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NVLAP TESTING
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LCTECH GUANGDONG TESTING SERVICES CO.,LTD. LABORATORY

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:

Direct Linear Ambient Luminaires

Models No.:

556081###(##=11-30,#=0-9)

(The product is a color tunable luminaire, 11-30 represents this product can tunable to 3000K, 4000K, 5000K, the 0-9 denotes different manufacture factory .)

Test Date:	May. 27, 2021 to May. 31, 2021
Test Lab.:	**LCTECH Guangdong Testing Services 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
Test Sites:	1/F., Building I, Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China
Template No.:	LC-RT-PL-046 Rev.1.3
Test Note:	

Complied by:		**Reviewed by:**	
Fish Tan	Fish Tan	**Lin Qiu**	Lin
Jun. 4, 2021		**Jun. 4, 2021**	

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1. General

1.1 Product Information

Brand Name	ETI
Factory 1	Name: ETI Solid State Lighting (Zhuhai) Ltd Address: No.1, Zhongzhu Road South, Science & Technology Innovation Coast, High Tech District, Zhuhai City, Guangdong Prov., China
Factory 2	Name: NVC VIETNAM TECHNOLOGY AND LIGHTING COMPANY LIMITED Address: Lot CN23-1, Yen Phong Industrial park, Dong Phong commune, Yen Phong district, Bac Ninh province VIETNAM
Category	Indoor
General Application	Linear Ambient
Primary Use	Direct Linear Ambient Luminaires
Model Number	556081###(##=11-30,#=0-9)
Rated Inputs	AC120V, 60Hz
Rated Power	8.5W
Rated Light output	1000lm
Declared CCT	3000K, 4000K, 5000K
Power Supply	ETI-AD00850140054SDA
LED Package, Array or Module	SPMWH22286D5WAT0S3, Samsung Electronics Co., LTD.
Dimming	Continuous Dimming
Integral Controls	No
Controls Controllability	No
Receipt Samples	1 unit
Sample Code of lab.	210521102001
Date of Receipt Samples	May. 21, 2021
Note	This product is colortunable, all the CCT settings was tested.

1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377- 2017	Specifications for the Chromaticity of Solid State Lighting Products
ANSI/IES TM-30-18*	IES Method for Evaluating Light Source Color Rendition
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

Note:

**For reference only and not in the scope of NVLAP.*

1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-987	APW-120N	2020-12-23	2021-12-22
AC Power supply	LC-I-989	APW-120N	2020-12-23	2021-12-22
Power analyzer	LC-I-928	WT210	2020-12-25	2021-12-24
Power analyzer	LC-I-954	WT210	2020-12-25	2021-12-24
Multimeter	LC-I-972	FLUKE	2020-07-20	2021-07-19
Photometric colorimetric electric system** (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp***	LC-PL-I-011	D204C	2020-07-14	2021-07-13
Luminous Flux Standard Lamp****	LC-PL-I-003	24V/100W	2020-07-14	2021-07-13
Goniophotometer(with mirror)	LC-I-902	GMS-2000	2021-04-22	2022-04-21
Wireless temperature transmitter	LC-I-PL-009	DWLR-DLR	2020-12-24	2021-12-23
Wireless temperature transmitter	LC-I-PL-008	DWLR-DLR	2020-12-24	2021-12-23

Note:

** Bandwidth of spectroradiometer is 1 nm.*

*** halogen lamp, 100W, omni-directional type, and its traceability to NIM.*

**** halogen lamp, 100W, omni-directional type, and its traceability to NIM.*

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 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		
	3000K	4000K	5000K
Input Voltage & Frequency	120.05 V~60Hz	120.04 V~60Hz	120.08 V~60Hz
Input Current(A)	0.081	0.078	0.080
Total Power(W)	9.14	8.70	8.99
Power Factor	0.940	0.935	0.939
I-THD	22.3%	23.0%	22.6%
Off-state Power(W)	-	-	-

