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: INFT9.5/840/DIM010UNV

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	PKS200825094-10
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:	INFT9.5/840/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:	4000K
Nominal Lumen Output:	3430lm

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	0.2369	27.91	0.9818	3778.4	135.38

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
11.496	3973	0.00129	0.3826	0.3809	0.2249	0.5037

Color Rendering Index

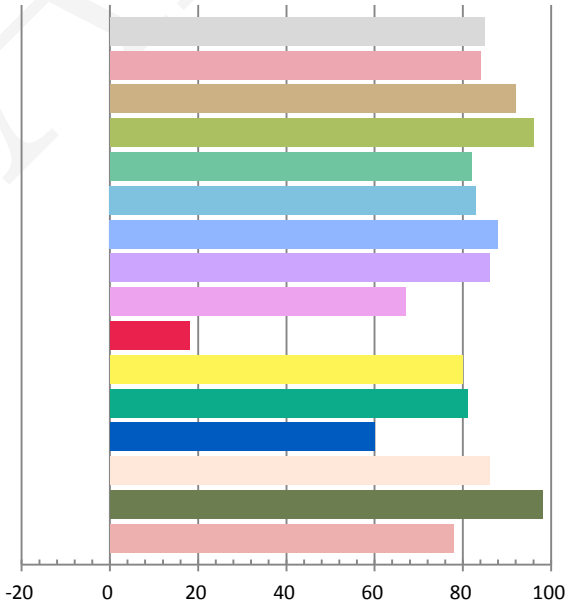
Ra
84.9

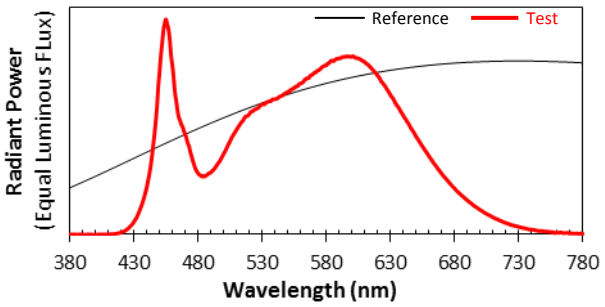
R1	R2	R3	R4
84	92	96	82

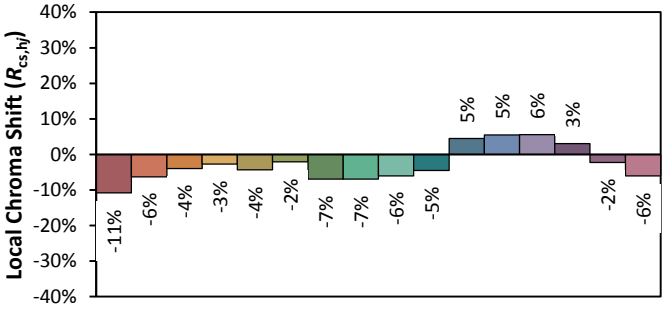
