

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 13PAR30DIM/940NF25

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu <i>Hill Liu</i>
Report Number:	R1KS170323016-10A1
Test Date:	2017-03-29 to 2017-03-30
Report Date:	2017-03-31
Reviewed By:	Bill Xiong / EE Engineer <i>Bill Xiong</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.
Accreditation:	The IAS Accreditation Number TL-460.

1. Product Description

General Information:

Two samples were received on 2017-03-29. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested: 13PAR30DIM/940NF25
Manufacturer: GREEN CREATIVE LTD
Brand Name: GREEN CREATIVE
Product Designation: Directional LED Lamp
Dimmable: Continuous Dimming
Dimming Range: 10% to 100%
Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120 VAC 60Hz
Rated Power: 13W
Nominal CCT: 4000K
Nominal Lumen Output: 1100lm

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	SPR-600	S09008	25~50°C	2017-03-09	2018-03-08
High Accuracy Array spectroradiometer	EVERFINE	HAAS-2000	M112048CA1361125	380-780nm	2016-07-08	2017-07-07
Power meter	YOKOGAWA	WT310	C20E17024V	2kV/20A	2016-07-08	2017-07-07
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2017-03-03	2018-03-02
Thermal Meter	SENSING	N/A	N/A	25、50°C	2017-03-09	2018-03-08
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-12-05	2017-12-04
AC Power Supply	ALL Power	APW-105N	970613	220V±10% 50Hz	2017-03-03	2018-03-02
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2017-03-03	2018-03-02
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2017-03-03	2018-03-02
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2017-03-03	2018-03-02
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2017-03-09	2018-03-08

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	2017-03-20	2018-03-19
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=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=32K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.1 (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_t , 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: **Base Up**

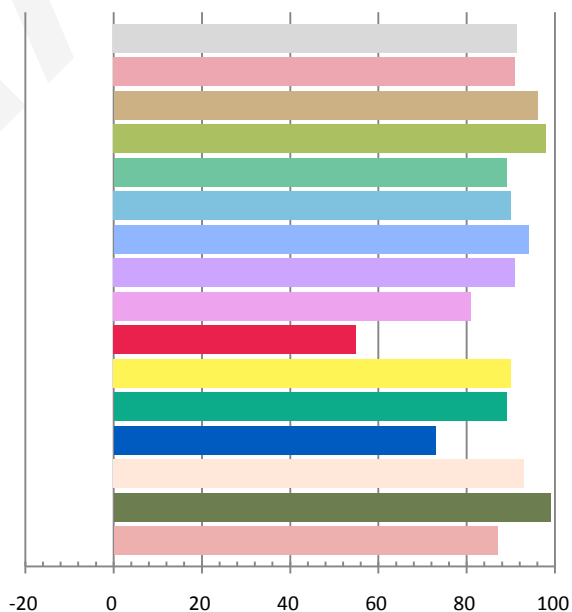
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1129	12.84	0.9471	1288.4	100.38

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.2982	3778	0.00181	0.3923	0.3878	0.2285	0.5081

Color Rendering Index

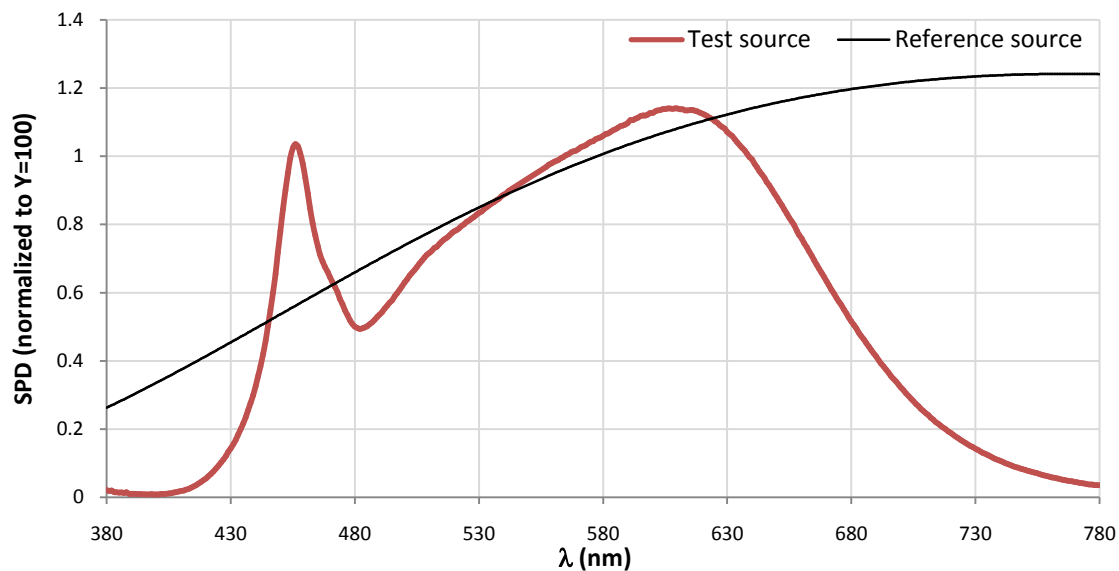
Ra			
91.4			
R1	R2	R3	R4
91	96	98	89
R5	R6	R7	R8
90	94	91	81
R9	R10	R11	R12
55	90	89	73
R13	R14	R15	
93	99	87	



