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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-8036M57-MHBC

**Test Date:** Oct. 28, 2016 to Oct. 29, 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](mailto:Service@lccert.com) <http://www.lccert.com>  
**Template No.:** LC-RT-PL/LM79-08/01  
**Test Note:** /

**Complied by:**

**Bowen Pang**  
**Project Engineer**  
**Nov. 7, 2016**

**Reviewed by:**

**Richard Li**  
**Technical Manager**  
**Nov. 7, 2016**

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## 1. General

### 1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8036M57-MHBC
Rated Inputs	277V, 60Hz
Rated Power	116 W
Rated Light output	N/A
Declared CCT	5700K
Ballast	M58
LED Package, Array or Module	Model: SPMWHX1228FXXXXXXXX, manufactured by SAMSUNG ELECTRONICS CO., LTD
Receipt Samples	1 unit
Date of Receipt Samples	Oct. 26, 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-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	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	277.00V~60Hz
Input Current(A)	0.875	0.869
Total Power(W)	121.20	121.19
Power Factor	0.500	0.504
I-THD(%)	45.95	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	9981.91
Luminaire Efficacy(Lm/W)	-	82.37
Correlated Color Temperature (CCT)(K)	5585	-
Color Rendering Index (CRI)	85.2	-
R9	23	-
Chromaticity Coordinate (x,y)	x=0.3305 y=0.3441	-
Chromaticity Coordinate (u,v)	u=0.2044 v=0.3192	-
Chromaticity Coordinate (u',v')	u'=0.2044 v'=0.4788	-
Duv	0.00243	-
Central intensity(cd)	-	3186.697
Beam angle	-	99.8°
Spacing Criteria(0-180°)	-	1.06
Spacing Criteria(90-270°)	-	1.06
Zone Lumens between 0-60 °	-	60.20%
Zone Lumens between 60-90 °	-	23.60%
Zone Lumens between 90-120 °	-	12.50%
Zone Lumens between 120-180 °	-	3.70%

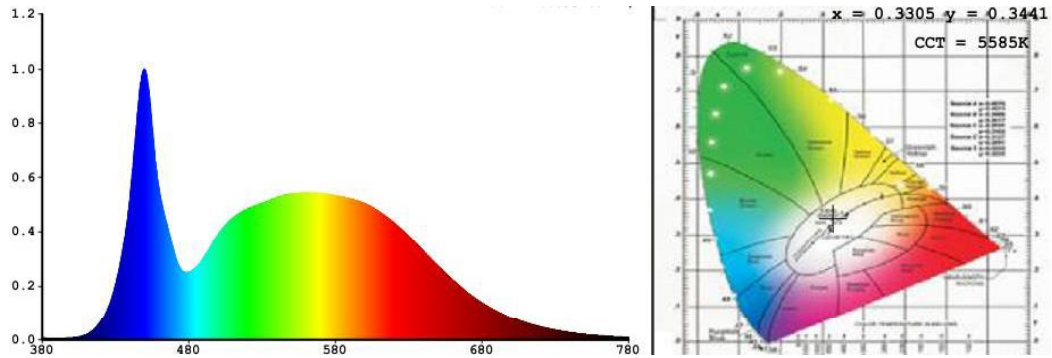
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
84	88	91	86	85	84	89	74
R9	R10	R11	R12	R13	R14	R15	-
23	72	86	66	85	95	80	-

