

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/827NF25/277V/SD

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Reviewed By:	James Liang <i>James Liang</i>
Report Number:	KS2220308-31377E-EE-1
Test Date:	2022-03-09
Report Date:	2022-09-22
Approved by:	Bill Xiong / 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 2022-03-08. 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/827NF25/277V/SD
Manufacturer: GREEN CREATIVE LTD
Product Designation: Directional LED Lamp
Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: AC 120-277V 60 Hz
Rated Power: 24W
Nominal CCT: 2700K
Nominal Lumen Output: 2500lm

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
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	2022-01-12	2023-01-11
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	2022-01-06	2023-01-05
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2022-10-14
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	2022-01-06	2023-01-05
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
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 $U=22\text{K}$ ($K=2$), 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 $U=0.18\%$ 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_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**

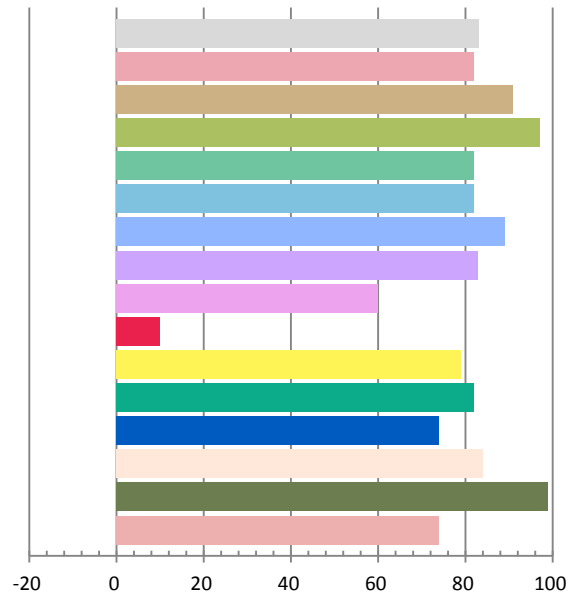
Photometric and Electrical Measurement Result

