

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEL9027DIM010UNVMDRBL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180522003-10-2
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: AD6LEL9027DIM010UNVMDRBL
 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**

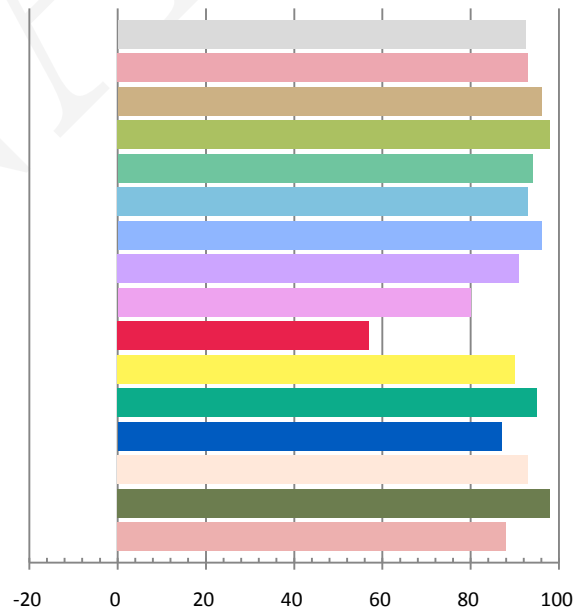
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.5036	60.05	0.9938	4097.1	68.23

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
14.393	2697	0.00013	0.4603	0.4111	0.2626	0.5276

Color Rendering Index

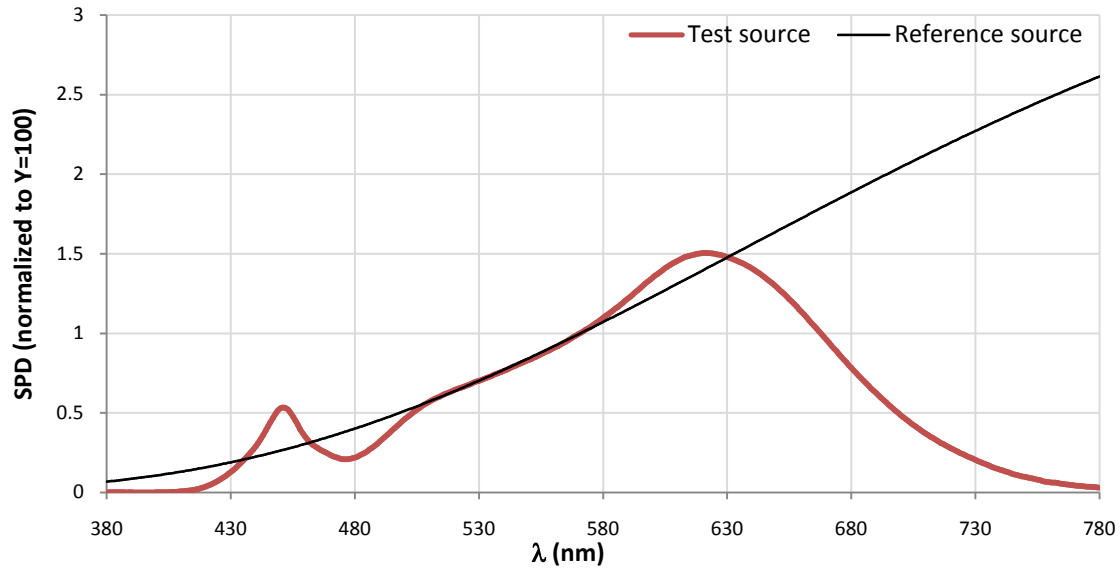
Ra 92.5			
R1 93	R2 96	R3 98	R4 94
R5 93	R6 96	R7 91	R8 80
R9 57	R10 90	R11 95	R12 87
R13 93	R14 98	R15 88	



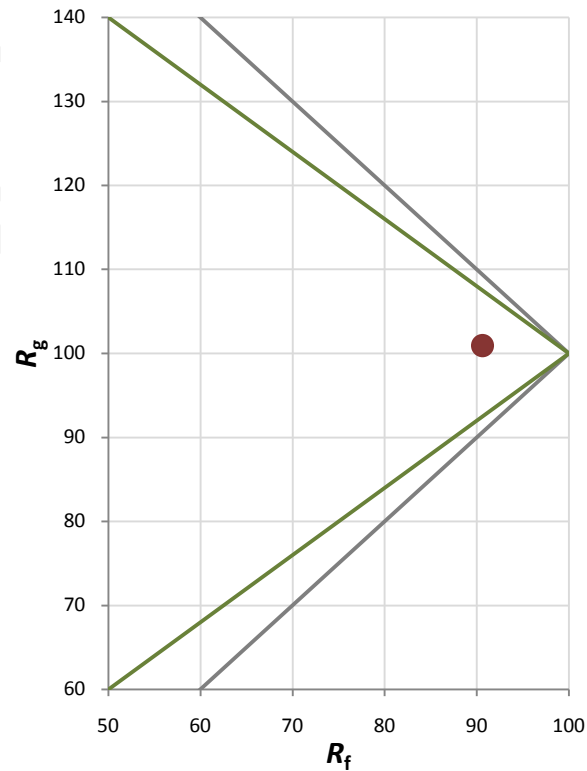
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

