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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-8032M57-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.  
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**Template No.:** LC-RT-PL/LM79-08/01  
**Test Note:**

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**Nov. 7, 2016**

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**Nov. 7, 2016**

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## 1. General

### 1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8032M57-MHBC
Rated Inputs	277V, 60Hz
Rated Power	210 W
Rated Light output	N/A
Declared CCT	5700K
Ballast	M59
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	277.04V~60Hz
Input Current(A)	1.306	1.296
Total Power(W)	210.90	211.22
Power Factor	0.583	0.588
I-THD(%)	32.77	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	17751.41
Luminaire Efficacy(Lm/W)	-	84.04
Correlated Color Temperature (CCT)(K)	5690	-
Color Rendering Index (CRI)	85.3	-
R9	26	-
Chromaticity Coordinate (x,y)	x=0.3282 y=0.3403	-
Chromaticity Coordinate (u,v)	u=0.2043 v=0.3177	-
Chromaticity Coordinate (u',v')	u'=0.2043 v'=0.4765	-
Duv	0.00151	-
Central intensity(cd)	-	6162.987
Beam angle	-	108.1°
Spacing Criteria(0-180°)	-	1.26
Spacing Criteria(90-270°)	-	1.26
Zone Lumens between 0-60 °	-	77.60%
Zone Lumens between 60-90 °	-	18.30%
Zone Lumens between 90-120 °	-	2.90%
Zone Lumens between 120-180 °	-	1.20%

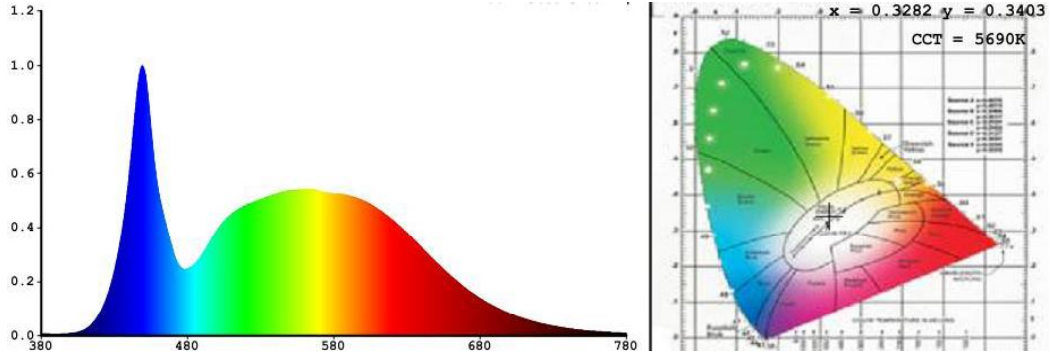
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
85	88	90	87	86	84	89	75
R9	R10	R11	R12	R13	R14	R15	-
26	71	87	67	85	94	81	-

