

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/927NF25

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu <i>Hill Liu</i>
Report Number:	R1KS161010022-10A1
Test Date:	2016-10-10 to 2016-10-11
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 2016-10-10. One was tested in integrating sphere and the other was tested in goniophotometer

Model Tested: 8PAR20DIM/927NF25
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: 2700K
Nominal Lumen Output: 535 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 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**

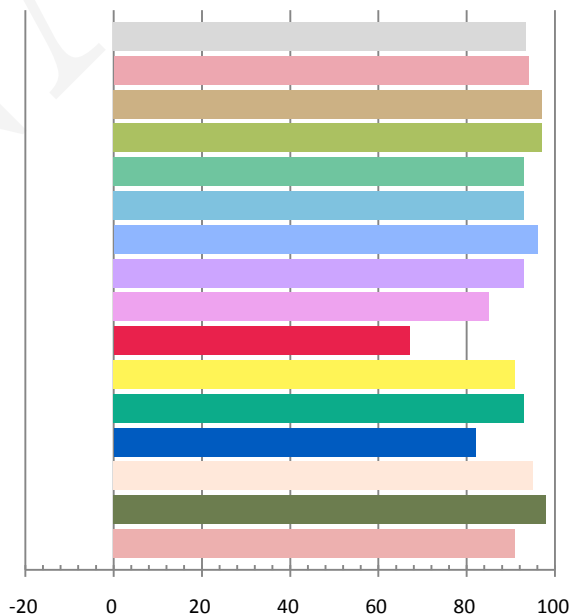
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.07070	7.946	0.9366	619.66	77.98

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.2577	2750	-0.00118	0.4538	0.4060	0.2607	0.5247

Color Rendering Index

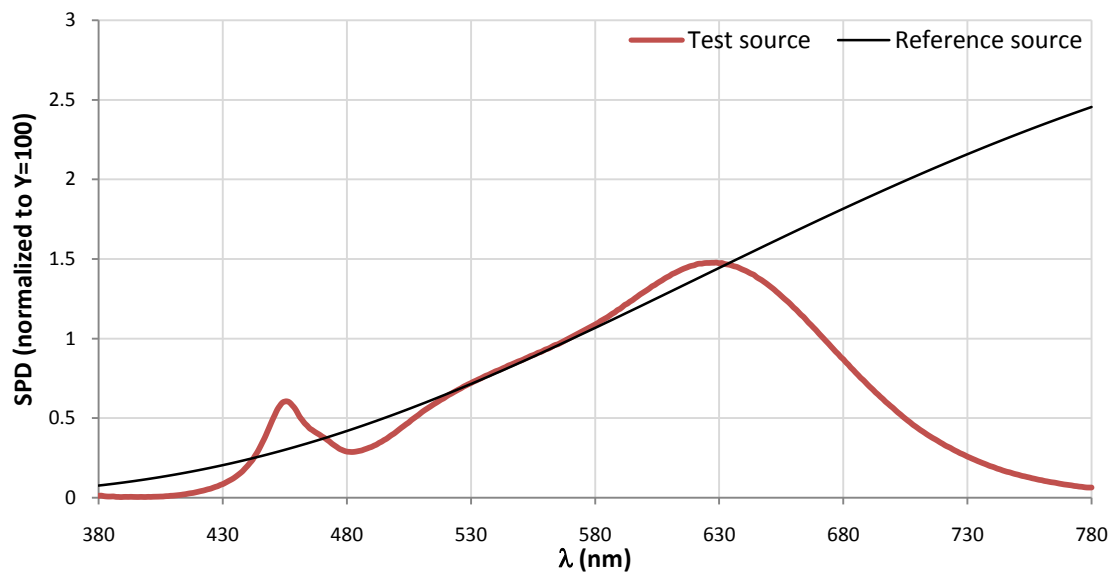
Ra			
93.5			
R1	R2	R3	R4
94	97	97	93
R5	R6	R7	R8
93	96	93	85
R9	R10	R11	R12
67	91	93	82
R13	R14	R15	
95	98	91	



