

# IES LM-79-08



## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 22.5STRIPDIM/840/277V**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Carl Du 
<b>Report Number:</b>	RKS170109004-10
<b>Test Date:</b>	2017-01-13 to 2017-01-14
<b>Report Date:</b>	2017-01-17
<b>Reviewed By:</b>	Blake Zhang 
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
<b>Test Facility:</b>	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
<b>Accreditation:</b>	The IAS Accreditation Number TL-460.

## 1. Product Description

### General Information:

One sample was received on 2017-01-12 and used for testing.

Model Tested: 22.5STRIPDIM/840/277V  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: Direct Linear Ambient Luminaires  
 Dimmable: Continuous  
 Dimming Range: 10% to 100%  
 Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz  
 Rated Power: 22.5W  
 Nominal CCT: 4000K  
 Nominal Lumen Output: 2600 lm  
 Nominal CRI: 80  
 Luminaire length: 4 ft

## 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 (This method is not in IAS accreditation scope)

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	N/A	N/A	25°C	2016-03-10	2017-03-09
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2016-03-04	2017-03-03
Spectral photometer	SENSING	SPR3000	s0902024	350nm~800nm	2016-03-10	2017-03-09
AC Power Supply	EVERFINE	APW-105N	970663	220V±10% 50Hz	2016-03-04	2017-03-03
Standard Light Source	EVERFINE	D204	G100283CA8351158	24V/100W	2016-08-26	2017-08-25
Thermal Meter	SENSING	N/A	N/A	25°C	2016-03-21	2017-03-20
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2016-03-10	2017-03-09

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2016-03-21	2017-03-20
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-09-07	2017-09-06

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) 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=2.3% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=23K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.3(K=2), at the 95% confidence level.

The uncertainty of power meter AC current U=0.19 % of rdg, AC Voltage U=0.15% of rdg, Power U=0.20%) (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 intensity is U=1.6% (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: **0.5hour**

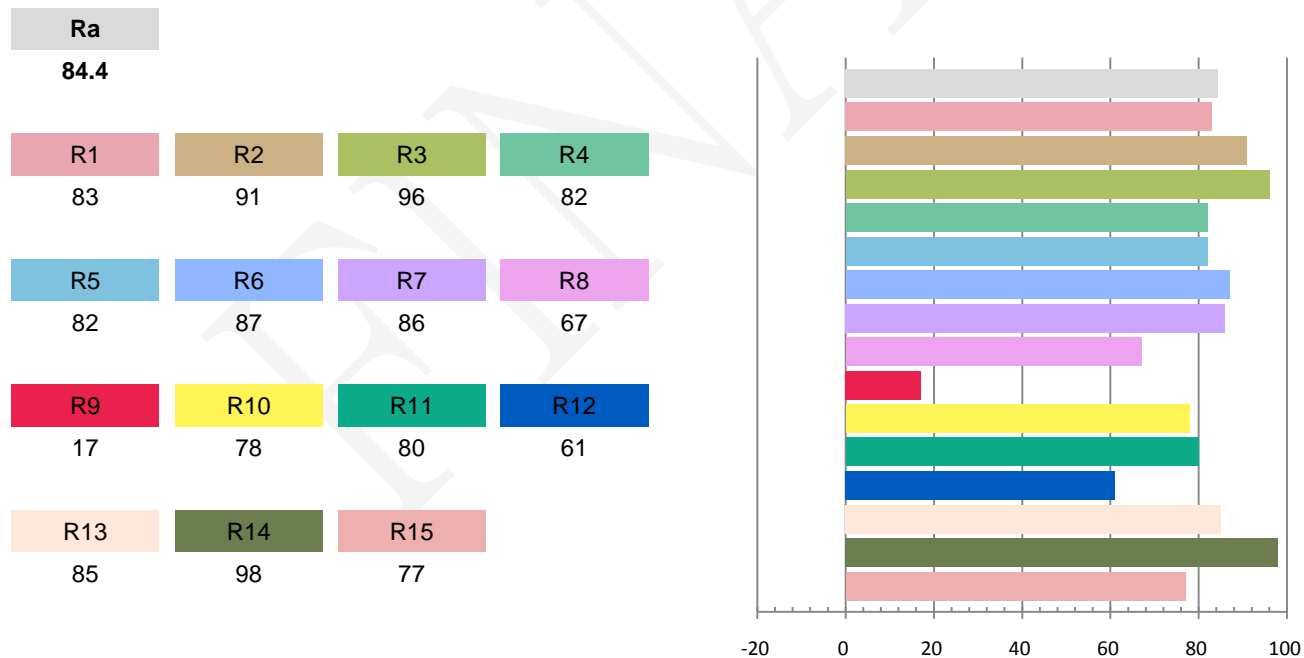
Test orientation: **Downward**

### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1839	21.88	0.9913	2753.3	125.84

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.401	4043	0.00241	0.3802	0.3818	0.2230	0.5038