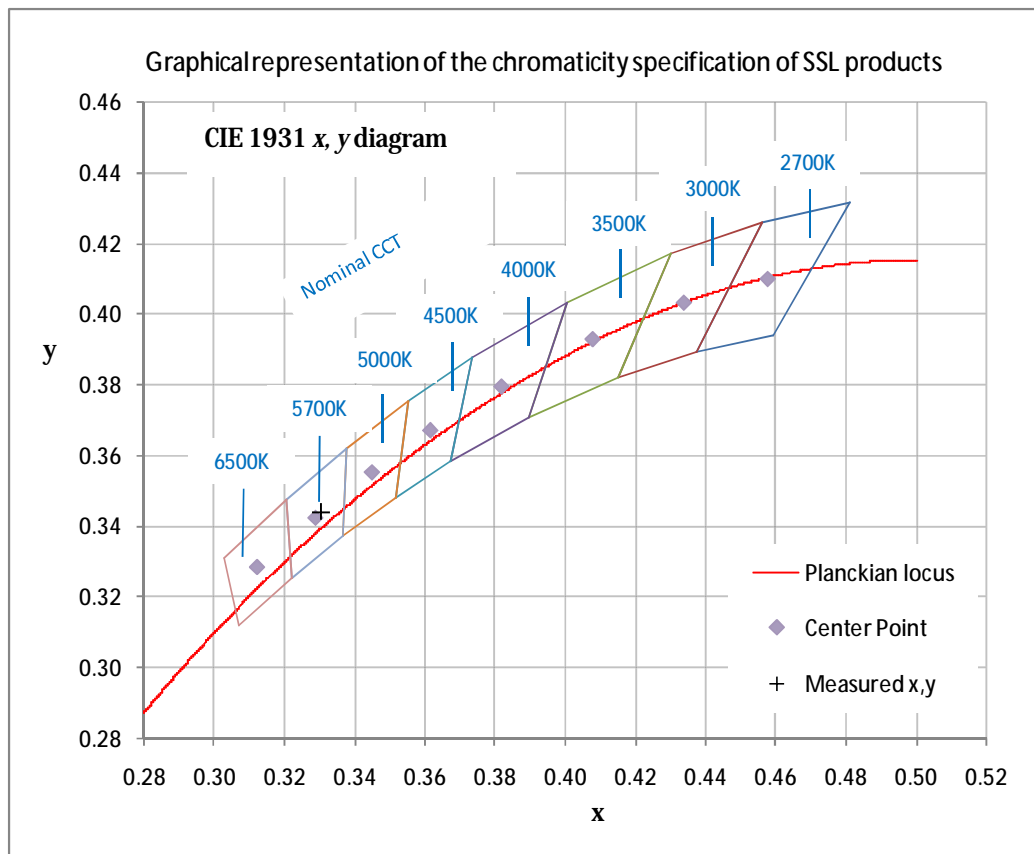
Note: N.A.

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram





**4.3 Goniometry Test Data**

CIE Type	Semi-Direct	Basic Luminous Shape	Circular w/ Sides
Spacing Criteria (0-180°)	1.06	Luminous Diameter	0.20 m
Spacing Criteria (90-270°)	1.06	Luminous Height	0.05 m
Spacing Criteria (Diagonal)	1.28		
Test Distance	29.65 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	1018.19	10.20	10.20
0-30	2098.07	21.00	21.00
0-40	3416.83	34.20	34.20
0-60	6011.35	60.20	60.20
0-80	7735.31	77.50	77.50
0-90	8368.41	83.80	83.80
10-90	8080.58	81.00	81.00
20-40	2398.64	24.00	24.00
20-50	3793.83	38.00	38.00
40-70	3552.14	35.60	35.60
60-80	1723.96	17.30	17.30
70-80	766.34	7.70	7.70
80-90	633.09	6.30	6.30
90-110	957.30	9.60	9.60
90-120	1251.83	12.50	12.50
90-130	1437.57	14.40	14.40
90-150	1585.4	15.90	15.90
90-180	1613.5	16.20	16.20
110-180	656.20	6.60	6.60
0-180	9981.91	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

