

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/840/DIR

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RKS161013003-10
Test Date:	2016-10-15 to 2016-10-18
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/840/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: 4000K
Nominal Lumen Output: 1100 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**

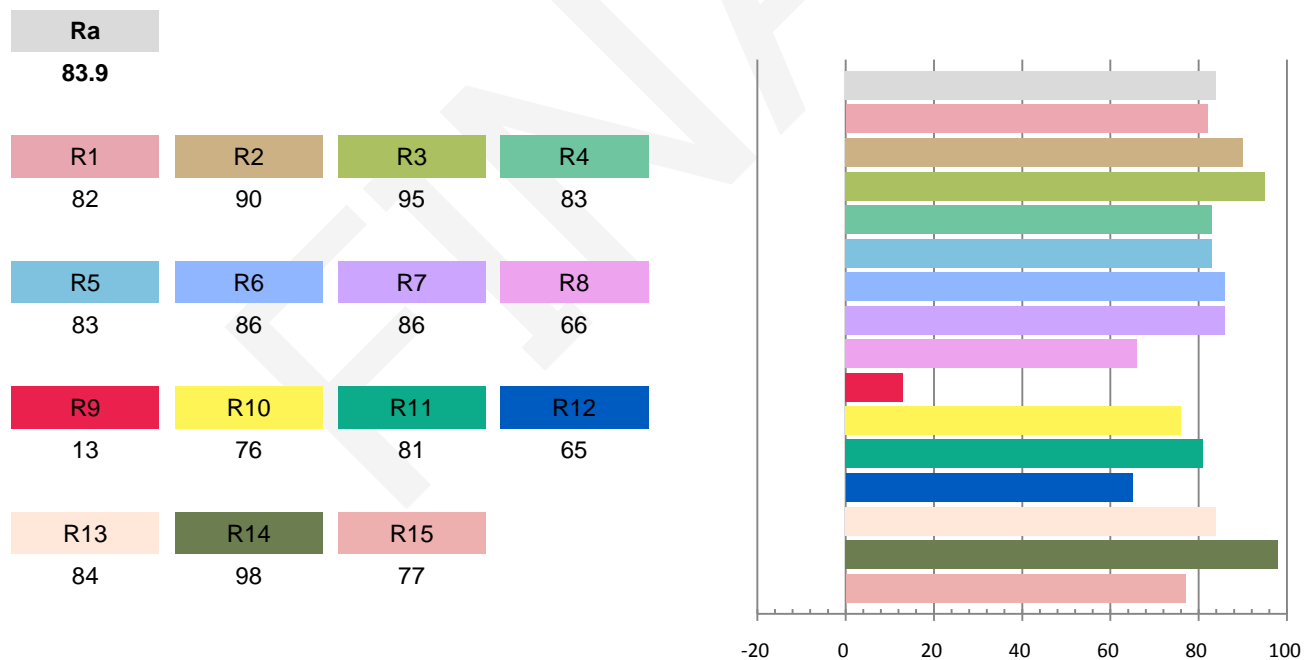
Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.08	9.36	0.9746	1058.6	113.1

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.217	3879	-0.00004	0.3859	0.3800	0.2274	0.5038

