

# 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) :**

**DLR0149(R4TL)**

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

**Type of Luminaire:** Downlights

**Report Date:** 2023-12-18

<b>1.1 Rated Values:</b>	
Rated Voltage / Frequency	120V, 60HZ
Nominal Power	20W
Rated Initial Lamp Lumen	1800lm (3000k) , 1900lm (5000k)
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>	2023-12-18	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0149(R4TL)	CCT Setting	2700k

#### Electrical Measurement:

Sampel No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
#1	120	60	0.167	19.82	0.984

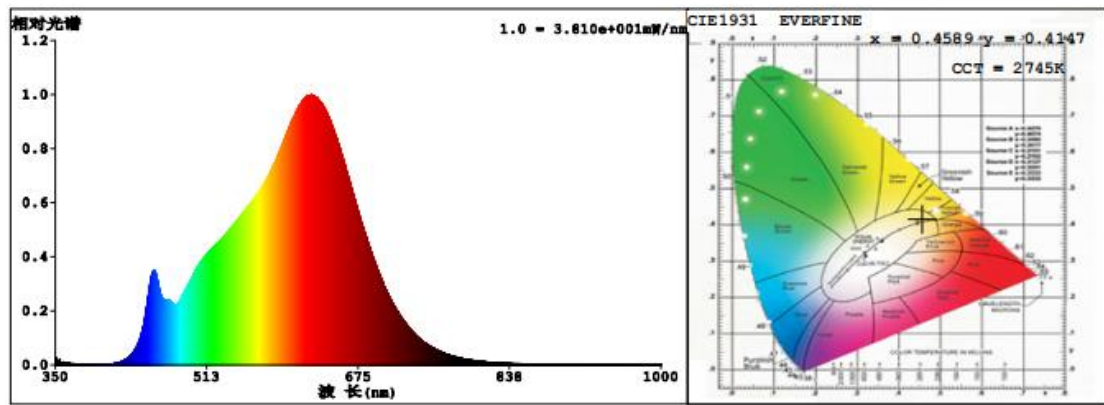
#### Chromaticity Measurement – Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120	R1	96	R9	67
Frequency (Hz)	60	R2	99	R10	97
CCT (K)	2745	R3	99	R11	98
Duv	0.00158	R4	95	R12	87
Chromaticity (x, y)	x=0.4589, y=0.4147	R5	96	R13	97
Chromaticity (u', v')	u' =0.2601, v' =0.5287	R6	98	R14	99
Color Rendering Index (CRI)	94.9	R7	92	R15	91
R9	67	R8	84	--	--

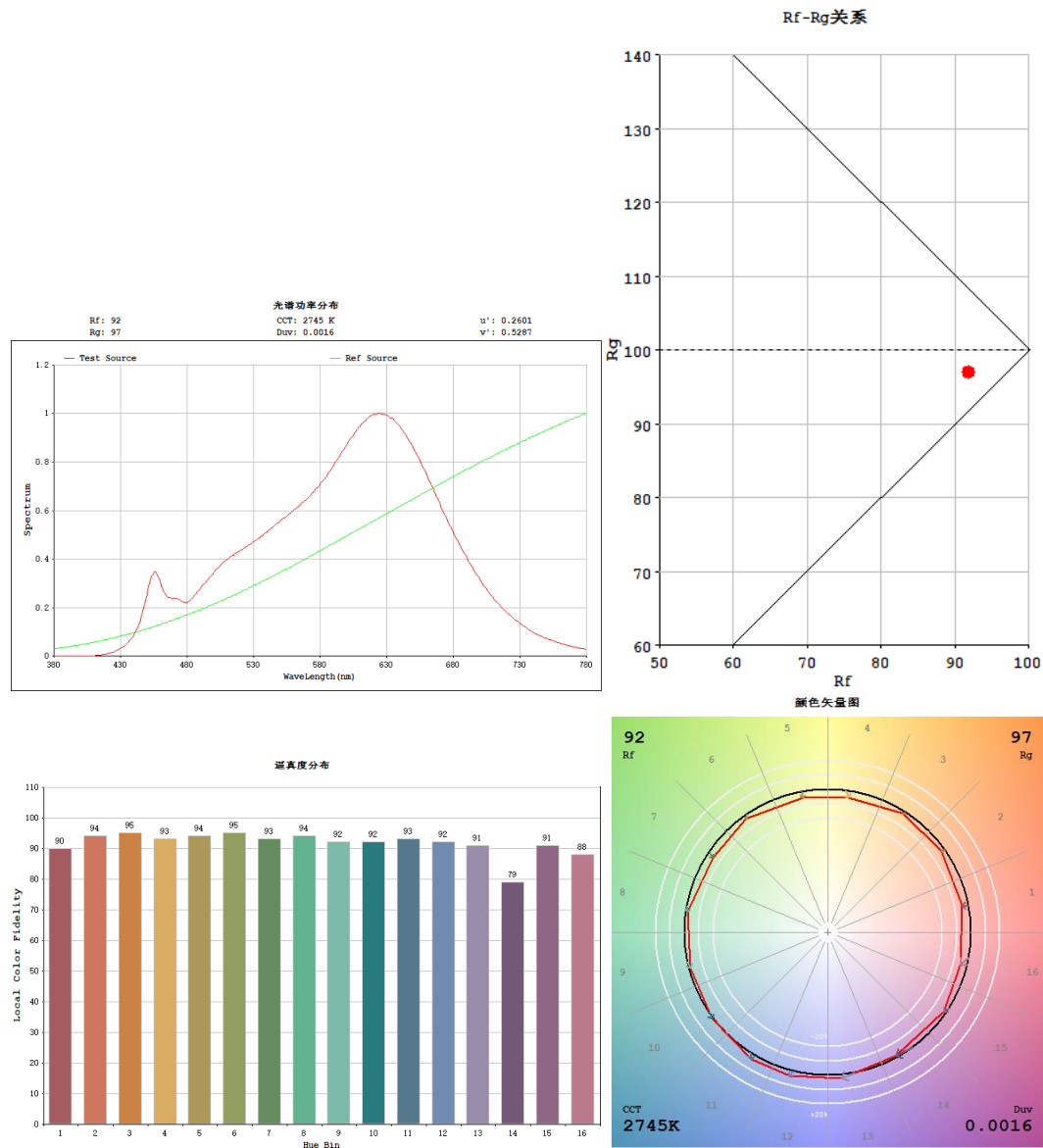
#### Photometric Measurement – Goniophotometer Method:

Parameter	Result
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	1767.48
Luminous Efficacy (lm/W)	89.16
Beam Angle (°)	40.9
Center Beam Candle Power (cd)	3446

# Spectral Power Distribution & Chromaticity Diagram



## TM30

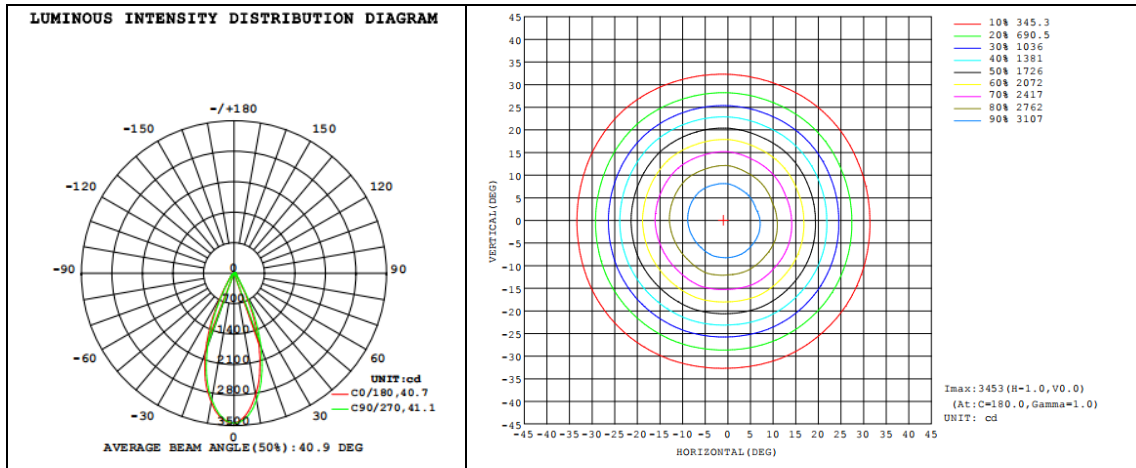


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1468.6	83.1%
0-40	1633.7	92.4%
0-60	1748.51	98.9%
60-90	18.912	1.1%
70-100	5.412	0.3%
90-120	0	0.0%
0-90	1767.422	100.0%
90-180	0	0.0%
0-180	1767.422	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	303.7	17.2%	90-100	0	0%
10-20	664.4	37.6%	100-110	0	0%
20-30	500.5	28.3%	110-120	0	0%
30-40	165.1	9.3%	120-130	0	0%
40-50	75.17	4.3%	130-140	0	0%
50-60	39.64	2.2%	140-150	0	0%
60-70	13.5	0.8%	150-160	0	0%
70-80	4.39	0.2%	160-170	0	0%
80-90	1.022	0.1%	170-180	0	0%

## Photometric Data





## 2.1.2 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-12-18	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0149 (R4TL)	<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	0.165	19.54	0.984

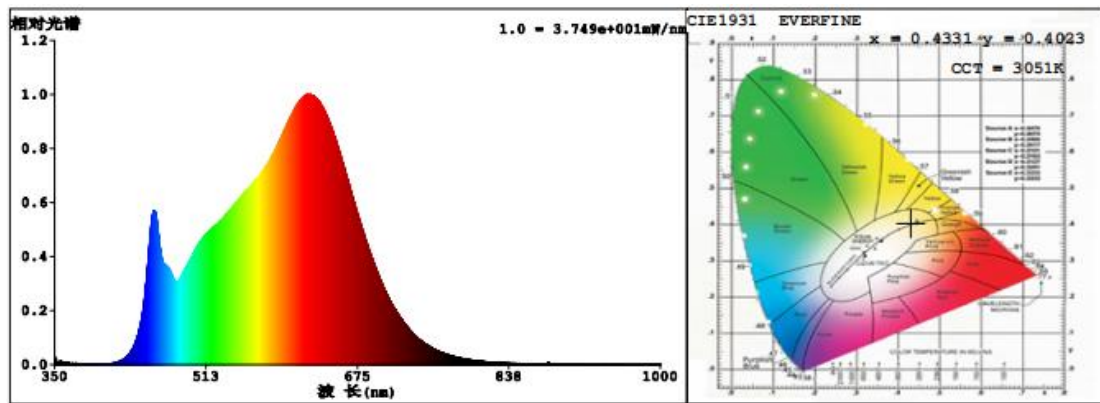
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	98	R9	73
Frequency (Hz)	60	R2	99	R10	99
CCT (K)	3051	R3	97	R11	98
Duv	-0.000181	R4	95	R12	83
Chromaticity (x, y)	x=0.4331, y=0.4023	R5	97	R13	99
Chromaticity (u', v')	u' =0.2489, v' =0.5201	R6	96	R14	99
Color Rendering Index (CRI)	95.1	R7	92	R15	94
R9	73	R8	87	--	--

