

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 6.5PLSV/835/HYB/GX23

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RKS170301012-10
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: 6.5PLSV/835/HYB/GX23
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**

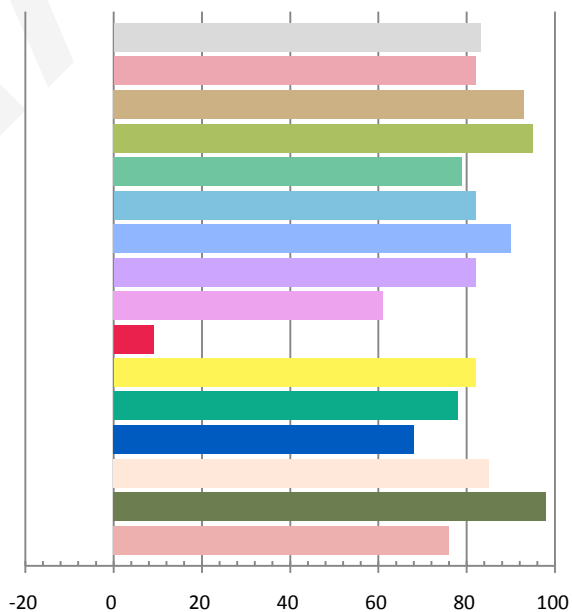
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.055	6.47	0.9812	630.5	97.4

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.910	3488	-0.00080	0.4051	0.3888	0.2364	0.5104

Color Rendering Index

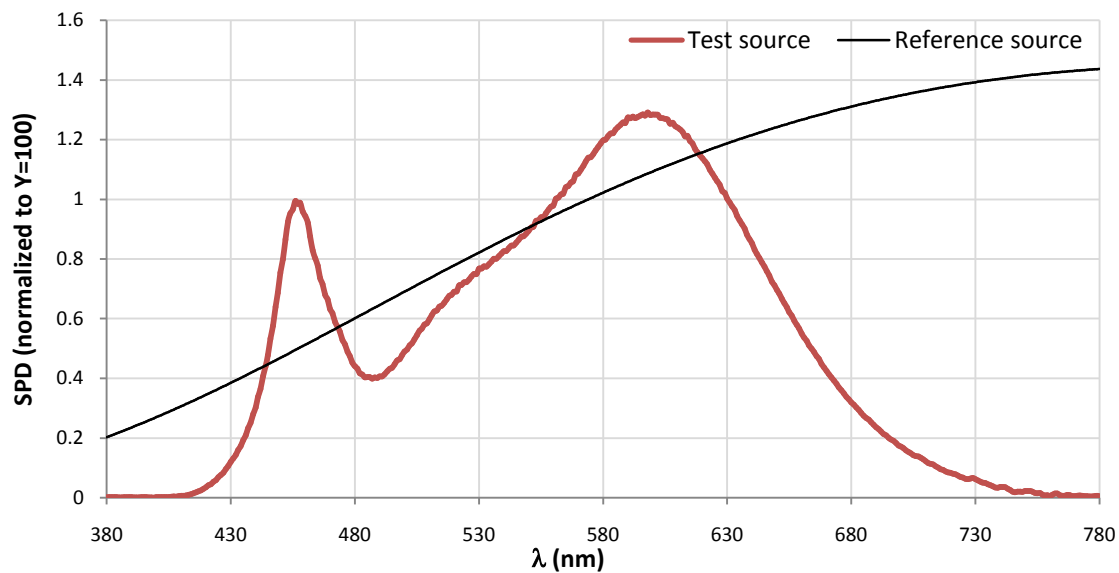
Ra			
83.1			
R1	R2	R3	R4
82	93	95	79
R5	R6	R7	R8
82	90	82	61
R9	R10	R11	R12
9	82	78	68
R13	R14	R15	
85	98	76	



