IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEL9027DIM010UNVNRRBL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu
Report Number:	RKSB180522003-10-1
Test Date:	2018-05-22
Report Date:	2018-05-25
Reviewed By:	Ray Gao/EE Engineer
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:	AD6LEL9027DIM010UNVNRRBL
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:	4030Im

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°C±1°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=24K (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_f, 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	0.5031	60.03	0.9944	4043.7	67.36

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
14.218	2707	0.00022	0.4597	0.4112	0.2621	0.5275

Color Rendering Index

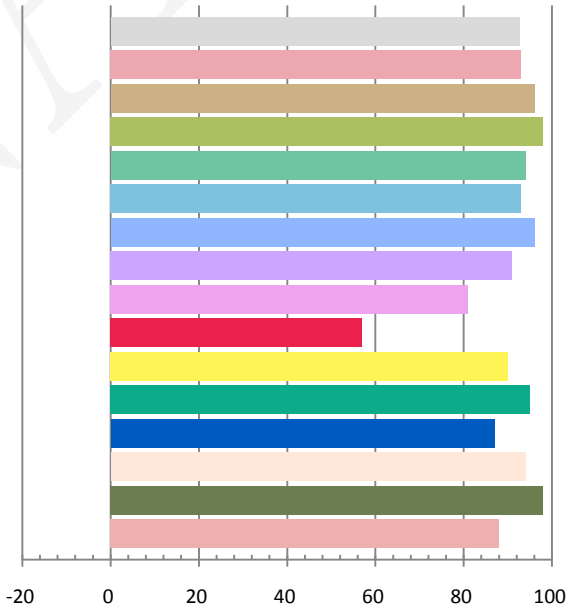
Ra
92.6

R1	R2	R3	R4
93	96	98	94

R5	R6	R7	R8
93	96	91	81

R9	R10	R11	R12
57	90	95	87

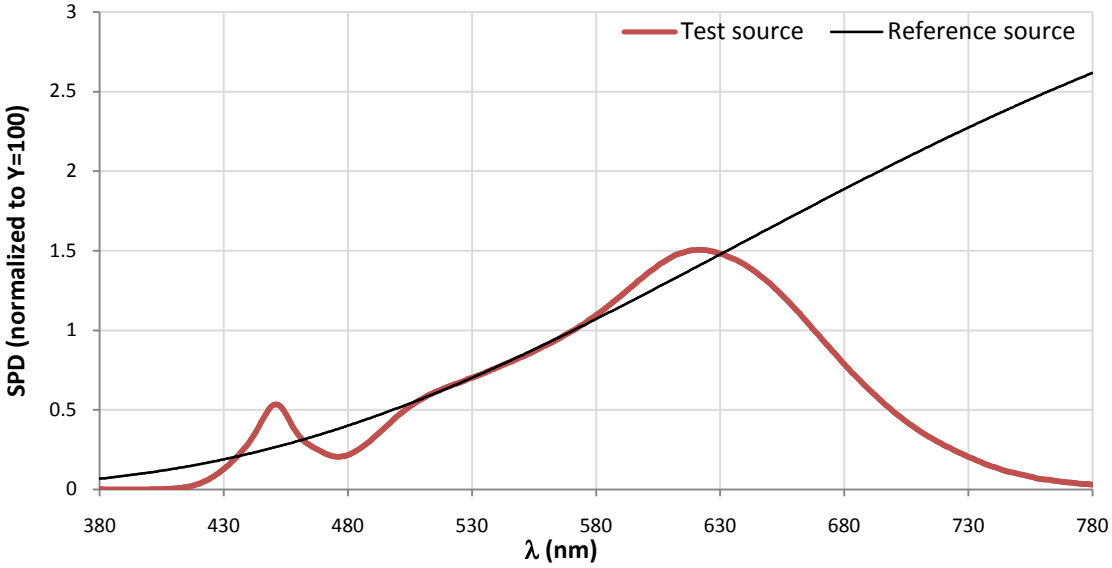
R13	R14	R15
94	98	88



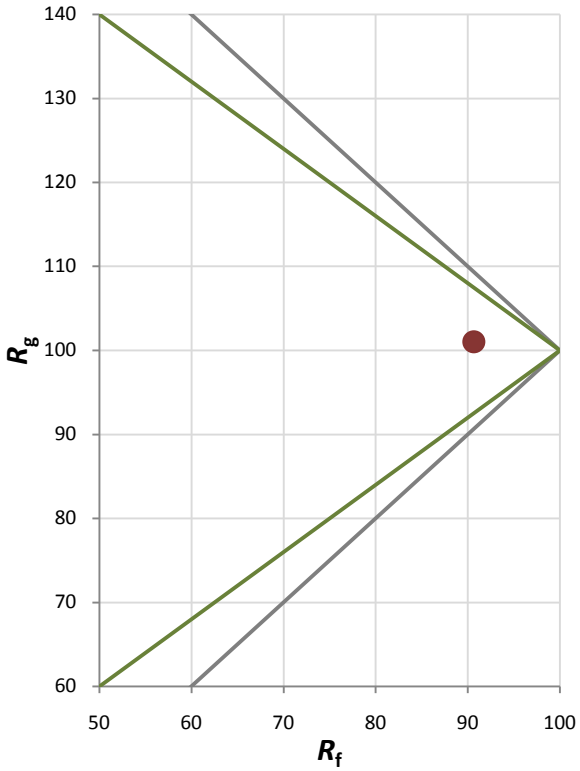
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

