

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/840/BYP/GU24/R
Multiple Model: 6PLH/840/BYP/R;
6PLH/840/BYP/E26/R;
6PLH/840/BYP/GU24/R

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RKS170301002-10
Test Date:	2017-03-06 to 2017-03-08
Report Date:	2017-03-09
Reviewed By:	Blake Zhang <i>Blake Zhang</i>
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.

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

1. Product Description

General Information:

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

Model Tested: 6PLH/840/BYP/GU24/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: 4000K
Nominal Lumen Output: 560 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/840/BYP/GU24/R	6PLH/840/BYP/R; 6PLH/840/BYP/E26/R; 6PLH/840/BYP/GU24/R	Lamp base	The lamp base of 6PLH/840/BYP/R is G24D; The lamp base of 6PLH/840/BYP/E26/R is E26; The lamp base of 6PLH/840/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.

Additional Test

The Additional Test item may not be covered by IESNA LM-79-2008. Additional test including power factor, off-state power and THD, was measured by Digital Power Meter after stabilized at $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$. Test voltage for THD and power factor test would be equal to rated voltage or, in case of a voltage range, maximum value of that range.

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.

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: **0.5hour**

Test orientation: **Baseup**

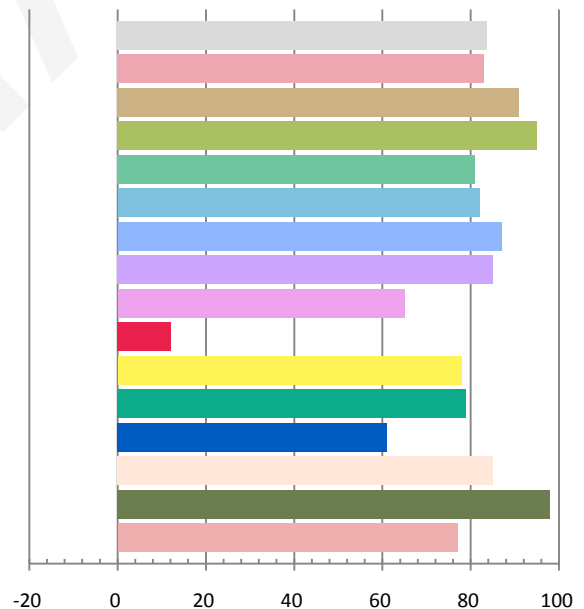
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0504	5.9	0.9754	649.4	110.03

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.985	4129	-0.00103	0.3743	0.3707	0.2235	0.4980

Color Rendering Index

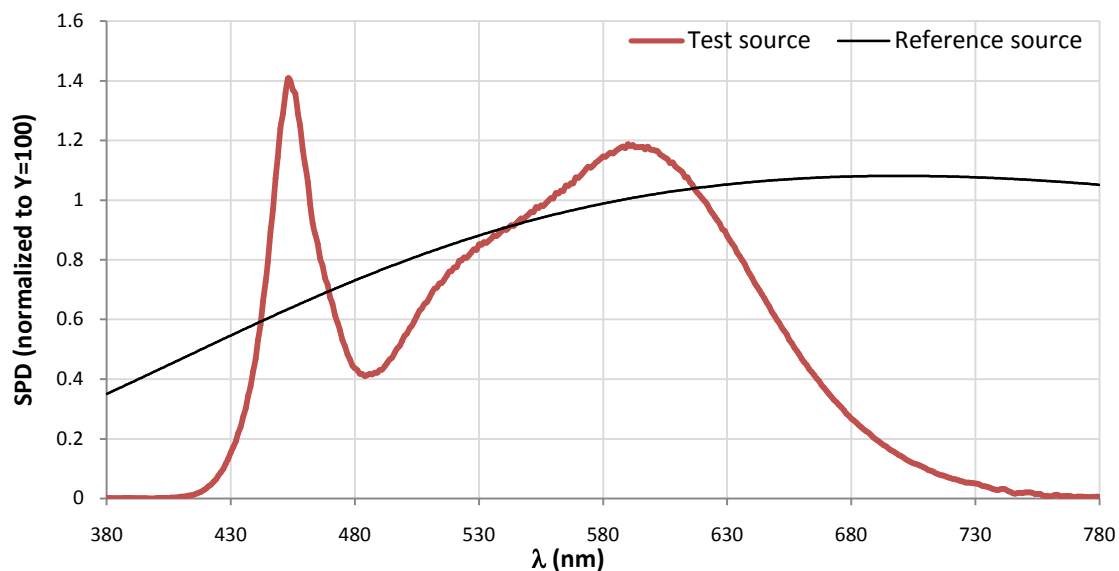
Ra			
83.8			
R1	R2	R3	R4
83	91	95	81
R5	R6	R7	R8
82	87	85	65
R9	R10	R11	R12
12	78	79	61
R13	R14	R15	
85	98	77	



