



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEM9040DIM010UNVMDRCW

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKS180131081-10-9
Test Date:	2018-06-03 to 2018-06-04
Report Date:	2018-06-04
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.

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. (Kunshan). 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 2018- 05-31 and used for testing.

Model Tested: AD6LEM9040DIM010UNVMDRCW
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Downlight
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277VAC, 50/60Hz
 Rated Power: 31.5W
 Nominal CCT: 4000K
 Nominal Lumen Output: 2650lm

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment
- 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	2018-03-23	2019-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-03-23	2019-03-22
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	2018-03-23	2019-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-03-23	2019-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-03-23	2019-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-03-23	2019-03-22
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 hour**

Test orientation: **Downward**

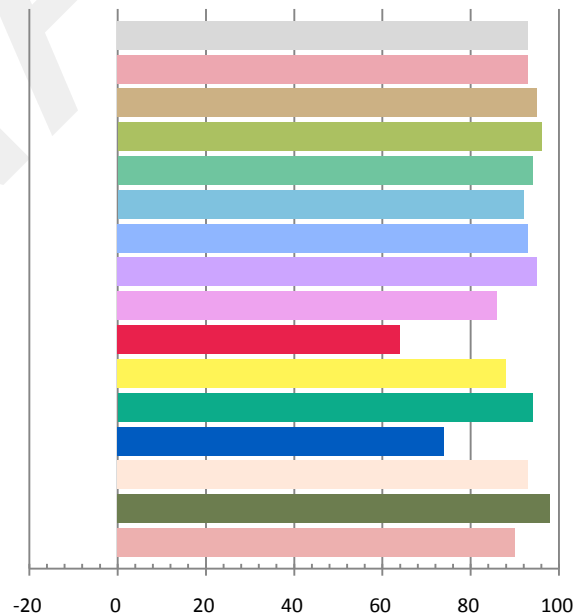
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.2567	30.59	0.9926	2827.2	92.42

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.494	3884	0.00254	0.3877	0.3867	0.2259	0.5070

Color Rendering Index

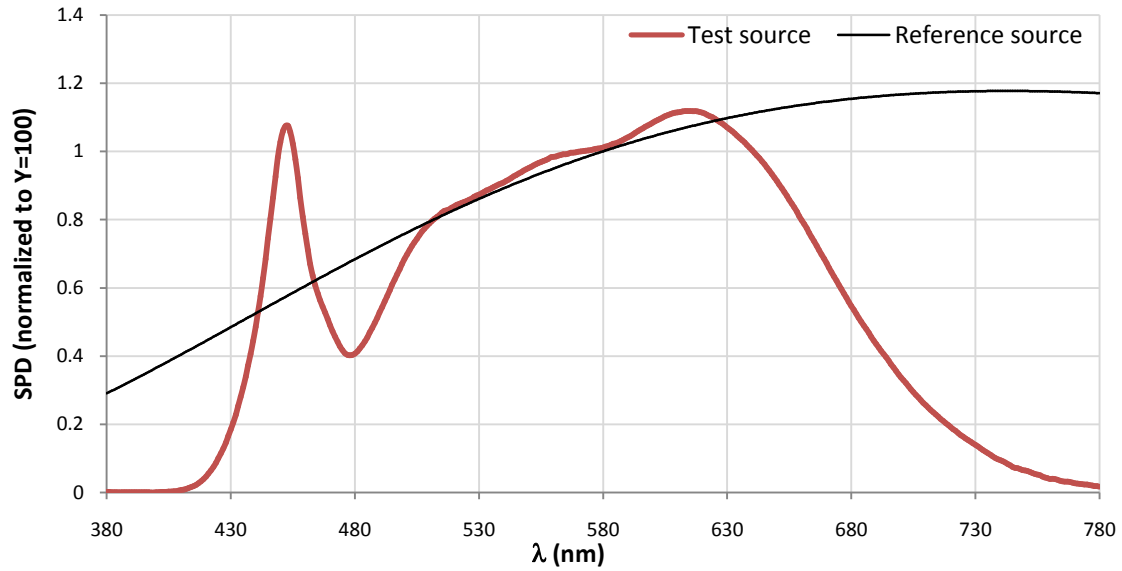
Ra 93.0			
R1 93	R2 95	R3 96	R4 94
R5 92	R6 93	R7 95	R8 86
R9 64	R10 88	R11 94	R12 74
R13 93	R14 98	R15 90	



