

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 6.5PLV/835/BYP

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RKS170301010-10
Test Date:	2017-03-07 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.

1. Product Description

General Information:

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

Model Tested: 6.5PLV/835/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: 6.5W
Nominal CCT: 3500K
Nominal Lumen Output: 600 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	15/30/60/150/300/600 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

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 $U=2.3\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=23\text{K}$ ($K=2$), 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_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**

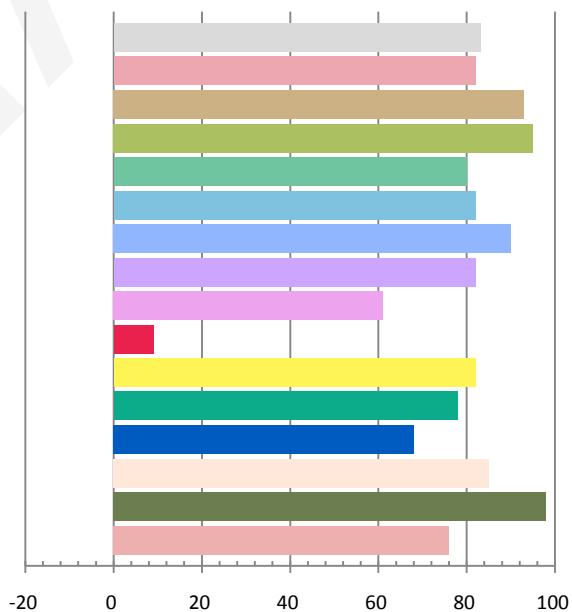
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0551	6.49	0.9809	626.4	96.55

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.898	3500	-0.00095	0.4044	0.3881	0.2362	0.5100

Color Rendering Index

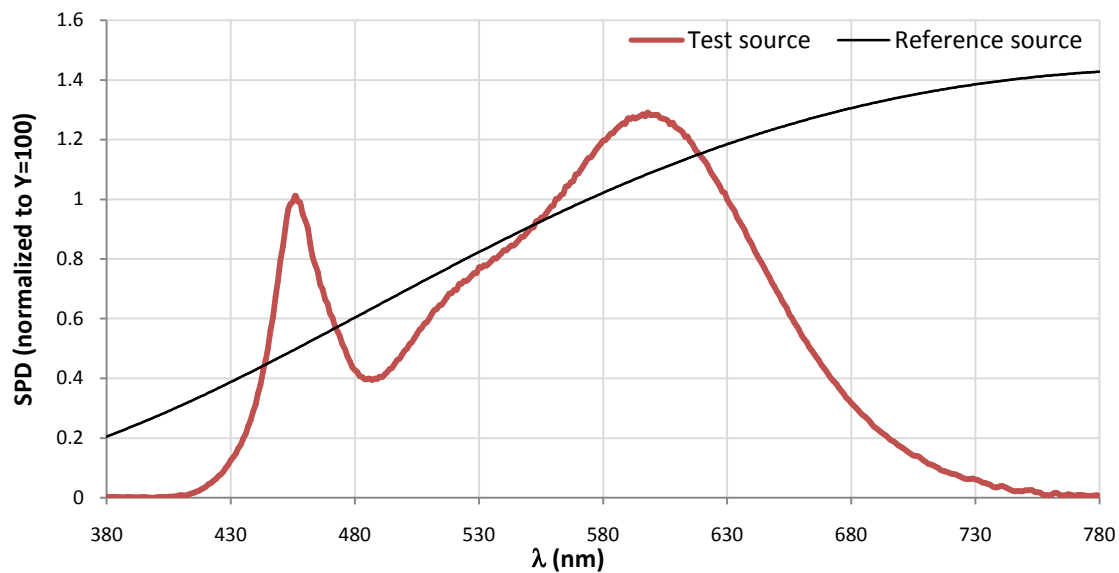
Ra			
83.1			
R1	R2	R3	R4
82	93	95	80
R5	R6	R7	R8
82	90	82	61
R9	R10	R11	R12
9	82	78	68
R13	R14	R15	
85	98	76	



