LM-79-08 Test Report

For

RAB LIGHTING INC

(Brand Name: N/A)

170 Ludlow Ave,PO BOX 970,Northvale, NJ 07647-2305 USA

Model name(s): CR4

Report Type:	Testing and Report According to IES LM-79-2008
Type of Luminaire:	Downlights
Report Date:	2024-06-25

Prepared By:

Test & Report By:

Engineer: Sun Fangfang

Review By:

Manager: Huang Qichong

1.1 Rated Values:	
Rated Voltage / Frequency	120V-277Vac, 60 Hz
Nominal Power	10.0W/8.0W/6.0 W
Rated Initial Lamp Lumen	1000lm/800lm/600lm（mode2700K）
Declared CCT	2700K/3000K/3500K/4000K/5000K

1.2 Test Specifications:

Test item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2015 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method:
Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25°C ±1°C, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1°vertical intervals and 22.5°horizontal intervals.

2) Chromaticity Measurement – Sphere-Spectroradiometer Method:
Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25ºC ±1ºC. 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 sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm

3) Electrical Measurements:
Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25ºC ±1ºC. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1.1 Electrical, Photometric and Chromaticity Measurements

Test date	2024-06-20	**Test Ambient:**	25.1 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	CR4	2700K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202406150004	120.0	60	0.083	9.95	0.995

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2702
Duv	0.0007
Chromaticity (x, y)	x=0.4609 y=0.4127
Chromaticity (u', v')	u'=0.2622 v'=0.5283
Color Rendering Index (CRI)	96.1
R9	68
Rg	99
Rf	92
Rcs,h1%	-5

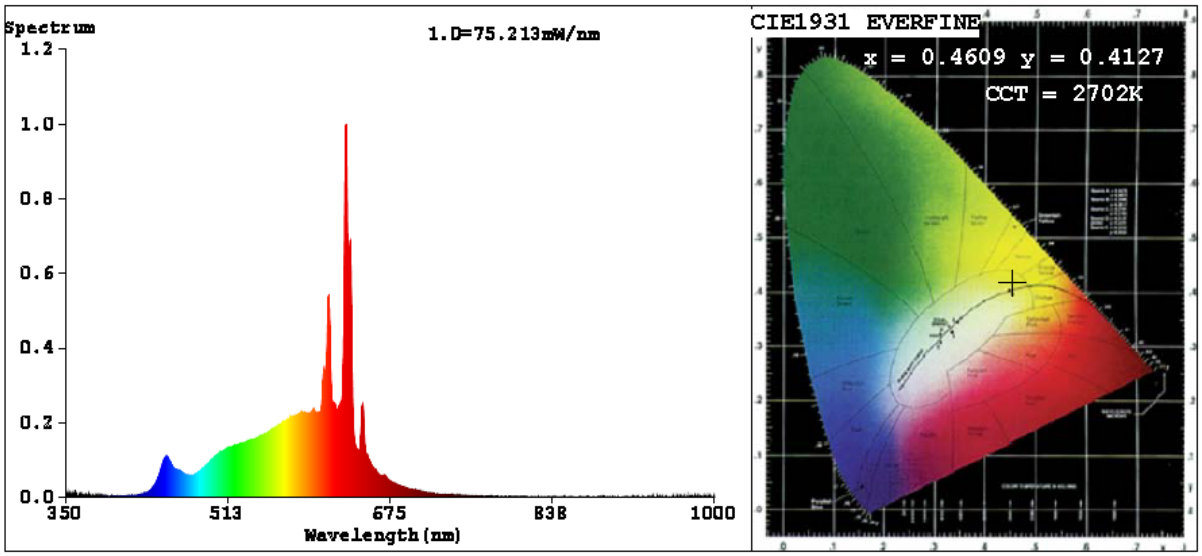
Special Color Rendering Indices			
R1	99	R9	68
R2	100	R10	98
R3	100	R11	97
R4	99	R12	90
R5	99	R13	99
R6	95	R14	98
R7	92	R15	93
R8	86	--	--

Photometric Measurement – Goniophotometer Method:

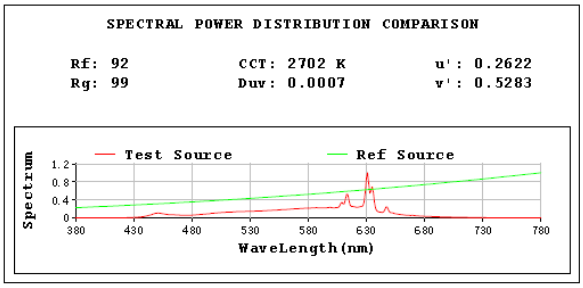
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	1048.0
Luminous Efficacy (lm/W)	105.33
Beam Angle (°)	81.3
Center Beam Candle Power (cd)	598.2

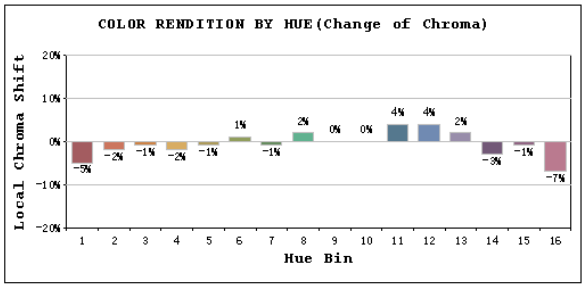
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	987.0
Luminous Efficacy (lm/W)	99.00

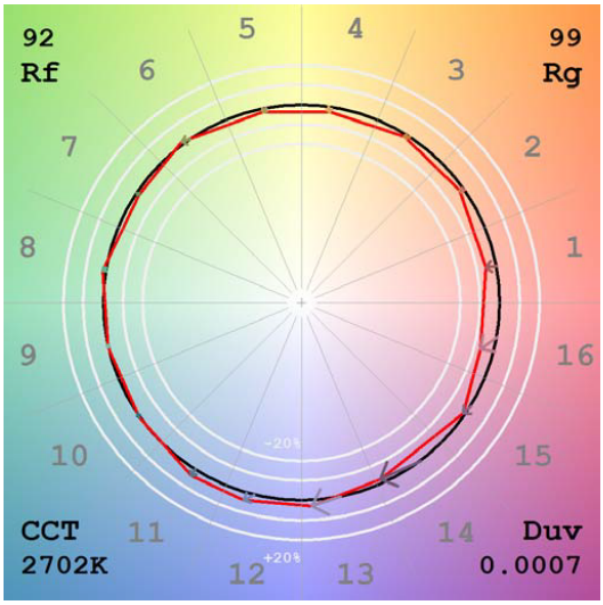
Spectral Power Distribution & Chromaticity Diagram

