Original Data

Relevant Standards

☑IES LM-79-2008
☑ANSI C82.77:2014

Prepared For

RAB lighting INC

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Prepared By

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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-H-8FA-DIR	A1
2	Goniophotometer Test	2020/9/10	PLC-9.5-H-8FA-DIR	A1
3	THD and PF Test	2020/9/10	PLC-9.5-H-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%		11.6
Lamp Output for bare lamp (lm)	IES LM-79-2008	960 ±10%		1085
Lamp Efficacy (lm/W)	IES LM-79-2008	> 75.1		90.0
Allowable CCTs* (K)	IES LM-79-2008	7 step	3985±275	3816
		4 step	3985±154	
		7 step	3465±245	3409
		4 step	3465±124	
		7 step	3045±175	3124
		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		3.7
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		0.94
Total Harmonic Distortion (A%)	ANSI C82.77:2014	<25%		8.78%
Goniophotometer system				
Lamp Output (lm)	IES LM-79-2008	960 ±10%		1179
Minimum Luminaire Efficacy(lm/W)	IES LM-79-2008	> 75.1		97.84
Beam Angle	IES LM-79-2008			164.3

2.0 Production Description

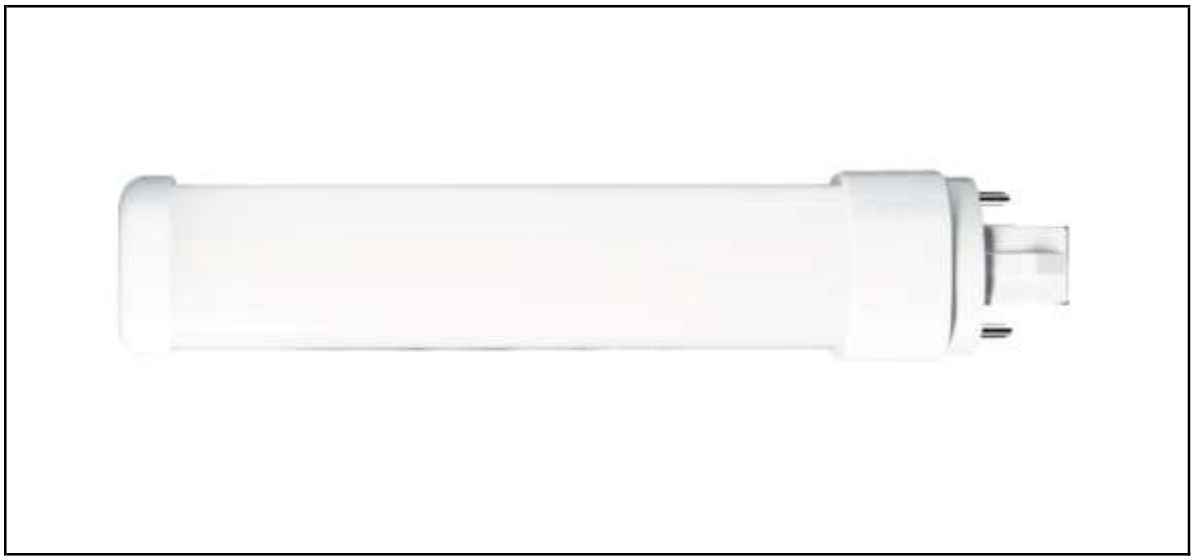
Luminaire Description: PLC-9.5-H-8FA-DIR

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-H-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	0.097	11.60	0.9909	1086.0	93.6
25.3	277.02	60.00	0.046	12.05	0.9385	1085.0	90.0

Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3816	2.3E-03	83	96	81	3.7	5.0
3817	2.3E-03	83	96	81	3.7	5.0

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	11.29	0.9906	1100.0	97.4
25.3	277.02	60.00	0.045	11.75	0.9357	1100.0	93.6

Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3409	7.0E-04	84	95	83	7.5	1.8
3409	7.0E-04	84	95	83	7.5	1.8

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Flux（lm）	Efficacy (lm/W)
25.3	120.00	60.00	0.097	11.51	0.9908	1018.0	88.4
25.3	277.02	60.00	0.046	11.96	0.9376	1017.0	85.0

