Original Data

Relevant Standards

☑IES LM-79-2008
☑ANSI C82.77:2014

Prepared For

RAB lighting INC

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Project Number

Data Number

Test Date
2020/9/10

1.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2020/9/10	PLC-9.5-V-8FA-DIR	A1
2	Goniophotometer Test	2020/9/10	PLC-9.5-V-8FA-DIR	A1
3	THD and PF Test	2020/9/10	PLC-9.5-V-8FA-DIR	A1

1.1 Test Summary

Requirement Category	Test Method	Requirements		Test value
Integrating Sphere system				
Power (W)	IES LM-79-2008	11.5 ±10%		11.68
Lamp Output for bare lamp (lm)	IES LM-79-2008	1100 ±10%		1166
Lamp Efficacy (lm/W)	IES LM-79-2008	> 86.1		96.3
Allowable CCTs* (K)	IES LM-79-2008	7 step	3985±275	3839
		4 step	3985±154	
		7 step	3465±245	3385
		4 step	3465±124	
		7 step	3045±175	3075
		4 step	3045±100	
		7 step	2725 ± 145	
		4 step	2725 ± 83	
CRI	IES LM-79-2008 CIE 13.3-1995	>80		81.2
R9	IES LM-79-2008 CIE 13.3-1995	>0		3.9
Rf	ANSI/IES TM-30-18	>70		83
Rg	ANSI/IES TM-30-18	>89		96
Rcs,h1	ANSI/IES TM-30-18	Rcs=>-12%,h1<=23%		
Power Factor	ANSI C82.77:2014	>0.9		0.9389
Total Harmonic Distortion (A%)	ANSI C82.77:2014	<25%		10.62%
Goniophotometer system				
Lamp Output (lm)	IES LM-79-2008	1100 ±10%		1104.4
Minimum Luminaire Efficacy(lm/W)	IES LM-79-2008	> 86.09		97.22
Beam Angle	IES LM-79-2008			110.3

2.0 Production Description

Luminaire Description: PLC-9.5-V-8FA-DIR

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-9.5-V-8FA-DIR	Sample ID.	A1
Opreate time (Min.)	15	Stabilization time (Min.)	15
Temperature（℃）	25.3	Humidity %	55

Test Method
The samples were tested according to the IES LM-79-2008. Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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 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.

Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux (lm)	Efficacy (lm/W)
25.3	120.00	60.00	0.098	11.680	0.9908	1176.0	100.7
25.3	277.02	60.00	0.047	12.110	0.9389	1166.0	96.3

Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3839	2.3E-03	83	96	81	3.9	4.4
3845	2.2E-03	83	96	81	3.9	4.2

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux (lm)	Efficacy (lm/W)
25.3	120.00	60.00	0.095	11.360	0.9905	1188.0	104.6
25.3	277.02	60.00	0.046	11.830	0.9362	1189.0	100.5

Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3386	5.0E-04	84	96	83	8.1	2.4
3385	5.0E-04	84	96	83	8.1	2.4

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux (lm)	Efficacy (lm/W)
25.3	120.00	60.00	0.098	11.620	0.9907	1112.0	95.7
25.3	277.02	60.00	0.097	11.590	0.9906	1103.0	95.2

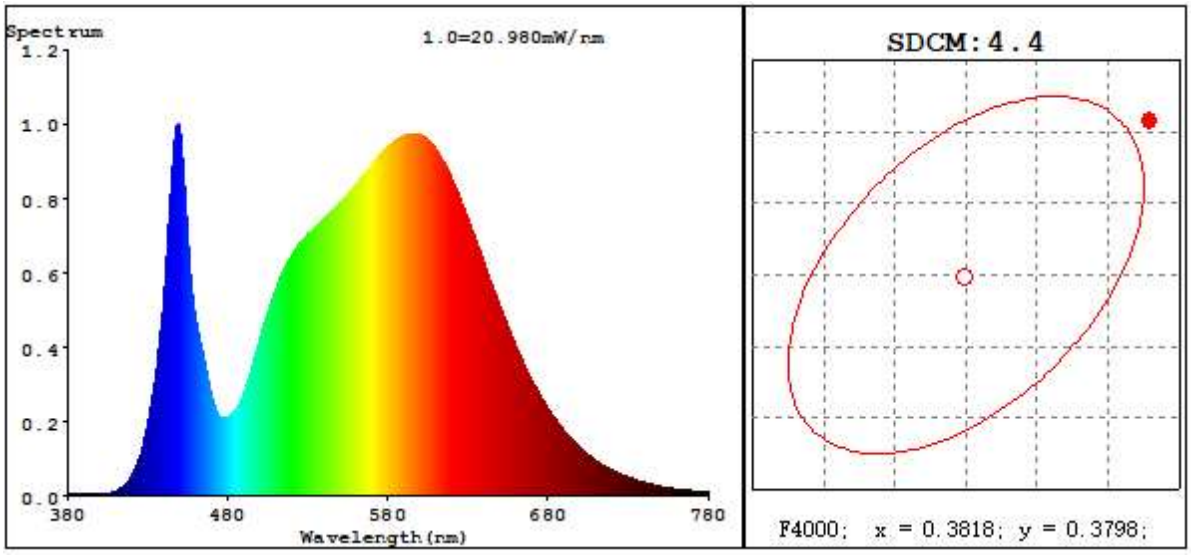
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3075	2.0E-04	84	95	82	6.4	1.2
3078	1.0E-04	84	95	82	6.3	1.2

