

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/930/277V/EXT

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180510003-10-4
Test Date:	2018-05-10 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/930/277V/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: 3000K
 Nominal Lumen Output: 920lm

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**

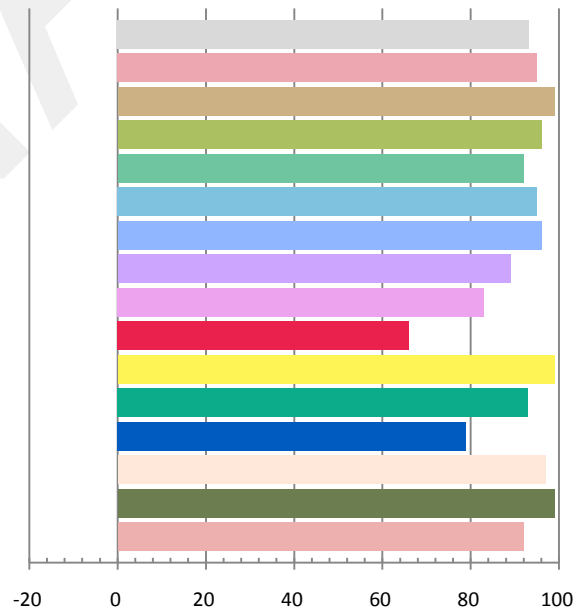
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
119.99	60	0.0965	11.55	0.9975	1014.9	87.87

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.507	3194	-0.00078	0.4228	0.3968	0.2445	0.5164

Color Rendering Index

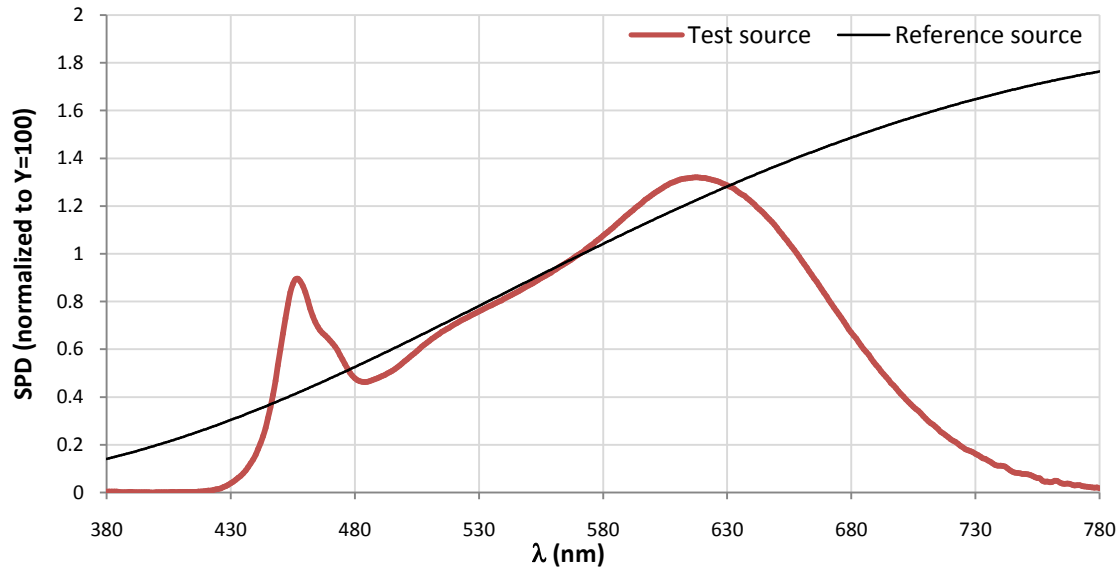
Ra			
93.2			
R1	R2	R3	R4
95	99	96	92
R5	R6	R7	R8
95	96	89	83
R9	R10	R11	R12
66	99	93	79
R13	R14	R15	
97	99	92	



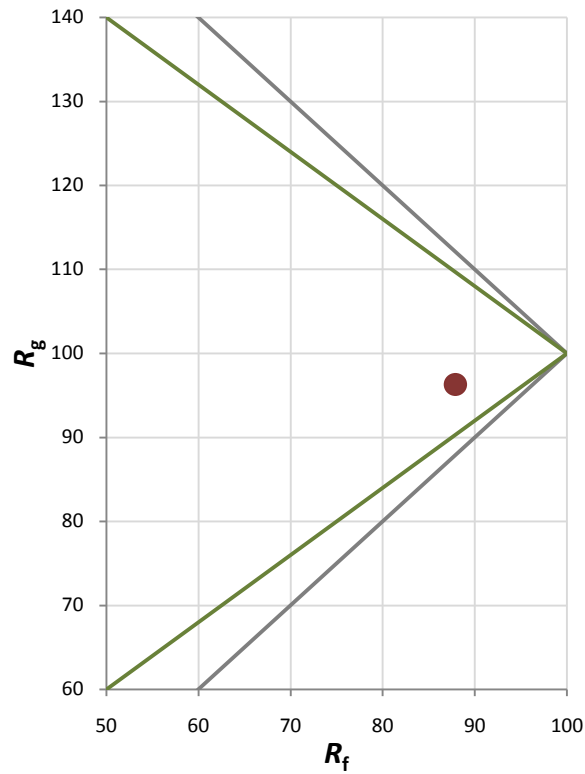
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	96

