

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/835/277V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RKS170109003-10
Test Date:	2017-01-13 to 2017-01-16
Report Date:	2017-01-17
Reviewed By:	Blake Zhang <i>Blake Zhang</i>
Prepared By:	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
Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
Accreditation:	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/835/277V
 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: 3500K
 Nominal Lumen Output: 2500 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**

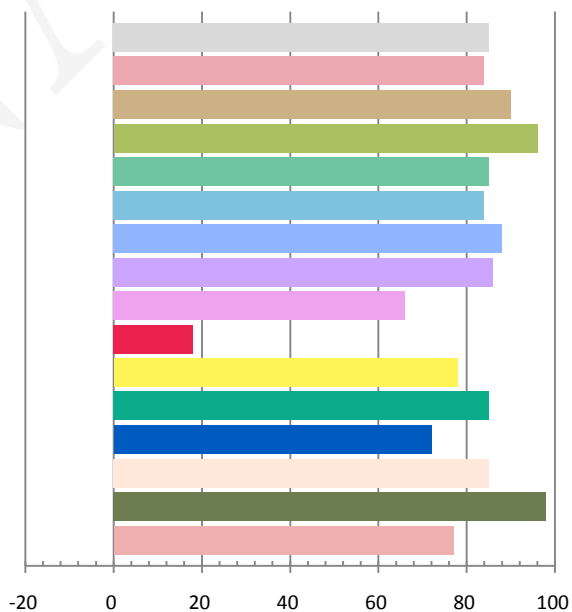
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1874	22.31	0.992	2584.6	115.84

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.889	3506	0.00033	0.4053	0.3915	0.2354	0.5116

Color Rendering Index

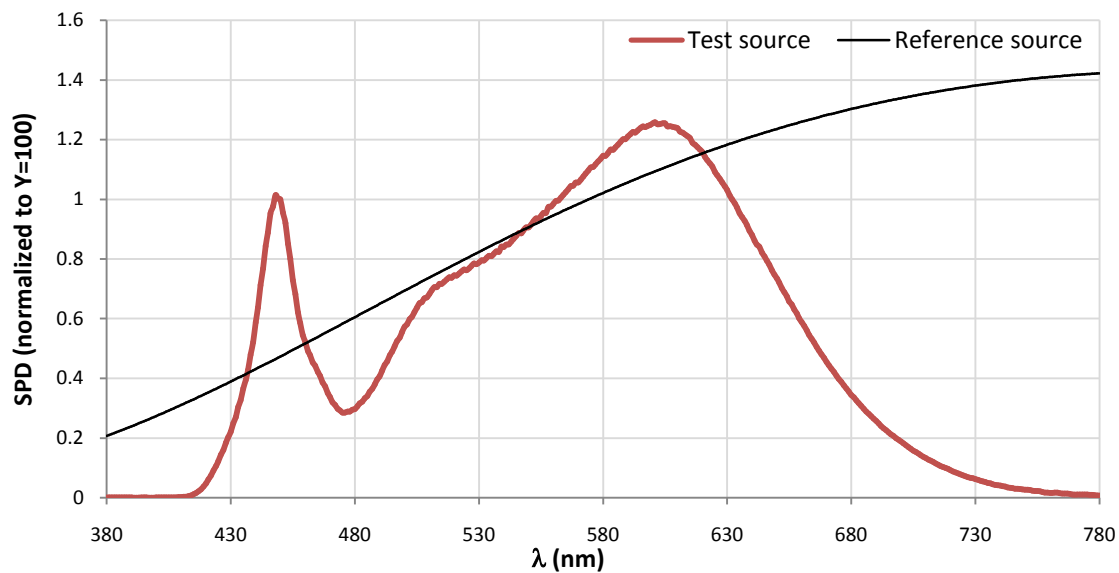
Ra			
85.1			
R1	R2	R3	R4
84	90	96	85
R5	R6	R7	R8
84	88	86	66
R9	R10	R11	R12
18	78	85	72
R13	R14	R15	
85	98	77	



