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: LE249027DIM120MDR4CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	RKSB190329018-10-2
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:	LE249027DIM120MDR4CC
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	0.2612	30.96	0.9877	2466.97	79.68

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.031	2718	-0.00033	0.4578	0.4092	0.2618	0.5265

Color Rendering Index

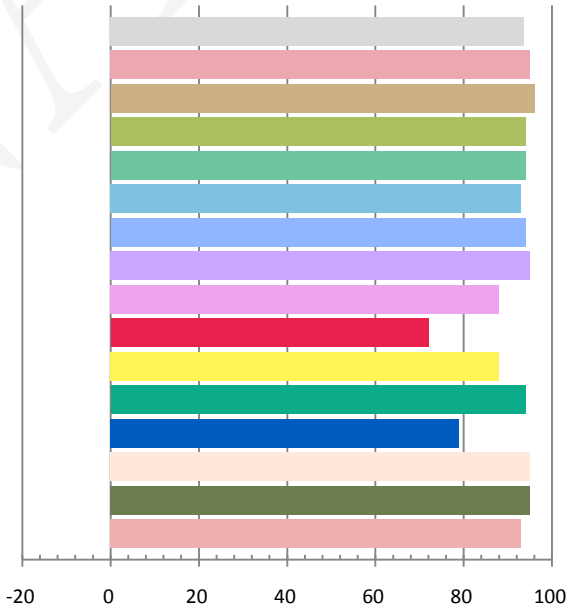
Ra
93.7

R1	R2	R3	R4
95	96	94	94

R5	R6	R7	R8
93	94	95	88

R9	R10	R11	R12
72	88	94	79

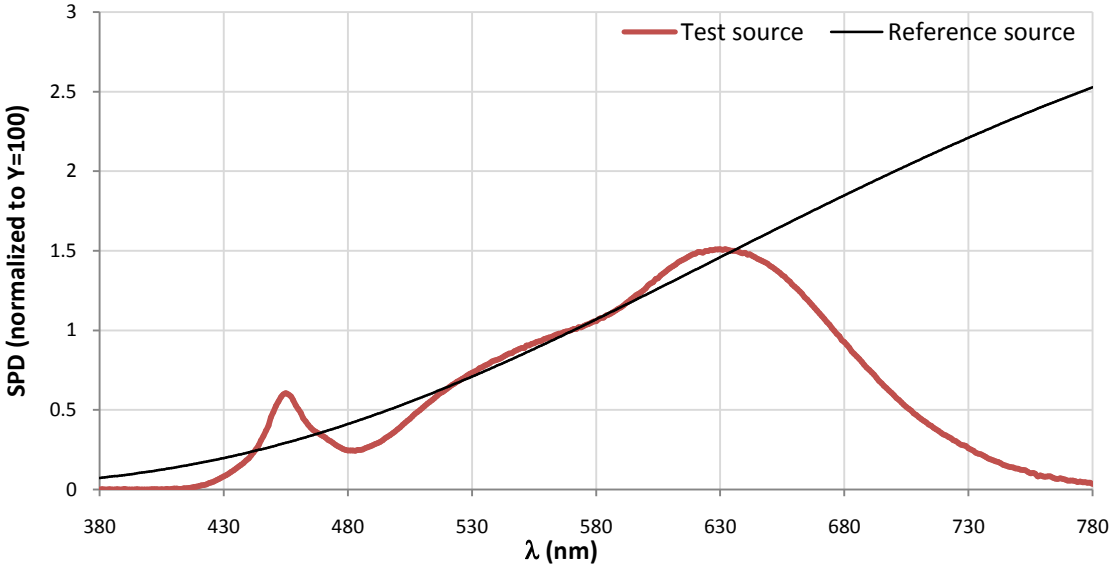
R13	R14	R15
95	95	93



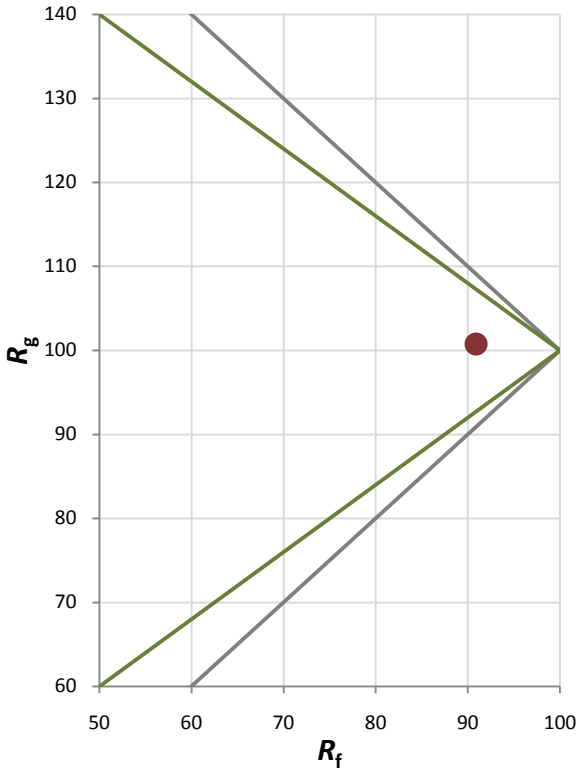
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