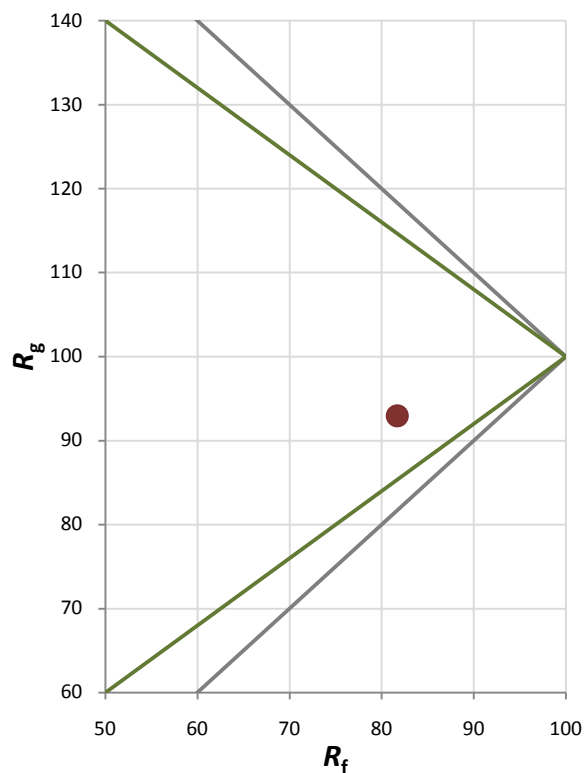
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	93