3.1 Integrating Sphere Test

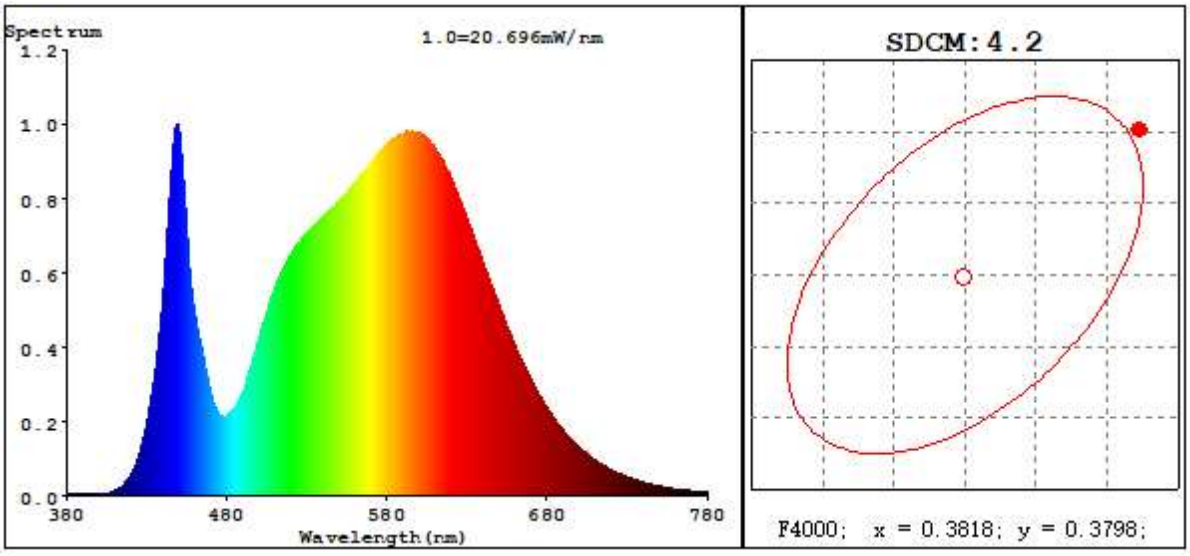
Spectroradiometric Parameters

120V



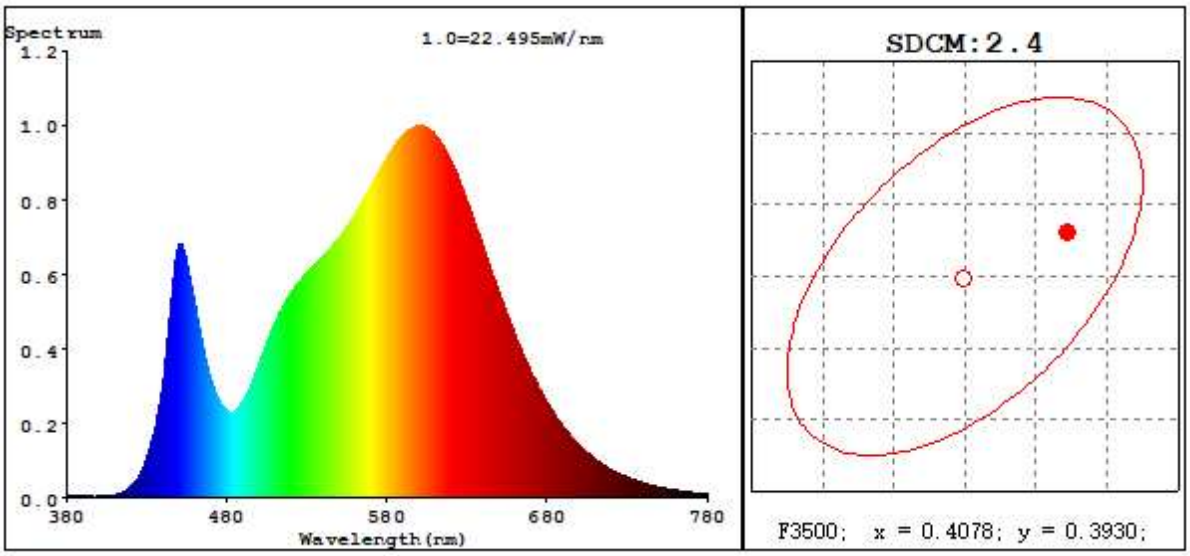
R1 =79.3 R2 =86.2 R3 =92.3 R4 =81.3 R5 =79.1 R6 =81.4 R7 =86.1
R8 =63.5 R9 =3.9 R10=67.6 R11=80.1 R12=59.4 R13=80.6 R14=95.6 R15=72.8