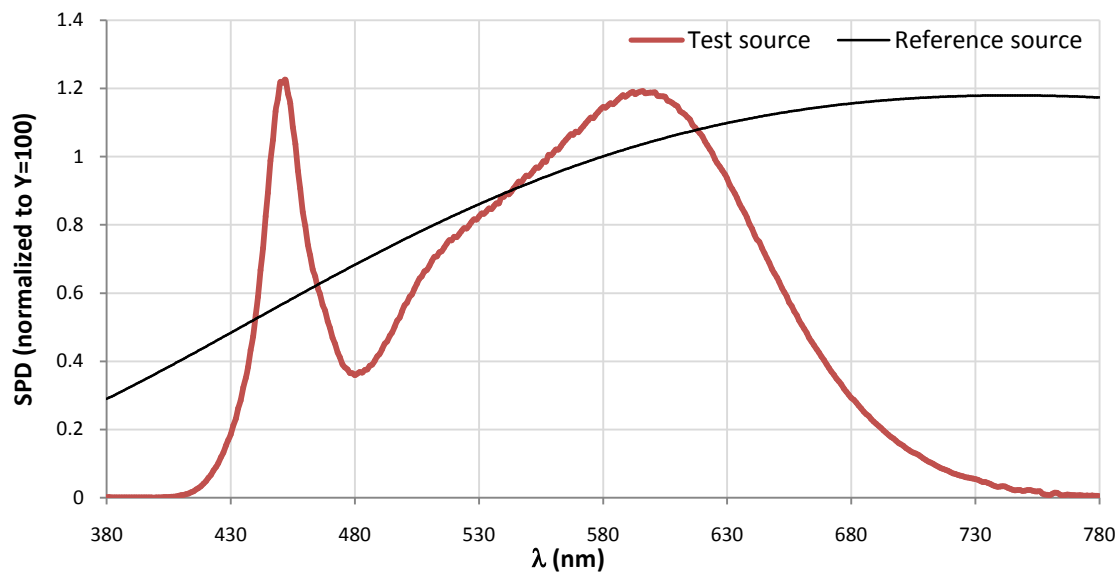
Color Rendering Index



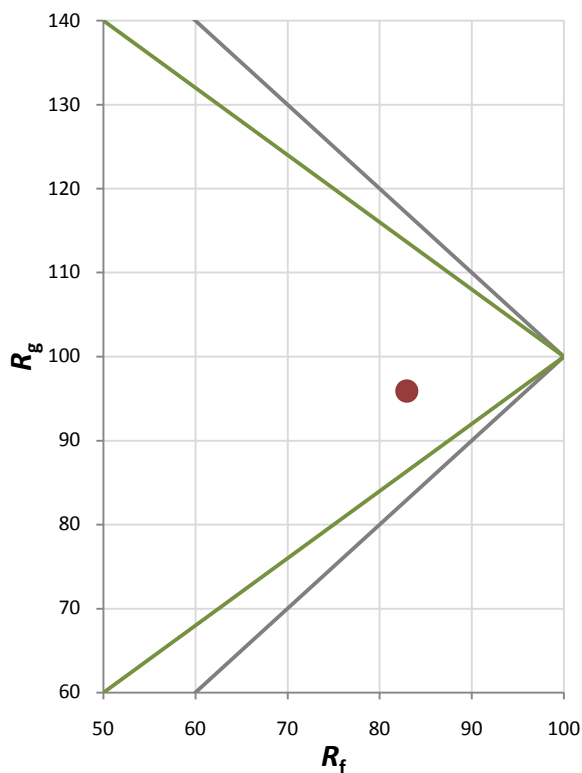
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	96

