IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 15SMPS7DIM/930/277V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	PKS171229080-10-1
Test Date:	2018-01-02
Report Date:	2018-01-04
Reviewed By:	Ray Gao/EE Engineer
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:	15SMPS7DIM/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:	15W
Nominal CCT:	3000K
Nominal Lumen Output:	850lm

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°C±1°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=24K (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_f, 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	0.1211	14.37	0.9888	1106.5	77.01

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.900	3066	0.00224	0.4355	0.4092	0.2475	0.5232

Color Rendering Index

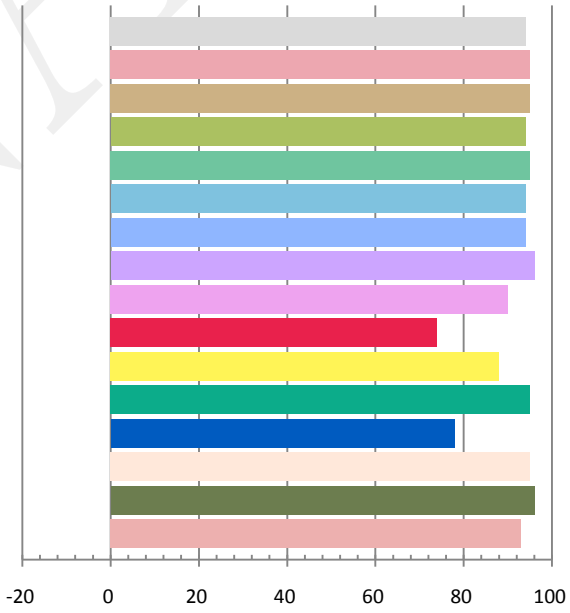
Ra
94.1

R1	R2	R3	R4
95	95	94	95

R5	R6	R7	R8
94	94	96	90

R9	R10	R11	R12
74	88	95	78

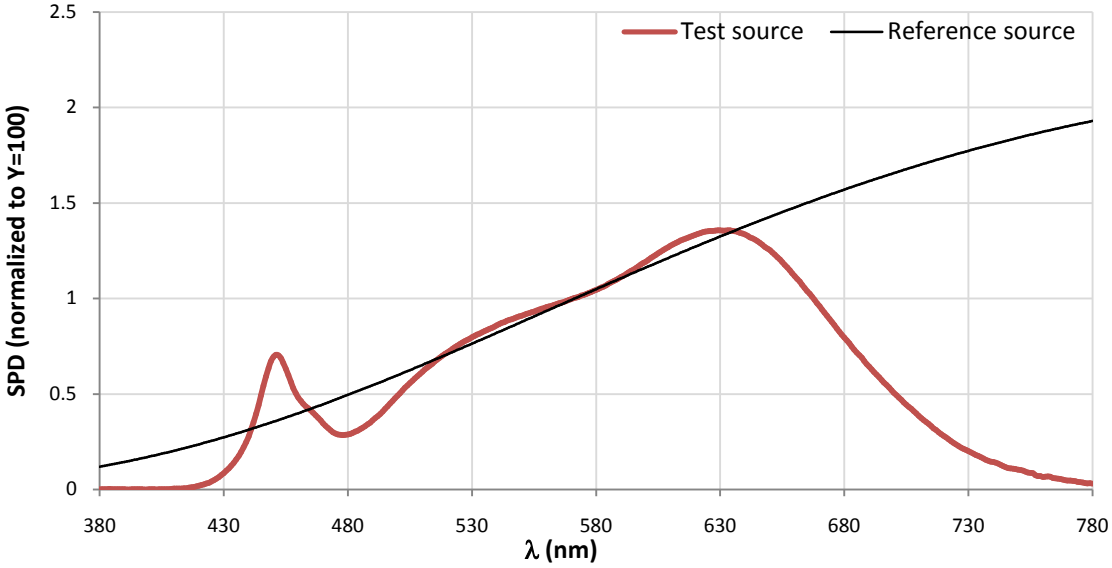
R13	R14	R15
95	96	93



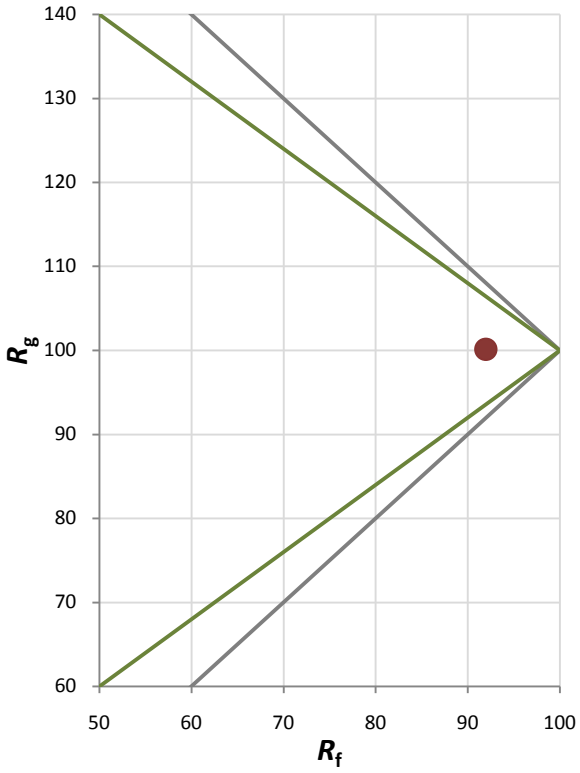
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	100

