

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEL9027DIM010UNVVNSCC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKS180131082-10-1
Test Date:	2018-05-22 to 2018-05-24
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 2018-02-05 and used for testing.

Model Tested: AD6LEL9027DIM010UNVVNSCC
 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: 4450lm

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.

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 $U=2.6\%$ ($K=2$), 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**

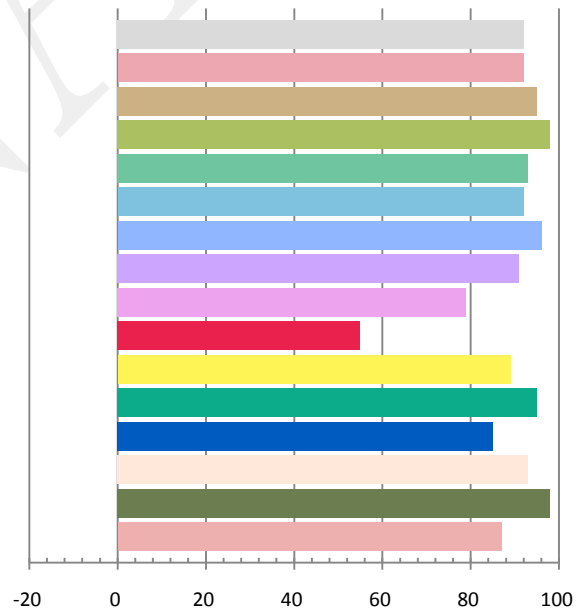
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.5034	60.08	0.9945	4478	74.53

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
15.608	2694	0.00132	0.4627	0.4148	0.2624	0.5294

Color Rendering Index

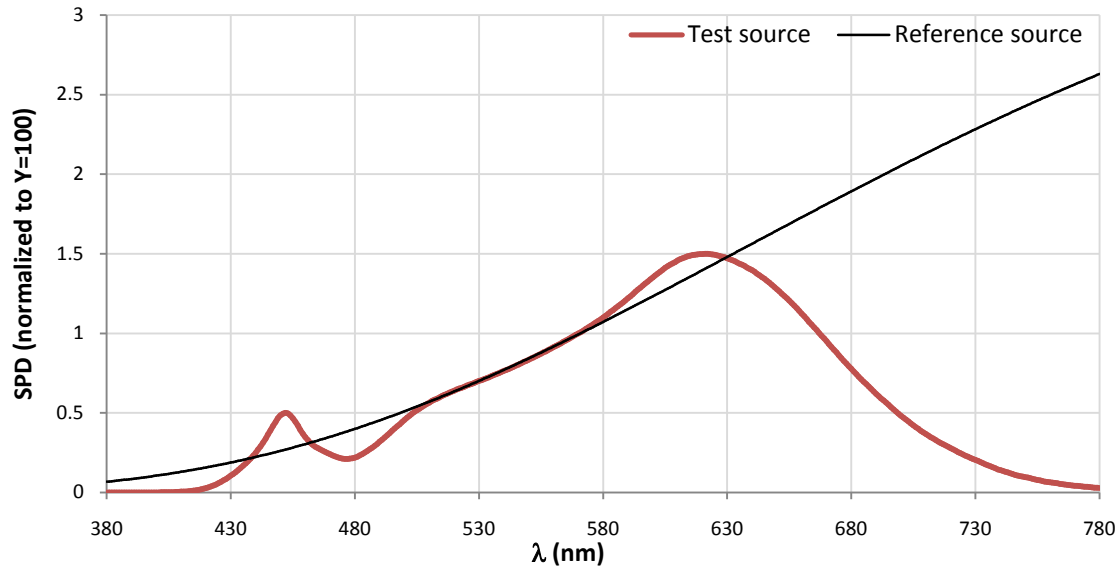
Ra			
92.1			
R1	R2	R3	R4
92	95	98	93
R5	R6	R7	R8
92	96	91	79
R9	R10	R11	R12
55	89	95	85
R13	R14	R15	
93	98	87	



