IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 9.5PLH/840/BYP

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du
Report Number:	RKS170301003-10
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:	9.5PLH/840/BYP
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:	9.5W
Nominal CCT:	4000K
Nominal Lumen Output:	950 lm
Nominal CRI:	80

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	15/30/60/150/300/600V	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)
120.1	60	0.0825	9.47	0.9558	1134.1	119.76

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.464	4125	-0.00085	0.3746	0.3712	0.2234	0.4983

Color Rendering Index

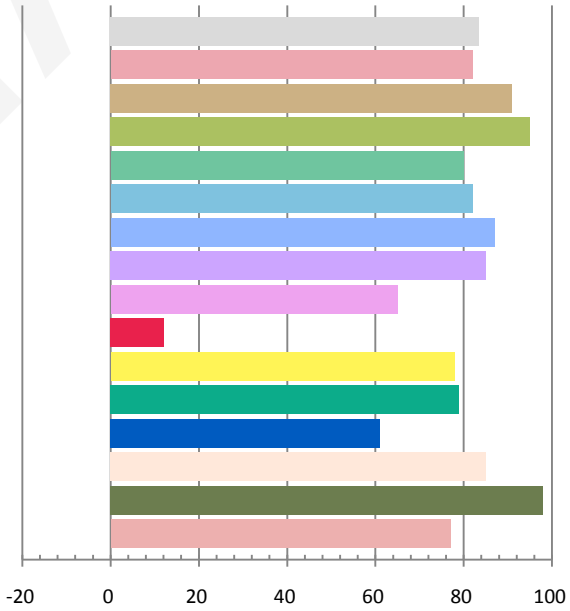
Ra
83.5

R1	R2	R3	R4
82	91	95	80

R5	R6	R7	R8
82	87	85	65

R9	R10	R11	R12
12	78	79	61

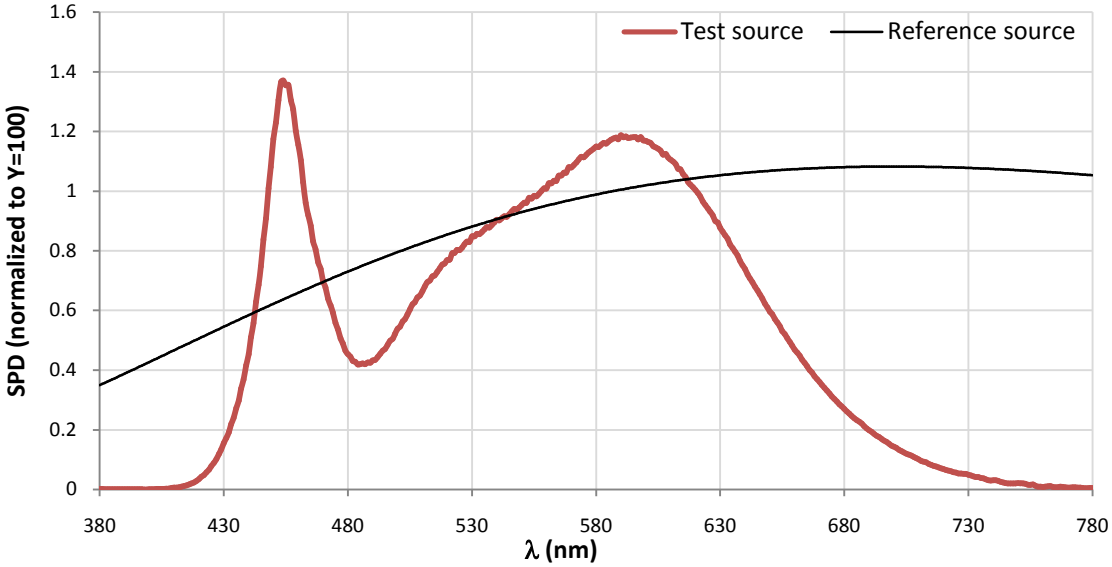
R13	R14	R15
85	98	77



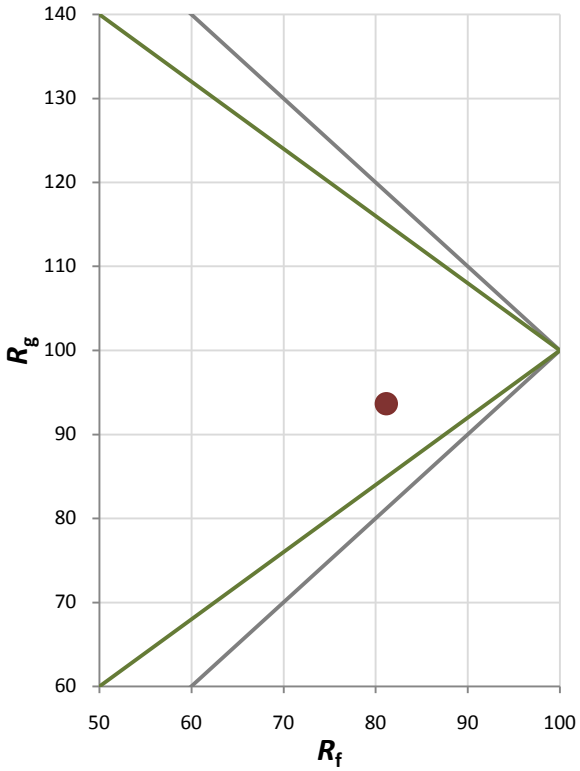
Fidelity Index and Gamut Index

Fidelity Index R_f	81
Gamut Index R_g	94

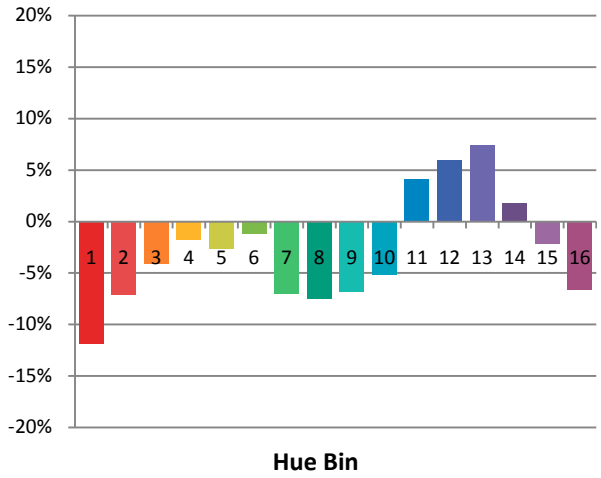
