

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/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:	RKSB180510002-10-4
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/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: 10W
 Nominal CCT: 3000K
 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**

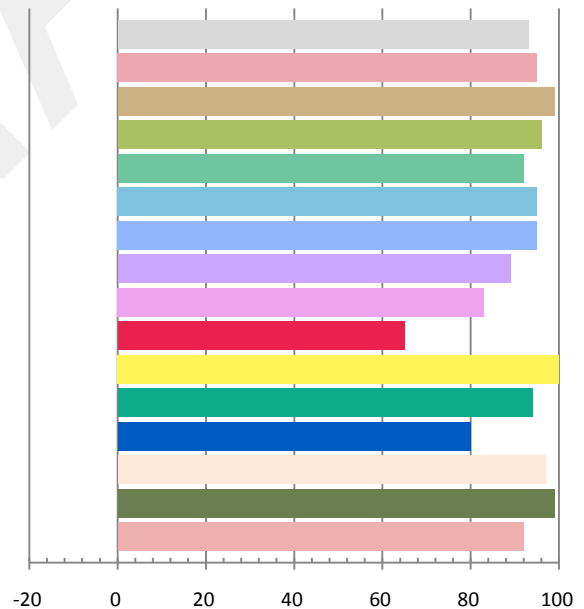
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.05	60	0.077	9.22	0.9974	724.7	78.6

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.520	3099	-0.00092	0.4288	0.3989	0.2475	0.5181

Color Rendering Index

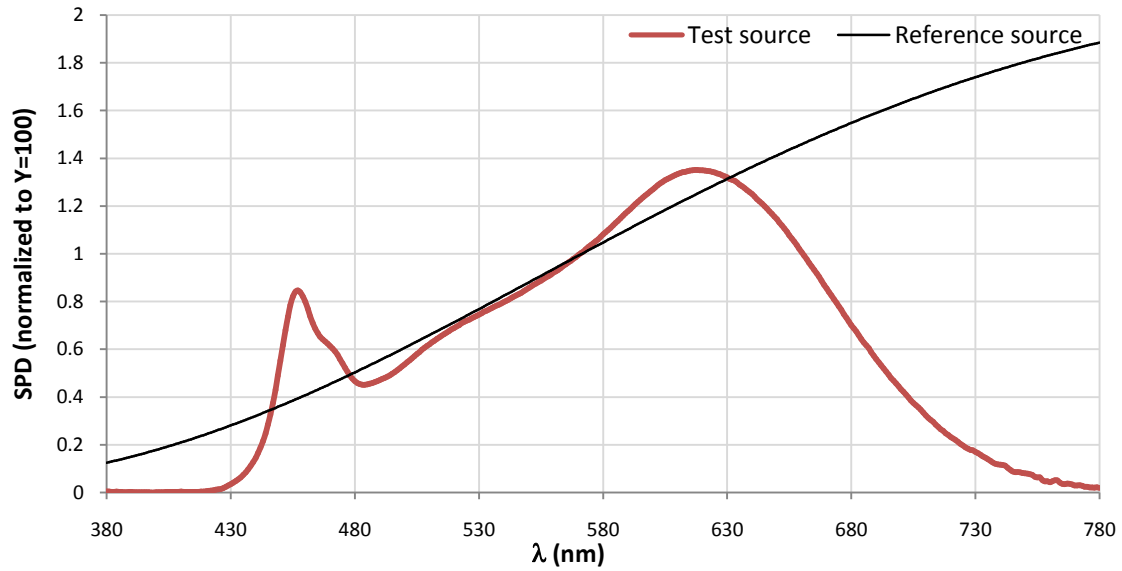
Ra			
93.1			
R1	R2	R3	R4
95	99	96	92
R5	R6	R7	R8
95	95	89	83
R9	R10	R11	R12
65	100	94	80
R13	R14	R15	
97	99	92	



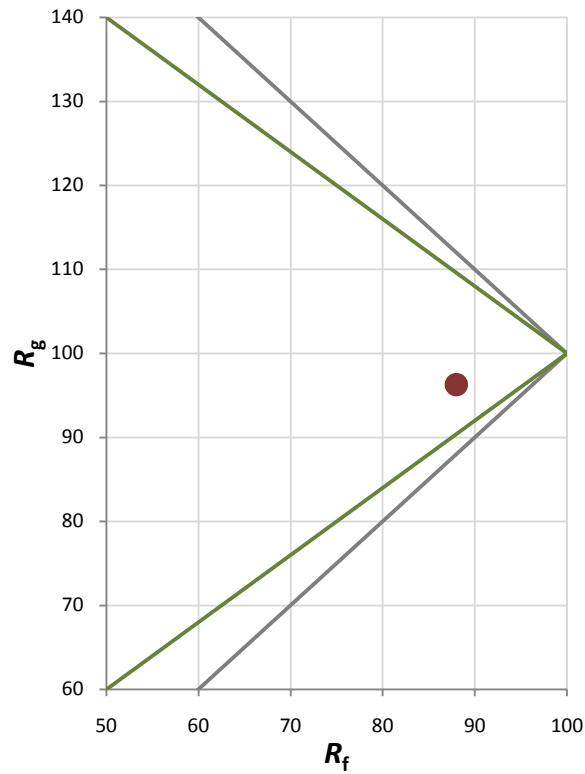
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	96

