TL-749

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: INFT9.5/830/DIM010UNV

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	PKS200825092-10
Test Date:	2020-08-28 to 2020-09-05
Report Date:	2020-09-07
Reviewed By:	Ray Gao/ EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax:+86-0512-88934268
Accreditation:	The IAS Accreditation Number TL-749.

1. Product Description

General Information:

One sample was received on 2020-08-25 and used for testing.

Model Tested:	INFT9.5/830/DIM010UNV
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	LED Recessed Downlight
Burning Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120-277VAC 50/60Hz
Rated Power:	27W
Nominal CCT:	3000K
Nominal Lumen Output:	3320lm

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 Equipment
- IES TM-30-18:IES Method for Evaluating Light Source Color Rendition

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2020-01-22	2021-01-21
Power Meter	INVENTFINE	WT500	GSJWQ20009	2020-04-02	2021-04-01
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2020-01-22	2021-01-21
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2020-04-02	2021-04-01
Standard Light Source	INVENTFINE	N/A	JWWCR020104	2019-11-19	2020-11-18
Thermal Meter	KEJIAN	TA298	N/A	2019-12-02	2020-12-01
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2019-12-20	2020-12-19
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2020-04-02	2021-04-01
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2019-12-20	2020-12-19
Power Meter	INVENTFINE	WT500	GSDSQ200007	2020-04-02	2021-04-01
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2020-01-22	2021-01-21
Wireless Weather Station	ZHONGXING	KG218	N/A	2019-12-02	2020-12-01
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2020-03-19	2021-03-18

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) 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_{rel}=2.61% (k=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=34K (k=2), at the 95% confidence level. The uncertainty of the CRI is U=2.5(k=2), at the 95% confidence level.

The uncertainty of power meter AC current U_{rel}=0.48 % of rdg, AC Voltage U_{rel}=0.25% of rdg, Power U_{rel}=0.44%,(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 flux is U_{rel}=2.6% (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: **Downward**

Photometric and Electrical Measurement Result

Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.2337	27.5	0.9806	3646.73	132.61

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
11.007	3071	0.00121	0.4336	0.4059	0.2477	0.5216

