



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 6.5R20DIM/8CCTD**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Carl Du <i>Carl Du</i>
<b>Report Number:</b>	RKS161206002-10
<b>Test Date:</b>	2016-12-10
<b>Report Date:</b>	2016-12-12
<b>Reviewed By:</b>	Blake Zhang <i>Blake Zhang</i>
<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.

**Note:** The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

## 1. Product Description

### General Information:

One sample was received on 2016-12-06 and used for testing.

Model Tested: 6.5R20DIM/8CCTD  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED R20  
 Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120 VAC 60Hz  
 Rated Power: 6.5W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 500 lm  
 Nominal CRI: 80

## 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
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  $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$  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  $U=2.3\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=23\text{K}$  ( $K=2$ ), 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 ( $\gamma$ ) 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: **0.5hour**

Test orientation: **Downward**

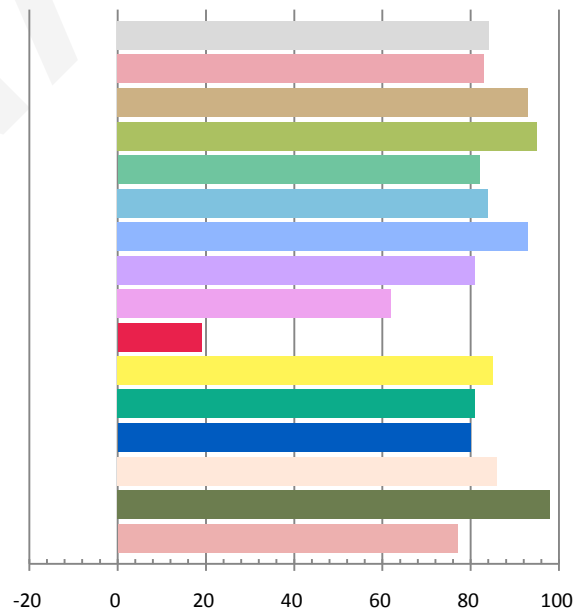
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0582	6.43	0.9206	520.2	80.92

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.678	2724	-0.00270	0.4534	0.4019	0.2622	0.5230

### Color Rendering Index

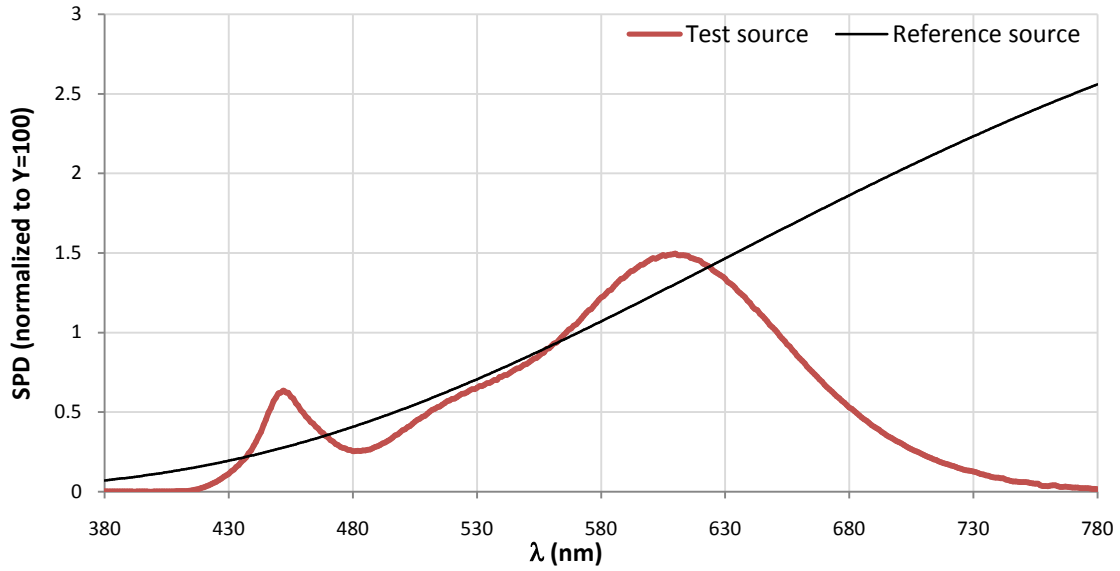
Ra			
<b>84.2</b>			
R1	R2	R3	R4
83	93	95	82
R5	R6	R7	R8
84	93	81	62
R9	R10	R11	R12
19	85	81	80
R13	R14	R15	
86	98	77	



