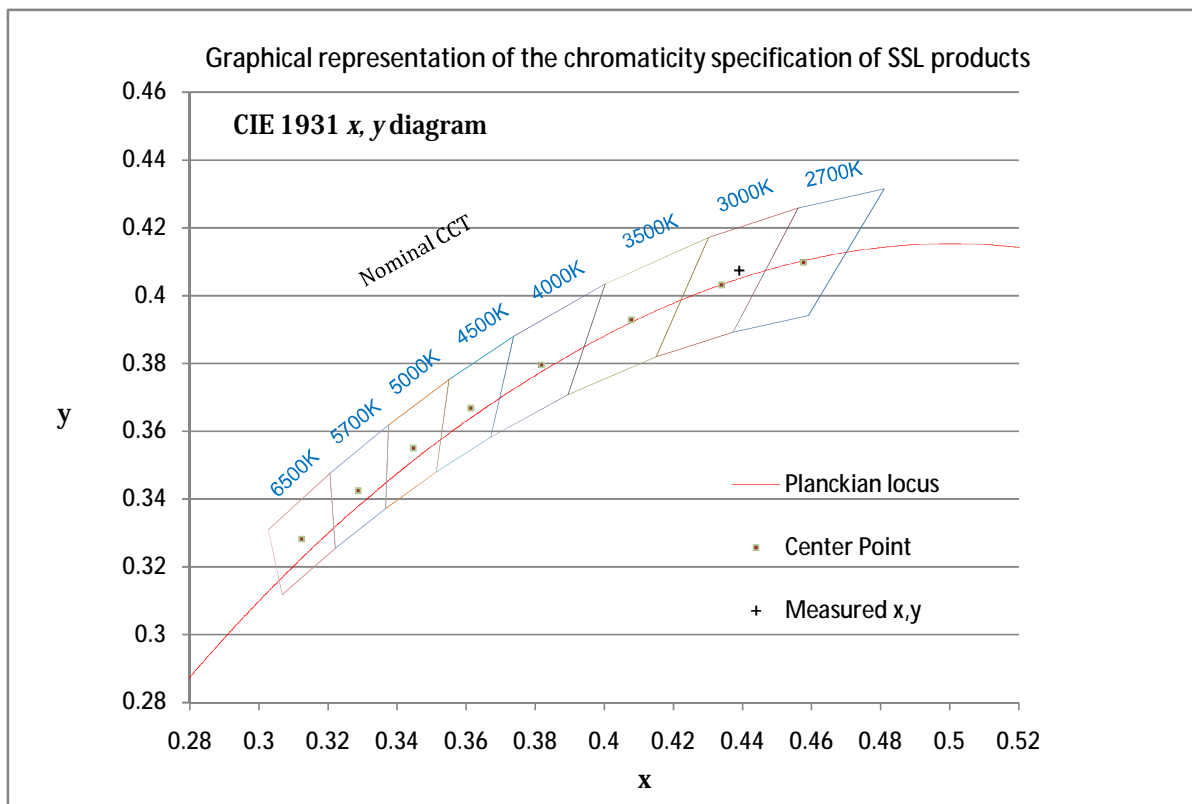
Criteria Item	Result (Sphere)	Result (Goniophotometer)
Input Voltage (V)	277.00	-
Input Frequency (Hz)	60	-
Power Factor	0.938	-
I-THD (%)	9.67	-

## 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)	1.26	Luminous Length (m)	0.550
Spacing Criteria (90-270)	1.26	Luminous Width (m)	0.550
Spacing Criteria (Diagonal)	1.38	Luminous Height (m)	0.000
Test Distance (m)	29.54	-	

