



NVLAP LAB CODE 500080-0

Ref. No.: LCZF16080116

Version: 1.0

Date of issue: Sep. 13, 2016

Total pages: 12



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

For products:

Direct Linear Ambient Luminaires

Models No.:

545732XX(XX=61-70)

Test Date: From Sep. 10, 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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Template No.: LC-RT-PL/LM79-08/01

Test Note: *545731XX is all the same as 545732XX except the dimmable optional, 545732XX is non-dimmable, 545731XX is dimmable.*

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Sep. 13, 2016

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1. General

1.1 Product Information

Brand Name	ETI
Product Type	Direct Linear Ambient Luminaires
Model Number	545732XX(XX=61-70)
Rated Inputs	120-277VAC, 50/60Hz
Rated Power	45W
Rated Light output	5000lm
Declared CCT	5000K
Power Supply	LED driver
LED Package, Array or Module	Model: 67-21S Series, manufactured by Everlight
Receipt Samples	1 unit
Date of Receipt Samples	2016/9/9
Note	545731XX is all the same as 545732XX except the dimmable optional, 545732XX is non-dimmable, 545731XX is dimmable.

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	2016-02-04	2017-02-03
AC Power supply	LC-I-987	APW-110N	2016-02-04	2017-02-03
Power analyzer	LC-I-928	WT210	2016-01-24	2017-01-24
Power analyzer	LC-I-954	WT210	2016-02-04	2017-02-03
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-I-917	24V100W	2015-10-09	2016-10-08
Luminous Flux Standard Lamp	LC-I-946	110V/200W	2015-10-17	2016-10-16
Goniophotometer(with mirror)	LC-I-902	GMS2000	2016-05-04	2017-05-05
Wireless temperature transmitter	LC-I-978	DWRF-B	2016-02-03	2017-02-02
Wireless temperature transmitter	LC-I-979	DWRF-B	2016-02-03	2017-02-02

2. Test conducted 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 ± 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	120.00 V~60Hz
Input Current(A)	0.383	0.381
Total Power(W)	44.86	44.61
Power Factor	0.976	0.976
I-THD(%)	20.81	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	5091.41
Lumen/Foot(lm/ft)	-	1282.53
Luminaire Efficacy(Lm/W)	-	114.13
Correlated Color Temperature (CCT)(K)	5198	-
Color Rendering Index (CRI)	84.9	-
R9	18	-
Chromaticity Coordinate (x,y)	x = 0.3399 y = 0.3494	-
Chromaticity Coordinate (u,v)	u = 0.2087 v = 0.3219	-
Chromaticity Coordinate (u',v')	u' = 0.2087 v' = 0.4828	-
Duv	0.0011	-
Spacing Criteria(0-180°)	-	1.24
Spacing Criteria(90-270°)	-	1.38
Zone Lumens between 0-60 °	-	58.46%

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
84	91	94	83	84	86	87	70
R9	R10	R11	R12	R13	R14	R15	-
18	77	82	64	86	97	79	-

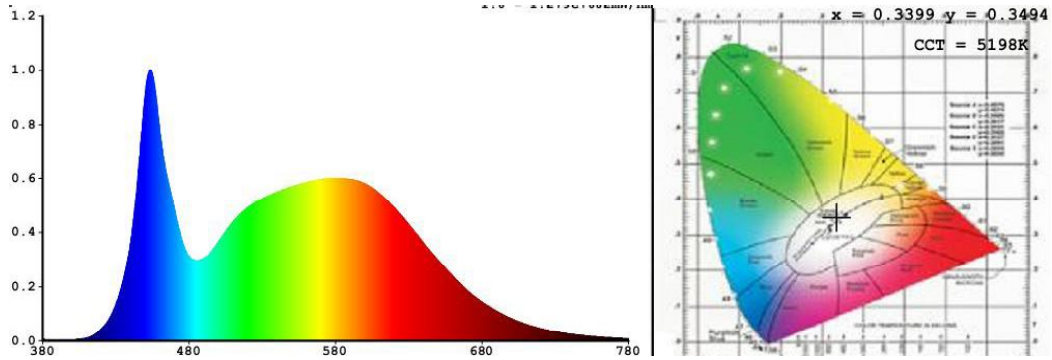
3.4 Electrical data at 277V

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.00 V~60Hz	-
Power Factor	0.916	-
I-THD(%)	20.57	-
Off-state Power(W)	-	-