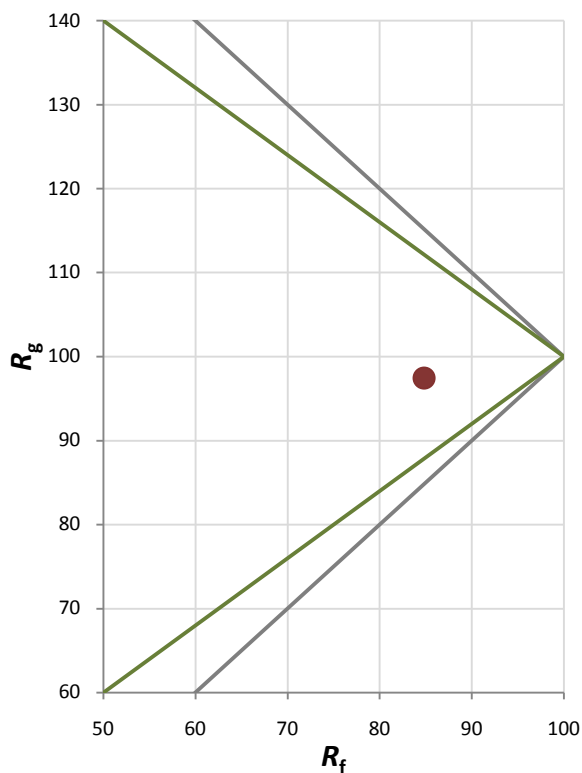
Fidelity Index and Gamut Index

Fidelity Index R_f	85
Gamut Index R_g	97

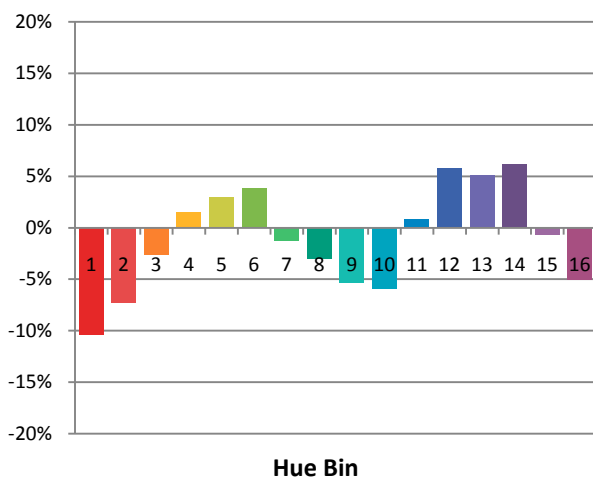
Spectral Power Distribution Comparison



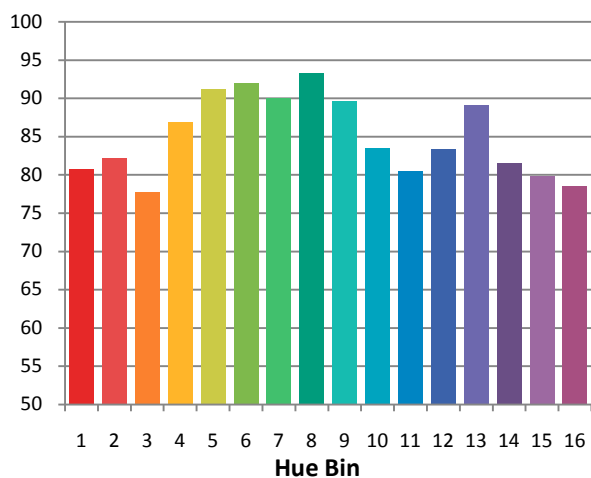
Plot of R_g versus R_f



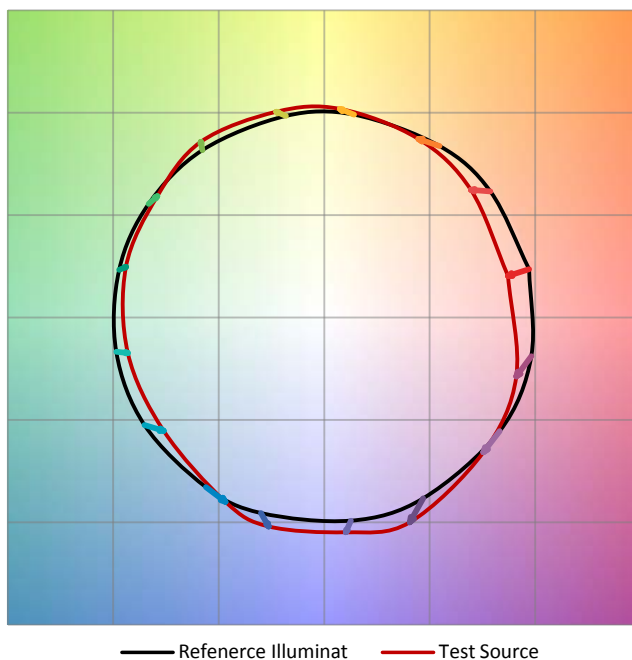
Chroma Shift by Hue



R_f by Hue

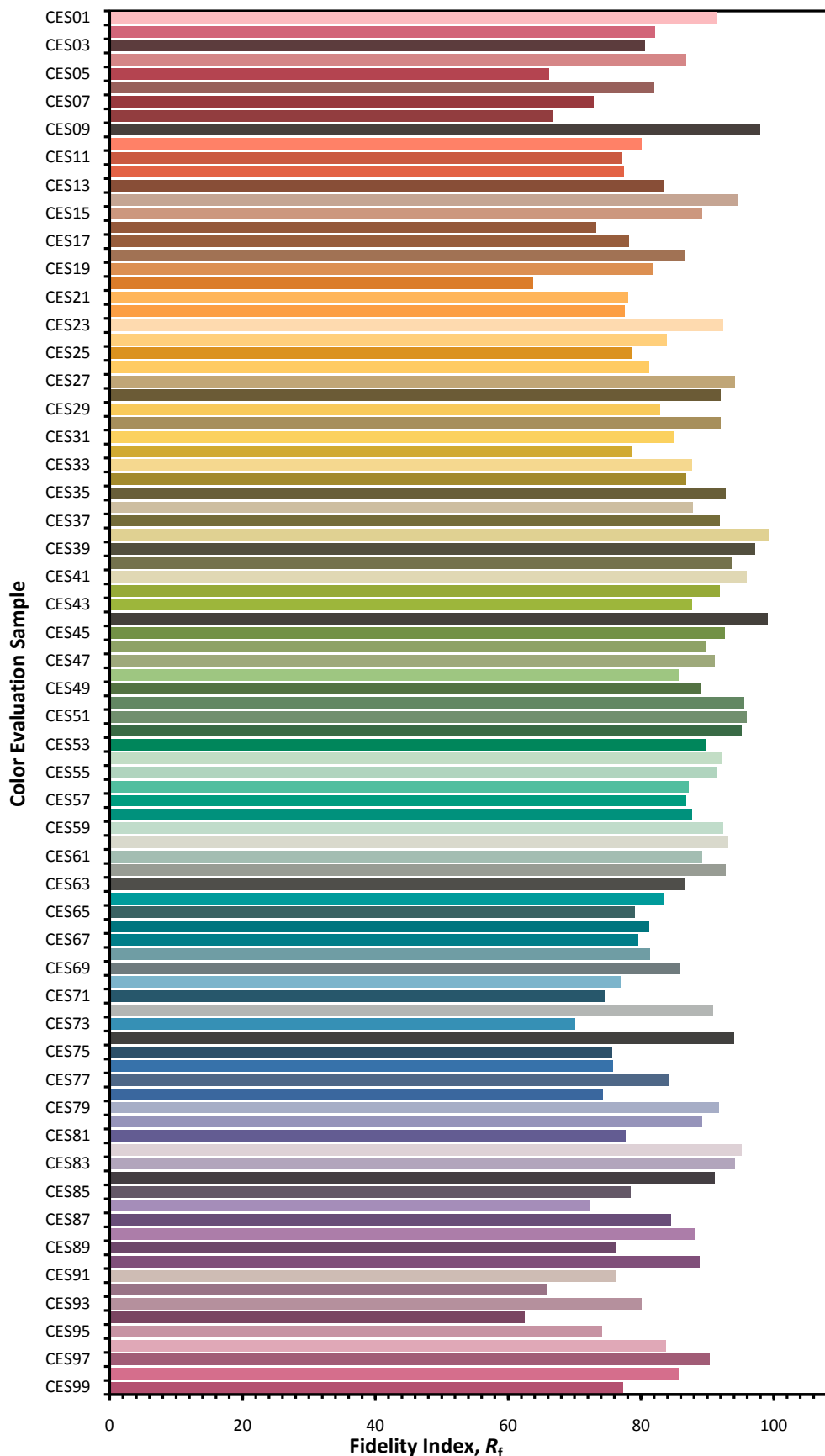


Color Vector Graphic

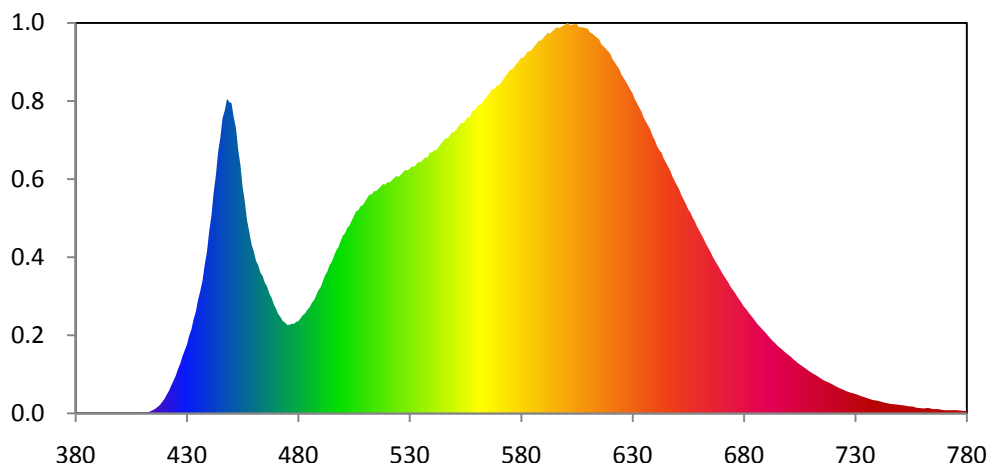


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



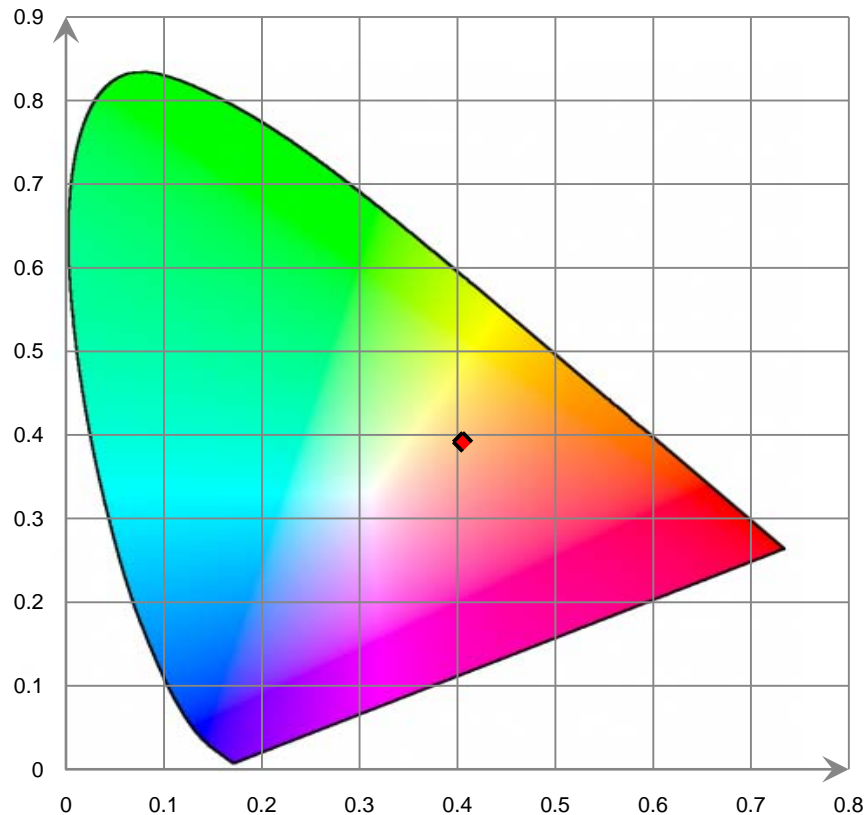
Relative Spectral Power Distribution



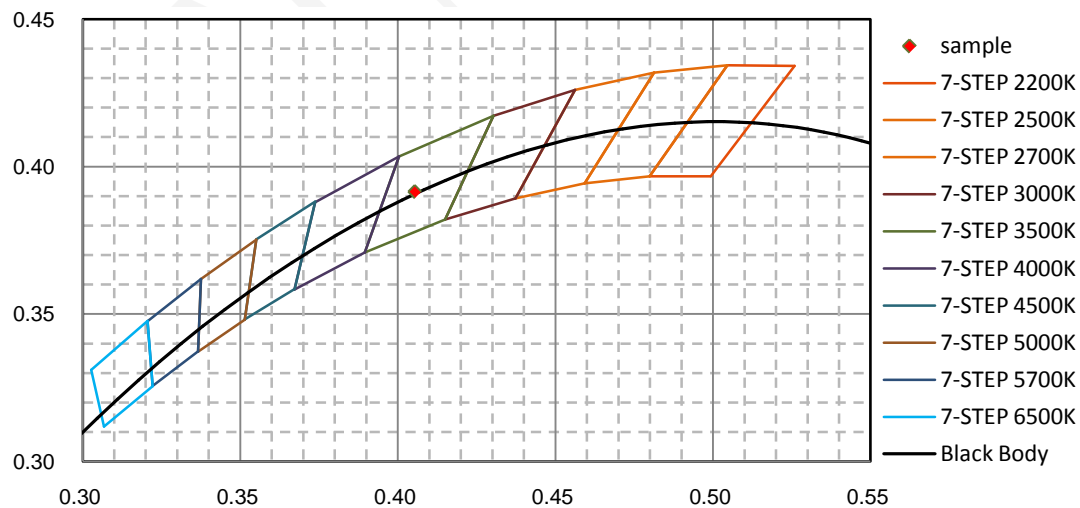
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.180E-02	421	2.309E+00	462	1.807E+01	503	2.291E+01	544	3.283E+01
381	2.710E-02	422	2.786E+00	463	1.716E+01	504	2.353E+01	545	3.319E+01
382	2.140E-02	423	3.437E+00	464	1.673E+01	505	2.410E+01	546	3.353E+01
383	2.490E-02	424	4.001E+00	465	1.592E+01	506	2.465E+01	547	3.352E+01
384	2.740E-02	425	4.604E+00	466	1.546E+01	507	2.479E+01	548	3.392E+01
385	2.010E-02	426	5.422E+00	467	1.461E+01	508	2.527E+01	549	3.427E+01
386	3.390E-02	427	6.060E+00	468	1.410E+01	509	2.540E+01	550	3.428E+01
387	4.320E-02	428	6.971E+00	469	1.328E+01	510	2.585E+01	551	3.465E+01
388	3.290E-02	429	7.682E+00	470	1.278E+01	511	2.629E+01	552	3.504E+01
389	3.030E-02	430	8.373E+00	471	1.210E+01	512	2.669E+01	553	3.540E+01
390	2.020E-02	431	9.445E+00	472	1.176E+01	513	2.670E+01	554	3.538E+01
391	1.100E-02	432	1.023E+01	473	1.126E+01	514	2.711E+01	555	3.575E+01
392	1.360E-02	433	1.148E+01	474	1.108E+01	515	2.709E+01	556	3.609E+01