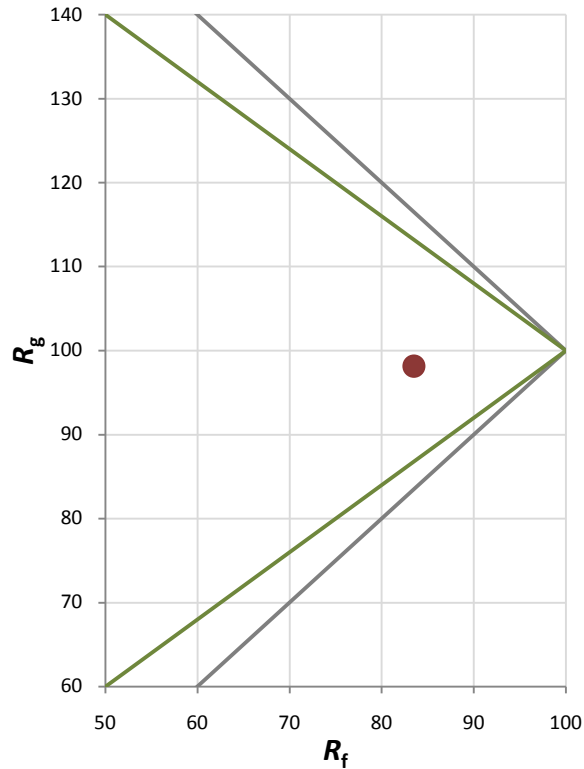
Fidelity Index and Gamut Index

Fidelity Index $R_f$	83
Gamut Index $R_g$	98

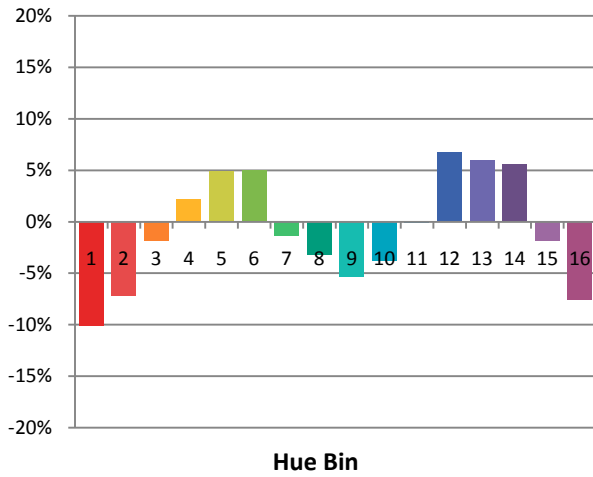
Spectral Power Distribution Comparison



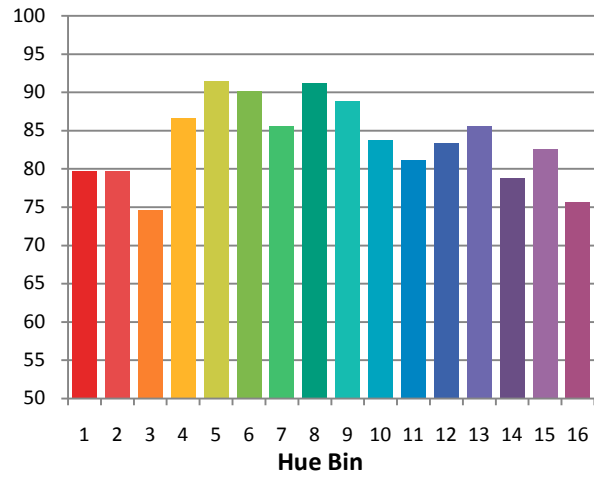
Plot of  $R_g$  versus  $R_f$



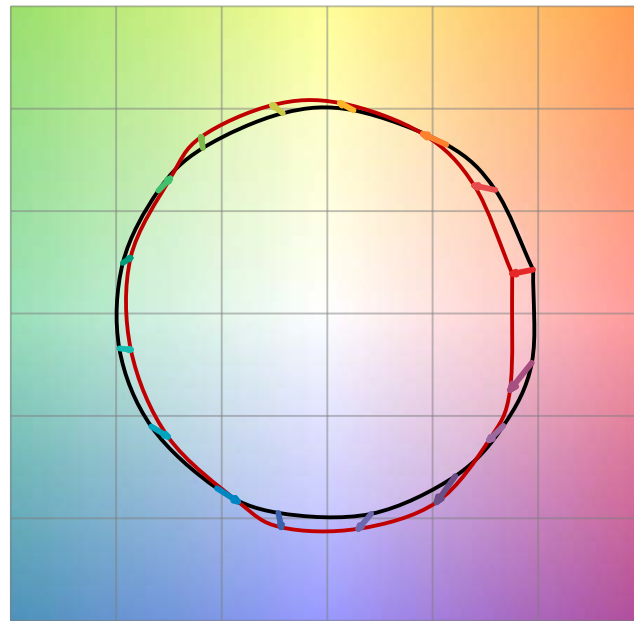
Chroma Shift by Hue



$R_f$  by Hue

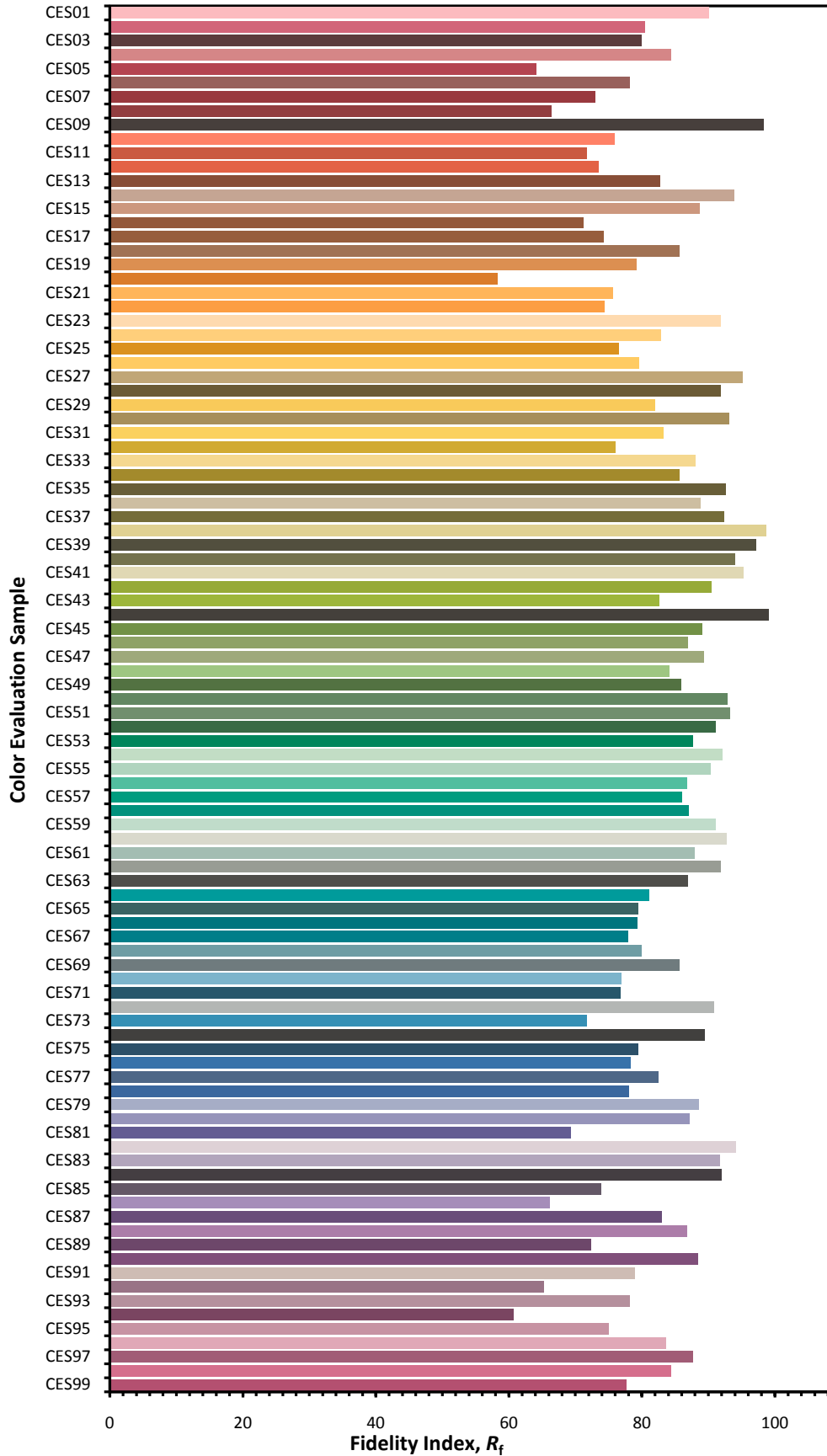


Color Vector Graphic

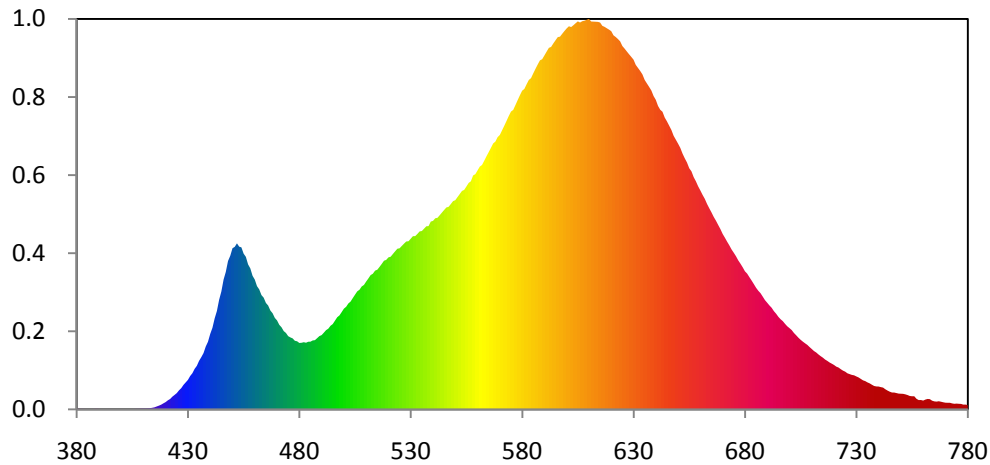


— Reference Illuminat    — Test Source

**Color Fidelity by CES Sample**



**Relative Spectral Power Distribution**

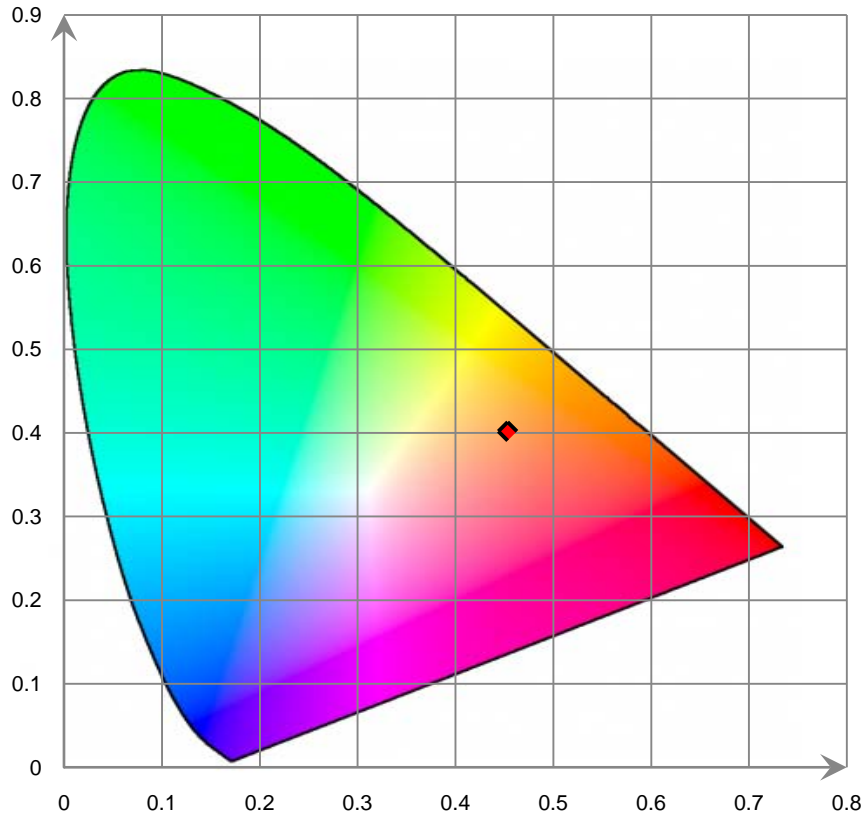


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.260E-02	421	2.641E-01	462	3.500E+00	503	3.144E+00	544	5.741E+00
381	1.740E-02	422	3.031E-01	463	3.334E+00	504	3.248E+00	545	5.817E+00
382	1.370E-02	423	3.701E-01	464	3.259E+00	505	3.346E+00	546	5.890E+00
