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):
DLC0055(CRLEDFA-6R-24S-9CCT-UNV-WS)

Report Type:	Testing and Report According to IES LM-79-2008
Type of Luminaire:	Downlights
Report Date:	2021-09-02

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	15.0 W /19.0 W /24.0W
Rated Initial Lamp Lumen	1200 lm /1600 lm /2000 lm
Declared CCT	2700K/3000K/.3500K/4000K

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	2021-09-02	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLC0055(CRLEDFA-6R-24S-9CCT-UNV-WS)	24W 2700K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202109020023	120.0	60	0.186	22.3	0.997

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2709
Duv	0.0010
Chromaticity (x, y)	x=0.4608 y=0.4135
Chromaticity (u', v')	u'=0.2619 v'=0.5286
Color Rendering Index (CRI)	93
R9	57

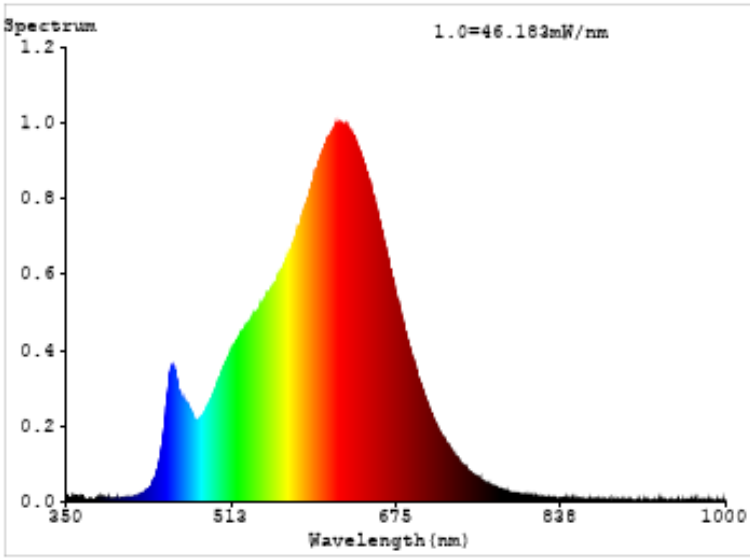
Special Color Rendering Indices			
R1	94	R9	57
R2	98	R10	95
R3	98	R11	95
R4	93	R12	85
R5	94	R13	95
R6	98	R14	100
R7	90	R15	88
R8	80	--	--

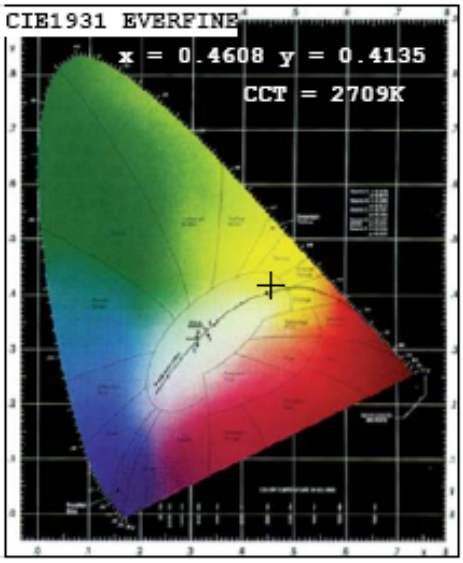
Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	2121.4
Luminous Efficacy (lm/W)	95.13
Beam Angle (°)	86.6
Center Beam Candle Power (cd)	1114

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	2077.
Luminous Efficacy (lm/W)	92.18

