

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 13PAR30DIM/927FL40

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu <i>Hill Liu</i>
Report Number:	R1KS170323019-10A1
Test Date:	2017-04-10 to 2017-04-11
Report Date:	2017-04-11
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:

One sample was received on 2017-04-10.

Model Tested: 13PAR30DIM/927FL40
 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 VAC 60Hz
 Rated Power: 13W
 Nominal CCT: 2700K
 Nominal Lumen Output: 1000lm

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
Standard Light	EVERFINE	D908	1012003	N/A	2016-09-07	2017-09-06

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Source						

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.

4π 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 $U=2.1\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=32\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1$ ($K=2$), 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**

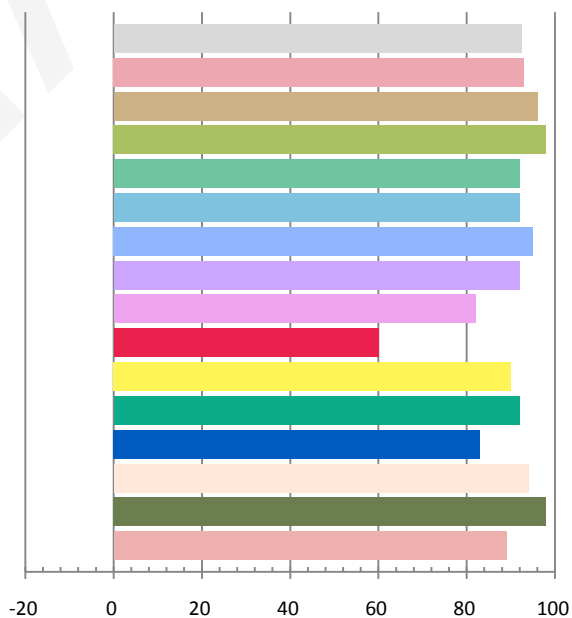
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1119	12.73	0.9477	1130.5	88.83

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.0665	2698	-0.00067	0.4589	0.4086	0.2628	0.5264

Color Rendering Index

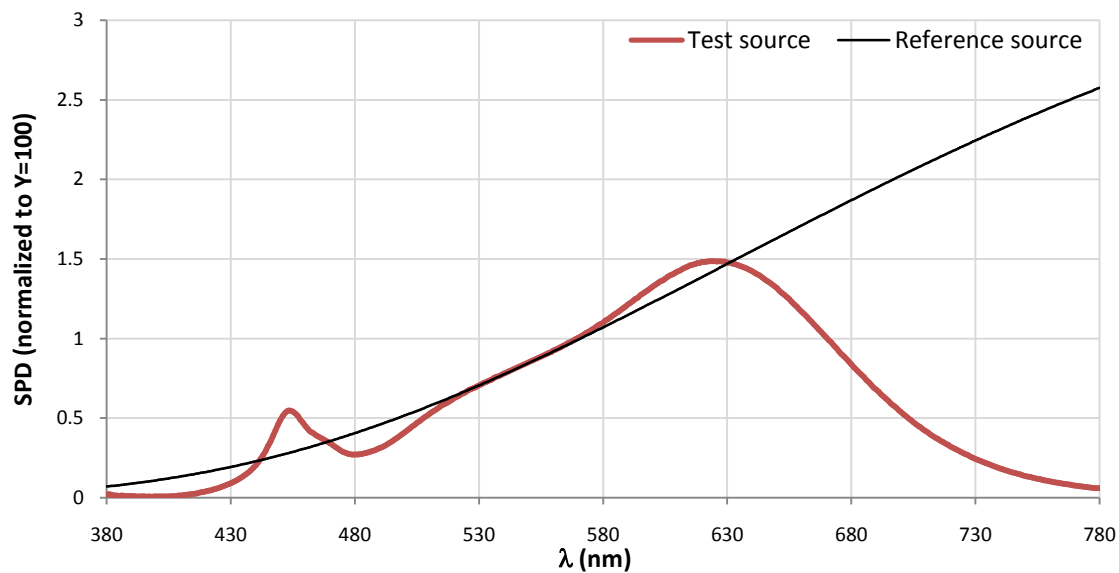
Ra			
92.5			
R1	R2	R3	R4
93	96	98	92
R5	R6	R7	R8
92	95	92	82
R9	R10	R11	R12
60	90	92	83
R13	R14	R15	
94	98	89	



