TL-749

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE249027DIM120VNR4CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	RKSB190329018-10-9
Test Date:	2019-04-04 to 2019-04-09
Report Date:	2019-05-15
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 2019-04-01 and used for testing.

Model Tested:	LE249027DIM120VNR4CC
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	LED Recessed Downlight
Aging Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120-277 VAC 60Hz
Rated Power:	31W
Nominal CCT:	2700K
Nominal Lumen Output:	2400lm

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	2019-01-23	2020-01-23
Power Meter	INVENTFINE	WT500	GSJWQ20009	2019-04-08	2020-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2019-04-08	2020-04-08
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-12-24	2019-12-24
Thermal Meter	KEJIAN	TA298	N/A	2018-12-01	2019-12-01
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2019-04-08	2020-04-08
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2019-04-08	2020-04-08
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2019-04-08	2020-04-08
Power Meter	INVENTFINE	WT500	GSDSQ200007	2019-04-08	2020-04-08
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2019-01-24	2020-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2018-12-01	2019-12-01
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2019-03-08	2020-03-08

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_{rel}=2.61% (k=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=34K (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_{rel}=0.48 % of rdg, AC Voltage U_{rel}=0.25% of rdg, Power U_{rel}=0.44%,(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_{rel}=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	60	0.2607	30.91	0.988	2421.68	78.35

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.863	2717	-0.00031	0.4580	0.4093	0.2618	0.5266

