LCTECH

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IESNA SUSTAINING MEMBER

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Test report of

IES LM-79-08

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

Rendered to:
LIGHT EFFICIENT DESIGN, DIV OF TADD LLC.
188 S. Northwest Highway Cary, IL 60013

For products:
LED Lamp

Models No.:
LED-8090M40-MHBC

Test Date:	From Sep. 12, 2016 to Sep. 14, 2016
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:**
Bowen Pang	**Richard Li**
Project Engineer	**Technical Manager**
Sep. 27, 2016	**Sep. 27, 2016**

Table of Contents

1. General

1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8090M40-MHBC
Rated Inputs	277V, 60Hz
Rated Power	175 W
Rated Light output	N/A
Declared CCT	4000K
Ballast	M59
LED Package, Array or Module	Model: XHP50A- XX- XXXX- XXXXXXXXX, manufactured by Cree, Inc.
Receipt Samples	1 unit
Date of Receipt Samples	Sep. 7, 2016
Note	-

1.2 Standards or methods

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

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011	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	2016-05-07	2017-05-07
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 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 (50 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 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	277.00V~60Hz	277.05V~60Hz
Input Current(A)	1.293	1.295
Total Power(W)	177.70	178.07
Power Factor	0.496	0.496
I-THD(%)	35.30	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	9929.00
Luminaire Efficacy(Lm/W)	-	55.76
Correlated Color Temperature (CCT)(K)	3896	-
Color Rendering Index (CRI)	73.7	-
R9	-14	-
Chromaticity Coordinate (x,y)	x=0.3856 y=0.3811	-
Chromaticity Coordinate (u,v)	u=0.2267 v=0.3361	-
Chromaticity Coordinate (u',v')	u'=0.2267 v'=0.5042	-
Duv	0.00056	-
Central intensity(cd)	-	3458.88
Beam angle	-	112.6°
Spacing Criteria(0-180°)	-	1.34
Spacing Criteria(90-270°)	-	1.34
Zone Lumens between 0-60 °	-	83.20%
Zone Lumens between60-90 °	-	16.20%
Zone Lumens between 90-120 °	-	0.30%
Zone Lumens between 120-180 °	-	0.30%

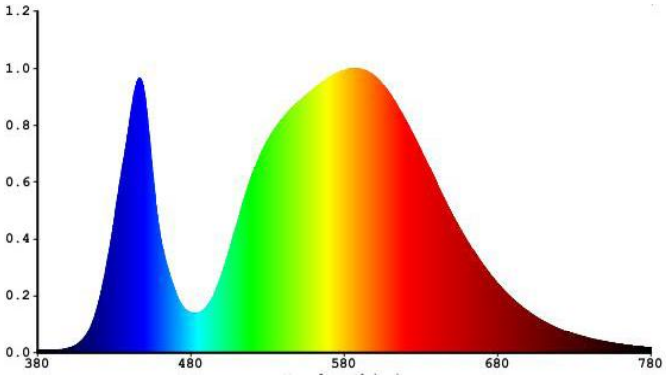
3.3 Color Rendering Details

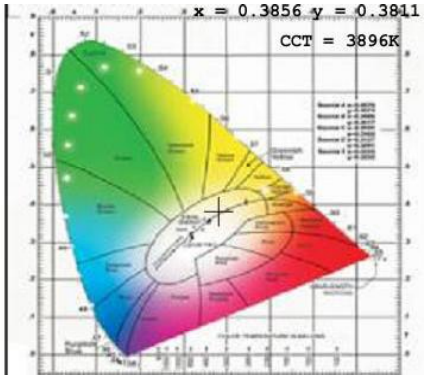
R1	R2	R3	R4	R5	R6	R7	R8
72	79	83	74	71	70	82	58
R9	R10	R11	R12	R13	R14	R15	-
-14	49	70	46	72	90	67	-

Note: N.A.

