

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 8T5HE/2F/830/DIR

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RKS161013001-10
Test Date:	2016-10-15 to 2016-10-17
Report Date:	2016-10-18
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:

Two samples were received on 2016-10-13 and used for testing with ballast, and only sample #1 was used for Photometric testing.

Model Tested: 8T5HE/2F/830/DIR
Manufacturer: GREEN CREATIVE LTD
Brand Name: GREEN CREATIVE
Product Designation: Integral LED Lamp
Burning Time Before Test: 0hour(For New Products)
Ballast: ICN-2S28-N

Rated Values:

Rated Voltage/Frequency: 120 VAC 60Hz
Rated Power: 8W
Nominal CCT: 3000K
Nominal Lumen Output: 950 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	SPR-600	S09008	25~50°C	2016-03-10	2017-03-09
Spectral photometer	SENSING	SPR3000	90902027	350nm~800nm	2016-03-10	2017-03-09
Power Meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2016-03-04	2017-03-03
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50HZ	2016-03-04	2017-03-03
Standard Light Source	EVERFINE	D204	01331191	24V/100W	2016-08-27	2017-08-26
Thermal Meter	SENSING	N/A	N/A	25、50°C	2016-03-10	2017-03-09
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	EVERFINE	D908	1012003	N/A	2016-09-08	2017-09-07

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Source						

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.

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 $U=32\text{K}$ ($K=2$), 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 (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**

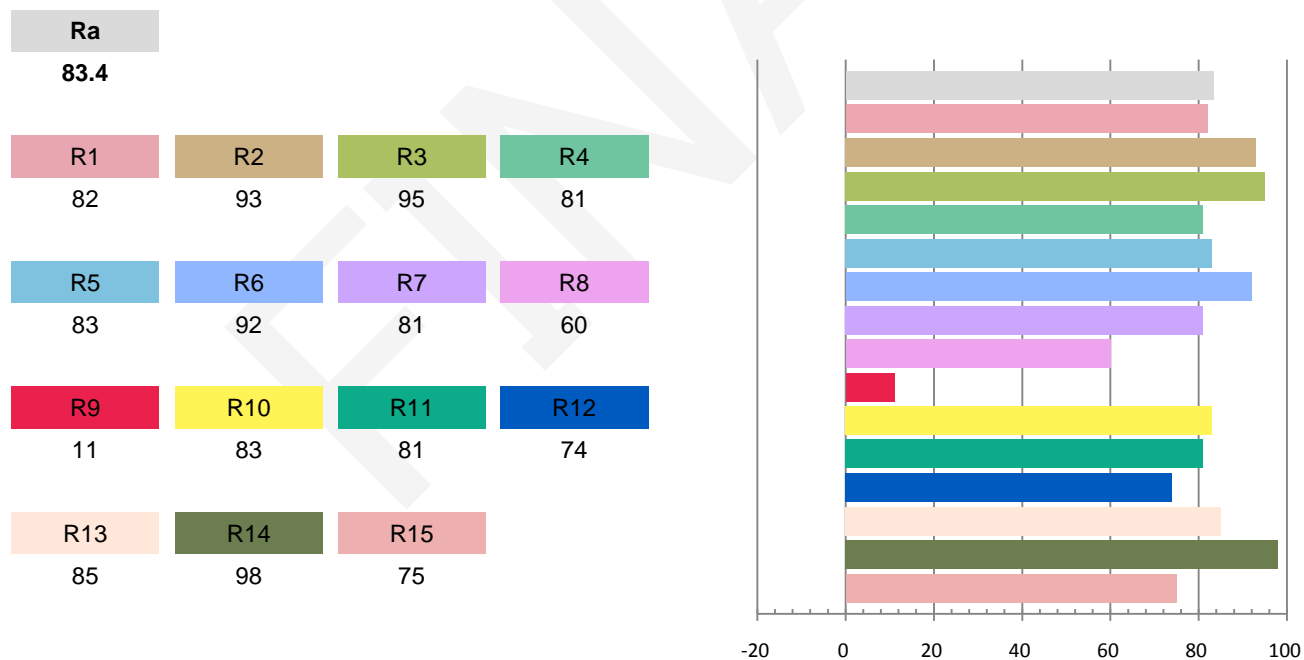
Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0802	9.38	0.9747	974.4	103.88

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.988	2924	-0.00061	0.4415	0.4041	0.2535	0.5221