Color Rendering Index

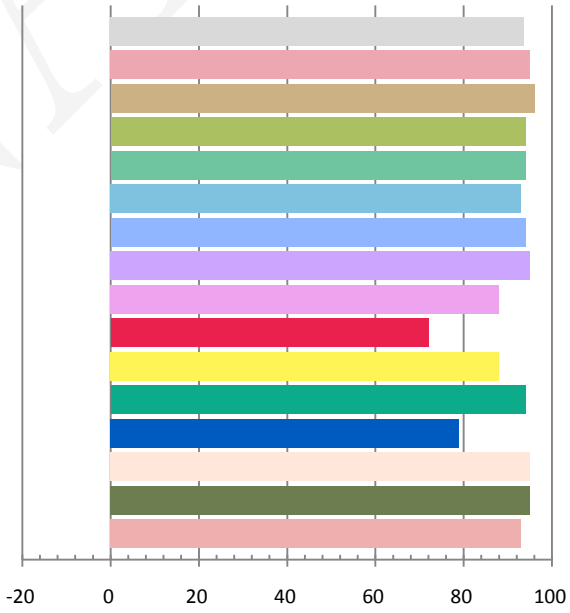
Ra
93.7

R1	R2	R3	R4
95	96	94	94

R5	R6	R7	R8
93	94	95	88

R9	R10	R11	R12
72	88	94	79

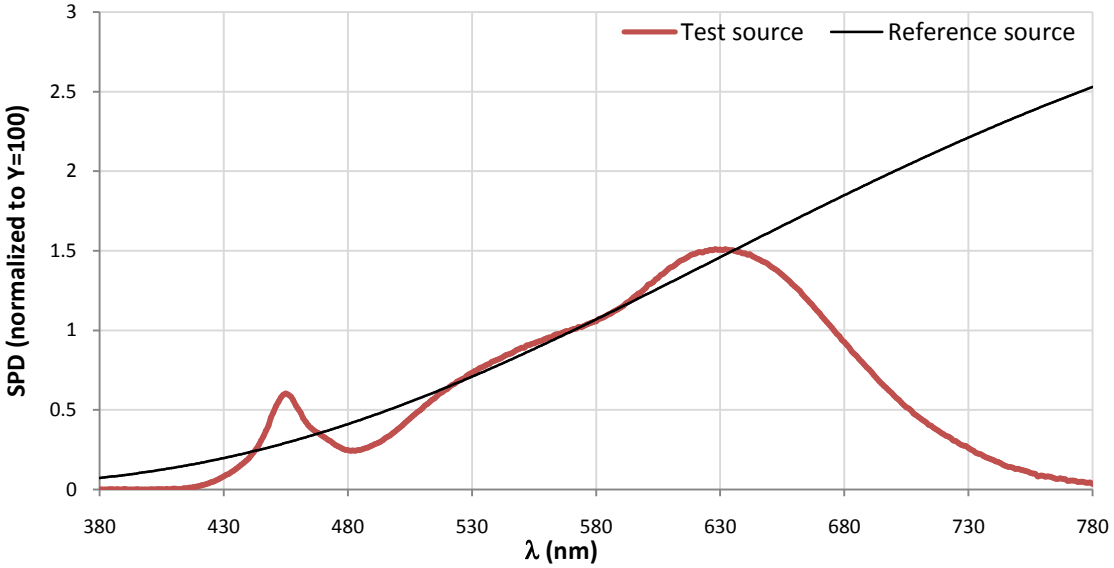
R13	R14	R15
95	95	93



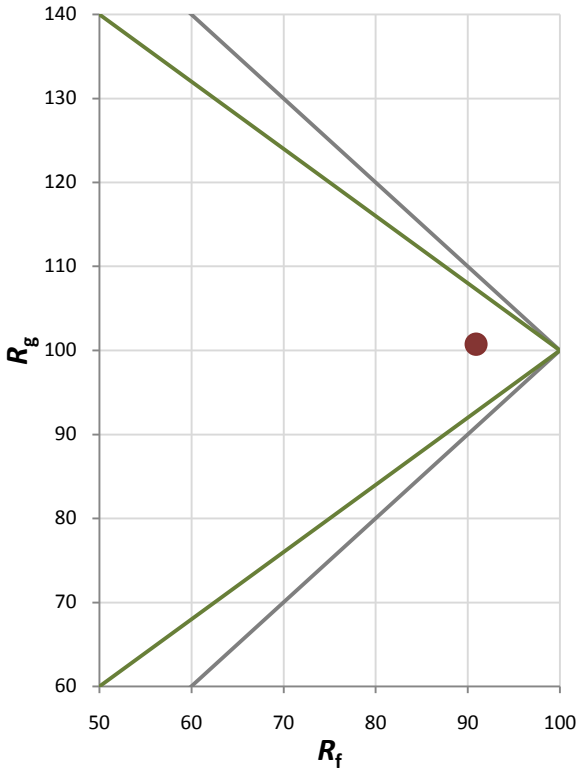
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

