

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/930FL40

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu <i>Hill Liu</i>
Report Number:	R1KS170216012-10A1
Test Date:	2017-03-05 to 2017-03-07
Report Date:	2017-03-24
Reviewed By:	Bill Xiong / EE Engineer <i>Bill Xiong</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	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/930FL40
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: 3000K
Nominal Lumen Output: 550lm

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 π 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 (γ) 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**

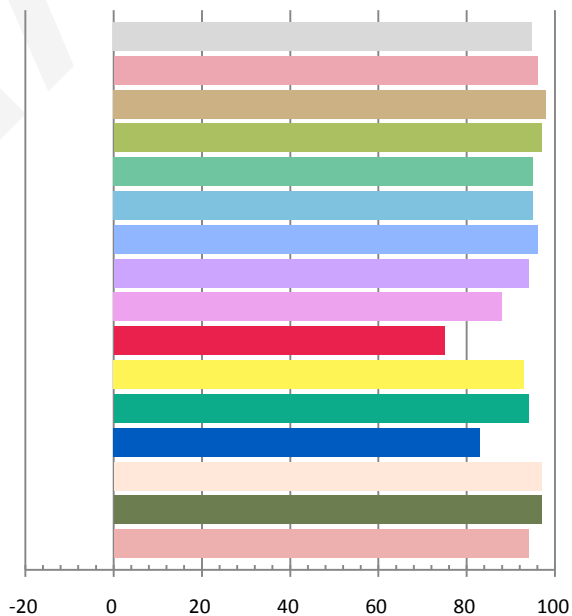
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.07031	7.971	0.9444	610.58	76.60

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.2491	2895	-0.00329	0.4396	0.3967	0.2555	0.5188

Color Rendering Index

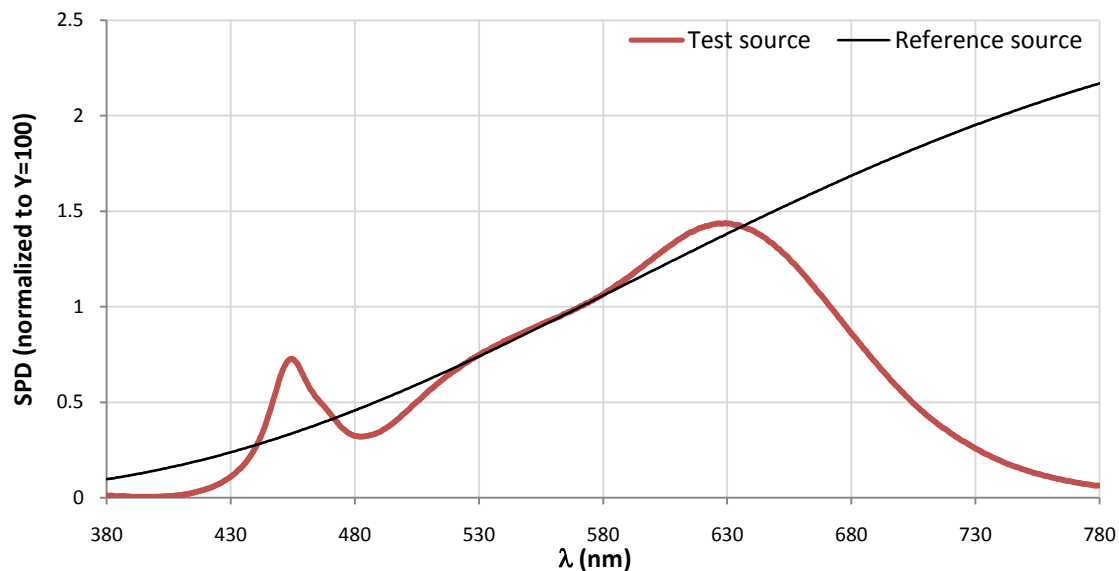
Ra			
94.9			
R1	R2	R3	R4
96	98	97	95
R5	R6	R7	R8
95	96	94	88
R9	R10	R11	R12
75	93	94	83
R13	R14	R15	
97	97	94	



