



NVLAP LAB CODE 500080-0

Ref. No.: LCZF17050332

Version: 1.0

Date of issue: Jun. 8, 2017

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,
ZhuhaiCity, Guangdong Province, P.R. China 519085

For products:

LED Tube

Models No.:

542161##(##=41-50)

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

Test Date: Jun. 1, 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:

Fish Tan
Project Engineer
Jun. 8, 2017

Reviewed by:

Richard Li
Technical Manager
Jun. 8, 2017

The duplication of this report or parts of it and its use for advertising purposes is only allowed with permission of the testing laboratory. This report contains the result of the examination of the product sample submitted by the applicant. A general statement concerning the quality of the products from the series manufacture cannot be derived therefore. This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Table of Contents

1. General	3
1.1 Product Information	3
1.2 Standards or methods	4
1.3 Equipment list	4
2. Test conducted and method	5
2.1 Ambient Condition	5
2.2 Power Supply Characteristics	5
2.3 Seasoning and Stabilization	5
2.4 Electrical Instrumentation	5
2.5 Color Measurement Method	5
2.6 Total Luminous Flux Measurement Method	5
2.7 Luminous Intensity Distribution Measurement Method	5
2.8 Spatial Non-uniformity of Chromaticity	5
3. Test Result Summary	6
3.1 Electrical data	6
3.2 Photometric data	6
3.3 Color Rendering Details	6
4. Test Data	7
4.1 Spectral Distribution	7
4.2 ANSI Chromaticity Quadrangles Diagram	7
4.3 Goniometry Test Data	8
4.4 Zonal Lumen Summary	8
4.5 Polar Curves	9
4.6 Candela Tabulation	10
Appendix 1 Product Photo	11
Appendix 2 U.S. Department of Energy Lighting Facts CM Uniform LM-79 Reporting Template ..	12



LCTECH



1. General

1.1 Product Information

Brand Name	ETI
Product Type	LED Tube
Model Number	542161##(##=41-50)
Rated Inputs	120-277 Vac, 50/60 Hz
Rated Power	22W
Rated Light output	3300lm
Declared CCT	4000K
Power Supply	Integrated in lamp
LED Package, Array or Module	Model: 67-23S-KK7C-HXXXXXXXXZ6-2T, manufactured by EVENLIGHT
Receipt Samples	1 unit
Sample Code of lab.	1705291319
Date of Receipt Samples	May. 29, 2017
Note	-



LCTECH



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	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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$; 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 and a sphere (2 meter)-spectroradiometer 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 color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were 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.



LCTECH



3. Test Result Summary

3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	120.00 V~60Hz	120.06 V~60Hz
Input Current(A)	0.196	0.196
Total Power(W)	21.76	21.79
Power Factor	0.925	0.925
I-THD	-	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	3391.50	3408.92
Luminaire Efficacy(Lm/W)	155.86	156.44
Correlated Color Temperature (CCT)(K)	3980	-
Color Rendering Index (CRI)	83.3	-
R9	8	-
Chromaticity Coordinate (x,y)	x = 0.3813 y = 0.3771	-
Chromaticity Coordinate (u,v)	u = 0.2255 v = 0.3346	-
Chromaticity Coordinate (u',v')	u' = 0.2255 v' = 0.5019	-
Duv	-0.0001	-
Zone Lumens between 0-60 °	-	53.67%

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
82	92	96	80	82	88	84	63
R9	R10	R11	R12	R13	R14	R15	-
8	80	79	62	85	98	76	-

Note: N.A.

