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/940/277V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	PKS171229081-10-1
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/940/277V
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:	4000K
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	0.1212	14.38	0.9885	1024.3	71.24

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.533	3999	-0.00063	0.3800	0.3752	0.2255	0.5008

Color Rendering Index

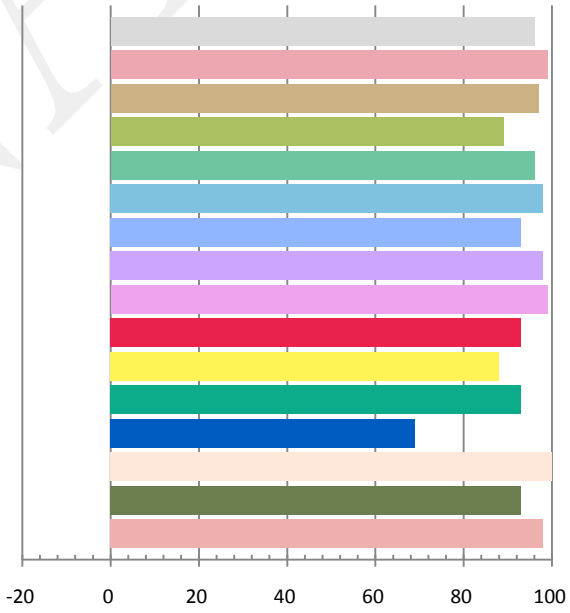
Ra
96.0

R1	R2	R3	R4
99	97	89	96

R5	R6	R7	R8
98	93	98	99

R9	R10	R11	R12
93	88	93	69

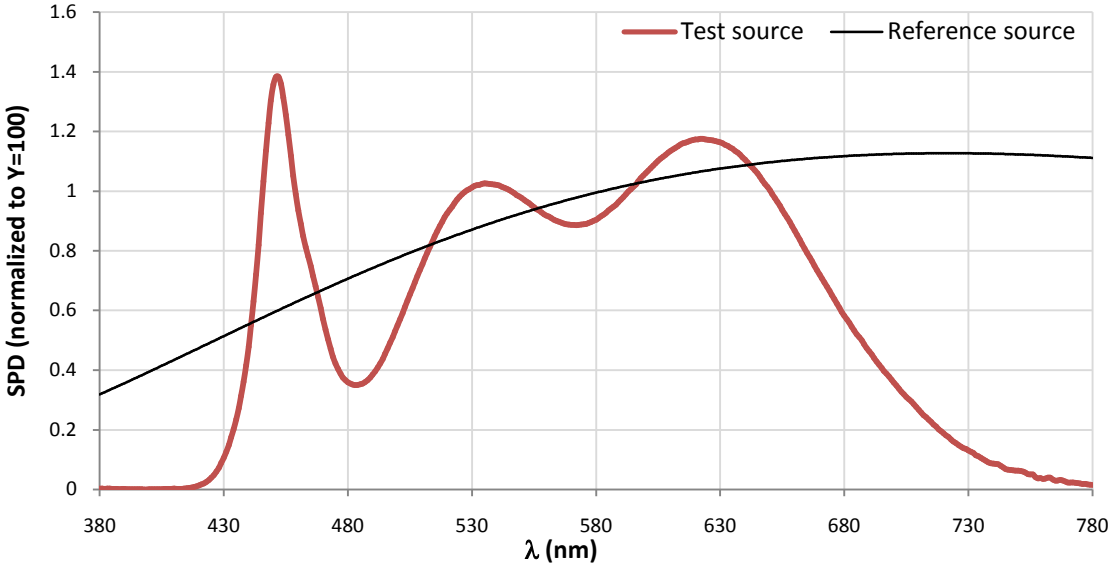
R13	R14	R15
100	93	98



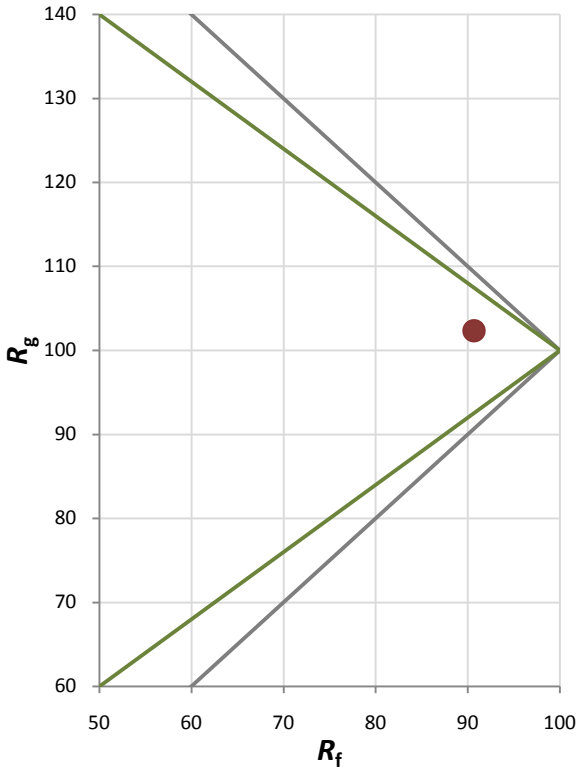
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	102