3.2 Photometric data

Criteria Item	Result		
	3000K	4000K	5000K
Total Lumens(lm)	1100.19	1173.70	1106.79
Luminaire Length(ft)	2	2	2
Lumens per Foot(lm/ft)	550.10	586.85	553.40
Luminaire Efficacy(lm/W)	120.37	134.91	123.11
Correlated Color Temperature (CCT)(K)	3105	4103	5151
Color Rendering Index (CRI)	83.8	86.0	85.1
R9	11	20	13
R_f	85	85	84
R_g	98	95	94
$R_{cs,h1}$	-10%	-11%	-12%
Chromaticity Coordinate (x,y)	x = 0.4306 y = 0.4035	x = 0.3744 y = 0.3673	x = 0.3409 y = 0.3462
Chromaticity Coordinate (u',v')	u' = 0.2467 v' = 0.5202	u' = 0.2249 v' = 0.4965	u' = 0.2106 v' = 0.4814
Duv	0.0007	-0.0027	-0.0010
Zone Lumens between 0-60 º	58.31%	-	-

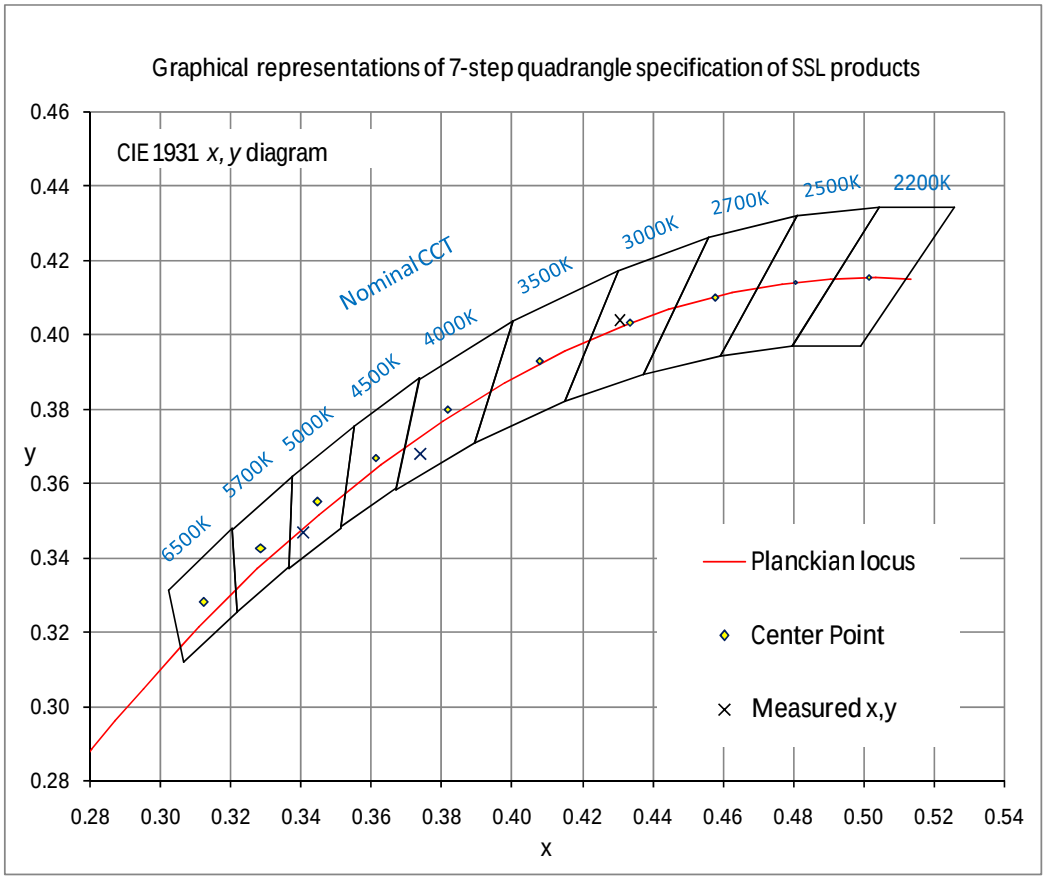
3.3 Color Rendering Details

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
3000K	82	90	97	84	83	88	85	62	11	77	85	74	84	98	74
4000K	86	94	96	84	86	90	86	68	20	84	84	67	88	99	80
5000K	84	93	95	83	85	88	85	67	13	82	83	65	87	98	80