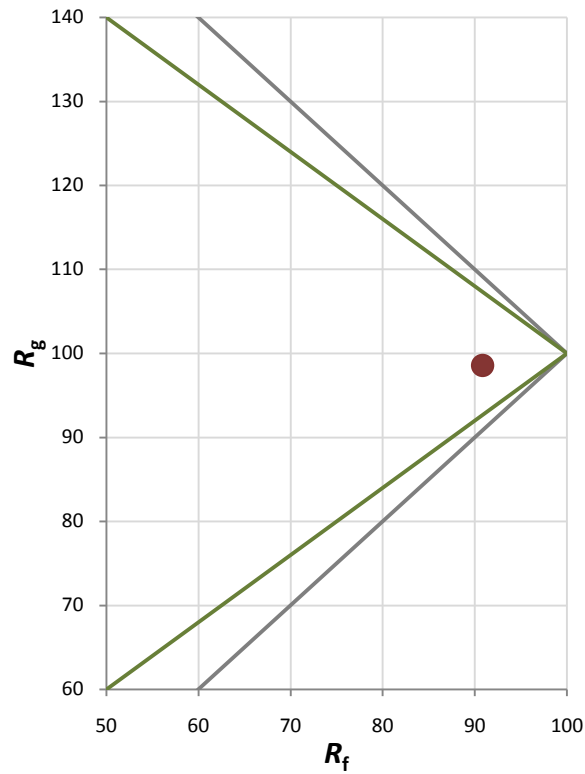
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	99