383	1.360E-02	424	4.215E-01	465	3.105E+00	506	3.443E+00	547	5.909E+00
384	1.270E-02	425	4.746E-01	466	3.029E+00	507	3.490E+00	548	5.990E+00
385	9.500E-03	426	5.553E-01	467	2.884E+00	508	3.585E+00	549	6.075E+00
386	9.200E-03	427	6.191E-01	468	2.804E+00	509	3.630E+00	550	6.103E+00
387	1.170E-02	428	7.146E-01	469	2.669E+00	510	3.729E+00	551	6.193E+00
388	1.380E-02	429	7.872E-01	470	2.594E+00	511	3.820E+00	552	6.281E+00
389	1.670E-02	430	8.599E-01	471	2.468E+00	512	3.916E+00	553	6.372E+00
390	1.410E-02	431	9.723E-01	472	2.396E+00	513	3.957E+00	554	6.402E+00
391	8.200E-03	432	1.055E+00	473	2.283E+00	514	4.047E+00	555	6.502E+00
392	6.300E-03	433	1.181E+00	474	2.229E+00	515	4.074E+00	556	6.605E+00
393	7.600E-03	434	1.270E+00	475	2.136E+00	516	4.156E+00	557	6.654E+00
394	1.090E-02	435	1.416E+00	476	2.099E+00	517	4.244E+00	558	6.824E+00
395	1.210E-02	436	1.523E+00	477	2.070E+00	518	4.337E+00	559	6.862E+00
