IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 6PLH/835/BYP/R
Multiple Model: 6PLH/835/BYP/R;
6PLH/835/BYP/E26/R;
6PLH/835/BYP/GU24/R

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du
Report Number:	RKS170301008-10
Test Date:	2017-03-06 to 2017-03-08
Report Date:	2017-03-09
Reviewed By:	Blake Zhang
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:

One sample was received on 2017-03-02 and used for testing.

Model Tested:	6PLH/835/BYP/R
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	LED Lamp
Burning Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120-277 VAC 60Hz
Rated Power:	6W
Nominal CCT:	3500K
Nominal Lumen Output:	550 lm
Nominal CRI:	80

Family Declaration:

GREEN CREATIVE LTD, hereby declare that there are some differences between our Multiple Models and testing products. Details as below:

Testing Model Number	Multiple listed Model Number	Difference	Details
6PLH/835/BYP/R	6PLH/835/BYP/R; 6PLH/835/BYP/E26/R; 6PLH/835/BYP/GU24/R	Lamp base	The lamp base of 6PLH/835/BYP/R is G24D; The lamp base of 6PLH/835/BYP/E26/R is E26; The lamp base of 6PLH/835/BYP/GU24/R is GU24

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	N/A	N/A	25°C	2017-03-09	2018-03-08
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2017-03-03	2018-03-02
Spectral photometer	SENSING	SPR3000	s0902024	350nm～800nm	2017-03-09	2018-03-08
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50Hz	2017-03-03	2018-03-02
Standard Light Source	EVERFINE	D204	G100283CA8351158	24V/100W	2016-08-26	2017-08-25
Thermal Meter	SENSING	N/A	N/A	25°C	2016-03-21	2017-03-20
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	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	2016-03-21	2017-03-20
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=2.3% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=23K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.3(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: **Baseup**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0491	5.75	0.9768	633.9	110.15

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.916	3505	-0.00080	0.4042	0.3884	0.2360	0.5101

