IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 13PAR30/940FL40/277V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu Hill Liu
Report Number:	R1KS170323011-10A1
Test Date:	2017-03-28 to 2017-03-30
Report Date:	2017-04-01
Reviewed By:	Bill Xiong / EE Engineer Bill Xiong
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.
Accreditation:	The IAS Accreditation Number TL-460.

1. Product Description

General Information:

Two samples were received on 2017-03-23. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested:	13PAR30/940FL40/277V
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:	120-277 VAC 60Hz
Rated Power:	13W
Nominal CCT:	4000K
Nominal Lumen Output:	1100lm

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 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°C±1°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=32K (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_f, 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: **0.5hour**

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	0.1114	12.89	0.9644	1355.0	105.11

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.5281	3811	0.00200	0.3908	0.3873	0.2277	0.5077

Color Rendering Index

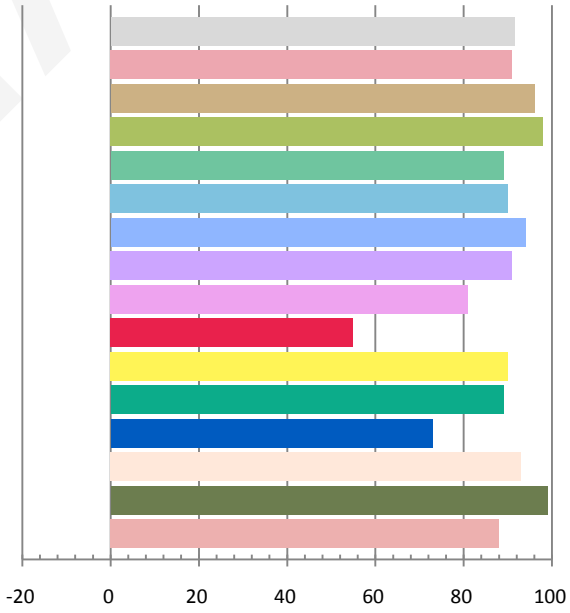
Ra
91.5

R1	R2	R3	R4
91	96	98	89

R5	R6	R7	R8
90	94	91	81

R9	R10	R11	R12
55	90	89	73

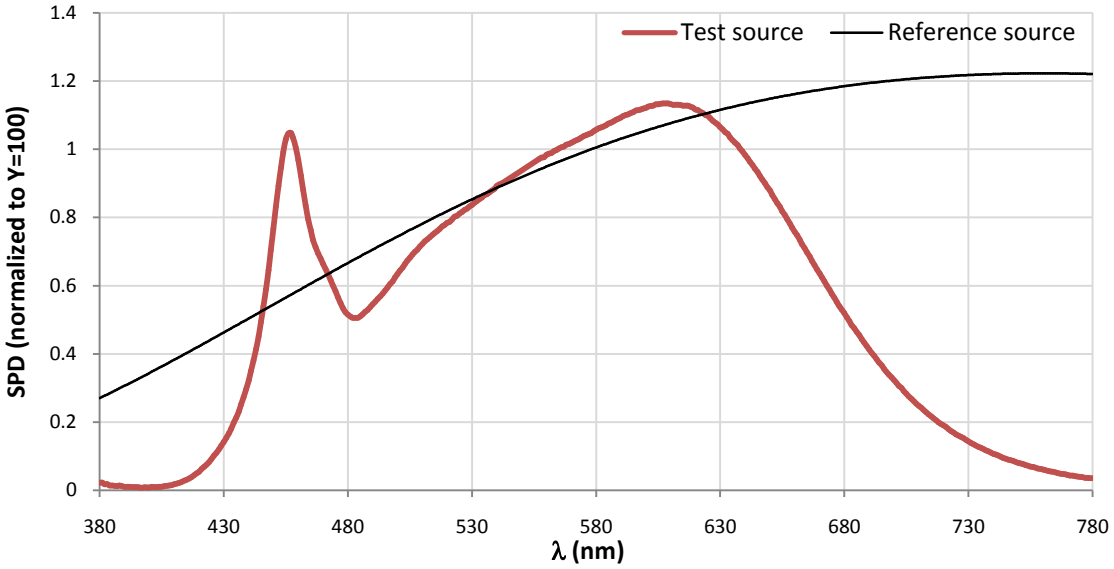
R13	R14	R15
93	99	88



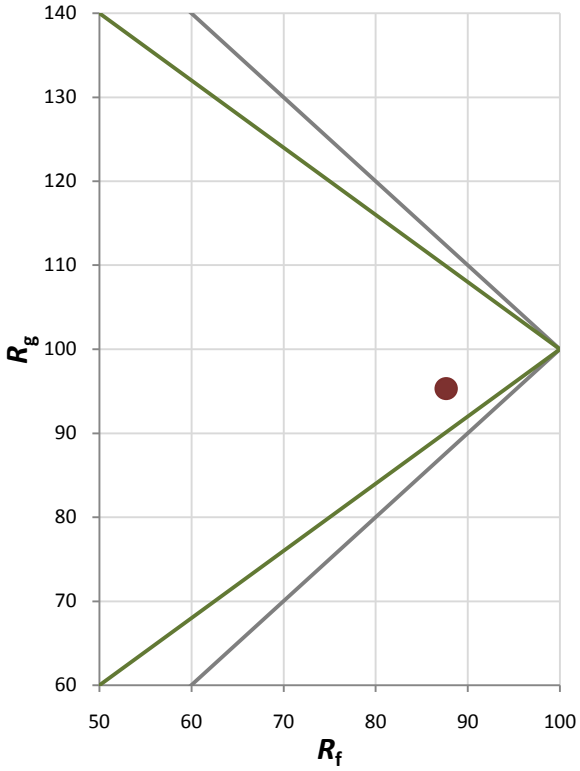
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	95