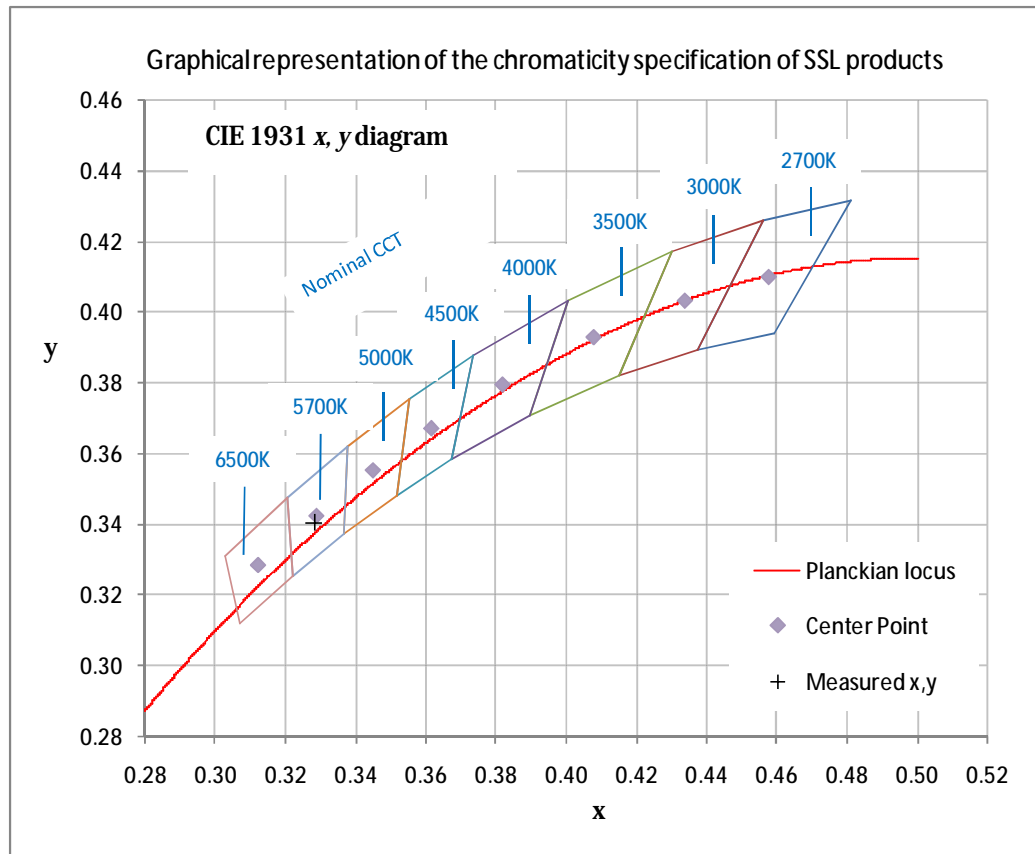
Note: N.A.

## 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	Circular w/ Sides
Spacing Criteria (0-180°)	1.26	Luminous Diameter	0.23 m
Spacing Criteria (90-270°)	1.26	Luminous Height	0.23 m
Spacing Criteria (Diagonal)	1.40		
Test Distance	29.65 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	2288.43	12.90	12.90
0-30	4870.61	27.40	27.40
0-40	7917.1	44.60	44.60
0-60	13769.52	77.60	77.60
0-80	16621.88	93.60	93.60
0-90	17030.31	95.90	95.90
10-90	16444.51	92.60	92.60
20-40	5628.68	31.70	31.70
20-50	8810.1	49.60	49.60
40-70	7685.6	43.30	43.30
60-80	2852.36	16.10	16.10
70-80	1019.17	5.70	5.70
80-90	408.43	2.30	2.30
90-110	360.49	2.00	2.00
90-120	507.73	2.90	2.90
90-130	605.18	3.40	3.40
90-150	687.82	3.90	3.90
90-180	721.09	4.10	4.10
110-180	360.60	2.00	2.00
0-180	17751.4	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

