

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 20SMPR9DIM/930/277V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	PKS171229082-10
Test Date:	2018-01-02
Report Date:	2018-01-04
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 2018-01-02 and used for testing.

Model Tested: 20SMPR9DIM/930/277V
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Downlight
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz
 Rated Power: 20W
 Nominal CCT: 3000K
 Nominal Lumen Output: 1250lm

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	Dia 1.5m	2017-01-25	2018-01-25
Power Meter	INVENTFINE	WT500	GSJWQ20009	20/40/80/150/300/600V	2017-03-23	2018-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	380nm~780nm	2017-01-25	2018-01-25
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	0~150V 4.2A/0~300V 2.1A	2017-03-23	2018-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	24V/50W	2017-01-26	2018-01-26
Thermal Meter	KEJIAN	TA298	N/A	0~60℃	2017-10-17	2018-10-17
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	30V/5A	2017-03-23	2018-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	0-150V, 0-300V, 5KVA	2017-03-23	2018-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	30V/10A	2017-03-23	2018-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	20/40/80/150/300/600V	2017-03-23	2018-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	0.001lx-99999lx	2017-01-25	2018-01-25
Wireless Weather Station	ZHONGXING	KG218	N/A	-40~65℃, 20%~99%RH	2017-10-17	2018-10-17
Standard Light Source	INVENTFINE	N/A	JWBYR040007	24V/150W	2017-01-25	2018-01-25

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**

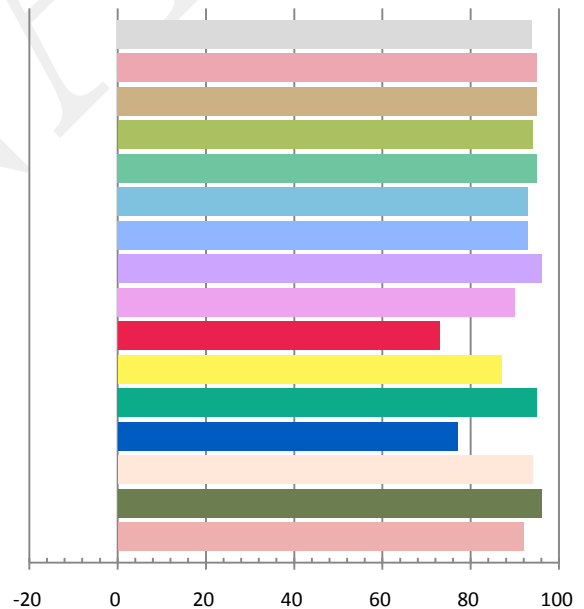
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1626	19.38	0.993	1555.8	80.26

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
5.483	3072	0.00248	0.4354	0.4098	0.2472	0.5234

Color Rendering Index

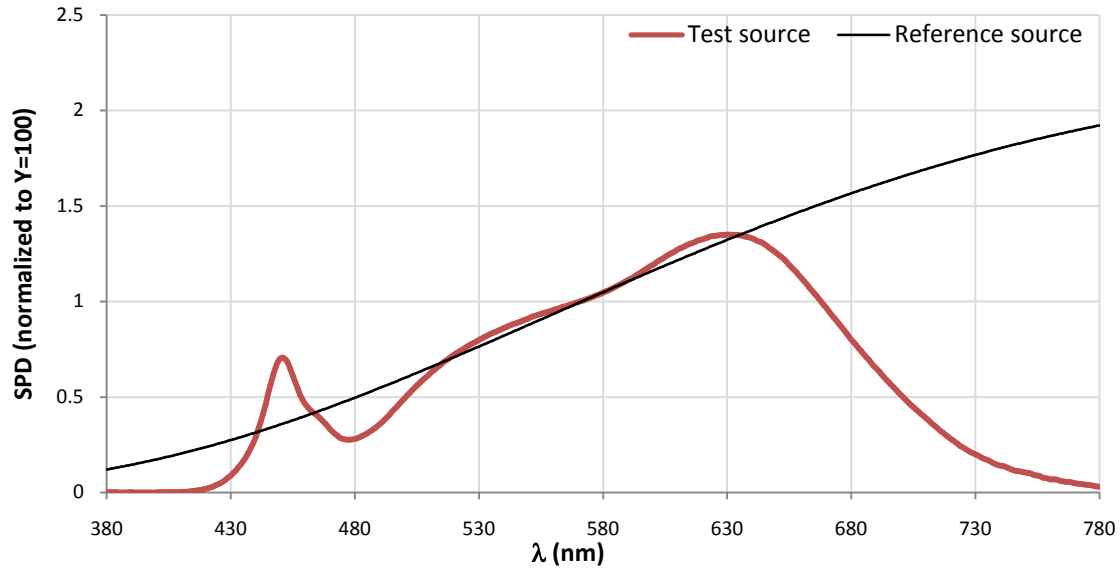
Ra 93.9			
R1 95	R2 95	R3 94	R4 95
R5 93	R6 93	R7 96	R8 90
R9 73	R10 87	R11 95	R12 77
R13 94	R14 96	R15 92	



