

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/835/DIR

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RKS161013002-10
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/835/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**

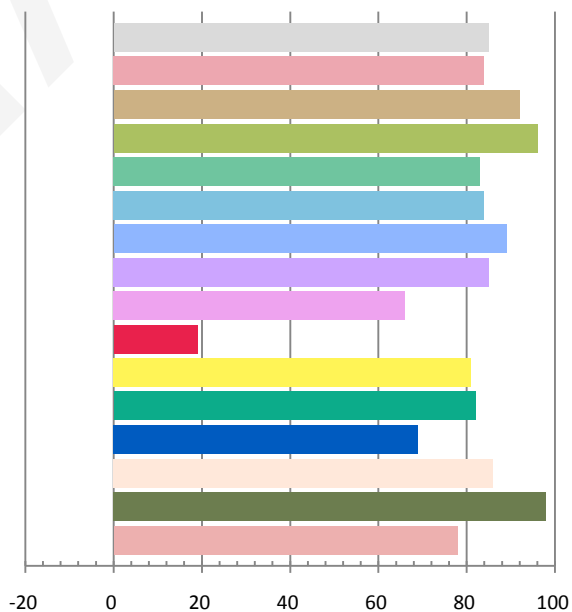
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0787	9.21	0.9748	1005.8	109.21

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.094	3478	-0.00231	0.4041	0.3849	0.2374	0.5086

Color Rendering Index

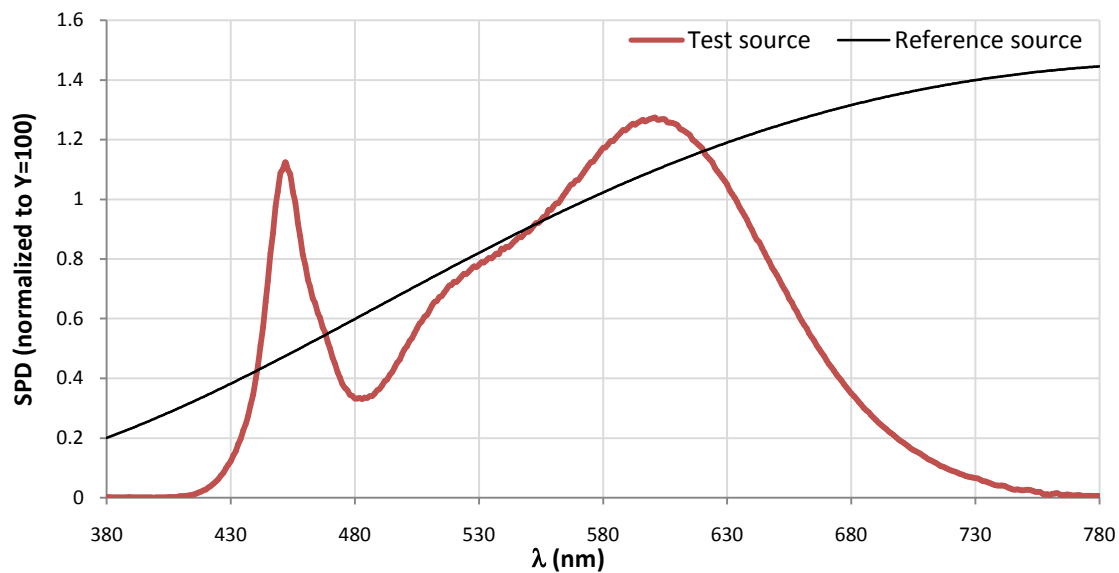
Ra			
84.9			
R1	R2	R3	R4
84	92	96	83
R5	R6	R7	R8
84	89	85	66
R9	R10	R11	R12
19	81	82	69
R13	R14	R15	
86	98	78	



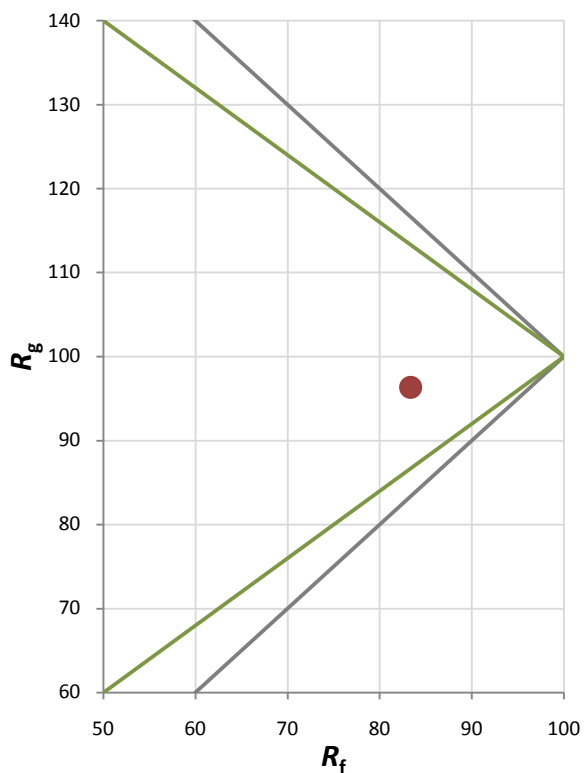
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	96