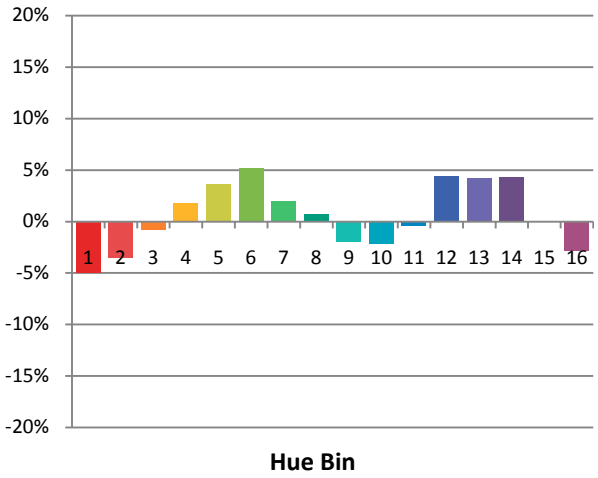
Spectral Power Distribution Comparison



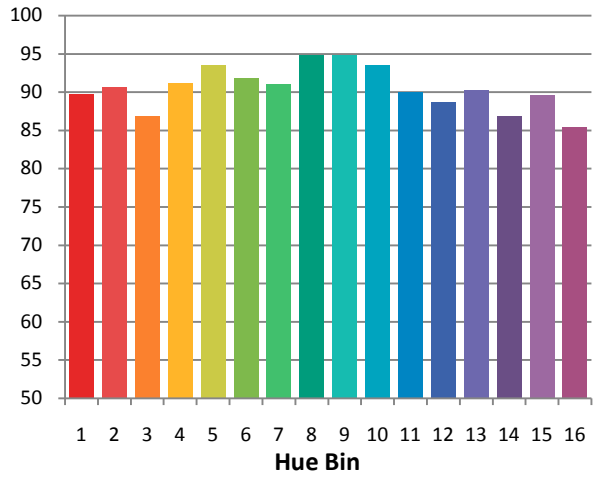
Plot of R_g versus R_f



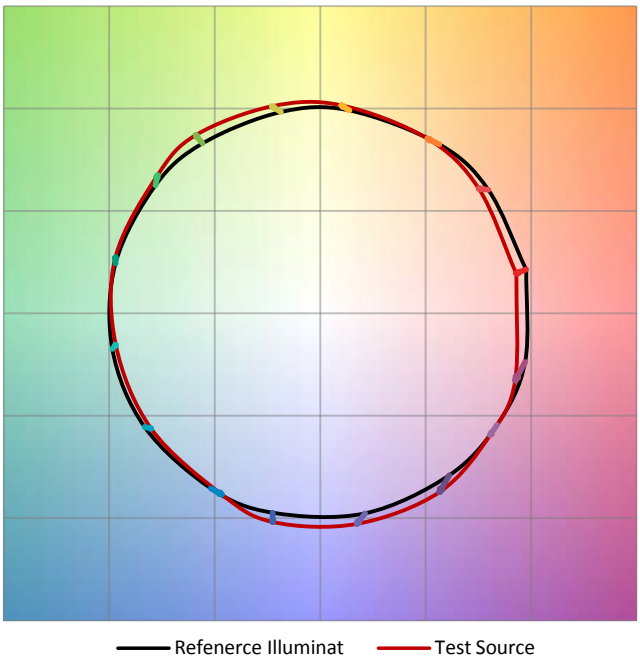
Chroma Shift by Hue

