

LM-79-08 Test Report

For

RAB LIGHTING INC

(Brand Name : RAB)

170 Ludlow Ave , PO BOX 970, Northvale, NJ 07647-2305 USA

Model name (s) :

DLR0139 (R3S-9B)

Report Type: Testing and Report According to IES LM-79-2008

Type of Luminaire: Downlights

Report Date: 2023-6-17

<b>1.1 Rated Values:</b>	
Rated Voltage / Frequency	120V, 60HZ
Nominal Power	9W
Rated Initial Lamp Lumen	600lm (2700k) , 650lm (3000k)
Declared CCT	2700k/3000k/3500k/4000k/5000k

### 1.2 Test Specifications:

Test item	<ol style="list-style-type: none"> <li>1. Total Luminous Flux</li> <li>2. Luminous Distribution Intensity</li> <li>3. Luminous Efficacy</li> <li>4. Correlated Color Temperature</li> <li>5. Color Rendering Index</li> <li>6. Chromaticity Coordinate</li> <li>7. Electrical Parameters</li> </ol>
Reference Standard	<ol style="list-style-type: none"> <li>1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products</li> <li>2. ANSI C78.377-2015 Specifications for the Chromaticity of Solid State Lighting Products</li> <li>3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources</li> <li>4. CIE 15-2004 Technical Report Colorimetry</li> <li>5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source</li> <li>6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems</li> </ol>
Reference Work Instruction	QD25

### 1.3 Test Methods

<p><b>1) Photometric and Light Distribution Measurement – Goniophotometer Method:</b></p> <p>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.</p>
<p><b>2) Chromaticity Measurement – Sphere-Spectroradiometer Method:</b></p> <p>Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25°C ±1°C. 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.</p>
<p><b>3) Electrical Measurements:</b></p> <p>Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25°C±1°C. 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.</p>

## 2.1.1 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-6-17	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0139 (R3S-9B)	<b>CCT Setting</b>	2700k

### Electrical Measurement:

<b>Sampel No.</b>	<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>
#1	120	60	0.07313	8.517	0.9667

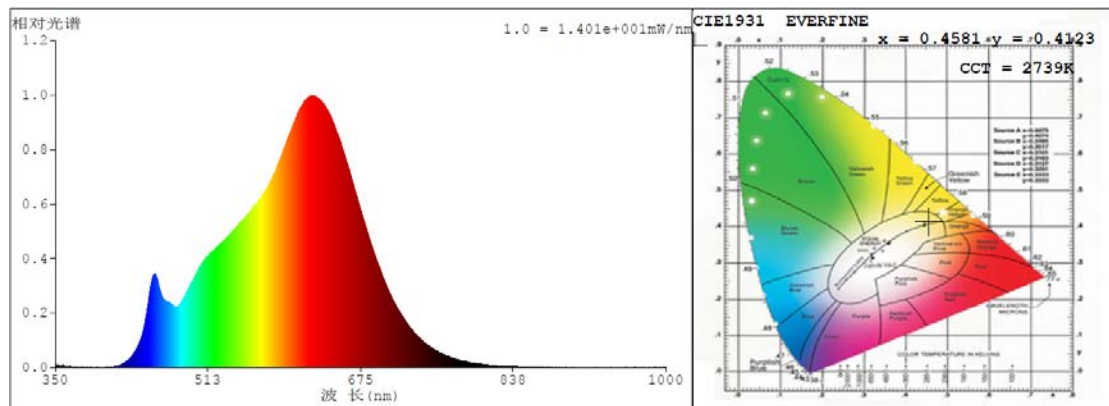
### Chromaticity Measurement – Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	98	R9	71
Frequency (Hz)	60	R2	100	R10	99
CCT (K)	2739	R3	98	R11	99
Duv	0.000793	R4	97	R12	88
Chromaticity (x, y)	x=0.4581, y=0.4123	R5	98	R13	99
Chromaticity (u', v')	u' =0.2606, v' =0.5277	R6	96	R14	99
Color Rendering Index (CRI)	95.6	R7	93	R15	93
R9	71	R8	86	--	--

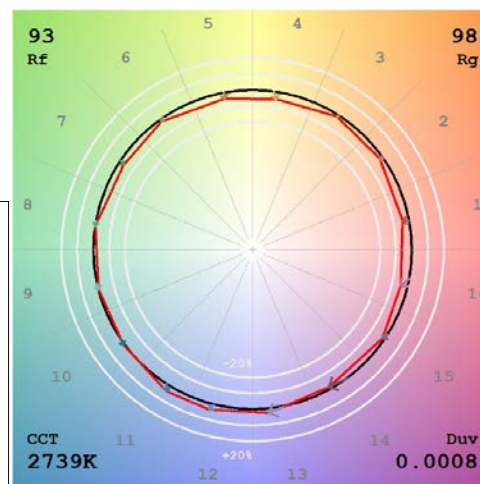
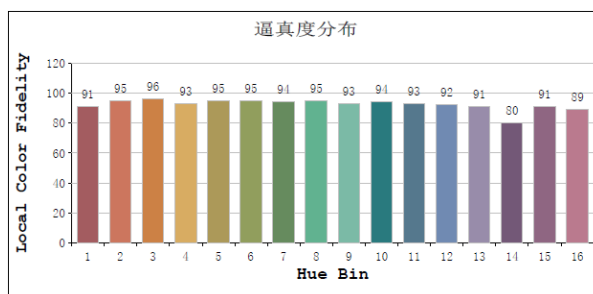
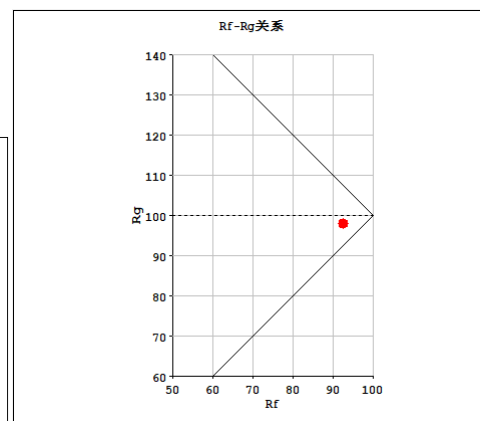
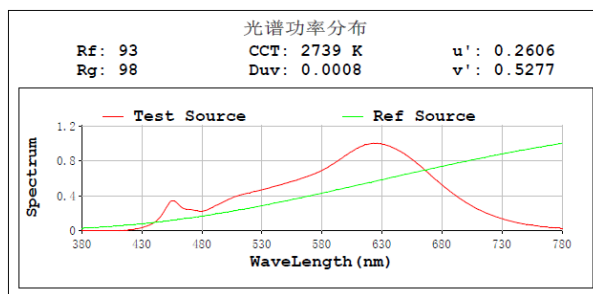
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	647.58
Luminous Efficacy (lm/W)	75.90
Beam Angle (°)	38.5
Center Beam Candle Power (cd)	1318

