



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

**Model: 45HID/840/277V/EX39/R,
45HID/840/277V/E26**

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Daniel Duan <i>Daniel Duan</i>
Report Number:	RKS160826010-10
Test Date:	2016-08-26
Report Date:	2016-08-31
Reviewed By:	Jeanne Han/EE Manager <i>Jeanne Han</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.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 2016-08-26 and used for testing. Sample No.: RKS160826010-S01 Model: 45HID/840/277V/EX39/R

Model Tested: 45HID/840/277V/EX39/R
Manufacturer: GREEN CREATIVE LTD
Brand Name: GREEN CREATIVE
Product Designation: LED HID
Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120 -277VAC 60Hz
Rated Power: 45W
Nominal CCT: 4000K
Nominal Lumen Output: 5350 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
45HID/840/277V/EX39/R	45HID/840/277V/EX39/R 45HID/840/277V/E26	Lamp base	The lamp base of 45HID/840/277V/EX39/R is EX39; The lamp base of 45HID/840/277V/E26 is E26

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
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2015-11-09	2016-11-08
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2016-03-10	2017-03-09
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2016-07-11	2017-07-10
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2016-07-07	2017-07-06
Temperature/humidity/clock	Victor	VC230	EE023	0~40°C0~90%	2016-03-21	2017-03-20

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Standard Light Source	SENSING	N/A	LSD090808	N/A	2015-09-25	2016-09-24
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	30V/5A	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2016-03-10	2017-03-09
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	2015-09-08	2016-09-07

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.

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=1.8% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=20K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=1.8(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: **Downward**

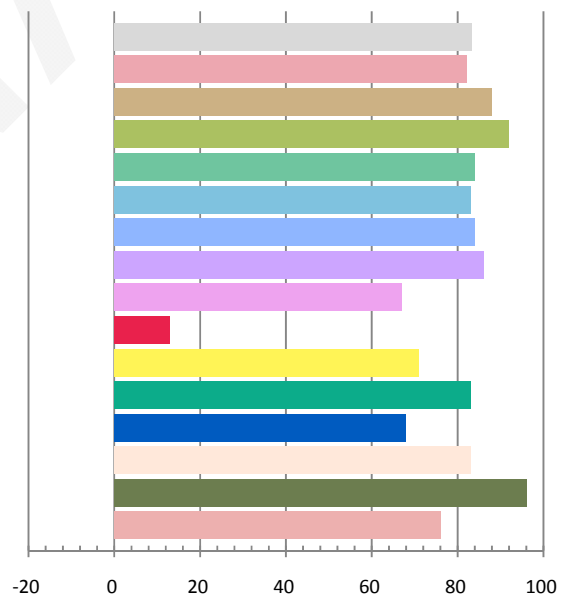
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.3817	44.8	0.978	5508.8	122.98

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
16.680	4050	-0.00067	0.3778	0.3737	0.2246	0.4998

Color Rendering Index

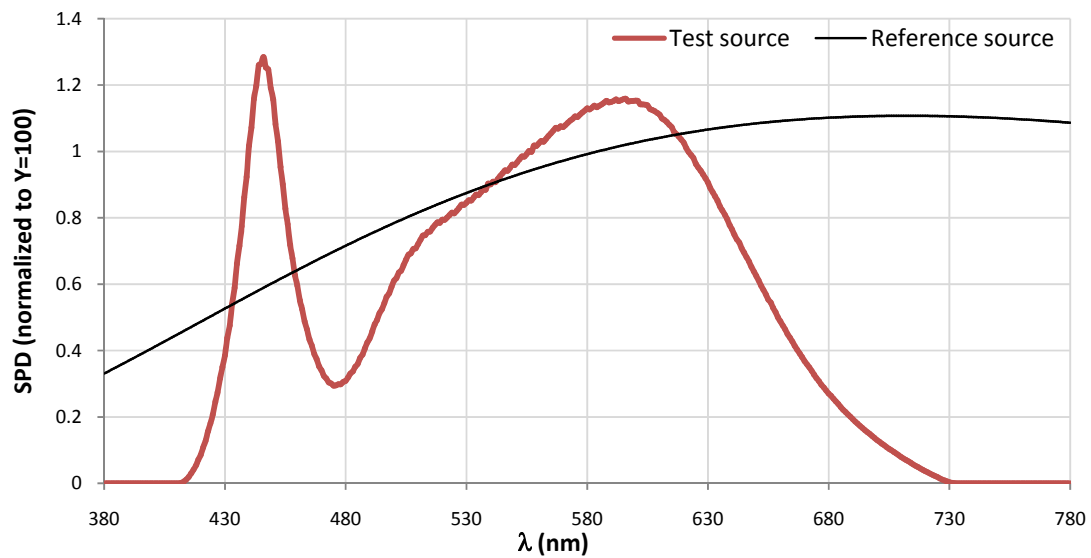
Ra			
83.2			
R1	R2	R3	R4
82	88	92	84
R5	R6	R7	R8
83	84	86	67
R9	R10	R11	R12
13	71	83	68
R13	R14	R15	
83	96	76	



