

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/940/277V/EXT

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180510002-10-2
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/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: 10W
 Nominal CCT: 4000K
 Nominal Lumen Output: 740lm

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**

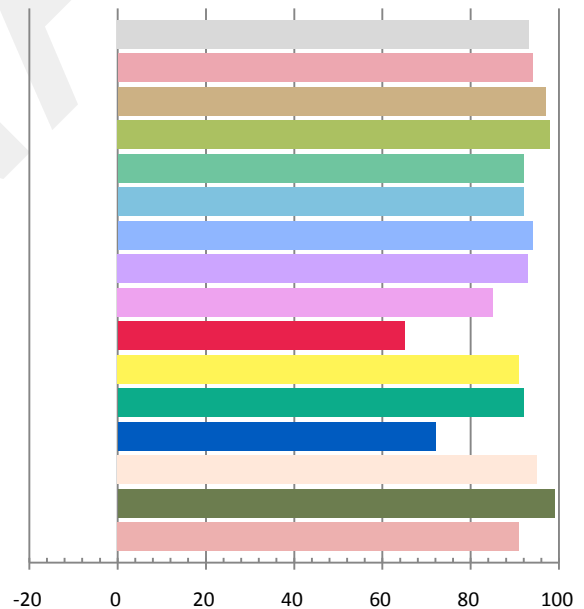
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.0778	9.31	0.9968	778.1	83.57

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.627	4006	0.00085	0.3808	0.3788	0.2245	0.5025

Color Rendering Index

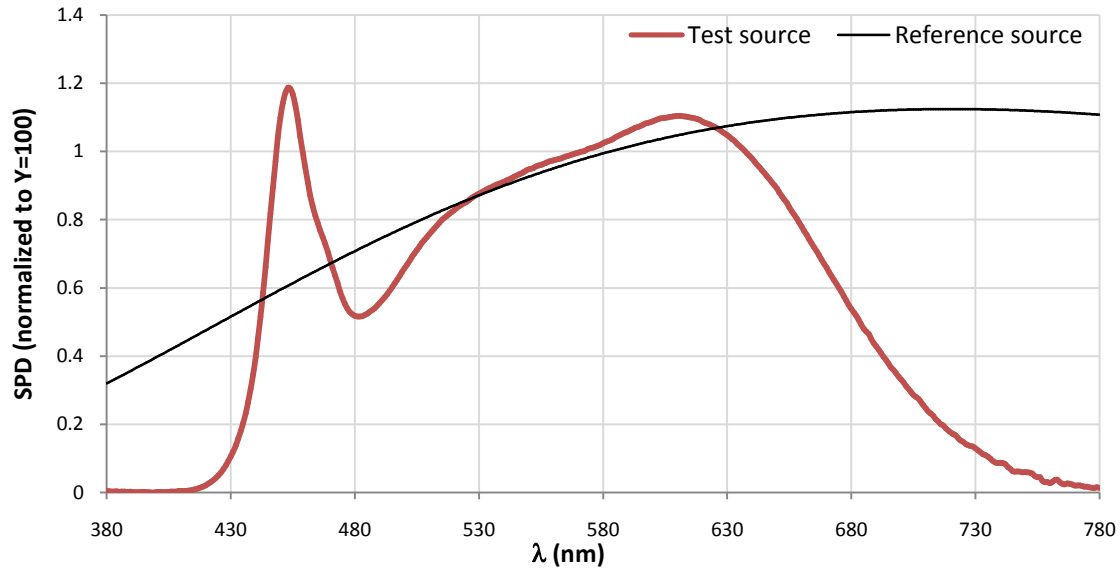
Ra 93.2			
R1 94	R2 97	R3 98	R4 92
R5 92	R6 94	R7 93	R8 85
R9 65	R10 91	R11 92	R12 72
R13 95	R14 99	R15 91	