Color Rendering Index

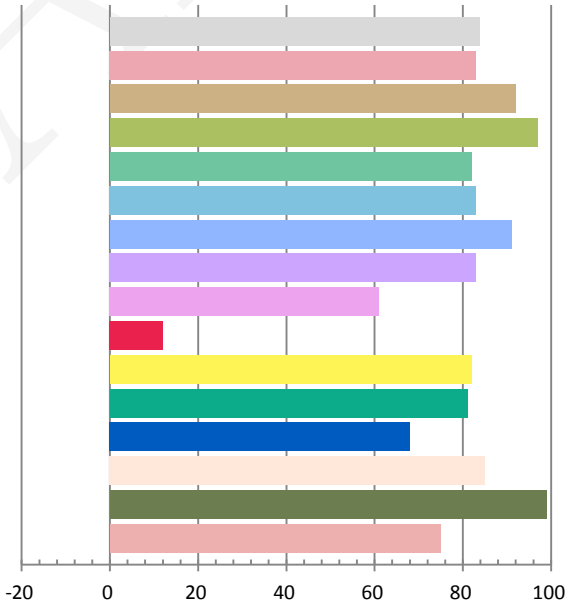
Ra
83.8

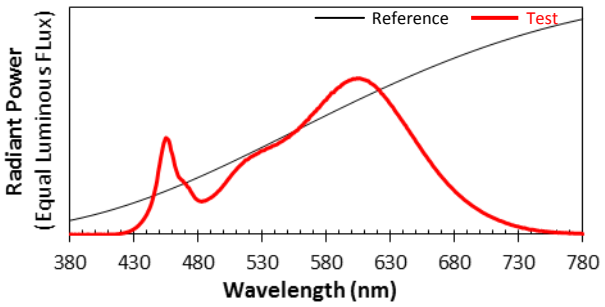
R1	R2	R3	R4
83	92	97	82

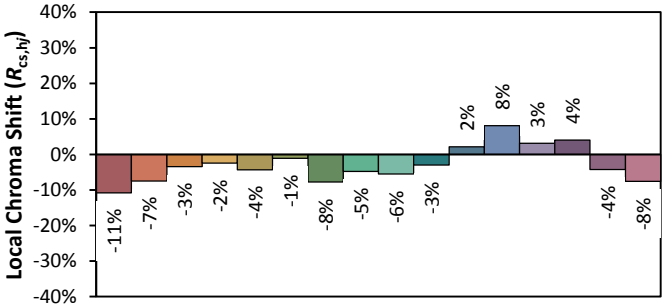
R5	R6	R7	R8
83	91	83	61

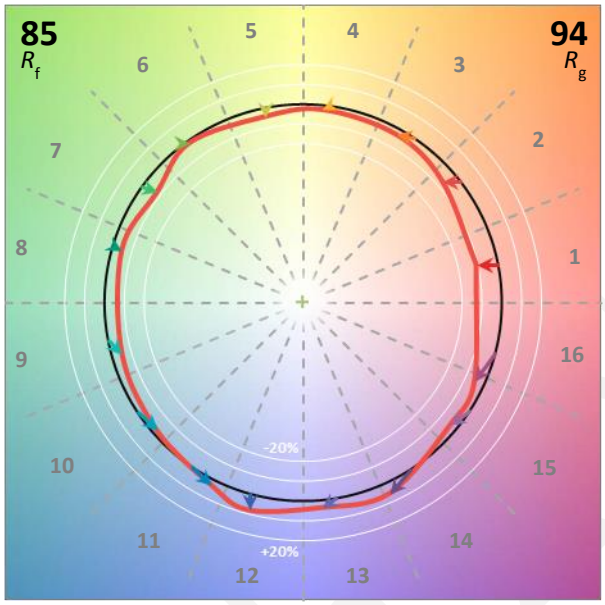
R9	R10	R11	R12
12	82	81	68

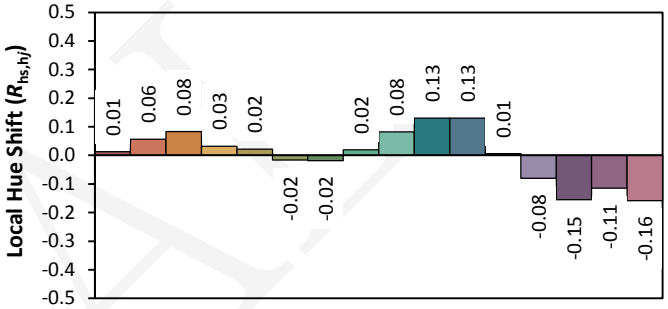
R13	R14	R15
85	99	75

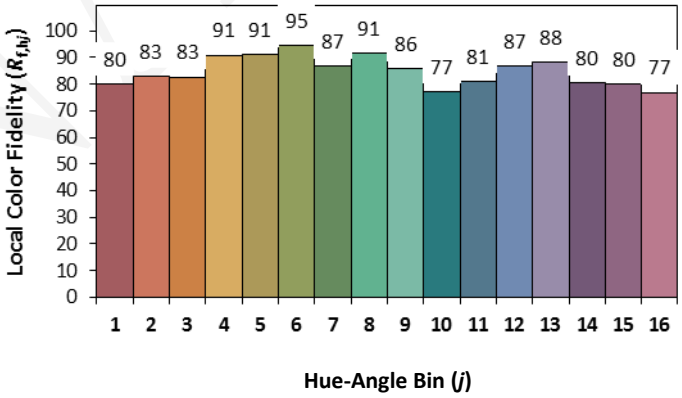


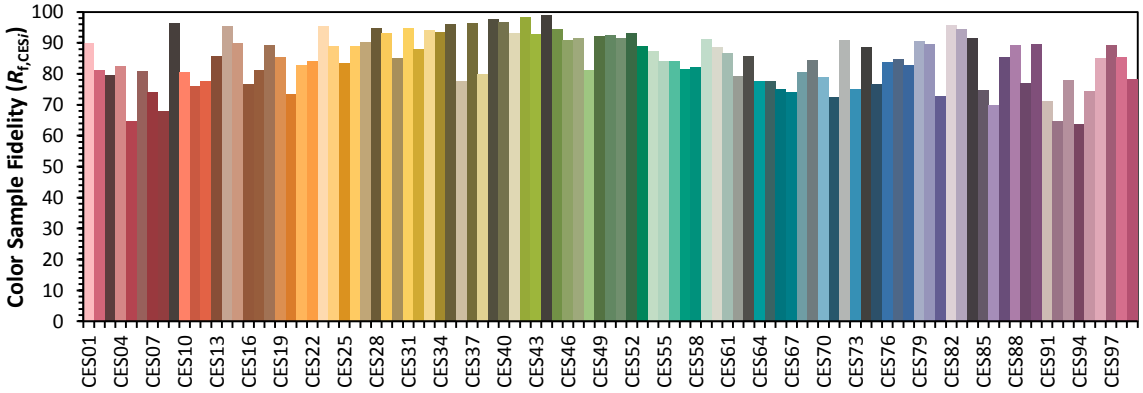

Reference
Test
Radiant Power
