

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 13PAR30/927FL40/277V**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Hill Liu <i>Hill Liu</i>
<b>Report Number:</b>	R1KS161101041-10A1
<b>Test Date:</b>	2016-11-01 to 2016-12-11
<b>Report Date:</b>	2017-04-01
<b>Reviewed By:</b>	Bill Xiong / EE Engineer <i>Bill Xiong</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
<b>Accreditation:</b>	The IAS Accreditation Number TL-460.

## 1. Product Description

### General Information:

Two samples were received on 2016-11-01. One was tested in integrating sphere and the other was tested in goniophotometer

Model Tested: 13PAR30/927FL40/277V  
Manufacturer: GREEN CREATIVE LTD  
Brand Name: GREEN CREATIVE  
Product Designation: Directional LED Lamp  
Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz  
Rated Power: 13W  
Nominal CCT: 2700K  
Nominal Lumen Output: 1000 lm

## 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
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2017-03-20	2018-03-19

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$  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.

4 $\pi$  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  $U=32\text{K}$  ( $K=2$ ), 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 ( $\gamma$ ) 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: **1.0 hour**

Test orientation: **Base up**

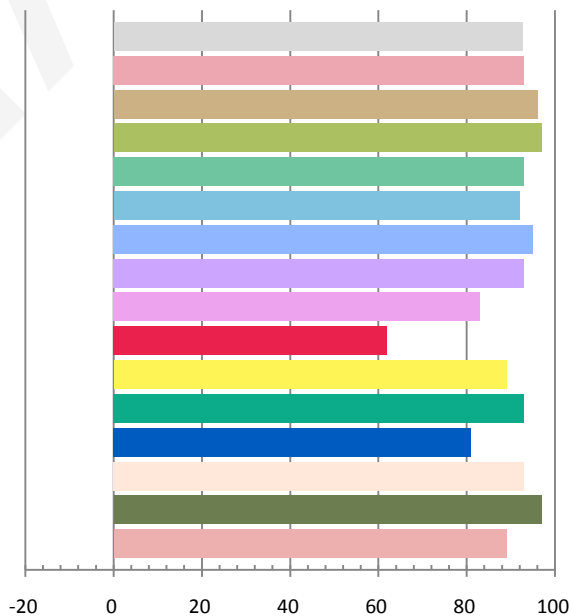
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1110	12.83	0.9638	1171.1	91.25

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.2299	2663	0.00070	0.4642	0.4135	0.2640	0.5291

### Color Rendering Index

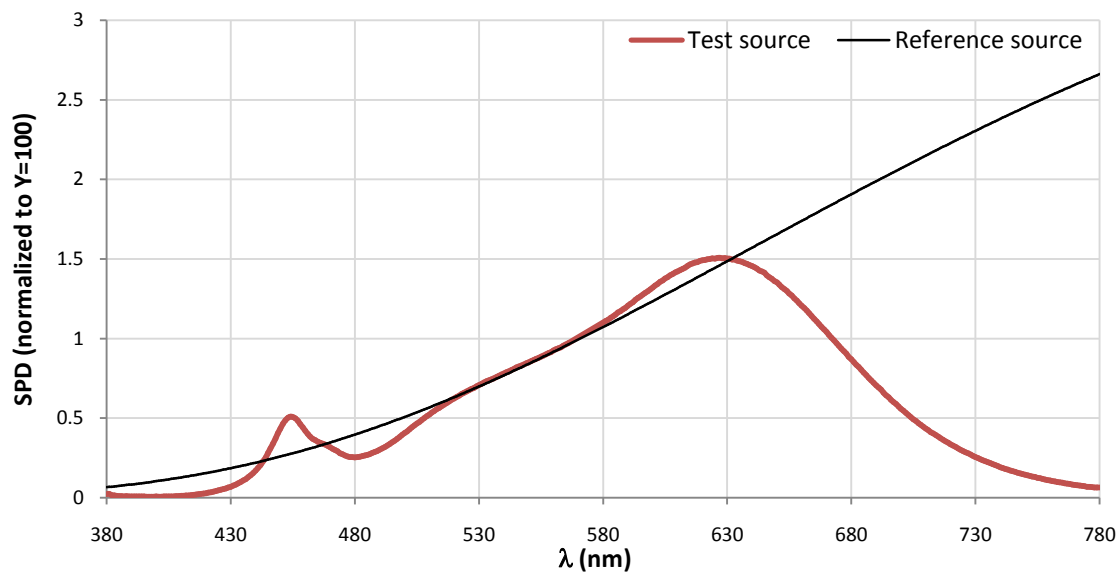
Ra			
92.7			
R1	R2	R3	R4
93	96	97	93
R5	R6	R7	R8
92	95	93	83
R9	R10	R11	R12
62	89	93	81
R13	R14	R15	
93	97	89	