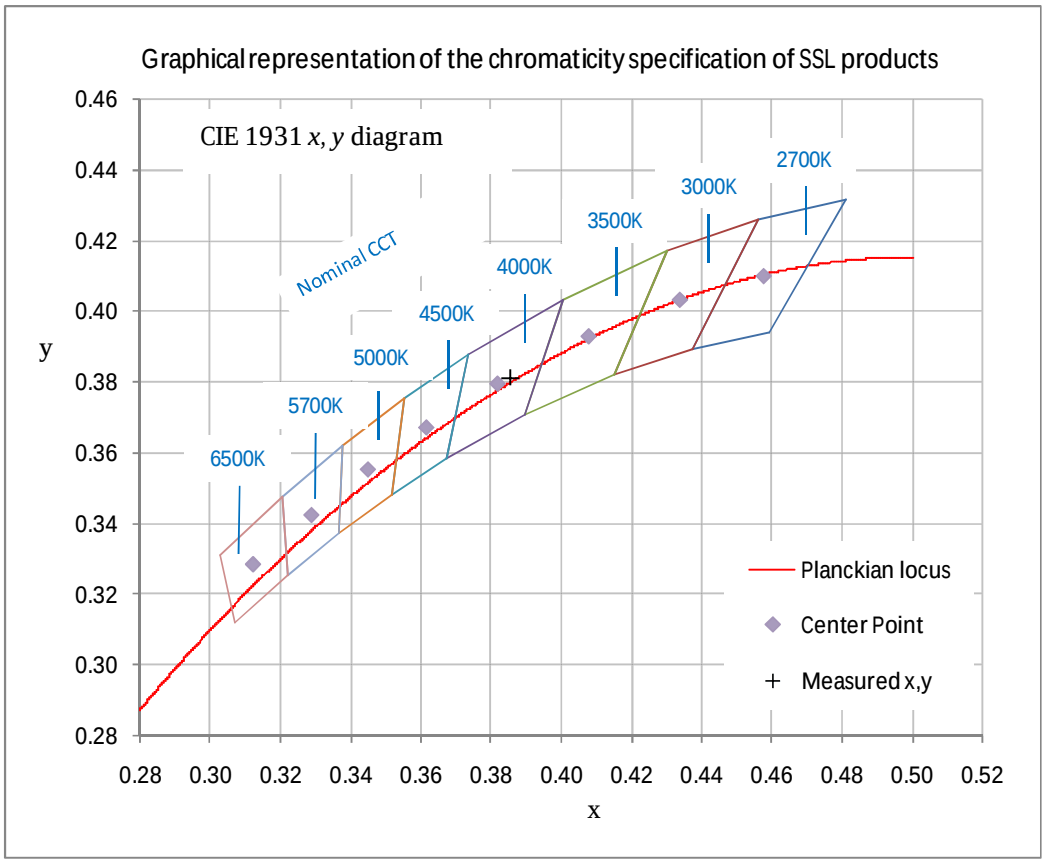
4. Test Data

4.1 Spectral Distribution





4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180°)	1.34	Luminous Length	0.13 m
Spacing Criteria (90-270°)	1.34	Luminous Width	0.07 m
Spacing Criteria (Diagonal)	1.44	Luminous Height	0.00 m
Test Distance	29.54 m		