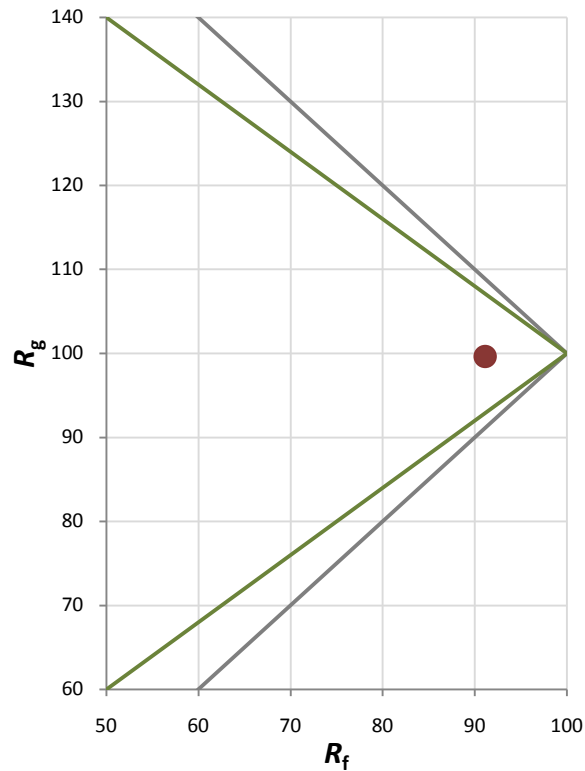
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	100

