

Original Data

Relevant Standards

- IES LM-79-2008
- ANSI C82.77:2014

Prepared For RAB lighting INC

408 W 14th St New York, NY 10014 United States

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Project Number
2024120401-R2

Data Number
2024/12/3

Test Date
2024/12/3

1.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2024/12/3	PLC-9-O-8FA-HYB-G24D	A1
2	Goniophotometer Test	2024/12/3	PLC-9-O-8FA-HYB-G24D	A1
3	THD and PF Test	2024/12/3	PLC-9-O-8FA-HYB-G24D	A1

1.1 Test Summary

Requirement Category	Test Method	Requirements	Test value	
Integrating Sphere system				
Power (W)	IES LM-79-2008	9 ±10%	9.1	
Lamp Output for bare lamp (lm)	IES LM-79-2008	1050 ±10%	1100	
Lamp Efficacy (lm/W)	IES LM-79-2008	> 105.0	119.6	
Allowable CCTs* (K)	IES LM-79-2008	7 step	3985±275	3967
		4 step	3985±154	
		7 step	3465±245	3612
		4 step	3465±124	
		7 step	3045±175	3079
		4 step	3045±100	
		7 step	2725 ± 145	2690
		4 step	2725 ± 83	
CRI	IES LM-79-2008 CIE 13.3-1995	>80	83.4	
R9	IES LM-79-2008 CIE 13.3-1995	>0	11	
Rf	ANSI/IES TM-30-18	>70	84	
Rg	ANSI/IES TM-30-18	>89	98	
Rcs,h1	ANSI/IES TM-30-18	Rcs=>-12%,h1<=23%		
Power Factor	ANSI C82.77:2014	>0.9	0.9003	
Total Harmonic Distortion (A%)	ANSI C82.77:2014	<25%	21.10%	
Goniophotometer system				
Lamp Output (lm)	IES LM-79-2008	1050 ±10%	1106.8	
Luminaire Efficacy(lm/W)	IES LM-79-2008	> 105.0	122.8	
Beam Angle	IES LM-79-2008		344.0	

2.0 Production Description

Luminaire Description: PLC-9-O-8FA-HYB-G24D

Electrical Specification: 120V~277V,50/60HZ

Light source:

Manufacturer Of Light Source: Seoul Semiconductor Co.,LTD

Photos of Luminaire Characteristics



3.0 LM-79 Measurement and Test Results

3.1 Integrating Sphere Test

Model No.	PLC-9-O-8FA-HYB-G24D	Sample ID.	A1
Opreate time (Min.)	15	Stabilization time (Min.)	15
Temperature (°C)	25.3	Humidity %	55

Test Method
<p>The samples were tested according to the IES LM-79-2008.</p> <p>Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.</p>

Test Conditions

Temperatur e (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux (lm)	Efficacy (lm/W)
25.3	120.51	60.00	0.076	9.077	0.9885	1117.0	123.1
25.3	277.76	60.00	0.037	9.196	0.9003	1100.0	119.6

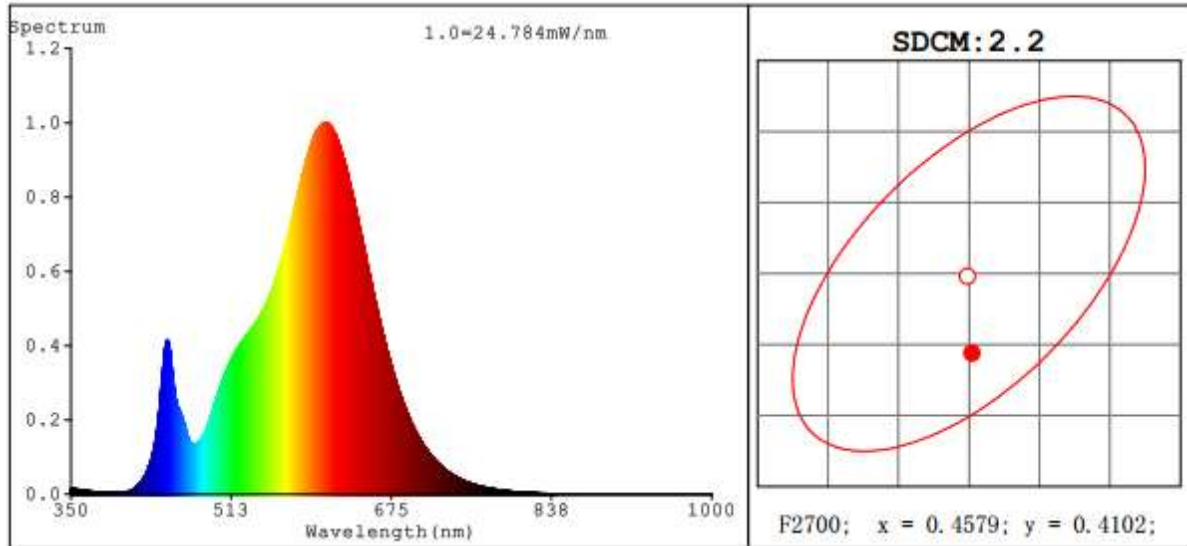
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
2690	-1.5E-03	84	98	84	11.5	2.2
2696	-1.7E-03	84	98	83	10.9	2.3