Color Rendering Index

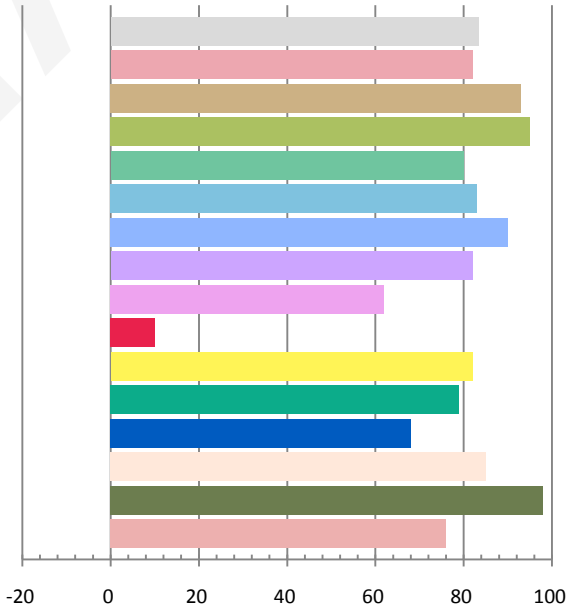
Ra
83.4

R1	R2	R3	R4
82	93	95	80

R5	R6	R7	R8
83	90	82	62

R9	R10	R11	R12
10	82	79	68

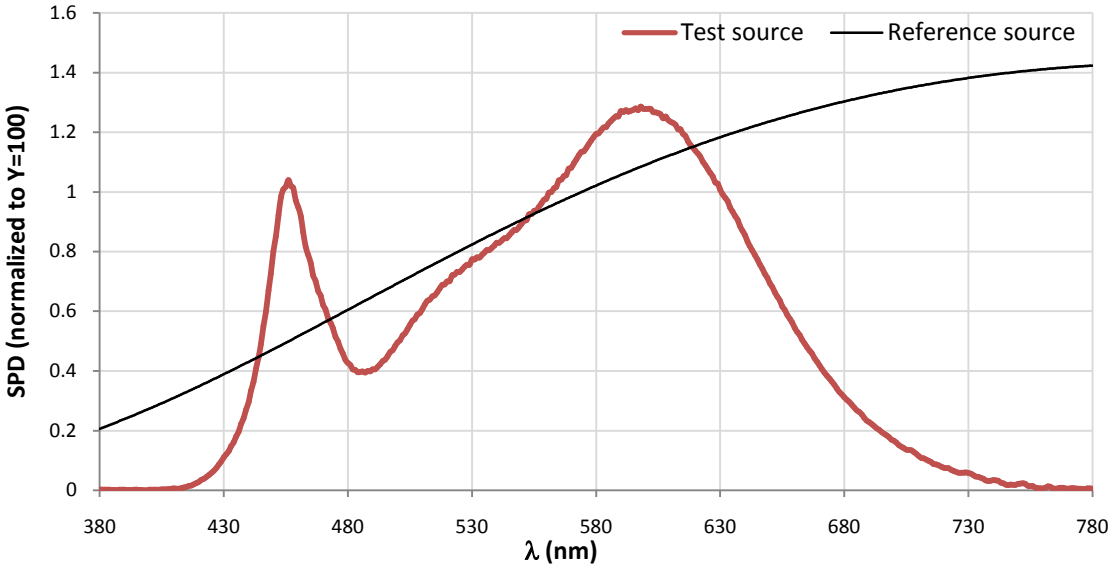
R13	R14	R15
85	98	76



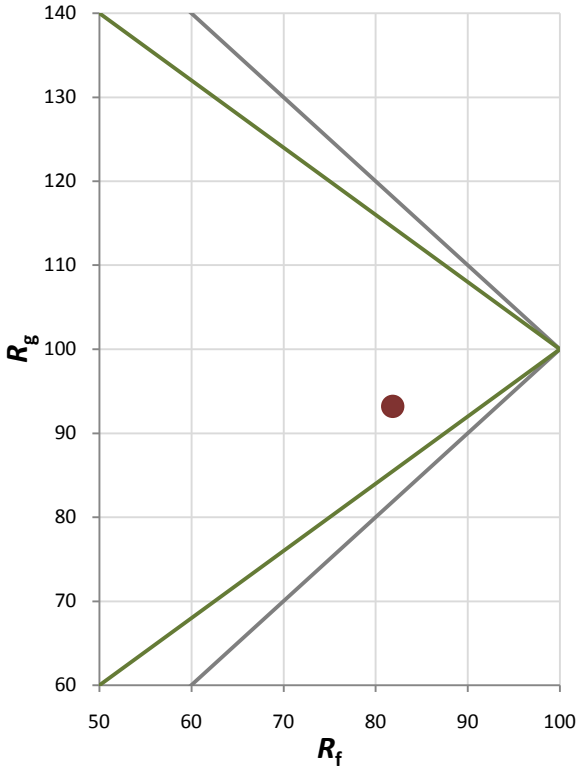
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	93

