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/835/DIR

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du
Report Number:	RKS161013007-10
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.

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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/835/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:	3500K
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	0.1186	13.99	0.9831	1549.4	110.75

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.781	3490	-0.00235	0.4034	0.3845	0.2371	0.5084

Color Rendering Index

Ra
85.2

R1	R2	R3	R4
84	92	96	84
R5	R6	R7	R8
85	89	85	66
R9	R10	R11	R12
20	81	83	69
R13	R14	R15	
86	98	79	

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Fidelity Index and Gamut Index

Fidelity Index R_f	84
Gamut Index R_g	97

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

Rf 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
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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	3.920E-02	421	7.875E-01	462	1.596E+01	503	1.217E+01	544	1.944E+01
381	3.720E-02	422	8.993E-01	463	1.510E+01	504	1.257E+01	545	1.964E+01
382	2.620E-02	423	1.086E+00	464	1.469E+01	505	1.295E+01	546	1.985E+01
383	2.740E-02	424	1.244E+00	465	1.396E+01	506	1.333E+01	547	1.985E+01
384	2.930E-02	425	1.423E+00	466	1.359E+01	507	1.350E+01	548	2.008E+01
385	1.710E-02	426	1.684E+00	467	1.288E+01	508	1.386E+01	549	2.029E+01
386	2.460E-02	427	1.908E+00	468	1.245E+01	509	1.399E+01	550	2.027E+01
387	2.620E-02	428	2.233E+00	469	1.171E+01	510	1.433E+01	551	2.047E+01
388	2.050E-02	429	2.498E+00	470	1.122E+01	511	1.468E+01	552	2.071E+01
389	2.320E-02	430	2.779E+00	471	1.049E+01	512	1.499E+01	553	2.093E+01
390	2.160E-02	431	3.207E+00	472	1.003E+01	513	1.508E+01	554	2.093E+01
391	1.080E-02	432	3.550E+00	473	9.395E+00	514	1.538E+01	555	2.116E+01
392	1.070E-02	433	4.070E+00	474	9.004E+00	515	1.545E+01	556	2.140E+01
393	1.570E-02	434	4.485E+00	475	8.490E+00	516	1.573E+01	557	2.142E+01
394	2.100E-02	435	5.139E+00	476	8.232E+00	517	1.599E+01	558	2.187E+01
395	2.760E-02	436	5.675E+00	477	8.046E+00	518	1.624E+01	559	2.189E+01
396	2.330E-02	437	6.259E+00	478	7.765E+00	519	1.627E+01	560	2.214E+01
397	1.800E-02	438	7.165E+00	479	7.677E+00	520	1.651E+01	561	2.240E+01
398	1.350E-02	439	7.973E+00	480	7.483E+00	521	1.650E+01	562	2.245E+01
399	7.700E-03	440	9.203E+00	481	7.486E+00	522	1.672E+01	563	2.270E+01
400	1.780E-02	441	1.027E+01	482	7.532E+00	523	1.691E+01	564	2.297E+01
401	2.450E-02	442	1.187E+01	483	7.465E+00	524	1.709E+01	565	2.321E+01
402	2.760E-02	443	1.328E+01	484	7.565E+00	525	1.709E+01	566	2.348E+01
403	2.730E-02	444	1.528E+01	485	7.553E+00	526	1.729E+01	567	2.375E+01
404	3.420E-02	445	1.691E+01	486	7.704E+00	527	1.748E+01	568	2.380E+01
405	4.120E-02	446	1.907E+01	487	7.731E+00	528	1.767E+01	569	2.407E+01
406	4.440E-02	447	2.060E+01	488	7.926E+00	529	1.764E+01	570	2.411E+01
407	4.950E-02	448	2.264E+01	489	8.158E+00	530	1.780E+01	571	2.437E+01
408	4.940E-02	449	2.376E+01	490	8.258E+00	531	1.799E+01	572	2.464E+01
409	7.940E-02	450	2.511E+01	491	8.528E+00	532	1.796E+01	573	2.490E+01
410	1.045E-01	451	2.536E+01	492	8.825E+00	533	1.813E+01	574	2.516E+01
411	1.251E-01	452	2.581E+01	493	9.000E+00	534	1.830E+01	575	2.542E+01
412	1.432E-01	453	2.513E+01	494	9.352E+00	535	1.826E+01	576	2.546E+01
413	1.711E-01	454	2.470E+01	495	9.563E+00	536	1.844E+01	577	2.570E+01