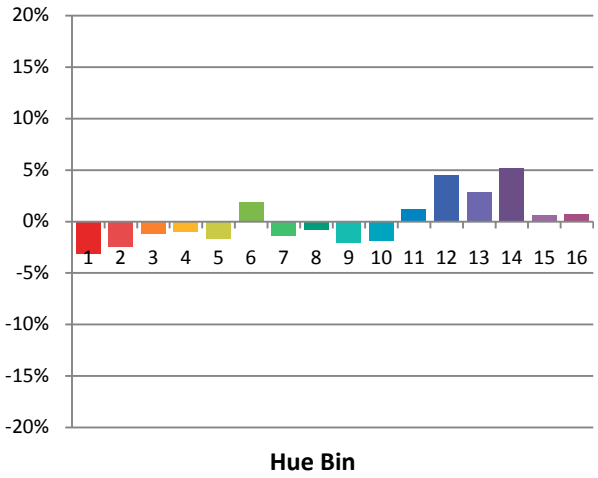
Spectral Power Distribution Comparison



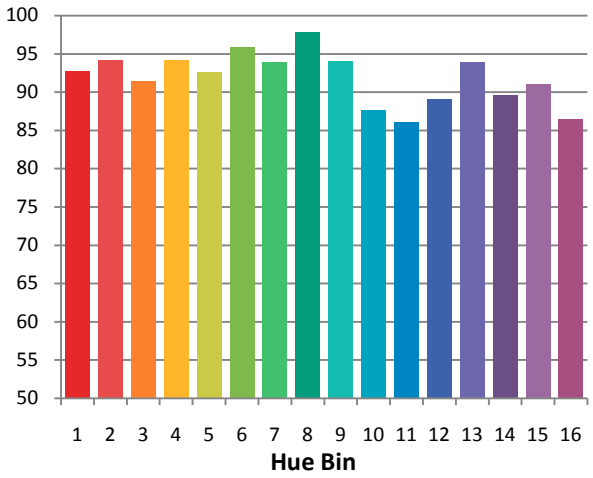
Plot of R_g versus R_f



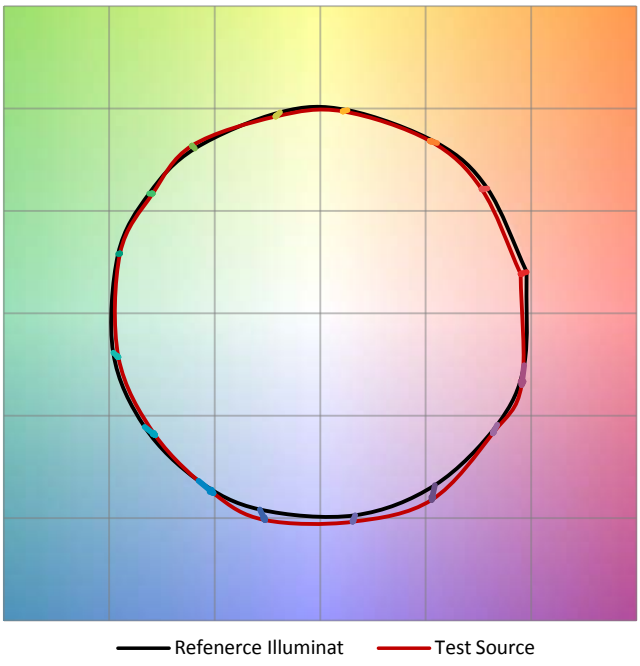
Chroma Shift by Hue

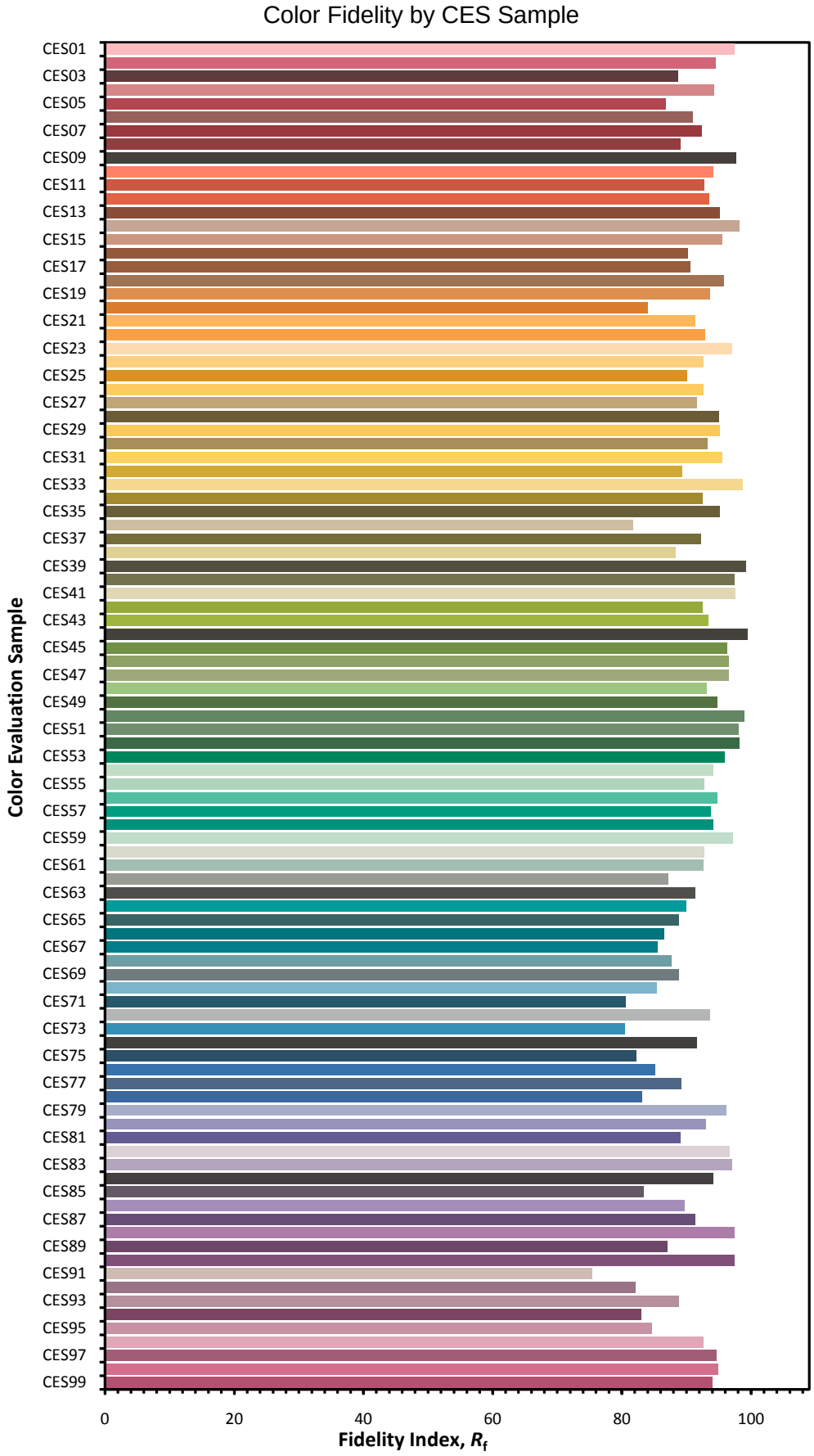


R_f by Hue

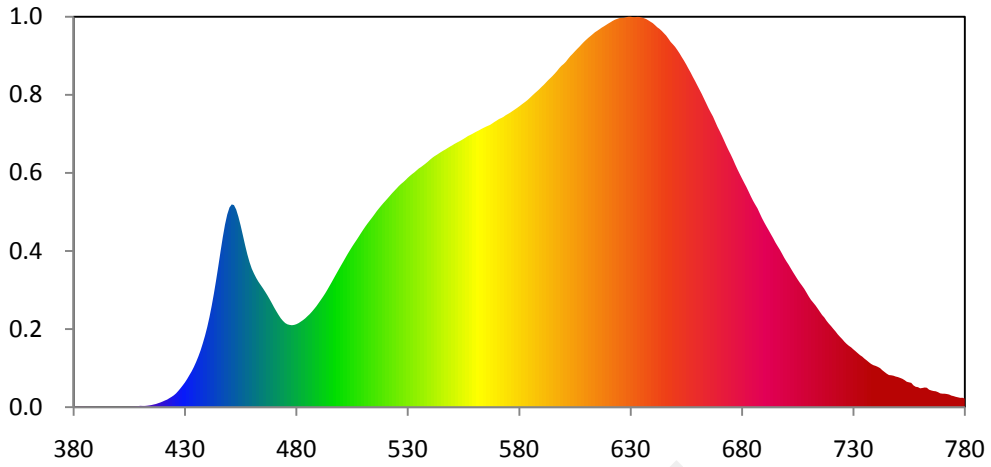


Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
CES15
CES17
CES19
CES21
CES23
CES25
CES27
CES29
CES31
CES33
CES35
CES37
CES39
CES41
CES43
CES45
CES47
CES49
CES51
CES53
CES55
CES57
CES59
CES61
CES63
CES65
CES67
CES69
CES71
CES73
CES75
CES77
CES79
CES81
CES83
CES85
CES87
CES89
CES91
CES93
CES95
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