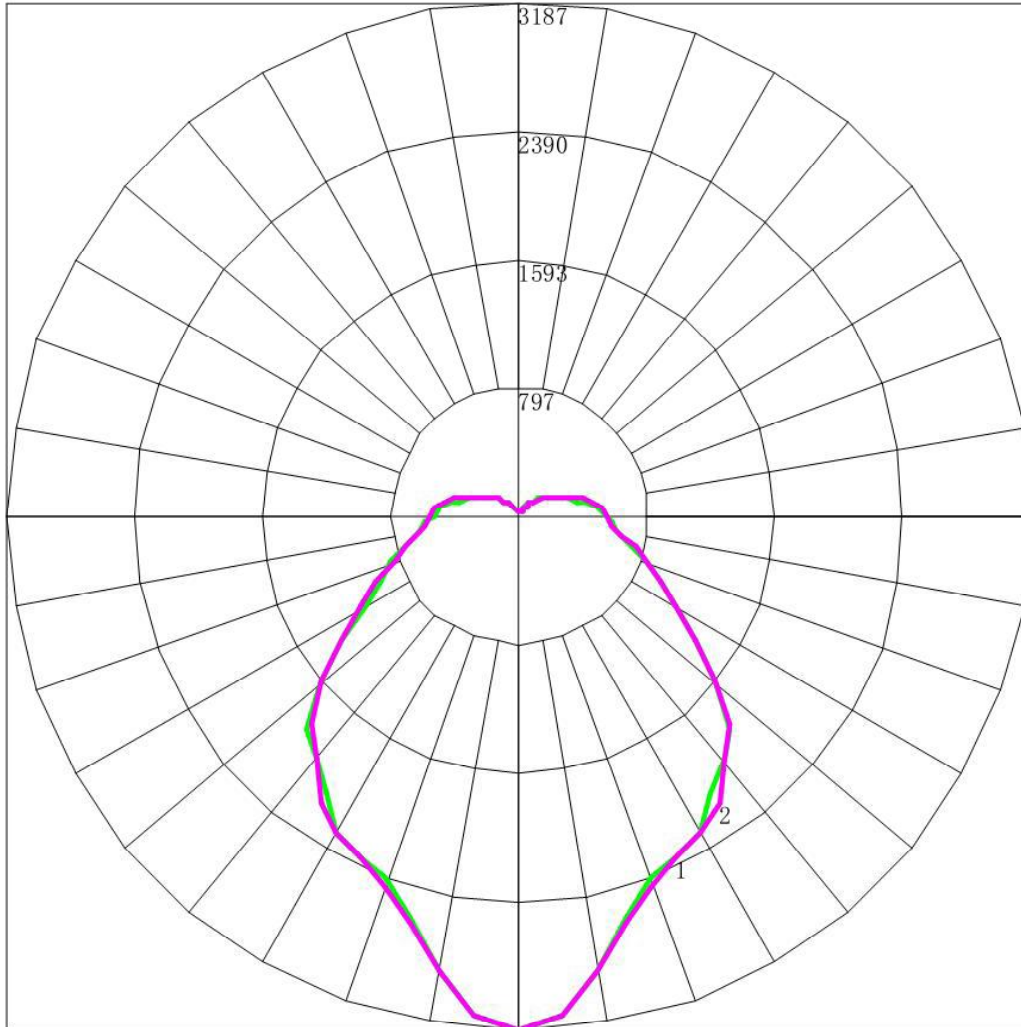
Zone	Lumens
0-10	287.83
10-20	730.37
20-30	1079.87
30-40	1318.76
40-50	1395.19
50-60	1199.33
60-70	957.62
70-80	766.34
80-90	633.09
90-100	542.12
100-110	415.18
110-120	294.53
120-130	185.74
130-140	102.44
140-150	45.39
150-160	18.32
160-170	7.52
170-180	2.26