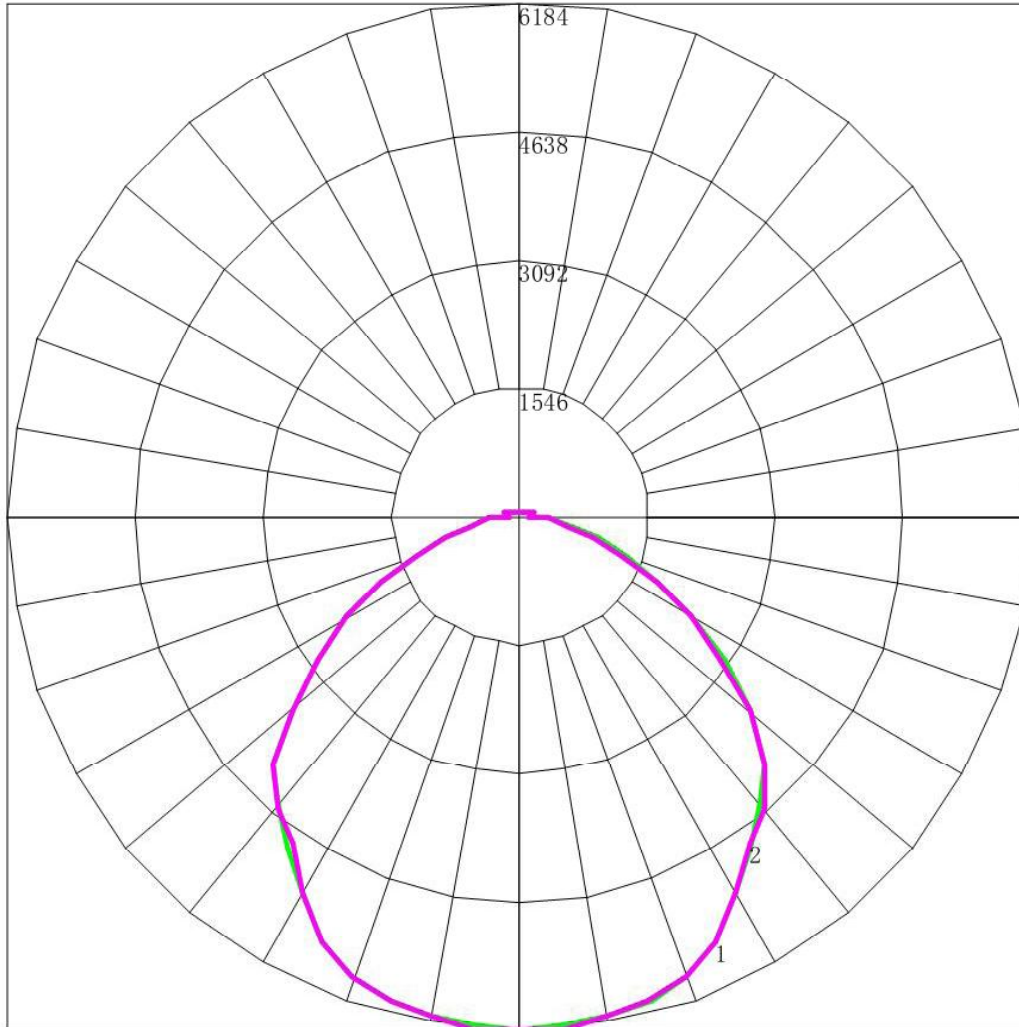
Zone	Lumens
0-10	585.80
10-20	1702.63
20-30	2582.19
30-40	3046.49
40-50	3181.42
50-60	2670.99
60-70	1833.19
70-80	1019.17
80-90	408.43
90-100	173.39
100-110	187.09
110-120	147.25
120-130	97.45
130-140	54.96
140-150	27.68
150-160	16.40
160-170	11.98
170-180	4.88