# Spectral Power Distribution & Chromaticity Diagram



## TM30

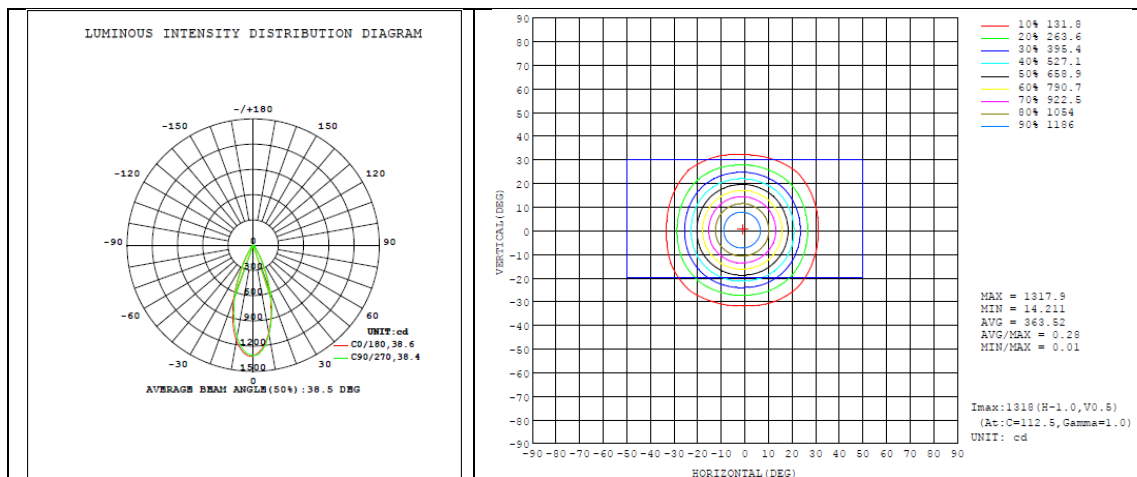


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	527.1	81.4%
0-40	590.6	91.2%
0-60	631.4	97.5%
60-90	16.2	2.3%
70-100	7.1	1.1%
90-120	0.0	0.0%
0-90	647.6	100.0%
90-180	0.0	0.0%
0-180	647.6	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	114.6	17.7%	90-100	0	0%
10-20	240.3	37.1%	100-110	0	0%
20-30	172.3	26.6%	110-120	0	0%
30-40	63.5	9.8%	120-130	0	0%
40-50	26.6	4.1%	130-140	0	0%
50-60	14.2	2.2%	140-150	0	0%
60-70	9.1	1.4%	150-160	0	0%
70-80	5.8	0.9%	160-170	0	0%
80-90	1.3	0.2%	170-180	0	0%

## Photometric Data





## 2.1.2 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-6-17	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0139 (R3S-9B)	<b>CCT Setting</b>	3000k

### Electrical Measurement:

<b>Sampel No.</b>	<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>
#1	120	60	0.07215	8.395	0.9659

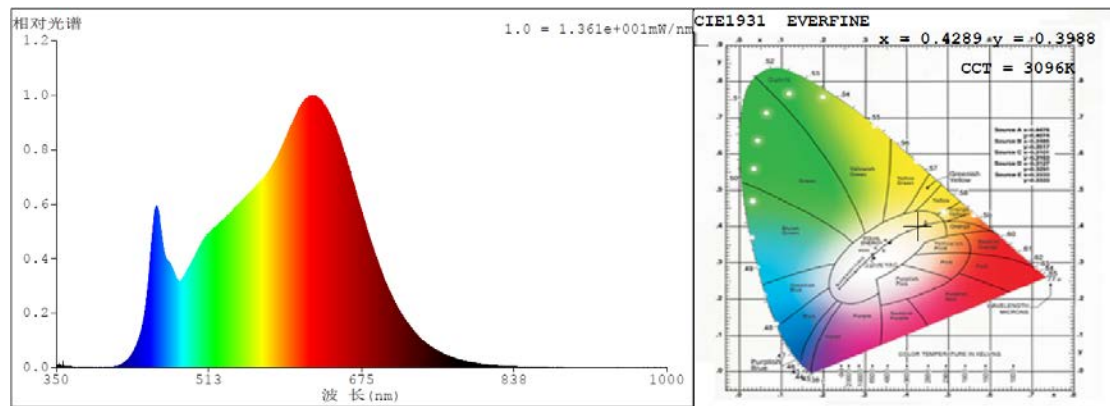
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	99	R9	79
Frequency (Hz)	60	R2	98	R10	97
CCT (K)	3096	R3	97	R11	99
Duv	-0.000979	R4	96	R12	83
Chromaticity (x, y)	x=0.4289, y=0.3999	R5	98	R13	99
Chromaticity (u', v')	u' =0.2477, v' =0.5181	R6	95	R14	99
Color Rendering Index (CRI)	95.6	R7	93	R15	96
R9	79	R8	89	--	--

