

IESNA
SUSTAINING
MEMBER

Ref. No.: LCZF16080227

Version: 1.0

Date of issue: Sep. 27, 2016

Total pages: 14



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-8089M40-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:

Bowen Pang
Project Engineer
Sep. 27, 2016

Reviewed by:

Richard Li
Technical Manager
Sep. 27, 2016

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 Lux distance Curve	10
4.7 ISO candela diagram on circular web	11
4.8 ISO illuminance diagram	12
4.9 Candela Tabulation	13
Appendix 1 Product Photo	14



LCTECH



1. General

1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8089M40-MHBC
Rated Inputs	277V, 60Hz
Rated Power	108W
Rated Light output	N/A
Declared CCT	4000K
Ballast	M58
LED Package, Array or Module	Model: XMLBWT- XX- XXXX- XXXXXXXXXX, 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$; 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 (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	277.03V~60Hz
Input Current(A)	0.881	0.880
Total Power(W)	107.60	108.45
Power Factor	0.441	0.445
I-THD(%)	48.07	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	7941.95
Luminaire Efficacy(Lm/W)	-	73.23
Correlated Color Temperature (CCT)(K)	3956	-
Color Rendering Index (CRI)	73.0	-
R9	-13	-
Chromaticity Coordinate (x,y)	x=0.3808 y=0.3721	-
Chromaticity Coordinate (u,v)	u=0.2272 v=0.3301	-
Chromaticity Coordinate (u',v')	u'= 0.2272 v'=0.4996	-
Duv	-0.00230	-
Central intensity(cd)	-	2830.521
Beam angle	-	111.4°
Spacing Criteria(0-180°)	-	1.26
Spacing Criteria(90-270°)	-	1.30
Zone Lumens between 0-60 °	-	81.20%
Zone Lumens between 60-90 °	-	18.10%
Zone Lumens between 90-120 °	-	0.40%
Zone Lumens between 120-180 °	-	0.30%

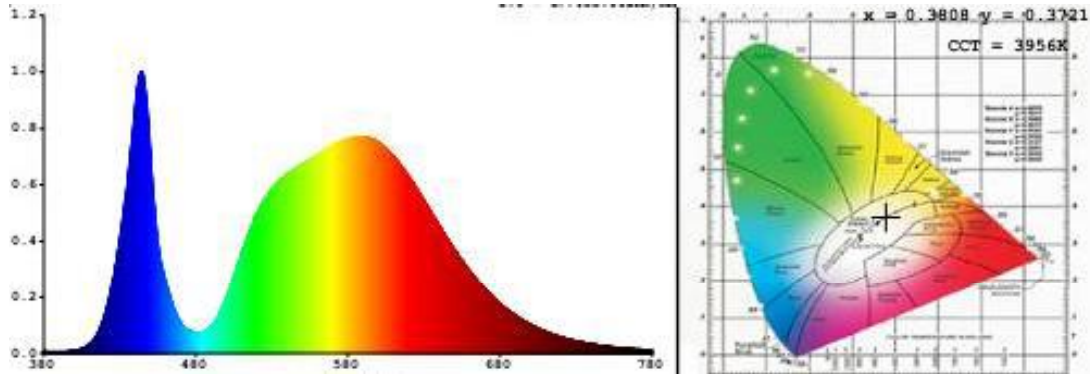
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
72	78	81	74	72	69	80	59
R9	R10	R11	R12	R13	R14	R15	-
-13	46	72	45	72	89	68	-