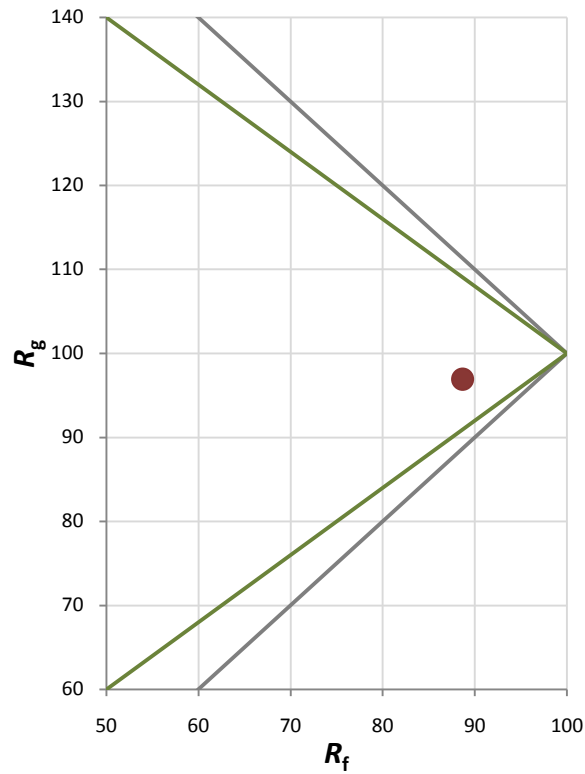
Fidelity Index and Gamut Index

Fidelity Index R_f	89
Gamut Index R_g	97

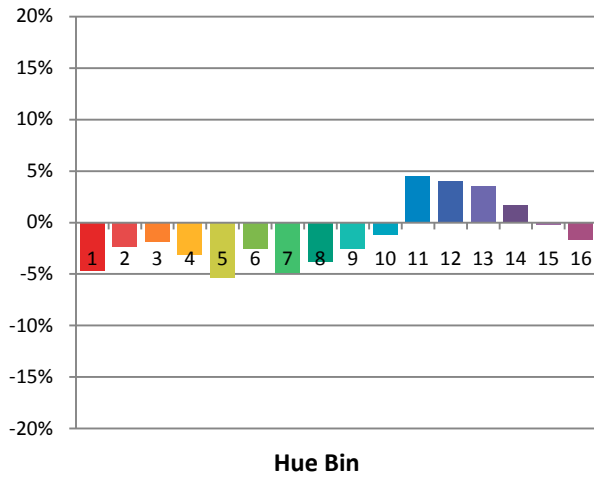
Spectral Power Distribution Comparison



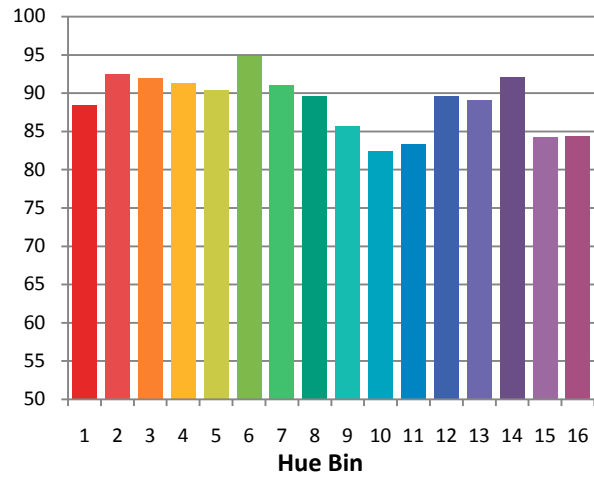
Plot of R_g versus R_f



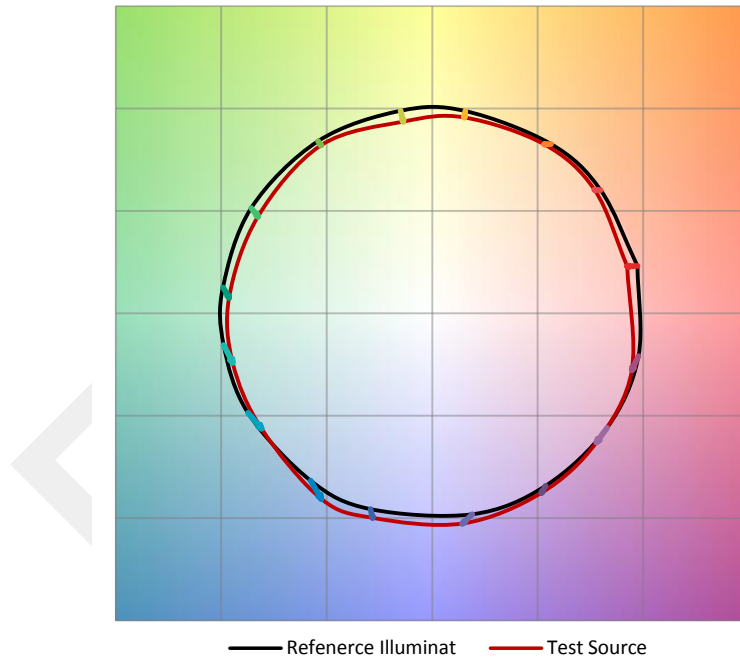
Chroma Shift by Hue



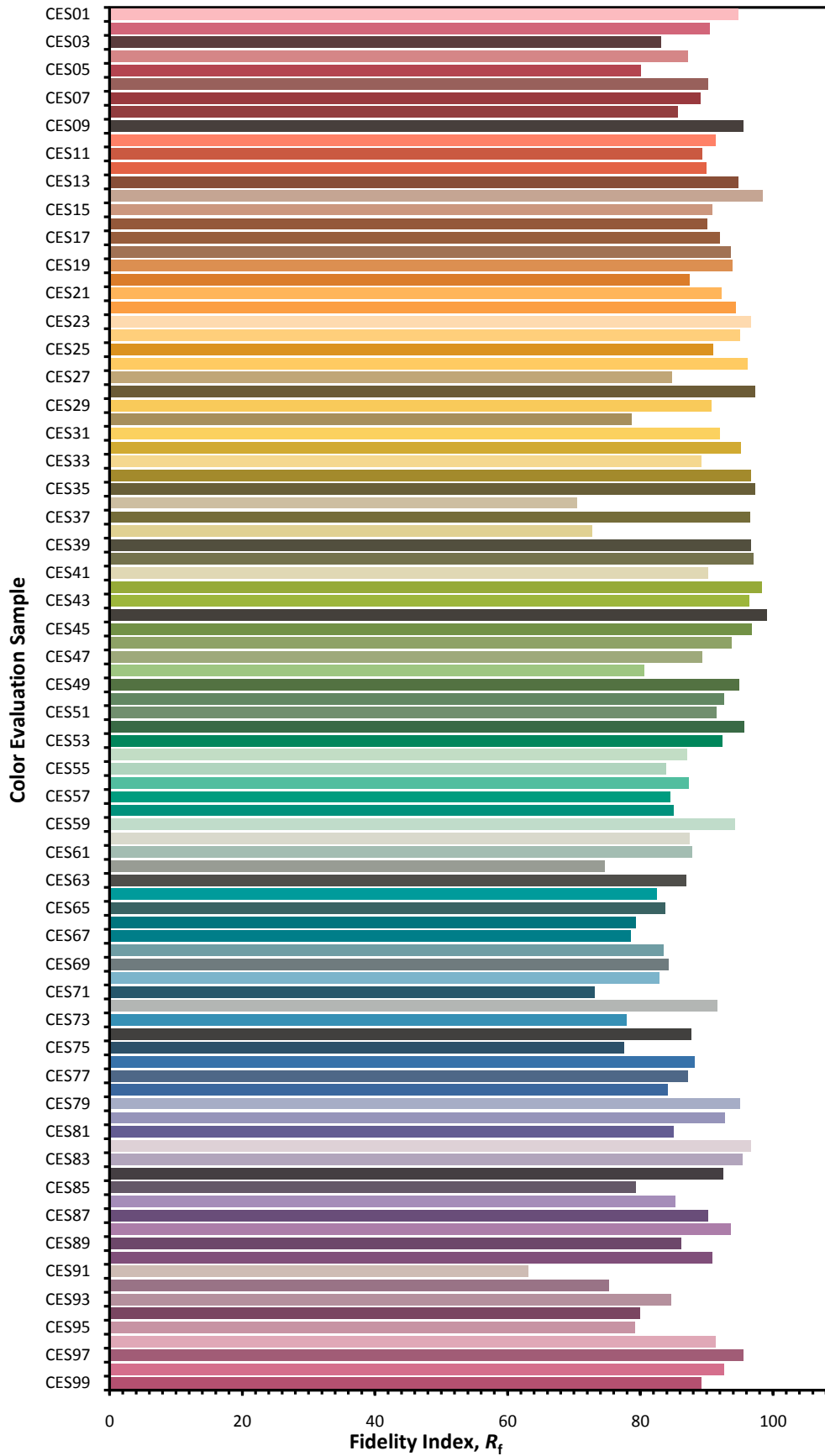
R_f by Hue



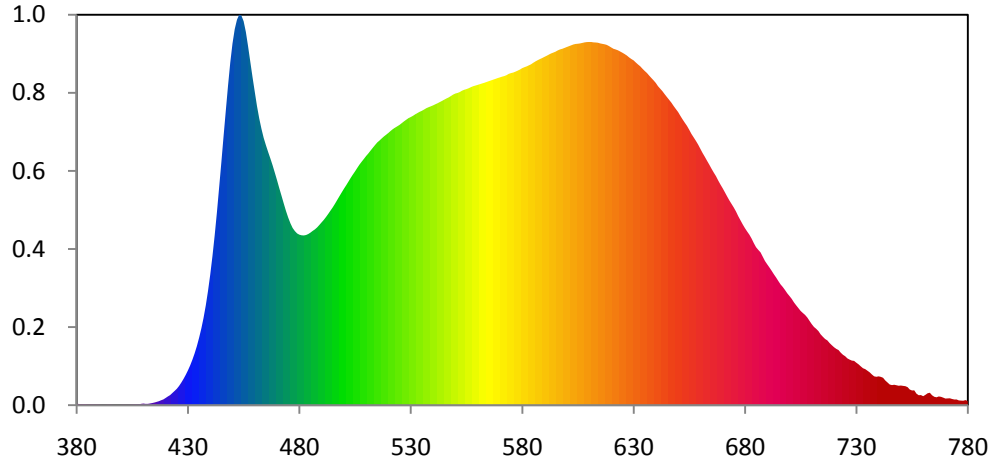
Color Vector Graphic



Color Fidelity by CES Sample



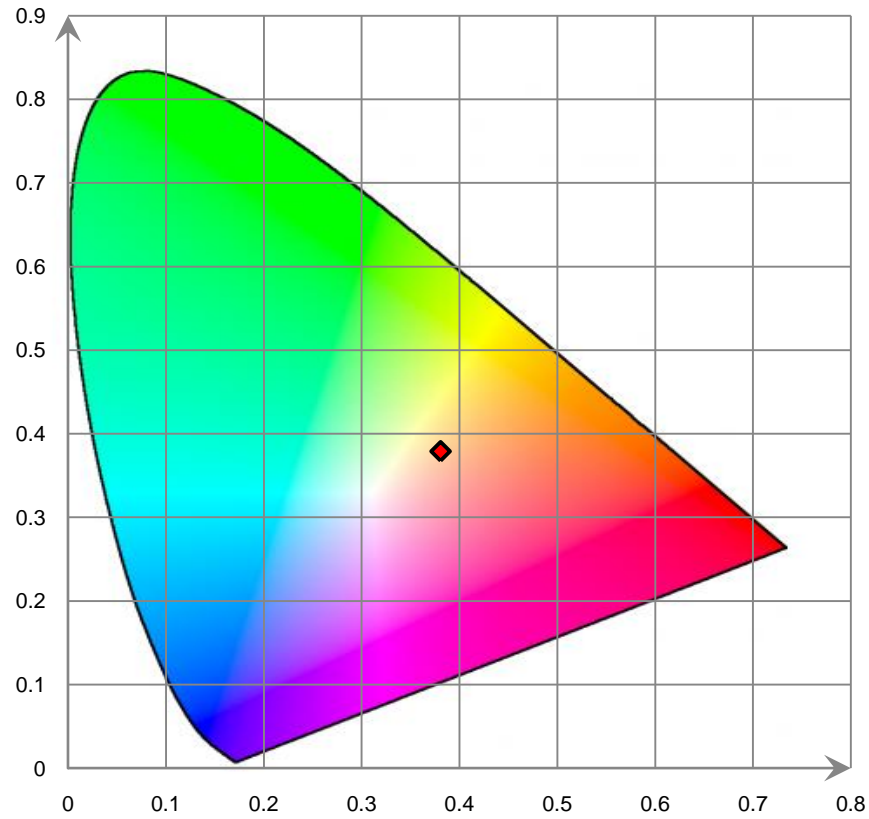
Relative Spectral Power Distribution



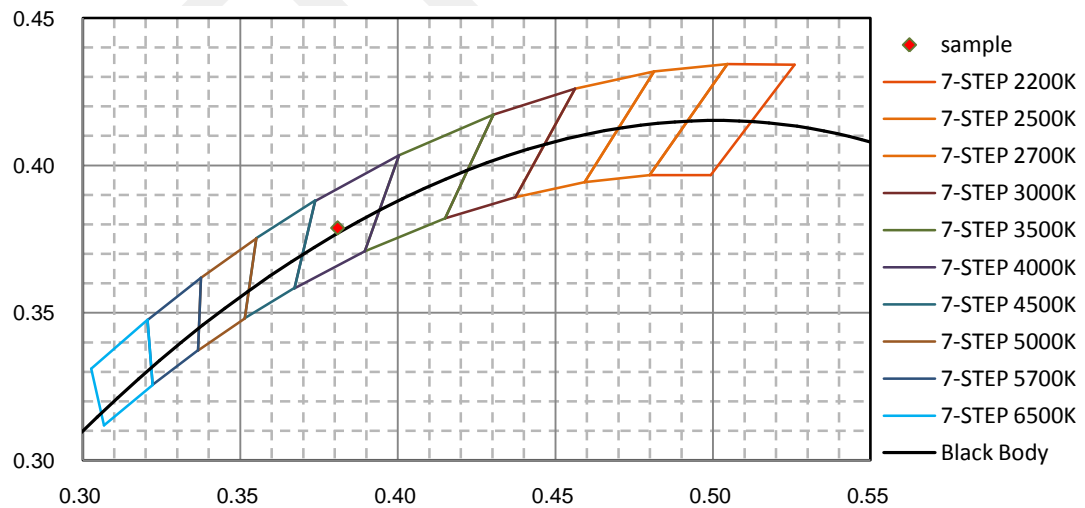
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.900E-02	421	3.026E-01	462	9.931E+00	503	7.865E+00	544	1.053E+01
381	4.250E-02	422	3.484E-01	463	9.569E+00	504	7.983E+00	545	1.058E+01
382	3.020E-02	423	4.209E-01	464	9.256E+00	505	8.096E+00	546	1.062E+01
383	3.520E-02	424	4.915E-01	465	9.002E+00	506	8.215E+00	547	1.066E+01
384	3.770E-02	425	5.669E-01	466	8.768E+00	507	8.332E+00	548	1.070E+01
385	2.240E-02	426	6.627E-01	467	8.544E+00	508	8.433E+00	549	1.075E+01
386	2.790E-02	427	7.795E-01	468	8.308E+00	509	8.530E+00	550	1.079E+01
387	2.770E-02	428	9.057E-01	469	8.051E+00	510	8.630E+00	551	1.081E+01
388	2.260E-02	429	1.048E+00	470	7.791E+00	511	8.719E+00	552	1.084E+01