393	1.740E-02	434	1.239E+01	475	1.080E+01	516	2.739E+01	557	3.609E+01
394	1.770E-02	435	1.384E+01	476	1.081E+01	517	2.766E+01	558	3.686E+01
395	2.510E-02	436	1.493E+01	477	1.092E+01	518	2.795E+01	559	3.691E+01
396	2.070E-02	437	1.619E+01	478	1.091E+01	519	2.789E+01	560	3.725E+01
397	1.420E-02	438	1.815E+01	479	1.116E+01	520	2.820E+01	561	3.763E+01
398	9.600E-03	439	1.973E+01	480	1.124E+01	521	2.815E+01	562	3.767E+01
399	4.700E-03	440	2.222E+01	481	1.159E+01	522	2.843E+01	563	3.805E+01
400	1.870E-02	441	2.411E+01	482	1.197E+01	523	2.867E+01	564	3.839E+01
401	2.640E-02	442	2.694E+01	483	1.217E+01	524	2.894E+01	565	3.873E+01
402	2.960E-02	443	2.904E+01	484	1.263E+01	525	2.883E+01	566	3.912E+01
403	2.700E-02	444	3.188E+01	485	1.289E+01	526	2.909E+01	567	3.953E+01
404	2.830E-02	445	3.361E+01	486	1.345E+01	527	2.938E+01	568	3.956E+01
405	3.200E-02	446	3.602E+01	487	1.378E+01	528	2.970E+01	569	3.995E+01
406	3.600E-02	447	3.693E+01	488	1.438E+01	529	2.961E+01	570	3.997E+01
407	3.680E-02	448	3.836E+01	489	1.500E+01	530	2.983E+01	571	4.035E+01
408	3.120E-02	449	3.795E+01	490	1.539E+01	531	3.010E+01	572	4.072E+01
409	6.210E-02	450	3.783E+01	491	1.610E+01	532	3.008E+01	573	4.110E+01
410	8.740E-02	451	3.614E+01	492	1.683E+01	533	3.038E+01	574	4.148E+01
411	1.007E-01	452	3.481E+01	493	1.729E+01	534	3.067E+01	575	4.187E+01
412	1.292E-01	453	3.216E+01	494	1.805E+01	535	3.062E+01	576	4.194E+01
413	1.913E-01	454	3.029E+01	495	1.848E+01	536	3.092E+01	577	4.230E+01
414	3.003E-01	455	2.759E+01	496	1.918E+01	537	3.122E+01	578	4.264E+01
415	4.287E-01	456	2.580E+01	497	1.986E+01	538	3.117E+01	579	4.298E+01
