

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: 24PAR38HO/840FL40/277V/SD

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
Reviewed By:	James Liang <i>James Liang</i>
Report Number:	KS2220711-31384E-EE
Test Date:	2022-07-14
Report Date:	2022-09-22
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China. Tel: +86-755-33320018 Fax: +86-755-33320008
Test Facility:	Test facility was located at No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China.

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.(Shenzhen). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, or any agency of the U.S. Government.

1. Product Description[#]

General Information:

Two test samples were in good condition and received on 2022-07-11. One was tested in integrating sphere and the other was tested in goniophotometer. All tests and evaluations were performed at the most consumptive setting.

Model Tested: 24PAR38HO/840FL40/277V/SD
Manufacturer: GREEN CREATIVE LTD
Product Designation: Directional LED Lamp
Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 V AC 60 Hz
Rated Power: 24W
Nominal CCT: 4000K
Nominal Lumen Output: 2500 lm

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 NVLAP accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
1.5m integrating sphere	SENSING	1.5m	NA	2022-06-07	2023-06-06
Digital power meter	EVERFINE	PF9811	G135717CN1361159	2022-01-05	2023-01-04
High-precision rapid spectral radiometer	EVERFINE	HAAS-2000	N/A	2022-06-07	2023-06-06
Precision frequency power supply	ALL Power	APW-105N	970663	2022-01-06	2023-01-05
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2022-10-14
thermometer	SENSING	NA	NA	2022-01-11	2023-01-10
Programmable Precision DC Power Supply	EVERFINE	WY5015	11060010	2022-01-05	2023-01-04
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2022-01-06	2023-01-05
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2022-01-06	2023-01-05
Digital power meter	YOKOGAWA	WT-210	91j926132	2022-01-06	2023-01-05
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2021-10-26	2022-10-25
wireless remote thermohygrometer	N/A	433MHz	N/A	2022-01-10	2023-01-09

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012003	2021-10-15	2022-10-14

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) 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 $U=21\text{K}$ ($K=2$), 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 $U=0.17\%$ of rdg, Power $U=0.48\%$ ($K=2$), 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_i , 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]

The Stabilization time: **30 minutes**

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Base Up**

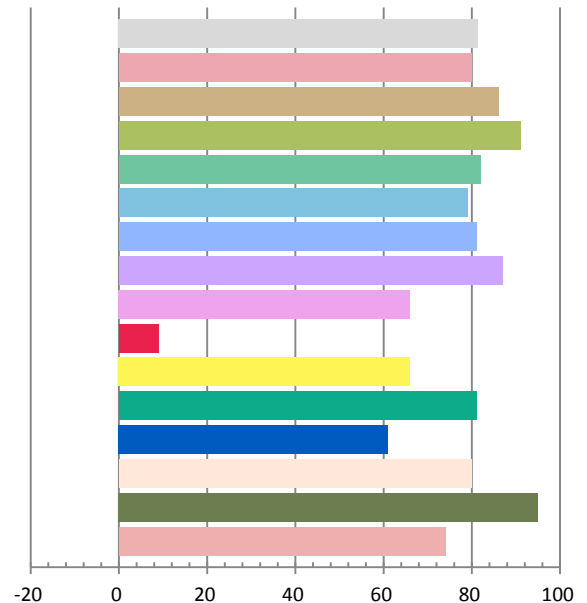
Photometric and Electrical Measurement Result

