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: INFT4/835/DIM010UNV

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	PKS200825081-10
Test Date:	2020-08-27 to 2020-09-07
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:	INFT4/835/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:	10W
Nominal CCT:	3500K
Nominal Lumen Output:	1070lm

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 Urel=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)
120.04	60	0.0857	10.16	0.9878	1140.64	112.31

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.424	3387	0.00091	0.4129	0.3965	0.2382	0.5148

Color Rendering Index

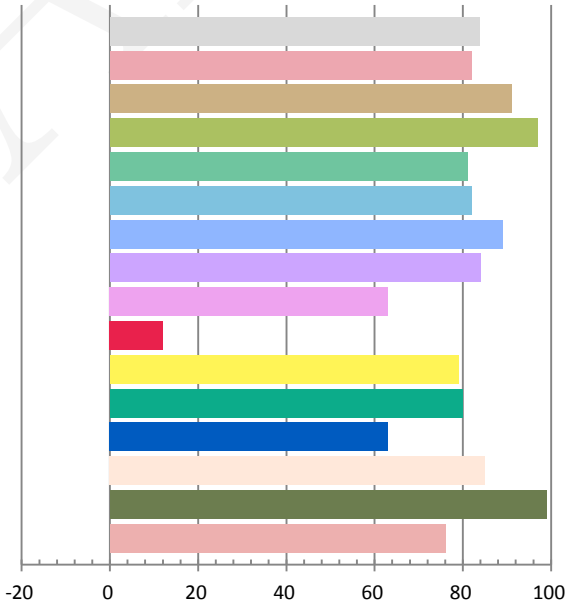
Ra
83.7

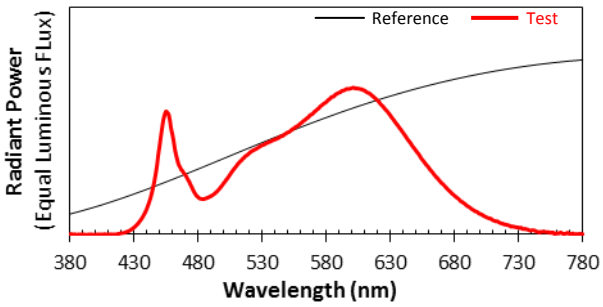
R1	R2	R3	R4
82	91	97	81

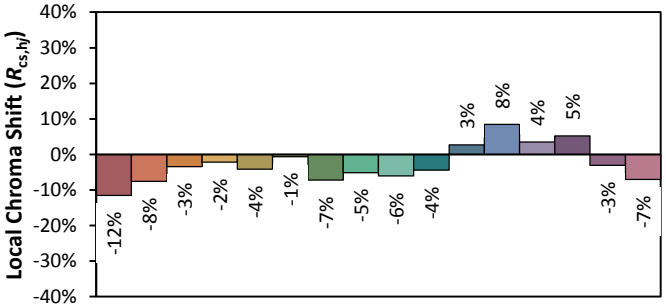
R5	R6	R7	R8
82	89	84	63

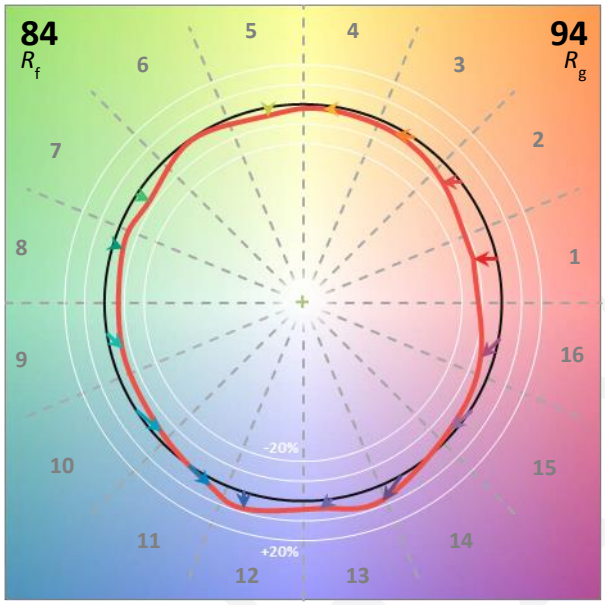
R9	R10	R11	R12
12	79	80	63

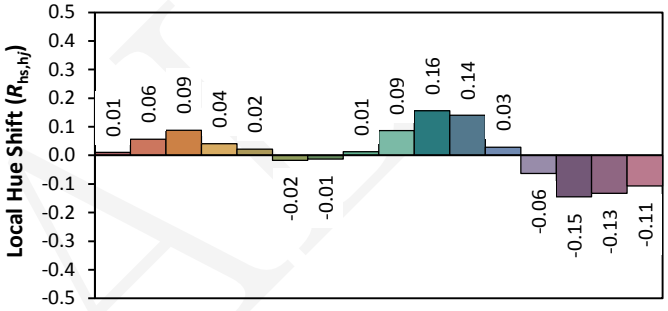
R13	R14	R15
85	99	76

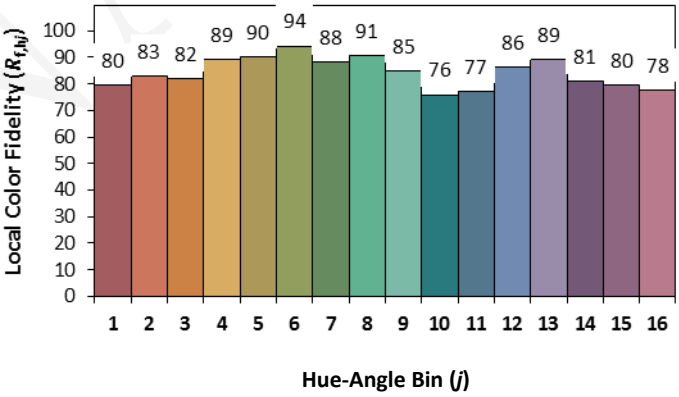


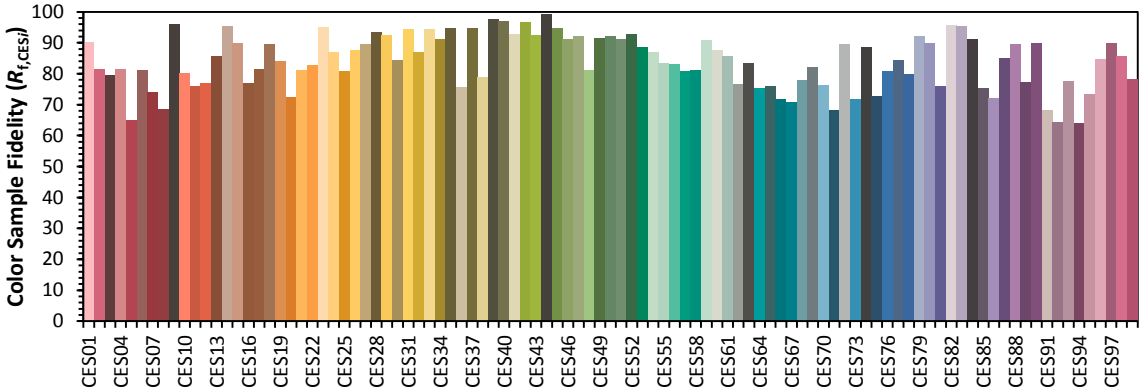

Reference
Test
Radiant Power
(Equal Luminous Flux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-12% -8% -3% -2% -4% -1% -7% -5% -6% -4% 3% 8% 4% 5% -3% -7%