Spectral Power Distribution & Chromaticity Diagram





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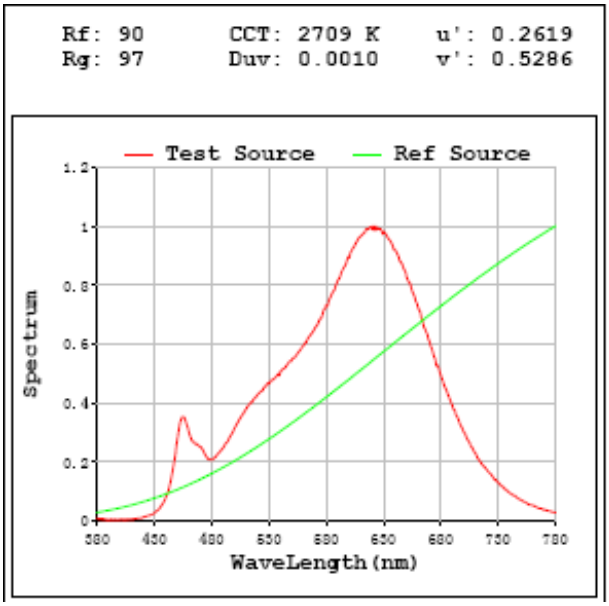
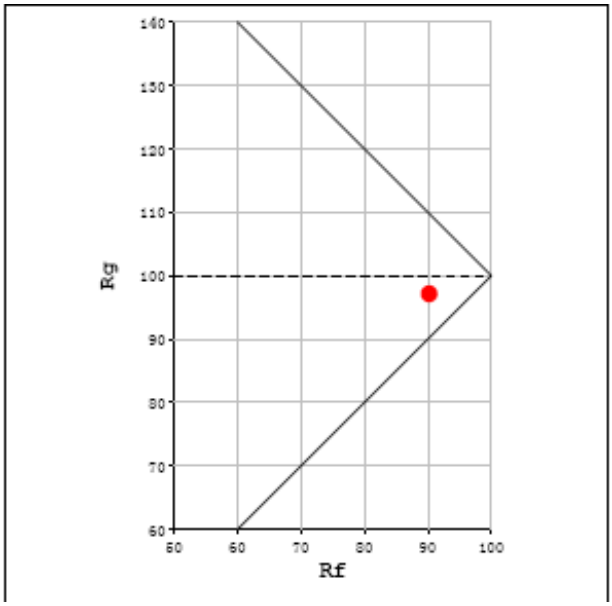
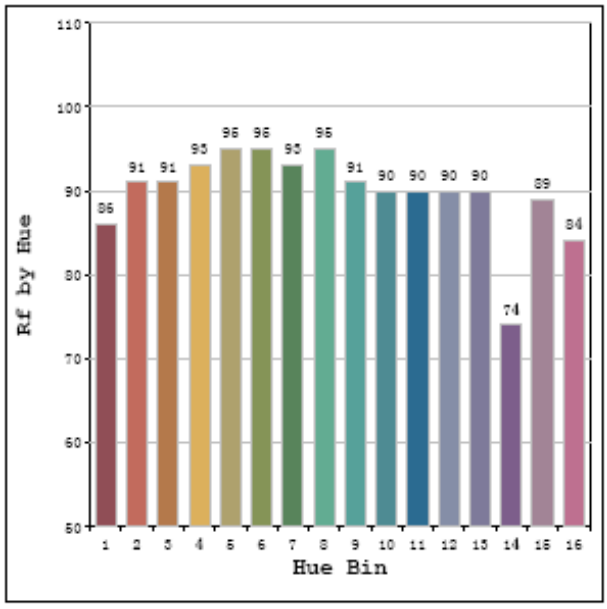
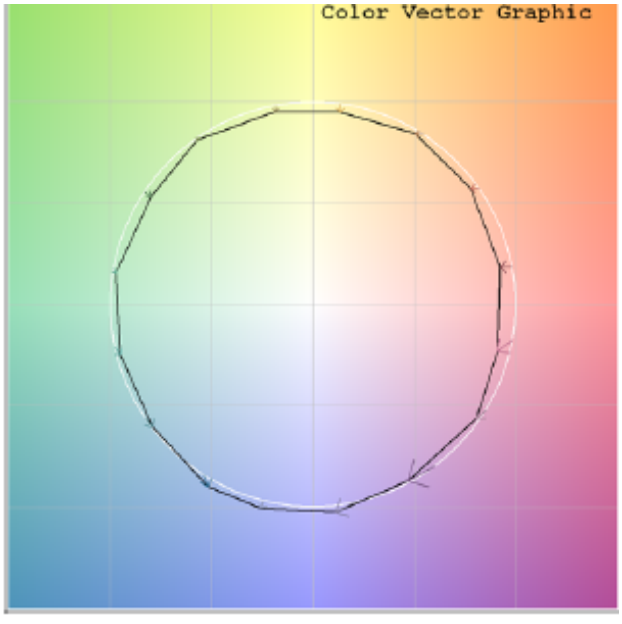








Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	818.8	38.6%
0-40	1280.5	60.4%
0-60	1916.6	90.3%
60-90	204.7	9.7%
70-100	88.7	4.2%
90-120	0.0	0.0%
0-90	2121.4	100.0%
90-180	0.0	0.0%
0-180	2121.4	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	104.7	4.9%	90-100	0.0	0.0%
10-20	292.6	13.8%	100-110	0.0	0.0%
20-30	421.5	19.9%	110-120	0.0	0.0%
30-40	461.7	21.8%	120-130	0.0	0.0%
40-50	394.7	18.6%	130-140	0.0	0.0%
50-60	241.5	11.4%	140-150	0.0	0.0%
60-70	116.1	5.5%	150-160	0.0	0.0%
70-80	61.9	2.9%	160-170	0.0	0.0%
80-90	26.8	1.3%	170-180	0.0	0.0%