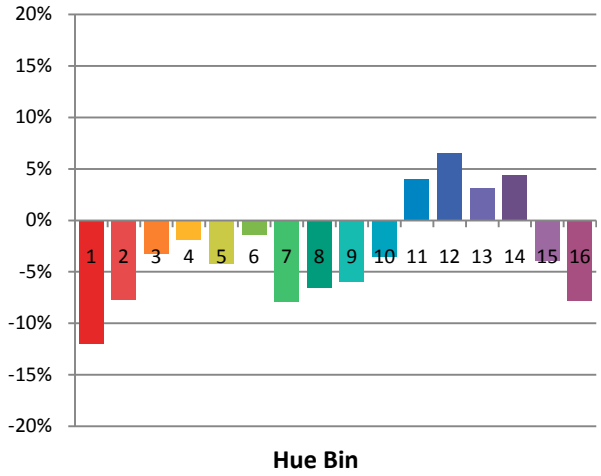
Spectral Power Distribution Comparison



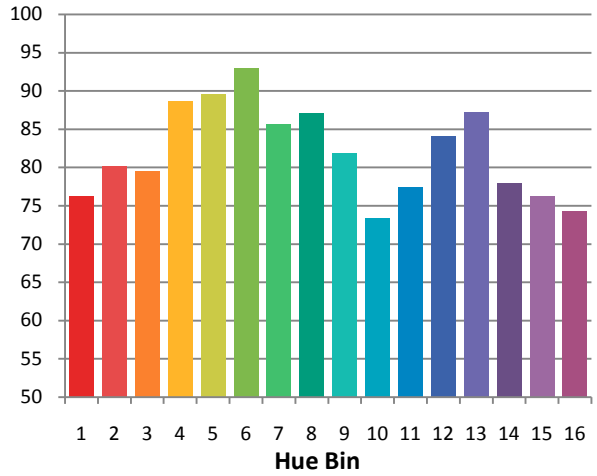
Plot of R_g versus R_f



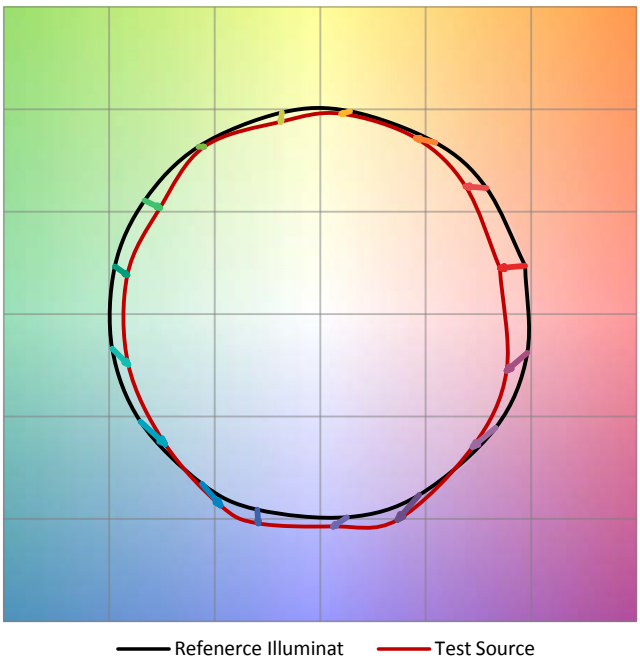
Chroma Shift by Hue