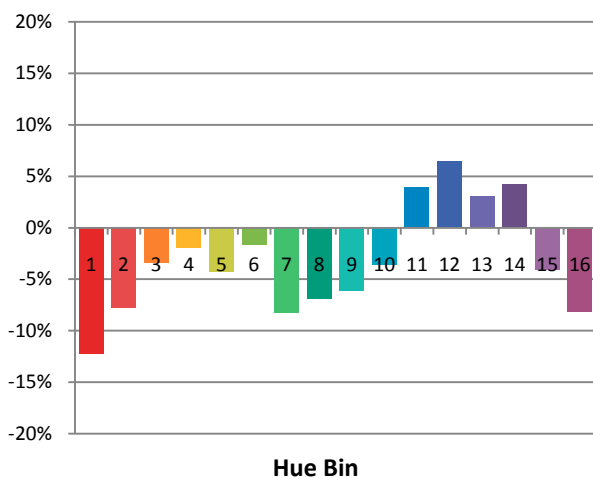
Spectral Power Distribution Comparison



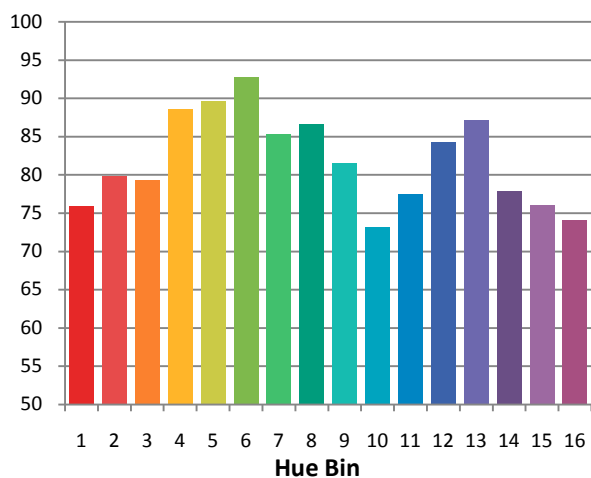
Plot of R_g versus R_f



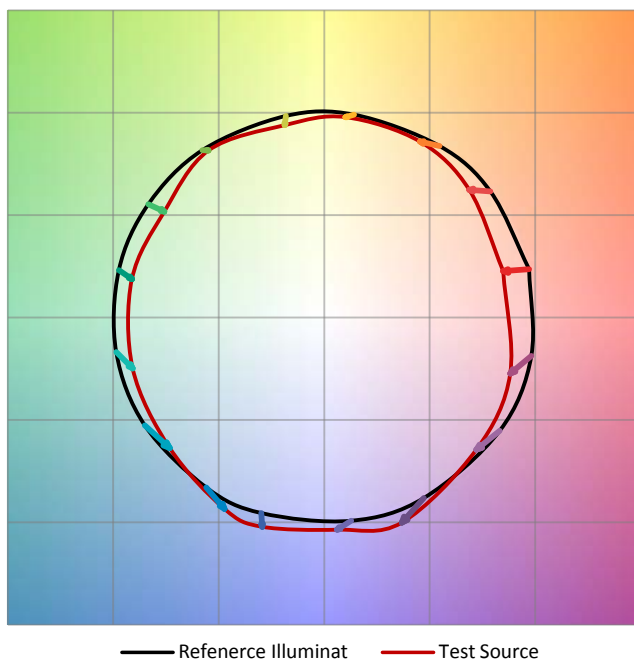
Chroma Shift by Hue



R_f by Hue

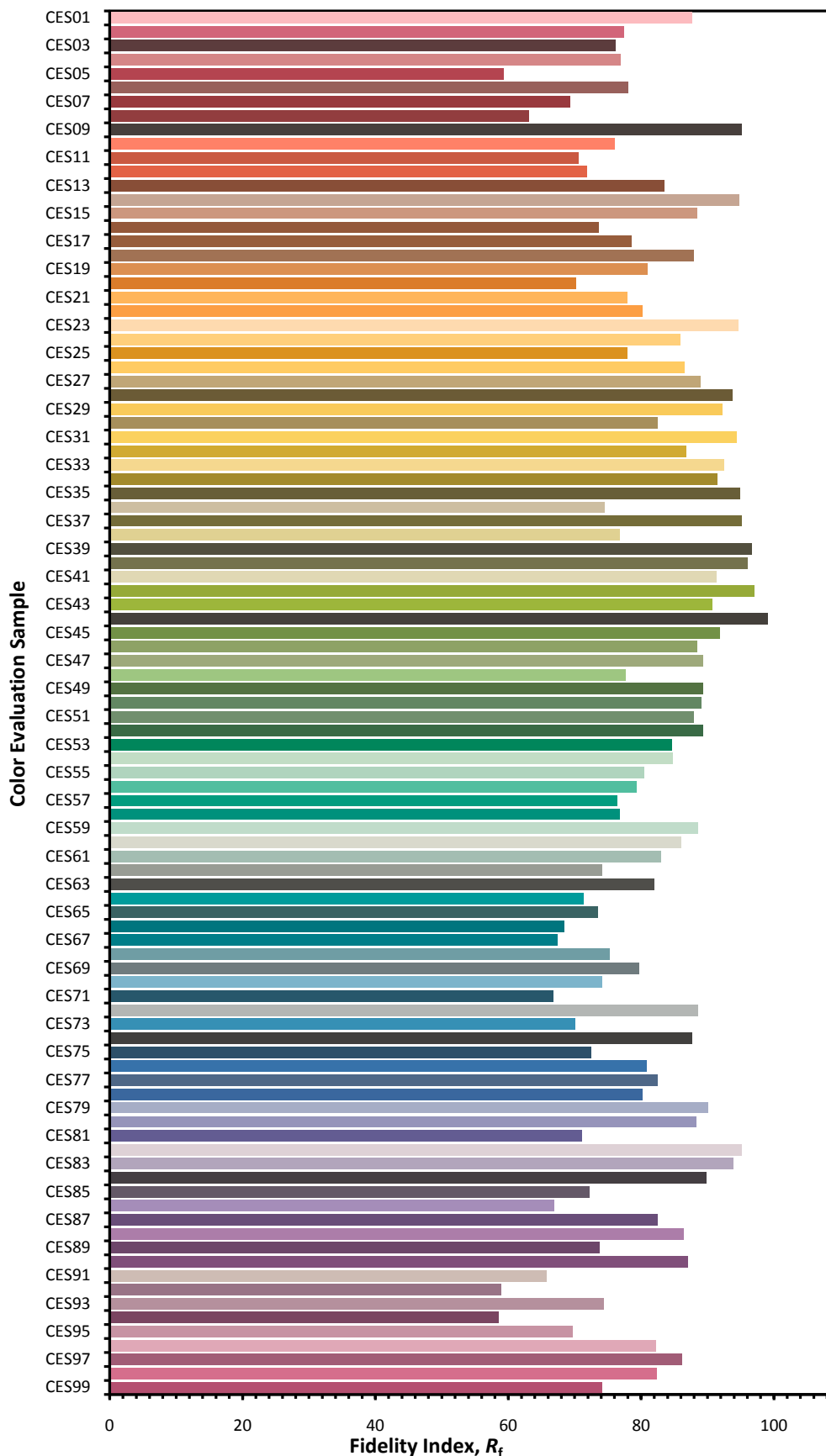


Color Vector Graphic

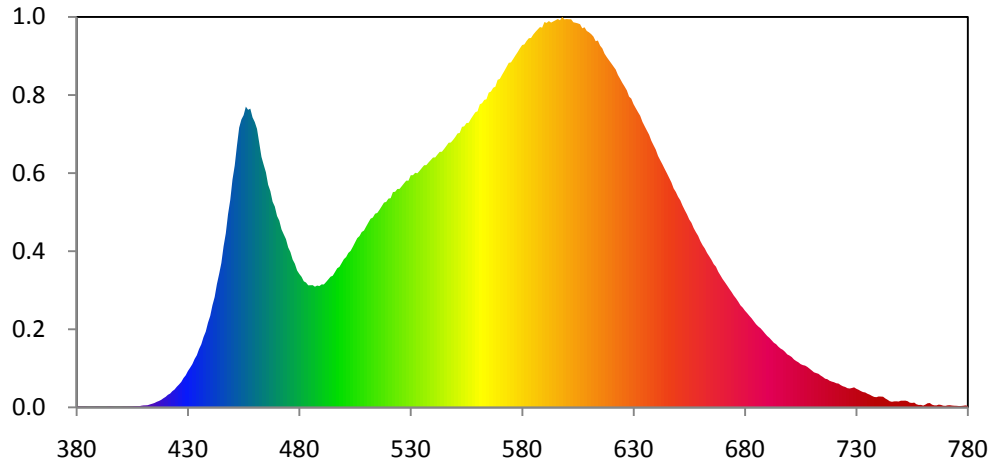


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



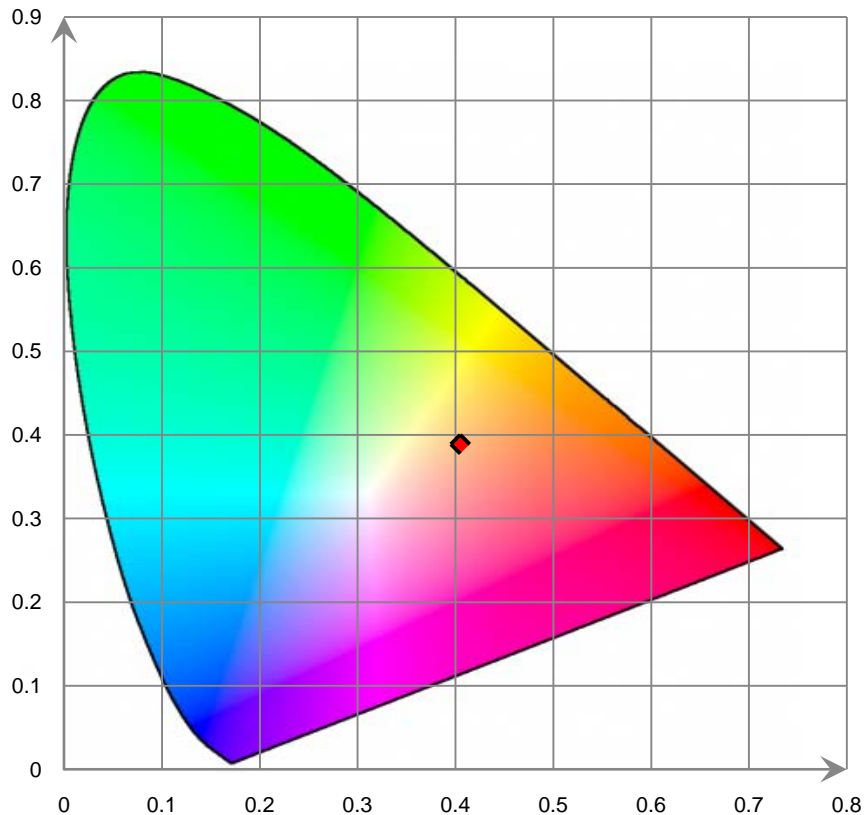
Relative Spectral Power Distribution



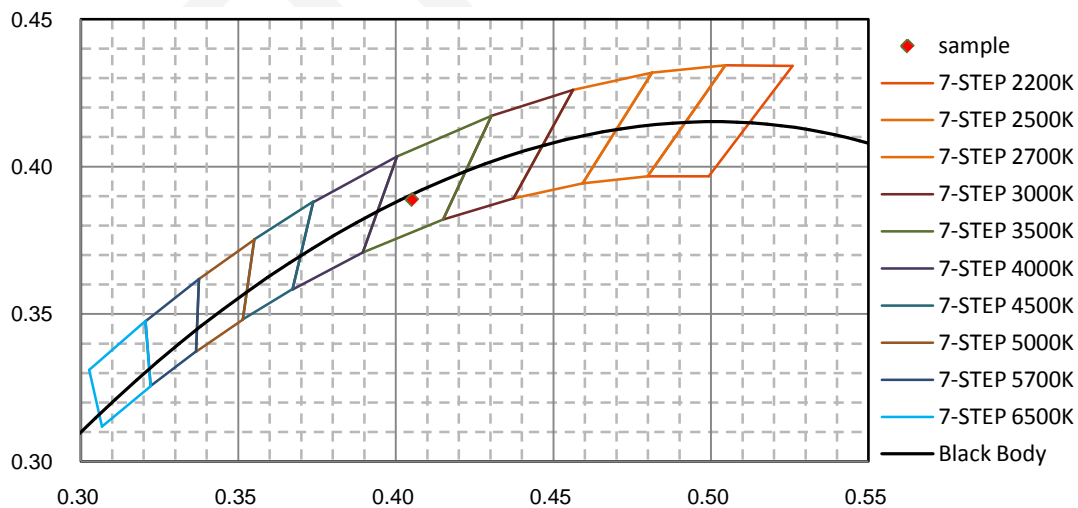
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.340E-02	421	3.835E-01	462	8.075E+00	503	4.775E+00	544	7.802E+00
381	2.230E-02	422	4.200E-01	463	7.646E+00	504	4.899E+00	545	7.887E+00
382	1.820E-02	423	4.946E-01	464	7.405E+00	505	5.032E+00	546	7.978E+00
383	1.940E-02	424	5.456E-01	465	7.173E+00	506	5.165E+00	547	8.075E+00
384	1.970E-02	425	6.297E-01	466	6.794E+00	507	5.227E+00	548	8.084E+00
385	1.250E-02	426	6.977E-01	467	6.599E+00	508	5.352E+00	549	8.161E+00
386	1.240E-02	427	7.763E-01	468	6.277E+00	509	5.396E+00	550	8.252E+00
387	1.500E-02	428	8.933E-01	469	6.127E+00	510	5.519E+00	551	8.359E+00
388	1.460E-02	429	9.788E-01	470	5.841E+00	511	5.642E+00	552	8.378E+00
389	1.950E-02	430	1.109E+00	471	5.700E+00	512	5.759E+00	553	8.560E+00
390	1.810E-02	431	1.212E+00	472	5.432E+00	513	5.793E+00	554	8.576E+00
391	9.800E-03	432	1.321E+00	473	5.281E+00	514	5.910E+00	555	8.676E+00
392	6.900E-03	433	1.475E+00	474	5.134E+00	515	5.934E+00	556	8.685E+00
393	1.070E-02	434	1.592E+00	475	4.882E+00	516	6.031E+00	557	8.803E+00
