IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai, China

Test Model: 12T5HE/3F/830/DIR

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du
Report Number:	RKS161013006-10
Test Date:	2016-10-15 to 2016-10-17
Report Date:	2016-10-18
Reviewed By:	Blake Zhang
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Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
Accreditation:	The IAS Accreditation Number TL-460.

Note: The test data was only valid for the test sample(s). 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. (Dongguan).
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1. Product Description

General Information:

Two samples were received on 2016-10-13 and used for testing with ballast,and only sample #1 was used for Photometric testing.

Model Tested:	12T5HE/3F/830/DIR
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	Integral LED Lamp
Burning Time Before Test:	0hour(For New Products)
Ballast:	ICN-2S28-N

Rated Values:

Rated Voltage/Frequency:	120 VAC 60Hz
Rated Power:	12W
Nominal CCT:	3000K
Nominal Lumen Output:	1420 lm
Nominal CRI:	80

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition (This method is not in IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	25～50°C	2016-03-10	2017-03-09
Spectral photometer	SENSING	SPR3000	90902027	350nm～800nm	2016-03-10	2017-03-09
Power Meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2016-03-04	2017-03-03
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50HZ	2016-03-04	2017-03-03
Standard Light Source	EVERFINE	D204	01331191	24V/100W	2016-08-27	2017-08-26
Thermal Meter	SENSING	N/A	N/A	25、50°C	2016-03-10	2017-03-09
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V， 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2016-03-10	2017-03-09
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2016-03-21	2017-03-20
Standard Light	EVERFINE	D908	1012003	N/A	2016-09-08	2017-09-07

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Source						

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) 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=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=32K (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=0.15% of rdg, Power U=0.20%) (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=1.6% (K=2) , at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_f, R_g was calculated according to IES TM-30-15 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.

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5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **0.5hour**

Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1189	14.05	0.9849	1516.6	107.94

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.660	2942	-0.00051	0.4404	0.4039	0.2529	0.5219

Color Rendering Index

Ra
83.6

R1	R2	R3	R4
83	92	96	82
R5	**R6**	**R7**	**R8**
83	92	82	60
R9	**R10**	**R11**	**R12**
13	83	81	74
R13	**R14**	**R15**	
85	99	75	

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Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	96

Spectral Power Distribution Comparison

Plot of R_g versus R_f

Chroma Shift by Hue
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue Bin

R_f by Hue
100
95
90
85
80
75
70
65
60
55
50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue Bin

Color Vector Graphic
Refenerce Illuminat
Test Source

Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
CES15
CES17
CES19
CES21
CES23
CES25
CES27
CES29
CES31
CES33
CES35
CES37
CES39
CES41
CES43
CES45
CES47
CES49
CES51
CES53
CES55
CES57
CES59
CES61
CES63
CES65
CES67
CES69
CES71
CES73
CES75
CES77
CES79
CES81
CES83
CES85
CES87
CES89
CES91
CES93
CES95
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