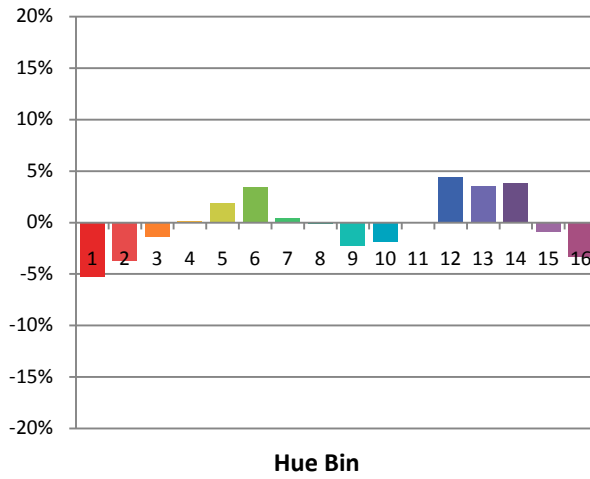
Spectral Power Distribution Comparison



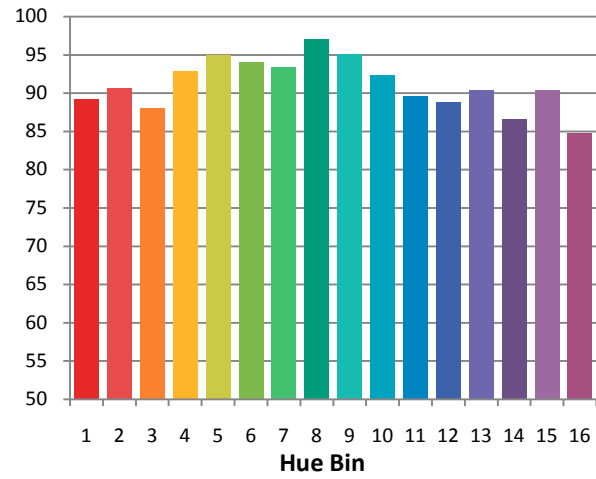
Plot of R_g versus R_f



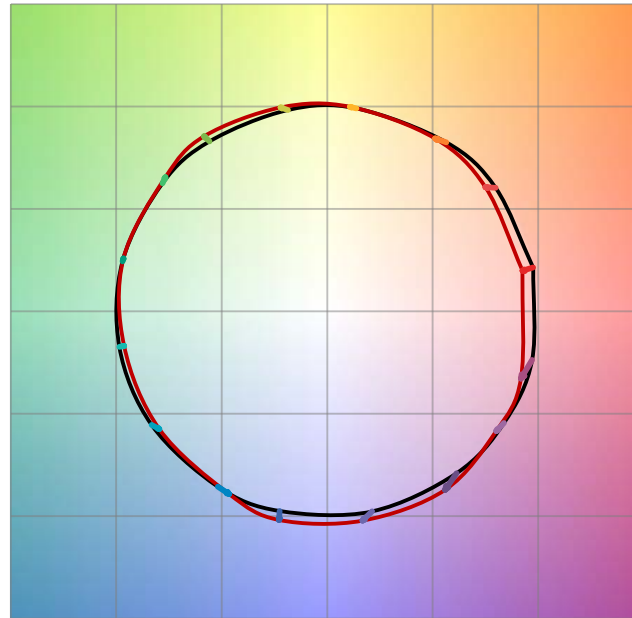
Chroma Shift by Hue



R_t by Hue

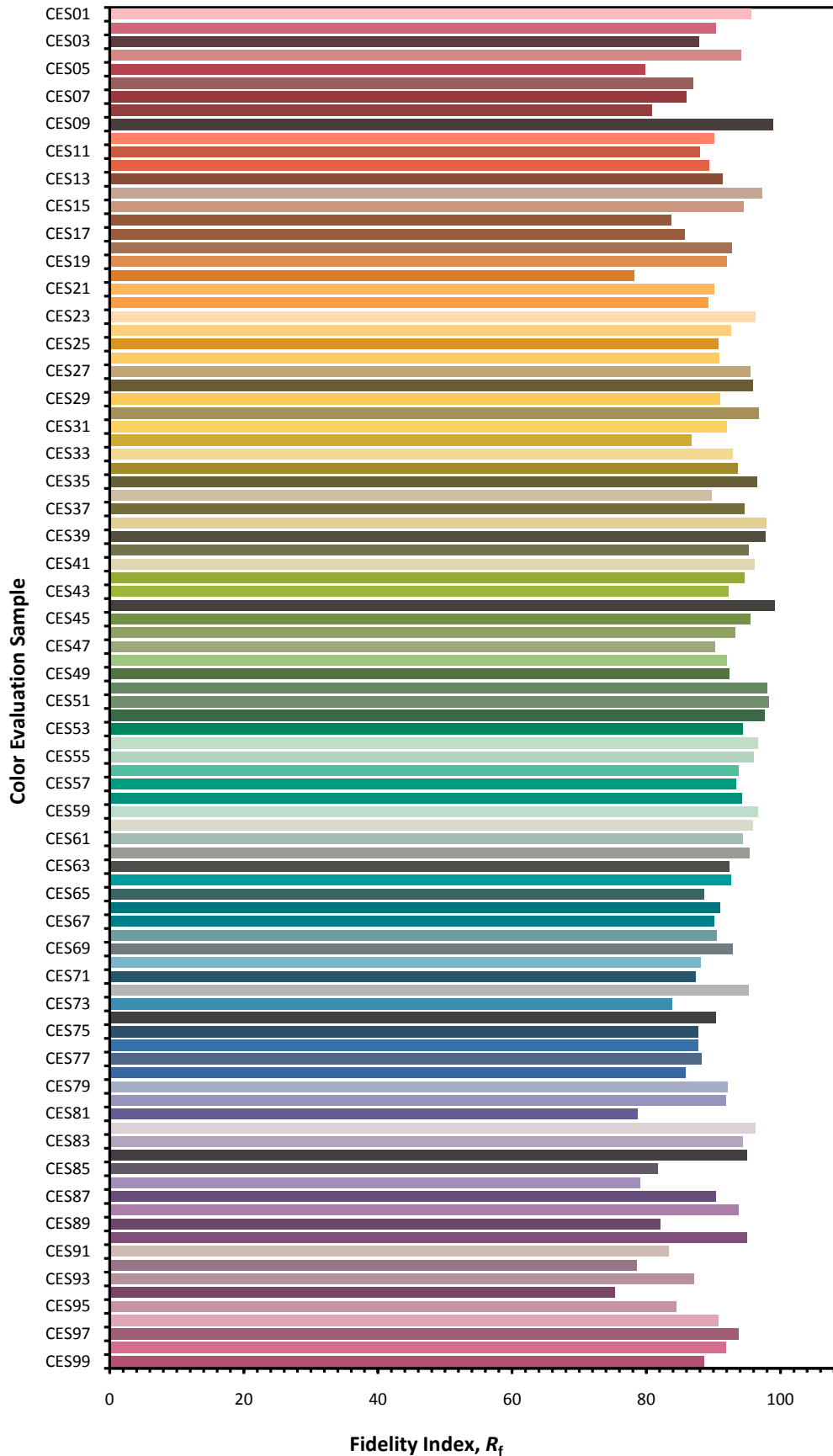


Color Vector Graphic

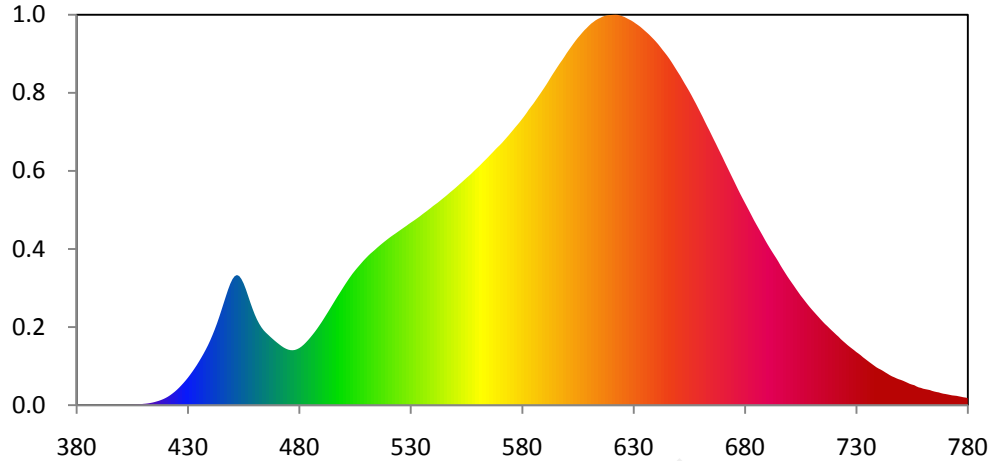


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



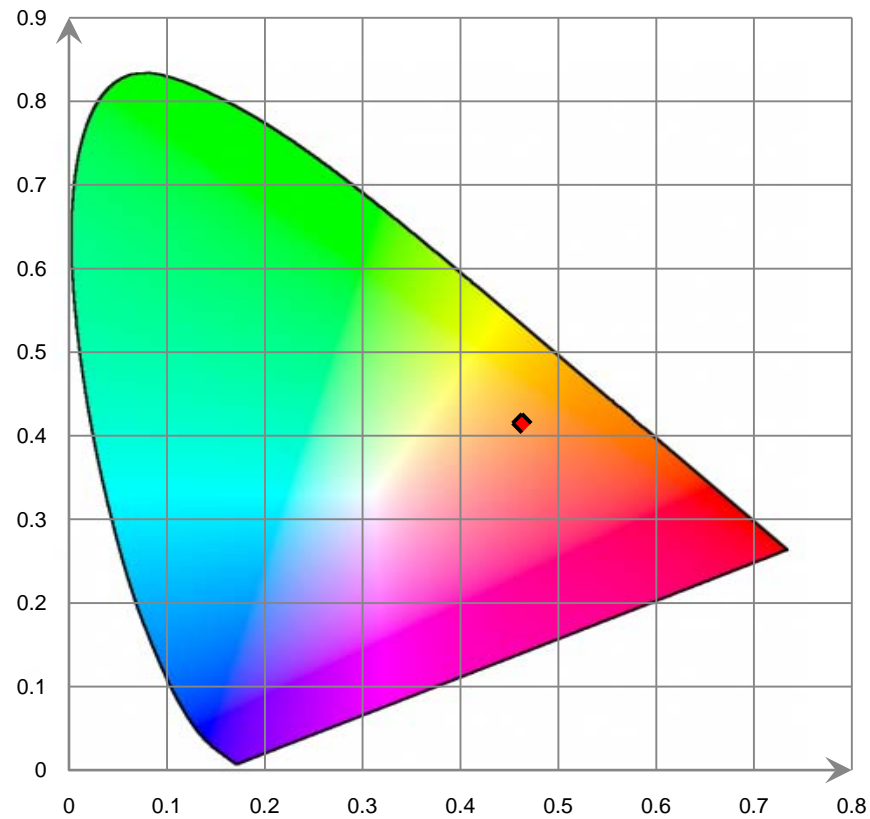
Relative Spectral Power Distribution



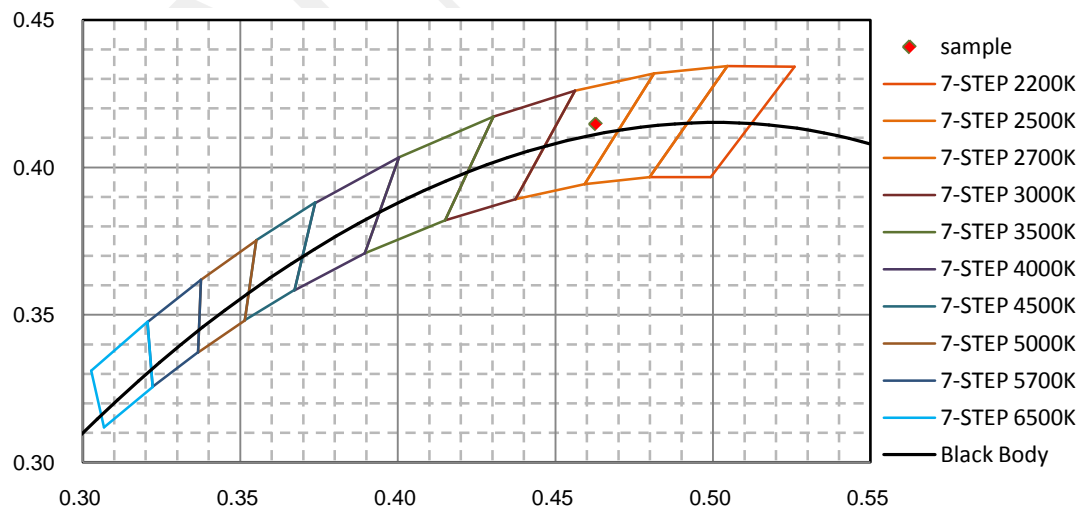
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.530E-02	421	2.133E+00	462	2.049E+01	503	3.242E+01	544	5.184E+01
381	1.030E-02	422	2.499E+00	463	1.959E+01	504	3.319E+01	545	5.229E+01
382	8.000E-03	423	2.908E+00	464	1.885E+01	505	3.389E+01	546	5.275E+01
383	1.340E-02	424	3.352E+00	465	1.825E+01	506	3.457E+01	547	5.324E+01
384	1.880E-02	425	3.847E+00	466	1.773E+01	507	3.522E+01	548	5.373E+01
385	1.140E-02	426	4.379E+00	467	1.720E+01	508	3.587E+01	549	5.418E+01
386	2.340E-02	427	4.970E+00	468	1.670E+01	509	3.650E+01	550	5.466E+01
387	2.640E-02	428	5.584E+00	469	1.621E+01	510	3.708E+01	551	5.516E+01
388	1.920E-02	429	6.232E+00	470	1.574E+01	511	3.766E+01	552	5.566E+01
389	2.390E-02	430	6.919E+00	471	1.530E+01	512	3.819E+01	553	5.616E+01
390	2.130E-02	431	7.662E+00	472	1.488E+01	513	3.867E+01	554	5.667E+01
391	1.030E-02	432	8.443E+00	473	1.451E+01	514	3.916E+01	555	5.718E+01
392	6.800E-03	433	9.260E+00	474	1.421E+01	515	3.966E+01	556	5.768E+01
393	1.420E-02	434	1.011E+01	475	1.398E+01	516	4.015E+01	557	5.817E+01