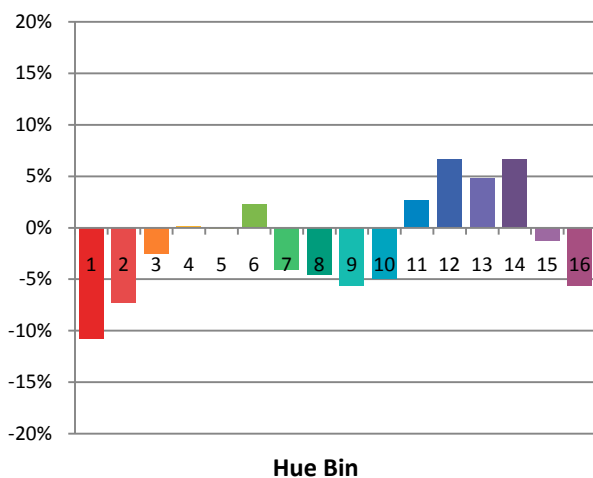
Spectral Power Distribution Comparison



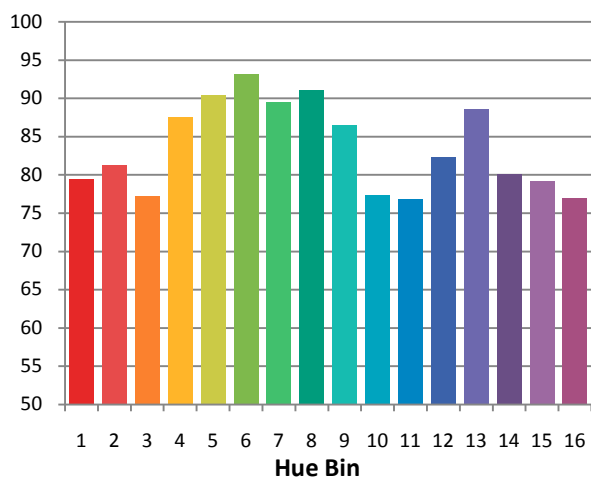
Plot of R_g versus R_f



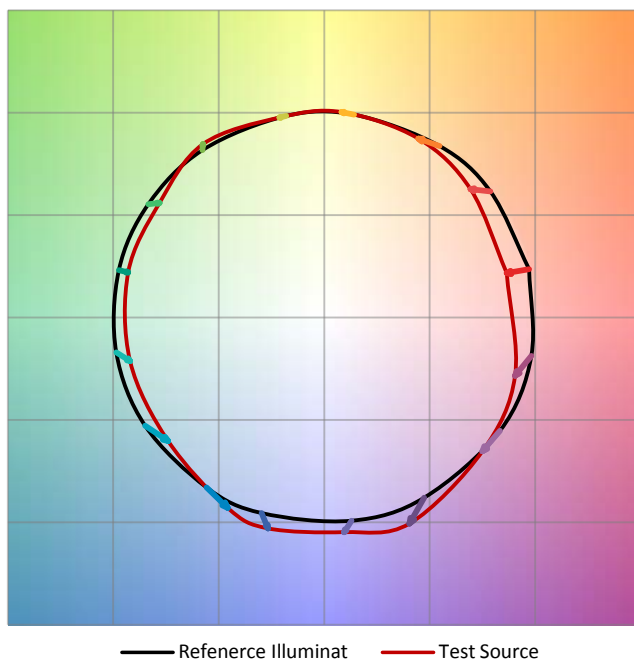
Chroma Shift by Hue



R_f by Hue

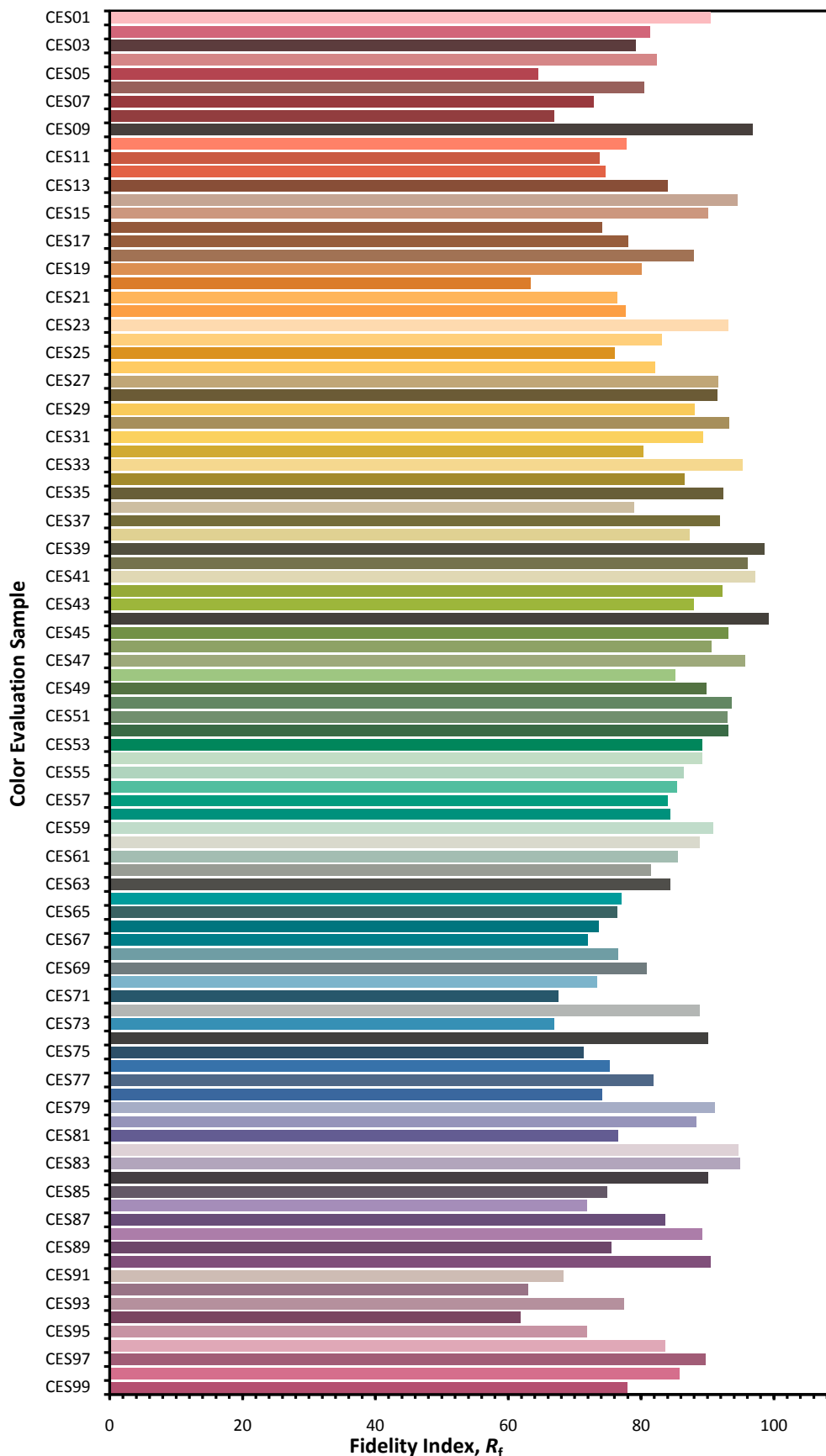


Color Vector Graphic

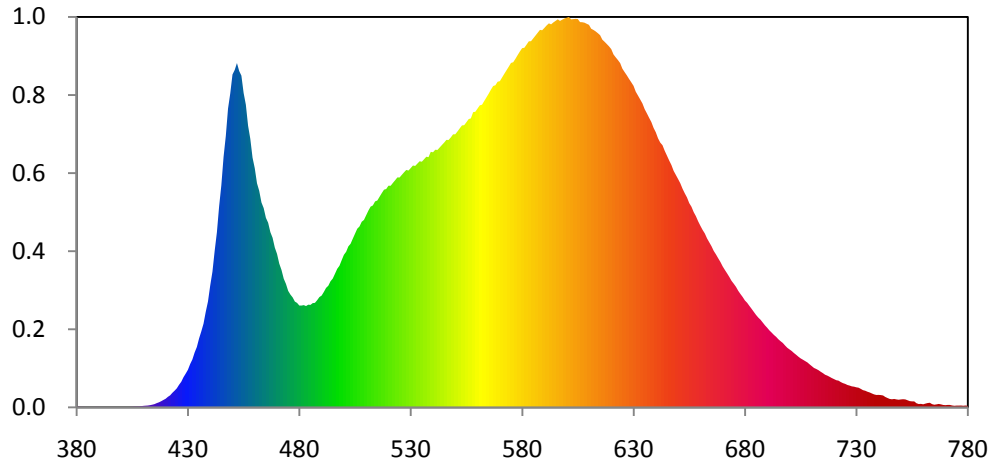


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



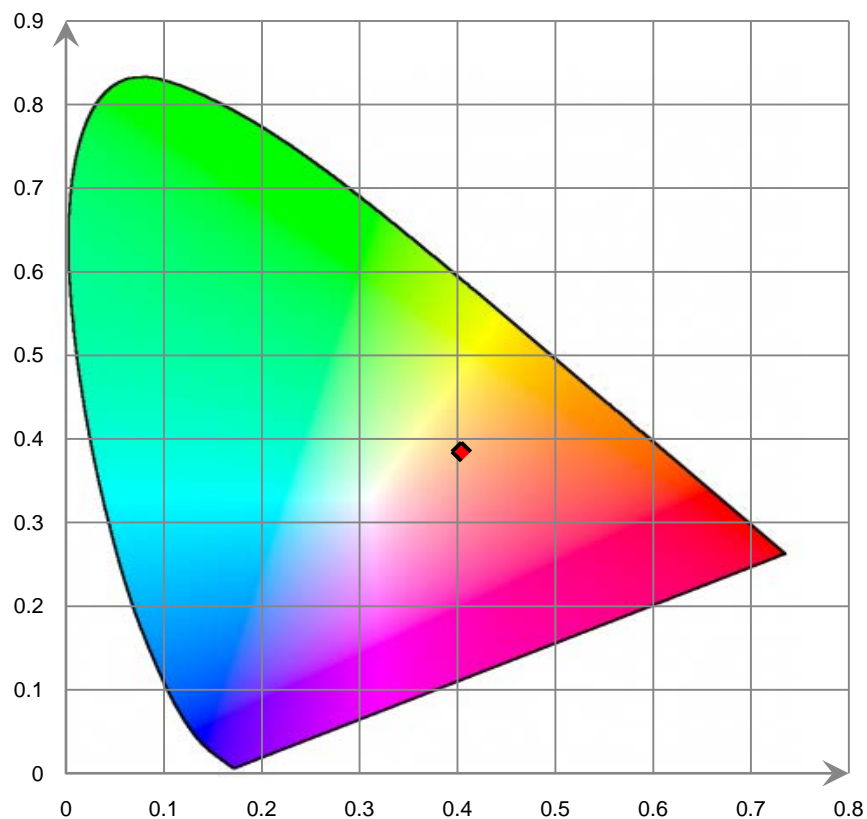
Relative Spectral Power Distribution



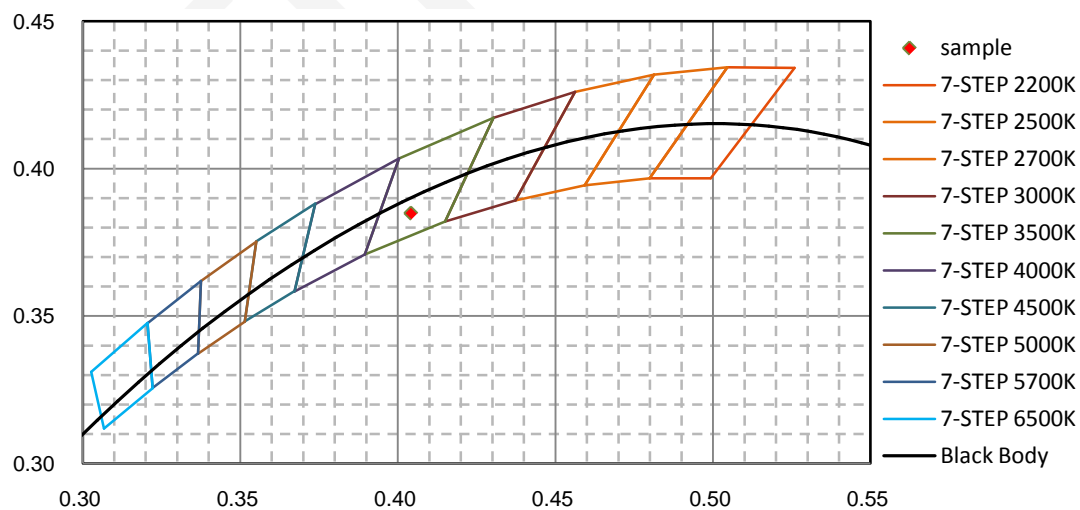
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.720E-02	421	5.059E-01	462	1.040E+01	503	7.862E+00	544	1.261E+01
381	3.190E-02	422	5.772E-01	463	9.848E+00	504	8.107E+00	545	1.272E+01
382	2.250E-02	423	6.980E-01	464	9.578E+00	505	8.348E+00	546	1.285E+01
383	2.180E-02	424	8.012E-01	465	9.108E+00	506	8.586E+00	547	1.285E+01
384	2.080E-02	425	9.139E-01	466	8.874E+00	507	8.693E+00	548	1.297E+01
385	1.270E-02	426	1.082E+00	467	8.422E+00	508	8.921E+00	549	1.312E+01
386	1.450E-02	427	1.230E+00	468	8.149E+00	509	9.008E+00	550	1.313E+01
387	1.700E-02	428	1.448E+00	469	7.679E+00	510	9.233E+00	551	1.326E+01
388	1.910E-02	429	1.624E+00	470	7.372E+00	511	9.457E+00	552	1.341E+01
389	2.450E-02	430	1.807E+00	471	6.908E+00	512	9.648E+00	553	1.355E+01
390	2.190E-02	431	2.082E+00	472	6.603E+00	513	9.705E+00	554	1.356E+01
391	1.030E-02	432	2.302E+00	473	6.185E+00	514	9.899E+00	555	1.371E+01
392	7.900E-03	433	2.634E+00	474	5.933E+00	515	9.941E+00	556	1.385E+01
393	1.390E-02	434	2.901E+00	475	5.597E+00	516	1.012E+01	557	1.389E+01