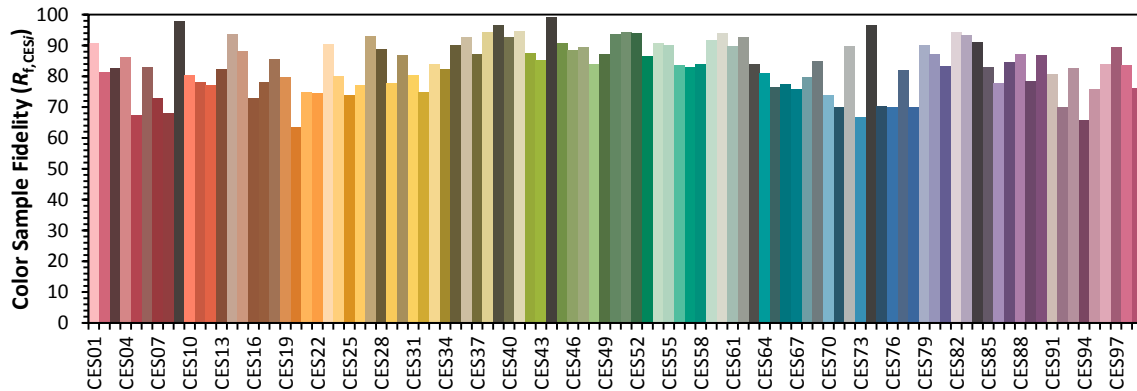
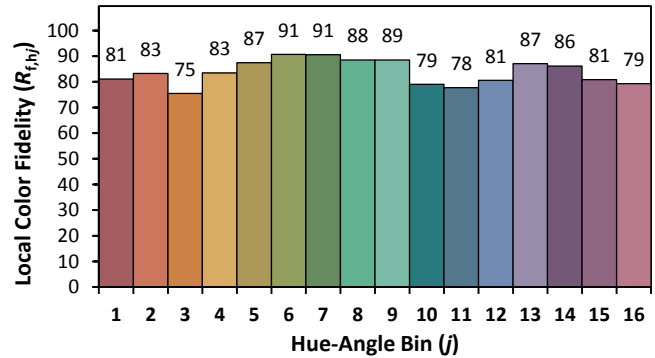
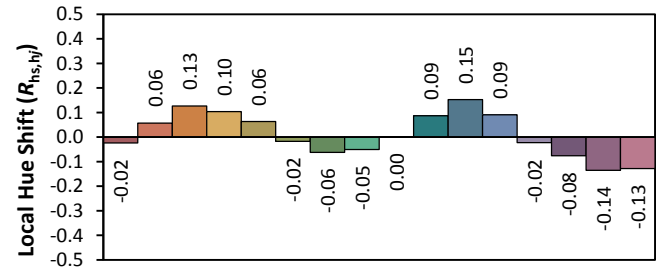
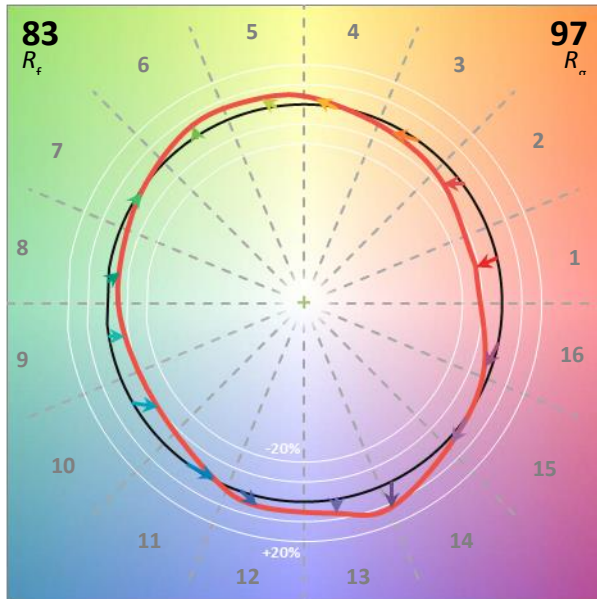
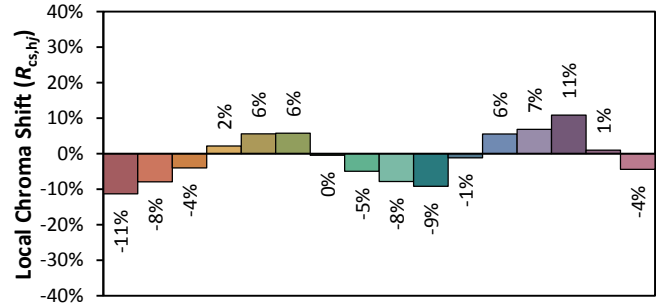
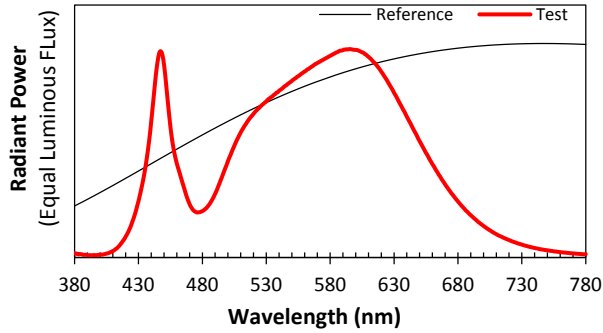
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1961	23.42	0.9952	3117.4	133.1