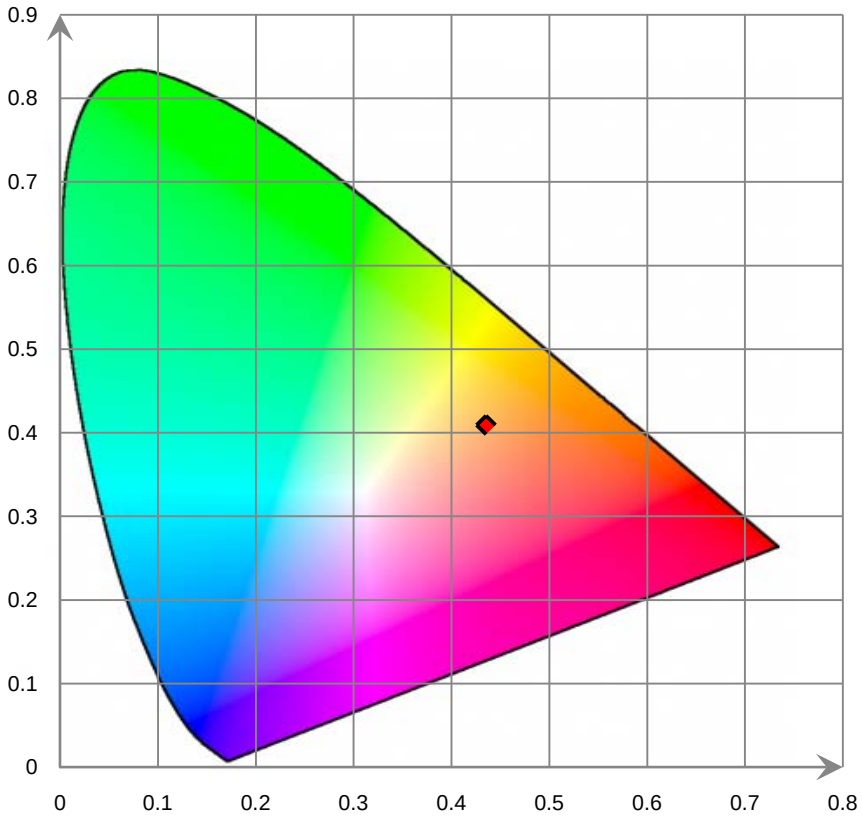
Relative Spectral Power Distribution



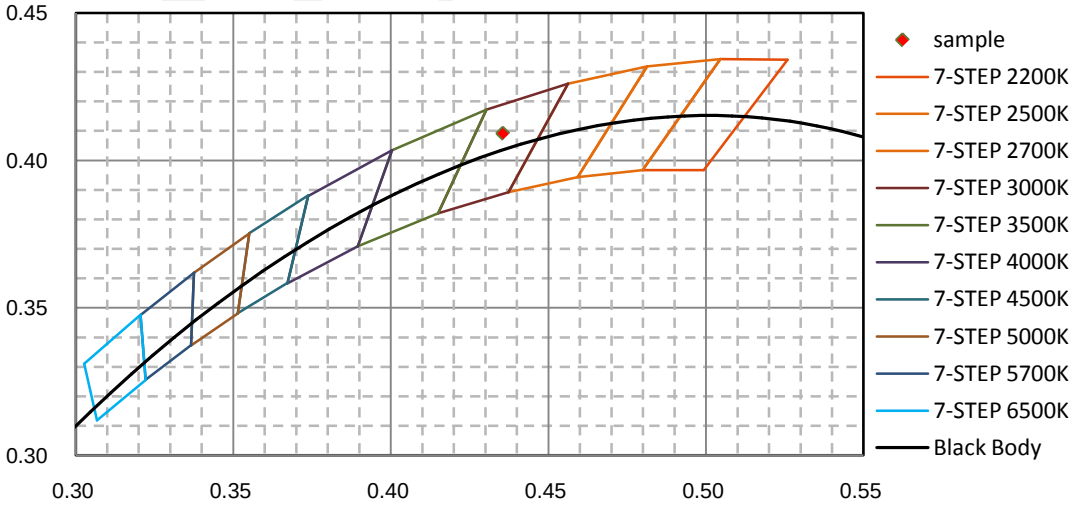
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.840E-02	421	3.757E-01	462	7.274E+00	503	8.619E+00	544	1.429E+01
381	2.440E-02	422	4.267E-01	463	7.061E+00	504	8.827E+00	545	1.437E+01
382	1.720E-02	423	5.054E-01	464	6.879E+00	505	9.028E+00	546	1.445E+01
383	2.890E-02	424	5.811E-01	465	6.695E+00	506	9.222E+00	547	1.452E+01
384	4.060E-02	425	6.655E-01	466	6.502E+00	507	9.407E+00	548	1.460E+01
385	2.560E-02	426	7.731E-01	467	6.300E+00	508	9.599E+00	549	1.467E+01
386	2.490E-02	427	9.121E-01	468	6.083E+00	509	9.797E+00	550	1.474E+01
387	2.220E-02	428	1.064E+00	469	5.857E+00	510	9.989E+00	551	1.482E+01
388	1.680E-02	429	1.225E+00	470	5.624E+00	511	1.017E+01	552	1.489E+01
389	2.190E-02	430	1.394E+00	471	5.405E+00	512	1.035E+01	553	1.496E+01
390	2.120E-02	431	1.588E+00	472	5.198E+00	513	1.051E+01	554	1.503E+01
391	1.030E-02	432	1.802E+00	473	5.008E+00	514	1.068E+01	555	1.510E+01
392	7.100E-03	433	2.014E+00	474	4.858E+00	515	1.085E+01	556	1.518E+01
393	1.290E-02	434	2.260E+00	475	4.737E+00	516	1.102E+01	557	1.526E+01
394	1.630E-02	435	2.540E+00	476	4.666E+00	517	1.118E+01	558	1.532E+01
395	1.750E-02	436	2.847E+00	477	4.632E+00	518	1.133E+01	559	1.539E+01
396	1.660E-02	437	3.187E+00	478	4.614E+00	519	1.148E+01	560	1.546E+01
397	1.230E-02	438	3.587E+00	479	4.631E+00	520	1.162E+01	561	1.553E+01
398	8.500E-03	439	4.017E+00	480	4.672E+00	521	1.176E+01	562	1.559E+01
399	4.400E-03	440	4.504E+00	481	4.733E+00	522	1.190E+01	563	1.566E+01
400	1.310E-02	441	5.065E+00	482	4.816E+00	523	1.205E+01	564	1.573E+01
401	1.670E-02	442	5.697E+00	483	4.903E+00	524	1.218E+01	565	1.579E+01
402	1.450E-02	443	6.395E+00	484	5.002E+00	525	1.231E+01	566	1.584E+01
403	1.060E-02	444	7.152E+00	485	5.122E+00	526	1.245E+01	567	1.590E+01
404	1.390E-02	445	7.955E+00	486	5.238E+00	527	1.257E+01	568	1.598E+01
405	1.790E-02	446	8.782E+00	487	5.377E+00	528	1.267E+01	569	1.607E+01
406	2.780E-02	447	9.579E+00	488	5.526E+00	529	1.279E+01	570	1.614E+01
407	3.310E-02	448	1.029E+01	489	5.683E+00	530	1.291E+01	571	1.623E+01
408	3.510E-02	449	1.085E+01	490	5.862E+00	531	1.303E+01	572	1.628E+01
409	6.140E-02	450	1.124E+01	491	6.041E+00	532	1.313E+01	573	1.635E+01
410	7.610E-02	451	1.142E+01	492	6.224E+00	533	1.322E+01	574	1.644E+01
411	6.930E-02	452	1.138E+01	493	6.416E+00	534	1.333E+01	575	1.651E+01
412	7.100E-02	453	1.113E+01	494	6.628E+00	535	1.344E+01	576	1.658E+01
413	8.440E-02	454	1.072E+01	495	6.849E+00	536	1.353E+01	577	1.667E+01
414	1.008E-01	455	1.023E+01	496	7.067E+00	537	1.362E+01	578	1.676E+01
415	1.199E-01	456	9.683E+00	497	7.293E+00	538	1.371E+01	579	1.684E+01
416	1.506E-01	457	9.125E+00	498	7.520E+00	539	1.382E+01	580	1.693E+01
417	1.805E-01	458	8.611E+00	499	7.743E+00	540	1.393E+01	581	1.703E+01
418	2.242E-01	459	8.164E+00	500	7.964E+00	541	1.404E+01	582	1.712E+01
419	2.662E-01	460	7.798E+00	501	8.181E+00	542	1.413E+01	583	1.722E+01