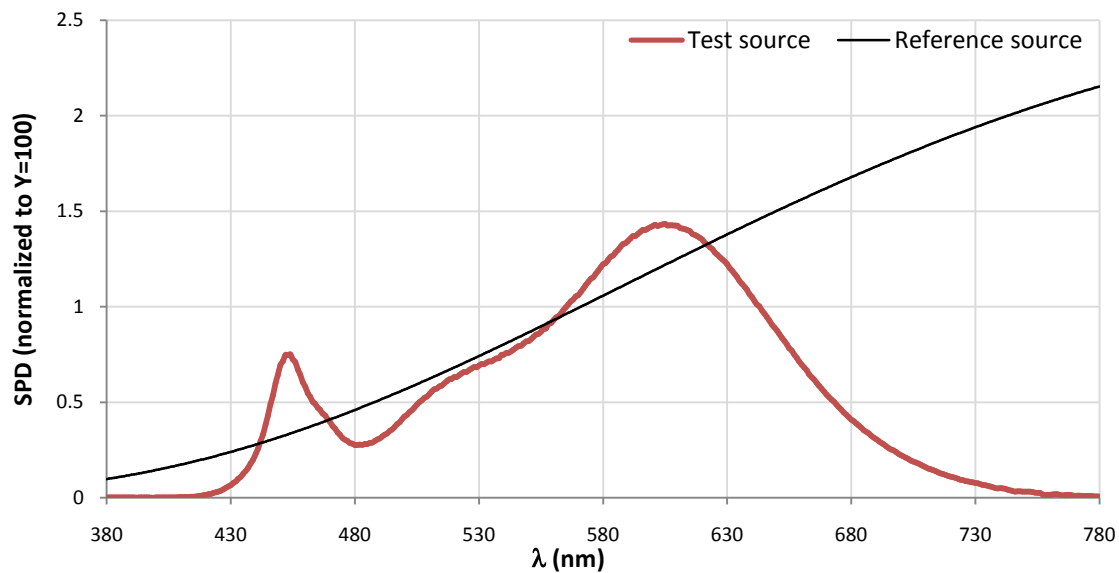
Color Rendering Index



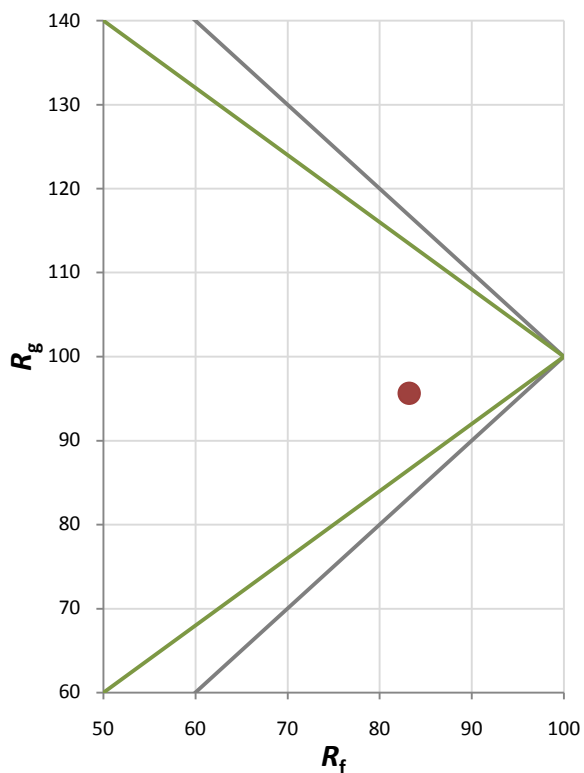
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	96