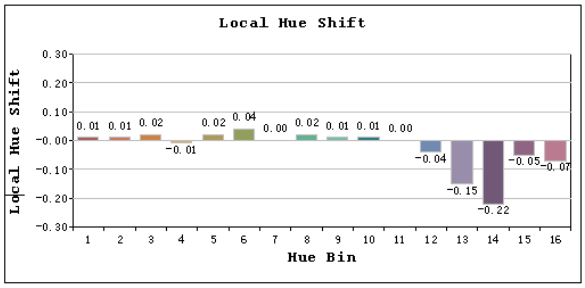


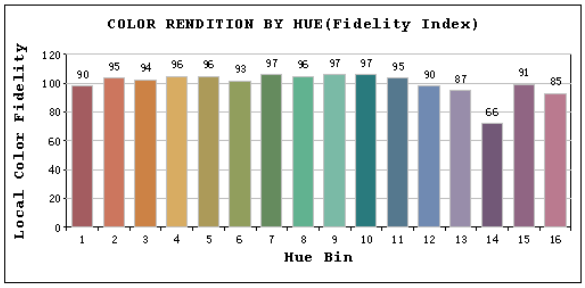
TM30

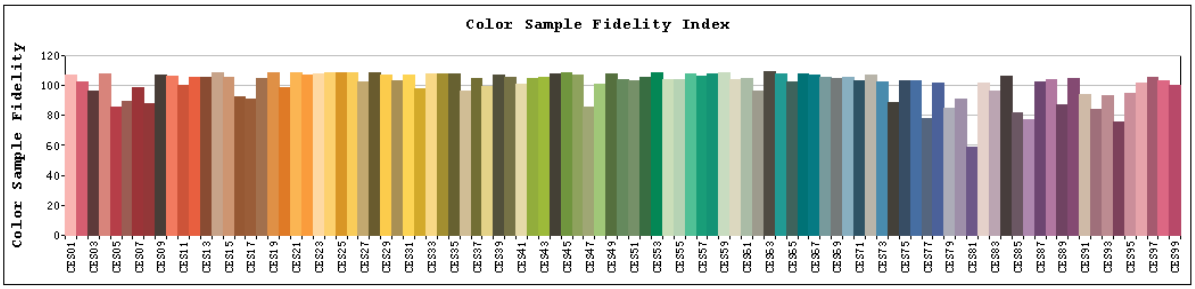

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 92
Rg: 99
CCT: 2702 K
Duv: 0.0007
u': 0.2622
v': 0.5283
Test Source
Ref Source
Spectrum
WaveLength(nm)


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


92
Rf
99
Rg
CCT
2702K
Duv
0.0007


Local Hue Shift
Local Hue Shift
Hue Bin


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

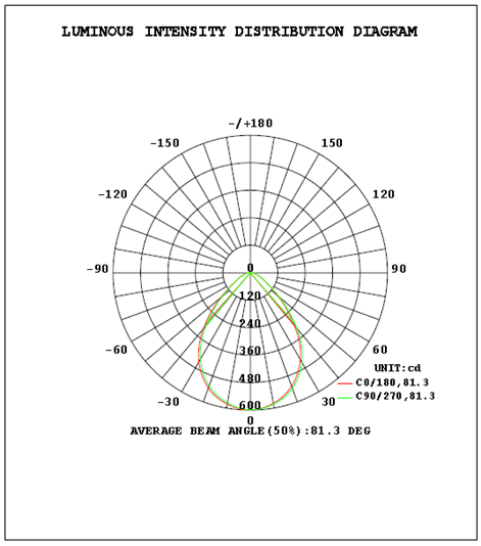

Color Sample Fidelity Index
Color Sample Fidelity

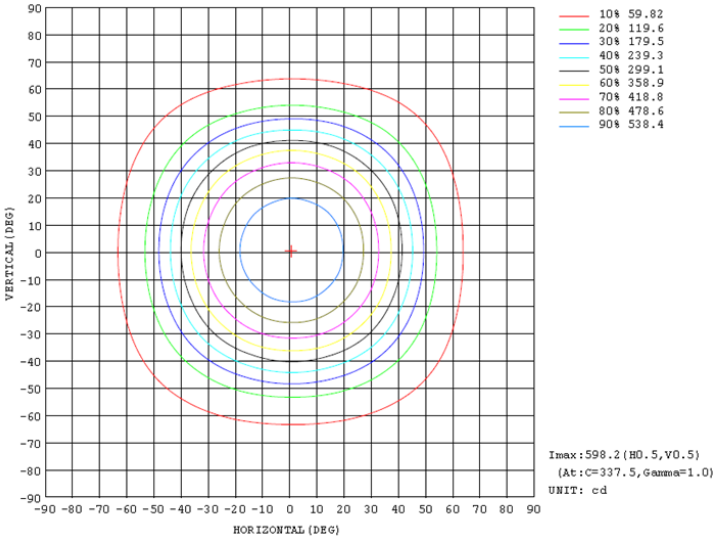
Zonal Lumen Tabulation

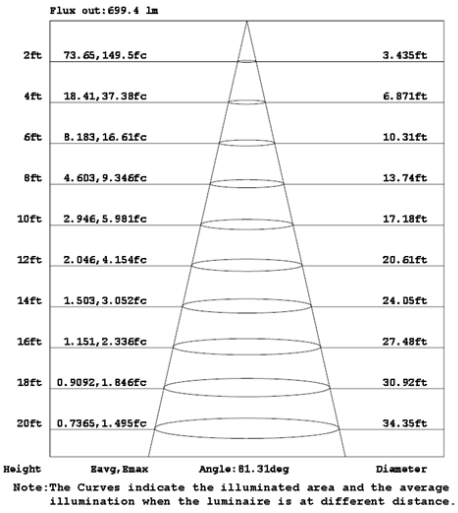
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	440.1	42.0%
0-40	677.9	64.7%
0-60	956.2	91.2%
60-90	91.8	8.8%
70-100	37.0	3.5%
90-120	0.0	0.0%
0-90	1048.1	100.0%
90-180	0.0	0.0%
0-180	1048.1	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	56.3	5.4%	90-100	0.0	0.0%
10-20	157.8	15.1%	100-110	0.0	0.0%
20-30	226.0	21.6%	110-120	0.0	0.0%
30-40	237.8	22.7%	120-130	0.0	0.0%
40-50	179.5	17.1%	130-140	0.0	0.0%
50-60	98.8	9.4%	140-150	0.0	0.0%
60-70	54.8	5.2%	150-160	0.0	0.0%
70-80	29.2	2.8%	160-170	0.0	0.0%
80-90	7.8	0.7%	170-180	0.0	0.0%