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4.5 Polar Curves



Maximum Candela = 3186.697 Located At Horizontal Angle = 0, Vertical Angle = 0

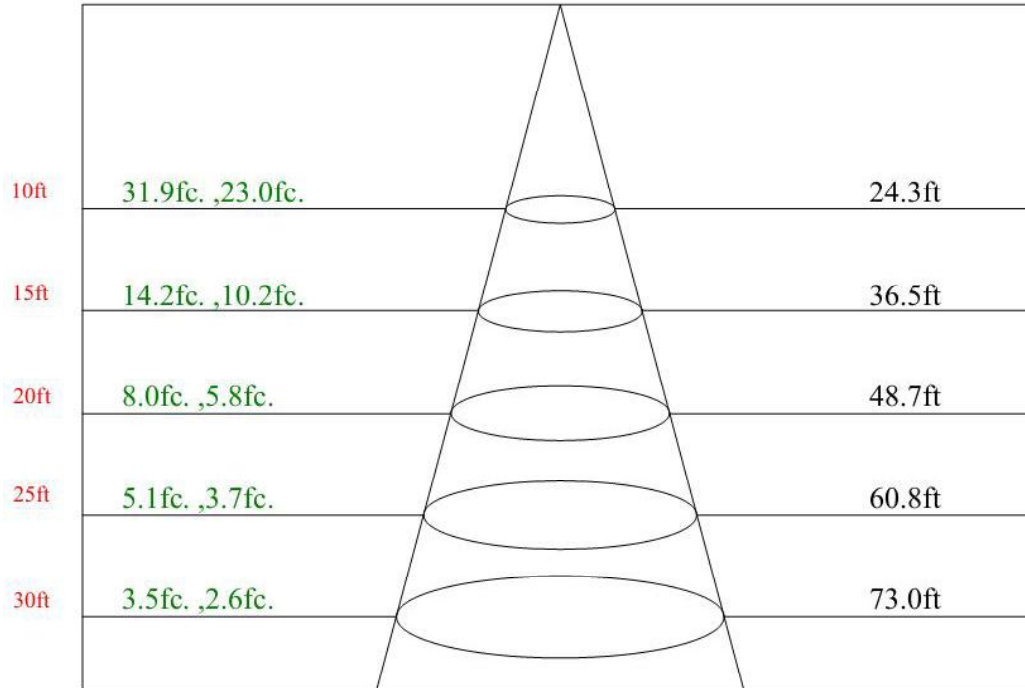
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)