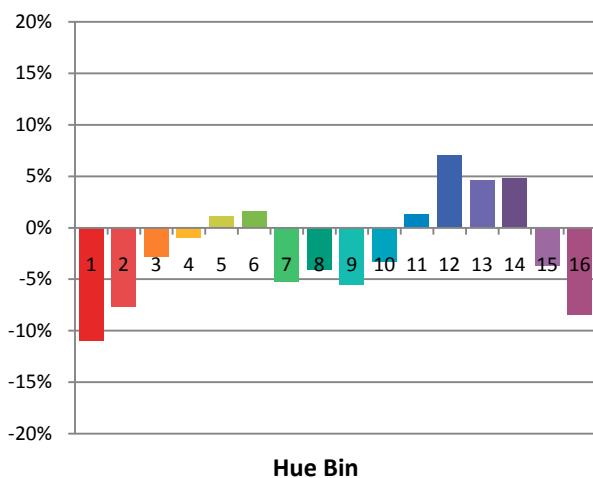
Spectral Power Distribution Comparison



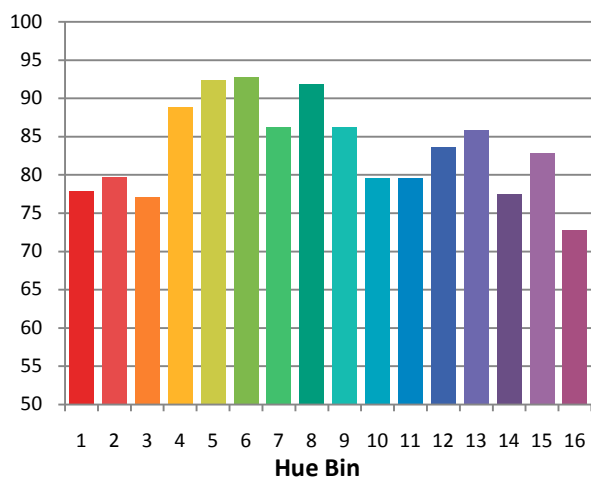
Plot of R_g versus R_f



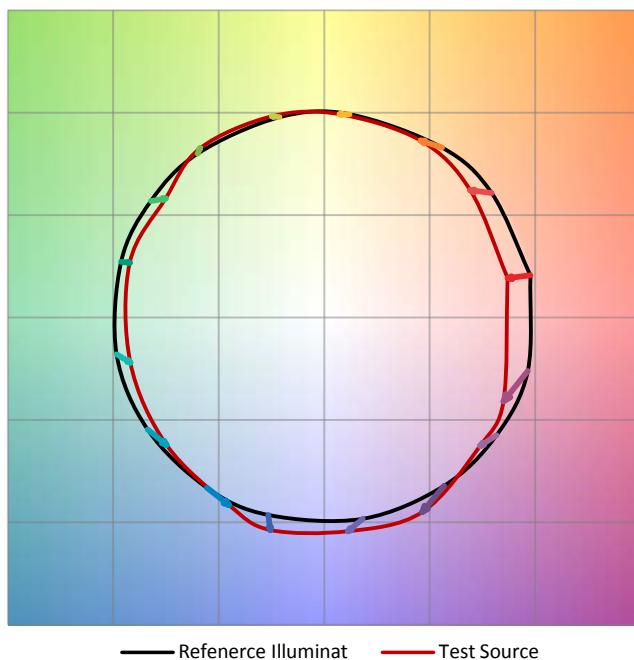
Chroma Shift by Hue



R_f by Hue

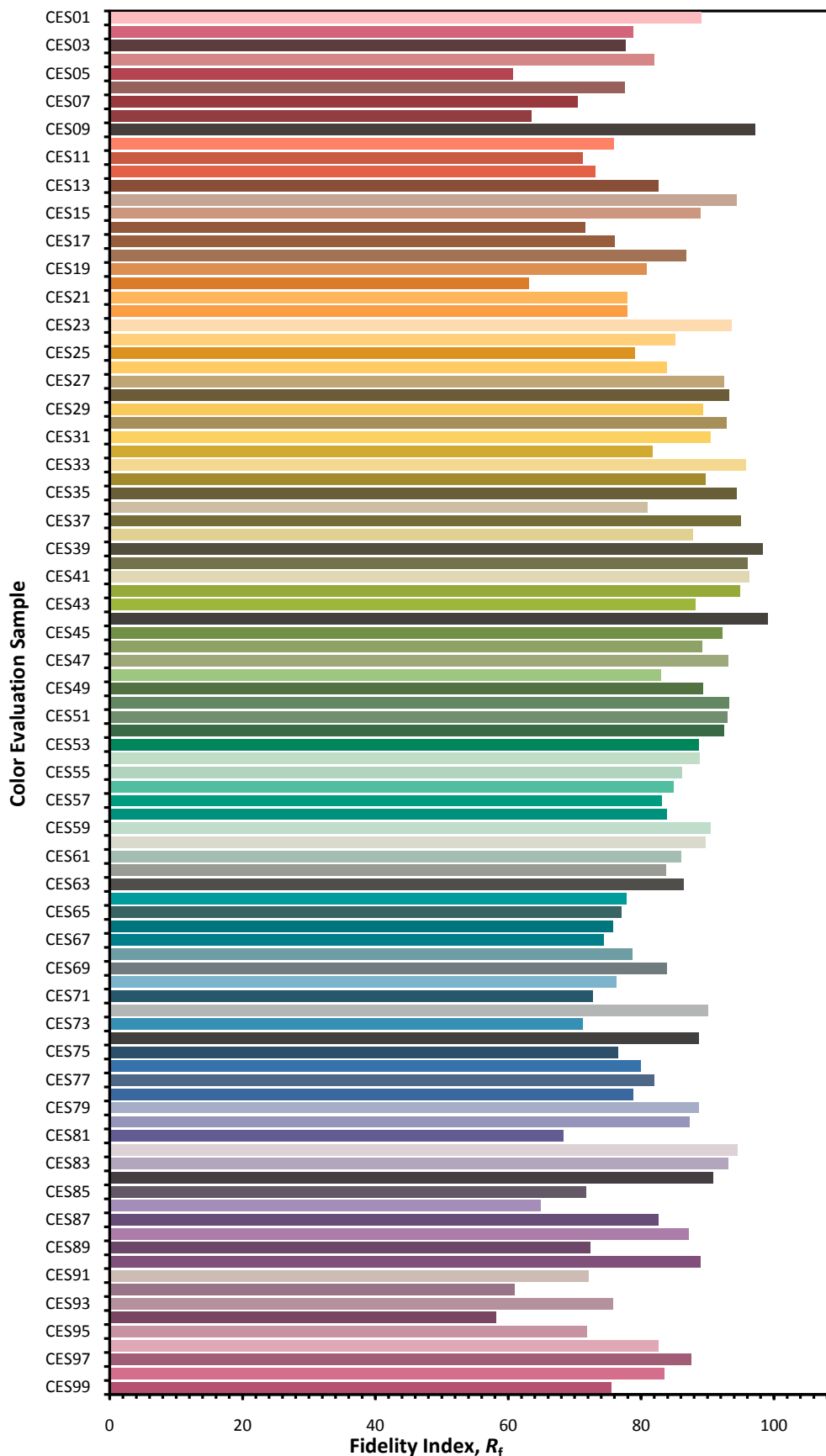


Color Vector Graphic

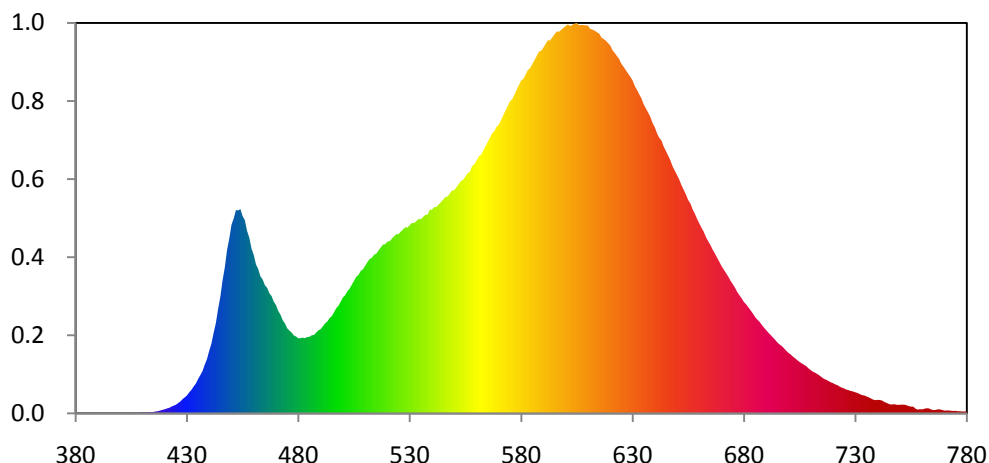


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



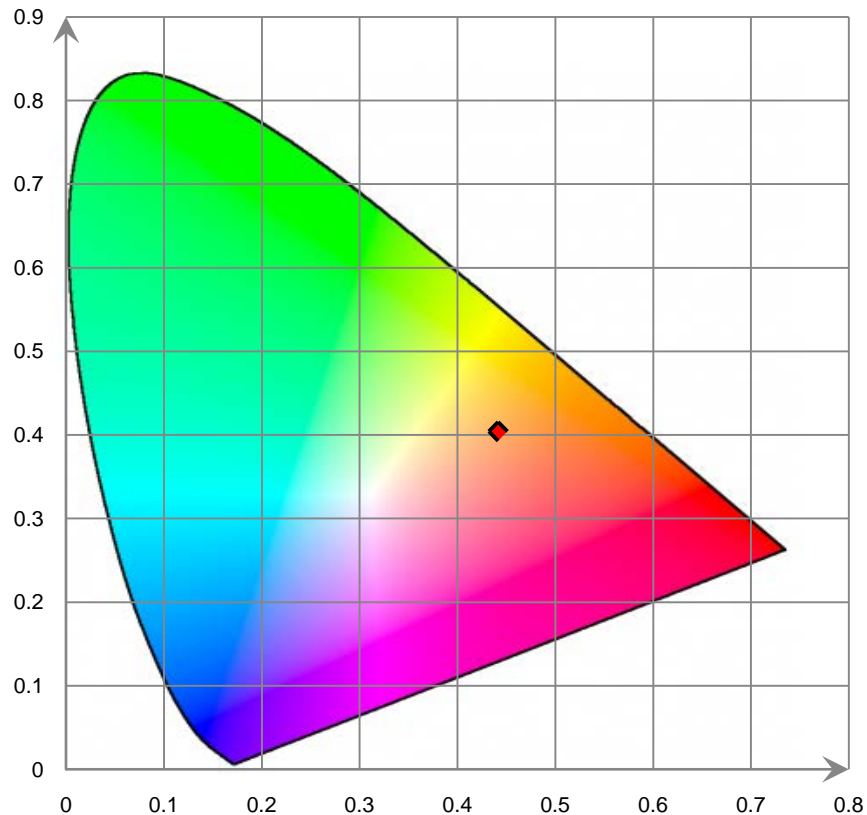
Relative Spectral Power Distribution



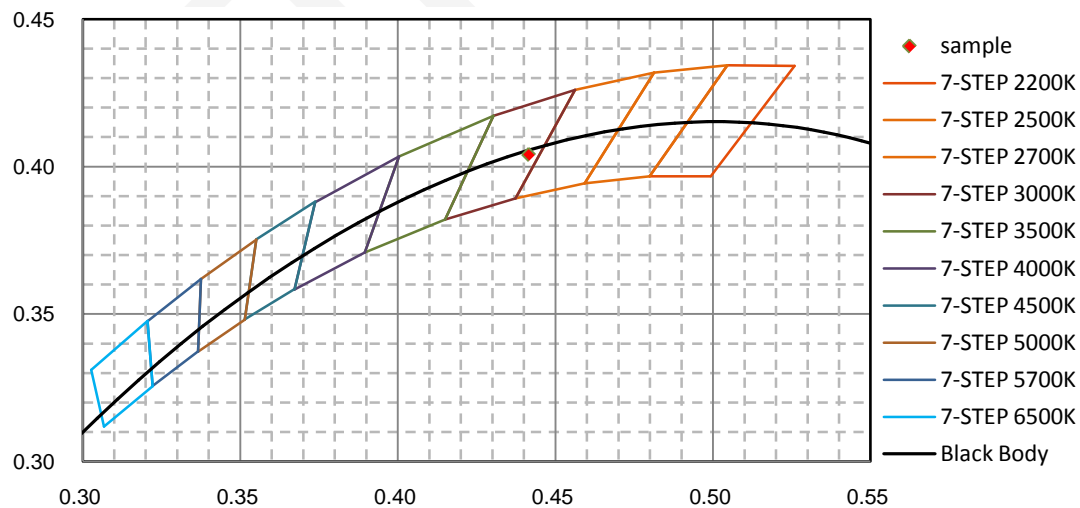
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.200E-02	421	2.581E-01	462	7.558E+00	503	6.530E+00	544	1.107E+01
381	2.360E-02	422	2.881E-01	463	7.175E+00	504	6.737E+00	545	1.120E+01
382	1.980E-02	423	3.521E-01	464	7.013E+00	505	6.946E+00	546	1.133E+01
383	2.460E-02	424	4.022E-01	465	6.712E+00	506	7.156E+00	547	1.136E+01
384	2.660E-02	425	4.504E-01	466	6.580E+00	507	7.257E+00	548	1.152E+01
385	1.830E-02	426	5.335E-01	467	6.292E+00	508	7.459E+00	549	1.167E+01
386	2.280E-02	427	6.177E-01	468	6.142E+00	509	7.546E+00	550	1.170E+01
387	2.530E-02	428	7.394E-01	469	5.848E+00	510	7.735E+00	551	1.185E+01
388	2.100E-02	429	8.336E-01	470	5.669E+00	511	7.922E+00	552	1.202E+01
389	2.360E-02	430	9.378E-01	471	5.361E+00	512	8.094E+00	553	1.218E+01
390	2.030E-02	431	1.096E+00	472	5.171E+00	513	8.145E+00	554	1.223E+01
391	1.140E-02	432	1.227E+00	473	4.882E+00	514	8.315E+00	555	1.241E+01
392	6.500E-03	433	1.405E+00	474	4.711E+00	515	8.369E+00	556	1.258E+01
393	1.140E-02	434	1.559E+00	475	4.459E+00	516	8.531E+00	557	1.265E+01
394	1.660E-02	435	1.797E+00	476	4.335E+00	517	8.692E+00	558	1.297E+01
395	1.850E-02	436	2.000E+00	477	4.235E+00	518	8.841E+00	559	1.304E+01
396	1.400E-02	437	2.221E+00	478	4.076E+00	519	8.863E+00	560	1.325E+01
397	1.060E-02	438	2.555E+00	479	4.027E+00	520	9.002E+00	561	1.346E+01
398	7.800E-03	439	2.842E+00	480	3.932E+00	521	9.016E+00	562	1.355E+01
399	3.600E-03	440	3.278E+00	481	3.942E+00	522	9.155E+00	563	1.377E+01
400	1.280E-02	441	3.657E+00	482	3.967E+00	523	9.280E+00	564	1.399E+01
401	1.550E-02	442	4.225E+00	483	3.940E+00	524	9.387E+00	565	1.422E+01