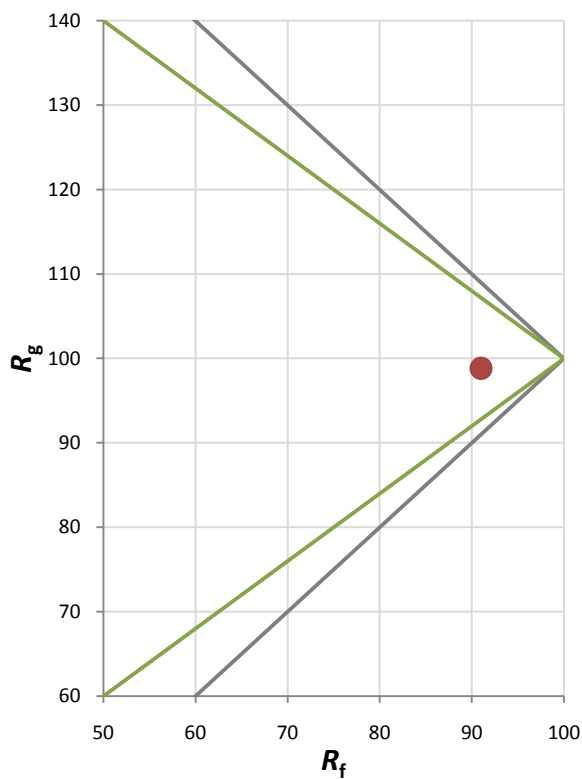
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	91
Gamut Index $R_g$	99

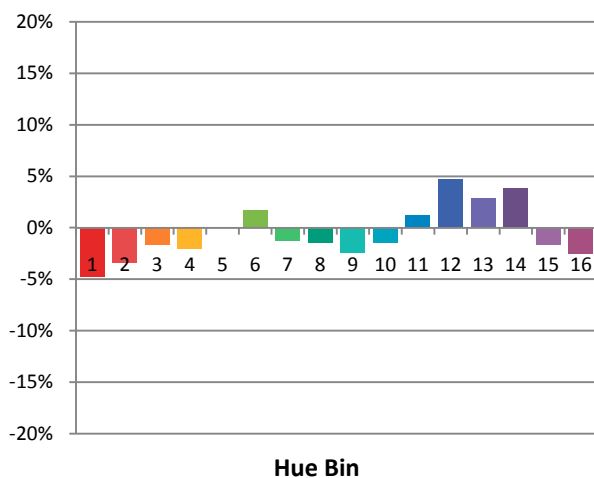
### Spectral Power Distribution Comparison