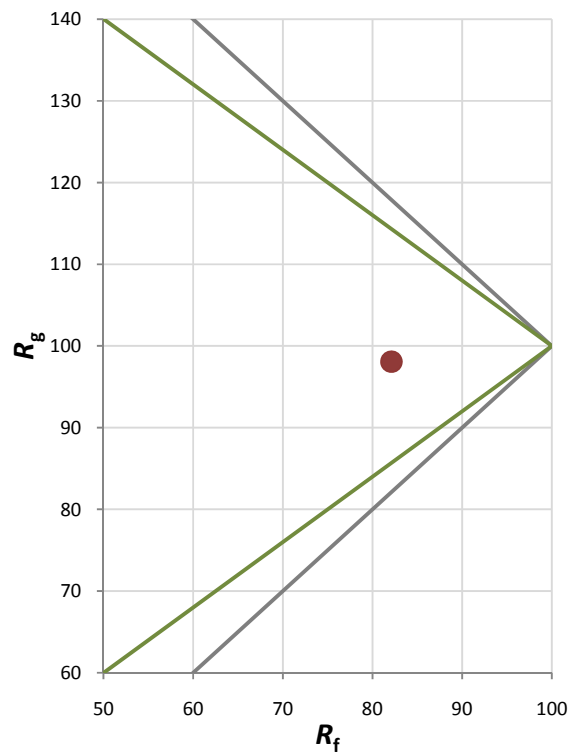
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	98

