IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

Test Model: 24HID/835/277V/E26/DIM

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Reviewed By:	George Chen
Report Number:	KS2210909-47100E-10-1
Test Date:	2021-11-10
Report Date:	2021-12-10
Approved by:	Bill Xiong / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588

1. Product Description

General Information:

Two test samples were in good condition and received on 2021-09-09. One was tested in integrating sphere and the other was tested in goniophotometer

Model Tested:	24HID/835/277V/E26/DIM
Manufacturer:	GREEN CREATIVE LTD
Product Designation:	Omnidirectional LED Lamp
Burning Time Before Test:	0hour(For New Products)

#Rated Values:

Rated Voltage/Frequency:	120-277VAC 50/60Hz
Rated Power:	24W
Nominal CCT:	3500K
Nominal Lumen Output:	3100lm

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-18: 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	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	2021-09-27	2022-09-26
spectroradiometer	EVERFINE	HAAS-2000	G112048TS81331121	2021-09-27	2022-09-26
Digital Power Meter	EVERFINE	PF2010A	1011004	2021-09-27	2022-09-26
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	2021-06-30	2022-06-29
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2022-10-14
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	2021-01-04	2022-01-03
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2021-01-04	2022-01-03
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2021-01-04	2022-01-03
Digital power meter	YOKOGAWA	WT-210	91j926132	2021-01-04	2022-01-03
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2021-03-12	2022-03-11
wireless remote thermohygrometer	N/A	433MHz	N/A	2021-04-27	2022-04-26
Standard Light Source	EVERFINE	D908	1012003	2021-10-15	2022-10-14

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=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=22K (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=0.18% of rdg, Power U=0.46%) (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=2.00% (K=2), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_f, R_g was calculated according to IES TM-30-18 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: **1.0 hour**

Test orientation: **Base up**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1935	23.07	0.9935	3105.0	134.61

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.3471	3440	0.000570	0.4093	0.3940	0.2370	0.5132