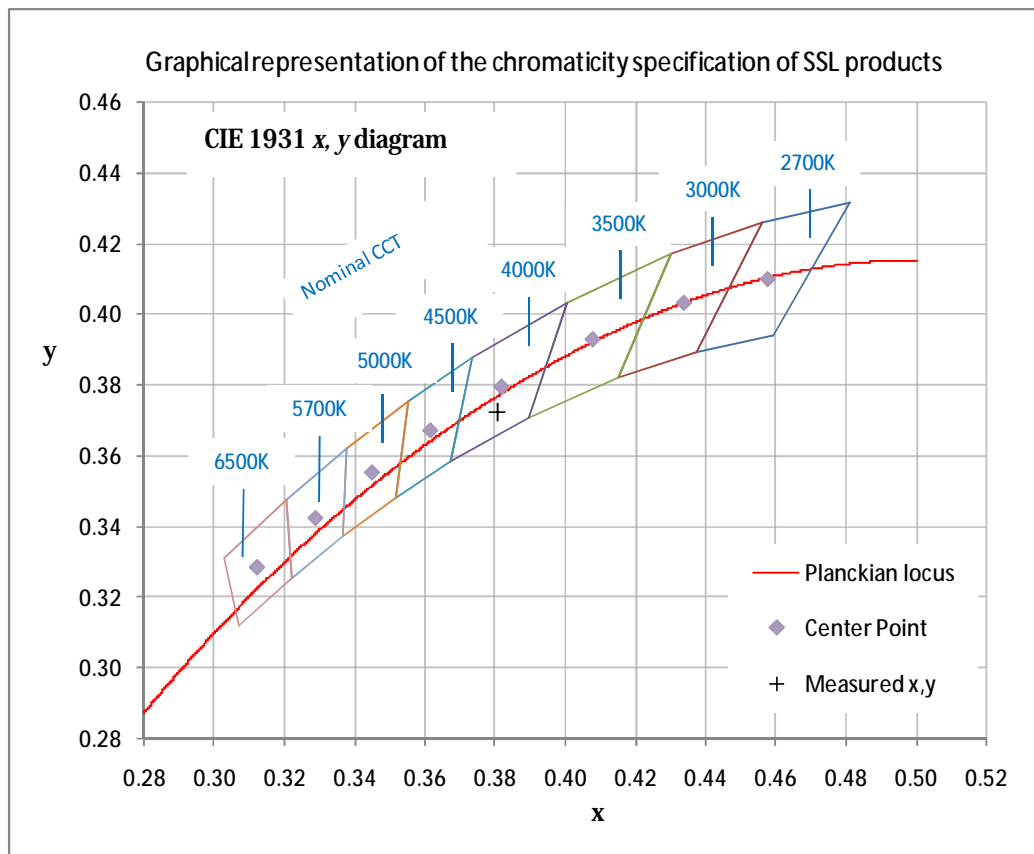
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram





LCTECH



4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180°)	1.26	Luminous Length	0.13 m
Spacing Criteria (90-270°)	1.30	Luminous Width	0.07 m
Spacing Criteria (Diagonal)	1.38	Luminous Height	0.00 m
Test Distance	29.54 m		

