



Shenzhen Belling Efficiency Testing Lab



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Test report of

IES LM-79-08

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Applicant:

MaxLite Inc.

Address:

10 York Ave West Caldwell, NJ. 07006

For Product:

2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model No.:

LRK24D4035 / LRK24D4041 / LRK24D4050

Test laboratory: Shenzhen Belling Efficiency Testing Lab., 1/F., Building 1, 1F, No.1 building, Meibaohu industrial park, Dalang street, Shenzhen, Guangdong Prov.518101, China.

Complied by: Zac Kuang

Review by: Jason Zhou

Project Engineer

Technical Manager

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or use in part without prior written consent from Shenzhen Belling Efficiency Testing Lab. This report must not be used by the customer to claim product certification, approval, or endorsement By NVLAP, NIST, or any agency of the Federal Government.



1 General

1.1 Product Information

Manufacturer	MaxLite Inc.
Manufacturer Address	10 York Ave West Caldwell, NJ. 07006
Brand Name	MaxLite
Luminaire Type	2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces
Model Number	LRK24D4035 / LRK24D4041 / LRK24D4050
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	40 W
Nominal CCT	3500K / 4100K / 5000K
Date of Receipt Samples	2017-06-20

1.2 Standards or methods

- ANSI C78.377-2015: Specifications for the Chromaticity of Solid State Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits-Related Power Quality Requirements for Lighting Equipment
- CIE Publication No.13.3-1995: Method of Measuring and Specifying Color Rendering of Light Sources
- IESNA LM-79-08 Approved Method: Electric & Photometric Measurement of Solid-state Lighting Products



1.3 Equipment list

Device	Manufacture	Model No.	Serial No.	Calibration due date
Goniophotometric System	SENSING	GMS-3000	N.A	2017-09-21
AC Power Source	ALL POWER	APW-110N	992257	2017-08-27
Total Luminous Flux Standard Lamp	SENSING	110V/100W	S13100234	2017-09-15
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2017-08-29
Integral Sphere	SENSING	SPR-600M	N.A	2017-08-27
Digital Power Meter	YOKOGAWA	WT210	91L929742	2017-08-29
Optical Color and Electrical Measurement System	SENSING	SPR-3000	N.A	2017-08-27
Temperature/humidity/clock	VICTOR	VC230	57636	2017-09-13
Digital Anemometer	TECMAN	TD8901	026141	2017-09-13

Statement of Traceability: Shenzhen Belling Efficiency Testing Lab attests that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit (SI).



2 Test conducted and method

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 (60 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 Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement. The system and standard light source has been calibrated regularly and traceable to the National Primary Standards. 4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

2.5 Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement. The standard light source has been calibrated regularly and traceable to the National Primary Standards.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The method according to IESNA LM-79-08 following chapter.



3 Test Result Summary

3.1 Integrating Sphere System

3.1.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
LRK24D4035	120.01	60	0.308	36.27	0.981
LRK24D4041	119.97	60	0.312	36.64	0.979
LRK24D4050	119.96	60	0.312	36.71	0.981

3.1.2 Additional Test

Test Item	Model	Test Voltage (V)	Frequency (Hz)	Test Result
Power factor	LRK24D4035	120	60	0.981
		277	60	0.917
	LRK24D4041	120	60	0.979
		277	60	0.925
	LRK24D4050	120	60	0.981
		277	60	0.929
Total harmonic distortion	LRK24D4035	120	60	9.7%
		277	60	13.2%
	LRK24D4041	120	60	10.6%
		277	60	14.7%
	LRK24D4050	120	60	11.2%
		277	60	15.3%
Off state power (W)	LRK24D4035	120	60	0
	LRK24D4035	277	60	0



3.1.3 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
LRK24D4035	4054.043	111.774	3412	80.6	0
LRK24D4041	4130.317	112.727	3926	81.8	5
LRK24D4050	4175.506	113.743	4805	83.6	11

3.1.4 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
LRK24D4035	0.0021	0.4127	0.3992	0.2370	0.5158
LRK24D4041	0.0025	0.3856	0.3853	0.2251	0.5061
LRK24D4050	0.0022	0.3514	0.3610	0.2120	0.4901

3.2 Goniophotometer System

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
LRK24D4035	120.09	60	0.3083	36.3200	0.981

