

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/827FL40/277V/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:	KS2220711-31378E-EE
Test Date:	2022-07-13 to 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/827FL40/277V/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: 2700K
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**

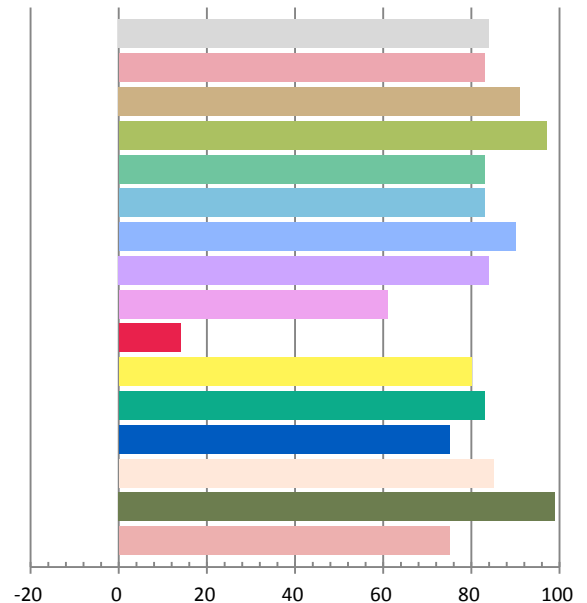