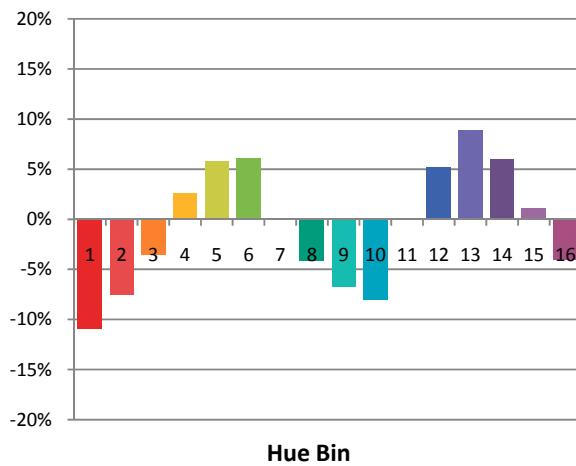
Spectral Power Distribution Comparison



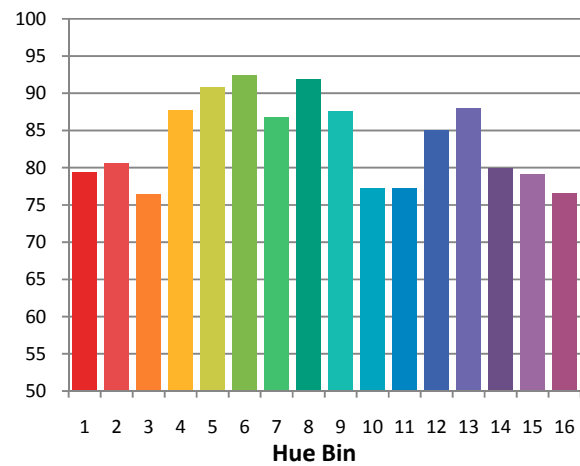
Plot of R_g versus R_f



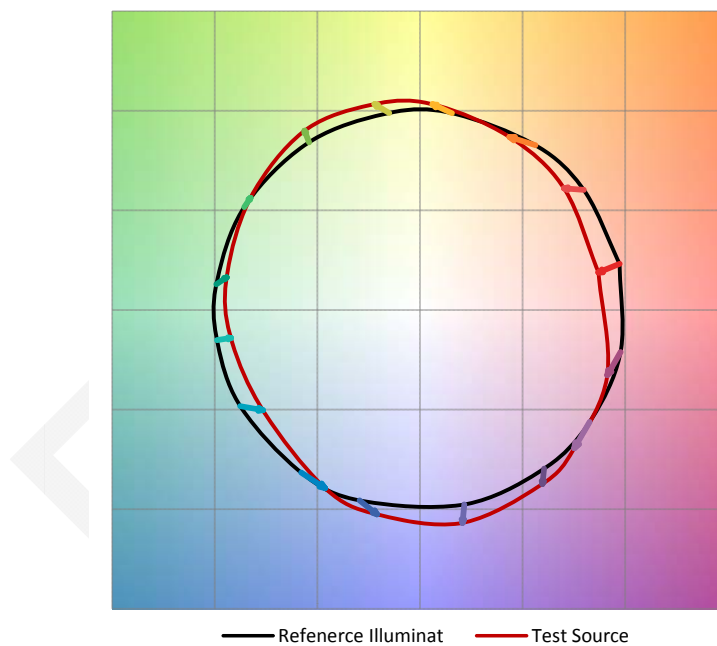
Chroma Shift by Hue



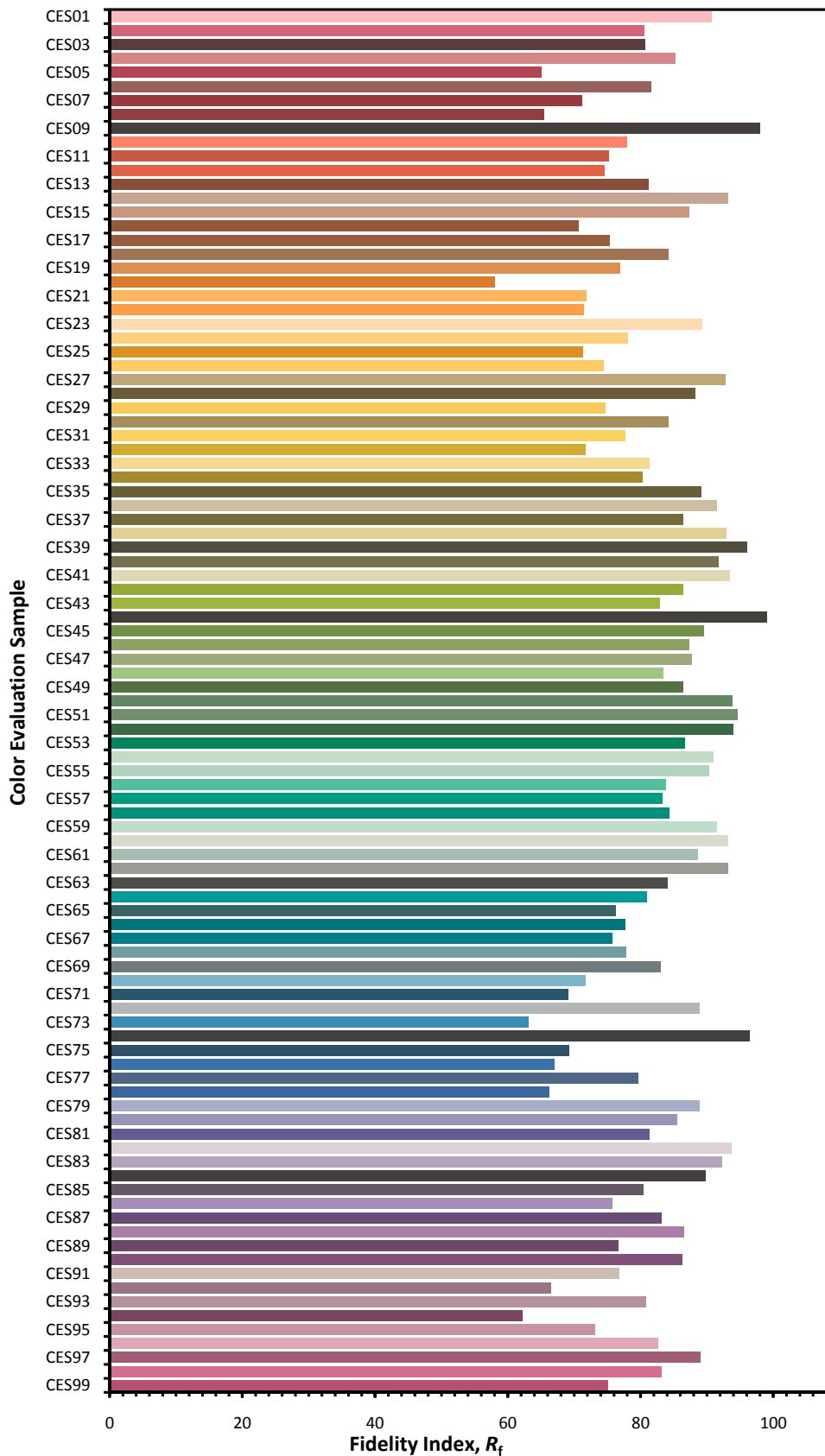
R_f by Hue



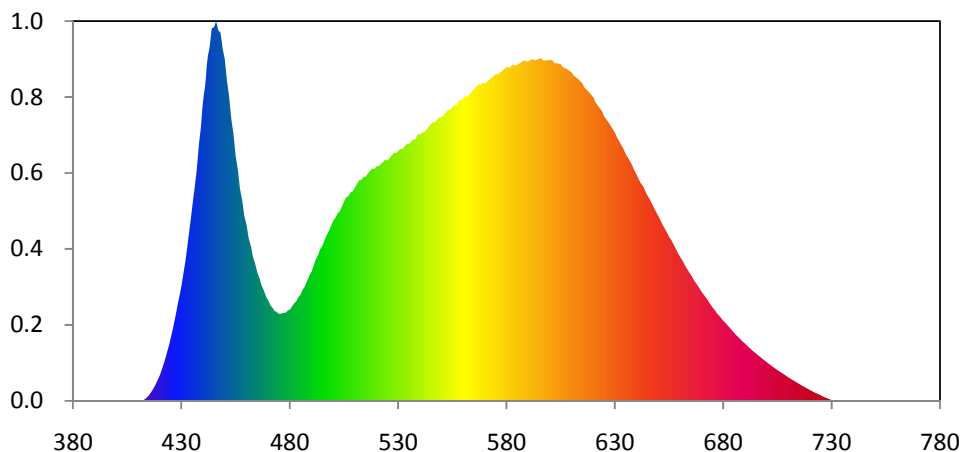
Color Vector Graphic



Color Fidelity by CES Sample



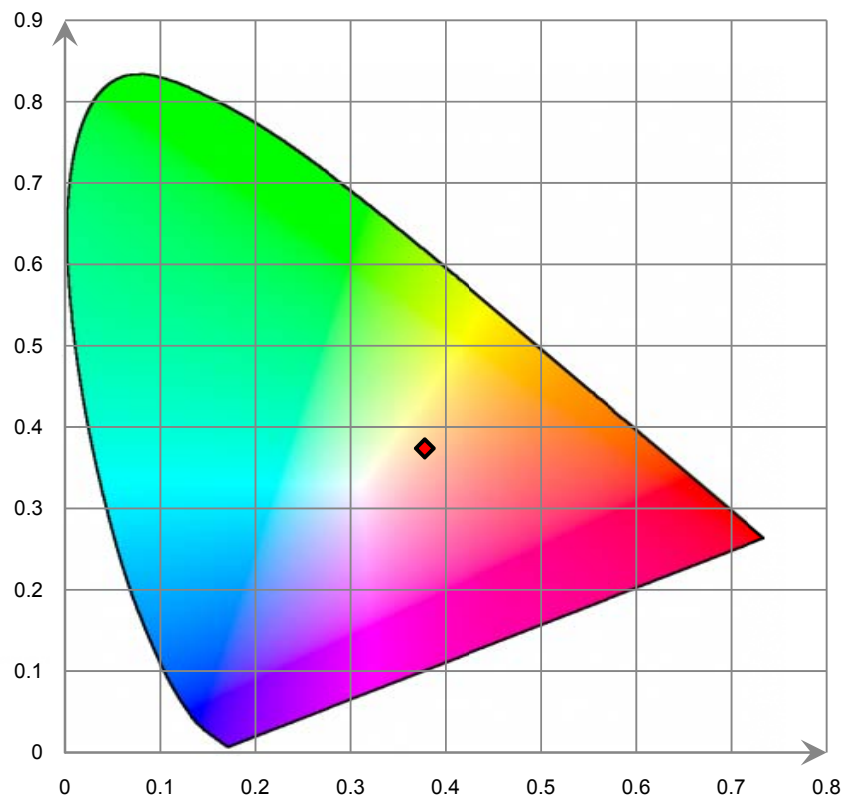
Relative Spectral Power Distribution



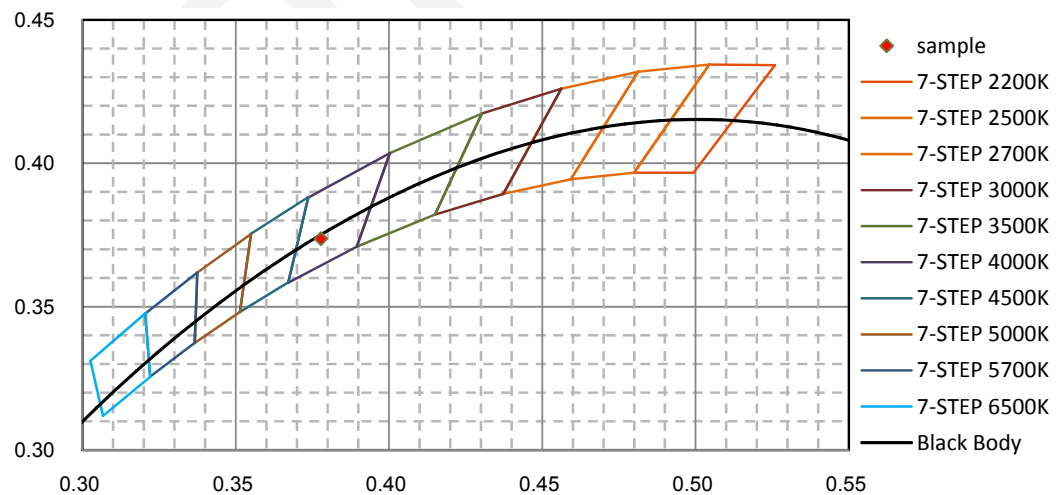
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.000E+00	421	8.715E+00	462	4.233E+01	503	5.170E+01	544	7.472E+01
381	0.000E+00	422	1.036E+01	463	3.933E+01	504	5.306E+01	545	7.538E+01
382	0.000E+00	423	1.261E+01	464	3.743E+01	505	5.434E+01	546	7.607E+01
383	0.000E+00	424	1.458E+01	465	3.498E+01	506	5.557E+01	547	7.596E+01
384	0.000E+00	425	1.672E+01	466	3.349E+01	507	5.589E+01	548	7.664E+01
385	0.000E+00	426	1.975E+01	467	3.141E+01	508	5.694E+01	549	7.746E+01
386	0.000E+00	427	2.211E+01	468	3.022E+01	509	5.713E+01	550	7.736E+01
387	0.000E+00	428	2.552E+01	469	2.844E+01	510	5.817E+01	551	7.801E+01
388	0.000E+00	429	2.824E+01	470	2.750E+01	511	5.920E+01	552	7.875E+01
389	0.000E+00	430	3.109E+01	471	2.609E+01	512	6.022E+01	553	7.947E+01
390	0.000E+00	431	3.531E+01	472	2.547E+01	513	6.031E+01	554	7.940E+01
391	0.000E+00	432	3.838E+01	473	2.454E+01	514	6.112E+01	555	8.007E+01
392	0.000E+00	433	4.356E+01	474	2.428E+01	515	6.121E+01	556	8.079E+01
393	0.000E+00	434	4.754E+01	475	2.373E+01	516	6.208E+01	557	8.060E+01
394	0.000E+00	435	5.330E+01	476	2.381E+01	517	6.278E+01	558	8.209E+01
395	0.000E+00	436	5.772E+01	477	2.407E+01	518	6.344E+01	559	8.201E+01
396	0.000E+00	437	6.246E+01	478	2.406E+01	519	6.332E+01	560	8.262E+01
397	0.000E+00	438	6.947E+01	479	2.466E+01	520	6.406E+01	561	8.322E+01
398	0.000E+00	439	7.448E+01	480	2.492E+01	521	6.403E+01	562	8.304E+01
399	0.000E+00	440	8.208E+01	481	2.573E+01	522	6.461E+01	563	8.373E+01
400	0.000E+00	441	8.648E+01	482	2.667E+01	523	6.518E+01	564	8.443E+01
401	0.000E+00	442	9.332E+01	483	2.720E+01	524	6.578E+01	565	8.507E+01
