

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 12NCDLR6DIM/950/277V/EXT

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180510003-10-3
Test Date:	2018-05-11 to 2018-05-15
Report Date:	2018-05-16
Reviewed By:	Ray Gao/EE Engineer <i>Ray 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 2018-05-10 and used for testing.

Model Tested: 12NCDLR6DIM/950/277V/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: 12W
 Nominal CCT: 5000K
 Nominal Lumen Output: 940lm

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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ 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.

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 $U=24\text{K}$ ($K=2$), 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 $U=0.16\%$ 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_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**

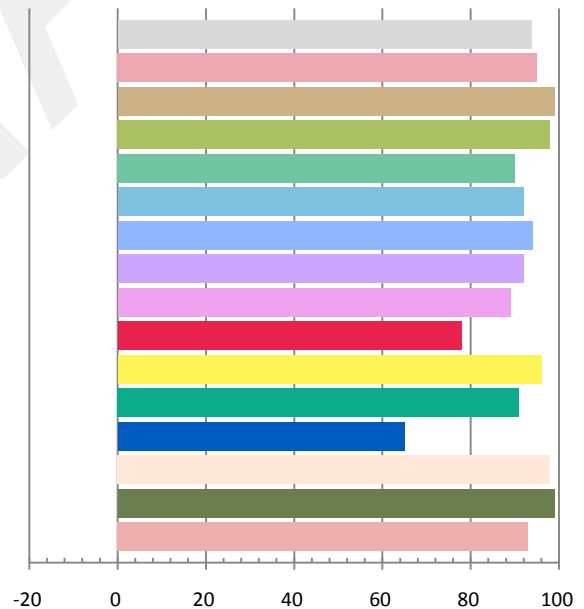
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0961	11.5	0.9973	1067	92.78

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.727	4948	0.00021	0.3466	0.3533	0.2118	0.4857

Color Rendering Index

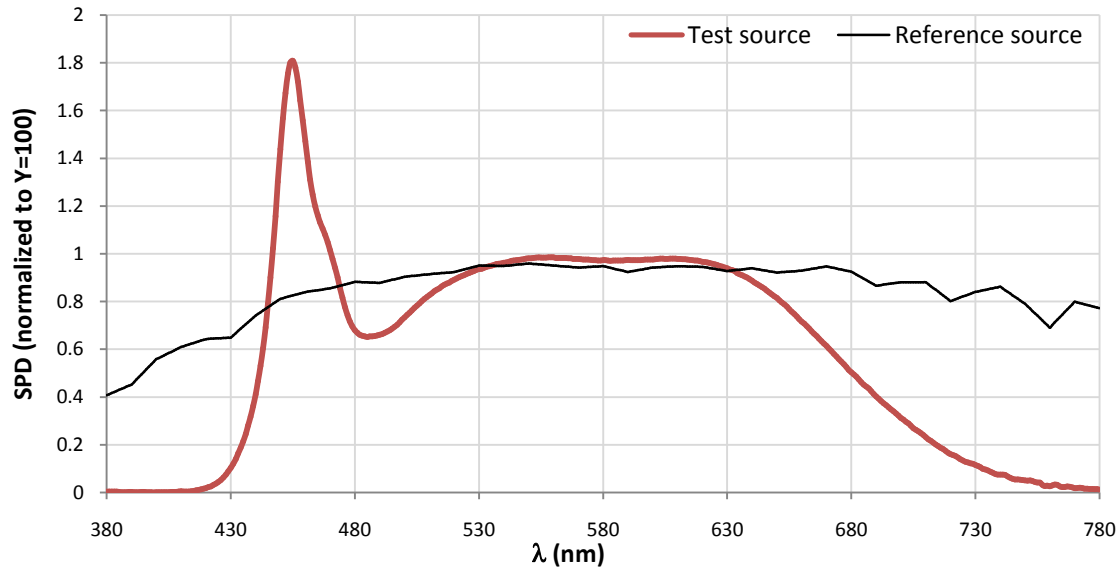
Ra			
93.8			
R1	R2	R3	R4
95	99	98	90
R5	R6	R7	R8
92	94	92	89
R9	R10	R11	R12
78	96	91	65
R13	R14	R15	
98	99	93	



