

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/835FL40/277V/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:	KS2220711-31382E-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/835FL40/277V/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: 3500K
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**

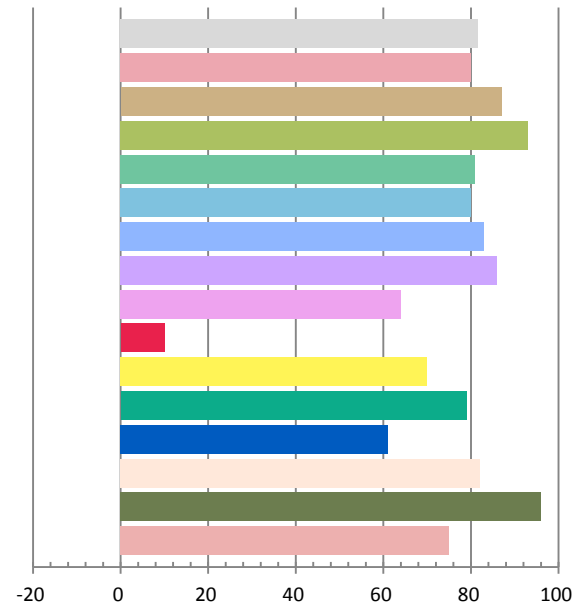
Photometric and Electrical Measurement Result

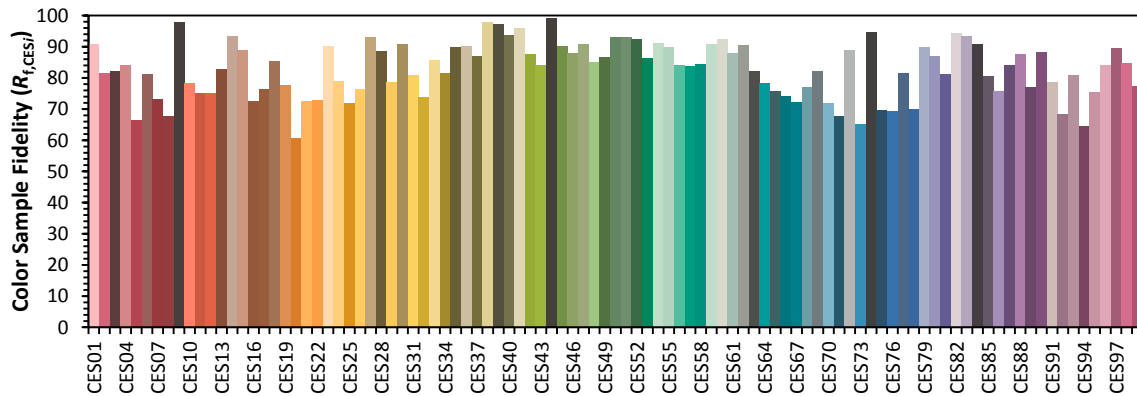
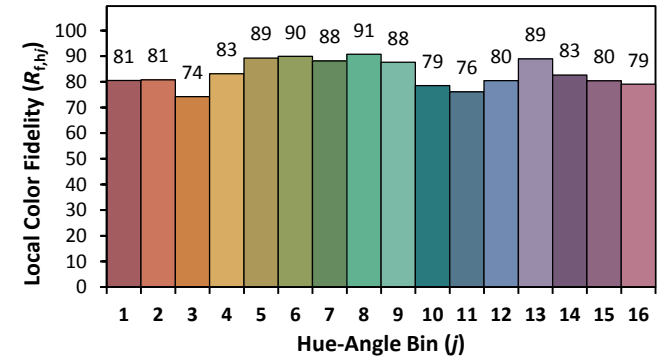
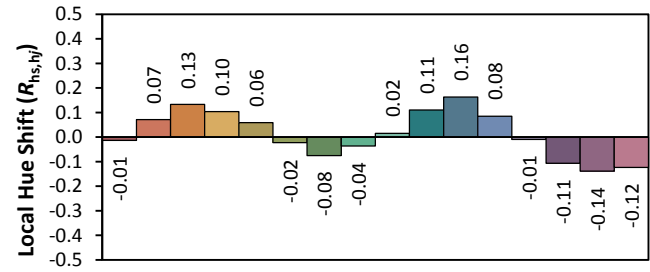
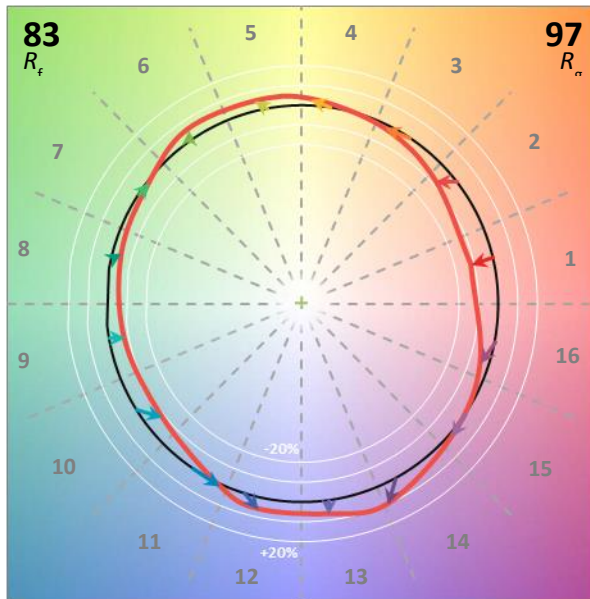
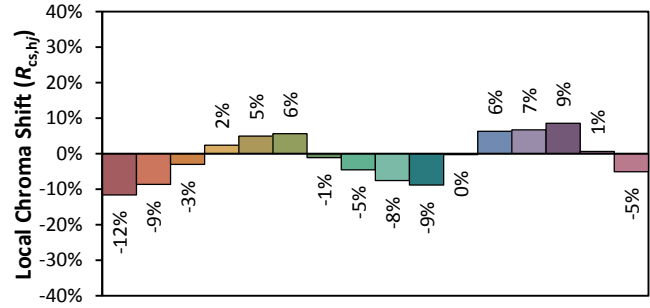
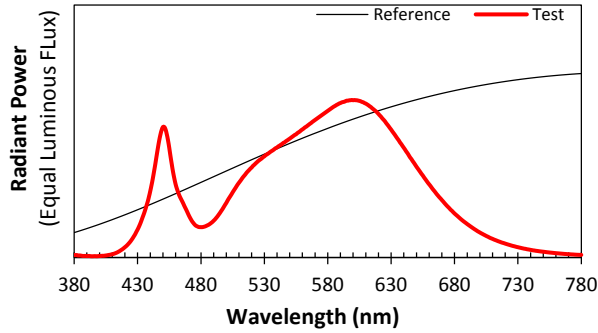
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1931	23.04	0.9938	3004.8	130.43