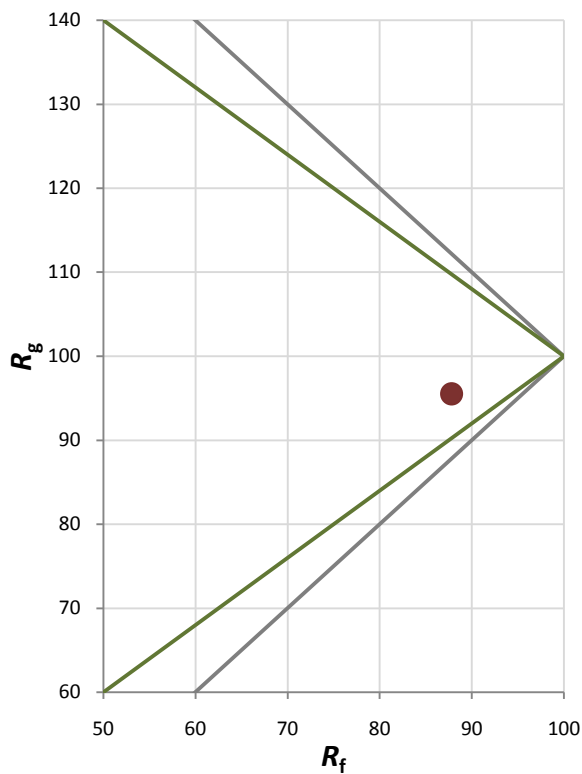
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	96

