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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-8032M50-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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## 1. General

### 1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8032M50-MHBC
Rated Inputs	277V, 60Hz
Rated Power	210 W
Rated Light output	N/A
Declared CCT	5000K
Ballast	M59
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ; 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	277.01V~60Hz	277.00V~60Hz
Input Current(A)	1.306	1.299
Total Power(W)	210.6	211.37
Power Factor	0.582	0.590
I-THD(%)	32.76	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	17892.34
Luminaire Efficacy(Lm/W)	-	84.65
Correlated Color Temperature (CCT)(K)	5046	-
Color Rendering Index (CRI)	83.6	-
R9	12	-
Chromaticity Coordinate (x,y)	x=0.3439 y=0.3516	-
Chromaticity Coordinate (u,v)	u=0. 2106 v=0.3230	-
Chromaticity Coordinate (u',v')	u'= 0.2106 v'=0.4845	-
Duv	0.00046	-
Central intensity(cd)	-	6416.541
Beam angle	-	106.2°
Spacing Criteria(0-180°)	-	1.24
Spacing Criteria(90-270°)	-	1.26
Zone Lumens between 0-60 °	-	78.30%
Zone Lumens between 60-90 °	-	17.80%
Zone Lumens between 90-120 °	-	2.80%
Zone Lumens between 120-180 °	-	1.10%

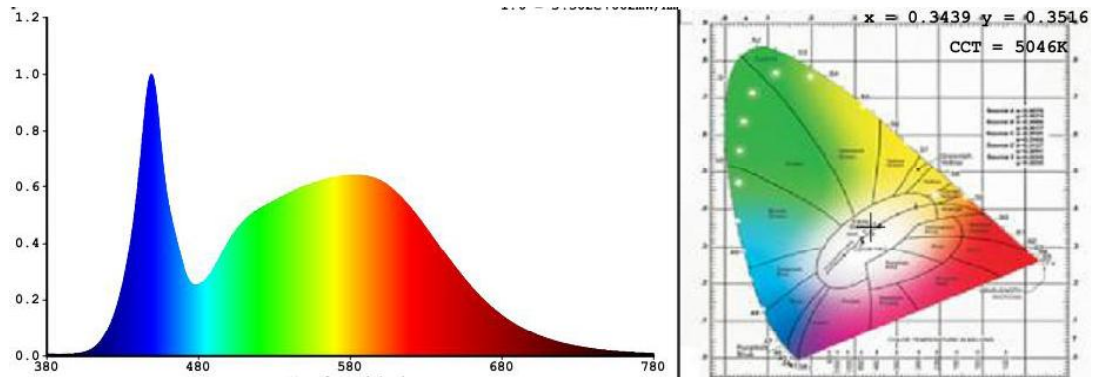
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
82	88	91	84	84	83	87	69
R9	R10	R11	R12	R13	R14	R15	-
12	71	84	68	83	95	77	-