420	3.193E-01	461	7.521E+00	502	8.400E+00	543	1.421E+01	584	1.732E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.744E+01	626	2.192E+01	667	1.637E+01	708	6.658E+00	749	1.725E+00
586	1.756E+01	627	2.192E+01	668	1.608E+01	709	6.448E+00	750	1.694E+00
587	1.767E+01	628	2.195E+01	669	1.579E+01	710	6.233E+00	751	1.648E+00
588	1.778E+01	629	2.198E+01	670	1.555E+01	711	6.038E+00	752	1.598E+00
589	1.790E+01	630	2.198E+01	671	1.529E+01	712	5.887E+00	753	1.525E+00
590	1.802E+01	631	2.196E+01	672	1.501E+01	713	5.733E+00	754	1.430E+00
591	1.814E+01	632	2.196E+01	673	1.473E+01	714	5.555E+00	755	1.398E+00
592	1.827E+01	633	2.197E+01	674	1.447E+01	715	5.371E+00	756	1.369E+00
593	1.841E+01	634	2.197E+01	675	1.422E+01	716	5.187E+00	757	1.227E+00
594	1.853E+01	635	2.194E+01	676	1.395E+01	717	5.047E+00	758	1.148E+00
595	1.865E+01	636	2.190E+01	677	1.366E+01	718	4.860E+00	759	1.127E+00
596	1.878E+01	637	2.185E+01	678	1.339E+01	719	4.704E+00	760	1.062E+00
597	1.893E+01	638	2.178E+01	679	1.313E+01	720	4.565E+00	761	1.082E+00
598	1.909E+01	639	2.170E+01	680	1.288E+01	721	4.412E+00	762	1.108E+00
599	1.922E+01	640	2.162E+01	681	1.264E+01	722	4.268E+00	763	1.095E+00
600	1.932E+01	641	2.151E+01	682	1.240E+01	723	4.101E+00	764	9.840E-01
601	1.945E+01	642	2.139E+01	683	1.214E+01	724	3.963E+00	765	9.406E-01
602	1.962E+01	643	2.130E+01	684	1.187E+01	725	3.835E+00	766	9.093E-01
603	1.977E+01	644	2.118E+01	685	1.162E+01	726	3.687E+00	767	8.955E-01
604	1.990E+01	645	2.105E+01	686	1.140E+01	727	3.561E+00	768	8.472E-01
605	2.003E+01	646	2.092E+01	687	1.119E+01	728	3.455E+00	769	7.773E-01
606	2.016E+01	647	2.075E+01	688	1.092E+01	729	3.371E+00	770	7.608E-01
607	2.029E+01	648	2.057E+01	689	1.065E+01	730	3.256E+00	771	7.590E-01
608	2.042E+01	649	2.043E+01	690	1.041E+01	731	3.151E+00	772	7.418E-01
609	2.056E+01	650	2.029E+01	691	1.018E+01	732	3.039E+00	773	7.118E-01
610	2.068E+01	651	2.011E+01	692	9.963E+00	733	2.930E+00	774	6.527E-01
611	2.079E+01	652	1.992E+01	693	9.738E+00	734	2.847E+00	775	6.223E-01
612	2.089E+01	653	1.971E+01	694	9.518E+00	735	2.732E+00	776	5.830E-01
613	2.100E+01	654	1.951E+01	695	9.282E+00	736	2.636E+00	777	5.537E-01
614	2.111E+01	655	1.929E+01	696	9.073E+00	737	2.530E+00	778	5.263E-01
615	2.119E+01	656	1.906E+01	697	8.869E+00	738	2.434E+00	779	5.308E-01
616	2.127E+01	657	1.884E+01	698	8.643E+00	739	2.366E+00	780	4.863E-01
617	2.136E+01	658	1.859E+01	699	8.410E+00	740	2.323E+00		
618	2.144E+01	659	1.836E+01	700	8.203E+00	741	2.269E+00		
619	2.152E+01	660	1.811E+01	701	8.012E+00	742	2.201E+00		
620	2.160E+01	661	1.787E+01	702	7.801E+00	743	2.083E+00		
621	2.167E+01	662	1.763E+01	703	7.591E+00	744	1.984E+00		
622	2.175E+01	663	1.736E+01	704	7.390E+00	745	1.886E+00		
623	2.182E+01	664	1.710E+01	705	7.191E+00	746	1.810E+00		
624	2.186E+01	665	1.683E+01	706	7.005E+00	747	1.796E+00		
625	2.191E+01	666	1.660E+01	707	6.837E+00	748	1.772E+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**