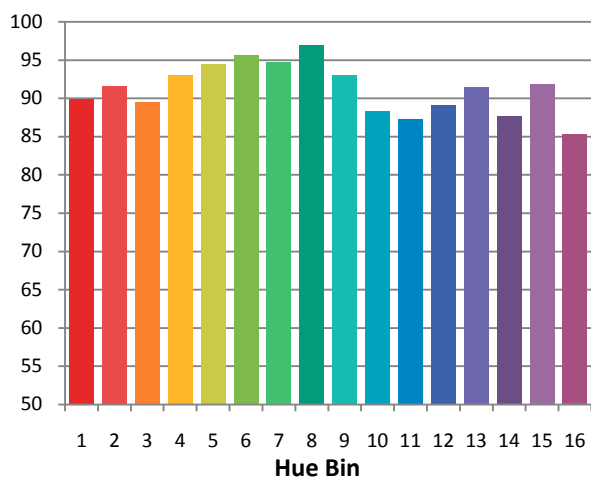
### Plot of $R_g$ versus $R_f$



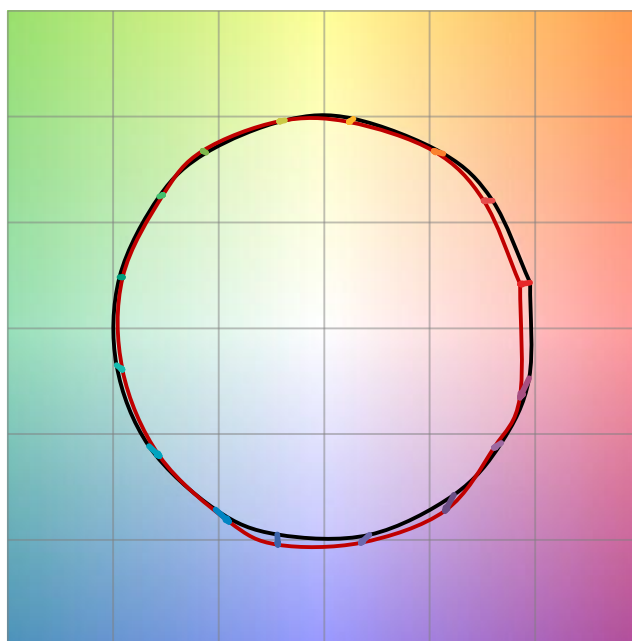
Chroma Shift by Hue



$R_f$  by Hue

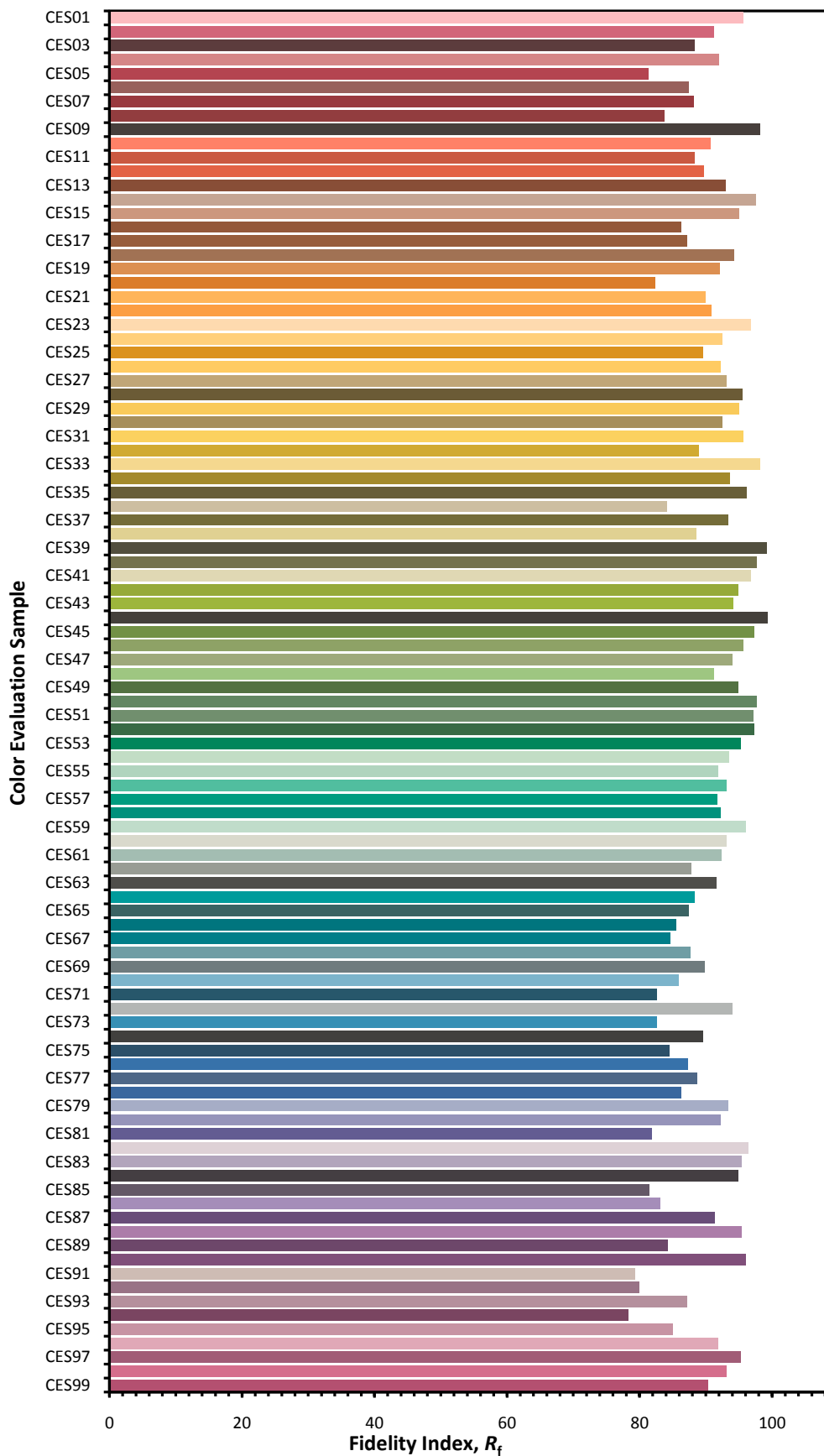


Color Vector Graphic

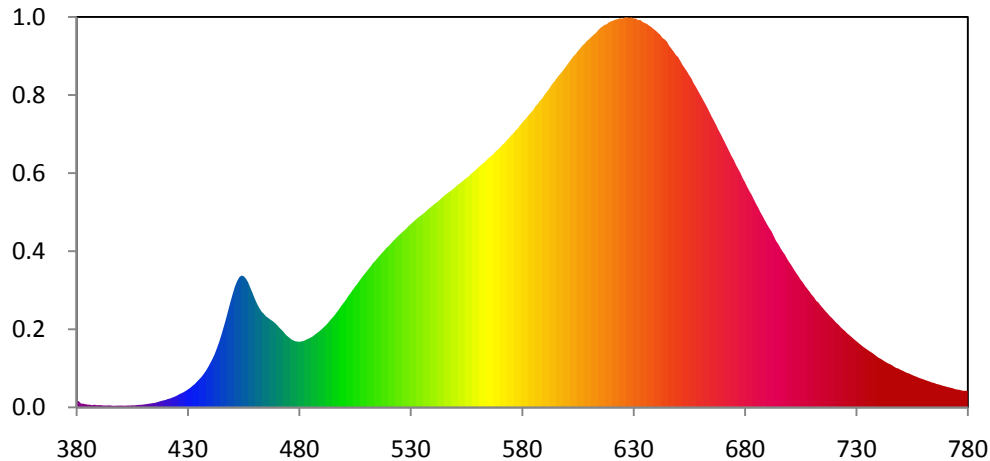


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



**Relative Spectral Power Distribution**

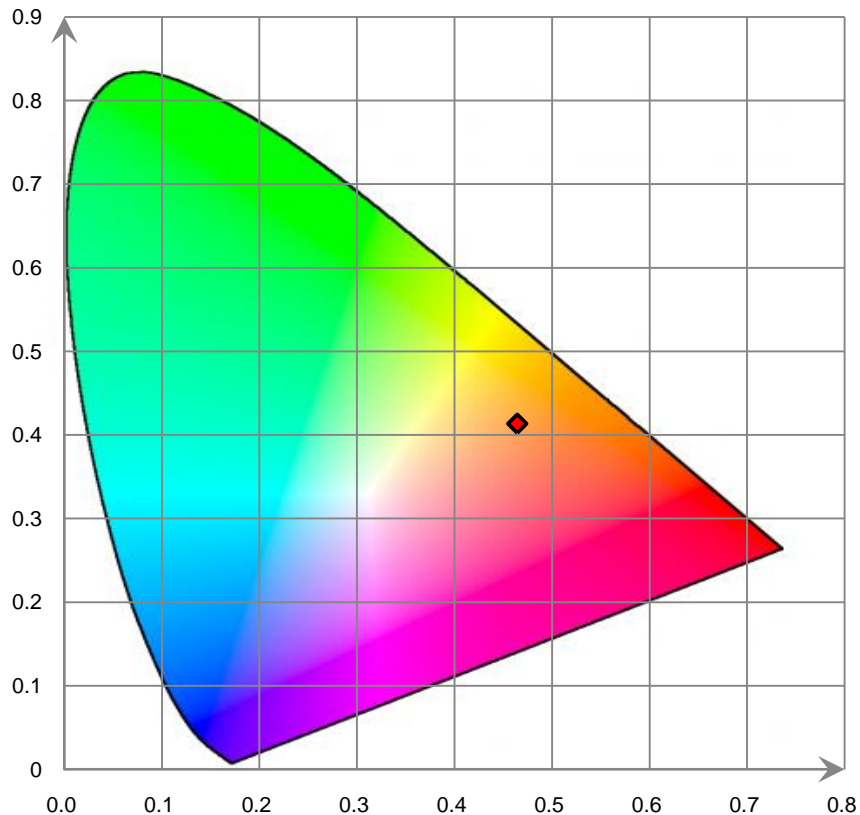


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.866E-01	421	5.559E-01	462	6.585E+00	503	7.573E+00	544	1.387E+01
381	4.175E-01	422	5.890E-01	463	6.353E+00	504	7.782E+00	545	1.402E+01
382	2.572E-01	423	6.508E-01	464	6.206E+00	505	7.994E+00	546	1.413E+01
383	2.458E-01	424	7.064E-01	465	6.032E+00	506	8.174E+00	547	1.423E+01
384	2.116E-01	425	7.754E-01	466	5.928E+00	507	8.391E+00	548	1.435E+01
385	1.839E-01	426	8.602E-01	467	5.813E+00	508	8.591E+00	549	1.446E+01
386	1.795E-01	427	9.273E-01	468	5.718E+00	509	8.783E+00	550	1.459E+01
387	1.447E-01	428	9.997E-01	469	5.596E+00	510	8.960E+00	551	1.472E+01
388	1.769E-01	429	1.089E+00	470	5.453E+00	511	9.152E+00	552	1.483E+01