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	S/MH (C0/180)	S/MH (C90/270)	Zonal Lumen in 0-60°(%lm)
4057.61	111.72	1.16	1.32	78.061



4 Test Data

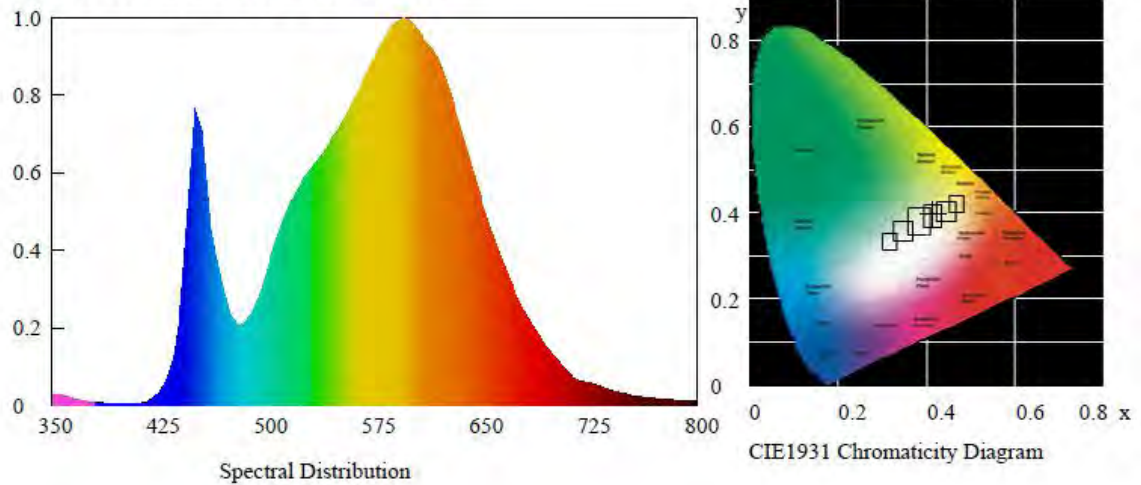
LRK24D4035

Test Condition

Temperature: 25°C
Spectrum Range: 350-800 nm

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4127$ $y=0.3992$ $u'=0.2370$ $v'=0.5158$

Correlated Color Temperature: 3412 K

Dominant Wavelength: 579.0 nm(E)