416	6.102E-01	457	2.350E+01	498	2.027E+01	539	3.184E+01	580	4.335E+01
417	8.121E-01	458	2.214E+01	499	2.099E+01	540	3.179E+01	581	4.335E+01
418	1.066E+00	459	2.060E+01	500	2.167E+01	541	3.209E+01	582	4.371E+01
419	1.435E+00	460	1.976E+01	501	2.199E+01	542	3.211E+01	583	4.414E+01
420	1.805E+00	461	1.861E+01	502	2.263E+01	543	3.249E+01	584	4.412E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.443E+01	626	4.089E+01	667	1.864E+01	708	5.407E+00	749	1.061E+00
586	4.477E+01	627	4.046E+01	668	1.816E+01	709	5.189E+00	750	1.025E+00
587	4.511E+01	628	3.998E+01	669	1.772E+01	710	5.023E+00	751	9.954E-01
588	4.545E+01	629	3.947E+01	670	1.722E+01	711	4.839E+00	752	9.666E-01
589	4.546E+01	630	3.903E+01	671	1.678E+01	712	4.697E+00	753	9.052E-01
590	4.579E+01	631	3.833E+01	672	1.637E+01	713	4.537E+00	754	8.657E-01
591	4.609E+01	632	3.782E+01	673	1.594E+01	714	4.355E+00	755	8.416E-01
592	4.639E+01	633	3.731E+01	674	1.544E+01	715	4.168E+00	756	8.249E-01
593	4.630E+01	634	3.679E+01	675	1.506E+01	716	3.997E+00	757	7.243E-01
594	4.658E+01	635	3.606E+01	676	1.469E+01	717	3.878E+00	758	6.616E-01
595	4.685E+01	636	3.557E+01	677	1.424E+01	718	3.772E+00	759	6.532E-01
596	4.708E+01	637	3.508E+01	678	1.385E+01	719	3.640E+00	760	6.152E-01
597	4.697E+01	638	3.457E+01	679	1.345E+01	720	3.495E+00	761	6.074E-01
598	4.713E+01	639	3.384E+01	680	1.300E+01	721	3.337E+00	762	6.480E-01
599	4.726E+01	640	3.330E+01	681	1.272E+01	722	3.207E+00	763	6.524E-01
600	4.746E+01	641	3.259E+01	682	1.233E+01	723	3.065E+00	764	5.672E-01
601	4.760E+01	642	3.209E+01	683	1.199E+01	724	2.954E+00	765	5.166E-01