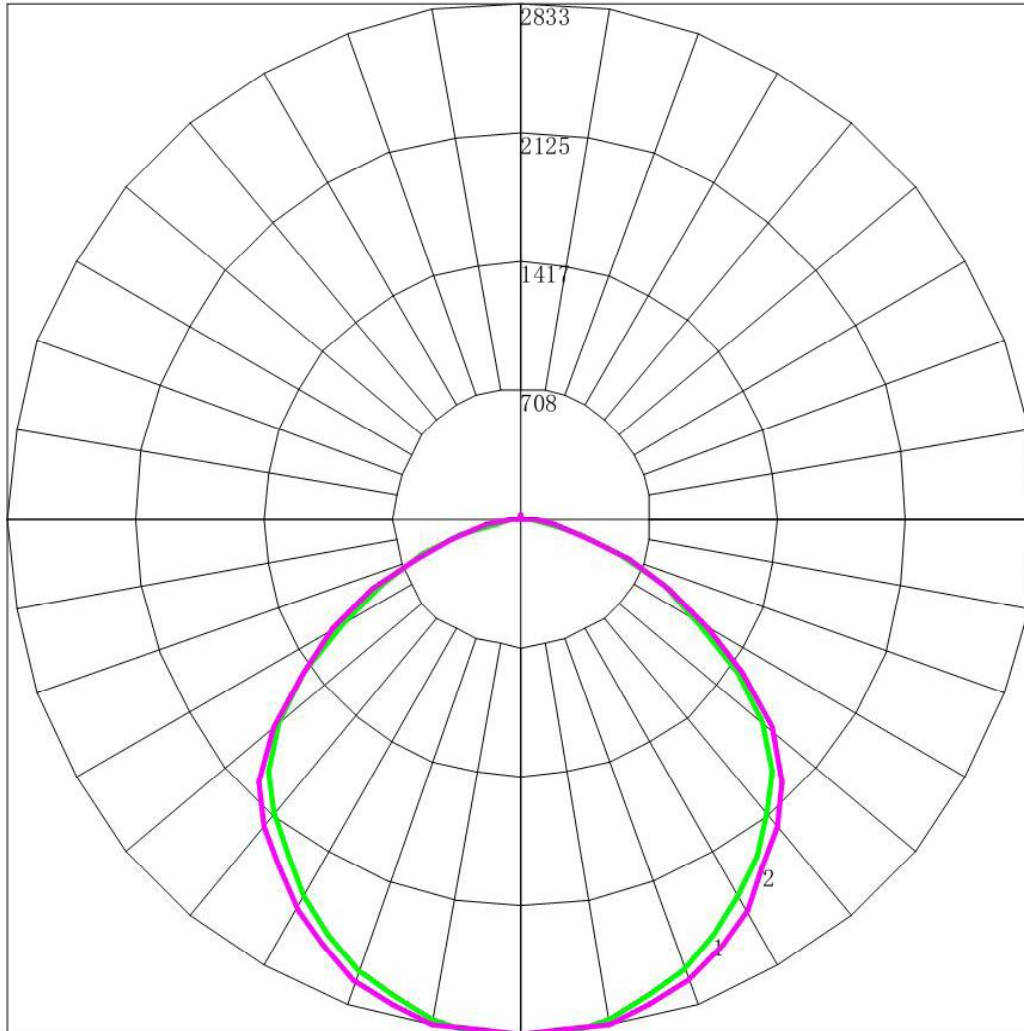
4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	1040.02	13.10	13.10
0-30	2211.91	27.90	27.90
0-40	3632.86	45.70	45.70
0-60	6452.36	81.20	81.20
0-80	7776.00	97.90	97.90
0-90	7887.48	99.30	99.30
10-90	7619.05	95.90	95.90
20-40	2592.83	32.60	32.60
20-50	4093.39	51.50	51.50
40-70	3716.14	46.80	46.80
60-80	1323.64	16.70	16.70
70-80	427.00	5.40	5.40
80-90	111.48	1.40	1.40
90-110	26.80	0.30	0.30
90-120	30.66	0.40	0.40
90-130	33.73	0.40	0.40
90-150	41.29	0.50	0.50
90-180	54.48	0.70	0.70
110-180	27.68	0.30	0.30
0-180	7941.95	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	268.42
10-20	771.60
20-30	1171.89
30-40	1420.94
40-50	1500.56
50-60	1318.95
60-70	896.64
70-80	427.00
80-90	111.48
90-100	19.83
100-110	6.96
110-120	3.86
120-130	3.08
130-140	3.06
140-150	4.49
150-160	5.64
160-170	5.30
170-180	2.26



