

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 10NCDLR4DIM/935/277V/EXT

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180510002-10-1
Test Date:	2018-05-10 to 2018-05-14
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: 10NCDLR4DIM/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: 10W
 Nominal CCT: 3500K
 Nominal Lumen Output: 720lm

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**

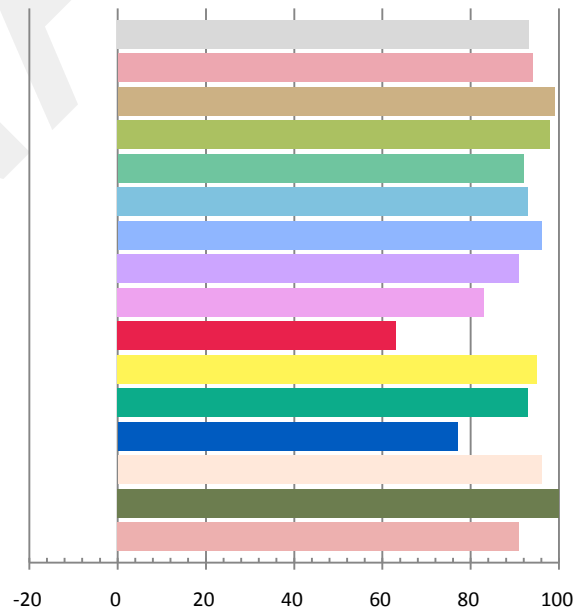
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.0771	9.23	0.9972	766.4	83.04

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.598	3442	-0.00031	0.4083	0.3915	0.2373	0.5120

Color Rendering Index

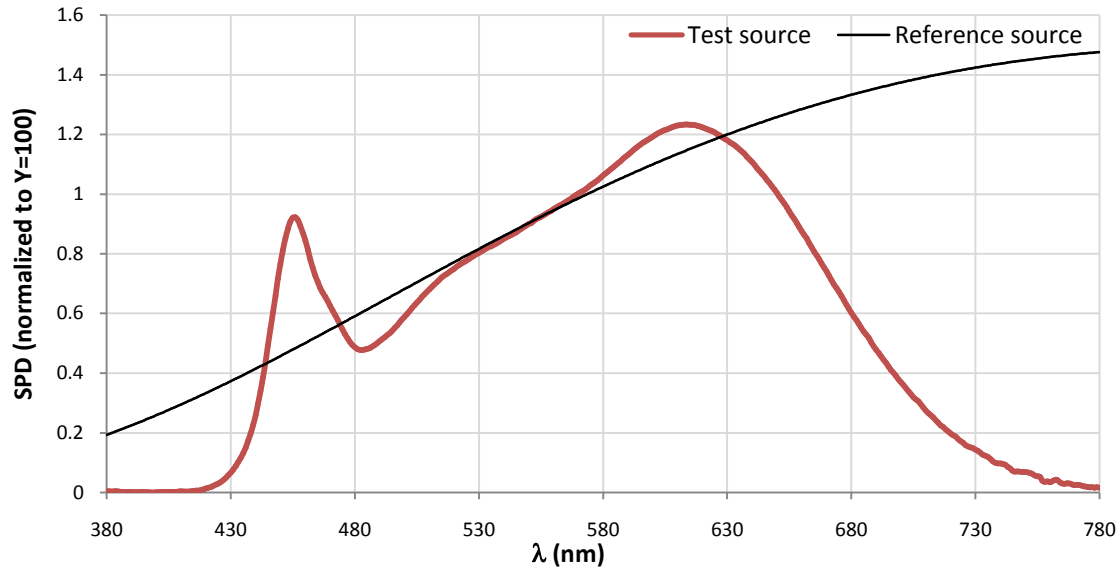
Ra 93.2			
R1 94	R2 99	R3 98	R4 92
R5 93	R6 96	R7 91	R8 83
R9 63	R10 95	R11 93	R12 77
R13 96	R14 100	R15 91	



