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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-8035E57-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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1. General

1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8035E57-MHBC
Rated Inputs	277V, 60Hz
Rated Power	78 W
Rated Light output	N/A
Declared CCT	5700K
Ballast	M57
LED Package, Array or Module	Model: SPMWHX1228FXXXXXXXXX, 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 ± 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	277.02V~60Hz
Input Current(A)	0.441	0.438
Total Power(W)	83.27	83.46
Power Factor	0.682	0.688
I-THD(%)	41.65	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	5189.79
Luminaire Efficacy(Lm/W)	-	62.18
Correlated Color Temperature (CCT)(K)	5491	-
Color Rendering Index (CRI)	84.9	-
R9	23	-
Chromaticity Coordinate (x,y)	x=0.3326 y=0.3453	-
Chromaticity Coordinate (u,v)	u=0.2054 v=0.3198	-
Chromaticity Coordinate (u',v')	u'=0.2054 v'=0.4797	-
Duv	0.00209	-
Central intensity(cd)	-	1284.411
Beam angle	-	104.2°
Spacing Criteria(0-180°)	-	1.34
Spacing Criteria(90-270°)	-	1.34
Zone Lumens between 0-60 °	-	57.10%
Zone Lumens between 60-90 °	-	20.10%
Zone Lumens between 90-120 °	-	11.90%
Zone Lumens between 120-180 °	-	2.70%

