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): DLC0040(C6R12/18/249FAUNVW)

Report Type:	Testing and Report According to IES LM-79-2008
Type of Luminaire:	Downlights
Report Date:	2020-09-11

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	12.0 W /18.0 W /24.0W
Rated Initial Lamp Lumen	1000 lm /1500 lm /2000 lm
Declared CCT	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	2020-09-11	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLC0040(C6R12/18/249FAUNVW)	3000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202008310029	120.0	60	0.187	22.40	0.997

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2994
Duv	0.0002
Chromaticity (x, y)	x=0.4371 y=0.4038
Chromaticity (u', v')	u'=0.2508 v'=0.5213
Color Rendering Index (CRI)	93.4
R9	62

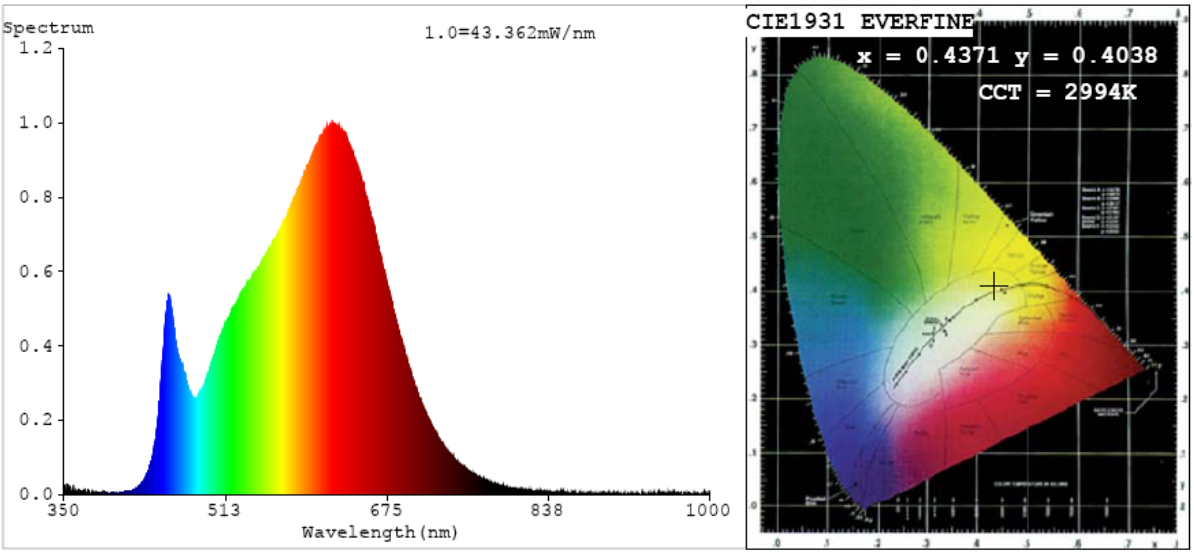
Special Color Rendering Indices			
R1	94	R9	62
R2	98	R10	93
R3	99	R11	93
R4	93	R12	80
R5	93	R13	95
R6	96	R14	99
R7	92	R15	90
R8	83	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	2147.8
Luminous Efficacy (lm/W)	95.88
Beam Angle (°)	70.8
Center Beam Candle Power (cd)	1427

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	2143
Luminous Efficacy (lm/W)	94.94

