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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,
Zhuhai City, Guangdong Province, P.R. China 519085

For products:

Direct Linear Ambient Luminaires

Models No.:

542631##-1(##=41-50)

(Where ## denotes CCT and could be 41-50 which refers 4000K)

Test Date: Mar. 12, 2018

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

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1. General

1.1 Product Information

Brand Name	ETI
Product Type	Direct Linear Ambient Luminaires
Model Number	542631##-1(##=41-50)
Rated Inputs	120VAC, 60Hz
Rated Power	8.5W
Rated Light output	900lm
Declared CCT	4000K
Power Supply	ETI-AD00850145060SNA
LED Package, Array or Module	SPMWHX228XXXXXXXXXX, Samsung Electronics Co., LTD.
Receipt Samples	1 unit
Sample Code of lab.	180307107010
Date of Receipt Samples	Mar. 7, 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-923	CHP-500	2018-01-10	2019-01-09
AC Power supply	LC-I-987	APW-110N	2018-01-10	2019-01-09
Power analyzer	LC-I-928	WT210	2018-01-05	2019-01-05
Power analyzer	LC-I-954	WT210	2018-01-10	2019-01-09
Multimeter	LC-I-972	Fluke 17B	2017-08-08	2018-08-07
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-PL-I-011	D204C	2017-09-07	2018-09-06
Luminous Flux Standard Lamp	LC-PL-I-003	24V100W	2017-09-22	2018-09-21
Goniophotometer(with mirror)	LC-I-902	GMS2000	2017-05-07	2018-05-06
Wireless temperature transmitter	LC-I-978	DWRF-B	2018-02-10	2019-02-09
Wireless temperature transmitter	LC-I-979	DWRF-B	2018-02-10	2019-02-09

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	119.98 V~60Hz
Input Current(A)	0.072	0.072
Total Power(W)	8.35	8.33
Power Factor	0.969	0.968
I-THD	10.51%	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	1063.39
Luminaire Efficacy(Lm/W)	-	127.66
Luminous Length(ft)	-	2
Lumens per Foot(lm/ft)	-	531.70
Correlated Color Temperature (CCT)(K)	3997	-
Color Rendering Index (CRI)	84.4	-
R9	15	-
Chromaticity Coordinate (x,y)	x = 0.3809 y = 0.3779	-
Chromaticity Coordinate (u,v)	u = 0.2249 v = 0.3348	-
Chromaticity Coordinate (u',v')	u' = 0.2249 v' = 0.5022	-
Duv	0.0004	-
Zone Lumens between 0-60 °	-	59.78 %

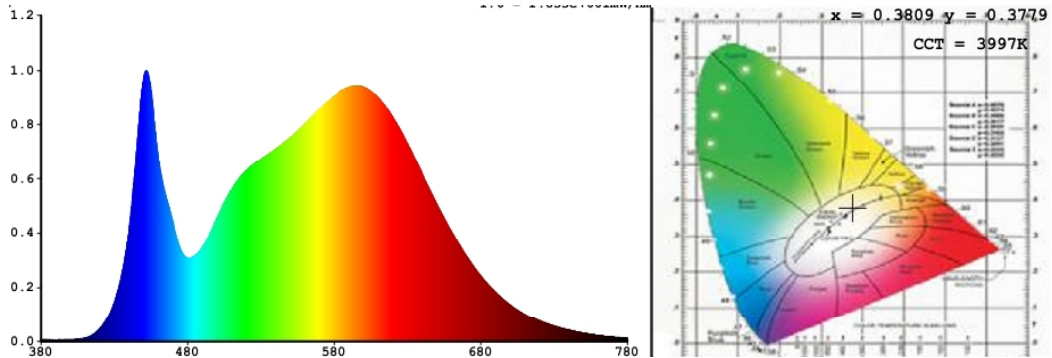
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
83	91	96	83	83	87	87	67
R9	R10	R11	R12	R13	R14	R15	-
15	77	82	64	85	98	77	-

