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
2024120301-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	PLS-3.5-H-8FA-HYB-G23	A1
2	Goniophotometer Test	2024/12/3	PLS-3.5-H-8FA-HYB-G23	A1
3	THD and PF Test	2024/12/3	PLS-3.5-H-8FA-HYB-G23	A1

1.1 Test Summary

Requirement Category	Test Method	Requirements		Test value
Integrating Sphere system				
Power (W)	IES LM-79-2008	3.5 ±10%		3.4
Lamp Output for bare lamp (lm)	IES LM-79-2008	325 ±10%		401.7
Lamp Efficacy (lm/W)	IES LM-79-2008	> 83.6		113.6
Allowable CCTs* (K)	IES LM-79-2008	7 step	3985±275	4060
		4 step	3985±154	
		7 step	3465±245	3458
		4 step	3465±124	
		7 step	3045±175	3076
		4 step	3045±100	
		7 step	2725 ± 145	2781
		4 step	2725 ± 83	
CRI	IES LM-79-2008 CIE 13.3-1995	>80		83.3
R9	IES LM-79-2008 CIE 13.3-1995	>0		10
Rf	ANSI/IES TM-30-18	>70		84
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		0.8862
Total Harmonic Distortion (A%)	ANSI C82.77:2014	<25%		21.10%
Goniophotometer system				
Lamp Output (lm)	IES LM-79-2008	325 ±10%		379.4
Luminaire Efficacy(lm/W)	IES LM-79-2008	> 83.6		118.7
Beam Angle	IES LM-79-2008			338.0

2.0 Production Description

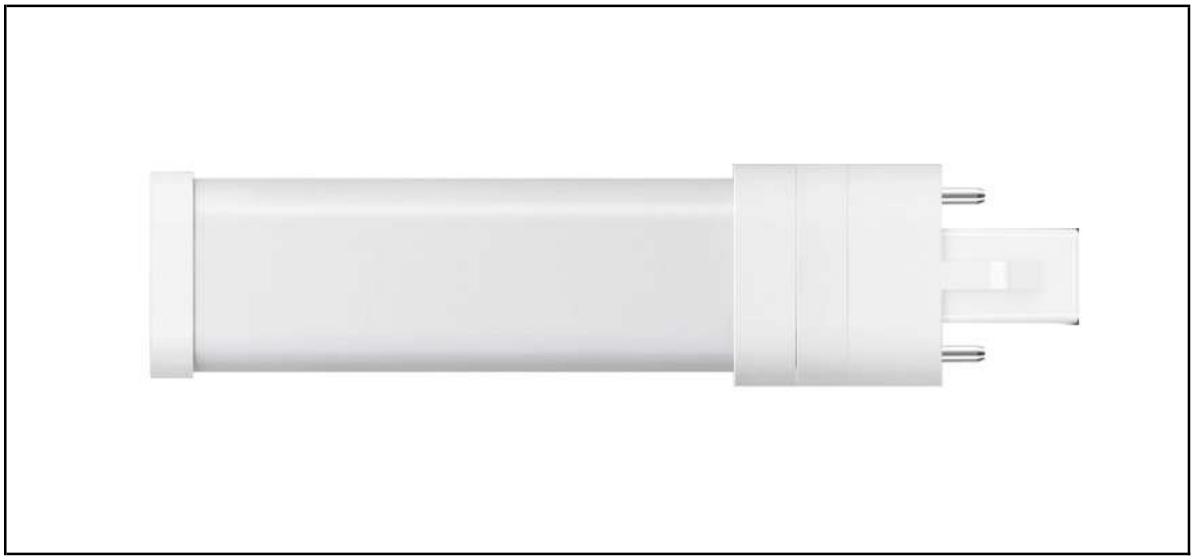
Luminaire Description: PLS-3.5-H-8FA-HYB-G23

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.	PLS-3.5-H-8FA-HYB-G23	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	120.51	60.00	0.028	3.361	0.9872	402.3	119.7
25.3	277.76	60.00	0.014	3.537	0.8862	401.7	113.6

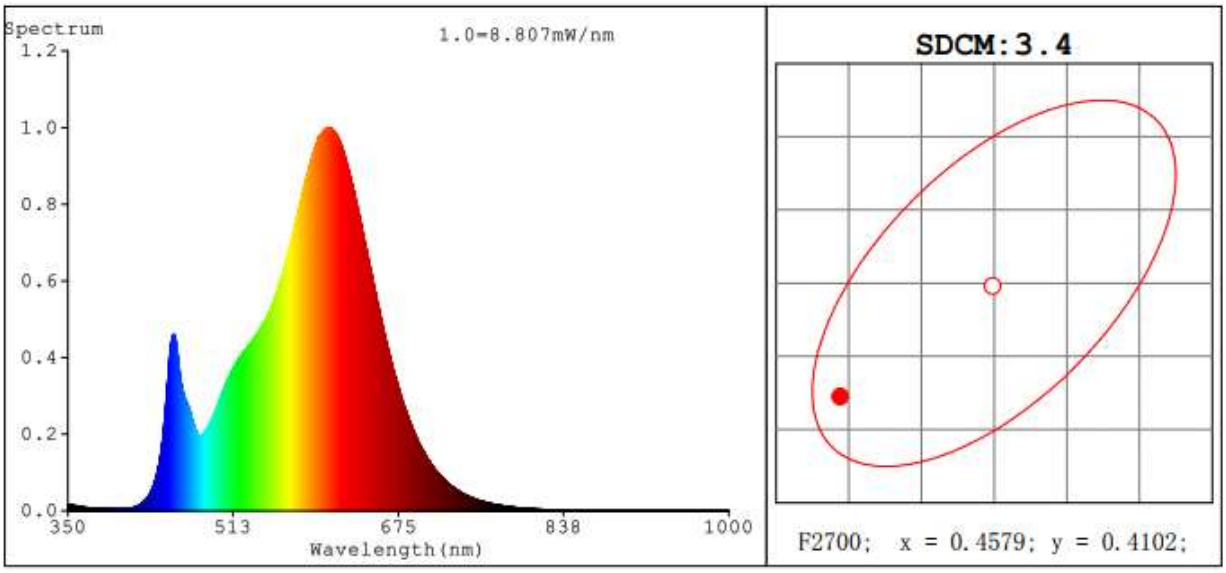
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
2781	-1.5E-03	84	96	83	10.2	3.4
2782	-1.5E-03	84	96	83	10.1	3.5