394	2.340E-02	435	1.101E+01	476	1.386E+01	517	4.062E+01	558	5.872E+01
395	2.940E-02	436	1.196E+01	477	1.383E+01	518	4.107E+01	559	5.928E+01
396	2.750E-02	437	1.295E+01	478	1.390E+01	519	4.151E+01	560	5.979E+01
397	2.000E-02	438	1.399E+01	479	1.409E+01	520	4.196E+01	561	6.033E+01
398	1.190E-02	439	1.509E+01	480	1.438E+01	521	4.238E+01	562	6.090E+01
399	5.900E-03	440	1.630E+01	481	1.477E+01	522	4.277E+01	563	6.147E+01
400	2.660E-02	441	1.761E+01	482	1.526E+01	523	4.315E+01	564	6.202E+01
401	4.890E-02	442	1.901E+01	483	1.581E+01	524	4.354E+01	565	6.259E+01
402	6.170E-02	443	2.051E+01	484	1.643E+01	525	4.395E+01	566	6.319E+01
403	6.640E-02	444	2.214E+01	485	1.708E+01	526	4.435E+01	567	6.376E+01
404	7.840E-02	445	2.385E+01	486	1.777E+01	527	4.474E+01	568	6.437E+01
405	9.870E-02	446	2.561E+01	487	1.849E+01	528	4.513E+01	569	6.493E+01
406	1.269E-01	447	2.736E+01	488	1.926E+01	529	4.554E+01	570	6.547E+01
407	1.552E-01	448	2.905E+01	489	2.007E+01	530	4.594E+01	571	6.605E+01
408	1.894E-01	449	3.054E+01	490	2.090E+01	531	4.632E+01	572	6.668E+01
409	2.668E-01	450	3.172E+01	491	2.177E+01	532	4.669E+01	573	6.732E+01
410	3.367E-01	451	3.248E+01	492	2.267E+01	533	4.710E+01	574	6.796E+01
411	3.834E-01	452	3.276E+01	493	2.356E+01	534	4.750E+01	575	6.864E+01
412	4.480E-01	453	3.251E+01	494	2.449E+01	535	4.794E+01	576	6.931E+01
413	5.437E-01	454	3.176E+01	495	2.542E+01	536	4.837E+01	577	6.999E+01
414	6.510E-01	455	3.063E+01	496	2.634E+01	537	4.877E+01	578	7.065E+01
415	7.856E-01	456	2.919E+01	497	2.725E+01	538	4.922E+01	579	7.132E+01
416	9.403E-01	457	2.753E+01	498	2.813E+01	539	4.966E+01	580	7.205E+01