Photometric Data







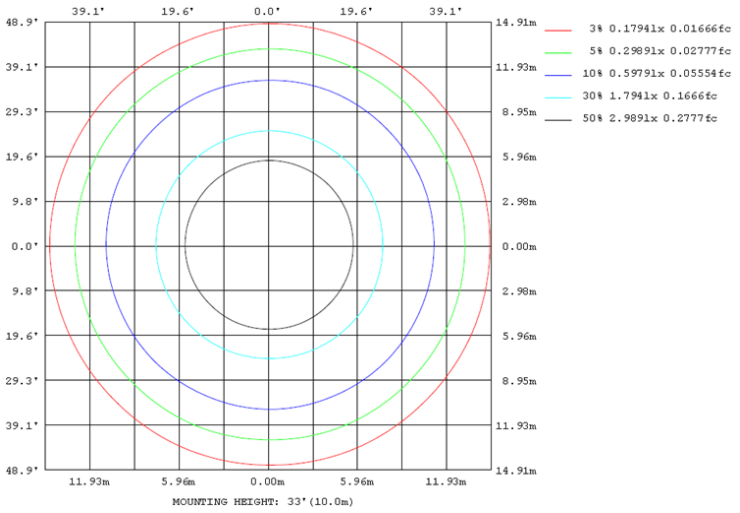


Table--1 UNIT: cd

γ (DEG) \ C(DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	598	598	598	598	598	598	598	598	598	598	598	598	598	598	598	598			
5	595	594	593	593	592	592	591	592	593	593	594	594	595	595	596	595			
10	583	582	580	579	578	577	577	578	579	579	581	582	583	584	584	584			
15	564	563	561	559	557	557	555	556	558	559	562	562	565	565	567	566			
20	536	535	531	529	526	525	523	525	528	529	532	534	537	538	540	539			
25	498	497	492	490	486	485	483	485	488	489	493	495	499	500	502	501			
30	450	449	443	441	436	435	432	435	438	440	445	447	452	453	455	454			
35	391	389	383	381	375	374	370	373	377	379	385	387	393	394	397	395			
40	320	313	312	304	303	296	297	295	299	306	306	315	315	322	320	324			
45	243	237	235	229	227	222	222	220	224	228	230	237	238	244	244	247			
50	169	167	162	160	155	155	152	153	156	156	160	162	167	171	172	172			
55	111	111	108	107	104	104	102	102	104	104	106	107	111	111	114	113			
60	75.3	75.5	74.2	74.0	72.6	72.4	71.5	72.0	72.7	72.1	73.4	73.7	75.4	75.6	76.9	76.4			
65	55.8	56.0	55.1	55.0	54.0	54.0	53.3	53.5	53.9	53.6	54.3	54.5	55.6	55.7	56.5	56.4			
70	40.1	40.5	39.8	39.8	39.1	39.2	38.6	38.8	39.0	38.7	39.2	39.2	39.9	40.0	40.6	40.5			
75	28.1	28.3	27.9	27.9	27.3	27.4	26.8	27.0	27.2	27.0	27.4	27.4	27.9	27.9	28.4	28.3			
80	16.9	17.1	16.7	16.7	16.2	16.2	15.7	15.9	16.1	15.9	16.3	16.3	16.9	16.9	17.3	17.2			
85	7.16	7.31	6.96	6.92	6.49	6.43	6.05	6.15	6.41	6.27	6.60	6.63	7.08	7.12	7.50	7.42			
90	0.24	0.22	0.24	0.23	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.22	0.21	0.23	0.23	0.24			

2.1.2 Electrical, Photometric and Chromaticity Measurements

Test date	2024-06-20	**Test Ambient:**	25.1 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	CR4	3000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202406150004	120.0	60	0.082	9.85	0.995

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2969
Duv	-0.0016
Chromaticity (x, y)	x=0.4368 y=0.4001
Chromaticity (u', v')	u'=0.2522 v'=0.5198
Color Rendering Index (CRI)	96.4
R9	78
Rg	101
Rf	93
Rcs,h1%	-4

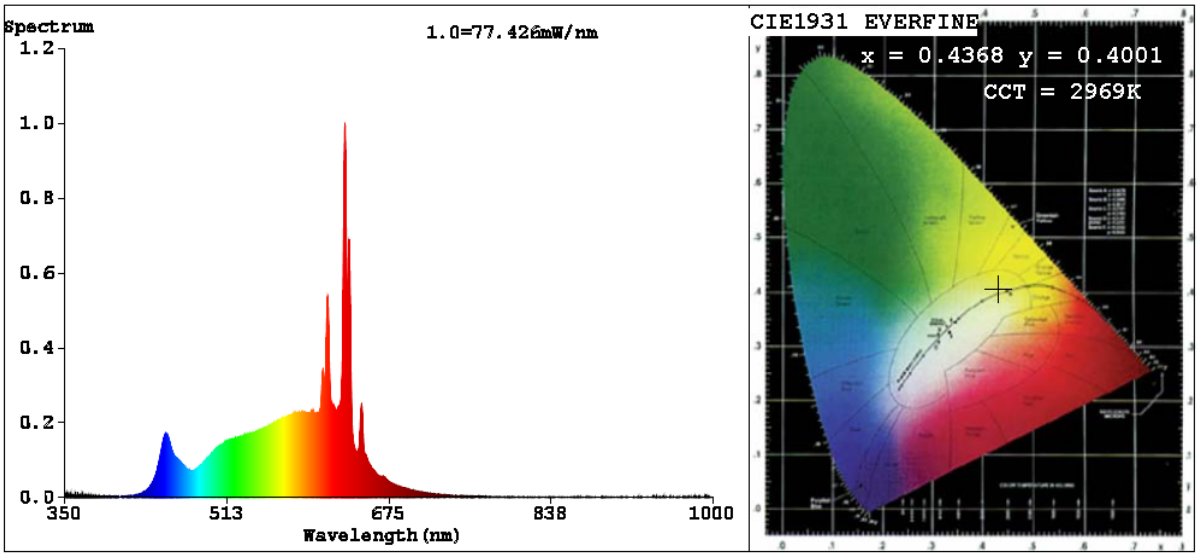
Special Color Rendering Indices			
R1	99	R9	78
R2	99	R10	99
R3	99	R11	95
R4	98	R12	88
R5	99	R13	99
R6	94	R14	98
R7	94	R15	97
R8	91	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	1081.8
Luminous Efficacy (lm/W)	109.83

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1015.0
Luminous Efficacy (lm/W)	102.84

