

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEL9027DIM010UNVWDRBL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180522003-10-3
Test Date:	2018-05-22
Report Date:	2018-05-25
Reviewed By:	Ray Gao/EE Engineer <i>Ray 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 2018-05-22 and used for testing.

Model Tested: AD6LEL9027DIM010UNVWDRBL
 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: 120-277 VAC 50/60Hz
 Rated Power: 60W
 Nominal CCT: 2700K
 Nominal Lumen Output: 4030lm

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: **1.0 hour**

Test orientation: **Downward**

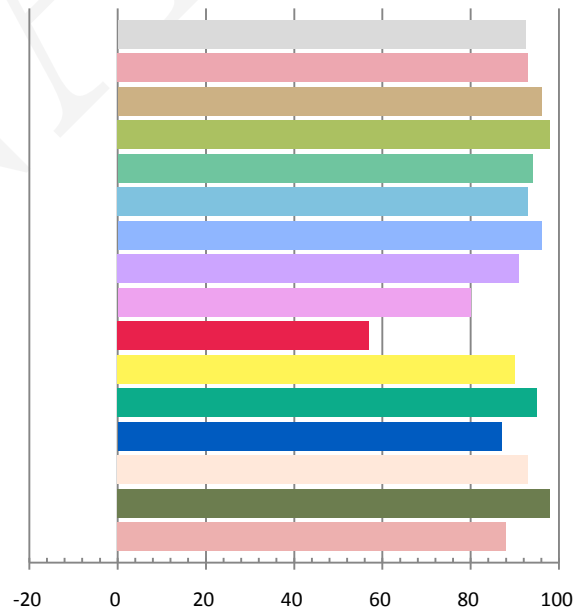
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.5027	60.01	0.9949	4126.4	68.76

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
14.488	2703	0.00015	0.4599	0.4110	0.2623	0.5275

Color Rendering Index

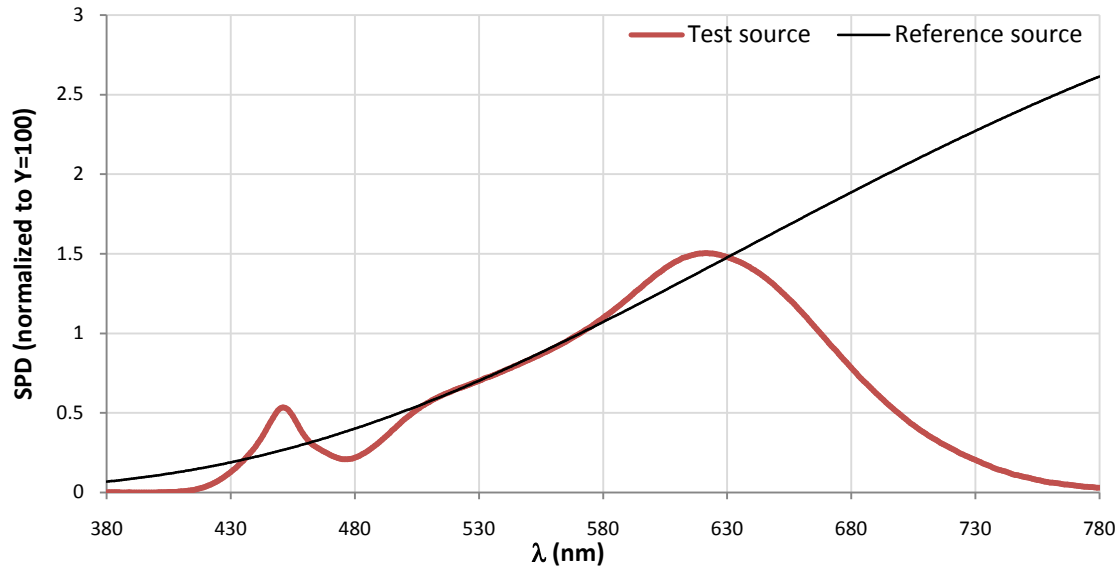
Ra 92.5			
R1 93	R2 96	R3 98	R4 94
R5 93	R6 96	R7 91	R8 80
R9 57	R10 90	R11 95	R12 87
R13 93	R14 98	R15 88	