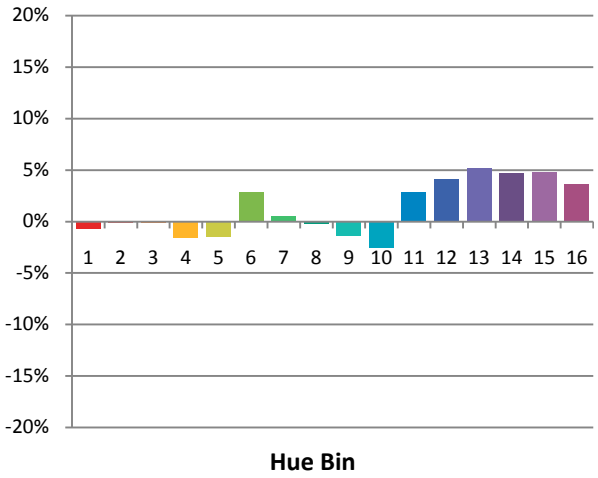
Spectral Power Distribution Comparison



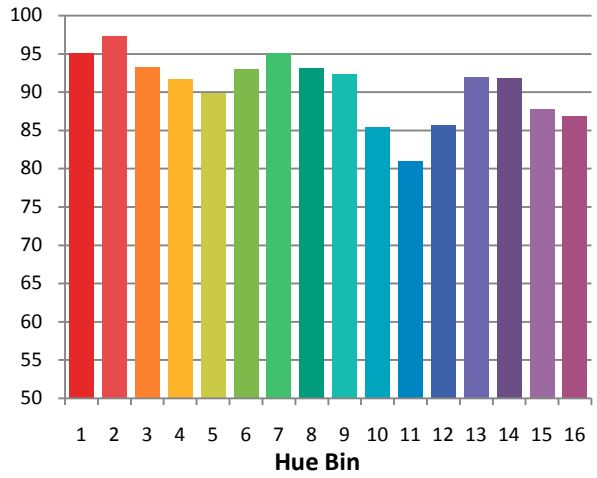
Plot of R_g versus R_f



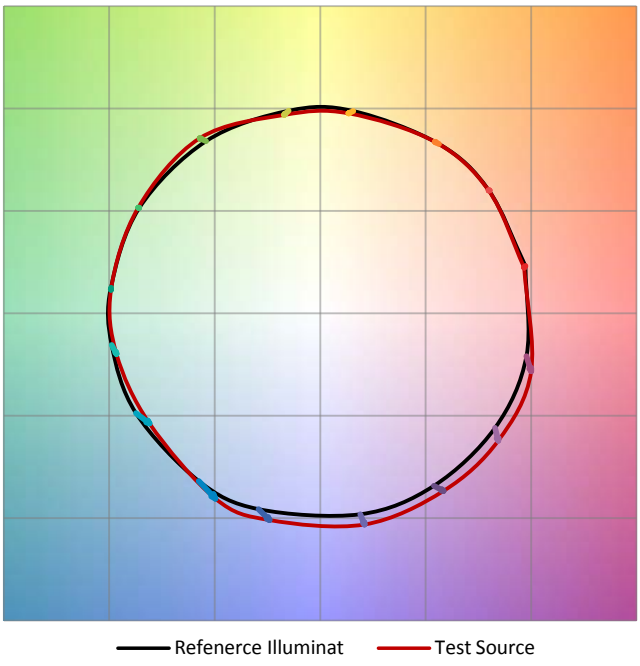
Chroma Shift by Hue