Photometric Data

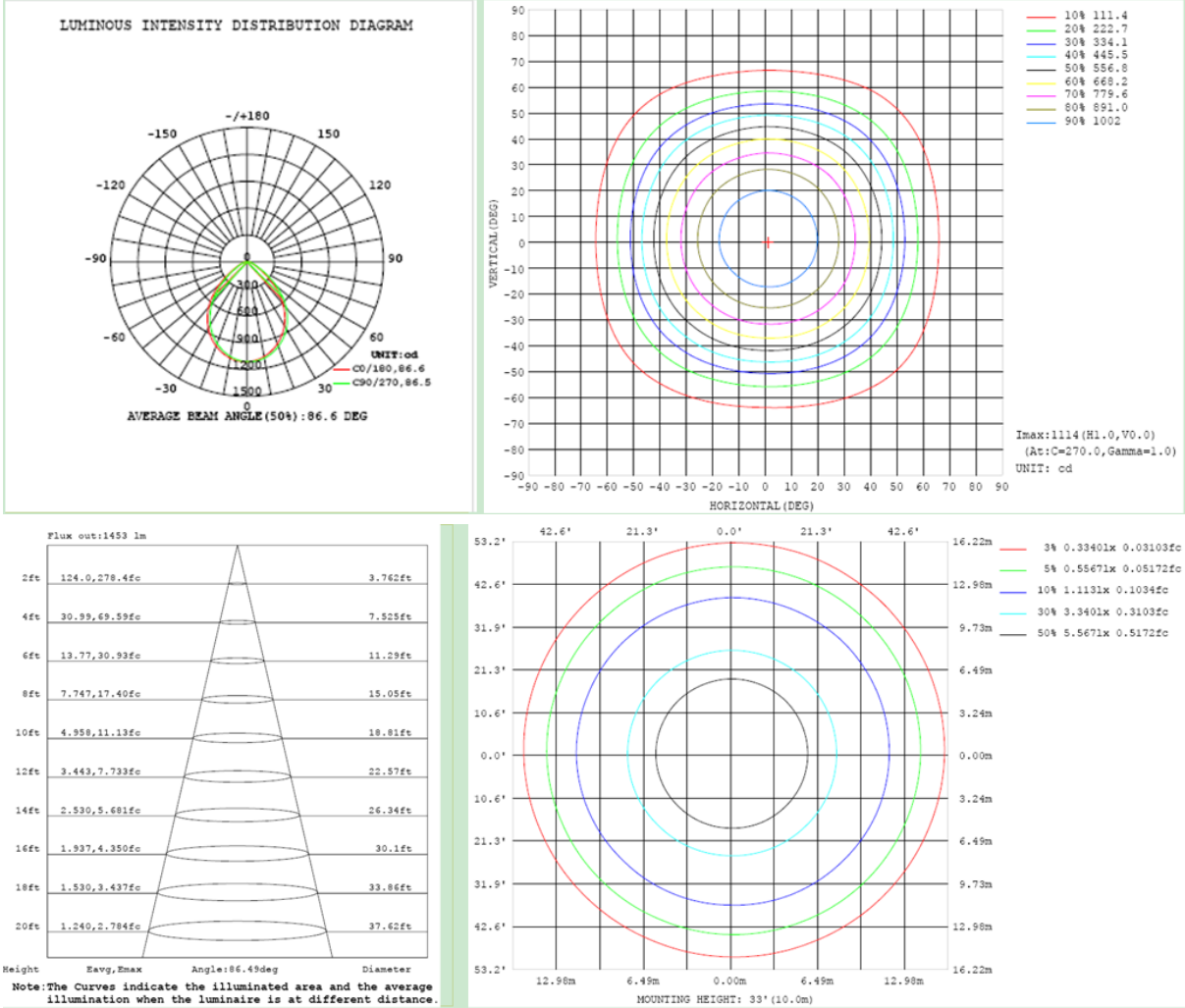


Table--1 UNIT: cd

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	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113
5	1109	1107	1104	1102	1100	1098	1098	1099	1100	1103	1105	1107	1110	1110	1111	1110
10	1088	1084	1079	1075	1070	1068	1067	1070	1072	1077	1082	1085	1090	1091	1092	1090
15	1051	1047	1038	1033	1026	1023	1021	1025	1029	1034	1042	1047	1054	1055	1058	1055
20	999	993	983	976	967	964	962	967	971	978	987	994	1003	1005	1008	1004
25	935	928	915	906	896	891	889	895	902	909	921	929	940	942	946	941
30	855	847	832	822	809	806	803	810	817	826	840	850	862	865	869	863
35	762	754	736	725	711	707	704	712	721	731	747	757	771	774	778	771
40	656	647	627	615	600	596	593	602	612	623	640	652	666	670	675	666
45	538	526	506	494	478	473	471	481	492	503	523	535	550	554	558	549
50	409	398	378	367	352	346	346	355	367	378	396	409	425	428	432	422
55	286	272	260	246	238	232	233	237	246	260	272	287	296	304	302	297
60	185	175	166	158	151	149	148	152	158	166	176	186	193	198	197	192
65	119	116	110	107	103	102	102	104	107	110	115	119	124	125	126	122
70	84.6	82.5	78.6	76.5	73.6	73.1	72.4	74.2	76.3	78.4	82.1	84.3	87.5	87.9	88.6	86.7
75	60.8	59.5	56.8	55.3	53.3	52.8	52.3	53.6	55.7	57.0	59.4	60.8	62.6	63.0	63.5	62.5
80	42.0	40.7	38.4	37.0	35.2	34.7	34.3	35.3	37.9	39.1	41.2	42.5	44.4	44.8	45.3	44.4
85	25.3	24.2	22.4	21.2	19.8	19.3	18.9	19.6	22.5	23.6	25.3	26.5	28.1	28.5	28.9	28.1
90	11.9	11.5	11.4	11.3	11.3	11.3	11.3	11.3	13.2	13.3	13.3	13.6	14.4	15.1	15.1	14.6

2.1.2 Electrical, Photometric and Chromaticity Measurements

Test date	2021-09-02	**Test Ambient:**	25.3 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	DLC0055(CRLEDFA-6R-24S-9CCT-UNV-WS)	24W 3000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202109020023	120.0	60	0.1875	22.41	0.9964