Spectral Power Distribution & Chromaticity Diagram



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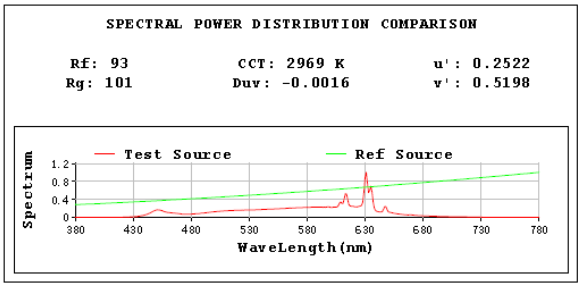
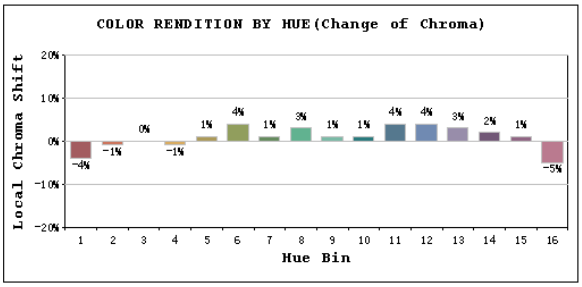
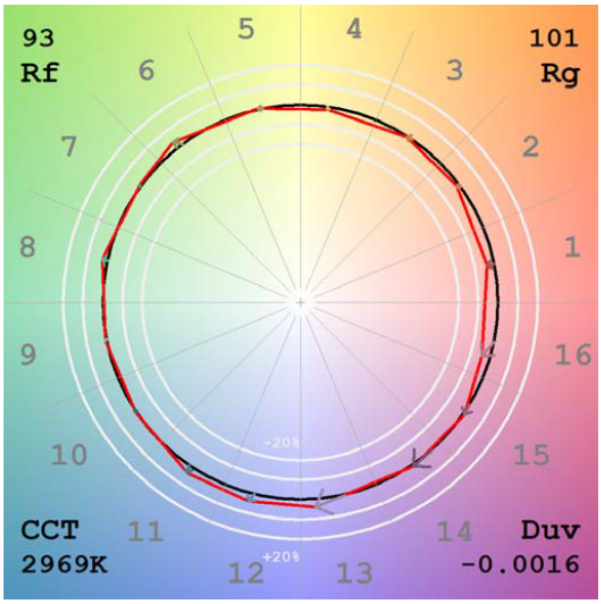
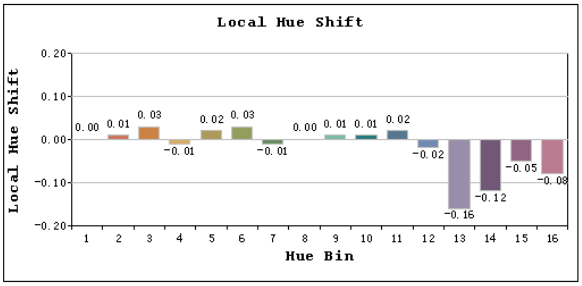
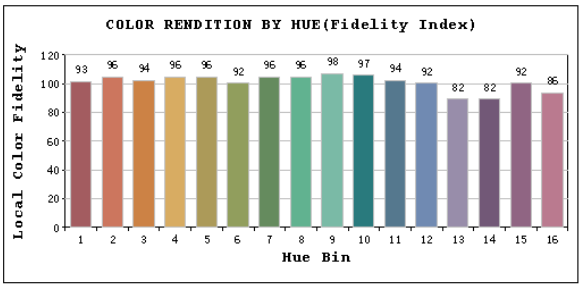
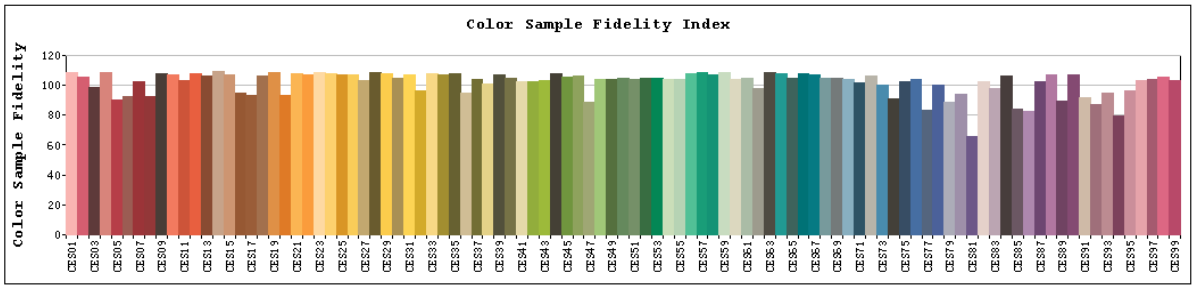

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 93
Rg: 101
CCT: 2969 K
Duv: -0.0016
u': 0.2522
v': 0.5198
Test Source
Ref Source
Spectrum
WaveLength(nm)


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


93
Rf
101
Rg
CCT
2969K
Duv
-0.0016


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

2.1.3 Electrical, Photometric and Chromaticity Measurements

Test date	2024-06-20	**Test Ambient:**	25.1 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	CR4	3500K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202406150004	120.0	60	0.082	9.74	0.994

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3340
Duv	-0.0029
Chromaticity (x, y)	x=0.4113 y=0.3871
Chromaticity (u', v')	u'=0.2413 v'=0.5106
Color Rendering Index (CRI)	96.5
R9	88
Rg	102
Rf	93
Rcs,h1%	-3

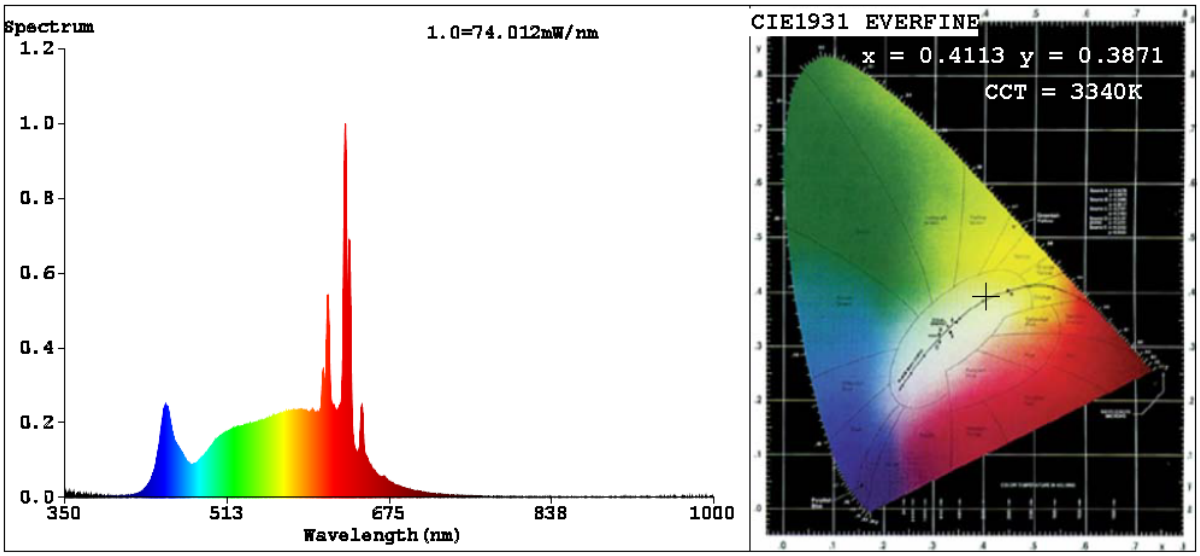
Special Color Rendering Indices			
R1	97	R9	88
R2	98	R10	99
R3	97	R11	93
R4	97	R12	85
R5	98	R13	97
R6	94	R14	97
R7	96	R15	99
R8	95	--	--