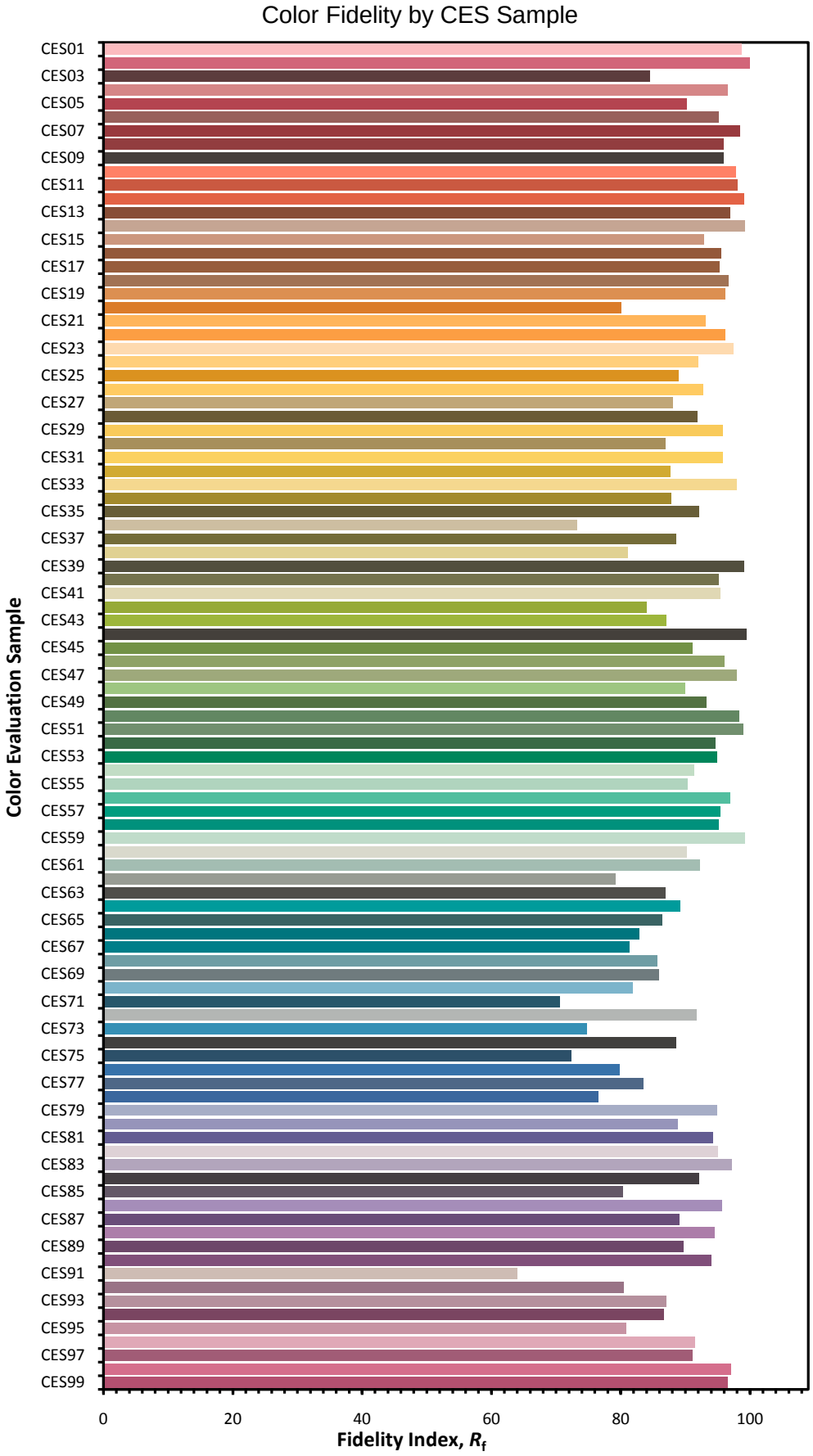


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
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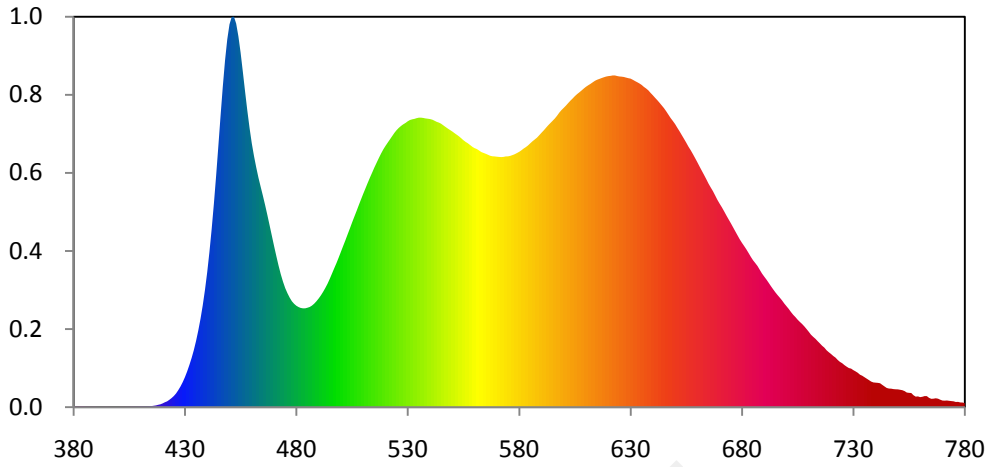
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

