

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 65HIDHB/850/BYP/EX39

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	PKS180312081-10-1
Test Date:	2018-03-14 to 2018-03-16
Report Date:	2018-03-16
Reviewed By:	Ray Gao/EE Engineer <i>Ry Gao</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268
Test Facility:	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
Accreditation:	The IAS Accreditation Number TL-749.

1. Product Description

General Information:

One sample was received on 2018-03-12 and used for testing.

Model Tested: 65HIDHB/850/BYP/EX39
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Luminaires
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120 VAC 50/60Hz
 Rated Power: 65W
 Nominal CCT: 5000K
 Nominal Lumen Output: 8600lm

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

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2018-01-24	2019-01-24
Power Meter	INVENTFINE	WT500	GSJWQ20009	2017-03-23	2018-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2017-03-23	2018-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-01-24	2019-01-24
Thermal Meter	KEJIAN	TA298	N/A	2017-11-14	2018-11-14
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2017-03-23	2018-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2017-03-23	2018-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2017-03-23	2018-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2017-03-23	2018-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2018-01-24	2019-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2017-11-14	2018-11-14
Standard Light Source	INVENTFINE	N/A	JWBYR040007	2018-01-24	2019-01-24

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) 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.

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 $U=2.6\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=24\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.5(K=2)$, at the 95% confidence level.

The uncertainty of power meter AC current $U=0.16\%$ of rdg, AC Voltage $U=0.18\%$ of rdg, Power $U=0.14\%$ ($K=2$), 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 flux is $U=2.6\%$ ($K=2$), 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: **1.0 hour**

Test orientation: **Base Up**

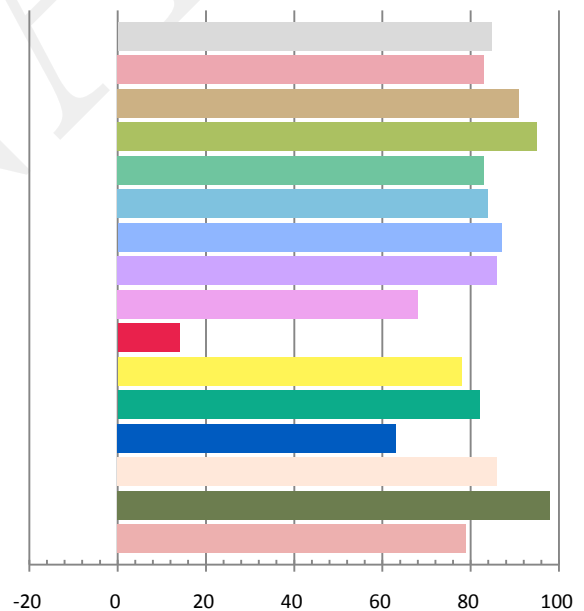
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.5417	64.08	0.9857	8723.6	136.14

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
27.320	5102	0.00149	0.3425	0.3525	0.2093	0.4847

Color Rendering Index

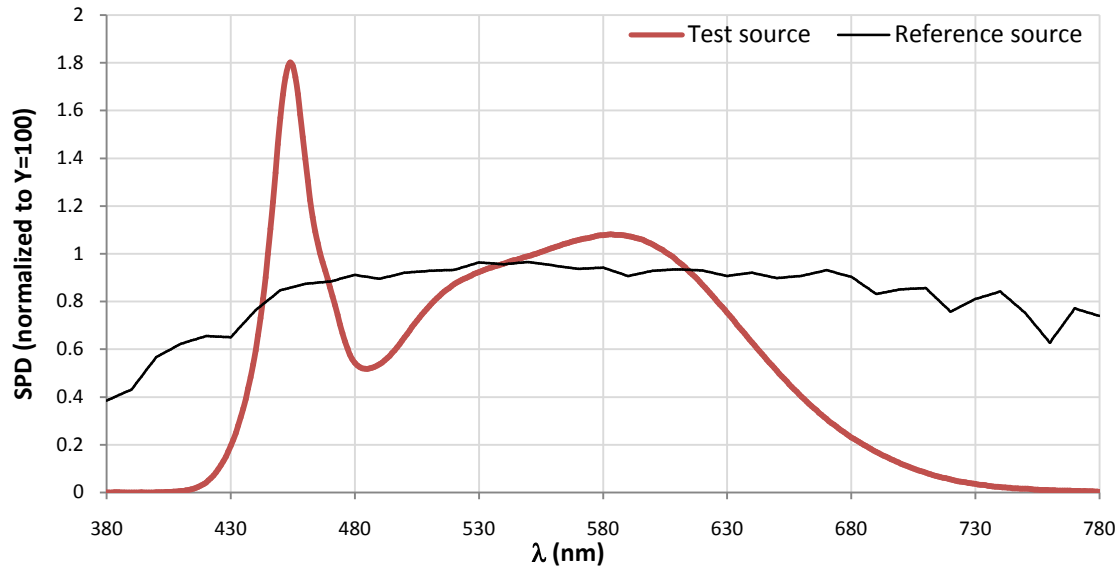
Ra 84.7			
R1 83	R2 91	R3 95	R4 83
R5 84	R6 87	R7 86	R8 68
R9 14	R10 78	R11 82	R12 63
R13 86	R14 98	R15 79	