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.1488	3475	-0.000208	0.4065	0.3908	0.2364	0.5115

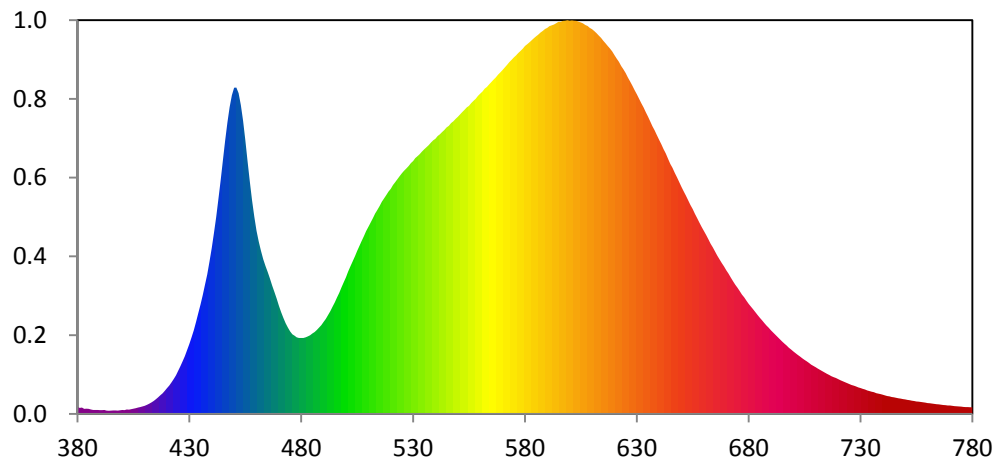
Color Rendering Index

Ra			
81.6			
R1	R2	R3	R4
80	87	93	81
R5	R6	R7	R8
80	83	86	64
R9	R10	R11	R12
10	70	79	61
R13	R14	R15	
82	96	75	





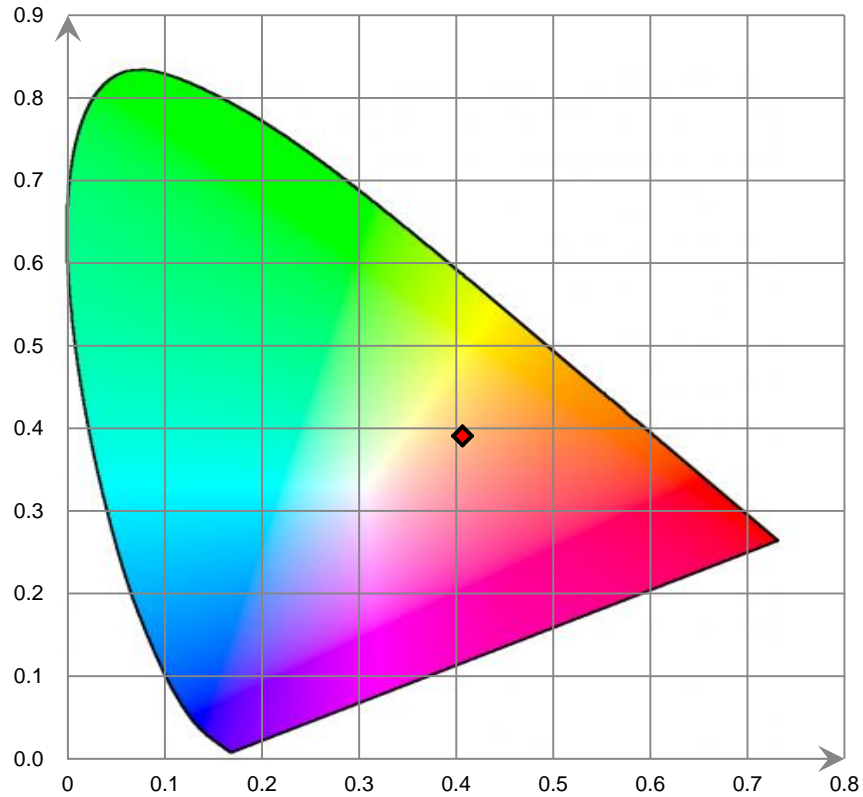
Relative Spectral Power Distribution



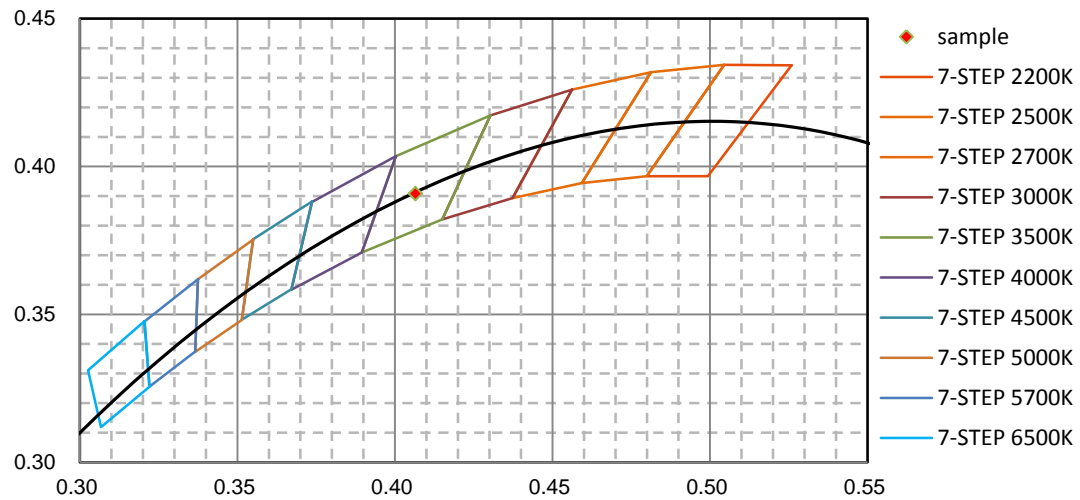
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	9.507E-01	421	3.973E+00	462	2.274E+01	503	2.129E+01	544	3.958E+01
381	8.333E-01	422	4.406E+00	463	2.157E+01	504	2.197E+01	545	3.996E+01
382	8.854E-01	423	4.888E+00	464	2.064E+01	505	2.273E+01	546	4.016E+01
383	7.202E-01	424	5.396E+00	465	1.977E+01	506	2.342E+01	547	4.054E+01
384	7.379E-01	425	5.989E+00	466	1.886E+01	507	2.410E+01	548	4.081E+01
385	7.018E-01	426	6.630E+00	467	1.788E+01	508	2.479E+01	549	4.113E+01
386	6.136E-01	427	7.330E+00	468	1.699E+01	509	2.549E+01	550	4.143E+01
387	5.504E-01	428	8.050E+00	469	1.608E+01	510	2.608E+01	551	4.176E+01
388	5.552E-01	429	8.908E+00	470	1.508E+01	511	2.667E+01	552	4.208E+01
389	5.602E-01	430	9.737E+00	471	1.419E+01	512	2.729E+01	553	4.240E+01
390	5.210E-01	431	1.067E+01	472	1.337E+01	513	2.792E+01	554	4.273E+01
391	5.398E-01	432	1.167E+01	473	1.263E+01	514	2.845E+01	555	4.296E+01
392	5.444E-01	433	1.283E+01	474	1.204E+01	515	2.897E+01	556	4.335E+01
393	4.728E-01	434	1.405E+01	475	1.151E+01	516	2.957E+01	557	4.365E+01
394	4.489E-01	435	1.525E+01	476	1.110E+01	517	3.005E+01	558	4.395E+01
395	4.537E-01	436	1.657E+01	477	1.089E+01	518	3.051E+01	559	4.434E+01
396	4.962E-01	437	1.803E+01	478	1.067E+01	519	3.099E+01	560	4.465E+01
397	4.780E-01	438	1.946E+01	479	1.060E+01	520	3.139E+01	561	4.496E+01
398	4.562E-01	439	2.123E+01	480	1.060E+01	521	3.193E+01	562	4.535E+01
399	5.068E-01	440	2.311E+01	481	1.059E+01	522	3.231E+01	563	4.560E+01
400	5.500E-01	441	2.522E+01	482	1.069E+01	523	3.275E+01	564	4.595E+01
401	5.405E-01	442	2.746E+01	483	1.081E+01	524	3.316E+01	565	4.629E+01
402	6.163E-01	443	3.000E+01	484	1.098E+01	525	3.357E+01	566	4.663E+01
