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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-8030M57-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
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Table of Contents

1. General	3
1.1 Product Information	3
1.2 Standards or methods	4
1.3 Equipment list	4
2. Test conducted and method	5
2.1 Ambient Condition	5
2.2 Power Supply Characteristics	5
2.3 Seasoning and Stabilization	5
2.4 Electrical Instrumentation	5
2.5 Color Measurement Method	5
2.6 Total Luminous Flux Measurement Method	5
2.7 Luminous Intensity Distribution Measurement Method	5
2.8 Spatial Non-uniformity of Chromaticity	5
3. Test Result Summary	6
3.1 Electrical data	6
3.2 Photometric data	6
3.3 Color Rendering Details	6
4. Test Data	7
4.1 Spectral Distribution	7
4.2 ANSI Chromaticity Quadrangles Diagram	7
4.3 Goniometry Test Data	8
4.4 Zonal Lumen Summary	8
4.5 Polar Curves	9
4.6 Lux distance Curve	10
4.7 ISO candela diagram on circular web	11
4.8 ISO illuminance diagram	12
4.9 Candela Tabulation	13
Appendix 1 Product Photo	14



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1. General

1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8030M57-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 ± 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	277.03V~60Hz
Input Current(A)	1.301	1.297
Total Power(W)	210.10	210.53
Power Factor	0.583	0.586
I-THD(%)	32.72	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	17226.44
Luminaire Efficacy(Lm/W)	-	81.82
Correlated Color Temperature (CCT)(K)	5717	-
Color Rendering Index (CRI)	85.4	-
R9	26	-
Chromaticity Coordinate (x,y)	x=0.3276 y=0.3399	-
Chromaticity Coordinate (u,v)	u=0.2040 v=0.3175	-
Chromaticity Coordinate (u',v')	u'=0.2040 v'=0.4763	-
Duv	0.00161	-
Central intensity(cd)	-	3887.890
Beam angle	-	112.6°
Spacing Criteria(0-180°)	-	1.42
Spacing Criteria(90-270°)	-	1.40
Zone Lumens between 0-60 °	-	56.10%
Zone Lumens between 60-90 °	-	21.30%
Zone Lumens between 90-120 °	-	13.50%
Zone Lumens between 120-180 °	-	9.10%

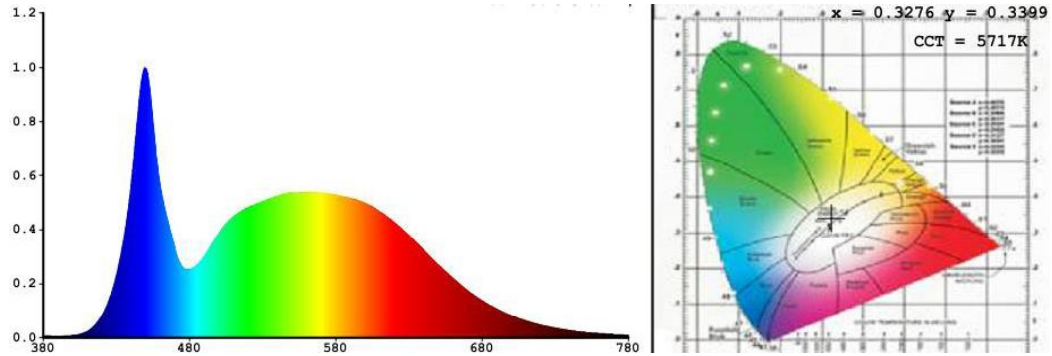
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
85	88	90	87	85	84	89	75
R9	R10	R11	R12	R13	R14	R15	-
26	72	86	66	85	95	81	-