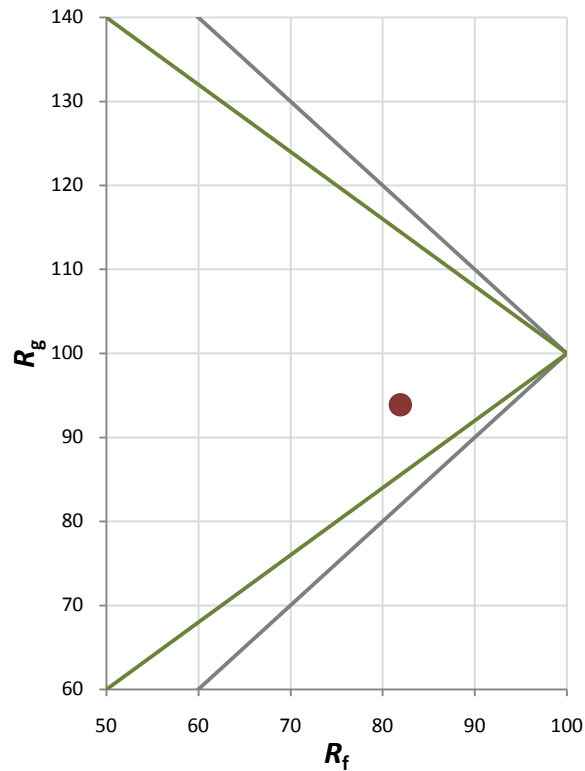
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	94

