

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) :

DLR0135(R3-9B)

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

### 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 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.

### 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 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.

## 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>	DLR0135 (R3-9B)	<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	0.07397	8.620	0.9672

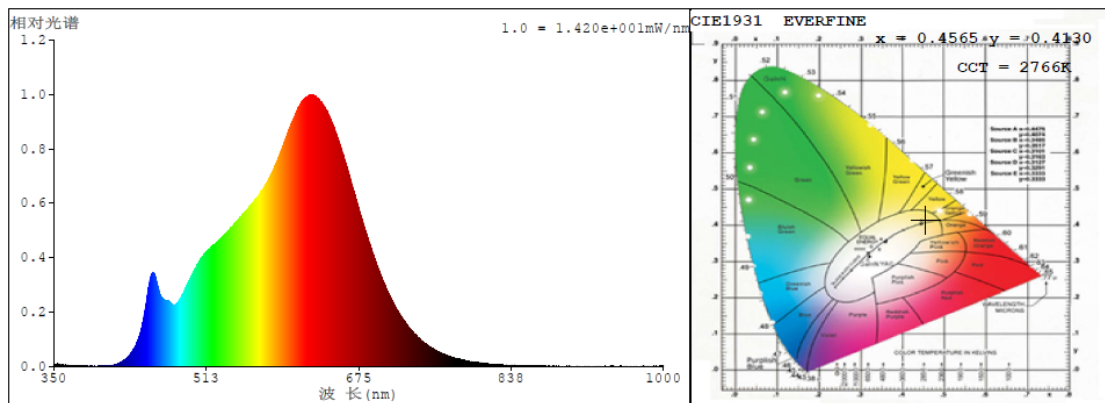
### Chromaticity Measurement – Sphere-Spectroradiometer Method:

<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)	2766	R3	99	R11	99
Duv	0.00120	R4	97	R12	88
Chromaticity (x, y)	x=0.4565, y=0.4130	R5	97	R13	99
Chromaticity (u', v')	u' =0.2593, v' =0.5278	R6	97	R14	99
Color Rendering Index (CRI)	95.8	R7	93	R15	93
R9	71	R8	87	--	--

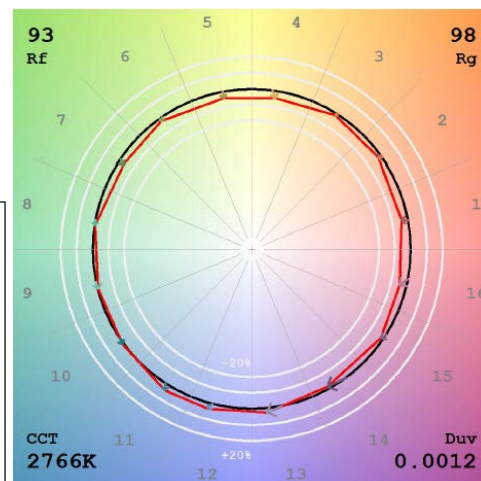
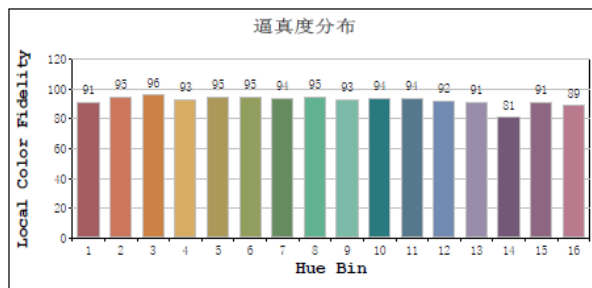
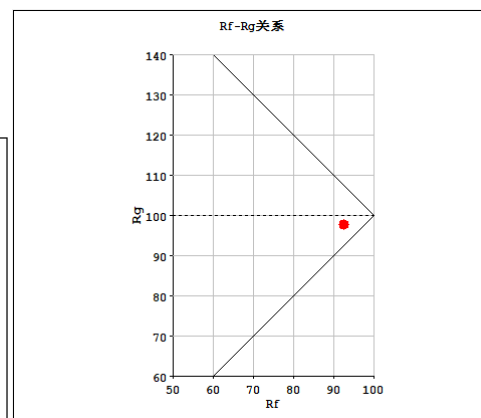
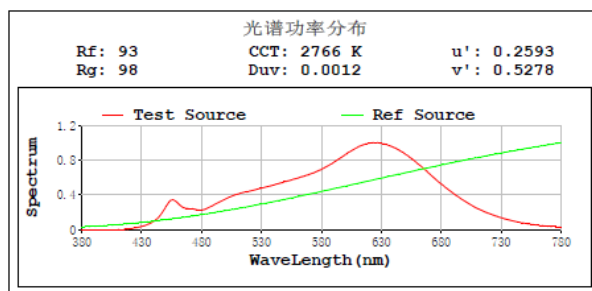
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	656.65
Luminous Efficacy (lm/W)	76.43
Beam Angle (°)	36.8
Center Beam Candle Power (cd)	1408

