

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 8PAR20DIM/940FL40**

<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>	R1KS170216013-10A1
<b>Test Date:</b>	2017-03-05 to 2017-03-07
<b>Report Date:</b>	2017-03-24
<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 2017-02-16. One was tested in integrating sphere and the other was tested in goniophotometer

Model Tested: 8PAR20DIM/940FL40  
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 V AC 60Hz  
Rated Power: 8 W  
Nominal CCT: 4000K  
Nominal Lumen Output: 570lm

## 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  $U=1.8\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=20\text{K}$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the CRI is  $U=1.8(K=2)$ , 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**

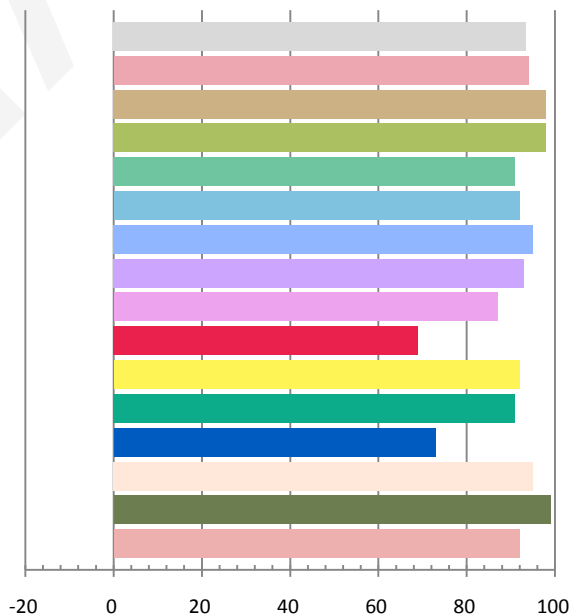
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
119.9	60	0.07034	7.950	0.9422	699.51	87.99

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.4119	3962	0.00022	0.3823	0.3784	0.2257	0.5026

### Color Rendering Index

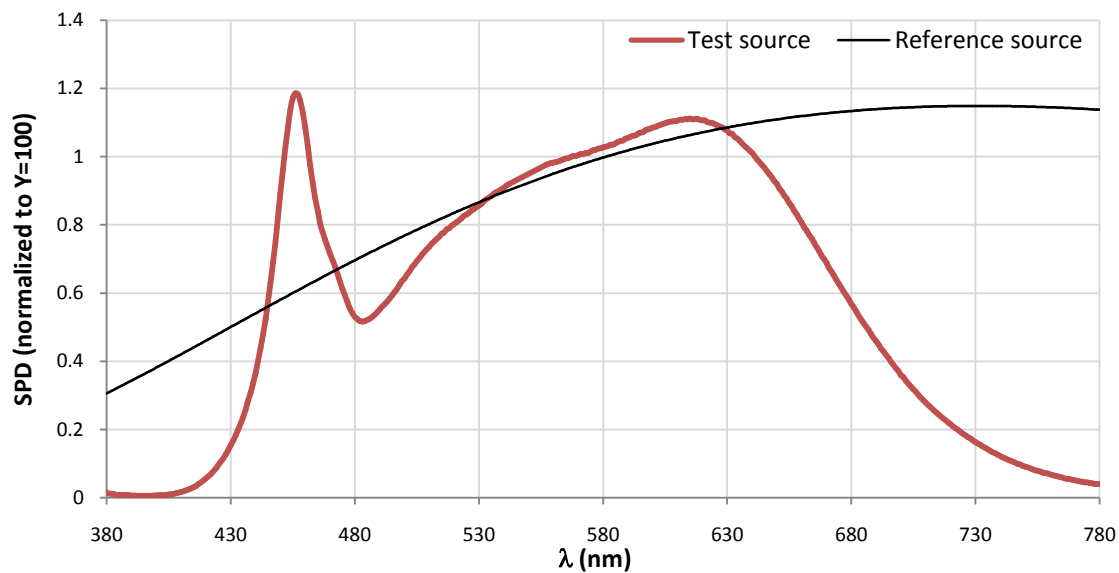
Ra			
93.5			
R1	R2	R3	R4
94	98	98	91
R5	R6	R7	R8
92	95	93	87
R9	R10	R11	R12
69	92	91	73
R13	R14	R15	
95	99	92	