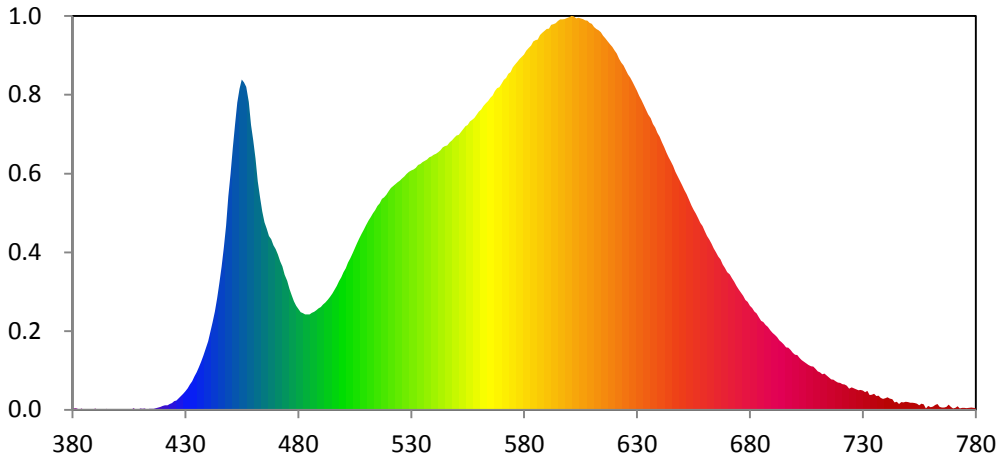

84
R_f
94
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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 0.06 0.09 0.04 0.02 -0.02 -0.01 0.01 0.09 0.16 0.14 0.03 -0.06 -0.15 -0.13 -0.11


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
80 83 82 89 90 94 88 91 85 76 77 86 89 81 80 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

