

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) :

DLR0136 (R3-15B)

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	15W
Rated Initial Lamp Lumen	950lm (2700k) , 1000lm (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>	DLR0136 (R3-15B)	<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	0.1214	14.38	0.9830

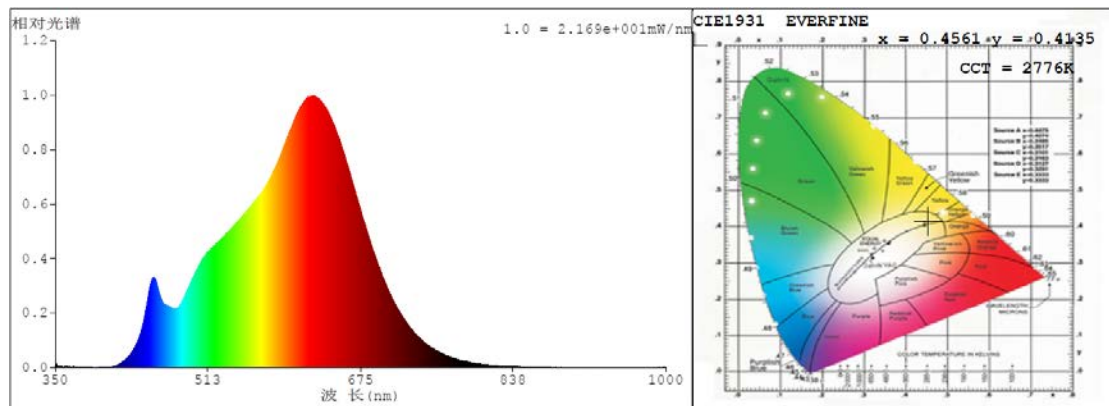
### Chromaticity Measurement – Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	97	R9	69
Frequency (Hz)	60	R2	99	R10	97
CCT (K)	2776	R3	99	R11	100
Duv	0.00142	R4	97	R12	89
Chromaticity (x, y)	x=0.4561, y=0.4135	R5	97	R13	98
Chromaticity (u', v')	u' =0.2588, v' =0.5279	R6	98	R14	99
Color Rendering Index (CRI)	95.7	R7	93	R15	92
R9	69	R8	86	--	--

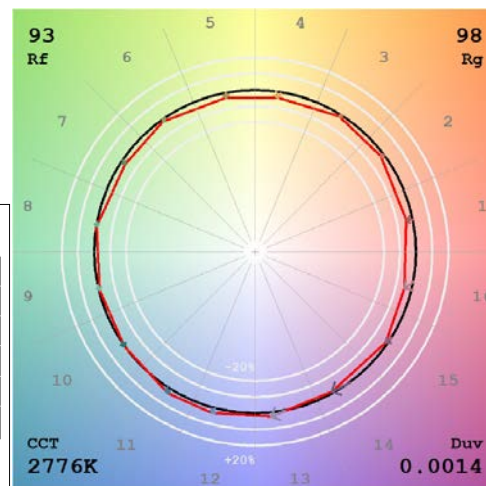
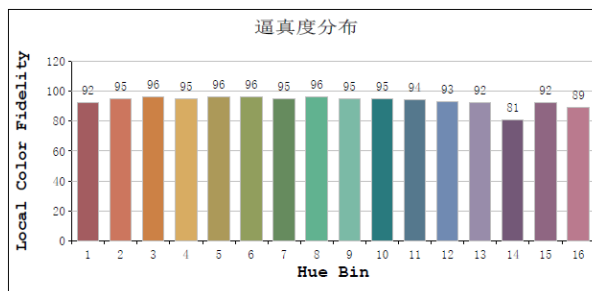
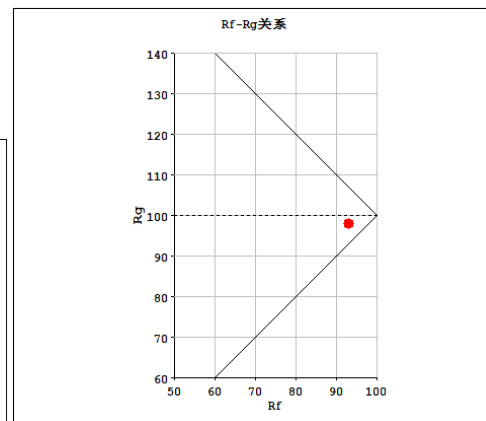
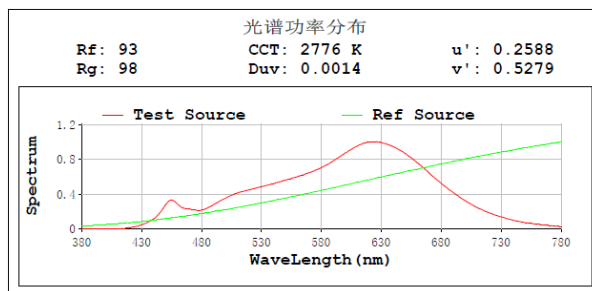
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	981.90
Luminous Efficacy (lm/W)	68.61
Beam Angle (°)	36.9
Center Beam Candle Power (cd)	2100