3.1 Integrating Sphere Test

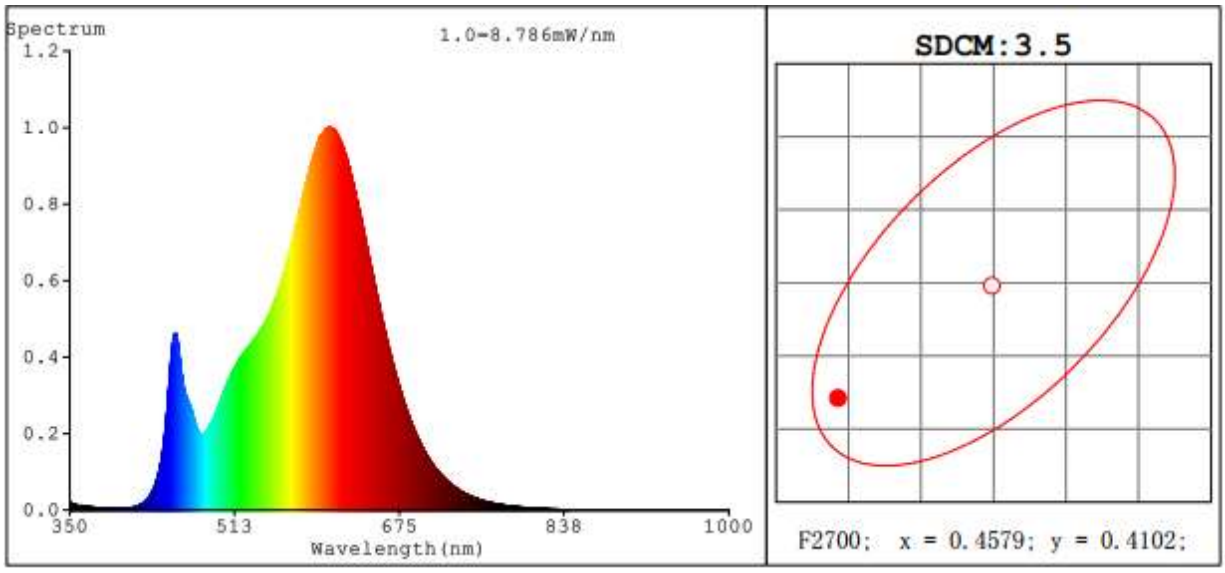
Spectroradiometric Parameters

120V



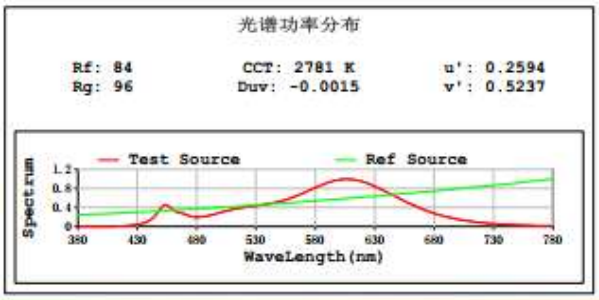
R1 =83.0 R2 =94.2 R3 =92.8 R4 =80.8 R5 =83.7 R6 =93.8 R7 =80.5
R8 =57.8 R9 =10.2 R10=87.2 R11=81.2 R12=78.4 R13=86.0 R14=96.8 R15=74.8

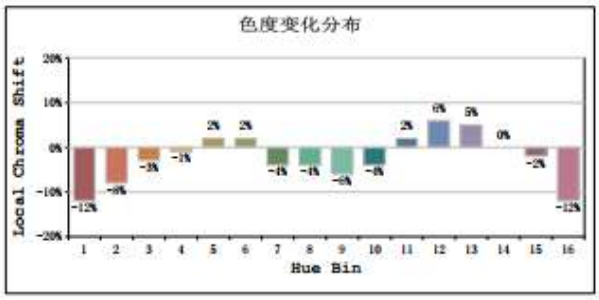
277V

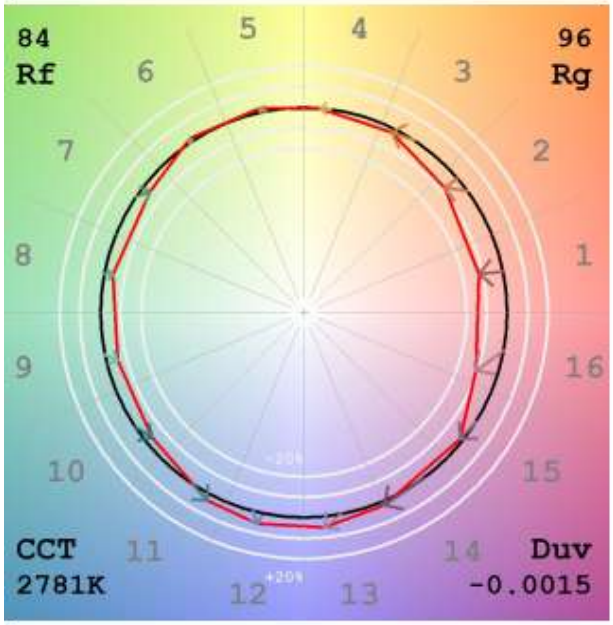


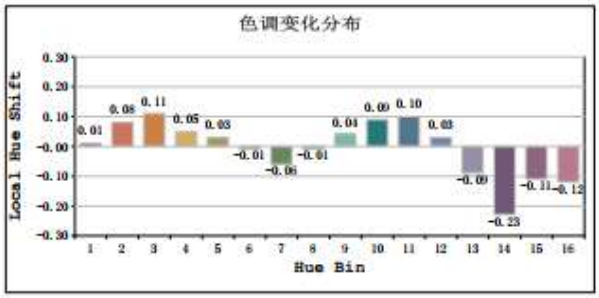
R1 =82.9 R2 =94.1 R3 =92.9 R4 =80.9 R5 =83.7 R6 =93.8 R7 =80.4
R8 =57.7 R9 =10.1 R10=87.1 R11=81.3 R12=78.4 R13=85.9 R14=96.8 R15=74.7