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.4328	3879	0.00318	0.3884	0.3885	0.2256	0.5078

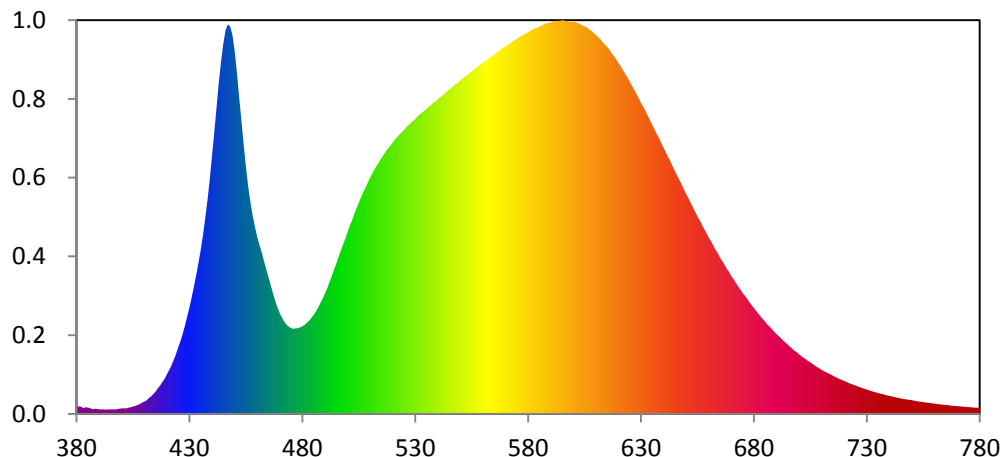
Color Rendering Index

Ra			
81.4			
R1	R2	R3	R4
80	86	91	82
R5	R6	R7	R8
79	81	87	66
R9	R10	R11	R12
9	66	81	61
R13	R14	R15	
80	95	74	





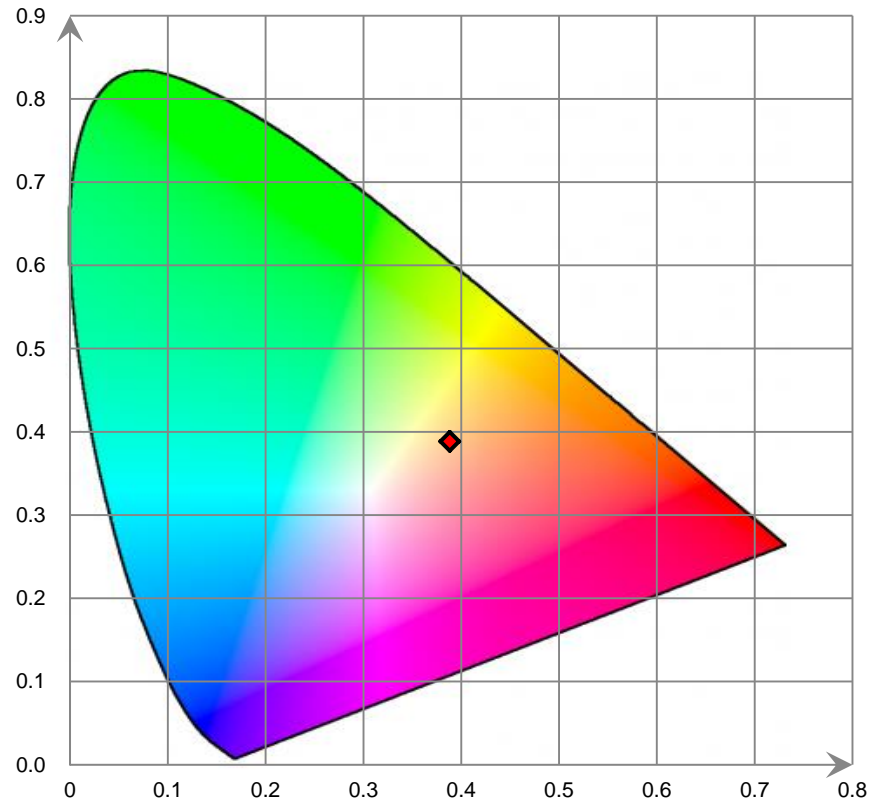
Relative Spectral Power Distribution



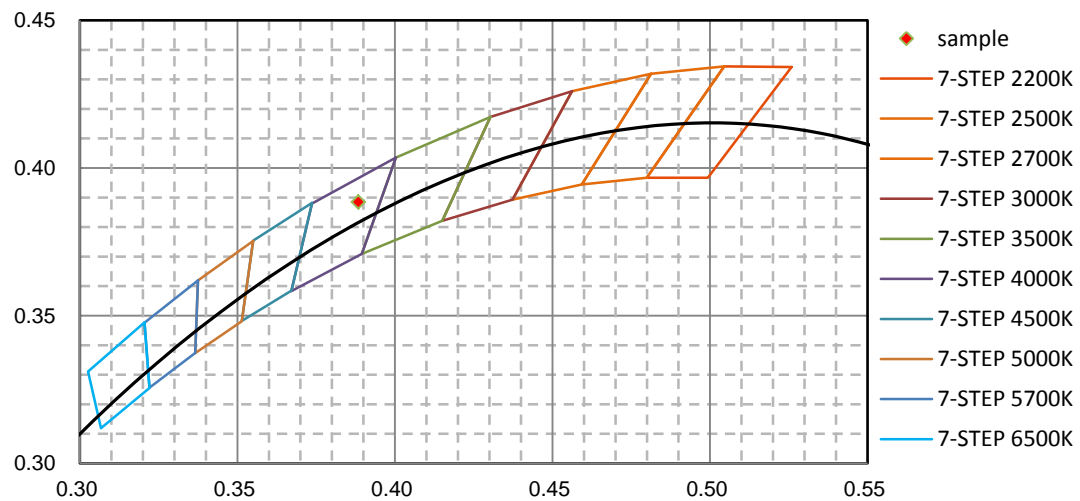
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.114E+00	421	5.866E+00	462	2.163E+01	503	2.677E+01	544	4.324E+01
381	9.697E-01	422	6.482E+00	463	2.049E+01	504	2.755E+01	545	4.348E+01
382	9.869E-01	423	7.212E+00	464	1.940E+01	505	2.828E+01	546	4.370E+01
383	7.860E-01	424	7.954E+00	465	1.833E+01	506	2.903E+01	547	4.398E+01
384	8.902E-01	425	8.894E+00	466	1.726E+01	507	2.973E+01	548	4.422E+01
385	8.490E-01	426	9.751E+00	467	1.618E+01	508	3.038E+01	549	4.443E+01
386	7.822E-01	427	1.076E+01	468	1.519E+01	509	3.104E+01	550	4.471E+01
387	6.513E-01	428	1.183E+01	469	1.431E+01	510	3.165E+01	551	4.498E+01
388	6.857E-01	429	1.305E+01	470	1.353E+01	511	3.224E+01	552	4.521E+01
389	6.840E-01	430	1.425E+01	471	1.288E+01	512	3.276E+01	553	4.542E+01
390	6.249E-01	431	1.562E+01	472	1.238E+01	513	3.331E+01	554	4.570E+01
391	5.999E-01	432	1.705E+01	473	1.194E+01	514	3.377E+01	555	4.589E+01
392	6.061E-01	433	1.857E+01	474	1.170E+01	515	3.429E+01	556	4.613E+01
393	5.684E-01	434	2.020E+01	475	1.152E+01	516	3.476E+01	557	4.639E+01
394	5.920E-01	435	2.201E+01	476	1.141E+01	517	3.521E+01	558	4.662E+01
395	6.253E-01	436	2.404E+01	477	1.146E+01	518	3.560E+01	559	4.685E+01