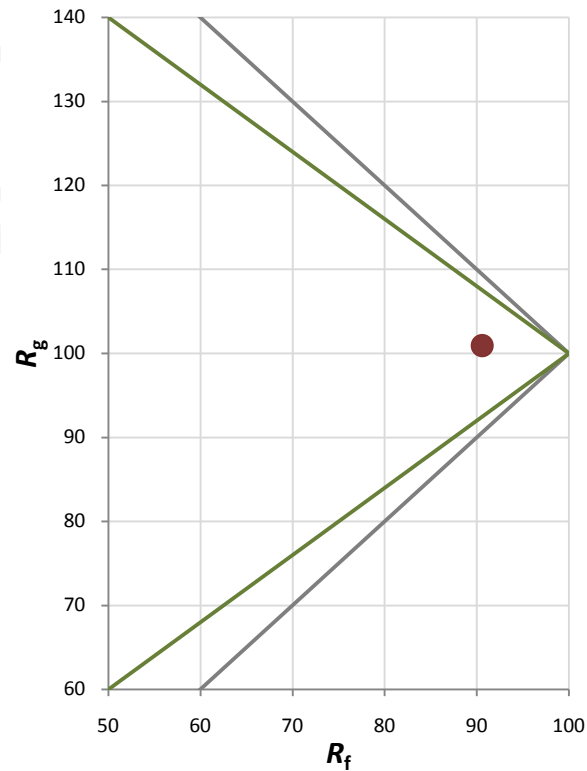
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

