

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai, China

**Test Model: 8PAR20DIM/940SP15**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Hill Liu <i>Hill Liu</i>
<b>Report Number:</b>	R1KS170216007-10A1
<b>Test Date:</b>	2017-03-05 to 2017-03-07
<b>Report Date:</b>	2017-03-24
<b>Reviewed By:</b>	Bill Xiong / EE Engineer <i>Bill Xiong</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
<b>Accreditation:</b>	The IAS Accreditation Number TL-460.

## 1. Product Description

### General Information:

Two samples were received on 2017-02-16. One was tested in integrating sphere and the other was tested in goniophotometer

Model Tested: 8PAR20DIM/940SP15  
Manufacturer: GREEN CREATIVE LTD  
Brand Name: GREEN CREATIVE  
Product Designation: Directional LED Lamp  
Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120 V AC 60Hz  
Rated Power: 8 W  
Nominal CCT: 4000K  
Nominal Lumen Output: 570 lm

## 2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition (This method is not in IAS accreditation scope)

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	25~50°C	2017-03-09	2018-03-08
High Accuracy Array spectroradiometer	EVERFINE	HAAS-2000	M112048CA1361125	380-780nm	2016-07-08	2017-07-07
Power meter	YOKOGAWA	WT310	C20E17024V	2kV/20A	2016-07-08	2017-07-07
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2017-03-03	2018-03-02
Thermal Meter	SENSING	N/A	N/A	25、50°C	2017-03-09	2018-03-08
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-12-05	2017-12-04
AC Power Supply	ALL Power	APW-105N	970613	220V±10% 50Hz	2017-03-03	2018-03-02
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2017-03-03	2018-03-02
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2017-03-03	2018-03-02
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2017-03-03	2018-03-02
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2017-03-09	2018-03-08
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2017-03-20	2018-03-19

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-09-07	2017-09-06

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

#### 4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$  during measurement. And relative humidity is less than 65%.

##### Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

4 $\pi$  geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is  $U=1.8\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=20\text{K}$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the CRI is  $U=1.8(K=2)$ , at the 95% confidence level.

The uncertainty of power meter AC current  $U=0.19\%$  of rdg, AC Voltage  $U=0.15\%$  of rdg, Power  $U=0.20\%$  ( $K=2$ ), at the 95% confidence level.

##### Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The vertical angle ( $\gamma$ ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

The uncertainty of the luminous intensity is  $U=1.6\%$  ( $K=2$ ) , at the 95% confidence level.

##### Fidelity Index and Gamut Index Calculation

The  $R_i$ ,  $R_g$  was calculated according to IES TM-30-15 by using calculation tools. The calculation was based on the measured SPD from 380nm to 780nm with 1nm intervals. All the colors in this report is for reference only.

## 5. Test Result

### [Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Base up**

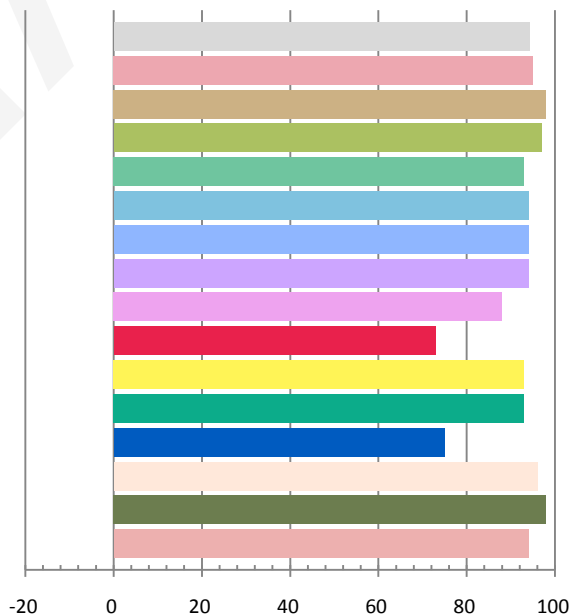
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.07074	7.993	0.9411	709.60	88.78

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.4739	3886	-0.00224	0.3839	0.3741	0.2285	0.5009