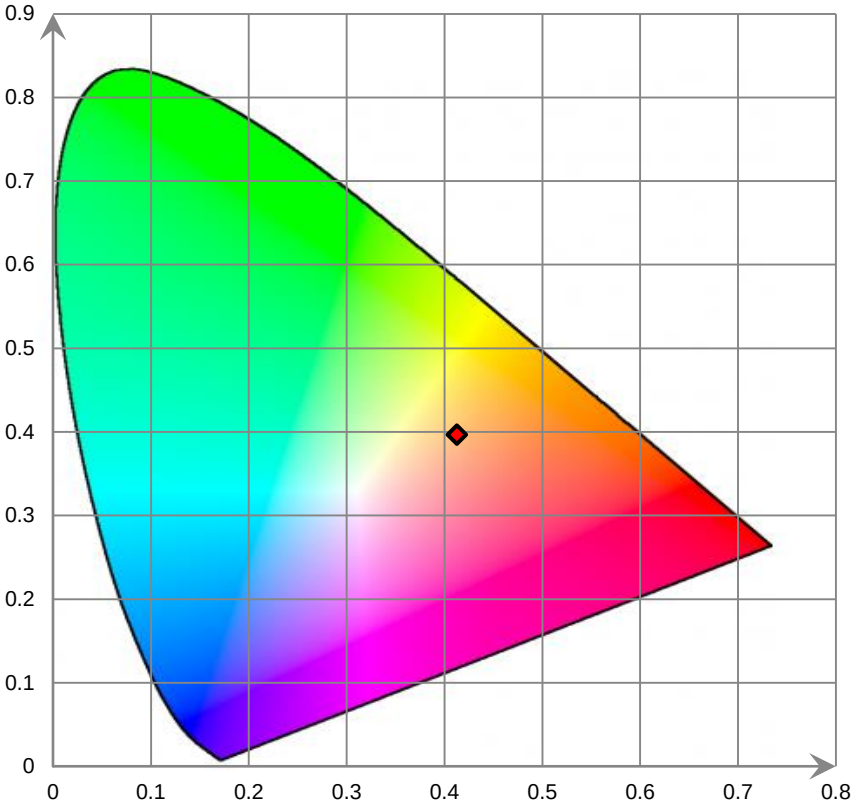
Relative Spectral Power Distribution



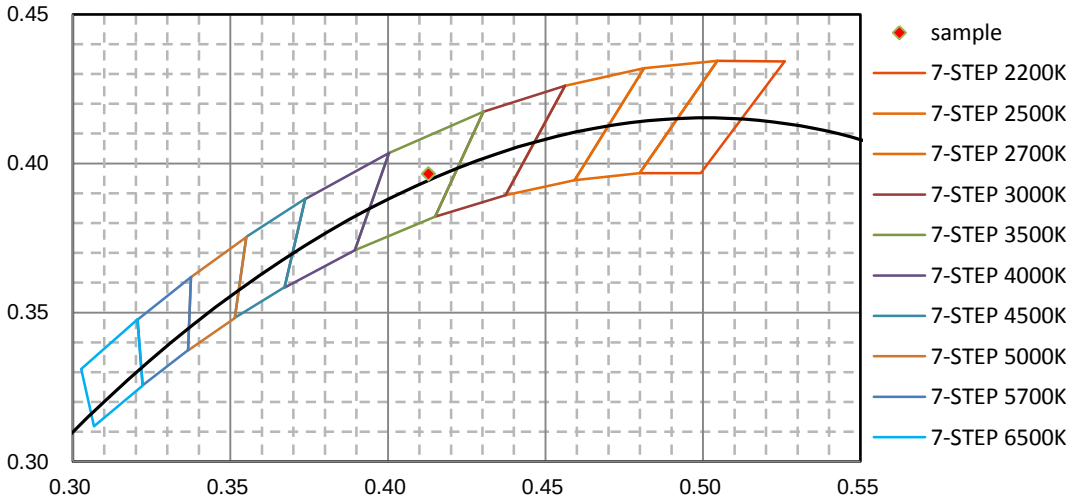
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.010E-02	421	2.377E-01	462	1.252E+01	503	8.287E+00	544	1.437E+01
381	7.920E-02	422	2.353E-01	463	1.165E+01	504	8.555E+00	545	1.444E+01
382	6.970E-02	423	3.120E-01	464	1.087E+01	505	8.828E+00	546	1.449E+01
383	1.690E-02	424	3.633E-01	465	1.027E+01	506	9.118E+00	547	1.465E+01
384	6.100E-02	425	4.773E-01	466	9.919E+00	507	9.383E+00	548	1.477E+01
385	1.700E-02	426	5.089E-01	467	9.517E+00	508	9.624E+00	549	1.491E+01
386	8.000E-04	427	6.294E-01	468	9.345E+00	509	9.854E+00	550	1.502E+01
387	3.150E-02	428	7.496E-01	469	9.012E+00	510	1.009E+01	551	1.506E+01
388	3.690E-02	429	8.825E-01	470	8.802E+00	511	1.036E+01	552	1.522E+01
389	2.210E-02	430	1.023E+00	471	8.506E+00	512	1.055E+01	553	1.537E+01
390	6.510E-02	431	1.179E+00	472	8.127E+00	513	1.077E+01	554	1.553E+01
391	2.760E-02	432	1.376E+00	473	7.845E+00	514	1.093E+01	555	1.560E+01
392	9.400E-03	433	1.561E+00	474	7.396E+00	515	1.116E+01	556	1.579E+01
393	4.700E-03	434	1.824E+00	475	7.066E+00	516	1.131E+01	557	1.588E+01
394	1.200E-02	435	2.055E+00	476	6.619E+00	517	1.155E+01	558	1.598E+01
395	4.210E-02	436	2.323E+00	477	6.270E+00	518	1.165E+01	559	1.616E+01
396	2.690E-02	437	2.621E+00	478	5.942E+00	519	1.178E+01	560	1.634E+01
397	2.960E-02	438	2.965E+00	479	5.690E+00	520	1.197E+01	561	1.645E+01
398	1.160E-02	439	3.322E+00	480	5.515E+00	521	1.214E+01	562	1.663E+01
399	5.100E-03	440	3.750E+00	481	5.345E+00	522	1.226E+01	563	1.678E+01
400	2.000E-04	441	4.268E+00	482	5.287E+00	523	1.236E+01	564	1.692E+01
401	2.070E-02	442	4.799E+00	483	5.223E+00	524	1.247E+01	565	1.710E+01
402	2.970E-02	443	5.382E+00	484	5.223E+00	525	1.255E+01	566	1.722E+01
403	2.440E-02	444	6.102E+00	485	5.231E+00	526	1.268E+01	567	1.746E+01
404	1.470E-02	445	6.938E+00	486	5.319E+00	527	1.278E+01	568	1.761E+01