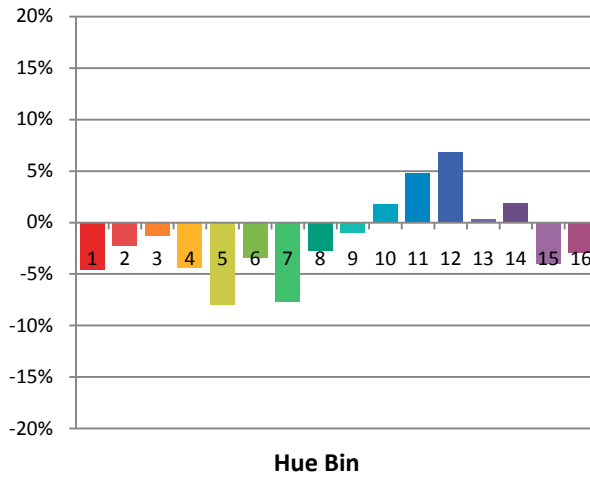
Spectral Power Distribution Comparison



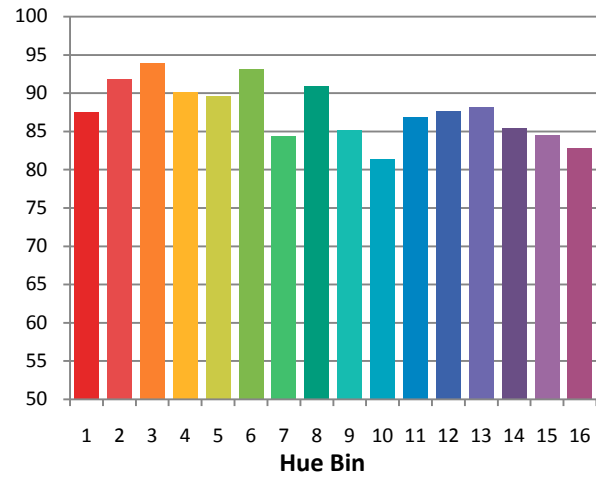
Plot of R_g versus R_f



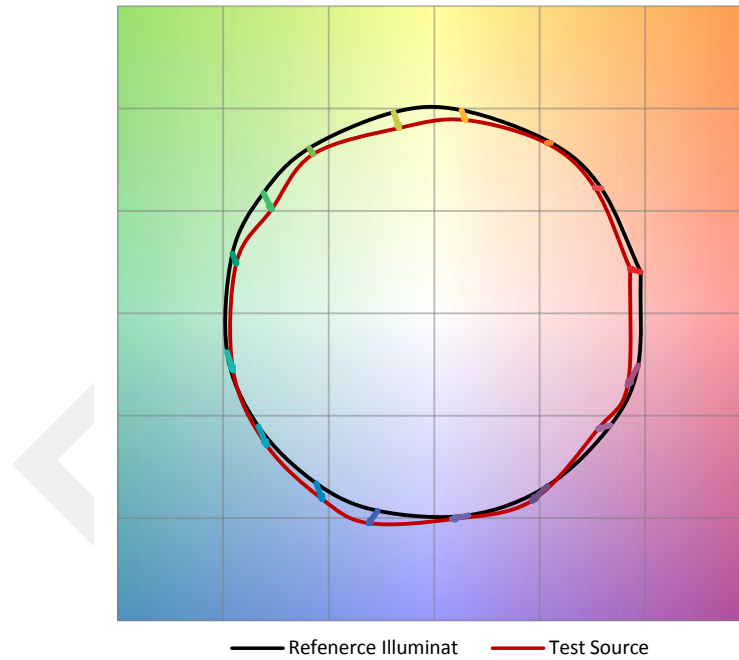
Chroma Shift by Hue



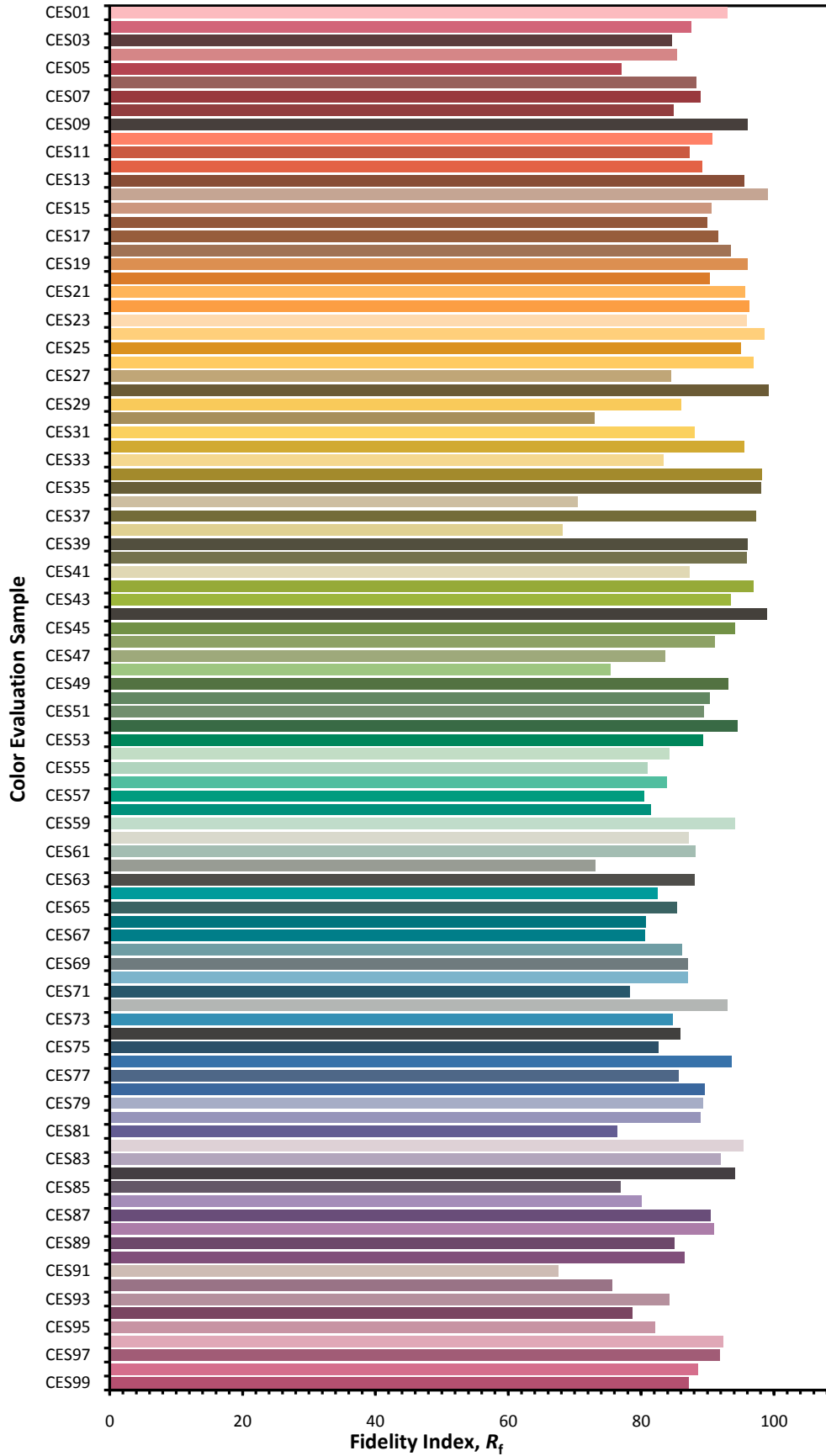
R_f by Hue



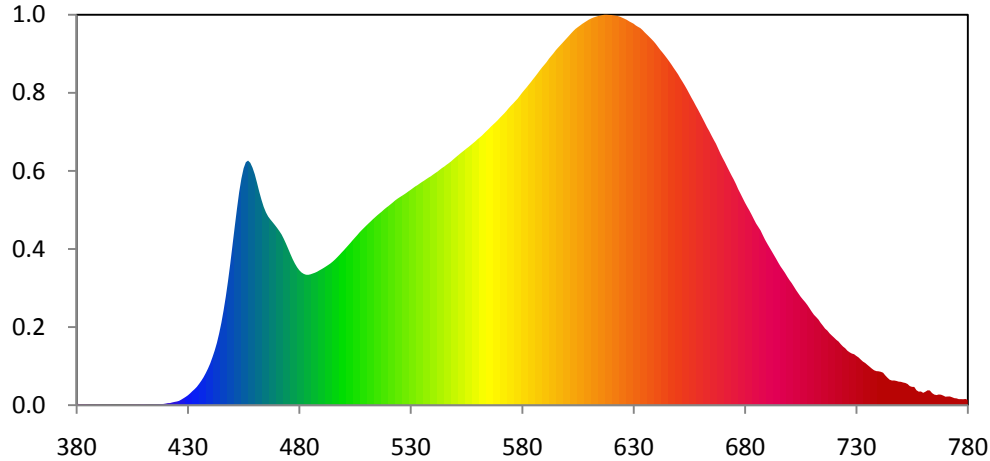
Color Vector Graphic



Color Fidelity by CES Sample



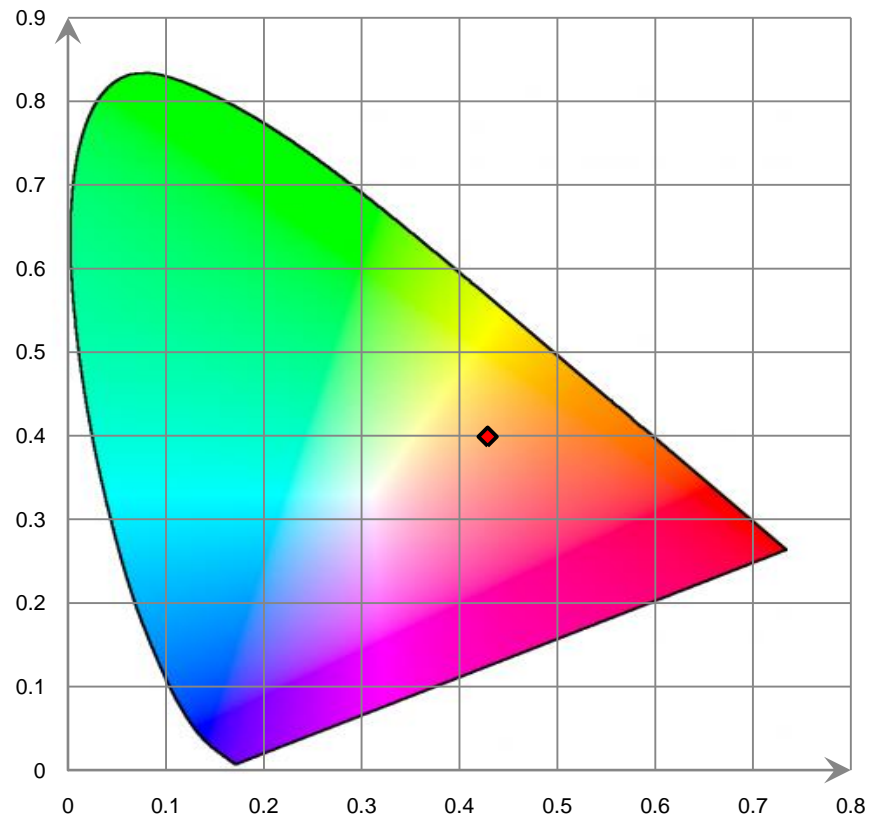
Relative Spectral Power Distribution



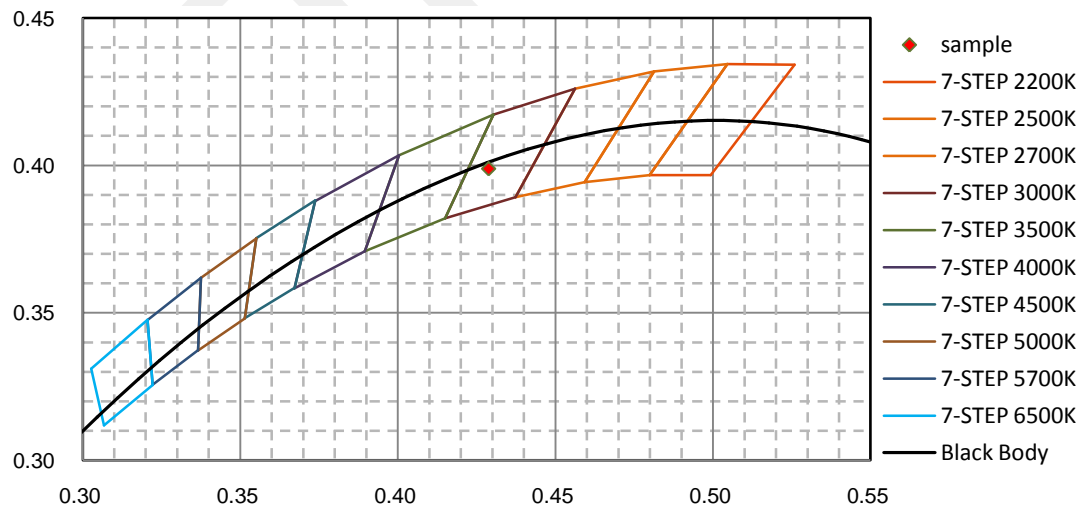
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.990E-02	421	7.630E-02	462	7.838E+00	503	5.965E+00	544	8.703E+00
381	4.410E-02	422	7.950E-02	463	7.542E+00	504	6.061E+00	545	8.757E+00
382	3.110E-02	423	1.015E-01	464	7.282E+00	505	6.152E+00	546	8.820E+00
383	3.180E-02	424	1.201E-01	465	7.079E+00	506	6.243E+00	547	8.879E+00
384	3.700E-02	425	1.346E-01	466	6.927E+00	507	6.341E+00	548	8.942E+00
385	2.730E-02	426	1.570E-01	467	6.816E+00	508	6.426E+00	549	9.016E+00
386	2.160E-02	427	2.031E-01	468	6.717E+00	509	6.507E+00	550	9.085E+00
387	2.010E-02	428	2.542E-01	469	6.616E+00	510	6.586E+00	551	9.154E+00
388	1.710E-02	429	3.056E-01	470	6.510E+00	511	6.667E+00	552	9.223E+00
389	2.660E-02	430	3.621E-01	471	6.394E+00	512	6.743E+00	553	9.289E+00