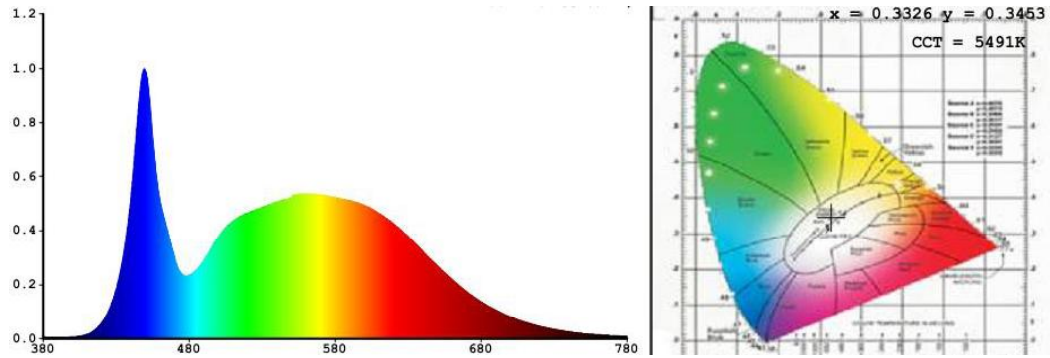
3.3 Color Rendering Details

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	85	65	84	95	80	-

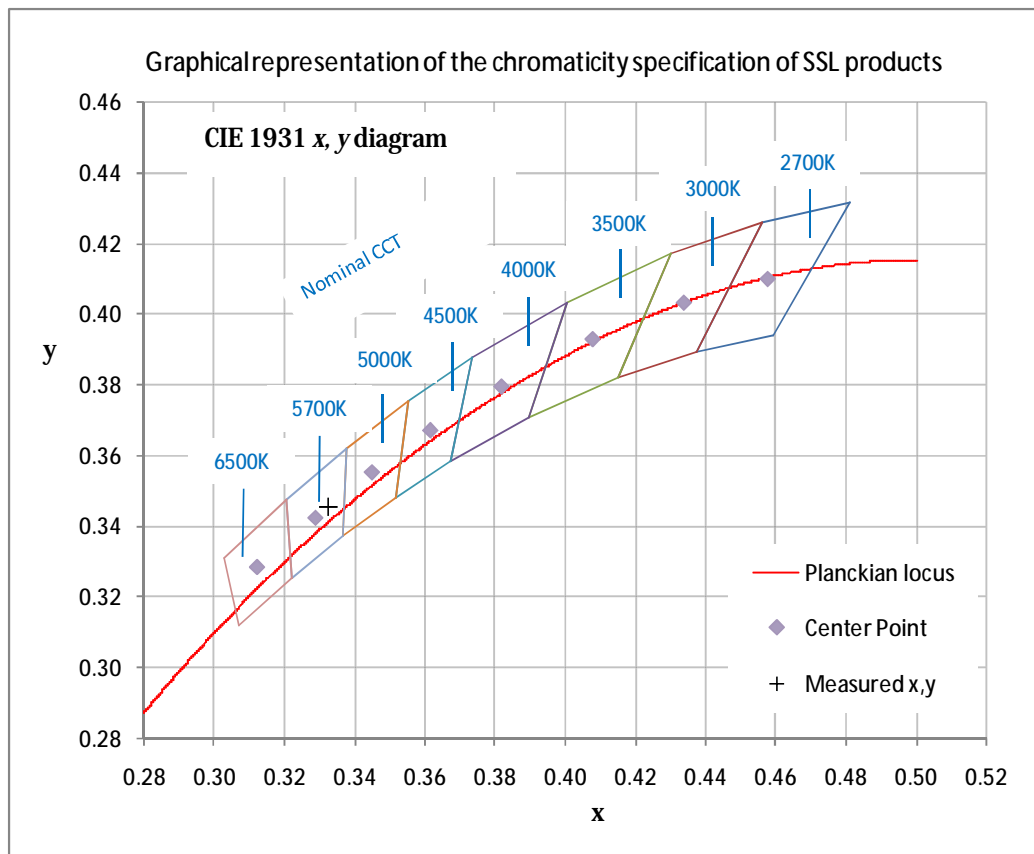
Note: N.A.

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°)	1.34	Luminous Diameter	0.20 m
Spacing Criteria (90-270°)	1.34	Luminous Height	0.05 m
Spacing Criteria (Diagonal)	1.40		
Test Distance	29.65 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	520.03	10.00	10.00
0-30	1091.87	21.00	21.00
0-40	1781.00	34.30	34.30
0-60	2962.07	57.10	57.10
0-80	3759.46	72.40	72.40
0-90	4004.4	77.20	77.20
10-90	3874.77	74.70	74.70
20-40	1260.96	24.30	24.30
20-50	1918.85	37.00	37.00
40-70	1631.14	31.40	31.40
60-80	797.40	15.40	15.40
70-80	347.33	6.70	6.70
80-90	244.93	4.70	4.70
90-110	425.20	8.20	8.20
90-120	615.31	11.90	11.90
90-130	775.45	14.90	14.90
90-150	1045.77	20.20	20.20
90-180	1185.4	22.80	22.80
110-180	760.20	14.60	14.60
0-180	5189.79	100.00	100.00