403	6.009E-01	444	3.260E+01	485	1.121E+01	526	3.392E+01	567	4.693E+01
404	6.581E-01	445	3.538E+01	486	1.141E+01	527	3.424E+01	568	4.731E+01
405	7.233E-01	446	3.811E+01	487	1.171E+01	528	3.457E+01	569	4.763E+01
406	7.906E-01	447	4.063E+01	488	1.204E+01	529	3.498E+01	570	4.797E+01
407	8.836E-01	448	4.278E+01	489	1.239E+01	530	3.526E+01	571	4.832E+01
408	9.480E-01	449	4.444E+01	490	1.283E+01	531	3.567E+01	572	4.867E+01
409	1.050E+00	450	4.548E+01	491	1.326E+01	532	3.594E+01	573	4.906E+01
410	1.138E+00	451	4.552E+01	492	1.380E+01	533	3.623E+01	574	4.937E+01
411	1.275E+00	452	4.473E+01	493	1.433E+01	534	3.657E+01	575	4.970E+01
412	1.433E+00	453	4.307E+01	494	1.495E+01	535	3.690E+01	576	4.999E+01
413	1.607E+00	454	4.088E+01	495	1.556E+01	536	3.718E+01	577	5.032E+01
414	1.804E+00	455	3.819E+01	496	1.624E+01	537	3.746E+01	578	5.062E+01
415	2.044E+00	456	3.523E+01	497	1.689E+01	538	3.782E+01	579	5.091E+01
416	2.308E+00	457	3.243E+01	498	1.763E+01	539	3.814E+01	580	5.131E+01
417	2.599E+00	458	2.980E+01	499	1.836E+01	540	3.836E+01	581	5.155E+01
418	2.883E+00	459	2.753E+01	500	1.905E+01	541	3.874E+01	582	5.181E+01
419	3.231E+00	460	2.555E+01	501	1.987E+01	542	3.899E+01	583	5.210E+01
420	3.607E+00	461	2.401E+01	502	2.060E+01	543	3.931E+01	584	5.237E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.265E+01	626	4.691E+01	667	2.155E+01	708	6.864E+00	749	2.076E+00
586	5.290E+01	627	4.634E+01	668	2.103E+01	709	6.681E+00	750	2.026E+00
587	5.319E+01	628	4.577E+01	669	2.056E+01	710	6.507E+00	751	1.968E+00
588	5.341E+01	629	4.515E+01	670	2.004E+01	711	6.297E+00	752	1.913E+00
589	5.368E+01	630	4.458E+01	671	1.955E+01	712	6.124E+00	753	1.848E+00
590	5.384E+01	631	4.394E+01	672	1.902E+01	713	5.956E+00	754	1.803E+00
591	5.406E+01	632	4.333E+01	673	1.852E+01	714	5.767E+00	755	1.747E+00
592	5.419E+01	633	4.273E+01	674	1.803E+01	715	5.600E+00	756	1.709E+00
593	5.429E+01	634	4.206E+01	675	1.759E+01	716	5.445E+00	757	1.662E+00
594	5.448E+01	635	4.144E+01	676	1.714E+01	717	5.267E+00	758	1.617E+00
595	5.467E+01	636	4.083E+01	677	1.664E+01	718	5.136E+00	759	1.574E+00