### Color Rendering Index

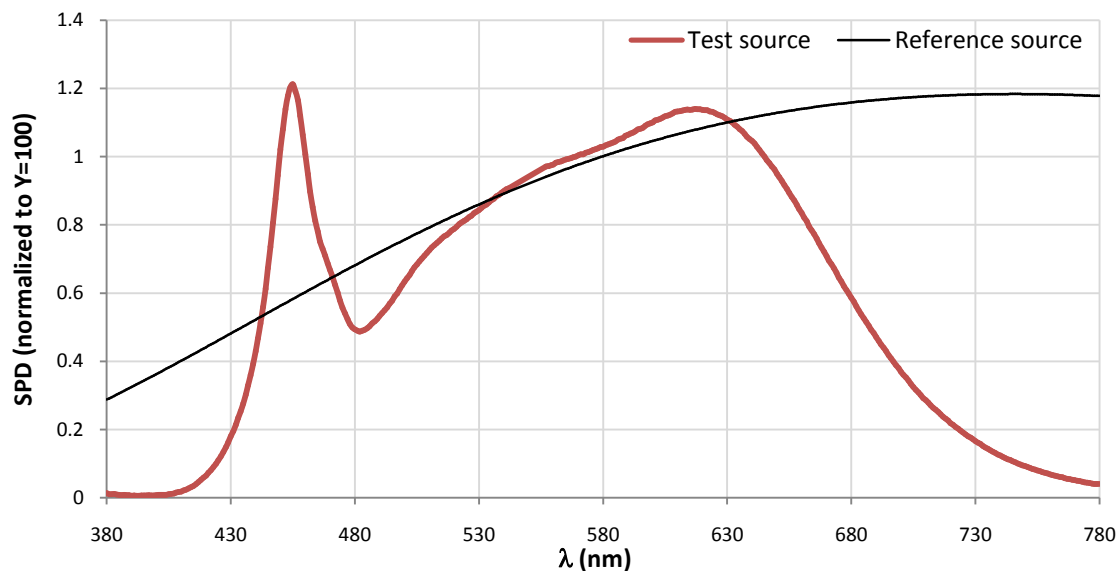
Ra			
94.3			
R1	R2	R3	R4
95	98	97	93
R5	R6	R7	R8
94	94	94	88
R9	R10	R11	R12
73	93	93	75
R13	R14	R15	
96	98	94	



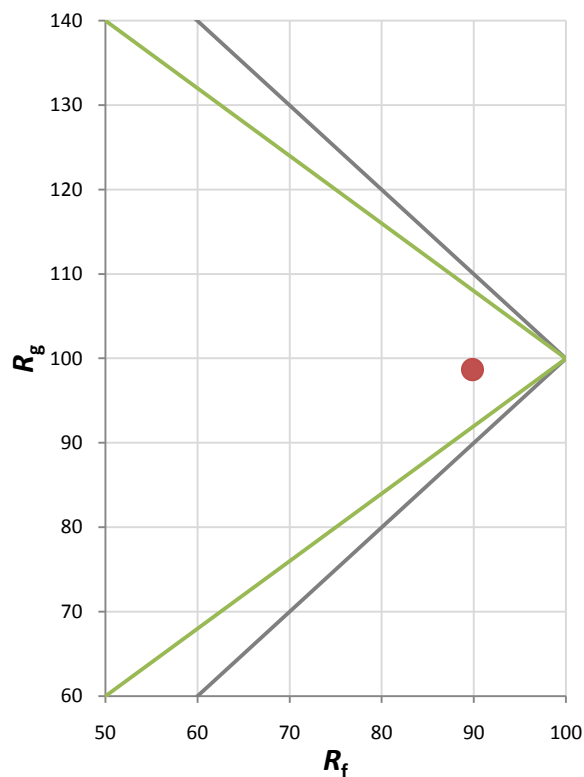
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	90
Gamut Index $R_g$	99

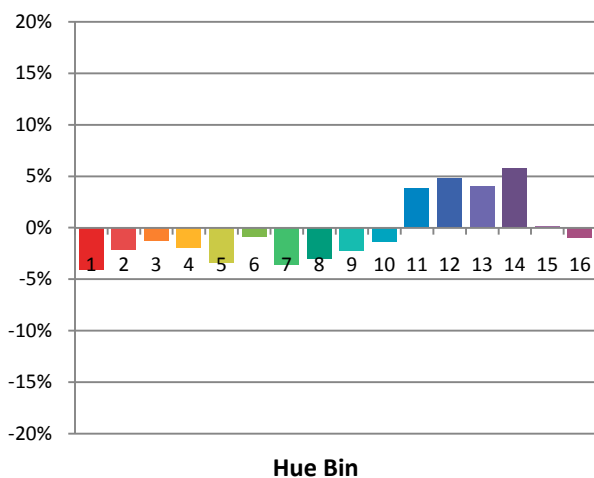
### Spectral Power Distribution Comparison