Total Luminaire Efficiency = 100.00%

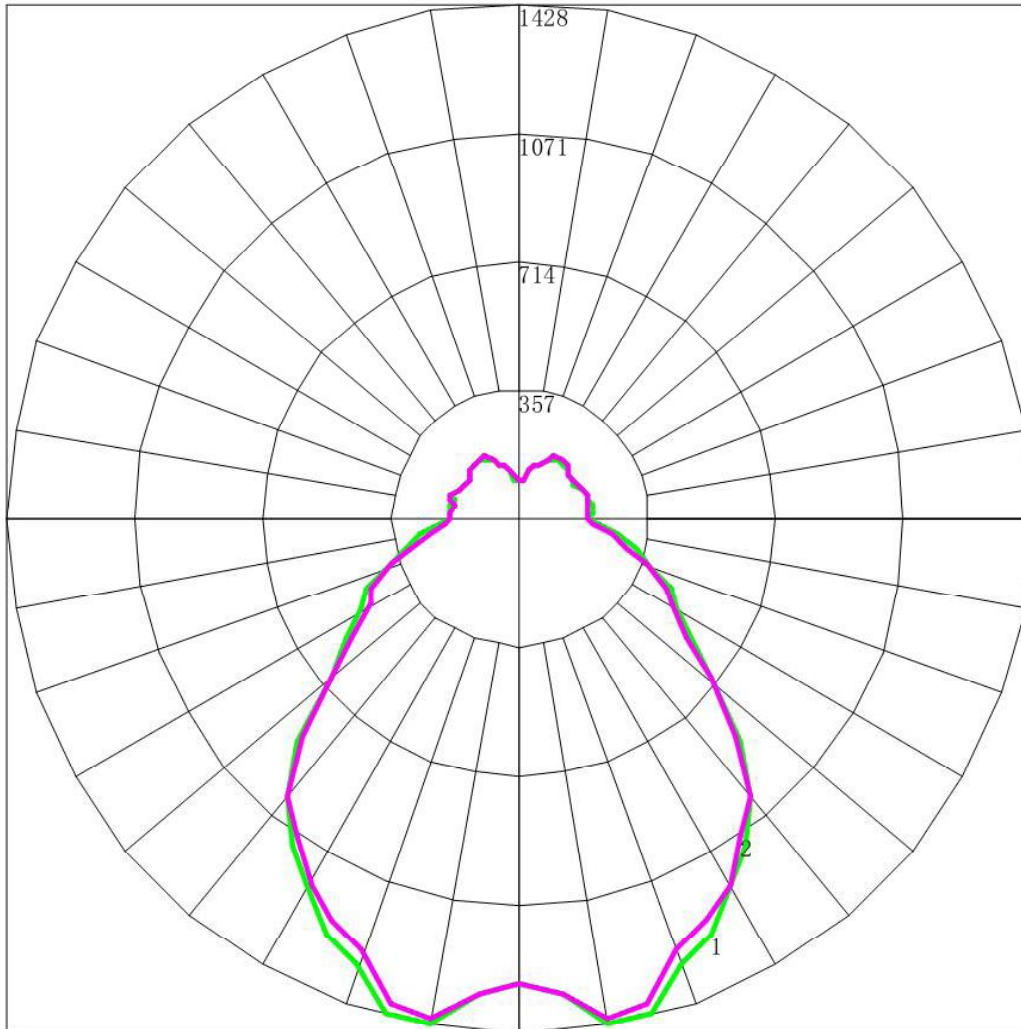
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	129.62
10-20	390.41
20-30	571.83
30-40	689.13
40-50	657.88
50-60	523.18
60-70	450.07
70-80	347.33
80-90	244.93
90-100	214.38
100-110	210.82
110-120	190.11
120-130	160.14
130-140	145.67
140-150	124.66
150-160	83.89
160-170	44.03
170-180	11.70