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



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4.6 Lux distance Curve

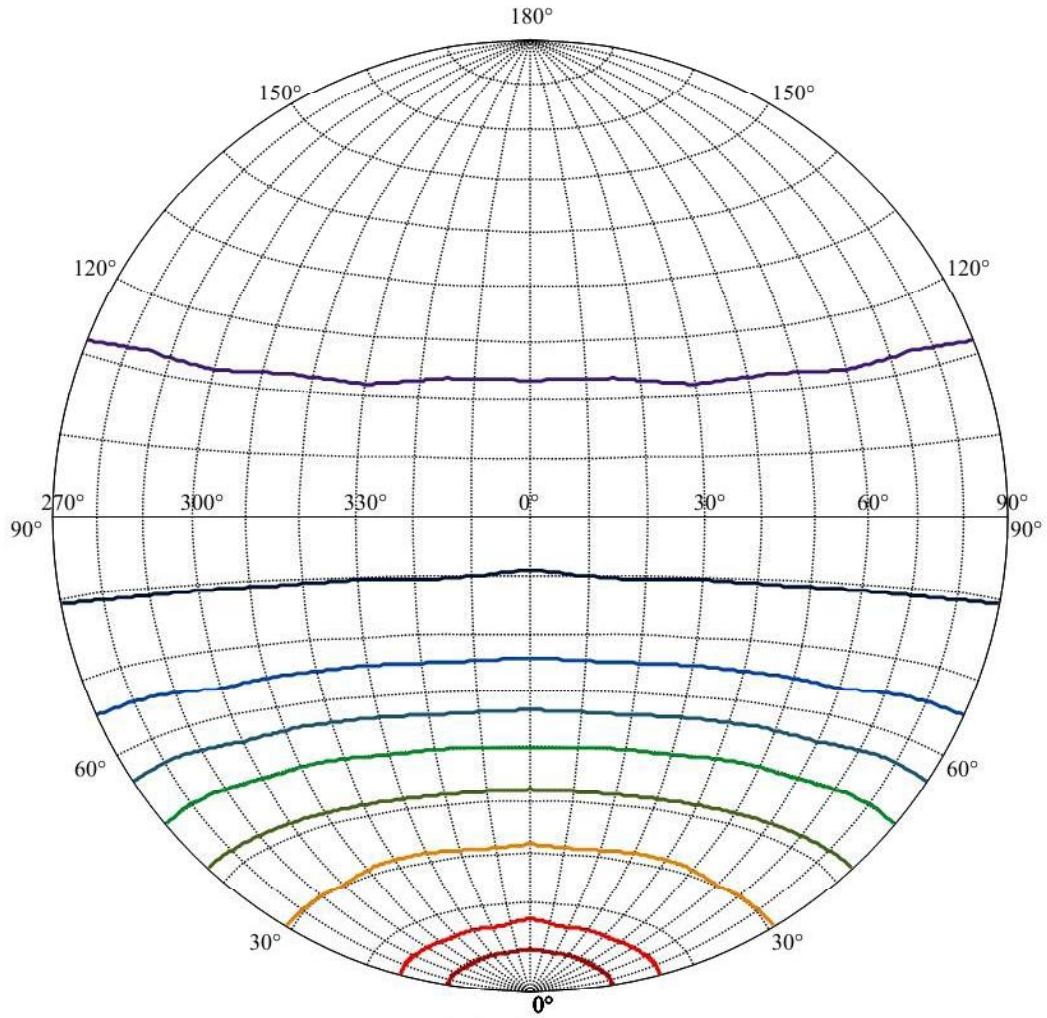




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4.7 ISO candela diagram on circular web



House

[Unit:cd]

Road

**Imax:3186.70**

- (10%Imax) 318.67
- (20%Imax) 637.339
- (30%Imax) 956.009
- (40%Imax) 1274.68
- (50%Imax) 1593.35
- (60%Imax) 1912.02
- (70%Imax) 2230.69
- (80%Imax) 2549.36
- (90%Imax) 2868.03

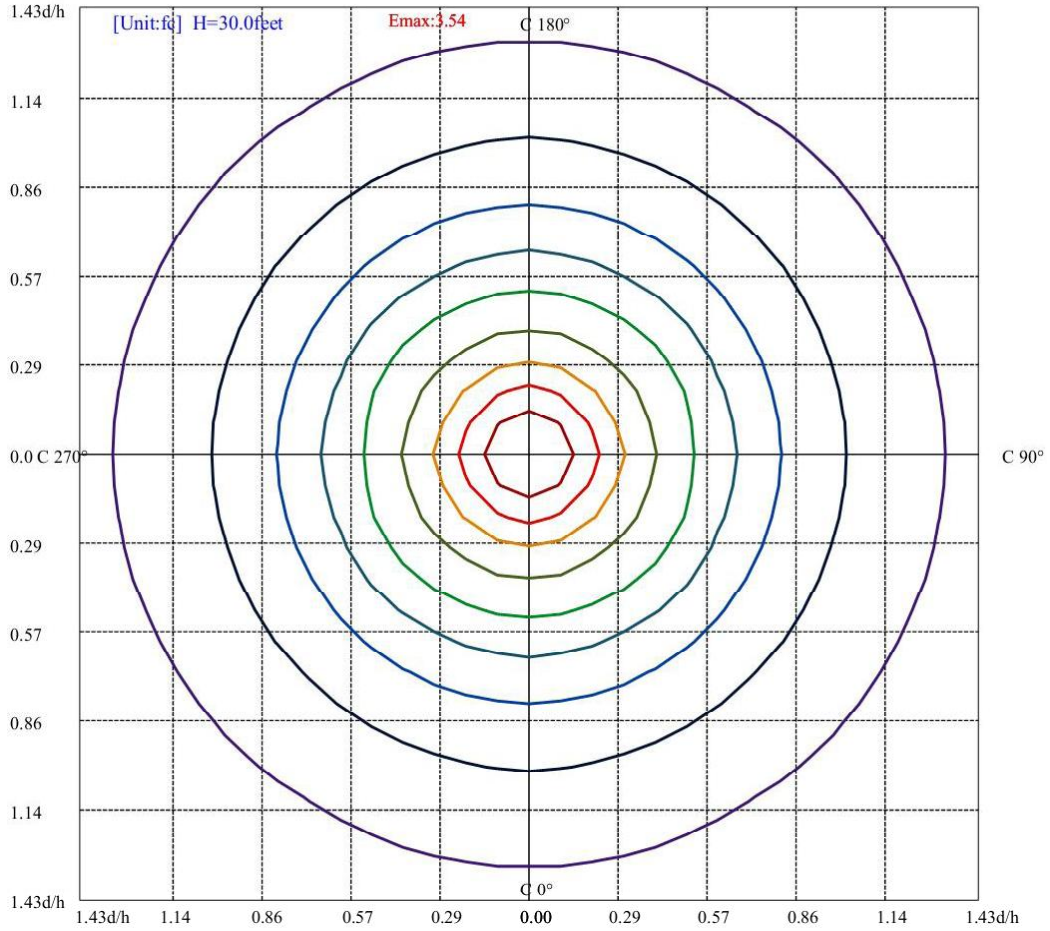




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### 4.8 ISO illuminance diagram