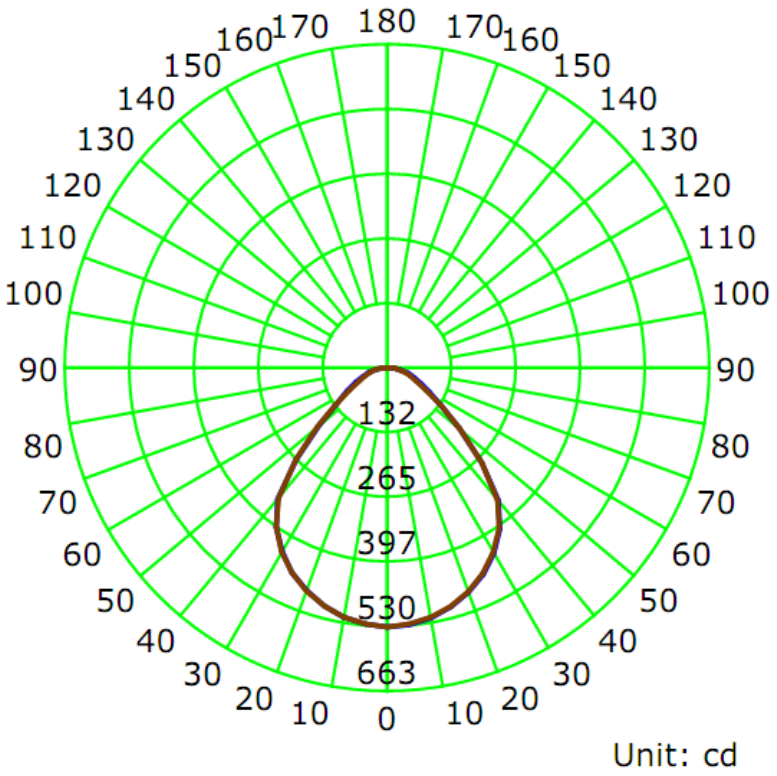
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1210	14.43	0.9910