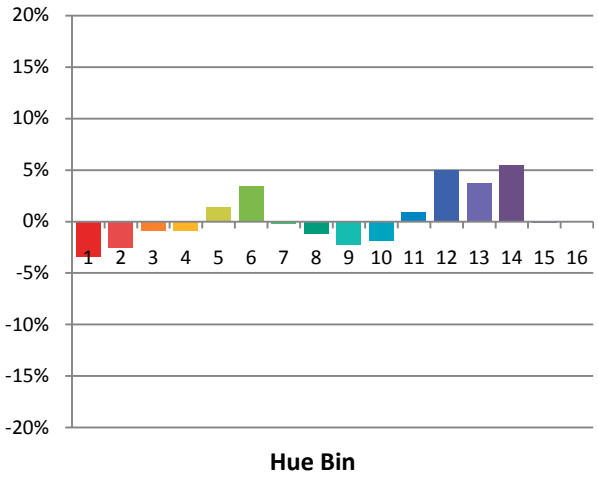
Spectral Power Distribution Comparison



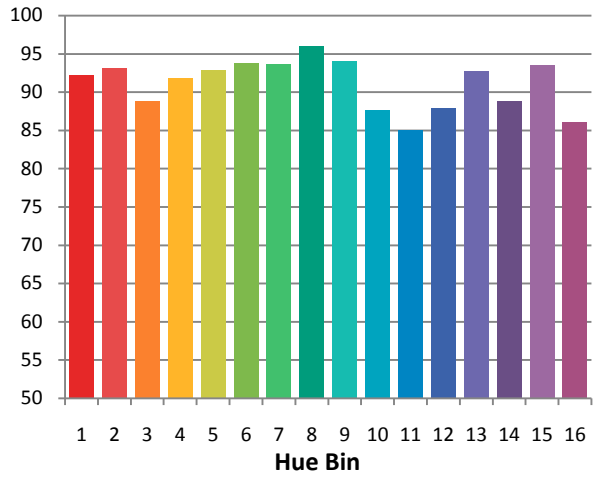
Plot of R_g versus R_f



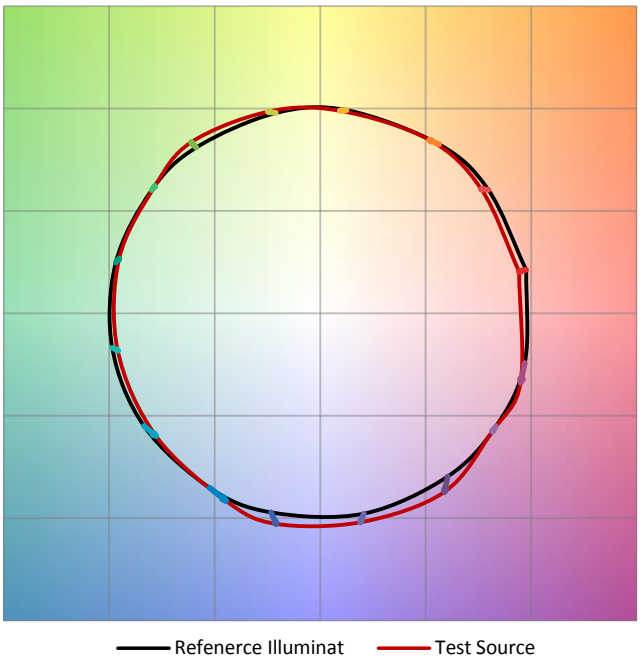
Chroma Shift by Hue