389	2.480E-02	430	1.204E+00	471	7.515E+00	512	8.818E+00	553	1.089E+01
390	2.390E-02	431	1.377E+00	472	7.251E+00	513	8.915E+00	554	1.092E+01
391	1.130E-02	432	1.574E+00	473	6.987E+00	514	9.010E+00	555	1.095E+01
392	7.700E-03	433	1.793E+00	474	6.727E+00	515	9.099E+00	556	1.098E+01
393	1.280E-02	434	2.043E+00	475	6.498E+00	516	9.166E+00	557	1.101E+01
394	2.010E-02	435	2.330E+00	476	6.297E+00	517	9.239E+00	558	1.105E+01
395	2.230E-02	436	2.652E+00	477	6.136E+00	518	9.307E+00	559	1.107E+01
396	1.150E-02	437	3.018E+00	478	6.028E+00	519	9.367E+00	560	1.109E+01
397	6.400E-03	438	3.450E+00	479	5.948E+00	520	9.430E+00	561	1.112E+01
398	3.500E-03	439	3.947E+00	480	5.904E+00	521	9.498E+00	562	1.114E+01
399	1.900E-03	440	4.515E+00	481	5.883E+00	522	9.560E+00	563	1.116E+01
400	1.460E-02	441	5.153E+00	482	5.877E+00	523	9.612E+00	564	1.119E+01
401	1.780E-02	442	5.874E+00	483	5.892E+00	524	9.659E+00	565	1.122E+01
402	1.580E-02	443	6.673E+00	484	5.926E+00	525	9.708E+00	566	1.125E+01
403	1.450E-02	444	7.531E+00	485	5.977E+00	526	9.768E+00	567	1.127E+01
404	1.850E-02	445	8.412E+00	486	6.036E+00	527	9.830E+00	568	1.130E+01
405	2.220E-02	446	9.315E+00	487	6.088E+00	528	9.885E+00	569	1.133E+01
406	2.790E-02	447	1.020E+01	488	6.157E+00	529	9.939E+00	570	1.135E+01