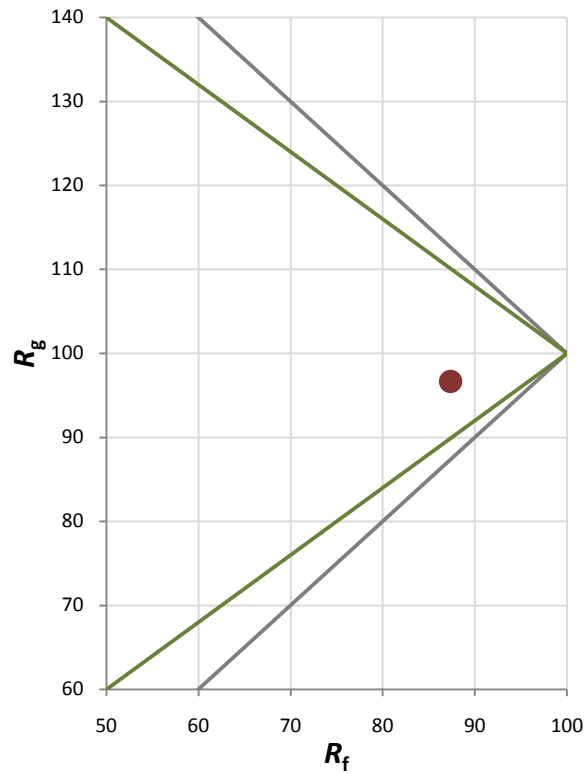
Fidelity Index and Gamut Index

Fidelity Index R_f	87
Gamut Index R_g	97

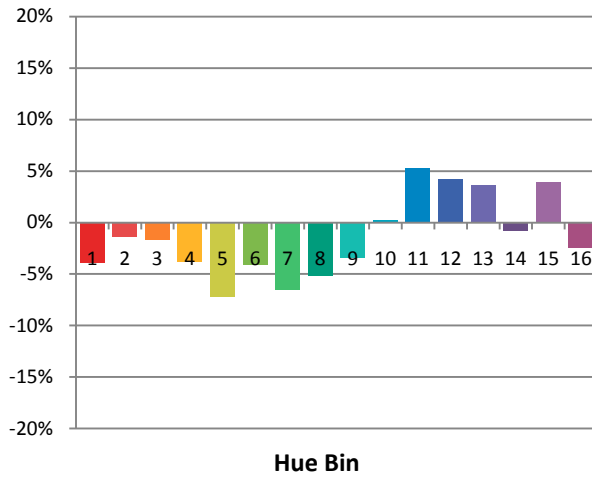
Spectral Power Distribution Comparison



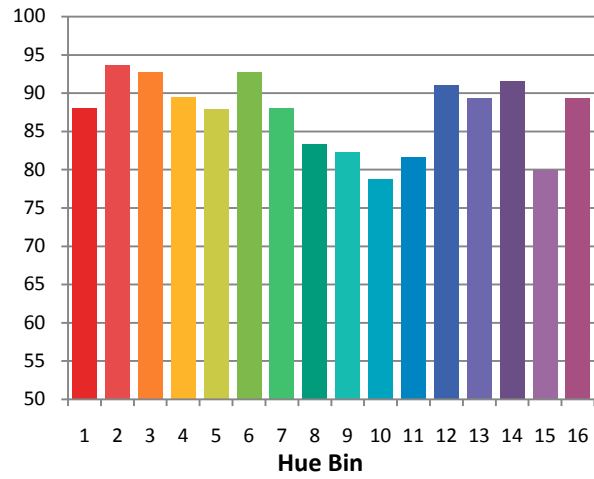
Plot of R_g versus R_f



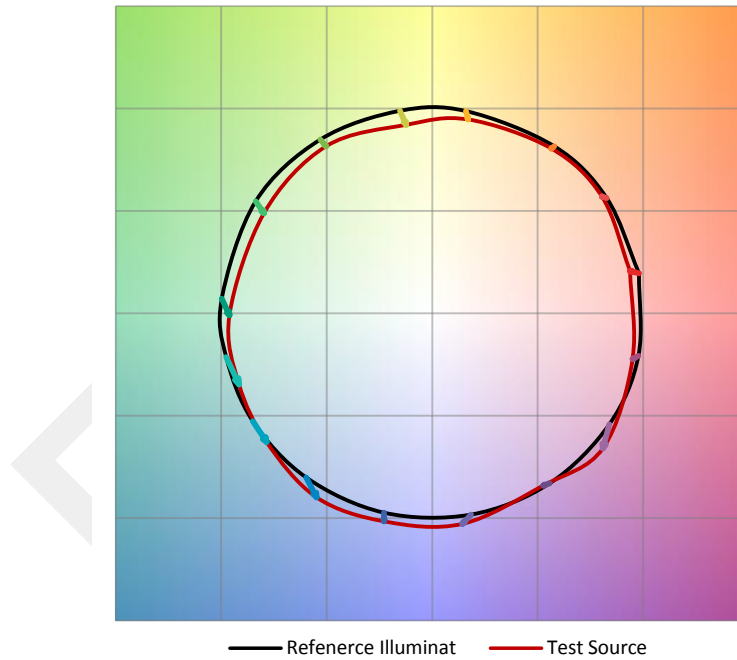
Chroma Shift by Hue



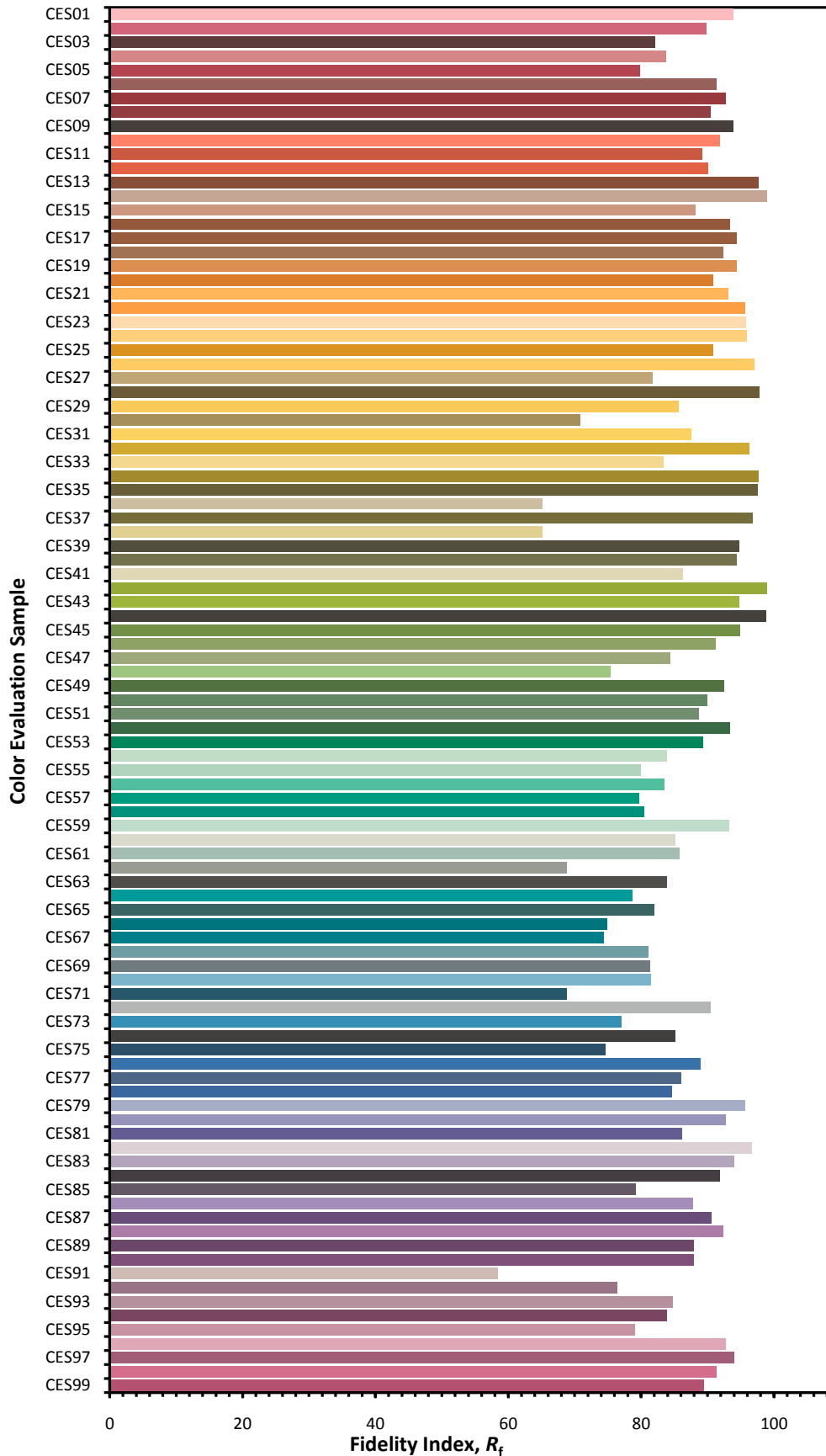
R_f by Hue



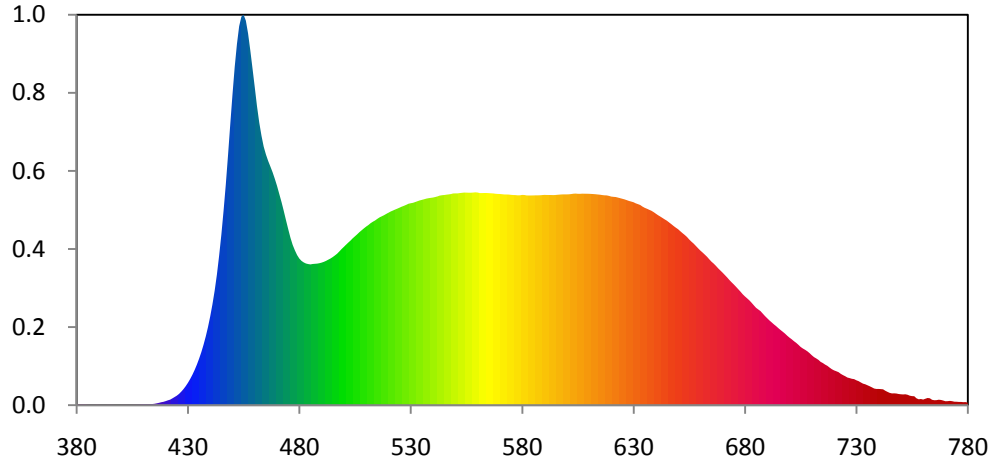
Color Vector Graphic



Color Fidelity by CES Sample



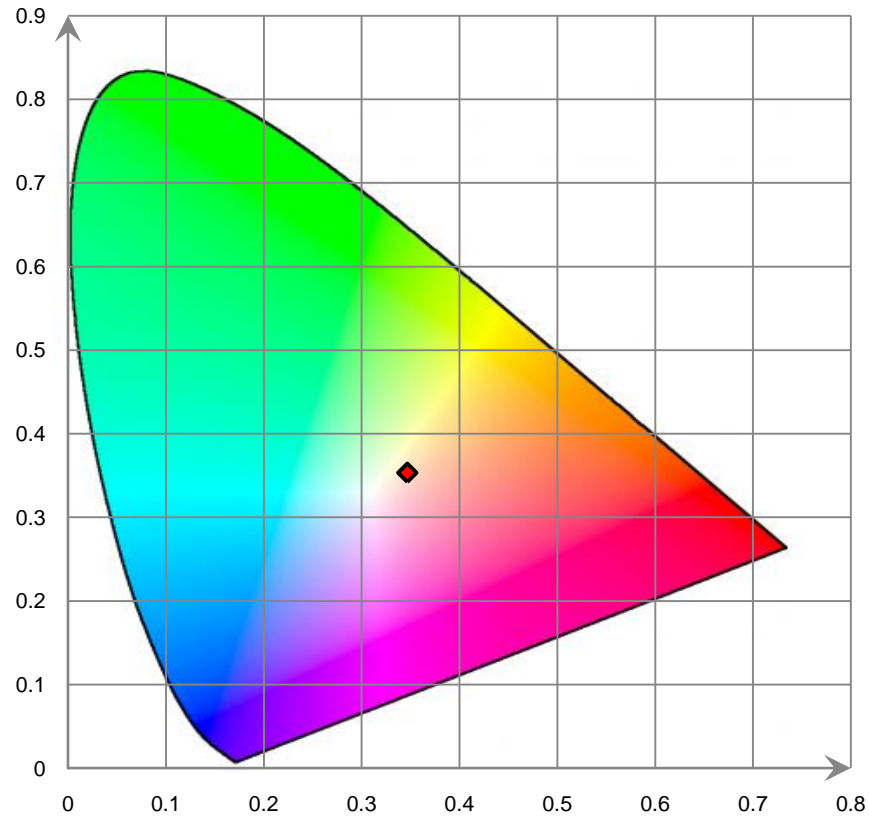
Relative Spectral Power Distribution



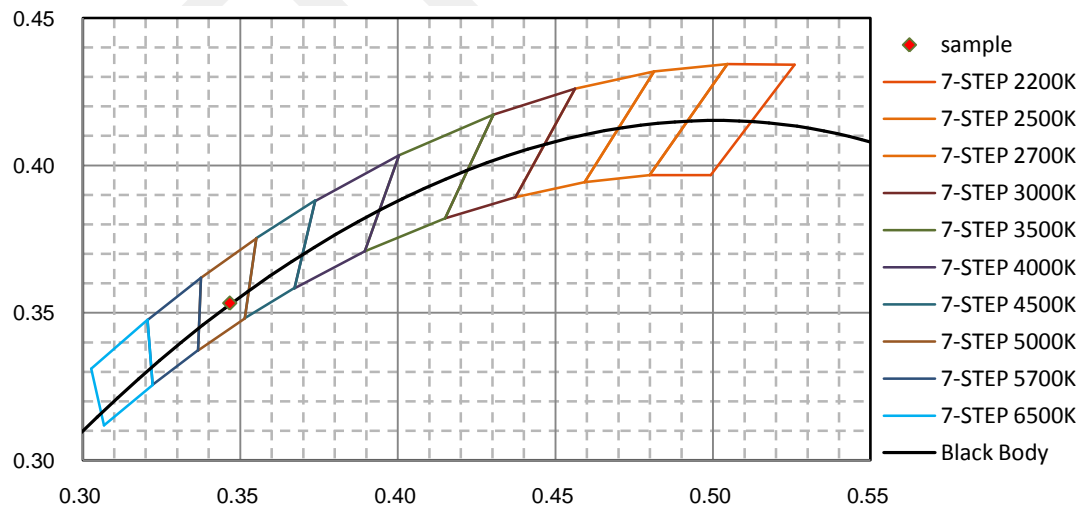
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.090E-02	421	3.497E-01	462	2.046E+01	503	1.191E+01	544	1.519E+01
381	5.710E-02	422	3.987E-01	463	1.950E+01	504	1.208E+01	545	1.520E+01
382	5.670E-02	423	4.907E-01	464	1.871E+01	505	1.222E+01	546	1.523E+01
383	5.530E-02	424	5.888E-01	465	1.814E+01	506	1.237E+01	547	1.525E+01
384	5.760E-02	425	6.898E-01	466	1.767E+01	507	1.252E+01	548	1.527E+01
385	3.240E-02	426	8.135E-01	467	1.727E+01	508	1.266E+01	549	1.531E+01
386	2.460E-02	427	9.766E-01	468	1.685E+01	509	1.279E+01	550	1.532E+01
387	2.130E-02	428	1.161E+00	469	1.637E+01	510	1.292E+01	551	1.532E+01
388	2.210E-02	429	1.375E+00	470	1.586E+01	511	1.303E+01	552	1.534E+01
