

# 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/850/277V**

<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>	RKS170109005-10
<b>Test Date:</b>	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/850/277V  
 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: 5000K  
 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**

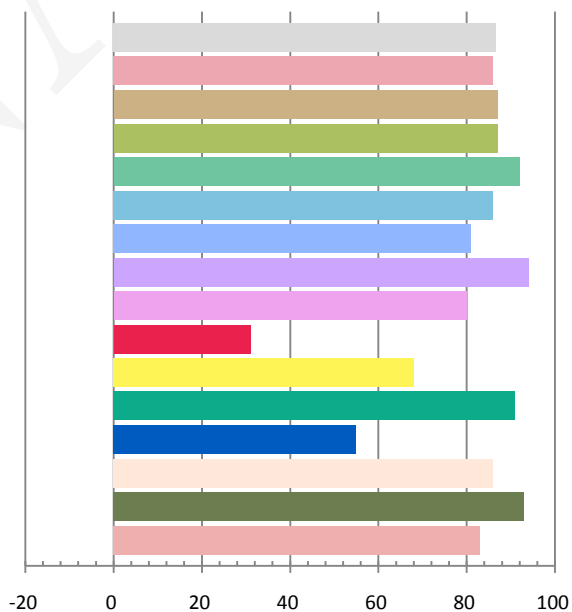
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1863	22.17	0.9918	2851.3	128.61

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.875	4989	0.00405	0.3462	0.3607	0.2087	0.4892

### Color Rendering Index

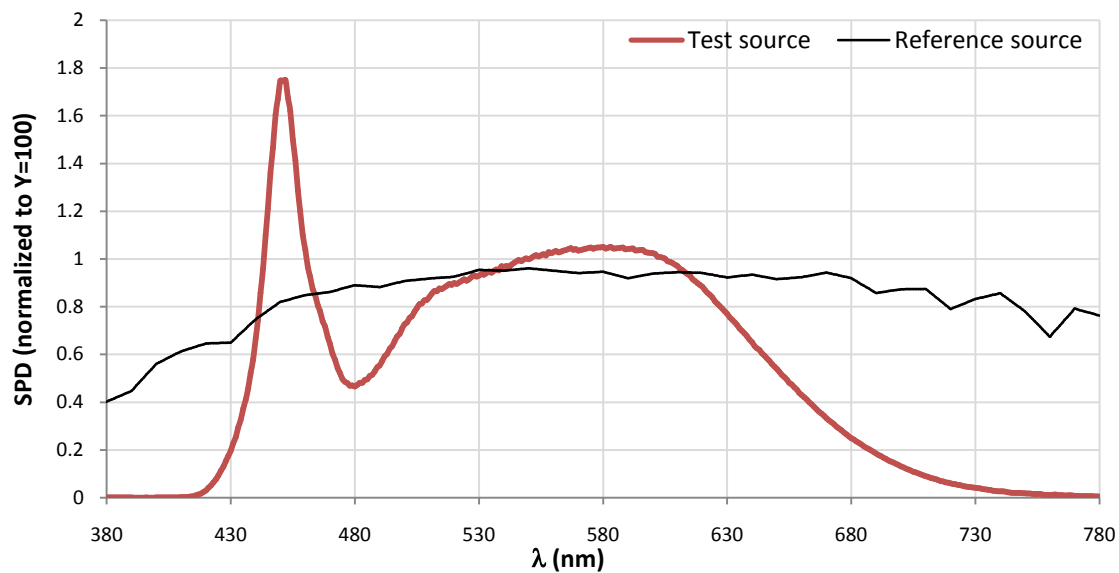
Ra			
86.6			
R1	R2	R3	R4
86	87	87	92
R5	R6	R7	R8
86	81	94	80
R9	R10	R11	R12
31	68	91	55
R13	R14	R15	
86	93	83	



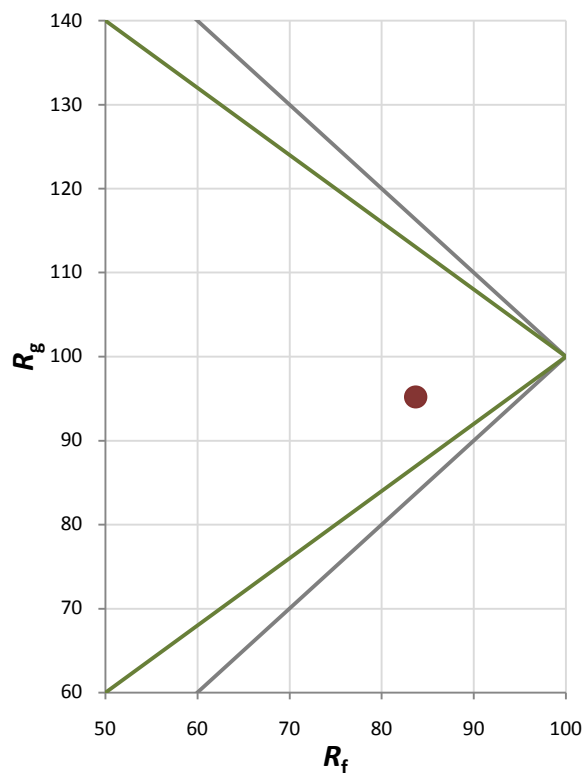
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	84
Gamut Index $R_g$	95