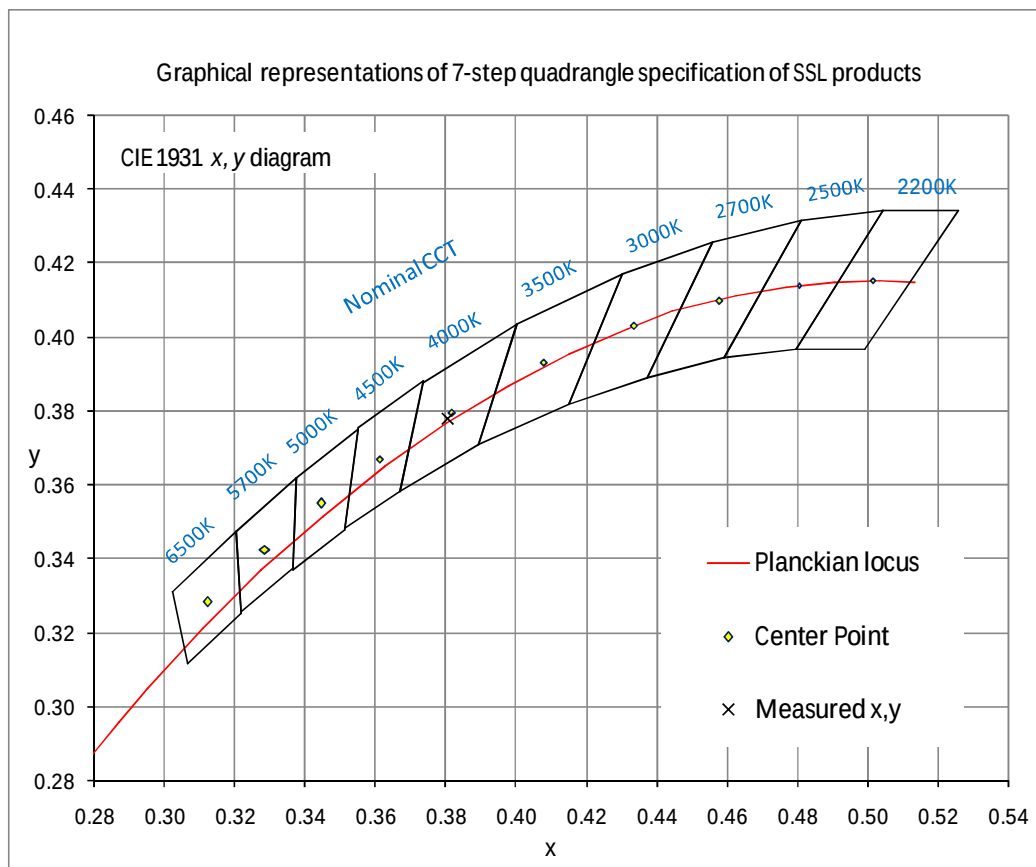
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Semi-Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.22	Luminous Length	0.60 m
Spacing Criteria (90-270)	1.34	Luminous Width	0.04 m
Spacing Criteria (Diagonal)	1.42	Luminous Height	0.02 m
Test Distance	29.79 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	98.70	9.30	9.30
0-30	210.48	19.80	19.80
0-40	347.43	32.70	32.70
0-60	635.65	59.80	59.80
0-80	858.02	80.70	80.70
0-90	930.09	87.50	87.50
10-90	904.59	85.10	85.10
20-40	248.73	23.40	23.40
20-50	395.43	37.20	37.20
40-70	412.07	38.80	38.80
60-80	222.37	20.90	20.90
70-80	98.52	9.30	9.30
80-90	72.07	6.80	6.80
90-110	85.38	8.00	8.00
90-120	107.83	10.10	10.10
90-130	121.29	11.40	11.40
90-150	131.61	12.40	12.40
90-180	133.30	12.50	12.50
110-180	47.92	4.50	4.50
0-180	1063.39	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	25.50
10-20	73.20
20-30	111.78
30-40	136.95
40-50	146.70
50-60	141.52
60-70	123.85
70-80	98.52
80-90	72.07
90-100	50.72
100-110	34.66
110-120	22.45
120-130	13.46
130-140	7.12
140-150	3.20
150-160	1.17
160-170	0.39
170-180	0.12