Photometric and Electrical Measurement Result

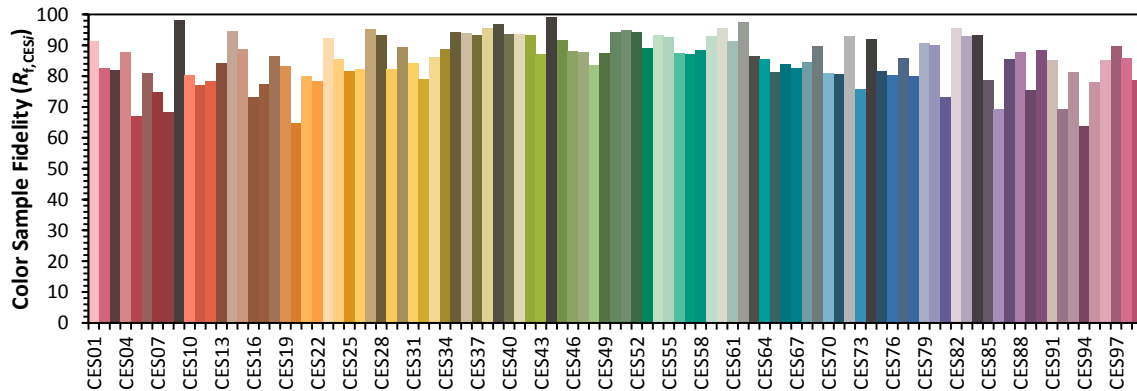
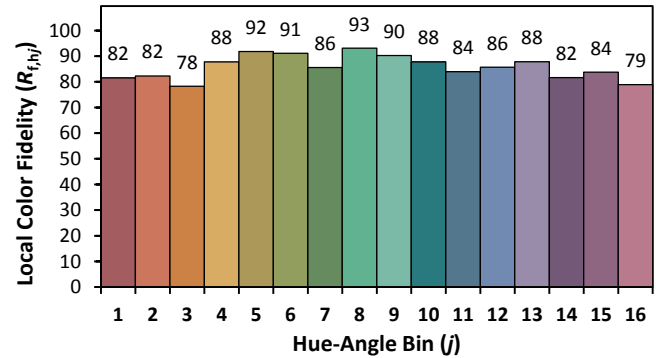
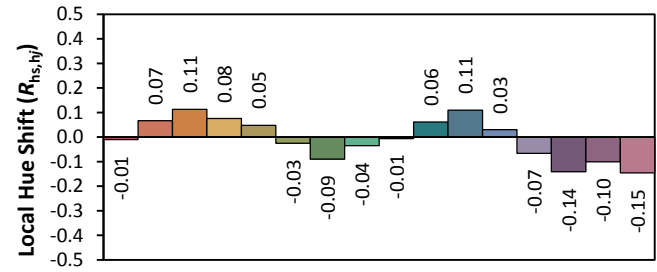
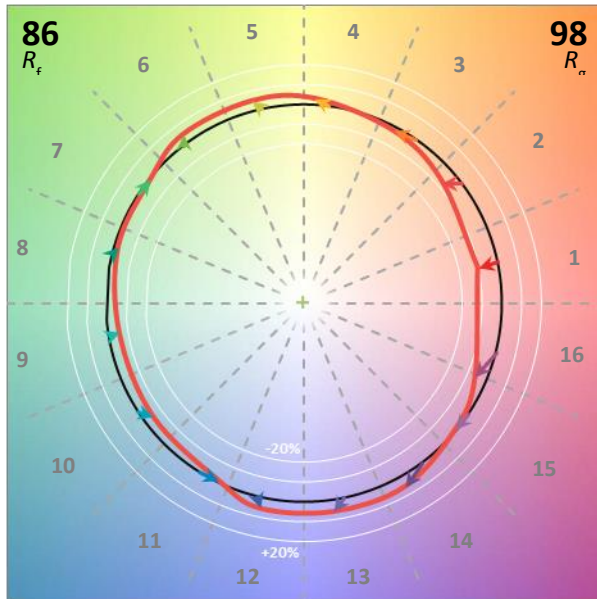
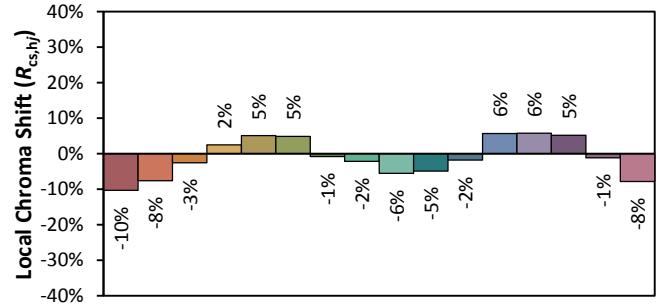
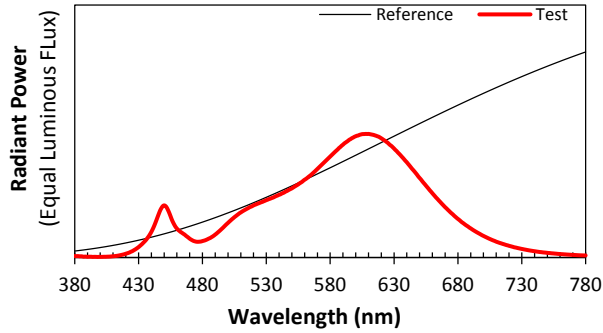
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1948	23.24	0.994	2871.6	123.58