390	2.790E-02	431	4.337E-01	472	6.268E+00	513	6.823E+00	554	9.353E+00
391	1.230E-02	432	5.153E-01	473	6.109E+00	514	6.898E+00	555	9.420E+00
392	8.200E-03	433	5.874E-01	474	5.931E+00	515	6.970E+00	556	9.482E+00
393	1.290E-02	434	6.740E-01	475	5.742E+00	516	7.040E+00	557	9.549E+00
394	1.820E-02	435	7.801E-01	476	5.547E+00	517	7.106E+00	558	9.619E+00
395	1.780E-02	436	8.962E-01	477	5.363E+00	518	7.182E+00	559	9.685E+00
396	1.070E-02	437	1.023E+00	478	5.200E+00	519	7.247E+00	560	9.762E+00
397	7.500E-03	438	1.177E+00	479	5.063E+00	520	7.309E+00	561	9.828E+00
398	4.600E-03	439	1.343E+00	480	4.951E+00	521	7.377E+00	562	9.899E+00
399	2.300E-03	440	1.532E+00	481	4.870E+00	522	7.444E+00	563	9.981E+00
400	1.490E-02	441	1.755E+00	482	4.818E+00	523	7.516E+00	564	1.006E+01
401	1.840E-02	442	2.003E+00	483	4.789E+00	524	7.576E+00	565	1.014E+01
402	2.000E-02	443	2.288E+00	484	4.786E+00	525	7.631E+00	566	1.023E+01
403	1.980E-02	444	2.628E+00	485	4.803E+00	526	7.683E+00	567	1.030E+01
404	2.060E-02	445	3.021E+00	486	4.832E+00	527	7.735E+00	568	1.038E+01
405	2.250E-02	446	3.475E+00	487	4.861E+00	528	7.789E+00	569	1.046E+01
406	2.720E-02	447	3.987E+00	488	4.899E+00	529	7.850E+00	570	1.055E+01
407	2.850E-02	448	4.559E+00	489	4.947E+00	530	7.907E+00	571	1.063E+01