R5	R6	R7	R8
83	88	86	67

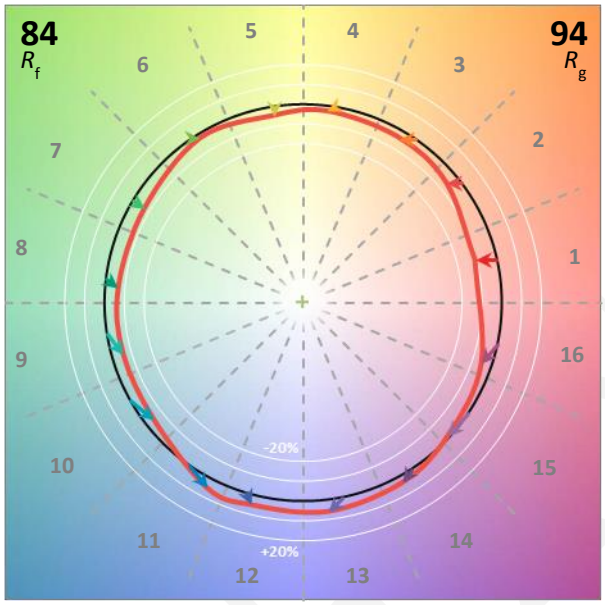
R9	R10	R11	R12
18	80	81	60

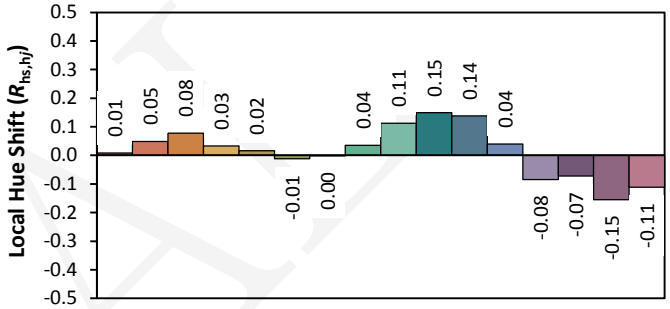
R13	R14	R15
86	98	78

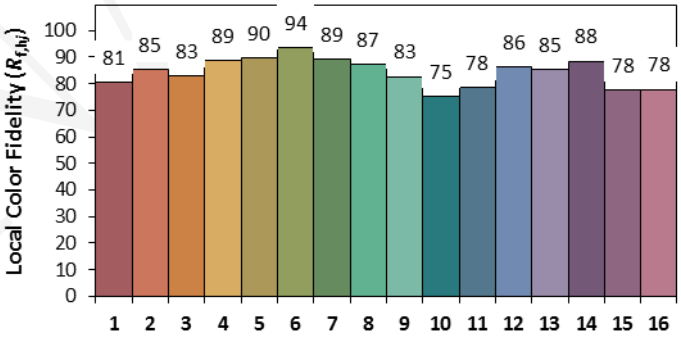


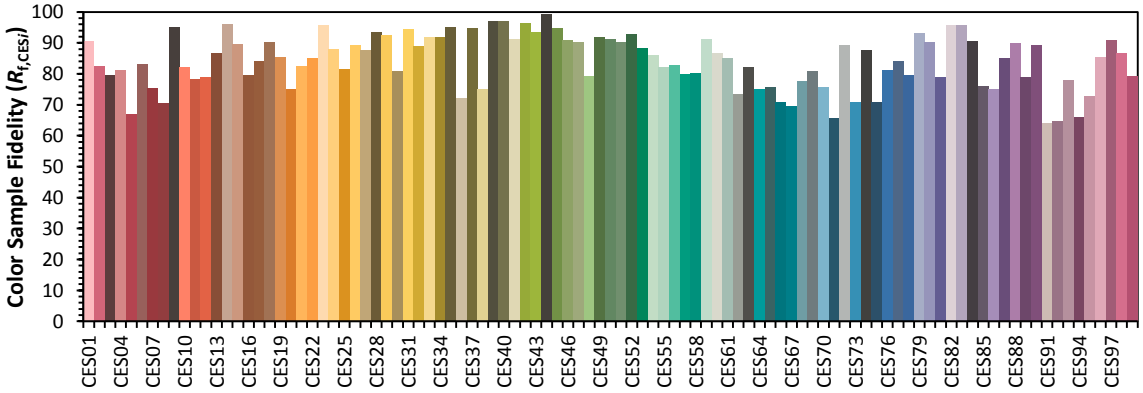

Reference
Test
Radiant Power
(Equal Luminous Flux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


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

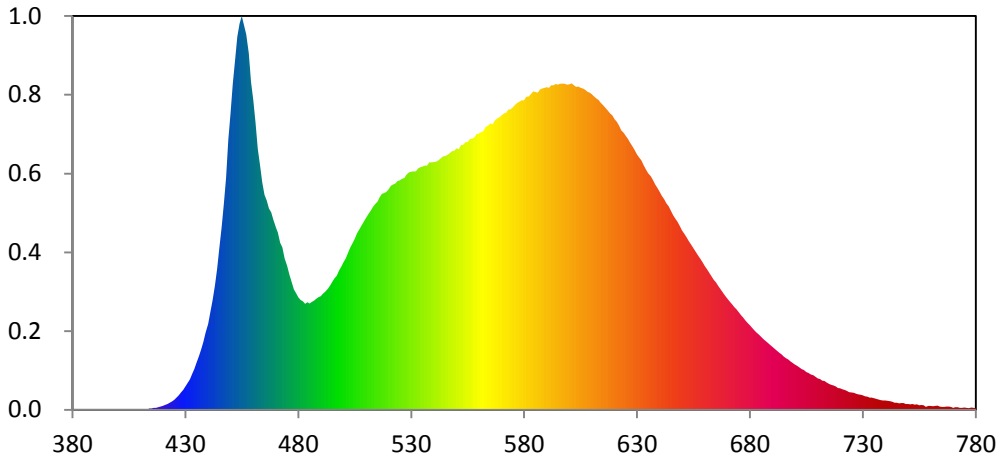

84
R_f
94
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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 0.05 0.08 0.03 0.02 -0.01 0.00 0.04 0.11 0.15 0.14 0.04 -0.08 -0.07 -0.15 -0.11