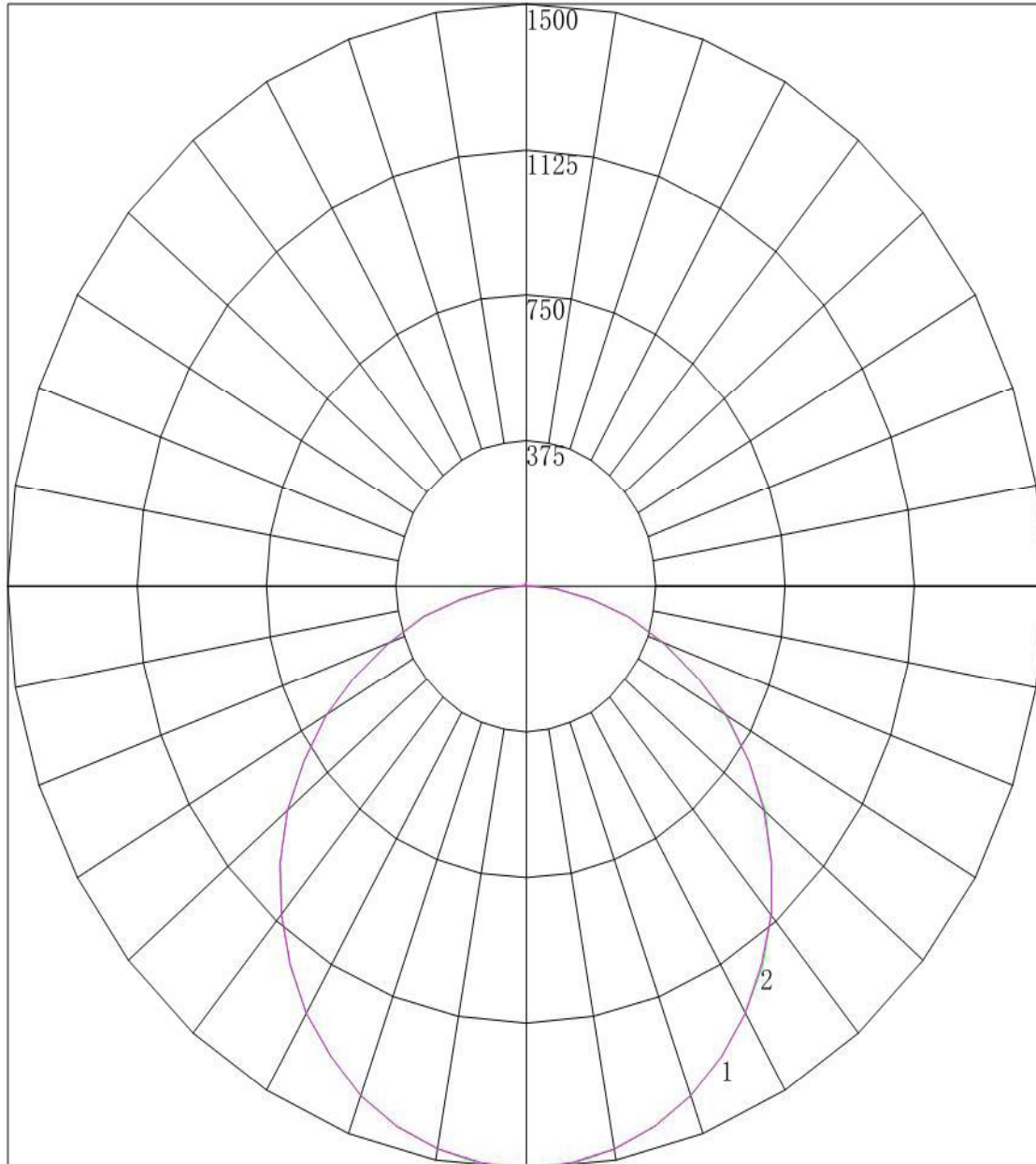
#### 4.4 Zonal Lumen Summary

zone	Lumen	%Lamp	%Fixt
0-20	548.71	12.5%	12.5%
0-30	1165.95	26.6%	26.6%
0-40	1911.58	43.6%	43.6%
0-60	3391.20	77.4%	77.4%
0-80	4259.07	97.2%	97.2%
0-90	4362.20	99.5%	99.5%
10-90	4220.25	96.3%	96.3%
20-40	1362.88	31.1%	31.1%
20-50	2138.54	48.8%	48.8%
40-70	2022.27	46.1%	46.1%
60-80	867.88	19.8%	19.8%
70-80	325.22	7.4%	7.4%
80-90	103.12	2.4%	2.4%
90-110	7.60	0.2%	0.2%
90-120	9.36	0.2%	0.2%
90-130	11.06	0.3%	0.3%
90-150	14.97	0.3%	0.3%
90-180	21.17	0.5%	0.5%
110-180	13.57	0.3%	0.3%
0-180	4383.37	100.0%	100.0%

