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):
DLS0103(CRVFAD-14R-20-9CCT-120-BN)

Report Type:	Testing and Report According to IES LM-79-2008
Type of Luminaire:	Downlights
Report Date:	2021-10-12

Prepared By:

Test & Report By:

Engineer: SunFangfang

Review By:

Manager: Huang Qichong

1.1 Rated Values:	
Rated Voltage / Frequency	120Vac, 60 Hz
Nominal Power	20.0W
Rated Initial Lamp Lumen	1400 lm
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	2021-10-12	**Test Ambient:**	25.3 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	DLS0103(CRVFAD-14R-20-9CCT-120-BN)	2700K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120045	120.0	60	0.169	20.00	0.982

Chromaticity Measurement - Sphere-Spectroradiometer Method:

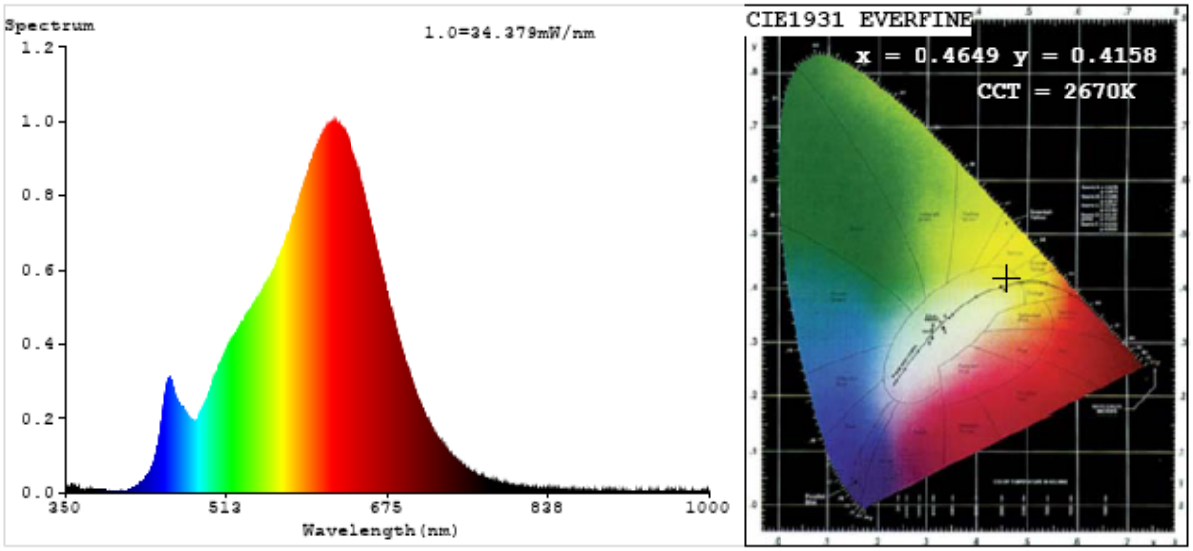
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2670
Duv	0.0015
Chromaticity (x, y)	x=0.4649 y=0.4158
Chromaticity (u', v')	u'=0.2634v'=0.5301
Color Rendering Index (CRI)	91.9
R9	51

Special Color Rendering Indices			
R1	92	R9	51
R2	97	R10	92
R3	99	R11	93
R4	91	R12	84
R5	92	R13	93
R6	97	R14	100
R7	90	R15	86
R8	77	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	1553.9
Luminous Efficacy (lm/W)	77.69
Beam Angle (°)	129.5
Center Beam Candle Power (cd)	371.5

Spectral Power Distribution & Chromaticity Diagram



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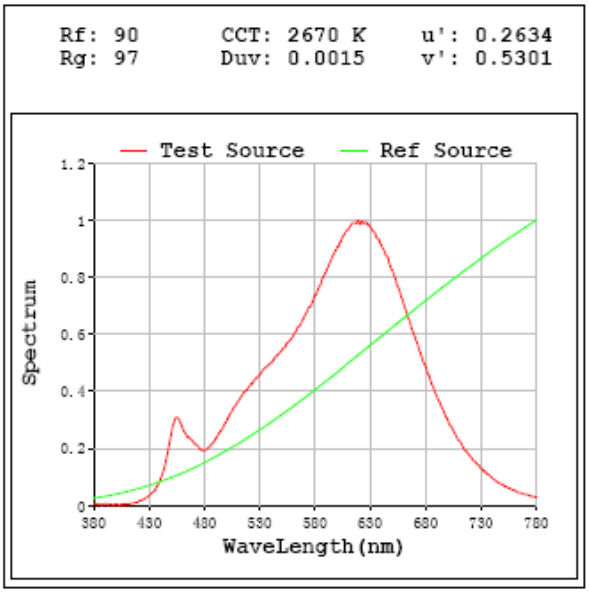
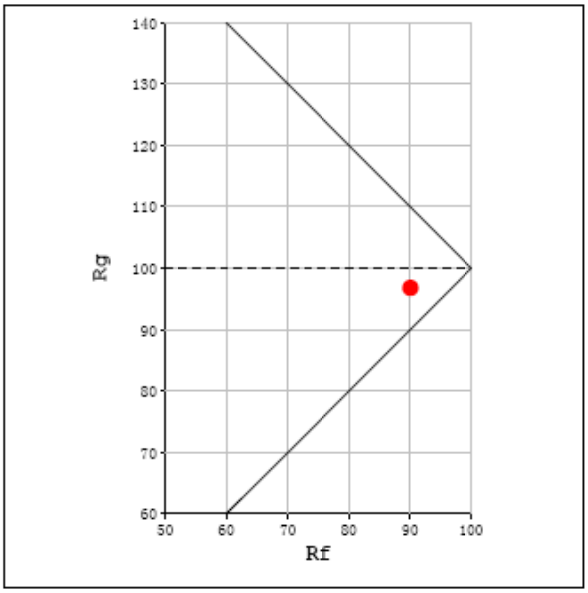
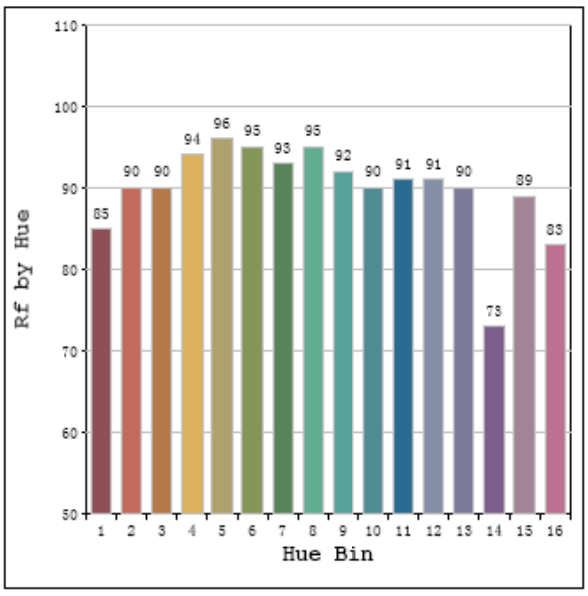
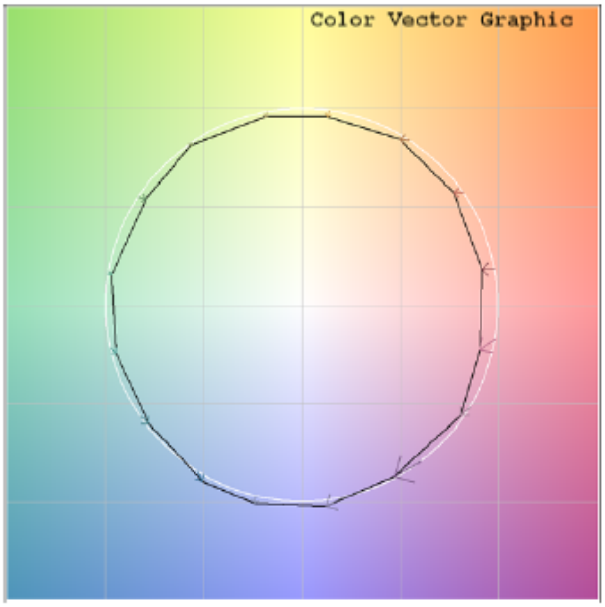