394	1.840E-02	435	3.312E+00	476	5.421E+00	517	1.030E+01	558	1.419E+01
395	1.860E-02	436	3.651E+00	477	5.287E+00	518	1.046E+01	559	1.421E+01
396	1.300E-02	437	4.025E+00	478	5.086E+00	519	1.049E+01	560	1.436E+01
397	1.010E-02	438	4.594E+00	479	5.019E+00	520	1.065E+01	561	1.452E+01
398	6.900E-03	439	5.090E+00	480	4.894E+00	521	1.065E+01	562	1.455E+01
399	3.400E-03	440	5.855E+00	481	4.894E+00	522	1.079E+01	563	1.473E+01
400	1.380E-02	441	6.519E+00	482	4.914E+00	523	1.092E+01	564	1.490E+01
401	1.600E-02	442	7.520E+00	483	4.870E+00	524	1.105E+01	565	1.508E+01
402	1.640E-02	443	8.411E+00	484	4.935E+00	525	1.105E+01	566	1.527E+01
403	1.650E-02	444	9.661E+00	485	4.926E+00	526	1.118E+01	567	1.545E+01
404	2.030E-02	445	1.068E+01	486	5.010E+00	527	1.130E+01	568	1.548E+01
405	2.640E-02	446	1.204E+01	487	5.022E+00	528	1.141E+01	569	1.565E+01
406	3.180E-02	447	1.304E+01	488	5.151E+00	529	1.138E+01	570	1.568E+01
407	3.680E-02	448	1.436E+01	489	5.301E+00	530	1.150E+01	571	1.585E+01
408	3.830E-02	449	1.509E+01	490	5.372E+00	531	1.162E+01	572	1.603E+01
409	6.020E-02	450	1.600E+01	491	5.547E+00	532	1.160E+01	573	1.620E+01
410	7.410E-02	451	1.622E+01	492	5.742E+00	533	1.172E+01	574	1.637E+01
411	8.330E-02	452	1.655E+01	493	5.845E+00	534	1.183E+01	575	1.655E+01
412	9.050E-02	453	1.617E+01	494	6.060E+00	535	1.181E+01	576	1.659E+01
413	1.064E-01	454	1.594E+01	495	6.190E+00	536	1.193E+01	577	1.675E+01
414	1.302E-01	455	1.511E+01	496	6.420E+00	537	1.205E+01	578	1.693E+01
415	1.567E-01	456	1.455E+01	497	6.658E+00	538	1.203E+01	579	1.711E+01
416	2.040E-01	457	1.354E+01	498	6.804E+00	539	1.228E+01	580	1.726E+01