Luminous Flux: 4054.043 lm

Purity: 0.4376

Chromaticity Difference: 0.0021Duv

Peak Wavelength: 332.6 nm

Color Ratio: $K_r=41.3\%$ $K_g=50.9\%$ $K_b=7.8\%$

Bandwidth: 0nm

Radiant Flux: 12.403 W

Rendering Index: $R_a=80.6$

$R_1=78$ $R_2=88$ $R_3=96$ $R_4=79$ $R_5=78$ $R_6=83$ $R_7=84$ $R_8=59$

$R_9=0$ $R_{10}=72$ $R_{11}=77$ $R_{12}=58$ $R_{13}=81$ $R_{14}=98$ $R_{15}=71$

Electric Parameters

Voltage: 120.01 V

Current: 0.308 A

Power Factor: 0.981

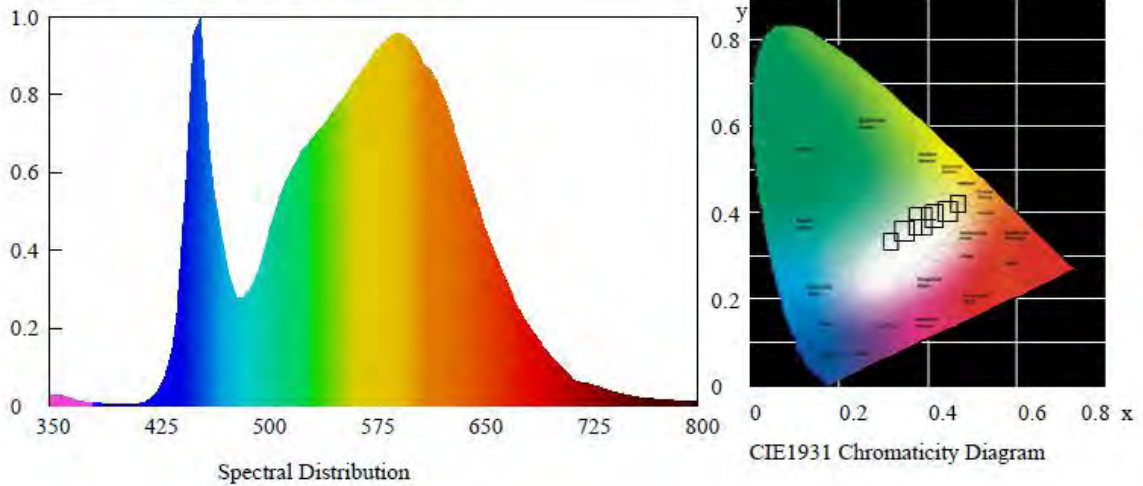
Power: 36.27 W

Luminous Efficacy: 111.774 lm/W

**LRK24D4041****Test Condition**

Temperature: 25°C
Spectrum Range: 350-800 nm

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.3856$ $y=0.3853$ $u'=0.2251$ $v'=0.5061$

Correlated Color Temperature: 3926 K

Dominant Wavelength: 577.0 nm(E)

Luminous Flux: 4130.317 lm

Purity: 0.3137

Chromaticity Difference: 0.0025Duv

Peak Wavelength: 448.2 nm

Color Ratio: $K_r=38.2\%$ $K_g=52.7\%$ $K_b=9.1\%$

Bandwidth: -444.6nm

Radiant Flux: 12.232 W

Rendering Index: $R_a=81.8$

$R_1=80$ $R_2=89$ $R_3=95$ $R_4=79$ $R_5=79$ $R_6=84$ $R_7=86$ $R_8=63$

$R_9=5$ $R_{10}=73$ $R_{11}=78$ $R_{12}=56$ $R_{13}=83$ $R_{14}=97$ $R_{15}=74$

Electric Parameters

Voltage: 119.97 V

Current: 0.312 A

Power Factor: 0.979

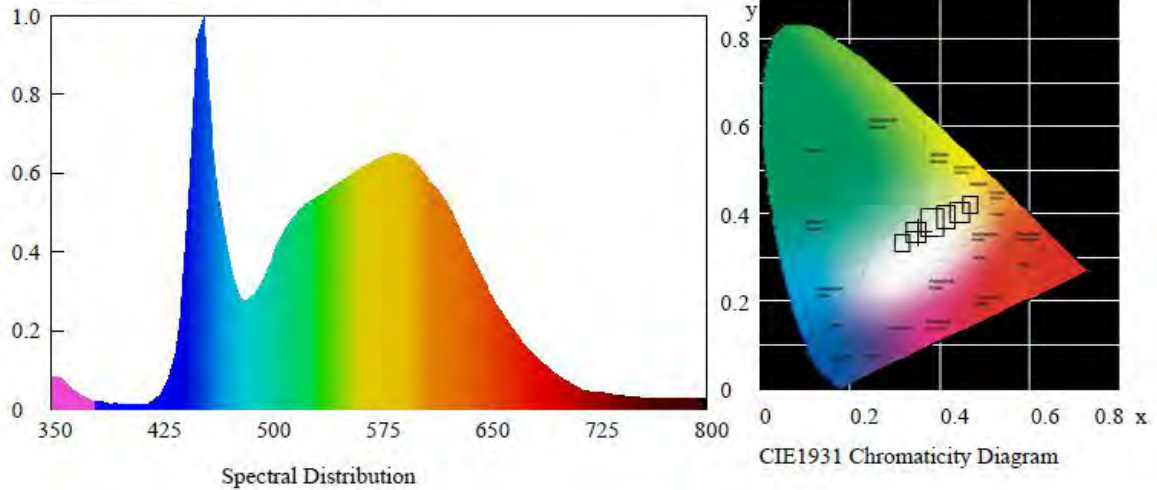
Power: 36.64 W

Luminous Efficacy: 112.727 lm/W

**LRK24D4050****Test Condition**

Temperature: 25°C
Spectrum Range: 350-800 nm

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.3514$ $y=0.3610$ $u'=0.2120$ $v'=0.4901$

Correlated Color Temperature: 4805 K

Dominant Wavelength: 571.0 nm(E)

