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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-8036M40-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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**Template No.:** LC-RT-PL/LM79-08/01  
**Test Note:**

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**Sep. 27, 2016**

**Reviewed by:**

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**Sep. 27, 2016**

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## 1. General

### 1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8036M40-MHBC
Rated Inputs	277V, 60Hz
Rated Power	116 W
Rated Light output	N/A
Declared CCT	4000K
Ballast	M58
LED Package, Array or Module	Model: SPMWHX1228FXXXXXXXXX, manufactured by SAMSUNG ELECTRONICS CO., LTD
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	277.00V~60Hz
Input Current(A)	0.873	0.872
Total Power(W)	119.7	120.53
Power Factor	0.495	0.499
I-THD(%)	46.09	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	11046.89
Luminaire Efficacy(Lm/W)	-	91.65
Correlated Color Temperature (CCT)(K)	3877	-
Color Rendering Index (CRI)	82.7	-
R9	8	-
Chromaticity Coordinate (x,y)	x=0.3861 y=0.3806	-
Chromaticity Coordinate (u,v)	u=0.2273 v=0.3361	-
Chromaticity Coordinate (u',v')	u'= 0.2273 v'=0.5041	-
Duv	0.00124	-
Central intensity(cd)	-	3581.657
Beam angle	-	99.4°
Spacing Criteria(0-180°)	-	1.04
Spacing Criteria(90-270°)	-	1.06
Zone Lumens between 0-60 °	-	60.80%
Zone Lumens between60-90 °	-	23.30%
Zone Lumens between 90-120 °	-	12.40%
Zone Lumens between 120-180 °	-	3.50%

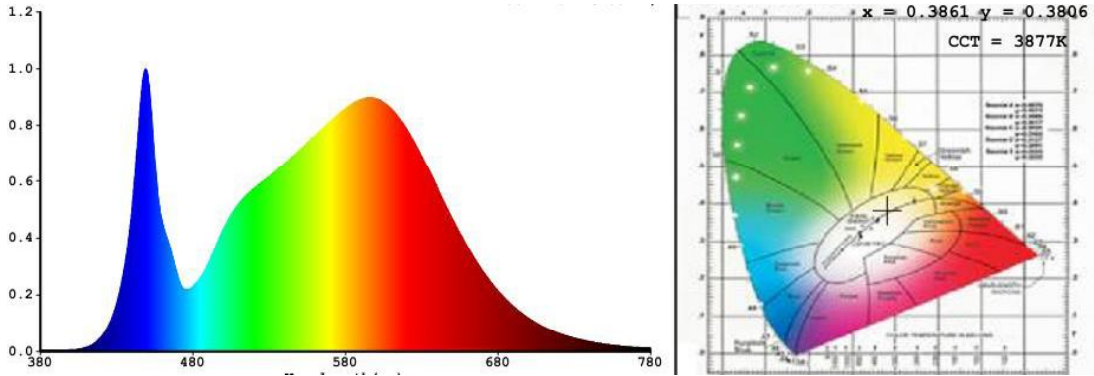
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
81	88	94	82	81	84	86	65
R9	R10	R11	R12	R13	R14	R15	-
8	73	81	64	83	97	75	-