394	1.670E-02	435	1.782E+00	476	4.740E+00	517	6.139E+00	558	8.907E+00
395	1.880E-02	436	1.925E+00	477	4.512E+00	518	6.250E+00	559	9.005E+00
396	1.670E-02	437	2.146E+00	478	4.383E+00	519	6.271E+00	560	9.035E+00
397	1.100E-02	438	2.313E+00	479	4.178E+00	520	6.371E+00	561	9.248E+00
398	7.900E-03	439	2.583E+00	480	4.072E+00	521	6.384E+00	562	9.282E+00
399	3.700E-03	440	2.791E+00	481	3.985E+00	522	6.571E+00	563	9.383E+00
400	1.460E-02	441	3.116E+00	482	3.848E+00	523	6.580E+00	564	9.404E+00
401	1.690E-02	442	3.367E+00	483	3.809E+00	524	6.664E+00	565	9.605E+00
402	1.800E-02	443	3.760E+00	484	3.724E+00	525	6.668E+00	566	9.638E+00
403	1.820E-02	444	4.070E+00	485	3.728E+00	526	6.752E+00	567	9.751E+00
404	2.010E-02	445	4.406E+00	486	3.730E+00	527	6.838E+00	568	9.788E+00
405	2.270E-02	446	4.915E+00	487	3.684E+00	528	6.920E+00	569	9.995E+00
406	3.020E-02	447	5.310E+00	488	3.718E+00	529	6.919E+00	570	1.003E+01
407	3.480E-02	448	5.896E+00	489	3.703E+00	530	7.085E+00	571	1.015E+01
408	3.160E-02	449	6.331E+00	490	3.753E+00	531	7.086E+00	572	1.027E+01
409	4.990E-02	450	6.954E+00	491	3.751E+00	532	7.159E+00	573	1.039E+01
410	6.070E-02	451	7.378E+00	492	3.825E+00	533	7.145E+00	574	1.051E+01
411	6.290E-02	452	7.985E+00	493	3.905E+00	534	7.222E+00	575	1.053E+01
412	6.760E-02	453	8.538E+00	494	3.987E+00	535	7.307E+00	576	1.063E+01
413	9.180E-02	454	8.785E+00	495	4.018E+00	536	7.389E+00	577	1.074E+01
414	1.125E-01	455	8.917E+00	496	4.130E+00	537	7.392E+00	578	1.084E+01
415	1.352E-01	456	9.178E+00	497	4.244E+00	538	7.475E+00	579	1.096E+01
416	1.697E-01	457	9.081E+00	498	4.289E+00	539	7.548E+00	580	1.106E+01