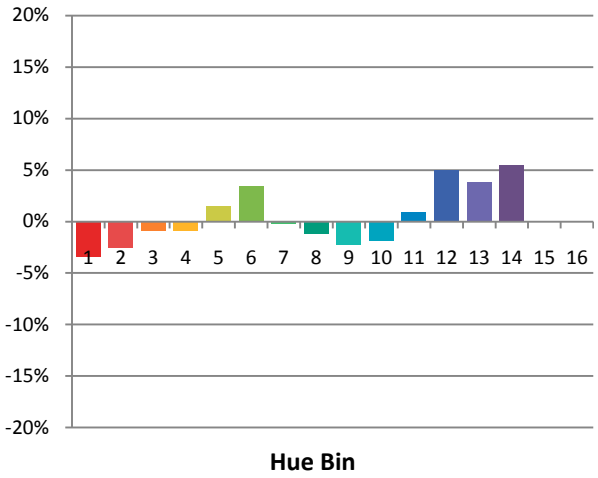
Spectral Power Distribution Comparison



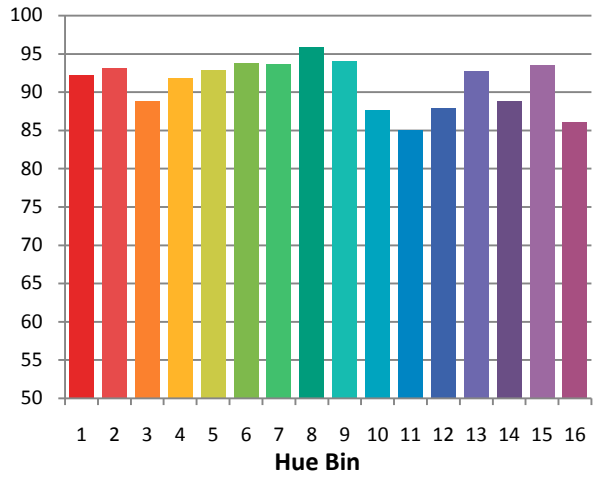
Plot of R_g versus R_f



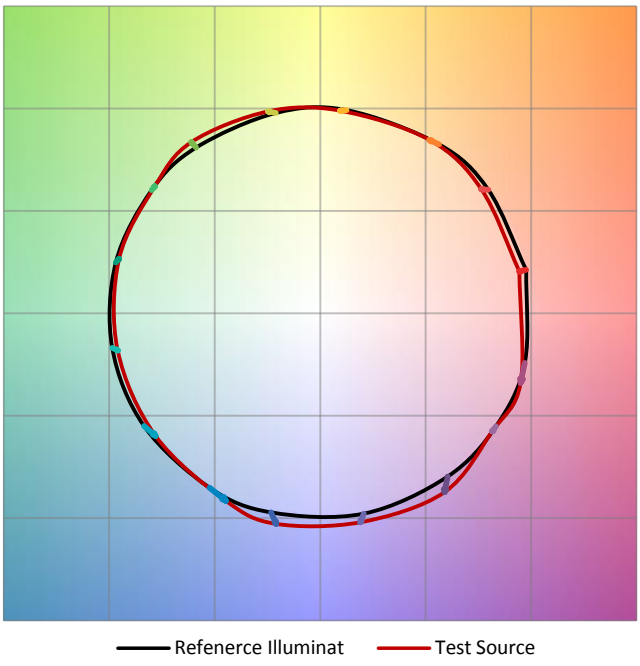
Chroma Shift by Hue

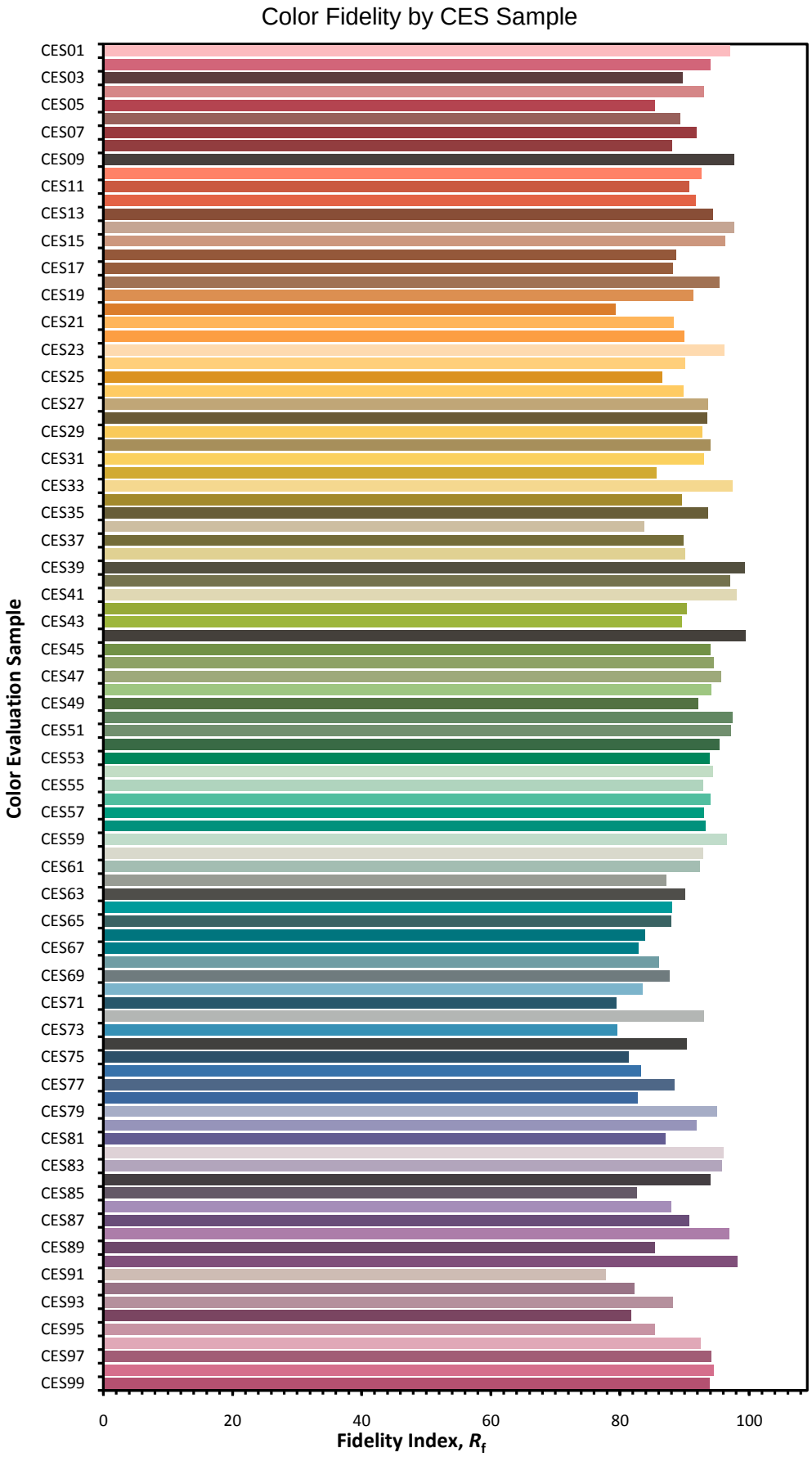


