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/940/277V/EXT

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu
Report Number:	RKSB180510004-10-2
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/940/277V/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:	4000K
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

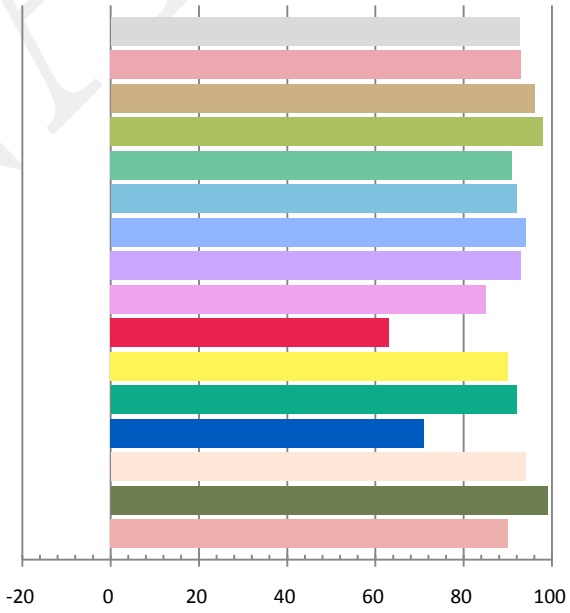
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1965	23.52	0.9975	2246	95.48

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.551	4063	0.00084	0.3783	0.3772	0.2235	0.5015

Color Rendering Index

Ra
92.7

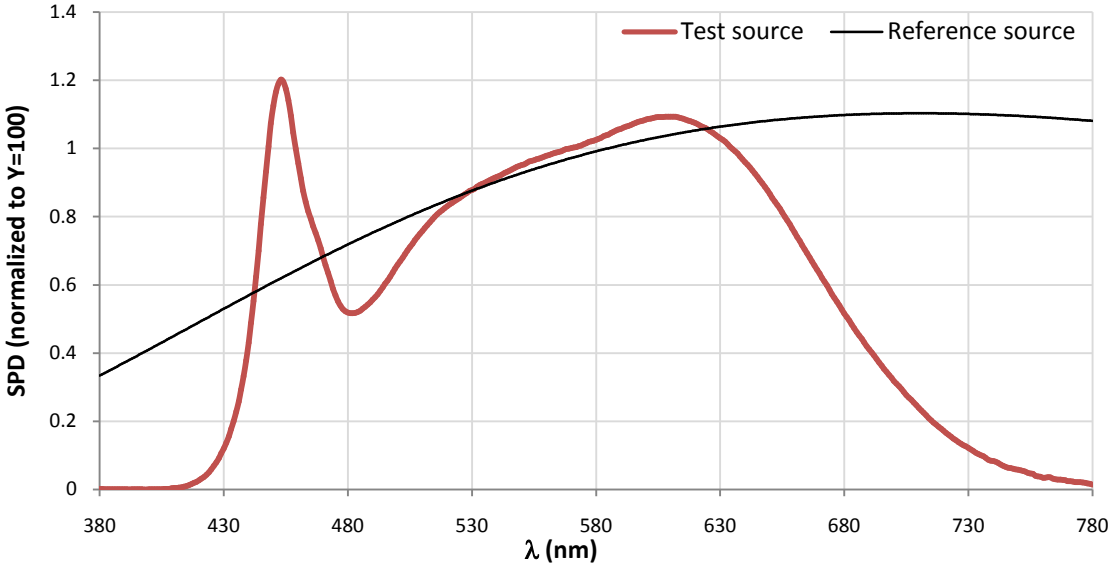
R1	R2	R3	R4
93	96	98	91
R5	R6	R7	R8
92	94	93	85
R9	R10	R11	R12
63	90	92	71
R13	R14	R15	
94	99	90	