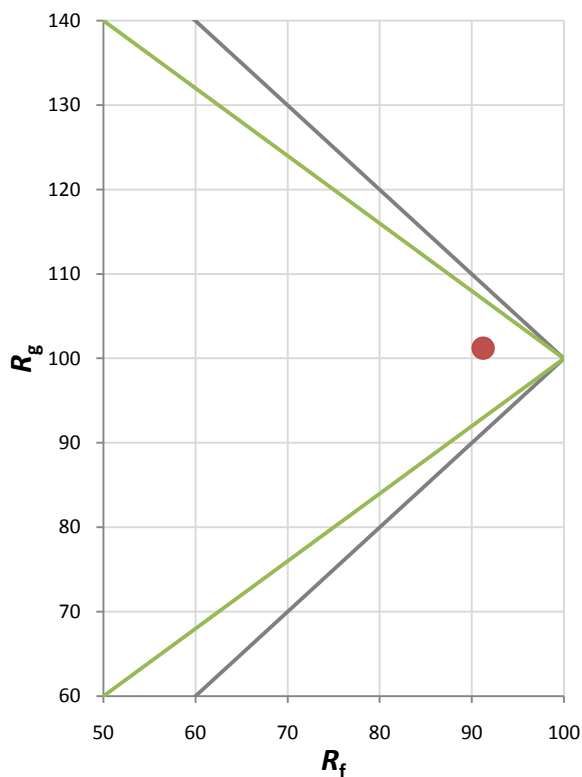
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