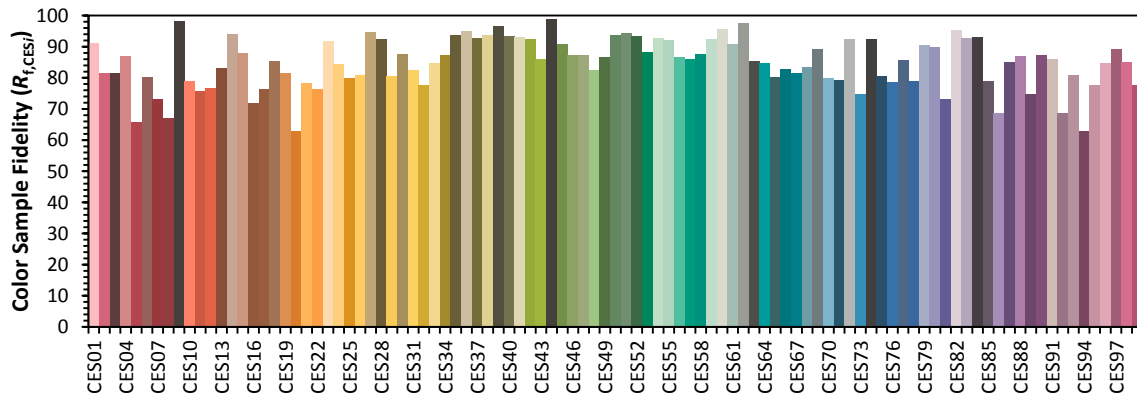
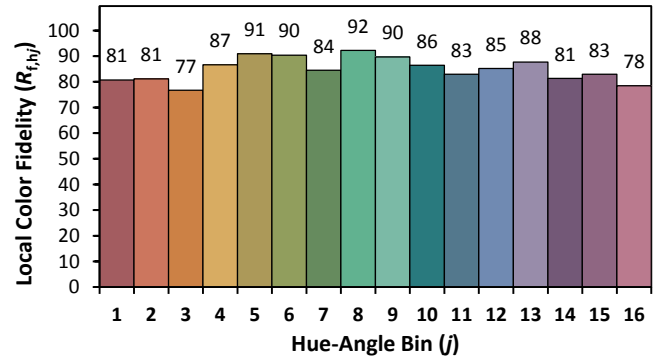
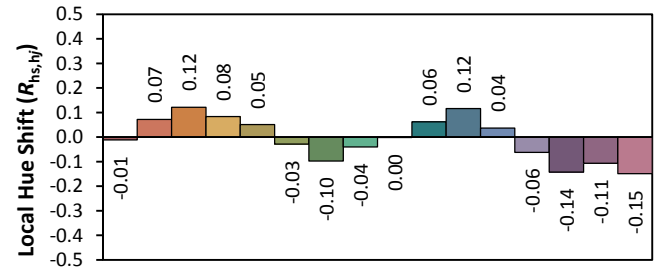
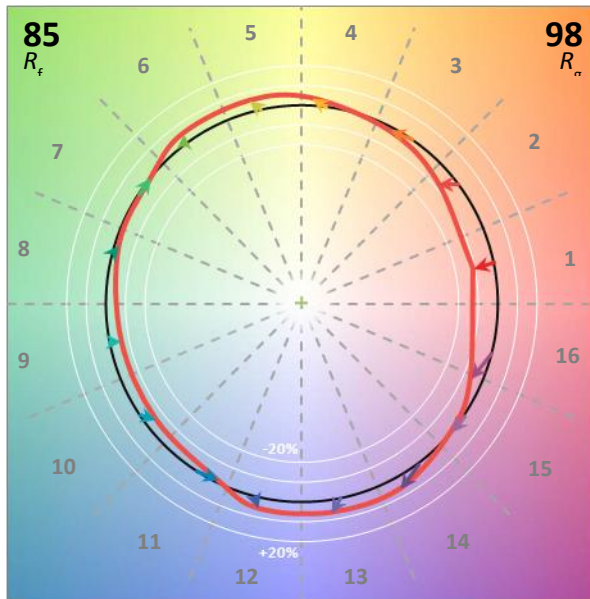
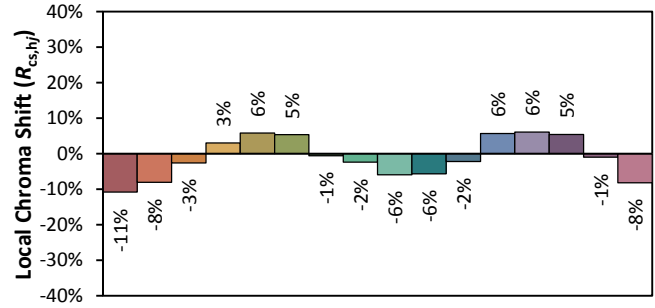
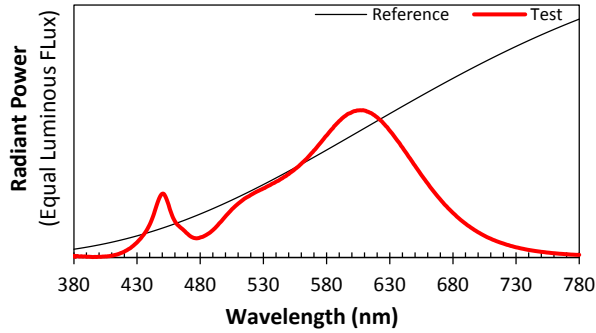
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.2007	23.94	0.9939	2993.0	125.01

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.2703	2795	-0.0001620	0.4520	0.4082	0.2585	0.5253