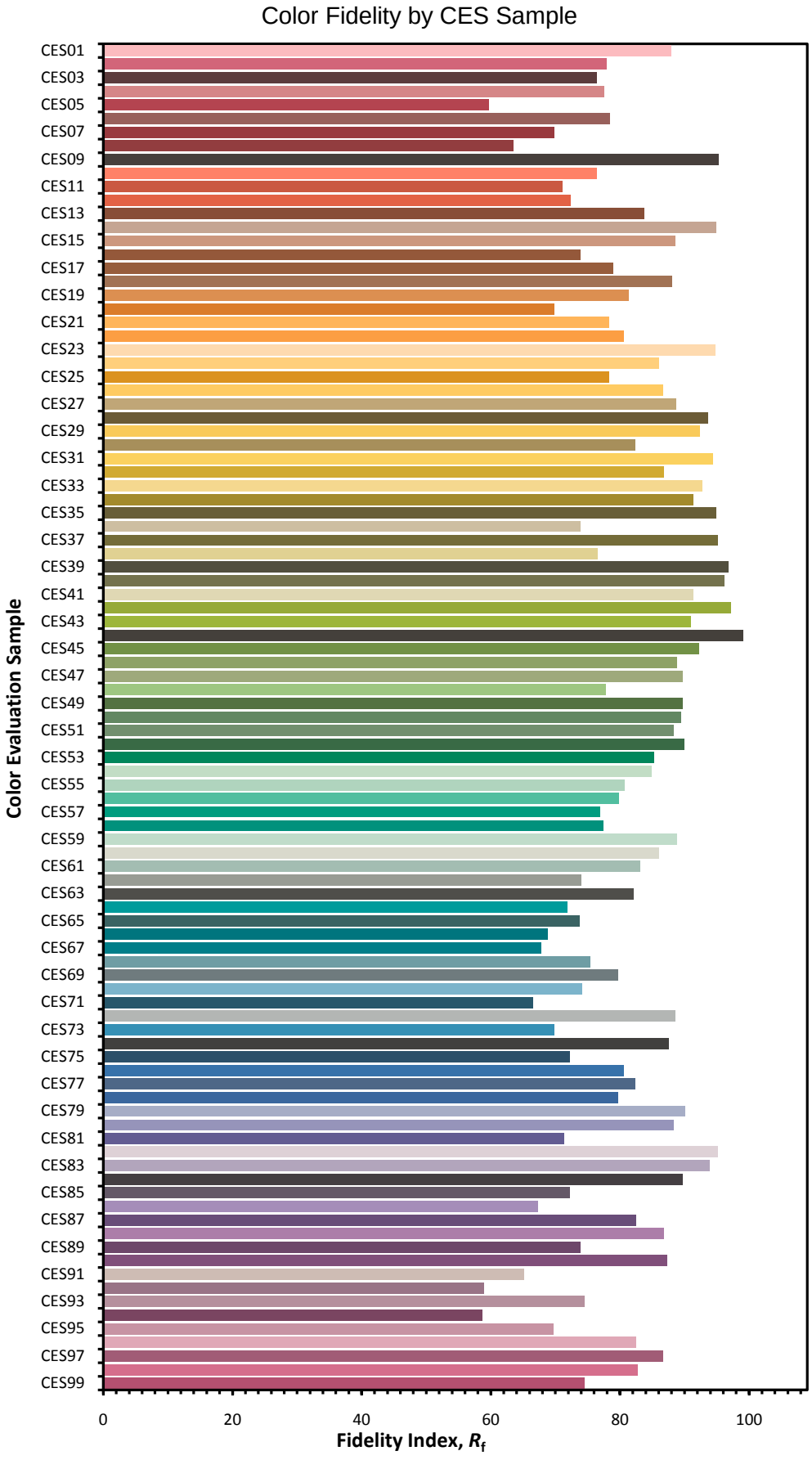


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
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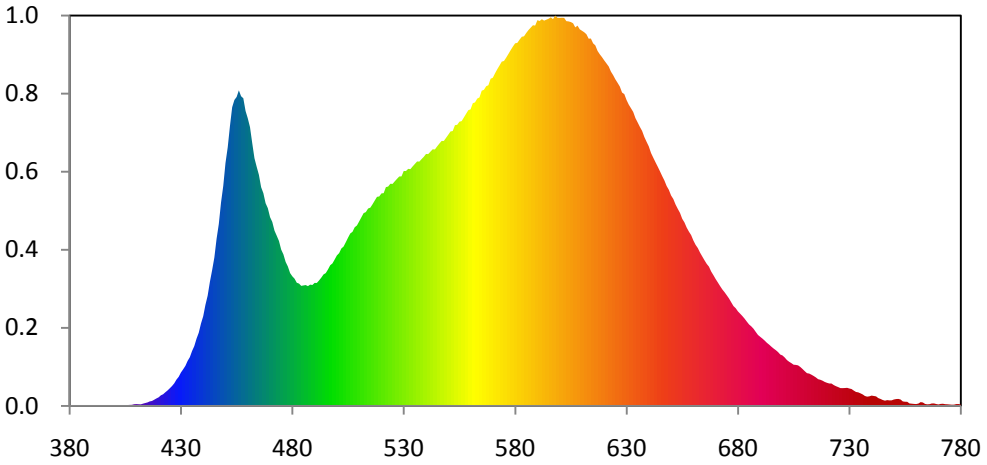
CES99
0
20
40
60
80
100
Fidelity Index, R_f