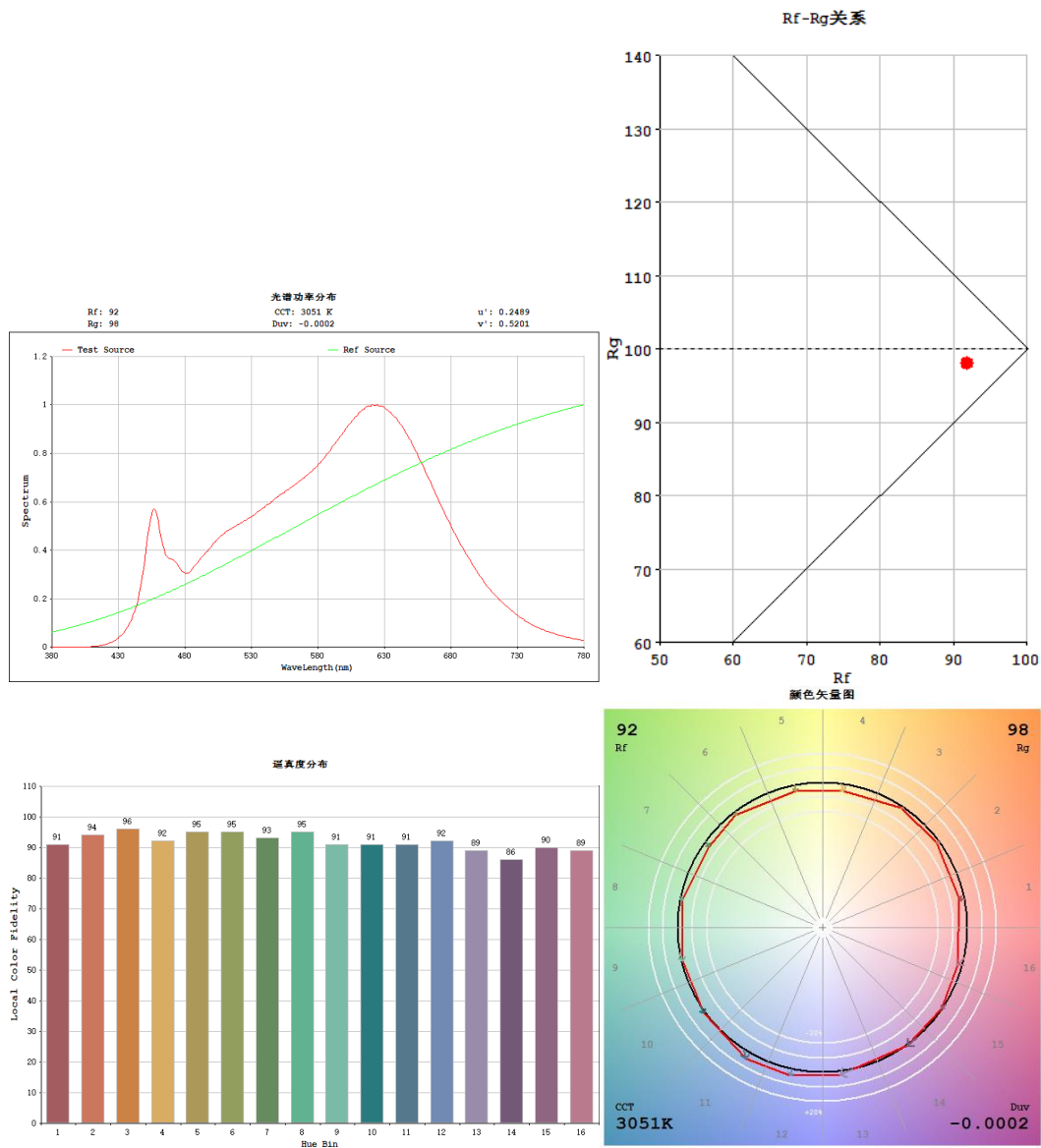
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	1876.06
Luminous Efficacy (lm/W)	96.01
Beam Angle (°)	40.9
Center Beam Candle Power (cd)	3675

# Spectral Power Distribution & Chromaticity Diagram



## TM30

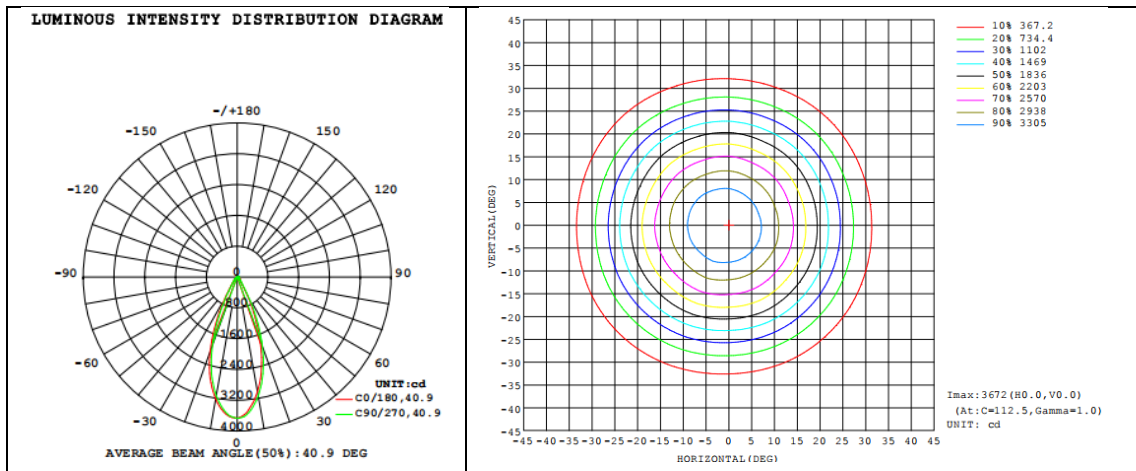


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1560.5	83.2%
0-40	1734.4	92.5%
0-60	1855.91	98.9%
60-90	20.079	1.1%
70-100	5.759	0.3%
90-120	0	0.0%
0-90	1875.989	100.0%
90-180	0	0.0%
0-180	1875.989	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	323.3	17.2%	90-100	0	0%
10-20	707.1	37.7%	100-110	0	0%
20-30	530.1	28.3%	110-120	0	0%
30-40	173.9	9.3%	120-130	0	0%
40-50	79.5	4.2%	130-140	0	0%
50-60	42.01	2.2%	140-150	0	0%
60-70	14.32	0.8%	150-160	0	0%
70-80	4.667	0.2%	160-170	0	0%
80-90	1.092	0.1%	170-180	0	0%

## Photometric Data





### 2.1.3 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-12-18	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0149 (R4TL)	<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	0.161	19.14	0.983

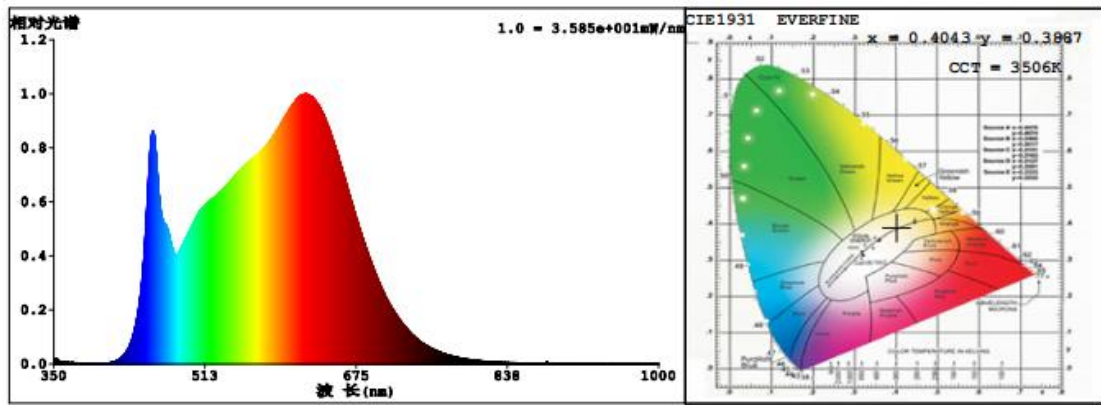
#### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<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)	3506	R3	97	R11	97
Duv	-0.000655	R4	94	R12	78
Chromaticity (x, y)	x=0.4043, y=0.3887	R5	96	R13	99
Chromaticity (u', v')	u' =0.2359, v' =0.5103	R6	96	R14	99
Color Rendering Index (CRI)	95.1	R7	92	R15	95
R9	77	R8	88	--	--