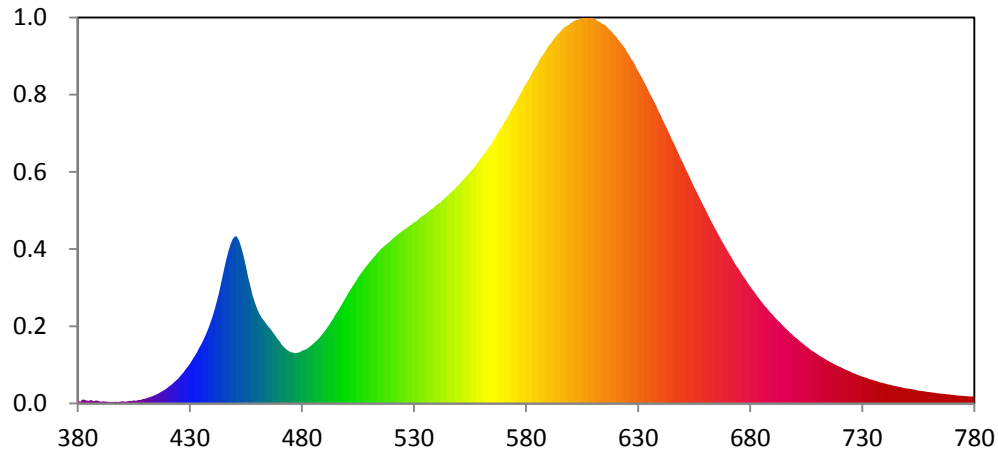
Color Rendering Index

Ra			
83.1			
R1	R2	R3	R4
82	91	97	82
R5	R6	R7	R8
82	89	83	60
R9	R10	R11	R12
10	79	82	74
R13	R14	R15	
84	99	74	





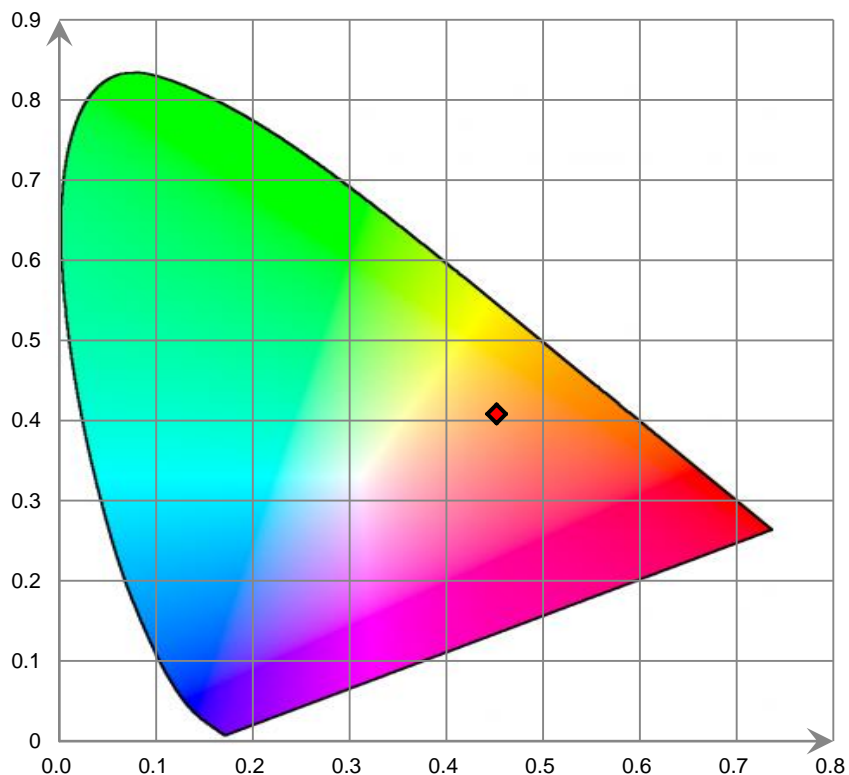
Relative Spectral Power Distribution



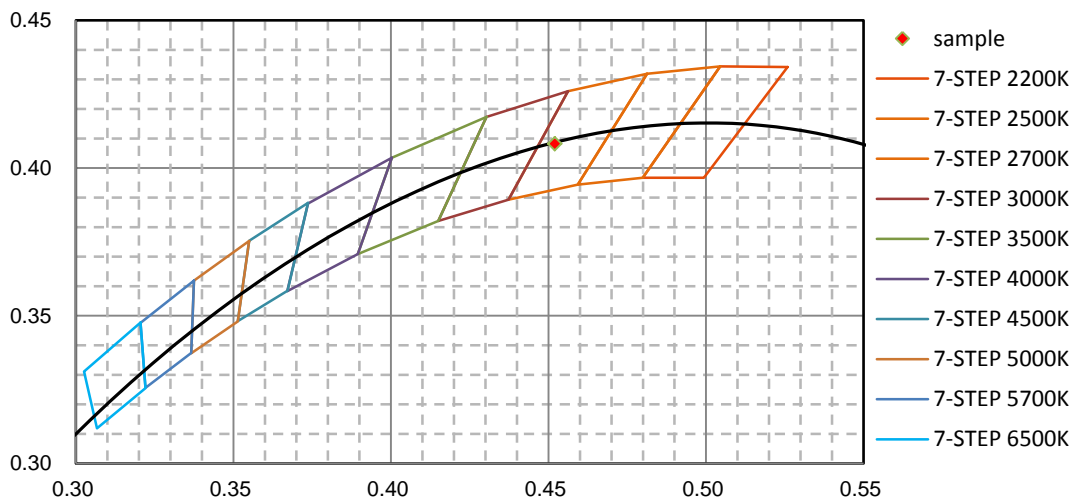
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	7.731E-01	421	2.923E+00	462	1.422E+01	503	1.967E+01	544	3.413E+01
381	2.351E-01	422	3.191E+00	463	1.375E+01	504	2.024E+01	545	3.441E+01
382	6.286E-01	423	3.565E+00	464	1.322E+01	505	2.089E+01	546	3.485E+01
383	6.472E-01	424	3.862E+00	465	1.276E+01	506	2.139E+01	547	3.514E+01
384	4.794E-01	425	4.211E+00	466	1.233E+01	507	2.191E+01	548	3.544E+01
385	4.490E-01	426	4.703E+00	467	1.181E+01	508	2.243E+01	549	3.592E+01
386	5.857E-01	427	5.098E+00	468	1.132E+01	509	2.289E+01	550	3.622E+01
387	3.747E-01	428	5.611E+00	469	1.073E+01	510	2.337E+01	551	3.671E+01
388	4.659E-01	429	6.082E+00	470	1.030E+01	511	2.380E+01	552	3.708E+01
389	4.774E-01	430	6.583E+00	471	9.763E+00	512	2.423E+01	553	3.748E+01
390	2.994E-01	431	7.185E+00	472	9.340E+00	513	2.466E+01	554	3.787E+01
391	3.501E-01	432	7.784E+00	473	8.977E+00	514	2.509E+01	555	3.838E+01
392	3.493E-01	433	8.359E+00	474	8.728E+00	515	2.553E+01	556	3.877E+01
393	2.981E-01	434	9.119E+00	475	8.503E+00	516	2.585E+01	557	3.922E+01
394	2.665E-01	435	9.769E+00	476	8.417E+00	517	2.619E+01	558	3.966E+01
395	2.056E-01	436	1.050E+01	477	8.328E+00	518	2.645E+01	559	4.021E+01
396	2.560E-01	437	1.131E+01	478	8.396E+00	519	2.677E+01	560	4.070E+01
397	2.788E-01	438	1.221E+01	479	8.480E+00	520	2.716E+01	561	4.125E+01
398	2.392E-01	439	1.323E+01	480	8.708E+00	521	2.746E+01	562	4.172E+01
399	3.099E-01	440	1.429E+01	481	8.867E+00	522	2.777E+01	563	4.227E+01
400	3.775E-01	441	1.552E+01	482	9.000E+00	523	2.809E+01	564	4.275E+01
401	2.964E-01	442	1.691E+01	483	9.289E+00	524	2.838E+01	565	4.334E+01
402	3.511E-01	443	1.837E+01	484	9.566E+00	525	2.867E+01	566	4.397E+01
403	4.292E-01	444	2.008E+01	485	9.882E+00	526	2.891E+01	567	4.457E+01