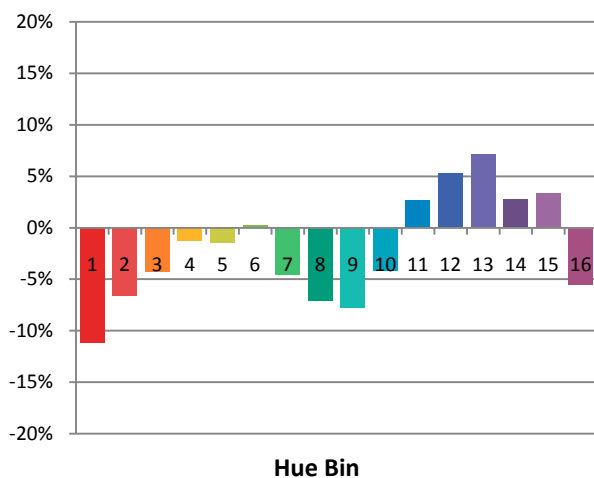
### Spectral Power Distribution Comparison



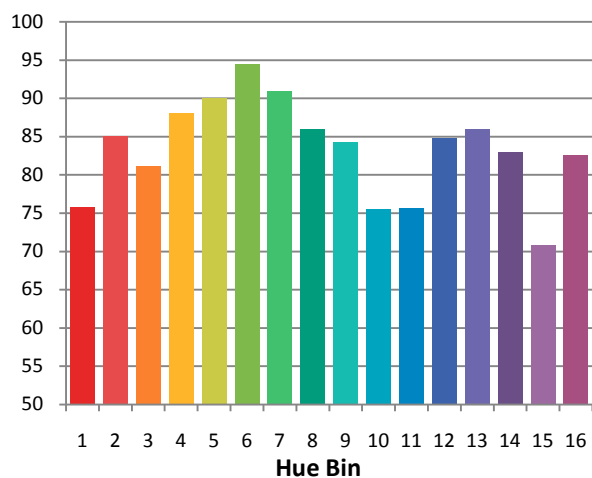
### Plot of $R_g$ versus $R_f$



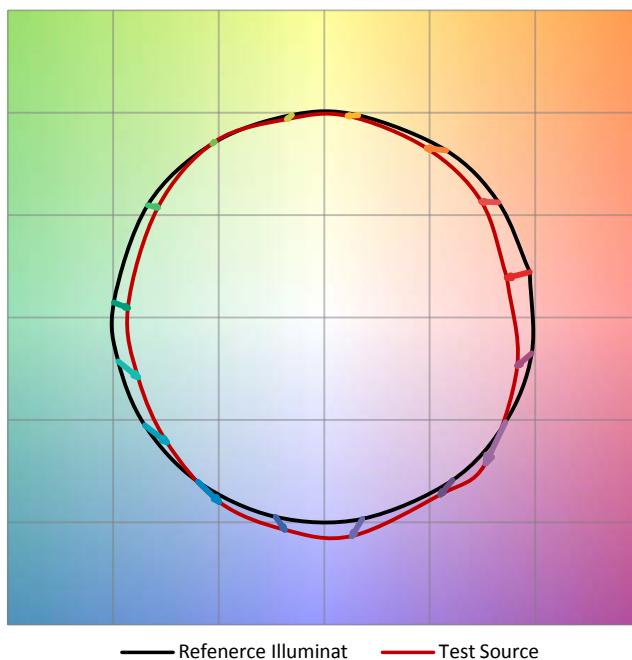
Chroma Shift by Hue



$R_f$  by Hue

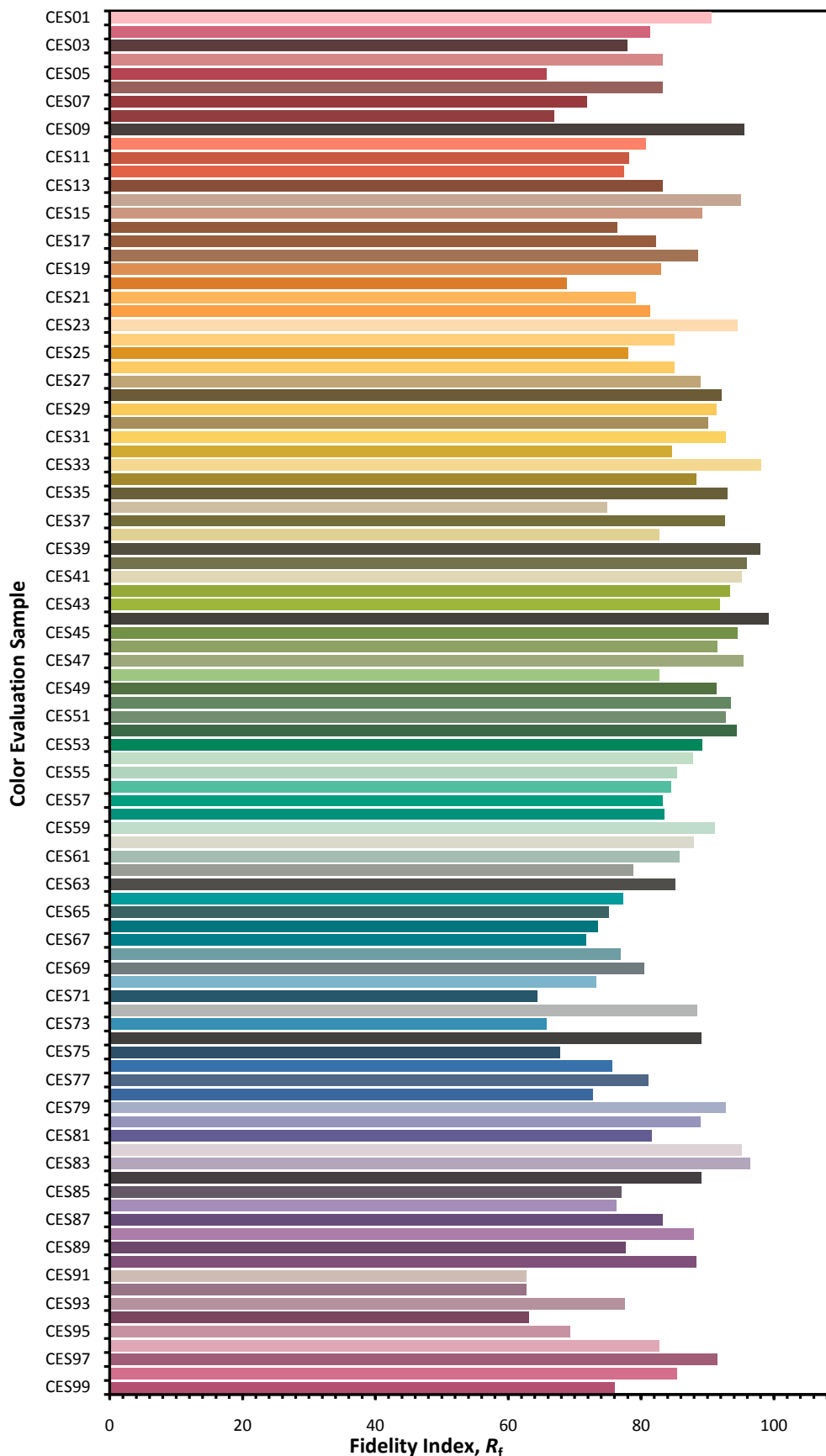


Color Vector Graphic

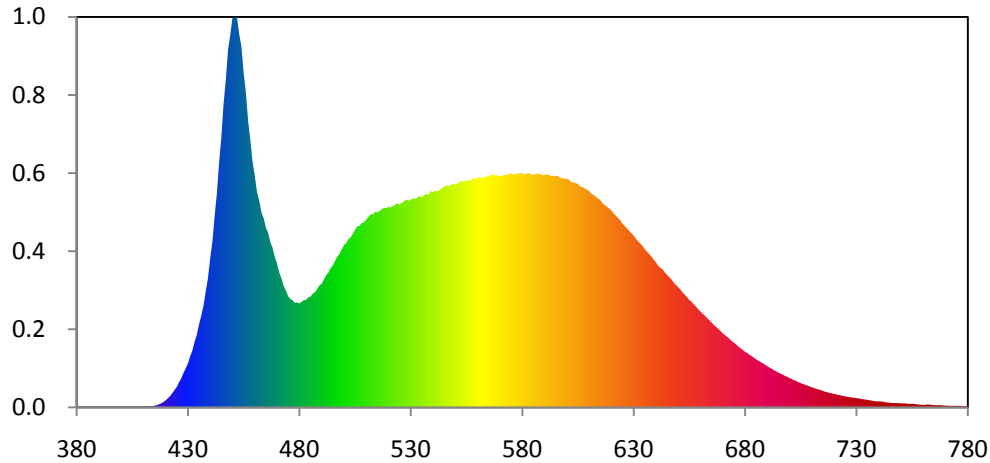


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

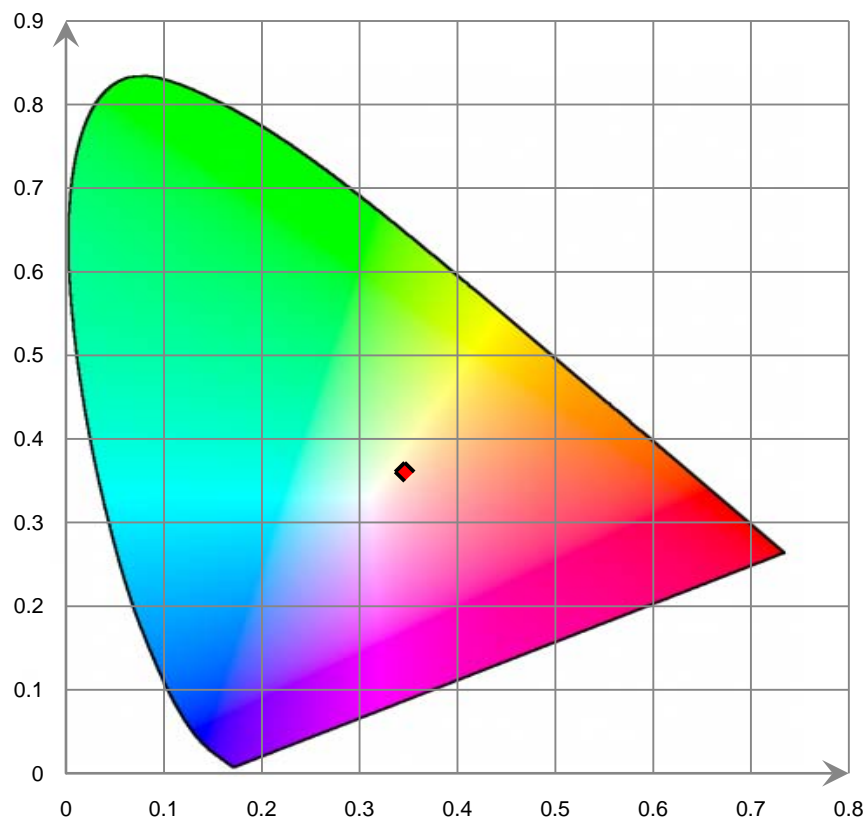


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.560E-02	421	1.714E+00	462	3.866E+01	503	3.174E+01	544	4.099E+01
381	3.060E-02	422	2.112E+00	463	3.646E+01	504	3.248E+01	545	4.128E+01
382	3.520E-02	423	2.688E+00	464	3.539E+01	505	3.320E+01	546	4.155E+01
383	4.540E-02	424	3.232E+00	465	3.363E+01	506	3.385E+01	547	4.134E+01
384	3.750E-02	425	3.850E+00	466	3.264E+01	507	3.394E+01	548	4.162E+01