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4.5 Polar Curves

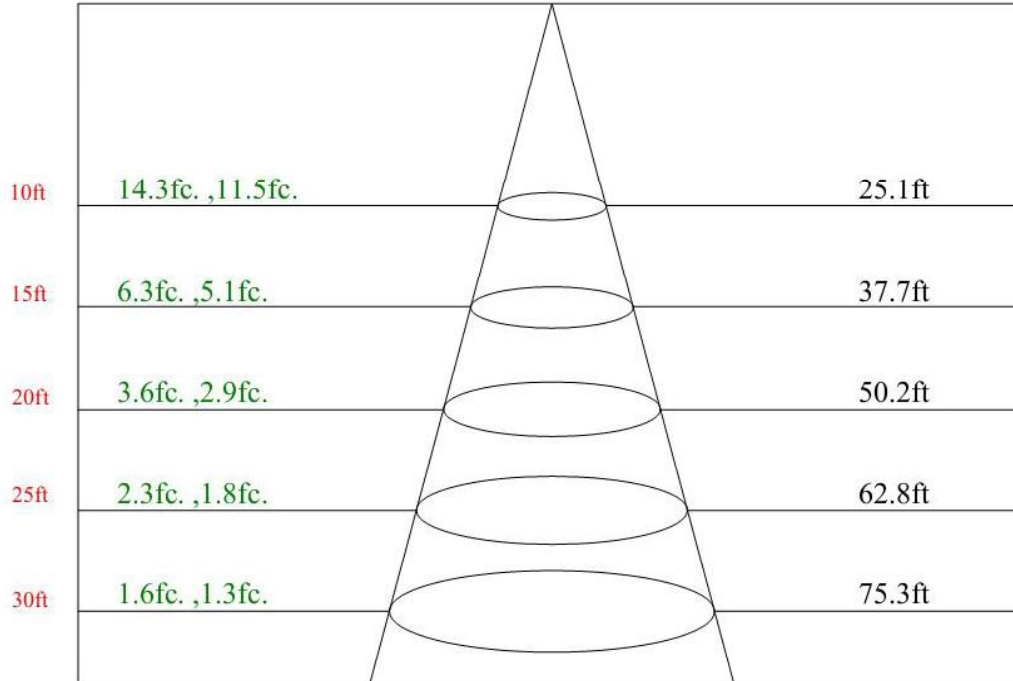


Maximum Candela = 1427.756 Located At Horizontal Angle = 60, Vertical Angle = 10
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