(Equal Luminous Flux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-11% -7% -3% -2% -4% -1% -8% -5% -6% -3% 2% 8% 3% 4% -4% -8%

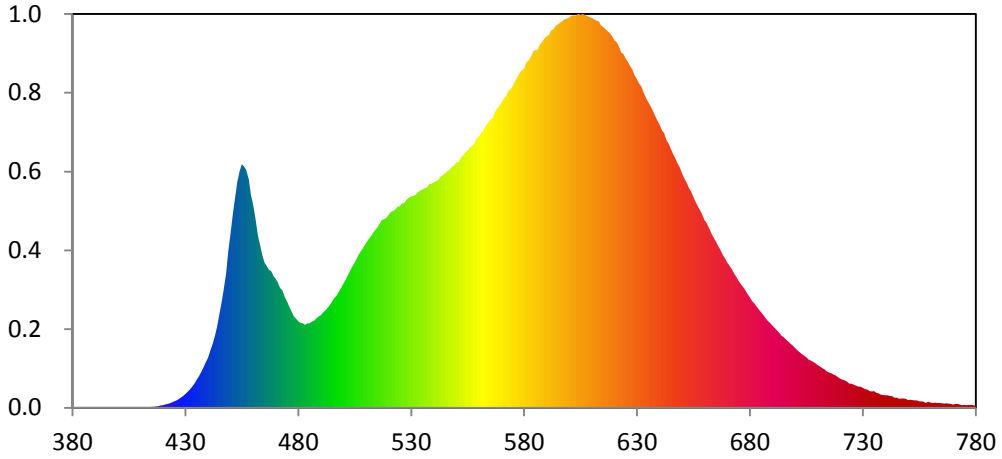

85
R_f
94
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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 0.08 0.03 0.02 -0.02 -0.02 0.02 0.08 0.13 0.13 0.01 -0.08 -0.15 -0.11 -0.16


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
80 83 83 91 91 95 87 91 86 77 81 87 88 80 80 77
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