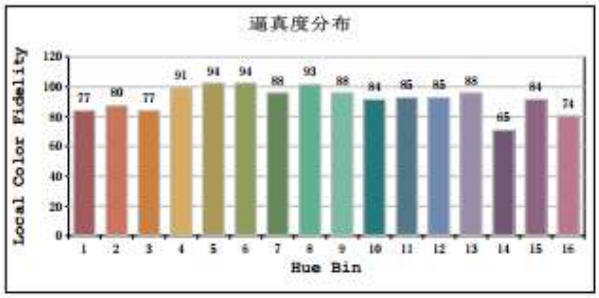
3.2 Integrating Sphere Test - Minimum CCT

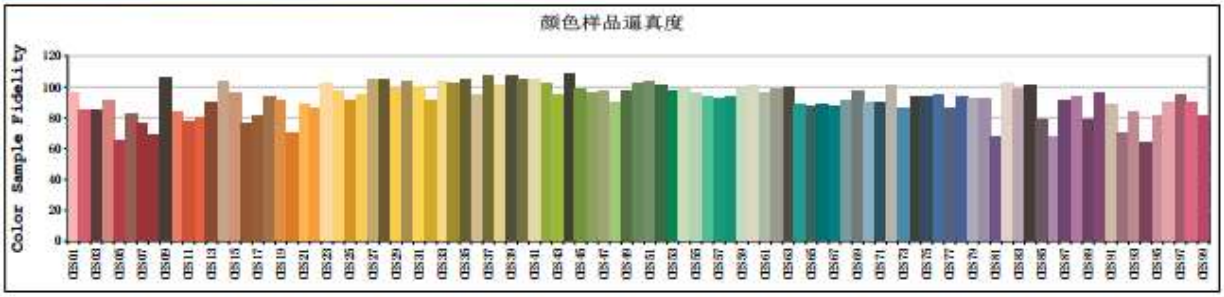












3.1 Integrating Sphere Test

Model No.	PLS-3.5-H-8FA-HYB-G23	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	120.47	60.00	0.028	3.309	0.9868	424.1	128.2
25.3	277.71	60.00	0.014	3.481	0.8824	424.2	121.9

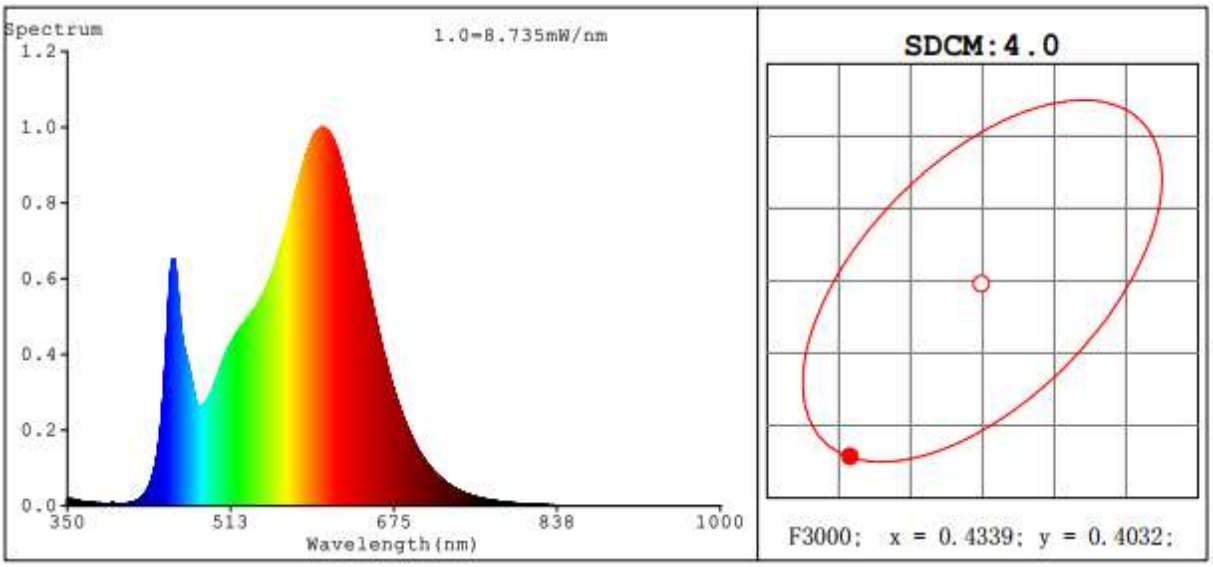
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3076	-2.6E-03	85	95	84	15.0	4.0
3076	-2.6E-03	85	95	84	15.1	4.0