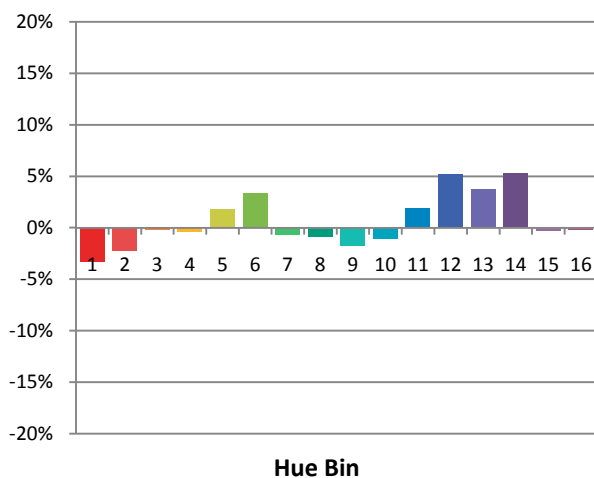
Spectral Power Distribution Comparison



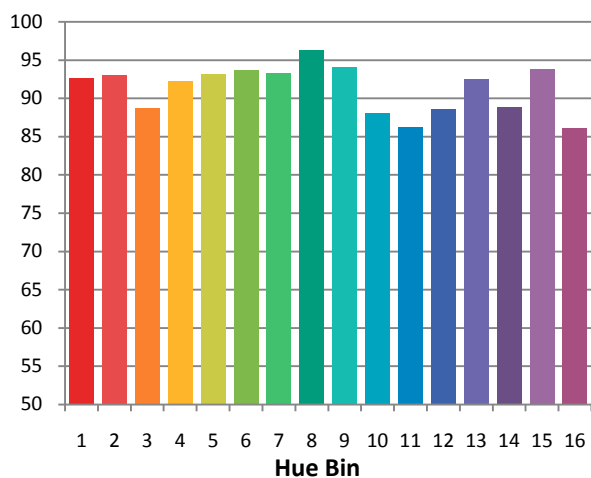
Plot of R_g versus R_f



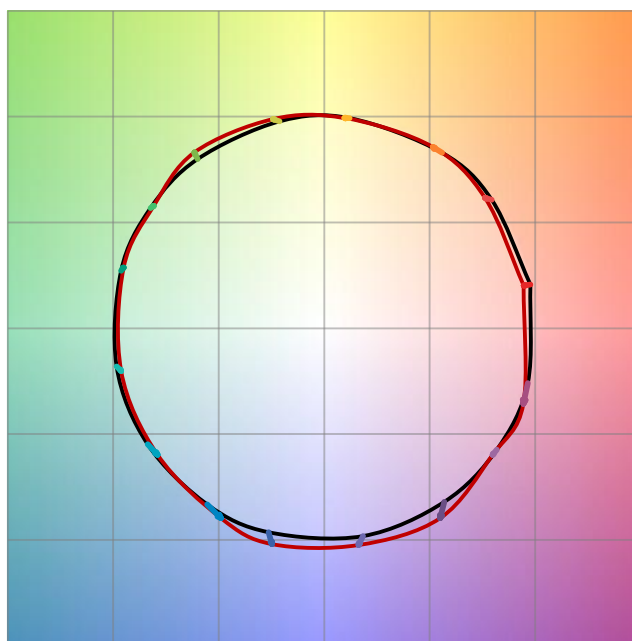
Chroma Shift by Hue



R_f by Hue

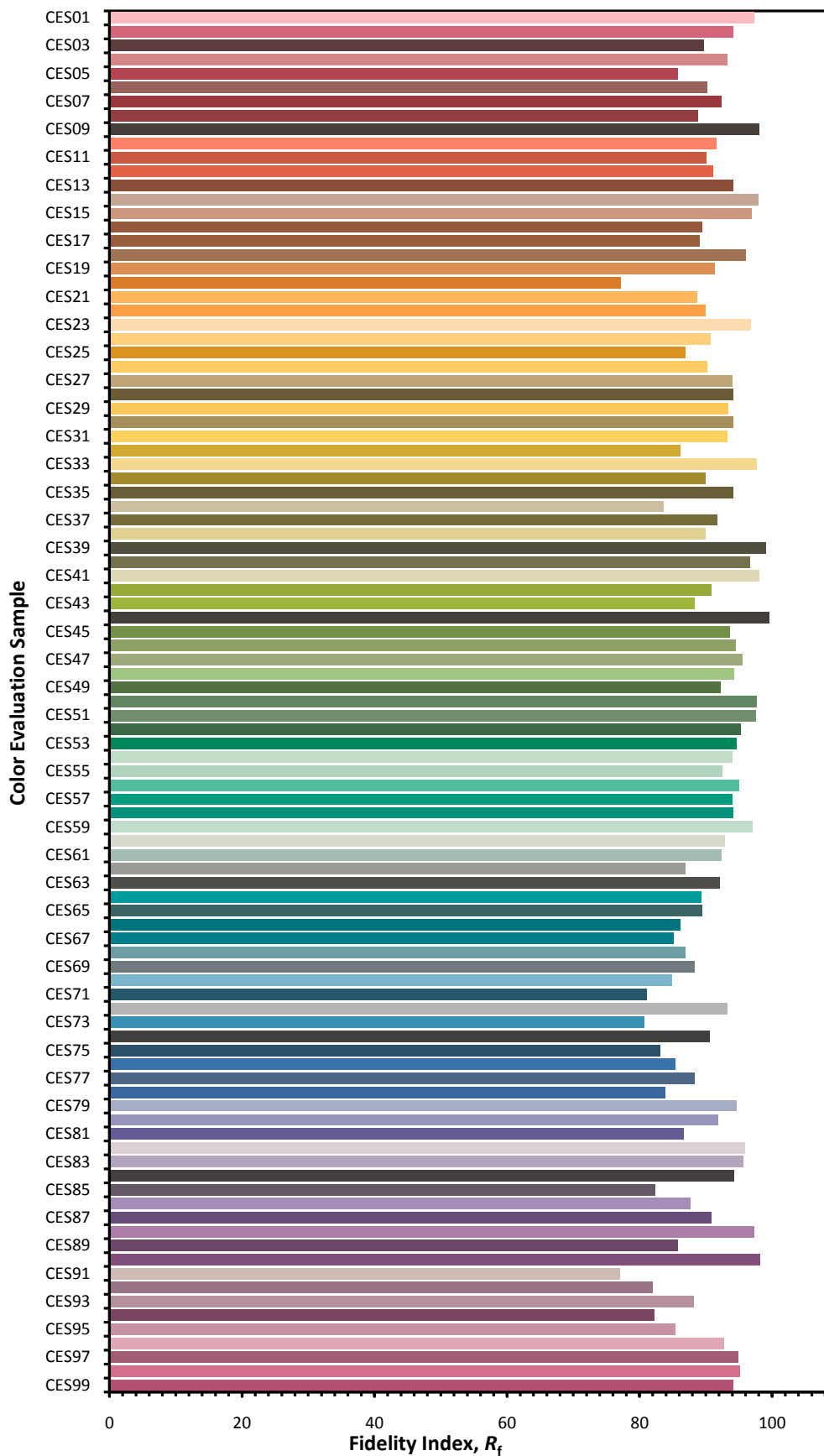


Color Vector Graphic

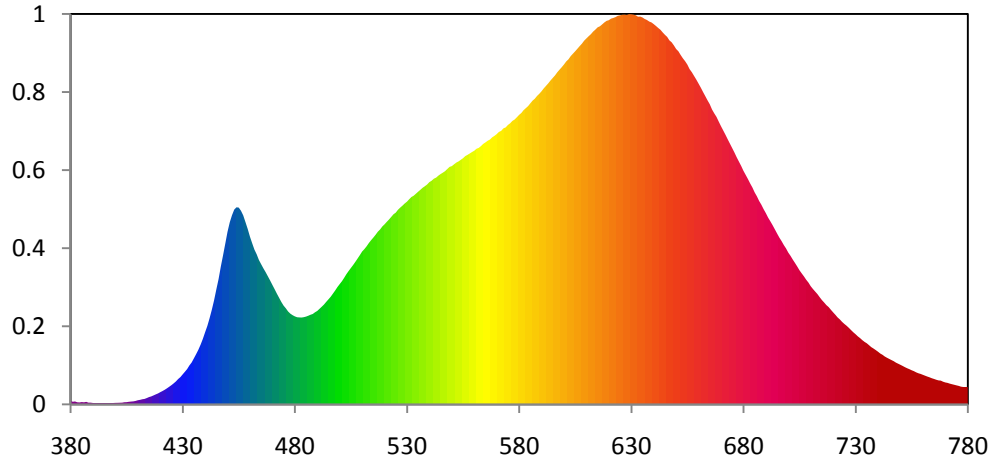


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



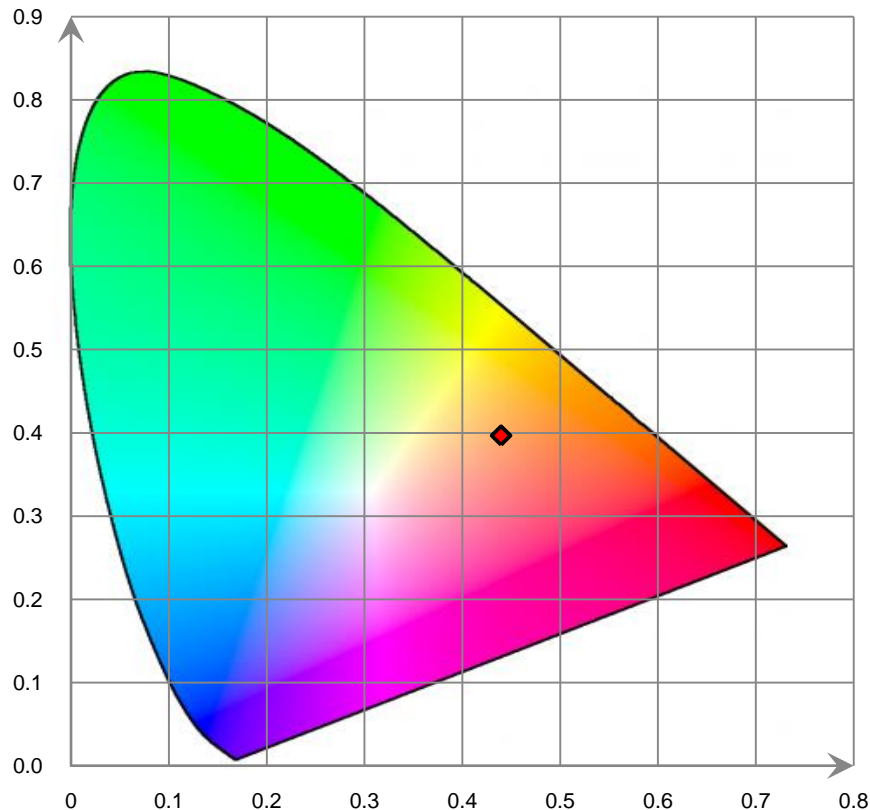
Relative Spectral Power Distribution



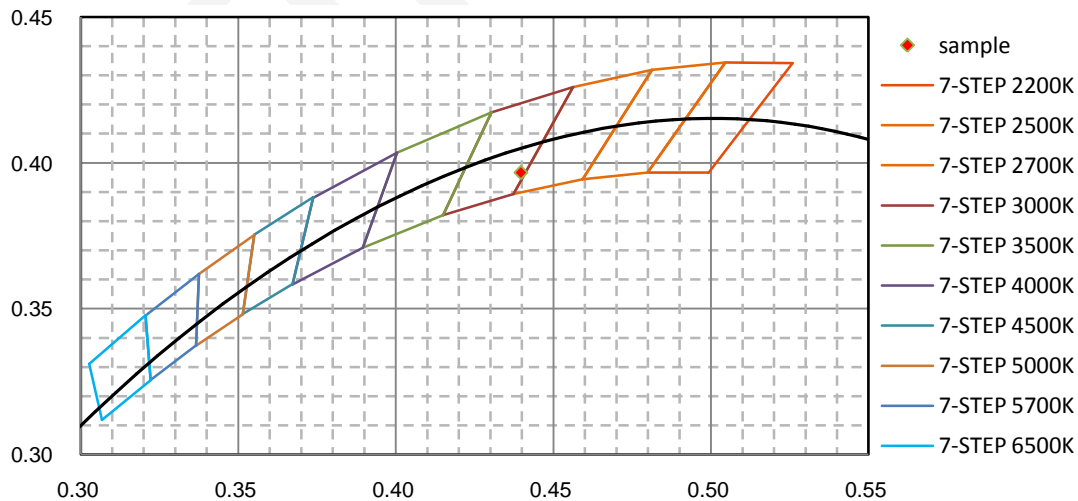
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.209E-01	421	4.384E-01	462	5.096E+00	503	4.287E+00	544	7.531E+00
381	8.649E-02	422	4.812E-01	463	4.941E+00	504	4.391E+00	545	7.583E+00
382	9.644E-02	423	5.286E-01	464	4.752E+00	505	4.490E+00	546	7.630E+00
383	6.979E-02	424	5.793E-01	465	4.614E+00	506	4.588E+00	547	7.678E+00
384	6.403E-02	425	6.320E-01	466	4.478E+00	507	4.693E+00	548	7.750E+00
385	7.647E-02	426	6.916E-01	467	4.352E+00	508	4.804E+00	549	7.820E+00
386	6.780E-02	427	7.554E-01	468	4.216E+00	509	4.915E+00	550	7.844E+00
387	8.337E-02	428	8.342E-01	469	4.078E+00	510	5.032E+00	551	7.903E+00