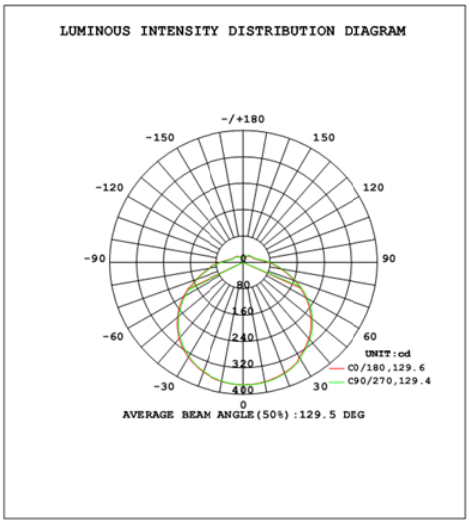


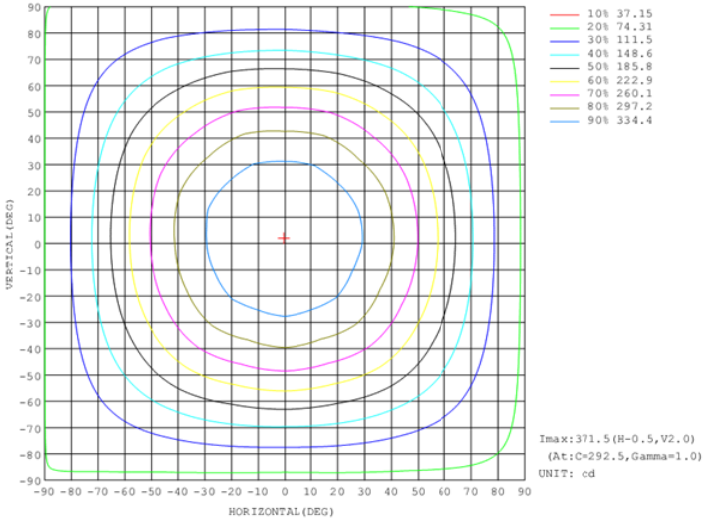
Zonal Lumen Tabulation

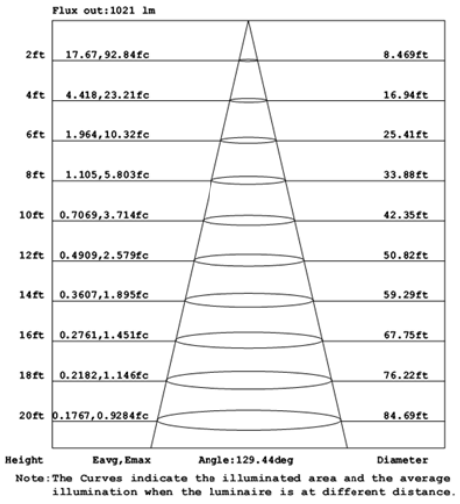
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	297.0	19.1%
0-40	496.0	31.9%
0-60	925.3	59.5%
60-90	419.4	27.0%
70-100	299.7	19.3%
90-120	134.9	8.7%
0-90	1344.6	86.5%
90-180	209.3	13.5%
0-180	1553.9	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	35.3	2.3%	90-100	62.5	4.0%
10-20	102.4	6.6%	100-110	40.8	2.6%
20-30	159.4	10.3%	110-120	31.7	2.0%
30-40	198.9	12.8%	120-130	26.3	1.7%
40-50	217.6	14.0%	130-140	20.2	1.3%
50-60	211.7	13.6%	140-150	14.0	0.9%
60-70	182.2	11.7%	150-160	8.4	0.5%
70-80	139.5	9.0%	160-170	4.2	0.3%
80-90	97.7	6.3%	170-180	1.3	0.1%