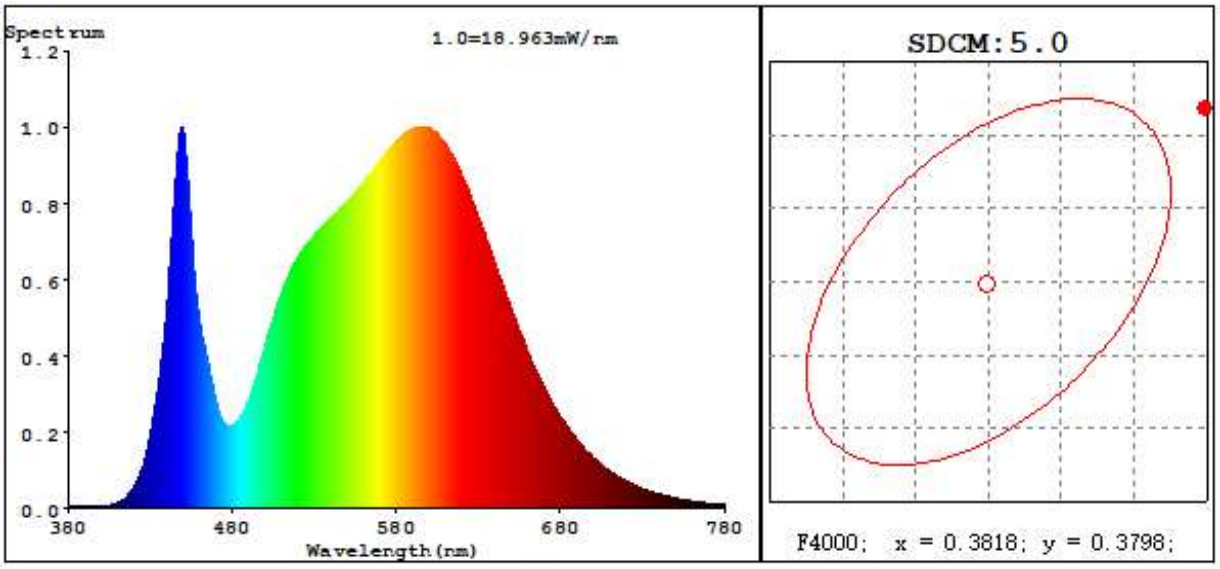
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3124	2.0E-04	84	95	82	6.0	2.8
3125	2.0E-04	84	95	82	5.9	2.8

