IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 24.5NCDLR8DIM/935/277V/EXT

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu
Report Number:	RKSB180510004-10-1
Test Date:	2018-05-11 to 2018-05-15
Report Date:	2018-05-16
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 2018-05-10 and used for testing.

Model Tested:	24.5NCDLR8DIM/935/277V/EXT
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	Slim Downlight
Aging Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120-277 VAC 60Hz
Rated Power:	24.5W
Nominal CCT:	3500K
Nominal Lumen Output:	1920Im

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	0.1985	23.76	0.9977	2218.2	93.34

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.458	3554	-0.00022	0.4021	0.3886	0.2345	0.5099

Color Rendering Index

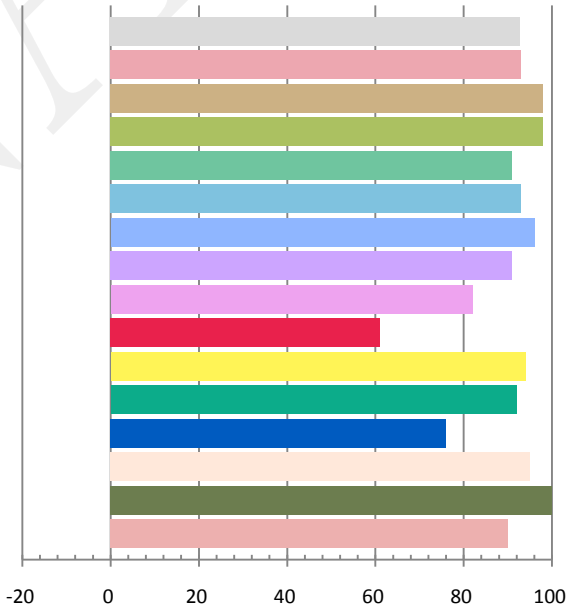
Ra
92.8

R1	R2	R3	R4
93	98	98	91

R5	R6	R7	R8
93	96	91	82

R9	R10	R11	R12
61	94	92	76

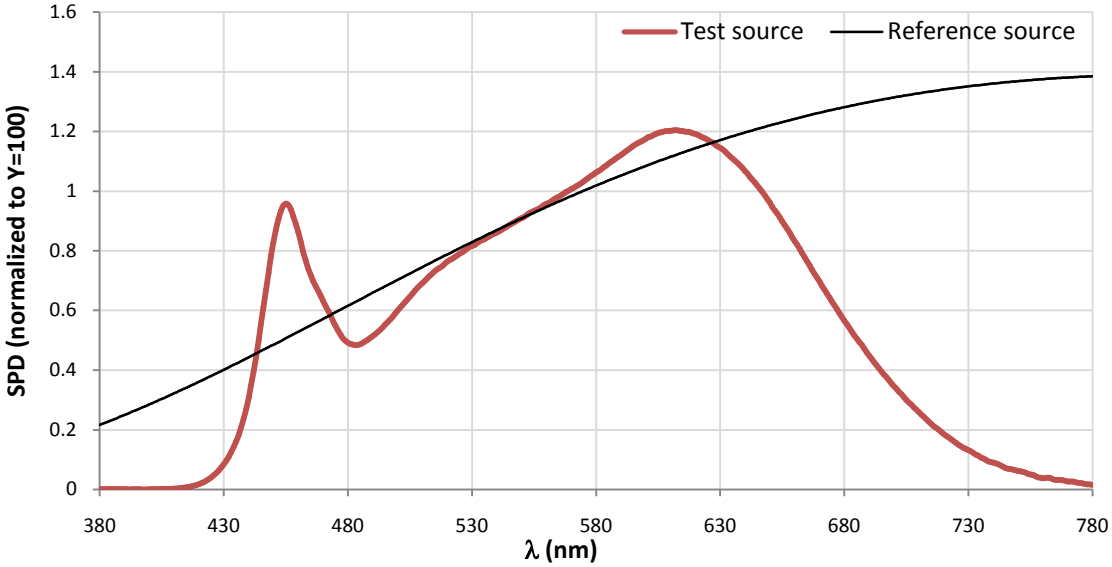
R13	R14	R15
95	100	90



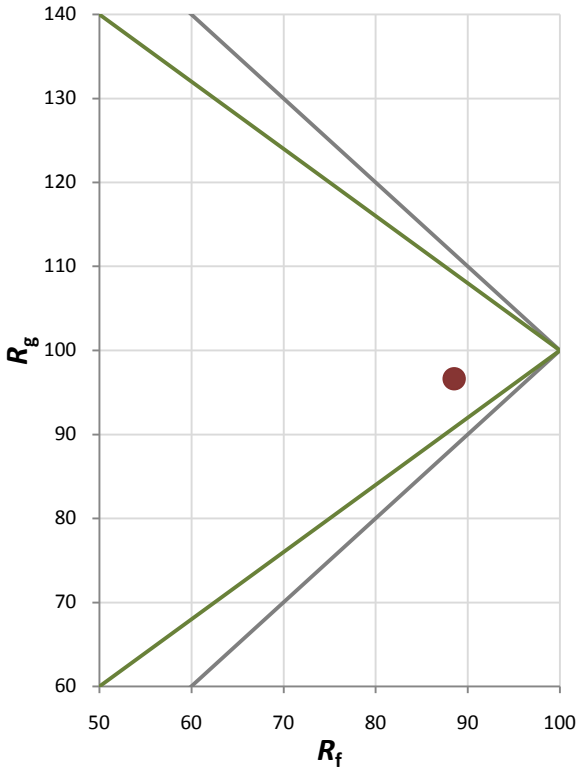