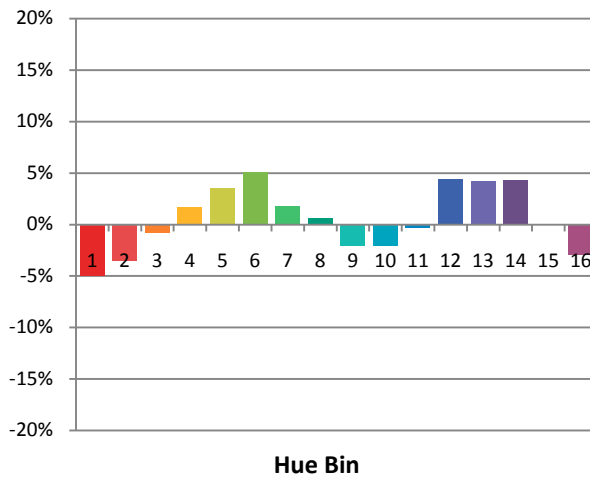
Spectral Power Distribution Comparison



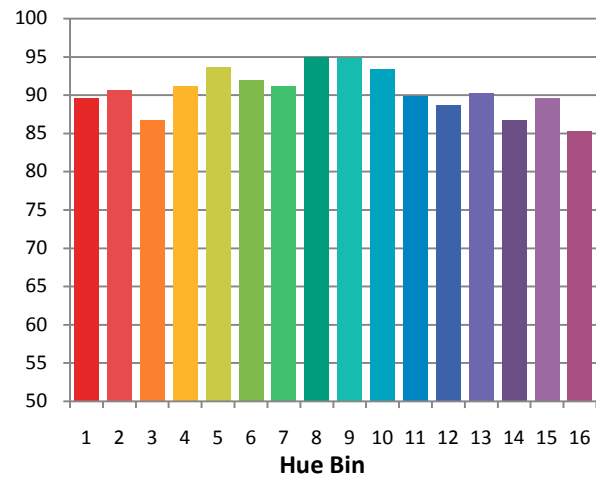
Plot of R_g versus R_f



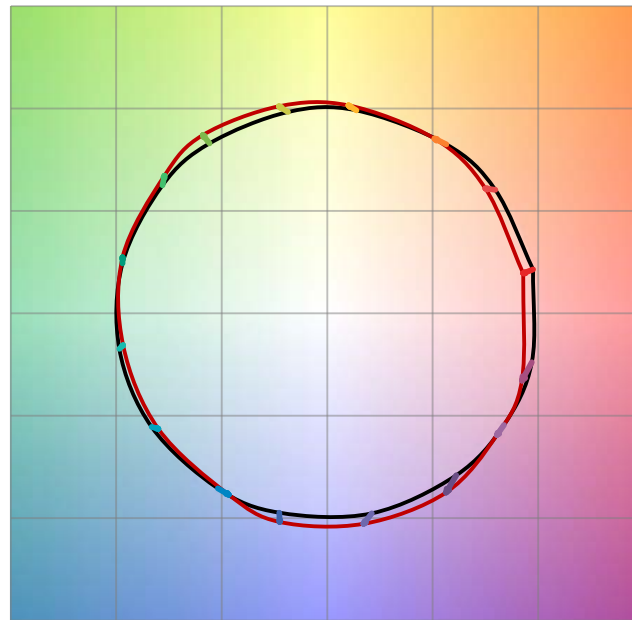
Chroma Shift by Hue



R_t by Hue

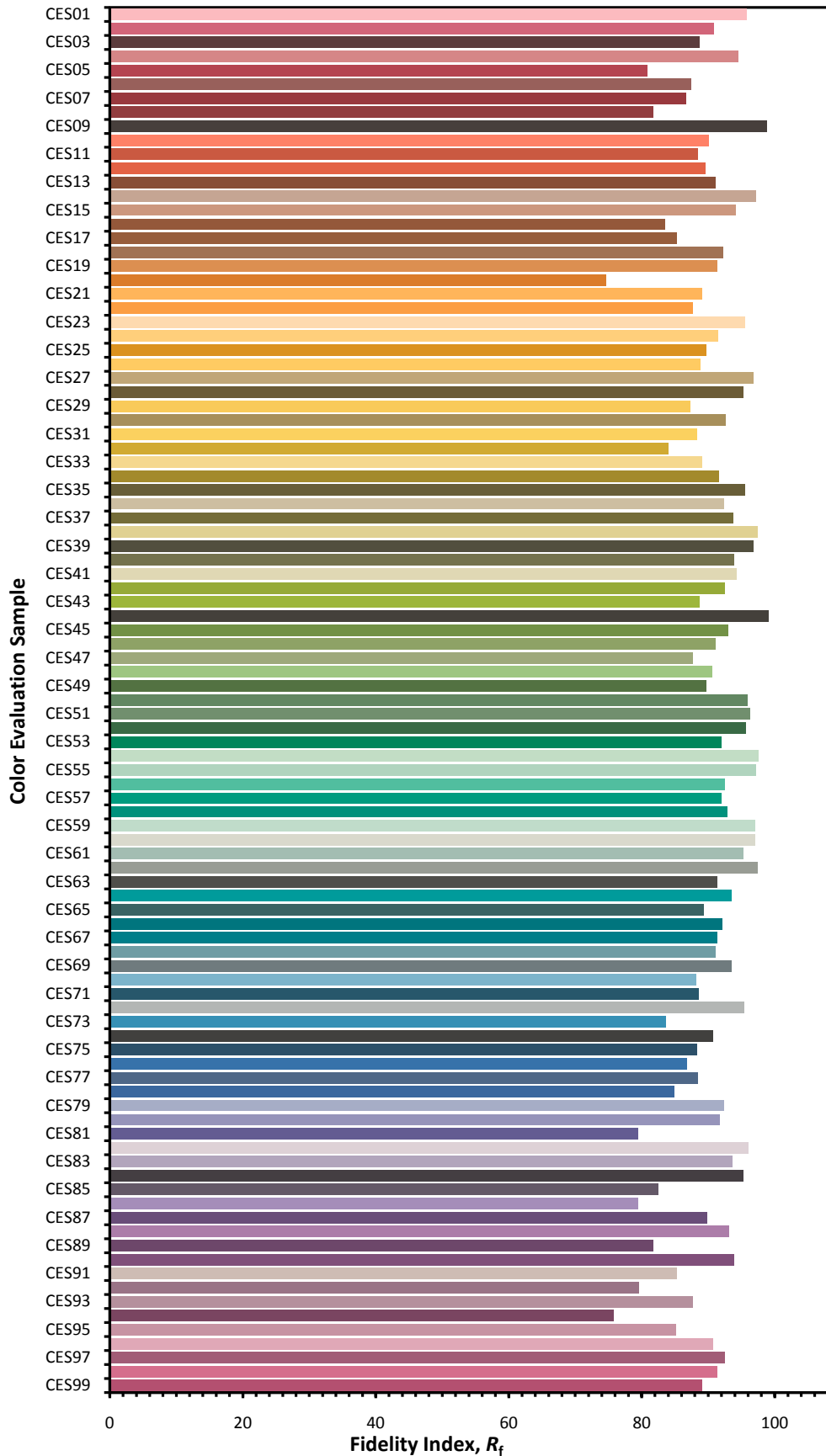


Color Vector Graphic

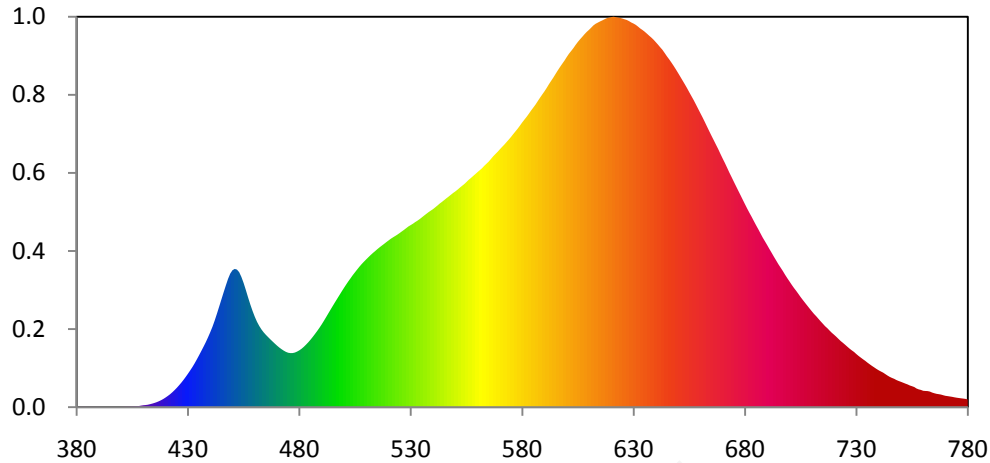


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



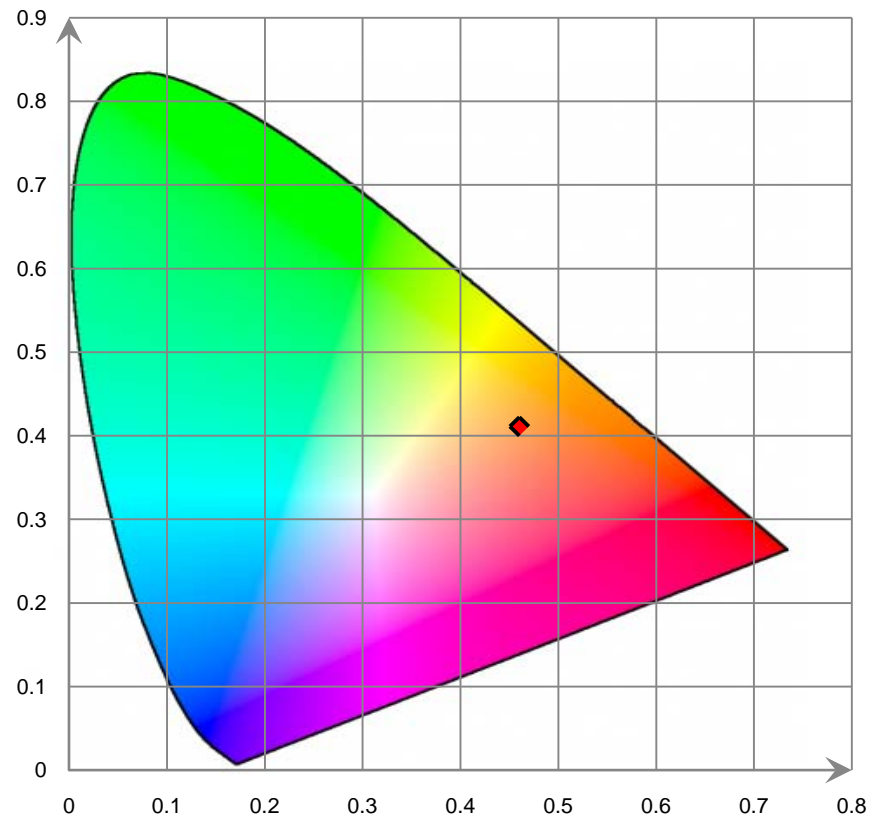
Relative Spectral Power Distribution



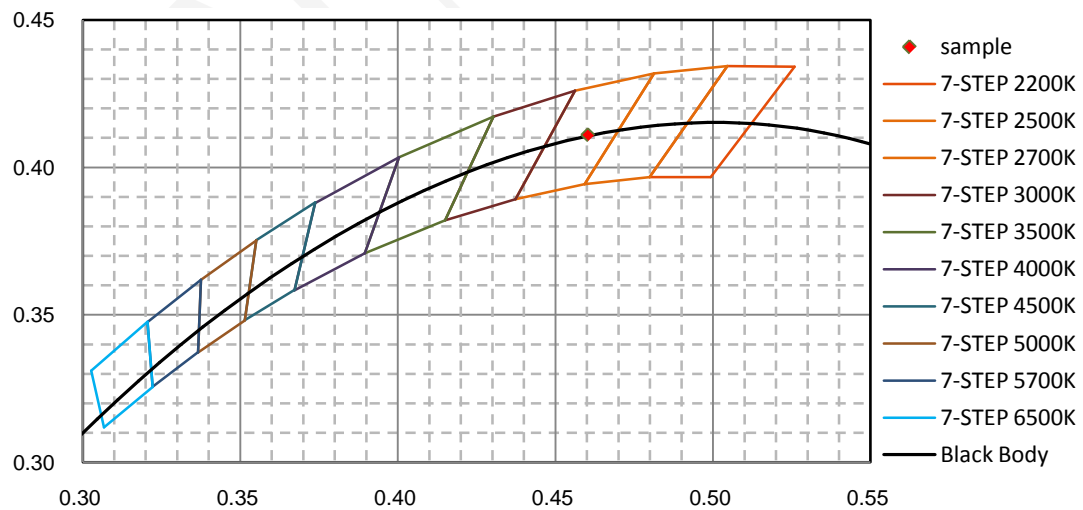
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.870E-02	421	2.610E+00	462	1.880E+01	503	2.982E+01	544	4.749E+01
381	6.070E-02	422	2.998E+00	463	1.798E+01	504	3.055E+01	545	4.790E+01
382	6.130E-02	423	3.447E+00	464	1.731E+01	505	3.122E+01	546	4.832E+01
383	7.250E-02	424	3.945E+00	465	1.673E+01	506	3.188E+01	547	4.871E+01
384	8.010E-02	425	4.471E+00	466	1.621E+01	507	3.252E+01	548	4.913E+01
385	5.780E-02	426	5.047E+00	467	1.569E+01	508	3.311E+01	549	4.954E+01
386	6.170E-02	427	5.658E+00	468	1.519E+01	509	3.365E+01	550	4.991E+01
387	6.310E-02	428	6.301E+00	469	1.471E+01	510	3.418E+01	551	5.031E+01
388	4.660E-02	429	6.996E+00	470	1.424E+01	511	3.469E+01	552	5.076E+01
389	6.960E-02	430	7.727E+00	471	1.380E+01	512	3.519E+01	553	5.119E+01