417	2.449E-01	458	1.290E+01	499	7.071E+00	540	1.226E+01	581	1.728E+01
418	2.960E-01	459	1.200E+01	500	7.332E+00	541	1.238E+01	582	1.743E+01
419	3.570E-01	460	1.149E+01	501	7.477E+00	542	1.237E+01	583	1.759E+01
420	4.141E-01	461	1.077E+01	502	7.736E+00	543	1.249E+01	584	1.760E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.773E+01	626	1.611E+01	667	7.353E+00	708	2.164E+00	749	3.673E-01
586	1.787E+01	627	1.595E+01	668	7.167E+00	709	2.072E+00	750	3.832E-01
587	1.801E+01	628	1.578E+01	669	6.987E+00	710	1.983E+00	751	3.927E-01
588	1.814E+01	629	1.562E+01	670	6.778E+00	711	1.896E+00	752	3.833E-01
589	1.812E+01	630	1.545E+01	671	6.605E+00	712	1.847E+00	753	3.422E-01
590	1.824E+01	631	1.517E+01	672	6.440E+00	713	1.788E+00	754	3.004E-01
591	1.835E+01	632	1.498E+01	673	6.268E+00	714	1.713E+00	755	2.882E-01
592	1.846E+01	633	1.480E+01	674	6.081E+00	715	1.645E+00	756	2.876E-01
593	1.841E+01	634	1.461E+01	675	5.941E+00	716	1.569E+00	757	1.981E-01
594	1.850E+01	635	1.433E+01	676	5.791E+00	717	1.526E+00	758	1.618E-01
595	1.857E+01	636	1.413E+01	677	5.602E+00	718	1.469E+00	759	1.696E-01
596	1.865E+01	637	1.392E+01	678	5.446E+00	719	1.408E+00	760	1.481E-01
597	1.857E+01	638	1.371E+01	679	5.303E+00	720	1.359E+00	761	1.807E-01
598	1.863E+01	639	1.343E+01	680	5.139E+00	721	1.307E+00	762	2.083E-01
599	1.869E+01	640	1.322E+01	681	5.027E+00	722	1.285E+00	763	2.210E-01
600	1.873E+01	641	1.293E+01	682	4.878E+00	723	1.218E+00	764	1.550E-01
601	1.876E+01	642	1.272E+01	683	4.736E+00	724	1.165E+00	765	1.274E-01
602	1.865E+01	643	1.260E+01	684	4.588E+00	725	1.130E+00	766	1.438E-01