407	3.080E-02	448	1.106E+01	489	6.243E+00	530	9.977E+00	571	1.138E+01
408	2.770E-02	449	1.186E+01	490	6.330E+00	531	1.002E+01	572	1.140E+01
409	4.780E-02	450	1.252E+01	491	6.418E+00	532	1.007E+01	573	1.143E+01
410	5.680E-02	451	1.302E+01	492	6.519E+00	533	1.012E+01	574	1.147E+01
411	4.540E-02	452	1.335E+01	493	6.626E+00	534	1.016E+01	575	1.150E+01
412	4.740E-02	453	1.352E+01	494	6.740E+00	535	1.019E+01	576	1.152E+01
413	5.890E-02	454	1.349E+01	495	6.851E+00	536	1.024E+01	577	1.155E+01
414	7.440E-02	455	1.329E+01	496	6.976E+00	537	1.028E+01	578	1.158E+01
415	9.350E-02	456	1.292E+01	497	7.106E+00	538	1.032E+01	579	1.162E+01
416	1.146E-01	457	1.243E+01	498	7.236E+00	539	1.035E+01	580	1.167E+01
417	1.373E-01	458	1.189E+01	499	7.365E+00	540	1.038E+01	581	1.170E+01
418	1.712E-01	459	1.136E+01	500	7.491E+00	541	1.042E+01	582	1.173E+01
419	2.001E-01	460	1.085E+01	501	7.611E+00	542	1.045E+01	583	1.177E+01
420	2.504E-01	461	1.036E+01	502	7.737E+00	543	1.049E+01	584	1.180E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.186E+01	626	1.216E+01	667	7.931E+00	708	3.036E+00	749	6.730E-01
586	1.190E+01	627	1.211E+01	668	7.781E+00	709	2.919E+00	750	6.800E-01
587	1.195E+01	628	1.204E+01	669	7.642E+00	710	2.806E+00	751	6.675E-01
588	1.199E+01	629	1.199E+01	670	7.513E+00	711	2.708E+00	752	6.583E-01
