



Test report of

## IES LM-79-08

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

Rendered to:

ETI Solid State Lighting (Zhuhai) Ltd  
No.1, Zhongzhu Road South, Science & Technology Innovation  
Coast, High Tech District, Zhuhai City, Guangdong Prov., China

For products:

2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces

Models No.:

FPE-24-50-840-MV-D

**Test Date:** Aug. 21, 2017 to Aug. 24, 2017

**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/LM79-08/01

**Test Note:**

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## 1. General

### 1.1 Product Information

Brand Name	ETI
Product Type	2x4Luminaires for Ambient Lighting of Interior Commercial Spaces
Model Number	FPE-24-50-840-MV-D
Rated Inputs	100-277VAC, 50/60Hz
Rated Power	50W
Rated Light output	5000lm
Declared CCT	4000K
Power Supply	MPU45D-40E
LED Package, Array or Module	67-21S Series, EVERLIGHT ELECTRONICS CO., LTD
Dimming Information	Dimmable
Receipt Samples	1 unit
Sample Code of lab.	170819105003
Date of Receipt Samples	Aug. 19, 2017
Note	-



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## 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-923	CHP-500	2017-02-04	2018-02-03
AC Power supply	LC-I-987	APW-110N	2017-02-04	2018-02-03
Power analyzer	LC-I-928	WT210	2017-01-19	2018-01-19
Power analyzer	LC-I-954	WT210	2017-02-04	2018-02-03
Multimeter	LC-I-972	Fluke 17B	2017-08-10	2018-08-09
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-PL-I-002	24V100W	2016-10-08	2017-10-07
Luminous Flux Standard Lamp	LC-PL-I-001	110V/200W	2016-09-24	2017-09-23
Goniophotometer(with mirror)	LC-I-902	GMS2000	2017-05-07	2018-05-07
Wireless temperature transmitter	LC-I-978	DWRF-B	2017-02-10	2018-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2017-02-10	2018-02-10



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## 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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ; 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.



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### 3. Test Result Summary

#### 3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	120.00 V~60Hz	120.02 V~60Hz
Input Current(A)	0.422	0.420
Total Power(W)	50.40	50.14
Power Factor	0.995	0.994
I-THD	3.92 %	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	5416.95
Luminaire Efficacy(lm/W)	-	108.04
Correlated Color Temperature (CCT)(K)	3809	-
Color Rendering Index (CRI)	82.9	-
R9	7	-
Chromaticity Coordinate (x,y)	x = 0.3921 y = 0.3913	-
Chromaticity Coordinate (u,v)	u = 0.2270 v = 0.3397	-
Chromaticity Coordinate (u',v')	u' = 0.2270 v' = 0.5095	-
Duv	0.0034	-
Zone Lumens between 0-60 °	-	77.95%

#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
81	90	97	80	81	87	86	63
R9	R10	R11	R12	R13	R14	R15	-
7	77	79	62	83	98	74	-

#### 3.4 Electrical data on 277V

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.00 V~60Hz	-
Power Factor	0.910	-
I-THD	8.59 %	-
Off-state Power(W)	-	-

Note: N.A.