Luminous Flux: 4175.506 lm

Purity: 0.1367

Chromaticity Difference: 0.0022Duv

Peak Wavelength: 448.4 nm

Color Ratio: $K_r=34.7\%$ $K_g=54.1\%$ $K_b=11.2\%$

Bandwidth: -375.6nm

Radiant Flux: 13.296 W

Rendering Index: $R_a=83.6$

$R_1=82$ $R_2=91$ $R_3=95$ $R_4=81$ $R_5=81$ $R_6=85$ $R_7=87$ $R_8=67$

$R_9=11$ $R_{10}=77$ $R_{11}=79$ $R_{12}=55$ $R_{13}=85$ $R_{14}=97$ $R_{15}=76$

Electric Parameters

Voltage: 119.96 V

Current: 0.312 A

Power Factor: 0.981

Power: 36.71 W

Luminous Efficacy: 113.743 lm/W



Zonal Flux Diagram

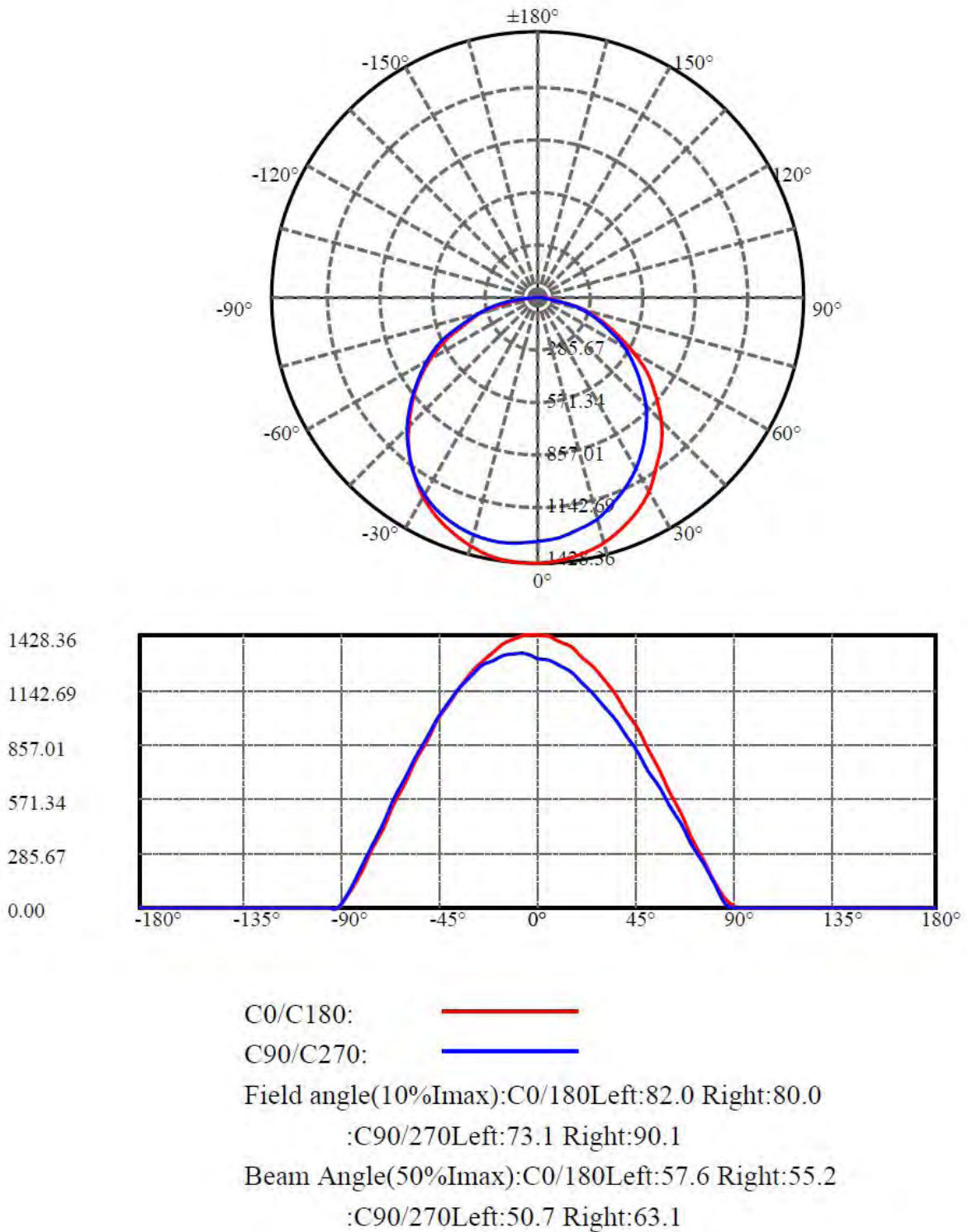
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	1382.788	.000	.000	.000%	.000%
5.0	1377.813	33.002	33.002	.813%	.813%
10.0	1363.073	98.050	131.052	2.416%	3.230%
15.0	1334.969	160.046	291.098	3.944%	7.174%
20.0	1295.460	216.784	507.883	5.343%	12.517%
25.0	1245.591	266.509	774.392	6.568%	19.085%
30.0	1184.396	307.517	1081.909	7.579%	26.664%
35.0	1113.132	338.327	1420.236	8.338%	35.002%
40.0	1033.293	358.115	1778.351	8.826%	43.828%
45.0	943.849	366.084	2144.435	9.022%	52.850%
50.0	845.302	361.524	2505.959	8.910%	61.759%
55.0	740.774	344.866	2850.824	8.499%	70.259%
60.0	628.928	316.603	3167.427	7.803%	78.061%
65.0	513.021	277.610	3445.037	6.842%	84.903%
70.0	394.852	229.879	3674.917	5.665%	90.569%
75.0	278.839	176.092	3851.009	4.340%	94.908%
80.0	169.243	119.894	3970.903	2.955%	97.863%
85.0	62.227	62.896	4033.799	1.550%	99.413%
90.0	1.588	17.473	4051.272	.431%	99.844%
95.0	.701	.627	4051.899	.015%	99.859%
100.0	.741	.392	4052.291	.010%	99.869%
105.0	.754	.400	4052.691	.010%	99.879%
110.0	.834	.415	4053.106	.010%	99.889%
115.0	.860	.429	4053.535	.011%	99.900%
120.0	.993	.450	4053.985	.011%	99.911%
125.0	1.072	.477	4054.462	.012%	99.922%
130.0	1.072	.466	4054.928	.011%	99.934%
135.0	1.112	.441	4055.370	.011%	99.945%
140.0	1.151	.419	4055.789	.010%	99.955%
145.0	1.204	.393	4056.182	.010%	99.965%
150.0	1.244	.360	4056.542	.009%	99.974%
155.0	1.310	.323	4056.865	.008%	99.982%
160.0	1.257	.269	4057.135	.007%	99.988%
165.0	1.231	.205	4057.340	.005%	99.993%
170.0	1.244	.147	4057.486	.004%	99.997%
175.0	1.257	.089	4057.576	.002%	99.999%
180.0	1.350	.031	4057.607	.001%	100.000%