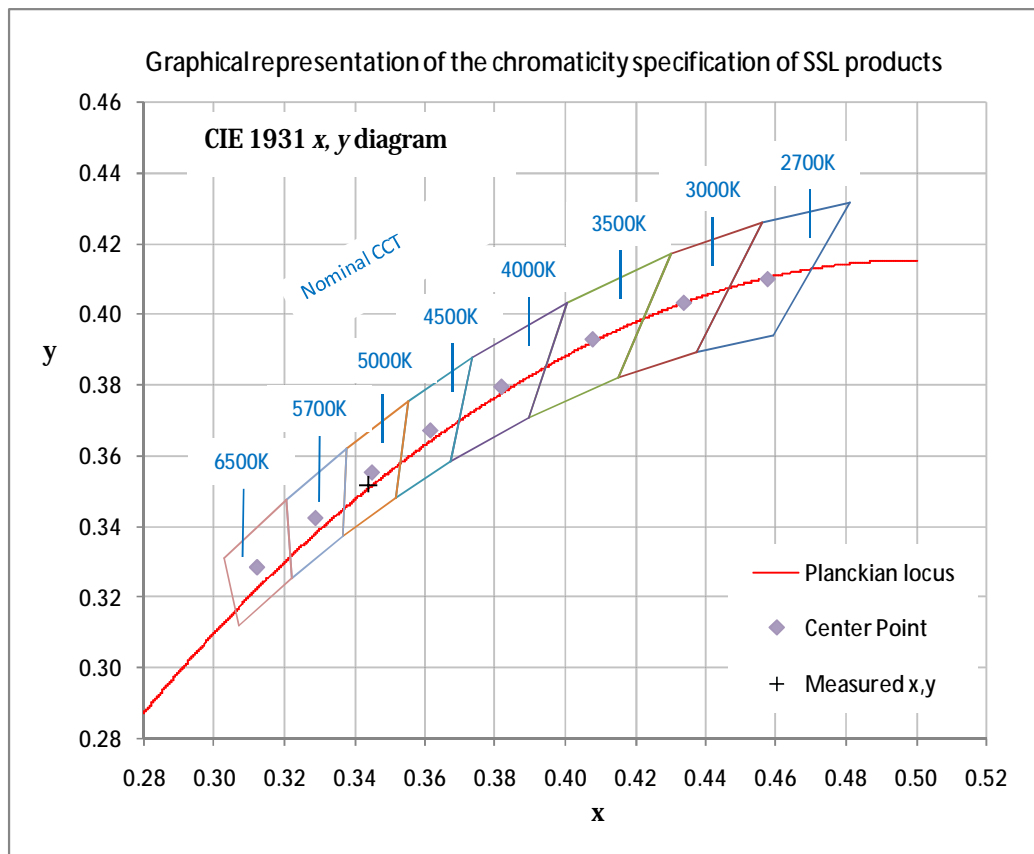
Note: N.A.

## 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°)	1.24	Luminous Diameter	0.22 m
Spacing Criteria (90-270°)	1.26	Luminous Height	0.03 m
Spacing Criteria (Diagonal)	1.38		
Test Distance	29.54 m		

#### 4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	2332.65	13.00	13.00
0-30	4975.29	27.80	27.80
0-40	8080.98	45.20	45.20
0-60	14006.88	78.30	78.30
0-80	16808.26	93.90	93.90
0-90	17200.68	96.10	96.10
10-90	16598.94	92.80	92.80
20-40	5748.33	32.10	32.10
20-50	8983.69	50.20	50.20
40-70	7744.75	43.30	43.30
60-80	2801.38	15.70	15.70
70-80	982.53	5.50	5.50
80-90	392.42	2.20	2.20
90-110	366.56	2.00	2.00
90-120	504.82	2.80	2.80
90-130	594.20	3.30	3.30
90-150	666.11	3.70	3.70
90-180	691.67	3.90	3.90
110-180	325.12	1.80	1.80
0-180	17892.35	100.00	100.00