385	2.720E-02	426	4.692E+00	467	3.088E+01	508	3.450E+01	549	4.186E+01
386	4.030E-02	427	5.417E+00	468	2.985E+01	509	3.458E+01	550	4.167E+01
387	4.420E-02	428	6.425E+00	469	2.809E+01	510	3.511E+01	551	4.191E+01
388	3.840E-02	429	7.298E+00	470	2.690E+01	511	3.563E+01	552	4.217E+01
389	3.690E-02	430	8.206E+00	471	2.520E+01	512	3.613E+01	553	4.242E+01
390	2.980E-02	431	9.549E+00	472	2.413E+01	513	3.609E+01	554	4.221E+01
391	1.770E-02	432	1.064E+01	473	2.268E+01	514	3.658E+01	555	4.240E+01
392	1.300E-02	433	1.226E+01	474	2.184E+01	515	3.646E+01	556	4.258E+01
393	1.030E-02	434	1.359E+01	475	2.078E+01	516	3.675E+01	557	4.233E+01
394	1.240E-02	435	1.554E+01	476	2.028E+01	517	3.702E+01	558	4.294E+01
395	1.500E-02	436	1.717E+01	477	2.001E+01	518	3.736E+01	559	4.274E+01
396	2.700E-02	437	1.901E+01	478	1.957E+01	519	3.722E+01	560	4.292E+01