Photometric Measurement – Goniophotometer Method:

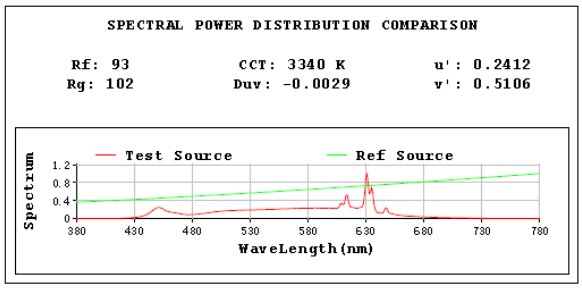
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	1116.0
Luminous Efficacy (lm/W)	114.58

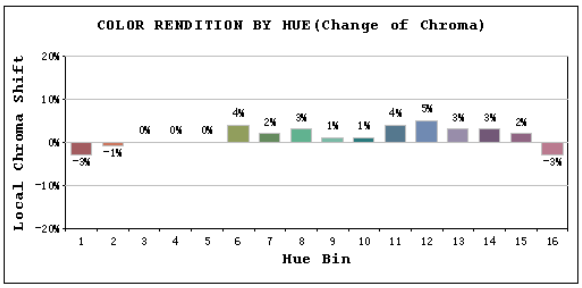
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1049.0
Luminous Efficacy (lm/W)	107.20

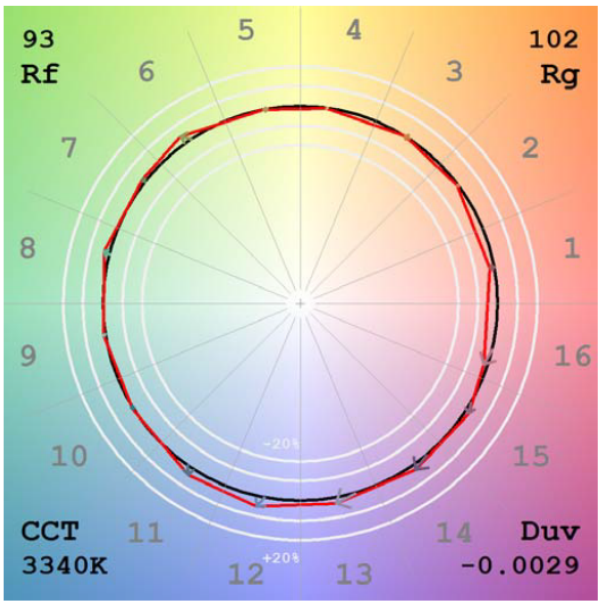
Spectral Power Distribution & Chromaticity Diagram

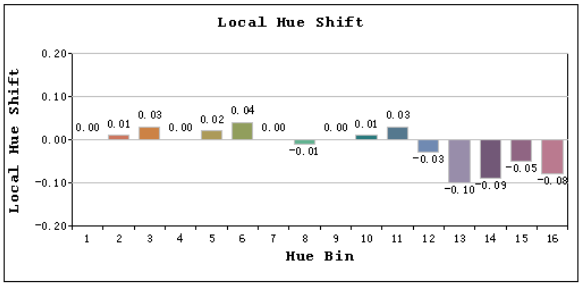


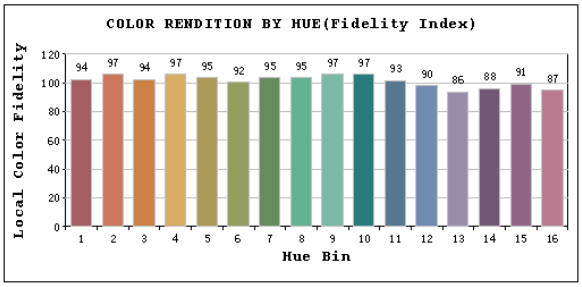
TM30

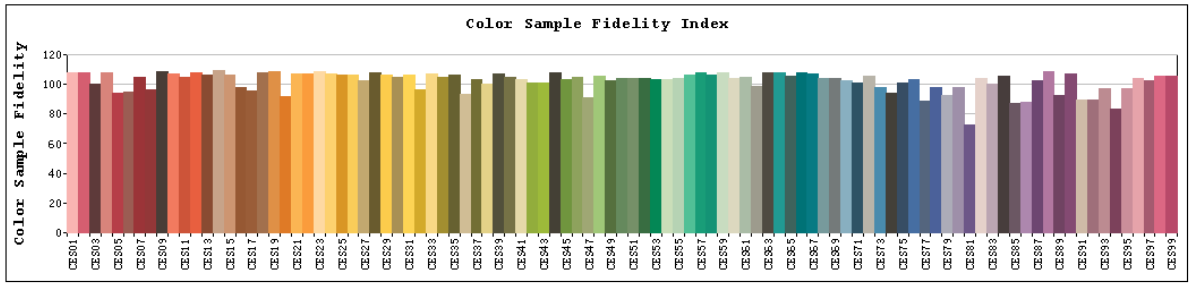

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 93
CCT: 3340 K
u': 0.2412
Rg: 102
Duv: -0.0029
v': 0.5106
Test Source
Ref Source
Spectrum
WaveLength(nm)


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


93
Rf
102
Rg
CCT
3340K
Duv
-0.0029


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

2.1.4 Electrical, Photometric and Chromaticity Measurements

Test date	2024-06-20	Test Ambient:	25.1 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	CR4	4000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202406150004	120.0	60	0.082	9.73	0.994

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3835
Duv	-0.0023
Chromaticity (x, y)	x=0.3862 y=0.3753
Chromaticity (u', v')	u'=0.2295 v'=0.5018
Color Rendering Index (CRI)	97.3
R9	94
Rg	102
Rf	94
Rcs,h1%	-2