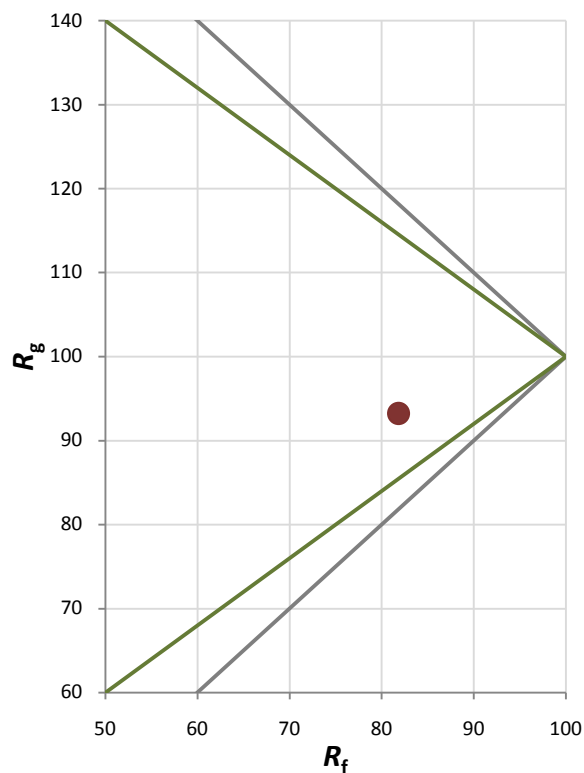
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	93