396	9.900E-03	437	1.642E+00	478	2.002E+00	519	4.361E+00	560	6.972E+00
397	6.800E-03	438	1.834E+00	479	1.986E+00	520	4.434E+00	561	7.083E+00
398	5.200E-03	439	1.973E+00	480	1.938E+00	521	4.453E+00	562	7.130E+00
399	2.300E-03	440	2.199E+00	481	1.943E+00	522	4.533E+00	563	7.254E+00
400	8.400E-03	441	2.380E+00	482	1.959E+00	523	4.610E+00	564	7.383E+00
401	9.600E-03	442	2.654E+00	483	1.944E+00	524	4.686E+00	565	7.505E+00
402	9.600E-03	443	2.870E+00	484	1.973E+00	525	4.699E+00	566	7.629E+00
403	9.000E-03	444	3.196E+00	485	1.975E+00	526	4.767E+00	567	7.757E+00
404	9.200E-03	445	3.439E+00	486	2.010E+00	527	4.835E+00	568	7.812E+00
405	1.020E-02	446	3.786E+00	487	2.020E+00	528	4.898E+00	569	7.941E+00
406	1.290E-02	447	4.011E+00	488	2.078E+00	529	4.904E+00	570	8.006E+00
407	1.540E-02	448	4.330E+00	489	2.138E+00	530	4.979E+00	571	8.140E+00