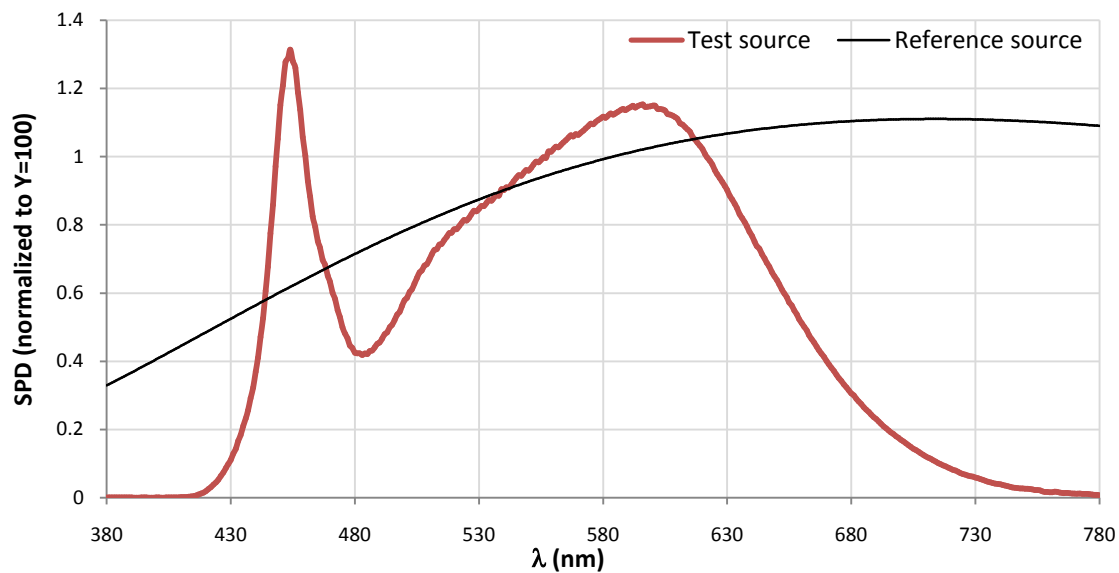
### Color Rendering Index



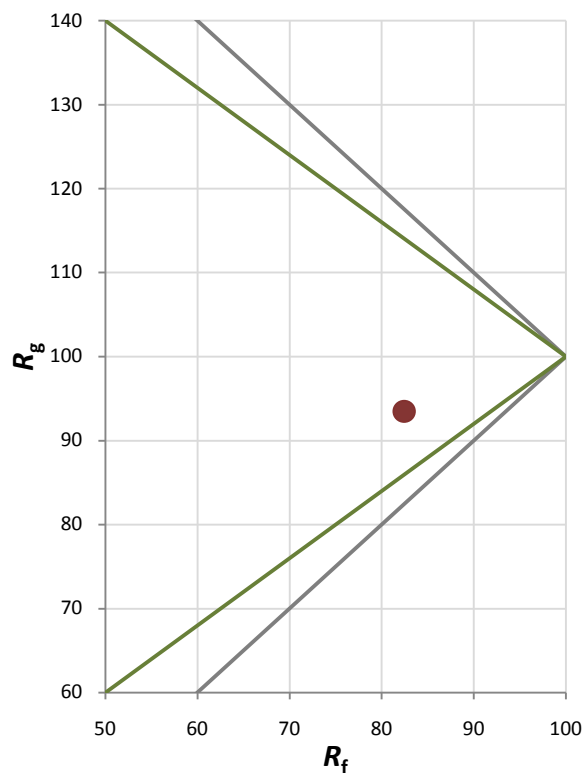
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	82
Gamut Index $R_g$	93

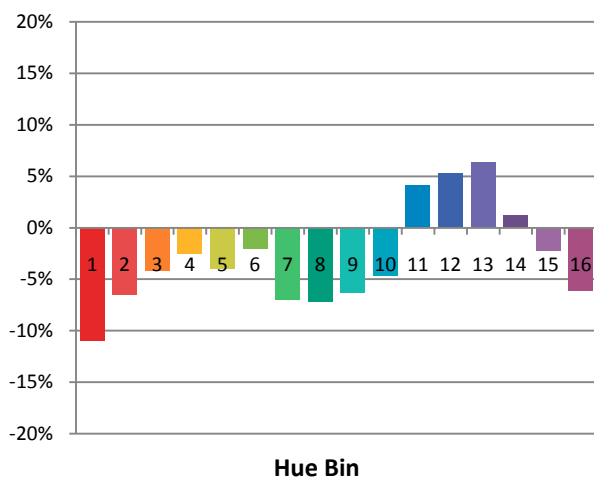
### Spectral Power Distribution Comparison