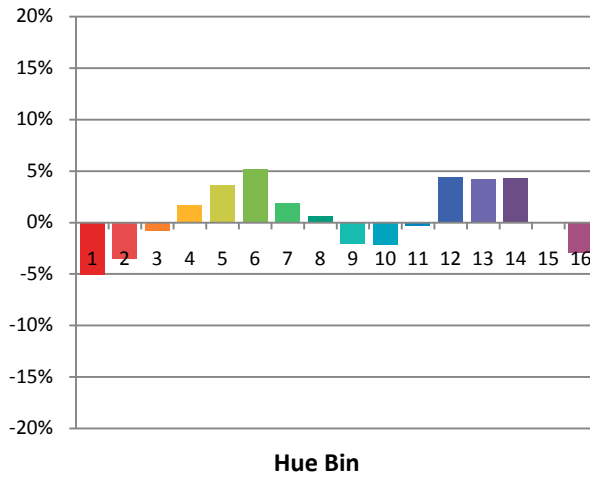
Spectral Power Distribution Comparison



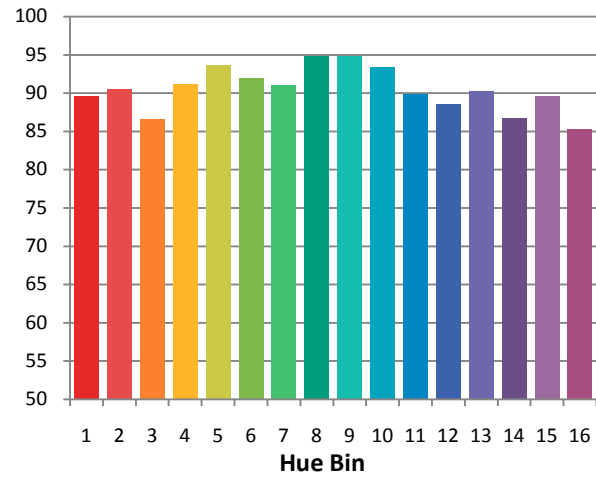
Plot of R_g versus R_f



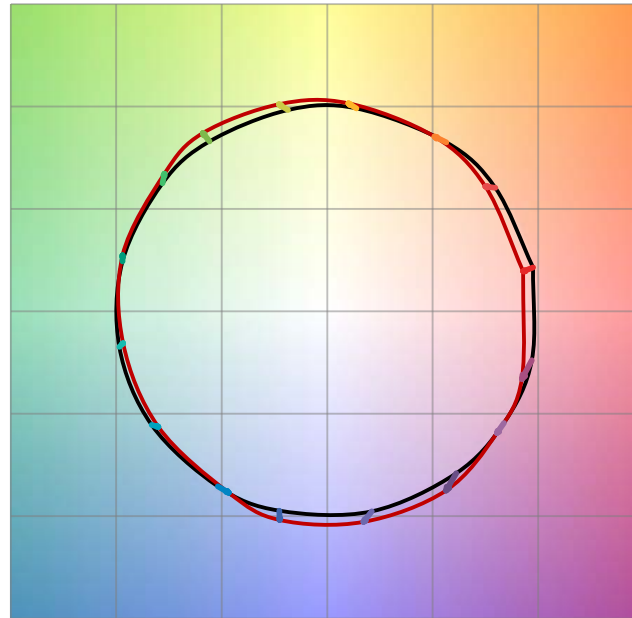
Chroma Shift by Hue



R_t by Hue

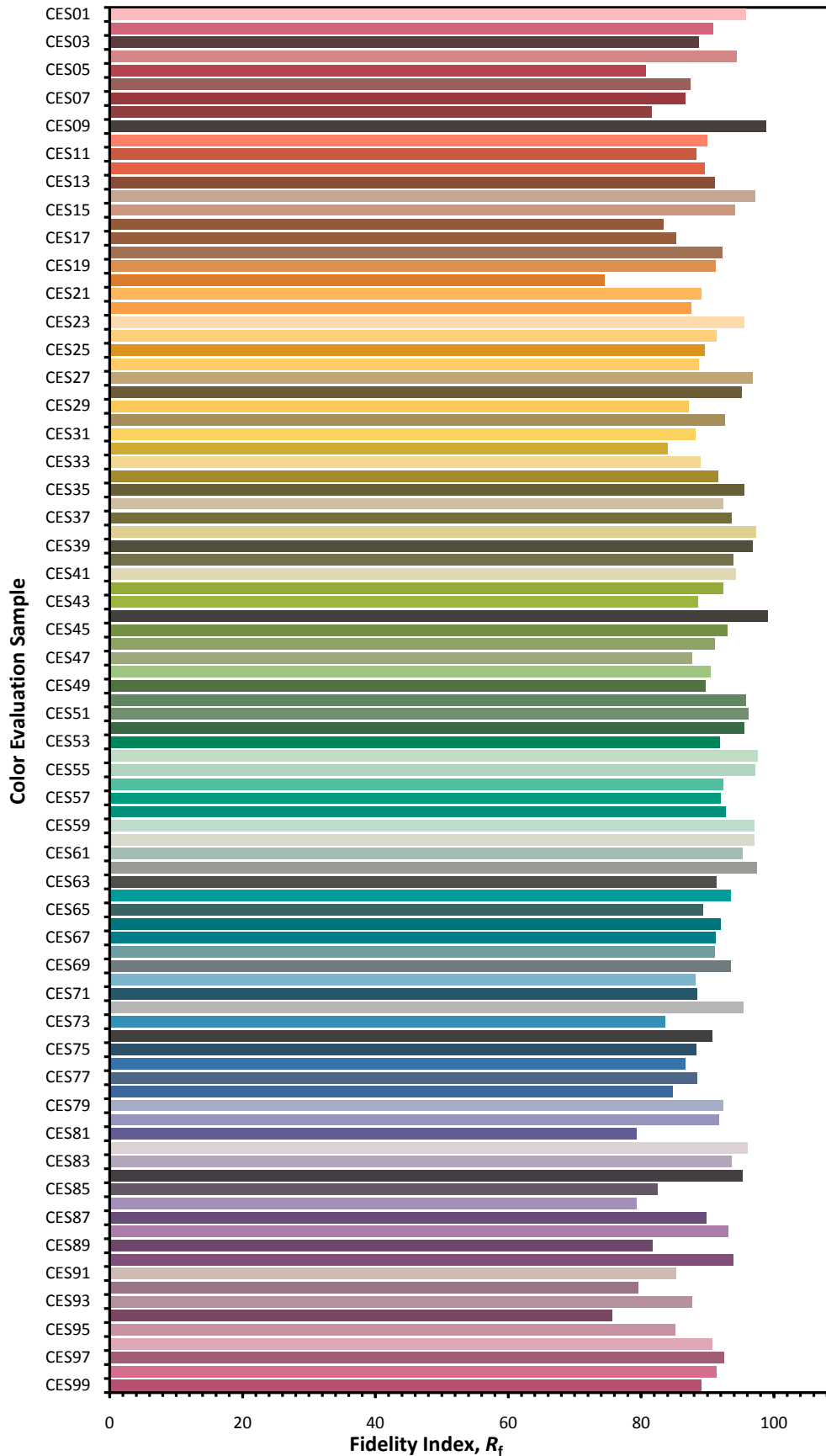


Color Vector Graphic

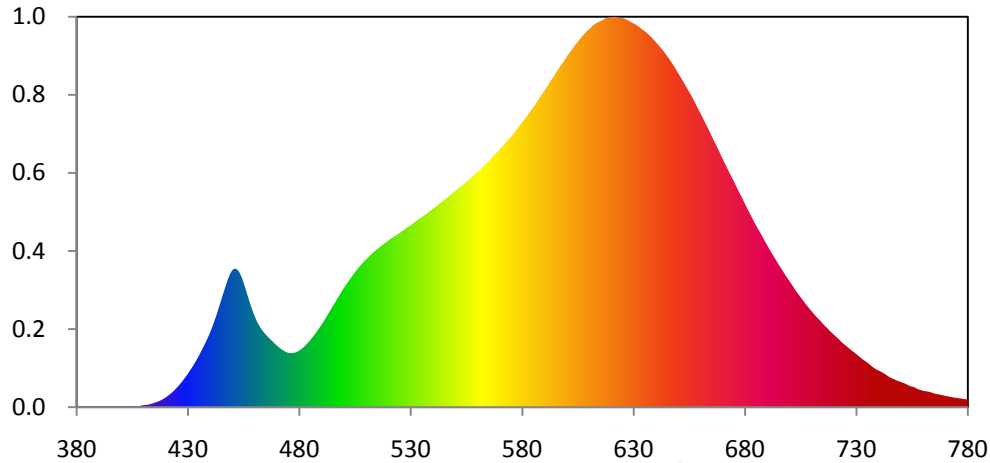


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



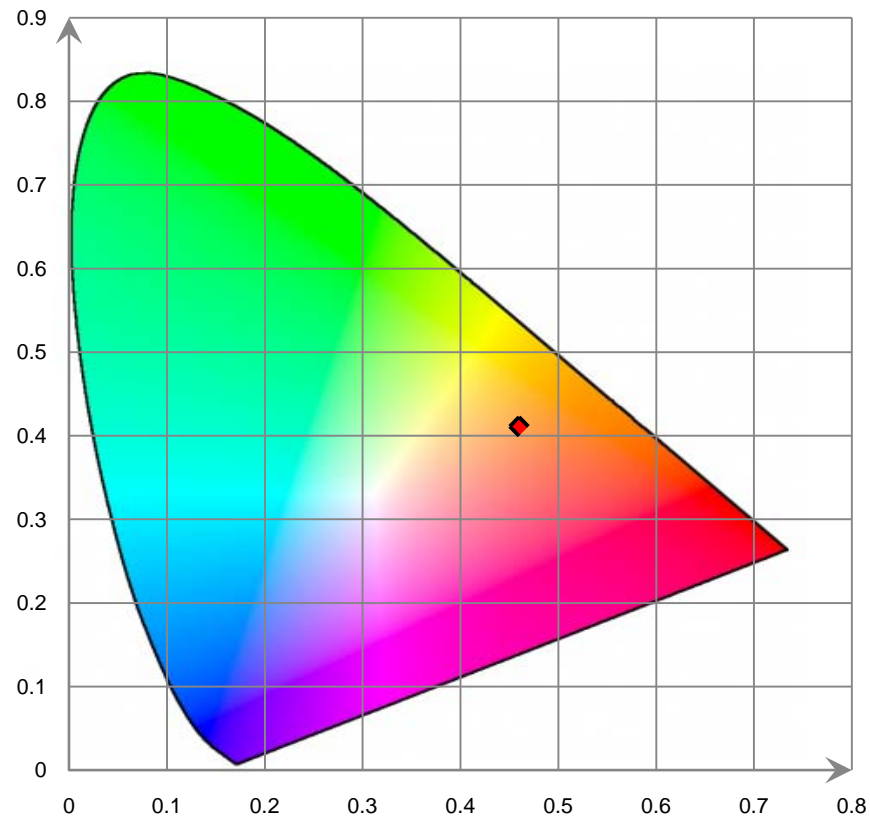
Relative Spectral Power Distribution



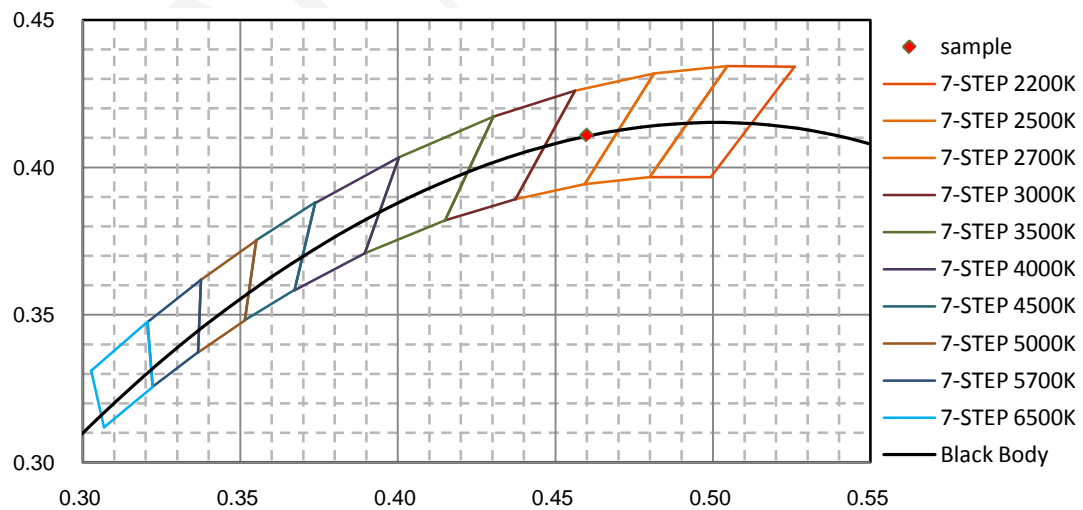
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	7.470E-02	421	2.642E+00	462	1.896E+01	503	3.002E+01	544	4.782E+01
381	6.260E-02	422	3.039E+00	463	1.815E+01	504	3.075E+01	545	4.821E+01
382	6.160E-02	423	3.477E+00	464	1.745E+01	505	3.143E+01	546	4.862E+01
383	7.270E-02	424	3.981E+00	465	1.687E+01	506	3.210E+01	547	4.902E+01
384	8.510E-02	425	4.521E+00	466	1.633E+01	507	3.274E+01	548	4.947E+01
385	5.700E-02	426	5.106E+00	467	1.580E+01	508	3.333E+01	549	4.990E+01
386	4.390E-02	427	5.728E+00	468	1.529E+01	509	3.390E+01	550	5.031E+01
387	4.260E-02	428	6.389E+00	469	1.479E+01	510	3.441E+01	551	5.073E+01
388	4.160E-02	429	7.071E+00	470	1.431E+01	511	3.491E+01	552	5.114E+01
389	5.770E-02	430	7.799E+00	471	1.386E+01	512	3.544E+01	553	5.155E+01
390	5.070E-02	431	8.585E+00	472	1.347E+01	513	3.594E+01	554	5.200E+01
391	2.560E-02	432	9.374E+00	473	1.315E+01	514	3.637E+01	555	5.246E+01
392	2.430E-02	433	1.022E+01	474	1.284E+01	515	3.682E+01	556	5.291E+01
393	3.940E-02	434	1.111E+01	475	1.265E+01	516	3.724E+01	557	5.332E+01
394	4.390E-02	435	1.206E+01	476	1.259E+01	517	3.763E+01	558	5.380E+01
395	4.690E-02	436	1.306E+01	477	1.260E+01	518	3.800E+01	559	5.427E+01
396	5.180E-02	437	1.410E+01	478	1.271E+01	519	3.840E+01	560	5.474E+01
397	4.350E-02	438	1.514E+01	479	1.291E+01	520	3.882E+01	561	5.523E+01
398	3.300E-02	439	1.626E+01	480	1.320E+01	521	3.920E+01	562	5.573E+01
399	2.400E-02	440	1.747E+01	481	1.356E+01	522	3.954E+01	563	5.628E+01
400	4.630E-02	441	1.877E+01	482	1.401E+01	523	3.986E+01	564	5.676E+01
401	6.110E-02	442	2.020E+01	483	1.451E+01	524	4.018E+01	565	5.725E+01