602	4.733E+01	643	3.179E+01	684	1.165E+01	725	2.823E+00	766	5.230E-01
603	4.739E+01	644	3.108E+01	685	1.128E+01	726	2.700E+00	767	5.302E-01
604	4.745E+01	645	3.057E+01	686	1.092E+01	727	2.610E+00	768	4.773E-01
605	4.746E+01	646	3.006E+01	687	1.061E+01	728	2.513E+00	769	4.130E-01
606	4.708E+01	647	2.954E+01	688	1.033E+01	729	2.457E+00	770	3.843E-01
607	4.709E+01	648	2.884E+01	689	1.003E+01	730	2.358E+00	771	3.905E-01
608	4.704E+01	649	2.828E+01	690	9.742E+00	731	2.276E+00	772	3.841E-01
609	4.696E+01	650	2.778E+01	691	9.407E+00	732	2.160E+00	773	3.889E-01
610	4.687E+01	651	2.727E+01	692	9.105E+00	733	2.061E+00	774	3.968E-01
611	4.643E+01	652	2.657E+01	693	8.804E+00	734	1.991E+00	775	4.016E-01
612	4.629E+01	653	2.603E+01	694	8.567E+00	735	1.878E+00	776	3.680E-01
613	4.605E+01	654	2.551E+01	695	8.260E+00	736	1.805E+00	777	3.536E-01
614	4.583E+01	655	2.486E+01	696	8.026E+00	737	1.700E+00	778	3.165E-01
615	4.560E+01	656	2.449E+01	697	7.830E+00	738	1.630E+00	779	2.963E-01
616	4.500E+01	657	2.385E+01	698	7.563E+00	739	1.582E+00	780	2.772E-01
617	4.474E+01	658	2.339E+01	699	7.328E+00	740	1.536E+00		
618	4.447E+01	659	2.275E+01	700	7.120E+00	741	1.469E+00		
619	4.416E+01	660	2.226E+01	701	6.915E+00	742	1.400E+00		
620	4.383E+01	661	2.177E+01	702	6.638E+00	743	1.315E+00		
621	4.321E+01	662	2.123E+01	703	6.421E+00	744	1.261E+00		
622	4.281E+01	663	2.064E+01	704	6.187E+00	745	1.205E+00		
623	4.239E+01	664	2.017E+01	705	5.980E+00	746	1.148E+00		
624	4.199E+01	665	1.968E+01	706	5.786E+00	747	1.122E+00		
625	4.132E+01	666	1.910E+01	707	5.599E+00	748	1.107E+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**

