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/840/277V/E26/DIM

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Reviewed By:	George Chen
Report Number:	KS2210909-47101E-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/840/277V/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:	4000K
Nominal Lumen Output:	3200lm

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**

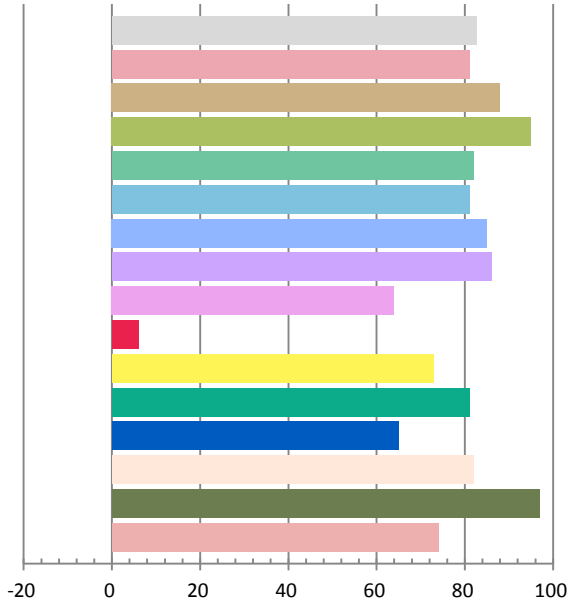
Photometric and Electrical Measurement Result

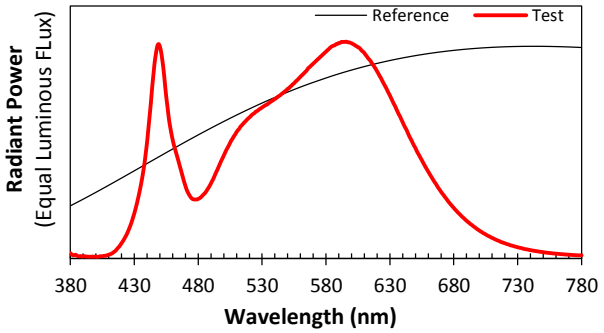
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1945	23.21	0.9941	3219.1	138.67

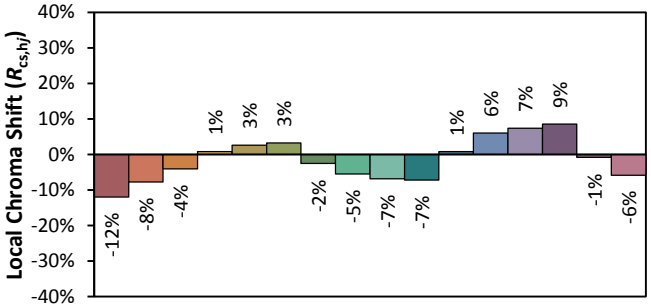
Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.7391	3903	0.001000	0.3856	0.3821	0.2264	0.5047

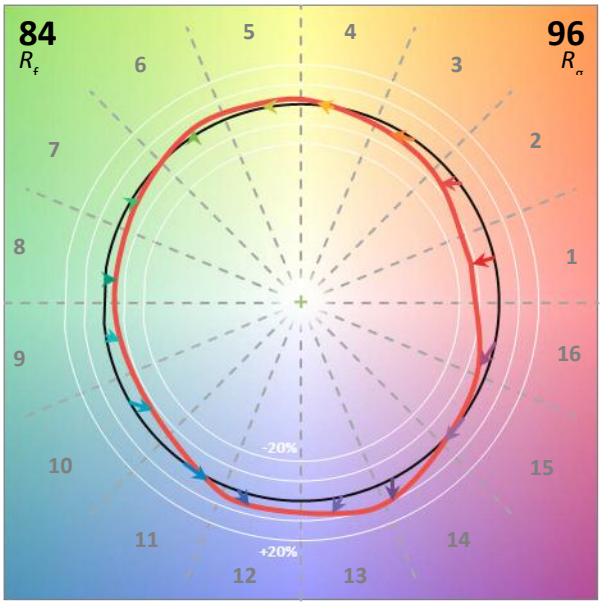
Color Rendering Index

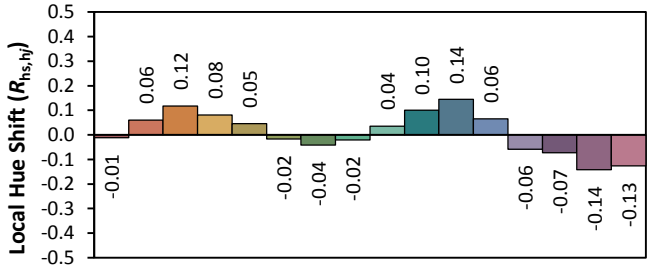
Ra			
82.7			
R1	R2	R3	R4
81	88	95	82
R5	R6	R7	R8
81	85	86	64
R9	R10	R11	R12
6	73	81	65
R13	R14	R15	
82	97	74	