Relative Spectral Power Distribution

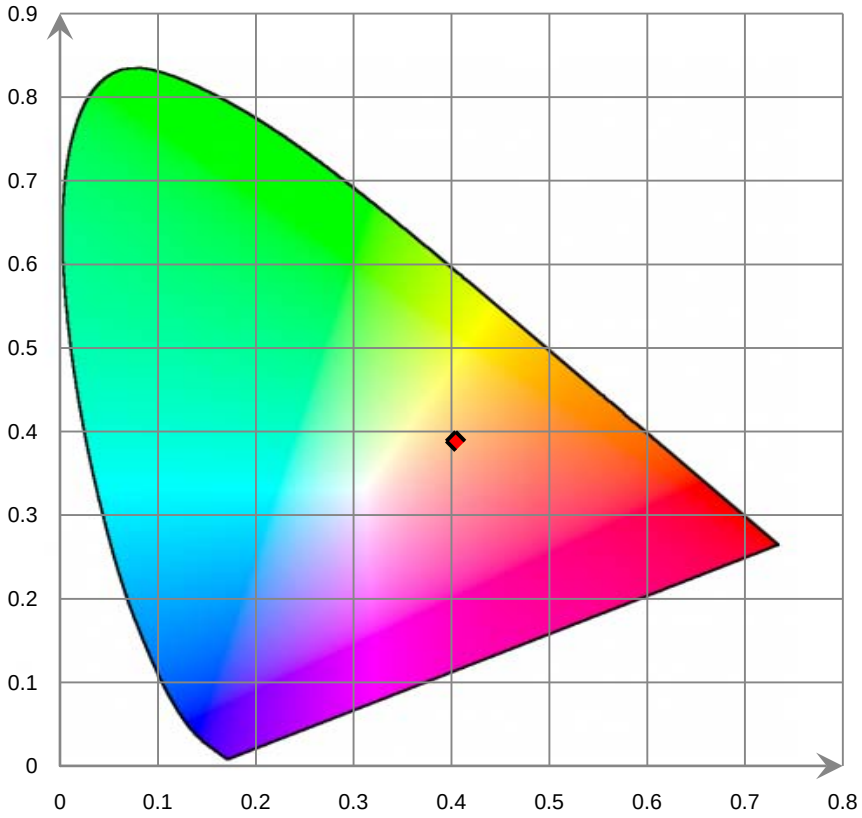


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.110E-02	421	3.262E-01	462	8.035E+00	503	4.872E+00	544	7.841E+00
381	2.320E-02	422	3.585E-01	463	7.571E+00	504	5.004E+00	545	7.933E+00
382	2.140E-02	423	4.191E-01	464	7.310E+00	505	5.143E+00	546	8.019E+00
383	2.300E-02	424	4.745E-01	465	7.063E+00	506	5.272E+00	547	8.099E+00
384	2.030E-02	425	5.403E-01	466	6.685E+00	507	5.322E+00	548	8.100E+00
385	1.360E-02	426	6.096E-01	467	6.503E+00	508	5.461E+00	549	8.193E+00
386	1.380E-02	427	6.915E-01	468	6.196E+00	509	5.516E+00	550	8.290E+00
387	1.360E-02	428	8.069E-01	469	6.045E+00	510	5.640E+00	551	8.389E+00
388	1.600E-02	429	8.911E-01	470	5.772E+00	511	5.767E+00	552	8.402E+00
389	2.030E-02	430	1.023E+00	471	5.625E+00	512	5.893E+00	553	8.581E+00
390	1.820E-02	431	1.120E+00	472	5.358E+00	513	5.926E+00	554	8.592E+00
391	9.700E-03	432	1.226E+00	473	5.203E+00	514	6.033E+00	555	8.688E+00
392	6.800E-03	433	1.378E+00	474	5.042E+00	515	6.060E+00	556	8.706E+00
393	1.200E-02	434	1.492E+00	475	4.779E+00	516	6.164E+00	557	8.816E+00
394	1.550E-02	435	1.680E+00	476	4.632E+00	517	6.279E+00	558	8.930E+00
395	1.590E-02	436	1.831E+00	477	4.401E+00	518	6.391E+00	559	9.039E+00
396	9.900E-03	437	2.058E+00	478	4.262E+00	519	6.403E+00	560	9.064E+00
397	4.600E-03	438	2.238E+00	479	4.061E+00	520	6.496E+00	561	9.252E+00
398	2.600E-03	439	2.518E+00	480	3.962E+00	521	6.504E+00	562	9.278E+00
399	1.400E-03	440	2.742E+00	481	3.890E+00	522	6.687E+00	563	9.394E+00
400	1.430E-02	441	3.091E+00	482	3.766E+00	523	6.706E+00	564	9.429E+00
401	1.740E-02	442	3.374E+00	483	3.740E+00	524	6.791E+00	565	9.635E+00
402	1.720E-02	443	3.793E+00	484	3.670E+00	525	6.787E+00	566	9.661E+00
403	1.620E-02	444	4.149E+00	485	3.683E+00	526	6.867E+00	567	9.770E+00
404	1.550E-02	445	4.537E+00	486	3.695E+00	527	6.942E+00	568	9.802E+00
405	2.760E-02	446	5.108E+00	487	3.662E+00	528	7.013E+00	569	1.000E+01
406	2.900E-02	447	5.561E+00	488	3.708E+00	529	7.016E+00	570	1.003E+01
407	3.340E-02	448	6.218E+00	489	3.697E+00	530	7.182E+00	571	1.017E+01
408	3.540E-02	449	6.726E+00	490	3.761E+00	531	7.179E+00	572	1.029E+01
409	5.310E-02	450	7.425E+00	491	3.760E+00	532	7.246E+00	573	1.041E+01
410	5.890E-02	451	7.903E+00	492	3.836E+00	533	7.237E+00	574	1.052E+01
411	5.380E-02	452	8.552E+00	493	3.922E+00	534	7.320E+00	575	1.054E+01
412	5.060E-02	453	9.130E+00	494	4.020E+00	535	7.397E+00	576	1.065E+01
413	7.210E-02	454	9.352E+00	495	4.060E+00	536	7.472E+00	577	1.076E+01
414	9.040E-02	455	9.443E+00	496	4.172E+00	537	7.468E+00	578	1.087E+01
415	1.080E-01	456	9.645E+00	497	4.301E+00	538	7.543E+00	579	1.098E+01
416	1.391E-01	457	9.465E+00	498	4.356E+00	539	7.614E+00	580	1.108E+01
417	1.524E-01	458	9.403E+00	499	4.475E+00	540	7.701E+00	581	1.110E+01
418	1.915E-01	459	9.016E+00	500	4.601E+00	541	7.698E+00	582	1.120E+01
419	2.298E-01	460	8.793E+00	501	4.670E+00	542	7.772E+00	583	1.128E+01