417	1.956E-01	458	9.116E+00	499	4.404E+00	540	7.625E+00	581	1.108E+01
418	2.297E-01	459	8.850E+00	500	4.523E+00	541	7.629E+00	582	1.118E+01
419	2.785E-01	460	8.707E+00	501	4.587E+00	542	7.716E+00	583	1.126E+01
420	3.215E-01	461	8.500E+00	502	4.713E+00	543	7.797E+00	584	1.127E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.138E+01	626	9.791E+00	667	4.293E+00	708	1.235E+00	749	1.789E-01
586	1.146E+01	627	9.675E+00	668	4.142E+00	709	1.182E+00	750	2.035E-01
587	1.153E+01	628	9.484E+00	669	4.030E+00	710	1.127E+00	751	2.043E-01
588	1.161E+01	629	9.421E+00	670	3.915E+00	711	1.070E+00	752	2.062E-01
589	1.159E+01	630	9.254E+00	671	3.820E+00	712	1.046E+00	753	1.895E-01
590	1.176E+01	631	9.131E+00	672	3.721E+00	713	1.024E+00	754	1.447E-01
591	1.173E+01	632	9.011E+00	673	3.619E+00	714	9.711E-01	755	1.362E-01
592	1.179E+01	633	8.898E+00	674	3.521E+00	715	9.283E-01	756	1.448E-01
593	1.174E+01	634	8.715E+00	675	3.413E+00	716	8.761E-01	757	9.410E-02
594	1.178E+01	635	8.580E+00	676	3.326E+00	717	8.587E-01	758	7.340E-02
595	1.181E+01	636	8.448E+00	677	3.226E+00	718	8.132E-01	759	7.580E-02
596	1.185E+01	637	8.320E+00	678	3.114E+00	719	7.861E-01	760	5.500E-02
597	1.181E+01	638	8.135E+00	679	3.044E+00	720	7.674E-01	761	8.470E-02
598	1.192E+01	639	7.997E+00	680	2.952E+00	721	7.368E-01	762	1.265E-01
599	1.184E+01	640	7.865E+00	681	2.877E+00	722	7.263E-01	763	1.317E-01
600	1.185E+01	641	7.674E+00	682	2.794E+00	723	6.788E-01	764	8.230E-02
601	1.184E+01	642	7.541E+00	683	2.718E+00	724	6.429E-01	765	6.190E-02
602	1.184E+01	643	7.412E+00	684	2.626E+00	725	6.238E-01	766	6.100E-02