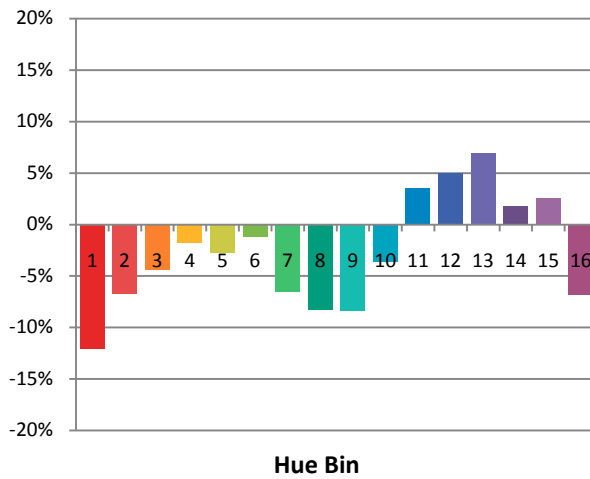
Spectral Power Distribution Comparison



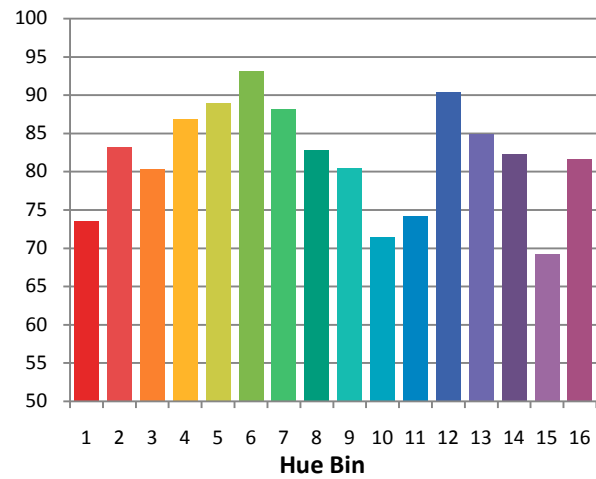
Plot of R_g versus R_f



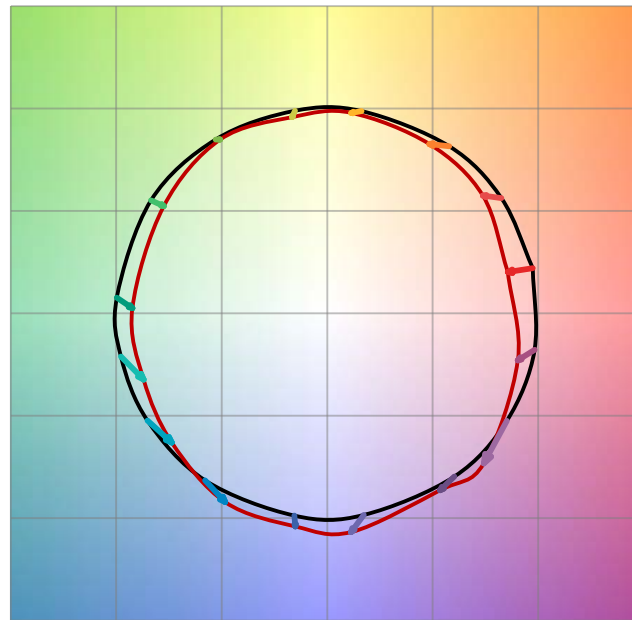
Chroma Shift by Hue



R_t by Hue

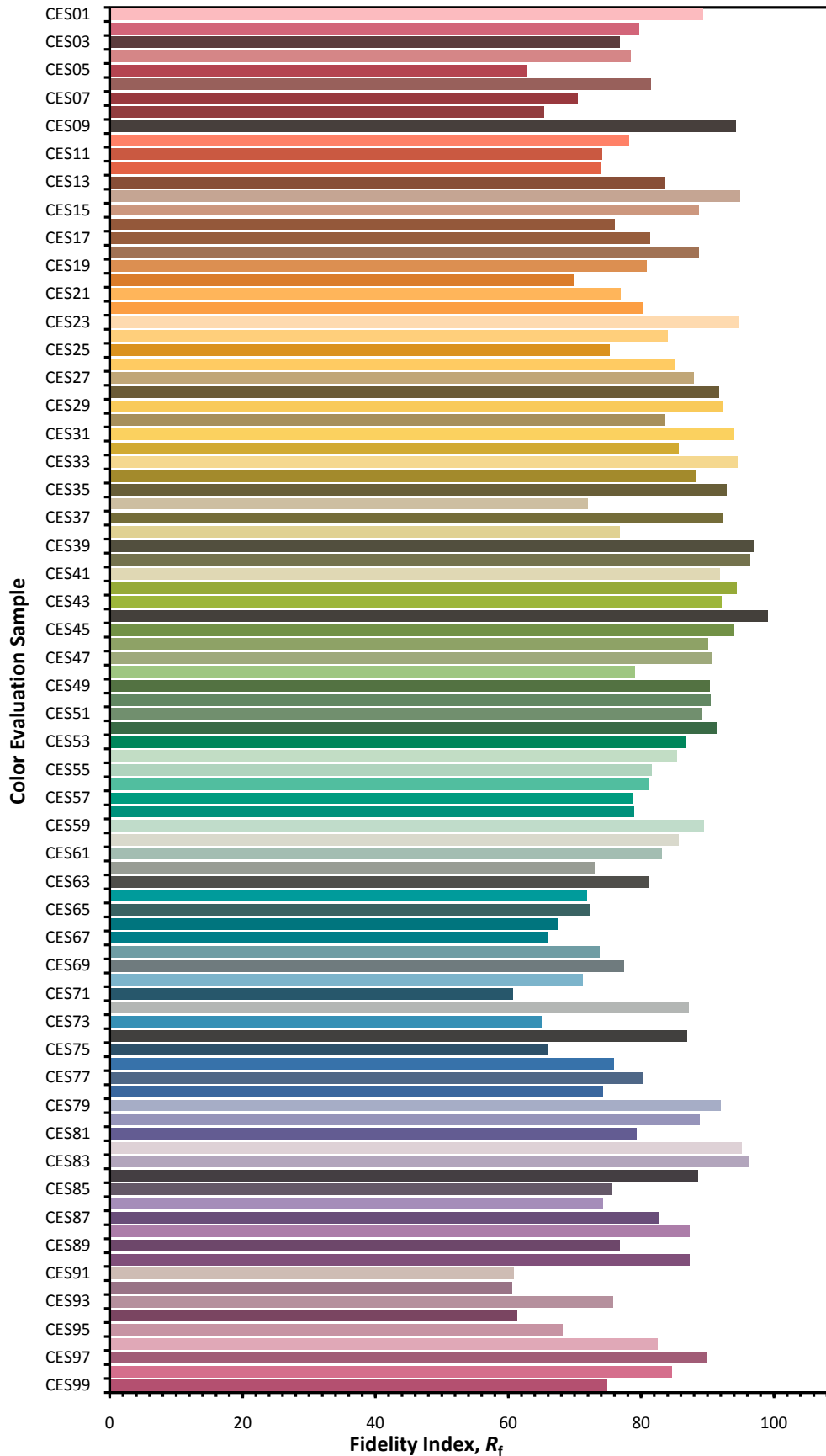


Color Vector Graphic

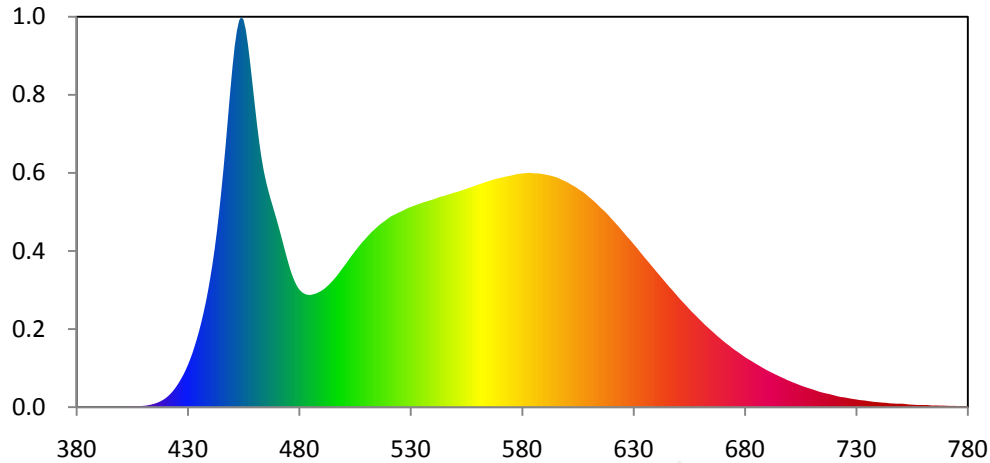


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



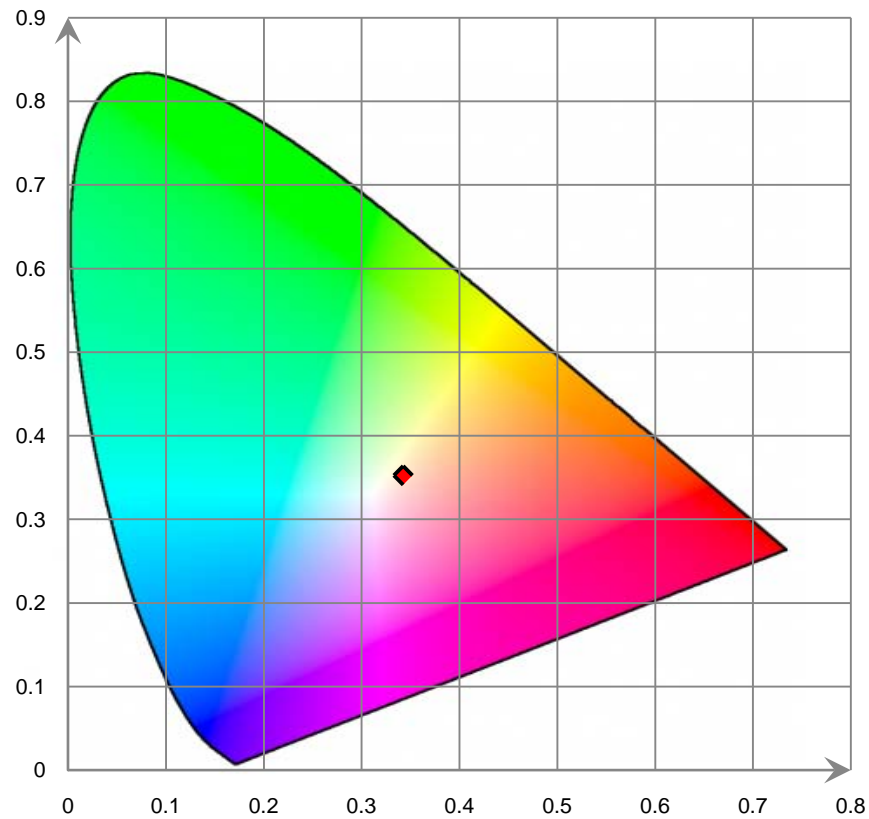
Relative Spectral Power Distribution



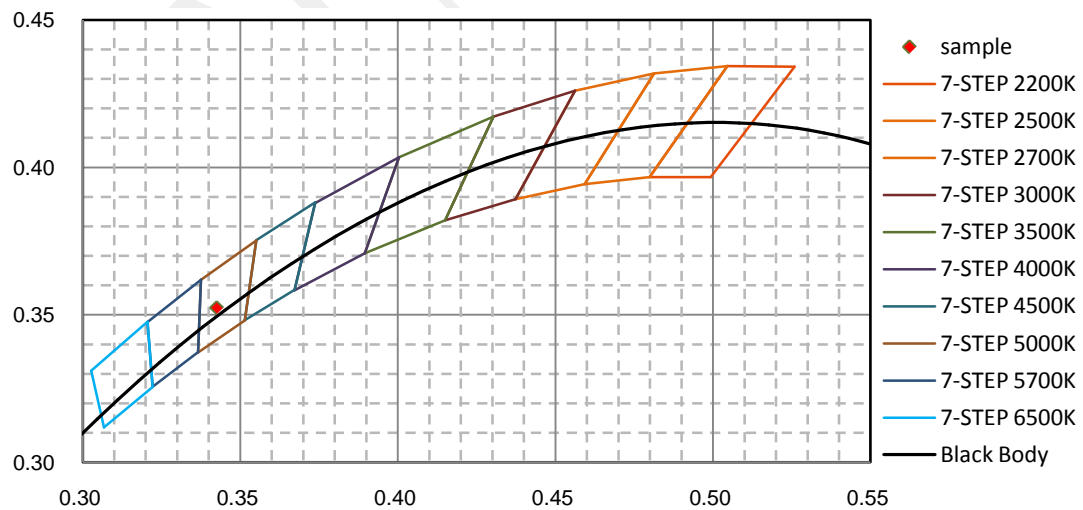
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	9.620E-02	421	6.409E+00	462	1.562E+02	503	8.844E+01	544	1.242E+02
381	6.250E-02	422	7.655E+00	463	1.472E+02	504	9.017E+01	545	1.245E+02
382	6.650E-02	423	9.088E+00	464	1.395E+02	505	9.187E+01	546	1.249E+02
383	7.440E-02	424	1.071E+01	465	1.333E+02	506	9.360E+01	547	1.253E+02
384	9.190E-02	425	1.254E+01	466	1.280E+02	507	9.521E+01	548	1.258E+02
385	9.210E-02	426	1.461E+01	467	1.232E+02	508	9.678E+01	549	1.262E+02
386	7.040E-02	427	1.684E+01	468	1.187E+02	509	9.826E+01	550	1.265E+02
387	7.110E-02	428	1.920E+01	469	1.142E+02	510	9.971E+01	551	1.269E+02