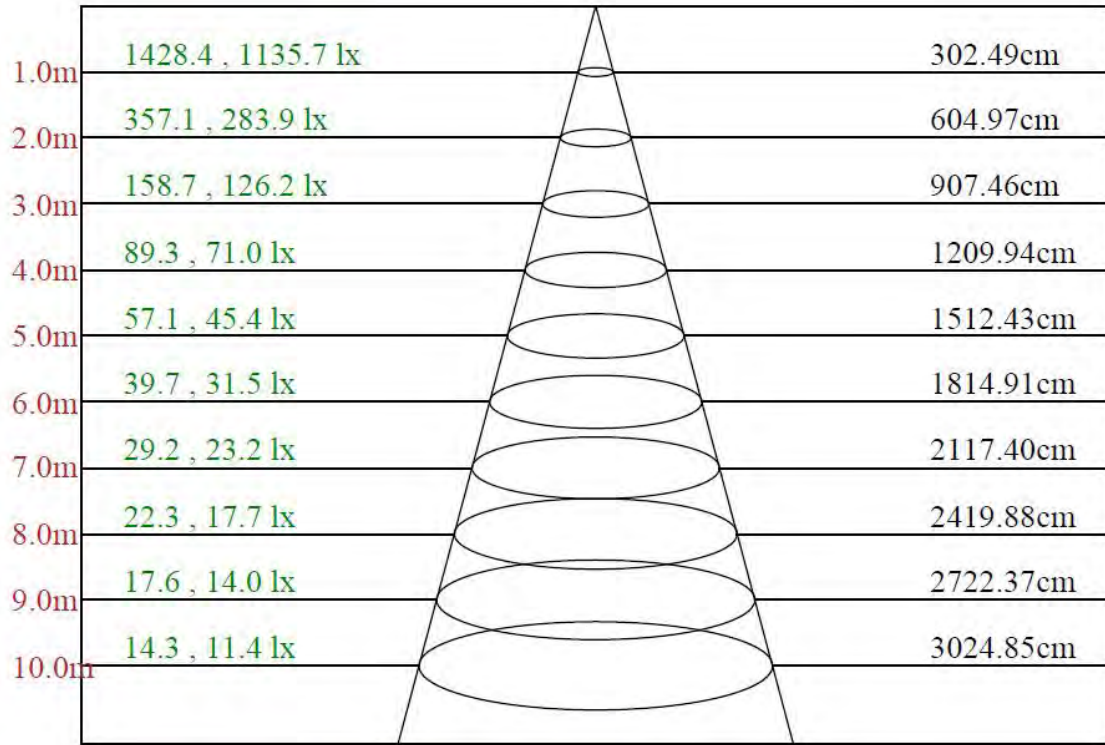
Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