388	5.691E-02	429	8.990E-01	470	3.933E+00	511	5.111E+00	552	7.961E+00
389	5.676E-02	430	9.872E-01	471	3.792E+00	512	5.203E+00	553	8.000E+00
390	4.611E-02	431	1.074E+00	472	3.647E+00	513	5.311E+00	554	8.051E+00
391	4.179E-02	432	1.163E+00	473	3.508E+00	514	5.404E+00	555	8.104E+00
392	4.097E-02	433	1.281E+00	474	3.370E+00	515	5.491E+00	556	8.174E+00
393	4.156E-02	434	1.378E+00	475	3.251E+00	516	5.583E+00	557	8.214E+00
394	4.091E-02	435	1.513E+00	476	3.163E+00	517	5.684E+00	558	8.260E+00
395	4.234E-02	436	1.652E+00	477	3.059E+00	518	5.758E+00	559	8.309E+00
396	4.076E-02	437	1.799E+00	478	2.988E+00	519	5.855E+00	560	8.351E+00
397	3.869E-02	438	1.967E+00	479	2.937E+00	520	5.928E+00	561	8.415E+00
398	4.332E-02	439	2.157E+00	480	2.897E+00	521	6.010E+00	562	8.444E+00
399	4.456E-02	440	2.372E+00	481	2.869E+00	522	6.087E+00	563	8.505E+00
400	5.042E-02	441	2.582E+00	482	2.863E+00	523	6.173E+00	564	8.576E+00
401	5.082E-02	442	2.835E+00	483	2.859E+00	524	6.259E+00	565	8.625E+00
402	5.366E-02	443	3.114E+00	484	2.870E+00	525	6.313E+00	566	8.680E+00
403	5.613E-02	444	3.422E+00	485	2.889E+00	526	6.408E+00	567	8.719E+00
404	7.134E-02	445	3.778E+00	486	2.918E+00	527	6.479E+00	568	8.792E+00