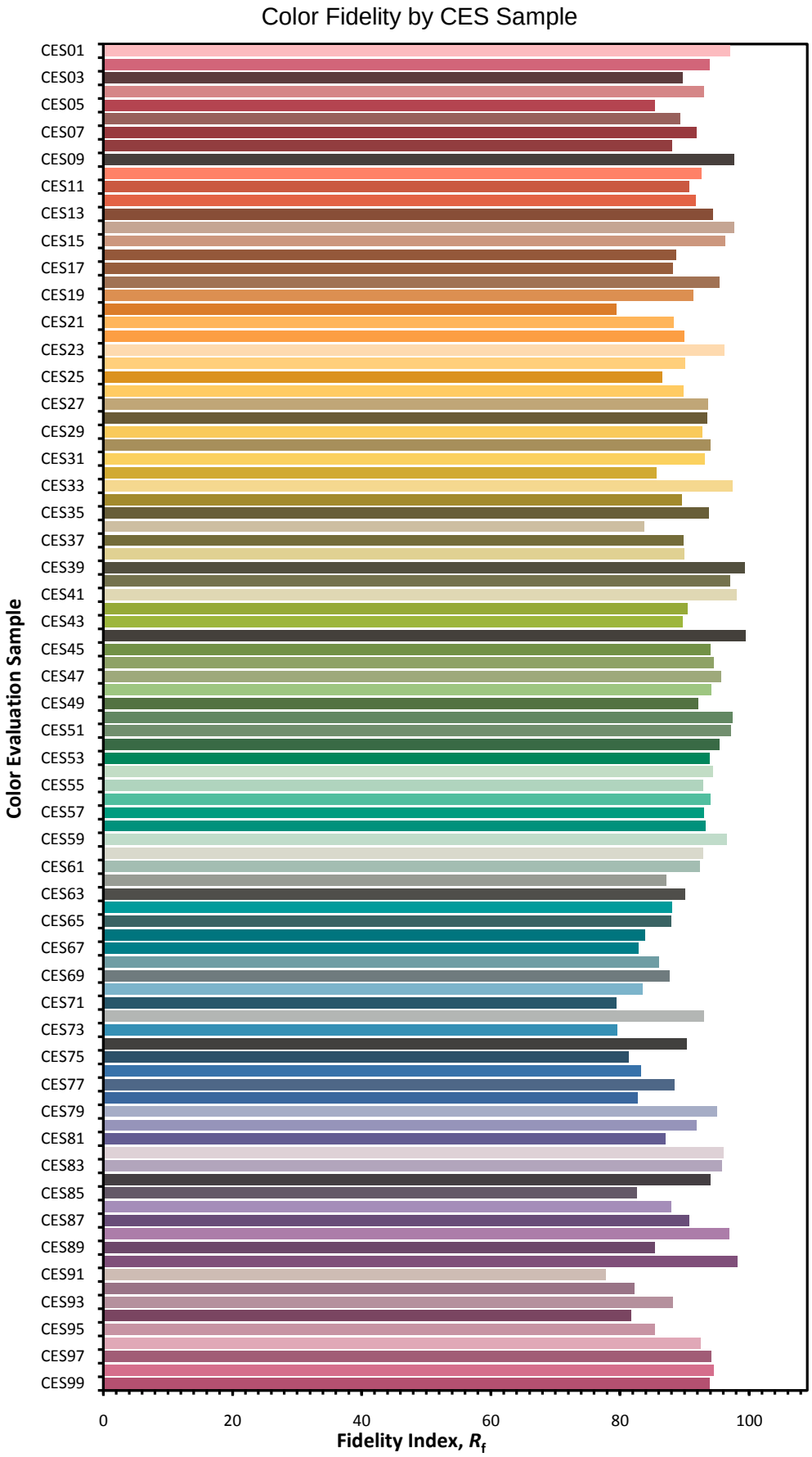


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
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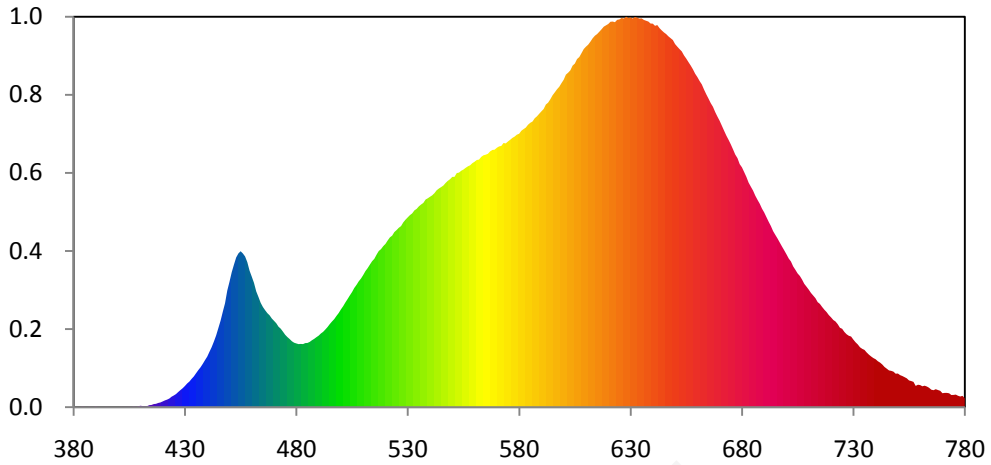
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