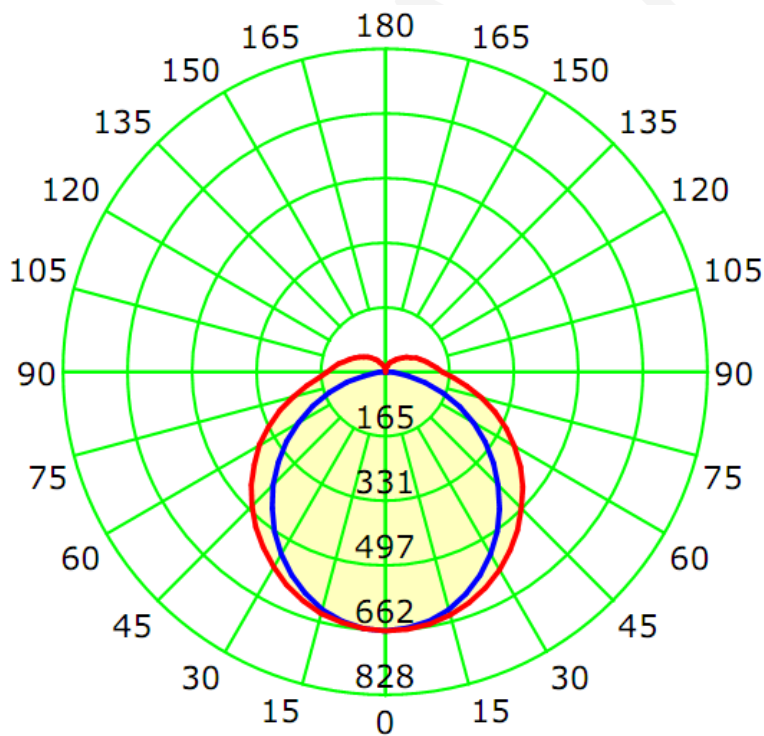
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1870	22.31	0.9950