408	1.540E-02	449	4.481E+00	490	2.167E+00	531	5.053E+00	572	8.275E+00
409	2.250E-02	450	4.701E+00	491	2.237E+00	532	5.054E+00	573	8.415E+00
410	2.390E-02	451	4.741E+00	492	2.311E+00	533	5.119E+00	574	8.557E+00
411	2.280E-02	452	4.843E+00	493	2.354E+00	534	5.192E+00	575	8.688E+00
412	2.780E-02	453	4.747E+00	494	2.439E+00	535	5.203E+00	576	8.736E+00
413	3.530E-02	454	4.725E+00	495	2.489E+00	536	5.272E+00	577	8.878E+00
414	4.610E-02	455	4.542E+00	496	2.588E+00	537	5.341E+00	578	9.022E+00
415	6.090E-02	456	4.450E+00	497	2.687E+00	538	5.347E+00	579	9.163E+00
416	8.500E-02	457	4.229E+00	498	2.740E+00	539	5.479E+00	580	9.295E+00
417	1.091E-01	458	4.113E+00	499	2.837E+00	540	5.498E+00	581	9.347E+00
418	1.375E-01	459	3.897E+00	500	2.938E+00	541	5.574E+00	582	9.482E+00
419	1.764E-01	460	3.788E+00	501	2.992E+00	542	5.587E+00	583	9.608E+00
420	2.131E-01	461	3.595E+00	502	3.089E+00	543	5.663E+00	584	9.664E+00