389	1.457E-01	430	1.186E+00	471	5.283E+00	512	9.327E+00	553	1.495E+01
390	1.484E-01	431	1.291E+00	472	5.137E+00	513	9.539E+00	554	1.507E+01
391	1.481E-01	432	1.420E+00	473	4.984E+00	514	9.697E+00	555	1.520E+01
392	1.278E-01	433	1.533E+00	474	4.799E+00	515	9.869E+00	556	1.529E+01
393	1.272E-01	434	1.693E+00	475	4.675E+00	516	1.004E+01	557	1.545E+01
394	1.285E-01	435	1.848E+00	476	4.547E+00	517	1.021E+01	558	1.558E+01
395	1.332E-01	436	1.998E+00	477	4.455E+00	518	1.037E+01	559	1.569E+01
396	1.103E-01	437	2.195E+00	478	4.389E+00	519	1.055E+01	560	1.585E+01
397	1.036E-01	438	2.405E+00	479	4.361E+00	520	1.068E+01	561	1.598E+01
398	1.137E-01	439	2.649E+00	480	4.342E+00	521	1.084E+01	562	1.611E+01
399	1.157E-01	440	2.921E+00	481	4.372E+00	522	1.100E+01	563	1.621E+01
400	1.209E-01	441	3.200E+00	482	4.399E+00	523	1.115E+01	564	1.638E+01
401	1.140E-01	442	3.522E+00	483	4.479E+00	524	1.130E+01	565	1.651E+01
402	1.133E-01	443	3.912E+00	484	4.543E+00	525	1.144E+01	566	1.664E+01
403	1.263E-01	444	4.322E+00	485	4.618E+00	526	1.158E+01	567	1.675E+01
404	1.219E-01	445	4.794E+00	486	4.695E+00	527	1.171E+01	568	1.694E+01