3.1 Integrating Sphere Test

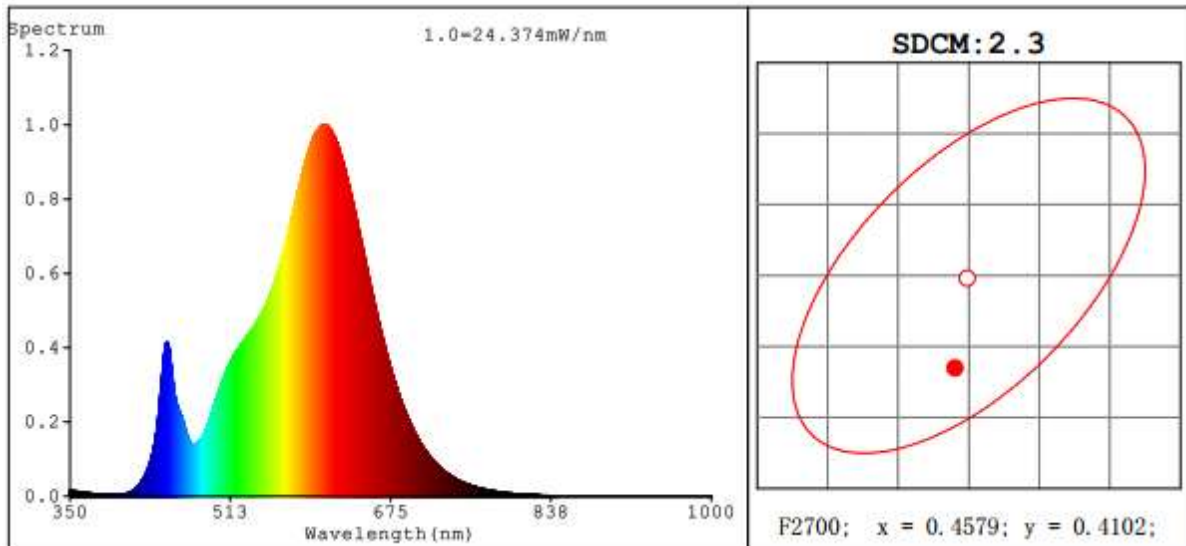
Spectroradiometric Parameters

120V



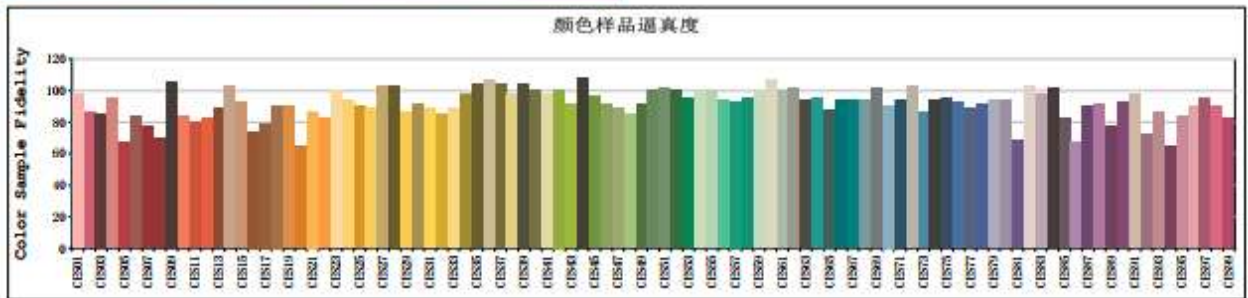
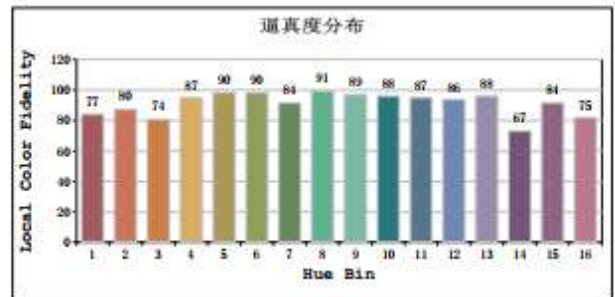
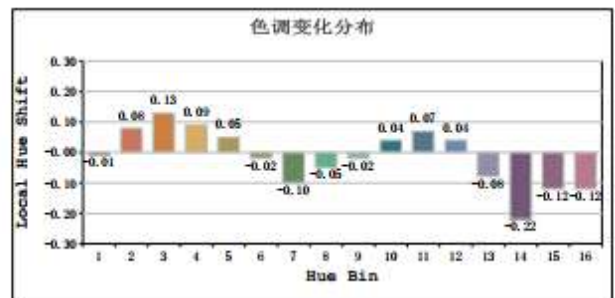
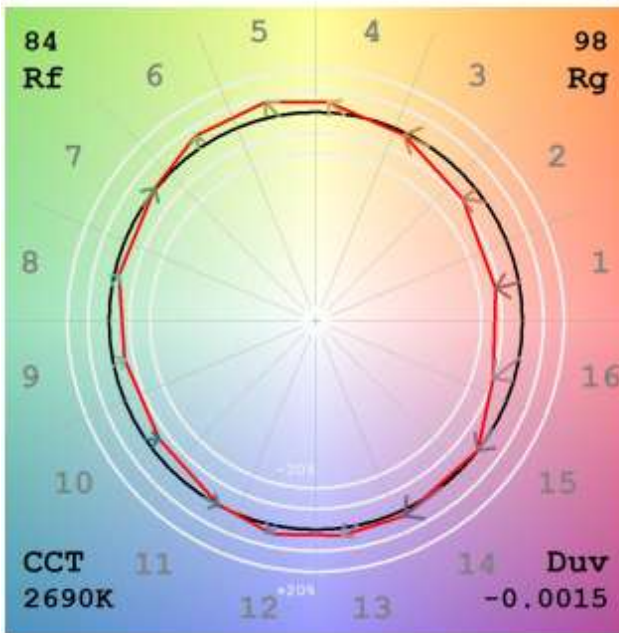
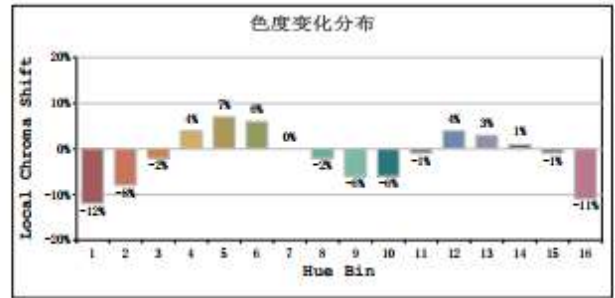
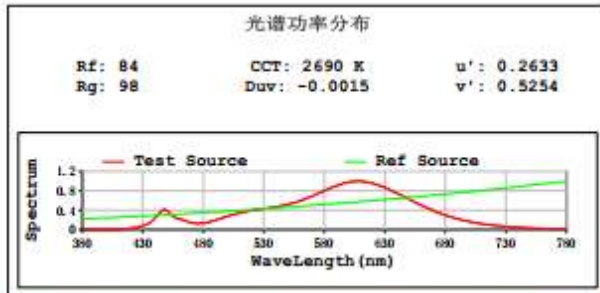
R1 =82.5 R2 =92.2 R3 =95.7 R4 =82.2 R5 =83.0 R6 =91.9 R7 =81.9
 R8 =58.9 R9 =11.5 R10=83.1 R11=83.0 R12=80.2 R13=84.8 R14=98.4 R15=74.6