Maximum Candela = 2833.191 Located At Horizontal Angle = 0, Vertical Angle = 5

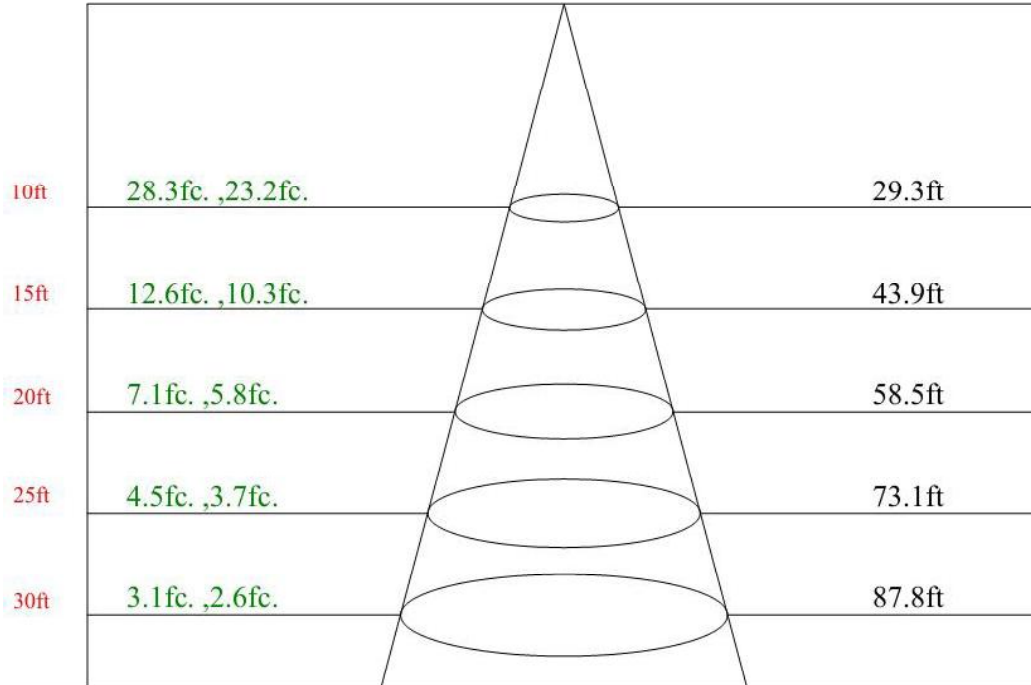
1 - Vertical Plane Through Horizontal Angles (0 - 180)

2 - Vertical Plane Through Horizontal Angles (90 - 270)