402	8.300E-02	443	2.173E+01	484	1.507E+01	525	4.053E+01	566	5.781E+01
403	1.115E-01	444	2.338E+01	485	1.568E+01	526	4.092E+01	567	5.842E+01
404	1.431E-01	445	2.505E+01	486	1.632E+01	527	4.128E+01	568	5.895E+01
405	1.850E-01	446	2.672E+01	487	1.699E+01	528	4.168E+01	569	5.948E+01
406	2.206E-01	447	2.830E+01	488	1.772E+01	529	4.207E+01	570	6.004E+01
407	2.376E-01	448	2.986E+01	489	1.847E+01	530	4.236E+01	571	6.059E+01
408	2.590E-01	449	3.113E+01	490	1.924E+01	531	4.275E+01	572	6.118E+01
409	3.600E-01	450	3.194E+01	491	2.006E+01	532	4.317E+01	573	6.180E+01
410	4.593E-01	451	3.227E+01	492	2.090E+01	533	4.354E+01	574	6.235E+01
411	5.094E-01	452	3.210E+01	493	2.176E+01	534	4.388E+01	575	6.295E+01
412	5.655E-01	453	3.148E+01	494	2.264E+01	535	4.426E+01	576	6.360E+01
413	6.889E-01	454	3.039E+01	495	2.350E+01	536	4.462E+01	577	6.427E+01
414	8.453E-01	455	2.898E+01	496	2.433E+01	537	4.499E+01	578	6.496E+01
415	1.017E+00	456	2.733E+01	497	2.520E+01	538	4.540E+01	579	6.561E+01
416	1.197E+00	457	2.563E+01	498	2.607E+01	539	4.579E+01	580	6.631E+01
417	1.392E+00	458	2.399E+01	499	2.694E+01	540	4.618E+01	581	6.699E+01
418	1.650E+00	459	2.247E+01	500	2.775E+01	541	4.658E+01	582	6.766E+01
419	1.936E+00	460	2.112E+01	501	2.852E+01	542	4.699E+01	583	6.838E+01
420	2.269E+00	461	1.993E+01	502	2.928E+01	543	4.742E+01	584	6.910E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.978E+01	626	9.040E+01	667	6.107E+01	708	2.354E+01	749	6.042E+00
586	7.050E+01	627	9.020E+01	668	6.001E+01	709	2.290E+01	750	5.860E+00
587	7.132E+01	628	8.992E+01	669	5.889E+01	710	2.230E+01	751	5.656E+00
588	7.215E+01	629	8.960E+01	670	5.781E+01	711	2.166E+01	752	5.465E+00
589	7.290E+01	630	8.933E+01	671	5.673E+01	712	2.108E+01	753	5.203E+00
590	7.361E+01	631	8.907E+01	672	5.567E+01	713	2.057E+01	754	4.940E+00
591	7.445E+01	632	8.871E+01	673	5.464E+01	714	2.002E+01	755	4.778E+00
592	7.532E+01	633	8.830E+01	674	5.364E+01	715	1.940E+01	756	4.652E+00
593	7.609E+01	634	8.791E+01	675	5.259E+01	716	1.886E+01	757	4.356E+00
594	7.682E+01	635	8.752E+01	676	5.152E+01	717	1.838E+01	758	4.126E+00