390	6.530E-02	431	8.489E+00	472	1.342E+01	513	3.566E+01	554	5.159E+01
391	3.230E-02	432	9.280E+00	473	1.308E+01	514	3.609E+01	555	5.208E+01
392	2.880E-02	433	1.014E+01	474	1.279E+01	515	3.655E+01	556	5.259E+01
393	4.000E-02	434	1.106E+01	475	1.259E+01	516	3.697E+01	557	5.301E+01
394	4.020E-02	435	1.201E+01	476	1.251E+01	517	3.736E+01	558	5.347E+01
395	3.910E-02	436	1.299E+01	477	1.252E+01	518	3.776E+01	559	5.392E+01
396	4.010E-02	437	1.399E+01	478	1.264E+01	519	3.816E+01	560	5.439E+01
397	3.190E-02	438	1.502E+01	479	1.286E+01	520	3.855E+01	561	5.482E+01
398	2.400E-02	439	1.614E+01	480	1.315E+01	521	3.894E+01	562	5.527E+01
399	2.370E-02	440	1.732E+01	481	1.351E+01	522	3.927E+01	563	5.583E+01
400	5.360E-02	441	1.859E+01	482	1.396E+01	523	3.959E+01	564	5.632E+01
401	8.020E-02	442	2.002E+01	483	1.446E+01	524	3.992E+01	565	5.682E+01
402	1.087E-01	443	2.160E+01	484	1.500E+01	525	4.027E+01	566	5.741E+01
403	1.317E-01	444	2.323E+01	485	1.560E+01	526	4.066E+01	567	5.803E+01
404	1.427E-01	445	2.488E+01	486	1.624E+01	527	4.102E+01	568	5.856E+01
405	1.637E-01	446	2.654E+01	487	1.692E+01	528	4.142E+01	569	5.907E+01
406	1.893E-01	447	2.814E+01	488	1.762E+01	529	4.182E+01	570	5.965E+01
407	2.307E-01	448	2.967E+01	489	1.834E+01	530	4.213E+01	571	6.020E+01