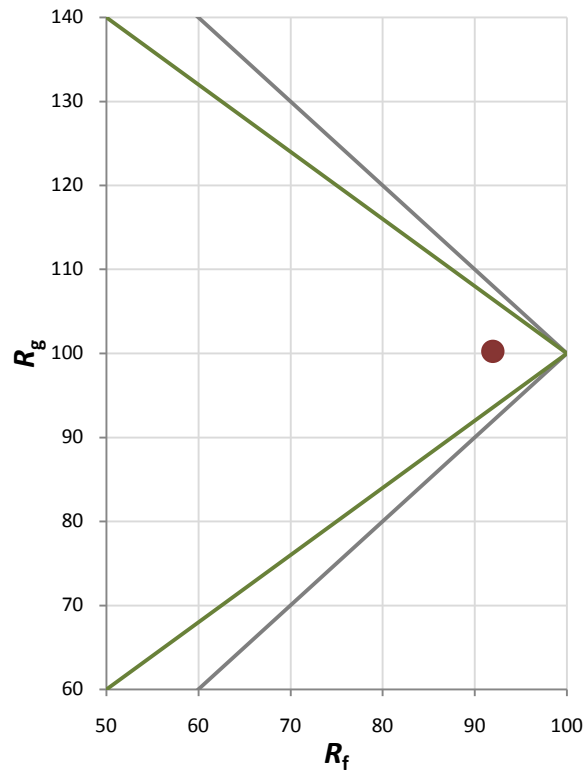
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	100