Spectral Power Distribution & Chromaticity Diagram



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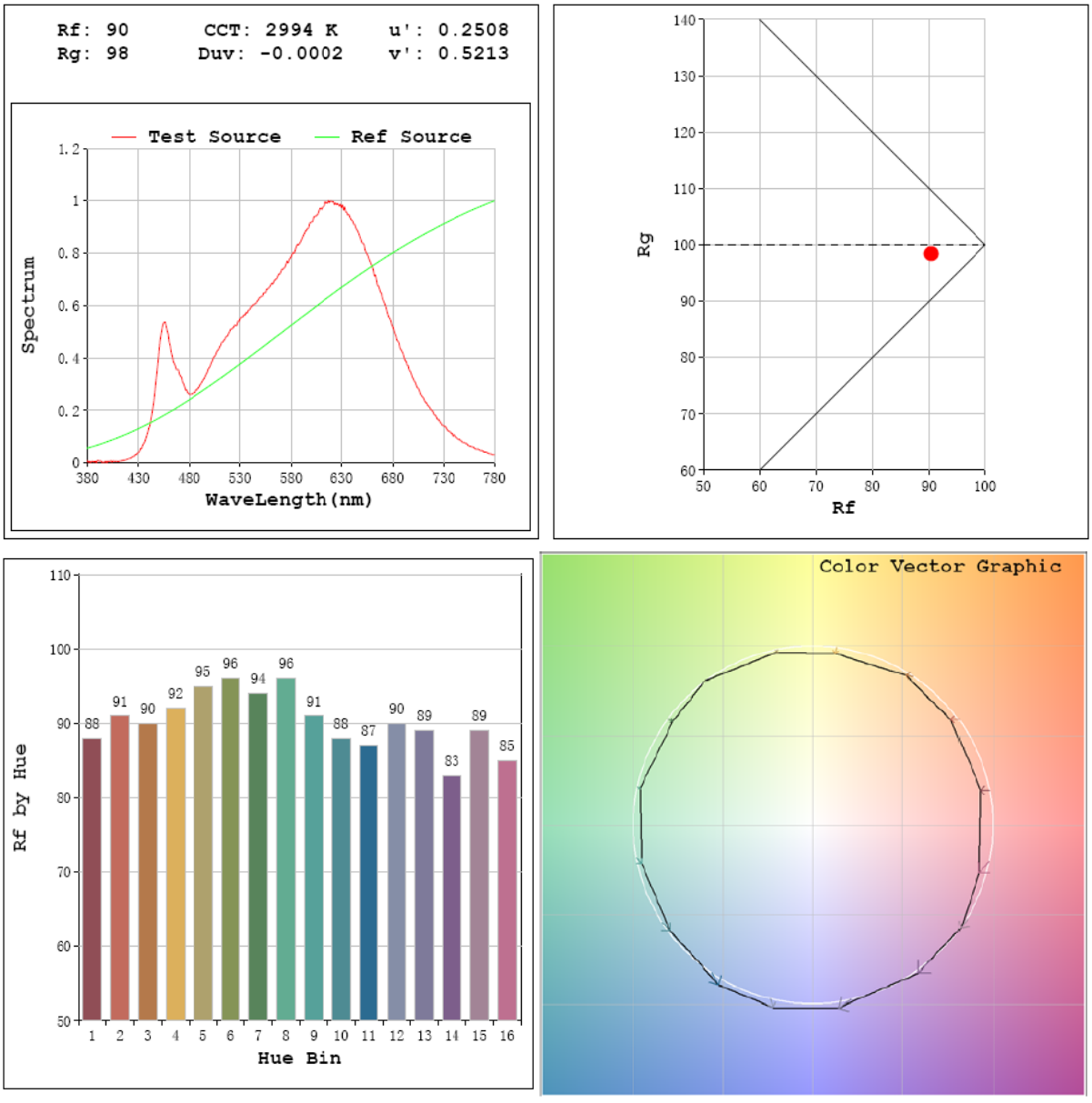
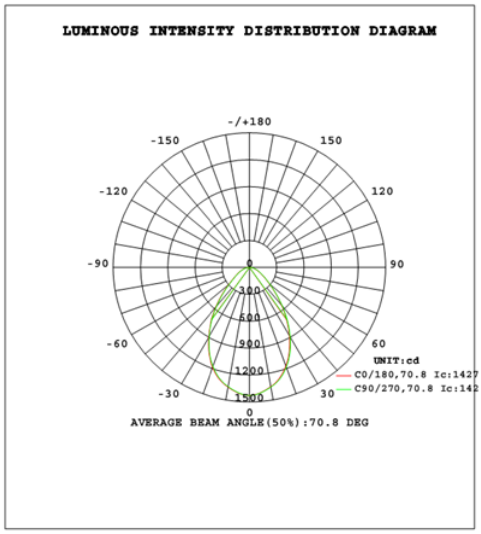