# Spectral Power Distribution & Chromaticity Diagram



## TM30

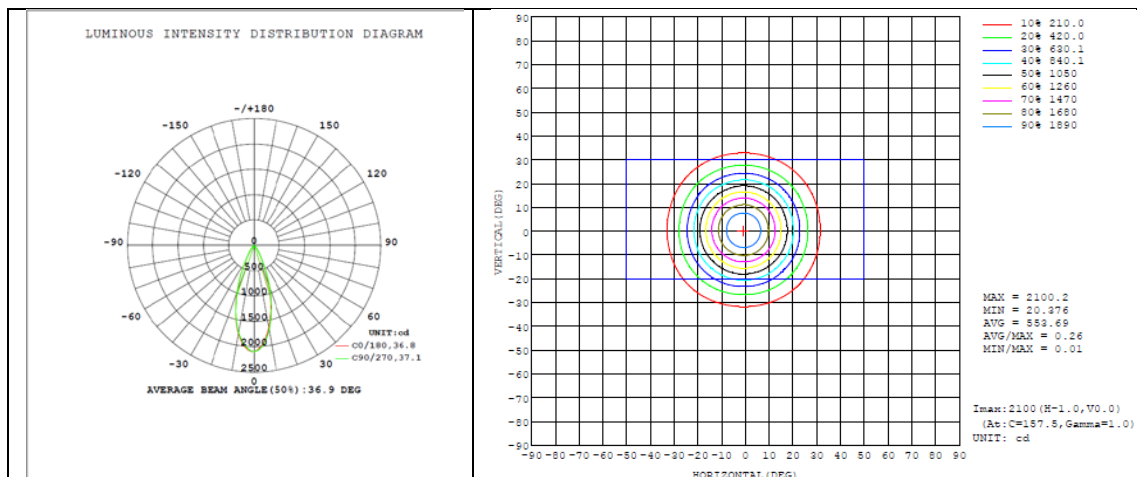


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	800.2	81.5%
0-40	898.4	91.5%
0-60	960.3	97.8%
60-90	21.6	2.0%
70-100	8.8	0.9%
90-120	0.0	0.0%
0-90	981.9	100.0%
90-180	0.0	0.0%
0-180	981.9	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	181.7	18.5%	90-100	0	0%
10-20	365.3	37.2%	100-110	0	0%
20-30	253.3	25.8%	110-120	0	0%
30-40	98.2	10.0%	120-130	0	0%
40-50	40.3	4.1%	130-140	0	0%
50-60	21.6	2.2%	140-150	0	0%
60-70	12.8	1.3%	150-160	0	0%
70-80	6.9	0.7%	160-170	0	0%
80-90	2.0	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>	DLR0136 (R3-15B)	<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	0.1189	14.07	0.9824

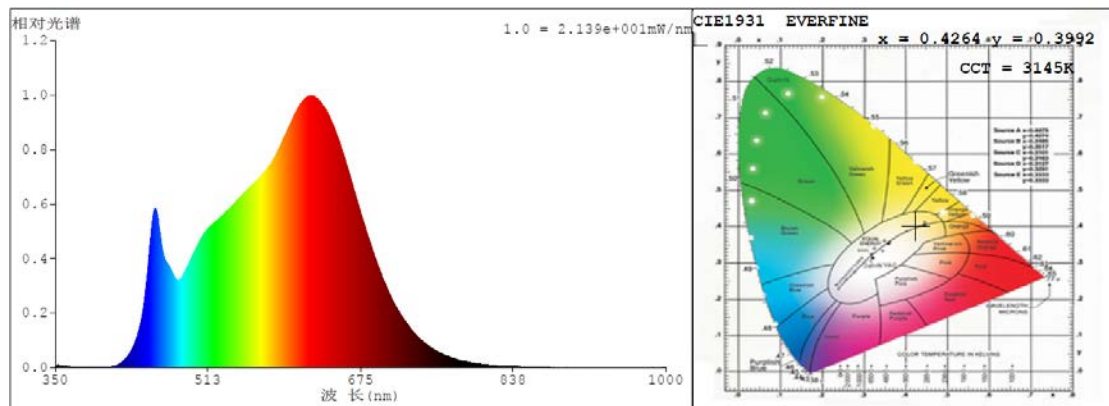
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	98	R9	77
Frequency (Hz)	60	R2	99	R10	99
CCT (K)	3145	R3	98	R11	99
Duv	-0.000426	R4	96	R12	83
Chromaticity (x, y)	x=0.4264, y=0.3992	R5	97	R13	100
Chromaticity (u', v')	u' =0.2459, v' =0.5179	R6	96	R14	100
Color Rendering Index (CRI)	95.9	R7	93	R15	95
R9	77	R8	89	--	--