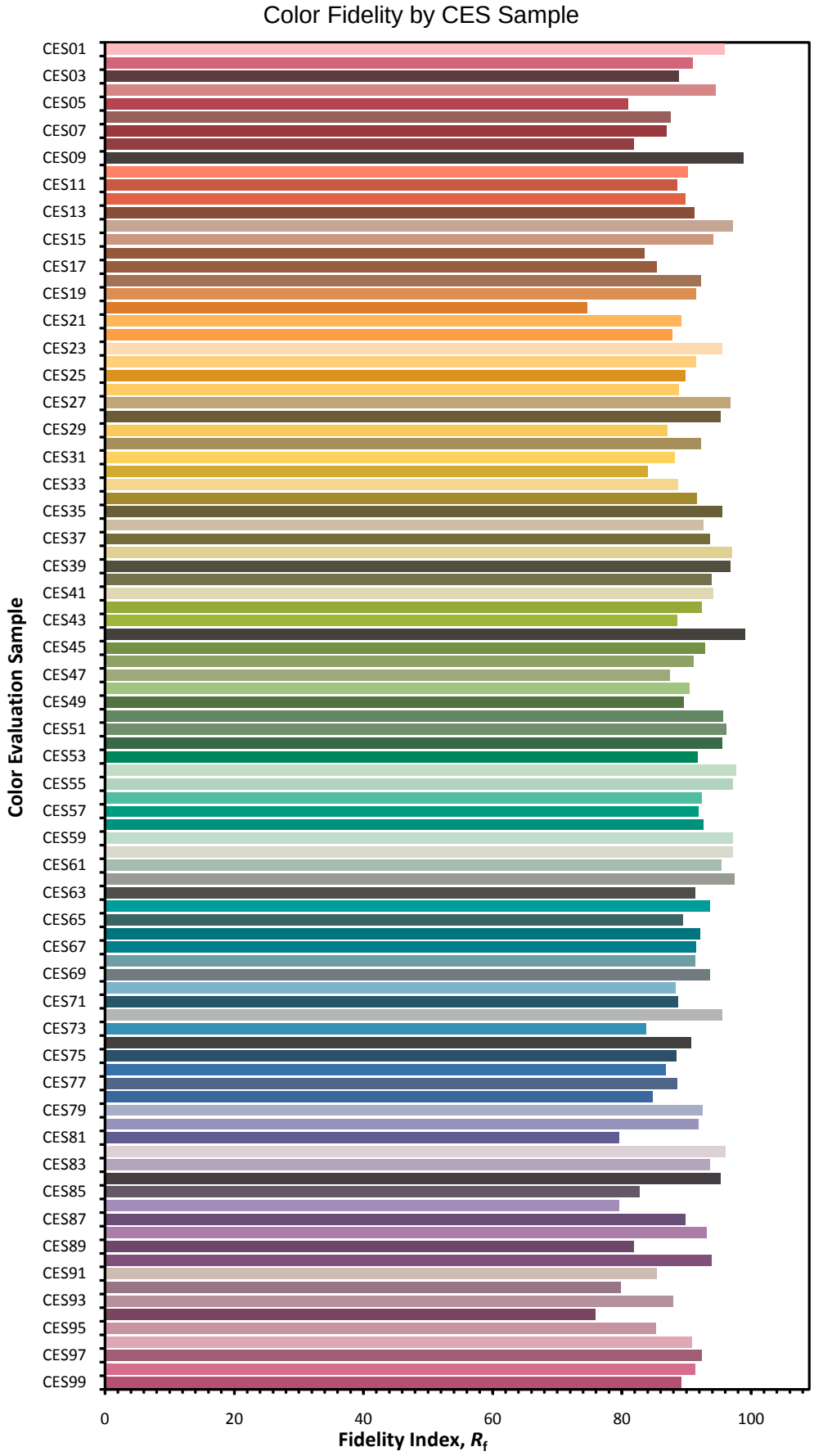


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
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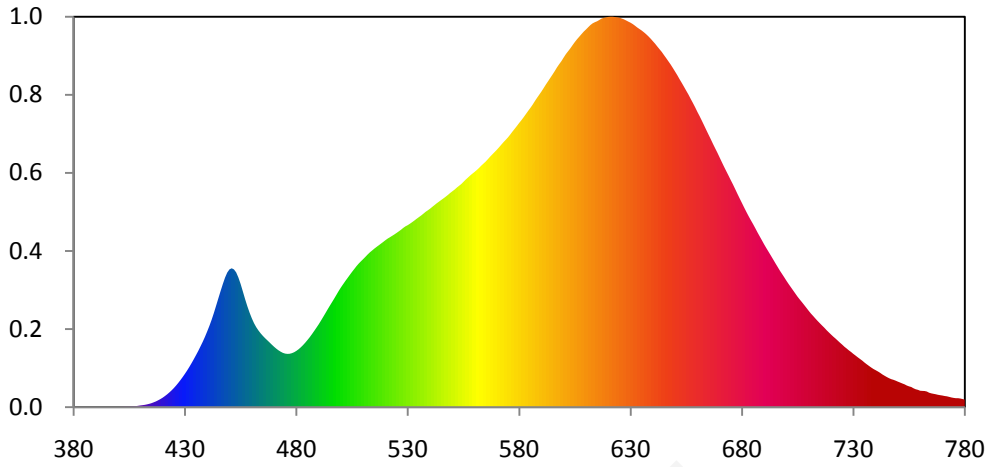
CES99
0
20
40
60
80
100
Fidelity Index, R_f