389	3.820E-02	430	1.616E+00	471	1.528E+01	512	1.316E+01	553	1.536E+01
390	3.730E-02	431	1.892E+00	472	1.470E+01	513	1.327E+01	554	1.538E+01
391	1.720E-02	432	2.200E+00	473	1.406E+01	514	1.336E+01	555	1.538E+01
392	1.320E-02	433	2.545E+00	474	1.339E+01	515	1.348E+01	556	1.537E+01
393	2.110E-02	434	2.929E+00	475	1.274E+01	516	1.358E+01	557	1.537E+01
394	3.020E-02	435	3.357E+00	476	1.212E+01	517	1.366E+01	558	1.538E+01
395	3.230E-02	436	3.832E+00	477	1.160E+01	518	1.374E+01	559	1.540E+01
396	2.760E-02	437	4.368E+00	478	1.120E+01	519	1.383E+01	560	1.538E+01
397	1.700E-02	438	4.970E+00	479	1.086E+01	520	1.392E+01	561	1.534E+01
398	9.100E-03	439	5.647E+00	480	1.061E+01	521	1.401E+01	562	1.534E+01
399	5.000E-03	440	6.422E+00	481	1.044E+01	522	1.408E+01	563	1.535E+01
400	1.950E-02	441	7.291E+00	482	1.032E+01	523	1.415E+01	564	1.535E+01
401	2.490E-02	442	8.285E+00	483	1.025E+01	524	1.422E+01	565	1.534E+01
402	2.750E-02	443	9.451E+00	484	1.021E+01	525	1.429E+01	566	1.533E+01
403	2.670E-02	444	1.081E+01	485	1.018E+01	526	1.436E+01	567	1.532E+01
404	2.370E-02	445	1.234E+01	486	1.021E+01	527	1.442E+01	568	1.529E+01
405	2.280E-02	446	1.407E+01	487	1.023E+01	528	1.449E+01	569	1.528E+01
406	3.220E-02	447	1.597E+01	488	1.024E+01	529	1.457E+01	570	1.527E+01
