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): WFRL4R99TW120WB-SS-NS/LCB

Report Type:	Testing and Report According to IES LM-79-2008
Type of Luminaire:	Downlights
Report Date:	2023-02-09

Prepared By:

Test & Report By:

Engineer: Sun Fangfang

Review By:

Manager: Huang Qichong

1.1 Rated Values:	
Rated Voltage / Frequency	120Vac, 60 Hz
Nominal Power	9.0 W
Rated Initial Lamp Lumen	550 lm
Declared CCT	2700K/3000K/3500K/4000K/5000K/6500K

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	2023-02-08	**Test Ambient:**	25.3 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	WFRL4R99TW120WB-SS-NS/LCB	2700K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202302080006	120.0	60	0.080	8.9	0.922

Chromaticity Measurement - Sphere-Spectroradiometer Method:

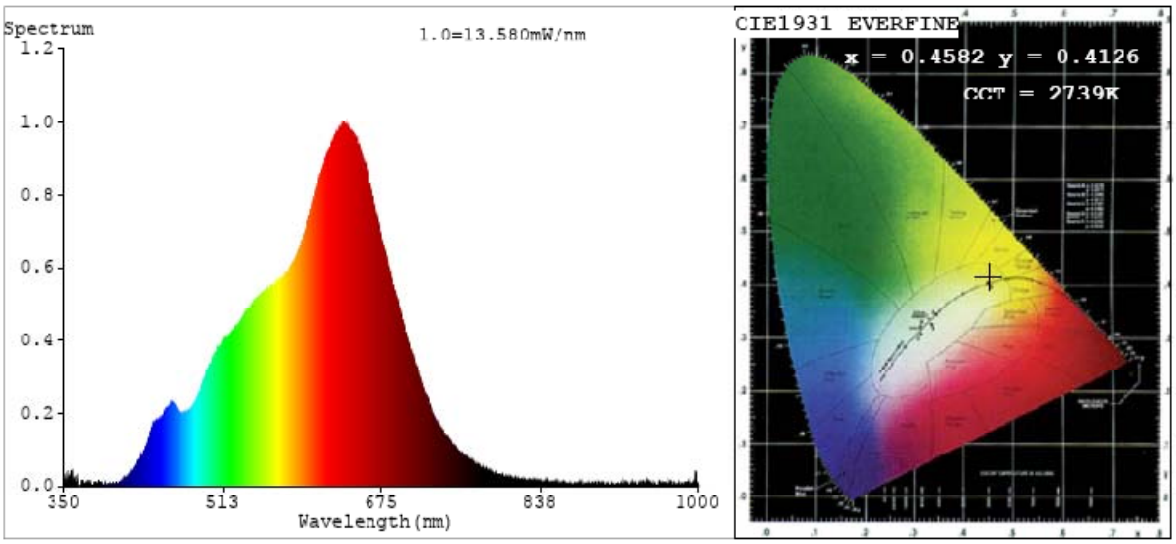
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2739
Duv	0.0009
Chromaticity (x, y)	x=0.4582 y=0.4126
Chromaticity (u', v')	u'=0.2605 v'=0.5279
Color Rendering Index (CRI)	96.9
R9	99

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

Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	556.39
Luminous Efficacy (lm/W)	62.52
Beam Angle (°)	110.5
Center Beam Candle Power (cd)	203.4

Spectral Power Distribution & Chromaticity Diagram



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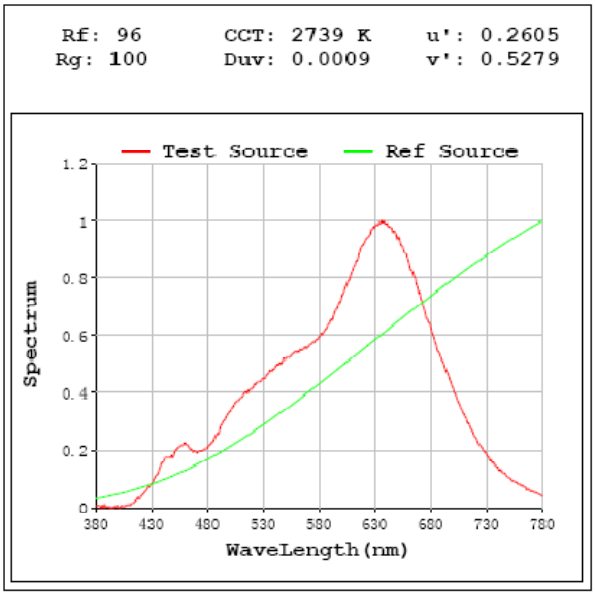
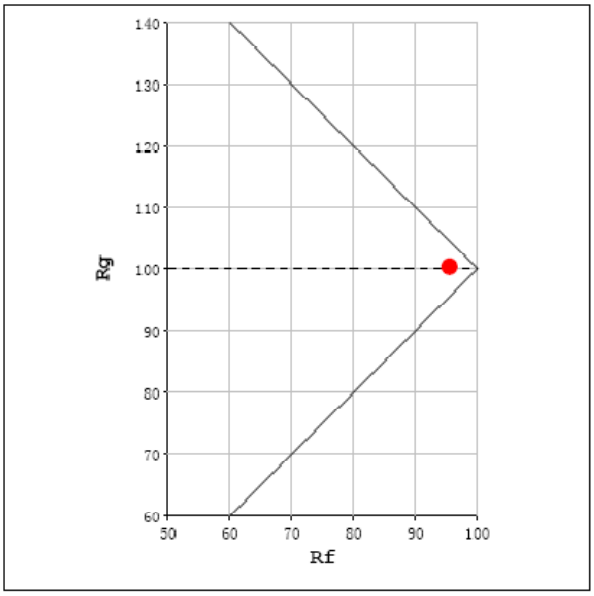
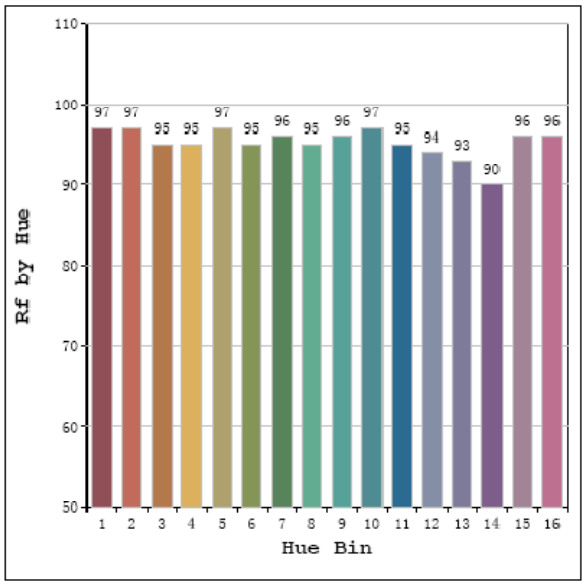
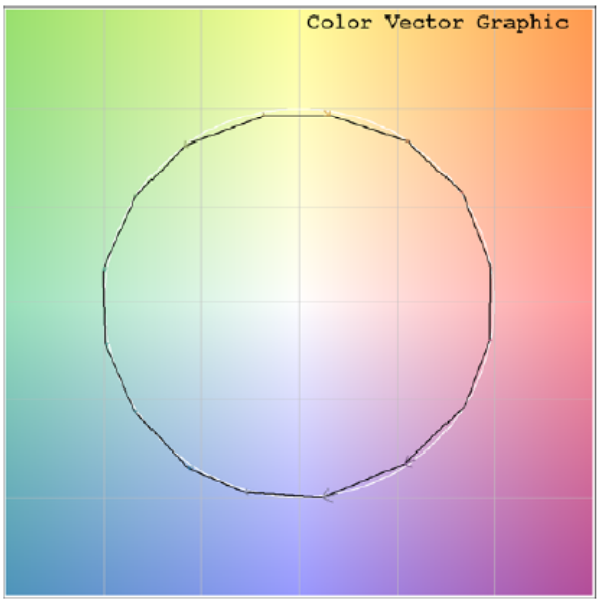






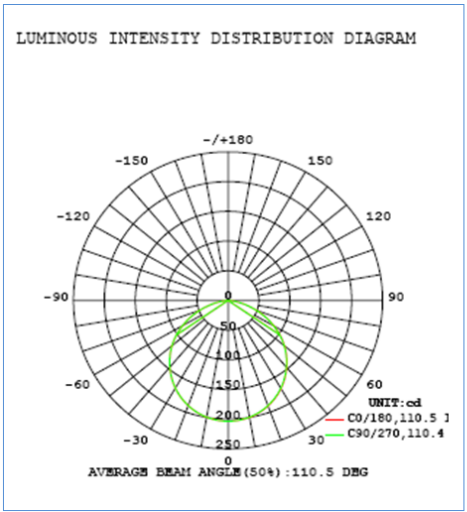


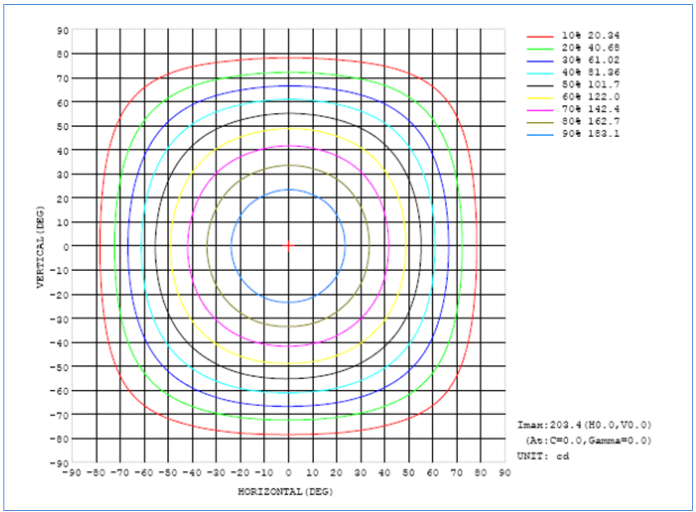
Zonal Lumen Tabulation

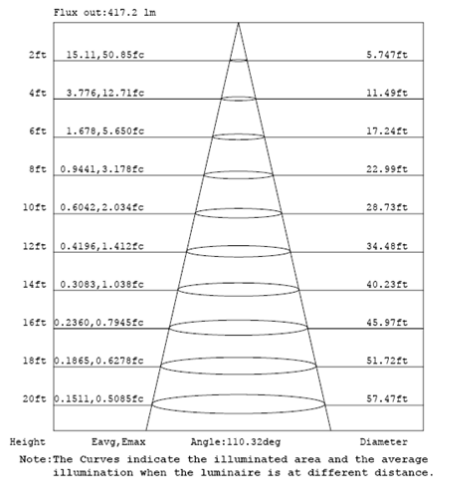
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	157.4	28.3%
0-40	257.2	46.2%
0-60	451.5	81.1%
60-90	104.9	18.9%
70-100	38.6	6.9%
90-120	0.0	0.0%
0-90	556.4	100.0%
90-180	0.0	0.0%
0-180	556.4	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	19.2	3.5%	90-100	0.0	0.0%
10-20	55.0	9.9%	100-110	0.0	0.0%
20-30	83.2	14.9%	110-120	0.0	0.0%
30-40	99.8	17.9%	120-130	0.0	0.0%
40-50	102.8	18.5%	130-140	0.0	0.0%
50-60	91.5	16.4%	140-150	0.0	0.0%
60-70	66.3	11.9%	150-160	0.0	0.0%
70-80	33.2	6.0%	160-170	0.0	0.0%
80-90	5.4	1.0%	170-180	0.0	0.0%