404	4.121E-01	445	2.181E+01	486	1.023E+01	527	2.918E+01	568	4.522E+01
405	4.954E-01	446	2.345E+01	487	1.056E+01	528	2.946E+01	569	4.574E+01
406	4.561E-01	447	2.497E+01	488	1.095E+01	529	2.967E+01	570	4.643E+01
407	5.843E-01	448	2.623E+01	489	1.143E+01	530	3.001E+01	571	4.697E+01
408	5.849E-01	449	2.718E+01	490	1.189E+01	531	3.016E+01	572	4.764E+01
409	7.401E-01	450	2.768E+01	491	1.241E+01	532	3.056E+01	573	4.833E+01
410	7.954E-01	451	2.766E+01	492	1.293E+01	533	3.083E+01	574	4.900E+01
411	8.975E-01	452	2.696E+01	493	1.353E+01	534	3.113E+01	575	4.964E+01
412	1.057E+00	453	2.580E+01	494	1.411E+01	535	3.136E+01	576	5.030E+01
413	1.173E+00	454	2.436E+01	495	1.480E+01	536	3.168E+01	577	5.099E+01
414	1.308E+00	455	2.278E+01	496	1.533E+01	537	3.204E+01	578	5.166E+01
415	1.482E+00	456	2.091E+01	497	1.592E+01	538	3.226E+01	579	5.242E+01
416	1.667E+00	457	1.941E+01	498	1.659E+01	539	3.253E+01	580	5.296E+01
417	1.916E+00	458	1.790E+01	499	1.723E+01	540	3.290E+01	581	5.360E+01
418	2.102E+00	459	1.672E+01	500	1.788E+01	541	3.315E+01	582	5.431E+01
419	2.341E+00	460	1.573E+01	501	1.850E+01	542	3.338E+01	583	5.496E+01
420	2.587E+00	461	1.488E+01	502	1.907E+01	543	3.377E+01	584	5.561E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.614E+01	626	5.768E+01	667	2.716E+01	708	8.620E+00	749	2.554E+00
586	5.695E+01	627	5.703E+01	668	2.649E+01	709	8.373E+00	750	2.471E+00
587	5.748E+01	628	5.653E+01	669	2.586E+01	710	8.163E+00	751	2.427E+00
588	5.808E+01	629	5.574E+01	670	2.523E+01	711	7.875E+00	752	2.360E+00
589	5.861E+01	630	5.506E+01	671	2.455E+01	712	7.651E+00	753	2.296E+00
590	5.922E+01	631	5.440E+01	672	2.395E+01	713	7.450E+00	754	2.201E+00
591	5.967E+01	632	5.376E+01	673	2.328E+01	714	7.210E+00	755	2.148E+00
592	6.025E+01	633	5.300E+01	674	2.269E+01	715	6.997E+00	756	2.101E+00
593	6.071E+01	634	5.225E+01	675	2.219E+01	716	6.808E+00	757	2.037E+00
594	6.116E+01	635	5.150E+01	676	2.155E+01	717	6.594E+00	758	1.973E+00
595	6.152E+01	636	5.077E+01	677	2.101E+01	718	6.416E+00	759	1.915E+00