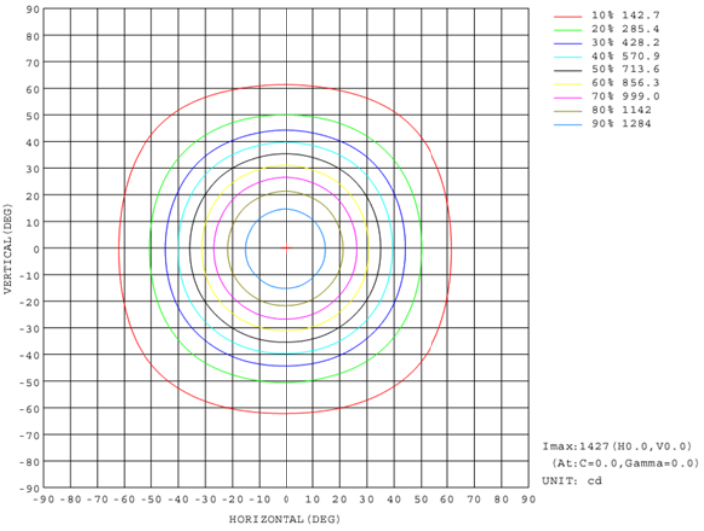
Zonal Lumen Tabulation

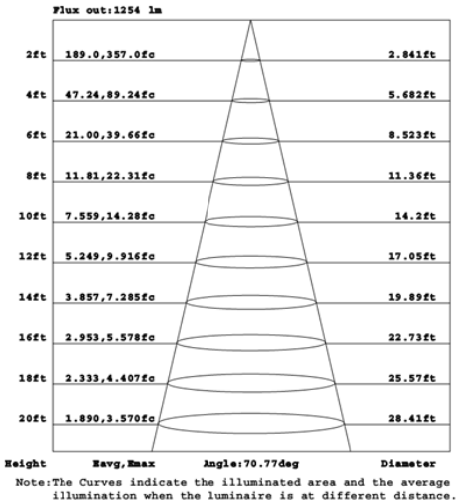
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	970.3	45.2%
0-40	1422.8	66.2%
0-60	1934.2	90.1%
60-90	213.6	9.9%
70-100	94.4	4.4%
90-120	0.0	0.0%
0-90	2147.8	100.0%
90-180	0.0	0.0%
0-180	2147.8	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	132.3	6.2%	90-100	0.0	0.0%
10-20	359.3	16.7%	100-110	0.0	0.0%
20-30	478.7	22.3%	110-120	0.0	0.0%
30-40	452.4	21.1%	120-130	0.0	0.0%
40-50	319.5	14.9%	130-140	0.0	0.0%
50-60	191.9	8.9%	140-150	0.0	0.0%
60-70	119.2	5.6%	150-160	0.0	0.0%
70-80	66.9	3.1%	160-170	0.0	0.0%
80-90	27.5	1.3%	170-180	0.0	0.0%

Photometric Data







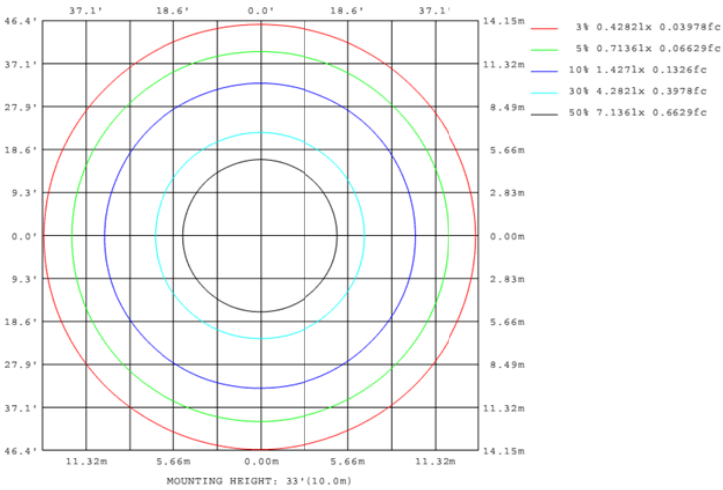


Table--1

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	1427	1427	1427	1427	1427	1427	1427	1427	1427	1427	1427	1427	1427	1427	1427	1427			
5	1402	1404	1404	1405	1405	1407	1406	1407	1406	1403	1404	1402	1402	1401	1402	1402			
10	1350	1353	1352	1355	1355	1357	1356	1357	1355	1352	1352	1349	1350	1348	1349	1348			
15	1278	1283	1283	1288	1288	1292	1291	1292	1288	1283	1283	1278	1278	1275	1277	1275			
20	1171	1177	1177	1184	1184	1190	1188	1190	1186	1180	1179	1174	1174	1169	1171	1168			
25	1037	1044	1044	1052	1052	1059	1057	1060	1056	1050	1050	1044	1044	1038	1039	1035			
30	879	887	886	895	895	902	900	904	902	896	897	890	891	883	883	877			
35	714	721	720	729	728	736	734	740	739	733	734	727	728	721	721	713			
40	550	556	553	562	561	570	569	577	575	567	567	559	561	554	557	551			
45	404	407	404	411	411	419	420	426	422	414	413	406	407	402	405	402			
50	289	289	291	291	297	299	304	301	297	295	290	289	284	285	283	286			
55	209	210	212	212	216	217	219	217	213	213	208	208	205	205	203	206			
60	155	157	157	160	160	162	161	162	159	156	156	153	153	152	153	152			
65	117	120	120	122	122	124	123	123	122	119	119	117	117	115	116	116			
70	86.0	88.0	88.3	90.3	90.4	91.8	91.1	91.3	90.3	88.4	87.9	86.2	86.1	84.9	85.6	85.4			
75	60.5	62.1	62.5	64.0	64.2	65.3	64.7	64.8	64.6	63.1	62.6	61.3	61.1	60.2	60.7	60.5			
80	39.6	40.9	41.2	42.5	42.7	43.5	43.1	43.2	43.7	42.4	42.0	40.9	40.7	39.9	40.3	40.3			
85	22.6	23.5	23.9	24.9	25.1	25.7	25.5	25.5	26.6	25.5	25.2	24.3	24.1	23.5	23.7	23.7			
90	11.0	11.0	11.0	11.1	11.3	11.5	11.6	11.5	13.1	12.8	12.7	12.7	12.7	12.7	12.7	12.7			

2.1.2 Electrical, Photometric and Chromaticity Measurements

Test date	2020-09-11	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLC0040(C6R12/18/249FAUNVW)	3500K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202008310029	120.0	60	0.185	22.17	0.997