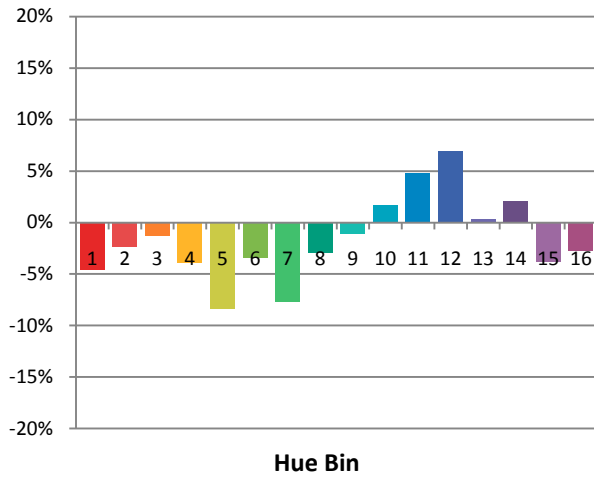
Spectral Power Distribution Comparison



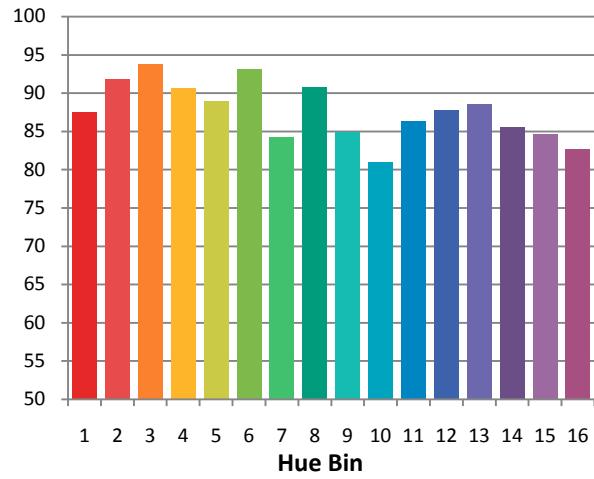
Plot of R_g versus R_f



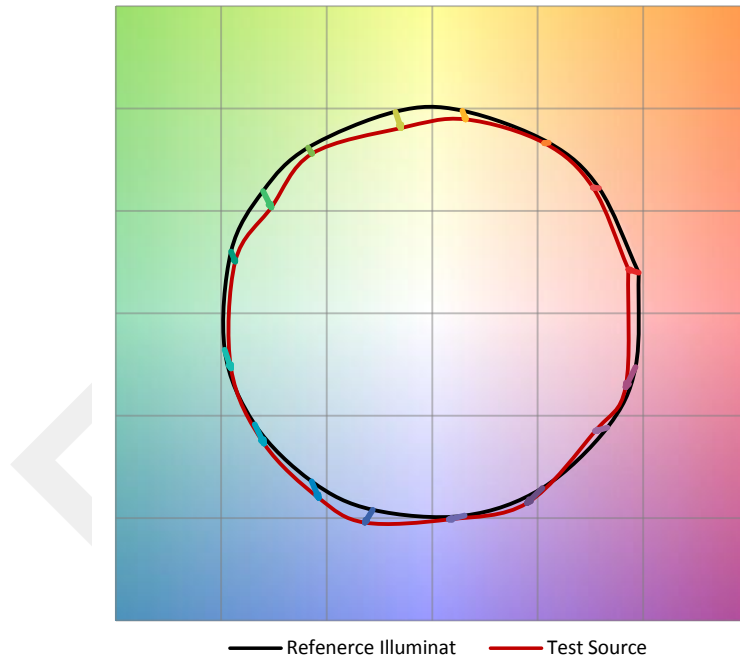
Chroma Shift by Hue



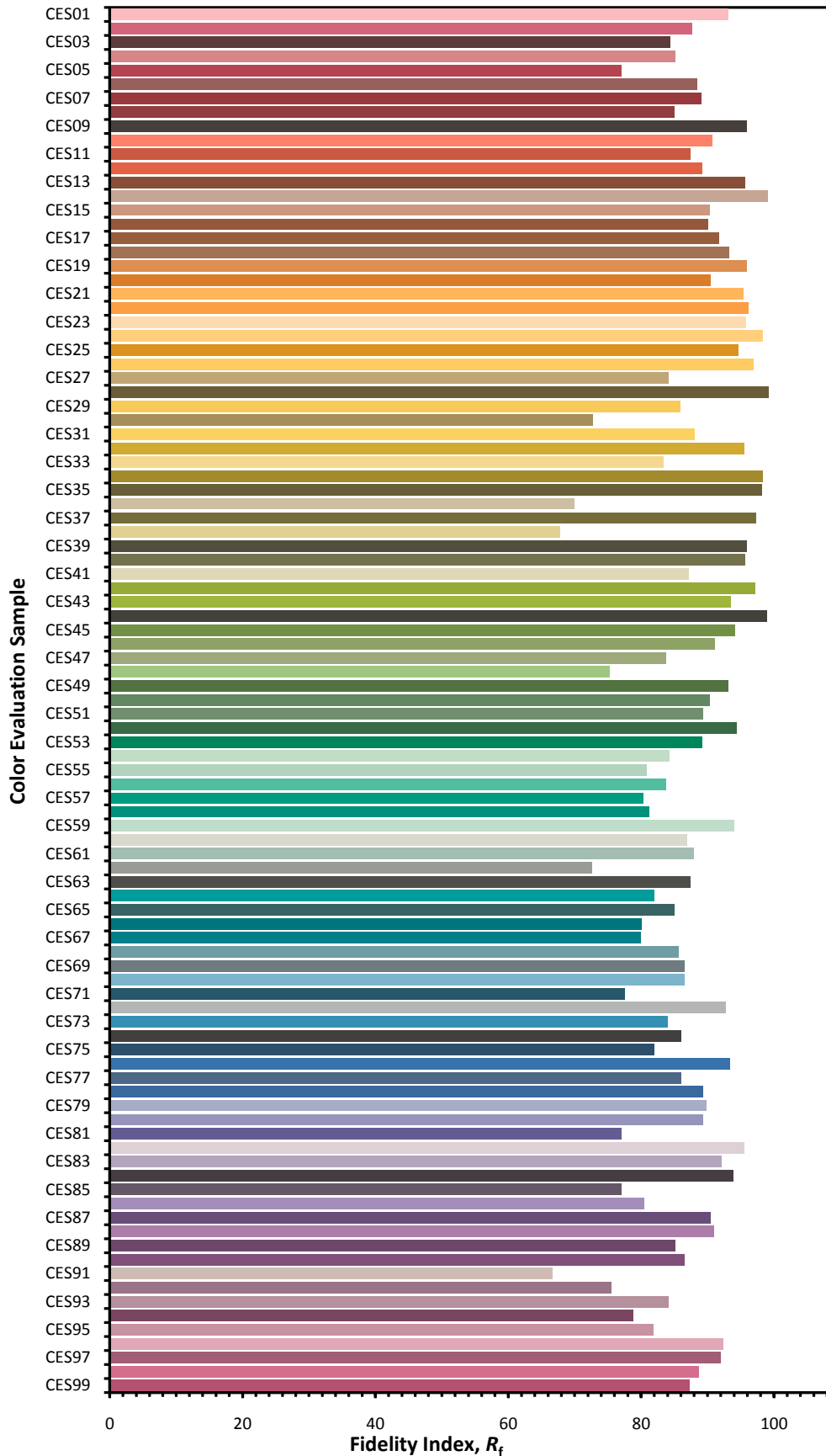
R_f by Hue



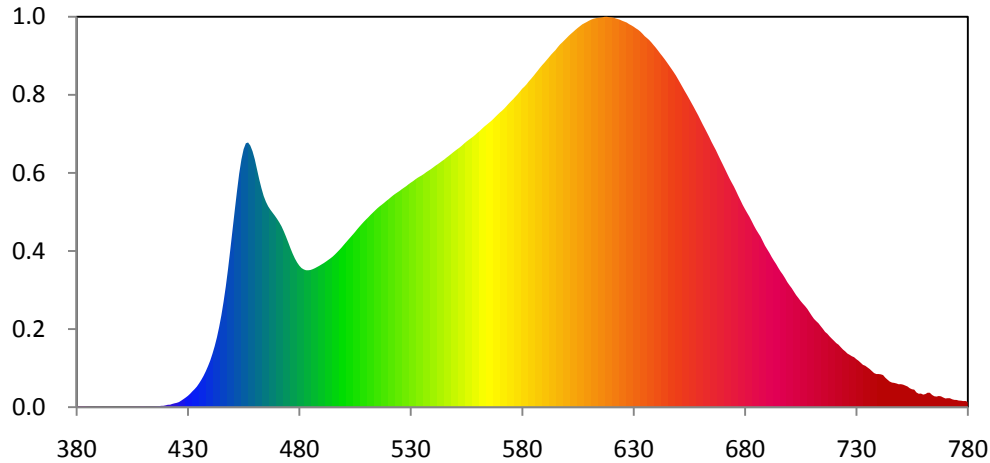
Color Vector Graphic



Color Fidelity by CES Sample



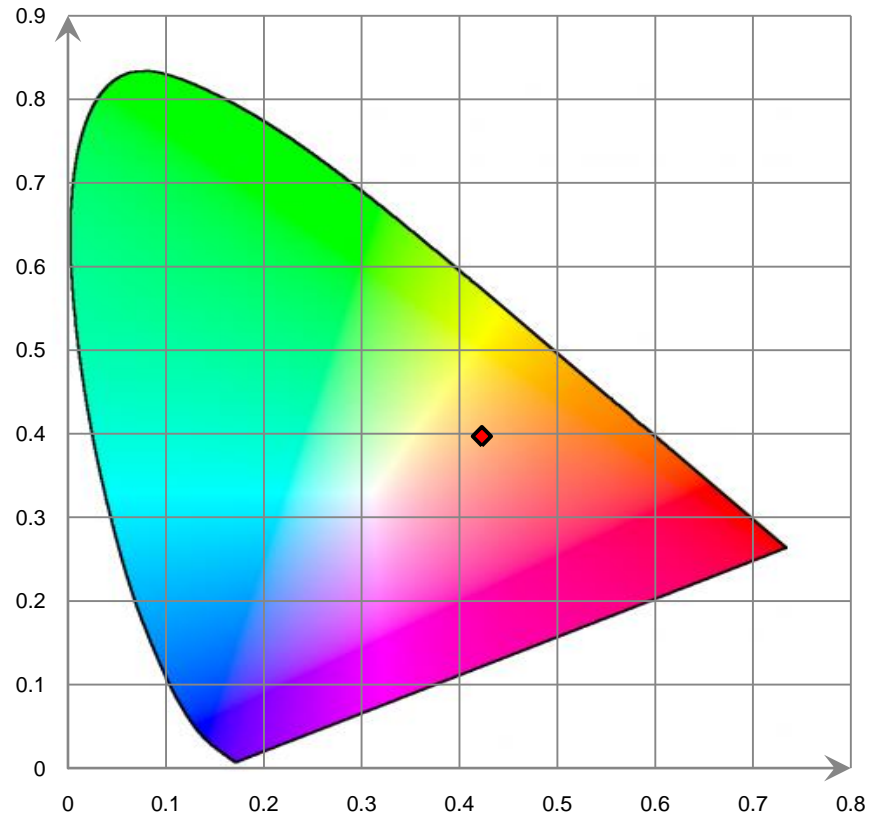
Relative Spectral Power Distribution



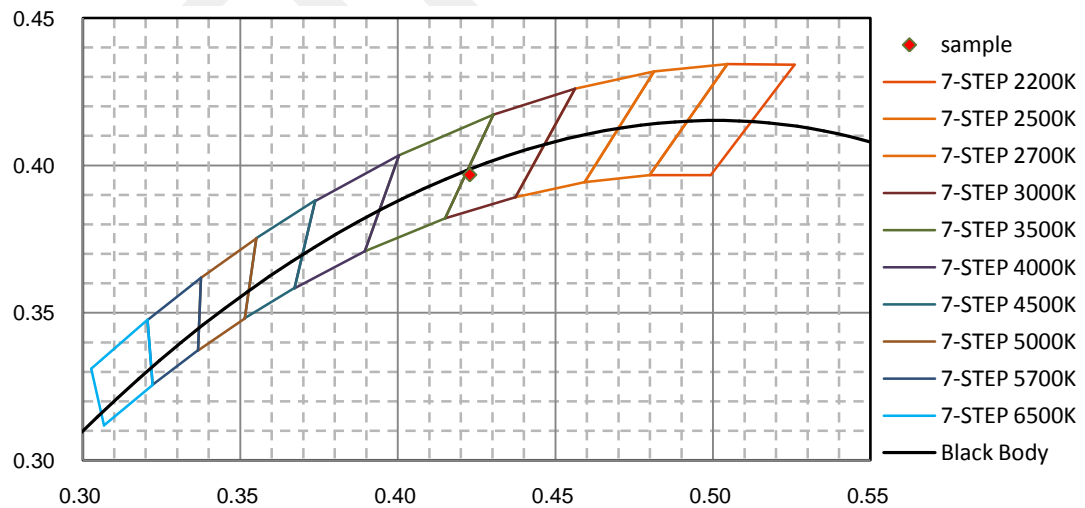
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.300E-02	421	1.213E-01	462	1.145E+01	503	8.546E+00	544	1.236E+01
381	5.100E-02	422	1.263E-01	463	1.100E+01	504	8.671E+00	545	1.244E+01
382	5.010E-02	423	1.638E-01	464	1.061E+01	505	8.802E+00	546	1.253E+01
383	5.340E-02	424	1.943E-01	465	1.032E+01	506	8.942E+00	547	1.262E+01
384	5.060E-02	425	2.192E-01	466	1.009E+01	507	9.074E+00	548	1.271E+01
385	3.110E-02	426	2.593E-01	467	9.920E+00	508	9.199E+00	549	1.280E+01
386	2.640E-02	427	3.292E-01	468	9.772E+00	509	9.322E+00	550	1.289E+01
387	2.130E-02	428	4.064E-01	469	9.622E+00	510	9.437E+00	551	1.297E+01
388	1.810E-02	429	4.839E-01	470	9.464E+00	511	9.549E+00	552	1.305E+01
389	2.930E-02	430	5.701E-01	471	9.286E+00	512	9.666E+00	553	1.315E+01
390	3.090E-02	431	6.741E-01	472	9.088E+00	513	9.773E+00	554	1.325E+01
391	1.470E-02	432	7.956E-01	473	8.844E+00	514	9.884E+00	555	1.334E+01
392	1.040E-02	433	9.055E-01	474	8.571E+00	515	9.991E+00	556	1.343E+01
393	1.700E-02	434	1.035E+00	475	8.287E+00	516	1.009E+01	557	1.351E+01
394	2.220E-02	435	1.195E+00	476	7.991E+00	517	1.017E+01	558	1.359E+01