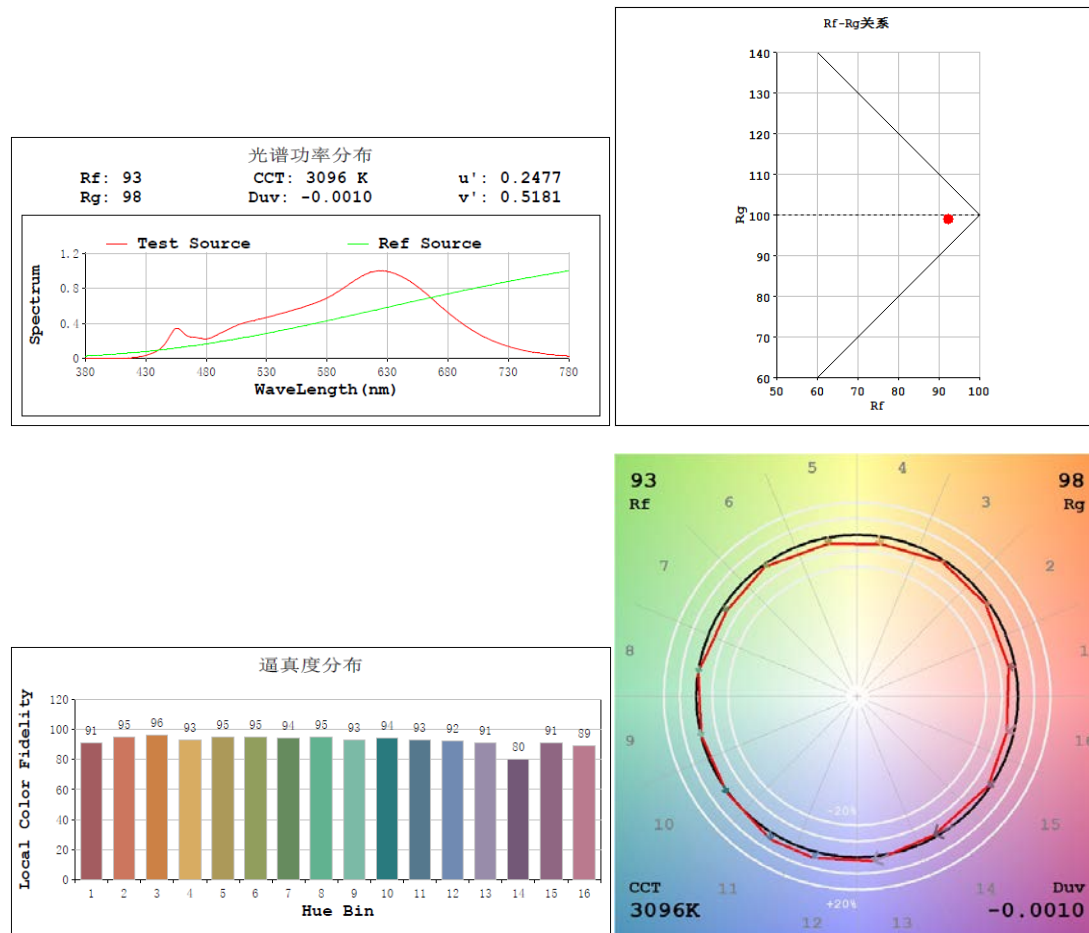
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	690.21
Luminous Efficacy (lm/W)	82.12
Beam Angle (°)	38.5
Center Beam Candle Power (cd)	1405

# Spectral Power Distribution & Chromaticity Diagram



## TM30

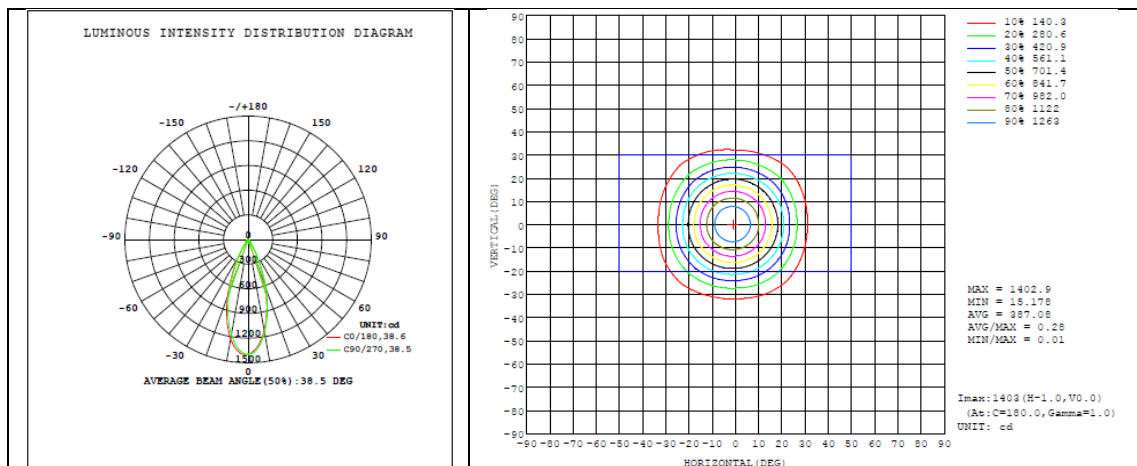


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	561.8	81.4%
0-40	629.5	91.2%
0-60	673.0	97.5%
60-90	17.3	2.3%
70-100	7.6	1.1%
90-120	0.0	0.0%
0-90	690.2	100.0%
90-180	0.0	0.0%
0-180	690.2	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	122.2	17.7%	90-100	0	0%
10-20	254.7	36.9%	100-110	0	0%
20-30	185.0	26.8%	110-120	0	0%
30-40	67.6	9.8%	120-130	0	0%
40-50	28.3	4.1%	130-140	0	0%
50-60	15.2	2.2%	140-150	0	0%
60-70	9.7	1.4%	150-160	0	0%
70-80	6.2	0.9%	160-170	0	0%
80-90	1.4	0.2%	170-180	0	0%

## Photometric Data





### 2.1.3 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-6-17	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0139 (R3S-9B)	<b>CCT Setting</b>	3500k

#### Electrical Measurement:

<b>Sampel No.</b>	<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>
#1	120	60	0.07090	8.240	0.9647