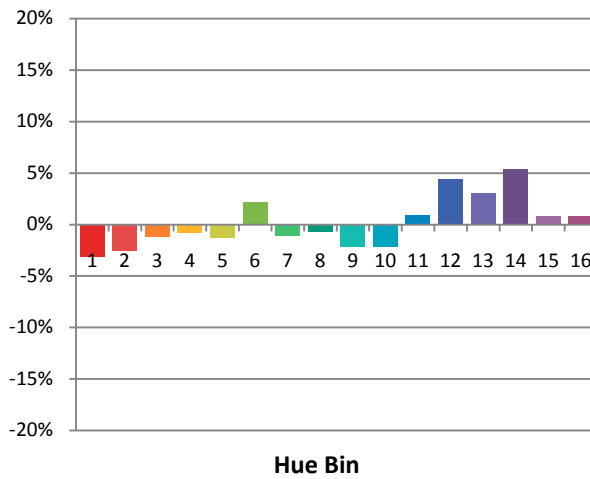
Spectral Power Distribution Comparison



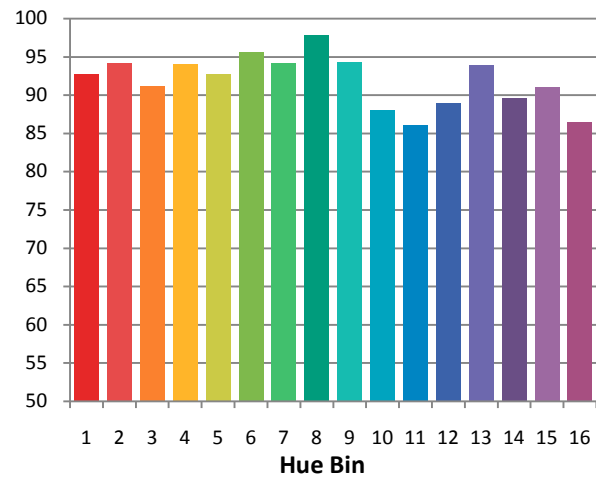
Plot of R_g versus R_f



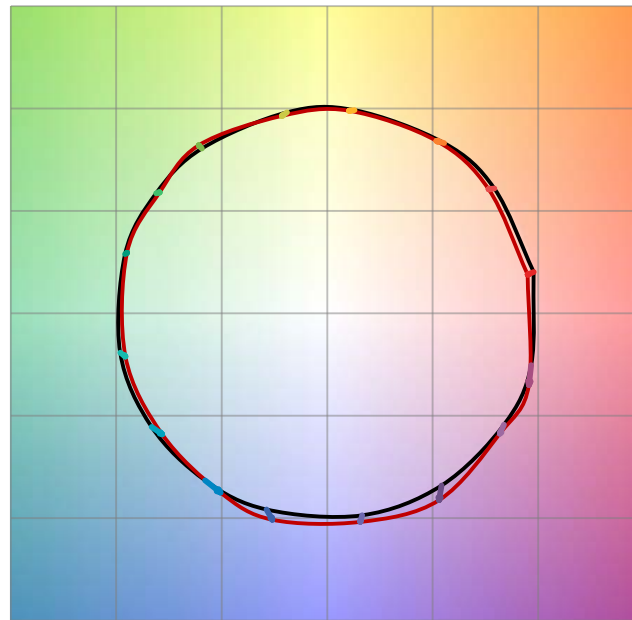
Chroma Shift by Hue



R_t by Hue

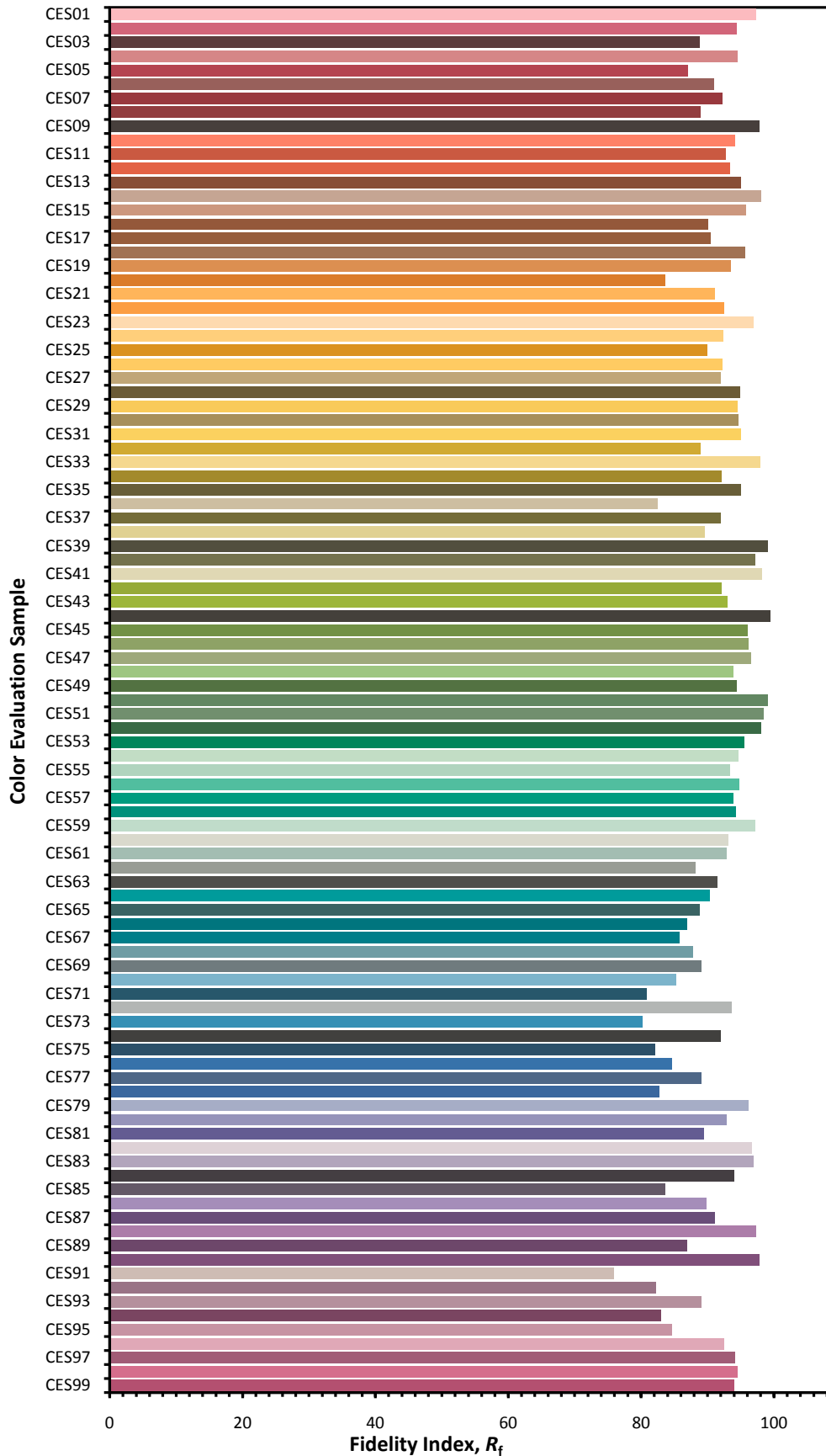


Color Vector Graphic

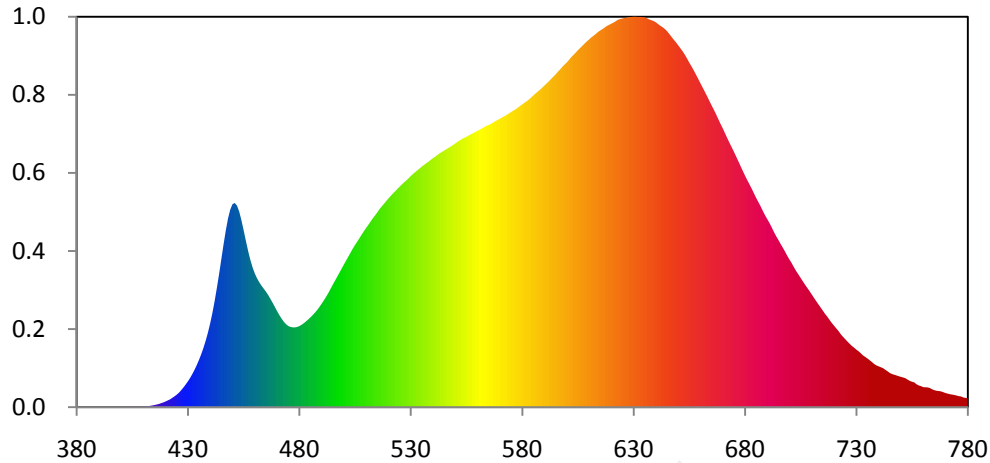


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



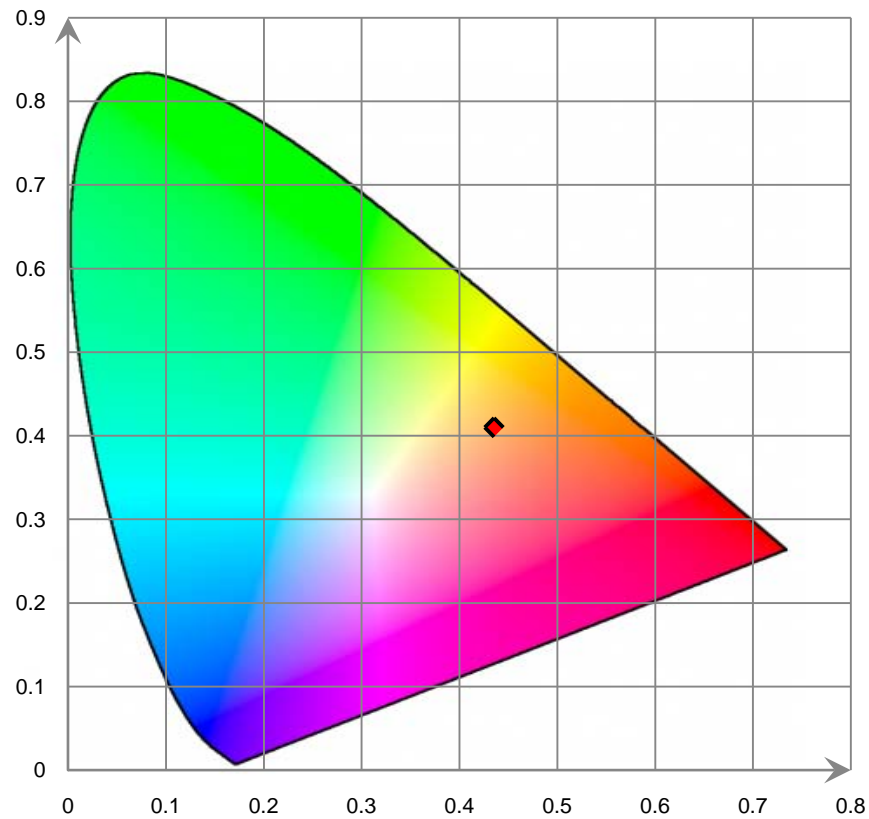
Relative Spectral Power Distribution



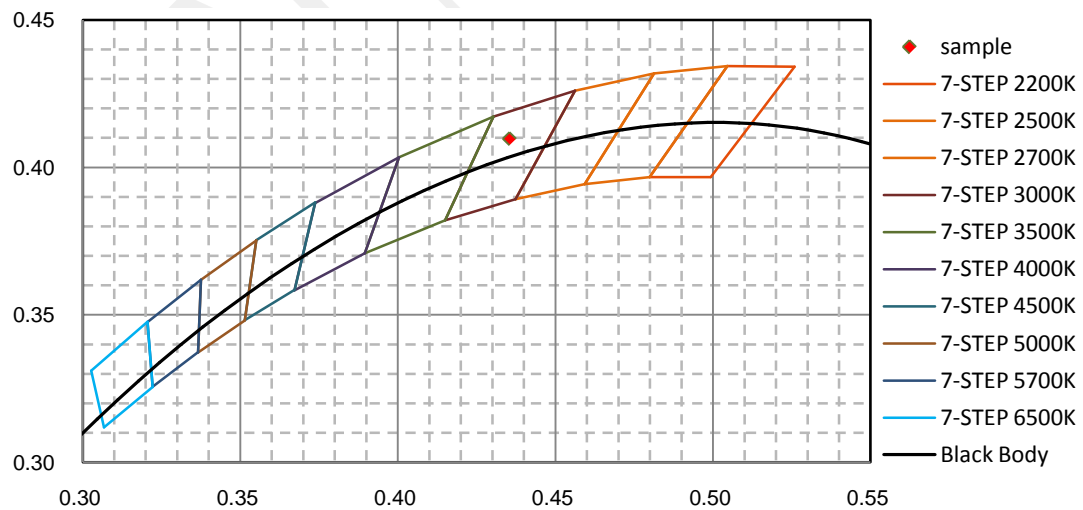
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.320E-02	421	5.350E-01	462	9.841E+00	503	1.217E+01	544	2.009E+01
381	2.190E-02	422	6.189E-01	463	9.570E+00	504	1.249E+01	545	2.020E+01
382	1.950E-02	423	7.388E-01	464	9.336E+00	505	1.277E+01	546	2.032E+01
383	2.480E-02	424	8.590E-01	465	9.101E+00	506	1.304E+01	547	2.042E+01
384	2.630E-02	425	9.896E-01	466	8.837E+00	507	1.331E+01	548	2.053E+01
385	1.480E-02	426	1.147E+00	467	8.539E+00	508	1.359E+01	549	2.064E+01
386	1.420E-02	427	1.342E+00	468	8.224E+00	509	1.386E+01	550	2.077E+01
387	1.510E-02	428	1.556E+00	469	7.901E+00	510	1.412E+01	551	2.089E+01
388	1.370E-02	429	1.789E+00	470	7.571E+00	511	1.437E+01	552	2.101E+01
389	1.930E-02	430	2.036E+00	471	7.262E+00	512	1.462E+01	553	2.112E+01
390	2.040E-02	431	2.309E+00	472	6.981E+00	513	1.487E+01	554	2.120E+01
391	1.070E-02	432	2.621E+00	473	6.733E+00	514	1.510E+01	555	2.129E+01
392	7.900E-03	433	2.956E+00	474	6.542E+00	515	1.534E+01	556	2.139E+01
393	9.400E-03	434	3.328E+00	475	6.398E+00	516	1.559E+01	557	2.149E+01