603	1.866E+01	644	1.233E+01	685	4.442E+00	726	1.076E+00	767	1.643E-01
604	1.867E+01	645	1.210E+01	686	4.316E+00	727	1.048E+00	768	1.437E-01
605	1.866E+01	646	1.186E+01	687	4.213E+00	728	1.010E+00	769	1.161E-01
606	1.852E+01	647	1.165E+01	688	4.078E+00	729	9.949E-01	770	1.063E-01
607	1.851E+01	648	1.137E+01	689	3.942E+00	730	9.647E-01	771	1.187E-01
608	1.849E+01	649	1.117E+01	690	3.826E+00	731	9.461E-01	772	1.182E-01
609	1.843E+01	650	1.097E+01	691	3.699E+00	732	8.903E-01	773	9.170E-02
610	1.838E+01	651	1.077E+01	692	3.593E+00	733	8.271E-01	774	7.760E-02
611	1.820E+01	652	1.051E+01	693	3.482E+00	734	7.993E-01	775	8.700E-02
612	1.814E+01	653	1.029E+01	694	3.391E+00	735	7.527E-01	776	8.720E-02
613	1.807E+01	654	1.009E+01	695	3.274E+00	736	7.172E-01	777	8.930E-02
614	1.798E+01	655	9.817E+00	696	3.182E+00	737	6.672E-01	778	7.800E-02
615	1.789E+01	656	9.643E+00	697	3.097E+00	738	6.224E-01	779	9.010E-02
616	1.767E+01	657	9.385E+00	698	2.976E+00	739	5.972E-01	780	7.660E-02
617	1.757E+01	658	9.190E+00	699	2.865E+00	740	6.000E-01		
618	1.746E+01	659	8.944E+00	700	2.786E+00	741	5.914E-01		
619	1.735E+01	660	8.729E+00	701	2.710E+00	742	5.715E-01		
620	1.722E+01	661	8.528E+00	702	2.613E+00	743	5.018E-01		
621	1.696E+01	662	8.357E+00	703	2.528E+00	744	4.501E-01		
622	1.682E+01	663	8.120E+00	704	2.436E+00	745	4.049E-01		
623	1.669E+01	664	7.932E+00	705	2.355E+00	746	3.896E-01		
624	1.655E+01	665	7.744E+00	706	2.294E+00	747	4.046E-01		
625	1.628E+01	666	7.519E+00	707	2.228E+00	748	3.827E-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**