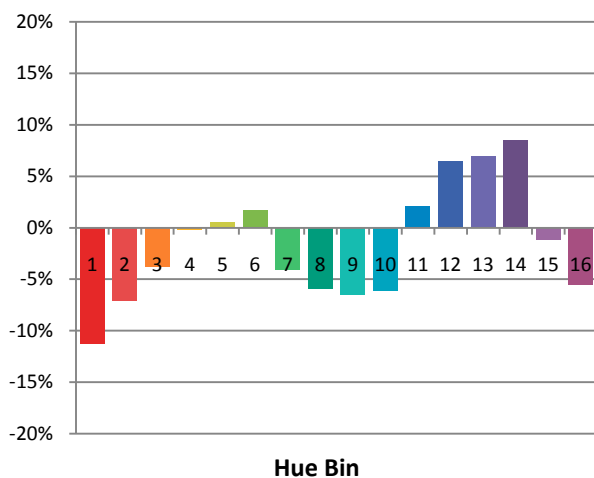
Spectral Power Distribution Comparison



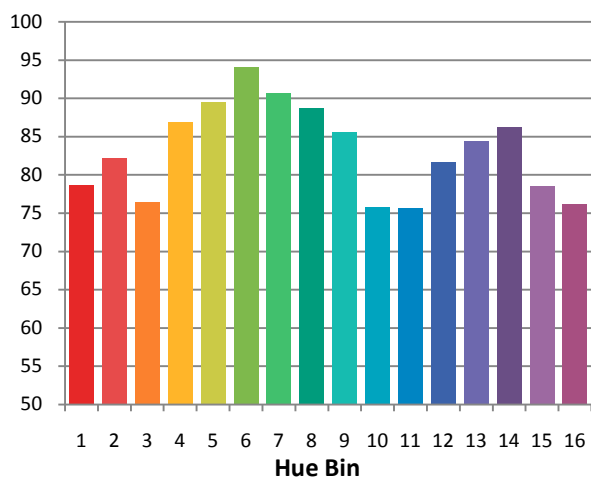
Plot of R_g versus R_f



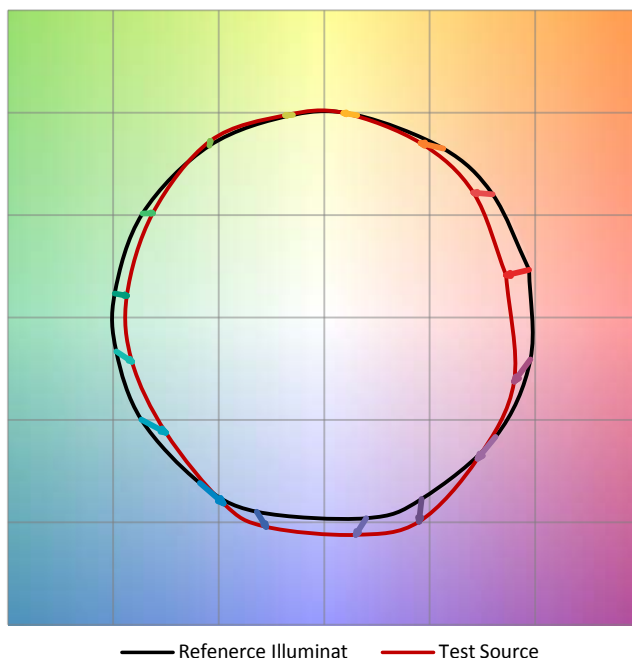
Chroma Shift by Hue



R_f by Hue

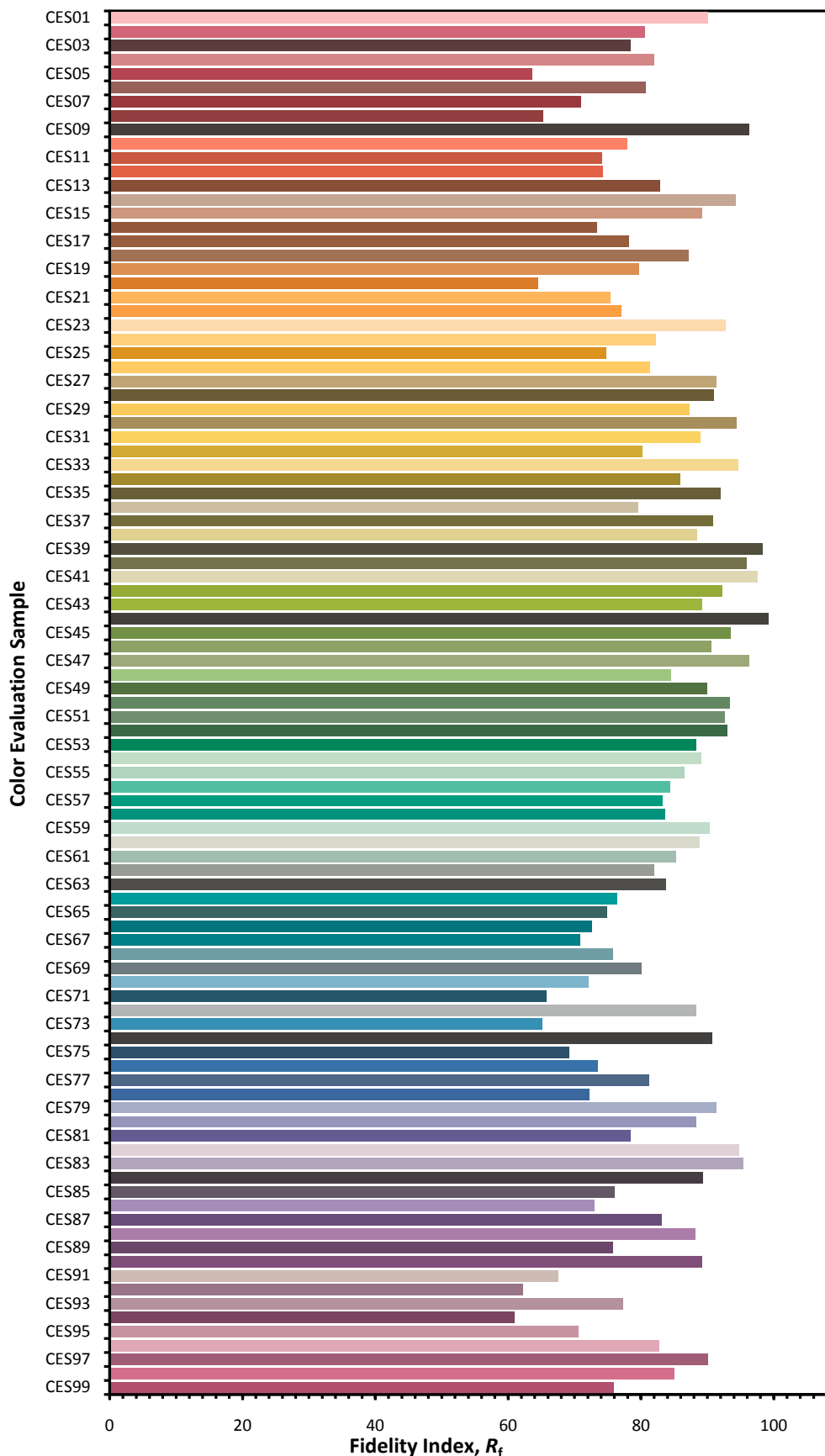


Color Vector Graphic

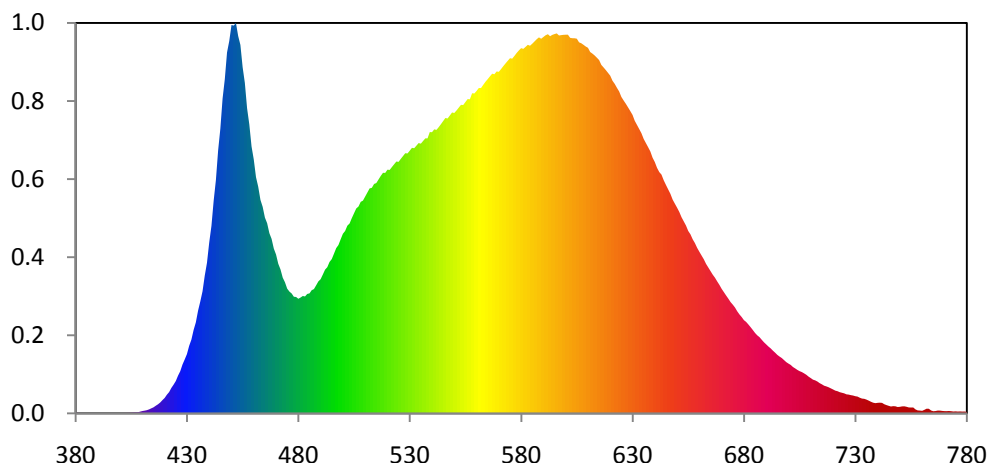


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



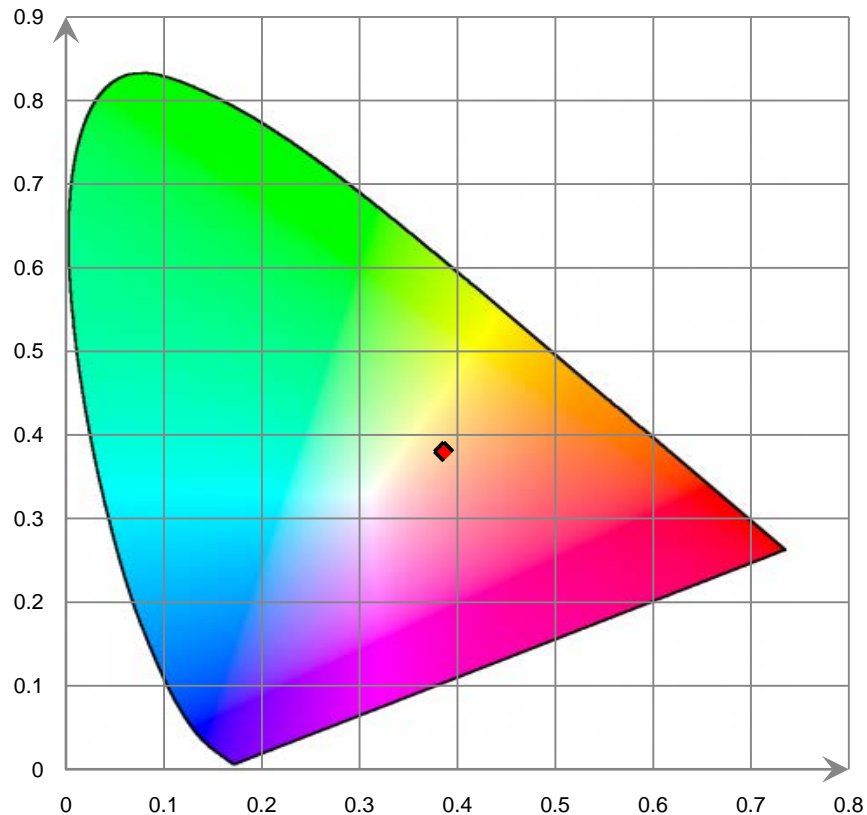
Relative Spectral Power Distribution



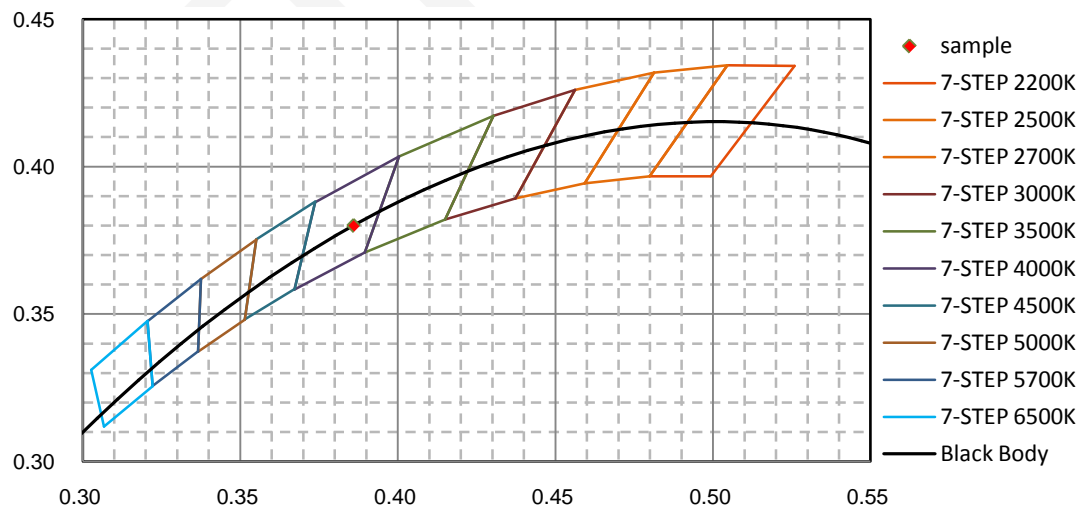
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.120E-02	421	9.069E-01	462	1.102E+01	503	9.233E+00	544	1.406E+01
381	2.690E-02	422	1.036E+00	463	1.038E+01	504	9.494E+00	545	1.421E+01
382	1.980E-02	423	1.235E+00	464	1.004E+01	505	9.730E+00	546	1.436E+01
383	1.870E-02	424	1.396E+00	465	9.522E+00	506	9.963E+00	547	1.434E+01
384	1.940E-02	425	1.572E+00	466	9.248E+00	507	1.006E+01	548	1.448E+01
385	1.320E-02	426	1.832E+00	467	8.765E+00	508	1.029E+01	549	1.463E+01
386	1.460E-02	427	2.051E+00	468	8.485E+00	509	1.035E+01	550	1.461E+01
387	1.650E-02	428	2.374E+00	469	8.013E+00	510	1.054E+01	551	1.473E+01
388	1.390E-02	429	2.621E+00	470	7.725E+00	511	1.074E+01	552	1.487E+01
389	1.820E-02	430	2.881E+00	471	7.274E+00	512	1.094E+01	553	1.500E+01
390	1.800E-02	431	3.283E+00	472	7.000E+00	513	1.097E+01	554	1.499E+01
391	8.800E-03	432	3.585E+00	473	6.600E+00	514	1.116E+01	555	1.514E+01
392	7.200E-03	433	4.056E+00	474	6.376E+00	515	1.120E+01	556	1.528E+01
393	9.200E-03	434	4.426E+00	475	6.066E+00	516	1.138E+01	557	1.527E+01
394	1.130E-02	435	4.996E+00	476	5.923E+00	517	1.155E+01	558	1.557E+01
395	1.670E-02	436	5.444E+00	477	5.830E+00	518	1.170E+01	559	1.555E+01
396	1.800E-02	437	5.936E+00	478	5.671E+00	519	1.169E+01	560	1.568E+01
397	1.280E-02	438	6.698E+00	479	5.659E+00	520	1.185E+01	561	1.582E+01
398	8.900E-03	439	7.324E+00	480	5.573E+00	521	1.184E+01	562	1.582E+01
399	4.300E-03	440	8.305E+00	481	5.634E+00	522	1.198E+01	563	1.598E+01
400	1.550E-02	441	9.115E+00	482	5.707E+00	523	1.211E+01	564	1.612E+01
401	1.860E-02	442	1.034E+01	483	5.687E+00	524	1.225E+01	565	1.625E+01