# Spectral Power Distribution & Chromaticity Diagram



## TM30

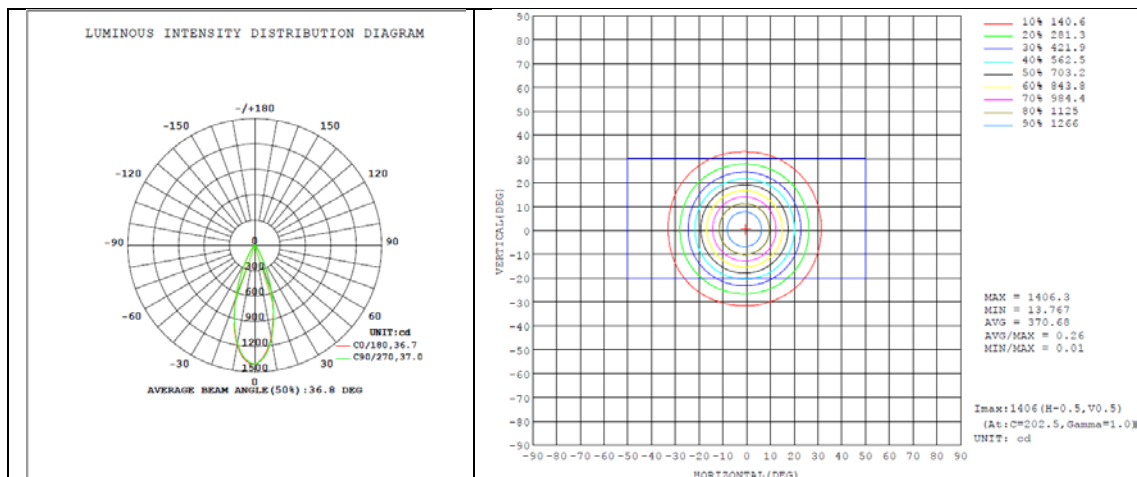


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	535.2	81.5%
0-40	600.8	91.5%
0-60	642.9	97.9%
60-90	13.8	1.9%
70-100	5.9	0.9%
90-120	0.0	0.0%
0-90	656.7	100.0%
90-180	0.0	0.0%
0-180	656.7	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	121.5	18.5%	90-100	0	0%
10-20	244.3	37.2%	100-110	0	0%
20-30	169.4	25.8%	110-120	0	0%
30-40	65.7	10.0%	120-130	0	0%
40-50	26.9	4.1%	130-140	0	0%
50-60	15.1	2.3%	140-150	0	0%
60-70	7.9	1.2%	150-160	0	0%
70-80	4.6	0.7%	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>	DLR0135 (R3-9B)	<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	0.07276	8.469	0.9662

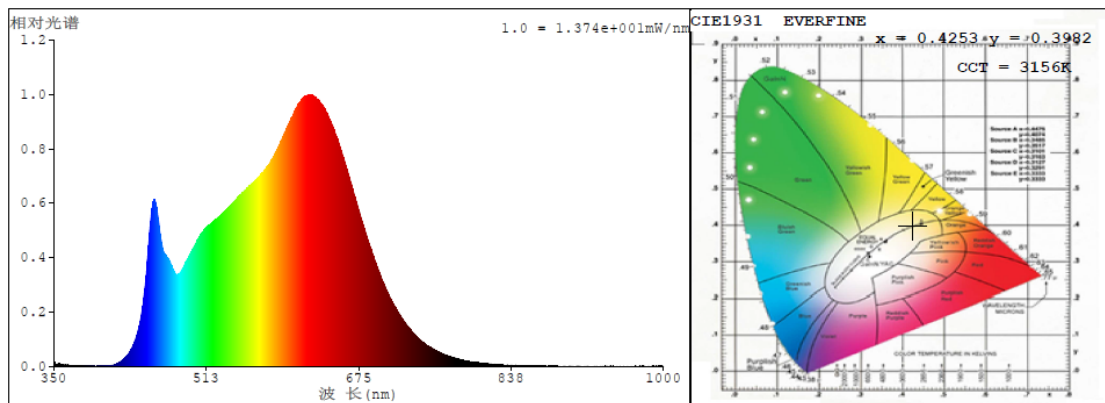
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	99	R9	80
Frequency (Hz)	60	R2	98	R10	97
CCT (K)	3156	R3	97	R11	99
Duv	-0.000664	R4	96	R12	82
Chromaticity (x, y)	x=0.4253, y=0.3982	R5	97	R13	99
Chromaticity (u', v')	u' =0.2456, v' =0.5173	R6	95	R14	99
Color Rendering Index (CRI)	95.6	R7	93	R15	96
R9	80	R8	90	--	--