405	1.404E-01	446	5.295E+00	487	4.824E+00	528	1.183E+01	569	1.706E+01
406	1.308E-01	447	5.813E+00	488	4.925E+00	529	1.201E+01	570	1.720E+01
407	1.517E-01	448	6.376E+00	489	5.047E+00	530	1.214E+01	571	1.737E+01
408	1.665E-01	449	6.939E+00	490	5.171E+00	531	1.226E+01	572	1.749E+01
409	1.738E-01	450	7.460E+00	491	5.312E+00	532	1.240E+01	573	1.767E+01
410	1.898E-01	451	7.961E+00	492	5.453E+00	533	1.253E+01	574	1.782E+01
411	2.075E-01	452	8.335E+00	493	5.613E+00	534	1.264E+01	575	1.800E+01
412	2.351E-01	453	8.608E+00	494	5.799E+00	535	1.276E+01	576	1.814E+01
413	2.477E-01	454	8.729E+00	495	5.960E+00	536	1.287E+01	577	1.832E+01
414	2.790E-01	455	8.684E+00	496	6.138E+00	537	1.301E+01	578	1.847E+01
415	2.949E-01	456	8.534E+00	497	6.332E+00	538	1.314E+01	579	1.866E+01
416	3.332E-01	457	8.283E+00	498	6.546E+00	539	1.326E+01	580	1.885E+01
417	3.811E-01	458	7.926E+00	499	6.756E+00	540	1.338E+01	581	1.901E+01
418	4.246E-01	459	7.579E+00	500	6.944E+00	541	1.351E+01	582	1.918E+01
419	4.598E-01	460	7.197E+00	501	7.142E+00	542	1.361E+01	583	1.936E+01
420	4.938E-01	461	6.872E+00	502	7.377E+00	543	1.375E+01	584	1.953E+01