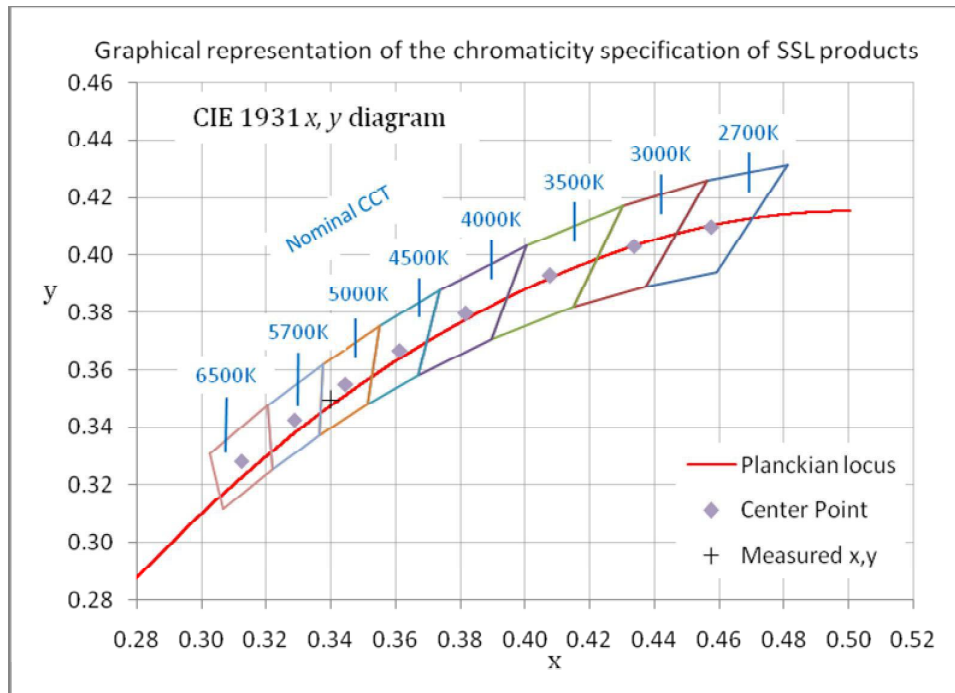
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Semi-Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.24	Luminous Length	1.21 m
Spacing Criteria (90-270)	1.38	Luminous Width	0.05 m
Spacing Criteria (Diagonal)	1.46	Luminous Height	0.02 m
Test Distance	29.54 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	452.44	8.90	8.90
0-30	972.01	19.10	19.10
0-40	1614.27	31.70	31.70
0-60	2976.44	58.50	58.50
0-80	3974.88	78.10	78.10
0-90	4252.7	83.50	83.50
10-90	4136.71	81.20	81.20
20-40	1161.83	22.80	22.80
20-50	1854.95	36.40	36.40
40-70	1935.98	38.00	38.00
60-80	998.44	19.60	19.60
70-80	424.63	8.30	8.30
80-90	277.81	5.50	5.50
90-110	393.81	7.70	7.70
90-120	546.02	10.70	10.70
90-130	663.76	13.00	13.00
90-150	799.40	15.70	15.70
90-180	838.71	16.50	16.50
110-180	444.90	8.70	8.70
0-180	5091.4	100.00	100.00