Photometric Data







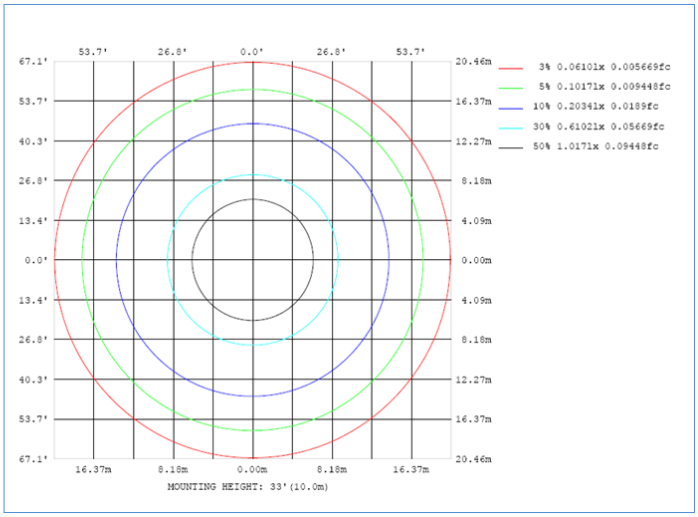


Table--1 UNIT: cd

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	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
5	202	202	202	202	202	202	202	202	203	202	202	202	202	202	202	202
10	200	200	200	200	200	200	200	200	200	200	200	199	200	200	200	200
15	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195
20	189	189	188	189	188	189	189	189	189	189	189	188	188	188	189	189
25	180	180	180	180	180	181	181	181	181	180	180	180	180	180	181	181
30	171	171	170	171	170	171	171	171	171	171	171	170	171	171	171	171
35	159	159	159	159	159	160	160	160	160	159	159	159	159	159	160	160
40	147	147	146	147	147	147	147	148	148	147	147	146	147	147	148	147
45	133	133	133	133	133	134	134	134	134	133	133	132	133	133	134	134
50	118	119	118	119	119	119	119	119	119	118	118	118	118	119	119	119
55	102	102	102	102	102	103	103	103	103	102	102	101	102	102	103	103
60	84.8	85.1	84.7	85.2	85.0	85.8	85.5	85.6	85.6	84.6	84.7	84.1	84.8	84.9	85.8	85.5
65	66.8	67.2	66.9	67.3	67.1	67.7	67.5	67.5	67.6	66.6	66.7	66.1	66.8	66.8	67.7	67.4
70	48.5	49.1	48.8	49.3	48.9	49.6	49.2	49.2	49.2	48.3	48.5	47.9	48.5	48.5	49.4	49.1
75	31.0	31.5	31.2	31.7	31.4	31.9	31.4	31.5	31.5	30.7	30.9	30.4	31.0	30.9	31.6	31.4
80	15.0	15.5	15.3	15.8	15.5	15.9	15.4	15.5	15.5	14.8	15.0	14.7	15.2	15.0	15.5	15.3
85	2.61	2.91	2.80	3.03	2.89	3.15	2.84	2.86	2.95	2.67	2.78	2.57	2.75	2.58	2.79	2.69
90	0.20	0.20	0.21	0.21	0.22	0.21	0.24	0.22	0.20	0.21	0.19	0.20	0.20	0.20	0.20	0.19

2.1.2 Electrical, Photometric and Chromaticity Measurements

Test date	2023-02-08	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	WFRL4R99TW120WB-SS-NS/LCB	3000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202302080006	120.0	60	0.080	8.91	0.922

Chromaticity Measurement - Sphere-Spectroradiometer Method:

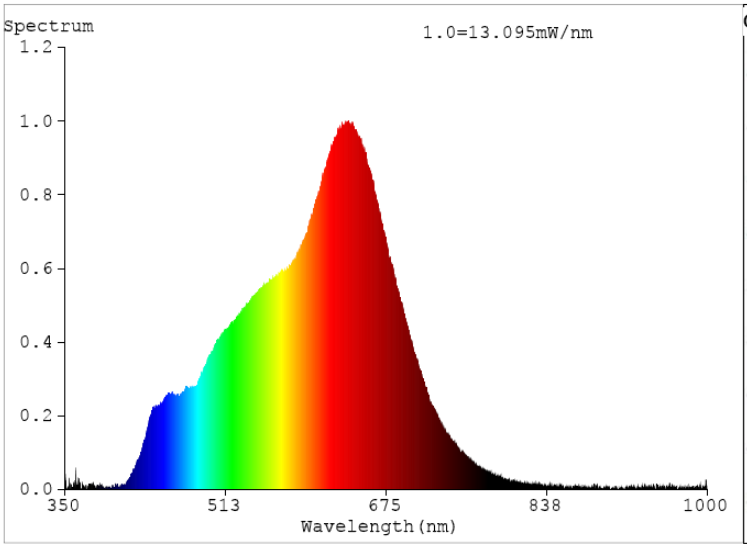
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	2910
Duv	-0.0008
Chromaticity (x, y)	x=0.4422 y=0.4037
Chromaticity (u', v')	u'=0.2542v'=0.5220
Color Rendering Index (CRI)	96.1
R9	94

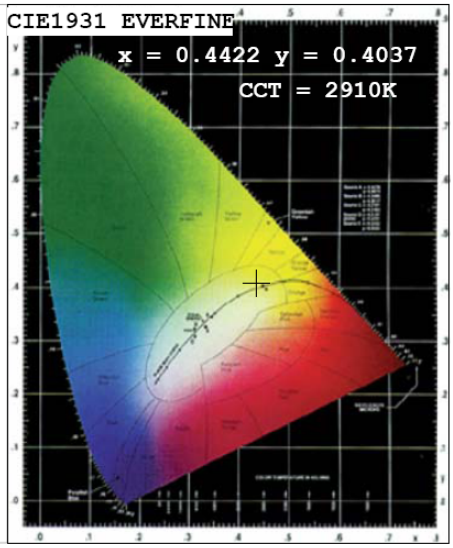
Special Color Rendering Indices			
R1	95	R9	94
R2	97	R10	95
R3	98	R11	91
R4	94	R12	92
R5	94	R13	95
R6	94	R14	98
R7	99	R15	96
R8	97	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	564
Luminous Efficacy (lm/W)	63.3
Beam Angle (°)	110.5
Center Beam Candle Power (cd)	206.1

Spectral Power Distribution & Chromaticity Diagram





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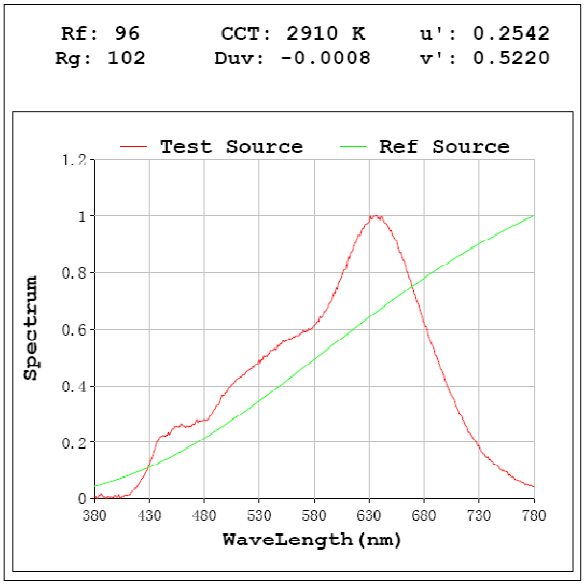
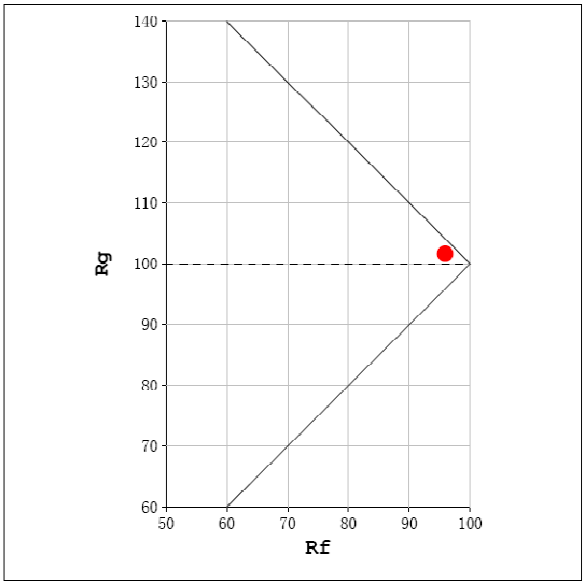
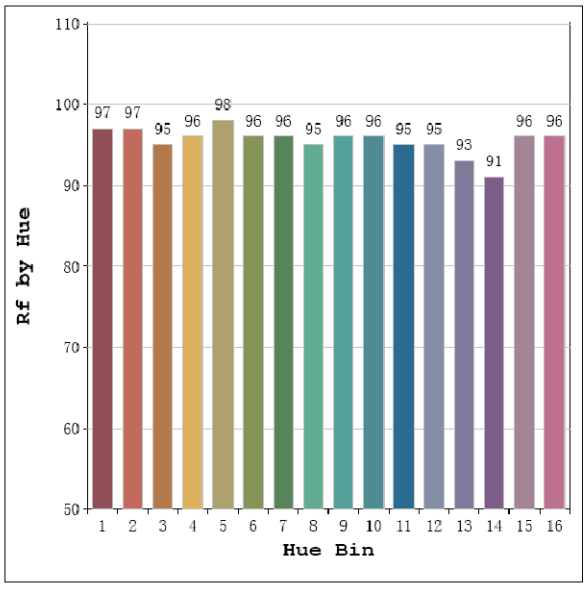
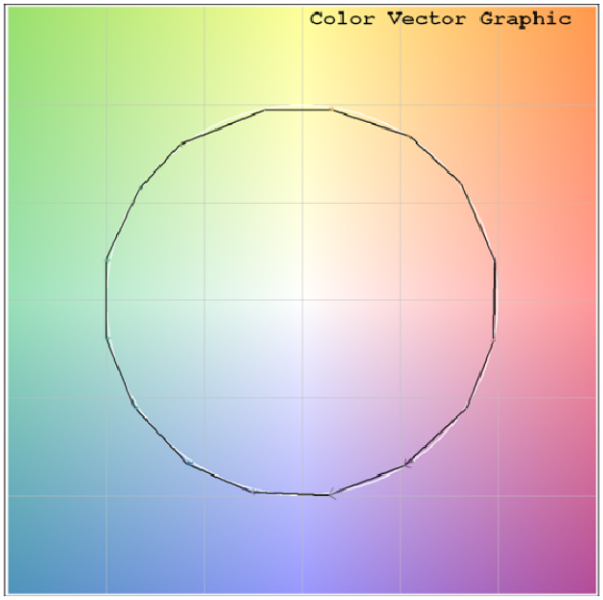