Spectral Power Distribution Comparison



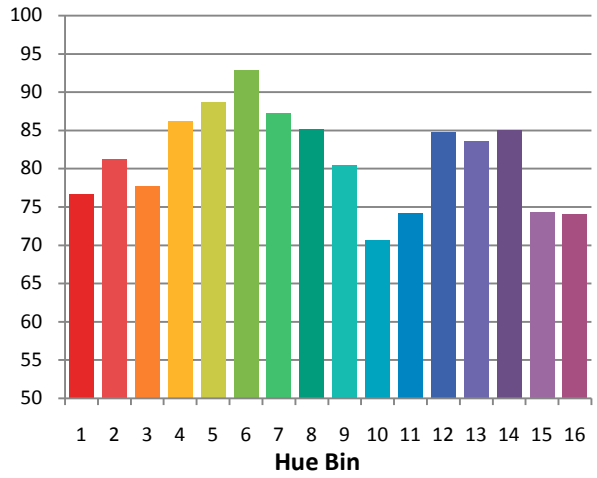
Plot of R_g versus R_f



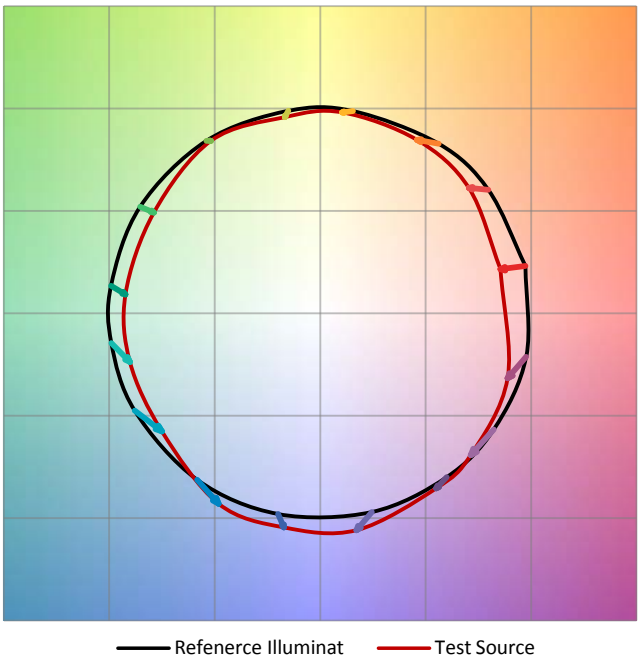
Chroma Shift by Hue

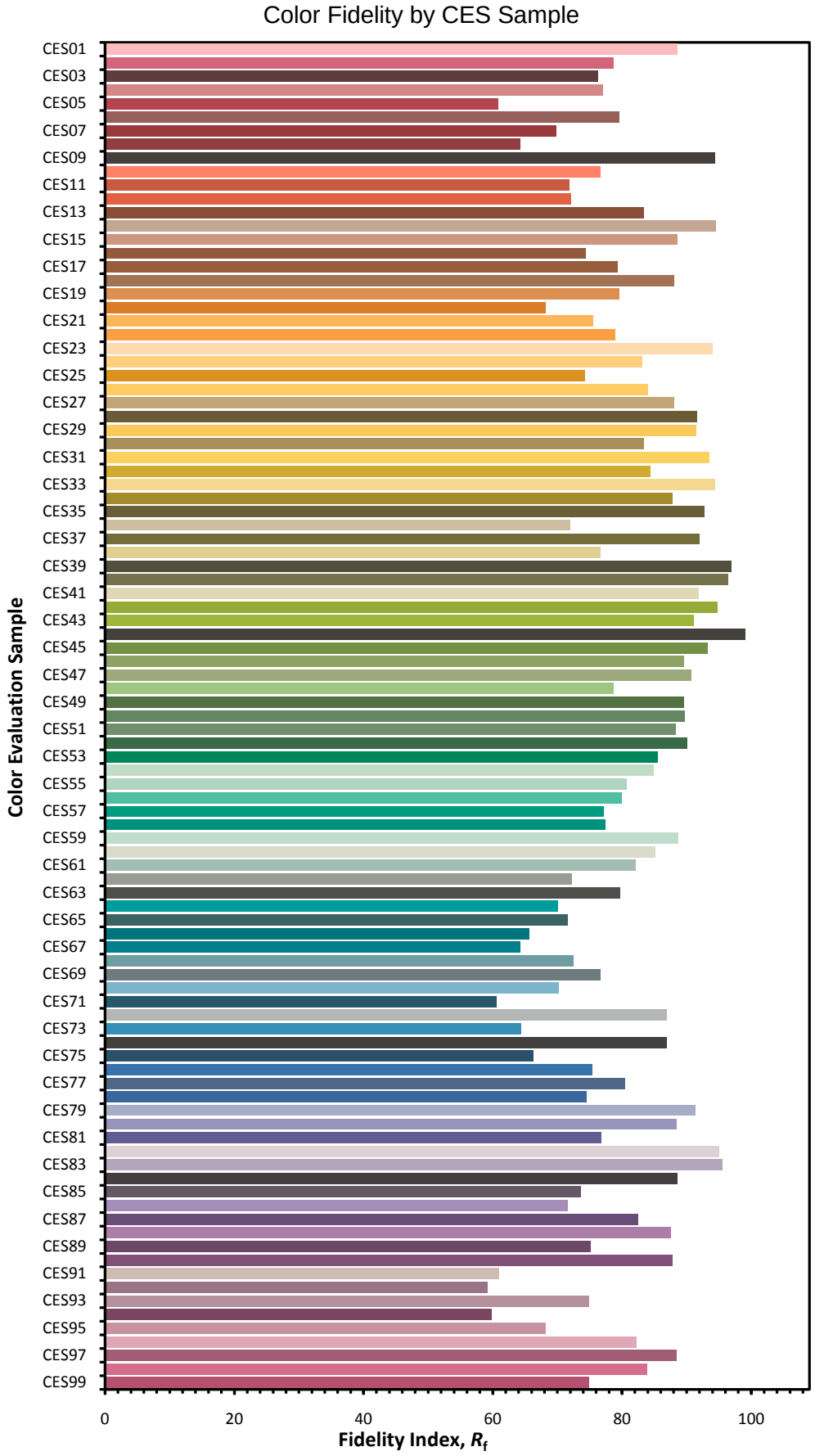


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
CES15
CES17
CES19
CES21
CES23
CES25
CES27
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CES31
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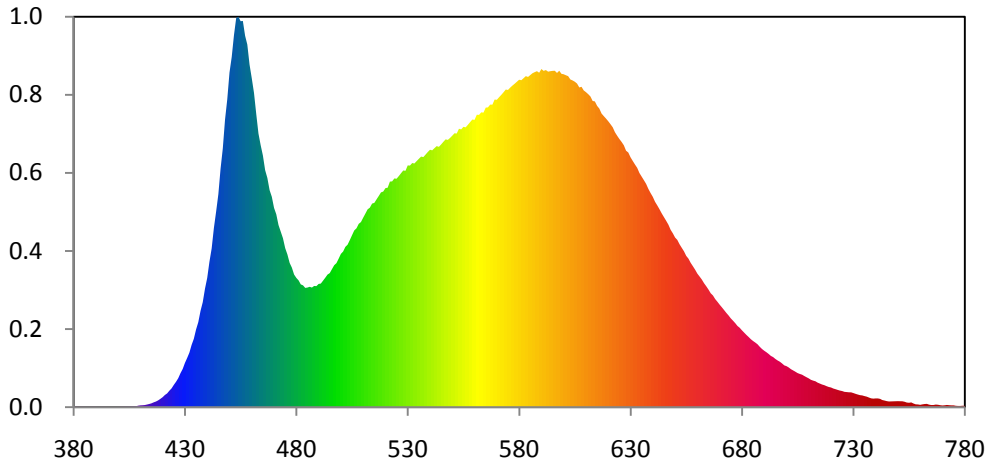
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