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
81 85 83 89 90 94 89 87 83 75 78 86 85 88 78 78
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

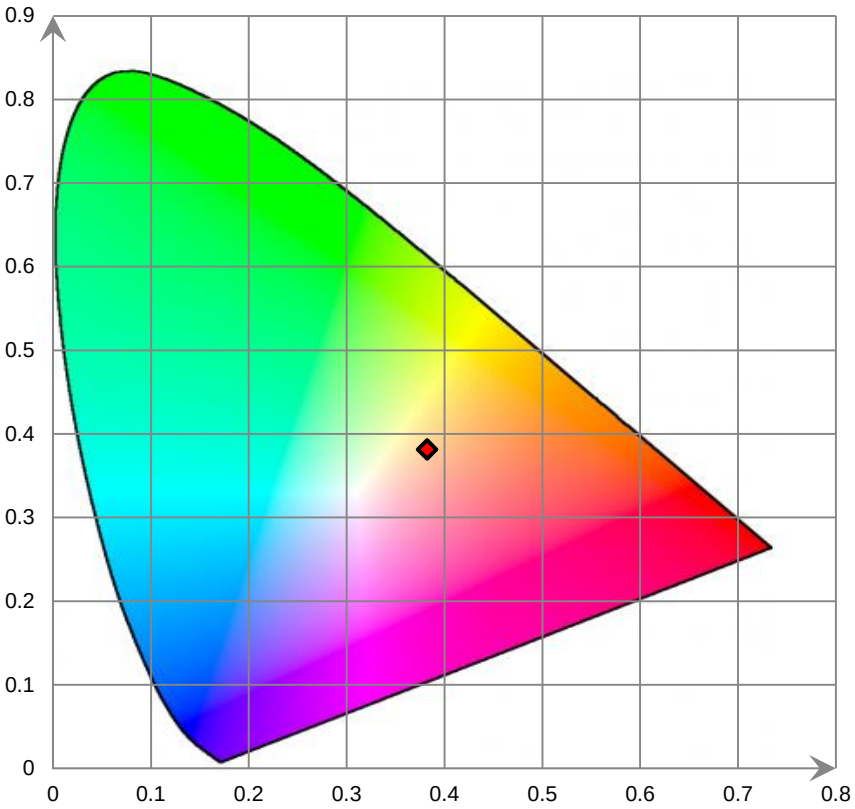
Relative Spectral Power Distribution



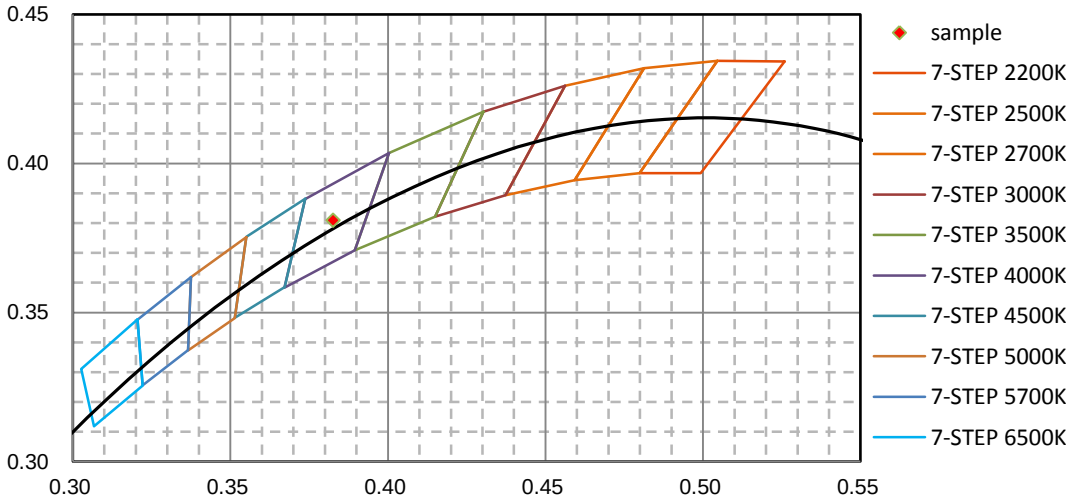
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.930E-02	421	9.482E-01	462	5.205E+01	503	3.232E+01	544	5.044E+01
381	7.160E-02	422	1.131E+00	463	4.882E+01	504	3.320E+01	545	5.060E+01
382	4.300E-02	423	1.390E+00	464	4.535E+01	505	3.405E+01	546	5.081E+01
383	1.880E-02	424	1.672E+00	465	4.287E+01	506	3.513E+01	547	5.120E+01
384	8.430E-02	425	1.985E+00	466	4.171E+01	507	3.595E+01	548	5.153E+01
385	7.040E-02	426	2.410E+00	467	4.015E+01	508	3.670E+01	549	5.165E+01
386	1.080E-02	427	2.871E+00	468	3.936E+01	509	3.747E+01	550	5.211E+01
387	7.450E-02	428	3.409E+00	469	3.780E+01	510	3.825E+01	551	5.193E+01
388	2.510E-02	429	3.919E+00	470	3.649E+01	511	3.902E+01	552	5.279E+01
389	5.380E-02	430	4.628E+00	471	3.525E+01	512	3.965E+01	553	5.282E+01
390	6.340E-02	431	5.365E+00	472	3.331E+01	513	4.048E+01	554	5.332E+01
391	3.260E-02	432	6.087E+00	473	3.235E+01	514	4.105E+01	555	5.339E+01
392	1.120E-02	433	7.112E+00	474	3.016E+01	515	4.150E+01	556	5.398E+01
393	6.900E-03	434	8.143E+00	475	2.863E+01	516	4.234E+01	557	5.404E+01
394	5.280E-02	435	9.437E+00	476	2.695E+01	517	4.307E+01	558	5.428E+01
395	4.130E-02	436	1.063E+01	477	2.545E+01	518	4.317E+01	559	5.501E+01
396	2.770E-02	437	1.197E+01	478	2.401E+01	519	4.344E+01	560	5.507E+01
397	5.360E-02	438	1.354E+01	479	2.321E+01	520	4.397E+01	561	5.540E+01
398	1.720E-02	439	1.536E+01	480	2.241E+01	521	4.465E+01	562	5.557E+01
399	2.210E-02	440	1.711E+01	481	2.186E+01	522	4.490E+01	563	5.640E+01
400	7.000E-04	441	1.949E+01	482	2.165E+01	523	4.512E+01	564	5.666E+01
401	3.420E-02	442	2.191E+01	483	2.113E+01	524	4.560E+01	565	5.707E+01
402	6.830E-02	443	2.469E+01	484	2.142E+01	525	4.573E+01	566	5.693E+01
403	4.640E-02	444	2.806E+01	485	2.116E+01	526	4.604E+01	567	5.767E+01