Photometric Data







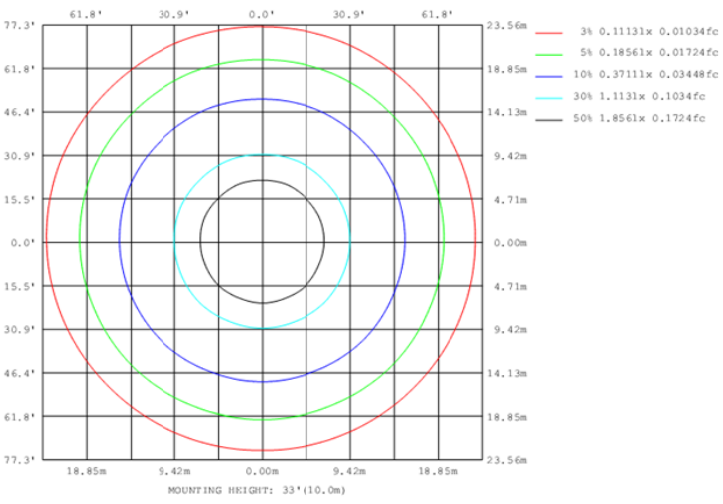


Table--1

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	371	371	371	371	371	371	371	371	371	371	371	371	371	371	371	371			
5	370	370	369	369	369	370	370	370	370	371	371	371	371	371	371	370			
10	367	366	366	365	365	366	366	367	368	368	369	369	369	369	368	368			
15	361	361	360	359	359	360	361	362	363	364	365	365	365	364	364	363			
20	354	353	352	352	351	352	353	355	356	357	359	359	359	358	357	355			
25	344	343	342	342	341	342	343	345	347	349	350	350	351	349	348	346			
30	332	326	329	324	328	325	331	329	331	338	340	340	340	338	334	334			
35	318	312	314	309	313	310	316	315	318	324	322	327	322	325	318	320			
40	301	295	297	292	296	293	299	298	302	309	306	311	306	309	302	303			
45	281	275	277	272	276	273	280	279	283	290	288	293	288	290	283	284			
50	259	253	254	250	253	251	258	258	262	269	268	272	267	269	262	262			
55	235	229	230	226	229	227	233	234	239	246	245	249	245	245	239	238			
60	208	203	204	200	202	202	207	209	214	220	220	223	220	220	213	212			
65	181	177	175	173	173	175	179	182	187	193	194	197	193	193	187	185			
70	152	150	148	148	147	149	151	156	161	164	167	167	166	163	160	156			
75	128	126	124	124	123	125	127	131	136	138	141	141	141	137	135	131			
80	106	104	102	102	101	103	104	108	113	115	118	118	117	114	112	109			
85	86.2	85.0	83.0	82.6	81.5	82.9	84.6	88.0	92.3	94.8	96.8	97.3	96.7	94.1	92.2	88.6			
90	69.0	67.9	66.1	65.6	64.5	65.6	67.0	70.0	74.1	76.5	78.4	79.1	78.5	76.2	74.5	71.2			
95	54.5	53.7	52.2	51.8	50.8	51.5	52.4	55.0	58.5	60.7	62.4	63.0	62.6	60.7	59.3	56.7			
100	43.9	43.1	42.0	41.7	40.9	41.2	41.7	43.5	46.6	48.4	50.0	50.5	50.2	48.7	47.7	45.9			
105	37.0	36.3	35.6	35.4	34.7	34.7	34.9	35.9	38.5	40.1	41.3	41.8	41.7	40.7	40.1	38.7			
110	33.0	32.5	32.0	31.8	31.3	31.2	31.3	32.0	34.0	35.2	36.0	36.7	36.7	36.2	35.7	34.5			
115	30.9	30.4	30.1	30.1	29.9	30.0	30.1	30.3	31.7	32.6	33.2	34.1	34.2	33.8	33.3	32.4			
120	29.9	29.3	28.9	28.7	28.6	28.7	28.8	29.2	30.8	31.7	32.1	32.9	33.1	32.8	32.3	31.3			
125	28.6	28.0	27.5	27.3	27.2	27.3	27.4	27.9	30.0	30.6	31.0	31.7	31.8	31.5	31.0	30.2			
130	27.1	26.5	25.9	25.7	25.7	25.8	25.9	26.4	28.1	29.1	29.7	30.2	30.4	30.1	29.5	28.7			
135	25.3	24.7	24.2	24.0	24.0	24.1	24.2	24.8	26.3	27.3	28.0	28.5	28.8	28.5	27.9	27.1			
140	23.5	22.8	22.3	22.2	22.2	22.3	22.4	23.0	24.5	25.4	26.1	26.6	26.9	26.5	26.0	25.1			
145	21.3	20.7	20.3	20.3	20.3	20.4	20.6	20.9	22.4	23.2	24.0	24.6	24.9	24.5	24.0	23.0			
150	19.2	18.7	18.4	18.4	18.2	18.4	18.6	19.0	20.2	20.9	21.8	22.4	22.8	22.4	21.8	21.0			
155	17.2	16.7	16.4	16.1	16.2	16.4	16.7	17.1	18.1	18.7	19.5	20.0	20.5	20.1	19.6	18.8			
160	15.2	14.9	14.6	14.4	14.4	14.6	15.0	15.3	16.1	16.6	17.2	17.5	18.1	17.9	17.4	16.6			
165	14.0	13.9	13.4	13.4	13.4	13.5	13.7	14.1	14.4	14.7	15.0	15.2	15.7	15.7	15.4	14.9			
170	13.5	13.1	12.9	12.9	12.9	13.0	13.1	13.5	13.3	13.8	14.1	14.2	14.2	14.6	14.3	14.1			
175	13.1	12.6	12.6	12.6	12.7	12.8	12.8	13.0	12.9	13.0	13.4	13.5	13.5	13.5	13.7	13.7			
180	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.8	12.5	12.6	12.6	12.6	12.6	12.7	12.7	12.8			

2.1.2 Electrical, Photometric and Chromaticity Measurements

Test date	2021-10-12	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLS0103(CRVFAD-14R-20-9CCT-120-BN)	3000K	

Electrical Measurement:

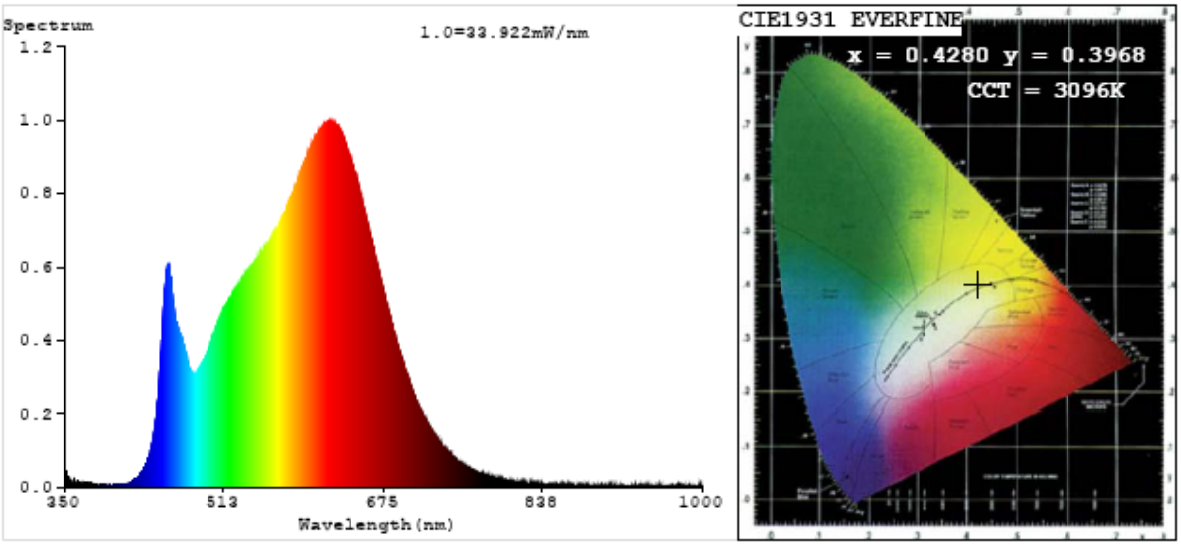
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120045	120.0	60	0.168	19.80	0.981