405	2.840E-02	446	7.837E+00	487	5.361E+00	528	1.292E+01	569	1.767E+01
406	6.100E-03	447	8.896E+00	488	5.448E+00	529	1.304E+01	570	1.787E+01
407	7.820E-02	448	1.009E+01	489	5.551E+00	530	1.311E+01	571	1.808E+01
408	6.500E-03	449	1.169E+01	490	5.621E+00	531	1.317E+01	572	1.819E+01
409	2.500E-02	450	1.293E+01	491	5.771E+00	532	1.326E+01	573	1.841E+01
410	6.600E-02	451	1.434E+01	492	5.877E+00	533	1.341E+01	574	1.849E+01
411	5.390E-02	452	1.562E+01	493	6.031E+00	534	1.346E+01	575	1.875E+01
412	6.130E-02	453	1.683E+01	494	6.191E+00	535	1.356E+01	576	1.893E+01
413	1.470E-02	454	1.758E+01	495	6.369E+00	536	1.364E+01	577	1.905E+01
414	5.160E-02	455	1.808E+01	496	6.576E+00	537	1.370E+01	578	1.922E+01
415	5.540E-02	456	1.793E+01	497	6.777E+00	538	1.383E+01	579	1.933E+01
416	5.410E-02	457	1.769E+01	498	7.046E+00	539	1.388E+01	580	1.947E+01
417	8.970E-02	458	1.686E+01	499	7.255E+00	540	1.397E+01	581	1.966E+01
418	1.248E-01	459	1.561E+01	500	7.541E+00	541	1.403E+01	582	1.983E+01
419	1.488E-01	460	1.474E+01	501	7.753E+00	542	1.412E+01	583	1.995E+01
420	2.143E-01	461	1.377E+01	502	8.054E+00	543	1.422E+01	584	2.019E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.024E+01	626	1.838E+01	667	8.240E+00	708	2.372E+00	749	4.432E-01
586	2.029E+01	627	1.820E+01	668	7.960E+00	709	2.236E+00	750	4.216E-01
587	2.053E+01	628	1.797E+01	669	7.767E+00	710	2.102E+00	751	3.768E-01
588	2.065E+01	629	1.773E+01	670	7.536E+00	711	2.044E+00	752	3.881E-01
589	2.076E+01	630	1.748E+01	671	7.422E+00	712	1.953E+00	753	3.607E-01
590	2.087E+01	631	1.720E+01	672	7.209E+00	713	1.987E+00	754	3.396E-01
591	2.089E+01	632	1.696E+01	673	7.007E+00	714	1.876E+00	755	2.350E-01
592	2.109E+01	633	1.670E+01	674	6.784E+00	715	1.775E+00	756	3.333E-01
593	2.113E+01	634	1.644E+01	675	6.589E+00	716	1.670E+00	757	2.971E-01
594	2.118E+01	635	1.619E+01	676	6.408E+00	717	1.645E+00	758	6.090E-02
595	2.130E+01	636	1.598E+01	677	6.243E+00	718	1.561E+00	759	2.137E-01
596	2.139E+01	637	1.566E+01	678	6.007E+00	719	1.491E+00	760	1.388E-01
