

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE259027DIM120VNR/ADR4BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329023-10-1
Test Date:	2019-04-03 to 2019-04-08
Report Date:	2019-05-06
Reviewed By:	Ray Gao/EE Engineer <i>Ry 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 2019-04-01 and used for testing.

Model Tested: LE259027DIM120VNR/ADR4BL
 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: 2050lm

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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ 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 $U_{re}=2.61\%$ ($k=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=34\text{K}$ ($k=2$), 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 $U_{re}=0.48\%$ of rdg, AC Voltage $U_{re}=0.25\%$ of rdg, Power $U_{re}=0.44\%$, ($k=2$), 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 $U_{re}=2.6\%$ ($k=2$), 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**

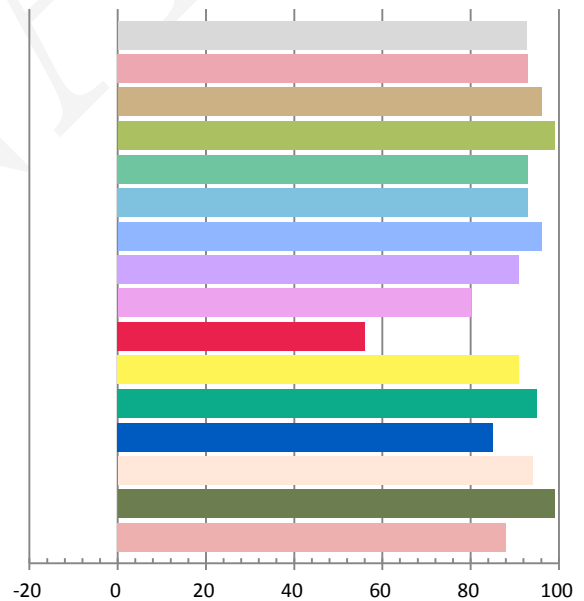
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.2631	31.16	0.987	2095.44	67.25

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.292	2736	0.00013	0.4572	0.4103	0.2609	0.5268

Color Rendering Index

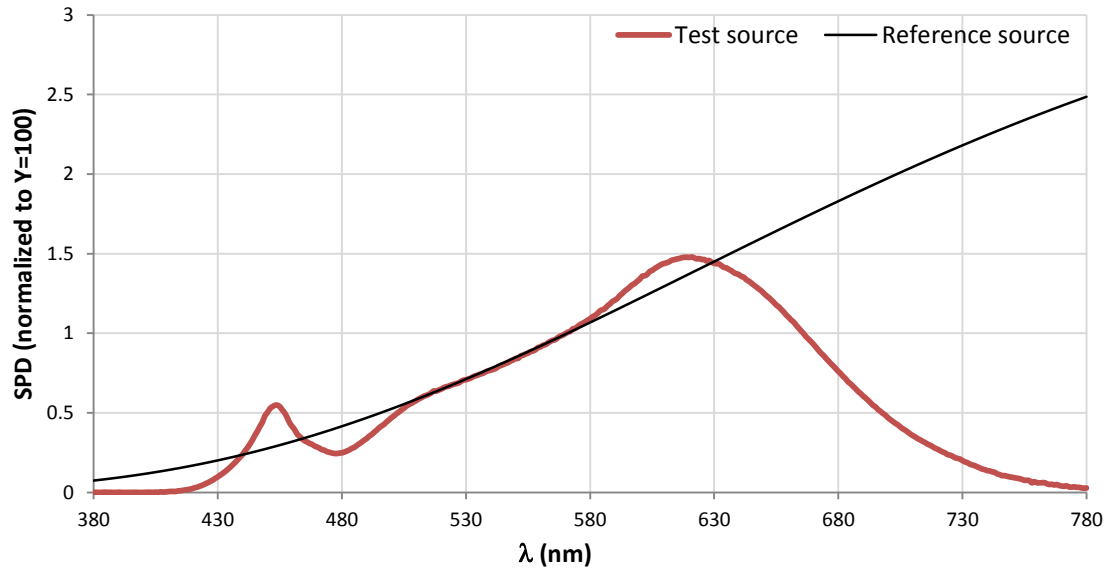
Ra			
92.6			
R1	R2	R3	R4
93	96	99	93
R5	R6	R7	R8
93	96	91	80
R9	R10	R11	R12
56	91	95	85
R13	R14	R15	
94	99	88	