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3096
Duv	0.0016
Chromaticity (x, y)	x=0.4280 y=0.3968
Chromaticity (u', v')	u'=0.2479 v'=0.5172
Color Rendering Index (CRI)	94.2
R9	67
Total Luminous (lm)	1684.0
Luminous Efficacy (lm/W)	85.05

Special Color Rendering Indices			
R1	96	R9	67
R2	99	R10	98
R3	98	R11	95
R4	94	R12	81
R5	95	R13	98
R6	96	R14	100
R7	91	R15	92
R8	84	--	--

Spectral Power Distribution & Chromaticity Diagram



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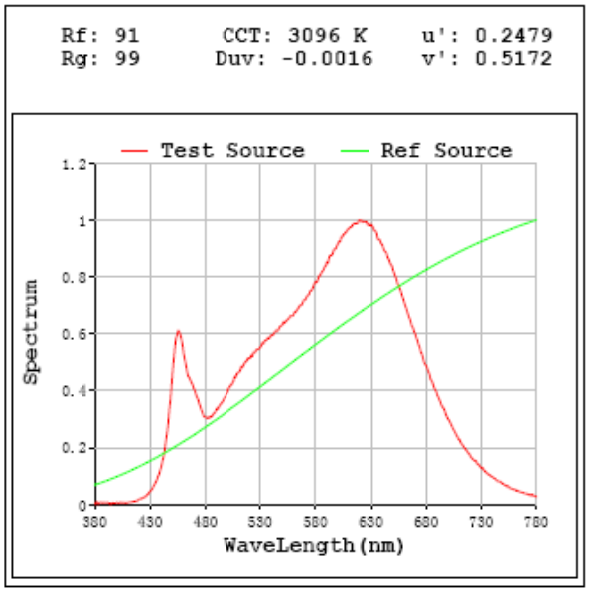
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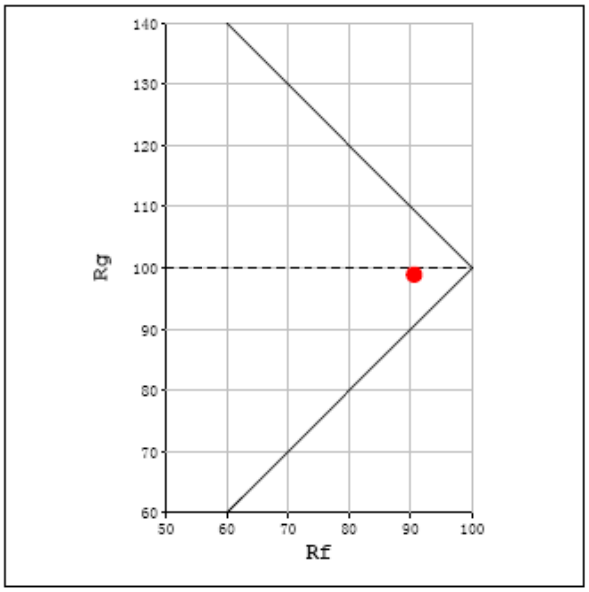
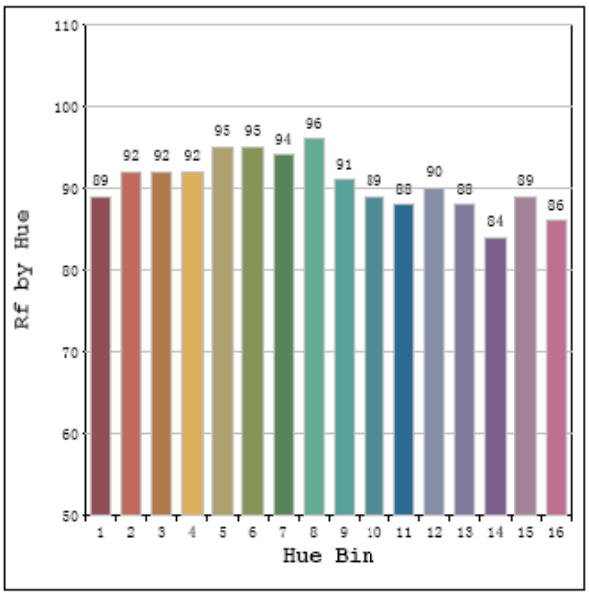
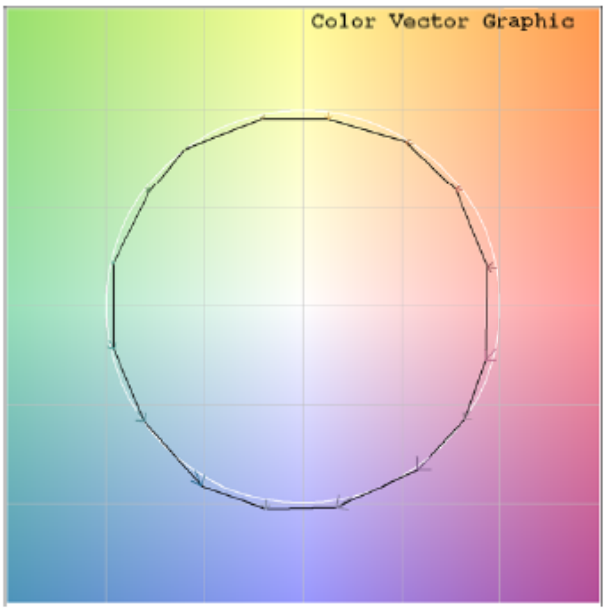
Rg: 99 Duv: -0.0016 v': 0.5172
Test Source
Ref Source
Spectrum
WaveLength(nm)


Rg
Rf


Rf by Hue
Hue Bin
89 92 92 92 95 95 94 96 91 89 88 90 88 84 89 86


Color Vector Graphic

2.1.3 Electrical, Photometric and Chromaticity Measurements

Test date	2021-10-12	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLS0103(CRVFAD-14R-20-9CCT-120-BN)	3500K	

Electrical Measurement:

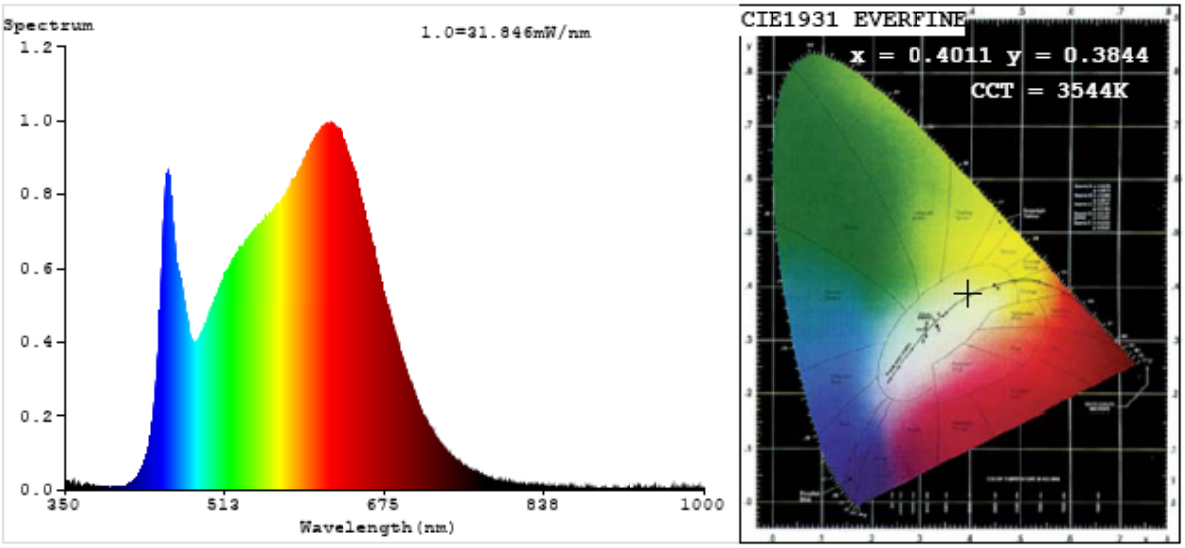
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120045	120.0	60	0.164	19.27	0.980

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3544
Duv	0.0018
Chromaticity (x, y)	x=0.4011 y=0.3844
Chromaticity (u', v')	u'=0.2355 v'=0.5080
Color Rendering Index (CRI)	95.2
R9	75
Total Luminous (lm)	1740.0
Luminous Efficacy (lm/W)	90.27

Special Color Rendering Indices			
R1	97	R9	75
R2	99	R10	99
R3	98	R11	96
R4	94	R12	77
R5	96	R13	99
R6	96	R14	100
R7	93	R15	95
R8	88	--	--

Spectral Power Distribution & Chromaticity Diagram



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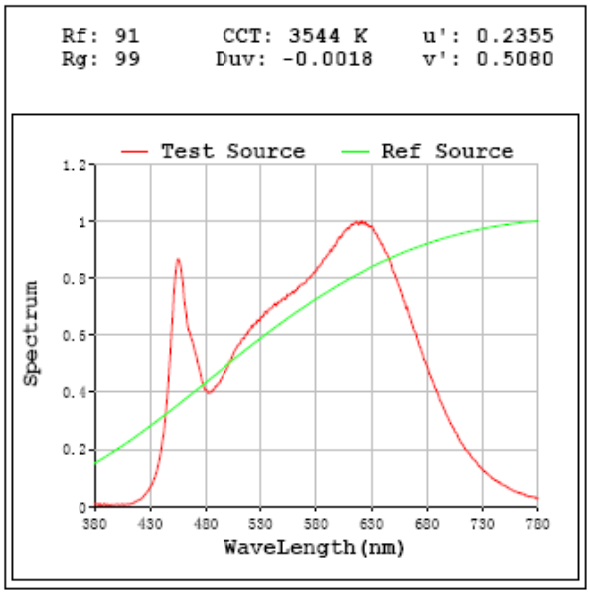
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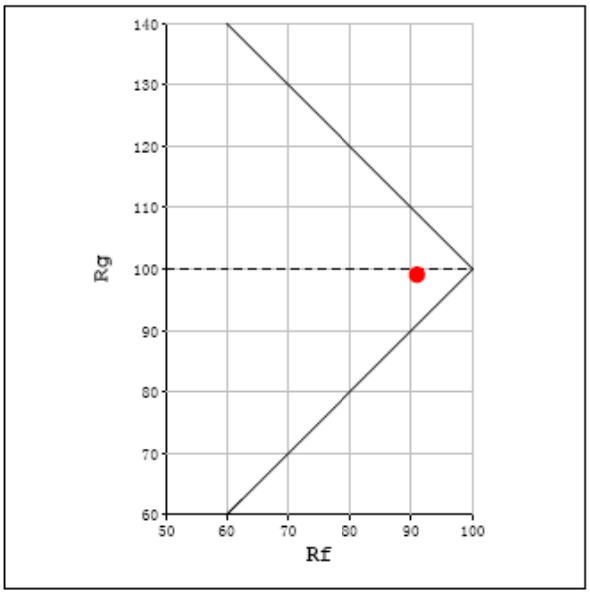
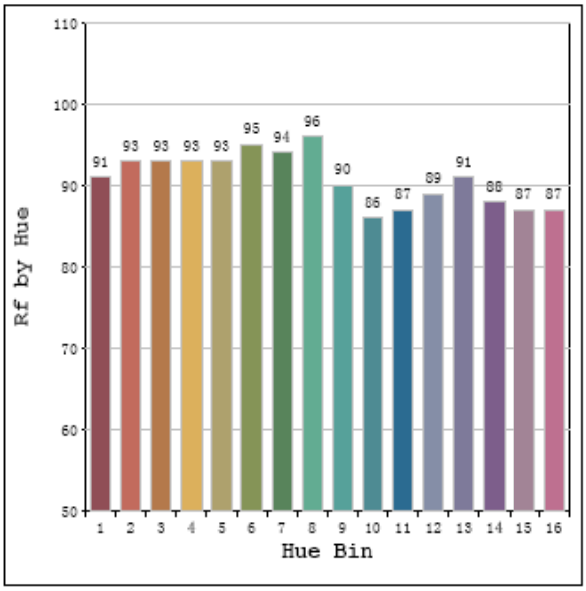
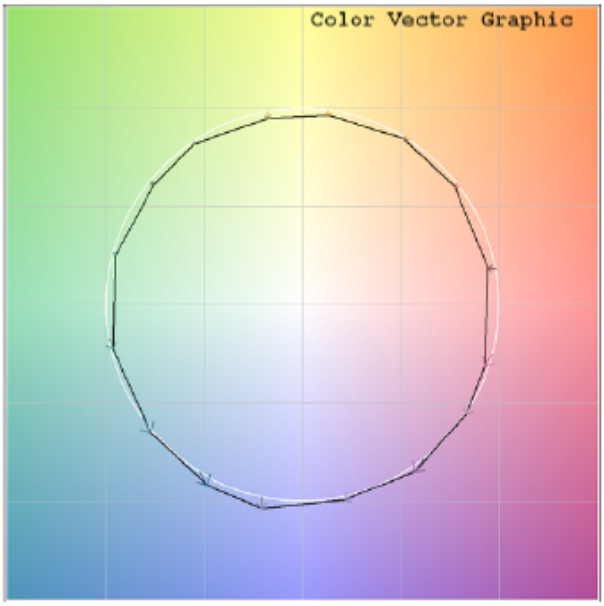
Rg: 99 Duv: -0.0018 v': 0.5080
Test Source
Ref Source
Spectrum
WaveLength(nm)