3.1 Integrating Sphere Test

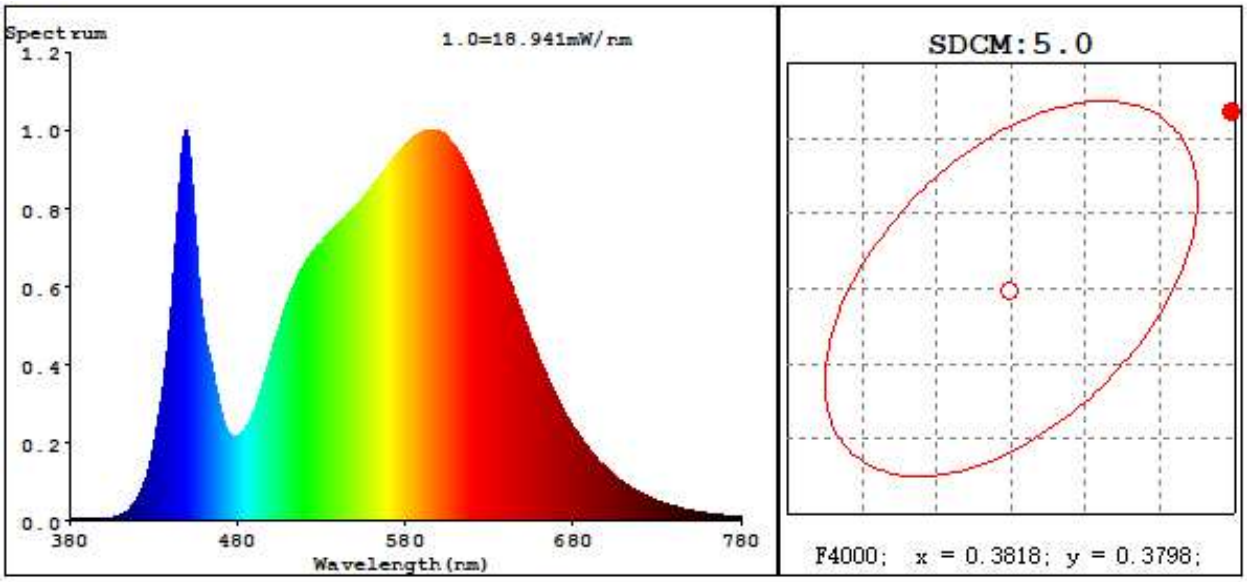
Spectroradiometric Parameters

120V



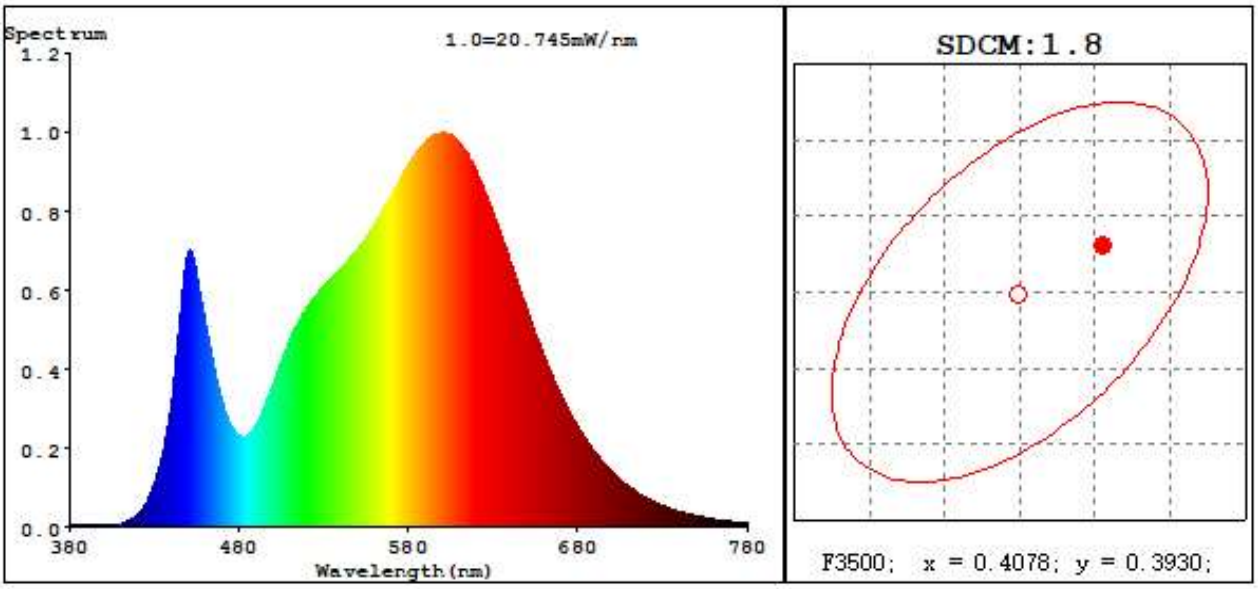
R1 =79.2 R2 =86.3 R3 =92.6 R4 =81.3 R5 =79.1 R6 =81.6 R7 =86.0