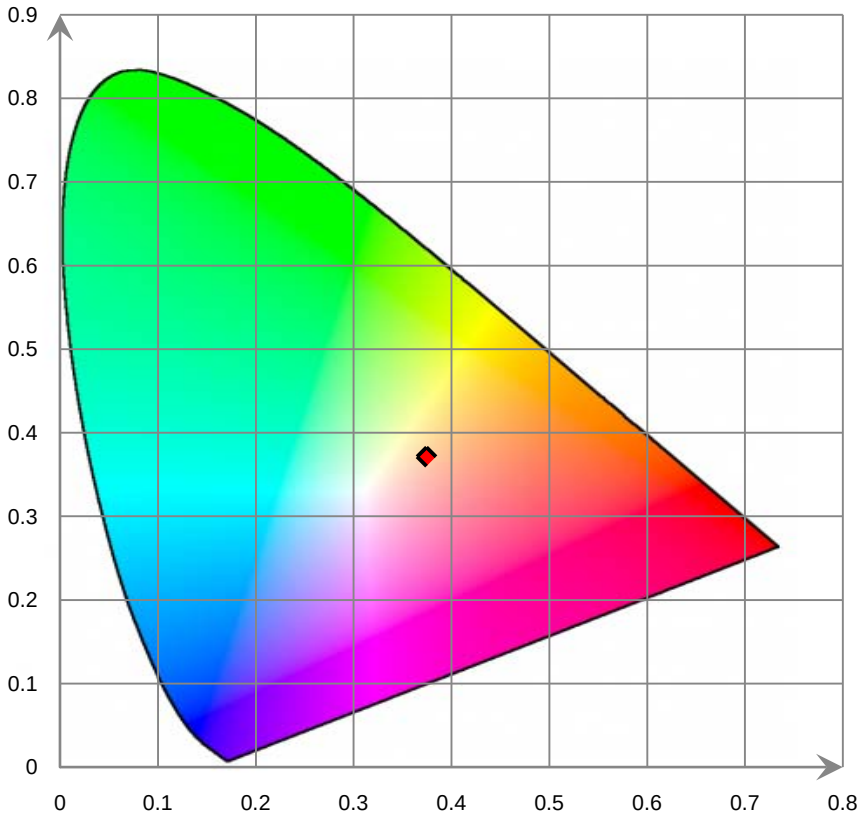
Relative Spectral Power Distribution



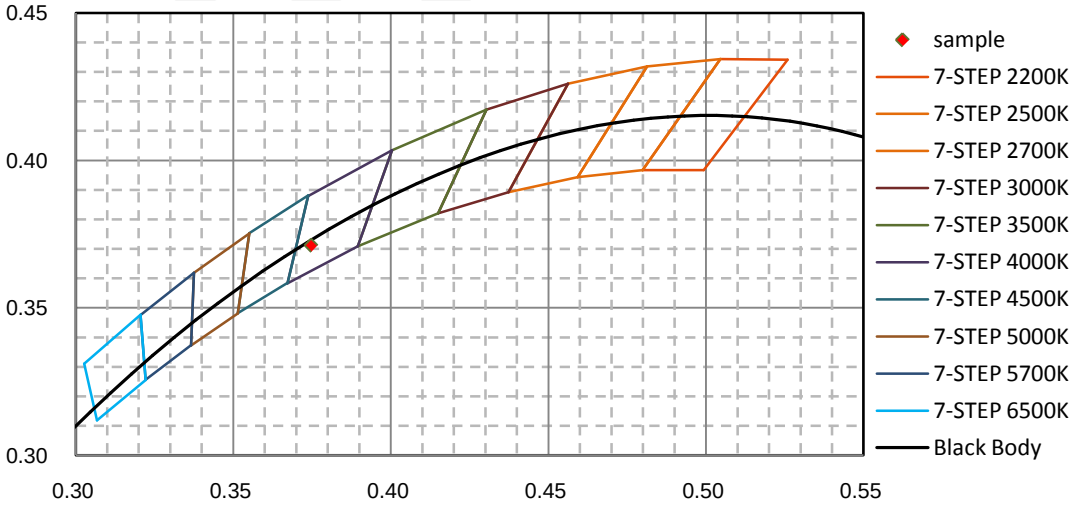
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.260E-02	421	7.097E-01	462	1.709E+01	503	9.468E+00	544	1.517E+01
381	2.730E-02	422	7.998E-01	463	1.595E+01	504	9.736E+00	545	1.531E+01
382	2.270E-02	423	9.580E-01	464	1.526E+01	505	1.002E+01	546	1.546E+01
383	2.190E-02	424	1.095E+00	465	1.466E+01	506	1.030E+01	547	1.560E+01
384	2.290E-02	425	1.298E+00	466	1.381E+01	507	1.042E+01	548	1.558E+01
385	1.720E-02	426	1.479E+00	467	1.336E+01	508	1.068E+01	549	1.569E+01
386	1.690E-02	427	1.687E+00	468	1.265E+01	509	1.079E+01	550	1.582E+01
387	1.740E-02	428	1.979E+00	469	1.226E+01	510	1.104E+01	551	1.596E+01
388	1.540E-02	429	2.227E+00	470	1.161E+01	511	1.128E+01	552	1.595E+01
389	2.170E-02	430	2.577E+00	471	1.124E+01	512	1.153E+01	553	1.622E+01
390	1.980E-02	431	2.868E+00	472	1.061E+01	513	1.163E+01	554	1.619E+01
391	1.280E-02	432	3.179E+00	473	1.023E+01	514	1.186E+01	555	1.634E+01
392	1.450E-02	433	3.629E+00	474	9.844E+00	515	1.190E+01	556	1.631E+01
393	1.750E-02	434	3.987E+00	475	9.269E+00	516	1.211E+01	557	1.645E+01
394	1.840E-02	435	4.528E+00	476	8.896E+00	517	1.231E+01	558	1.661E+01
395	1.690E-02	436	4.956E+00	477	8.406E+00	518	1.252E+01	559	1.676E+01
396	1.200E-02	437	5.611E+00	478	8.131E+00	519	1.256E+01	560	1.674E+01
397	9.100E-03	438	6.119E+00	479	7.728E+00	520	1.276E+01	561	1.704E+01
398	7.100E-03	439	6.901E+00	480	7.533E+00	521	1.279E+01	562	1.703E+01
399	4.800E-03	440	7.531E+00	481	7.390E+00	522	1.314E+01	563	1.718E+01
400	1.530E-02	441	8.474E+00	482	7.155E+00	523	1.316E+01	564	1.716E+01
401	2.070E-02	442	9.249E+00	483	7.100E+00	524	1.333E+01	565	1.746E+01
402	2.150E-02	443	1.044E+01	484	6.952E+00	525	1.331E+01	566	1.747E+01
403	2.780E-02	444	1.139E+01	485	6.972E+00	526	1.347E+01	567	1.763E+01
404	2.970E-02	445	1.241E+01	486	7.015E+00	527	1.363E+01	568	1.763E+01
405	3.230E-02	446	1.390E+01	487	6.972E+00	528	1.379E+01	569	1.793E+01
406	3.900E-02	447	1.508E+01	488	7.064E+00	529	1.377E+01	570	1.791E+01
407	4.380E-02	448	1.676E+01	489	7.054E+00	530	1.409E+01	571	1.806E+01
408	5.040E-02	449	1.794E+01	490	7.182E+00	531	1.408E+01	572	1.820E+01
409	8.770E-02	450	1.950E+01	491	7.204E+00	532	1.422E+01	573	1.835E+01
410	1.076E-01	451	2.041E+01	492	7.374E+00	533	1.420E+01	574	1.851E+01
411	1.141E-01	452	2.167E+01	493	7.545E+00	534	1.434E+01	575	1.849E+01
412	1.243E-01	453	2.267E+01	494	7.727E+00	535	1.447E+01	576	1.862E+01
413	1.540E-01	454	2.275E+01	495	7.812E+00	536	1.460E+01	577	1.874E+01
414	1.871E-01	455	2.249E+01	496	8.044E+00	537	1.457E+01	578	1.885E+01
415	2.256E-01	456	2.251E+01	497	8.273E+00	538	1.472E+01	579	1.896E+01
416	2.815E-01	457	2.165E+01	498	8.393E+00	539	1.487E+01	580	1.908E+01
417	3.301E-01	458	2.113E+01	499	8.654E+00	540	1.500E+01	581	1.905E+01
418	3.972E-01	459	1.997E+01	500	8.933E+00	541	1.497E+01	582	1.917E+01
419	4.864E-01	460	1.917E+01	501	9.068E+00	542	1.509E+01	583	1.929E+01