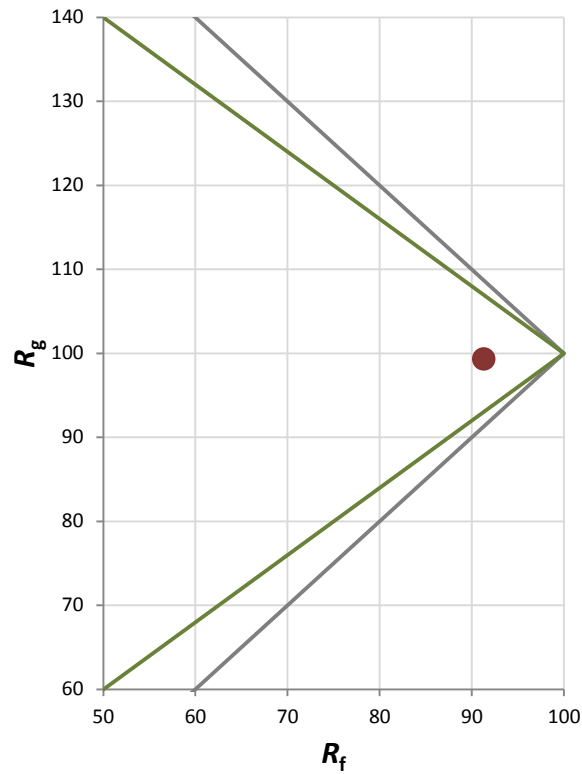
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	99