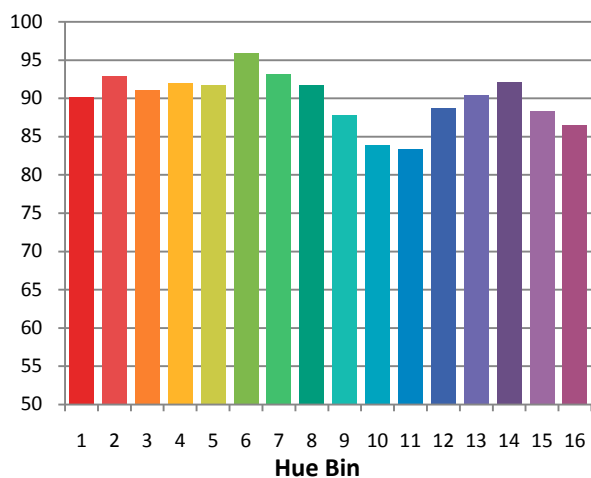
### Plot of $R_g$ versus $R_f$



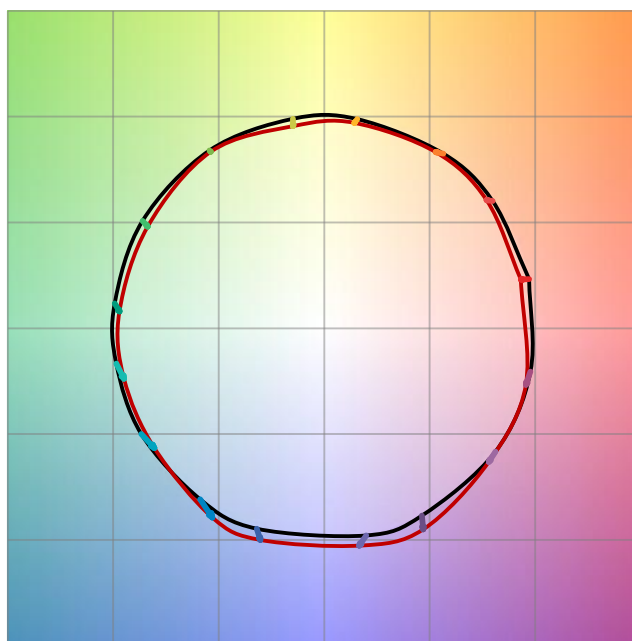
Chroma Shift by Hue



$R_f$  by Hue

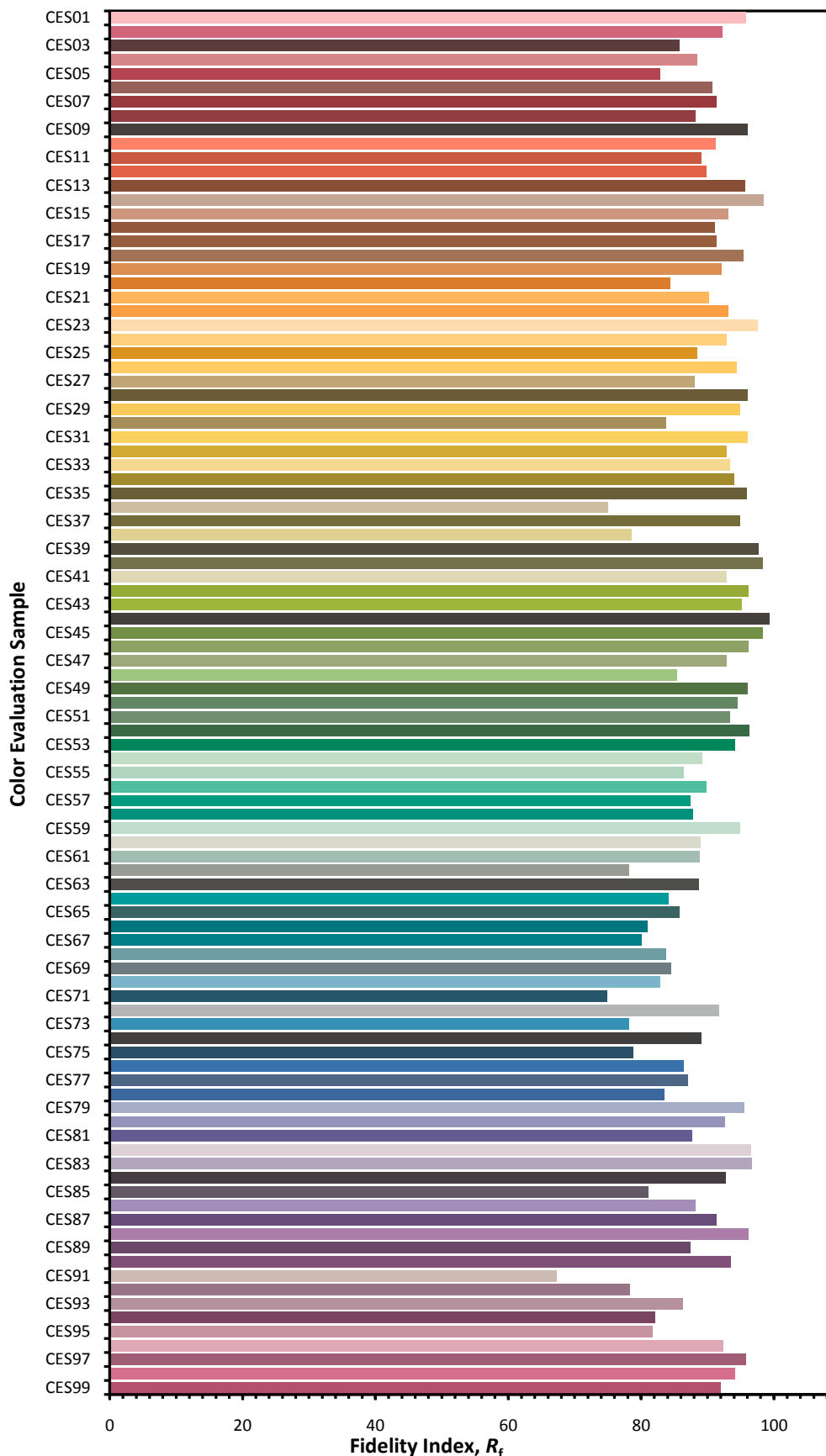


Color Vector Graphic

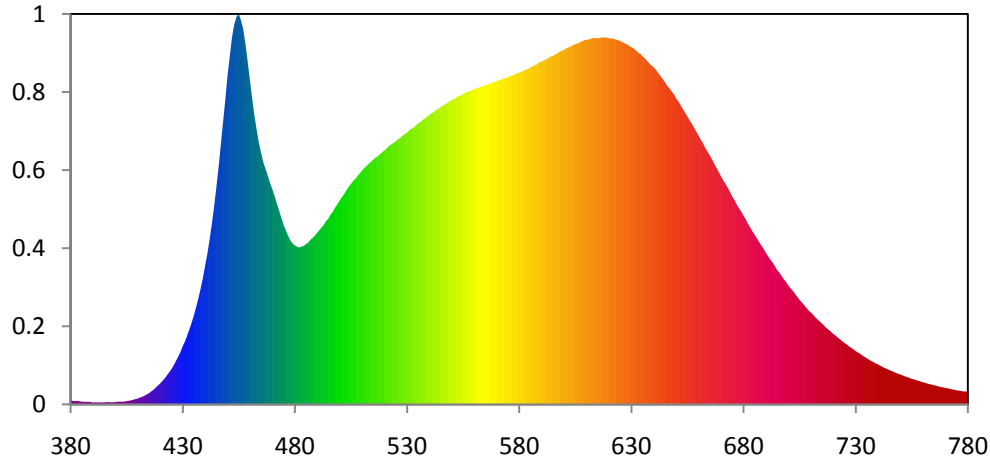


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



**Relative Spectral Power Distribution**

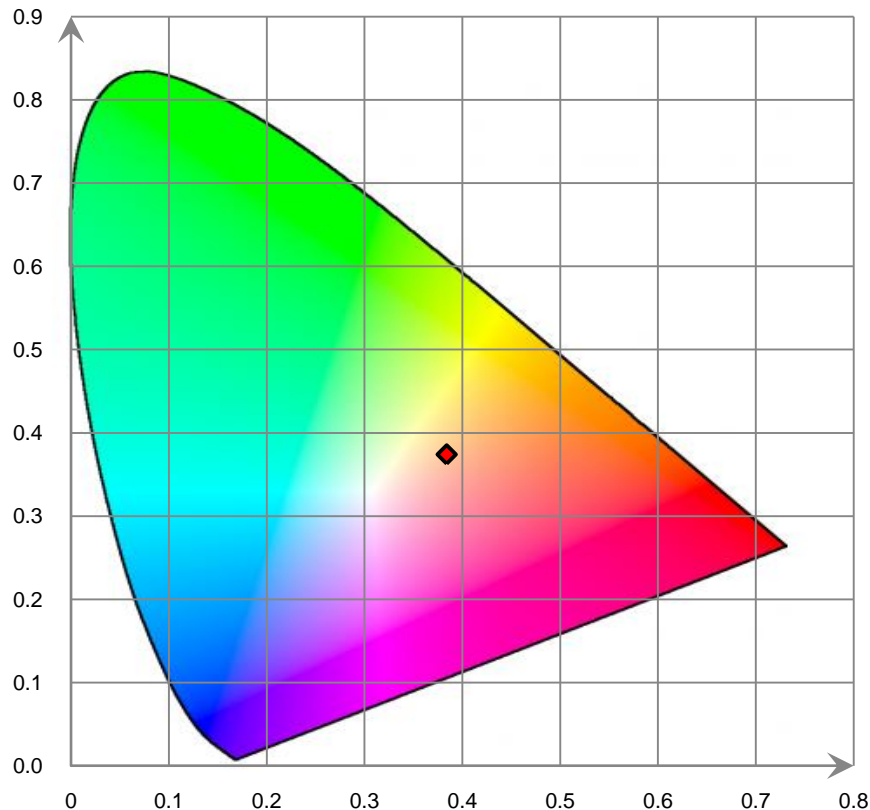


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.486E-01	421	7.572E-01	462	9.313E+00	503	6.899E+00	544	9.526E+00
381	1.111E-01	422	8.398E-01	463	8.850E+00	504	7.014E+00	545	9.592E+00
382	1.109E-01	423	9.384E-01	464	8.431E+00	505	7.105E+00	546	9.631E+00
383	1.124E-01	424	1.035E+00	465	8.107E+00	506	7.204E+00	547	9.682E+00
384	1.001E-01	425	1.137E+00	466	7.794E+00	507	7.277E+00	548	9.715E+00
385	8.618E-02	426	1.256E+00	467	7.586E+00	508	7.373E+00	549	9.778E+00
386	8.139E-02	427	1.397E+00	468	7.367E+00	509	7.455E+00	550	9.809E+00
387	8.294E-02	428	1.538E+00	469	7.132E+00	510	7.542E+00	551	9.851E+00
388	8.107E-02	429	1.685E+00	470	6.938E+00	511	7.626E+00	552	9.892E+00