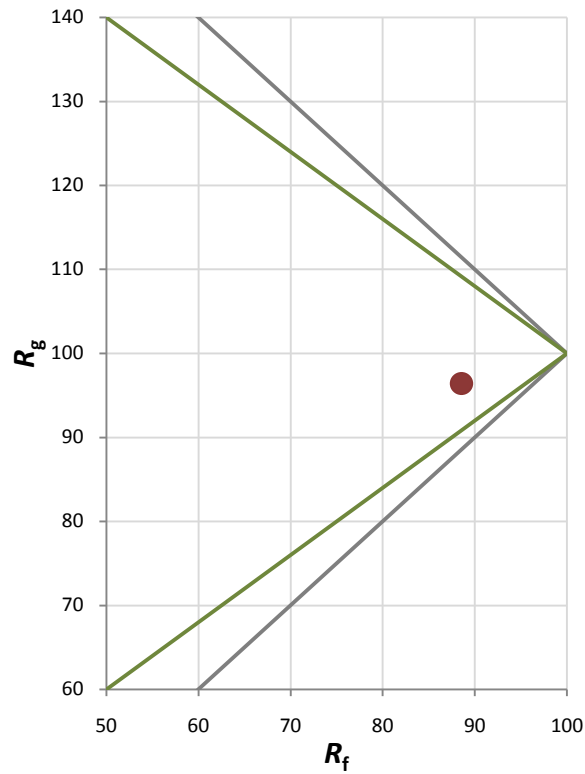
Fidelity Index and Gamut Index

Fidelity Index R_f	89
Gamut Index R_g	96

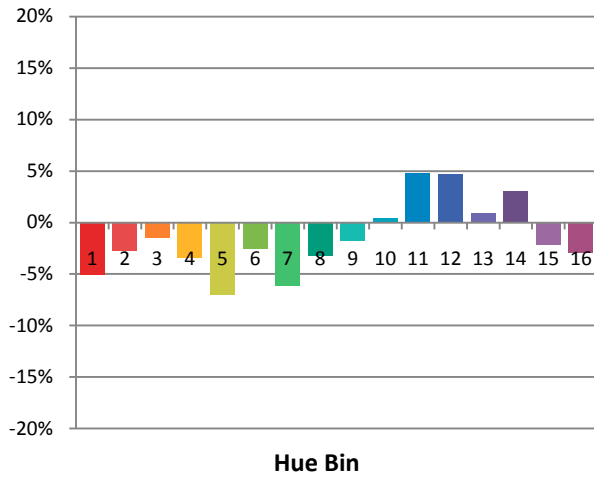
Spectral Power Distribution Comparison



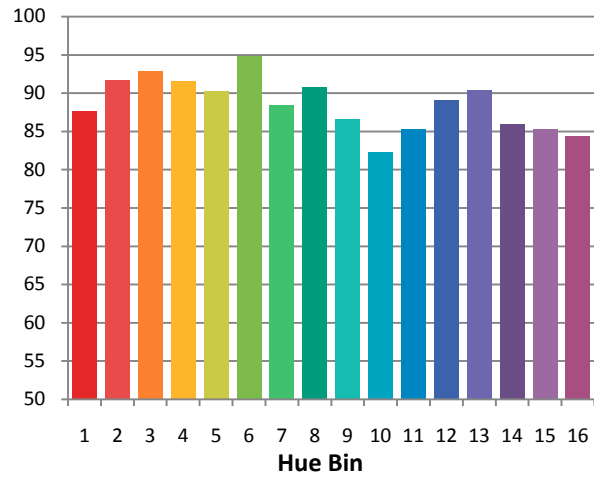
Plot of R_g versus R_f



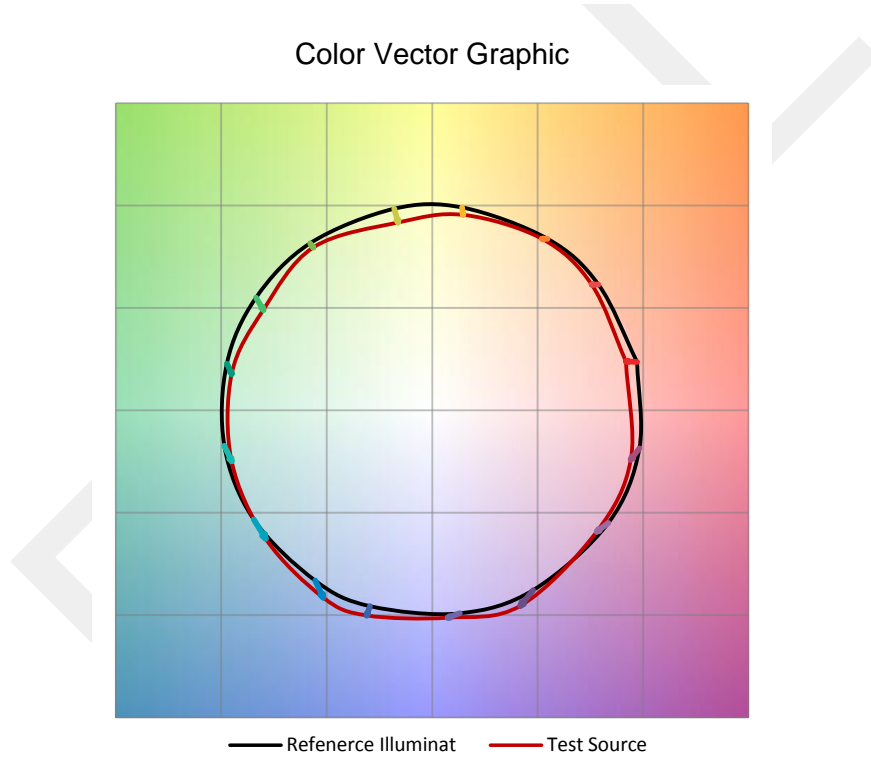
Chroma Shift by Hue



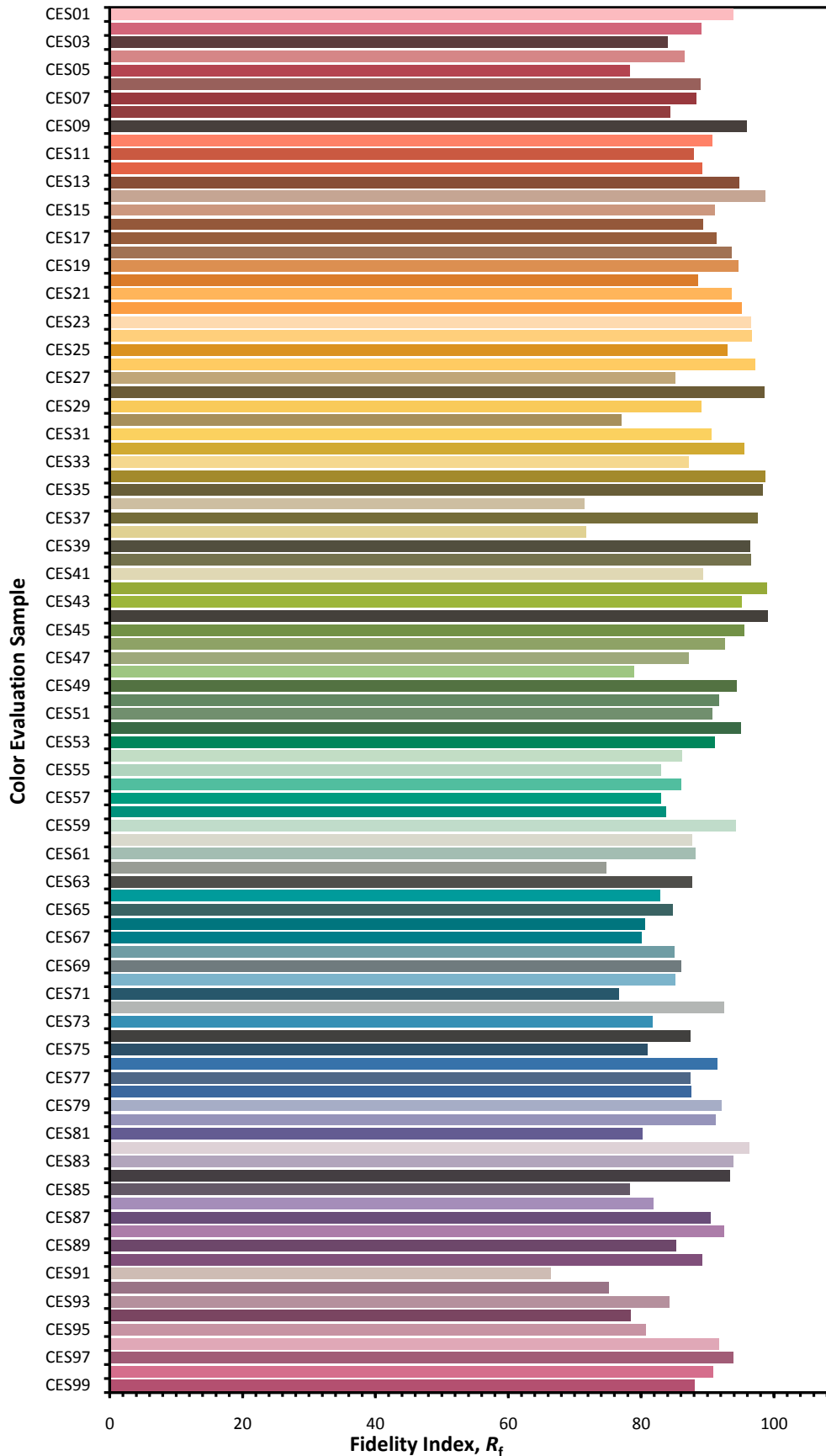
R_f by Hue



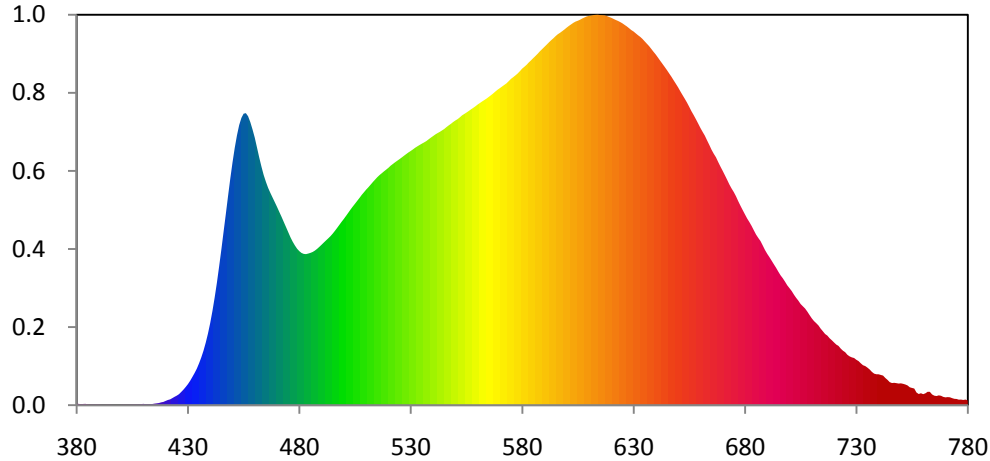
Color Vector Graphic



Color Fidelity by CES Sample



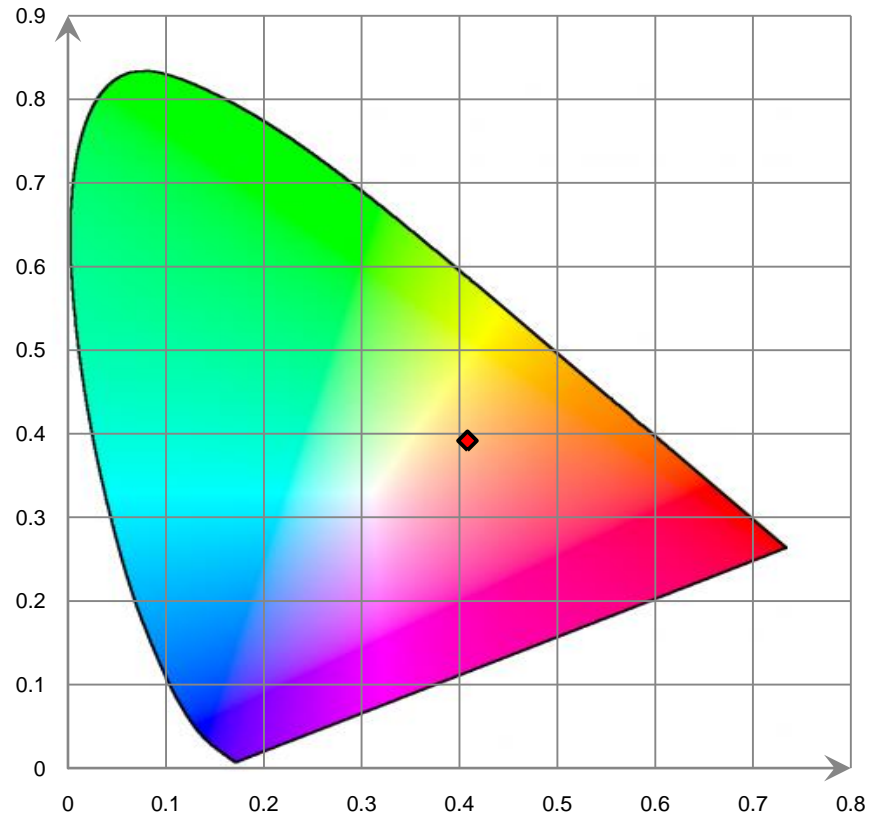
Relative Spectral Power Distribution



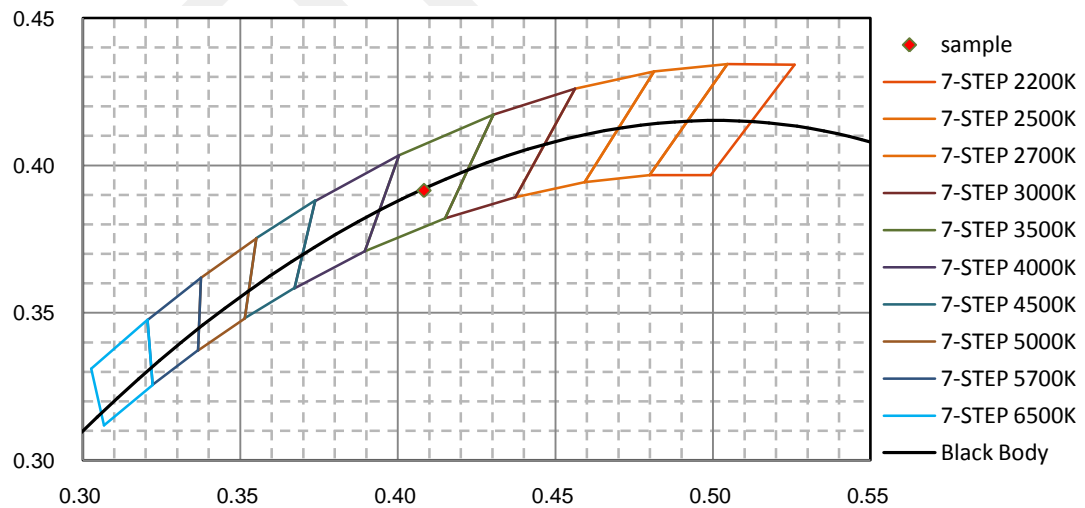
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.310E-02	421	1.844E-01	462	8.779E+00	503	6.935E+00	544	9.736E+00
381	4.620E-02	422	2.063E-01	463	8.452E+00	504	7.040E+00	545	9.787E+00
382	3.330E-02	423	2.508E-01	464	8.158E+00	505	7.142E+00	546	9.852E+00
383	4.230E-02	424	2.965E-01	465	7.915E+00	506	7.242E+00	547	9.913E+00
384	4.730E-02	425	3.397E-01	466	7.701E+00	507	7.345E+00	548	9.969E+00
385	2.980E-02	426	3.905E-01	467	7.523E+00	508	7.451E+00	549	1.003E+01
386	2.220E-02	427	4.687E-01	468	7.358E+00	509	7.547E+00	550	1.009E+01
387	2.060E-02	428	5.518E-01	469	7.192E+00	510	7.639E+00	551	1.014E+01
388	1.960E-02	429	6.444E-01	470	7.027E+00	511	7.725E+00	552	1.020E+01