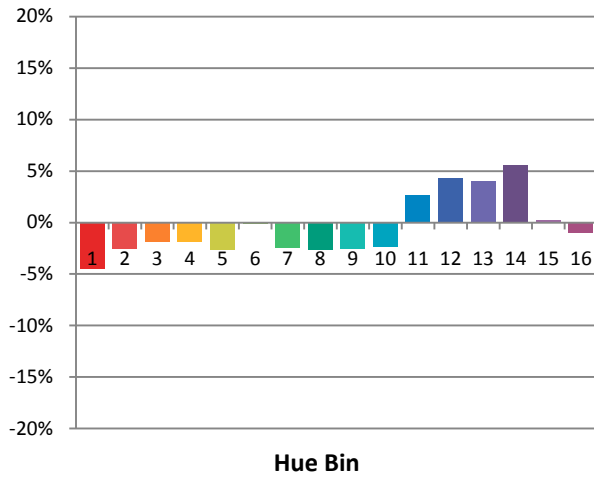
Spectral Power Distribution Comparison



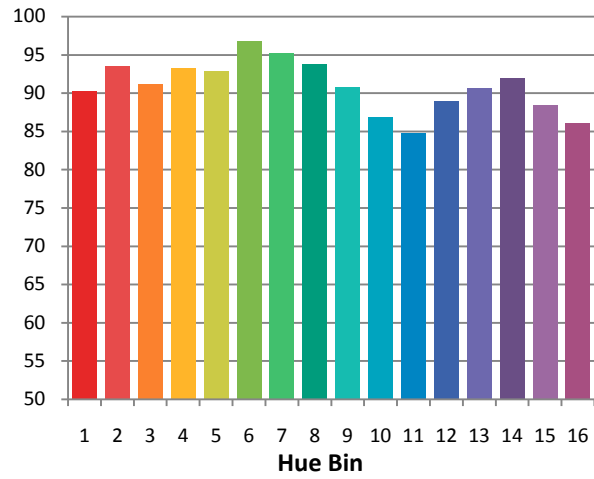
Plot of R_g versus R_f



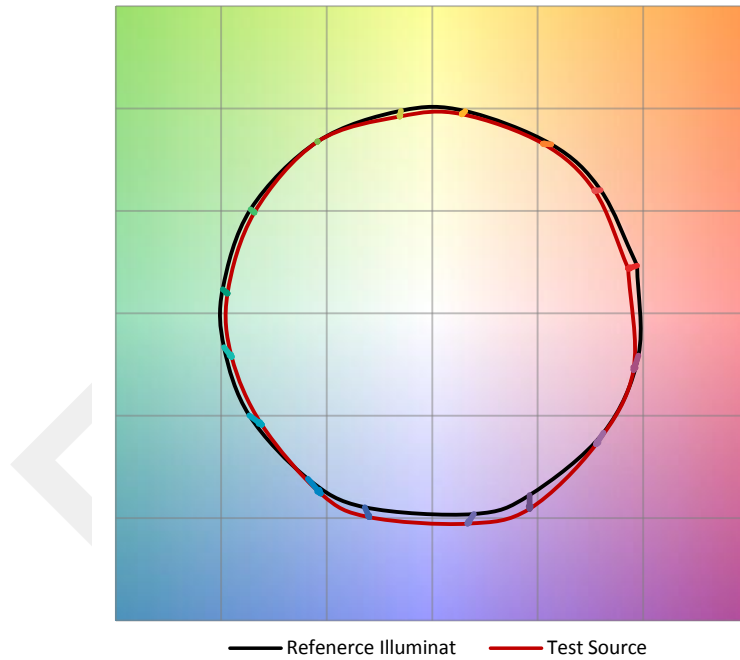
Chroma Shift by Hue



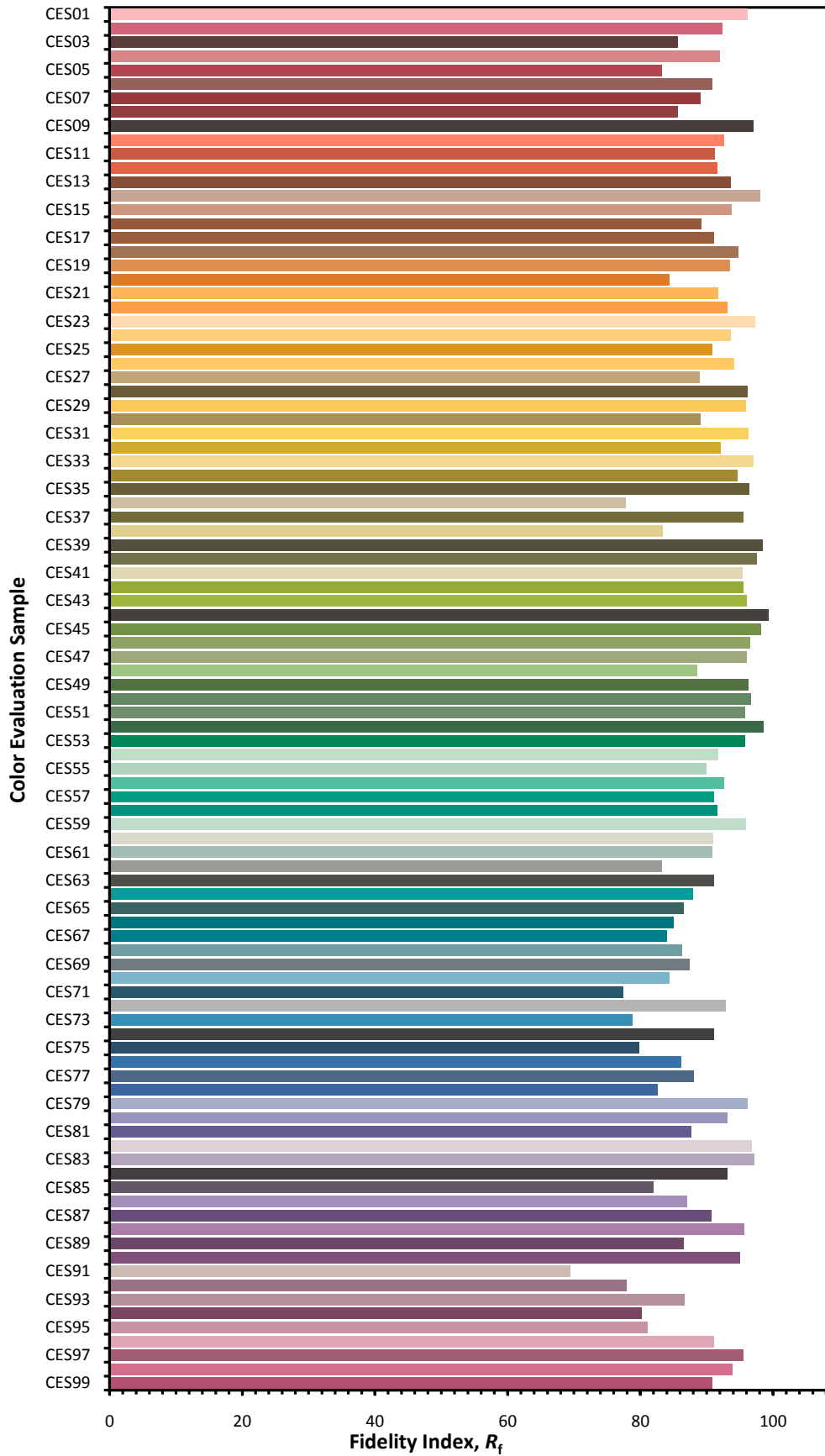
R_f by Hue



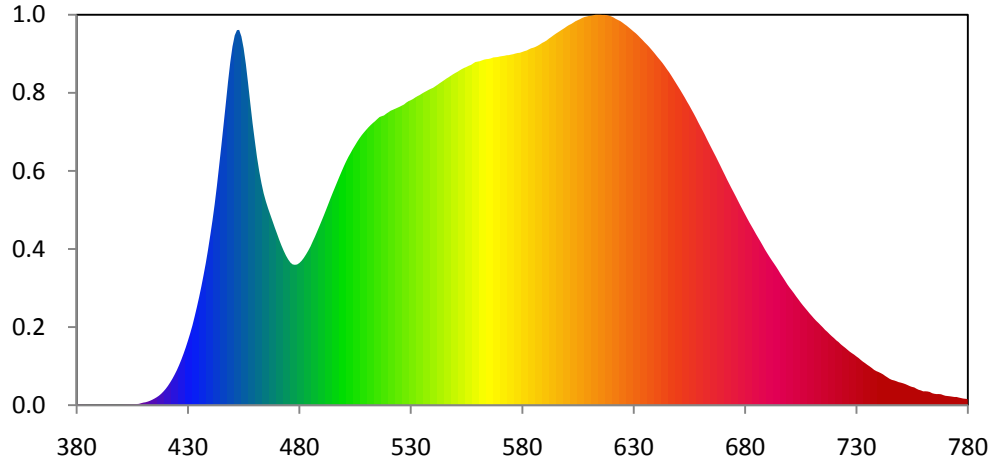
Color Vector Graphic



Color Fidelity by CES Sample



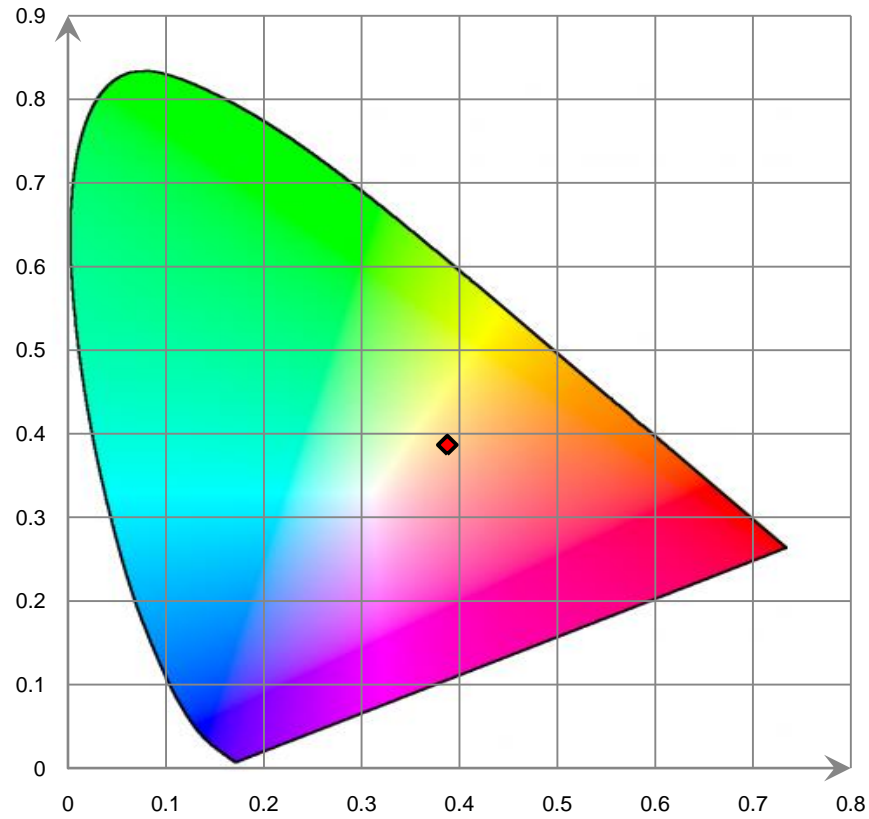
Relative Spectral Power Distribution



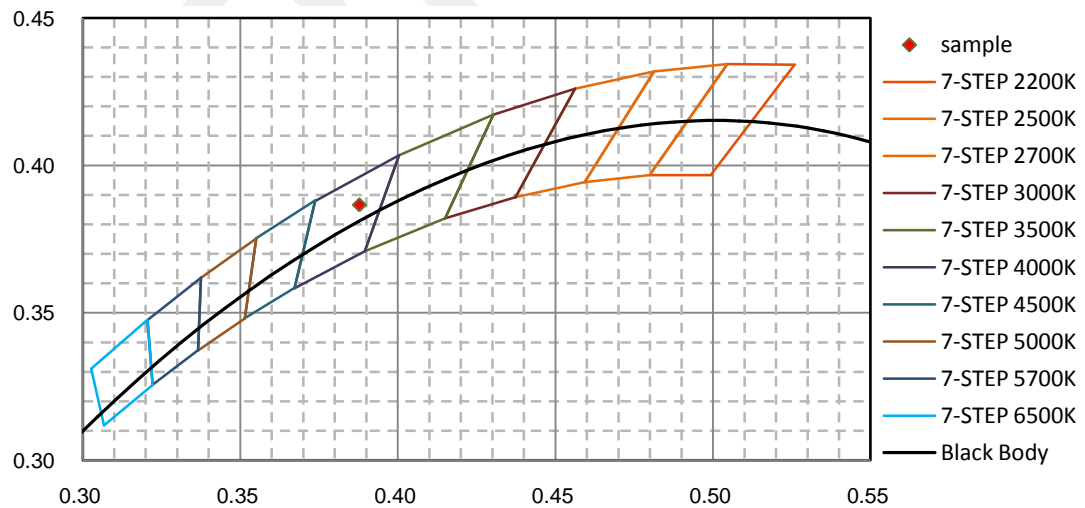
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	7.230E-02	421	2.283E+00	462	2.774E+01	503	2.990E+01	544	3.835E+01
381	6.540E-02	422	2.683E+00	463	2.632E+01	504	3.037E+01	545	3.853E+01
382	5.190E-02	423	3.122E+00	464	2.511E+01	505	3.081E+01	546	3.872E+01
383	4.110E-02	424	3.604E+00	465	2.415E+01	506	3.124E+01	547	3.888E+01
384	3.770E-02	425	4.134E+00	466	2.332E+01	507	3.165E+01	548	3.906E+01
385	1.770E-02	426	4.726E+00	467	2.256E+01	508	3.201E+01	549	3.923E+01
386	2.510E-02	427	5.368E+00	468	2.181E+01	509	3.233E+01	550	3.939E+01
387	2.980E-02	428	6.075E+00	469	2.104E+01	510	3.264E+01	551	3.953E+01
388	2.980E-02	429	6.829E+00	470	2.033E+01	511	3.294E+01	552	3.970E+01
389	3.360E-02	430	7.643E+00	471	1.959E+01	512	3.321E+01	553	3.986E+01
390	3.310E-02	431	8.511E+00	472	1.891E+01	513	3.345E+01	554	3.999E+01
391	1.950E-02	432	9.442E+00	473	1.829E+01	514	3.367E+01	555	4.011E+01
392	1.990E-02	433	1.050E+01	474	1.774E+01	515	3.393E+01	556	4.024E+01
393	2.870E-02	434	1.162E+01	475	1.728E+01	516	3.417E+01	557	4.034E+01
394	3.280E-02	435	1.279E+01	476	1.691E+01	517	3.427E+01	558	4.052E+01
395	3.480E-02	436	1.405E+01	477	1.669E+01	518	3.435E+01	559	4.068E+01
396	3.000E-02	437	1.540E+01	478	1.664E+01	519	3.456E+01	560	4.073E+01
397	2.070E-02	438	1.682E+01	479	1.668E+01	520	3.473E+01	561	4.078E+01
398	1.230E-02	439	1.839E+01	480	1.685E+01	521	3.492E+01	562	4.088E+01
399	6.300E-03	440	2.010E+01	481	1.711E+01	522	3.503E+01	563	4.097E+01
400	2.540E-02	441	2.186E+01	482	1.746E+01	523	3.514E+01	564	4.103E+01
401	4.270E-02	442	2.382E+01	483	1.787E+01	524	3.526E+01	565	4.105E+01