417	1.110E+00	458	2.586E+01	499	2.902E+01	540	5.011E+01	581	7.278E+01
418	1.317E+00	459	2.427E+01	500	2.991E+01	541	5.053E+01	582	7.356E+01
419	1.538E+00	460	2.282E+01	501	3.077E+01	542	5.093E+01	583	7.440E+01
420	1.814E+00	461	2.155E+01	502	3.161E+01	543	5.138E+01	584	7.515E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	7.586E+01	626	9.770E+01	667	6.579E+01	708	2.545E+01	749	6.537E+00
586	7.667E+01	627	9.739E+01	668	6.462E+01	709	2.476E+01	750	6.364E+00
587	7.749E+01	628	9.709E+01	669	6.348E+01	710	2.410E+01	751	6.144E+00
588	7.829E+01	629	9.682E+01	670	6.234E+01	711	2.347E+01	752	5.892E+00
589	7.912E+01	630	9.647E+01	671	6.115E+01	712	2.284E+01	753	5.631E+00
590	7.995E+01	631	9.607E+01	672	5.999E+01	713	2.222E+01	754	5.363E+00
591	8.081E+01	632	9.568E+01	673	5.883E+01	714	2.159E+01	755	5.182E+00
592	8.173E+01	633	9.526E+01	674	5.767E+01	715	2.098E+01	756	5.033E+00
593	8.266E+01	634	9.479E+01	675	5.653E+01	716	2.040E+01	757	4.728E+00
594	8.354E+01	635	9.428E+01	676	5.537E+01	717	1.989E+01	758	4.487E+00
595	8.439E+01	636	9.379E+01	677	5.420E+01	718	1.934E+01	759	4.350E+00
596	8.526E+01	637	9.328E+01	678	5.309E+01	719	1.879E+01	760	4.144E+00
597	8.610E+01	638	9.271E+01	679	5.200E+01	720	1.827E+01	761	4.032E+00
598	8.688E+01	639	9.214E+01	680	5.094E+01	721	1.773E+01	762	3.922E+00
599	8.773E+01	640	9.154E+01	681	4.988E+01	722	1.724E+01	763	3.804E+00
600	8.861E+01	641	9.090E+01	682	4.880E+01	723	1.665E+01	764	3.595E+00
601	8.941E+01	642	9.020E+01	683	4.773E+01	724	1.614E+01	765	3.436E+00
602	9.020E+01	643	8.946E+01	684	4.663E+01	725	1.566E+01	766	3.314E+00