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2592.7	116.21	717.5	1.21	1.31

Luminous Intensity Distribution



Unit: cd

	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	106.2	118.2	131.4	119.3	118.8
Field Angle (10% I_{max}):	158.2	207.3	251.8	210.3	206.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	718	718	718	718	718	718	718	718
5.0°	714	713	715	714	714	714	715	714
10.0°	702	702	705	706	707	706	704	702
15.0°	684	684	688	692	694	692	688	685
20.0°	656	660	666	672	676	674	666	660
25.0°	624	629	638	648	654	650	639	629
30.0°	586	592	605	619	627	622	606	593
35.0°	543	550	569	586	597	589	570	552
40.0°	496	507	530	550	563	554	531	508
45.0°	447	460	487	512	526	516	489	461
50.0°	395	412	442	471	489	476	446	413
55.0°	342	363	395	429	448	433	400	362
60.0°	286	309	348	385	405	389	353	310
65.0°	230	257	300	340	360	344	305	258
70.0°	173	205	252	293	314	297	257	207
75.0°	118	154	203	246	267	249	208	156
80.0°	66	106	158	200	222	203	163	109
85.0°	23	66	120	162	182	164	124	69
90.0°	3	43	97	138	157	141	101	47
95.0°	2	36	86	124	142	126	89	39
100.0°	2	30	77	111	128	113	79	33
105.0°	2	26	68	101	115	102	70	28
110.0°	2	24	60	90	103	92	62	25
115.0°	2	22	56	84	96	84	58	24
120.0°	2	19	47	71	81	72	49	21
125.0°	2	18	42	63	71	64	43	19
130.0°	3	16	38	55	62	56	38	17
135.0°	3	15	33	48	54	48	34	16
140.0°	3	13	29	42	46	42	29	14
145.0°	3	12	25	35	39	36	25	12
150.0°	3	11	21	30	33	30	20	10
155.0°	4	9	18	24	27	24	15	9
160.0°	4	8	14	19	21	18	13	7
165.0°	4	7	11	14	15	13	9	6
170.0°	4	6	8	10	11	8	7	6
175.0°	4	5	6	7	7	6	5	5
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	718	718	718	718	718	718	718	718
5.0°	713	714	714	716	716	715	715	713
10.0°	701	702	706	708	709	709	706	703
15.0°	682	684	691	695	697	696	690	684
20.0°	655	659	668	677	680	678	669	660
25.0°	620	629	641	653	658	654	642	628
30.0°	583	592	608	625	633	627	610	593
35.0°	539	551	573	593	603	596	573	552
40.0°	492	507	533	558	571	561	535	508
45.0°	441	460	491	519	535	524	494	462
50.0°	389	411	446	479	497	484	450	413
55.0°	335	361	400	438	456	442	405	363
60.0°	279	309	353	393	414	397	358	310
65.0°	223	256	305	348	370	353	311	259
70.0°	165	203	257	302	324	306	262	208
75.0°	110	152	208	254	278	258	214	158
80.0°	59	105	163	209	232	212	168	110
85.0°	19	66	124	170	192	172	128	71
90.0°	2	44	100	144	163	146	104	49
95.0°	2	36	89	130	148	132	93	41
100.0°	2	31	80	117	134	119	83	35
105.0°	2	27	71	106	121	108	74	31
110.0°	2	24	63	95	108	97	66	27
115.0°	2	22	56	84	96	86	59	25
120.0°	2	20	50	75	86	76	52	22
125.0°	2	18	44	66	75	67	46	20
130.0°	2	16	39	58	66	59	41	18
135.0°	3	15	35	51	58	52	37	17
140.0°	2	13	30	44	50	45	32	15
145.0°	3	11	26	37	42	38	27	13
150.0°	3	10	21	31	35	32	24	12
155.0°	3	9	16	25	28	26	20	10
160.0°	3	7	13	19	22	20	15	9
165.0°	4	6	10	13	16	15	12	7
170.0°	4	6	8	9	11	11	8	6
175.0°	4	5	6	6	6	6	5	5
180.0°	0	0	0	0	0	0	0	0