402	1.410E-02	443	4.737E+00	484	4.005E+00	525	9.392E+00	566	1.444E+01
403	1.560E-02	444	5.478E+00	485	4.012E+00	526	9.524E+00	567	1.467E+01
404	2.110E-02	445	6.114E+00	486	4.090E+00	527	9.637E+00	568	1.479E+01
405	2.110E-02	446	6.972E+00	487	4.108E+00	528	9.746E+00	569	1.502E+01
406	2.530E-02	447	7.647E+00	488	4.225E+00	529	9.738E+00	570	1.512E+01
407	2.850E-02	448	8.556E+00	489	4.347E+00	530	9.858E+00	571	1.536E+01
408	2.450E-02	449	9.151E+00	490	4.409E+00	531	9.977E+00	572	1.562E+01
409	3.870E-02	450	9.883E+00	491	4.554E+00	532	9.970E+00	573	1.587E+01
410	4.870E-02	451	1.021E+01	492	4.717E+00	533	1.007E+01	574	1.611E+01
411	4.480E-02	452	1.065E+01	493	4.810E+00	534	1.018E+01	575	1.635E+01
412	4.530E-02	453	1.063E+01	494	4.988E+00	535	1.018E+01	576	1.646E+01
413	5.530E-02	454	1.070E+01	495	5.090E+00	536	1.029E+01	577	1.670E+01
414	6.800E-02	455	1.033E+01	496	5.290E+00	537	1.040E+01	578	1.695E+01
415	7.750E-02	456	1.012E+01	497	5.506E+00	538	1.041E+01	579	1.720E+01
416	9.990E-02	457	9.555E+00	498	5.634E+00	539	1.066E+01	580	1.744E+01
417	1.170E-01	458	9.206E+00	499	5.847E+00	540	1.067E+01	581	1.752E+01
418	1.492E-01	459	8.626E+00	500	6.068E+00	541	1.080E+01	582	1.774E+01
419	1.834E-01	460	8.295E+00	501	6.187E+00	542	1.081E+01	583	1.799E+01
420	2.144E-01	461	7.801E+00	502	6.401E+00	543	1.094E+01	584	1.808E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.830E+01	626	1.816E+01	667	8.370E+00	708	2.471E+00	749	4.439E-01
586	1.850E+01	627	1.797E+01	668	8.149E+00	709	2.357E+00	750	4.528E-01
587	1.873E+01	628	1.780E+01	669	7.932E+00	710	2.262E+00	751	4.583E-01
588	1.895E+01	629	1.763E+01	670	7.704E+00	711	2.180E+00	752	4.557E-01
589	1.900E+01	630	1.745E+01	671	7.525E+00	712	2.126E+00	753	4.253E-01
590	1.917E+01	631	1.716E+01	672	7.343E+00	713	2.055E+00	754	3.801E-01
591	1.936E+01	632	1.694E+01	673	7.158E+00	714	1.976E+00	755	3.556E-01
592	1.954E+01	633	1.671E+01	674	6.946E+00	715	1.887E+00	756	3.521E-01
593	1.954E+01	634	1.650E+01	675	6.771E+00	716	1.804E+00	757	2.500E-01
594	1.970E+01	635	1.619E+01	676	6.583E+00	717	1.759E+00	758	1.957E-01