596	6.196E+01	637	5.010E+01	678	2.048E+01	719	6.238E+00	760	1.875E+00
597	6.235E+01	638	4.938E+01	679	1.992E+01	720	6.068E+00	761	1.829E+00
598	6.254E+01	639	4.846E+01	680	1.938E+01	721	5.869E+00	762	1.769E+00
599	6.274E+01	640	4.779E+01	681	1.889E+01	722	5.677E+00	763	1.725E+00
600	6.305E+01	641	4.694E+01	682	1.840E+01	723	5.498E+00	764	1.664E+00
601	6.333E+01	642	4.617E+01	683	1.782E+01	724	5.392E+00	765	1.633E+00
602	6.354E+01	643	4.541E+01	684	1.736E+01	725	5.184E+00	766	1.600E+00
603	6.358E+01	644	4.461E+01	685	1.688E+01	726	5.014E+00	767	1.557E+00
604	6.381E+01	645	4.374E+01	686	1.640E+01	727	4.903E+00	768	1.509E+00
605	6.383E+01	646	4.304E+01	687	1.596E+01	728	4.727E+00	769	1.476E+00
606	6.388E+01	647	4.222E+01	688	1.553E+01	729	4.583E+00	770	1.435E+00
607	6.391E+01	648	4.142E+01	689	1.509E+01	730	4.431E+00	771	1.401E+00
608	6.386E+01	649	4.056E+01	690	1.469E+01	731	4.339E+00	772	1.349E+00
609	6.394E+01	650	3.983E+01	691	1.424E+01	732	4.213E+00	773	1.305E+00
610	6.375E+01	651	3.901E+01	692	1.383E+01	733	4.070E+00	774	1.279E+00
611	6.367E+01	652	3.824E+01	693	1.350E+01	734	3.947E+00	775	1.262E+00
612	6.333E+01	653	3.746E+01	694	1.308E+01	735	3.842E+00	776	1.223E+00
613	6.323E+01	654	3.665E+01	695	1.272E+01	736	3.740E+00	777	1.193E+00
614	6.291E+01	655	3.584E+01	696	1.236E+01	737	3.607E+00	778	1.164E+00
615	6.273E+01	656	3.510E+01	697	1.197E+01	738	3.508E+00	779	1.170E+00
616	6.242E+01	657	3.435E+01	698	1.165E+01	739	3.392E+00	780	1.172E+00
617	6.201E+01	658	3.362E+01	699	1.129E+01	740	3.301E+00		
618	6.170E+01	659	3.284E+01	700	1.096E+01	741	3.205E+00		
619	6.121E+01	660	3.216E+01	701	1.067E+01	742	3.121E+00		
620	6.085E+01	661	3.139E+01	702	1.033E+01	743	3.028E+00		
621	6.033E+01	662	3.059E+01	703	1.003E+01	744	2.950E+00		
622	5.986E+01	663	2.991E+01	704	9.732E+00	745	2.856E+00		
623	5.941E+01	664	2.921E+01	705	9.439E+00	746	2.779E+00		
624	5.891E+01	665	2.852E+01	706	9.153E+00	747	2.702E+00		
625	5.826E+01	666	2.784E+01	707	8.857E+00	748	2.624E+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**

