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): DLS0106(CRVFAD-14R-20-9CCT-UNV-BN/MVS)

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	120V-277Vac, 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	DLS0106(CRVFAD-14R-20-9CCT-UNV-BN/MVS)	2700K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120048	120.0	60	0.170	20.30	0.997

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2681
Duv	0.0016
Chromaticity (x, y)	x=0.4642 y=0.4159
Chromaticity (u', v')	u'=0.2629v'=0.5300
Color Rendering Index (CRI)	92.0
R9	51

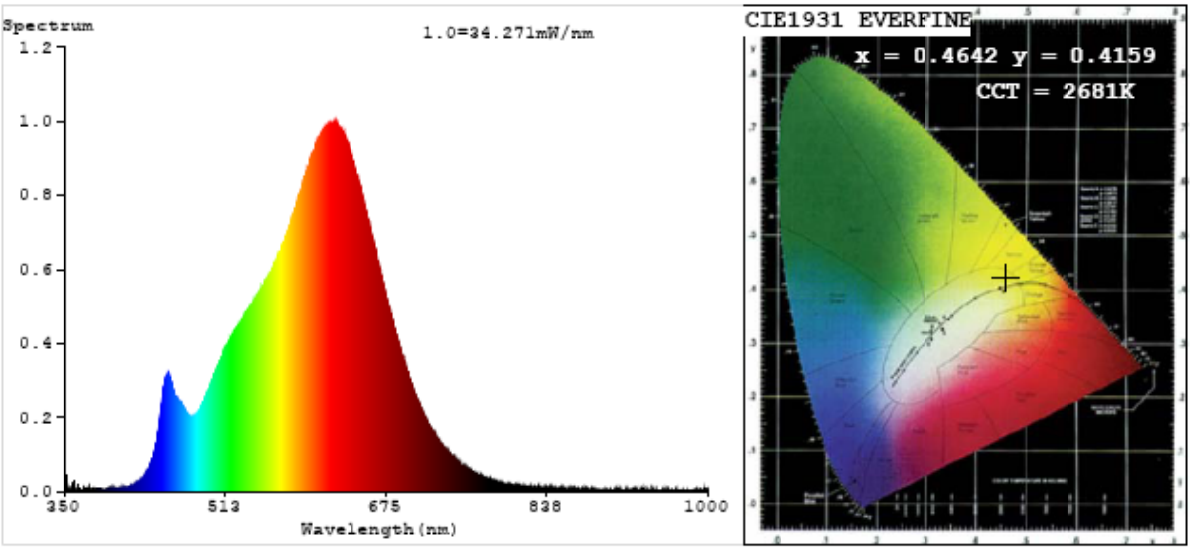
Special Color Rendering Indices			
R1	92	R9	51
R2	97	R10	92
R3	99	R11	93
R4	92	R12	84
R5	92	R13	93
R6	97	R14	100
R7	90	R15	86
R8	78	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	1553.3
Luminous Efficacy (lm/W)	76.52
Beam Angle (°)	127.8
Center Beam Candle Power (cd)	378.9

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1554.0
Luminous Efficacy (lm/W)	74.94

Spectral Power Distribution & Chromaticity Diagram



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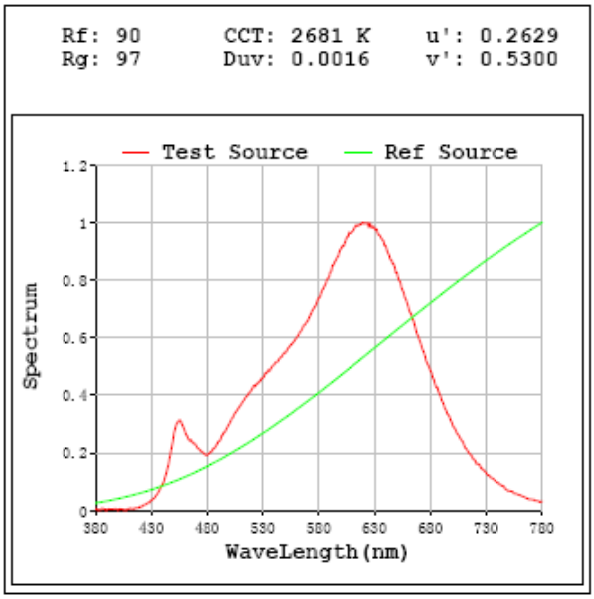
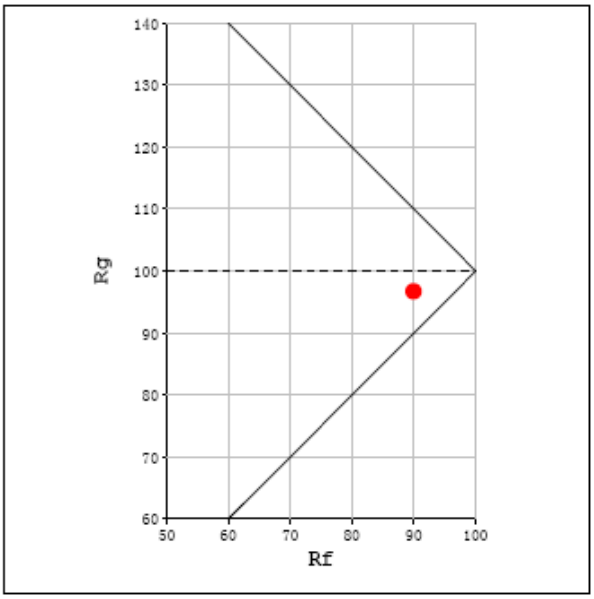
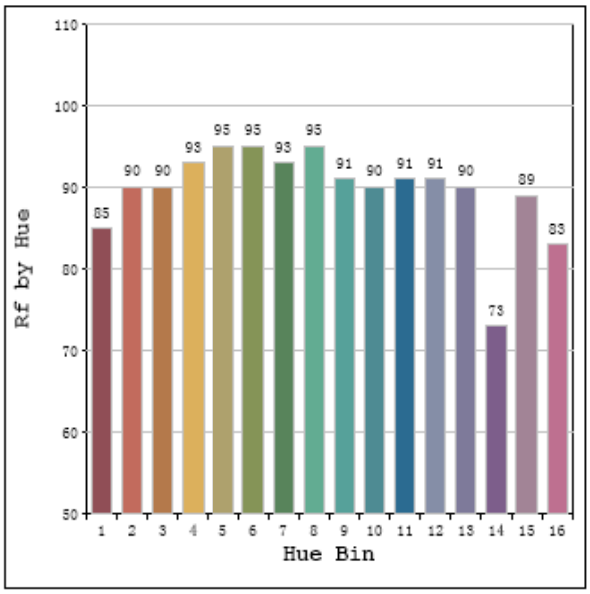
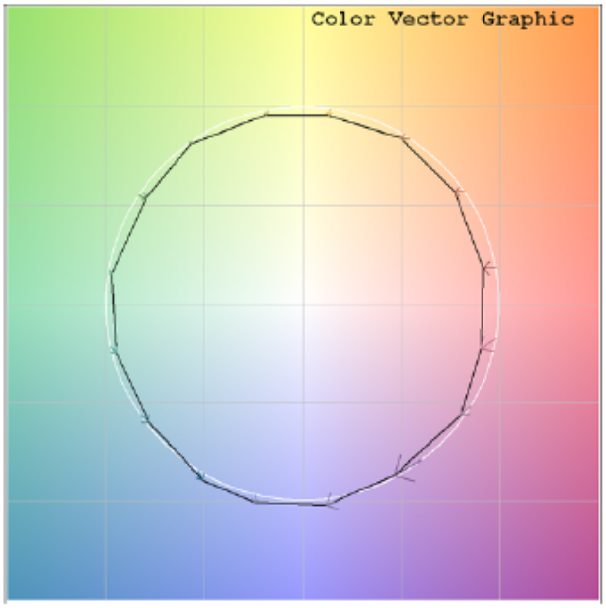