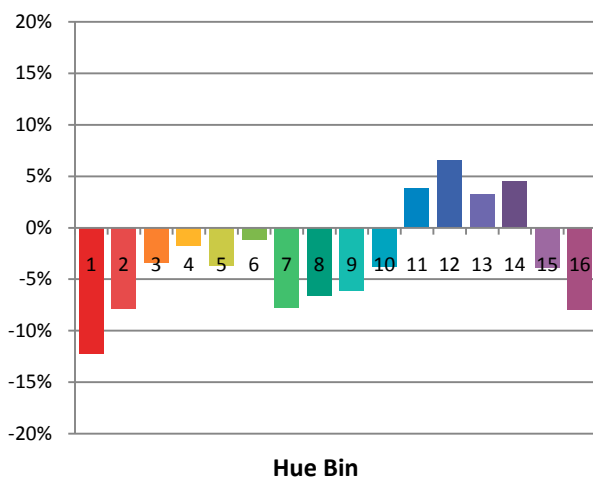
Spectral Power Distribution Comparison



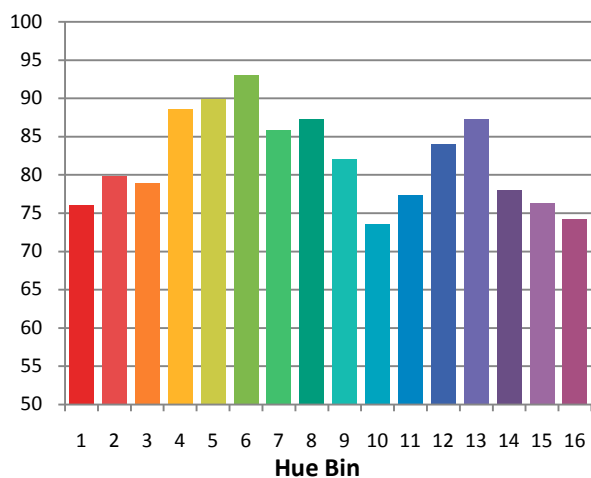
Plot of R_g versus R_f



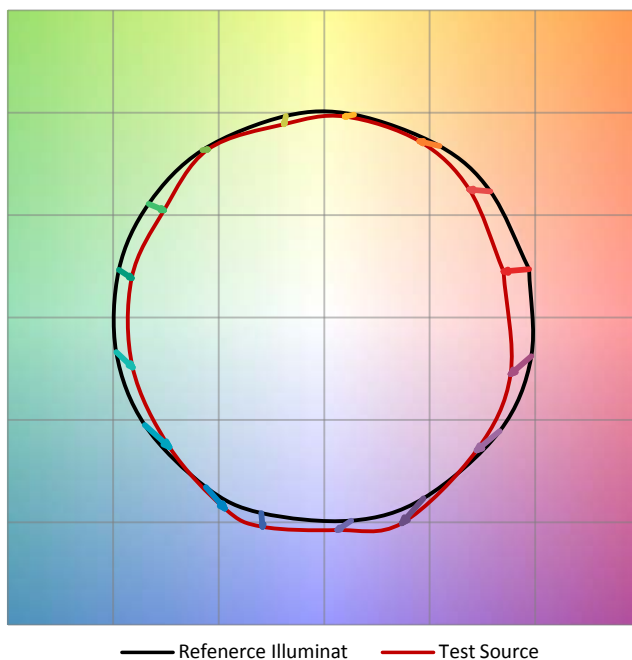
Chroma Shift by Hue



R_f by Hue

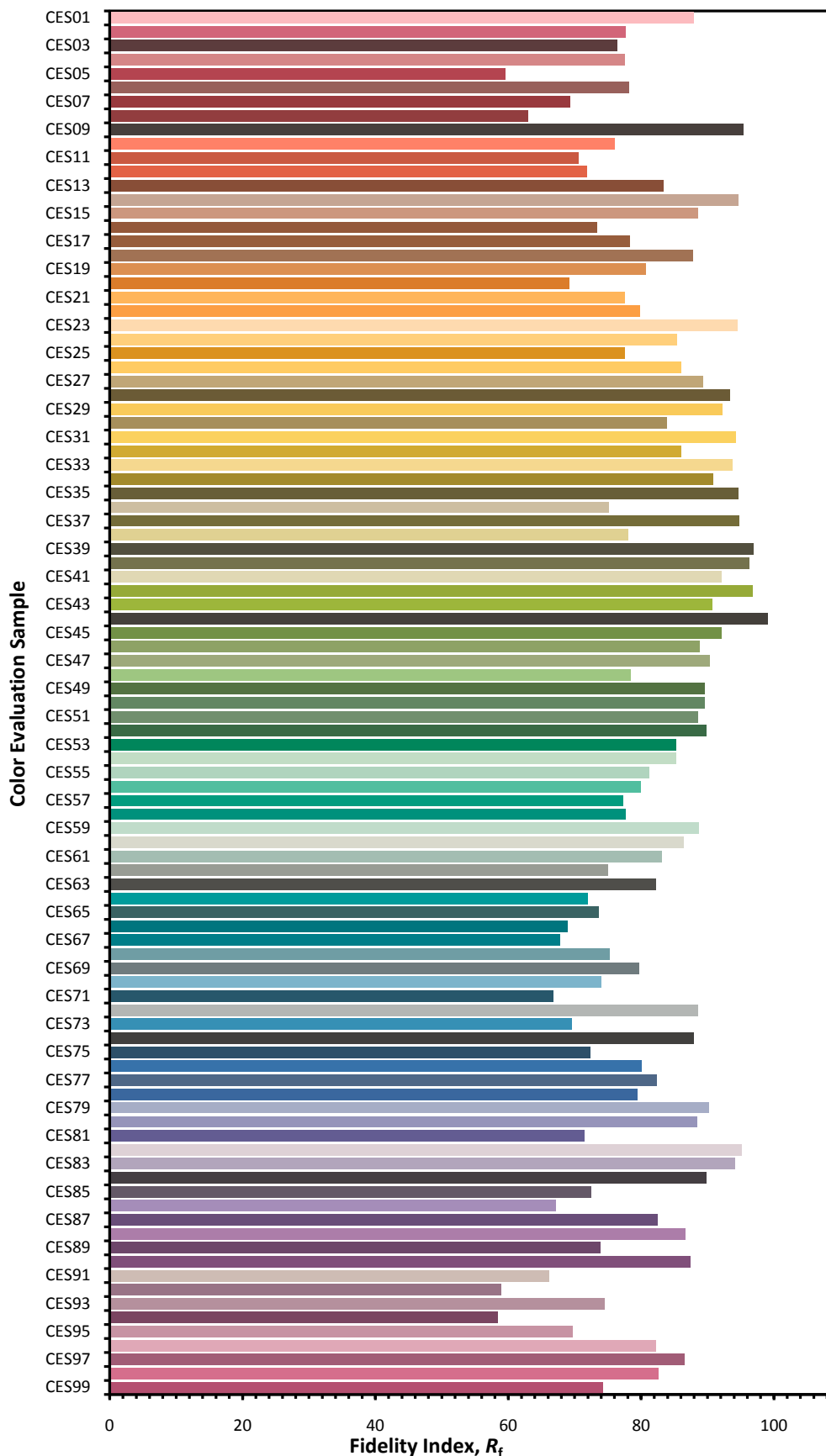


Color Vector Graphic

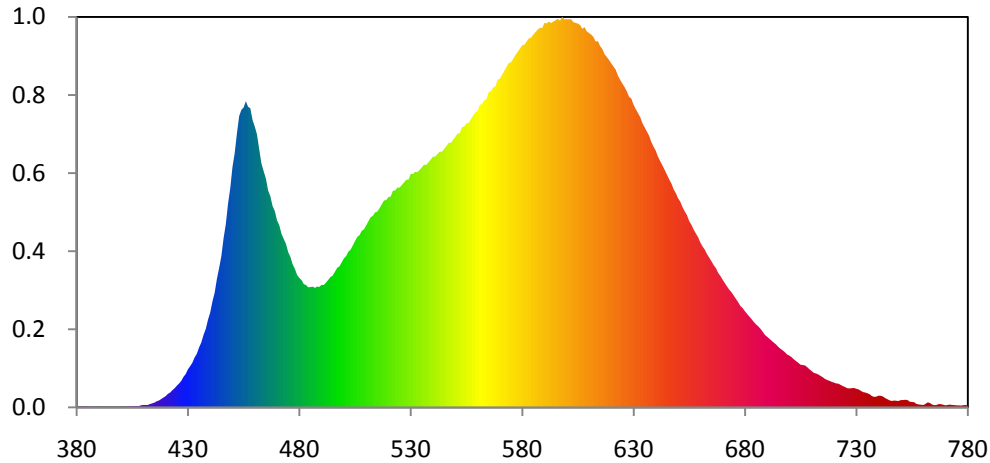


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



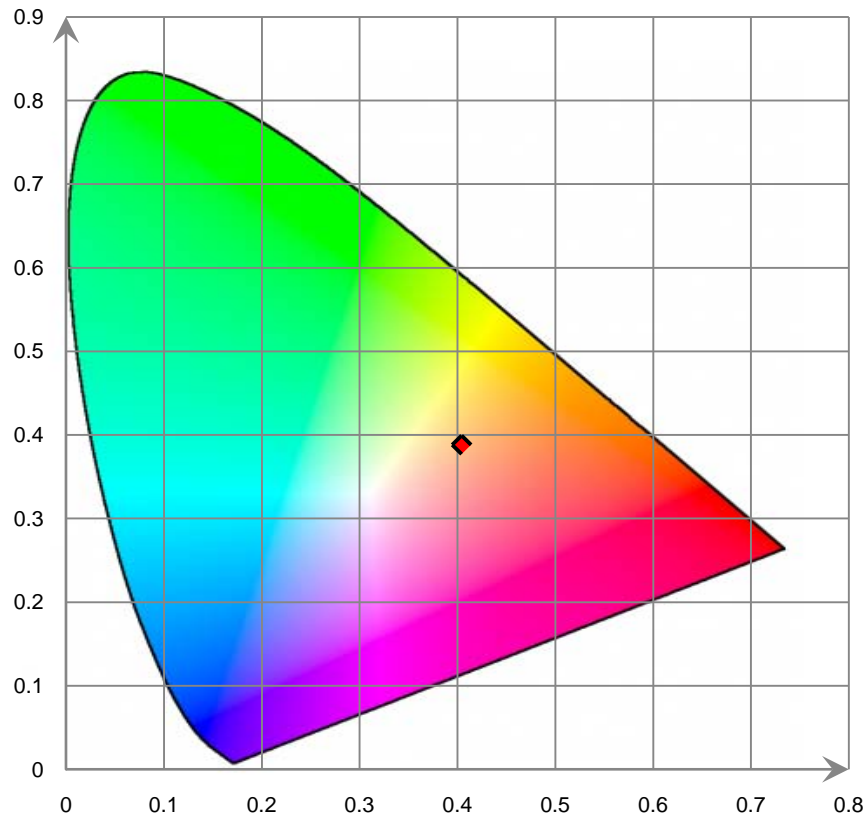
Relative Spectral Power Distribution



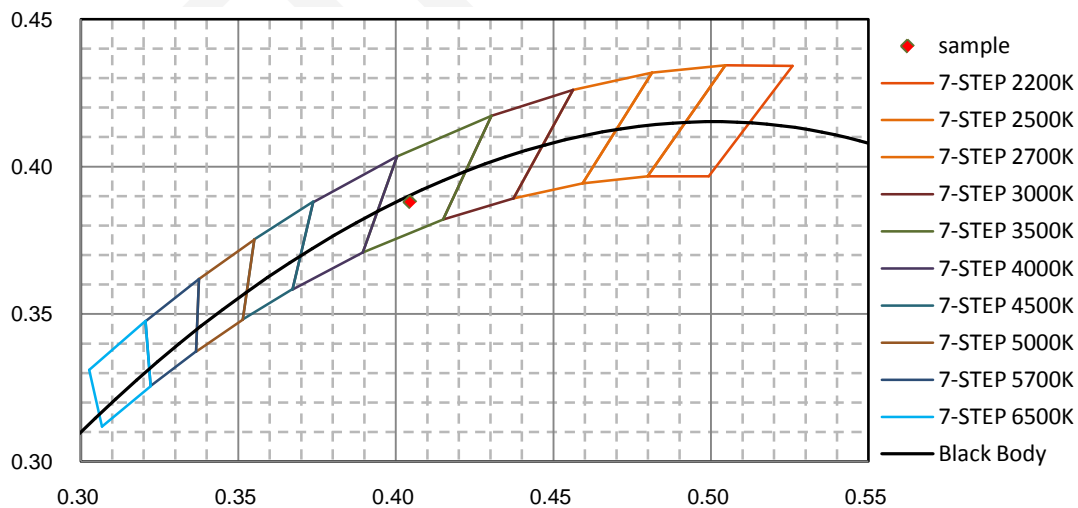
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.000E-02	421	4.097E-01	462	7.822E+00	503	4.777E+00	544	7.750E+00
381	2.370E-02	422	4.473E-01	463	7.391E+00	504	4.907E+00	545	7.830E+00
382	2.330E-02	423	5.200E-01	464	7.158E+00	505	5.038E+00	546	7.920E+00
383	2.560E-02	424	5.787E-01	465	6.935E+00	506	5.166E+00	547	8.015E+00
384	2.320E-02	425	6.543E-01	466	6.573E+00	507	5.220E+00	548	8.021E+00
385	1.440E-02	426	7.221E-01	467	6.400E+00	508	5.351E+00	549	8.108E+00
386	1.370E-02	427	8.031E-01	468	6.101E+00	509	5.394E+00	550	8.199E+00
387	1.320E-02	428	9.243E-01	469	5.950E+00	510	5.515E+00	551	8.296E+00
388	1.420E-02	429	1.012E+00	470	5.668E+00	511	5.639E+00	552	8.311E+00
389	1.980E-02	430	1.151E+00	471	5.522E+00	512	5.763E+00	553	8.491E+00
390	1.840E-02	431	1.249E+00	472	5.257E+00	513	5.806E+00	554	8.510E+00
391	1.010E-02	432	1.355E+00	473	5.107E+00	514	5.910E+00	555	8.609E+00
392	7.400E-03	433	1.512E+00	474	4.958E+00	515	5.933E+00	556	8.624E+00
393	1.210E-02	434	1.624E+00	475	4.706E+00	516	6.037E+00	557	8.734E+00
394	1.460E-02	435	1.816E+00	476	4.562E+00	517	6.155E+00	558	8.839E+00
395	1.560E-02	436	1.967E+00	477	4.335E+00	518	6.271E+00	559	8.945E+00
396	1.170E-02	437	2.196E+00	478	4.202E+00	519	6.284E+00	560	8.979E+00
397	6.100E-03	438	2.376E+00	479	4.012E+00	520	6.377E+00	561	9.173E+00
398	4.100E-03	439	2.654E+00	480	3.925E+00	521	6.389E+00	562	9.198E+00
399	2.000E-03	440	2.873E+00	481	3.857E+00	522	6.566E+00	563	9.307E+00
400	1.370E-02	441	3.210E+00	482	3.737E+00	523	6.576E+00	564	9.346E+00
401	1.740E-02	442	3.477E+00	483	3.709E+00	524	6.661E+00	565	9.556E+00