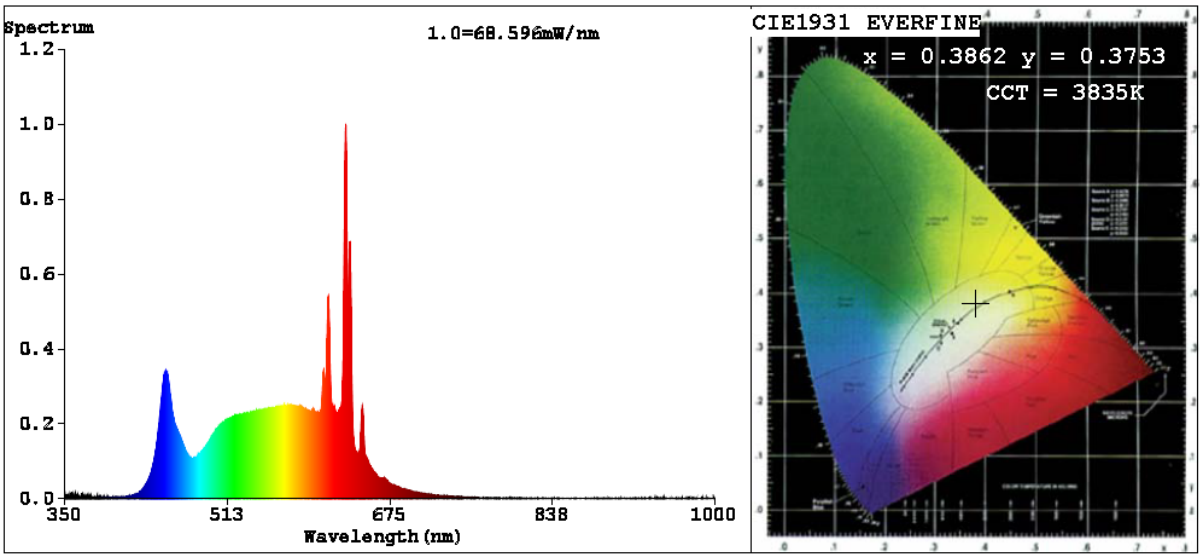
Special Color Rendering Indices			
R1	97	R9	94
R2	99	R10	97
R3	95	R11	93
R4	97	R12	80
R5	98	R13	98
R6	95	R14	96
R7	98	R15	98
R8	98	--	--

Photometric Measurement – Goniophotometer Method:

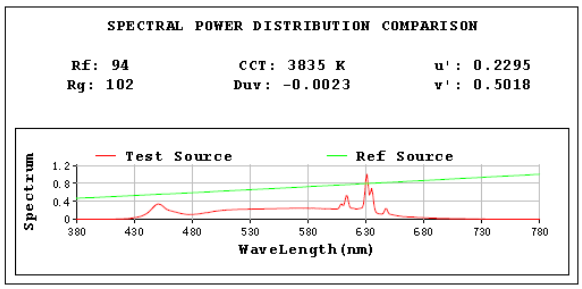
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	1138.4
Luminous Efficacy (lm/W)	117.00

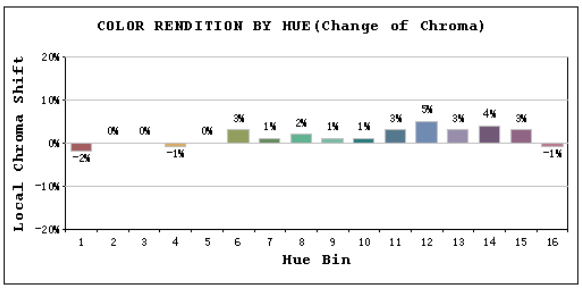
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1069.0
Luminous Efficacy (lm/W)	109.46

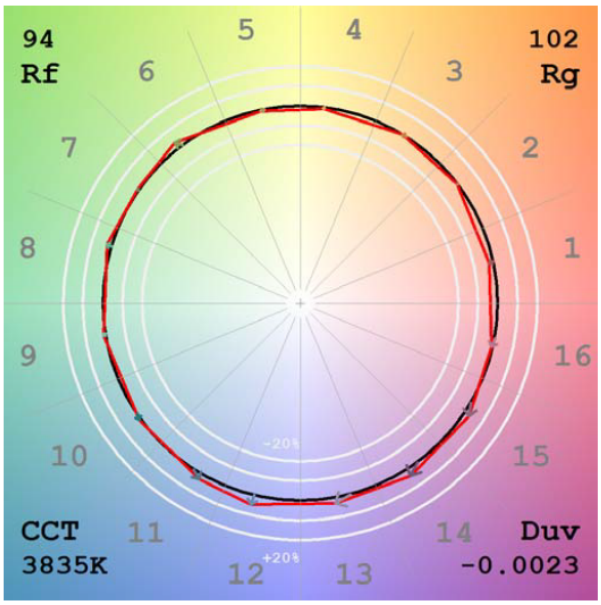
Spectral Power Distribution & Chromaticity Diagram

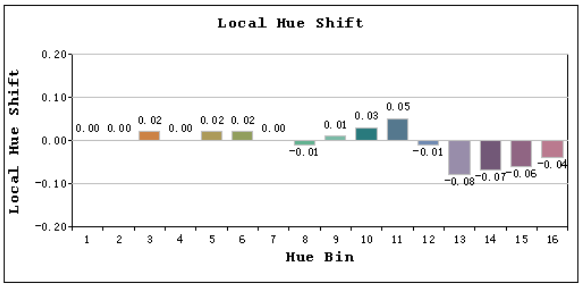


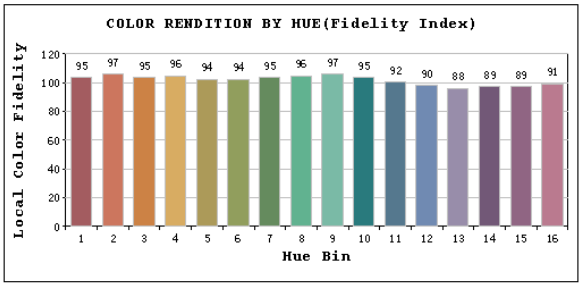
TM30

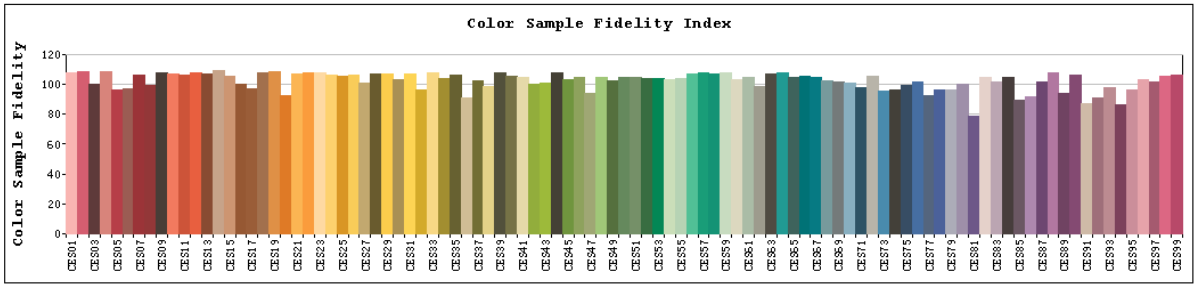

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 94
CCT: 3835 K
u': 0.2295
Rg: 102
Duv: -0.0023
v': 0.5018
Test Source
Ref Source
Spectrum
WaveLength(nm)


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


94
Rf
102
Rg
CCT
3835K
Duv
-0.0023


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

2.1.5 Electrical, Photometric and Chromaticity Measurements

Test date	2024-06-20	**Test Ambient:**	25.1 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	CR4	5000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202406150004	120.0	60	0.083	9.93	0.995