3.1 Integrating Sphere Test

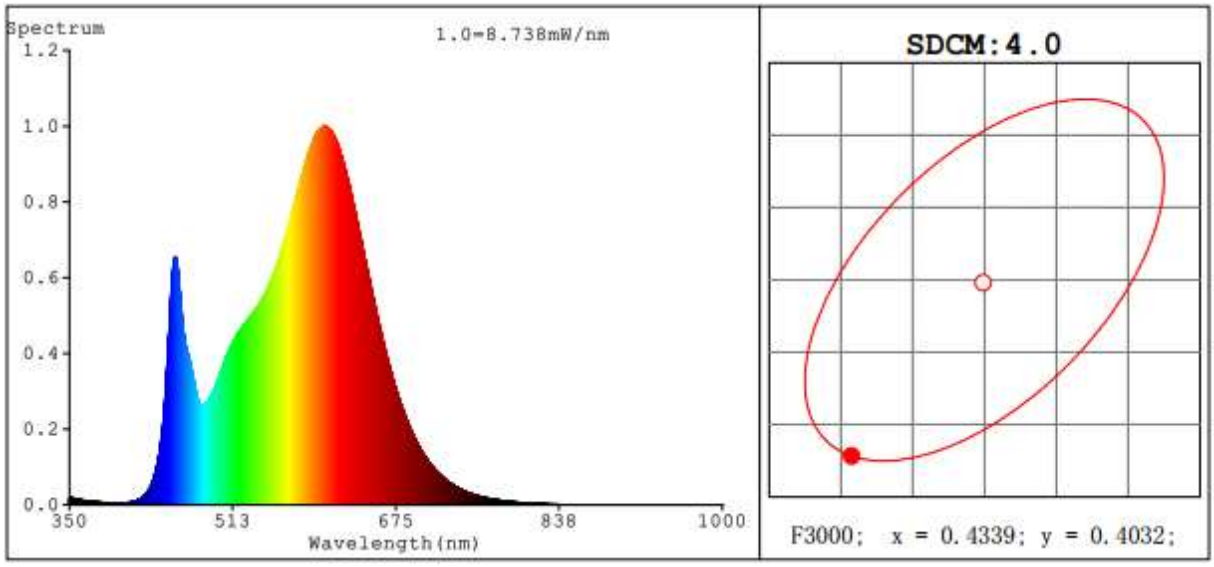
Spectroradiometric Parameters

120V



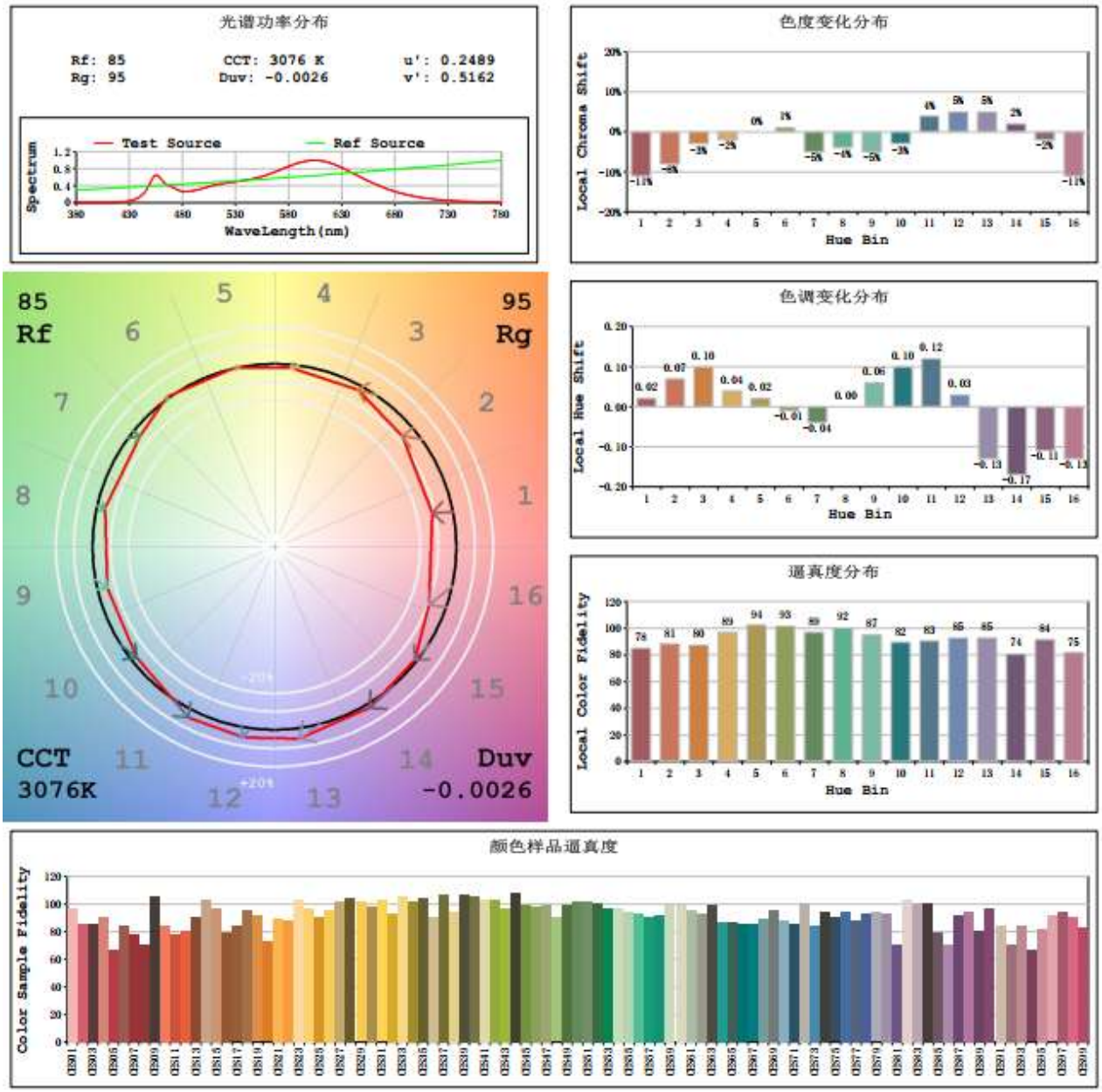
R1 =84.7 R2 =95.5 R3 =92.5 R4 =81.6 R5 =85.3 R6 =93.8 R7 =81.1
R8 =60.7 R9 =15.0 R10=89.5 R11=81.8 R12=75.6 R13=87.9 R14=96.7 R15=77.4