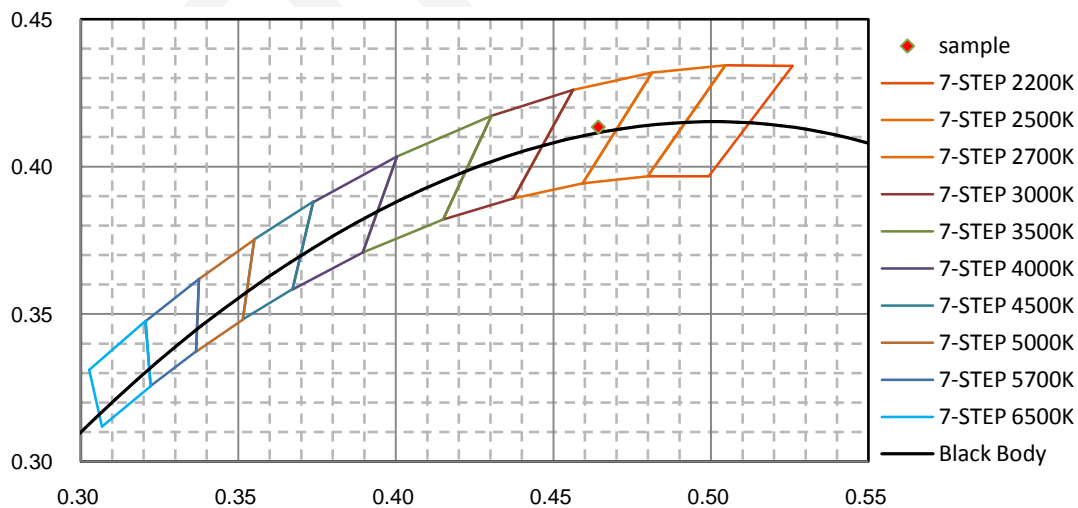


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.970E+01	626	2.582E+01	667	1.872E+01	708	7.849E+00	749	2.564E+00
586	1.994E+01	627	2.584E+01	668	1.840E+01	709	7.658E+00	750	2.478E+00
587	2.009E+01	628	2.579E+01	669	1.813E+01	710	7.454E+00	751	2.418E+00
588	2.031E+01	629	2.582E+01	670	1.784E+01	711	7.288E+00	752	2.333E+00
589	2.045E+01	630	2.576E+01	671	1.754E+01	712	7.059E+00	753	2.274E+00
590	2.068E+01	631	2.575E+01	672	1.725E+01	713	6.941E+00	754	2.228E+00
591	2.088E+01	632	2.565E+01	673	1.695E+01	714	6.739E+00	755	2.145E+00
592	2.107E+01	633	2.566E+01	674	1.664E+01	715	6.571E+00	756	2.087E+00
593	2.131E+01	634	2.553E+01	675	1.638E+01	716	6.395E+00	757	2.031E+00
594	2.150E+01	635	2.546E+01	676	1.606E+01	717	6.239E+00	758	1.962E+00
595	2.169E+01	636	2.540E+01	677	1.579E+01	718	6.061E+00	759	1.907E+00
596	2.189E+01	637	2.528E+01	678	1.551E+01	719	5.924E+00	760	1.865E+00
597	2.207E+01	638	2.518E+01	679	1.518E+01	720	5.765E+00	761	1.804E+00
598	2.224E+01	639	2.506E+01	680	1.492E+01	721	5.600E+00	762	1.754E+00
599	2.244E+01	640	2.494E+01	681	1.461E+01	722	5.474E+00	763	1.703E+00
600	2.264E+01	641	2.480E+01	682	1.432E+01	723	5.309E+00	764	1.645E+00
601	2.285E+01	642	2.467E+01	683	1.408E+01	724	5.170E+00	765	1.613E+00
602	2.304E+01	643	2.446E+01	684	1.377E+01	725	5.044E+00	766	1.549E+00
603	2.325E+01	644	2.436E+01	685	1.348E+01	726	4.888E+00	767	1.519E+00
604	2.339E+01	645	2.422E+01	686	1.321E+01	727	4.772E+00	768	1.471E+00