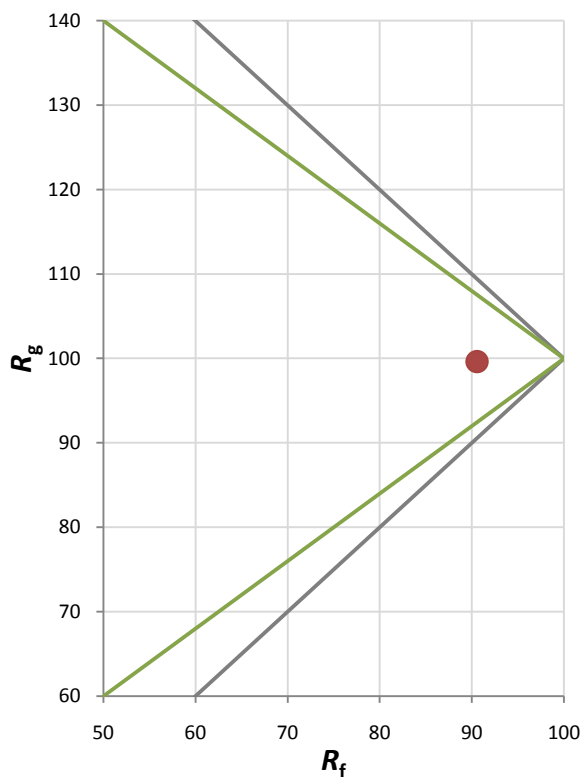
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	100