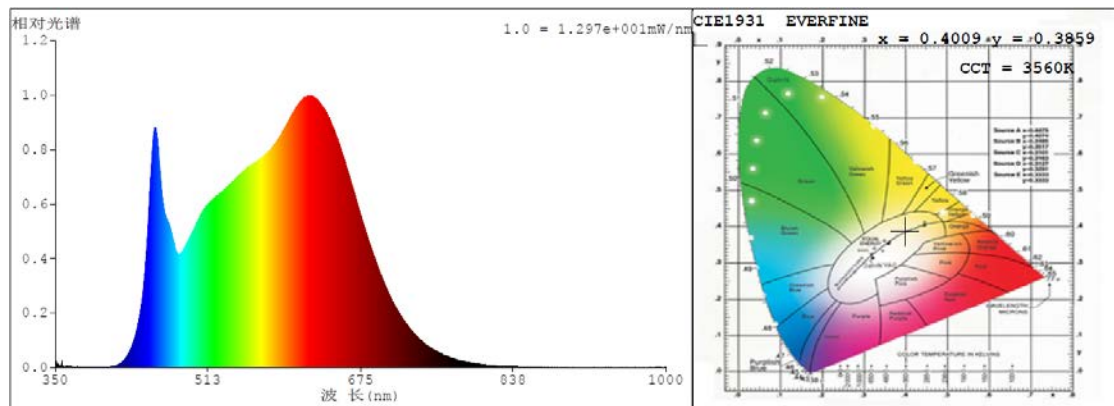
#### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	98	R9	83
Frequency (Hz)	60	R2	98	R10	98
CCT (K)	3560	R3	98	R11	98
Duv	-0.00114	R4	95	R12	78
Chromaticity (x, y)	x=0.4009, y=0.3859	R5	97	R13	99
Chromaticity (u', v')	u' =0.2348, v' =0.5086	R6	95	R14	99
Color Rendering Index (CRI)	95.6	R7	93	R15	96
R9	83	R8	91	--	--

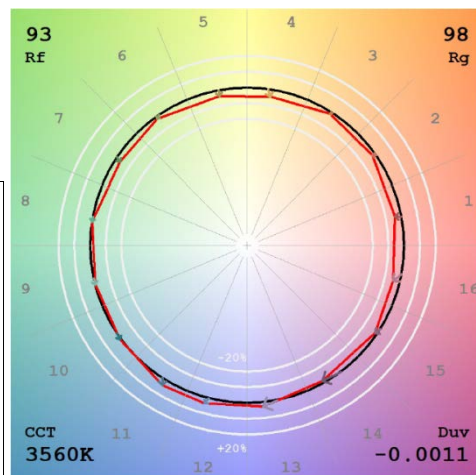
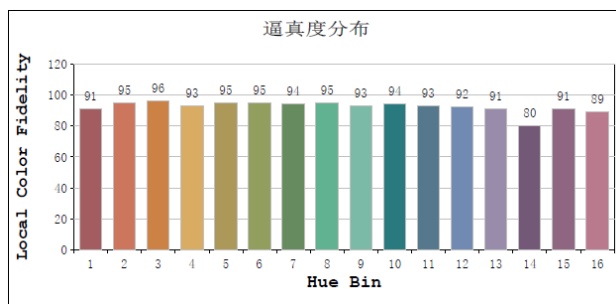
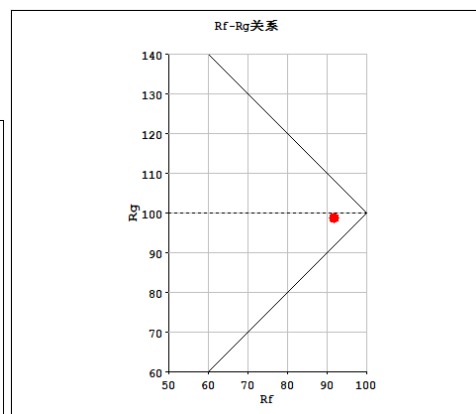
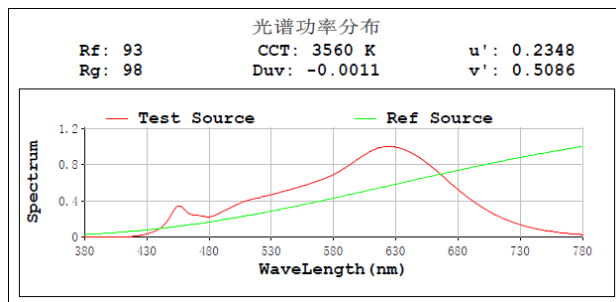
#### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	732.24
Luminous Efficacy (lm/W)	88.76
Beam Angle (°)	38.6
Center Beam Candle Power (cd)	1483

# Spectral Power Distribution & Chromaticity Diagram



## TM30

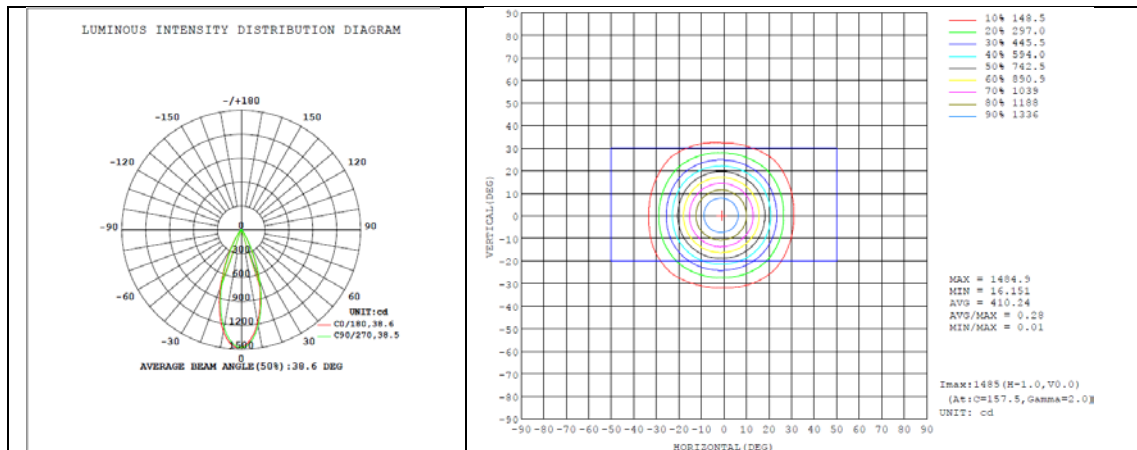


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	595.3	81.3%
0-40	667.8	91.2%
0-60	713.9	97.5%
60-90	18.3	2.3%
70-100	8.1	1.1%
90-120	0.0	0.0%
0-90	732.2	100.0%
90-180	0.0	0.0%
0-180	732.2	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	128.9	17.6%	90-100	0	0%
10-20	270.2	36.9%	100-110	0	0%
20-30	196.2	26.8%	110-120	0	0%
30-40	72.5	9.9%	120-130	0	0%
40-50	30.0	4.1%	130-140	0	0%
50-60	16.1	2.2%	140-150	0	0%
60-70	10.3	1.4%	150-160	0	0%
70-80	6.6	0.9%	160-170	0	0%
80-90	1.5	0.2%	170-180	0	0%