396	6.157E-01	437	2.626E+01	478	1.149E+01	519	3.596E+01	560	4.708E+01
397	6.016E-01	438	2.871E+01	479	1.161E+01	520	3.636E+01	561	4.727E+01
398	6.463E-01	439	3.139E+01	480	1.176E+01	521	3.676E+01	562	4.757E+01
399	6.968E-01	440	3.455E+01	481	1.194E+01	522	3.712E+01	563	4.773E+01
400	7.369E-01	441	3.769E+01	482	1.221E+01	523	3.744E+01	564	4.795E+01
401	7.383E-01	442	4.095E+01	483	1.249E+01	524	3.776E+01	565	4.820E+01
402	7.487E-01	443	4.430E+01	484	1.286E+01	525	3.805E+01	566	4.840E+01
403	8.304E-01	444	4.728E+01	485	1.327E+01	526	3.841E+01	567	4.864E+01
404	8.975E-01	445	4.966E+01	486	1.372E+01	527	3.870E+01	568	4.888E+01
405	1.008E+00	446	5.146E+01	487	1.427E+01	528	3.896E+01	569	4.907E+01
406	1.066E+00	447	5.220E+01	488	1.482E+01	529	3.926E+01	570	4.925E+01
407	1.205E+00	448	5.198E+01	489	1.544E+01	530	3.952E+01	571	4.945E+01
408	1.333E+00	449	5.088E+01	490	1.616E+01	531	3.987E+01	572	4.966E+01
409	1.520E+00	450	4.877E+01	491	1.683E+01	532	4.016E+01	573	4.990E+01
410	1.654E+00	451	4.593E+01	492	1.765E+01	533	4.039E+01	574	5.009E+01
411	1.828E+00	452	4.260E+01	493	1.845E+01	534	4.063E+01	575	5.026E+01
412	2.114E+00	453	3.931E+01	494	1.929E+01	535	4.086E+01	576	5.050E+01
413	2.323E+00	454	3.613E+01	495	2.010E+01	536	4.119E+01	577	5.063E+01
414	2.651E+00	455	3.314E+01	496	2.097E+01	537	4.138E+01	578	5.087E+01
415	2.977E+00	456	3.053E+01	497	2.182E+01	538	4.173E+01	579	5.100E+01
416	3.397E+00	457	2.841E+01	498	2.268E+01	539	4.185E+01	580	5.119E+01
417	3.803E+00	458	2.662E+01	499	2.348E+01	540	4.221E+01	581	5.135E+01