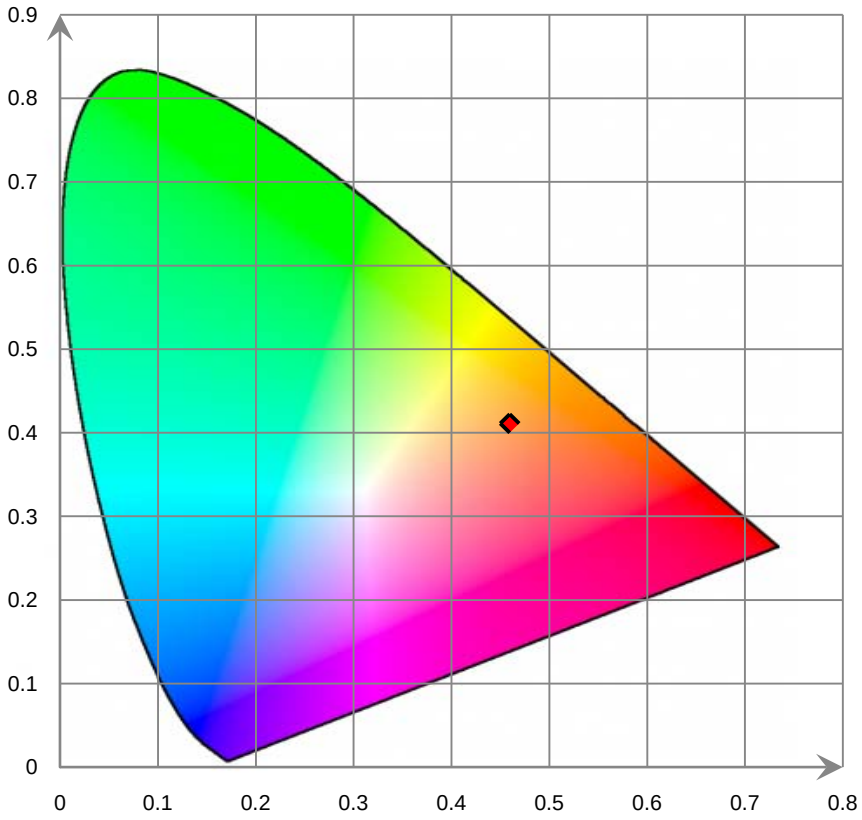
Relative Spectral Power Distribution



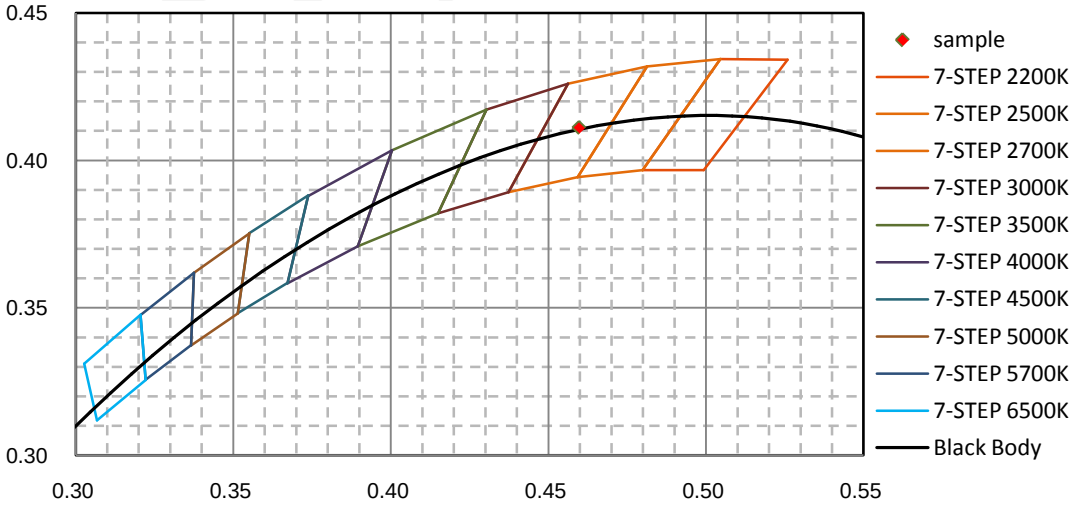
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.330E-02	421	2.534E+00	462	1.826E+01	503	2.948E+01	544	4.690E+01
381	5.470E-02	422	2.921E+00	463	1.750E+01	504	3.019E+01	545	4.727E+01
382	4.370E-02	423	3.363E+00	464	1.684E+01	505	3.088E+01	546	4.764E+01
383	3.770E-02	424	3.835E+00	465	1.626E+01	506	3.153E+01	547	4.802E+01
384	3.640E-02	425	4.347E+00	466	1.574E+01	507	3.218E+01	548	4.843E+01
385	1.880E-02	426	4.923E+00	467	1.525E+01	508	3.278E+01	549	4.887E+01
386	2.610E-02	427	5.530E+00	468	1.476E+01	509	3.329E+01	550	4.926E+01
387	3.610E-02	428	6.195E+00	469	1.427E+01	510	3.379E+01	551	4.965E+01
388	3.400E-02	429	6.891E+00	470	1.380E+01	511	3.431E+01	552	5.010E+01
389	3.830E-02	430	7.620E+00	471	1.336E+01	512	3.484E+01	553	5.051E+01
390	2.950E-02	431	8.389E+00	472	1.297E+01	513	3.534E+01	554	5.091E+01
391	1.650E-02	432	9.207E+00	473	1.265E+01	514	3.575E+01	555	5.142E+01
392	1.300E-02	433	1.007E+01	474	1.238E+01	515	3.618E+01	556	5.194E+01
393	1.420E-02	434	1.097E+01	475	1.223E+01	516	3.657E+01	557	5.239E+01
394	1.470E-02	435	1.191E+01	476	1.217E+01	517	3.694E+01	558	5.286E+01
395	1.780E-02	436	1.286E+01	477	1.219E+01	518	3.733E+01	559	5.329E+01
396	1.890E-02	437	1.389E+01	478	1.232E+01	519	3.771E+01	560	5.369E+01
397	1.170E-02	438	1.493E+01	479	1.254E+01	520	3.811E+01	561	5.413E+01
398	7.300E-03	439	1.607E+01	480	1.284E+01	521	3.848E+01	562	5.460E+01
399	4.700E-03	440	1.730E+01	481	1.321E+01	522	3.879E+01	563	5.512E+01
400	2.890E-02	441	1.858E+01	482	1.366E+01	523	3.910E+01	564	5.559E+01
401	5.800E-02	442	1.997E+01	483	1.416E+01	524	3.942E+01	565	5.606E+01
402	7.970E-02	443	2.151E+01	484	1.472E+01	525	3.977E+01	566	5.661E+01
403	1.128E-01	444	2.317E+01	485	1.533E+01	526	4.013E+01	567	5.719E+01
404	1.261E-01	445	2.485E+01	486	1.596E+01	527	4.050E+01	568	5.771E+01
405	1.347E-01	446	2.650E+01	487	1.665E+01	528	4.092E+01	569	5.823E+01
406	1.757E-01	447	2.809E+01	488	1.739E+01	529	4.128E+01	570	5.875E+01
407	2.039E-01	448	2.957E+01	489	1.812E+01	530	4.154E+01	571	5.931E+01
408	2.338E-01	449	3.074E+01	490	1.889E+01	531	4.188E+01	572	5.991E+01
409	3.227E-01	450	3.146E+01	491	1.970E+01	532	4.223E+01	573	6.049E+01
410	4.045E-01	451	3.170E+01	492	2.055E+01	533	4.260E+01	574	6.102E+01
411	4.594E-01	452	3.144E+01	493	2.141E+01	534	4.299E+01	575	6.158E+01
412	5.332E-01	453	3.076E+01	494	2.227E+01	535	4.337E+01	576	6.222E+01
413	6.422E-01	454	2.959E+01	495	2.313E+01	536	4.374E+01	577	6.290E+01
414	7.668E-01	455	2.811E+01	496	2.395E+01	537	4.415E+01	578	6.353E+01
415	9.214E-01	456	2.642E+01	497	2.479E+01	538	4.457E+01	579	6.418E+01
416	1.112E+00	457	2.468E+01	498	2.565E+01	539	4.492E+01	580	6.485E+01
417	1.321E+00	458	2.306E+01	499	2.651E+01	540	4.529E+01	581	6.548E+01
418	1.574E+00	459	2.160E+01	500	2.732E+01	541	4.570E+01	582	6.616E+01
419	1.851E+00	460	2.030E+01	501	2.806E+01	542	4.612E+01	583	6.687E+01