394	1.130E-02	435	3.739E+00	476	6.318E+00	517	1.581E+01	558	2.158E+01
395	1.140E-02	436	4.188E+00	477	6.283E+00	518	1.601E+01	559	2.167E+01
396	7.600E-03	437	4.687E+00	478	6.283E+00	519	1.623E+01	560	2.177E+01
397	5.000E-03	438	5.253E+00	479	6.315E+00	520	1.644E+01	561	2.186E+01
398	3.300E-03	439	5.888E+00	480	6.385E+00	521	1.663E+01	562	2.195E+01
399	1.800E-03	440	6.613E+00	481	6.486E+00	522	1.682E+01	563	2.206E+01
400	1.180E-02	441	7.435E+00	482	6.611E+00	523	1.700E+01	564	2.215E+01
401	1.700E-02	442	8.368E+00	483	6.755E+00	524	1.718E+01	565	2.222E+01
402	1.750E-02	443	9.401E+00	484	6.909E+00	525	1.736E+01	566	2.231E+01
403	1.750E-02	444	1.050E+01	485	7.074E+00	526	1.753E+01	567	2.241E+01
404	2.560E-02	445	1.167E+01	486	7.249E+00	527	1.770E+01	568	2.252E+01
405	2.710E-02	446	1.283E+01	487	7.440E+00	528	1.785E+01	569	2.262E+01
406	2.790E-02	447	1.391E+01	488	7.650E+00	529	1.802E+01	570	2.271E+01
407	2.830E-02	448	1.487E+01	489	7.885E+00	530	1.820E+01	571	2.282E+01
408	2.620E-02	449	1.556E+01	490	8.143E+00	531	1.836E+01	572	2.291E+01
409	5.240E-02	450	1.598E+01	491	8.409E+00	532	1.851E+01	573	2.301E+01
410	7.290E-02	451	1.608E+01	492	8.687E+00	533	1.865E+01	574	2.312E+01
411	7.430E-02	452	1.588E+01	493	8.987E+00	534	1.880E+01	575	2.323E+01
412	8.070E-02	453	1.542E+01	494	9.309E+00	535	1.895E+01	576	2.335E+01
413	1.035E-01	454	1.473E+01	495	9.641E+00	536	1.908E+01	577	2.345E+01
414	1.353E-01	455	1.394E+01	496	9.956E+00	537	1.921E+01	578	2.357E+01
415	1.707E-01	456	1.311E+01	497	1.027E+01	538	1.933E+01	579	2.371E+01
416	2.097E-01	457	1.231E+01	498	1.059E+01	539	1.948E+01	580	2.383E+01