595	7.766E+01	636	8.712E+01	677	5.045E+01	718	1.782E+01	759	3.970E+00
596	7.847E+01	637	8.662E+01	678	4.946E+01	719	1.733E+01	760	3.797E+00
597	7.927E+01	638	8.614E+01	679	4.841E+01	720	1.681E+01	761	3.731E+00
598	8.001E+01	639	8.559E+01	680	4.734E+01	721	1.635E+01	762	3.648E+00
599	8.074E+01	640	8.494E+01	681	4.630E+01	722	1.589E+01	763	3.541E+00
600	8.160E+01	641	8.437E+01	682	4.527E+01	723	1.535E+01	764	3.342E+00
601	8.236E+01	642	8.378E+01	683	4.426E+01	724	1.485E+01	765	3.179E+00
602	8.301E+01	643	8.318E+01	684	4.326E+01	725	1.445E+01	766	3.055E+00
603	8.371E+01	644	8.250E+01	685	4.228E+01	726	1.401E+01	767	2.982E+00
604	8.445E+01	645	8.178E+01	686	4.139E+01	727	1.359E+01	768	2.873E+00
605	8.511E+01	646	8.107E+01	687	4.049E+01	728	1.315E+01	769	2.752E+00
606	8.573E+01	647	8.028E+01	688	3.955E+01	729	1.276E+01	770	2.641E+00
607	8.634E+01	648	7.951E+01	689	3.859E+01	730	1.232E+01	771	2.524E+00
608	8.696E+01	649	7.867E+01	690	3.767E+01	731	1.192E+01	772	2.426E+00
609	8.751E+01	650	7.778E+01	691	3.677E+01	732	1.150E+01	773	2.327E+00
610	8.795E+01	651	7.694E+01	692	3.591E+01	733	1.107E+01	774	2.219E+00
611	8.844E+01	652	7.605E+01	693	3.505E+01	734	1.073E+01	775	2.166E+00
612	8.896E+01	653	7.517E+01	694	3.418E+01	735	1.035E+01	776	2.069E+00
613	8.930E+01	654	7.425E+01	695	3.333E+01	736	9.935E+00	777	2.018E+00
614	8.955E+01	655	7.339E+01	696	3.251E+01	737	9.498E+00	778	1.926E+00
615	8.982E+01	656	7.249E+01	697	3.170E+01	738	9.100E+00	779	1.858E+00
616	9.006E+01	657	7.148E+01	698	3.087E+01	739	8.793E+00	780	1.768E+00
617	9.039E+01	658	7.047E+01	699	3.009E+01	740	8.530E+00		
618	9.062E+01	659	6.945E+01	700	2.934E+01	741	8.282E+00		
619	9.070E+01	660	6.846E+01	701	2.856E+01	742	7.990E+00		
620	9.078E+01	661	6.746E+01	702	2.777E+01	743	7.645E+00		
621	9.089E+01	662	6.638E+01	703	2.698E+01	744	7.311E+00		
622	9.084E+01	663	6.536E+01	704	2.627E+01	745	6.949E+00		
623	9.070E+01	664	6.428E+01	705	2.561E+01	746	6.716E+00		
624	9.068E+01	665	6.317E+01	706	2.490E+01	747	6.513E+00		
625	9.058E+01	666	6.210E+01	707	2.421E+01	748	6.255E+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**