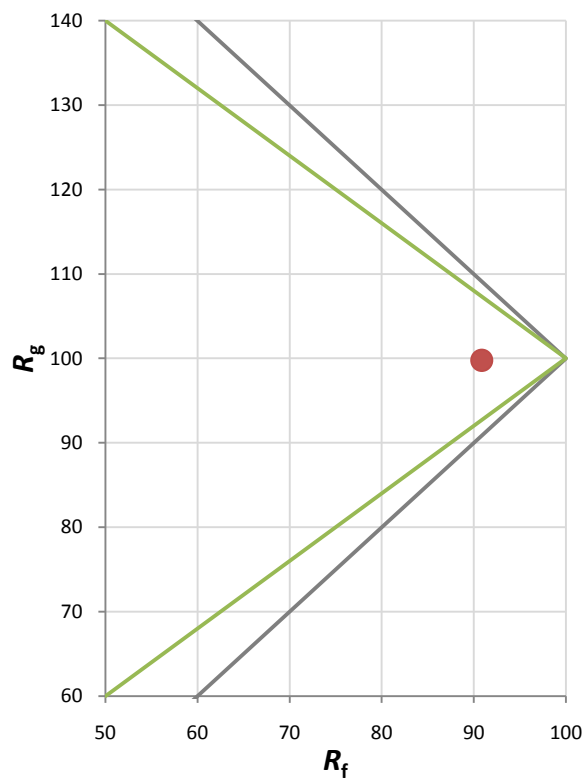
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	100