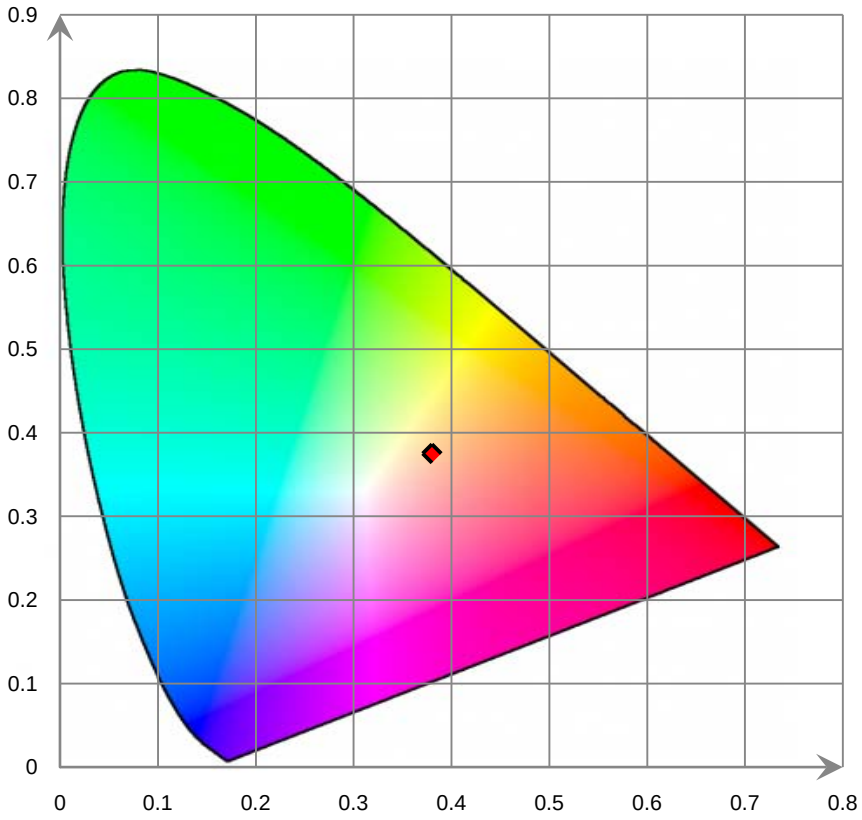
Relative Spectral Power Distribution



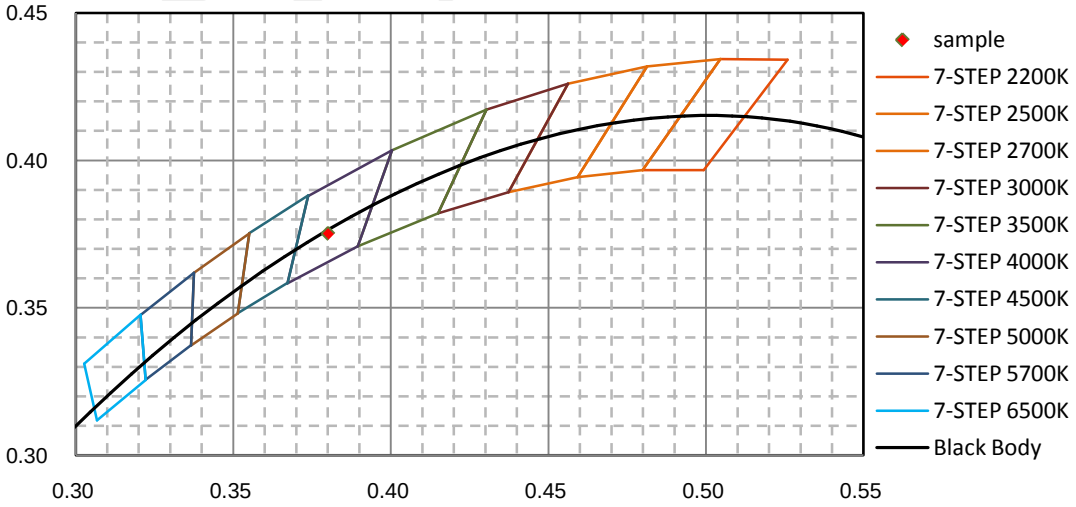
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.710E-02	421	2.611E-01	462	1.274E+01	503	9.173E+00	544	1.512E+01
381	3.950E-02	422	3.095E-01	463	1.219E+01	504	9.482E+00	545	1.506E+01
382	3.390E-02	423	3.923E-01	464	1.171E+01	505	9.801E+00	546	1.497E+01
383	4.270E-02	424	4.826E-01	465	1.123E+01	506	1.011E+01	547	1.488E+01
384	5.070E-02	425	5.919E-01	466	1.073E+01	507	1.041E+01	548	1.480E+01
385	3.360E-02	426	7.268E-01	467	1.021E+01	508	1.072E+01	549	1.472E+01
386	2.870E-02	427	9.015E-01	468	9.664E+00	509	1.103E+01	550	1.465E+01
387	2.710E-02	428	1.099E+00	469	9.115E+00	510	1.133E+01	551	1.456E+01
388	1.960E-02	429	1.329E+00	470	8.566E+00	511	1.161E+01	552	1.447E+01
389	2.470E-02	430	1.595E+00	471	8.039E+00	512	1.191E+01	553	1.439E+01
390	2.420E-02	431	1.901E+00	472	7.533E+00	513	1.219E+01	554	1.429E+01
391	1.180E-02	432	2.242E+00	473	7.070E+00	514	1.245E+01	555	1.418E+01
392	8.200E-03	433	2.614E+00	474	6.673E+00	515	1.272E+01	556	1.409E+01
393	1.610E-02	434	3.035E+00	475	6.328E+00	516	1.297E+01	557	1.402E+01
394	2.010E-02	435	3.523E+00	476	6.056E+00	517	1.323E+01	558	1.393E+01
395	2.190E-02	436	4.077E+00	477	5.823E+00	518	1.346E+01	559	1.383E+01
396	1.810E-02	437	4.699E+00	478	5.628E+00	519	1.369E+01	560	1.376E+01
397	1.060E-02	438	5.413E+00	479	5.492E+00	520	1.388E+01	561	1.371E+01
398	6.900E-03	439	6.233E+00	480	5.388E+00	521	1.405E+01	562	1.364E+01
399	3.300E-03	440	7.168E+00	481	5.319E+00	522	1.422E+01	563	1.355E+01
400	1.310E-02	441	8.249E+00	482	5.271E+00	523	1.440E+01	564	1.351E+01
401	1.660E-02	442	9.460E+00	483	5.249E+00	524	1.457E+01	565	1.346E+01
402	1.680E-02	443	1.081E+01	484	5.251E+00	525	1.472E+01	566	1.341E+01
403	1.950E-02	444	1.229E+01	485	5.284E+00	526	1.484E+01	567	1.335E+01
404	2.230E-02	445	1.387E+01	486	5.323E+00	527	1.494E+01	568	1.333E+01
405	2.270E-02	446	1.549E+01	487	5.395E+00	528	1.503E+01	569	1.332E+01