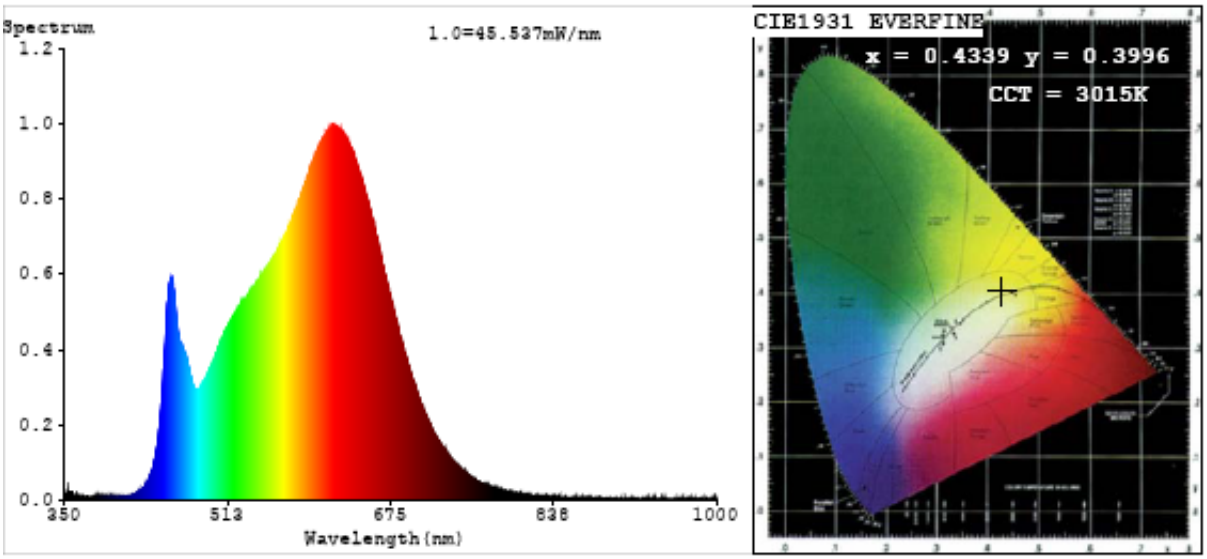
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3015
Duv	-0.0014
Chromaticity (x, y)	x=0.4339 y=0.3996
Chromaticity (u', v')	u'=0.2505 v'=0.5192
Color Rendering Index (CRI)	93.6
R9	64
Total Luminous (lm)	2211
Luminous Efficacy (lm/W)	98.66

Special Color Rendering Indices			
R1	96	R9	64
R2	99	R10	99
R3	97	R11	95
R4	93	R12	81
R5	95	R13	97
R6	96	R14	99
R7	90	R15	91
R8	83	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
otal Luminous (lm)	2203
Luminous Efficacy (lm/W)	98.39

Spectral Power Distribution & Chromaticity Diagram



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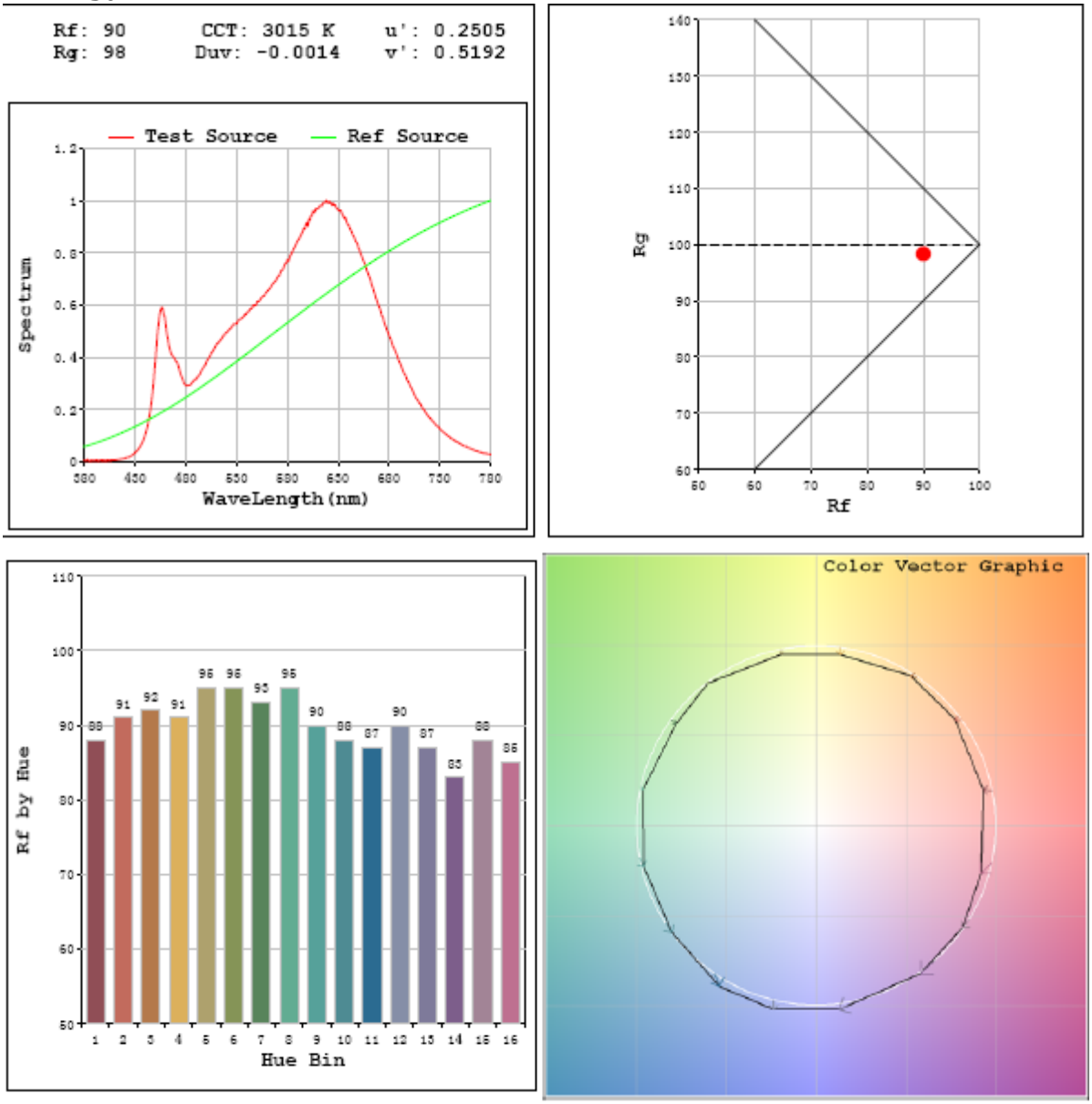