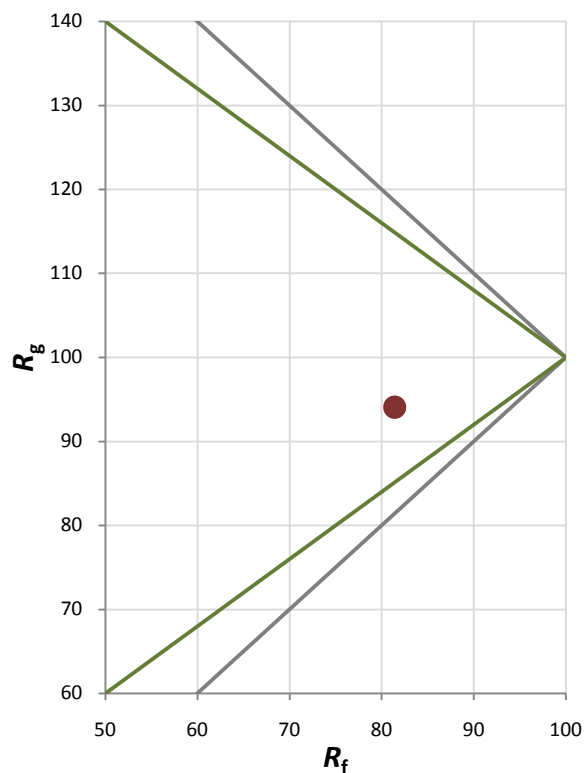
Fidelity Index and Gamut Index

Fidelity Index R_f	81
Gamut Index R_g	94

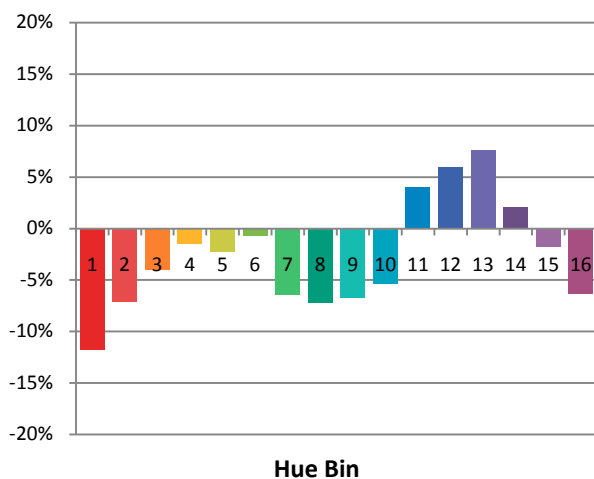
Spectral Power Distribution Comparison



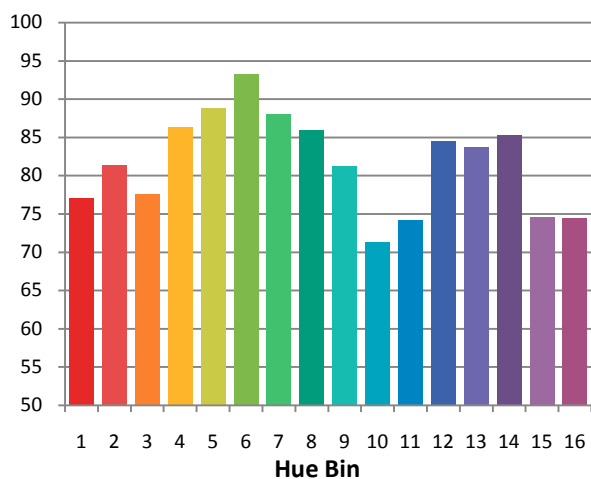
Plot of R_g versus R_f



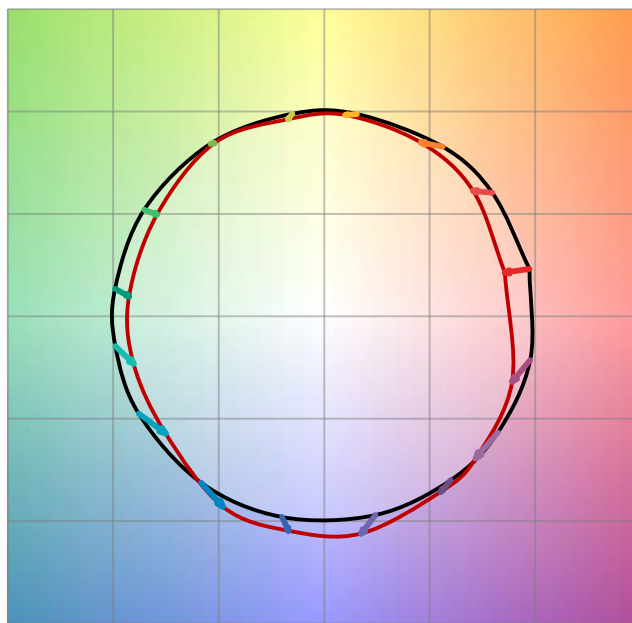
Chroma Shift by Hue



R_t by Hue

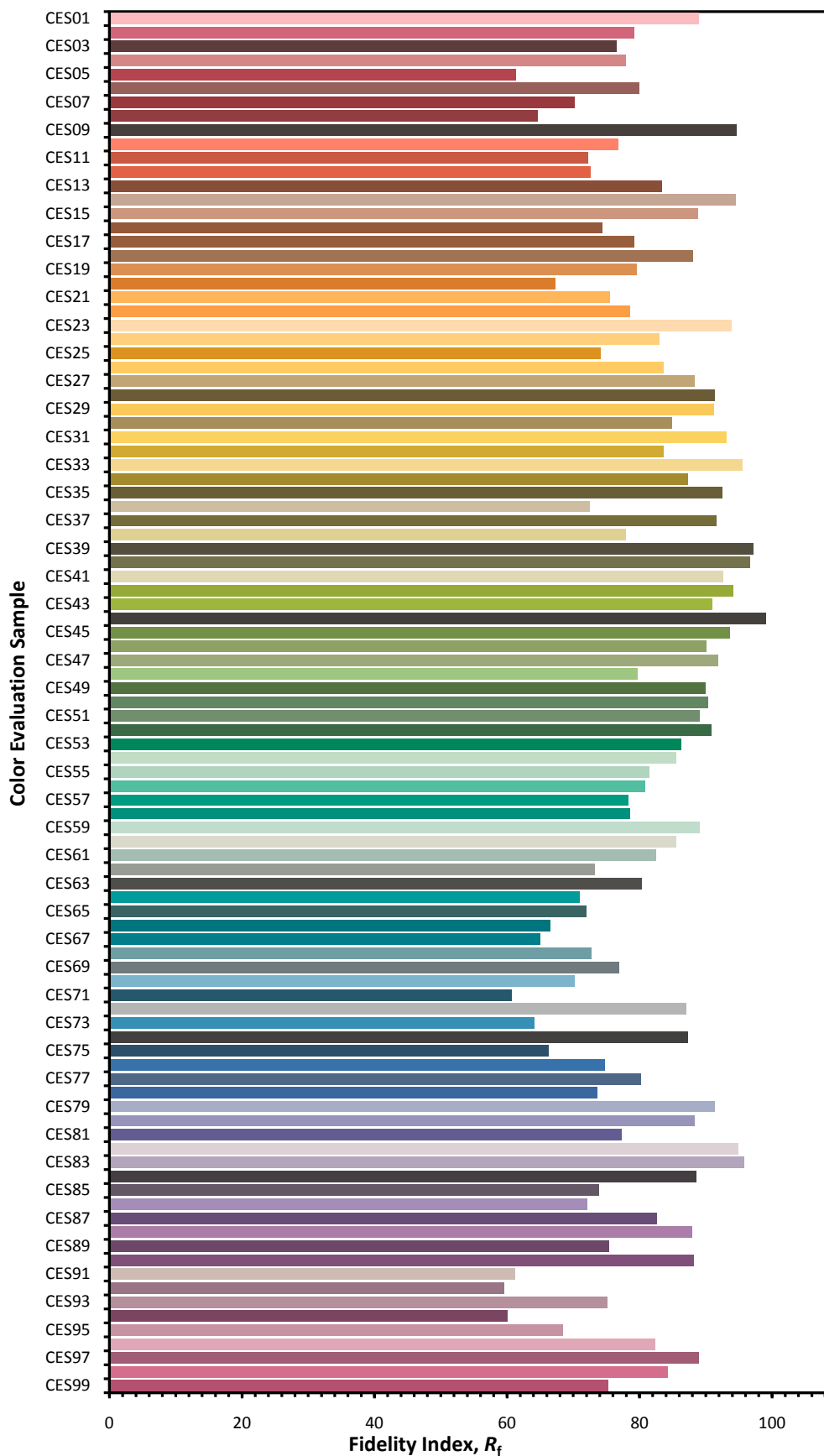


Color Vector Graphic

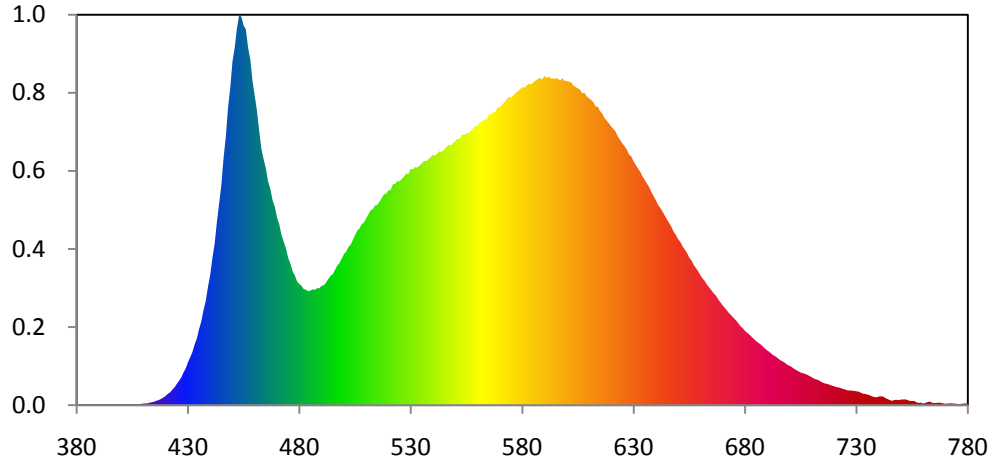


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



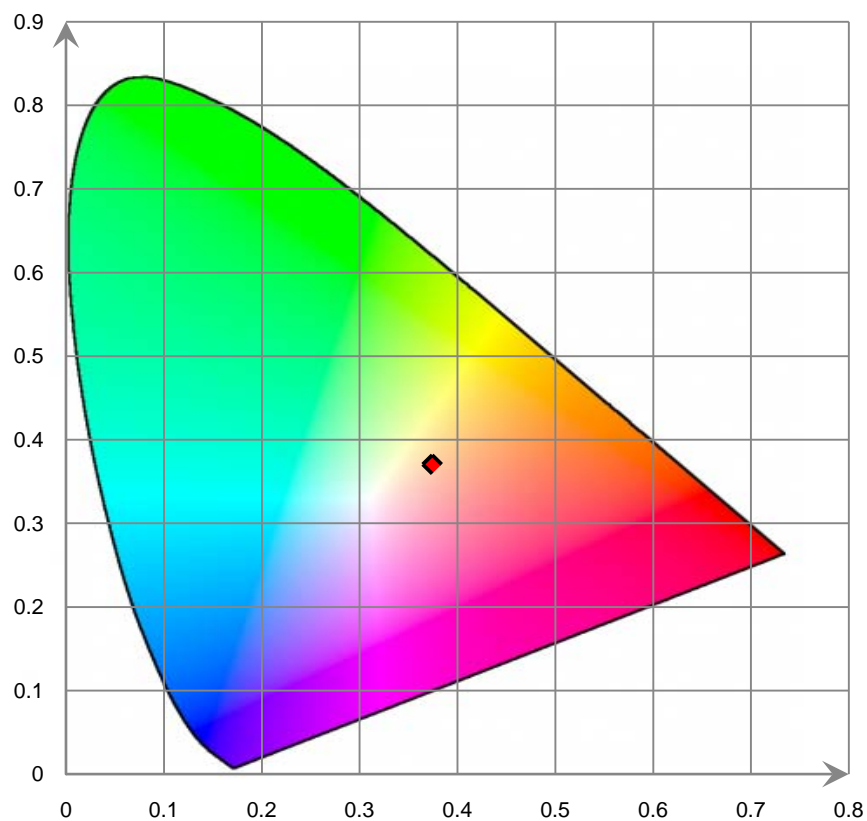
Relative Spectral Power Distribution



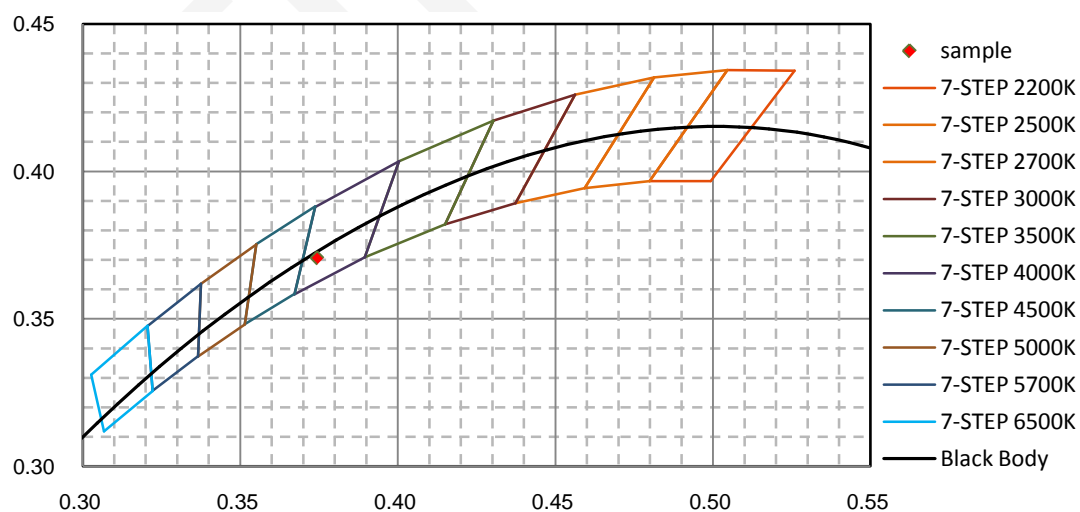
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.120E-02	421	3.903E-01	462	9.393E+00	503	5.500E+00	544	8.683E+00
381	1.850E-02	422	4.385E-01	463	8.771E+00	504	5.658E+00	545	8.763E+00
382	1.360E-02	423	5.326E-01	464	8.422E+00	505	5.822E+00	546	8.847E+00
383	1.370E-02	424	6.126E-01	465	8.108E+00	506	5.987E+00	547	8.922E+00
384	1.270E-02	425	7.279E-01	466	7.654E+00	507	6.056E+00	548	8.908E+00
385	6.700E-03	426	8.327E-01	467	7.411E+00	508	6.201E+00	549	8.981E+00
386	1.010E-02	427	9.496E-01	468	7.017E+00	509	6.262E+00	550	9.056E+00
387	1.510E-02	428	1.118E+00	469	6.802E+00	510	6.401E+00	551	9.137E+00
388	1.950E-02	429	1.259E+00	470	6.421E+00	511	6.541E+00	552	9.122E+00