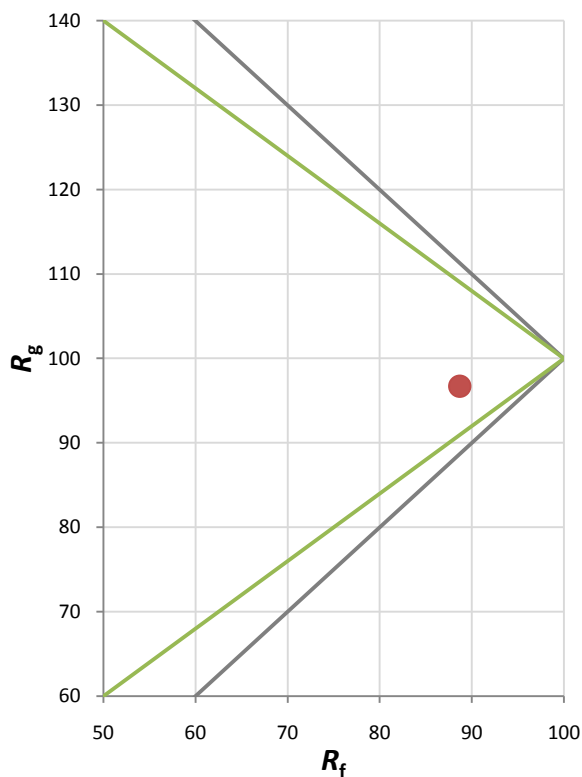
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	89
Gamut Index $R_g$	97

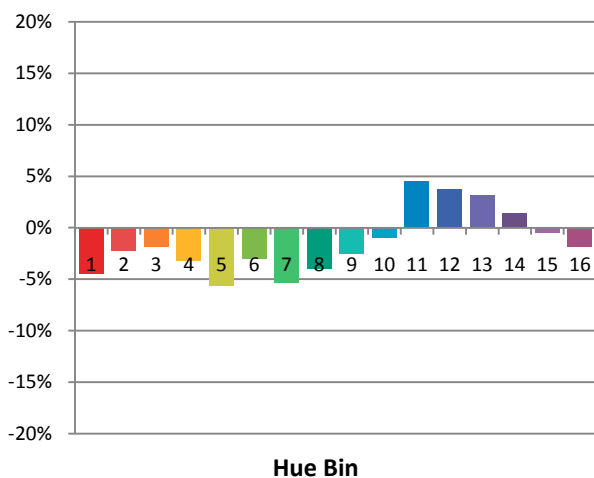
### Spectral Power Distribution Comparison