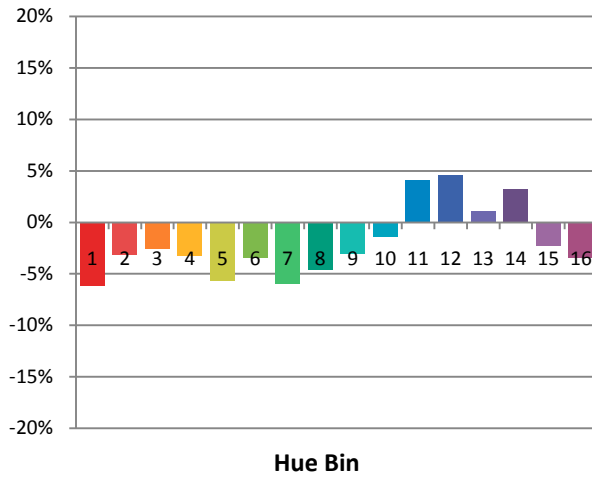
Spectral Power Distribution Comparison



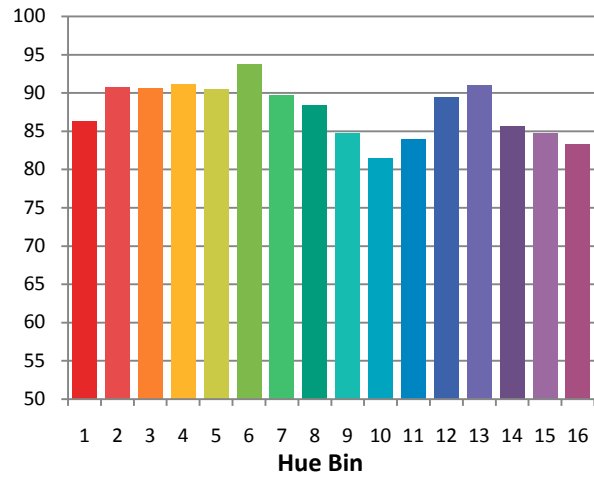
Plot of R_g versus R_f



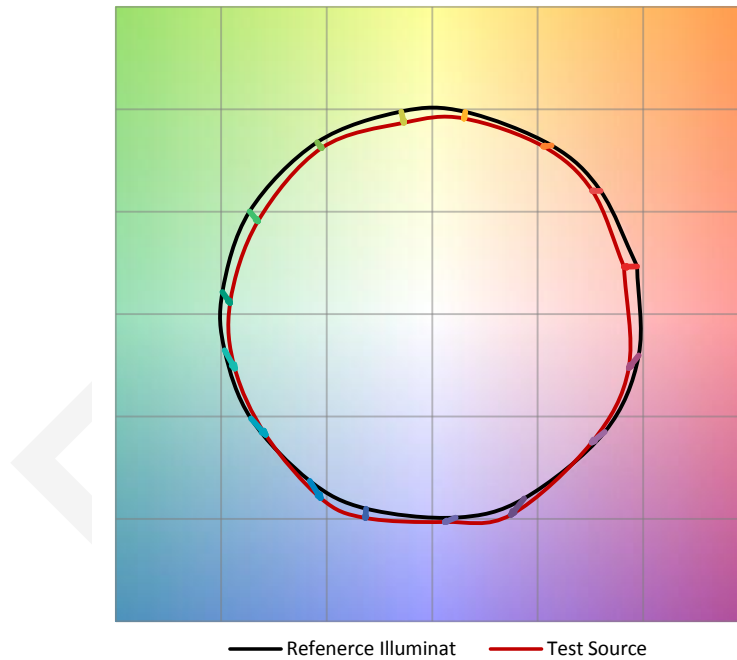
Chroma Shift by Hue



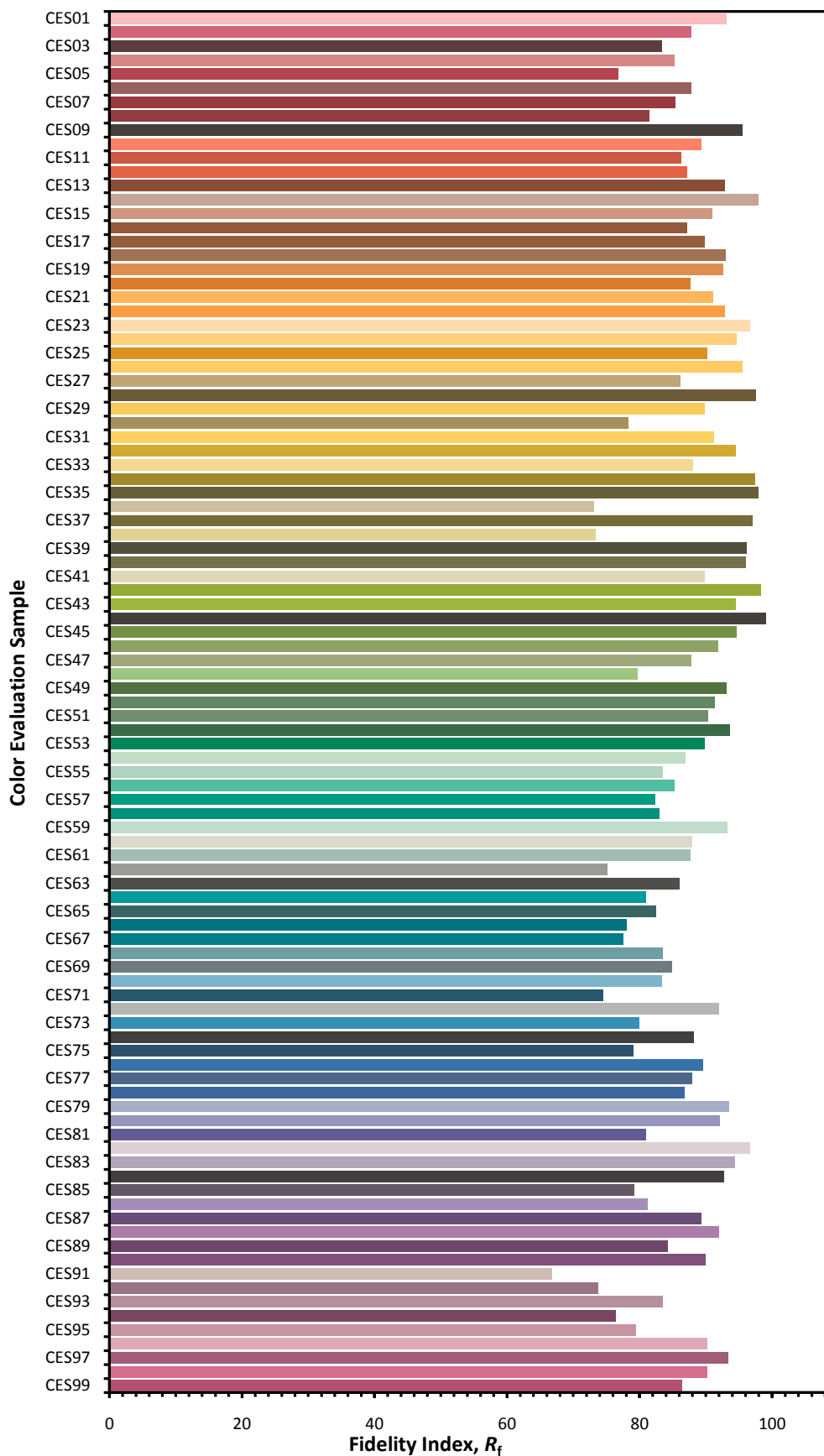
R_f by Hue



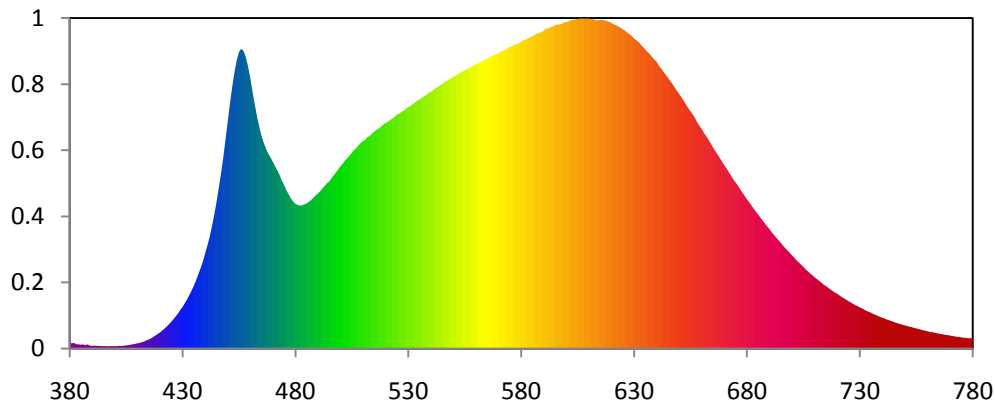
Color Vector Graphic



Color Fidelity by CES Sample



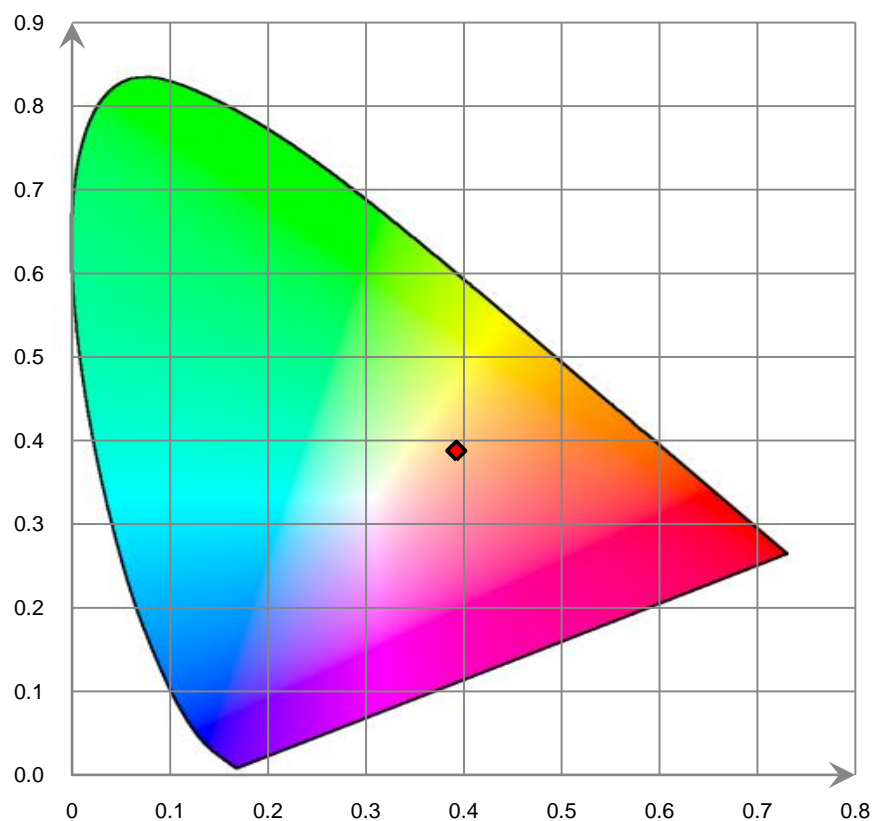
Relative Spectral Power Distribution



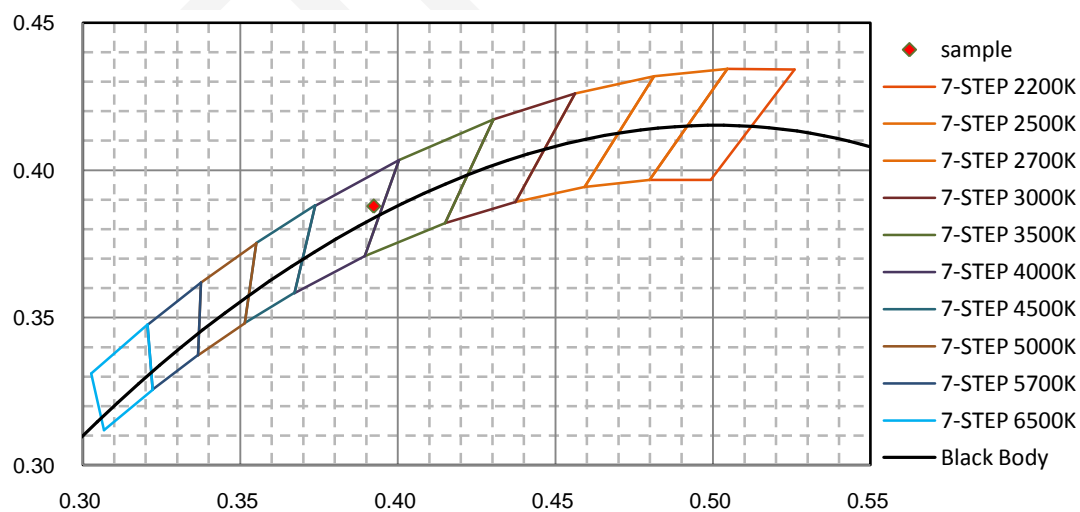
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.092E-01	421	1.167E+00	462	1.596E+01	503	1.240E+01	544	1.714E+01
381	3.464E-01	422	1.297E+00	463	1.515E+01	504	1.257E+01	545	1.723E+01
382	3.756E-01	423	1.438E+00	464	1.449E+01	505	1.274E+01	546	1.735E+01
383	2.850E-01	424	1.586E+00	465	1.390E+01	506	1.293E+01	547	1.742E+01
384	2.805E-01	425	1.741E+00	466	1.342E+01	507	1.307E+01	548	1.754E+01
385	2.562E-01	426	1.915E+00	467	1.304E+01	508	1.325E+01	549	1.762E+01
386	2.714E-01	427	2.094E+00	468	1.272E+01	509	1.341E+01	550	1.771E+01
387	2.378E-01	428	2.280E+00	469	1.246E+01	510	1.352E+01	551	1.778E+01
388	2.767E-01	429	2.511E+00	470	1.218E+01	511	1.362E+01	552	1.788E+01
389	1.958E-01	430	2.701E+00	471	1.189E+01	512	1.379E+01	553	1.796E+01
390	1.878E-01	431	2.939E+00	472	1.162E+01	513	1.385E+01	554	1.806E+01
391	1.954E-01	432	3.187E+00	473	1.133E+01	514	1.402E+01	555	1.814E+01
392	1.778E-01	433	3.470E+00	474	1.097E+01	515	1.414E+01	556	1.821E+01
393	1.834E-01	434	3.761E+00	475	1.068E+01	516	1.427E+01	557	1.826E+01
394	1.710E-01	435	4.081E+00	476	1.034E+01	517	1.436E+01	558	1.839E+01