389	2.120E-02	430	1.464E+00	471	6.196E+00	512	6.681E+00	553	9.280E+00
390	1.670E-02	431	1.636E+00	472	5.831E+00	513	6.719E+00	554	9.257E+00
391	8.700E-03	432	1.820E+00	473	5.601E+00	514	6.848E+00	555	9.336E+00
392	5.300E-03	433	2.077E+00	474	5.372E+00	515	6.865E+00	556	9.321E+00
393	7.600E-03	434	2.285E+00	475	5.046E+00	516	6.976E+00	557	9.409E+00
394	1.220E-02	435	2.607E+00	476	4.851E+00	517	7.099E+00	558	9.486E+00
395	1.260E-02	436	2.869E+00	477	4.587E+00	518	7.227E+00	559	9.567E+00
396	7.800E-03	437	3.258E+00	478	4.444E+00	519	7.251E+00	560	9.558E+00
397	4.200E-03	438	3.572E+00	479	4.240E+00	520	7.363E+00	561	9.724E+00
398	2.700E-03	439	4.056E+00	480	4.151E+00	521	7.374E+00	562	9.718E+00
399	1.500E-03	440	4.458E+00	481	4.091E+00	522	7.576E+00	563	9.804E+00
400	1.190E-02	441	5.051E+00	482	3.975E+00	523	7.584E+00	564	9.798E+00
401	1.550E-02	442	5.536E+00	483	3.961E+00	524	7.679E+00	565	9.966E+00
402	1.750E-02	443	6.285E+00	484	3.900E+00	525	7.669E+00	566	9.960E+00
403	1.750E-02	444	6.901E+00	485	3.931E+00	526	7.755E+00	567	1.004E+01
404	1.850E-02	445	7.547E+00	486	3.968E+00	527	7.843E+00	568	1.004E+01
405	2.250E-02	446	8.476E+00	487	3.952E+00	528	7.939E+00	569	1.022E+01
406	2.810E-02	447	9.193E+00	488	4.008E+00	529	7.922E+00	570	1.021E+01