## Photometric Data



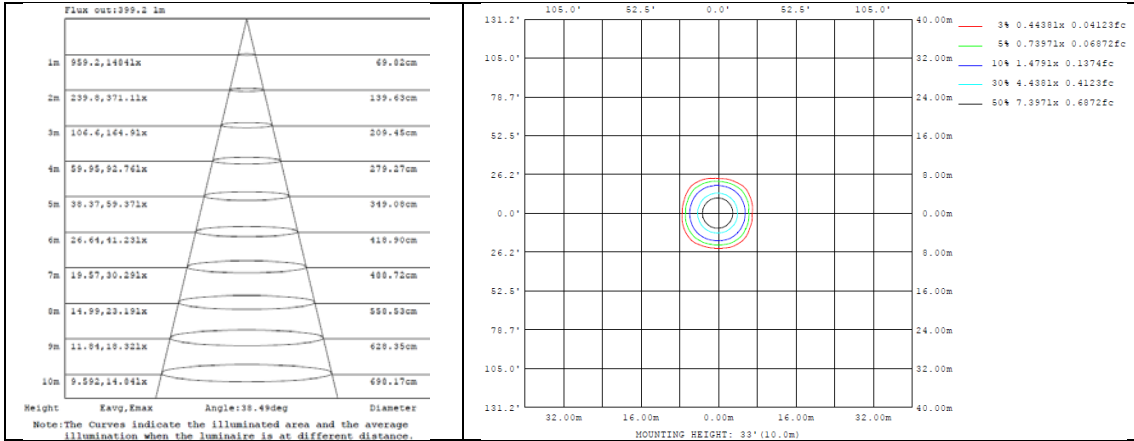


Table--1

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	1477	1477	1477	1477	1477	1477	1477	1477	1477	1477	1477	1477	1477	1477	1477	1477				
5	1377	1384	1389	1398	1407	1424	1435	1445	1441	1445	1440	1426	1416	1400	1388	1382				
10	1184	1191	1189	1207	1220	1247	1269	1291	1292	1298	1288	1264	1245	1223	1207	1191				
15	921	927	927	946	963	994	1022	1051	1057	1057	1046	1025	1002	974	955	933				
20	632	639	643	661	677	708	736	762	768	768	762	741	717	687	667	644				
25	360	376	389	397	403	433	461	478	477	481	483	458	430	412	403	381				
30	175	184	207	204	205	222	253	260	253	257	268	242	215	209	212	190				
35	74.8	85.0	107	103	87.1	103	133	131	111	124	140	117	90.5	96.5	114	93.8				
40	44.3	49.1	64.7	57.0	47.7	55.1	77.5	69.7	53.9	61.1	80.0	62.1	47.9	51.2	66.4	53.4				
45	30.8	34.2	41.2	37.3	32.6	37.2	46.7	41.3	34.6	37.9	47.1	38.6	31.8	34.1	40.8	35.9				
50	21.5	24.1	28.0	26.5	23.2	26.0	31.0	28.1	24.2	26.2	30.5	26.8	22.6	24.1	27.3	24.9				
55	15.0	17.0	19.1	18.8	16.4	18.6	21.1	20.3	17.3	18.9	20.8	19.1	15.8	17.1	18.7	17.6				
60	11.7	12.6	13.1	13.3	12.3	13.4	14.4	14.1	12.5	13.3	14.3	13.2	12.0	12.6	12.8	12.6				
65	9.93	10.5	9.86	10.6	10.6	11.0	10.4	10.9	10.7	10.9	10.3	10.6	10.3	10.6	9.69	10.2				
70	7.64	7.97	7.74	8.28	8.22	8.59	8.21	8.69	8.30	8.53	8.07	8.32	8.02	8.04	7.61	7.78				
75	5.34	5.52	5.52	5.90	5.77	6.20	5.99	6.18	6.04	6.18	5.84	5.94	5.52	5.58	5.37	5.46				
80	3.13	3.38	3.32	3.59	3.71	3.88	3.80	3.91	3.86	3.83	3.66	3.64	3.47	3.42	3.20	3.27				
85	1.18	1.29	1.30	1.42	1.55	1.66	1.75	1.84	1.69	1.71	1.63	1.51	1.46	1.36	1.18	1.20				
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				

## 2.1.4 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-6-17	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0139 (R3S-9B)	<b>CCT Setting</b>	4000k

### Electrical Measurement:

<b>Sampel No.</b>	<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>
#1	120	60	0.07130	8.290	0.9651