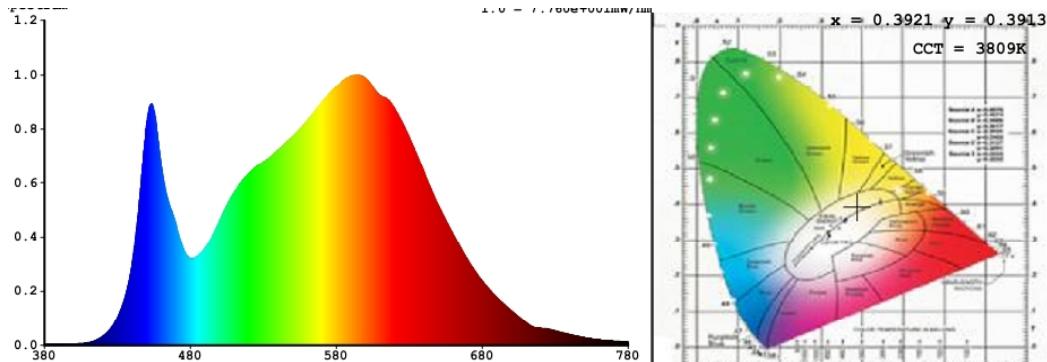


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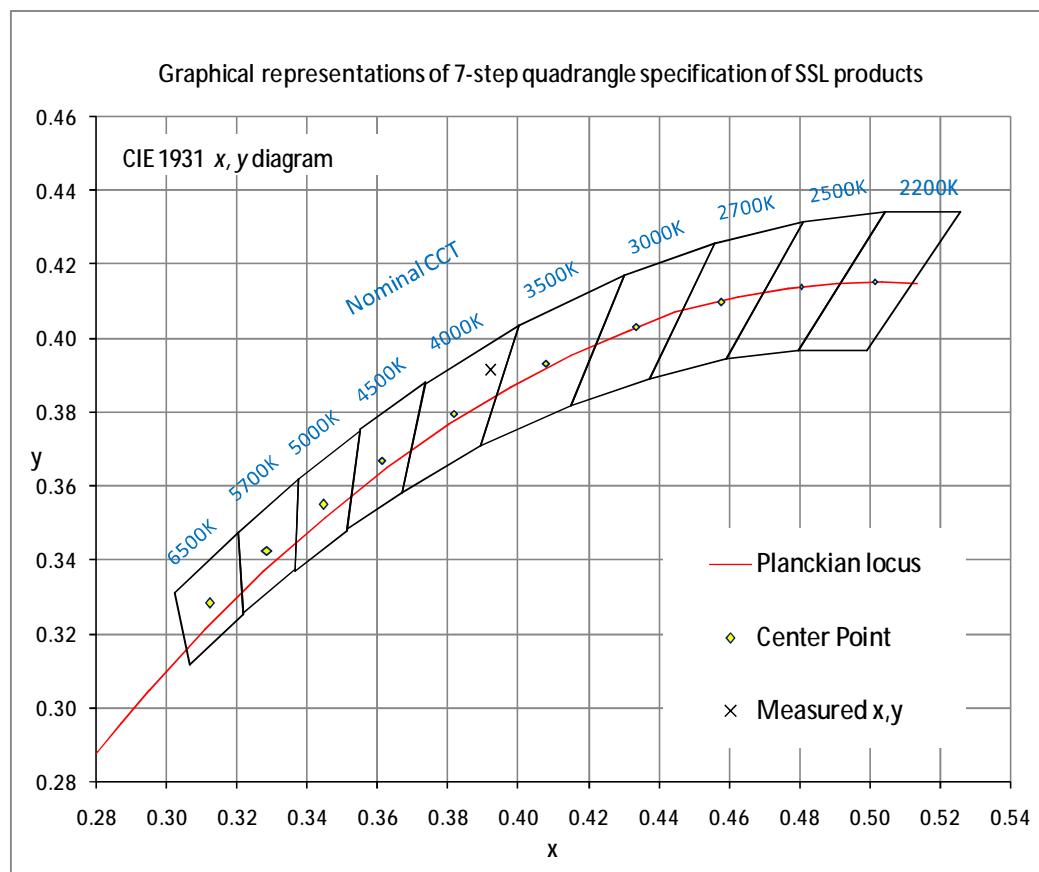


## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram





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#### 4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180)	1.26	Luminous Length	1.17 m
Spacing Criteria (90-270)	1.28	Luminous Width	0.56 m
Spacing Criteria (Diagonal)	1.38	Luminous Height	0.00 m
Test Distance	29.79 m		

#### 4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	683.78	12.60	12.60
0-30	1453.72	26.80	26.80
0-40	2383.48	44.00	44.00
0-60	4222.32	77.90	77.90
0-80	5283.33	97.50	97.50
0-90	5401.31	99.70	99.70
10-90	5224.51	96.40	96.40
20-40	1699.7	31.40	31.40
20-50	2665.41	49.20	49.20
40-70	2506.64	46.30	46.30
60-80	1061.01	19.60	19.60
70-80	393.21	7.30	7.30
80-90	117.98	2.20	2.20
90-110	5.78	0.10	0.10
90-120	7.75	0.10	0.10
90-130	9.62	0.20	0.20
90-150	12.70	0.20	0.20
90-180	15.64	0.30	0.30
110-180	9.87	0.20	0.20
0-180	5416.95	100.00	100.00