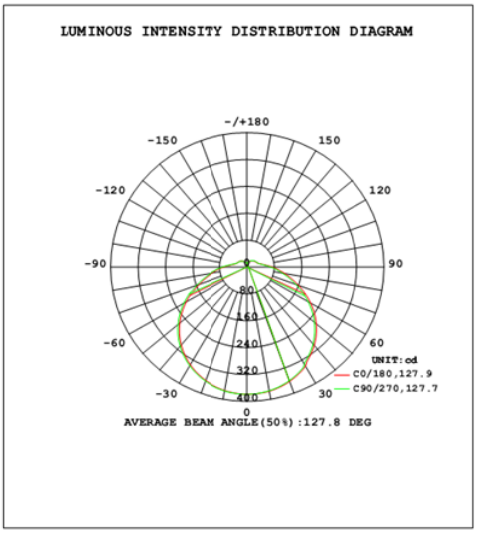


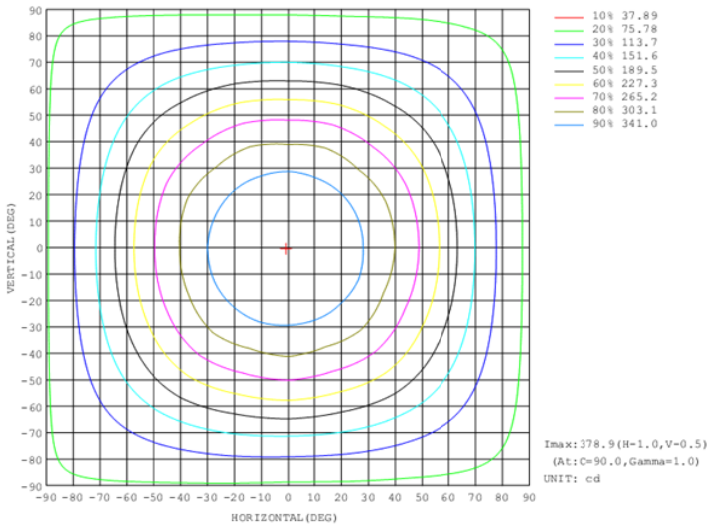
Zonal Lumen Tabulation

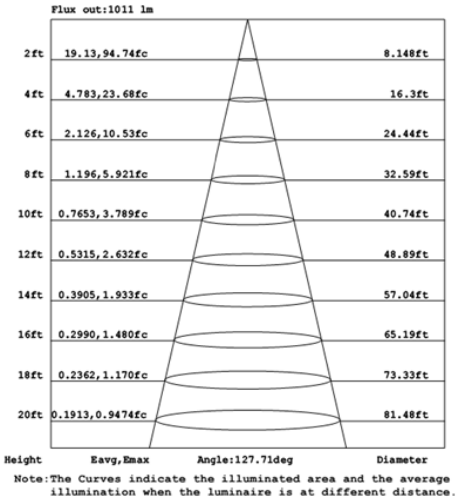
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	301.9	19.4%
0-40	502.9	32.4%
0-60	933.4	60.1%
60-90	415.0	26.7%
70-100	295.0	19.0%
90-120	132.1	8.5%
0-90	1348.4	86.8%
90-180	204.9	13.2%
0-180	1553.3	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	35.9	2.3%	90-100	61.2	3.9%
10-20	104.2	6.7%	100-110	39.9	2.6%
20-30	161.8	10.4%	110-120	31.0	2.0%
30-40	200.9	12.9%	120-130	25.6	1.7%
40-50	218.8	14.1%	130-140	19.7	1.3%
50-60	211.8	13.6%	140-150	13.7	0.9%
60-70	181.1	11.7%	150-160	8.3	0.5%
70-80	137.9	8.9%	160-170	4.1	0.3%
80-90	96.0	6.2%	170-180	1.3	0.1%