603	9.099E+01	644	8.876E+01	685	4.563E+01	726	1.515E+01	767	3.212E+00
604	9.175E+01	645	8.804E+01	686	4.463E+01	727	1.471E+01	768	3.036E+00
605	9.246E+01	646	8.726E+01	687	4.364E+01	728	1.427E+01	769	2.895E+00
606	9.312E+01	647	8.642E+01	688	4.264E+01	729	1.383E+01	770	2.807E+00
607	9.378E+01	648	8.554E+01	689	4.162E+01	730	1.338E+01	771	2.703E+00
608	9.441E+01	649	8.463E+01	690	4.064E+01	731	1.298E+01	772	2.590E+00
609	9.495E+01	650	8.375E+01	691	3.971E+01	732	1.255E+01	773	2.467E+00
610	9.552E+01	651	8.287E+01	692	3.880E+01	733	1.206E+01	774	2.405E+00
611	9.605E+01	652	8.189E+01	693	3.792E+01	734	1.163E+01	775	2.349E+00
612	9.646E+01	653	8.092E+01	694	3.705E+01	735	1.120E+01	776	2.232E+00
613	9.688E+01	654	7.999E+01	695	3.614E+01	736	1.078E+01	777	2.123E+00
614	9.721E+01	655	7.902E+01	696	3.516E+01	737	1.036E+01	778	1.996E+00
615	9.748E+01	656	7.800E+01	697	3.424E+01	738	9.955E+00	779	1.913E+00
616	9.776E+01	657	7.695E+01	698	3.335E+01	739	9.540E+00	780	1.786E+00
617	9.798E+01	658	7.591E+01	699	3.247E+01	740	9.222E+00		
618	9.811E+01	659	7.480E+01	700	3.164E+01	741	8.939E+00		
619	9.818E+01	660	7.369E+01	701	3.083E+01	742	8.622E+00		
620	9.822E+01	661	7.259E+01	702	3.003E+01	743	8.255E+00		
621	9.827E+01	662	7.142E+01	703	2.921E+01	744	7.922E+00		
622	9.828E+01	663	7.029E+01	704	2.841E+01	745	7.572E+00		
623	9.825E+01	664	6.920E+01	705	2.762E+01	746	7.259E+00		
624	9.809E+01	665	6.805E+01	706	2.690E+01	747	7.031E+00		
625	9.791E+01	666	6.690E+01	707	2.617E+01	748	6.763E+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**