277V



R1 =82.3 R2 =92.3 R3 =95.4 R4 =81.9 R5 =82.9 R6 =91.9 R7 =81.6
 R8 =58.6 R9 =10.9 R10=83.1 R11=82.5 R12=80.1 R13=84.7 R14=98.3 R15=74.5

3.2 Integrating Sphere Test - Minimum CCT



3.1 Integrating Sphere Test

Model No.	PLC-9-O-8FA-HYB-G24D	Sample ID.	A1
Opreate time (Min.)	15	Stabilization time (Min.)	15
Temperature (°C)	25.3	Humidity %	55

Test Method
<p>The samples were tested according to the IES LM-79-2008.</p> <p>Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.</p>

Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux (lm)	Efficacy (lm/W)
25.3	120.47	60.00	0.074	8.777	0.9885	1175.0	133.9
25.3	277.71	60.00	0.036	8.995	0.8962	1184.0	131.6

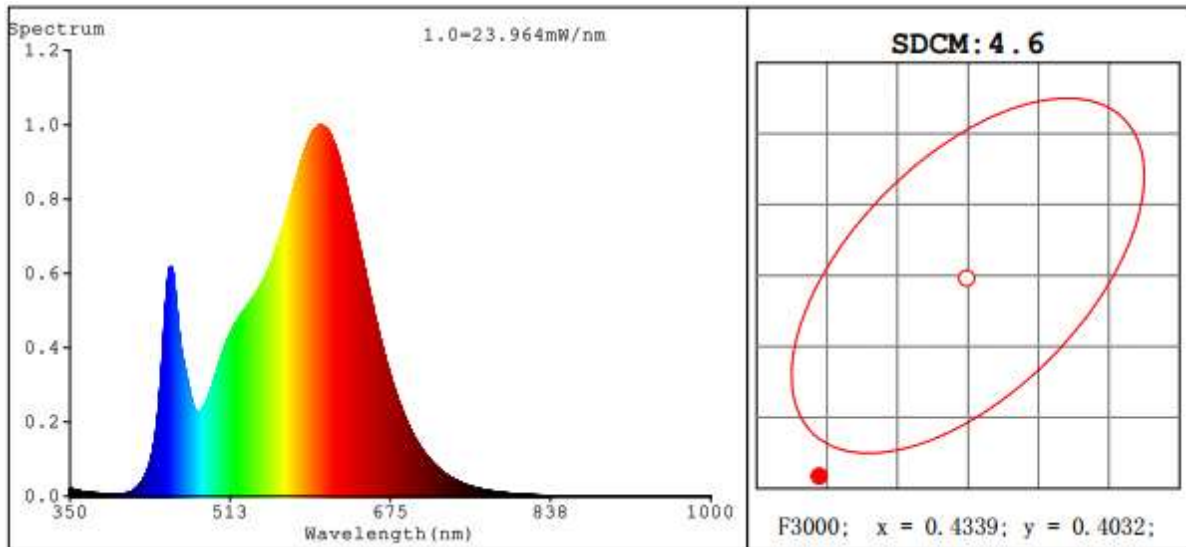
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3079	-3.1E-03	85	97	85	17.1	4.6
3081	-3.1E-03	85	97	85	17.3	4.7

