IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 8.5DLNC4DIM/840

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du
Report Number:	RKS170309002-10
Test Date:	2017-03-10
Report Date:	2017-03-11
Reviewed By:	Blake Zhang
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.
Accreditation:	The IAS Accreditation Number TL-460.

1. Product Description

General Information:

One sample was received on 2017-03-09 and used for testing.

Model Tested:	8.5DLNC4DIM/840
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	4" New Construction Downlight
Burning Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120 VAC 60Hz
Rated Power:	8.5W
Nominal CCT:	4000K
Nominal Lumen Output:	550 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	2017-03-09	2018-03-08
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2017-03-03	2018-03-02
Spectral photometer	SENSING	SPR3000	s0902024	350nm～800nm	2017-03-09	2018-03-08
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50Hz	2017-03-03	2018-03-02
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	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	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°C±1°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=2.3% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=23K (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 (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_f, 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	0.07343	8.218	0.9327	664.22	80.82

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.049	3786	0.00063	0.3909	0.3844	0.2289	0.5064

Color Rendering Index

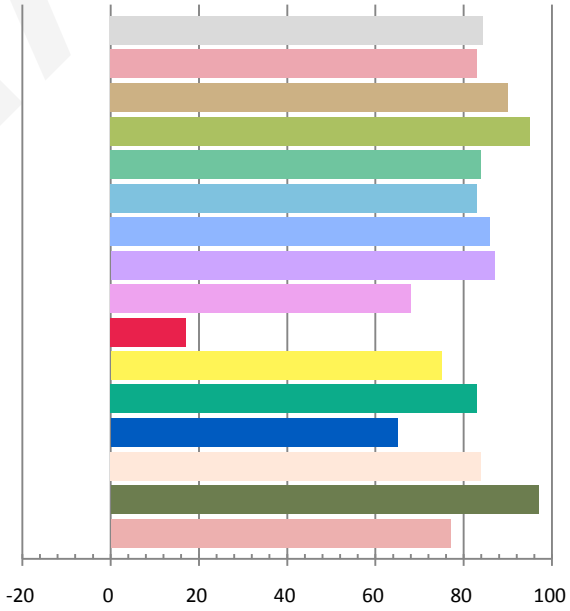
Ra