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4.5 Polar Curves

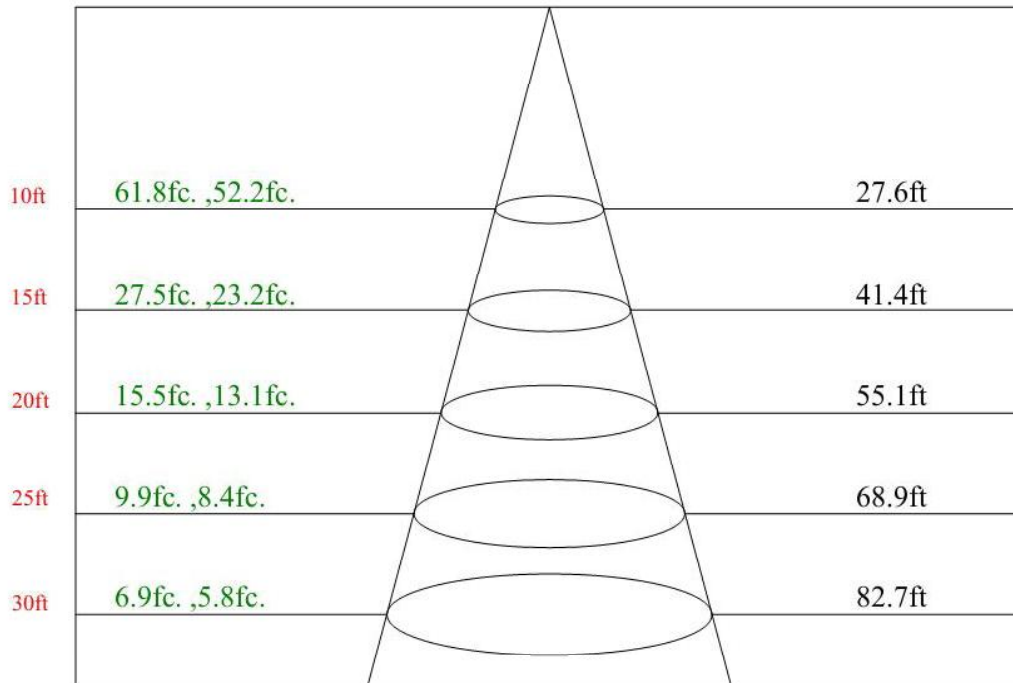


Maximum Candela = 6183.639 Located At Horizontal Angle = 90, Vertical Angle = 5  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