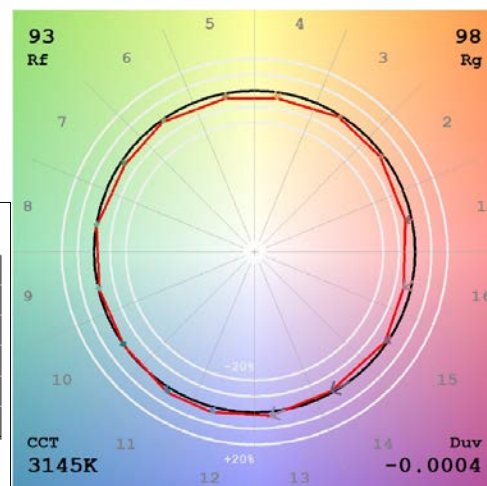
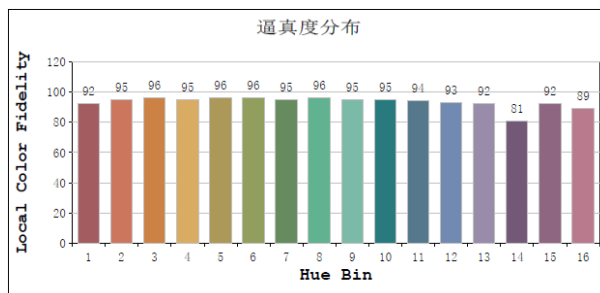
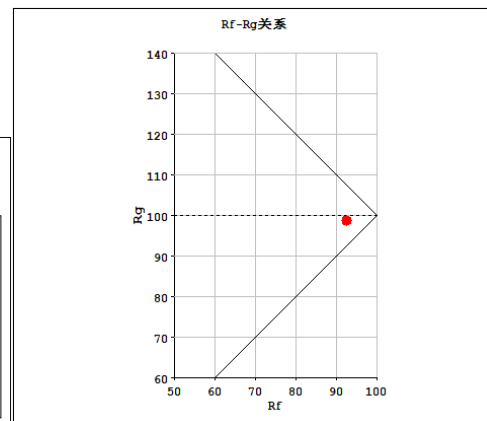
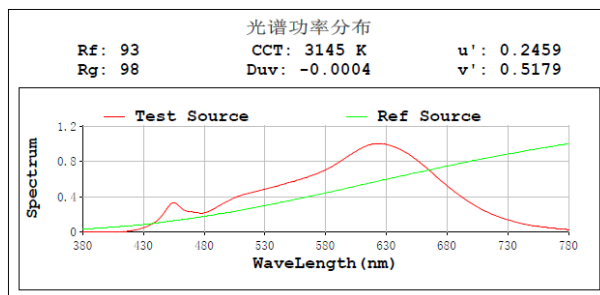
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	1070.5
Luminous Efficacy (lm/W)	76.40
Beam Angle (°)	37.0
Center Beam Candle Power (cd)	2283

# Spectral Power Distribution & Chromaticity Diagram



## TM30

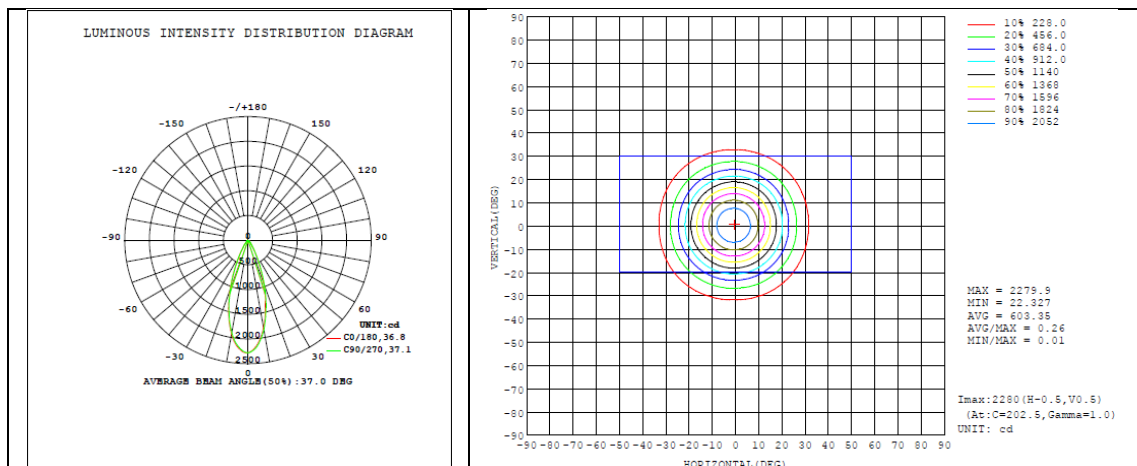


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	871.4	81.4%
0-40	979.5	91.5%
0-60	1046.9	97.8%
60-90	23.6	2.0%
70-100	9.6	0.9%
90-120	0.0	0.0%
0-90	1070.5	100.0%
90-180	0.0	0.0%
0-180	1070.5	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	197.0	18.4%	90-100	0	0%
10-20	397.2	37.1%	100-110	0	0%
20-30	277.3	25.9%	110-120	0	0%
30-40	108.1	10.1%	120-130	0	0%
40-50	43.9	4.1%	130-140	0	0%
50-60	23.6	2.2%	140-150	0	0%
60-70	13.9	1.3%	150-160	0	0%
70-80	7.5	0.7%	160-170	0	0%
80-90	2.1	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>	DLR0136 (R3-15B)	<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	0.1155	13.66	0.9815