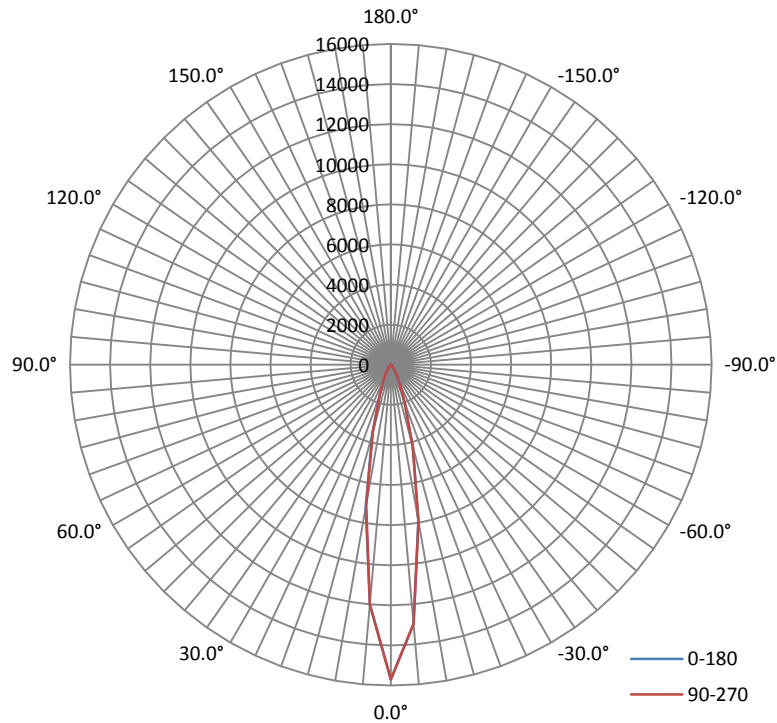
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2008	23.95	0.9940