420	5.822E-01	461	1.831E+01	502	9.339E+00	543	1.521E+01	584	1.924E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.935E+01	626	1.546E+01	667	6.510E+00	708	1.816E+00	749	3.456E-01
586	1.946E+01	627	1.526E+01	668	6.301E+00	709	1.745E+00	750	3.503E-01
587	1.952E+01	628	1.494E+01	669	6.144E+00	710	1.676E+00	751	3.459E-01
588	1.958E+01	629	1.484E+01	670	5.974E+00	711	1.592E+00	752	3.428E-01
589	1.949E+01	630	1.456E+01	671	5.819E+00	712	1.548E+00	753	3.163E-01
590	1.970E+01	631	1.435E+01	672	5.658E+00	713	1.509E+00	754	2.713E-01
591	1.960E+01	632	1.414E+01	673	5.495E+00	714	1.430E+00	755	2.579E-01
592	1.964E+01	633	1.394E+01	674	5.344E+00	715	1.373E+00	756	2.785E-01
593	1.955E+01	634	1.365E+01	675	5.176E+00	716	1.321E+00	757	2.130E-01
594	1.958E+01	635	1.344E+01	676	5.041E+00	717	1.282E+00	758	1.655E-01
595	1.960E+01	636	1.323E+01	677	4.896E+00	718	1.223E+00	759	1.603E-01
596	1.960E+01	637	1.301E+01	678	4.733E+00	719	1.176E+00	760	1.371E-01
597	1.948E+01	638	1.272E+01	679	4.629E+00	720	1.146E+00	761	1.640E-01
598	1.960E+01	639	1.248E+01	680	4.479E+00	721	1.087E+00	762	1.834E-01
599	1.942E+01	640	1.226E+01	681	4.346E+00	722	1.048E+00	763	1.930E-01
600	1.940E+01	641	1.197E+01	682	4.211E+00	723	1.006E+00	764	1.486E-01
601	1.934E+01	642	1.176E+01	683	4.091E+00	724	9.659E-01	765	1.262E-01
602	1.929E+01	643	1.153E+01	684	3.962E+00	725	9.397E-01	766	1.270E-01
603	1.910E+01	644	1.129E+01	685	3.858E+00	726	8.943E-01	767	1.532E-01
604	1.904E+01	645	1.108E+01	686	3.766E+00	727	8.804E-01	768	1.412E-01
605	1.896E+01	646	1.086E+01	687	3.664E+00	728	8.663E-01	769	1.162E-01
606	1.886E+01	647	1.064E+01	688	3.520E+00	729	8.638E-01	770	1.003E-01
607	1.863E+01	648	1.034E+01	689	3.392E+00	730	8.237E-01	771	1.122E-01
608	1.867E+01	649	1.013E+01	690	3.289E+00	731	7.785E-01	772	1.306E-01
609	1.846E+01	650	9.885E+00	691	3.202E+00	732	7.361E-01	773	1.157E-01
610	1.836E+01	651	9.748E+00	692	3.101E+00	733	7.007E-01	774	1.065E-01
611	1.824E+01	652	9.495E+00	693	2.988E+00	734	6.847E-01	775	1.072E-01
612	1.811E+01	653	9.286E+00	694	2.920E+00	735	6.453E-01	776	8.160E-02
613	1.784E+01	654	9.081E+00	695	2.813E+00	736	6.135E-01	777	7.230E-02
614	1.782E+01	655	8.817E+00	696	2.723E+00	737	5.619E-01	778	7.300E-02
615	1.756E+01	656	8.656E+00	697	2.652E+00	738	5.141E-01	779	8.360E-02
616	1.740E+01	657	8.413E+00	698	2.550E+00	739	4.993E-01	780	8.220E-02
617	1.711E+01	658	8.214E+00	699	2.438E+00	740	5.095E-01		
618	1.696E+01	659	8.012E+00	700	2.391E+00	741	5.097E-01		
619	1.682E+01	660	7.781E+00	701	2.314E+00	742	4.841E-01		
620	1.666E+01	661	7.613E+00	702	2.214E+00	743	4.173E-01		
621	1.649E+01	662	7.438E+00	703	2.141E+00	744	3.869E-01		
622	1.631E+01	663	7.223E+00	704	2.066E+00	745	3.531E-01		
623	1.603E+01	664	7.044E+00	705	1.987E+00	746	3.324E-01		
624	1.582E+01	665	6.850E+00	706	1.937E+00	747	3.365E-01		
625	1.563E+01	666	6.637E+00	707	1.893E+00	748	3.423E-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**