595	1.986E+01	636	1.598E+01	677	6.358E+00	718	1.690E+00	759	2.202E-01
596	2.001E+01	637	1.576E+01	678	6.185E+00	719	1.629E+00	760	2.069E-01
597	1.999E+01	638	1.552E+01	679	6.024E+00	720	1.582E+00	761	2.426E-01
598	2.009E+01	639	1.521E+01	680	5.832E+00	721	1.518E+00	762	2.671E-01
599	2.019E+01	640	1.499E+01	681	5.712E+00	722	1.477E+00	763	2.619E-01
600	2.030E+01	641	1.467E+01	682	5.554E+00	723	1.404E+00	764	2.046E-01
601	2.038E+01	642	1.443E+01	683	5.397E+00	724	1.345E+00	765	1.739E-01
602	2.029E+01	643	1.429E+01	684	5.229E+00	725	1.306E+00	766	1.805E-01
603	2.035E+01	644	1.397E+01	685	5.053E+00	726	1.247E+00	767	2.123E-01
604	2.042E+01	645	1.374E+01	686	4.914E+00	727	1.214E+00	768	2.079E-01
605	2.045E+01	646	1.350E+01	687	4.798E+00	728	1.171E+00	769	1.771E-01
606	2.033E+01	647	1.325E+01	688	4.638E+00	729	1.148E+00	770	1.456E-01
607	2.035E+01	648	1.293E+01	689	4.492E+00	730	1.105E+00	771	1.507E-01
608	2.034E+01	649	1.271E+01	690	4.361E+00	731	1.067E+00	772	1.526E-01
609	2.033E+01	650	1.248E+01	691	4.221E+00	732	1.008E+00	773	1.370E-01
610	2.031E+01	651	1.224E+01	692	4.109E+00	733	9.591E-01	774	1.277E-01
611	2.014E+01	652	1.194E+01	693	3.978E+00	734	9.379E-01	775	1.320E-01
612	2.011E+01	653	1.170E+01	694	3.855E+00	735	8.897E-01	776	1.130E-01
613	2.004E+01	654	1.146E+01	695	3.714E+00	736	8.379E-01	777	1.126E-01
614	1.997E+01	655	1.117E+01	696	3.612E+00	737	7.824E-01	778	1.002E-01
615	1.990E+01	656	1.099E+01	697	3.528E+00	738	7.198E-01	779	1.038E-01
616	1.969E+01	657	1.068E+01	698	3.408E+00	739	6.937E-01	780	9.560E-02
617	1.961E+01	658	1.045E+01	699	3.280E+00	740	7.073E-01		
618	1.952E+01	659	1.019E+01	700	3.169E+00	741	7.018E-01		
619	1.940E+01	660	9.944E+00	701	3.082E+00	742	6.734E-01		
620	1.927E+01	661	9.715E+00	702	2.974E+00	743	5.999E-01		
621	1.902E+01	662	9.507E+00	703	2.885E+00	744	5.503E-01		
622	1.888E+01	663	9.224E+00	704	2.783E+00	745	4.973E-01		
623	1.872E+01	664	9.009E+00	705	2.690E+00	746	4.627E-01		
624	1.856E+01	665	8.812E+00	706	2.617E+00	747	4.756E-01		
625	1.831E+01	666	8.569E+00	707	2.545E+00	748	4.702E-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**