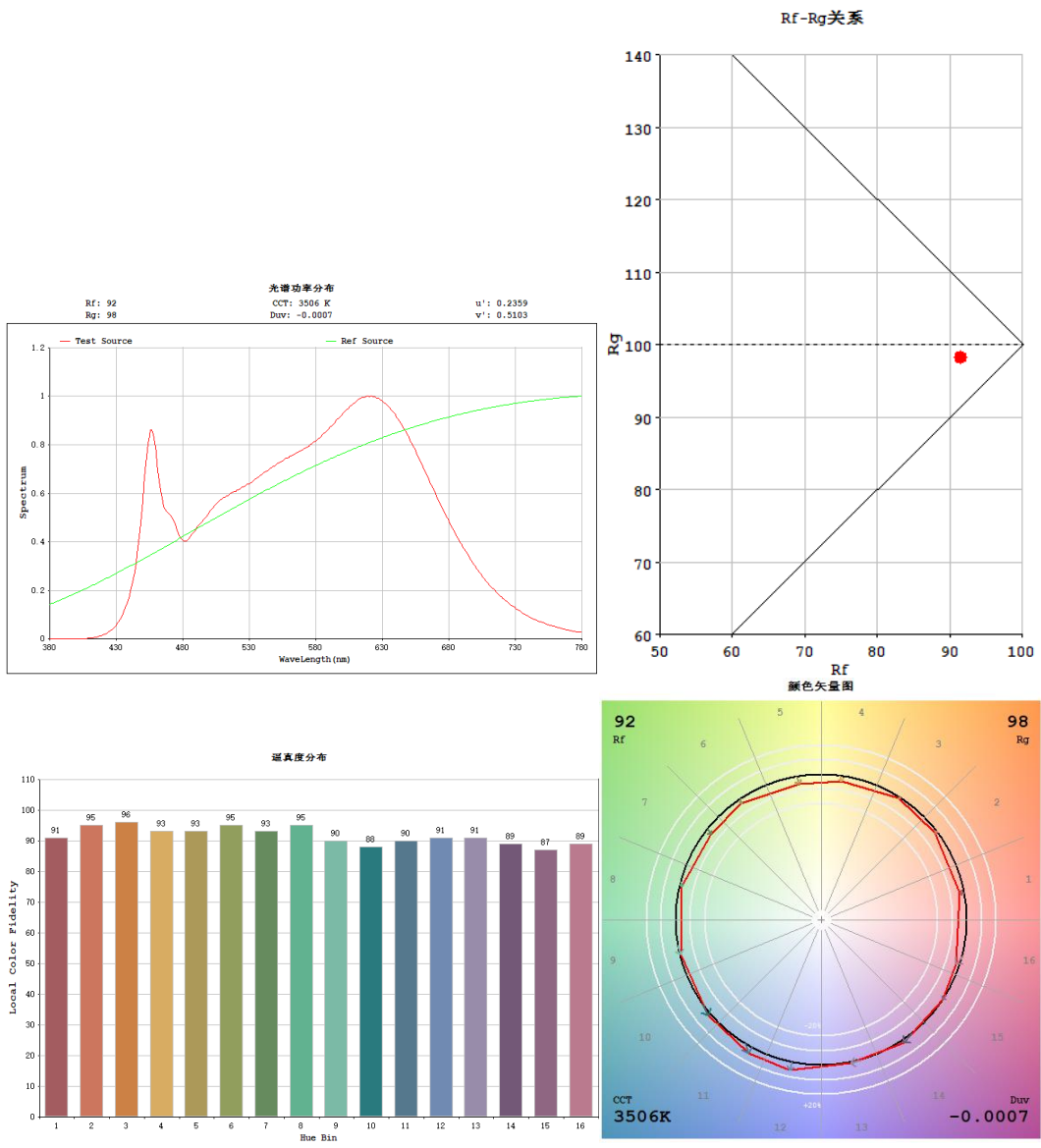
#### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	1994.97
Luminous Efficacy (lm/W)	104.21
Beam Angle (°)	40.8
Center Beam Candle Power (cd)	3923

# Spectral Power Distribution & Chromaticity Diagram



## TM30







## 2.1.4 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-12-18	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0149 (R4TL)	<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	0.165	19.55	0.984

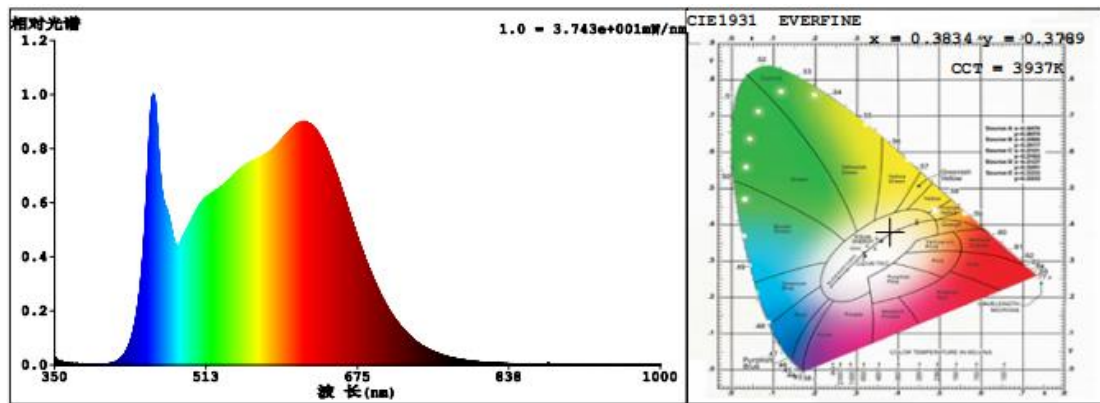
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	97	R9	76
Frequency (Hz)	60	R2	99	R10	99
CCT (K)	3937	R3	98	R11	95
Duv	-0.000142	R4	93	R12	75
Chromaticity (x, y)	x=0.3834, y=0.3789	R5	95	R13	99
Chromaticity (u', v')	u' =0.2262, v' =0.5030	R6	96	R14	99
Color Rendering Index (CRI)	94.8	R7	92	R15	94
R9	76	R8	88	--	--