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
CES15
CES17
CES19
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CES87
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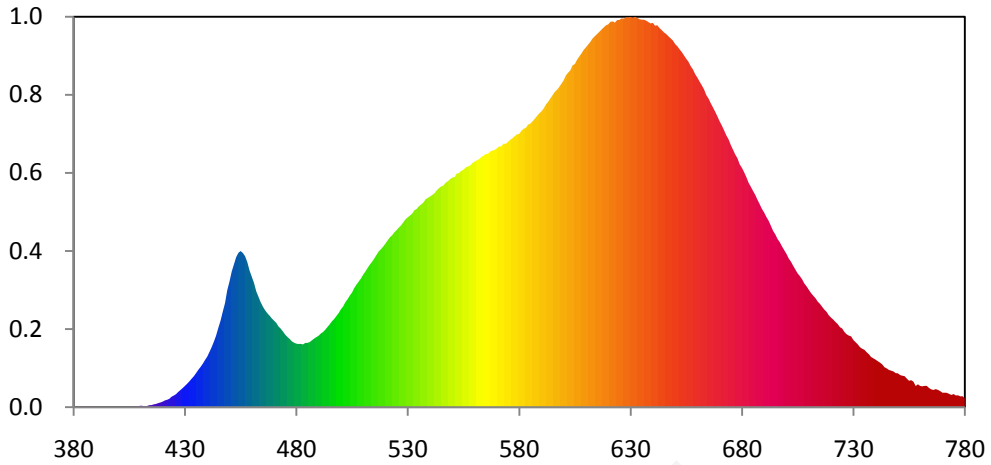
CES91
CES93
CES95
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