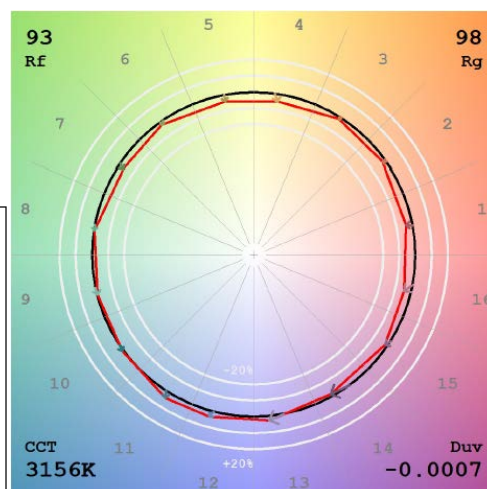
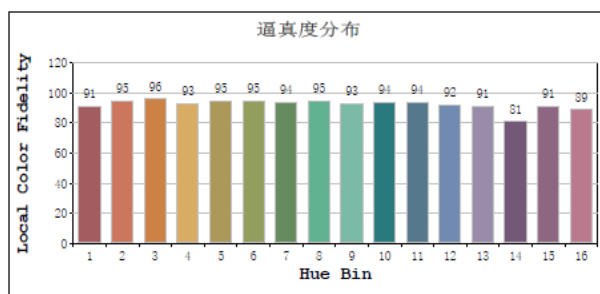
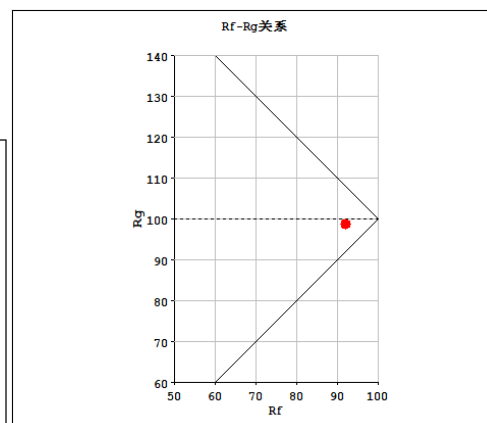
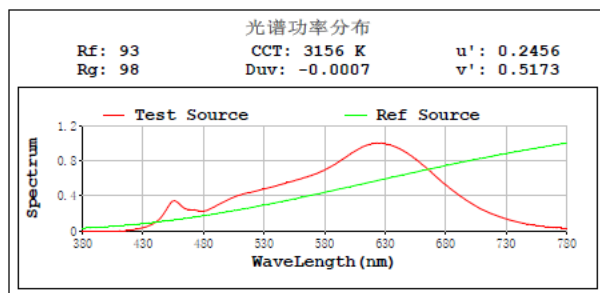
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	702.42
Luminous Efficacy (lm/W)	83.18
Beam Angle (°)	36.9
Center Beam Candle Power (cd)	1501

# Spectral Power Distribution & Chromaticity Diagram



## TM30

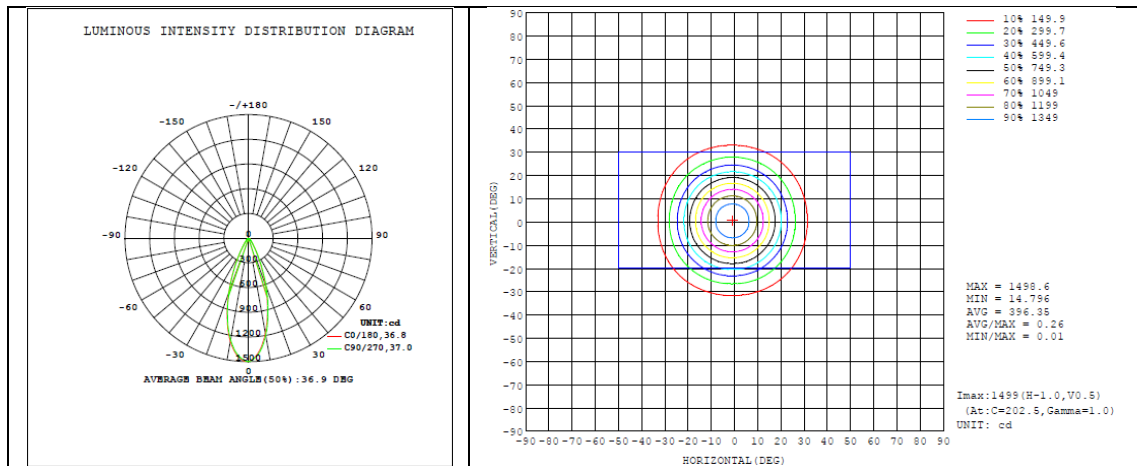


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	571.8	81.4%
0-40	642.7	91.5%
0-60	687.0	97.8%
60-90	15.5	2.0%
70-100	6.3	0.9%
90-120	0.0	0.0%
0-90	702.4	100.0%
90-180	0.0	0.0%
0-180	702.4	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	129.2	18.4%	90-100	0	0%
10-20	261.3	37.2%	100-110	0	0%
20-30	181.2	25.8%	110-120	0	0%
30-40	70.9	10.1%	120-130	0	0%
40-50	28.8	4.1%	130-140	0	0%
50-60	15.5	2.2%	140-150	0	0%
60-70	9.1	1.3%	150-160	0	0%
70-80	4.9	0.7%	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>	DLR0135 (R3-9B)	<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	0.07139	8.299	0.9650