596	5.467E+01	637	4.012E+01	678	1.626E+01	719	5.005E+00	760	1.522E+00
597	5.480E+01	638	3.954E+01	679	1.579E+01	720	4.855E+00	761	1.486E+00
598	5.482E+01	639	3.887E+01	680	1.535E+01	721	4.710E+00	762	1.451E+00
599	5.490E+01	640	3.825E+01	681	1.496E+01	722	4.568E+00	763	1.408E+00
600	5.482E+01	641	3.760E+01	682	1.458E+01	723	4.441E+00	764	1.367E+00
601	5.488E+01	642	3.691E+01	683	1.419E+01	724	4.303E+00	765	1.334E+00
602	5.483E+01	643	3.630E+01	684	1.379E+01	725	4.169E+00	766	1.291E+00
603	5.480E+01	644	3.558E+01	685	1.339E+01	726	4.042E+00	767	1.254E+00
604	5.470E+01	645	3.486E+01	686	1.303E+01	727	3.945E+00	768	1.231E+00
605	5.459E+01	646	3.431E+01	687	1.267E+01	728	3.822E+00	769	1.184E+00
606	5.445E+01	647	3.360E+01	688	1.234E+01	729	3.697E+00	770	1.167E+00
607	5.423E+01	648	3.300E+01	689	1.202E+01	730	3.602E+00	771	1.137E+00
608	5.410E+01	649	3.232E+01	690	1.167E+01	731	3.493E+00	772	1.097E+00
609	5.383E+01	650	3.165E+01	691	1.136E+01	732	3.399E+00	773	1.075E+00
610	5.365E+01	651	3.103E+01	692	1.104E+01	733	3.284E+00	774	1.047E+00
611	5.338E+01	652	3.041E+01	693	1.072E+01	734	3.187E+00	775	1.011E+00
612	5.309E+01	653	2.978E+01	694	1.042E+01	735	3.086E+00	776	9.847E-01
613	5.275E+01	654	2.913E+01	695	1.011E+01	736	3.029E+00	777	9.624E-01
614	5.245E+01	655	2.858E+01	696	9.818E+00	737	2.907E+00	778	9.443E-01
615	5.204E+01	656	2.790E+01	697	9.535E+00	738	2.837E+00	779	9.311E-01
616	5.169E+01	657	2.730E+01	698	9.232E+00	739	2.757E+00	780	9.328E-01
617	5.131E+01	658	2.668E+01	699	8.981E+00	740	2.664E+00		
618	5.095E+01	659	2.607E+01	700	8.720E+00	741	2.592E+00		
619	5.054E+01	660	2.551E+01	701	8.466E+00	742	2.501E+00		
620	5.005E+01	661	2.496E+01	702	8.236E+00	743	2.451E+00		
621	4.955E+01	662	2.434E+01	703	7.995E+00	744	2.365E+00		
622	4.909E+01	663	2.374E+01	704	7.772E+00	745	2.312E+00		
623	4.852E+01	664	2.322E+01	705	7.526E+00	746	2.247E+00		
624	4.804E+01	665	2.265E+01	706	7.324E+00	747	2.184E+00		
625	4.754E+01	666	2.207E+01	707	7.104E+00	748	2.132E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