389	2.470E-02	430	7.462E-01	471	6.850E+00	512	7.815E+00	553	1.027E+01
390	2.440E-02	431	8.651E-01	472	6.678E+00	513	7.908E+00	554	1.032E+01
391	1.110E-02	432	1.002E+00	473	6.497E+00	514	7.996E+00	555	1.037E+01
392	7.300E-03	433	1.142E+00	474	6.315E+00	515	8.081E+00	556	1.042E+01
393	1.190E-02	434	1.297E+00	475	6.136E+00	516	8.155E+00	557	1.048E+01
394	1.740E-02	435	1.485E+00	476	5.954E+00	517	8.220E+00	558	1.054E+01
395	1.760E-02	436	1.695E+00	477	5.797E+00	518	8.287E+00	559	1.059E+01
396	8.200E-03	437	1.934E+00	478	5.661E+00	519	8.348E+00	560	1.065E+01
397	5.300E-03	438	2.218E+00	479	5.545E+00	520	8.413E+00	561	1.071E+01
398	2.700E-03	439	2.539E+00	480	5.458E+00	521	8.488E+00	562	1.076E+01
399	1.500E-03	440	2.912E+00	481	5.394E+00	522	8.550E+00	563	1.081E+01
400	1.320E-02	441	3.337E+00	482	5.361E+00	523	8.610E+00	564	1.086E+01
401	1.680E-02	442	3.817E+00	483	5.354E+00	524	8.666E+00	565	1.092E+01
402	1.830E-02	443	4.341E+00	484	5.374E+00	525	8.722E+00	566	1.098E+01
403	1.730E-02	444	4.915E+00	485	5.398E+00	526	8.781E+00	567	1.105E+01
404	1.900E-02	445	5.518E+00	486	5.431E+00	527	8.842E+00	568	1.112E+01
405	2.000E-02	446	6.145E+00	487	5.480E+00	528	8.901E+00	569	1.118E+01
406	2.330E-02	447	6.769E+00	488	5.541E+00	529	8.959E+00	570	1.124E+01