404	4.230E-02	445	3.225E+01	486	2.148E+01	527	4.619E+01	568	5.808E+01
405	4.280E-02	446	3.630E+01	487	2.175E+01	528	4.687E+01	569	5.831E+01
406	3.370E-02	447	4.104E+01	488	2.216E+01	529	4.733E+01	570	5.868E+01
407	1.273E-01	448	4.627E+01	489	2.247E+01	530	4.748E+01	571	5.909E+01
408	5.600E-02	449	5.383E+01	490	2.263E+01	531	4.753E+01	572	5.919E+01
409	1.034E-01	450	5.917E+01	491	2.318E+01	532	4.755E+01	573	5.988E+01
410	1.231E-01	451	6.501E+01	492	2.357E+01	533	4.812E+01	574	5.989E+01
411	1.276E-01	452	6.961E+01	493	2.414E+01	534	4.837E+01	575	6.029E+01
412	1.272E-01	453	7.434E+01	494	2.479E+01	535	4.850E+01	576	6.078E+01
413	1.335E-01	454	7.693E+01	495	2.553E+01	536	4.868E+01	577	6.116E+01
414	2.176E-01	455	7.853E+01	496	2.621E+01	537	4.870E+01	578	6.146E+01
415	2.706E-01	456	7.670E+01	497	2.675E+01	538	4.933E+01	579	6.171E+01
416	3.488E-01	457	7.483E+01	498	2.772E+01	539	4.931E+01	580	6.170E+01
417	4.032E-01	458	7.109E+01	499	2.851E+01	540	4.936E+01	581	6.238E+01
418	5.328E-01	459	6.533E+01	500	2.944E+01	541	4.948E+01	582	6.247E+01
419	6.549E-01	460	6.177E+01	501	3.019E+01	542	4.969E+01	583	6.300E+01
420	7.616E-01	461	5.733E+01	502	3.125E+01	543	5.011E+01	584	6.351E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.335E+01	626	5.399E+01	667	2.405E+01	708	6.862E+00	749	1.151E+00
586	6.326E+01	627	5.318E+01	668	2.342E+01	709	6.580E+00	750	1.167E+00
587	6.384E+01	628	5.251E+01	669	2.279E+01	710	6.274E+00	751	1.105E+00
588	6.407E+01	629	5.176E+01	670	2.220E+01	711	6.126E+00	752	1.129E+00
589	6.419E+01	630	5.092E+01	671	2.156E+01	712	5.789E+00	753	1.047E+00
590	6.430E+01	631	5.027E+01	672	2.107E+01	713	5.710E+00	754	1.073E+00
591	6.421E+01	632	4.971E+01	673	2.051E+01	714	5.421E+00	755	8.911E-01
592	6.471E+01	633	4.874E+01	674	2.004E+01	715	5.174E+00	756	9.503E-01
593	6.470E+01	634	4.789E+01	675	1.943E+01	716	4.992E+00	757	8.600E-01
594	6.498E+01	635	4.716E+01	676	1.886E+01	717	4.810E+00	758	5.565E-01
595	6.481E+01	636	4.656E+01	677	1.835E+01	718	4.633E+00	759	7.328E-01