Total Luminaire Efficiency = 100.00%

#### ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	176.80
10-20	506.98
20-30	769.94
30-40	929.76
40-50	965.71
50-60	873.13
60-70	667.80
70-80	393.21
80-90	117.98
90-100	3.49
100-110	2.29
110-120	1.98
120-130	1.86
130-140	1.52
140-150	1.56
150-160	1.48
160-170	1.07
170-180	0.40



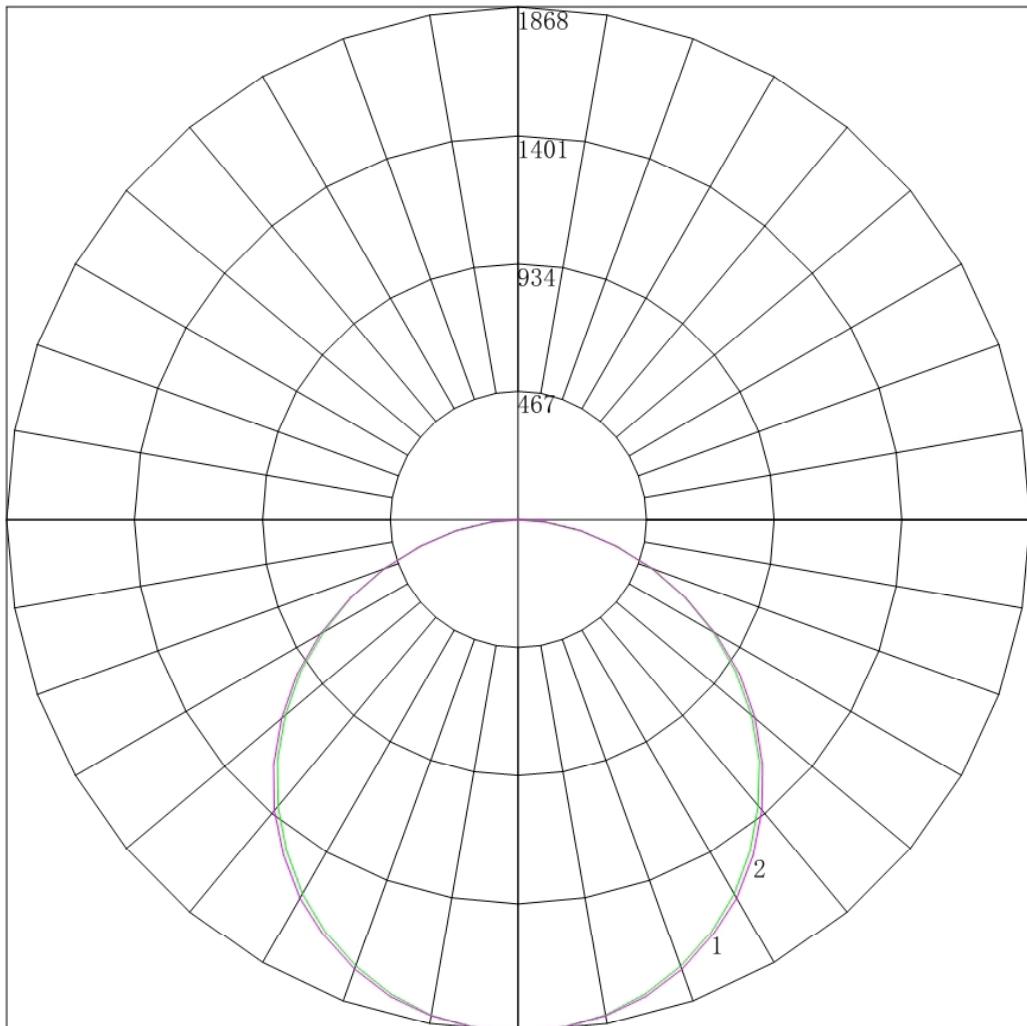
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#### 4.5 Polar Curves