Color Rendering Index

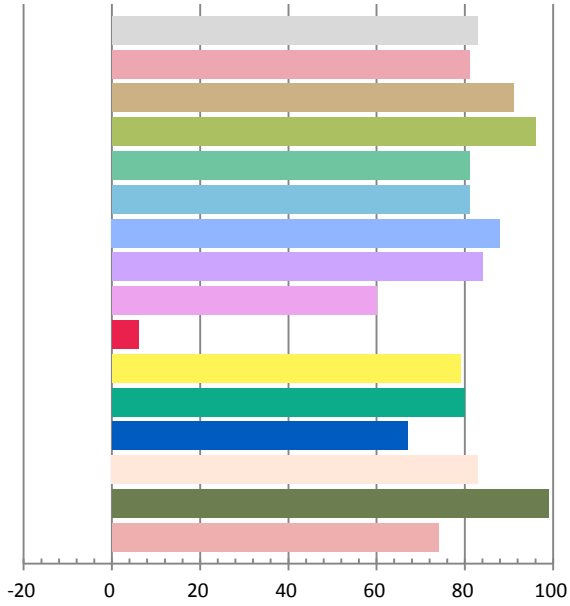
Ra
82.8

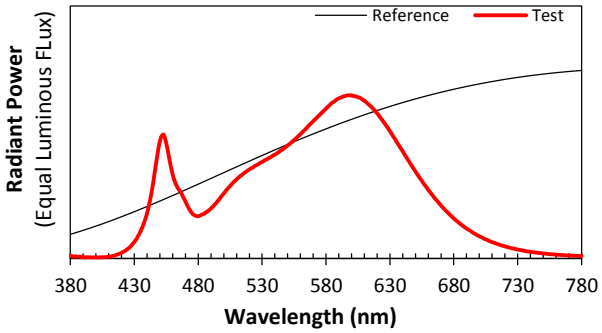
R1	R2	R3	R4
81	91	96	81

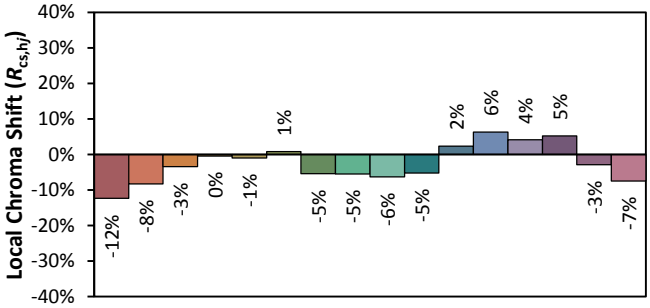
R5	R6	R7	R8
81	88	84	60

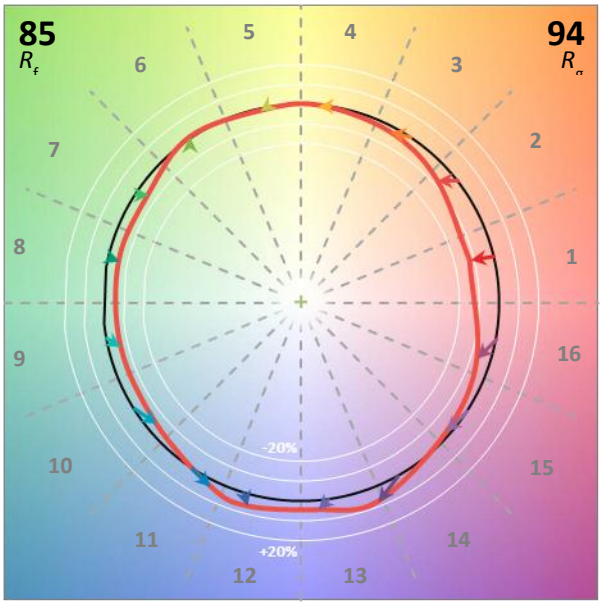
R9	R10	R11	R12
6	79	80	67

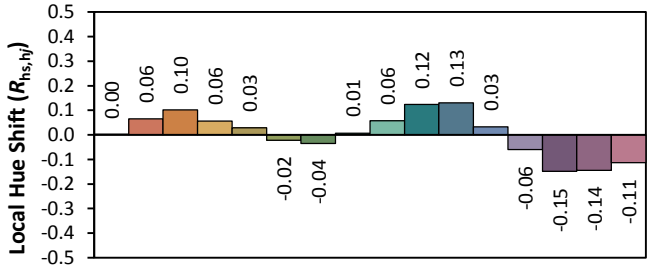
R13	R14	R15
83	99	74

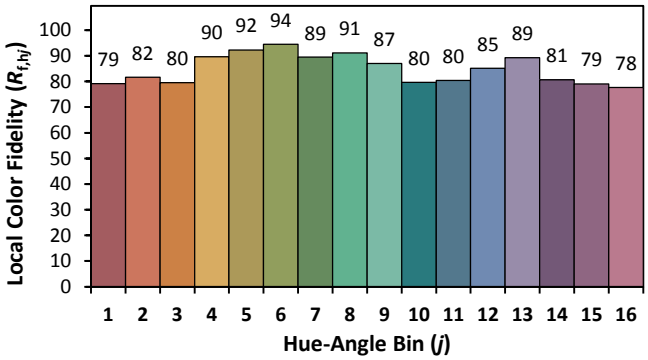


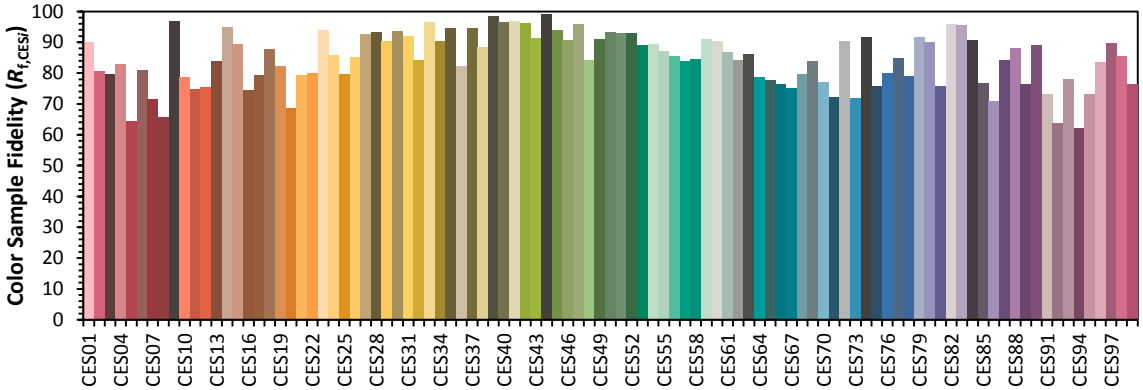

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-12% -8% -3% 0% -1% 1% -5% -5% -6% -5% 2% 6% 4% 5% -3% -7%

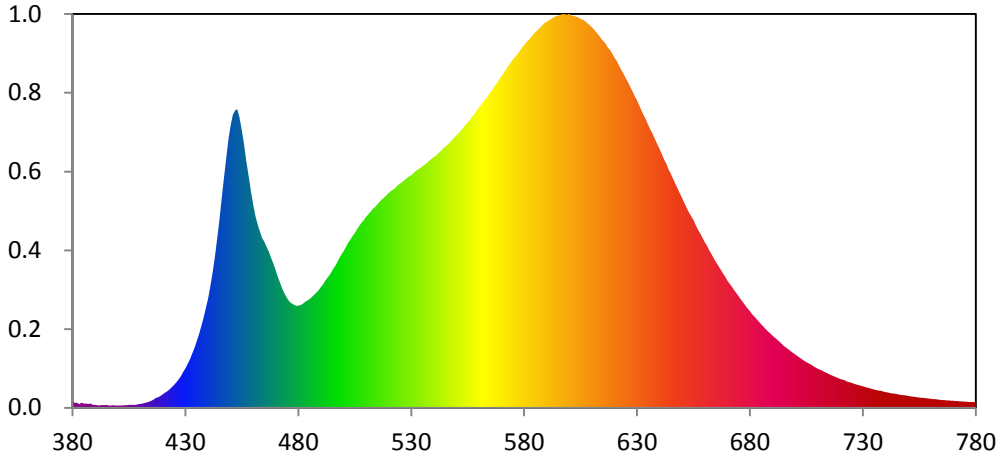

85
R_f
94
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


Local Hue Shift ($R_{hs,hj}$)
0.5 0.4 0.3 0.2 0.1 0.0 -0.1 -0.2 -0.3 -0.4 -0.5
0.00 0.06 0.10 0.06 0.03 -0.02 -0.04 0.01 0.06 0.12 0.13 0.03 -0.06 -0.15 -0.14 -0.11


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
79 82 80 90 92 94 89 91 87 80 80 85 89 81 79 78
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue-Angle Bin (j)


Color Sample Fidelity ($R_{f,cesi}$)
100 90 80 70 60 50 40 30 20 10 0
CES01 CES04 CES07 CES10 CES13 CES16 CES19 CES22 CES25 CES28 CES31 CES34 CES37 CES40 CES43 CES46 CES49 CES52 CES55 CES58 CES61 CES64 CES67 CES70 CES73 CES76 CES79 CES82 CES85 CES88 CES91 CES94 CES97