395	1.658E-01	436	4.435E+00	477	1.007E+01	518	1.447E+01	559	1.846E+01
396	1.646E-01	437	4.820E+00	478	9.803E+00	519	1.460E+01	560	1.852E+01
397	1.512E-01	438	5.217E+00	479	9.594E+00	520	1.471E+01	561	1.860E+01
398	1.671E-01	439	5.647E+00	480	9.438E+00	521	1.478E+01	562	1.866E+01
399	1.609E-01	440	6.161E+00	481	9.369E+00	522	1.489E+01	563	1.876E+01
400	1.655E-01	441	6.679E+00	482	9.311E+00	523	1.500E+01	564	1.882E+01
401	1.625E-01	442	7.252E+00	483	9.351E+00	524	1.509E+01	565	1.892E+01
402	1.851E-01	443	7.912E+00	484	9.399E+00	525	1.524E+01	566	1.898E+01
403	1.736E-01	444	8.650E+00	485	9.467E+00	526	1.531E+01	567	1.907E+01
404	1.926E-01	445	9.457E+00	486	9.573E+00	527	1.542E+01	568	1.913E+01
405	2.161E-01	446	1.036E+01	487	9.677E+00	528	1.551E+01	569	1.917E+01
406	2.269E-01	447	1.131E+01	488	9.828E+00	529	1.563E+01	570	1.925E+01
407	2.572E-01	448	1.235E+01	489	9.978E+00	530	1.574E+01	571	1.936E+01
408	2.828E-01	449	1.352E+01	490	1.011E+01	531	1.581E+01	572	1.942E+01
409	3.105E-01	450	1.471E+01	491	1.025E+01	532	1.592E+01	573	1.947E+01
410	3.475E-01	451	1.591E+01	492	1.044E+01	533	1.604E+01	574	1.958E+01
411	3.725E-01	452	1.699E+01	493	1.060E+01	534	1.614E+01	575	1.966E+01
412	4.200E-01	453	1.797E+01	494	1.078E+01	535	1.624E+01	576	1.970E+01
413	4.603E-01	454	1.875E+01	495	1.089E+01	536	1.632E+01	577	1.980E+01
414	5.360E-01	455	1.931E+01	496	1.111E+01	537	1.643E+01	578	1.985E+01
415	5.923E-01	456	1.953E+01	497	1.129E+01	538	1.651E+01	579	1.991E+01
416	6.643E-01	457	1.941E+01	498	1.148E+01	539	1.665E+01	580	1.999E+01