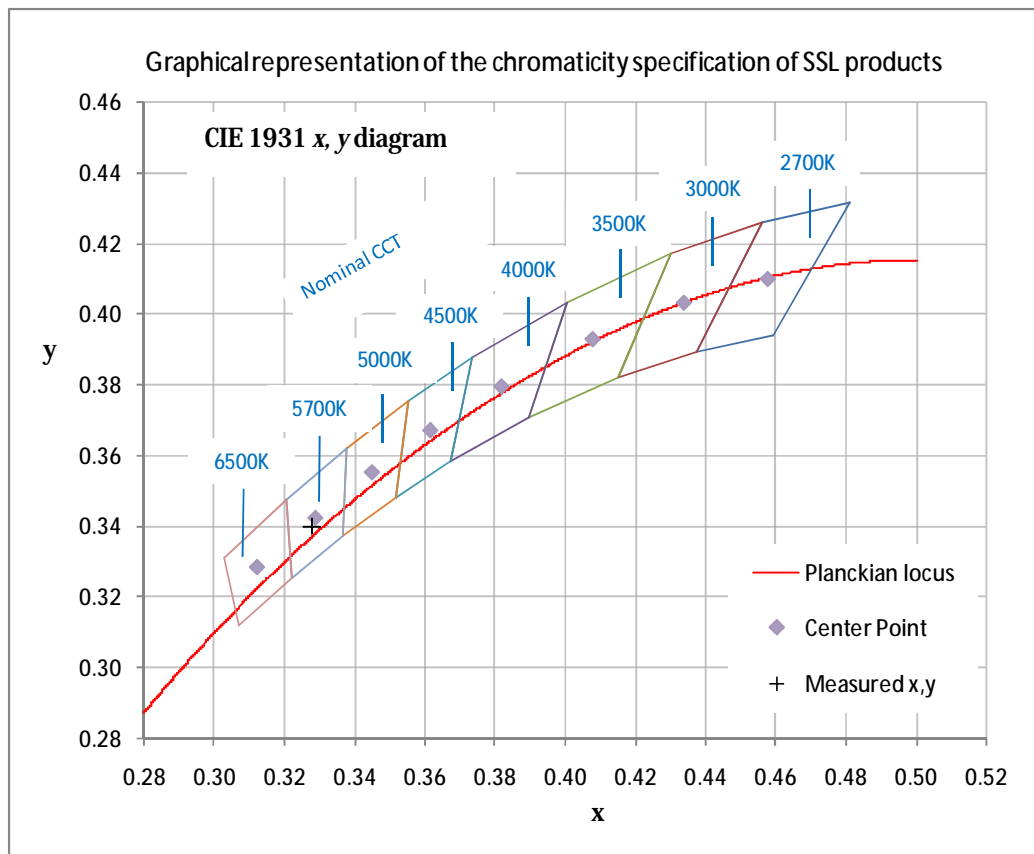
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram





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4.3 Goniometry Test Data

CIE Type	Semi-Direct	Basic Luminous Shape	Circular w/ Sides
Spacing Criteria (0-180°)	1.42	Luminous Diameter	0.23 m
Spacing Criteria (90-270°)	1.40	Luminous Height	0.07 m
Spacing Criteria (Diagonal)	1.48		
Test Distance	29.65 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	1525.4	8.90	8.90
0-30	3327.28	19.30	19.30
0-40	5546.4	32.20	32.20
0-60	9658.96	56.10	56.10
0-80	12388.76	71.90	71.90
0-90	13333.04	77.40	77.40
10-90	12954.54	75.20	75.20
20-40	4020.99	23.30	23.30
20-50	6278.15	36.40	36.40
40-70	5604.03	32.50	32.50
60-80	2729.8	15.80	15.80
70-80	1238.33	7.20	7.20
80-90	944.28	5.50	5.50
90-110	1660.34	9.60	9.60
90-120	2323.32	13.50	13.50
90-130	2852.1	16.60	16.60
90-150	3550.1	20.60	20.60
90-180	3893.37	22.60	22.60
110-180	2233.03	13.00	13.00
0-180	17226.41	100.00	100.00