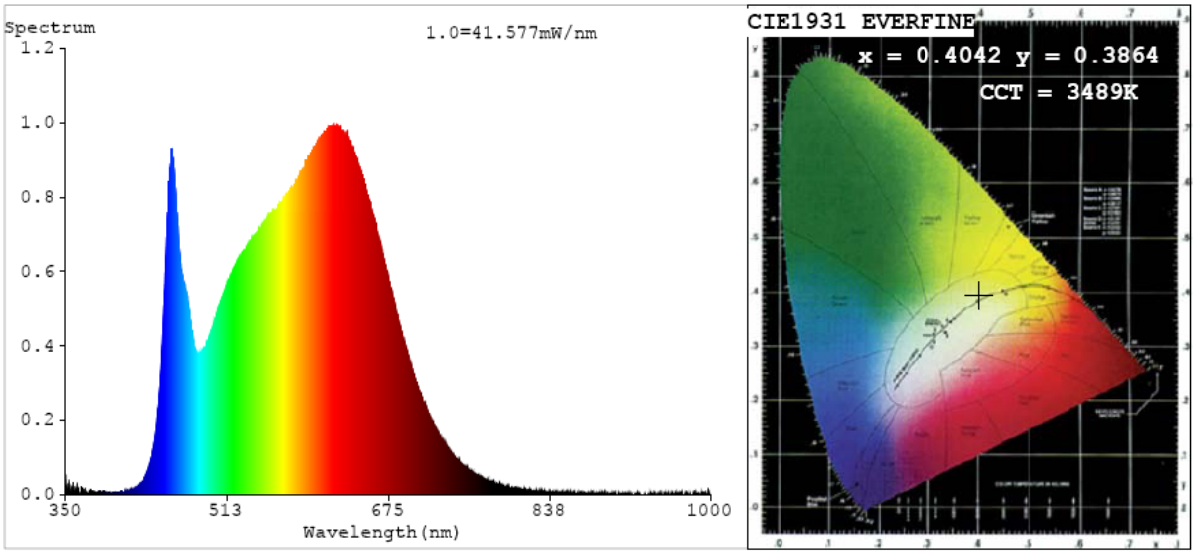
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3489
Duv	0.0017
Chromaticity (x, y)	x=0.4042 y=0.3864
Chromaticity (u', v')	u'=0.2368 v'=0.5093
Color Rendering Index (CRI)	94.7
R9	75
Total Luminous (lm)	2280
Luminous Efficacy (lm/W)	102.87

Special Color Rendering Indices			
R1	96	R9	75
R2	100	R10	97
R3	98	R11	94
R4	93	R12	75
R5	95	R13	98
R6	96	R14	100
R7	92	R15	94
R8	88	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	2276
Luminous Efficacy (lm/W)	102.03