597	2.139E+01	638	1.547E+01	679	5.904E+00	720	1.475E+00	761	1.721E-01
598	2.140E+01	639	1.516E+01	680	5.691E+00	721	1.394E+00	762	2.583E-01
599	2.145E+01	640	1.495E+01	681	5.566E+00	722	1.383E+00	763	3.176E-01
600	2.151E+01	641	1.465E+01	682	5.383E+00	723	1.314E+00	764	1.643E-01
601	2.158E+01	642	1.440E+01	683	5.281E+00	724	1.159E+00	765	1.123E-01
602	2.154E+01	643	1.409E+01	684	5.073E+00	725	1.219E+00	766	1.266E-01
603	2.144E+01	644	1.383E+01	685	4.873E+00	726	1.174E+00	767	1.504E-01
604	2.147E+01	645	1.360E+01	686	4.810E+00	727	1.130E+00	768	2.852E-01
605	2.144E+01	646	1.335E+01	687	4.647E+00	728	1.071E+00	769	1.623E-01
606	2.140E+01	647	1.305E+01	688	4.537E+00	729	1.087E+00	770	6.220E-02
607	2.133E+01	648	1.279E+01	689	4.341E+00	730	1.045E+00	771	1.018E-01
608	2.132E+01	649	1.256E+01	690	4.200E+00	731	9.530E-01	772	1.852E-01
609	2.119E+01	650	1.230E+01	691	4.095E+00	732	1.027E+00	773	6.930E-02
610	2.115E+01	651	1.205E+01	692	3.975E+00	733	8.097E-01	774	1.007E-01
611	2.096E+01	652	1.182E+01	693	3.808E+00	734	8.198E-01	775	1.107E-01
612	2.086E+01	653	1.153E+01	694	3.689E+00	735	8.772E-01	776	7.910E-02
613	2.080E+01	654	1.120E+01	695	3.578E+00	736	7.571E-01	777	1.060E-01
614	2.068E+01	655	1.096E+01	696	3.416E+00	737	7.645E-01	778	1.291E-01
615	2.050E+01	656	1.074E+01	697	3.400E+00	738	6.407E-01	779	1.012E-01
616	2.035E+01	657	1.049E+01	698	3.284E+00	739	6.025E-01	780	8.350E-02
617	2.020E+01	658	1.024E+01	699	3.122E+00	740	6.256E-01		
618	2.002E+01	659	1.005E+01	700	3.007E+00	741	6.796E-01		
619	1.987E+01	660	9.788E+00	701	2.991E+00	742	6.158E-01		
620	1.968E+01	661	9.521E+00	702	2.834E+00	743	5.699E-01		
621	1.951E+01	662	9.318E+00	703	2.718E+00	744	4.063E-01		
622	1.923E+01	663	9.105E+00	704	2.632E+00	745	4.410E-01		
623	1.902E+01	664	8.841E+00	705	2.539E+00	746	3.089E-01		
624	1.886E+01	665	8.617E+00	706	2.455E+00	747	4.114E-01		
625	1.863E+01	666	8.390E+00	707	2.385E+00	748	4.015E-01		