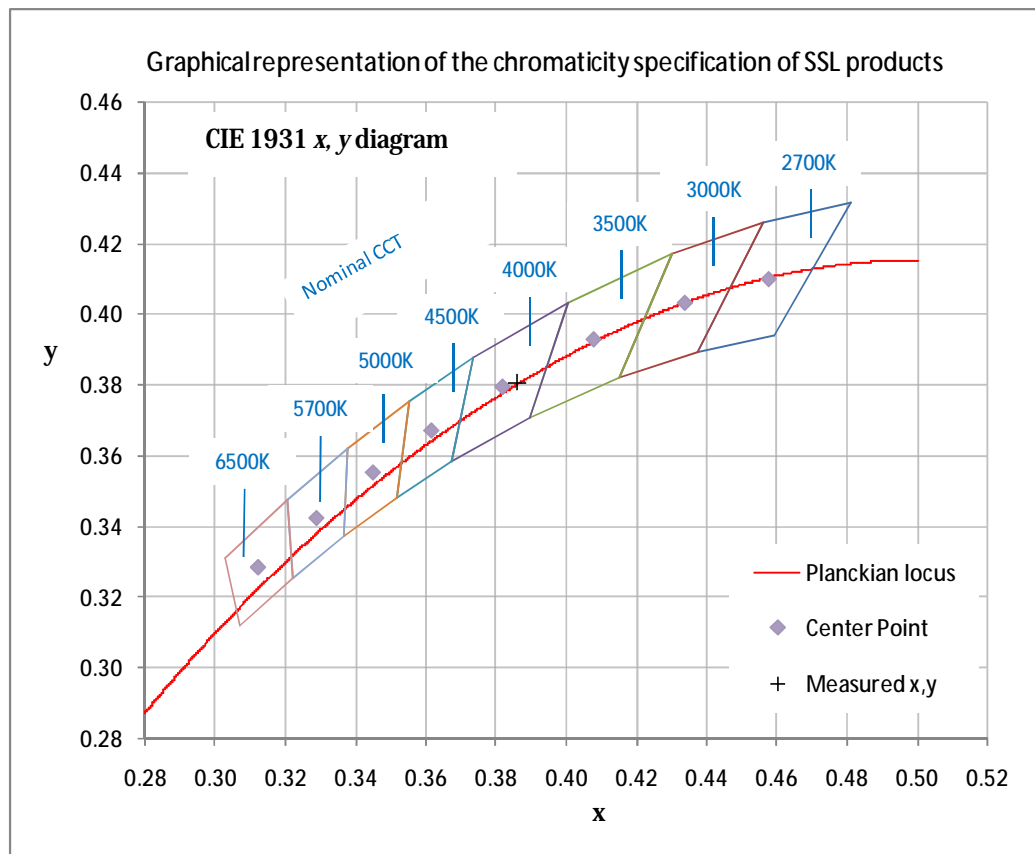
Note: N.A.

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram





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**4.3 Goniometry Test Data**

CIE Type	Semi-Direct	Basic Luminous Shape	Circular w/ Sides
Spacing Criteria (0-180°)	1.04	Luminous Diameter	0.15 m
Spacing Criteria (90-270°)	1.06	Luminous Height	0.05 m
Spacing Criteria (Diagonal)	1.28		
Test Distance	29.54 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	1142.91	10.30	10.30
0-30	2356.49	21.30	21.30
0-40	3832.65	34.70	34.70
0-60	6716.52	60.80	60.80
0-80	8609.59	77.90	77.90
0-90	9286.48	84.10	84.10
10-90	8963.00	81.10	81.10
20-40	2689.74	24.30	24.30
20-50	4247.01	38.40	38.40
40-70	3940.78	35.70	35.70
60-80	1893.08	17.10	17.10
70-80	836.16	7.60	7.60
80-90	676.89	6.10	6.10
90-110	1041.93	9.40	9.40
90-120	1364.77	12.40	12.40
90-130	1569.35	14.20	14.20
90-150	1732.9	15.70	15.70
90-180	1760.41	15.90	15.90
110-180	718.48	6.50	6.50
0-180	11046.89	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