397	2.380E-02	438	2.175E+01	479	1.963E+01	520	3.753E+01	561	4.312E+01
398	1.500E-02	439	2.418E+01	480	1.945E+01	521	3.738E+01	562	4.288E+01
399	1.180E-02	440	2.787E+01	481	1.972E+01	522	3.766E+01	563	4.303E+01
400	2.570E-02	441	3.106E+01	482	2.006E+01	523	3.790E+01	564	4.318E+01
401	3.710E-02	442	3.582E+01	483	2.009E+01	524	3.818E+01	565	4.330E+01
402	4.390E-02	443	4.006E+01	484	2.056E+01	525	3.794E+01	566	4.347E+01
403	3.620E-02	444	4.585E+01	485	2.070E+01	526	3.823E+01	567	4.363E+01
404	3.520E-02	445	5.055E+01	486	2.128E+01	527	3.855E+01	568	4.334E+01
405	3.770E-02	446	5.680E+01	487	2.150E+01	528	3.889E+01	569	4.347E+01
406	4.000E-02	447	6.121E+01	488	2.212E+01	529	3.865E+01	570	4.321E+01
407	3.920E-02	448	6.691E+01	489	2.281E+01	530	3.885E+01	571	4.332E+01
408	3.490E-02	449	6.963E+01	490	2.312E+01	531	3.912E+01	572	4.343E+01