407	3.190E-02	448	1.019E+01	489	4.009E+00	530	8.094E+00	571	1.030E+01
408	2.840E-02	449	1.088E+01	490	4.090E+00	531	8.087E+00	572	1.038E+01
409	4.440E-02	450	1.178E+01	491	4.109E+00	532	8.163E+00	573	1.048E+01
410	5.580E-02	451	1.226E+01	492	4.210E+00	533	8.145E+00	574	1.057E+01
411	5.990E-02	452	1.291E+01	493	4.322E+00	534	8.216E+00	575	1.054E+01
412	6.620E-02	453	1.338E+01	494	4.435E+00	535	8.290E+00	576	1.062E+01
413	8.660E-02	454	1.331E+01	495	4.490E+00	536	8.377E+00	577	1.069E+01
414	1.051E-01	455	1.301E+01	496	4.634E+00	537	8.361E+00	578	1.075E+01
415	1.259E-01	456	1.288E+01	497	4.785E+00	538	8.433E+00	579	1.082E+01
416	1.559E-01	457	1.226E+01	498	4.865E+00	539	8.508E+00	580	1.090E+01
417	1.798E-01	458	1.185E+01	499	5.019E+00	540	8.581E+00	581	1.088E+01
418	2.179E-01	459	1.111E+01	500	5.176E+00	541	8.557E+00	582	1.096E+01
419	2.650E-01	460	1.060E+01	501	5.260E+00	542	8.634E+00	583	1.102E+01
420	3.168E-01	461	1.008E+01	502	5.418E+00	543	8.705E+00	584	1.099E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.106E+01	626	8.869E+00	667	3.753E+00	708	1.038E+00	749	1.739E-01
586	1.112E+01	627	8.761E+00	668	3.623E+00	709	9.992E-01	750	1.898E-01
587	1.117E+01	628	8.585E+00	669	3.526E+00	710	9.581E-01	751	1.968E-01
588	1.121E+01	629	8.524E+00	670	3.420E+00	711	9.102E-01	752	1.967E-01