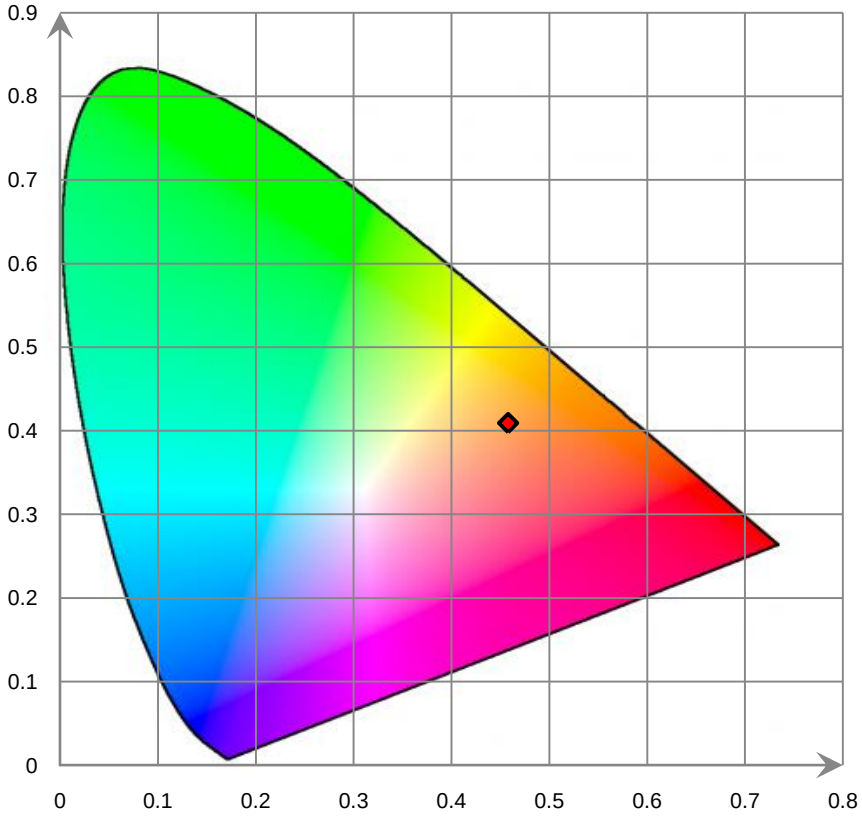
Relative Spectral Power Distribution



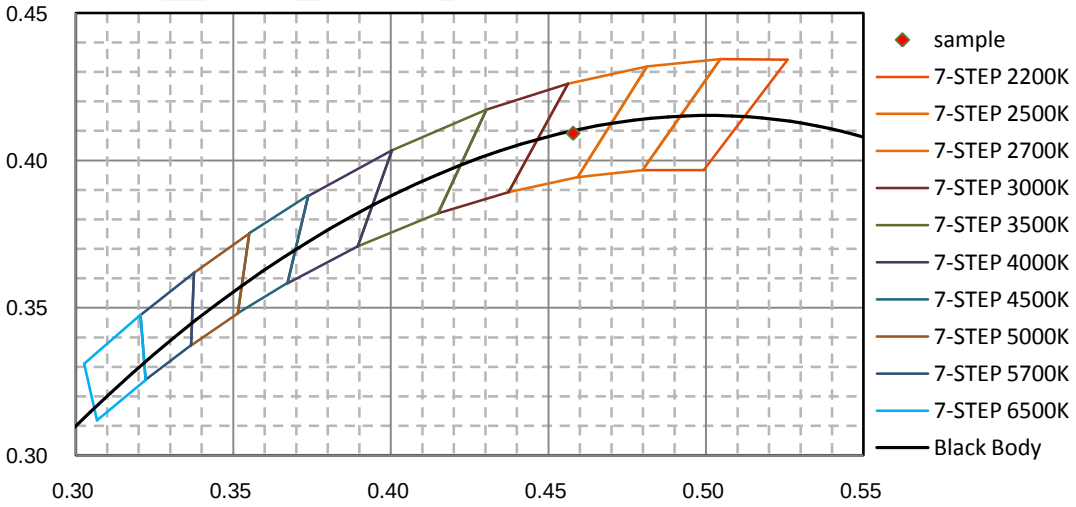
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.940E-02	421	9.438E-01	462	1.620E+01	503	1.508E+01	544	3.058E+01
381	3.700E-02	422	1.039E+00	463	1.543E+01	504	1.560E+01	545	3.084E+01
382	2.880E-02	423	1.172E+00	464	1.467E+01	505	1.603E+01	546	3.096E+01
383	2.300E-03	424	1.462E+00	465	1.404E+01	506	1.664E+01	547	3.135E+01
384	9.580E-02	425	1.628E+00	466	1.354E+01	507	1.712E+01	548	3.156E+01
385	2.450E-02	426	1.819E+00	467	1.313E+01	508	1.755E+01	549	3.185E+01
386	1.400E-03	427	2.134E+00	468	1.279E+01	509	1.797E+01	550	3.209E+01
387	9.170E-02	428	2.400E+00	469	1.240E+01	510	1.851E+01	551	3.212E+01
388	7.600E-03	429	2.672E+00	470	1.210E+01	511	1.896E+01	552	3.265E+01
389	1.730E-02	430	2.976E+00	471	1.178E+01	512	1.945E+01	553	3.270E+01
390	1.076E-01	431	3.273E+00	472	1.127E+01	513	1.992E+01	554	3.302E+01
391	1.660E-02	432	3.611E+00	473	1.098E+01	514	2.032E+01	555	3.318E+01
392	6.000E-04	433	3.975E+00	474	1.057E+01	515	2.078E+01	556	3.349E+01
393	0.000E+00	434	4.324E+00	475	1.014E+01	516	2.128E+01	557	3.363E+01
394	1.590E-02	435	4.764E+00	476	9.811E+00	517	2.178E+01	558	3.376E+01
395	7.550E-02	436	5.214E+00	477	9.539E+00	518	2.208E+01	559	3.411E+01
396	7.900E-03	437	5.613E+00	478	9.199E+00	519	2.244E+01	560	3.430E+01
397	1.700E-02	438	6.058E+00	479	9.004E+00	520	2.286E+01	561	3.450E+01
398	1.200E-03	439	6.587E+00	480	8.878E+00	521	2.330E+01	562	3.464E+01
399	0.000E+00	440	7.055E+00	481	8.825E+00	522	2.374E+01	563	3.495E+01
400	0.000E+00	441	7.710E+00	482	8.842E+00	523	2.401E+01	564	3.514E+01
401	6.660E-02	442	8.391E+00	483	8.768E+00	524	2.443E+01	565	3.536E+01
402	6.060E-02	443	9.158E+00	484	8.973E+00	525	2.473E+01	566	3.542E+01
403	5.630E-02	444	1.001E+01	485	8.982E+00	526	2.510E+01	567	3.570E+01
404	2.850E-02	445	1.111E+01	486	9.099E+00	527	2.539E+01	568	3.585E+01
405	5.060E-02	446	1.210E+01	487	9.347E+00	528	2.581E+01	569	3.595E+01