LCTECH

4.6 Lux distance Curve

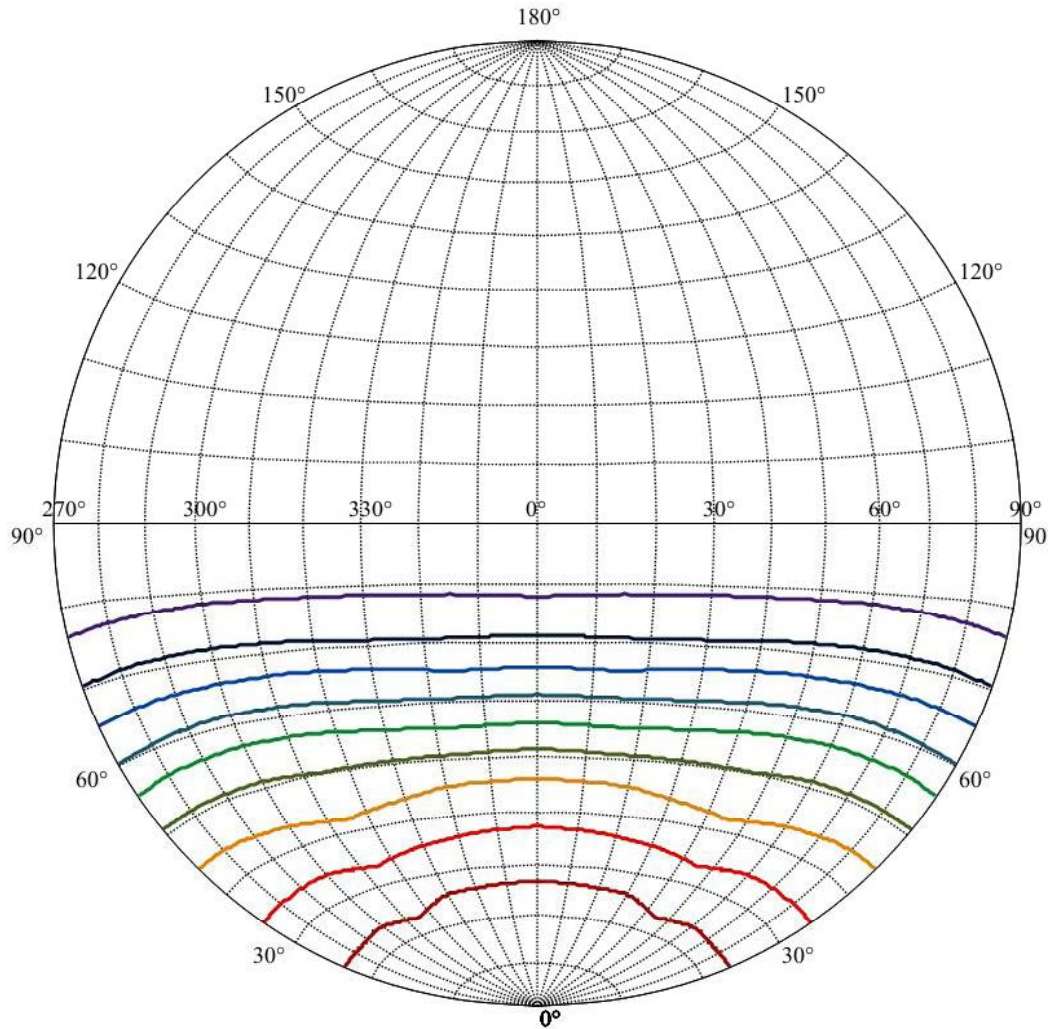




LCTECH



4.7 ISO candela diagram on circular web



House

[Unit:cd]

Road

I_{max}:2833.19

- (10%I_{max}) 283.319
- (20%I_{max}) 566.638
- (30%I_{max}) 849.957
- (40%I_{max}) 1133.28
- (50%I_{max}) 1416.6
- (60%I_{max}) 1699.91
- (70%I_{max}) 1983.23
- (80%I_{max}) 2266.55
- (90%I_{max}) 2549.87