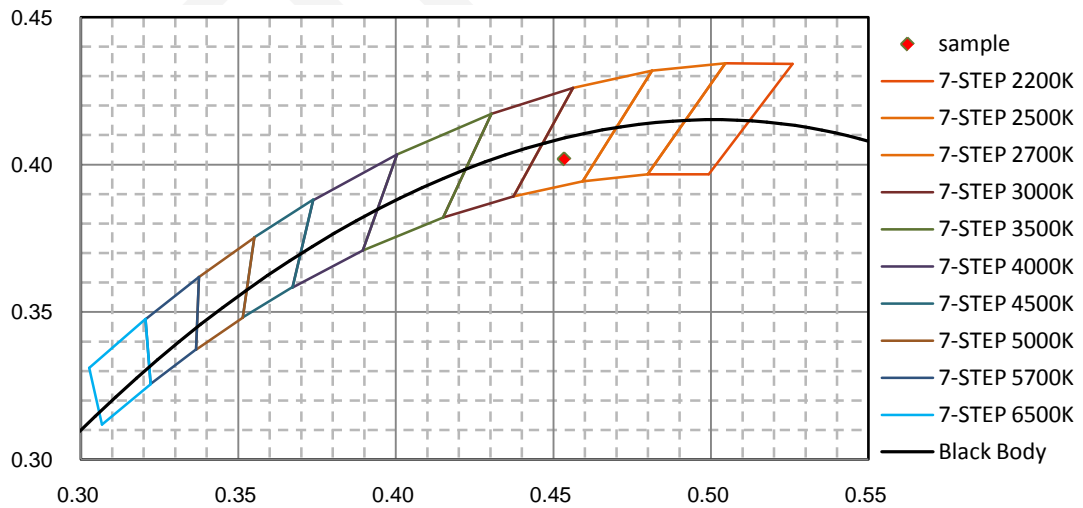


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	9.802E+00	626	1.052E+01	667	5.504E+00	708	1.882E+00	749	4.599E-01
586	9.935E+00	627	1.044E+01	668	5.379E+00	709	1.819E+00	750	4.573E-01
587	1.006E+01	628	1.036E+01	669	5.259E+00	710	1.761E+00	751	4.530E-01
588	1.018E+01	629	1.028E+01	670	5.119E+00	711	1.702E+00	752	4.381E-01
589	1.021E+01	630	1.020E+01	671	5.009E+00	712	1.660E+00	753	4.181E-01
590	1.033E+01	631	1.005E+01	672	4.893E+00	713	1.603E+00	754	3.906E-01
591	1.044E+01	632	9.961E+00	673	4.785E+00	714	1.552E+00	755	3.824E-01
592	1.055E+01	633	9.871E+00	674	4.665E+00	715	1.508E+00	756	3.831E-01
593	1.057E+01	634	9.772E+00	675	4.568E+00	716	1.454E+00	757	3.087E-01
594	1.068E+01	635	9.611E+00	676	4.466E+00	717	1.414E+00	758	2.713E-01
595	1.077E+01	636	9.508E+00	677	4.346E+00	718	1.368E+00	759	2.729E-01
596	1.086E+01	637	9.407E+00	678	4.250E+00	719	1.333E+00	760	2.557E-01
597	1.087E+01	638	9.303E+00	679	4.145E+00	720	1.295E+00	761	2.853E-01
598	1.096E+01	639	9.141E+00	680	4.029E+00	721	1.247E+00	762	3.044E-01
599	1.104E+01	640	9.028E+00	681	3.960E+00	722	1.221E+00	763	2.985E-01
600	1.111E+01	641	8.851E+00	682	3.858E+00	723	1.173E+00	764	2.537E-01
601	1.118E+01	642	8.740E+00	683	3.758E+00	724	1.131E+00	765	2.330E-01
602	1.115E+01	643	8.681E+00	684	3.655E+00	725	1.100E+00	766	2.268E-01
603	1.121E+01	644	8.513E+00	685	3.548E+00	726	1.053E+00	767	2.365E-01
604	1.126E+01	645	8.402E+00	686	3.461E+00	727	1.028E+00	768	2.230E-01
605	1.132E+01	646	8.276E+00	687	3.389E+00	728	1.006E+00	769	2.072E-01
606	1.128E+01	647	8.149E+00	688	3.290E+00	729	9.935E-01	770	1.949E-01
607	1.132E+01	648	7.981E+00	689	3.187E+00	730	9.613E-01	771	1.923E-01
608	1.134E+01	649	7.866E+00	690	3.110E+00	731	9.313E-01	772	1.919E-01
609	1.136E+01	650	7.750E+00	691	3.032E+00	732	8.897E-01	773	1.739E-01
610	1.139E+01	651	7.628E+00	692	2.963E+00	733	8.479E-01	774	1.633E-01
611	1.131E+01	652	7.460E+00	693	2.866E+00	734	8.247E-01	775	1.684E-01
612	1.131E+01	653	7.323E+00	694	2.791E+00	735	7.872E-01	776	1.634E-01
613	1.131E+01	654	7.200E+00	695	2.701E+00	736	7.591E-01	777	1.590E-01
614	1.130E+01	655	7.035E+00	696	2.630E+00	737	7.183E-01	778	1.390E-01
615	1.128E+01	656	6.943E+00	697	2.575E+00	738	6.820E-01	779	1.401E-01
616	1.119E+01	657	6.775E+00	698	2.495E+00	739	6.687E-01	780	1.253E-01
617	1.116E+01	658	6.653E+00	699	2.423E+00	740	6.667E-01		
618	1.112E+01	659	6.507E+00	700	2.370E+00	741	6.492E-01		
619	1.108E+01	660	6.386E+00	701	2.313E+00	742	6.358E-01		
620	1.103E+01	661	6.257E+00	702	2.229E+00	743	5.873E-01		
621	1.091E+01	662	6.141E+00	703	2.162E+00	744	5.486E-01		
622	1.086E+01	663	5.992E+00	704	2.091E+00	745	5.156E-01		
623	1.080E+01	664	5.866E+00	705	2.030E+00	746	4.915E-01		
624	1.073E+01	665	5.745E+00	706	1.976E+00	747	4.905E-01		
625	1.060E+01	666	5.614E+00	707	1.927E+00	748	4.761E-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**