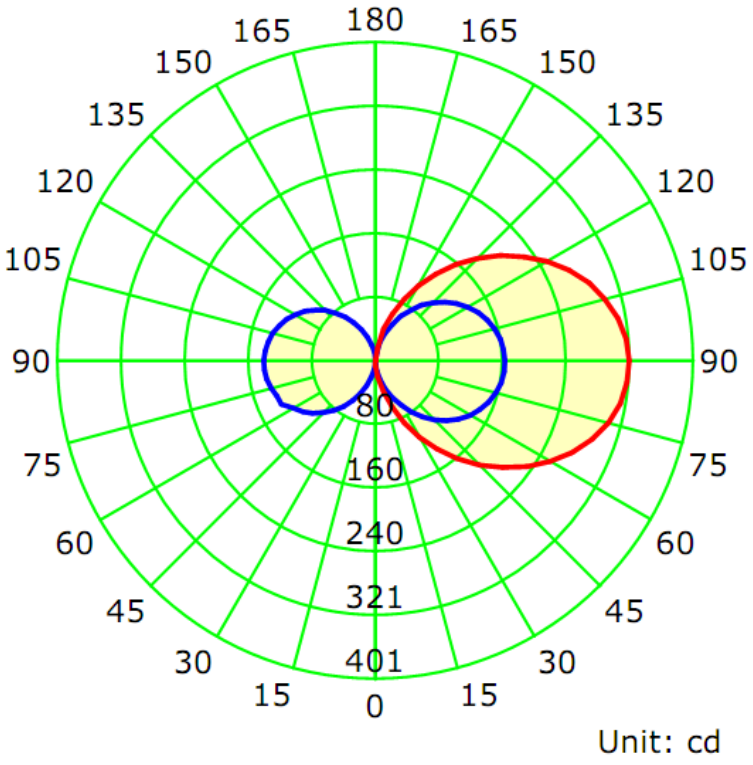
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0820	9.48	0.9634