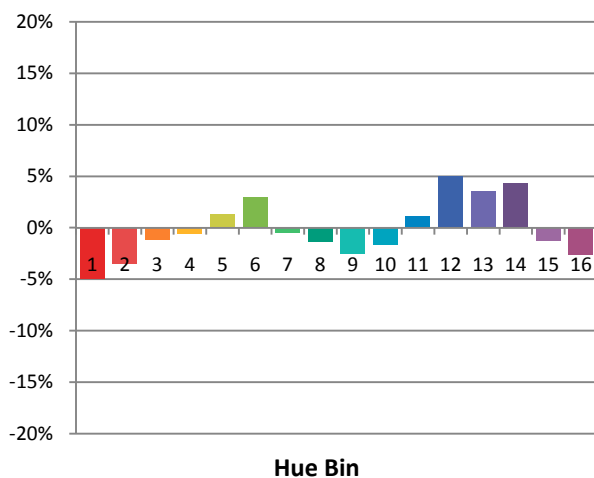
Spectral Power Distribution Comparison



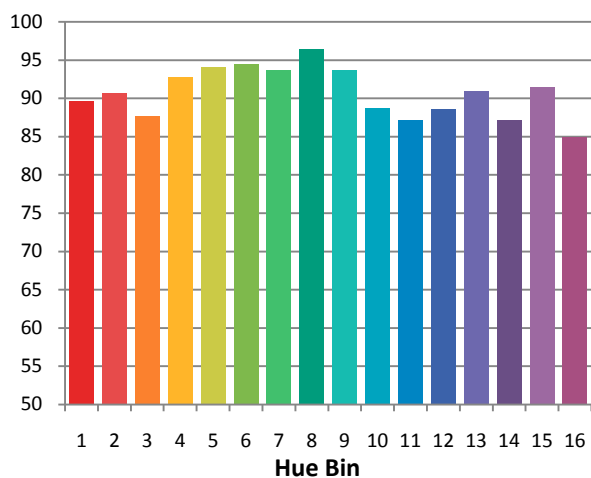
Plot of R_g versus R_f



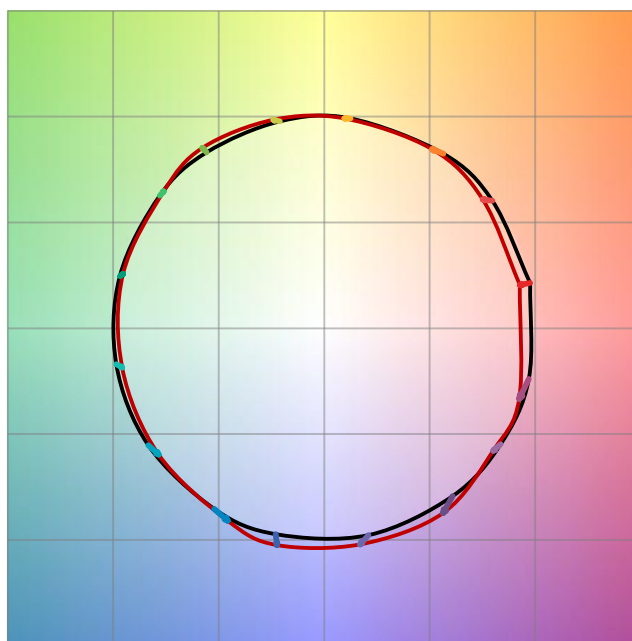
Chroma Shift by Hue



R_f by Hue

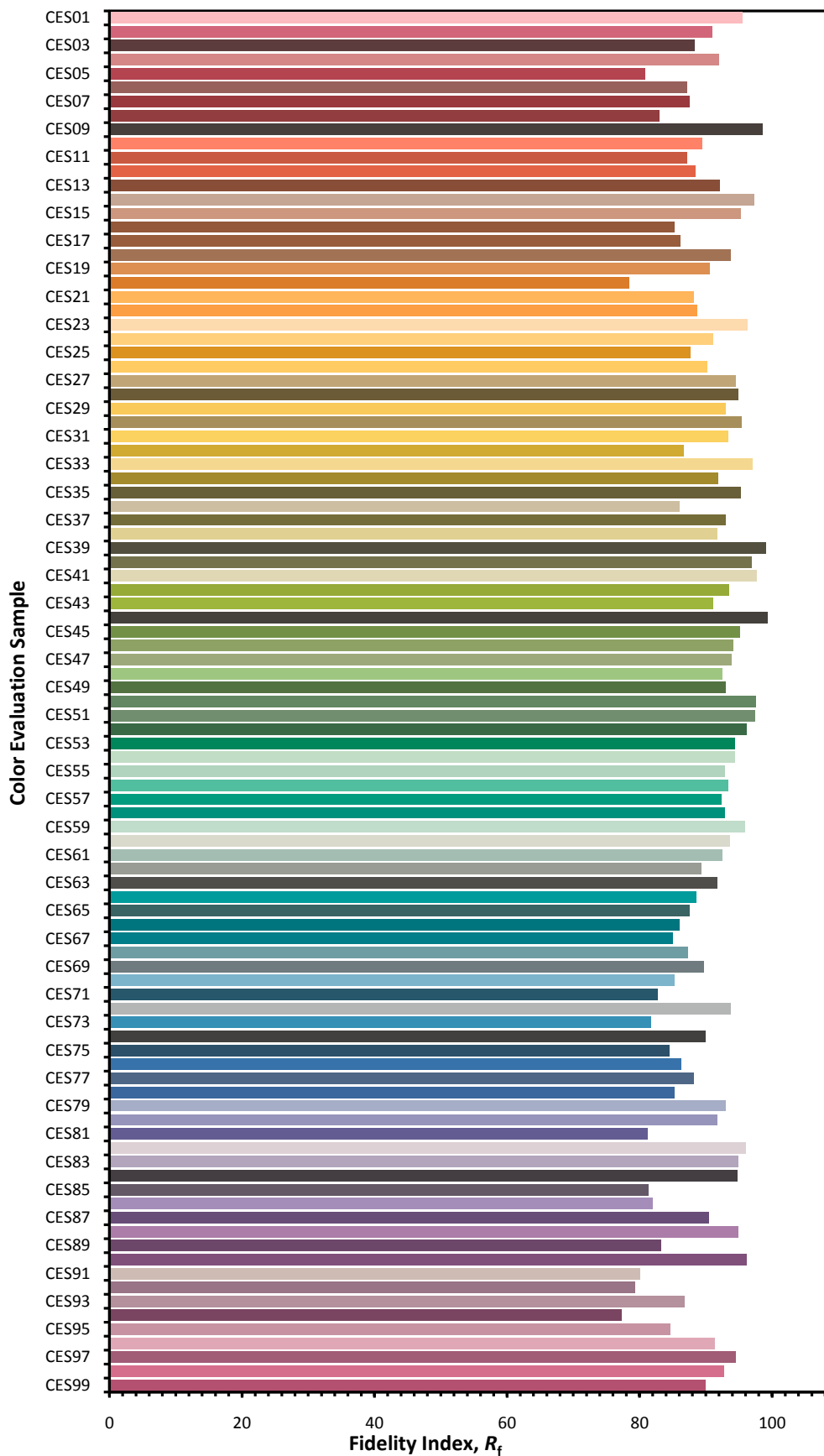


Color Vector Graphic

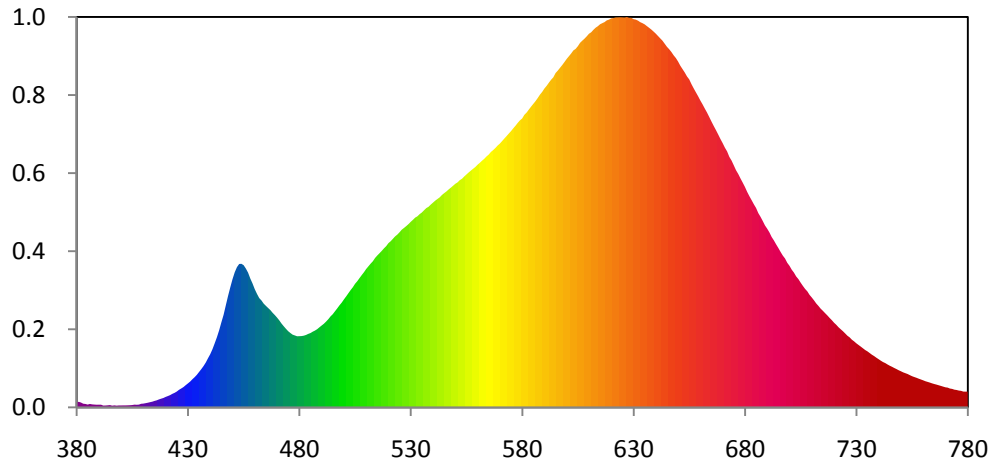


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



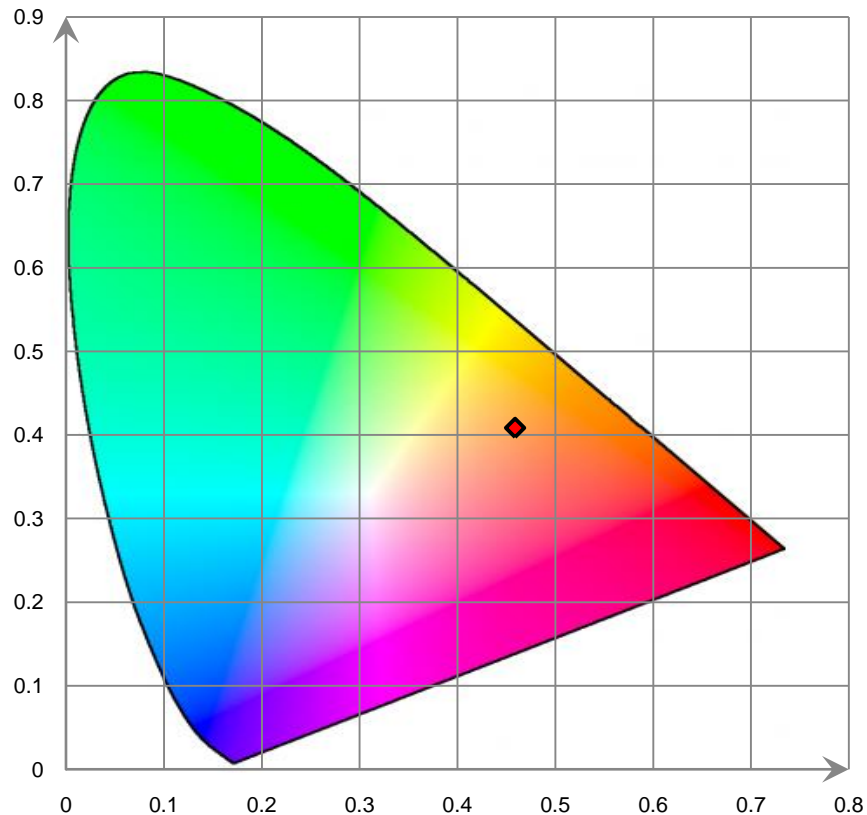
Relative Spectral Power Distribution



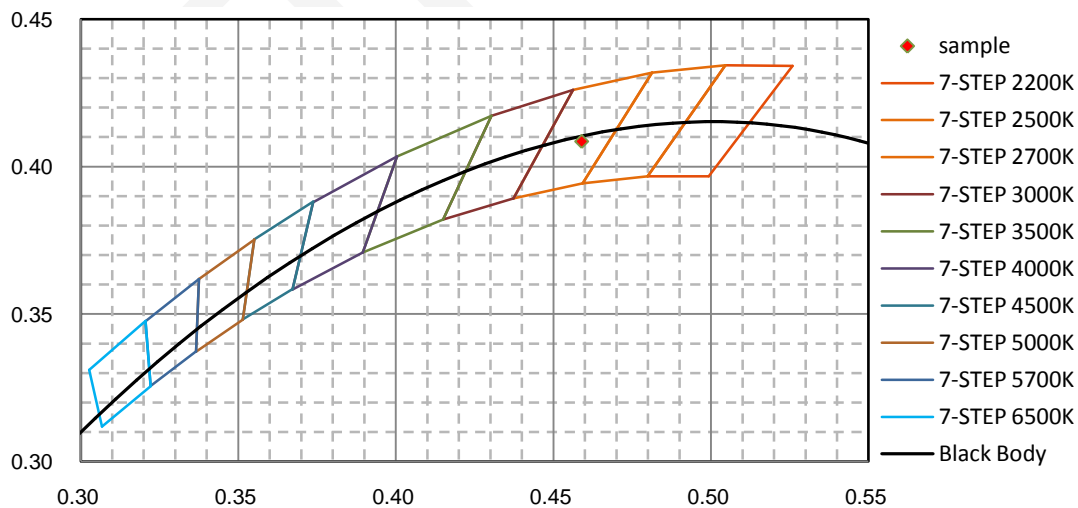
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.270E-01	421	7.146E-01	462	6.888E+00	503	7.390E+00	544	1.338E+01
381	3.503E-01	422	7.720E-01	463	6.738E+00	504	7.567E+00	545	1.350E+01
382	3.050E-01	423	8.532E-01	464	6.539E+00	505	7.787E+00	546	1.360E+01
383	2.313E-01	424	9.143E-01	465	6.396E+00	506	7.951E+00	547	1.373E+01
384	2.149E-01	425	9.993E-01	466	6.263E+00	507	8.145E+00	548	1.384E+01
385	1.763E-01	426	1.107E+00	467	6.129E+00	508	8.335E+00	549	1.397E+01
386	2.177E-01	427	1.191E+00	468	5.961E+00	509	8.516E+00	550	1.409E+01
387	1.895E-01	428	1.279E+00	469	5.818E+00	510	8.717E+00	551	1.417E+01
388	1.780E-01	429	1.401E+00	470	5.659E+00	511	8.890E+00	552	1.432E+01
389	1.661E-01	430	1.511E+00	471	5.481E+00	512	9.055E+00	553	1.440E+01
390	1.706E-01	431	1.627E+00	472	5.282E+00	513	9.206E+00	554	1.455E+01
391	1.692E-01	432	1.771E+00	473	5.112E+00	514	9.418E+00	555	1.468E+01
392	1.143E-01	433	1.902E+00	474	4.951E+00	515	9.574E+00	556	1.481E+01
393	1.187E-01	434	2.052E+00	475	4.800E+00	516	9.716E+00	557	1.492E+01