389	7.791E-02	430	1.873E+00	471	6.722E+00	512	7.693E+00	553	9.944E+00
390	5.806E-02	431	2.027E+00	472	6.477E+00	513	7.757E+00	554	9.957E+00
391	6.744E-02	432	2.217E+00	473	6.245E+00	514	7.828E+00	555	1.000E+01
392	6.225E-02	433	2.422E+00	474	6.018E+00	515	7.890E+00	556	1.005E+01
393	6.173E-02	434	2.632E+00	475	5.790E+00	516	7.963E+00	557	1.009E+01
394	6.511E-02	435	2.869E+00	476	5.615E+00	517	7.999E+00	558	1.010E+01
395	6.575E-02	436	3.135E+00	477	5.435E+00	518	8.074E+00	559	1.013E+01
396	6.963E-02	437	3.416E+00	478	5.292E+00	519	8.138E+00	560	1.015E+01
397	7.323E-02	438	3.730E+00	479	5.186E+00	520	8.188E+00	561	1.020E+01
398	6.647E-02	439	4.071E+00	480	5.127E+00	521	8.260E+00	562	1.022E+01
399	6.762E-02	440	4.462E+00	481	5.083E+00	522	8.335E+00	563	1.024E+01
400	7.339E-02	441	4.851E+00	482	5.058E+00	523	8.383E+00	564	1.027E+01
401	8.296E-02	442	5.310E+00	483	5.090E+00	524	8.431E+00	565	1.030E+01
402	8.784E-02	443	5.808E+00	484	5.114E+00	525	8.483E+00	566	1.032E+01
403	8.747E-02	444	6.362E+00	485	5.169E+00	526	8.549E+00	567	1.034E+01
404	8.746E-02	445	6.985E+00	486	5.222E+00	527	8.590E+00	568	1.037E+01