589	1.116E+01	630	8.364E+00	671	3.332E+00	712	8.839E-01	753	1.780E-01
590	1.128E+01	631	8.237E+00	672	3.236E+00	713	8.598E-01	754	1.466E-01
591	1.122E+01	632	8.111E+00	673	3.143E+00	714	8.082E-01	755	1.396E-01
592	1.125E+01	633	8.003E+00	674	3.068E+00	715	7.711E-01	756	1.477E-01
593	1.119E+01	634	7.843E+00	675	2.982E+00	716	7.399E-01	757	9.830E-02
594	1.119E+01	635	7.723E+00	676	2.904E+00	717	7.294E-01	758	7.760E-02
595	1.120E+01	636	7.596E+00	677	2.812E+00	718	6.994E-01	759	8.690E-02
596	1.120E+01	637	7.475E+00	678	2.704E+00	719	6.702E-01	760	5.610E-02
597	1.113E+01	638	7.306E+00	679	2.638E+00	720	6.505E-01	761	7.620E-02
598	1.121E+01	639	7.162E+00	680	2.551E+00	721	6.176E-01	762	1.080E-01
599	1.112E+01	640	7.030E+00	681	2.484E+00	722	6.085E-01	763	1.225E-01
600	1.111E+01	641	6.868E+00	682	2.418E+00	723	5.851E-01	764	8.390E-02
601	1.108E+01	642	6.761E+00	683	2.345E+00	724	5.579E-01	765	7.320E-02
602	1.106E+01	643	6.637E+00	684	2.271E+00	725	5.361E-01	766	7.710E-02
603	1.095E+01	644	6.499E+00	685	2.201E+00	726	5.057E-01	767	8.530E-02
604	1.090E+01	645	6.369E+00	686	2.137E+00	727	5.047E-01	768	7.950E-02
605	1.086E+01	646	6.237E+00	687	2.086E+00	728	4.968E-01	769	6.190E-02
606	1.081E+01	647	6.112E+00	688	2.014E+00	729	4.931E-01	770	4.500E-02