407	2.450E-02	448	7.405E+00	489	5.612E+00	530	9.010E+00	571	1.129E+01
408	2.130E-02	449	8.025E+00	490	5.687E+00	531	9.066E+00	572	1.135E+01
409	3.800E-02	450	8.594E+00	491	5.765E+00	532	9.124E+00	573	1.141E+01
410	4.700E-02	451	9.117E+00	492	5.840E+00	533	9.174E+00	574	1.148E+01
411	3.520E-02	452	9.562E+00	493	5.914E+00	534	9.223E+00	575	1.156E+01
412	3.340E-02	453	9.928E+00	494	5.992E+00	535	9.269E+00	576	1.163E+01
413	3.400E-02	454	1.018E+01	495	6.081E+00	536	9.313E+00	577	1.169E+01
414	4.210E-02	455	1.033E+01	496	6.181E+00	537	9.359E+00	578	1.175E+01
415	5.560E-02	456	1.035E+01	497	6.286E+00	538	9.421E+00	579	1.184E+01
416	6.630E-02	457	1.024E+01	498	6.395E+00	539	9.480E+00	580	1.193E+01
417	7.720E-02	458	1.003E+01	499	6.503E+00	540	9.536E+00	581	1.199E+01
418	1.007E-01	459	9.770E+00	500	6.603E+00	541	9.592E+00	582	1.206E+01
419	1.167E-01	460	9.481E+00	501	6.711E+00	542	9.640E+00	583	1.215E+01
420	1.508E-01	461	9.132E+00	502	6.823E+00	543	9.684E+00	584	1.222E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.230E+01	626	1.348E+01	667	8.786E+00	708	3.318E+00	749	7.668E-01
586	1.238E+01	627	1.342E+01	668	8.619E+00	709	3.196E+00	750	7.730E-01
587	1.246E+01	628	1.336E+01	669	8.458E+00	710	3.079E+00	751	7.570E-01
588	1.254E+01	629	1.329E+01	670	8.309E+00	711	2.981E+00	752	7.333E-01