407	3.570E-02	448	1.808E+01	489	1.027E+01	530	1.461E+01	571	1.526E+01
408	3.860E-02	449	2.032E+01	490	1.031E+01	531	1.464E+01	572	1.524E+01
409	6.230E-02	450	2.246E+01	491	1.037E+01	532	1.469E+01	573	1.524E+01
410	7.390E-02	451	2.448E+01	492	1.044E+01	533	1.475E+01	574	1.523E+01
411	6.190E-02	452	2.613E+01	493	1.053E+01	534	1.481E+01	575	1.522E+01
412	6.470E-02	453	2.742E+01	494	1.061E+01	535	1.485E+01	576	1.520E+01
413	6.900E-02	454	2.811E+01	495	1.072E+01	536	1.490E+01	577	1.519E+01
414	8.070E-02	455	2.824E+01	496	1.084E+01	537	1.494E+01	578	1.518E+01
415	1.021E-01	456	2.781E+01	497	1.096E+01	538	1.497E+01	579	1.518E+01
416	1.353E-01	457	2.689E+01	498	1.113E+01	539	1.500E+01	580	1.521E+01
417	1.699E-01	458	2.566E+01	499	1.130E+01	540	1.502E+01	581	1.520E+01
418	2.150E-01	459	2.435E+01	500	1.145E+01	541	1.506E+01	582	1.517E+01
419	2.440E-01	460	2.300E+01	501	1.161E+01	542	1.510E+01	583	1.517E+01
420	2.947E-01	461	2.164E+01	502	1.177E+01	543	1.516E+01	584	1.517E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.517E+01	626	1.488E+01	667	1.008E+01	708	3.899E+00	749	8.077E-01
586	1.518E+01	627	1.483E+01	668	9.897E+00	709	3.769E+00	750	7.894E-01
587	1.518E+01	628	1.477E+01	669	9.739E+00	710	3.617E+00	751	7.772E-01