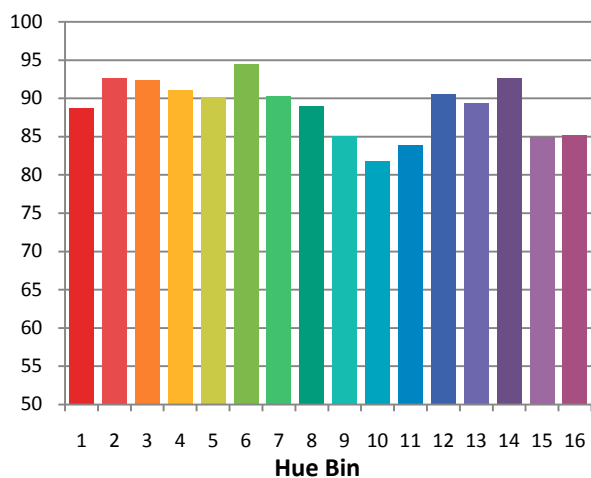
### Plot of $R_g$ versus $R_f$



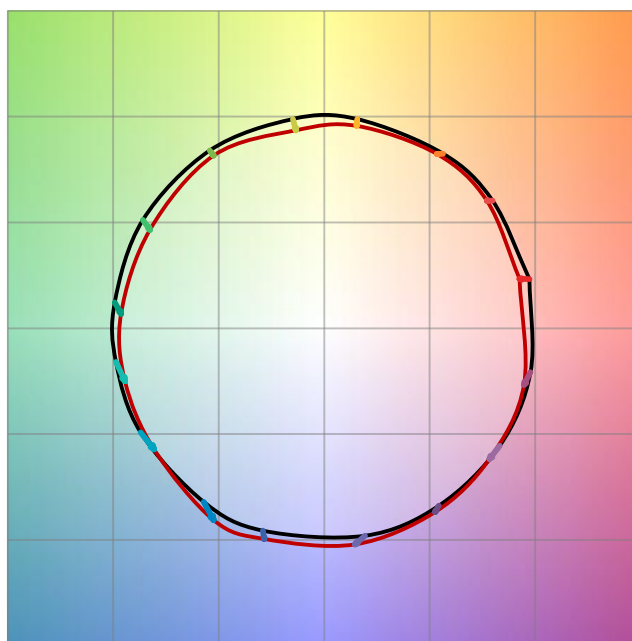
Chroma Shift by Hue



$R_f$  by Hue

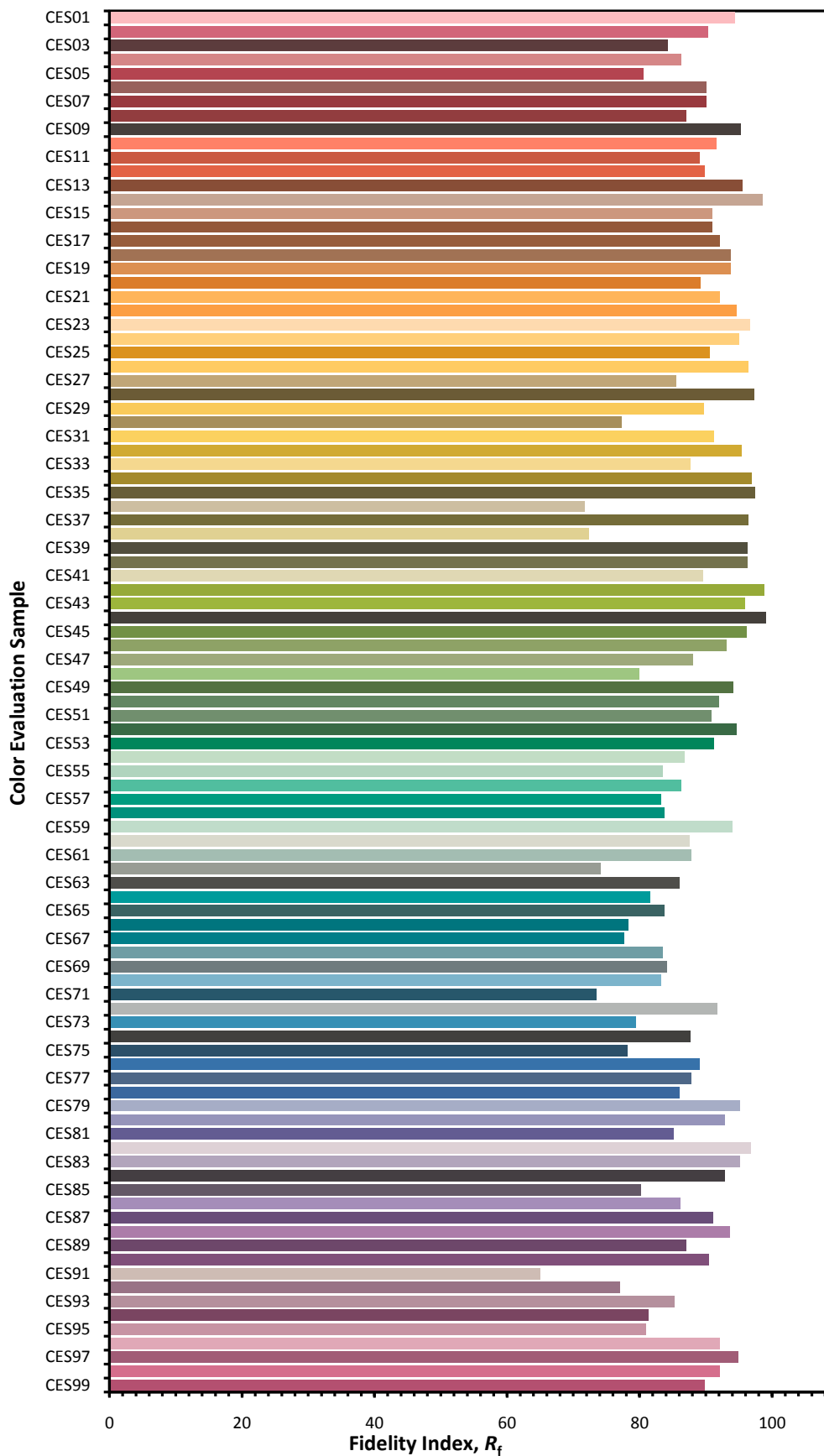


Color Vector Graphic

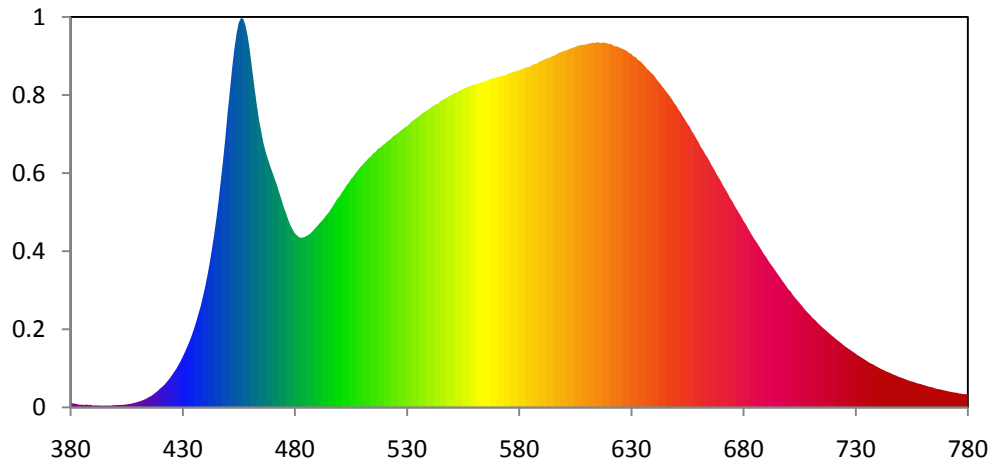


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

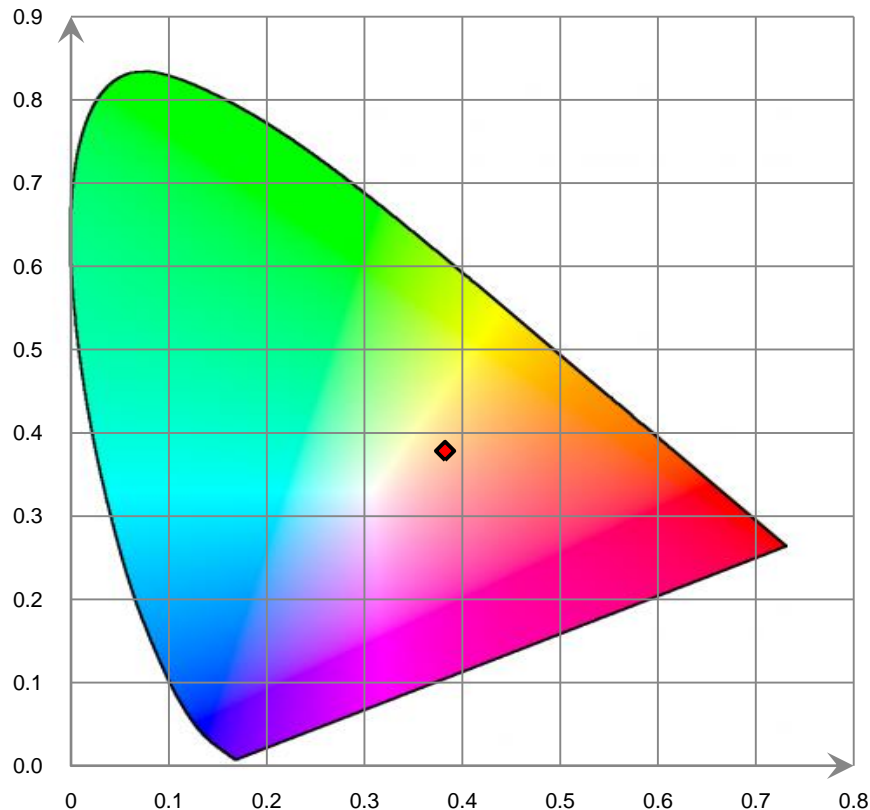


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.486E-01	421	6.469E-01	462	9.987E+00	503	6.916E+00	544	9.475E+00
381	1.202E-01	422	7.150E-01	463	9.463E+00	504	7.003E+00	545	9.553E+00
382	1.169E-01	423	7.987E-01	464	8.979E+00	505	7.113E+00	546	9.595E+00
383	1.025E-01	424	8.834E-01	465	8.616E+00	506	7.193E+00	547	9.624E+00
384	8.143E-02	425	9.794E-01	466	8.244E+00	507	7.290E+00	548	9.667E+00
385	8.659E-02	426	1.083E+00	467	7.971E+00	508	7.382E+00	549	9.717E+00
386	7.325E-02	427	1.181E+00	468	7.746E+00	509	7.470E+00	550	9.745E+00
387	8.697E-02	428	1.309E+00	469	7.526E+00	510	7.545E+00	551	9.798E+00
388	7.506E-02	429	1.430E+00	470	7.334E+00	511	7.626E+00	552	9.810E+00
389	8.032E-02	430	1.573E+00	471	7.138E+00	512	7.698E+00	553	9.862E+00