406	2.190E-02	447	1.336E+01	488	9.584E+00	529	2.624E+01	570	3.616E+01
407	1.325E-01	448	1.455E+01	489	9.790E+00	530	2.653E+01	571	3.642E+01
408	3.260E-02	449	1.635E+01	490	9.984E+00	531	2.677E+01	572	3.645E+01
409	1.094E-01	450	1.754E+01	491	1.029E+01	532	2.704E+01	573	3.682E+01
410	2.046E-01	451	1.895E+01	492	1.050E+01	533	2.752E+01	574	3.678E+01
411	1.842E-01	452	1.996E+01	493	1.084E+01	534	2.770E+01	575	3.708E+01
412	1.168E-01	453	2.097E+01	494	1.121E+01	535	2.806E+01	576	3.736E+01
413	1.669E-01	454	2.157E+01	495	1.159E+01	536	2.833E+01	577	3.757E+01
414	2.794E-01	455	2.182E+01	496	1.201E+01	537	2.857E+01	578	3.786E+01
415	2.950E-01	456	2.154E+01	497	1.232E+01	538	2.904E+01	579	3.811E+01
416	3.935E-01	457	2.109E+01	498	1.274E+01	539	2.924E+01	580	3.818E+01
417	4.541E-01	458	2.027E+01	499	1.315E+01	540	2.943E+01	581	3.859E+01
418	5.682E-01	459	1.910E+01	500	1.367E+01	541	2.963E+01	582	3.890E+01
419	6.535E-01	460	1.823E+01	501	1.407E+01	542	2.988E+01	583	3.901E+01
420	7.743E-01	461	1.738E+01	502	1.466E+01	543	3.029E+01	584	3.947E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.961E+01	626	5.433E+01	667	4.189E+01	708	1.728E+01	749	4.758E+00
586	3.992E+01	627	5.429E+01	668	4.128E+01	709	1.689E+01	750	4.728E+00
587	4.029E+01	628	5.447E+01	669	4.062E+01	710	1.640E+01	751	4.489E+00
588	4.068E+01	629	5.446E+01	670	3.994E+01	711	1.595E+01	752	4.397E+00
589	4.104E+01	630	5.452E+01	671	3.935E+01	712	1.558E+01	753	4.329E+00
590	4.132E+01	631	5.440E+01	672	3.867E+01	713	1.523E+01	754	3.999E+00
591	4.172E+01	632	5.455E+01	673	3.798E+01	714	1.476E+01	755	3.692E+00
592	4.227E+01	633	5.439E+01	674	3.742E+01	715	1.444E+01	756	3.771E+00
593	4.265E+01	634	5.421E+01	675	3.663E+01	716	1.403E+01	757	3.555E+00
594	4.313E+01	635	5.414E+01	676	3.598E+01	717	1.363E+01	758	2.964E+00
595	4.358E+01	636	5.414E+01	677	3.529E+01	718	1.332E+01	759	3.195E+00
596	4.405E+01	637	5.401E+01	678	3.477E+01	719	1.284E+01	760	2.966E+00