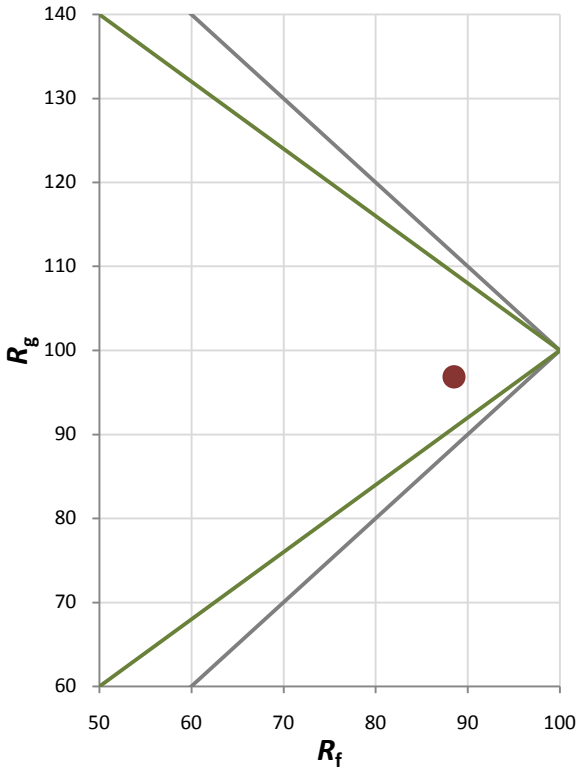
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	97