417	2.565E-01	458	1.161E+01	499	1.091E+01	540	1.961E+01	581	2.396E+01
418	3.175E-01	459	1.102E+01	500	1.123E+01	541	1.973E+01	582	2.409E+01
419	3.780E-01	460	1.053E+01	501	1.155E+01	542	1.986E+01	583	2.422E+01
420	4.507E-01	461	1.015E+01	502	1.186E+01	543	2.000E+01	584	2.437E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.454E+01	626	3.065E+01	667	2.308E+01	708	9.389E+00	749	2.442E+00
586	2.470E+01	627	3.067E+01	668	2.270E+01	709	9.140E+00	750	2.389E+00
587	2.485E+01	628	3.072E+01	669	2.233E+01	710	8.877E+00	751	2.340E+00
588	2.500E+01	629	3.073E+01	670	2.198E+01	711	8.607E+00	752	2.285E+00
589	2.516E+01	630	3.074E+01	671	2.160E+01	712	8.349E+00	753	2.174E+00
590	2.532E+01	631	3.074E+01	672	2.121E+01	713	8.093E+00	754	2.069E+00
591	2.549E+01	632	3.073E+01	673	2.084E+01	714	7.847E+00	755	2.002E+00
592	2.565E+01	633	3.073E+01	674	2.049E+01	715	7.594E+00	756	1.953E+00
593	2.585E+01	634	3.072E+01	675	2.013E+01	716	7.341E+00	757	1.809E+00
594	2.603E+01	635	3.070E+01	676	1.976E+01	717	7.120E+00	758	1.714E+00
595	2.620E+01	636	3.063E+01	677	1.939E+01	718	6.865E+00	759	1.661E+00
596	2.640E+01	637	3.053E+01	678	1.900E+01	719	6.631E+00	760	1.579E+00
597	2.659E+01	638	3.047E+01	679	1.862E+01	720	6.418E+00	761	1.567E+00
598	2.679E+01	639	3.041E+01	680	1.825E+01	721	6.206E+00	762	1.556E+00
599	2.697E+01	640	3.030E+01	681	1.789E+01	722	5.997E+00	763	1.508E+00
600	2.713E+01	641	3.017E+01	682	1.756E+01	723	5.753E+00	764	1.410E+00
601	2.734E+01	642	3.004E+01	683	1.722E+01	724	5.544E+00	765	1.339E+00
602	2.755E+01	643	2.992E+01	684	1.685E+01	725	5.361E+00	766	1.290E+00