277V



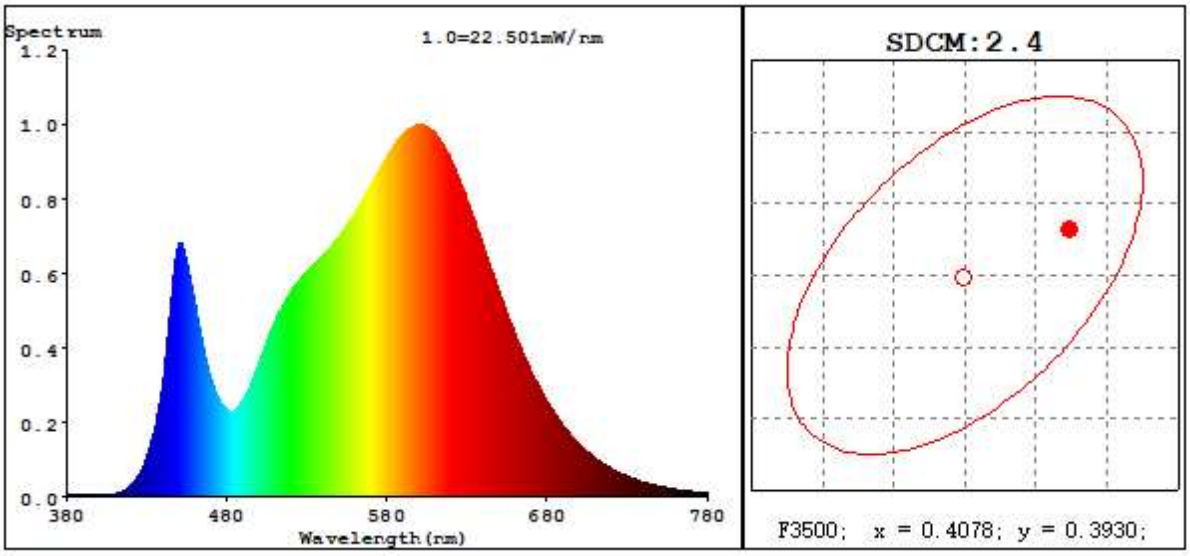
R1 =79.3 R2 =86.3 R3 =92.4 R4 =81.3 R5 =79.1 R6 =81.4 R7 =86.1
R8 =63.5 R9 =3.9 R10=67.8 R11=80.0 R12=59.3 R13=80.6 R14=95.7 R15=72.9