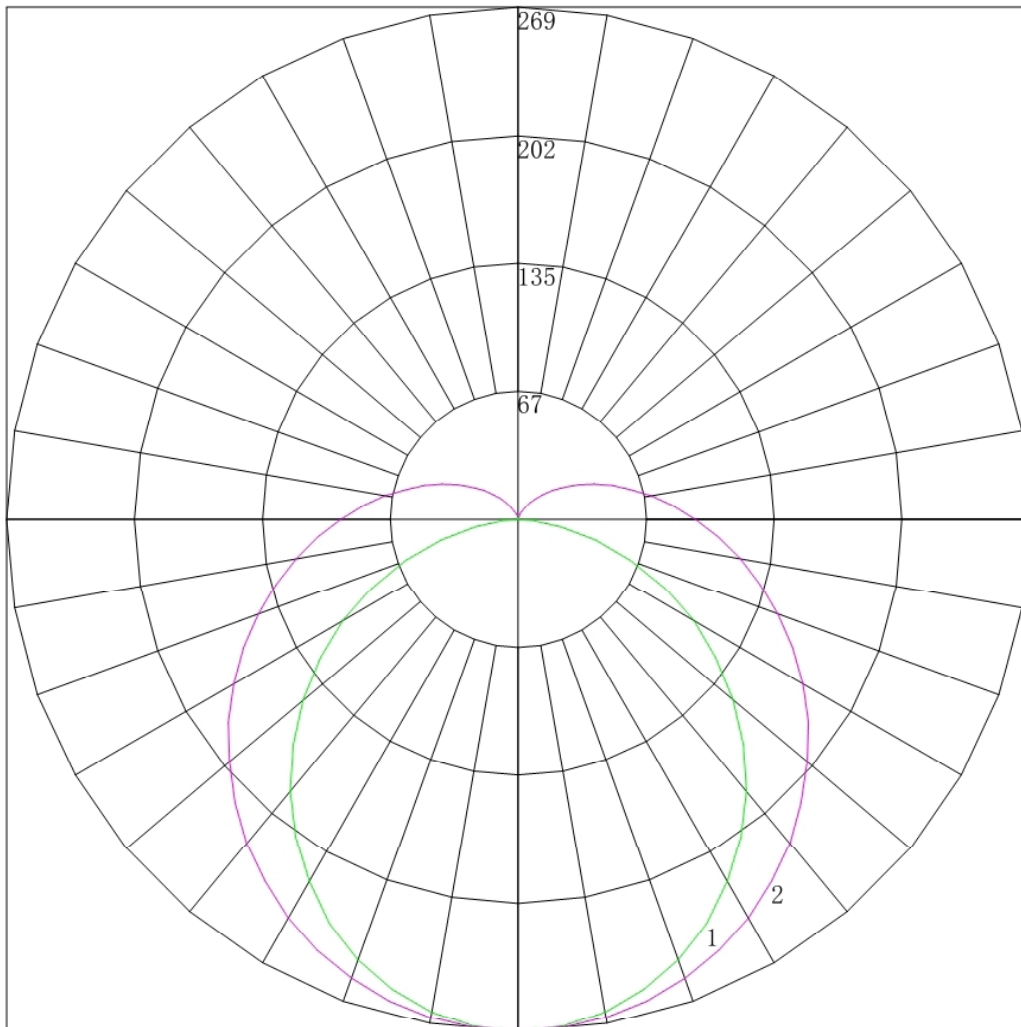
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4.5 Polar Curves