CIE 1931xy Chromaticity Diagram



7-StepChromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

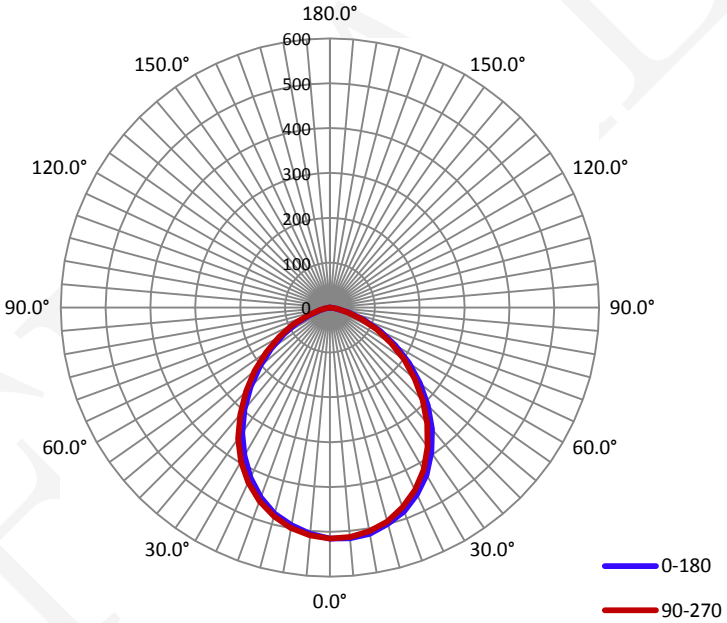
Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.0860	10.22	0.9920

Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	I_{max}(cd)	S/MH(C0/180)	S/MH(C90/270)
1148.5	112.43	517.5	1.18	1.18

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50%I_{max}):	94.5	94.7	94.6	94.5	94.6
Field Angle(10%I_{max}):	143.4	143.7	144.1	144.1	143.8

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	515	515	515	515	515	515	515	515
5.0°	516	518	517	516	513	512	510	510
10.0°	512	511	512	509	506	503	500	498
15.0°	500	501	500	498	494	488	484	481
20.0°	484	484	484	479	474	468	462	457
25.0°	460	461	460	455	449	441	432	426
30.0°	430	431	430	424	418	407	398	392
35.0°	394	396	395	389	379	370	360	352
40.0°	354	356	354	347	338	327	316	309
45.0°	309	312	310	302	293	282	271	263
50.0°	262	264	263	256	247	236	226	218
55.0°	215	218	216	210	202	192	182	174
60.0°	169	171	170	165	158	148	139	132
65.0°	124	126	126	121	115	107	99	92
70.0°	82	83	84	81	75	69	62	57
75.0°	45	47	46	44	41	36	32	29
80.0°	19	19	20	19	17	16	15	13
85.0°	7	8	8	7	6	6	5	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°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

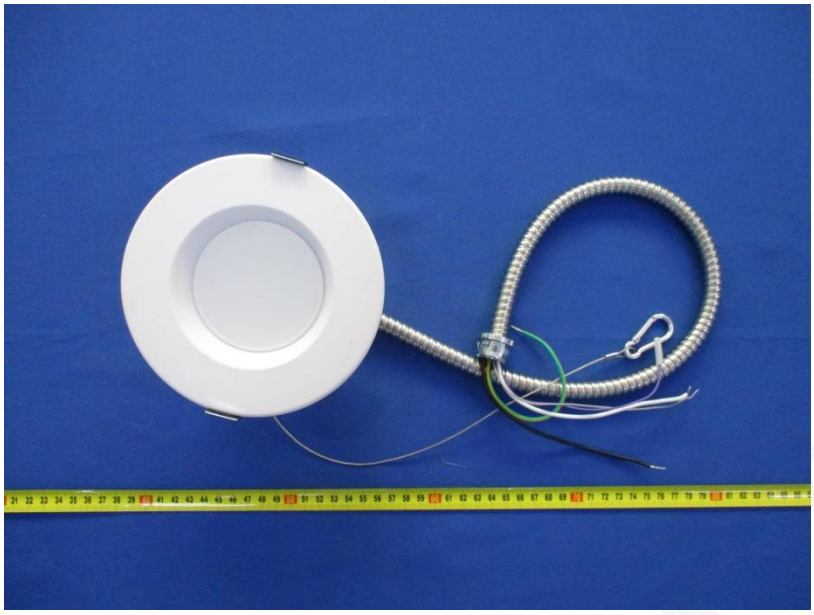
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	515	515	515	515	515	515	515	515
5.0°	506	508	508	509	510	511	513	515
10.0°	493	492	495	496	499	502	505	509
15.0°	476	474	477	479	482	486	491	496
20.0°	450	449	451	454	459	466	471	476
25.0°	419	418	421	425	430	438	444	452
30.0°	381	381	385	389	396	405	413	421
35.0°	341	340	343	347	356	365	375	384
40.0°	297	294	298	303	311	321	331	342
45.0°	250	249	252	256	264	276	286	295
50.0°	204	203	206	210	219	229	239	248
55.0°	160	159	161	165	174	183	192	201
60.0°	119	117	119	124	131	139	148	156
65.0°	81	79	81	85	92	99	106	113
70.0°	47	46	48	50	56	61	67	72
75.0°	22	22	23	24	27	30	34	38
80.0°	10	10	10	11	12	13	15	16
85.0°	0	0	0	0	1	3	4	5
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	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