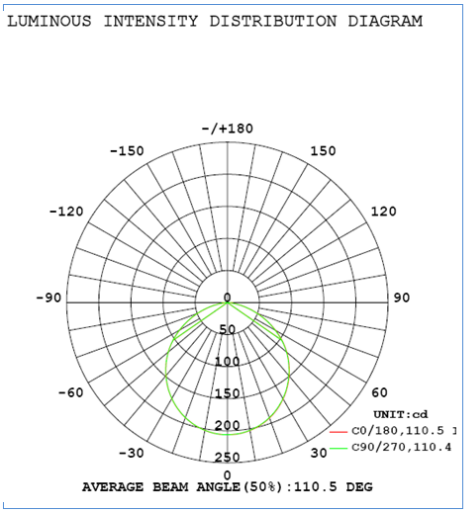


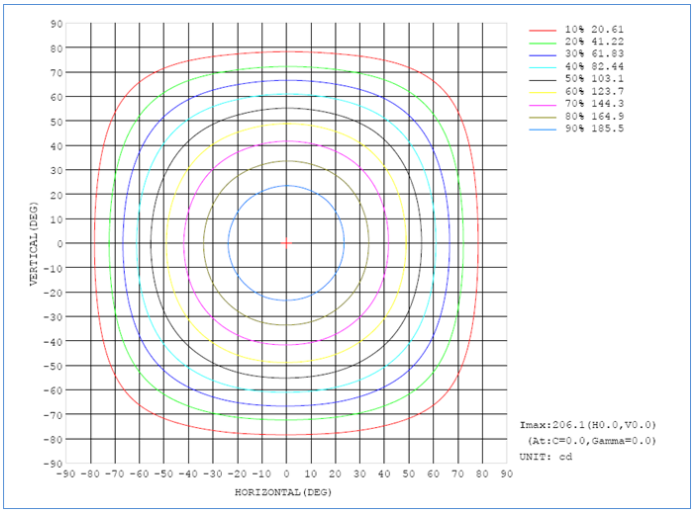
Zonal Lumen Tabulation

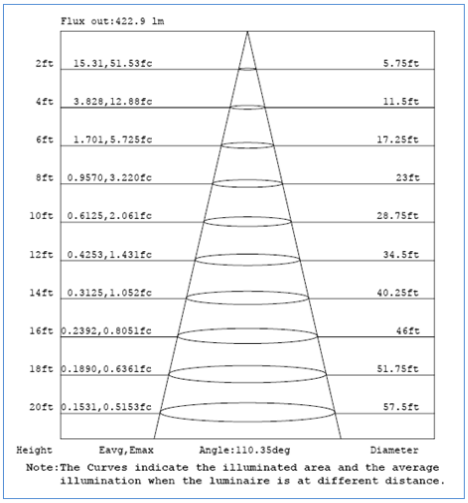
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	159.6	28.3%
0-40	260.7	46.2%
0-60	457.6	81.1%
60-90	106.4	18.9%
70-100	39.1	6.9%
90-120	0.0	0.0%
0-90	564.0	100.0%
90-180	0.0	0.0%
0-180	564.0	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	19.5	3.5%	90-100	0.0	0.0%
10-20	55.8	9.9%	100-110	0.0	0.0%
20-30	84.3	14.9%	110-120	0.0	0.0%
30-40	101.1	17.9%	120-130	0.0	0.0%
40-50	104.2	18.5%	130-140	0.0	0.0%
50-60	92.7	16.4%	140-150	0.0	0.0%
60-70	67.2	11.9%	150-160	0.0	0.0%
70-80	33.7	6.0%	160-170	0.0	0.0%
80-90	5.5	1.0%	170-180	0.0	0.0%

Photometric Data







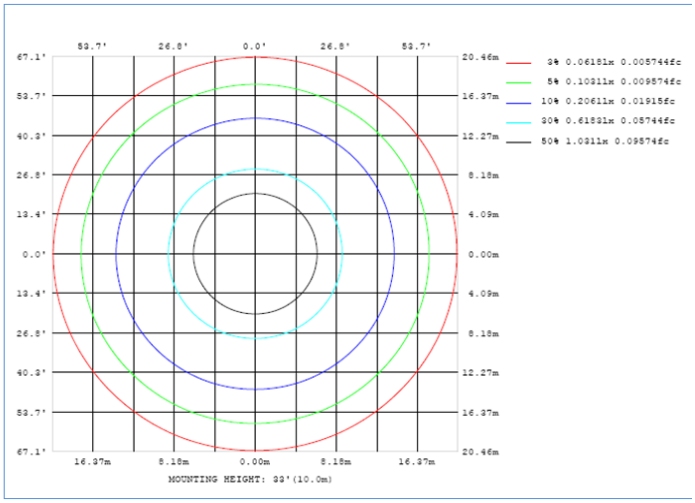


Table--1 UNIT: cd

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	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
5	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205	205
10	202	202	202	202	202	202	202	202	203	202	202	202	202	202	202	202
15	198	198	197	198	198	198	198	198	198	198	198	197	198	198	198	198
20	191	191	191	191	191	191	191	192	192	191	191	191	191	191	191	191
25	183	183	183	183	183	183	183	183	183	183	183	182	183	183	183	183
30	173	173	173	173	173	173	173	174	174	173	173	172	173	173	174	173
35	162	162	161	162	161	162	162	162	162	161	161	161	161	162	162	162
40	149	149	148	149	149	150	149	150	150	149	149	148	149	149	150	149
45	135	135	135	135	135	136	136	136	136	135	135	134	135	135	136	136
50	120	120	120	120	120	121	121	121	121	120	120	119	120	120	121	121
55	104	104	103	104	104	105	104	104	104	103	103	103	104	104	105	104
60	86.0	86.3	85.9	86.4	86.2	87.0	86.7	86.8	86.7	85.7	85.9	85.2	86.0	86.0	86.9	86.6
65	67.7	68.2	67.8	68.3	68.0	68.7	68.4	68.5	68.4	67.4	67.6	67.0	67.6	67.7	68.6	68.3
70	49.3	49.8	49.4	50.0	49.6	50.2	49.8	49.9	49.9	49.0	49.1	48.6	49.2	49.2	50.0	49.8
75	31.5	32.0	31.7	32.2	31.8	32.3	31.9	32.0	31.9	31.1	31.3	30.8	31.4	31.3	32.0	31.8
80	15.2	15.7	15.5	16.0	15.7	16.1	15.6	15.7	15.7	15.0	15.2	14.8	15.4	15.1	15.7	15.5
85	2.64	2.96	2.84	3.08	2.95	3.19	2.88	2.89	2.99	2.69	2.82	2.61	2.78	2.60	2.85	2.74
90	0.22	0.20	0.22	0.21	0.22	0.21	0.23	0.21	0.21	0.22	0.20	0.21	0.20	0.21	0.21	0.21

2.1.3 Electrical, Photometric and Chromaticity Measurements

Test date	2023-02-08	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	WFRL4R99TW120WB-SS-NS/LCB	3500K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202302080006	120.0	60	0.080	8.91	0.922

Chromaticity Measurement - Sphere-Spectroradiometer Method:

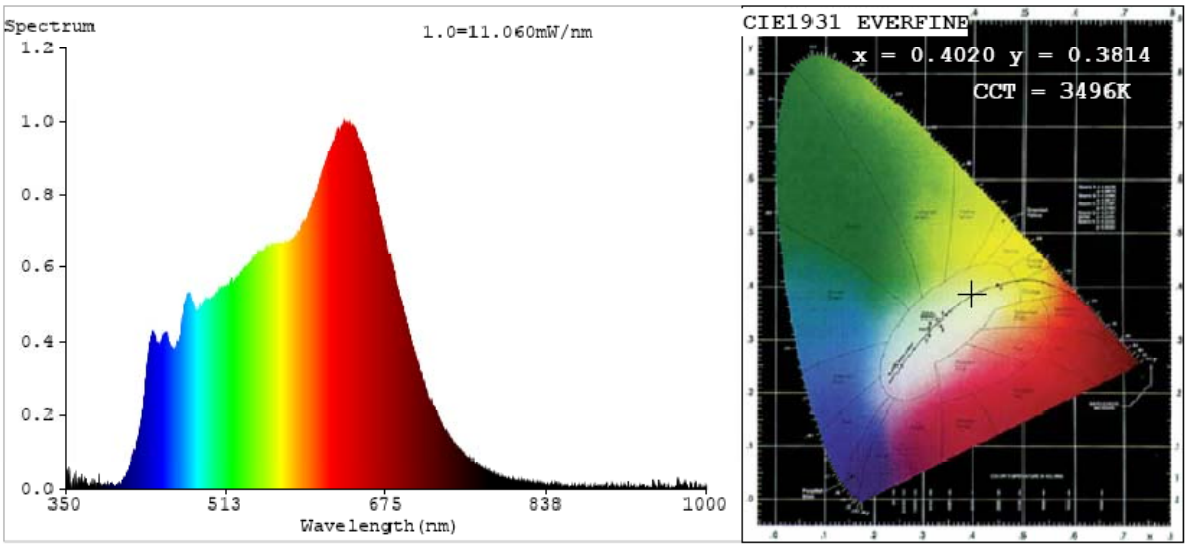
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3496
Duv	-0.0034
Chromaticity (x, y)	x=0.4020 y=0.3814
Chromaticity (u', v')	u'=0.2374 v'=0.5068
Color Rendering Index (CRI)	94.2
R9	81

Special Color Rendering Indices			
R1	92	R9	81
R2	92	R10	89
R3	99	R11	91
R4	94	R12	88
R5	92	R13	92
R6	92	R14	99
R7	98	R15	92
R8	93	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	576.71
Luminous Efficacy (lm/W)	64.73
Beam Angle (°)	110.5
Center Beam Candle Power (cd)	210.7