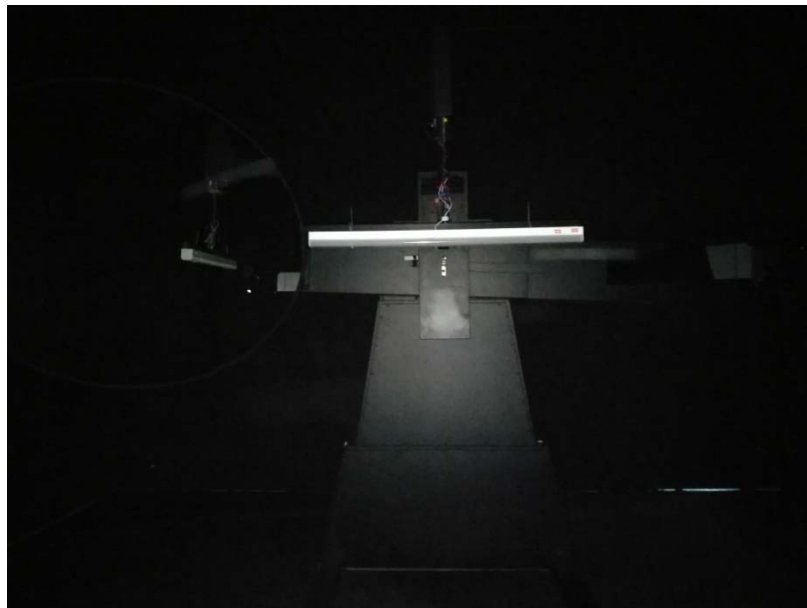
Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	17.1	0.66	0-5	17.1	0.66
5-10	50.8	1.96	0-10	67.9	2.62
10-15	82.7	3.19	0-15	150.6	5.81
15-20	111.8	4.31	0-20	262.3	10.12
20-25	137.1	5.29	0-25	399.4	15.41
25-30	157.8	6.09	0-30	557.2	21.49
30-35	173.5	6.69	0-35	730.8	28.19
35-40	183.9	7.09	0-40	914.7	35.28
40-45	188.9	7.29	0-45	1103.6	42.57
45-50	188.6	7.27	0-50	1292.3	49.84
50-55	183.2	7.07	0-55	1475.5	56.91
55-60	172.9	6.67	0-60	1648.4	63.58
60-65	158.3	6.10	0-65	1806.7	69.68
65-70	139.9	5.40	0-70	1946.6	75.08
70-75	118.5	4.57	0-75	2065.1	79.65
75-80	95.6	3.69	0-80	2160.7	83.34
80-85	73.7	2.84	0-85	2234.4	86.18
85-90	57.0	2.20	0-90	2291.4	88.38
90-95	47.8	1.84	0-95	2339.1	90.22
95-100	42.3	1.63	0-100	2381.4	91.85
100-105	37.2	1.44	0-105	2418.6	93.29
105-110	32.5	1.25	0-110	2451.2	94.54
110-115	28.4	1.09	0-115	2479.6	95.64
115-120	24.3	0.94	0-120	2503.9	96.57
120-125	20.3	0.78	0-125	2524.2	97.36
125-130	17.0	0.65	0-130	2541.1	98.01
130-135	13.9	0.54	0-135	2555.0	98.55
135-140	11.1	0.43	0-140	2566.2	98.98
140-145	8.7	0.33	0-145	2574.9	99.31
145-150	6.5	0.25	0-150	2581.4	99.56
150-155	4.7	0.18	0-155	2586.0	99.74
155-160	3.1	0.12	0-160	2589.2	99.86
160-165	1.9	0.07	0-165	2591.1	99.94
165-170	1.0	0.04	0-170	2592.2	99.98
170-175	0.5	0.02	0-175	2592.6	100.00
175-180	0.1	0.00	0-180	2592.7	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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