Fidelity Index and Gamut Index

Fidelity Index R_f	89
Gamut Index R_g	97

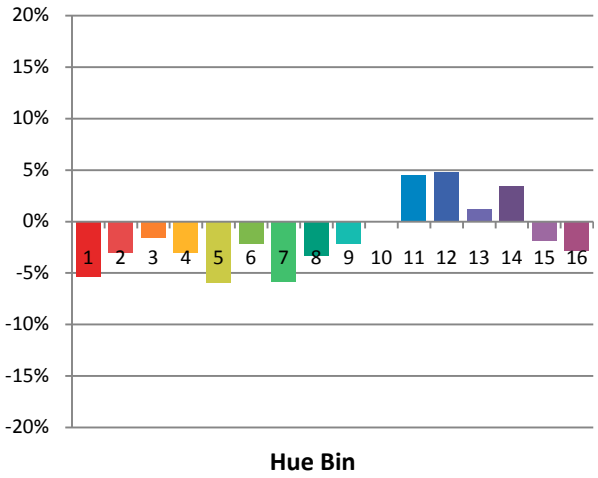
Spectral Power Distribution Comparison



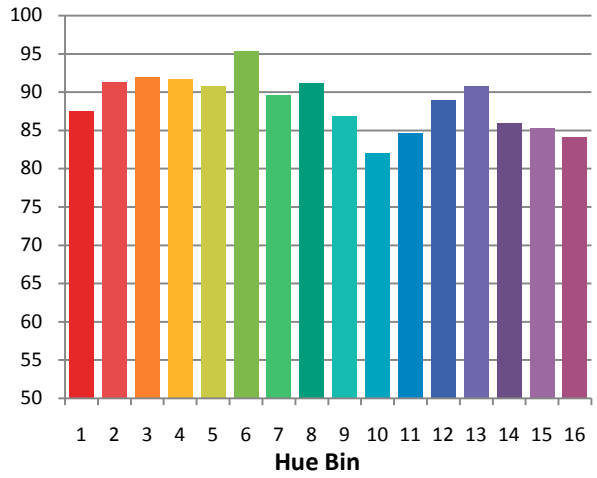
Plot of R_g versus R_f



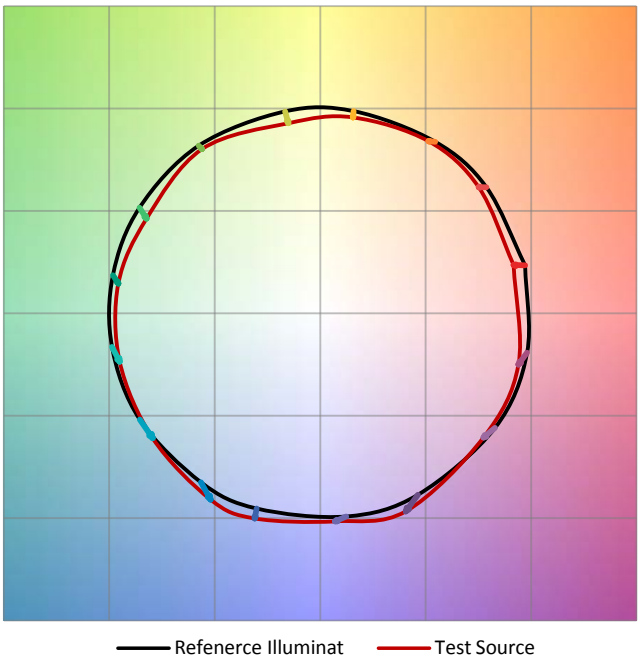
Chroma Shift by Hue

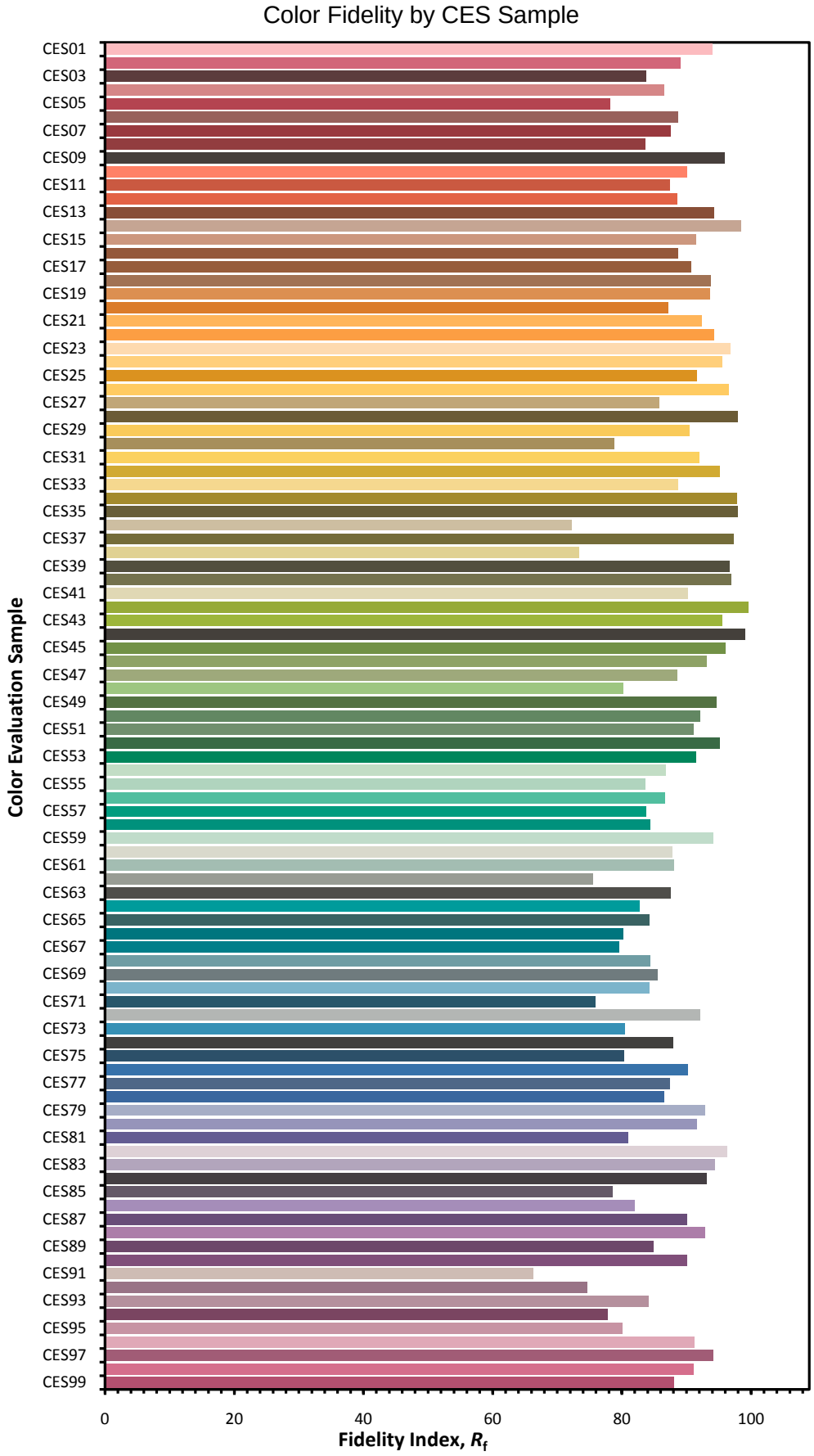


R_f by Hue



Color Vector Graphic




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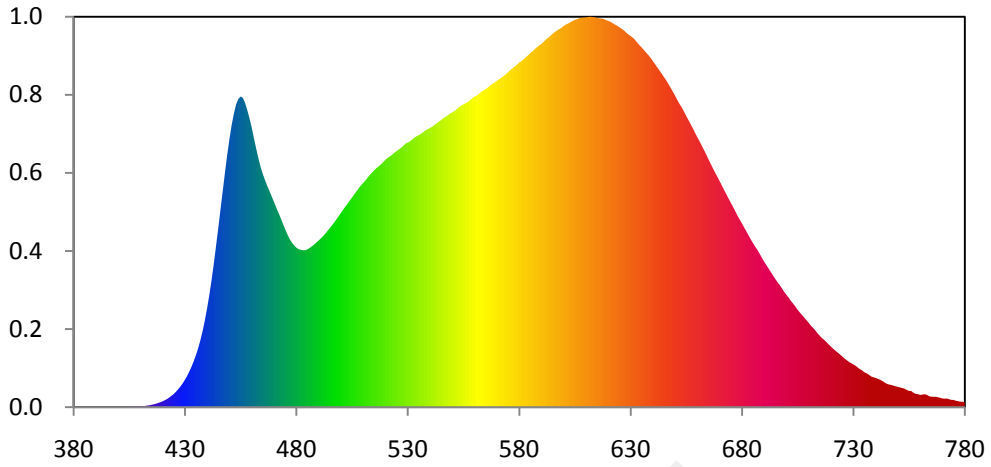
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