120V



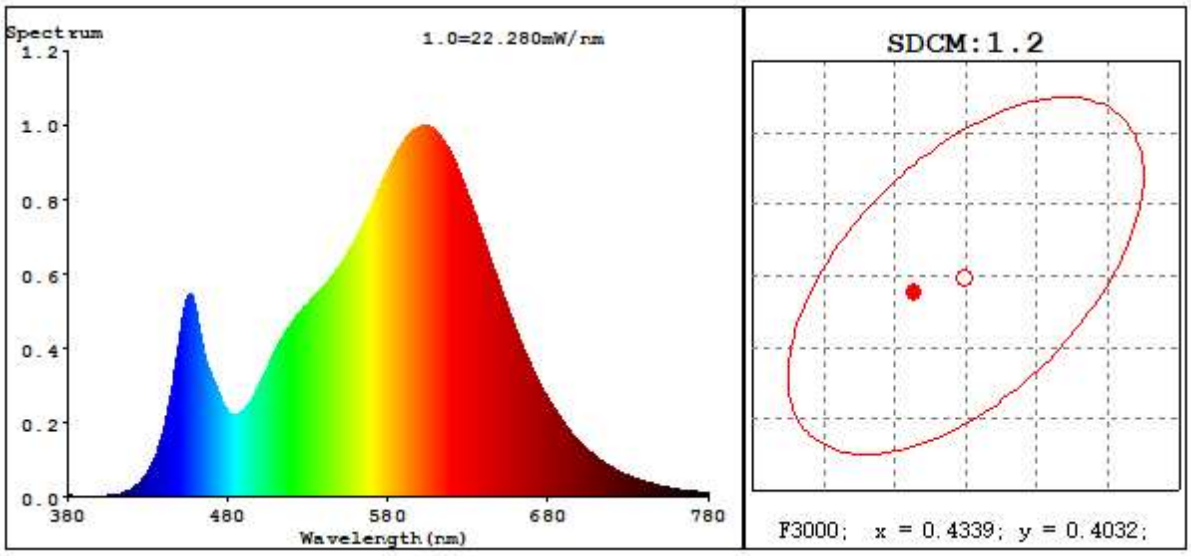
R1 =81.2 R2 =89.9 R3 =96.3 R4 =81.1 R5 =81.0 R6 =86.6 R7 =84.7
R8 =61.8 R9 =8.1 R10=76.1 R11=79.8 R12=65.5 R13=83.3 R14=98.1 R15=74.4

277V



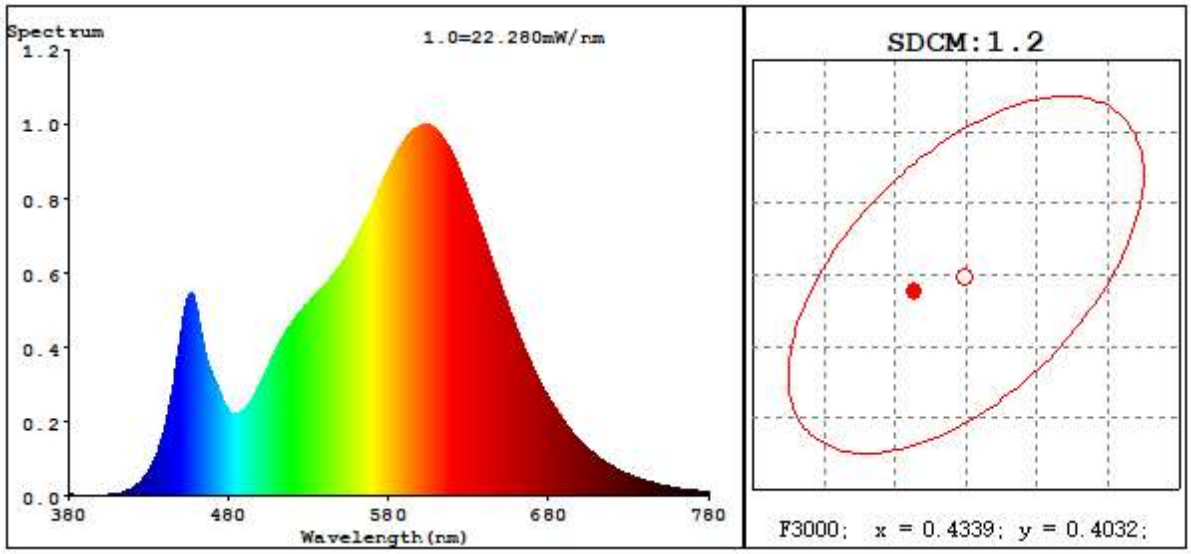
R1 =81.2 R2 =89.9 R3 =96.3 R4 =81.1 R5 =81.0 R6 =86.6 R7 =84.7
R8 =61.8 R9 =8.1 R10=76.0 R11=79.8 R12=65.5 R13=83.3 R14=98.1 R15=74.4