395	1.980E-02	436	1.374E+00	477	7.715E+00	518	1.026E+01	559	1.369E+01
396	1.630E-02	437	1.569E+00	478	7.471E+00	519	1.036E+01	560	1.379E+01
397	1.240E-02	438	1.802E+00	479	7.273E+00	520	1.045E+01	561	1.388E+01
398	8.500E-03	439	2.056E+00	480	7.108E+00	521	1.054E+01	562	1.399E+01
399	4.000E-03	440	2.339E+00	481	6.990E+00	522	1.063E+01	563	1.409E+01
400	1.770E-02	441	2.678E+00	482	6.921E+00	523	1.071E+01	564	1.419E+01
401	2.080E-02	442	3.060E+00	483	6.880E+00	524	1.079E+01	565	1.428E+01
402	2.020E-02	443	3.504E+00	484	6.877E+00	525	1.087E+01	566	1.437E+01
403	2.040E-02	444	4.020E+00	485	6.894E+00	526	1.095E+01	567	1.447E+01
404	2.310E-02	445	4.614E+00	486	6.932E+00	527	1.103E+01	568	1.459E+01
405	2.690E-02	446	5.296E+00	487	6.983E+00	528	1.111E+01	569	1.470E+01
406	3.250E-02	447	6.070E+00	488	7.044E+00	529	1.120E+01	570	1.480E+01
407	3.440E-02	448	6.940E+00	489	7.105E+00	530	1.128E+01	571	1.490E+01
408	2.730E-02	449	7.900E+00	490	7.175E+00	531	1.135E+01	572	1.500E+01
409	4.310E-02	450	8.884E+00	491	7.241E+00	532	1.144E+01	573	1.513E+01
410	4.640E-02	451	9.878E+00	492	7.317E+00	533	1.152E+01	574	1.525E+01
411	3.340E-02	452	1.084E+01	493	7.400E+00	534	1.159E+01	575	1.537E+01
412	2.950E-02	453	1.173E+01	494	7.480E+00	535	1.165E+01	576	1.548E+01
413	3.080E-02	454	1.245E+01	495	7.569E+00	536	1.173E+01	577	1.560E+01
414	3.270E-02	455	1.297E+01	496	7.674E+00	537	1.181E+01	578	1.572E+01
415	3.940E-02	456	1.326E+01	497	7.787E+00	538	1.188E+01	579	1.586E+01
416	4.490E-02	457	1.330E+01	498	7.903E+00	539	1.196E+01	580	1.600E+01