Rg
Rf


Rf by Hue
Hue Bin
91 93 93 93 93 95 94 96 90 86 87 89 91 88 87 87


Color Vector Graphic

2.1.4 Electrical, Photometric and Chromaticity Measurements

Test date	2021-10-12	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLS0103(CRVFAD-14R-20-9CCT-120-BN)	4000K	

Electrical Measurement:

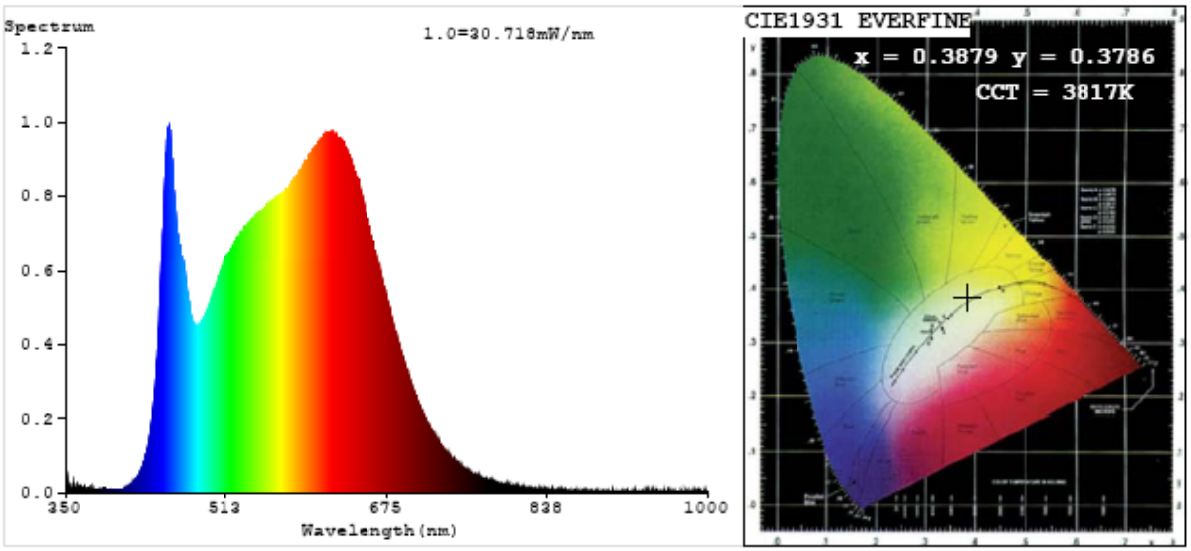
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120045	120.0	60	0.166	19.55	0.980

Chromaticity Measurement - Sphere-Spectroradiometer Method:

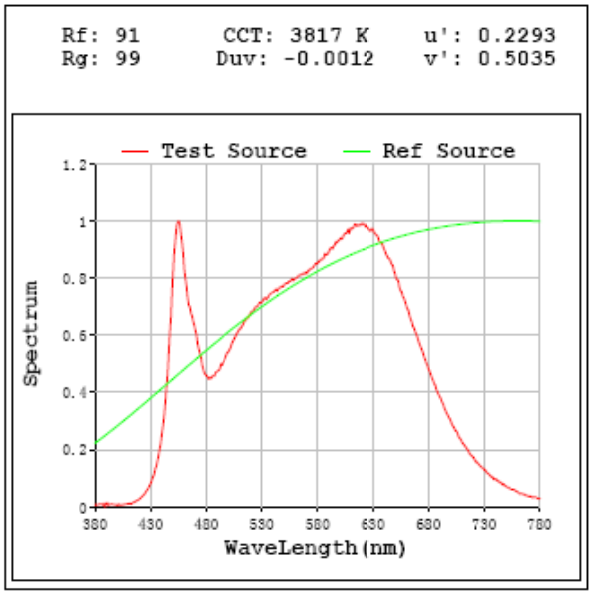
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3817
Duv	0.0012
Chromaticity (x, y)	x=0.3879y=0.3786
Chromaticity (u', v')	u'=0.2293 v'=0.5035
Color Rendering Index (CRI)	95.3
R9	77
Total Luminous (lm)	1737.0
Luminous Efficacy (lm/W)	88.82

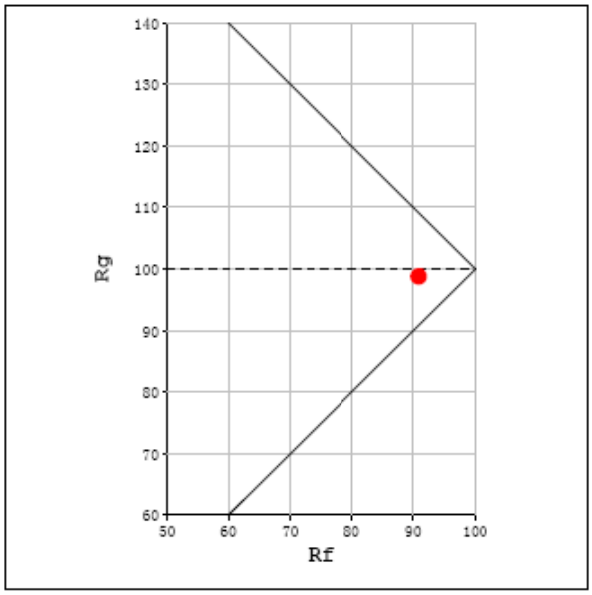
Special Color Rendering Indices			
R1	97	R9	77
R2	100	R10	98
R3	99	R11	95
R4	94	R12	75
R5	95	R13	99
R6	96	R14	100
R7	93	R15	95
R8	89	--	--