120V



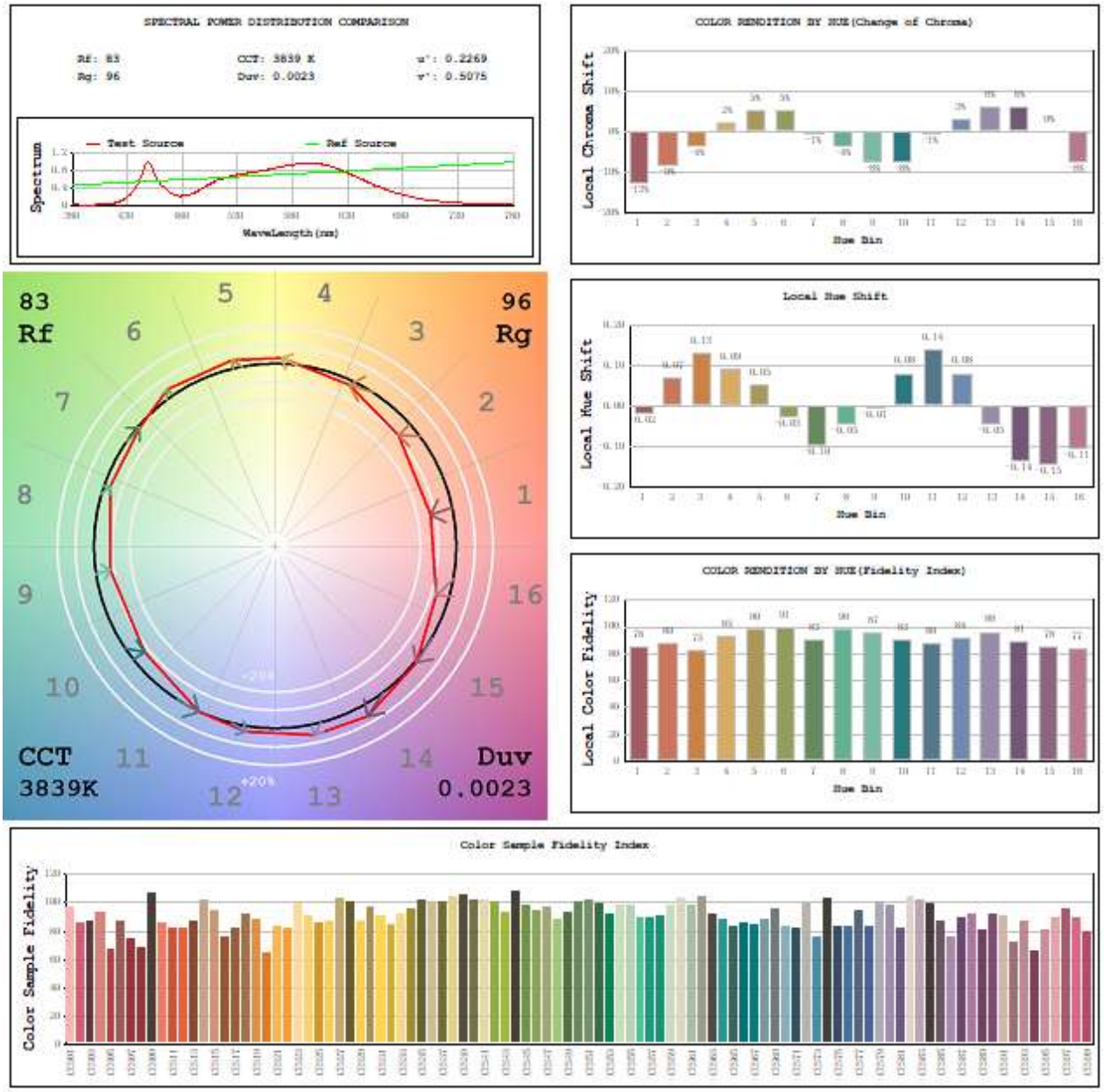
R1 =81.0 R2 =91.6 R3 =95.9 R4 =79.2 R5 =80.8 R6 =89.4 R7 =82.4
R8 =58.7 R9 =6.3 R10=80.0 R11=77.8 R12=69.0 R13=83.7 R14=98.5 R15=73.6