Total Luminaire Efficiency = 100.00%

#### ZONAL LUMEN SUMMARY

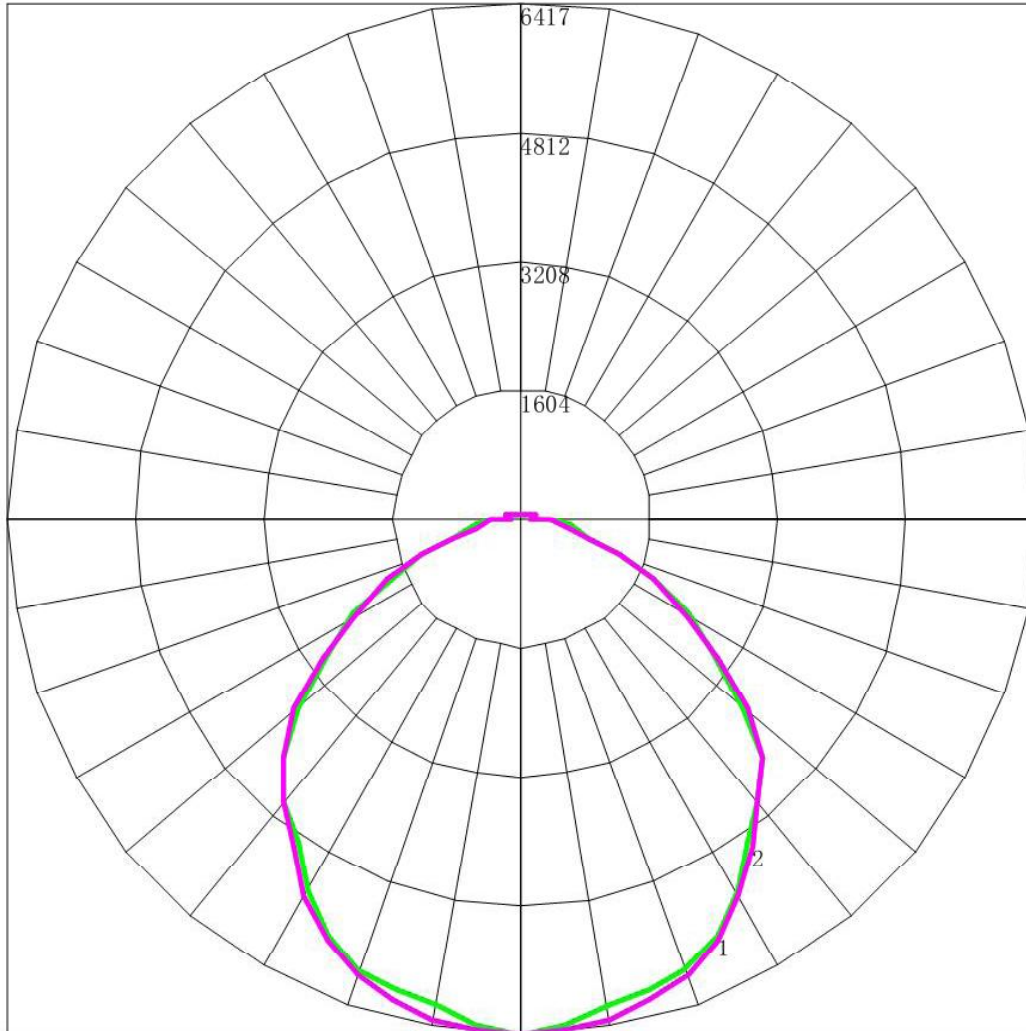
Zone	Lumens
0-10	601.74
10-20	1730.9
20-30	2642.64
30-40	3105.69
40-50	3235.36
50-60	2690.54
60-70	1818.85
70-80	982.53
80-90	392.42
90-100	180.97
100-110	185.59
110-120	138.27
120-130	89.38
130-140	49.40
140-150	22.50
150-160	12.36
160-170	9.25
170-180	3.96