409	6.580E-02	450	7.292E+01	491	2.388E+01	532	3.898E+01	573	4.352E+01
410	8.550E-02	451	7.286E+01	492	2.471E+01	533	3.927E+01	574	4.364E+01
411	9.160E-02	452	7.304E+01	493	2.516E+01	534	3.955E+01	575	4.376E+01
412	1.069E-01	453	6.987E+01	494	2.606E+01	535	3.935E+01	576	4.354E+01
413	1.473E-01	454	6.756E+01	495	2.649E+01	536	3.964E+01	577	4.367E+01
414	2.193E-01	455	6.260E+01	496	2.733E+01	537	3.991E+01	578	4.373E+01
415	2.968E-01	456	5.897E+01	497	2.819E+01	538	3.974E+01	579	4.377E+01
416	4.190E-01	457	5.364E+01	498	2.864E+01	539	4.048E+01	580	4.384E+01
417	5.668E-01	458	5.005E+01	499	2.951E+01	540	4.027E+01	581	4.357E+01
418	7.500E-01	459	4.592E+01	500	3.035E+01	541	4.052E+01	582	4.369E+01
419	1.005E+00	460	4.338E+01	501	3.068E+01	542	4.039E+01	583	4.386E+01
420	1.302E+00	461	4.029E+01	502	3.147E+01	543	4.070E+01	584	4.358E+01