Rf: 90 CCT: 3015 K u': 0.2505
Rg: 98 Duv: -0.0014 v': 0.5192
Test Source
Ref Source
Spectrum
WaveLength(nm)
Rg
Rf
Rf by Hue
Hue Bin
Color Vector Graphic

2.1.3 Electrical, Photometric and Chromaticity Measurements

Test date	2021-09-02	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLC0055(CRLEDFA-6R-24S-9CCT-UNV-WS)	24W 3500K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202109020023	120.0	60	0.1861	22.25	0.9964

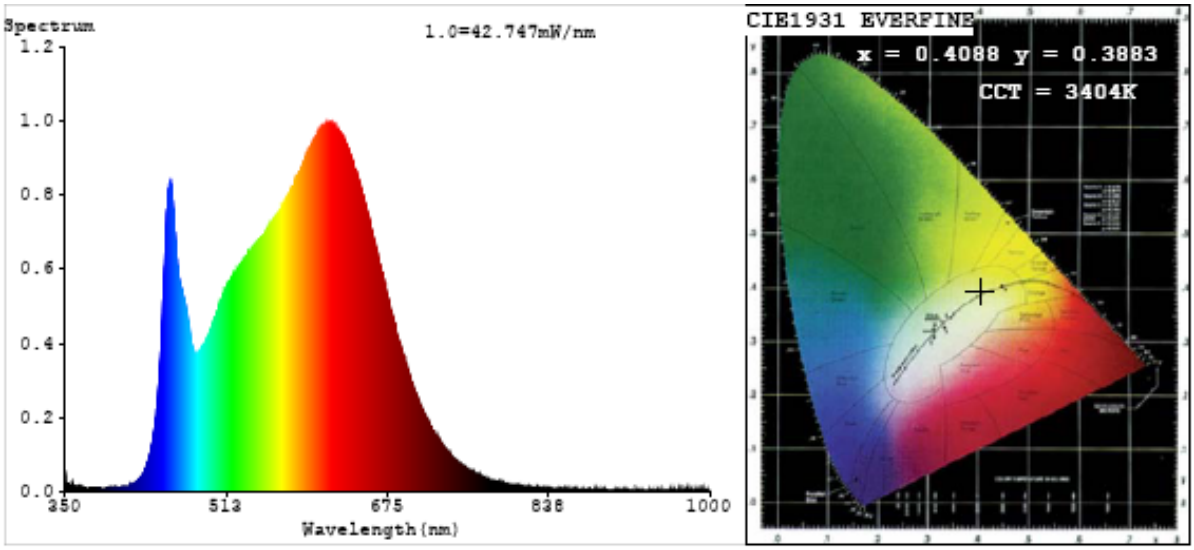
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3404
Duv	-0.0018
Chromaticity (x, y)	x=0.4088 y=0.3883
Chromaticity (u', v')	u'=0.2390 v'=0.5108
Color Rendering Index (CRI)	93.9
R9	68
Total Luminous (lm)	2272
Luminous Efficacy (lm/W)	102.11

Special Color Rendering Indices			
R1	96	R9	68
R2	99	R10	98
R3	97	R11	95
R4	93	R12	77
R5	95	R13	98
R6	96	R14	99
R7	91	R15	93
R8	84	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	2264
Luminous Efficacy (lm/W)	101.8