Spectral Power Distribution & Chromaticity Diagram



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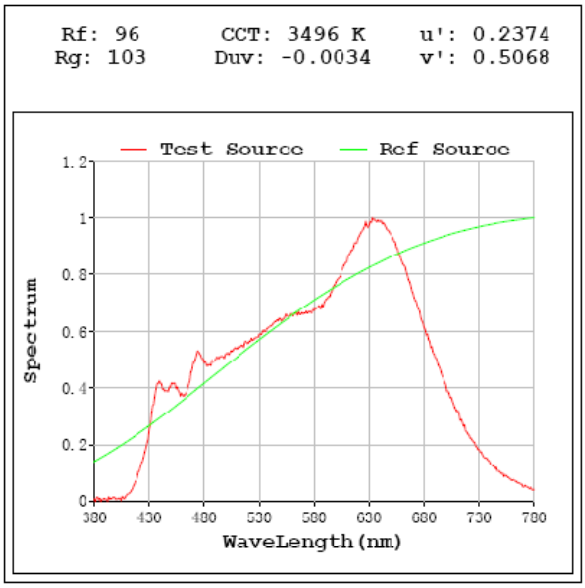
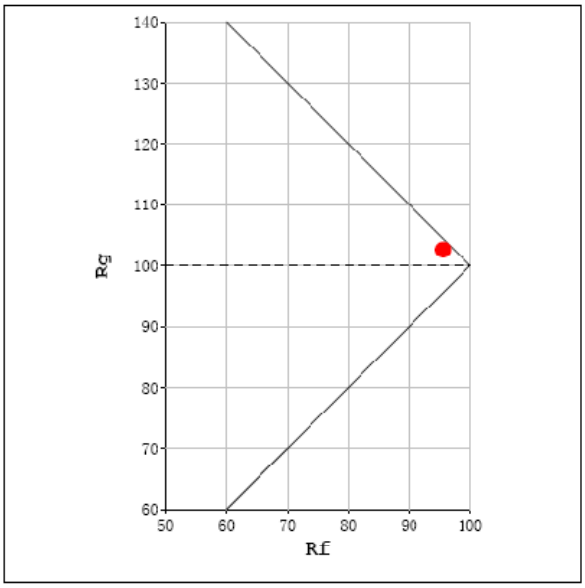
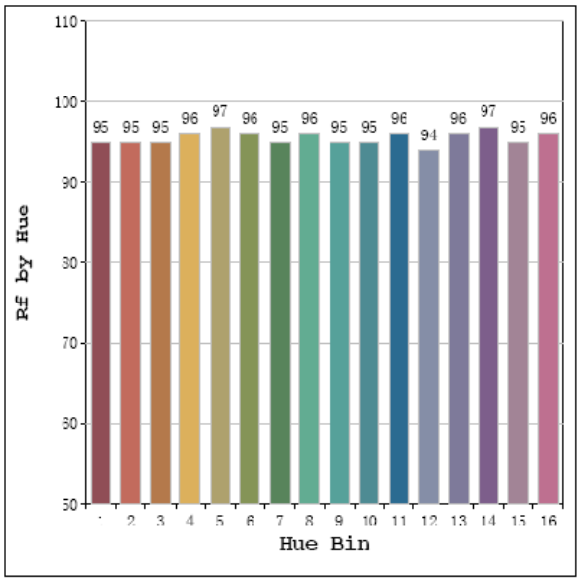
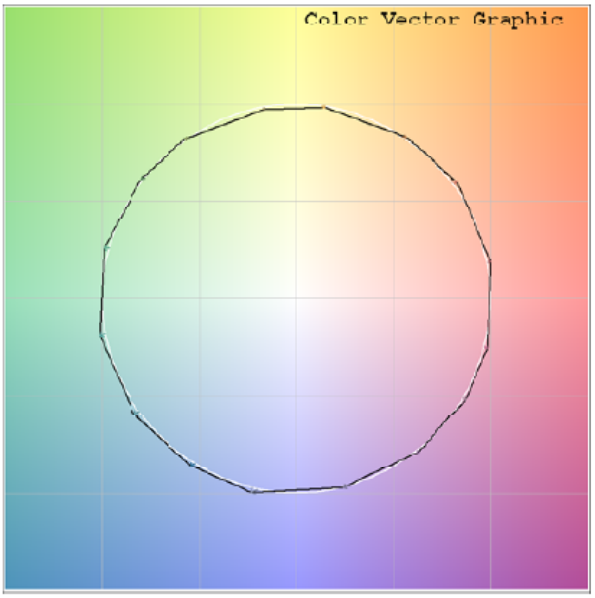






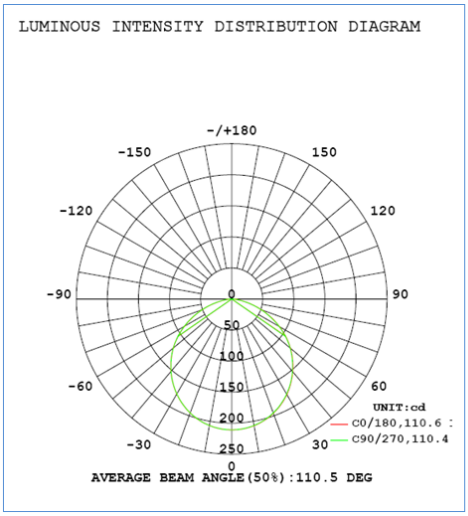


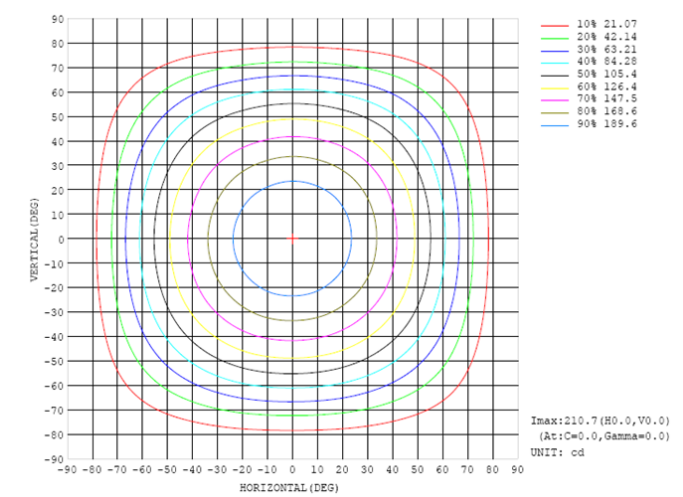
Zonal Lumen Tabulation

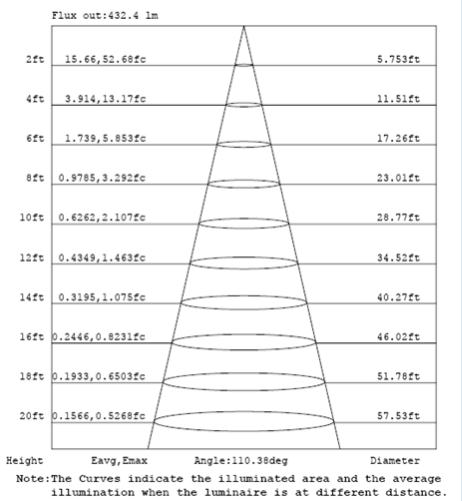
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	163.1	28.3%
0-40	266.5	46.2%
0-60	467.9	81.1%
60-90	108.8	18.9%
70-100	40.0	6.9%
90-120	0.0	0.0%
0-90	576.7	100.0%
90-180	0.0	0.0%
0-180	576.7	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	19.9	3.5%	90-100	0.0	0.0%
10-20	57.0	9.9%	100-110	0.0	0.0%
20-30	86.2	14.9%	110-120	0.0	0.0%
30-40	103.4	17.9%	120-130	0.0	0.0%
40-50	106.6	18.5%	130-140	0.0	0.0%
50-60	94.8	16.4%	140-150	0.0	0.0%
60-70	68.8	11.9%	150-160	0.0	0.0%
70-80	34.5	6.0%	160-170	0.0	0.0%
80-90	5.6	1.0%	170-180	0.0	0.0%

Photometric Data







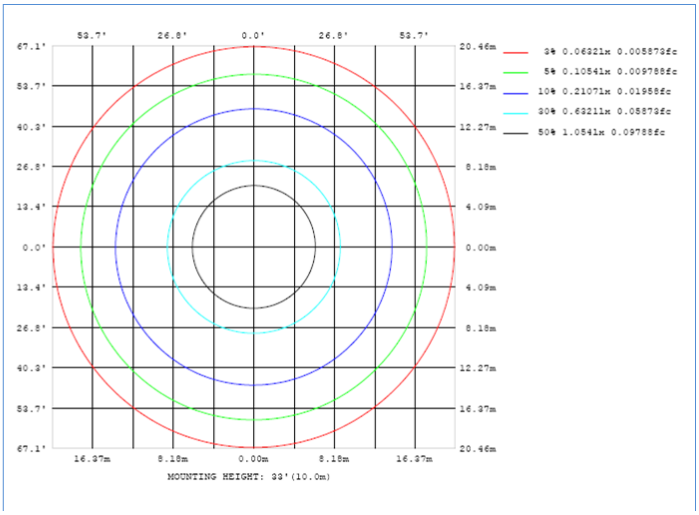


Table--1 UNIT: cd

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	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211
5	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
10	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207
15	202	202	202	202	202	202	202	202	202	202	202	202	202	202	202	202
20	195	195	195	195	195	196	196	196	196	195	195	195	195	195	196	196
25	187	187	187	187	187	187	187	187	188	187	187	186	187	187	187	187
30	177	177	177	177	177	177	177	177	178	177	177	176	177	177	177	177
35	165	165	165	165	165	166	166	166	166	165	165	164	165	165	166	166
40	152	152	152	152	152	153	153	153	153	152	152	151	152	152	153	153
45	138	138	138	138	138	139	139	139	139	138	138	137	138	138	139	139
50	123	123	123	123	123	124	124	124	124	123	123	122	123	123	124	123
55	106	106	106	106	106	107	107	107	107	106	106	105	106	106	107	107
60	88.0	88.3	87.9	88.4	88.2	89.0	88.7	88.8	88.6	87.6	87.7	87.2	87.9	88.0	89.0	88.6
65	69.3	69.7	69.4	69.8	69.6	70.3	70.0	70.0	69.9	68.9	69.1	68.5	69.2	69.2	70.2	69.9
70	50.4	51.0	50.6	51.1	50.8	51.4	51.0	51.1	51.0	50.1	50.2	49.7	50.3	50.3	51.2	51.0
75	32.2	32.8	32.4	32.9	32.5	33.1	32.6	32.7	32.6	31.8	32.0	31.5	32.1	32.0	32.8	32.6
80	15.7	16.1	15.9	16.4	16.0	16.5	16.0	16.1	16.1	15.3	15.6	15.1	15.7	15.5	16.0	15.9
85	2.74	3.06	2.93	3.17	3.01	3.26	2.95	2.96	3.04	2.75	2.86	2.64	2.83	2.67	2.90	2.79
90	0.22	0.21	0.22	0.21	0.24	0.22	0.24	0.23	0.20	0.21	0.20	0.20	0.20	0.20	0.20	0.20

2.1.4 Electrical, Photometric and Chromaticity Measurements

Test date	2023-02-08	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	WFRL4R99TW120WB-SS-NS/LCB	4000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202302080006	120.0	60	0.080	8.91	0.922

Chromaticity Measurement - Sphere-Spectroradiometer Method:

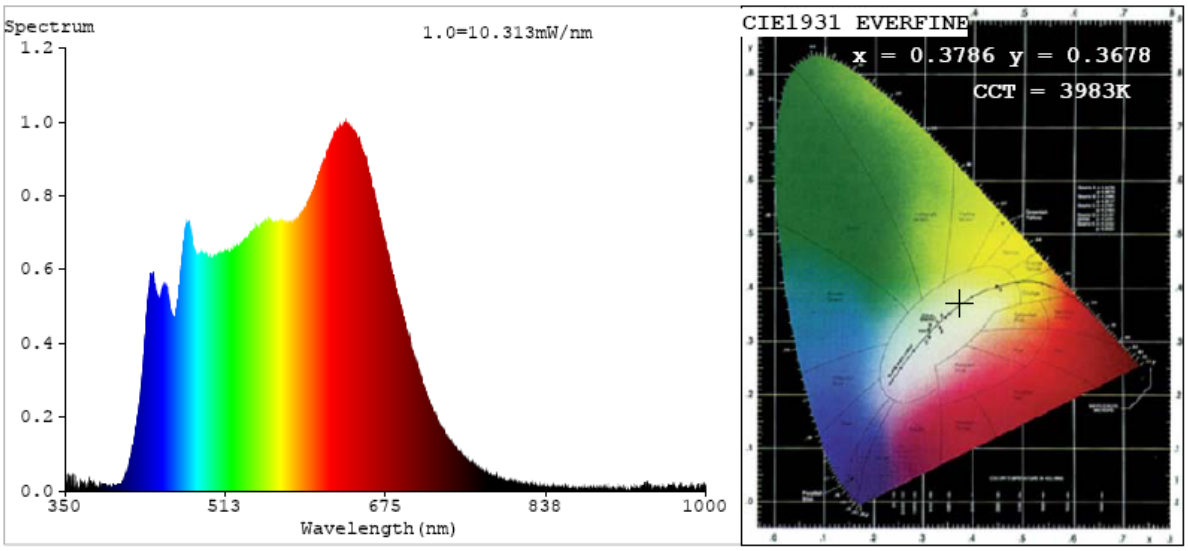
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	3983
Duv	-0.0037
Chromaticity (x, y)	x=0.3786 y=0.3678
Chromaticity (u', v')	u'=0.2275 v'=0.4973
Color Rendering Index (CRI)	93.5
R9	76