406	3.090E-02	447	1.703E+01	488	5.497E+00	529	1.510E+01	570	1.331E+01
407	3.330E-02	448	1.842E+01	489	5.622E+00	530	1.519E+01	571	1.329E+01
408	2.810E-02	449	1.954E+01	490	5.771E+00	531	1.525E+01	572	1.328E+01
409	3.800E-02	450	2.034E+01	491	5.934E+00	532	1.529E+01	573	1.330E+01
410	4.190E-02	451	2.073E+01	492	6.124E+00	533	1.532E+01	574	1.332E+01
411	3.700E-02	452	2.074E+01	493	6.330E+00	534	1.535E+01	575	1.332E+01
412	3.700E-02	453	2.038E+01	494	6.555E+00	535	1.538E+01	576	1.335E+01
413	3.770E-02	454	1.970E+01	495	6.817E+00	536	1.538E+01	577	1.339E+01
414	4.580E-02	455	1.882E+01	496	7.095E+00	537	1.536E+01	578	1.344E+01
415	5.730E-02	456	1.781E+01	497	7.376E+00	538	1.534E+01	579	1.350E+01
416	7.610E-02	457	1.677E+01	498	7.650E+00	539	1.532E+01	580	1.356E+01
417	9.600E-02	458	1.576E+01	499	7.943E+00	540	1.531E+01	581	1.364E+01
418	1.275E-01	459	1.484E+01	500	8.251E+00	541	1.527E+01	582	1.374E+01
419	1.538E-01	460	1.402E+01	501	8.558E+00	542	1.522E+01	583	1.381E+01
420	2.004E-01	461	1.334E+01	502	8.859E+00	543	1.516E+01	584	1.390E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.402E+01	626	1.756E+01	667	1.147E+01	708	4.292E+00	749	9.504E-01
586	1.413E+01	627	1.754E+01	668	1.124E+01	709	4.152E+00	750	9.455E-01
587	1.422E+01	628	1.751E+01	669	1.101E+01	710	4.006E+00	751	9.254E-01
588	1.431E+01	629	1.748E+01	670	1.081E+01	711	3.850E+00	752	9.019E-01
589	1.444E+01	630	1.745E+01	671	1.062E+01	712	3.735E+00	753	8.553E-01
590	1.457E+01	631	1.739E+01	672	1.041E+01	713	3.632E+00	754	7.770E-01
591	1.470E+01	632	1.732E+01	673	1.019E+01	714	3.505E+00	755	7.607E-01
592	1.483E+01	633	1.726E+01	674	9.981E+00	715	3.387E+00	756	7.539E-01
593	1.497E+01	634	1.720E+01	675	9.777E+00	716	3.263E+00	757	6.340E-01
594	1.509E+01	635	1.712E+01	676	9.563E+00	717	3.164E+00	758	5.604E-01
595	1.521E+01	636	1.701E+01	677	9.345E+00	718	3.021E+00	759	5.715E-01
596	1.533E+01	637	1.693E+01	678	9.132E+00	719	2.919E+00	760	5.338E-01