408	2.160E-02	449	5.191E+00	490	4.993E+00	531	7.967E+00	572	1.071E+01
409	3.330E-02	450	5.863E+00	491	5.041E+00	532	8.027E+00	573	1.080E+01
410	3.900E-02	451	6.547E+00	492	5.094E+00	533	8.076E+00	574	1.090E+01
411	2.960E-02	452	7.209E+00	493	5.148E+00	534	8.135E+00	575	1.099E+01
412	2.440E-02	453	7.821E+00	494	5.206E+00	535	8.190E+00	576	1.108E+01
413	2.240E-02	454	8.322E+00	495	5.271E+00	536	8.243E+00	577	1.117E+01
414	2.410E-02	455	8.696E+00	496	5.346E+00	537	8.299E+00	578	1.125E+01
415	2.940E-02	456	8.919E+00	497	5.427E+00	538	8.353E+00	579	1.136E+01
416	3.170E-02	457	8.977E+00	498	5.513E+00	539	8.401E+00	580	1.147E+01
417	3.130E-02	458	8.896E+00	499	5.602E+00	540	8.461E+00	581	1.157E+01
418	4.150E-02	459	8.718E+00	500	5.688E+00	541	8.520E+00	582	1.167E+01
419	4.400E-02	460	8.476E+00	501	5.780E+00	542	8.573E+00	583	1.177E+01
420	5.900E-02	461	8.168E+00	502	5.872E+00	543	8.640E+00	584	1.187E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.198E+01	626	1.418E+01	667	9.595E+00	708	3.680E+00	749	8.641E-01
586	1.208E+01	627	1.414E+01	668	9.416E+00	709	3.556E+00	750	8.566E-01
587	1.219E+01	628	1.409E+01	669	9.235E+00	710	3.432E+00	751	8.322E-01
588	1.230E+01	629	1.405E+01	670	9.074E+00	711	3.316E+00	752	8.149E-01