418	4.289E+00	459	2.513E+01	500	2.438E+01	541	4.244E+01	582	5.154E+01
419	4.720E+00	460	2.381E+01	501	2.522E+01	542	4.266E+01	583	5.166E+01
420	5.305E+00	461	2.268E+01	502	2.594E+01	543	4.293E+01	584	5.176E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.191E+01	626	4.398E+01	667	1.996E+01	708	6.272E+00	749	1.874E+00
586	5.204E+01	627	4.343E+01	668	1.946E+01	709	6.109E+00	750	1.829E+00
587	5.225E+01	628	4.289E+01	669	1.901E+01	710	5.924E+00	751	1.778E+00
588	5.235E+01	629	4.233E+01	670	1.849E+01	711	5.721E+00	752	1.721E+00
589	5.238E+01	630	4.169E+01	671	1.803E+01	712	5.566E+00	753	1.675E+00
590	5.249E+01	631	4.114E+01	672	1.758E+01	713	5.422E+00	754	1.632E+00
591	5.264E+01	632	4.058E+01	673	1.711E+01	714	5.285E+00	755	1.581E+00
592	5.263E+01	633	3.995E+01	674	1.668E+01	715	5.121E+00	756	1.533E+00
593	5.271E+01	634	3.932E+01	675	1.621E+01	716	4.967E+00	757	1.498E+00
594	5.267E+01	635	3.872E+01	676	1.584E+01	717	4.820E+00	758	1.466E+00
595	5.276E+01	636	3.814E+01	677	1.540E+01	718	4.675E+00	759	1.406E+00
596	5.273E+01	637	3.749E+01	678	1.499E+01	719	4.559E+00	760	1.381E+00
597	5.268E+01	638	3.698E+01	679	1.458E+01	720	4.405E+00	761	1.328E+00
598	5.260E+01	639	3.630E+01	680	1.419E+01	721	4.302E+00	762	1.304E+00
599	5.258E+01	640	3.566E+01	681	1.380E+01	722	4.139E+00	763	1.255E+00
600	5.255E+01	641	3.503E+01	682	1.343E+01	723	4.035E+00	764	1.236E+00
601	5.253E+01	642	3.442E+01	683	1.305E+01	724	3.909E+00	765	1.207E+00
602	5.240E+01	643	3.386E+01	684	1.270E+01	725	3.814E+00	766	1.171E+00