Total Luminaire Efficiency = 100.00%

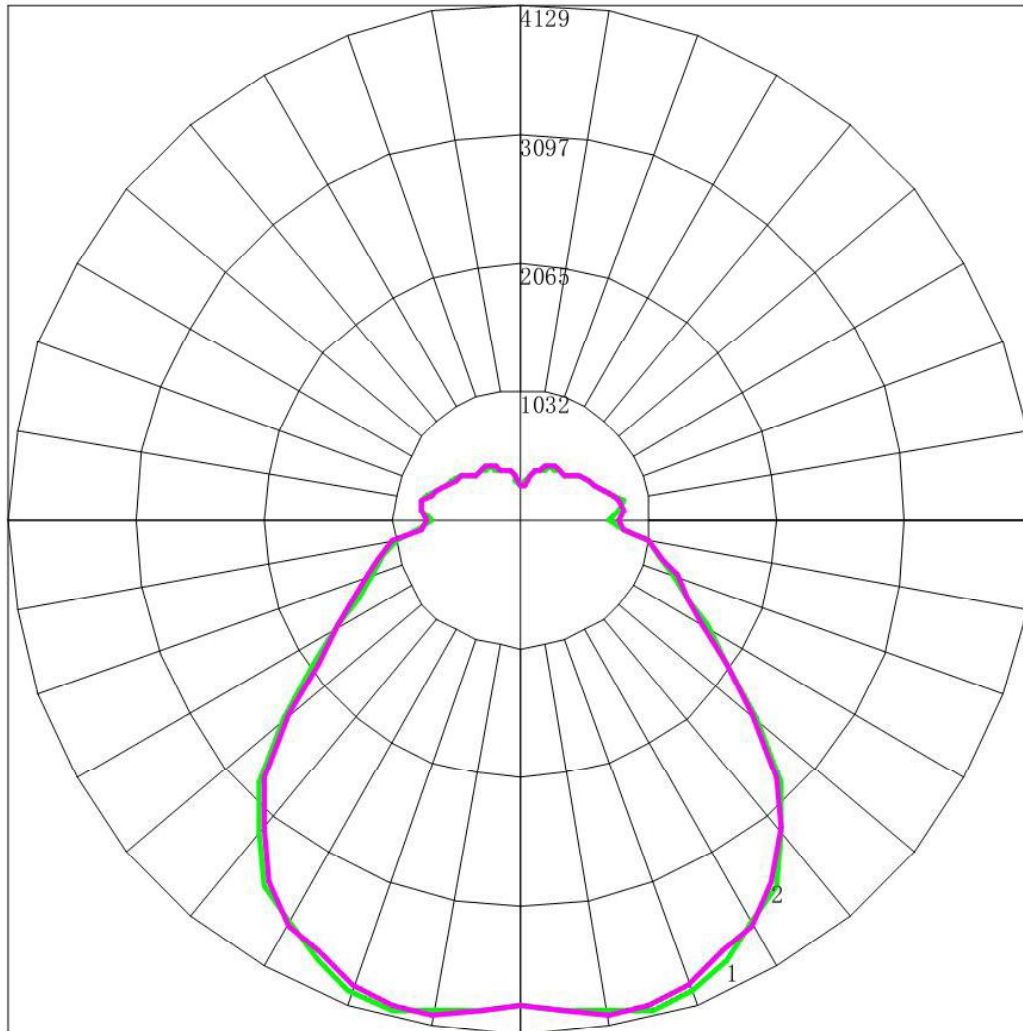
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	378.51
10-20	1146.9
20-30	1801.88
30-40	2219.12
40-50	2257.15
50-60	1855.41
60-70	1491.46
70-80	1238.33
80-90	944.28
90-100	853.23
100-110	807.11
110-120	662.98
120-130	528.78
130-140	390.76
140-150	307.24
150-160	206.42
160-170	107.21
170-180	29.65



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4.5 Polar Curves



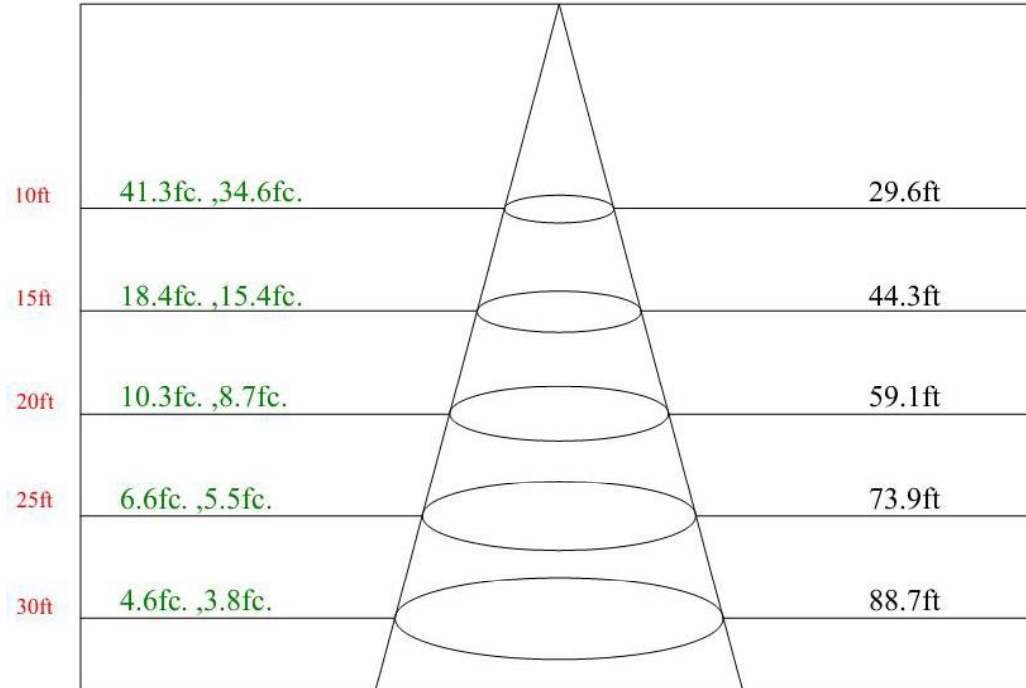
Maximum Candela = 4129.025 Located At Horizontal Angle = 75, Vertical Angle = 15
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