402	1.780E-02	443	3.893E+00	484	3.638E+00	525	6.662E+00	566	9.586E+00
403	2.060E-02	444	4.226E+00	485	3.647E+00	526	6.739E+00	567	9.697E+00
404	2.200E-02	445	4.585E+00	486	3.660E+00	527	6.816E+00	568	9.728E+00
405	3.310E-02	446	5.129E+00	487	3.623E+00	528	6.898E+00	569	9.932E+00
406	3.190E-02	447	5.551E+00	488	3.662E+00	529	6.903E+00	570	9.961E+00
407	3.710E-02	448	6.172E+00	489	3.653E+00	530	7.078E+00	571	1.008E+01
408	4.080E-02	449	6.642E+00	490	3.712E+00	531	7.073E+00	572	1.020E+01
409	6.330E-02	450	7.290E+00	491	3.710E+00	532	7.140E+00	573	1.032E+01
410	7.330E-02	451	7.714E+00	492	3.785E+00	533	7.126E+00	574	1.044E+01
411	7.220E-02	452	8.309E+00	493	3.866E+00	534	7.199E+00	575	1.046E+01
412	7.280E-02	453	8.831E+00	494	3.954E+00	535	7.278E+00	576	1.056E+01
413	1.015E-01	454	9.019E+00	495	3.994E+00	536	7.356E+00	577	1.068E+01
414	1.226E-01	455	9.091E+00	496	4.112E+00	537	7.350E+00	578	1.078E+01
415	1.457E-01	456	9.281E+00	497	4.230E+00	538	7.430E+00	579	1.087E+01
416	1.852E-01	457	9.109E+00	498	4.276E+00	539	7.511E+00	580	1.097E+01
417	2.089E-01	458	9.067E+00	499	4.390E+00	540	7.600E+00	581	1.099E+01
418	2.518E-01	459	8.712E+00	500	4.518E+00	541	7.603E+00	582	1.109E+01
419	2.980E-01	460	8.513E+00	501	4.583E+00	542	7.676E+00	583	1.118E+01
420	3.412E-01	461	8.271E+00	502	4.718E+00	543	7.751E+00	584	1.121E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.130E+01	626	9.704E+00	667	4.219E+00	708	1.215E+00	749	1.953E-01
586	1.138E+01	627	9.581E+00	668	4.078E+00	709	1.152E+00	750	2.214E-01
587	1.145E+01	628	9.410E+00	669	3.983E+00	710	1.100E+00	751	2.224E-01
588	1.151E+01	629	9.361E+00	670	3.871E+00	711	1.043E+00	752	2.309E-01
589	1.149E+01	630	9.177E+00	671	3.765E+00	712	1.027E+00	753	2.211E-01
590	1.165E+01	631	9.041E+00	672	3.662E+00	713	9.946E-01	754	1.716E-01
591	1.164E+01	632	8.919E+00	673	3.565E+00	714	9.526E-01	755	1.642E-01
592	1.169E+01	633	8.796E+00	674	3.487E+00	715	9.105E-01	756	1.553E-01
593	1.165E+01	634	8.615E+00	675	3.386E+00	716	8.592E-01	757	1.028E-01
594	1.169E+01	635	8.488E+00	676	3.285E+00	717	8.283E-01	758	8.990E-02