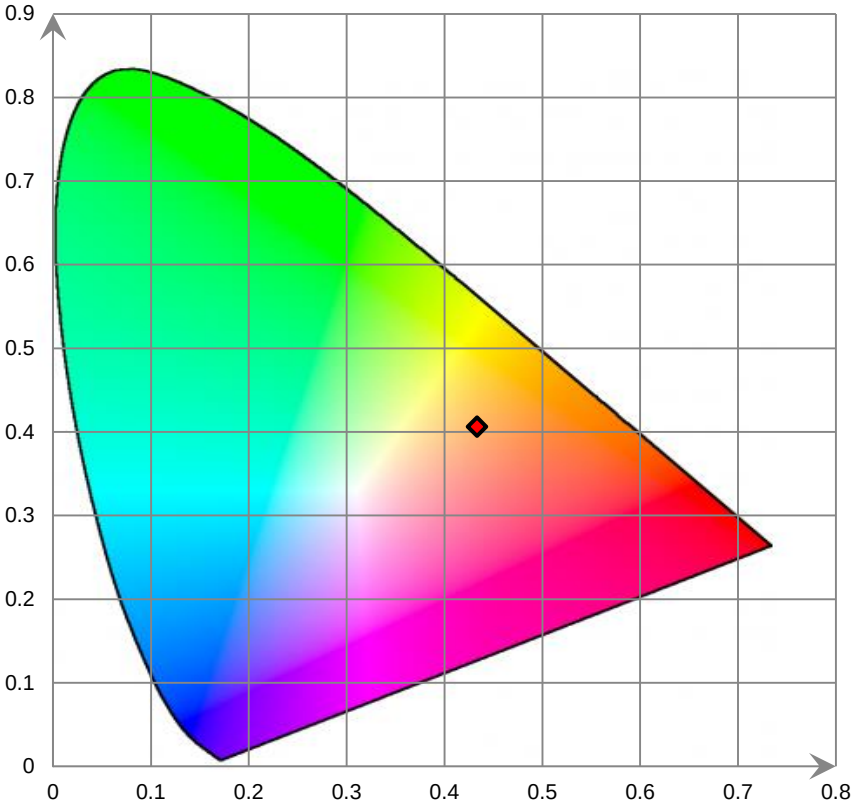
Relative Spectral Power Distribution



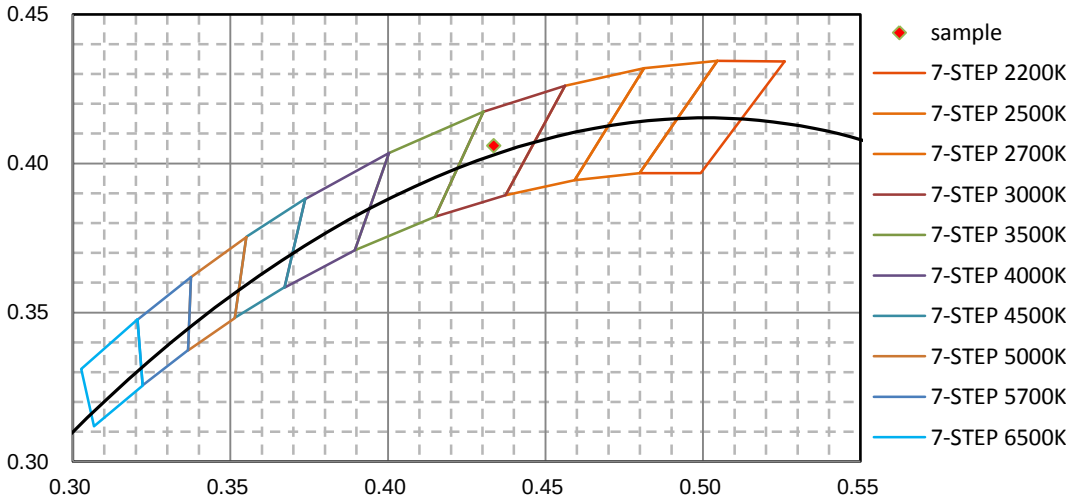
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.240E-02	421	5.802E-01	462	3.227E+01	503	2.556E+01	544	4.336E+01
381	4.830E-02	422	6.858E-01	463	3.041E+01	504	2.632E+01	545	4.362E+01
382	3.540E-02	423	8.341E-01	464	2.851E+01	505	2.706E+01	546	4.396E+01
383	9.300E-03	424	1.013E+00	465	2.705E+01	506	2.791E+01	547	4.442E+01
384	6.470E-02	425	1.173E+00	466	2.643E+01	507	2.864E+01	548	4.490E+01
385	4.360E-02	426	1.334E+00	467	2.569E+01	508	2.932E+01	549	4.517E+01
386	3.700E-03	427	1.600E+00	468	2.544E+01	509	2.995E+01	550	4.574E+01
387	6.210E-02	428	1.904E+00	469	2.453E+01	510	3.066E+01	551	4.576E+01
388	2.420E-02	429	2.213E+00	470	2.399E+01	511	3.138E+01	552	4.662E+01
389	7.000E-03	430	2.583E+00	471	2.333E+01	512	3.190E+01	553	4.702E+01
390	7.630E-02	431	2.998E+00	472	2.231E+01	513	3.254E+01	554	4.762E+01
391	2.650E-02	432	3.401E+00	473	2.190E+01	514	3.307E+01	555	4.786E+01
392	3.100E-03	433	3.926E+00	474	2.066E+01	515	3.361E+01	556	4.851E+01
393	1.900E-02	434	4.485E+00	475	1.974E+01	516	3.425E+01	557	4.874E+01
394	3.640E-02	435	5.182E+00	476	1.876E+01	517	3.499E+01	558	4.921E+01
395	7.930E-02	436	5.831E+00	477	1.788E+01	518	3.509E+01	559	5.018E+01
396	1.320E-02	437	6.607E+00	478	1.700E+01	519	3.538E+01	560	5.050E+01
397	3.050E-02	438	7.434E+00	479	1.655E+01	520	3.593E+01	561	5.120E+01
398	1.400E-03	439	8.426E+00	480	1.608E+01	521	3.649E+01	562	5.168E+01
399	2.600E-03	440	9.381E+00	481	1.578E+01	522	3.668E+01	563	5.254E+01
400	1.000E-04	441	1.064E+01	482	1.573E+01	523	3.697E+01	564	5.308E+01
401	2.070E-02	442	1.188E+01	483	1.545E+01	524	3.742E+01	565	5.372E+01
402	6.550E-02	443	1.336E+01	484	1.576E+01	525	3.758E+01	566	5.394E+01
403	3.720E-02	444	1.512E+01	485	1.575E+01	526	3.803E+01	567	5.509E+01
404	2.810E-02	445	1.738E+01	486	1.601E+01	527	3.818E+01	568	5.574E+01