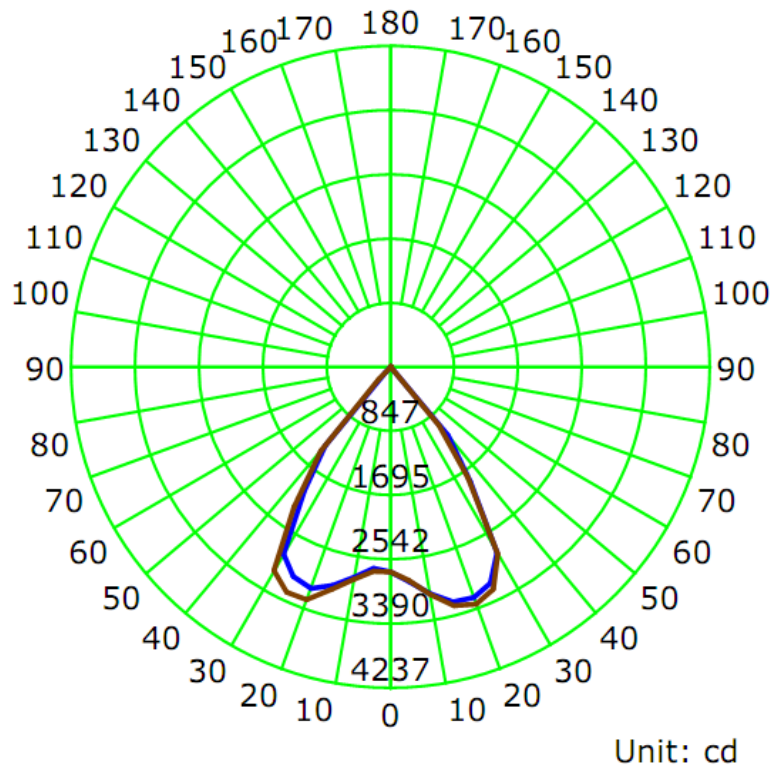
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5020	60.04	0.9970