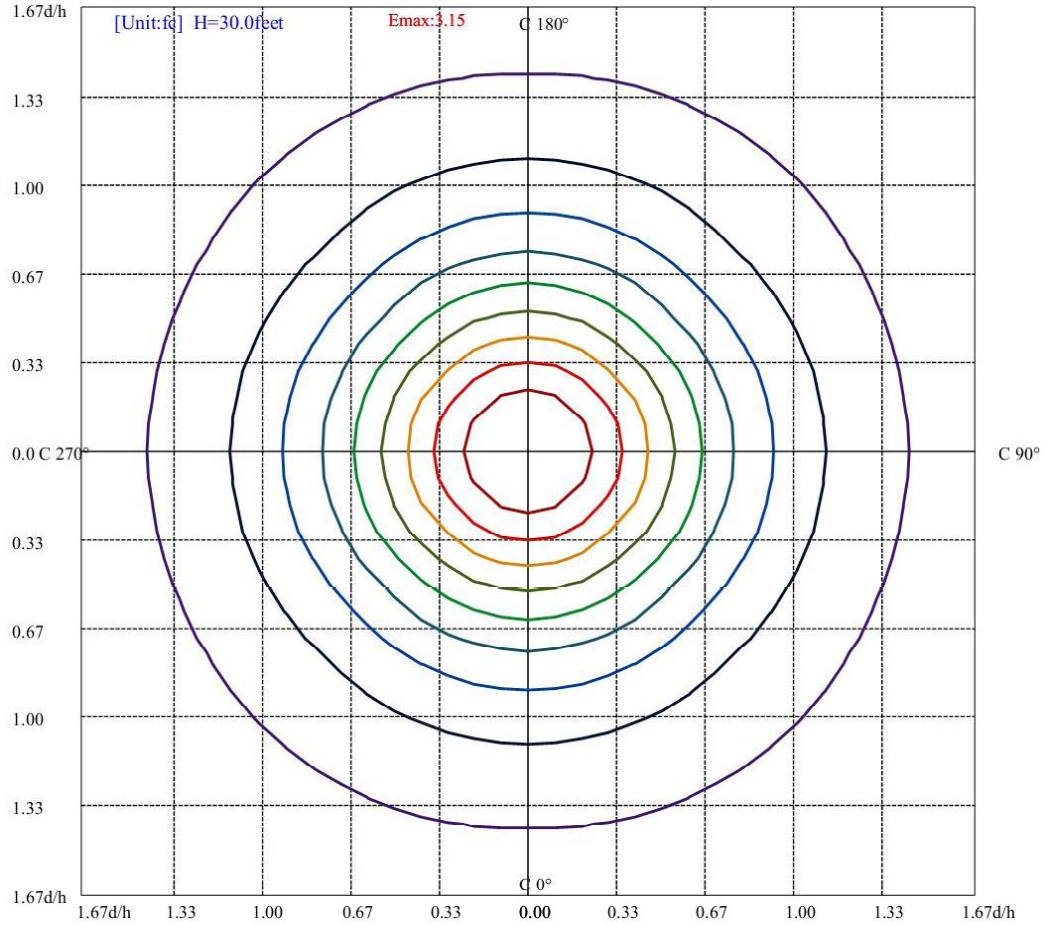




LCTECH



4.8 ISO illuminance diagram

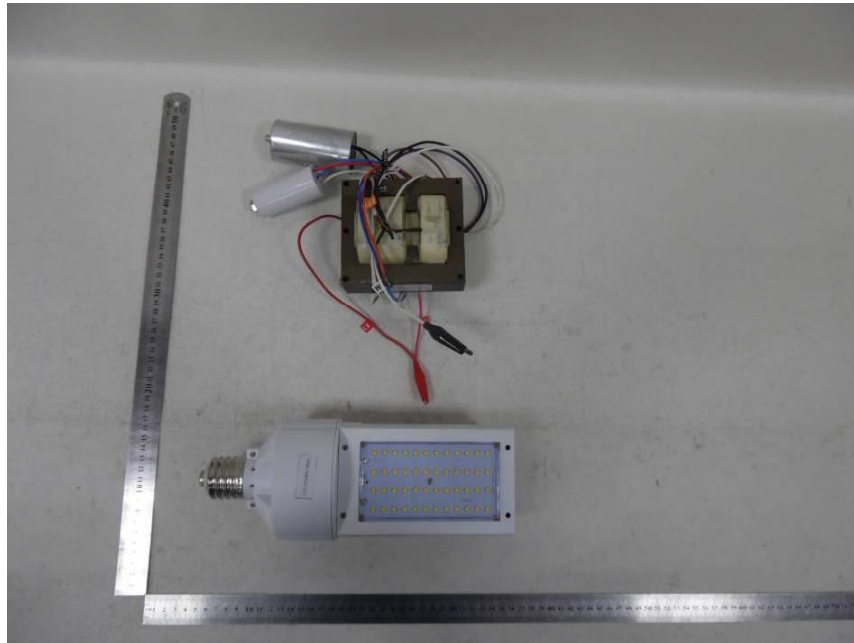


(10%Emax) 0.3146165	—
(20%Emax) 0.629233	—
(30%Emax) 0.9438495	—
(40%Emax) 1.258468	—
(50%Emax) 1.573083	—
(60%Emax) 1.887697	—
(70%Emax) 2.202311	—
(80%Emax) 2.516936	—
(90%Emax) 2.831551	—