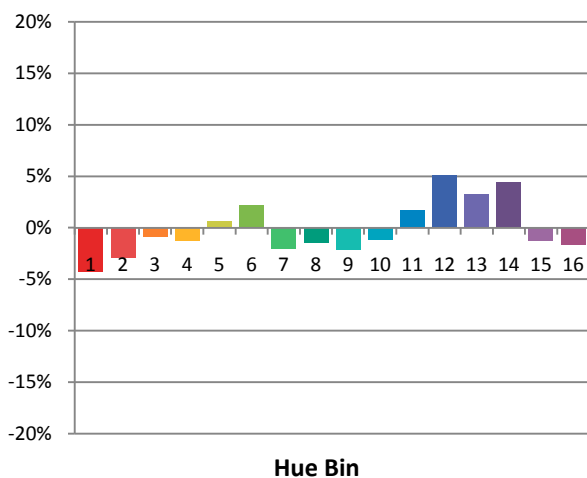
Spectral Power Distribution Comparison



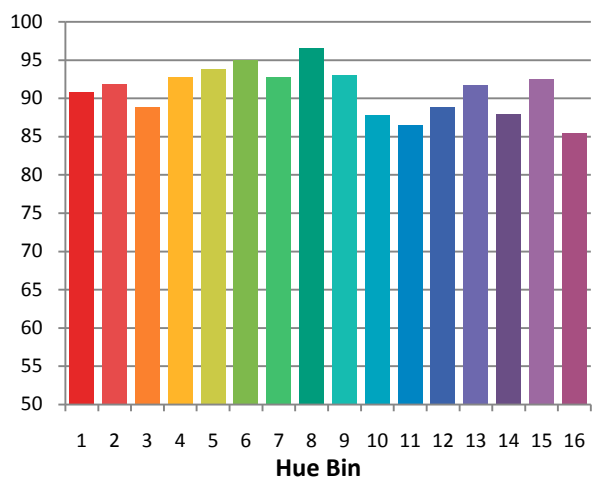
Plot of R_g versus R_f



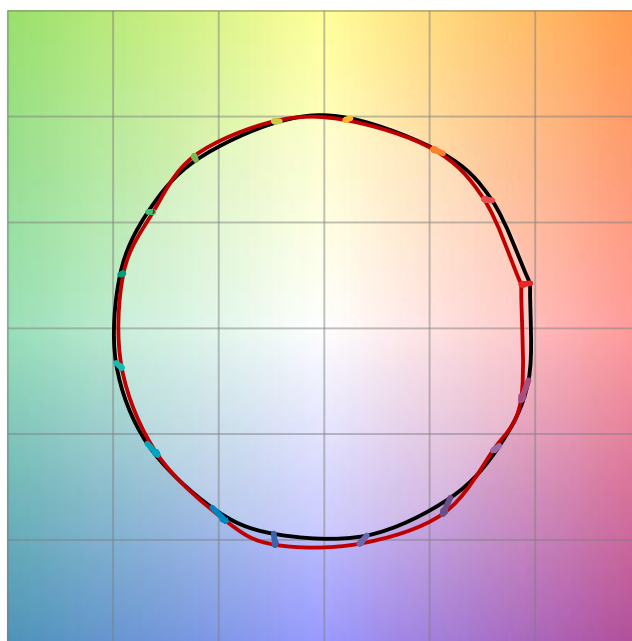
Chroma Shift by Hue



R_f by Hue

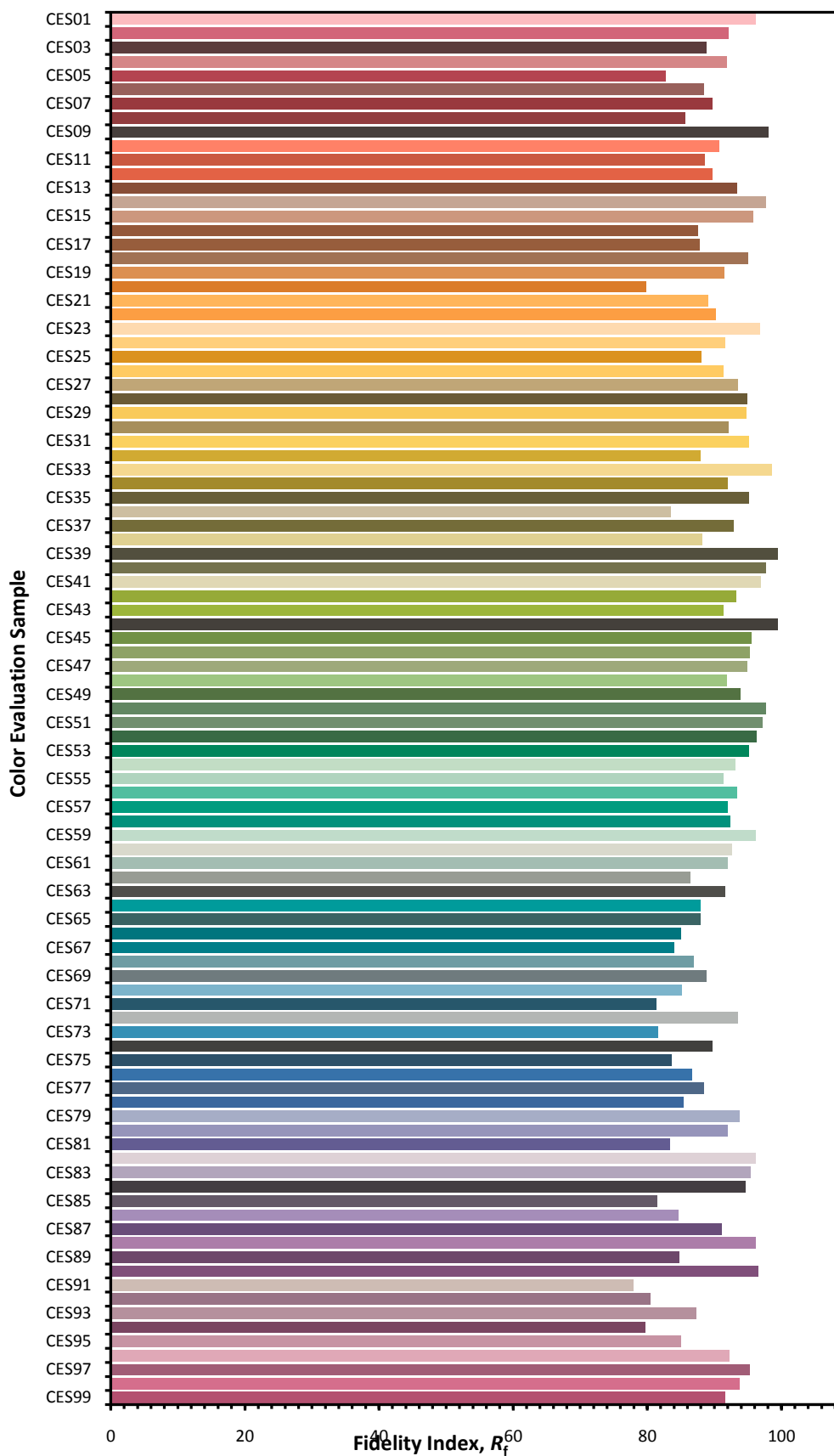


Color Vector Graphic

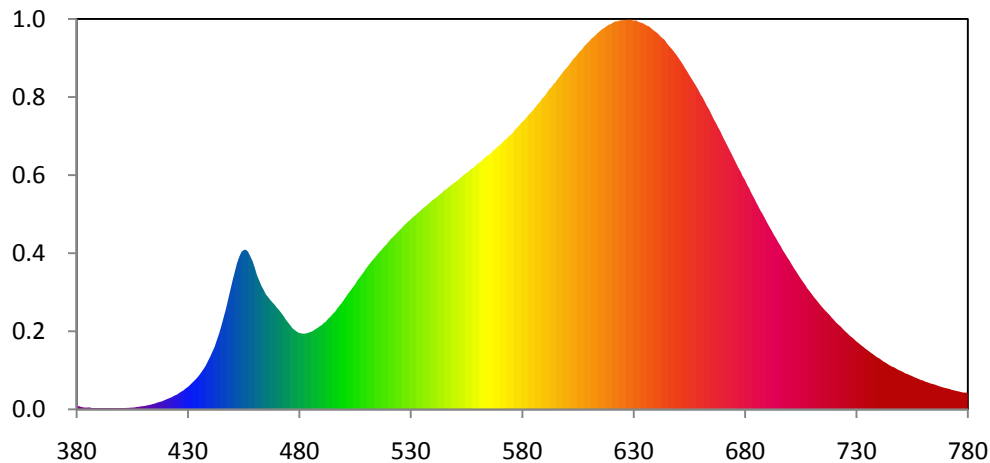


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



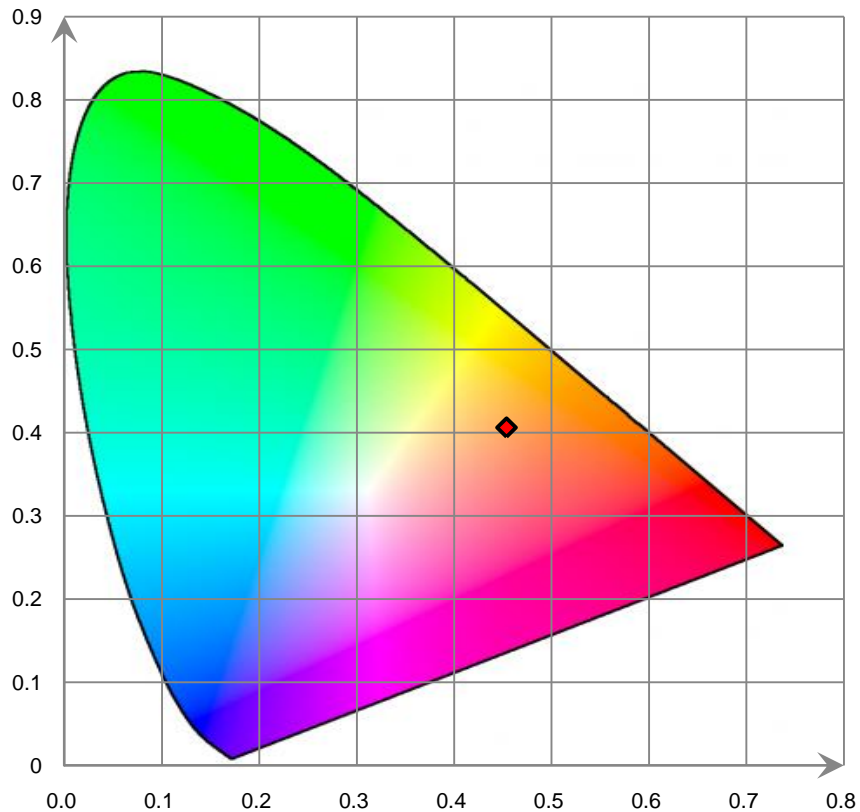
Relative Spectral Power Distribution



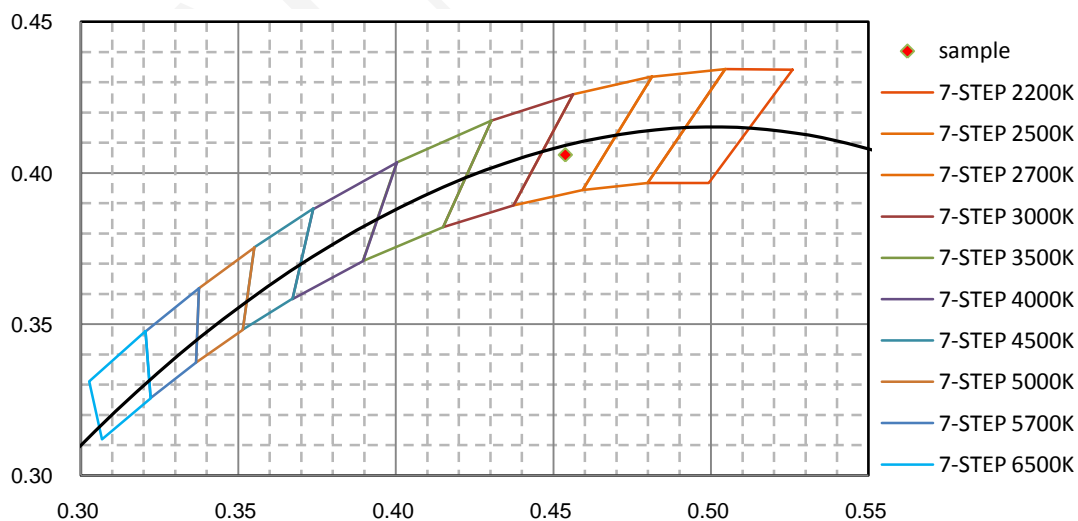
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.016E-01	421	3.664E-01	462	4.430E+00	503	4.089E+00	544	7.444E+00
381	1.156E-01	422	3.948E-01	463	4.242E+00	504	4.196E+00	545	7.526E+00
382	8.691E-02	423	4.327E-01	464	4.106E+00	505	4.291E+00	546	7.575E+00
383	7.003E-02	424	4.749E-01	465	3.950E+00	506	4.421E+00	547	7.636E+00
384	6.102E-02	425	5.051E-01	466	3.859E+00	507	4.524E+00	548	7.698E+00
385	6.381E-02	426	5.567E-01	467	3.759E+00	508	4.627E+00	549	7.763E+00
386	6.773E-02	427	6.088E-01	468	3.671E+00	509	4.728E+00	550	7.810E+00
387	4.309E-02	428	6.521E-01	469	3.589E+00	510	4.847E+00	551	7.868E+00
388	4.002E-02	429	7.199E-01	470	3.488E+00	511	4.951E+00	552	7.939E+00
389	3.131E-02	430	7.699E-01	471	3.405E+00	512	5.044E+00	553	8.001E+00
390	4.005E-02	431	8.428E-01	472	3.302E+00	513	5.135E+00	554	8.074E+00
391	4.385E-02	432	9.210E-01	473	3.201E+00	514	5.228E+00	555	8.122E+00
392	4.103E-02	433	9.956E-01	474	3.079E+00	515	5.324E+00	556	8.181E+00
393	4.618E-02	434	1.073E+00	475	2.980E+00	516	5.407E+00	557	8.259E+00