405	1.052E-01	446	7.638E+00	487	5.313E+00	528	8.661E+00	569	1.039E+01
406	1.148E-01	447	8.368E+00	488	5.371E+00	529	8.715E+00	570	1.043E+01
407	1.286E-01	448	9.102E+00	489	5.448E+00	530	8.763E+00	571	1.046E+01
408	1.515E-01	449	9.817E+00	490	5.539E+00	531	8.832E+00	572	1.046E+01
409	1.712E-01	450	1.060E+01	491	5.625E+00	532	8.886E+00	573	1.051E+01
410	1.894E-01	451	1.122E+01	492	5.709E+00	533	8.924E+00	574	1.053E+01
411	2.227E-01	452	1.183E+01	493	5.801E+00	534	8.996E+00	575	1.056E+01
412	2.453E-01	453	1.225E+01	494	5.917E+00	535	9.064E+00	576	1.059E+01
413	2.824E-01	454	1.250E+01	495	5.994E+00	536	9.107E+00	577	1.061E+01
414	3.195E-01	455	1.259E+01	496	6.130E+00	537	9.177E+00	578	1.064E+01
415	3.631E-01	456	1.238E+01	497	6.218E+00	538	9.219E+00	579	1.068E+01
416	4.186E-01	457	1.211E+01	498	6.352E+00	539	9.285E+00	580	1.069E+01
417	4.724E-01	458	1.163E+01	499	6.458E+00	540	9.333E+00	581	1.073E+01
418	5.413E-01	459	1.105E+01	500	6.577E+00	541	9.391E+00	582	1.076E+01
419	6.114E-01	460	1.046E+01	501	6.686E+00	542	9.427E+00	583	1.079E+01
420	6.731E-01	461	9.865E+00	502	6.784E+00	543	9.493E+00	584	1.082E+01