390	5.635E-02	431	1.723E+00	472	6.936E+00	513	7.773E+00	554	9.895E+00
391	6.237E-02	432	1.884E+00	473	6.705E+00	514	7.837E+00	555	9.921E+00
392	6.122E-02	433	2.049E+00	474	6.497E+00	515	7.922E+00	556	9.961E+00
393	5.701E-02	434	2.230E+00	475	6.260E+00	516	7.966E+00	557	9.989E+00
394	5.510E-02	435	2.435E+00	476	6.069E+00	517	8.061E+00	558	1.002E+01
395	5.345E-02	436	2.663E+00	477	5.865E+00	518	8.093E+00	559	1.005E+01
396	5.822E-02	437	2.906E+00	478	5.689E+00	519	8.162E+00	560	1.006E+01
397	5.481E-02	438	3.148E+00	479	5.544E+00	520	8.210E+00	561	1.008E+01
398	5.755E-02	439	3.442E+00	480	5.430E+00	521	8.277E+00	562	1.010E+01
399	6.434E-02	440	3.753E+00	481	5.361E+00	522	8.326E+00	563	1.013E+01
400	6.925E-02	441	4.100E+00	482	5.301E+00	523	8.389E+00	564	1.016E+01
401	7.188E-02	442	4.485E+00	483	5.289E+00	524	8.461E+00	565	1.018E+01
402	7.651E-02	443	4.910E+00	484	5.299E+00	525	8.500E+00	566	1.019E+01
403	7.722E-02	444	5.359E+00	485	5.338E+00	526	8.556E+00	567	1.023E+01
404	8.375E-02	445	5.870E+00	486	5.374E+00	527	8.617E+00	568	1.026E+01