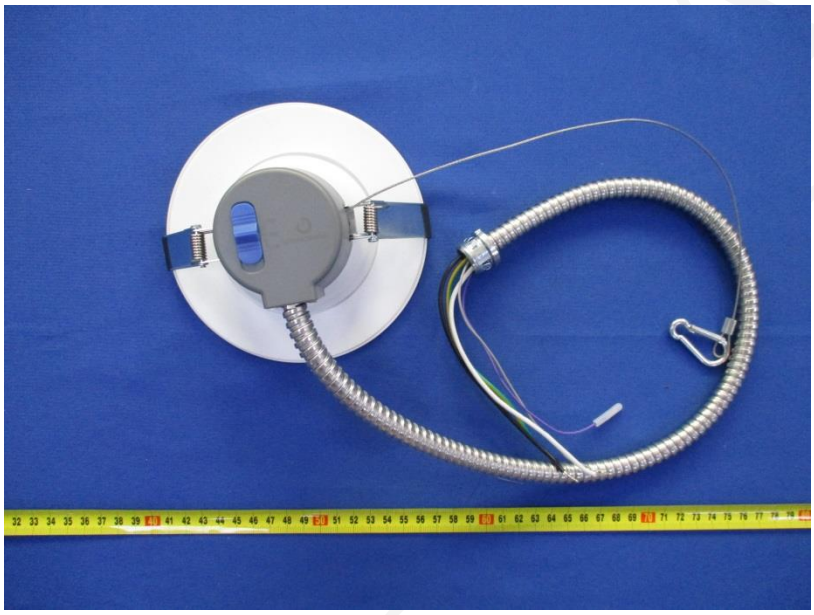
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	12.3	1.07
5-10	36.3	3.16
10-15	58.7	5.12
15-20	78.7	6.85
20-25	95.0	8.27
25-30	107.0	9.32
30-35	114.0	9.93
35-40	115.6	10.06
40-45	111.9	9.74
45-50	103.5	9.02
50-55	91.5	7.97
55-60	76.7	6.68
60-65	60.0	5.23
65-70	42.5	3.70
70-75	25.8	2.25
75-80	12.9	1.13
80-85	5.1	0.44
85-90	1.1	0.09
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	0.0	0.00
145-150	0.0	0.00
150-155	0.0	0.00
155-160	0.0	0.00
160-165	0.0	0.00
165-170	0.0	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	12.3	1.07
0-10	48.6	4.23
0-15	107.3	9.34
0-20	186.0	16.19
0-25	281.0	24.46
0-30	388.0	33.78
0-35	502.0	43.71
0-40	617.6	53.77
0-45	729.4	63.51
0-50	833.0	72.53
0-55	924.5	80.49
0-60	1001.1	87.17
0-65	1061.2	92.39
0-70	1103.7	96.09
0-75	1129.4	98.34
0-80	1142.4	99.47
0-85	1147.4	99.91
0-90	1148.5	100.00
0-95	1148.5	100.00
0-100	1148.5	100.00
0-105	1148.5	100.00
0-110	1148.5	100.00
0-115	1148.5	100.00
0-120	1148.5	100.00
0-125	1148.5	100.00
0-130	1148.5	100.00
0-135	1148.5	100.00
0-140	1148.5	100.00
0-145	1148.5	100.00
0-150	1148.5	100.00
0-155	1148.5	100.00
0-160	1148.5	100.00
0-165	1148.5	100.00
0-170	1148.5	100.00
0-175	1148.5	100.00
0-180	1148.5	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**********