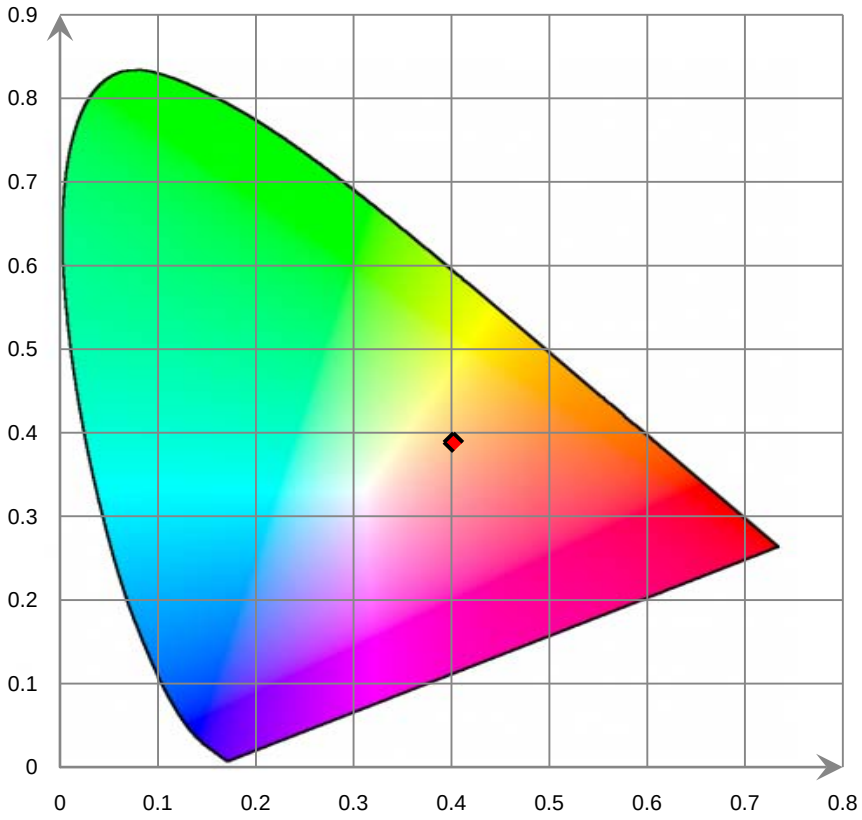
Relative Spectral Power Distribution



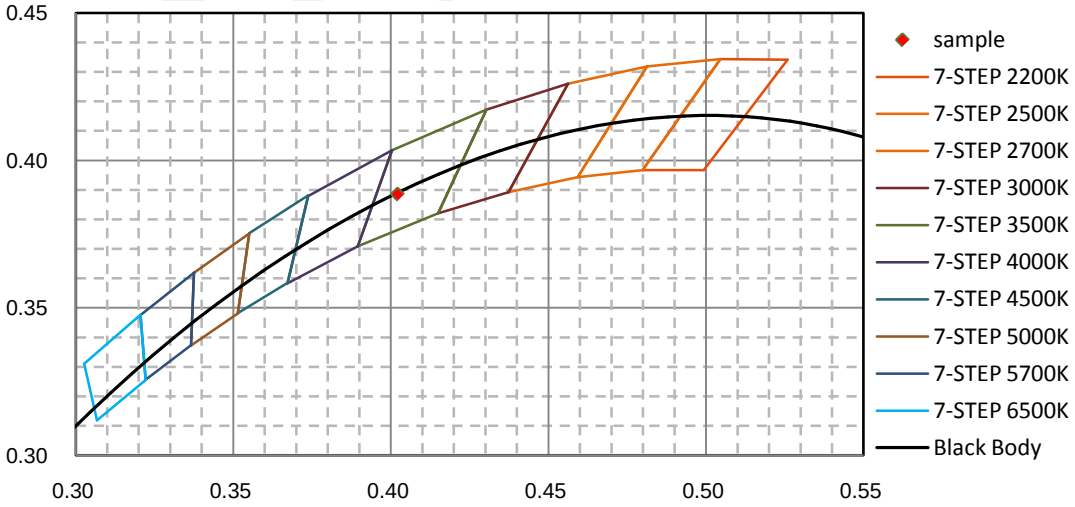
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.350E-02	421	7.006E-01	462	2.587E+01	503	2.038E+01	544	2.859E+01
381	4.920E-02	422	8.158E-01	463	2.491E+01	504	2.070E+01	545	2.875E+01
382	3.950E-02	423	9.730E-01	464	2.403E+01	505	2.099E+01	546	2.893E+01
383	4.970E-02	424	1.145E+00	465	2.332E+01	506	2.131E+01	547	2.909E+01
384	5.590E-02	425	1.327E+00	466	2.270E+01	507	2.162E+01	548	2.923E+01
385	3.410E-02	426	1.549E+00	467	2.213E+01	508	2.192E+01	549	2.940E+01
386	3.460E-02	427	1.801E+00	468	2.162E+01	509	2.220E+01	550	2.953E+01
387	3.550E-02	428	2.082E+00	469	2.108E+01	510	2.245E+01	551	2.966E+01
388	3.030E-02	429	2.394E+00	470	2.054E+01	511	2.270E+01	552	2.985E+01
389	4.470E-02	430	2.741E+00	471	1.997E+01	512	2.299E+01	553	3.003E+01
390	4.310E-02	431	3.134E+00	472	1.946E+01	513	2.326E+01	554	3.020E+01
391	2.230E-02	432	3.580E+00	473	1.893E+01	514	2.349E+01	555	3.032E+01
392	1.360E-02	433	4.076E+00	474	1.836E+01	515	2.374E+01	556	3.044E+01
393	1.860E-02	434	4.629E+00	475	1.783E+01	516	2.395E+01	557	3.056E+01
394	2.280E-02	435	5.249E+00	476	1.729E+01	517	2.413E+01	558	3.075E+01
395	2.400E-02	436	5.952E+00	477	1.684E+01	518	2.432E+01	559	3.094E+01
396	2.180E-02	437	6.756E+00	478	1.649E+01	519	2.454E+01	560	3.109E+01
397	1.460E-02	438	7.683E+00	479	1.619E+01	520	2.478E+01	561	3.121E+01
398	1.000E-02	439	8.751E+00	480	1.598E+01	521	2.496E+01	562	3.137E+01
399	4.700E-03	440	9.971E+00	481	1.583E+01	522	2.511E+01	563	3.158E+01
400	1.760E-02	441	1.130E+01	482	1.576E+01	523	2.528E+01	564	3.174E+01
401	2.030E-02	442	1.279E+01	483	1.571E+01	524	2.547E+01	565	3.185E+01
402	2.100E-02	443	1.443E+01	484	1.573E+01	525	2.565E+01	566	3.202E+01
403	2.850E-02	444	1.620E+01	485	1.580E+01	526	2.581E+01	567	3.222E+01
404	4.630E-02	445	1.801E+01	486	1.595E+01	527	2.597E+01	568	3.237E+01
405	5.040E-02	446	1.986E+01	487	1.611E+01	528	2.617E+01	569	3.252E+01