394	4.082E-02	435	1.168E+00	476	2.885E+00	517	5.497E+00	558	8.298E+00
395	3.782E-02	436	1.275E+00	477	2.785E+00	518	5.588E+00	559	8.366E+00
396	3.568E-02	437	1.385E+00	478	2.723E+00	519	5.659E+00	560	8.444E+00
397	4.227E-02	438	1.505E+00	479	2.665E+00	520	5.758E+00	561	8.488E+00
398	3.796E-02	439	1.663E+00	480	2.624E+00	521	5.850E+00	562	8.555E+00
399	3.571E-02	440	1.812E+00	481	2.611E+00	522	5.922E+00	563	8.638E+00
400	4.536E-02	441	1.984E+00	482	2.601E+00	523	6.005E+00	564	8.706E+00
401	4.064E-02	442	2.153E+00	483	2.610E+00	524	6.084E+00	565	8.742E+00
402	4.931E-02	443	2.385E+00	484	2.633E+00	525	6.163E+00	566	8.816E+00
403	5.252E-02	444	2.606E+00	485	2.662E+00	526	6.234E+00	567	8.888E+00
404	5.589E-02	445	2.870E+00	486	2.691E+00	527	6.326E+00	568	8.955E+00
405	6.161E-02	446	3.152E+00	487	2.745E+00	528	6.395E+00	569	9.030E+00
406	6.524E-02	447	3.436E+00	488	2.792E+00	529	6.468E+00	570	9.086E+00
407	8.171E-02	448	3.762E+00	489	2.847E+00	530	6.531E+00	571	9.165E+00
408	8.804E-02	449	4.089E+00	490	2.894E+00	531	6.609E+00	572	9.250E+00
409	1.057E-01	450	4.419E+00	491	2.967E+00	532	6.669E+00	573	9.306E+00
410	1.113E-01	451	4.717E+00	492	3.027E+00	533	6.740E+00	574	9.386E+00
411	1.253E-01	452	5.021E+00	493	3.121E+00	534	6.801E+00	575	9.445E+00
412	1.405E-01	453	5.235E+00	494	3.189E+00	535	6.877E+00	576	9.529E+00
413	1.558E-01	454	5.412E+00	495	3.282E+00	536	6.949E+00	577	9.632E+00
414	1.782E-01	455	5.477E+00	496	3.356E+00	537	6.998E+00	578	9.706E+00
415	1.975E-01	456	5.487E+00	497	3.463E+00	538	7.071E+00	579	9.795E+00
416	2.252E-01	457	5.417E+00	498	3.567E+00	539	7.138E+00	580	9.874E+00