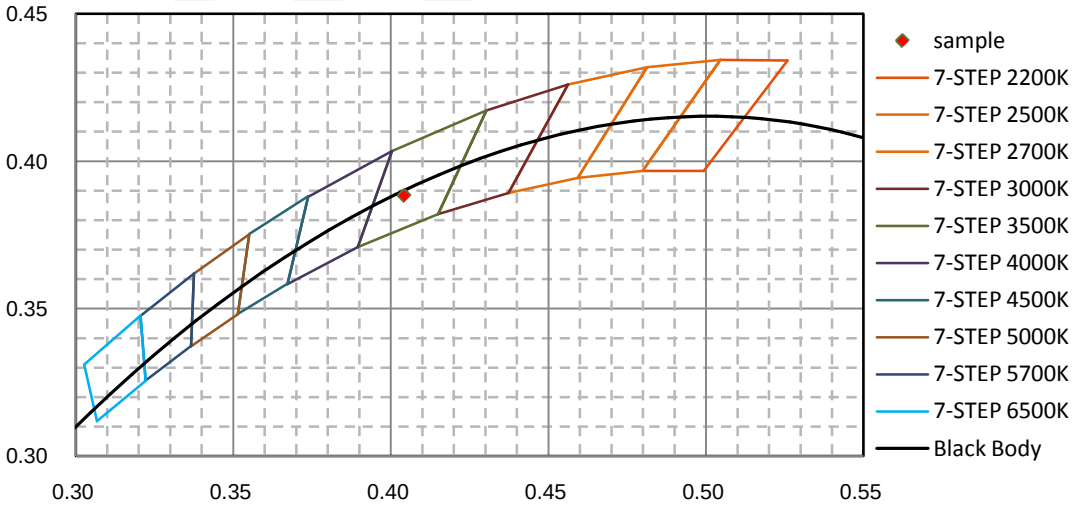
420	2.651E-01	461	8.522E+00	502	4.812E+00	543	7.844E+00	584	1.130E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.140E+01	626	9.873E+00	667	4.257E+00	708	1.192E+00	749	1.714E-01
586	1.149E+01	627	9.760E+00	668	4.108E+00	709	1.130E+00	750	1.984E-01
587	1.156E+01	628	9.578E+00	669	3.997E+00	710	1.064E+00	751	2.114E-01
588	1.163E+01	629	9.531E+00	670	3.879E+00	711	1.003E+00	752	2.162E-01
589	1.162E+01	630	9.351E+00	671	3.773E+00	712	9.907E-01	753	1.982E-01
590	1.179E+01	631	9.209E+00	672	3.665E+00	713	9.559E-01	754	1.396E-01
591	1.177E+01	632	9.098E+00	673	3.562E+00	714	9.162E-01	755	1.297E-01
592	1.182E+01	633	8.985E+00	674	3.477E+00	715	8.718E-01	756	1.272E-01
593	1.178E+01	634	8.796E+00	675	3.382E+00	716	8.188E-01	757	7.810E-02
594	1.180E+01	635	8.663E+00	676	3.285E+00	717	8.005E-01	758	7.020E-02
595	1.183E+01	636	8.528E+00	677	3.168E+00	718	7.726E-01	759	6.290E-02
596	1.188E+01	637	8.404E+00	678	3.053E+00	719	7.333E-01	760	5.850E-02
597	1.182E+01	638	8.220E+00	679	2.987E+00	720	7.071E-01	761	7.380E-02
598	1.193E+01	639	8.073E+00	680	2.891E+00	721	6.877E-01	762	1.184E-01
599	1.186E+01	640	7.931E+00	681	2.820E+00	722	6.859E-01	763	1.075E-01
600	1.186E+01	641	7.731E+00	682	2.748E+00	723	6.392E-01	764	6.240E-02
601	1.186E+01	642	7.588E+00	683	2.668E+00	724	6.055E-01	765	5.010E-02
602	1.186E+01	643	7.448E+00	684	2.577E+00	725	5.773E-01	766	5.470E-02
603	1.176E+01	644	7.314E+00	685	2.491E+00	726	5.466E-01	767	7.690E-02
604	1.175E+01	645	7.174E+00	686	2.433E+00	727	5.452E-01	768	7.800E-02
605	1.173E+01	646	7.027E+00	687	2.360E+00	728	5.492E-01	769	5.960E-02
606	1.170E+01	647	6.891E+00	688	2.263E+00	729	5.549E-01	770	4.610E-02
607	1.157E+01	648	6.723E+00	689	2.171E+00	730	5.341E-01	771	6.270E-02
608	1.162E+01	649	6.604E+00	690	2.115E+00	731	5.183E-01	772	6.840E-02
609	1.151E+01	650	6.432E+00	691	2.059E+00	732	4.699E-01	773	5.540E-02
610	1.147E+01	651	6.325E+00	692	1.998E+00	733	4.279E-01	774	5.140E-02
611	1.142E+01	652	6.158E+00	693	1.931E+00	734	4.165E-01	775	4.540E-02
612	1.136E+01	653	6.024E+00	694	1.875E+00	735	3.869E-01	776	3.930E-02
613	1.122E+01	654	5.901E+00	695	1.814E+00	736	3.531E-01	777	4.040E-02
614	1.123E+01	655	5.720E+00	696	1.756E+00	737	3.054E-01	778	5.870E-02
615	1.108E+01	656	5.609E+00	697	1.707E+00	738	2.856E-01	779	5.970E-02
616	1.102E+01	657	5.451E+00	698	1.647E+00	739	2.953E-01	780	4.630E-02
617	1.085E+01	658	5.329E+00	699	1.572E+00	740	3.179E-01		
618	1.075E+01	659	5.223E+00	700	1.544E+00	741	3.054E-01		
619	1.066E+01	660	5.058E+00	701	1.481E+00	742	2.935E-01		
620	1.056E+01	661	4.925E+00	702	1.404E+00	743	2.413E-01		
621	1.047E+01	662	4.825E+00	703	1.351E+00	744	2.152E-01		
622	1.037E+01	663	4.687E+00	704	1.309E+00	745	1.830E-01		
623	1.022E+01	664	4.569E+00	705	1.261E+00	746	1.622E-01		
624	1.011E+01	665	4.452E+00	706	1.255E+00	747	1.793E-01		
625	9.981E+00	666	4.342E+00	707	1.240E+00	748	1.703E-01		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Baseup**