277V



R1 =84.7 R2 =95.5 R3 =92.5 R4 =81.7 R5 =85.4 R6 =93.9 R7 =81.1
R8 =60.7 R9 =15.1 R10=89.5 R11=81.9 R12=75.6 R13=87.9 R14=96.7 R15=77.4

3.2 Integrating Sphere Test - Minimum CCT



3.1 Integrating Sphere Test

Model No.	PLS-3.5-H-8FA-HYB-G23	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	120.46	60.00	0.028	3.290	0.9870	440.4	133.9
25.3	277.71	60.00	0.014	3.461	0.8818	440.5	127.3

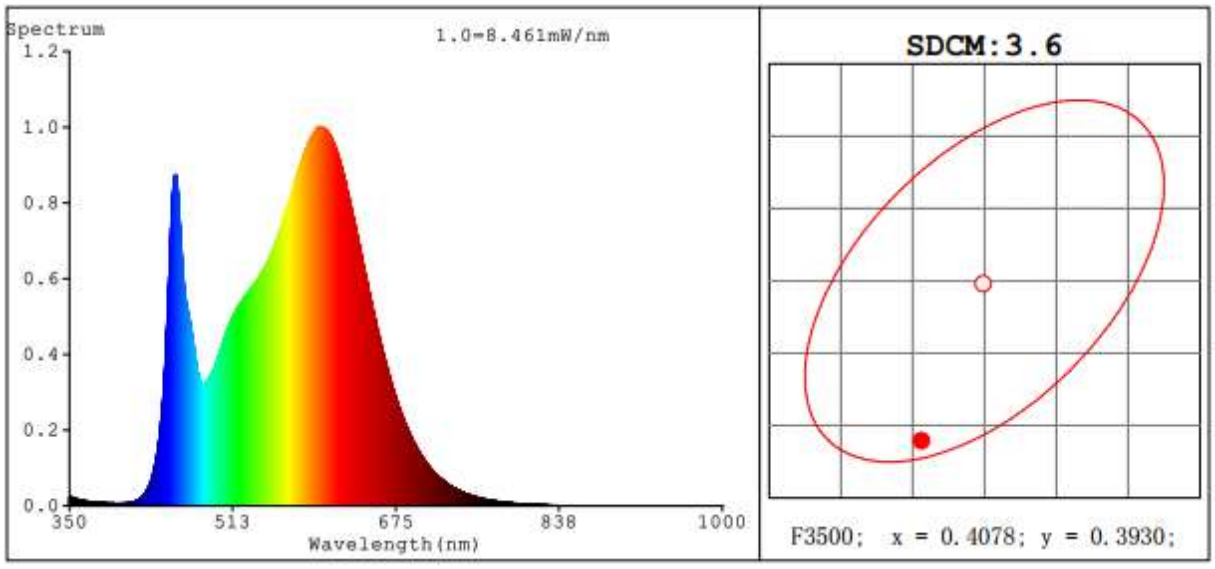
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
3458	-2.4E-03	84	95	85	16.3	3.6
3458	-2.4E-03	84	95	85	16.4	3.6

3.1 Integrating Sphere Test

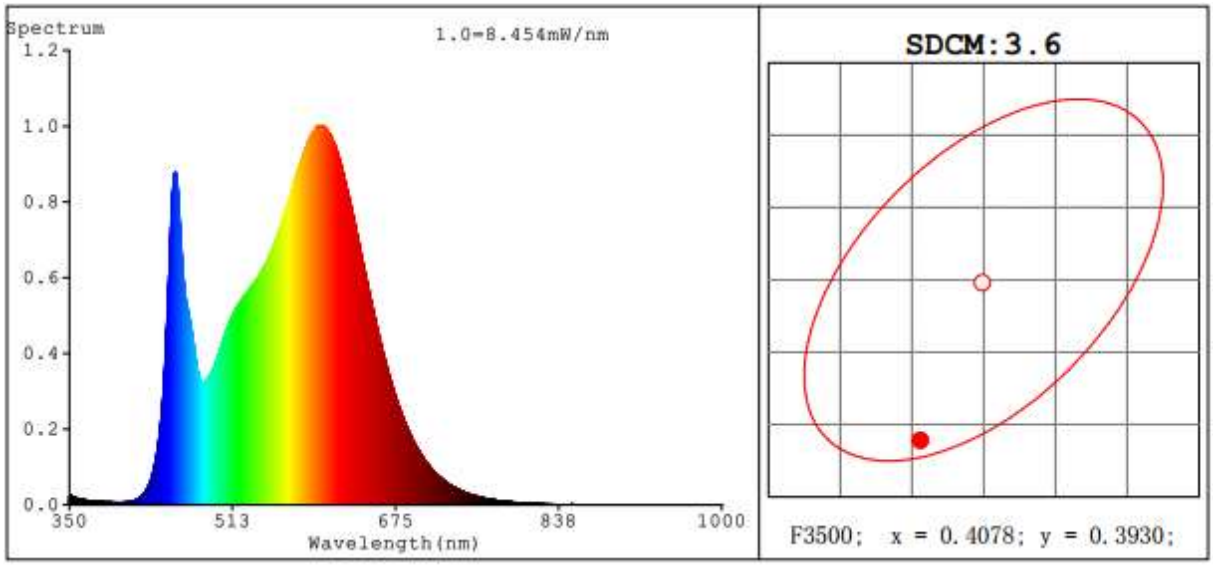
Spectroradiometric Parameters

120V



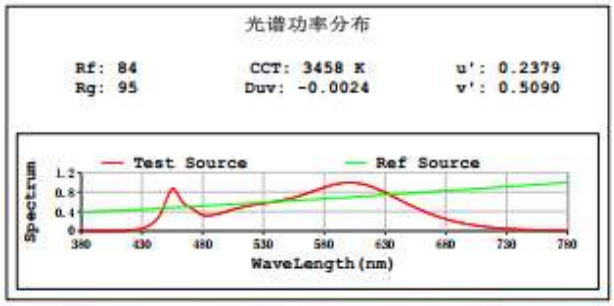
R1 =85.1	R2 =95.4	R3 =93.3	R4 =81.6	R5 =85.2	R6 =92.7	R7 =82.4	
R8 =62.9	R9 =16.3	R10=88.7	R11=81.5	R12=71.1	R13=88.3	R14=97.1	R15=78.4