603	5.226E+01	644	3.317E+01	685	1.235E+01	726	3.684E+00	767	1.139E+00
604	5.210E+01	645	3.255E+01	686	1.196E+01	727	3.567E+00	768	1.099E+00
605	5.194E+01	646	3.194E+01	687	1.168E+01	728	3.476E+00	769	1.074E+00
606	5.184E+01	647	3.137E+01	688	1.135E+01	729	3.368E+00	770	1.054E+00
607	5.153E+01	648	3.074E+01	689	1.102E+01	730	3.272E+00	771	1.023E+00
608	5.137E+01	649	3.004E+01	690	1.072E+01	731	3.163E+00	772	9.894E-01
609	5.106E+01	650	2.946E+01	691	1.043E+01	732	3.064E+00	773	9.716E-01
610	5.081E+01	651	2.888E+01	692	1.013E+01	733	2.984E+00	774	9.394E-01
611	5.050E+01	652	2.827E+01	693	9.826E+00	734	2.899E+00	775	9.223E-01
612	5.023E+01	653	2.768E+01	694	9.566E+00	735	2.809E+00	776	8.952E-01
613	4.983E+01	654	2.707E+01	695	9.274E+00	736	2.721E+00	777	8.689E-01
614	4.950E+01	655	2.647E+01	696	8.979E+00	737	2.645E+00	778	8.406E-01
615	4.918E+01	656	2.596E+01	697	8.740E+00	738	2.567E+00	779	8.319E-01
616	4.880E+01	657	2.536E+01	698	8.470E+00	739	2.483E+00	780	8.334E-01
617	4.838E+01	658	2.474E+01	699	8.264E+00	740	2.415E+00		
618	4.797E+01	659	2.422E+01	700	7.993E+00	741	2.350E+00		
619	4.754E+01	660	2.363E+01	701	7.766E+00	742	2.287E+00		
620	4.705E+01	661	2.317E+01	702	7.535E+00	743	2.201E+00		
621	4.660E+01	662	2.258E+01	703	7.308E+00	744	2.141E+00		
622	4.606E+01	663	2.202E+01	704	7.101E+00	745	2.079E+00		
623	4.559E+01	664	2.154E+01	705	6.896E+00	746	2.033E+00		
624	4.509E+01	665	2.096E+01	706	6.688E+00	747	1.973E+00		
625	4.453E+01	666	2.052E+01	707	6.480E+00	748	1.918E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

