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Test report of

## IES LM-79-08

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

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

For products:

LED Lamp

Models No.:

LED-8090M50-MHBC

**Test Date:** Sep. 12, 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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**Test Note:**

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## Table of Contents

<b>1. General</b> .....	3
1.1 Product Information .....	3
1.2 Standards or methods .....	4
1.3 Equipment list .....	4
<b>2. Test conducted and method</b> .....	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
<b>3. Test Result Summary</b> .....	6
3.1 Electrical data .....	6
3.2 Photometric data .....	6
3.3 Color Rendering Details .....	6
<b>4. Test Data</b> .....	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
<b>Appendix 1 Product Photo</b> .....	14



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## 1. General

### 1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8090M50-MHBC
Rated Inputs	277V, 60Hz
Rated Power	175 W
Rated Light output	N/A
Declared CCT	5000K
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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ; 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  $\pm 0.2$  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)	1.288	1.295
Total Power(W)	179.00	178.47
Power Factor	0.502	0.497
I-THD(%)	35.18	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	10810.58
Luminaire Efficacy(Lm/W)	-	60.57
Correlated Color Temperature (CCT)(K)	5040	-
Color Rendering Index (CRI)	75.8	-
R9	-7	-
Chromaticity Coordinate (x,y)	x=0.3437 y=0.3474	-
Chromaticity Coordinate (u,v)	u=0.2121 v=0.3216	-
Chromaticity Coordinate (u',v')	u'=0.2121 v'=0.4824	-
Duv	-0.00156	-
Central intensity(cd)	-	3700.66
Beam angle	-	111.2°
Spacing Criteria(0-180°)	-	1.36
Spacing Criteria(90-270°)	-	1.36
Zone Lumens between 0-60 °	-	82.40%
Zone Lumens between 60-90 °	-	17.10%
Zone Lumens between 90-120 °	-	0.30%
Zone Lumens between 120-180 °	-	0.20%

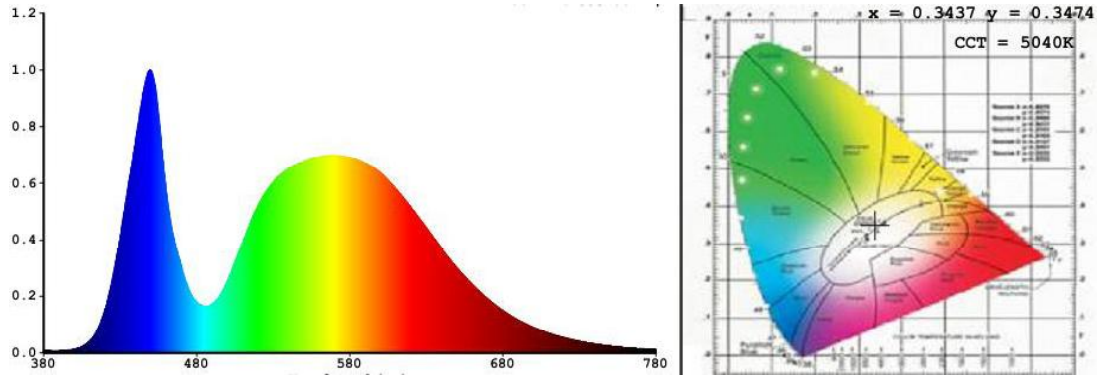
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
75	80	81	77	75	72	82	63
R9	R10	R11	R12	R13	R14	R15	-
-7	50	74	52	75	89	71	-