Spectral Power Distribution & Chromaticity Diagram



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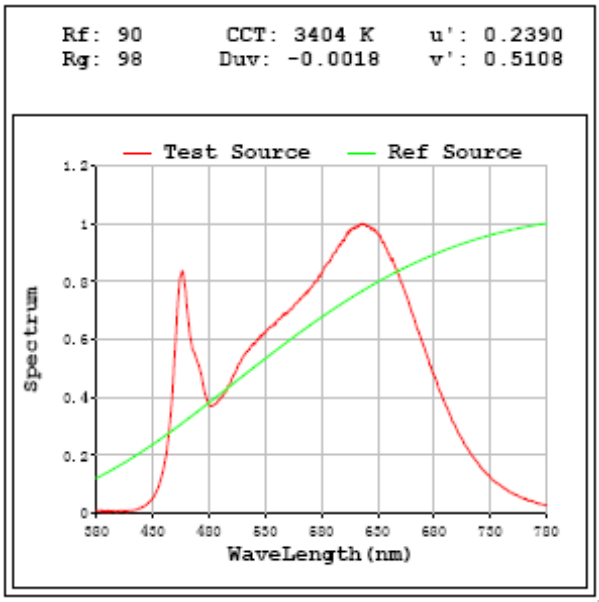
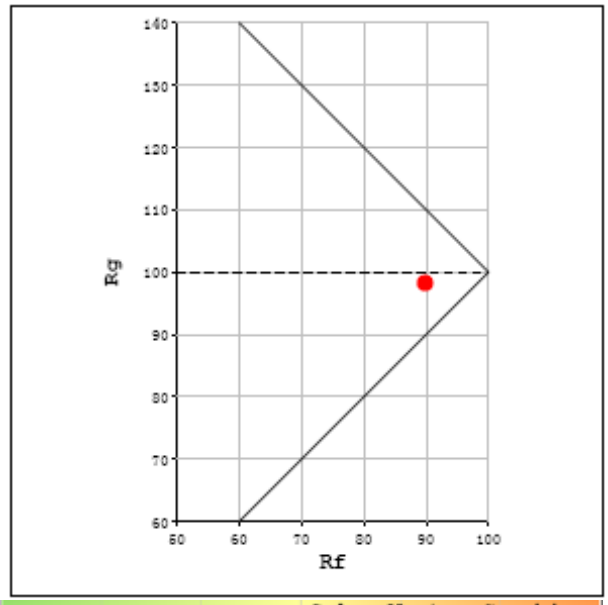
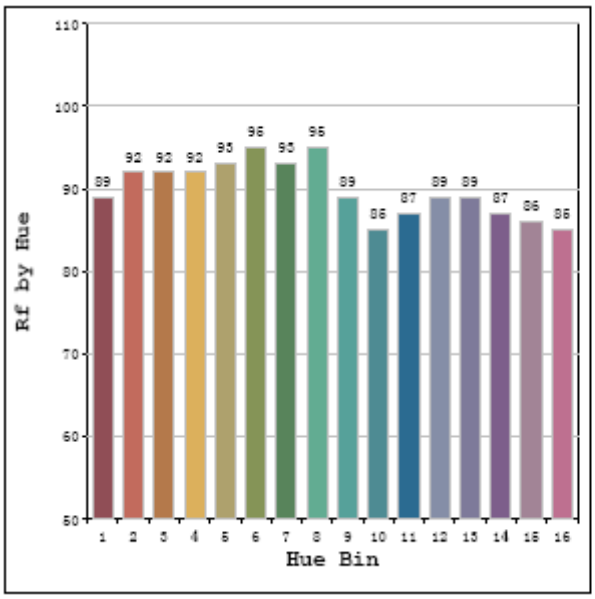
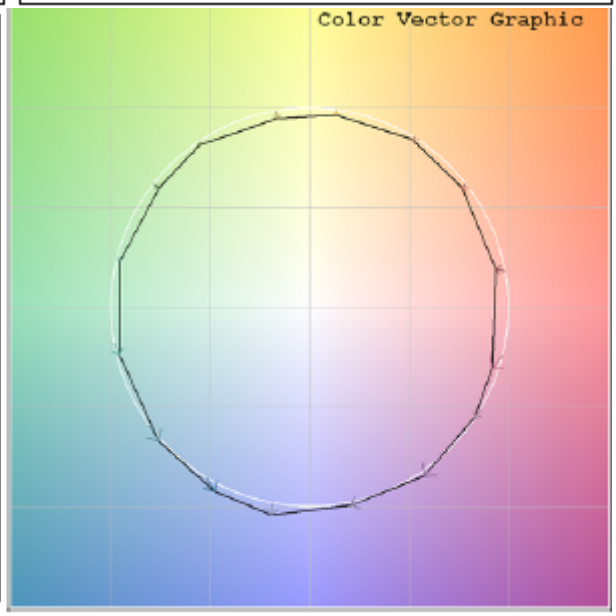

Rf: 90 CCT: 3404 K u': 0.2390
Rg: 98 Duv: -0.0018 v': 0.5108
Test Source
Ref Source
Spectrum
WaveLength (nm)


Rg
Rf


Rf by Hue
Hue Bin
89 92 92 92 93 96 93 95 89 86 87 89 89 87 86 86


Color Vector Graphic

2.1.4 Electrical, Photometric and Chromaticity Measurements

Test date	2021-09-02	**Test Ambient:**	25.3 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	DLC0055(CRLEDFA-6R-24S-9CCT-UNV-WS)	24W 4000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202109020023	120.0	60	0.1882	22.49	0.9964