388	4.850E-02	429	2.191E+01	470	1.097E+02	511	1.012E+02	552	1.274E+02
389	4.890E-02	430	2.491E+01	471	1.049E+02	512	1.026E+02	553	1.278E+02
390	5.010E-02	431	2.818E+01	472	1.001E+02	513	1.039E+02	554	1.282E+02
391	3.360E-02	432	3.180E+01	473	9.506E+01	514	1.051E+02	555	1.287E+02
392	3.280E-02	433	3.585E+01	474	9.005E+01	515	1.063E+02	556	1.291E+02
393	5.610E-02	434	4.019E+01	475	8.529E+01	516	1.074E+02	557	1.295E+02
394	7.720E-02	435	4.483E+01	476	8.084E+01	517	1.084E+02	558	1.300E+02
395	6.590E-02	436	4.995E+01	477	7.705E+01	518	1.094E+02	559	1.305E+02
396	7.100E-02	437	5.557E+01	478	7.385E+01	519	1.104E+02	560	1.310E+02
397	7.040E-02	438	6.163E+01	479	7.125E+01	520	1.114E+02	561	1.315E+02
398	6.290E-02	439	6.843E+01	480	6.931E+01	521	1.123E+02	562	1.319E+02
399	5.430E-02	440	7.594E+01	481	6.796E+01	522	1.130E+02	563	1.323E+02
400	9.110E-02	441	8.408E+01	482	6.707E+01	523	1.136E+02	564	1.328E+02
401	1.031E-01	442	9.320E+01	483	6.644E+01	524	1.143E+02	565	1.332E+02
402	1.562E-01	443	1.035E+02	484	6.617E+01	525	1.149E+02	566	1.336E+02
403	2.285E-01	444	1.150E+02	485	6.615E+01	526	1.155E+02	567	1.340E+02
404	2.821E-01	445	1.275E+02	486	6.643E+01	527	1.161E+02	568	1.344E+02