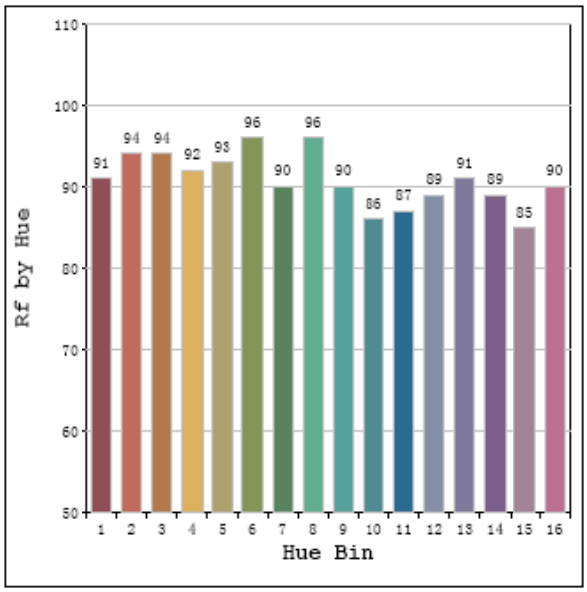
Spectral Power Distribution & Chromaticity Diagram

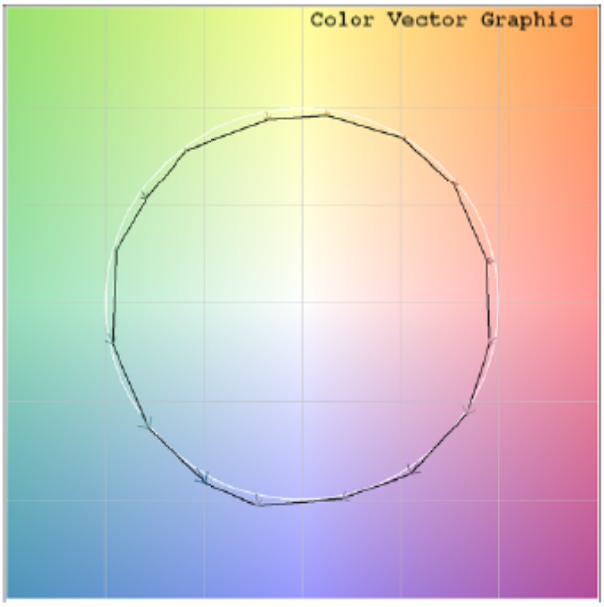


TM30


Rf: 91 CCT: 3817 K u': 0.2293
Rg: 99 Duv: -0.0012 v': 0.5035
Test Source
Ref Source
Spectrum
WaveLength(nm)


Rg
Rf


Rf by Hue
Hue Bin
91 94 94 92 93 96 90 96 90 86 87 89 91 89 85 90


Color Vector Graphic

2.1.5 Electrical, Photometric and Chromaticity Measurements

Test date	2021-10-12	**Test Ambient:**	25.3 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	DLS0103(CRVFAD-14R-20-9CCT-120-BN)	5000K	

Electrical Measurement:

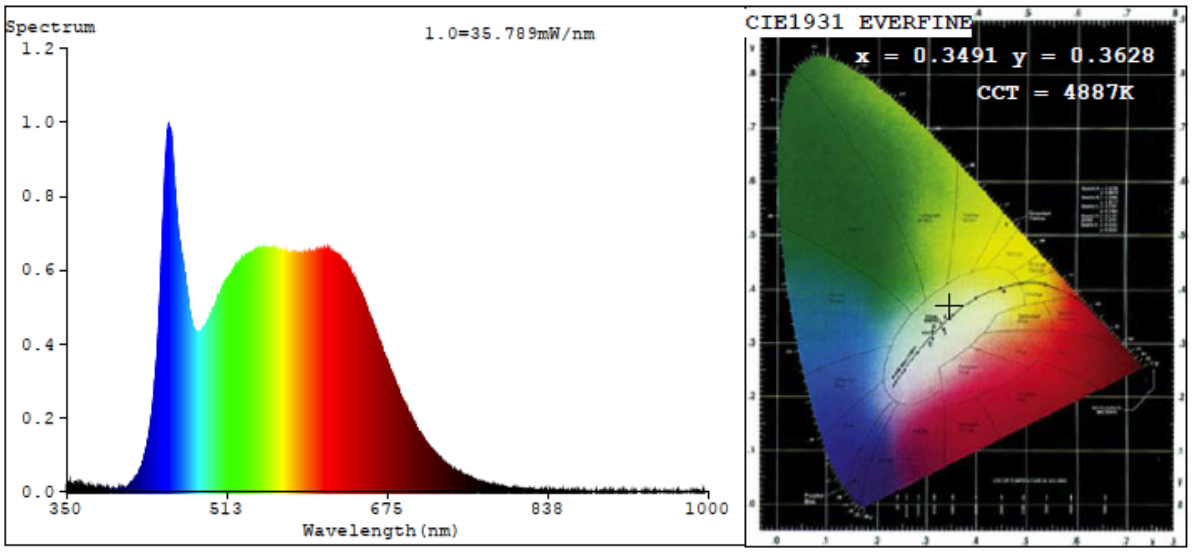
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120045	120.0	60	0.169	19.93	0.981

Chromaticity Measurement - Sphere-Spectroradiometer Method:

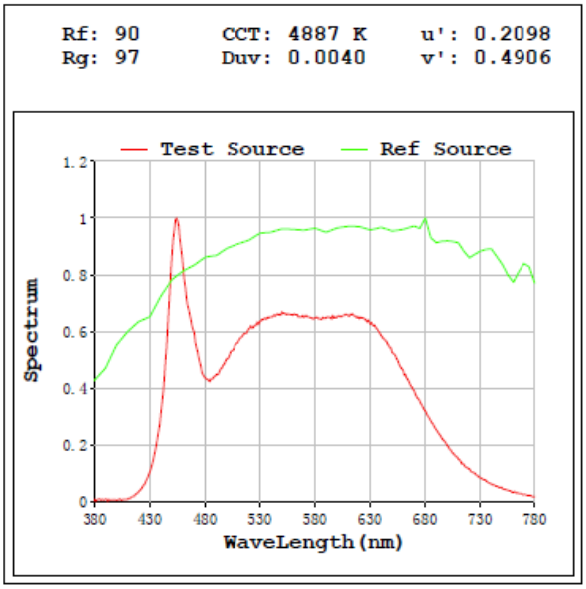
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	4887
Duv	0.0040
Chromaticity (x, y)	x=0.3491y=0.3628
Chromaticity (u', v')	u'=0.2098 v'=0.4906
Color Rendering Index (CRI)	93.3
R9	71
Total Luminous (lm)	1622.0
Luminous Efficacy (lm/W)	81.37