405	9.096E-02	446	6.435E+00	487	5.427E+00	528	8.669E+00	569	1.026E+01
406	1.033E-01	447	7.063E+00	488	5.497E+00	529	8.728E+00	570	1.029E+01
407	1.161E-01	448	7.697E+00	489	5.575E+00	530	8.769E+00	571	1.032E+01
408	1.333E-01	449	8.386E+00	490	5.651E+00	531	8.830E+00	572	1.032E+01
409	1.499E-01	450	9.149E+00	491	5.736E+00	532	8.904E+00	573	1.035E+01
410	1.718E-01	451	9.839E+00	492	5.809E+00	533	8.960E+00	574	1.035E+01
411	1.900E-01	452	1.054E+01	493	5.893E+00	534	9.009E+00	575	1.040E+01
412	2.163E-01	453	1.114E+01	494	5.986E+00	535	9.058E+00	576	1.043E+01
413	2.462E-01	454	1.164E+01	495	6.068E+00	536	9.123E+00	577	1.044E+01
414	2.806E-01	455	1.200E+01	496	6.173E+00	537	9.171E+00	578	1.048E+01
415	3.209E-01	456	1.214E+01	497	6.273E+00	538	9.216E+00	579	1.049E+01
416	3.550E-01	457	1.212E+01	498	6.395E+00	539	9.264E+00	580	1.052E+01
417	4.090E-01	458	1.191E+01	499	6.506E+00	540	9.304E+00	581	1.054E+01
418	4.622E-01	459	1.157E+01	500	6.581E+00	541	9.364E+00	582	1.056E+01
419	5.178E-01	460	1.110E+01	501	6.709E+00	542	9.414E+00	583	1.060E+01
420	5.892E-01	461	1.054E+01	502	6.798E+00	543	9.452E+00	584	1.060E+01