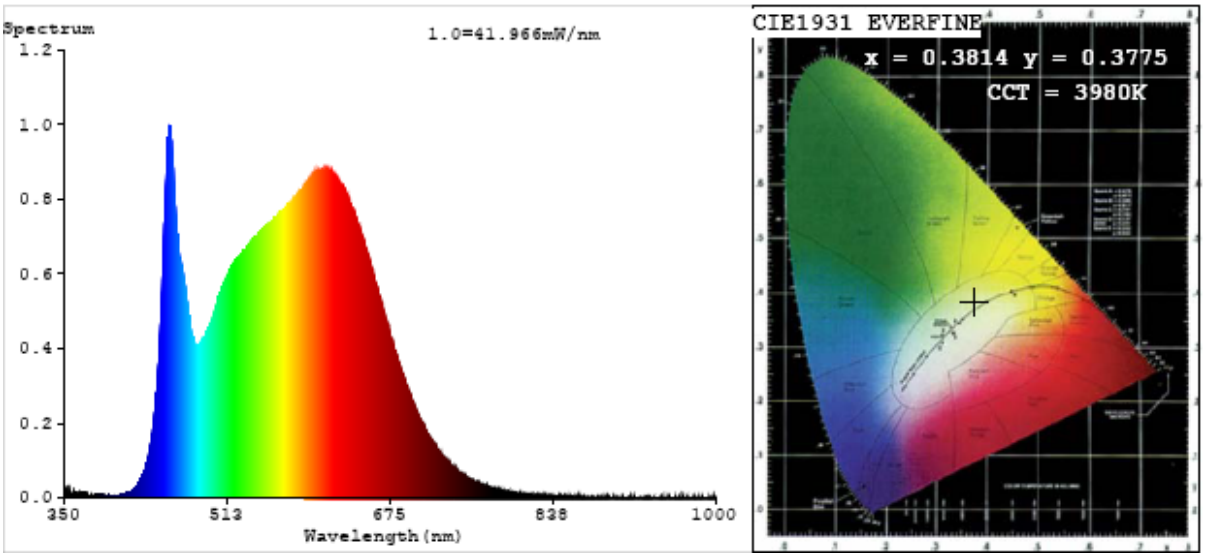
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3980
Duv	0.0001
Chromaticity (x, y)	x=0.3814 y=0.3775
Chromaticity (u', v')	u'=0.2254 v'=0.5021
Color Rendering Index (CRI)	92.9
R9	63
Total Luminous (lm)	2226
Luminous Efficacy (lm/W)	98.99

Special Color Rendering Indices			
R1	94	R9	63
R2	98	R10	94
R3	98	R11	92
R4	91	R12	71
R5	92	R13	96
R6	95	R14	100
R7	92	R15	91
R8	84	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	2218
Luminous Efficacy (lm/W)	98.8