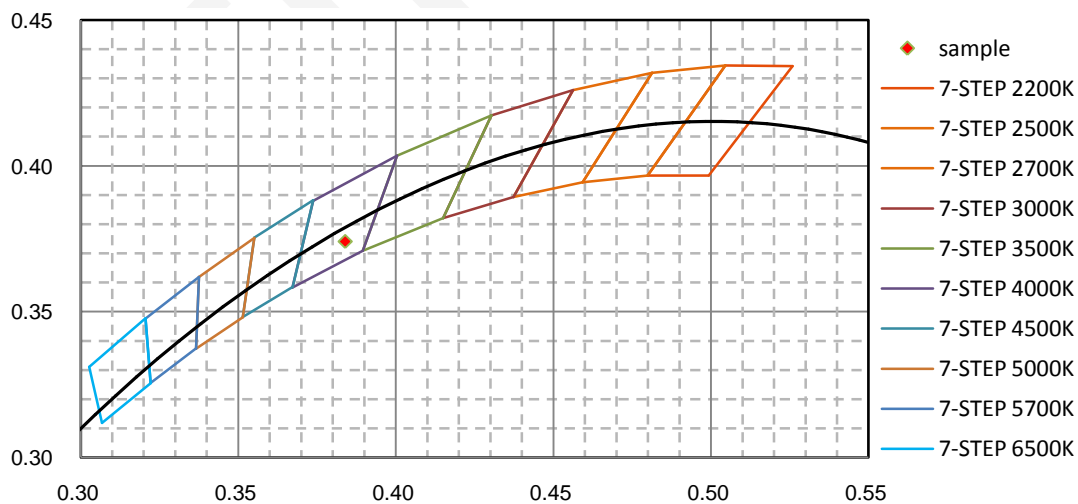


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.085E+01	626	1.168E+01	667	7.761E+00	708	3.124E+00	749	9.859E-01
586	1.091E+01	627	1.165E+01	668	7.622E+00	709	3.034E+00	750	9.624E-01
587	1.094E+01	628	1.162E+01	669	7.492E+00	710	2.971E+00	751	9.355E-01
588	1.096E+01	629	1.157E+01	670	7.355E+00	711	2.894E+00	752	9.027E-01
589	1.102E+01	630	1.152E+01	671	7.224E+00	712	2.813E+00	753	8.810E-01
590	1.105E+01	631	1.148E+01	672	7.110E+00	713	2.742E+00	754	8.552E-01
591	1.109E+01	632	1.143E+01	673	6.991E+00	714	2.675E+00	755	8.251E-01
592	1.112E+01	633	1.135E+01	674	6.848E+00	715	2.611E+00	756	8.053E-01
593	1.116E+01	634	1.131E+01	675	6.704E+00	716	2.539E+00	757	7.817E-01
594	1.122E+01	635	1.123E+01	676	6.589E+00	717	2.463E+00	758	7.596E-01
595	1.124E+01	636	1.117E+01	677	6.447E+00	718	2.405E+00	759	7.399E-01
596	1.127E+01	637	1.108E+01	678	6.328E+00	719	2.344E+00	760	7.131E-01
597	1.133E+01	638	1.099E+01	679	6.220E+00	720	2.273E+00	761	6.942E-01
598	1.137E+01	639	1.093E+01	680	6.088E+00	721	2.225E+00	762	6.724E-01
599	1.140E+01	640	1.087E+01	681	5.973E+00	722	2.158E+00	763	6.523E-01
600	1.143E+01	641	1.079E+01	682	5.827E+00	723	2.102E+00	764	6.359E-01
601	1.149E+01	642	1.069E+01	683	5.709E+00	724	2.043E+00	765	6.195E-01
602	1.151E+01	643	1.059E+01	684	5.580E+00	725	1.985E+00	766	5.977E-01
603	1.154E+01	644	1.049E+01	685	5.470E+00	726	1.933E+00	767	5.782E-01
604	1.158E+01	645	1.039E+01	686	5.351E+00	727	1.875E+00	768	5.659E-01
605	1.162E+01	646	1.028E+01	687	5.237E+00	728	1.831E+00	769	5.477E-01