408	2.745E-01	449	3.091E+01	490	1.912E+01	531	4.244E+01	572	6.073E+01
409	3.741E-01	450	3.168E+01	491	1.995E+01	532	4.281E+01	573	6.132E+01
410	4.525E-01	451	3.199E+01	492	2.081E+01	533	4.314E+01	574	6.190E+01
411	5.013E-01	452	3.183E+01	493	2.169E+01	534	4.350E+01	575	6.250E+01
412	5.709E-01	453	3.123E+01	494	2.255E+01	535	4.391E+01	576	6.317E+01
413	6.986E-01	454	3.013E+01	495	2.342E+01	536	4.432E+01	577	6.380E+01
414	8.344E-01	455	2.873E+01	496	2.426E+01	537	4.472E+01	578	6.443E+01
415	9.836E-01	456	2.710E+01	497	2.509E+01	538	4.512E+01	579	6.513E+01
416	1.161E+00	457	2.539E+01	498	2.593E+01	539	4.547E+01	580	6.585E+01
417	1.379E+00	458	2.376E+01	499	2.675E+01	540	4.582E+01	581	6.651E+01
418	1.630E+00	459	2.227E+01	500	2.757E+01	541	4.622E+01	582	6.716E+01
419	1.918E+00	460	2.093E+01	501	2.836E+01	542	4.665E+01	583	6.787E+01
420	2.250E+00	461	1.975E+01	502	2.911E+01	543	4.710E+01	584	6.861E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.930E+01	626	8.973E+01	667	6.073E+01	708	2.349E+01	749	6.060E+00
586	7.000E+01	627	8.956E+01	668	5.972E+01	709	2.283E+01	750	5.873E+00
587	7.078E+01	628	8.930E+01	669	5.860E+01	710	2.219E+01	751	5.662E+00
588	7.156E+01	629	8.899E+01	670	5.752E+01	711	2.158E+01	752	5.455E+00