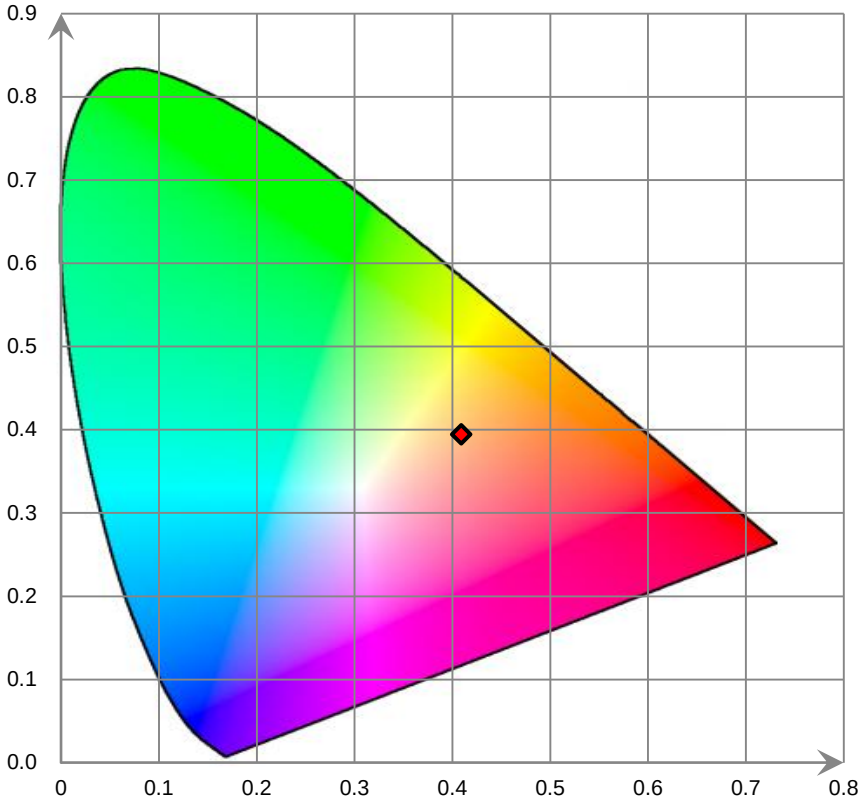
Relative Spectral Power Distribution



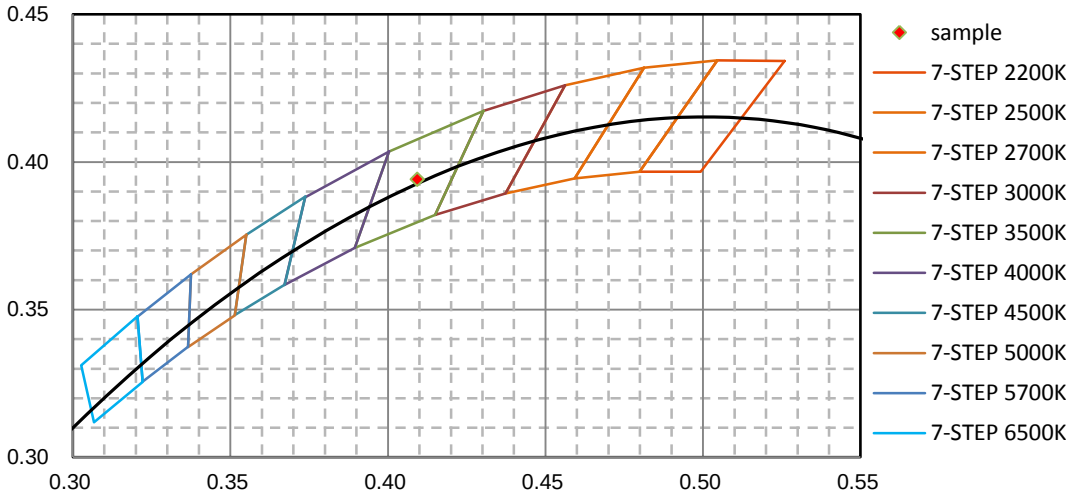
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.099E+00	421	2.241E+00	462	2.732E+01	503	2.505E+01	544	3.862E+01
381	7.366E-01	422	2.490E+00	463	2.626E+01	504	2.559E+01	545	3.893E+01
382	7.633E-01	423	2.770E+00	464	2.530E+01	505	2.607E+01	546	3.921E+01
383	5.072E-01	424	3.113E+00	465	2.471E+01	506	2.660E+01	547	3.957E+01
384	7.678E-01	425	3.447E+00	466	2.398E+01	507	2.712E+01	548	3.989E+01
385	6.288E-01	426	3.802E+00	467	2.323E+01	508	2.760E+01	549	4.031E+01
386	6.216E-01	427	4.253E+00	468	2.231E+01	509	2.797E+01	550	4.065E+01
387	5.747E-01	428	4.733E+00	469	2.145E+01	510	2.846E+01	551	4.097E+01
388	6.326E-01	429	5.350E+00	470	2.051E+01	511	2.890E+01	552	4.139E+01
389	4.293E-01	430	5.888E+00	471	1.948E+01	512	2.926E+01	553	4.175E+01
390	4.141E-01	431	6.514E+00	472	1.860E+01	513	2.969E+01	554	4.222E+01
391	3.682E-01	432	7.202E+00	473	1.771E+01	514	2.996E+01	555	4.257E+01
392	3.244E-01	433	8.085E+00	474	1.702E+01	515	3.035E+01	556	4.292E+01
393	4.205E-01	434	8.886E+00	475	1.634E+01	516	3.074E+01	557	4.342E+01
394	3.876E-01	435	9.858E+00	476	1.585E+01	517	3.105E+01	558	4.382E+01
395	4.138E-01	436	1.087E+01	477	1.556E+01	518	3.138E+01	559	4.428E+01
396	3.476E-01	437	1.206E+01	478	1.535E+01	519	3.171E+01	560	4.476E+01
397	3.164E-01	438	1.332E+01	479	1.520E+01	520	3.201E+01	561	4.515E+01
398	3.565E-01	439	1.470E+01	480	1.520E+01	521	3.231E+01	562	4.564E+01
399	3.260E-01	440	1.631E+01	481	1.532E+01	522	3.256E+01	563	4.607E+01
400	3.424E-01	441	1.817E+01	482	1.551E+01	523	3.280E+01	564	4.653E+01
401	3.184E-01	442	2.021E+01	483	1.578E+01	524	3.319E+01	565	4.705E+01
402	3.350E-01	443	2.248E+01	484	1.597E+01	525	3.340E+01	566	4.757E+01
403	3.856E-01	444	2.515E+01	485	1.620E+01	526	3.365E+01	567	4.802E+01
404	3.750E-01	445	2.792E+01	486	1.652E+01	527	3.391E+01	568	4.850E+01
405	4.305E-01	446	3.112E+01	487	1.687E+01	528	3.423E+01	569	4.898E+01