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1114	77.25	530.6	1.22	1.22

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	90.7	90.8	90.9	90.8	90.8
Field Angle (10% I_{max}):	143.3	140.3	137.5	140.5	140.4

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	531	531	531	531	531	531	531	531
5.0°	528	528	528	528	528	527	528	528
10.0°	520	520	520	519	520	520	520	519
15.0°	507	507	507	506	506	506	507	507
20.0°	490	489	489	488	489	488	488	489
25.0°	467	467	466	466	466	465	466	466
30.0°	439	439	438	437	438	437	437	437
35.0°	405	404	403	402	402	402	402	402
40.0°	356	356	355	354	355	354	355	356
45.0°	276	277	278	277	277	276	275	274
50.0°	194	195	195	195	193	194	192	190
55.0°	134	135	136	136	134	135	134	131
60.0°	100	93	95	99	92	98	94	90
65.0°	78	67	70	76	66	74	70	64
70.0°	61	51	55	60	49	58	54	48
75.0°	45	40	43	45	39	44	41	37
80.0°	29	27	29	30	28	29	27	26
85.0°	13	12	13	14	14	14	13	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.)

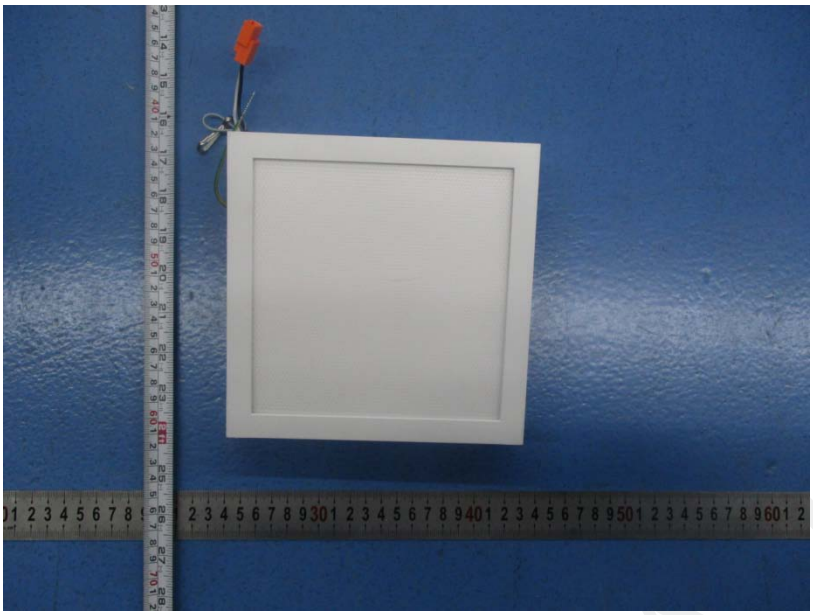
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	531	531	531	531	531	531	531	531
5.0°	527	528	528	527	528	528	528	528
10.0°	519	519	519	519	519	519	519	519
15.0°	505	506	506	506	506	506	506	506
20.0°	487	488	487	487	488	488	488	488
25.0°	464	464	464	464	465	464	465	465
30.0°	435	435	435	435	435	435	436	435
35.0°	400	400	399	399	399	399	400	400
40.0°	351	351	349	349	349	349	349	349
45.0°	265	265	267	268	268	268	269	268
50.0°	182	183	186	186	188	188	188	187
55.0°	127	127	129	130	130	131	131	129
60.0°	95	87	91	95	90	96	92	89
65.0°	72	62	66	73	64	74	69	64
70.0°	56	47	52	57	49	58	54	50
75.0°	40	37	39	43	38	43	41	38
80.0°	25	24	25	27	26	28	27	26
85.0°	10	10	11	12	12	12	11	10
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