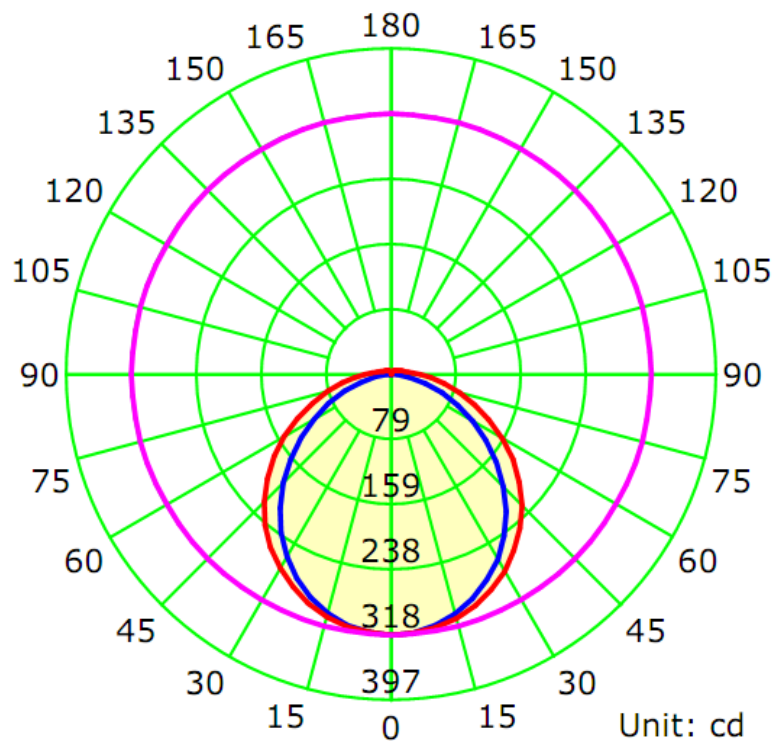
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0780	9.31	0.9947