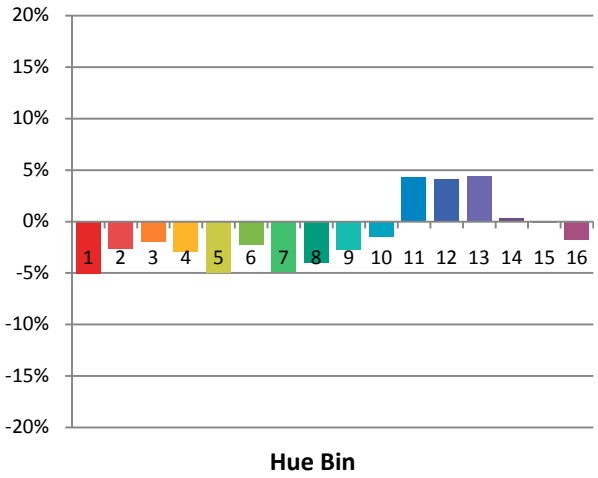
Spectral Power Distribution Comparison



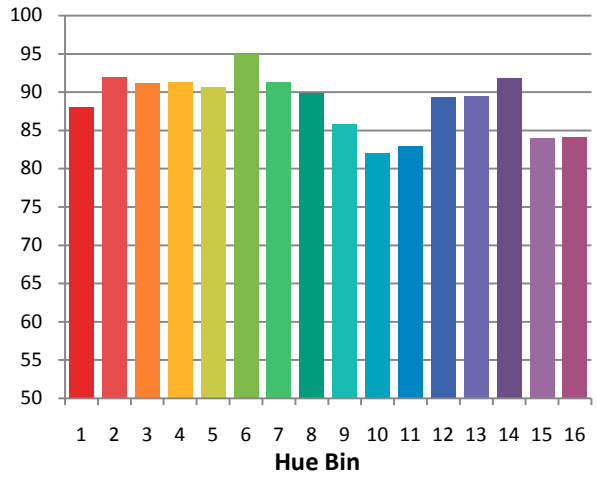
Plot of R_g versus R_f



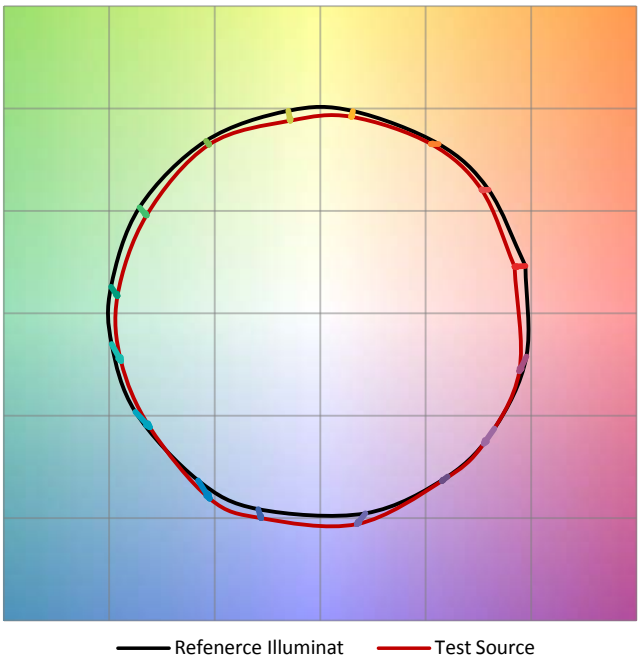
Chroma Shift by Hue