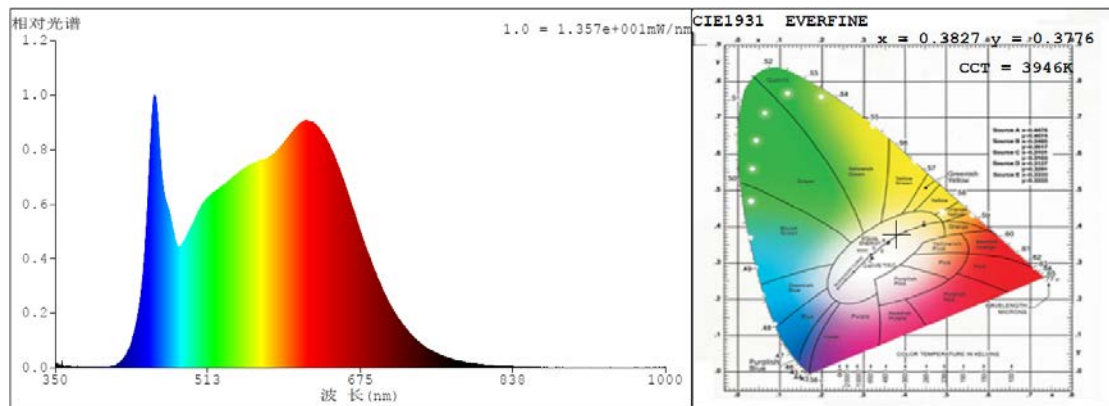
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	98	R9	82
Frequency (Hz)	60	R2	99	R10	99
CCT (K)	3946	R3	98	R11	96
Duv	-0.000250	R4	94	R12	75
Chromaticity (x, y)	x=0.3827, y=0.3776	R5	96	R13	99
Chromaticity (u', v')	u' =0.2262, v' =0.5023	R6	96	R14	100
Color Rendering Index (CRI)	95.5	R7	93	R15	95
R9	82	R8	90	--	--

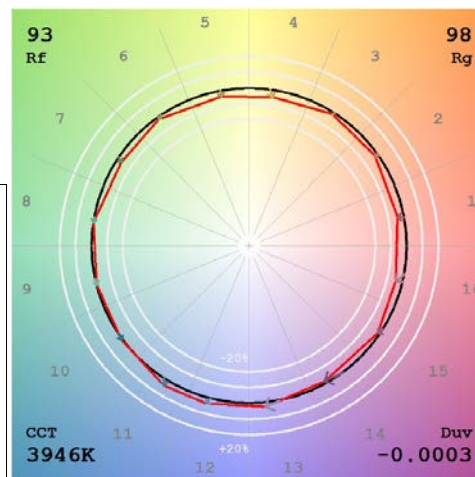
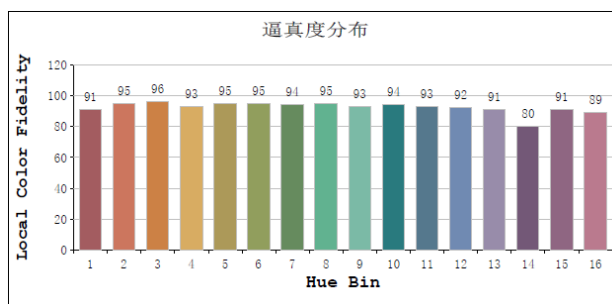
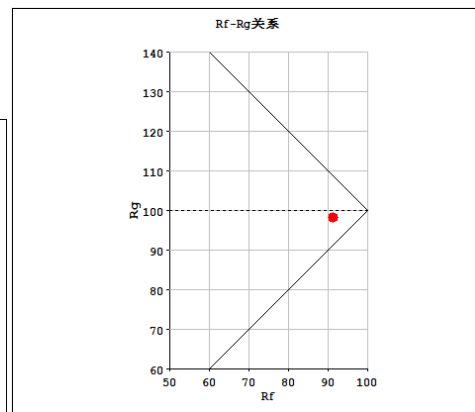
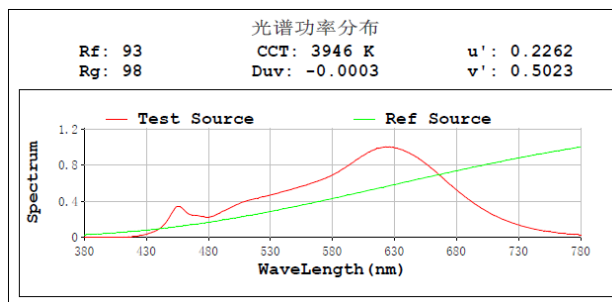
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	753.15
Luminous Efficacy (lm/W)	90.74
Beam Angle (°)	38.6
Center Beam Candle Power (cd)	1525

# Spectral Power Distribution & Chromaticity Diagram



## TM30

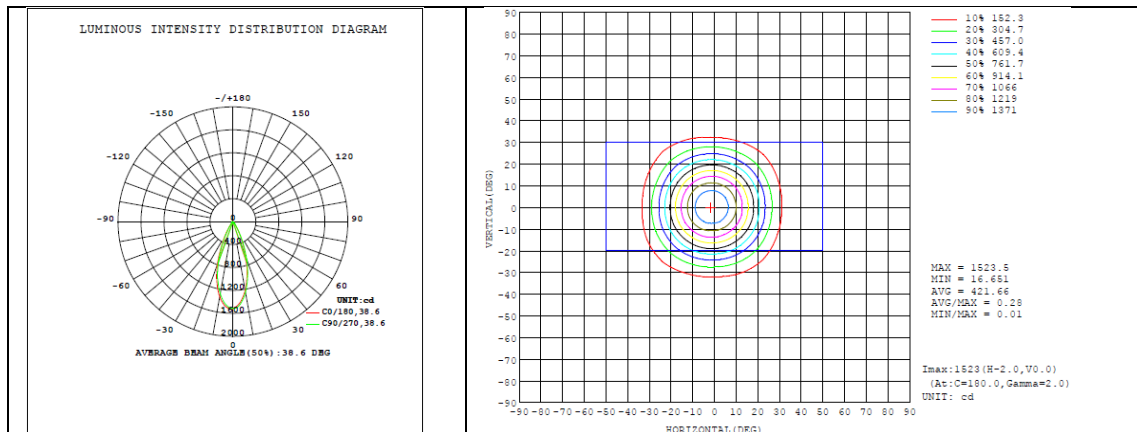


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	611.6	81.2%
0-40	686.1	91.1%
0-60	734.3	97.5%
60-90	18.8	2.3%
70-100	8.3	1.1%
90-120	0.0	0.0%
0-90	753.2	100.0%
90-180	0.0	0.0%
0-180	753.2	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	132.6	17.6%	90-100	0	0%
10-20	277.2	36.8%	100-110	0	0%
20-30	201.8	26.8%	110-120	0	0%
30-40	74.6	9.9%	120-130	0	0%
40-50	30.9	4.1%	130-140	0	0%
50-60	17.3	2.3%	140-150	0	0%
60-70	10.5	1.4%	150-160	0	0%
70-80	6.8	0.9%	160-170	0	0%
80-90	1.5	0.2%	170-180	0	0%