596	6.500E+01	637	4.580E+01	678	1.783E+01	719	4.347E+00	760	7.517E-01
597	6.502E+01	638	4.492E+01	679	1.731E+01	720	4.275E+00	761	6.902E-01
598	6.501E+01	639	4.422E+01	680	1.685E+01	721	4.069E+00	762	7.657E-01
599	6.483E+01	640	4.345E+01	681	1.632E+01	722	3.924E+00	763	8.376E-01
600	6.492E+01	641	4.260E+01	682	1.580E+01	723	3.780E+00	764	6.341E-01
601	6.509E+01	642	4.201E+01	683	1.537E+01	724	3.482E+00	765	5.742E-01
602	6.471E+01	643	4.116E+01	684	1.496E+01	725	3.449E+00	766	5.956E-01
603	6.440E+01	644	4.055E+01	685	1.455E+01	726	3.363E+00	767	6.053E-01
604	6.447E+01	645	3.971E+01	686	1.409E+01	727	3.163E+00	768	6.485E-01
605	6.421E+01	646	3.878E+01	687	1.371E+01	728	3.089E+00	769	5.404E-01
606	6.407E+01	647	3.812E+01	688	1.331E+01	729	2.995E+00	770	3.944E-01
607	6.384E+01	648	3.744E+01	689	1.290E+01	730	2.856E+00	771	5.173E-01
608	6.342E+01	649	3.665E+01	690	1.251E+01	731	2.662E+00	772	4.866E-01
609	6.324E+01	650	3.573E+01	691	1.209E+01	732	2.640E+00	773	3.424E-01
610	6.290E+01	651	3.507E+01	692	1.174E+01	733	2.393E+00	774	3.976E-01
611	6.246E+01	652	3.437E+01	693	1.133E+01	734	2.442E+00	775	4.334E-01
612	6.209E+01	653	3.360E+01	694	1.101E+01	735	2.276E+00	776	3.897E-01
613	6.179E+01	654	3.288E+01	695	1.060E+01	736	2.181E+00	777	3.334E-01
614	6.119E+01	655	3.215E+01	696	1.024E+01	737	2.044E+00	778	4.085E-01
615	6.074E+01	656	3.147E+01	697	9.994E+00	738	1.899E+00	779	3.719E-01
616	6.020E+01	657	3.073E+01	698	9.652E+00	739	1.831E+00	780	3.000E-01
617	5.976E+01	658	3.011E+01	699	9.336E+00	740	1.854E+00		
618	5.908E+01	659	2.941E+01	700	8.990E+00	741	1.779E+00		
619	5.869E+01	660	2.864E+01	701	8.737E+00	742	1.692E+00		
620	5.792E+01	661	2.800E+01	702	8.418E+00	743	1.588E+00		
621	5.744E+01	662	2.728E+01	703	8.097E+00	744	1.418E+00		
622	5.668E+01	663	2.663E+01	704	7.881E+00	745	1.411E+00		
623	5.568E+01	664	2.590E+01	705	7.557E+00	746	1.259E+00		
624	5.528E+01	665	2.538E+01	706	7.310E+00	747	1.359E+00		
625	5.462E+01	666	2.469E+01	707	7.033E+00	748	1.356E+00		