417	5.070E-02	458	1.314E+01	499	8.026E+00	540	1.204E+01	581	1.610E+01
418	6.800E-02	459	1.286E+01	500	8.159E+00	541	1.212E+01	582	1.622E+01
419	7.020E-02	460	1.246E+01	501	8.288E+00	542	1.220E+01	583	1.637E+01
420	9.430E-02	461	1.196E+01	502	8.418E+00	543	1.228E+01	584	1.649E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.663E+01	626	1.937E+01	667	1.291E+01	708	4.938E+00	749	1.151E+00
586	1.677E+01	627	1.932E+01	668	1.267E+01	709	4.764E+00	750	1.156E+00
587	1.691E+01	628	1.925E+01	669	1.243E+01	710	4.595E+00	751	1.131E+00
588	1.705E+01	629	1.919E+01	670	1.221E+01	711	4.436E+00	752	1.088E+00
589	1.719E+01	630	1.912E+01	671	1.198E+01	712	4.324E+00	753	1.037E+00
590	1.731E+01	631	1.904E+01	672	1.174E+01	713	4.218E+00	754	9.522E-01
591	1.744E+01	632	1.897E+01	673	1.151E+01	714	4.075E+00	755	8.999E-01
592	1.757E+01	633	1.888E+01	674	1.130E+01	715	3.933E+00	756	8.801E-01
593	1.771E+01	634	1.877E+01	675	1.110E+01	716	3.782E+00	757	7.391E-01
594	1.783E+01	635	1.864E+01	676	1.087E+01	717	3.688E+00	758	6.745E-01
595	1.794E+01	636	1.855E+01	677	1.063E+01	718	3.557E+00	759	6.837E-01
596	1.809E+01	637	1.845E+01	678	1.040E+01	719	3.444E+00	760	6.319E-01
597	1.822E+01	638	1.833E+01	679	1.016E+01	720	3.332E+00	761	6.591E-01
598	1.833E+01	639	1.819E+01	680	9.955E+00	721	3.220E+00	762	7.279E-01
599	1.844E+01	640	1.806E+01	681	9.761E+00	722	3.141E+00	763	7.239E-01
600	1.855E+01	641	1.792E+01	682	9.571E+00	723	3.017E+00	764	6.167E-01
601	1.867E+01	642	1.777E+01	683	9.357E+00	724	2.897E+00	765	5.503E-01
602	1.877E+01	643	1.763E+01	684	9.133E+00	725	2.805E+00	766	5.338E-01