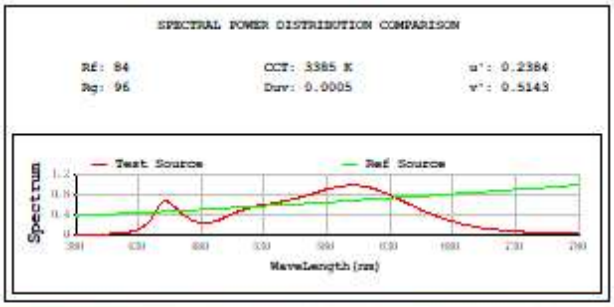
277V

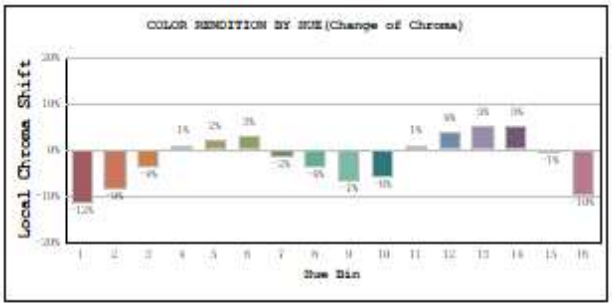


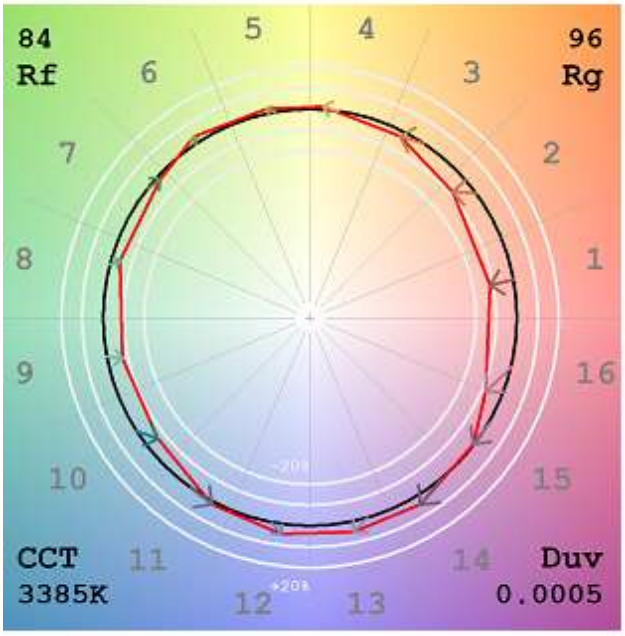
R1 =81.0 R2 =91.6 R3 =95.9 R4 =79.2 R5 =80.8 R6 =89.4 R7 =82.4
R8 =58.7 R9 =6.3 R10=80.0 R11=77.8 R12=69.0 R13=83.7 R14=98.5 R15=73.6

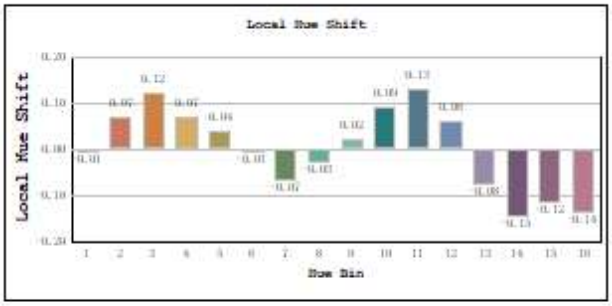
3.2 Integrating Sphere Test - Minimum CCT

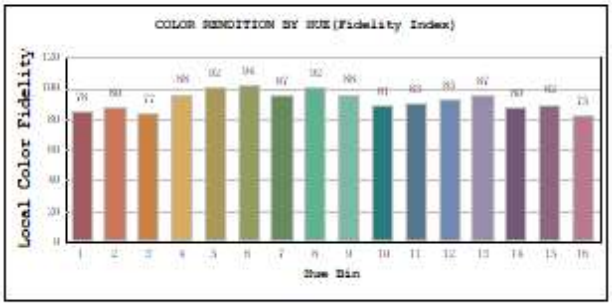


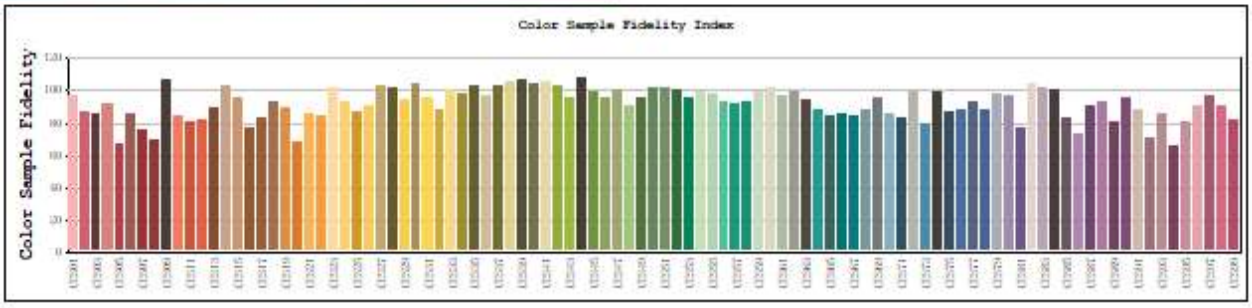

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 84
Rg: 96
CCT: 3385 K
Duv: 0.0005
u': 0.2384
v': 0.5143
Test Source
Ref Source
Spectrum
WaveLength(nm)