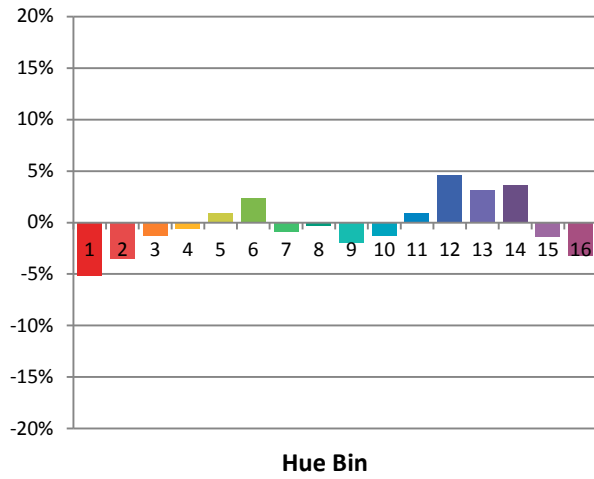
Spectral Power Distribution Comparison



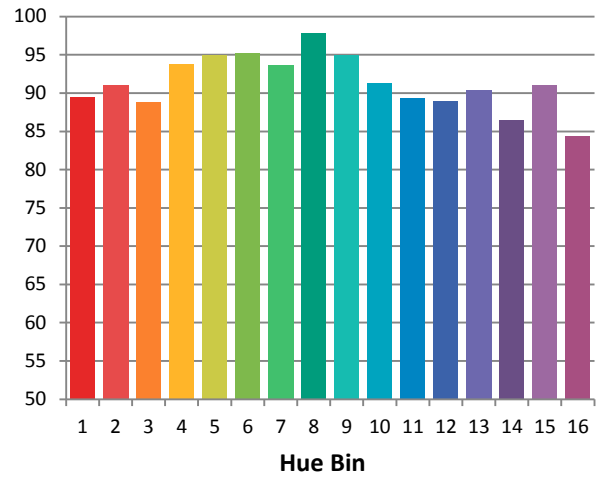
Plot of R_g versus R_f



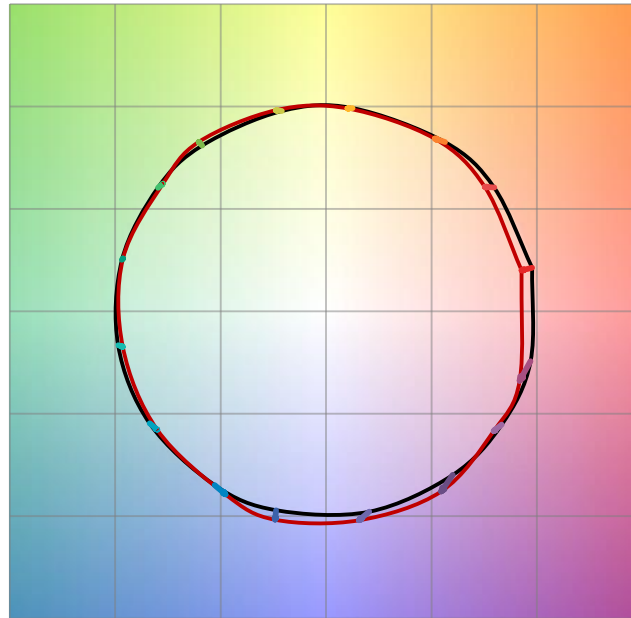
Chroma Shift by Hue



R_f by Hue

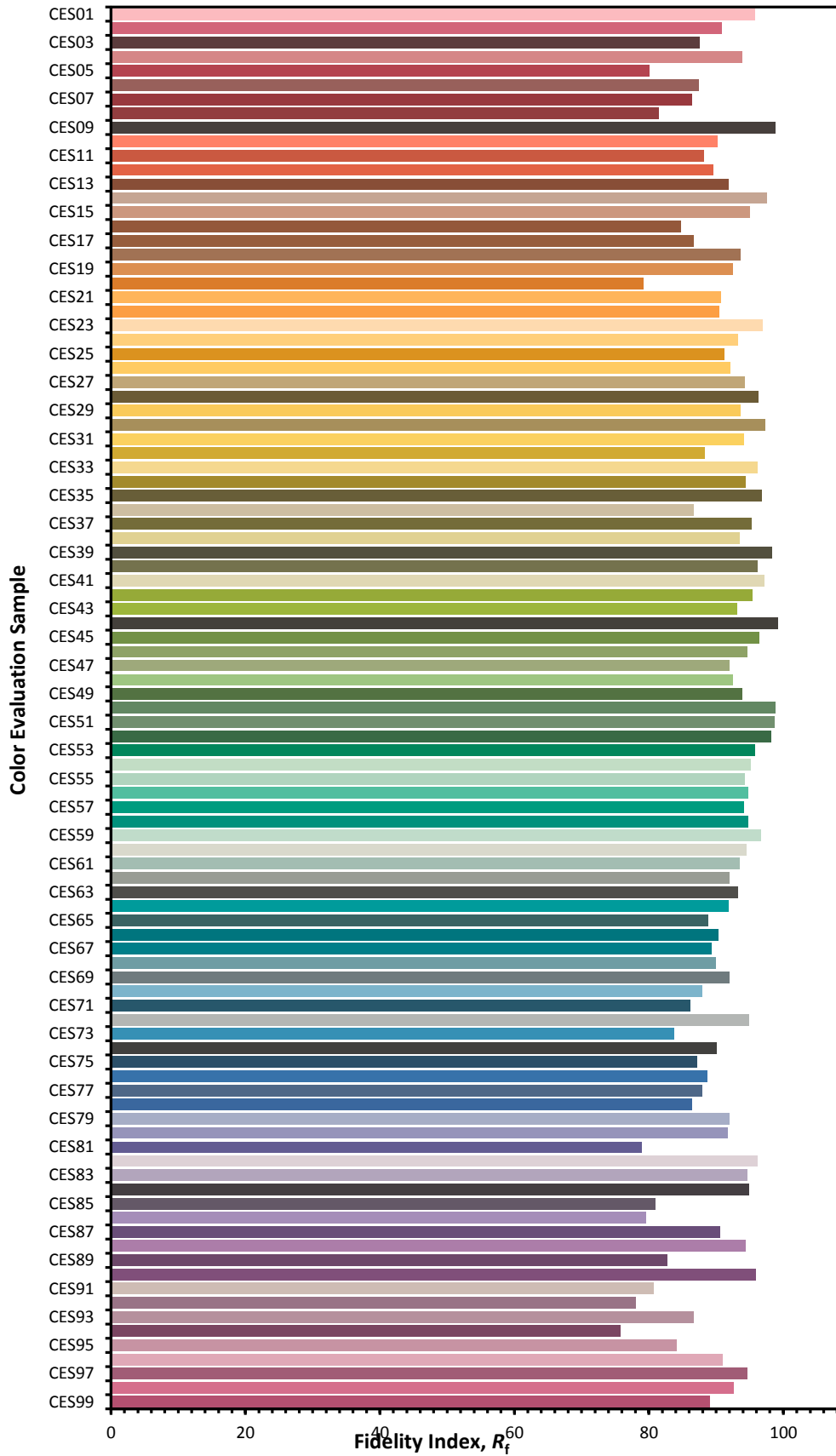


Color Vector Graphic

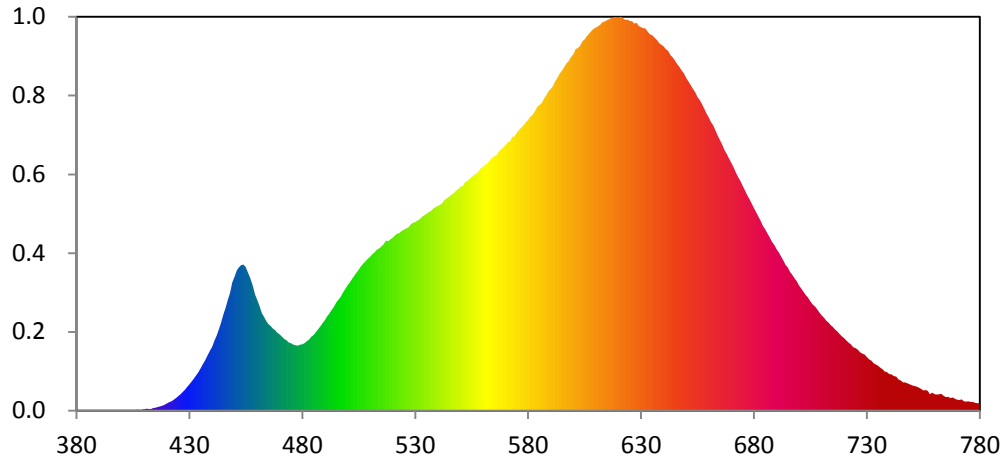


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



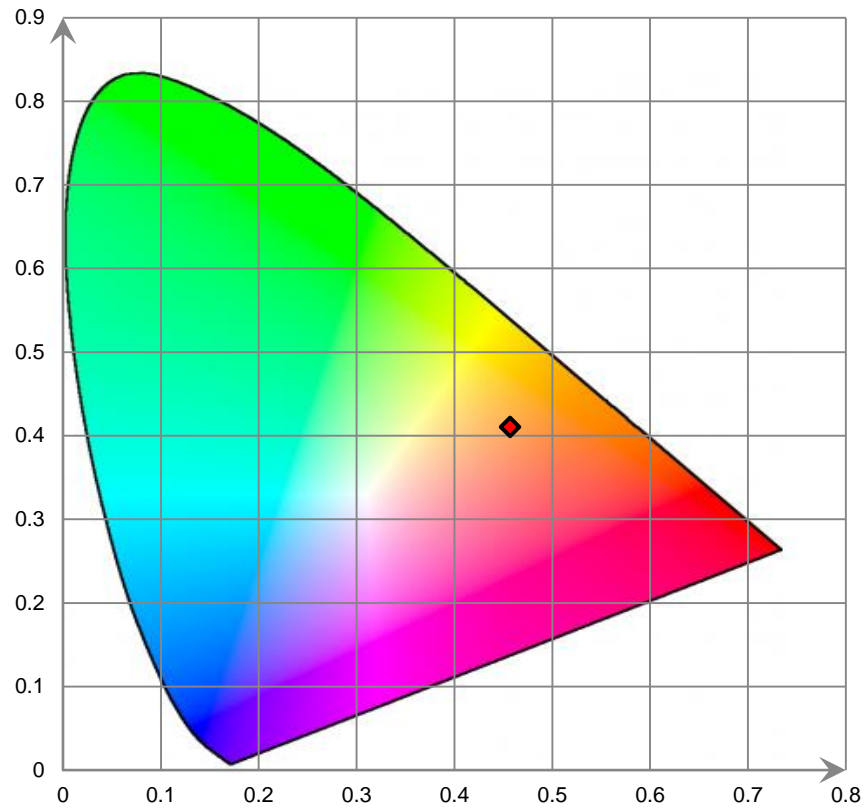
Relative Spectral Power Distribution



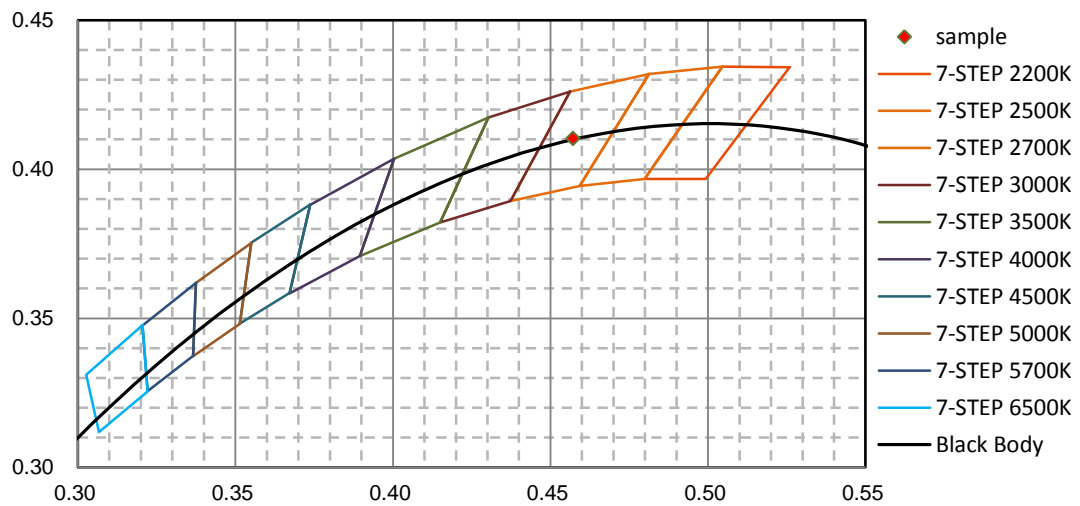
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.580E-02	421	9.459E-01	462	1.123E+01	503	1.552E+01	544	2.446E+01
381	2.720E-02	422	1.067E+00	463	1.079E+01	504	1.590E+01	545	2.466E+01
382	4.300E-03	423	1.262E+00	464	1.033E+01	505	1.624E+01	546	2.486E+01
383	5.500E-03	424	1.436E+00	465	9.962E+00	506	1.665E+01	547	2.506E+01
384	4.800E-02	425	1.662E+00	466	9.729E+00	507	1.694E+01	548	2.534E+01
385	4.780E-02	426	1.895E+00	467	9.451E+00	508	1.717E+01	549	2.554E+01
386	4.600E-03	427	2.136E+00	468	9.269E+00	509	1.747E+01	550	2.582E+01
387	3.630E-02	428	2.402E+00	469	8.957E+00	510	1.772E+01	551	2.584E+01
388	7.000E-03	429	2.719E+00	470	8.765E+00	511	1.803E+01	552	2.631E+01
389	7.100E-03	430	3.015E+00	471	8.527E+00	512	1.826E+01	553	2.646E+01
390	4.380E-02	431	3.356E+00	472	8.243E+00	513	1.854E+01	554	2.669E+01
391	2.030E-02	432	3.673E+00	473	8.128E+00	514	1.871E+01	555	2.687E+01
392	3.800E-03	433	4.047E+00	474	7.859E+00	515	1.891E+01	556	2.714E+01
393	9.700E-03	434	4.442E+00	475	7.748E+00	516	1.919E+01	557	2.728E+01