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4.6 Lux distance Curve

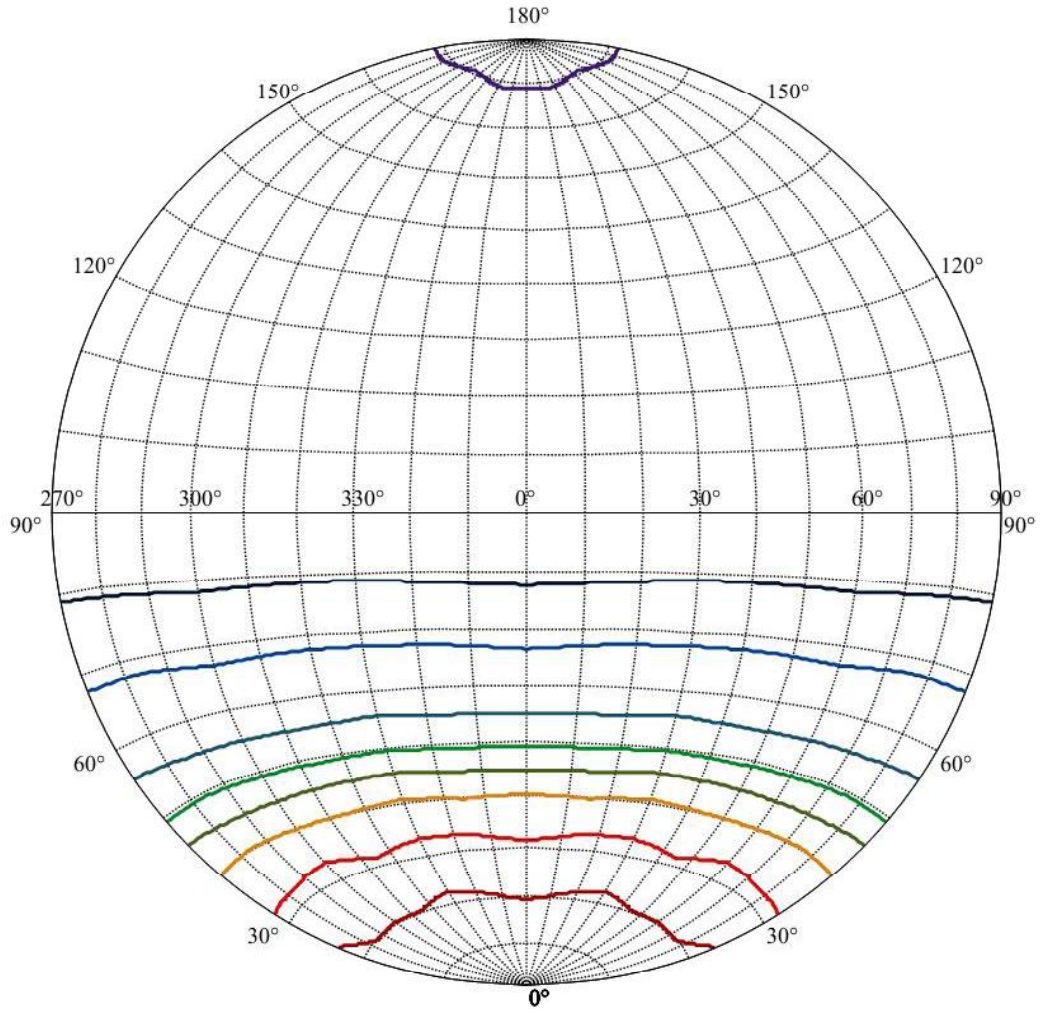




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4.7 ISO candela diagram on circular web



House

[Unit:cd]