589	1.262E+01	630	1.324E+01	671	8.151E+00	712	2.908E+00	753	6.989E-01
590	1.270E+01	631	1.318E+01	672	7.992E+00	713	2.825E+00	754	6.342E-01
591	1.277E+01	632	1.311E+01	673	7.826E+00	714	2.713E+00	755	6.100E-01
592	1.286E+01	633	1.305E+01	674	7.682E+00	715	2.618E+00	756	5.907E-01
593	1.293E+01	634	1.298E+01	675	7.553E+00	716	2.522E+00	757	4.492E-01
594	1.300E+01	635	1.289E+01	676	7.404E+00	717	2.466E+00	758	3.961E-01
595	1.308E+01	636	1.281E+01	677	7.228E+00	718	2.372E+00	759	4.234E-01
596	1.315E+01	637	1.272E+01	678	7.067E+00	719	2.301E+00	760	3.902E-01
597	1.320E+01	638	1.262E+01	679	6.915E+00	720	2.223E+00	761	4.203E-01
598	1.326E+01	639	1.252E+01	680	6.765E+00	721	2.148E+00	762	4.742E-01
599	1.331E+01	640	1.243E+01	681	6.616E+00	722	2.101E+00	763	4.735E-01
600	1.338E+01	641	1.232E+01	682	6.489E+00	723	2.006E+00	764	3.806E-01
601	1.344E+01	642	1.220E+01	683	6.353E+00	724	1.931E+00	765	3.376E-01
602	1.350E+01	643	1.210E+01	684	6.196E+00	725	1.878E+00	766	3.235E-01
603	1.355E+01	644	1.199E+01	685	6.047E+00	726	1.785E+00	767	3.471E-01
604	1.360E+01	645	1.188E+01	686	5.927E+00	727	1.730E+00	768	3.328E-01
605	1.363E+01	646	1.176E+01	687	5.815E+00	728	1.694E+00	769	2.951E-01
606	1.366E+01	647	1.164E+01	688	5.660E+00	729	1.671E+00	770	2.770E-01