405	5.600E-02	446	1.959E+01	487	1.623E+01	528	3.876E+01	569	5.630E+01
406	1.110E-02	447	2.220E+01	488	1.666E+01	529	3.918E+01	570	5.688E+01
407	6.640E-02	448	2.500E+01	489	1.699E+01	530	3.939E+01	571	5.763E+01
408	1.080E-02	449	2.924E+01	490	1.725E+01	531	3.946E+01	572	5.798E+01
409	2.980E-02	450	3.247E+01	491	1.776E+01	532	3.971E+01	573	5.908E+01
410	8.390E-02	451	3.599E+01	492	1.810E+01	533	4.018E+01	574	5.931E+01
411	9.500E-02	452	3.904E+01	493	1.868E+01	534	4.047E+01	575	5.998E+01
412	8.500E-02	453	4.202E+01	494	1.916E+01	535	4.065E+01	576	6.087E+01
413	3.630E-02	454	4.399E+01	495	1.985E+01	536	4.091E+01	577	6.156E+01
414	1.052E-01	455	4.538E+01	496	2.050E+01	537	4.106E+01	578	6.233E+01
415	1.453E-01	456	4.495E+01	497	2.094E+01	538	4.165E+01	579	6.291E+01
416	1.617E-01	457	4.432E+01	498	2.170E+01	539	4.176E+01	580	6.315E+01
417	2.375E-01	458	4.259E+01	499	2.238E+01	540	4.199E+01	581	6.430E+01
418	2.929E-01	459	3.955E+01	500	2.320E+01	541	4.219E+01	582	6.471E+01
419	3.922E-01	460	3.767E+01	501	2.387E+01	542	4.244E+01	583	6.547E+01
420	4.820E-01	461	3.521E+01	502	2.473E+01	543	4.303E+01	584	6.644E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.667E+01	626	6.437E+01	667	2.939E+01	708	8.506E+00	749	1.639E+00
586	6.674E+01	627	6.362E+01	668	2.848E+01	709	8.253E+00	750	1.435E+00
587	6.774E+01	628	6.293E+01	669	2.785E+01	710	7.906E+00	751	1.476E+00
588	6.822E+01	629	6.189E+01	670	2.709E+01	711	7.713E+00	752	1.444E+00
589	6.881E+01	630	6.115E+01	671	2.638E+01	712	7.402E+00	753	1.371E+00
590	6.923E+01	631	6.039E+01	672	2.577E+01	713	7.162E+00	754	1.336E+00
591	6.945E+01	632	5.979E+01	673	2.499E+01	714	6.793E+00	755	1.182E+00
592	7.032E+01	633	5.869E+01	674	2.433E+01	715	6.555E+00	756	1.197E+00
593	7.056E+01	634	5.778E+01	675	2.362E+01	716	6.405E+00	757	1.136E+00
594	7.119E+01	635	5.693E+01	676	2.300E+01	717	6.187E+00	758	8.905E-01
595	7.140E+01	636	5.615E+01	677	2.248E+01	718	6.003E+00	759	1.116E+00
596	7.175E+01	637	5.527E+01	678	2.185E+01	719	5.718E+00	760	9.293E-01