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4.6 Lux distance Curve

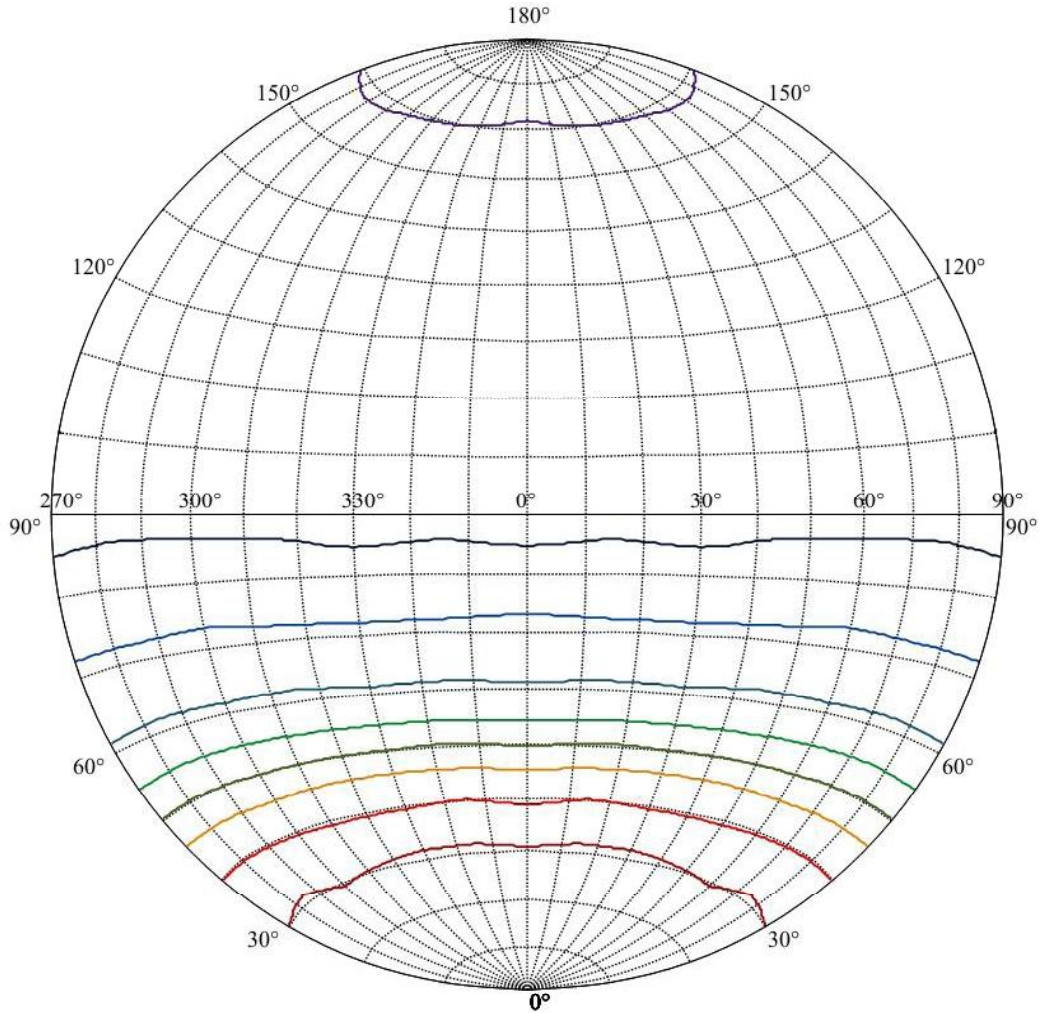




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4.7 ISO candela diagram on circular web











House

[Unit:cd]