406	5.450E-02	447	2.170E+01	488	1.629E+01	529	2.640E+01	570	3.269E+01
407	5.550E-02	448	2.354E+01	489	1.649E+01	530	2.649E+01	571	3.283E+01
408	5.010E-02	449	2.532E+01	490	1.669E+01	531	2.662E+01	572	3.299E+01
409	7.400E-02	450	2.688E+01	491	1.690E+01	532	2.681E+01	573	3.316E+01
410	1.015E-01	451	2.829E+01	492	1.712E+01	533	2.700E+01	574	3.332E+01
411	1.065E-01	452	2.942E+01	493	1.738E+01	534	2.713E+01	575	3.354E+01
412	1.206E-01	453	3.034E+01	494	1.765E+01	535	2.724E+01	576	3.374E+01
413	1.548E-01	454	3.087E+01	495	1.793E+01	536	2.739E+01	577	3.393E+01
414	1.919E-01	455	3.111E+01	496	1.820E+01	537	2.756E+01	578	3.411E+01
415	2.377E-01	456	3.097E+01	497	1.849E+01	538	2.771E+01	579	3.429E+01
416	2.909E-01	457	3.046E+01	498	1.881E+01	539	2.784E+01	580	3.450E+01
417	3.459E-01	458	2.974E+01	499	1.912E+01	540	2.796E+01	581	3.465E+01
418	4.206E-01	459	2.891E+01	500	1.945E+01	541	2.810E+01	582	3.483E+01
419	4.916E-01	460	2.798E+01	501	1.977E+01	542	2.826E+01	583	3.505E+01
420	5.846E-01	461	2.691E+01	502	2.009E+01	543	2.843E+01	584	3.524E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.545E+01	626	3.790E+01	667	2.392E+01	708	8.963E+00	749	2.093E+00
586	3.565E+01	627	3.773E+01	668	2.347E+01	709	8.703E+00	750	2.032E+00
587	3.585E+01	628	3.752E+01	669	2.306E+01	710	8.437E+00	751	1.975E+00
588	3.605E+01	629	3.732E+01	670	2.263E+01	711	8.157E+00	752	1.917E+00
589	3.623E+01	630	3.718E+01	671	2.219E+01	712	7.922E+00	753	1.851E+00
590	3.638E+01	631	3.700E+01	672	2.176E+01	713	7.667E+00	754	1.720E+00
591	3.659E+01	632	3.678E+01	673	2.132E+01	714	7.387E+00	755	1.633E+00
592	3.681E+01	633	3.651E+01	674	2.089E+01	715	7.142E+00	756	1.611E+00
593	3.698E+01	634	3.625E+01	675	2.047E+01	716	6.902E+00	757	1.445E+00
594	3.718E+01	635	3.602E+01	676	2.007E+01	717	6.724E+00	758	1.333E+00
595	3.738E+01	636	3.577E+01	677	1.963E+01	718	6.496E+00	759	1.302E+00
596	3.756E+01	637	3.550E+01	678	1.919E+01	719	6.272E+00	760	1.231E+00