603	2.773E+01	644	2.978E+01	685	1.649E+01	726	5.169E+00	767	1.272E+00
604	2.791E+01	645	2.962E+01	686	1.616E+01	727	4.994E+00	768	1.243E+00
605	2.810E+01	646	2.940E+01	687	1.583E+01	728	4.824E+00	769	1.184E+00
606	2.828E+01	647	2.917E+01	688	1.547E+01	729	4.686E+00	770	1.115E+00
607	2.845E+01	648	2.895E+01	689	1.512E+01	730	4.535E+00	771	1.068E+00
608	2.862E+01	649	2.874E+01	690	1.482E+01	731	4.407E+00	772	1.025E+00
609	2.879E+01	650	2.851E+01	691	1.451E+01	732	4.248E+00	773	9.924E-01
610	2.895E+01	651	2.827E+01	692	1.417E+01	733	4.073E+00	774	9.550E-01
611	2.911E+01	652	2.803E+01	693	1.380E+01	734	3.960E+00	775	9.199E-01
612	2.924E+01	653	2.776E+01	694	1.347E+01	735	3.833E+00	776	8.677E-01
613	2.938E+01	654	2.746E+01	695	1.317E+01	736	3.696E+00	777	8.441E-01
614	2.953E+01	655	2.714E+01	696	1.286E+01	737	3.557E+00	778	7.669E-01
615	2.966E+01	656	2.684E+01	697	1.256E+01	738	3.404E+00	779	7.320E-01
616	2.976E+01	657	2.653E+01	698	1.225E+01	739	3.289E+00	780	6.976E-01
617	2.989E+01	658	2.620E+01	699	1.192E+01	740	3.219E+00		
618	3.001E+01	659	2.586E+01	700	1.162E+01	741	3.146E+00		
619	3.010E+01	660	2.552E+01	701	1.134E+01	742	3.070E+00		
620	3.019E+01	661	2.518E+01	702	1.102E+01	743	2.945E+00		
621	3.028E+01	662	2.484E+01	703	1.072E+01	744	2.828E+00		
622	3.039E+01	663	2.449E+01	704	1.045E+01	745	2.700E+00		
623	3.051E+01	664	2.413E+01	705	1.018E+01	746	2.610E+00		
624	3.056E+01	665	2.378E+01	706	9.910E+00	747	2.559E+00		
625	3.061E+01	666	2.344E+01	707	9.642E+00	748	2.498E+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**