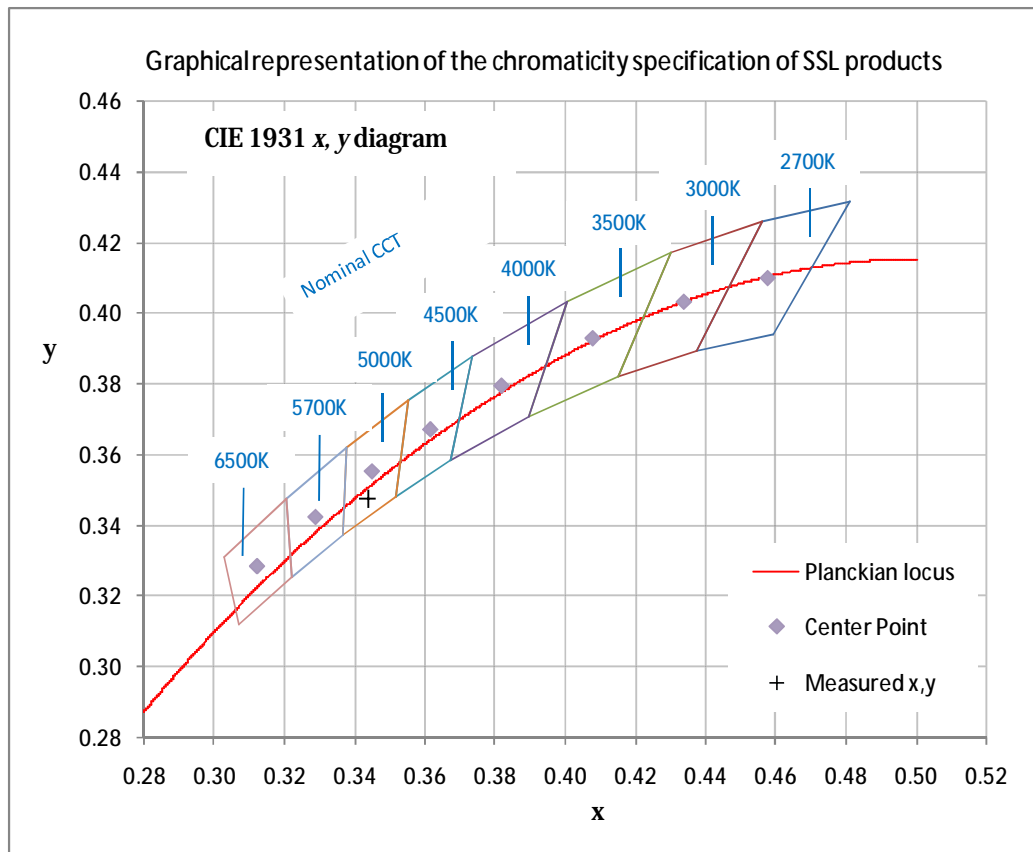
Note: N.A.

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram





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**4.3 Goniometry Test Data**

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180°)	1.36	Luminous Length	0.13 m
Spacing Criteria (90-270°)	1.36	Luminous Width	0.07 m
Spacing Criteria (Diagonal)	1.46	Luminous Height	0.00 m
Test Distance	29.54 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	1392.08	12.90	12.90
0-30	3020.38	27.90	27.90
0-40	5036.39	46.60	46.60
0-60	8903.44	82.40	82.40
0-80	10629.63	98.30	98.30
0-90	10758.87	99.50	99.50
10-90	10405.32	96.30	96.30
20-40	3644.31	33.70	33.70
20-50	5740.89	53.10	53.10
40-70	5063.07	46.80	46.80
60-80	1726.19	16.00	16.00
70-80	530.17	4.90	4.90
80-90	129.24	1.20	1.20
90-110	29.23	0.30	0.30
90-120	33.03	0.30	0.30
90-130	35.78	0.30	0.30
90-150	41.59	0.40	0.40
90-180	51.71	0.50	0.50
110-180	22.49	0.20	0.20
0-180	10810.58	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