607	1.370E+01	648	1.152E+01	689	5.501E+00	730	1.610E+00	771	2.858E-01
608	1.374E+01	649	1.139E+01	690	5.366E+00	731	1.563E+00	772	2.790E-01
609	1.378E+01	650	1.127E+01	691	5.246E+00	732	1.485E+00	773	2.492E-01
610	1.380E+01	651	1.112E+01	692	5.120E+00	733	1.416E+00	774	2.258E-01
611	1.381E+01	652	1.099E+01	693	4.992E+00	734	1.387E+00	775	2.194E-01
612	1.383E+01	653	1.086E+01	694	4.869E+00	735	1.330E+00	776	1.950E-01
613	1.383E+01	654	1.072E+01	695	4.730E+00	736	1.264E+00	777	1.980E-01
614	1.384E+01	655	1.057E+01	696	4.603E+00	737	1.179E+00	778	1.855E-01
615	1.383E+01	656	1.042E+01	697	4.498E+00	738	1.119E+00	779	1.997E-01
616	1.382E+01	657	1.028E+01	698	4.378E+00	739	1.096E+00	780	1.680E-01
617	1.382E+01	658	1.013E+01	699	4.248E+00	740	1.095E+00		
618	1.379E+01	659	9.985E+00	700	4.147E+00	741	1.072E+00		
619	1.376E+01	660	9.828E+00	701	4.045E+00	742	1.049E+00		
620	1.373E+01	661	9.687E+00	702	3.916E+00	743	9.659E-01		
621	1.369E+01	662	9.552E+00	703	3.805E+00	744	8.967E-01		
622	1.365E+01	663	9.388E+00	704	3.702E+00	745	8.166E-01		
623	1.362E+01	664	9.226E+00	705	3.586E+00	746	7.848E-01		
624	1.358E+01	665	9.057E+00	706	3.506E+00	747	7.926E-01		
625	1.353E+01	666	8.911E+00	707	3.427E+00	748	7.806E-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**