Spectral Power Distribution & Chromaticity Diagram



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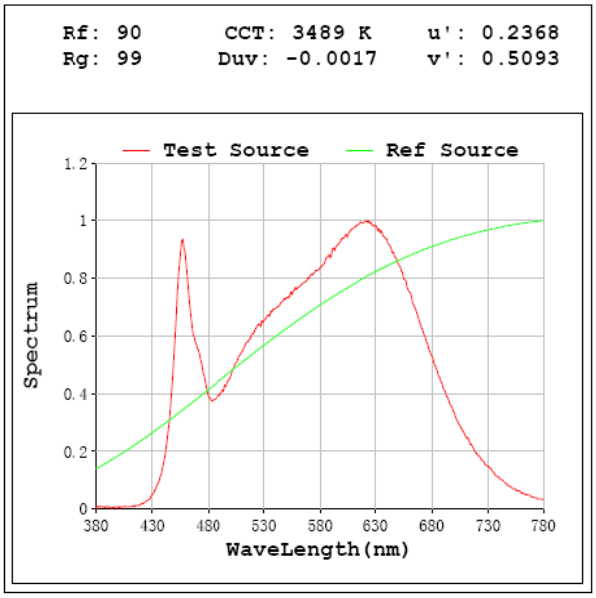
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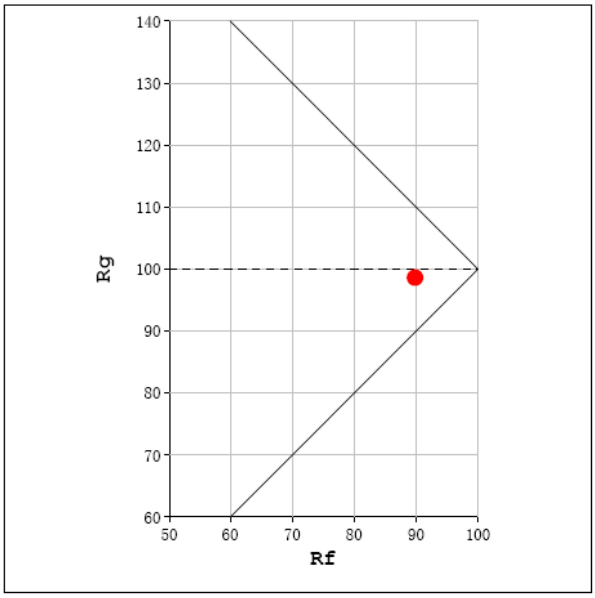
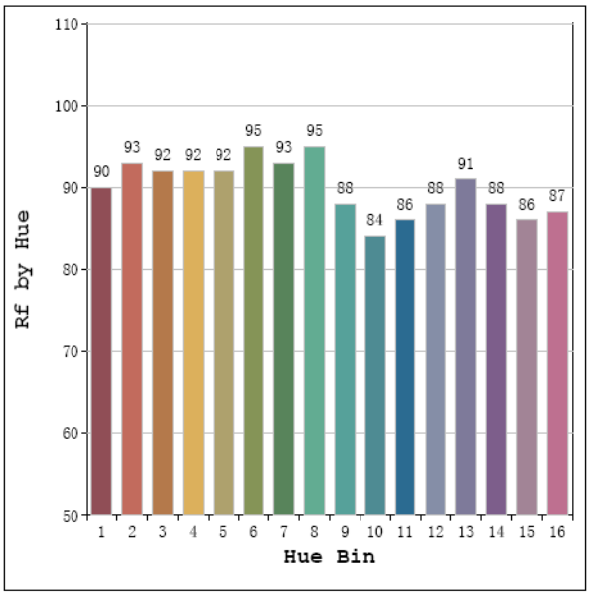
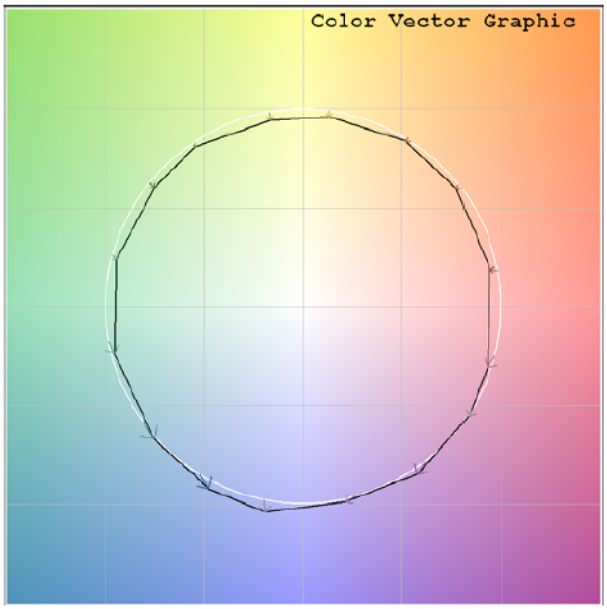
Rg: 99 Duv: -0.0017 v': 0.5093
Test Source
Ref Source
Spectrum
WaveLength(nm)


Rg
Rf


Rf by Hue
Hue Bin
90 93 92 92 92 95 93 95 88 84 86 88 91 88 86 87


Color Vector Graphic

2.1.3 Electrical, Photometric and Chromaticity Measurements

Test date	2020-09-11	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLC0040(C6R12/18/249FAUNVW)	4000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202008310029	120.0	60	0.184	21.99	0.997

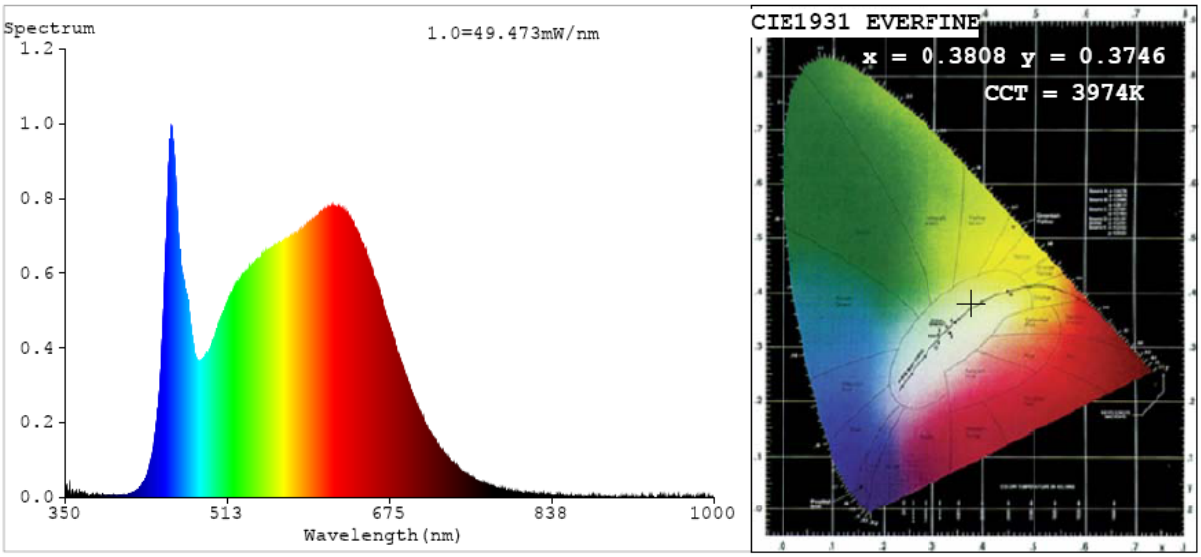
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3974
Duv	0.0011
Chromaticity (x, y)	x=0.3808 y=0.3746
Chromaticity (u', v')	u'=0.2262 v'=0.5007
Color Rendering Index (CRI)	94.7
R9	79
Total Luminous (lm)	2329
Luminous Efficacy (lm/W)	105.93