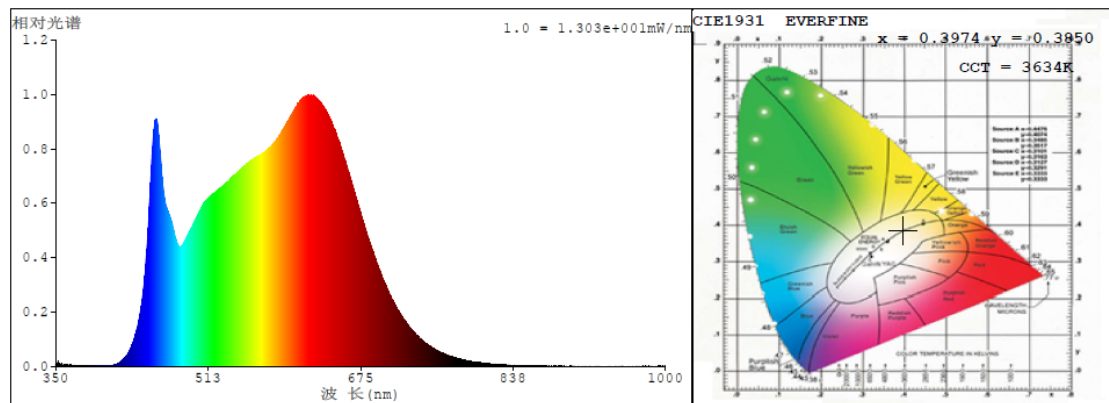
#### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<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	97
CCT (K)	3634	R3	98	R11	98
Duv	-0.000705	R4	95	R12	78
Chromaticity (x, y)	x=0.3974, y=0.3850	R5	96	R13	99
Chromaticity (u', v')	u' =0.2329, v' =0.5077	R6	95	R14	99
Color Rendering Index (CRI)	95.4	R7	93	R15	96
R9	83	R8	91	--	--

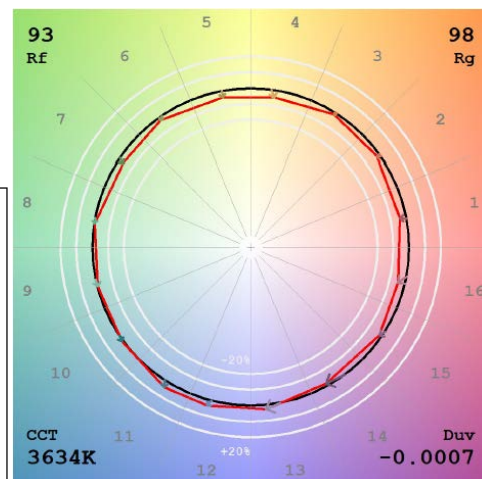
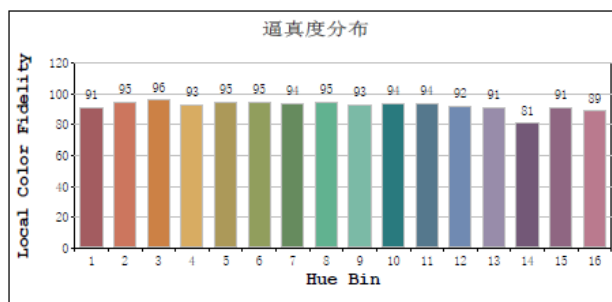
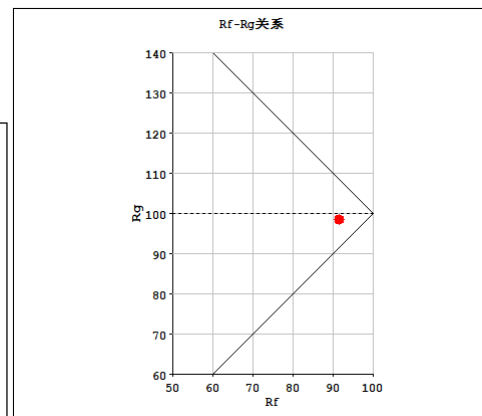
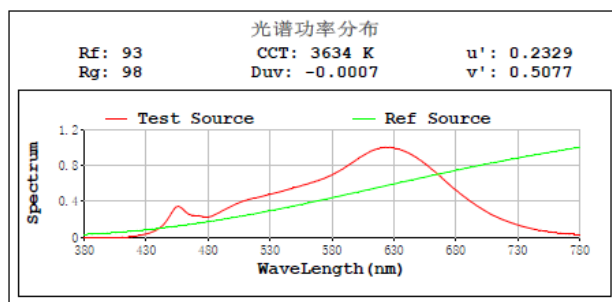
#### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	742.63
Luminous Efficacy (lm/W)	89.68
Beam Angle (°)	36.9
Center Beam Candle Power (cd)	1583