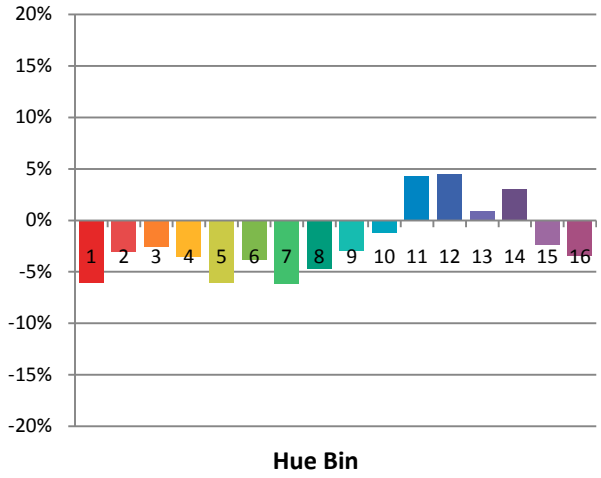
Spectral Power Distribution Comparison



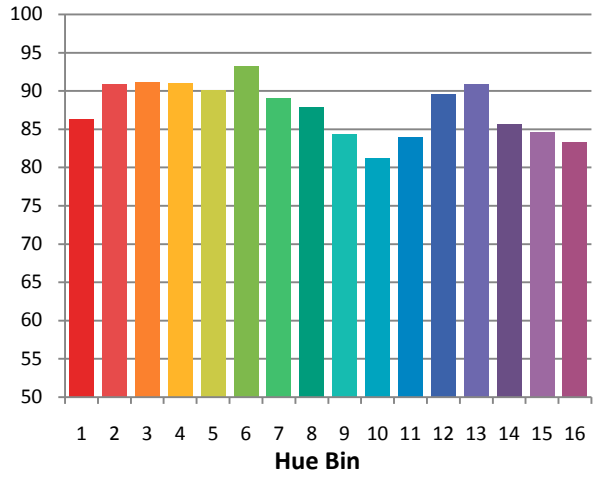
Plot of R_g versus R_f



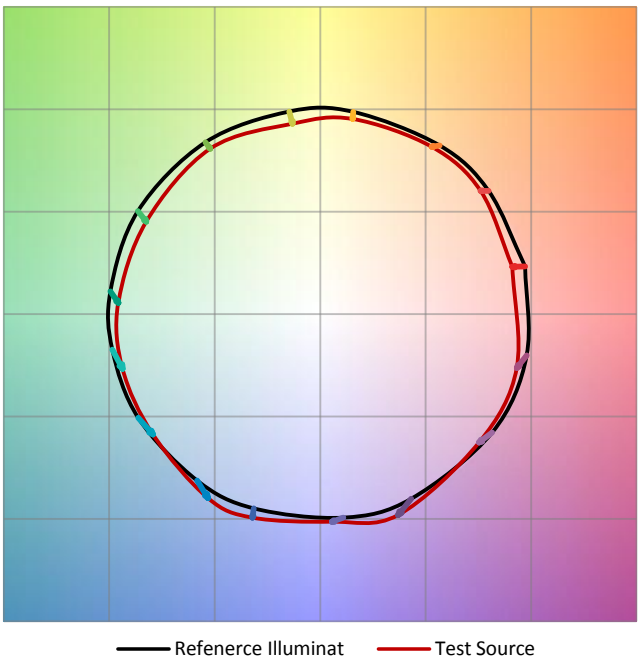
Chroma Shift by Hue



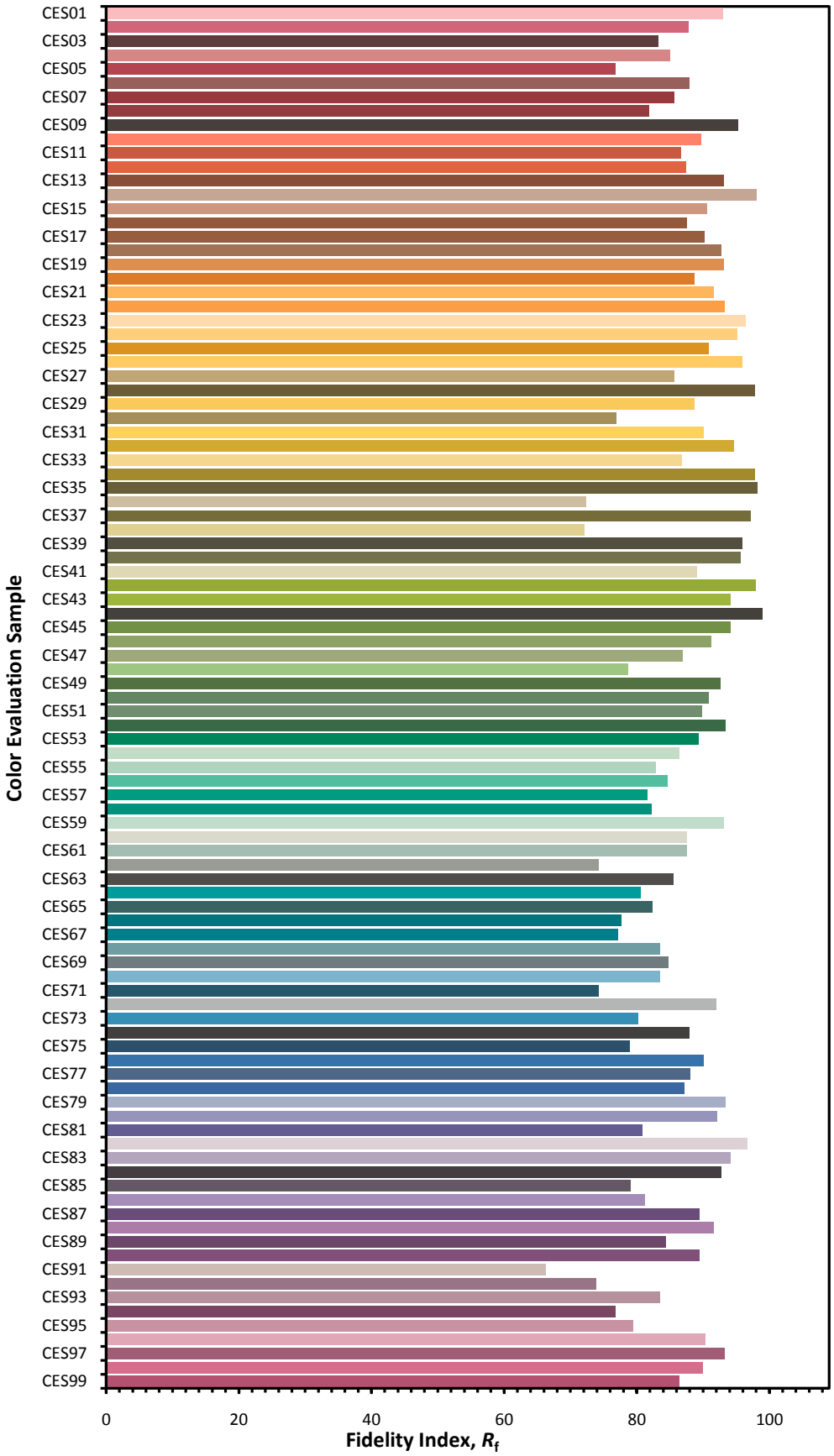
R_f by Hue



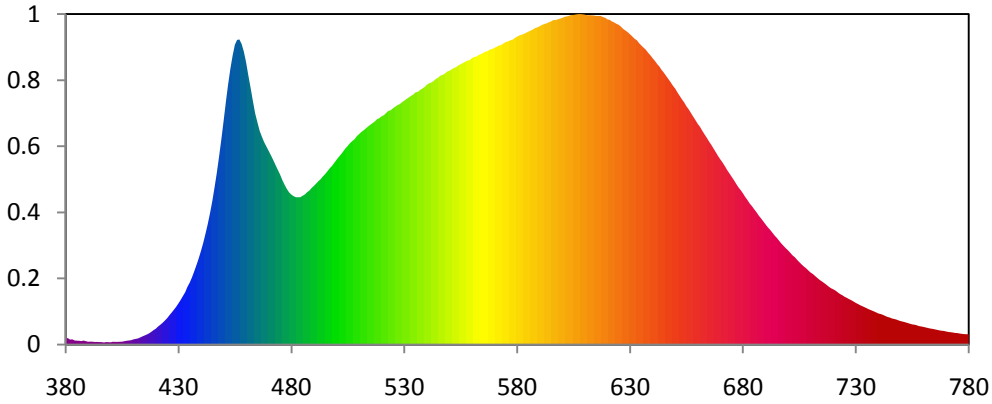
Color Vector Graphic



Color Fidelity by CES Sample



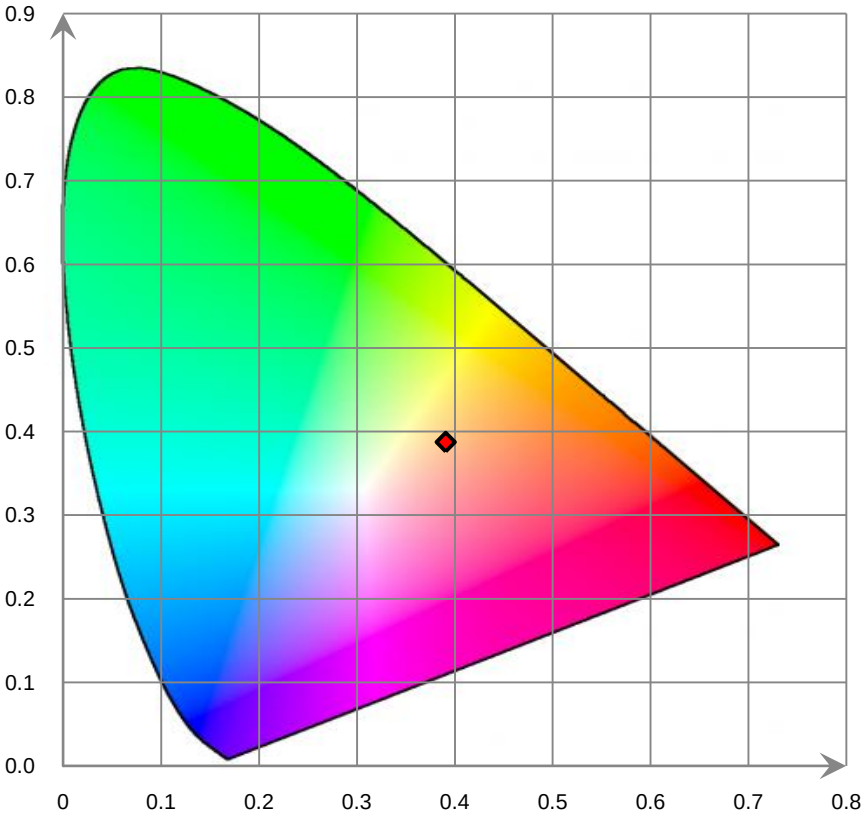
Relative Spectral Power Distribution



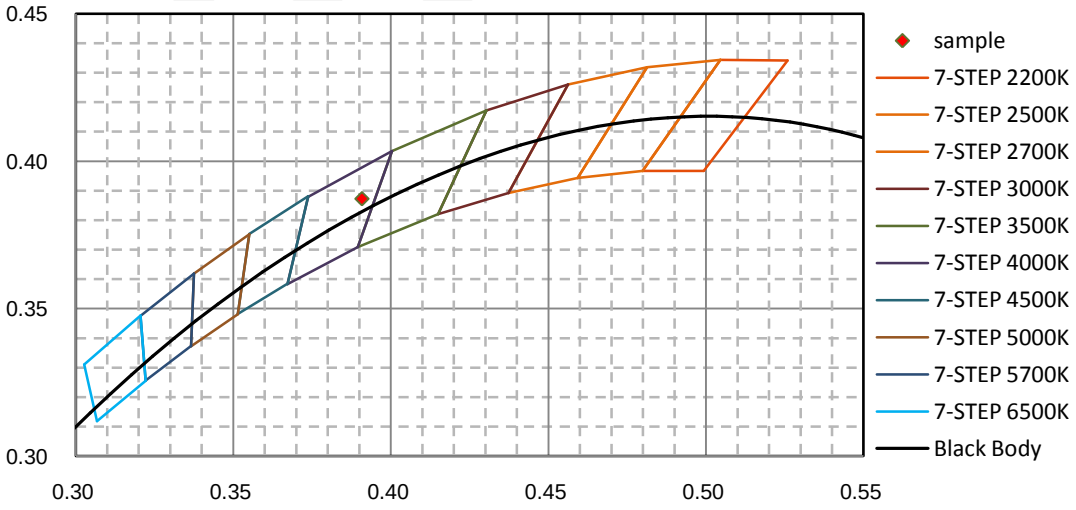
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.234E-01	421	1.234E+00	462	1.747E+01	503	1.316E+01	544	1.808E+01
381	4.464E-01	422	1.355E+00	463	1.657E+01	504	1.337E+01	545	1.818E+01
382	3.466E-01	423	1.486E+00	464	1.574E+01	505	1.353E+01	546	1.832E+01
383	3.600E-01	424	1.640E+00	465	1.513E+01	506	1.372E+01	547	1.836E+01
384	2.839E-01	425	1.799E+00	466	1.455E+01	507	1.386E+01	548	1.846E+01
385	2.696E-01	426	2.000E+00	467	1.415E+01	508	1.399E+01	549	1.859E+01
386	2.624E-01	427	2.181E+00	468	1.378E+01	509	1.419E+01	550	1.865E+01
387	2.399E-01	428	2.375E+00	469	1.348E+01	510	1.433E+01	551	1.873E+01
388	2.765E-01	429	2.577E+00	470	1.318E+01	511	1.448E+01	552	1.884E+01
389	2.369E-01	430	2.806E+00	471	1.288E+01	512	1.459E+01	553	1.890E+01