Note: N/A

4. Test Data

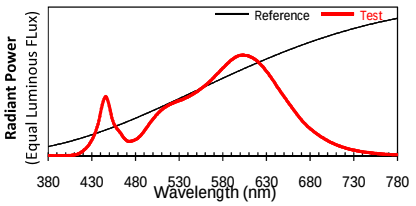
4.1 ANSI Chromaticity Quadrangles Diagram

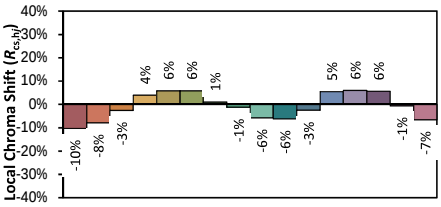


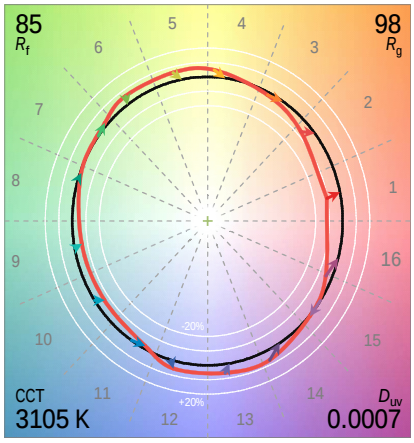
4.2 ANSI/IES TM-30-18 Color Rendition

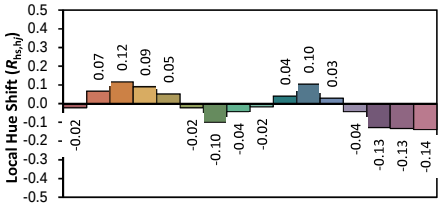
ANSI/IES TM-30-18 Color Rendition Report

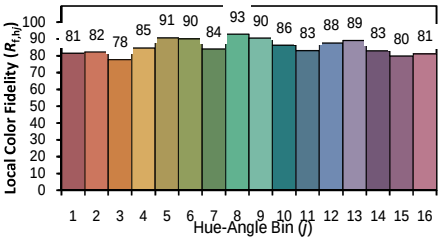
Source:	User SPD	**Manufacturer:**	ETI Solid State Lighting
Date:	20120/06/04	**Model:**	556081###(##=11-30,#=0-9)

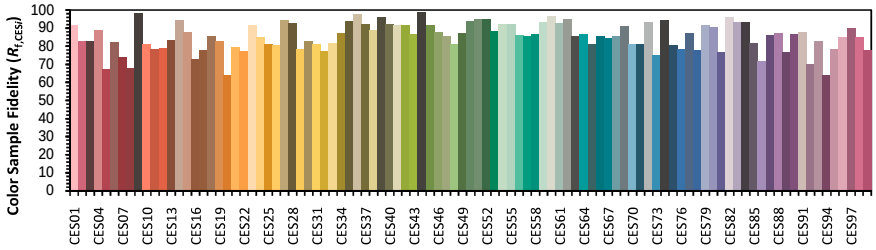












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

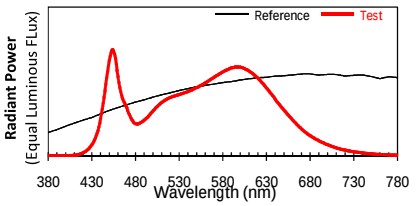
x	0.4306
y	0.4035
u'	0.2467
v'	0.5202

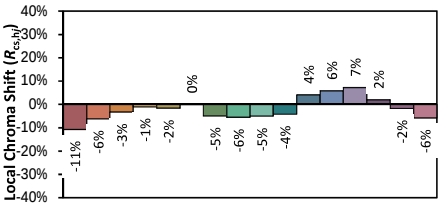
Colors are for visual orientation purposes only. Created with the IES TM-30-18 Calculator Version 2.00.

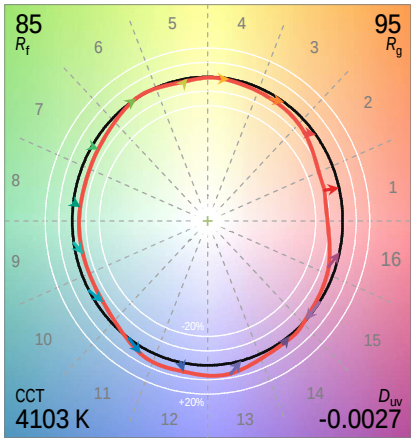
4.2 ANSI/IES TM-30-18 Color Rendition – Cont.