406	4.077E-01	447	3.411E+01	488	1.719E+01	529	3.452E+01	570	4.952E+01
407	4.380E-01	448	3.702E+01	489	1.752E+01	530	3.469E+01	571	4.996E+01
408	4.147E-01	449	3.993E+01	490	1.798E+01	531	3.497E+01	572	5.049E+01
409	5.265E-01	450	4.205E+01	491	1.840E+01	532	3.531E+01	573	5.096E+01
410	5.820E-01	451	4.368E+01	492	1.894E+01	533	3.554E+01	574	5.146E+01
411	6.363E-01	452	4.436E+01	493	1.942E+01	534	3.574E+01	575	5.193E+01
412	7.098E-01	453	4.452E+01	494	1.988E+01	535	3.604E+01	576	5.238E+01
413	8.209E-01	454	4.330E+01	495	2.048E+01	536	3.628E+01	577	5.275E+01
414	9.159E-01	455	4.143E+01	496	2.102E+01	537	3.653E+01	578	5.320E+01
415	1.059E+00	456	3.931E+01	497	2.157E+01	538	3.685E+01	579	5.367E+01
416	1.235E+00	457	3.683E+01	498	2.226E+01	539	3.713E+01	580	5.407E+01
417	1.455E+00	458	3.443E+01	499	2.280E+01	540	3.738E+01	581	5.449E+01
418	1.589E+00	459	3.220E+01	500	2.334E+01	541	3.762E+01	582	5.491E+01
419	1.782E+00	460	3.022E+01	501	2.394E+01	542	3.796E+01	583	5.527E+01
420	2.015E+00	461	2.856E+01	502	2.457E+01	543	3.826E+01	584	5.571E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.609E+01	626	4.854E+01	667	2.067E+01	708	6.215E+00	749	1.842E+00
586	5.631E+01	627	4.786E+01	668	2.008E+01	709	6.023E+00	750	1.746E+00
587	5.671E+01	628	4.722E+01	669	1.961E+01	710	5.837E+00	751	1.711E+00
588	5.705E+01	629	4.651E+01	670	1.900E+01	711	5.664E+00	752	1.674E+00
589	5.736E+01	630	4.585E+01	671	1.849E+01	712	5.517E+00	753	1.629E+00
590	5.759E+01	631	4.510E+01	672	1.803E+01	713	5.345E+00	754	1.571E+00
591	5.779E+01	632	4.436E+01	673	1.750E+01	714	5.173E+00	755	1.533E+00
592	5.801E+01	633	4.362E+01	674	1.707E+01	715	5.007E+00	756	1.492E+00
593	5.818E+01	634	4.302E+01	675	1.660E+01	716	4.871E+00	757	1.465E+00
594	5.841E+01	635	4.219E+01	676	1.615E+01	717	4.706E+00	758	1.416E+00
595	5.845E+01	636	4.139E+01	677	1.568E+01	718	4.570E+00	759	1.380E+00
596	5.860E+01	637	4.075E+01	678	1.522E+01	719	4.440E+00	760	1.334E+00