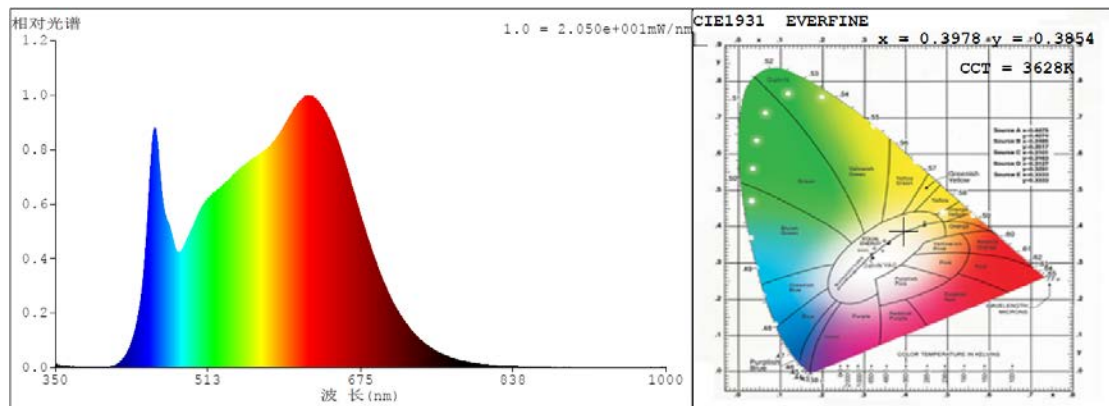
#### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	98	R9	81
Frequency (Hz)	60	R2	99	R10	99
CCT (K)	3628	R3	98	R11	98
Duv	-0.000629	R4	95	R12	79
Chromaticity (x, y)	x=0.3978, y=0.3854	R5	97	R13	100
Chromaticity (u', v')	u' =0.2330, v' =0.5079	R6	96	R14	100
Color Rendering Index (CRI)	95.9	R7	93	R15	96
R9	81	R8	90	--	--

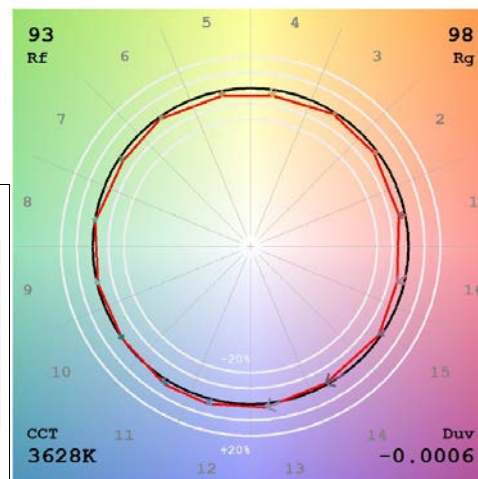
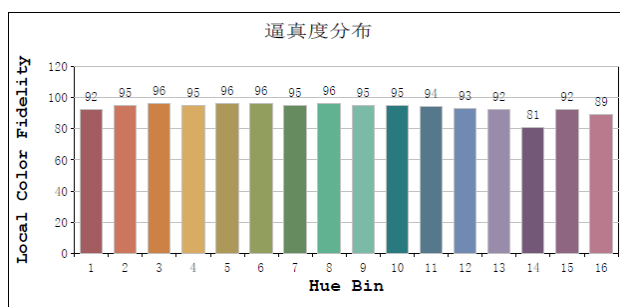
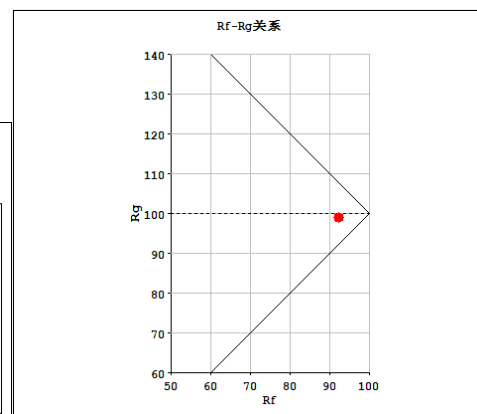
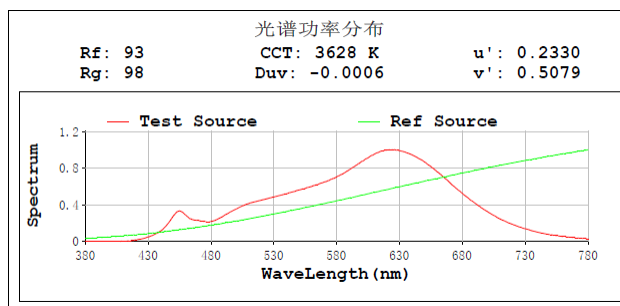
#### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	1147.9
Luminous Efficacy (lm/W)	84.30
Beam Angle (°)	37.0
Center Beam Candle Power (cd)	2439