402	0.000E+00	443	9.658E+01	484	2.833E+01	525	6.561E+01	566	8.572E+01
403	0.000E+00	444	1.016E+02	485	2.902E+01	526	6.625E+01	567	8.641E+01
404	0.000E+00	445	1.019E+02	486	3.044E+01	527	6.694E+01	568	8.621E+01
405	0.000E+00	446	1.036E+02	487	3.132E+01	528	6.773E+01	569	8.677E+01
406	0.000E+00	447	1.011E+02	488	3.277E+01	529	6.765E+01	570	8.658E+01
407	0.000E+00	448	1.005E+02	489	3.427E+01	530	6.821E+01	571	8.708E+01
408	0.000E+00	449	9.611E+01	490	3.522E+01	531	6.881E+01	572	8.765E+01
409	0.000E+00	450	9.327E+01	491	3.690E+01	532	6.873E+01	573	8.816E+01
410	0.000E+00	451	8.728E+01	492	3.864E+01	533	6.946E+01	574	8.858E+01
411	9.600E-03	452	8.310E+01	493	3.969E+01	534	7.017E+01	575	8.917E+01
412	1.254E-01	453	7.686E+01	494	4.138E+01	535	7.006E+01	576	8.905E+01
413	4.198E-01	454	7.267E+01	495	4.229E+01	536	7.074E+01	577	8.962E+01
414	9.216E-01	455	6.679E+01	496	4.381E+01	537	7.144E+01	578	9.012E+01
415	1.535E+00	456	6.302E+01	497	4.534E+01	538	7.137E+01	579	9.058E+01
416	2.406E+00	457	5.795E+01	498	4.617E+01	539	7.283E+01	580	9.113E+01
417	3.315E+00	458	5.470E+01	499	4.771E+01	540	7.265E+01	581	9.089E+01
418	4.342E+00	459	5.057E+01	500	4.922E+01	541	7.331E+01	582	9.130E+01
419	5.716E+00	460	4.807E+01	501	4.986E+01	542	7.320E+01	583	9.179E+01
420	6.949E+00	461	4.450E+01	502	5.122E+01	543	7.399E+01	584	9.144E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	9.175E+01	626	7.678E+01	667	3.243E+01	708	7.253E+00	749	0.000E+00
586	9.210E+01	627	7.599E+01	668	3.156E+01	709	6.843E+00	750	0.000E+00
587	9.252E+01	628	7.509E+01	669	3.071E+01	710	6.415E+00	751	0.000E+00
588	9.298E+01	629	7.412E+01	670	2.972E+01	711	6.038E+00	752	0.000E+00
589	9.259E+01	630	7.315E+01	671	2.895E+01	712	5.698E+00	753	0.000E+00
590	9.271E+01	631	7.176E+01	672	2.817E+01	713	5.341E+00	754	0.000E+00
591	9.295E+01	632	7.075E+01	673	2.734E+01	714	4.999E+00	755	0.000E+00
592	9.331E+01	633	6.969E+01	674	2.637E+01	715	4.607E+00	756	0.000E+00
593	9.288E+01	634	6.868E+01	675	2.555E+01	716	4.266E+00	757	0.000E+00
594	9.312E+01	635	6.729E+01	676	2.479E+01	717	3.944E+00	758	0.000E+00