84.4

R1	R2	R3	R4
83	90	95	84

R5	R6	R7	R8
83	86	87	68

R9	R10	R11	R12
17	75	83	65

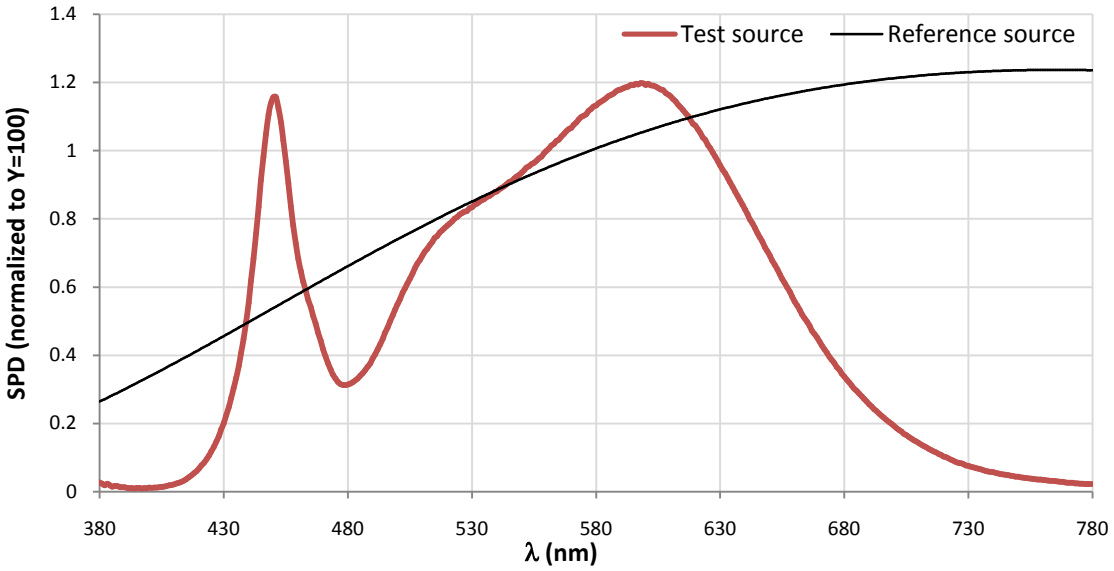
R13	R14	R15
84	97	77



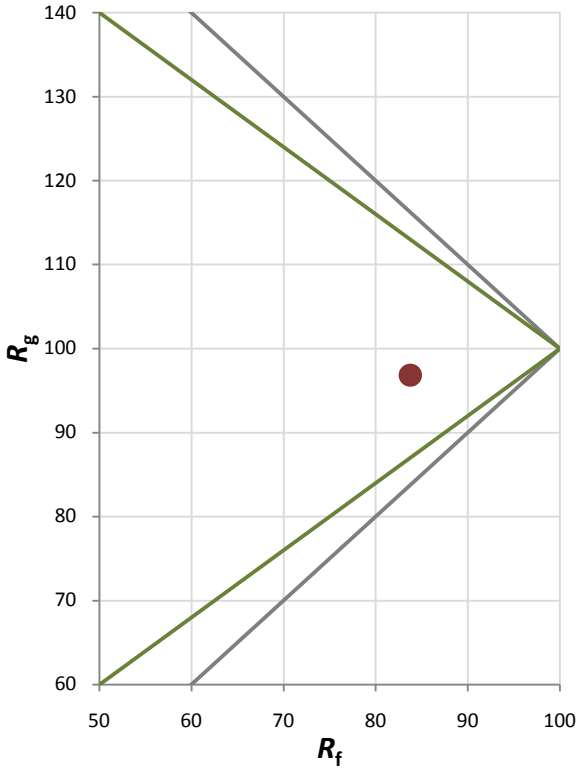
Fidelity Index and Gamut Index

Fidelity Index R_f	84
Gamut Index R_g	97

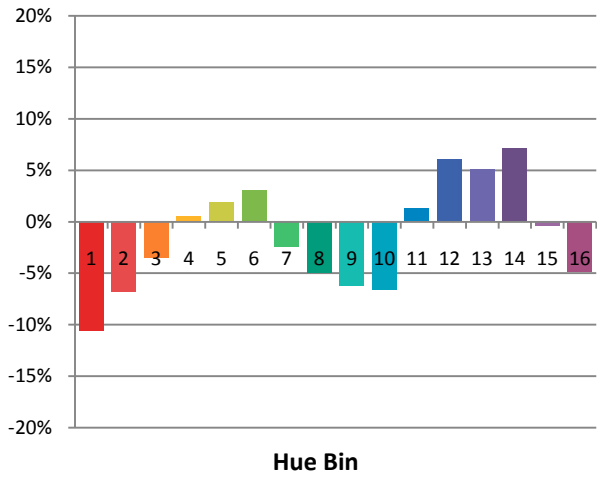
Spectral Power Distribution Comparison



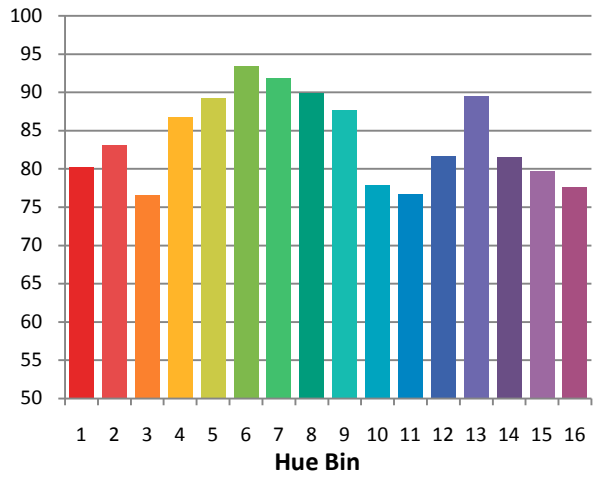
Plot of R_g versus R_f



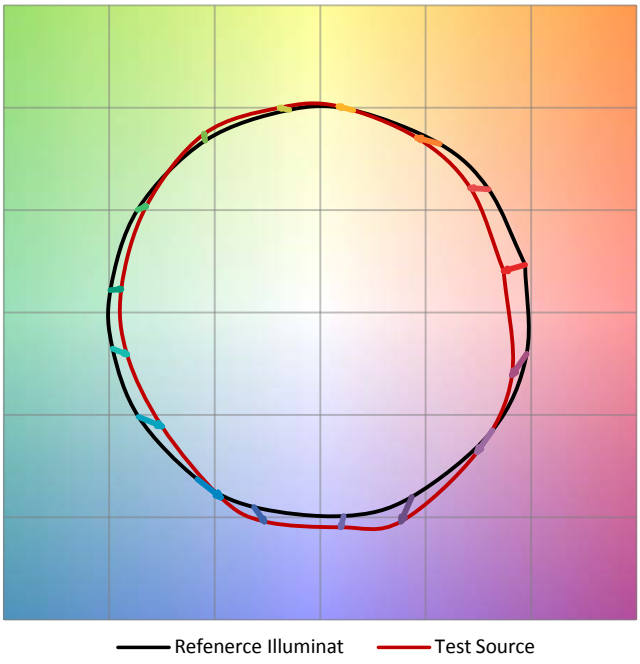
Chroma Shift by Hue

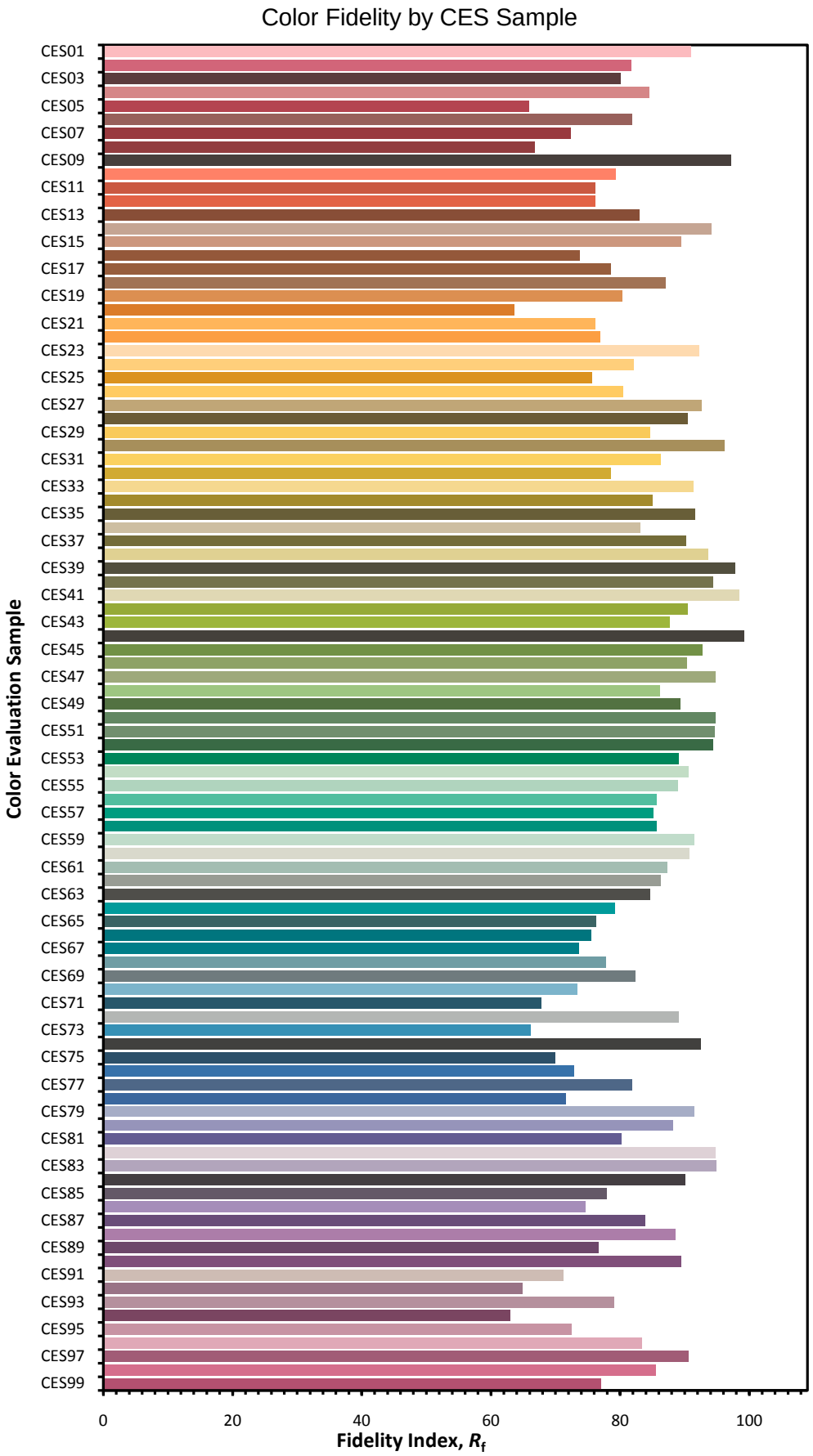


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
CES15
CES17
CES19
CES21
CES23
CES25
CES27
CES29
CES31
CES33
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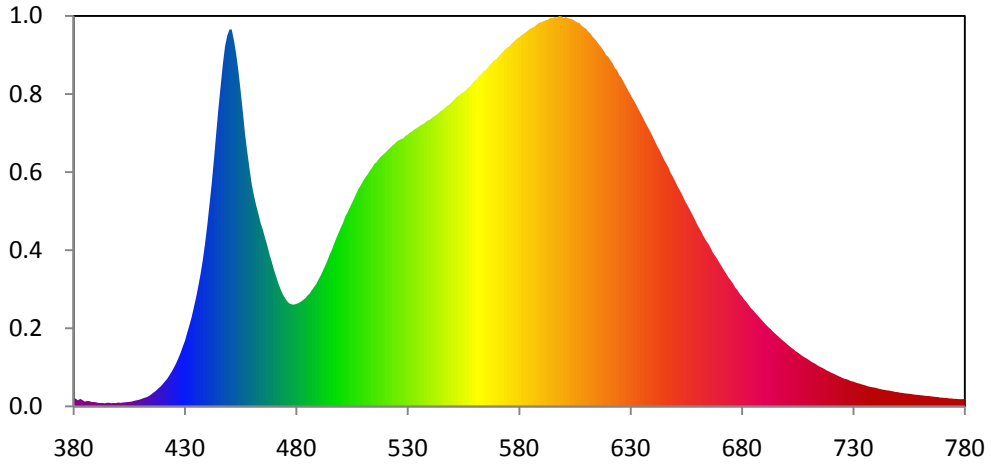
CES81
CES83
CES85
CES87
CES89
CES91
CES93
CES95
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