4.4 Zonal Lumen Summary

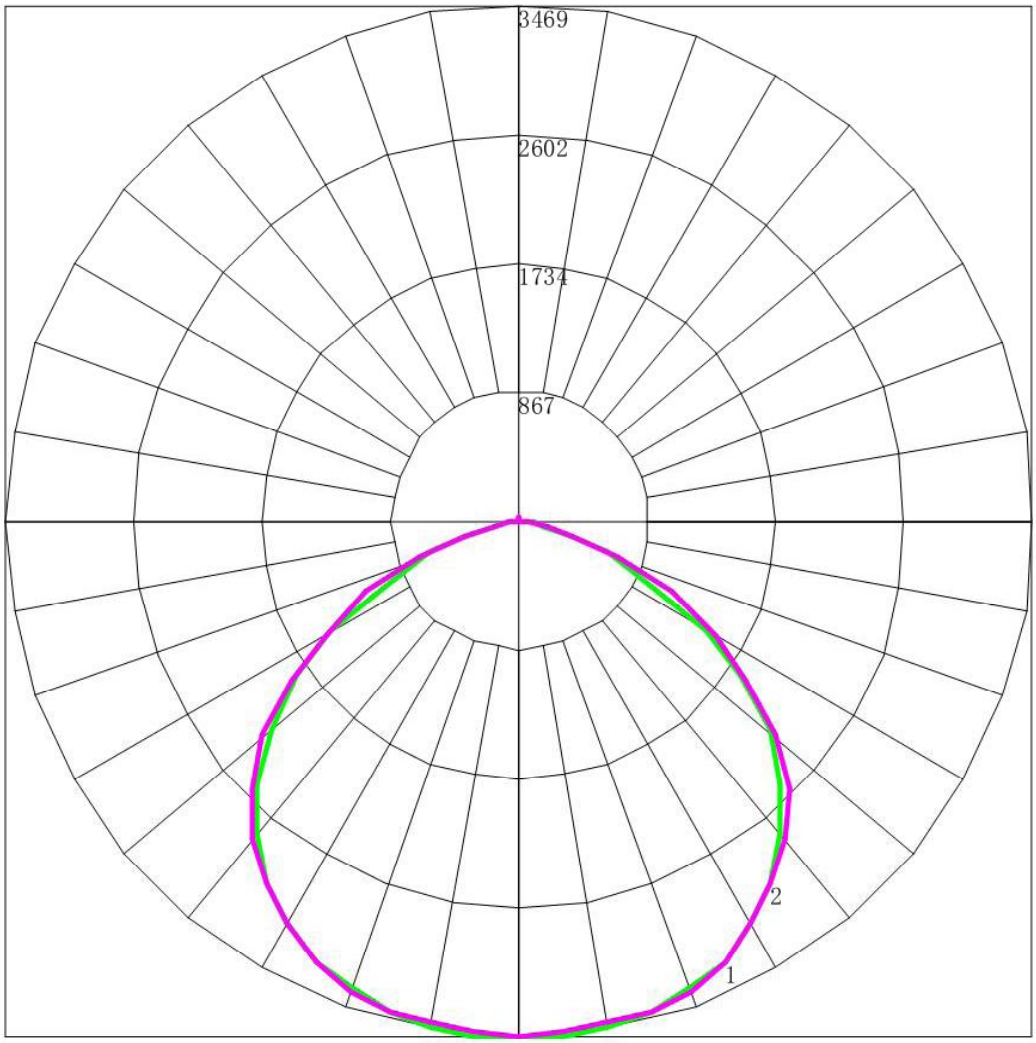
Zone	Lumens	%Lamp	%Fixt
0-20	1295.66	13.00	13.00
0-30	2804.62	28.20	28.20
0-40	4666.78	47.00	47.00
0-60	8256.07	83.20	83.20
0-80	9764.25	98.30	98.30
0-90	9867.87	99.40	99.40
10-90	9537.99	96.10	96.10
20-40	3371.12	34.00	34.00
20-50	5310.45	53.50	53.50
40-70	4652.45	46.90	46.90
60-80	1508.19	15.20	15.20
70-80	445.03	4.50	4.50
80-90	103.62	1.00	1.00
90-110	26.17	0.30	0.30
90-120	30.69	0.30	0.30
90-130	34.50	0.30	0.30
90-150	44.31	0.40	0.40
90-180	61.13	0.60	0.60
110-180	34.96	0.40	0.40
0-180	9929.00	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