405	3.524E-01	446	1.410E+02	487	6.678E+01	528	1.168E+02	569	1.347E+02
406	4.153E-01	447	1.554E+02	488	6.729E+01	529	1.175E+02	570	1.350E+02
407	4.680E-01	448	1.709E+02	489	6.796E+01	530	1.180E+02	571	1.353E+02
408	5.371E-01	449	1.863E+02	490	6.867E+01	531	1.184E+02	572	1.357E+02
409	6.680E-01	450	2.004E+02	491	6.955E+01	532	1.189E+02	573	1.359E+02
410	7.778E-01	451	2.128E+02	492	7.064E+01	533	1.195E+02	574	1.362E+02
411	9.237E-01	452	2.219E+02	493	7.183E+01	534	1.199E+02	575	1.365E+02
412	1.133E+00	453	2.279E+02	494	7.314E+01	535	1.203E+02	576	1.368E+02
413	1.390E+00	454	2.300E+02	495	7.455E+01	536	1.208E+02	577	1.371E+02
414	1.716E+00	455	2.281E+02	496	7.604E+01	537	1.212E+02	578	1.374E+02
415	2.072E+00	456	2.222E+02	497	7.764E+01	538	1.216E+02	579	1.376E+02
416	2.503E+00	457	2.130E+02	498	7.938E+01	539	1.220E+02	580	1.377E+02
417	3.042E+00	458	2.021E+02	499	8.118E+01	540	1.224E+02	581	1.378E+02
418	3.680E+00	459	1.903E+02	500	8.293E+01	541	1.228E+02	582	1.379E+02
419	4.431E+00	460	1.783E+02	501	8.471E+01	542	1.233E+02	583	1.381E+02
420	5.316E+00	461	1.667E+02	502	8.662E+01	543	1.238E+02	584	1.380E+02

