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Test report of

IES LM-79-08

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

Rendered to:

ELEC-TECH INTERNATIONAL CO LTD
No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District, ZhuhaiCity, Guangdong Province, P.R. China 519085

For products:

Direct Linear Ambient Luminaires

Models No.:

546562XX(XX=41-50 means 4000K)

Test Date:	May. 3, 2017 to May. 5, 2017
Test Item:	Total luminous flux, Luminous Efficacy, Electrical values, Luminous Intensity Distribution, Chromaticity coordinates, CCT and CRI, Spectral Power Distribution.
Test Lab.:	**LCTECH (Zhongshan) Testing Service Co., Ltd** 2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China Tel:+86-760-22833366 Fax:+86-760-22833399 E-mail:Service@lccert.com http://www.lccert.com
Template No.:	LC-RT-PL/LM79-08/01
Test Note:	

Complied by:	**Reviewed by:**
Fish Tan	**Richard Li**
Project Engineer	**Technical Manager**
May. 23, 2017	**May. 23, 2017**

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1. General

1.1 Product Information

Brand Name	ETI
Product Type	Direct Linear Ambient Luminaires
Model Number	546562XX(XX=41-50 means 4000K)
Rated Inputs	120-277VAC, 50/60Hz
Rated Power	34W
Rated Light output	3600lm
Declared CCT	4000K
Power Supply	LED driver
LED Package, Array or Module	SPMWHX1228FXXXXXXXX, Samsung Electronics Co., LTD
Dimming Information	Non-dimmable
Receipt Samples	1 unit
Sample Code of lab.	1704201131
Date of Receipt Samples	Apr. 20, 2017
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-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	2016-08-10	2017-08-09
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

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 °C ± 1°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 both sphere-spectroradiometer system and 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.

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the total luminous flux was calculated from these 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	120.02 V~60Hz	120.05 V~60Hz
Input Current(A)	0.274	0.273
Total Power(W)	32.51	32.50
Power Factor	0.990	0.990
I-THD	11.69%	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	3862.18
Luminous Length(ft)	-	3.90
Lumens per Foot(lm/ft)	-	990.30
Luminaire Efficacy(Lm/W)	-	118.84
Correlated Color Temperature (CCT)(K)	4099	-
Color Rendering Index (CRI)	83.9	-
R9	13	-
Chromaticity Coordinate (x,y)	x=0.3767 y=0.3762	-
Chromaticity Coordinate (u,v)	u=0.2229 v=0.3339	-
Chromaticity Coordinate (u',v')	u'=0.2229 v'=0.5008	-
Duv	0.00083	-
Zone Lumens between 0-60 °	-	64.5 %

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
82	89	95	83	82	85	87	67
R9	R10	R11	R12	R13	R14	R15	-
13	75	83	63	85	97	77	-

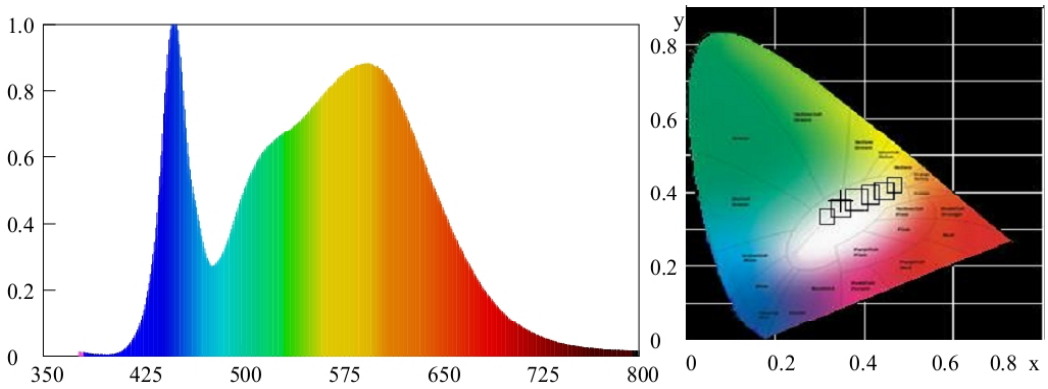
3.4 Electrical data on 277V

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.00 V~50Hz	-
Power Factor	0.900	-
I-THD	10.81%	-
Off-state Power(W)	-	-