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1141.3	120.39	321.3	28.13	28.51

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	282.4	179.6	179.5	179.5	205.3
Field Angle (10% I_{max}):	335.2	177.5	179.7	179.5	218.0

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	0	0	0	0	0	0	0	0
5.0°	5	5	5	7	7	6	4	3
10.0°	14	12	16	20	21	19	12	8
15.0°	25	23	31	39	41	37	24	14
20.0°	38	36	48	60	63	58	37	22
25.0°	52	51	66	82	87	79	52	31
30.0°	66	65	84	105	111	101	66	40
35.0°	80	80	103	129	136	124	81	49
40.0°	93	94	121	152	161	146	96	58
45.0°	106	108	140	175	186	168	110	67
50.0°	118	122	157	198	210	189	123	75
55.0°	129	134	174	220	234	210	136	83
60.0°	138	146	190	239	255	228	148	90
65.0°	146	156	203	258	275	246	159	96
70.0°	153	165	215	273	291	260	168	102
75.0°	158	172	224	285	305	271	175	106
80.0°	162	176	231	294	314	279	180	109
85.0°	164	179	234	299	319	284	183	111
90.0°	164	180	236	300	321	285	184	111
95.0°	163	179	233	298	318	283	182	110
100.0°	160	175	229	291	312	277	179	108
105.0°	156	170	221	282	301	268	173	105
110.0°	151	163	212	269	288	256	166	101
115.0°	144	154	200	254	270	241	156	95
120.0°	136	144	186	236	251	224	146	89
125.0°	127	132	171	216	229	206	134	82
130.0°	116	120	155	194	207	186	121	74
135.0°	104	107	138	172	183	165	108	66
140.0°	92	93	120	150	159	144	94	57
145.0°	78	79	101	127	134	121	80	49
150.0°	65	65	83	104	110	100	65	40
155.0°	51	51	66	81	86	78	51	31
160.0°	37	37	48	60	64	58	37	22
165.0°	24	23	23	34	42	38	24	14
170.0°	11	5	13	13	17	14	8	7
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°	0	0	0	0	0	0	0	0
5.0°	5	1	1	0	0	0	1	1
10.0°	13	3	1	0	0	1	1	3
15.0°	23	6	2	1	0	1	2	5
20.0°	35	9	3	1	0	1	3	7
25.0°	47	12	4	1	0	2	4	10
30.0°	59	15	5	1	0	2	6	12
35.0°	71	19	6	1	0	2	7	15
40.0°	83	22	7	2	1	3	8	17
45.0°	94	24	8	2	1	3	9	19
50.0°	104	27	9	2	1	4	10	21
55.0°	113	29	10	2	1	4	11	23
60.0°	121	31	11	3	1	5	12	24
65.0°	132	32	12	3	1	5	12	26
70.0°	133	34	12	3	1	5	13	26
75.0°	137	35	13	3	1	5	13	27
80.0°	140	35	13	3	1	6	13	27
85.0°	141	36	13	3	1	6	14	28
90.0°	141	36	13	3	1	6	14	28
95.0°	140	35	13	3	1	6	13	27
100.0°	138	35	13	3	1	5	13	27
105.0°	135	34	12	3	1	5	13	26
110.0°	130	33	12	3	1	5	12	25
115.0°	124	32	11	3	1	5	12	24
120.0°	117	30	10	3	1	4	11	23
125.0°	109	28	10	2	1	4	10	21
130.0°	100	26	9	2	0	3	9	20
135.0°	90	23	8	2	0	3	8	18
140.0°	79	20	7	2	0	2	7	16
145.0°	68	18	6	1	0	2	6	13
150.0°	56	15	5	1	0	2	5	11
155.0°	44	11	4	1	0	1	4	9
160.0°	32	8	3	1	0	1	3	6
165.0°	21	5	2	0	0	1	2	4
170.0°	11	2	1	0	0	0	1	2
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