Total Luminaire Efficiency = 100.00%

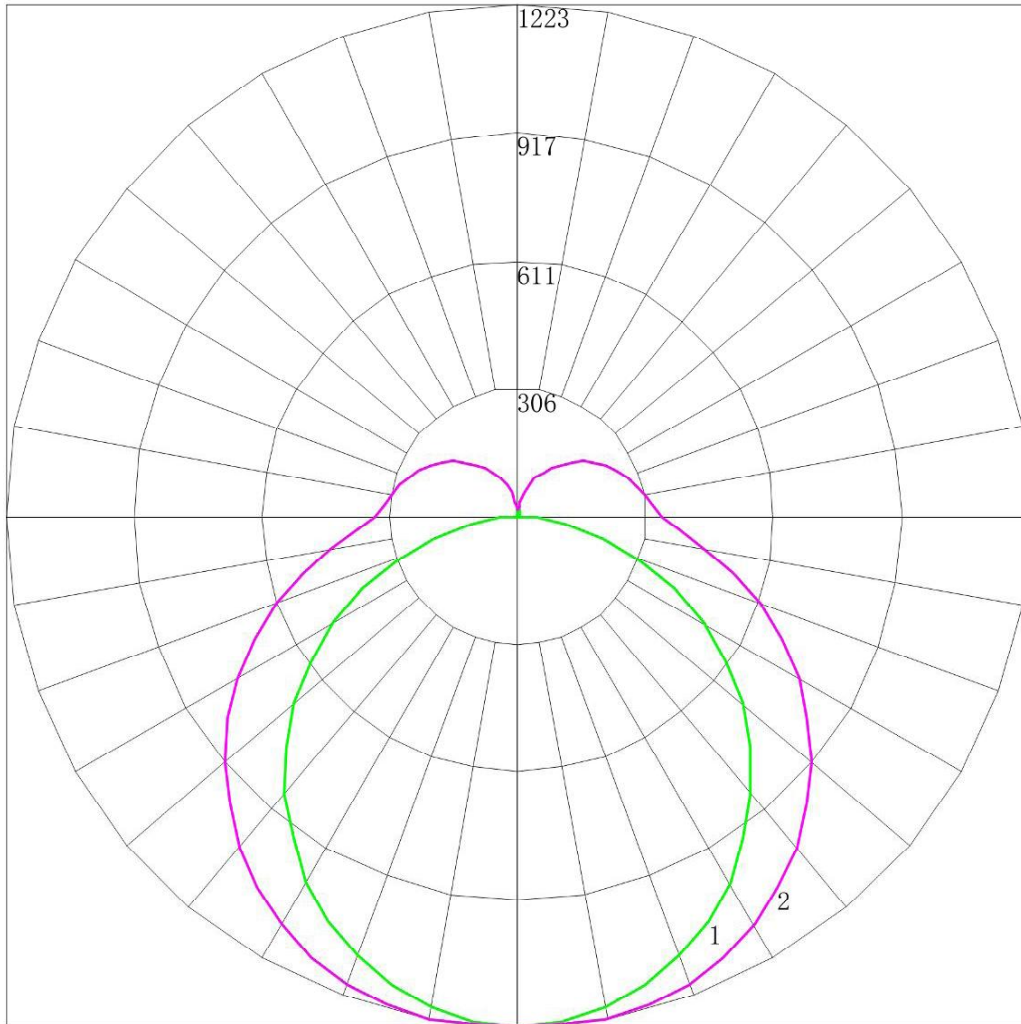
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	115.99
10-20	336.45
20-30	519.57
30-40	642.26
40-50	693.12
50-60	669.06
60-70	573.81
70-80	424.63
80-90	277.81
90-100	210.61
100-110	183.21
110-120	152.21
120-130	117.74
130-140	83.21
140-150	52.43
150-160	27.20
160-170	10.15
170-180	1.95



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4.5 Polar Curves



Maximum Candela = 1222.68 Located At Horizontal Angle = 90, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