The Stabilization time: **30 minutes**

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

Test orientation: **Base Up**

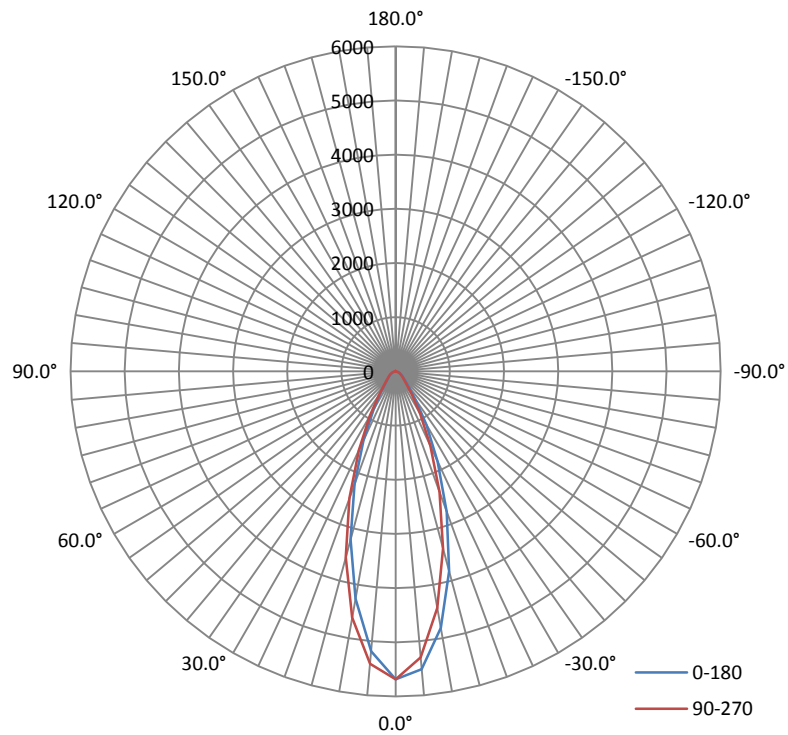
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1932	23.04	0.9940

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3006.31	130.48	5792.0	0.63	0.57

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	36.2	35.9	35.8	36.1	36.0
Field Angle (10% I _{max}):	69.4	68.8	68.6	68.9	68.9