417	2.505E-01	458	5.263E+00	499	3.652E+00	540	7.207E+00	581	9.946E+00
418	2.677E-01	459	5.101E+00	500	3.763E+00	541	7.255E+00	582	1.005E+01
419	2.994E-01	460	4.870E+00	501	3.876E+00	542	7.314E+00	583	1.013E+01
420	3.313E-01	461	4.611E+00	502	3.987E+00	543	7.386E+00	584	1.021E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.029E+01	626	1.338E+01	667	9.842E+00	708	4.160E+00	749	1.352E+00
586	1.039E+01	627	1.339E+01	668	9.692E+00	709	4.063E+00	750	1.321E+00
587	1.049E+01	628	1.339E+01	669	9.551E+00	710	3.962E+00	751	1.283E+00
588	1.057E+01	629	1.340E+01	670	9.385E+00	711	3.858E+00	752	1.238E+00
589	1.069E+01	630	1.336E+01	671	9.233E+00	712	3.768E+00	753	1.213E+00
590	1.076E+01	631	1.338E+01	672	9.084E+00	713	3.672E+00	754	1.176E+00
591	1.087E+01	632	1.333E+01	673	8.931E+00	714	3.575E+00	755	1.146E+00
592	1.099E+01	633	1.330E+01	674	8.785E+00	715	3.488E+00	756	1.107E+00
593	1.106E+01	634	1.328E+01	675	8.624E+00	716	3.400E+00	757	1.077E+00
594	1.117E+01	635	1.324E+01	676	8.470E+00	717	3.324E+00	758	1.043E+00
595	1.125E+01	636	1.319E+01	677	8.313E+00	718	3.241E+00	759	1.011E+00
596	1.136E+01	637	1.316E+01	678	8.180E+00	719	3.150E+00	760	9.906E-01
597	1.146E+01	638	1.310E+01	679	8.011E+00	720	3.070E+00	761	9.506E-01
598	1.157E+01	639	1.303E+01	680	7.890E+00	721	2.979E+00	762	9.283E-01
599	1.166E+01	640	1.297E+01	681	7.721E+00	722	2.909E+00	763	9.000E-01
600	1.175E+01	641	1.291E+01	682	7.588E+00	723	2.846E+00	764	8.748E-01
601	1.184E+01	642	1.283E+01	683	7.418E+00	724	2.761E+00	765	8.591E-01
602	1.194E+01	643	1.276E+01	684	7.282E+00	725	2.683E+00	766	8.311E-01