603	1.175E+01	644	7.274E+00	685	2.537E+00	726	5.857E-01	767	8.440E-02
604	1.174E+01	645	7.142E+00	686	2.469E+00	727	5.758E-01	768	7.550E-02
605	1.172E+01	646	7.004E+00	687	2.415E+00	728	5.905E-01	769	5.170E-02
606	1.169E+01	647	6.866E+00	688	2.340E+00	729	6.112E-01	770	4.630E-02
607	1.157E+01	648	6.682E+00	689	2.256E+00	730	5.689E-01	771	6.310E-02
608	1.160E+01	649	6.573E+00	690	2.180E+00	731	5.378E-01	772	6.690E-02
609	1.149E+01	650	6.427E+00	691	2.121E+00	732	4.975E-01	773	5.660E-02
610	1.145E+01	651	6.318E+00	692	2.047E+00	733	4.667E-01	774	4.950E-02
611	1.139E+01	652	6.157E+00	693	1.972E+00	734	4.554E-01	775	4.780E-02
612	1.132E+01	653	6.019E+00	694	1.929E+00	735	4.159E-01	776	4.130E-02
613	1.117E+01	654	5.889E+00	695	1.853E+00	736	3.889E-01	777	4.350E-02
614	1.119E+01	655	5.736E+00	696	1.796E+00	737	3.509E-01	778	4.960E-02
615	1.104E+01	656	5.633E+00	697	1.757E+00	738	3.192E-01	779	6.100E-02
616	1.095E+01	657	5.471E+00	698	1.694E+00	739	3.106E-01	780	4.700E-02
617	1.079E+01	658	5.347E+00	699	1.617E+00	740	3.324E-01		
618	1.069E+01	659	5.234E+00	700	1.582E+00	741	3.301E-01		
619	1.059E+01	660	5.075E+00	701	1.536E+00	742	3.255E-01		
620	1.050E+01	661	4.948E+00	702	1.462E+00	743	2.728E-01		
621	1.040E+01	662	4.847E+00	703	1.414E+00	744	2.341E-01		
622	1.031E+01	663	4.713E+00	704	1.375E+00	745	1.871E-01		
623	1.014E+01	664	4.609E+00	705	1.320E+00	746	1.699E-01		
624	1.003E+01	665	4.499E+00	706	1.290E+00	747	1.837E-01		
625	9.900E+00	666	4.371E+00	707	1.275E+00	748	1.843E-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**