597	3.773E+01	638	3.526E+01	679	1.879E+01	720	6.054E+00	761	1.257E+00
598	3.786E+01	639	3.499E+01	680	1.840E+01	721	5.840E+00	762	1.293E+00
599	3.799E+01	640	3.466E+01	681	1.800E+01	722	5.659E+00	763	1.241E+00
600	3.817E+01	641	3.435E+01	682	1.760E+01	723	5.463E+00	764	1.100E+00
601	3.832E+01	642	3.402E+01	683	1.719E+01	724	5.286E+00	765	1.052E+00
602	3.842E+01	643	3.371E+01	684	1.679E+01	725	5.081E+00	766	1.038E+00
603	3.854E+01	644	3.340E+01	685	1.642E+01	726	4.880E+00	767	1.039E+00
604	3.867E+01	645	3.306E+01	686	1.606E+01	727	4.716E+00	768	9.967E-01
605	3.878E+01	646	3.273E+01	687	1.573E+01	728	4.540E+00	769	9.471E-01
606	3.886E+01	647	3.237E+01	688	1.535E+01	729	4.414E+00	770	8.686E-01
607	3.895E+01	648	3.199E+01	689	1.494E+01	730	4.282E+00	771	8.541E-01
608	3.899E+01	649	3.159E+01	690	1.457E+01	731	4.148E+00	772	8.639E-01
609	3.901E+01	650	3.119E+01	691	1.422E+01	732	3.964E+00	773	7.941E-01
610	3.903E+01	651	3.075E+01	692	1.387E+01	733	3.799E+00	774	7.345E-01
611	3.908E+01	652	3.037E+01	693	1.352E+01	734	3.673E+00	775	7.219E-01
612	3.910E+01	653	3.002E+01	694	1.317E+01	735	3.497E+00	776	6.466E-01
613	3.906E+01	654	2.960E+01	695	1.282E+01	736	3.389E+00	777	6.031E-01
614	3.903E+01	655	2.916E+01	696	1.252E+01	737	3.247E+00	778	5.526E-01
615	3.898E+01	656	2.875E+01	697	1.222E+01	738	3.076E+00	779	5.426E-01
616	3.894E+01	657	2.834E+01	698	1.188E+01	739	2.997E+00	780	4.941E-01
617	3.892E+01	658	2.791E+01	699	1.154E+01	740	2.933E+00		
618	3.887E+01	659	2.746E+01	700	1.125E+01	741	2.837E+00		
619	3.877E+01	660	2.703E+01	701	1.095E+01	742	2.752E+00		
620	3.868E+01	661	2.662E+01	702	1.063E+01	743	2.626E+00		
621	3.859E+01	662	2.617E+01	703	1.037E+01	744	2.474E+00		
622	3.844E+01	663	2.574E+01	704	1.008E+01	745	2.341E+00		
623	3.831E+01	664	2.530E+01	705	9.753E+00	746	2.268E+00		
624	3.820E+01	665	2.481E+01	706	9.483E+00	747	2.228E+00		
625	3.804E+01	666	2.436E+01	707	9.224E+00	748	2.159E+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**