607	1.069E+01	648	5.944E+00	689	1.941E+00	730	4.764E-01	771	5.720E-02
608	1.071E+01	649	5.834E+00	690	1.878E+00	731	4.648E-01	772	6.160E-02
609	1.058E+01	650	5.692E+00	691	1.825E+00	732	4.299E-01	773	5.900E-02
610	1.052E+01	651	5.594E+00	692	1.759E+00	733	3.941E-01	774	5.370E-02
611	1.046E+01	652	5.448E+00	693	1.698E+00	734	3.860E-01	775	4.680E-02
612	1.038E+01	653	5.333E+00	694	1.656E+00	735	3.659E-01	776	3.780E-02
613	1.023E+01	654	5.217E+00	695	1.593E+00	736	3.401E-01	777	4.530E-02
614	1.023E+01	655	5.061E+00	696	1.537E+00	737	3.046E-01	778	5.270E-02
615	1.008E+01	656	4.956E+00	697	1.497E+00	738	2.798E-01	779	6.270E-02
616	9.989E+00	657	4.811E+00	698	1.448E+00	739	2.692E-01	780	5.230E-02
617	9.837E+00	658	4.699E+00	699	1.384E+00	740	2.958E-01		
618	9.748E+00	659	4.595E+00	700	1.352E+00	741	3.031E-01		
619	9.651E+00	660	4.453E+00	701	1.309E+00	742	2.965E-01		
620	9.549E+00	661	4.344E+00	702	1.248E+00	743	2.461E-01		
621	9.462E+00	662	4.254E+00	703	1.205E+00	744	2.123E-01		
622	9.371E+00	663	4.129E+00	704	1.164E+00	745	1.727E-01		
623	9.201E+00	664	4.032E+00	705	1.119E+00	746	1.505E-01		
624	9.088E+00	665	3.935E+00	706	1.096E+00	747	1.770E-01		
625	8.974E+00	666	3.827E+00	707	1.075E+00	748	1.844E-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**