597	5.870E+01	638	3.998E+01	679	1.480E+01	720	4.311E+00	761	1.299E+00
598	5.870E+01	639	3.928E+01	680	1.439E+01	721	4.177E+00	762	1.272E+00
599	5.864E+01	640	3.856E+01	681	1.395E+01	722	4.079E+00	763	1.251E+00
600	5.875E+01	641	3.781E+01	682	1.358E+01	723	3.921E+00	764	1.209E+00
601	5.849E+01	642	3.703E+01	683	1.320E+01	724	3.815E+00	765	1.166E+00
602	5.847E+01	643	3.636E+01	684	1.284E+01	725	3.694E+00	766	1.141E+00
603	5.833E+01	644	3.552E+01	685	1.243E+01	726	3.568E+00	767	1.118E+00
604	5.823E+01	645	3.487E+01	686	1.211E+01	727	3.496E+00	768	1.096E+00
605	5.800E+01	646	3.414E+01	687	1.174E+01	728	3.381E+00	769	1.050E+00
606	5.791E+01	647	3.341E+01	688	1.140E+01	729	3.267E+00	770	1.035E+00
607	5.769E+01	648	3.268E+01	689	1.105E+01	730	3.175E+00	771	1.005E+00
608	5.737E+01	649	3.197E+01	690	1.071E+01	731	3.084E+00	772	9.764E-01
609	5.707E+01	650	3.129E+01	691	1.045E+01	732	2.990E+00	773	9.518E-01
610	5.673E+01	651	3.055E+01	692	1.017E+01	733	2.913E+00	774	9.376E-01
611	5.640E+01	652	2.990E+01	693	9.896E+00	734	2.813E+00	775	9.160E-01
612	5.597E+01	653	2.919E+01	694	9.544E+00	735	2.725E+00	776	8.973E-01
613	5.559E+01	654	2.857E+01	695	9.232E+00	736	2.645E+00	777	8.598E-01
614	5.516E+01	655	2.794E+01	696	8.984E+00	737	2.547E+00	778	8.500E-01
615	5.473E+01	656	2.718E+01	697	8.713E+00	738	2.502E+00	779	8.569E-01
616	5.435E+01	657	2.655E+01	698	8.451E+00	739	2.416E+00	780	8.586E-01
617	5.380E+01	658	2.597E+01	699	8.187E+00	740	2.351E+00		
618	5.335E+01	659	2.532E+01	700	7.962E+00	741	2.273E+00		
619	5.277E+01	660	2.466E+01	701	7.738E+00	742	2.209E+00		
620	5.221E+01	661	2.413E+01	702	7.505E+00	743	2.146E+00		
621	5.168E+01	662	2.350E+01	703	7.268E+00	744	2.085E+00		
622	5.102E+01	663	2.292E+01	704	7.012E+00	745	2.034E+00		
623	5.041E+01	664	2.230E+01	705	6.828E+00	746	1.966E+00		
624	4.984E+01	665	2.171E+01	706	6.634E+00	747	1.918E+00		
625	4.914E+01	666	2.117E+01	707	6.434E+00	748	1.859E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hour**