# Spectral Power Distribution & Chromaticity Diagram



## TM30

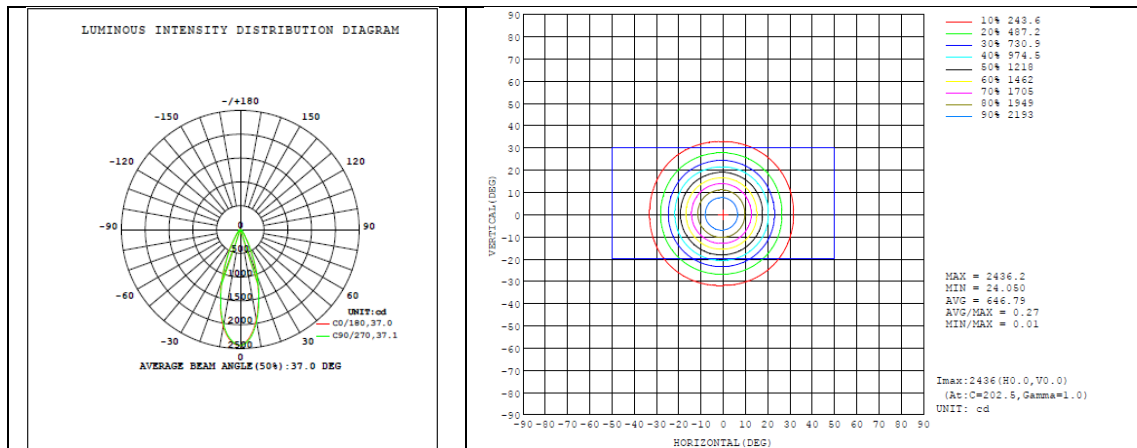


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	933.2	81.3%
0-40	1050.3	91.5%
0-60	1122.6	97.8%
60-90	25.3	2.0%
70-100	10.3	0.9%
90-120	0.0	0.0%
0-90	1147.9	100.0%
90-180	0.0	0.0%
0-180	1147.9	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	210.1	18.3%	90-100	0	0%
10-20	425.9	37.1%	100-110	0	0%
20-30	297.3	25.9%	110-120	0	0%
30-40	117.1	10.2%	120-130	0	0%
40-50	47.1	4.1%	130-140	0	0%
50-60	25.3	2.2%	140-150	0	0%
60-70	14.9	1.3%	150-160	0	0%
70-80	8.0	0.7%	160-170	0	0%
80-90	2.3	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>	DLR0136 (R3-15B)	<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	0.1165	13.78	0.9818

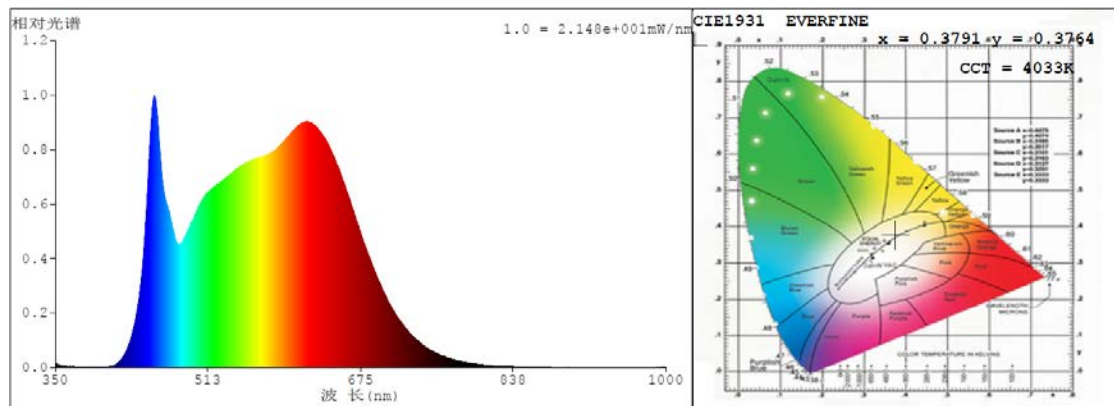
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	97	R9	80
Frequency (Hz)	60	R2	100	R10	99
CCT (K)	4033	R3	99	R11	96
Duv	0.000229	R4	94	R12	75
Chromaticity (x, y)	x=0.3791, y=0.3764	R5	95	R13	99
Chromaticity (u', v')	u' =0.2244, v' =0.5012	R6	96	R14	100
Color Rendering Index (CRI)	95.7	R7	94	R15	95
R9	80	R8	90	--	--