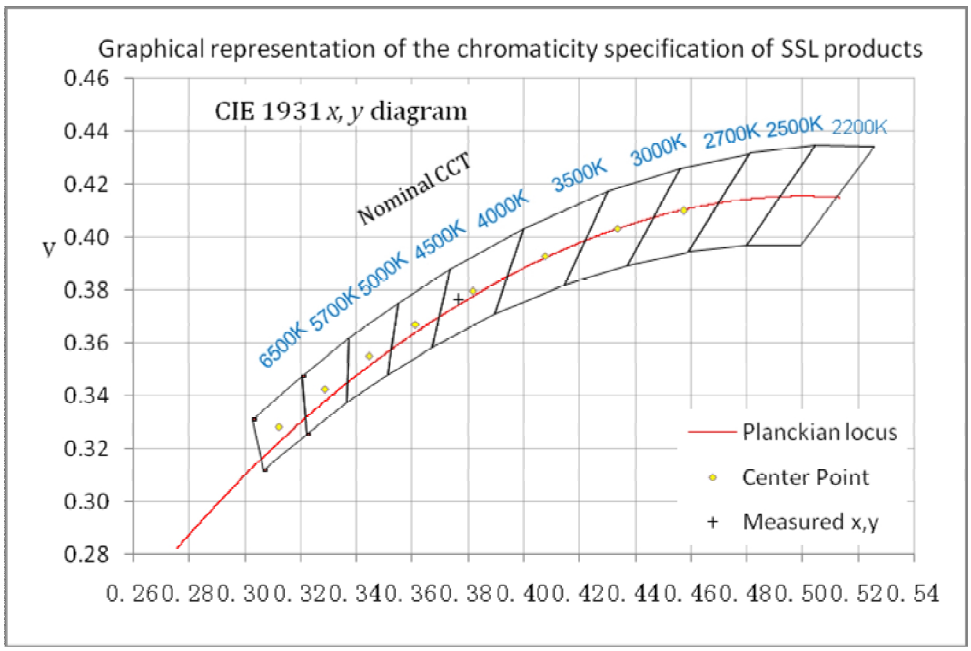
Note: N.A.

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 w/Sides
Spacing Criteria (0-180)	1.22	Luminous Length	1.19 m
Spacing Criteria (90-270)	1.30	Luminous Width	0.10 m
Spacing Criteria (Diagonal)	1.38	Luminous Height	0.04 m
Test Distance	29.65 m		