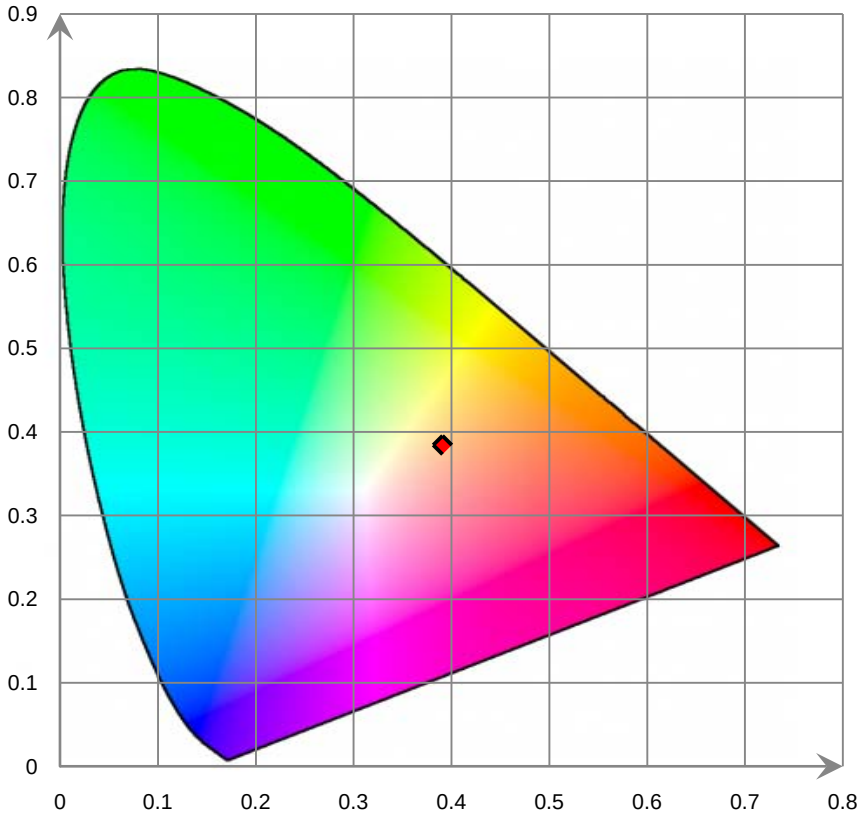
Relative Spectral Power Distribution



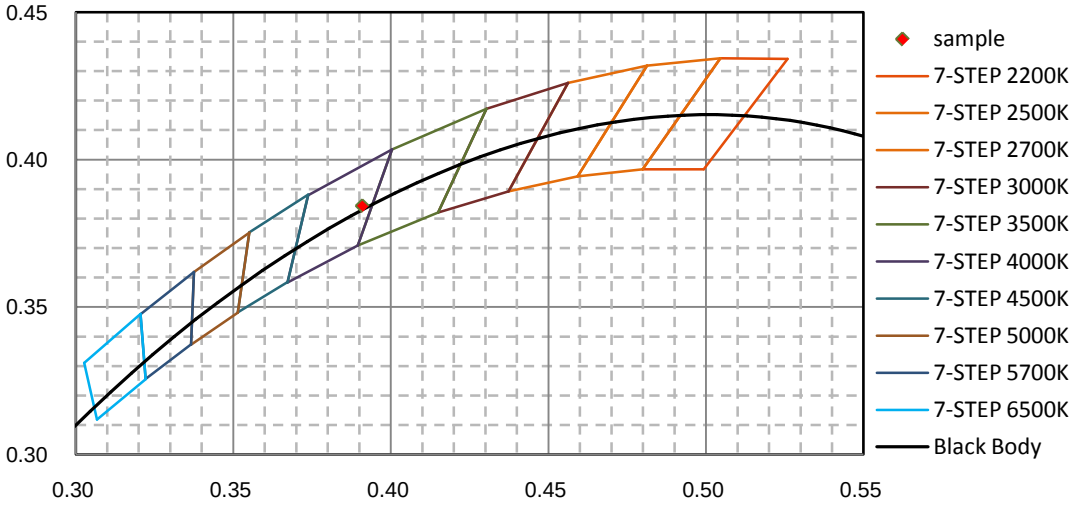
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.631E-01	421	7.432E-01	462	5.992E+00	503	5.793E+00	544	8.766E+00
381	2.289E-01	422	8.185E-01	463	5.746E+00	504	5.939E+00	545	8.827E+00
382	1.794E-01	423	9.228E-01	464	5.466E+00	505	6.073E+00	546	8.863E+00
383	2.258E-01	424	1.032E+00	465	5.268E+00	506	6.219E+00	547	8.933E+00
384	1.901E-01	425	1.151E+00	466	5.020E+00	507	6.365E+00	548	8.982E+00
385	1.411E-01	426	1.279E+00	467	4.797E+00	508	6.505E+00	549	9.032E+00
386	1.595E-01	427	1.431E+00	468	4.529E+00	509	6.609E+00	550	9.100E+00
387	1.594E-01	428	1.590E+00	469	4.310E+00	510	6.730E+00	551	9.168E+00
388	1.344E-01	429	1.776E+00	470	4.070E+00	511	6.838E+00	552	9.245E+00
389	1.289E-01	430	1.954E+00	471	3.863E+00	512	6.926E+00	553	9.280E+00
390	1.257E-01	431	2.192E+00	472	3.661E+00	513	7.035E+00	554	9.343E+00
391	1.052E-01	432	2.420E+00	473	3.487E+00	514	7.127E+00	555	9.383E+00
392	1.004E-01	433	2.662E+00	474	3.335E+00	515	7.239E+00	556	9.434E+00
393	1.037E-01	434	2.954E+00	475	3.227E+00	516	7.287E+00	557	9.508E+00
394	9.077E-02	435	3.250E+00	476	3.126E+00	517	7.389E+00	558	9.553E+00
395	1.085E-01	436	3.585E+00	477	3.068E+00	518	7.457E+00	559	9.649E+00
396	1.099E-01	437	3.946E+00	478	3.044E+00	519	7.518E+00	560	9.718E+00
397	9.316E-02	438	4.363E+00	479	3.040E+00	520	7.579E+00	561	9.782E+00
398	1.038E-01	439	4.842E+00	480	3.058E+00	521	7.649E+00	562	9.869E+00
399	9.664E-02	440	5.391E+00	481	3.086E+00	522	7.713E+00	563	9.914E+00
400	1.160E-01	441	6.009E+00	482	3.122E+00	523	7.779E+00	564	1.000E+01
401	1.048E-01	442	6.637E+00	483	3.176E+00	524	7.831E+00	565	1.004E+01
402	1.139E-01	443	7.359E+00	484	3.225E+00	525	7.899E+00	566	1.013E+01
403	1.207E-01	444	8.120E+00	485	3.309E+00	526	7.946E+00	567	1.020E+01
404	1.281E-01	445	8.876E+00	486	3.372E+00	527	7.983E+00	568	1.027E+01
405	1.327E-01	446	9.546E+00	487	3.470E+00	528	8.002E+00	569	1.034E+01
406	1.422E-01	447	1.020E+01	488	3.567E+00	529	8.081E+00	570	1.037E+01
407	1.606E-01	448	1.075E+01	489	3.656E+00	530	8.113E+00	571	1.046E+01
408	1.784E-01	449	1.107E+01	490	3.795E+00	531	8.179E+00	572	1.053E+01
409	1.907E-01	450	1.125E+01	491	3.916E+00	532	8.211E+00	573	1.061E+01
410	2.087E-01	451	1.125E+01	492	4.063E+00	533	8.270E+00	574	1.068E+01
411	2.362E-01	452	1.093E+01	493	4.207E+00	534	8.307E+00	575	1.072E+01
412	2.584E-01	453	1.053E+01	494	4.360E+00	535	8.352E+00	576	1.077E+01
413	2.823E-01	454	1.002E+01	495	4.537E+00	536	8.402E+00	577	1.086E+01
414	3.177E-01	455	9.422E+00	496	4.683E+00	537	8.432E+00	578	1.091E+01
415	3.648E-01	456	8.788E+00	497	4.863E+00	538	8.480E+00	579	1.098E+01
416	4.175E-01	457	8.121E+00	498	5.029E+00	539	8.538E+00	580	1.101E+01
417	4.658E-01	458	7.593E+00	499	5.185E+00	540	8.559E+00	581	1.108E+01
418	5.317E-01	459	7.090E+00	500	5.342E+00	541	8.620E+00	582	1.112E+01
419	5.876E-01	460	6.628E+00	501	5.488E+00	542	8.668E+00	583	1.117E+01