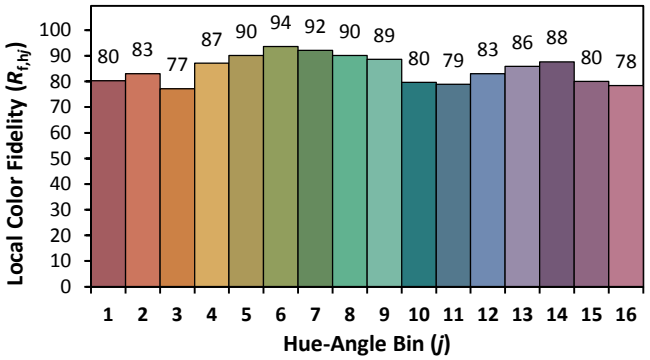


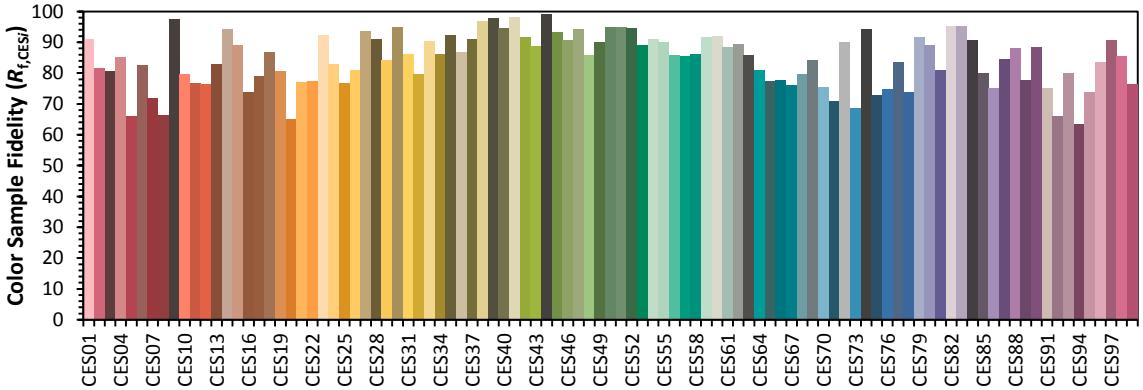

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-12% -8% -4% 1% 3% 3% -2% -5% -7% -7% 1% 6% 7% 9% -1% -6%

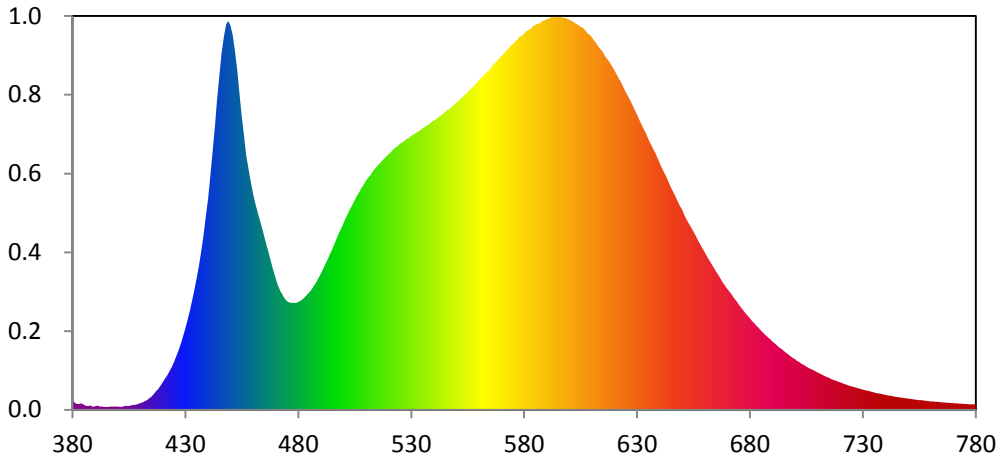

84
R_f
96
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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
-0.01 0.06 0.12 0.08 0.05 -0.02 -0.04 -0.02 0.04 0.10 0.14 0.06 -0.06 -0.07 -0.14 -0.13