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.9399	2756	0.00016	0.4556	0.4100	0.2600	0.5265

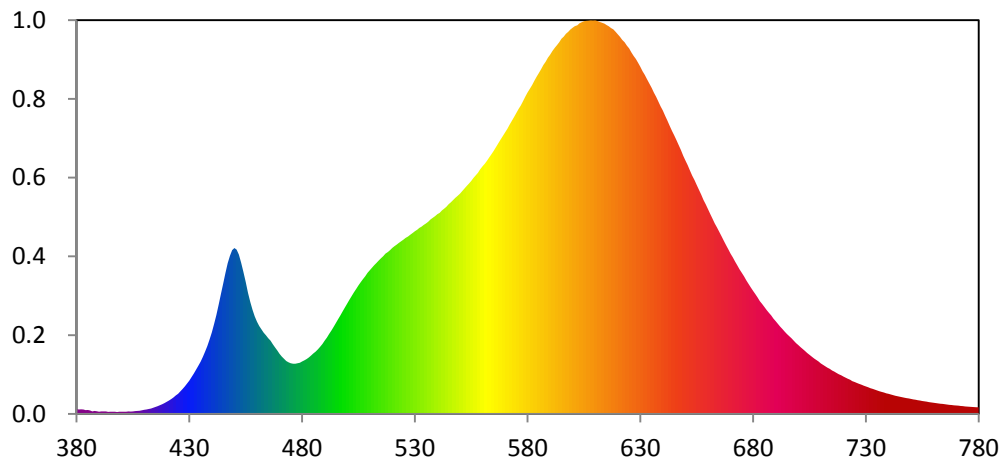
Color Rendering Index

Ra			
84.0			
R1	R2	R3	R4
83	91	97	83
R5	R6	R7	R8
83	90	84	61
R9	R10	R11	R12
14	80	83	75
R13	R14	R15	
85	99	75	





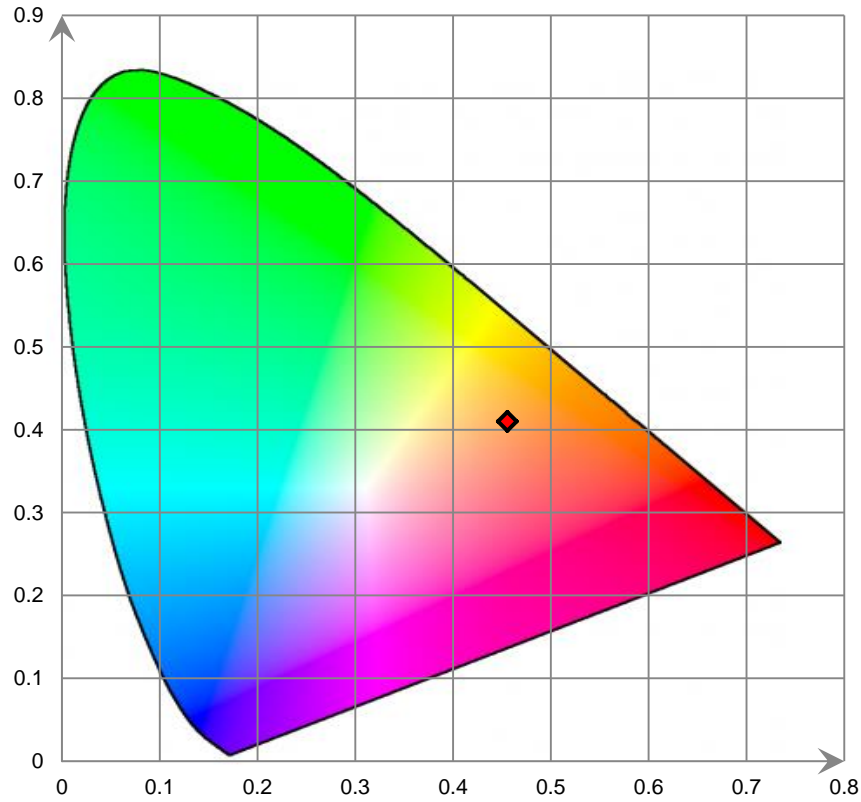
Relative Spectral Power Distribution



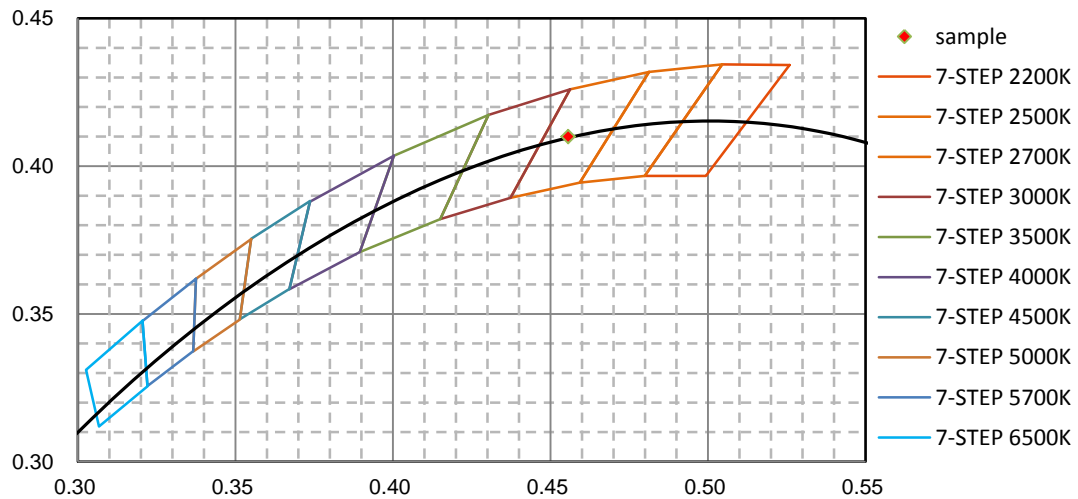
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	7.727E-01	421	2.109E+00	462	1.327E+01	503	1.908E+01	544	3.250E+01
381	6.976E-01	422	2.317E+00	463	1.275E+01	504	1.960E+01	545	3.292E+01
382	7.212E-01	423	2.578E+00	464	1.235E+01	505	2.016E+01	546	3.320E+01
383	6.929E-01	424	2.899E+00	465	1.188E+01	506	2.065E+01	547	3.356E+01
384	6.064E-01	425	3.159E+00	466	1.148E+01	507	2.115E+01	548	3.392E+01
385	6.249E-01	426	3.535E+00	467	1.093E+01	508	2.162E+01	549	3.423E+01
386	5.547E-01	427	3.910E+00	468	1.044E+01	509	2.214E+01	550	3.456E+01
387	4.056E-01	428	4.304E+00	469	9.962E+00	510	2.253E+01	551	3.497E+01
388	4.750E-01	429	4.757E+00	470	9.438E+00	511	2.295E+01	552	3.538E+01
389	4.297E-01	430	5.218E+00	471	9.009E+00	512	2.334E+01	553	3.577E+01
390	3.530E-01	431	5.769E+00	472	8.645E+00	513	2.371E+01	554	3.615E+01
391	4.035E-01	432	6.323E+00	473	8.319E+00	514	2.407E+01	555	3.656E+01
392	3.984E-01	433	6.912E+00	474	8.107E+00	515	2.443E+01	556	3.703E+01
393	3.960E-01	434	7.579E+00	475	7.946E+00	516	2.476E+01	557	3.744E+01
394	3.175E-01	435	8.214E+00	476	7.872E+00	517	2.515E+01	558	3.784E+01
395	3.507E-01	436	8.945E+00	477	7.885E+00	518	2.540E+01	559	3.839E+01
396	3.546E-01	437	9.794E+00	478	7.946E+00	519	2.570E+01	560	3.887E+01
397	3.332E-01	438	1.067E+01	479	8.032E+00	520	2.606E+01	561	3.927E+01
398	2.969E-01	439	1.168E+01	480	8.232E+00	521	2.634E+01	562	3.975E+01
399	3.450E-01	440	1.280E+01	481	8.403E+00	522	2.658E+01	563	4.028E+01
400	3.325E-01	441	1.410E+01	482	8.596E+00	523	2.686E+01	564	4.078E+01
401	3.531E-01	442	1.549E+01	483	8.857E+00	524	2.710E+01	565	4.129E+01
402	3.493E-01	443	1.707E+01	484	9.153E+00	525	2.736E+01	566	4.187E+01