402	2.000E-02	443	1.134E+01	484	5.808E+00	525	1.223E+01	566	1.639E+01
403	2.270E-02	444	1.278E+01	485	5.835E+00	526	1.238E+01	567	1.652E+01
404	2.850E-02	445	1.385E+01	486	5.990E+00	527	1.251E+01	568	1.649E+01
405	3.240E-02	446	1.531E+01	487	6.044E+00	528	1.265E+01	569	1.663E+01
406	4.250E-02	447	1.625E+01	488	6.227E+00	529	1.264E+01	570	1.661E+01
407	4.970E-02	448	1.755E+01	489	6.420E+00	530	1.277E+01	571	1.674E+01
408	5.160E-02	449	1.811E+01	490	6.523E+00	531	1.291E+01	572	1.688E+01
409	8.570E-02	450	1.889E+01	491	6.751E+00	532	1.289E+01	573	1.702E+01
410	1.136E-01	451	1.886E+01	492	6.989E+00	533	1.302E+01	574	1.715E+01
411	1.338E-01	452	1.899E+01	493	7.108E+00	534	1.314E+01	575	1.727E+01
412	1.550E-01	453	1.835E+01	494	7.363E+00	535	1.312E+01	576	1.725E+01
413	1.939E-01	454	1.792E+01	495	7.502E+00	536	1.325E+01	577	1.738E+01
414	2.454E-01	455	1.684E+01	496	7.766E+00	537	1.337E+01	578	1.753E+01
415	2.946E-01	456	1.607E+01	497	8.036E+00	538	1.337E+01	579	1.765E+01
416	3.707E-01	457	1.484E+01	498	8.187E+00	539	1.368E+01	580	1.776E+01
417	4.407E-01	458	1.405E+01	499	8.464E+00	540	1.367E+01	581	1.773E+01
418	5.269E-01	459	1.298E+01	500	8.733E+00	541	1.381E+01	582	1.782E+01
419	6.427E-01	460	1.235E+01	501	8.868E+00	542	1.379E+01	583	1.792E+01
420	7.493E-01	461	1.149E+01	502	9.127E+00	543	1.392E+01	584	1.788E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.798E+01	626	1.522E+01	667	6.598E+00	708	1.878E+00	749	3.090E-01
586	1.808E+01	627	1.505E+01	668	6.417E+00	709	1.789E+00	750	3.187E-01
587	1.819E+01	628	1.488E+01	669	6.249E+00	710	1.717E+00	751	3.408E-01
588	1.828E+01	629	1.470E+01	670	6.056E+00	711	1.641E+00	752	3.429E-01
589	1.822E+01	630	1.452E+01	671	5.895E+00	712	1.604E+00	753	3.218E-01
590	1.830E+01	631	1.423E+01	672	5.733E+00	713	1.547E+00	754	2.879E-01
591	1.839E+01	632	1.403E+01	673	5.578E+00	714	1.470E+00	755	2.854E-01
592	1.844E+01	633	1.383E+01	674	5.414E+00	715	1.413E+00	756	2.861E-01
593	1.834E+01	634	1.362E+01	675	5.288E+00	716	1.345E+00	757	1.933E-01
594	1.841E+01	635	1.335E+01	676	5.147E+00	717	1.312E+00	758	1.441E-01