Road

Imax:4129.03

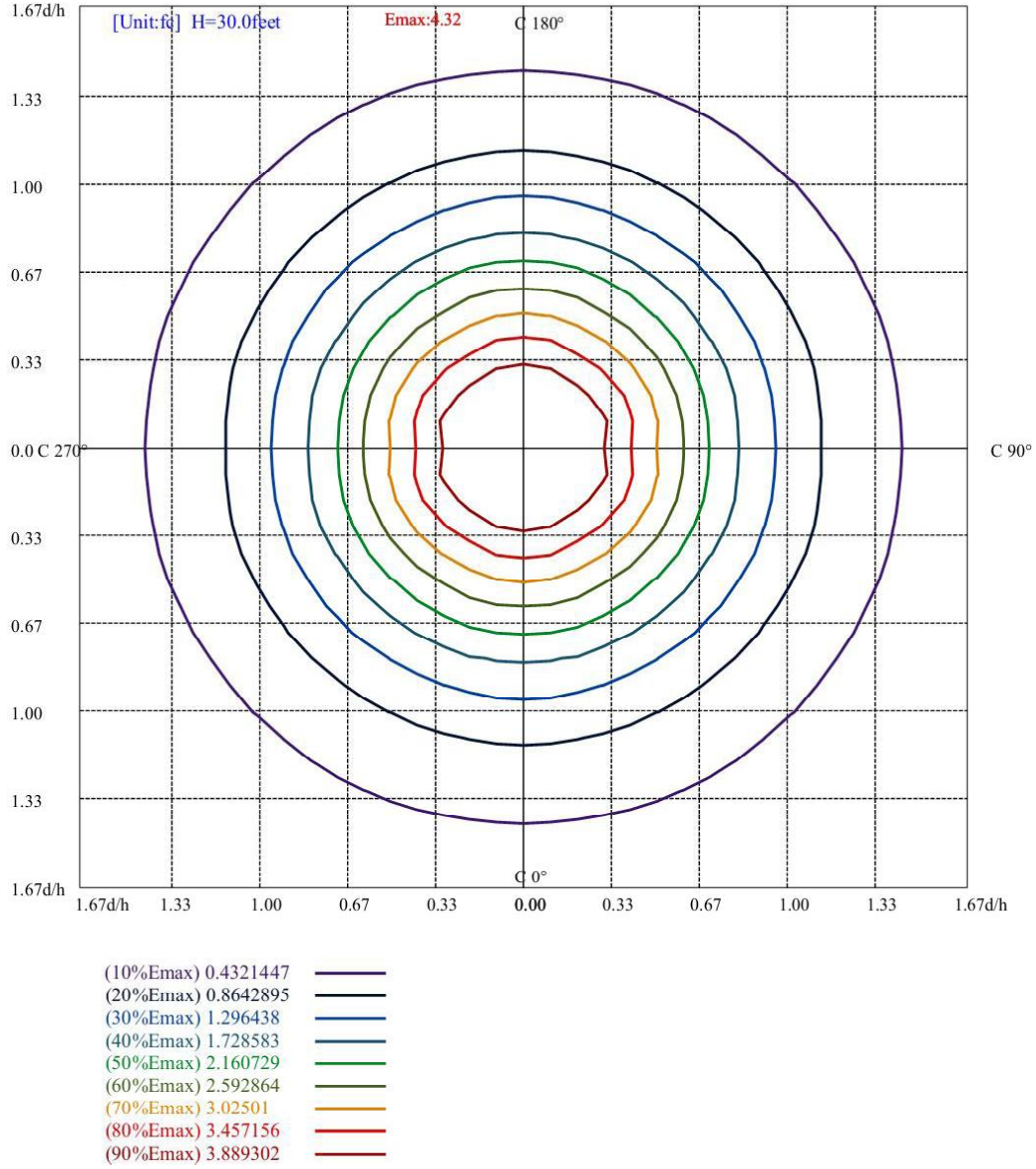
(10%Imax) 412.902	
(20%Imax) 825.805	
(30%Imax) 1238.71	
(40%Imax) 1651.61	
(50%Imax) 2064.51	
(60%Imax) 2477.42	
(70%Imax) 2890.32	
(80%Imax) 3303.22	
(90%Imax) 3716.12	