Photometric Data







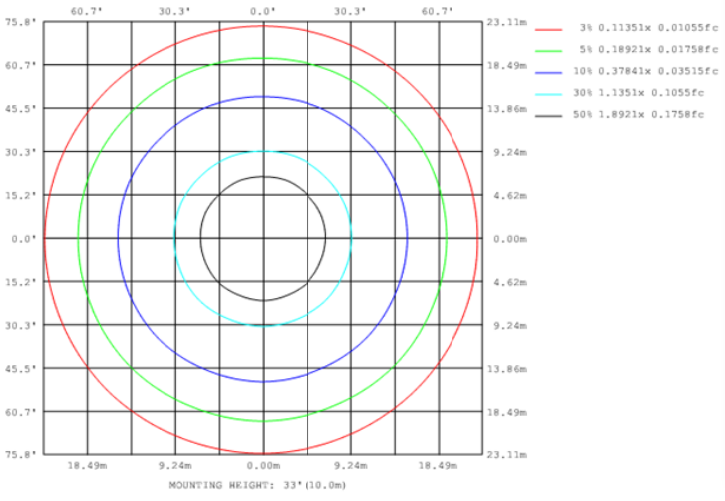


Table--1 UNIT: cd

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	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379			
5	377	377	377	378	378	378	378	378	378	378	378	378	377	377	377	377			
10	374	374	374	374	375	375	375	375	375	375	374	374	374	374	373	373			
15	368	368	368	369	369	370	370	370	370	369	369	369	368	367	368	367			
20	359	360	360	361	361	362	362	362	363	362	361	361	360	359	359	359			
25	349	350	350	351	352	353	352	353	353	352	351	350	350	349	349	349			
30	336	335	337	336	339	341	341	341	341	339	336	338	335	336	331	335			
35	321	317	322	319	325	321	326	322	321	325	319	322	317	320	316	320			
40	303	299	305	302	308	305	309	305	305	308	302	304	299	302	298	302			
45	282	280	285	283	288	285	290	286	285	287	282	284	279	281	278	282			
50	259	257	262	261	266	264	268	264	263	265	260	261	256	259	255	259			
55	234	233	238	237	242	240	244	240	240	241	235	236	232	234	230	234			
60	208	207	211	211	216	214	218	215	214	214	209	210	205	207	204	207			
65	179	180	184	184	188	187	190	188	187	187	182	182	178	178	177	178			
70	151	153	154	157	158	160	160	160	160	157	155	153	151	150	150	150			
75	126	128	129	132	133	135	135	135	134	132	130	128	127	125	126	126			
80	104	106	107	109	110	112	112	112	112	109	108	106	105	104	104	104			
85	84.5	85.7	86.6	88.8	89.3	91.1	91.0	91.1	91.2	89.2	87.9	86.4	85.6	84.6	84.9	84.0			
90	67.1	68.1	69.0	71.0	71.4	73.1	73.1	73.1	73.3	71.6	70.5	69.4	68.9	67.6	67.5	66.6			
95	52.9	53.6	54.3	55.9	56.3	57.7	57.6	57.7	58.0	56.8	56.0	55.3	54.8	53.7	53.5	52.7			
100	42.4	42.7	43.1	44.5	44.9	45.9	45.8	45.7	46.3	45.6	45.2	44.8	44.5	43.6	43.2	42.5			
105	35.7	35.5	35.8	36.9	37.2	38.0	37.7	37.5	38.4	38.2	38.1	38.1	37.8	37.2	36.7	35.8			
110	32.1	31.8	31.9	32.6	32.6	33.1	32.9	32.7	33.7	33.8	33.9	34.2	34.2	33.7	33.3	32.3			
115	30.9	30.5	30.2	30.2	30.0	30.3	30.3	30.4	31.5	31.7	31.9	32.3	32.3	32.1	31.9	31.3			
120	29.6	29.2	28.9	29.0	28.8	29.0	29.0	29.2	30.3	30.6	30.8	31.1	31.2	30.9	30.7	30.1			
125	28.1	27.8	27.6	27.7	27.5	27.7	27.7	27.8	29.0	29.2	29.5	29.8	29.8	29.6	29.3	28.8			
130	26.7	26.4	26.1	26.2	26.2	26.3	26.3	26.4	27.5	27.8	28.0	28.3	28.4	28.0	27.8	27.3			
135	24.9	24.7	24.6	24.6	24.7	24.8	24.7	24.8	25.8	26.1	26.4	26.6	26.7	26.3	26.0	25.5			
140	23.1	22.9	22.8	23.0	23.0	23.1	23.0	23.1	24.0	24.2	24.5	24.7	24.8	24.5	24.1	23.7			
145	21.0	21.0	21.0	21.2	21.3	21.4	21.2	21.1	22.0	22.2	22.5	22.8	22.9	22.5	22.2	21.6			
150	19.0	19.0	19.1	19.3	19.3	19.5	19.3	19.2	19.9	20.0	20.5	20.7	21.0	20.5	20.1	19.7			
155	17.0	17.1	17.3	17.2	17.4	17.6	17.5	17.3	17.9	17.9	18.2	18.5	18.8	18.4	18.0	17.7			
160	15.2	15.3	15.1	15.4	15.5	15.7	15.7	15.5	15.9	15.9	16.0	16.2	16.6	16.4	16.1	15.7			
165	14.1	13.9	13.8	13.9	13.9	14.0	14.3	14.3	14.6	14.5	14.6	14.6	14.9	15.1	14.8	14.4			
170	13.5	13.1	13.2	13.2	13.3	13.3	13.6	13.7	13.8	13.9	14.0	14.0	13.9	14.2	14.2	13.8			
175	12.9	12.9	12.9	12.9	12.9	12.9	13.1	13.3	13.0	13.4	13.5	13.5	13.4	13.3	13.3	13.2			
180	12.6	12.6	12.7	12.7	12.7	12.7	12.7	12.7	12.6	12.6	12.7	12.7	12.7	12.7	12.7	12.7			

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	DLS0106(CRVFAD-14R-20-9CCT-UNV-BN/MVS)	3000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120048	120.0	60	0.169	20.17	0.997

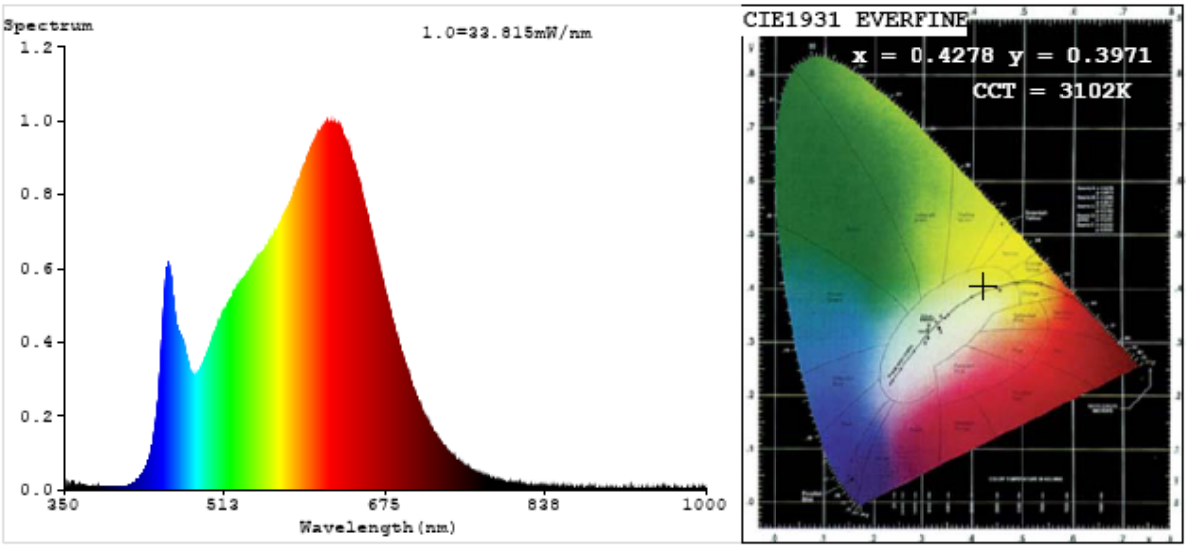
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3102
Duv	0.0015
Chromaticity (x, y)	x=0.4278 y=0.3971
Chromaticity (u', v')	u'=0.2477 v'=0.5172
Color Rendering Index (CRI)	94.2
R9	67
Total Luminous (lm)	1688.0
Luminous Efficacy (lm/W)	83.68