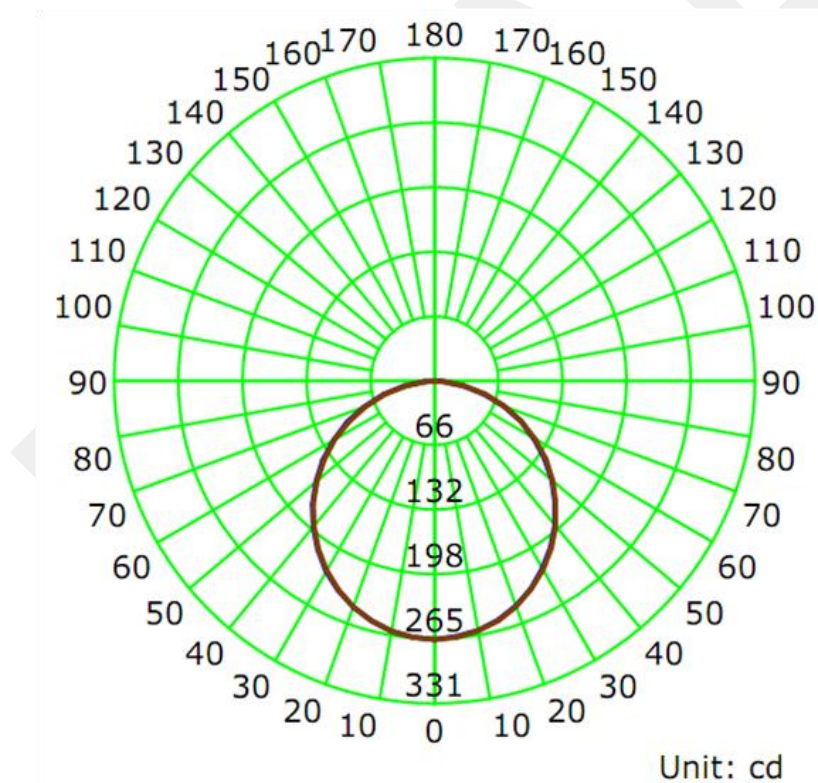
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0770	9.21	0.9980