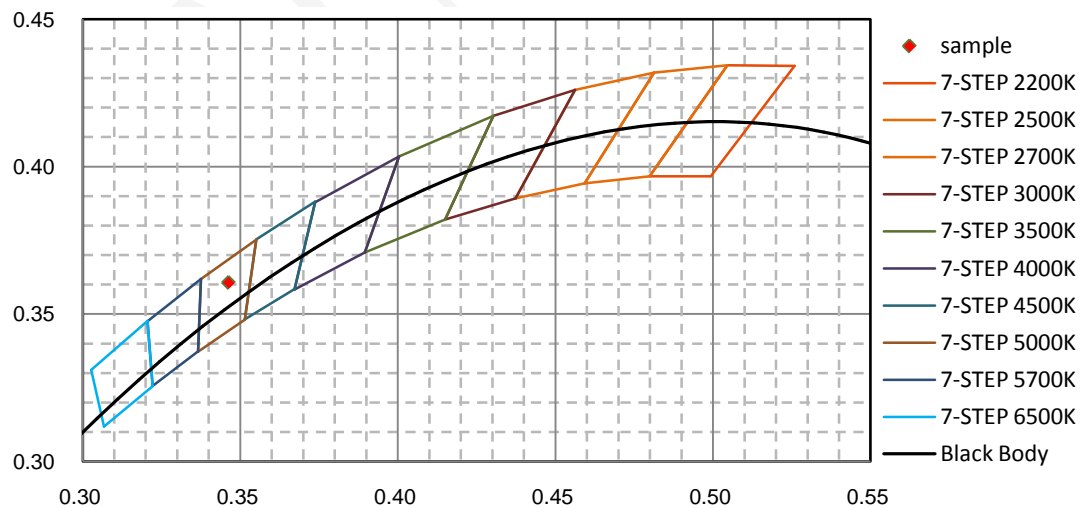


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.358E+01	626	3.395E+01	667	1.507E+01	708	4.091E+00	749	7.829E-01
586	4.361E+01	627	3.352E+01	668	1.470E+01	709	3.922E+00	750	7.517E-01
587	4.369E+01	628	3.305E+01	669	1.432E+01	710	3.768E+00	751	7.469E-01
588	4.373E+01	629	3.258E+01	670	1.388E+01	711	3.611E+00	752	7.489E-01
589	4.344E+01	630	3.218E+01	671	1.354E+01	712	3.474E+00	753	6.887E-01
590	4.349E+01	631	3.158E+01	672	1.321E+01	713	3.349E+00	754	6.429E-01
591	4.353E+01	632	3.112E+01	673	1.286E+01	714	3.236E+00	755	6.636E-01
592	4.357E+01	633	3.066E+01	674	1.244E+01	715	3.083E+00	756	6.718E-01
593	4.324E+01	634	3.021E+01	675	1.212E+01	716	2.932E+00	757	5.762E-01
594	4.327E+01	635	2.958E+01	676	1.180E+01	717	2.826E+00	758	5.154E-01
595	4.330E+01	636	2.914E+01	677	1.140E+01	718	2.709E+00	759	5.058E-01
596	4.328E+01	637	2.870E+01	678	1.108E+01	719	2.610E+00	760	4.489E-01
597	4.295E+01	638	2.826E+01	679	1.076E+01	720	2.525E+00	761	5.061E-01
598	4.288E+01	639	2.765E+01	680	1.041E+01	721	2.419E+00	762	5.399E-01
599	4.279E+01	640	2.717E+01	681	1.017E+01	722	2.335E+00	763	5.249E-01
600	4.276E+01	641	2.654E+01	682	9.854E+00	723	2.224E+00	764	4.520E-01
601	4.262E+01	642	2.612E+01	683	9.600E+00	724	2.154E+00	765	4.173E-01
602	4.215E+01	643	2.584E+01	684	9.315E+00	725	2.065E+00	766	4.075E-01
603	4.207E+01	644	2.525E+01	685	9.008E+00	726	1.970E+00	767	4.133E-01
604	4.197E+01	645	2.482E+01	686	8.735E+00	727	1.909E+00	768	4.246E-01
605	4.181E+01	646	2.439E+01	687	8.499E+00	728	1.846E+00	769	3.700E-01
606	4.135E+01	647	2.395E+01	688	8.252E+00	729	1.802E+00	770	3.358E-01
607	4.121E+01	648	2.336E+01	689	7.998E+00	730	1.729E+00	771	3.228E-01
608	4.099E+01	649	2.292E+01	690	7.724E+00	731	1.680E+00	772	2.935E-01
609	4.075E+01	650	2.249E+01	691	7.461E+00	732	1.601E+00	773	2.783E-01
610	4.050E+01	651	2.206E+01	692	7.245E+00	733	1.516E+00	774	2.935E-01
611	4.001E+01	652	2.150E+01	693	6.964E+00	734	1.466E+00	775	2.958E-01
612	3.976E+01	653	2.107E+01	694	6.742E+00	735	1.400E+00	776	2.820E-01
613	3.939E+01	654	2.065E+01	695	6.512E+00	736	1.335E+00	777	2.971E-01
614	3.910E+01	655	2.011E+01	696	6.315E+00	737	1.250E+00	778	2.442E-01
615	3.883E+01	656	1.981E+01	697	6.126E+00	738	1.174E+00	779	2.410E-01
616	3.823E+01	657	1.929E+01	698	5.900E+00	739	1.138E+00	780	2.279E-01
617	3.789E+01	658	1.890E+01	699	5.696E+00	740	1.116E+00		
618	3.755E+01	659	1.837E+01	700	5.494E+00	741	1.105E+00		
619	3.722E+01	660	1.795E+01	701	5.310E+00	742	1.066E+00		
620	3.689E+01	661	1.755E+01	702	5.098E+00	743	9.544E-01		
621	3.630E+01	662	1.716E+01	703	4.925E+00	744	8.904E-01		
622	3.588E+01	663	1.672E+01	704	4.734E+00	745	8.584E-01		
623	3.545E+01	664	1.632E+01	705	4.546E+00	746	8.168E-01		
624	3.501E+01	665	1.590E+01	706	4.390E+00	747	8.191E-01		
625	3.436E+01	666	1.544E+01	707	4.233E+00	748	8.132E-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**