603	1.886E+01	644	1.748E+01	685	8.928E+00	726	2.695E+00	767	5.611E-01
604	1.897E+01	645	1.732E+01	686	8.746E+00	727	2.630E+00	768	5.447E-01
605	1.906E+01	646	1.716E+01	687	8.569E+00	728	2.561E+00	769	4.857E-01
606	1.915E+01	647	1.700E+01	688	8.346E+00	729	2.511E+00	770	4.378E-01
607	1.923E+01	648	1.684E+01	689	8.116E+00	730	2.412E+00	771	4.519E-01
608	1.929E+01	649	1.667E+01	690	7.933E+00	731	2.331E+00	772	4.500E-01
609	1.935E+01	650	1.648E+01	691	7.752E+00	732	2.229E+00	773	3.974E-01
610	1.942E+01	651	1.628E+01	692	7.549E+00	733	2.125E+00	774	3.692E-01
611	1.947E+01	652	1.608E+01	693	7.362E+00	734	2.081E+00	775	3.636E-01
612	1.952E+01	653	1.588E+01	694	7.194E+00	735	1.999E+00	776	3.317E-01
613	1.954E+01	654	1.569E+01	695	6.999E+00	736	1.917E+00	777	3.261E-01
614	1.956E+01	655	1.549E+01	696	6.819E+00	737	1.814E+00	778	3.056E-01
615	1.957E+01	656	1.529E+01	697	6.663E+00	738	1.714E+00	779	3.127E-01
616	1.959E+01	657	1.509E+01	698	6.484E+00	739	1.665E+00	780	2.642E-01
617	1.961E+01	658	1.487E+01	699	6.288E+00	740	1.666E+00		
618	1.962E+01	659	1.467E+01	700	6.126E+00	741	1.649E+00		
619	1.960E+01	660	1.444E+01	701	5.980E+00	742	1.613E+00		
620	1.959E+01	661	1.422E+01	702	5.800E+00	743	1.484E+00		
621	1.957E+01	662	1.401E+01	703	5.630E+00	744	1.381E+00		
622	1.953E+01	663	1.379E+01	704	5.486E+00	745	1.287E+00		
623	1.950E+01	664	1.357E+01	705	5.335E+00	746	1.236E+00		
624	1.946E+01	665	1.333E+01	706	5.201E+00	747	1.221E+00		
625	1.941E+01	666	1.312E+01	707	5.080E+00	748	1.193E+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**