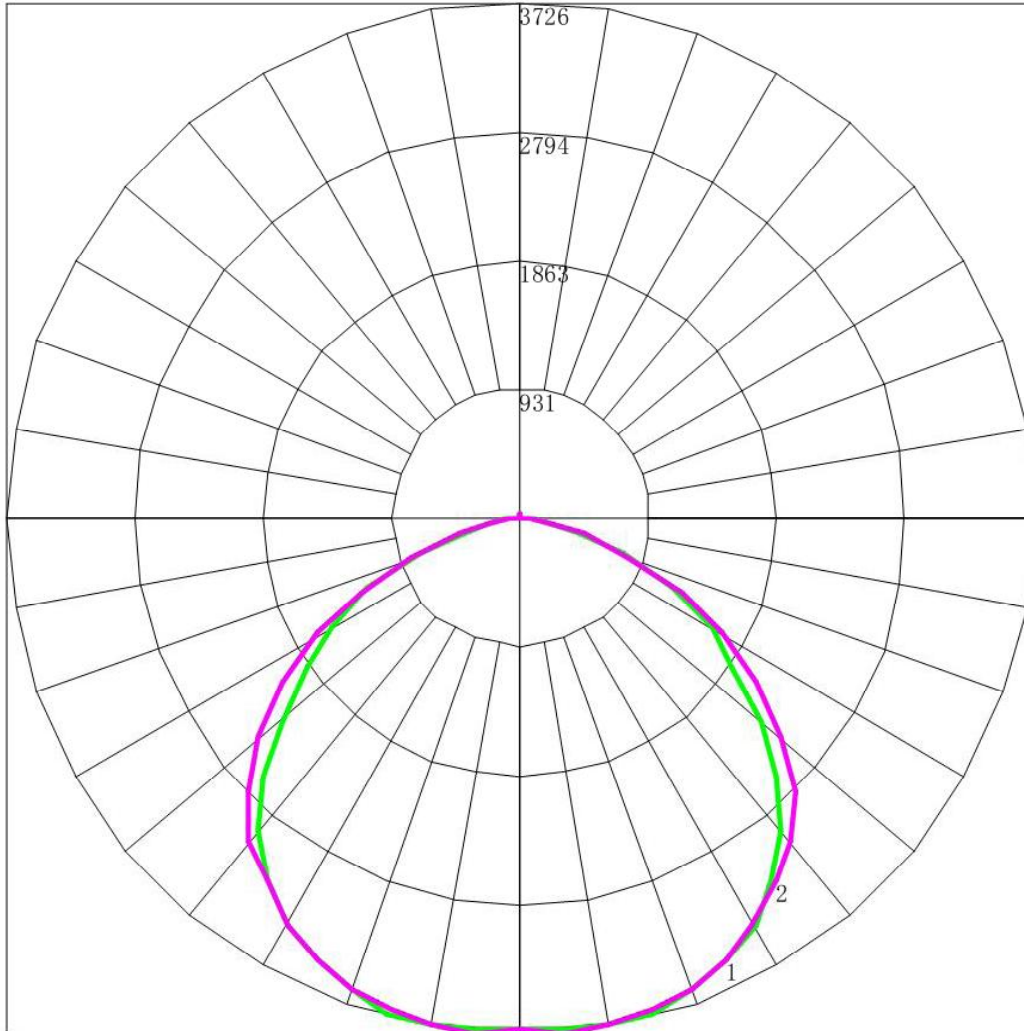
Zone	Lumens
0-10	353.55
10-20	1038.53
20-30	1628.29
30-40	2016.02
40-50	2096.58
50-60	1770.47
60-70	1196.02
70-80	530.17
80-90	129.24
90-100	21.89
100-110	7.34
110-120	3.80
120-130	2.75
130-140	2.46
140-150	3.35
150-160	4.20
160-170	4.10
170-180	1.82





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4.5 Polar Curves

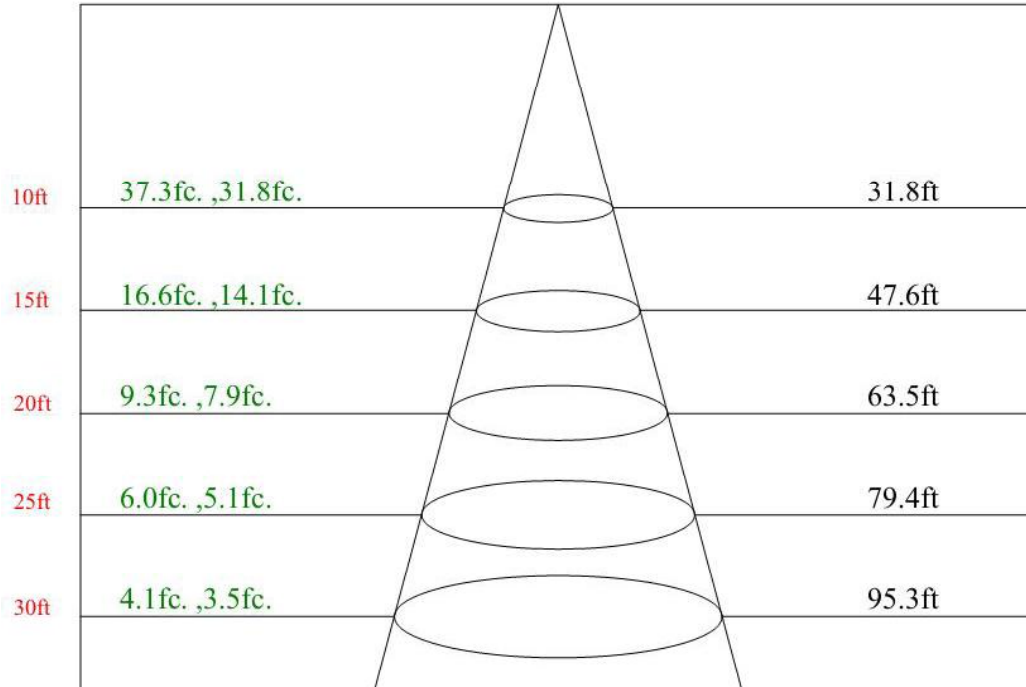


Maximum Candela = 3725.884 Located At Horizontal Angle = 90, Vertical Angle = 5  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