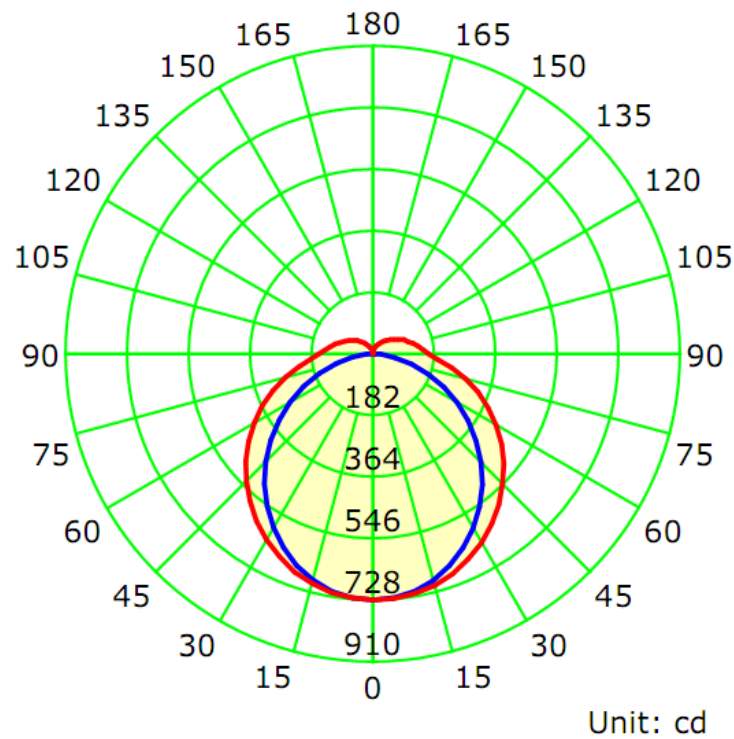
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1850	22.1	0.9950

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
2858.8	129.36	789.9	1.21	1.30

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	106.2	119.2	131.4	118.5	118.8
Field Angle (10% $I_{max}$ ):	158.2	212.7	251.8	205.8	207.1

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	790	790	790	790	790	790	790	790
5.0°	785	787	786	788	787	787	787	788
10.0°	773	774	777	780	780	780	777	776
15.0°	753	755	759	766	769	768	762	757
20.0°	723	728	737	747	751	748	738	730
25.0°	686	695	708	720	726	722	708	696
30.0°	645	655	674	691	699	693	673	657
35.0°	598	611	636	657	666	658	633	612
40.0°	547	564	593	617	630	619	589	564
45.0°	491	513	545	577	590	578	544	511
50.0°	434	460	497	533	549	534	495	456
55.0°	375	405	447	488	505	487	445	401
60.0°	313	348	394	439	458	439	393	342
65.0°	251	291	343	391	410	389	341	285
70.0°	189	232	290	339	359	336	287	227
75.0°	128	179	236	287	308	285	233	170
80.0°	72	127	187	237	258	234	183	118
85.0°	26	82	144	193	212	189	138	73
90.0°	4	56	116	162	180	158	109	47
95.0°	3	47	103	146	163	142	96	38
100.0°	3	41	93	132	148	128	86	33
105.0°	3	35	83	119	134	116	76	28
110.0°	3	31	74	108	120	104	68	25
115.0°	3	29	69	99	112	95	63	24
120.0°	3	26	58	85	95	82	54	21
125.0°	3	24	52	76	84	73	48	20
130.0°	4	22	46	67	73	64	42	18
135.0°	4	20	41	58	63	56	37	16
140.0°	4	18	36	50	55	48	33	15
145.0°	4	16	31	43	47	41	28	13
150.0°	5	15	27	36	39	35	23	11
155.0°	5	13	22	30	32	29	19	10
160.0°	5	11	18	24	25	22	15	9
165.0°	5	9	14	18	19	16	11	8
170.0°	5	9	10	13	13	11	9	7
175.0°	6	7	8	9	10	8	7	7
180.0°	0	0	0	0	0	0	0	0