394	8.500E-03	435	4.866E+00	476	7.602E+00	517	1.957E+01	558	2.752E+01
395	2.150E-02	436	5.336E+00	477	7.518E+00	518	1.953E+01	559	2.794E+01
396	2.480E-02	437	5.784E+00	478	7.500E+00	519	1.973E+01	560	2.806E+01
397	3.030E-02	438	6.307E+00	479	7.591E+00	520	1.993E+01	561	2.837E+01
398	3.700E-03	439	6.834E+00	480	7.645E+00	521	2.018E+01	562	2.849E+01
399	2.000E-04	440	7.342E+00	481	7.788E+00	522	2.039E+01	563	2.882E+01
400	0.000E+00	441	8.028E+00	482	7.990E+00	523	2.047E+01	564	2.913E+01
401	2.500E-02	442	8.646E+00	483	8.204E+00	524	2.069E+01	565	2.934E+01
402	4.020E-02	443	9.371E+00	484	8.502E+00	525	2.085E+01	566	2.947E+01
403	3.930E-02	444	1.016E+01	485	8.692E+00	526	2.098E+01	567	2.985E+01
404	1.880E-02	445	1.104E+01	486	9.047E+00	527	2.111E+01	568	3.013E+01
405	6.140E-02	446	1.184E+01	487	9.386E+00	528	2.142E+01	569	3.031E+01
406	3.170E-02	447	1.275E+01	488	9.709E+00	529	2.165E+01	570	3.061E+01
407	1.190E-01	448	1.357E+01	489	1.008E+01	530	2.174E+01	571	3.089E+01
408	6.620E-02	449	1.479E+01	490	1.039E+01	531	2.189E+01	572	3.104E+01
409	9.900E-02	450	1.540E+01	491	1.084E+01	532	2.206E+01	573	3.152E+01
410	1.532E-01	451	1.616E+01	492	1.117E+01	533	2.235E+01	574	3.162E+01
411	1.978E-01	452	1.653E+01	493	1.161E+01	534	2.250E+01	575	3.201E+01
412	1.924E-01	453	1.679E+01	494	1.200E+01	535	2.268E+01	576	3.236E+01
413	1.947E-01	454	1.682E+01	495	1.247E+01	536	2.285E+01	577	3.262E+01
414	2.955E-01	455	1.653E+01	496	1.281E+01	537	2.300E+01	578	3.288E+01
415	3.288E-01	456	1.590E+01	497	1.313E+01	538	2.327E+01	579	3.320E+01
416	4.133E-01	457	1.529E+01	498	1.359E+01	539	2.345E+01	580	3.348E+01
