

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE539027DIM120VNR6CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	RKSB190329019-10-8
Test Date:	2019-04-03 to 2019-04-06
Report Date:	2019-05-07
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: LE539027DIM120VNR6CC
 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 50/60Hz
 Rated Power: 53W
 Nominal CCT: 2700K
 Nominal Lumen Output: 4200lm

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**

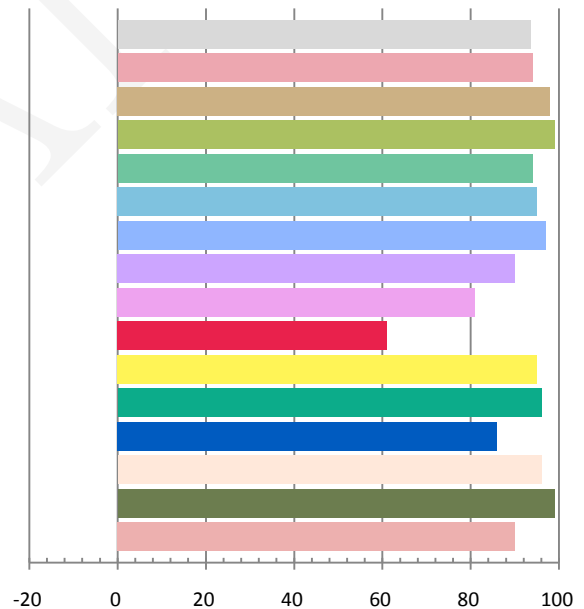
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.4778	53.95	0.9409	4303.09	79.76

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
15.256	2695	-0.00093	0.4587	0.4078	0.2630	0.5261

Color Rendering Index

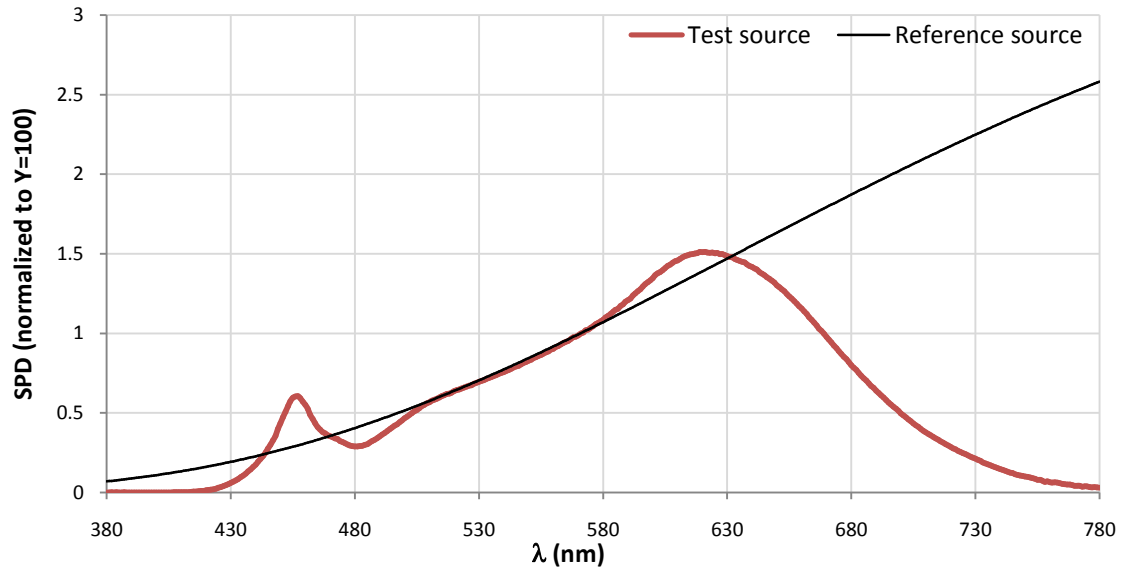
Ra			
93.6			
R1	R2	R3	R4
94	98	99	94
R5	R6	R7	R8
95	97	90	81
R9	R10	R11	R12
61	95	96	86
R13	R14	R15	
96	99	90	