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	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1686.0
Luminous Efficacy (lm/W)	82.36

Spectral Power Distribution & Chromaticity Diagram



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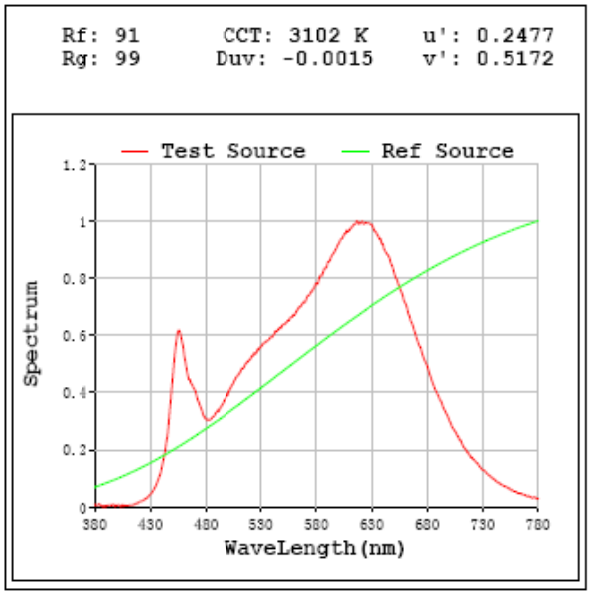
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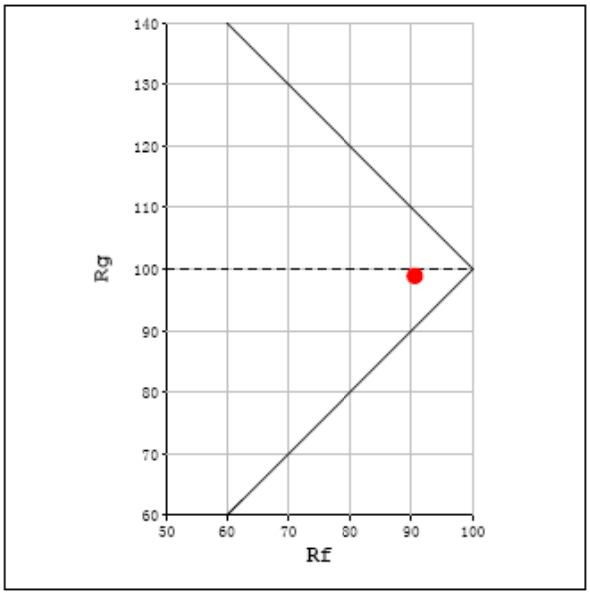
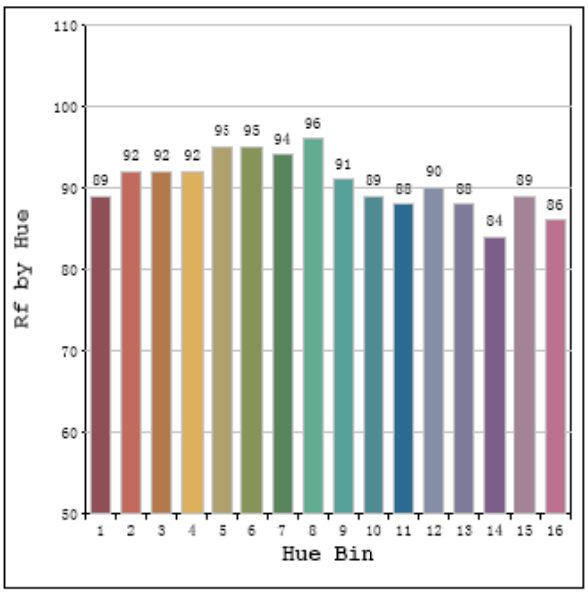
Rg: 99 Duv: -0.0015 v': 0.5172
Test Source
Ref Source
Spectrum
WaveLength(nm)


Rg
Rf


Rf by Hue
Hue Bin
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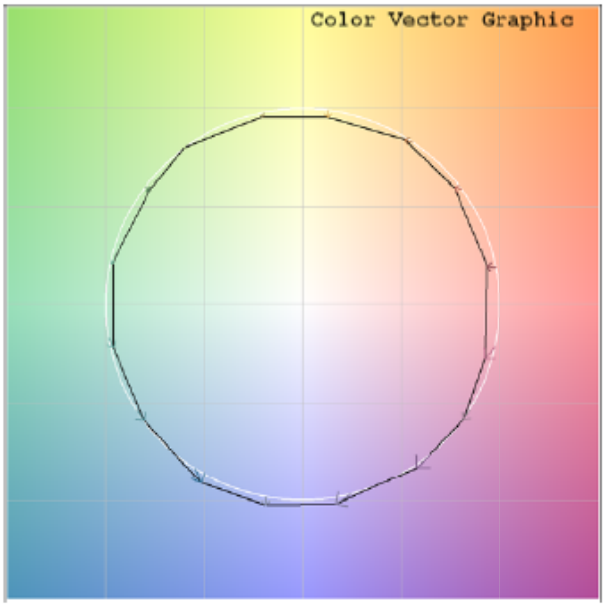

Color Vector Graphic

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	DLS0106(CRVFAD-14R-20-9CCT-UNV-BN/MVS)	3500K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120048	120.0	60	0.164	19.63	0.997