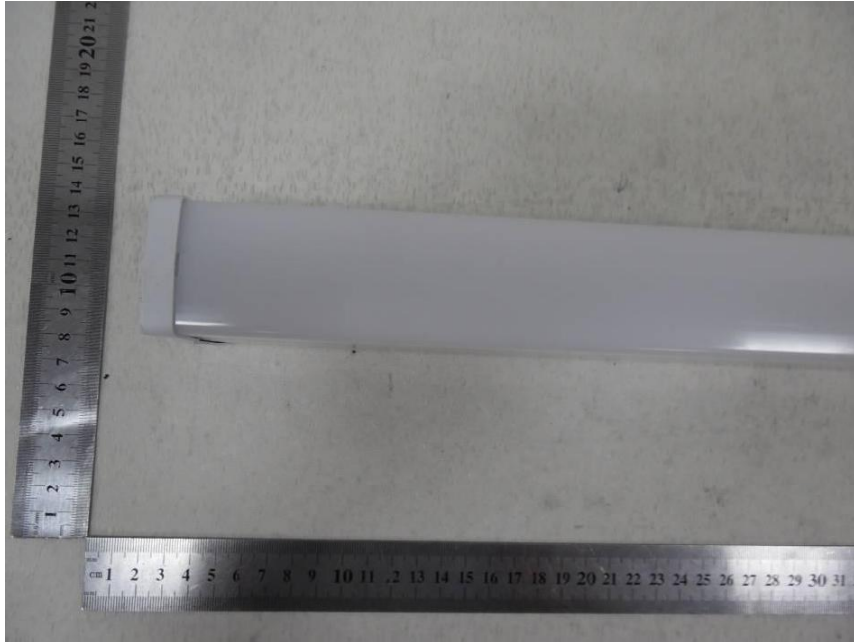
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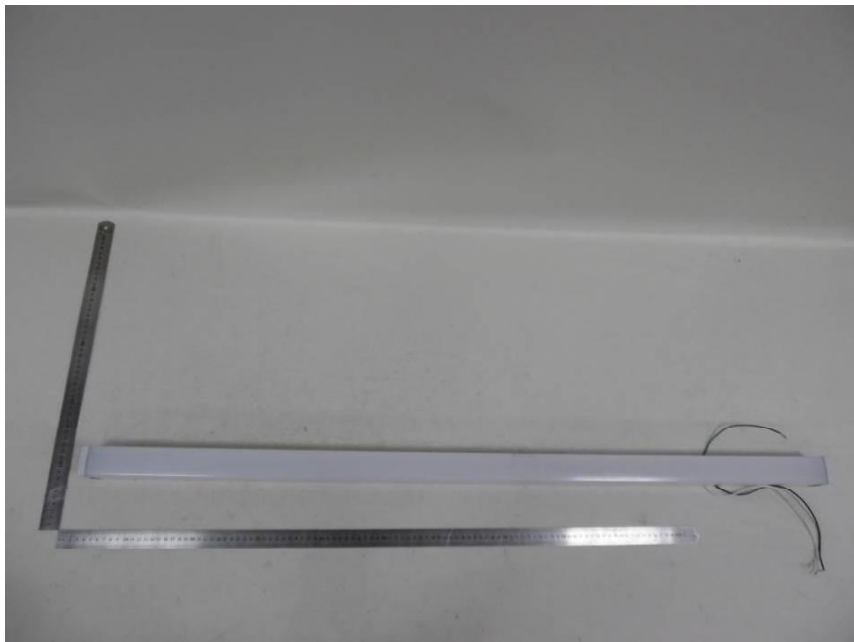
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	1219.825	1219.825	1219.825	1219.825	1219.825	1219.825	1219.825
5	1214.890	1215.555	1216.406	1220.351	1220.280	1220.261	1222.680
10	1194.190	1197.031	1202.595	1211.428	1216.268	1218.517	1221.166
15	1165.061	1169.946	1180.266	1196.027	1203.941	1208.950	1213.424
20	1122.395	1132.526	1147.517	1170.810	1181.327	1190.274	1192.965
25	1073.046	1085.471	1106.646	1135.301	1150.917	1162.205	1165.975
30	1012.125	1029.747	1058.110	1091.721	1110.811	1125.114	1129.253
35	939.150	962.657	997.361	1039.376	1060.924	1079.894	1084.356
40	867.573	891.276	932.216	980.212	1007.308	1028.594	1034.139
45	781.846	814.421	863.157	913.509	945.283	971.302	976.137
50	698.740	731.720	785.148	842.008	878.549	908.429	914.458
55	604.061	644.947	704.792	767.466	807.746	839.346	846.421
60	510.386	553.553	618.554	684.495	731.934	764.946	773.972
65	410.291	457.233	529.069	599.490	651.260	687.321	696.419
70	310.372	361.547	436.642	511.637	566.573	605.271	614.670
75	208.050	263.869	344.123	421.785	480.716	520.716	531.884
80	116.428	175.366	257.997	338.326	400.416	442.241	452.644
85	42.361	102.803	189.475	269.801	333.230	375.337	387.375
90	7.861	65.536	150.554	229.106	291.090	331.882	343.084
95	3.799	56.733	137.344	211.967	270.149	309.195	320.290
100	3.581	53.142	130.435	202.065	257.965	294.768	306.838
105	3.406	49.967	123.376	192.230	245.461	280.952	292.089
110	3.319	46.880	116.271	181.455	231.932	265.348	276.734
115	3.406	43.771	108.795	170.222	217.356	248.829	259.519
120	3.537	40.596	100.820	158.134	201.667	231.133	241.396
125	3.625	37.158	92.777	145.546	186.067	212.849	222.494
130	3.668	33.326	84.168	132.432	169.290	193.498	202.425
135	4.149	29.867	75.212	118.880	152.209	173.492	182.312
140	5.022	26.757	66.341	105.110	135.367	153.966	161.507
145	6.201	23.736	57.798	91.822	118.089	134.396	141.092
150	7.555	20.232	48.037	77.659	100.049	114.172	120.330
155	9.171	17.605	38.533	62.276	82.140	93.818	98.920
160	11.005	16.575	30.945	47.080	63.013	73.529	77.510
165	12.927	16.356	24.145	34.945	44.318	53.218	56.662
170	14.412	16.072	19.722	24.302	28.866	33.517	36.462
175	15.634	16.137	17.323	18.686	19.564	20.115	21.194
180	16.226	16.226	16.226	16.226	16.226	16.226	16.226