R8 =63.2 R9 =3.7 R10=67.9 R11=80.0 R12=59.4 R13=80.5 R14=95.8 R15=72.7

277V



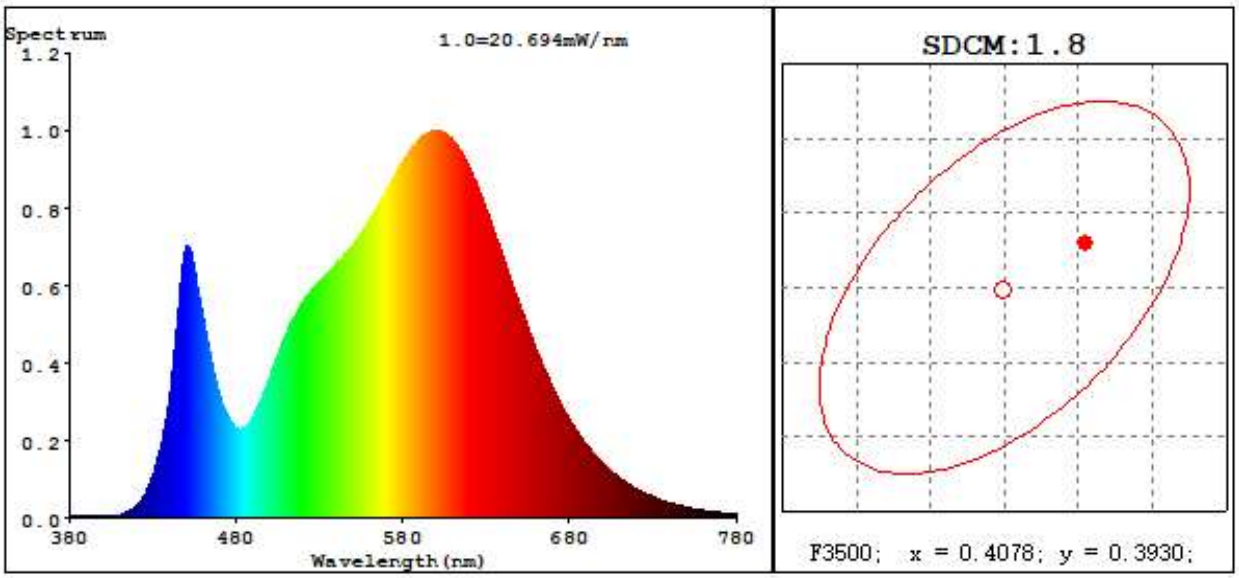
R1 =79.2 R2 =86.3 R3 =92.6 R4 =81.3 R5 =79.2 R6 =81.6 R7 =86.0
R8 =63.2 R9 =3.7 R10=67.9 R11=80.0 R12=59.4 R13=80.5 R14=95.8 R15=72.7