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4.6 Lux distance Curve

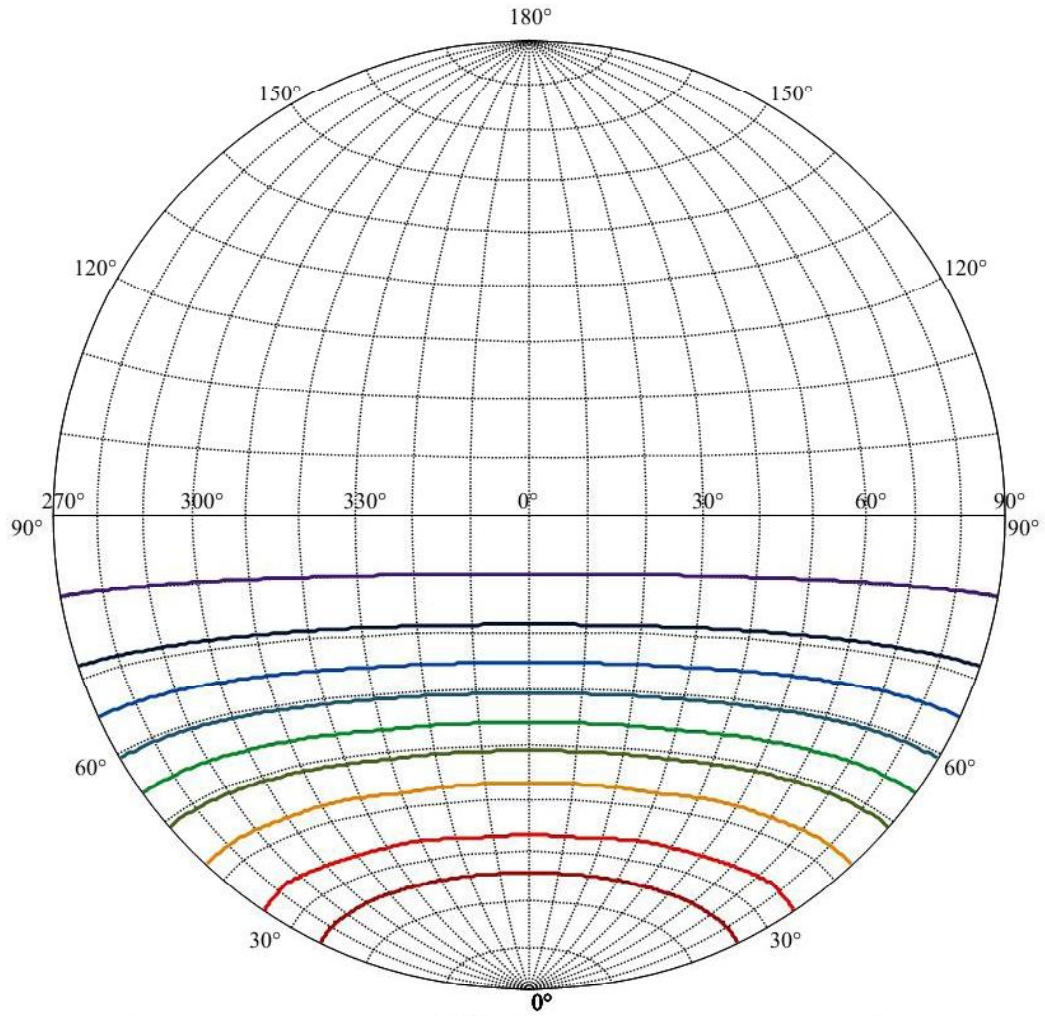




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4.7 ISO candela diagram on circular web



House

[Unit:cd]

Road

Imax:6183.64

- (10%Imax) 618.364
- (20%Imax) 1236.73
- (30%Imax) 1855.09
- (40%Imax) 2473.46
- (50%Imax) 3091.82
- (60%Imax) 3710.18
- (70%Imax) 4328.55
- (80%Imax) 4946.91
- (90%Imax) 5565.28

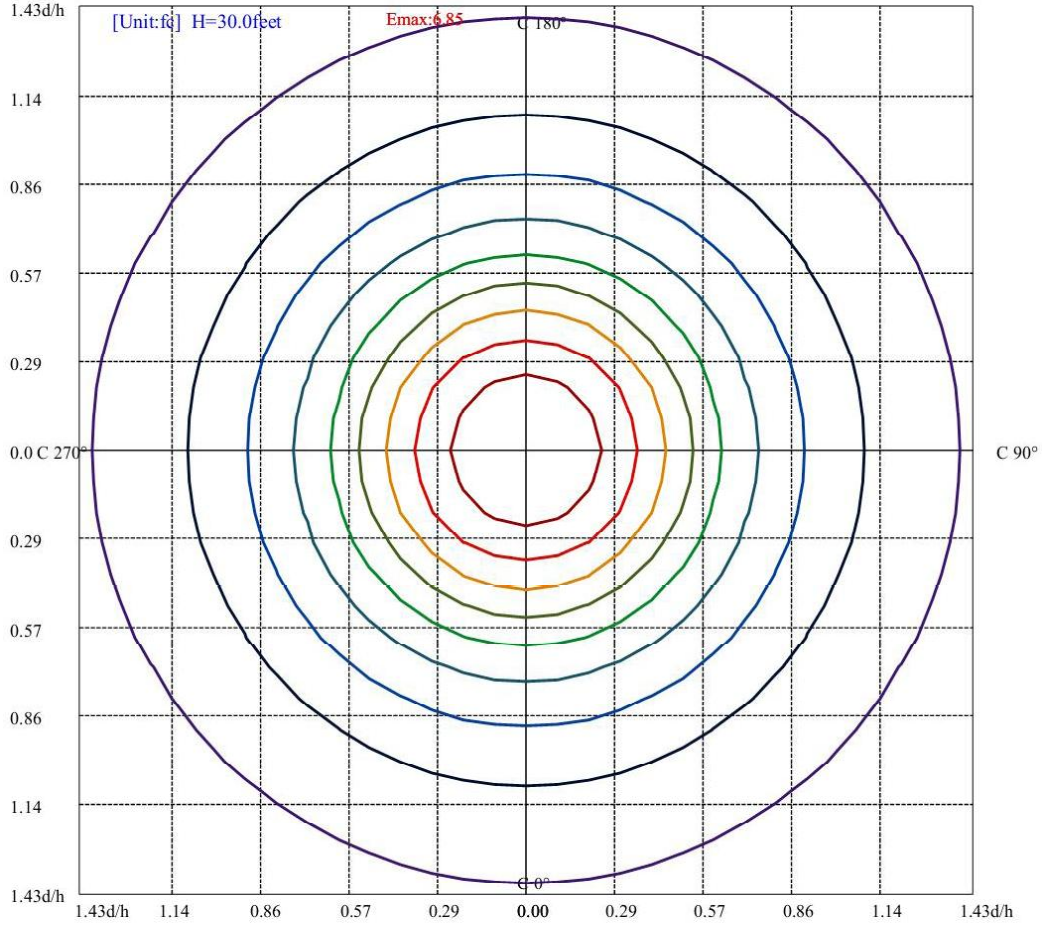




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### 4.8 ISO illuminance diagram