Special Color Rendering Indices			
R1	92	R9	76
R2	94	R10	87
R3	98	R11	92
R4	94	R12	87
R5	92	R13	92
R6	92	R14	99
R7	97	R15	90
R8	91	--	--

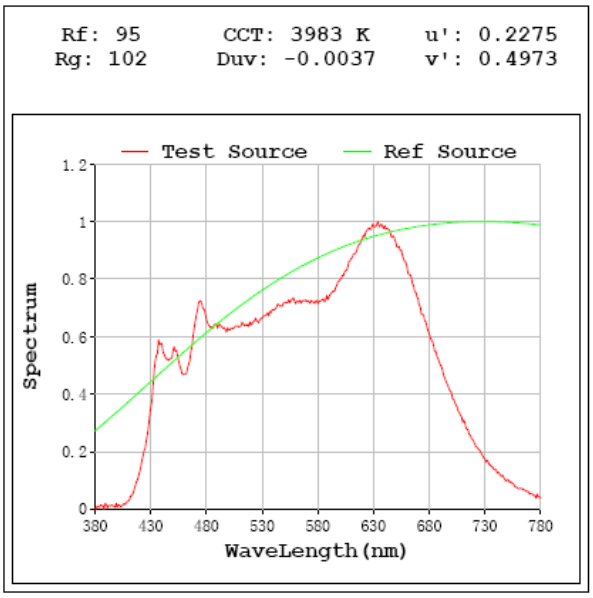
Photometric Measurement – Goniophotometer Method:

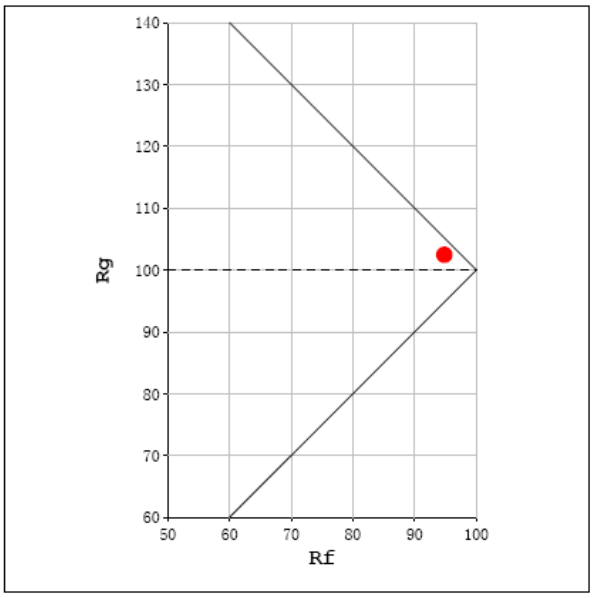
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	589.45
Luminous Efficacy (lm/W)	66.16
Beam Angle (°)	110.5
Center Beam Candle Power (cd)	215.3

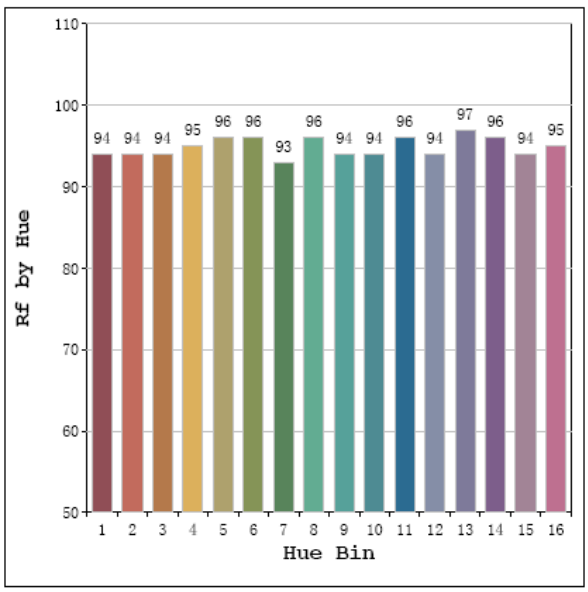
Spectral Power Distribution & Chromaticity Diagram

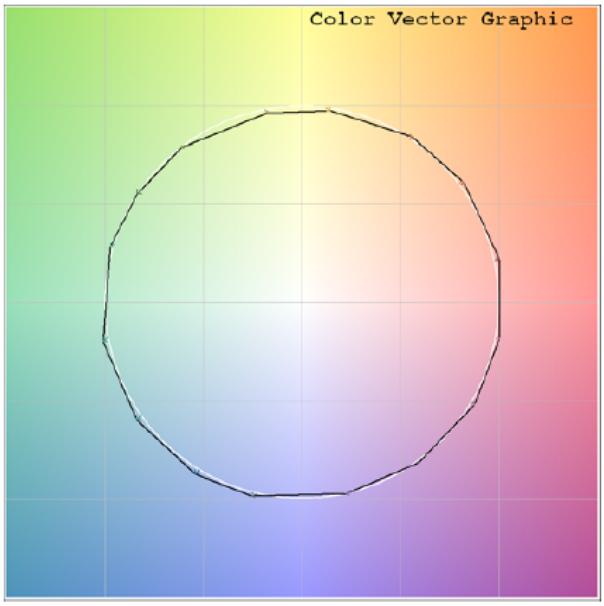


TM30







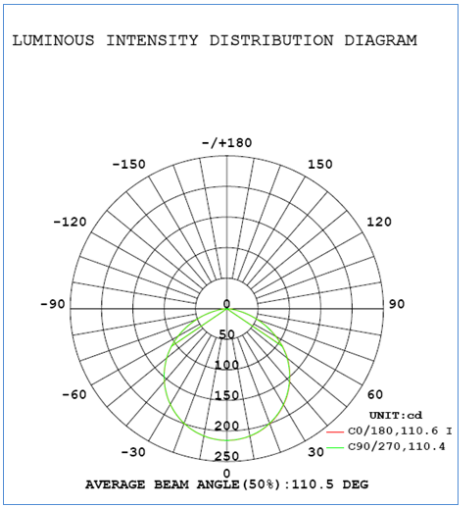


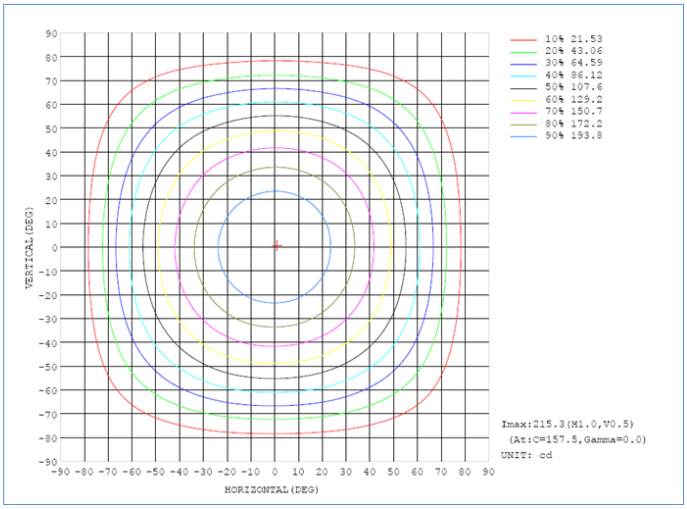
Zonal Lumen Tabulation

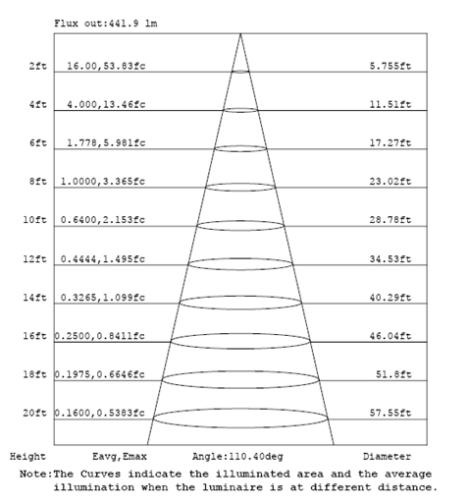
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	166.7	28.3%
0-40	272.4	46.2%
0-60	478.2	81.1%
60-90	111.2	18.9%
70-100	40.9	6.9%
90-120	0.0	0.0%
0-90	589.5	100.0%
90-180	0.0	0.0%
0-180	589.5	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	20.4	3.5%	90-100	0.0	0.0%
10-20	58.3	9.9%	100-110	0.0	0.0%
20-30	88.1	14.9%	110-120	0.0	0.0%
30-40	105.7	17.9%	120-130	0.0	0.0%
40-50	108.9	18.5%	130-140	0.0	0.0%
50-60	96.9	16.4%	140-150	0.0	0.0%
60-70	70.3	11.9%	150-160	0.0	0.0%
70-80	35.2	6.0%	160-170	0.0	0.0%
80-90	5.7	1.0%	170-180	0.0	0.0%

Photometric Data







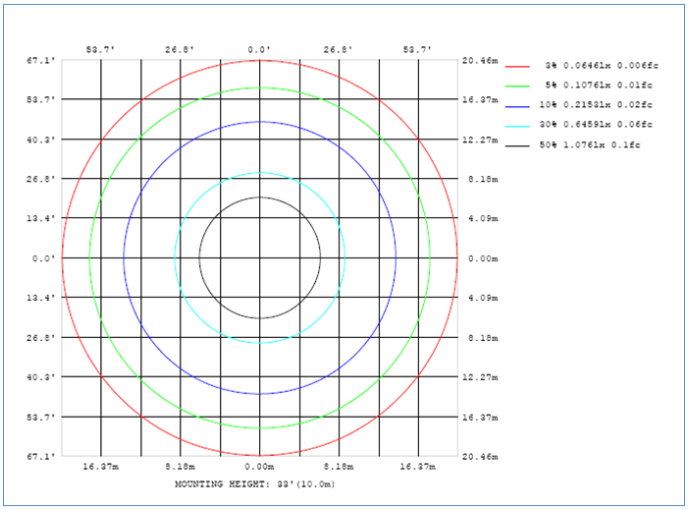


Table--1 UNIT: cd

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	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
5	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214	214
10	211	211	211	211	211	212	211	212	212	211	211	211	211	211	211	212
15	206	207	206	206	206	207	207	207	207	206	206	206	206	206	207	207
20	200	200	200	200	200	200	200	200	200	200	200	199	200	200	200	200
25	191	191	191	191	191	191	191	192	192	191	191	191	191	191	191	191
30	181	181	180	181	181	181	181	181	181	181	181	180	181	181	181	181
35	169	169	168	169	169	169	169	169	169	169	168	168	169	169	169	169
40	155	156	155	156	155	156	156	156	156	155	155	155	155	156	156	156
45	141	141	141	141	141	142	142	142	142	141	141	140	141	141	142	142
50	125	126	125	126	126	126	126	126	126	125	125	125	125	126	127	126
55	108	109	108	109	108	109	109	109	109	108	108	108	108	108	109	109
60	89.9	90.2	89.9	90.3	90.2	91.0	90.7	90.8	90.7	89.6	89.7	89.1	89.8	90.0	90.9	90.7
65	70.8	71.2	70.9	71.4	71.2	71.9	71.5	71.5	71.5	70.5	70.6	70.1	70.7	70.8	71.7	71.5
70	51.6	52.1	51.8	52.3	51.9	52.6	52.1	52.2	52.1	51.2	51.3	50.8	51.4	51.4	52.3	52.2
75	32.9	33.5	33.2	33.7	33.3	33.8	33.3	33.4	33.4	32.5	32.7	32.2	32.8	32.7	33.5	33.4
80	16.0	16.5	16.3	16.7	16.4	16.8	16.3	16.4	16.4	15.7	15.9	15.5	16.0	15.8	16.4	16.3
85	2.80	3.12	3.00	3.22	3.08	3.33	3.01	3.00	3.10	2.82	2.92	2.73	2.89	2.75	2.97	2.87
90	0.23	0.22	0.24	0.22	0.24	0.22	0.24	0.22	0.22	0.22	0.21	0.21	0.21	0.22	0.22	0.22