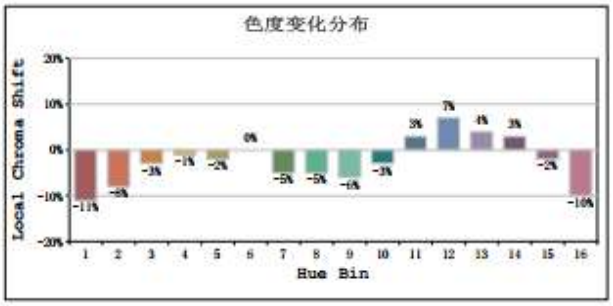
277V

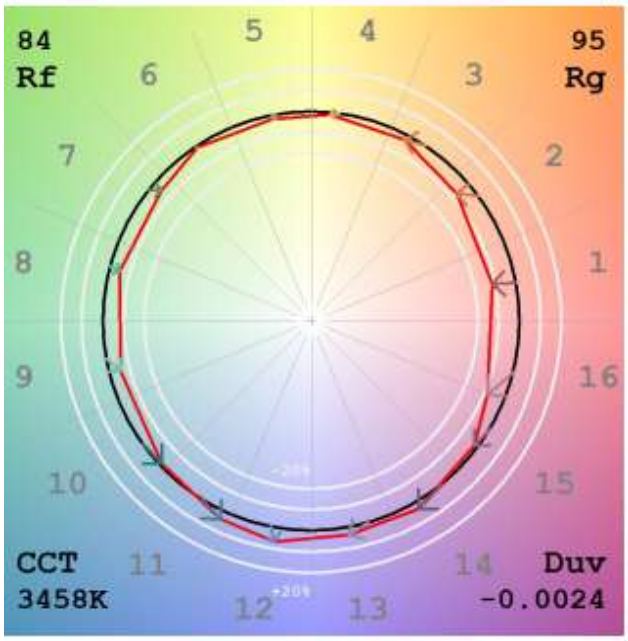


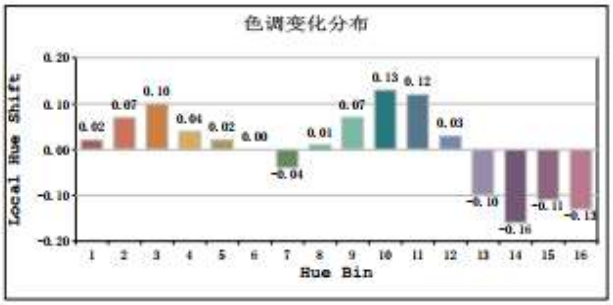
R1 =85.1	R2 =95.5	R3 =93.3	R4 =81.7	R5 =85.3	R6 =92.8	R7 =82.4	
R8 =63.0	R9 =16.4	R10=88.7	R11=81.6	R12=71.1	R13=88.4	R14=97.1	R15=78.5

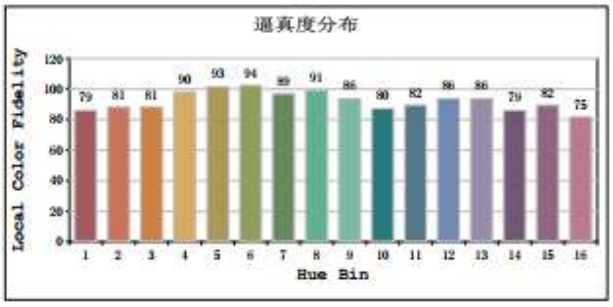
3.2 Integrating Sphere Test - Minimum CCT

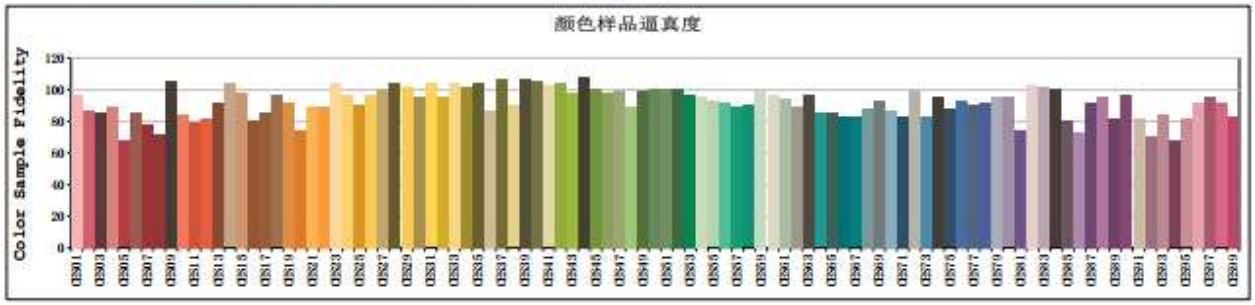












3.1 Integrating Sphere Test

Model No.	PLS-3.5-H-8FA-HYB-G23	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	120.50	60.00	0.028	3.365	0.9869	437.9	130.1
25.3	277.77	60.00	0.014	3.543	0.8860	439.1	123.9