595	9.337E+01	636	6.634E+01	677	2.396E+01	718	3.608E+00	759	0.000E+00
596	9.348E+01	637	6.529E+01	678	2.326E+01	719	3.276E+00	760	0.000E+00
597	9.282E+01	638	6.421E+01	679	2.257E+01	720	2.964E+00	761	0.000E+00
598	9.289E+01	639	6.277E+01	680	2.181E+01	721	2.666E+00	762	0.000E+00
599	9.293E+01	640	6.172E+01	681	2.127E+01	722	2.363E+00	763	0.000E+00
600	9.301E+01	641	6.039E+01	682	2.054E+01	723	2.042E+00	764	0.000E+00
601	9.295E+01	642	5.929E+01	683	1.990E+01	724	1.786E+00	765	0.000E+00
602	9.216E+01	643	5.852E+01	684	1.926E+01	725	1.509E+00	766	0.000E+00
603	9.210E+01	644	5.714E+01	685	1.856E+01	726	1.183E+00	767	0.000E+00
604	9.204E+01	645	5.603E+01	686	1.788E+01	727	9.175E-01	768	0.000E+00
605	9.186E+01	646	5.499E+01	687	1.731E+01	728	6.786E-01	769	0.000E+00
606	9.102E+01	647	5.393E+01	688	1.674E+01	729	4.692E-01	770	0.000E+00
607	9.076E+01	648	5.260E+01	689	1.615E+01	730	2.567E-01	771	0.000E+00
608	9.044E+01	649	5.154E+01	690	1.562E+01	731	1.268E-01	772	0.000E+00
609	9.004E+01	650	5.041E+01	691	1.501E+01	732	6.020E-02	773	0.000E+00
610	8.962E+01	651	4.932E+01	692	1.450E+01	733	2.880E-02	774	0.000E+00
611	8.866E+01	652	4.802E+01	693	1.394E+01	734	1.380E-02	775	0.000E+00
612	8.831E+01	653	4.700E+01	694	1.345E+01	735	6.600E-03	776	0.000E+00
613	8.779E+01	654	4.591E+01	695	1.292E+01	736	3.200E-03	777	0.000E+00
614	8.716E+01	655	4.465E+01	696	1.244E+01	737	1.500E-03	778	0.000E+00
615	8.658E+01	656	4.393E+01	697	1.200E+01	738	7.000E-04	779	0.000E+00
616	8.542E+01	657	4.265E+01	698	1.151E+01	739	3.000E-04	780	0.000E+00
617	8.485E+01	658	4.161E+01	699	1.101E+01	740	2.000E-04		
618	8.425E+01	659	4.033E+01	700	1.054E+01	741	1.000E-04		
619	8.352E+01	660	3.936E+01	701	1.011E+01	742	0.000E+00		
620	8.280E+01	661	3.839E+01	702	9.652E+00	743	0.000E+00		
621	8.150E+01	662	3.739E+01	703	9.232E+00	744	0.000E+00		
622	8.058E+01	663	3.626E+01	704	8.793E+00	745	0.000E+00		
623	7.983E+01	664	3.535E+01	705	8.390E+00	746	0.000E+00		
624	7.907E+01	665	3.444E+01	706	8.029E+00	747	0.000E+00		
625	7.765E+01	666	3.336E+01	707	7.619E+00	748	0.000E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