Lux distance Curve



Max , Ave Beam angle of C0plane112.98

**Luminous Intensity Distribution Data**

$C/\gamma(^{\circ})$	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	1428.36	1418.62	1397.03	1362.09	1317.00	1261.54	1194.43	1115.25	1031.84
22.5	1420.10	1405.07	1377.34	1339.23	1292.02	1232.74	1162.25	1089.63	1005.16
45.0	1412.27	1390.25	1362.94	1322.72	1273.39	1215.38	1146.58	1068.67	986.96
67.5	1347.28	1326.95	1304.09	1270.22	1220.25	1162.04	1097.89	1022.52	941.65
90.0	1305.78	1293.50	1269.37	1229.78	1177.49	1120.12	1056.40	984.63	903.55
112.5	1351.09	1332.24	1303.88	1259.84	1210.52	1150.60	1084.55	1011.52	930.86
135.0	1399.14	1380.94	1352.78	1312.13	1263.65	1202.47	1135.78	1059.99	978.49
157.5	1398.30	1384.32	1359.55	1323.14	1275.30	1219.62	1152.30	1077.14	994.37
180.0	1428.36	1424.55	1409.09	1383.05	1341.98	1290.33	1229.78	1155.90	1073.33
202.5	1420.10	1422.01	1413.96	1391.94	1355.32	1308.11	1249.26	1178.12	1096.41
225.0	1412.27	1419.47	1413.75	1396.39	1368.02	1323.99	1267.89	1201.84	1124.99
247.5	1347.28	1366.96	1363.15	1352.14	1329.28	1292.02	1236.98	1175.80	1100.85
270.0	1305.78	1326.95	1332.88	1318.91	1296.47	1265.13	1215.38	1152.93	1078.41
292.5	1351.09	1351.30	1365.06	1354.90	1329.28	1295.83	1247.99	1180.24	1107.20
315.0	1399.14	1402.95	1396.60	1379.67	1348.97	1307.69	1252.43	1185.11	1105.72
337.5	1398.30	1398.93	1387.71	1363.36	1328.43	1281.86	1220.47	1150.82	1072.91
360.0	1428.36	1418.62	1397.03	1362.09	1317.00	1261.54	1194.43	1115.25	1031.84
$C/\gamma(^{\circ})$	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	936.15	833.26	720.00	602.72	484.59	365.19	252.14	142.48	44.67
22.5	911.80	809.34	702.85	591.07	475.70	357.99	247.06	139.94	45.73
45.0	894.87	796.85	692.69	580.70	468.29	352.49	240.49	139.09	37.90
67.5	857.40	759.38	658.82	558.47	450.93	344.65	236.26	136.34	25.40
90.0	817.60	722.33	630.87	534.76	432.93	326.87	226.73	134.64	20.96
112.5	840.04	747.52	654.16	552.54	445.42	339.78	235.20	136.97	25.83
135.0	887.03	791.77	692.06	580.07	464.69	349.31	240.28	135.91	35.35
157.5	903.34	802.78	694.38	583.45	471.25	354.60	239.86	134.01	42.55
180.0	982.09	880.26	773.98	657.76	537.51	418.75	298.50	184.18	82.99
202.5	1009.40	909.26	797.48	679.35	558.05	431.24	307.82	193.71	85.95
225.0	1033.96	934.24	823.31	705.82	579.01	450.08	326.45	204.08	92.51
247.5	1013.21	919.21	812.30	695.87	577.95	456.85	331.53	211.49	94.42
270.0	994.79	895.93	793.67	681.47	568.42	443.73	321.58	209.59	86.80
292.5	1020.19	921.12	815.06	702.22	579.85	455.16	331.95	210.01	89.97
315.0	1014.90	914.56	809.34	691.84	567.79	446.69	321.58	201.96	96.11
337.5	984.84	887.03	781.39	664.75	545.98	424.25	304.01	193.50	88.49
360.0	936.15	833.26	720.00	602.72	484.59	365.19	252.14	142.48	44.67
$C/\gamma(^{\circ})$	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	0.21	0.21	0.21	0.21	0.42	0.42	0.42	0.42	0.42
22.5	0.42	0.42	0.64	0.42	0.64	0.85	0.85	0.85	1.06
45.0	0.42	0.64	0.42	0.64	0.64	0.85	0.85	0.85	1.06
67.5	0.64	0.42	0.42	0.85	0.64	0.64	1.06	1.06	1.06
90.0	0.64	0.64	0.42	0.64	0.64	0.85	1.27	1.06	1.06
112.5	0.42	0.42	0.64	0.42	0.42	0.85	1.06	1.06	1.06
135.0	0.42	0.64	0.42	0.85	0.85	0.85	0.85	0.85	1.06
157.5	0.64	0.64	0.64	0.64	0.85	0.64	1.06	1.27	1.06
180.0	4.23	0.85	1.06	0.85	1.06	0.85	1.06	1.48	1.06
202.5	3.60	0.85	0.85	0.85	1.06	1.06	1.06	1.06	1.27
225.0	2.12	1.06	0.64	0.85	1.06	0.85	0.85	1.27	1.06
247.5	1.91	0.85	1.06	0.85	1.06	1.27	0.85	1.06	1.06
270.0	1.06	1.06	1.06	0.85	0.85	1.06	1.06	1.27	1.27
292.5	1.27	0.85	1.27	0.85	1.06	1.06	1.06	1.06	1.06
315.0	2.54	0.85	1.06	1.27	1.06	0.85	1.27	1.27	1.27
337.5	4.87	0.85	1.06	1.06	1.06	0.85	1.27	1.27	1.27
360.0	0.21	0.21	0.21	0.21	0.42	0.42	0.42	0.42	0.42