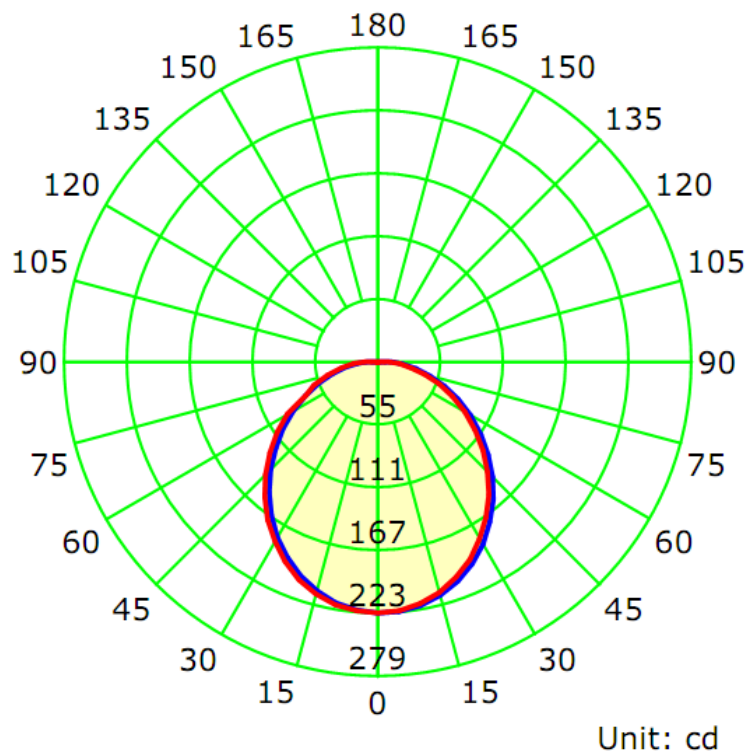
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0550	6.46	0.9840

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
637.5	98.68	223.9	1.22	1.22

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	107.6	107.5	107.6	107.5	107.6
Field Angle (10% I_{max}):	168.5	168.5	168.5	168.5	168.5