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4129.6	68.83	3390.0	1.30	1.32

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	74.7	74.6	74.5	74.6	74.6
Field Angle (10% I _{max}):	87.8	88.1	88.0	87.7	87.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2705	2705	2705	2705	2705	2705	2705	2705
5.0°	2847	2863	2859	2848	2820	2789	2744	2705
10.0°	3040	3079	3111	3088	3047	2992	2923	2857
15.0°	3204	3273	3315	3301	3257	3134	3008	2937
20.0°	3232	3326	3377	3390	3328	3217	3085	3031
25.0°	3144	3224	3276	3297	3232	3098	2981	2956
30.0°	2830	2893	2917	2914	2851	2766	2696	2702
35.0°	1852	1828	1843	1809	1788	1797	1793	1857
40.0°	1183	1084	993	939	1007	1112	1220	1317
45.0°	20	19	17	17	18	22	29	75
50.0°	7	7	7	7	8	8	9	9
55.0°	3	4	3	3	4	5	5	5
60.0°	0	1	1	1	2	2	2	2
65.0°	0	0	0	0	0	0	0	0
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	1	2	2	2	2	1	1
145.0°	2	3	3	3	3	3	3	3
150.0°	4	5	5	6	5	5	5	5
155.0°	6	6	7	7	7	7	6	6
160.0°	8	8	8	8	8	8	8	8
165.0°	8	9	9	9	9	9	9	9
170.0°	9	10	10	10	10	9	10	9
175.0°	10	11	11	11	11	11	11	11
180.0°	0	0	0	0	0	0	0	0