420	6.628E-01	461	6.290E+00	502	5.671E+00	543	8.713E+00	584	1.122E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.128E+01	626	9.798E+00	667	4.587E+00	708	1.467E+00	749	4.299E-01
586	1.131E+01	627	9.668E+00	668	4.494E+00	709	1.432E+00	750	4.239E-01
587	1.135E+01	628	9.554E+00	669	4.393E+00	710	1.388E+00	751	4.097E-01
588	1.141E+01	629	9.422E+00	670	4.277E+00	711	1.339E+00	752	4.013E-01
589	1.145E+01	630	9.305E+00	671	4.170E+00	712	1.302E+00	753	3.917E-01
590	1.147E+01	631	9.182E+00	672	4.059E+00	713	1.268E+00	754	3.827E-01
591	1.150E+01	632	9.077E+00	673	3.956E+00	714	1.220E+00	755	3.760E-01
592	1.153E+01	633	8.942E+00	674	3.845E+00	715	1.183E+00	756	3.687E-01
593	1.155E+01	634	8.819E+00	675	3.760E+00	716	1.153E+00	757	3.568E-01
594	1.160E+01	635	8.694E+00	676	3.666E+00	717	1.118E+00	758	3.489E-01
595	1.159E+01	636	8.561E+00	677	3.548E+00	718	1.075E+00	759	3.426E-01
596	1.163E+01	637	8.428E+00	678	3.472E+00	719	1.045E+00	760	3.354E-01
597	1.161E+01	638	8.307E+00	679	3.363E+00	720	1.007E+00	761	3.263E-01
598	1.165E+01	639	8.186E+00	680	3.286E+00	721	9.812E-01	762	3.192E-01
599	1.164E+01	640	8.046E+00	681	3.193E+00	722	9.497E-01	763	3.087E-01
600	1.160E+01	641	7.909E+00	682	3.114E+00	723	9.147E-01	764	3.085E-01
601	1.163E+01	642	7.766E+00	683	3.026E+00	724	8.857E-01	765	2.973E-01
602	1.159E+01	643	7.657E+00	684	2.936E+00	725	8.524E-01	766	2.908E-01
603	1.158E+01	644	7.514E+00	685	2.871E+00	726	8.248E-01	767	2.815E-01
604	1.155E+01	645	7.371E+00	686	2.791E+00	727	8.114E-01	768	2.785E-01
605	1.151E+01	646	7.255E+00	687	2.720E+00	728	7.828E-01	769	2.621E-01
606	1.147E+01	647	7.135E+00	688	2.642E+00	729	7.516E-01	770	2.593E-01
607	1.145E+01	648	6.972E+00	689	2.570E+00	730	7.409E-01	771	2.523E-01
608	1.137E+01	649	6.855E+00	690	2.493E+00	731	7.150E-01	772	2.537E-01
609	1.132E+01	650	6.722E+00	691	2.424E+00	732	6.907E-01	773	2.370E-01
610	1.128E+01	651	6.586E+00	692	2.357E+00	733	6.757E-01	774	2.372E-01
611	1.119E+01	652	6.464E+00	693	2.299E+00	734	6.519E-01	775	2.262E-01
612	1.113E+01	653	6.339E+00	694	2.225E+00	735	6.337E-01	776	2.253E-01
613	1.103E+01	654	6.196E+00	695	2.166E+00	736	6.131E-01	777	2.176E-01
614	1.097E+01	655	6.068E+00	696	2.108E+00	737	5.916E-01	778	2.157E-01
615	1.088E+01	656	5.948E+00	697	2.047E+00	738	5.785E-01	779	2.160E-01
616	1.079E+01	657	5.820E+00	698	1.985E+00	739	5.659E-01	780	2.162E-01
617	1.071E+01	658	5.699E+00	699	1.930E+00	740	5.552E-01		
618	1.061E+01	659	5.564E+00	700	1.875E+00	741	5.352E-01		
619	1.049E+01	660	5.418E+00	701	1.813E+00	742	5.184E-01		
620	1.044E+01	661	5.308E+00	702	1.759E+00	743	5.026E-01		
621	1.033E+01	662	5.183E+00	703	1.714E+00	744	4.926E-01		
622	1.024E+01	663	5.054E+00	704	1.653E+00	745	4.790E-01		
623	1.010E+01	664	4.940E+00	705	1.612E+00	746	4.730E-01		
624	1.003E+01	665	4.844E+00	706	1.562E+00	747	4.589E-01		
625	9.883E+00	666	4.726E+00	707	1.511E+00	748	4.453E-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**