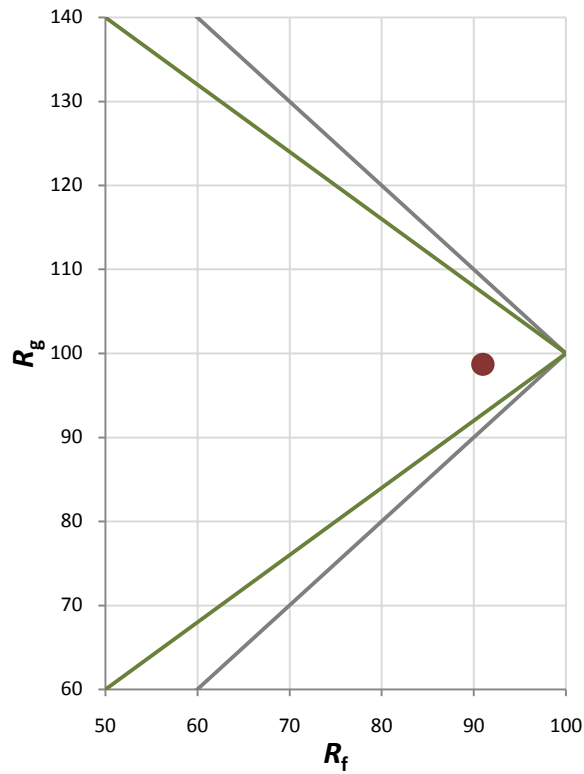
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	99