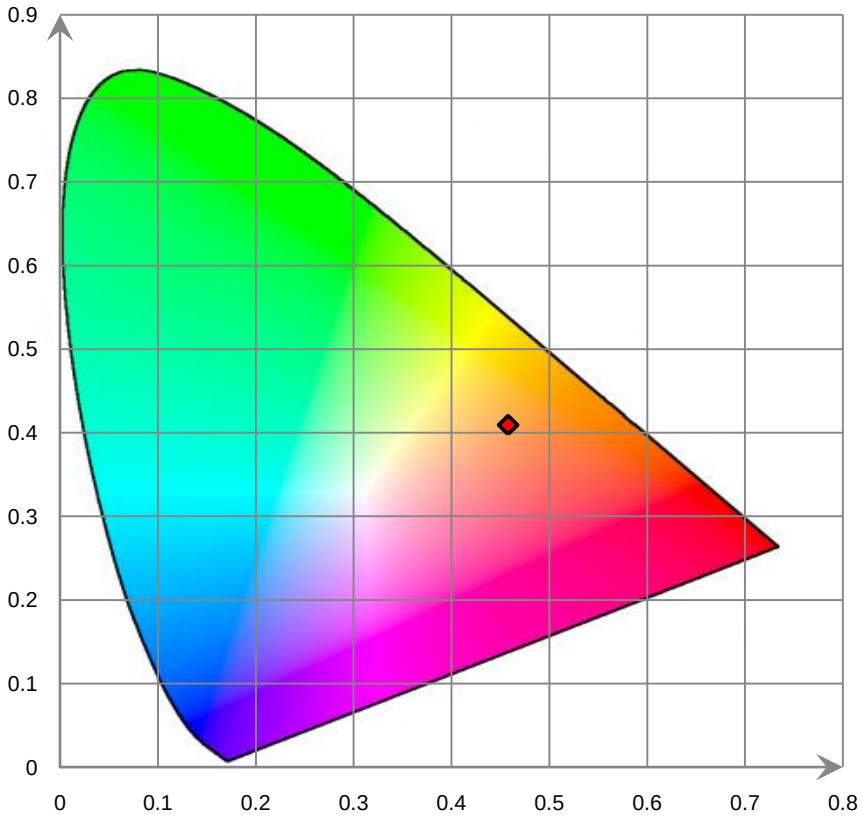
Relative Spectral Power Distribution



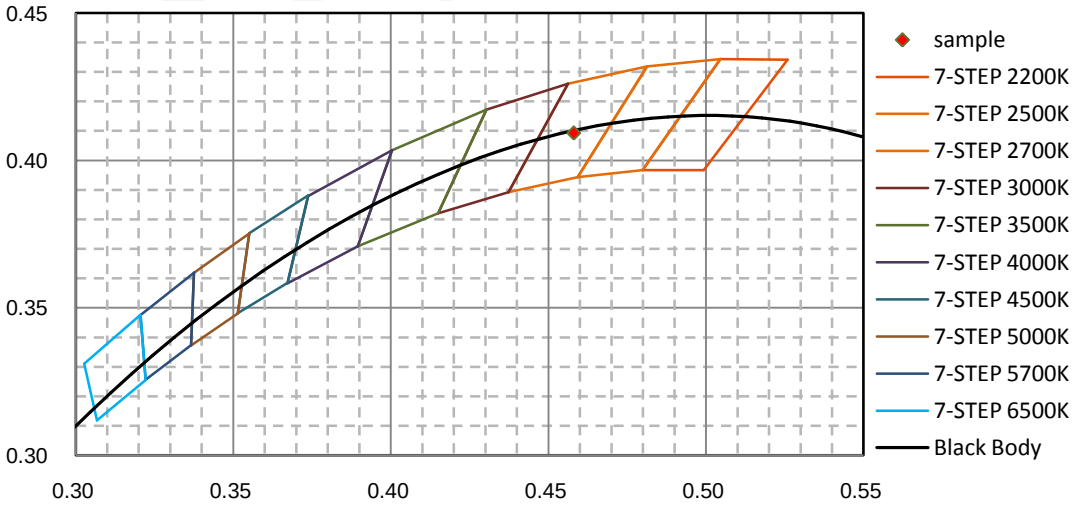
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	7.090E-02	421	9.260E-01	462	1.588E+01	503	1.482E+01	544	2.998E+01
381	2.680E-02	422	1.037E+00	463	1.511E+01	504	1.532E+01	545	3.018E+01
382	2.760E-02	423	1.188E+00	464	1.430E+01	505	1.579E+01	546	3.039E+01
383	9.100E-03	424	1.433E+00	465	1.374E+01	506	1.634E+01	547	3.075E+01
384	8.800E-02	425	1.605E+00	466	1.329E+01	507	1.676E+01	548	3.104E+01
385	4.010E-02	426	1.797E+00	467	1.289E+01	508	1.725E+01	549	3.126E+01
386	1.700E-03	427	2.085E+00	468	1.260E+01	509	1.763E+01	550	3.158E+01
387	7.790E-02	428	2.349E+00	469	1.216E+01	510	1.811E+01	551	3.158E+01
388	2.330E-02	429	2.603E+00	470	1.184E+01	511	1.865E+01	552	3.210E+01
389	1.180E-02	430	2.905E+00	471	1.151E+01	512	1.906E+01	553	3.217E+01
390	1.080E-01	431	3.243E+00	472	1.103E+01	513	1.954E+01	554	3.242E+01
391	1.730E-02	432	3.510E+00	473	1.076E+01	514	2.001E+01	555	3.258E+01
392	8.100E-03	433	3.880E+00	474	1.035E+01	515	2.034E+01	556	3.282E+01
393	1.870E-02	434	4.222E+00	475	9.927E+00	516	2.091E+01	557	3.302E+01
394	2.790E-02	435	4.654E+00	476	9.613E+00	517	2.142E+01	558	3.317E+01
395	5.840E-02	436	5.079E+00	477	9.342E+00	518	2.167E+01	559	3.346E+01
396	1.870E-02	437	5.467E+00	478	9.041E+00	519	2.207E+01	560	3.365E+01
397	1.800E-03	438	5.939E+00	479	8.839E+00	520	2.239E+01	561	3.389E+01
398	1.470E-02	439	6.442E+00	480	8.740E+00	521	2.286E+01	562	3.395E+01
399	4.000E-04	440	6.927E+00	481	8.646E+00	522	2.328E+01	563	3.433E+01
400	0.000E+00	441	7.585E+00	482	8.674E+00	523	2.352E+01	564	3.454E+01
401	4.930E-02	442	8.230E+00	483	8.651E+00	524	2.401E+01	565	3.462E+01
402	2.980E-02	443	9.002E+00	484	8.784E+00	525	2.429E+01	566	3.475E+01
403	4.520E-02	444	9.832E+00	485	8.806E+00	526	2.460E+01	567	3.508E+01
404	4.570E-02	445	1.085E+01	486	8.953E+00	527	2.483E+01	568	3.526E+01
405	6.250E-02	446	1.186E+01	487	9.176E+00	528	2.534E+01	569	3.531E+01
406	1.400E-02	447	1.309E+01	488	9.363E+00	529	2.571E+01	570	3.557E+01
407	1.087E-01	448	1.424E+01	489	9.595E+00	530	2.602E+01	571	3.575E+01
408	2.450E-02	449	1.598E+01	490	9.801E+00	531	2.633E+01	572	3.583E+01
409	1.197E-01	450	1.718E+01	491	1.010E+01	532	2.656E+01	573	3.622E+01
410	1.986E-01	451	1.850E+01	492	1.032E+01	533	2.699E+01	574	3.617E+01
411	1.571E-01	452	1.954E+01	493	1.064E+01	534	2.719E+01	575	3.643E+01
412	1.021E-01	453	2.053E+01	494	1.099E+01	535	2.754E+01	576	3.668E+01
413	1.408E-01	454	2.108E+01	495	1.139E+01	536	2.779E+01	577	3.692E+01
414	2.759E-01	455	2.138E+01	496	1.175E+01	537	2.801E+01	578	3.711E+01
415	3.064E-01	456	2.108E+01	497	1.207E+01	538	2.846E+01	579	3.737E+01
416	4.291E-01	457	2.067E+01	498	1.251E+01	539	2.864E+01	580	3.749E+01
417	4.580E-01	458	1.988E+01	499	1.290E+01	540	2.885E+01	581	3.790E+01
418	5.782E-01	459	1.873E+01	500	1.340E+01	541	2.905E+01	582	3.813E+01
419	6.485E-01	460	1.790E+01	501	1.384E+01	542	2.935E+01	583	3.834E+01