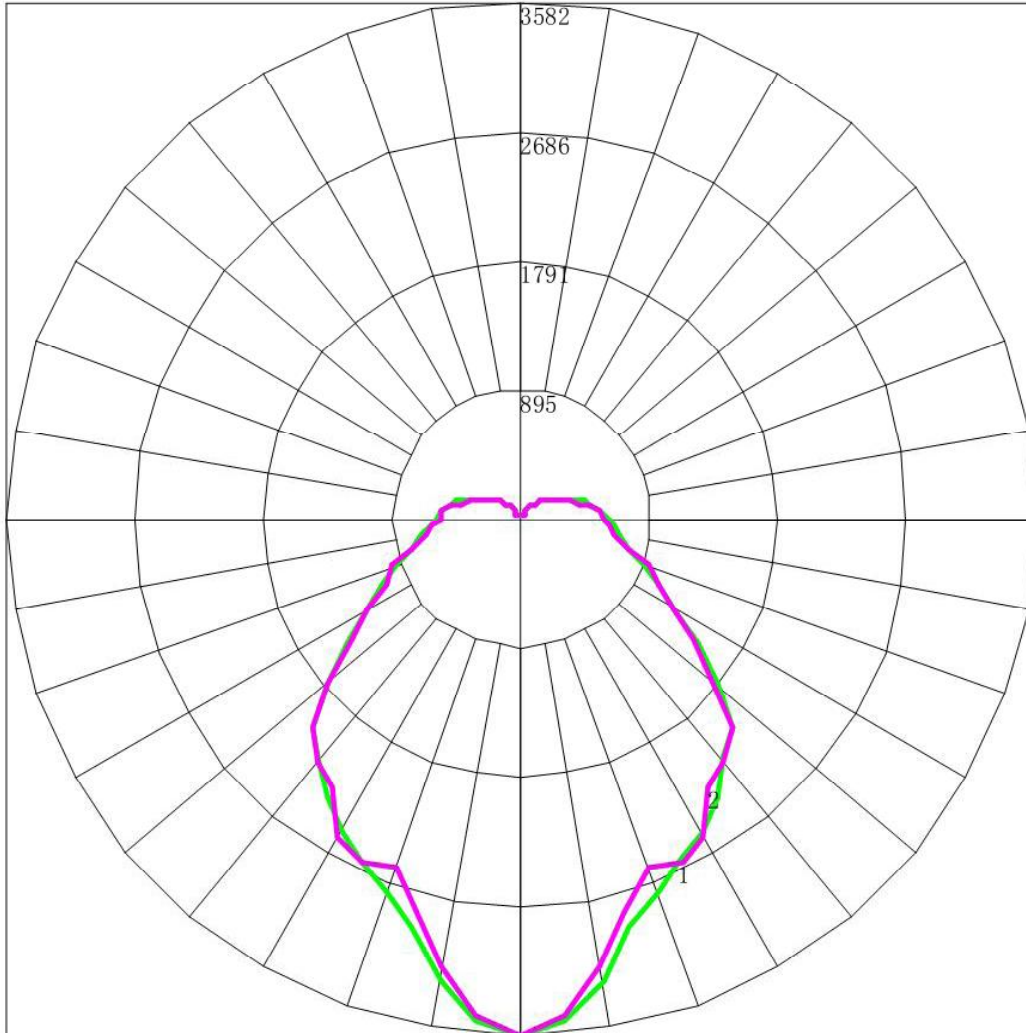
Zone	Lumens
0-10	323.48
10-20	819.42
20-30	1213.58
30-40	1476.17
40-50	1557.26
50-60	1326.6
60-70	1056.92
70-80	836.16
80-90	676.89
90-100	585.52
100-110	456.41
110-120	322.84
120-130	204.58
130-140	113.77
140-150	49.78
150-160	18.61
160-170	6.90
170-180	2.00