390	1.969E-01	431	3.045E+00	472	1.257E+01	513	1.473E+01	554	1.902E+01
391	2.061E-01	432	3.311E+00	473	1.223E+01	514	1.485E+01	555	1.909E+01
392	1.977E-01	433	3.566E+00	474	1.191E+01	515	1.497E+01	556	1.917E+01
393	1.822E-01	434	3.935E+00	475	1.159E+01	516	1.508E+01	557	1.926E+01
394	1.851E-01	435	4.222E+00	476	1.122E+01	517	1.520E+01	558	1.935E+01
395	1.760E-01	436	4.575E+00	477	1.089E+01	518	1.535E+01	559	1.937E+01
396	1.706E-01	437	4.985E+00	478	1.061E+01	519	1.542E+01	560	1.951E+01
397	1.482E-01	438	5.420E+00	479	1.037E+01	520	1.555E+01	561	1.958E+01
398	1.746E-01	439	5.875E+00	480	1.022E+01	521	1.562E+01	562	1.962E+01
399	1.689E-01	440	6.381E+00	481	1.011E+01	522	1.577E+01	563	1.972E+01
400	1.607E-01	441	6.932E+00	482	1.004E+01	523	1.592E+01	564	1.979E+01
401	1.954E-01	442	7.561E+00	483	1.004E+01	524	1.596E+01	565	1.987E+01
402	1.888E-01	443	8.213E+00	484	1.004E+01	525	1.609E+01	566	1.996E+01
403	1.900E-01	444	8.952E+00	485	1.013E+01	526	1.620E+01	567	1.999E+01
404	1.965E-01	445	9.768E+00	486	1.023E+01	527	1.631E+01	568	2.010E+01
405	2.010E-01	446	1.070E+01	487	1.038E+01	528	1.638E+01	569	2.013E+01
406	2.329E-01	447	1.168E+01	488	1.049E+01	529	1.650E+01	570	2.021E+01
407	2.601E-01	448	1.281E+01	489	1.067E+01	530	1.661E+01	571	2.029E+01