3.1 Integrating Sphere Test

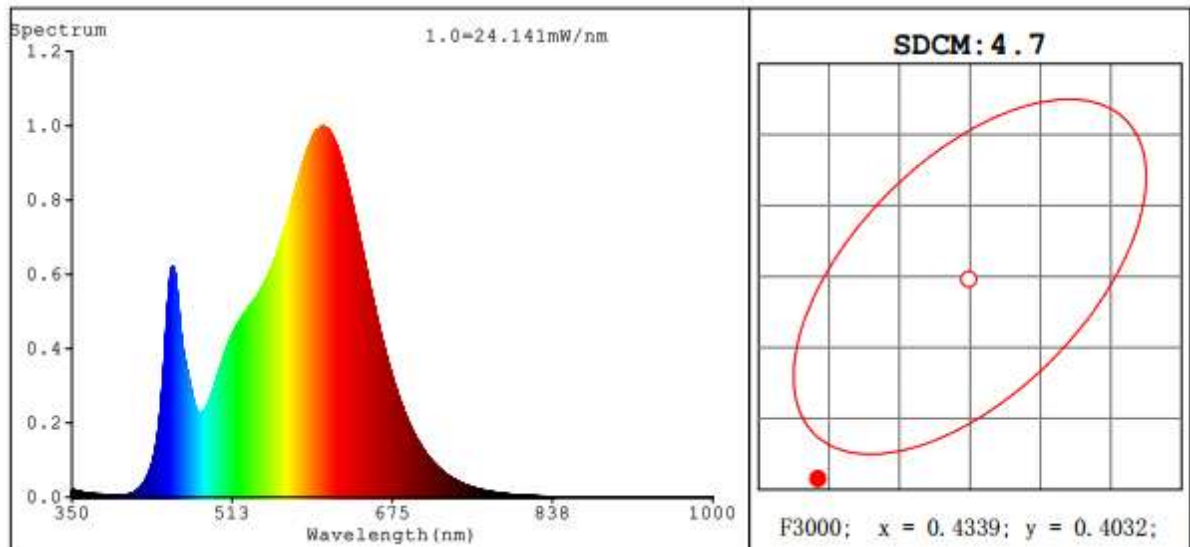
Spectroradiometric Parameters

120V



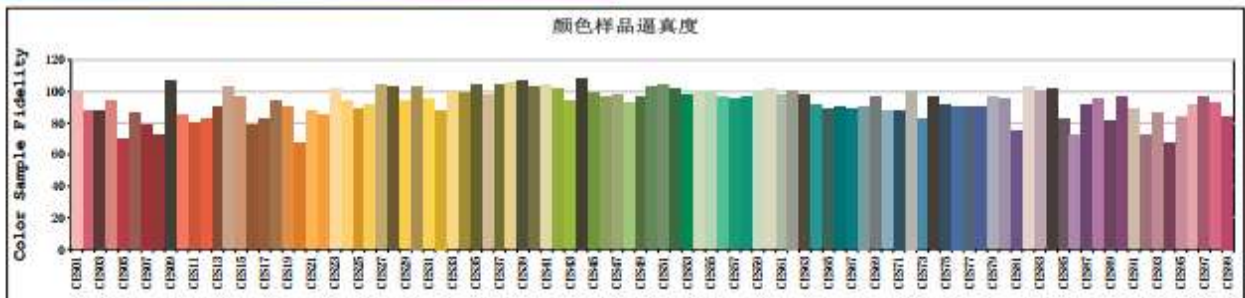
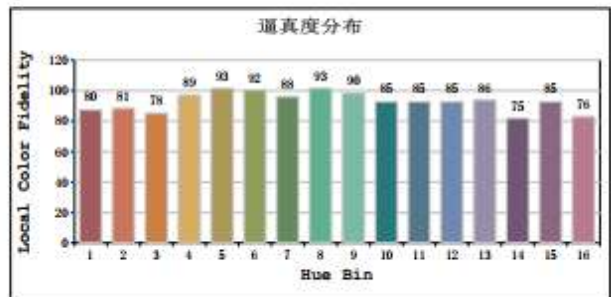
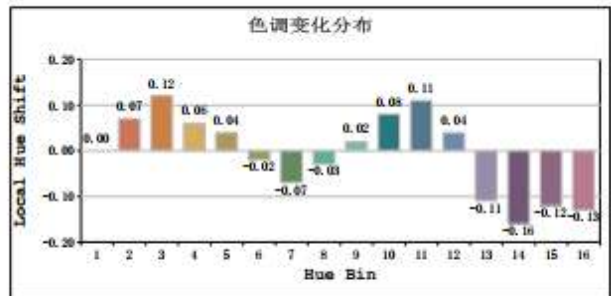
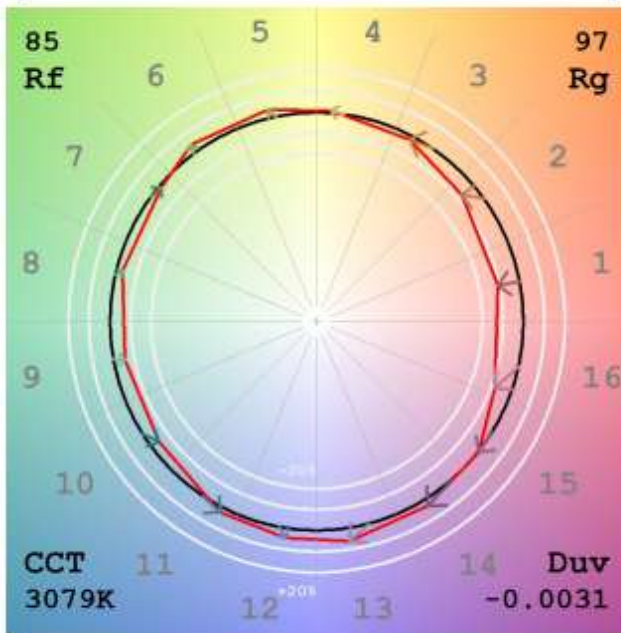
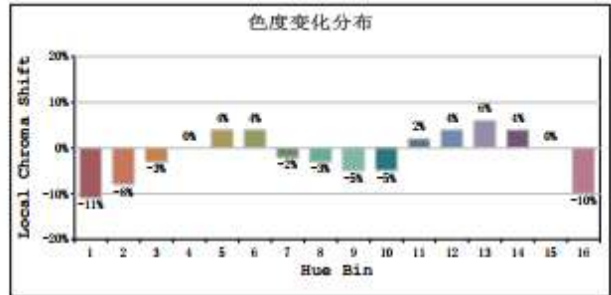
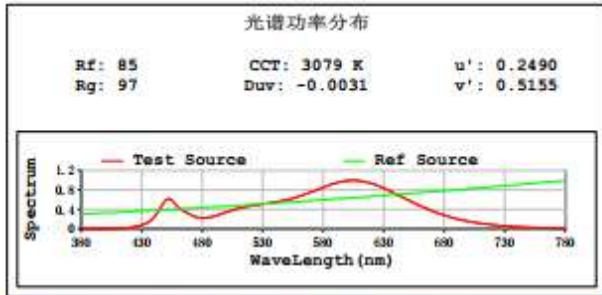
R1 =84.6 R2 =93.9 R3 =95.0 R4 =83.1 R5 =85.2 R6 =92.5 R7 =82.8
 R8 =62.5 R9 =17.1 R10=85.9 R11=83.3 R12=76.8 R13=87.1 R14=98.1 R15=77.8

277V



R1 =84.6 R2 =94.0 R3 =95.0 R4 =83.2 R5 =85.3 R6 =92.5 R7 =82.8
 R8 =62.6 R9 =17.3 R10=86.0 R11=83.4 R12=76.8 R13=87.2 R14=98.1 R15=77.8

3.2 Integrating Sphere Test - Minimum CCT



3.1 Integrating Sphere Test

Model No.	PLC-9-O-8FA-HYB-G24D	Sample ID.	A1
Opreate time (Min.)	15	Stabilization time (Min.)	15
Temperature (°C)	25.3	Humidity %	55

Test Method
<p>The samples were tested according to the IES LM-79-2008.</p> <p>Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.</p>

Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux (lm)	Efficacy (lm/W)
25.3	120.46	60.00	0.074	8.793	0.9884	1221.0	138.9
25.3	277.71	60.00	0.036	8.991	0.8961	1225.0	136.2