417	7.573E-01	458	1.903E+01	499	1.167E+01	540	1.674E+01	581	2.009E+01
418	8.498E-01	459	1.845E+01	500	1.188E+01	541	1.682E+01	582	2.013E+01
419	9.539E-01	460	1.767E+01	501	1.205E+01	542	1.696E+01	583	2.021E+01
420	1.048E+00	461	1.680E+01	502	1.226E+01	543	1.705E+01	584	2.029E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.035E+01	626	2.072E+01	667	1.265E+01	708	4.900E+00	749	1.548E+00
586	2.044E+01	627	2.059E+01	668	1.242E+01	709	4.785E+00	750	1.514E+00
587	2.052E+01	628	2.048E+01	669	1.219E+01	710	4.647E+00	751	1.475E+00
588	2.057E+01	629	2.038E+01	670	1.195E+01	711	4.541E+00	752	1.429E+00
589	2.062E+01	630	2.021E+01	671	1.174E+01	712	4.413E+00	753	1.401E+00
590	2.071E+01	631	2.009E+01	672	1.149E+01	713	4.300E+00	754	1.354E+00
591	2.086E+01	632	1.998E+01	673	1.127E+01	714	4.165E+00	755	1.318E+00
592	2.086E+01	633	1.981E+01	674	1.103E+01	715	4.078E+00	756	1.279E+00
593	2.093E+01	634	1.965E+01	675	1.083E+01	716	3.967E+00	757	1.239E+00
594	2.099E+01	635	1.949E+01	676	1.063E+01	717	3.851E+00	758	1.199E+00
595	2.107E+01	636	1.933E+01	677	1.039E+01	718	3.762E+00	759	1.168E+00
596	2.112E+01	637	1.919E+01	678	1.017E+01	719	3.650E+00	760	1.127E+00
597	2.111E+01	638	1.900E+01	679	9.953E+00	720	3.570E+00	761	1.098E+00
598	2.117E+01	639	1.882E+01	680	9.739E+00	721	3.464E+00	762	1.073E+00
599	2.126E+01	640	1.869E+01	681	9.536E+00	722	3.362E+00	763	1.045E+00
600	2.126E+01	641	1.844E+01	682	9.337E+00	723	3.281E+00	764	1.010E+00
601	2.134E+01	642	1.827E+01	683	9.117E+00	724	3.180E+00	765	9.744E-01
602	2.140E+01	643	1.804E+01	684	8.922E+00	725	3.091E+00	766	9.512E-01