2.1.5 Electrical, Photometric and Chromaticity Measurements

Test date	2023-02-08	Test Ambient:	25.3 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	WFRL4R99TW120WB-SS-NS/LCB	5000K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202302080006	120.0	60	0.080	8.9	0.921

Chromaticity Measurement - Sphere-Spectroradiometer Method:

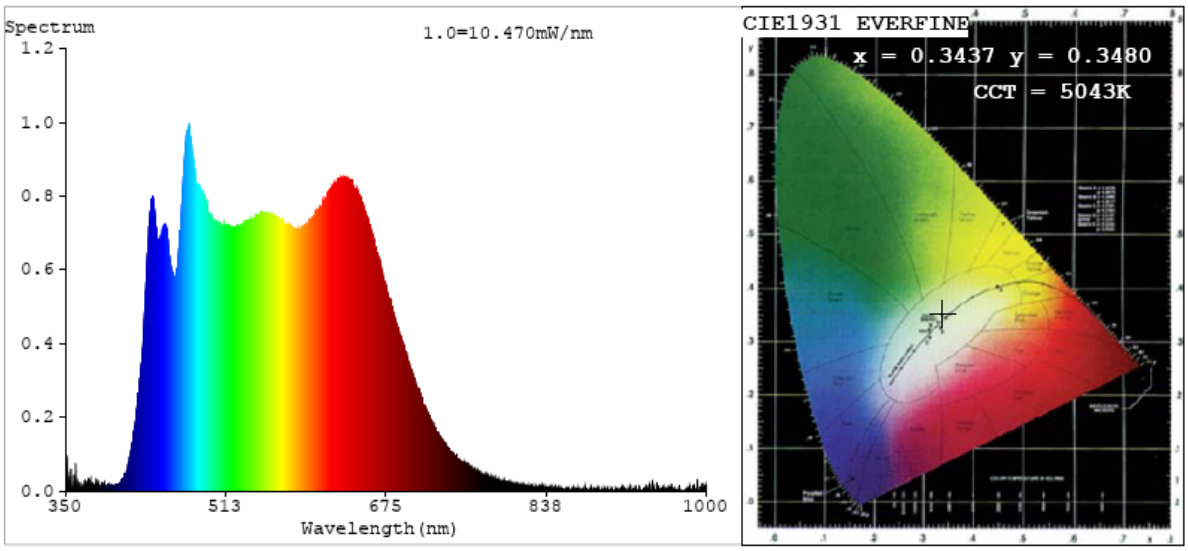
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	5043
Duv	-0.0013
Chromaticity (x, y)	x=0.3437 y=0.3480
Chromaticity (u', v')	u'=0.2119 v'=0.4827
Color Rendering Index (CRI)	94.1
R9	79

Special Color Rendering Indices			
R1	93	R9	79
R2	94	R10	87
R3	97	R11	94
R4	95	R12	88
R5	93	R13	93
R6	92	R14	98
R7	97	R15	92
R8	93	--	--

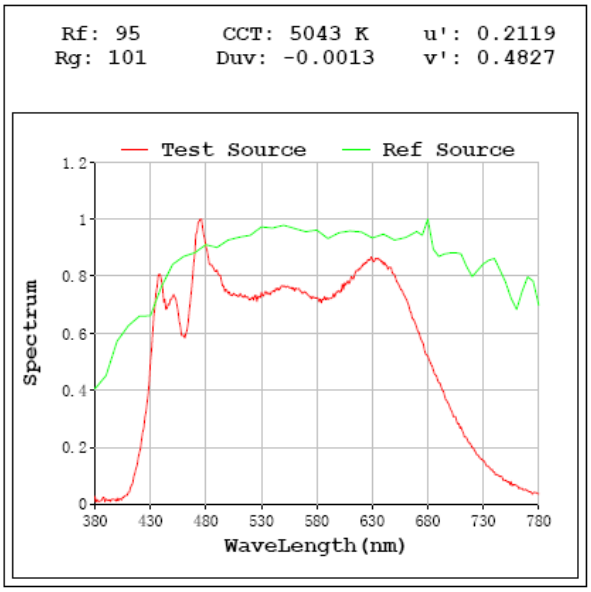
Photometric Measurement – Goniophotometer Method:

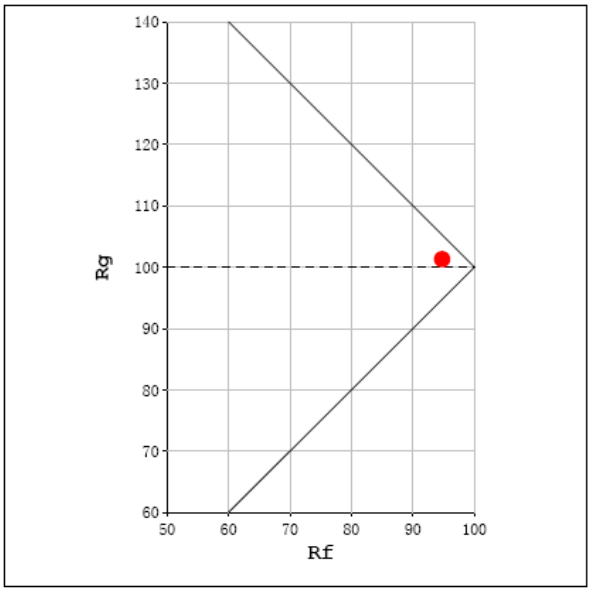
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	610.25
Luminous Efficacy (lm/W)	68.57
Beam Angle (°)	110.5
Center Beam Candle Power (cd)	222.9

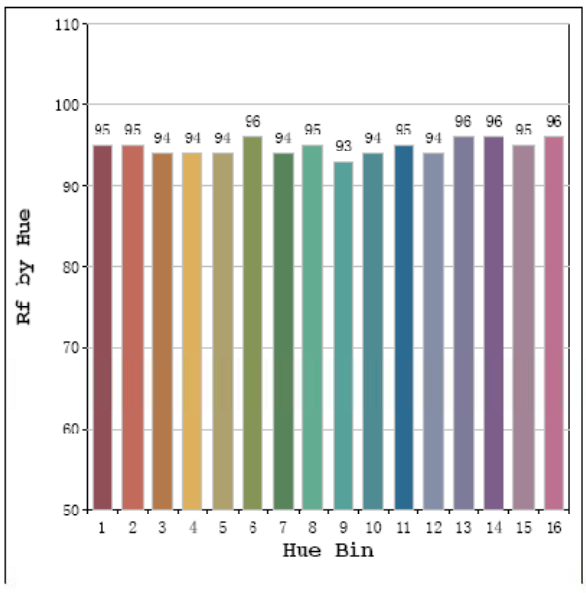
Spectral Power Distribution & Chromaticity Diagram

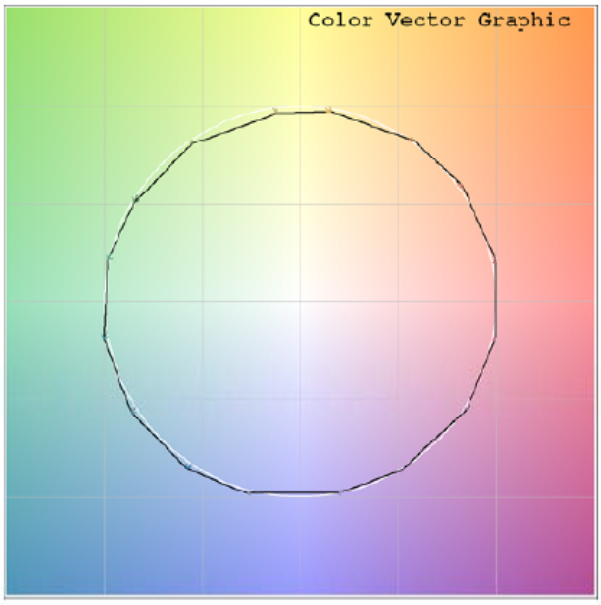


TM30







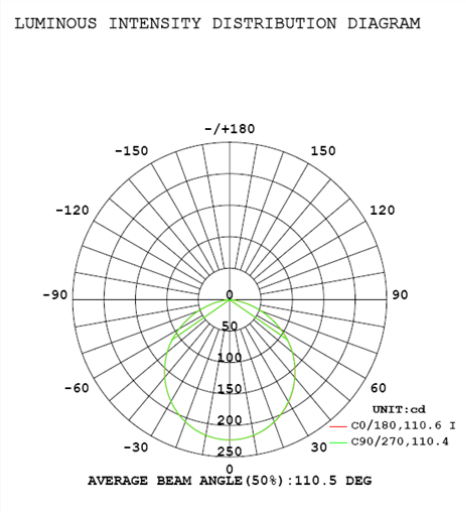


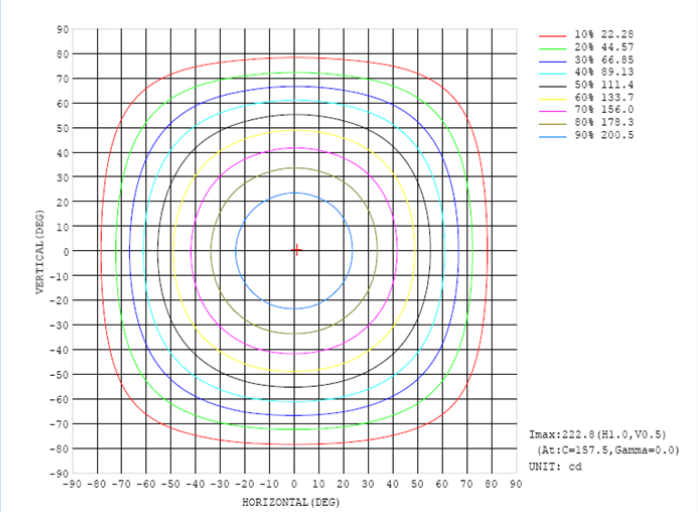
Zonal Lumen Tabulation

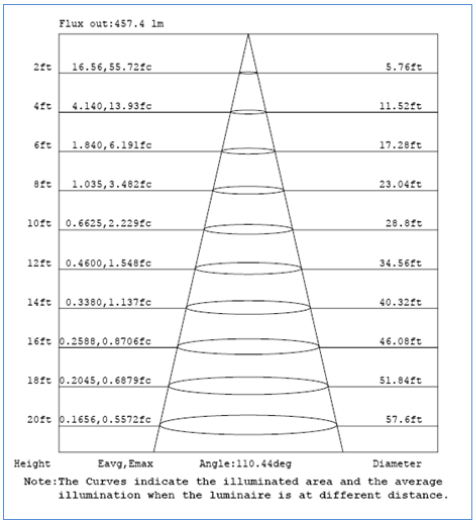
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	172.5	28.3%
0-40	281.9	46.2%
0-60	495.0	81.1%
60-90	115.2	18.9%
70-100	42.4	6.9%
90-120	0.0	0.0%
0-90	610.3	100.0%
90-180	0.0	0.0%
0-180	610.3	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	21.1	3.5%	90-100	0.0	0.0%
10-20	60.3	9.9%	100-110	0.0	0.0%
20-30	91.1	14.9%	110-120	0.0	0.0%
30-40	109.4	17.9%	120-130	0.0	0.0%
40-50	112.8	18.5%	130-140	0.0	0.0%
50-60	100.4	16.4%	140-150	0.0	0.0%
60-70	72.8	11.9%	150-160	0.0	0.0%
70-80	36.5	6.0%	160-170	0.0	0.0%
80-90	5.9	1.0%	170-180	0.0	0.0%