Appendix 1 Product Photo



Picture 1



Picture 2



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Attachment 1

**U.S. Department of Energy
Lighting Facts^{CM} Uniform LM-79 Reporting Template**

Laboratory Information

Name of test lab	LCTECH (Zhongshan) Testing Service Co.,Ltd
Date of test report	Sep. 13, 2016
Test report number	LCZP16080116
Laboratory contact name	Richard Li

Product Information

Manufacturer	Elec-Tech International Co., Ltd	
Brand name	ETI	
Model number	545732XX(XX=61-70)	
SKU(if available)	N/A	
Type of luminaire (for integral lamps, list base type and lamp type)	Direct Linear Ambient Luminaires	
Luminaire aperture	-	in.
Luminaire height	0.787	in.
Luminaire length	47.244	in.
Luminaire width	1.575	in.
Number of units(modular products)	N/A	

Electrical Measurements	Integrating sphere output	Goniophotometer Output	
Input wattage	44.86	44.61	W
Input current	0.383	0.381	A
Input voltage(AC)	120.00	120.00	V
Power factor	0.976	0.976	
Off-state power	0.0	0.0	W

Photometric Characteristics

Total initial lumen output	-	5091.41	lm
Initial luminaire efficacy	-	114.13	lm/W
Correlated color temperature / CCT	5198	K	
Color rendering index/CRI	84.9		
Rgvalue	18		
Duv	0.0011		

Luminous Intensity Distribution		Goniophotometer Output	
Center beam candle power(if applicable)		1219.825	cd
Beam angle(if applicable)		109.4	°
Zonallumensinthe0°-60°zone	--	58.46	%
Zonal lumens in the60°-90° zone		25.08	%
Zonallumensinthe90°-120°zone		10.72	%
Zonallumensinthe120°-180°zone		5.75	%

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