603	1.205E+01	644	1.270E+01	685	7.125E+00	726	2.616E+00	767	8.008E-01
604	1.212E+01	645	1.258E+01	686	6.983E+00	727	2.537E+00	768	7.760E-01
605	1.222E+01	646	1.249E+01	687	6.828E+00	728	2.480E+00	769	7.512E-01
606	1.231E+01	647	1.241E+01	688	6.708E+00	729	2.412E+00	770	7.337E-01
607	1.239E+01	648	1.231E+01	689	6.561E+00	730	2.340E+00	771	7.154E-01
608	1.249E+01	649	1.221E+01	690	6.412E+00	731	2.278E+00	772	6.970E-01
609	1.257E+01	650	1.210E+01	691	6.276E+00	732	2.214E+00	773	6.673E-01
610	1.264E+01	651	1.199E+01	692	6.147E+00	733	2.156E+00	774	6.532E-01
611	1.274E+01	652	1.188E+01	693	5.998E+00	734	2.092E+00	775	6.295E-01
612	1.280E+01	653	1.175E+01	694	5.878E+00	735	2.035E+00	776	6.178E-01
613	1.287E+01	654	1.163E+01	695	5.737E+00	736	1.977E+00	777	5.961E-01
614	1.294E+01	655	1.150E+01	696	5.618E+00	737	1.924E+00	778	5.786E-01
615	1.301E+01	656	1.137E+01	697	5.470E+00	738	1.866E+00	779	5.752E-01
616	1.307E+01	657	1.125E+01	698	5.355E+00	739	1.806E+00	780	5.763E-01
617	1.312E+01	658	1.113E+01	699	5.228E+00	740	1.765E+00		
618	1.318E+01	659	1.099E+01	700	5.115E+00	741	1.715E+00		
619	1.322E+01	660	1.084E+01	701	4.981E+00	742	1.654E+00		
620	1.325E+01	661	1.072E+01	702	4.853E+00	743	1.614E+00		
621	1.331E+01	662	1.057E+01	703	4.741E+00	744	1.560E+00		
622	1.334E+01	663	1.042E+01	704	4.616E+00	745	1.513E+00		
623	1.334E+01	664	1.030E+01	705	4.502E+00	746	1.471E+00		
624	1.337E+01	665	1.014E+01	706	4.389E+00	747	1.443E+00		
625	1.338E+01	666	9.977E+00	707	4.283E+00	748	1.396E+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**