Photometric Data







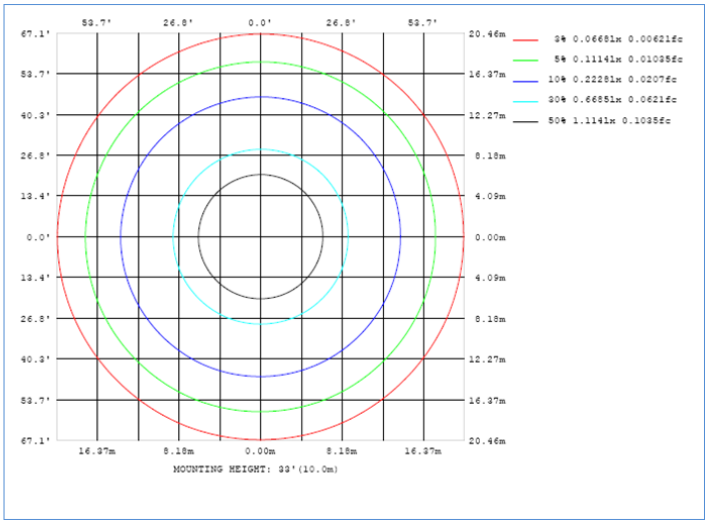


Table--1 UNIT: cd

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	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
5	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222
10	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219
15	214	214	214	214	214	214	214	214	214	214	214	213	214	214	214	214
20	207	207	206	207	207	207	207	207	207	207	207	206	207	207	207	207
25	198	198	197	198	198	198	198	198	198	198	198	197	198	198	198	198
30	187	187	187	187	187	188	187	188	188	187	187	186	187	187	188	188
35	175	175	174	175	175	175	175	175	175	175	174	174	175	175	176	175
40	161	161	161	161	161	162	162	162	162	161	161	160	161	161	162	162
45	146	146	146	146	146	147	147	147	147	146	146	145	146	146	147	147
50	130	130	130	130	130	131	131	131	131	130	130	129	130	130	131	131
55	112	112	112	112	112	113	113	113	113	112	112	111	112	112	113	113
60	93.1	93.5	93.0	93.6	93.3	94.2	93.8	94.0	93.9	92.7	93.0	92.2	93.1	93.1	94.2	93.8
65	73.4	73.9	73.4	74.0	73.7	74.5	74.0	74.1	74.0	72.9	73.2	72.5	73.3	73.3	74.3	74.0
70	53.4	54.0	53.6	54.2	53.8	54.5	54.0	54.1	54.0	53.0	53.2	52.6	53.3	53.3	54.3	54.0
75	34.1	34.7	34.4	35.0	34.5	35.1	34.5	34.7	34.6	33.6	33.9	33.3	34.0	33.9	34.8	34.5
80	16.6	17.1	16.9	17.4	17.0	17.5	16.9	17.0	17.1	16.2	16.5	16.0	16.6	16.4	17.0	16.9
85	2.89	3.25	3.09	3.37	3.19	3.46	3.11	3.14	3.23	2.89	3.04	2.81	3.01	2.81	3.09	2.96
90	0.23	0.22	0.23	0.23	0.24	0.23	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.22	0.21	0.22

2.1.5 Electrical, Photometric and Chromaticity Measurements

Test date	2023-02-08	**Test Ambient:**	25.3 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	WFRL4R99TW120WB-SS-NS/LCB	6500K	

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
202302080006	120.0	60	0.08	8.85	0.921

Chromaticity Measurement - Sphere-Spectroradiometer Method:

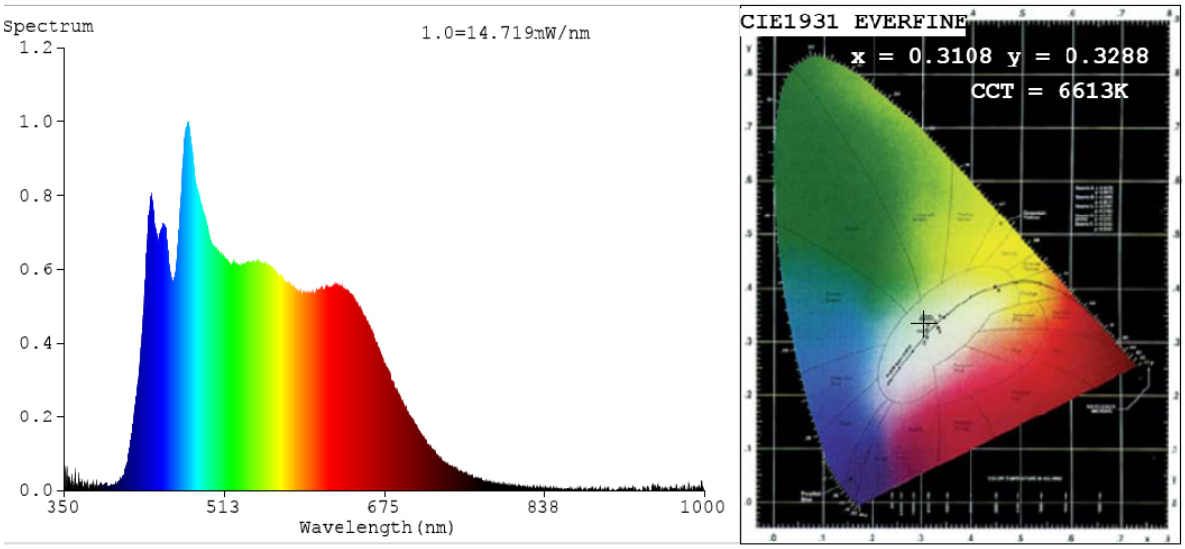
Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
CCT (K)	6613
Duv	0.0041
Chromaticity (x, y)	x=0.3108 y=0.3288
Chromaticity (u', v')	u'=0.1966 v'=0.4679
Color Rendering Index (CRI)	95.1
R9	93

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

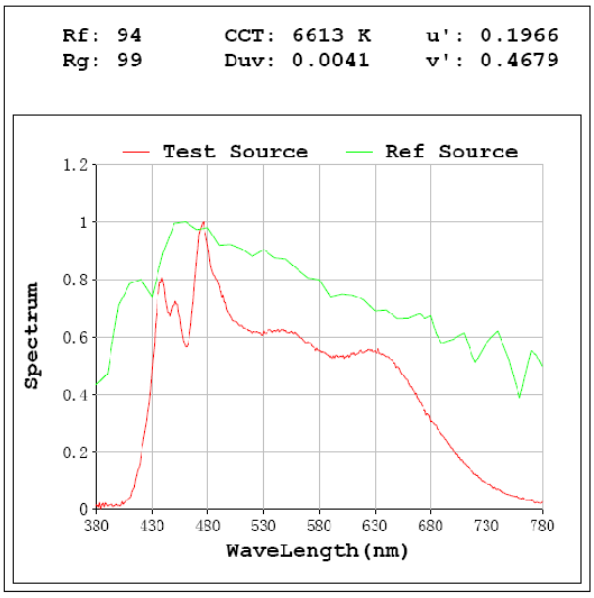
Photometric Measurement – Goniophotometer Method:

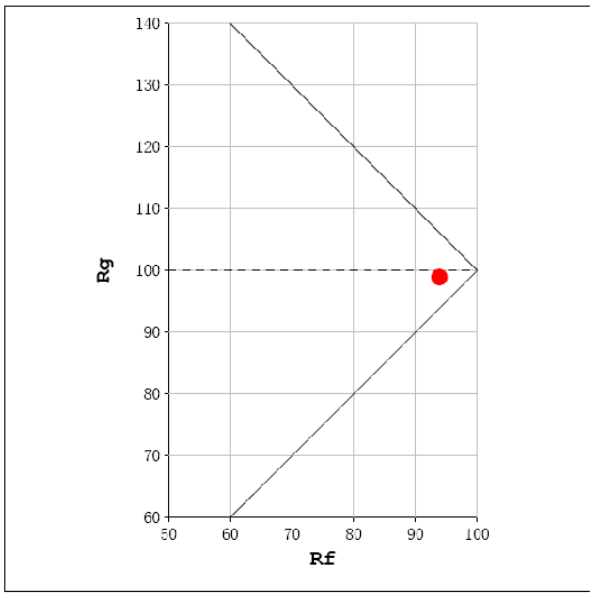
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	634.46
Luminous Efficacy (lm/W)	71.69
Beam Angle (°)	110.6
Center Beam Candle Power (cd)	231.7

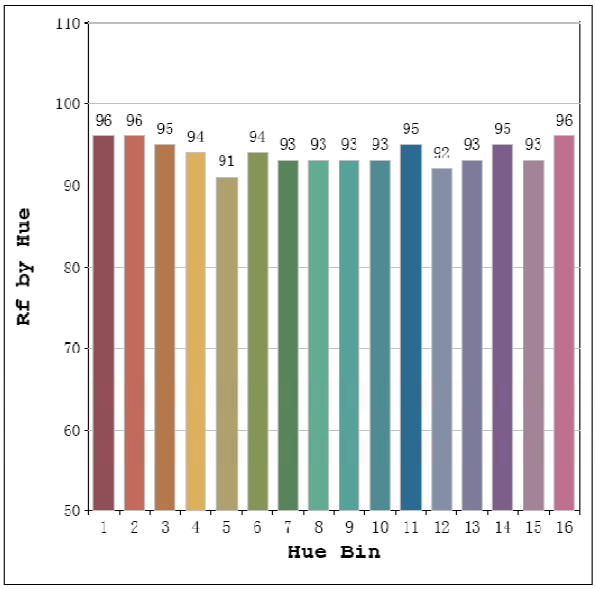
Spectral Power Distribution & Chromaticity Diagram