405	7.299E-02	446	4.123E+00	487	2.950E+00	528	6.543E+00	569	8.840E+00
406	8.449E-02	447	4.533E+00	488	2.976E+00	529	6.614E+00	570	8.898E+00
407	9.276E-02	448	4.905E+00	489	3.032E+00	530	6.675E+00	571	8.970E+00
408	9.897E-02	449	5.291E+00	490	3.076E+00	531	6.754E+00	572	9.004E+00
409	1.134E-01	450	5.682E+00	491	3.145E+00	532	6.827E+00	573	9.087E+00
410	1.362E-01	451	5.994E+00	492	3.214E+00	533	6.871E+00	574	9.117E+00
411	1.497E-01	452	6.228E+00	493	3.288E+00	534	6.937E+00	575	9.198E+00
412	1.680E-01	453	6.413E+00	494	3.374E+00	535	7.002E+00	576	9.254E+00
413	1.799E-01	454	6.488E+00	495	3.458E+00	536	7.066E+00	577	9.331E+00
414	2.079E-01	455	6.479E+00	496	3.542E+00	537	7.132E+00	578	9.379E+00
415	2.398E-01	456	6.373E+00	497	3.646E+00	538	7.184E+00	579	9.454E+00
416	2.619E-01	457	6.222E+00	498	3.749E+00	539	7.240E+00	580	9.531E+00
417	2.937E-01	458	6.001E+00	499	3.863E+00	540	7.316E+00	581	9.594E+00
418	3.276E-01	459	5.776E+00	500	3.959E+00	541	7.364E+00	582	9.688E+00
419	3.600E-01	460	5.522E+00	501	4.053E+00	542	7.430E+00	583	9.752E+00
420	4.008E-01	461	5.304E+00	502	4.167E+00	543	7.466E+00	584	9.819E+00