597	7.200E+01	638	5.440E+01	679	2.117E+01	720	5.393E+00	761	8.665E-01
598	7.243E+01	639	5.350E+01	680	2.058E+01	721	5.234E+00	762	9.761E-01
599	7.248E+01	640	5.271E+01	681	1.987E+01	722	5.115E+00	763	8.910E-01
600	7.274E+01	641	5.171E+01	682	1.943E+01	723	4.884E+00	764	8.990E-01
601	7.311E+01	642	5.117E+01	683	1.880E+01	724	4.538E+00	765	8.345E-01
602	7.308E+01	643	4.989E+01	684	1.830E+01	725	4.481E+00	766	7.526E-01
603	7.308E+01	644	4.919E+01	685	1.775E+01	726	4.308E+00	767	8.366E-01
604	7.337E+01	645	4.825E+01	686	1.730E+01	727	4.134E+00	768	7.474E-01
605	7.324E+01	646	4.726E+01	687	1.671E+01	728	3.935E+00	769	6.938E-01
606	7.337E+01	647	4.647E+01	688	1.617E+01	729	3.906E+00	770	5.649E-01
607	7.315E+01	648	4.550E+01	689	1.574E+01	730	3.683E+00	771	6.861E-01
608	7.296E+01	649	4.475E+01	690	1.528E+01	731	3.480E+00	772	7.244E-01
609	7.277E+01	650	4.362E+01	691	1.486E+01	732	3.396E+00	773	5.710E-01
610	7.263E+01	651	4.275E+01	692	1.438E+01	733	3.099E+00	774	4.897E-01
611	7.238E+01	652	4.197E+01	693	1.395E+01	734	3.052E+00	775	5.331E-01
612	7.216E+01	653	4.103E+01	694	1.344E+01	735	3.066E+00	776	4.973E-01
613	7.201E+01	654	4.016E+01	695	1.312E+01	736	2.780E+00	777	5.477E-01
614	7.130E+01	655	3.917E+01	696	1.269E+01	737	2.695E+00	778	5.215E-01
615	7.093E+01	656	3.829E+01	697	1.231E+01	738	2.465E+00	779	4.911E-01
616	7.059E+01	657	3.745E+01	698	1.190E+01	739	2.359E+00	780	3.112E-01
617	7.017E+01	658	3.670E+01	699	1.154E+01	740	2.298E+00		
618	6.973E+01	659	3.582E+01	700	1.116E+01	741	2.334E+00		
619	6.915E+01	660	3.490E+01	701	1.073E+01	742	2.216E+00		
620	6.845E+01	661	3.427E+01	702	1.035E+01	743	2.118E+00		
621	6.805E+01	662	3.339E+01	703	1.004E+01	744	1.866E+00		
622	6.726E+01	663	3.242E+01	704	9.736E+00	745	1.878E+00		
623	6.616E+01	664	3.163E+01	705	9.421E+00	746	1.678E+00		
624	6.588E+01	665	3.092E+01	706	9.018E+00	747	1.705E+00		
625	6.504E+01	666	3.010E+01	707	8.779E+00	748	1.692E+00		