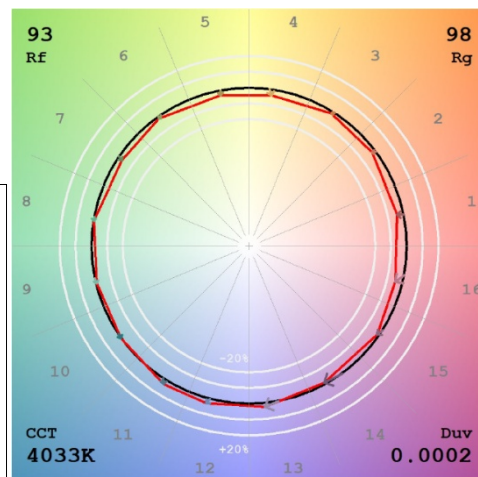
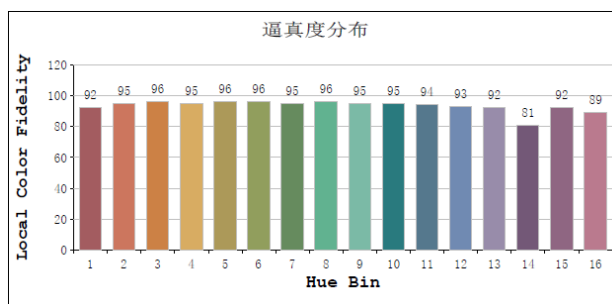
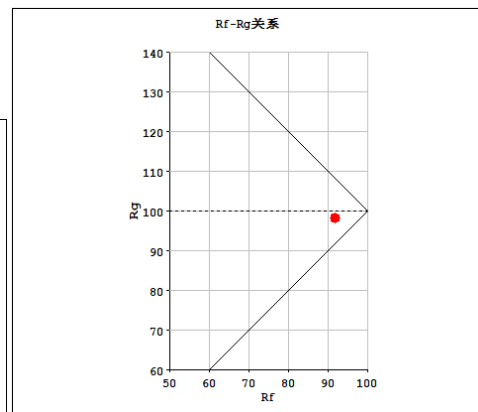
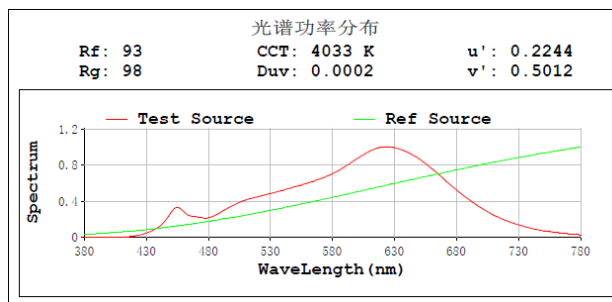
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	1179.9
Luminous Efficacy (lm/W)	85.85
Beam Angle (°)	37.1
Center Beam Candle Power (cd)	2500

# Spectral Power Distribution & Chromaticity Diagram



## TM30

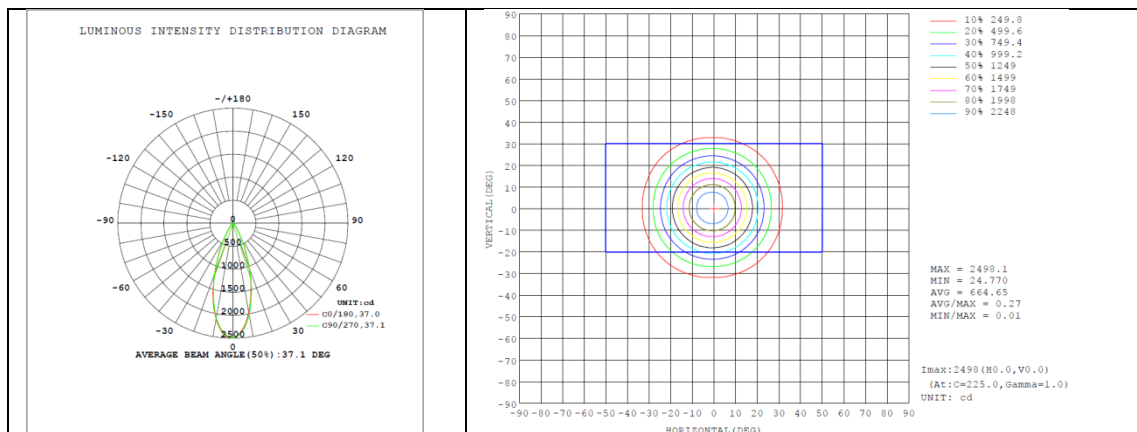


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	959.3	81.3%
0-40	1078.4	91.4%
0-60	1153.9	97.8%
60-90	26.0	2.0%
70-100	10.6	0.9%
90-120	0.0	0.0%
0-90	1179.9	100.0%
90-180	0.0	0.0%
0-180	1179.9	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	215.9	18.3%	90-100	0	0%
10-20	436.6	37.0%	100-110	0	0%
20-30	306.8	26.0%	110-120	0	0%
30-40	119.2	10.1%	120-130	0	0%
40-50	49.6	4.2%	130-140	0	0%
50-60	26.0	2.2%	140-150	0	0%
60-70	15.3	1.3%	150-160	0	0%
70-80	8.3	0.7%	160-170	0	0%
80-90	2.4	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>	DLR0136 (R3-15B)	<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	0.1213	14.37	0.9830

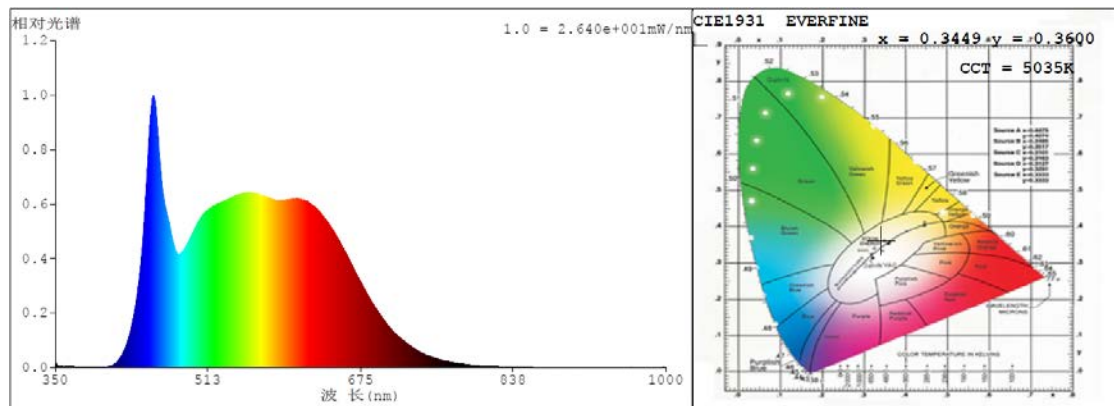
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	93	R9	64
Frequency (Hz)	60	R2	97	R10	91
CCT (K)	5035	R3	98	R11	92
Duv	0.00426	R4	92	R12	74
Chromaticity (x, y)	x=0.3449, y=0.3600	R5	92	R13	94
Chromaticity (u', v')	u' =0.2081, v' =0.4887	R6	94	R14	99
Color Rendering Index (CRI)	93.1	R7	94	R15	90
R9	64	R8	86	--	--