595	1.173E+01	636	8.360E+00	677	3.183E+00	718	8.023E-01	759	8.080E-02
596	1.178E+01	637	8.232E+00	678	3.071E+00	719	7.733E-01	760	7.130E-02
597	1.172E+01	638	8.042E+00	679	3.009E+00	720	7.493E-01	761	1.030E-01
598	1.183E+01	639	7.902E+00	680	2.913E+00	721	7.249E-01	762	1.501E-01
599	1.176E+01	640	7.775E+00	681	2.832E+00	722	7.189E-01	763	1.344E-01
600	1.176E+01	641	7.595E+00	682	2.753E+00	723	6.788E-01	764	8.770E-02
601	1.176E+01	642	7.460E+00	683	2.672E+00	724	6.443E-01	765	6.800E-02
602	1.177E+01	643	7.329E+00	684	2.589E+00	725	6.137E-01	766	7.190E-02
603	1.168E+01	644	7.195E+00	685	2.516E+00	726	5.796E-01	767	1.001E-01
604	1.165E+01	645	7.052E+00	686	2.456E+00	727	5.741E-01	768	9.730E-02
605	1.163E+01	646	6.913E+00	687	2.381E+00	728	5.828E-01	769	8.050E-02
606	1.159E+01	647	6.785E+00	688	2.289E+00	729	5.880E-01	770	6.110E-02
607	1.147E+01	648	6.611E+00	689	2.197E+00	730	5.634E-01	771	7.490E-02
608	1.153E+01	649	6.492E+00	690	2.138E+00	731	5.449E-01	772	8.390E-02
609	1.140E+01	650	6.336E+00	691	2.079E+00	732	5.038E-01	773	7.430E-02
610	1.135E+01	651	6.235E+00	692	2.019E+00	733	4.633E-01	774	6.890E-02
611	1.130E+01	652	6.069E+00	693	1.959E+00	734	4.512E-01	775	6.210E-02
612	1.123E+01	653	5.939E+00	694	1.905E+00	735	4.268E-01	776	6.050E-02
613	1.109E+01	654	5.825E+00	695	1.832E+00	736	3.971E-01	777	5.490E-02
614	1.110E+01	655	5.644E+00	696	1.774E+00	737	3.429E-01	778	6.600E-02
615	1.095E+01	656	5.534E+00	697	1.725E+00	738	3.175E-01	779	7.240E-02
616	1.086E+01	657	5.388E+00	698	1.668E+00	739	3.270E-01	780	5.510E-02
617	1.070E+01	658	5.269E+00	699	1.599E+00	740	3.551E-01		
618	1.062E+01	659	5.155E+00	700	1.567E+00	741	3.516E-01		
619	1.053E+01	660	4.996E+00	701	1.517E+00	742	3.274E-01		
620	1.043E+01	661	4.877E+00	702	1.454E+00	743	2.801E-01		
621	1.033E+01	662	4.778E+00	703	1.400E+00	744	2.466E-01		
622	1.024E+01	663	4.643E+00	704	1.348E+00	745	2.108E-01		
623	1.006E+01	664	4.536E+00	705	1.293E+00	746	1.942E-01		
624	9.928E+00	665	4.426E+00	706	1.285E+00	747	2.081E-01		
625	9.813E+00	666	4.308E+00	707	1.269E+00	748	1.989E-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**