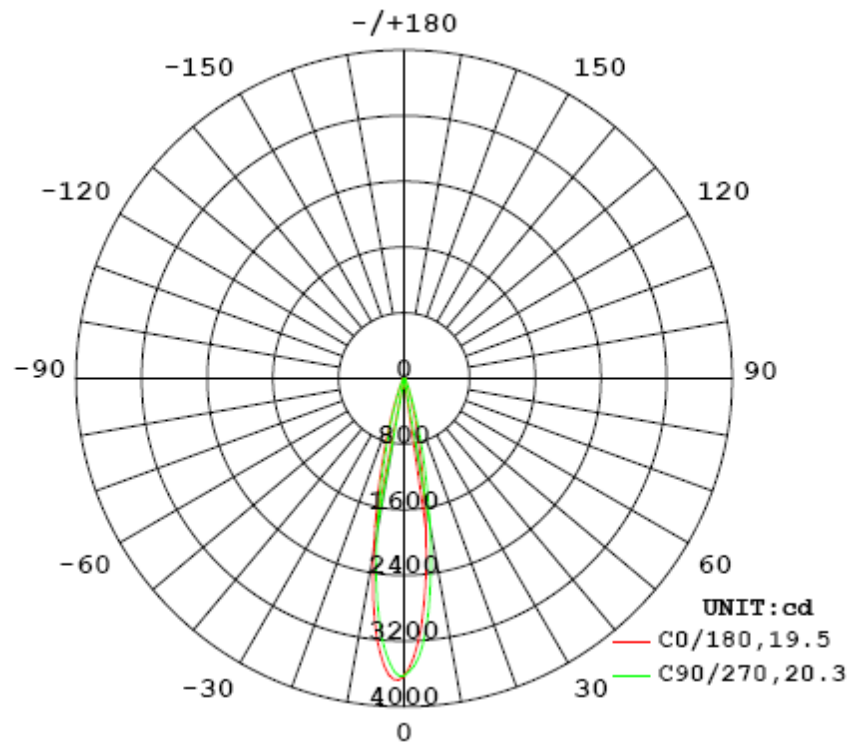
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.0710	7.991	0.9369