597	1.548E+01	638	1.683E+01	679	8.920E+00	720	2.824E+00	761	5.537E-01
598	1.564E+01	639	1.669E+01	680	8.733E+00	721	2.719E+00	762	5.886E-01
599	1.578E+01	640	1.657E+01	681	8.560E+00	722	2.634E+00	763	5.874E-01
600	1.590E+01	641	1.644E+01	682	8.382E+00	723	2.507E+00	764	4.941E-01
601	1.602E+01	642	1.631E+01	683	8.187E+00	724	2.407E+00	765	4.438E-01
602	1.615E+01	643	1.617E+01	684	7.986E+00	725	2.335E+00	766	4.525E-01
603	1.628E+01	644	1.603E+01	685	7.803E+00	726	2.236E+00	767	4.734E-01
604	1.640E+01	645	1.589E+01	686	7.653E+00	727	2.152E+00	768	4.512E-01
605	1.652E+01	646	1.572E+01	687	7.499E+00	728	2.078E+00	769	3.984E-01
606	1.663E+01	647	1.554E+01	688	7.300E+00	729	2.048E+00	770	3.526E-01
607	1.672E+01	648	1.536E+01	689	7.101E+00	730	1.968E+00	771	3.471E-01
608	1.682E+01	649	1.520E+01	690	6.939E+00	731	1.902E+00	772	3.543E-01
609	1.692E+01	650	1.504E+01	691	6.780E+00	732	1.828E+00	773	3.382E-01
610	1.702E+01	651	1.484E+01	692	6.608E+00	733	1.727E+00	774	3.234E-01
611	1.710E+01	652	1.466E+01	693	6.432E+00	734	1.669E+00	775	3.105E-01
612	1.717E+01	653	1.445E+01	694	6.265E+00	735	1.593E+00	776	2.768E-01
613	1.725E+01	654	1.426E+01	695	6.103E+00	736	1.515E+00	777	2.813E-01
614	1.733E+01	655	1.405E+01	696	5.955E+00	737	1.439E+00	778	2.513E-01
615	1.739E+01	656	1.384E+01	697	5.818E+00	738	1.360E+00	779	2.460E-01
616	1.744E+01	657	1.365E+01	698	5.672E+00	739	1.315E+00	780	2.177E-01
617	1.748E+01	658	1.344E+01	699	5.510E+00	740	1.302E+00		
618	1.753E+01	659	1.323E+01	700	5.365E+00	741	1.291E+00		
619	1.756E+01	660	1.301E+01	701	5.221E+00	742	1.272E+00		
620	1.759E+01	661	1.278E+01	702	5.057E+00	743	1.184E+00		
621	1.760E+01	662	1.256E+01	703	4.908E+00	744	1.101E+00		
622	1.762E+01	663	1.234E+01	704	4.788E+00	745	1.020E+00		
623	1.762E+01	664	1.211E+01	705	4.648E+00	746	9.899E-01		
624	1.759E+01	665	1.188E+01	706	4.530E+00	747	9.823E-01		
625	1.757E+01	666	1.167E+01	707	4.421E+00	748	9.605E-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**