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#### 4.5 Polar Curves



Maximum Candela = 6416.542 Located At Horizontal Angle = 0, Vertical Angle = 0

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

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



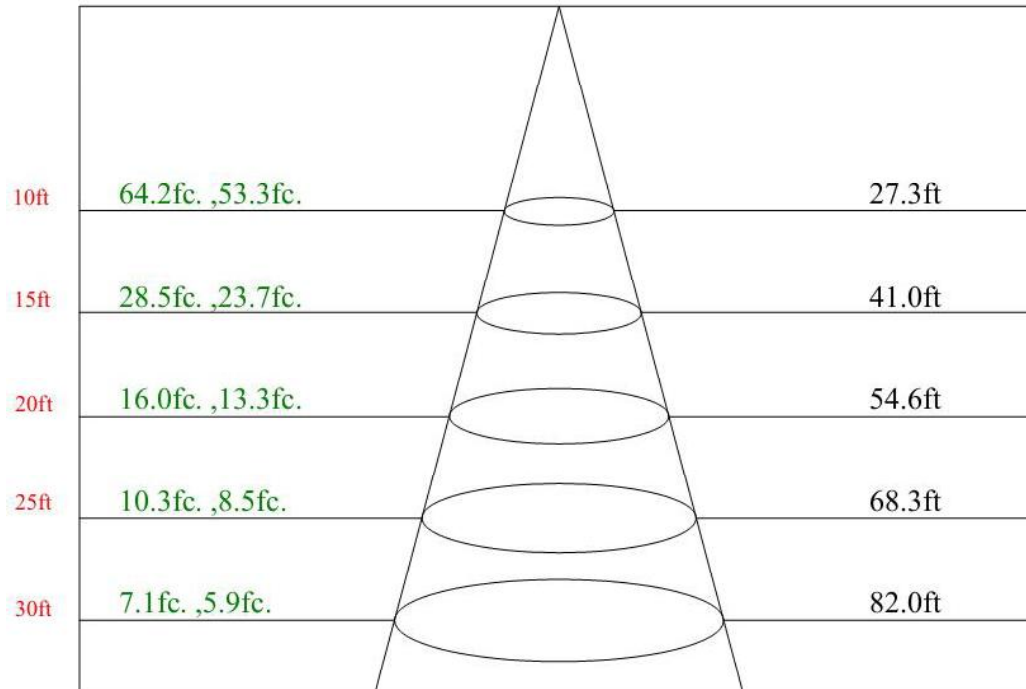
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#### 4.6 Lux distance Curve