414	2.128E-01	455	2.335E+01	496	9.941E+00	537	1.861E+01	578	2.596E+01
415	2.514E-01	456	2.242E+01	497	1.032E+01	538	1.858E+01	579	2.621E+01
416	3.193E-01	457	2.082E+01	498	1.056E+01	539	1.898E+01	580	2.644E+01
417	3.763E-01	458	1.980E+01	499	1.097E+01	540	1.894E+01	581	2.645E+01
418	4.467E-01	459	1.841E+01	500	1.137E+01	541	1.911E+01	582	2.668E+01
419	5.501E-01	460	1.762E+01	501	1.157E+01	542	1.907E+01	583	2.692E+01
420	6.454E-01	461	1.651E+01	502	1.197E+01	543	1.926E+01	584	2.693E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.713E+01	626	2.487E+01	667	1.137E+01	708	3.388E+00	749	6.708E-01
586	2.734E+01	627	2.462E+01	668	1.109E+01	709	3.252E+00	750	6.588E-01
587	2.758E+01	628	2.436E+01	669	1.081E+01	710	3.128E+00	751	6.504E-01
588	2.779E+01	629	2.409E+01	670	1.050E+01	711	3.020E+00	752	6.293E-01
589	2.775E+01	630	2.380E+01	671	1.025E+01	712	2.945E+00	753	5.790E-01
590	2.792E+01	631	2.339E+01	672	9.970E+00	713	2.834E+00	754	5.421E-01
591	2.810E+01	632	2.314E+01	673	9.711E+00	714	2.722E+00	755	5.349E-01
592	2.828E+01	633	2.285E+01	674	9.410E+00	715	2.613E+00	756	5.216E-01
593	2.820E+01	634	2.255E+01	675	9.179E+00	716	2.518E+00	757	4.061E-01
594	2.833E+01	635	2.211E+01	676	8.943E+00	717	2.439E+00	758	3.589E-01
595	2.847E+01	636	2.180E+01	677	8.648E+00	718	2.346E+00	759	3.643E-01
596	2.861E+01	637	2.149E+01	678	8.424E+00	719	2.268E+00	760	3.362E-01
597	2.849E+01	638	2.118E+01	679	8.216E+00	720	2.201E+00	761	3.690E-01
598	2.858E+01	639	2.075E+01	680	7.967E+00	721	2.119E+00	762	4.021E-01
599	2.867E+01	640	2.044E+01	681	7.795E+00	722	2.055E+00	763	4.107E-01
600	2.876E+01	641	2.000E+01	682	7.558E+00	723	1.965E+00	764	3.460E-01
601	2.883E+01	642	1.968E+01	683	7.349E+00	724	1.882E+00	765	2.946E-01
602	2.866E+01	643	1.950E+01	684	7.139E+00	725	1.813E+00	766	2.924E-01
603	2.867E+01	644	1.905E+01	685	6.904E+00	726	1.733E+00	767	3.205E-01
604	2.870E+01	645	1.870E+01	686	6.694E+00	727	1.674E+00	768	3.246E-01
605	2.871E+01	646	1.837E+01	687	6.529E+00	728	1.628E+00	769	2.790E-01
606	2.848E+01	647	1.806E+01	688	6.319E+00	729	1.599E+00	770	2.356E-01
607	2.845E+01	648	1.764E+01	689	6.126E+00	730	1.544E+00	771	2.353E-01
608	2.840E+01	649	1.730E+01	690	5.950E+00	731	1.504E+00	772	2.451E-01
609	2.837E+01	650	1.698E+01	691	5.768E+00	732	1.416E+00	773	2.330E-01
610	2.829E+01	651	1.665E+01	692	5.623E+00	733	1.344E+00	774	2.153E-01
611	2.799E+01	652	1.624E+01	693	5.441E+00	734	1.318E+00	775	2.222E-01
612	2.791E+01	653	1.591E+01	694	5.277E+00	735	1.237E+00	776	2.022E-01
613	2.780E+01	654	1.558E+01	695	5.090E+00	736	1.158E+00	777	1.897E-01
614	2.767E+01	655	1.519E+01	696	4.955E+00	737	1.085E+00	778	1.748E-01
615	2.754E+01	656	1.494E+01	697	4.835E+00	738	1.048E+00	779	1.682E-01
616	2.721E+01	657	1.454E+01	698	4.648E+00	739	1.016E+00	780	1.386E-01
617	2.707E+01	658	1.424E+01	699	4.500E+00	740	9.977E-01		
618	2.691E+01	659	1.386E+01	700	4.381E+00	741	9.738E-01		
619	2.671E+01	660	1.355E+01	701	4.250E+00	742	9.459E-01		
620	2.651E+01	661	1.324E+01	702	4.075E+00	743	8.689E-01		
621	2.614E+01	662	1.293E+01	703	3.959E+00	744	8.199E-01		
622	2.593E+01	663	1.257E+01	704	3.825E+00	745	7.571E-01		
623	2.572E+01	664	1.229E+01	705	3.694E+00	746	6.934E-01		
624	2.551E+01	665	1.200E+01	706	3.588E+00	747	6.928E-01		
625	2.511E+01	666	1.165E+01	707	3.483E+00	748	6.894E-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	0.1192	14.02	0.9801