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4.8 ISO illuminance diagram

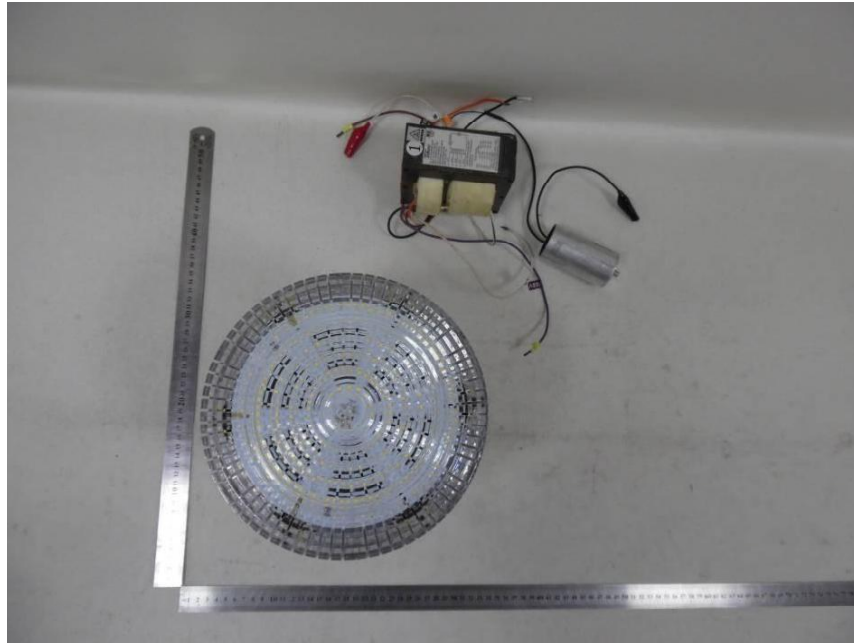




4.9 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	3887.890	3887.890	3887.890	3887.890	3887.890	3887.890	3887.890
5	3930.787	3923.130	3923.997	3922.479	3950.910	3960.136	3929.121
10	4006.951	3998.443	3991.675	4017.222	4069.977	4090.392	4034.152
15	4060.792	4064.118	4023.524	4055.691	4093.813	4129.025	4022.868
20	4027.962	4026.846	3962.832	4009.740	4062.387	4058.233	3954.728
25	3902.335	3906.913	3846.267	3917.417	3972.124	3957.850	3824.958
30	3715.863	3761.322	3698.515	3746.737	3790.177	3806.393	3751.175
35	3571.413	3601.426	3560.373	3548.295	3567.463	3553.596	3522.017
40	3287.329	3284.520	3268.894	3259.352	3274.209	3317.685	3236.870
45	2962.973	2947.146	2933.203	2976.778	2992.986	2973.334	2932.193
50	2489.353	2486.920	2471.696	2492.471	2496.610	2531.096	2445.664
55	2026.237	2055.921	2053.048	2038.298	2032.516	2036.162	2013.821
60	1709.367	1732.444	1734.331	1743.616	1712.542	1727.693	1701.852
65	1471.769	1504.022	1481.683	1512.690	1473.369	1510.454	1483.023
70	1289.631	1307.775	1316.480	1304.587	1294.282	1306.817	1324.869
75	1159.757	1162.932	1193.953	1167.755	1163.738	1159.706	1185.290
80	1025.419	1036.866	1051.893	1046.683	1010.663	1050.201	1048.880
85	822.401	862.932	857.447	853.887	811.755	845.775	810.954
90	721.374	735.079	755.638	741.847	728.204	739.365	773.715
95	786.114	771.752	805.351	779.390	790.429	794.029	810.606
100	826.253	796.425	808.434	793.543	819.013	806.542	812.950
105	787.383	755.482	766.496	759.777	782.015	761.621	764.341
110	711.044	689.665	717.319	701.480	722.132	710.622	721.286
115	655.715	656.238	663.893	661.420	674.763	667.009	658.528
120	644.246	621.644	622.571	630.981	652.981	642.178	619.554
125	595.921	585.527	584.636	591.854	611.444	601.586	586.395
130	526.279	524.670	528.423	527.598	538.357	539.366	541.258
135	505.925	490.892	487.119	489.679	506.544	505.458	501.025
140	488.372	487.228	481.135	488.922	486.506	506.940	490.478
145	491.567	483.300	478.824	502.409	496.550	511.017	502.414
150	475.809	464.958	461.364	478.884	481.953	487.010	484.142
155	443.461	433.570	428.627	451.920	446.163	464.748	467.085
160	409.187	397.751	402.164	405.354	409.934	415.625	430.281
165	394.304	386.118	373.440	362.309	364.903	378.324	384.449
170	363.226	347.351	326.242	334.534	342.613	347.872	344.650
175	308.554	292.568	290.022	293.376	296.720	297.920	275.512
180	283.257	283.257	283.257	283.257	283.257	283.257	283.257

Appendix 1 Product Photo



Picture 1



Picture 2

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