(10%Emax) 0.3542053	—
(20%Emax) 0.7084118	—
(30%Emax) 1.062617	—
(40%Emax) 1.416826	—
(50%Emax) 1.771032	—
(60%Emax) 2.125239	—
(70%Emax) 2.479445	—
(80%Emax) 2.83364	—
(90%Emax) 3.187847	—

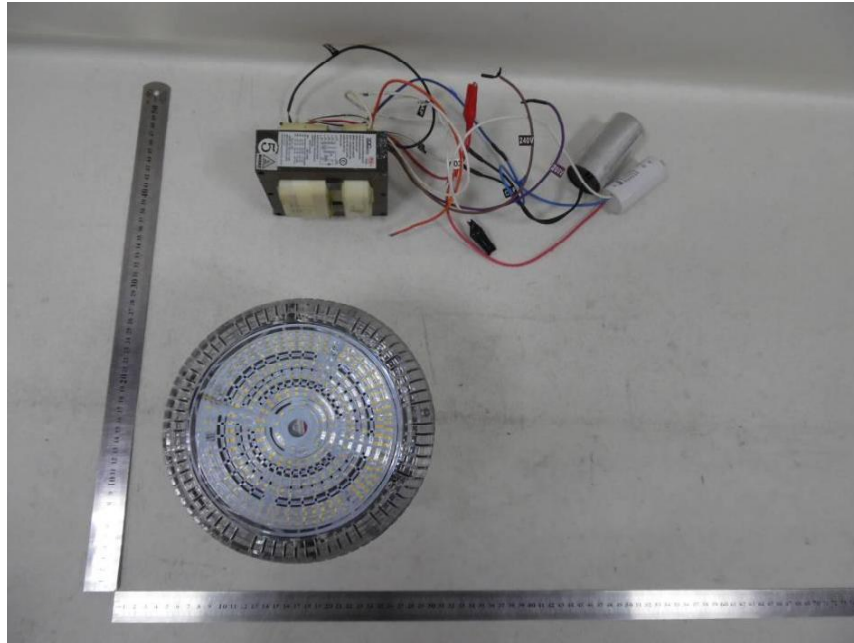




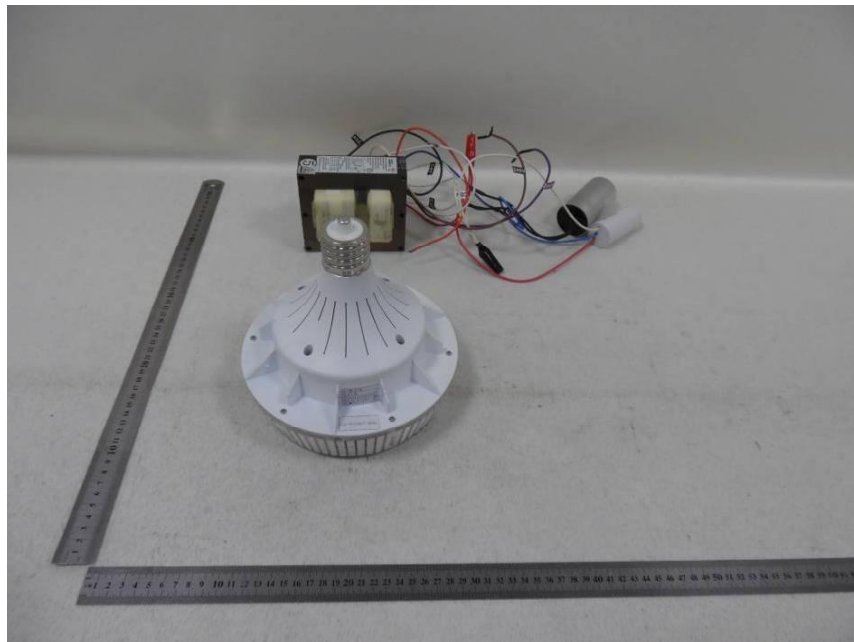
**4.9 Candela Tabulation**

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	3186.697	3186.697	3186.697	3186.697	3186.697	3186.697	3186.697
<b>5</b>	3093.773	3092.944	3092.195	3093.426	3087.506	3085.797	3118.037
<b>10</b>	2866.530	2865.519	2846.434	2844.958	2852.886	2846.397	2873.520
<b>15</b>	2582.034	2577.112	2564.214	2554.392	2568.438	2560.858	2609.069
<b>20</b>	2390.022	2392.406	2378.690	2384.482	2385.902	2367.906	2443.400
<b>25</b>	2340.258	2341.697	2342.432	2354.463	2360.083	2333.038	2337.531
<b>30</b>	2250.417	2244.510	2236.569	2281.824	2294.264	2274.761	2273.301
<b>35</b>	2092.756	2072.077	2076.389	2098.264	2098.023	2084.759	2156.358
<b>40</b>	1967.243	1966.450	1965.493	1967.196	1961.762	1964.242	1968.540
<b>45</b>	1857.189	1838.649	1830.972	1823.167	1828.723	1829.354	1840.878
<b>50</b>	1585.333	1598.676	1573.248	1602.328	1584.050	1597.806	1586.925
<b>55</b>	1335.189	1337.887	1307.638	1330.330	1329.869	1323.719	1344.756
<b>60</b>	1108.694	1122.246	1086.992	1123.706	1121.575	1119.512	1122.298
<b>65</b>	964.068	960.851	933.207	954.558	963.353	961.874	977.759
<b>70</b>	842.079	834.871	823.797	838.666	843.156	832.633	829.675
<b>75</b>	719.913	719.214	707.802	717.825	722.538	720.477	742.500