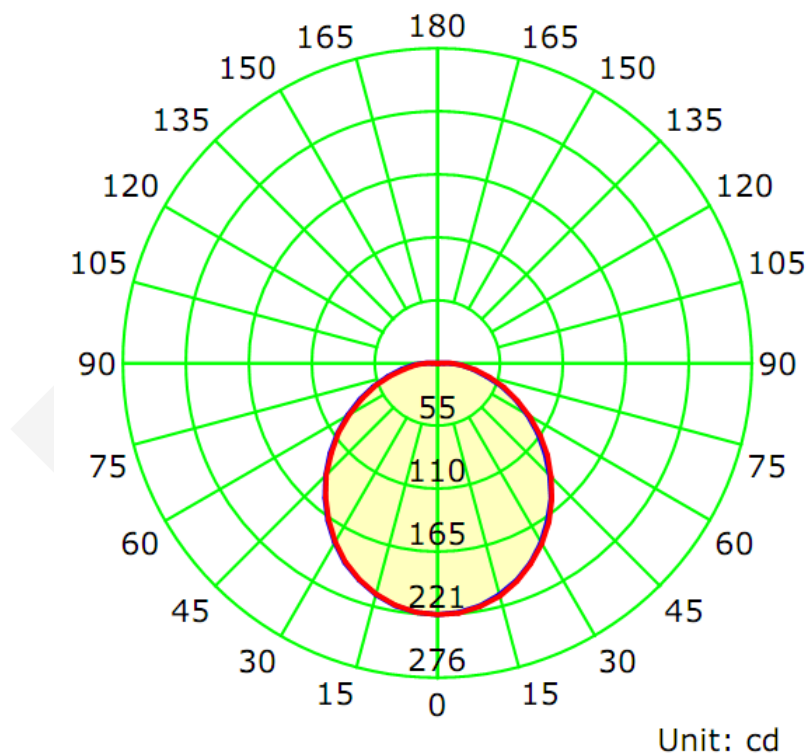
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0550	6.48	0.9840