595	1.845E+01	636	1.314E+01	677	4.963E+00	718	1.270E+00	759	1.366E-01
596	1.848E+01	637	1.294E+01	678	4.811E+00	719	1.218E+00	760	1.226E-01
597	1.838E+01	638	1.274E+01	679	4.683E+00	720	1.164E+00	761	1.721E-01
598	1.839E+01	639	1.243E+01	680	4.534E+00	721	1.107E+00	762	2.270E-01
599	1.841E+01	640	1.222E+01	681	4.447E+00	722	1.079E+00	763	2.238E-01
600	1.841E+01	641	1.194E+01	682	4.323E+00	723	1.031E+00	764	1.399E-01
601	1.842E+01	642	1.173E+01	683	4.193E+00	724	1.003E+00	765	1.042E-01
602	1.826E+01	643	1.161E+01	684	4.054E+00	725	9.746E-01	766	1.132E-01
603	1.824E+01	644	1.134E+01	685	3.909E+00	726	9.259E-01	767	1.376E-01
604	1.824E+01	645	1.111E+01	686	3.794E+00	727	9.142E-01	768	1.352E-01
605	1.822E+01	646	1.089E+01	687	3.707E+00	728	8.868E-01	769	1.200E-01
606	1.804E+01	647	1.068E+01	688	3.579E+00	729	8.682E-01	770	1.094E-01
607	1.800E+01	648	1.040E+01	689	3.457E+00	730	8.353E-01	771	1.080E-01
608	1.792E+01	649	1.020E+01	690	3.355E+00	731	8.173E-01	772	1.149E-01
609	1.784E+01	650	1.000E+01	691	3.251E+00	732	7.607E-01	773	1.064E-01
610	1.778E+01	651	9.793E+00	692	3.162E+00	733	7.186E-01	774	9.090E-02
611	1.757E+01	652	9.536E+00	693	3.050E+00	734	7.074E-01	775	9.820E-02
612	1.749E+01	653	9.335E+00	694	2.953E+00	735	6.693E-01	776	8.920E-02
613	1.740E+01	654	9.133E+00	695	2.844E+00	736	6.215E-01	777	9.440E-02
614	1.729E+01	655	8.870E+00	696	2.763E+00	737	5.655E-01	778	8.690E-02
615	1.718E+01	656	8.707E+00	697	2.690E+00	738	5.203E-01	779	9.090E-02
616	1.694E+01	657	8.467E+00	698	2.591E+00	739	4.974E-01	780	7.580E-02
617	1.682E+01	658	8.283E+00	699	2.493E+00	740	5.132E-01		
618	1.669E+01	659	8.050E+00	700	2.422E+00	741	5.207E-01		
619	1.656E+01	660	7.859E+00	701	2.356E+00	742	5.111E-01		
620	1.642E+01	661	7.675E+00	702	2.256E+00	743	4.446E-01		
621	1.618E+01	662	7.493E+00	703	2.186E+00	744	4.032E-01		
622	1.602E+01	663	7.270E+00	704	2.113E+00	745	3.662E-01		
623	1.583E+01	664	7.094E+00	705	2.052E+00	746	3.339E-01		
624	1.565E+01	665	6.920E+00	706	2.009E+00	747	3.514E-01		
625	1.539E+01	666	6.746E+00	707	1.946E+00	748	3.438E-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**