Special Color Rendering Indices			
R1	96	R9	79
R2	100	R10	97
R3	98	R11	93
R4	92	R12	70
R5	94	R13	98
R6	95	R14	99
R7	93	R15	94
R8	89	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	2328
Luminous Efficacy (lm/W)	105.16

Spectral Power Distribution & Chromaticity Diagram



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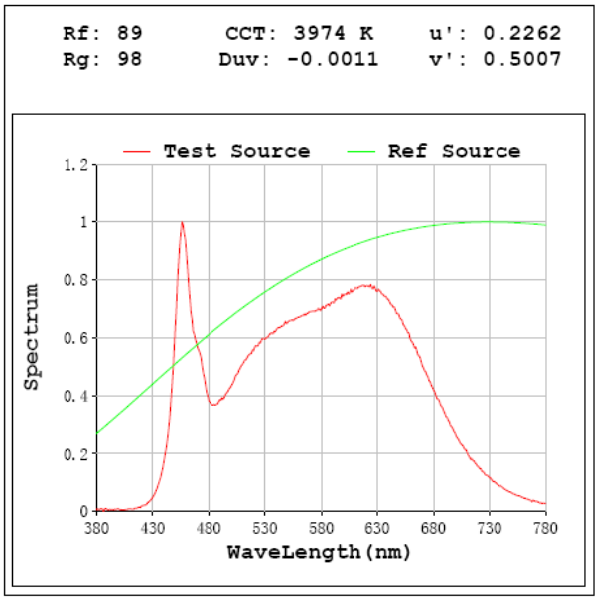
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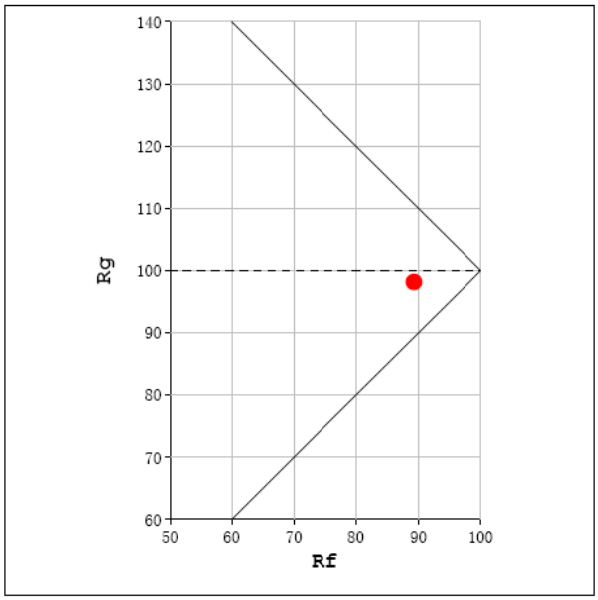
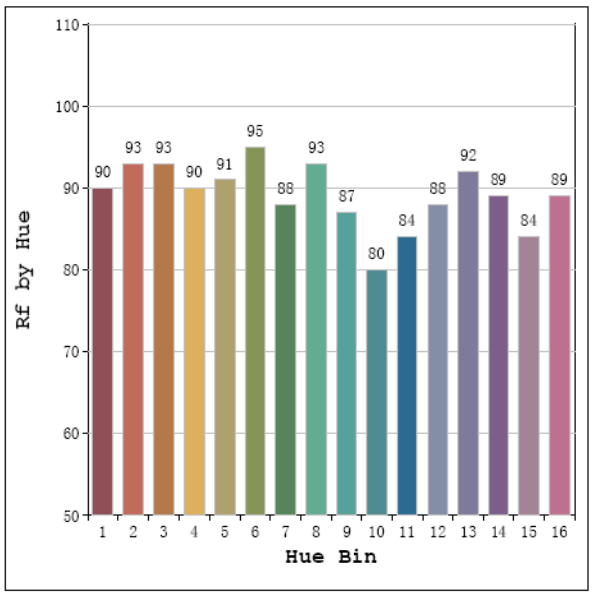
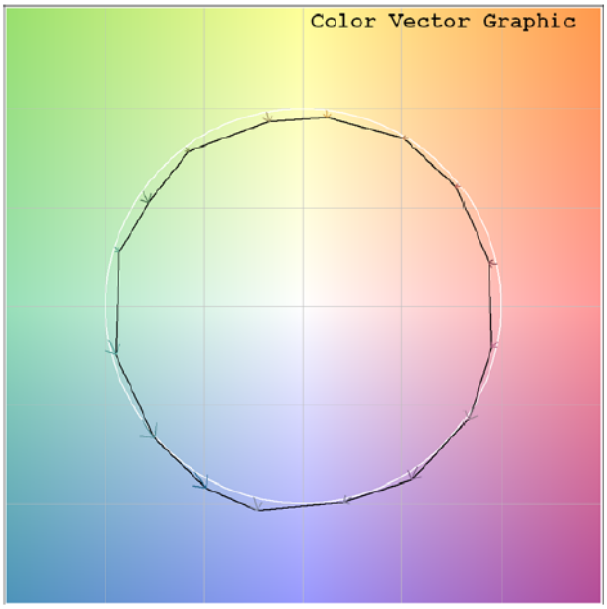
Rg: 98 Duv: -0.0011 v': 0.5007
Test Source
Ref Source
Spectrum
WaveLength(nm)