(10%Emax) 0.6850255	—
(20%Emax) 1.370053	—
(30%Emax) 2.05508	—
(40%Emax) 2.740095	—
(50%Emax) 3.425122	—
(60%Emax) 4.110149	—
(70%Emax) 4.795175	—
(80%Emax) 5.480202	—
(90%Emax) 6.165228	—



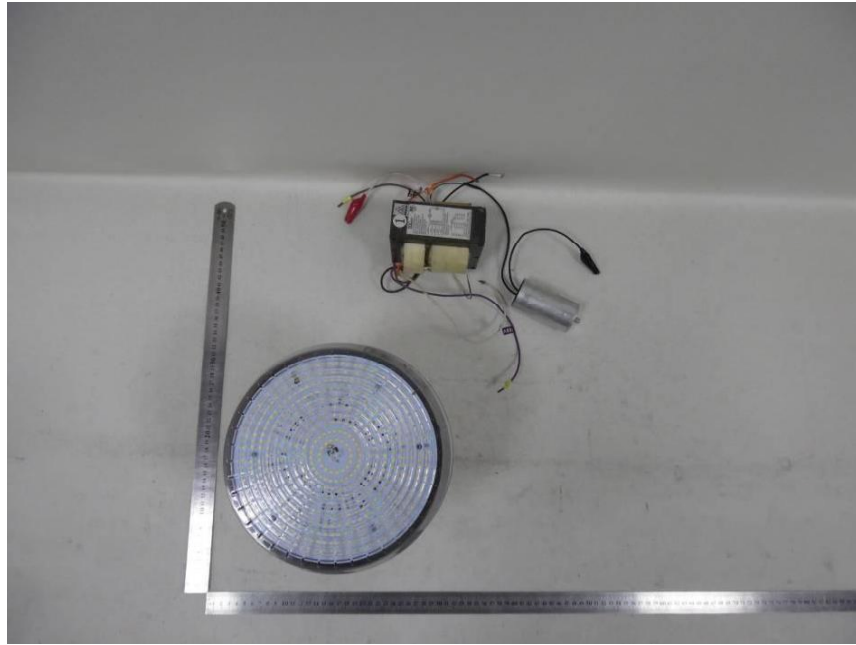
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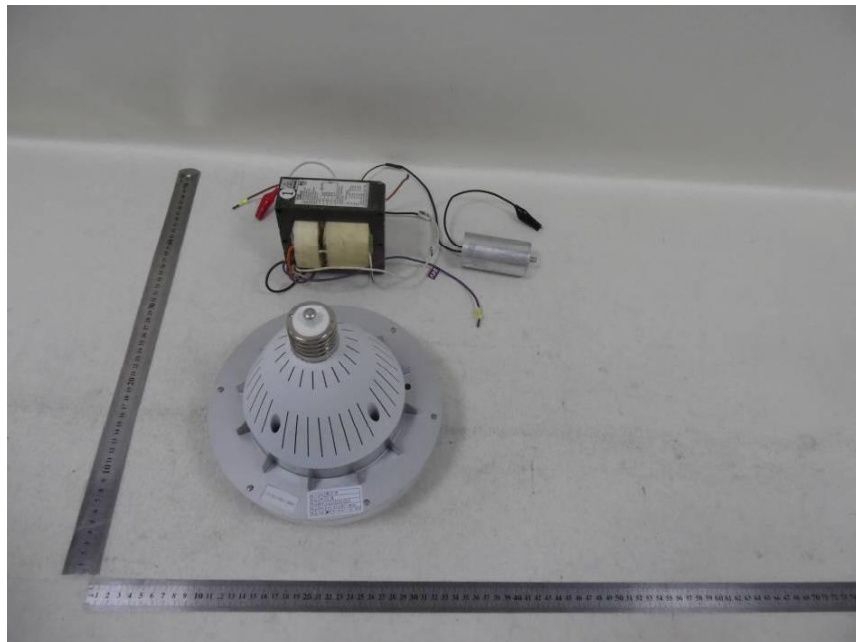
4.9 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	6162.987	6162.987	6162.987	6162.987	6162.987	6162.987	6162.987
<b>5</b>	6158.145	6160.146	6164.988	6161.710	6147.137	6140.656	6183.639
<b>10</b>	6111.035	6115.689	6110.844	6100.148	6084.603	6078.139	6115.093
<b>15</b>	6050.717	6041.516	6037.990	6033.543	6007.625	6000.719	6019.304
<b>20</b>	5909.388	5898.680	5915.158	5906.442	5896.790	5902.289	5912.970
<b>25</b>	5657.110	5640.309	5639.161	5630.358	5627.551	5634.152	5631.756
<b>30</b>	5213.752	5240.439	5206.962	5186.817	5210.441	5173.548	5191.041
<b>35</b>	4858.889	4886.781	4853.501	4842.144	4854.424	4797.146	4821.068
<b>40</b>	4507.548	4537.265	4524.187	4564.187	4551.485	4552.617	4567.975
<b>45</b>	4184.386	4162.966	4158.144	4179.718	4130.388	4190.295	4178.229
<b>50</b>	3606.743	3602.448	3600.901	3595.010	3573.123	3596.793	3592.073
<b>55</b>	3000.042	3002.509	2988.622	2982.805	2955.277	2980.545	2972.962
<b>60</b>	2386.738	2385.395	2391.516	2380.245	2380.728	2389.001	2386.367
<b>65</b>	1847.443	1846.549	1850.613	1838.025	1823.747	1827.633	1827.366
<b>70</b>	1358.516	1347.428	1348.188	1350.465	1349.854	1342.785	1342.315