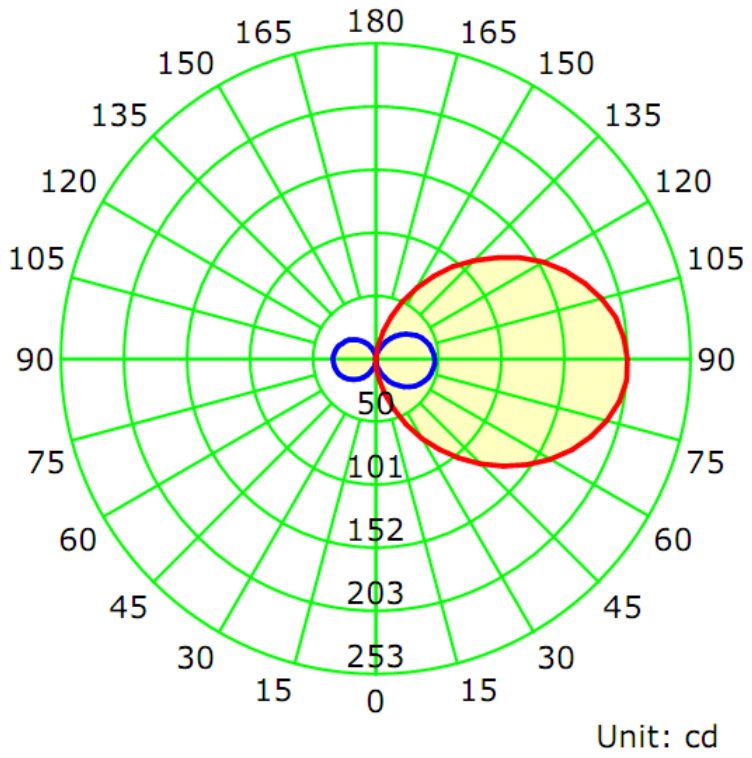
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0490	5.76	0.9790

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
639	110.94	203.0	9.07	12.39

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	272.4	176.9	177.6	177.5	201.1
Field Angle (10% I_{max}):	332.4	176.9	177.6	177.5	216.1