4.4 Zonal Lumen Summary

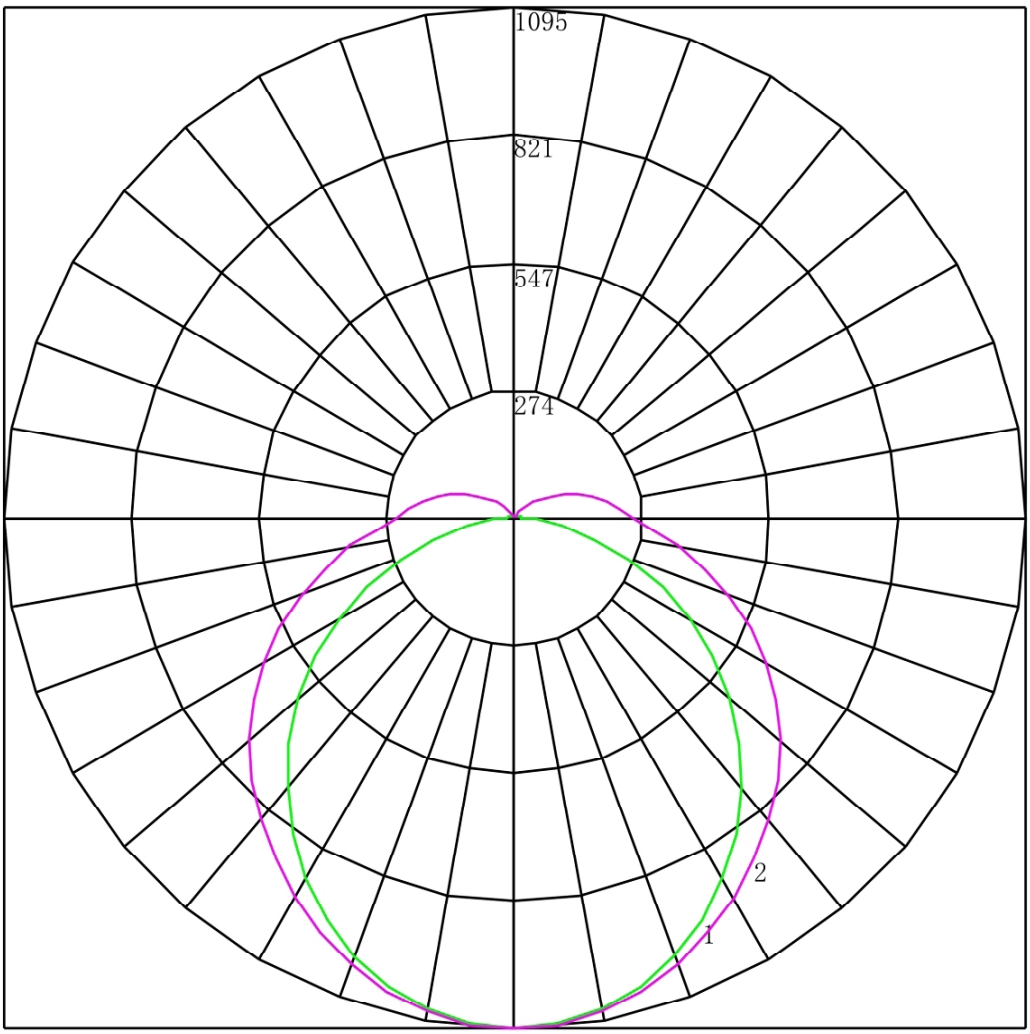
Zone	Lumens	%Lamp	%Fixt
0-20	398.59	10.30	10.30
0-30	844.02	21.90	21.90
0-40	1382.41	35.80	35.80
0-60	2492.17	64.50	64.50
0-80	3289.66	85.20	85.20
0-90	3509.37	90.90	90.90
10-90	3405.92	88.20	88.20
20-40	983.82	25.50	25.50
20-50	1553.33	40.20	40.20
40-70	1567.65	40.60	40.60
60-80	797.49	20.60	20.60
70-80	339.59	8.80	8.80
80-90	219.71	5.70	5.70
90-110	247.28	6.40	6.40
90-120	307.15	8.00	8.00
90-130	336.51	8.70	8.70
90-150	349.65	9.10	9.10
90-180	352.81	9.10	9.10
110-180	105.53	2.70	2.70
0-180	3862.18	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	103.45
10-20	295.15
20-30	445.43
30-40	538.39
40-50	569.51
50-60	540.24
60-70	457.90
70-80	339.59
80-90	219.71
90-100	147.50
100-110	99.78
110-120	59.87
120-130	29.36
130-140	10.25
140-150	2.89
150-160	1.73
160-170	1.07
170-180	0.36