408	2.823E-01	449	1.395E+01	490	1.081E+01	531	1.673E+01	572	2.037E+01
409	3.022E-01	450	1.520E+01	491	1.097E+01	532	1.683E+01	573	2.041E+01
410	3.545E-01	451	1.651E+01	492	1.113E+01	533	1.694E+01	574	2.051E+01
411	3.885E-01	452	1.770E+01	493	1.127E+01	534	1.703E+01	575	2.060E+01
412	4.180E-01	453	1.877E+01	494	1.145E+01	535	1.717E+01	576	2.065E+01
413	4.840E-01	454	1.968E+01	495	1.162E+01	536	1.721E+01	577	2.072E+01
414	5.562E-01	455	2.042E+01	496	1.180E+01	537	1.733E+01	578	2.077E+01
415	6.209E-01	456	2.075E+01	497	1.201E+01	538	1.743E+01	579	2.088E+01
416	6.892E-01	457	2.078E+01	498	1.216E+01	539	1.754E+01	580	2.098E+01
417	7.671E-01	458	2.047E+01	499	1.237E+01	540	1.770E+01	581	2.105E+01
418	8.705E-01	459	1.994E+01	500	1.258E+01	541	1.779E+01	582	2.110E+01
419	9.908E-01	460	1.920E+01	501	1.278E+01	542	1.785E+01	583	2.116E+01
420	1.087E+00	461	1.831E+01	502	1.296E+01	543	1.795E+01	584	2.124E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.132E+01	626	2.165E+01	667	1.335E+01	708	5.195E+00	749	1.646E+00
586	2.138E+01	627	2.149E+01	668	1.310E+01	709	5.048E+00	750	1.596E+00
587	2.146E+01	628	2.139E+01	669	1.284E+01	710	4.906E+00	751	1.561E+00
588	2.156E+01	629	2.128E+01	670	1.261E+01	711	4.807E+00	752	1.516E+00