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4.5 Polar Curves

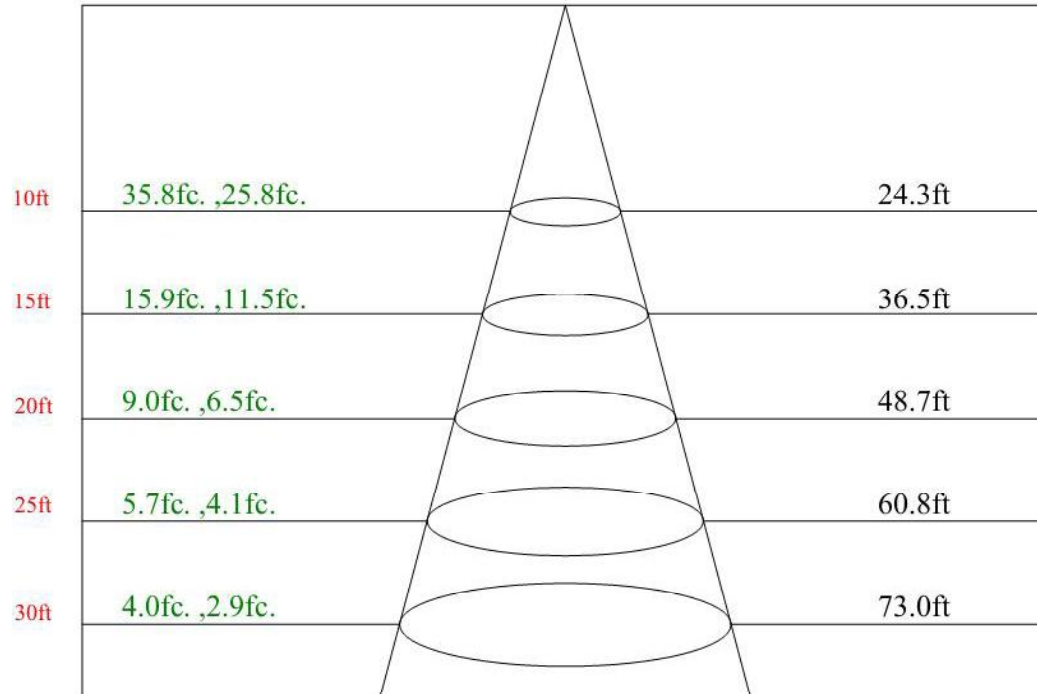


Maximum Candela = 3581.657 Located At Horizontal Angle = 0, Vertical Angle = 0  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