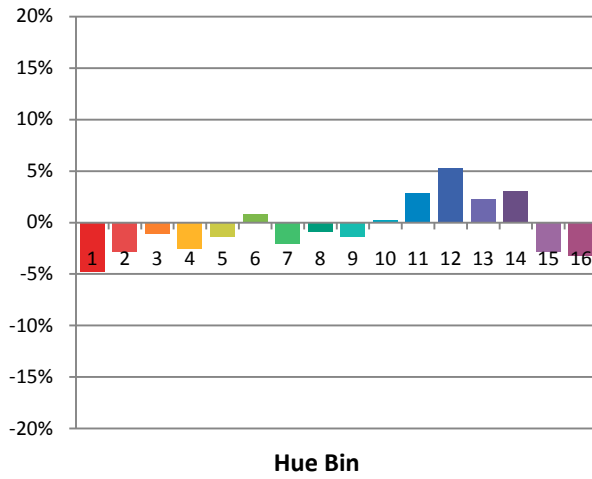
Spectral Power Distribution Comparison



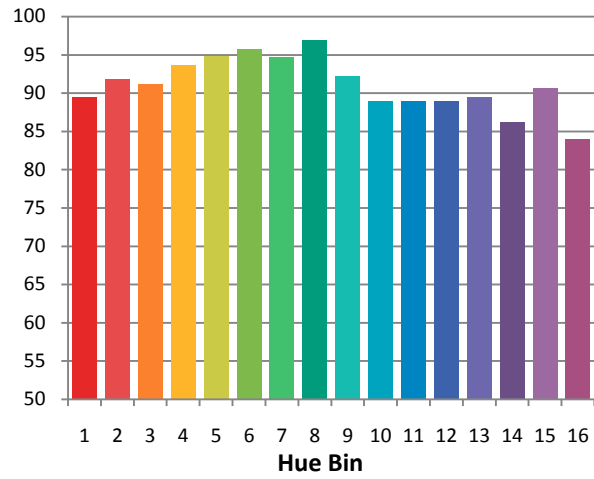
Plot of R_g versus R_f



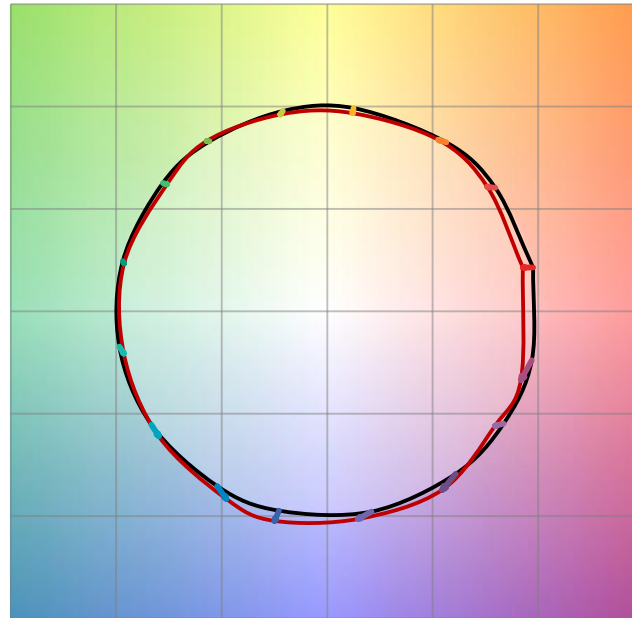
Chroma Shift by Hue



R_f by Hue

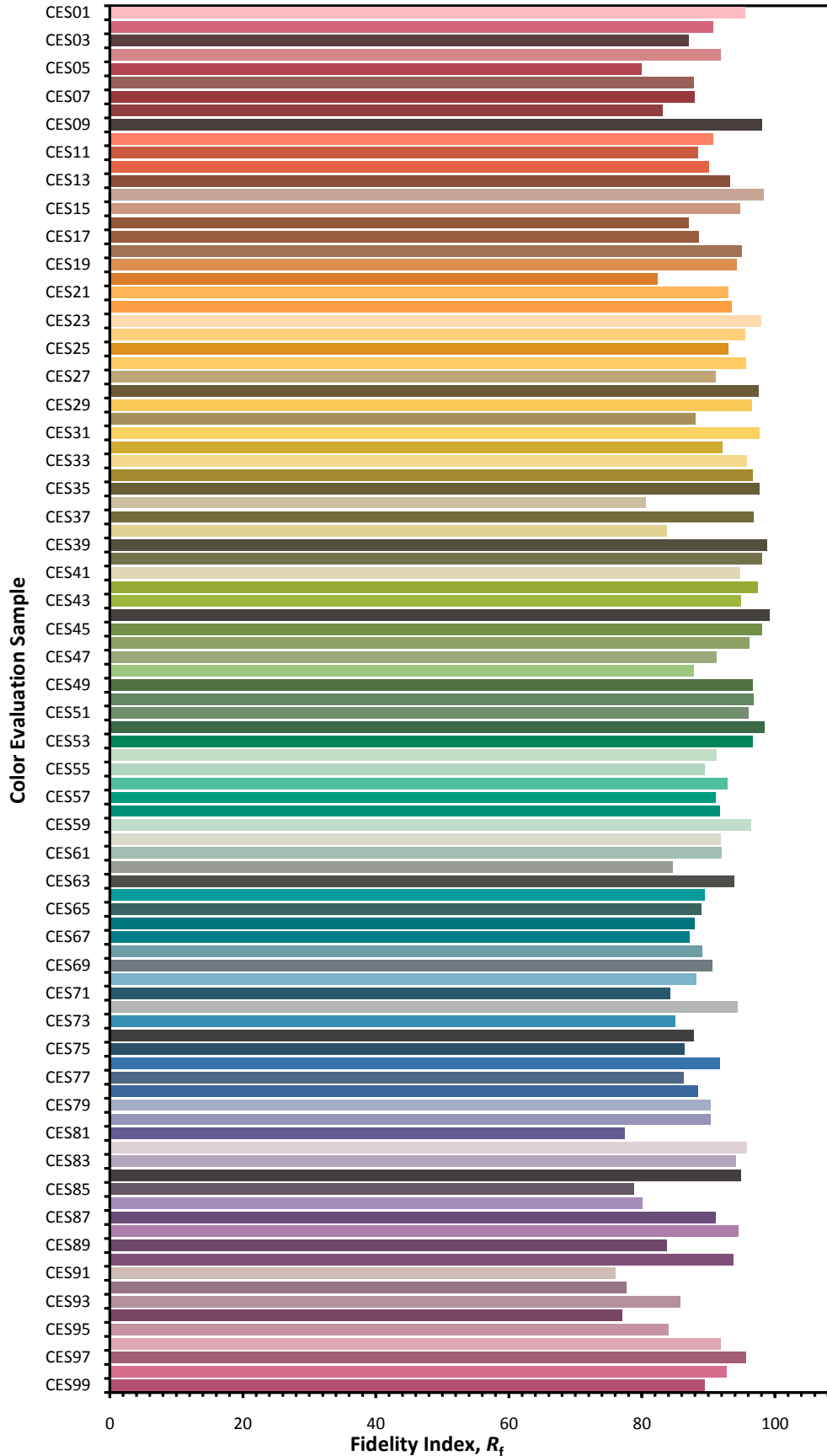


Color Vector Graphic

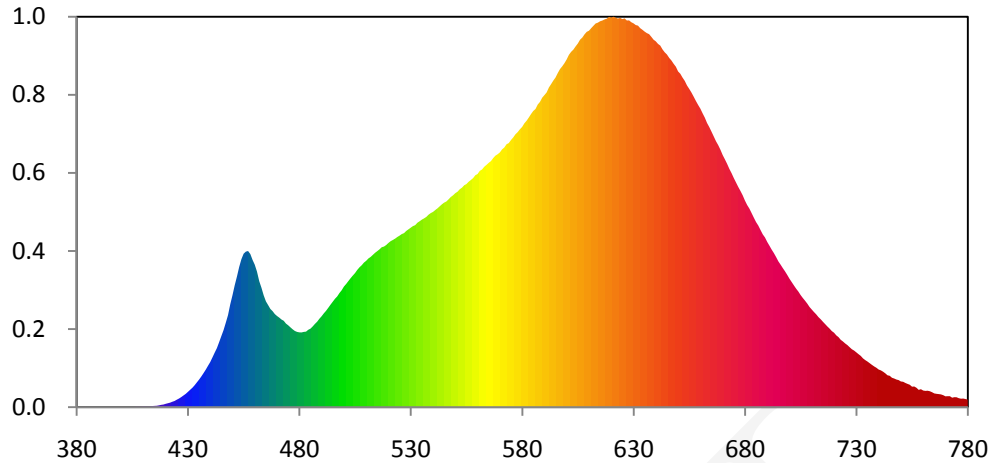


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



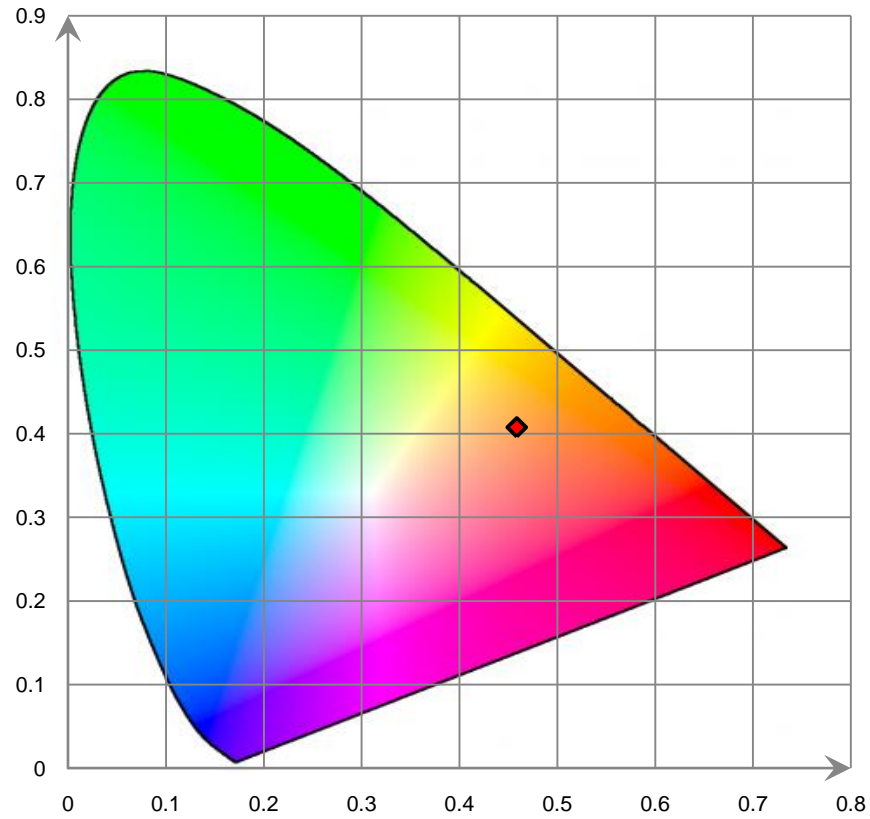
Relative Spectral Power Distribution



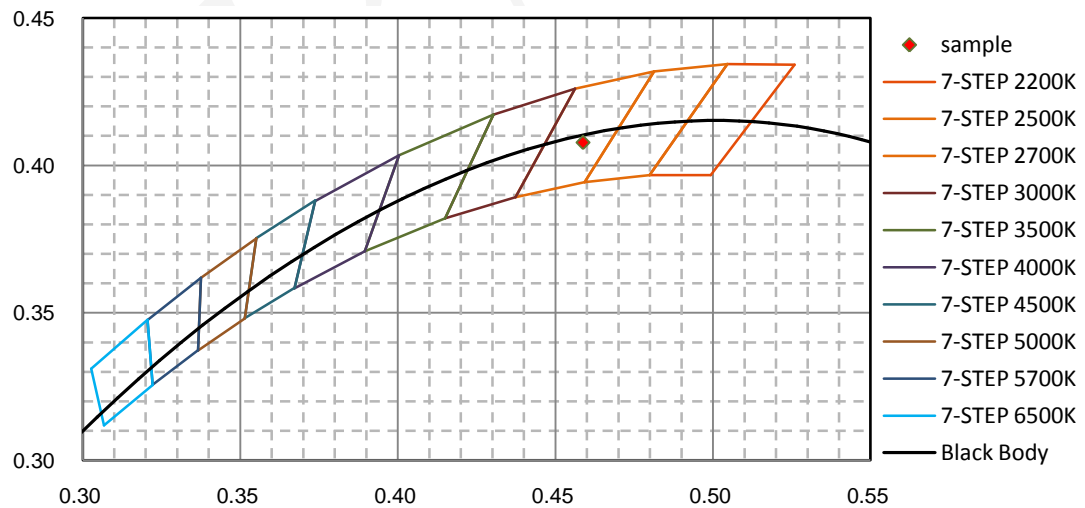
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.820E-02	421	9.647E-01	462	3.076E+01	503	3.147E+01	544	4.950E+01
381	2.860E-02	422	1.106E+00	463	2.913E+01	504	3.210E+01	545	4.991E+01
382	5.510E-02	423	1.320E+00	464	2.730E+01	505	3.273E+01	546	5.019E+01
383	2.900E-03	424	1.519E+00	465	2.582E+01	506	3.349E+01	547	5.072E+01
384	7.260E-02	425	1.830E+00	466	2.490E+01	507	3.414E+01	548	5.129E+01
385	8.200E-03	426	2.113E+00	467	2.397E+01	508	3.463E+01	549	5.170E+01
386	3.000E-04	427	2.469E+00	468	2.342E+01	509	3.528E+01	550	5.221E+01
387	6.340E-02	428	2.857E+00	469	2.272E+01	510	3.571E+01	551	5.257E+01
388	1.630E-02	429	3.247E+00	470	2.225E+01	511	3.629E+01	552	5.317E+01
389	2.270E-02	430	3.735E+00	471	2.185E+01	512	3.666E+01	553	5.356E+01
390	5.420E-02	431	4.239E+00	472	2.139E+01	513	3.715E+01	554	5.414E+01
391	2.070E-02	432	4.745E+00	473	2.109E+01	514	3.767E+01	555	5.444E+01
392	9.000E-04	433	5.347E+00	474	2.040E+01	515	3.808E+01	556	5.501E+01
393	0.000E+00	434	6.036E+00	475	1.998E+01	516	3.852E+01	557	5.543E+01
394	7.300E-03	435	6.722E+00	476	1.948E+01	517	3.903E+01	558	5.589E+01
395	2.690E-02	436	7.486E+00	477	1.901E+01	518	3.919E+01	559	5.659E+01
396	6.500E-03	437	8.303E+00	478	1.859E+01	519	3.956E+01	560	5.689E+01
397	8.600E-03	438	9.155E+00	479	1.837E+01	520	4.008E+01	561	5.765E+01
398	8.700E-03	439	1.008E+01	480	1.826E+01	521	4.051E+01	562	5.799E+01
399	5.000E-04	440	1.101E+01	481	1.823E+01	522	4.081E+01	563	5.866E+01
400	0.000E+00	441	1.213E+01	482	1.837E+01	523	4.113E+01	564	5.911E+01
401	2.460E-02	442	1.330E+01	483	1.844E+01	524	4.152E+01	565	5.961E+01