Relative Spectral Power Distribution

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.950E-02	421	4.610E-01	462	1.163E+01	503	1.025E+01	544	1.733E+01
381	2.510E-02	422	5.238E-01	463	1.106E+01	504	1.060E+01	545	1.754E+01
382	2.100E-02	423	6.316E-01	464	1.080E+01	505	1.093E+01	546	1.776E+01
383	2.890E-02	424	7.132E-01	465	1.033E+01	506	1.125E+01	547	1.777E+01
384	2.580E-02	425	8.066E-01	466	1.010E+01	507	1.140E+01	548	1.800E+01
385	1.150E-02	426	9.639E-01	467	9.642E+00	508	1.171E+01	549	1.826E+01
386	1.850E-02	427	1.101E+00	468	9.398E+00	509	1.183E+01	550	1.829E+01
387	1.900E-02	428	1.292E+00	469	8.922E+00	510	1.214E+01	551	1.852E+01
388	1.870E-02	429	1.446E+00	470	8.641E+00	511	1.243E+01	552	1.880E+01
389	2.300E-02	430	1.608E+00	471	8.175E+00	512	1.271E+01	553	1.907E+01
390	2.040E-02	431	1.864E+00	472	7.899E+00	513	1.281E+01	554	1.914E+01
391	1.120E-02	432	2.077E+00	473	7.457E+00	514	1.306E+01	555	1.941E+01
392	7.700E-03	433	2.381E+00	474	7.192E+00	515	1.315E+01	556	1.970E+01
393	9.200E-03	434	2.633E+00	475	6.815E+00	516	1.342E+01	557	1.979E+01
394	1.490E-02	435	3.025E+00	476	6.641E+00	517	1.366E+01	558	2.027E+01
395	1.830E-02	436	3.350E+00	477	6.507E+00	518	1.388E+01	559	2.038E+01
396	1.500E-02	437	3.710E+00	478	6.291E+00	519	1.394E+01	560	2.069E+01
397	1.110E-02	438	4.245E+00	479	6.244E+00	520	1.416E+01	561	2.104E+01
398	8.300E-03	439	4.713E+00	480	6.113E+00	521	1.416E+01	562	2.118E+01
399	5.000E-03	440	5.434E+00	481	6.133E+00	522	1.436E+01	563	2.151E+01
400	1.650E-02	441	6.075E+00	482	6.165E+00	523	1.455E+01	564	2.184E+01
401	1.810E-02	442	7.030E+00	483	6.113E+00	524	1.474E+01	565	2.217E+01
402	1.500E-02	443	7.882E+00	484	6.214E+00	525	1.475E+01	566	2.252E+01
403	1.750E-02	444	9.071E+00	485	6.220E+00	526	1.493E+01	567	2.288E+01
404	2.230E-02	445	1.006E+01	486	6.354E+00	527	1.511E+01	568	2.303E+01
405	2.620E-02	446	1.140E+01	487	6.391E+00	528	1.530E+01	569	2.340E+01
406	3.380E-02	447	1.240E+01	488	6.575E+00	529	1.529E+01	570	2.356E+01
407	3.870E-02	448	1.375E+01	489	6.776E+00	530	1.546E+01	571	2.392E+01
408	3.890E-02	449	1.458E+01	490	6.867E+00	531	1.564E+01	572	2.430E+01
409	6.490E-02	450	1.563E+01	491	7.108E+00	532	1.562E+01	573	2.467E+01
410	7.610E-02	451	1.600E+01	492	7.370E+00	533	1.580E+01	574	2.503E+01
411	7.630E-02	452	1.654E+01	493	7.519E+00	534	1.597E+01	575	2.540E+01
412	8.080E-02	453	1.639E+01	494	7.805E+00	535	1.595E+01	576	2.555E+01
413	1.010E-01	454	1.641E+01	495	7.970E+00	536	1.613E+01	577	2.595E+01
414	1.280E-01	455	1.579E+01	496	8.272E+00	537	1.632E+01	578	2.635E+01
415	1.436E-01	456	1.542E+01	497	8.603E+00	538	1.634E+01	579	2.671E+01
416	1.771E-01	457	1.455E+01	498	8.802E+00	539	1.672E+01	580	2.704E+01
417	2.125E-01	458	1.403E+01	499	9.153E+00	540	1.672E+01	581	2.714E+01
418	2.613E-01	459	1.317E+01	500	9.509E+00	541	1.691E+01	582	2.748E+01
419	3.171E-01	460	1.271E+01	501	9.709E+00	542	1.693E+01	583	2.784E+01
420	3.732E-01	461	1.198E+01	502	1.007E+01	543	1.713E+01	584	2.795E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.826E+01	626	2.818E+01	667	1.307E+01	708	3.901E+00	749	7.475E-01
586	2.859E+01	627	2.791E+01	668	1.274E+01	709	3.731E+00	750	7.505E-01
587	2.892E+01	628	2.763E+01	669	1.243E+01	710	3.599E+00	751	7.574E-01
588	2.924E+01	629	2.734E+01	670	1.207E+01	711	3.477E+00	752	7.354E-01
589	2.932E+01	630	2.703E+01	671	1.178E+01	712	3.384E+00	753	6.750E-01
590	2.960E+01	631	2.657E+01	672	1.147E+01	713	3.262E+00	754	6.239E-01
591	2.989E+01	632	2.628E+01	673	1.116E+01	714	3.146E+00	755	6.094E-01
592	3.016E+01	633	2.596E+01	674	1.083E+01	715	3.038E+00	756	6.033E-01
593	3.019E+01	634	2.565E+01	675	1.056E+01	716	2.919E+00	757	4.741E-01
594	3.044E+01	635	2.520E+01	676	1.029E+01	717	2.840E+00	758	4.358E-01
595	3.067E+01	636	2.489E+01	677	9.945E+00	718	2.735E+00	759	4.405E-01
596	3.088E+01	637	2.456E+01	678	9.681E+00	719	2.628E+00	760	4.093E-01
597	3.083E+01	638	2.419E+01	679	9.443E+00	720	2.535E+00	761	4.397E-01
598	3.098E+01	639	2.368E+01	680	9.150E+00	721	2.439E+00	762	4.712E-01
599	3.116E+01	640	2.333E+01	681	8.953E+00	722	2.377E+00	763	4.636E-01
600	3.134E+01	641	2.284E+01	682	8.692E+00	723	2.261E+00	764	3.901E-01
601	3.149E+01	642	2.250E+01	683	8.456E+00	724	2.182E+00	765	3.582E-01
602	3.138E+01	643	2.229E+01	684	8.196E+00	725	2.127E+00	766	3.478E-01
603	3.149E+01	644	2.177E+01	685	7.918E+00	726	2.020E+00	767	3.590E-01
604	3.159E+01	645	2.140E+01	686	7.687E+00	727	1.950E+00	768	3.284E-01
605	3.164E+01	646	2.105E+01	687	7.505E+00	728	1.887E+00	769	2.912E-01
606	3.143E+01	647	2.068E+01	688	7.284E+00	729	1.846E+00	770	2.539E-01
607	3.149E+01	648	2.019E+01	689	7.063E+00	730	1.763E+00	771	2.654E-01
608	3.153E+01	649	1.981E+01	690	6.854E+00	731	1.701E+00	772	2.848E-01
609	3.152E+01	650	1.945E+01	691	6.639E+00	732	1.633E+00	773	2.543E-01
610	3.148E+01	651	1.909E+01	692	6.457E+00	733	1.548E+00	774	2.310E-01
611	3.117E+01	652	1.864E+01	693	6.239E+00	734	1.480E+00	775	2.438E-01
612	3.113E+01	653	1.827E+01	694	6.070E+00	735	1.413E+00	776	2.190E-01
613	3.106E+01	654	1.788E+01	695	5.852E+00	736	1.357E+00	777	2.183E-01
614	3.094E+01	655	1.742E+01	696	5.690E+00	737	1.285E+00	778	1.925E-01
615	3.082E+01	656	1.715E+01	697	5.539E+00	738	1.219E+00	779	1.915E-01
616	3.050E+01	657	1.670E+01	698	5.342E+00	739	1.173E+00	780	1.792E-01
617	3.038E+01	658	1.635E+01	699	5.167E+00	740	1.158E+00		
618	3.022E+01	659	1.589E+01	700	5.022E+00	741	1.125E+00		
619	3.005E+01	660	1.554E+01	701	4.894E+00	742	1.085E+00		
620	2.986E+01	661	1.519E+01	702	4.708E+00	743	9.945E-01		
621	2.950E+01	662	1.484E+01	703	4.572E+00	744	9.233E-01		
622	2.929E+01	663	1.442E+01	704	4.418E+00	745	8.776E-01		
623	2.906E+01	664	1.409E+01	705	4.272E+00	746	8.258E-01		
624	2.886E+01	665	1.377E+01	706	4.153E+00	747	8.146E-01		
625	2.844E+01	666	1.338E+01	707	4.026E+00	748	7.932E-01		