589	2.161E+01	630	2.113E+01	671	1.240E+01	712	4.667E+00	753	1.470E+00
590	2.168E+01	631	2.099E+01	672	1.216E+01	713	4.534E+00	754	1.424E+00
591	2.177E+01	632	2.083E+01	673	1.189E+01	714	4.409E+00	755	1.379E+00
592	2.183E+01	633	2.073E+01	674	1.166E+01	715	4.303E+00	756	1.360E+00
593	2.187E+01	634	2.053E+01	675	1.143E+01	716	4.192E+00	757	1.316E+00
594	2.195E+01	635	2.037E+01	676	1.120E+01	717	4.075E+00	758	1.260E+00
595	2.200E+01	636	2.022E+01	677	1.095E+01	718	3.949E+00	759	1.239E+00
596	2.210E+01	637	2.008E+01	678	1.071E+01	719	3.844E+00	760	1.205E+00
597	2.211E+01	638	1.988E+01	679	1.052E+01	720	3.769E+00	761	1.168E+00
598	2.214E+01	639	1.971E+01	680	1.031E+01	721	3.679E+00	762	1.131E+00
599	2.220E+01	640	1.950E+01	681	1.006E+01	722	3.560E+00	763	1.096E+00
600	2.224E+01	641	1.932E+01	682	9.846E+00	723	3.448E+00	764	1.072E+00
601	2.232E+01	642	1.911E+01	683	9.611E+00	724	3.369E+00	765	1.041E+00
602	2.235E+01	643	1.893E+01	684	9.432E+00	725	3.262E+00	766	1.007E+00
603	2.238E+01	644	1.870E+01	685	9.218E+00	726	3.186E+00	767	9.727E-01
604	2.245E+01	645	1.851E+01	686	9.021E+00	727	3.100E+00	768	9.467E-01
605	2.245E+01	646	1.829E+01	687	8.790E+00	728	3.024E+00	769	9.339E-01
606	2.248E+01	647	1.808E+01	688	8.604E+00	729	2.936E+00	770	8.947E-01