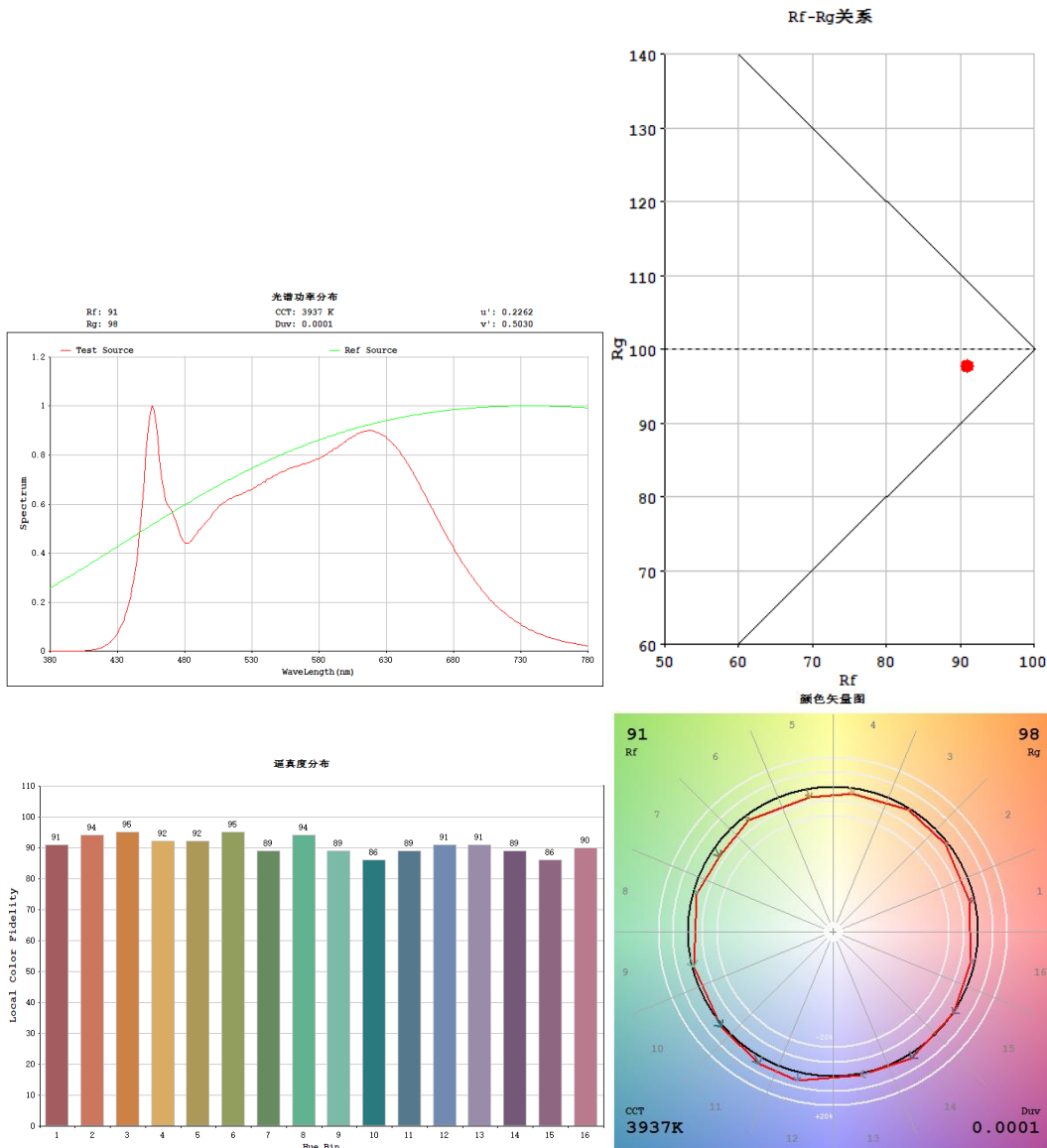
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	2050.29
Luminous Efficacy (lm/W)	104.88
Beam Angle (°)	40.7
Center Beam Candle Power (cd)	4058

# Spectral Power Distribution & Chromaticity Diagram



## TM30

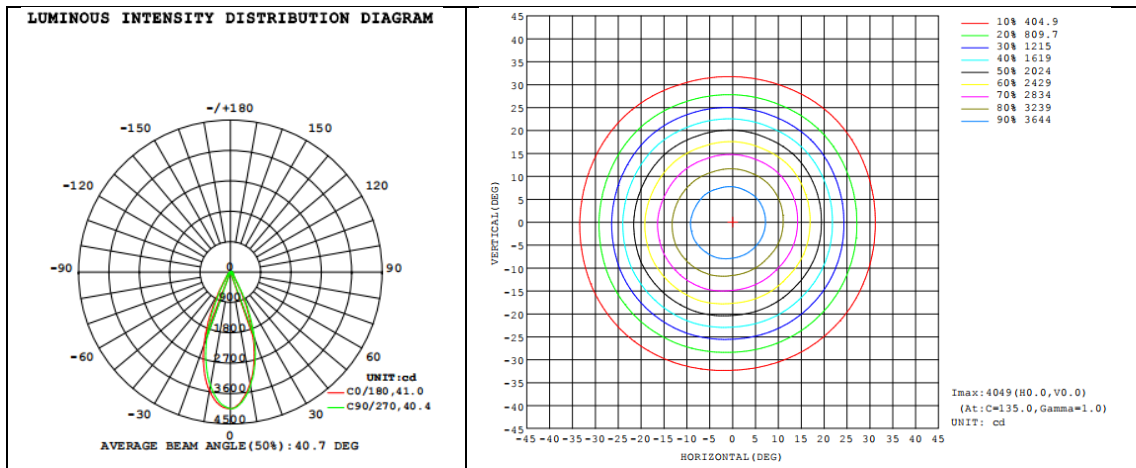


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1709.9	83.4%
0-40	1896.4	92.5%
0-60	2028.34	98.9%
60-90	21.907	1.1%
70-100	6.297	0.3%
90-120	0	0.0%
0-90	2050.247	100.0%
90-180	0	0.0%
0-180	2050.247	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	356.1	17.4%	90-100	0	0%
10-20	777.4	37.9%	100-110	0	0%
20-30	576.4	28.1%	110-120	0	0%
30-40	186.5	9.1%	120-130	0	0%
40-50	86.16	4.2%	130-140	0	0%
50-60	45.78	2.2%	140-150	0	0%
60-70	15.61	0.8%	150-160	0	0%
70-80	5.093	0.2%	160-170	0	0%
80-90	1.204	0.1%	170-180	0	0%