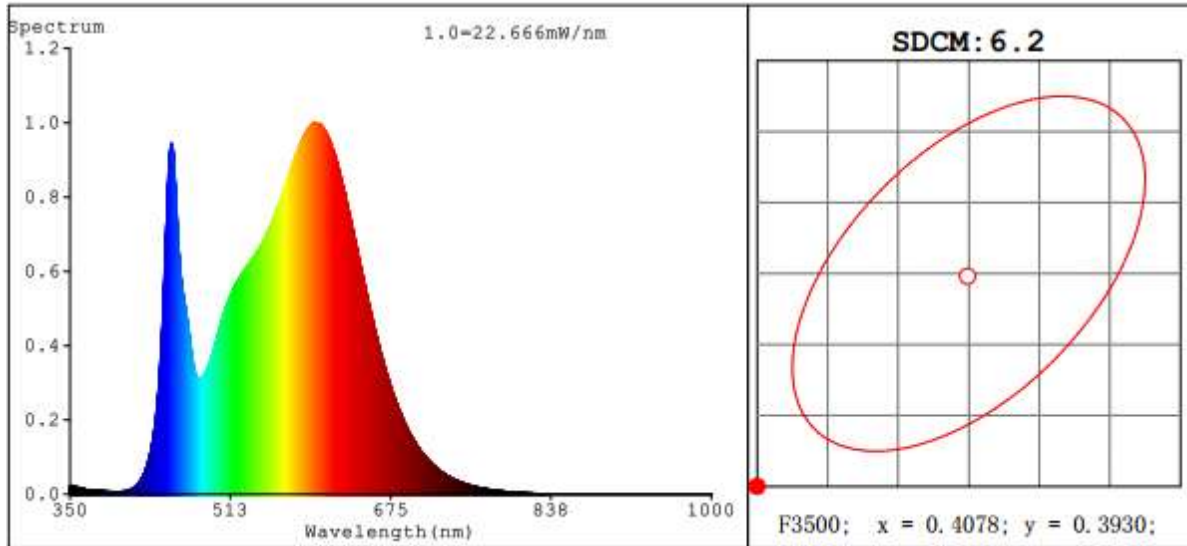
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3612	-2.2E-03	85	96	85	17.2	6.2
3612	-2.3E-03	85	96	85	17.3	6.3