# Spectral Power Distribution & Chromaticity Diagram



## TM30

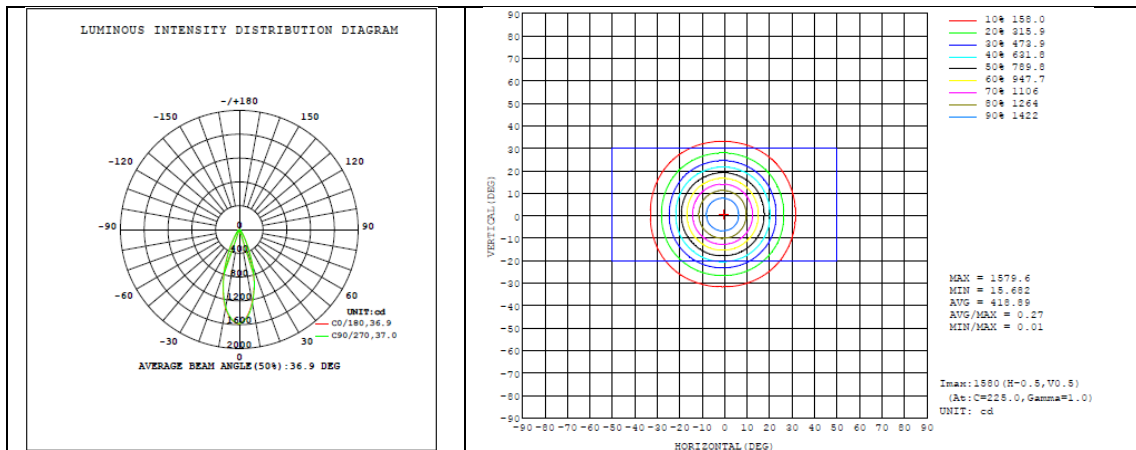


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1287.0	81.3%
0-40	1446.9	91.4%
0-60	1548.2	97.8%
60-90	34.8	2.0%
70-100	14.2	0.9%
90-120	0.0	0.0%
0-90	1583.0	100.0%
90-180	0.0	0.0%
0-180	1583.0	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	291.3	18.4%	90-100	0	0%
10-20	585.7	37.0%	100-110	0	0%
20-30	410.0	25.9%	110-120	0	0%
30-40	159.9	10.1%	120-130	0	0%
40-50	66.5	4.2%	130-140	0	0%
50-60	34.8	2.2%	140-150	0	0%
60-70	20.6	1.3%	150-160	0	0%
70-80	11.1	0.7%	160-170	0	0%
80-90	3.2	0.2%	170-180	0	0%

## Photometric Data





## 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>	DLR0135 (R3-9B)	<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	0.07178	8.348	0.9653

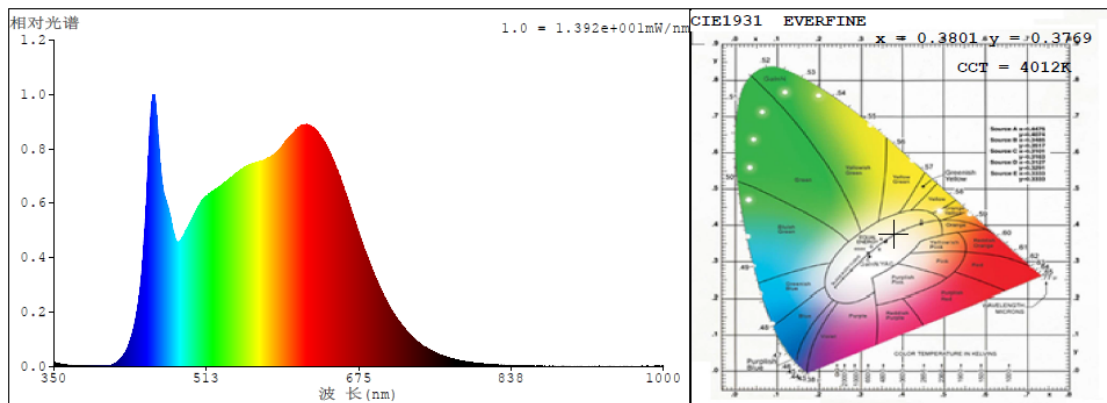
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	98	R9	83
Frequency (Hz)	60	R2	99	R10	99
CCT (K)	4012	R3	98	R11	96
Duv	0.000194	R4	93	R12	75
Chromaticity (x, y)	x=0.3801, y=0.3769	R5	95	R13	99
Chromaticity (u', v')	u' =0.2248, v' =0.5016	R6	96	R14	99
Color Rendering Index (CRI)	95.3	R7	93	R15	95
R9	83	R8	90	--	--

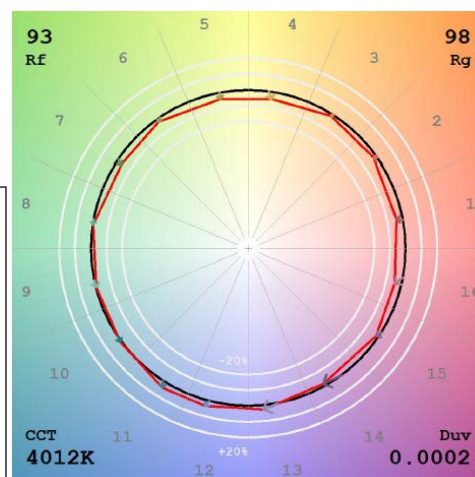
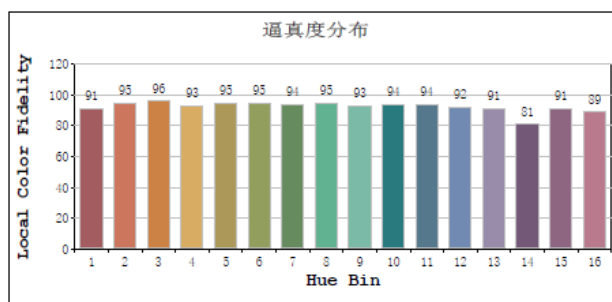
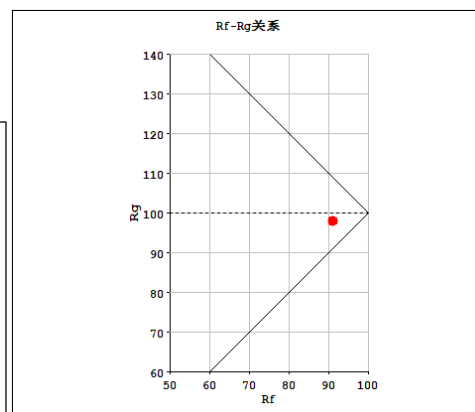
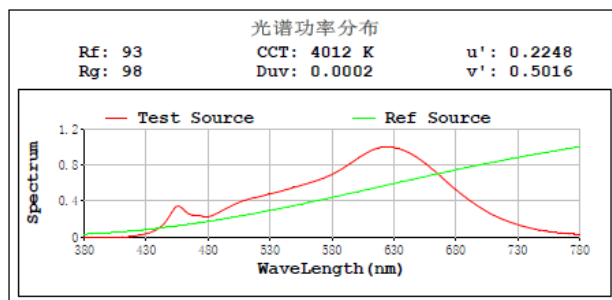
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	761.83
Luminous Efficacy (lm/W)	91.45
Beam Angle (°)	37.0
Center Beam Candle Power (cd)	1619