597	4.434E+01	638	5.381E+01	679	3.393E+01	720	1.252E+01	761	2.914E+00
598	4.475E+01	639	5.361E+01	680	3.344E+01	721	1.223E+01	762	2.977E+00
599	4.518E+01	640	5.370E+01	681	3.282E+01	722	1.190E+01	763	2.971E+00
600	4.569E+01	641	5.330E+01	682	3.213E+01	723	1.160E+01	764	2.674E+00
601	4.636E+01	642	5.336E+01	683	3.135E+01	724	1.118E+01	765	2.487E+00
602	4.674E+01	643	5.297E+01	684	3.079E+01	725	1.099E+01	766	2.408E+00
603	4.707E+01	644	5.269E+01	685	3.021E+01	726	1.051E+01	767	2.528E+00
604	4.776E+01	645	5.236E+01	686	2.965E+01	727	1.019E+01	768	2.410E+00
605	4.793E+01	646	5.214E+01	687	2.896E+01	728	1.000E+01	769	2.244E+00
606	4.854E+01	647	5.182E+01	688	2.834E+01	729	9.896E+00	770	2.022E+00
607	4.900E+01	648	5.153E+01	689	2.769E+01	730	9.395E+00	771	2.026E+00
608	4.943E+01	649	5.124E+01	690	2.718E+01	731	9.076E+00	772	2.000E+00
609	4.993E+01	650	5.074E+01	691	2.656E+01	732	8.778E+00	773	1.862E+00
610	5.029E+01	651	5.043E+01	692	2.604E+01	733	8.381E+00	774	1.705E+00
611	5.067E+01	652	5.001E+01	693	2.534E+01	734	8.161E+00	775	1.830E+00
612	5.105E+01	653	4.961E+01	694	2.463E+01	735	8.011E+00	776	1.642E+00
613	5.153E+01	654	4.915E+01	695	2.413E+01	736	7.677E+00	777	1.658E+00
614	5.184E+01	655	4.868E+01	696	2.349E+01	737	7.392E+00	778	1.511E+00
615	5.213E+01	656	4.827E+01	697	2.305E+01	738	7.006E+00	779	1.534E+00
616	5.244E+01	657	4.764E+01	698	2.245E+01	739	6.826E+00	780	1.248E+00
617	5.276E+01	658	4.720E+01	699	2.193E+01	740	6.635E+00		
618	5.307E+01	659	4.653E+01	700	2.141E+01	741	6.421E+00		
619	5.335E+01	660	4.605E+01	701	2.078E+01	742	6.219E+00		
620	5.350E+01	661	4.549E+01	702	2.033E+01	743	5.966E+00		
621	5.384E+01	662	4.496E+01	703	1.976E+01	744	5.573E+00		
622	5.389E+01	663	4.441E+01	704	1.922E+01	745	5.419E+00		
623	5.373E+01	664	4.361E+01	705	1.870E+01	746	5.200E+00		
624	5.409E+01	665	4.312E+01	706	1.832E+01	747	5.102E+00		
625	5.410E+01	666	4.247E+01	707	1.787E+01	748	4.991E+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**