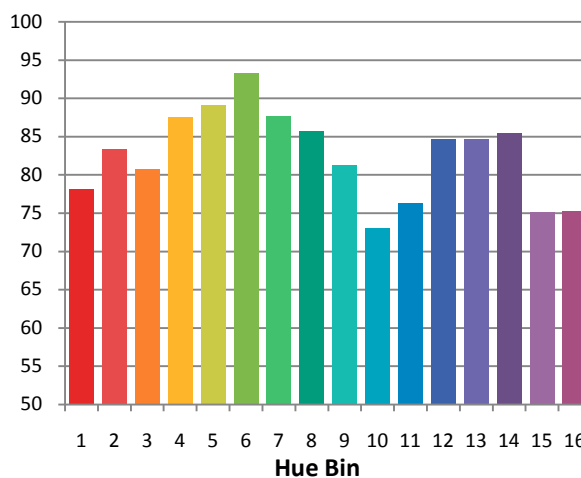
### Plot of $R_g$ versus $R_f$



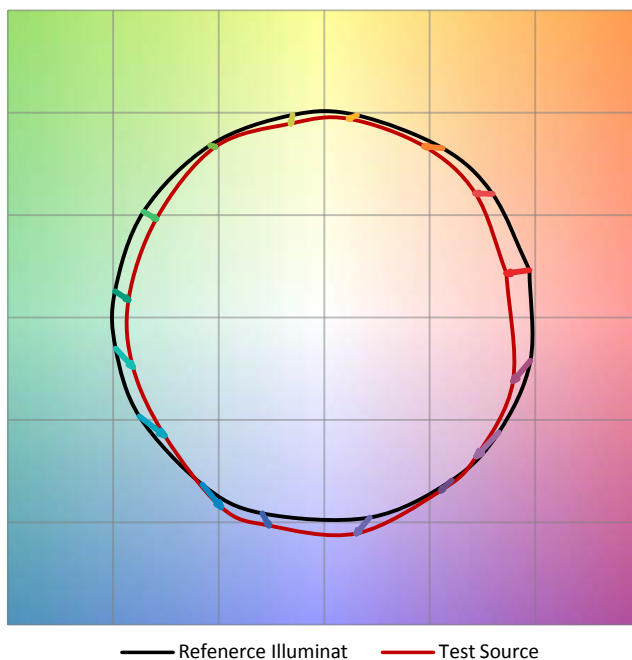
Chroma Shift by Hue



$R_f$  by Hue

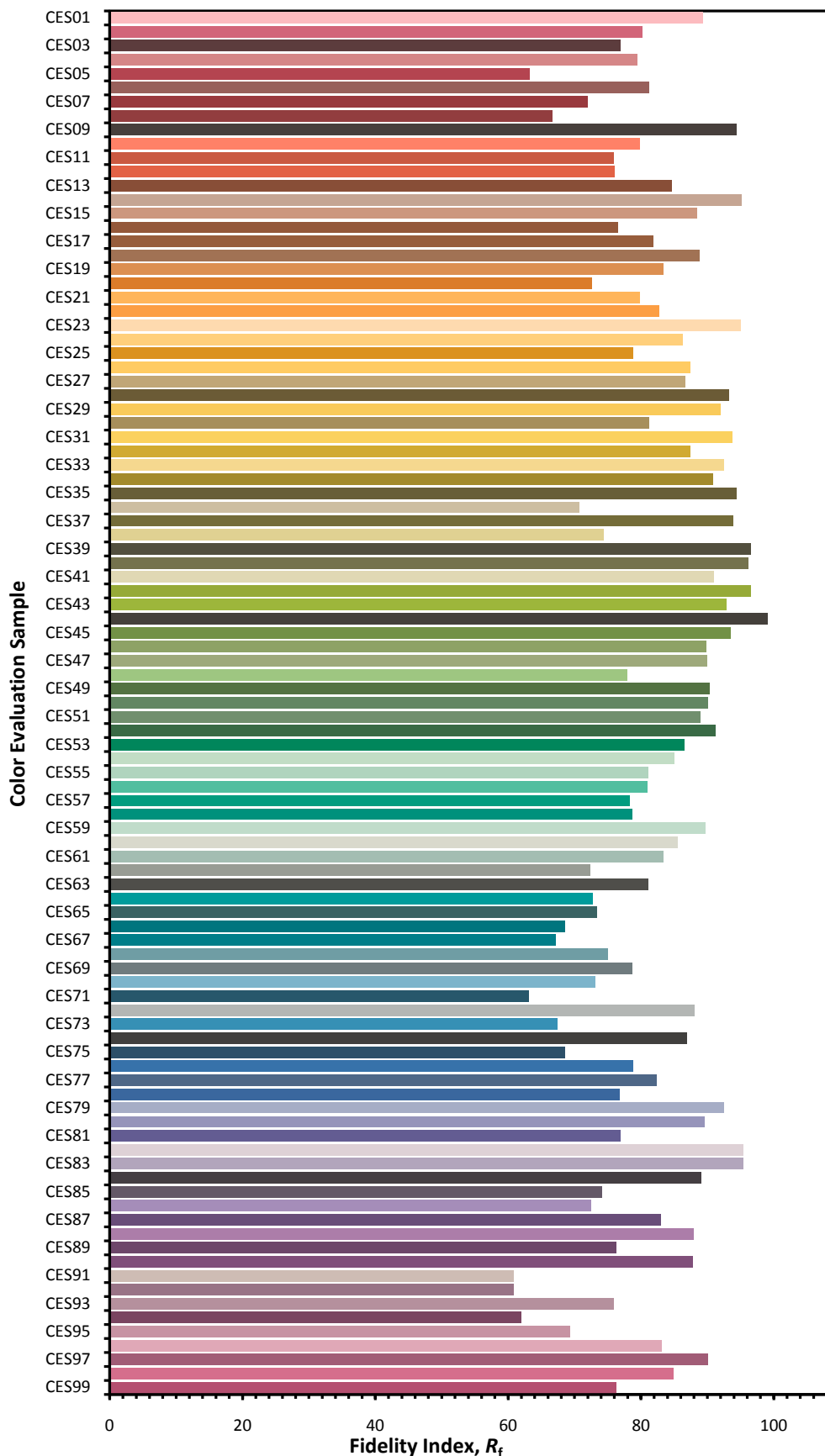


Color Vector Graphic

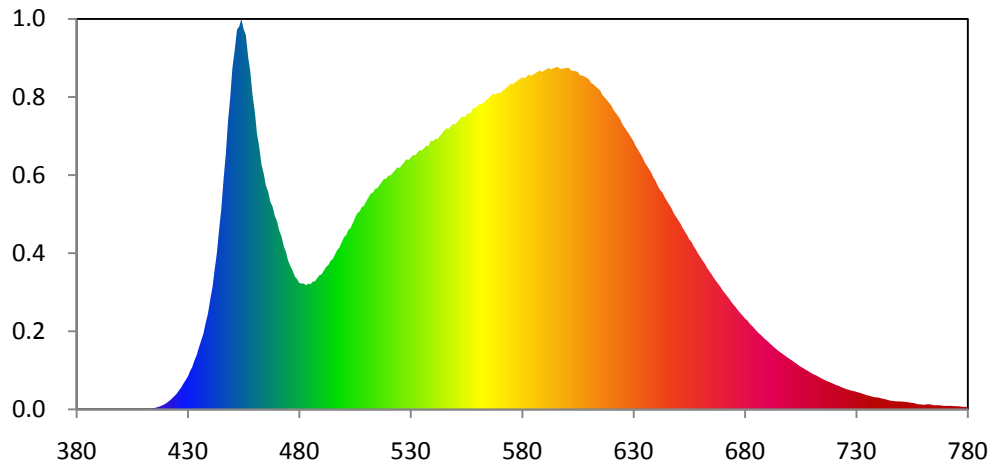


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

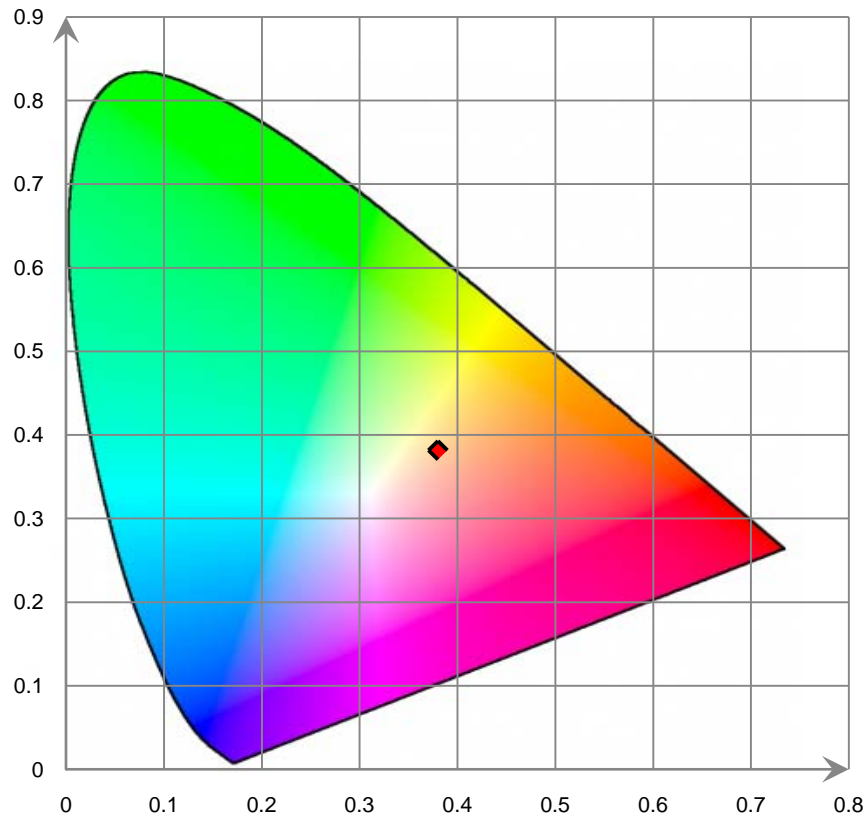


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.130E-02	421	1.012E+00	462	3.560E+01	503	2.460E+01	544	3.741E+01
381	2.270E-02	422	1.228E+00	463	3.324E+01	504	2.529E+01	545	3.779E+01
382	2.870E-02	423	1.532E+00	464	3.201E+01	505	2.597E+01	546	3.813E+01
383	4.560E-02	424	1.819E+00	465	3.035E+01	506	2.662E+01	547	3.805E+01
384	4.000E-02	425	2.130E+00	466	2.954E+01	507	2.683E+01	548	3.839E+01
385	2.780E-02	426	2.581E+00	467	2.814E+01	508	2.742E+01	549	3.872E+01
386	2.650E-02	427	2.968E+00	468	2.750E+01	509	2.762E+01	550	3.866E+01
387	2.750E-02	428	3.517E+00	469	2.624E+01	510	2.819E+01	551	3.899E+01
388	2.630E-02	429	3.975E+00	470	2.552E+01	511	2.874E+01	552	3.937E+01
389	3.020E-02	430	4.469E+00	471	2.424E+01	512	2.927E+01	553	3.972E+01