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
80 83 77 87 90 94 92 90 89 80 79 83 86 88 80 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

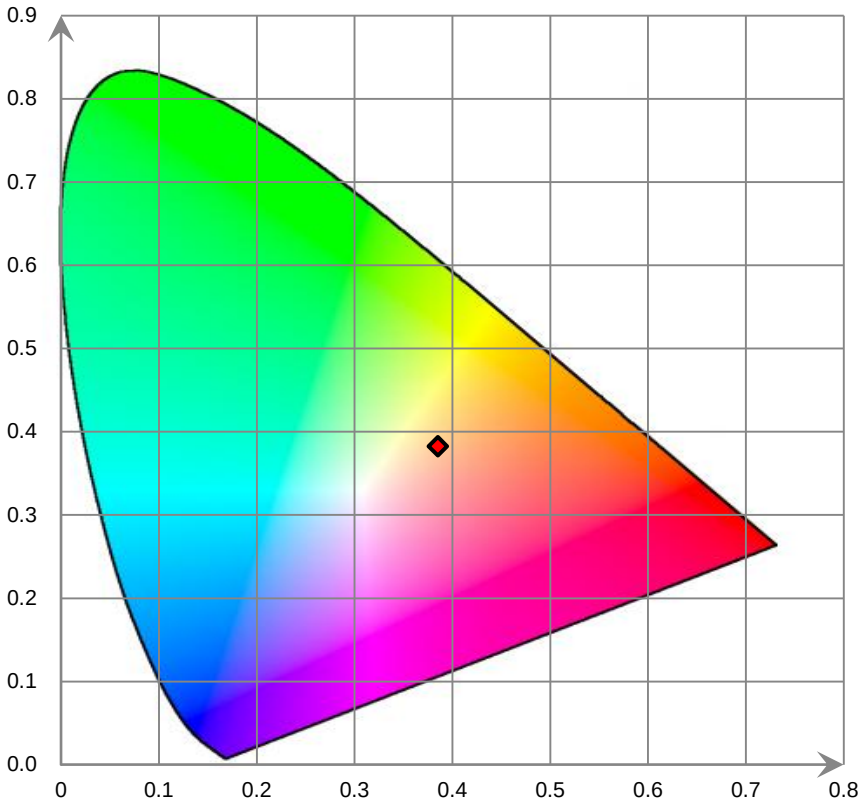
Relative Spectral Power Distribution



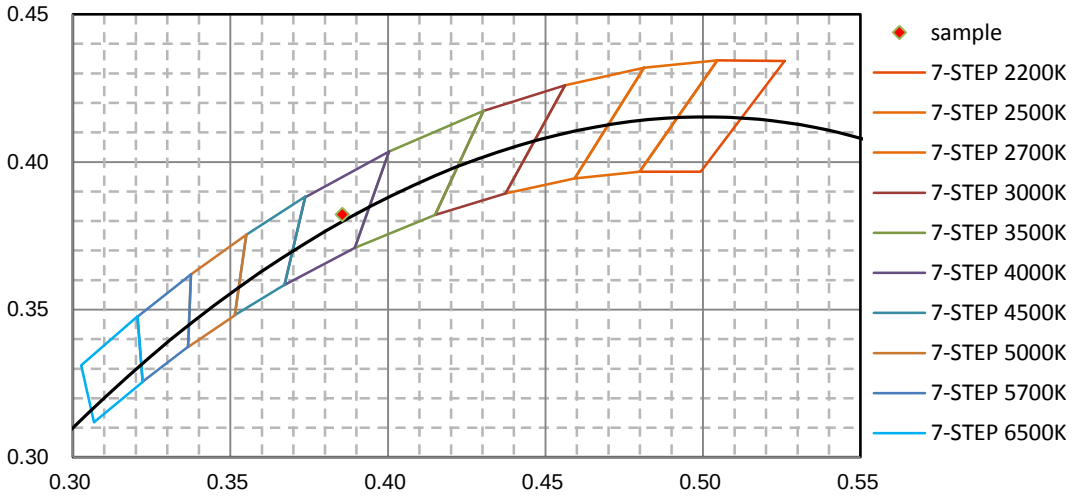
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.354E+00	421	4.455E+00	462	2.841E+01	503	2.893E+01	544	4.258E+01
381	9.981E-01	422	5.004E+00	463	2.724E+01	504	2.954E+01	545	4.288E+01
382	8.174E-01	423	5.617E+00	464	2.607E+01	505	3.021E+01	546	4.314E+01
383	8.380E-01	424	6.234E+00	465	2.483E+01	506	3.085E+01	547	4.339E+01
384	9.373E-01	425	6.967E+00	466	2.362E+01	507	3.135E+01	548	4.371E+01
385	7.513E-01	426	7.795E+00	467	2.244E+01	508	3.194E+01	549	4.392E+01
386	5.641E-01	427	8.635E+00	468	2.119E+01	509	3.241E+01	550	4.430E+01
387	5.400E-01	428	9.604E+00	469	2.000E+01	510	3.299E+01	551	4.447E+01
388	6.146E-01	429	1.066E+01	470	1.892E+01	511	3.348E+01	552	4.485E+01
389	4.327E-01	430	1.175E+01	471	1.792E+01	512	3.382E+01	553	4.512E+01
390	5.203E-01	431	1.300E+01	472	1.717E+01	513	3.439E+01	554	4.551E+01
391	5.747E-01	432	1.430E+01	473	1.658E+01	514	3.473E+01	555	4.574E+01
392	4.710E-01	433	1.576E+01	474	1.604E+01	515	3.512E+01	556	4.613E+01
393	4.612E-01	434	1.727E+01	475	1.564E+01	516	3.550E+01	557	4.642E+01
394	4.273E-01	435	1.892E+01	476	1.545E+01	517	3.582E+01	558	4.675E+01
395	4.259E-01	436	2.072E+01	477	1.538E+01	518	3.619E+01	559	4.710E+01
396	4.122E-01	437	2.272E+01	478	1.539E+01	519	3.652E+01	560	4.746E+01
397	4.626E-01	438	2.495E+01	479	1.539E+01	520	3.682E+01	561	4.780E+01
398	4.558E-01	439	2.762E+01	480	1.553E+01	521	3.713E+01	562	4.811E+01
399	4.361E-01	440	3.047E+01	481	1.571E+01	522	3.748E+01	563	4.845E+01
400	4.426E-01	441	3.380E+01	482	1.594E+01	523	3.774E+01	564	4.879E+01
401	3.912E-01	442	3.726E+01	483	1.627E+01	524	3.797E+01	565	4.915E+01
402	4.296E-01	443	4.075E+01	484	1.664E+01	525	3.831E+01	566	4.967E+01
403	5.282E-01	444	4.477E+01	485	1.695E+01	526	3.849E+01	567	4.993E+01