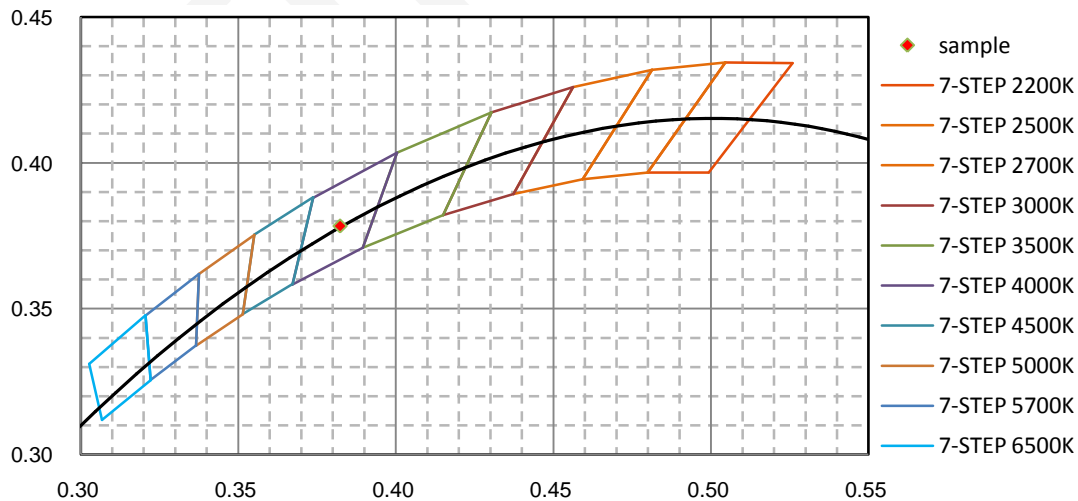


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.064E+01	626	1.118E+01	667	7.417E+00	708	3.003E+00	749	9.610E-01
586	1.068E+01	627	1.115E+01	668	7.275E+00	709	2.930E+00	750	9.344E-01
587	1.071E+01	628	1.112E+01	669	7.163E+00	710	2.857E+00	751	9.117E-01
588	1.072E+01	629	1.106E+01	670	7.048E+00	711	2.775E+00	752	8.843E-01
589	1.078E+01	630	1.102E+01	671	6.907E+00	712	2.719E+00	753	8.529E-01
590	1.080E+01	631	1.094E+01	672	6.793E+00	713	2.639E+00	754	8.289E-01
591	1.084E+01	632	1.092E+01	673	6.672E+00	714	2.573E+00	755	8.084E-01
592	1.087E+01	633	1.083E+01	674	6.534E+00	715	2.506E+00	756	7.892E-01
593	1.088E+01	634	1.079E+01	675	6.429E+00	716	2.446E+00	757	7.626E-01
594	1.092E+01	635	1.072E+01	676	6.298E+00	717	2.385E+00	758	7.396E-01
595	1.096E+01	636	1.064E+01	677	6.178E+00	718	2.323E+00	759	7.298E-01
596	1.097E+01	637	1.056E+01	678	6.062E+00	719	2.262E+00	760	7.015E-01
597	1.103E+01	638	1.050E+01	679	5.953E+00	720	2.206E+00	761	6.841E-01
598	1.106E+01	639	1.042E+01	680	5.818E+00	721	2.145E+00	762	6.589E-01
599	1.108E+01	640	1.036E+01	681	5.714E+00	722	2.088E+00	763	6.413E-01
600	1.112E+01	641	1.026E+01	682	5.585E+00	723	2.037E+00	764	6.280E-01
601	1.113E+01	642	1.017E+01	683	5.468E+00	724	1.978E+00	765	6.055E-01
602	1.116E+01	643	1.008E+01	684	5.347E+00	725	1.920E+00	766	5.799E-01
603	1.119E+01	644	9.988E+00	685	5.237E+00	726	1.872E+00	767	5.689E-01
604	1.122E+01	645	9.902E+00	686	5.134E+00	727	1.819E+00	768	5.555E-01