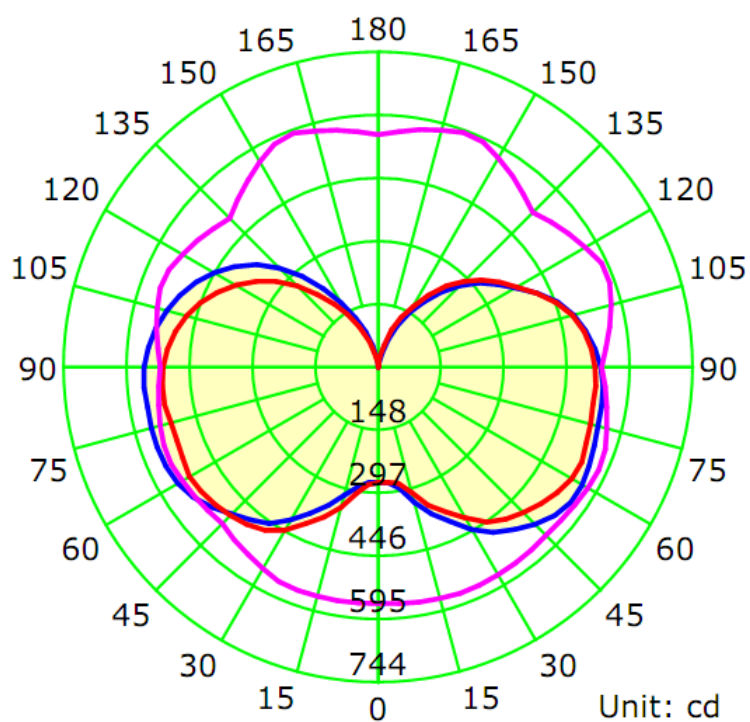
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.3820	44.98	0.9810