403	3.895E-01	444	1.874E+01	485	9.482E+00	526	2.763E+01	567	4.245E+01
404	3.784E-01	445	2.045E+01	486	9.757E+00	527	2.783E+01	568	4.303E+01
405	4.104E-01	446	2.212E+01	487	1.014E+01	528	2.812E+01	569	4.358E+01
406	4.444E-01	447	2.364E+01	488	1.053E+01	529	2.838E+01	570	4.418E+01
407	4.663E-01	448	2.481E+01	489	1.097E+01	530	2.867E+01	571	4.474E+01
408	5.021E-01	449	2.570E+01	490	1.148E+01	531	2.889E+01	572	4.538E+01
409	5.762E-01	450	2.604E+01	491	1.197E+01	532	2.919E+01	573	4.599E+01
410	6.347E-01	451	2.578E+01	492	1.254E+01	533	2.939E+01	574	4.660E+01
411	6.869E-01	452	2.500E+01	493	1.308E+01	534	2.966E+01	575	4.722E+01
412	7.772E-01	453	2.375E+01	494	1.366E+01	535	2.990E+01	576	4.785E+01
413	8.576E-01	454	2.232E+01	495	1.426E+01	536	3.016E+01	577	4.840E+01
414	9.615E-01	455	2.067E+01	496	1.485E+01	537	3.051E+01	578	4.909E+01
415	1.099E+00	456	1.899E+01	497	1.548E+01	538	3.078E+01	579	4.978E+01
416	1.220E+00	457	1.760E+01	498	1.612E+01	539	3.104E+01	580	5.043E+01
417	1.372E+00	458	1.637E+01	499	1.673E+01	540	3.136E+01	581	5.103E+01
418	1.519E+00	459	1.530E+01	500	1.731E+01	541	3.156E+01	582	5.161E+01
419	1.698E+00	460	1.448E+01	501	1.792E+01	542	3.193E+01	583	5.231E+01
420	1.911E+00	461	1.380E+01	502	1.849E+01	543	3.221E+01	584	5.293E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.350E+01	626	5.673E+01	667	2.716E+01	708	8.466E+00	749	2.421E+00
586	5.409E+01	627	5.617E+01	668	2.649E+01	709	8.222E+00	750	2.346E+00
587	5.476E+01	628	5.571E+01	669	2.583E+01	710	7.921E+00	751	2.284E+00
588	5.526E+01	629	5.510E+01	670	2.516E+01	711	7.696E+00	752	2.224E+00
589	5.588E+01	630	5.447E+01	671	2.458E+01	712	7.475E+00	753	2.146E+00
590	5.637E+01	631	5.378E+01	672	2.393E+01	713	7.244E+00	754	2.093E+00
591	5.697E+01	632	5.320E+01	673	2.332E+01	714	7.061E+00	755	2.037E+00
592	5.743E+01	633	5.248E+01	674	2.269E+01	715	6.833E+00	756	1.975E+00
593	5.787E+01	634	5.183E+01	675	2.210E+01	716	6.647E+00	757	1.920E+00
594	5.833E+01	635	5.116E+01	676	2.157E+01	717	6.434E+00	758	1.847E+00
595	5.886E+01	636	5.042E+01	677	2.093E+01	718	6.226E+00	759	1.804E+00