420	2.168E+00	461	1.918E+01	502	2.879E+01	543	4.652E+01	584	6.759E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.827E+01	626	8.871E+01	667	6.011E+01	708	2.328E+01	749	6.055E+00
586	6.899E+01	627	8.853E+01	668	5.907E+01	709	2.264E+01	750	5.827E+00
587	6.980E+01	628	8.826E+01	669	5.807E+01	710	2.197E+01	751	5.621E+00
588	7.057E+01	629	8.800E+01	670	5.699E+01	711	2.135E+01	752	5.410E+00
589	7.130E+01	630	8.775E+01	671	5.591E+01	712	2.080E+01	753	5.213E+00
590	7.203E+01	631	8.743E+01	672	5.486E+01	713	2.022E+01	754	4.950E+00
591	7.283E+01	632	8.706E+01	673	5.384E+01	714	1.967E+01	755	4.751E+00
592	7.363E+01	633	8.666E+01	674	5.284E+01	715	1.914E+01	756	4.608E+00
593	7.439E+01	634	8.632E+01	675	5.181E+01	716	1.862E+01	757	4.311E+00
594	7.516E+01	635	8.596E+01	676	5.081E+01	717	1.812E+01	758	4.089E+00
595	7.592E+01	636	8.557E+01	677	4.975E+01	718	1.758E+01	759	3.957E+00
596	7.671E+01	637	8.513E+01	678	4.867E+01	719	1.708E+01	760	3.753E+00
597	7.756E+01	638	8.465E+01	679	4.763E+01	720	1.659E+01	761	3.716E+00
598	7.830E+01	639	8.412E+01	680	4.661E+01	721	1.610E+01	762	3.687E+00
599	7.899E+01	640	8.354E+01	681	4.558E+01	722	1.567E+01	763	3.572E+00
600	7.981E+01	641	8.297E+01	682	4.457E+01	723	1.519E+01	764	3.307E+00
601	8.059E+01	642	8.233E+01	683	4.359E+01	724	1.472E+01	765	3.154E+00
602	8.125E+01	643	8.171E+01	684	4.268E+01	725	1.428E+01	766	3.050E+00
603	8.190E+01	644	8.109E+01	685	4.178E+01	726	1.380E+01	767	2.950E+00
604	8.263E+01	645	8.037E+01	686	4.085E+01	727	1.339E+01	768	2.821E+00
605	8.334E+01	646	7.967E+01	687	3.988E+01	728	1.297E+01	769	2.740E+00
606	8.398E+01	647	7.893E+01	688	3.897E+01	729	1.260E+01	770	2.656E+00
607	8.456E+01	648	7.821E+01	689	3.806E+01	730	1.217E+01	771	2.553E+00
608	8.515E+01	649	7.742E+01	690	3.713E+01	731	1.178E+01	772	2.477E+00
609	8.572E+01	650	7.659E+01	691	3.627E+01	732	1.138E+01	773	2.356E+00
610	8.620E+01	651	7.577E+01	692	3.543E+01	733	1.100E+01	774	2.215E+00
611	8.671E+01	652	7.486E+01	693	3.460E+01	734	1.063E+01	775	2.125E+00
612	8.722E+01	653	7.401E+01	694	3.374E+01	735	1.019E+01	776	2.049E+00
613	8.761E+01	654	7.313E+01	695	3.288E+01	736	9.806E+00	777	2.051E+00
614	8.786E+01	655	7.223E+01	696	3.204E+01	737	9.432E+00	778	1.976E+00
615	8.808E+01	656	7.134E+01	697	3.119E+01	738	9.064E+00	779	1.865E+00
616	8.838E+01	657	7.037E+01	698	3.041E+01	739	8.722E+00	780	1.732E+00
617	8.869E+01	658	6.943E+01	699	2.964E+01	740	8.447E+00		
618	8.887E+01	659	6.845E+01	700	2.884E+01	741	8.164E+00		
619	8.897E+01	660	6.739E+01	701	2.808E+01	742	7.851E+00		
620	8.907E+01	661	6.643E+01	702	2.735E+01	743	7.484E+00		
621	8.911E+01	662	6.540E+01	703	2.664E+01	744	7.179E+00		
622	8.911E+01	663	6.434E+01	704	2.591E+01	745	6.889E+00		
623	8.904E+01	664	6.327E+01	705	2.519E+01	746	6.621E+00		
624	8.899E+01	665	6.222E+01	706	2.455E+01	747	6.397E+00		
625	8.890E+01	666	6.119E+01	707	2.393E+01	748	6.245E+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**