402	5.720E-02	443	2.600E+01	484	1.832E+01	525	3.538E+01	566	4.112E+01
403	6.710E-02	444	2.836E+01	485	1.882E+01	526	3.552E+01	567	4.123E+01
404	8.250E-02	445	3.077E+01	486	1.940E+01	527	3.566E+01	568	4.125E+01
405	9.730E-02	446	3.325E+01	487	1.998E+01	528	3.587E+01	569	4.128E+01
406	1.148E-01	447	3.577E+01	488	2.059E+01	529	3.605E+01	570	4.135E+01
407	1.336E-01	448	3.833E+01	489	2.122E+01	530	3.616E+01	571	4.139E+01
408	1.570E-01	449	4.066E+01	490	2.185E+01	531	3.630E+01	572	4.142E+01
409	2.366E-01	450	4.252E+01	491	2.250E+01	532	3.648E+01	573	4.149E+01
410	3.060E-01	451	4.384E+01	492	2.316E+01	533	3.664E+01	574	4.150E+01
411	3.516E-01	452	4.447E+01	493	2.384E+01	534	3.677E+01	575	4.156E+01
412	4.277E-01	453	4.450E+01	494	2.453E+01	535	3.694E+01	576	4.162E+01
413	5.233E-01	454	4.371E+01	495	2.519E+01	536	3.710E+01	577	4.169E+01
414	6.465E-01	455	4.233E+01	496	2.583E+01	537	3.723E+01	578	4.176E+01
415	7.882E-01	456	4.044E+01	497	2.646E+01	538	3.738E+01	579	4.179E+01
416	9.452E-01	457	3.818E+01	498	2.710E+01	539	3.751E+01	580	4.188E+01
417	1.125E+00	458	3.578E+01	499	2.772E+01	540	3.763E+01	581	4.197E+01
418	1.352E+00	459	3.348E+01	500	2.833E+01	541	3.780E+01	582	4.205E+01
419	1.619E+00	460	3.140E+01	501	2.890E+01	542	3.799E+01	583	4.218E+01
420	1.927E+00	461	2.942E+01	502	2.943E+01	543	3.818E+01	584	4.231E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.238E+01	626	4.517E+01	667	2.944E+01	708	1.121E+01	749	2.732E+00
586	4.248E+01	627	4.497E+01	668	2.891E+01	709	1.089E+01	750	2.669E+00
587	4.262E+01	628	4.476E+01	669	2.837E+01	710	1.059E+01	751	2.593E+00
588	4.278E+01	629	4.453E+01	670	2.783E+01	711	1.028E+01	752	2.501E+00
589	4.295E+01	630	4.431E+01	671	2.729E+01	712	9.998E+00	753	2.383E+00
590	4.309E+01	631	4.409E+01	672	2.675E+01	713	9.749E+00	754	2.257E+00
591	4.324E+01	632	4.384E+01	673	2.622E+01	714	9.481E+00	755	2.165E+00
592	4.346E+01	633	4.357E+01	674	2.571E+01	715	9.211E+00	756	2.106E+00
593	4.364E+01	634	4.331E+01	675	2.521E+01	716	8.927E+00	757	1.950E+00
594	4.384E+01	635	4.302E+01	676	2.470E+01	717	8.688E+00	758	1.823E+00