CIE 1931 x y Chromaticity Diagram

7-Step Chromaticity Quadrangles

[Goniophotometer System]

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

Test orientation: **Downward**

Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1165	13.92	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1521.3	109.29	488.9	1.21	1.28

Luminous Intensity Distribution

	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	102.9	112.6	118.2	112.8	111.6
Field Angle (10% I_{max}):	155.1	178.5	182.6	178.4	173.7

Luminous Intensity (cd) Distribution Data

γ \ C	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	489	489	489	489	489	489	489	489
5.0°	486	486	487	487	488	488	488	488
10.0°	478	479	480	482	483	483	482	482
15.0°	465	467	469	472	474	474	473	471
20.0°	447	450	454	459	461	461	458	454
25.0°	424	429	434	441	445	444	439	433
30.0°	398	403	411	420	425	423	417	409
35.0°	367	374	384	395	402	399	391	379
40.0°	332	341	355	367	377	373	363	347
45.0°	294	305	323	337	346	342	331	311
50.0°	255	268	289	304	313	309	297	274
55.0°	215	230	254	269	278	273	261	235
60.0°	175	191	217	231	240	236	224	196
65.0°	135	153	180	193	202	198	186	158
70.0°	99	119	144	158	165	162	150	123
75.0°	65	88	112	125	131	128	117	91
80.0°	34	61	85	96	100	98	89	64
85.0°	11	41	63	71	74	74	66	42
90.0°	1	27	46	52	54	54	49	28
95.0°	0	18	35	40	40	40	36	18
100.0°	0	13	27	31	31	32	28	13
105.0°	0	10	22	25	26	25	22	10
110.0°	1	9	18	21	22	21	19	9
115.0°	1	8	16	18	20	19	17	8
120.0°	1	7	14	16	17	16	14	7
125.0°	1	6	12	15	15	15	12	5
130.0°	1	4	11	13	14	13	11	3
135.0°	1	3	10	12	13	12	10	2
140.0°	1	3	9	11	12	11	8	2
145.0°	2	3	7	10	10	10	6	2
150.0°	2	3	4	8	9	8	4	2
155.0°	2	3	3	5	6	5	3	2
160.0°	2	3	3	4	4	3	3	2
165.0°	2	3	3	3	3	3	3	2
170.0°	2	3	3	3	3	3	2	2
175.0°	2	2	3	3	3	2	2	2
180.0°	0	0	0	0	0	0	0	0

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Luminous Intensity (cd) Distribution Data (cont.)