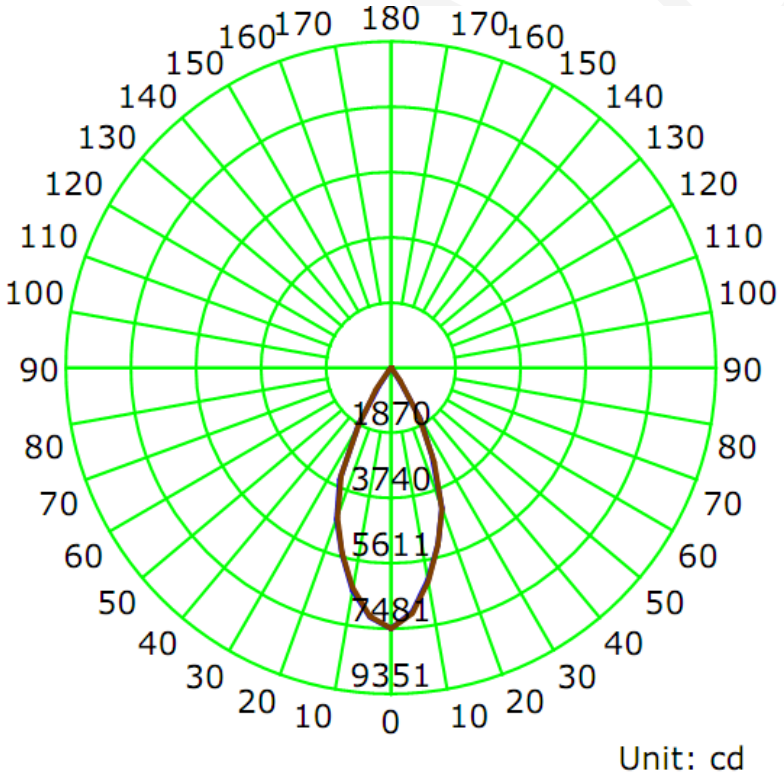
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5020	60.01	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4047.4	67.50	7481.5	0.72	0.72