394	1.293E-01	435	2.233E+00	476	4.685E+00	517	9.862E+00	558	1.504E+01
395	1.460E-01	436	2.412E+00	477	4.581E+00	518	1.002E+01	559	1.515E+01
396	1.078E-01	437	2.603E+00	478	4.532E+00	519	1.016E+01	560	1.529E+01
397	1.274E-01	438	2.825E+00	479	4.481E+00	520	1.035E+01	561	1.541E+01
398	1.075E-01	439	3.093E+00	480	4.486E+00	521	1.047E+01	562	1.554E+01
399	1.220E-01	440	3.348E+00	481	4.493E+00	522	1.062E+01	563	1.566E+01
400	1.226E-01	441	3.659E+00	482	4.518E+00	523	1.078E+01	564	1.581E+01
401	1.254E-01	442	4.032E+00	483	4.564E+00	524	1.089E+01	565	1.593E+01
402	1.244E-01	443	4.419E+00	484	4.630E+00	525	1.104E+01	566	1.610E+01
403	1.311E-01	444	4.851E+00	485	4.684E+00	526	1.120E+01	567	1.621E+01
404	1.385E-01	445	5.357E+00	486	4.769E+00	527	1.131E+01	568	1.634E+01
405	1.464E-01	446	5.830E+00	487	4.840E+00	528	1.142E+01	569	1.650E+01
406	1.717E-01	447	6.430E+00	488	4.927E+00	529	1.155E+01	570	1.662E+01
407	1.643E-01	448	7.014E+00	489	5.044E+00	530	1.169E+01	571	1.678E+01
408	1.750E-01	449	7.562E+00	490	5.158E+00	531	1.182E+01	572	1.694E+01
409	2.260E-01	450	8.070E+00	491	5.269E+00	532	1.196E+01	573	1.709E+01
410	2.382E-01	451	8.512E+00	492	5.403E+00	533	1.204E+01	574	1.725E+01
411	2.652E-01	452	8.839E+00	493	5.557E+00	534	1.218E+01	575	1.741E+01
412	2.937E-01	453	9.037E+00	494	5.734E+00	535	1.228E+01	576	1.758E+01
413	3.282E-01	454	9.046E+00	495	5.871E+00	536	1.243E+01	577	1.774E+01
414	3.593E-01	455	8.961E+00	496	6.056E+00	537	1.256E+01	578	1.792E+01
415	4.072E-01	456	8.747E+00	497	6.234E+00	538	1.264E+01	579	1.808E+01
416	4.450E-01	457	8.489E+00	498	6.430E+00	539	1.278E+01	580	1.820E+01