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	224	224	224	224	224	224	224	224
5.0°	223	223	223	223	222	222	222	222
10.0°	221	220	220	219	219	218	218	218
15.0°	216	215	214	213	213	212	212	212
20.0°	208	207	207	205	204	204	203	203
25.0°	199	198	197	196	194	193	193	193
30.0°	188	186	185	184	182	181	180	181
35.0°	175	173	172	170	169	168	167	167
40.0°	161	159	158	156	154	153	152	152
45.0°	145	144	142	140	139	138	137	137
50.0°	129	128	126	124	123	121	121	121
55.0°	113	111	110	108	106	105	104	105
60.0°	96	95	93	91	90	89	88	88
65.0°	79	78	77	75	74	73	73	73
70.0°	64	62	61	59	58	57	57	57
75.0°	48	47	46	45	44	43	43	43
80.0°	35	33	32	31	30	30	30	30
85.0°	23	22	21	20	19	19	19	19
90.0°	13	13	12	11	11	11	11	11
95.0°	7	6	6	5	5	5	5	5
100.0°	3	3	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

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	224	224	224	224	224	224	224	224
5.0°	222	222	223	223	223	223	223	223
10.0°	218	218	219	219	220	220	220	220
15.0°	211	212	213	213	214	215	215	215
20.0°	203	203	204	205	207	207	208	208
25.0°	192	193	194	195	197	197	198	198
30.0°	180	181	182	183	185	186	187	187
35.0°	166	167	169	170	172	173	174	174
40.0°	152	153	154	156	158	159	159	159
45.0°	136	137	139	140	142	144	144	144
50.0°	120	121	123	124	126	127	128	128
55.0°	104	105	106	108	110	111	112	112
60.0°	87	89	90	92	94	95	95	95
65.0°	72	73	73	76	72	74	79	79
70.0°	57	58	59	61	62	63	63	63
75.0°	42	43	45	46	47	48	48	48
80.0°	30	31	32	33	34	34	34	34
85.0°	19	20	20	21	22	22	22	22
90.0°	11	11	12	12	13	13	13	13
95.0°	5	6	6	6	7	7	7	6
100.0°	2	2	2	3	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

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	5.3	0.84	0-5	5.3	0.84
5-10	15.8	2.48	0-10	21.1	3.32
10-15	25.7	4.02	0-15	46.8	7.34
15-20	34.5	5.41	0-20	81.3	12.75
20-25	42.0	6.59	0-25	123.3	19.35
25-30	48.0	7.52	0-30	171.3	26.87
30-35	52.1	8.18	0-35	223.4	35.05
35-40	54.4	8.54	0-40	277.9	43.58
40-45	54.9	8.60	0-45	332.7	52.19
45-50	53.5	8.39	0-50	386.2	60.58
50-55	50.5	7.92	0-55	436.7	68.50
55-60	46.2	7.24	0-60	482.9	75.74
60-65	40.5	6.35	0-65	523.3	82.09
65-70	34.1	5.35	0-70	557.4	87.44
70-75	27.5	4.32	0-75	585.0	91.75
75-80	20.7	3.24	0-80	605.7	95.00
80-85	14.3	2.25	0-85	620.0	97.24
85-90	8.9	1.40	0-90	628.9	98.64
90-95	4.9	0.76	0-95	633.7	99.40
95-100	2.2	0.35	0-100	636.0	99.75
100-105	0.9	0.13	0-105	636.8	99.89
105-110	0.3	0.05	0-110	637.1	99.94
110-115	0.1	0.02	0-115	637.2	99.95
115-120	0.0	0.01	0-120	637.3	99.96
120-125	0.0	0.01	0-125	637.3	99.96
125-130	0.0	0.01	0-130	637.3	99.97
130-135	0.0	0.01	0-135	637.4	99.98
135-140	0.0	0.00	0-140	637.4	99.98
140-145	0.0	0.00	0-145	637.4	99.98
145-150	0.0	0.00	0-150	637.5	99.99
150-155	0.0	0.00	0-155	637.5	99.99
155-160	0.0	0.00	0-160	637.5	99.99
160-165	0.0	0.00	0-165	637.5	100.00
165-170	0.0	0.00	0-170	637.5	100.00
170-175	0.0	0.00	0-175	637.5	100.00
175-180	0.0	0.00	0-180	637.5	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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