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4.6 Lux distance Curve

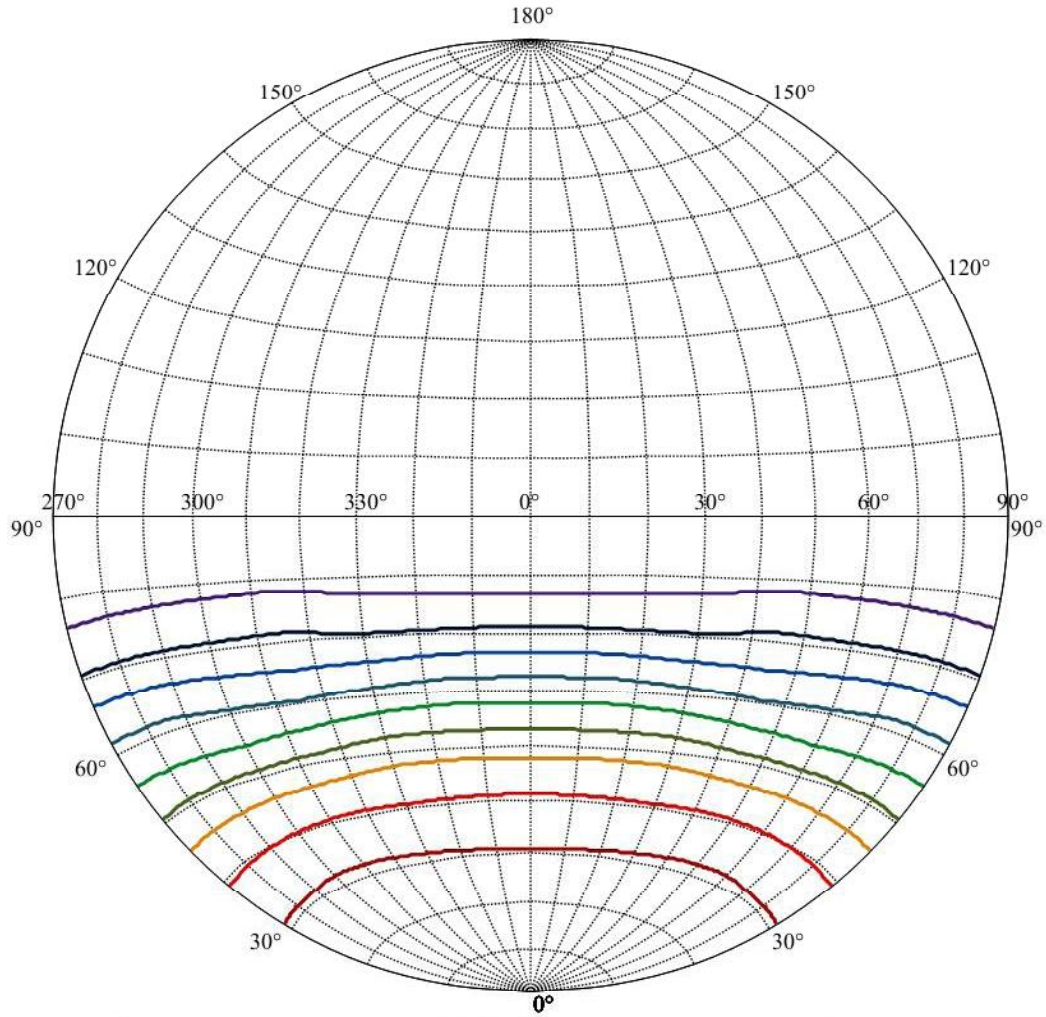




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4.7 ISO candela diagram on circular web



House

[Unit:cd]

Road

**Imax:3725.88**

- (10%Imax) 372.588
- (20%Imax) 745.177
- (30%Imax) 1117.77
- (40%Imax) 1490.35
- (50%Imax) 1862.94
- (60%Imax) 2235.53
- (70%Imax) 2608.12
- (80%Imax) 2980.71
- (90%Imax) 3353.3