417	4.817E-01	458	1.439E+01	499	1.400E+01	540	2.358E+01	581	3.387E+01
418	5.654E-01	459	1.337E+01	500	1.441E+01	541	2.373E+01	582	3.414E+01
419	6.619E-01	460	1.271E+01	501	1.476E+01	542	2.392E+01	583	3.451E+01
420	7.891E-01	461	1.207E+01	502	1.517E+01	543	2.425E+01	584	3.502E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.522E+01	626	4.490E+01	667	3.002E+01	708	1.163E+01	749	3.008E+00
586	3.545E+01	627	4.461E+01	668	2.957E+01	709	1.129E+01	750	2.930E+00
587	3.598E+01	628	4.471E+01	669	2.907E+01	710	1.096E+01	751	2.829E+00
588	3.633E+01	629	4.435E+01	670	2.857E+01	711	1.070E+01	752	2.755E+00
589	3.680E+01	630	4.417E+01	671	2.801E+01	712	1.037E+01	753	2.656E+00
590	3.707E+01	631	4.409E+01	672	2.742E+01	713	1.014E+01	754	2.518E+00
591	3.741E+01	632	4.403E+01	673	2.687E+01	714	9.851E+00	755	2.339E+00
592	3.796E+01	633	4.367E+01	674	2.643E+01	715	9.613E+00	756	2.347E+00
593	3.835E+01	634	4.338E+01	675	2.588E+01	716	9.311E+00	757	2.273E+00
594	3.883E+01	635	4.328E+01	676	2.537E+01	717	9.101E+00	758	1.859E+00
595	3.919E+01	636	4.296E+01	677	2.483E+01	718	8.827E+00	759	2.069E+00
596	3.959E+01	637	4.273E+01	678	2.437E+01	719	8.545E+00	760	1.876E+00
597	4.002E+01	638	4.235E+01	679	2.386E+01	720	8.335E+00	761	1.858E+00
598	4.029E+01	639	4.217E+01	680	2.334E+01	721	8.076E+00	762	1.874E+00
599	4.071E+01	640	4.197E+01	681	2.288E+01	722	7.827E+00	763	1.896E+00
600	4.110E+01	641	4.163E+01	682	2.234E+01	723	7.627E+00	764	1.689E+00
601	4.167E+01	642	4.146E+01	683	2.189E+01	724	7.320E+00	765	1.534E+00
602	4.178E+01	643	4.099E+01	684	2.129E+01	725	7.197E+00	766	1.585E+00