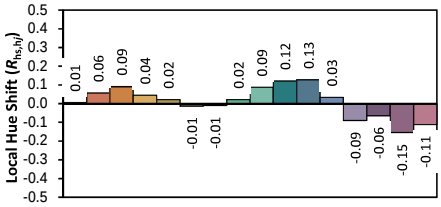
ANSI/IES TM-30-18 Color Rendition Report

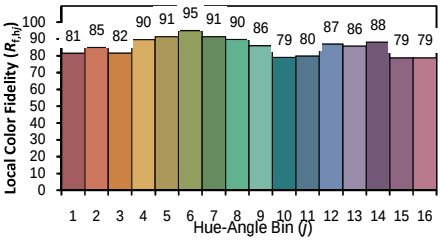
Source:	User SPD	**Manufacturer:**	ETI Solid State Lighting
Date:	20120/06/04	**Model:**	556081###(##=11-30,#=0-9)

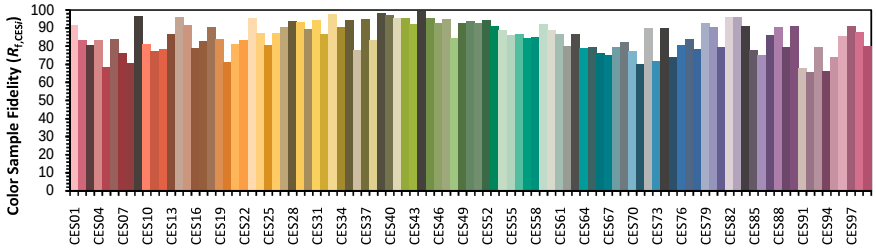












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

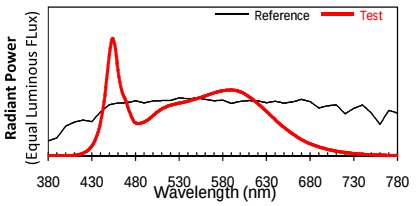
x	0.3744
y	0.3673
u'	0.2249
v'	0.4965

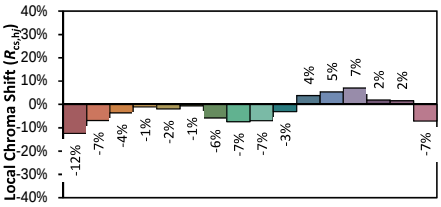
Colors are for visual orientation purposes only. Created with the IES TM-30-18 Calculator Version 2.00.

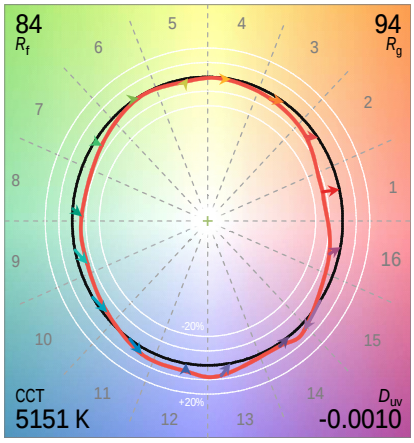
4.2 ANSI/IES TM-30-18 Color Rendition – Cont.

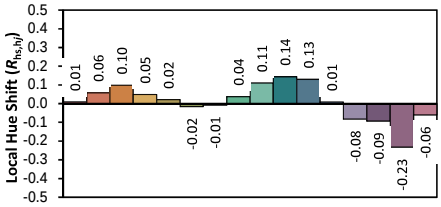
ANSI/IES TM-30-18 Color Rendition Report

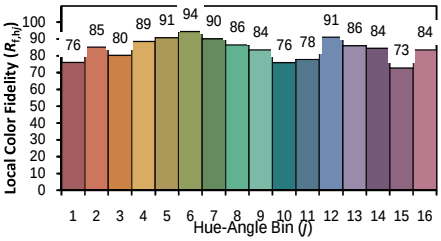
Source:	User SPD	**Manufacturer:**	ETI Solid State Lighting
Date:	20120/06/04	**Model:**	556081###(##=11-30,#=0-9)