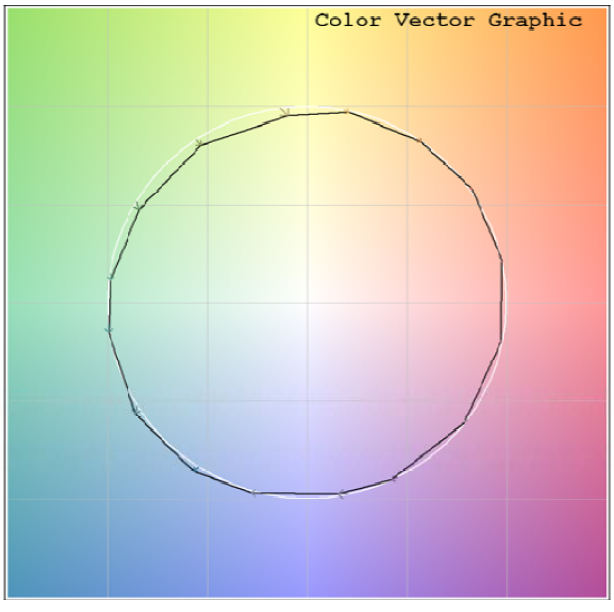


TM30







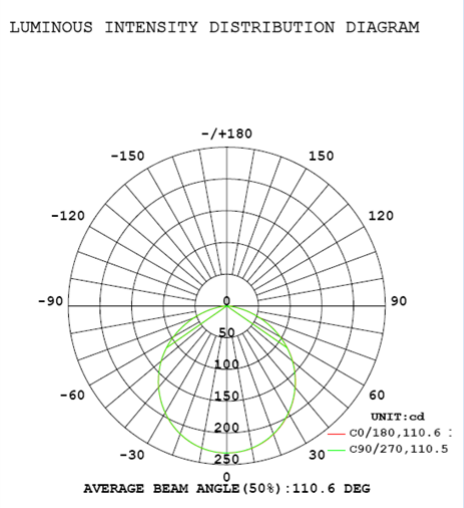


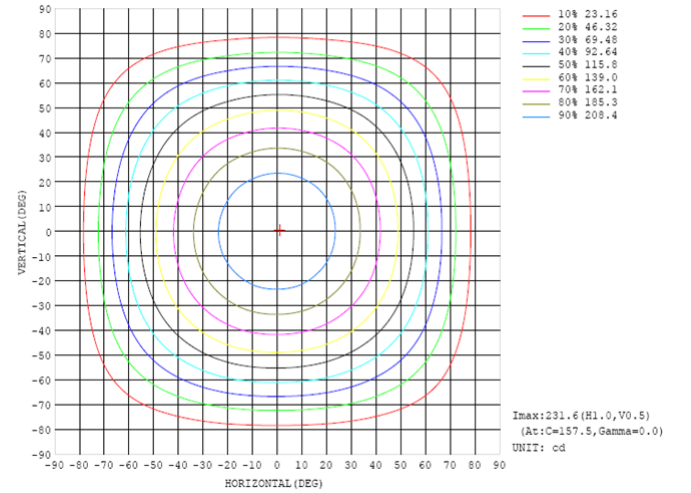
Zonal Lumen Tabulation

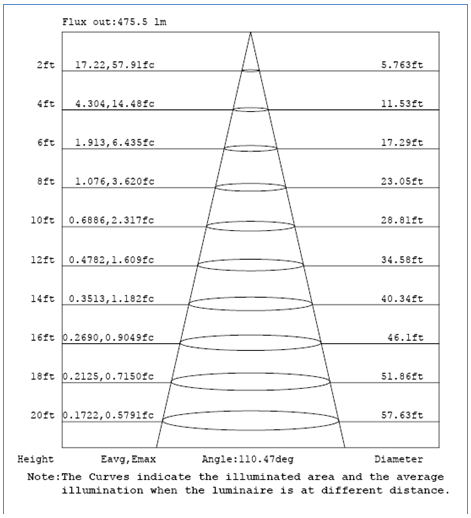
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	179.3	28.3%
0-40	293.0	46.2%
0-60	514.6	81.1%
60-90	119.9	18.9%
70-100	44.1	7.0%
90-120	0.0	0.0%
0-90	634.5	100.0%
90-180	0.0	0.0%
0-180	634.5	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	21.9	3.5%	90-100	0.0	0.0%
10-20	62.7	9.9%	100-110	0.0	0.0%
20-30	94.7	14.9%	110-120	0.0	0.0%
30-40	113.7	17.9%	120-130	0.0	0.0%
40-50	117.2	18.5%	130-140	0.0	0.0%
50-60	104.4	16.5%	140-150	0.0	0.0%
60-70	75.8	11.9%	150-160	0.0	0.0%
70-80	38.0	6.0%	160-170	0.0	0.0%
80-90	6.2	1.0%	170-180	0.0	0.0%

Photometric Data







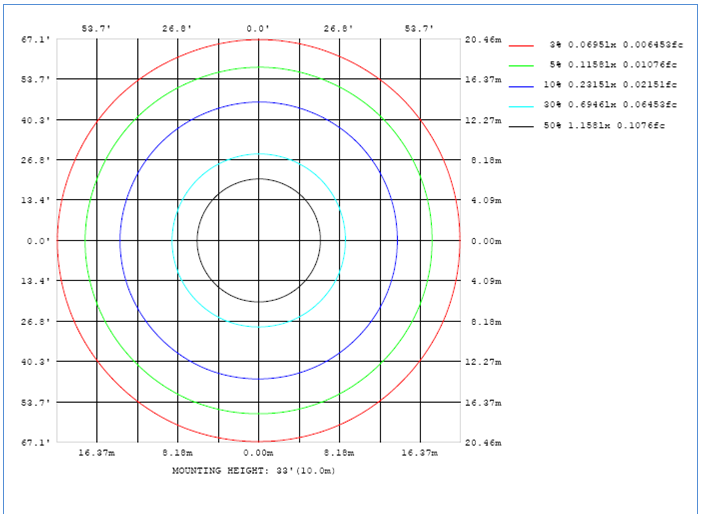
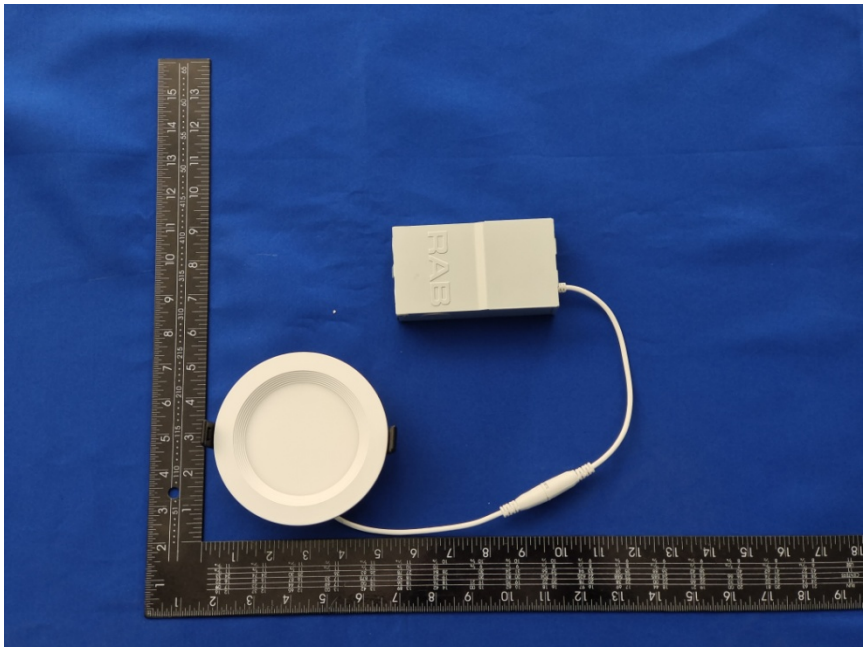


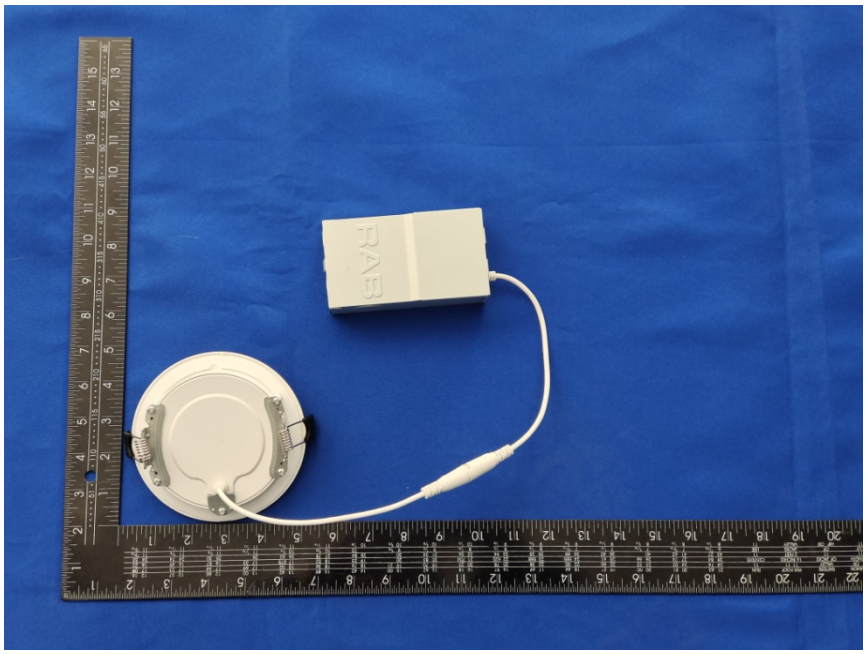
Table--1 UNIT: cd

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	232	232	232	232	232	232	232	232	232	232	232	232	232	232	232	232
5	231	231	231	231	231	231	231	231	231	230	231	230	230	230	231	231
10	227	227	227	227	227	227	227	228	228	227	227	227	227	227	228	228
15	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222
20	215	215	215	215	215	215	215	215	215	215	215	214	215	215	215	215
25	205	206	205	206	205	206	206	206	206	205	205	205	205	206	206	206
30	194	194	194	194	194	195	195	195	195	194	194	194	194	194	195	195
35	182	182	181	182	181	182	182	182	182	181	181	181	181	182	182	182
40	167	168	167	167	167	168	168	168	168	167	167	167	167	167	168	168
45	152	152	151	152	152	153	152	153	153	151	151	151	152	152	153	153
50	135	135	135	135	135	136	136	136	136	135	135	134	135	135	136	136
55	117	117	116	117	117	118	118	118	117	116	116	116	117	117	118	117
60	96.8	97.2	96.7	97.3	97.1	98.0	97.6	97.8	97.7	96.4	96.7	95.9	96.9	96.9	97.9	97.6
65	76.4	76.8	76.4	77.0	76.7	77.5	77.0	77.1	77.0	75.9	76.1	75.4	76.2	76.3	77.3	77.0
70	55.6	56.3	55.8	56.4	55.8	56.7	56.2	56.3	56.2	55.1	55.3	54.7	55.4	55.4	56.5	56.2
75	35.5	36.2	35.8	36.3	35.9	36.5	35.9	36.0	36.0	35.0	35.3	34.7	35.4	35.2	36.1	36.0
80	17.3	17.8	17.6	18.1	17.7	18.1	17.6	17.7	17.7	16.9	17.1	16.7	17.3	17.1	17.7	17.6
85	3.04	3.40	3.23	3.52	3.33	3.60	3.25	3.27	3.36	3.02	3.15	2.92	3.11	2.94	3.20	3.09
90	0.24	0.24	0.25	0.24	0.26	0.24	0.26	0.23	0.23	0.22	0.22	0.23	0.22	0.23	0.23	0.23

Sample No.	Wattage and CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
WFRL4R99TW120WB-SS-NS/LCB	2700K setting	120.0	556.39	8.9	62.52
	3000K setting	120.0	564	8.91	63.3
	3500K setting	120.0	576.71	8.91	64.73
	4000K setting	120.0	589.45	8.91	66.16
	5000K setting	120.0	610.25	8.9	68.57
	6500K setting	120.0	634.46	8.85	71.69

3. Product Photo





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