596	5.919E+01	637	4.974E+01	678	2.037E+01	719	6.082E+00	760	1.760E+00
597	5.964E+01	638	4.899E+01	679	1.982E+01	720	5.860E+00	761	1.694E+00
598	5.994E+01	639	4.826E+01	680	1.930E+01	721	5.704E+00	762	1.663E+00
599	6.032E+01	640	4.759E+01	681	1.881E+01	722	5.521E+00	763	1.607E+00
600	6.059E+01	641	4.679E+01	682	1.826E+01	723	5.356E+00	764	1.567E+00
601	6.085E+01	642	4.603E+01	683	1.769E+01	724	5.147E+00	765	1.524E+00
602	6.099E+01	643	4.523E+01	684	1.726E+01	725	5.022E+00	766	1.476E+00
603	6.129E+01	644	4.442E+01	685	1.677E+01	726	4.877E+00	767	1.434E+00
604	6.147E+01	645	4.371E+01	686	1.629E+01	727	4.723E+00	768	1.394E+00
605	6.164E+01	646	4.296E+01	687	1.586E+01	728	4.581E+00	769	1.349E+00
606	6.168E+01	647	4.218E+01	688	1.545E+01	729	4.438E+00	770	1.316E+00
607	6.171E+01	648	4.138E+01	689	1.496E+01	730	4.301E+00	771	1.293E+00
608	6.176E+01	649	4.051E+01	690	1.457E+01	731	4.183E+00	772	1.255E+00
609	6.172E+01	650	3.976E+01	691	1.413E+01	732	4.034E+00	773	1.218E+00
610	6.176E+01	651	3.904E+01	692	1.371E+01	733	3.929E+00	774	1.170E+00
611	6.165E+01	652	3.821E+01	693	1.332E+01	734	3.799E+00	775	1.147E+00
612	6.152E+01	653	3.741E+01	694	1.293E+01	735	3.682E+00	776	1.110E+00
613	6.139E+01	654	3.669E+01	695	1.256E+01	736	3.563E+00	777	1.088E+00
614	6.125E+01	655	3.590E+01	696	1.220E+01	737	3.453E+00	778	1.072E+00
615	6.103E+01	656	3.514E+01	697	1.186E+01	738	3.352E+00	779	1.050E+00
616	6.083E+01	657	3.438E+01	698	1.148E+01	739	3.247E+00	780	1.052E+00
617	6.056E+01	658	3.358E+01	699	1.112E+01	740	3.152E+00		
618	6.035E+01	659	3.289E+01	700	1.081E+01	741	3.065E+00		
619	5.998E+01	660	3.212E+01	701	1.049E+01	742	2.954E+00		
620	5.957E+01	661	3.139E+01	702	1.018E+01	743	2.869E+00		
621	5.916E+01	662	3.065E+01	703	9.874E+00	744	2.772E+00		
622	5.871E+01	663	2.991E+01	704	9.564E+00	745	2.714E+00		
623	5.831E+01	664	2.926E+01	705	9.274E+00	746	2.631E+00		
624	5.780E+01	665	2.854E+01	706	8.993E+00	747	2.550E+00		
625	5.736E+01	666	2.787E+01	707	8.710E+00	748	2.490E+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**