605	2.360E+01	646	2.394E+01	687	1.290E+01	728	4.643E+00	769	1.424E+00
606	2.376E+01	647	2.375E+01	688	1.265E+01	729	4.509E+00	770	1.389E+00
607	2.395E+01	648	2.356E+01	689	1.237E+01	730	4.387E+00	771	1.345E+00
608	2.408E+01	649	2.334E+01	690	1.210E+01	731	4.262E+00	772	1.311E+00
609	2.426E+01	650	2.320E+01	691	1.185E+01	732	4.143E+00	773	1.280E+00
610	2.438E+01	651	2.294E+01	692	1.164E+01	733	4.021E+00	774	1.226E+00
611	2.452E+01	652	2.267E+01	693	1.132E+01	734	3.916E+00	775	1.186E+00
612	2.466E+01	653	2.246E+01	694	1.102E+01	735	3.814E+00	776	1.167E+00
613	2.478E+01	654	2.225E+01	695	1.081E+01	736	3.714E+00	777	1.132E+00
614	2.495E+01	655	2.199E+01	696	1.054E+01	737	3.619E+00	778	1.094E+00
615	2.511E+01	656	2.177E+01	697	1.030E+01	738	3.512E+00	779	1.097E+00
616	2.522E+01	657	2.146E+01	698	1.010E+01	739	3.398E+00	780	1.099E+00
617	2.533E+01	658	2.122E+01	699	9.824E+00	740	3.284E+00		
618	2.537E+01	659	2.095E+01	700	9.588E+00	741	3.213E+00		
619	2.551E+01	660	2.069E+01	701	9.376E+00	742	3.117E+00		
620	2.556E+01	661	2.043E+01	702	9.130E+00	743	3.021E+00		
621	2.562E+01	662	2.015E+01	703	8.903E+00	744	2.931E+00		
622	2.568E+01	663	1.989E+01	704	8.687E+00	745	2.865E+00		
623	2.572E+01	664	1.958E+01	705	8.457E+00	746	2.793E+00		
624	2.578E+01	665	1.928E+01	706	8.271E+00	747	2.690E+00		
625	2.574E+01	666	1.900E+01	707	8.041E+00	748	2.604E+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**

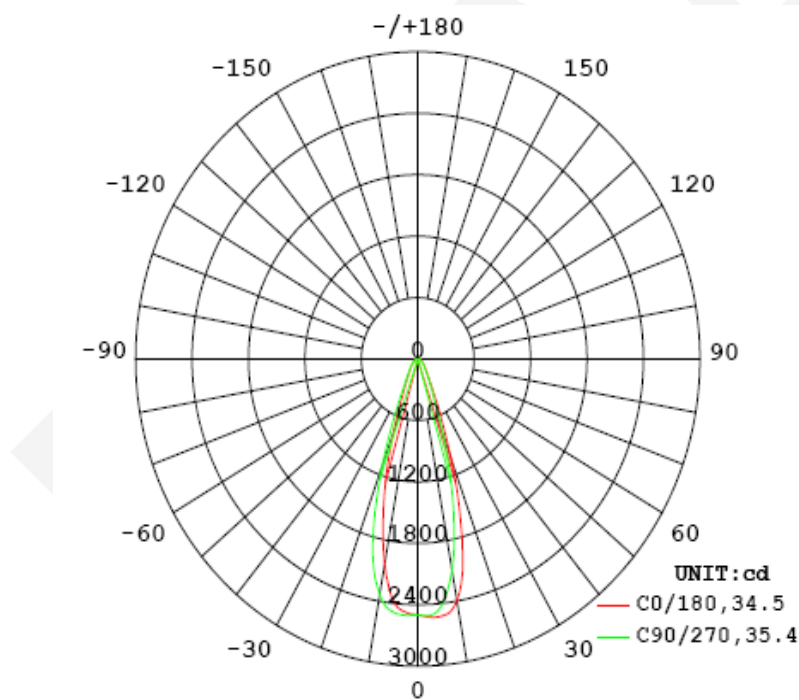
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1109	12.87	0.9670