417	5.025E-01	458	8.118E+00	499	6.597E+00	540	1.290E+01	581	1.844E+01
418	5.486E-01	459	7.807E+00	500	6.801E+00	541	1.302E+01	582	1.858E+01
419	5.920E-01	460	7.448E+00	501	6.989E+00	542	1.313E+01	583	1.876E+01
420	6.597E-01	461	7.152E+00	502	7.189E+00	543	1.324E+01	584	1.895E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.912E+01	626	2.457E+01	667	1.747E+01	708	7.312E+00	749	2.341E+00
586	1.930E+01	627	2.460E+01	668	1.720E+01	709	7.091E+00	750	2.276E+00
587	1.949E+01	628	2.455E+01	669	1.691E+01	710	6.927E+00	751	2.206E+00
588	1.971E+01	629	2.455E+01	670	1.665E+01	711	6.745E+00	752	2.155E+00
589	1.988E+01	630	2.446E+01	671	1.637E+01	712	6.549E+00	753	2.104E+00
590	2.009E+01	631	2.443E+01	672	1.613E+01	713	6.393E+00	754	2.033E+00
591	2.026E+01	632	2.437E+01	673	1.579E+01	714	6.221E+00	755	1.965E+00
592	2.046E+01	633	2.428E+01	674	1.555E+01	715	6.081E+00	756	1.914E+00
593	2.065E+01	634	2.421E+01	675	1.525E+01	716	5.937E+00	757	1.864E+00
594	2.080E+01	635	2.413E+01	676	1.495E+01	717	5.794E+00	758	1.808E+00
595	2.107E+01	636	2.402E+01	677	1.471E+01	718	5.638E+00	759	1.756E+00
596	2.122E+01	637	2.392E+01	678	1.443E+01	719	5.498E+00	760	1.706E+00
597	2.140E+01	638	2.381E+01	679	1.416E+01	720	5.335E+00	761	1.649E+00
598	2.157E+01	639	2.368E+01	680	1.389E+01	721	5.204E+00	762	1.608E+00
599	2.176E+01	640	2.355E+01	681	1.358E+01	722	5.048E+00	763	1.563E+00
600	2.196E+01	641	2.340E+01	682	1.331E+01	723	4.923E+00	764	1.514E+00
601	2.213E+01	642	2.325E+01	683	1.306E+01	724	4.799E+00	765	1.471E+00
602	2.230E+01	643	2.311E+01	684	1.280E+01	725	4.659E+00	766	1.434E+00