589	7.231E+01	630	8.874E+01	671	5.650E+01	712	2.104E+01	753	5.266E+00
590	7.305E+01	631	8.845E+01	672	5.540E+01	713	2.044E+01	754	5.025E+00
591	7.383E+01	632	8.805E+01	673	5.429E+01	714	1.986E+01	755	4.851E+00
592	7.469E+01	633	8.761E+01	674	5.325E+01	715	1.929E+01	756	4.662E+00
593	7.547E+01	634	8.726E+01	675	5.218E+01	716	1.873E+01	757	4.328E+00
594	7.624E+01	635	8.687E+01	676	5.113E+01	717	1.826E+01	758	4.120E+00
595	7.708E+01	636	8.642E+01	677	5.010E+01	718	1.772E+01	759	3.989E+00
596	7.790E+01	637	8.594E+01	678	4.907E+01	719	1.721E+01	760	3.798E+00
597	7.869E+01	638	8.550E+01	679	4.802E+01	720	1.676E+01	761	3.748E+00
598	7.944E+01	639	8.501E+01	680	4.698E+01	721	1.629E+01	762	3.724E+00
599	8.017E+01	640	8.444E+01	681	4.596E+01	722	1.579E+01	763	3.612E+00
600	8.098E+01	641	8.386E+01	682	4.498E+01	723	1.529E+01	764	3.384E+00
601	8.175E+01	642	8.325E+01	683	4.405E+01	724	1.488E+01	765	3.229E+00
602	8.239E+01	643	8.265E+01	684	4.306E+01	725	1.443E+01	766	3.092E+00
603	8.306E+01	644	8.192E+01	685	4.209E+01	726	1.398E+01	767	3.011E+00
604	8.380E+01	645	8.115E+01	686	4.116E+01	727	1.353E+01	768	2.917E+00
605	8.449E+01	646	8.047E+01	687	4.019E+01	728	1.314E+01	769	2.760E+00
606	8.511E+01	647	7.973E+01	688	3.922E+01	729	1.276E+01	770	2.627E+00