## Photometric Data





## 2.1.5 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-6-17	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0139 (R3S-9B)	<b>CCT Setting</b>	5000k

### Electrical Measurement:

<b>Sampel No.</b>	<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>
#1	120	60	0.07318	8.524	0.9668

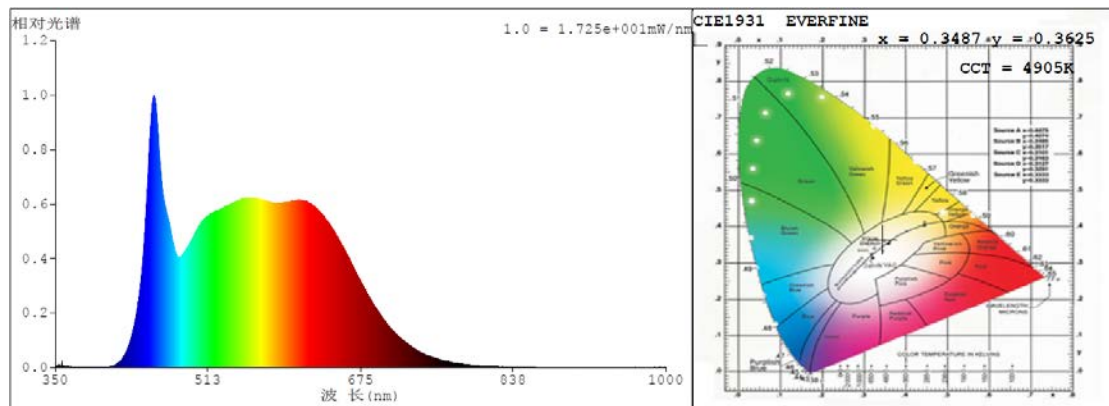
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	93	R9	69
Frequency (Hz)	60	R2	97	R10	93
CCT (K)	4905	R3	98	R11	90
Duv	0.00392	R4	89	R12	67
Chromaticity (x, y)	x=0.3487, y=0.3625	R5	91	R13	95
Chromaticity (u', v')	u' =0.2097, v' =0.4904	R6	94	R14	99
Color Rendering Index (CRI)	92.9	R7	93	R15	90
R9	69	R8	87	--	--

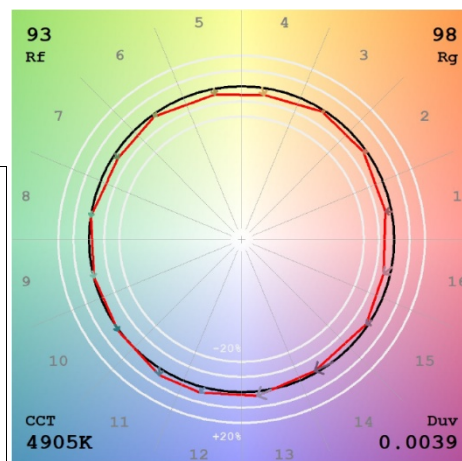
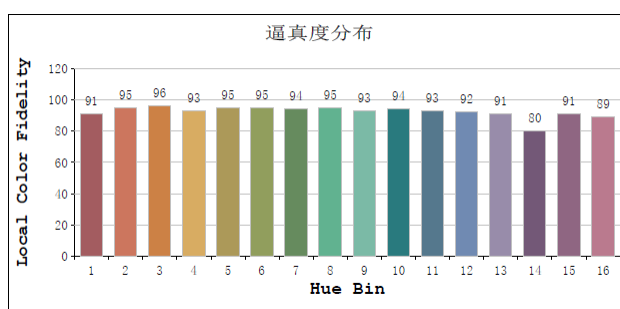
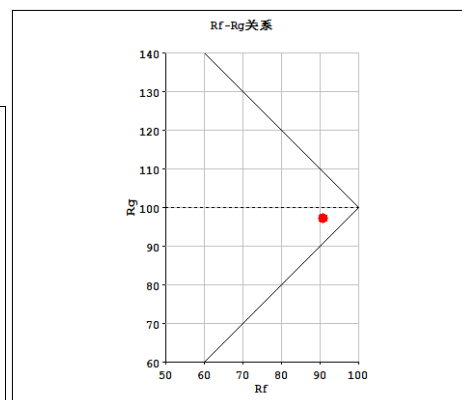
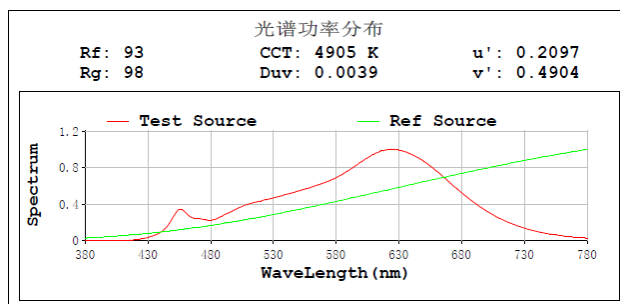
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	769.20
Luminous Efficacy (lm/W)	90.17
Beam Angle (°)	38.7
Center Beam Candle Power (cd)	1552