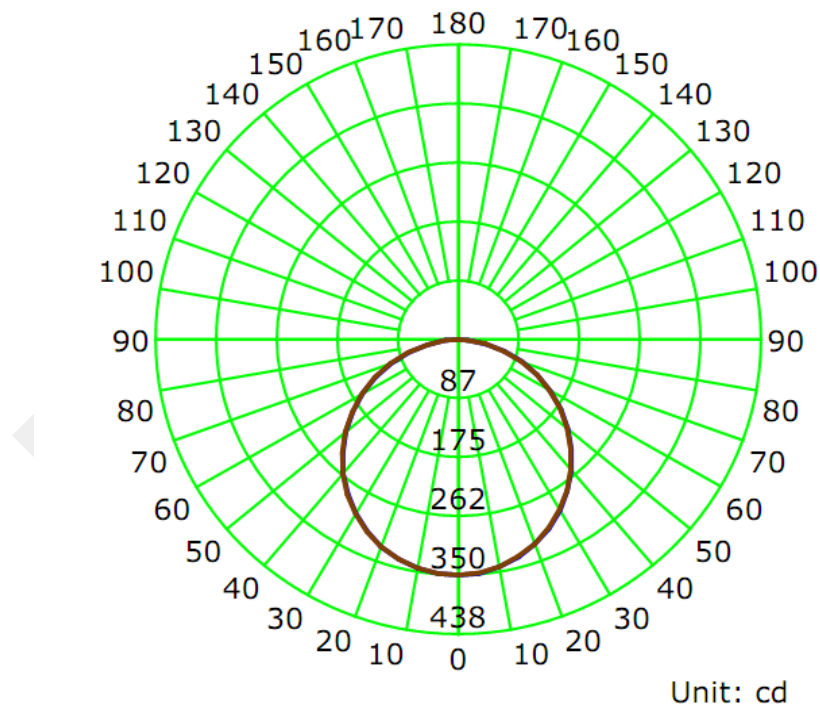
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0960	11.54	0.9970