605	1.124E+01	646	9.809E+00	687	5.026E+00	728	1.774E+00	769	5.386E-01
606	1.127E+01	647	9.716E+00	688	4.911E+00	729	1.724E+00	770	5.236E-01
607	1.129E+01	648	9.621E+00	689	4.793E+00	730	1.674E+00	771	5.053E-01
608	1.130E+01	649	9.505E+00	690	4.698E+00	731	1.622E+00	772	4.893E-01
609	1.131E+01	650	9.414E+00	691	4.588E+00	732	1.582E+00	773	4.760E-01
610	1.132E+01	651	9.293E+00	692	4.478E+00	733	1.535E+00	774	4.635E-01
611	1.135E+01	652	9.195E+00	693	4.387E+00	734	1.495E+00	775	4.560E-01
612	1.135E+01	653	9.071E+00	694	4.286E+00	735	1.447E+00	776	4.383E-01
613	1.137E+01	654	8.969E+00	695	4.185E+00	736	1.399E+00	777	4.271E-01
614	1.136E+01	655	8.847E+00	696	4.084E+00	737	1.362E+00	778	4.122E-01
615	1.139E+01	656	8.756E+00	697	3.985E+00	738	1.331E+00	779	4.126E-01
616	1.136E+01	657	8.613E+00	698	3.886E+00	739	1.287E+00	780	4.134E-01
617	1.137E+01	658	8.507E+00	699	3.792E+00	740	1.251E+00		
618	1.138E+01	659	8.380E+00	700	3.683E+00	741	1.212E+00		
619	1.135E+01	660	8.263E+00	701	3.617E+00	742	1.177E+00		
620	1.133E+01	661	8.122E+00	702	3.509E+00	743	1.146E+00		
621	1.133E+01	662	8.016E+00	703	3.418E+00	744	1.112E+00		
622	1.128E+01	663	7.893E+00	704	3.339E+00	745	1.086E+00		
623	1.126E+01	664	7.790E+00	705	3.256E+00	746	1.054E+00		
624	1.125E+01	665	7.662E+00	706	3.176E+00	747	1.017E+00		
625	1.121E+01	666	7.522E+00	707	3.086E+00	748	9.959E-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: **Base up**

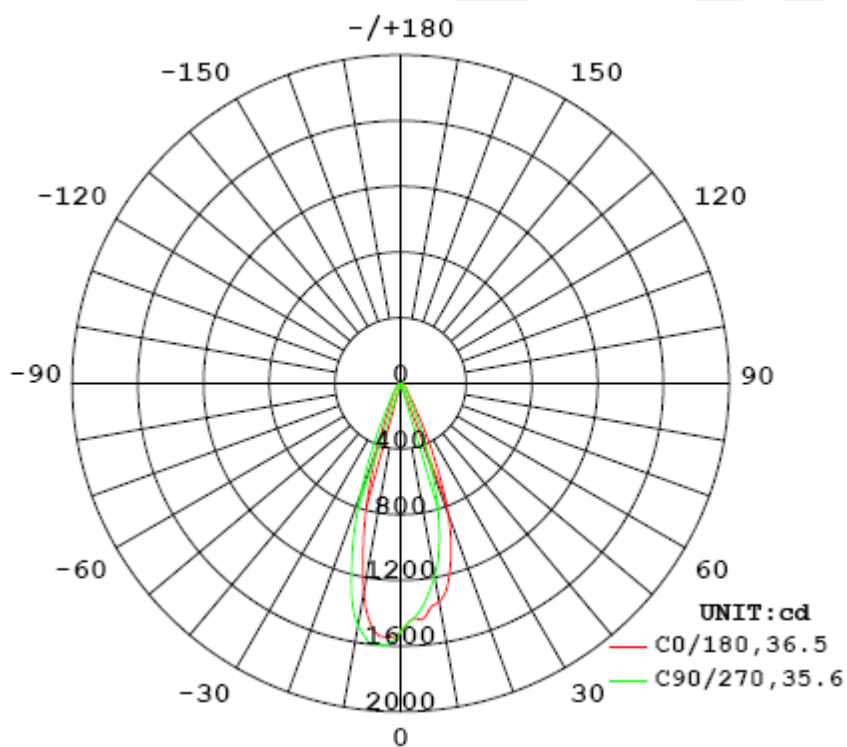
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.0710	8.029	0.9418