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2994.87	125.05	16048	0.34	0.35

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	19.2	19.2	19.2	19.2	19.2
Field Angle (10% I _{max}):	42.0	42.2	41.9	41.8	42.0

Luminous Intensity (cd) Distribution Data

C Y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	15694	15694	15694	15694	15694	15694	15694	15694
5.0°	12005	11646	11475	11606	12018	12636	13483	14382
10.0°	7193	6812	6673	6756	7094	7570	8254	9071
15.0°	3566	3318	3228	3259	3456	3789	4306	4952
20.0°	1628	1542	1505	1519	1601	1751	1988	2293
25.0°	905	880	872	877	909	966	1066	1202
30.0°	494	482	481	490	503	527	593	681
35.0°	248	244	245	248	251	261	292	344
40.0°	131	128	127	129	130	135	151	172
45.0°	86	87	86	84	85	87	92	102
50.0°	68	68	67	66	66	68	71	77
55.0°	55	54	53	52	53	55	58	62
60.0°	45	44	43	42	43	44	46	50
65.0°	37	36	35	35	35	37	38	40
70.0°	29	28	27	27	28	29	30	32
75.0°	21	20	19	19	20	21	22	24
80.0°	13	12	12	12	13	13	15	16
85.0°	5	5	4	4	5	6	7	8
90.0°	0	0	0	0	0	0	0	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	1	1	1	1	1	1
140.0°	2	3	3	3	2	2	2	2
145.0°	5	5	5	5	5	5	4	4
150.0°	7	7	7	7	7	7	7	6
155.0°	8	9	9	9	9	9	9	8
160.0°	9	9	9	10	10	10	10	10
165.0°	9	9	9	9	9	10	10	10
170.0°	7	7	7	7	8	8	8	9
175.0°	5	5	5	6	6	6	7	7
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°	15694	15694	15694	15694	15694	15694	15694	15694
5.0°	12969	13502	13634	13438	12982	12332	11771	11172
10.0°	7891	8336	8518	8368	7950	7437	6931	6475
15.0°	4234	4548	4675	4544	4237	3850	3453	3107
20.0°	1999	2175	2248	2169	2000	1790	1612	1501
25.0°	1103	1200	1228	1182	1081	979	888	822
30.0°	625	690	713	681	612	525	461	423
35.0°	317	358	373	354	306	259	230	212
40.0°	163	186	191	182	163	139	121	113
45.0°	96	102	107	104	96	89	84	82
50.0°	73	75	75	74	71	68	66	66
55.0°	59	60	60	59	57	56	54	54
60.0°	47	49	49	48	47	45	45	44
65.0°	38	39	40	39	39	38	37	36
70.0°	30	31	32	31	30	29	28	27
75.0°	22	23	23	23	22	21	20	20
80.0°	14	15	15	15	14	13	13	11
85.0°	6	7	7	7	6	6	5	4
90.0°	0	0	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	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	2	2	2	2	2	2
155.0°	2	2	2	2	2	3	3	3
160.0°	2	2	2	2	3	3	3	3
165.0°	2	2	2	2	2	3	3	3
170.0°	2	2	2	2	2	2	3	3
175.0°	2	2	2	3	3	3	3	3
180.0°	4	4	4	4	4	4	4	5

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	336.2	11.23	0-5	336.2	11.23
5-10	697.0	23.27	0-10	1033.2	34.50
10-15	654.9	21.86	0-15	1688.0	56.36
15-20	442.7	14.79	0-20	2130.8	71.15
20-25	283.6	9.47	0-25	2414.4	80.62
25-30	193.3	6.45	0-30	2607.7	87.07
30-35	119.2	3.98	0-35	2726.9	91.05
35-40	69.3	2.32	0-40	2796.2	93.37
40-45	42.3	1.41	0-45	2838.5	94.78
45-50	32.2	1.08	0-50	2870.8	95.86
50-55	27.3	0.91	0-55	2898.1	96.77
55-60	23.5	0.78	0-60	2921.6	97.55
60-65	20.2	0.67	0-65	2941.7	98.22
65-70	16.9	0.57	0-70	2958.6	98.79
70-75	13.2	0.44	0-75	2971.8	99.23
75-80	9.3	0.31	0-80	2981.2	99.54
80-85	5.2	0.18	0-85	2986.3	99.72
85-90	1.4	0.04	0-90	2987.7	99.76
90-95	0.0	0.00	0-95	2987.7	99.76
95-100	0.0	0.00	0-100	2987.8	99.76
100-105	0.0	0.00	0-105	2987.8	99.76
105-110	0.0	0.00	0-110	2987.8	99.76
110-115	0.0	0.01	0-115	2987.8	99.77
115-120	0.0	0.00	0-120	2987.9	99.77
120-125	0.0	0.00	0-125	2987.9	99.77
125-130	0.1	0.00	0-130	2988.0	99.77
130-135	0.2	0.01	0-135	2988.2	99.78
135-140	0.4	0.01	0-140	2988.5	99.79
140-145	0.7	0.02	0-145	2989.3	99.81
145-150	1.1	0.04	0-150	2990.3	99.85
150-155	1.2	0.04	0-155	2991.6	99.89
155-160	1.2	0.04	0-160	2992.8	99.93
160-165	1.0	0.03	0-165	2993.8	99.96
165-170	0.7	0.03	0-170	2994.4	99.99
170-175	0.3	0.01	0-175	2994.8	100.00
175-180	0.1	0.00	0-180	2994.9	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.
6. This report cannot be reproduced except in full, without prior written approval of the Company.
7. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

*****END OF REPORT*****