607	8.569E+01	648	7.896E+01	689	3.836E+01	730	1.229E+01	771	2.553E+00
608	8.628E+01	649	7.815E+01	690	3.748E+01	731	1.186E+01	772	2.471E+00
609	8.682E+01	650	7.731E+01	691	3.658E+01	732	1.148E+01	773	2.394E+00
610	8.728E+01	651	7.645E+01	692	3.570E+01	733	1.108E+01	774	2.284E+00
611	8.779E+01	652	7.558E+01	693	3.481E+01	734	1.072E+01	775	2.195E+00
612	8.832E+01	653	7.472E+01	694	3.395E+01	735	1.031E+01	776	2.121E+00
613	8.870E+01	654	7.382E+01	695	3.309E+01	736	9.924E+00	777	2.054E+00
614	8.897E+01	655	7.287E+01	696	3.230E+01	737	9.553E+00	778	1.985E+00
615	8.924E+01	656	7.195E+01	697	3.151E+01	738	9.211E+00	779	1.916E+00
616	8.948E+01	657	7.103E+01	698	3.066E+01	739	8.861E+00	780	1.794E+00
617	8.975E+01	658	7.004E+01	699	2.986E+01	740	8.542E+00		
618	8.999E+01	659	6.902E+01	700	2.909E+01	741	8.264E+00		
619	9.012E+01	660	6.801E+01	701	2.831E+01	742	8.000E+00		
620	9.024E+01	661	6.702E+01	702	2.758E+01	743	7.663E+00		
621	9.032E+01	662	6.598E+01	703	2.691E+01	744	7.317E+00		
622	9.024E+01	663	6.490E+01	704	2.620E+01	745	7.010E+00		
623	9.015E+01	664	6.384E+01	705	2.547E+01	746	6.770E+00		
624	9.005E+01	665	6.279E+01	706	2.479E+01	747	6.557E+00		
625	8.990E+01	666	6.177E+01	707	2.413E+01	748	6.279E+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**