## Photometric Data



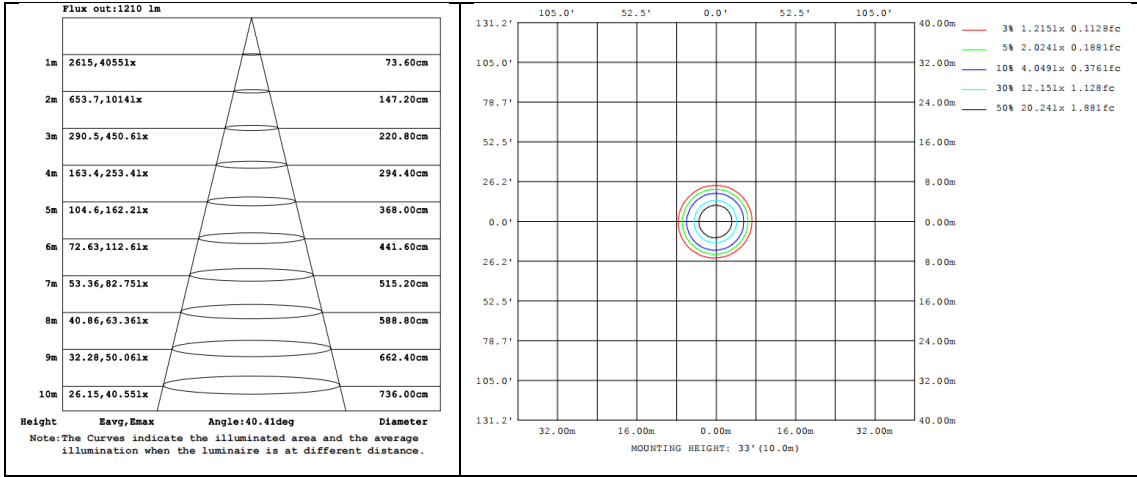


Table--1

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	4046	4046	4046	4046	4046	4046	4046	4046	4046	4046	4046	4046	4046	4046	4046	4046			
5	3831	3844	3832	3867	3875	3908	3930	3939	3931	3922	3892	3875	3853	3838	3846	3833			
10	3362	3366	3344	3387	3427	3496	3555	3577	3568	3542	3484	3450	3414	3383	3398	3378			
15	2724	2728	2701	2766	2814	2924	3007	3035	3024	2955	2885	2828	2795	2772	2780	2740			
20	1922	1945	1946	2020	2075	2197	2265	2323	2295	2209	2146	2063	2035	1977	1986	1942			
25	1114	1144	1174	1240	1291	1386	1434	1471	1448	1385	1339	1268	1213	1160	1148	1117			
30	500	513	524	570	613	676	712	731	710	659	619	569	545	518	513	499			
35	239	235	238	248	267	296	316	326	320	303	283	260	257	246	243	241			
40	152	149	149	152	160	172	186	189	185	178	165	158	152	152	152	154			
45	105	105	104	107	110	117	124	127	125	118	112	106	103	102	104	104			
50	71.7	72.0	71.6	73.1	74.8	78.0	80.7	82.1	80.4	77.8	75.4	73.0	72.3	71.8	72.2	71.8			
55	48.8	49.5	49.4	50.5	51.5	53.1	54.1	54.9	53.7	52.5	51.1	49.7	49.1	48.7	48.8	48.6			
60	27.7	28.4	28.7	29.8	30.3	31.0	31.3	31.6	31.1	30.4	29.6	28.7	28.1	27.4	27.5	27.3			
65	13.5	14.0	14.2	14.9	15.2	15.8	16.0	16.2	15.8	15.3	14.9	14.3	13.9	13.5	13.5	13.4			
70	7.08	7.12	7.13	7.26	7.33	7.44	7.52	7.58	7.56	7.50	7.42	7.35	7.26	7.15	7.12	7.07			
75	4.52	4.60	4.61	4.73	4.82	4.95	5.00	5.04	5.01	4.95	4.86	4.76	4.69	4.58	4.56	4.52			
80	2.44	2.48	2.52	2.61	2.69	2.78	2.84	2.86	2.85	2.78	2.70	2.64	2.56	2.49	2.46	2.45			
85	0.86	0.87	0.94	0.98	1.08	1.13	1.19	1.18	1.19	1.17	1.09	1.05	0.96	0.93	0.87	0.89			
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

## 2.1.5 Electrical, Photometric and Chromaticity Measurements

<b>Test date</b>	2023-12-18	<b>Test Ambient:</b>	25.3
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	15
<b>Model Number</b>	DLR0149 (R4TL)	<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	0.171	20.33	0.985

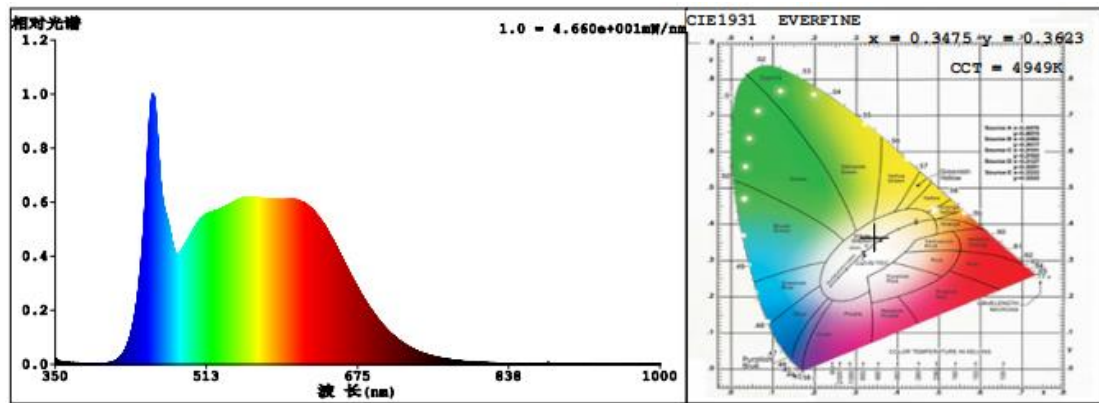
### Chromaticity Measurement - Sphere-Spectroradiometer Method:

<b>Parameter</b>	<b>Result</b>	<b>Special Color Rendering Indices</b>			
Test Voltage (V)	120	R1	92	R9	60
Frequency (Hz)	60	R2	97	R10	92
CCT (K)	4949	R3	98	R11	89
Duv	0.00434	R4	88	R12	66
Chromaticity (x, y)	x=0.3475, y=0.3623	R5	90	R13	94
Chromaticity (u', v')	u' =0.2089, v' =0.4901	R6	94	R14	99
Color Rendering Index (CRI)	91.7	R7	92	R15	88
R9	60	R8	83	--	--

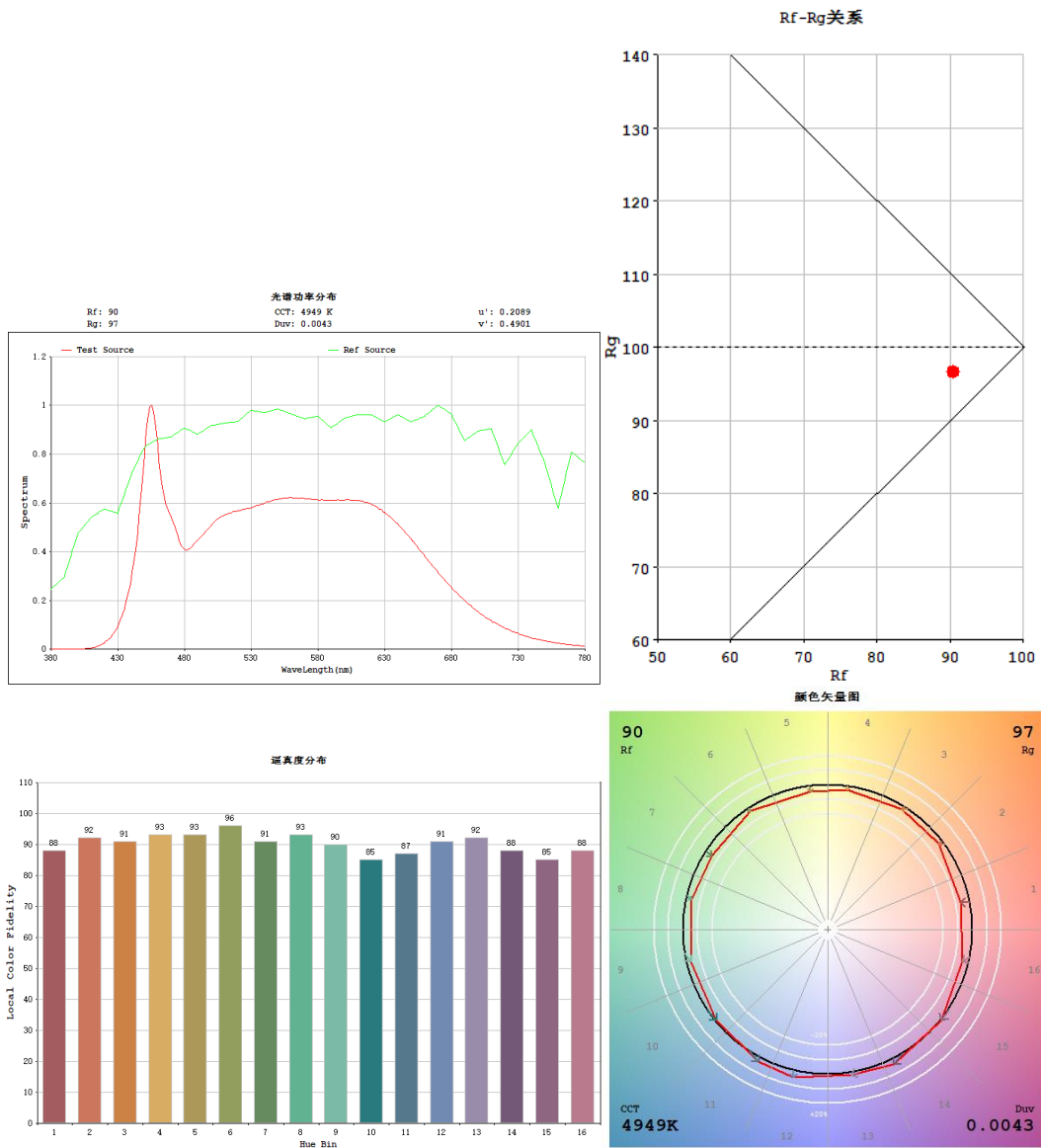
### Photometric Measurement – Goniophotometer Method:

<b>Parameter</b>	<b>Result</b>
Test Voltage (V)	120
Frequency (Hz)	60
Total Luminous (lm)	2049.24
Luminous Efficacy (lm/W)	100.78
Beam Angle (°)	40.6
Center Beam Candle Power (cd)	4084