The Stabilization time: **30 minutes**

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

Test orientation: **Base Up**

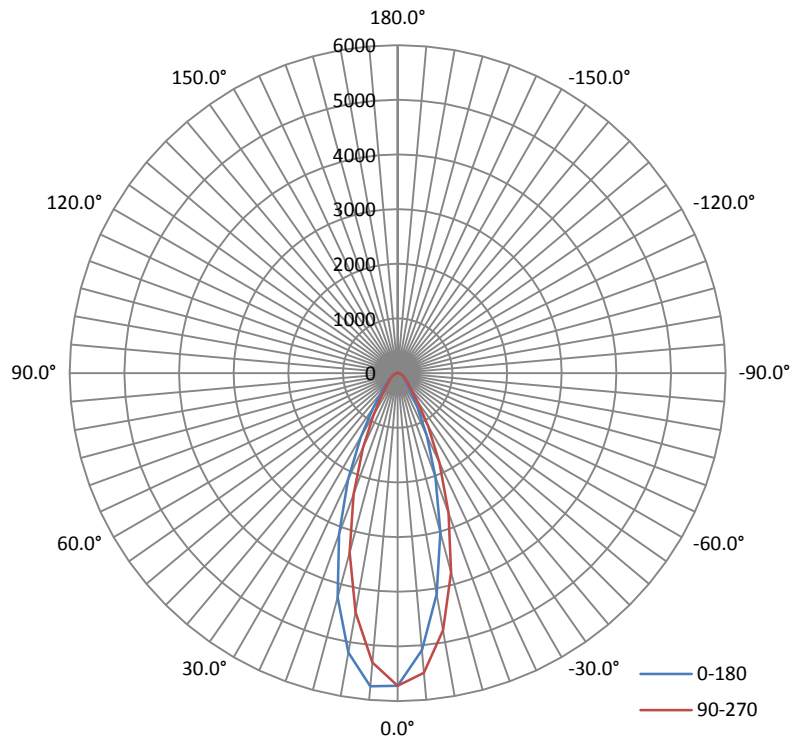
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1962	23.44	0.9954

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3121.3	133.16	5831.0	0.51	0.62

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	36.5	36.6	36.7	36.7	36.6
Field Angle (10% I _{max}):	69.8	69.7	70.0	70.1	69.9

Luminous Intensity (cd) Distribution Data

C Y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	5720	5720	5720	5720	5720	5720	5720	5720
5.0°	5752	5637	5533	5411	5313	5242	5204	5226
10.0°	5189	5018	4816	4626	4444	4329	4290	4294
15.0°	4247	4013	3797	3571	3393	3254	3189	3212
20.0°	3133	2937	2717	2521	2354	2233	2179	2193
25.0°	2147	1966	1791	1630	1501	1410	1367	1380
30.0°	1349	1216	1080	970	881	822	798	802
35.0°	788	703	623	566	516	480	467	471
40.0°	463	423	384	353	328	315	310	311
45.0°	305	284	268	251	237	230	227	229
50.0°	223	213	203	193	184	178	177	178
55.0°	173	166	159	151	145	141	140	141
60.0°	137	132	126	120	114	111	111	112
65.0°	107	102	98	92	88	85	84	86
70.0°	81	77	72	68	64	62	62	62
75.0°	56	53	49	45	41	40	39	40
80.0°	35	32	28	25	22	21	20	21
85.0°	16	14	11	9	7	6	6	7
90.0°	3	2	1	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	1
135.0°	1	1	1	1	1	1	1	1
140.0°	2	2	2	2	2	2	2	2
145.0°	3	3	3	4	4	4	4	4
150.0°	4	4	5	5	5	5	5	5
155.0°	6	6	6	6	6	6	6	6
160.0°	7	7	7	7	7	7	7	7
165.0°	7	7	7	7	7	7	7	7
170.0°	6	6	6	6	6	6	6	6
175.0°	6	5	5	5	5	5	5	5
180.0°	4	4	4	4	4	4	4	4