3.1 Integrating Sphere Test

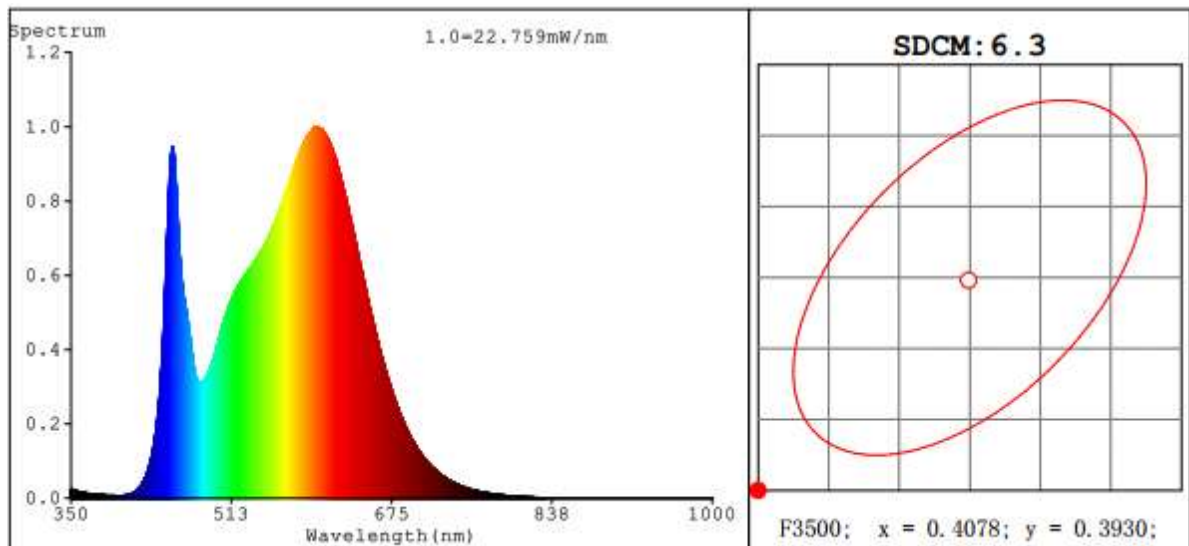
Spectroradiometric Parameters

120V



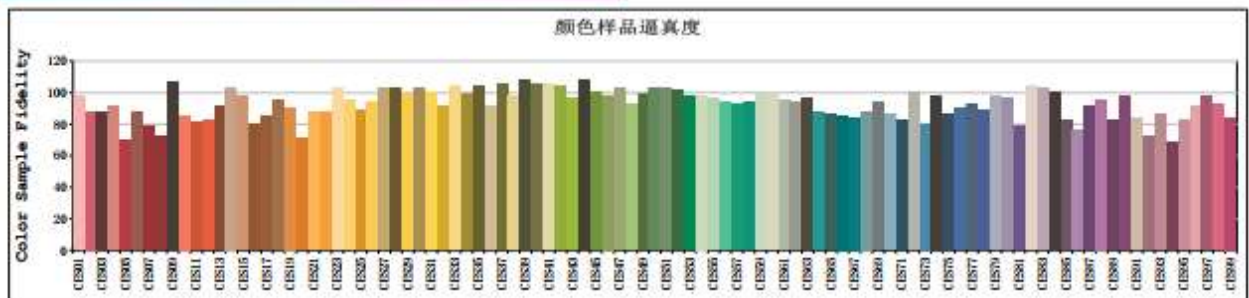
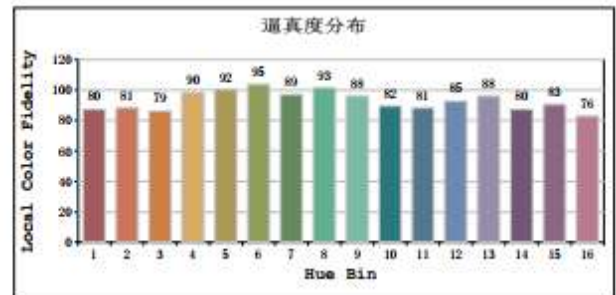
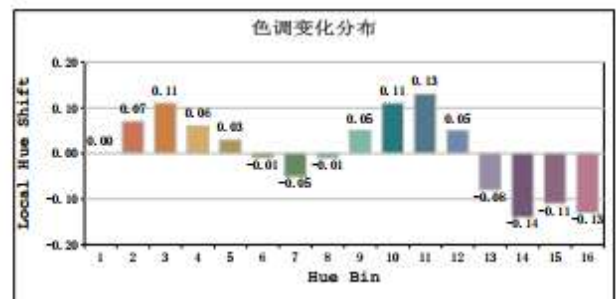
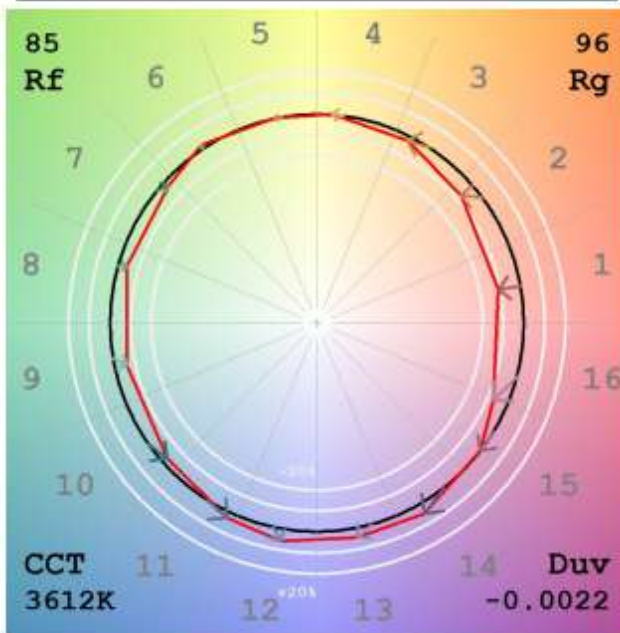
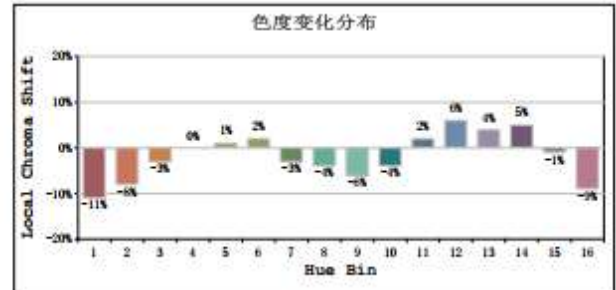
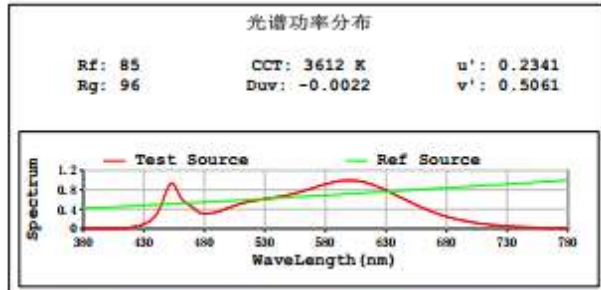
R1 =84.6 R2 =93.6 R3 =95.7 R4 =82.9 R5 =84.8 R6 =90.6 R7 =84.4
 R8 =64.9 R9 =17.2 R10=84.3 R11=82.5 R12=69.7 R13=87.3 R14=98.5 R15=78.5

277V



R1 =84.7 R2 =93.6 R3 =95.6 R4 =82.9 R5 =84.8 R6 =90.6 R7 =84.4
 R8 =64.9 R9 =17.3 R10=84.4 R11=82.6 R12=69.7 R13=87.3 R14=98.5 R15=78.6

3.2 Integrating Sphere Test - Minimum CCT



3.1 Integrating Sphere Test

Model No.	PLC-9-O-8FA-HYB-G24D	Sample ID.	A1
Opreate time (Min.)	15	Stabilization time (Min.)	15
Temperature (°C)	25.3	Humidity %	55

Test Method
<p>The samples were tested according to the IES LM-79-2008.</p> <p>Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.</p>

Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux (lm)	Efficacy (lm/W)
25.3	120.50	60.00	0.076	9.001	0.9885	1248.0	138.7
25.3	277.77	60.00	0.037	9.150	0.8992	1243.0	135.8

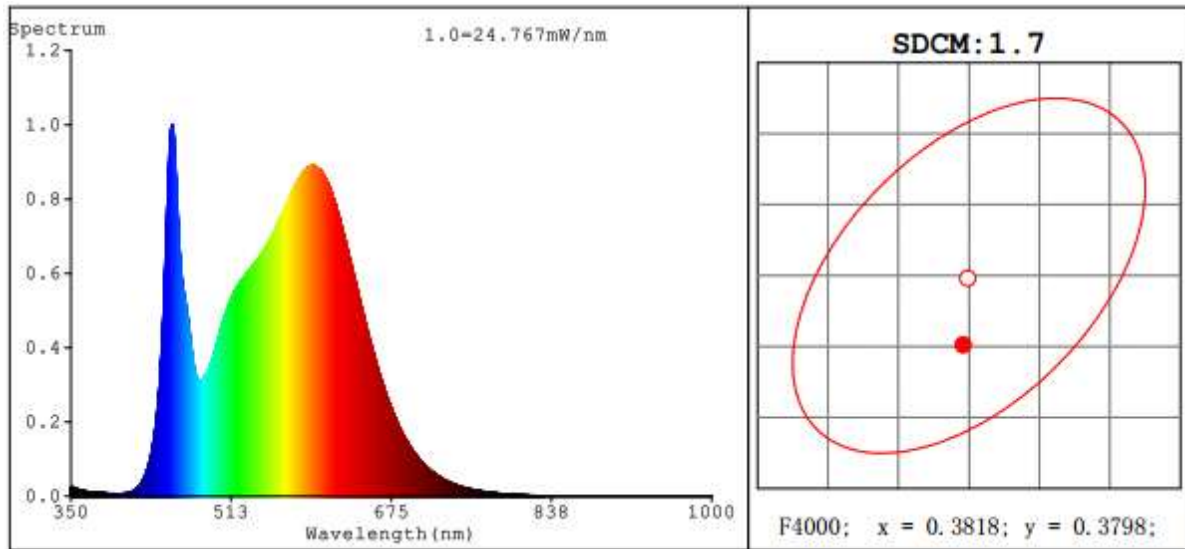
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3967	-4.0E-04	85	95	84	12.5	1.7
3970	-5.0E-04	85	95	84	12.7	1.8