603	4.204E+01	644	4.072E+01	685	2.092E+01	726	6.986E+00	767	1.445E+00
604	4.259E+01	645	4.034E+01	686	2.044E+01	727	6.715E+00	768	1.518E+00
605	4.279E+01	646	3.995E+01	687	1.999E+01	728	6.572E+00	769	1.357E+00
606	4.316E+01	647	3.961E+01	688	1.947E+01	729	6.441E+00	770	1.237E+00
607	4.345E+01	648	3.921E+01	689	1.908E+01	730	6.154E+00	771	1.200E+00
608	4.375E+01	649	3.886E+01	690	1.859E+01	731	5.908E+00	772	1.274E+00
609	4.400E+01	650	3.838E+01	691	1.820E+01	732	5.747E+00	773	1.060E+00
610	4.416E+01	651	3.795E+01	692	1.775E+01	733	5.464E+00	774	1.021E+00
611	4.430E+01	652	3.756E+01	693	1.729E+01	734	5.312E+00	775	1.078E+00
612	4.450E+01	653	3.711E+01	694	1.680E+01	735	5.159E+00	776	9.987E-01
613	4.478E+01	654	3.665E+01	695	1.649E+01	736	4.940E+00	777	9.763E-01
614	4.487E+01	655	3.613E+01	696	1.599E+01	737	4.739E+00	778	8.836E-01
615	4.502E+01	656	3.579E+01	697	1.563E+01	738	4.500E+00	779	8.246E-01
616	4.511E+01	657	3.529E+01	698	1.522E+01	739	4.407E+00	780	8.584E-01
617	4.526E+01	658	3.480E+01	699	1.489E+01	740	4.206E+00		
618	4.533E+01	659	3.422E+01	700	1.441E+01	741	4.153E+00		
619	4.535E+01	660	3.378E+01	701	1.404E+01	742	3.972E+00		
620	4.531E+01	661	3.324E+01	702	1.368E+01	743	3.892E+00		
621	4.540E+01	662	3.286E+01	703	1.333E+01	744	3.581E+00		
622	4.521E+01	663	3.226E+01	704	1.303E+01	745	3.444E+00		
623	4.502E+01	664	3.170E+01	705	1.263E+01	746	3.235E+00		
624	4.508E+01	665	3.116E+01	706	1.226E+01	747	3.252E+00		
625	4.490E+01	666	3.064E+01	707	1.199E+01	748	3.119E+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**