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1017	88.18	350.5	1.26	1.25

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	113.3	113.3	113.2	113.3	113.3
Field Angle (10% I_{max}):	163.4	163.4	163.1	163.3	163.3

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	351	351	351	351	351	351	351	351
5.0°	349	348	348	348	348	349	349	349
10.0°	343	343	343	343	343	343	344	345
15.0°	335	335	334	334	334	335	337	338
20.0°	324	323	323	323	323	324	326	327
25.0°	311	309	309	308	309	310	312	314
30.0°	294	293	292	292	293	294	296	298
35.0°	275	274	273	273	274	276	278	280
40.0°	255	253	252	251	253	255	257	259
45.0°	232	230	229	229	230	232	235	237
50.0°	207	205	204	204	205	208	210	213
55.0°	181	179	178	178	179	182	185	187
60.0°	154	153	151	151	152	155	158	161
65.0°	126	124	124	124	125	127	130	133
70.0°	98	96	96	96	97	99	102	105
75.0°	70	68	67	67	68	70	73	76
80.0°	42	40	39	38	40	42	45	48
85.0°	15	13	12	11	13	15	18	20
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

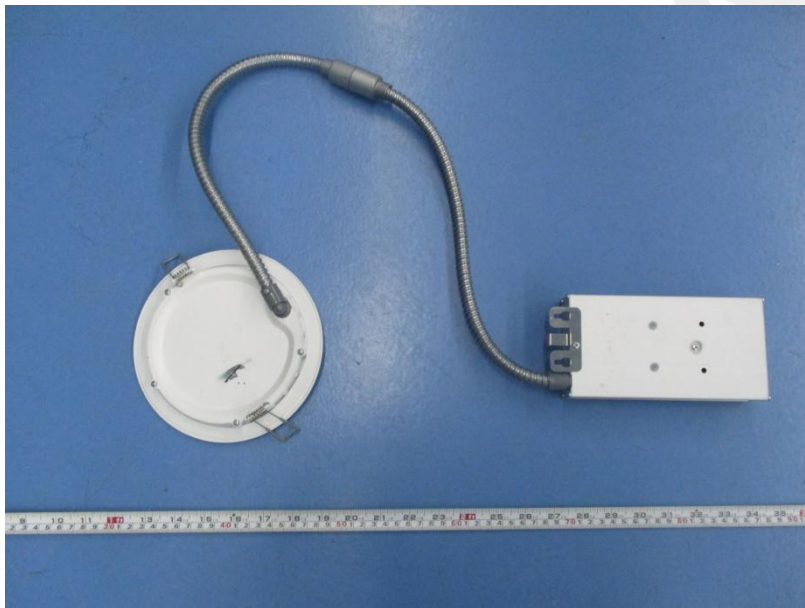
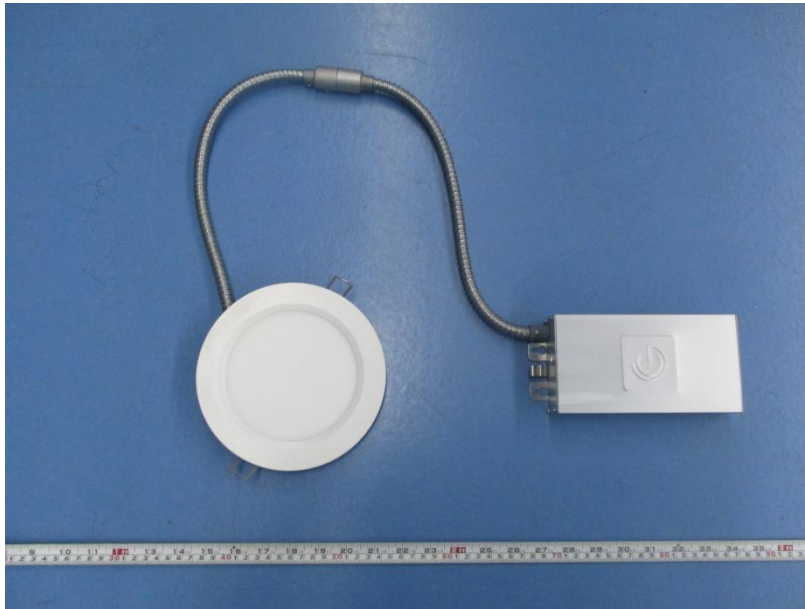
Luminous Intensity (cd) Distribution Data (cont.)