420	7.854E-01	461	1.704E+01	502	1.435E+01	543	2.975E+01	584	3.873E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.900E+01	626	5.337E+01	667	4.119E+01	708	1.691E+01	749	4.591E+00
586	3.917E+01	627	5.329E+01	668	4.047E+01	709	1.652E+01	750	4.617E+00
587	3.962E+01	628	5.354E+01	669	3.984E+01	710	1.611E+01	751	4.398E+00
588	3.988E+01	629	5.337E+01	670	3.927E+01	711	1.566E+01	752	4.271E+00
589	4.023E+01	630	5.344E+01	671	3.859E+01	712	1.531E+01	753	4.119E+00
590	4.056E+01	631	5.329E+01	672	3.791E+01	713	1.494E+01	754	3.958E+00
591	4.088E+01	632	5.351E+01	673	3.724E+01	714	1.441E+01	755	3.667E+00
592	4.150E+01	633	5.341E+01	674	3.666E+01	715	1.415E+01	756	3.581E+00
593	4.176E+01	634	5.328E+01	675	3.604E+01	716	1.374E+01	757	3.467E+00
594	4.222E+01	635	5.331E+01	676	3.536E+01	717	1.336E+01	758	2.920E+00
595	4.276E+01	636	5.309E+01	677	3.464E+01	718	1.304E+01	759	3.079E+00
596	4.317E+01	637	5.299E+01	678	3.415E+01	719	1.263E+01	760	3.032E+00
597	4.359E+01	638	5.287E+01	679	3.333E+01	720	1.231E+01	761	2.867E+00
598	4.394E+01	639	5.261E+01	680	3.289E+01	721	1.196E+01	762	2.943E+00
599	4.443E+01	640	5.259E+01	681	3.224E+01	722	1.175E+01	763	2.835E+00
600	4.490E+01	641	5.229E+01	682	3.157E+01	723	1.138E+01	764	2.661E+00
601	4.560E+01	642	5.240E+01	683	3.080E+01	724	1.089E+01	765	2.397E+00
602	4.586E+01	643	5.198E+01	684	3.023E+01	725	1.074E+01	766	2.327E+00
603	4.619E+01	644	5.166E+01	685	2.970E+01	726	1.031E+01	767	2.462E+00
604	4.683E+01	645	5.139E+01	686	2.900E+01	727	9.997E+00	768	2.349E+00
605	4.712E+01	646	5.116E+01	687	2.842E+01	728	9.788E+00	769	2.244E+00
606	4.774E+01	647	5.085E+01	688	2.789E+01	729	9.687E+00	770	1.915E+00
607	4.801E+01	648	5.060E+01	689	2.722E+01	730	9.274E+00	771	1.961E+00
608	4.855E+01	649	5.034E+01	690	2.670E+01	731	8.898E+00	772	1.961E+00
609	4.911E+01	650	4.979E+01	691	2.606E+01	732	8.605E+00	773	1.905E+00
610	4.943E+01	651	4.943E+01	692	2.543E+01	733	8.214E+00	774	1.672E+00
611	4.971E+01	652	4.910E+01	693	2.484E+01	734	8.000E+00	775	1.684E+00
612	5.012E+01	653	4.879E+01	694	2.414E+01	735	7.855E+00	776	1.724E+00
613	5.059E+01	654	4.824E+01	695	2.362E+01	736	7.499E+00	777	1.562E+00
614	5.093E+01	655	4.780E+01	696	2.312E+01	737	7.201E+00	778	1.469E+00
615	5.116E+01	656	4.732E+01	697	2.257E+01	738	6.954E+00	779	1.551E+00
616	5.148E+01	657	4.685E+01	698	2.202E+01	739	6.735E+00	780	1.227E+00
617	5.182E+01	658	4.633E+01	699	2.150E+01	740	6.575E+00		
618	5.218E+01	659	4.573E+01	700	2.096E+01	741	6.302E+00		
619	5.235E+01	660	4.526E+01	701	2.039E+01	742	6.114E+00		
620	5.254E+01	661	4.472E+01	702	1.998E+01	743	5.851E+00		
621	5.285E+01	662	4.426E+01	703	1.931E+01	744	5.514E+00		
622	5.288E+01	663	4.355E+01	704	1.884E+01	745	5.285E+00		
623	5.279E+01	664	4.290E+01	705	1.834E+01	746	5.045E+00		
624	5.311E+01	665	4.231E+01	706	1.800E+01	747	4.984E+00		
625	5.317E+01	666	4.169E+01	707	1.750E+01	748	4.874E+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**