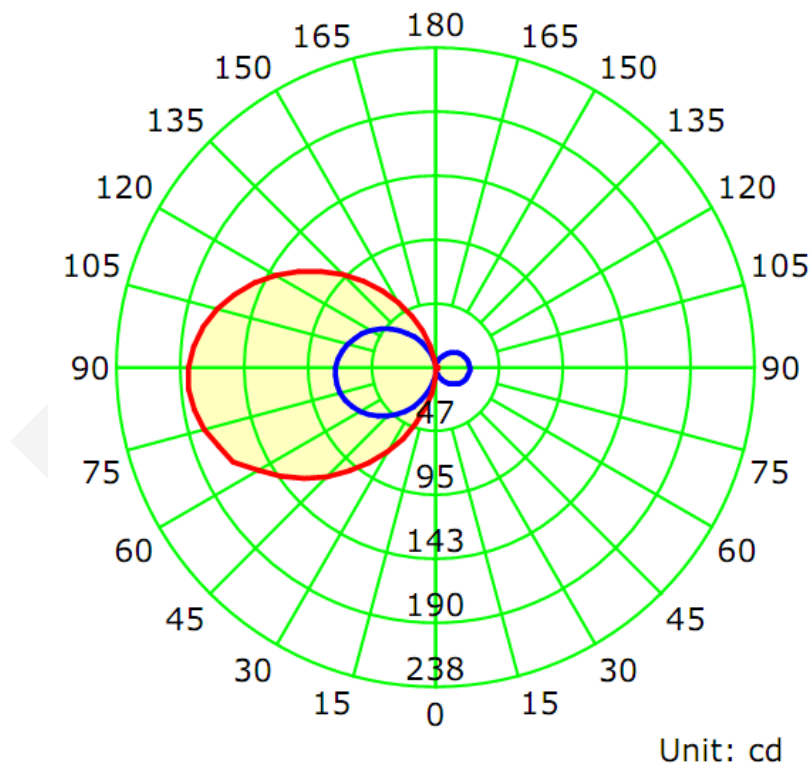
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0500	5.9	0.9780

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
654.9	111.00	190.8	6.26	7.83

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	169.6	172.8	173.9	173.4	172.4
Field Angle (10% I_{max}):	319.4	173.3	174.4	300.6	241.9