402	4.210E-02	443	1.441E+01	484	1.888E+01	525	4.187E+01	566	6.004E+01
403	2.410E-02	444	1.585E+01	485	1.915E+01	526	4.225E+01	567	6.077E+01
404	2.560E-02	445	1.736E+01	486	1.970E+01	527	4.247E+01	568	6.137E+01
405	2.990E-02	446	1.882E+01	487	2.033E+01	528	4.300E+01	569	6.171E+01
406	1.830E-02	447	2.062E+01	488	2.086E+01	529	4.339E+01	570	6.215E+01
407	1.293E-01	448	2.247E+01	489	2.158E+01	530	4.380E+01	571	6.290E+01
408	9.230E-02	449	2.511E+01	490	2.218E+01	531	4.419E+01	572	6.335E+01
409	1.046E-01	450	2.730E+01	491	2.290E+01	532	4.441E+01	573	6.415E+01
410	1.611E-01	451	2.975E+01	492	2.351E+01	533	4.501E+01	574	6.443E+01
411	1.583E-01	452	3.188E+01	493	2.425E+01	534	4.537E+01	575	6.518E+01
412	1.314E-01	453	3.420E+01	494	2.502E+01	535	4.576E+01	576	6.582E+01
413	1.568E-01	454	3.612E+01	495	2.573E+01	536	4.608E+01	577	6.659E+01
414	2.760E-01	455	3.744E+01	496	2.644E+01	537	4.642E+01	578	6.711E+01
415	3.161E-01	456	3.795E+01	497	2.702E+01	538	4.697E+01	579	6.780E+01
416	3.545E-01	457	3.809E+01	498	2.785E+01	539	4.736E+01	580	6.837E+01
417	4.473E-01	458	3.737E+01	499	2.853E+01	540	4.764E+01	581	6.925E+01
418	5.761E-01	459	3.595E+01	500	2.942E+01	541	4.809E+01	582	6.989E+01
419	6.518E-01	460	3.475E+01	501	3.005E+01	542	4.851E+01	583	7.067E+01
420	8.212E-01	461	3.308E+01	502	3.076E+01	543	4.901E+01	584	7.153E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	7.228E+01	626	9.486E+01	667	6.490E+01	708	2.525E+01	749	6.607E+00
586	7.274E+01	627	9.434E+01	668	6.395E+01	709	2.445E+01	750	6.265E+00
587	7.384E+01	628	9.437E+01	669	6.282E+01	710	2.383E+01	751	6.197E+00
588	7.448E+01	629	9.392E+01	670	6.155E+01	711	2.321E+01	752	5.912E+00
589	7.551E+01	630	9.365E+01	671	6.048E+01	712	2.265E+01	753	5.678E+00
590	7.614E+01	631	9.324E+01	672	5.938E+01	713	2.198E+01	754	5.468E+00
591	7.679E+01	632	9.310E+01	673	5.816E+01	714	2.146E+01	755	5.000E+00
592	7.798E+01	633	9.248E+01	674	5.710E+01	715	2.085E+01	756	5.053E+00
593	7.881E+01	634	9.207E+01	675	5.592E+01	716	2.028E+01	757	4.731E+00
594	7.968E+01	635	9.164E+01	676	5.484E+01	717	1.969E+01	758	4.228E+00