Maximum Candela = 1868.396 Located At Horizontal Angle = 0, Vertical Angle = 0  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



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## 4.6 Candela Tabulation

	<b>0</b>	<b>15</b>	<b>30</b>	<b>45</b>	<b>60</b>	<b>75</b>	<b>90</b>
<b>0</b>	1868.396	1868.396	1868.396	1868.396	1868.396	1868.396	1868.396
<b>5</b>	1859.968	1859.738	1859.524	1859.974	1859.967	1860.630	1862.183
<b>10</b>	1835.127	1833.985	1834.679	1835.814	1837.129	1837.555	1838.666
<b>15</b>	1793.430	1792.917	1793.870	1795.926	1797.217	1798.723	1800.950
<b>20</b>	1735.408	1737.948	1738.889	1741.423	1744.000	1745.509	1746.685
<b>25</b>	1663.813	1665.063	1666.875	1670.414	1673.997	1676.943	1676.801
<b>30</b>	1576.515	1577.590	1580.179	1586.320	1589.692	1594.419	1594.583
<b>35</b>	1475.465	1478.652	1481.329	1486.447	1491.468	1495.229	1494.750
<b>40</b>	1363.858	1366.648	1371.211	1373.149	1380.016	1383.921	1385.153
<b>45</b>	1245.509	1242.437	1248.663	1253.367	1255.948	1260.305	1262.072
<b>50</b>	1111.545	1112.408	1114.676	1118.875	1124.386	1125.884	1127.633
<b>55</b>	968.754	973.590	974.285	975.458	981.871	983.593	986.271
<b>60</b>	819.442	823.580	824.799	825.526	830.825	831.258	833.329
<b>65</b>	670.218	671.236	672.956	674.535	676.737	677.528	675.595
<b>70</b>	518.112	521.827	521.119	521.755	520.984	524.062	521.367
<b>75</b>	374.212	370.374	370.280	370.112	369.076	368.887	366.253
<b>80</b>	230.844	229.936	230.463	227.709	229.056	226.380	229.153
<b>85</b>	101.360	102.253	99.850	98.656	98.028	97.239	97.999
<b>90</b>	4.480	4.928	6.074	6.136	6.381	5.790	7.717
<b>95</b>	2.573	2.531	2.440	2.283	2.195	2.019	1.997
<b>100</b>	2.573	2.464	2.395	2.261	2.173	2.086	2.086
<b>105</b>	2.307	2.353	2.240	2.194	2.040	2.019	2.086
<b>110</b>	2.174	2.154	2.107	2.017	1.951	1.908	1.908
<b>115</b>	2.085	2.020	1.996	1.884	1.862	1.886	1.864
<b>120</b>	2.218	2.198	2.173	2.017	1.951	1.931	1.908
<b>125</b>	2.218	2.264	2.196	2.150	2.106	2.041	2.130
<b>130</b>	1.952	1.998	1.996	1.906	1.951	1.864	1.864
<b>135</b>	2.085	1.976	1.952	1.884	1.818	1.709	1.731
<b>140</b>	2.218	2.220	2.218	2.150	2.107	2.152	2.174
<b>145</b>	2.484	2.486	2.440	2.482	2.483	2.552	2.529
<b>150</b>	2.795	2.819	2.772	2.815	2.794	2.840	2.839
<b>155</b>	3.194	3.219	3.194	3.214	3.215	3.218	3.239
<b>160</b>	3.504	3.530	3.571	3.613	3.615	3.639	3.594
<b>165</b>	3.726	3.685	3.770	3.768	3.792	3.883	3.949
<b>170</b>	4.037	3.996	3.992	4.034	4.036	4.061	4.126
<b>175</b>	4.214	4.218	4.258	4.255	4.368	4.371	4.393
<b>180</b>	4.373	4.373	4.373	4.373	4.373	4.373	4.373



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## Appendix 1 Product Photo



Picture 1



Picture 2

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