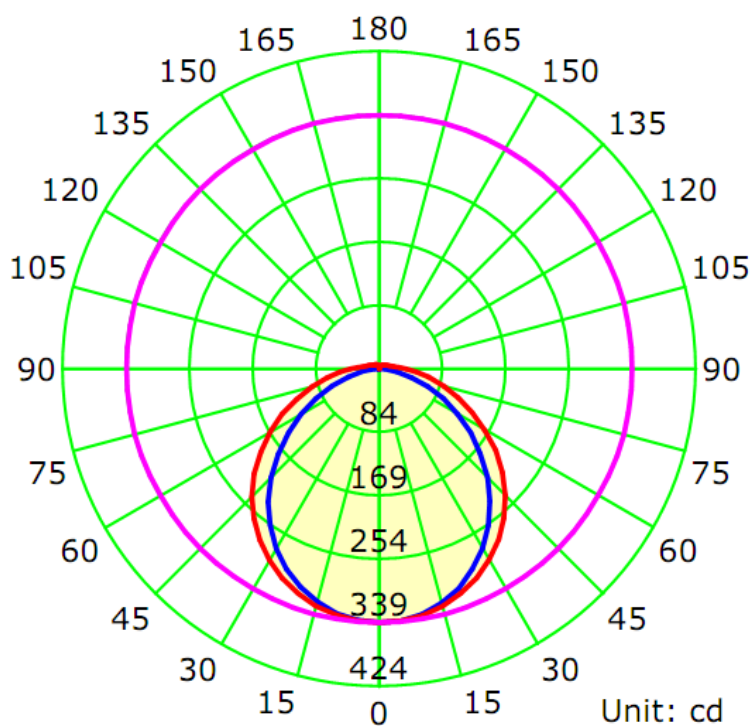
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0780	9.27	0.9904