588	1.519E+01	629	1.473E+01	670	9.584E+00	711	3.477E+00	752	7.885E-01
589	1.520E+01	630	1.468E+01	671	9.415E+00	712	3.384E+00	753	7.529E-01
590	1.521E+01	631	1.460E+01	672	9.244E+00	713	3.275E+00	754	6.867E-01
591	1.521E+01	632	1.454E+01	673	9.062E+00	714	3.132E+00	755	6.545E-01
592	1.520E+01	633	1.448E+01	674	8.891E+00	715	3.044E+00	756	6.479E-01
593	1.520E+01	634	1.437E+01	675	8.733E+00	716	2.935E+00	757	4.978E-01
594	1.520E+01	635	1.428E+01	676	8.566E+00	717	2.847E+00	758	4.278E-01
595	1.521E+01	636	1.421E+01	677	8.388E+00	718	2.719E+00	759	4.456E-01
596	1.522E+01	637	1.414E+01	678	8.214E+00	719	2.604E+00	760	4.080E-01
597	1.524E+01	638	1.407E+01	679	8.028E+00	720	2.518E+00	761	4.674E-01
598	1.525E+01	639	1.397E+01	680	7.869E+00	721	2.454E+00	762	5.184E-01
599	1.525E+01	640	1.385E+01	681	7.729E+00	722	2.389E+00	763	5.002E-01
600	1.525E+01	641	1.374E+01	682	7.580E+00	723	2.272E+00	764	3.909E-01
601	1.525E+01	642	1.365E+01	683	7.409E+00	724	2.176E+00	765	3.576E-01
602	1.527E+01	643	1.354E+01	684	7.222E+00	725	2.095E+00	766	3.633E-01
603	1.530E+01	644	1.344E+01	685	7.045E+00	726	2.000E+00	767	3.957E-01
604	1.531E+01	645	1.334E+01	686	6.923E+00	727	1.958E+00	768	3.781E-01
605	1.529E+01	646	1.322E+01	687	6.805E+00	728	1.910E+00	769	3.362E-01