# Spectral Power Distribution & Chromaticity Diagram



## TM30

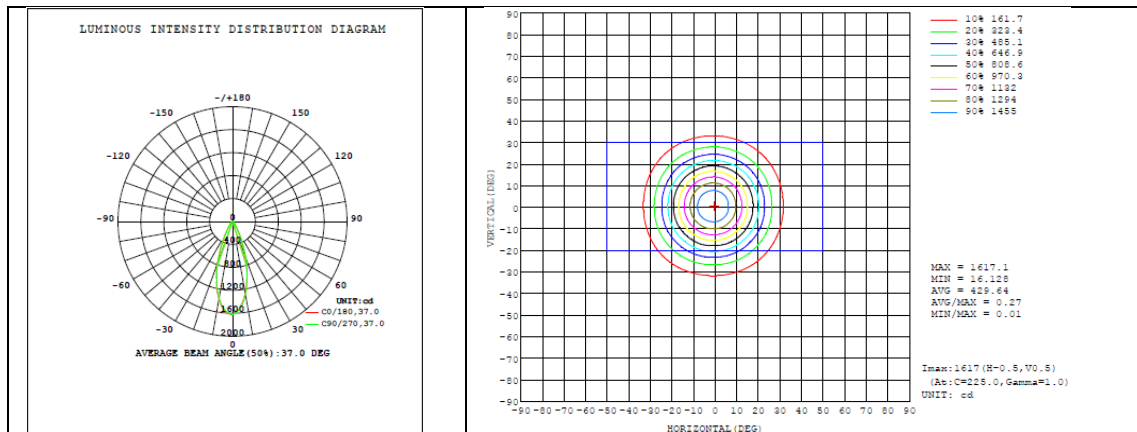


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	619.4	81.3%
0-40	696.3	91.4%
0-60	745.1	97.8%
60-90	16.8	2.0%
70-100	6.9	0.9%
90-120	0.0	0.0%
0-90	761.8	100.0%
90-180	0.0	0.0%
0-180	761.8	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	139.4	18.3%	90-100	0	0%
10-20	281.9	37.0%	100-110	0	0%
20-30	198.1	26.0%	110-120	0	0%
30-40	76.9	10.1%	120-130	0	0%
40-50	32.0	4.2%	130-140	0	0%
50-60	16.8	2.2%	140-150	0	0%
60-70	9.9	1.3%	150-160	0	0%
70-80	5.3	0.7%	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>	DLR0135 (R3-9B)	<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	0.07387	8.608	0.9672

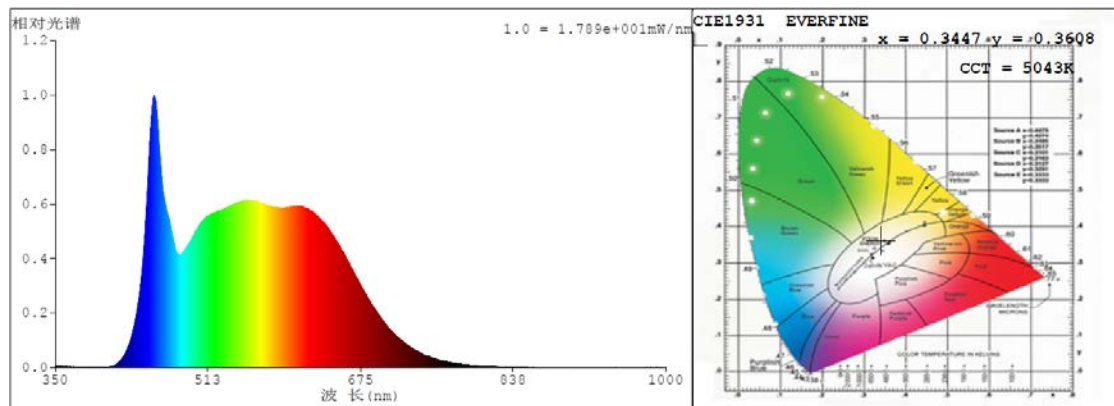
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	93	R9	66
Frequency (Hz)	60	R2	97	R10	93
CCT (K)	5043	R3	98	R11	92
Duv	0.00471	R4	91	R12	73
Chromaticity (x, y)	x=0.3447, y=0.3608	R5	92	R13	95
Chromaticity (u', v')	u' =0.2077, v' =0.4890	R6	95	R14	99
Color Rendering Index (CRI)	93.1	R7	93	R15	90
R9	66	R8	86	--	--