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1064	114.78	339.3	1.21	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	102.8	113.7	118.9	113.3	112.2
Field Angle (10% I_{max}):	155.0	179.7	183.9	179.4	174.5

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	339	339	339	339	339	339	339	339
5.0°	338	338	338	338	338	338	338	338
10.0°	333	333	333	334	335	334	333	332
15.0°	324	324	326	328	329	327	326	324
20.0°	312	313	316	319	320	318	316	313
25.0°	296	298	303	307	309	306	303	299
30.0°	277	280	287	292	295	292	287	281
35.0°	256	260	268	275	279	275	270	262
40.0°	231	237	248	257	261	257	249	239
45.0°	205	212	226	235	239	235	227	215
50.0°	177	186	202	212	216	212	203	189
55.0°	149	159	177	186	191	187	178	161
60.0°	122	133	151	159	164	160	152	134
65.0°	95	107	125	134	138	133	126	108
70.0°	70	83	101	109	113	109	101	83
75.0°	46	61	79	87	89	87	79	61
80.0°	24	43	60	66	68	66	59	42
85.0°	7	29	44	49	50	49	45	28
90.0°	0	20	33	36	37	36	33	19
95.0°	0	13	25	27	27	27	24	12
100.0°	0	9	19	21	21	21	19	8
105.0°	0	7	15	17	17	17	15	6
110.0°	0	6	12	14	14	14	12	5
115.0°	0	5	11	13	13	13	10	5
120.0°	0	4	9	10	11	10	9	4
125.0°	0	4	8	9	10	9	8	3
130.0°	1	3	7	9	9	9	7	2
135.0°	1	1	6	8	8	8	6	1
140.0°	1	1	5	7	8	7	5	1
145.0°	1	1	4	6	6	6	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.)

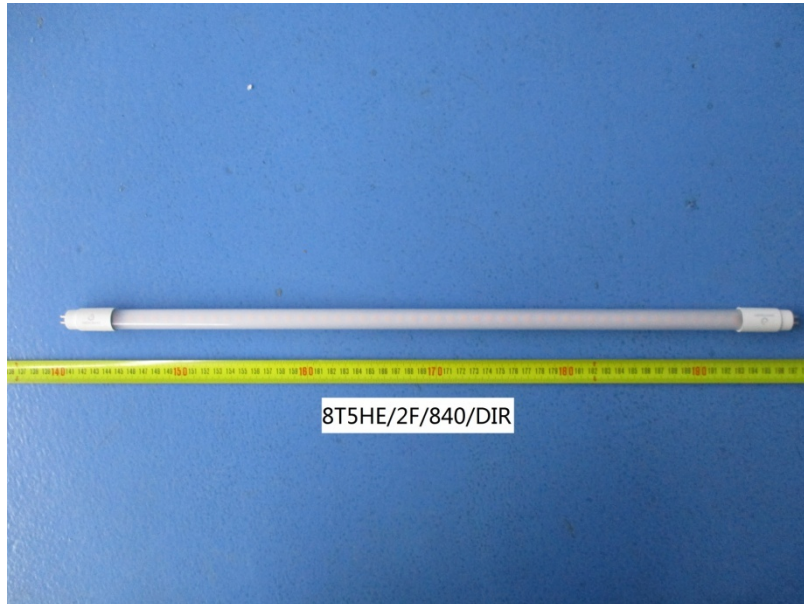
C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	339	339	339	339	339	339	339	339
5.0°	337	338	338	338	338	338	338	338
10.0°	332	333	333	334	334	334	333	333
15.0°	323	324	326	328	328	328	326	324
20.0°	311	313	316	320	320	320	316	312
25.0°	295	298	303	308	309	308	303	297
30.0°	277	281	288	294	295	295	288	279
35.0°	256	261	270	278	280	278	270	259
40.0°	232	239	250	260	262	259	249	236
45.0°	206	215	229	239	242	239	227	211
50.0°	178	188	206	216	219	216	203	185
55.0°	149	161	181	191	195	191	178	158
60.0°	121	134	156	165	170	165	153	132
65.0°	94	108	130	140	144	140	128	106
70.0°	68	84	106	115	118	115	104	82
75.0°	44	62	83	90	93	91	81	61
80.0°	22	44	62	69	72	70	61	42
85.0°	6	29	46	52	53	52	46	29
90.0°	0	19	34	38	39	38	34	19
95.0°	0	12	26	29	29	29	25	12
100.0°	0	9	20	22	23	22	20	9
105.0°	0	7	16	18	18	18	16	7
110.0°	0	6	13	15	15	15	13	6
115.0°	0	5	11	13	13	13	11	5
120.0°	0	5	9	11	11	11	9	5
125.0°	0	5	8	10	10	10	8	5
130.0°	1	4	8	9	9	9	8	5
135.0°	1	4	7	8	8	8	7	4
140.0°	1	4	7	8	8	8	7	4
145.0°	1	3	6	7	7	7	6	3
150.0°	1	3	5	7	7	7	5	3
155.0°	1	2	4	5	6	5	4	2
160.0°	1	1	4	5	5	5	4	1
165.0°	1	1	2	4	4	4	3	1
170.0°	1	2	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