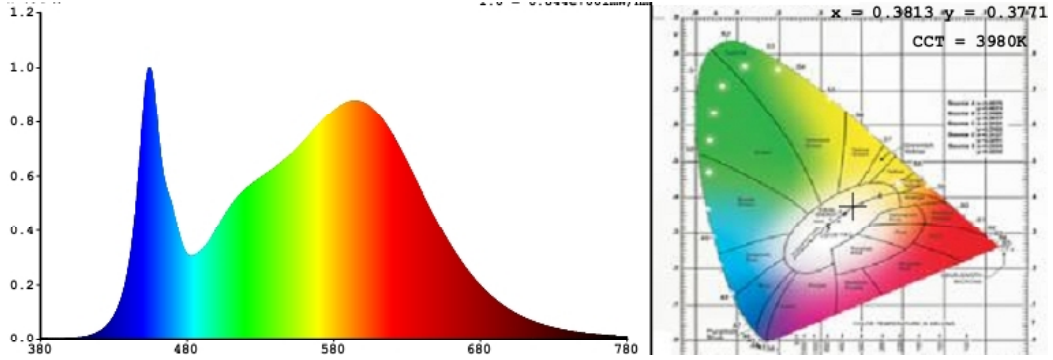


LCTECH

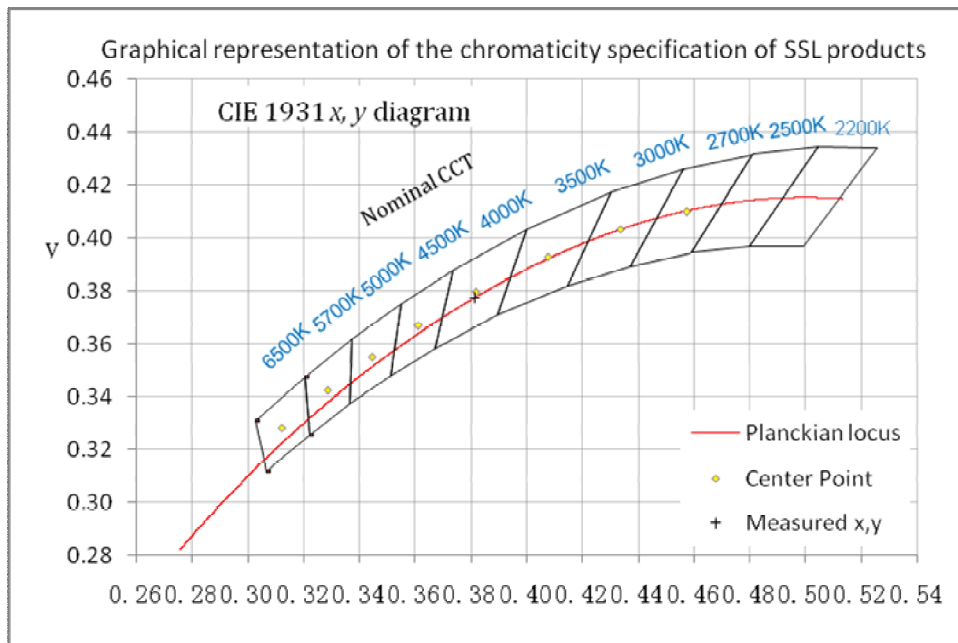


4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram





LCTECH



4.3 Goniometry Test Data

CIE Type	Semi-Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.20	Luminous Length	1.07 m
Spacing Criteria (90-270)	1.34	Luminous Width	0.03 m
Spacing Criteria (Diagonal)	1.38	Luminous Height	0.02 m
Test Distance	29.65 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	292.97	8.60	8.60
0-30	620.93	18.20	18.20
0-40	1015.9	29.80	29.80
0-60	1829.39	53.70	53.70
0-80	2473.21	72.60	72.60
0-90	2707.6	79.40	79.40
10-90	2631.68	77.20	77.20
20-40	722.93	21.20	21.20
20-50	1138.85	33.40	33.40
40-70	1164.89	34.20	34.20
60-80	643.81	18.90	18.90
70-80	292.42	8.60	8.60
80-90	234.39	6.90	6.90
90-110	333.39	9.80	9.80
90-120	448.42	13.20	13.20
90-130	537.20	15.80	15.80
90-150	650.86	19.10	19.10
90-180	701.31	20.60	20.60
110-180	367.93	10.80	10.80
0-180	3408.91	100.00	100.00