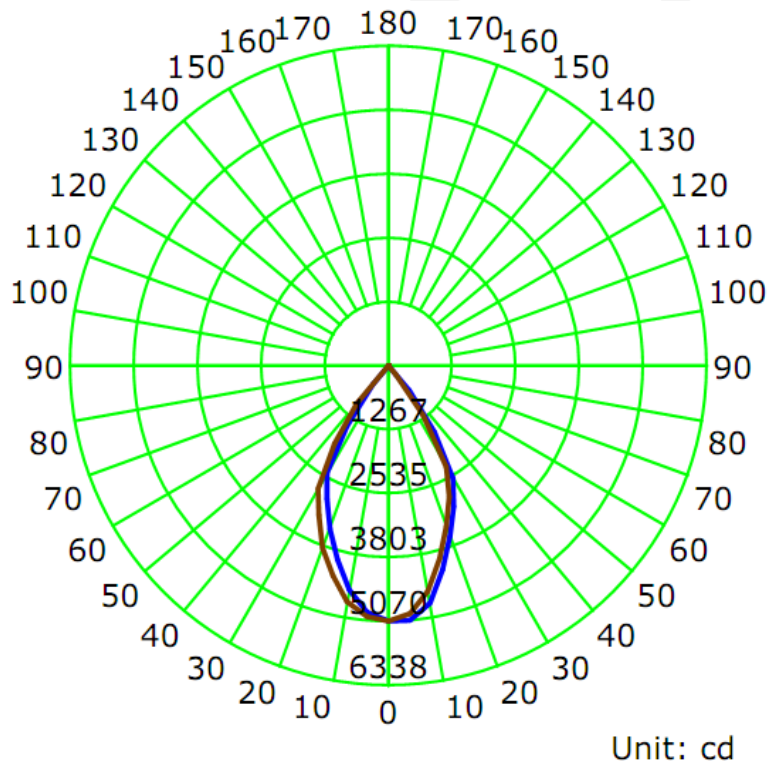
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5110	60.03	0.9970