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3	3	3	3	3	3	3	3
5.0°	2	1	0	0	1	1	2	4
10.0°	3	1	0	0	1	1	3	6
15.0°	5	2	1	0	1	2	4	9
20.0°	7	3	1	0	1	2	6	12
25.0°	10	4	1	0	1	3	8	15
30.0°	12	5	1	0	1	4	9	18
35.0°	14	6	2	0	1	4	11	21
40.0°	16	7	2	0	1	5	12	23
45.0°	18	8	2	0	1	6	13	26
50.0°	20	8	3	0	1	6	15	28
55.0°	21	9	3	0	2	7	16	30
60.0°	23	10	3	0	2	7	16	32
65.0°	24	10	4	0	2	8	17	33
70.0°	25	11	4	0	2	8	18	34
75.0°	25	11	4	1	2	8	18	35
80.0°	26	11	4	1	2	8	18	35
85.0°	26	11	4	1	2	8	18	35
90.0°	26	11	4	0	2	8	18	35
95.0°	25	11	4	0	2	8	18	34
100.0°	25	11	4	0	2	8	17	34
105.0°	24	11	4	0	2	8	17	33
110.0°	23	10	4	0	2	7	16	31
115.0°	22	10	4	0	1	7	15	30
120.0°	21	9	3	0	1	6	14	28
125.0°	20	9	3	0	1	6	13	26
130.0°	18	8	3	0	1	5	12	23
135.0°	16	7	2	0	1	4	11	21
140.0°	14	6	2	0	1	4	9	18
145.0°	12	5	2	0	1	3	8	15
150.0°	10	4	1	0	1	2	6	12
155.0°	8	3	1	0	0	2	5	9
160.0°	6	2	1	0	0	1	3	7
165.0°	4	2	0	0	0	1	2	4
170.0°	2	0	0	0	0	0	0	2
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.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	3	3	3	3	3	3	3	3
5.0°	6	7	9	9	9	8	6	4
10.0°	10	15	19	20	19	17	12	7
15.0°	16	23	30	32	32	27	19	11
20.0°	22	33	42	46	45	39	27	15
25.0°	28	42	55	60	59	51	36	20
30.0°	34	52	69	75	73	63	44	24
35.0°	40	62	82	90	87	75	53	29
40.0°	46	72	95	104	101	87	61	33
45.0°	52	81	107	119	116	98	69	37
50.0°	57	90	120	133	129	110	76	41
55.0°	62	98	131	146	142	120	83	44
60.0°	66	105	142	158	153	130	89	47
65.0°	69	112	151	169	167	138	96	49
70.0°	72	117	159	177	173	145	99	51
75.0°	74	121	165	184	179	150	103	53
80.0°	76	124	168	189	184	154	105	54
85.0°	76	125	170	191	186	155	106	54
90.0°	75	124	169	190	185	155	106	54
95.0°	74	122	166	187	182	152	104	53
100.0°	71	118	161	181	177	148	101	52
105.0°	68	113	155	174	169	142	97	50
110.0°	65	107	146	165	161	135	93	48
115.0°	61	100	137	154	150	127	87	45
120.0°	56	92	126	142	138	117	80	42
125.0°	51	84	114	128	126	107	74	39
130.0°	45	75	102	114	112	96	66	35
135.0°	40	65	89	100	98	84	58	31
140.0°	34	56	76	85	84	72	50	27
145.0°	28	46	63	71	70	60	42	23
150.0°	22	36	50	57	56	48	34	19
155.0°	16	27	38	43	43	37	26	14
160.0°	11	18	26	30	30	26	18	10
165.0°	7	10	15	18	18	15	11	7
170.0°	3	1	5	5	7	6	5	3
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)	%	Deg	Flux (lm)	%
0-5	0.1	0.01	0-5	0.1	0.01
5-10	0.5	0.07	0-10	0.5	0.08
10-15	1.3	0.20	0-15	1.8	0.28
15-20	2.6	0.40	0-20	4.5	0.68
20-25	4.5	0.69	0-25	9.0	1.37
25-30	6.9	1.06	0-30	15.9	2.43
30-35	9.7	1.49	0-35	25.6	3.91
35-40	12.9	1.97	0-40	38.6	5.89
40-45	16.4	2.50	0-45	55.0	8.39
45-50	20.0	3.06	0-50	75.0	11.45
50-55	23.8	3.63	0-55	98.8	15.08
55-60	27.4	4.18	0-60	126.1	19.26
60-65	30.9	4.71	0-65	157.0	23.97
65-70	33.9	5.18	0-70	190.9	29.15
70-75	36.4	5.55	0-75	227.3	34.71
75-80	38.3	5.85	0-80	265.6	40.55
80-85	39.5	6.03	0-85	305.0	46.58
85-90	39.9	6.09	0-90	344.9	52.66
90-95	39.4	6.02	0-95	384.3	58.69
95-100	38.3	5.84	0-100	422.6	64.53
100-105	36.4	5.56	0-105	459.0	70.08
105-110	34.0	5.19	0-110	492.9	75.27
110-115	31.0	4.74	0-115	524.0	80.01
115-120	27.7	4.24	0-120	551.7	84.24
120-125	24.2	3.69	0-125	575.9	87.94
125-130	20.6	3.14	0-130	596.5	91.08
130-135	17.0	2.59	0-135	613.4	93.67
135-140	13.5	2.06	0-140	626.9	95.73
140-145	10.3	1.57	0-145	637.2	97.30
145-150	7.5	1.14	0-150	644.7	98.44
150-155	5.0	0.76	0-155	649.7	99.20
155-160	3.0	0.46	0-160	652.7	99.66
160-165	1.5	0.24	0-165	654.2	99.90
165-170	0.6	0.09	0-170	654.8	99.99
170-175	0.1	0.01	0-175	654.9	100.00
175-180	0.0	0.00	0-180	654.9	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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