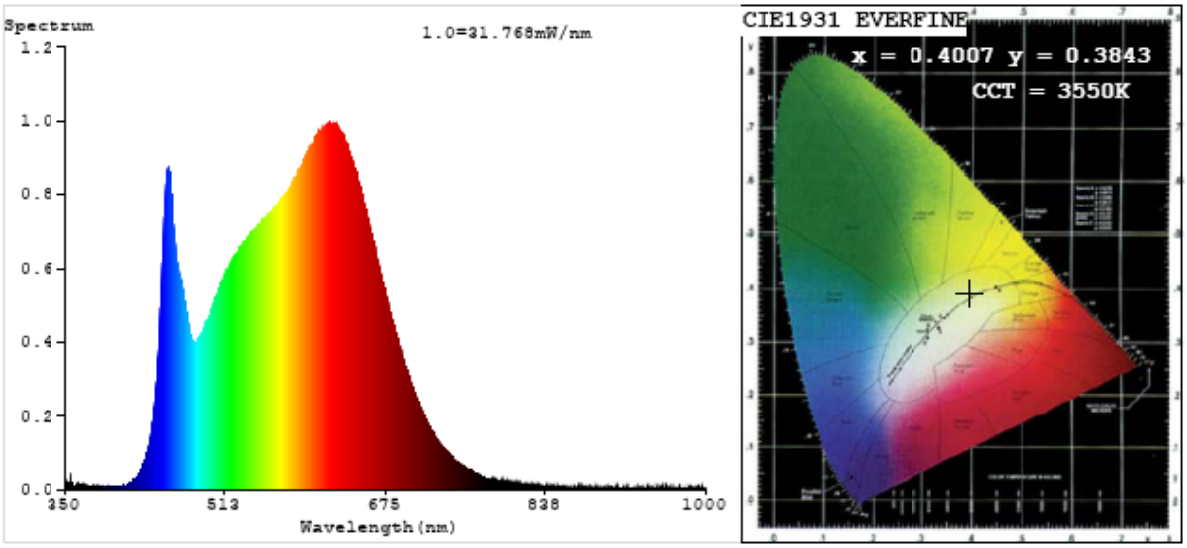
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3550
Duv	0.0018
Chromaticity (x, y)	x=0.4007 y=0.3843
Chromaticity (u', v')	u'=0.2354 v'=0.5079
Color Rendering Index (CRI)	95.2
R9	75
Total Luminous (lm)	1741.0
Luminous Efficacy (lm/W)	88.71

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	--	--

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1747.0
Luminous Efficacy (lm/W)	87.46

Spectral Power Distribution & Chromaticity Diagram



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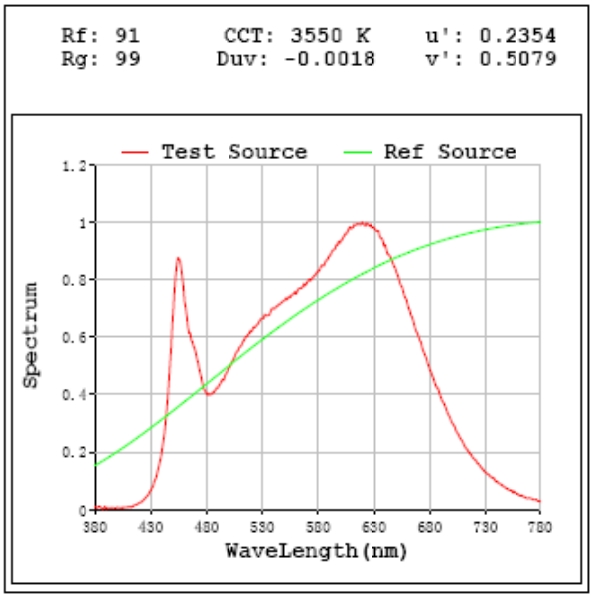
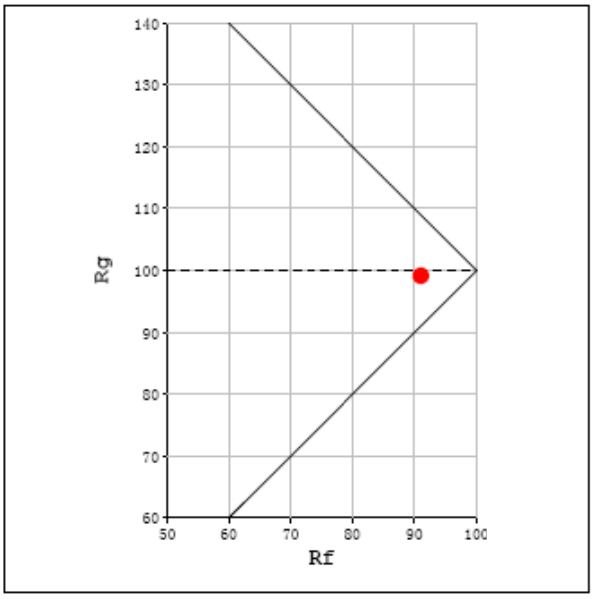
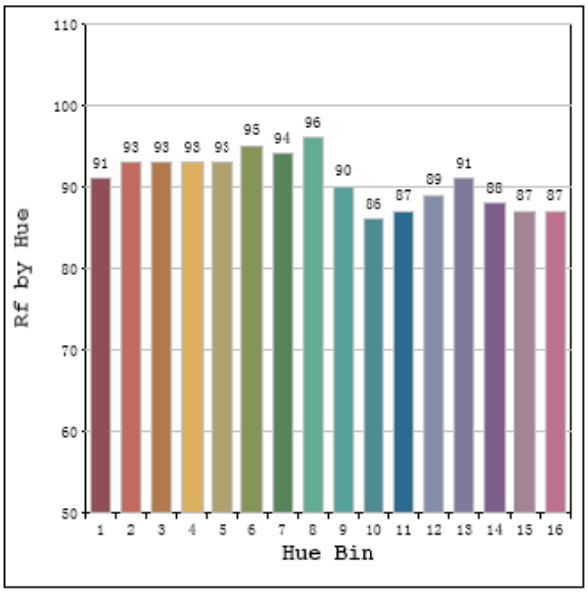
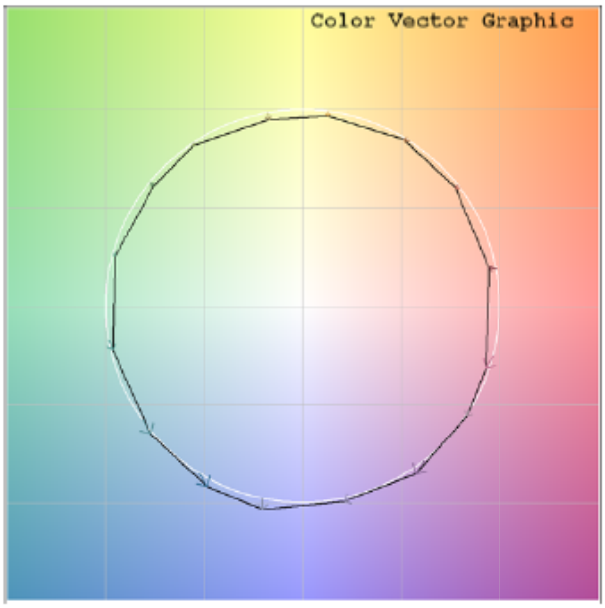