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4096	68.28	5071.0	0.84	0.86

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	59.4	60.7	59.6	58.4	59.5
Field Angle (10% I _{max}):	81.0	81.4	81.2	81.3	81.2

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	5071	5071	5071	5071	5071	5071	5071	5071
5.0°	5070	5040	5002	4968	4936	4935	4916	4927
10.0°	4775	4695	4640	4575	4542	4500	4469	4480
15.0°	4190	4151	4088	4024	3958	3896	3840	3861
20.0°	3602	3595	3549	3489	3396	3353	3320	3348
25.0°	3090	3051	3052	2978	2866	2814	2804	2841
30.0°	2583	2551	2510	2365	2316	2259	2258	2306
35.0°	1604	1482	1365	1268	1210	1212	1276	1382
40.0°	654	510	389	302	249	243	335	447
45.0°	0	0	0	0	0	0	0	0
50.0°	0	0	0	0	0	0	0	0
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	0	0	0	0	0
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	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

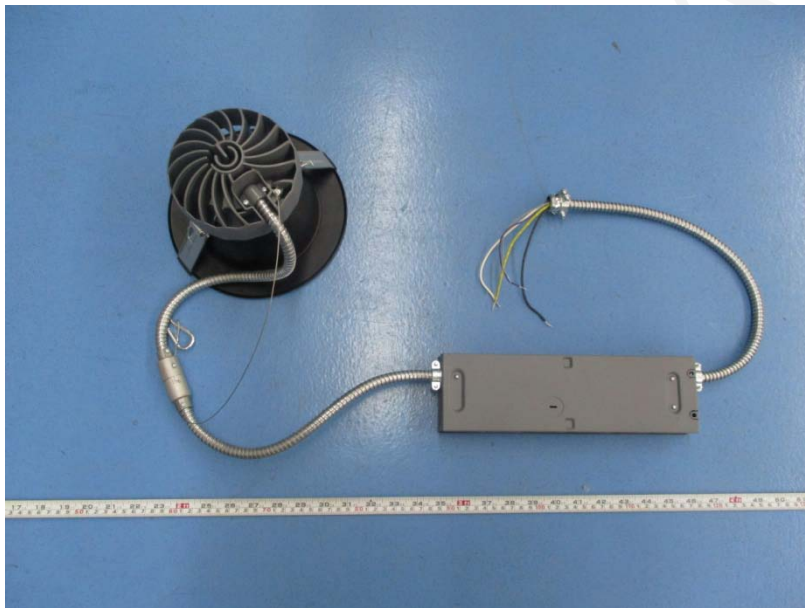
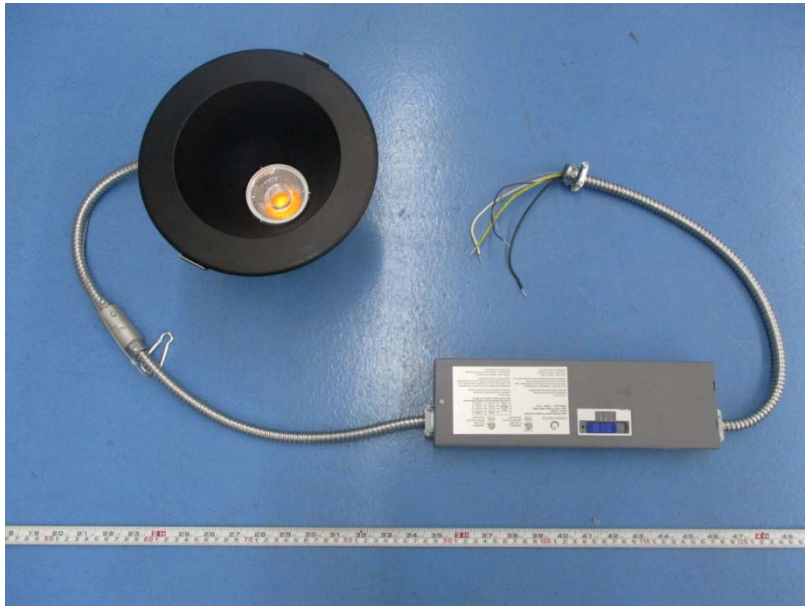
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	5071	5071	5071	5071	5071	5071	5071	5071
5.0°	4907	4918	4948	4994	4988	4962	5007	5034
10.0°	4508	4615	4678	4708	4755	4779	4758	4730
15.0°	3970	4138	4242	4305	4315	4274	4216	4170
20.0°	3441	3596	3746	3830	3851	3762	3705	3640
25.0°	2914	3052	3213	3305	3281	3224	3155	3129
30.0°	2457	2587	2718	2808	2820	2771	2692	2649
35.0°	1461	1623	1751	1878	1899	1881	1823	1730
40.0°	489	668	831	939	987	957	892	734
45.0°	0	8	26	51	48	40	26	17
50.0°	0	0	0	0	0	0	0	0
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	0	0	0	0	0
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	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	120.1	2.93	0-5	120.1	2.93
5-10	343.8	8.39	0-10	463.8	11.32
10-15	518.5	12.66	0-15	982.3	23.98
15-20	632.8	15.45	0-20	1615.1	39.43
20-25	694.8	16.96	0-25	2309.9	56.40
25-30	707.2	17.27	0-30	3017.2	73.66
30-35	602.8	14.72	0-35	3619.9	88.38
35-40	359.4	8.78	0-40	3979.3	97.15
40-45	113.9	2.78	0-45	4093.2	99.93
45-50	2.7	0.07	0-50	4096.0	100.00
50-55	0.0	0.00	0-55	4096.0	100.00
55-60	0.0	0.00	0-60	4096.0	100.00
60-65	0.0	0.00	0-65	4096.0	100.00
65-70	0.0	0.00	0-70	4096.0	100.00
70-75	0.0	0.00	0-75	4096.0	100.00
75-80	0.0	0.00	0-80	4096.0	100.00
80-85	0.0	0.00	0-85	4096.0	100.00
85-90	0.0	0.00	0-90	4096.0	100.00
90-95	0.0	0.00	0-95	4096.0	100.00
95-100	0.0	0.00	0-100	4096.0	100.00
100-105	0.0	0.00	0-105	4096.0	100.00
105-110	0.0	0.00	0-110	4096.0	100.00
110-115	0.0	0.00	0-115	4096.0	100.00
115-120	0.0	0.00	0-120	4096.0	100.00
120-125	0.0	0.00	0-125	4096.0	100.00
125-130	0.0	0.00	0-130	4096.0	100.00
130-135	0.0	0.00	0-135	4096.0	100.00
135-140	0.0	0.00	0-140	4096.0	100.00
140-145	0.0	0.00	0-145	4096.0	100.00
145-150	0.0	0.00	0-150	4096.0	100.00
150-155	0.0	0.00	0-155	4096.0	100.00
155-160	0.0	0.00	0-160	4096.0	100.00
160-165	0.0	0.00	0-165	4096.0	100.00
165-170	0.0	0.00	0-170	4096.0	100.00
170-175	0.0	0.00	0-175	4096.0	100.00
175-180	0.0	0.00	0-180	4096.0	100.00

6. Product Photo



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