589	1.202E+01	630	1.194E+01	671	7.373E+00	712	2.644E+00	753	6.249E-01
590	1.206E+01	631	1.187E+01	672	7.232E+00	713	2.566E+00	754	5.420E-01
591	1.210E+01	632	1.180E+01	673	7.094E+00	714	2.451E+00	755	5.096E-01
592	1.214E+01	633	1.174E+01	674	6.969E+00	715	2.368E+00	756	5.134E-01
593	1.218E+01	634	1.165E+01	675	6.844E+00	716	2.292E+00	757	3.990E-01
594	1.221E+01	635	1.158E+01	676	6.707E+00	717	2.244E+00	758	3.454E-01
595	1.224E+01	636	1.150E+01	677	6.546E+00	718	2.151E+00	759	3.503E-01
596	1.228E+01	637	1.142E+01	678	6.401E+00	719	2.077E+00	760	3.112E-01
597	1.232E+01	638	1.133E+01	679	6.262E+00	720	2.007E+00	761	3.566E-01
598	1.234E+01	639	1.125E+01	680	6.131E+00	721	1.950E+00	762	4.125E-01
599	1.237E+01	640	1.116E+01	681	6.014E+00	722	1.910E+00	763	4.295E-01
600	1.240E+01	641	1.105E+01	682	5.903E+00	723	1.818E+00	764	3.415E-01
601	1.243E+01	642	1.096E+01	683	5.769E+00	724	1.746E+00	765	2.905E-01
602	1.246E+01	643	1.087E+01	684	5.610E+00	725	1.696E+00	766	2.735E-01
603	1.249E+01	644	1.077E+01	685	5.471E+00	726	1.620E+00	767	3.017E-01
604	1.251E+01	645	1.067E+01	686	5.377E+00	727	1.578E+00	768	2.895E-01
605	1.252E+01	646	1.057E+01	687	5.292E+00	728	1.544E+00	769	2.614E-01
606	1.253E+01	647	1.047E+01	688	5.142E+00	729	1.534E+00	770	2.295E-01