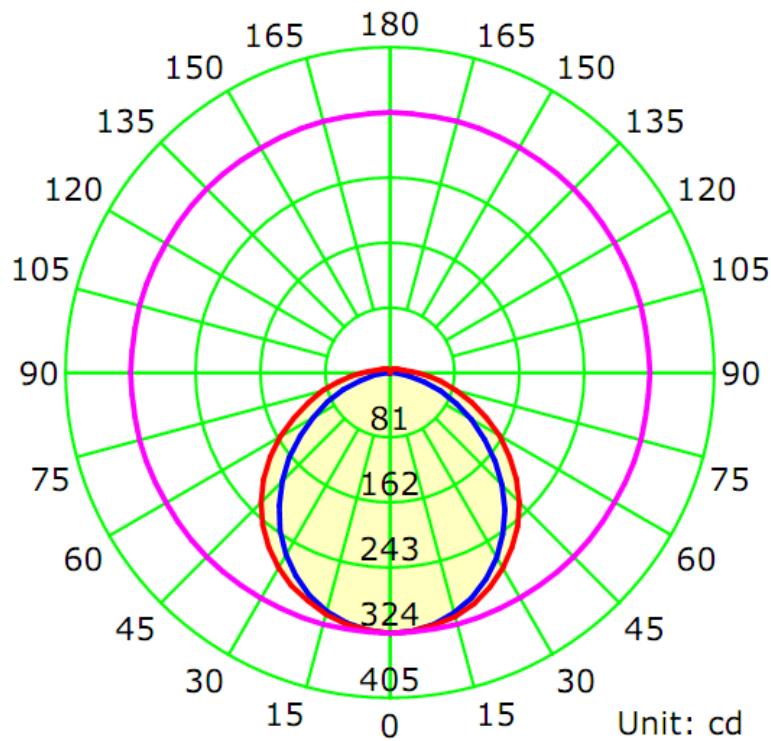
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0765	9.14	0.9956