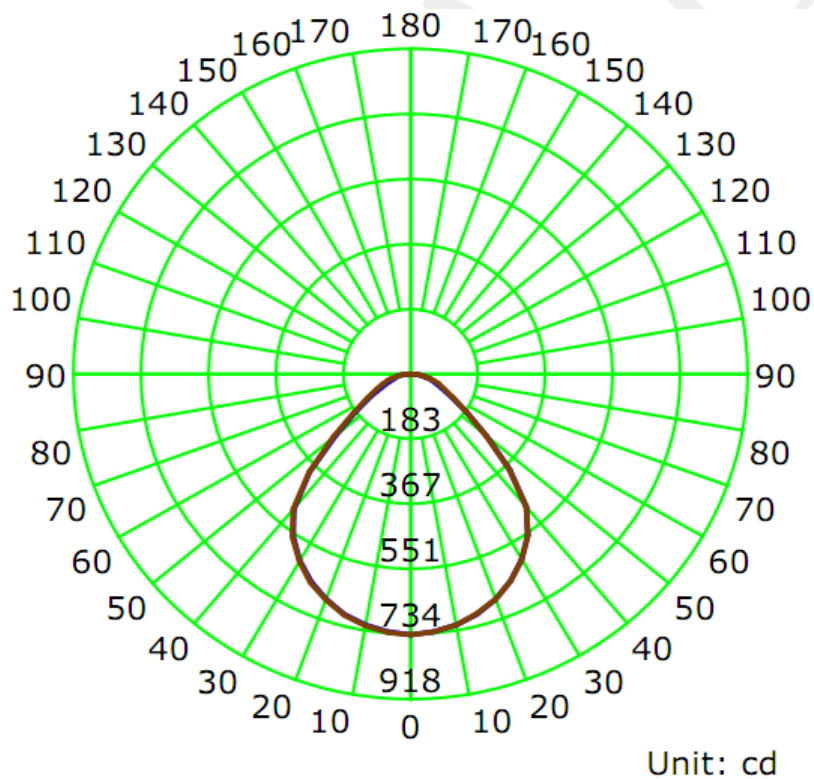
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1630	19.45	0.9950

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1562.7	80.40	734.7	1.22	1.23

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	91.6	91.6	91.7	91.7	91.7
Field Angle (10% I_{max}):	137.6	138.9	144.3	142.6	140.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	735	735	735	735	735	735	735	735
5.0°	730	730	730	731	730	730	731	732
10.0°	719	719	718	718	719	719	720	721
15.0°	701	700	700	700	701	700	701	703
20.0°	676	676	674	674	675	676	677	678
25.0°	645	644	643	643	644	644	645	648
30.0°	607	605	604	603	605	605	607	609
35.0°	557	556	555	555	556	557	560	562
40.0°	490	490	488	488	489	493	497	501
45.0°	381	380	377	377	380	385	392	397
50.0°	270	266	266	266	267	271	273	277
55.0°	187	185	184	184	185	186	189	191
60.0°	129	136	128	128	135	128	134	135
65.0°	93	105	93	93	104	89	99	100
70.0°	71	83	72	73	81	67	77	76
75.0°	55	63	56	56	61	51	59	59
80.0°	39	41	38	39	40	36	40	40
85.0°	17	18	18	17	19	17	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