390	2.530E-02	431	5.203E+00	472	2.347E+01	513	2.938E+01	554	3.965E+01
391	1.410E-02	432	5.800E+00	473	2.217E+01	514	2.990E+01	555	3.995E+01
392	1.000E-02	433	6.693E+00	474	2.135E+01	515	2.999E+01	556	4.024E+01
393	1.500E-02	434	7.412E+00	475	2.015E+01	516	3.042E+01	557	4.015E+01
394	1.770E-02	435	8.471E+00	476	1.942E+01	517	3.083E+01	558	4.090E+01
395	2.250E-02	436	9.364E+00	477	1.882E+01	518	3.126E+01	559	4.088E+01
396	1.730E-02	437	1.034E+01	478	1.802E+01	519	3.130E+01	560	4.117E+01
397	9.500E-03	438	1.177E+01	479	1.768E+01	520	3.172E+01	561	4.148E+01
398	5.800E-03	439	1.300E+01	480	1.715E+01	521	3.173E+01	562	4.139E+01
399	3.000E-03	440	1.489E+01	481	1.706E+01	522	3.211E+01	563	4.170E+01
400	1.860E-02	441	1.651E+01	482	1.707E+01	523	3.245E+01	564	4.198E+01
401	2.270E-02	442	1.897E+01	483	1.686E+01	524	3.283E+01	565	4.224E+01
402	1.560E-02	443	2.123E+01	484	1.705E+01	525	3.275E+01	566	4.254E+01
403	1.620E-02	444	2.443E+01	485	1.699E+01	526	3.310E+01	567	4.284E+01
404	1.930E-02	445	2.725E+01	486	1.732E+01	527	3.350E+01	568	4.270E+01