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1	1	1	1	1	1	1	1
5.0°	3	5	6	7	7	6	4	3
10.0°	6	10	13	17	17	14	9	5
15.0°	9	17	23	29	30	24	17	9
20.0°	13	24	35	43	44	36	25	14
25.0°	17	32	46	58	58	48	34	18
30.0°	21	40	58	73	74	61	42	23
35.0°	25	49	69	88	89	74	51	28
40.0°	29	57	81	103	105	86	60	33
45.0°	32	64	92	118	120	98	69	37
50.0°	35	72	103	132	135	110	77	41
55.0°	38	78	113	146	149	122	84	45
60.0°	41	85	123	159	162	132	91	49
65.0°	43	90	131	170	174	142	98	52
70.0°	45	95	138	180	185	150	103	55
75.0°	46	98	144	188	193	157	107	57
80.0°	47	101	148	194	199	162	111	59
85.0°	48	102	150	197	203	164	112	59
90.0°	48	102	151	197	203	165	113	60
95.0°	47	101	149	195	201	163	112	59
100.0°	46	99	145	190	196	159	109	58
105.0°	45	95	140	184	189	153	105	56
110.0°	43	91	134	174	179	146	100	53
115.0°	41	86	126	164	169	137	95	50
120.0°	38	80	117	152	156	127	88	47
125.0°	35	73	107	139	142	116	80	43
130.0°	32	66	96	124	128	105	73	39
135.0°	28	58	85	110	112	93	64	35
140.0°	25	50	74	95	97	80	56	30
145.0°	21	42	62	80	82	68	47	25
150.0°	17	34	50	65	67	55	38	21
155.0°	13	26	39	50	51	43	29	16
160.0°	9	19	28	36	37	31	21	12
165.0°	6	11	17	23	24	19	13	7
170.0°	3	5	7	9	10	6	6	4
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°	1	1	1	1	1	1	1	1
5.0°	2	1	0	0	0	1	1	2
10.0°	4	2	1	0	0	1	2	3
15.0°	6	3	1	0	0	1	2	4
20.0°	9	5	2	1	0	1	3	6
25.0°	12	6	2	1	0	2	4	8
30.0°	15	8	3	1	0	2	5	9
35.0°	18	10	4	1	1	3	6	11
40.0°	21	11	5	1	1	3	7	13
45.0°	24	13	5	1	1	3	8	14
50.0°	26	14	6	1	1	4	9	15
55.0°	28	15	6	2	1	4	9	16
60.0°	30	16	7	2	1	4	10	17
65.0°	32	17	8	2	1	5	10	18
70.0°	33	18	8	2	1	5	11	19
75.0°	34	18	8	2	1	5	11	19
80.0°	35	19	8	2	1	5	11	19
85.0°	35	19	8	2	1	5	11	19
90.0°	35	19	8	2	1	5	11	19
95.0°	35	19	8	2	1	5	11	19
100.0°	34	18	8	2	1	5	11	19
105.0°	33	18	8	2	1	5	10	18
110.0°	32	17	8	2	1	4	10	17
115.0°	31	17	7	2	1	4	9	16
120.0°	29	16	7	2	1	4	9	15
125.0°	27	15	6	2	1	3	8	14
130.0°	25	13	6	1	0	3	7	13
135.0°	22	12	5	1	0	3	6	12
140.0°	20	11	4	1	0	2	6	10
145.0°	17	9	4	1	0	2	5	9
150.0°	14	8	3	1	0	1	4	7
155.0°	11	6	2	1	0	1	3	5
160.0°	8	4	2	1	0	1	2	4
165.0°	5	3	1	0	0	0	1	2
170.0°	3	1	1	0	0	0	0	1
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	0.0	0.01
5-10	0.3	0.05
10-15	1.0	0.16
15-20	2.3	0.35
20-25	4.0	0.62
25-30	6.2	0.97
30-35	8.8	1.38
35-40	11.9	1.86
40-45	15.2	2.37
45-50	18.7	2.92
50-55	22.2	3.48
55-60	25.8	4.04
60-65	29.2	4.57
65-70	32.3	5.05
70-75	34.9	5.46
75-80	36.9	5.78
80-85	38.3	5.99
85-90	38.9	6.09
90-95	38.7	6.06
95-100	37.8	5.91
100-105	36.1	5.65
105-110	33.9	5.30
110-115	31.1	4.86
115-120	27.9	4.37
120-125	24.5	3.83
125-130	20.9	3.28
130-135	17.4	2.72
135-140	14.0	2.18
140-145	10.8	1.68
145-150	7.9	1.23
150-155	5.4	0.84
155-160	3.3	0.52
160-165	1.8	0.28
165-170	0.7	0.11
170-175	0.1	0.02
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	0.0	0.01
0-10	0.4	0.06
0-15	1.4	0.22
0-20	3.7	0.57
0-25	7.6	1.20
0-30	13.8	2.17
0-35	22.7	3.55
0-40	34.5	5.40
0-45	49.7	7.78
0-50	68.4	10.70
0-55	90.6	14.18
0-60	116.4	18.21
0-65	145.6	22.78
0-70	177.9	27.83
0-75	212.7	33.29
0-80	249.6	39.06
0-85	287.9	45.05
0-90	326.8	51.14
0-95	365.5	57.20
0-100	403.3	63.11
0-105	439.4	68.77
0-110	473.3	74.06
0-115	504.4	78.93
0-120	532.3	83.30
0-125	556.8	87.13
0-130	577.7	90.41
0-135	595.1	93.13
0-140	609.1	95.31
0-145	619.8	97.00
0-150	627.7	98.23
0-155	633.1	99.07
0-160	636.4	99.59
0-165	638.2	99.87
0-170	638.9	99.98
0-175	639.0	100.00
0-180	639.0	100.00

6. Product Photo

7. Product Test orientation in the Goniophotometer

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