603	2.249E+01	644	2.291E+01	685	1.257E+01	726	4.516E+00	767	1.393E+00
604	2.259E+01	645	2.272E+01	686	1.224E+01	727	4.413E+00	768	1.352E+00
605	2.276E+01	646	2.257E+01	687	1.201E+01	728	4.268E+00	769	1.306E+00
606	2.297E+01	647	2.239E+01	688	1.175E+01	729	4.160E+00	770	1.265E+00
607	2.311E+01	648	2.219E+01	689	1.146E+01	730	4.037E+00	771	1.245E+00
608	2.323E+01	649	2.201E+01	690	1.126E+01	731	3.932E+00	772	1.188E+00
609	2.338E+01	650	2.179E+01	691	1.102E+01	732	3.829E+00	773	1.164E+00
610	2.354E+01	651	2.153E+01	692	1.074E+01	733	3.720E+00	774	1.118E+00
611	2.364E+01	652	2.131E+01	693	1.052E+01	734	3.612E+00	775	1.095E+00
612	2.379E+01	653	2.110E+01	694	1.027E+01	735	3.528E+00	776	1.060E+00
613	2.393E+01	654	2.086E+01	695	1.004E+01	736	3.424E+00	777	1.041E+00
614	2.402E+01	655	2.067E+01	696	9.797E+00	737	3.320E+00	778	9.970E-01
615	2.414E+01	656	2.037E+01	697	9.567E+00	738	3.231E+00	779	9.920E-01
616	2.421E+01	657	2.011E+01	698	9.383E+00	739	3.129E+00	780	9.939E-01
617	2.428E+01	658	1.985E+01	699	9.112E+00	740	3.037E+00		
618	2.439E+01	659	1.960E+01	700	8.921E+00	741	2.943E+00		
619	2.443E+01	660	1.933E+01	701	8.678E+00	742	2.853E+00		
620	2.451E+01	661	1.909E+01	702	8.491E+00	743	2.790E+00		
621	2.453E+01	662	1.883E+01	703	8.254E+00	744	2.703E+00		
622	2.457E+01	663	1.858E+01	704	8.084E+00	745	2.626E+00		
623	2.458E+01	664	1.830E+01	705	7.864E+00	746	2.558E+00		
624	2.458E+01	665	1.801E+01	706	7.656E+00	747	2.484E+00		
625	2.458E+01	666	1.773E+01	707	7.466E+00	748	2.416E+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**