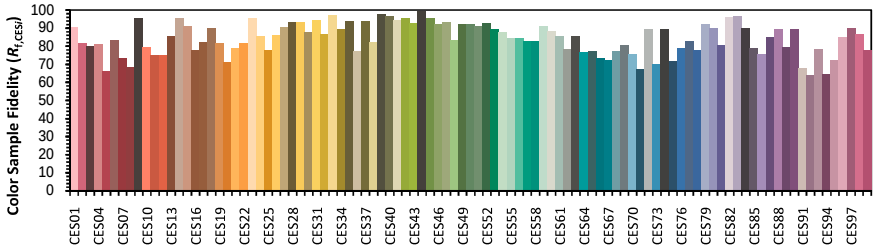












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3409
y	0.3462
u'	0.2106
v'	0.4814

Colors are for visual orientation purposes only. Created with the IES TM-30-18 Calculator Version 2.00.

4.3 Goniometry Test Data of 3000K

CIE Type	Semi-Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.26	Luminous Length	0.60 m
Spacing Criteria (90-270)	1.36	Luminous Width	0.04 m
Spacing Criteria (Diagonal)	1.44	Luminous Height	0.02 m
Test Distance	29.83 m		

4.4 Zonal Lumen Summary of 3000K

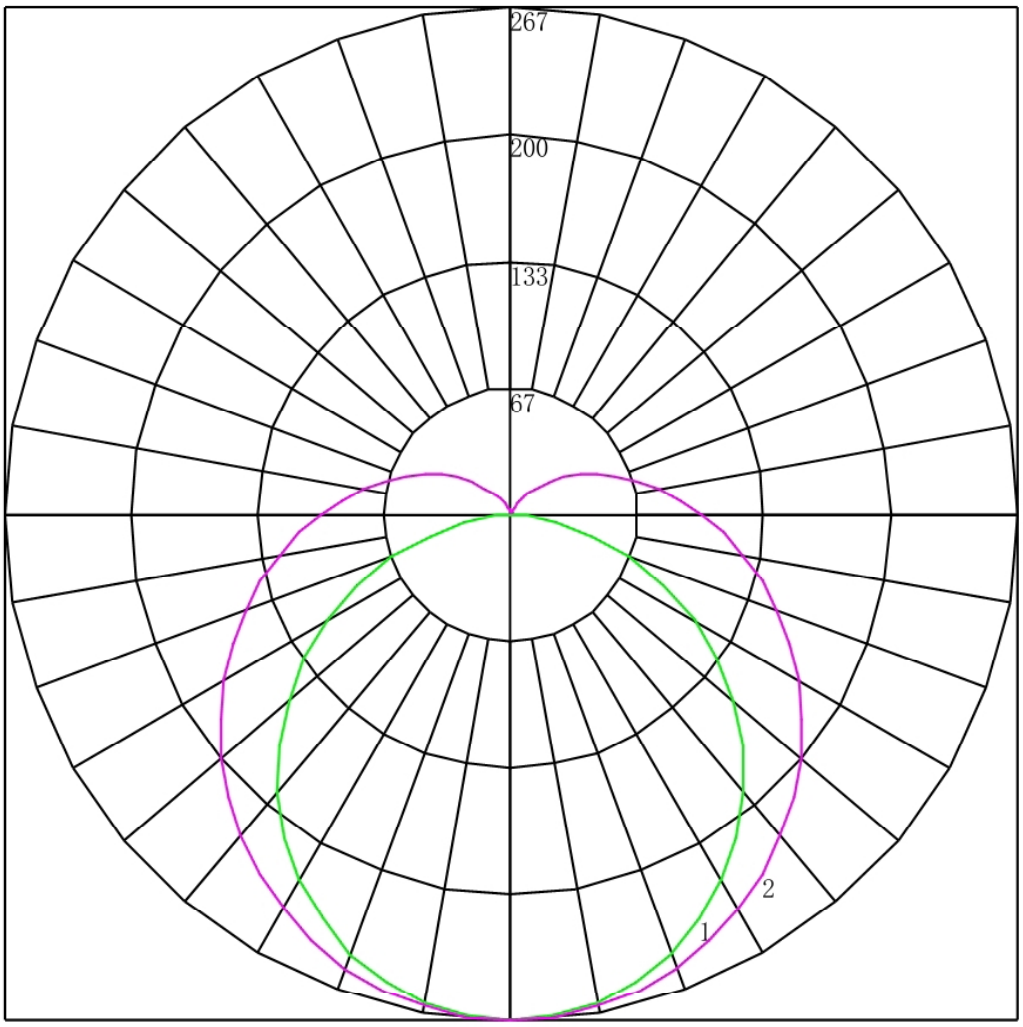
Zone	Lumens	%Lamp	%Fixt
0-20	98.05	8.90	8.90
0-30	209.69	19.10	19.10
0-40	347.37	31.60	31.60
0-60	641.52	58.30	58.30
0-80	874.72	79.50	79.50
0-90	952.68	86.60	86.60
10-90	927.40	84.30	84.30
20-40	249.33	22.70	22.70
20-50	398.27	36.20	36.20
40-70	422.91	38.40	38.40
60-80	233.21	21.20	21.20
70-80	104.44	9.50	9.50
80-90	77.96	7.10	7.10
90-110	95.11	8.60	8.60
90-120	120.51	11.00	11.00
90-130	135.43	12.30	12.30
90-150	145.86	13.30	13.30
90-180	147.51	13.40	13.40
110-180	52.40	4.80	4.80
0-180	1100.19	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	25.28
10-20	72.77
20-30	111.64
30-40	137.68
40-50	148.94
50-60	145.20
60-70	128.77
70-80	104.44
80-90	77.96
90-100	56.12
100-110	38.99
110-120	25.40
120-130	14.93
130-140	7.34
140-150	3.09
150-160	1.11
160-170	0.41
170-180	0.13