Rf: 91 CCT: 3550 K u': 0.2354
Rg: 99 Duv: -0.0018 v': 0.5079
Test Source
Ref Source
Spectrum
WaveLength(nm)


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 ℃
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLS0106(CRVFAD-14R-20-9CCT-UNV-BN/MVS)	4000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120048	120.0	60	0.166	19.90	0.997

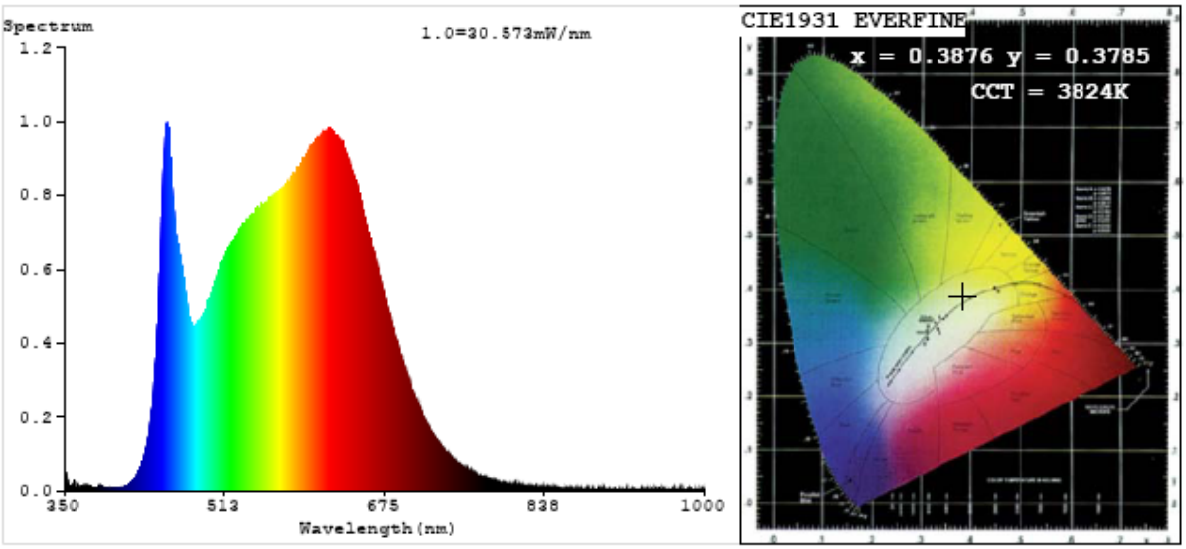
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3824
Duv	0.0012
Chromaticity (x, y)	x=0.3876y=0.3785
Chromaticity (u', v')	u'=0.2291 v'=0.5034
Color Rendering Index (CRI)	95.3
R9	77
Total Luminous (lm)	1739.0
Luminous Efficacy (lm/W)	87.37

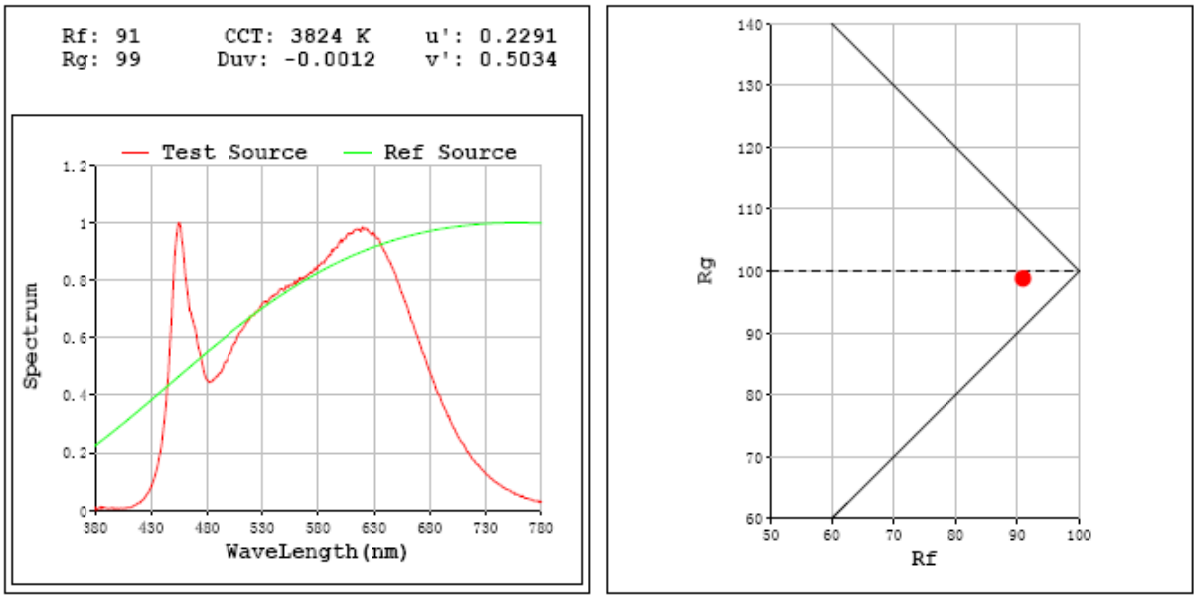
Special Color Rendering Indices			
R1	97	R9	77
R2	100	R10	98
R3	99	R11	96
R4	94	R12	75
R5	95	R13	99
R6	96	R14	99
R7	93	R15	95
R8	89	--	--