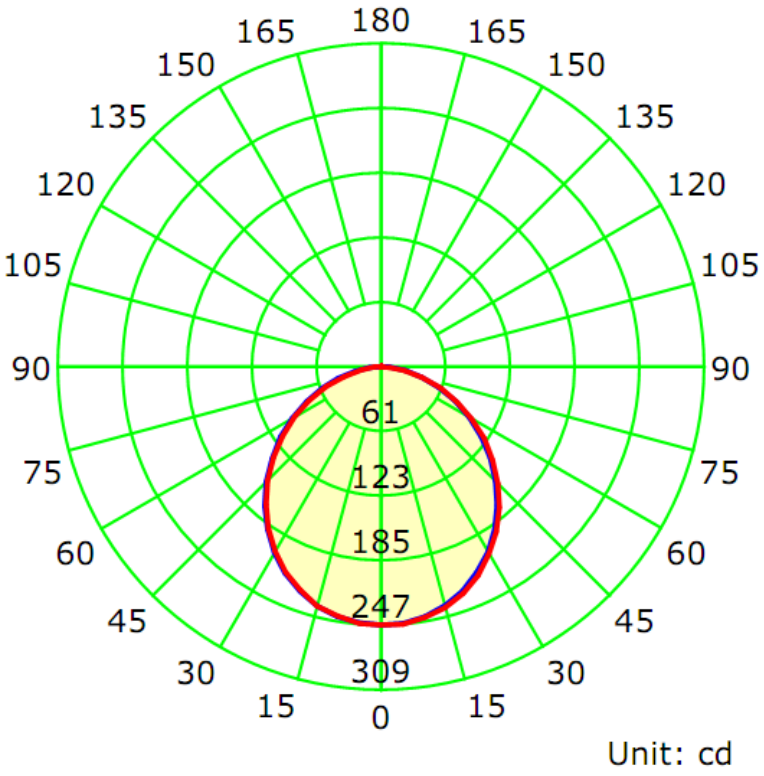
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0740	8.25	0.9350