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	5040
Duv	0.0031
Chromaticity (x, y)	x=0.3445 y=0.3573
Chromaticity (u', v')	u'=0.2089 v'=0.4873
Color Rendering Index (CRI)	95.2
R9	85
Rg	102
Rf	93
Rcs,h1%	-3

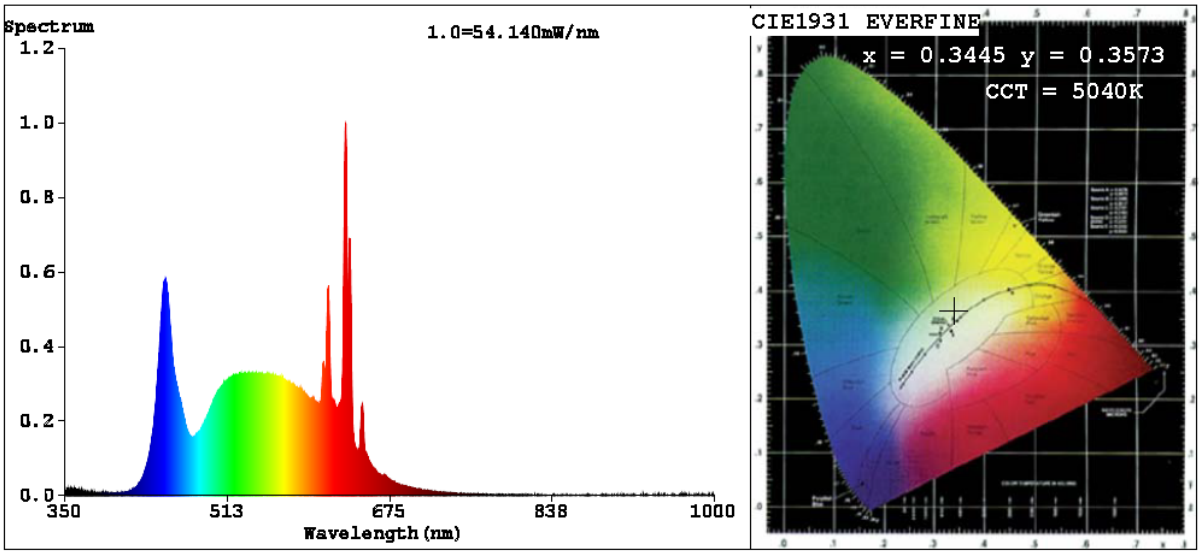
Special Color Rendering Indices			
R1	95	R9	61
R2	98	R10	94
R3	100	R11	97
R4	95	R12	83
R5	95	R13	96
R6	98	R14	98
R7	92	R15	90
R8	83	--	--

Photometric Measurement – Goniophotometer Method:

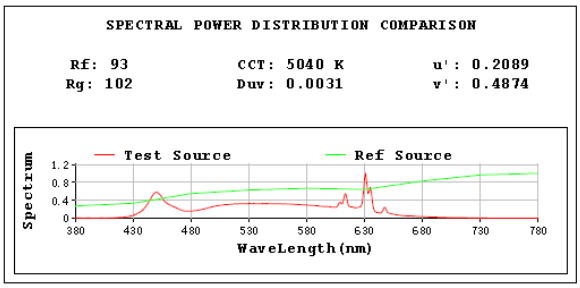
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	1142.7
Luminous Efficacy (lm/W)	115.07

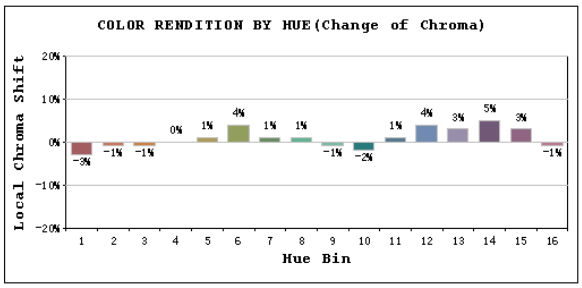
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1078.0
Luminous Efficacy (lm/W)	108.34

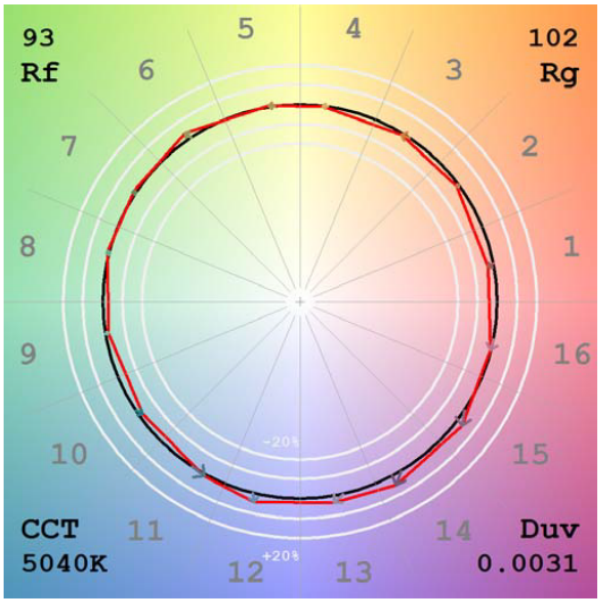
Spectral Power Distribution & Chromaticity Diagram

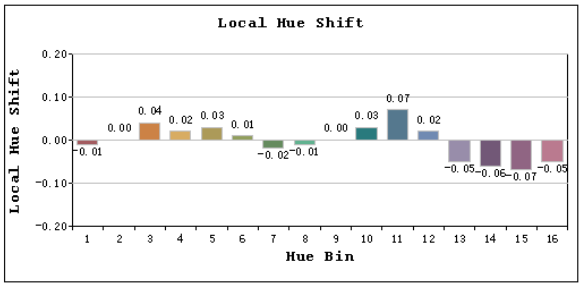


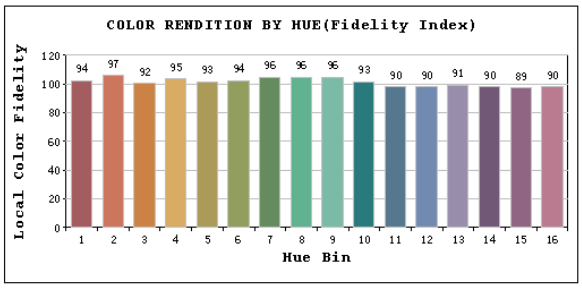
TM30

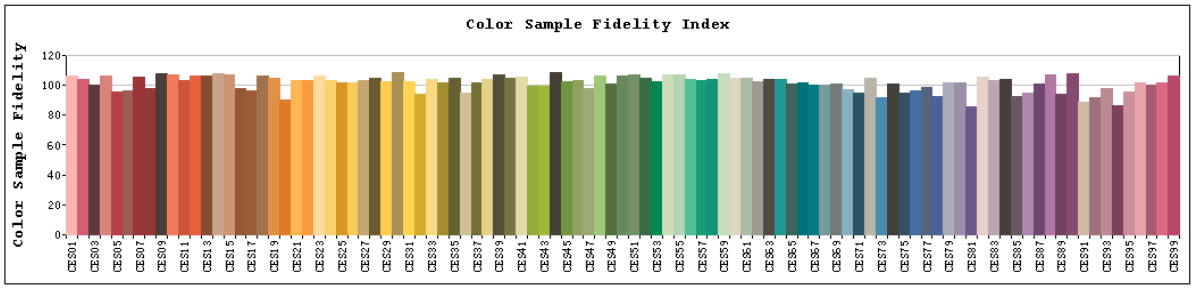

SPECTRAL POWER DISTRIBUTION COMPARISON
Rf: 93
Rg: 102
CCT: 5040 K
Duv: 0.0031
u': 0.2089
v': 0.4874
Test Source
Ref Source
Spectrum
WaveLength(nm)