595	4.403E+01	636	4.276E+01	677	2.417E+01	718	8.422E+00	759	1.752E+00
596	4.420E+01	637	4.248E+01	678	2.365E+01	719	8.175E+00	760	1.641E+00
597	4.437E+01	638	4.217E+01	679	2.316E+01	720	7.946E+00	761	1.650E+00
598	4.454E+01	639	4.187E+01	680	2.265E+01	721	7.688E+00	762	1.626E+00
599	4.471E+01	640	4.153E+01	681	2.216E+01	722	7.492E+00	763	1.565E+00
600	4.490E+01	641	4.121E+01	682	2.167E+01	723	7.231E+00	764	1.420E+00
601	4.506E+01	642	4.090E+01	683	2.122E+01	724	7.007E+00	765	1.354E+00
602	4.519E+01	643	4.057E+01	684	2.075E+01	725	6.806E+00	766	1.313E+00
603	4.536E+01	644	4.021E+01	685	2.028E+01	726	6.577E+00	767	1.321E+00
604	4.553E+01	645	3.983E+01	686	1.983E+01	727	6.355E+00	768	1.296E+00
605	4.565E+01	646	3.946E+01	687	1.938E+01	728	6.165E+00	769	1.195E+00
606	4.577E+01	647	3.906E+01	688	1.892E+01	729	5.995E+00	770	1.113E+00
607	4.592E+01	648	3.863E+01	689	1.845E+01	730	5.788E+00	771	1.083E+00
608	4.602E+01	649	3.821E+01	690	1.802E+01	731	5.598E+00	772	1.057E+00
609	4.609E+01	650	3.778E+01	691	1.760E+01	732	5.367E+00	773	1.015E+00
610	4.614E+01	651	3.736E+01	692	1.720E+01	733	5.152E+00	774	9.734E-01
611	4.618E+01	652	3.692E+01	693	1.682E+01	734	4.971E+00	775	9.731E-01
612	4.624E+01	653	3.647E+01	694	1.643E+01	735	4.774E+00	776	9.026E-01
613	4.629E+01	654	3.600E+01	695	1.601E+01	736	4.598E+00	777	8.412E-01
614	4.629E+01	655	3.555E+01	696	1.557E+01	737	4.397E+00	778	7.832E-01
615	4.629E+01	656	3.507E+01	697	1.517E+01	738	4.185E+00	779	7.571E-01
616	4.627E+01	657	3.459E+01	698	1.476E+01	739	4.036E+00	780	7.135E-01
617	4.627E+01	658	3.409E+01	699	1.434E+01	740	3.927E+00		
618	4.625E+01	659	3.356E+01	700	1.396E+01	741	3.800E+00		
619	4.618E+01	660	3.306E+01	701	1.362E+01	742	3.654E+00		
620	4.609E+01	661	3.257E+01	702	1.327E+01	743	3.462E+00		
621	4.597E+01	662	3.206E+01	703	1.290E+01	744	3.290E+00		
622	4.581E+01	663	3.152E+01	704	1.254E+01	745	3.113E+00		
623	4.567E+01	664	3.099E+01	705	1.218E+01	746	2.995E+00		
624	4.555E+01	665	3.047E+01	706	1.184E+01	747	2.930E+00		
625	4.537E+01	666	2.995E+01	707	1.153E+01	748	2.836E+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**