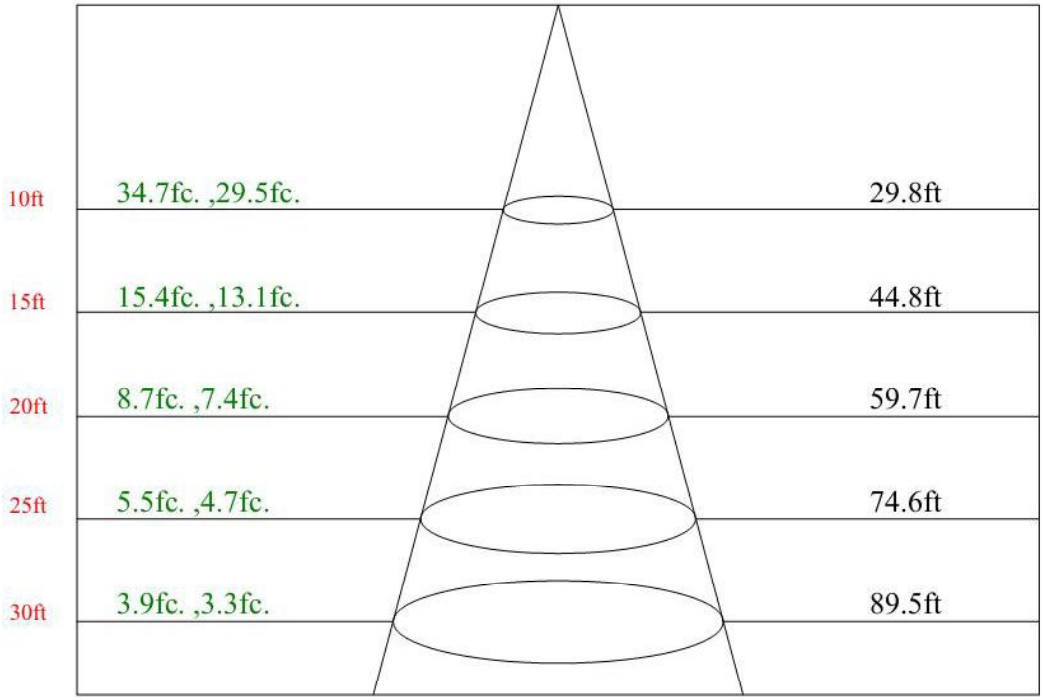
Zone	Lumens
0-10	329.88
10-20	965.78
20-30	1508.96
30-40	1862.16
40-50	1939.33
50-60	1649.96
60-70	1063.16
70-80	445.03
80-90	103.62
90-100	18.44
100-110	7.74
110-120	4.52
120-130	3.81
130-140	3.94
140-150	5.86
150-160	7.24
160-170	6.73
170-180	2.85