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
1181.88	91.83	2528	0.52	0.58

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	34.5	33.3	35.4	33.9	34.3
Field Angle (10% I <sub>max</sub> ):	59.6	61.9	60.4	62.0	61.0

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2500	2500	2500	2500	2500	2500	2500	2500
5.0°	2527	2492	2468	2476	2469	2420	2392	2395
10.0°	2397	2211	2125	2110	2096	1986	1927	1942
15.0°	1828	1677	1542	1480	1447	1373	1299	1307
20.0°	1035	923	812	783	773	731	682	688
25.0°	501	474	439	404	386	388	396	371
30.0°	268	268	270	241	230	236	248	230
35.0°	179	178	176	163	158	162	167	160
40.0°	132	129	126	120	118	120	124	121
45.0°	104	101	98	96	95	96	101	99
50.0°	87	83	78	76	75	77	79	78
55.0°	65	64	61	60	59	60	60	60
60.0°	52	51	49	48	47	47	47	48
65.0°	41	40	39	38	37	37	37	38
70.0°	32	31	30	29	28	28	28	28
75.0°	23	23	21	20	20	19	19	20
80.0°	15	15	14	13	12	12	12	12
85.0°	8	7	6	5	4	4	4	4
90.0°	1	1	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 y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	2500	2500	2500	2500	2500	2500	2500	2500
5.0°	2437	2453	2447	2472	2498	2500	2498	2524
10.0°	2035	2043	2074	2168	2338	2330	2295	2361
15.0°	1386	1398	1461	1628	1852	1859	1813	1855
20.0°	755	765	809	950	1117	1110	1031	1082
25.0°	383	400	445	482	529	527	507	511
30.0°	230	242	275	279	283	286	305	288
35.0°	161	167	183	186	187	187	196	189
40.0°	121	124	132	137	137	136	139	137
45.0°	98	98	103	106	106	104	106	105
50.0°	78	80	83	87	86	83	85	85
55.0°	61	63	64	67	67	66	67	66
60.0°	49	50	51	53	53	53	54	53
65.0°	39	40	41	42	42	43	43	43
70.0°	30	31	31	33	33	34	34	34
75.0°	21	22	23	24	25	25	25	25
80.0°	13	14	15	16	17	17	17	17
85.0°	6	7	7	8	9	9	9	9
90.0°	0	0	1	1	2	2	2	2
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	59.5	5.04
5-10	165.9	14.03
10-15	221.2	18.72
15-20	198.3	16.78
20-25	131.7	11.14
25-30	85.9	7.26
30-35	62.7	5.31
35-40	49.8	4.21
40-45	42.0	3.56
45-50	36.7	3.10
50-55	31.1	2.63
55-60	26.0	2.20
60-65	21.9	1.85
65-70	17.9	1.52
70-75	13.8	1.17
75-80	9.7	0.82
80-85	5.7	0.49
85-90	1.9	0.16
90-95	0.2	0.01
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	59.5	5.04
0-10	225.4	19.07
0-15	446.6	37.79
0-20	644.9	54.57
0-25	776.6	65.71
0-30	862.5	72.97
0-35	925.2	78.28
0-40	975.0	82.49
0-45	1017.0	86.05
0-50	1053.6	89.15
0-55	1084.7	91.78
0-60	1110.8	93.98
0-65	1132.6	95.83
0-70	1150.5	97.35
0-75	1164.4	98.52
0-80	1174.1	99.34
0-85	1179.9	99.83
0-90	1181.7	99.99
0-95	1181.9	100.00
0-100	1181.9	100.00
0-105	1181.9	100.00
0-110	1181.9	100.00
0-115	1181.9	100.00
0-120	1181.9	100.00
0-125	1181.9	100.00
0-130	1181.9	100.00
0-135	1181.9	100.00
0-140	1181.9	100.00
0-145	1181.9	100.00
0-150	1181.9	100.00
0-155	1181.9	100.00
0-160	1181.9	100.00
0-165	1181.9	100.00
0-170	1181.9	100.00
0-175	1181.9	100.00
0-180	1181.9	100.00

## 6. Product Photo







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