404	5.509E-01	445	4.815E+01	486	1.737E+01	527	3.872E+01	568	5.026E+01
405	5.561E-01	446	5.141E+01	487	1.790E+01	528	3.902E+01	569	5.064E+01
406	6.420E-01	447	5.366E+01	488	1.841E+01	529	3.918E+01	570	5.099E+01
407	6.655E-01	448	5.548E+01	489	1.897E+01	530	3.946E+01	571	5.133E+01
408	7.246E-01	449	5.601E+01	490	1.961E+01	531	3.966E+01	572	5.172E+01
409	8.322E-01	450	5.534E+01	491	2.028E+01	532	3.990E+01	573	5.199E+01
410	9.697E-01	451	5.388E+01	492	2.091E+01	533	4.008E+01	574	5.242E+01
411	1.043E+00	452	5.159E+01	493	2.170E+01	534	4.027E+01	575	5.263E+01
412	1.221E+00	453	4.889E+01	494	2.246E+01	535	4.051E+01	576	5.303E+01
413	1.380E+00	454	4.552E+01	495	2.316E+01	536	4.076E+01	577	5.332E+01
414	1.658E+00	455	4.222E+01	496	2.393E+01	537	4.099E+01	578	5.373E+01
415	1.905E+00	456	3.950E+01	497	2.470E+01	538	4.118E+01	579	5.391E+01
416	2.234E+00	457	3.662E+01	498	2.547E+01	539	4.144E+01	580	5.419E+01
417	2.681E+00	458	3.450E+01	499	2.615E+01	540	4.165E+01	581	5.453E+01
418	3.001E+00	459	3.266E+01	500	2.686E+01	541	4.187E+01	582	5.471E+01
419	3.461E+00	460	3.099E+01	501	2.760E+01	542	4.214E+01	583	5.495E+01
420	3.951E+00	461	2.960E+01	502	2.831E+01	543	4.238E+01	584	5.527E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.545E+01	626	4.516E+01	667	1.889E+01	708	5.704E+00	749	1.658E+00
586	5.561E+01	627	4.456E+01	668	1.836E+01	709	5.507E+00	750	1.613E+00
587	5.570E+01	628	4.387E+01	669	1.790E+01	710	5.340E+00	751	1.546E+00
588	5.601E+01	629	4.318E+01	670	1.741E+01	711	5.195E+00	752	1.516E+00
589	5.605E+01	630	4.255E+01	671	1.695E+01	712	5.023E+00	753	1.463E+00
590	5.629E+01	631	4.183E+01	672	1.654E+01	713	4.863E+00	754	1.426E+00
591	5.631E+01	632	4.114E+01	673	1.605E+01	714	4.710E+00	755	1.381E+00
592	5.656E+01	633	4.041E+01	674	1.565E+01	715	4.594E+00	756	1.363E+00
593	5.653E+01	634	3.982E+01	675	1.517E+01	716	4.435E+00	757	1.314E+00
594	5.659E+01	635	3.905E+01	676	1.473E+01	717	4.261E+00	758	1.284E+00
595	5.656E+01	636	3.832E+01	677	1.432E+01	718	4.180E+00	759	1.259E+00