603	2.142E+01	644	1.786E+01	685	8.733E+00	726	3.011E+00	767	9.274E-01
604	2.146E+01	645	1.766E+01	686	8.531E+00	727	2.920E+00	768	8.975E-01
605	2.147E+01	646	1.744E+01	687	8.340E+00	728	2.836E+00	769	8.780E-01
606	2.151E+01	647	1.725E+01	688	8.151E+00	729	2.773E+00	770	8.523E-01
607	2.151E+01	648	1.702E+01	689	7.955E+00	730	2.685E+00	771	8.242E-01
608	2.149E+01	649	1.680E+01	690	7.787E+00	731	2.623E+00	772	7.997E-01
609	2.151E+01	650	1.659E+01	691	7.579E+00	732	2.538E+00	773	7.708E-01
610	2.150E+01	651	1.637E+01	692	7.403E+00	733	2.456E+00	774	7.638E-01
611	2.146E+01	652	1.615E+01	693	7.229E+00	734	2.397E+00	775	7.310E-01
612	2.146E+01	653	1.591E+01	694	7.058E+00	735	2.338E+00	776	7.107E-01
613	2.140E+01	654	1.568E+01	695	6.891E+00	736	2.257E+00	777	6.996E-01
614	2.139E+01	655	1.546E+01	696	6.715E+00	737	2.200E+00	778	6.787E-01
615	2.141E+01	656	1.526E+01	697	6.544E+00	738	2.130E+00	779	6.788E-01
616	2.142E+01	657	1.504E+01	698	6.401E+00	739	2.067E+00	780	6.801E-01
617	2.138E+01	658	1.474E+01	699	6.233E+00	740	2.012E+00		
618	2.134E+01	659	1.452E+01	700	6.075E+00	741	1.958E+00		
619	2.128E+01	660	1.431E+01	701	5.929E+00	742	1.896E+00		
620	2.122E+01	661	1.405E+01	702	5.748E+00	743	1.848E+00		
621	2.114E+01	662	1.384E+01	703	5.616E+00	744	1.789E+00		
622	2.107E+01	663	1.360E+01	704	5.467E+00	745	1.741E+00		
623	2.099E+01	664	1.337E+01	705	5.330E+00	746	1.684E+00		
624	2.092E+01	665	1.311E+01	706	5.158E+00	747	1.645E+00		
625	2.080E+01	666	1.287E+01	707	5.040E+00	748	1.599E+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: **Base Up**