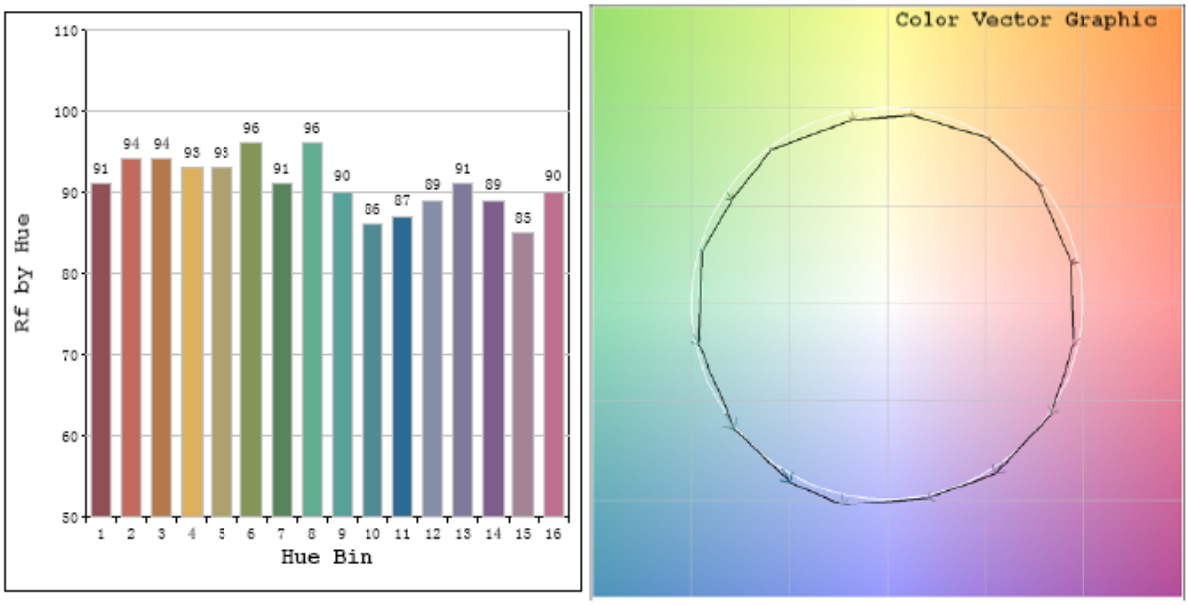
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1741.0
Luminous Efficacy (lm/W)	86.12

Spectral Power Distribution & Chromaticity Diagram



TM30


Rf: 91 CCT: 3824 K u': 0.2291
Rg: 99 Duv: -0.0012 v': 0.5034
Test Source
Ref Source
Spectrum
WaveLength(nm)
Rg
Rf


Rf by Hue
Hue Bin
91 94 94 93 93 96 91 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 ℃
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	DLS0106(CRVFAD-14R-20-9CCT-UNV-BN/MVS)	5000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202110120048	120.0	60	0.169	20.26	0.997

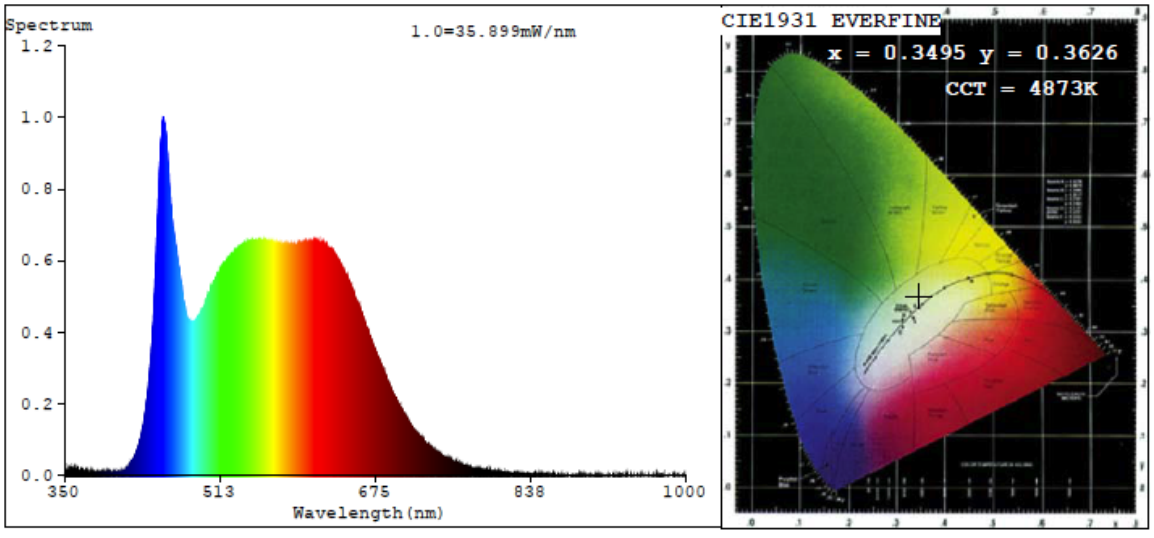
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	4873
Duv	0.0037
Chromaticity (x, y)	x=0.3495y=0.3626
Chromaticity (u', v')	u'=0.2102 v'=0.4906
Color Rendering Index (CRI)	93.4
R9	71
Total Luminous (lm)	1619.0
Luminous Efficacy (lm/W)	79.93

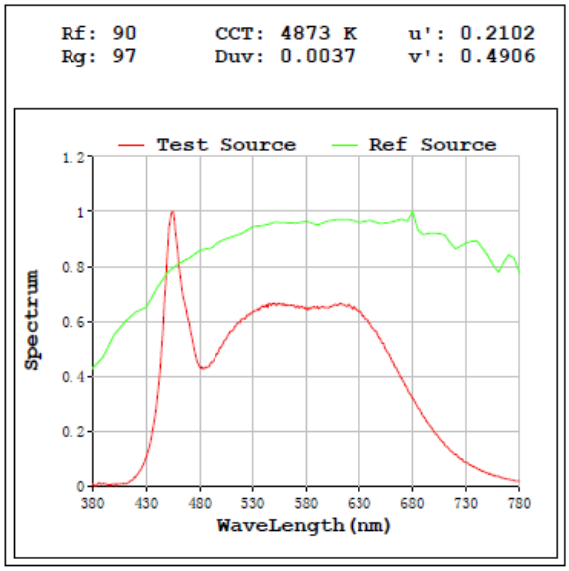
Special Color Rendering Indices			
R1	94	R9	71
R2	97	R10	92
R3	98	R11	91
R4	90	R12	68
R5	92	R13	95
R6	94	R14	99
R7	94	R15	91
R8	88	--	--