596	5.663E+01	637	3.761E+01	678	1.393E+01	719	4.037E+00	760	1.201E+00
597	5.646E+01	638	3.705E+01	679	1.354E+01	720	3.939E+00	761	1.191E+00
598	5.646E+01	639	3.627E+01	680	1.317E+01	721	3.803E+00	762	1.156E+00
599	5.632E+01	640	3.556E+01	681	1.277E+01	722	3.691E+00	763	1.144E+00
600	5.621E+01	641	3.482E+01	682	1.244E+01	723	3.596E+00	764	1.091E+00
601	5.601E+01	642	3.416E+01	683	1.206E+01	724	3.459E+00	765	1.080E+00
602	5.585E+01	643	3.358E+01	684	1.175E+01	725	3.346E+00	766	1.062E+00
603	5.559E+01	644	3.279E+01	685	1.140E+01	726	3.288E+00	767	1.006E+00
604	5.542E+01	645	3.205E+01	686	1.105E+01	727	3.168E+00	768	9.899E-01
605	5.517E+01	646	3.139E+01	687	1.073E+01	728	3.080E+00	769	9.625E-01
606	5.502E+01	647	3.076E+01	688	1.044E+01	729	2.986E+00	770	9.475E-01
607	5.468E+01	648	3.006E+01	689	1.012E+01	730	2.901E+00	771	9.230E-01
608	5.427E+01	649	2.939E+01	690	9.825E+00	731	2.806E+00	772	8.960E-01
609	5.401E+01	650	2.883E+01	691	9.520E+00	732	2.738E+00	773	8.775E-01
610	5.365E+01	651	2.806E+01	692	9.281E+00	733	2.661E+00	774	8.620E-01
611	5.318E+01	652	2.745E+01	693	8.961E+00	734	2.574E+00	775	8.297E-01
612	5.276E+01	653	2.685E+01	694	8.747E+00	735	2.461E+00	776	8.241E-01
613	5.226E+01	654	2.623E+01	695	8.461E+00	736	2.399E+00	777	7.968E-01
614	5.191E+01	655	2.564E+01	696	8.222E+00	737	2.353E+00	778	7.832E-01
615	5.148E+01	656	2.501E+01	697	7.984E+00	738	2.289E+00	779	7.811E-01
616	5.092E+01	657	2.438E+01	698	7.706E+00	739	2.209E+00	780	7.826E-01
617	5.047E+01	658	2.380E+01	699	7.484E+00	740	2.157E+00		
618	4.997E+01	659	2.323E+01	700	7.259E+00	741	2.084E+00		
619	4.943E+01	660	2.268E+01	701	7.026E+00	742	2.004E+00		
620	4.886E+01	661	2.210E+01	702	6.846E+00	743	1.966E+00		
621	4.828E+01	662	2.154E+01	703	6.585E+00	744	1.898E+00		
622	4.766E+01	663	2.100E+01	704	6.440E+00	745	1.860E+00		
623	4.711E+01	664	2.045E+01	705	6.233E+00	746	1.814E+00		
624	4.641E+01	665	1.992E+01	706	6.027E+00	747	1.735E+00		
625	4.579E+01	666	1.945E+01	707	5.837E+00	748	1.700E+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**