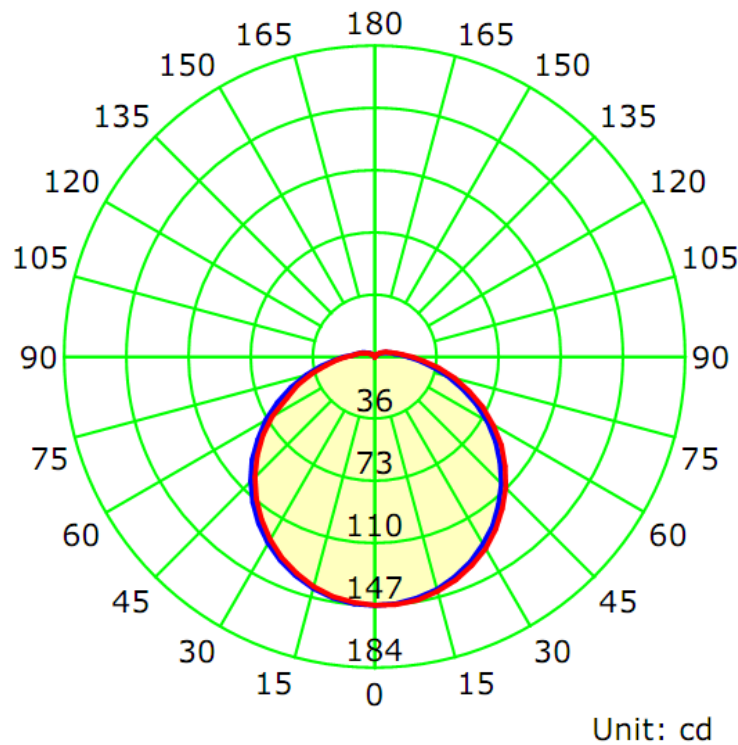
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0580	6.52	0.9300

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
526.5	80.75	146.4	1.29	1.29

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	122.1	122.4	122.2	121.9	122.2
Field Angle (10% I <sub>max</sub> ):	190.5	192.5	191.3	189.8	191.0