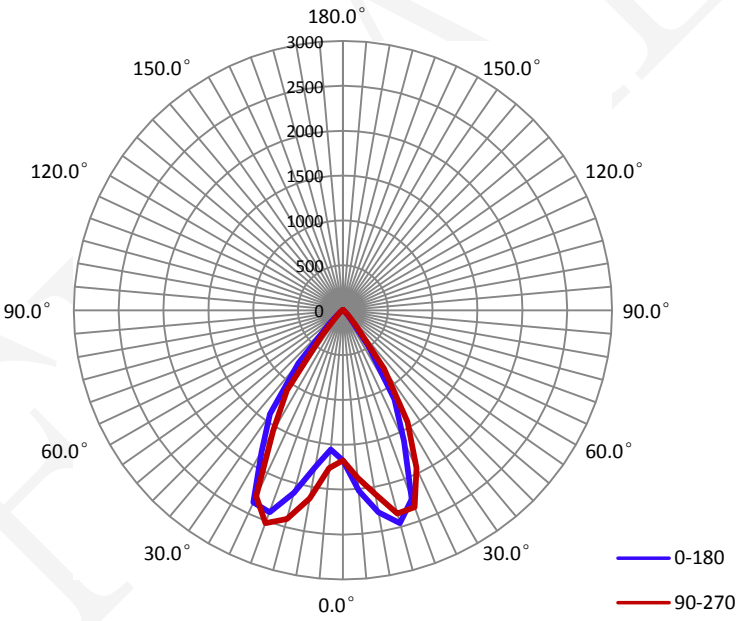
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2680	30.95	0.9620

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2470.6	79.88	2537.5	1.22	1.22

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	65.6	65.5	64.5	65.8	65.1
Field Angle (10% I_{max}):	83.4	83.2	81.8	82.9	82.8

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1674	1674	1674	1674	1674	1674	1674	1674
5.0°	2020	2021	2003	1951	1876	1770	1651	1574
10.0°	2285	2259	2215	2141	2085	2019	1920	1808
15.0°	2456	2440	2441	2408	2347	2230	2090	2055
20.0°	2240	2231	2260	2296	2337	2370	2354	2352
25.0°	1612	1571	1600	1715	1942	2146	2229	2305
30.0°	1149	1125	1205	1339	1440	1493	1533	1719
35.0°	501	496	526	640	794	1057	1275	1378
40.0°	157	155	163	192	229	330	542	715
45.0°	65	63	64	71	83	102	136	203
50.0°	27	27	27	28	33	41	50	62
55.0°	14	14	13	14	16	19	22	26
60.0°	8	6	6	8	8	10	11	13
65.0°	4	4	4	3	4	4	5	6
70.0°	2	1	2	2	2	3	2	3
75.0°	0	0	0	1	0	1	1	2
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.)