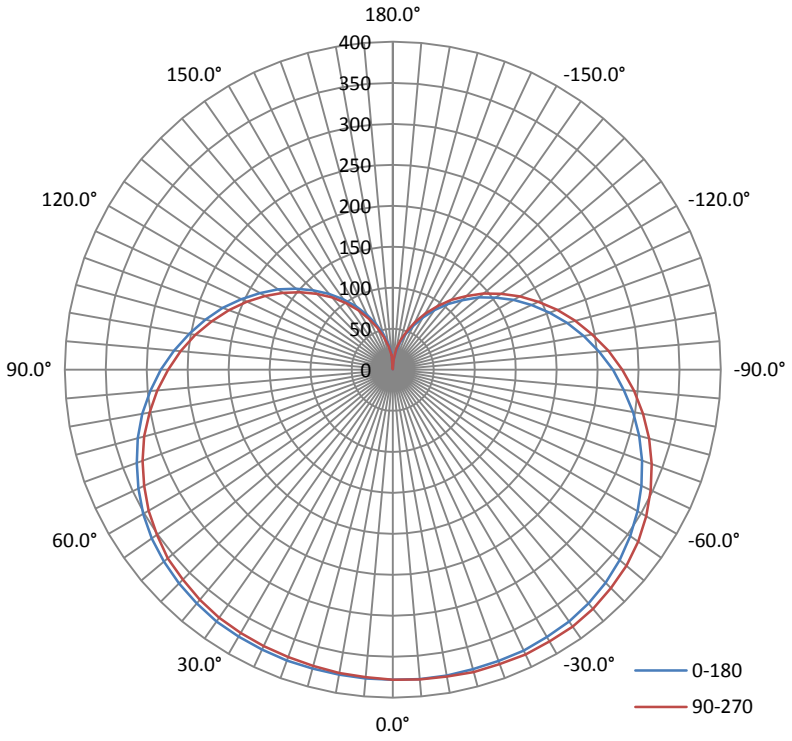
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1947	23.22	0.9942