Spectral Power Distribution & Chromaticity Diagram



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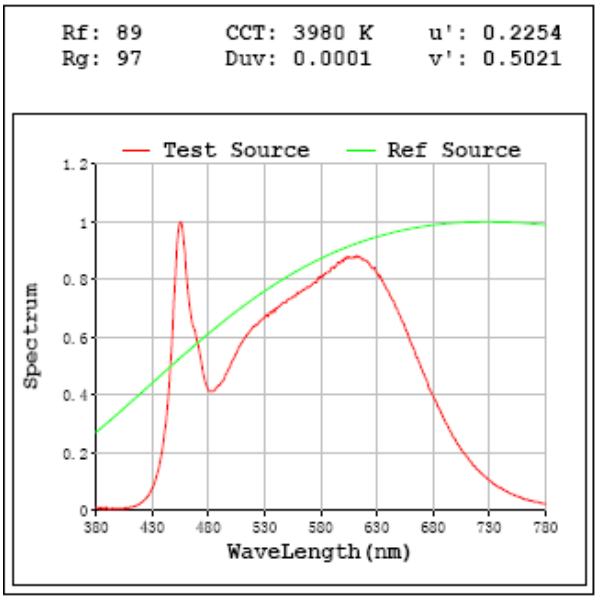
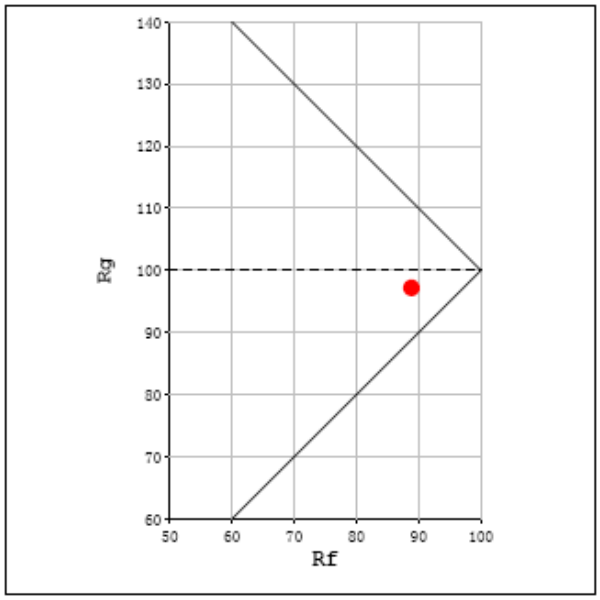
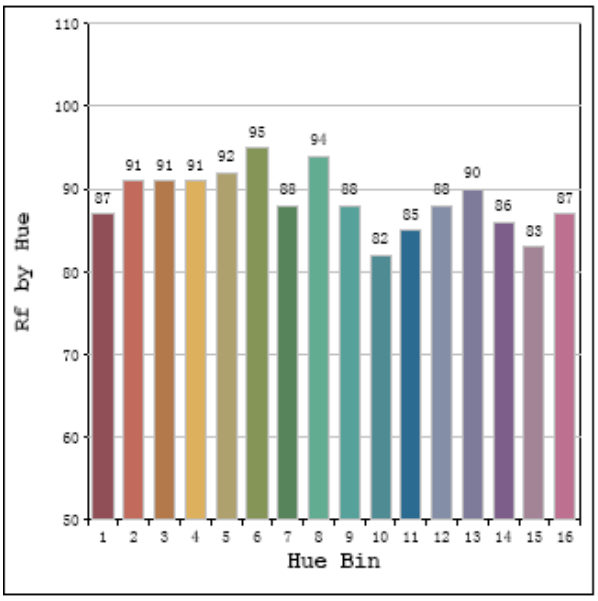
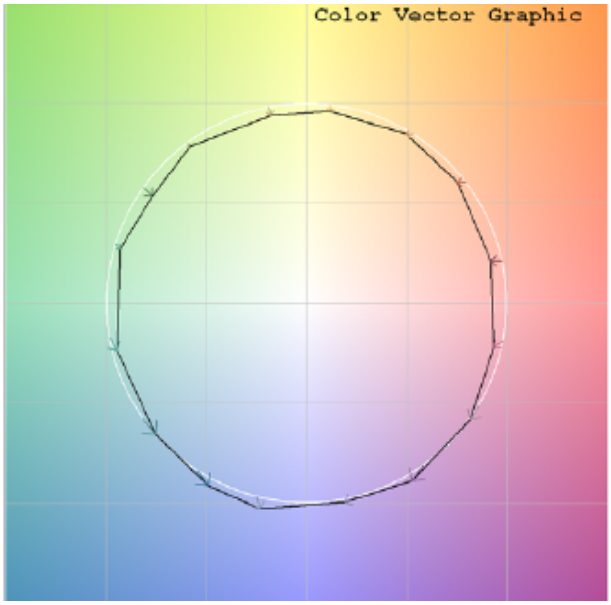


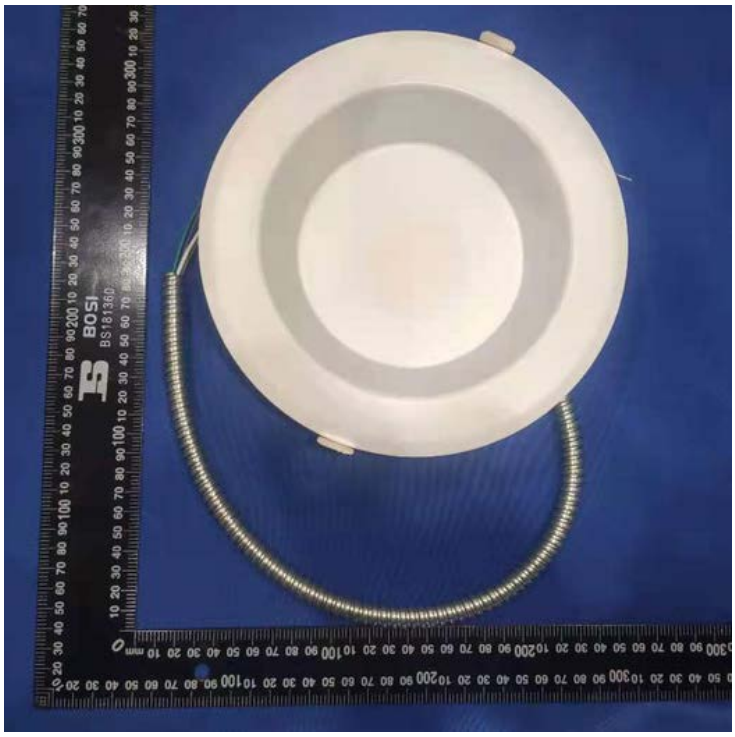






Sample No.	Wattage and CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
DLC0055(CRLEDFA-6R-24S-9CCT-UNV-WS)	15W 2700K setting	120.0	1340	13.05	102.67
		277.0	1347	13.48	99.92
	19W 2700K setting	120.0	1776	17.87	99.37
		277.0	1763	18.02	97.83
	24W 2700K setting	120.0	2021.4	22.3	95.13
		277.0	2077	22.53	92.18
	24W 3000K setting	120.0	2211	22.41	98.66
		277.0	2203	22.39	98.39
	24W 3500K setting	120.0	2272	22.25	102.11
		277.0	2264	22.24	101.8
	24W 4000K setting	120.0	2226	22.49	98.99
		277.0	2218	22.45	98.8

3. Product Photo



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