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.378E+02	626	1.022E+02	667	4.268E+01	708	1.144E+01	749	2.054E+00
586	1.377E+02	627	1.007E+02	668	4.150E+01	709	1.105E+01	750	2.071E+00
587	1.377E+02	628	9.925E+01	669	4.038E+01	710	1.064E+01	751	2.000E+00
588	1.376E+02	629	9.775E+01	670	3.928E+01	711	1.017E+01	752	1.867E+00
589	1.374E+02	630	9.613E+01	671	3.819E+01	712	9.748E+00	753	1.670E+00
590	1.371E+02	631	9.461E+01	672	3.721E+01	713	9.279E+00	754	1.563E+00
591	1.369E+02	632	9.304E+01	673	3.623E+01	714	8.876E+00	755	1.504E+00
592	1.366E+02	633	9.135E+01	674	3.517E+01	715	8.540E+00	756	1.416E+00
593	1.363E+02	634	8.974E+01	675	3.417E+01	716	8.226E+00	757	1.327E+00
594	1.360E+02	635	8.816E+01	676	3.321E+01	717	7.947E+00	758	1.292E+00
595	1.356E+02	636	8.662E+01	677	3.234E+01	718	7.678E+00	759	1.314E+00
596	1.352E+02	637	8.506E+01	678	3.140E+01	719	7.331E+00	760	1.266E+00
597	1.345E+02	638	8.344E+01	679	3.044E+01	720	6.988E+00	761	1.258E+00
598	1.339E+02	639	8.189E+01	680	2.952E+01	721	6.635E+00	762	1.260E+00
599	1.333E+02	640	8.030E+01	681	2.867E+01	722	6.314E+00	763	1.097E+00
600	1.327E+02	641	7.874E+01	682	2.790E+01	723	6.032E+00	764	9.942E-01
601	1.320E+02	642	7.722E+01	683	2.712E+01	724	5.858E+00	765	9.882E-01
602	1.312E+02	643	7.566E+01	684	2.631E+01	725	5.668E+00	766	1.018E+00
603	1.304E+02	644	7.409E+01	685	2.551E+01	726	5.461E+00	767	9.521E-01
604	1.297E+02	645	7.252E+01	686	2.475E+01	727	5.182E+00	768	9.316E-01
605	1.287E+02	646	7.100E+01	687	2.397E+01	728	4.922E+00	769	9.108E-01
606	1.278E+02	647	6.954E+01	688	2.319E+01	729	4.741E+00	770	8.653E-01
607	1.270E+02	648	6.809E+01	689	2.243E+01	730	4.547E+00	771	8.159E-01
608	1.261E+02	649	6.654E+01	690	2.170E+01	731	4.308E+00	772	7.707E-01
609	1.250E+02	650	6.499E+01	691	2.102E+01	732	4.119E+00	773	7.474E-01
610	1.238E+02	651	6.352E+01	692	2.038E+01	733	4.026E+00	774	7.867E-01
611	1.228E+02	652	6.209E+01	693	1.973E+01	734	3.889E+00	775	7.108E-01
612	1.217E+02	653	6.072E+01	694	1.909E+01	735	3.649E+00	776	6.248E-01
613	1.204E+02	654	5.933E+01	695	1.848E+01	736	3.466E+00	777	5.968E-01
614	1.192E+02	655	5.788E+01	696	1.786E+01	737	3.289E+00	778	5.737E-01
615	1.178E+02	656	5.642E+01	697	1.724E+01	738	3.110E+00	779	4.633E-01
616	1.166E+02	657	5.516E+01	698	1.664E+01	739	3.005E+00	780	3.975E-01
617	1.154E+02	658	5.389E+01	699	1.599E+01	740	2.909E+00		
618	1.141E+02	659	5.252E+01	700	1.544E+01	741	2.759E+00		
619	1.127E+02	660	5.123E+01	701	1.492E+01	742	2.673E+00		
620	1.112E+02	661	4.992E+01	702	1.439E+01	743	2.599E+00		
621	1.097E+02	662	4.861E+01	703	1.386E+01	744	2.472E+00		
622	1.083E+02	663	4.742E+01	704	1.334E+01	745	2.281E+00		
623	1.069E+02	664	4.624E+01	705	1.279E+01	746	2.211E+00		
624	1.053E+02	665	4.503E+01	706	1.233E+01	747	2.145E+00		
625	1.038E+02	666	4.390E+01	707	1.187E+01	748	2.050E+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: **Base Up**