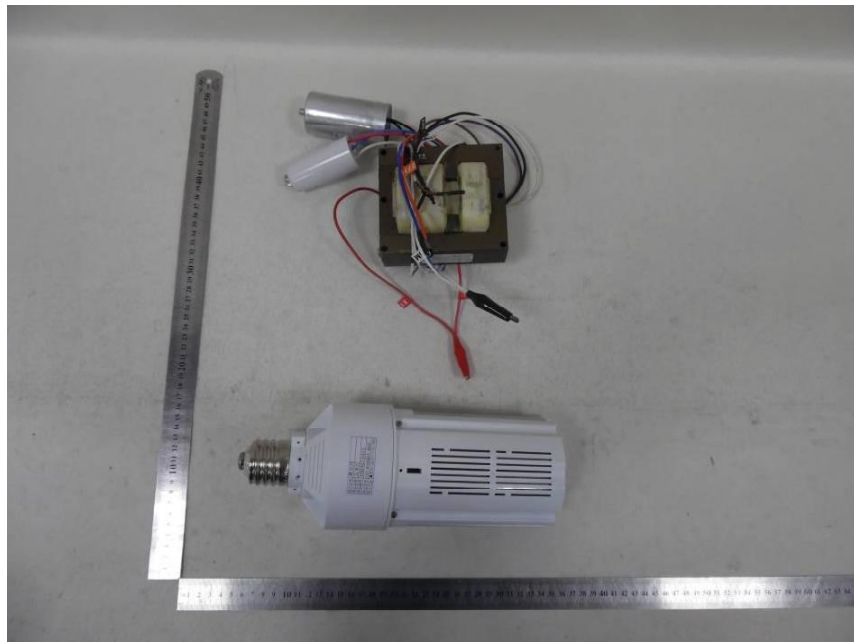
4.9 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	2830.521	2830.521	2830.521	2830.521	2830.521	2830.521	2830.521
5	2833.191	2815.979	2831.406	2823.939	2824.895	2821.934	2823.918
10	2798.477	2783.531	2801.936	2748.658	2796.969	2800.092	2810.711
15	2719.703	2720.650	2741.443	2698.800	2748.044	2756.134	2766.250
20	2631.583	2625.549	2644.833	2618.923	2677.038	2681.397	2694.497
25	2514.090	2507.513	2525.618	2501.211	2572.490	2584.895	2598.972
30	2395.706	2385.049	2400.424	2367.191	2439.318	2461.095	2477.036
35	2250.175	2250.008	2257.276	2218.017	2277.569	2316.303	2333.089
40	2108.204	2106.580	2096.850	2057.217	2105.517	2169.238	2196.185
45	1966.678	1958.762	1930.661	1879.033	1947.106	2015.490	2044.314
50	1741.304	1739.813	1745.984	1710.290	1728.147	1749.071	1791.460
55	1457.985	1495.291	1512.050	1514.836	1464.745	1443.741	1476.185
60	1135.947	1180.851	1232.528	1217.779	1176.487	1174.158	1197.711
65	859.526	898.343	930.323	946.887	927.712	863.273	898.547
70	582.260	625.595	638.716	644.859	602.244	597.729	618.577
75	332.853	379.206	420.453	391.779	414.787	410.497	400.059
80	149.670	185.139	212.269	231.853	220.982	218.316	193.338
85	57.634	84.298	98.312	96.883	86.799	85.568	70.785
90	30.530	33.984	39.219	33.807	29.095	23.789	17.652
95	17.713	19.039	21.848	19.847	15.559	9.397	5.503
100	5.697	8.183	13.916	13.026	10.693	6.895	3.213
105	3.026	3.132	7.313	9.110	8.320	5.421	2.773
110	2.715	2.824	4.742	6.499	6.512	4.740	2.817
115	2.670	2.670	3.346	4.652	5.008	3.996	2.817
120	2.893	2.824	3.102	3.718	4.126	3.592	2.993
125	3.160	3.222	3.346	3.524	3.871	3.616	3.258
130	3.249	3.266	3.390	3.438	3.593	3.488	3.302
135	3.605	3.597	3.634	3.634	3.744	3.723	3.742
140	5.118	5.097	5.141	5.092	5.209	5.191	5.238
145	7.076	7.127	7.135	6.985	7.189	7.168	7.263
150	9.569	9.444	9.439	9.292	9.468	9.359	9.596
155	12.372	12.180	12.209	11.946	12.073	11.909	12.194
160	16.022	15.733	15.755	15.449	15.622	15.669	15.715
165	19.404	19.153	19.256	18.756	19.002	19.008	19.193
170	22.253	22.065	22.114	21.564	21.799	21.747	21.922
175	24.923	24.670	24.662	24.067	24.382	24.238	24.431
180	25.575	25.575	25.575	25.575	25.575	25.575	25.575

Appendix 1 Product Photo



Picture 1



Picture 2

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