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	9.911E+00	626	1.283E+01	667	9.580E+00	708	4.102E+00	749	1.338E+00
586	9.999E+00	627	1.283E+01	668	9.464E+00	709	4.009E+00	750	1.302E+00
587	1.006E+01	628	1.282E+01	669	9.308E+00	710	3.890E+00	751	1.264E+00
588	1.015E+01	629	1.285E+01	670	9.159E+00	711	3.797E+00	752	1.225E+00
589	1.023E+01	630	1.284E+01	671	9.018E+00	712	3.713E+00	753	1.189E+00
590	1.031E+01	631	1.283E+01	672	8.876E+00	713	3.630E+00	754	1.158E+00
591	1.040E+01	632	1.281E+01	673	8.727E+00	714	3.528E+00	755	1.123E+00
592	1.049E+01	633	1.276E+01	674	8.580E+00	715	3.434E+00	756	1.093E+00
593	1.057E+01	634	1.277E+01	675	8.437E+00	716	3.354E+00	757	1.055E+00
594	1.066E+01	635	1.274E+01	676	8.292E+00	717	3.267E+00	758	1.024E+00
595	1.075E+01	636	1.269E+01	677	8.135E+00	718	3.203E+00	759	1.003E+00
596	1.083E+01	637	1.265E+01	678	7.991E+00	719	3.113E+00	760	9.729E-01
597	1.093E+01	638	1.260E+01	679	7.850E+00	720	3.029E+00	761	9.442E-01
598	1.102E+01	639	1.257E+01	680	7.692E+00	721	2.949E+00	762	9.152E-01
599	1.110E+01	640	1.252E+01	681	7.556E+00	722	2.862E+00	763	8.897E-01
600	1.119E+01	641	1.246E+01	682	7.421E+00	723	2.796E+00	764	8.602E-01
601	1.129E+01	642	1.239E+01	683	7.273E+00	724	2.714E+00	765	8.372E-01
602	1.136E+01	643	1.233E+01	684	7.140E+00	725	2.648E+00	766	8.104E-01
603	1.146E+01	644	1.225E+01	685	6.980E+00	726	2.589E+00	767	7.899E-01
604	1.155E+01	645	1.217E+01	686	6.851E+00	727	2.519E+00	768	7.811E-01
605	1.163E+01	646	1.210E+01	687	6.697E+00	728	2.445E+00	769	7.466E-01
606	1.171E+01	647	1.198E+01	688	6.574E+00	729	2.373E+00	770	7.225E-01
607	1.180E+01	648	1.192E+01	689	6.427E+00	730	2.310E+00	771	7.072E-01
608	1.188E+01	649	1.182E+01	690	6.297E+00	731	2.239E+00	772	6.832E-01
609	1.197E+01	650	1.170E+01	691	6.151E+00	732	2.183E+00	773	6.631E-01
610	1.205E+01	651	1.163E+01	692	6.027E+00	733	2.116E+00	774	6.459E-01
611	1.212E+01	652	1.150E+01	693	5.900E+00	734	2.058E+00	775	6.255E-01
612	1.219E+01	653	1.139E+01	694	5.764E+00	735	2.012E+00	776	6.081E-01
613	1.227E+01	654	1.130E+01	695	5.627E+00	736	1.948E+00	777	5.838E-01
614	1.234E+01	655	1.119E+01	696	5.493E+00	737	1.884E+00	778	5.727E-01
615	1.241E+01	656	1.104E+01	697	5.377E+00	738	1.839E+00	779	5.720E-01
616	1.245E+01	657	1.094E+01	698	5.247E+00	739	1.786E+00	780	5.731E-01
617	1.251E+01	658	1.081E+01	699	5.134E+00	740	1.734E+00		
618	1.257E+01	659	1.069E+01	700	4.998E+00	741	1.676E+00		
619	1.263E+01	660	1.056E+01	701	4.890E+00	742	1.633E+00		
620	1.265E+01	661	1.043E+01	702	4.766E+00	743	1.578E+00		
621	1.270E+01	662	1.029E+01	703	4.654E+00	744	1.535E+00		
622	1.272E+01	663	1.015E+01	704	4.538E+00	745	1.496E+00		
623	1.275E+01	664	1.001E+01	705	4.414E+00	746	1.459E+00		
624	1.279E+01	665	9.881E+00	706	4.312E+00	747	1.422E+00		
625	1.281E+01	666	9.709E+00	707	4.213E+00	748	1.374E+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**