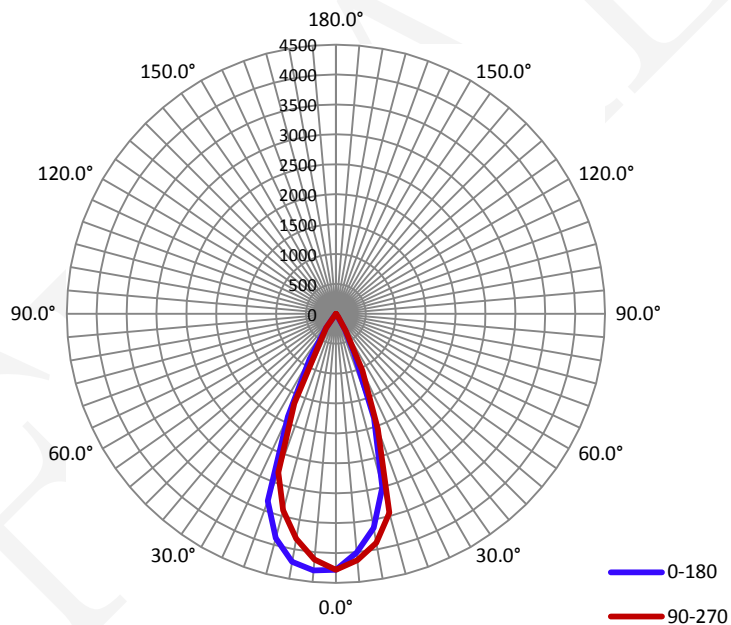
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2700	31.19	0.9630

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2097.1	67.29	4309.7	0.73	0.70

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	42.8	43.7	42.6	43.7	42.7
Field Angle (10% I _{max}):	62.3	62.4	60.9	61.6	61.8

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	4280	4280	4280	4280	4280	4280	4280	4280
5.0°	4004	4002	4059	4085	4134	4218	4272	4310
10.0°	3633	3649	3668	3766	3891	3997	4074	4176
15.0°	3002	3045	3133	3255	3443	3597	3725	3892
20.0°	1858	1711	1695	1818	2049	2478	3042	3346
25.0°	715	681	737	859	1053	1266	1499	1763
30.0°	303	254	242	265	335	452	636	846
35.0°	42	38	35	47	61	76	133	247
40.0°	11	0	0	10	16	16	24	37
45.0°	0	0	0	0	0	0	0	9
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.)