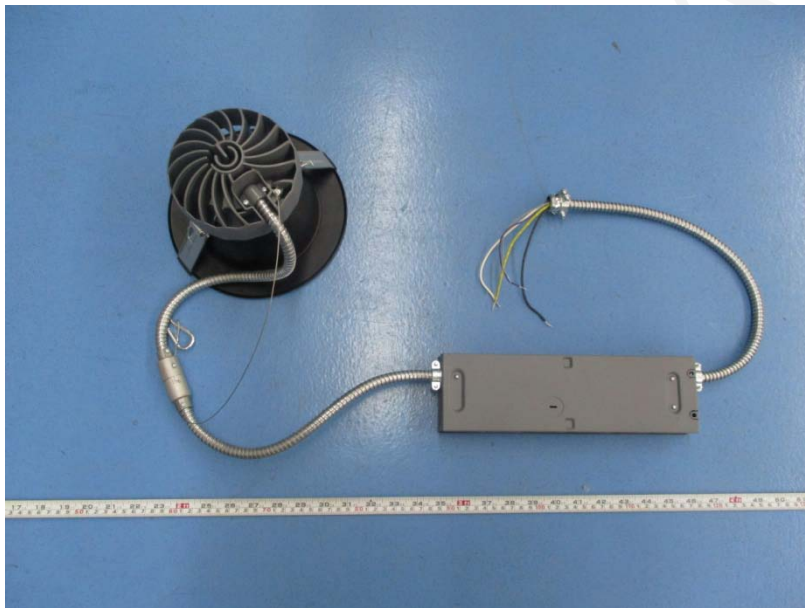
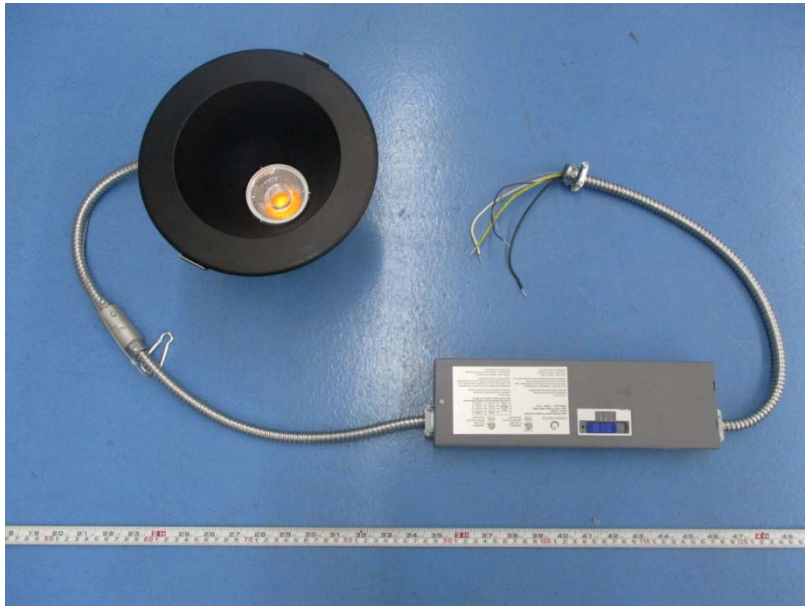
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	2705	2705	2705	2705	2705	2705	2705	2705
5.0°	2664	2648	2666	2684	2709	2750	2785	2817
10.0°	2820	2814	2795	2818	2848	2893	2922	2962
15.0°	2983	2998	2997	3008	3039	3063	3091	3141
20.0°	3110	3205	3240	3247	3271	3251	3199	3227
25.0°	3055	3206	3282	3278	3277	3213	3120	3095
30.0°	2850	3013	3104	3128	3100	3012	2886	2857
35.0°	1994	2140	2276	2316	2250	2112	1982	1899
40.0°	1357	1430	1470	1483	1450	1407	1328	1215
45.0°	98	198	278	261	225	163	58	22
50.0°	8	9	9	9	10	9	8	8
55.0°	4	5	5	5	6	5	4	4
60.0°	0	1	1	2	2	2	2	2
65.0°	0	0	0	0	0	0	0	0
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	1	1	1	0	1	0
145.0°	2	2	3	3	2	3	3	3
150.0°	4	5	4	5	4	5	4	4
155.0°	5	6	6	6	7	7	6	6
160.0°	7	8	8	7	8	8	8	8
165.0°	8	8	9	9	9	9	9	9
170.0°	9	9	10	10	10	10	10	10
175.0°	10	10	10	11	11	11	11	11
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	65.4	1.58	0-5	65.4	1.58
5-10	203.9	4.94	0-10	269.3	6.52
10-15	358.7	8.69	0-15	628.0	15.21
15-20	522.7	12.66	0-20	1150.7	27.87
20-25	671.7	16.27	0-25	1822.4	44.13
25-30	769.2	18.63	0-30	2591.6	62.76
30-35	718.4	17.40	0-35	3310.0	80.15
35-40	537.3	13.01	0-40	3847.3	93.17
40-45	249.0	6.03	0-45	4096.3	99.19
45-50	20.9	0.50	0-50	4117.2	99.70
50-55	2.7	0.07	0-55	4119.9	99.77
55-60	1.3	0.03	0-60	4121.2	99.80
60-65	0.3	0.01	0-65	4121.6	99.81
65-70	0.0	0.00	0-70	4121.6	99.81
70-75	0.0	0.00	0-75	4121.6	99.81
75-80	0.0	0.00	0-80	4121.6	99.81
80-85	0.0	0.00	0-85	4121.6	99.81
85-90	0.0	0.00	0-90	4121.6	99.81
90-95	0.0	0.00	0-95	4121.6	99.81
95-100	0.0	0.00	0-100	4121.6	99.81
100-105	0.0	0.00	0-105	4121.6	99.81
105-110	0.0	0.00	0-110	4121.6	99.81
110-115	0.0	0.00	0-115	4121.6	99.81
115-120	0.0	0.00	0-120	4121.6	99.81
120-125	0.0	0.00	0-125	4121.6	99.81
125-130	0.0	0.00	0-130	4121.6	99.81
130-135	0.0	0.00	0-135	4121.6	99.81
135-140	0.2	0.00	0-140	4121.7	99.81
140-145	0.6	0.01	0-145	4122.3	99.82
145-150	1.1	0.03	0-150	4123.4	99.85
150-155	1.4	0.03	0-155	4124.8	99.88
155-160	1.5	0.04	0-160	4126.3	99.92
160-165	1.4	0.03	0-165	4127.6	99.95
165-170	1.1	0.03	0-170	4128.7	99.98
170-175	0.7	0.02	0-175	4129.5	100.00
175-180	0.1	0.00	0-180	4129.6	100.00

6. Product Photo



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