<b>80</b>	626.682	616.969	620.799	618.522	629.507	629.149	649.344
<b>85</b>	581.101	576.913	579.318	576.232	576.968	568.864	589.100
<b>90</b>	538.647	538.578	550.096	542.360	530.964	537.217	559.422
<b>95</b>	494.828	502.457	497.469	491.741	492.474	503.038	519.466
<b>100</b>	442.993	445.739	435.504	453.863	448.277	451.804	458.381
<b>105</b>	389.749	398.527	373.959	391.000	382.561	398.884	405.181
<b>110</b>	329.195	340.394	336.042	345.900	333.806	345.705	348.393
<b>115</b>	297.971	302.137	289.443	295.336	293.210	307.209	303.520
<b>120</b>	252.478	246.628	243.279	246.292	247.756	251.118	264.096
<b>125</b>	202.758	198.402	206.521	204.836	204.862	206.162	215.902
<b>130</b>	168.847	163.201	168.546	164.334	164.841	167.507	174.529
<b>135</b>	126.658	127.805	126.374	131.066	131.650	134.173	139.756
<b>140</b>	95.345	97.911	94.597	99.245	98.457	99.016	102.325
<b>145</b>	66.764	67.816	66.834	70.052	70.171	69.533	74.020
<b>150</b>	48.443	49.104	48.194	49.460	49.903	50.499	53.643
<b>155</b>	37.390	37.933	37.411	38.153	38.141	38.487	39.468
<b>160</b>	29.947	29.921	29.771	30.964	31.091	31.248	31.938
<b>165</b>	24.970	25.112	24.970	25.410	25.500	25.470	26.799
<b>170</b>	23.473	23.478	23.049	23.734	23.492	23.485	23.743
<b>175</b>	23.913	23.854	23.573	24.176	23.735	23.682	24.097
<b>180</b>	24.032	24.032	24.032	24.032	24.032	24.032	24.032

**Appendix 1 Product Photo**



Picture 1



Picture 2

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