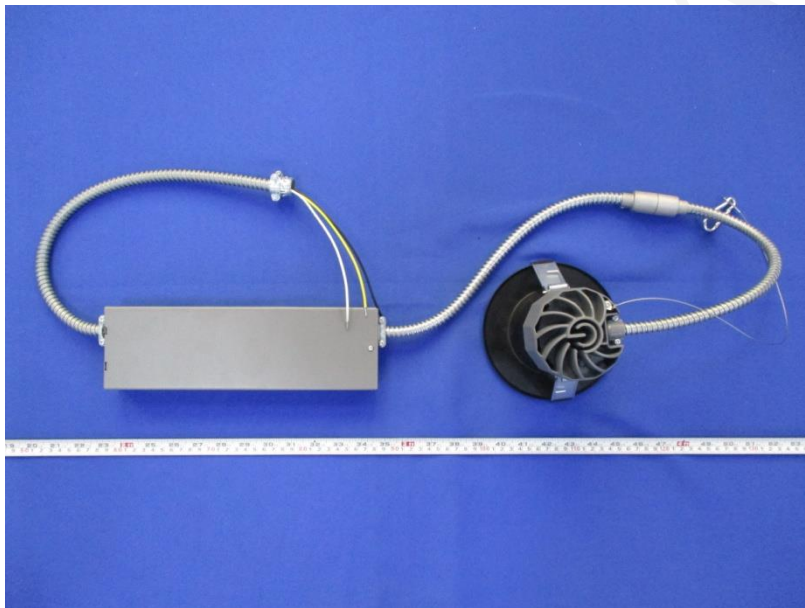
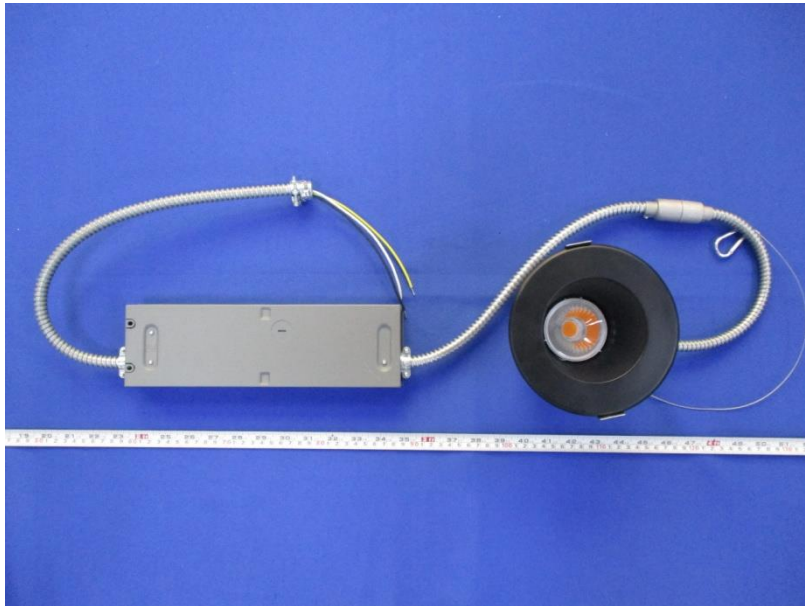
C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	4280	4280	4280	4280	4280	4280	4280	4280
5.0°	4305	4304	4210	4122	4121	4080	4071	4017
10.0°	4209	4194	4075	3923	3818	3738	3704	3663
15.0°	3882	3878	3750	3546	3402	3282	3154	3035
20.0°	3330	3316	3215	3000	2821	2636	2369	2012
25.0°	1895	2192	2200	2002	1650	1299	986	769
30.0°	873	927	861	681	493	409	376	326
35.0°	299	354	356	327	279	184	95	57
40.0°	35	54	47	41	28	23	15	12
45.0°	9	14	11	15	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	100.7	4.80
5-10	287.3	13.70
10-15	434.5	20.72
15-20	493.0	23.51
20-25	408.1	19.46
25-30	236.0	11.26
30-35	100.4	4.79
35-40	31.3	1.49
40-45	4.9	0.24
45-50	0.7	0.04
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	100.7	4.80
0-10	388.0	18.50
0-15	822.5	39.22
0-20	1315.5	62.73
0-25	1723.7	82.19
0-30	1959.7	93.45
0-35	2060.1	98.24
0-40	2091.4	99.73
0-45	2096.3	99.96
0-50	2097.1	100.00
0-55	2097.1	100.00
0-60	2097.1	100.00
0-65	2097.1	100.00
0-70	2097.1	100.00
0-75	2097.1	100.00
0-80	2097.1	100.00
0-85	2097.1	100.00
0-90	2097.1	100.00
0-95	2097.1	100.00
0-100	2097.1	100.00
0-105	2097.1	100.00
0-110	2097.1	100.00
0-115	2097.1	100.00
0-120	2097.1	100.00
0-125	2097.1	100.00
0-130	2097.1	100.00
0-135	2097.1	100.00
0-140	2097.1	100.00
0-145	2097.1	100.00
0-150	2097.1	100.00
0-155	2097.1	100.00
0-160	2097.1	100.00
0-165	2097.1	100.00
0-170	2097.1	100.00
0-175	2097.1	100.00
0-180	2097.1	100.00

6. Product Photo



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