4.5 Polar Curves of 3000K

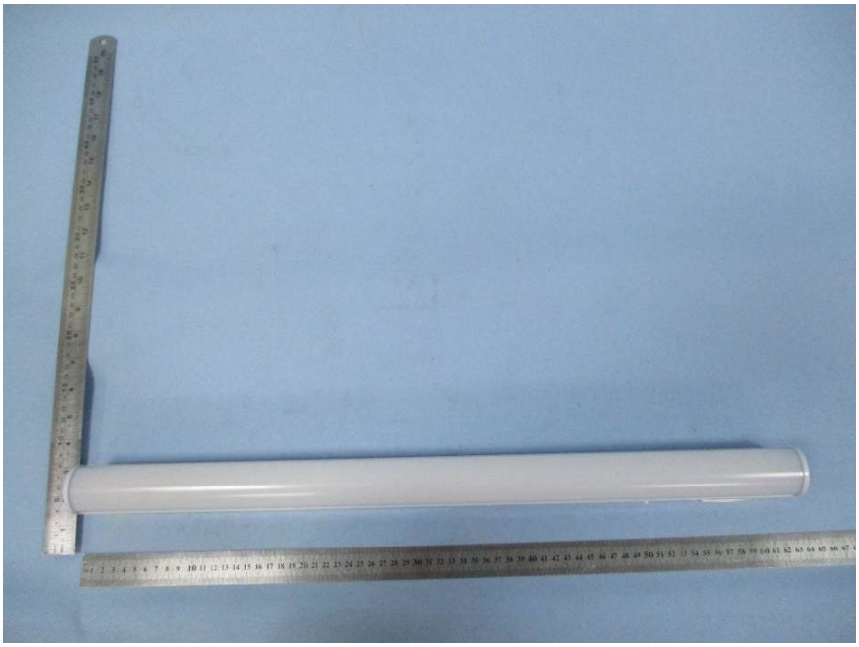


Maximum Candela = 266.912 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

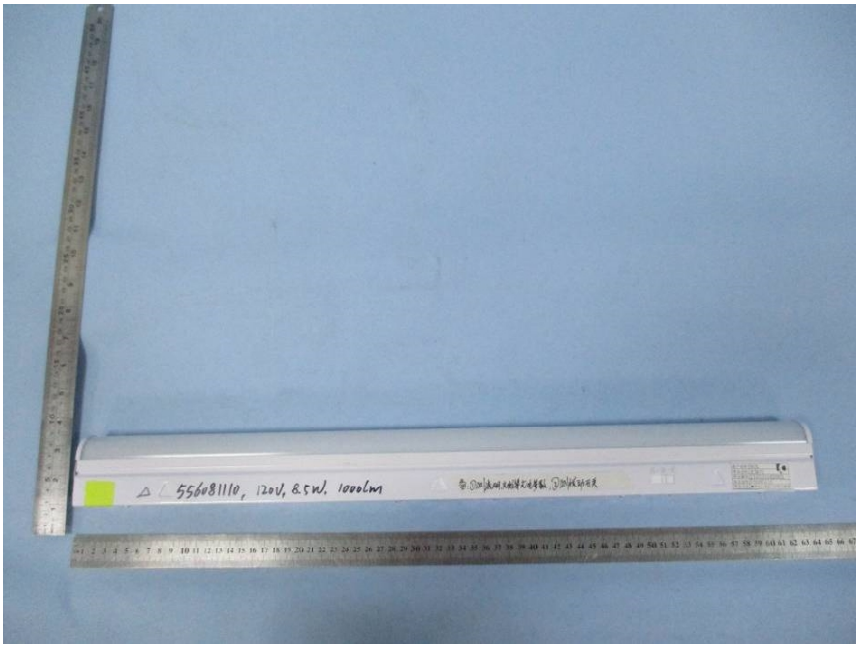
4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	266.912	266.912	266.912	266.912	266.912	266.912	266.912
5	265.882	265.704	265.729	265.662	266.132	266.227	266.257
10	261.987	261.947	262.269	262.517	263.190	263.707	263.683
15	255.630	255.798	256.399	257.408	258.890	259.684	260.062
20	246.721	247.278	248.453	250.269	252.985	254.334	255.045
25	235.618	236.634	238.765	241.590	245.364	247.547	248.457
30	222.993	223.932	227.047	231.439	237.589	239.544	240.430
35	207.817	209.464	213.633	219.771	226.200	230.283	231.312
40	191.208	193.431	199.102	206.676	214.969	220.002	221.277
45	173.166	176.413	183.544	194.696	202.781	209.104	210.894
50	153.423	157.472	166.715	178.231	189.834	197.079	199.507
55	133.187	138.085	149.595	163.418	176.620	185.031	187.379
60	111.877	117.736	133.707	148.292	162.893	172.077	174.858
65	89.269	97.118	114.240	132.921	149.167	159.167	162.293
70	66.706	77.172	97.432	117.951	135.685	146.190	149.729
75	44.634	60.381	81.428	104.007	122.226	133.523	136.990