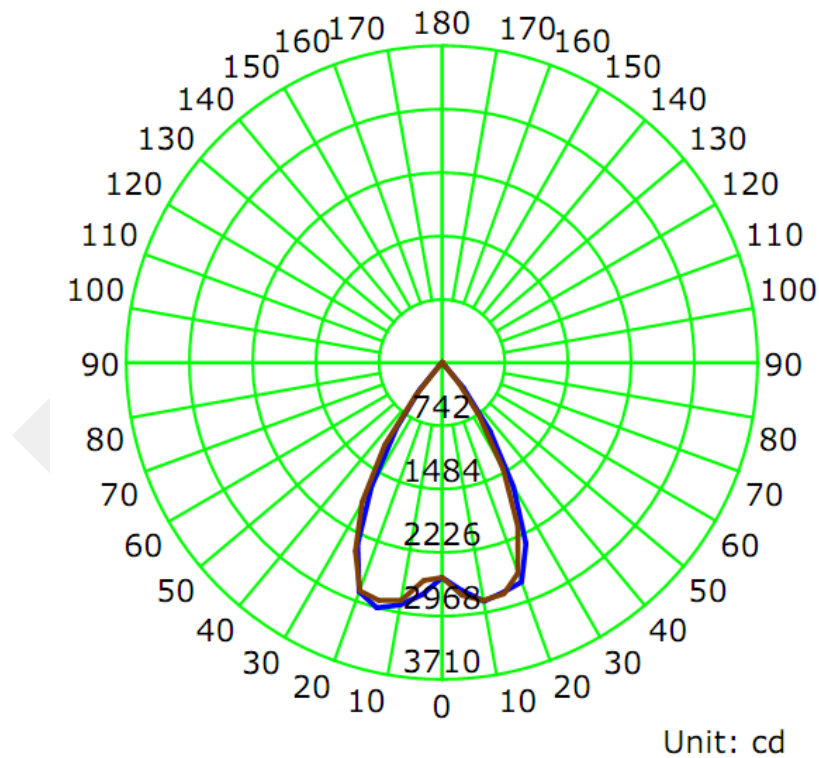
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2560	30.58	0.9950