607	2.250E+01	648	1.787E+01	689	8.399E+00	730	2.842E+00	771	8.635E-01
608	2.251E+01	649	1.763E+01	690	8.194E+00	731	2.762E+00	772	8.461E-01
609	2.250E+01	650	1.743E+01	691	7.992E+00	732	2.680E+00	773	8.248E-01
610	2.247E+01	651	1.718E+01	692	7.827E+00	733	2.609E+00	774	7.969E-01
611	2.242E+01	652	1.694E+01	693	7.632E+00	734	2.539E+00	775	7.870E-01
612	2.243E+01	653	1.670E+01	694	7.434E+00	735	2.465E+00	776	7.550E-01
613	2.242E+01	654	1.649E+01	695	7.271E+00	736	2.393E+00	777	7.333E-01
614	2.241E+01	655	1.622E+01	696	7.078E+00	737	2.328E+00	778	7.162E-01
615	2.238E+01	656	1.602E+01	697	6.889E+00	738	2.266E+00	779	7.103E-01
616	2.238E+01	657	1.577E+01	698	6.722E+00	739	2.196E+00	780	7.116E-01
617	2.238E+01	658	1.552E+01	699	6.562E+00	740	2.120E+00		
618	2.231E+01	659	1.528E+01	700	6.417E+00	741	2.085E+00		
619	2.226E+01	660	1.503E+01	701	6.251E+00	742	2.029E+00		
620	2.215E+01	661	1.483E+01	702	6.074E+00	743	1.956E+00		
621	2.211E+01	662	1.457E+01	703	5.950E+00	744	1.886E+00		
622	2.201E+01	663	1.432E+01	704	5.772E+00	745	1.848E+00		
623	2.194E+01	664	1.408E+01	705	5.614E+00	746	1.784E+00		
624	2.184E+01	665	1.383E+01	706	5.461E+00	747	1.748E+00		
625	2.178E+01	666	1.360E+01	707	5.317E+00	748	1.707E+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**