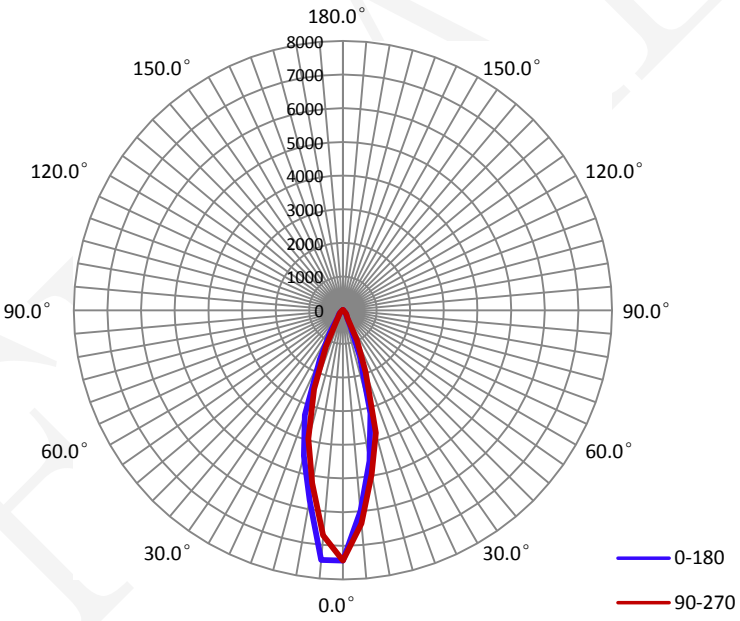
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2670	30.91	0.9650

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2424.1	78.47	7517.5	0.50	0.50

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	31.3	31.4	31.0	31.3	31.1
Field Angle (10% I_{max}):	54.1	54.0	54.4	54.0	54.1

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	7441	7441	7441	7441	7441	7441	7441	7441
5.0°	5987	5945	5964	6105	6362	6704	7048	7404
10.0°	4550	4542	4649	4762	4938	5262	5564	5788
15.0°	3174	3145	3315	3543	3781	4052	4342	4563
20.0°	1481	1458	1539	1671	1961	2403	2886	3322
25.0°	551	530	587	769	990	1169	1362	1580
30.0°	227	227	226	241	276	327	485	701
35.0°	172	175	177	182	196	217	225	251
40.0°	129	128	129	134	150	157	172	186
45.0°	48	48	45	64	82	107	123	135
50.0°	19	21	18	21	26	33	48	57
55.0°	0	9	0	0	0	12	12	23
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.)