Total Luminaire Efficiency = 100.00%

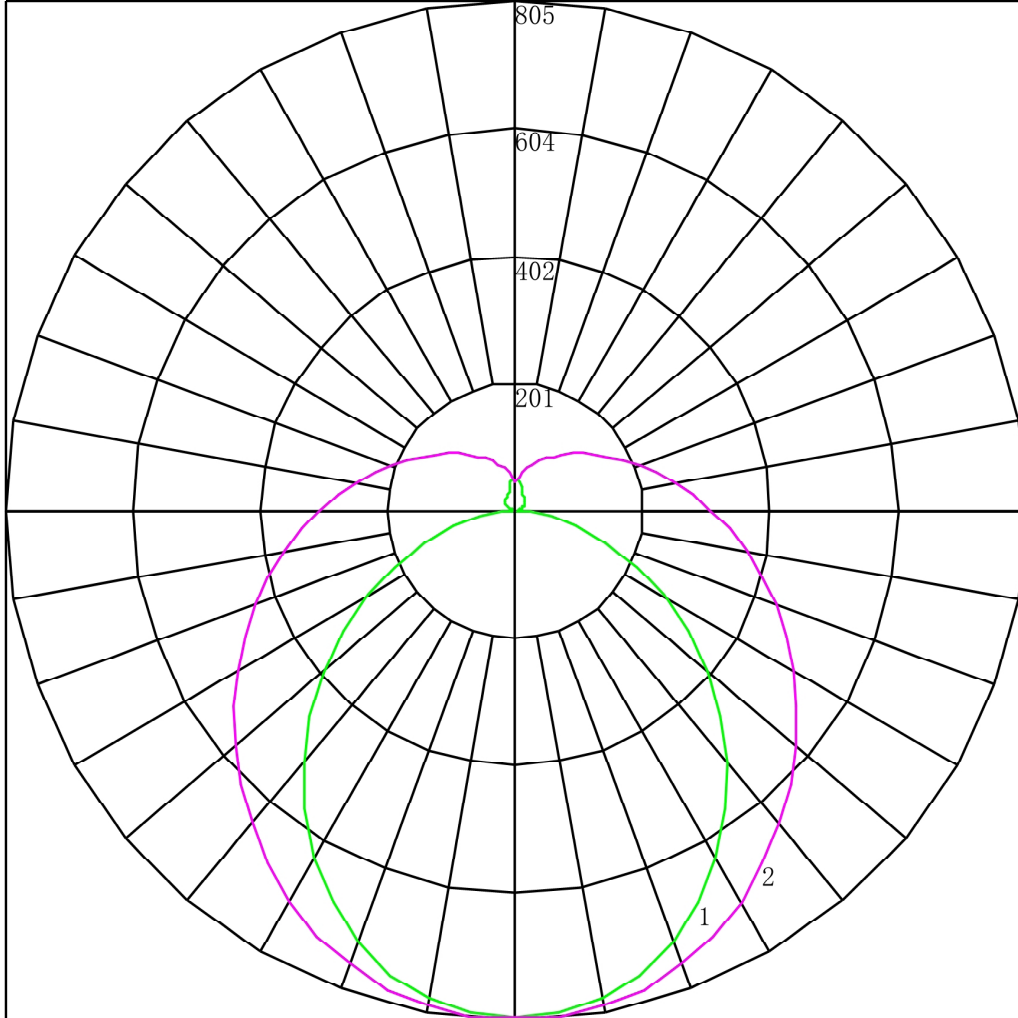
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	75.91
10-20	217.05
20-30	327.96
30-40	394.97
40-50	415.92
50-60	397.57
60-70	351.39
70-80	292.42
80-90	234.39
90-100	186.13
100-110	147.25
110-120	115.04
120-130	88.78
130-140	66.45
140-150	47.21
150-160	29.97
160-170	15.74
170-180	4.74



LCTECH

4.5 Polar Curves



Maximum Candela = 804.917 Located At Horizontal Angle = 90, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