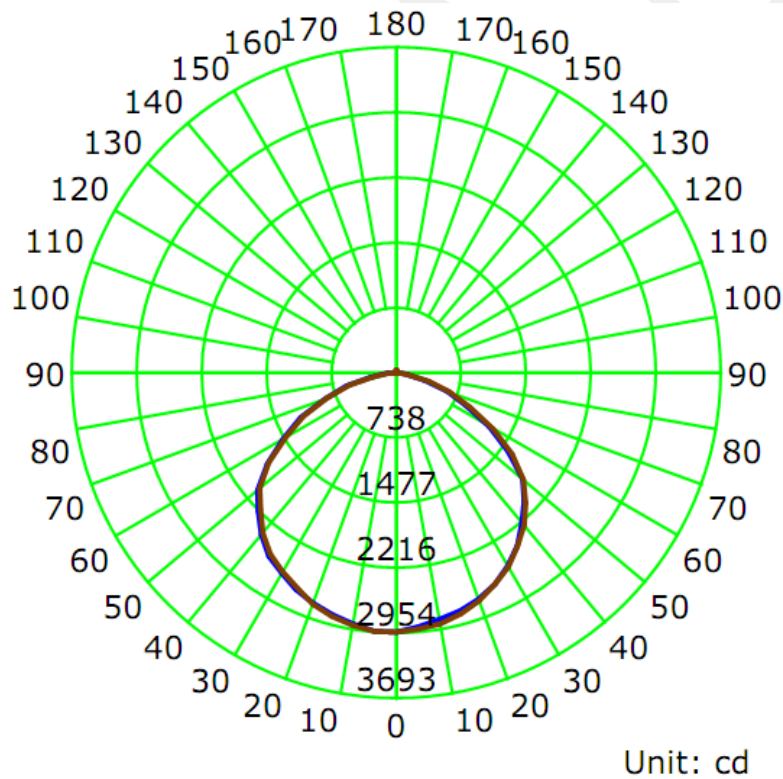
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5400	64.02	0.9890

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
8745.4	136.65	2954.8	1.31	1.30

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	116.7	116.8	116.8	116.5	116.7
Field Angle (10% I _{max}):	156.4	156.6	156.5	156.4	156.5

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2941	2941	2941	2941	2941	2941	2941	2941
5.0°	2894	2886	2905	2906	2919	2911	2937	2931
10.0°	2842	2833	2849	2861	2888	2878	2886	2879
15.0°	2793	2773	2781	2807	2835	2842	2839	2827
20.0°	2733	2710	2709	2718	2757	2763	2780	2769
25.0°	2649	2629	2630	2632	2648	2668	2699	2692
30.0°	2536	2512	2518	2518	2544	2564	2609	2630
35.0°	2398	2375	2389	2389	2409	2444	2493	2529
40.0°	2225	2206	2229	2237	2265	2321	2367	2378
45.0°	2057	2044	2052	2068	2081	2143	2175	2194
50.0°	1882	1834	1858	1835	1890	1948	2011	2055
55.0°	1560	1573	1519	1556	1607	1659	1728	1764
60.0°	1224	1198	1227	1251	1279	1320	1405	1492
65.0°	879	861	836	903	927	1022	1087	1186
70.0°	620	598	612	616	647	707	800	836
75.0°	345	316	315	340	388	449	514	571
80.0°	126	111	113	123	154	186	229	285
85.0°	40	39	38	43	49	61	76	93
90.0°	21	22	22	24	25	29	27	34
95.0°	11	12	13	14	16	19	21	21
100.0°	5	5	6	5	7	8	10	11
105.0°	3	4	4	5	4	4	4	5
110.0°	4	7	5	6	6	6	4	6
115.0°	9	8	7	8	9	11	8	8
120.0°	9	9	10	9	10	11	11	13
125.0°	11	11	12	12	12	12	11	11
130.0°	14	14	15	14	14	13	14	13
135.0°	16	17	17	17	17	16	16	16
140.0°	19	20	20	20	20	19	18	18
145.0°	22	22	23	23	23	22	21	20
150.0°	24	25	26	26	26	25	24	23
155.0°	28	28	28	29	29	28	27	27
160.0°	30	31	31	32	31	31	30	29
165.0°	33	34	35	35	35	34	32	32
170.0°	35	35	38	38	37	36	35	35
175.0°	30	31	33	32	33	33	36	32
180.0°	0	0	0	0	0	0	0	0