595	8.044E+01	636	9.126E+01	677	5.374E+01	718	1.917E+01	759	4.385E+00
596	8.153E+01	637	9.101E+01	678	5.275E+01	719	1.857E+01	760	4.069E+00
597	8.249E+01	638	9.035E+01	679	5.169E+01	720	1.816E+01	761	3.971E+00
598	8.317E+01	639	8.966E+01	680	5.041E+01	721	1.753E+01	762	4.008E+00
599	8.393E+01	640	8.926E+01	681	4.933E+01	722	1.709E+01	763	3.889E+00
600	8.485E+01	641	8.864E+01	682	4.845E+01	723	1.644E+01	764	3.651E+00
601	8.597E+01	642	8.823E+01	683	4.736E+01	724	1.603E+01	765	3.357E+00
602	8.671E+01	643	8.730E+01	684	4.624E+01	725	1.555E+01	766	3.259E+00
603	8.724E+01	644	8.658E+01	685	4.516E+01	726	1.514E+01	767	3.189E+00
604	8.803E+01	645	8.605E+01	686	4.431E+01	727	1.463E+01	768	3.119E+00
605	8.874E+01	646	8.522E+01	687	4.322E+01	728	1.414E+01	769	2.924E+00
606	8.965E+01	647	8.460E+01	688	4.217E+01	729	1.382E+01	770	2.649E+00
607	9.018E+01	648	8.379E+01	689	4.140E+01	730	1.338E+01	771	2.675E+00
608	9.096E+01	649	8.306E+01	690	4.033E+01	731	1.293E+01	772	2.680E+00
609	9.158E+01	650	8.192E+01	691	3.940E+01	732	1.251E+01	773	2.311E+00
610	9.184E+01	651	8.135E+01	692	3.845E+01	733	1.191E+01	774	2.439E+00
611	9.247E+01	652	8.042E+01	693	3.759E+01	734	1.149E+01	775	2.422E+00
612	9.306E+01	653	7.961E+01	694	3.663E+01	735	1.113E+01	776	2.190E+00
613	9.362E+01	654	7.851E+01	695	3.558E+01	736	1.073E+01	777	2.069E+00
614	9.382E+01	655	7.767E+01	696	3.479E+01	737	1.033E+01	778	2.102E+00
615	9.417E+01	656	7.678E+01	697	3.394E+01	738	9.943E+00	779	1.979E+00
616	9.434E+01	657	7.576E+01	698	3.314E+01	739	9.619E+00	780	1.853E+00
617	9.461E+01	658	7.471E+01	699	3.227E+01	740	9.196E+00		
618	9.479E+01	659	7.373E+01	700	3.133E+01	741	8.981E+00		
619	9.525E+01	660	7.285E+01	701	3.053E+01	742	8.658E+00		
620	9.507E+01	661	7.171E+01	702	2.970E+01	743	8.258E+00		
621	9.527E+01	662	7.064E+01	703	2.890E+01	744	7.785E+00		
622	9.504E+01	663	6.934E+01	704	2.820E+01	745	7.655E+00		
623	9.482E+01	664	6.834E+01	705	2.736E+01	746	7.170E+00		
624	9.498E+01	665	6.722E+01	706	2.663E+01	747	6.988E+00		
625	9.469E+01	666	6.607E+01	707	2.597E+01	748	6.748E+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**