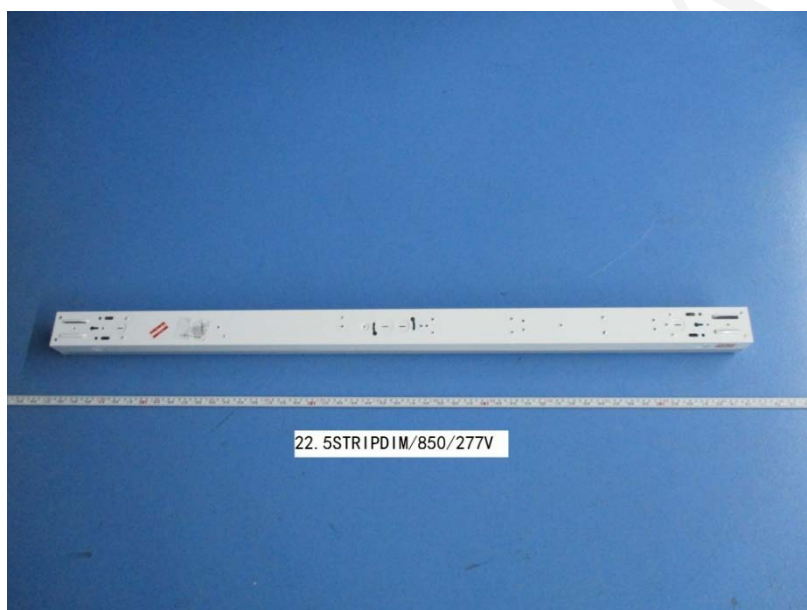
Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	790	790	790	790	790	790	790	790
5.0°	784	786	786	786	785	786	786	787
10.0°	773	772	775	777	777	776	774	773
15.0°	750	753	758	760	762	761	757	752
20.0°	721	726	734	740	744	740	732	723
25.0°	685	693	703	713	717	712	700	689
30.0°	643	653	669	681	688	681	663	648
35.0°	595	608	629	646	653	644	623	603
40.0°	544	559	586	607	617	606	579	554
45.0°	489	509	539	565	576	564	532	502
50.0°	431	456	491	522	535	519	483	447
55.0°	370	401	439	475	490	472	432	391
60.0°	308	342	387	426	442	423	381	332
65.0°	246	285	334	377	394	373	328	276
70.0°	185	227	281	325	343	322	275	218
75.0°	123	172	228	273	292	269	222	163
80.0°	66	120	179	223	243	219	173	112
85.0°	21	78	137	183	201	179	131	69
90.0°	3	55	114	158	175	153	107	46
95.0°	2	45	101	142	158	138	95	38
100.0°	2	39	90	128	142	124	84	32
105.0°	2	33	80	115	127	112	74	28
110.0°	2	29	71	102	113	100	66	24
115.0°	2	26	63	91	101	88	58	22
120.0°	2	23	55	80	89	78	51	19
125.0°	2	20	48	70	78	69	45	17
130.0°	3	18	42	61	68	60	40	16
135.0°	3	16	36	52	58	51	35	14
140.0°	3	14	31	45	50	44	30	12
145.0°	3	11	26	38	42	37	26	10
150.0°	4	9	20	31	34	31	21	9
155.0°	4	8	16	25	27	25	17	8
160.0°	4	6	12	18	21	19	13	6
165.0°	5	5	9	12	15	14	10	5
170.0°	5	5	6	7	9	9	6	5
175.0°	5	5	5	5	5	5	5	5
180.0°	0	0	0	0	0	0	0	0

**Zonal Lumen Density Measurement**

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	18.8	0.66	0-5	18.8	0.66
5-10	55.9	1.95	0-10	74.7	2.61
10-15	91.0	3.18	0-15	165.8	5.80
15-20	123.1	4.31	0-20	288.9	10.11
20-25	151.0	5.28	0-25	439.9	15.39
25-30	173.9	6.08	0-30	613.8	21.47
30-35	191.3	6.69	0-35	805.1	28.16
35-40	202.8	7.09	0-40	1007.9	35.26
40-45	208.3	7.29	0-45	1216.2	42.54
45-50	207.9	7.27	0-50	1424.1	49.82
50-55	202.0	7.07	0-55	1626.1	56.88
55-60	190.6	6.67	0-60	1816.7	63.55
60-65	174.5	6.10	0-65	1991.1	69.65
65-70	154.3	5.40	0-70	2145.4	75.05
70-75	130.7	4.57	0-75	2276.1	79.62
75-80	105.6	3.70	0-80	2381.8	83.31
80-85	81.6	2.86	0-85	2463.4	86.17
85-90	63.3	2.21	0-90	2526.7	88.38
90-95	53.0	1.85	0-95	2579.7	90.24
95-100	46.8	1.64	0-100	2626.5	91.88
100-105	41.2	1.44	0-105	2667.8	93.32
105-110	36.0	1.26	0-110	2703.7	94.58
110-115	31.3	1.10	0-115	2735.1	95.67
115-120	26.8	0.94	0-120	2761.9	96.61
120-125	22.4	0.78	0-125	2784.2	97.39
125-130	18.6	0.65	0-130	2802.8	98.04
130-135	15.2	0.53	0-135	2818.0	98.57
135-140	12.1	0.42	0-140	2830.1	99.00
140-145	9.4	0.33	0-145	2839.5	99.33
145-150	7.1	0.25	0-150	2846.6	99.57
150-155	5.0	0.18	0-155	2851.6	99.75
155-160	3.4	0.12	0-160	2855.0	99.87
160-165	2.1	0.07	0-165	2857.1	99.94
165-170	1.1	0.04	0-170	2858.2	99.98
170-175	0.5	0.02	0-175	2858.7	100.00
175-180	0.1	0.00	0-180	2858.8	100.00

## 6. Product Photo



## 7. Product Test orientation in the Goniophotometer



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