CIE 1931xy Chromaticity Diagram



7-StepChromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

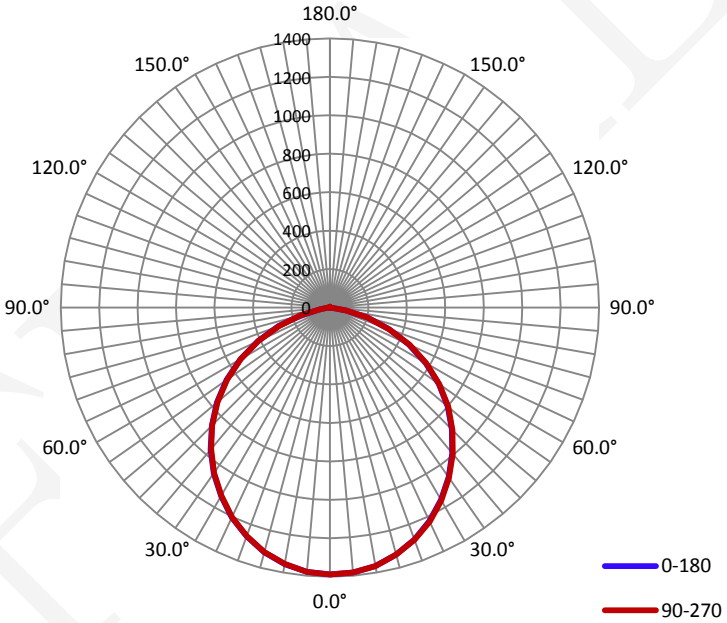
Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.2330	27.58	0.9850

Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	I_{max}(cd)	S/MH(C0/180)	S/MH(C90/270)
3658.4	132.70	1388.2	1.23	1.23

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50%I_{max}):	108.1	108.2	108.2	108.1	108.2
Field Angle(10%I_{max}):	153.6	153.6	153.5	153.6	153.6

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1388	1388	1388	1388	1388	1388	1388	1388
5.0°	1384	1384	1385	1384	1384	1383	1382	1381
10.0°	1365	1365	1366	1366	1365	1362	1361	1359
15.0°	1331	1333	1333	1332	1331	1329	1327	1323
20.0°	1284	1286	1288	1287	1285	1282	1278	1273
25.0°	1225	1228	1230	1229	1228	1224	1218	1213
30.0°	1155	1158	1161	1160	1158	1154	1148	1142
35.0°	1077	1080	1083	1083	1081	1074	1070	1062
40.0°	990	994	996	996	994	990	983	977
45.0°	897	901	905	905	902	897	889	882
50.0°	799	803	805	806	803	797	791	783
55.0°	691	696	698	699	696	688	682	673
60.0°	574	580	582	579	578	571	562	556
65.0°	451	459	461	459	457	449	440	434
70.0°	326	332	335	334	328	320	314	306
75.0°	201	205	207	207	202	195	189	180
80.0°	84	87	88	89	85	79	72	67
85.0°	12	13	13	13	13	12	11	11
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°	0	0	0	0	0	0	0	0
145.0°	0	1	0	1	1	1	1	1
150.0°	1	2	2	2	2	1	2	2
155.0°	2	2	2	3	3	3	2	2
160.0°	2	3	3	3	3	3	3	3
165.0°	3	3	3	3	4	3	3	3
170.0°	3	3	3	4	3	4	4	4
175.0°	4	4	4	4	4	5	4	4
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