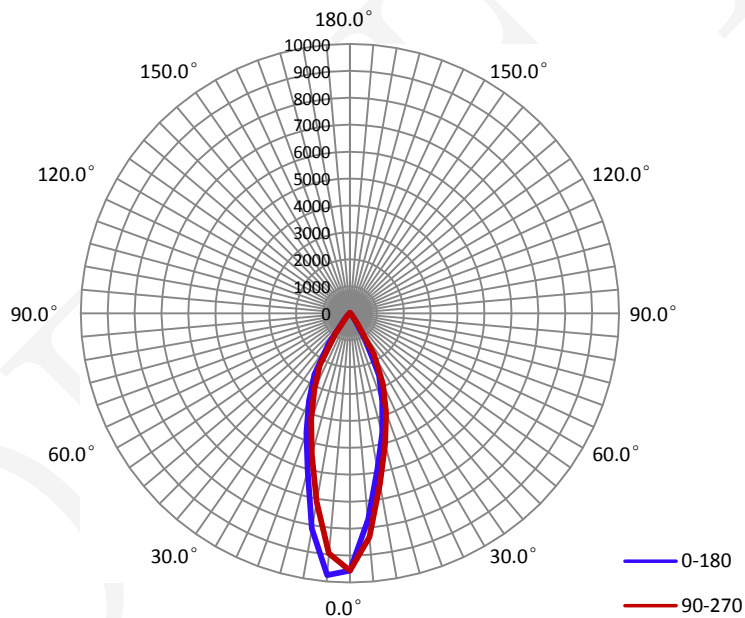
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.4680	53.98	0.9600