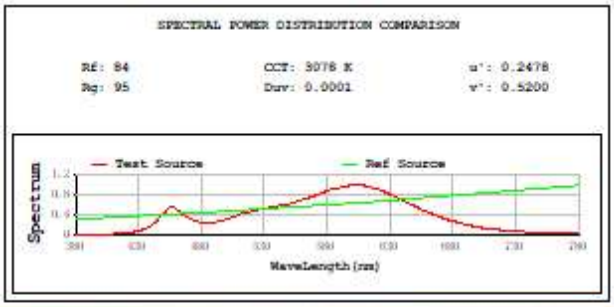

COLOR RENDITION BY HUE(Change of Chroma)
Local Chroma Shift
Hue Bin

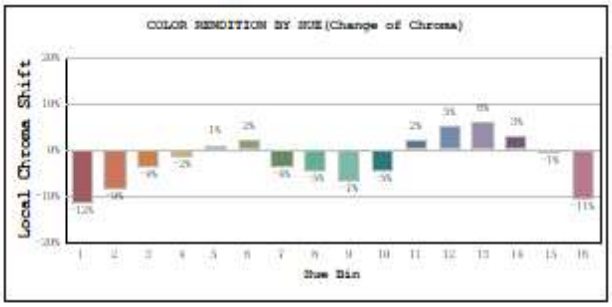

84
Rf
96
Rg
CCT
3385K
Duv
0.0005

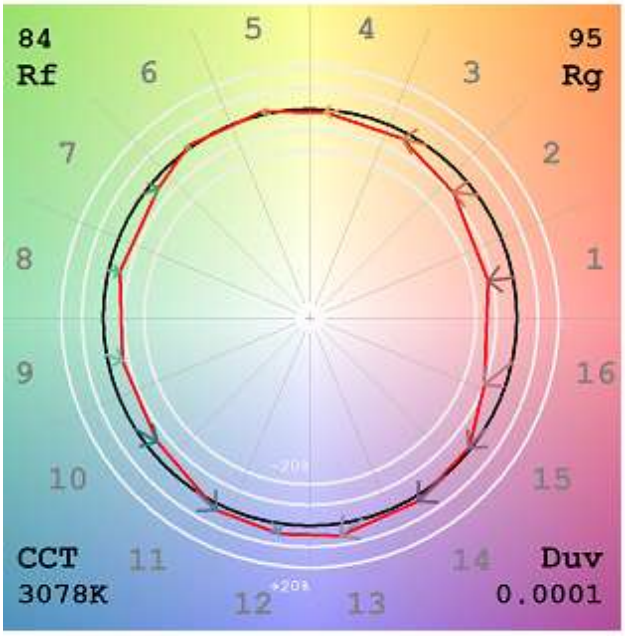

Local Hue Shift
Local Hue Shift
Hue Bin

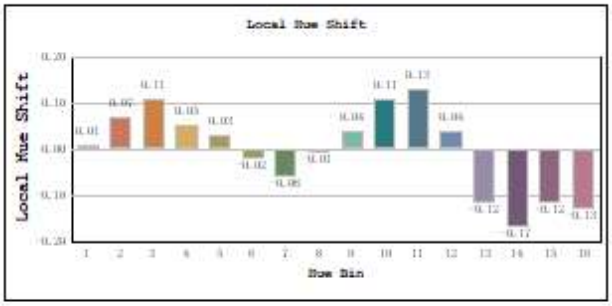

COLOR RENDITION BY HUE(Fidelity Index)
Local Color Fidelity
Hue Bin

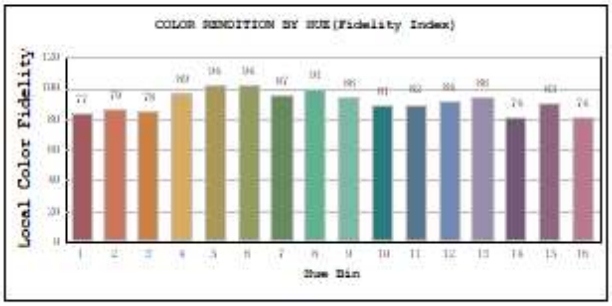

Color Sample Fidelity Index
Color Sample Fidelity

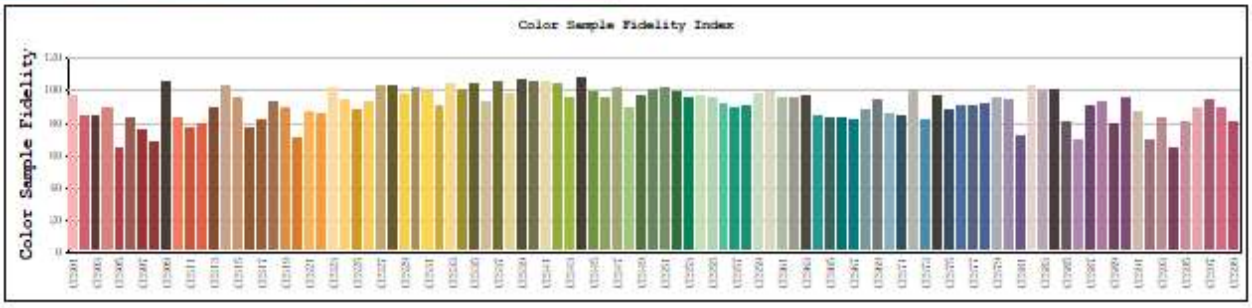

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 84
Rg: 95
CCT: 3078 K
Duv: 0.0001
u': 0.2478
v': 0.5200
Test Source
Ref Source
Spectrum
WaveLength(nm)


COLOR RENDITION BY HUE(Change of Chroma)
Local Chroma Shift
Hue Bin


84
Rf
95
Rg
CCT
3078K
Duv
0.0001


Local Hue Shift
Local Hue Shift
Hue Bin


COLOR RENDITION BY HUE(Fidelity Index)
Local Color Fidelity
Hue Bin


Color Sample Fidelity Index
Color Sample Fidelity

3.3 Goniophotometer Test

Model No.	PLC-9.5-V-8FA-DIR	Sample ID.	0
Opreate time (Min.)	15	Stabilization time (Min.)	15

Test Method
The samples were tested according to the IES LM-79-2008. Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C + 1º 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

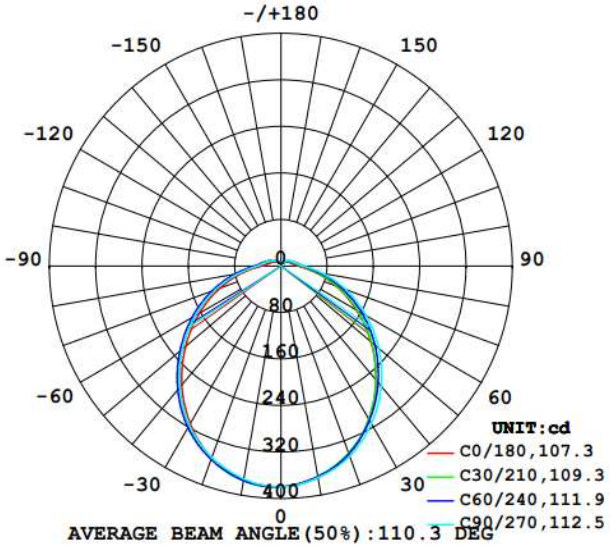