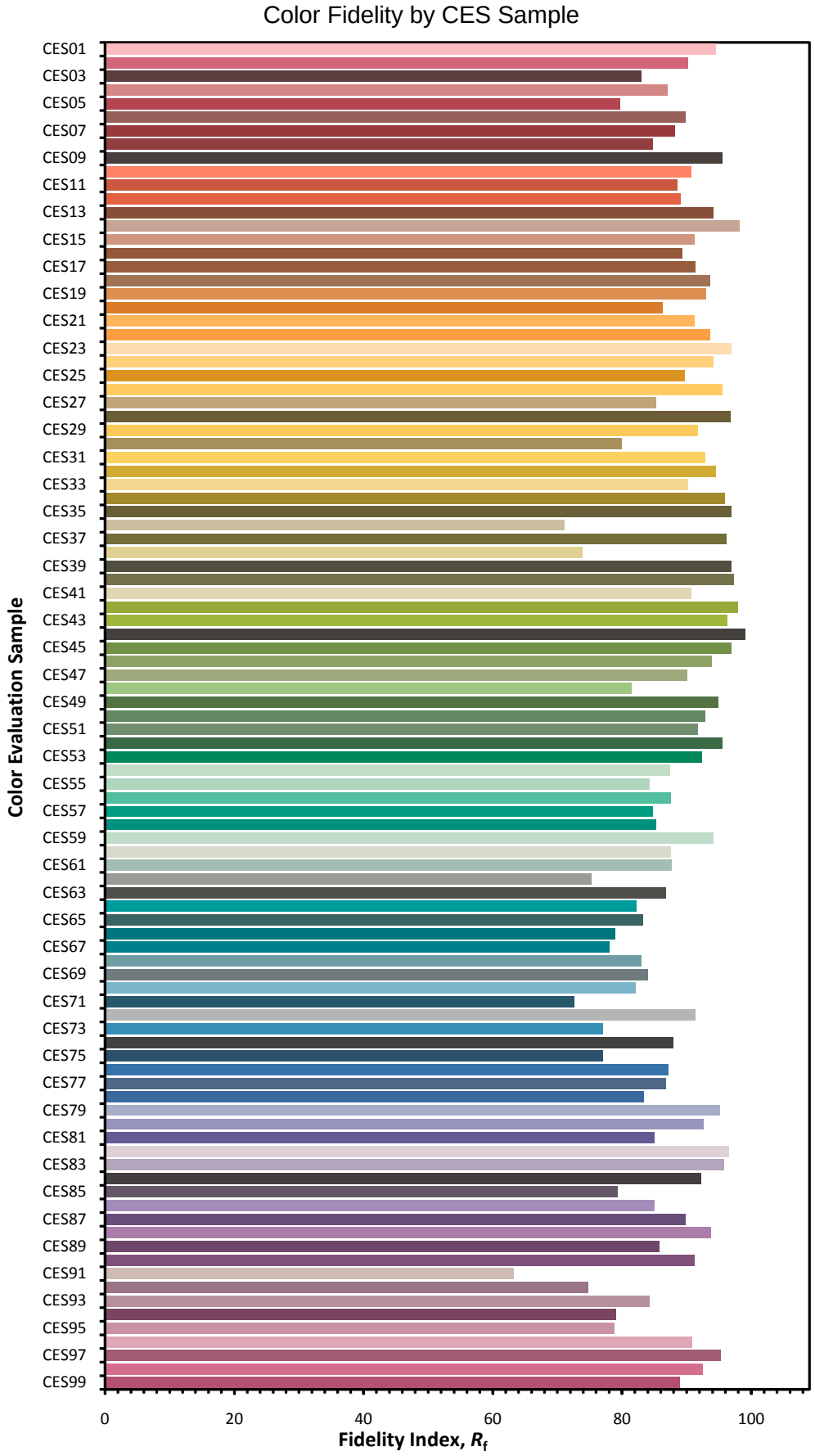


R_f by Hue



Color Vector Graphic




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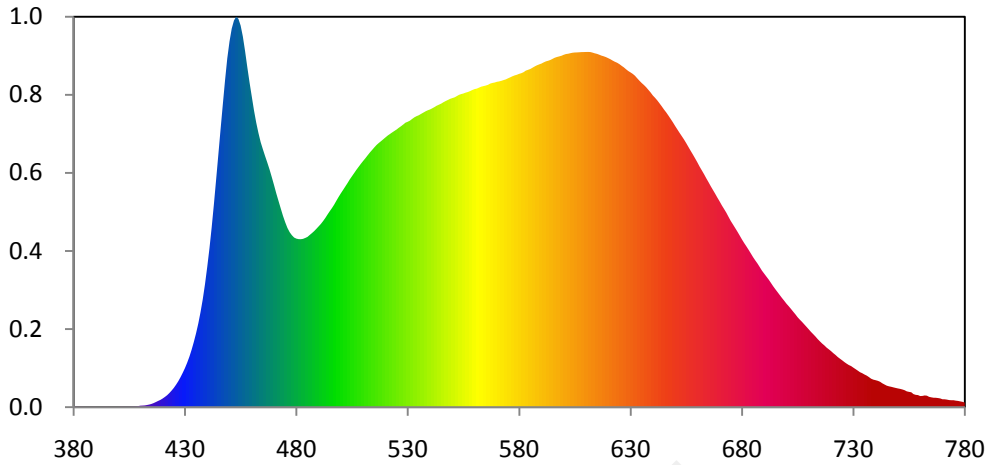
CES99
0
20
40
60
80
100
Fidelity Index, R_f