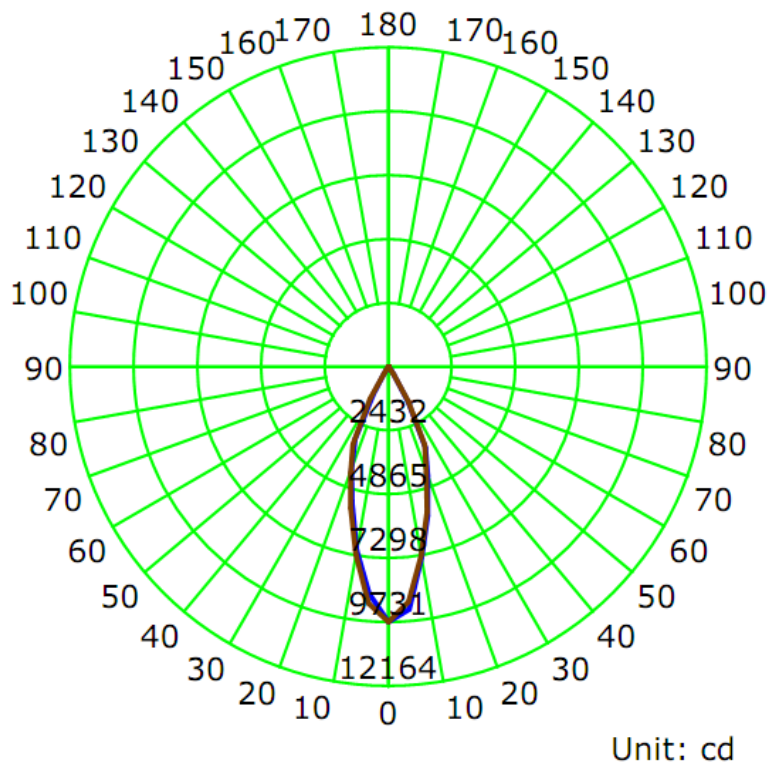
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5170	60.09	0.9950

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4479.4	74.59	9731.4	0.56	0.56

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	35.6	36.3	35.8	36.3	35.7
Field Angle (10% I _{max}):	63.7	75.3	64.5	75.5	69.8

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	9731	9731	9731	9731	9731	9731	9731	9731
5.0°	9261	9155	9018	9000	9000	8964	8869	8850
10.0°	7340	7347	7328	7408	7314	7277	7236	7133
15.0°	5860	5800	5850	5801	5723	5659	5624	5524
20.0°	4420	4486	4516	4394	4299	4338	4330	4256
25.0°	3405	3433	3297	3374	3301	3254	3176	3266
30.0°	1583	2065	2437	2118	1563	2008	2357	1814
35.0°	359	556	1692	603	355	529	1606	422
40.0°	186	207	499	201	176	200	422	184
45.0°	56	88	125	88	48	76	105	67
50.0°	13	17	18	11	0	8	0	11
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