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1555.3	110.93	499.0	1.22	1.28

Luminous Intensity Distribution

	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	103.0	112.7	118.1	112.9	111.7
Field Angle (10% I_{max}):	155.2	178.6	182.5	178.6	173.7

Luminous Intensity (cd) Distribution Data

γ \ C	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	499	499	499	499	499	499	499	499
5.0°	497	497	497	497	497	497	496	496
10.0°	490	490	490	492	492	491	490	489
15.0°	478	479	480	482	482	481	479	476
20.0°	461	462	465	468	469	467	463	459
25.0°	439	442	445	451	452	449	443	437
30.0°	412	417	422	429	431	427	420	411
35.0°	381	387	395	403	407	402	392	381
40.0°	347	354	365	374	379	373	362	347
45.0°	308	318	332	342	347	341	328	310
50.0°	267	279	297	307	313	306	293	272
55.0°	226	239	261	271	276	269	256	231
60.0°	184	199	223	232	237	230	217	192
65.0°	144	161	185	194	198	192	179	154
70.0°	105	124	148	158	162	156	143	119
75.0°	69	92	116	126	128	122	111	87
80.0°	37	64	88	96	97	93	84	61
85.0°	11	43	65	71	71	70	62	40
90.0°	1	29	48	52	52	51	46	26
95.0°	0	19	36	40	39	38	34	17
100.0°	0	13	28	31	31	31	27	12
105.0°	0	10	22	25	25	25	22	10
110.0°	1	9	19	21	21	21	18	8
115.0°	1	8	17	19	20	19	16	8
120.0°	1	7	14	17	17	16	14	6
125.0°	1	6	13	15	15	15	13	5
130.0°	1	4	12	14	14	14	11	3
135.0°	1	3	10	13	13	13	10	3
140.0°	1	3	9	12	12	11	9	2
145.0°	2	3	7	10	11	10	6	3
150.0°	2	3	5	8	9	8	4	3
155.0°	2	3	4	5	6	5	3	3
160.0°	2	3	3	4	4	4	3	3
165.0°	2	3	3	3	3	3	3	2
170.0°	2	3	3	3	3	3	3	2
175.0°	2	3	3	3	3	3	3	3
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°	499	499	499	499	499	499	499	499
5.0°	495	497	497	497	497	497	497	497
10.0°	488	489	490	491	491	491	491	490
15.0°	474	476	479	482	483	483	480	478
20.0°	456	459	464	470	471	471	466	461
25.0°	432	437	445	453	454	454	448	439
30.0°	404	411	421	431	434	432	425	414
35.0°	372	382	394	405	409	406	399	386
40.0°	337	348	363	377	384	380	369	353
45.0°	297	311	329	346	354	349	335	317
50.0°	257	272	295	312	321	315	301	278
55.0°	215	233	259	277	285	280	265	238
60.0°	174	193	222	239	248	242	228	198
65.0°	135	155	185	201	210	205	190	159
70.0°	98	119	149	164	171	168	154	123