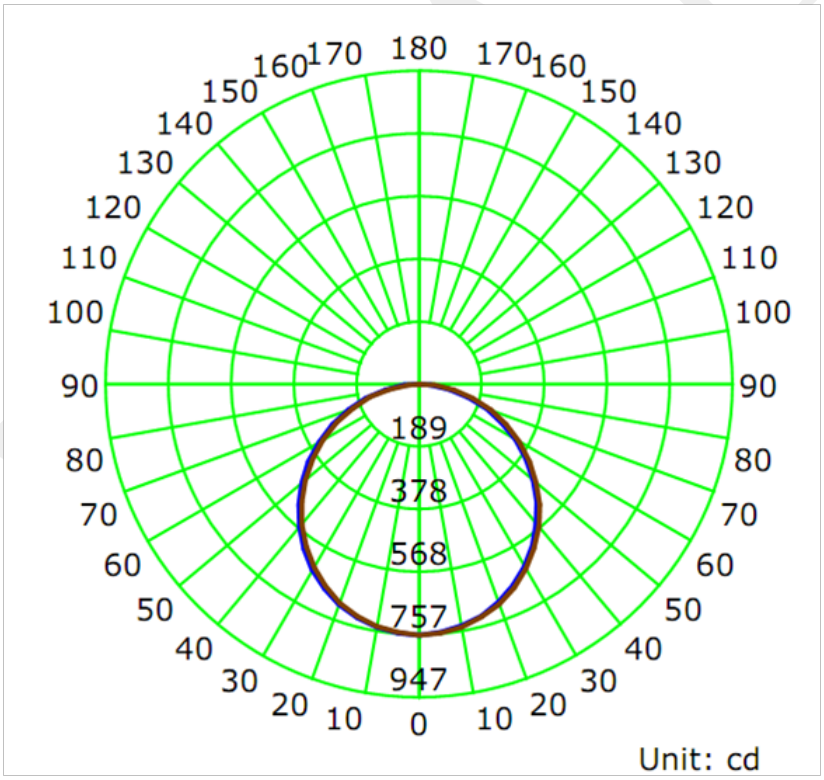
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1980	23.74	0.9980

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2218.4	93.50	757.8	1.26	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	113.9	113.9	113.8	113.9	113.9
Field Angle (10% I_{max}):	164.1	164.1	164.1	164.2	164.1

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	758	758	758	758	758	758	758	758
5.0°	754	753	754	754	755	755	756	757
10.0°	743	743	744	744	746	746	747	748
15.0°	726	726	726	728	729	730	732	734
20.0°	702	702	703	706	708	709	711	712
25.0°	672	673	675	677	679	681	684	685
30.0°	636	638	640	643	645	648	651	651
35.0°	597	599	601	604	606	609	612	614
40.0°	552	554	556	559	563	566	569	570
45.0°	503	505	508	511	515	518	521	522
50.0°	450	452	456	459	463	466	470	471
55.0°	394	396	399	404	408	411	414	416
60.0°	337	339	343	346	351	354	356	359
65.0°	277	278	282	287	291	295	297	298
70.0°	216	218	221	226	230	234	237	237
75.0°	155	157	160	164	168	173	175	175
80.0°	94	96	99	103	108	112	114	115
85.0°	36	38	41	45	48	53	55	55
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.)