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
701.272	87.34	1607	0.23	0.22

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	36.5	35.7	35.6	36.7	36.1
Field Angle (10% I <sub>max</sub> ):	57.5	57.2	57.1	57.3	57.3

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1512	1512	1512	1512	1512	1512	1512	1512
5.0°	1542	1576	1604	1603	1599	1568	1536	1499
10.0°	1298	1352	1436	1460	1498	1534	1524	1451
15.0°	830	901	984	1069	1158	1237	1276	1228
20.0°	401	464	542	609	716	798	849	841
25.0°	176	197	231	270	333	372	415	444
30.0°	97	107	121	136	152	164	181	186
35.0°	71	74	83	90	95	94	98	97
40.0°	51	54	59	63	67	68	69	68
45.0°	39	41	44	46	49	50	53	53
50.0°	30	32	34	35	37	38	40	41
55.0°	24	25	26	27	28	29	31	32
60.0°	18	19	20	21	22	23	24	25
65.0°	14	15	15	16	17	17	19	19
70.0°	9	10	11	11	12	13	14	14
75.0°	6	6	7	8	8	9	9	10
80.0°	3	3	4	4	5	5	6	6
85.0°	1	1	1	2	2	3	3	3
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

**Luminous Intensity (cd) Distribution Data (cont.)**

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1512	1512	1512	1512	1512	1512	1512	1512
5.0°	1444	1404	1369	1357	1384	1409	1466	1516
10.0°	1351	1252	1201	1190	1191	1211	1245	1281
15.0°	1164	1090	1013	954	908	869	852	855
20.0°	847	802	712	622	546	481	445	429
25.0°	444	414	354	282	244	198	180	177
30.0°	195	178	155	130	109	98	93	94
35.0°	99	92	81	76	69	67	68	69
40.0°	68	66	62	59	55	53	51	51
45.0°	54	52	50	47	44	43	40	39
50.0°	41	40	38	37	35	33	31	31
55.0°	32	31	30	29	28	26	24	24
60.0°	25	24	24	23	22	21	19	18
65.0°	19	19	18	17	16	15	14	14
70.0°	14	14	13	12	12	11	10	9
75.0°	10	9	9	8	8	7	6	6
80.0°	6	6	5	5	4	4	3	3
85.0°	3	3	3	2	2	1	1	1
90.0°	1	1	1	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

**Zonal Lumen Density Measurement**

Deg	Flux (lm)	%
0-5	35.9	5.11
5-10	101.6	14.49
10-15	140.8	20.08
15-20	135.4	19.31
20-25	93.5	13.33
25-30	51.1	7.30
30-35	30.9	4.40
35-40	23.4	3.34
40-45	19.6	2.80
45-50	16.5	2.36
50-55	13.8	1.96
55-60	11.4	1.63
60-65	9.3	1.32
65-70	7.1	1.02
70-75	5.1	0.73
75-80	3.3	0.47
80-85	1.8	0.25
85-90	0.6	0.09
90-95	0.1	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	35.9	5.11
0-10	137.5	19.60
0-15	278.3	39.68
0-20	413.7	58.99
0-25	507.2	72.32
0-30	558.3	79.62
0-35	589.2	84.02
0-40	612.6	87.36
0-45	632.3	90.16
0-50	648.8	92.52
0-55	662.6	94.48
0-60	674.0	96.11
0-65	683.2	97.43
0-70	690.4	98.45
0-75	695.5	99.18
0-80	698.8	99.65
0-85	700.6	99.90
0-90	701.2	99.99
0-95	701.3	100.00
0-100	701.3	100.00
0-105	701.3	100.00
0-110	701.3	100.00
0-115	701.3	100.00
0-120	701.3	100.00
0-125	701.3	100.00
0-130	701.3	100.00
0-135	701.3	100.00
0-140	701.3	100.00
0-145	701.3	100.00
0-150	701.3	100.00
0-155	701.3	100.00
0-160	701.3	100.00
0-165	701.3	100.00
0-170	701.3	100.00
0-175	701.3	100.00
0-180	701.3	100.00

## 6. Product Photo



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