607	1.254E+01	648	1.036E+01	689	4.992E+00	730	1.472E+00	771	2.341E-01
608	1.256E+01	649	1.025E+01	690	4.879E+00	731	1.415E+00	772	2.385E-01
609	1.257E+01	650	1.015E+01	691	4.769E+00	732	1.344E+00	773	2.141E-01
610	1.258E+01	651	1.002E+01	692	4.654E+00	733	1.279E+00	774	1.959E-01
611	1.258E+01	652	9.898E+00	693	4.532E+00	734	1.248E+00	775	1.968E-01
612	1.256E+01	653	9.782E+00	694	4.421E+00	735	1.193E+00	776	1.652E-01
613	1.256E+01	654	9.672E+00	695	4.298E+00	736	1.137E+00	777	1.582E-01
614	1.255E+01	655	9.536E+00	696	4.183E+00	737	1.062E+00	778	1.536E-01
615	1.253E+01	656	9.392E+00	697	4.091E+00	738	9.994E-01	779	1.754E-01
616	1.251E+01	657	9.272E+00	698	3.986E+00	739	9.827E-01	780	1.437E-01
617	1.250E+01	658	9.153E+00	699	3.874E+00	740	9.972E-01		
618	1.248E+01	659	9.024E+00	700	3.780E+00	741	9.805E-01		
619	1.244E+01	660	8.876E+00	701	3.682E+00	742	9.492E-01		
620	1.239E+01	661	8.731E+00	702	3.560E+00	743	8.555E-01		
621	1.234E+01	662	8.600E+00	703	3.458E+00	744	7.858E-01		
622	1.232E+01	663	8.464E+00	704	3.361E+00	745	7.147E-01		
623	1.229E+01	664	8.330E+00	705	3.264E+00	746	6.954E-01		
624	1.225E+01	665	8.190E+00	706	3.193E+00	747	7.069E-01		
625	1.221E+01	666	8.057E+00	707	3.127E+00	748	6.903E-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**