4.5 Polar Curves

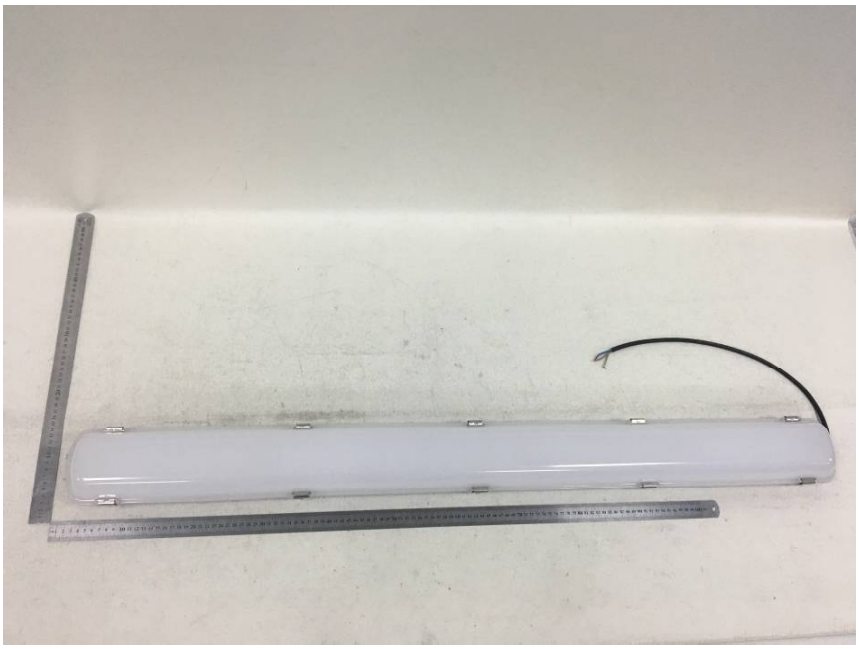


Maximum Candela = 1094.783 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	1094.783	1094.783	1094.783	1094.783	1094.783	1094.783	1094.783
5	1087.346	1088.109	1088.081	1090.786	1089.469	1089.040	1092.739
10	1069.903	1070.698	1071.348	1074.399	1072.420	1073.665	1076.932
15	1041.084	1041.708	1042.409	1047.520	1047.453	1050.118	1052.591
20	1000.666	1001.561	1005.408	1012.161	1014.440	1017.704	1020.326
25	950.155	953.923	957.895	967.929	971.906	978.934	982.529
30	893.711	897.447	902.602	916.088	925.135	934.360	941.819
35	829.078	833.636	841.480	859.514	874.756	887.162	895.310
40	757.804	763.286	773.277	799.633	821.510	840.504	848.370
45	683.122	688.381	702.703	737.427	766.697	789.343	798.732
50	602.861	610.341	633.381	673.238	707.154	733.619	742.561
55	519.989	529.845	561.942	608.081	646.153	674.222	684.518
60	434.549	449.793	489.323	540.459	582.029	611.825	622.469
65	349.065	368.659	416.621	471.612	514.733	547.341	557.633
70	261.632	289.094	345.388	403.890	447.839	479.816	490.751
75	179.822	214.894	275.579	335.287	382.028	412.770	423.391
80	104.210	146.311	210.250	271.477	319.337	348.882	357.465
85	44.225	90.254	154.103	214.723	260.323	289.330	299.592
90	15.494	54.349	116.469	174.670	218.672	247.058	255.610
95	12.661	37.470	93.503	148.586	190.770	218.101	227.611
100	11.200	24.346	72.887	123.756	164.179	189.650	198.394
105	9.739	15.089	54.750	101.167	138.686	162.709	170.873
110	8.411	9.677	38.942	80.381	113.826	136.647	144.703
115	6.995	7.601	24.979	60.520	91.031	111.766	118.534
120	5.268	6.032	14.069	42.220	69.418	88.483	95.106
125	3.851	4.839	7.112	26.475	49.402	65.837	72.986
130	3.010	3.800	4.831	13.741	31.496	45.488	51.300
135	2.523	3.071	3.887	5.782	16.788	27.069	31.661
140	2.258	2.740	3.403	4.157	6.924	13.578	15.984
145	2.169	2.607	3.250	3.893	4.428	5.169	6.184
150	2.523	2.806	3.337	3.893	4.297	4.534	4.529
155	2.833	2.983	3.360	3.849	4.187	4.380	4.485
160	3.055	3.204	3.535	3.827	4.121	4.271	4.355
165	3.364	3.403	3.623	3.806	3.946	4.118	4.137
170	3.542	3.535	3.601	3.761	3.836	3.943	3.875
175	3.763	3.712	3.755	3.805	3.792	3.833	3.875
180	3.823	3.823	3.823	3.823	3.823	3.823	3.823

Appendix 1 Product Photo



Picture 1

Picture 2

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