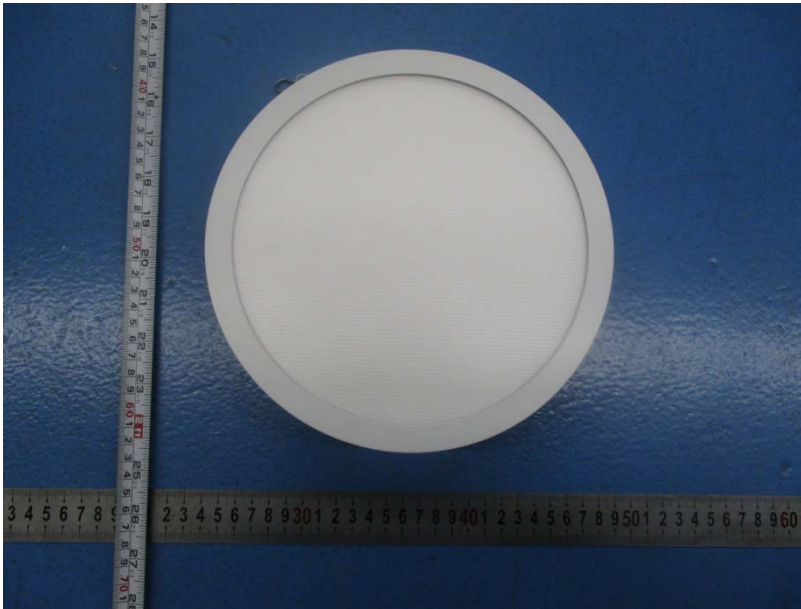
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	735	735	735	735	735	735	735	735
5.0°	730	731	732	731	732	731	732	731
10.0°	720	720	721	721	722	721	720	720
15.0°	702	704	704	705	705	702	702	702
20.0°	677	679	680	681	680	679	677	677
25.0°	646	647	649	650	649	647	646	645
30.0°	607	610	610	612	610	609	608	606
35.0°	559	562	564	564	563	560	559	557
40.0°	498	500	500	500	499	495	490	487
45.0°	392	395	396	397	394	389	383	378
50.0°	269	272	277	277	278	276	272	266
55.0°	187	189	192	192	192	191	189	185
60.0°	127	137	132	134	138	131	135	131
65.0°	88	104	93	96	106	93	102	99
70.0°	66	82	71	74	83	70	80	77
75.0°	51	61	55	58	63	54	61	60
80.0°	36	40	39	39	42	38	40	39
85.0°	17	19	19	20	19	18	18	17
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	17.5	1.12	0-5	17.5	1.12
5-10	51.9	3.32	0-10	69.4	4.44
10-15	84.3	5.40	0-15	153.8	9.84
15-20	113.7	7.27	0-20	267.4	17.11
20-25	138.8	8.88	0-25	406.2	25.99
25-30	158.6	10.15	0-30	564.8	36.14
30-35	171.8	10.99	0-35	736.5	47.13
35-40	175.7	11.24	0-40	912.2	58.37
40-45	163.1	10.44	0-45	1075.4	68.81
45-50	133.1	8.51	0-50	1208.4	77.33
50-55	99.9	6.39	0-55	1308.3	83.72
55-60	74.0	4.74	0-60	1382.3	88.46
60-65	55.8	3.57	0-65	1438.1	92.03
65-70	43.6	2.79	0-70	1481.7	94.82
70-75	34.7	2.22	0-75	1516.4	97.04
75-80	25.8	1.65	0-80	1542.2	98.69
80-85	15.5	0.99	0-85	1557.8	99.68
85-90	5.0	0.32	0-90	1562.7	100.00
90-95	0.0	0.00	0-95	1562.7	100.00
95-100	0.0	0.00	0-100	1562.7	100.00
100-105	0.0	0.00	0-105	1562.7	100.00
105-110	0.0	0.00	0-110	1562.7	100.00
110-115	0.0	0.00	0-115	1562.7	100.00
115-120	0.0	0.00	0-120	1562.7	100.00
120-125	0.0	0.00	0-125	1562.7	100.00
125-130	0.0	0.00	0-130	1562.7	100.00
130-135	0.0	0.00	0-135	1562.7	100.00
135-140	0.0	0.00	0-140	1562.7	100.00
140-145	0.0	0.00	0-145	1562.7	100.00
145-150	0.0	0.00	0-150	1562.7	100.00
150-155	0.0	0.00	0-155	1562.7	100.00
155-160	0.0	0.00	0-160	1562.7	100.00
160-165	0.0	0.00	0-165	1562.7	100.00
165-170	0.0	0.00	0-170	1562.7	100.00
170-175	0.0	0.00	0-175	1562.7	100.00
175-180	0.0	0.00	0-180	1562.7	100.00

6. Product Photo



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