4.5 Polar Curves

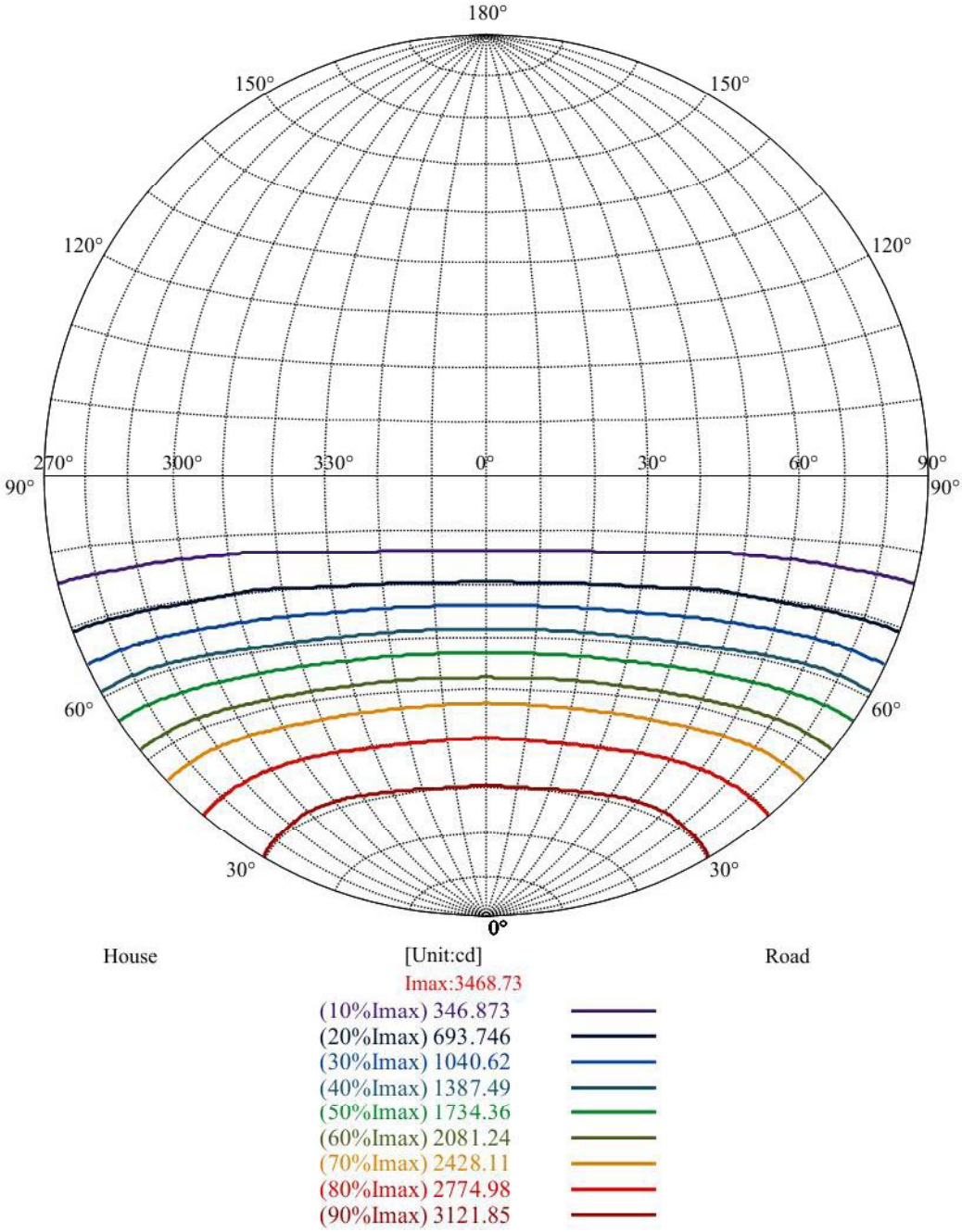


Maximum Candela = 3468.728 Located At Horizontal Angle = 30, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