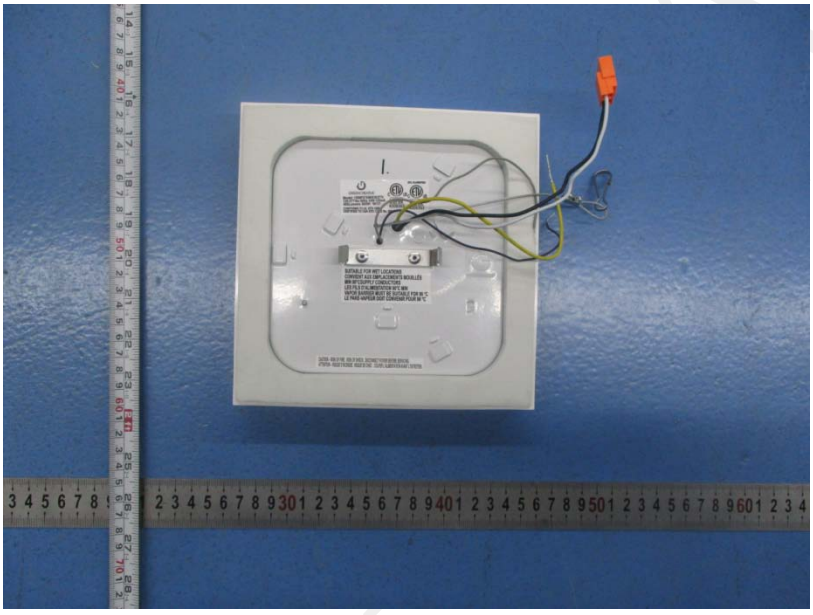
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	12.7	1.14
5-10	37.5	3.36
10-15	60.8	5.46
15-20	82.0	7.36
20-25	100.0	8.97
25-30	114.1	10.24
30-35	123.3	11.07
35-40	125.7	11.28
40-45	115.5	10.37
45-50	93.2	8.37
50-55	69.8	6.27
55-60	52.0	4.67
60-65	39.6	3.55
65-70	31.1	2.79
70-75	24.7	2.22
75-80	18.2	1.63
80-85	10.6	0.95
85-90	3.3	0.30
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.0	0.00
145-150	0.0	0.00
150-155	0.0	0.00
155-160	0.0	0.00
160-165	0.0	0.00
165-170	0.0	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	12.7	1.14
0-10	50.1	4.50
0-15	111.0	9.96
0-20	192.9	17.32
0-25	292.9	26.29
0-30	406.9	36.53
0-35	530.3	47.60
0-40	655.9	58.88
0-45	771.5	69.25
0-50	864.7	77.62
0-55	934.6	83.89
0-60	986.6	88.56
0-65	1026.2	92.11
0-70	1057.3	94.90
0-75	1081.9	97.12
0-80	1100.1	98.75
0-85	1110.7	99.70
0-90	1114.0	100.00
0-95	1114.0	100.00
0-100	1114.0	100.00
0-105	1114.0	100.00
0-110	1114.0	100.00
0-115	1114.0	100.00
0-120	1114.0	100.00
0-125	1114.0	100.00
0-130	1114.0	100.00
0-135	1114.0	100.00
0-140	1114.0	100.00
0-145	1114.0	100.00
0-150	1114.0	100.00
0-155	1114.0	100.00
0-160	1114.0	100.00
0-165	1114.0	100.00
0-170	1114.0	100.00
0-175	1114.0	100.00
0-180	1114.0	100.00

6. Product Photo





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