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2832.9	92.69	2968.6	1.09	1.08

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	62.7	63.1	63.2	63.1	63.0
Field Angle (10% I_{max}):	83.0	83.1	82.9	83.5	83.1

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2518	2518	2518	2518	2518	2518	2518	2518
5.0°	2668	2696	2712	2723	2730	2737	2746	2726
10.0°	2839	2820	2804	2821	2830	2857	2885	2914
15.0°	2784	2768	2770	2765	2805	2839	2896	2914
20.0°	2729	2654	2606	2591	2618	2677	2776	2826
25.0°	2333	2246	2162	2111	2115	2155	2240	2325
30.0°	1682	1584	1530	1498	1442	1442	1500	1607
35.0°	979	898	812	773	753	772	836	898
40.0°	392	364	338	306	316	351	385	407
45.0°	47	45	41	39	39	41	44	52
50.0°	20	21	20	18	18	19	20	21
55.0°	10	11	10	9	9	10	10	11
60.0°	4	5	5	4	4	5	4	6
65.0°	1	2	2	2	1	2	2	2
70.0°	0	0	0	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
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°	1	1	1	2	2	1	1	2
150.0°	2	2	3	3	3	3	3	3
155.0°	4	4	5	5	5	5	4	4
160.0°	6	6	6	6	6	6	6	6
165.0°	7	7	7	7	7	7	7	7
170.0°	7	8	8	8	8	8	8	8
175.0°	8	9	9	9	9	9	9	9
180.0°	0	0	0	0	0	0	0	0