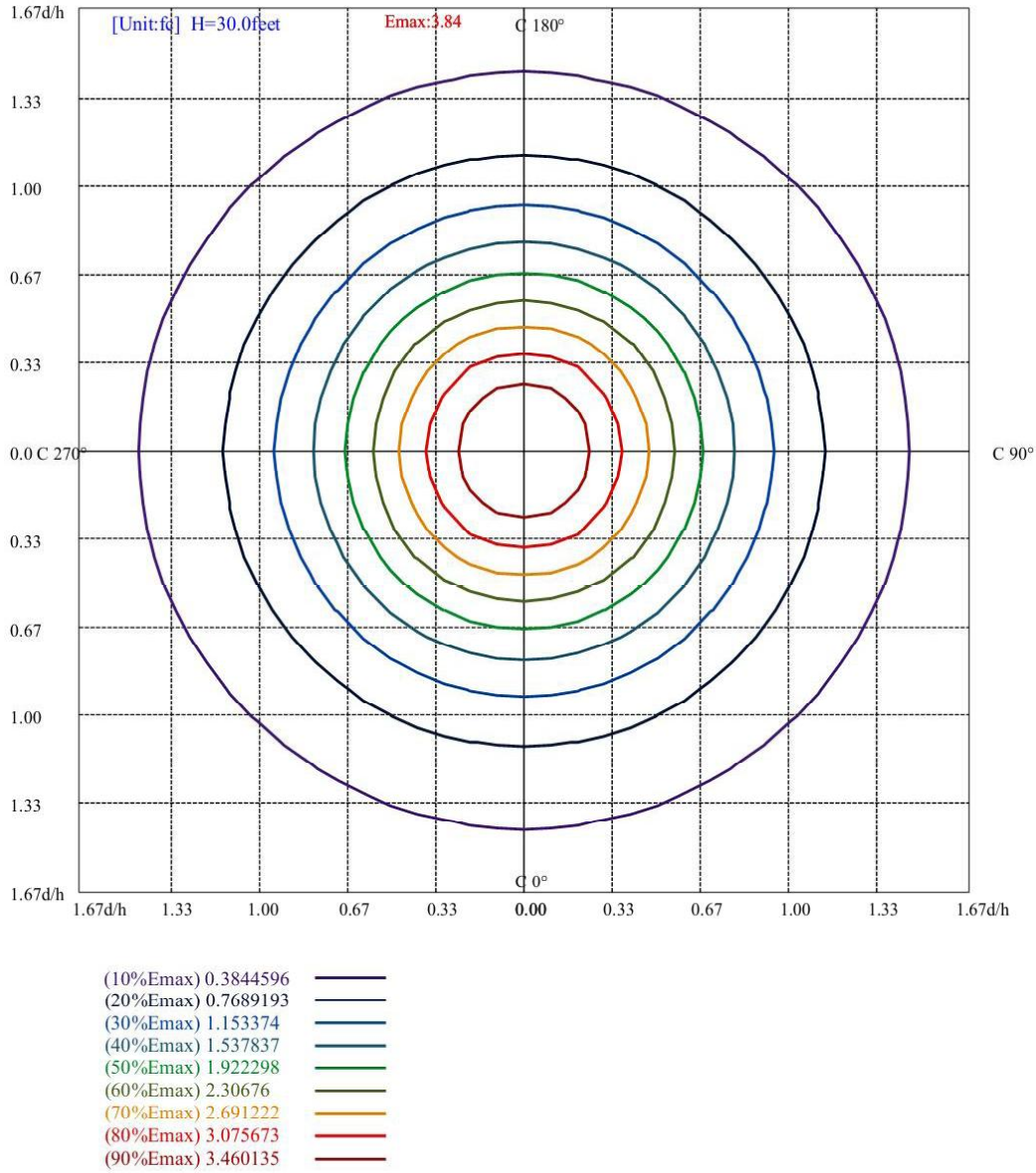
4.6 Lux distance Curve



4.7 ISO candela diagram on circular web



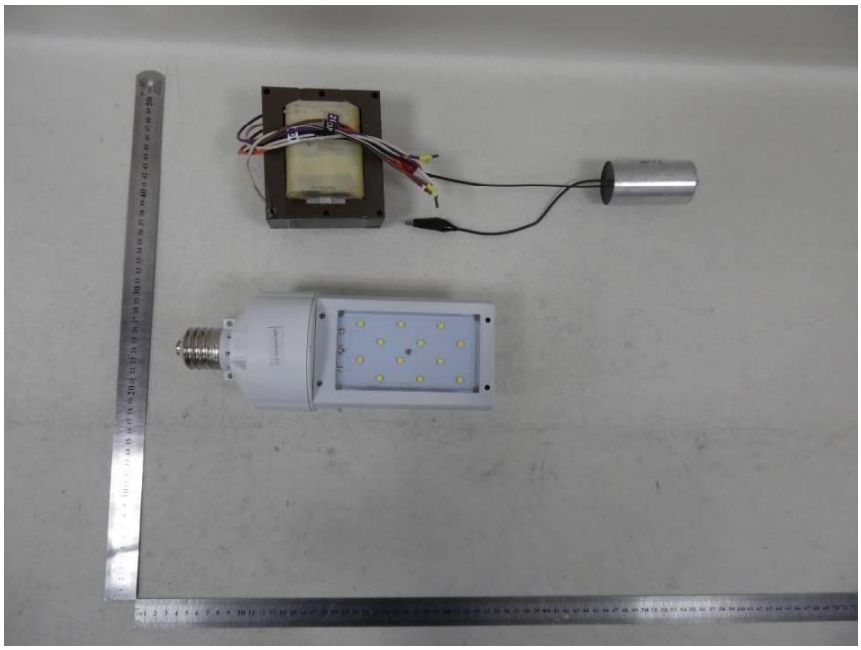
4.8 ISO illuminance diagram



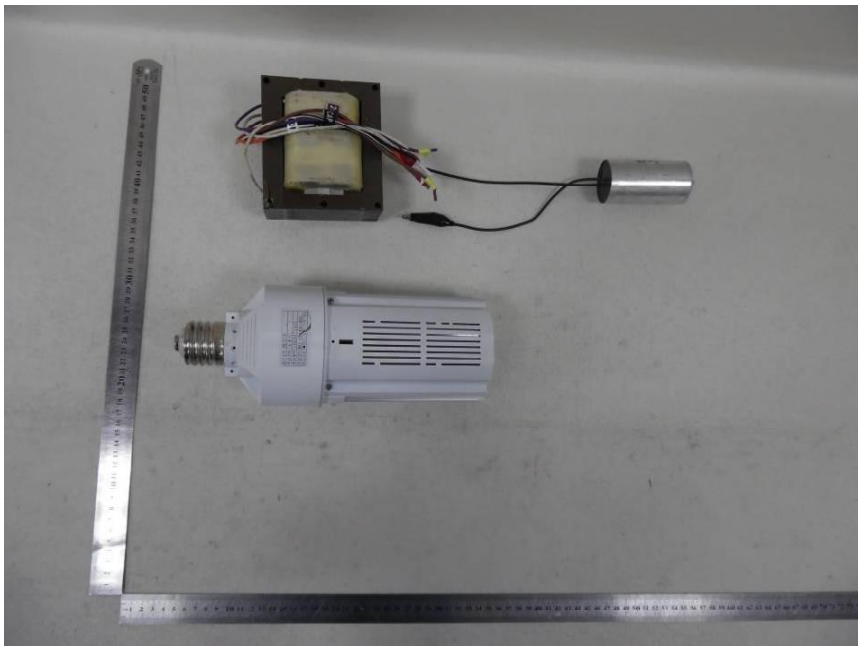
4.9 Candela Tabulation

	0	15	30	45	60	75	90
0	3458.879	3458.879	3458.879	3458.879	3458.879	3458.879	3458.879
5	3466.317	3459.314	3468.728	3468.258	3453.857	3458.452	3461.491
10	3449.692	3451.229	3459.086	3453.858	3438.457	3436.979	3429.279
15	3419.067	3423.669	3426.866	3422.439	3413.009	3400.974	3408.385
20	3353.442	3367.715	3371.430	3367.233	3357.107	3346.531	3368.772
25	3266.379	3276.778	3290.790	3291.519	3269.929	3256.946	3269.089
30	3129.879	3139.947	3168.947	3166.929	3145.568	3129.179	3135.017
35	2972.379	2978.644	3000.653	2997.607	2978.529	2956.301	2971.781
40	2760.628	2769.887	2781.082	2777.226	2761.484	2769.965	2785.038
45	2499.003	2515.048	2517.682	2510.807	2525.090	2542.878	2572.612
50	2198.440	2218.859	2208.043	2197.254	2224.828	2241.573	2255.280
55	1831.771	1818.409	1820.345	1835.612	1853.355	1886.787	1870.563
60	1451.408	1474.190	1454.076	1442.159	1465.563	1505.221	1519.321
65	999.776	1040.385	1049.004	1068.093	1082.896	1113.042	1128.598
70	645.488	651.166	663.782	723.019	703.793	716.947	715.630