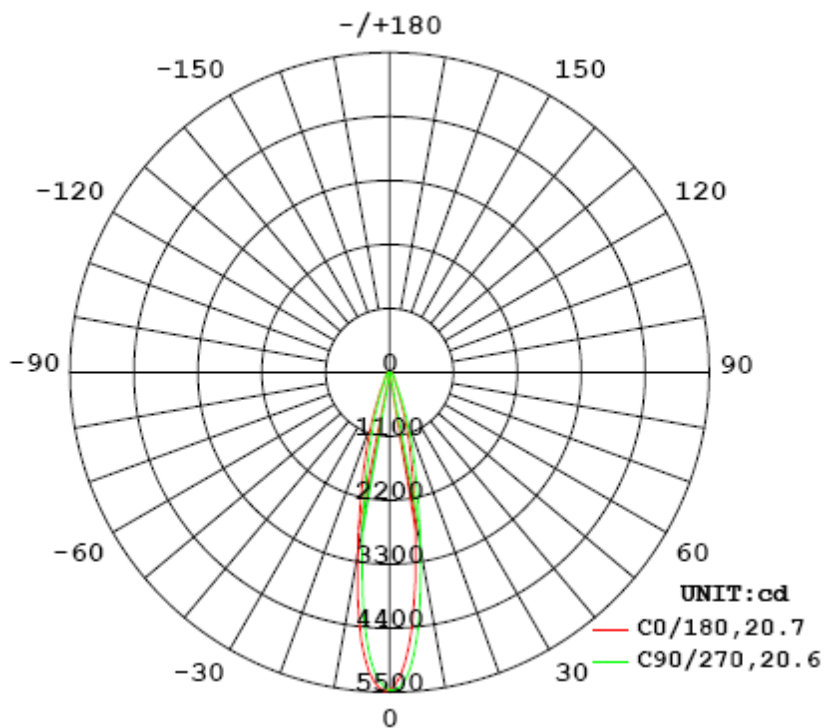
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1125	12.77	0.9459