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	146	146	146	146	146	146	146	146
5.0°	146	146	146	146	146	146	146	146
10.0°	144	145	145	145	145	145	145	145
15.0°	142	142	143	143	143	143	142	142
20.0°	138	139	139	140	140	140	139	138
25.0°	133	134	135	135	135	135	135	134
30.0°	128	129	130	130	130	130	129	128
35.0°	121	122	123	124	124	124	123	122
40.0°	114	115	116	117	117	116	115	114
45.0°	105	107	108	109	109	108	107	106
50.0°	97	98	100	100	100	100	98	97
55.0°	87	89	90	91	91	90	89	87
60.0°	77	79	80	81	81	80	79	77
65.0°	66	68	70	70	70	69	68	66
70.0°	55	57	59	60	59	58	57	55
75.0°	44	46	48	49	49	48	46	45
80.0°	35	37	38	39	38	37	36	35
85.0°	27	28	29	30	30	29	27	26
90.0°	20	21	22	23	22	22	21	20
95.0°	15	16	17	17	17	16	16	15
100.0°	12	13	13	13	13	13	12	12
105.0°	10	10	11	11	11	10	10	10
110.0°	8	9	9	9	9	8	8	8
115.0°	7	7	7	7	7	7	7	7
120.0°	5	6	6	6	6	6	5	5
125.0°	4	4	5	5	5	4	4	4
130.0°	3	3	4	4	4	3	3	3
135.0°	2	3	3	3	3	3	2	2
140.0°	2	2	2	2	2	2	2	2
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	0	0	1	1	1	1	1	1
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°	146	146	146	146	146	146	146	146
5.0°	146	146	145	145	145	145	145	146
10.0°	144	144	143	143	143	143	143	144
15.0°	141	141	140	140	140	140	140	141
20.0°	137	137	136	136	136	136	136	137
25.0°	132	132	131	130	130	131	131	132
30.0°	126	125	125	124	124	124	125	126
35.0°	120	119	118	117	117	117	118	119
40.0°	112	111	110	109	109	109	110	112
45.0°	104	103	101	100	100	101	101	103
50.0°	94	93	92	91	91	91	92	94
55.0°	85	83	82	81	81	81	82	84
60.0°	74	73	71	71	70	71	72	74
65.0°	64	61	56	60	57	58	61	63
70.0°	53	51	50	49	49	49	50	52
75.0°	42	41	40	39	39	39	40	41
80.0°	33	32	31	30	30	30	31	32
85.0°	25	24	24	23	23	23	23	24
90.0°	19	18	18	18	17	17	17	18
95.0°	14	14	14	14	14	13	14	14
100.0°	12	12	12	11	11	11	11	11
105.0°	10	10	10	9	9	9	9	9
110.0°	8	8	8	8	7	7	7	8
115.0°	6	6	6	6	6	6	6	6
120.0°	5	5	5	5	5	5	5	5
125.0°	4	4	4	4	4	4	4	4
130.0°	3	3	3	3	3	3	3	3
135.0°	2	2	2	2	2	2	2	2
140.0°	2	2	2	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
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)	%	Deg	Flux (lm)	%
0-5	3.5	0.66	0-5	3.5	0.66
5-10	10.4	1.97	0-10	13.9	2.63
10-15	16.9	3.22	0-15	30.8	5.85
15-20	23.0	4.37	0-20	53.8	10.22
20-25	28.4	5.39	0-25	82.1	15.60
25-30	32.9	6.25	0-30	115.0	21.85
30-35	36.4	6.92	0-35	151.5	28.77
35-40	38.9	7.39	0-40	190.4	36.16
40-45	40.3	7.65	0-45	230.7	43.81
45-50	40.4	7.68	0-50	271.1	51.49
50-55	39.4	7.49	0-55	310.5	58.97
55-60	37.3	7.08	0-60	347.8	66.05
60-65	33.9	6.45	0-65	381.7	72.50
65-70	29.9	5.68	0-70	411.6	78.17
70-75	25.4	4.83	0-75	437.0	83.00
75-80	20.7	3.92	0-80	457.7	86.92
80-85	16.2	3.08	0-85	473.9	90.00
85-90	12.4	2.36	0-90	486.3	92.36
90-95	9.5	1.80	0-95	495.8	94.16
95-100	7.3	1.39	0-100	503.1	95.55
100-105	5.8	1.10	0-105	508.9	96.65
105-110	4.6	0.88	0-110	513.5	97.53
110-115	3.7	0.70	0-115	517.2	98.23
115-120	2.9	0.54	0-120	520.1	98.77
120-125	2.1	0.41	0-125	522.2	99.18
125-130	1.6	0.30	0-130	523.7	99.47
130-135	1.1	0.21	0-135	524.8	99.68
135-140	0.7	0.14	0-140	525.5	99.82
140-145	0.4	0.08	0-145	526.0	99.90
145-150	0.3	0.05	0-150	526.3	99.95
150-155	0.1	0.03	0-155	526.4	99.98
155-160	0.1	0.01	0-160	526.5	99.99
160-165	0.0	0.01	0-165	526.5	100.00
165-170	0.0	0.00	0-170	526.5	100.00
170-175	0.0	0.00	0-175	526.5	100.00
175-180	0.0	0.00	0-180	526.5	100.00

## 6. Product Photo



## 7. Product Test orientation in the Goniophotometer



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