589	1.240E+01	630	1.400E+01	671	8.920E+00	712	3.233E+00	753	7.774E-01
590	1.250E+01	631	1.394E+01	672	8.754E+00	713	3.143E+00	754	7.009E-01
591	1.259E+01	632	1.389E+01	673	8.590E+00	714	3.021E+00	755	6.724E-01
592	1.271E+01	633	1.384E+01	674	8.432E+00	715	2.917E+00	756	6.710E-01
593	1.281E+01	634	1.377E+01	675	8.280E+00	716	2.810E+00	757	5.494E-01
594	1.291E+01	635	1.369E+01	676	8.114E+00	717	2.737E+00	758	4.974E-01
595	1.302E+01	636	1.360E+01	677	7.925E+00	718	2.635E+00	759	5.024E-01
596	1.311E+01	637	1.353E+01	678	7.765E+00	719	2.557E+00	760	4.532E-01
597	1.320E+01	638	1.344E+01	679	7.601E+00	720	2.480E+00	761	4.949E-01
598	1.329E+01	639	1.336E+01	680	7.439E+00	721	2.400E+00	762	5.456E-01
599	1.338E+01	640	1.326E+01	681	7.290E+00	722	2.338E+00	763	5.395E-01
600	1.347E+01	641	1.315E+01	682	7.146E+00	723	2.240E+00	764	4.441E-01
601	1.356E+01	642	1.304E+01	683	6.993E+00	724	2.154E+00	765	3.892E-01
602	1.365E+01	643	1.294E+01	684	6.828E+00	725	2.091E+00	766	3.710E-01
603	1.374E+01	644	1.284E+01	685	6.672E+00	726	1.999E+00	767	3.925E-01
604	1.381E+01	645	1.273E+01	686	6.543E+00	727	1.941E+00	768	3.857E-01
605	1.388E+01	646	1.262E+01	687	6.417E+00	728	1.894E+00	769	3.526E-01
606	1.394E+01	647	1.251E+01	688	6.246E+00	729	1.871E+00	770	3.117E-01