120V



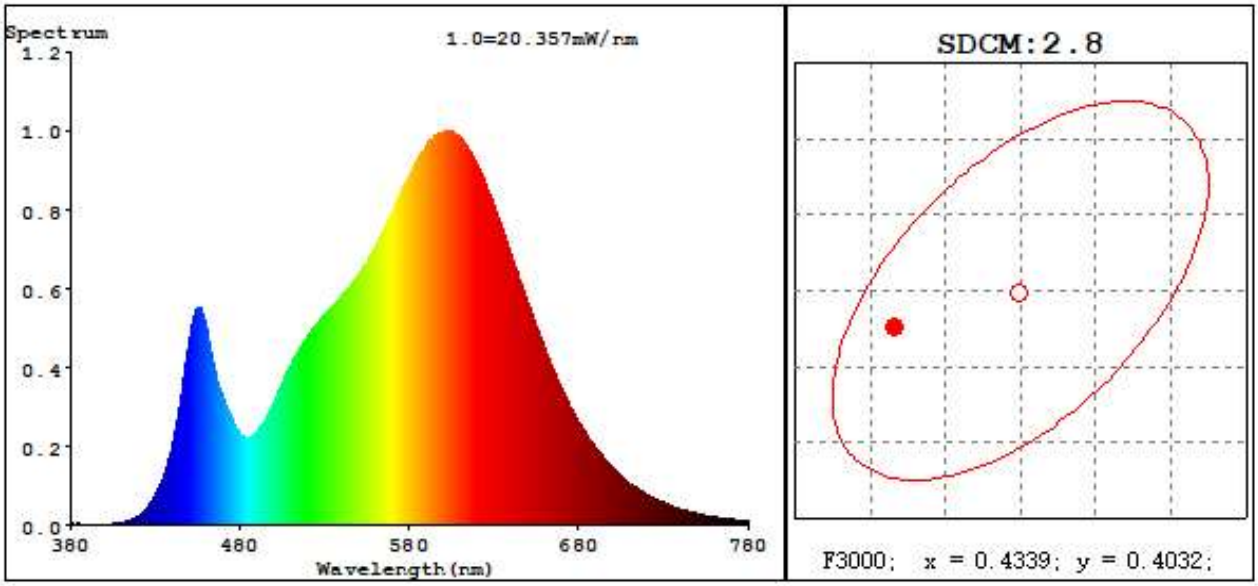
R1 =80.9 R2 =89.6 R3 =96.1 R4 =81.0 R5 =80.8 R6 =86.3 R7 =84.8
R8 =61.8 R9 =7.5 R10=75.4 R11=79.7 R12=64.9 R13=83.0 R14=98.0 R15=74.1

277V



R1 =80.9 R2 =89.6 R3 =96.1 R4 =81.0 R5 =80.8 R6 =86.3 R7 =84.8
R8 =61.8 R9 =7.5 R10=75.4 R11=79.7 R12=64.9 R13=83.0 R14=98.0 R15=74.2