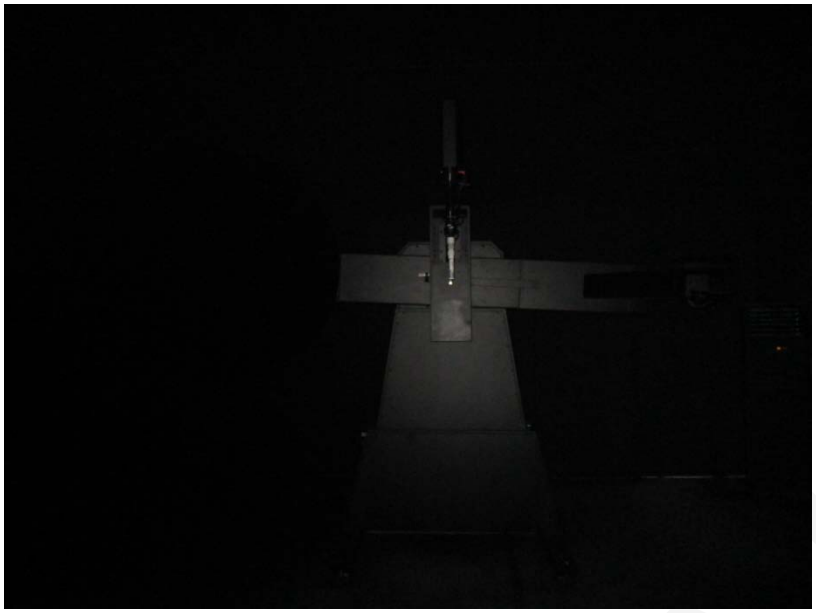
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	0.0	0.00
5-10	0.4	0.04
10-15	1.5	0.14
15-20	3.6	0.31
20-25	6.6	0.57
25-30	10.4	0.91
30-35	15.1	1.32
35-40	20.5	1.80
40-45	26.4	2.32
45-50	32.7	2.87
50-55	39.2	3.43
55-60	45.5	3.99
60-65	51.7	4.53
65-70	57.2	5.01
70-75	61.8	5.41
75-80	65.4	5.73
80-85	67.8	5.94
85-90	69.0	6.05
90-95	68.9	6.04
95-100	67.4	5.91
100-105	64.7	5.67
105-110	60.9	5.34
110-115	56.2	4.92
115-120	50.7	4.44
120-125	44.6	3.91
125-130	38.4	3.36
130-135	32.0	2.81
135-140	25.9	2.27
140-145	20.1	1.76
145-150	14.8	1.30
150-155	10.2	0.90
155-160	6.5	0.57
160-165	3.5	0.30
165-170	1.3	0.12
170-175	0.2	0.02
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	0.0	0.00
0-10	0.5	0.04
0-15	2.0	0.18
0-20	5.6	0.49
0-25	12.2	1.06
0-30	22.6	1.98
0-35	37.7	3.30
0-40	58.2	5.10
0-45	84.6	7.41
0-50	117.3	10.28
0-55	156.5	13.71
0-60	202.1	17.70
0-65	253.7	22.23
0-70	310.9	27.24
0-75	372.7	32.66
0-80	438.1	38.39
0-85	505.9	44.33
0-90	575.0	50.38
0-95	643.9	56.42
0-100	711.3	62.33
0-105	776.0	68.00
0-110	836.9	73.33
0-115	893.1	78.26
0-120	943.8	82.70
0-125	988.4	86.61
0-130	1026.8	89.97
0-135	1058.8	92.78
0-140	1084.7	95.04
0-145	1104.7	96.80
0-150	1119.5	98.10
0-155	1129.8	98.99
0-160	1136.2	99.56
0-165	1139.7	99.86
0-170	1141.0	99.98
0-175	1141.3	100.00
0-180	1141.3	100.00

6. Product Photo

7. Product Test orientation in the Goniophotometer



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