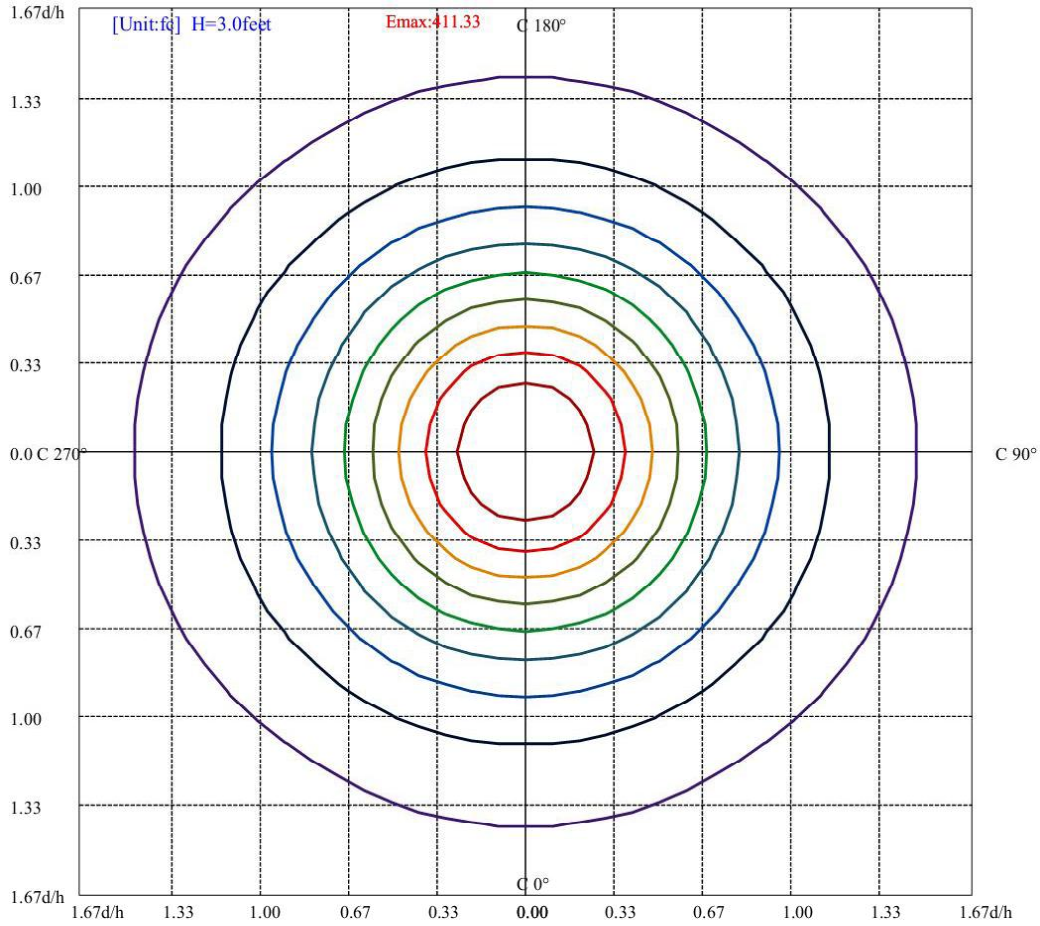




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4.8 ISO illuminance diagram



(10%Emax) 41.13339	—
(20%Emax) 82.26666	—
(30%Emax) 123.4004	—
(40%Emax) 164.5331	—
(50%Emax) 205.6669	—
(60%Emax) 246.7996	—
(70%Emax) 287.9335	—
(80%Emax) 329.0662	—
(90%Emax) 370.2001	—