Test orientation: **Base up**

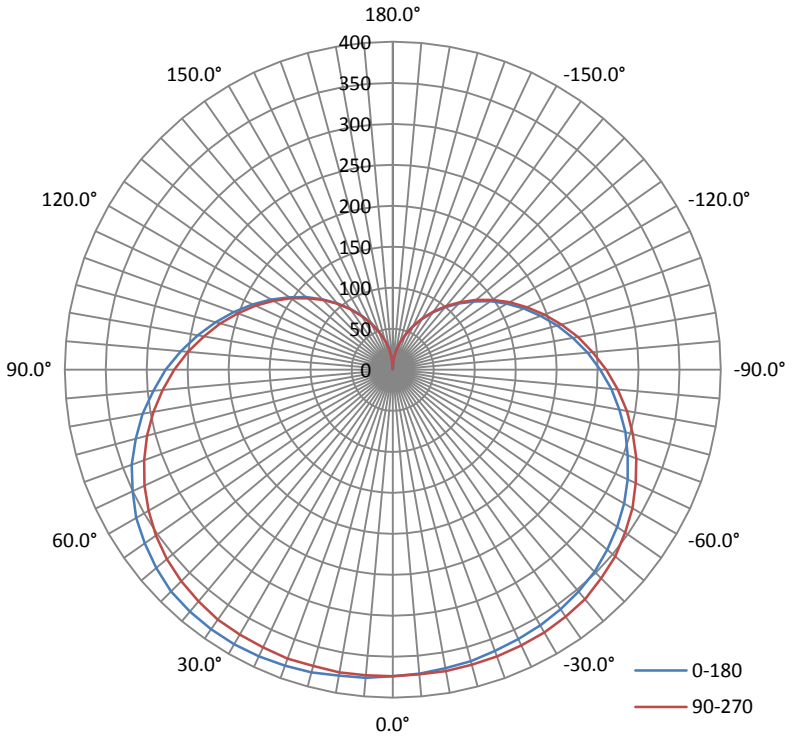
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1936	23.09	0.9936

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3108.44	134.65	387.4	1.47	1.51

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	223.1	224.7	227.1	225.3	225.1
Field Angle (10% I_{max}):	327.4	328.0	328.8	328.1	328.1

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	374	374	374	374	374	374	374	374
5.0°	377	376	376	375	374	374	372	372
10.0°	379	378	378	376	375	373	370	370
15.0°	382	381	379	377	374	372	370	368
20.0°	384	383	381	378	375	371	368	366
25.0°	386	385	382	379	374	371	366	363
30.0°	387	385	383	378	373	369	364	361
35.0°	386	385	383	378	372	367	361	358
40.0°	385	384	381	376	369	364	358	355
45.0°	382	380	377	372	365	360	354	351
50.0°	376	375	372	366	359	354	348	345
55.0°	369	368	365	360	353	347	341	338
60.0°	361	360	357	351	344	339	333	329
65.0°	350	349	346	341	334	330	323	320
70.0°	339	338	334	329	323	318	313	309
75.0°	324	323	321	316	310	306	300	297
80.0°	310	309	306	301	296	292	288	285
85.0°	293	293	291	287	282	279	274	271
90.0°	277	277	275	271	266	263	260	257
95.0°	259	259	258	254	251	248	244	242
100.0°	242	242	240	238	234	232	229	227
105.0°	224	224	223	220	218	216	213	211
110.0°	206	207	205	203	201	200	197	196
115.0°	188	189	188	187	185	184	181	180
120.0°	172	172	171	170	168	167	165	164
125.0°	154	154	154	153	152	151	150	149
130.0°	138	138	138	137	136	135	134	133
135.0°	122	122	122	121	120	120	119	118
140.0°	106	107	106	106	105	105	104	103
145.0°	91	91	91	91	90	90	89	89
150.0°	77	77	77	77	76	76	75	75
155.0°	63	63	63	63	62	62	61	61
160.0°	50	50	50	49	49	49	48	48
165.0°	38	38	38	38	37	37	36	36
170.0°	27	27	27	27	26	26	26	26
175.0°	17	17	17	16	15	16	15	15
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°	374	374	374	374	374	374	374	374
5.0°	372	371	372	373	373	375	376	376
10.0°	370	369	370	372	373	375	376	379
15.0°	368	367	368	370	372	377	378	381
20.0°	365	365	366	369	372	377	379	382
25.0°	362	363	364	367	371	377	380	383
30.0°	360	360	362	365	370	376	380	384
35.0°	357	357	359	362	368	374	379	384
40.0°	353	353	356	358	365	372	377	382
45.0°	348	348	350	354	360	368	373	378
50.0°	342	342	344	348	354	362	367	373
55.0°	334	335	336	340	346	354	361	365
60.0°	326	326	328	332	338	346	351	357
65.0°	316	316	318	322	327	335	340	346
70.0°	305	305	307	311	316	324	329	334
75.0°	294	294	295	298	303	310	315	321
80.0°	281	281	283	285	290	297	301	306
85.0°	268	268	269	272	275	281	285	289
90.0°	253	253	255	257	261	266	269	273
95.0°	239	238	240	242	245	250	252	256
100.0°	223	223	225	227	230	233	236	238
105.0°	208	208	210	211	213	217	219	221
110.0°	192	192	194	195	197	200	201	203
115.0°	177	177	179	180	181	183	184	185
120.0°	161	161	163	163	165	167	168	168
125.0°	146	146	147	148	149	150	151	152
130.0°	130	130	131	132	133	134	134	135
135.0°	115	115	116	116	117	118	118	118
140.0°	100	100	101	101	102	103	103	103
145.0°	85	86	86	87	87	88	88	88
150.0°	71	72	72	72	73	74	74	74
155.0°	58	58	59	59	59	60	60	60
160.0°	46	46	46	46	47	47	47	47
165.0°	34	34	34	35	35	35	36	36
170.0°	24	24	24	24	25	25	25	25
175.0°	13	12	12	12	13	13	14	14
180.0°	1	1	1	1	1	1	1	1