Road

Imax:1427.76

(10%Imax) 142.776

(20%Imax) 285.551

(30%Imax) 428.327

(40%Imax) 571.102

(50%Imax) 713.878

(60%Imax) 856.654

(70%Imax) 999.429

(80%Imax) 1142.2

(90%Imax) 1284.98

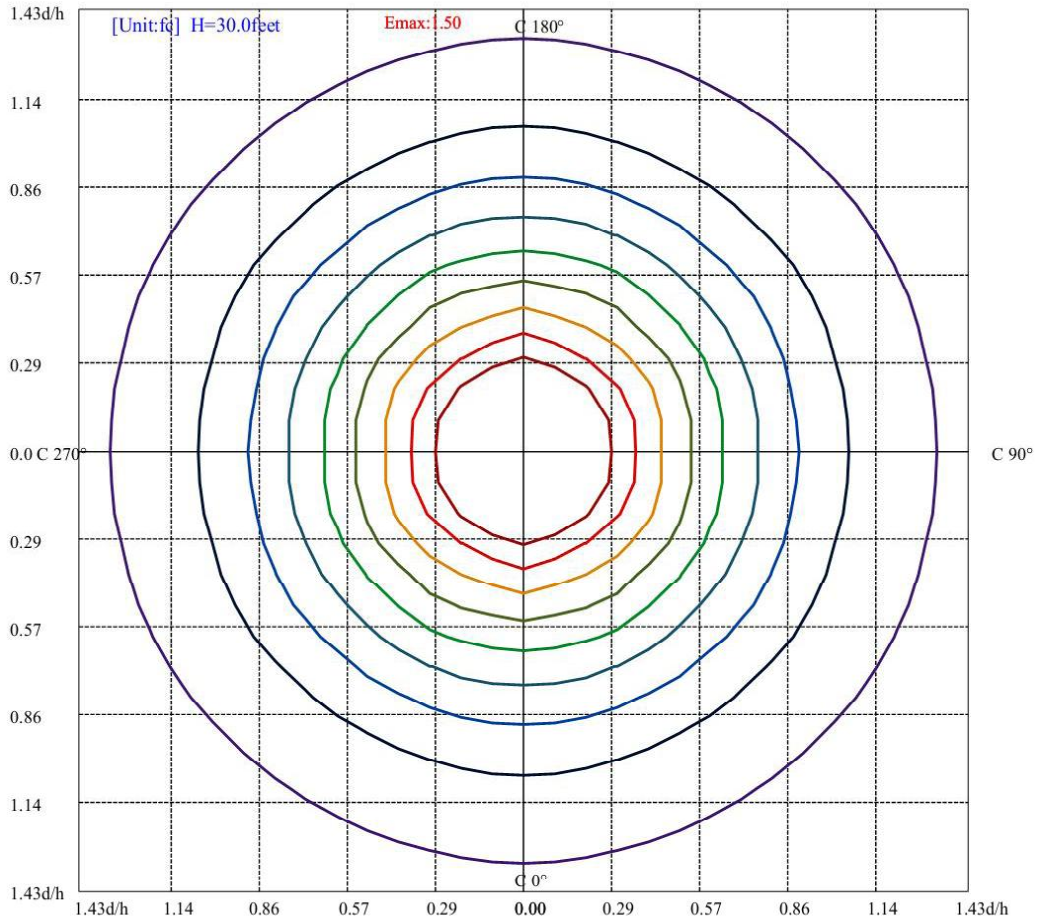




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4.8 ISO illuminance diagram



(10%Emax) 0.1495999	—
(20%Emax) 0.2991987	—
(30%Emax) 0.4487986	—
(40%Emax) 0.5983984	—
(50%Emax) 0.7479983	—
(60%Emax) 0.8975972	—
(70%Emax) 1.047197	—
(80%Emax) 1.196801	—
(90%Emax) 1.3464	—