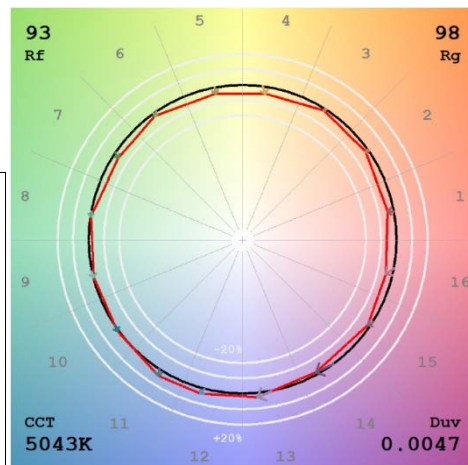
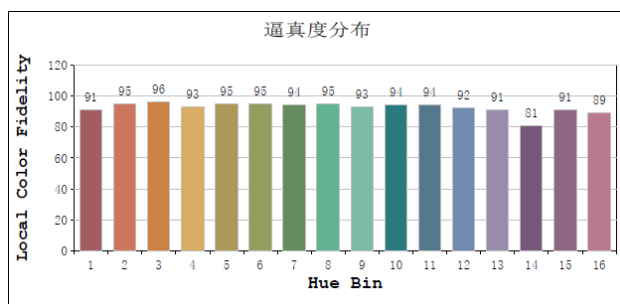
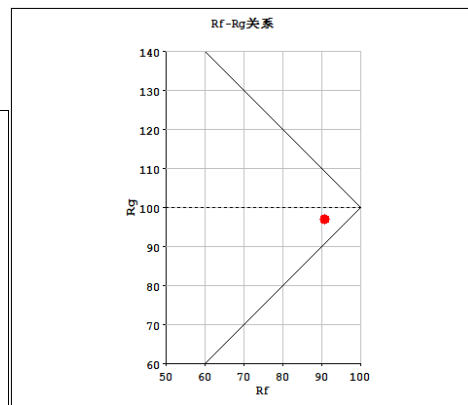
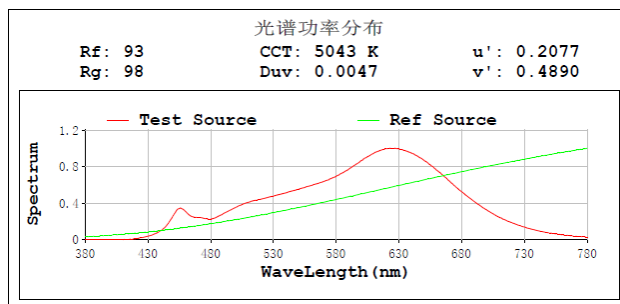
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	778.58
Luminous Efficacy (lm/W)	90.63
Beam Angle (°)	37.1
Center Beam Candle Power (cd)	1646

# Spectral Power Distribution & Chromaticity Diagram



## TM30

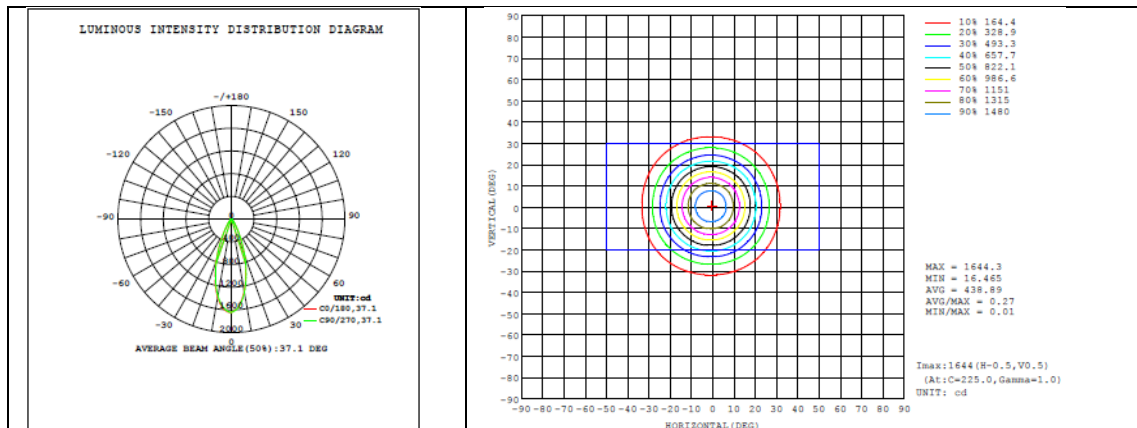


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	632.2	81.2%
0-40	711.6	91.4%
0-60	761.5	97.8%
60-90	17.1	2.0%
70-100	7.0	0.9%
90-120	0.0	0.0%
0-90	778.6	100.0%
90-180	0.0	0.0%
0-180	778.6	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	141.7	18.2%	90-100	0	0%
10-20	287.3	36.9%	100-110	0	0%
20-30	203.2	26.1%	110-120	0	0%
30-40	79.4	10.2%	120-130	0	0%
40-50	32.7	4.2%	130-140	0	0%
50-60	17.1	2.2%	140-150	0	0%
60-70	10.1	1.3%	150-160	0	0%
70-80	5.5	0.7%	160-170	0	0%
80-90	1.6	0.2%	170-180	0	0%