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3222.3	138.75	384.3	1.52	1.55

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	233.1	233.1	232.4	233.0	232.9
Field Angle (10% I_{max}):	331.2	330.9	330.7	330.8	330.9

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	378	378	378	378	378	378	378	378
5.0°	378	377	377	377	377	376	377	377
10.0°	378	376	376	376	375	376	376	377
15.0°	377	376	375	375	374	374	377	376
20.0°	377	375	375	374	373	374	375	376
25.0°	377	374	373	373	372	372	374	376
30.0°	376	373	372	372	371	371	373	374
35.0°	375	372	371	370	369	369	370	372
40.0°	372	369	368	368	366	367	368	369
45.0°	369	366	365	364	362	362	364	365
50.0°	364	361	360	360	358	358	358	359
55.0°	359	356	354	353	351	350	351	353
60.0°	351	348	347	346	344	343	343	344
65.0°	342	340	339	337	335	333	333	334
70.0°	332	330	329	328	325	324	323	323
75.0°	322	320	318	316	314	312	311	312
80.0°	310	307	306	305	301	300	298	299
85.0°	297	294	294	291	288	285	285	285
90.0°	283	280	280	278	274	272	270	269
95.0°	268	266	265	263	259	257	255	255
100.0°	252	251	250	248	245	242	239	239
105.0°	236	235	234	232	228	225	224	223
110.0°	221	219	218	217	213	209	207	206
115.0°	204	203	202	200	196	193	191	190
120.0°	187	187	186	184	180	177	174	173
125.0°	171	170	169	167	164	160	158	157
130.0°	154	153	153	151	147	144	142	140
135.0°	137	137	136	134	131	128	126	124
140.0°	121	121	120	118	115	112	110	108
145.0°	105	105	104	102	99	96	94	92
150.0°	89	89	88	87	84	81	79	77
155.0°	74	73	73	71	69	67	65	63
160.0°	59	59	58	57	55	52	50	49
165.0°	45	45	44	43	41	39	38	36
170.0°	33	33	32	31	29	28	26	25
175.0°	22	21	21	20	18	16	15	14
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°	378	378	378	378	378	378	378	378
5.0°	379	378	379	380	379	378	378	378
10.0°	379	379	380	381	380	379	379	378
15.0°	378	379	381	382	382	380	380	378
20.0°	378	380	382	383	382	382	380	378
25.0°	378	379	383	384	383	382	380	378
30.0°	376	379	381	383	382	381	380	377
35.0°	375	377	380	383	382	381	378	376
40.0°	372	375	378	380	380	378	377	374
45.0°	367	370	374	377	376	375	374	370
50.0°	361	364	369	371	372	371	369	365
55.0°	354	357	361	365	365	364	362	359
60.0°	345	348	353	356	357	356	355	352
65.0°	335	338	342	346	347	347	345	342
70.0°	324	327	331	334	336	336	335	333
75.0°	311	314	318	322	324	323	323	321
80.0°	298	300	304	308	310	310	310	309
85.0°	283	286	290	294	296	296	296	295
90.0°	269	270	275	278	280	281	281	281
95.0°	253	254	258	262	264	265	266	265
100.0°	237	238	241	245	247	249	250	250
105.0°	220	222	225	228	231	232	234	234
110.0°	204	205	208	211	213	215	217	217
115.0°	187	188	191	194	196	198	200	201
120.0°	170	171	173	177	179	181	183	184
125.0°	153	154	156	159	162	164	166	167
130.0°	137	138	140	142	145	147	149	150
135.0°	120	121	123	125	127	130	132	134
140.0°	104	105	106	108	111	113	115	117
145.0°	89	89	91	93	95	97	99	100
150.0°	74	74	75	77	79	81	83	85
155.0°	59	60	61	62	64	66	68	69
160.0°	46	46	47	48	50	52	54	55
165.0°	34	34	35	36	37	39	40	42
170.0°	23	23	24	25	26	27	28	30
175.0°	11	11	11	12	13	15	17	18
180.0°	1	1	1	1	1	1	1	1

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	9.0	0.28
5-10	27.0	0.84
10-15	44.8	1.39
15-20	62.3	1.93
20-25	79.2	2.46
25-30	95.4	2.96
30-35	110.7	3.44
35-40	124.8	3.87
40-45	137.3	4.26
45-50	148.1	4.59
50-55	156.8	4.87
55-60	163.3	5.07
60-65	167.6	5.20
65-70	169.5	5.26
70-75	169.1	5.25
75-80	166.5	5.16
80-85	161.9	5.03
85-90	155.4	4.82
90-95	147.1	4.56
95-100	137.5	4.27
100-105	126.8	3.94
105-110	115.4	3.58
110-115	103.4	3.21
115-120	91.2	2.83
120-125	79.0	2.45
125-130	67.0	2.08
130-135	55.6	1.72
135-140	44.8	1.39
140-145	35.0	1.09
145-150	26.3	0.81
150-155	18.7	0.58
155-160	12.5	0.39
160-165	7.6	0.24
165-170	4.0	0.12
170-175	1.6	0.05
175-180	0.2	0.01

Deg	Flux (lm)	%
0-5	9.0	0.28
0-10	36.1	1.12
0-15	80.9	2.51
0-20	143.2	4.44
0-25	222.3	6.90
0-30	317.7	9.86
0-35	428.4	13.30
0-40	553.2	17.17
0-45	690.5	21.43
0-50	838.6	26.02
0-55	995.3	30.89
0-60	1158.6	35.96
0-65	1326.2	41.16
0-70	1495.7	46.42
0-75	1664.8	51.67
0-80	1831.3	56.83
0-85	1993.2	61.86
0-90	2148.6	66.68
0-95	2295.7	71.24
0-100	2433.2	75.51
0-105	2560.1	79.45
0-110	2675.4	83.03
0-115	2778.8	86.24
0-120	2870.0	89.07
0-125	2948.9	91.52
0-130	3016.0	93.60
0-135	3071.5	95.32
0-140	3116.3	96.71
0-145	3151.3	97.80
0-150	3177.6	98.61
0-155	3196.4	99.19
0-160	3208.9	99.58
0-165	3216.4	99.82
0-170	3220.5	99.94
0-175	3222.1	99.99
0-180	3222.3	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**********