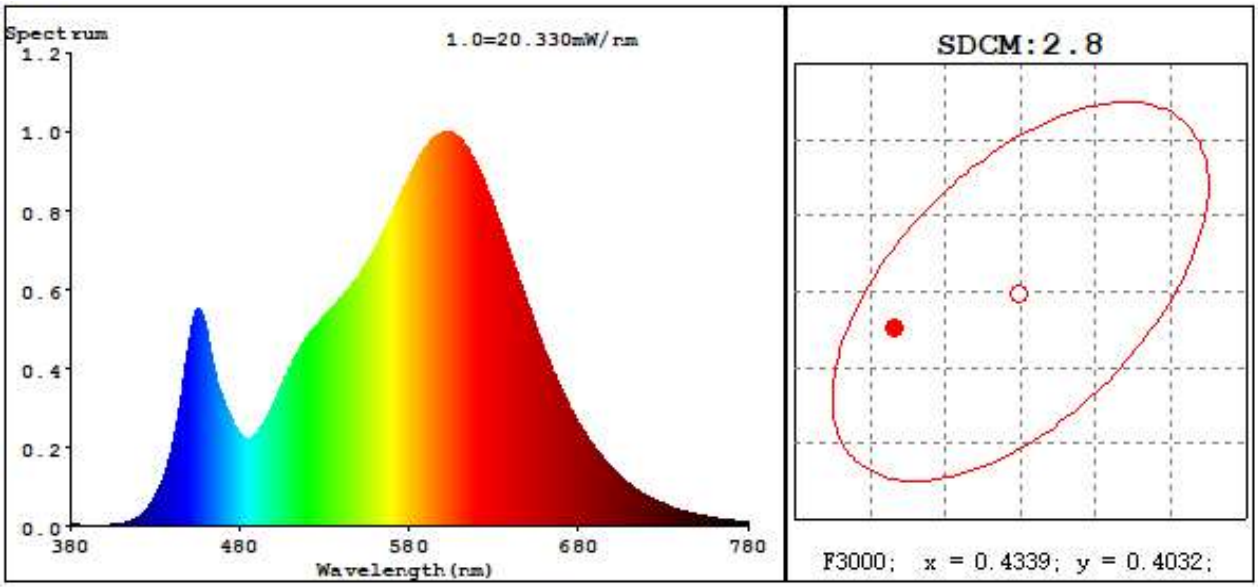
120V



R1 =80.8 R2 =91.2 R3 =96.2 R4 =79.4 R5 =80.7 R6 =88.8 R7 =82.7

R8 =58.9 R9 =6.0 R10=79.2 R11=78.0 R12=68.4 R13=83.4 R14=98.6 R15=73.5

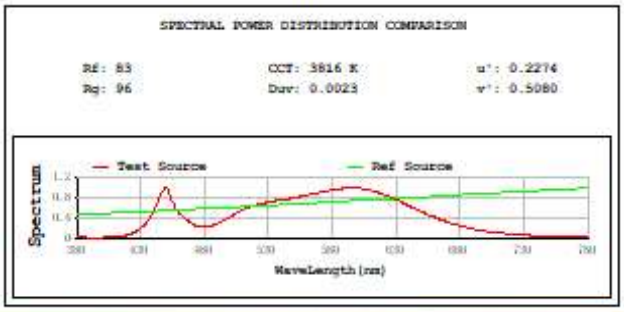
277V

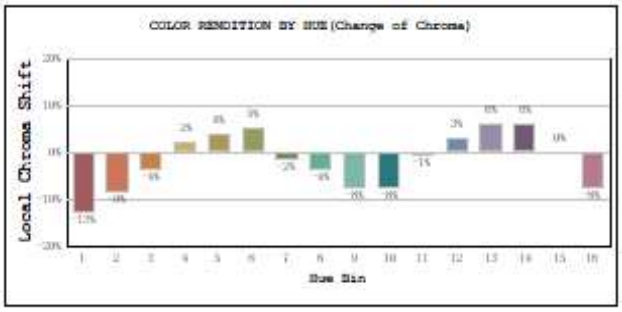


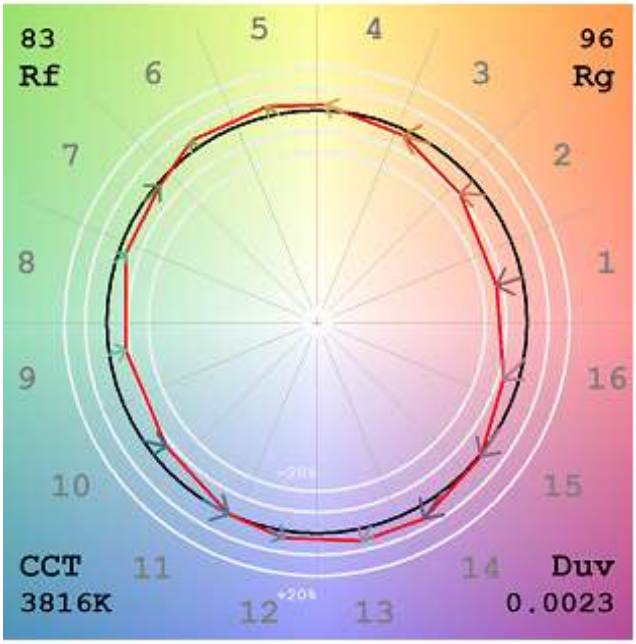
R1 =80.8 R2 =91.1 R3 =96.2 R4 =79.4 R5 =80.7 R6 =88.8 R7 =82.6

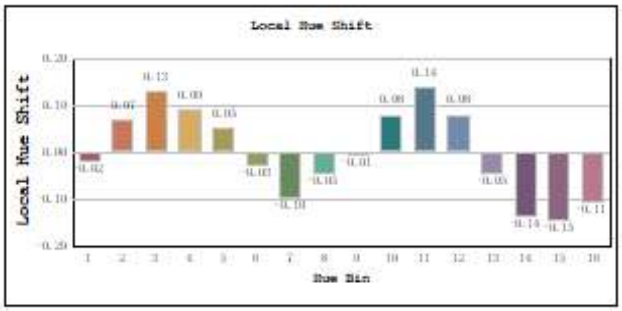
R8 =58.8 R9 =5.9 R10=79.1 R11=78.0 R12=68.4 R13=83.3 R14=98.7 R15=73.5

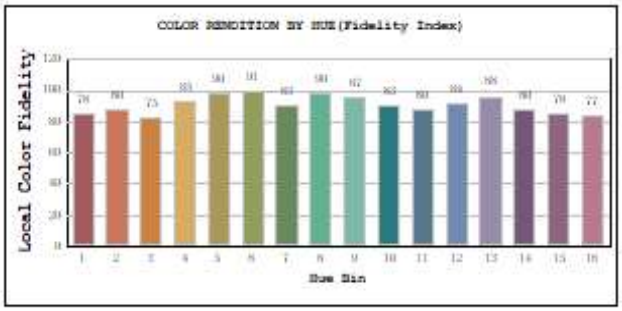
3.2 Integrating Sphere Test - Minimum CCT