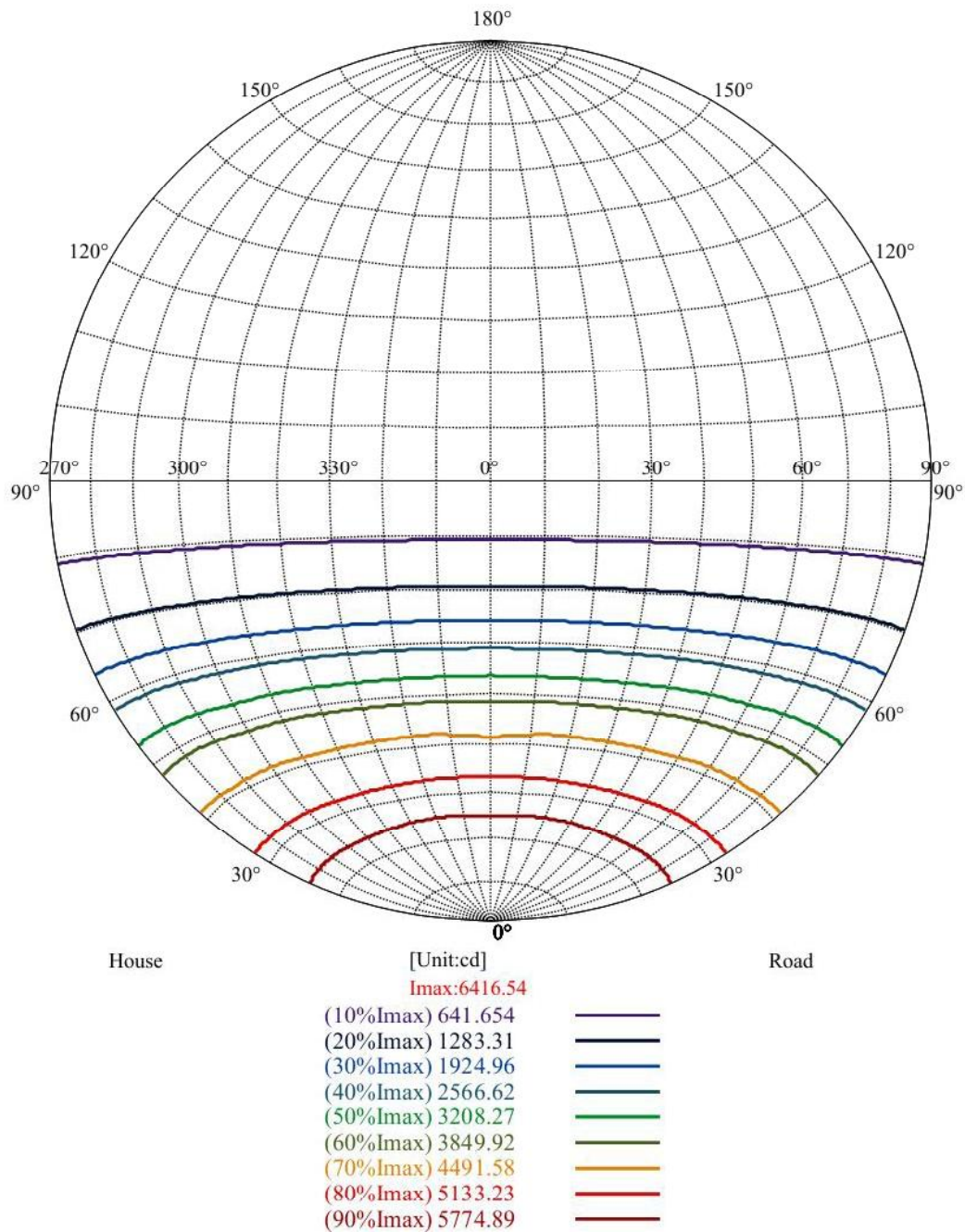
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