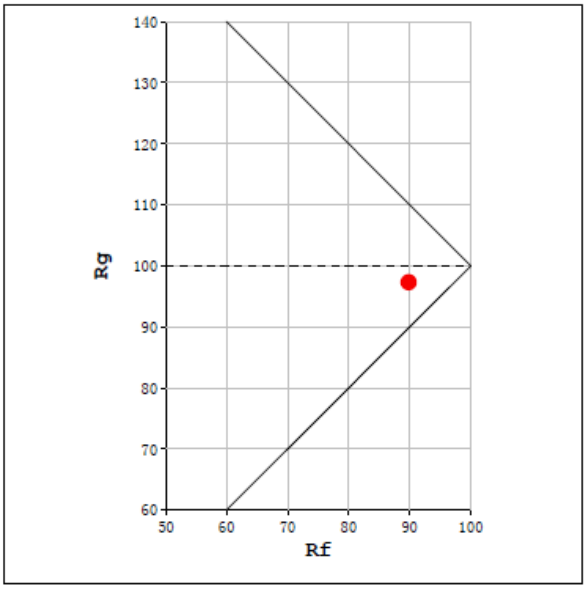
Special Color Rendering Indices			
R1	94	R9	71
R2	97	R10	92
R3	98	R11	91
R4	90	R12	67
R5	92	R13	95
R6	94	R14	99
R7	94	R15	91
R8	88	--	--

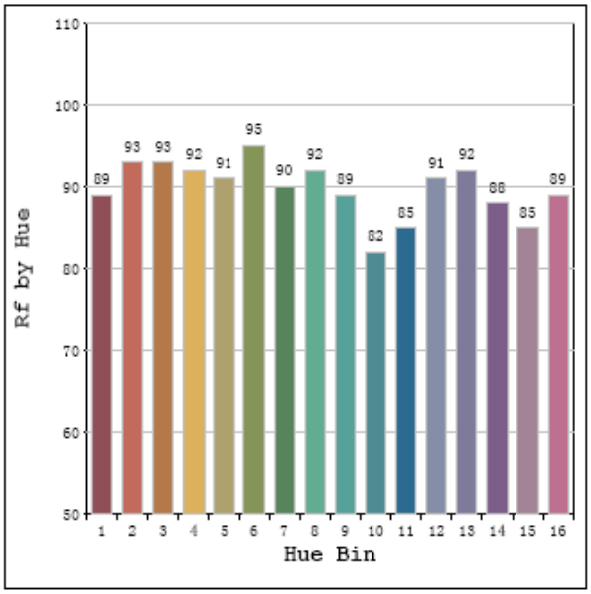
Spectral Power Distribution & Chromaticity Diagram

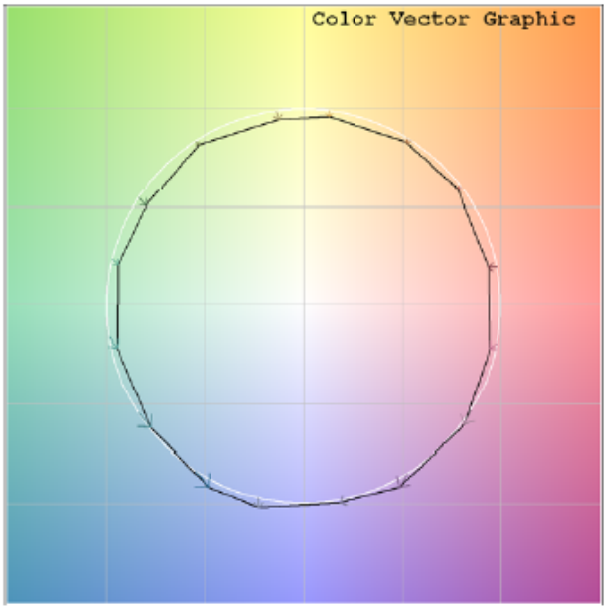


TM30



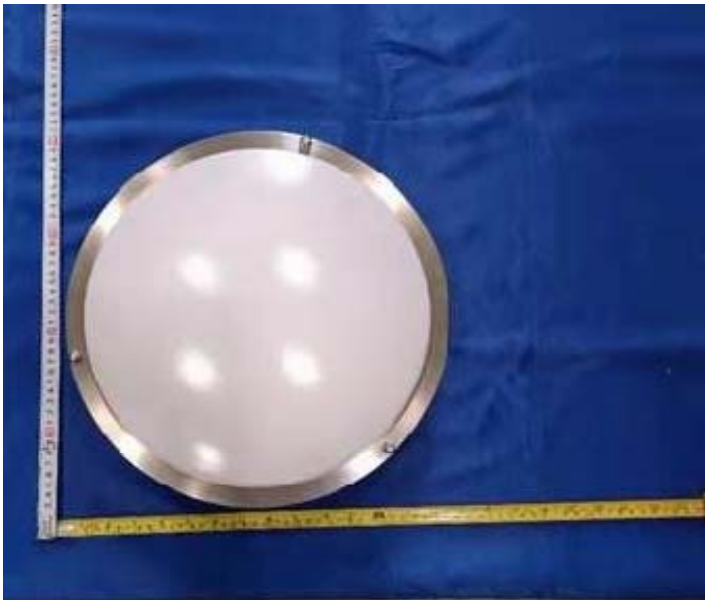


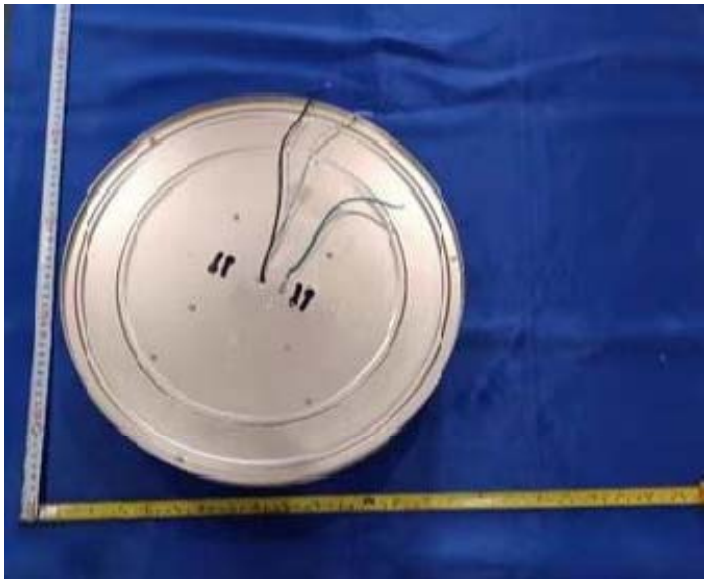




Sample No.	Wattage and CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
DLS0103(CRVFAD-14R-20-9CCT-120-BN)	2700K setting	120.0	1553.9	20.00	77.69
	3000K setting	120.0	1684.0	19.80	85.05
	3500K setting	120.0	1740.0	19.27	90.27
	4000K setting	120.0	1737.0	19.55	88.82
	5000K setting	120.0	1622.0	19.93	81.37

3. Product Photo





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