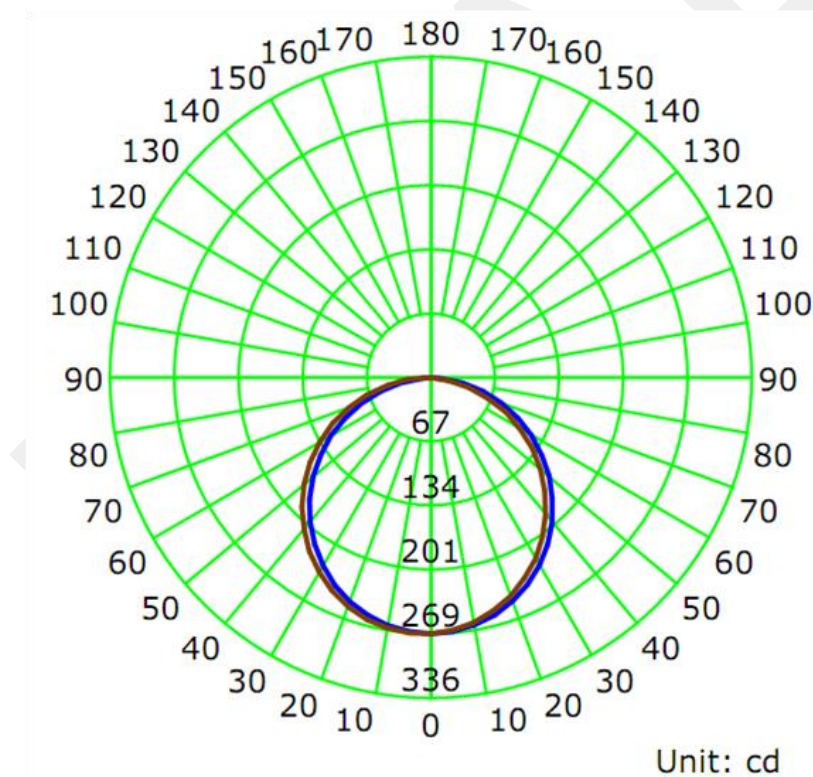
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0780	9.27	0.9970