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


93
Rf
102
Rg
CCT
5040K
Duv
0.0031

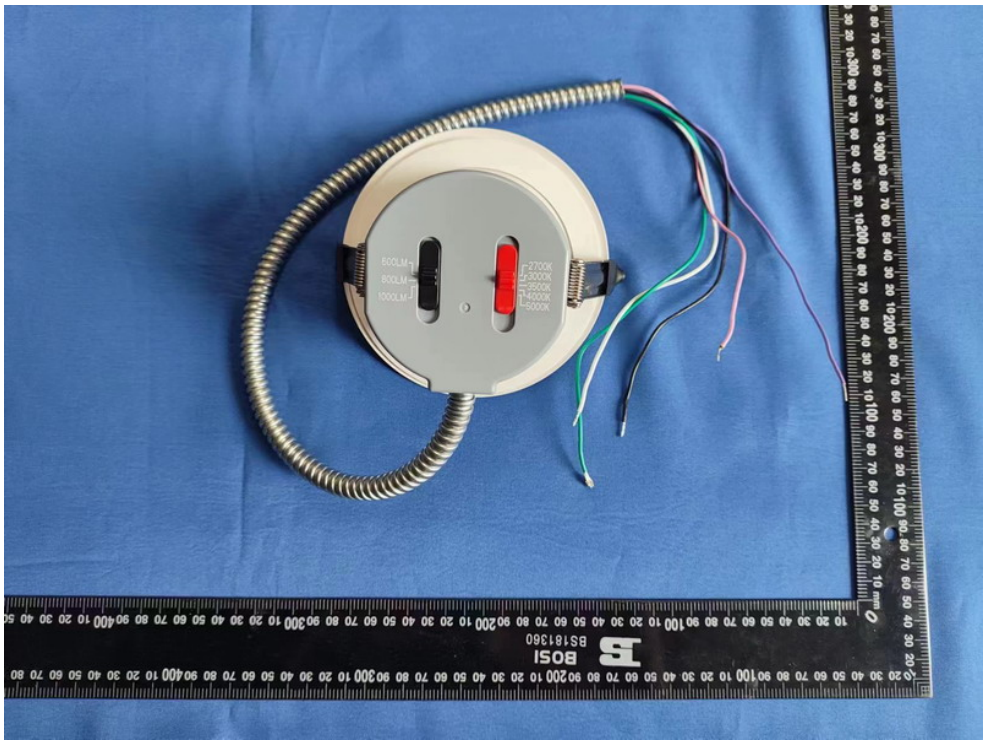

Local Hue Shift
Local Hue Shift
Hue Bin

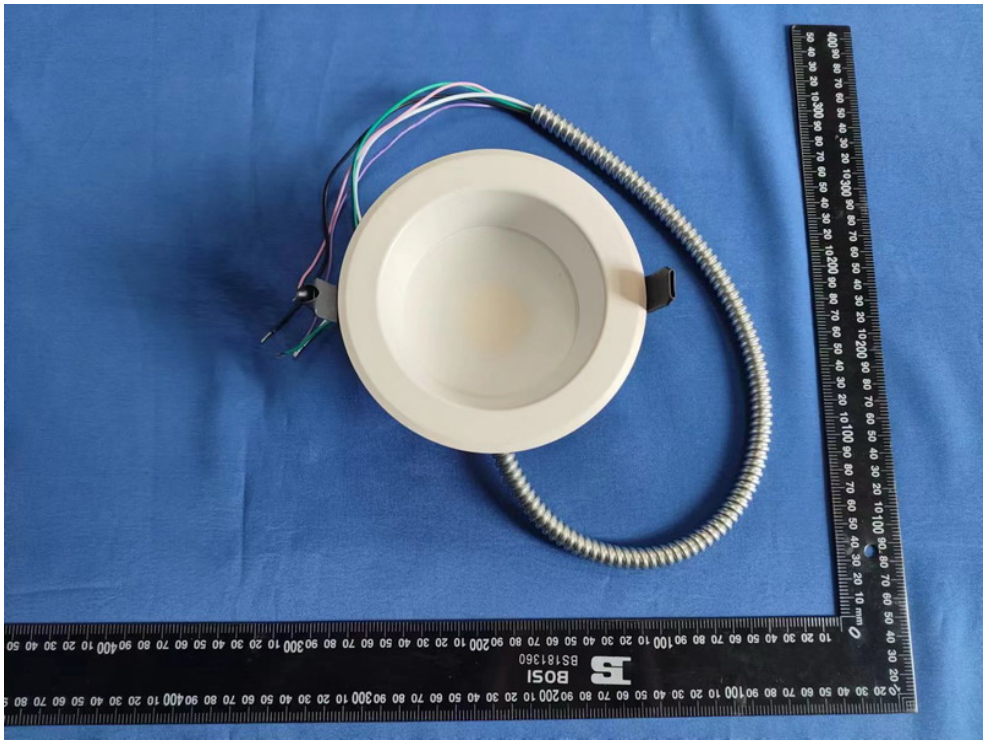

COLOR RENDITION BY HUE(Fidelity Index)
Local Color Fidelity
Hue Bin


Color Sample Fidelity Index
Color Sample Fidelity

Sample No.	Wattage and CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
CR4	6W-2700K setting	120	637.0	5.82	109.45
		277	602.0	5.96	101.01
	8W-2700K setting	120	834.8	7.74	107.86
		277	797.0	7.95	100.21
	10W-2700K setting	120	1048.0	9.95	105.33
		277	987.0	9.97	99.00
	10W-3000K setting	120	1081.8	9.85	109.83
		277	1015.0	9.87	102.84
	10W-3500K setting	120	1116.0	9.74	114.58
		277	1049.0	9.79	107.20
	10W-4000K setting	120	1138.4	9.73	117.00
		277	1069.0	9.77	109.46
	10W-5000K setting	120	1142.7	9.93	115.07
		277	1078.0	9.95	108.34

3. Product Photo





******** END OF REPORT ********