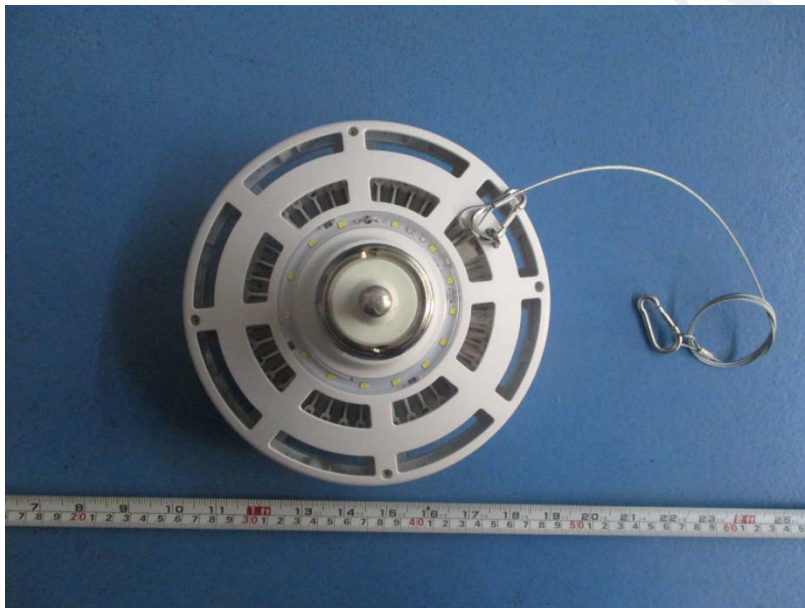
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	2941	2941	2941	2941	2941	2941	2941	2941
5.0°	2944	2943	2955	2950	2946	2927	2923	2901
10.0°	2893	2900	2912	2920	2905	2890	2879	2853
15.0°	2840	2851	2873	2873	2859	2850	2841	2815
20.0°	2780	2795	2818	2825	2792	2777	2774	2743
25.0°	2716	2728	2757	2721	2690	2685	2669	2639
30.0°	2624	2630	2651	2632	2606	2578	2563	2535
35.0°	2539	2542	2553	2526	2507	2467	2455	2405
40.0°	2392	2408	2417	2404	2376	2336	2290	2234
45.0°	2227	2244	2246	2226	2194	2169	2122	2065
50.0°	2074	2098	2087	2068	2036	2008	1960	1901
55.0°	1803	1850	1857	1807	1772	1677	1637	1575
60.0°	1495	1530	1546	1525	1457	1399	1309	1240
65.0°	1213	1229	1234	1216	1166	1036	969	915
70.0°	865	881	872	881	842	751	698	648
75.0°	587	622	612	581	560	489	425	353
80.0°	307	324	345	314	265	218	166	134
85.0°	97	117	113	107	85	71	56	42
90.0°	34	37	37	36	31	29	23	24
95.0°	19	19	19	20	20	20	17	13
100.0°	11	12	12	11	11	9	8	5
105.0°	5	5	5	5	4	4	3	5
110.0°	4	4	4	6	5	5	5	8
115.0°	7	8	6	9	8	14	12	11
120.0°	11	13	15	14	14	13	11	10
125.0°	11	12	14	13	13	11	11	10
130.0°	12	12	13	13	13	13	12	13
135.0°	14	14	14	14	15	14	15	16
140.0°	17	17	17	16	18	18	17	18
145.0°	19	20	19	19	20	20	20	21
150.0°	22	23	23	23	23	23	24	24
155.0°	26	26	26	26	26	26	26	27
160.0°	29	29	28	27	28	29	27	29
165.0°	32	32	31	31	29	31	30	33
170.0°	34	34	33	32	31	31	34	34
175.0°	32	32	33	29	32	31	29	28
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	70.1	0.80	0-5	70.1	0.80
5-10	207.6	2.37	0-10	277.7	3.18
10-15	338.7	3.87	0-15	616.4	7.05
15-20	461.2	5.27	0-20	1077.7	12.32
20-25	570.9	6.53	0-25	1648.6	18.85
25-30	665.2	7.61	0-30	2313.8	26.46
30-35	742.4	8.49	0-35	3056.2	34.95
35-40	797.8	9.12	0-40	3854.0	44.07
40-45	826.2	9.45	0-45	4680.2	53.52
45-50	831.6	9.51	0-50	5511.8	63.03
50-55	794.8	9.09	0-55	6306.6	72.11
55-60	705.6	8.07	0-60	7012.2	80.18
60-65	586.1	6.70	0-65	7598.3	86.88
65-70	451.8	5.17	0-70	8050.1	92.05
70-75	316.0	3.61	0-75	8366.1	95.66
75-80	181.7	2.08	0-80	8547.8	97.74
80-85	76.8	0.88	0-85	8624.6	98.62
85-90	27.0	0.31	0-90	8651.6	98.93
90-95	12.5	0.14	0-95	8664.1	99.07
95-100	6.9	0.08	0-100	8671.0	99.15
100-105	3.4	0.04	0-105	8674.4	99.19
105-110	2.5	0.03	0-110	8676.8	99.22
110-115	3.5	0.04	0-115	8680.4	99.26
115-120	4.9	0.06	0-120	8685.3	99.31
120-125	5.3	0.06	0-125	8690.7	99.37
125-130	5.4	0.06	0-130	8696.0	99.44
130-135	5.8	0.07	0-135	8701.8	99.50
135-140	6.2	0.07	0-140	8708.1	99.57
140-145	6.5	0.07	0-145	8714.6	99.65
145-150	6.6	0.08	0-150	8721.2	99.72
150-155	6.5	0.07	0-155	8727.7	99.80
155-160	5.9	0.07	0-160	8733.6	99.87
160-165	5.1	0.06	0-165	8738.7	99.92
165-170	4.0	0.05	0-170	8742.6	99.97
170-175	2.4	0.03	0-175	8745.0	100.00
175-180	0.4	0.00	0-180	8745.4	100.00

6. Product Photo



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