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4312.7	79.95	9830.6	0.54	0.53

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	33.3	33.5	33.8	34.0	33.7
Field Angle (10% I _{max}):	67.9	68.3	68.1	68.0	68.1

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	9562	9562	9562	9562	9562	9562	9562	9562
5.0°	7684	7652	7744	7984	8350	8804	9303	9707
10.0°	5874	5794	5865	6096	6429	6905	7380	7932
15.0°	4610	4557	4629	4783	5034	5378	5676	6001
20.0°	3493	3474	3536	3683	3917	4189	4474	4721
25.0°	2549	2519	2574	2706	2895	3106	3367	3589
30.0°	1191	1191	1253	1443	1770	2124	2428	2614
35.0°	278	276	291	326	487	804	1051	1279
40.0°	135	137	140	155	167	205	243	286
45.0°	50	55	59	73	84	108	127	138
50.0°	16	13	16	18	21	22	35	60
55.0°	0	0	0	0	0	0	13	11
60.0°	0	0	0	0	0	0	0	10
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

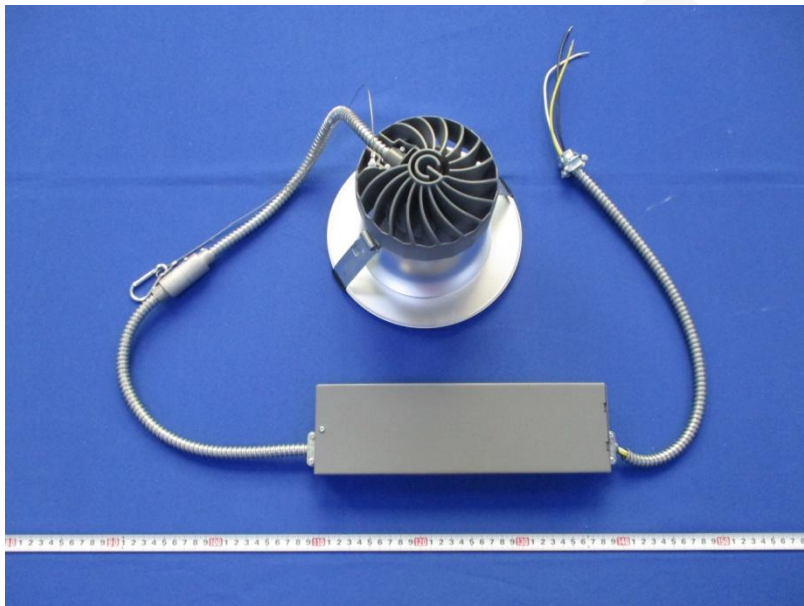
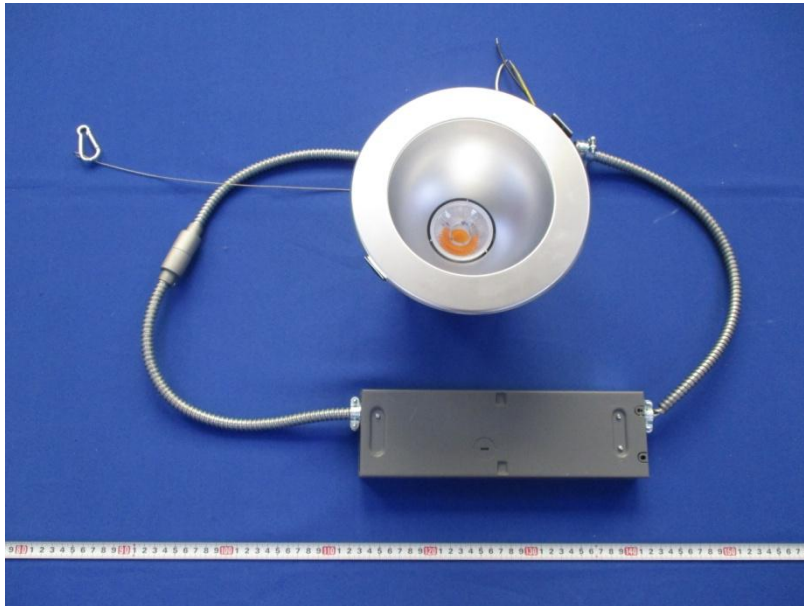
Luminous Intensity (cd) Distribution Data (cont.)