CIE 1931xy Chromaticity Diagram



7-StepChromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

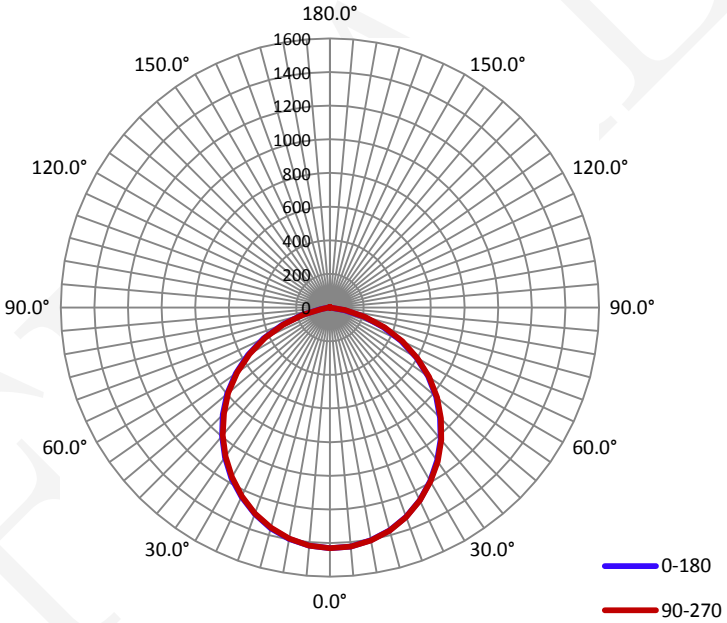
Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.2360	27.97	0.9860

Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	I_{max}(cd)	S/MH(C0/180)	S/MH(C90/270)
3787.7	135.47	1431.0	1.23	1.23

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50%I_{max}):	108.5	108.6	108.4	108.5	108.5
Field Angle(10%I_{max}):	153.8	153.9	153.8	154.0	153.9

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1431	1431	1431	1431	1431	1431	1431	1431
5.0°	1425	1426	1427	1427	1427	1425	1425	1423
10.0°	1405	1408	1410	1408	1405	1406	1404	1401
15.0°	1371	1373	1376	1375	1373	1371	1368	1364
20.0°	1324	1327	1330	1329	1326	1323	1319	1316
25.0°	1263	1268	1269	1270	1266	1263	1260	1253
30.0°	1192	1197	1199	1199	1196	1194	1188	1181
35.0°	1110	1116	1120	1118	1117	1113	1107	1101
40.0°	1024	1028	1030	1032	1029	1025	1018	1011
45.0°	927	934	936	935	934	930	924	916
50.0°	825	830	835	835	831	827	822	814
55.0°	713	719	725	724	720	716	710	702
60.0°	593	599	604	604	600	594	588	582
65.0°	466	475	478	480	476	470	463	457
70.0°	337	343	349	348	346	340	333	325
75.0°	207	212	216	218	214	209	204	196
80.0°	85	89	92	95	92	88	83	76
85.0°	12	13	13	14	13	13	13	12
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	1	0
145.0°	0	0	0	1	1	1	1	1
150.0°	1	1	2	2	2	2	2	2
155.0°	2	2	2	2	2	2	3	2
160.0°	2	2	3	3	3	3	3	3
165.0°	3	3	3	3	3	3	3	4
170.0°	3	3	3	3	4	4	4	3
175.0°	4	4	4	4	4	4	4	5
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