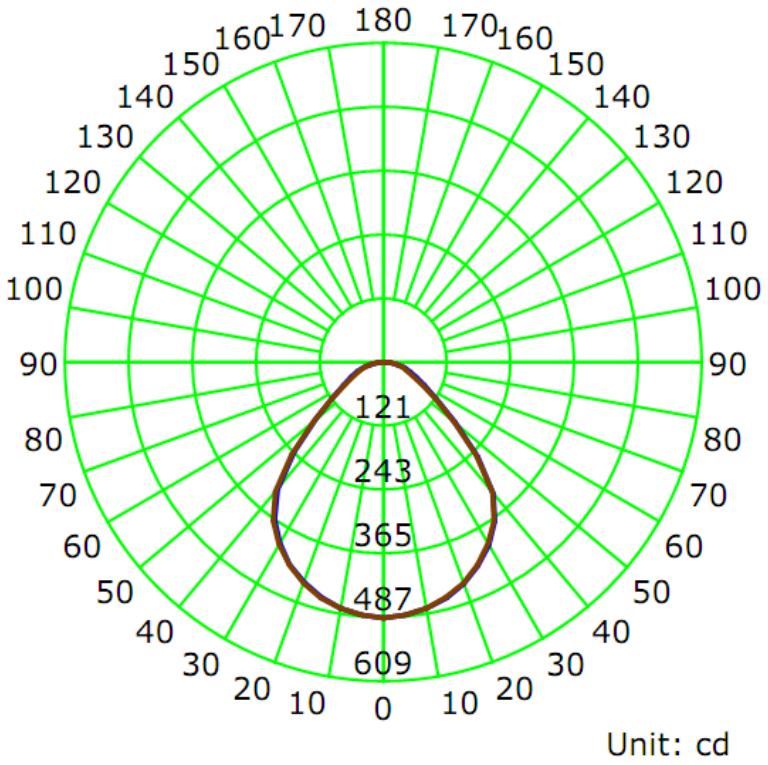
Electrical Measurement

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

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1031	71.50	488.0	1.22	1.22

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	90.8	90.8	90.9	90.8	90.8
Field Angle (10% I_{max}):	144.1	139.8	139.8	143.9	141.9

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	488	488	488	488	488	488	488	488
5.0°	485	486	485	485	485	485	486	486
10.0°	478	479	478	478	477	478	478	477
15.0°	466	466	466	466	465	465	465	466
20.0°	450	450	449	449	448	448	448	449
25.0°	429	429	428	428	427	427	428	428
30.0°	404	403	402	402	401	400	401	402
35.0°	372	370	370	370	369	368	368	369
40.0°	329	328	327	326	325	323	323	324
45.0°	256	255	253	254	252	252	251	250
50.0°	178	178	177	176	177	177	176	177
55.0°	124	124	124	124	123	124	124	123
60.0°	91	89	86	93	86	89	90	86
65.0°	70	65	62	73	62	67	69	61
70.0°	55	50	48	58	48	52	54	46
75.0°	41	39	38	44	38	40	41	36
80.0°	27	26	26	29	27	26	26	24
85.0°	12	12	13	15	13	12	11	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.)

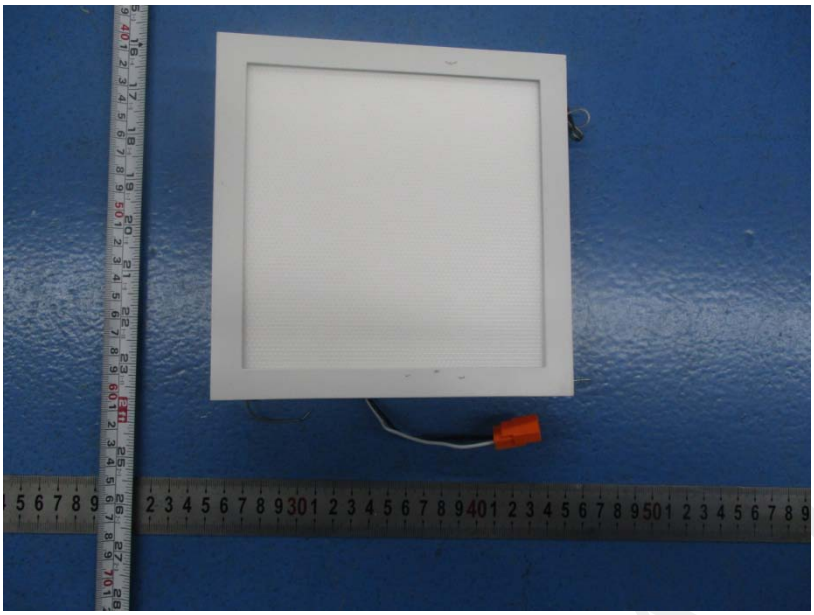
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	488	488	488	488	488	488	488	488
5.0°	485	485	486	485	485	486	486	486
10.0°	477	477	477	478	478	478	478	478
15.0°	465	465	466	466	466	466	466	466
20.0°	448	448	449	449	450	449	449	449
25.0°	426	427	428	428	428	428	428	428
30.0°	399	400	401	403	402	402	402	401
35.0°	365	367	368	369	369	369	369	369
40.0°	318	320	321	323	324	324	323	323
45.0°	245	246	247	250	250	249	249	248
50.0°	171	173	174	174	175	175	173	172
55.0°	120	121	121	124	122	122	121	119
60.0°	89	87	85	94	86	87	89	82
65.0°	69	66	63	74	63	65	69	58
70.0°	54	52	49	59	49	51	54	45
75.0°	40	39	39	44	38	40	40	34
80.0°	25	26	27	29	26	26	25	23
85.0°	10	10	11	13	12	11	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