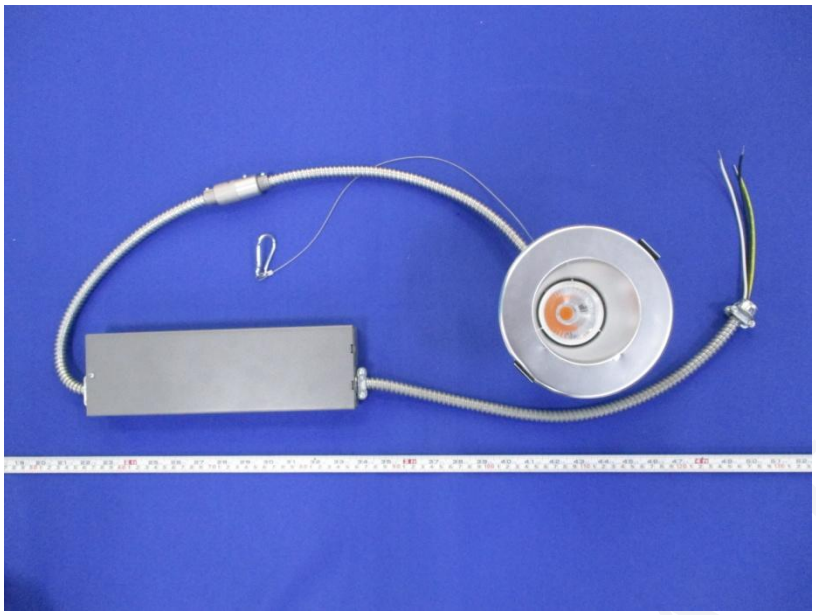
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	7441	7441	7441	7441	7441	7441	7441	7441
5.0°	7453	7518	7299	7039	6715	6424	6217	6052
10.0°	5731	5727	5645	5529	5225	4943	4719	4580
15.0°	4490	4492	4410	4221	3960	3729	3518	3253
20.0°	3320	3297	3248	2940	2503	2054	1718	1515
25.0°	1614	1611	1544	1368	1195	1021	797	585
30.0°	756	782	720	546	353	288	245	228
35.0°	267	269	259	236	213	193	179	177
40.0°	186	193	189	179	163	152	145	131
45.0°	143	146	143	132	116	94	63	55
50.0°	65	73	63	59	43	27	25	22
55.0°	24	29	23	22	15	9	0	0
60.0°	0	0	0	0	10	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

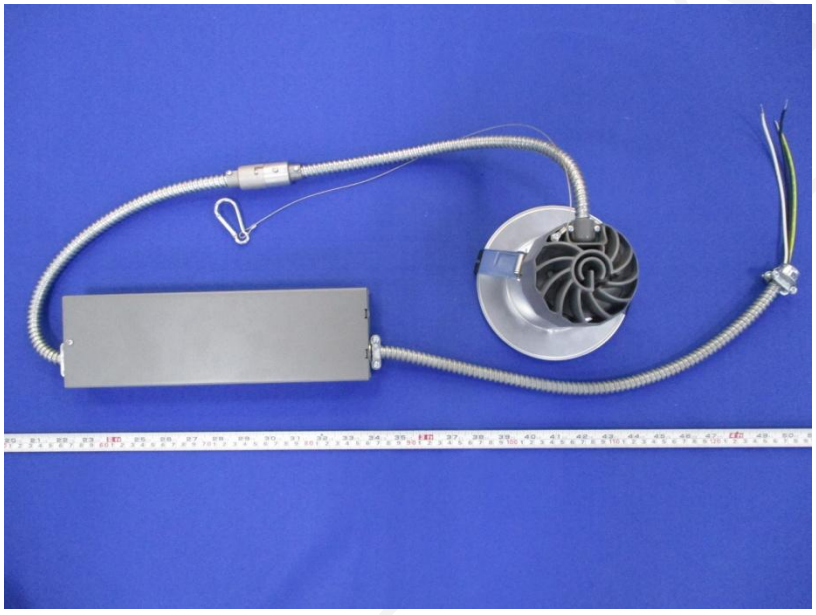
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	168.3	6.94
5-10	421.2	17.38
10-15	534.4	22.04
15-20	511.5	21.10
20-25	357.8	14.76
25-30	189.0	7.80
30-35	92.2	3.80
35-40	61.6	2.54
40-45	47.0	1.94
45-50	27.3	1.13
50-55	10.9	0.45
55-60	2.7	0.11
60-65	0.1	0.01
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	168.3	6.94
0-10	589.5	24.32
0-15	1123.9	46.36
0-20	1635.4	67.46
0-25	1993.2	82.22
0-30	2182.3	90.02
0-35	2274.4	93.82
0-40	2336.0	96.37
0-45	2383.1	98.31
0-50	2410.4	99.43
0-55	2421.3	99.88
0-60	2424.0	99.99
0-65	2424.1	100.00
0-70	2424.1	100.00
0-75	2424.1	100.00
0-80	2424.1	100.00
0-85	2424.1	100.00
0-90	2424.1	100.00
0-95	2424.1	100.00
0-100	2424.1	100.00
0-105	2424.1	100.00
0-110	2424.1	100.00
0-115	2424.1	100.00
0-120	2424.1	100.00
0-125	2424.1	100.00
0-130	2424.1	100.00
0-135	2424.1	100.00
0-140	2424.1	100.00
0-145	2424.1	100.00
0-150	2424.1	100.00
0-155	2424.1	100.00
0-160	2424.1	100.00
0-165	2424.1	100.00
0-170	2424.1	100.00
0-175	2424.1	100.00
0-180	2424.1	100.00

6. Product Photo





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