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	8.9	0.29
5-10	26.8	0.86
10-15	44.4	1.43
15-20	61.6	1.98
20-25	78.3	2.52
25-30	94.4	3.03
30-35	109.4	3.52
35-40	123.2	3.97
40-45	135.5	4.36
45-50	145.8	4.69
50-55	154.1	4.96
55-60	160.2	5.15
60-65	163.9	5.27
65-70	165.3	5.32
70-75	164.4	5.29
75-80	161.2	5.18
80-85	156.0	5.02
85-90	149.1	4.80
90-95	140.5	4.52
95-100	130.7	4.20
100-105	120.0	3.86
105-110	108.6	3.50
110-115	96.8	3.11
115-120	85.0	2.73
120-125	73.3	2.36
125-130	61.9	1.99
130-135	51.1	1.65
135-140	41.1	1.32
140-145	32.1	1.03
145-150	24.0	0.78
150-155	17.1	0.55
155-160	11.4	0.36
160-165	6.9	0.23
165-170	3.7	0.12
170-175	1.5	0.04
175-180	0.2	0.01

Deg	Flux (lm)	%
0-5	8.9	0.29
0-10	35.7	1.15
0-15	80.1	2.58
0-20	141.7	4.56
0-25	220.0	7.08
0-30	314.3	10.11
0-35	423.8	13.63
0-40	547.0	17.60
0-45	682.5	21.96
0-50	828.3	26.65
0-55	982.4	31.61
0-60	1142.6	36.76
0-65	1306.6	42.03
0-70	1471.9	47.35
0-75	1636.2	52.64
0-80	1797.4	57.82
0-85	1953.4	62.84
0-90	2102.5	67.64
0-95	2243.0	72.16
0-100	2373.7	76.36
0-105	2493.7	80.22
0-110	2602.3	83.72
0-115	2699.1	86.83
0-120	2784.1	89.56
0-125	2857.3	91.92
0-130	2919.3	93.91
0-135	2970.3	95.56
0-140	3011.5	96.88
0-145	3043.5	97.91
0-150	3067.6	98.69
0-155	3084.7	99.24
0-160	3096.1	99.60
0-165	3103.1	99.83
0-170	3106.7	99.95
0-175	3108.2	99.99
0-180	3108.4	100.00

6. Product Photo

Directions

1. The information marked “superscript #” is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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**********END OF REPORT**********