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1008.2	110.31	324.5	1.21	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	102.3	113.0	118.3	112.5	111.5
Field Angle (10% I_{max}):	154.8	179.1	183.2	178.9	174.0

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	325	325	325	325	325	325	325	325
5.0°	323	323	323	323	323	323	323	323
10.0°	318	318	318	319	320	319	318	318
15.0°	310	310	312	314	315	313	311	309
20.0°	298	299	302	305	307	305	302	297
25.0°	284	286	290	293	295	293	289	283
30.0°	266	269	275	279	281	278	273	266
35.0°	246	251	257	263	266	262	255	247
40.0°	224	229	237	245	249	244	235	225
45.0°	199	205	217	225	228	224	213	201
50.0°	172	180	194	202	206	201	190	175
55.0°	145	154	171	179	183	178	166	150
60.0°	118	128	147	154	158	153	142	124
65.0°	92	104	122	130	133	128	118	100
70.0°	67	80	99	106	109	103	94	77
75.0°	44	60	77	83	86	82	73	57
80.0°	23	42	59	63	65	63	55	39
85.0°	7	28	43	47	48	47	42	26
90.0°	0	19	32	35	35	34	30	17
95.0°	0	13	24	26	26	26	23	11
100.0°	0	9	18	20	20	20	18	8
105.0°	0	7	14	16	16	16	14	6
110.0°	0	6	12	13	13	13	11	5
115.0°	0	5	11	12	12	12	10	5
120.0°	0	4	9	10	10	10	8	4
125.0°	0	3	8	9	9	9	7	3
130.0°	0	2	7	8	8	8	7	2
135.0°	1	1	6	7	8	7	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	4	5	4	1	1
155.0°	1	1	1	2	3	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.)

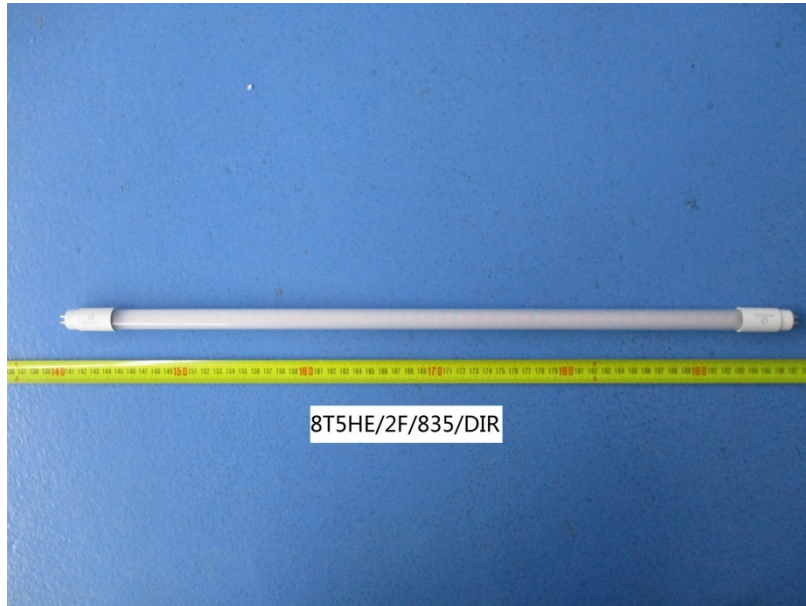
$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	325	325	325	325	325	325	325	325
5.0°	322	322	323	323	323	323	323	323
10.0°	317	317	318	319	318	319	318	318
15.0°	308	309	310	312	312	312	311	309
20.0°	295	297	300	303	303	303	300	298
25.0°	280	282	286	292	293	292	288	284
30.0°	262	265	271	279	280	280	273	267
35.0°	240	245	254	263	266	264	257	248
40.0°	217	222	234	246	249	247	238	226
45.0°	192	198	214	225	229	227	217	203
50.0°	165	173	192	203	207	205	195	178
55.0°	138	148	168	179	183	181	171	152
60.0°	111	123	143	153	158	155	147	127
65.0°	86	99	119	128	133	130	122	102
70.0°	63	76	95	105	109	107	98	79
75.0°	41	56	74	83	87	85	77	59
80.0°	20	40	56	64	66	66	59	41
85.0°	6	26	42	47	49	49	44	27
90.0°	0	17	31	35	36	36	32	18
95.0°	0	12	23	26	27	27	24	12
100.0°	0	8	18	20	21	21	18	8
105.0°	0	6	14	16	17	17	15	6
110.0°	0	5	12	14	14	14	12	5
115.0°	0	5	10	12	12	12	10	5
120.0°	0	5	9	10	10	10	9	5
125.0°	0	5	8	9	9	9	8	5
130.0°	1	4	7	8	8	8	7	4
135.0°	1	4	6	7	8	8	7	4
140.0°	1	3	6	7	7	7	6	3
145.0°	1	3	5	7	7	7	6	3
150.0°	1	3	4	6	6	6	5	3
155.0°	1	2	4	5	5	5	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