3.1 Integrating Sphere Test

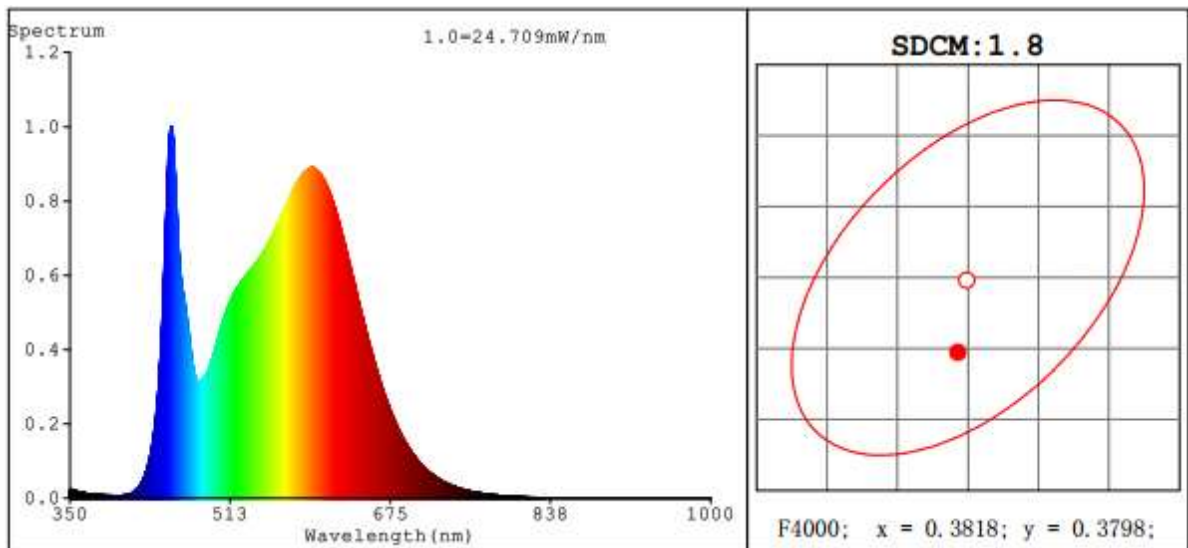
Spectroradiometric Parameters

120V



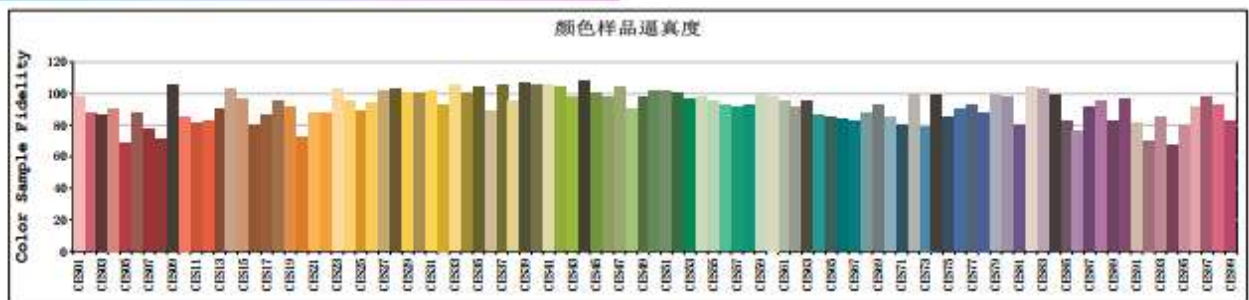
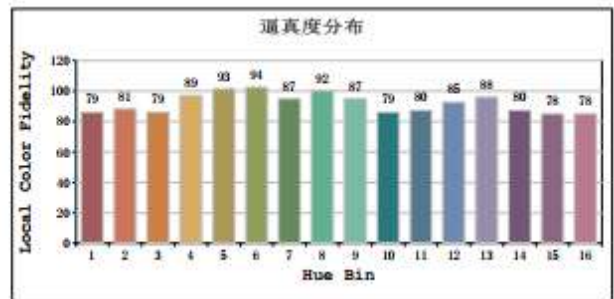
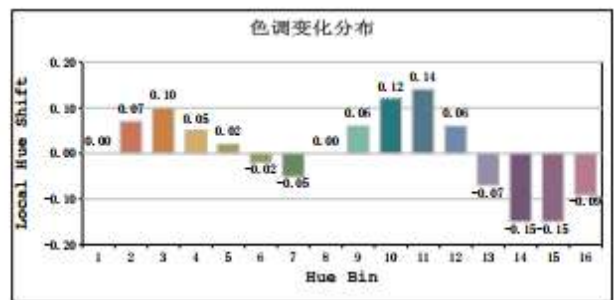
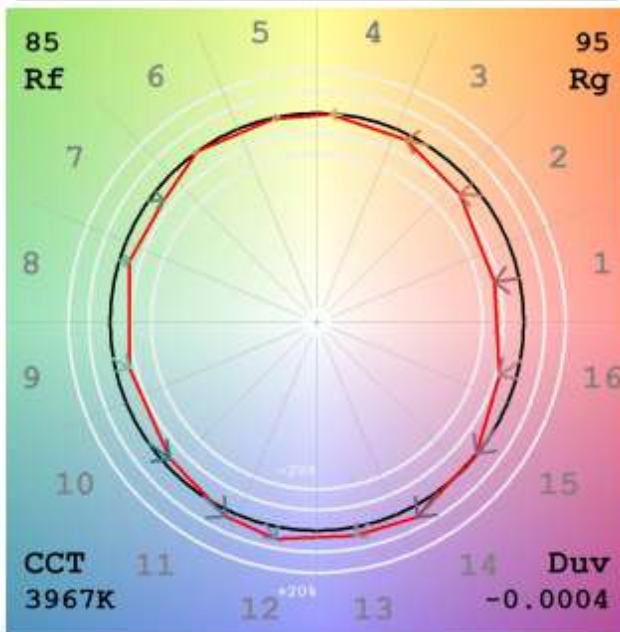
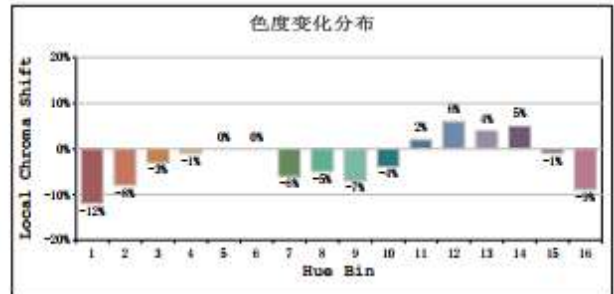
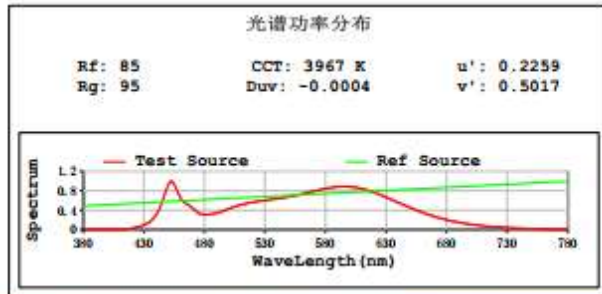
R1 =83.3 R2 =92.2 R3 =96.0 R4 =82.0 R5 =83.2 R6 =88.5 R7 =85.2
 R8 =64.8 R9 =12.5 R10=81.0 R11=81.3 R12=64.9 R13=85.9 R14=98.5 R15=77.1