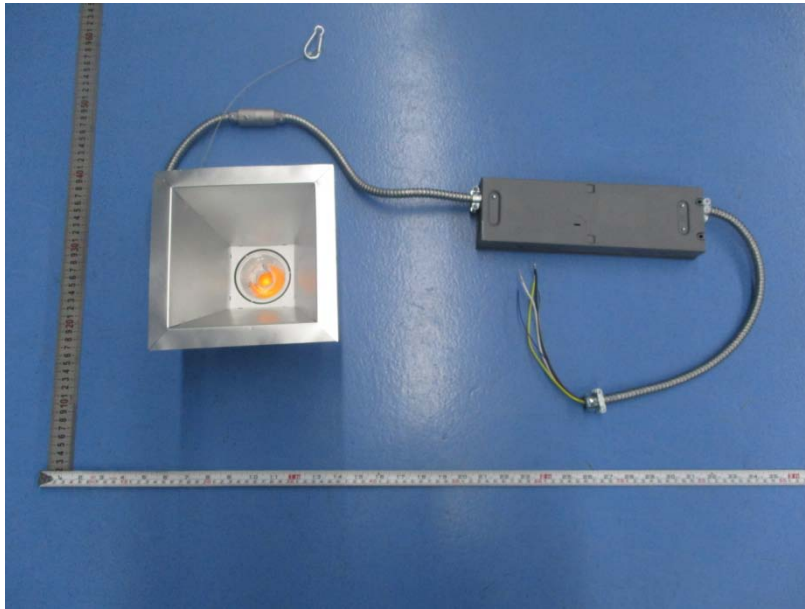
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	9731	9731	9731	9731	9731	9731	9731	9731
5.0°	8673	8734	8809	8902	9034	9038	9063	9101
10.0°	7079	7069	7108	7123	7249	7349	7394	7354
15.0°	5398	5455	5580	5569	5589	5640	5778	5863
20.0°	4164	4232	4187	4301	4295	4304	4429	4437
25.0°	3042	3198	3084	3221	3255	3285	3213	3337
30.0°	1181	1629	2263	1854	1417	1997	2423	1945
35.0°	312	385	1488	461	340	463	1651	484
40.0°	158	182	342	193	167	192	458	192
45.0°	40	60	94	71	46	72	113	79
50.0°	0	14	0	8	0	12	17	17
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	223.5	4.99	0-5	223.5	4.99
5-10	580.4	12.96	0-10	803.9	17.95
10-15	766.8	17.12	0-15	1570.7	35.06
15-20	824.7	18.41	0-20	2395.3	53.47
20-25	796.6	17.78	0-25	3192.0	71.26
25-30	654.9	14.62	0-30	3846.8	85.88
30-35	389.9	8.70	0-35	4236.7	94.58
35-40	163.3	3.65	0-40	4400.0	98.23
40-45	60.0	1.34	0-45	4460.0	99.57
45-50	17.4	0.39	0-50	4477.4	99.96
50-55	2.0	0.04	0-55	4479.4	100.00
55-60	0.0	0.00	0-60	4479.4	100.00
60-65	0.0	0.00	0-65	4479.4	100.00
65-70	0.0	0.00	0-70	4479.4	100.00
70-75	0.0	0.00	0-75	4479.4	100.00
75-80	0.0	0.00	0-80	4479.4	100.00
80-85	0.0	0.00	0-85	4479.4	100.00
85-90	0.0	0.00	0-90	4479.4	100.00
90-95	0.0	0.00	0-95	4479.4	100.00
95-100	0.0	0.00	0-100	4479.4	100.00
100-105	0.0	0.00	0-105	4479.4	100.00
105-110	0.0	0.00	0-110	4479.4	100.00
110-115	0.0	0.00	0-115	4479.4	100.00
115-120	0.0	0.00	0-120	4479.4	100.00
120-125	0.0	0.00	0-125	4479.4	100.00
125-130	0.0	0.00	0-130	4479.4	100.00
130-135	0.0	0.00	0-135	4479.4	100.00
135-140	0.0	0.00	0-140	4479.4	100.00
140-145	0.0	0.00	0-145	4479.4	100.00
145-150	0.0	0.00	0-150	4479.4	100.00
150-155	0.0	0.00	0-155	4479.4	100.00
155-160	0.0	0.00	0-160	4479.4	100.00
160-165	0.0	0.00	0-165	4479.4	100.00
165-170	0.0	0.00	0-170	4479.4	100.00
170-175	0.0	0.00	0-175	4479.4	100.00
175-180	0.0	0.00	0-180	4479.4	100.00

6. Product Photo



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