Rg
Rf


Rf by Hue
Hue Bin
90 93 93 90 91 95 88 93 87 80 84 88 92 89 84 89


Color Vector Graphic

2.1.4 Electrical, Photometric and Chromaticity Measurements

Test date	2020-09-11	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLC0040(C6R12/18/249FAUNVW)	5000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202008310029	120.0	60	0.187	22.42	0.997

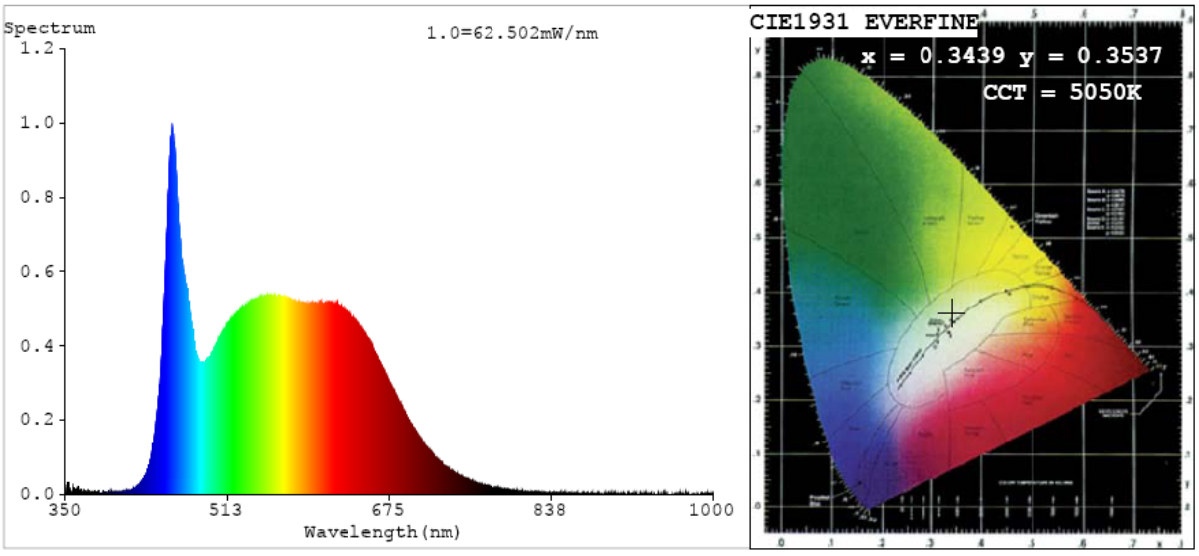
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	5050
Duv	0.0015
Chromaticity (x, y)	x=0.3439 y=0.3537
Chromaticity (u', v')	u'=0.2098 v'=0.4855
Color Rendering Index (CRI)	93.9
R9	79
Total Luminous (lm)	2283
Luminous Efficacy (lm/W)	101.86

Special Color Rendering Indices			
R1	95	R9	79
R2	99	R10	96
R3	98	R11	91
R4	90	R12	70
R5	93	R13	98
R6	94	R14	99
R7	92	R15	94
R8	89	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	2282
Luminous Efficacy (lm/W)	101.18

Spectral Power Distribution & Chromaticity Diagram



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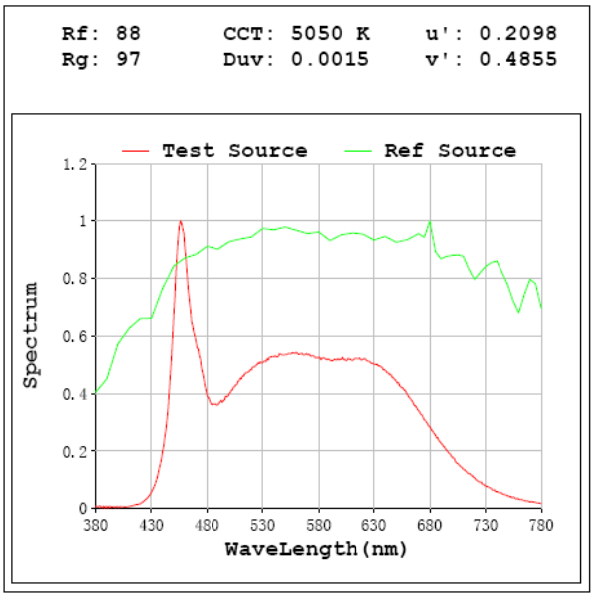