<b>75</b>	955.708	948.170	948.789	945.525	941.676	942.492	940.574
<b>80</b>	627.482	625.546	624.551	620.712	620.533	621.506	613.575
<b>85</b>	351.296	344.815	351.311	352.933	359.336	358.441	368.610
<b>90</b>	182.759	179.620	176.309	173.296	164.385	154.503	136.257
<b>95</b>	149.826	149.278	146.823	146.293	144.951	142.105	137.180
<b>100</b>	175.494	174.588	174.160	176.391	178.772	178.225	181.735
<b>105</b>	184.124	180.330	180.476	180.565	183.070	181.097	185.030
<b>110</b>	168.934	167.016	166.170	166.211	168.223	166.868	167.718
<b>115</b>	148.285	148.529	149.134	148.734	149.694	147.966	149.088
<b>120</b>	128.473	127.357	128.511	128.466	128.206	126.870	126.898
<b>125</b>	109.012	108.234	108.043	108.351	109.283	107.196	108.619
<b>130</b>	89.552	89.065	87.927	88.436	89.106	88.705	89.461
<b>135</b>	69.476	70.294	69.593	69.619	69.506	70.279	70.919
<b>140</b>	54.022	54.490	54.186	54.076	53.146	52.992	52.728
<b>145</b>	42.795	43.178	42.939	42.601	42.317	42.105	42.006
<b>150</b>	36.719	36.686	36.469	36.292	36.023	35.949	35.635
<b>155</b>	34.342	34.310	34.268	34.139	34.030	33.935	33.921
<b>160</b>	37.600	37.457	37.460	37.370	37.231	37.068	36.997
<b>165</b>	42.883	42.827	42.830	42.734	42.669	42.676	42.753
<b>170</b>	48.078	48.131	48.068	47.966	47.910	47.847	48.070
<b>175</b>	52.833	52.840	52.800	52.692	52.558	52.404	52.684
<b>180</b>	54.539	54.539	54.539	54.539	54.539	54.539	54.539

**Appendix 1 Product Photo**



Picture 1



Picture 2

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