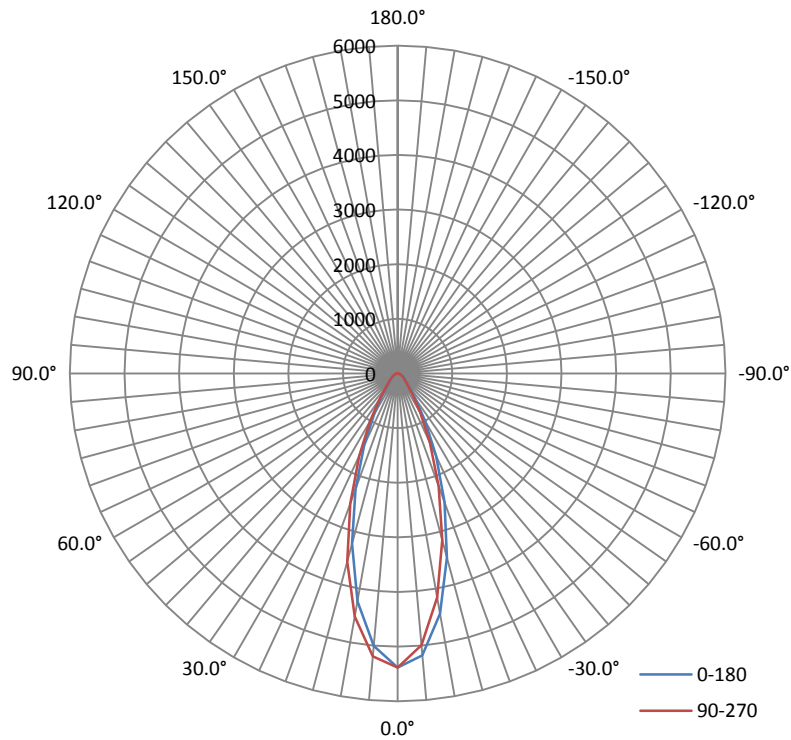
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1949	23.25	0.9942