C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	351	351	351	351	351	351	351	351
5.0°	349	350	350	349	349	349	349	349
10.0°	345	346	346	346	345	345	344	344
15.0°	338	338	339	338	338	337	337	336
20.0°	328	328	329	329	328	327	326	325
25.0°	315	316	316	316	315	314	312	311
30.0°	299	300	301	300	299	298	296	295
35.0°	281	282	283	282	281	280	278	276
40.0°	260	262	262	262	261	259	257	255
45.0°	238	239	240	240	238	236	234	232
50.0°	213	215	216	215	214	212	209	207
55.0°	188	190	190	190	188	187	184	181
60.0°	161	163	163	163	162	160	157	154
65.0°	133	135	136	135	134	132	129	126
70.0°	105	106	107	107	106	103	101	98
75.0°	76	78	79	78	77	75	72	69
80.0°	47	49	50	49	48	46	43	41
85.0°	20	22	23	21	20	18	17	13
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	8.4	0.82	0-5	8.4	0.82
5-10	24.8	2.44	0-10	33.2	3.26
10-15	40.4	3.97	0-15	73.5	7.23
15-20	54.6	5.37	0-20	128.1	12.60
20-25	66.9	6.58	0-25	195.0	19.18
25-30	77.0	7.57	0-30	272.0	26.75
30-35	84.5	8.31	0-35	356.5	35.06
35-40	89.2	8.77	0-40	445.7	43.83
40-45	91.0	8.94	0-45	536.7	52.77
45-50	89.7	8.82	0-50	626.4	61.59
50-55	85.7	8.42	0-55	712.1	70.02
55-60	78.9	7.76	0-60	791.0	77.78
60-65	69.7	6.86	0-65	860.8	84.64
65-70	58.5	5.75	0-70	919.2	90.38
70-75	45.4	4.47	0-75	964.6	94.85
75-80	31.2	3.07	0-80	995.8	97.91
80-85	16.6	1.63	0-85	1012.4	99.54
85-90	4.6	0.45	0-90	1017.0	100.00
90-95	0.0	0.00	0-95	1017.0	100.00
95-100	0.0	0.00	0-100	1017.0	100.00
100-105	0.0	0.00	0-105	1017.0	100.00
105-110	0.0	0.00	0-110	1017.0	100.00
110-115	0.0	0.00	0-115	1017.0	100.00
115-120	0.0	0.00	0-120	1017.0	100.00
120-125	0.0	0.00	0-125	1017.0	100.00
125-130	0.0	0.00	0-130	1017.0	100.00
130-135	0.0	0.00	0-135	1017.0	100.00
135-140	0.0	0.00	0-140	1017.0	100.00
140-145	0.0	0.00	0-145	1017.0	100.00
145-150	0.0	0.00	0-150	1017.0	100.00
150-155	0.0	0.00	0-155	1017.0	100.00
155-160	0.0	0.00	0-160	1017.0	100.00
160-165	0.0	0.00	0-165	1017.0	100.00
165-170	0.0	0.00	0-170	1017.0	100.00
170-175	0.0	0.00	0-175	1017.0	100.00
175-180	0.0	0.00	0-180	1017.0	100.00

6. Product Photo



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