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
5538.4	123.13	595.8	2.43	2.36

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	274.5	270.3	273.8	274.1	273.2
Field Angle (10% I_{max}):	326.8	325.2	326.8	327.2	326.5

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	272	272	272	272	272	272	272	272
5.0°	274	275	274	273	273	273	273	273
10.0°	292	290	282	282	279	279	282	279
15.0°	330	316	315	308	308	297	306	296
20.0°	370	345	360	340	348	342	341	335
25.0°	403	397	396	371	378	403	374	394
30.0°	443	456	430	422	411	458	409	436
35.0°	476	491	467	493	447	496	446	487
40.0°	501	520	494	531	469	541	470	527
45.0°	525	551	518	546	486	565	488	557
50.0°	545	563	540	561	503	576	501	577
55.0°	556	565	554	573	517	586	509	591
60.0°	558	569	562	577	529	591	519	596
65.0°	551	560	553	572	532	590	527	595
70.0°	545	556	548	568	525	581	528	586
75.0°	539	551	542	560	522	574	525	581
80.0°	537	549	539	558	516	570	524	578
85.0°	535	551	537	558	518	571	526	578
90.0°	527	548	531	556	514	567	525	576
95.0°	515	541	522	549	506	562	519	568
100.0°	500	530	507	538	494	552	509	558
105.0°	480	514	486	523	476	536	494	542
110.0°	453	494	458	504	449	517	474	522
115.0°	415	471	422	481	415	494	448	497
120.0°	377	442	385	453	381	467	413	469
125.0°	343	409	354	421	351	437	373	436
130.0°	310	371	322	383	321	401	335	399
135.0°	274	328	289	339	288	360	299	356
140.0°	231	281	249	289	251	316	260	306
145.0°	190	229	206	237	207	265	214	254
150.0°	150	176	167	192	168	213	174	214
155.0°	109	134	127	147	131	166	136	157
160.0°	69	74	86	83	95	116	97	94
165.0°	35	37	47	34	54	54	57	51
170.0°	11	14	19	15	27	19	25	22
175.0°	2	3	3	5	6	5	5	5
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°	272	272	272	272	272	272	272	272
5.0°	274	274	275	275	279	275	279	276
10.0°	287	282	296	288	304	290	304	296
15.0°	314	308	331	323	343	324	340	326
20.0°	347	359	366	354	376	372	373	382
25.0°	382	411	396	396	408	411	404	418
30.0°	417	453	430	445	444	451	439	461
35.0°	451	497	458	489	470	486	465	497
40.0°	471	536	476	514	486	508	485	534
45.0°	492	564	487	531	496	525	503	554
50.0°	515	581	493	545	506	538	516	560
55.0°	535	591	495	554	512	543	522	565
60.0°	549	593	498	554	517	543	523	563
65.0°	556	583	500	543	512	534	518	553
70.0°	557	579	507	540	508	529	514	551
75.0°	556	574	511	537	509	525	509	547
80.0°	556	573	514	538	515	528	512	548
85.0°	558	573	517	539	513	525	507	546
90.0°	554	568	514	533	510	519	500	542
95.0°	546	560	508	525	502	510	489	532
100.0°	535	546	496	512	489	496	473	518
105.0°	519	528	479	495	472	478	454	501
110.0°	500	506	456	474	448	456	429	479
115.0°	476	479	429	449	421	431	400	453
120.0°	450	447	397	420	389	400	367	422
125.0°	417	415	359	388	355	365	332	389
130.0°	377	376	318	357	317	325	298	348
135.0°	332	331	275	306	273	285	261	307
140.0°	281	281	223	256	224	236	218	253
145.0°	227	239	180	210	183	191	180	199
150.0°	177	188	142	172	146	145	143	150
155.0°	130	123	104	118	107	97	104	103
160.0°	90	81	64	66	65	50	64	57
165.0°	55	47	36	33	30	21	31	23
170.0°	16	17	9	11	7	6	9	7
175.0°	4	3	2	1	1	1	1	0
180.0°	0	0	0	0	0	0	0	0