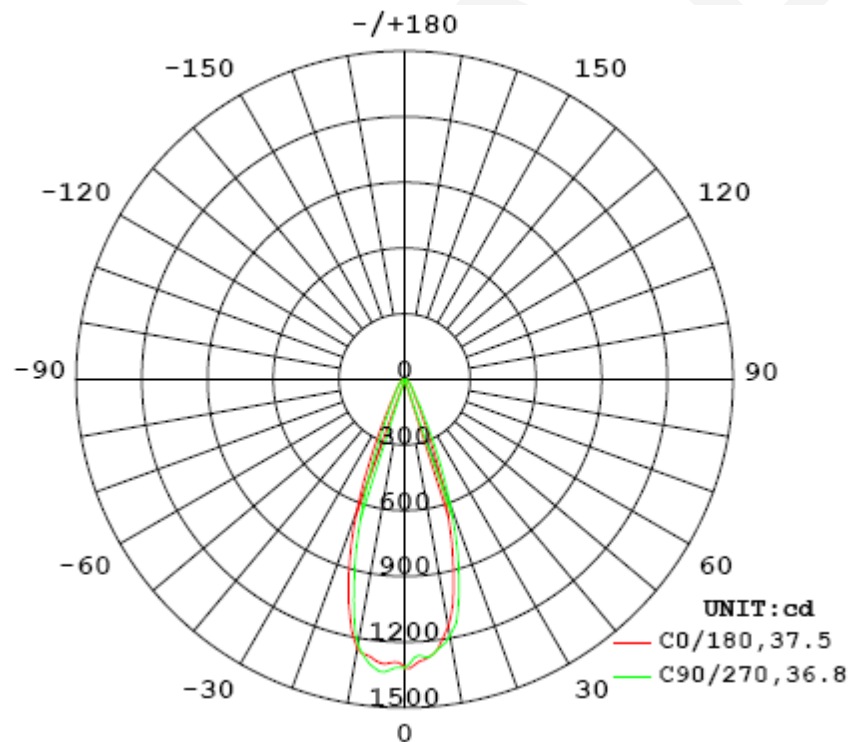
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0705	7.989	0.9440