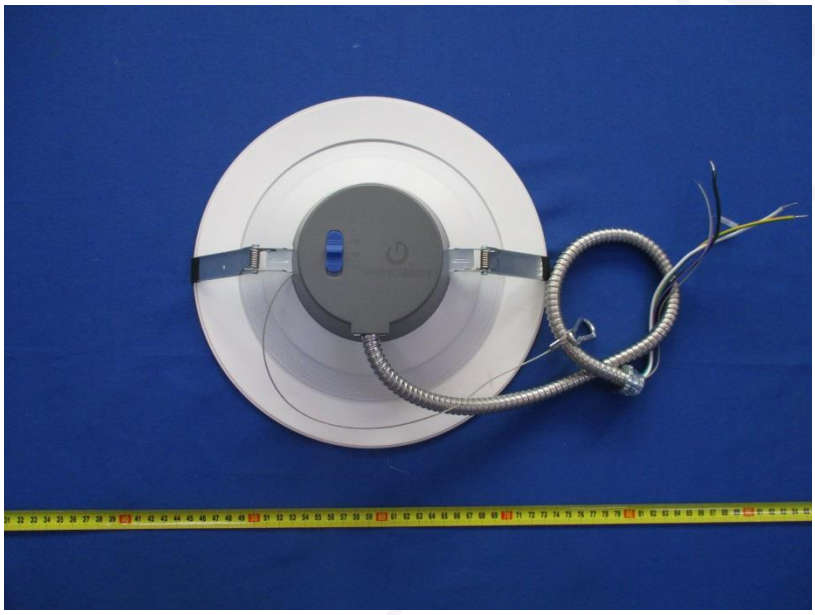
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1431	1431	1431	1431	1431	1431	1431	1431
5.0°	1421	1420	1420	1420	1420	1421	1422	1423
10.0°	1397	1395	1394	1394	1395	1397	1399	1401
15.0°	1358	1356	1356	1356	1355	1357	1361	1364
20.0°	1306	1304	1303	1303	1304	1307	1310	1314
25.0°	1243	1241	1238	1238	1239	1242	1246	1253
30.0°	1171	1167	1165	1162	1164	1169	1175	1179
35.0°	1087	1085	1080	1080	1082	1085	1090	1099
40.0°	998	992	989	990	991	994	1000	1009
45.0°	900	896	893	892	892	897	905	912
50.0°	796	792	789	785	789	794	801	807
55.0°	684	678	675	672	674	679	687	694
60.0°	562	556	551	549	552	555	563	572
65.0°	435	429	424	423	425	428	436	446
70.0°	302	297	294	290	293	299	307	314
75.0°	171	167	165	162	164	170	177	183
80.0°	56	52	49	49	52	53	58	65
85.0°	9	8	9	8	9	10	10	10
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	0	0	1	1	0	0
150.0°	0	1	1	2	2	1	1	2
155.0°	0	1	2	2	2	2	2	2
160.0°	2	2	2	3	3	3	3	3
165.0°	2	3	3	3	3	3	4	3
170.0°	3	3	3	4	4	4	4	4
175.0°	3	3	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	34.1	0.90
5-10	101.0	2.67
10-15	164.1	4.33
15-20	220.9	5.83
20-25	269.4	7.11
25-30	308.0	8.13
30-35	335.8	8.87
35-40	351.9	9.29
40-45	356.2	9.40
45-50	348.5	9.20
50-55	328.1	8.66
55-60	294.6	7.78
60-65	249.7	6.59
65-70	195.1	5.15
70-75	133.1	3.51
75-80	69.7	1.84
80-85	22.2	0.59
85-90	3.0	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	0.4	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	34.1	0.90
0-10	135.2	3.57
0-15	299.2	7.90
0-20	520.1	13.73
0-25	789.5	20.84
0-30	1097.5	28.98
0-35	1433.3	37.84
0-40	1785.2	47.13
0-45	2141.4	56.54
0-50	2489.9	65.74
0-55	2817.9	74.40
0-60	3112.6	82.18
0-65	3362.3	88.77
0-70	3557.3	93.92
0-75	3690.4	97.43
0-80	3760.1	99.27
0-85	3782.4	99.86
0-90	3785.3	99.94
0-95	3785.3	99.94
0-100	3785.3	99.94
0-105	3785.3	99.94
0-110	3785.3	99.94
0-115	3785.3	99.94
0-120	3785.3	99.94
0-125	3785.3	99.94
0-130	3785.3	99.94
0-135	3785.3	99.94
0-140	3785.3	99.94
0-145	3785.4	99.94
0-150	3785.7	99.95
0-155	3786.1	99.96
0-160	3786.6	99.97
0-165	3787.0	99.98
0-170	3787.4	99.99
0-175	3787.7	100.00
0-180	3787.7	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**********