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
986.5	105.96	318.3	1.21	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	102.2	112.7	118.1	112.2	111.3
Field Angle (10% I_{max}):	154.9	178.9	182.7	178.6	173.8

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	318	318	318	318	318	318	318	318
5.0°	317	317	317	317	318	317	317	317
10.0°	312	312	313	314	314	314	313	312
15.0°	303	304	306	308	309	308	306	304
20.0°	292	294	296	299	301	299	296	293
25.0°	278	280	284	288	291	288	283	278
30.0°	261	264	269	275	278	275	268	261
35.0°	241	245	252	259	263	259	251	242
40.0°	219	224	234	242	246	241	232	220
45.0°	195	201	214	222	227	222	211	197
50.0°	168	177	192	201	205	200	188	173
55.0°	142	152	169	178	182	177	165	148
60.0°	115	127	145	153	158	152	141	123
65.0°	90	103	122	129	133	127	117	98
70.0°	67	80	98	106	109	103	94	76
75.0°	44	59	77	84	87	83	73	56
80.0°	23	42	59	65	67	64	55	39
85.0°	7	28	44	48	49	48	42	26
90.0°	0	18	33	36	36	35	31	17
95.0°	0	12	24	27	27	26	23	11
100.0°	0	9	18	21	21	20	18	8
105.0°	0	7	15	17	17	17	14	6
110.0°	0	5	12	14	14	14	12	5
115.0°	0	5	11	12	13	12	10	5
120.0°	0	4	9	10	10	10	8	4
125.0°	0	3	8	9	9	9	8	3
130.0°	0	2	7	8	8	8	7	2
135.0°	1	1	6	8	8	8	6	1
140.0°	1	1	5	7	7	7	5	1
145.0°	1	1	4	5	6	5	4	1
150.0°	1	1	2	5	5	5	1	1
155.0°	1	1	1	2	4	2	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

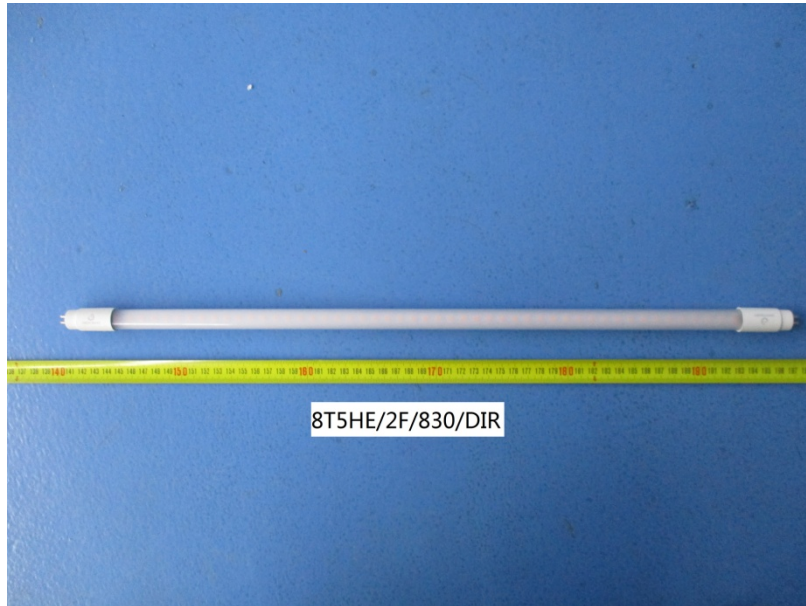
C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	318	318	318	318	318	318	318	318
5.0°	317	316	316	316	316	316	316	317
10.0°	311	311	312	313	313	313	312	311
15.0°	302	303	305	307	307	307	305	303
20.0°	290	292	295	298	298	298	295	292
25.0°	275	278	282	286	287	287	283	279
30.0°	257	261	266	272	273	272	267	262
35.0°	236	241	248	257	259	257	250	243
40.0°	213	219	228	239	241	239	231	222
45.0°	188	195	208	218	220	219	211	198
50.0°	162	170	186	195	199	197	188	174
55.0°	135	145	162	172	176	173	164	148
60.0°	110	120	138	147	152	149	141	124
65.0°	85	96	114	123	128	125	117	99
70.0°	62	74	91	100	103	101	94	76
75.0°	40	54	71	78	81	80	73	56
80.0°	20	38	53	59	61	61	55	39
85.0°	6	25	39	43	45	45	41	26
90.0°	0	16	29	32	32	33	30	17
95.0°	0	11	22	24	24	24	22	11
100.0°	0	8	16	19	19	19	17	8
105.0°	0	6	13	15	15	15	13	6
110.0°	0	5	11	12	13	13	11	5
115.0°	0	4	9	11	11	11	9	4
120.0°	0	4	8	9	9	9	8	4
125.0°	0	4	7	8	8	8	7	4
130.0°	0	4	6	7	8	7	6	4
135.0°	1	3	6	7	7	7	6	3
140.0°	1	3	6	6	7	6	6	3
145.0°	1	3	5	6	6	6	5	3
150.0°	1	2	4	6	6	6	4	2
155.0°	1	2	4	4	5	4	4	2
160.0°	1	1	3	4	4	4	3	1
165.0°	1	1	2	3	3	3	2	1
170.0°	1	1	1	2	2	2	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