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
634.4	97.90	221.2	1.22	1.22

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	108.4	108.6	108.5	108.3	108.5
Field Angle (10% I_{max}):	168.5	168.7	168.7	168.6	168.6

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	221	221	221	221	221	221	221	221
5.0°	220	220	220	220	220	221	220	220
10.0°	217	217	217	217	217	217	217	217
15.0°	211	211	212	212	212	212	211	212
20.0°	203	203	204	204	204	205	204	204
25.0°	194	194	194	194	195	195	195	195
30.0°	182	183	183	183	184	184	183	183
35.0°	169	169	170	170	171	171	171	170
40.0°	155	156	156	156	157	157	157	157
45.0°	140	140	141	141	142	142	142	141
50.0°	124	125	125	126	126	126	126	126
55.0°	108	109	109	110	110	110	110	110
60.0°	92	92	93	94	94	95	94	94
65.0°	76	76	77	78	78	78	78	78
70.0°	60	61	62	62	62	63	63	62
75.0°	45	46	47	47	48	48	48	48
80.0°	32	32	33	34	34	34	34	34
85.0°	20	21	21	22	22	23	23	22
90.0°	11	12	12	13	13	13	13	13
95.0°	5	5	6	6	6	7	7	6
100.0°	2	2	2	2	3	3	3	3
105.0°	1	1	1	1	1	1	1	1
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°	221	221	221	221	221	221	221	221
5.0°	220	220	220	220	220	220	220	220
10.0°	216	216	217	216	216	216	216	216
15.0°	211	210	211	211	210	211	210	210
20.0°	203	203	203	202	202	202	202	202
25.0°	193	193	193	193	193	193	192	192
30.0°	182	181	182	181	181	181	181	180
35.0°	169	169	168	168	168	168	168	167
40.0°	155	154	154	154	153	153	153	153
45.0°	140	139	139	139	138	138	138	138
50.0°	124	123	123	123	122	122	122	122
55.0°	108	108	107	107	106	106	106	106
60.0°	92	91	91	90	90	90	89	90
65.0°	76	73	75	74	74	64	73	73
70.0°	61	60	60	59	58	58	58	58
75.0°	46	45	45	44	43	43	43	43
80.0°	32	32	31	30	30	30	29	30
85.0°	21	20	20	19	19	19	18	18
90.0°	12	12	11	11	11	10	10	10
95.0°	6	6	5	5	5	5	5	5
100.0°	2	2	2	2	2	2	2	2
105.0°	1	1	1	1	1	1	1	1
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