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
780.9	84.29	269.3	1.26	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	113.8	113.8	113.8	113.9	113.8
Field Angle (10% I_{max}):	162.8	161.8	162.6	162.2	162.4

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	269	269	269	269	269	269	269	269
5.0°	268	267	266	266	266	266	267	267
10.0°	264	263	262	261	261	262	262	263
15.0°	258	256	255	254	254	254	255	257
20.0°	250	247	245	244	244	245	246	249
25.0°	240	237	234	233	232	233	235	238
30.0°	227	224	221	219	219	220	222	225
35.0°	213	209	206	204	204	205	207	211
40.0°	198	193	189	187	187	188	191	195
45.0°	180	176	172	170	169	170	173	177
50.0°	162	157	153	150	150	151	154	159
55.0°	142	137	133	130	130	131	134	139
60.0°	122	117	112	109	108	110	113	118
65.0°	101	95	91	88	87	88	92	97
70.0°	79	73	68	65	64	65	69	74
75.0°	56	51	44	41	41	43	46	52
80.0°	34	29	21	18	19	21	24	30
85.0°	10	6	2	1	0	1	3	8
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

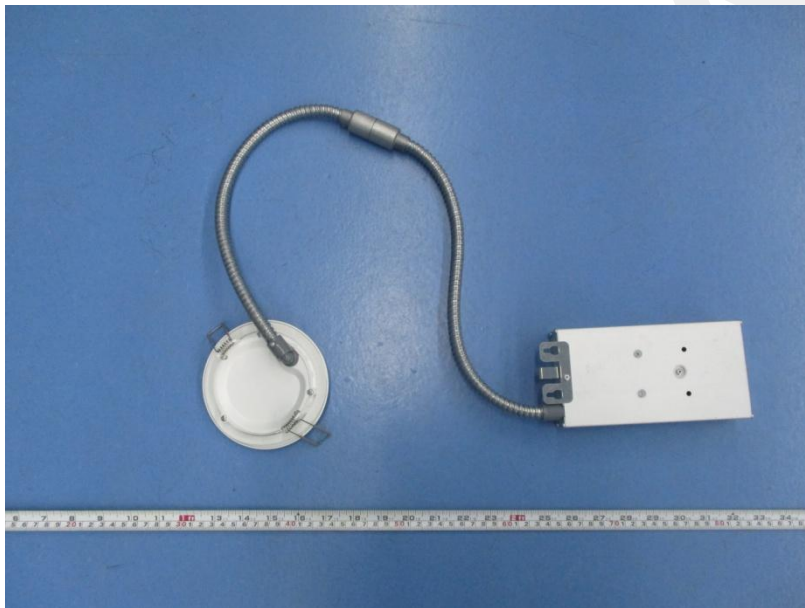
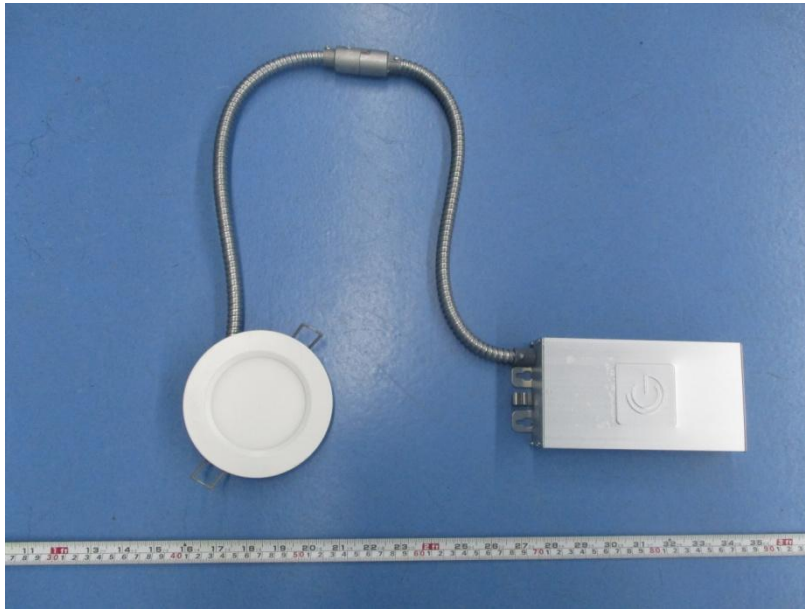
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	269	269	269	269	269	269	269	269
5.0°	268	268	269	269	269	269	269	268
10.0°	264	265	266	267	267	267	266	265
15.0°	258	260	261	262	263	262	261	259
20.0°	250	252	255	256	256	255	254	252
25.0°	240	243	245	247	247	246	244	242
30.0°	227	231	234	236	236	235	233	230
35.0°	213	217	220	223	223	222	219	216
40.0°	198	202	205	208	208	207	204	201
45.0°	181	185	189	191	192	190	188	184
50.0°	162	167	170	173	174	173	169	165
55.0°	142	147	151	154	155	154	150	146
60.0°	122	127	131	134	135	134	130	125
65.0°	100	106	110	113	114	113	109	104
70.0°	78	83	88	92	92	91	87	82
75.0°	55	61	65	68	70	69	65	60
80.0°	33	39	41	44	47	46	42	37
85.0°	10	16	19	21	24	23	16	10
90.0°	0	0	0	1	4	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	6.4	0.82	0-5	6.4	0.82
5-10	19.0	2.44	0-10	25.4	3.26
10-15	31.0	3.97	0-15	56.4	7.22
15-20	41.9	5.36	0-20	98.3	12.58
20-25	51.4	6.58	0-25	149.6	19.16
25-30	59.1	7.57	0-30	208.7	26.73
30-35	64.9	8.31	0-35	273.6	35.04
35-40	68.6	8.78	0-40	342.2	43.82
40-45	70.0	8.96	0-45	412.1	52.78
45-50	69.1	8.85	0-50	481.3	61.63
50-55	66.1	8.47	0-55	547.4	70.10
55-60	61.0	7.81	0-60	608.4	77.91
60-65	54.0	6.91	0-65	662.3	84.82
65-70	45.2	5.79	0-70	707.5	90.61
70-75	34.9	4.47	0-75	742.5	95.08
75-80	23.5	3.02	0-80	766.0	98.10
80-85	11.7	1.50	0-85	777.7	99.60
85-90	3.0	0.38	0-90	780.7	99.98
90-95	0.1	0.01	0-95	780.8	99.99
95-100	0.0	0.00	0-100	780.8	99.99
100-105	0.0	0.00	0-105	780.8	99.99
105-110	0.0	0.00	0-110	780.8	99.99
110-115	0.0	0.00	0-115	780.8	99.99
115-120	0.0	0.00	0-120	780.8	99.99
120-125	0.0	0.00	0-125	780.8	99.99
125-130	0.0	0.00	0-130	780.8	99.99
130-135	0.0	0.00	0-135	780.8	99.99
135-140	0.0	0.00	0-140	780.8	100.00
140-145	0.0	0.00	0-145	780.9	100.00
145-150	0.0	0.00	0-150	780.9	100.00
150-155	0.0	0.00	0-155	780.9	100.00
155-160	0.0	0.00	0-160	780.9	100.00
160-165	0.0	0.00	0-165	780.9	100.00
165-170	0.0	0.00	0-170	780.9	100.00
170-175	0.0	0.00	0-175	780.9	100.00
175-180	0.0	0.00	0-180	780.9	100.00

6. Product Photo



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