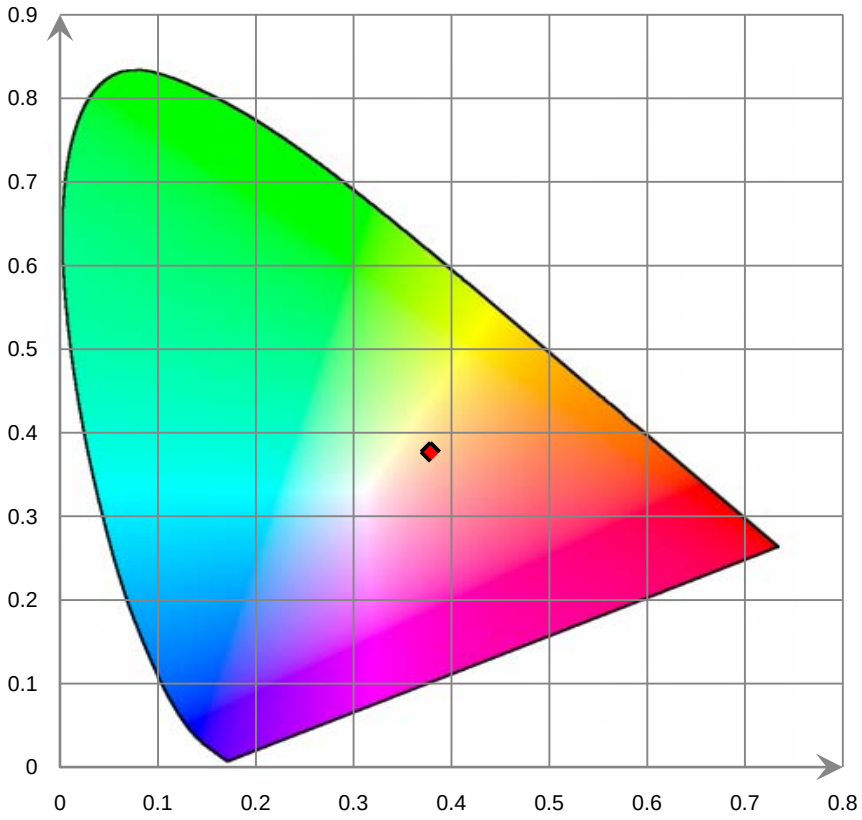
Relative Spectral Power Distribution



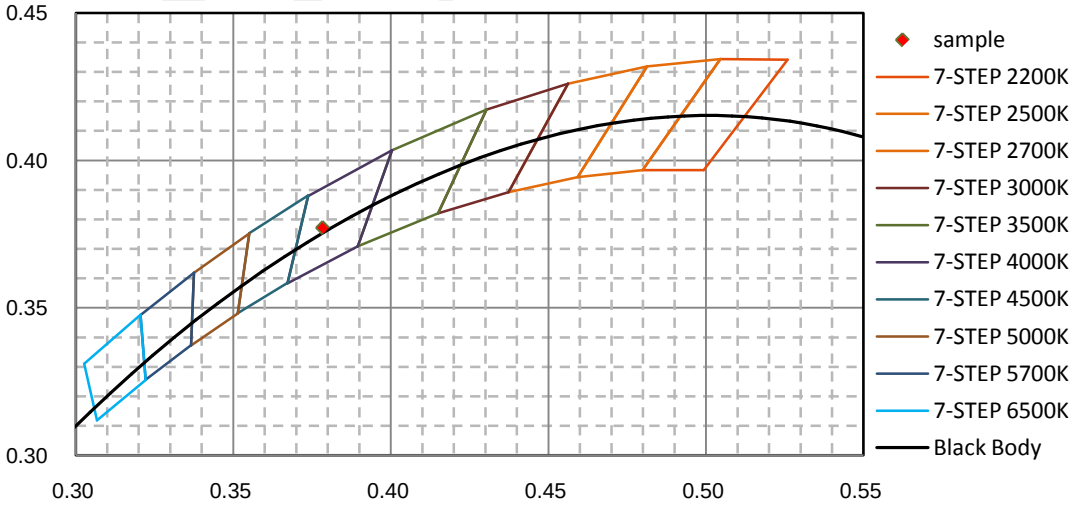
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.600E-02	421	1.037E+00	462	2.880E+01	503	2.268E+01	544	3.061E+01
381	5.260E-02	422	1.211E+00	463	2.774E+01	504	2.306E+01	545	3.072E+01
382	3.720E-02	423	1.426E+00	464	2.682E+01	505	2.338E+01	546	3.086E+01
383	3.940E-02	424	1.674E+00	465	2.609E+01	506	2.371E+01	547	3.098E+01
384	3.750E-02	425	1.948E+00	466	2.540E+01	507	2.403E+01	548	3.109E+01
385	2.090E-02	426	2.268E+00	467	2.474E+01	508	2.434E+01	549	3.120E+01
386	2.720E-02	427	2.620E+00	468	2.404E+01	509	2.464E+01	550	3.128E+01
387	2.700E-02	428	3.026E+00	469	2.327E+01	510	2.492E+01	551	3.135E+01
388	2.120E-02	429	3.475E+00	470	2.247E+01	511	2.519E+01	552	3.148E+01
389	3.080E-02	430	3.950E+00	471	2.164E+01	512	2.549E+01	553	3.161E+01
390	2.990E-02	431	4.497E+00	472	2.087E+01	513	2.577E+01	554	3.169E+01
391	1.580E-02	432	5.107E+00	473	2.012E+01	514	2.603E+01	555	3.175E+01
392	1.120E-02	433	5.814E+00	474	1.937E+01	515	2.629E+01	556	3.183E+01
393	2.570E-02	434	6.606E+00	475	1.872E+01	516	2.653E+01	557	3.190E+01
394	3.470E-02	435	7.483E+00	476	1.814E+01	517	2.674E+01	558	3.199E+01
395	3.350E-02	436	8.469E+00	477	1.771E+01	518	2.692E+01	559	3.210E+01
396	2.470E-02	437	9.616E+00	478	1.740E+01	519	2.711E+01	560	3.219E+01
397	1.680E-02	438	1.092E+01	479	1.717E+01	520	2.730E+01	561	3.224E+01
398	8.800E-03	439	1.243E+01	480	1.706E+01	521	2.749E+01	562	3.234E+01
399	5.400E-03	440	1.417E+01	481	1.701E+01	522	2.765E+01	563	3.244E+01
400	2.720E-02	441	1.605E+01	482	1.700E+01	523	2.780E+01	564	3.249E+01
401	3.480E-02	442	1.818E+01	483	1.704E+01	524	2.795E+01	565	3.255E+01
402	3.700E-02	443	2.053E+01	484	1.712E+01	525	2.810E+01	566	3.262E+01
403	3.530E-02	444	2.303E+01	485	1.723E+01	526	2.828E+01	567	3.274E+01
404	3.590E-02	445	2.557E+01	486	1.742E+01	527	2.844E+01	568	3.281E+01
405	3.840E-02	446	2.812E+01	487	1.762E+01	528	2.861E+01	569	3.286E+01
406	5.250E-02	447	3.062E+01	488	1.782E+01	529	2.879E+01	570	3.293E+01
407	6.010E-02	448	3.307E+01	489	1.805E+01	530	2.888E+01	571	3.297E+01
408	6.260E-02	449	3.529E+01	490	1.829E+01	531	2.900E+01	572	3.302E+01
409	1.090E-01	450	3.700E+01	491	1.854E+01	532	2.917E+01	573	3.310E+01
410	1.537E-01	451	3.831E+01	492	1.883E+01	533	2.933E+01	574	3.317E+01
411	1.644E-01	452	3.913E+01	493	1.914E+01	534	2.945E+01	575	3.328E+01
412	1.798E-01	453	3.951E+01	494	1.950E+01	535	2.955E+01	576	3.338E+01
413	2.207E-01	454	3.930E+01	495	1.983E+01	536	2.968E+01	577	3.349E+01
414	2.699E-01	455	3.863E+01	496	2.015E+01	537	2.981E+01	578	3.358E+01
415	3.317E-01	456	3.751E+01	497	2.050E+01	538	2.994E+01	579	3.364E+01
416	4.177E-01	457	3.603E+01	498	2.090E+01	539	3.005E+01	580	3.373E+01
417	5.252E-01	458	3.441E+01	499	2.129E+01	540	3.013E+01	581	3.380E+01
418	6.344E-01	459	3.287E+01	500	2.165E+01	541	3.024E+01	582	3.390E+01
419	7.400E-01	460	3.145E+01	501	2.199E+01	542	3.037E+01	583	3.406E+01