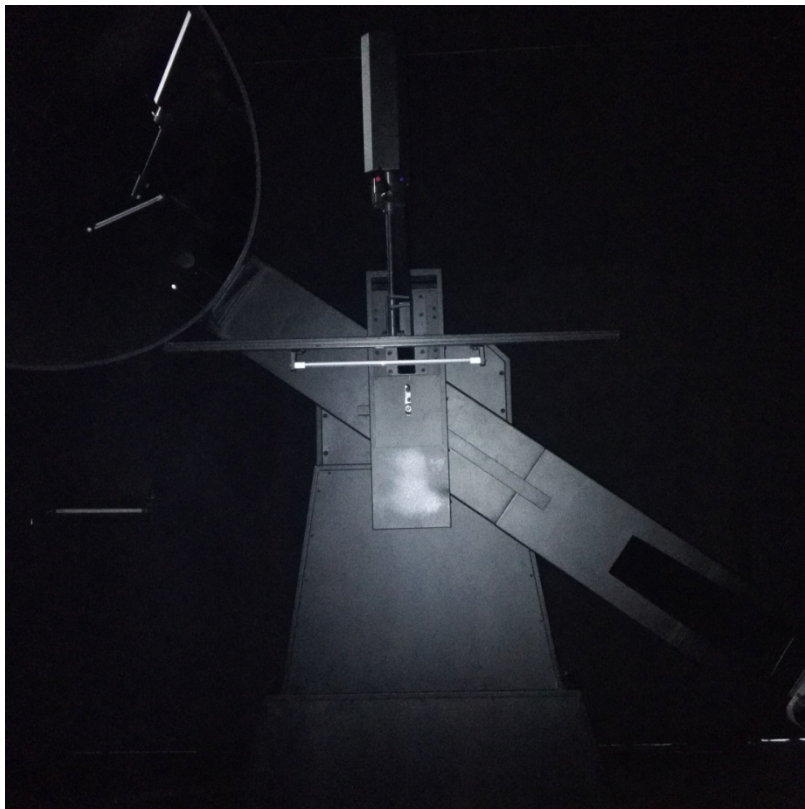
Deg	Flux (lm)	%
0-5	8.1	0.76
5-10	24.0	2.26
10-15	39.1	3.67
15-20	52.9	4.97
20-25	64.8	6.09
25-30	74.6	7.01
30-35	81.8	7.68
35-40	86.1	8.10
40-45	87.6	8.23
45-50	86.0	8.08
50-55	81.5	7.66
55-60	74.6	7.01
60-65	65.7	6.18
65-70	55.6	5.23
70-75	45.0	4.23
75-80	34.5	3.25
80-85	25.2	2.37
85-90	17.9	1.69
90-95	12.9	1.21
95-100	9.5	0.89
100-105	7.3	0.68
105-110	5.8	0.54
110-115	4.7	0.45
115-120	4.0	0.37
120-125	3.3	0.31
125-130	2.8	0.26
130-135	2.3	0.22
135-140	1.9	0.18
140-145	1.5	0.14
145-150	1.2	0.11
150-155	0.8	0.07
155-160	0.5	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	8.1	0.76
0-10	32.1	3.02
0-15	71.2	6.69
0-20	124.1	11.66
0-25	188.9	17.76
0-30	263.5	24.77
0-35	345.3	32.45
0-40	431.4	40.55
0-45	519.0	48.78
0-50	605.0	56.86
0-55	686.5	64.52
0-60	761.1	71.53
0-65	826.8	77.70
0-70	882.4	82.93
0-75	927.4	87.16
0-80	961.9	90.40
0-85	987.1	92.77
0-90	1005.1	94.46
0-95	1018.0	95.67
0-100	1027.5	96.56
0-105	1034.7	97.25
0-110	1040.5	97.79
0-115	1045.2	98.23
0-120	1049.2	98.60
0-125	1052.5	98.91
0-130	1055.2	99.17
0-135	1057.5	99.39
0-140	1059.4	99.57
0-145	1060.9	99.71
0-150	1062.1	99.82
0-155	1062.9	99.89
0-160	1063.4	99.94
0-165	1063.7	99.97
0-170	1063.9	99.99
0-175	1064.0	100.00
0-180	1064.0	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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