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°	5720	5720	5720	5720	5720	5720	5720	5720
5.0°	5088	5165	5278	5400	5504	5583	5611	5608
10.0°	4105	4248	4417	4607	4775	4889	4948	4944
15.0°	3012	3154	3350	3574	3774	3932	3999	3976
20.0°	2018	2151	2327	2529	2718	2865	2926	2895
25.0°	1260	1363	1484	1645	1805	1933	1981	1948
30.0°	726	789	879	997	1113	1214	1250	1216
35.0°	432	460	509	571	639	698	723	701
40.0°	294	309	330	361	391	419	429	416
45.0°	220	228	240	256	272	287	288	282
50.0°	173	178	185	193	202	209	211	208
55.0°	138	141	146	153	159	163	164	162
60.0°	108	111	115	120	125	129	129	128
65.0°	82	84	88	93	97	100	100	99
70.0°	58	61	64	68	72	75	75	74
75.0°	37	39	42	45	49	51	51	50
80.0°	18	20	23	26	28	30	31	30
85.0°	4	6	7	9	11	13	13	12
90.0°	0	0	0	0	1	1	1	1
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°	1	1	0	0	0	0	0	0
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	2	2	1	1	1	1	1	1
155.0°	2	2	2	2	2	2	2	2
160.0°	2	2	2	2	2	2	2	2
165.0°	2	2	2	2	2	2	2	2
170.0°	3	3	3	2	2	2	2	3
175.0°	3	3	3	3	3	3	3	3
180.0°	4	4	4	4	4	4	4	4

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	133.0	4.26
5-10	357.8	11.46
10-15	484.7	15.53
15-20	500.3	16.03
20-25	434.7	13.93
25-30	330.9	10.60
30-35	227.4	7.28
35-40	153.5	4.92
40-45	112.7	3.61
45-50	90.0	2.89
50-55	74.8	2.39
55-60	62.8	2.01
60-65	51.7	1.66
65-70	40.7	1.31
70-75	29.6	0.95
75-80	18.9	0.60
80-85	9.3	0.30
85-90	2.3	0.07
90-95	0.1	0.01
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.1	0.00
115-120	0.1	0.00
120-125	0.1	0.01
125-130	0.2	0.00
130-135	0.3	0.01
135-140	0.4	0.01
140-145	0.6	0.02
145-150	0.8	0.03
150-155	0.9	0.03
155-160	0.9	0.03
160-165	0.7	0.02
165-170	0.5	0.02
170-175	0.3	0.01
175-180	0.1	0.00

Deg	Flux (lm)	%
0-5	133.0	4.26
0-10	490.8	15.72
0-15	975.5	31.25
0-20	1475.8	47.28
0-25	1910.5	61.21
0-30	2241.4	71.81
0-35	2468.8	79.09
0-40	2622.3	84.01
0-45	2735.0	87.62
0-50	2825.0	90.51
0-55	2899.7	92.90
0-60	2962.6	94.91
0-65	3014.3	96.57
0-70	3055.0	97.88
0-75	3084.6	98.83
0-80	3103.5	99.43
0-85	3112.9	99.73
0-90	3115.2	99.80
0-95	3115.3	99.81
0-100	3115.3	99.81
0-105	3115.3	99.81
0-110	3115.4	99.81
0-115	3115.4	99.81
0-120	3115.5	99.81
0-125	3115.6	99.82
0-130	3115.7	99.82
0-135	3116.0	99.83
0-140	3116.4	99.84
0-145	3117.1	99.86
0-150	3117.9	99.89
0-155	3118.7	99.92
0-160	3119.6	99.95
0-165	3120.4	99.97
0-170	3120.9	99.99
0-175	3121.2	100.00
0-180	3121.3	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. This report includes some test methods are not in NVLAP accreditation scope marked *.
3. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor $K=2$ with the 95% confidence interval.
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*****END OF REPORT*****