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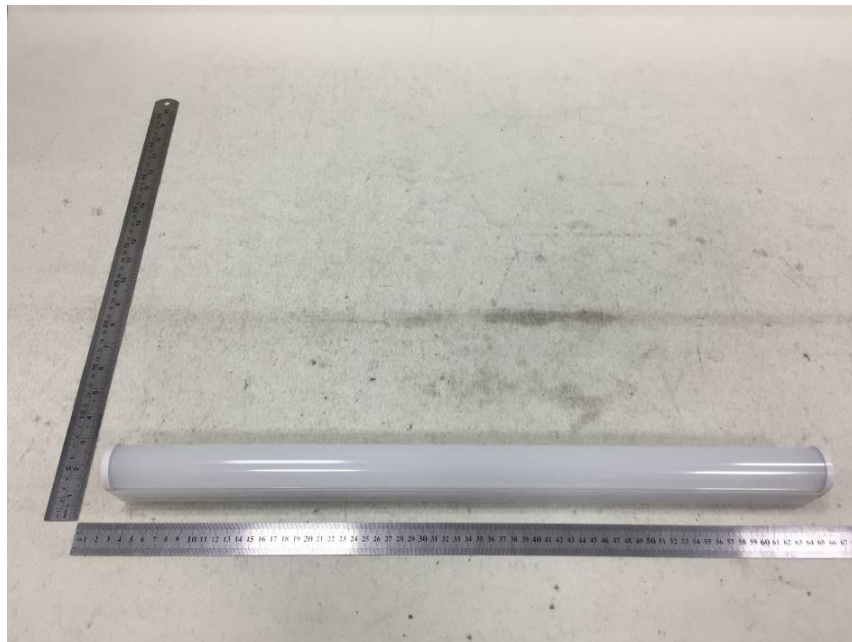


Maximum Candela = 269.296 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

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>
0	269.296	269.296	269.296	269.296	269.296	269.296	269.296
5	267.694	268.161	268.096	268.651	268.209	268.546	268.506
10	262.842	263.932	264.095	264.979	265.280	266.140	266.006
15	255.854	256.942	257.783	259.216	260.554	262.101	262.190
20	246.462	247.592	248.981	251.739	254.407	256.253	256.621
25	234.711	235.637	238.335	242.349	246.308	249.478	250.130
30	220.022	221.834	225.377	231.356	237.032	241.157	242.149
35	204.086	206.384	211.730	218.427	226.004	231.248	232.501
40	186.638	189.686	196.038	205.009	213.955	220.699	222.327
45	167.542	171.364	179.190	190.301	200.974	208.648	210.749
50	147.646	152.084	161.965	174.858	187.039	196.091	198.471
55	127.081	132.760	144.028	159.481	173.103	182.893	186.280
60	106.428	112.366	125.869	143.126	158.680	169.232	172.861
65	84.973	92.262	108.666	127.194	143.901	155.195	159.398
70	62.940	72.470	91.306	111.839	129.656	141.380	145.454
75	41.975	53.791	75.548	97.375	115.987	128.027	131.772
80	22.968	37.627	61.190	84.135	102.651	114.741	118.617
85	8.057	24.314	48.543	71.496	90.224	101.808	105.768
90	0.846	14.962	38.074	60.147	78.175	89.604	93.402
95	0.267	9.574	29.739	50.512	67.590	78.591	82.045
100	0.312	6.435	23.182	41.945	57.649	67.843	71.257
105	0.267	4.676	18.159	34.580	48.751	58.022	61.084
110	0.312	3.451	14.358	28.416	41.029	49.304	52.358
115	0.267	2.360	11.358	23.075	33.951	41.359	44.158
120	0.312	1.781	8.913	18.736	27.981	34.297	36.747
125	0.356	1.358	6.957	14.931	22.678	28.095	29.950
130	0.356	1.024	5.090	11.682	17.996	22.467	23.855
135	0.356	0.668	3.623	8.834	13.913	17.590	18.724
140	0.401	0.468	2.734	6.253	10.540	13.396	14.252
145	0.579	0.534	1.978	4.517	7.411	9.777	10.612
150	0.623	0.668	1.311	3.160	5.037	6.533	7.104
155	0.846	0.801	1.045	2.136	3.373	4.326	4.604
160	0.979	0.979	0.956	1.402	2.175	2.737	2.938
165	1.113	1.113	1.134	1.135	1.287	1.589	1.666
170	1.291	1.247	1.267	1.246	1.243	1.236	1.228
175	1.246	1.336	1.334	1.313	1.331	1.302	1.316
180	1.381	1.381	1.381	1.381	1.381	1.381	1.381

Appendix A Product Photo



Picture 1



Picture 2

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