606	1.529E+01	647	1.309E+01	688	6.626E+00	729	1.885E+00	770	2.842E-01
607	1.530E+01	648	1.296E+01	689	6.449E+00	730	1.802E+00	771	2.919E-01
608	1.530E+01	649	1.284E+01	690	6.288E+00	731	1.739E+00	772	3.102E-01
609	1.530E+01	650	1.273E+01	691	6.129E+00	732	1.647E+00	773	2.878E-01
610	1.529E+01	651	1.258E+01	692	5.991E+00	733	1.558E+00	774	2.502E-01
611	1.528E+01	652	1.244E+01	693	5.847E+00	734	1.512E+00	775	2.485E-01
612	1.527E+01	653	1.231E+01	694	5.718E+00	735	1.440E+00	776	2.335E-01
613	1.526E+01	654	1.217E+01	695	5.574E+00	736	1.369E+00	777	2.337E-01
614	1.524E+01	655	1.199E+01	696	5.436E+00	737	1.291E+00	778	2.187E-01
615	1.522E+01	656	1.183E+01	697	5.311E+00	738	1.205E+00	779	2.256E-01
616	1.520E+01	657	1.168E+01	698	5.174E+00	739	1.174E+00	780	1.851E-01
617	1.518E+01	658	1.151E+01	699	5.023E+00	740	1.176E+00		
618	1.517E+01	659	1.135E+01	700	4.886E+00	741	1.163E+00		
619	1.514E+01	660	1.118E+01	701	4.768E+00	742	1.146E+00		
620	1.509E+01	661	1.104E+01	702	4.629E+00	743	1.045E+00		
621	1.507E+01	662	1.089E+01	703	4.512E+00	744	9.627E-01		
622	1.506E+01	663	1.074E+01	704	4.370E+00	745	8.894E-01		
623	1.502E+01	664	1.055E+01	705	4.215E+00	746	8.497E-01		
624	1.497E+01	665	1.038E+01	706	4.102E+00	747	8.556E-01		
625	1.493E+01	666	1.024E+01	707	4.008E+00	748	8.422E-01		