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
768.9	83.54	265.1	1.26	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	113.7	113.7	113.7	113.8	113.7
Field Angle (10% I _{max}):	162.6	162.7	161.7	162.8	162.5

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	265	265	265	265	265	265	265	265
5.0°	264	263	264	264	264	264	264	264
10.0°	260	260	260	260	261	260	261	261
15.0°	254	254	254	254	255	255	255	256
20.0°	246	246	246	246	246	247	247	248
25.0°	235	235	235	236	236	237	237	238
30.0°	223	223	223	223	224	225	225	226
35.0°	209	209	209	209	210	211	212	212
40.0°	194	193	193	194	195	195	196	197
45.0°	177	176	177	177	178	178	180	180
50.0°	158	158	158	159	160	160	162	162
55.0°	139	139	139	140	140	141	142	143
60.0°	119	118	119	119	120	121	122	123
65.0°	98	98	98	98	99	100	101	102
70.0°	76	76	76	76	77	78	79	80
75.0°	54	54	54	53	54	56	57	57
80.0°	32	32	32	30	30	33	35	35
85.0°	6	7	9	10	11	12	13	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

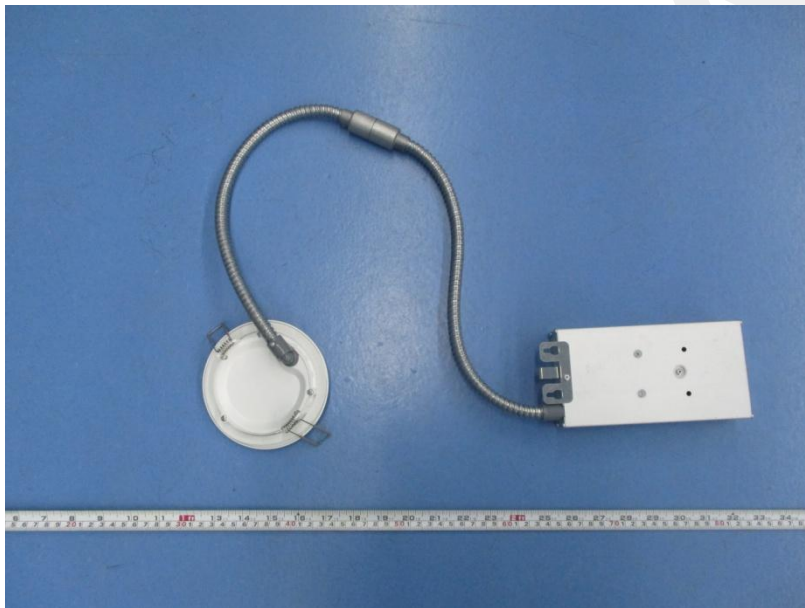
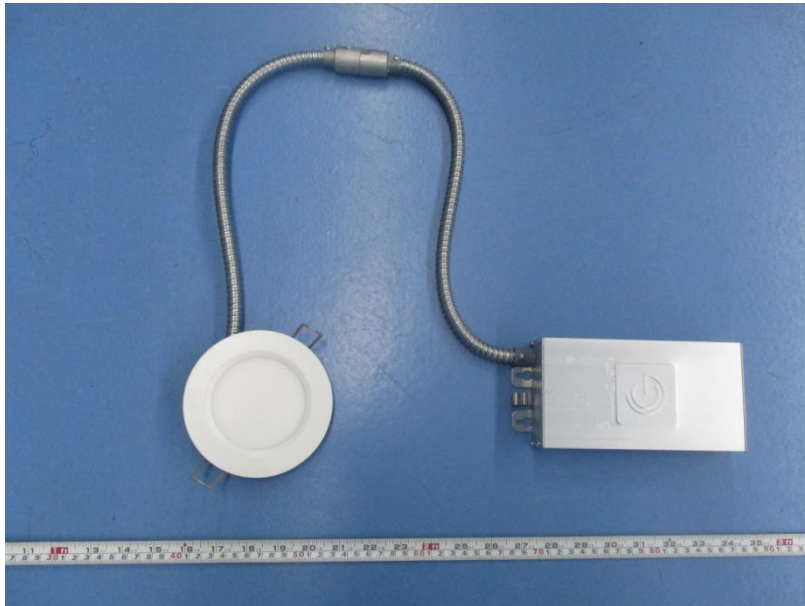
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	265	265	265	265	265	265	265	265
5.0°	264	264	264	264	264	264	264	263
10.0°	261	261	261	261	261	260	260	260
15.0°	255	255	255	255	255	255	254	254
20.0°	247	247	248	247	247	246	246	246
25.0°	237	237	238	237	237	236	236	235
30.0°	225	225	225	225	225	224	223	223
35.0°	211	211	212	211	211	210	209	209
40.0°	196	196	196	196	195	194	194	193
45.0°	179	179	179	178	178	177	176	175
50.0°	161	161	161	160	160	159	158	157
55.0°	141	141	142	141	140	139	138	138
60.0°	121	121	121	121	120	119	118	117
65.0°	100	100	100	100	99	98	97	96
70.0°	78	78	78	77	77	76	75	74
75.0°	55	56	56	54	53	53	53	52
80.0°	33	34	33	31	29	31	31	30
85.0°	12	12	12	11	10	9	7	5
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	6.3	0.82	0-5	6.3	0.82
5-10	18.8	2.44	0-10	25.1	3.26
10-15	30.5	3.97	0-15	55.6	7.23
15-20	41.3	5.37	0-20	96.9	12.61
20-25	50.7	6.59	0-25	147.6	19.19
25-30	58.3	7.58	0-30	205.9	26.77
30-35	64.0	8.32	0-35	269.9	35.10
35-40	67.6	8.79	0-40	337.5	43.89
40-45	69.0	8.97	0-45	406.4	52.86
45-50	68.1	8.86	0-50	474.6	61.72
50-55	65.1	8.47	0-55	539.7	70.19
55-60	60.1	7.82	0-60	599.8	78.01
60-65	53.2	6.91	0-65	653.0	84.92
65-70	44.5	5.78	0-70	697.5	90.71
70-75	34.3	4.46	0-75	731.7	95.16
75-80	23.0	3.00	0-80	754.8	98.16
80-85	11.4	1.48	0-85	766.2	99.64
85-90	2.8	0.36	0-90	768.9	100.00
90-95	0.0	0.00	0-95	768.9	100.00
95-100	0.0	0.00	0-100	768.9	100.00
100-105	0.0	0.00	0-105	768.9	100.00
105-110	0.0	0.00	0-110	768.9	100.00
110-115	0.0	0.00	0-115	768.9	100.00
115-120	0.0	0.00	0-120	768.9	100.00
120-125	0.0	0.00	0-125	768.9	100.00
125-130	0.0	0.00	0-130	768.9	100.00
130-135	0.0	0.00	0-135	768.9	100.00
135-140	0.0	0.00	0-140	768.9	100.00
140-145	0.0	0.00	0-145	768.9	100.00
145-150	0.0	0.00	0-150	768.9	100.00
150-155	0.0	0.00	0-155	768.9	100.00
155-160	0.0	0.00	0-160	768.9	100.00
160-165	0.0	0.00	0-165	768.9	100.00
165-170	0.0	0.00	0-170	768.9	100.00
170-175	0.0	0.00	0-175	768.9	100.00
175-180	0.0	0.00	0-180	768.9	100.00

6. Product Photo



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