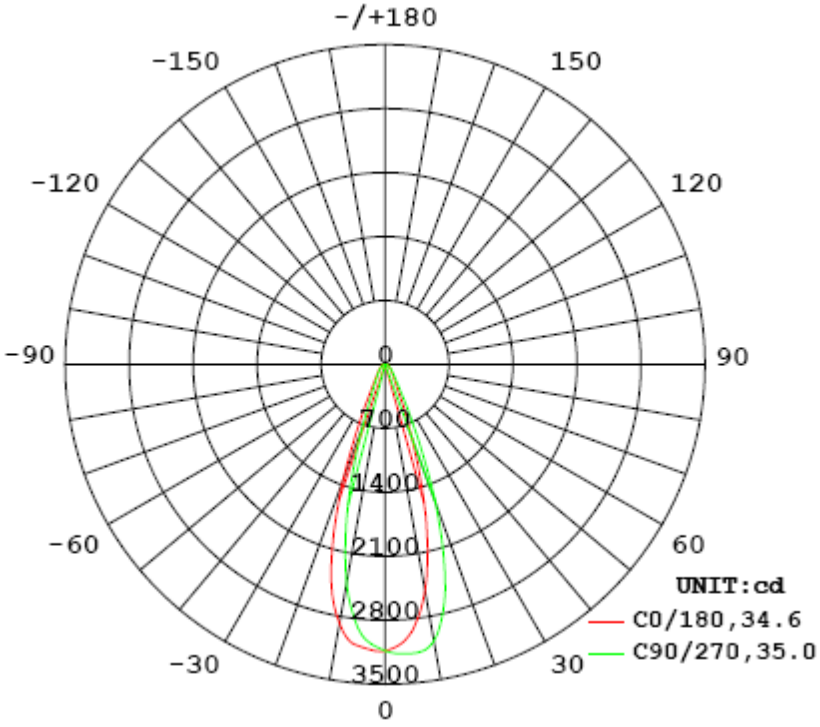
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1114	12.87	0.9627