γ \ C	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	489	489	489	489	489	489	489	489
5.0°	487	487	486	486	486	486	485	485
10.0°	480	480	480	480	480	479	478	477
15.0°	468	468	470	472	472	471	467	464
20.0°	450	452	456	460	459	457	452	446
25.0°	428	431	437	442	442	439	433	424
30.0°	401	406	414	421	420	417	409	399
35.0°	370	377	387	395	397	391	382	370
40.0°	335	345	356	368	371	365	352	337
45.0°	297	309	324	337	341	333	319	301
50.0°	258	271	290	303	307	299	285	263
55.0°	216	232	254	268	272	264	249	224
60.0°	176	192	218	231	236	227	212	185
65.0°	137	154	182	194	199	191	176	148
70.0°	99	119	146	158	162	155	141	114
75.0°	65	88	114	124	126	121	109	84
80.0°	33	61	86	94	96	92	82	58
85.0°	9	41	63	70	70	67	61	38
90.0°	1	27	46	51	51	49	44	25
95.0°	1	17	35	38	38	37	33	17
100.0°	1	12	26	30	29	28	25	12
105.0°	1	9	21	24	23	23	20	9
110.0°	1	8	17	20	19	19	17	8
115.0°	1	7	14	17	17	16	14	7
120.0°	1	7	12	14	15	14	12	7
125.0°	1	7	11	13	13	13	11	7
130.0°	1	6	10	12	12	11	10	6
135.0°	1	5	9	11	11	10	9	5
140.0°	2	5	9	10	10	10	9	5
145.0°	2	5	8	9	10	9	8	5
150.0°	2	4	6	9	9	9	7	4
155.0°	2	3	6	7	7	7	6	3
160.0°	2	2	4	6	6	6	5	2
165.0°	2	2	3	5	5	5	4	2
170.0°	2	2	2	3	3	3	2	2
175.0°	2	2	2	2	2	2	2	2
180.0°	0	0	0	0	0	0	0	0

FINAL

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	11.7	0.77
5-10	34.6	2.27
10-15	56.3	3.70
15-20	76.2	5.01
20-25	93.3	6.14
25-30	107.2	7.05
30-35	117.4	7.72
35-40	123.5	8.12
40-45	125.4	8.24
45-50	122.9	8.08
50-55	116.5	7.66
55-60	106.6	7.00
60-65	93.8	6.16
65-70	79.1	5.20
70-75	63.7	4.19
75-80	48.8	3.21
80-85	35.5	2.33
85-90	25.1	1.65
90-95	17.9	1.18
95-100	13.2	0.87
100-105	10.1	0.67
105-110	8.1	0.53
110-115	6.7	0.44
115-120	5.6	0.37
120-125	4.7	0.31
125-130	4.0	0.26
130-135	3.3	0.22
135-140	2.8	0.18
140-145	2.3	0.15
145-150	1.8	0.12
150-155	1.3	0.08
155-160	0.8	0.05
160-165	0.6	0.04
165-170	0.3	0.02
170-175	0.2	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	11.7	0.77
0-10	46.2	3.04
0-15	102.6	6.74
0-20	178.8	11.75
0-25	272.1	17.89
0-30	379.3	24.94
0-35	496.7	32.65
0-40	620.2	40.77
0-45	745.6	49.01
0-50	868.5	57.09
0-55	985.1	64.75
0-60	1091.6	71.76
0-65	1185.4	77.92
0-70	1264.5	83.12
0-75	1328.2	87.31
0-80	1377.0	90.51
0-85	1412.5	92.85
0-90	1437.6	94.50
0-95	1455.5	95.67
0-100	1468.7	96.54
0-105	1478.8	97.21
0-110	1486.9	97.74
0-115	1493.6	98.18
0-120	1499.2	98.55
0-125	1503.9	98.86
0-130	1507.9	99.12
0-135	1511.3	99.34
0-140	1514.1	99.52
0-145	1516.4	99.67
0-150	1518.1	99.79
0-155	1519.4	99.87
0-160	1520.2	99.93
0-165	1520.8	99.96
0-170	1521.1	99.99
0-175	1521.3	100.00
0-180	1521.3	100.00

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6. Product Photo

7. Product Test orientation in the Goniophotometer

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

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