## Photometric Data



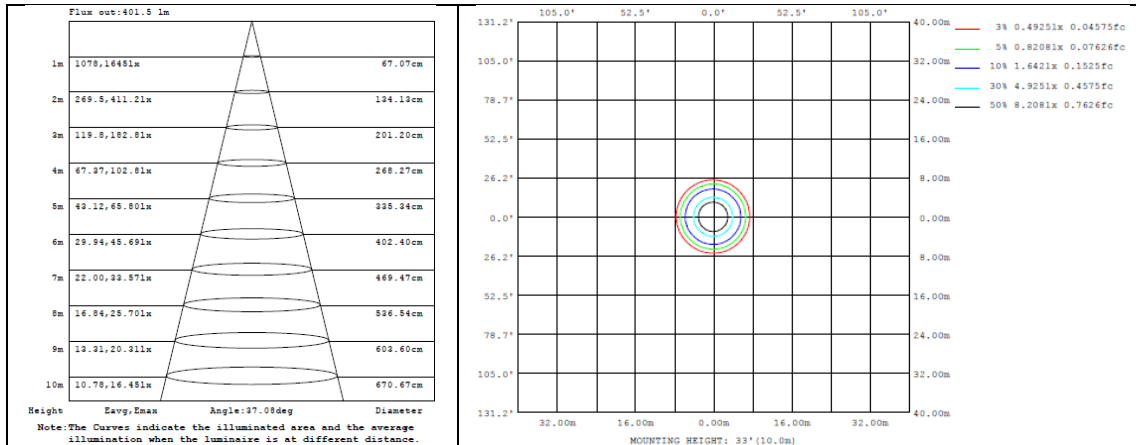


Table--1

UNIT: cd

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	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642		
5	1531	1531	1534	1539	1542	1558	1570	1586	1587	1587	1592	1579	1567	1556	1544	1537		
10	1296	1291	1297	1306	1315	1342	1360	1390	1401	1407	1411	1392	1376	1352	1331	1308		
15	990	982	982	995	1007	1036	1061	1097	1117	1124	1127	1108	1088	1059	1030	1005		
20	674	665	662	676	690	715	737	771	787	796	796	779	767	738	718	691		
25	393	389	387	396	406	425	447	477	490	495	496	482	469	447	426	405		
30	206	199	199	203	211	220	238	258	267	269	269	261	253	238	222	214		
35	108	105	104	105	107	112	117	126	132	137	137	136	132	123	117	111		
40	59.6	59.2	59.5	61.1	62.9	64.9	66.7	70.5	72.5	73.3	73.4	71.6	69.8	65.6	62.6	60.2		
45	37.9	37.9	38.1	39.0	40.0	41.2	41.8	43.0	43.5	43.6	43.5	42.4	41.1	39.6	38.6	37.9		
50	26.2	26.4	26.5	27.1	27.5	28.4	28.7	29.4	29.2	29.2	29.0	28.0	27.4	26.8	26.4	26.2		
55	18.3	18.4	18.5	18.9	19.2	19.8	20.2	20.7	20.6	20.6	20.4	20.0	19.7	19.0	18.7	18.2		
60	12.2	12.5	12.5	12.7	12.7	13.1	13.5	13.8	13.8	13.6	13.4	13.2	13.1	12.8	12.4	12.2		
65	9.68	9.72	9.79	9.89	9.97	10.1	10.1	10.2	10.1	10.0	10.00	9.88	9.81	9.70	9.66	9.64		
70	7.21	7.25	7.33	7.47	7.60	7.76	7.87	7.97	7.94	7.88	7.79	7.63	7.50	7.32	7.23	7.18		
75	4.88	4.93	5.00	5.14	5.24	5.40	5.50	5.60	5.57	5.52	5.44	5.29	5.17	5.01	4.94	4.88		
80	2.90	2.94	3.01	3.14	3.25	3.38	3.45	3.52	3.51	3.48	3.41	3.31	3.22	3.07	2.99	2.90		
85	1.09	1.10	1.17	1.28	1.41	1.52	1.62	1.65	1.64	1.62	1.54	1.45	1.33	1.20	1.13	1.08		
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		

Model Number	CCT setting	Test Voltage(V)	Flux(lm)	P(W)	Luminous Efficacy lm/W
DLR0135 (R3-9B)	2700K setting	120	656.65	8.59	76.43
	3000K setting	120	702.42	8.44	83.18
	3500K setting	120	742.63	8.28	89.68
	4000K setting	120	761.83	8.33	91.45
	5000K setting	120	778.58	8.59	90.63