Zone	Lumens
0-10	141.95
10-20	406.75
20-30	617.25
30-40	745.63
40-50	775.66
50-60	703.96
60-70	542.65
70-80	325.22
80-90	103.12
90-100	5.63
100-110	1.97
110-120	1.76
120-130	1.69
130-140	1.65
140-150	2.26
150-160	2.90
160-170	2.37
170-180	0.93



#### 4.5 Polar Curves



Maximum Candela = 1500.362 Located At Horizontal Angle = 0, Vertical Angle = 0

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

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

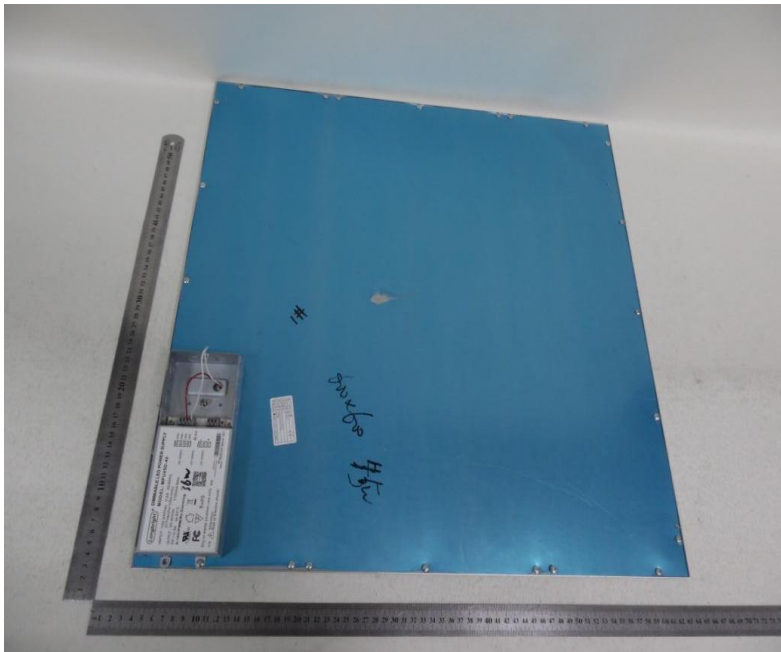
**4.6 Candela Tabulation**

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<u>0</u>	1500	1500	1500	1500	1500	1500	1500
<u>5</u>	1494	1494	1494	1494	1494	1494	1493
<u>10</u>	1474	1474	1474	1474	1474	1474	1474
<u>15</u>	1441	1441	1441	1441	1441	1441	1441
<u>20</u>	1397	1396	1397	1397	1396	1396	1396
<u>25</u>	1338	1339	1340	1339	1340	1339	1339
<u>30</u>	1271	1272	1272	1272	1272	1271	1270
<u>35</u>	1192	1192	1192	1191	1192	1192	1191
<u>40</u>	1104	1103	1104	1104	1103	1103	1103
<u>45</u>	1006	1005	1007	1006	1006	1005	1005
<u>50</u>	902	900	900	901	899	899	900
<u>55</u>	787	787	789	789	788	787	787
<u>60</u>	669	670	669	671	669	671	670
<u>65</u>	547	549	548	547	549	548	547
<u>70</u>	425	426	426	426	427	427	425
<u>75</u>	306	306	306	307	307	308	307
<u>80</u>	189	191	193	193	194	194	194
<u>85</u>	84	86	85	86	87	87	85
<u>90</u>	17	16	15	15	15	14	10
<u>95</u>	2	2	2	2	2	2	2
<u>100</u>	2	2	2	2	2	2	2
<u>105</u>	2	2	2	2	2	2	2
<u>110</u>	2	2	2	2	2	2	2
<u>115</u>	2	2	2	2	2	2	2
<u>120</u>	2	2	2	2	2	2	2
<u>125</u>	2	2	2	2	2	2	2
<u>130</u>	2	2	2	2	2	2	2
<u>135</u>	2	2	2	2	2	2	2
<u>140</u>	3	3	3	3	3	3	3
<u>145</u>	4	3	4	4	3	3	3
<u>150</u>	5	5	5	5	5	5	5
<u>155</u>	6	6	6	6	6	6	6
<u>160</u>	8	8	8	8	8	8	8
<u>165</u>	9	8	8	8	8	8	8
<u>170</u>	9	9	9	9	9	9	9
<u>175</u>	10	10	10	10	10	10	10
<u>180</u>	10	10	10	10	10	10	10

### Appendix 1 Product Photo



Picture 1



Picture 2