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1293.49	101.29	5498	0.32	0.37

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	20.7	20.7	20.6	20.7	20.7
Field Angle (10% I_{max}):	44.6	45.0	44.2	45.1	44.7

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	5460	5460	5460	5460	5460	5460	5460	5460
5.0°	4919	4846	4751	4670	4598	4501	4380	4292
10.0°	3172	3065	2879	2726	2637	2568	2464	2391
15.0°	1742	1670	1552	1438	1365	1333	1294	1256
20.0°	901	870	792	706	660	661	636	608
25.0°	421	425	379	335	318	329	316	301
30.0°	226	231	217	202	194	197	193	191
35.0°	154	157	159	155	146	146	146	151
40.0°	125	126	130	129	121	120	121	130
45.0°	101	102	104	103	98	97	98	105
50.0°	78	78	79	79	74	74	75	79
55.0°	58	58	58	57	55	55	55	56
60.0°	44	44	44	42	42	42	41	42
65.0°	34	33	33	32	32	32	31	32
70.0°	26	25	25	24	24	24	23	24
75.0°	18	18	18	17	16	16	16	16
80.0°	11	11	11	10	10	10	9	10
85.0°	5	5	5	4	4	4	3	4
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°	5460	5460	5460	5460	5460	5460	5460	5460
5.0°	4399	4483	4620	4751	4855	4947	5017	5053
10.0°	2523	2667	2829	2945	3049	3170	3267	3316
15.0°	1368	1438	1525	1590	1663	1762	1812	1806
20.0°	667	731	777	801	861	951	978	948
25.0°	323	355	371	371	398	460	468	441
30.0°	198	205	208	208	218	245	247	235
35.0°	158	151	149	149	153	169	169	159
40.0°	135	128	124	125	130	142	143	130
45.0°	106	105	103	103	108	117	119	108
50.0°	79	78	78	78	82	88	89	82
55.0°	57	57	57	58	59	63	63	60
60.0°	43	42	43	44	44	46	47	45
65.0°	33	32	33	33	34	35	36	35
70.0°	24	24	24	25	26	27	27	26
75.0°	17	17	17	18	19	19	19	19
80.0°	10	10	11	11	12	12	13	12
85.0°	4	4	5	5	5	6	6	6
90.0°	0	0	0	0	0	1	1	1
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	121.4	9.39
5-10	264.4	20.44
10-15	248.2	19.18
15-20	183.8	14.21
20-25	115.1	8.90
25-30	70.7	5.47
30-35	52.6	4.07
35-40	46.9	3.62
40-45	43.4	3.36
45-50	37.1	2.86
50-55	29.6	2.29
55-60	23.1	1.79
60-65	18.5	1.43
65-70	14.6	1.13
70-75	11.1	0.85
75-80	7.6	0.59
80-85	4.2	0.33
85-90	1.2	0.09
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	121.4	9.39
0-10	385.8	29.83
0-15	634.0	49.01
0-20	817.8	63.22
0-25	932.9	72.12
0-30	1003.6	77.59
0-35	1056.3	81.66
0-40	1103.1	85.28
0-45	1146.5	88.64
0-50	1183.6	91.50
0-55	1213.2	93.79
0-60	1236.3	95.58
0-65	1254.8	97.01
0-70	1269.4	98.14
0-75	1280.5	98.99
0-80	1288.1	99.58
0-85	1292.3	99.91
0-90	1293.5	100.00
0-95	1293.5	100.00
0-100	1293.5	100.00
0-105	1293.5	100.00
0-110	1293.5	100.00
0-115	1293.5	100.00
0-120	1293.5	100.00
0-125	1293.5	100.00
0-130	1293.5	100.00
0-135	1293.5	100.00
0-140	1293.5	100.00
0-145	1293.5	100.00
0-150	1293.5	100.00
0-155	1293.5	100.00
0-160	1293.5	100.00
0-165	1293.5	100.00
0-170	1293.5	100.00
0-175	1293.5	100.00
0-180	1293.5	100.00

6. Product Photo



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