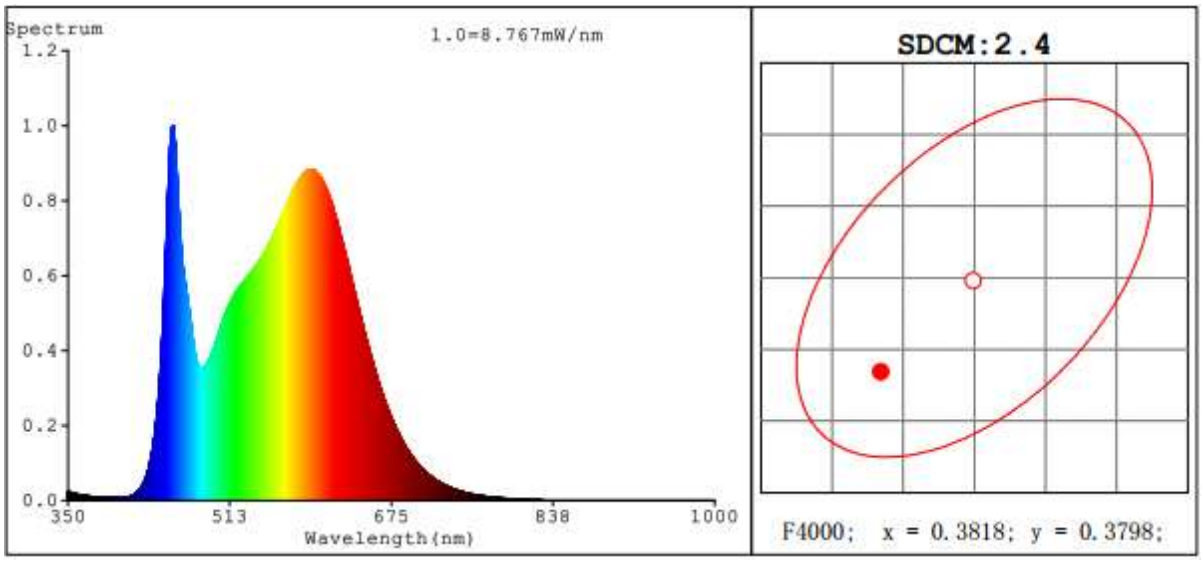
Test Result

Tc(K)	色差(Duv)	Rf	Rg	Ra	R9	SDCM
4060	1.0E-04	83	93	84	9.7	2.4
4060	1.0E-04	83	93	84	9.8	2.4