405	2.820E-02	446	3.125E+01	487	1.738E+01	528	3.392E+01	569	4.297E+01
406	2.370E-02	447	3.460E+01	488	1.778E+01	529	3.384E+01	570	4.287E+01
407	2.650E-02	448	3.915E+01	489	1.819E+01	530	3.414E+01	571	4.313E+01
408	2.380E-02	449	4.239E+01	490	1.832E+01	531	3.449E+01	572	4.339E+01
409	4.450E-02	450	4.642E+01	491	1.881E+01	532	3.446E+01	573	4.364E+01
410	5.630E-02	451	4.873E+01	492	1.933E+01	533	3.482E+01	574	4.392E+01
411	5.910E-02	452	5.149E+01	493	1.956E+01	534	3.517E+01	575	4.420E+01
412	7.230E-02	453	5.194E+01	494	2.015E+01	535	3.510E+01	576	4.412E+01
413	1.018E-01	454	5.296E+01	495	2.040E+01	536	3.544E+01	577	4.439E+01
414	1.463E-01	455	5.158E+01	496	2.100E+01	537	3.578E+01	578	4.462E+01
415	1.904E-01	456	5.077E+01	497	2.162E+01	538	3.571E+01	579	4.482E+01
416	2.712E-01	457	4.787E+01	498	2.195E+01	539	3.646E+01	580	4.504E+01
417	3.579E-01	458	4.582E+01	499	2.265E+01	540	3.636E+01	581	4.491E+01
418	4.748E-01	459	4.262E+01	500	2.333E+01	541	3.669E+01	582	4.514E+01
419	6.175E-01	460	4.044E+01	501	2.364E+01	542	3.666E+01	583	4.541E+01
420	7.737E-01	461	3.740E+01	502	2.432E+01	543	3.704E+01	584	4.527E+01