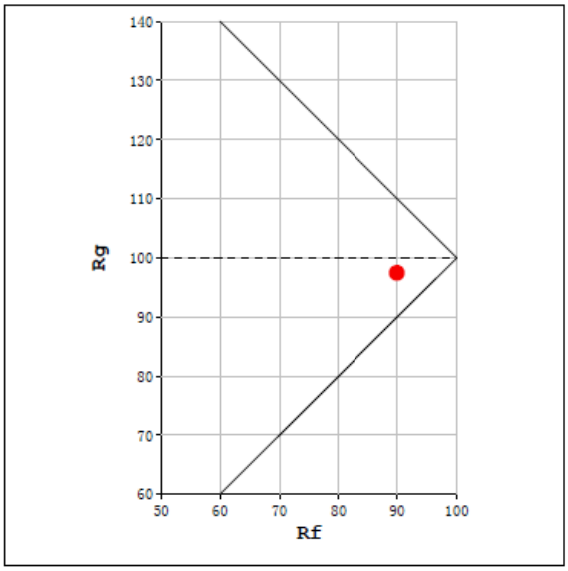
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	1623.0
Luminous Efficacy (lm/W)	78.83

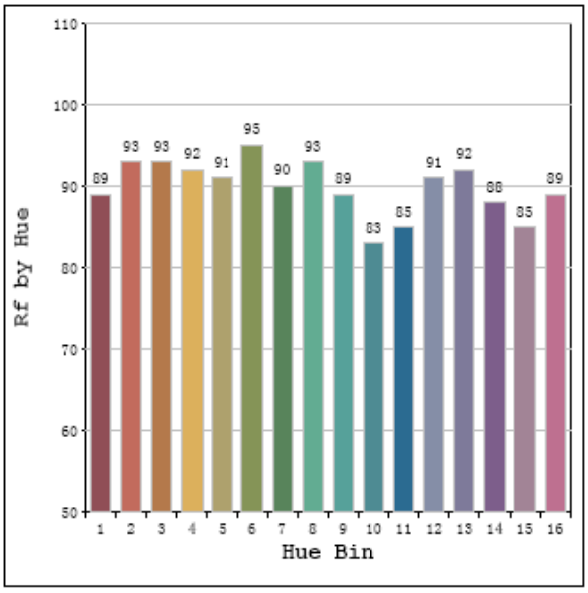
Spectral Power Distribution & Chromaticity Diagram

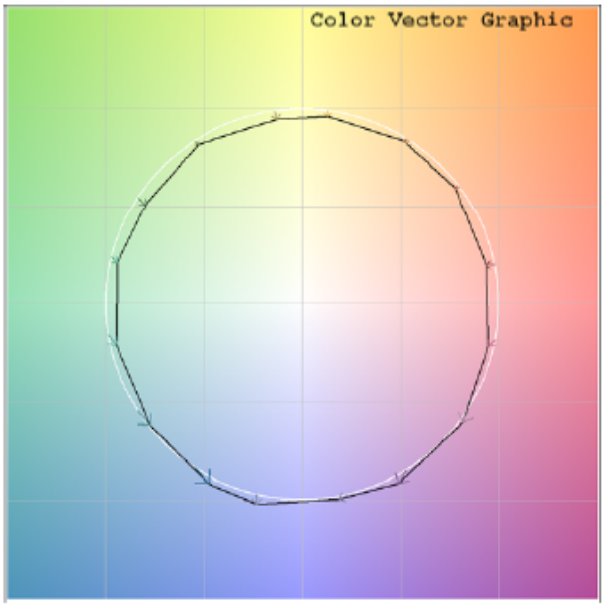


TM30



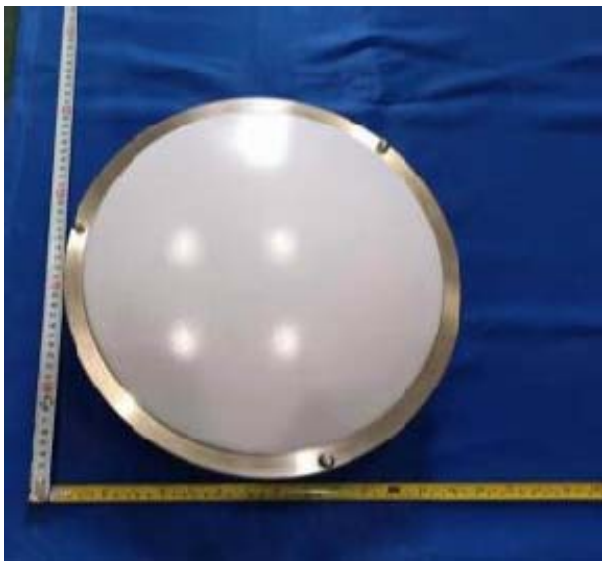


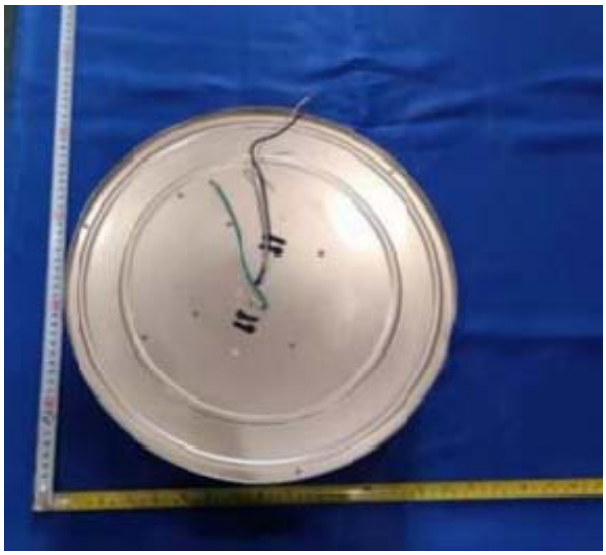




Sample No.	Wattage and CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
DLS0106(CRVFAD-14R-20-9CCT-UNV-BN/MVS)	2700K setting	120.0	1553.3	20.30	76.52
		277.0	1554.0	20.74	74.94
	3000K setting	120.0	1688.0	20.17	83.68
		277.0	1686.0	20.47	82.36
	3500K setting	120.0	1741.0	19.63	88.71
		277.0	1747.0	19.98	87.46
	4000K setting	120.0	1739.0	19.90	87.37
		277.0	1741.0	20.21	86.12
	5000K setting	120.0	1619.0	20.26	79.93
		277.0	1623.0	20.59	78.83

3. Product Photo





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