3.1 Integrating Sphere Test

Spectroradiometric Parameters

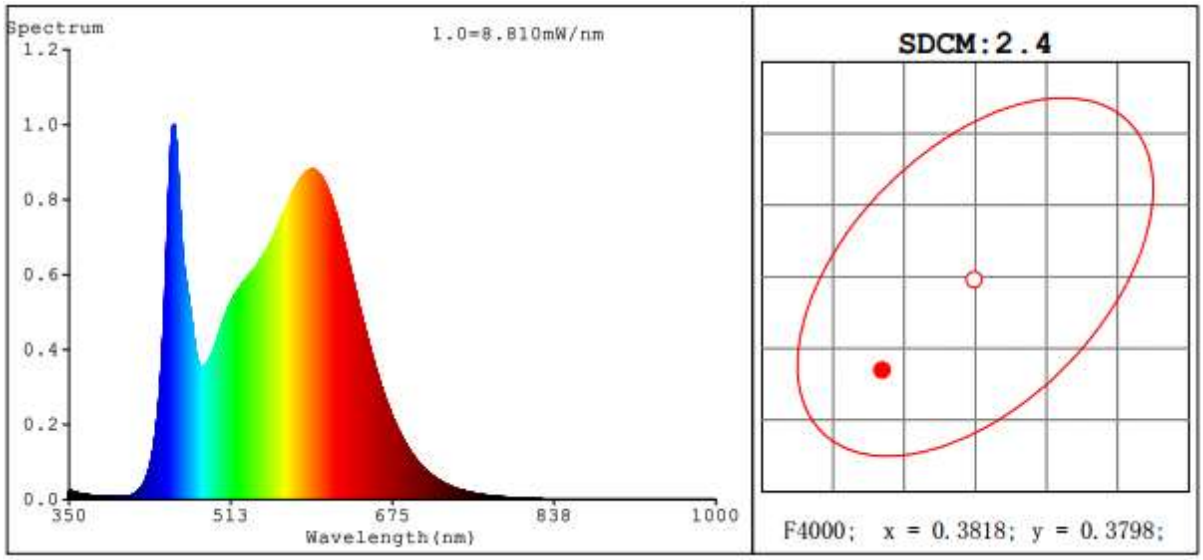
120V



R1 =83.1 R2 =93.6 R3 =94.7 R4 =79.9 R5 =82.8 R6 =89.9 R7 =83.6

R8 =63.0 R9 =9.7 R10=84.0 R11=79.2 R12=64.1 R13=86.4 R14=97.7 R15=76.5

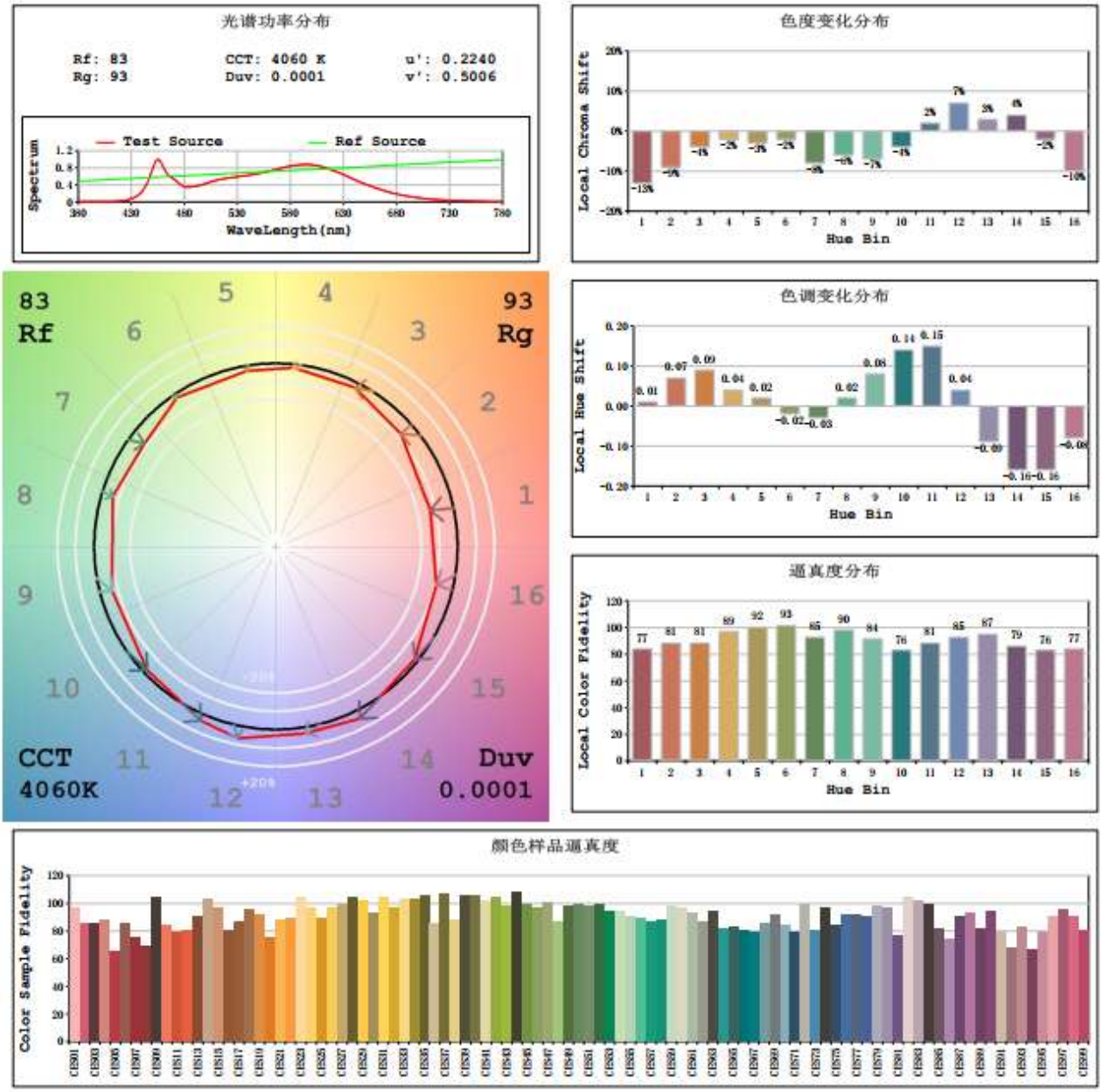
277V



R1 =83.1 R2 =93.6 R3 =94.7 R4 =79.9 R5 =82.8 R6 =89.9 R7 =83.6

R8 =63.0 R9 =9.8 R10=84.0 R11=79.2 R12=64.0 R13=86.4 R14=97.7 R15=76.5

3.2 Integrating Sphere Test - Minimum CCT



3.3 Goniophotometer Test

Model No.	PLS-3.5-H-8FA-HYB-G23	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

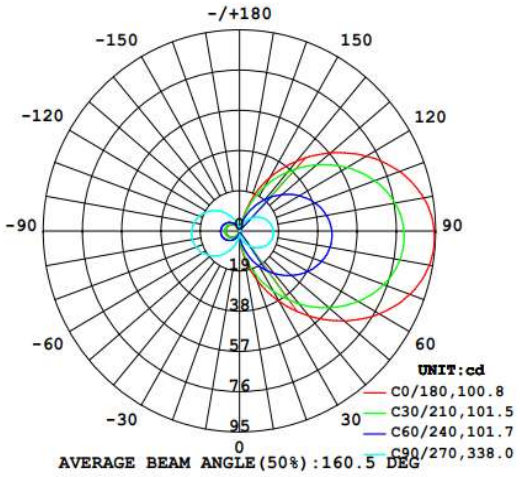
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.3	120.00	60.00	0.027	3.2	0.983

Test Result

Flux(lm)	Beam Angle	Zonal Lumen Requirement(0°-60°)	SC (0°-180°)	SC (90°-270°)	Efficacy (lm/W)
379.4	338	18.3%	1.2	1.22	118.7

3.3 Goniophotometer Test

Light Distrubtion Curve



Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt	Zone	Lumens
0-20	2.86	N.A.	0.70	0-10	0.36
0-30	9.97	N.A.	2.50	10-20	2.50
0-40	23.91	N.A.	5.90	20-30	7.12
0-60	77.42	N.A.	19.10	30-40	13.94
0-80	162.48	N.A.	40.10	40-50	22.29
0-90	211.18	N.A.	52.10	50-60	31.21
10-90	210.82	N.A.	52.10	60-70	39.43
20-40	21.06	N.A.	5.20	70-80	45.63
20-50	43.35	N.A.	10.70	80-90	48.70
40-70	92.94	N.A.	22.90	90-100	48.10
60-80	85.06	N.A.	21.00	100-110	43.91
70-80	45.63	N.A.	11.30	110-120	36.85
80-90	48.70	N.A.	12.00	120-130	28.19
90-110	92.01	N.A.	22.70	130-140	19.28
90-120	128.86	N.A.	31.80	140-150	11.31
90-130	157.05	N.A.	38.80	150-160	5.07
90-150	187.64	N.A.	46.30	160-170	1.13
90-180	193.85	N.A.	47.90	170-180	0.02
110-180	101.84	N.A.	25.10		
0-180	405.03	N.A.	100.00		

5.0 THD and PF Test

Model No.	PLS-3.5-H-8FA-HYB-G23	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	0.028	3.4	0.987	10.28%
25.3	277.02	60.00	0.014	3.5	0.886	21.10%