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
624.251	78.12	3677	0.38	0.35

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	19.5	20.0	20.3	19.8	19.9
Field Angle (10% I _{max}):	37.0	37.7	37.7	37.2	37.4

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3623	3623	3623	3623	3623	3623	3623	3623
5.0°	2770	2811	2880	2969	3062	3166	3227	3273
10.0°	1396	1442	1547	1678	1820	1920	2000	2023
15.0°	559	579	612	696	770	826	861	877
20.0°	212	209	233	256	269	309	313	339
25.0°	98	103	105	113	122	130	138	137
30.0°	55	58	60	61	64	65	68	71
35.0°	40	40	43	43	42	42	43	45
40.0°	30	30	32	31	31	31	32	33
45.0°	24	24	26	25	25	25	25	27
50.0°	20	21	22	21	21	21	21	23
55.0°	18	18	19	18	18	19	19	20
60.0°	14	15	15	15	15	15	16	17
65.0°	10	11	11	11	11	11	11	12
70.0°	8	8	8	8	8	8	8	9
75.0°	5	5	5	5	5	5	6	6
80.0°	3	3	3	3	3	3	3	3
85.0°	1	1	1	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°	3623	3623	3623	3623	3623	3623	3623	3623
5.0°	3365	3356	3334	3266	3163	3051	2948	2864
10.0°	2164	2166	2147	2046	1900	1720	1586	1494
15.0°	989	1000	993	936	820	713	631	602
20.0°	370	385	372	348	294	261	234	220
25.0°	159	159	155	146	129	114	109	104
30.0°	77	77	74	70	65	61	57	55
35.0°	48	48	45	45	44	43	40	39
40.0°	35	34	32	33	32	32	30	30
45.0°	28	27	26	26	26	26	25	24
50.0°	23	23	22	22	22	22	21	20
55.0°	20	20	19	19	19	20	18	18
60.0°	17	17	16	16	16	16	15	15
65.0°	12	12	12	12	12	12	11	11
70.0°	9	9	9	9	9	9	8	8
75.0°	6	6	6	6	6	6	5	5
80.0°	4	4	3	3	3	3	3	3
85.0°	1	1	1	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

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	80.2	12.85
5-10	172.9	27.69
10-15	144.5	23.15
15-20	80.9	12.95
20-25	39.6	6.35
25-30	22.9	3.66
30-35	15.4	2.46
35-40	12.3	1.97
40-45	10.5	1.68
45-50	9.5	1.52
50-55	8.8	1.41
55-60	8.1	1.29
60-65	6.5	1.04
65-70	5.0	0.80
70-75	3.6	0.58
75-80	2.3	0.37
80-85	1.1	0.18
85-90	0.3	0.05
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	80.2	12.85
0-10	253.1	40.54
0-15	397.6	63.69
0-20	478.4	76.64
0-25	518.1	82.99
0-30	540.9	86.65
0-35	556.3	89.11
0-40	568.6	91.08
0-45	579.1	92.76
0-50	588.5	94.28
0-55	597.3	95.69
0-60	605.4	96.98
0-65	611.9	98.02
0-70	616.9	98.82
0-75	620.5	99.40
0-80	622.8	99.77
0-85	623.9	99.95
0-90	624.2	100.00
0-95	624.2	100.00
0-100	624.2	100.00
0-105	624.2	100.00
0-110	624.2	100.00
0-115	624.2	100.00
0-120	624.2	100.00
0-125	624.2	100.00
0-130	624.2	100.00
0-135	624.2	100.00
0-140	624.2	100.00
0-145	624.2	100.00
0-150	624.2	100.00
0-155	624.2	100.00
0-160	624.2	100.00
0-165	624.2	100.00
0-170	624.2	100.00
0-175	624.3	100.00
0-180	624.3	100.00

6. Product Photo



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