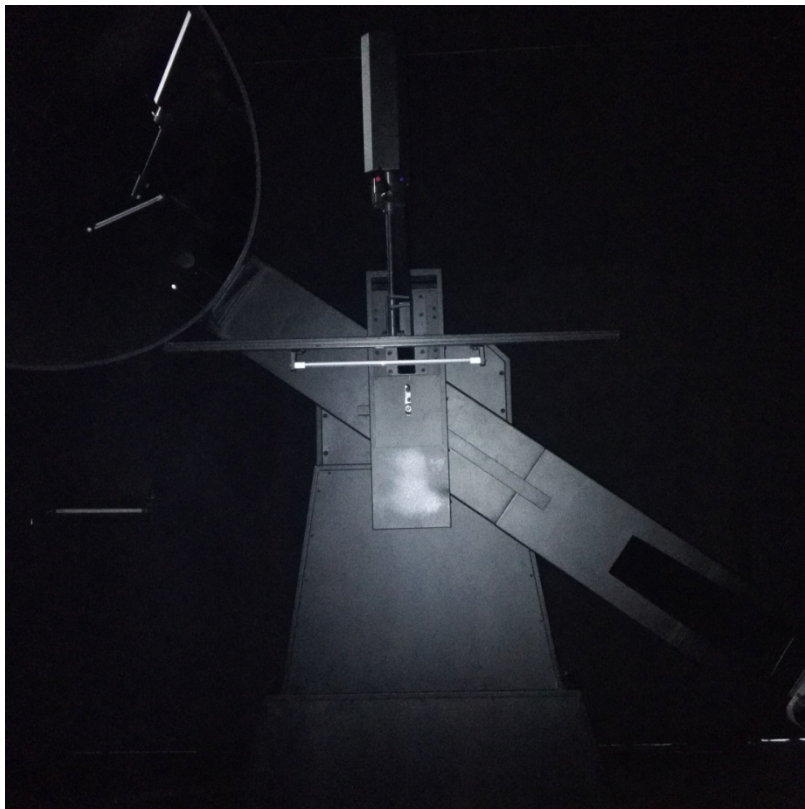
Deg	Flux (lm)	%
0-5	7.7	0.77
5-10	22.9	2.27
10-15	37.3	3.70
15-20	50.4	5.00
20-25	61.8	6.13
25-30	70.9	7.04
30-35	77.7	7.71
35-40	81.8	8.12
40-45	83.1	8.24
45-50	81.5	8.08
50-55	77.2	7.66
55-60	70.6	7.00
60-65	62.1	6.16
65-70	52.4	5.20
70-75	42.3	4.20
75-80	32.5	3.22
80-85	23.7	2.35
85-90	16.9	1.67
90-95	12.1	1.20
95-100	8.9	0.88
100-105	6.8	0.68
105-110	5.4	0.53
110-115	4.4	0.44
115-120	3.7	0.37
120-125	3.1	0.30
125-130	2.6	0.26
130-135	2.1	0.21
135-140	1.8	0.17
140-145	1.4	0.14
145-150	1.1	0.11
150-155	0.7	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	7.7	0.77
0-10	30.7	3.04
0-15	68.0	6.74
0-20	118.4	11.75
0-25	180.2	17.87
0-30	251.1	24.91
0-35	328.8	32.62
0-40	410.7	40.74
0-45	493.8	48.98
0-50	575.3	57.06
0-55	652.5	64.72
0-60	723.1	71.72
0-65	785.2	77.88
0-70	837.6	83.08
0-75	879.9	87.28
0-80	912.5	90.51
0-85	936.2	92.86
0-90	953.0	94.53
0-95	965.1	95.73
0-100	974.0	96.61
0-105	980.8	97.29
0-110	986.2	97.82
0-115	990.7	98.26
0-120	994.4	98.63
0-125	997.4	98.94
0-130	1000.0	99.19
0-135	1002.1	99.40
0-140	1003.9	99.58
0-145	1005.3	99.72
0-150	1006.4	99.82
0-155	1007.1	99.89
0-160	1007.6	99.94
0-165	1007.9	99.97
0-170	1008.1	99.99
0-175	1008.1	100.00
0-180	1008.2	100.00

6. Product Photo



7. Product Test orientation in the Goniophotometer



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