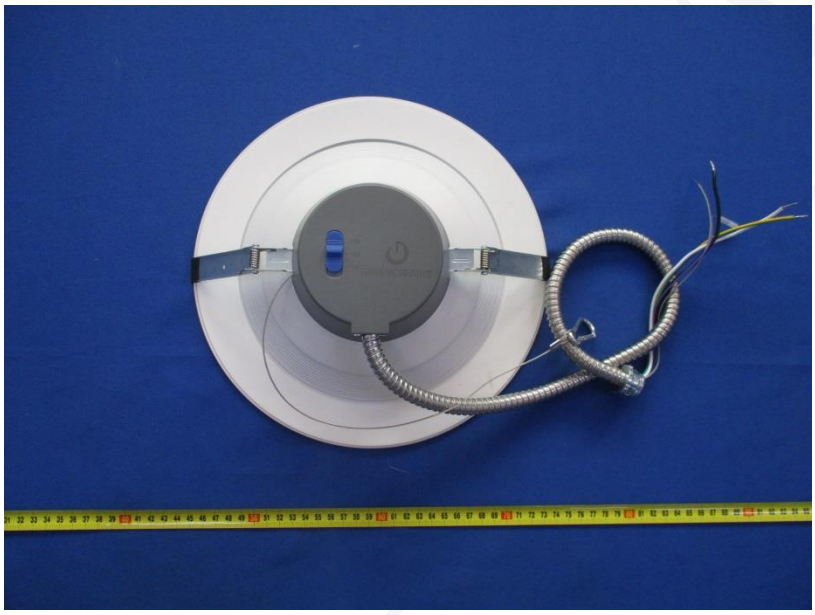
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1388	1388	1388	1388	1388	1388	1388	1388
5.0°	1379	1378	1378	1377	1379	1379	1380	1381
10.0°	1355	1354	1353	1353	1354	1355	1358	1360
15.0°	1318	1315	1314	1315	1316	1319	1321	1324
20.0°	1267	1265	1264	1263	1265	1268	1273	1276
25.0°	1206	1202	1201	1200	1204	1207	1210	1215
30.0°	1133	1130	1128	1127	1130	1135	1139	1145
35.0°	1052	1049	1045	1045	1050	1054	1058	1065
40.0°	964	960	956	957	961	967	971	978
45.0°	869	864	863	863	865	870	877	883
50.0°	767	763	761	760	763	769	777	783
55.0°	655	651	650	648	652	658	664	673
60.0°	538	533	529	529	533	540	546	555
65.0°	414	410	405	406	410	417	423	433
70.0°	285	280	279	280	281	288	298	305
75.0°	159	155	155	153	157	164	173	179
80.0°	49	47	45	46	49	55	59	65
85.0°	7	8	8	8	9	10	10	11
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°	0	0	0	0	0	0	0	0
145.0°	0	0	1	1	1	1	1	1
150.0°	0	1	1	1	2	2	2	2
155.0°	1	2	2	2	2	2	2	2
160.0°	2	2	3	3	3	3	3	3
165.0°	2	3	3	3	3	4	3	4
170.0°	3	3	4	4	4	4	4	4
175.0°	4	4	4	4	4	4	4	4
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	33.1	0.90
5-10	98.0	2.68
10-15	159.2	4.35
15-20	214.2	5.85
20-25	261.2	7.14
25-30	298.5	8.16
30-35	325.2	8.89
35-40	340.6	9.31
40-45	344.4	9.41
45-50	336.7	9.20
50-55	316.6	8.66
55-60	284.0	7.76
60-65	240.3	6.57
65-70	187.1	5.11
70-75	127.0	3.47
75-80	66.0	1.80
80-85	20.9	0.57
85-90	2.9	0.08
90-95	0.0	0.00
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	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.1	0.00
145-150	0.3	0.01
150-155	0.5	0.01
155-160	0.5	0.01
160-165	0.5	0.01
165-170	0.4	0.01
170-175	0.3	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	33.1	0.90
0-10	131.1	3.58
0-15	290.3	7.94
0-20	504.5	13.79
0-25	765.7	20.93
0-30	1064.2	29.09
0-35	1389.3	37.98
0-40	1729.9	47.29
0-45	2074.3	56.70
0-50	2411.0	65.90
0-55	2727.7	74.56
0-60	3011.6	82.32
0-65	3251.9	88.89
0-70	3439.0	94.00
0-75	3566.0	97.47
0-80	3632.0	99.28
0-85	3652.9	99.85
0-90	3655.8	99.93
0-95	3655.8	99.93
0-100	3655.8	99.93
0-105	3655.8	99.93
0-110	3655.8	99.93
0-115	3655.8	99.93
0-120	3655.8	99.93
0-125	3655.8	99.93
0-130	3655.8	99.93
0-135	3655.8	99.93
0-140	3655.8	99.93
0-145	3655.9	99.93
0-150	3656.2	99.94
0-155	3656.7	99.95
0-160	3657.2	99.97
0-165	3657.7	99.98
0-170	3658.1	99.99
0-175	3658.3	100.00
0-180	3658.4	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**********