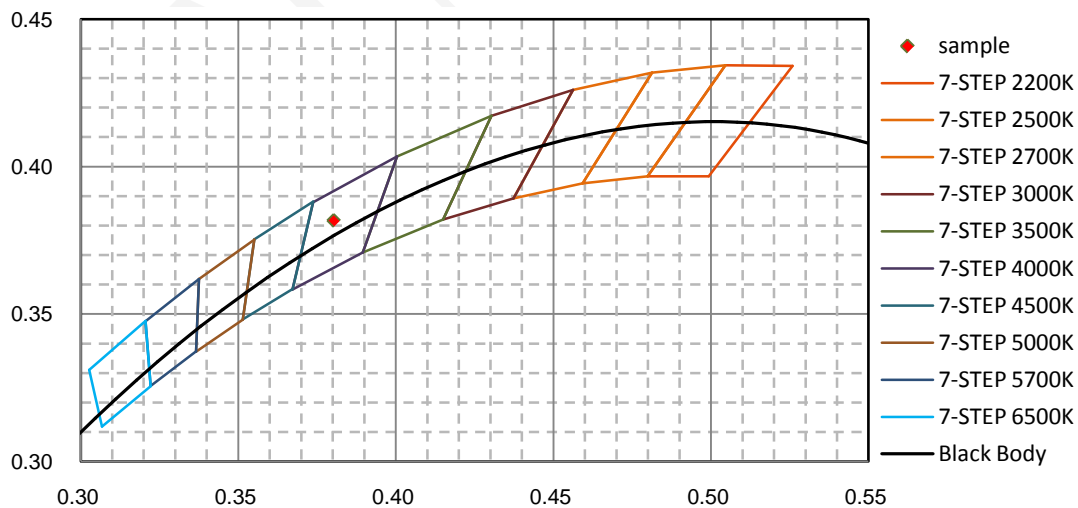


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.543E+01	626	3.823E+01	667	1.743E+01	708	5.260E+00	749	1.077E+00
586	4.560E+01	627	3.779E+01	668	1.702E+01	709	5.066E+00	750	1.070E+00
587	4.581E+01	628	3.732E+01	669	1.662E+01	710	4.881E+00	751	1.043E+00
588	4.596E+01	629	3.684E+01	670	1.615E+01	711	4.726E+00	752	1.019E+00
589	4.579E+01	630	3.638E+01	671	1.576E+01	712	4.610E+00	753	9.850E-01
590	4.598E+01	631	3.571E+01	672	1.537E+01	713	4.427E+00	754	9.148E-01
591	4.615E+01	632	3.523E+01	673	1.498E+01	714	4.256E+00	755	8.896E-01
592	4.632E+01	633	3.471E+01	674	1.452E+01	715	4.101E+00	756	8.531E-01
593	4.611E+01	634	3.421E+01	675	1.416E+01	716	3.954E+00	757	7.381E-01
594	4.627E+01	635	3.351E+01	676	1.381E+01	717	3.814E+00	758	6.897E-01
595	4.640E+01	636	3.305E+01	677	1.339E+01	718	3.695E+00	759	6.750E-01
596	4.647E+01	637	3.257E+01	678	1.304E+01	719	3.562E+00	760	6.409E-01
597	4.619E+01	638	3.208E+01	679	1.270E+01	720	3.429E+00	761	6.473E-01
598	4.622E+01	639	3.142E+01	680	1.234E+01	721	3.295E+00	762	7.016E-01
599	4.626E+01	640	3.093E+01	681	1.209E+01	722	3.201E+00	763	6.856E-01
600	4.634E+01	641	3.023E+01	682	1.169E+01	723	3.055E+00	764	6.200E-01
601	4.632E+01	642	2.973E+01	683	1.138E+01	724	2.924E+00	765	5.556E-01
602	4.595E+01	643	2.942E+01	684	1.107E+01	725	2.810E+00	766	5.487E-01
603	4.593E+01	644	2.877E+01	685	1.072E+01	726	2.707E+00	767	5.722E-01
604	4.587E+01	645	2.827E+01	686	1.038E+01	727	2.624E+00	768	5.261E-01
605	4.576E+01	646	2.777E+01	687	1.013E+01	728	2.524E+00	769	4.947E-01
606	4.533E+01	647	2.730E+01	688	9.845E+00	729	2.479E+00	770	4.757E-01
607	4.527E+01	648	2.665E+01	689	9.539E+00	730	2.379E+00	771	4.708E-01
608	4.514E+01	649	2.616E+01	690	9.289E+00	731	2.295E+00	772	4.810E-01
609	4.498E+01	650	2.570E+01	691	8.998E+00	732	2.208E+00	773	4.586E-01
610	4.477E+01	651	2.523E+01	692	8.742E+00	733	2.103E+00	774	4.396E-01
611	4.426E+01	652	2.463E+01	693	8.445E+00	734	1.994E+00	775	4.344E-01
612	4.408E+01	653	2.414E+01	694	8.198E+00	735	1.894E+00	776	4.213E-01
613	4.380E+01	654	2.367E+01	695	7.931E+00	736	1.828E+00	777	3.730E-01
614	4.353E+01	655	2.307E+01	696	7.716E+00	737	1.737E+00	778	3.504E-01
615	4.326E+01	656	2.272E+01	697	7.518E+00	738	1.664E+00	779	3.450E-01
616	4.266E+01	657	2.213E+01	698	7.277E+00	739	1.624E+00	780	3.057E-01
617	4.232E+01	658	2.167E+01	699	7.055E+00	740	1.592E+00		
618	4.197E+01	659	2.110E+01	700	6.850E+00	741	1.506E+00		
619	4.159E+01	660	2.066E+01	701	6.660E+00	742	1.439E+00		
620	4.124E+01	661	2.019E+01	702	6.428E+00	743	1.372E+00		
621	4.062E+01	662	1.976E+01	703	6.216E+00	744	1.292E+00		
622	4.022E+01	663	1.921E+01	704	5.993E+00	745	1.203E+00		
623	3.980E+01	664	1.876E+01	705	5.790E+00	746	1.156E+00		
624	3.937E+01	665	1.834E+01	706	5.625E+00	747	1.135E+00		
625	3.868E+01	666	1.784E+01	707	5.428E+00	748	1.087E+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**