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	0.42	0.42	0.85	0.85	0.85	0.64	0.64	0.64	0.64
22.5	1.06	1.06	1.06	1.48	1.48	1.27	1.69	1.48	1.06
45.0	1.06	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
67.5	1.06	1.27	1.06	1.06	1.06	1.27	1.06	1.06	1.27
90.0	1.27	1.27	1.27	1.06	1.27	1.27	1.27	1.27	1.48
112.5	1.27	1.06	1.27	1.06	1.27	1.27	1.27	1.27	1.27
135.0	1.27	1.48	1.27	1.27	1.06	1.06	1.06	1.48	1.27
157.5	1.27	1.06	1.27	1.27	1.48	1.48	1.48	1.27	1.48
180.0	1.06	1.27	1.06	1.27	1.69	1.48	1.27	1.06	1.27
202.5	1.06	1.06	1.27	1.27	1.48	1.48	1.48	1.27	1.27
225.0	1.27	1.27	1.27	1.27	1.48	1.27	1.27	1.27	1.48
247.5	1.27	1.06	1.27	1.27	1.06	1.27	1.27	1.27	1.27
270.0	1.06	1.27	1.27	1.27	1.27	1.27	1.06	1.48	1.48
292.5	1.06	1.06	1.27	1.27	1.06	1.06	1.27	1.27	1.06
315.0	0.85	1.27	1.06	1.69	1.48	1.27	1.06	1.27	1.27
337.5	1.48	1.27	1.48	1.27	1.69	1.48	1.27	1.27	1.27
360.0	0.42	0.42	0.85	0.85	0.85	0.64	0.64	0.64	0.64
C/γ(°)	180.0								
0.0	0.64								
22.5	1.48								
45.0	1.48								
67.5	1.48								
90.0	1.27								
112.5	1.48								
135.0	1.48								
157.5	1.48								
180.0	0.64								
202.5	1.48								
225.0	1.48								
247.5	1.48								
270.0	1.27								
292.5	1.48								
315.0	1.48								
337.5	1.48								
360.0	0.64								



Photo Document



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