420	8.791E-01	461	3.003E+01	502	2.234E+01	543	3.051E+01	584	3.414E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.422E+01	626	3.455E+01	667	2.198E+01	708	8.378E+00	749	1.947E+00
586	3.435E+01	627	3.439E+01	668	2.160E+01	709	8.130E+00	750	1.897E+00
587	3.449E+01	628	3.420E+01	669	2.120E+01	710	7.877E+00	751	1.852E+00
588	3.460E+01	629	3.402E+01	670	2.082E+01	711	7.618E+00	752	1.796E+00
589	3.469E+01	630	3.388E+01	671	2.042E+01	712	7.388E+00	753	1.719E+00
590	3.477E+01	631	3.373E+01	672	2.005E+01	713	7.150E+00	754	1.602E+00
591	3.489E+01	632	3.354E+01	673	1.968E+01	714	6.893E+00	755	1.551E+00
592	3.499E+01	633	3.328E+01	674	1.926E+01	715	6.661E+00	756	1.511E+00
593	3.506E+01	634	3.304E+01	675	1.884E+01	716	6.442E+00	757	1.322E+00
594	3.514E+01	635	3.281E+01	676	1.849E+01	717	6.251E+00	758	1.250E+00
595	3.525E+01	636	3.261E+01	677	1.812E+01	718	6.031E+00	759	1.225E+00
596	3.537E+01	637	3.238E+01	678	1.775E+01	719	5.856E+00	760	1.124E+00
597	3.544E+01	638	3.212E+01	679	1.737E+01	720	5.674E+00	761	1.138E+00
598	3.550E+01	639	3.185E+01	680	1.698E+01	721	5.468E+00	762	1.184E+00
599	3.556E+01	640	3.155E+01	681	1.662E+01	722	5.285E+00	763	1.165E+00
600	3.566E+01	641	3.131E+01	682	1.628E+01	723	5.078E+00	764	1.047E+00
601	3.573E+01	642	3.105E+01	683	1.593E+01	724	4.907E+00	765	9.939E-01
602	3.577E+01	643	3.076E+01	684	1.556E+01	725	4.743E+00	766	9.557E-01
603	3.582E+01	644	3.045E+01	685	1.518E+01	726	4.566E+00	767	9.519E-01
604	3.587E+01	645	3.013E+01	686	1.485E+01	727	4.407E+00	768	9.265E-01
605	3.589E+01	646	2.984E+01	687	1.453E+01	728	4.263E+00	769	8.836E-01
606	3.590E+01	647	2.952E+01	688	1.418E+01	729	4.162E+00	770	8.032E-01
607	3.592E+01	648	2.918E+01	689	1.382E+01	730	4.003E+00	771	7.990E-01
608	3.593E+01	649	2.883E+01	690	1.351E+01	731	3.851E+00	772	7.669E-01
609	3.594E+01	650	2.847E+01	691	1.321E+01	732	3.699E+00	773	7.206E-01
610	3.595E+01	651	2.811E+01	692	1.292E+01	733	3.540E+00	774	7.036E-01
611	3.595E+01	652	2.777E+01	693	1.259E+01	734	3.436E+00	775	7.028E-01
612	3.594E+01	653	2.743E+01	694	1.224E+01	735	3.308E+00	776	6.618E-01
613	3.588E+01	654	2.709E+01	695	1.194E+01	736	3.196E+00	777	6.322E-01
614	3.581E+01	655	2.672E+01	696	1.164E+01	737	3.047E+00	778	5.844E-01
615	3.575E+01	656	2.633E+01	697	1.134E+01	738	2.882E+00	779	5.396E-01
616	3.566E+01	657	2.594E+01	698	1.104E+01	739	2.787E+00	780	4.709E-01
617	3.558E+01	658	2.557E+01	699	1.076E+01	740	2.731E+00		
618	3.551E+01	659	2.518E+01	700	1.047E+01	741	2.668E+00		
619	3.543E+01	660	2.478E+01	701	1.022E+01	742	2.574E+00		
620	3.532E+01	661	2.435E+01	702	9.950E+00	743	2.420E+00		
621	3.521E+01	662	2.397E+01	703	9.670E+00	744	2.294E+00		
622	3.507E+01	663	2.358E+01	704	9.398E+00	745	2.179E+00		
623	3.495E+01	664	2.316E+01	705	9.102E+00	746	2.109E+00		
624	3.485E+01	665	2.277E+01	706	8.856E+00	747	2.062E+00		
625	3.472E+01	666	2.236E+01	707	8.626E+00	748	2.005E+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**