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	45.9	46.0	45.7	45.4	45.8
Field Angle (10% I_{max}):	68.4	69.0	68.9	68.3	68.7

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	7482	7482	7482	7482	7482	7482	7482	7482
5.0°	7009	7007	7006	7031	7053	7118	7157	7182
10.0°	6158	6134	6171	6188	6211	6281	6349	6425
15.0°	5220	5190	5169	5234	5232	5302	5359	5466
20.0°	4265	4239	4223	4230	4305	4387	4393	4509
25.0°	2796	2745	2731	2880	2980	3182	3339	3480
30.0°	1666	1655	1635	1640	1649	1679	1742	1817
35.0°	479	449	447	447	463	496	538	607
40.0°	45	36	30	23	36	39	54	71
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.)

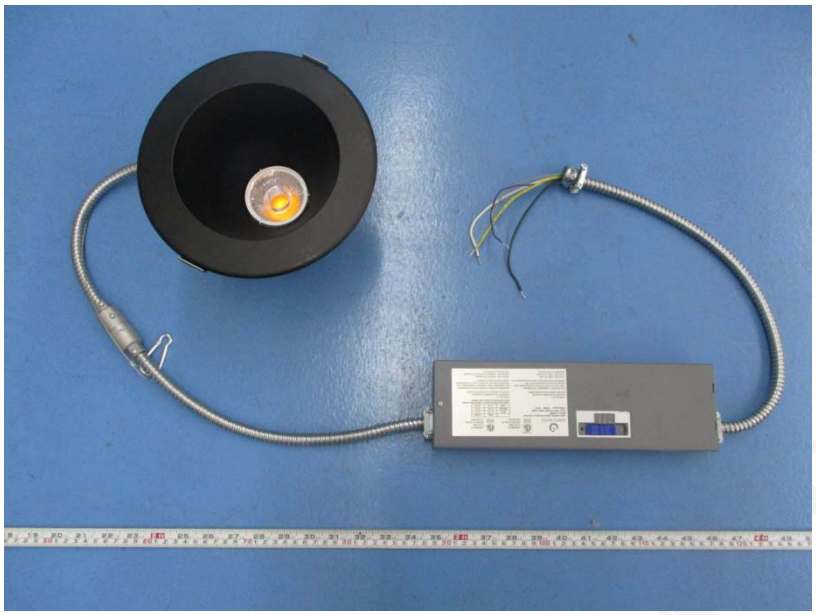
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	7482	7482	7482	7482	7482	7482	7482	7482
5.0°	7182	7249	7254	7198	7158	7091	7057	6974
10.0°	6479	6554	6553	6523	6390	6250	6143	6075
15.0°	5526	5617	5622	5587	5485	5425	5292	5172
20.0°	4609	4679	4703	4635	4577	4484	4382	4275
25.0°	3544	3624	3615	3534	3406	3233	2982	2822
30.0°	1882	1958	1981	1944	1907	1819	1733	1688
35.0°	632	702	777	806	768	659	562	486
40.0°	83	106	124	123	102	77	62	50
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