607	1.400E+01	648	1.238E+01	689	6.079E+00	730	1.807E+00	771	3.184E-01
608	1.405E+01	649	1.226E+01	690	5.931E+00	731	1.752E+00	772	3.199E-01
609	1.410E+01	650	1.214E+01	691	5.794E+00	732	1.674E+00	773	2.908E-01
610	1.415E+01	651	1.200E+01	692	5.655E+00	733	1.600E+00	774	2.583E-01
611	1.419E+01	652	1.187E+01	693	5.514E+00	734	1.548E+00	775	2.491E-01
612	1.423E+01	653	1.173E+01	694	5.376E+00	735	1.477E+00	776	2.226E-01
613	1.426E+01	654	1.159E+01	695	5.228E+00	736	1.411E+00	777	2.220E-01
614	1.428E+01	655	1.144E+01	696	5.092E+00	737	1.341E+00	778	2.175E-01
615	1.430E+01	656	1.129E+01	697	4.974E+00	738	1.282E+00	779	2.300E-01
616	1.432E+01	657	1.114E+01	698	4.853E+00	739	1.250E+00	780	1.930E-01
617	1.433E+01	658	1.099E+01	699	4.716E+00	740	1.243E+00		
618	1.433E+01	659	1.084E+01	700	4.591E+00	741	1.226E+00		
619	1.433E+01	660	1.068E+01	701	4.481E+00	742	1.192E+00		
620	1.432E+01	661	1.053E+01	702	4.350E+00	743	1.093E+00		
621	1.431E+01	662	1.037E+01	703	4.219E+00	744	1.006E+00		
622	1.430E+01	663	1.020E+01	704	4.101E+00	745	9.325E-01		
623	1.428E+01	664	1.006E+01	705	3.983E+00	746	9.036E-01		
624	1.426E+01	665	9.897E+00	706	3.881E+00	747	9.054E-01		
625	1.422E+01	666	9.743E+00	707	3.786E+00	748	8.906E-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**