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	5683	5683	5683	5683	5683	5683	5683	5683
5.0°	5186	5185	5221	5310	5419	5525	5638	5714
10.0°	4259	4261	4328	4446	4613	4809	4989	5118
15.0°	3210	3196	3230	3353	3552	3779	4006	4180
20.0°	2213	2187	2220	2326	2488	2700	2918	3088
25.0°	1404	1376	1397	1485	1606	1768	1948	2095
30.0°	814	797	810	868	951	1065	1198	1308
35.0°	465	456	461	500	543	598	681	749
40.0°	295	293	295	310	334	362	399	434
45.0°	214	214	216	225	238	253	272	289
50.0°	166	166	168	175	185	192	202	209
55.0°	132	132	134	139	145	151	158	163
60.0°	106	106	107	111	117	122	128	131
65.0°	81	81	83	86	90	95	99	102
70.0°	59	59	60	64	68	72	75	78
75.0°	38	39	40	42	46	49	52	55
80.0°	21	21	22	24	27	30	32	34
85.0°	6	6	7	8	10	13	15	17
90.0°	0	0	0	0	0	1	2	4
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°	4	4	4	3	3	3	3	3
150.0°	5	5	5	5	5	4	4	4
155.0°	6	6	6	6	6	6	6	5
160.0°	6	7	7	7	7	7	6	6
165.0°	6	6	7	7	7	7	7	7
170.0°	6	6	6	6	6	6	6	6
175.0°	5	5	5	5	5	5	5	6
180.0°	4	4	4	4	4	4	5	5

Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	5683	5683	5683	5683	5683	5683	5683	5683
5.0°	5518	5508	5445	5381	5298	5192	5108	5026
10.0°	4810	4793	4704	4591	4435	4271	4132	4030
15.0°	3820	3815	3700	3553	3387	3216	3083	2967
20.0°	2762	2747	2652	2522	2369	2227	2110	2017
25.0°	1835	1829	1754	1645	1518	1419	1332	1262
30.0°	1136	1132	1068	992	903	826	769	718
35.0°	650	647	605	565	516	470	441	415
40.0°	383	382	361	342	319	298	285	273
45.0°	260	258	246	236	224	213	207	202
50.0°	192	192	187	180	172	166	162	159
55.0°	151	151	147	142	137	132	130	127
60.0°	119	119	116	112	108	105	102	100
65.0°	93	93	90	87	84	81	78	76
70.0°	69	69	67	65	62	59	56	54
75.0°	48	47	46	44	41	38	36	34
80.0°	28	28	27	25	23	20	18	17
85.0°	12	12	11	10	8	6	4	3
90.0°	1	1	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°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	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	2	2	2
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	3	3	3
170.0°	2	2	3	3	3	3	3	3
175.0°	3	3	3	3	3	3	3	4
180.0°	4	4	4	4	4	4	4	5

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	131.8	4.38
5-10	352.5	11.73
10-15	473.8	15.76
15-20	486.9	16.19
20-25	420.9	14.00
25-30	317.9	10.58
30-35	215.4	7.17
35-40	142.4	4.73
40-45	103.4	3.44
45-50	82.8	2.76
50-55	69.4	2.30
55-60	58.7	1.95
60-65	48.6	1.62
65-70	38.4	1.28
70-75	28.1	0.93
75-80	18.1	0.61
80-85	9.1	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	0.0	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	0.8	0.03
150-155	0.9	0.03
155-160	0.9	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	131.8	4.38
0-10	484.3	16.11
0-15	958.1	31.87
0-20	1445.0	48.06
0-25	1865.9	62.06
0-30	2183.8	72.64
0-35	2399.3	79.81
0-40	2541.6	84.54
0-45	2645.0	87.98
0-50	2727.8	90.74
0-55	2797.2	93.04
0-60	2855.8	94.99
0-65	2904.4	96.61
0-70	2942.8	97.89
0-75	2971.0	98.82
0-80	2989.0	99.43
0-85	2998.1	99.73
0-90	3000.4	99.80
0-95	3000.5	99.81
0-100	3000.5	99.81
0-105	3000.5	99.81
0-110	3000.6	99.81
0-115	3000.6	99.81
0-120	3000.7	99.81
0-125	3000.8	99.82
0-130	3000.9	99.82
0-135	3001.1	99.83
0-140	3001.5	99.84
0-145	3002.1	99.86
0-150	3002.9	99.89
0-155	3003.8	99.92
0-160	3004.6	99.94
0-165	3005.4	99.97
0-170	3005.9	99.99
0-175	3006.2	100.00
0-180	3006.3	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*****