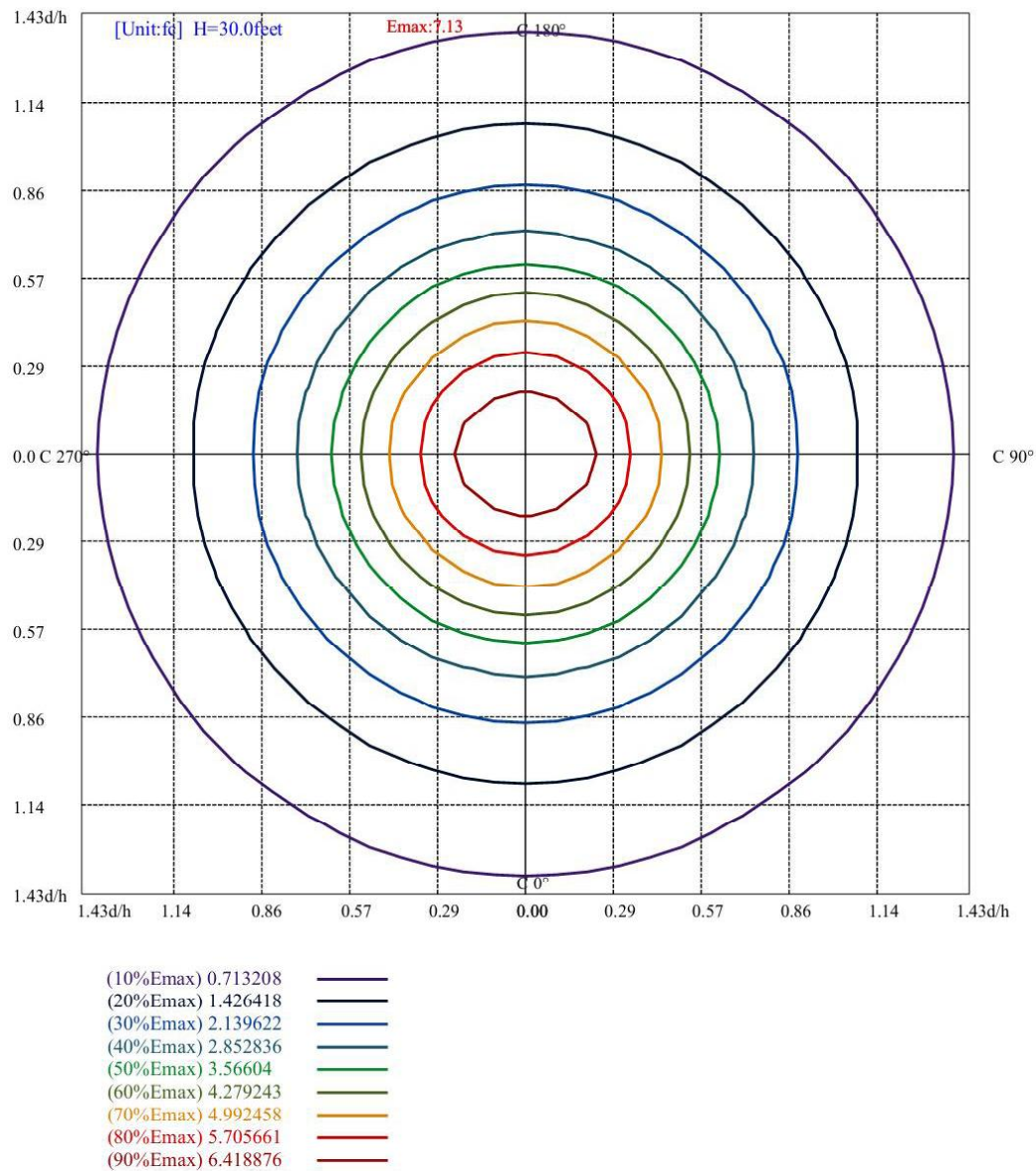
Ref. No.: LCZM16080226 , V1.0