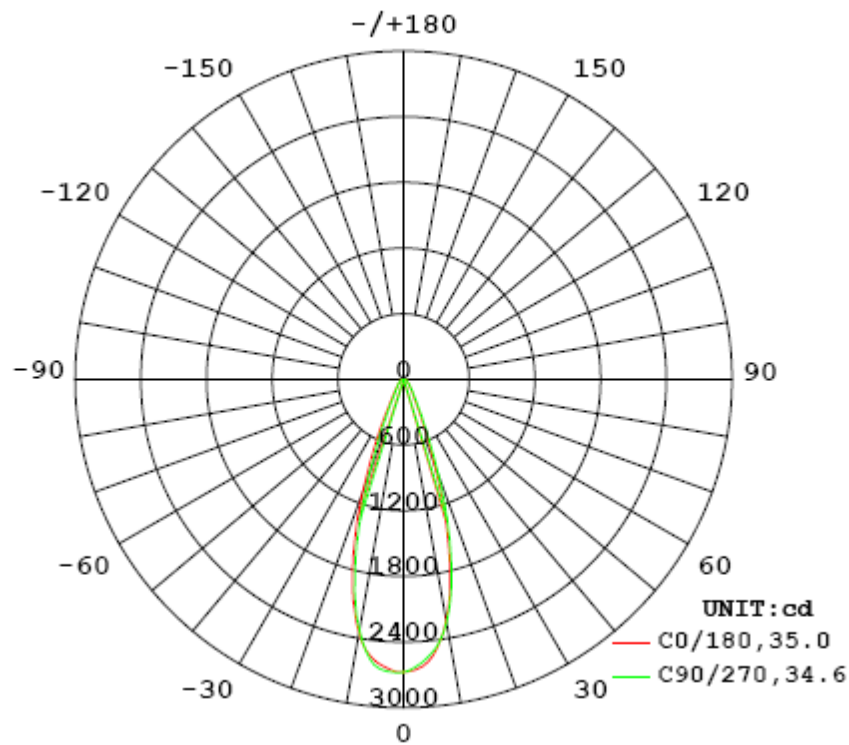
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1108	12.63	0.9496