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**

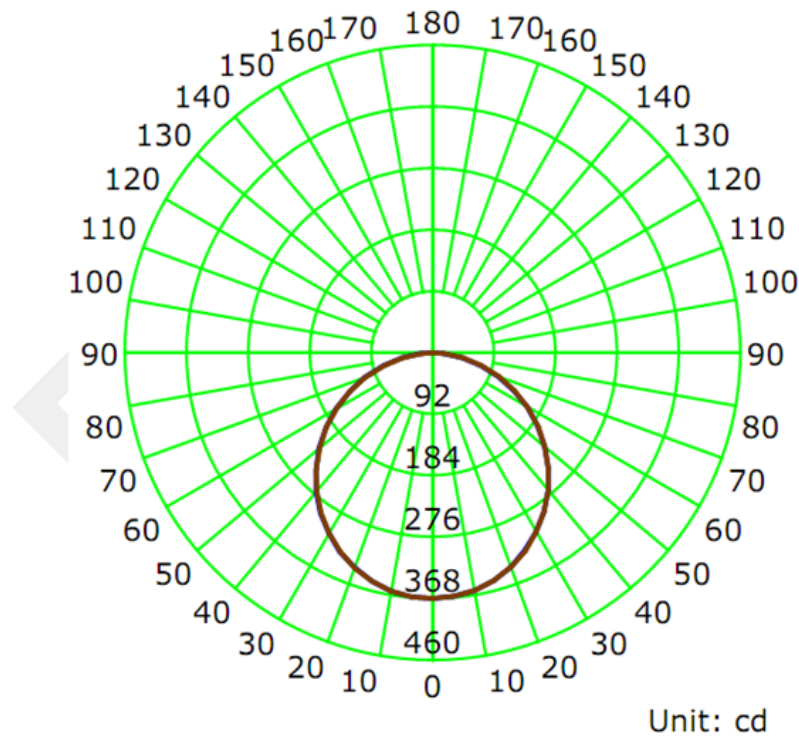
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0960	11.52	0.9980

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1070.4	92.97	368.7	1.25	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	113.3	113.4	113.3	113.3	113.3
Field Angle (10% I _{max}):	163.4	163.5	163.2	163.4	163.4

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	369	369	369	369	369	369	369	369
5.0°	367	367	367	367	367	367	367	368
10.0°	362	362	361	362	362	362	363	363
15.0°	353	353	353	353	353	354	354	355
20.0°	342	341	341	342	342	343	343	345
25.0°	327	327	327	327	328	328	329	330
30.0°	310	310	310	310	311	311	312	314
35.0°	291	290	290	290	291	292	293	295
40.0°	269	268	268	269	270	270	271	273
45.0°	245	244	244	245	246	247	248	249
50.0°	220	219	219	219	220	221	223	224
55.0°	192	192	192	192	193	194	196	197
60.0°	164	164	163	164	165	166	168	169
65.0°	135	134	135	135	135	137	139	140
70.0°	105	104	105	105	106	108	109	110
75.0°	75	74	74	75	76	77	79	80
80.0°	45	45	45	45	46	47	49	50
85.0°	16	16	17	17	18	19	20	21
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