80	24.712	41.349	66.964	90.577	109.436	120.989	124.556
85	8.461	27.305	53.862	78.017	97.313	108.808	112.384
90	1.791	17.243	42.813	66.594	85.414	96.783	100.343
95	0.448	11.205	33.974	56.555	74.651	85.730	89.218
100	0.448	7.157	26.764	47.453	64.423	75.008	78.355
105	0.403	5.032	21.162	39.444	55.042	64.994	68.146
110	0.358	3.355	15.895	32.617	46.574	55.621	58.766
115	0.313	2.281	12.457	26.549	38.997	47.088	49.822
120	0.313	1.655	9.219	20.860	32.156	39.373	41.795
125	0.313	1.230	6.541	15.885	25.583	32.255	34.335
130	0.358	0.783	4.822	11.646	19.410	25.335	27.442
135	0.403	0.582	3.349	8.790	13.950	18.395	19.676
140	0.403	0.514	2.433	6.158	10.140	13.198	14.004
145	0.537	0.581	1.607	4.217	7.265	9.440	10.122
150	0.716	0.671	1.161	2.856	5.147	6.477	6.937
155	0.851	0.895	1.027	1.896	3.031	4.068	4.145
160	1.074	1.073	1.049	1.428	1.939	2.520	2.618
165	1.254	1.252	1.205	1.272	1.427	1.725	1.483
170	1.343	1.386	1.362	1.361	1.382	1.371	1.309
175	1.522	1.521	1.518	1.495	1.448	1.459	1.440
180	0.765	0.765	0.765	0.765	0.765	0.765	0.765

Appendix A Product Photo



Picture 1



Picture 2

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