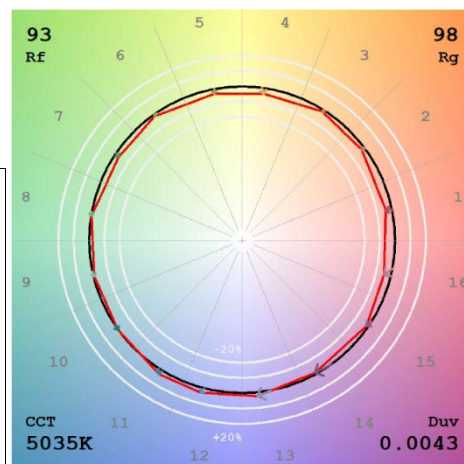
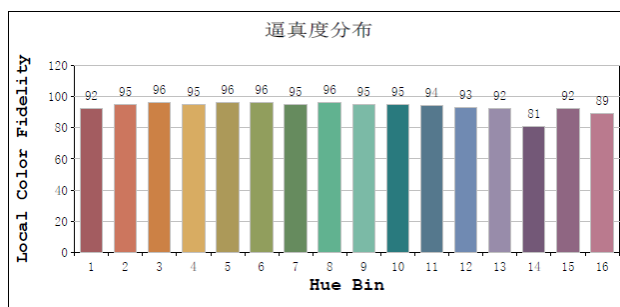
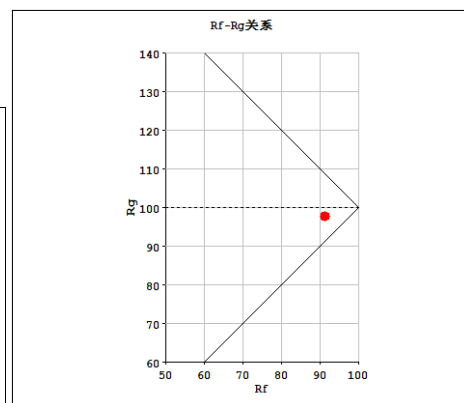
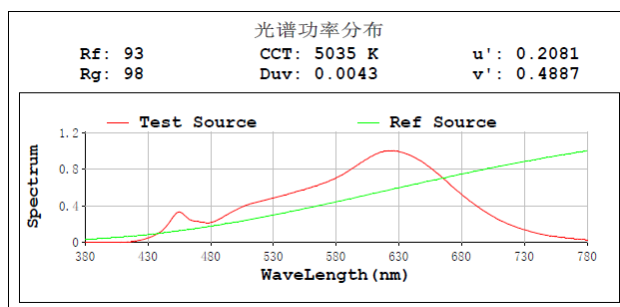
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	1171.1
Luminous Efficacy (lm/W)	81.68
Beam Angle (°)	37.1
Center Beam Candle Power (cd)	2473

# Spectral Power Distribution & Chromaticity Diagram



## TM30

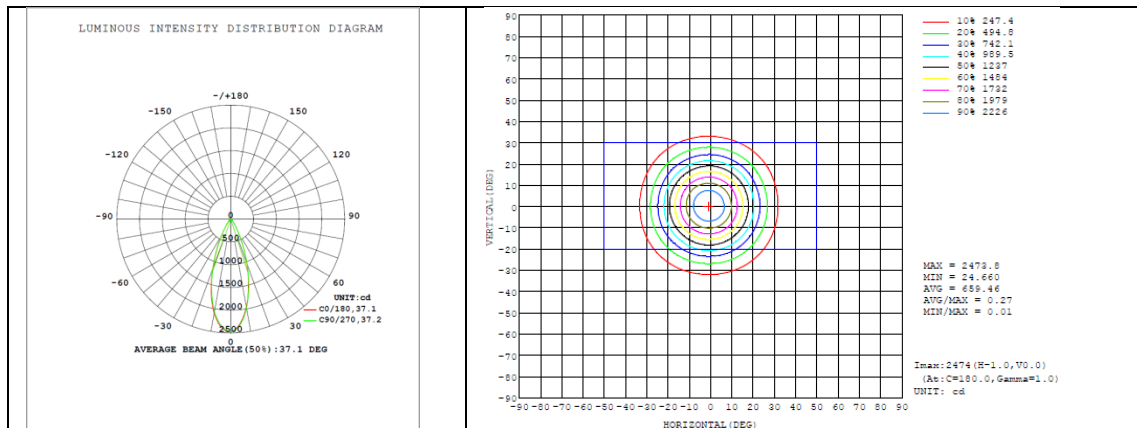


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	950.9	81.2%
0-40	1070.4	91.4%
0-60	1145.3	97.8%
60-90	25.8	2.0%
70-100	10.5	0.9%
90-120	0.0	0.0%
0-90	1171.1	100.0%
90-180	0.0	0.0%
0-180	1171.1	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	213.1	18.2%	90-100	0	0%
10-20	432.1	36.9%	100-110	0	0%
20-30	305.7	26.1%	110-120	0	0%
30-40	119.5	10.2%	120-130	0	0%
40-50	49.2	4.2%	130-140	0	0%
50-60	25.8	2.2%	140-150	0	0%
60-70	15.2	1.3%	150-160	0	0%
70-80	8.2	0.7%	160-170	0	0%
80-90	2.3	0.2%	170-180	0	0%