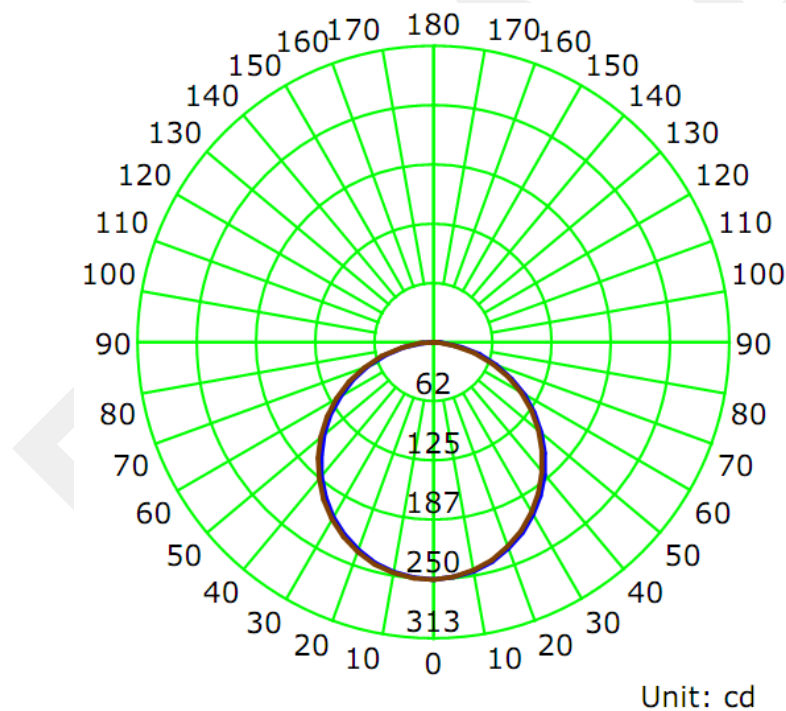
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0770	9.2	0.9970