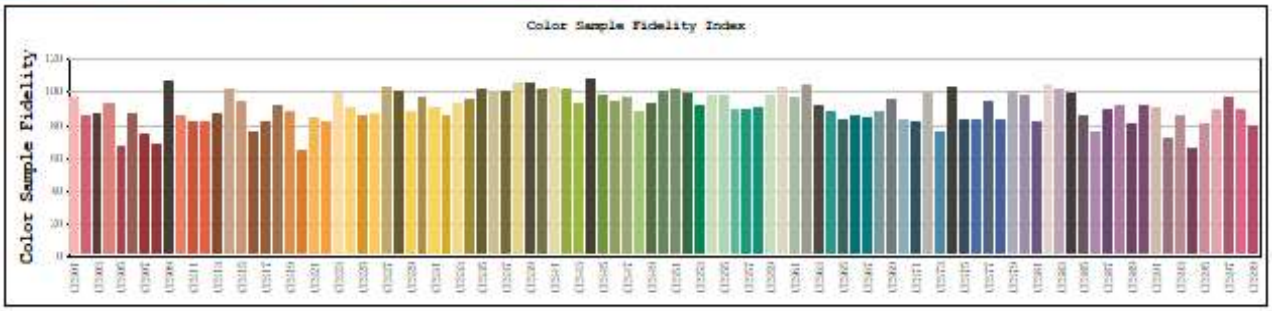




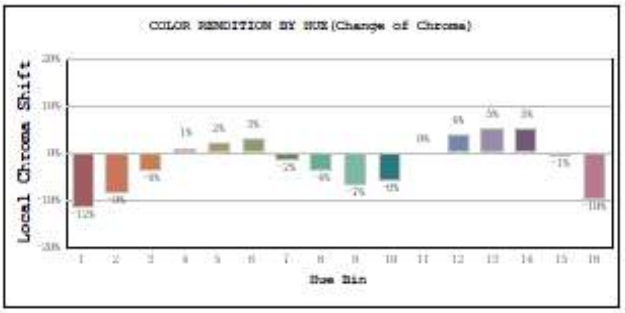


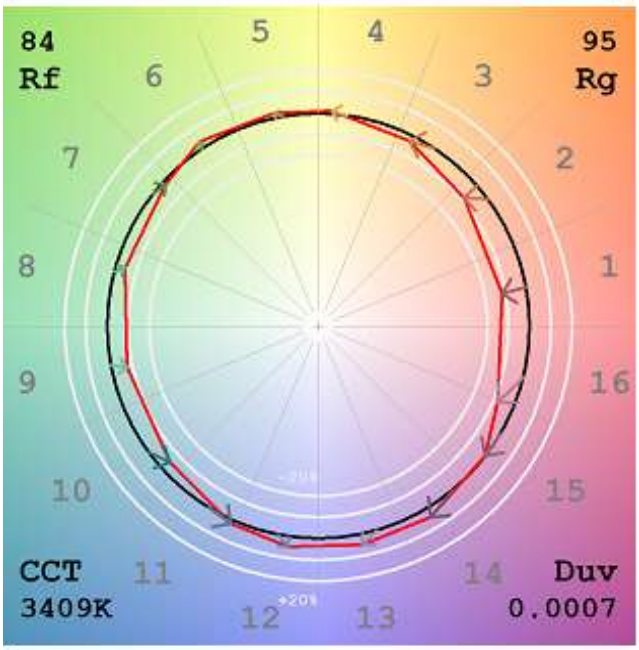


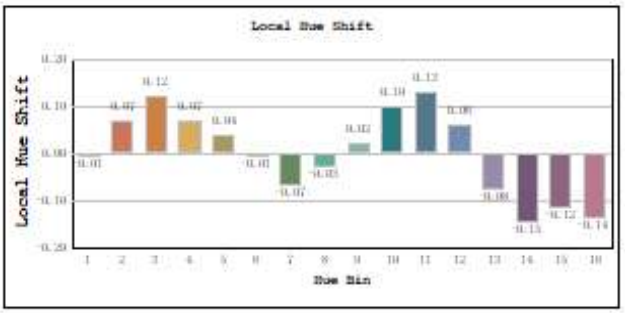


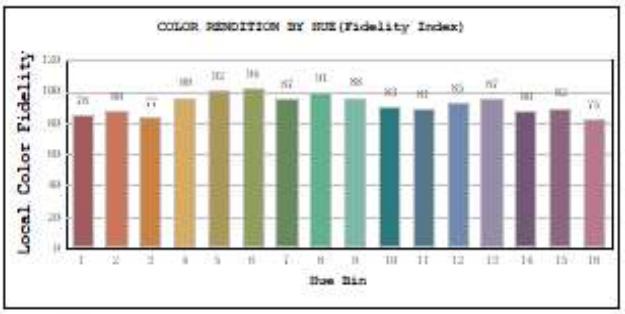


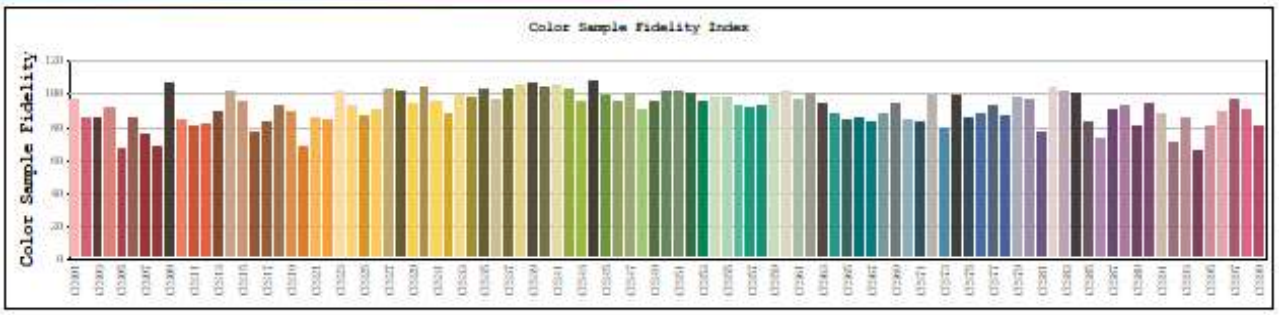

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 84
Rg: 95
CCT: 3409 K
Duv: 0.0007
u': 0.2377
v': 0.5141
Test Source
Ref Source
Spectrum
WaveLength(nm)