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1364.81	106.05	3196	0.57	0.48

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	34.6	33.0	35.0	33.7	34.1
Field Angle (10% I_{max}):	55.9	58.2	55.9	58.2	57.1

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3134	3134	3134	3134	3134	3134	3134	3134
5.0°	2980	3084	3140	3143	3176	3196	3186	3167
10.0°	2510	2778	2876	2905	3075	3072	2960	3000
15.0°	1724	2020	2217	2338	2543	2545	2426	2440
20.0°	860	1081	1238	1396	1619	1634	1473	1451
25.0°	399	490	584	658	736	733	677	631
30.0°	231	261	332	369	340	339	377	314
35.0°	160	175	208	222	206	202	225	197
40.0°	119	128	145	153	146	143	146	139
45.0°	95	101	110	115	110	108	109	107
50.0°	76	83	90	93	90	87	87	86
55.0°	57	61	67	70	68	68	68	66
60.0°	44	47	51	52	52	53	52	50
65.0°	34	37	39	41	41	41	40	39
70.0°	25	28	30	31	31	32	31	30
75.0°	17	19	21	22	23	23	22	21
80.0°	9	11	13	14	14	15	14	13
85.0°	3	5	6	7	7	7	7	6
90.0°	0	0	1	1	1	2	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

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	3134	3134	3134	3134	3134	3134	3134	3134
5.0°	3100	3012	2969	2952	2969	2955	2901	2916
10.0°	2877	2556	2418	2356	2436	2409	2315	2371
15.0°	2281	1806	1525	1473	1554	1522	1452	1528
20.0°	1349	947	716	691	718	705	701	746
25.0°	566	439	409	355	329	333	378	400
30.0°	279	249	250	218	208	211	231	239
35.0°	181	165	161	149	147	151	156	160
40.0°	132	120	117	112	112	114	116	117
45.0°	104	95	92	90	93	92	93	94
50.0°	84	76	73	70	70	71	72	73
55.0°	63	58	56	54	53	54	55	55
60.0°	49	46	44	43	42	42	42	43
65.0°	38	36	34	33	32	32	32	33
70.0°	29	27	25	24	23	23	23	24
75.0°	20	19	17	16	15	15	15	16
80.0°	12	11	9	8	8	8	8	9
85.0°	5	4	3	2	2	2	2	3
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	74.0	5.42
5-10	205.8	15.08
10-15	275.9	20.21
15-20	246.5	18.06
20-25	156.9	11.50
25-30	94.8	6.94
30-35	65.4	4.79
35-40	50.5	3.70
40-45	41.9	3.07
45-50	36.4	2.67
50-55	30.5	2.23
55-60	24.8	1.81
60-65	20.2	1.48
65-70	16.1	1.18
70-75	12.0	0.88
75-80	7.9	0.59
80-85	4.1	0.30
85-90	1.2	0.08
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	74.0	5.42
0-10	279.8	20.50
0-15	555.7	40.71
0-20	802.1	58.77
0-25	959.0	70.27
0-30	1053.8	77.21
0-35	1119.2	82.00
0-40	1169.6	85.70
0-45	1211.6	88.77
0-50	1247.9	91.44
0-55	1278.4	93.67
0-60	1303.2	95.48
0-65	1323.4	96.96
0-70	1339.5	98.14
0-75	1351.5	99.02
0-80	1359.4	99.61
0-85	1363.6	99.91
0-90	1364.7	99.99
0-95	1364.8	100.00
0-100	1364.8	100.00
0-105	1364.8	100.00
0-110	1364.8	100.00
0-115	1364.8	100.00
0-120	1364.8	100.00
0-125	1364.8	100.00
0-130	1364.8	100.00
0-135	1364.8	100.00
0-140	1364.8	100.00
0-145	1364.8	100.00
0-150	1364.8	100.00
0-155	1364.8	100.00
0-160	1364.8	100.00
0-165	1364.8	100.00
0-170	1364.8	100.00
0-175	1364.8	100.00
0-180	1364.8	100.00

6. Product Photo

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