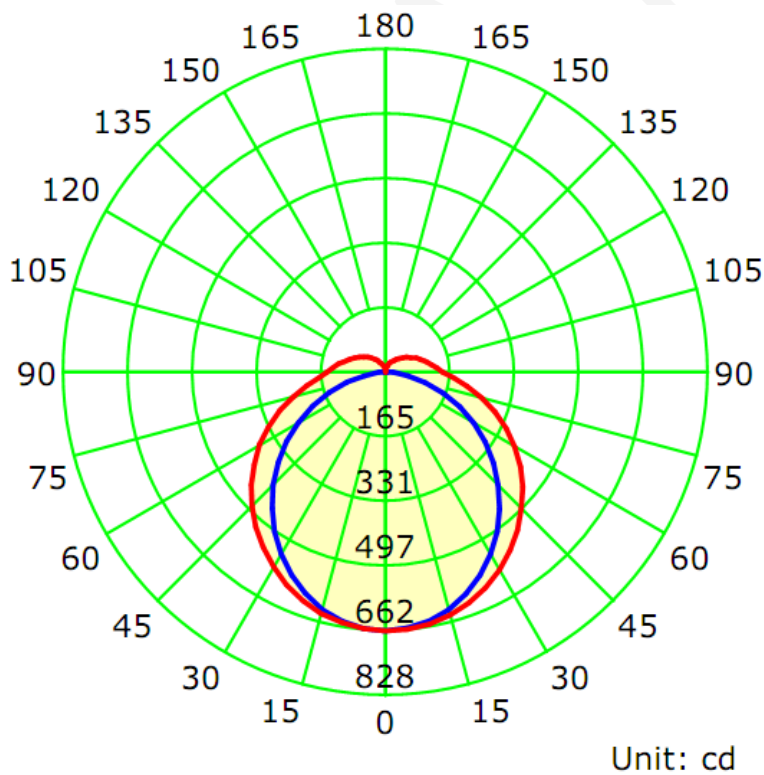
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1830	21.9	0.9950

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
2764.3	126.22	760.9	1.21	1.31

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	106.3	118.6	132.0	119.6	119.1
Field Angle (10% $I_{max}$ ):	158.2	208.9	252.7	211.8	207.9

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	761	761	761	761	761	761	761	761
5.0°	758	757	758	758	759	759	757	758
10.0°	745	746	748	750	752	751	749	748
15.0°	725	727	732	737	740	738	732	729
20.0°	697	702	710	718	721	719	709	703
25.0°	662	668	681	692	699	695	681	671
30.0°	621	630	646	663	671	665	647	634
35.0°	576	586	609	628	640	632	610	590
40.0°	526	541	567	591	606	595	569	543
45.0°	473	491	522	550	567	556	525	494
50.0°	418	440	474	508	527	513	479	442
55.0°	362	387	425	464	484	469	431	389
60.0°	302	330	374	416	438	422	382	334
65.0°	243	274	324	369	392	373	332	279
70.0°	182	219	272	319	343	324	280	224
75.0°	123	165	221	269	293	274	228	170
80.0°	69	116	174	220	243	224	180	120
85.0°	24	72	131	178	200	181	136	77
90.0°	3	47	104	148	168	151	108	51
95.0°	2	39	92	133	152	136	95	42
100.0°	2	33	82	120	138	122	85	36
105.0°	2	28	73	109	124	110	76	31
110.0°	2	25	65	98	111	98	67	27
115.0°	2	24	61	90	102	91	62	25
120.0°	2	21	51	77	87	78	53	22
125.0°	2	19	46	68	77	68	47	20
130.0°	3	18	41	60	67	60	41	18
135.0°	3	16	36	52	58	52	36	16
140.0°	3	14	31	45	50	45	31	15
145.0°	3	13	27	39	42	39	27	12
150.0°	4	12	23	32	35	32	22	11
155.0°	4	10	19	27	29	26	17	9
160.0°	4	9	16	21	22	20	13	7
165.0°	4	7	12	16	16	14	10	6
170.0°	4	6	8	11	11	9	7	5
175.0°	5	5	6	7	7	6	5	5
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	761	761	761	761	761	761	761	761
5.0°	758	758	758	757	758	757	757	757
10.0°	744	745	747	750	752	749	747	745
15.0°	724	726	731	735	737	736	729	725
20.0°	696	700	707	715	718	714	706	700
25.0°	660	668	679	689	695	691	677	665
30.0°	620	629	645	659	666	661	642	629
35.0°	574	585	606	625	635	627	605	584
40.0°	524	538	564	588	601	589	563	537
45.0°	471	488	519	547	563	550	519	487
50.0°	414	437	473	506	523	508	472	436
55.0°	357	384	423	461	481	463	425	382
60.0°	298	328	372	414	435	417	375	327
65.0°	239	271	321	366	389	368	326	272
70.0°	179	215	270	316	339	319	273	218
75.0°	119	161	219	266	290	268	223	164
80.0°	65	112	171	218	242	220	175	115
85.0°	21	70	131	179	202	181	135	74
90.0°	3	47	108	155	175	157	112	53
95.0°	2	40	97	140	159	142	100	45
100.0°	2	34	87	126	145	129	90	39
105.0°	2	30	77	114	130	116	80	33
110.0°	2	26	69	102	117	104	71	30
115.0°	2	24	61	91	104	93	64	27
120.0°	2	22	54	81	92	82	57	24
125.0°	2	20	48	72	81	73	50	22
130.0°	2	18	42	63	71	64	45	20
135.0°	2	16	37	55	62	56	39	18
140.0°	3	14	33	47	53	48	34	16
145.0°	3	12	28	40	45	41	30	15
150.0°	3	11	22	33	38	35	25	13
155.0°	3	9	18	27	31	28	21	12
160.0°	3	8	15	20	24	22	17	10
165.0°	3	7	11	14	18	17	13	8
170.0°	4	6	8	10	12	12	10	7
175.0°	4	5	6	7	8	8	7	6
180.0°	0	0	0	0	0	0	0	0