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

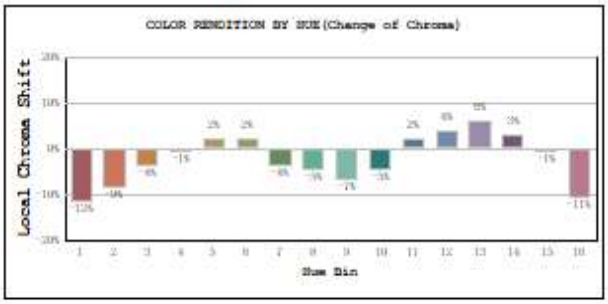

84
Rf
95
Rg
CCT
3409K
Duv
0.0007

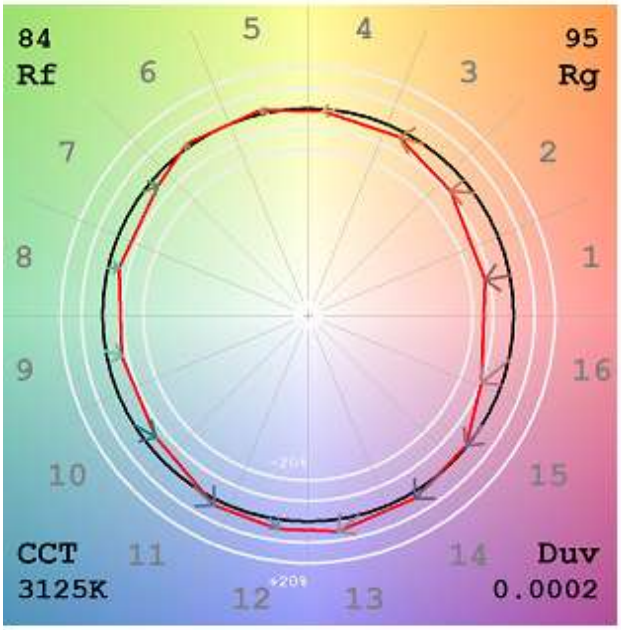

Local Hue Shift
Hue Bin

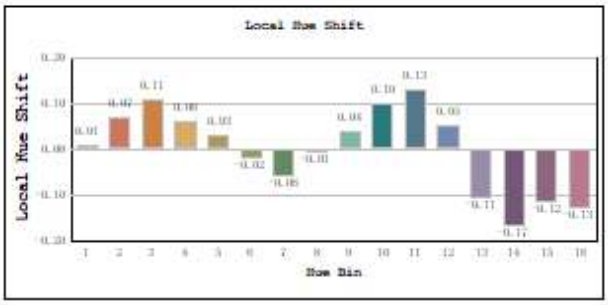

COLOR RENDITION BY HUE(Fidelity Index)
Local Color Fidelity
Hue Bin

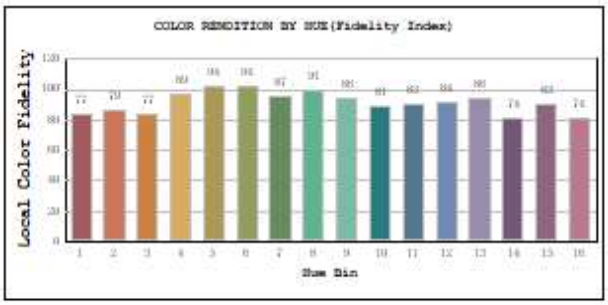

Color Sample Fidelity Index
Color Sample Fidelity

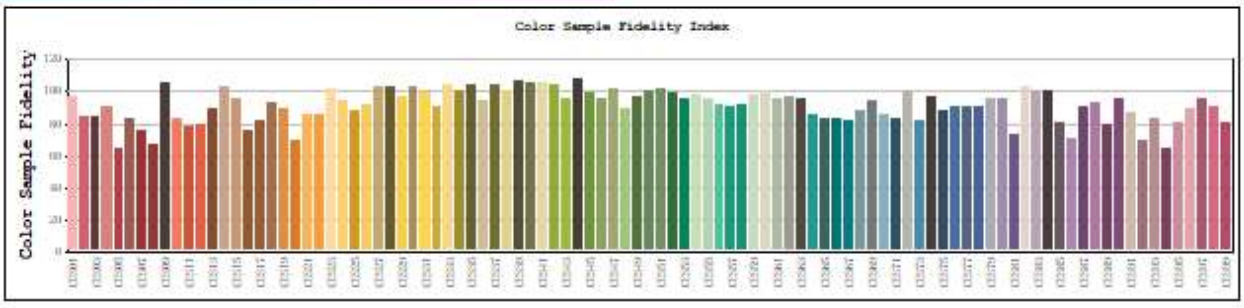

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 84
Rg: 95
CCT: 3125 K
Duv: 0.0002
u': 0.2463
v': 0.5191
Test Source
Ref Source
Spectrum
WaveLength(nm)


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


84
Rf
95
Rg
CCT
3125K
Duv
0.0002


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-H-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

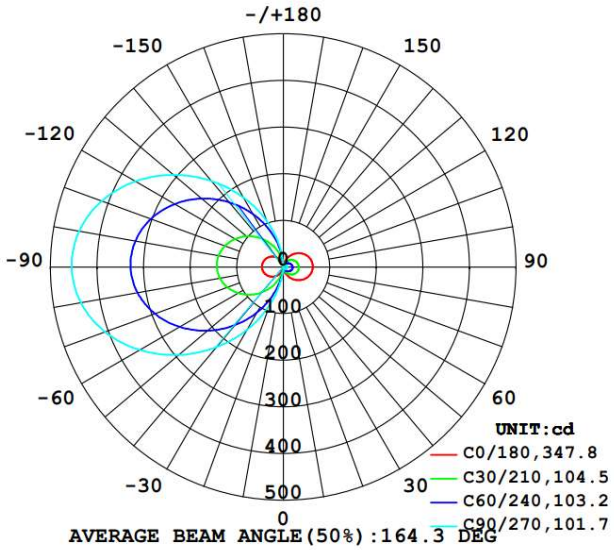
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.3	120.00	60.00	0.046	12.1	0.939

Test Result

Flux(lm)	Beam Angle	Zonal Lumen Requirement(0°-60°)	SC (0°-180°)	SC (90°-270°)	Efficacy (lm/W)
1179	164.3	18.2%	1.2	1.22	97.8

3.3 Goniophotometer Test

Light Distrubtion Curve



Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt	Zone	Lumens
0-20	5.12	0.50	0.40	0-10	0.41
0-30	21.51	1.90	1.80	10-20	4.71
0-40	56.59	5.10	4.70	20-30	16.39
0-60	200.69	18.20	16.80	30-40	35.09
0-80	441.18	39.90	37.00	40-50	58.93
0-90	582.93	52.80	48.80	50-60	85.17
10-90	582.52	52.70	48.80	60-70	110.24
20-40	51.48	4.70	4.30	70-80	130.25
20-50	110.40	10.00	9.20	80-90	141.75
40-70	254.34	23.00	21.30	90-100	142.65
60-80	240.49	21.80	20.10	100-110	132.91
70-80	130.25	11.80	10.90	110-120	114.33
80-90	141.75	12.80	11.90	120-130	90.08
90-110	275.56	24.90	23.10	130-140	63.99
90-120	389.89	35.30	32.70	140-150	39.70
90-130	479.98	43.50	40.20	150-160	20.03
90-150	583.67	52.80	48.90	160-170	6.71
90-180	610.90	55.30	51.20	170-180	0.49
110-180	335.33	30.40	28.10		
0-180	1193.82	108.10	100.00		

5.0 THD and PF Test

Model No.	PLC-9.5-H-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	0.097	11.6	0.991	8.78%
25.3	277.02	60.00	0.046	12.1	0.939	8.49%