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4.6 Lux distance Curve

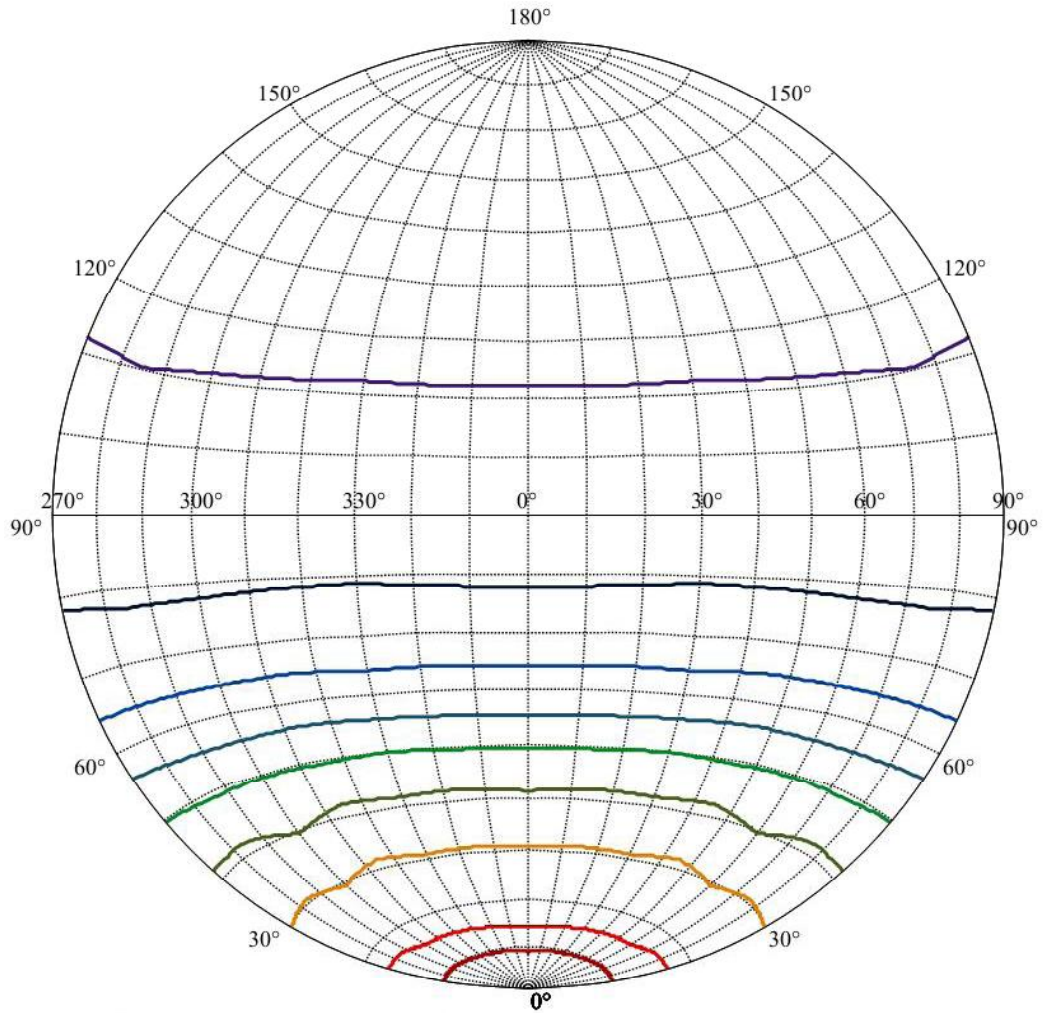




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4.7 ISO candela diagram on circular web



House

[Unit:cd]

Road

Imax:3581.66

- (10%Imax) 358.166
- (20%Imax) 716.331
- (30%Imax) 1074.5
- (40%Imax) 1432.66
- (50%Imax) 1790.83
- (60%Imax) 2148.99
- (70%Imax) 2507.16
- (80%Imax) 2865.33
- (90%Imax) 3223.49