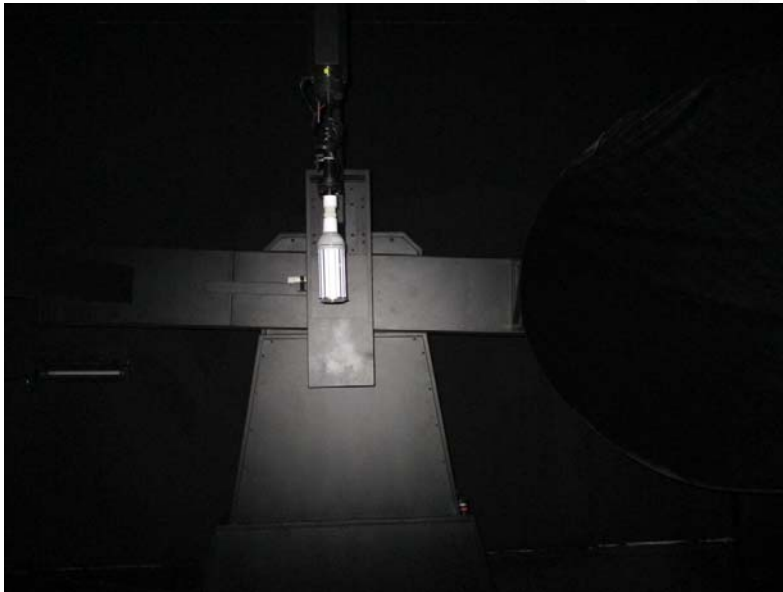
Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	6.5	0.12	0-5	6.5	0.12
5-10	20.1	0.36	0-10	26.7	0.48
10-15	36.0	0.65	0-15	62.6	1.13
15-20	55.6	1.00	0-20	118.2	2.13
20-25	79.0	1.43	0-25	197.2	3.56
25-30	105.5	1.91	0-30	302.8	5.47
30-35	134.6	2.43	0-35	437.3	7.90
35-40	163.5	2.95	0-40	600.8	10.85
40-45	190.4	3.44	0-45	791.2	14.29
45-50	214.8	3.88	0-50	1006.0	18.16
50-55	236.3	4.27	0-55	1242.3	22.43
55-60	254.4	4.59	0-60	1496.6	27.02
60-65	267.6	4.83	0-65	1764.3	31.86
65-70	276.9	5.00	0-70	2041.2	36.86
70-75	284.0	5.13	0-75	2325.1	41.98
75-80	289.5	5.23	0-80	2614.7	47.21
80-85	293.8	5.31	0-85	2908.5	52.52
85-90	294.9	5.32	0-90	3203.4	57.84
90-95	291.6	5.26	0-95	3495.0	63.10
95-100	283.8	5.12	0-100	3778.7	68.23
100-105	271.4	4.90	0-105	4050.1	73.13
105-110	254.8	4.60	0-110	4304.9	77.73
110-115	234.2	4.23	0-115	4539.1	81.96
115-120	210.6	3.80	0-120	4749.7	85.76
120-125	185.2	3.34	0-125	4935.0	89.10
125-130	159.0	2.87	0-130	5094.0	91.98
130-135	132.1	2.39	0-135	5226.1	94.36
135-140	104.8	1.89	0-140	5330.9	96.25
140-145	78.9	1.42	0-145	5409.8	97.68
145-150	56.4	1.02	0-150	5466.2	98.70
150-155	37.2	0.67	0-155	5503.5	99.37
155-160	21.3	0.38	0-160	5524.7	99.75
160-165	9.8	0.18	0-165	5534.5	99.93
165-170	3.2	0.06	0-170	5537.7	99.99
170-175	0.6	0.01	0-175	5538.3	100.00
175-180	0.0	0.00	0-180	5538.4	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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