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2873.64	123.60	5452.0	0.62	0.56

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	36.6	36.6	36.5	36.3	36.5
Field Angle (10% I _{max}):	69.7	69.8	69.4	69.3	69.6

Luminous Intensity (cd) Distribution Data

C Y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	5383	5383	5383	5383	5383	5383	5383	5383
5.0°	5007	5026	5068	5120	5198	5246	5325	5377
10.0°	4234	4254	4309	4403	4517	4613	4705	4789
15.0°	3224	3261	3338	3442	3570	3689	3785	3852
20.0°	2251	2280	2341	2433	2534	2649	2744	2817
25.0°	1451	1476	1518	1582	1665	1753	1836	1913
30.0°	854	872	904	948	1007	1066	1126	1186
35.0°	489	499	520	539	581	601	641	674
40.0°	295	300	313	324	342	359	374	389
45.0°	209	212	218	225	236	244	249	257
50.0°	159	161	166	171	177	182	184	189
55.0°	125	126	130	133	137	141	143	146
60.0°	98	100	102	105	108	112	114	116
65.0°	75	76	79	81	84	87	90	91
70.0°	54	55	57	60	63	65	67	69
75.0°	35	36	38	40	43	45	47	48
80.0°	19	19	21	23	25	27	29	30
85.0°	6	6	7	9	11	12	14	14
90.0°	0	0	0	0	1	2	2	3
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	3	3	3	3	3
150.0°	4	4	4	4	4	4	4	4
155.0°	6	6	6	5	5	5	5	5
160.0°	6	6	6	6	6	6	6	6
165.0°	6	6	6	6	6	6	6	6
170.0°	6	6	6	6	6	6	6	6
175.0°	5	5	5	5	5	5	5	5
180.0°	4	4	4	4	4	4	4	4

Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	5383	5383	5383	5383	5383	5383	5383	5383
5.0°	5182	5174	5122	5059	4992	4915	4879	4857
10.0°	4464	4435	4356	4260	4164	4072	4012	3971
15.0°	3489	3455	3374	3266	3154	3039	2961	2930
20.0°	2504	2483	2404	2302	2190	2092	2032	2002
25.0°	1661	1639	1577	1482	1403	1326	1288	1267
30.0°	1010	1000	958	885	823	769	739	725
35.0°	573	570	545	503	468	438	419	413
40.0°	340	342	329	307	293	279	267	266
45.0°	233	232	226	216	209	203	196	193
50.0°	174	173	170	164	160	155	151	149
55.0°	135	135	132	128	125	121	118	118
60.0°	107	106	104	101	97	94	92	91
65.0°	83	82	80	77	74	72	70	69
70.0°	61	60	58	56	53	51	49	48
75.0°	42	41	39	37	34	32	31	30
80.0°	24	24	22	20	18	16	15	14
85.0°	10	9	8	6	5	4	3	3
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	0	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°	1	1	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°	2	2	2	3	3	3	3	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	125.3	4.36
5-10	336.9	11.72
10-15	454.8	15.83
15-20	468.2	16.29
20-25	406.0	14.13
25-30	307.8	10.71
30-35	208.4	7.25
35-40	136.8	4.77
40-45	98.1	3.41
45-50	77.8	2.71
50-55	64.5	2.24
55-60	53.8	1.87
60-65	44.2	1.54
65-70	34.6	1.20
70-75	25.1	0.88
75-80	16.0	0.55
80-85	7.9	0.28
85-90	1.9	0.06
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	0.0	0.00
115-120	0.1	0.00
120-125	0.1	0.01
125-130	0.1	0.00
130-135	0.2	0.01
135-140	0.4	0.01
140-145	0.6	0.02
145-150	0.7	0.03
150-155	0.8	0.03
155-160	0.8	0.02
160-165	0.7	0.03
165-170	0.5	0.02
170-175	0.3	0.01
175-180	0.1	0.00

Deg	Flux (lm)	%
0-5	125.3	4.36
0-10	462.2	16.08
0-15	917.0	31.91
0-20	1385.2	48.20
0-25	1791.2	62.33
0-30	2098.9	73.04
0-35	2307.3	80.29
0-40	2444.2	85.06
0-45	2542.3	88.47
0-50	2620.1	91.18
0-55	2684.6	93.42
0-60	2738.4	95.29
0-65	2782.5	96.83
0-70	2817.1	98.03
0-75	2842.2	98.91
0-80	2858.1	99.46
0-85	2866.1	99.74
0-90	2868.0	99.80
0-95	2868.1	99.81
0-100	2868.1	99.81
0-105	2868.1	99.81
0-110	2868.2	99.81
0-115	2868.2	99.81
0-120	2868.3	99.81
0-125	2868.4	99.82
0-130	2868.5	99.82
0-135	2868.7	99.83
0-140	2869.1	99.84
0-145	2869.7	99.86
0-150	2870.4	99.89
0-155	2871.2	99.92
0-160	2872.1	99.94
0-165	2872.8	99.97
0-170	2873.3	99.99
0-175	2873.5	100.00
0-180	2873.6	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.
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*****END OF REPORT*****