606	1.164E+01	647	1.019E+01	688	5.118E+00	729	1.779E+00	770	5.311E-01
607	1.167E+01	648	1.009E+01	689	5.021E+00	730	1.720E+00	771	5.203E-01
608	1.171E+01	649	1.000E+01	690	4.889E+00	731	1.675E+00	772	5.016E-01
609	1.175E+01	650	9.863E+00	691	4.777E+00	732	1.635E+00	773	4.870E-01
610	1.176E+01	651	9.766E+00	692	4.669E+00	733	1.579E+00	774	4.711E-01
611	1.177E+01	652	9.647E+00	693	4.568E+00	734	1.531E+00	775	4.549E-01
612	1.179E+01	653	9.527E+00	694	4.460E+00	735	1.489E+00	776	4.447E-01
613	1.181E+01	654	9.406E+00	695	4.336E+00	736	1.442E+00	777	4.316E-01
614	1.182E+01	655	9.289E+00	696	4.252E+00	737	1.400E+00	778	4.182E-01
615	1.181E+01	656	9.159E+00	697	4.140E+00	738	1.362E+00	779	4.162E-01
616	1.182E+01	657	9.051E+00	698	4.034E+00	739	1.320E+00	780	4.170E-01
617	1.184E+01	658	8.922E+00	699	3.946E+00	740	1.288E+00		
618	1.183E+01	659	8.788E+00	700	3.837E+00	741	1.249E+00		
619	1.183E+01	660	8.670E+00	701	3.745E+00	742	1.209E+00		
620	1.181E+01	661	8.531E+00	702	3.662E+00	743	1.171E+00		
621	1.180E+01	662	8.420E+00	703	3.570E+00	744	1.145E+00		
622	1.180E+01	663	8.268E+00	704	3.466E+00	745	1.107E+00		
623	1.176E+01	664	8.149E+00	705	3.375E+00	746	1.081E+00		
624	1.175E+01	665	8.031E+00	706	3.289E+00	747	1.046E+00		
625	1.172E+01	666	7.898E+00	707	3.210E+00	748	1.017E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



## [Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hours**

Test orientation: **Base up**

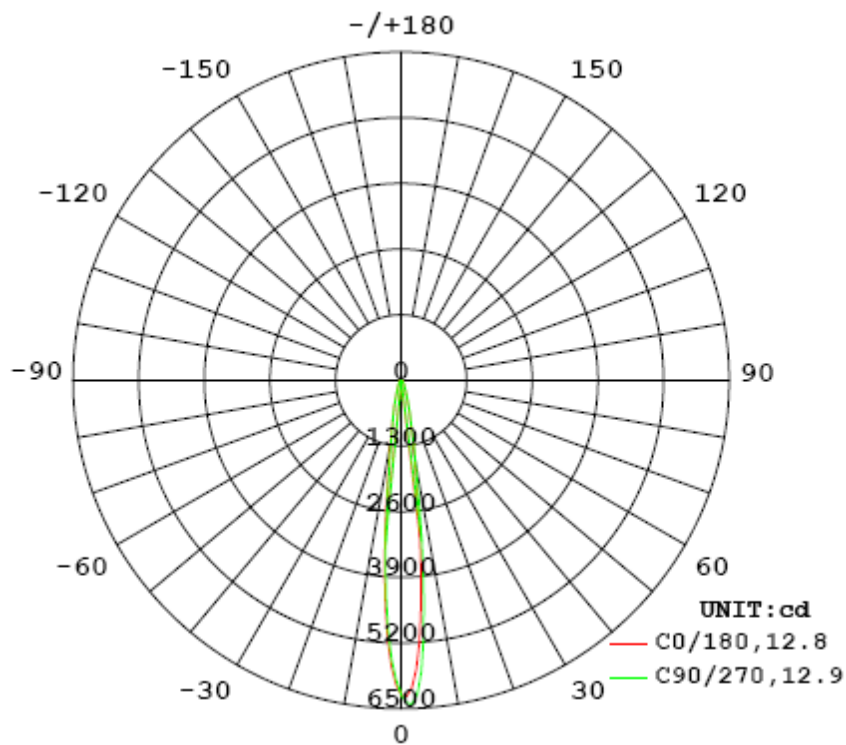
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.0708	7.997	0.9410