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
725.5	78.91	250.5	1.26	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	113.5	113.6	113.7	113.5	113.6
Field Angle (10% I_{max}):	162.7	162.3	161.9	162.5	162.4

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	251	251	251	251	251	251	251	251
5.0°	249	249	249	249	249	249	249	249
10.0°	246	245	245	245	245	245	246	246
15.0°	240	239	238	238	239	239	240	240
20.0°	232	231	230	230	230	230	232	233
25.0°	222	221	220	220	220	220	222	223
30.0°	211	209	208	208	208	208	210	212
35.0°	198	195	194	194	194	195	197	199
40.0°	183	180	179	179	179	180	182	184
45.0°	167	164	163	162	162	164	166	168
50.0°	149	147	145	144	145	146	148	150
55.0°	131	128	127	126	126	128	130	132
60.0°	112	109	107	107	107	109	111	113
65.0°	92	89	88	87	87	88	91	93
70.0°	71	68	67	65	66	68	70	73
75.0°	50	48	45	43	44	47	49	52
80.0°	30	27	24	22	23	26	29	31
85.0°	7	6	5	5	5	7	8	11
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

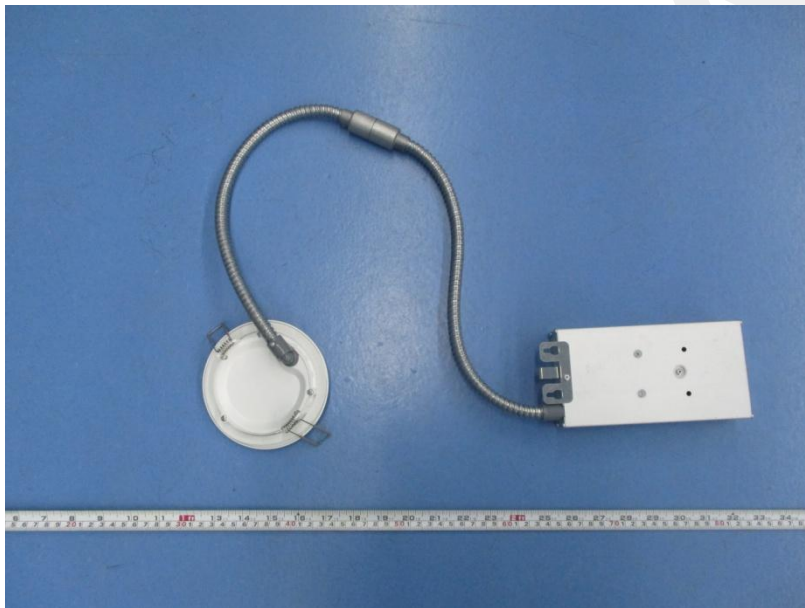
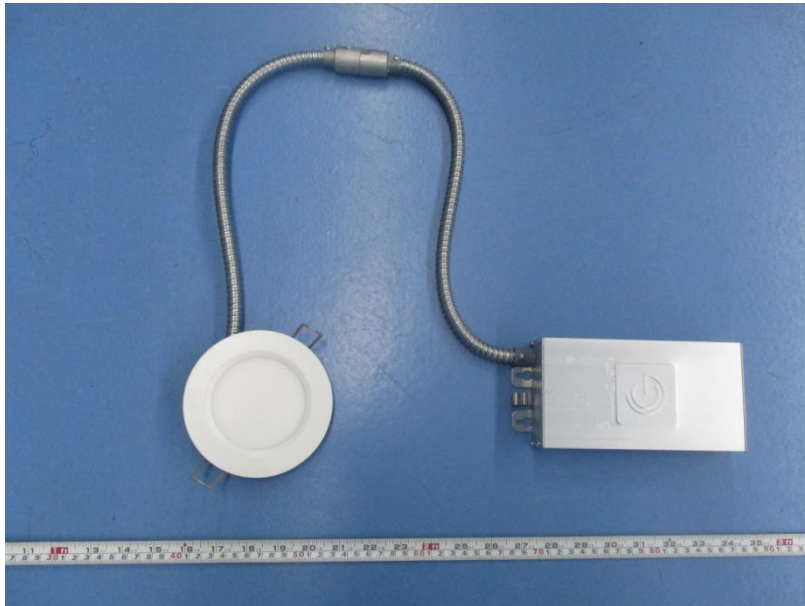
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	251	251	251	251	251	251	251	251
5.0°	250	250	250	250	250	250	250	249
10.0°	247	247	248	248	248	247	247	246
15.0°	241	242	243	243	243	242	242	240
20.0°	234	235	236	236	236	235	234	233
25.0°	224	226	227	227	227	226	225	223
30.0°	213	214	216	216	216	215	214	211
35.0°	200	202	203	204	203	202	201	198
40.0°	185	187	189	189	189	187	186	184
45.0°	169	171	173	173	173	172	170	167
50.0°	152	154	156	156	156	154	153	150
55.0°	133	136	138	138	138	137	134	131
60.0°	114	117	119	119	119	118	115	112
65.0°	94	97	99	100	99	98	95	93
70.0°	74	76	78	79	79	77	75	72
75.0°	53	55	57	57	58	56	54	51
80.0°	32	35	35	35	35	35	33	30
85.0°	12	14	15	14	15	15	10	7
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	6.0	0.82	0-5	6.0	0.82
5-10	17.7	2.44	0-10	23.7	3.27
10-15	28.9	3.98	0-15	52.6	7.25
15-20	39.0	5.38	0-20	91.6	12.62
20-25	47.8	6.59	0-25	139.4	19.22
25-30	55.0	7.59	0-30	194.5	26.80
30-35	60.4	8.33	0-35	254.9	35.13
35-40	63.8	8.79	0-40	318.7	43.92
40-45	65.1	8.97	0-45	383.7	52.89
45-50	64.3	8.86	0-50	448.0	61.75
50-55	61.4	8.46	0-55	509.4	70.21
55-60	56.6	7.81	0-60	566.0	78.02
60-65	50.1	6.90	0-65	616.1	84.92
65-70	41.9	5.77	0-70	658.0	90.69
70-75	32.3	4.45	0-75	690.3	95.14
75-80	21.7	2.99	0-80	712.0	98.14
80-85	10.8	1.49	0-85	722.8	99.63
85-90	2.7	0.37	0-90	725.4	99.99
90-95	0.0	0.00	0-95	725.4	99.99
95-100	0.0	0.00	0-100	725.4	99.99
100-105	0.0	0.00	0-105	725.4	99.99
105-110	0.0	0.00	0-110	725.4	99.99
110-115	0.0	0.00	0-115	725.4	99.99
115-120	0.0	0.00	0-120	725.4	99.99
120-125	0.0	0.00	0-125	725.4	99.99
125-130	0.0	0.00	0-130	725.4	99.99
130-135	0.0	0.00	0-135	725.5	99.99
135-140	0.0	0.00	0-140	725.5	99.99
140-145	0.0	0.00	0-145	725.5	100.00
145-150	0.0	0.00	0-150	725.5	100.00
150-155	0.0	0.00	0-155	725.5	100.00
155-160	0.0	0.00	0-160	725.5	100.00
160-165	0.0	0.00	0-165	725.5	100.00
165-170	0.0	0.00	0-170	725.5	100.00
170-175	0.0	0.00	0-175	725.5	100.00
175-180	0.0	0.00	0-180	725.5	100.00

6. Product Photo



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