C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	9562	9562	9562	9562	9562	9562	9562	9562
5.0°	9763	9831	9728	9456	8954	8403	7980	7726
10.0°	8132	8233	8048	7612	7114	6600	6233	5990
15.0°	6057	6131	6048	5809	5441	5065	4834	4651
20.0°	4724	4757	4716	4491	4196	3935	3678	3524
25.0°	3598	3648	3588	3384	3129	2889	2720	2571
30.0°	2631	2681	2606	2445	2237	1906	1535	1281
35.0°	1348	1433	1366	1155	926	602	355	284
40.0°	296	313	304	268	221	179	155	139
45.0°	133	140	140	131	112	94	74	52
50.0°	56	71	66	49	24	20	14	18
55.0°	11	10	20	15	13	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	218.2	5.06	0-5	218.2	5.06
5-10	557.4	12.92	0-10	775.6	17.98
10-15	722.7	16.76	0-15	1498.3	34.74
15-20	773.7	17.94	0-20	2272.0	52.68
20-25	749.5	17.38	0-25	3021.5	70.06
25-30	634.1	14.70	0-30	3655.6	84.76
30-35	401.2	9.30	0-35	4056.8	94.07
35-40	162.7	3.77	0-40	4219.5	97.84
40-45	56.9	1.32	0-45	4276.3	99.16
45-50	26.4	0.61	0-50	4302.7	99.77
50-55	8.3	0.19	0-55	4311.1	99.96
55-60	1.5	0.03	0-60	4312.6	100.00
60-65	0.2	0.00	0-65	4312.7	100.00
65-70	0.0	0.00	0-70	4312.7	100.00
70-75	0.0	0.00	0-75	4312.7	100.00
75-80	0.0	0.00	0-80	4312.7	100.00
80-85	0.0	0.00	0-85	4312.7	100.00
85-90	0.0	0.00	0-90	4312.7	100.00
90-95	0.0	0.00	0-95	4312.7	100.00
95-100	0.0	0.00	0-100	4312.7	100.00
100-105	0.0	0.00	0-105	4312.7	100.00
105-110	0.0	0.00	0-110	4312.7	100.00
110-115	0.0	0.00	0-115	4312.7	100.00
115-120	0.0	0.00	0-120	4312.7	100.00
120-125	0.0	0.00	0-125	4312.7	100.00
125-130	0.0	0.00	0-130	4312.7	100.00
130-135	0.0	0.00	0-135	4312.7	100.00
135-140	0.0	0.00	0-140	4312.7	100.00
140-145	0.0	0.00	0-145	4312.7	100.00
145-150	0.0	0.00	0-150	4312.7	100.00
150-155	0.0	0.00	0-155	4312.7	100.00
155-160	0.0	0.00	0-160	4312.7	100.00
160-165	0.0	0.00	0-165	4312.7	100.00
165-170	0.0	0.00	0-170	4312.7	100.00
170-175	0.0	0.00	0-175	4312.7	100.00
175-180	0.0	0.00	0-180	4312.7	100.00

6. Product Photo



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