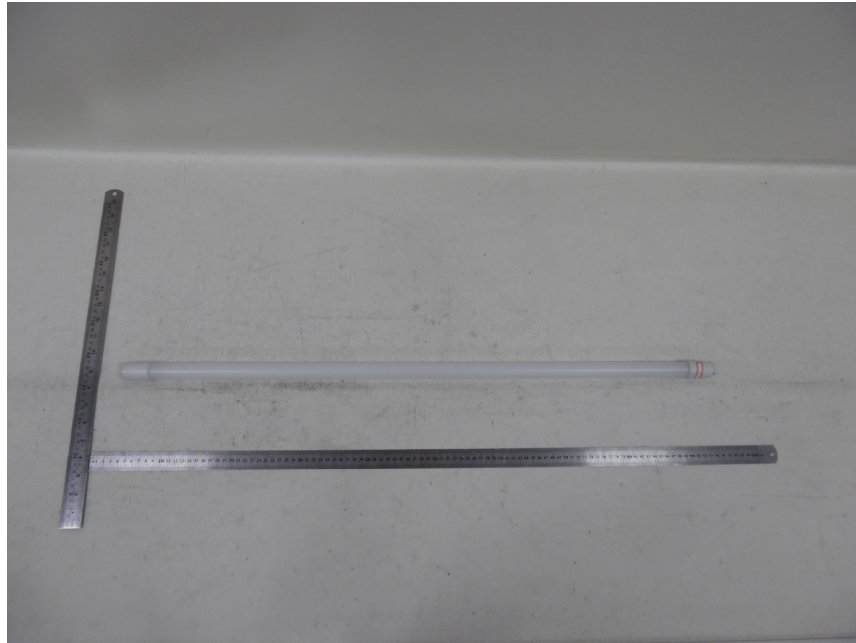
LCTECH



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	802.504	802.504	802.504	802.504	802.504	802.504	802.504
5	797.858	796.998	798.346	797.475	800.022	800.255	804.917
10	782.594	782.737	784.981	787.419	790.911	791.440	795.354
15	759.366	759.978	763.749	768.247	775.191	776.612	783.361
20	726.182	727.958	735.376	742.933	753.952	757.963	763.955
25	683.708	688.605	697.873	711.690	726.488	733.476	741.117
30	634.685	640.625	654.495	673.219	692.354	705.388	713.731
35	579.291	588.019	606.802	631.483	655.867	672.131	681.266
40	521.862	531.308	554.822	586.072	617.766	638.596	647.197
45	458.725	471.147	501.359	540.077	577.172	602.918	613.343
50	396.739	410.344	447.654	493.152	537.858	567.297	578.012
55	332.850	350.090	394.555	449.748	498.873	531.989	543.112
60	268.829	290.835	343.159	405.150	460.082	495.473	506.865
65	209.718	237.029	296.494	364.905	423.821	460.250	470.917
70	152.245	187.165	254.380	327.422	388.347	426.339	436.970
75	99.904	142.481	217.397	293.191	354.915	392.256	403.581
80	56.942	106.410	188.006	263.683	323.362	361.076	371.234
85	20.751	79.019	161.635	236.871	294.807	329.547	339.449
90	3.761	60.707	140.263	211.775	267.283	299.722	309.661
95	3.805	50.076	122.470	189.904	241.569	273.051	280.779
100	5.708	44.140	108.533	170.492	218.629	246.551	254.327
105	8.008	41.283	97.830	153.893	197.178	222.916	230.043
110	10.397	40.706	89.110	139.004	177.730	200.328	207.926
115	12.831	41.679	82.524	126.092	160.675	181.237	187.892
120	15.397	42.831	77.592	115.310	145.763	163.899	169.418
125	18.096	44.468	74.022	105.933	132.723	148.726	154.111
130	20.352	45.111	71.355	98.115	120.954	134.975	139.497
135	22.388	45.731	68.956	91.241	110.459	122.097	126.749
140	23.980	45.289	66.822	85.487	101.237	111.314	115.172
145	25.662	45.376	64.865	80.480	93.288	101.323	104.028
150	27.210	43.606	61.696	75.584	85.976	92.118	94.705
155	28.449	42.123	54.717	69.262	79.127	83.832	86.204
160	31.989	42.256	50.486	60.258	71.271	75.872	77.830
165	38.758	44.248	49.733	53.713	60.535	68.984	69.846
170	44.731	46.547	48.650	50.929	50.831	57.008	61.386
175	49.377	49.668	50.965	50.987	49.471	42.908	53.271
180	46.664	46.664	46.664	46.664	46.664	46.664	46.664

Appendix 1 Product Photo



Picture 1



Picture 2



LCTECH



Appendix 2 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	Jun. 8, 2017
Test report number	LCZP17050332
Laboratory contact name	Richard Li

Product Information

Applicant	ELEC-TECH INTERNATIONAL CO LTD	
Brand name	ETI	
Model number	542161##(##=41-50)	
SKU(if available)	N/A	
Type of luminaire (for integral lamps, list base type and lamp type)	LED Tube	
Luminaire aperture	-	in.
Luminaire height	0.9	in.
Luminaire length	42.2	in.
Luminaire width	1.0	in.
Number of units(modular products)	N/A	

Electrical Measurements	Integrating sphere output	Goniophotometer Output	
Input wattage	21.76	21.79	W
Input current	0.196	0.196	A
Input voltage(AC)	120.00	120.06	V
Power factor	0.925	0.925	
Off-state power	0.0	0.0	W

Photometric Characteristics			
Total initial lumen output	3391.50	3408.92	lm
Initial luminaire efficacy	155.86	156.44	lm/W
Correlated color temperature / CCT	3980	K	
Color rendering index/CRI	83.3		
Rgvalue	8		
Duv	-0.0001		

Luminous Intensity Distribution		Goniophotometer Output	
Center beam candle power(if applicable)	--	802.504	cd
Beam angle(if applicable)		99.3	°
Zonallumensinthe0°-60°zone		53.7	%
Zonal lumens in the60°-90° zone		31.4	%
Zonallumensinthe90°-120°zone		16.4	%
Zonallumensinthe120°-180°zone		7.4	%

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