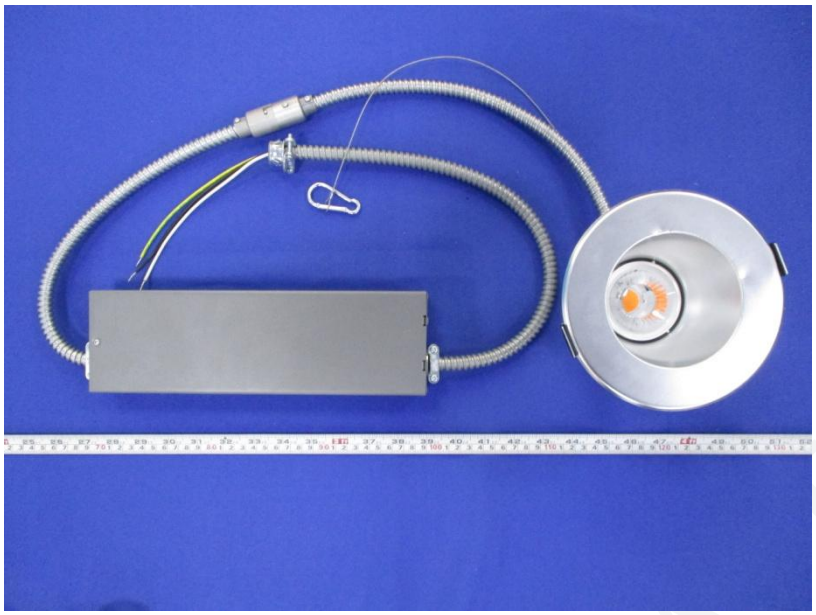
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1674	1674	1674	1674	1674	1674	1674	1674
5.0°	1560	1550	1578	1660	1768	1889	1967	2005
10.0°	1773	1771	1844	1986	2133	2189	2257	2283
15.0°	2107	2133	2215	2353	2412	2488	2484	2462
20.0°	2394	2446	2512	2538	2527	2430	2338	2246
25.0°	2364	2415	2425	2382	2289	2101	1813	1645
30.0°	1816	1892	1829	1682	1554	1457	1324	1194
35.0°	1415	1437	1411	1300	1091	831	639	528
40.0°	773	803	750	616	358	223	180	154
45.0°	213	225	181	132	102	82	70	61
50.0°	66	68	60	50	41	33	28	26
55.0°	28	29	25	21	18	15	13	13
60.0°	14	14	12	11	9	8	6	6
65.0°	8	7	6	5	5	4	3	3
70.0°	4	4	3	3	2	2	2	2
75.0°	1	2	2	1	0	0	0	0
80.0°	1	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	41.6	1.68
5-10	138.2	5.59
10-15	259.8	10.52
15-20	386.3	15.63
20-25	461.6	18.69
25-30	445.3	18.03
30-35	359.6	14.55
35-40	225.8	9.14
40-45	94.8	3.84
45-50	31.8	1.29
50-55	13.1	0.53
55-60	6.5	0.26
60-65	3.4	0.14
65-70	1.8	0.07
70-75	0.8	0.03
75-80	0.2	0.01
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	41.6	1.68
0-10	179.8	7.28
0-15	439.6	17.79
0-20	825.9	33.43
0-25	1287.5	52.11
0-30	1732.9	70.14
0-35	2092.4	84.69
0-40	2318.3	93.83
0-45	2413.0	97.67
0-50	2444.8	98.96
0-55	2457.9	99.49
0-60	2464.4	99.75
0-65	2467.8	99.88
0-70	2469.6	99.96
0-75	2470.4	99.99
0-80	2470.6	100.00
0-85	2470.6	100.00
0-90	2470.6	100.00
0-95	2470.6	100.00
0-100	2470.6	100.00
0-105	2470.6	100.00
0-110	2470.6	100.00
0-115	2470.6	100.00
0-120	2470.6	100.00
0-125	2470.6	100.00
0-130	2470.6	100.00
0-135	2470.6	100.00
0-140	2470.6	100.00
0-145	2470.6	100.00
0-150	2470.6	100.00
0-155	2470.6	100.00
0-160	2470.6	100.00
0-165	2470.6	100.00
0-170	2470.6	100.00
0-175	2470.6	100.00
0-180	2470.6	100.00

6. Product Photo



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