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
671.9	81.44	247.9	1.23	1.23

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	106.7	106.7	107.0	107.2	106.9
Field Angle (10% I_{max}):	160.3	160.4	157.9	159.5	159.5

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	248	248	248	248	248	248	248	248
5.0°	247	247	247	247	248	247	247	247
10.0°	243	243	243	244	244	244	245	244
15.0°	237	238	238	238	239	239	238	237
20.0°	229	229	230	230	231	231	231	231
25.0°	218	218	219	219	220	220	221	219
30.0°	205	206	206	207	207	207	208	208
35.0°	190	191	191	192	193	193	193	193
40.0°	174	174	175	176	176	177	177	177
45.0°	156	156	157	158	159	159	159	159
50.0°	137	138	138	139	140	141	141	141
55.0°	117	118	119	120	121	121	121	121
60.0°	98	98	99	100	101	101	102	101
65.0°	78	78	79	80	81	82	82	82
70.0°	59	60	60	61	61	61	63	63
75.0°	41	42	42	42	41	42	44	45
80.0°	24	25	25	25	23	23	27	28
85.0°	8	10	11	11	9	10	12	13
90.0°	0	0	0	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°	1	1	1	1	1	1	1	0
135.0°	1	1	1	1	1	1	1	1
140.0°	1	1	1	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°	1	1	1	1	1	1	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.)

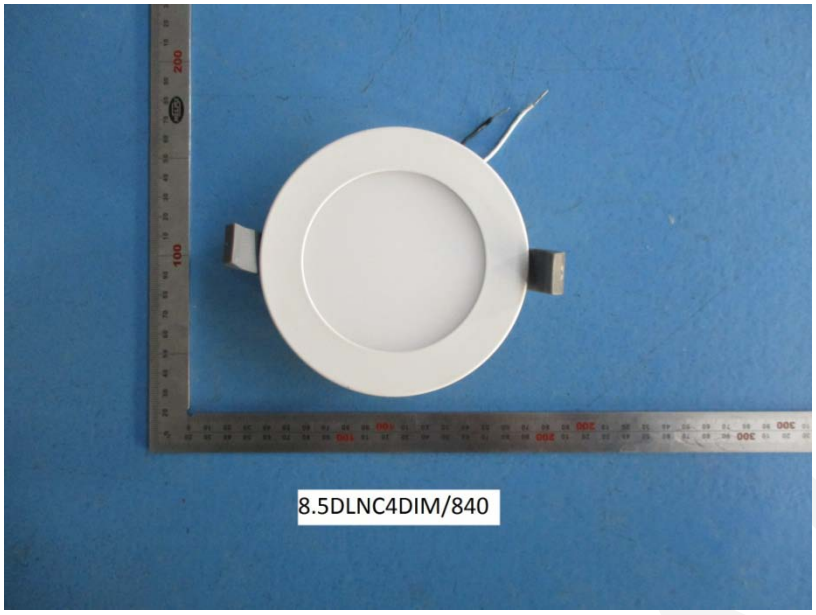
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	248	248	248	248	248	248	248	248
5.0°	247	247	246	247	247	245	246	247
10.0°	243	243	243	243	243	243	242	243
15.0°	238	237	237	236	237	235	236	237
20.0°	229	229	228	228	228	227	228	228
25.0°	218	218	218	217	217	218	217	217
30.0°	206	205	205	204	204	204	204	204
35.0°	191	191	190	189	189	189	189	189
40.0°	174	174	173	172	173	172	172	172
45.0°	156	156	155	154	154	154	153	153
50.0°	137	137	136	136	135	134	135	135
55.0°	118	118	117	116	116	115	115	115
60.0°	99	98	97	97	96	95	95	95
65.0°	79	79	78	77	77	76	76	76
70.0°	61	60	60	59	56	55	57	57
75.0°	43	42	42	40	37	36	39	39
80.0°	26	26	25	23	20	19	21	22
85.0°	12	11	11	9	7	6	6	4
90.0°	0	0	0	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	1	0	0	1	1	1	0
140.0°	1	1	1	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°	1	1	1	1	1	1	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