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
618.285	77.39	1340	0.23	0.22

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	37.5	37.3	36.8	36.9	37.1
Field Angle (10% I _{max}):	58.4	58.4	58.1	57.9	58.2

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1316	1316	1316	1316	1316	1316	1316	1316
5.0°	1300	1297	1307	1332	1339	1335	1319	1290
10.0°	1248	1235	1239	1240	1232	1209	1178	1145
15.0°	997	964	948	910	882	850	829	814
20.0°	643	606	573	526	491	467	443	450
25.0°	300	286	252	234	208	197	186	186
30.0°	137	129	119	113	106	98	96	94
35.0°	81	78	75	73	72	68	66	66
40.0°	58	57	56	54	53	50	49	49
45.0°	45	43	41	41	40	39	39	38
50.0°	34	32	31	31	30	30	30	29
55.0°	26	25	24	24	24	24	23	23
60.0°	20	19	19	18	18	18	18	17
65.0°	15	15	14	14	14	14	13	13
70.0°	11	10	10	10	10	10	9	9
75.0°	7	7	7	6	6	6	6	6
80.0°	4	4	4	4	3	3	3	3
85.0°	2	2	2	1	1	1	1	1
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°	1316	1316	1316	1316	1316	1316	1316	1316
5.0°	1273	1258	1253	1263	1274	1288	1299	1297
10.0°	1145	1142	1143	1164	1189	1236	1257	1261
15.0°	852	863	889	919	959	998	1009	1021
20.0°	492	522	549	585	610	641	648	666
25.0°	210	232	256	277	297	312	313	325
30.0°	101	108	114	128	135	138	142	145
35.0°	68	71	72	75	76	79	79	80
40.0°	51	53	53	55	56	57	57	57
45.0°	39	40	41	43	43	44	44	44
50.0°	30	31	32	33	32	34	33	33
55.0°	23	24	25	26	25	26	25	26
60.0°	18	19	19	20	20	20	20	20
65.0°	14	14	14	15	15	15	15	15
70.0°	10	10	10	11	11	11	11	11
75.0°	6	7	7	7	7	7	7	7
80.0°	4	4	4	4	4	4	4	4
85.0°	1	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

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	31.0	5.02
5-10	89.5	14.47
10-15	126.4	20.45
15-20	120.4	19.48
20-25	81.5	13.17
25-30	43.8	7.09
30-35	27.0	4.36
35-40	21.0	3.40
40-45	17.5	2.84
45-50	14.6	2.36
50-55	12.1	1.96
55-60	10.0	1.62
60-65	8.0	1.30
65-70	6.2	1.00
70-75	4.4	0.71
75-80	2.8	0.46
80-85	1.5	0.24
85-90	0.4	0.07
90-95	0.0	0.00
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	31.0	5.02
0-10	120.5	19.49
0-15	246.9	39.94
0-20	367.4	59.42
0-25	448.8	72.59
0-30	492.7	79.68
0-35	519.6	84.04
0-40	540.7	87.44
0-45	558.2	90.28
0-50	572.8	92.64
0-55	584.9	94.60
0-60	594.9	96.22
0-65	603.0	97.52
0-70	609.1	98.52
0-75	613.6	99.23
0-80	616.4	99.69
0-85	617.8	99.93
0-90	618.3	100.00
0-95	618.3	100.00
0-100	618.3	100.00
0-105	618.3	100.00
0-110	618.3	100.00
0-115	618.3	100.00
0-120	618.3	100.00
0-125	618.3	100.00
0-130	618.3	100.00
0-135	618.3	100.00
0-140	618.3	100.00
0-145	618.3	100.00
0-150	618.3	100.00
0-155	618.3	100.00
0-160	618.3	100.00
0-165	618.3	100.00
0-170	618.3	100.00
0-175	618.3	100.00
0-180	618.3	100.00

6. Product Photo



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