# Spectral Power Distribution & Chromaticity Diagram



## TM30

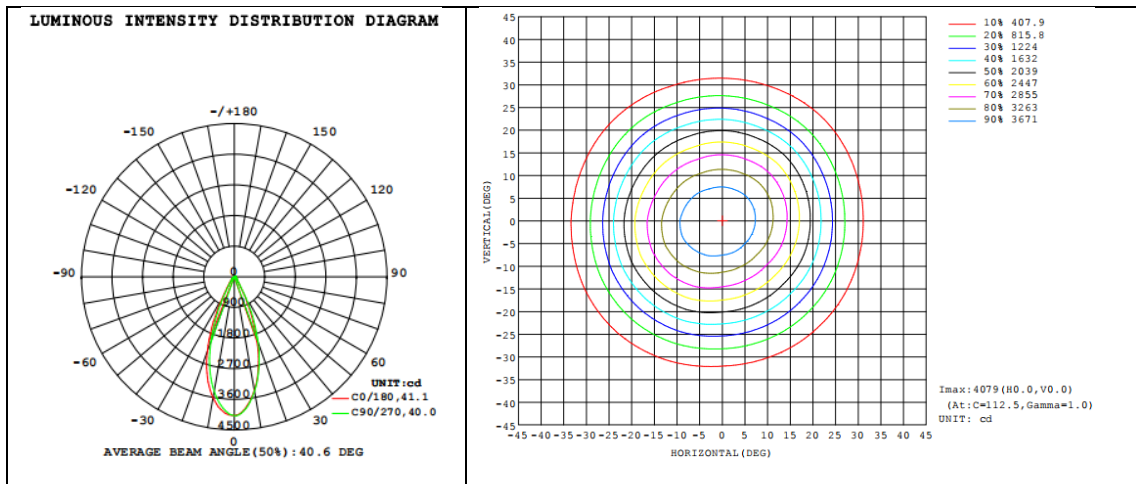


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1712.7	83.6%
0-40	1896.3	92.5%
0-60	2027.43	98.9%
60-90	21.836	1.1%
70-100	6.276	0.3%
90-120	0	0.0%
0-90	2049.266	100.0%
90-180	0	0.0%
0-180	2049.266	100.0%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	358.1	17.5%	90-100	0	0%
10-20	780.8	38.1%	100-110	0	0%
20-30	573.8	28.0%	110-120	0	0%
30-40	183.6	9.0%	120-130	0	0%
40-50	85.5	4.2%	130-140	0	0%
50-60	45.63	2.2%	140-150	0	0%
60-70	15.56	0.8%	150-160	0	0%
70-80	5.076	0.2%	160-170	0	0%
80-90	1.2	0.1%	170-180	0	0%

## Photometric Data



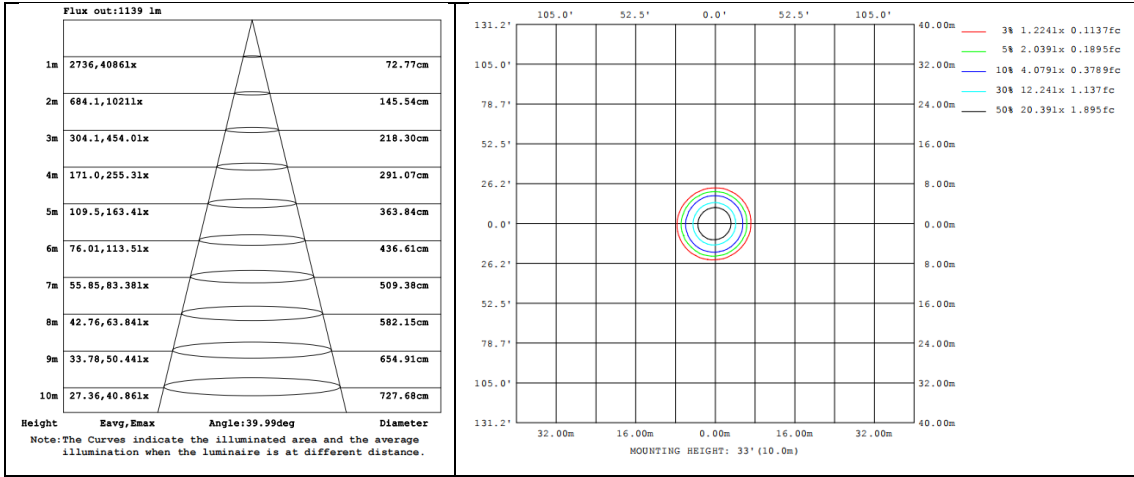


Table--1

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	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076
5	3866	3856	3853	3872	3891	3931	3957	3976	3961	3931	3902	3874	3870	3864	3880	3870
10	3395	3368	3342	3378	3420	3523	3582	3627	3616	3532	3486	3428	3420	3420	3438	3436
15	2751	2721	2687	2727	2794	2945	3052	3097	3058	2948	2874	2802	2796	2793	2822	2795
20	1938	1936	1923	1986	2061	2219	2303	2373	2329	2199	2124	2038	2020	1994	2009	1971
25	1109	1134	1156	1215	1282	1394	1448	1489	1460	1373	1324	1240	1199	1151	1144	1118
30	495	497	503	549	597	673	713	733	706	642	595	542	525	507	510	500
35	240	231	231	238	259	294	319	333	323	295	270	247	238	242	245	246
40	154	147	144	144	155	172	190	195	188	174	158	149	146	152	154	157
45	106	103	101	103	108	118	127	131	127	116	107	101	101	102	105	106
50	72.1	71.1	70.3	71.2	73.7	78.2	81.8	83.5	81.5	77.1	73.8	71.2	71.2	71.9	72.7	72.6
55	48.9	48.7	49.0	50.0	51.2	53.2	54.3	55.3	54.0	52.0	50.6	49.1	48.8	48.6	48.9	48.7
60	27.7	28.2	28.5	29.5	30.2	31.1	31.4	31.8	31.1	30.2	29.5	28.5	28.0	27.4	27.4	27.3
65	13.5	13.8	14.1	14.7	15.1	15.8	16.0	16.2	15.9	15.2	14.8	14.1	13.9	13.5	13.5	13.4
70	7.06	7.07	7.11	7.22	7.30	7.44	7.48	7.60	7.57	7.45	7.40	7.32	7.25	7.14	7.10	7.06
75	4.52	4.54	4.58	4.70	4.79	4.95	5.00	5.05	5.01	4.91	4.84	4.73	4.66	4.57	4.54	4.51
80	2.43	2.46	2.50	2.59	2.68	2.79	2.84	2.87	2.85	2.77	2.71	2.61	2.55	2.47	2.44	2.44
85	0.86	0.86	0.93	0.97	1.08	1.14	1.19	1.19	1.20	1.17	1.08	1.04	0.95	0.92	0.87	0.88
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	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
DLR0149 (R4TL)	2700K setting	120	1767.48	19.82	89.16
	3000K setting	120	1876.06	19.54	96.01
	3500K setting	120	1994.97	19.14	104.21
	4000K setting	120	2050.29	19.55	104.88
	5000K setting	120	2049.24	20.33	100.78