# Spectral Power Distribution & Chromaticity Diagram



## TM30

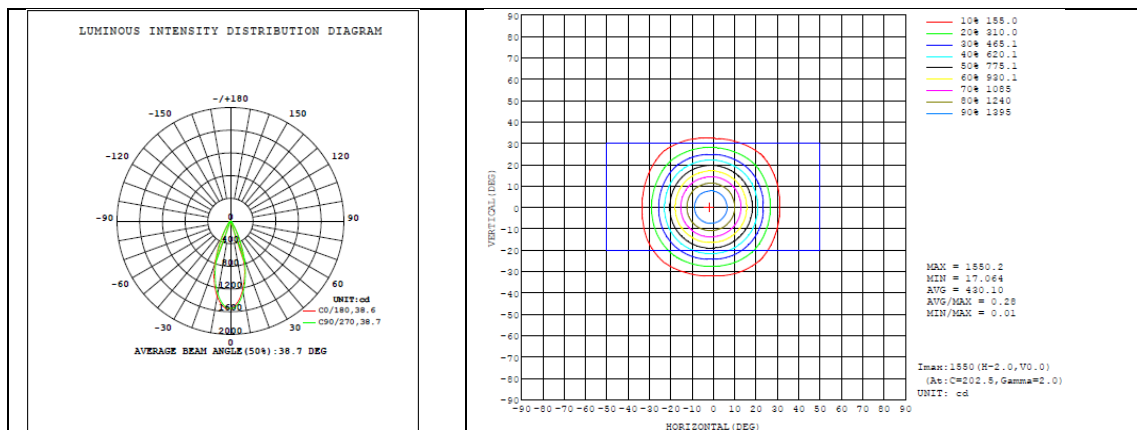


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	623.8	81.1%
0-40	700.7	91.1%
0-60	750.0	97.5%
60-90	19.2	2.3%
70-100	8.5	1.1%
90-120	0.0	0.0%
0-90	769.2	100.0%
90-180	0.0	0.0%
0-180	769.2	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	135.4	17.6%	90-100	0	0%
10-20	282.3	36.7%	100-110	0	0%
20-30	206.1	26.8%	110-120	0	0%
30-40	76.9	10.0%	120-130	0	0%
40-50	31.5	4.1%	130-140	0	0%
50-60	17.7	2.3%	140-150	0	0%
60-70	10.8	1.4%	150-160	0	0%
70-80	6.9	0.9%	160-170	0	0%
80-90	1.5	0.2%	170-180	0	0%

## Photometric Data



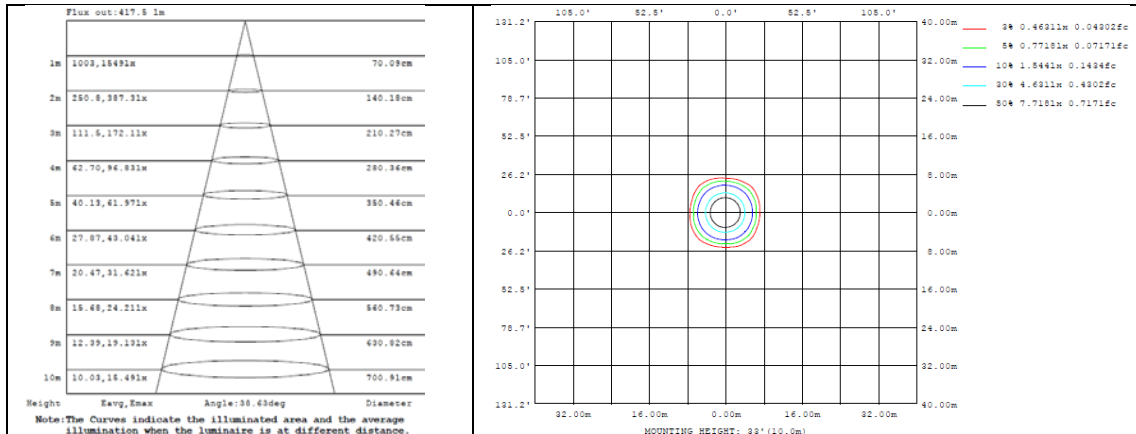


Table--1

UNIT: cd

Y (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	1542	1542	1542	1542	1542	1542	1542	1542	1542	1542	1542	1542	1542	1542	1542	1542
5	1440	1446	1451	1461	1477	1493	1500	1508	1510	1511	1501	1492	1480	1462	1451	1442
10	1235	1241	1245	1261	1281	1308	1329	1352	1353	1356	1345	1322	1300	1273	1259	1242
15	961	969	971	991	1014	1047	1069	1100	1105	1102	1096	1069	1048	1014	992	974
20	663	670	676	698	717	749	774	801	805	803	795	775	752	719	696	674
25	380	394	410	421	428	461	487	506	502	502	507	482	454	435	424	401
30	184	194	219	218	221	238	269	276	268	271	282	254	229	221	223	200
35	78.9	89.5	113	109	94.0	111	141	139	117	130	148	127	96.9	102	119	98.8
40	46.9	51.9	68.6	60.7	50.9	58.9	82.3	73.2	57.0	64.3	84.0	65.8	50.8	54.3	69.7	56.4
45	32.5	36.0	43.4	39.4	34.6	39.4	49.4	43.7	36.5	40.0	49.7	40.7	33.7	36.1	43.0	37.9
50	22.7	25.5	29.5	28.0	24.6	27.5	32.6	29.7	25.6	27.6	32.2	28.3	23.9	25.5	28.8	26.4
55	15.9	18.0	20.2	19.9	17.4	19.7	22.2	21.5	18.3	20.0	21.9	20.3	16.8	18.2	19.7	18.5
60	12.4	13.3	13.8	14.0	13.1	14.2	15.2	14.9	13.2	14.0	15.1	14.0	12.8	13.3	13.5	13.4
65	10.5	11.1	10.4	11.2	11.2	11.7	11.0	11.5	11.4	11.6	10.9	11.2	10.9	11.2	10.2	10.8
70	8.11	8.42	8.19	8.74	8.72	9.07	8.68	9.17	8.74	9.06	8.54	8.80	8.53	8.52	8.03	8.26
75	5.66	5.85	5.82	6.23	6.10	6.57	6.33	6.53	6.38	6.52	6.20	6.26	5.85	5.91	5.68	5.78
80	3.32	3.58	3.51	3.79	3.93	4.10	4.00	4.15	4.10	4.05	3.88	3.85	3.71	3.63	3.39	3.47
85	1.26	1.37	1.38	1.49	1.65	1.76	1.85	1.95	1.81	1.81	1.74	1.61	1.56	1.45	1.25	1.28
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00

Model Number	CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
DLR0139 (R3S-9B)	2700K setting	120	647.58	8.53	75.90
	3000K setting	120	690.21	8.40	82.12
	3500K setting	120	732.24	8.25	88.76
	4000K setting	120	753.15	8.30	90.74
	5000K setting	120	769.20	8.53	90.17