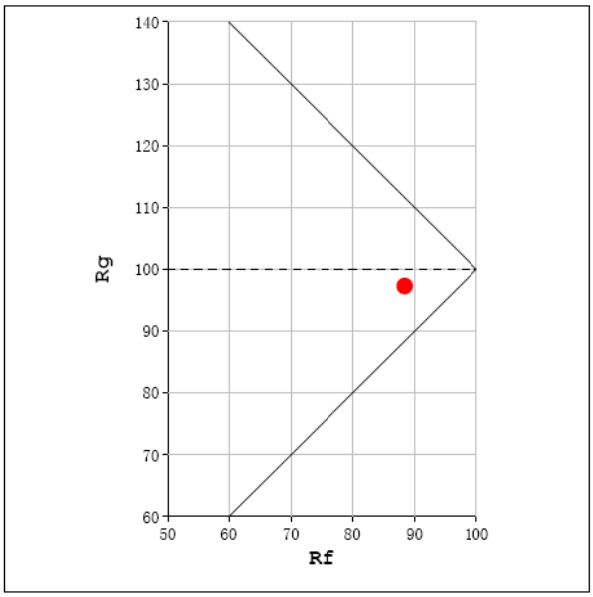

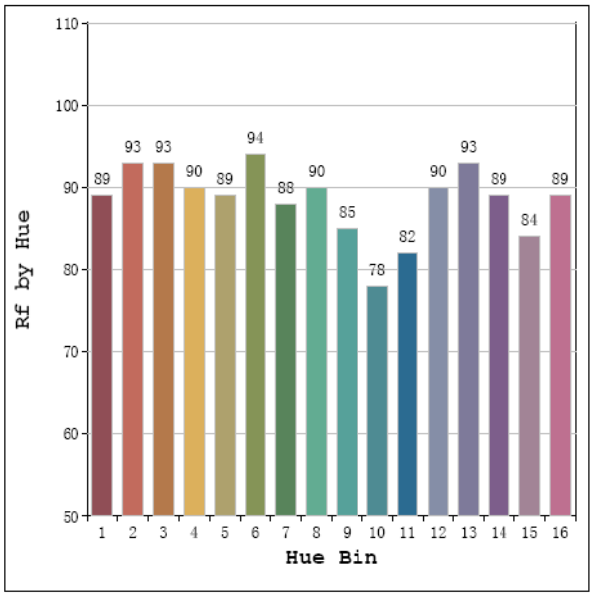

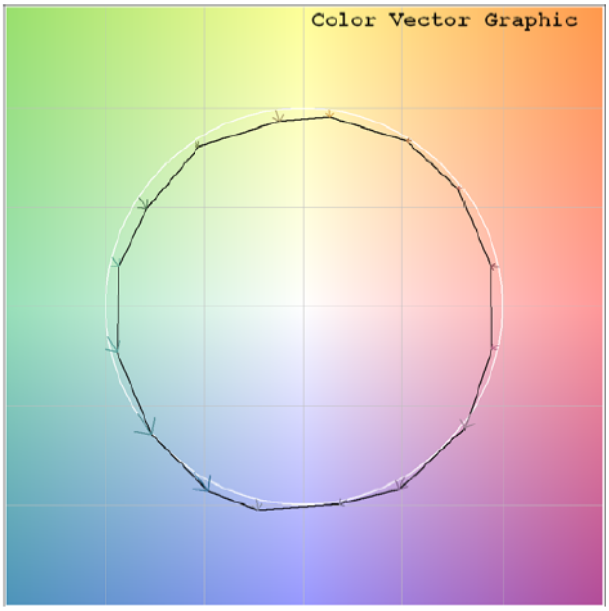

Sample No.	Wattage and CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
DLC0040(C6R12/18/249FAUNVW)	12W 3000K setting	120.0	1150.0	11.28	101.88
		277.0	1148.0	11.77	97.50
	18W 3000K setting	120.0	1619.0	16.32	99.23
		277.0	1620.0	16.68	97.10
	24W 3000K setting	120.0	2144.0	22.43	95.59
		277.0	2143.0	22.57	94.94
	24W 3500K setting	120.0	2280.0	22.17	102.87
		277.0	2276.0	22.31	102.03
	24W 4000K setting	120.0	2329.0	21.99	105.93
		277.0	2328.0	22.14	105.16
	24W 5000K setting	120.0	2283.0	22.42	101.86
		277.0	2282.0	22.55	101.18

3. Product Photo

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