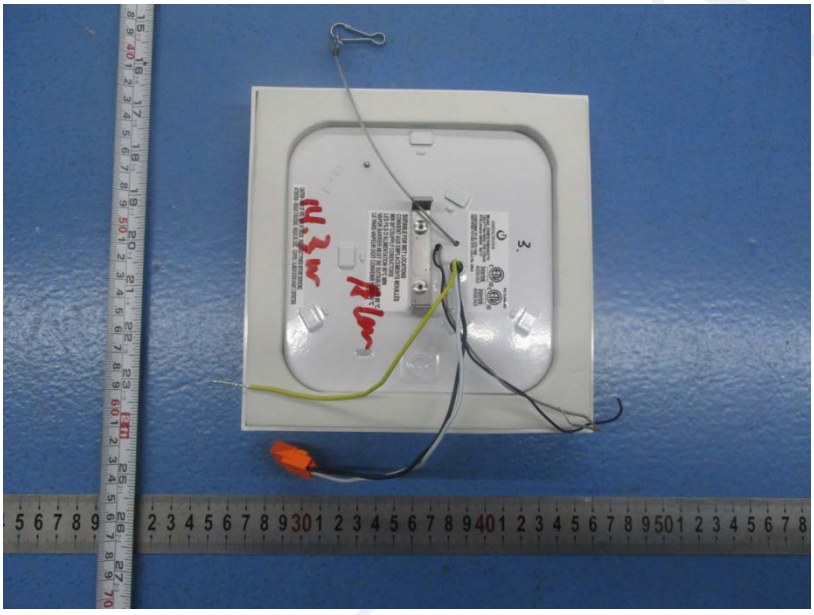
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	11.6	1.13
5-10	34.5	3.34
10-15	56.0	5.43
15-20	75.4	7.31
20-25	92.0	8.92
25-30	105.0	10.18
30-35	113.4	11.00
35-40	115.6	11.21
40-45	106.3	10.31
45-50	85.9	8.34
50-55	64.7	6.28
55-60	48.7	4.72
60-65	37.5	3.63
65-70	29.8	2.89
70-75	23.8	2.31
75-80	17.6	1.71
80-85	10.3	1.00
85-90	3.2	0.31
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	11.6	1.13
0-10	46.1	4.47
0-15	102.0	9.90
0-20	177.4	17.21
0-25	269.4	26.13
0-30	374.3	36.31
0-35	487.8	47.31
0-40	603.3	58.52
0-45	709.6	68.83
0-50	795.5	77.16
0-55	860.3	83.44
0-60	908.9	88.16
0-65	946.4	91.79
0-70	976.2	94.68
0-75	999.9	96.99
0-80	1017.5	98.69
0-85	1027.8	99.69
0-90	1031.0	100.00
0-95	1031.0	100.00
0-100	1031.0	100.00
0-105	1031.0	100.00
0-110	1031.0	100.00
0-115	1031.0	100.00
0-120	1031.0	100.00
0-125	1031.0	100.00
0-130	1031.0	100.00
0-135	1031.0	100.00
0-140	1031.0	100.00
0-145	1031.0	100.00
0-150	1031.0	100.00
0-155	1031.0	100.00
0-160	1031.0	100.00
0-165	1031.0	100.00
0-170	1031.0	100.00
0-175	1031.0	100.00
0-180	1031.0	100.00

6. Product Photo





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