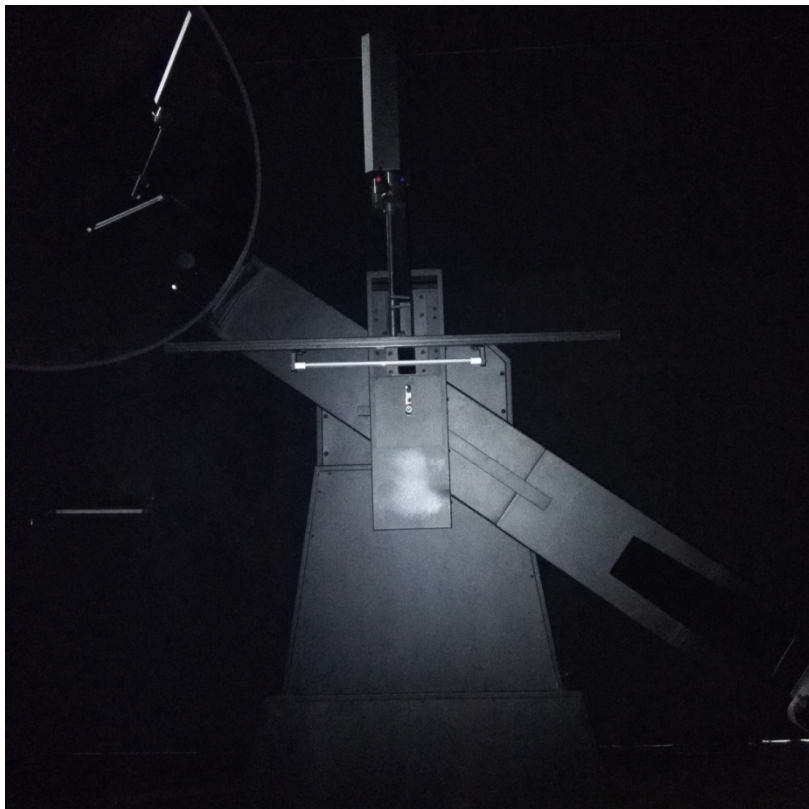
Deg	Flux (lm)	%
0-5	7.6	0.77
5-10	22.5	2.28
10-15	36.7	3.72
15-20	49.5	5.02
20-25	60.7	6.15
25-30	69.6	7.06
30-35	76.2	7.73
35-40	80.2	8.13
40-45	81.4	8.25
45-50	79.8	8.09
50-55	75.5	7.66
55-60	69.1	7.00
60-65	60.7	6.16
65-70	51.3	5.20
70-75	41.3	4.19
75-80	31.7	3.21
80-85	23.1	2.34
85-90	16.4	1.66
90-95	11.7	1.19
95-100	8.6	0.88
100-105	6.6	0.67
105-110	5.2	0.53
110-115	4.3	0.43
115-120	3.6	0.36
120-125	3.0	0.30
125-130	2.5	0.25
130-135	2.0	0.21
135-140	1.7	0.17
140-145	1.4	0.14
145-150	1.0	0.10
150-155	0.7	0.07
155-160	0.4	0.05
160-165	0.3	0.03
165-170	0.2	0.02
170-175	0.1	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	7.6	0.77
0-10	30.1	3.05
0-15	66.8	6.77
0-20	116.3	11.79
0-25	177.0	17.94
0-30	246.6	25.00
0-35	322.8	32.73
0-40	403.1	40.86
0-45	484.5	49.11
0-50	564.2	57.19
0-55	639.8	64.85
0-60	708.8	71.85
0-65	769.6	78.01
0-70	820.8	83.21
0-75	862.1	87.40
0-80	893.8	90.61
0-85	916.9	92.95
0-90	933.3	94.61
0-95	945.0	95.79
0-100	953.6	96.67
0-105	960.2	97.34
0-110	965.4	97.86
0-115	969.7	98.30
0-120	973.3	98.66
0-125	976.2	98.96
0-130	978.7	99.21
0-135	980.7	99.42
0-140	982.4	99.59
0-145	983.8	99.72
0-150	984.8	99.83
0-155	985.5	99.90
0-160	985.9	99.94
0-165	986.2	99.97
0-170	986.4	99.99
0-175	986.5	100.00
0-180	986.5	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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