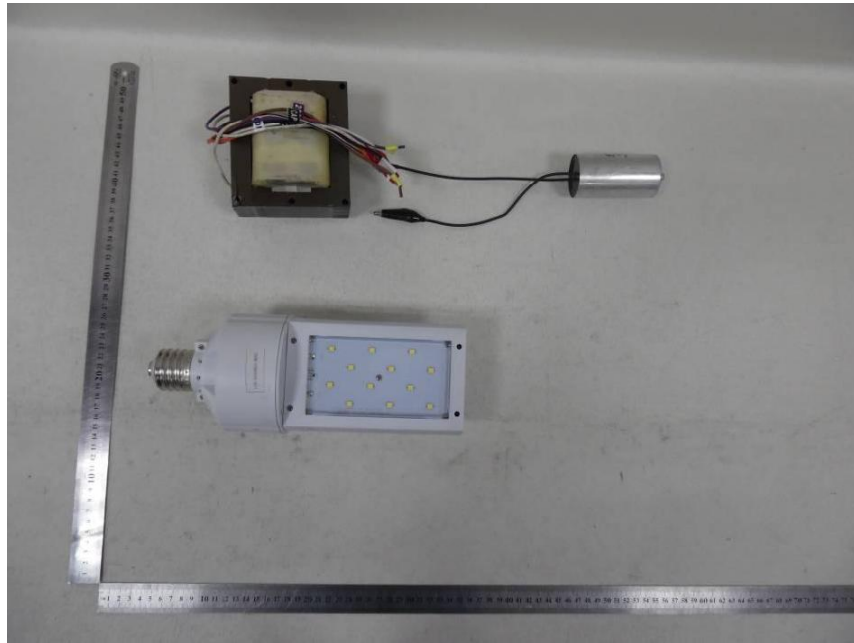
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4.9 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	3700.656	3700.656	3700.656	3700.656	3700.656	3700.656	3700.656
<b>5</b>	3704.170	3710.789	3707.076	3704.137	3700.055	3705.891	3725.884
<b>10</b>	3697.143	3698.280	3708.430	3713.713	3688.139	3690.473	3709.791
<b>15</b>	3692.312	3681.631	3678.449	3679.528	3656.449	3656.856	3664.989
<b>20</b>	3624.237	3632.685	3637.975	3622.913	3618.639	3606.229	3615.838
<b>25</b>	3518.391	3534.587	3540.815	3546.254	3529.296	3519.792	3513.623
<b>30</b>	3394.977	3401.767	3430.543	3418.219	3409.476	3389.712	3382.264
<b>35</b>	3190.751	3206.489	3247.439	3258.577	3224.282	3218.574	3211.759
<b>40</b>	2932.504	2956.351	2997.975	3032.760	3016.639	3026.842	3046.473
<b>45</b>	2636.926	2657.797	2703.697	2726.143	2780.344	2813.594	2802.460
<b>50</b>	2267.563	2299.720	2336.974	2375.544	2467.958	2467.284	2461.884
<b>55</b>	1887.133	1878.790	1858.807	1931.240	2045.535	2087.482	2086.512
<b>60</b>	1585.669	1609.942	1542.320	1522.503	1612.879	1691.355	1688.044
<b>65</b>	1230.141	1236.852	1185.590	1143.820	1184.038	1267.200	1278.049
<b>70</b>	776.804	808.921	814.967	841.571	778.664	805.137	836.258
<b>75</b>	430.235	471.367	503.781	520.907	472.558	460.097	463.104
<b>80</b>	215.425	233.067	258.172	288.536	238.487	224.105	221.439
<b>85</b>	98.819	107.345	107.490	105.078	93.297	88.688	78.902
<b>90</b>	38.386	42.563	40.695	36.167	31.297	26.262	18.225
<b>95</b>	23.277	23.745	23.782	20.665	15.213	9.140	5.002
<b>100</b>	8.037	10.263	15.400	13.565	10.779	6.753	3.088
<b>105</b>	2.679	3.217	8.028	9.733	8.477	5.450	2.653
<b>110</b>	2.503	2.539	4.878	6.946	6.738	4.820	2.784
<b>115</b>	2.459	2.429	3.303	4.812	5.064	4.039	2.653
<b>120</b>	2.503	2.429	2.713	3.571	3.956	3.496	2.740
<b>125</b>	2.635	2.648	2.757	3.114	3.457	3.322	2.871
<b>130</b>	2.899	2.889	2.976	3.092	3.392	3.301	3.175
<b>135</b>	2.811	2.758	2.779	2.875	2.913	2.975	2.914
<b>140</b>	3.865	3.809	3.873	3.898	3.913	3.931	3.871
<b>145</b>	5.314	5.341	5.339	5.335	5.392	5.277	5.133
<b>150</b>	7.247	7.135	7.046	7.034	7.022	6.928	6.916
<b>155</b>	9.179	9.127	9.037	8.928	8.827	8.817	8.612
<b>160</b>	12.122	12.016	11.925	11.868	11.740	11.618	11.526
<b>165</b>	14.977	14.927	14.858	14.743	14.631	14.615	14.441
<b>170</b>	17.743	17.641	17.527	17.465	17.305	17.199	17.051
<b>175</b>	20.071	20.005	20.000	19.904	19.806	19.740	19.530
<b>180</b>	20.919	20.919	20.919	20.919	20.919	20.919	20.919

### Appendix 1 Product Photo



Picture 1



Picture 2

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