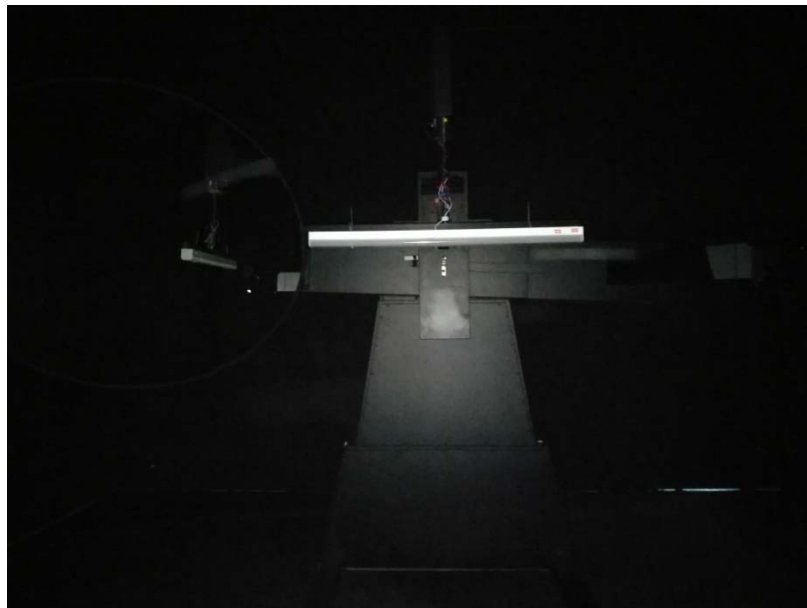
**Zonal Lumen Density Measurement**

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	18.2	0.66	0-5	18.2	0.66
5-10	53.9	1.95	0-10	72.0	2.61
10-15	87.8	3.17	0-15	159.8	5.78
15-20	118.7	4.29	0-20	278.4	10.07
20-25	145.6	5.27	0-25	424.0	15.34
25-30	167.7	6.07	0-30	591.7	21.40
30-35	184.4	6.67	0-35	776.1	28.08
35-40	195.5	7.07	0-40	971.6	35.15
40-45	200.9	7.27	0-45	1172.6	42.42
45-50	200.7	7.26	0-50	1373.2	49.68
50-55	195.0	7.06	0-55	1568.3	56.73
55-60	184.2	6.66	0-60	1752.5	63.40
60-65	168.7	6.10	0-65	1921.2	69.50
65-70	149.2	5.40	0-70	2070.4	74.90
70-75	126.5	4.58	0-75	2196.9	79.47
75-80	102.2	3.70	0-80	2299.1	83.17
80-85	79.0	2.86	0-85	2378.2	86.03
85-90	61.3	2.22	0-90	2439.4	88.25
90-95	51.4	1.86	0-95	2490.8	90.11
95-100	45.5	1.65	0-100	2536.4	91.75
100-105	40.2	1.45	0-105	2576.5	93.21
105-110	35.1	1.27	0-110	2611.6	94.48
110-115	30.6	1.11	0-115	2642.2	95.58
115-120	26.2	0.95	0-120	2668.4	96.53
120-125	21.9	0.79	0-125	2690.3	97.32
125-130	18.3	0.66	0-130	2708.6	97.99
130-135	15.0	0.54	0-135	2723.6	98.53
135-140	12.0	0.43	0-140	2735.6	98.96
140-145	9.4	0.34	0-145	2745.0	99.30
145-150	7.0	0.25	0-150	2752.0	99.56
150-155	5.0	0.18	0-155	2757.1	99.74
155-160	3.4	0.12	0-160	2760.5	99.86
160-165	2.1	0.08	0-165	2762.6	99.94
165-170	1.1	0.04	0-170	2763.7	99.98
170-175	0.5	0.02	0-175	2764.2	100.00
175-180	0.1	0.00	0-180	2764.3	100.00

## 6. Product Photo



## 7. Product Test orientation in the Goniophotometer



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