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.3	120.00	60.00	0.095	11.4	0.991

Test Result

Flux(lm)	Beam Angle	Zonal Lumen Requirement(0°-60°)	SC (0°-180°)	SC (90°-270°)	Efficacy (lm/W)
1104.4	110.3	67.2%	1.24	1.24	97.2

3.3 Goniophotometer Test

Light Distrubtion Curve



Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt	Zone	Lumens
0-20	126.48	11.20	11.20	0-10	32.92
0-30	266.38	23.70	23.60	10-20	93.56
0-40	432.09	38.40	38.30	20-30	139.90
0-60	756.80	67.20	67.10	30-40	165.71
0-80	971.15	86.20	86.10	40-50	169.82
0-90	1023.51	90.90	90.80	50-60	154.90
10-90	990.59	88.00	87.90	60-70	125.85
20-40	305.61	27.10	27.10	70-80	88.49
20-50	475.43	42.20	42.20	80-90	52.36
40-70	450.57	40.00	40.00	90-100	32.74
60-80	214.35	19.00	19.00	100-110	24.02
70-80	88.49	7.90	7.80	110-120	17.69
80-90	52.36	4.60	4.60	120-130	12.47
90-110	56.76	5.00	5.00	130-140	8.11
90-120	74.45	6.60	6.60	140-150	4.73
90-130	86.93	7.70	7.70	150-160	2.50
90-150	99.76	8.90	8.80	160-170	1.33
90-180	104.07	9.20	9.20	170-180	0.46
110-180	47.31	4.20	4.20		
0-180	1127.58	100.10	100.00		

5.0 THD and PF Test

Model No.	PLC-9.5-V-8FA-DIR	Sample ID.	A1
Temperature（℃）	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 25º C ± 1º 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	0.100	11.9	0.991	10.62%
25.3	277.02	60.00	0.098	11.7	0.991	4.18%