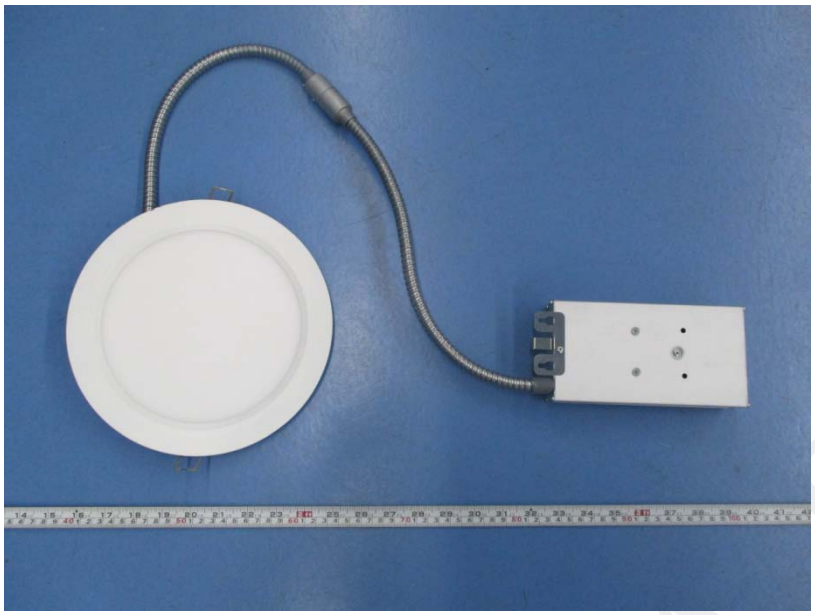
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	758	758	758	758	758	758	758	758
5.0°	756	755	755	754	753	753	753	753
10.0°	746	747	746	744	744	742	742	742
15.0°	731	731	730	728	727	725	724	724
20.0°	710	708	707	705	704	701	700	700
25.0°	681	680	679	676	673	671	670	670
30.0°	648	646	644	642	639	635	634	634
35.0°	609	607	605	602	599	595	594	593
40.0°	565	563	561	557	554	550	549	547
45.0°	517	515	511	508	504	501	498	498
50.0°	464	462	459	454	451	447	445	444
55.0°	409	407	403	399	394	392	389	388
60.0°	350	348	345	341	336	333	330	329
65.0°	291	289	285	280	276	273	270	269
70.0°	229	227	224	218	214	211	210	208
75.0°	168	165	161	157	153	149	147	147
80.0°	107	104	100	96	92	89	87	87
85.0°	48	44	41	37	34	31	30	29
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	18.1	0.81
5-10	53.6	2.42
10-15	87.4	3.94
15-20	118.2	5.33
20-25	145.0	6.53
25-30	166.9	7.52
30-35	183.3	8.26
35-40	193.7	8.73
40-45	197.7	8.91
45-50	195.3	8.80
50-55	186.6	8.41
55-60	172.2	7.76
60-65	152.4	6.87
65-70	128.1	5.78
70-75	100.2	4.52
75-80	69.8	3.15
80-85	38.5	1.73
85-90	11.4	0.51
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	18.1	0.81
0-10	71.7	3.23
0-15	159.1	7.17
0-20	277.2	12.50
0-25	422.2	19.03
0-30	589.1	26.55
0-35	772.4	34.82
0-40	966.1	43.55
0-45	1163.9	52.46
0-50	1359.2	61.27
0-55	1545.8	69.68
0-60	1718.0	77.44
0-65	1870.4	84.31
0-70	1998.6	90.09
0-75	2098.8	94.61
0-80	2168.6	97.75
0-85	2207.0	99.49
0-90	2218.4	100.00
0-95	2218.4	100.00
0-100	2218.4	100.00
0-105	2218.4	100.00
0-110	2218.4	100.00
0-115	2218.4	100.00
0-120	2218.4	100.00
0-125	2218.4	100.00
0-130	2218.4	100.00
0-135	2218.4	100.00
0-140	2218.4	100.00
0-145	2218.4	100.00
0-150	2218.4	100.00
0-155	2218.4	100.00
0-160	2218.4	100.00
0-165	2218.4	100.00
0-170	2218.4	100.00
0-175	2218.4	100.00
0-180	2218.4	100.00

6. Product Photo



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