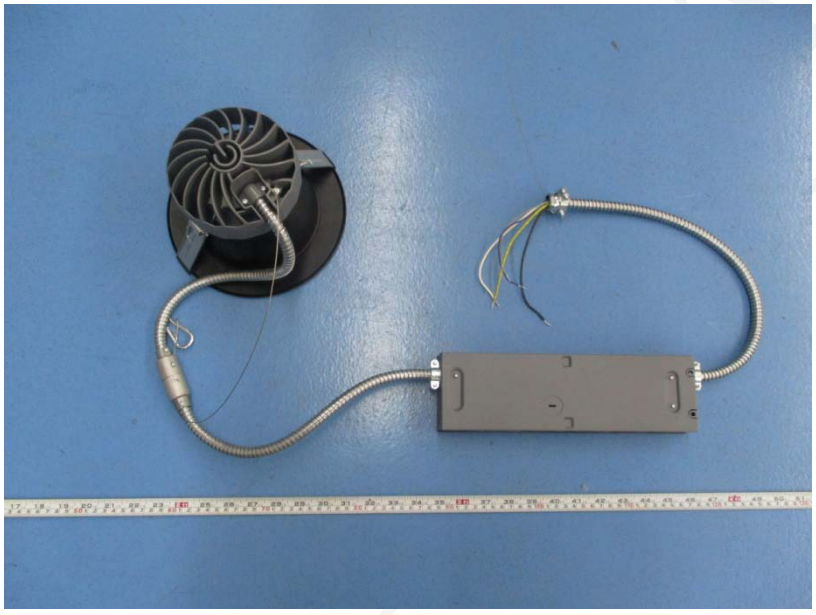
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	174.4	4.31
5-10	479.8	11.86
10-15	692.5	17.11
15-20	807.6	19.95
20-25	798.3	19.72
25-30	627.1	15.49
30-35	347.1	8.58
35-40	108.2	2.67
40-45	12.3	0.30
45-50	0.0	0.00
50-55	0.0	0.00
55-60	0.0	0.00
60-65	0.0	0.00
65-70	0.0	0.00
70-75	0.0	0.00
75-80	0.0	0.00
80-85	0.0	0.00
85-90	0.0	0.00
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.0	0.00
145-150	0.0	0.00
150-155	0.0	0.00
155-160	0.0	0.00
160-165	0.0	0.00
165-170	0.0	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	174.4	4.31
0-10	654.2	16.16
0-15	1346.7	33.27
0-20	2154.4	53.23
0-25	2952.7	72.95
0-30	3579.8	88.45
0-35	3926.9	97.02
0-40	4035.1	99.70
0-45	4047.4	100.00
0-50	4047.4	100.00
0-55	4047.4	100.00
0-60	4047.4	100.00
0-65	4047.4	100.00
0-70	4047.4	100.00
0-75	4047.4	100.00
0-80	4047.4	100.00
0-85	4047.4	100.00
0-90	4047.4	100.00
0-95	4047.4	100.00
0-100	4047.4	100.00
0-105	4047.4	100.00
0-110	4047.4	100.00
0-115	4047.4	100.00
0-120	4047.4	100.00
0-125	4047.4	100.00
0-130	4047.4	100.00
0-135	4047.4	100.00
0-140	4047.4	100.00
0-145	4047.4	100.00
0-150	4047.4	100.00
0-155	4047.4	100.00
0-160	4047.4	100.00
0-165	4047.4	100.00
0-170	4047.4	100.00
0-175	4047.4	100.00
0-180	4047.4	100.00

6. Product Photo





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