277V



R1 =83.3 R2 =92.3 R3 =95.9 R4 =81.9 R5 =83.3 R6 =88.7 R7 =85.1
 R8 =64.8 R9 =12.7 R10=81.3 R11=81.3 R12=64.9 R13=86.0 R14=98.5 R15=77.2

3.2 Integrating Sphere Test - Minimum CCT



3.3 Goniophotometer Test

Model No.	PLC-9-O-8FA-HYB-G24D	Sample ID.	0
Operate time (Min.)	15	Stabilization time (Min.)	15

Test Method

The samples were tested according to the IES LM-79-2008. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ± 0.2 percent under load.

The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5o vertical intervals and 10o horizontal intervals.

Test Conditions

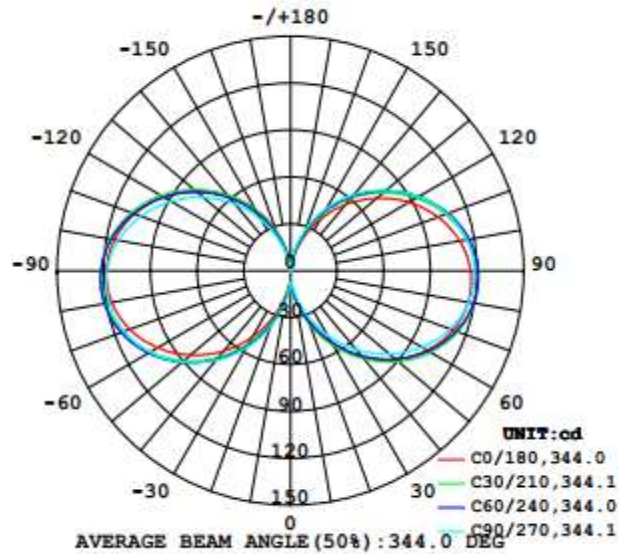
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.3	120.00	60.00	0.076	9.0	0.989

Test Result

Flux(lm)	Beam Angle	Zonal Lumen Requirement(0°-60°)	SC (0°-180°)	SC (90°-270°)	Efficacy (lm/W)
1106.82	344	19.6%	5.2	5.28	122.8

3.3 Goniophotometer Test

Light Distribution Curve



Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt	Zone	Lumens
0-20	8.67	N.A.	0.80	0-10	1.22
0-30	29.17	N.A.	2.60	10-20	7.45
0-40	68.59	N.A.	6.20	20-30	20.50
0-60	216.54	N.A.	19.60	30-40	39.42
0-80	446.53	N.A.	40.40	40-50	62.13
0-90	576.77	N.A.	52.20	50-60	85.82
10-90	575.55	N.A.	52.10	60-70	107.16
20-40	59.92	N.A.	5.40	70-80	122.83
20-50	122.05	N.A.	11.00	80-90	130.24
40-70	255.11	N.A.	23.10	90-100	128.19
60-80	230.00	N.A.	20.80	100-110	117.19
70-80	122.83	N.A.	11.10	110-120	99.18
80-90	130.24	N.A.	11.80	120-130	77.04
90-110	245.38	N.A.	22.20	130-140	53.92
90-120	344.55	N.A.	31.20	140-150	32.68
90-130	421.59	N.A.	38.10	150-160	15.65
90-150	508.19	N.A.	46.00	160-170	4.68
90-180	528.86	N.A.	47.80	170-180	0.33
110-180	283.48	N.A.	25.60		
0-180	1105.63	N.A.	100.00		

5.0 THD and PF Test

Model No.	PLC-9-O-8FA-HYB-G24D	Sample ID.	A1
Temperature (°C)	25.3	Humidity %	49

Test Method

The samples were tested according to the ANSI C82.77:2002.

The total harmonic distortion shall be measured to the 40th order.

The ambient temperature condition was maintained at 25° C ± 1° C. The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion were calculated.

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
25.3	120.00	60.00	0.076	9.1	0.989	11.28%
25.3	277.02	60.00	0.037	9.2	0.900	21.10%