## Photometric Data



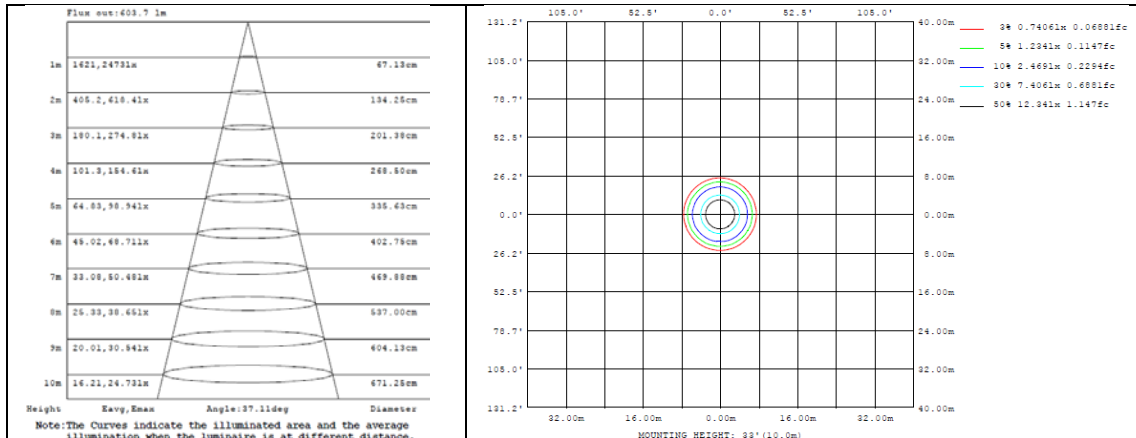


Table--1

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	2468	2468	2468	2468	2468	2468	2468	2468	2468	2468	2468	2468	2468	2468	2468	2468
5	2307	2311	2310	2320	2334	2343	2360	2373	2380	2383	2378	2355	2356	2332	2322	2306
10	1957	1957	1960	1975	1992	2024	2053	2079	2099	2104	2103	2076	2059	2023	1999	1970
15	1502	1497	1494	1512	1533	1573	1605	1643	1667	1675	1675	1646	1625	1586	1550	1517
20	1026	1019	1013	1033	1055	1086	1111	1151	1173	1182	1178	1151	1140	1105	1075	1040
25	601	599	595	609	623	649	677	715	729	733	733	711	695	667	640	614
30	315	311	308	317	325	340	361	386	397	397	395	382	373	354	337	323
35	167	162	162	162	167	171	180	189	196	200	199	197	194	185	176	171
40	90.0	89.8	90.3	93.0	95.9	98.7	101	105	108	108	108	105	103	97.0	93.5	90.0
45	56.9	57.1	57.4	58.9	60.6	62.3	63.0	64.4	64.9	64.8	64.5	62.5	61.0	58.8	57.7	56.6
50	39.2	39.6	39.8	40.6	41.5	42.8	43.3	44.1	43.9	43.6	43.2	41.6	40.9	39.9	39.4	39.0
55	27.4	27.7	27.8	28.4	29.0	29.9	30.5	30.9	30.8	30.7	30.3	29.7	29.3	28.4	27.8	27.1
60	18.4	18.8	18.9	19.1	19.3	19.7	20.3	20.7	20.6	20.3	19.9	19.6	19.6	19.1	18.6	18.2
65	14.5	14.6	14.7	14.8	15.0	15.2	15.2	15.3	15.2	15.1	15.0	14.8	14.7	14.6	14.5	14.4
70	10.8	10.9	11.0	11.3	11.5	11.7	11.9	12.0	12.0	11.8	11.7	11.4	11.2	11.0	10.9	10.8
75	7.38	7.46	7.56	7.77	7.99	8.19	8.31	8.44	8.42	8.31	8.18	7.92	7.77	7.53	7.42	7.32
80	4.42	4.51	4.59	4.80	4.97	5.17	5.27	5.33	5.34	5.25	5.16	4.98	4.86	4.62	4.53	4.40
85	1.70	1.76	1.84	2.04	2.20	2.41	2.50	2.56	2.54	2.47	2.36	2.16	2.01	1.82	1.74	1.67
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
DLR0136 (R3-15B)	2700K setting	120	981.90	14.31	68.61
	3000K setting	120	1070.5	14.01	76.40
	3500K setting	120	1147.9	13.62	84.30
	4000K setting	120	1179.9	13.74	85.85
	5000K setting	120	1171.1	14.34	81.68