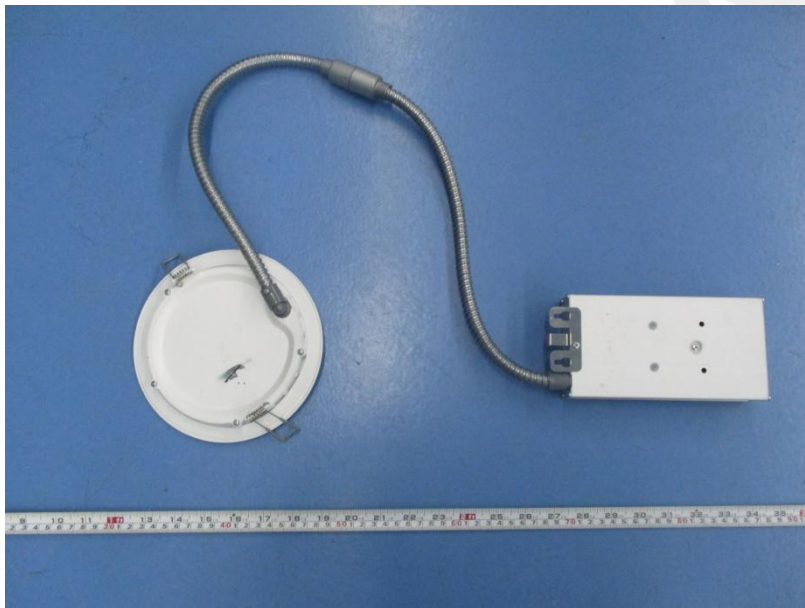
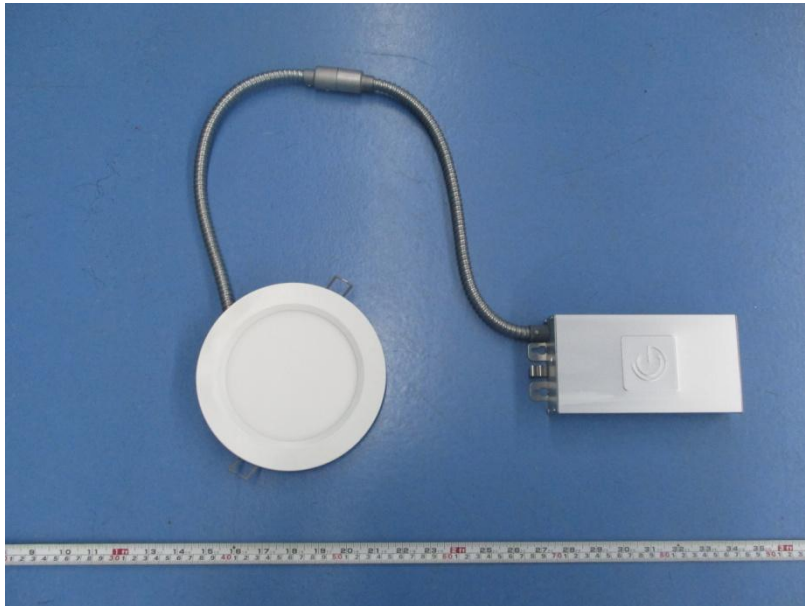
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	369	369	369	369	369	369	369	369
5.0°	367	367	368	368	367	367	367	367
10.0°	363	363	363	363	362	362	362	362
15.0°	355	355	355	355	355	354	353	353
20.0°	343	344	344	344	343	343	342	342
25.0°	330	330	330	330	330	329	328	327
30.0°	313	313	313	314	313	312	311	310
35.0°	294	294	295	294	293	292	291	290
40.0°	272	273	273	273	272	270	269	268
45.0°	248	249	249	249	248	246	245	244
50.0°	223	223	223	223	222	221	219	218
55.0°	196	197	196	196	195	194	192	190
60.0°	167	168	168	168	167	165	163	162
65.0°	138	138	139	139	138	136	134	133
70.0°	109	109	109	109	108	106	104	103
75.0°	78	79	79	78	76	76	74	73
80.0°	48	49	49	47	46	45	44	43
85.0°	20	20	20	18	17	17	16	14
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	8.8	0.82	0-5	8.8	0.82
5-10	26.1	2.44	0-10	34.9	3.26
10-15	42.5	3.97	0-15	77.4	7.23
15-20	57.4	5.36	0-20	134.8	12.59
20-25	70.4	6.58	0-25	205.2	19.17
25-30	81.0	7.57	0-30	286.2	26.74
30-35	88.9	8.31	0-35	375.1	35.04
35-40	93.9	8.77	0-40	468.9	43.81
40-45	95.7	8.94	0-45	564.7	52.75
45-50	94.4	8.82	0-50	659.1	61.57
50-55	90.2	8.42	0-55	749.3	70.00
55-60	83.1	7.76	0-60	832.4	77.76
60-65	73.4	6.86	0-65	905.8	84.62
65-70	61.6	5.75	0-70	967.4	90.37
70-75	47.8	4.47	0-75	1015.2	94.84
75-80	32.9	3.07	0-80	1048.1	97.91
80-85	17.5	1.63	0-85	1065.5	99.54
85-90	4.9	0.46	0-90	1070.4	100.00
90-95	0.0	0.00	0-95	1070.4	100.00
95-100	0.0	0.00	0-100	1070.4	100.00
100-105	0.0	0.00	0-105	1070.4	100.00
105-110	0.0	0.00	0-110	1070.4	100.00
110-115	0.0	0.00	0-115	1070.4	100.00
115-120	0.0	0.00	0-120	1070.4	100.00
120-125	0.0	0.00	0-125	1070.4	100.00
125-130	0.0	0.00	0-130	1070.4	100.00
130-135	0.0	0.00	0-135	1070.4	100.00
135-140	0.0	0.00	0-140	1070.4	100.00
140-145	0.0	0.00	0-145	1070.4	100.00
145-150	0.0	0.00	0-150	1070.4	100.00
150-155	0.0	0.00	0-155	1070.4	100.00
155-160	0.0	0.00	0-160	1070.4	100.00
160-165	0.0	0.00	0-165	1070.4	100.00
165-170	0.0	0.00	0-170	1070.4	100.00
170-175	0.0	0.00	0-175	1070.4	100.00
175-180	0.0	0.00	0-180	1070.4	100.00

6. Product Photo



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