75.0°	63	88	116	129	135	132	121	91
80.0°	33	62	87	99	103	101	91	64
85.0°	9	41	64	73	76	75	68	43
90.0°	1	27	47	53	55	55	49	28
95.0°	1	18	35	40	41	41	37	18
100.0°	1	13	27	31	31	31	28	13
105.0°	1	10	21	25	25	25	22	10
110.0°	1	8	18	20	21	20	18	8
115.0°	1	7	15	17	18	17	15	8
120.0°	1	7	13	15	15	15	13	7
125.0°	1	7	11	13	14	13	12	7
130.0°	1	6	10	12	12	12	11	6
135.0°	1	6	10	11	11	11	10	6
140.0°	2	5	9	10	11	10	9	5
145.0°	2	5	8	10	10	10	9	5
150.0°	2	4	7	9	10	9	7	4
155.0°	2	3	6	7	8	7	6	3
160.0°	2	2	5	6	7	6	5	2
165.0°	2	2	3	5	6	5	4	2
170.0°	2	3	2	3	4	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	11.9	0.77
5-10	35.3	2.27
10-15	57.5	3.70
15-20	77.8	5.00
20-25	95.4	6.13
25-30	109.6	7.05
30-35	120.0	7.72
35-40	126.3	8.12
40-45	128.2	8.24
45-50	125.7	8.08
50-55	119.1	7.66
55-60	108.8	7.00
60-65	95.8	6.16
65-70	80.8	5.20
70-75	65.1	4.18
75-80	49.9	3.21
80-85	36.3	2.34
85-90	25.7	1.65
90-95	18.3	1.18
95-100	13.6	0.87
100-105	10.4	0.67
105-110	8.3	0.53
110-115	6.9	0.44
115-120	5.8	0.37
120-125	4.9	0.31
125-130	4.1	0.27
130-135	3.5	0.22
135-140	2.9	0.19
140-145	2.4	0.15
145-150	1.9	0.12
150-155	1.3	0.08
155-160	0.9	0.06
160-165	0.6	0.04
165-170	0.4	0.02
170-175	0.2	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	11.9	0.77
0-10	47.2	3.04
0-15	104.7	6.73
0-20	182.5	11.74
0-25	277.9	17.87
0-30	387.5	24.91
0-35	507.5	32.63
0-40	633.8	40.75
0-45	761.9	48.99
0-50	887.6	57.07
0-55	1006.7	64.73
0-60	1115.5	71.72
0-65	1211.3	77.88
0-70	1292.1	83.08
0-75	1357.2	87.26
0-80	1407.1	90.47
0-85	1443.4	92.81
0-90	1469.1	94.46
0-95	1487.4	95.63
0-100	1501.0	96.51
0-105	1511.4	97.17
0-110	1519.7	97.71
0-115	1526.6	98.15
0-120	1532.4	98.53
0-125	1537.2	98.84
0-130	1541.4	99.10
0-135	1544.8	99.33
0-140	1547.7	99.51
0-145	1550.1	99.67
0-150	1552.0	99.79
0-155	1553.3	99.87
0-160	1554.1	99.93
0-165	1554.7	99.96
0-170	1555.1	99.99
0-175	1555.3	100.00
0-180	1555.3	100.00

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6. Product Photo

7. Product Test orientation in the Goniophotometer

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

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