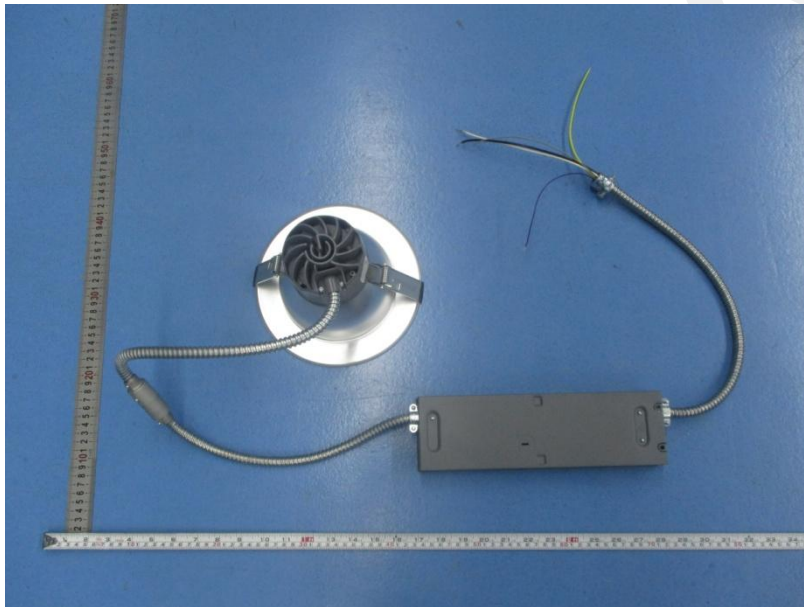
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	2518	2518	2518	2518	2518	2518	2518	2518
5.0°	2721	2669	2616	2592	2563	2563	2599	2645
10.0°	2877	2868	2848	2826	2826	2815	2824	2802
15.0°	2969	2948	2926	2902	2882	2854	2865	2840
20.0°	2853	2865	2855	2815	2842	2837	2851	2781
25.0°	2350	2421	2427	2416	2429	2466	2430	2377
30.0°	1669	1753	1859	1895	1888	1859	1844	1772
35.0°	934	1015	1105	1157	1180	1172	1117	1023
40.0°	419	474	485	492	496	468	462	393
45.0°	52	63	70	73	72	65	56	45
50.0°	21	23	24	23	22	21	19	19
55.0°	11	12	13	12	12	11	10	10
60.0°	5	6	7	6	6	5	5	4
65.0°	1	3	3	3	2	2	2	1
70.0°	0	0	1	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
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	1	1	1	1	1
150.0°	1	2	2	3	3	3	3	3
155.0°	3	3	3	4	4	5	4	4
160.0°	4	5	5	6	6	6	6	5
165.0°	6	5	7	7	7	7	7	7
170.0°	7	8	7	8	8	8	8	8
175.0°	8	8	9	9	9	10	10	9
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	62.0	2.19	0-5	62.0	2.19
5-10	197.1	6.96	0-10	259.1	9.15
10-15	338.1	11.93	0-15	597.2	21.08
15-20	463.1	16.35	0-20	1060.2	37.43
20-25	532.1	18.78	0-25	1592.4	56.21
25-30	504.8	17.82	0-30	2097.2	74.03
30-35	388.8	13.73	0-35	2486.0	87.76
35-40	229.1	8.09	0-40	2715.1	95.84
40-45	85.5	3.02	0-45	2800.6	98.86
45-50	14.8	0.52	0-50	2815.4	99.38
50-55	6.7	0.24	0-55	2822.1	99.62
55-60	3.6	0.13	0-60	2825.7	99.75
60-65	1.6	0.06	0-65	2827.3	99.80
65-70	0.5	0.02	0-70	2827.8	99.82
70-75	0.0	0.00	0-75	2827.8	99.82
75-80	0.0	0.00	0-80	2827.8	99.82
80-85	0.0	0.00	0-85	2827.8	99.82
85-90	0.0	0.00	0-90	2827.8	99.82
90-95	0.0	0.00	0-95	2827.8	99.82
95-100	0.0	0.00	0-100	2827.8	99.82
100-105	0.0	0.00	0-105	2827.8	99.82
105-110	0.0	0.00	0-110	2827.8	99.82
110-115	0.0	0.00	0-115	2827.8	99.82
115-120	0.0	0.00	0-120	2827.8	99.82
120-125	0.0	0.00	0-125	2827.8	99.82
125-130	0.0	0.00	0-130	2827.8	99.82
130-135	0.0	0.00	0-135	2827.8	99.82
135-140	0.0	0.00	0-140	2827.8	99.82
140-145	0.2	0.01	0-145	2828.0	99.83
145-150	0.5	0.02	0-150	2828.5	99.84
150-155	0.8	0.03	0-155	2829.3	99.87
155-160	1.0	0.04	0-160	2830.3	99.91
160-165	1.0	0.04	0-165	2831.3	99.94
165-170	0.9	0.03	0-170	2832.2	99.98
170-175	0.6	0.02	0-175	2832.8	100.00
175-180	0.1	0.00	0-180	2832.9	100.00

6. Product Photo



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