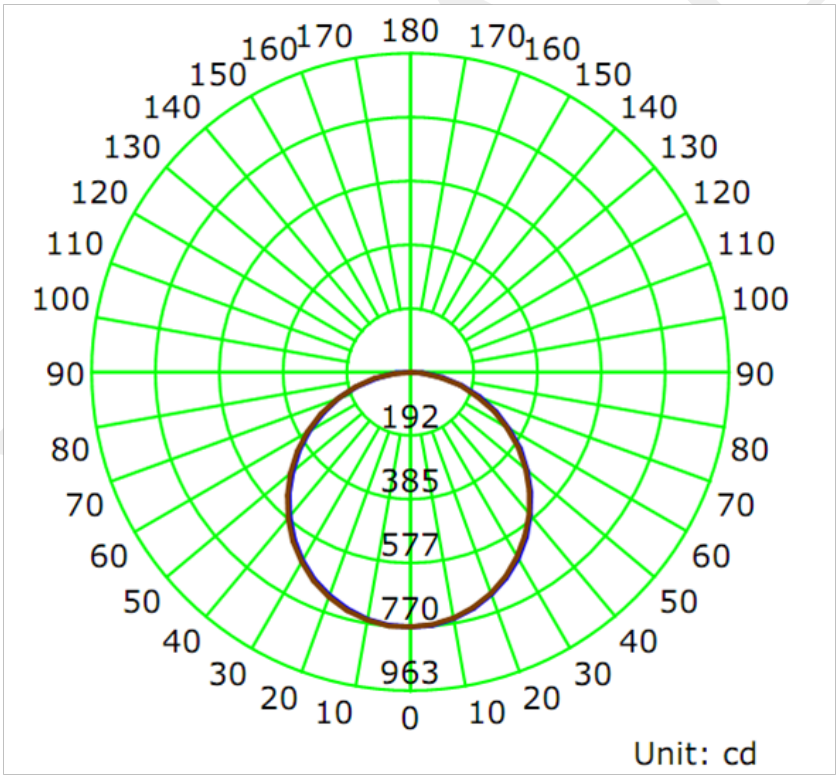
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1970	23.59	0.9980

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2255.5	95.66	770.4	1.26	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	113.9	113.8	114.0	113.8	113.9
Field Angle (10% I_{max}):	164.3	164.3	164.3	164.2	164.3

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	770	770	770	770	770	770	770	770
5.0°	767	766	765	765	765	765	767	768
10.0°	756	754	754	753	754	755	755	758
15.0°	739	737	735	735	735	736	739	742
20.0°	714	712	710	710	711	713	715	718
25.0°	685	682	680	679	680	682	686	690
30.0°	650	645	644	644	645	646	651	655
35.0°	609	605	603	603	603	606	610	615
40.0°	564	559	557	556	558	560	565	571
45.0°	514	509	507	507	508	510	516	521
50.0°	462	456	452	453	454	457	461	469
55.0°	405	400	396	396	398	400	405	411
60.0°	346	341	338	338	338	342	346	353
65.0°	284	280	277	276	279	281	286	291
70.0°	223	219	216	214	217	219	224	230
75.0°	161	156	154	153	154	158	163	168
80.0°	100	95	93	92	93	97	101	107
85.0°	39	36	35	34	35	37	41	41
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.)