75	383.426	394.540	415.438	424.496	393.996	395.899	387.241
80	166.644	177.424	200.686	221.340	200.495	194.173	189.224
85	80.981	88.576	84.104	82.523	78.489	67.548	62.030
90	30.888	33.291	32.701	28.912	25.577	20.822	17.543
95	18.069	18.623	19.352	17.020	13.485	9.694	5.224
100	6.913	9.485	14.486	13.594	10.267	6.789	3.831
105	4.988	5.311	8.766	9.514	8.309	5.769	3.352
110	3.456	3.497	5.369	7.113	6.895	5.205	3.395
115	3.413	3.497	4.098	5.324	5.547	4.620	3.439
120	3.675	3.651	3.813	4.408	4.742	4.360	3.657
125	4.113	4.088	4.142	4.342	4.589	4.490	4.135
130	4.244	4.153	4.207	4.298	4.436	4.360	4.266
135	4.638	4.656	4.690	4.713	4.741	4.750	4.832
140	6.738	6.711	6.706	6.764	6.763	6.789	6.834
145	9.319	9.355	9.335	9.317	9.373	9.327	9.359
150	12.250	12.284	12.272	12.219	12.221	12.212	12.275
155	15.619	15.651	15.603	15.536	15.462	15.466	15.453
160	19.994	20.001	20.029	19.943	19.919	19.934	20.067
165	24.281	24.285	24.302	24.220	24.181	24.208	24.290
170	27.738	27.892	27.919	27.733	27.661	27.570	27.816
175	30.975	30.974	31.052	30.941	30.814	30.758	30.906
180	32.291	32.291	32.291	32.291	32.291	32.291	32.291

Appendix 1 Product Photo



Picture 1



Picture 2

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