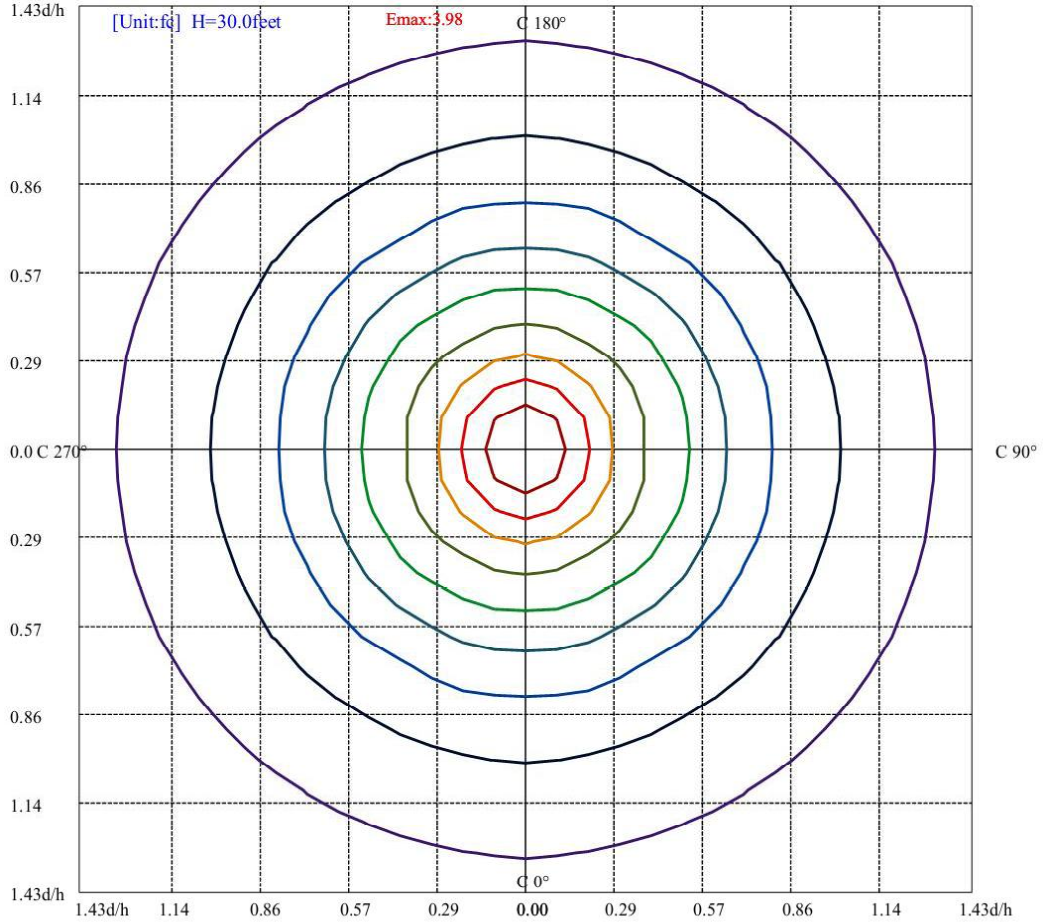




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4.8 ISO illuminance diagram



(10%Emax) 0.3981057	—
(20%Emax) 0.7962126	—
(30%Emax) 1.194323	—
(40%Emax) 1.592423	—
(50%Emax) 1.990534	—
(60%Emax) 2.388634	—
(70%Emax) 2.786746	—
(80%Emax) 3.184846	—
(90%Emax) 3.582957	—