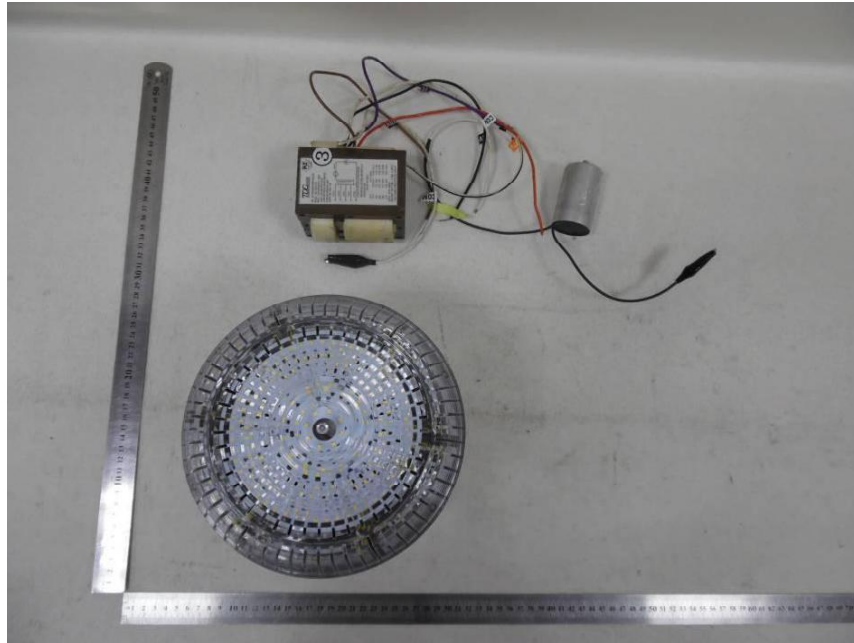
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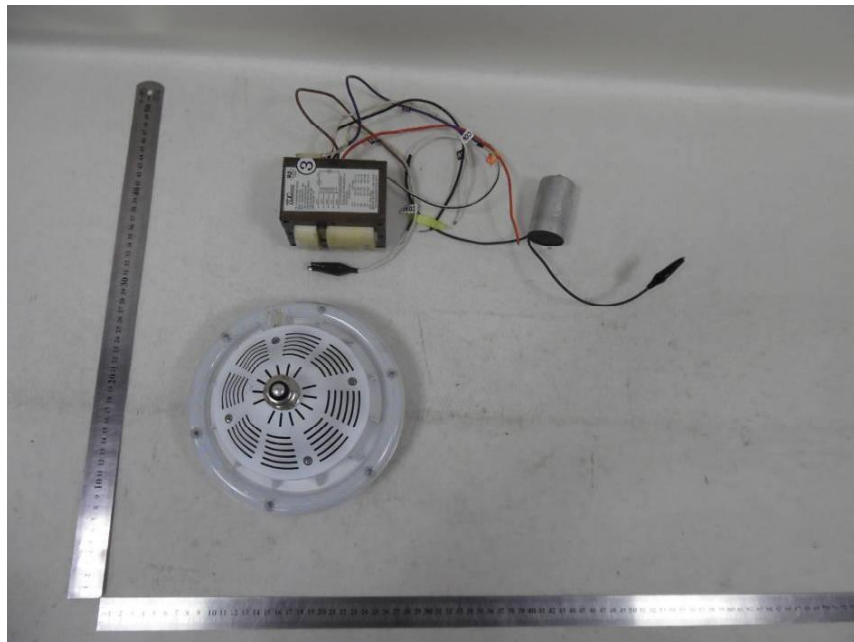
4.9 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	1284.411	1284.411	1284.411	1284.411	1284.411	1284.411	1284.411
5	1321.042	1324.970	1327.797	1328.601	1330.190	1332.044	1325.155
10	1424.075	1420.178	1423.143	1423.500	1427.756	1426.838	1406.165
15	1421.216	1414.469	1400.816	1395.634	1419.633	1406.538	1393.076
20	1317.788	1279.153	1288.124	1287.252	1312.053	1295.942	1270.323
25	1270.779	1214.567	1236.096	1244.091	1257.531	1240.769	1221.969
30	1173.727	1172.410	1197.340	1161.357	1197.234	1178.755	1168.485
35	1099.102	1110.210	1119.173	1094.770	1114.352	1120.386	1077.083
40	999.148	1006.017	996.948	999.740	1021.024	994.136	1008.336
45	871.138	851.504	851.291	864.614	877.248	852.291	849.621
50	688.027	693.368	685.864	685.587	699.147	681.818	688.211
55	582.004	572.770	573.040	572.359	582.822	573.583	570.502
60	511.645	504.281	491.491	498.170	509.608	494.471	482.274
65	468.462	464.983	455.531	462.971	467.474	459.192	449.922
70	394.277	401.156	386.071	397.598	395.804	394.482	378.088
75	334.383	335.608	322.856	329.768	327.947	323.556	314.863
80	273.786	267.853	262.495	268.040	271.928	263.181	256.117
85	222.028	221.205	217.605	219.669	221.271	215.543	209.894
90	196.435	195.836	194.769	195.768	195.643	192.915	190.631
95	198.809	198.828	199.730	199.822	199.426	197.439	196.675
100	199.601	193.684	194.087	191.301	197.599	190.227	189.240
105	193.401	199.500	203.742	200.065	194.936	198.458	201.763
110	200.876	205.747	208.621	207.243	202.233	206.807	204.981
115	187.156	190.674	189.831	189.893	188.118	192.485	189.240
120	177.394	180.216	182.593	180.256	178.570	181.294	179.543
125	176.734	175.818	177.290	175.649	176.673	175.590	175.542
130	181.132	180.149	181.969	180.813	180.874	182.563	182.935
135	188.827	186.408	187.279	186.643	187.419	189.269	189.848
140	194.588	195.402	198.080	197.174	193.183	195.005	201.893
145	194.676	197.576	206.475	202.463	199.807	205.107	202.850
150	187.948	187.731	194.588	192.330	198.175	199.647	195.501
155	178.097	177.772	178.377	178.951	185.235	185.929	182.630
160	159.672	165.442	164.998	170.046	164.047	169.715	164.845
165	148.546	153.053	153.259	158.979	156.082	155.887	157.453
170	141.071	140.149	142.539	146.065	142.092	136.963	137.016
175	114.554	115.197	111.088	121.790	116.832	110.930	101.403
180	101.355	101.355	101.355	101.355	101.355	101.355	101.355

Appendix 1 Product Photo



Picture 1



Picture 2

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