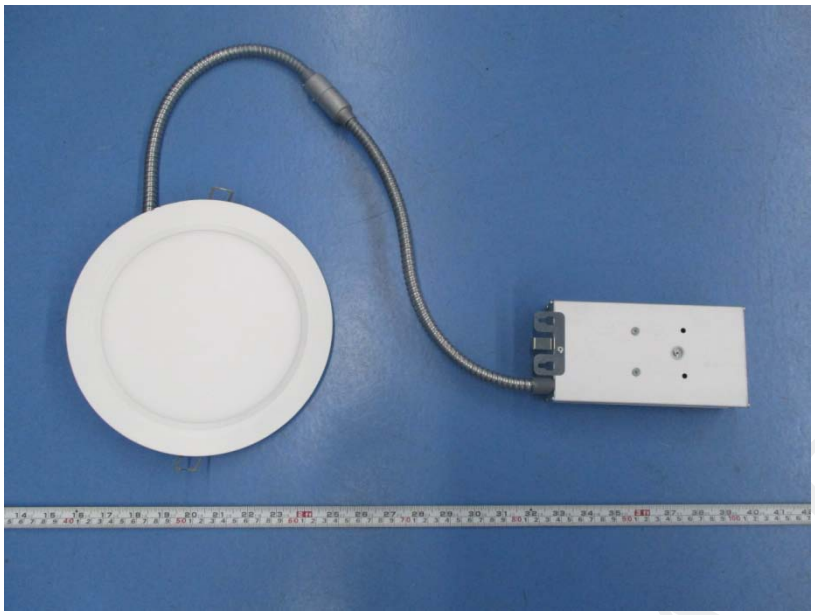
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	770	770	770	770	770	770	770	770
5.0°	767	767	768	768	769	767	768	767
10.0°	758	759	760	760	760	758	757	757
15.0°	742	743	745	745	744	743	742	739
20.0°	719	721	723	723	723	721	719	716
25.0°	691	693	695	695	695	692	690	686
30.0°	655	659	661	662	661	658	655	650
35.0°	615	619	623	622	622	619	615	610
40.0°	570	574	577	579	577	574	570	566
45.0°	521	526	528	528	528	525	521	515
50.0°	467	472	475	477	476	471	467	462
55.0°	411	416	419	420	420	415	410	405
60.0°	352	357	361	362	360	356	351	346
65.0°	291	296	300	301	300	296	291	286
70.0°	229	234	238	239	237	233	229	223
75.0°	167	171	174	176	174	171	165	160
80.0°	106	109	113	114	113	108	104	99
85.0°	47	49	52	53	52	49	42	38
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	18.4	0.81
5-10	54.5	2.42
10-15	88.8	3.94
15-20	120.1	5.32
20-25	147.3	6.53
25-30	169.6	7.52
30-35	186.3	8.26
35-40	196.8	8.73
40-45	200.9	8.91
45-50	198.4	8.80
50-55	189.7	8.41
55-60	175.0	7.76
60-65	155.0	6.87
65-70	130.4	5.78
70-75	102.1	4.52
75-80	71.3	3.16
80-85	39.4	1.75
85-90	11.6	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	18.4	0.81
0-10	72.9	3.23
0-15	161.7	7.17
0-20	281.7	12.49
0-25	429.0	19.02
0-30	598.6	26.54
0-35	784.8	34.80
0-40	981.7	43.52
0-45	1182.6	52.43
0-50	1381.0	61.23
0-55	1570.7	69.64
0-60	1745.7	77.40
0-65	1900.7	84.27
0-70	2031.0	90.05
0-75	2133.1	94.57
0-80	2204.4	97.74
0-85	2243.9	99.49
0-90	2255.5	100.00
0-95	2255.5	100.00
0-100	2255.5	100.00
0-105	2255.5	100.00
0-110	2255.5	100.00
0-115	2255.5	100.00
0-120	2255.5	100.00
0-125	2255.5	100.00
0-130	2255.5	100.00
0-135	2255.5	100.00
0-140	2255.5	100.00
0-145	2255.5	100.00
0-150	2255.5	100.00
0-155	2255.5	100.00
0-160	2255.5	100.00
0-165	2255.5	100.00
0-170	2255.5	100.00
0-175	2255.5	100.00
0-180	2255.5	100.00

6. Product Photo



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