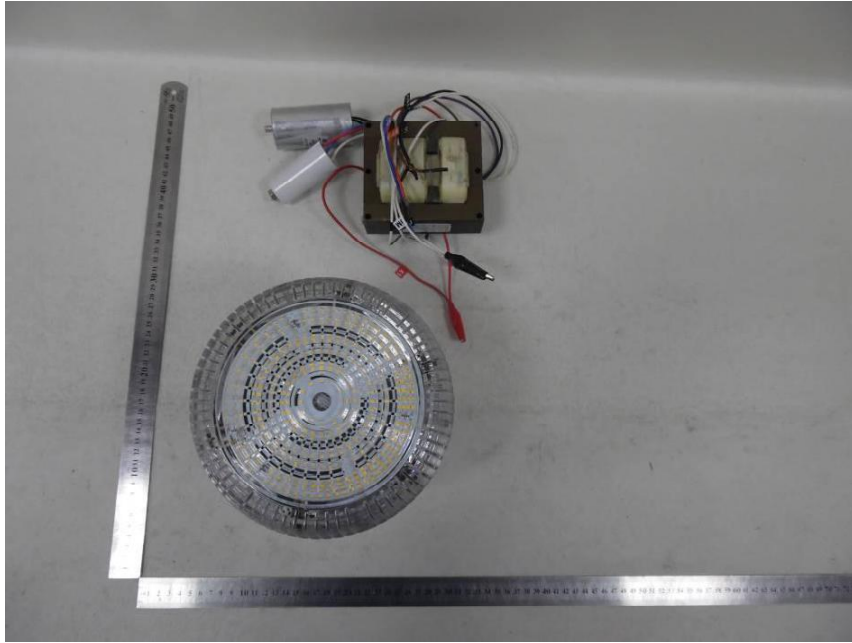
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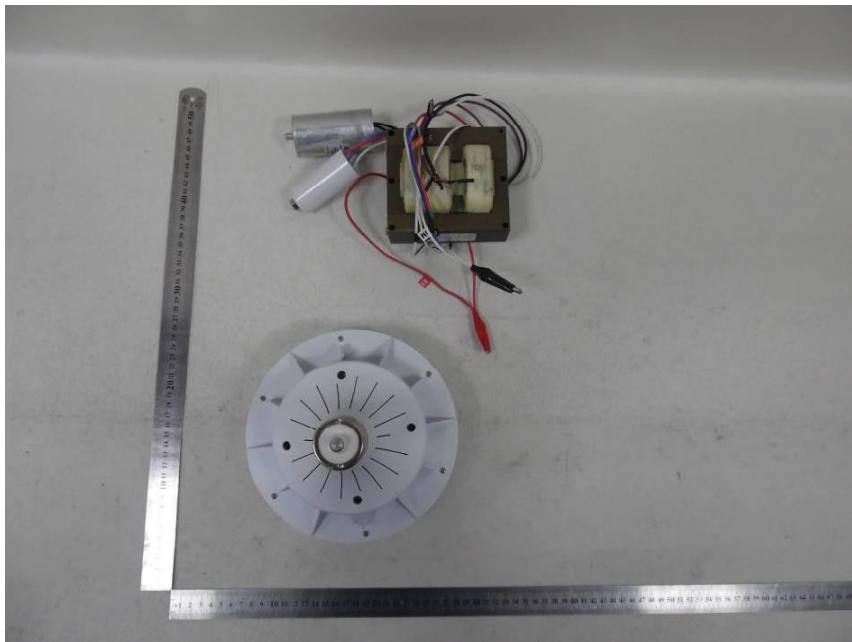
4.9 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	3581.657	3581.657	3581.657	3581.657	3581.657	3581.657	3581.657
<b>5</b>	3481.385	3490.567	3492.063	3479.397	3479.769	3471.557	3446.509
<b>10</b>	3236.861	3235.085	3220.664	3198.067	3189.119	3180.534	3156.656
<b>15</b>	2939.122	2929.691	2880.888	2877.210	2869.119	2839.138	2808.138
<b>20</b>	2761.447	2741.051	2693.201	2706.119	2682.379	2632.326	2573.475
<b>25</b>	2613.677	2634.588	2621.194	2661.568	2655.706	2638.144	2630.836
<b>30</b>	2503.290	2525.682	2492.140	2575.114	2536.743	2563.098	2551.746
<b>35</b>	2365.195	2391.876	2322.364	2384.332	2345.677	2323.349	2263.632
<b>40</b>	2181.802	2201.887	2137.360	2211.392	2196.976	2210.397	2184.976
<b>45</b>	2063.059	2051.442	2020.243	2070.428	2056.271	2067.284	2061.561
<b>50</b>	1770.906	1729.795	1764.806	1761.262	1790.190	1762.562	1760.192
<b>55</b>	1493.442	1458.466	1465.460	1488.365	1471.384	1458.356	1442.962
<b>60</b>	1236.120	1230.510	1227.661	1246.974	1225.788	1231.317	1220.814
<b>65</b>	1050.748	1050.368	1052.515	1066.400	1043.223	1055.468	1044.512
<b>70</b>	926.332	911.962	920.696	936.998	932.703	933.607	941.478
<b>75</b>	780.409	767.440	768.215	790.809	790.759	792.318	776.388
<b>80</b>	686.865	659.459	669.098	680.195	691.266	667.692	660.490
<b>85</b>	637.829	595.811	613.282	610.319	641.850	606.602	622.640
<b>90</b>	600.183	555.719	565.039	572.988	597.199	576.758	572.492
<b>95</b>	548.067	524.843	531.574	541.287	551.724	545.169	543.159
<b>100</b>	494.501	476.083	481.927	495.061	501.970	496.076	489.708
<b>105</b>	451.445	418.720	421.482	433.750	436.644	428.399	430.911
<b>110</b>	382.486	360.382	370.312	373.912	381.823	377.375	374.636
<b>115</b>	322.851	316.723	321.847	326.474	330.539	329.655	340.088
<b>120</b>	271.483	263.654	275.302	273.246	273.729	274.410	283.160
<b>125</b>	223.458	216.581	229.969	226.064	231.851	225.096	233.664
<b>130</b>	186.515	174.923	186.189	184.422	186.270	181.733	191.338
<b>135</b>	142.976	139.706	144.067	146.360	148.601	148.078	146.360
<b>140</b>	110.300	108.814	108.985	113.424	109.864	110.256	109.249
<b>145</b>	75.688	74.058	73.678	77.053	76.245	76.757	73.789
<b>150</b>	52.511	52.168	51.942	53.186	52.808	52.353	50.974
<b>155</b>	38.350	37.246	37.758	38.933	39.041	38.946	38.372
<b>160</b>	29.554	29.059	28.902	29.849	30.099	29.983	29.333
<b>165</b>	23.441	23.258	22.860	23.228	22.797	22.569	21.902
<b>170</b>	20.758	20.650	20.371	20.653	20.517	20.489	20.337
<b>175</b>	21.374	21.250	20.956	21.225	21.065	20.882	20.685
<b>180</b>	21.523	21.523	21.523	21.523	21.523	21.523	21.523

## Appendix 1 Product Photo



Picture 1



Picture 2

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