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1137.24	90.04	2679	0.52	0.54

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	35.0	33.6	34.6	33.7	34.2
Field Angle (10% I _{max}):	56.8	57.6	56.3	58.3	57.3

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2673	2673	2673	2673	2673	2673	2673	2673
5.0°	2606	2610	2603	2624	2647	2623	2576	2554
10.0°	2350	2381	2293	2292	2328	2285	2167	2147
15.0°	1812	1895	1759	1687	1710	1650	1534	1509
20.0°	1104	1150	971	888	921	885	778	750
25.0°	533	534	477	435	398	389	407	380
30.0°	253	245	255	244	201	199	227	215
35.0°	154	151	155	149	131	131	140	137
40.0°	105	105	104	101	95	94	97	96
45.0°	80	80	79	77	75	73	75	75
50.0°	62	64	62	61	61	59	60	59
55.0°	47	48	47	46	46	45	45	44
60.0°	36	37	37	36	36	35	35	34
65.0°	28	29	29	28	28	27	27	26
70.0°	22	22	22	22	21	21	20	20
75.0°	15	16	16	15	15	15	14	14
80.0°	10	10	10	10	9	9	9	9
85.0°	5	5	5	5	4	4	4	4
90.0°	1	1	1	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

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	2673	2673	2673	2673	2673	2673	2673	2673
5.0°	2587	2584	2556	2529	2549	2576	2591	2597
10.0°	2237	2217	2143	2143	2254	2332	2267	2272
15.0°	1590	1542	1475	1523	1669	1755	1705	1731
20.0°	828	801	762	805	933	1024	982	996
25.0°	367	351	382	415	436	473	471	491
30.0°	195	192	217	239	230	240	261	288
35.0°	131	129	141	150	149	152	164	178
40.0°	94	94	98	104	105	106	112	116
45.0°	73	73	76	80	80	80	83	85
50.0°	58	58	61	63	64	63	63	64
55.0°	44	45	46	47	47	48	49	49
60.0°	34	35	35	36	36	37	38	38
65.0°	27	27	27	28	28	29	29	29
70.0°	20	20	21	21	21	22	22	22
75.0°	14	14	14	15	15	16	16	16
80.0°	9	9	9	9	9	10	10	10
85.0°	4	4	4	4	4	5	5	5
90.0°	0	0	1	1	1	1	1	1
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	62.9	5.53
5-10	173.9	15.29
10-15	232.8	20.47
15-20	208.3	18.32
20-25	133.1	11.70
25-30	79.9	7.02
30-35	53.9	4.74
35-40	40.6	3.57
40-45	32.7	2.88
45-50	28.0	2.46
50-55	23.3	2.05
55-60	18.8	1.66
60-65	15.4	1.36
65-70	12.4	1.09
70-75	9.5	0.83
75-80	6.5	0.57
80-85	3.7	0.33
85-90	1.3	0.12
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	62.9	5.53
0-10	236.8	20.82
0-15	469.5	41.29
0-20	677.9	59.61
0-25	811.0	71.31
0-30	890.8	78.33
0-35	944.7	83.07
0-40	985.3	86.64
0-45	1018.1	89.52
0-50	1046.1	91.98
0-55	1069.4	94.03
0-60	1088.2	95.69
0-65	1103.6	97.05
0-70	1116.1	98.14
0-75	1125.5	98.97
0-80	1132.0	99.54
0-85	1135.8	99.87
0-90	1137.1	99.99
0-95	1137.2	100.00
0-100	1137.2	100.00
0-105	1137.2	100.00
0-110	1137.2	100.00
0-115	1137.2	100.00
0-120	1137.2	100.00
0-125	1137.2	100.00
0-130	1137.2	100.00
0-135	1137.2	100.00
0-140	1137.2	100.00
0-145	1137.2	100.00
0-150	1137.2	100.00
0-155	1137.2	100.00
0-160	1137.2	100.00
0-165	1137.2	100.00
0-170	1137.2	100.00
0-175	1137.2	100.00
0-180	1137.2	100.00

6. Product Photo



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