#### 4.7 ISO candela diagram on circular web



#### 4.8 ISO illuminance diagram

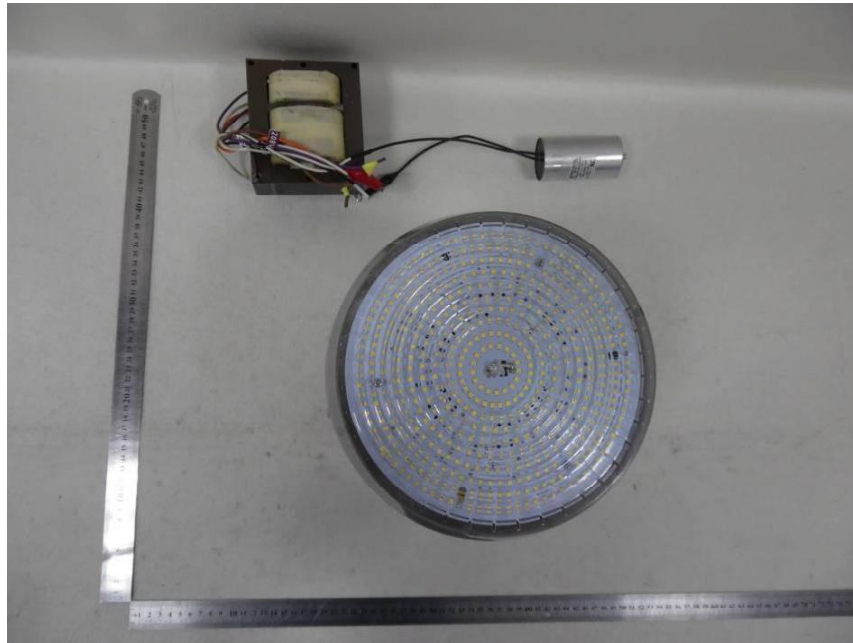




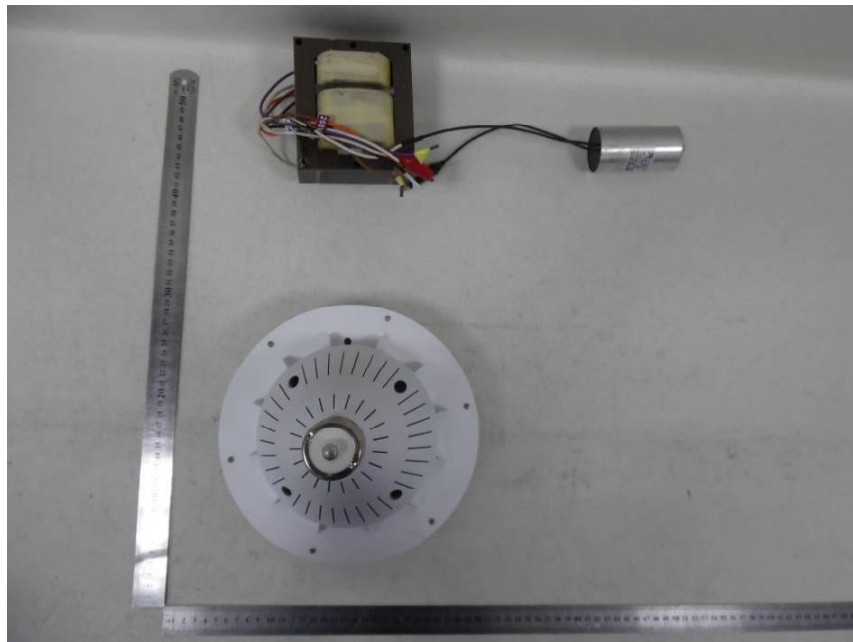
#### 4.9 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	6416.542	6416.542	6416.542	6416.542	6416.542	6416.542	6416.542
5	6302.843	6306.382	6322.729	6348.271	6355.808	6369.785	6360.001
10	6164.410	6160.317	6179.399	6211.900	6250.276	6277.479	6309.160
15	6083.259	6073.407	6076.654	6116.186	6148.178	6171.875	6178.112
20	5986.920	5978.150	5978.451	5993.309	6015.651	6043.635	6016.822
25	5733.053	5734.752	5731.139	5739.078	5776.096	5797.992	5781.022
30	5350.300	5347.770	5361.017	5371.944	5394.169	5426.816	5423.818
35	4874.245	4860.787	4880.794	4901.223	4932.801	4981.258	4988.159
40	4587.397	4560.557	4605.331	4599.307	4641.470	4674.343	4598.959
45	4216.361	4221.436	4221.213	4240.288	4234.591	4272.907	4213.266
50	3633.986	3676.258	3646.243	3686.367	3671.262	3689.239	3678.115
55	2946.158	2971.938	2936.890	2969.835	2973.263	2989.936	3021.998
60	2415.858	2416.790	2401.609	2425.721	2424.531	2437.385	2425.488
65	1790.738	1796.435	1791.255	1792.083	1812.263	1826.279	1839.365
70	1307.914	1310.193	1310.834	1322.682	1324.265	1333.640	1325.428
75	905.025	904.140	898.700	905.606	912.742	912.411	913.086
80	586.845	586.148	585.452	591.057	591.590	593.006	593.486
85	357.670	356.712	359.072	357.272	356.682	347.237	351.463
90	141.428	138.093	141.825	143.191	143.897	145.083	118.163
95	168.247	165.604	166.291	167.792	167.609	167.752	171.283
100	190.986	188.271	185.658	188.257	190.960	188.557	186.316
105	177.967	177.085	175.991	176.509	176.069	177.006	175.666
110	159.177	159.417	159.729	160.770	161.342	159.509	157.214
115	138.477	138.472	138.952	139.433	140.652	139.581	139.814
120	118.688	117.365	117.276	117.210	118.921	118.004	116.760
125	100.288	98.597	97.286	97.569	99.628	99.085	98.264
130	82.583	82.550	81.540	82.054	83.026	83.129	83.099
135	62.013	62.728	63.175	62.634	62.369	63.484	64.385
140	45.132	45.637	45.313	45.311	44.898	44.800	44.705
145	34.413	34.378	34.624	34.406	34.264	34.484	34.625
150	28.468	28.392	28.238	28.194	28.094	28.140	27.744
155	25.170	25.312	25.392	25.468	25.556	25.572	25.508
160	27.383	27.480	27.564	27.737	27.876	27.965	27.787
165	32.764	32.816	32.909	33.102	33.325	33.431	33.441
170	38.058	37.957	38.121	38.270	38.380	38.545	38.569
175	42.615	42.643	42.749	42.893	42.953	43.221	43.347
180	45.319	45.319	45.319	45.319	45.319	45.319	45.319

## Appendix 1 Product Photo



Picture 1



Picture 2

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