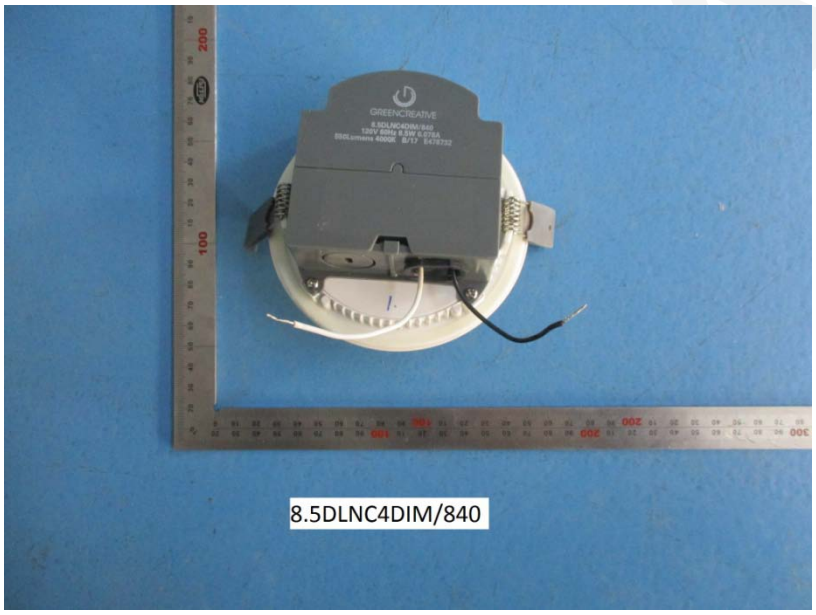
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	5.9	0.88
5-10	17.5	2.61
10-15	28.5	4.24
15-20	38.4	5.72
20-25	46.9	6.99
25-30	53.7	7.99
30-35	58.4	8.69
35-40	60.9	9.06
40-45	61.2	9.10
45-50	59.3	8.83
50-55	55.5	8.26
55-60	49.9	7.43
60-65	43.0	6.40
65-70	35.0	5.21
70-75	26.3	3.91
75-80	17.4	2.58
80-85	9.0	1.34
85-90	2.6	0.39
90-95	0.1	0.01
95-100	0.1	0.01
100-105	0.1	0.01
105-110	0.1	0.01
110-115	0.1	0.01
115-120	0.1	0.02
120-125	0.1	0.02
125-130	0.2	0.02
130-135	0.2	0.03
135-140	0.2	0.03
140-145	0.2	0.03
145-150	0.2	0.03
150-155	0.2	0.03
155-160	0.2	0.03
160-165	0.2	0.03
165-170	0.1	0.02
170-175	0.1	0.01
175-180	0.0	0.00

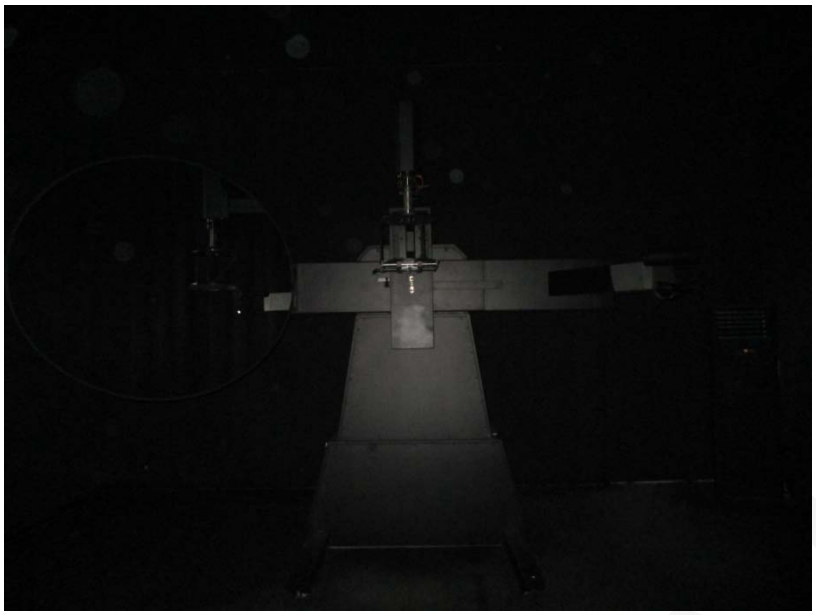
Deg	Flux (lm)	%
0-5	5.9	0.88
0-10	23.4	3.49
0-15	51.9	7.73
0-20	90.4	13.45
0-25	137.3	20.44
0-30	191.0	28.43
0-35	249.3	37.11
0-40	310.2	46.18
0-45	371.4	55.28
0-50	430.7	64.10
0-55	486.2	72.37
0-60	536.1	79.80
0-65	579.2	86.20
0-70	614.2	91.41
0-75	640.4	95.32
0-80	657.8	97.90
0-85	666.8	99.24
0-90	669.4	99.63
0-95	669.5	99.64
0-100	669.5	99.65
0-105	669.6	99.66
0-110	669.7	99.68
0-115	669.8	99.69
0-120	669.9	99.70
0-125	670.0	99.72
0-130	670.2	99.75
0-135	670.4	99.78
0-140	670.6	99.81
0-145	670.8	99.84
0-150	671.0	99.88
0-155	671.3	99.91
0-160	671.5	99.94
0-165	671.6	99.97
0-170	671.8	99.99
0-175	671.9	100.00
0-180	671.9	100.00

6. Product Photo





7. Product Test orientation in the Goniophotometer



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