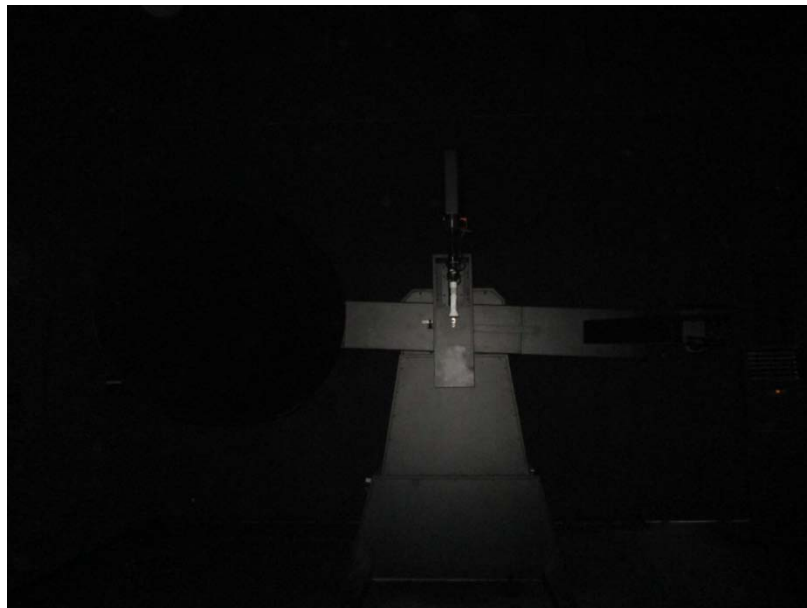
Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	5.3	0.83	0-5	5.3	0.83
5-10	15.6	2.46	0-10	20.9	3.29
10-15	25.4	4.00	0-15	46.3	7.29
15-20	34.1	5.38	0-20	80.4	12.67
20-25	41.6	6.56	0-25	122.0	19.23
25-30	47.5	7.49	0-30	169.5	26.72
30-35	51.7	8.15	0-35	221.2	34.87
35-40	54.1	8.52	0-40	275.3	43.39
40-45	54.6	8.60	0-45	329.9	51.99
45-50	53.3	8.41	0-50	383.2	60.40
50-55	50.5	7.95	0-55	433.7	68.35
55-60	46.2	7.28	0-60	479.9	75.64
60-65	40.6	6.40	0-65	520.5	82.03
65-70	34.3	5.40	0-70	554.7	87.44
70-75	27.6	4.35	0-75	582.4	91.79
75-80	20.7	3.26	0-80	603.1	95.06
80-85	14.3	2.25	0-85	617.3	97.30
85-90	8.8	1.39	0-90	626.1	98.69
90-95	4.7	0.74	0-95	630.9	99.44
95-100	2.1	0.33	0-100	633.0	99.77
100-105	0.8	0.12	0-105	633.8	99.89
105-110	0.3	0.04	0-110	634.0	99.93
110-115	0.1	0.01	0-115	634.1	99.95
115-120	0.0	0.01	0-120	634.1	99.95
120-125	0.0	0.01	0-125	634.2	99.96
125-130	0.0	0.01	0-130	634.2	99.97
130-135	0.0	0.01	0-135	634.3	99.97
135-140	0.0	0.01	0-140	634.3	99.98
140-145	0.0	0.00	0-145	634.3	99.98
145-150	0.0	0.00	0-150	634.4	99.99
150-155	0.0	0.00	0-155	634.4	99.99
155-160	0.0	0.00	0-160	634.4	99.99
160-165	0.0	0.00	0-165	634.4	100.00
165-170	0.0	0.00	0-170	634.4	100.00
170-175	0.0	0.00	0-175	634.4	100.00
175-180	0.0	0.00	0-180	634.4	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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