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
713.959	89.28	6471	0.24	0.25

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	12.8	12.8	12.9	12.9	12.9
Field Angle (10% I <sub>max</sub> ):	28.7	28.9	28.6	29.1	28.8

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	6221	6221	6221	6221	6221	6221	6221	6221
5.0°	3807	3674	3574	3560	3584	3685	3837	4048
10.0°	1179	1139	1111	1093	1104	1151	1220	1290
15.0°	550	556	556	543	540	551	562	563
20.0°	278	281	282	276	274	274	275	278
25.0°	168	168	167	166	164	165	167	169
30.0°	120	119	119	118	118	118	120	120
35.0°	92	92	91	89	88	89	91	92
40.0°	67	67	66	65	65	65	66	67
45.0°	50	50	49	49	49	48	48	50
50.0°	37	36	36	36	35	35	36	37
55.0°	28	27	27	27	26	26	27	27
60.0°	22	22	21	21	21	21	21	21
65.0°	18	17	17	17	17	17	17	17
70.0°	14	13	13	13	13	13	13	13
75.0°	10	9	9	9	9	9	9	10
80.0°	6	5	5	5	5	5	5	6
85.0°	2	2	2	2	2	2	2	2
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

**Luminous Intensity (cd) Distribution Data (cont.)**

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	6221	6221	6221	6221	6221	6221	6221	6221
5.0°	4518	4804	5044	5199	5126	4900	4575	4255
10.0°	1556	1553	1619	1647	1613	1666	1558	1439
15.0°	604	632	652	654	640	636	619	586
20.0°	298	307	317	321	320	322	318	299
25.0°	178	182	188	191	190	190	186	177
30.0°	124	129	135	140	140	139	132	124
35.0°	95	98	105	107	105	106	103	95
40.0°	70	71	74	75	75	76	74	70
45.0°	52	52	52	56	57	57	53	52
50.0°	38	38	40	43	44	44	41	38
55.0°	28	28	30	32	32	32	30	28
60.0°	22	22	23	23	24	23	23	23
65.0°	18	18	18	19	19	19	18	18
70.0°	14	14	14	15	15	14	14	14
75.0°	10	10	10	11	11	10	10	10
80.0°	6	6	6	7	7	7	6	6
85.0°	3	3	3	3	3	3	3	3
90.0°	0	0	0	1	1	1	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

**Zonal Lumen Density Measurement**

Deg	Flux (lm)	%
0-5	125.4	17.56
5-10	174.1	24.39
10-15	104.5	14.64
15-20	68.6	9.61
20-25	47.1	6.60
25-30	37.3	5.22
30-35	32.5	4.55
35-40	27.4	3.84
40-45	22.1	3.10
45-50	18.1	2.53
50-55	14.4	2.01
55-60	11.5	1.62
60-65	9.6	1.35
65-70	8.0	1.12
70-75	6.1	0.85
75-80	4.2	0.59
80-85	2.2	0.32
85-90	0.7	0.09
90-95	0.1	0.01
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.0	0.00
145-150	0.0	0.00
150-155	0.0	0.00
155-160	0.0	0.00
160-165	0.0	0.00
165-170	0.0	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	125.4	17.56
0-10	299.5	41.95
0-15	404.0	56.59
0-20	472.6	66.20
0-25	519.7	72.80
0-30	557.0	78.02
0-35	589.5	82.57
0-40	616.9	86.41
0-45	639.1	89.51
0-50	657.1	92.04
0-55	671.5	94.05
0-60	683.0	95.67
0-65	692.7	97.02
0-70	700.6	98.14
0-75	706.8	98.99
0-80	711.0	99.58
0-85	713.2	99.90
0-90	713.9	99.99
0-95	713.9	100.00
0-100	714.0	100.00
0-105	714.0	100.00
0-110	714.0	100.00
0-115	714.0	100.00
0-120	714.0	100.00
0-125	714.0	100.00
0-130	714.0	100.00
0-135	714.0	100.00
0-140	714.0	100.00
0-145	714.0	100.00
0-150	714.0	100.00
0-155	714.0	100.00
0-160	714.0	100.00
0-165	714.0	100.00
0-170	714.0	100.00
0-175	714.0	100.00
0-180	714.0	100.00

## 6. Product Photo



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